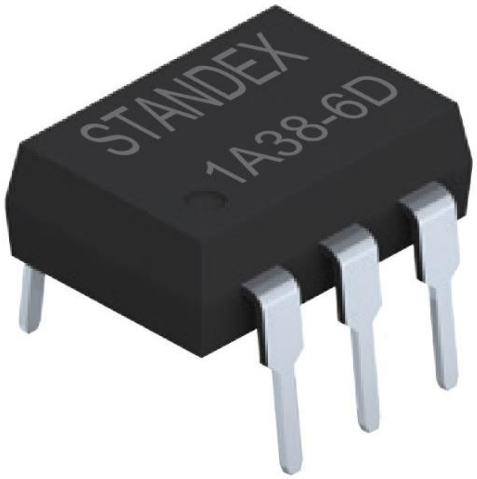
# 38 Series Photo-MOSFET Relay




- Features: High Voltage Photo MOSFET Relay, switching up to 600V DC or Peak AC
- THT, SMD or SOP; High I/O Isolation
- Tested in accordance with AEC-Q101, UL listed, RoHS Compliance
- Applications: Automatic Test Equipment, Battery Management Systems, I/O Modules, Telephone Equipment
- Markets: Automotive, Telecommunication, Test & Measurement, Security

Part Description: SMP-XA38-XXX-X

| Number of Poles | Contact Form | Series Number | Number of Pins | Mounting Type | Package Style | Special Features |
|---|---|---|---|---|---|---|
| 1, 2 | A | 38 | 4, 6, 8 | D, S, P | Tube, Reel | Nil, Q, R |

See page 7 for Glossary

| Maximum Ratings @ Ambient Temperature = 25⁰C | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Parameters | Symbol | Value | | | | | Units | Condition |
| | | 1A38-4P | 2A38-8P | 1A38-4D, S | 2A38-8D, S | 1A38-6D, S | | |
| **INPUT SPECIFICATIONS** | | | | | | | | |
| **Continuous LED Current** | $I_F$ | 50 | 50 | 50 | 50 | 50 | mA | - |
| **Peak LED Current** | $I_{FP}$ | 500 | 500 | 500 | 500 | 500 | mA | f=100Hz, 1% Duty Cycle |
| **LED Reverse Voltage** | $V_R$ | 5 | 5 | 5 | 5 | 5 | V | - |
| **Input Power Dissipation** | $P_{IN}$ | 75 | 75 | 75 | 75 | 75 | mW | - |
| **OUTPUT SPECIFICATIONS** | | | | | | | | |
| **Load Voltage** | $V_L$ | 600 | 600 | 600 | 600 | 600 | DC or Peak AC | - |
| **Load Current** | $I_L$ | 70 | 60 | 80 | 70 | 80 | mA | |
| **Peak Load Current** | $I_{PEAK}$ | 200 | 200 | 200 | 200 | 200 | mA | 1 ms, 1 shot |
| **Output Power Dissipation** | $P_{OUT}$ | 300 | 450 | 450 | 600 | 450 | mW | - |
| **GENERAL SPECIFICATIONS** | | | | | | | | |
| **Total Power Dissipation** | $P_T$ | 350 | 500 | 500 | 650 | 500 | mW | - |
| **I/O Breakdown Voltage** | $V_{I/O}$ | 1500 | 1500 | 3750 | 3750 | 3750 | $V_{RMS}$ | - |
| **I/O Breakdown Voltage** | $V_{I/O}$ | 3750 | 3750 | 5000 | 5000 | 5000 | $V_{RMS}$ | Suffix R |
| **Operating Temperature** | $T_{OPR}$ | -40/+85 | -40/+85 | -40/+85 | -40/+85 | -40/+85 | ⁰C | - |
| **Operating Temperature** | $T_{OPR}$ | -40/+105 | -40/+105 | -40/+105 | -40/+105 | -40/+105 | ⁰C | Suffix Q |
| **Storage Temperature** | $T_{STG}$ | -40/+100 | -40/+100 | -40/+100 | -40/+100 | -40/+100 | ⁰C | - |

