

P0080EC - P5000EC Series - TO-92

ROHS

@10/700 μ S, 6KV

Thyristor Surge Suppressors (TSS)

Description

P0080EC - P5000EC 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

Applicable Global Standards

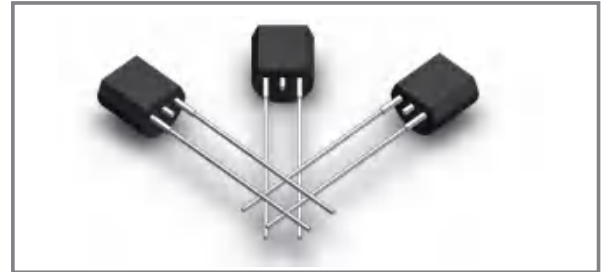
- ◆ TIA-968-A / TIA-968-B
- ◆ ITU K.20/21 Enhanced level
- ◆ ITU K.20/21 Basic Level
- ◆ GR 1089 Inter building
- ◆ IEC 6100-4-5
- ◆ YD/T 1082
- ◆ YD/T 993
- ◆ YD/T 950

Electrical Parameters

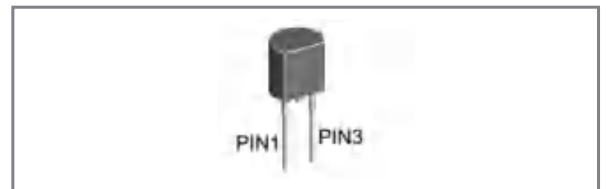
Parameter	Definition
I_S	Switching Current - maximum current required to switch to on state
I_{DRM}	Leakage Current - maximum peak off-state current measured at V_{DRM}
I_H	Holding Current - minimum current required to maintain on state
I_T	On-state Current - maximum rated continuous on-state current
V_S	Switching Voltage - maximum voltage prior to switching to on state
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



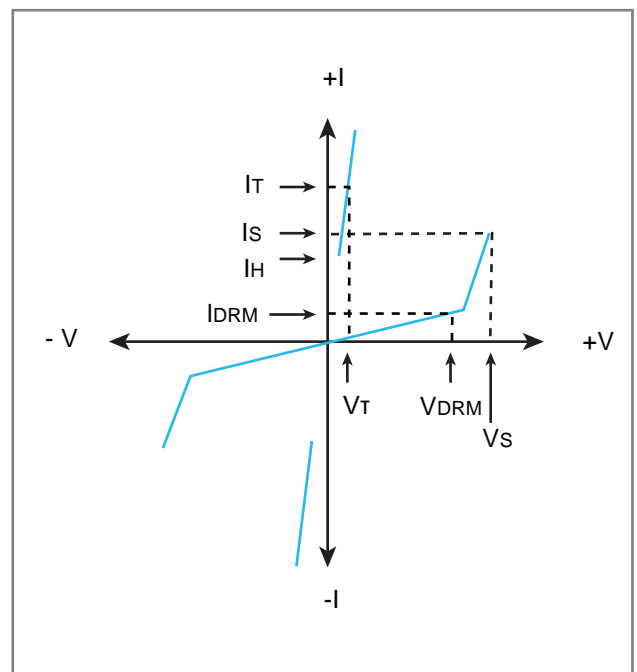
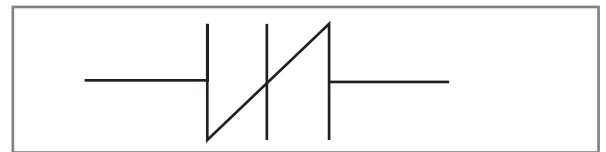
www.unsemi.com.tw



