





Components Catalogue

Contents

OMRON



| Welcome | 7 - 8 |
|---|-----------|
| POWER RELAYS | 9 - 156 |
| Technical Information – Power & Signal Relays | 9 - 28 |
| Selection Guide | 29 - 40 |
| G5B | 41 - 44 |
| G5NB-E | 45 - 48 |
| G5SB | 49 - 52 |
| G6M | 53 - 56 |
| G6D | 57 - 60 |
| G6B | 61 - 67 |
| G2RG | 68 - 71 |
| G5Q-EU | 72 - 75 |
| G6RN | 76 - 79 |
| G5LE | 80 - 84 |
| G5LC-EU | 85 - 88 |
| G5C(E) | 89 - 92 |
| G6C | 93 -101 |
| <u>G2R</u> | 102 - 122 |
| G2RL | 123 - 127 |
| G4W | 128 - 132 |
| G8P | 133 - 138 |
| G4A | 139 - 142 |
| G9EA-1 | 143 - 149 |
| G9EC-1 | 150 - 156 |



| SIGNAL RELAYS | 157 -273 |
|-----------------|-----------|
| Selection Guide | 157 - 165 |
| G5V-1 | 166 - 168 |
| G2E | 169 - 172 |
| G6E | 173 - 177 |
| G6L | 178 - 186 |
| G6H | 187 - 192 |
| G6J | 193 - 202 |
| G6K | 203 - 212 |
| G6S | 213 - 221 |
| G5A | 222 - 225 |
| G5V-2 | 226 - 230 |
| G6A | 231 - 239 |
| G6Y | 240 - 245 |
| G6K(U)-RF | 246 - 249 |
| G6Z | 250 - 265 |
| G6W | 266 - 273 |

Contents



| AUTOMOTIVE RELAYS | 274 - 313 |
|-------------------|-----------|
| Selection Guide | 274 - 277 |
| G8N-1 | 278 - 282 |
| G8ND-2 | 283 - 287 |
| G8NW | 288 - 292 |
| G8QN | 293 - 294 |
| G8SN | 295 - 296 |
| G8SE | 297 - 298 |
| G8HN-J | 299 - 304 |
| G8HL | 305 - 309 |
| G8JN | 310 - 311 |
| G8JR | 312 - 313 |



| SOLID STATE RELAYS | 314 - 347 |
|-----------------------|-----------|
| Technical Information | 314 - 318 |
| Selection Guide | 319 - 323 |
| G3R/G3RD | 324 - 327 |
| G3M | 328 - 331 |
| G3MB | 332 - 334 |
| G3MC | 335 - 339 |
| G3S/G3SD | 340 - 343 |
| G3DZ | 344 - 347 |



| 348 - 433 |
|-----------|
| 348 - 351 |
| 352 - 357 |
| 358 - 359 |
| 360 - 361 |
| 362 - 363 |
| 364 - 365 |
| 366 - 367 |
| 368 - 369 |
| 370 - 371 |
| 372 - 373 |
| 374 - 375 |
| 376 - 377 |
| 378 - 379 |
| 380 - 381 |
| 382 - 384 |
| 385 - 386 |
| |

OMRON

Contents

G3VM-3(F)L

G3VM-353B/E

G3VM-401B/E

G3VM-401BY/EY

G3VM-601BY/EY

G3VM-4N(F)

G3VM-61H1 G3VM-201H1

G3VM-351H

G3VM-353H G3VM-401H

G3VM-62C1/F1 G3VM-352C/F

G3VM-W(F)L

G3VM-354C/F

G3VM-355C/F

G3VM-402C/F

G3VM-62J1

G3VM-202J1

G3VM-352J

G3VM-354J

G3VM-355J

G3VM-402J

OMRON

387 - 388

389 - 390

391 - 392

393 - 395

396 - 397

398 - 399 400 - 401

402 - 403

404 - 405 406 - 407

408 - 409 410 - 411

412 - 413

414 - 415

416 - 417

418 - 419

420 - 421

422 - 423

424 - 425

426 - 427

428 - 429

430 - 431

432 - 433

Contents

OMROF

| SS-P | 576 - 581 |
|------|-----------|
| SSG | 582 - 589 |
| D2F | 590 - 595 |
| D2MQ | 596 - 600 |
| D3C | 601 - 604 |
| D2X | 605 - 608 |
| D3K | 609 - 612 |
| D3M | 613 - 618 |
| D2SW | 619 - 624 |
| D2VW | 625 - 630 |
| D2JW | 631 - 635 |
| D2HW | 636 - 644 |
| D2MC | 645 - 649 |
| D2D | 650 - 657 |
| D3D | 658 - 661 |



| DIP SWITCHES | 662 - 690 |
|-----------------------|-----------|
| Technical Information | 662 - 664 |
| Selection Guide | 665 - 668 |
| A6H | 669 - 670 |
| A6T/A6S | 671 - 673 |
| A6D/A6DR | 674 - 676 |
| A6E/A6ER | 677 - 679 |
| A6A | 680 - 683 |
| A6C/A6CV | 684 - 686 |
| A6R/A6RV | 687 - 690 |



| TACTILE SWITCHES | 691 - 731 |
|------------------------|-----------|
| Techinical Information | 691 - 693 |
| Selection Guide | 694 - 698 |
| B3F | 699 - 707 |
| B3W | 708 - 711 |
| B3FS | 712 - 714 |
| B3SN | 715 - 716 |
| B3S | 717 - 718 |
| B3WN | 719 - 720 |
| B3J | 721 - 723 |
| B3DA | 724 - 725 |
| B3D | 726 - 729 |
| B32 | 730 - 731 |

| | | The second | |
|-------------------|-----|------------|--|
| 1 | ł | | |
| | 2 | Pr. | |
| $\langle \rangle$ | 1/h | 0 | |

| GENERAL PURPOSE RELAYS | 434 - 508 |
|------------------------|-----------|
| Technical Information | 434 - 439 |
| Selection Guide | 440 - 442 |
| MY | 443 - 455 |
| LY | 456 - 468 |
| G2RS | 469 - 478 |
| G7L | 479 - 493 |
| G7J | 494 - 502 |
| G7SA | 503 - 508 |



| MICROSWITCHES | 509 - 659 |
|-----------------------|-----------|
| Technical Information | 509 - 520 |
| Selection Guide | 521 - 530 |
| D3V | 531 - 544 |
| V | 545 - 560 |
| VX | 561 - 567 |
| SS | 568 - 575 |



| | ACC/ACCV |
|---|-------------------------------|
| | A6R/A6RV |
| | |
| | TACTILE SWITCHES |
| 1 | Techinical Information |
| | Selection Guide |
| | B3F |
| | B3W/ |

Contents



| Contents | |
|----------|--|
| | |

OMRON

| 862 - 864 865 - 867 868 - 870 871 - 873 |
|--|
| 865 - 867 868 - 870 871 - 873 |
| 868 - 870 871 - 873 |
| 871 - 873 |
| 07/ 076 |
| 0/4 - 0/0 |
| 877 - 881 |
| 882 - 884 |
| 885 - 887 |
| 888 - 890 |
| 891 - 894 |
| 895 - 897 |
| 898 - 900 |
| 901 - 904 |
| 905 - 908 |
| 909 - 911 |
| 010 011 |
| |



| LEDs | 915 - 921 |
|------|-----------|
| 2MDR | 915 - 921 |
| | |

| 922 - 935 |
|-----------|
| 922 - 923 |
| 924 - 926 |
| 927 - 928 |
| 929 - 930 |
| 931 - 933 |
| 934 - 935 |
| |



| CONNECTORS | 936 - 968 |
|------------|-----------|
| XF2E | 936 - 937 |
| XF2H | 938 - 939 |
| XF2J | 940 - 941 |
| XF2L | 942 - 943 |
| XG4M-U | 944 - 946 |
| XG4 | 947 - 954 |
| XM4 | 955 - 957 |
| XH2 | 958 - 964 |
| XM7 | 965 - 968 |

969 - 971



| PHOTOMICROSENSORS | 732 - 914 |
|-----------------------|-----------|
| Technical Information | 732 - 736 |
| Selection Guide | 737 - 738 |
| EE-SX1107 | 739 - 743 |
| EE-SX1018 | 744 - 746 |
| EE-SX1108 | 747 - 751 |
| EE-SX1131 | 752 - 756 |
| EE-SX1139 | 757 - 759 |
| EE-SX4139 | 760 - 762 |
| EE-SX493 | 763 - 765 |
| EE-SX1055 | 766 - 768 |
| EE-SX1046 | 769 - 771 |
| EE-SX1082 | 772 - 774 |
| EE-SX1106 | 775 - 777 |
| EE-SX1109 | 778 - 782 |
| EE-SX199 | 783 - 785 |
| EE-SX398/498 | 786 - 788 |
| EE-SV3 | 789 - 791 |
| EE-SX1071 | 792 - 794 |
| EE-SX1088 | 795 - 797 |
| EE-SH3 | 798 - 800 |
| EE-SJ3 | 801 - 803 |
| EE-SX3088/4088 | 804 - 806 |
| EE-SG3 | 807 - 809 |
| EE-SX1128 | 810 - 812 |
| EE-SX1041 | 813 - 815 |
| EE-SX1042 | 816 - 818 |
| EE-SX1081 | 819 - 821 |
| EE-SX1235A-P2 | 822 - 824 |
| EE-SX4009-P1 | 825 - 827 |
| EE-SX4019-P2 | 828 - 830 |
| EE-SX3081/4081 | 831 - 833 |
| EE-SX4009-P10 | 834 - 836 |
| EE-SX4235A-P2 | 837 - 839 |
| EE-SX1070 | 840 - 842 |
| EE-SX3070/4070 | 843 - 845 |
| EE-SPX415-P2 | 846 - 848 |
| EE-SX461-P11 | 849 - 852 |
| EE-SX414-P1 | 853 - 855 |
| EE-SA102 | 856 - 858 |
| EE-SA103 | 859 - 861 |

PART NUMBER INDEX

Welcome to the Omron Components Catalogue

Omron Components is a world-class business delivering a wide range of high quality, high performance components utilising latest technologies and backed by full technical, applications and logistical support.

We offer the widest range of relays for power, signal and automotive applications as well as solid-state and MOSFET relays. Our G3VM MOSFETS combine

the advantages of mechanical and solid-state technologies allowing design flexibility with either AC or DC load able to be connected in either direction. We are also developing our range of microsensors, and currently offer photomicrosensors and a new range of D8M-D8 micro pressure-sensors which meet stringent safety standards such as working reliably with low pressure, metal casing and flange fitting. Our broad range of switches includes micro, DIP, and tactile options, and you will find a wide selection of connectors to meet



industry-standard data interconnect, power transmission and signalling. Omron Double Reflection LEDs feature built-in optical light guide technology that more than doubles effective light output compared with conventional bullet-type LEDs. Environmental research and experience enabled us to formulate a policy to remove recognised hazardous substances from our products well within the timescales of European Directives. We have identified suitable alternative materials and agreed the changes we need to make to our production processes in order to maintain quality levels. All of our manufacturing sites have achieved ISO14001 certification for the management of environmental protection in our organisation.





Using our website alongside this catalogue, you can be kept fully up-to-date with our range of products, technical capabilities and environmental policy.

www.eu.omron.com/ocb

Omron Electronic Components Europe B.V. reserves the right to make any changes to the specifications, technical information and data of the components described in this catalogue at its sole discretion without prior notice Although we do strive for perfection, Omron Electronic Components Europe B.V. does not warrant or make any representations regarding the correctness or accuracy of the specifications, technical information and data of the components as described in this catalogue.

OMRON

3.8+0

Dimensions -

Note: All units are in millimeters unless otherwise indicated. Unless otherwise specified, a tolerance of ±0.4 mm applies to all dimensions.

B32-12 0

B32-10 0









B32-16 0



Technical Information – Photomicrosensors

OMRO

Technical Information –

The Photomicrosensor is a compact optical sensor that senses objects or object positions with an optical beam. The transmissive Photomicrosensor and reflective Photomicrosensor are typical Photomicrosensors.

The transmissive Photomicrosensor incorporates an emitter and a transmissive that face each other as shown in Figure 1. When an object is located in the sensing position between the emitter and the detector, the object intercepts the optical beam of the emitter, thus reducing the amount of optical energy reaching the detector.

The reflective Photomicrosensor incorporates an emitter and a detector as shown in Figure 2. When an object is located in the sensing area of the reflective Photomicrosensor, the object reflects the optical beam of the emitter, thus changing the amount of optical energy reaching the detector.

"Photomicrosensor" is an OMRON product name. Generally, the Photomicrosensor is called a photointerrupter.

Figure 1. Transmissive Photomicrosensor





Figure 2. Reflective Photomicrosensor

DataSheet

Absolute Maximum Ratings and Electrical and Optical Characteristics

The datasheets of Photomicrosensors include the absolute maximum ratings and electrical and optical characteristics of the Photomicrosensors as well as the datasheets of transistors and ICs. It is necessary to understand the difference between the absolutemaximum ratings and electrical and optical characteristics of various Photomicrosensors.

Absolute Maximum Ratings

The absolute maximum ratings of Photomicrosensors and other products with semiconductors specify the permissible operating voltage, current, temperature, and power limits of these products.

The products must be operated absolutely within these limits.

Therefore, when using any Photomicrosensor, do not ignore the absolute maximum ratings of the Photomicrosensor, otherwise the Photomicrosensor will not operate precisely. Furthermore, the Photomicrosensor may be deteriorate or become damaged, in which case OMRON will not be responsible.

Practically, Photomicrosensors should be used so that there will be some margin between their absolute maximum ratings and actual operating conditions.

Electrical and Optical Characteristics

The electrical and optical characteristics of Photomicrosensors indicate the performance of Photomicrosensors under certain conditions.

Most items of the electrical and optical characteristics are indicated by maximum or minimum values. OMRON usually sells Photomicrosensors with standard electrical and optical characteristics.

The electrical and optical characteristics of Photomicrosensors sold to customers may be changed upon request. All electrical and optical characteristic items of Photomicrosensors indicated by maximum or minimum values are checked and those of the Photomicrosensors indicated by typical values are regularly checked before shipping so that OMRON can guarantee the performance of the Photomicrosensors.

In short, the absolute maximum ratings indicate the permissible operating limits of the Photomicrosensors and the electrical and optical characteristics indicate the maximum performance of the Photomicrosensors.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Terminology -

The terms used in the datasheet of each Photomicrosensor with a phototransistor output circuit or a photo IC output circuit are explained below.

OMRON

Phototransistor Output Photomicrosensor

| Symbol | Item | Definition |
|-----------------------|--|---|
| I _{FP} | Pulse forward current | The maximum pulse current that is allowed to flow continuously from the anode to cathode of an LED under a specified temperature, a repetition period, and a pulse width condition. |
| Ic | Collector current | The current that flows to the collector junction of a phototransistor. |
| Pc | Collector dissipation | The maximum power that is consumed by the collector junction of a phototransistor. |
| ID | Dark current | The current leakage of the phototransistor when a specified bias voltage is imposed on the phototransistor so that the polarity of the collector is positive and that of the emitter is negative on condition that the illumination of the Photomicrosensor is 0(x . |
| IL. | Light current | The collector current of a phototransistor under a specified input current condition and at a specified bias voltage. |
| V _{CE} (sat) | Collector-emitter saturated voltage | The ON-state voltage between the collector and emitter of a phototransistor under a specified bias current condition. |
| I _{LEAK} | Leakage current | The collector current of a phototransistor under a specified input current condition and at a specified bias voltage when the phototransistor is not exposed to light. |
| tr | Rising time | The time required for the leading edge of an output waveform of a phototransistor to rise from 10% to 90% of its final value when a specified input current and bias condition is given to the phototransistor. |
| tf | Falling time | The time required for the trailing edge of an output waveform of a phototransistor to decrease from 90% to 10% of its final value when a specified input current and bias condition is given to the phototransistor. |
| V _{CEO} | Collector-emitter voltage | The maximum positive voltage that can be applied to the collector of a phototransistor with the emitter at reference potential. |
| V _{ECO} | Emitter-collector voltage | The maximum positive voltage that can be applied to the emitter of a phototransistor with the collector at reference potential. |

Phototransistor/Photo IC Output Photomicrosensor

| Symbol | Item | Definition | |
|--|--|--|--|
| IF | Forward current | The maximum DC voltage that is allowed to flow continuously from the anode of the LED to the cathode of the LED under a specified temperature condition. | |
| V _R | Reverse voltage | The maximum negative voltage that can be applied to the anode of the LED with the cathode at reference potential. | |
| V _{cc} | Supply voltage | The maximum positive voltage that can be applied to the voltage terminals of the photo IC with the ground terminal at reference potential. | |
| V _{OUT} | Output voltage | The maximum positive voltage that can be applied to the output terminal with the ground terminal of the photo IC at reference potential. | |
| I _{OUT} | Output current | The maximum current that is allowed to flow in the collector junction of the output transistor of the photo IC. | |
| Pout | Output permissible dissipation | The maximum power that is consumed by the collector junction of the output transistor of the photo IC. | |
| V _F | Forward voltage | The voltage drop across the LED in the forward direction when a specified bias current is applied to the photo IC. | |
| I _R | Reverse current | The reverse leakage current across the LED when a specified negative bias is applied to the anode with the cathode at reference potential. | |
| V _{oL} | Output low voltage | The voltage drop in the output of the photo IC when the IC output is turned ON under a specified voltage and output current applied to the photo IC. | |
| V _{OH} | Output high voltage | The voltage output by the photo IC when the IC output is turned OFF under a specified supply voltage and bias condition given to the photo IC. | |
| I _{cc} | Current consumption | The current that will flow into the sensor when a specified positive bias voltage is applied from the power source with the ground of the photo IC at reference potential. | |
| I _{FT} (I _{FT OFF}) | LED current when output is turned OFF | The forward LED current value that turns OFF the output of the photo IC when the forward current to the LED is increased under a specified voltage applied to the photo IC. | |
| I _{FT} (I _{FT ON}) | LED current when output is turned ON | The forward LED current value that turns ON the output of the photo IC when the forward current to the LED is increased under a specified voltage applied to the photo IC. | |
| ∆н | Hysteresis | The difference in forward LED current value, expressed in percentage, calculated from the respective forward LED currents when the photo IC is turned ON and when the photo IC is turned OFF. | |
| f | Response frequency | The number of revolutions of a disk with a specified shape rotating in the light path, expressed by the number of pulse strings during which the output logic of the photo IC can be obtained under a specified bias condition given to the LED and photo IC (the number of pulse strings to which the photo IC can respond in a second). | |

Precautions

Correct Use

Use the product within the rated voltage range.

Applying voltages beyond the rated voltage ranges may result in damage or malfunction to the product.

Wire the product correctly and be careful with the power supply polarities.

Incorrect wiring may result in damage or malfunction to the product.

Connect the loads to the power supply. Do not short-circuit the loads.

Short-circuiting the loads may result in damage or malfunction to the product.

Structure and Materials

The emitter and detector elements of conventional Photomicrosensors are fixed with transparent epoxy resin and the main bodies are made of polycarbonate. Unlike ICs and transistors, which are covered with black epoxy resin, Photomicrosensors are subject to the following restrictions.

1. Low Heat Resistivity

The storage temperature of standard ICs and transistors is approximately 150°C. On the other hand, the storage temperature of highly resistant Photomicrosensors is 100° C maximum.

2. Low Mechanical Strength

Black epoxy resin, which is used for the main bodies of ICs and transistors, contains additive agents including glass fibre to increase the heat resistivity and mechanical strength of the main bodies. Materials with additive agents cannot be used for the bodies of Photomicrosensors because Photomicrosensors must maintain good optical permeability. Unlike ICs and transistors, Photomicrosensors must be handled with utmost care because Photomicrosensors are not as heat or mechanically resistant as ICs and transistors. No excessive force must be imposed on the lead wires of Photomicrosensors.

Mounting

Screw Mounting

If Photomicrosensors have screw mounting holes, the Photomicrosensors can be mounted with screws. Unless otherwise specified, refer to the following when tightening the screws.

| Hole diameter | Screw size | Tightening torque |
|---------------|------------|-------------------|
| 1.5 dia. | M1.4 | 0.20 N • m |
| 2.1 dia. | M2 | 0.34 N • m |
| 3.2 dia. | M3 | 0.54 N • m |
| 4.2 dia. | M4 | 0.54 N • m |

Read the following before tightening the screws.

 The use of a torque screwdriver is recommended to tighten each of the screws so that the screws can be tightened to the tightening torque required.

OMRON

- 2. The use of a screw with a spring washer and flat washer for the mounting holes of a Photomicrosensor is recommended. If a screw with a spring washer but without a flat washer is used for any mounting hole, the part around the mounting hole may crack.
- Do not mount Photomicrosensors to plates stained with machining oil, otherwise the machining oil may cause cracks on the Photomicrosensors.
- 4. Do not impose excessive forces on Photomicrosensors mounted to PCBs. Make sure that no continuous or instantaneous external force exceeding 500 g (4.9 N) is imposed on any lead wire of the Photomicrosensors.

PCB Mounting Holes

Unless otherwise specified, the PCB to which a Photomicrosensor is mounted must have the following mounting holes



Soldering

Lead Wires

Make sure to solder the lead wires of Photomicrosensors so that no excessive force will be imposed on the lead wires. If an excessive forces is likely to be imposed on the lead wires, hold the bases of the lead wires.

Soldering Temperature

1. Manual Soldering

Unless otherwise specified, the lead wires of Photomicrosensors can be soldered manually under the following conditions.

| Soldering temperature: | 350°C max. (The temperature of the tip of a 30-W soldering iron is approximately 320°C when the soldering iron is heated up.) |
|------------------------|--|
| Soldering time: | 3 s max. |
| Soldering position: | At least 1.5 mm away from the bases of the lead wires |

The temperature of the tip of any soldering iron depends on the shape of the tip. Check the temperature with a thermometer before soldering the lead wires. A highly resistive soldering iron incorporating a ceramic heater is recommended for soldering the lead wires.

2. Dip Soldering

The lead wires of Photomicrosensors can be dip-soldered under the following conditions unless otherwise specified. Preheating temperature: Must not exceed the storage

temperature. Must not exceed the stora

| Soldering | temperature: | 260°C. |
|-----------|--------------|--------|

Soldering time: 10 s max.

Soldering position: At least 1.5 mm away from the bases of the lead wires.

Do not use non-washable flux when soldering EE-SA-series Photomicrosensors, otherwise the Photomicrosensors will have operational problems.

3. Reflow Soldering

The reflow soldering of Photomicrosensors is not possible except for the EE-SX1102. The reflow soldering of the EE-SX1102 must be performed carefully under the conditions specified in the datasheet of the EE-SX1102. Before performing the reflow soldering of the EE-SX1102, make sure that the reflow soldering equipment satisfies the conditions.

External Forces

The heat resistivity and mechanical strength of Photomicrosensors are lower than those of ICs or transistors. Do not to impose external force on Photomicrosensors immediately after the Photomicrosensors are soldered. Especially, do not impose external force on Photomicrosensors immediately after the Photomicrosensors are dipsoldered.

Cleaning Precautions

Cleaning

Photomicrosensors except the EE-SA105 can be cleaned subject to the following restrictions.

1. Types of Detergent

Polycarbonate is used for the bodies of most Photomicrosensors. Some types of detergent dissolve or crack polycarbonate. Before cleaning Photomicrosensors, refer to the following results of experiments, which indicate what types of detergent are suitable for cleaning Photomicrosensors other than the EE-SA105.

Observe the law and prevent against any environmental damage when using any detergent.

Results of Experiments

| Ethyl alcohol: | OK |
|---------------------|--|
| Methyl alcohol: | OK |
| Isopropyl alcohol: | OK |
| Chlorofluorocarbon: | Depends on the additive agents (see note) |
| Trichlene: | NG |
| Acetone: | NG |
| Methylbenzene: | NG |
| Water (hot water): | The lead wires corrode depending on the conditions |

Note: Chlorofluorocarbon containing ethyl alcohol or methyl alcohol as an additive agent can be used to clean Photomicrosensors except the EE-SA105. Chlorofluorocarbon containing acetone as an additive agent must not be used to clean any Photomicrosensor. For reasons of environmental protection, refrain from using any detergent containing chlorofluorocarbon.

2. Cleaning Method

Unless otherwise specified, Photomicrosensors other than the EE-SA105 can be cleaned under the following conditions. Do not apply an unclean detergent to the Photomicrosensors. DIP cleaning: OK

Ultrasonic cleaning:

Brushina:

Depends on the equipment and the PCB size. Before cleaning Photomicrosensors, conduct a cleaning test with a single Photomicrosensor and make sure that the Photomicrosensor has no broken lead wires after the Photomicrosensor is cleaned.

The marks on Photomicrosensors may be brushed off. The emitters and detectors of reflective Photomicrosensors may have scratches and deteriorate when they are brushed. Before brushing Photomicrosensors, conduct a brushing test with a single Photomicrosensor and make sure that the Photomicrosensor is not damaged after it is brushed.