AEC-Q101 c UL us RoHS REACH COMPLIANT



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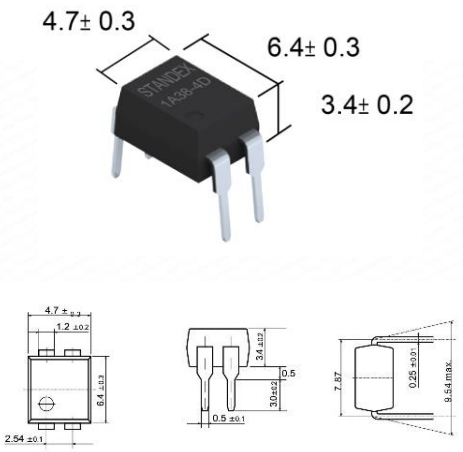
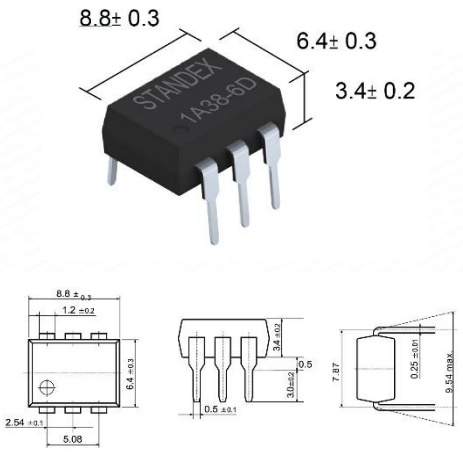
| Maximum Ratings @ Ambient Temperature = 25⁰C | | | | | | |
|---|---|---|---|---|---|---|
| Parameters | Symbol | Min | Typ | Max | Units | Condition |
| **INPUT SPECIFICATIONS** | | | | | | |
| **LED Forward Voltage** | $V_F$ | 1.0 | 1.17 | 1.5 | V | $I_F$ = 10mA |
| **Operation LED Current** | $I_{F\ ON}$ | - | 1.0 | 3.0 | mA | - |
| **Recovery LED Voltage** | $V_{F\ OFF}$ | 0.5 | 1.0 | - | V | - |
| **OUTPUT SPECIFICATIONS** | | | | | | |
| **On Resistance: Drain to Drain** | $R_{ON}$ | - | 40 | 60 | Ω | $I_F$ = 5mA, $I_L$=Rating (within 1 sec.) |
| **Off-State Leakage Current** | $I_{LEAK}$ | - | - | 1.0 | µA | $V_L$=200V |
| **Output Capacitance** | $C_{OUT}$ | - | 47 | - | ρF | $V_L$=0V, f=1MHz |
| **TRANSMISSION SPECIFICATIONS** | | | | | | |
| **Turn-On Time** | $T_{ON}$ | - | 0.2 | 0.5 | ms | $I_F$ = 5mA, $I_L$=Rating (for SOP type) |
| **Turn-Off Time** | $T_{OFF}$ | - | 0.05 | 0.2 | ms | |
| **Turn-On Time** | $T_{ON}$ | - | 0.1 | 1.0 | ms | $I_F$ = 10mA, $I_L$=Rating (for DIP/SMD type) |
| **Turn-Off Time** | $T_{OFF}$ | - | 0.05 | 0.5 | ms | |
| **COUPLED SPECIFICATIONS** | | | | | | |
| **I/O Insulation Resistance** | $R_{I/O}$ | $10^9$ | - | - | Ω | - |
| **I/O Capacitance** | $C_{I/O}$ | - | 1.3 | - | ρF | f=1MHz |

## Photo-MOSFET Relay Dimensions (Tolerances acc. to ISO 2768-mp)

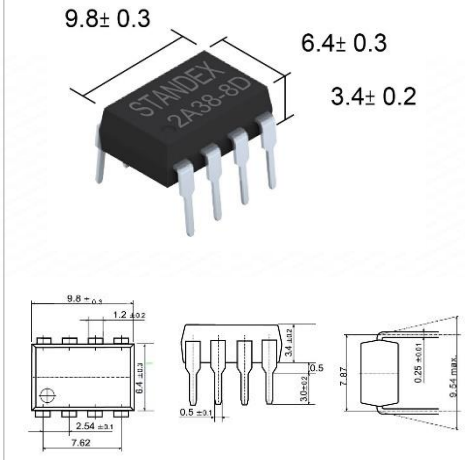
**DIP4**




**DIP6**




**DIP8**



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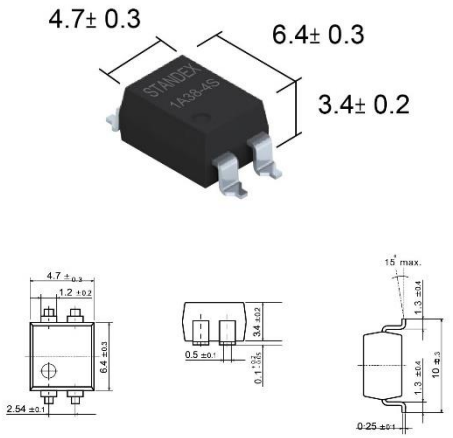
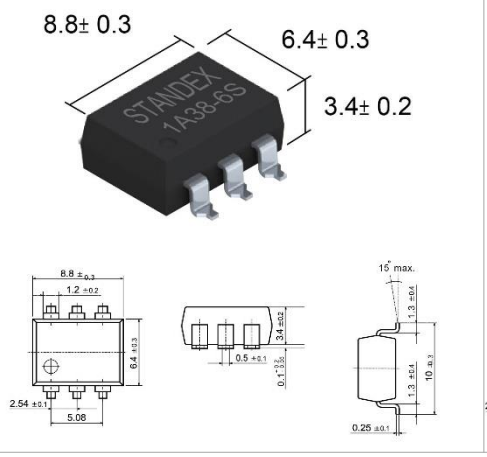
## Photo-MOSFET Relay Dimensions (Tolerances acc. to ISO 2768-mp)