Pinout Designation



Schematic Symbol



Electrical Characteristics

Part Number	Marking	V_{DRM} @ $I_{DRM}=5\mu A$	I_{DRM}	V_s @100V/ μ S	I_s	V_T @ $I_T=2.2A$	I_T	I_H	C_o @1MHz
		VMin.	μ A Max.	VMax.	mA Max.	VMax.	A Max.	mA Min.	pF Max.
P0080EC	P0080EC	6	5	25	800	4	2.2	50	110
P0300EC	P0300EC	25	5	40	800	4	2.2	50	110
P0640EC	P0640EC	58	5	77	800	4	2.2	150	100
P0720EC	P0720EC	65	5	88	800	4	2.2	150	100
P0900EC	P0900EC	75	5	98	800	4	2.2	150	90
P1100EC	P1100EC	90	5	130	800	4	2.2	150	90
P1300EC	P1300EC	120	5	160	800	4	2.2	150	90
P1500EC	P1500EC	140	5	180	800	4	2.2	150	85
P1800EC	P1800EC	170	5	220	800	4	2.2	150	85
P2000EC	P2000EC	180	5	220	800	4	2.2	150	85
P2300EC	P2300EC	190	5	260	800	4	2.2	150	80
P2600EC	P2600EC	220	5	300	800	4	2.2	150	80
P3100EC	P3100EC	275	5	350	800	4	2.2	150	65
P3500EC	P3500EC	320	5	400	800	4	2.2	150	65
P3800EC	P3800EC	360	5	460	800	4	2.2	150	30
P4200EC	P4200EC	400	5	520	800	4	2.2	150	30
P4500EC	P4500EC	420	5	540	800	4	2.2	150	30
P5000EC	P5000EC	440	5	600	800	4	2.2	150	30

Notes:

- Absolute maximum ratings measured at $T_A = 25^\circ C$ (unless otherwise noted).
- Devices are bi-directional.


Surge Ratings

Series	2/10 μ S ¹	8/20 μ S ¹	10/560 μ S ¹	10/560 μ S ¹	10/1000 μ S ¹	5/320 μ S ¹	I_{TSM} 50/60Hz	di/dt
	2/10 μ S ²	1.2/50 μ S ²	10/560 μ S ²	10/560 μ S ²	10/1000 μ S ²	10/700 μ S ²		
	A min	A min	A min	A min	A min	A min	A min	Amps/ μ S max
C	500	400	200	150	100	150	50	500

Notes:

- Current waveform in μ S
 - Voltage waveform in μ S
- Peak pulse current rating (IPP) is repetitive and guaranteed for the life of the product.
 - IPP ratings applicable over temperature range of $-40^\circ C$ to $+85^\circ C$
 - The device must initially be in thermal equilibrium with $-40^\circ C < T_J < +150^\circ C$

Thermal Considerations

Package	Symbol	Parameter	Value	Unit
	TJ	Operating Junction Temperature Range	- 40 to +150	°C
	Ts	Storage Temperature Range	- 40 to +150	°C
	R θ JA	Thermal Resistance: Junction to Ambient	90	°C/W

