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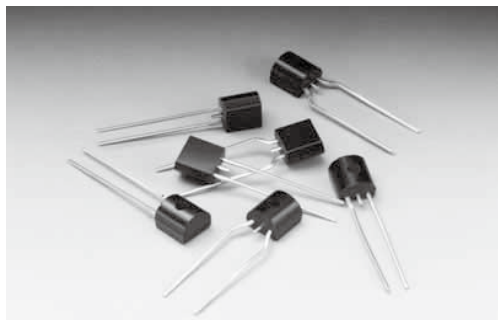


Thyristor Surge Suppressors

半导体放电管

PxxxxEX Series T0-92

Thyristor Surge Suppressors - PxxxxEX Series



Description

TO-92 Series are designed to protect baseband equipment such as modems, line cards, CPE and DSL from damaging overvoltage transients.

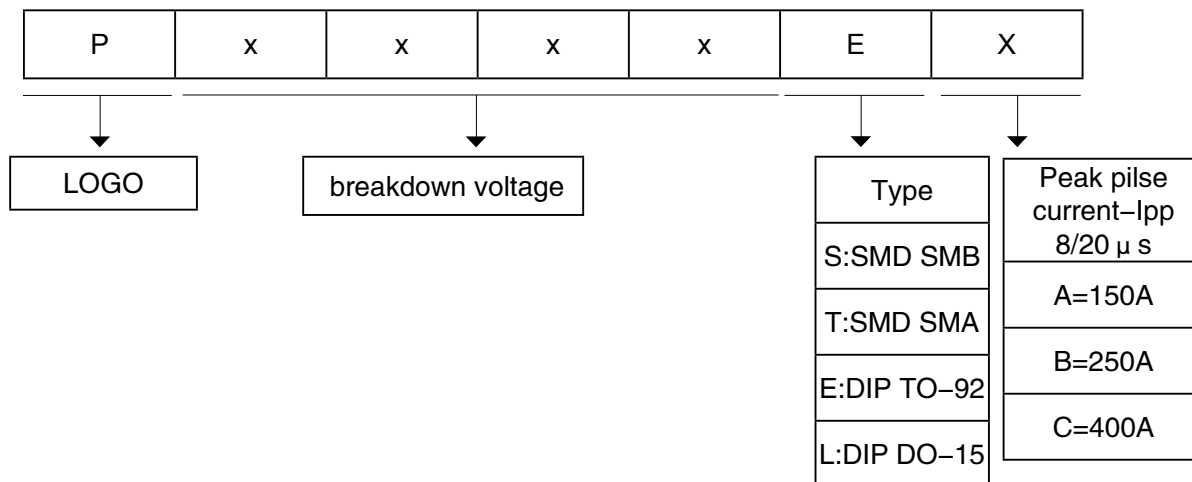
The series provides a cost-effective through-hole solution that enables equipment to comply with global regulatory standards.

Features

Compared to surge suppression using other technologies, P Series devices offer absolute surge protection regardless of the surge current available and the rate of applied voltage (dv/dt). P Series devices:

- Cannot be damaged by voltage
- Eliminate hysteresis and heat dissipation typically found with clamping devices
- Eliminate voltage overshoot caused by fast-rising transients
- Are non-degenerative
- Will not fatigue
- Have low capacitance, making them ideal for high-speed transmission equipment