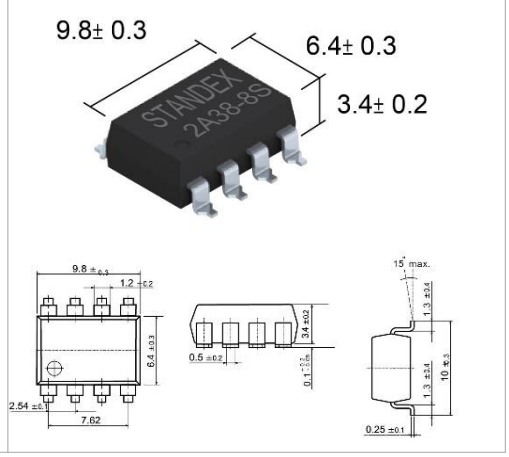
### SMD4




### SMD6

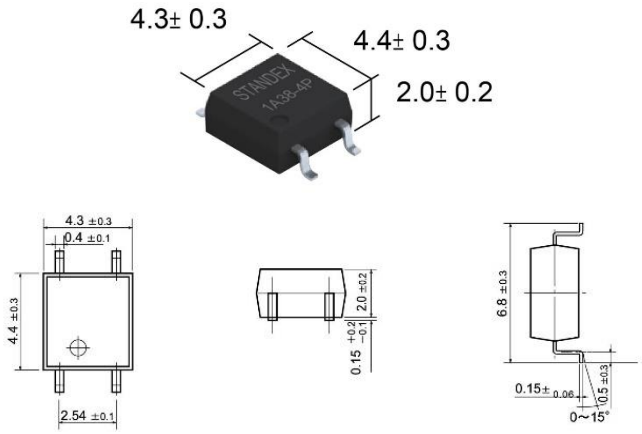



### SMD8

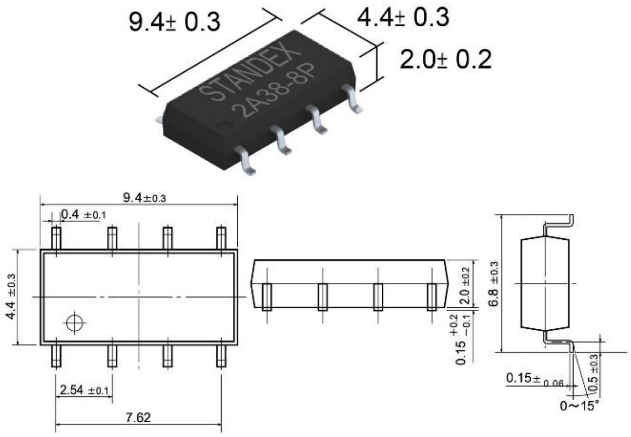



## Photo-MOSFET Relay Dimensions (Tolerances acc. to ISO 2768-mp)

### SOP4

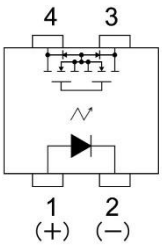



### SOP8



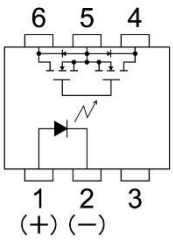

## Photo MOSFET Relay Pin-Out (Top View)

### 4 PIN



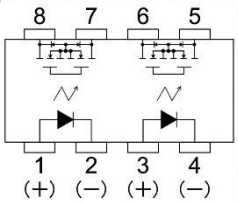

1:Anode (LED)
2:Cathode (LED)
3,4:Drain (MOS FET)

### 6 PIN




1:Anode (LED)
2:Cathode (LED)
3:NC
4,6:Drain (MOS FET)
5:Source (MOS FET)

### 8 PIN




1,3:Anode (LED)
2,4:Cathode (LED)
5,6,7,8:Drain (MOS FET)



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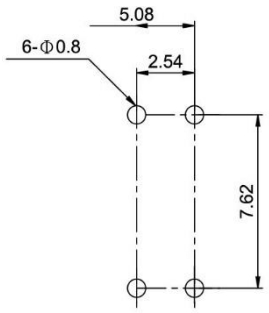
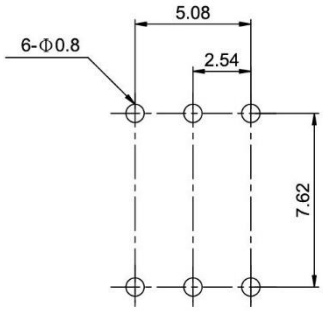
# 38 Series Photo-MOSFET Relay

## Photo MOSFET Relay Recommended PCB Pad Layout (Tolerances acc. to ISO 2768-mp)

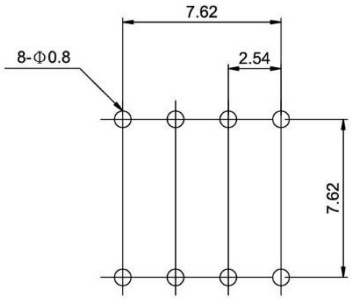
### DIP4 (Bottom View)



