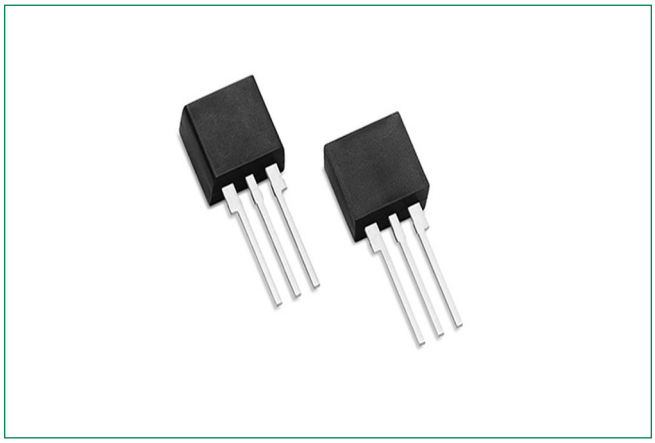
Pxxx2AxL Series

Two-Chip SIDACtor® - Modified TO-220



Description

The Pxxx2AxL Series Modified TO-220 Two-Chip SIDACtor® are designed to protect baseband equipment from damaging overvoltage transients.

The series provides a robust peak surge current capability that enables voice though DS-1 equipment to comply with various global regulatory standards.

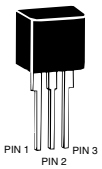
Features & Benefits

- Low voltage overshoot
- Low on-state voltage
- Does not degrade surge capability after multiple surge events within limit.
- Modified TO-220 Package
- Fails short circuit when surged in excess of ratings
- Single-port protection
- Lead forms available
- RoHS Compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

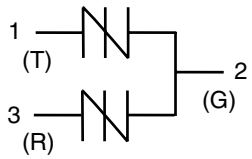
Additional Information

Resources | Accessories | Samples

Pinout Designation



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

*A/B-rated parts require series resistance

Agency Approvals

Agency	Agency File Number
	E133083

Electrical Characteristics

Part Number	Marking	V_{DRM} @I_{DRM}=5µA	V_S @100V/µs	V_{DRM} @I_{DRM}=5µA	V_S @100V/µs	V_T @I_T=2.2 A	I_H	I_S	I_T	Capacitance @1MHz, 2V bias	
		V min	V max	V min	V max	V max	mA min	mA max	A max	pF min	pf max
		Pins 1-2, 3-2		Pins 1-3		Pins 1-2, 3-2					
P0602AALxx	P0602AA	25	40	50	80	4	50	800	2.2	See Capacitance Values Table	
P1402AALxx	P1402AA	58	77	116	154	4	150	800	2.2		
P1602AALxx	P1602AA	65	95	130	190	4	150	800	2.2		
P2202AALxx	P2202AA	90	130	180	260	4	150	800	2.2		
P2702AALxx	P2702AA	120	160	240	320	4	150	800	2.2		
P3002AALxx	P3002AA	140	180	280	360	4	150	800	2.2		
P3602AALxx	P3602AA	170	220	340	440	4	150	800	2.2		
P4202AALxx	P4202AA	190	250	380	500	4	150	800	2.2		
P4802AALxx	P4802AA	220	300	440	600	4	150	800	2.2		
P6002AALxx	P6002AA	275	350	550	700	4	150	800	2.2		

Table continues on next page.

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Electrical Characteristics (continued)

