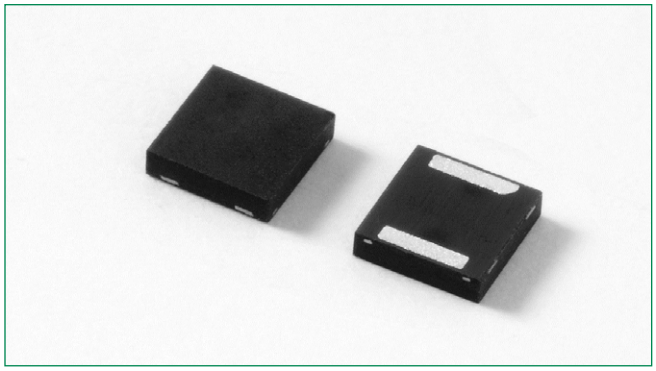
Pxxx0Q22xLHL, Low IH Series – QFN 3.3X3.3



Description

The Pxxx0Q22xLHL Low IH series is the low capacitance SIDACtor® component designed to protect high density broadband equipment from damaging overvoltage transients.
It provides a low profile, chip scale surface mount solution that enables broadband equipment to comply with global regulatory standards while limiting the impact to broadband signals and board space.

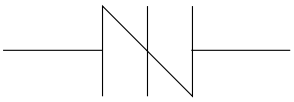
Features and Benefits

- Low profile
- Small footprint
- Low capacitance
- Low voltage overshoot
- Low on-state voltage
- Does not degrade surge capability after multiple surge events within limit.
- Fails short circuit when surged in excess of ratings
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)
- Halogen-Free and RoHS-Compliant

Agency Approvals

Agency	Agency File Number
	E133083

Schematic Symbol



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 Edition
- YD/T 1082
- YD/T 993
- YD/T 950

Electrical Characteristics

Part Number	Marking	V_{DRM} @I_{DRM}=5µA	V_S @100V/µs	I_H	I_S	I_T	V_T @I_T=2.2 Amps	Capacitance @1MHz, 2V bias	
		V min	V max	mA min	mA max	A max	V max	pF min	pF max
P4500Q22DLHL	P45DL	400	570	10	800	2.2	4	25	65

Notes:
- Absolute maximum ratings measured at T_A= 25°C (unless otherwise noted).
- Components are bi-directional (unless otherwise noted).

Surge Ratings

Series	I_{PP}								I_{TSM} 50/60 Hz	di/dt
	0.2/310 [1] 0.5/700 [2]	2/10 [1] 2/10 [2]	8/20 [1] 1.2/50 [2]	10/160 [1] 10/160 [2]	5/320 [1] 9/720 [2]	10/360 [1] 10/360 [2]	10/1000 [1] 10/1000 [2]	5/310 [1] 10/700 [2]		
	A min	A min	A min	A min	A min	A min	A min	A typ	A min	A/µs max
D	-	600	550	-	-	-	130	250	50	500

Notes:
1. Current waveform in µs
2. Voltage waveform in µs
- Peak pulse current rating (I_{PP}) is repetitive and guaranteed for the life of the product.
- I_{PP} ratings applicable over temperature range of -40°C to +85°C
- The component must initially be in thermal equilibrium with -40°C ≤ T_J ≤ +150°C

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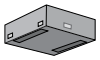
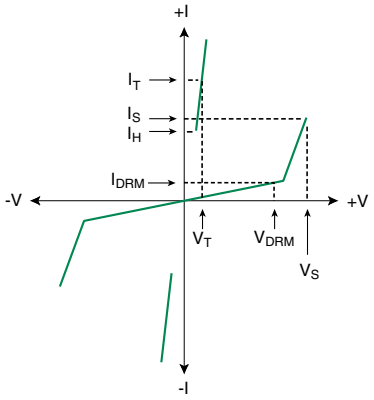
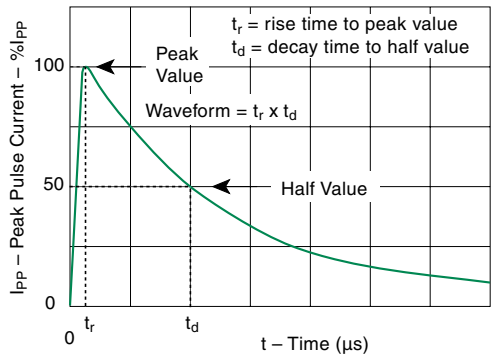
Thermal Considerations

