

SEP Biased Series - 5x6 QFN



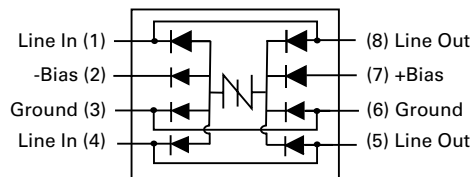
**Agency Approvals**

| Agency | Agency File Number |
|--------|--------------------|
|        | E133083            |

**Pinout Designation**

|         |   |   |          |
|---------|---|---|----------|
| Line in | 1 | 8 | Line out |
| - Bias  | 2 | 7 | + Bias   |
| Ground  | 3 | 6 | Ground   |
| Line in | 4 | 5 | Line out |

**Schematic Symbol**



**Additional Information**



Datashheet



Resources



Samples

**Electrical Characteristics**

| Part Number  | Marking | $V_{DRM}@I_{DRM}=5\mu A$ | $V_S@100V/\mu s$ | $I_H$  | $I_S$  | $I_T@V_T$ | $V_T@I_T=2.2Amps$ | Capacitance                            |
|--------------|---------|--------------------------|------------------|--------|--------|-----------|-------------------|--|
|              |         | V min                    | V max            | mA min | mA max | A max     | V max             |  |
| SEP0080Q38CB | SEP-8C  | 6                        | 25               | 50     | 800    | 2.2       | 8                 | See Capacitance vs. Bias Voltage Graph |
| SEP0640Q38CB | SEP06C  | 58                       | 77               | 150    | 800    | 2.2       | 8                 |  |
| SEP0720Q38CB | SEP07C  | 65                       | 88               | 150    | 800    | 2.2       | 8                 |  |
| SEP0900Q38CB | SEP09C  | 75                       | 98               | 150    | 800    | 2.2       | 8                 |  |
| SEP0080Q38BB | SEP-8B  | 6                        | 25               | 50     | 800    | 2.2       | 8                 |  |
| SEP0640Q38BB | SEP06B  | 58                       | 77               | 150    | 800    | 2.2       | 8                 |  |
| SEP0720Q38BB | SEP07B  | 65                       | 88               | 150    | 800    | 2.2       | 8                 |  |
| SEP0900Q38BB | SEP09B  | 75                       | 98               | 150    | 800    | 2.2       | 8                 |  |

Notes:  
- Absolute maximum ratings measured at  $T_A=25^\circ C$  (unless otherwise noted).  
- Components are bidirectional (unless otherwise noted).

**Description**

The new SEP (SIDACtor Thyristor Ethernet/PoE Protector) series has a surge rating compatible with GR1089 inter-building and ITU K.20/21 Enhanced protection requirements. Targeted for high-speed applications such as 10BaseT, 100BaseT, and 1000BaseT, the SEP series maintains signal quality while providing robust protection for Ethernet and PoE applications. This latest silicon design innovation results in a capacitive loading characteristic that is constant with respect to the voltage across the component. This reduces distortion caused by typical solid-state protection solutions. Offered in a surface-mount, QFN package, the SEP provides small package size without sacrificing power and surge handling capabilities.

**Features & Benefits**

- Compatible with 1000Base-T
- Balanced overvoltage protection
- Low distortion
- Low insertion loss
- Low profile
- SO-8 footprint compatible
- Fails short circuit when surged in excess of ratings
- RoHS Compliant and Halogen-Free
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

**Applicable Global Standards**

- TIA-968-A
- TIA-968-B
- ITU K.20/21 Enhanced Level
- ITU K.20/21 Basic Level
- IEC 61000-4-5 2<sup>nd</sup> edition
- GR 1089 Inter-building
- GR 1089 Intra-building
- YD/T 1082
- YD/T 993
- YD/T 950
- Class 4/5 compliance of IEC 61000-4-5

### 50/60 Hz Ratings

| Parameter Name  | Test Conditions | Value | Units |
|---|-----------------|-------|-------|
| $I_{TSM}$ Maximum non-repetitive on-state current, 50/60 Hz | 0.5s            | 6.5   | A     |
|   | 1s              | 4.6   |       |
|   | 2s              | 3.4   |       |
|   | 5s              | 2.3   |       |
|   | 30s             | 1.3   |       |
|   | 900s            | 0.73  |       |

