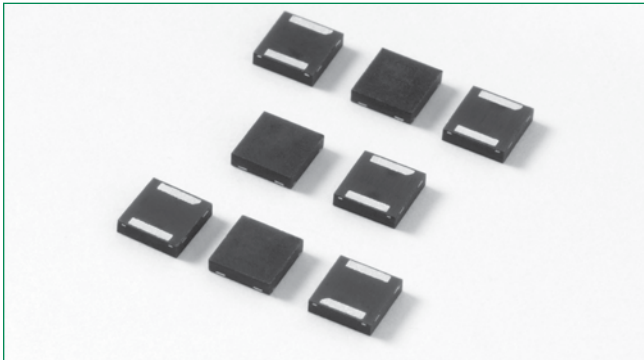


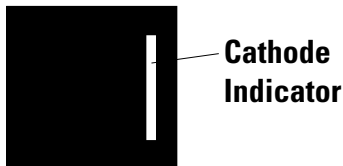
Fixed Voltage Q2L Series 3.3x3.3 QFN



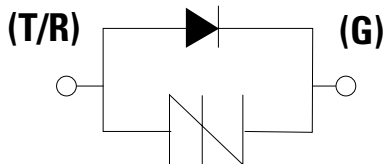
**Agency Approvals**

Agency	Agency File Number
	E133083

**Pinout Designation**



**Schematic Symbol**



**Description**

Fixed Voltage Q2L Series are uni-directional SIDActo<sup>®</sup>r thyristors designed to protect SLICs (Subscriber Line Interface Circuit) from damaging overvoltage transients.

The series provides single line protection using a fixed voltage switching component for negative surges. All positive surges are routed through an internal diode to a ground reference. The small size of the Q2L makes it ideal for high density applications.

**Features and Benefits**

- Integrated diode for positive voltage surges
- Low profile
- Small footprint QFN Package
- Low on-state voltage
- Does not degrade surge capability after multiple surge events within limit.
- 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
- GR 1089 Inter-building
- GR-1089 Intra-building
- IEC 61000-4-5 2nd editin
- YD/T 950
- YD/T 993
- YD/T 1082

**Additional Information**



Datasheet



Resources



Samples

**Electrical Characteristics**

Part Number	Marking	$V_{DRM}$	$V_S$	$I_H$	$I_S$	$I_T$	$V_T$	$V_F$	Capacitance	
		@ $I_{DRM}=5\mu A$	@ 100V/ $\mu s$				@ $I_T=2.2$ Amps		@ 1MHz @ 2V bias	pF min
		V min	V max	mA min	mA max	A max	V max	V max		
P0641Q22CLRP	P61C	58	77	120	800	2.2	4	5	35	75
P0721Q22CLRP	P71C	65	88	120	800	2.2	4	5	25	45
P0901Q22CLRP	P91C	75	98	120	800	2.2	4	5	55	85
P1101Q22CLRP	P10C	95	130	120	800	2.2	4	5	50	75
P1301Q22CLRP	P13C	120	160	120	800	2.2	4	5	45	70
P1701Q22CLRP	P17C	160	200	120	800	2.2	4	5	45	70

**Notes:**


- Absolute maximum ratings measured at  $T_A = 25^\circ C$  (unless otherwise noted).
- Components are not appropriate for positive ringing systems.

**Surge Ratings**

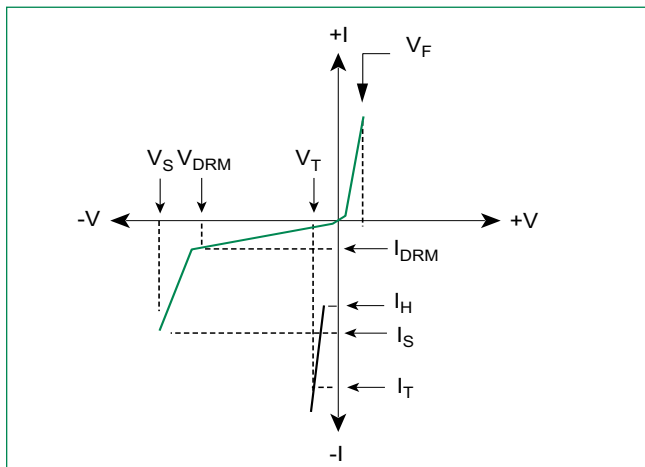
Series	$I_{PP}$					$I_{TSM}$	di/dt
	2/10 $\mu$ s	1.2/50 $\mu$ s/8/20 $\mu$ s	10/160 $\mu$ s	10/560 $\mu$ s	10/1000 $\mu$ s	50 / 60Hz	Amps/ $\mu$ s max
C	500	400	200	150	100	30	500