15

Selection Guide – Photomicrosensors

OMRON

| Sensing Method | Sensing Distance | Model | Output Configuration | Features | Page No. |
|-------------------|---------------------|----------------|---------------------------|--|-------------|
| Transmissive | 1 mm | EE-SX1107 | Phototransistor | Ultra-compact, surface mounting | 737 |
| | 2 mm | EE-SX1018 | Phototransistor | Compact, general purpose | 742 |
| | | EE-SX1108 | Phototransistor | Ultra-compact, surface mounting | 745 |
| | | EE-SX1131 | Phototransistor | Ultra-compact, surface mounting, dual channel output | 750 |
| | | EE-SX1139 | Phototransistor | Ultra-compact, general purpose | 755 |
| | | EE-SX4139 | Photo-IC | Ultra-compact with low operating voltage | 758 |
| | | EE-SX493 | Photo-IC | With a horizontal aperture | 761 |
| | 2.8 mm | EE-SX1055 | Phototransistor | Compact, cost effective | 764 |
| | 3 mm | EE-SX1046 | Phototransistor | With a horizontal aperture | 767 |
| | | EE-SX1082 | Phototransistor | With a horizontal aperture | 770 |
| | | EE-SX1106 | Phototransistor | Ultra-compact, general purpose | 773 |
| | | EE-SX1109 | Phototransistor | Ultra-compact, surface mounting | 776 |
| | | EE-SX199 | Phototransistor | With a positioning boss | 781 |
| | | EE-SX398/ 498 | Phototransistor/ Photo-IC | General purpose | 784 |
| | 3.4 mm | EE-SV3 | Phototransistor | With mounting tab | 787 |
| | | EE-SX1071 | Phototransistor | General purpose | 790 |
| | | EE-SX1088 | Phototransistor | Screw mounting | 793 |
| | | SH3 | Phototransistor | Screw mounting | 796 |
| | | EE-SJ3 | Phototransistor | Various aperture types available | 799 |
| | | EE-SX3088/4088 | Photo-IC | Screw mounting | 802 |
| | 3.6 mm | EE-SG3 | Phototransistor | With dust-proof aperture and mounting tab | 805 |
| | 4.2 mm | EE-SX1128 | Phototransistor | With a horizontal aperture | 808 |
| | 5 mm | EE-SX1041 | Phototransistor | General purpose | 811 |
| | | EE-SX1042 | Phototransistor | High profile | 814 |
| | | EE-SX1081 | Phototransistor | General purpose | 817 |
| | | EE-SX1235A-P2 | Phototransistor | Snap-in mounting | 820 |
| | | EE-SX4009-P1 | Photo-IC | Screw mounting | 823 |
| | | EE-SX4019-P2 | Photo-IC | Screw mounting | 826 |
| | | EE-SX3081/4081 | Photo-IC | General purpose q | 829 |
| | | EE-SX4009-P10 | Photo-IC | Screw mounting | 832 |
| | | EE-SX4235A-P2 | Photo-IC | Snap-in mounting | 835 |
| | 8 mm | EE-SX1070 | Phototransistor | General purpose | 838 |
| | | EE-SX3070/4070 | Photo-IC | General purpose | 841 |
| | 12 mm | EE-SPX415-P2 | Photo-IC | Light modulation built-in amplifier IC | 844 |
| | 15 mm | EE-SX461-P11 | Photo-IC | Easy mountable | 847 |
| | 17 mm | EE-SPX414-P1 | Photo-IC | Light modulation built-in amplifier IC | 851 |

Selection Guide – Photomicrosensors

OMRON

| Sensing Method | Sensing Distance | Model | Output Configuration | Features | Page No. |
|-----------------------|---------------------|---------------|-------------------------|--|-------------|
| Actuator | - | EE-SA102 | Phototransistor | General purpose | 854 |
| | | EE-SA103 | Phototransistor | Compact | 857 |
| | | EE-SA104 | Phototransistor | Compact | 860 |
| | | EE-SA107-P2 | Phototransistor | Snap-in mounting with connector | 863 |
| | | EE-SA407-P2 | Photo-IC | Snap-in mounting with connector | 866 |
| Reflective mounting | 1 mm | EE-SY124 | Phototransistor | Ultra-compact, general purpose/ surface mounting | 869 |
| | | EE-SY125 | Phototransistor | Ultra-compact, general purpose/ surface mounting | 872 |
| | | EE-SY193 | Phototransistor | Ultra-compact, surface mounting | 875 |
| | 3.5 mm | EE-SY171 | Phototransistor | Thin | 880 |
| | 4 mm | EE-SY169B | Phototransistor | High resolution red LED/ infra-red LED | 883 |
| | 4.4 mm | EE-SY113 | Phototransistor | Dust-proof | 886 |
| | | EE-SY313/ 413 | Photo-IC | Dust-proof | 889 |
| | 5 mm | EE-SF5-B | Phototransistor | General purpose or screw mounting | 893 |
| | | EE-SY110 | Phototransistor | General purpose | 896 |
| | | EE-SY310/ 410 | Photo-IC | General purpose | 899 |
| Micro displacement | 5.5 - 11.5 mm | Z4D-B01 | Analog votage output | Easy control and ultra high resolution | 903 |
| Multi-beam | 50 - 125mm | EY3A-312 | Photo-IC | 3 beam high sensitivity and resisitivity to light interference | 907 |
| | 125 mm | EY3A-112 | Photo-IC | 1 beam high sensitivity and resisitivity to light interference | |

Dimensions

Note: All units are in millimeters unless stated.



(0.5)

Optical axis

Name

(0.5)





Cross section AA

Internal Circuit



Anode Cathode

Collector Emitter

Terminal No.

С

| Recommended | Soldering |
|-------------|-----------|
| Pattern | |

| | | | 1.2 |
|-----|-----|-----|-----|
| | | | 2 |
| 1.8 | 1.8 | 1.8 | |

| | | | 2.0 |
|-----|-----|-----|-----|
| | į | | °, |
| 1.8 | 1.8 | 1.8 | |

Unless otherwise stated the tolerances are ±0.15mm.

Features

- Ultra-compact with a 3.4-mm-wide sensor and a 1-mm-wide slot.
- PCB surface mounting type.
- High resolution with a 0.15-mm-wide aperture.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|---------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | l _F | 25 mA (see note 1) |
| | Pulse foward current | I _{FP} | 100 mA (see note 2) |
| | Reverse Voltage | V _R | 5 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 20 V |
| | Emitter-Collector voltage | V _{ECO} | 5 V |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 75 mW (see note 1) |
| Ambient temperature | Operating | Topr | -30°C to 85°C |
| | Storage | Tstg | -40°C to 90°C |
| | Reflow soldering | Tsol | 240°C (see note 3) |
| | Manual soldering | Tsol | 300°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. Duty: 1/100; Pulse width: 0.1 ms.

3. Complete soldering within 10 seconds for reflow soldering and within 3 seconds for manual soldering.

■ Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|---|---|
| Emitter | Forward voltage | V _F | 1.1 V typ., 1.3 V max. | I _F = 5 mA |
| | Reverse current | I _R | 10 µA max. | $V_R = 5 V$ |
| | Peak emission wavelength | λ _P | 940 m typ. | I _F = 20 mA |
| Detector | Light current | l, | 50 μA min., 150 μA typ., 500 μA max. | $I_F=5\ \text{mA},\ V_{CE}=5\ \text{V}$ |
| | Dark current | ID | 100 nA max. | $V_{CE}=10 \text{ V}, 0 \ell_X$ |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. | $I_F=20~mA,~I_L=50~\mu A$ |
| | Peak spectral sensitivity wavelength | λ _P | 900 nm typ. | - |
| Rising time | | tr | 10 µs typ. | $V_{CC}=5~V,~R_L=1~k\Omega,~I_L=100~\mu A$ |
| Falling time | | tf | 10 μs typ. | V_{CC} = 5 V, R_L = 1 kΩ, I_L = 100 μA |

OMRON

Engineering Data





0.4 0.6 0.8

1.2 1.4 1.6 1.6



Characteristics (Typical)

Light Current vs. Forward Current

Light Current vs. Collector-Emitter Voltage Characteristics (Typical)







Response Time vs. Load Resistance Characteristics (Typical)



Response Time Measurement Circuit





Dark

Ambient temperature Ta (°C)

Sensing Position Characteristics (Typical)



Photomicrosensor-Transmissive - EE-SX1107

Tape and Reel

Unit: mm (inch).

Reel



Tape



Tape configuration



Tape quantity

2,500 pcs./reel



1 L (%)

current

light

Ve

1 L (%)

t

S

Relative light

-0.6

Sensing Position Characteristics (Typical)

Distance d (mm)

40 60 80

Ir=5mA Vcz=5V

1ªr

OMRON

Precautions

Soldering Information

Reflow soldering

- The following soldering paste is recommended:
 - Melting temperature: 178 to 192°C Composition: Sn 63%, Pb 37%
- The recommended thickness of the metal mask for screen printing is between 0.2 and 0.25 mm.
- Set the reflow oven so that the temperature profile shown in the following chart is obtained for the upper surface of the product being soldered.



Manual soldering

- Use "Sn 60" (60% tin and 40% lead) or solder with silver content.
- Use a soldering iron of less than 25W, and keep the temperature of the iron tip at 300°C or below.
- · Solder each point for a maximum of three seconds.
- After soldering, allow the product to return to room temperature before handling it.

Storage

To protect the product from the effects of humidity until the package is opened, dry-box storage is recommended. If this is not possible, store the product under the following conditions:

Temperature: 10 to 30°C

Humidity: 60% max.

The product is packed in a humidity-proof envelope. Reflow soldering must be done within 48 hours after opening the envelope, during which time the product must be stored under 30° C at 80% maximum humidity.

If it is necessary to store the product after opening the envelope, use dry-box storage or reseal the envelope.

Baking

If a product has remained packed in a humidity-proof envelope for six months or more, or if more than 48 hours have lapsed since the envelope was opened, bake the product under the following conditions before use:

> Reel: 60°C for 24 hours or more Bulk: 80°C for 4 hours or more

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Photomicrosensor-Transmissive – EE-SX1018

Features

- Compact model with a 2-mm-wide slot.
- PCB mounting type.
- High resolution with a 0.5-mm-wide aperture.



OMRO

Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | I _C | 20 mA |
| | Collector dissipation | P _C | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is10µs maximum with a frequency of 100Hz.

3. Complete soldering within 10 seconds.

Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|--|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | IR | 0.01 µA typ., 10 µA max. | $V_{R} = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | $I_F = 20 \text{ mA}$ |
| Detector | Light current | IL. | 0.5 mA min., 14 mA max. | I_F = 20 mA, V_{CE} = 10 V |
| | Dark current | ID | 2 nA typ., 200 nA max. | V_{CE} = 10 V, 0 ℓx |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. | $I_F=20\ mA,\ I_L=0.1\ mA$ |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CF} = 10 V$ |
| Rising time | | tr | 4 μs typ. | V_{CC} = 5 V, R_L = 100 $\Omega,~I_L$ = 5 mA |
| Falling time | | tf | 4 µs typ. | $V_{CC}=5~V,~R_L=100~\Omega,~I_L=5~mA$ |

Dimensions

Note: All units are in millimeters unless stated.



Internal Circuit



| Terminal No. | Name |
|--|-----------|
| A Contraction of the second se | Anode |
| < | Cathode |
|) | Collecter |
| | Emitter |

Unless otherwise specified, the tolerances are as shown below.

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| δ < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Engineering Data

Forward Current vs. Collector **Dissipation Temperature Rating** Forward Current vs. Forward Voltage Characteristics (Typical)

Light Current vs. Forward Current Characteristics (Typical)





Light Current vs. Collector-Emitter Voltage Characteristics (Typical)



Load resistance R_L (kΩ)

ŝ

E Ħ

Ę,

ime

e P

ent Temperature Characteristics (Typical)



Response Time vs. Load Resistance Characteristics (Typical) (Typical)

(%)

1

ent

cun

tive light (

Relat

Ambient temperature Ta (°C)

Sensing Position Characteristics

-0.5 -0.25 0

100

Circuit





0.25 0.5 0.75

Distance d (mm)

I_F = 20 mA V_{CE} = 10 V Ta = 25°C

(Center of optical axis) ---0-+

OMRON







Dimensions

Note: All units are in millimeters otherwise indicated



Ø





| Recommended | | | |
|-------------------|--|--|--|
| Soldering Pattern | | | |
| | | | |

| | 1.6 |
|---|-----|
| | 10 |
| 2 | 3 2 |

| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

Features

- Ultra Compact model with a 2mm slot.
- PCB surface mounting type.
- High resolution with a 0.3-mm-wide aperture.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|---------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | l _F | 25 mA (see note 1) |
| | Pulse foward current | I _{FP} | 100 mA (see note 2) |
| | Reverse Voltage | V _R | 5 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 20 V |
| | Emitter-Collector voltage | V _{ECO} | 5 V |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 75 mW (see note 1) |
| Ambient temperature | Operating | Topr | -30°C to 85°C |
| | Storage | Tstg | -40°C to 90°C |
| | Reflow Soldering | Tsol | 240°C (see note 3) |
| | Manual Soldering | Tsol | 300°C (see note 3 |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. Duty: 1/100; Pulse width: 0.1 ms

3. Complete soldering within 10 seconds for reflow soldering and within 3 seconds for manual soldering.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|---------------------------|-------------------------------------|-----------------------|---|--|
| Emitter | Forward voltage | V _F | 1.1 V typ., 1.3 V max. | I _F = 5 mA |
| | Reverse current | I _R | 10 µA max. | V _R = 5 V |
| | Peak emission wavelength | λ _P | 940 nm typ. | $I_F = 20 \text{ mA}$ |
| Detector | Light current | ۱ _L | 50 μA min., 150 μA typ., 500 μA max. | $I_F = 5$ mA, $V_{CE} = 5$ V |
| | Dark current | ID | 100 nA max. | $V_{CE} = 10$ V, 0 ℓx |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. | $I_F=20 \text{ mA}, I_L=50 \mu\text{A}$ |
| Peak spectral sensitivity | | λ_{P} | 900 nm typ. | - |
| Rising time | | tr | 10 μs typ. | V_{CC} = 5 V, R_L = 1K $\Omega,~I_L$ = 100 μA |
| Falling time | | tf | 10 μs typ. | V_{CC} = 5 V, R_L = 1K $\Omega,~I_L$ = 100 μA |

Unless otherwise specified, the tolerances are ± 0.15 mm.

Ta=250

Engineering Data





P 12 14 16 18 04 06 0.8

Forward voltage VF (V)

Ambient temperature Ta (°C) Light Current vs. Collector-Emitter Relative Light Current vs. Ambient Voltage Characteristics (Typical)







Collector-Emitter voltage VCF (V) Ambient temperature Ta (°C)

(Typical)

Response Time vs. Load Resistance Characteristics (Typical)





Sensing Position Characteristics

0.2 0.4 0.6

ative Rel -0.2

Distance d (mm)

Response Time Measurement Circuit





IF=5mA



Light Current vs. Forward Current

Characteristics (Typical)

Forward current I_F (mA)

Dark Current vs. Ambient Temperature Characteristics (Typical)



Ambient temperature Ta (°C)

Sensing Position Characteristics (Typical)



Distance d (mm)

Photomicrosensor-Transmissive - EE-SX1108

Tape and Reel

Unit: mm (inch).

Reel



Tape



Tape configuration



Tape quantity 2,000 pcs./reel

Forward Current vs. Forward Voltage Characteristics (Typical)

OMRON

Precautions -

Soldering Information

Reflow soldering

- The following soldering paste is recommended:
 - Melting temperature: 178 to 192°C Composition: Sn 63%, Pb 37%
- The recommended thickness of the metal mask for screen printing is between 0.2 and 0.25 mm.
- Set the reflow oven so that the temperature profile shown in the following chart is obtained for the upper surface of the product being soldered.



Manual soldering

- Use "Sn 60" (60% tin and 40% lead) or solder with silver content.
- Use a soldering iron of less than 25W, and keep the temperature of the iron tip at 300°C or below.
- · Solder each point for a maximum of three seconds.
- After soldering, allow the product to return to room temperature before handling it.

Storage

To protect the product from the effects of humidity until the package is opened, dry-box storage is recommended. If this is not possible, store the product under the following conditions:

Temperature: 10 to 30°C

Humidity: 60% max.

The product is packed in a humidity-proof envelope. Reflow soldering must be done within 48 hours after opening the envelope, during which time the product must be stored under 30°C at 80% maximum humidity.

If it is necessary to store the product after opening the envelope, use dry-box storage or reseal the envelope.

Baking

If a product has remained packed in a humidity-proof envelope for six months or more, or if more than 48 hours have lapsed since the envelope was opened, bake the product under the following conditions before use:

> Reel: 60°C for 24 hours or more Bulk: 80°C for 4 hours or more

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

OMRON

Features

- Ultra-compact with a 5mm wide sensor and a 2mm wide slot.
- PCB surface mounting type.
- High resolution with a 0.3-mm-wide aperture.
- Dual channel output.



■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|---------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 25 mA (see note 1) |
| | Pulse foward current | I _{FP} | 100 mA (see note 2) |
| | Reverse Voltage | V _R | 5 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 20 V |
| | Emitter-Collector voltage | V _{ECO} | 5 V |
| | Collector current | I _C | 20 mA |
| | Collector dissipation | Pc | 75 mW (see note 1) |
| Ambient temperature | Operating | Topr | -30°C to 85°C |
| | Storage | Tstg | -40°C to 90°C |
| | Reflow soldering | Tsol | 240°C (see note 3) |
| | Manual soldering | Tsol | 300°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. Duty: 1/100; Pulse width: 0.1 ms.

3. Complete soldering within 10 seconds for reflow soldering and within 3 seconds for manual soldering.

Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------|--------------------------------------|----------------------------------|---|--|
| Emitter | Forward voltage | V _F | 1.1 V typ., 1.3 V max. | $I_F = 5 \text{ mA}$ |
| | Reverse current | I _R | 10 µA max. | V _R = 5 V |
| | Peak emission wavelength | λρ | 940 nm typ. | I _F = 20 mA |
| Detector | Light current | I _{L1} /I _{L2} | 50 μA min., 150 μA typ., 500 μA max. | $I_F = 5$ mA, VCE = 5 V |
| | Dark current | I _D | 100 nA max. | V _{CE} = 10 V, 0 ℓ x |
| | Leakage current | I _{LEAK} | - | - |
| | Collector Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. | $I_{F} = 20 \text{ mA}, I_{L} = 50 \mu\text{A}$ |
| | Peak spectral sensitivity wavelength | λ _P | 900 nm typ. | - |
| Rising time | | tr | 10 µs typ. | $\label{eq:V_CC} \begin{array}{l} V_{CC}=5 \ V, \ R_L=1 \ k\Omega, \\ I_L=100 \ \mu A \end{array}$ |
| Falling time | | tf | 10 μs typ. | $\label{eq:V_CC} \begin{array}{l} V_{CC} = 5 \ V, \ R_L = 1 \ k\Omega, \\ I_L = 100 \ \mu A \end{array}$ |

Note: All units are in millimeters unless otherwise indicated.



Recommended Soldering Pattern

۰.

-

0.4

2

Unless otherwise specified the tolerances are ±0.15mm.

Internal Circuit



| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E1 | Emitter 1 |
| E2 | Emitter 2 |

Forward Current vs. Collector **Dissipation Temperature Rating**

IL(mA)

ent

cun

Light

Forward Current vs. Forward









416 31 Forward current IF (mA)

Forward voltage V_F (V)

Light Current vs. Collector-Emitter Voltage Characteristics (Typical)

Relative Light Current vs. Ambient Temperature Characteristics (Typical)

k=5mA

Dark Current vs. Ambient Temperature Characteristics (Typical)





Ambient temperature Ta (°C)

Response Time vs. Load Resistance Sensing Position Characteristics (Typical)

IL (%)

t

8

light

Re



Characteristics (Typical)

Load resistance R_L (kΩ)



 $\Rightarrow = k$

R

Outpu

101 0.2 -0.4-0.20 0.4

Distance d (mm)

1-=5mA

Ambient temperature Ta (°C) **Sensing Position Characteristics**





Light Current vs. Forward Current Characteristics (Typical)

OMRON





(An) di

Tape and Reel

Unit: mm (inch).





Tape configuration

Tape



Tape quantity 2,000 pcs./reel

Precautions -

Soldering Information

Reflow soldering

- The following soldering paste is recommended: Melting temperature: 178 to 192°C Our and the solution of a 2020 (Dt 0.72)
 - Composition: Sn 63%, Pb 37%
- The recommended thickness of the metal mask for screen printing is between 0.2 and 0.25 mm.
- Set the reflow oven so that the temperature profile shown in the following chart is obtained for the upper surface of the product being soldered.



Manual soldering

- Use "Sn 60" (60% tin and 40% lead) or solder with silver content.
- Use a soldering iron of less than 25W, and keep the temperature of the iron tip at 300°C or below.
- Solder each point for a maximum of three seconds.
- After soldering, allow the product to return to room temperature before handling it.

Storage

To protect the product from the effects of humidity until the package is opened, dry-box storage is recommended. If this is not possible, store the product under the following conditions: Temperature: 10 to 30°C

Humidity: 60% max.

The product is packed in a humidity-proof envelope. Reflow soldering must be done within 48 hours after opening the envelope, during which time the product must be stored under 30°C at 80% maximum humidity.

If it is necessary to store the product after opening the envelope, use dry-box storage or reseal the envelope.

Baking

If a product has remained packed in a humidity-proof envelope for six months or more, or if more than 48 hours have lapsed since the envelope was opened, bake the product under the following conditions before use:

> Reel: 60°C for 24 hours or more Bulk: 80°C for 4 hours or more

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Photomicrosensor-Transmissive – EE-SX1139

OMRON

Features

- Ultra-compact with a 4.3-mm-wide sensor and a 2-mm-wide slot.
- High resolution with a 0.5-mm-wide aperture.
- A light current (I_L) of 0.4 mA minimum with a forward current of (I_F) 10 mA.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|---------------------|---------------------------|------------------|--------------------|
| Emitter | Forward current | l _F | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | P _C | 75 mW (see note 1) |
| Ambient temperature | Operating | Topr | -40°C to 85°C |
| | Storage | Tstg | -40°C to 100°C |
| | Soldering | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is10 $\!\mu s$ maximum with a frequency of 100Hz.

3. Complete soldering within 3 seconds for reflow soldering and within 3 seconds for manual soldering.

■ Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|--|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.4 V max. | I _F = 20 mA |
| | Reverse current | I _R | 0.01 μA typ., 10 μA max. | V _R = 4 V |
| | Peak emission wavelength | λ _P | 940 nm typ. | $I_F = 20 \text{ mA}$ |
| Detector | Light current | IL. | 0.4 mA min. | $I_F=10 \text{ mA, } V_{CE}=5 \text{ V}$ |
| | Dark current | I _D | 2 nA typ., 100 nA max. | $V_{CE} = 10 \text{ V}, 0 \text{ x}$ |
| | Leakage current | I _{LEAK} | - | - |
| | Collector Emitter saturated voltage | V _{CE} (sat) | 0.4 V max. | $I_F = 20$ mA, $I_L = 0.1$ μ A |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CF} = 5 V$ |
| Rising time | | tr | 30 μs typ., 150 μs max. | $\label{eq:V_CC} \begin{array}{l} V_{CC}=5 \ V, \ R_L=1 \ k\Omega, \\ I_L=100 \ \mu A \end{array}$ |
| Falling time | | tf | 30 μs typ., 150 μs max | $\label{eq:V_CC} \begin{array}{l} V_{CC}=5 \ V, \ R_L=1 \ k\Omega, \\ I_L=100 \ \mu A \end{array}$ |

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



| Terminal No. | Name |
|--------------|-----------|
| А | Anode |
| к | Cathode |
| С | Collector |
| E | Emitter |

Unless otherwise specified the tolerances are ±0.1 mm.

Engineering Data





0.6 1.2 1.4 1.6

Relative Light Current vs. Ambi-

ent Temperature Characteristics

20 40 60 80

Sensing Position Characteristics

Ambient temperature Ta (°C)

ΠΠ

0

(Typical)

(%)

B

light

å

-40 -20

(Typical)

- 120 10

Forward voltage V_F (V)

Light Current vs. Collector-Emitter Voltage Characteristics (Typical)



Response Time vs. Load Resistance Characteristics (Typical)





Distance d (mm)



OMRON

Dark Current vs. Ambient **Temperature Characteristics** (Typical)



Ambient temperature Ta (°C)

Response Time Measurement Circuit





Features

- Ultra-compact model
- Photo IC output model
- Operates at V_{cc} of 2.2 to 7 V
- High speed response



OMRON

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|---------------------|--------------------------------|------------------|--------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Supply voltage | V _{CC} | 9 V |
| | Output voltage | V _{OUT} | 17 V |
| | Output current | Iout | 8 mA |
| | Permissible output dissipation | Pout | 80 mW (see note 1) |
| Ambient temperature | Ambient temperature Operating | | -25°C to 85°C |
| | Storage | Tstg | -40°C to 100°C |
| | Soldering | Tsol | 260°C (see note 2) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C. 2. Complete soldering within 3 seconds.