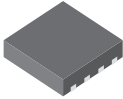
### Surge Ratings

| Series | $I_{PP}$     |                             |                      |                 | $I_{TSM}$                   |
|--------|--------------|-----------------------------|----------------------|-----------------|-----------------------------|
|        | 2x10 $\mu$ s | 1.2/50 $\mu$ s-8/20 $\mu$ s | 10/700-5/310 $\mu$ s | 10x1000 $\mu$ s | 600V <sub>RMS</sub> 1 cycle |
|        | A min        | A min                       | A min                | A min           | A <sub>RMS</sub>            |
| B      | 250          | 250                         | 100                  | 80              | 30                          |
| C      | 500          | 430                         | 200                  | 100             | 30                          |

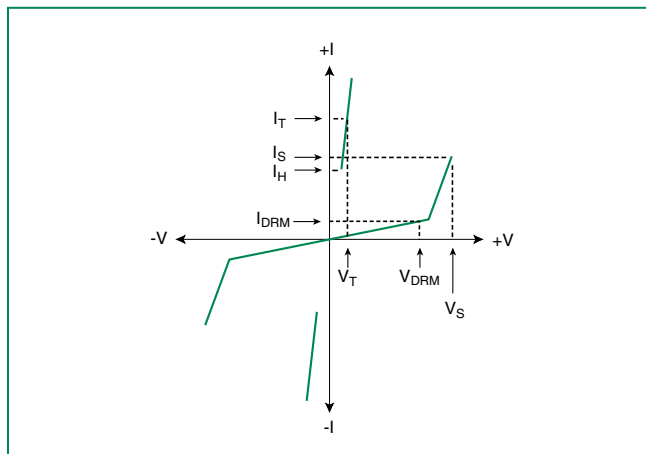
**Notes:**

- Peak pulse current rating ( $I_{PP}$ ) is repetitive and guaranteed for the life of the product as long as it returns to 25C° between surges
- $I_{PP}$  ratings applicable over temperature range of -40°C to +85°C
- The components must initially be in thermal equilibrium with -40°C  $\leq T_J \leq$  +150°C

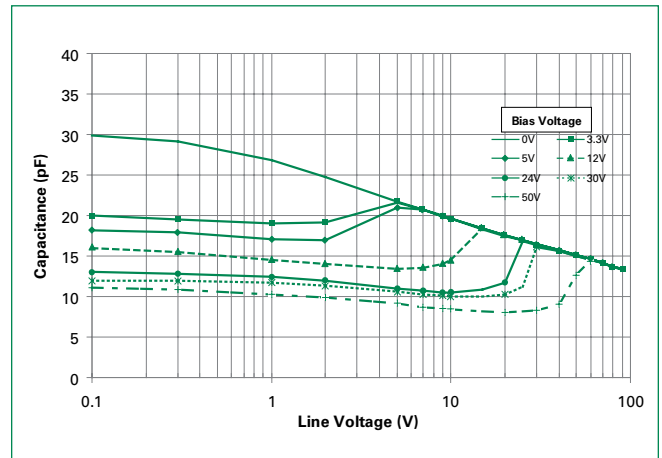
### Thermal Considerations

| Package  | Symbol          | Parameter                               | Value       | Unit |
|--|-----------------|---|-------------|------|
| <br>5x6 QFN | $T_J$           | Junction Temperature                    | -40 to +150 | °C   |
|  | $T_{STG}$       | Storage Temperature Range               | -40 to +150 | °C   |
|  | $R_{\theta JA}$ | Thermal Resistance: Junction to Ambient | 100         | °C/W |

