SOCAY

RoHS

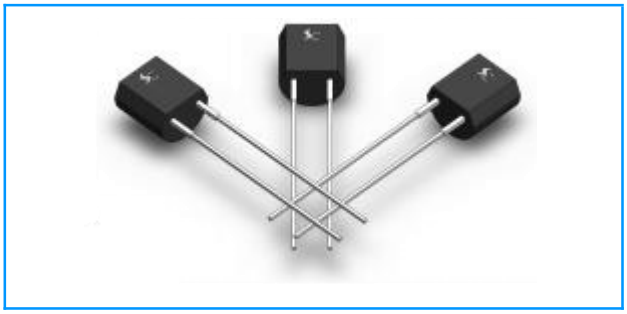
Thyristor Surge Suppressors (TSS)

P0080EA - P5000EA Series - TO-92 @10/700μS, 2KV

Description

P0080EA - P5000EA Series are designed to protect broadband equipment such as modems, line card, CPE and DSL from damaging over-voltage transients.

The series provides a surface mount solution that enables equipment to comply with global regulatory standards.



Features and Benefits

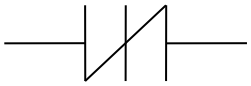
- Low voltage overshoot
- Low on-state voltage
- Does not degrade surge capability after multiple surge events within limit
- Fails short circuit when surged in excess of ratings
- Low Capacitance

Pinout Designation

Applicable Global Standards

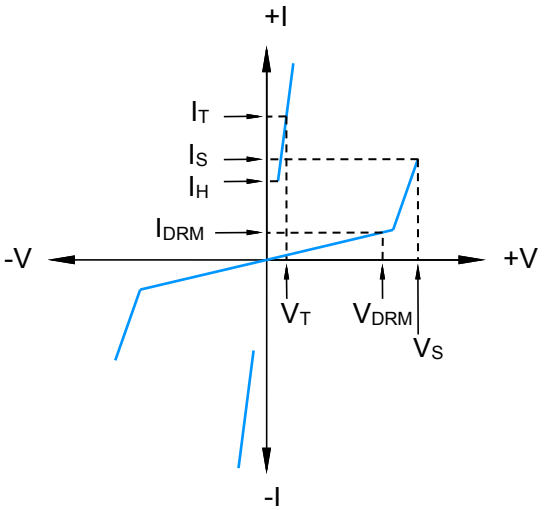
- TIA-968-A / TIA-968-B
- ITU K.20/21 Enhanced level
- ITU K.20/21 Basic Level
- GR 1089 Inter building
- GR 1089 Inter building
- IEC 6100-4-5
- YD/T 1082
- YD/T 993
- YD/T 950

Schematic Symbol



Electrical Parameters

Parameter	Definition
I_S	**Switching Current** - maximum current required to switch to on state
I_{DRM}	**Leakage Current** - maximum peak off-state current measured at VDRM
I_H	**Holding Current** - minimum current required to maintain on state
I_T	**On-state Current** - maximum rated continuous on-state current
V_S	**Switching Voltage** - maximum voltage prior to switching to on stat
V_{DRM}	**Peak Off-state Voltage** - maximum voltage that can be applied while maintaining off state
V_T	**On-state Voltage** - maximum voltage measured at rated on-state current
C_0	**Off-state Capacitance** - typical capacitance measured in off state



Thyristor Surge Suppressors (TSS)

P0080EA - P5000EA Series - TO-92 @10/700μS, 2KV

Electrical Characteristics

Part Number	Marking	V_{DRM} @I_{DRM}=5μA	V_S @100V/μS	V_T @I_T=2.2A	I_S	I_T	I_H	C_0 @1MHz	
		V min	V max	V max	mA max	A max	mA min	pF min	pF max
P0080EA	P0080EA	6	25	4	800	2.2	50	25	150
P0300EA	P0300EA	25	40	4	800	2.2	50	15	140
P0640EA	P0640EA	58	77	4	800	2.2	150	40	60
P0720EA	P0720EA	65	88	4	800	2.2	150	35	60
P0900EA	P0900EA	75	98	4	800	2.2	150	25	55
P1100EA	P1100EA	90	130	4	800	2.2	150	30	50
P1300EA	P1300EA	120	160	4	800	2.2	150	25	45
P1500EA	P1500EA	140	180	4	800	2.2	150	25	40
P1800EA	P1800EA	170	220	4	800	2.2	150	25	35
P2000EA	P2000EA	180	220	4	800	2.2	150	20	35
P2300EA	P2300EA	190	260	4	800	2.2	150	25	35
P2600EA	P2600EA	220	300	4	800	2.2	150	20	35
P3100EA	P3100EA	275	350	4	800	2.2	150	20	35
P3500EA	P3500EA	320	400	4	800	2.2	150	20	35
P4000EA	P4000EA	360	460	4	800	2.2	150	20	35
P4500EA	P4500EA	400	540	4	800	2.2	150	20	35
P5000EA	P5000EA	440	600	4	800	2.2	150	20	35