Electrical and Optical Characteristics (Ta = 25°C)

| | Item | | Value | Condition | |
|---------------------|--------------------------------------|------------------|--------------------------|--|--|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.4 V max. | I _F = 20 mA | |
| | Reverse current | IR | 0.01 μA typ., 10 μA max. | $V_R = 4 V$ | |
| | Peak emission wavelength | λ _P | 940 nm typ. | I _F = 20 mA | |
| Detector | Power supply voltage | V _{cc} | 2.2 V min., 7 V max. | - | |
| | Low-level output voltage | V _{OL} | 0.12 V typ., 0.4 V max. | V_{CC} = 2.2 to 7 V, I_{OL} = 8 mA, I_{F} = 5 mA | |
| | High-level output voltage | I _{OH} | 10 µA max. | V_{CC} = 2.2 to 7 V, I_{F} = 0 mA, V_{O} = 17 V | |
| | Current consumption | Icc | 2.3 mA typ., 4 mA max. | $V_{CC} = 7 V$ | |
| | Peak spectral sensitivity wavelength | λ _P | 870 nm typ. | V _{CC} = 2.2 to 7 V | |
| LED current v | vhen output is ON | I _{FT} | 1.1 mA typ., 2.5 mA max. | V _{CC} = 2.2 to 7 V | |
| Hysteresis | | ΔH | 21% typ. | V _{CC} = 2.2 to 7 V (see note 1) | |
| Response frequency | | f | 3 kHs min. | V_{CC} = 2.2 to 7 V, I_{F} = 5 mA, I_{OL} = 8mA (see note 2) | |
| Response delay time | | t _{PLH} | 5 μs min. | $V_{\rm CC}$ = 2.2 to 7 V, $I_{\rm F}$ = 5 mA, $I_{\rm OL}$ = 8mA (see note 3) | |
| Response delay time | | t _{PHL} | 18 μs typ. | $V_{\rm CC}$ = 2.2 to 7 V, $I_{\rm F}$ = 5 mA, $I_{\rm OL}$ = 8mA (see note 3) | |

OMRON

Dimensions



G

Terminal No. Name Anode Cathode Supply voltage V_{CC} Output (OUT) 0 Ground (GND)

кC

Unless otherwise specified the tolerances are ±0.15mm.

Photomicrosensor-Transmissive - EE-SX4139

- Note: 1. Hysteresis denotes the difference in forward LED current value, expressed in percentage, calculated from the respective forward LED currents when the photo IC is turned from ON to OFF and when the photo IC is turned from OFF to ON.
 - 2. The value of the response frequency is measured by rotating the disk as shown below (P.P.S = pulse/s).

(mW)

d

able cur

Output

P

Vol(V)

voltage

output

evel

NO

(IIIS)

t PLH

Hd

e delay

Se

ň



Engineering Data

(Am

ц

Ħ

P

Eor

Forward Current vs. Collector

Dissipation Temperature Rating





IFT ON

Ta = 25°C

 $R_1 = 1 k\Omega$

TPLH



Low-level Output Voltage vs. **Output Current (Typical)**



Ambient temperature Ta (°C)

LED Current vs. Ambient Temper-

ature Characteristics (Typical)

Ambient temperature Ta (°C)

Current Consumption vs. Supply Voltage (Typical)



A IF (m) ť

Voltage Characteristics (Typical)



Ta = 25°C

V_{CC} = 5 V $l_F = 5 \text{ mA}$

2=5

= ()

Output current I_C (mA)

Response Delay Time vs. Forward

Current (Typical)

= 5 V

680 0

current | E 3 4 5 5 7 8

Supply voltage V_{CC} (V)

Low-level Output Voltage vs. Ambient Temperature Characteristics (Typical)



Ambient temperature Ta (°C)

Repeat Sensing Position Characteristics (Typical)







3. The following illustrations show the definition of response

delay time.

Input

Output

IFT (mA)

Forward current I_F (mA)

- Incorporates an IC chip with a built-in detector element and amplifier.
- Incorporates a detector element with a built-in temperature compensation circuit.
- A wide supply voltage range: 4.5 to 16 VDC
- Directly connects with C-MOS and TTL.
- Allows highly precise sensing with a 0.2-mmwide sensing aperture.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|--------------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Power supply voltage | V _{CC} | 16 V |
| | Output voltage | V _{OUT} | 28 V |
| | Output current | Ι _{ουτ} | 16 mA |
| | Permissible output dissipation | Pout | 250 mW (see note 1) |
| Ambient temperature | Operating | Topr | -40°C to 60°C |
| | Storage | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | 260°C (see note 2) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|--------------------------------|--------------------------------------|--------------------------------------|--------------------------|---|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 20 mA |
| | Reverse current | I _R | 0.01 µA typ., 10 µA max. | $V_{R} = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | $I_F = 20 \text{ mA}$ |
| Detector | Low-level output voltage | V _{OL} | 0.12 V typ., 0.4 V max. | V_{CC} = 4.5 to 16 V, I_{OL} = 16 mA, I_{F} = 15 mA |
| | High-level output voltage | V _{OH} | 15 V min. | $Vcc = 16 \text{ V}, \text{ R}_L = 1 \text{ k}\Omega, \text{ I}_F = 0 \text{ mA}$ |
| | Current consumption | I _{CC} | 5 mA typ., 10 mA max. | V _{CC} = 16 V |
| | Peak spectral sensitivity wavelength | λ _P | 870 nm typ. | $V_{CC} = 4.5$ to 16 V |
| LED current when output is OFF | | I _{FT} | 10 mA typ., 15 mA max. | $V_{CC} = 4.5$ to 16 V |
| LED current | when output is ON | | | |
| Hysteresis | | ∆H | 15% typ. | V_{CC} = 4.5 to 16 V (see note 1) |
| Response frequency | | f | 3 kHz min. | $V_{\rm CC}$ = 4.5 to 16 V, I_F = 15 mA, I_{\rm OL} = 16 mA (see note 2) |
| Response delay time | | t _{PLH} (t _{PHL}) | 3 μs typ. | $V_{\rm CC}$ = 4.5 to 16 V, I_F = 15 mA, I_{\rm OL} = 16 mA (see note 3) |
| Response delay time | | t _{PHL} (t _{PLH}) | 20 µs typ. | V_{CC} = 4.5 to 16 V, $I_{\rm F}$ = 15 mA, I_{OL} = 16 mA (see note 3) |

OMRON

Dimensions

Note: All units are in millimeters unless stated.



Unless otherwise specified, the tolerances are as shown below.

| Terminal No. | Name |
|--------------|--------------------|
| A | Anode |
| К | Cathode |
| V | Power supply (Vcc) |
| 0 | Output (OUT) |
| G | Ground (GND) |

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.125 |
| 3 < mm ≤ 6 | ±0.150 |
| 6 < mm ≤ 10 | ±0.180 |
| 10 < mm ≤ 18 | ±0.215 |
| 18 < mm ≤ 30 | ±0.260 |

Photomicrosensor-Transmissive - EE-SX493

I ⊨ (mA)

current

Ē

Forw

OU(V)

ge

olta

output

evel

NO 0.00

8

PLH (

-

H

-

time

delay

Se Respon

>

- Note: 1. Hysteresis denotes the difference in forward LED current value, expressed in percentage, calculated from the respective forward LED currents when the photo IC in turned from ON to OFF and when the photo IC in turned from OFF to ON.
 - 2. The value of the response frequency is measured by rotating the disk as shown below.





delay time.

Engineering Data







Ambient temperature Ta (°C)

Current Consumption vs. Supply Voltage (Typical)



Forward Current vs. Forward Voltage Characteristics (Typical)

> 04 05 0.8

Low-level Output Voltage vs.

Output Current (Typical)

Response Delay Time vs.

Forward Current (Typical)

V_{CC} = 5 V

 $R_L = 330 \Omega$ Ta = 25°C

Ta = -30°C

= 70°C Ta

Forward voltage V_F (V)

12 14

 $a = 25^{\circ}$

¥=15

嘲

Output current I_C (mA)

(EE-SX3

(EE-SX4

V_{CC} = 5 V

15 m

Ta = 25°C

LED Current vs. Supply Voltage (Typical)

3. The following illustrations show the definition of response

OMRON



Low-level Output Voltage vs. Ambient Temperature Characteristics (Typical)



Ambient temperature Ta (°C)

Repeat Sensing Time Position



Photomicrosensor-Transmissive - EE-SX1055

Features

- Longer leads allow the sensor to be mounted to a 1.6-mm thick board.
- 5.4-mm-tall compact model.
- PCB mounting type.
- High resolution with a 0.5-mm-wide aperture.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse forward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter Voltage | V _{CEO} | 30 V |
| | Emitter-Collector Voltage | V _{ECO} | - |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 µs maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

Electrical and Optical Characteristics (Ta = 25°C)

| | Item | | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|--|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | I _R | 0.01 µA typ., 10 µA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | I _F = 20 mA |
| Detector | Light current | IL. | 0.5 mA min., 14 mA max. | $I_F = 20 \text{ mA}, V_{CE} = 10 \text{ V}$ |
| | Dark current | I _D | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0ℓx |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. | $I_{\rm F} = 20 \text{ mA}, I_{\rm L} = 0.1 \text{mA}$ |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CE} = 10 V$ |
| Rising time | | tr | 4 µs typ. | V_{CC} = 5 V, RL = 100 Ω , IL = 5 mA |
| Falling time | | tf | 4 µs typ. | V_{CC} = 5 V, RL = 100 Ω , IL = 5 mA |

Characteristics (Typical)



Forward current I_F (mA)

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



| Unless otherwise specified, t | the tolerances | are as | shown | below |
|-------------------------------|----------------|--------|-------|-------|
|-------------------------------|----------------|--------|-------|-------|

| Terminal No. | Name | Г |
|--------------|-----------|-----|
| L. | Anode | 3 |
| (| Cathode | 3 |
| ; | Collector | 6 |
| | Emitter | 1 |
| | | - 1 |

| Terminal No. | Name |
|--------------|--------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Engineering Data

Forward Current vs. Collector **Dissipation Temperature Rating**

E C

tr, tf (_js)



Ta = -30°C

Ta = 25°C

 $T_a = 70^{\circ}C$



Light Current vs. Forward Current Characteristics (Typical)



OMRON

Light Current vs. Collector-Emitter **Relative Light Current vs. Ambient** Voltage Characteristics (Typical) (Typical)

Rel

60 L

-20

Temperature Characteristics

Forward voltage V_F (V)

02 04 06 08 1

1.2 1.4 1.6 1.8





(Pu) (ID) Dark 0.00 10 20 30 40 50 Ambient temperature Ta (°C)

Response Time vs. Load Resistance Characteristics (Typical)

Sensing Position Characteristics (Typical)

20

Ambient temperature Ta (°C)

40 60 80

I_F = 20 mA V_{CE} = 10 V Ta = 25°C

(Center of optical axis)



-0.5 -0.25 0

Response Time Measurement



0.25 0.5 0.75 1.0 Distance d (mm)

Dark Current vs. Ambient

(Typical)

10.0

Temperature Characteristics

Circuit

Photomicrosensor-Transmissive – EE-SX1046

OMRON

Features

- With a horizontal sensing aperture.
- PCB mounting type.
- High resolution with a 0.5-mm-wide aperture.



■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | I _C | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 µs maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|-------------------------|---|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | I _R | 0.01µA typ., 10 µA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 920 nm typ. | I _F = 20 mA |
| Detector | Light current | IL. | 1.2 mA min., 14 mA Max. | $I_F = 20$ mA, $V_{CE} = 5$ V |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0ℓx |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. | $I_{\rm F} = 20$ mA, $I_{\rm L} = 0.1$ mA |
| | Peak spectral sensitivity wavelength | λ_P | 850 nm typ. | $V_{CC} = 10 V$ |
| Rising time | | tr | 4 μs typ. | V_{CC} = 5 V, R_L = 100 $\Omega,~I_L$ = 5 mA |
| Falling time | | tf | 4 µs typ. | V_{CC} = 5 V, R_L = 100 Ω , I_L = 5 mA |

OMRON

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Unless otherwise specified, the tolerances are as shown below.

| Terminal No. | Name |
|--------------|-----------|
| А | Anode |
| к | Cathode |
| С | Collector |
| E | Emitter |

| Dimensions | Tolerence |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Engineering Data





0.2 0.4 0.6 0.8 1 12 14 16 18 Forward voltage VF (V)

Relative Light Current vs. Ambi-

ent Temperature Characteristics

IF = 20 mA

20 40 50 80

I_F = 20 mA V_{CE} = 10 V Ta = 25°C

Ш

Ambient temperature Ta (°C)

Sensing Position Characteristics

(Typical)

(%)

_ +

Light Current vs. Collector-Emitter Voltage Characteristics (Typical)



Response Time vs. Load Resistance Characteristics (Typical)





60 -40 -20

(Typical)

0





OMRON

Dark Current vs. Ambient **Temperature Characteristics** (Typical)



Response Time Measurement Circuit



Photomicrosensor-Transmissive - EE-SX1082

Features

- Horizontal sensing aperture.
- PCB mounting type.
- High resolution with 0.2-mm wide aperture.



OMRON

Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -40°C to 85°C |
| | Storage | Tstg | -40°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 μs maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| | Item | | Value | Condition |
|--------------|--------------------------------------|-----------------------|-------------------------|--|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | I _R | 0.01µA typ., 10 µA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 920 nm typ. | $I_F = 20 \text{ mA}$ |
| Detector | Light current | IL. | 0.12 mA min. | $I_{F} = 20 \text{ mA}, V_{CE} = 5 \text{ V}$ |
| | Dark current | I _D | 2 nA typ., 200 nA max. | V_{CE} = 10 V, 0 ℓx |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.08 V typ., 0.4 V max. | $I_F=20~mA,~I_L=0.05~\mu A$ |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{\rm CC} = 10 \text{ V}$ |
| Rising time | | tr | 100 µs typ. | V_{CC} = 5 V, R_L = 50 kΩ, I_L = 0.1 mA |
| Falling time | | tf | 1,000 µs typ. | $V_{CC} = 5$ V, $R_L = 50$ k Ω , $I_L = 0.1$ mA |

OMRON

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| к | Cathode |
| С | Collector |
| E | Emitter |

Unless otherwise specified, the tolerances are ±0.02 mm

Engineering Data

Forward Current vs. Collector



Light Current vs. Forward Current Characteristics (Typical)

OMRON







Light Current vs. Collector-Emitter Voltage Characteristics (Typical)



Response Time vs. Load Resis-

tance Characteristics (Typical)

tf (µs)

Ŧ, time

Response

IF = 20 mA (%) _ ant light curr e/e Sel

Relative Light Current vs. Ambi-

ent Temperature Characteristics

0.2

(Typical)

60 40

-20

Dark Current vs. Ambient **Temperature Characteristics** (Typical)



Response Time Measurement Circuit



(Typical) I_F = 20 mA V_{CE} = 10 V Ta = 25°C

Ambient temperature Ta (°C)

Sensing Position Characteristics

0 20 40 60 80

(Center of

optical axis)

0.3

100



0.2 Distance d (mm)

773

Photomicrosensor-Transmissive – EE-SX1106

OMRON

Features

- Ultra compact with a slot width of 3 mm.
- PCB mounting type.
- High resolution with 0.4-mm wide aperture.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|--------------------|
| Emitter | Forward current | l _F | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | - |
| | Reverse Voltage | V _R | 5 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | 4.5 V |
| | Collector current | Ic | 30 mA |
| | Collector dissipation | P _C | 80 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 85°C |
| Soldering temperature | | Tsol | 260°C (see note 2) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. Complete soldering within 3 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|------------------------|--|
| Emitter | Forward voltage | V _F | 1.3 V typ., 1.6 V max. | $I_F = 50 \text{ mA}$ |
| | Reverse current | I _R | 10 µA max. | $V_R = 5 V$ |
| | Peak emission wavelength | λ _P | 950 nm typ. | $I_F = 50 \text{ mA}$ |
| Detector | Light current | IL. | 0.2 mA min. | $I_F=20\ mA,\ V_{CE}=5\ V$ |
| | Dark current | I _D | 500 nA max. | V _{CE} = 10 V, 0 ℓx |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.4 V max. | I_F = 20 mA, I_L = 0.1 μA |
| | Peak spectral sensitivity wavelength | λ_P | 800 nm typ. | $V_{CE} = 5 V$ |
| Rising time | | tr | 10 µs typ. | $V_{CC}=5~V,~R_L=100\Omega,~I_L=20~mA$ |
| Falling time | | tf | 10 µs typ. | V_{CC} = 5 V, R_L = 100 Ω , I_L = 20 mA |

Dimensions

Note: All units are in millimeters unless otherwise indicated.



| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

Unless otherwise specified, the tolerances are \pm 0.2 mm.

Ta = 25°C

Forward current IF (mA)

Light Current vs. Forward Current

Characteristics (Typical)

Dark Current vs. Ambient

(Typical)

30 -20

Temperature Characteristics

Engineering Data







Ambient temperature Ta (°C) Light Current vs. Collector-Emitter Voltage Characteristics (Typical)







Collector-Emitter voltage V_{CE} (V)

Response Time vs. Light Current Characteristics (Typical)









Forward Current vs. Forward

Voltage Characteristics (Typical)



Forward voltage VF (V) Relative Light Current vs. Ambient Temperature Characteristics (Typical)



Ambient temperature Ta (°C)

Sensing Position Characteristics (Typical)





20 30 40 50 60 70 80 9 Ambient temperature Ta (°C)



Features

- Ultra-compact with a 6-mm-wide sensor and a 3-mm-wide slot.
- PCB surface mounting type.
- High resolution with a 0.5-mm-wide aperture.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|---------------------|---------------------------|------------------|--------------------|
| Emitter | Forward current | IF | 25 mA (see note 1) |
| | Pulse forward current | I _{PF} | 100 A (see note 2) |
| | Reverse Voltage | V _R | 5 V |
| Detector | Collector-Emitter Voltage | V _{CEO} | 20 V |
| | Emitter-Collector Voltage | V _{ECO} | 5 V |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 75 mW (see note 1) |
| Ambient temperature | Operating | Topr | -30°C to 85°C |
| | Storage | Tstg | -40°C to 90°C |
| | Reflow soldering | Tsol | 240°C (see note 3) |
| | Manual soldering | Tsol | 300°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. Duty: 1/100: Pulse width: 0.1 ms

3. Complete soldering within 10 seconds for reflow soldering and within 3 seconds for manual soldering.

Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|--|--|
| Emitter | Forward voltage | V _F | 1.1 V typ., 1.3 V max. | I _F = 5 mA |
| | Reverse current | IR | 10 µA max. | $V_R = 5 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | I _F = 20 mA |
| Detector | Light current | IL. | 50 μA min., 150 μA max. 500 μA max. | $I_F = 5$ mA, $V_{CE} = 5$ V |
| | Dark current | ID | 100 nA max. | $V_{CE} = 10$ V, 0 ℓx |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 max. | $I_F=20 \text{ mA}, \ I_L=50 \ \mu\text{A}$ |
| | Peak spectral sensitivity wavelength | λ _P | 900 nm typ. | - |
| Rising time | | tr | 10 μs typ. | V_{CC} = 5 V. R_L = 1 k\Omega, I_L = 100 μA |
| Falling time | | tf | 10 µs typ. | V_{CC} = 5 V. R_L = 1 k\Omega, I_L = 100 μA |

Dimensions

Note: All units are in millimeters unless otherwise indicated.



| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| C | Collector |
| E | Emitter |

Unless otherwise specified, the tolerances are ± 0.15mm

1 L (%)

ent

CI

light

vel

Rel

1 L (%)

current |

Relative light

0.6 -0.4 -0.2

0 40

Engineering Data

Forward Current vs. Collector **Dissipation Temperature Rating**

Ambient temperature Ta (°C)

Light Current vs. Collector-Emitter

Voltage Characteristics (Typical)

F (mA)

t curro

1 L (mA)

t

uno

ight

-20

Forward Current vs. Forward Voltage Characteristics (Typical)



Ta=25'C

k=10mA

k=6mA



Relative Light Current vs. Ambient

Temperature Characteristics (Typical)

Light Current vs. Forward Current Characteristics (Typical)

OMRON



Forward current I_F (mA) Dark Current vs. Ambient Temperature Characteristics (Typical)



Ambient temperature Ta (°C)

Sensing Position Characteristics (Typical)

tr, tf (µs) time Re

Collector-Emitter voltage VCE (V)

Response Time vs. Load Resistance

Characteristics (Typical)

Load resistance RL (kΩ) **Response Time Measurement Circuit**





Sensing Position Characteristics (Typical)

Ir=5mA Vct=5V

-10+

0.2

Distance d (mm)

Ir=5mA J -12-09 -0.6 -0.3 0 0.3 0.6 0.9 1.



L(%) t



Tape and Reel

Unit: mm (inch).

Reel

Tape





Tape configuration



Tape quantity 1,000 pcs./reel

Photomicrosensor-Transmissive – EE-SX1109

OMRON

Precautions

Soldering Information

Reflow soldering

- The following soldering paste is recommended: Melting temperature: 178 to 192°C
 - Composition: Sn 63%, Pb 37%
- The recommended thickness of the metal mask for screen printing is between 0.2 and 0.25 mm.
- Set the reflow oven so that the temperature profile shown in the following chart is obtained for the upper surface of the product being soldered.



Manual soldering

- Use "Sn 60" (60% tin and 40% lead) or solder with silver content.
- Use a soldering iron of less than 25W, and keep the temperature of the iron tip at 300°C or below.
- Solder each point for a maximum of three seconds.
- After soldering, allow the product to return to room temperature before handling it.

Storage

To protect the product from the effects of humidity until the package is opened, dry-box storage is recommended. If this is not possible, store the product under the following conditions: Temperature: 10 to 30°C

Humidity: 60% max.

The product is packed in a humidity-proof envelope. Reflow soldering must be done within 48 hours after opening the envelope, during which time the product must be stored under 30°C at 80% maximum humidity.

If it is necessary to store the product after opening the envelope, use dry-box storage or reseal the envelope.

Baking

If a product has remained packed in a humidity-proof envelope for six months or more, or if more than 48 hours have lapsed since the envelope was opened, bake the product under the following conditions before use:

> Reel: 60°C for 24 hours or more Bulk: 80°C for 4 hours or more

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Anode

Cathode Collector

Emitter

Name

Terminal No.

С

| Unless otherwise sp | pecified the tolerances | are ±0.2mm. |
|---------------------|-------------------------|-------------|
|---------------------|-------------------------|-------------|

Features

- General-purpose model with a 3-mm-wide slot.
- PCB mounting type.
- High resolution with a 0.5-mm-wide aperture.
- With a positioning boss.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | 1A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -40°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25° C.

2. The pulse width is 10 μs maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|--------------|--|-----------------------|--|--|
| Emitter | ter Forward voltage | | 1.2 V typ., 1.4 V max. | I _F = 30 mA |
| | Reverse current | I _R | 0.01 µA typ., 10 µA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | $I_F = 20 \text{ mA}$ |
| Detector | Light current | IL. | 0.5 mA min., 14 mA max. | $I_{F} = 20 \text{ mA}, V_{CE} = 5 \text{ V}$ |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 20 V, 0 ℓ _X |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. | $I_F=40\ m\text{A},\ I_L=0.5m\text{A}$ |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CE} = 10 V$ |
| Rising time | ng time tr $4 \ \mu s \ typ.$ $V_{CC} =$ | | V_{CC} = 5 V, R_L = 100 $\Omega,~I_L$ = 5 mA | |
| Falling time | Falling time | | 4 µs typ. | V_{CC} = 5 V, R_L = 100 $\Omega,~I_L$ = 5 mA |

Engineering Data





0.8 1.2 1.4 1.6 Forward voltage VF (V)

Light Current vs. Collector-Emitter Voltage Characteristics (Typical)



Response Time vs. Load Resis-

tance Characteristics (Typical)

time tr, tf (µs)

Response

Relative Light Current vs. Ambient Temperature Characteristics (Typical)



Sensing Position Characteristics (Typical)





Distance d (mm)



Dark Current vs. Ambient **Temperature Characteristics** (Typical)

Forward current IF (mA)



Response Time Measurement

Circuit



Photomicrosensor-Transmissive - EE-SX398/-SX498 OMRON

Features

Incorporates an IC chip with a built-in detector element and amplifier.

Incorporates a detector element with a built-in temperature compensation circuit.

- A wide supply voltage range: 4.5 to 16 VDC
- Directly connects with C-MOS and TTL.
- High resolution with a 0.5-mm-wide sensing aperture.
- Dark ON model (EE-SX398)
- Light ON model (EE-SX498)

Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|--------------------------------|------------------|---------------------|
| Emitter | Forward current | l _F | 50 mA (see note 1) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Power supply voltage | V _{cc} | 16 V |
| Output voltage | | V _{OUT} | 28 V |
| | Output current | I _{OUT} | 16 mA |
| | Permissible output dissipation | Pout | 250 mW (see note 1) |
| Ambient temperature | Operating | Topr | -40°C to 75°C |
| | Storage | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | 260°C (see note 2) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| | Item | | Value | Condition |
|---------------------|---|--------------------------------------|--------------------------|---|
| Emitter | Forward voltage | VF | 1.2 V typ., 1.5 V max. | I _F = 20 mA |
| | Reverse current | I _R | 0.01 µA typ., 10 µA max. | $V_{R} = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | I _F = 20 mA |
| Detector | Low-level output voltage | V _{OL} | 0.12 V typ., 0.4 V max. | |
| | High-level output voltage | V _{OH} | 15 V min. | Vcc = 16 V, R_L = 1 k Ω , I_F = 5 mA (EE-SX398), I_F = 0 mA (EE-SX498) |
| | Current consumption | I _{cc} | 3.2 mA typ., 10 mA max. | $V_{CC} = 16 V$ |
| | Peak spectral sensitivity wavelength | λ _P | 870 nm typ. | V_{CC} = 4.5 to 16 V |
| LED current | LED current when output is OFF LED current when output is ON | | 2 mA typ., 5 mA max. | V _{CC} = 4.5 to 16 |
| Hysteresis | | ∆H | 15% typ. | V _{CC} = 4.5 to 16 V (see note 1) |
| Response frequency | | f | 3 kHz min. | $V_{\rm CC}$ = 4.5 to 16 V, I_F = 15 mA, I_{\rm OL} = 16 mA (see note 2) |
| Response delay time | | t _{PLH} (t _{PHL}) | 3 μs typ. | $V_{\rm CC}$ = 4.5 to 16 V, I_F = 15 mA, I_{\rm OL} = 16 mA (see note 3) |
| Response de | Response delay time | | 20 µs typ. | V_{CC} = 4.5 to 16 V, I_{F} = 15 mA, I_{OL} = 16 m (see note 3) |



IL (mA)

ight current

Light Current vs. Forward Current Characteristics (Typical)

OMRON

Ta = 25°C VCE = 51

Dimensions

Note: All units are in millimeters unless otherwise indicated.