Characteristic Curves

Figure 1 - V- I Characteristics

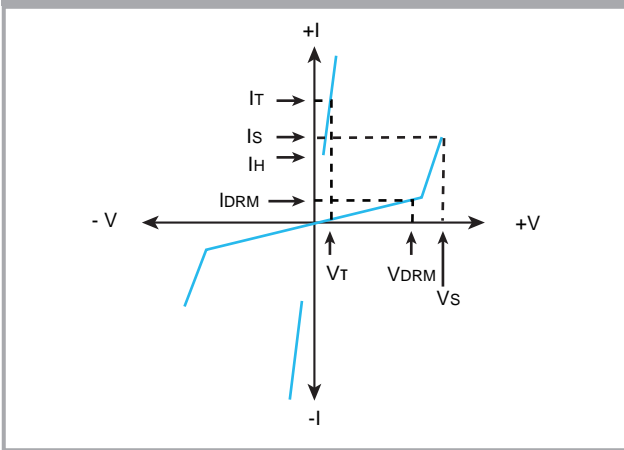


Figure 2 - $t_r \times t_d$ Pulse Waveform

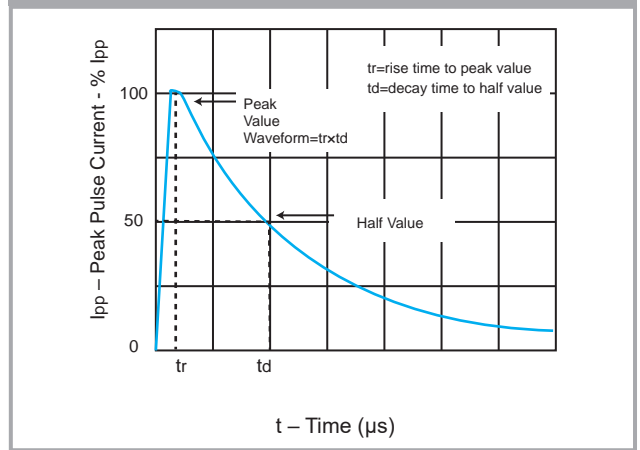


Figure 3 - Normalized VS Change Versus Junction Temperature

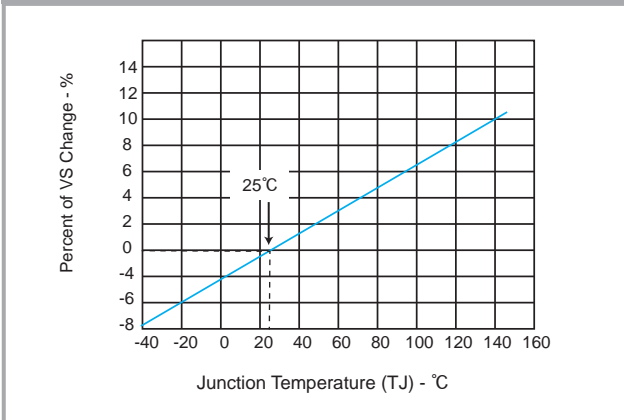
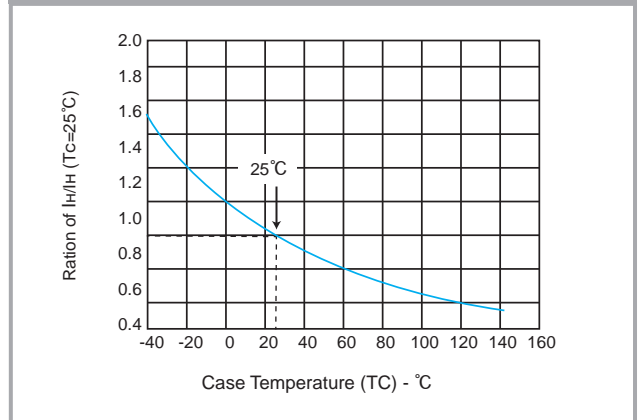


Figure 4 - Normalized DC Holding Current Versus Case Temperature



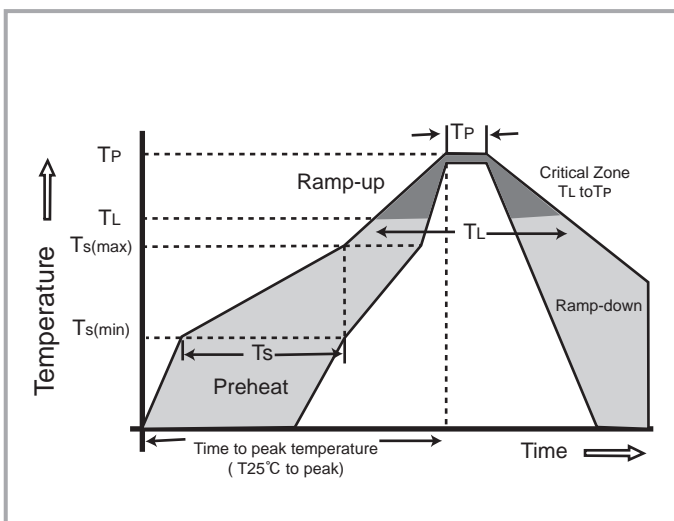
Environmental Specifications

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

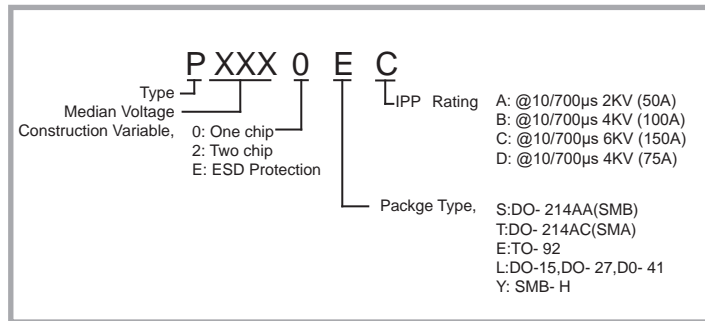
Lead Material	Copper Alloy
Terminal Finish	100% Matte-Tin Plated
Body Material	UL recognized epoxy meeting flammability classification 94V-0