- Notes:**
- Peak pulse current rating ( $I_{PP}$ ) is repetitive and guaranteed for the life of the product that remains in thermal equilibrium.
  - $I_{PP}$  ratings applicable over temperature range of -40°C to +85°C
  - The component must initially be in thermal equilibrium with -40°C  $\leq$  T<sub>J</sub>  $\leq$  +150°C

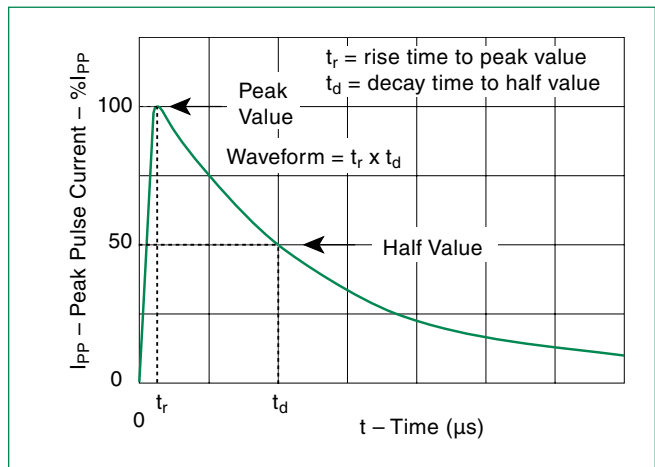
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
3.3x3.3 QFN 	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	120	°C/W

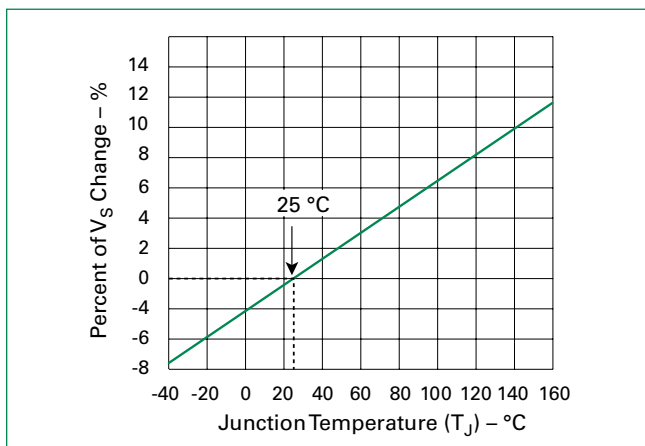
**V-I Characteristics**



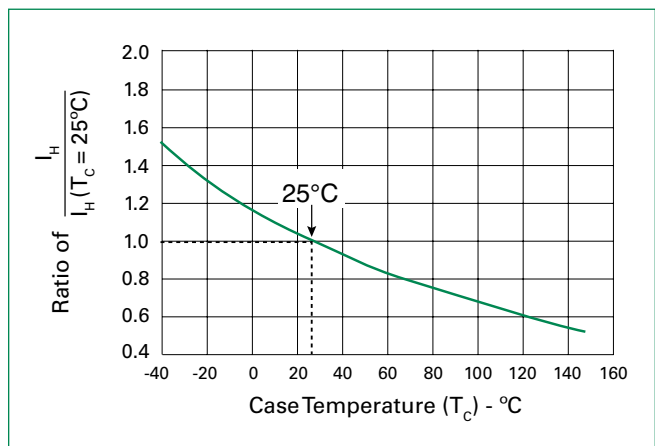
**t<sub>r</sub> x t<sub>d</sub> Pulse Waveform**