Part Number	Marking	V_{DRM} @I_{DRM}=5µA	V_S @100V/µs	V_{DRM} @I_{DRM}=5µA	V_S @100V/µs	V_T @I_T=2.2 A	I_H	I_S	I_T	Capacitance
		V min	V max	V min	V max	V max	mA min	mA max	A max	
		Pins 1-2, 3-2		Pins 1-3		Pins 1-2, 3-2				
P0602ABLxx	P0602AB	25	40	50	80	4	50	800	2.2	See Capacitance Values Table
P1402ABLxx	P1402AB	58	77	116	154	4	150	800	2.2	
P1602ABLxx	P1602AB	65	95	130	190	4	150	800	2.2	
P2202ABLxx	P2202AB	90	130	180	260	4	150	800	2.2	
P2702ABLxx	P2702AB	120	160	240	320	4	150	800	2.2	
P3002ABLxx	P3002AB	140	180	280	360	4	150	800	2.2	
P3602ABLxx	P3602AB	170	220	340	440	4	150	800	2.2	
P4202ABLxx	P4202AB	190	250	380	500	4	150	800	2.2	
P4802ABLxx	P4802AB	220	300	440	600	4	150	800	2.2	
P6002ABLxx	P6002AB	275	350	550	700	4	150	800	2.2	
P0602ACLxx	P0602AC	25	40	50	80	4	50	800	2.2	
P1402ACLxx	P1402AC	58	77	116	154	4	150	800	2.2	
P1602ACLxx	P1602AC	65	95	130	190	4	150	800	2.2	
P2202ACLxx	P2202AC	90	130	180	260	4	150	800	2.2	
P2702ACLxx	P2702AC	120	160	240	320	4	150	800	2.2	
P3002ACLxx	P3002AC	140	180	280	360	4	150	800	2.2	
P3602ACLxx	P3602AC	170	220	340	440	4	150	800	2.2	
P4202ACLxx	P4202AC	190	250	380	500	4	150	800	2.2	
P4802ACLxx	P4802AC	220	300	440	600	4	150	800	2.2	
P6002ACLxx	P6002AC	275	350	550	700	4	150	800	2.2	

Notes:
- Absolute maximum ratings measured at T_A= 25ºC (unless otherwise noted).
- Devices are bi-directional (unless otherwise noted).
- **XX** Part Number Suffix: **'RP'** (Reel Pack), **Blank** (Bulk Pack), or **'60'** (Type 60 lead form bulk pack)

Capacitance Values

Part Number	pF Pin 1-2, 3-2 Tip-Ground, Ring-Ground		pF Pin 1-3 Tip-Ring	
	MIN	MAX	MIN	MAX
P0602AALxx	15	145	10	90
P1402AALxx	40	60	20	35
P1602AALxx	35	60	20	35
P2202AALxx	30	50	15	30
P2702AALxx	25	45	15	25
P3002AALxx	25	40	15	25
P3602AALxx	25	35	10	20
P4202AALxx	25	35	10	20
P4802AALxx	20	35	10	20
P6002AALxx	20	35	10	20
P0602ABLxx	15	250	10	145
P1402ABLxx	40	155	20	90
P1602ABLxx	35	145	20	85
P2202ABLxx	30	115	15	65
P2702ABLxx	25	105	15	60
P3002ABLxx	25	95	15	55
P3602ABLxx	25	90	10	50
P4202ABLxx	25	85	10	50
P4802ABLxx	20	85	10	50
P6002ABLxx	20	80	10	45

Part Number	pF Pin 1-2, 3-2 Tip-Ground, Ring-Ground		pF Pin 1-3 Tip-Ring	
	MIN	MAX	MIN	MAX
P0602ACLxx	25	250	10	145
P1402ACLxx	55	155	30	90
P1602ACLxx	45	145	25	85
P2202ACLxx	45	115	25	65
P2702ACLxx	40	105	20	60
P3002ACLxx	35	95	20	55
P3602ACLxx	35	90	15	50
P4202ACLxx	30	85	15	50
P4802ACLxx	30	85	15	50
P6002ACLxx	30	80	15	45

Note: Off-state capacitance (C_o) is measured at 1 MHz with a 2 V bias.

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Surge Ratings

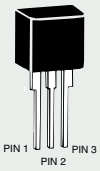
Series	I_{PP}									I_{TSM} 50/60 Hz	di/dt
	0.2x310 [1] 0.5x700 [2]	2x10 [1] 2x10 [2]	8x20 [1] 1.2x50 [2]	10x160 [1] 10x160 [2]	10x560 [1] 10x560 [2]	5x320 [1] 9x720 [2]	10x360 [1] 10x360 [2]	10x1000 [1] 10x1000 [2]	5x310 [1] 10x700 [2]		
	A min	A min	A min	A min	A min	A min	A min	A min	A min	A min	A/µs max
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	50	500

Notes:

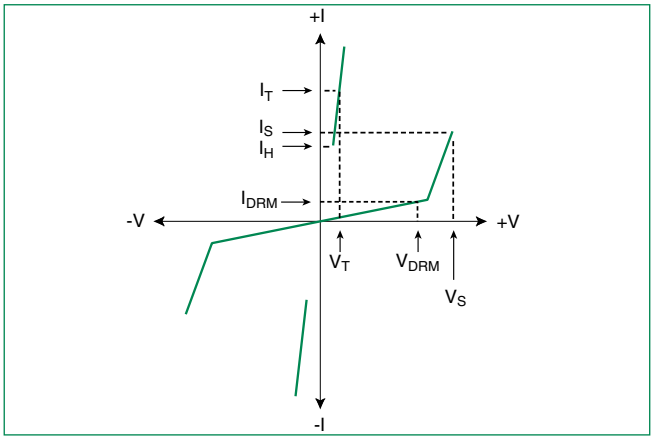
1. Current waveform in µs
2. Voltage waveform in µs

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

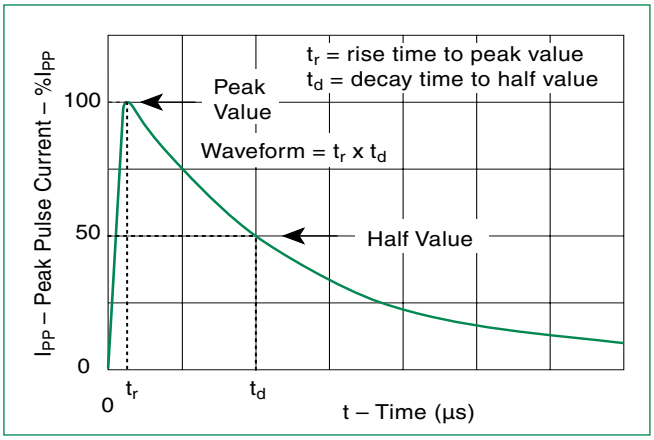
Thermal Considerations

Package	Symbol	Parameter	Value	Unit
Modified TO-220 	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	60	°C/W

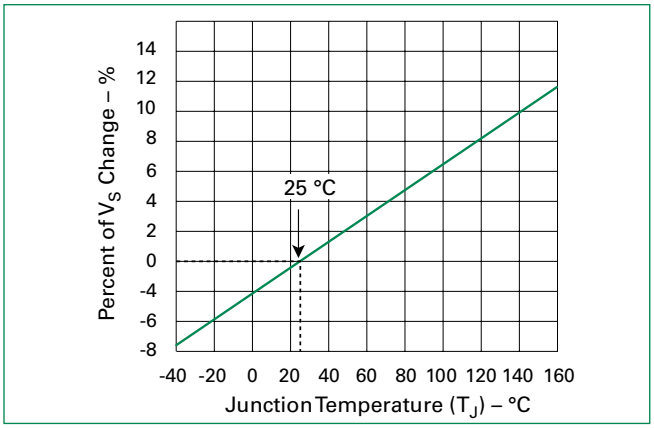
V-I Characteristics



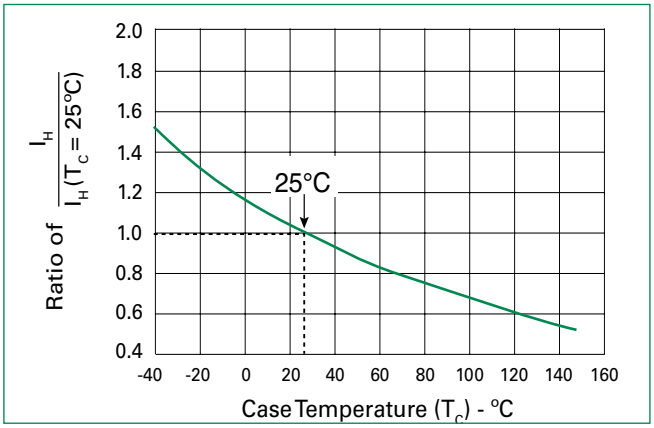
tr x td Pulse Waveform



Normalized VS Change vs. Junction Temperature



Normalized DC Holding Current vs. Case Temperature



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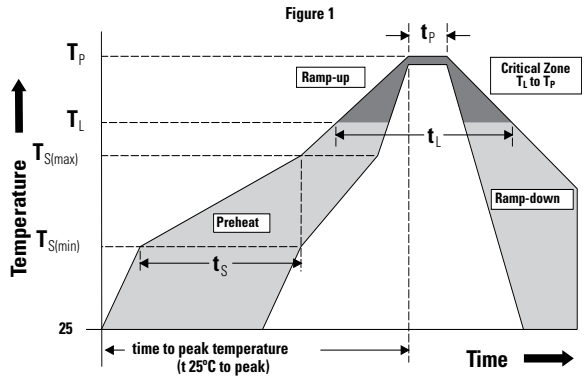
Soldering Parameters