Unless otherwise specified, the tolerances are as shown below.

| Terminal No. | Name |
|--------------|--------------------|
| A | Anode |
| к | Cathode |
| V | Power supply (Vcc) |
| 0 | Output (OUT) |
| G | Ground (GND) |

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Photomicrosensor-Transmissive – EE-SX398/-SX498 OMRON

- Note: 1. Hysteresis denotes the difference in forward LED current value, expressed in percentage, calculated from the respective forward LED currents when the photo IC in turned from ON to OFF and when the photo IC in turned from OFF to ON.
 - 2. The value of the response frequency is measured by



rotating the disk as shown below.



3. The following illustrations show the definition of response

delay time. The value in the parentheses applies to the

Engineering Data

Note: The values in the parentheses apply to the EE-SX498.



04 05 0.5

LED Current vs. Ambient Temper-



ature Characteristics (Typical)

Ambient temperature Ta (°C)

Current Consumption vs. Supply



Forward Current vs. Forward Voltage Characteristics (Typical) (MM)

F (mA)

current

ē

LED Current vs. Supply Voltage (Typical)



EE-SX498.

Low-level Output Voltage vs. **Output Current (Typical)**



Output current I_C (mA)

Response Delay Time vs. Forward Current (Typical)



788

 $Ta = 25^{\circ}C$



Low-level Output Voltage vs. Ambient Temperature Characteristics (Typical)



Ambient temperature Ta (°C)

Repeat Sensing Position Characteristics (Typical)



Photomicrosensor-Transmissive – EE-SV3

OMRON

Features

- High-resolution model with a 0.2-mm-wide or 0.5-mm-wide sensing aperture, highsensitivity model with a 1-mm-wide sensing aperture, and model with a horizontal sensing aperture are available.
- Solder terminal models: EE-SV3/-SV3-CS/-SV3-DS/-SV3-GS
- PCB terminal models: EE-SV3-B/-SV3-C/-SV3-D/-SV3-G



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| lt | em | Symbol | Rated value |
|------------------------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse forward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector Collector-Emitter Voltage | | V _{CEO} | 30 V |
| | Emitter-Collector Voltage | V _{ECO} | - |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 μs maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | | Value | | | Condition |
|--------------|---|-----------------------|---|--------------------------|---|------------------------|---|
| | | | EE-SV3(-B) | EE-SV3-C(S) | EE-SV3-D(S) | EE-SV3-G(S) | |
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 | V max. | | | I _F = 30 mA |
| | Reverse current | I _R | 0.01 µA typ., 1 | Э.01 μA typ., 10 μA max. | | | $V_R = 4 V$ |
| | Peak emission wavelength | λρ | 940 nm typ. | 940 nm typ. | | | I _F = 20 mA |
| Detector | Light current | IL. | 0.5 to 14 mA | 1 to 28 mA | 0.1 mA min. | 0.5 to 14 mA | $I_F = 20 \text{ mA},$ $V_{CE} = 10 \text{ V}$ |
| | Dark current | I _D | 2 nA typ., 200 | 2 nA typ., 200 nA max. | | | $V_{CE} = 10 \text{ V}, 0 \ell x$ |
| | Leakage current | ILEAK | - | | | | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. – 0.1 V typ. 0.4 V max. | | $I_F = 20 \text{ mA}, \\ I_L = 0.1 \mu\text{A}$ | | |
| | Peak spectral sensitivity wavelength | λρ | 850 nm typ. | | | V _{CE} = 10 V | |
| Rising time | | tr | 4 μs typ. | | | | $V_{CC} = 5 V$, |
| Falling time | | tf | 4 μs typ. | | | | $I_L = 5 \text{ mA}$ |

OMROF

Dimensions

Note: All units are in millimeters unless otherwise indicated.



| Model | Aperture (a x b) |
|-------------|------------------|
| EE-SV3(-B) | 2.1 x 0.5 |
| EE-SV3-C(S) | 2.1 x 1.0 |
| EE-SV3-D(S) | 2.1 x 0.2 |
| EE-SV3-G(S) | 0.5 x 2.1 |

Unless otherwise specified, the tolerances are as shown below.

| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

| Dimensions | Tolerence |
|--------------|-----------|
| 3 mm max. | ±0.2 |
| 3 < mm ≤ 6 | ±0.24 |
| 6 < mm ≤ 10 | ±0.29 |
| 10 < mm ≤ 18 | ±0.35 |
| 18 < mm ≤ 30 | ±0.42 |

OMRON

Engineering Data





Forward Current vs. Forward

Forward voltage V_F (V)

Light Current vs. Collector-Emitter Voltage Characteristics (EE-SV3(-B))

Ta = 25°C

= 50 mA

= 40 mA





Collector-Emitter voltage V_{CE} (V)

Response Time vs. Load Resistance Characteristics (Typical)



Sensing Position Characteristics (EE-SV3-G(S))







0.2 0.4 0.6 0.8 12 1.4 1.6 1.8

Relative Light Current vs. Ambi-



Ambient temperature Ta (°C)

Sensing Position Characteristics (EE-SV3-D(S))



Sensing Position Characteristics (EE-SV3-C(S))

IF = 20 mA V_{CE} = 10 V Ta = 25°C

10 15

optical a

2.0



Light Current vs. Forward Current Characteristics (Typical)



Dark Current vs. Ambient **Temperature Characteristics** (Typical)



Ambient temperature Ta (°C)

Sensing Position Characteristics (EE-SV3(-B))



Distance d (mm)

Response Time Measurement Circuit



Photomicrosensor-Transmissive - EE-SX1071

OMRON

Features

- General-purpose model with a 3.4-mm-wide slot.
- PCB mounting type.
- High resolution with a 0.5-mm-wide aperture.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Emitter Forward current | | 50 mA (see note 1) |
| | Pulse forward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | I _C | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 µs maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

Electrical and Optical Characteristics (Ta = 25°C)

| | Item | | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|---|
| Emitter | Emitter Forward voltage | | 1.2 V typ., 1.5 V max. | $I_F = 30 \text{ mA}$ |
| | Reverse current | I _R | 0.01 μA typ., 10 μA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | $I_F = 20 \text{ mA}$ |
| Detector | Light current | IL. | 0.5 mA min., 14 mA max. | $I_F=20\ mA,\ V_{CE}=10\ V$ |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0 ℓx |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. | I _F = 20 mA, I _L = 0.1 mA |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CE} = 10 V$ |
| Rising time | | tr | 4 μs typ. | V_{CC} = 5 V. R_L = 100 Ω , I_L = 5 mA |
| Falling time | | tf | 4 μs typ. | $V_{CC}=5$ V. $R_L=100\Omega,\ I_L=5\ mA$ |

ent Temperature Characteristics (Typical) (%)

_

t

LING

ight

(%)

_

ant

curr light

Relative


Note: All units are in millimeters unless otherwise indicated.



| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| C | Collector |
| E | Emitter |

Unless otherwise specified, the tolerances are shown below

| Dimensions | Tolerance |
|-------------|-----------|
| mm max. | ±0.3 |
| 8 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 0 < mm ≤ 18 | ±0.55 |
| 8 < mm ≤ 30 | ±0.65 |

Photomicrosensor-Transmissive - EE-SX1071

(%)

t

3

light

å

60 L -40

Engineering Data





Forward current I_F (mA)

Light Current vs. Collector-Emitter Characteristics (Typical)



Relative Light Current vs. Ambient Temperature Characteristics (Typical)

0.6 0.8

a = -30°C

= 25°C

Ta = 70°C

Dark Current vs. Ambient Temperature Characteristics (Typical)





-20 -10 0 10 20 30 40 50 60 70 80 9 Ambient temperature Ta (°C)

Characteristics (Typical)

Circuit





(Center of optical axis) -+ 0+

0 0.25 0.5 0.75 1.0

Distance d (mm)



Response Time vs. Load Resistance

tr, tf (µs)

ame

Re

Sensing Position Characteristics (Typical)

Response Time Measurement



Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Unless otherwise specified, the tolerances are shown below

| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Features

- General-purpose model with a 3.4-mm-wide slot.
- Mounts to PCBs or connects to connectors.
- High resolution with a 0.5-mm-wide aperture.
- OMRON's XK8-series Connectors can be connected without soldering. Contact your OMRON representative for information on obtaining XK8-series Connectors.



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse forward current | | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| Collector current | | I _C | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 μs maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|-------------------------------------|--------------------------------------|-----------------------|--------------------------|---|
| Emitter Forward voltage | | V _F | 1.2 V typ., 1.5 V max. | $I_F = 30 \text{ mA}$ |
| Reverse current | | I _R | 0.01 μA typ., 10 μA max. | $V_R = 4 V$ |
| Peak emission wavelength | | λ _P | 940 nm typ. | $I_F = 20 \text{ mA}$ |
| Detector | Light current | IL. | 0.5 mA min., 14 mA max. | $I_F=20\ m\text{A},\ V_{CE}=10\ V$ |
| | Dark current | I _D | 2 nA typ., 200 nA max. | V_{CE} = 10 V, 0 ℓx |
| Leakage current | | I _{LEAK} | - | - |
| Collector-Emitter saturated voltage | | V _{CE} (sat) | 0.15 V typ., 0.4 max. | $I_F=20\ m\text{A},\ I_L=0.1\ m\text{A}$ |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CE} = 10 \text{ V}$ |
| Rising time | | tr | 4 μs typ. | V_{CC} = 5 V. R_L = 100 Ω,I_L = 5 mA |
| Falling time | | tf | 4 μs typ. | $V_{CC}=5$ V. $R_L=100\Omega,\ I_L=5\ mA$ |

OMRON

Engineering Data





Light Current vs. Collector-Emitter Characteristics (Typical)



Relative Light Current vs. Ambient **Temperature Characteristics (Typical)**



1.2 1.4

Dark Current vs. Ambient Temperature Characteristics (Typical)



Response Time vs. Load Resistance Characteristics (Typical)

(Typical)

t

ight

Φ





optical axis)

-+-0-+

UU



Response Time Measurement

Circuit

Photomicrosensor-Transmissive – EE-SH3 Series OMRON

Features

- High-resolution model with a 0.2-mm-wide or 0.5-mm-wide sensing aperture. high-sensitivity model with a 1-mm-wide sensing aperture, and model with a horizontal sensing aperture are available.
- Solder terminal models: EE-SH3/-SH3-CS/-SH3-DS/-SH3-GS
- PCB terminal models: EE-SH3-B/-SH3-C/-SH3-D/-SH3-G

Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value | |
|---|---------------------------|------------------|---------------------|--|
| Emitter Forward current I, Pulse forward current I, Reverse Voltage | | l _F | 50 mA (see note 1) | |
| | | I _{FP} | 1 A (see note 2) | |
| | | V _R | 4 V | |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V | |
| | Emitter-Collector voltage | V _{ECO} | - | |
| | Collector current | Ic | 20 mA | |
| | Collector dissipation | Pc | 100 mW (see note 1) | |
| Ambient temperature Operating Storage | | Topr | -25°C to 85°C | |
| | | Tstg | -30°C to 100°C | |
| Soldering temperature | | Tsol | 260°C (see note 3) | |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 µs maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

| Item | | Symbol | | Value | | | |
|--------------|--|-----------------------|---|------------------------|-------------------------|--|--|
| | | | EE-SH3(-B) | EE-SH3 -C(S) | EE-SH3 -D(S) | EE-SH3 -G(S) | |
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 | 1.2 V typ., 1.5 V max. | | | $I_F = 30 \text{ mA}$ |
| | Reverse current | I _R | l _R 0.01 μA typ., 10 μA max. | | | $V_{R} = 4 V$ | |
| | Peak emission wavelength | λ_P | 940 nm typ. | 940 nm typ. | | | $I_F = 20 \text{ mA}$ |
| Detector | Light current | IL. | 0.5 to 14 mA typ. | 1 to 28 mA | 0.1 mA min. | 0.5 to 14 mA | $\begin{array}{l} I_{F}=20 \text{ mA,} \\ V_{CE}=10 \text{ V} \end{array}$ |
| | Dark current | ID | 2 nA typ., 200 nA max. | | | $\begin{array}{l} V_{CE}=10 \ V \\ 0 \ \ell x \end{array}$ | |
| | Leakage current | I _{LEAK} | - | | | | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 max. – 0.1 V typ. 0.4 max. | | 0.1 V typ. 0.4 max. | $I_F = 20 \text{ mA}, \\ I_L = 0.1 \text{ mA}$ | |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | | $V_{CE} = 10 \text{ V}$ | | |
| Rising time | | tr | 4 μs typ. | | | | $V_{CC} = 5 V.$ |
| Falling time | | tf | 4 µs typ. | | $I_L = 5 \text{ mA}$ | | |

Electrical and Optical Characteristics (Ta = 25°C)

-0.5 -0.25 0 0.25 0.5 0.75 1.0

Distance d (mm)

OMRON

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Terminal No.

| Model | Aperture (a x b) | |
|-------------|------------------|--|
| EE-SH3(-B) | 2.1 x 0.5 | |
| EE-SH3-C(S) | 2.1 x 1.0 | |
| EE-SH3-D(S) | 2.1 x 0.2 | |
| EE-SH3-G(S) | 0.5 x 2.1 | |

.2±0.2



| Name | Dimensions |
|-----------|--------------|
| Anode | 3 mm max. |
| Cathode | 3 < mm ≤ 6 |
| Collector | 6 < mm ≤ 10 |
| Emitter | 10 < mm ≤ 18 |
| | 18 < mm < 30 |

799

Unless otherwise specified, the tolerances are shown below

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.2 |
| 3 < mm ≤ 6 | ±0.24 |
| 6 < mm ≤ 10 | ±0.29 |
| 10 < mm ≤ 18 | ±0.35 |
| 18 < mm ≤ 30 | ±0.42 |

8

light

ñ

Engineering Data

Forward Current vs. Collector





Forward Current vs. Forward





OMRON

Light Current vs. Collector-Emitter Characteristics (Typical)



Response Time vs. Load Resistance



Sensing Position Characteristics

(EE-SH3-G(S))





Characteristics (Typical)

Sensing Position Characteristics (EE-SH3(-B))

I_F = 20 mA V_{CE} = 10 V Ta = 25°C IL (%) opfical as ---0it CUL light TU Rela -0.5 -0.25 0.25 Distance d (mm)

Response Time Measurement Circuit





Dark Current vs. Ambient Temperature

Relative Light Current vs. Ambient Temperature Characteristics (Typical)

IF = 20 mA VCE = 5 V

Ambient temperature Ta (°C)

Sensing Position Characteristics (EE-SH3-D(S))

I_F = 20 mA V_{CE} = 10 V Ta = 25°C (%) optical axis ant D idht

-0.2

-0.1

Sensing Position Characteristics (EE-SH3-C(S))



800

0 0.1

Distance d (mm)



Features

High-resolution model with a 0.2-mm-wide sensing aperture, high-sensitivity model with a 1-mm-wide sensing aperture, and model with a horizontal sensing aperture are available.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| | Item | Symbol | Rated value | |
|---|---------------------------|------------------|---------------------|--|
| Emitter Forward current I _F Pulse forward current I _F | | I _F | 50 mA (see note 1) | |
| | | I _{FP} | 1 A (see note 2) | |
| | Reverse Voltage | V _R | 4 V | |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V | |
| | Emitter-Collector voltage | V _{ECO} | - | |
| Collector current | | I _C | 20 mA | |
| | Collector dissipation | Pc | 100 mW (see note 1) | |
| Ambient temperature Operating Storage | | Topr | -25°C to 85°C | |
| | | Tstg | -30°C to 100°C | |
| Soldering temperature | | Tsol | 260°C (see note 3) | |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25° C.

2. The pulse width ia 10 μ s maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | | | Condition |
|--------------|---|-----------------------|-------------------------|------------------------|-------------------------|--|
| | | | EE-SJ3-C | EE-SJ3-D | EE-SJ3-G | |
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V ma | 1.2 V typ., 1.5 V max. | | I _F = 30 mA |
| | Reverse current | I _R | 0.01 μA typ., 10 μA | max. | | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | | | $I_F = 20 \text{ mA}$ |
| Detector | Light current | IL. | 1 to 28 mA typ. | 0.1 mA min. | 0.5 to 14 mA | $\begin{array}{l} I_F = 20 \text{ mA,} \\ V_{CE} = 10 \text{ V} \end{array}$ |
| | Dark current | ID | 2 nA typ., 200 nA max. | | | V _{CE} = 10 V 0ℓ x |
| | Leakage current | I _{LEAK} | - | | - | |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 max. | - | 0.1 V typ., 0.4 max. | $\begin{array}{l} I_F = 20 \text{ mA}, \\ I_L = 0.1 \text{ mA} \end{array}$ |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | | | V _{CE} = 10 V |
| Rising time | | tr | 4 μs typ. | | | $V_{\rm CC} = 5 \text{ V.}$ |
| Falling time | | tf | 4 μs typ. | | | $I_{L} = 10002$, $I_{L} = 5 \text{ mA}$ |

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



| Model | Aperture (a x b) |
|-------------|------------------|
| EE-SH3(-B) | 2.1 x 1.0 |
| EE-SH3-C(S) | 2.1 x 0.2 |
| EE-SH3-D(S) | 0.5 x 2.1 |

OMRON

Unless otherwise specified, the tolerances are shown below

| Terminal No. | Name |
|--------------|-----------|
| А | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

OMRON

Engineering Data

Note: The values in the parentheses apply to EE-SX4070.





Forward voltage VF (V)

Light Current vs. Collector-Emitter Characteristics (EE-SJ3-G)



Response Time vs. Load Resistance Characteristics (Typical)



Sensing Position Characteristics (EE-SJ3-C)







Ambient temperature Ta (°C)

(%)

ent

light

đ

Relativ

Sensing Position Characteristics (EE-SJ3-D)



Distance d (mm)

Circuit







Relative Light Current vs. Ambient Dark Current vs. Ambient Temperature Temperature Characteristics (Typical) Characteristics (Typical)



(EE-SJ3-G)



Response Time Measurement



Sensing Position Characteristics



Distance d (mm)

Photomicrosensor-Transmissive - EE-SX3088/-SX4088 OMRON

Features

- Incorporates an IC chip with a built-in detector element and amplifier.
- A wide supply voltage range: 4.5 to 16 VDC.
- Directly connects with C-MOS and TTL.
- High resolution with a 0.5-mm-wide sensing aperture.
- Dark ON model (EE-SX3081).
- Light ON model (EE-SX4081).
- OMRON's XK8-series Connectors can be connected without soldering. Contact your OMRON representative for information on obtaining XK8-series Connectors.

Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|--------------------------------|------------------|---------------------|
| Emitter | Forward current | l _F | 50 mA (see note 1) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Power supply voltage | V _{cc} | 16 V |
| | Output voltage | V _{OUT} | 28 V |
| | Output current | I _{OUT} | 16 mA |
| | Permissible output dissipation | Pout | 250 mW (see note 1) |
| Ambient temperature | Operating | Topr | -40°C to 75°C |
| | Storage | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | 260°C (see note 2) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. Complete soldering within 10 seconds.

Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------------------------|--------------------------------------|--------------------------------------|--------------------------|--|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 20 mA |
| | Reverse current | I _R | 0.01 μA typ., 10 μA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | $I_F = 20 \text{ mA}$ |
| Detector | Low-level output voltage | V _{OL} | 0.12 V typ., 0.4 V max. | |
| | High-level output voltage | V _{OH} | 15 V min. | |
| | Current consumption | Icc | 3.2 mA typ., 10 mA max. | $V_{CC} = 16 V$ |
| | Peak spectral sensitivity wavelength | λ _P | 870 nm | V_{CC} = 4.5 to 16 V |
| LED current when output is OFF | | I _{FT} | 2 mA typ., 5 mA max. | V _{CC} = 4.5 to 16 V |
| LED current when output is ON | | | | |
| Hysteresis | | ΔH | 15% typ. | $V_{\rm CC}$ = 4.5 to 16 V (see note 1) |
| Response fr | equency | f | 3 kHz min. | $V_{\rm CC}$ = 4.5 to 16 V, $I_{\rm F}$ = 15 mA, $I_{\rm OL}$ = 16mA (see note 2) |
| Response delay time | | t _{PLH} (t _{PHL}) | 3 μs typ. | $V_{\rm CC}$ = 4.5 to 16 V, $I_{\rm F}$ = 15 mA, $I_{\rm OL}$ = 16 mA (see note 3) |
| Response delay time | | t _{PHL} (t _{PLH}) | 20 µs typ. | $V_{\rm CC}$ = 4.5 to 16 V, $I_{\rm F}$ = 15 mA, $I_{\rm OL}$ = 16 mA (see note 3) |



Photomicrosensor-Transmissive - EE-SX3088/-SX4088 OMRON

Dimensions

Note: All units are in millimeters unless otherwise indicated.



805

| Terminal No. | Name |
|--------------|--------------------|
| A | Anode |
| к | Cathode |
| V | Power supply (Vcc) |
| 0 | Output (OUT) |
| G | Ground (GND) |

κО

Α

- Note: 1. Hysteresis denotes the difference in forward LED current value, expressed in percentage, calculated from the respective forward LED currents when the photo IC in turned from ON to OFF and when the photo IC in turned from OFF to ON.
 - 2. The value of the response frequency is measured by rotating the disk as shown below.



| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

3. The following illustrations show the definition of response delay time. The value in the parentheses applies to the EESX4088.



Photomicrosensor-Transmissive - EE-SX3088/-SX4088 OMRON

Engineering Data

Note: The values in the parentheses apply to EE-SX4080.







LED Current vs. Ambient Temperature Characteristics (Typical)



Current Consumption vs. Supply

Voltage (Typical)

Low-level Output Voltage vs. **Output Current (Typical)**

IF (mA)

current

P

5

ab

10

=

outpu

evel

N

(8)

PLH (

-

10

¢ 5

lelav

Se

Re

OL(V) Vcc = 5 V 0 mA (15 mA

2=5

Output current Ic (mA)

Current (Typical)

(MM) Ta = 25°C 0 mA (15 mA CC 2=5 E S

Supply voltage V_{CC} (V)

Response Delay Time vs. Forward

Vcc = 5 V = 330 \ Ta = 25°C 12 (EE-SX3 (EE-SX4DD) 100

Forward current IF (mA)

Low-level Output Voltage vs. Ambient Temperature Characteristics (Typical)







Distance d (mm)

0.00

Photomicrosensor-Transmissive – EE-SG3/EE-SG3-B OMRON

Features

- Dust-proof model.
- Solder terminal model (EE-SG3).
- PCB terminal model (EE-SG3-B).



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse forward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | I _C | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25° C.

2. The pulse width is 10 µs maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|---|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | I _R | 0.01 μA typ., 10 μA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | I _F = 20 mA |
| Detector | Light current | IL. | 2 mA min., 40 mA max. | I_F = 15 mA, V_{CE} = 10 V |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0 ℓx |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 max. | $I_F = 30 \text{ mA}, I_L = 1 \text{ mA}$ |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CE} = 10 \text{ V}$ |
| Rising time | | tr | 4 μs typ. | V_{CC} = 5 V. R_L = 100 $\Omega,~I_L$ = 5 mA |
| Falling time | | tf | 4 µs typ. | V_{CC} = 5 V. R_L = 100 Ω , I_L = 5 mA |

Photomicrosensor-Transmissive – EE-SG3/EE-SG3-B OMRON

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Unless otherwise specified, the tolerances are shown below

| Terminal No. | Name |
|--------------|-----------|
| А | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Photomicrosensor-Transmissive – EE-SG3/EE-SG3-B OINRON

Engineering Data





5 10 0 02 04 06 08 1 12 14 16 18 Forward voltage V_F (V)

Light Current vs. Collector-Emitter Characteristics (Typical)



Response Time vs. Load Resistance

Load resistance RL (kQ)

Characteristics (Typical)

tr, tf (µs)

-5

e c

Relative Light Current vs. Ambient Temperature Characteristics (Typical)



Sensing Position Characteristics (Typical)



Response Time Measurement Circuit

Ambient temperature Ta (°C)

Light Current vs. Forward Current

Forward current IF (mA)

Dark Current vs. Ambient Temperature

Characteristics (Typical)

Ta = 25°C V_{CE} = 10 V

Characteristics (Typical)

(MA)

-

ant

III

Light

10.00

0.00



Photomicrosensor-Transmissive – EE-SX1128

OMRON

Features

- General-purpose model with a 4.2-mm-wide slot.
- PCB mounting type.
- High resolution with a 0.5-mm-wide aperture.
- Horizontal sensing aperture.



