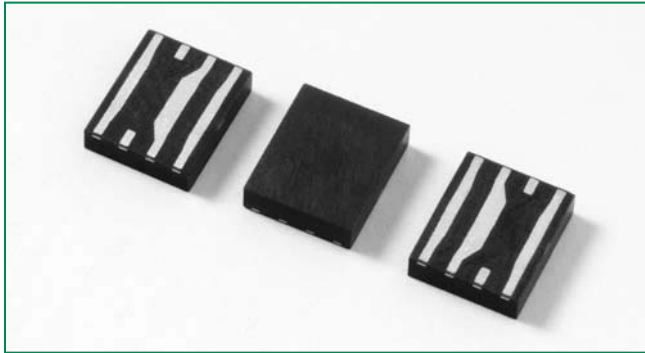



**RoHS HF SEP Ethernet/PoE Protector Series**

**Description**

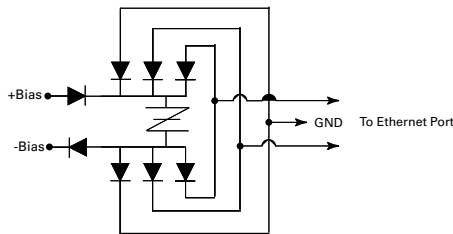
The new SEP (SIDACtor Ethernet/PoE Protector) series has a surge rating compatible with GR1089 Inter-building and ITU K.20/21 Enhanced protection requirements. Targeted for high-speed applications such as 10BaseT, 100BaseT, and 1000BaseT, the SEP series maintains signal quality while providing robust 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 device. 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.

**Agency Approvals**

Agency	Agency File Number
	E133083

**Pinout Designation**

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

**Schematic Symbol**

**Features & Benefits**

- RoHS compliant
- Halogen-Free
- QFN (Quad Flatpak No-lead) surface mount package
- Low insertion loss
- Constant capacitance determined by bias voltage
- Bidirectional transient voltage protection
- Nanoseconds crowbar speed
- Well suited for transformer coupled applications
- Balanced longitudinal load capacitance
- Balanced overvoltage protection

**Protection Solution for**

- GR 1089 Inter-building
- GR 1089 Intra-building
- ITU K.20/21 Basic Level
- ITU K.20/21 Enhanced Level
- TIA-968-A
- IEC 61000-4-5
- YD/T 950
- YD/T 993
- YD/T 1082

**Electrical Characteristics**

Part Number	Marking	$V_{DRM}@I_{DRM}=5\mu A$	$V_S@100V/\mu S$	$I_H$	$I_S$	$I_T@V_T$	$V_T@I_T=2.2$ amp	Capacitance @1MHz @ 2V bias
		Volts	Volts	mAmps	mAmps	Amps	Volts	
		Min	Max	Min	Max	Max	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	

- $V_{DRM}$  and  $V_S$  characteristics are measured from line-to-line or line-to-ground.
- All measurements are made at an ambient temperature of 25°C.  $I_{pp}$  applies to -40°C through +85°C temperature range.
- Listed SIDACtor devices are bidirectional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- Specifications are subject to change without notice.

**50/60 Hz Ratings**

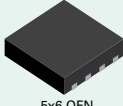
Parameter Name	Test Conditions	Value	Units
$I_{TSM}$ Maximum non-repetitive on-state current, 50/60 Hz	0.5s	6.5	A
	1s	4.6	
	2s	3.4	
	5s	2.3	
	30s	1.3	
	900s	0.73	

**Surge Ratings**

Series	$I_{PP}$				$I_{TSM}$
	2x10 $\mu$ s	1.2x50 $\mu$ s/8x20 $\mu$ s	10x700/5x310 $\mu$ s	10x1000 $\mu$ s	600V <sub>RMS</sub> 1 cycle
	Amps	Amps	Amps	Amps	A <sub>RMS</sub>
	Min	Min	Min	Min	Min
C	500	400	200	100	40