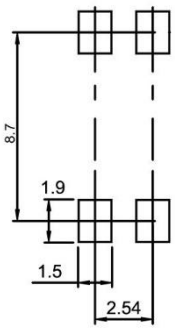

### DIP6 (Bottom View)



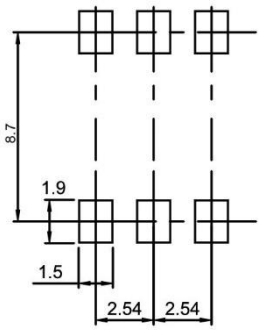

### DIP8 (Bottom View)



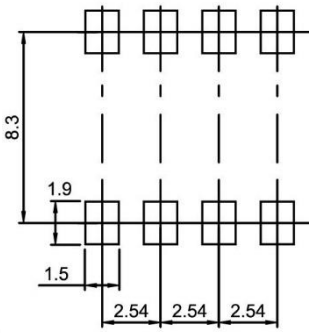

### SMD4 (Top View)



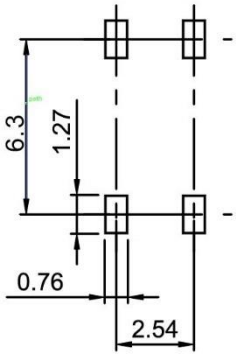

### SMD6 (Top View)



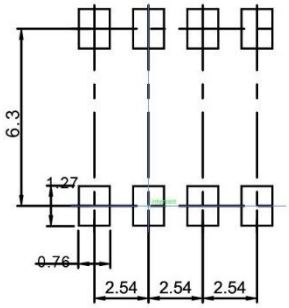

### SMD8 (Top View)



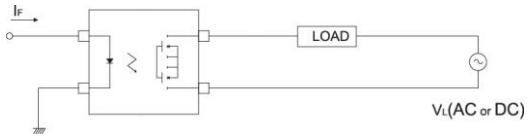
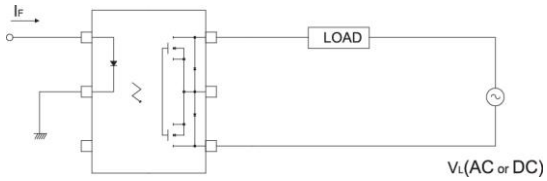
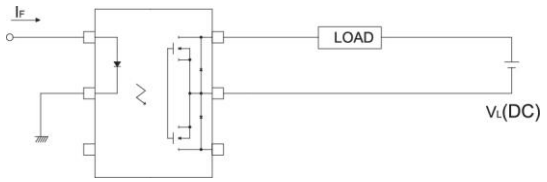
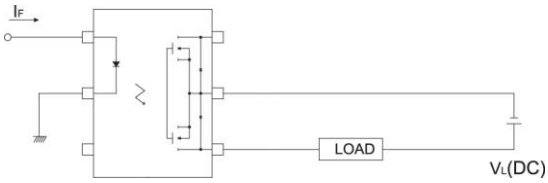
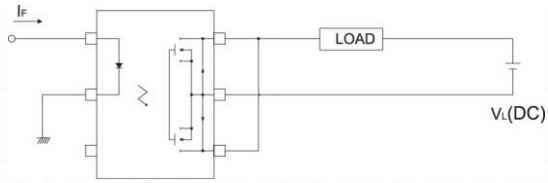
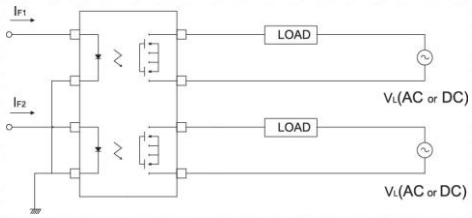
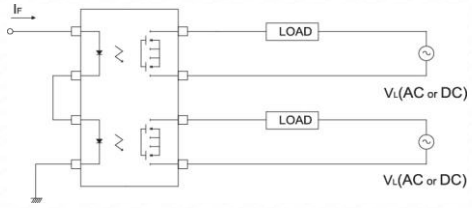

### SOP4 (Top View)




### SOP8 (Top View)



# 38 Series Photo-MOSFET Relay

| Photo-MOSFET Relay Load Connection Method | | | |
|---|---|---|---|
| TYPE | LOAD | CONNECTION | FEATURE |
| 4-PIN | AC OR DC |  | Control bi-directional signal |
| 6-PIN | AC OR DC |  | Control bi-directional signal |
| | DC |  | On-Resistance is 1/2 of connection 1<br><br>2-Make-contacts (Source Common) |
| | |  | |
| | DC |  | On-Resistance is 1/2 of connection 2 |
| 8-PIN | AC OR DC |  | 2 inputs and 2 outputs |
| | |  | 1 input and 2 outputs |