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|------------------------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | IF | 50 mA (see note 1) |
| | Pulse forward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector Collector-Emitter Voltage | | V _{CEO} | 30 V |
| | Emitter-Collector Voltage | V _{ECO} | - |
| | Collector current | I _C | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25° C.

2. The pulse width is 10 µs maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|---|
| Emitter | Forward voltage | VF | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | I _R | 0.01 μA typ., 10 μA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | $I_F = 20 \text{ mA}$ |
| Detector | Light current | IL. | 0.5 mA min., 10 mA max. | I _F = 20 mA, V _{CE} = 10 V |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0 ℓx |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 max. | I _F = 20 mA, I _L = 1 mA |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CE} = 10 \text{ V}$ |
| Rising time | | tr | 4 μs typ. | V_{CC} = 5 V. R_L = 100 Ω , I_L = 5 mA |
| Falling time | | tf | 4 µs typ. | V_{CC} = 5 V. R_L = 100 Ω , I_L = 5 mA |

Note: All units are in millimeters unless otherwise indicated.



811

Internal Circuit



| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

Unless otherwise specified, the tolerances are shown below

| Dimensions | Tolerance |
|-------------|-----------|
| 0 < mm ≤ 4 | ±0.100 |
| 4 < mm ≤ 18 | ±0.200 |

Photomicrosensor-Transmissive - EE-SX1128

Engineering Data

(mA)

ц.

ant

1no

Forward Current vs. Collector **Dissipation Temperature Rating**

Forward Current vs. Forward







Light Current vs. Collector-Emitter Voltage Characteristics (Typical)



Relative Light Current vs. Ambient Temperature Characteristics (Typical)



-0.5 -0.25

0

812

Distance d (mm)

Sensing Position Characteristics (Typical)

Response Time Measurement Circuit

I_F = 20 mA V_{CE} = 10 V Ta = 25°C

(Center of optical axis)

0.25 0.5 0.75

Input--111 Vcc $\Rightarrow =$ Outpu RI.

Response Time vs. Load Resistance Characteristics (Typical)





(Typical)

Dark Current vs. Ambient

Temperature Characteristics



1.0

Note: All units are in millimeters unless otherwise indicated.

Features

- General-purpose model with a 5-mm-wide slot.
- PCB mounting type.
- High resolution with a 0.5-mm-wide aperture.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-------------------------|---------------------------|------------------|---------------------|
| Emitter Forward current | | I _F | 50 mA (see note 1) |
| | Pulse forward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 µs maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|--|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | I _R | 0.01 μA typ., 10 μA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | I _F = 20 mA |
| Detector | Light current | IL. | 0.5 mA min., 14 mA max. | $I_{F} = 15 \text{ mA}, V_{CE} = 10 \text{ V}$ |
| | Dark current | ID | 2 nA typ., 200 nA max. | $V_{CE}=10 \text{ V}, 0 \ell x$ |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 max. | $I_F = 20 \text{ mA}, I_L = 1 \text{ mA}$ |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CE} = 10 V$ |
| Rising time | | tr | 4 µs typ. | V_{CC} = 5 V. R_L = 100 $\Omega,~I_L$ = 5 mA |
| Falling time | | tf | 4 µs typ. | V_{CC} = 5 V. R_L = 100 $\Omega,~I_L$ = 5 mA |



Е

Internal Circuit

Dimensions



Unless otherwise specified, the tolerances are shown below

Two, 0.7±0.1 dia.

| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

OMRON

Engineering Data





Forward voltage VF (V)



Light Current vs. Collector-Emitter Characteristics (Typical)



Relative Light Current vs. Ambient Temperature Characteristics (Typical)



1.2 1.4 1.6 1.8

Dark Current vs. Ambient Temperature Characteristics (Typical)



(%)

Ξ

ant

cum

Sel

60 L -20

L (%)

ŧ

5

ight

æ

Response Time vs. Load Resistance Characteristics (Typical)





(Center of

-0.5 -0.25 0 0.25 0.5 0.75 1.0

Distance d (mm)

optical axis) -+0



Response Time Measurement

Circuit

Photomicrosensor-Transmissive - EE-SX1042

OMRON

Features

- 14.5-mm-tall model with a deep slot.
- PCB mounting type.
- High resolution with a 0.5-mm-wide aperture.



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|------------------------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse forward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector Collector-Emitter voltage | | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 µs maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

Electrical and Optical Characteristics (Ta = 25°C)

| | Item | | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|--|
| Emitter | Forward voltage | VF | 1.2 V typ., 1.5 V max. | $I_F = 30 \text{ mA}$ |
| | Reverse current | I _R | 0.01 µA typ., 10 µA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | $I_F = 20 \text{ mA}$ |
| Detector | Light current | IL. | 0.5 mA min., 10 mA max. | I _F = 20 mA, V _{CE} = 10 V |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0ℓ x |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 max. | $I_F = 20 \text{ mA}, I_L = 1 \text{ mA}$ |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CE} = 10 \text{ V}$ |
| Rising time | | tr | 4 μs typ. | V_{CC} = 5 V. R_L = 100 Ω , I_L = 5 mA |
| Falling time | | tf | 4 µs typ. | $V_{CC} = 5 \text{ V. } \text{R}_{L} = 100 \Omega, \text{ I}_{L} = 5 \text{ mA}$ |

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



| | | _ | |
|-------------|---------|---|--------|
| erminal No. | Name | | |
| | Anode | | 3 mm |
| | Cathode | | 3 < mr |

Collector

Emitter

Unless otherwise specified, the tolerances are shown below

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Photomicrosensor-Transmissive - EE-SX1042

Engineering Data

Forward Current vs. Collector **Dissipation Temperature Rating**

Forward Current vs. Forward Voltage Characteristics (Typical)

Ta = -30°C

Ta = 70°C

Light Current vs. Forward Current Characteristics (Typical)

OMRON





Light Current vs. Collector-Emitter Characteristics (Typical)



(91)

Ŧ

÷, ime

Res

Temperature Characteristics (Typical)

0.2 0.4 0.6 0.8

20 40 60

0



Relative Light Current vs. Ambient Dark Current vs. Ambient Temperature

IF = 20 mA VCE = 5 V

80 100

F = 20 mA

V_{CE} = 10 V Ta = 25°C

Forward voltage VF (V)

Characteristics (Typical)



Response Time vs. Load Resistance Characteristics (Typical)

Sensing Position Characteristics (Typical)

60 HO -20

Response Time Measurement





(Center of

optical axis)

Ambient temperature Ta (°C)

Circuit



-0.5 -0.25 0 0.25 0.5 0.75 1.0 Distance d (mm)

817

Features

- General-purpose model with a 5-mm-wide slot.
- PCB mounting type.
- High resolution with a 0.5-mm-wide aperture.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse forward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 160°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 µs maximum with a frequency of 100Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|--------------|-------------------------------------|-----------------------|--------------------------|--|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | I _R | 0.01 µA typ., 10 µA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | I _F = 20 mA |
| Detector | Light current | IL. | 0.5 mA min., 14 mA max | $I_{\rm F} = 20$ mA, $V_{\rm CE} = 10$ V |
| | Dark current | ID | 2 nA typ., 200 nA max. | $V_{CE} = 10 \text{ V}, 0 \ \ell x$ |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. | $I_F=20\ m\text{A},\ I_L=0.1\ m\text{A}$ |
| | Peak spectral sensitivity | λ _P | 850 nm typ. | V _{CE} = 10 V |
| Rising time | | tr | 4 μs typ. | V_{CC} = 5 V, R_L = 100 $\Omega,~I_L$ = 5 mA |
| Falling time | | tf | 4 µs typ. | $V_{CC}=5$ V, $R_L=100~\Omega,~I_L=5~mA$ |

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Unless otherwise specified, the tolerances are as shown below.

| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

| Terminal No. | Name |
|--------------|--------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Engineering Data





Light Current vs. Collector-Emitter Voltage Characteristics (Typical)



Characteristics (Typical)

Relative Light Current vs. Ambient Temperature Characteristics (Typical)

0



Response Time vs. Load Resistance Sensing Position Characteristics (Typical)





20

-0.5 -0.25

Circuit I_F = 20 mA V_{CE} = 10 V Ta = 25°C

0 0.25 0.5 0.75 1.0

Distance d (mm)



Response Time Measurement

Dark Current vs. Ambient Temperature

Ambient temperature Ta (°C)

Characteristics (Typical)

10.00

D(nA)

Dark

0.001

OMRON Photomicrosensor-Transmissive – EE-SX1235A-P2

Features

OMRON

Ta = 25°C V_{CE} = 10 V

- Snap-in mounting model.
- Mounts to 1.0-, 1.2- and 1.6-mm-thick PCBs.
- High resolution with a 0.5-mm-wide aperture.
- 5-mm-wide slot.
- Connects to Tyco Electronics AMP's CT-series connectors.



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|-------------------|
| Emitter | Forward current | I _F | 50 mA (see note) |
| | Pulse forward current | I _{FP} | - |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | 5 V |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -40°C to 100°C |
| Soldering temperature | | Tsol | - |

Note: Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

■ Electrical and Optical Characteristics (Ta = 25°C)

| | Item | | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|---|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | I _R | 0.01 μA typ., 10 μA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | $I_F = 30 \text{ mA}$ |
| Detector | Light current | IL. | 0.6 mA min., 14 mA max. | $I_F = 20$ mA, $V_{CE} = 5$ V |
| | Dark current | ID | 200 nA max. | $V_{CE} = 10$ V, 0 ℓ x |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 max. | $I_F = 20 \text{ mA}, I_L = 0.3 \text{ mA}$ |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | V _{CE} = 5 V |
| Rising time | | tr | 8 µs typ. | V_{CC} = 5 V. R_L = 100 Ω , I_L = 1 mA |
| Falling time | | tf | 8 µs typ. | V_{CC} = 5 V. R_L = 100 $\Omega,~I_L$ = 1 mA |

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Note: The asterisked dimension is specified by datum A only.

Unless otherwise specified, the tolerances are shown below

| Terminal No. | Name |
|--------------|------------------|
| A | Anode |
| С | Collector |
| K, E | Cathode, Emitter |

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Recommended Mating Connectors:

Tyco Electronics AMP 173977-3 (insulation displacement-type connector)

175778-3 (crimp-type connector)

179228-3 (crimp-type connector)

 $T_{P} = -30^{\circ}C$

Ta = 25°C

 $Ta = 70^{\circ}C$

Engineering Data





Light Current vs. Collector-Emitter Characteristics (Typical)



Relative Light Current vs. Ambient

Forward voltage V_F (V)

Temperature Characteristics (Typical)



Dark Current vs. Ambient Temperature **Characteristics (Typical)**



Response Time vs. Load Resistance Characteristics (Typical)

(g)

Ť

E

(Typical)

Sensing Position Characteristics

-0.5 -0.25 0 0.25 0.5 0.75 1.0

Distance d (mm)

I_F = 20 mA V_{CE} = 10 V Ta = 25°C

(Center of optical axis) ---0-



Response Time Measurement Circuit



Input



Photomicrosensor-Transmissive - EE-SX4009-P1

OMRON

- **Features**
- Screw-mounting model.
- High resolution with a 0.5-mm-wide sensing aperture.
- With a 5-mm-wide groove.
- Photo IC output signals directly connect with C-MOS and TTL.
- Connects to Tyco Electronics AMP's El-series connectors.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| | Item | Symbol | Rated value |
|----------------------------|-----------|------------------|-------------------|
| Power supply voltage | | V _{CC} | 10 V |
| Output voltage | | V _{OUT} | 28 V |
| Output current | | I _{OUT} | 16 mA |
| Permissible output dissipa | tion | Pout | 250 mW (see note) |
| Ambient temperature | Operating | Topr | -25°C to 75°C |
| | Storage | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | - |

Note: Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

■ Electrical and Optical Characteristics (Ta = 25°C, Vcc = 5 V ± 10%)

| Item | Symbol | Value | Condition |
|---------------------------|-----------------|--------------------------------|---|
| Current consumption | I _{CC} | 30 mA max. | With and without incident |
| Low-level output voltage | V _{OL} | 0.3 V max. | $I_{OUT} = 16 \text{ mA}$ with incident |
| High-level output voltage | V _{OH} | (V _{CC} x 0.9) V min. | V_{OUT} = V_{CC} without incident, R_{L} = 47 $k\Omega$ |
| Response frequency | f | 3 kHz min. | V_{OUT} = $V_{\text{CC},}R_{\text{L}}$ = 47 k Ω (see note) |

825

Note: The value of the response frequency is measured by rotating the disk as shown below.





Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Unless otherwise specified, the tolerances are shown below

| Terminal No. | Name |
|--------------|--------------------|
| V | Power supply (Vcc) |
| 0 | Output (OUT) |
| G | Ground (GND) |

| Dimensions | Tolerance |
|--------------|-----------|
| 4 mm max. | ±0.2 |
| 1 < mm ≤ 16 | ±0.3 |
| 16 < mm ≤ 63 | ±0.5 |

Recommended Mating Connectors:

Tyco Electronics AMP 171822-3 (crimp-type connector) 172142-3 (crimp-type connector) OMRON EE-1005 (with harness)

OMRON

Engineering Data



EE-1005 Connector



| Number | Name | Model | Quantity | Maker |
|--------|--------------------|--------------|----------|----------------------|
| 1 | Receptacle housing | 171822-3 | 1 | Tyco Electronics AMP |
| 2 | Receptacle contact | 170262-1 | 3 | Tyco Electronics AMP |
| 3 | Lead wire | UL1007 AWG24 | 3 | - |

Wiring

| Connector circuit no. | Lead wire colour | Output when connected to EE-SX4009-P1 |
|-----------------------|------------------|--|
| 1 | Red | V _{cc} |
| 2 | Orange | GND |
| 3 | Yellow | OUT |

Features

- Screw-mounting model.
- High resolution with a 0.5-mm-wide sensing aperture.
- With a 5-mm-wide groove.
- Photo IC output signals directly connect with C-MOS and TTL.
- Connects to Tyco Electronics AMP's CT-series connectors.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value | |
|--------------------------------|-----------|------------------|-------------------|---------------|
| Power supply voltage | | V _{CC} | 7 V | |
| Output voltage | | V _{OUT} | 28 V | |
| Output current | | I _{OUT} | 16 mA | |
| Permissible output dissipation | | P _{OUT} | 250 mW (see note) | |
| Ambient temperature | Operating | | Topr | -20°C to 75°C |
| | Storage | | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | - | |

Note: Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

■ Electrical and Optical Characteristics (Ta = 25°C, Vcc = 5 V ± 10%)

| Item | Symbol | Value | Condition |
|---------------------------|-----------------|--------------------------------|--|
| Current consumption | I _{CC} | 30 mA max. | With and without incident |
| Low-level output voltage | V _{OL} | 0.3 V max. | I _{OUT} = 16 mA with incident |
| High-level output voltage | V _{OH} | (V _{CC} x 0.9) V min. | V_{OUT} = V_{CC} without incident, R_{L} = 47 $k\Omega$ |
| Response frequency | f | 3 kHz min. | V_{OUT} = $V_{\text{CC},}R_{\text{L}}$ = 47 k Ω (see note) |

Note: The value of the response frequency is measured by rotating the disk as shown below.



Engineering Data

Output Allowable Dissipation vs. Ambient Temperature Characteristics







Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Unless otherwise specified, the tolerances are shown below

| Terminal No. | Name |
|--------------|--------------------|
| V | Power supply (Vcc) |
| 0 | Output (OUT) |
| G | Ground (GND) |

Recommended Mating Connectors:

Tyco Electronics AMP 179228-3 (crimp-type connector) 175778-3 (crimp-type connector) 173977-3 (press-fit connector)

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Photomicrosensor-Transmissive – EE-SX3081/-SX4081 OIIROI

Features

- Incorporates an IC chip with a built-in detector element and amplifier.
- Incorporates a detector element with built-in temperature compensation circuit.
- A wide supply voltage range: 4.5 to 16 VDC
- Directly connects with C-MOS and TTL.
- High resolution with a 0.5-mm-wide sensing aperture.
- Dark ON model (EE-SX3081)
- Light ON model (EE-SX4081.

Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| | Item | | Rated value |
|-----------------------|--------------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Power supply voltage | V _{CC} | 16 V |
| | Output voltage | V _{OUT} | 28 V |
| | Output current | lout | 16 mA |
| | Permissible output dissipation | P _{OUT} | 250 mW (see note 1) |
| Ambient temperature | Operating | Topr | -40°C to 75°C |
| | Storage | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | 260°C (see note 2) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. Complete soldering within 10 seconds.



Photomicrosensor-Transmissive - EE-SX3081/-SX4081 OMRON

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Unless otherwise specified, the tolerances are as shown below

| Terminal No. | Name |
|--------------|--------------------|
| A | Anode |
| К | Cathode |
| V | Power supply (Vcc) |
| 0 | Output (OUT) |
| G | Ground (GND) |

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

- Note: 1. Hysteresis denotes the difference in forward LED current value, expressed in percentage, calculated from the respective forward LED currents when the photo IC in turned from ON to OFF and when the photo IC in turned from OFF to ON.
 - 2. The value of the response frequency is measured by rotating the disk as shown below.



 The following illustrations show the definition of response delay time. The value in the parentheses applies to the EESX4081.



Photomicrosensor-Transmissive – EE-SX3081/-SX4081 OMRON

Engineering Data

Note: The values in the parentheses apply to EE-SX4081.





Forward voltage VF (V)

LED Current vs. Ambient Temperature Characteristics (Typical)



Current Consumption vs. Supply

Ta = 25°C

Supply voltage V_{CC} (V)

= 0 mA (15 mA)

Voltage (Typical)

(mA)

00

S

con

Current o

Low-level Output Voltage vs. Output Current (Typical)



Output current I_C (mA)

Response Delay Time vs. Forward Current (Typical)





LED Current vs. Supply Voltage

FT OFF (IFT ON)

IFT ON (IFT OF

Low-level Output Voltage vs. Ambient Temperature Characteristics (Typical)

Supply voltage Vcc (V)

100 = 51

0 mA (15 mA)

 $T_a = 25^{\circ}C$ $R_L = 1 k\Omega$

2=6

(Typical)

I FT(mA)

current

Ē

V ou(V)

put

level

MO

Distance d (mm)



Features

- Screw-mounting model.
- High resolution with a 0.5-mm-wide sensing aperture.
- With a 5-mm-wide groove.
- Photo IC output signals directly connect with C-MOS and TTL.
- Connects to US Molex connectors.



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value | |
|--------------------------------|----------------------|------------------|-------------------|---------------|
| Power supply voltage | Power supply voltage | | V _{cc} | 10 V |
| Output voltage | | V _{OUT} | 28 V | |
| Output current | | IOUT | 16 mA | |
| Permissible output dissipation | | P _{OUT} | 250 mW (see note) | |
| Ambient temperature | Operating | | Topr | -25°C to 75°C |
| | Storage | | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | - | |

Note: Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

■ Electrical and Optical Characteristics (Ta = 25°C, Vcc = 5 V ± 10%)

| Item | Symbol | Value | Condition |
|---------------------------|-----------------|--------------------------------|---|
| Current consumption | I _{CC} | 30 mA max. | With and without incident |
| Low-level output voltage | V _{OL} | 0.3 V max. | $I_{OUT} = 16 \text{ mA}$ with incident |
| High-level output voltage | V _{OH} | (V _{CC} x 0.9) V min. | V_{OUT} = V_{CC} without incident, R_{L} = 47 k Ω |
| Response frequency | f | 3 kHz min. | $V_{OUT} = V_{CC,} R_L = 47 \text{ k}\Omega$ (see note) |

Note: The value of the response frequency is measured by rotating the disk as shown below.



Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Unless otherwise specified, the tolerances are shown below

OMRON

| Terminal No. | Name |
|--------------|--------------------|
| V | Power supply (Vcc) |
| 0 | Output (OUT) |
| G | Ground (GND) |

Recommended Mating Connectors:

US Molex

| 50-57-9403 | |
|------------|---------|
| 15-47-4033 | |
| 14-56-2036 | (AWG28) |
| 14-56-2034 | (AWG26) |
| 14-56-2032 | (AWG24) |
| 14-56-2037 | (AWG22) |

Engineering Data

Output Allowable Dissipation vs. Ambient Temperature Characteristics





| Dimensions | Iolerance |
|--------------|-----------|
| 4 mm max. | ±0.2 |
| 4 < mm ≤ 16 | ±0.3 |
| 16 < mm ≤ 63 | ±0.5 |
| | |

835

Photomicrosensor-Transmissive – EE-SX4235A-P2 OMRON

Photomicrosensor-Transmissive – EE-SX4235A-P2 OMRON

Four, R0.5

175489-3

GND OUT

Vcc

(Tyco Electronics AMP)

Snap-in mounting model.

Features

- Mounts to 1.0-, 1.2- and 1.6-mm-thick panels.
- High resolution with a 0.5-mm-wide sensing aperture.
- With a 5-mm-wide slot.
- Photo IC output signals directly connect with C-MOS and TTL.
- Connects to Tyco Electronics AMP's CT-series connectors.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| | Item | | Symbol | Rated value |
|-----------------------------|-----------|------------------|------------------|-------------------|
| Power supply voltage | | | V _{cc} | 7 V |
| Output voltage | | | V _{OUT} | 28 V |
| Output current | | I _{OUT} | 16 mA | |
| Permissible output dissipat | ion | | P _{OUT} | 250 mW (see note) |
| Ambient temperature | Operating | | Topr | -25°C to 75°C |
| | Storage | | Tstg | -40°C to 85°C |
| Soldering temperature | | | Tsol | - |

Note: Refer to the temperature rating chart if the ambient temperature exceeds 25°C

■ Electrical and Optical Characteristics (Ta = 25°C, Vcc = 5 V ± 10%)

| Item | Symbol | Value | Condition |
|---------------------------|-----------------|--------------------------------|--|
| Current consumption | Icc | 16.5 mA max. | With and without incident |
| Low-level output voltage | V _{OL} | 0.35 V max. | $I_{OUT} = 16 \text{ mA}$ with incident |
| High-level output voltage | V _{OH} | (V _{CC} x 0.9) V min. | |
| Response frequency | f | 3 kHz min. | $V_{\text{OUT}}{=}V_{\text{CC},}R_{\text{L}}{=}47~\text{k}\Omega$ (see note) |

Note: The value of the response frequency is measured by rotating the disk as shown below.





(1.2) 0.5 (Aperture +5+5+

7.6±0.2



Internal Circuit



Note: The asterisked dimension is specified by datum A only.

Optica axis

Unless otherwise specified, the tolerances are shown below

| Terminal No. | Name |
|--------------|--------------------|
| V | Power supply (Vcc) |
| 0 | Output (OUT) |
| G | Ground (GND) |

Recommended Mating Connectors:

Dimensions

Note: All units are in millimeters unless otherwise indicated.

(Apertur

Tyco Electronics AMP 179228-3 (crimp-type connector) 175778-3 (crimp-type connector) 173977-3 (press-fit connector)

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Note: Refer to the temperature rating chart if the ambient temperature exceeds 25°C

Engineering Data



Sensing Position Characteristics (Typical)



Recommended Mounting Holes



- When mounting the Photomicrosensor to a panel with a hole opened by pressing, make sure that the hole has no burrs. The mounting strength of the Photomicrosensor will decrease if the hole has burrs.
- When mounting the Photomicrosensor to a panel with a hole opened by pressing, be sure to mount the Photomicrosensor on the pressing side of the panel.
- The mounting strength of the Photomicrosensor will increase if the Photomicrosensor is mounted to a panel with a hole that is only a little larger than the size of the Photomicrosensor, in which case, however, it will be difficult to mount the Photomicrosensor to the panel. The mounting strength of the Photomicrosensor will decrease if the Photomicrosensor is mounted to a panel with a hole that is comparatively larger than the size of the Photomicrosensor, in which case, however, it will be easy to mount the Photomicrosensor to a panel. Other panel. When mounting the Photomicrosensor to a panel, open an appropriate hole for the Photomicrosensor according to the application.

• After mounting the Photomicrosensor to any panel, make sure that the Photomicrosensor does not wobble.

-0---

 When mounting the Photomicrosensor to a molding with a hole, make sure that the edges of the hole are sharp enough, otherwise the Photomicrosensor may fall out.

OMRON

Features

- Wide model with a 8-mm-wide slot.
- PCB mounting type.
- High resolution with a 0.5-mm-wide aperture.



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse forward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 μs maximum with a frequency of 100 Hz.