Part Number Code



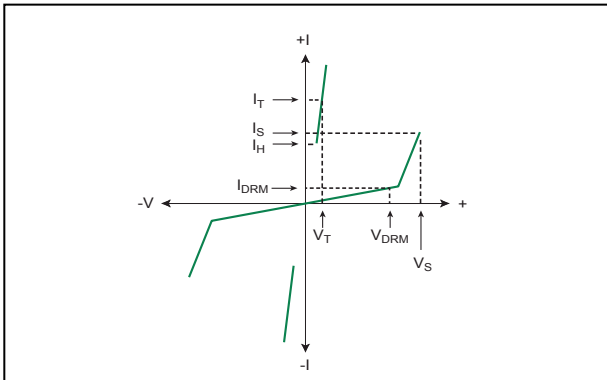
Electrical Characteristics

Type Number	VDRM	IDRM	VBO	IH	IS	IT	VT	CJ	
	V	μA	V	MA	MA	A	V	pFMin	pFMax
P0080EA	6	5	25	50	800	2.2	4	25	150
P0080EB	6	5	25	50	800	2.2	4	25	150
P0080EC	6	5	25	50	800	2.2	4	35	260
P0300EA	25	5	40	50	800	2.2	4	15	140
P0300EB	25	5	40	50	800	2.2	4	15	140
P0300EC	25	5	40	50	800	2.2	4	25	250
P0640EA	58	5	77	150	800	2.2	4	40	60
P0640EB	58	5	77	150	800	2.2	4	40	60
P0640EC	58	5	77	150	800	2.2	4	55	155
P0720EA	65	5	88	150	800	2.2	4	35	60
P0720EB	65	5	88	150	800	2.2	4	35	75
P0720EC	65	5	88	150	800	2.2	4	50	150
P0900EA	75	5	98	150	800	2.2	4	35	55
P0900EB	75	5	98	150	800	2.2	4	35	70
P0900EC	75	5	98	150	800	2.2	4	45	140
P1100EA	90	5	130	150	800	2.2	4	30	50
P1100EB	90	5	130	150	800	2.2	4	30	70
P1100EC	90	5	130	150	800	2.2	4	45	115
P1300EA	120	5	160	150	800	2.2	4	25	45
P1300EB	120	5	160	150	800	2.2	4	25	60
P1300EC	120	5	160	150	800	2.2	4	40	105
P1500EA	140	5	180	150	800	2.2	4	25	40
P1500EB	140	5	180	150	800	2.2	4	25	55
P1500EC	140	5	180	150	800	2.2	4	35	95
P1800EA	170	5	220	150	800	2.2	4	25	35
P1800EB	170	5	220	150	800	2.2	4	25	50
P1800EC	170	5	220	150	800	2.2	4	35	90
P2300EA	190	5	260	150	800	2.2	4	25	35
P2300EB	190	5	260	150	800	2.2	4	25	50
P2300EC	190	5	260	150	800	2.2	4	30	80
P2600EA	220	5	300	150	800	2.2	4	20	35
P2600EB	220	5	300	150	800	2.2	4	20	45
P2600EC	220	5	300	150	800	2.2	4	30	80
P3100EA	275	5	350	150	800	2.2	4	20	35
P3100EB	275	5	350	150	800	2.2	4	20	45
P3100EC	275	5	350	150	800	2.2	4	30	70
P3500EA	320	5	400	150	800	2.2	4	20	35
P3500EB	320	5	400	150	800	2.2	4	20	40
P3500EC	320	5	400	150	800	2.2	4	25	65

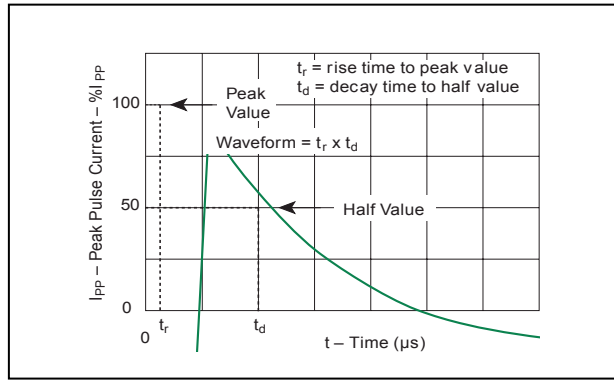
Notes:

Is: Switching Current – maximum current required to switch to on state
 IDRM: Leakage Current – maximum peak off-state current measured at VDRM
 IH: Holding Current – minimum current required to maintain on state
 IPP: Peak Pulse Current – maximum rated peak impulse current
 IT: On-state Current – maximum rated continuous on-state current
 VDRM: Peak Off-state Voltage – maximum voltage that can be applied while maintaining off state
 VT: On-state Voltage – maximum voltage measured at rated on-state current