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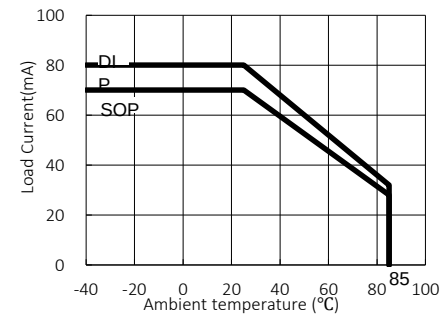
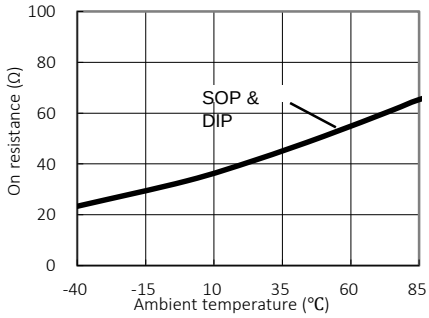
# 38 Series Photo-MOSFET Relay

## Photo MOSFET Relay Reference Data

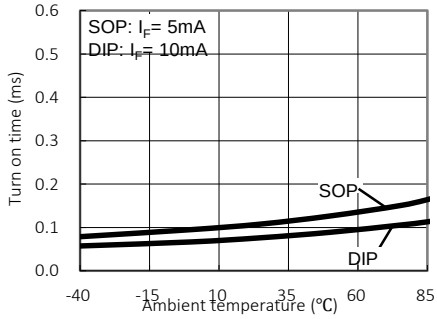
Load Current Vs. Ambient temperature



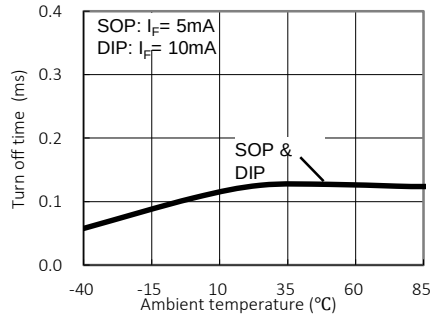

On resistance Vs. Ambient temperature



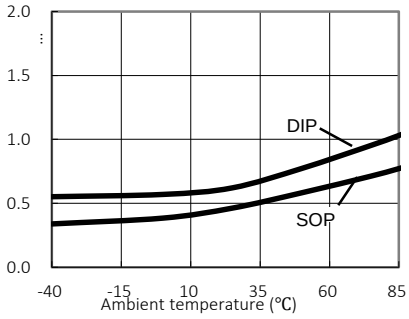

Turn on time Vs. Ambient temperature



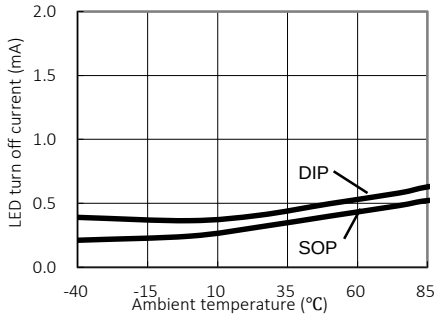

Turn off time Vs. Ambient temperature



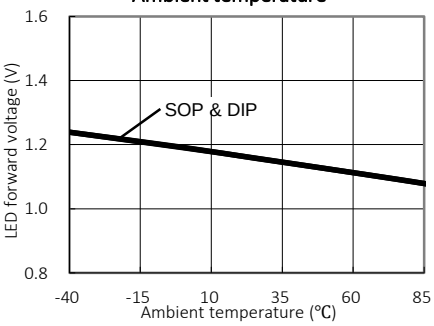

LED operate current Vs. Ambient temperature



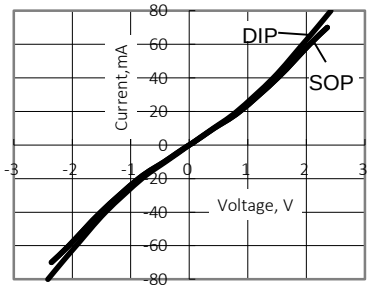

LED turn off current Vs. Ambient temperature



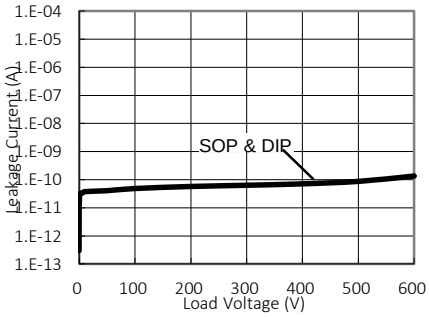