3. Complete soldering within 10 seconds.

Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|---|
| Emitter | Forward voltage | VF | 1.2 V typ., 1.5 V max. | $I_F = 30 \text{ mA}$ |
| | Reverse current | I _R | 0.01 μA typ., 10 μA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | $I_F = 20 \text{ mA}$ |
| Detector | Light current | IL. | 0.5 mA min., 14 mA max. | $I_F=20\ m\text{A},\ V_{CE}=10\ V$ |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0 ℓx |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 max. | $I_F = 20 \text{ mA}, I_L = 0.1 \text{ mA}$ |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CE} = 10 V$ |
| Rising time | | tr | 4 μs typ. | V_{CC} = 5 V. R_L = 100 Ω , I_L = 5 mA |
| Falling time | | tf | 4 μs typ. | $V_{CC} = 5$ V. $R_L = 100\Omega$, $I_L = 5$ mA |

Note: All units are in millimeters unless otherwise indicated.





| Terminal No. | Name | |
|--------------|-----------|---|
| | Anode | 3 |
| | Cathode | 3 |
| | Collector | 6 |

Emitter

Unless otherwise specified, the tolerances are shown below

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| δ < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Photomicrosensor-Transmissive - EE-SX1070

Engineering Data

Forward Current vs. Collector **Dissipation Temperature Rating**

Forward Current vs. Forward Voltage Characteristics (Typical)





Light Current vs. Collector-Emitter Characteristics (Typical)



Relative Light Current vs. Ambient

0.2 0.4 0.6 0.8 1

٥<u>۲</u>

 $T_{B} = -30^{\circ}C$

Ta = 70°C

Temperature Characteristics (Typical)

IF = 20 mA VCE = 5 V



Dark Current vs. Ambient Temperature Characteristics (Typical)



Response Time vs. Load Resistance Characteristics (Typical)

Sensing Position Characteristics (Typical)

Ambient temperature Ta (°C)

Response Time Measurement Circuit





1 L (%)

light

-20 0 20 40 60 80





OMRON

Distance d (mm)

Photomicrosensor-Transmissive – EE-SX3070/-SX4070 OIRON

Features

- Incorporates an IC chip with a built-in detector element and amplifier.
- Incorporates a detector element with a built-in temperature compensation circuit.
- A wide supply voltage range: 4.5 to 16 VDC
- Directly connects with C-MOS and TTL.
- High resolution with a 0.5-mm-wide sensing aperture.
- Dark ON model (EE-SX3070)
- Light ON model (EE-SX4070)

Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| | Item | Symbol | Rated value |
|-----------------------|--------------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Power supply voltage | V _{CC} | 16 V |
| | Output voltage | V _{OUT} | 28 V |
| | Output current | I _{OUT} | 16 mA |
| | Permissible output dissipation | Pout | 250 mW (see note 1) |
| Ambient temperature | Operating | Topr | -40°C to 75°C |
| | Storage | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | 260°C (see note 2) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. Complete soldering within 10 seconds.



Photomicrosensor-Transmissive - EE-SX3070/-SX4070 OMRON

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Unless otherwise specified, the tolerances are shown below

| Terminal No. | Name |
|--------------|--------------------|
| A | Anode |
| К | Cathode |
| V | Power supply (Vcc) |
| 0 | Output (OUT) |
| G | Ground (GND) |

- Note:1. Hysteresis denotes the difference in forward LED current value, expressed in percentage, calculated from the respective forward LED currents when the photo IC in turned from ON to OFF and when the photo IC in turned from OFF to ON.
 - 2. The value of the response frequency is measured by rotating the disk as shown below.





3. The following illustrations show the definition of response delay time. The value in the parentheses applies to the EESX4070.



Disk

Photomicrosensor-Transmissive - EE-SX3070/-SX4070 OMRON

Engineering Data

Note: The values in the parentheses apply to EE-SX4070.





Forward voltage VF (V)

LED Current vs. Ambient Temperature Characteristics (Typical)



Current Consumption vs. Supply

Ta = 25°C

Supply voltage V_{CC} (V)

0 mA (15 mA)

Voltage (Typical)

(mA)

8

S

ent con

Curr

Low-level Output Voltage vs. Output Current (Typical)



Output current I_C (mA)

Response Delay Time vs. Forward Current (Typical)



Repeat Sensing Position Characteristics (Typical)

LED Current vs. Supply Voltage

IFT OFF (IFT ON)

IFT ON (IFT OFF

Supply voltage V_{CC} (V)

= 5 \

0 mA (15 mA)

Low-level Output Voltage vs. Ambient

Temperature Characteristics (Typical)

 $Ta = 25^{\circ}C$ $R_L = 1 k\Omega$

2=8

(Typical)

I FT(mA)

current

Ē

(V)IO

>

e

put

out

evel

MO



Distance d (mm)

Ambient temperature Ta (°C)

Photomicrosensor-Transmissive – EE-SPX415-P2 OMRON

Features

- Separate LED/Photo IC combinations with 12-mm slot.
- Uses light modulation via built-in amplifier IC.
- Applicable to the PA connector series from JST (Japan Solderless Terminal).



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | Symbol | Rated value | |
|-----------------------|------------------|---------------|--|
| Supply voltage | V _{CC} | 16 VDC | |
| Output voltage | V _{OUT} | 16 V | |
| Output current | I _{OUT} | 50 mA | |
| Soldering temperature | Tsol | -40°C to 80°C | |

■ Electrical and Optical Characteristics (Ta = 25°C, Vcc = 12 V±10%)

| Item | Symbol | Value | | | Unit | Testing Conditions |
|---------------------------|-----------------|------------|-------------|------------|------|---|
| | | EE-SV3(-B) | EE-SV3-C(S) | EE-SV3-D(S | | |
| Current consumption | I _{cc} | - | - | 35 | mA | With/without object |
| Low level output voltage | V _{OL} | 0.01 | 0.2 | 0.4 | V | I _{OUT} = 20 mA without object |
| High level output current | I _{OH} | 0 | - | 40 | mA | V _{OUT} = 12 V with object |
| Ambient illumination | - | 0 | - | 3,000 | ℓx | Sunlight and fluorescent light |
| Response frequency | f | 500 | - | - | Hz | $\label{eq:Vcc0} \begin{array}{l} V_{cc}0 = V_{cc}1 = \\ V_{cc}2 = 12 \ VDC \\ RL = 1.2 \ k\Omega \\ (See note.) \end{array}$ |

Note: The value indicated is that measured by rotating the disk as shown below.



Note: All units are in millimeters unless otherwise indicated.



Engineering Data

Repetitive Sensing Position Characteristics for OUT1 (in horizontal direction, typical)

Repetitive Sensing Position Characteristics for OUT2 (in horizontal direction, typical)



d Output transistor OFF X direction 0.003 mm Oh ON point OFF 0.001 n ON 4.3 3.5 3.9 37 4.1 4.5 Distance (mm)

Internal Circuit



Unless otherwise specified, the tolerances are shown below

| Terminal No. | Name | |
|--------------|------------------------------------|--|
| V | Power supply (Vcc) | |
| 01 | V _{OUT} 1 (Optical axis1) | |
| 02 | V _{OUT} 2 (Optical axis2) | |
| G | Ground (GND) | |

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |
| 30 < mm < 50 | +0.8 |

Photomicrosensor-Transmissive – EE-SX461-P11

OMRON

Features

- Snap-in-mounting model.
- Mounts to 0.8- to 1.6-mm-thick panels.
- With a 15-mm-wide slot.
- Photo IC output signals directly connect with C-MOS and



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|------------------------------|--------------------------------|------------------|-------------------|
| Power supply voltage | | V _{CC} | 7 V |
| Output voltage | | V _{OUT} | 28 V |
| Output current | | IOUT | 16 mA |
| Permissible output dissipati | Permissible output dissipation | | 250 mW (see note) |
| Ambient temperature | Operating | Topr | -25°C to 75°C |
| Storage | | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | - |

Note: Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

■ Electrical and Optical Characteristics (Ta = 25°C, Vcc = 5 V ± 10%)

| Item | | Value | Condition |
|---|-----------------|--------------------------------|---|
| Current consumption | I _{CC} | 35 mA max. | With and without incident |
| Low-level output voltage | V _{OL} | 0.3 V max. | $I_{OUT} = 16 \text{ mA}$ with incident |
| High-level output voltage V _{OH} | | (V _{CC} x 0.9) V min. | V_{OUT} = V_{CC} without incident, R_{L} = 47 $k\Omega$ |
| Response frequency | f | 3 kHz min. | $V_{OUT} = V_{CC,} R_L = 47 \text{ k}\Omega$ (see note) |

Note: The value of the response frequency is measured by rotating the disk as shown below.





Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Unless otherwise specified, the tolerances are shown below

| Terminal No. | Name | | |
|--------------------------------|--------------------|--|--|
| V | Power supply (Vcc) | | |
| 0 | Output (OUT) | | |
| G Ground (GND) | | | |
| Recommended Mating Connectors: | | | |

Tyco Electronics AMP 171822-3 (crimp-type connector) 172142-3 (crimp-type connector) OMRON EE-1005 (with harness)

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Engineering Data

(MM)

PC D

dissipation

able

allow

Output:



EE-1005 Connector



| Number | Name | Model | Quantity | Maker |
|--------|--------------------|--------------|----------|----------------------|
| 1 | Receptacle housing | 171822-3 | 1 | Tyco Electronics AMP |
| 2 | Receptacle contact | 170262-1 | 3 | Tyco Electronics AMP |
| 3 | Lead wire | UL1007 AWG24 | 3 | - |

Wiring

| Connector circuit no. | Lead wire colour | Output when connected to EE-SX461-P11 |
|-----------------------|------------------|--|
| 1 | Red | V _{CC} |
| 2 | Orange | GND |
| 3 | Yellow | OUT |

Recommended Mounting Hole Dimensions and Mounting and **Dismounting Method**



The Photomicrosensor can be mounted to 0.8- to 1.6-mm-thick panels.

Refer to the above mounting hole dimensions and open the mounting holes in the panel to which the Photomicrosensor will be mounted.

Insert into the holes the Photomicrosensor's mounting portions with a force of three to five kilograms but do not press in the Photomicrosensor at one time. The Photomicrosensor can be easily mounted by inserting the mounting portions halfway and then slowly pressing the Photomicrosensor onto the panel.

There are two ways to dismount the Photomicrosensor. Refer to the following.

Dismounting with Screwdriver

Press the mounting hooks of the Photomicrosensor with a flatblade screwdriver as shown in the following illustration and pull up the Photomicrosensor



Dismounting by Hand

Squeeze the mounting tabs as shown in the following illustration and press the mounting tabs upwards.



Pressed mounting holes are ideal for mounting the Photomicrosensor. When mounting the Photomicrosensor to a panel that has pressed mounting holes for the Photomicrosensor, be sure to mount the Photomicrosensor on the pressing side of the panel, otherwise it may be difficult to mount the Photomicrosensor and an insertion force of five to six kilograms may be required.

When mounting the Photomicrosensor to a panel that has mounting holes opened by pressing, make sure that the mounting holes have no burrs, otherwise the lock mechanism of the Photomicrosensor will not work perfectly. After mounting the Photomicrosensor to a panel, be sure to check if the lock mechanism is working perfectly.



Photomicrosensor-Transmissive – EE-SPX414-P1

OMRON

Features

- Wide-width transmissive sensor with 17-mm slot.
- Uses light modulation via built-in amplifier IC.
- Applicable to the PH connector series from JST (Japan Solderless Terminal).



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | Symbol | Rated value | |
|-----------------------|------------------|---------------|--|
| Supply voltage | V _{cc} | 16 VDC | |
| Output voltage | V _{OUT} | 16 V | |
| Output current | I _{OUT} | 50 mA | |
| Operating temperature | Topr | -10°C to 60°C | |
| Storage temperature | Tstg | -40°C to 80°C | |

■ Electrical and Optical Characteristics (Ta = 25°C, Vcc = 12)

| Item | Symbol | Limits | | | Unit | Testing Conditions |
|---------------------------|-----------------|--------|------|------|------|--|
| | | MIN. | TYP. | MAX. | 1 | |
| Current consumption | I _{CC} | - | - | 20 | mA | With/without object |
| Low level output voltage | V _{OL} | 0.01 | 0.2 | 0.4 | V | I _{OUT} = 20 mA without object |
| High level output current | Іон | 0 | - | 40 | mA | V _{OUT} = 12 V with object |
| Response frequency | f | 500 | - | - | Hz | $V_{CC}0 = V_{CC} =$ 12 VDC RL = 1.2 k Ω (See note.) |

Note: The value indicated is that measured by rotating the disk as shown below.



Dimensions

Note: All units are in millimeters unless otherwise indicated.







Unless otherwise specified, the tolerances are shown below

| Terminal No. | Name |
|--------------|--------------------|
| V | Power supply (Vcc) |
| 0 | Output (OUT) |
| G | Ground (GND) |

Recommended Mating Connectors:

JST (Japan Solderless Terminal) PHR-3

03CR-6H 03KR-8M 03KR-6S

| Dimensions | Tolerance | |
|-------------|-----------|--|
| 3 mm max. | ±0.2 | |
| 3 < mm ≤ 16 | ±0.3 | |
| 6 < mm ≤ 63 | ±0.5 | |

Engineering Data



OFF point ON 3.6 3.8 4.0 4.2 4.4 Distance (mm)

Repetitive Sensing Position Characteristics (in vertical direction, typical)

OMRON



Features

- An actuator can be attached.
- PCB mounting type.
- High resolution with a 0.5-mm-wide aperture.



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 250°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 μs maximum with frequency of 100 Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| | Item | | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|---|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | $I_F = 30 \text{ mA}$ |
| | Reverse current | IR | 0.01 µA typ., 10 µA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | I _F = 20 mA |
| Detector | Light current | IL. | 0.5 mA min., 14 mA max. | $I_F = 20 \text{ mA}, V_{CE} = 10 \text{ V}$ |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0 ℓx |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. | I_F = 20 mA, I_L = 0.1 μ A |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CF} = 10 V$ |
| Rising time | | tr | 4 μs typ. | V_{CC} = 5 V, R_L = 100 Ω , I_L = 5 mA |
| Falling time | | tf | 4 μs typ. | V_{CC} = 5 V, R_L = 100 $\Omega,~I_L$ = 5 mA |

IF (mA)

Forward current

.40

-20 0



Light Current vs. Forward Current Characteristics (Typical)



Dark Current vs. Ambient **Temperature Characteristics** (Typical)



Response Time Measurement Circuit



- Note: 1. Make sure that the portions marked with dotted lines have no burrs.
 - 2. The material of the actuator must be selected by considering the infrared permeability of the actuator.



Note: All units are in millimeters unless otherwise indicated.



| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

Unless otherwise specified, the tolerances are ±0.2 mm.

Engineering Data Forward Current vs. Collector **Dissipation Temperature Rating**

Forward Current vs. Forward Voltage Characteristics (Typical)



(%)

_

current

light

0

Sals

(%)

_

t

light

0

Rels

13.7+0. 17+0.2



12 14 16 18 Forward voltage VF (V)

IF = 20 mA VCF = 5 V

Light Current vs. Collector-Emitter Relative Light Current vs. Ambient Temperature Characteristics (Typical)



20

Voltage Characteristics (Typical)

Ambient temperature Ta (°C)

40

Collector-Emitter voltage V_{CE} (V)

Response Time vs. Load Resistance Characteristics (Typical)



Actuator Dimensions

2.5±0.2 dia

٠

1.6-0 1 dia.

(Typical) I_F = 20 mA V_{CE} = 10 V Ta = 25°C

-20

60 40

Sensing Position Characteristics

20 Ambient temperature Ta (°C)

-0.5 -0.25 0 0.25 0.5 0.75 1.0

Distance d (mm)

40 60

(Center of

optical axis)

Note: All units are in millimeters unless otherwise indicated.

Dimensions





| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

| Terminal No. | Name |
|--------------|--------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Features

- An actuator can be attached.
- PCB mounting type.
- High resolution with a 0.5-mm-wide aperture.



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | l _F | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 µs maximum with frequency of 100 Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|--|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | I _R | 0.01 µA typ., 10 µA max. | $V_{R} = 4 V$ |
| | Peak emission wavelength | λ _P | 940 m typ. | I _F = 20 mA |
| Detector | Light current | I _L | 0.5 μA min., 14 μA max. | I_F = 20 mA, V_{CE} = 10 V |
| | Dark current | ID | 2 nA typ., 200 nA max. | $V_{CE}=10~V,~0~\ell x$ |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. | $I_F=20~mA,~I_L=0.1~\mu A$ |
| | Peak spectral sensitivity wavelength | λ_{P} | 850 nm typ. | $V_{CF} = 10 V$ |
| Rising time | | tr | 4 μs typ. | V_{CC} = 5 V, R_L = 100 $\Omega,~I_L$ = 5 mA |
| Falling time | | tf | 4 μs typ. | V_{CC} = 5 V, R_L = 100 $\Omega,~I_L$ = 5 mA |

Engineering Data







Relative Light Current vs. Ambi-

ent Temperature Characteristics

(Typical)

120

(%)

_ Ħ

cun light

Rel

60 40

.20

Forward voltage V_F (V)

40 60 80

Ambient temperature Ta (°C)

-0.5 -0.25 0 0.25 0.5 0.75 1.0

Distance d (mm)

20

Sensing Position Characteristics

F = 20 mA

IF = 20 mA V_{CE} = 10 V Ta = 25°C

(Center of

optical axis)

Light Current vs. Collector-Emitter Voltage Characteristics (Typical)











(mA) _ ant cum ight.

Light Current vs. Forward Current

Characteristics (Typical)

Forward current IF (mA)

Dark Current vs. Ambient **Temperature Characteristics**



Ambient temperature Ta (°C)

Response Time Measurement



- Note: Make sure that the por-1 tions marked with dotted lines have no burrs.
 - 2. The material of the actuator must be selected by considering the infrared permeability of the actuator.



Features

- An actuator can be attached.
- PCB mounting type.
- High resolution with a 0.5-mm-wide aperture.



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | I _C | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -30°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 µs maximum with frequency of 100 Hz.

3. Complete soldering within 10 seconds.

Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|---|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | $I_F = 30 \text{ mA}$ |
| | Reverse current | I _R | 0.01 µA typ., 10 µA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 m typ. | $I_F = 20 \text{ mA}$ |
| Detector | Light current | IL. | 0.5 mA min., 14 mA max. | $I_F = 20$ mA, $V_{CE} = 10$ V |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0 (x |
| | Leakage current | I _{LEAK} | - | - |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. | $I_F=20\ mA,\ I_L=0.1\ mA$ |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CF} = 10 V$ |
| Rising time | | tr | 4 μs typ. | V_{CC} = 5 V, R_L = 100 Ω , I_L = 5 mA |
| Falling time | | tf | 4 μs typ. | V_{CC} = 5 V, R_L = 100 $\Omega,~I_L$ = 5 mA |

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



| Terminal No. | Name |
|--------------|-----------|
| | Anode |
| | Cathode |
| | Collector |
| | Emitter |

Unless otherwise specified, the tolerances are as shown below.

| Terminal No. | Name |
|--------------|--------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Engineering Data

Forward Current vs. Collector **Dissipation Temperature Rating** Forward Current vs. Forward Voltage Characteristics (Typical)

Light Current vs. Forward Current Characteristics (Typical)







Light Current vs. Collector-Emitter Voltage Characteristics (Typical)



60 40 -20 0 Collector-Emitter voltage V_{CE} (V) Ambient temperature Ta (°C)

Response Time vs. Load Resis-**Sensing Position Characteristics** tance Characteristics (Typical) (Typical)

(%)

2

ent

cum

Relative light

(Typical)

(%)

_

ent

LINC

ve light

Sal



Actuator Dimensions



-0.5 -0.25 0

Relative Light Current vs. Ambi-Dark Current vs. Ambient ent Temperature Characteristics **Temperature Characteristics**

IF = 20 mA VCF = 5 V

IF = 20 mA VCE = 10 V Ta = 25°C

ТП

(Center of

optical axis)

0.25 0.5 0.75 1.0

Distance d (mm)

20 40 80 80 100





Ambient temperature Ta (°C)

Response Time Measurement Circuit



863
Photomicrosensor (Actuator Mounted) - EE-SA107-P2 OIRON

Features

- An actuator can be attached.
- Snap-in mounting model.
- Mountable to 1.0, 1.2 and 1.6 mm thick boards.
- Connects to Tyco Electronics AMP's CT series connectors.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | l _F | 50 mA (see note) |
| | Pulse forward current | I _{FP} | - |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{CEO} | 5 V |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -40°C to 85°C |
| Soldering temperature | Soldering temperature | | - |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|--------------------|--------------------------------------|-----------------------|--------------------------|--|
| Emitter | Forward voltage | VF | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | IR | 0.01 μA typ., 10 μA max. | V _R = 4 V |
| | Peak emission wavelength | λρ | 940 nm typ. | I _F = 30 mA |
| Detector | Light current | IL. | 0.5 mA min., 14 mA max. | I _F = 20 mA, V _{CE} = 5 V |
| | Dark current | ID | 200 nA max. | V _{CE} = 10 V, 0 <i>l</i> x |
| | Leakage current | ILEAK | | |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | 0.1 V typ., 0.4 V max. | I _F = 20 mA, I _L = 0.3 mA |
| | Peak spectral sensitivity wavelength | λρ | 850 nm typ. | V _{CE} = 5 V |
| Rising time | 0 | tr | 8 μs typ. | V _{CC} = 5 V, R _L = 100 Ω, I _L = 1 mA |
| Falling time |) | tf | 8 μs typ. | V _{CC} = 5 V, R _L = 100 Ω, I _L = 1 mA |

Photomicrosensor (Actuator Mounted) - EE-SA107-P2 OMRON

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Note: The asterisked dimension is specified by datum A only.

Unless otherwise specified, the tolerances are as shown below.

±0.3

±0.375 ±0.45

±0.55

±0.65

Tolerence

Dimensions

3 mm max.

3 < mm ≤ 6

6 < mm ≤ 10 10 < mm ≤ 18

18 < mm ≤ 30

| Terminal No. | Name |
|--------------|------------------|
| A | Anode |
| С | Collector |
| K, E | Cathode, Emitter |

Recommended Mating Connectors:

Tyco Elctronics AMP 173977-3 (insulation displacement - type connector) 175778-3 (crimp-type connector) 179228-3 (crimp-type connector)

Photomicrosensor (Actuator Mounted) - EE-SA107-P2 OMRON

Engineering Data











1.2 1.4 1.6 1.8 Forward voltage V_F (V) Relative Light Current vs. Ambient Temperature Characteristics (Typical)

0.4 0.6 0.8



Ambient temperature Ta (°C)

1 L (%)

t

ight

Φ

Sel

Sensing Position Characteristics (Typical)



Light Current vs. Forward Current

Forward current I_F (mA)

10 20 30 40 50 60 70 80 9

Innet

Vcc

Output

GND

Ambient temperature Ta (°C)

Dark Current vs. Ambient

.00 .10 0

Response Time Measurement

Temperature Characteristics

Ta = 25°C

VCE = 10 V

Characteristics (Typical)

IL (mA)

ť

Inc

ght

(Typical)

ď

Distance d (mm)

-0.5 -0.25



Note: 1. Make sure that the portions marked with dotted lines have no burrs.

2. The material of the actuator must be selected by considering the infrared permeability of the actuator.



Features

- An actuator can be attached.
- Snap-in mounting model.
- Mounts to 1.0-, 1.2- and 1.6-mm-thick panels.
- High resolution with a 0.5-mm-wide sensing aperture.
- With a 3.6-mm-wide slot.
- Photo IC output signals directly connect with logic circuit and TTL.
- Connects to Tyco Electronics AMP's CT-series connectors.



Specifications -

Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------------|--------------------------------|------------------|-------------------|
| Power supply voltage | | V _{CC} | 7 V |
| Output voltage | | V _{OUT} | 28 V |
| Output current | | I _{OUT} | 16 mA |
| Permissable output dissipat | Permissable output dissipation | | 250 mW (see note) |
| Ambient temperature | Operating | Topr | -20°C to 75°C |
| Storage | | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | - |

Note: Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

■ Electrical and Optical Characteristics (Ta = 25°C, V_{CC} = 5 V ±10%)

| Item | Symbol | Value | Condition |
|---------------------------|--------|--------------------------------|---|
| Current consumption | Icc | 30 mA max. | With and without incident |
| Low-level output voltage | VOL | 0.35 V max. | I _{OUT} = 16 mA with incident |
| High-level output voltage | VOH | (V _{CC} x 0.9) V min. | $V_{OUT} = V_{CC}$ without incident, $R_L = 47 \text{ k}\Omega$ |
| Response frequency | f | 3 kHz min. | $V_{OUT} = V_{CC}$, $R_L = 47 \text{ k}\Omega$ (see note) |

Note: The value of the response frequency is measured by



Photomicrosensor (Actuator Mounted) - EE-SA407-P2 OMRON

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Note: The asterisked dimension is specified by datum A only.

Unless otherwise specified, the tolerances are as shown below.