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

Surge Ratings

Series	2/10μS[1]	8/20μS[1]	10/160μS[1]	10/560μS[1]	10/1000μS[1]	5/310μS[1]	I_{TSM} 50/60 Hz	di/dt
	2/10μS[2]	1.2/50μS[2]	10/160μS[2]	10/560μS[2]	10/1000μS[2]	10/700μS[2]		
	A min	A min	A min	A min	A min	A min	A min	Amps/μs max
A	150	150	90	50	45	50	20	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 -40ºC to +85ºC
- The device must initially be in thermal equilibrium with -40°C < T_J < +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	- 40 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	90	°C/W

Thyristor Surge Suppressors (TSS)

P0080EA - P5000EA Series - TO-92 @10/700μS, 2KV

Characteristic Curves

Figure 1 - V-I Characteristics

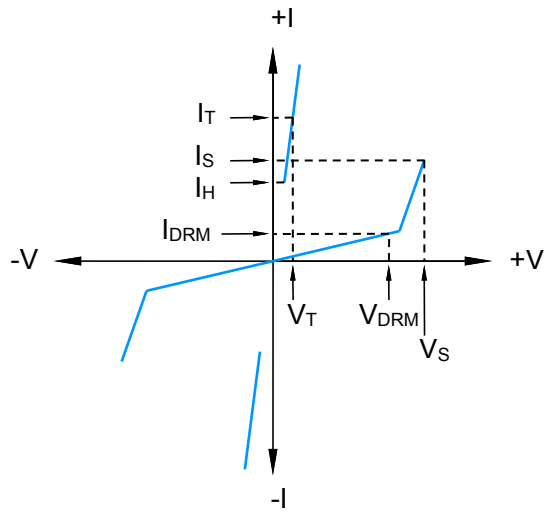


Figure 2 - $t_r \times t_d$ Pulse Waveform

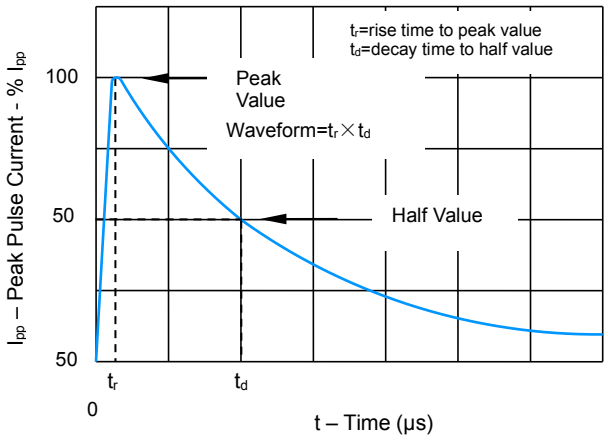


Figure 3 - Normalized V_S Change Versus Junction Temperature

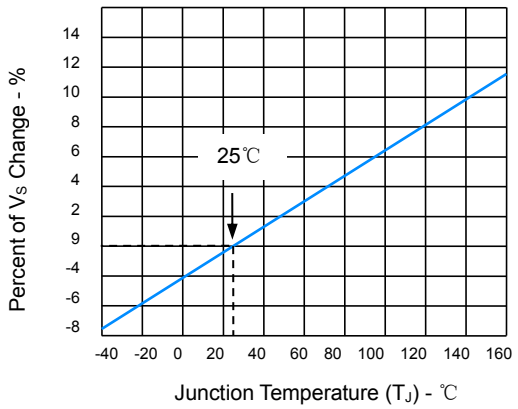
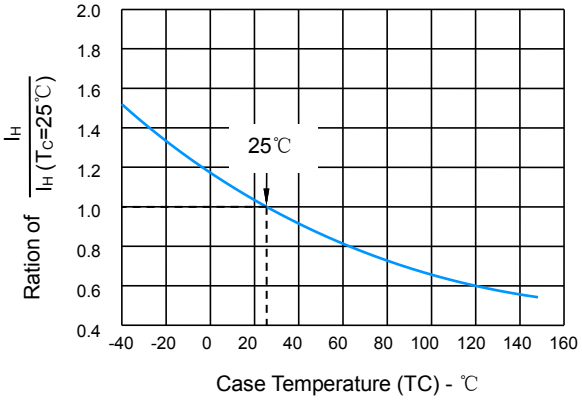