LED forward voltage Vs. Ambient temperature



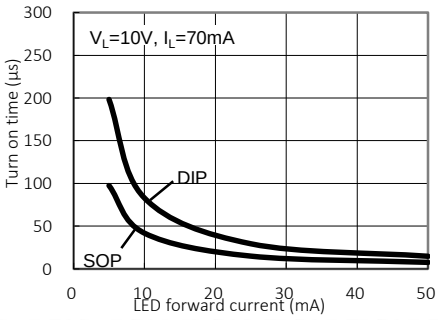

Current Vs. voltage characteristics of output at MOS portion



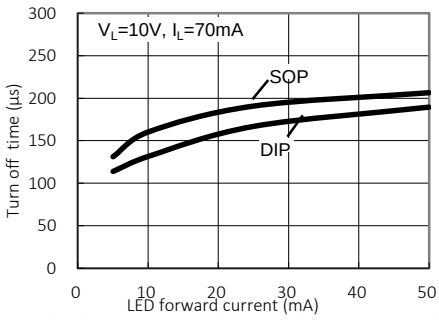

Off state leakage Current Vs. load voltage



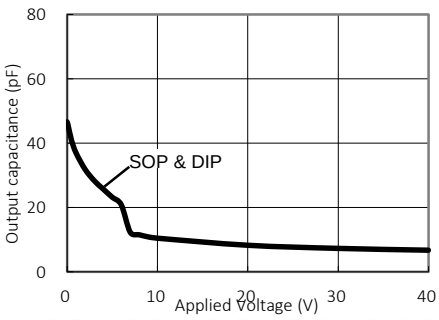

Time on turn vs. LED forward current




Turn off time vs. LED forward current



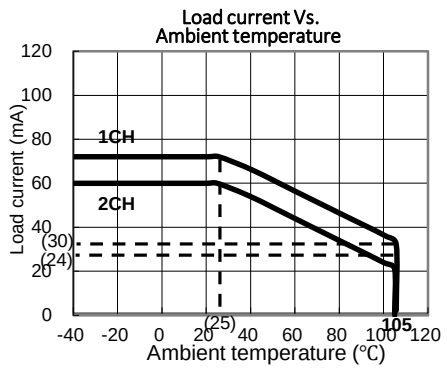

Output capacitance Vs. applied voltage

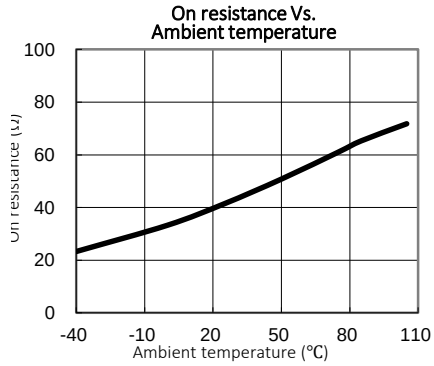


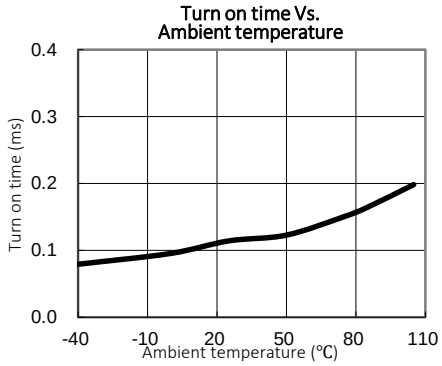
# 38 Series Photo-MOSFET Relay

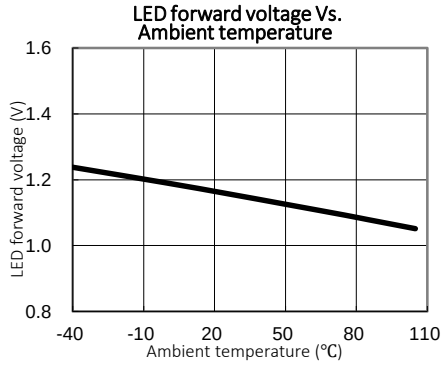
AEC-Q101

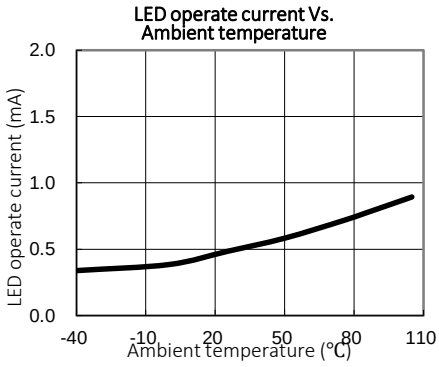
## Photo MOSFET Relay Reference Data for "Q" High Temperature Version