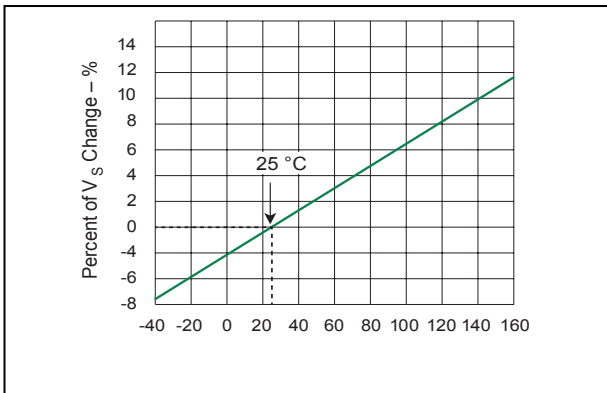
V-I Characteristics



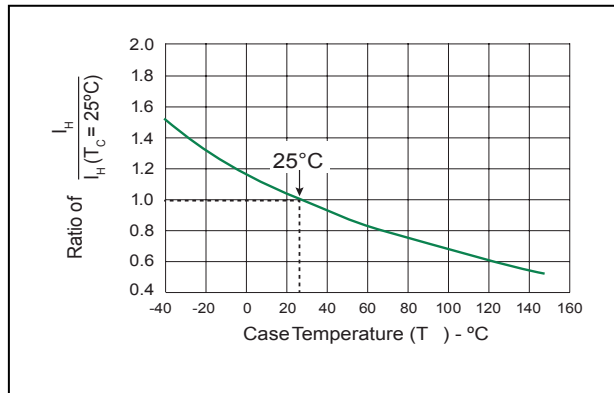
$t_r \times t_d$ Pulse Waveform



Normalized V_S Change vs. Junction Temperature



Normalized DC Holding Current vs. Case Temperature



Physical Specifications

Lead Material	Copper Alloy
Terminal Finish	100% Matte-Tin Plated
Body Material	Junction Temperature 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-A-104
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
Autoclave (Pressure Cooker Test)	+121°C, 100%RH, 2atm, 24 up to 168 hrs. EIA/JEDEC, JESD22-A-102
Resistance to Solder Heat	+260°C, 30 secs. MIL-STD-750 (Method 2031)

Thyristor Surge Suppressors - PxxxxEX Series

Surge Ratings


Series	I_{PP}									I_{TSM} 50/60 Hz	di/dt
	0.2x310 ¹ 0.5x700 ²	2x10 ¹ 2x10 ²	8x20 ¹ 1.2x50 ²	10x160 ¹ 10x160 ²	10x560 ¹ 10x560 ²	5x320 ¹ 9x720 ²	10x360 ¹ 10x360 ²	10x1000 ¹ 10x1000 ²	5x310 ¹ 10x700 ²		
	A MIN	A MIN	A MIN	A MIN	A MIN	A MIN	A MIN	A MIN	A MIN		
A	20	150	150	90	50	75	75	45	75	20	500
B	25	250	250	150	100	100	125	80	100	25	500
C	50	500	400	200	150	200	175	100	200	30	500

Notes:

1 Current waveform in μ s
2 Voltage waveform in μ s

- 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 $\leq T_J \leq$ +150°C

Thermal Considerations

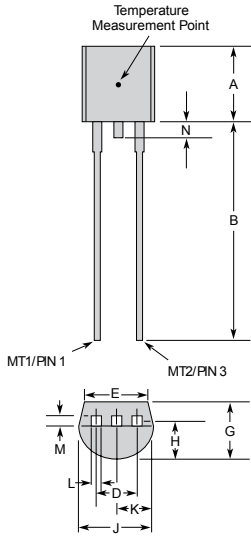
Package	Symbol	Parameter	Value	Unit
TO-92 	T_J	Operating Junction Temperature Range	-40 to +150	°C
	T_S	Storage Temperature Range	-65 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	90	°C/W

Packing Options

Package Type	Description	Packing Options Quantity	Added Suffix	Lead Spacing	Industry Standard
E	TO-92 Tape and Reel Pack	1000	RP1	0.1 inch (2.54mm)	EIA-481-D
			RP2	0.2 inch (5.08mm)	
	TO-92 Ammo Pack		AP		EIA-468-B
	TO-92 Bulk Pack		N/A		N/A