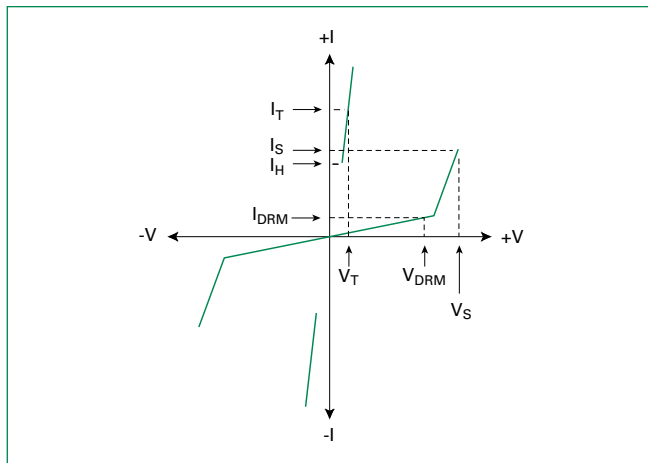
Note: The lightning surge may be repeated after the device returns to its initial conditions.  
The device must initially be in thermal equilibrium with -40°C  $\geq$  T<sub>J</sub>  $\geq$  150°C.

**Thermal Considerations**

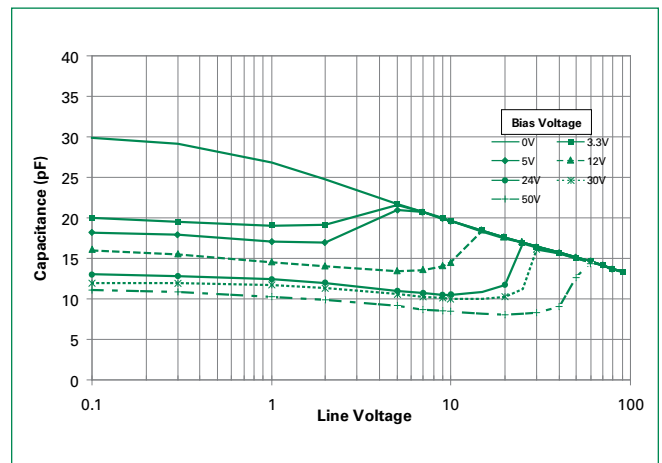
Package	Symbol	Parameter	Value	Unit
 5x6 QFN	T <sub>J</sub>	Junction Temperature	-65 to +150	°C
	T <sub>STG</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	100	°C/W

Note : The device must initially be in thermal equilibrium with -40°C  $\geq$  T<sub>J</sub>  $\geq$  150°C

