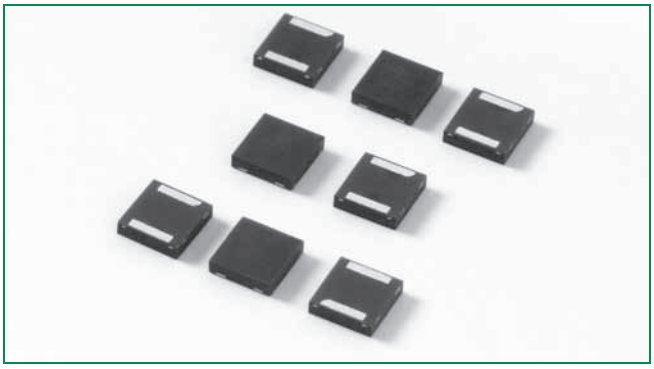
HF RoHS Q2L Series - 3x3 QFN



Description

Q2L Series 3x3 QFN are low capacitance SIDACtor® devices designed to protect high density broadband equipment from damaging overvoltage transients.

The series 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.

Agency Approvals

Agency	Agency File Number
	E133083

Pinout Designation

Not Applicable

Schematic Symbol

Features and Benefits

- Low voltage overshoot
- Low on-state voltage
- Low capacitance
- Does not degrade with use
- Small SO-8 footprint
- Fails short circuit when surged in excess of ratings

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
- GR 1089 Inter-building*
- GR 1089 Intra-building
- YD/T 1082
- YD/T 993
- YD/T 950

* A/B-Rated parts require series resistance

Electrical Characteristics

Part Number	Marking	V_{DRM} @I_{DRM}=5µA	V_S @100V/µs	I_H	I_S	I_T	V_T@ I_T= 2.2Amps	Capacitance @1MHz, 2V bias	
		V min	V max	mA min	mA max	A max	V max	pF min	pF max
P0080Q12ALRP	P-8A	6	25	50	800	2.2	5	25	55
P0300Q12ALRP	P03A	25	40	50	800	2.2	5	15	35
P0640Q12ALRP	P06A	58	77	150	800	2.2	5	40	60
P0720Q12ALRP	P07A	65	88	150	800	2.2	5	40	60
P0900Q12ALRP	P09A	75	98	150	800	2.2	5	35	55
P1100Q12ALRP	P11A	90	130	150	800	2.2	5	30	50
P1300Q12ALRP	P13A	120	160	150	800	2.2	5	25	45
P1500Q12ALRP	P15A	140	180	150	800	2.2	5	25	40
P1800Q12ALRP	P18A	170	220	150	800	2.2	5	25	35
P2300Q12ALRP	P23A	190	260	150	800	2.2	5	25	35
P2600Q12ALRP	P26A	220	300	150	800	2.2	5	25	35
P3100Q12ALRP	P31A	275	350	150	800	2.2	5	20	35
P3500Q12ALRP	P35A	320	400	150	800	2.2	5	20	30

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

Table continues on next page.

Electrical Characteristics (continued)

Part Number	Marking	V_{DRM} @I_{DRM}=5µA	V_S @100V/µs	I_H	I_S	I_T	V_T@ I_T= 2.2Amps	Capacitance @1MHz, 2V bias	
		V min	V max	mA min	mA max	A max	V max	pF min	pF max
P0080Q12BLRP	P-8B	6	25	50	800	2.2	5	25	55
P0300Q12BLRP	P03B	25	40	50	800	2.2	5	15	35
P0640Q12BLRP	P06B	58	77	150	800	2.2	5	40	60
P0720Q12BLRP	P07B	65	88	150	800	2.2	5	40	60
P0900Q12BLRP	P09B	75	98	150	800	2.2	5	35	55
P1100Q12BLRP	P11B	90	130	150	800	2.2	5	30	50
P1300Q12BLRP	P13B	120	160	150	800	2.2	5	25	45
P1500Q12BLRP	P15B	140	180	150	800	2.2	5	25	40
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Notes:
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Surge Ratings