Thyristor Surge Suppressors - PxxxxEX Series

Dimensions — TO-92



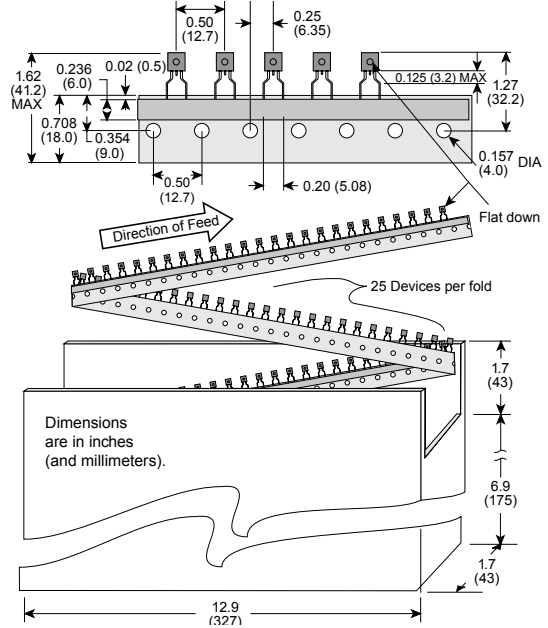
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.176	0.196	4.47	4.98
B	0.500		12.70	
D	0.095	0.105	2.41	2.67
E	0.150		3.81	
G	0.135	0.145	3.43	3.68
H	0.088	0.096	2.23	2.44
J	0.176	0.186	4.47	4.73
K	0.088	0.096	2.23	2.44
L	0.013	0.019	0.33	0.48
M	0.013	0.017	0.33	0.43
N		0.60		1.52

All leads are insulated (from case). Case is electrically non-conductive. (Rated at 1600 V_(AC) RMS for one minute from leads to case over the operating temperature range.)

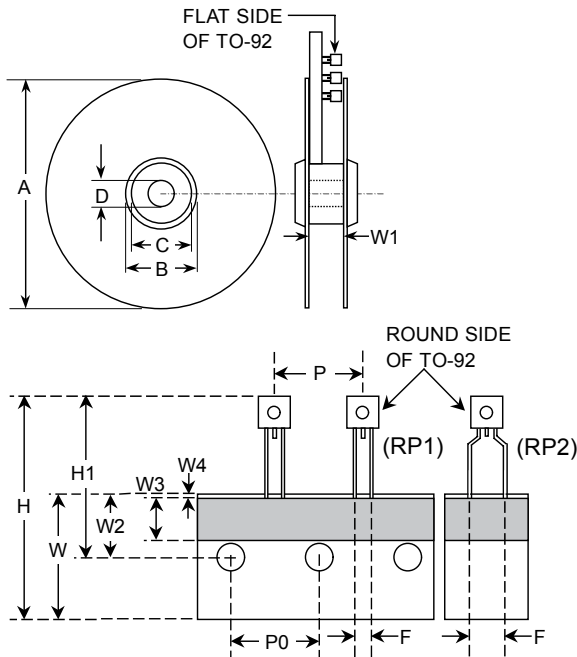
Mold flash shall not exceed 0.13 mm per side.

The TO-92 is designed to meet mechanical standards as set forth in JEDEC publication number 95.

Ammo Pack Specification — TO-92



Tape and Reel Specification — TO-92



Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	N/A	14.173	N/A	360.0
B	4.016	N/A	102.0	N/A
C	3.386	N/A	86.0	N/A
D	0.795	N/A	20.2	N/A
W1	1.181	1.968	30.0	50.0
P	0.496	0.504	12.60	12.80
P0	0.498	0.502	12.65	12.75
F(for RP1)	0.090	0.110	2.29	2.80
F(for RP2)	0.182	0.244	4.63	6.19
H	N/A	1.673	N/A	42.50
H1	N/A	1.270	N/A	32.26
W	0.674	0.763	17.12	19.38
W2	0.354	0.370	8.25	9.75
W3	0.236	N/A	6.00	N/A
W4	0.020	N/A	0.50	N/A