### V-I Characteristics

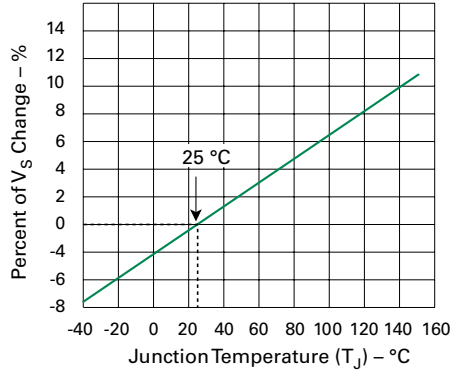


### Capacitance vs. Bias Voltage\*

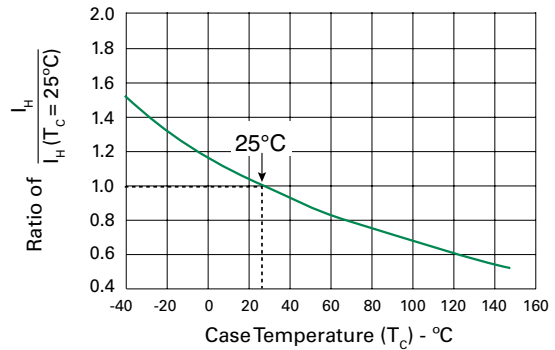


\* Bias voltage must be lower than  $V_{DRM}$

**Normalized  $V_s$  Change vs. Junction Temperature**

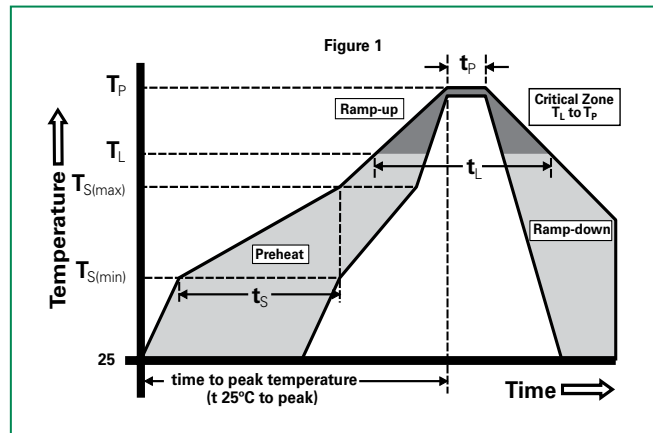


**Normalized DC Holding Current vs. Case Temperature**



**Soldering Parameters**

|  |                                    |                               |
|--|------------------------------------|-------------------------------|
| Reflow Condition                                       |                                    | Pb-Free assembly (see Fig. 1) |
| Pre Heat   | - Temperature Min ( $T_{s(min)}$ ) | +150°C                        |
|  | - Temperature Max ( $T_{s(max)}$ ) | +200°C                        |
|  | - Time (Min to Max) ( $t_s$ )      | 60-180 secs.                  |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                    | 3°C/sec. Max.                 |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                    | 3°C/sec. Max.                 |
| Reflow   | - Temperature ( $T_L$ ) (Liquidus) | +217°C                        |
|  | - Temperature ( $t_L$ )            | 60-150 secs.                  |
| Peak Temp ( $T_p$ )                                    |                                    | +260(+0/-5)°C                 |
| Time within 5°C of actual Peak Temp ( $t_p$ )          |                                    | 30 secs. Max.                 |
| Ramp-down Rate   |                                    | 6°C/sec. Max.                 |
| Time 25°C to Peak Temp ( $T_p$ )                       |                                    | 8 min. Max.                   |
| Do not exceed  |                                    | +260°C                        |



**Physical Specifications**

|                        |  |
|------------------------|--|
| <b>Lead Material</b>   | Copper Alloy   |
| <b>Terminal Finish</b> | 100% Matte-Tin Plated                                  |
| <b>Body Material</b>   | UL Recognized compound meeting flammability rating V-0 |