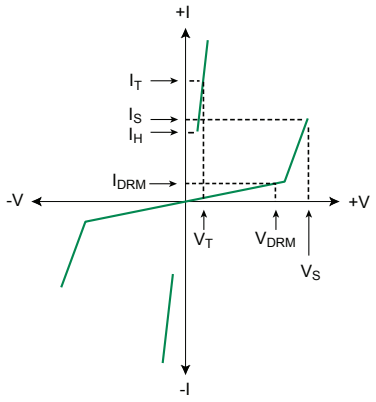
Series	I_{pp}					I_{TSM}	di/dt
	2x10µs	1.2x50µs/8x20µs	10x160µs	10x560µs	10x1000µs	50 / 60 Hz	
	A min	A min	A min	A min	A min	A min	A/µs max
A	150	150	90	50	45	20	500
B	250	250	150	100	80	25	500

Notes:
- 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 device must initially be in thermal equilibrium with -40°C ≤ T_J ≤ +150°C

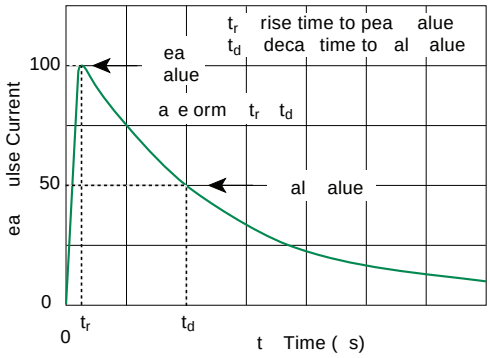
Thermal Considerations

Package	Symbol	Parameter	Value	Unit
3x3 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

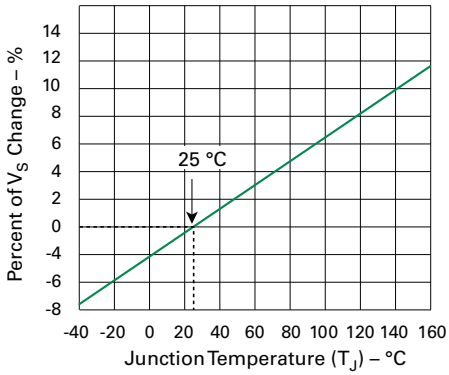
V-I Characteristics



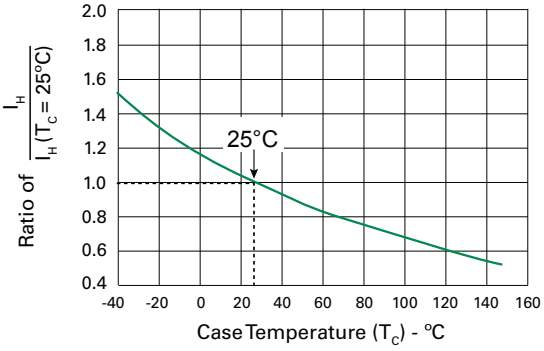
t_r x t_d Pulse Waveform



Normalized V_S Change vs. Junction Temperature



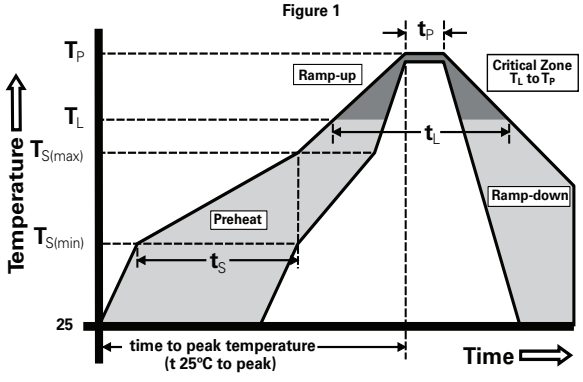
Normalized DC Holding Current vs. Case Temperature