**V-I Characteristics**

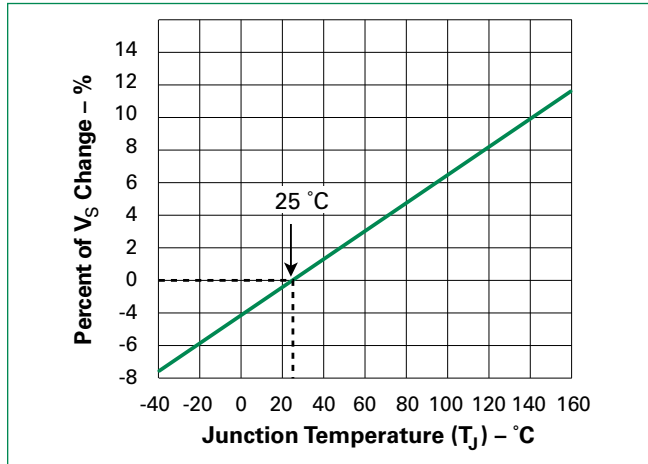


**Capacitance vs. Voltage\***

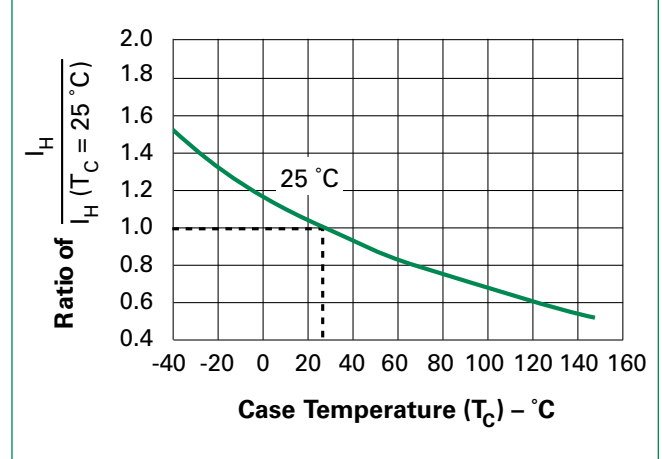


\* Bias voltage must be lower than V<sub>DRM</sub>

### Normalized $V_S$ Change vs. Junction Temperature

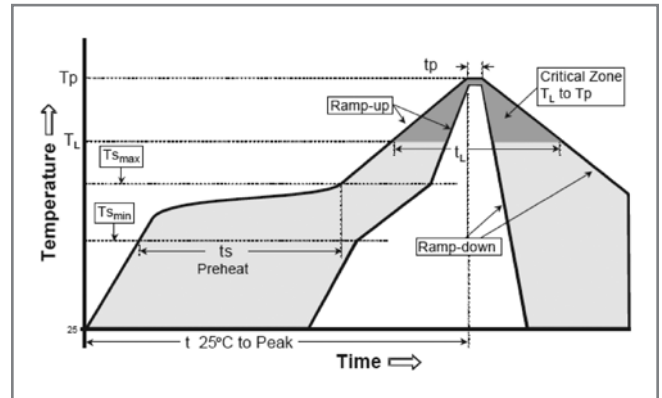


### Normalized DC Holding Current vs. Case Temperature



### Soldering Parameters

Reflow Condition	Pb – Free assembly (see Figure1)	
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/second max	
$T_{s(max)}$ to $T_L$ - Ramp-up Rate	3°C/second max	
Reflow	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Temperature ( $t_L$ )	60 – 150 seconds
Peak Temperature ( $T_p$ )	260 <sup>+0.5</sup> °C	
Time within 5°C of actual peak Temperature ( $t_p$ )	20 – 30 seconds	
Ramp-down Rate	6°C/second max	
Time 25°C to peak Temperature ( $T_p$ )	8 minutes max	
Do not exceed	260°C	



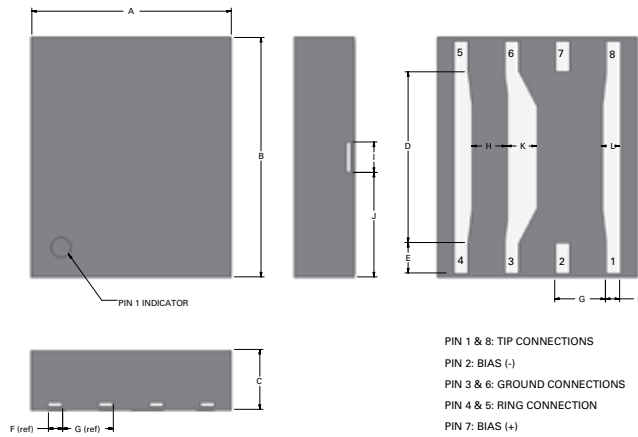
### Physical Specifications

<b>Terminal Material</b>	Copper Alloy
<b>Terminal Finish</b>	100% Matte Tin Plated
<b>Body Material</b>	UL recognized epoxy meeting flammability classification 94V-0

### Environmental Specifications

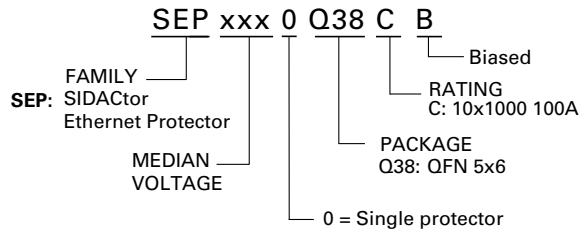
<b>High Temperature Voltage Blocking</b>	MIL-STD-750: Method 1040, Condition A 80% min $V_{DRM}$ (VAC-peak), 150°C, 504 hours
<b>Temperature Cycling</b>	MIL-STD-750: Method 1051 -65°C to 150°C, 15-minute dwell, 100 cycles
<b>Biased Temperature &amp; Humidity</b>	EIA/JEDEC: JESD22-A101 52VDC, 85°C, 85%RH, 1008 hours
<b>High Temp. Storage</b>	MIL-STD-750: Method 1031 150°C, 1008 hours
<b>Low Temp. Storage</b>	-65°C, 1008 hours
<b>Thermal Shock</b>	MIL-STD-750: Method 1056 0°C to 100°C, 5-minute dwell, 10-second transfer, 10 cycles
<b>Autoclave (Pressure Cooker Test)</b>	EIA/JEDEC: JESD22-A102 121°C, 100%RH, 2atm, 168 hours
<b>Resistance to Solder Heat</b>	MIL-STD-750: Method 2031 260°C, 10 seconds