Figure 4 - Normalized DC Holding Current Versus Case Temperature



Thyristor Surge Suppressors (TSS)

P0080EA - P5000EA Series - TO-92 @10/700μS, 2KV

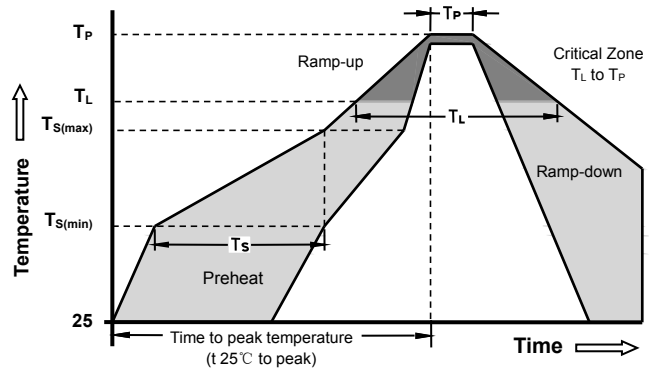
Environmental Specifications

High Temp Voltage Blocking	80% Rated VDRM (VAC Peak) +125°C or +150°C, Lead Material Copper Alloy High Temp Voltage Blocking 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 VDC (+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, Thermal Shock 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/Cooker Test) JEDEC, JESD22-A-102
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 Level (+260°C Peak). JEDEC-J-STD-020, Level 1

Physical Specifications

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

Soldering Parameters



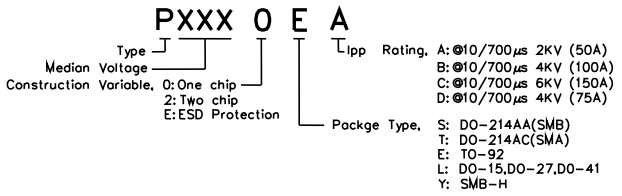
Reflow Condition		Lead–free assembly
Pre Heat	**-Temperature Min ($T_{s(min)}$)**	+150°C
	-Temperature Max ($T_{s(max)}$)	+200°C
	-Time (min to max) (T_s)	60 -180 Seconds
Average ramp up rate (Liquidus Temp T_L) to peak		3°C/Second Max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/Second Max
Reflow	**- Temperature (T_L) (Liquidus)**	+217°C
	- Time (min to max) (T_L)	60 -150 Seconds
Peak Temperature (T_P)		260 +0/-5°C
Time within 5°C of actual peak Temperature (t_p)		30 Seconds Max
Ramp-down Rate		6°C/Second Max
Time 25°C to peak Temperature (T_P)		8 minutes Max
Do not exceed		+260°C

RoHS

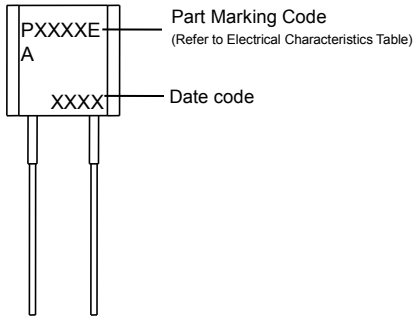
Thyristor Surge Suppressors (TSS)

P0080EA - P5000EA Series - TO-92 @10/700μS, 2KV

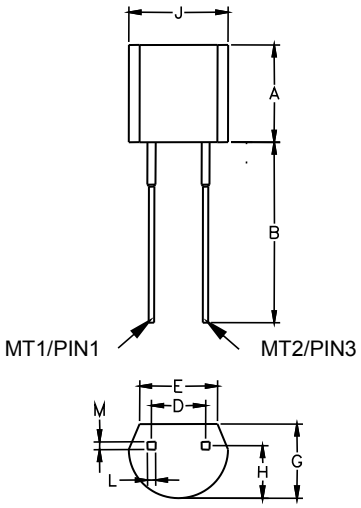
Part Numbering



Part Marking



Dimensions TO-92



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

Dimensions	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
L	0.013	0.019	0.33	0.48
M	0.013	0.017	0.33	0.43

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.

Packaging

Part Number	Description	Quantity
Pxxx0EA	TO-92 Bulk Pack	1000