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



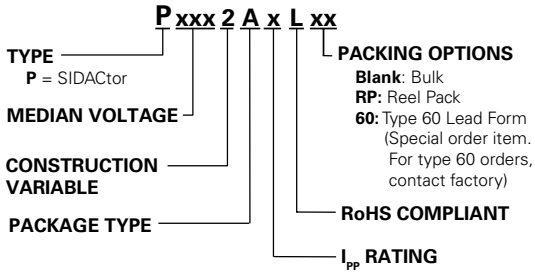
Physical Specifications

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

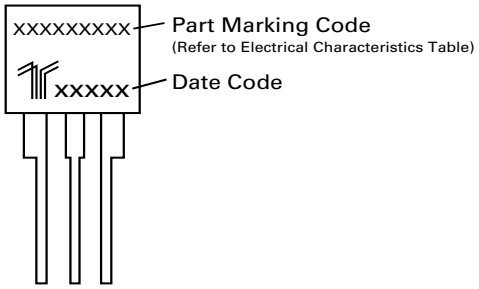
Environmental Specifications

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
Unbiased Highly Accelerated Stress Test	+130°C, 85%RH, 2atm, 168hrs. JESD22-A-118
Resistance to Solder Heat	+260°C, 30 secs. MIL-STD-750 (Method 2031)

Part Numbering



Part Marking



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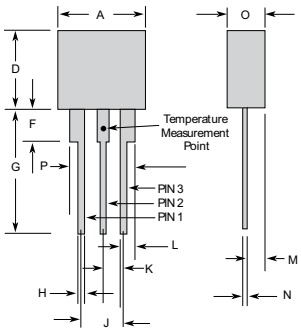
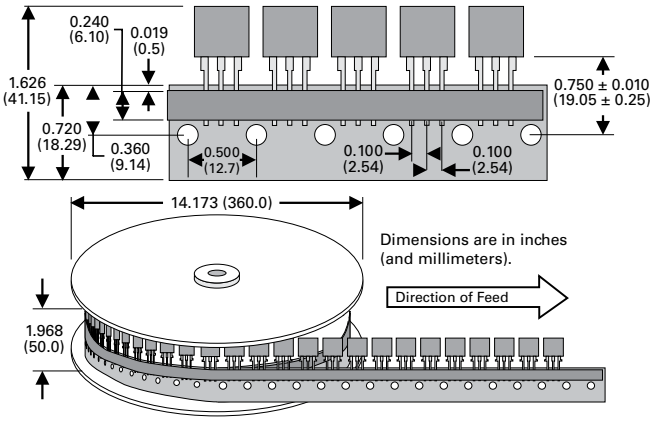
Dimensions - Modified TO-220



The modified TO-220 package is designed to meet mechanical standards as set forth in JEDEC publication number 95.

	Inches		Millimeters	
	Min	Max	Min	Max
A	0.400	0.410	10.16	10.42
D	0.360	0.375	9.14	9.53
F	0.110	0.130	2.80	3.30
G	0.540	0.575	13.71	14.61
H	0.025	0.035	0.63	0.89
J	0.195	0.205	4.95	5.21
K	0.095	0.105	2.41	2.67
L	0.060	0.075	1.52	1.90
M	0.070	0.085	1.78	2.16
N	0.018	0.024	0.46	0.61
O	0.178	0.188	4.52	4.78
P	0.290	0.310	7.37	7.87

Tape and Reel Specification — Modified TO-220



Packing Options

Package Type	Description	Quantity	Added Suffix	Industry Standard
A	Modified TO-220 Tape and Reel Pack	700	RP	EIA-468-B
	Modified TO-220 Bulk Pack	500	N/A	N/A
	Modified TO-220 Type 60 Lead Form Bulk Pack	500	60 (special order item, contact factory for details)	N/A