**Environmental Specifications**

|                                   |  |
|-----------------------------------|--|
| <b>High Temp Voltage Blocking</b> | 80% Rated $V_{DRM}$ ( $V_{AC Peak}$ ) +125°C or +150°C, 504 or 1008 hrs. MIL-STD-750 (Method 1040) JEDEC, JESD22-A-101 |
| <b>Temp Cycling</b>               | -65°C to +150°C, 15 min. dwell, 10 up to 100 cycles. MIL-STD-750 (Method 1051) EIA/JEDEC, JESD22-A104                  |
| <b>Biased Temp &amp; Humidity</b> | 52 $V_{DC}$ (+85°C) 85%RH, 504 up to 1008 hrs. EIA/JEDEC, JESD22-A-101   |
| <b>High Temp Storage</b>          | +150°C 1008 hrs. MIL-STD-750 (Method 1031) JEDEC, JESD22-A-101   |
| <b>Low Temp Storage</b>           | -65°C, 1008 hrs.   |
| <b>Thermal Shock</b>              | 0°C to +100°C, 5 min. dwell, 10 sec. transfer, 10 cycles. MIL-STD-750 (Method 1056) JEDEC, JESD22-A-106                |
| <b>Resistance to Solder Heat</b>  | +260°C, 30 secs. MIL-STD-750 (Method 2031)   |
| <b>Moisture Sensitivity Level</b> | 85%RH, +85°C, 168 hrs., 3 reflow cycles (+260°C Peak). JEDEC-J-STD-020, Level 1  |

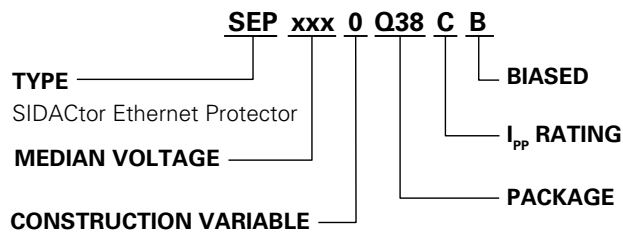
**Dimensions — 5x6 QFN**



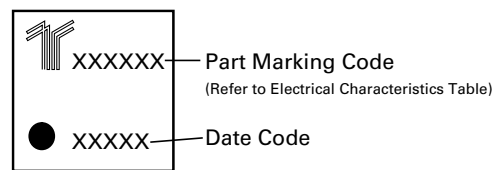
PIN 1 & 8: LINE IN / LINE OUT  
 PIN 2: BIAS (-)  
 PIN 3 & 6: GROUND CONNECTIONS  
 PIN 4 & 5: LINE IN / LINE OUT  
 PIN 7: BIAS (+)

| Dimension | Inches |       | Millimeters |       |
|-----------|--------|-------|-------------|-------|
|           | Min    | Max   | Min         | Max   |
| <b>A</b>  | 0.187  | 0.207 | 4.745       | 5.253 |
| <b>B</b>  | 0.226  | 0.246 | 5.745       | 6.253 |
| <b>C</b>  | 0.054  | 0.064 | 1.374       | 1.628 |
| <b>D</b>  | 0.165  | 0.171 | 4.199       | 4.351 |
| <b>E</b>  | 0.027  | 0.033 | 0.686       | 0.838 |
| <b>F</b>  | 0.011  | 0.017 | 0.279       | 0.432 |
| <b>G</b>  | 0.047  | 0.053 | 1.194       | 1.346 |
| <b>H</b>  | 0.032  | 0.038 | 0.800       | 0.953 |
| <b>I</b>  | 0.027  | 0.033 | 0.686       | 0.838 |
| <b>J</b>  | 0.100  | 0.106 | 2.540       | 2.692 |
| <b>K</b>  | 0.027  | 0.033 | 0.686       | 0.838 |
| <b>L</b>  | 0.015  | 0.021 | 0.381       | 0.533 |

**Part Numbering**



**Part Marking**

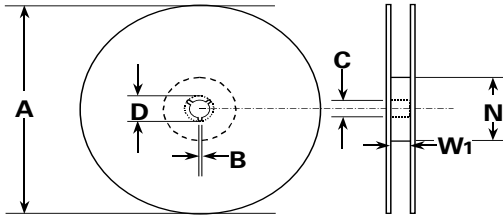


**Packing Options**

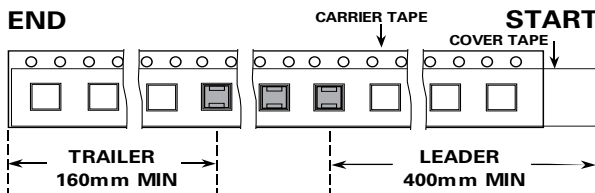
| Package Type | Description                  | Quantity | Added Suffix | Industry Standard |
|--------------|------------------------------|----------|--------------|-------------------|
| Q38          | 5x6x1.5 QFN<br>Tape and Reel | 4,000    | N / A        | EIA-481-D         |