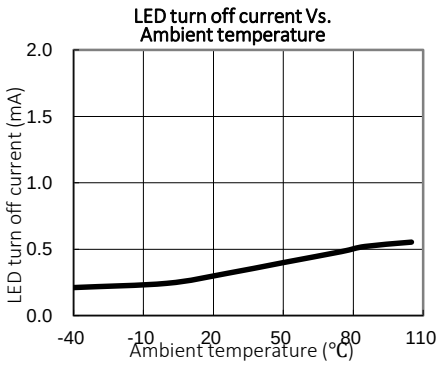


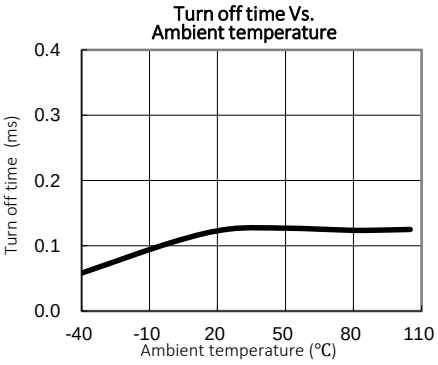



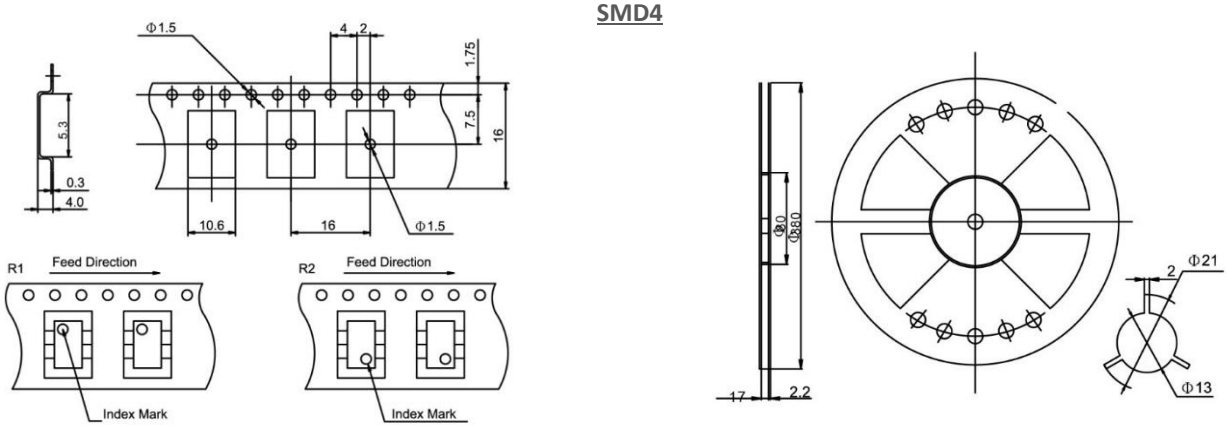



# 38 Series Photo-MOSFET Relay

## Photo MOSFET Relay Tape & Reel Packaging (1,000 pcs per reel)

### SMD4

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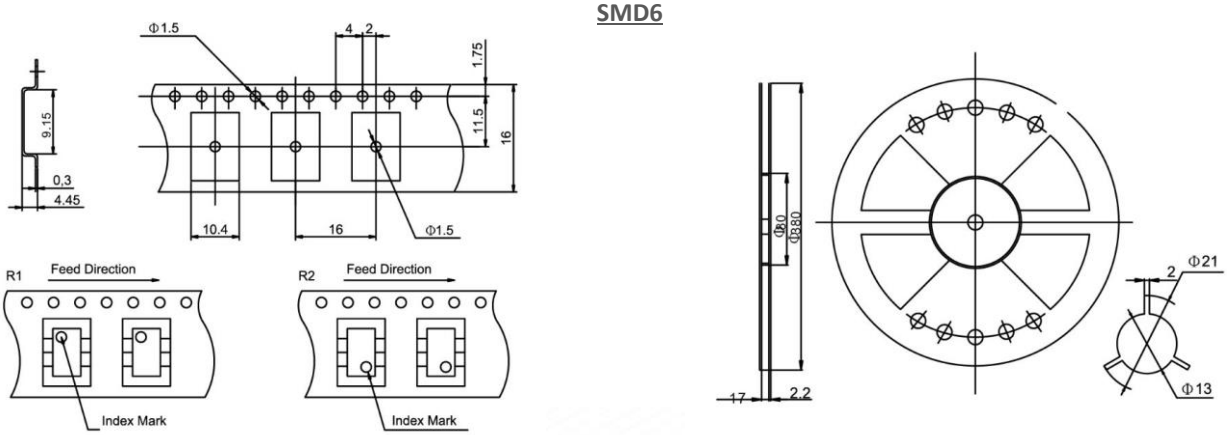