**Dimensions - 5x6 QFN**

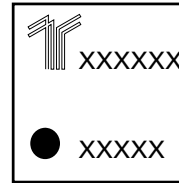


Dimension	Inches			Millimeters		
	Min	Typ	Max	Min	Typ	Max
A	0.187	0.197	0.207	4.745	5.000	5.253
B	0.226	0.236	0.246	5.745	6.000	6.253
C	0.054	0.059	0.064	1.374	1.500	1.628
D	0.165	0.168	0.171	4.199	4.275	4.351
E	0.027	0.030	0.033	0.686	0.762	0.838
F	0.011	0.014	0.017	0.279	0.356	0.432
G	0.047	0.050	0.053	1.194	1.270	1.346
H	0.032	0.035	0.038	0.800	0.876	0.953
I	0.027	0.030	0.033	0.686	0.762	0.838
J	0.100	0.103	0.106	2.540	2.616	2.692
K	0.027	0.030	0.033	0.686	0.762	0.838
L	0.015	0.018	0.021	0.381	0.457	0.533

**Part Numbering System**



**Part Marking System**

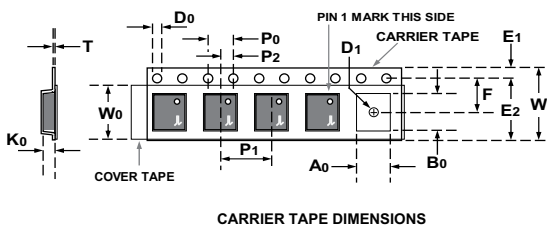
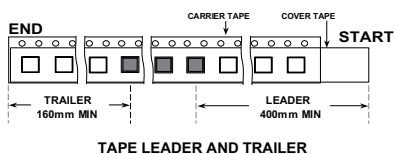
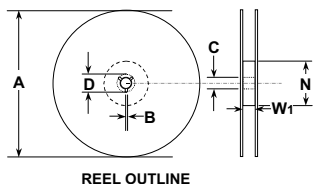


First Line: Part number  
Second Line: Date code

**Packaging**

Package Type	Description	Packaging Quantity	Industry Standard
5x6 QFN	5x6x1.5	4,000	12mm Embossed Carrier Tape & Reel

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



ITEM	DESCRIPTION	Inches			Millimeters		
		Min	Typ	Max	Min	Typ	Max
A	Reel Diameter	N/A		12.992	N/A		330.0
B	Drive Spoke Width	0.059		N/A	1.50		N/A
C	Arbor Hole Diameter	0.504		0.531	12.80		13.50
D	Drive Spoke Diameter	0.795		N/A	20.20		N/A
N	Hub Diameter	1.969		N/A	50.00		N/A
W1	Reel Inner Width at Hub	0.488		0.567	12.40		14.40
A0	Pocket Width at bottom	0.204	0.208	0.212	5.20	5.30	5.40
B0	Pocket Length at bottom	0.244	0.248	0.252	6.20	6.30	6.40
A1	Pocket Width at opening		0.212			5.40	
B1	Pocket Length at opening		0.252			6.40	
D0	Feed Hole Diameter	0.059	0.061	0.063	1.50	1.55	1.60
D1	Pocket Hole Diameter	0.059	0.063	N/A	1.50	1.60	N/A
E1	Feed hole position 1	0.065	0.069	0.073	1.65	1.75	1.85
E2	Feed hole position 2	0.400	0.404	0.408	10.15	10.25	10.35
F	Feed hole center-Pocket hole center 2	0.212	0.216	0.220	5.40	5.50	5.60
K0	Pocket Depth	0.067	0.071	0.075	1.70	1.80	1.90
P0	Feed Hole Pitch	0.153	0.157	0.161	3.90	4.00	4.10
P1	Component Spacing	0.311	0.315	0.319	7.90	8.00	8.10
P2	Feed hole center-Pocket hole center 1	0.077	0.079	0.081	1.90	2.00	2.10
T	Carrier Tape Thickness	0.010	0.012	0.014	0.25	0.30	0.35
W	Embossed Carrier Tape Width	0.460	0.472	0.484	11.70	12.00	12.30
W0	Cover Tape Width	0.358	0.362	0.366	9.10	9.20	9.30