**Tape and Reel Specifications — 5x6 QFN**

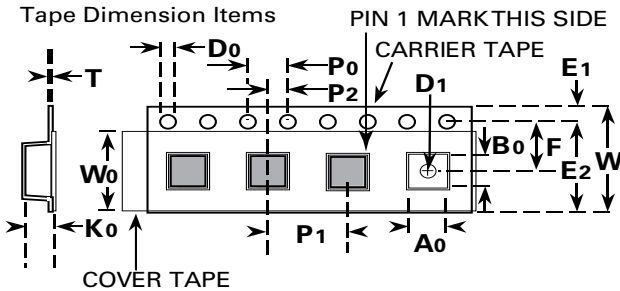
**Reel Dimension**



**Tape Leader and Trailer Dimensions**



**Tape Dimension Items**



| Symbols              | Description                             | Inches |        | Millimeters |       |
|----------------------|---|--------|--------|-------------|-------|
|                      |   | Min    | Max    | Min         | Max   |
| <b>A</b>             | Reel Diameter                           | N/A    | 12.992 | N/A         | 330.0 |
| <b>B</b>             | Drive Spoke Width                       | 0.059  | N/A    | 1.50        | N/A   |
| <b>C</b>             | Arbor Hole Diameter                     | 0.504  | 0.531  | 12.80       | 13.50 |
| <b>D</b>             | Drive Spoke Diameter                    | 0.795  | N/A    | 20.20       | N/A   |
| <b>N</b>             | Hub Diameter                            | 1.969  | N/A    | 50.00       | N/A   |
| <b>W<sub>1</sub></b> | Reel Inner Width at Hub                 | 0.488  | 0.567  | 12.40       | 14.40 |
| <b>A<sub>0</sub></b> | Pocket Width at Bottom                  | 0.204  | 0.212  | 5.20        | 5.40  |
| <b>B<sub>0</sub></b> | Pocket Length at Bottom                 | 0.244  | 0.252  | 6.20        | 6.40  |
| <b>D<sub>0</sub></b> | Feed Hole Diameter                      | 0.059  | 0.063  | 1.50        | 1.60  |
| <b>D<sub>1</sub></b> | Pocket Hole Diameter                    | 0.059  | N/A    | 1.50        | N/A   |
| <b>E<sub>1</sub></b> | Feed Hole Position 1                    | 0.065  | 0.073  | 1.65        | 1.85  |
| <b>E<sub>2</sub></b> | Feed Hole Position 2                    | 0.400  | 0.408  | 10.15       | 10.35 |
| <b>F</b>             | Feed Hole Center - Pocket Hole Center 2 | 0.212  | 0.220  | 5.40        | 5.60  |
| <b>K<sub>0</sub></b> | Pocket Depth                            | 0.067  | 0.075  | 1.70        | 1.90  |
| <b>P<sub>0</sub></b> | Feed Hole Pitch                         | 0.153  | 0.161  | 3.90        | 4.10  |
| <b>P<sub>1</sub></b> | Component Spacing                       | 0.311  | 0.319  | 7.90        | 8.10  |
| <b>P<sub>2</sub></b> | Feed Hole Center - Pocket Hole Center 1 | 0.077  | 0.081  | 1.90        | 2.10  |
| <b>T</b>             | Carrier Tape Thickness                  | 0.010  | 0.014  | 0.25        | 0.35  |
| <b>W</b>             | Embossed Carrier Tape Width             | 0.460  | 0.484  | 11.70       | 12.30 |
| <b>W<sub>0</sub></b> | Cover Tape Width                        | 0.358  | 0.366  | 9.10        | 9.30  |

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#### Как с нами связаться

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