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

Figure 1



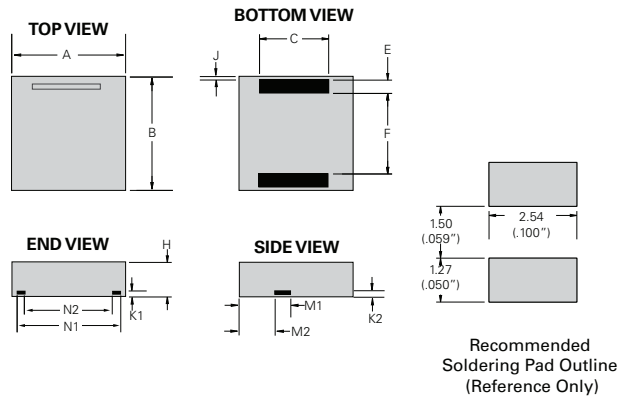
Physical Specifications

Lead Material	Copper Alloy
Terminal Finish	100% Matte-Tin Plated
Body Material	UL recognized epoxy meeting flammability classification 94V-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

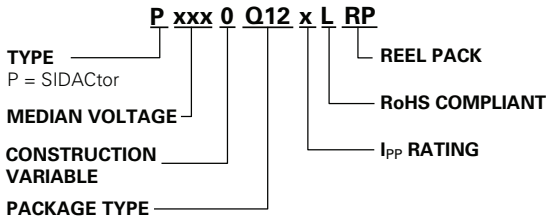
Dimensions — 3x3 QFN



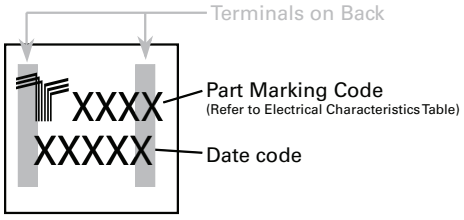
Recommended Soldering Pad Outline (Reference Only)

Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.114	0.122	2.900	3.100
B	0.114	0.122	2.900	3.100
C	0.075	0.083	1.900	2.100
E	0.011	0.019	0.285	0.485
F	0.076	0.084	1.930	2.130
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	0.056	0.064	1.430	1.630
M2	0.038	0.046	0.970	1.170
N1	0.096	0.104	2.440	2.640
N2	0.082	0.090	2.080	2.280

Part Numbering



Part Marking

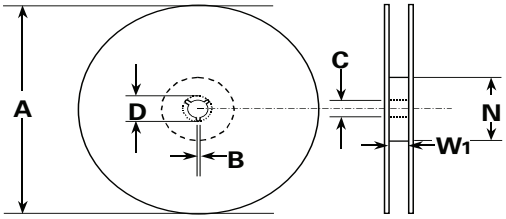


Packing Options

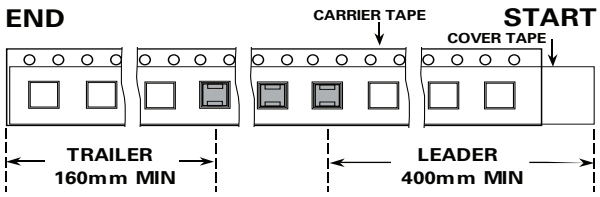
Package Type	Description	Quantity	Added Suffix	Industry Standard
Q12	3x3 QFN Tape and Reel Pack	5000	RP	EIA-481-D

Tape and Reel Dimensions — 3x3 QFN

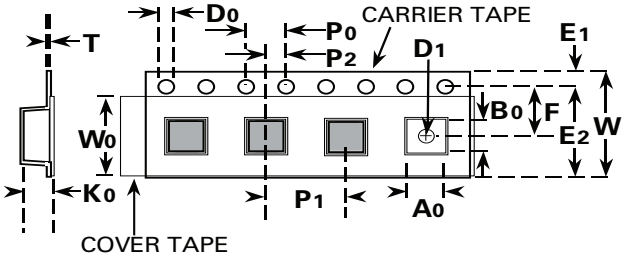
Reel Dimension



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	0.126	0.134	3.20	3.40
B_0	Pocket Length at bottom	0.126	0.134	3.20	3.40
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	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	0.077	0.081	1.95	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