**Normalized V<sub>S</sub> Change vs. Junction Temperature**

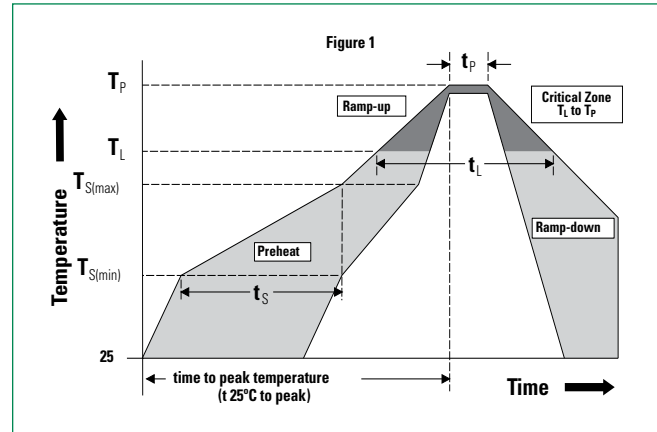


**Normalized DC Holding Current vs. Case Temperature**



**Soldering Parameters**

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



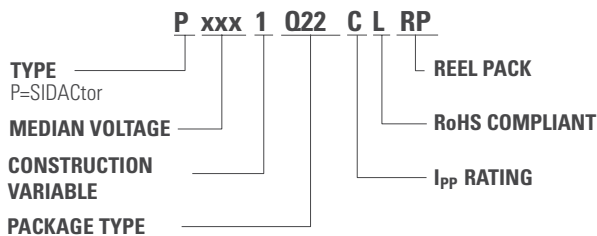
**Physical Specifications**

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

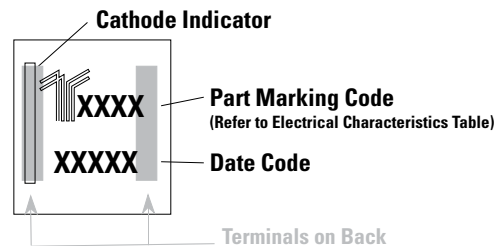
**Environmental Specifications**

<b>High Temp Voltage Blocking</b>	80% Rated $V_{DRM}$ ( $V_{DC}$ ) +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-A-104
<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

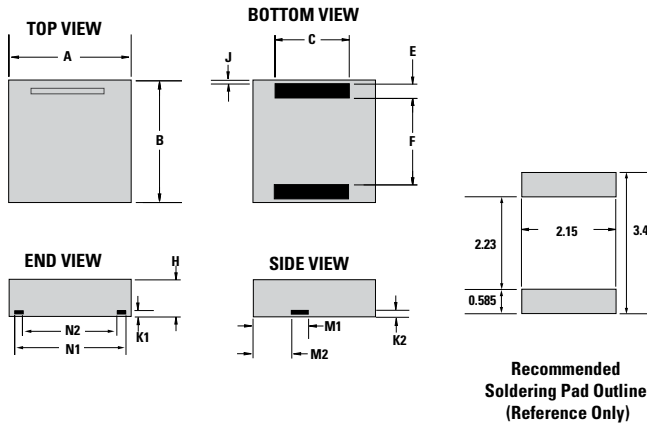
**Part Numbering**



**Part Marking**



**Dimensions — 3.3x3.3 QFN**



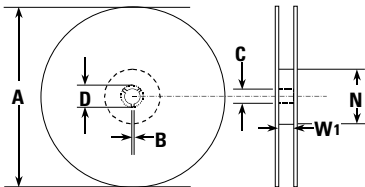
Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
<b>A</b>	0.126	0.134	3.200	3.400
<b>B</b>	0.126	0.134	3.200	3.400
<b>C</b>	0.075	0.083	1.900	2.100
<b>E</b>	0.011	0.019	0.285	0.485
<b>F</b>	0.088	0.096	2.230	2.430
<b>H</b>	0.035	0.043	0.900	1.100
<b>J</b>	0.000	0.008	0.000	0.200
<b>K1</b>	0.004	0.012	0.100	0.300
<b>K2</b>	0.004	0.012	0.100	0.300
<b>M1</b>	0.063	0.071	1.610	1.810
<b>M2</b>	0.045	0.053	1.153	1.353
<b>N1</b>	0.095	0.103	2.420	2.620
<b>N2</b>	0.082	0.090	2.080	2.280

**Packing Options**

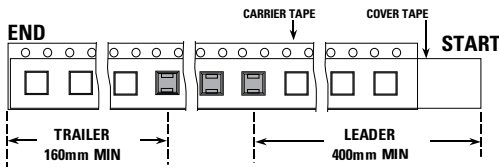
Package Type	Description	Quantity	Added Suffix	Industry Standard
Q22	3.3x3.3 QFN Tape and Reel Pack	5000	RP	EIA-481-D

**Tape and Reel Dimension — 3.3x3.3 QFN**

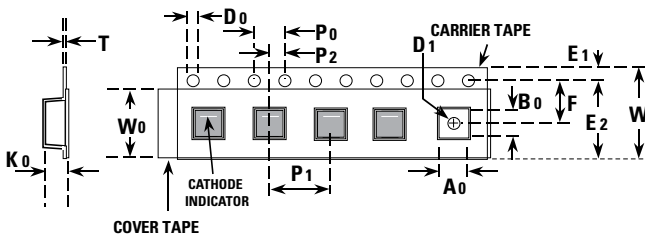
**Reel Dimension**



**Tape Leader and Trailer Dimensions**



**Tape Dimension Items**



	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	0.138	0.146	3.50	3.70
<b>B<sub>0</sub></b>	Pocket Length at bottom	0.138	0.146	3.50	3.70
<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	0.215	0.219	5.45	5.55
<b>K<sub>0</sub></b>	Pocket Depth	0.039	0.051	1.00	1.30
<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	0.077	0.081	1.95	2.05
<b>T</b>	Carrier Tape Thickness	0.010	0.014	0.25	0.35
<b>W</b>	Embossed Carrier Tape Width	0.453	0.484	11.50	12.30
<b>W<sub>0</sub></b>	Cover Tape Width	0.358	0.366	9.10	9.30