±0.3

±0.375

±0.45

+0.55

±0.65

Tolerence

| | | Dimensions |
|--------------|---------------------------------|--------------|
| | | 3 mm max. |
| Terminal No. | Name | 3 < mm ≤ 6 |
| V | Power Supply (V _{CC}) | 6 < mm ≤ 10 |
| 0 | Output (OUT) | 10 < mm ≤ 18 |
| G | Ground(GND) | 18 < mm ≤ 30 |

Recommended Mating Connectors:

Tyco Elctronics AMP 179228-3 (insulation displacement - type connector) 175778-3 (crimp-type connector) 173977-3 (crimp-type connector) Photomicrosensor (Actuator Mounted) - EE-SA407-P2 OMRON

Engineering Data





Sensing Position Characteristics

Recommended Mounting Holes



- When mounting the Photomicrosensor to a panel with a hole opened by pressing, make sure that the hole has no burrs. The mounting strength of the Photomicrosensor will decrease if the hole has burrs.
- When mounting the Photomicrosensor to a panel with a hole opened by pressing, be sure to mount the Photomicrosensor on the pressing side of the panel.
- The mounting strength of the Photomicrosensor will increase if the Photomicrosensor is mounted to a panel with a hole that is only a little larger than the size of the Photomicrosensor, in which case, however, it will be difficult to mount the Photomicrosensor to the panel. The mounting strength of the Photomicrosensor will

Actuator Dimensions



decrease if the Photomicrosensor is mounted to a panel with a hole that is comparatively larger than the size of the Photomicrosensor, in which case, however, it will be easy to mount the Photomicrosensor to the panel. When mounting the Photomicrosensor to a panel, open an appropriate hole for the Photomicrosensor according to the application.

- After mounting the Photomicrosensor to any panel, make sure that the Photomicrosensor does not wobble.
- When mounting the Photomicrosensor to a molding with a hole, make sure that the edges of the hole are sharp enough, otherwise the Photomicrosensor may come fall out.

| Note: | 1. | Make sure that the portions | | | | |
|-------|----|-----------------------------|--------|--------|-------|--|
| | | marked | with | dotted | lines | |
| | | have no | burrs. | | | |

 The material of the actuator must be selected by considering the infrared permeability of the actuator. Ultra-compact model.



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|--------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | 5 V |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 75 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -40°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 μs maximum with frequency of 100 Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|---|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 20 mA |
| | Reverse current | I _R | 0.01 µA typ., 10 µA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | $I_F = 4 \text{ mA}$ |
| Detector | Light current | IL. | 50 μA min., 300 μA max. | $ I_F = 4 \text{ mA}, V_{CE} = 2 \text{ V} \\ Aluminum-deposited surface, \\ d = 1 \text{ mm} (see note 1) $ |
| | Dark current | ID | 2 nA typ., 200 nA max. | V_{CE} = 10 V, 0 ℓx |
| | Leakage current | I _{LEAK} | 200 nA max. | $I_F = 4 \text{ mA}, V_{CE} = 2 \text{ V}$ with no reflection |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | - | - |
| | Peak spectral sensitivity wavelength | λ _P | 930 nm typ. | $V_{CF} = 10 \text{ V}$ |
| Rising time | | tr | 35 µs typ. | $V_{CC} = 2 \text{ V}, \text{R}_{\text{L}} = 1 \text{k}\Omega, \text{I}_{\text{L}} = 100 \mu\text{A}$ |
| Falling time | | tf | 25 µs typ. | V_{CC} = 2 V, R_L = 1 k\Omega, I_L = 100 μA |

Note: The letter 'd' indicates the distance between the top surface of the sensor and the sensing object.

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

Unless otherwise specified, the tolerances are ± 0.15 mm.

Light Current vs. Collector-Emitter

IF=15 m/

IF=10 mA

IF=7 mA

IF=4 mA

IF=2 mA

6

Response Time vs. Load Resistance

Characteristics (Typical)

Relative Light Current vs.

Card Moving Distance (1)

White Black

0 1 2 3 4 5 6

+- 1-0 -

IF = 4 mA

VCE = 2 V

d = 1 mm

Ta = 25°C

Collector-Emitter voltage V_{CE} (V)

10

-470 0

Voltage Characteristics (Typical)

a = 25°C = 1 mm ensing object uminum-decr

Engineering Data



Ambient Temperature

120

(%)

_

0

Rel

-26

Characteristics (Typical)



Dark Current vs. Ambient

(Typical)

10

10

10

10

Input

(M)

_

VCE = 20 V









Relative Collector Current vs. Card Moving Distance (2)



(MI) _ ť cur ight

Light Current vs. Forward Current

Forward current I_F (mA)

Temperature Characteristics



Ambient temperature Ta (°C)

Sensing Distance Characteristics (Typical)



Response Time Measurement Circuit

--¢.

≤ R.





Features

- Ultra-compact model.
- PCB surface mounting type.



OMRON

Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-----------------------|---------------------------|------------------|--------------------|
| Emitter | Forward current | IF | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | 5 V |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 75 mW (see note 1) |
| Ambient temperature | Operating | Topr | -25°C to 85°C |
| | Storage | Tstg | -40°C to 100°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 µs maximum with frequency of 100 Hz.

3. Complete soldering within 10 seconds.

Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|--------------------------|---|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.4 V max. | I _F = 20 mA |
| | Reverse current | I _R | 0.01 µA typ., 10 µA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 950 nm typ. | $I_F = 4 \text{ mA}$ |
| Detector | Light current | IL | 50 μA min., 300 μA max. | $\label{eq:IF} \begin{array}{l} I_{\text{F}} = 4 \text{ mA}, \ V_{\text{CE}} = 2 \ V \\ Aluminum-deposited \ surface, \\ d = 1 \ \text{mm} \ (\text{see note 1}) \end{array}$ |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0 ℓx |
| | Leakage current | I _{LEAK} | 200 nA max. | $I_F = 4 \text{ mA}, V_{CE} = 2 \text{ V}$ with no reflection |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | - | - |
| | Peak spectral sensitivity wavelength | λρ | 930 nm typ. | V _{CF} = 10 V |
| Rising time | | tr | 35 µs typ. | $V_{CC}=2~V,~R_L=1~k\Omega,~I_L=100~\mu A$ |
| Falling time | | tf | 25 µs typ. | V_{CC} = 2 V, R_L = 1 k\Omega, I_L = 100 μA |

Note: The letter 'd' indicates the distance between the top surface of the sensor and the sensing object.

ent Inc Light

Distance d (mm)

Note: All units are in millimeters unless otherwise indicated.







Internal Circuit



| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

Unless otherwise specified, the tolerances are ±0.15 mm

Engineering Data

(mA)

ш.

current

vard

(%)

_

current

light

e Relativ

-40

Relative Light Current vs.

Characteristics (Typical)

Ambient Temperature

Forward Current vs. Collector Dissipation Temperature Rating Light Current vs. Forward Current Characteristics (Typical)



E

ICEO

Current

Dark

(M)

current

Light

Circuit

- 60

(Typical)

20 25 10 15 Forward current I_F (mA) Dark Current vs. Ambient

Temperature Characteristics (Typical)



Response Time vs. Load Resistance

Characteristics (Typical)



Relative Collector Current vs. Card Moving Distance (2)



Sensing object:

Light Current vs. Collector-Emitter Voltage Characteristics (Typical)



Response Time vs. Load Resistance Characteristics (Typical)



Ambient temperature Ta (°C)

 $T_A = 25^{\circ}C$ $I_C = 4 \text{ mA}$

V_{CE} = 2 V d = 1 mm

surface

Distance d (mm)

Response Time Measurement

Sensing object

Aluminum-deposite

Sensing Distance Characteristics

TAu25°C RL=47 kΩ (Ins) RL=1 kΩ Ŧ e 5 a_=470 Ω RL=100 Ω ž 80 100 120 140 160 180 200 220

Light current IL (µA)

Card Moving Distance (1)















Features

- Ultra-compact model.
- PCB surface mounting type.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|----------------------------|---------------------------|------------------|---------------------|
| Emitter Forward current Is | | l _F | 25 mA (see note 1) |
| | Pulse foward current | I _{FP} | 100 mA (see note 2) |
| | Reverse Voltage | V _R | 6 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 18 V |
| | Emitter-Collector voltage | V _{ECO} | 4 V |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | P _C | 75 mW (see note 1) |
| Ambient temperature | Operating | Topr | -30°C to 80°C |
| | Storage | Tstg | -40°C to 85°C |
| | Reflow soldering | Tsol | 220°C (see note 3) |
| | Manual soldering | Tsol | 300°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. Duty: 1/100; Pulse width: 0.1 ms.

3. Complete soldering within 10 seconds for reflow soldering and within 3 seconds for manual soldering.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|---|--|
| Emitter | Forward voltage | V _F | 1.1 V typ., 1.3 V max. | I _F = 4 mA |
| | Reverse current | IR | 10 µA max. | V _R = 6 V |
| | Peak emission wavelength | λ _P | 940 nm typ. | I _F = 20 mA |
| Detector | Light current | I _L | 100 μA min., 150 μA typ., 360 μA max. | Aluminum-deposited surface, I _F = 4 mA, V _{CE} = 2 V, d = 1 mm (see note 1) |
| | Dark current | ID | 100 nA max. | V _{CE} = 10 V, 0 ℓx |
| | Leakage current | I _{LEAK} | 1 μA max. | $I_F=4\ mA,\ V_{CE}=2\ V$ |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | - | - |
| | Peak spectral sensitivity wavelength | λ _P | 900 nm typ. | - |
| Rising time | | tr | 25 μs typ. | V_{CC} = 2 V, R_L = 1 k Ω |
| Falling time | | tf | 30 µs typ. | V_{CC} = 2 V, R_L = 1 k Ω |

Note: The letter 'd' indicates the distance between the top surface of the sensor and the sensing object.

OMRON

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit

Recommended soldering patterns





Unless otherwise specified, the tolerances are $\pm 0.2 \mbox{ mm}.$

| | Terminal No. | Name |
|---|--------------|-----------|
| Ŀ | A | Anode |
| | K | Cathode |
| | С | Collector |
| | E | Emitter |

Engineering Data



Voltage Characteristics (Typical) Ta = 25°C

0.5



Dark Current vs. Ambient Temper-

ature Characteristics (Typical)

(NA)

'n

curr

Dark

10

0.1

-40 -20

Characteristics (Typical)

Light Current vs. Collector-Emitter Voltage Characteristics (Typical)



Response Time vs. Load Resis-

tance Characteristics (Typical)

Load resistance RL (kΩ)

Vcc

Outout

Response Time Measurement

 $\Rightarrow = \zeta$

≶ R.

Response time tr, tf (µs)

10

Circuit

Input Output

> Input

Relative Light Current vs. Ambient Temperature Characteristics (Typical)

.

Forward voltage V_F (V)

0.2 0.4 0.6 0.8



Sensing Distance Characteristics (Typical)



Sensing Position Characteristics (Typical)

20

Ambient temperature Ta (°C)

60 80



Light Current vs. Forward Current



Tape



Tape configuration

+ - 0.2±0.05

· · (1.15)



Tape quantity

3,000 pcs./reel

Photomicrosensor-Reflective - EE-SY193

OMRON

Tape and Reel

Unit: mm (inch).

Reel



Precautions -

Soldering Information

Reflow soldering

- The following soldering paste is recommended:
 - Melting temperature: 178 to 192°C
 - Composition: Sn 63%, Pb 37%
- The recommended thickness of the metal mask for screen printing is between 0.2 and 0.25 mm.
- Set the reflow oven so that the temperature profile shown in the following chart is obtained for the upper surface of the product being soldered.



Manual soldering

- Use "Sn 60" (60% tin and 40% lead) or solder with silver content.
- Use a soldering iron of less than 25W, and keep the temperature of the iron tip at 300°C or below.
- Solder each point for a maximum of three seconds.
- After soldering, allow the product to return to room temperature before handling it.

Storage

To protect the product from the effects of humidity until the package is opened, dry-box storage is recommended. If this is not possible, store the product under the following conditions:

Temperature: 10 to 30°C

Humidity: 60% max.

The product is packed in a humidity-proof envelope. Reflow soldering must be done within 48 hours after opening the envelope, during which time the product must be stored under 30°C at 80% maximum humidity.

If it is necessary to store the product after opening the envelope, use dry-box storage or reseal the envelope.

Baking

If a product has remained packed in a humidity-proof envelope for six months or more, or if more than 48 hours have lapsed since the envelope was opened, bake the product under the following conditions before use:

> Reel: 60°C for 24 hours or more Bulk: 80°C for 4 hours or more

Features

■ 3 mm tall, thin model.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|----------------------------|---------------------------|------------------|---------------------|
| Emitter Forward current IF | | l _F | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -40°C to 85°C |
| | Storage | Tstg | -40°C to 85°C |
| Soldering temperature | Soldering temperature | | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 μs maximum with frequency of 100 Hz.

3. Complete soldering within 10 seconds.

Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------|--------------------------------------|-----------------------|----------------------------|--|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | I _R | 0.01 µA typ., 10 µA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 940 nm typ. | $I_F = 20 \text{ mA}$ |
| Detector | Light current | IL. | 50 μA min., 500 μA max. | $\label{eq:lF} \begin{array}{l} I_{F}=20 \text{ mA}, \ V_{CE}=10 \text{ V} \\ \text{White paper with a relection ratio} \\ \text{of 90\%, d}=3.5 \text{ mm} \ (\text{see note}) \end{array}$ |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0 ℓx |
| | Leakage current | I _{LEAK} | 2 µA max. | $I_F = 20$ mA, $V_{CE} = 10$ V with no reflection |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | - | - |
| | Peak spectral sensitivity wavelength | λρ | 850 nm typ. | V _{CC} = 10 V |
| Rising time | | tr | 30 µs typ. | V_{CC} = 5 V, R_L = 1 k Ω , I_L = 1 mA |
| Falling time | | tf | 30 µs typ. | V_{CC} = 5 V, R_L = 1 k Ω , I_L = 1 mA |

Note: The letter 'd' indicates the distance between the top surface of the sensor and the sensing object.

OMROI

Note: All units are in millimeters unless otherwise indicated.





883

Internal Circuit



| Unless otherwise specified | , the | tolerances | are | as | shown | below. |
|----------------------------|-------|------------|-----|----|-------|--------|
|----------------------------|-------|------------|-----|----|-------|--------|

| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

| Dimensions | Tolerence |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

(MM)

0

5

(M) 40

_

current

ight

(NA)

0

Ħ

CUIT

Dark

(%)

4

current

light (

Relative

350

300 90%

250

200

Engineering Data

(mA)

ш

current

-onward

(%)

_ current

light

g Relativ

0 ----

(Typical)

Forward Current vs. Collector **Dissipation Temperature Rating**

60

I_F = 20 mA V_{CE} = 5 V

Ambient temperature Ta (°C)

Relative Light Current vs.

Characteristics (Typical)

Ambient Temperature



Ta = 25°C V_{CE} = 10 V d = 3.5 mm

Sensing object

White paper with a reflection factor of

Dark Current vs. Ambient

Temperature Characteristics



OMRON





26 20 26 40

Forward current I_F (mA)

Sensing Position Characteristics (Typical)



Ambient temperature Ta (°C)

Sensing Distance Characteristics

Response Time Measurement Circuit



Ambient temperature Ta (°C)

I_F = 20 mA V_{CE} = 10 V Ta = 25°C Sensing object: White paper with a reflection factor of 90% $d_4 = 3 mr$ ----= 5 mm -2.5 3.5

Distance d₂ (mm)



Response Time vs. Load **Resistance Characteristics**



Load resistance R_L (kΩ)

Sensing Angle Characteristics (Typical)

(%)

_

Ħ

B

light

e

å



884

(Typical)

Photomicrosensor-Reflective - EE-SY169B

OMRON

Features

- High-quality model with plastic lenses.
- Highly precise sensing range with a tolerance
- of ±0.6 mm horizontally and vertically. ■ Limited reflective model Red LED.
- Red LED.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value | |
|---------------------------|---------------------------|------------------|---------------------|--|
| Emitter Forward current I | | IF | 40 mA (see note 1) | |
| | Pulse foward current | I _{FP} | 300 mA (see note 2) | |
| | Reverse Voltage | V _R | 3 V | |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V | |
| | Emitter-Collector voltage | V _{ECO} | - | |
| | Collector current | Ic | 20 mA | |
| | Collector dissipation | Pc | 100 mW (see note 1) | |
| Ambient temperature | Operating | Topr | 0°C to 70°C | |
| | Storage | Tstg | -20°C to 80°C | |
| Soldering temperature | | Tsol | 260°C (see note 3) | |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

The pulse width is 10 µs maximum with frequency of 100 Hz.

3. Complete soldering within 10 seconds.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|---------------------------|--------------------------------------|-----------------------|------------------------------|--|
| Emitter Forward voltage V | | V _F | 1.85 V typ., 2.3 V max. | I _F = 20 mA |
| | Reverse current | I _R | 0.01 µA typ., 10 µA max. | $V_R = 3 V$ |
| | Peak emission wavelength | λ _P | 660 nm typ. | I _F = 20 mA |
| Detector | Light current | IL | 16 μA min., 2,000 μA max. | $\label{eq:l_F} \begin{array}{l} I_{F} = 20 \text{ mA}, \ V_{CE} = 5 \text{ V} \\ \text{White paper with a reflection ratio} \\ \text{of 90\%, d} = 4 \text{ mm (see note)} \end{array}$ |
| | Dark current | ID | 2 nA typ., 200 nA max. | $V_{CE} = 5 V, 0 \ell x$ |
| | Leakage current | I _{LEAK} | 2 µA max. | $I_F = 10$ mA, $V_{CE} = 10$ V with no reflection |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | - | - |
| | Peak spectral sensitivity wavelength | λ _P | 850 nm typ. | $V_{CC} = 5 V$ |
| Rising time | | tr | 30 µs typ. | $V_{CC}=5~V,~R_L=1~k\Omega,~I_L=1~mA$ |
| Falling time | | tf | 30 µs typ. | $V_{CC}=5 \text{ V}, \text{R}_{\text{L}}=1 \text{k}\Omega, \text{I}_{\text{L}}=1 \text{m}\text{A}$ |

Note: The letter 'd' indicates the distance between the top surface of the sensor and the sensing object.

OMRON

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Note: These dimensions are for the surface A. Other lead wire pitch dimensions are for the case surface.

Unless otherwise specified, the tolerances are as shown below.

| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

| Dimensions | Tolerence |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

(M)

-

current

Engineering Data











Light Current vs. Forward Current

- d = 4 mm

V_{CE} = 5 V

Characteristics (Typical)

(Typical)





Collector-Emitter voltage V_{CE} (V) Response Time vs. Load **Resistance Characteristics** (Typical)



Load resistance RL (kΩ)

Sensing Position Characteristics (Typical)



Distance d₂ (mm) **Response Time Measurement** Circuit



Photomicrosensor (Reflective) - EE-SY113

Features

Compact reflective Photomicrosensor (EE-SY110) with a moulded housing and dust-tight cover.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-------------------------|-------------------------------|------------------|---------------------|
| Emitter Forward current | | IF | 50 mA (see note 1) |
| | Pulse forward current | | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| Collector current | | I _C | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature | Ambient temperature Operating | | -40°C to 80°C |
| | Storage | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 us maximum with a frequency of 100Hz.

3. Complete soldering within 10 seconds.

Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------|---|-----------------------|----------------------------|--|
| Emitter | Forward voltage | VF | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | IR | 0.01 μA typ., 10 μA max. | V _R = 4 V |
| | Peak emission wavelength | λρ | 940 nm typ. | I _F = 20 mA |
| Detector | Light current | IL. | 160 μA min., 1,600 μA max. | I _F = 20 mA, V _{CE} = 10 V White paper with a reflection ratio of 90%, d = 4.4 mm (see note) |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0 ℓx |
| | Leakage current | I _{LEAK} | 2 μA max. | I _F = 20 mA, V _{CE} = 10 V with no reflection |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | | |
| | Peak spectral sensitivity wavelength | λp | 850 nm typ. | V _{CE} = 10 V |
| Rising time | r | tr | 30 μs typ. | $V_{CC} = 5 V, R_L = 1 k\Omega, I_L = 1 mA$ |
| Falling time | 9 | tf | 30 μs typ. | $V_{CC} = 5 V, R_L = 1 k\Omega, I_L = 1 mA$ |

Note: The letter "d" indicates the distance between the top surface of the sensor and the sensing object.

Note: All units are in millimeters unless otherwise indicated.





Internal Circuit



| Unless otherwise spec | ified, the | tolerances | are as | shown | below |
|-----------------------|------------|------------|--------|-------|-------|
| | | | | | |

| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

| Dimensions | Tolerence |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Engineering Data

Relative Light Current vs.

Characteristics (Typical)

Ambient Temperature

F (mA)

current

Forward

1 (%)

current

light

Relative

(Typical)

Forward Current vs. Collector **Dissipation Temperature Rating**

(MM) (Å 2 t E I Light 8 -20 20 40 Ambient temperature Ta (°C)

IF = 20 mA VCE = 5 V

40 Ambient temperature Ta (°C)

Sensing Distance Characteristics

Light Current vs. Forward Current Characteristics (Typical)

Sensing object: White pape

with a reflection factor of 90%

Forward current I_F (mA)

V_{CE} = 10 V d = 4.4 mm

Dark Current vs. Ambient

(Typical)

(An) d

current

Dark

Temperature Characteristics

Light Current vs. Collector-Emitter Voltage Characteristics (Typical)

OMRON





Sensing Position Characteristics (Typical)



Response Time Measurement Circuit





I_F = 20 mA V_{CE} = 10 V Ta = 25°C 1 L (%) $d_1 = 4.4 \text{ mm}$ Sensing object: current White paper with a reflection factor of 90% light Relative 20 Distance d₂ (mm)



Angle deviation θ (°)









Sensing Angle Characteristics (Typical)















OMRON

Photomicrosensor-Reflective – EE-SY313/314

OMRON

Features

- Incorporates an IC chip with a built-in detector element and amplifier.
- Incorporates a detector element with a built-in temperature compensation circuit.
- Compact reflective Photomicrosensor (EE-SY310/-SY410) with a molded housing and a dust-tight cover.
- A wide supply voltage range: 4.5 to 16 VDC
- Directly connects with C-MOS and TTL.
- Dark ON model (EE-SY313)
- Light ON model (EE-SY413)

Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-------------------------|--------------------------------|------------------|---------------------|
| Emitter Forward current | | l _F | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Power supply voltage | V _{cc} | 16 V |
| | Output voltage | V _{OUT} | 28 V |
| | Output current | I _{OUT} | 16 mA |
| | Permissible output dissipation | Pout | 250 mW (see note 1) |
| Ambient temperature | Operating | Topr | -40°C to 65°C |
| | Storage | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | 260°C (see note 2) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 µs maximum with frequency of 100 Hz.

3. Complete soldering within 10 seconds.



Photomicrosensor-Reflective - EE-SY313/314



■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|-------------------------------|--------------------------------------|-----------------|--------------------------|---|
| Emitter | Forward voltage | V _F | 1.2 V typ., 1.5 V max. | I _F = 20 mA |
| | Reverse current | IR | 0.01 μA typ., 10 μA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 920 nm typ. | $I_F = 20 \text{ mA}$ |
| | Low-level output voltage | V _{OL} | 0.12 V typ., 0.4 V max. | $ \begin{array}{l} V_{CC} = 4.5 \text{ to } 16 \text{ V}, I_{OL} = 16 \text{ mA}, \\ \text{without incident light (EE-SY313),} \\ \text{with incident light (EE-SY413) (see} \\ \text{notes } 1 \ \& \ 2) \end{array} $ |
| | High-level output voltage | I _{OH} | 15 V min. | $ \begin{array}{l} V_{CC} = 16 \mbox{ V, } R_L = 1 \mbox{ k}\Omega, \mbox{ with } \\ \mbox{incident light (EE-SY313), without } \\ \mbox{incident light (EE-SY413) (see } \\ \mbox{notes } 1 \mbox{ \& } 2) \end{array} $ |
| | Current consumption | I _{CC} | 3.2 mA typ., 10 mA max. | $V_{CC} = 16 V$ |
| | Peak spectral sensitivity wavelength | λ _P | 870 nm typ. | V _{CC} = 4.5 to 16 V |
| LED current | when output is OFF | IFT | 10 mA typ., 20 mA max. | $V_{CC} = 4.5$ to 16 V |
| LED current when output is ON | | | | |
| Hysteresis | | ΔH | 17% typ. | V _{CC} = 4.5 to 16 V |
| Response frequency | | f | 50 Hz min. | V_{CC} = 4.5 to 16 V, I_{F} = 20 mA, I_{OL} = 16mA |
| Response de | Response delay time | | 3 µs min. | $V_{\rm CC}$ = 4.5 to 16 V, $I_{\rm F}$ = 20 mA, $I_{\rm OL}$ = 16mA |
| Response de | Response delay time | | 20 µs typ. | V_{CC} = 4.5 to 16 V, I_{F} = 20 mA, I_{OL} = 16mA |

Dimensions

Note: All units are in millimeters unless otherwise indicated.





Internal Circuit



Unless otherwise specified, the tolerances are as shown right.

Photomicrosensor-Reflective - EE-SY313/314



| Terminal No. | Name |
|--------------|------------------------------|
| A | Anode |
| К | Cathode |
| V | Power supply V _{CC} |
| 0 | Output (OUT) |
| G | Ground (GND) |

| Dimensions | Tolerence |
|-------------|-----------|
| mm max. | ±0.3 |
| 8 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 0 < mm ≤ 18 | ±0.55 |
| 8 < mm ≤ 30 | ±0.65 |

- Note: 1. "With incident light" denotes the condition whereby the light reflected by white paper with a reflection factor of 90% at a sensing distance of 4.4 mm is received by the photo IC when the forward current (I_F) of the LED is 20 mA.
 - 2. Sensing object: White paper with a reflection factor of 90% at a sensing distance of 4.4 mm.
 - 3. Hysteresis denotes the difference in forward LED current value, expressed in percentage, calculated from the respective forward LED currents when the photo IC is turned from ON to OFF and when the photo IC is turned from OFF to ON.