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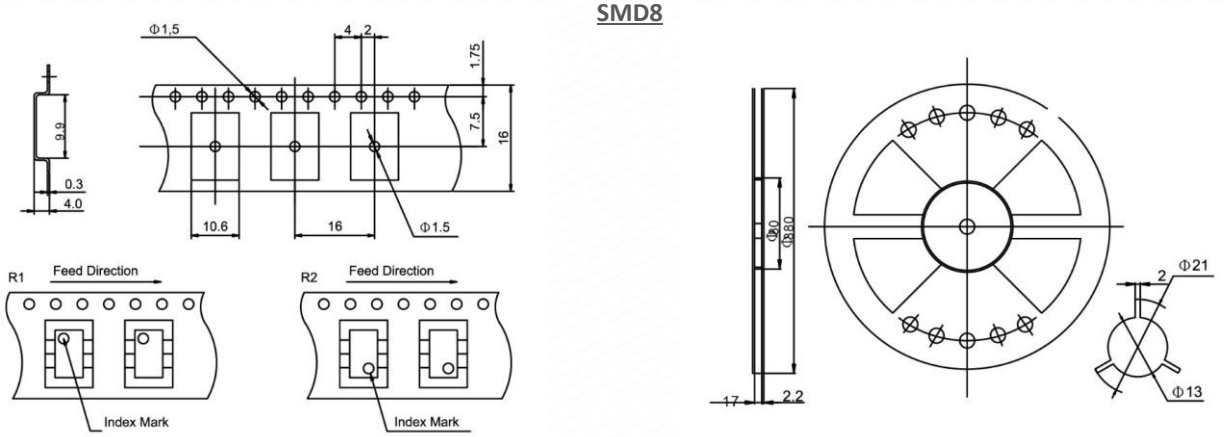
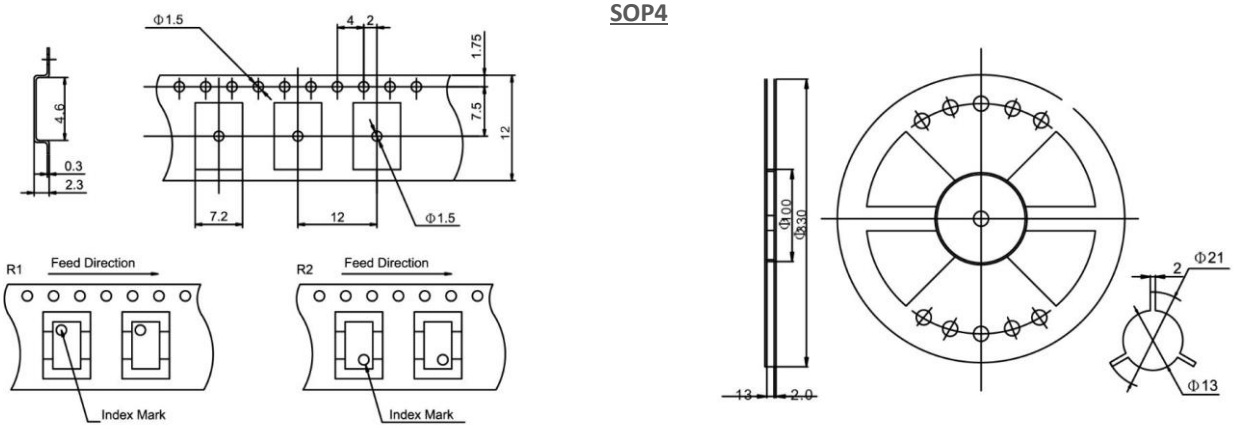


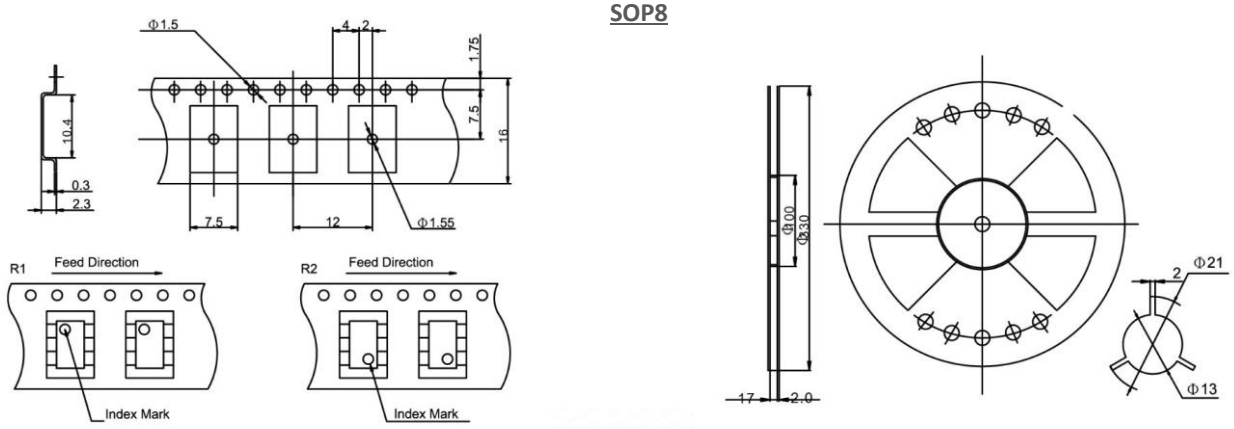
# 38 Series Photo-MOSFET Relay

## Photo MOSFET Relay Tape & Reel Packaging (1,000 pcs per reel)

**SOP4**




**SOP8**




| Glossary Options | |
|---|---|
| D | DIP (Dual-In-Line Package) |
| S | SMD (Surface Mount Design) |
| P | SOP (Small-Outline Package) |
| Q | AEC-Q101 / High Temperature |
| R | Reinforced Isolation |

**Please note:** All technical specifications in this series datasheet refer to the standard product range. Modifications in the sense of technical progress are reserved. For general information only. For more specific information, please consult the product datasheet, available upon request.

This series datasheet could contain technical inaccuracies or typographical errors. Changes are periodically made to the information herein. These changes will be incorporated in future revisions.

For deviating values, latest specifications and product details, please contact your nearest sales office.



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