Soldering Parameters

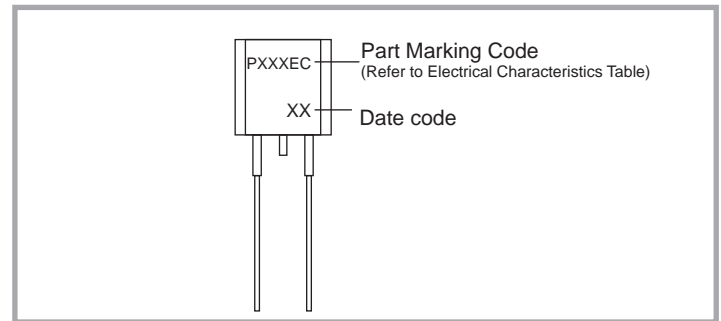


Reflow Condition		Lead-free assembly
Pre Heat	-Temperature Min (Ts(min))	+150°C
	-Temperature Max (Ts(max))	+200°C
	- Time (min to max) (Ts)	60 -180 Seconds
Average ramp up rate (Liquidus Temp TL) to peak		3°C/Second max
Ts(max) to TL - Ramp-up Rate		5°C/Second max
Reflow	- Temperature (TL) (Liquidus)	217°C
	- Time (min to max) (Ts)	60 -150 Seconds
Peak Temperature (TP)		260 +0/-5°C
Time within 5°C of actual peak Temperature (TP)		30 Seconds Max
Ramp-down Rate		6°C/Second Max
Time 25°C to peak Temperature (TP)		8 minutes Max
Do not exceed		+260°C

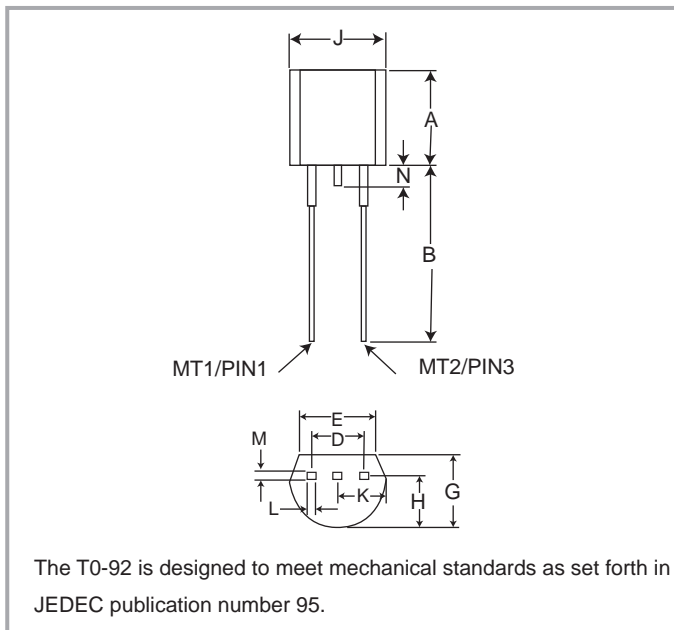
Part Numbering



Part Marking



Dimensions TO-92



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
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		0.060		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.

Packaging

Part Number	Description	Quantity
Pxxx0EC	TO-92 Bulk Pack	1000

Disclaimer

UNSEMI RESERVES THE RIGHT TO MAKE CHANGE ON OUR PRODUCTS , PRODUCTS SPECIFICATION AND DATA WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

UN SEMICONDUCTOR LIMITED its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "UNSEMI") does not give any representations or warranties for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

In no event shall UNSEMI be liable for any indirect, incidental, punitive, special or consequential damages (including any and all implied warranties, warranties of fitness for particular purpose, non-infringement and merchantability.) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Statements regarding the suitability of products for certain types of applications are based on UNSEMI knowledge of typical requirements that are often placed on UNSEMI products in generic applications. Such statements are not binding, statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify UNSEMI's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Unless otherwise agreed in writing, UNSEMI product is not designed, authorized or warranted to be suitable for use in medical life-saving, or life-sustaining application , nor in applications where failure or malfunction of a UNSEMI product can reasonably be expected to result in personal injury, death or severe property or environmental damage. UNSEMI and its suppliers accept no liability for inclusion or use of UNSEMI products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

All referenced brands, product names, service names and trademarks are the property of their respective owners.