Package	Symbol	Parameter	Value	Unit
3.3 x 3.3 QFN 	T_J	Operating Junction Temperature Range	-40 to +150	°C
	T_S	Storage Temperature Range	-65 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	120	°C/W

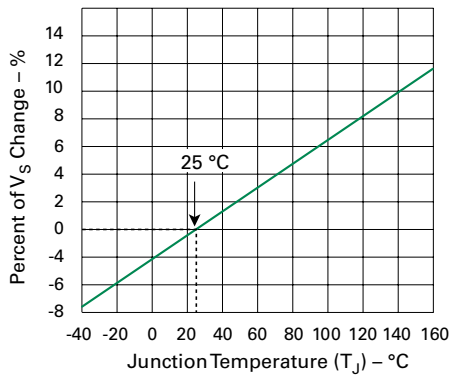
V-I Characteristics



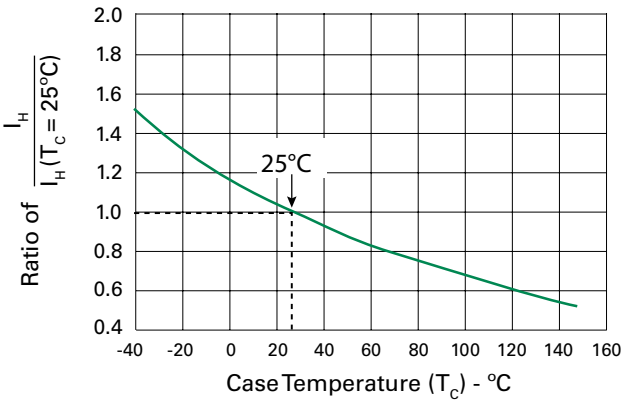
t_r x t_d Pulse Waveform



Normalized V_S Change vs. Junction Temperature



Normalized DC Holding Current vs. Case Temperature



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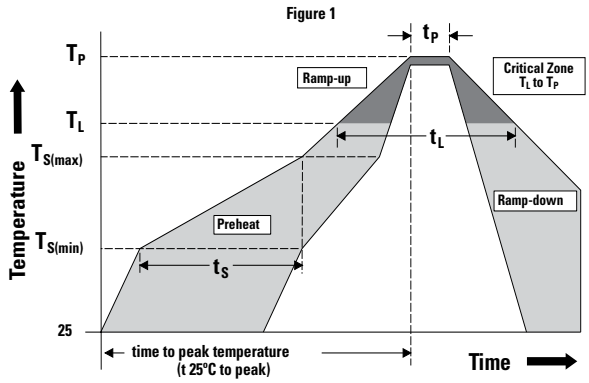
SIDACtor® Protection Thyristors
Broadband Optimized™ Protection

Soldering Parameters

Reflow Condition		Pb-Free assembly
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

Figure 1



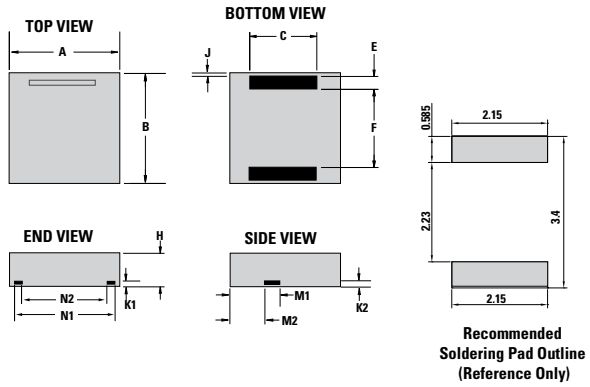
Physical Specifications

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

Environmental Specifications

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

Dimensions — 3.3x3.3 QFN



Recommended Soldering Pad Outline (Reference Only)