4. The value of the response frequency is measured by rotating the disk as shown below.



5. The following illustrations show the definition of response delay time. The value in the parentheses applies to the EESY413.



IF (mA)

current |

P

-ODW

Engineering Data

Note: The values in parentheses apply to EE-SY413.



Temperature Characteristics

OFF (IFT ON)

IFT ON (IFT OFF)

.20

1

(Typical)

IFT (mA)

current

LED



Output Current (Typical)



Current Consumption vs. Supply Voltage (Typical)

20



Low-level Output Voltage vs. Ta = 25°C



Response Delay Time vs. Forward Current (Typical)

 $V_{CC} = 5 V$ R₁ = 330 Ω 25°C (EE-SX3CICI) VOUT (EE-SX4CICI) tені (tрі н ter u (tour 15 20 25 30





Distance d1 (mm)



OMRON



Low-level Output Voltage vs. Ambient Temperature Characteristics (Typical) Vol(V)

= 5 V

0 mA (20 mA





time delay Se

(Ins)

. t PLH

Ŧ

å

Forward current I_F (mA)



(Typical)

Features

- Dust-tight construction.
- With a visible-light intercepting filter which allows objects to be sensed without being greatly influenced by the light radiated from fluorescent lamps.
- Mounted with M2 screws.
- Model with soldering terminals (EE-SF5).
- Model with PCB terminals (EE-SF5-B).



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|-------------------------------|---------------------------|------------------|---------------------|
| Emitter | Forward current | I _F | 50 mA (see note 1) |
| Pulse forward current | | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector | Collector-Emitter voltage | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| | Collector current | Ic | 20 mA |
| | Collector dissipation | Pc | 100 mW (see note 1) |
| Ambient temperature Operating | | Topr | -25°C to 80°C |
| | Storage | Tstg | -30°C to 80°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 µs maximum with a frequency of 100Hz.

3. Complete soldering within 10 seconds.

Electrical and Optical Characteristics (Ta = 25°C)

| | ltem | Symbol | Value | Condition |
|--------------------|---|-----------------------|----------------------------|--|
| Emitter | Forward voltage | VF | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | IR | 0.01 μA typ., 10 μA max. | V _R = 4 V |
| | Peak emission wavelength | λp | 940 nm typ. | I _F = 20 mA |
| Detector | Light current | ۱ _L | 200 μA min., 2,000 μA max. | $I_F = 20 \text{ mA}, V_{CE} = 10 \text{ V}$ White paper with a reflection ratio of 90%, d = 5 mm (see note) |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0 ℓx |
| | Leakage current | ILEAK | 2 μA max. | I _F = 20 mA, V _{CE} = 10 V with no reflection |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | | i i i i i i i i i i i i i i i i i i i |
| | Peak spectral sensitivity wavelength | λρ | 850 nm typ. | V _{CE} = 10 V |
| Rising time | | tr | 30 µs typ. | $V_{CC} = 5 V, R_L = 1 k\Omega, I_L = 1 mA$ |
| Falling time | | tf | 30 μs typ. | $V_{CC} = 5 V, R_L = 1 k\Omega, I_L = 1 mA$ |

Note: The letter "d" indicates the distance between the top surface of the sensor and the sensing object.

OMRON

Dimensions

Note: All units are in millimeters unless otherwise indicated.







Unless otherwise specified, the tolerances are as shown below.

| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |
| - | 2 |

| Dimensions | Tolerance |
|--------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |

Engineering Data



Ta = 25°C V_{CE} = 10 V

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Ta = 25°0

c = 20 mA

VCE = 10 V

aper with a reflection actor of 90% d = 5 mm

10 20

Angle deviation θ (°)

Distance d (mm)

Sensing Angle Characteristics

Sensing object: White paper with a reflection factor of 90%

TIT

(Typical)

3.00

(Typical)

light

Relative I

(HI) (IN)

ent

Inc

ight





Forward current I_F (mA)

Dark Current vs. Ambient **Temperature Characteristics** (Typical)



Ambient temperature Ta (°C)

Sensing Position Characteristics (Typical)



Sensing Angle Characteristics





Collector-Emitter voltage V_{CE} (V)

Response Time vs. Load **Resistance Characteristics** (Typical)



Load resistance RL (kQ)

Sensing Position Characteristics (Typical)



Distance d₂ (mm) **Response Time Measurement** Circuit



2 831

Specifications -

Features

housina.

Absolute Maximum Ratings (Ta = 25°C)

Compact reflective model with a moulded

| Item | | Symbol | Rated value |
|------------------------------------|---------------------------|------------------|---------------------|
| Emitter Forward current | | l _F | 50 mA (see note 1) |
| | Pulse forward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector Collector-Emitter voltage | | V _{CEO} | 30 V |
| | Emitter-Collector voltage | V _{ECO} | - |
| Collector current | | I _C | 20 mA |
| | Collector dissipation | P _C | 100 mW (see note 1) |
| Ambient temperature | Operating | Topr | -40°C to 85°C |
| | Storage | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | 260°C (see note 3) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25°C.

2. The pulse width is 10 μs maximum with a frequency of 100Hz.

3. Complete soldering within 10 seconds.

Electrical and Optical Characteristics (Ta = 25°C)

| | Item | Symbol | Value | Condition |
|--------------------|---|-----------------------|----------------------------|--|
| Emitter | Forward voltage | VF | 1.2 V typ., 1.5 V max. | I _F = 30 mA |
| | Reverse current | IR | 0.01 μA typ., 10 μA max. | V _R = 4 V |
| | Peak emission wavelength | λp | 940 nm typ. | I _F = 20 mA |
| Detector | Light current | IL. | 200 μA min., 2,000 μA max. | I_F = 20 mA, V_{CE} = 10 V White paper with a reflection ratio of 90%, d = 5 mm (see note) |
| | Dark current | ID | 2 nA typ., 200 nA max. | V _{CE} = 10 V, 0 ℓx |
| | Leakage current | ILEAK | 2 μA max. | I _F = 20 mA, V _{CE} = 10 V with no reflection |
| | Collector-Emitter saturated voltage | V _{CE} (sat) | | |
| | Peak spectral sensitivity wavelength | λρ | 850 nm typ. | V _{CE} = 10 V |
| Rising time | 1. 1 | tr | 30 µs typ. | $V_{CC} = 5 V, R_L = 1 k\Omega, I_L = 1 mA$ |
| Falling time | 3 | tf | 30 μs typ. | $V_{CC} = 5 V, R_L = 1 k\Omega, I_L = 1 mA$ |

Note: The letter "d" indicates the distance between the top surface of the sensor and the sensing object.

Note: All units are in millimeters unless otherwise indicated.





899

Internal Circuit



| Terminal No. | Name |
|--------------|-----------|
| A | Anode |
| К | Cathode |
| С | Collector |
| E | Emitter |

| Dimensions | Tolerence |
|--------------|-----------|
| 3 mm max. | ±0.2 |
| 3 < mm ≤ 6 | ±0.24 |
| 6 < mm ≤ 10 | ±0.29 |
| 10 < mm ≤ 18 | ±0.35 |
| 18 < mm ≤ 30 | ±0.42 |



(MM)

Pc

٩.

t

7

oht

(Pu) (ID)

current

Hr.

ĉ

curr

light

Relative

Engineering Data

IF (mA)

Forward current

11 (%)

current

light

Relative

40 .20

(Typical)

Forward Current vs. Collector **Dissipation Temperature Rating**

Ambient temperature Ta (°C)

IF = 20 mA VCE = 5 V

40

Ambient temperature Ta (°C)

Sensing Distance Characteristics

Relative Light Current vs.

Characteristics (Typical)

Ambient Temperature

Light Current vs. Forward Current Characteristics (Typical)

d = 5 mm

VCE -

Voltage Characteristics (Typical)



Response Time vs. Load Resistance Characteristics (Typical)



Forward current I_F (mA)

Dark Current vs. Ambient

Temperature Characteristics

Ambient temperature Ta (°C)

Directio da

Sensing Position Characteristics (Typical)

factor of 90%

2.0 3.0 4.0 5.0 6.0

Distance d₂ (mm)



Response Time Measurement Circuit



OMRON





Load resistance R_L (kΩ)







Photomicrosensor-Reflective – EE-SY310/410

OMRON

Features

- Incorporates an IC chip with a built-in detector element and amplifier.
- Incorporates a detector element with a built-in temperature compensation circuit.
- Compact reflective model with a molded housing.
- A wide supply voltage range: 4.5 to 16 VDC
- Directly connects with C-MOS and TTL.
- Dark ON model (EE-SY310)
- Light ON model (EE-SY410)



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|--------------------------------|----------------------|------------------|---------------------|
| Emitter Forward current | | I _F | 50 mA (see note 1) |
| | Pulse foward current | I _{FP} | 1 A (see note 2) |
| | Reverse Voltage | V _R | 4 V |
| Detector Power supply voltage | | V _{CC} | 16 V |
| | Output voltage | V _{OUT} | 28 V |
| | Output current | I _{OUT} | 16 mA |
| Permissible output dissipation | | Pout | 250 mW (see note 1) |
| Ambient temperature | Operating | Topr | -40°C to 75°C |
| | Storage | Tstg | -40°C to 85°C |
| Soldering temperature | | Tsol | 260°C (see note 2) |

Note: 1. Refer to the temperature rating chart if the ambient temperature exceeds 25° C.

2. The pulse width is 10 μs maximum with frequency of 100 Hz.

3. Complete soldering within 10 seconds.

Photomicrosensor-Reflective - EE-SY310/410



■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | | Symbol | Value | Condition |
|-------------------------------|--------------------------------------|--------------------------------------|--------------------------|---|
| Emitter Forward voltage V | | V _F | 1.2 V typ., 1.5 V max. | I _F = 20 mA |
| | Reverse current | IR | 0.01 μA typ., 10 μA max. | $V_R = 4 V$ |
| | Peak emission wavelength | λ _P | 920 nm typ. | $I_F = 20 \text{ mA}$ |
| | Low-level output voltage | V _{OL} | 0.12 V typ., 0.4 V max. | $\label{eq:V_CC} \begin{array}{l} V_{CC} = 4.5 \text{ to } 16 \text{ V}, I_{OL} = 16 \text{ mA}, \\ \text{without incident light (EE-SY310)}, \\ \text{with incident light (EE-SY410) (see \\ notes 1 \& 2) \end{array}$ |
| | High-level output voltage | V _{OH} | 15 V min. | V_{CC} = 16 V, R_L = 1 k $\Omega,$ with incident light (EE-SY310), without incident light (EE-SY410) (see notes 1 & 2) |
| | Current consumption | I _{cc} | 3.2 mA typ., 10 mA max. | V _{CC} = 16 V |
| | Peak spectral sensitivity wavelength | λ _P | 870 nm typ. | V _{CC} = 4.5 to 16 V |
| LED current v | when output is OFF | IFT | 6 mA typ., 15 mA max. | $V_{CC} = 4.5$ to 16 V |
| LED current when output is ON | | | | |
| Hysteresis | | ΔH | 17% typ. | V _{CC} = 4.5 to 16 V |
| Response fre | quency | f | 50 Hz min. | V_{CC} = 4.5 to 16 V, I_{F} = 15 mA, I_{OL} = 16mA |
| Response de | Response delay time | | 3 µs min. | V_{CC} = 4.5 to 16 V, $I_{\rm F}$ = 15 mA, I_{OL} = 16mA |
| Response de | lay time | t _{PHL} (t _{PLH}) | 20 µs typ. | V_{CC} = 4.5 to 16 V, I_{F} = 15 mA, I_{OL} = 16mA |

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Internal Circuit



Unless otherwise specified, the tolerances are as shown right.

Photomicrosensor-Reflective - EE-SY310/410

OMRON

| Terminal No. | Name |
|--------------|------------------------------|
| A | Anode |
| К | Cathode |
| V | Power supply V _{CC} |
| 0 | Output (OUT) |
| G | Ground (GND) |

| Dimensions | Tolerence |
|--------------|-----------|
| 3 mm max. | ±0.2 |
| 3 < mm ≤ 6 | ±0.24 |
| 6 < mm ≤ 10 | ±0.29 |
| 10 < mm ≤ 18 | ±0.35 |
| 18 < mm ≤ 30 | ±0.42 |

- Note: 1. "With incident light" denotes the condition whereby the light reflected by white paper with a reflection factor of 90% at a sensing distance of 4.4 mm is received by the photo IC when the forward current (I_F) of the LED is 20 mA.
 - 2. Sensing object: White paper with a reflection factor of 90% at a sensing distance of 4.4 mm.
 - 3. Hysteresis denotes the difference in forward LED current value, expressed in percentage, calculated from the respective forward LED currents when the photo IC is turned from ON to OFF and when the photo IC is turned from OFF to ON.

4. The value of the response frequency is measured by



5. The following illustrations show the definition of response delay time. The value in the parentheses applies to the EESY410.



(mA)

Ľ.

ent

2

P

NIC

VOL(V)

de

volt

utput

3

evel

NO 0.001

(sni)

t PLH

œ 5

9

Å

Current (Typical)

 $\begin{array}{c} \mathsf{V}_{CC}=5\,\mathsf{V}\\ \mathsf{R}_L=330\,\Omega\\ \mathsf{Ta}=25^\circ\mathsf{C} \end{array}$

(EE-SX3CC) (EE-SX4CC)

25

Forward current IF (mA)

Engineering Data

Note: The values in parentheses apply to EE-SY413.



Temperature Characteristics

OFF (IFT ON)

FT ON (IFT OFF

-40 -20 0 $V_{CC} = 5 V$ B₁ = 330 O

\$35

20 40

(Typical)



Ta = 25°C

CC = 5 V

Output Current (Typical)

LED Current vs. Supply Voltage (Typical)

OMRON



Low-level Output Voltage vs. Ambient Temperature Characteristics (Typical)



Sensing Position Characteristics (Typical)



Distance d₁ (mm)





Supply voltage V_{CC} (V)

Photomicrosensor-Displacement – Z4D-B01

OMRON

Features

- Easier control enabled by built-in processor circuit.
- Resolution: ±10 µm.
- Operating area: 6.5±1 mm.
- Adapts well to changes in reflection factor using division processing.



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | Symbol | Value | Unit | Features |
|--|------------------|-----------|------|-----------------------------|
| Supply voltage | V _{CC} | 7 | VDC | - |
| LED pulse light emission control signal | PLS | 7 | VDC | LED |
| LED light emission pulse | tFP | 100 | ms | - |
| Operating temperature | T _{opr} | -10 to 65 | °C | No freezing or condensation |
| Storage temperature | T _{stg} | -25 to 80 | °C | - |

■ Electrical and Optical Characteristics (Ta = -10°C to 65°C)

| Item | Symbol | Rated value | Remarks |
|--|-----------------|------------------------|------------------------------|
| Supply voltage | V _{CC} | 5 VDC±10% | Ripple (p-p): 10 mV p-p max. |
| Output voltage | OUT | 0.2 VDC to (VCC-0.3) V | (see note 1) |
| Response time | tr | 100 µs max. | (see note 2) |
| LED pulse light emission control signal | PLS | 3.5 VDC to VCC | (see note 3) |

Note: 1. Load impedance (between OUT-GND) is set at more than 10 k $\Omega.$

2. The time for output voltage to rise from 10% to 90% of the full output range.

3. Apply the voltage ranging from 3.5 V to VCC on the LED pulse light emission control signal terminal. In this case, a maximum of 2 mA (typ.1 mA) current is sunk.

OMRON

Dimensions

Note: All units are in millimeters unless otherwise indicated.



Recommended Mating Connectors:

Tyco Electronics AMP 175778-4 (crimp-type connector) 173977-4 (press-fit connector)

| Pin No. | Remarks |
|---------|-----------------|
| 1 | PLS |
| 2 | V _{cc} |
| 3 | OUT |
| 4 | GND |

| official off |
|--|
|--|

| Dimensions | Tolerence |
|-------------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| $18 < mm \leq 30$ | ±0.65 |
| 30 < mm ≤ 50 | ±0.8 |

■ Characteristics (Ta = -10°C to 65°C)

Object: N8.5 Munsell paper with a relection factor of 70%.

| Pin No. | Remarks |
|------------------------------------|---------------------------|
| Operating area (see note 1) | 6.5 ±1 mm |
| Sensitivity variation (see note 2) | -1.4 mV/µm±10% max. |
| Resolution (see note 3) | ±10 µm max. (Ta = 25°C) |
| Linearity (see note 4) | 2% F.S. (full scale) max. |

Note: 1. Distance from the mounting reference plane.

2. "Sensitivity" is defined as "inclination of divided output line" and the variation value between individual products of fluctuating divided output voltage per unit length.

Sensitivity =
$$\frac{V2 - V0}{2000}$$
 (mV/µm)

Where V0: Output voltage when d=5.5 mm

V2: Output voltage when d=7.5 mm

- d: Distance from reference mounting plane to an object.
- 3. Value of electrical noise range of divided output signal converted to distance under the following conditions.



(1) Ripple noise of power supply: 10 mV p-p max.

(2) Sampling time of the sample and hold circuit: 50 μsec

- (3) Distance to object: Distance from the reference mounting plane is 6.5 mm \pm 1 mm
 - ** When the testing conditions are deviated from the above conditions, resolution changes. For details, please consult OMRON sales representative.
- 4. The peak-to-peak value of the output error from the ideal line.
- Calculation, based on a linearity of 2% F.S., is as follows:
- (1) The conversion value based on the full scale distance: 2 mm $\,$ 0.02 = 0.04 mm (40 $\mu m)$
- (2) The conversion value based on the output voltage: 1.4 mV/ μ m 40 μ m = 56 mV
- (When the product sensitivity variation is 1.4 mV/ μm)



OMRON

Circuit Diagram



Engineering Data





Photomicrosensor-Multi-beam Sensor – EY3A-312 OINRON

Features

- Simultaneously senses three objects positioned differently, thus saving space.
- Ensures higher sensitivity and external light interference resistivity than any other photomicrosensor.
- Narrow sensing range ensures stable sensing of a variety of sensing objects.
- 50mm and 80mm versions available (EY3A-308 & EY3A-351)

Application Examples

Sensing of paper sizes.



Specifications -

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|----------------------|-----------|------------------|---------------|
| Power supply voltage | | V _{CC} | 7 V |
| Output voltage | | V _{OUT} | 7 V |
| Output current | | IOUT | 10 mA |
| Ambient temperature | Operating | Topr | 0°C to 65°C |
| | Storage | Tstg | -15°C to 70°C |

Note: 1. Make sure there is no icing or condensation when operating the sensor.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | Value | Condition |
|--------------------------------------|-------------|--|
| Power supply voltage | 5 V ±5% | - |
| Current consumption | 50 mA max. | $V_{CC} = 5 \text{ V}, \text{ RL} = \infty$ |
| Peak spectral sensitivity wavelength | 300 mA max. | $V_{CC} = 5$ V, RL = ∞ |
| Low-level output voltage | 0.6 V max. | $V_{\rm CC}$ = 5 V, IOL = 4 mA (see note 1) |
| High-level output voltage | 3.5 V min. | V_{CC} = 5 V, RL = 4.7 k Ω (see note 2) |
| Response delay time (High to low) | 35 ms max. | The time required for the output to become "Lo" after placing sensing object. |
| Response delay time (Low to high) | 20 ms max. | The time required for the output to become "Hi" after removing sensing object. |

Note: 1. These conditions are for the sensing of lusterless paper with an OD of 0.6 maximum located at the correct sensing position of the Sensor as shown in the optical path arrangement on page 16.

 These conditions are for the sensing of the paper supporting plate with an OD of 0.05 located using the glass plate without paper as shown in the optical path arrangement on page 16.

Dimensions

Note: All units are in millimeters unless otherwise indicated.





Recommended Mating Connectors:

Japan Molex 51090-0500 (crimp-type connector)

52484-0510 (insulation displacement-type connector)

Unless otherwise specified, the tolerances are as shown below.

| Pin No. | Remarks | Name |
|---------|---------|---------------------------------|
| 1 | 01 | Output 1 (OUT1) |
| 2 | O2 | Output 2 (OUT2) |
| 3 | O3 | Output 3 (OUT3) |
| 4 | V | Power supply (V _{CC}) |
| 5 | G | Ground (GND) |

| Dimensions | Tolerence |
|-------------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| $18 < mm \leq 30$ | ±0.65 |
| $30 < mm \le 50$ | ±0.8 |
| 50 < mm ≤ 80 | ±0.95 |

■ Characteristics (Paper Table Glass: t = 6 mm max., Transparency Rate: 90% min.) (Ta = 0°C to 65°C)

| Item | Characteristic value | |
|------------------------|---|--|
| Sensing density | Lusterless paper with an OD of 0.6 max. (sensing distance: 125 mm) (see note) | |
| Non-sensing distance | 185 mm (from the top of the sensor), OD: 0.05 | |
| Paper sensing distance | 125 mm (from the top of the sensor) | |
| Ambient illumination | Sunlight: 3,000 ℓx max., fluorescent light: 2,000 ℓx max. | |

Note: 1. The data shown are initial data.

2. Optical darkness (OD) is defined by the following formula:

$$CD = -log_{10} \left(\frac{P_{OUT}}{P_{IN}} \right)$$

 P_{IN} (mW): Light power incident upon the document

P_{OUT} (mW): Reflected light power from the document

Optical Path Arrangement



Engineering Data

Distance Characteristics (Estimated Lower-limit Value).



Features

- Ensures higher sensitivity and external light interference resistivity than any other photomicrosensor.
- Narrow sensing range ensures stable sensing of a variety of sensing objects.



Specifications

■ Absolute Maximum Ratings (Ta = 25°C)

| Item | | Symbol | Rated value |
|----------------------|-----------|------------------|---------------|
| Power supply voltage | | V _{CC} | 7 V |
| Output voltage | | V _{OUT} | 7 V |
| Output current | | lout | 10 mA |
| Ambient temperature | Operating | Topr | 0°C to 65°C |
| | Storage | Tstg | -15°C to 70°C |

Note: 1. Make sure there is no icing or condensation when operating the sensor.

■ Electrical and Optical Characteristics (Ta = 25°C)

| Item | Value | Condition |
|--------------------------------------|-------------|--|
| Power supply voltage | 5 V ±5% | - |
| Current consumption | 50 mA max. | $V_{CC} = 5$ V, RL = ∞ |
| Peak spectral sensitivity wavelength | 200 mA max. | $V_{CC} = 5 V, RL = \infty$ |
| Low-level output voltage | 0.6 V max. | $V_{CC} = 5$ V, IOL = 4 mA (see note 1) |
| High-level output voltage | 3.5 V min. | V_{CC} = 5 V, RL = 4.7 k Ω (see note 2) |
| Response delay time (High to low) | 35 ms max. | The time required for the output to become "Lo" after placing sensing object. |
| Response delay time (Low to high) | 20 ms max. | The time required for the output to become "Hi" after removing sensing object. |

Note: 1. These conditions are for the sensing of lusterless paper with an OD of 0.6 maximum located at the correct sensing position of the Sensor.

2. These conditions are for the sensing of the paper supporting plate with an OD of 0.05 located using the glass plate without paper.

Note: All units are in millimeters unless otherwise indicated.





Recommended Mating Connectors:

Japan Molex 51090-0300 (crimp-type connector) 52484-0310 (insulation displacement-type connector)

Unless otherwise specified, the tolerances are as shown below.

| Pin No. | Remarks | Name |
|---------|---------|---------------------------------|
| 1 | 0 | Output (OUT) |
| 2 | V | Power supply (V _{CC}) |
| 3 | G | Ground (GND) |

| Dimensions | Tolerence |
|------------------|-----------|
| 3 mm max. | ±0.3 |
| 3 < mm ≤ 6 | ±0.375 |
| 6 < mm ≤ 10 | ±0.45 |
| 10 < mm ≤ 18 | ±0.55 |
| 18 < mm ≤ 30 | ±0.65 |
| $30 < mm \le 50$ | ±0.8 |
| 50 < mm ≤ 80 | ±0.95 |

Photomicrosensor-Multi-beam Sensor – EY3A-112 OIRON

■ Characteristics (Paper Table Glass: t = 6 mm max., Transparency Rate: 90% min.) (Ta = 0°C to 65°C)

| Item | Characteristic value |
|------------------------|---|
| Sensing density | Lusterless paper with an OD of 0.6 max. (sensing distance: 125 mm) (see note) |
| Non-sensing distance | 185 mm (from the top of the sensor), OD: 0.05 |
| Paper sensing distance | 125 mm (from the top of the sensor) |
| Ambient illumination | Sunlight: 3,000 lx max., fluorescent light: 2,000 lx max. |

Note: 1. The data shown are initial data.

2. Optical darkness (OD) is defined by the following formula:

$$CD = -log_{10} \left(\frac{P_{OUT}}{P_{IN}} \right)$$

 PIN (mW):
 Light power incident upon the document

 POLIT (mW):
 Reflected light power from the document

Optical Path Arrangement



Engineering Data

Distance Characteristics (Estimated Lower-limit Value).