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

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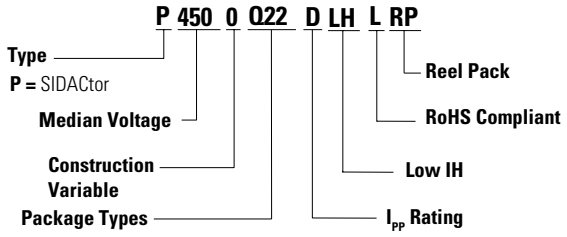
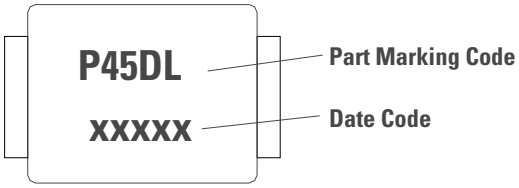
SIDACtor® Protection Thyristors
Broadband Optimized™ Protection

Part Numbering



Part Marking

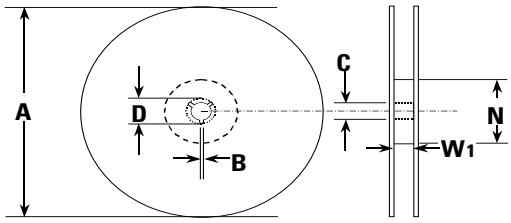


Packing Options

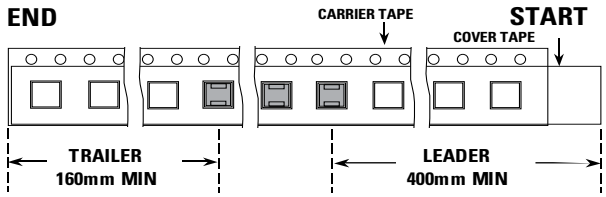
Package Type	Description	Quantity	Added Suffix	Industry Standard
Q22	3.3x3.3 QFN Tape and Reel Pack	5000	RP	EIA-481-D

Tape and Reel Specifications — 3.3x3.3 QFN

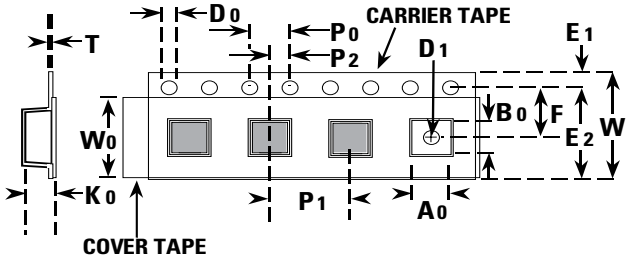
Reel Dimension



Tape Leader and Trailer Dimensions



Tape Dimension Items



Symbols	Description	Inches		Millimeters	
		Min	Max	Min	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
W_1	Reel Inner Width at Hub	0.488	0.567	12.40	14.40
A_0	Pocket Width at Bottom	0.138	0.146	3.50	3.70
B_0	Pocket Length at Bottom	0.138	0.146	3.50	3.70
D_0	Feed Hole Diameter	0.059	0.063	1.50	1.60
D_1	Pocket Hole Diameter	0.059	N/A	1.50	N/A
E_1	Feed Hole Position 1	0.065	0.073	1.65	1.85
E_2	Feed Hole Position 2	0.400	0.408	10.15	10.35
F	Feed Hole Center - Pocket Hole Center 2	0.215	0.219	5.45	5.55
K_0	Pocket Depth	0.039	0.051	1.00	1.30
P_0	Feed Hole Pitch	0.153	0.161	3.90	4.10
P_1	Component Spacing	0.311	0.319	7.90	8.10
P_2	Feed Hole Center - Pocket Hole Center 1	0.077	0.081	1.90	2.05
T	Carrier Tape Thickness	0.010	0.014	0.25	0.35
W	Embossed Carrier Tape Width	0.453	0.484	11.50	12.30
W_0	Cover Tape Width	0.358	0.366	9.10	9.30