

### Electrical Characteristics (continued)

| Part Number | Marking | $V_{DRM}$          | $V_S$           | $V_{DRM}$          | $V_S$           | $V_T$         | $I_H$ | $I_S$  | $I_T$  | Capacitance                  |
|-------------|---------|--------------------|-----------------|--------------------|-----------------|---------------|-------|--------|--------|------------------------------|
|             |         | @ $I_{DRM}=5\mu A$ | @ 100V/ $\mu s$ | @ $I_{DRM}=5\mu A$ | @ 100V/ $\mu s$ | @ $I_T=2.2 A$ |       |        |        |                              |
|             |         | V min              | V max           | V min              | V max           | V max         |       |        |        |                              |
|             |         | Pins 1-2, 3-2      |                 | Pins 1-3           |                 | Pins 1-2, 3-2 |       | mA min | mA max | A max                        |
| 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  $T_a = 25^\circ C$  (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<br>Pin 1-2, 3-2<br>Tip-Ground, Ring-Ground |     | pF<br>Pin 1-3<br>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<br>Pin 1-2, 3-2<br>Tip-Ground, Ring-Ground |     | pF<br>Pin 1-3<br>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.

### Surge Ratings

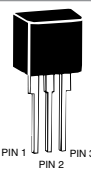
| Series | $I_{PP}$                                     |  |  |  |  |  |  |  |   | $I_{TSM}$<br>50/60 Hz | di/dt |
|--------|--|--|--|--|--|--|--|--|---|-----------------------|-------|
|        | 0.2x310 <sup>1</sup><br>0.5x700 <sup>2</sup> | 2x10 <sup>1</sup><br>2x10 <sup>2</sup> | 8x20 <sup>1</sup><br>1.2x50 <sup>2</sup> | 10x160 <sup>1</sup><br>10x160 <sup>2</sup> | 10x560 <sup>1</sup><br>10x560 <sup>2</sup> | 5x320 <sup>1</sup><br>9x720 <sup>2</sup> | 10x360 <sup>1</sup><br>10x360 <sup>2</sup> | 10x1000 <sup>1</sup><br>10x1000 <sup>2</sup> | 5x310 <sup>1</sup><br>10x700 <sup>2</sup> |                       |       |
|        | 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                                       | 50                    | 500   |

Notes:

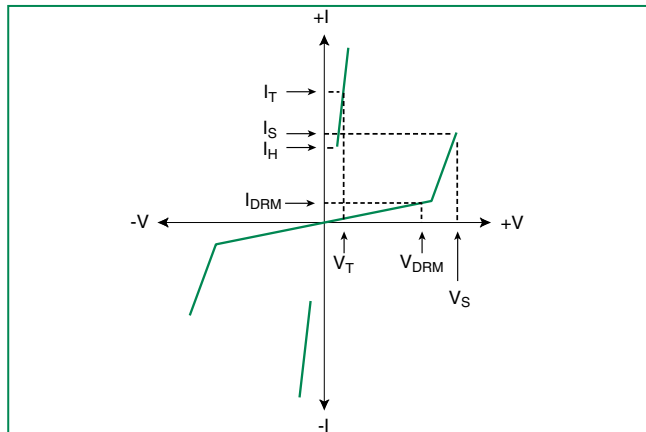
- 1 Current waveform in  $\mu$ s
- 2 Voltage waveform in  $\mu$ s

- 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<sub>j</sub>  $\leq$  +150°C

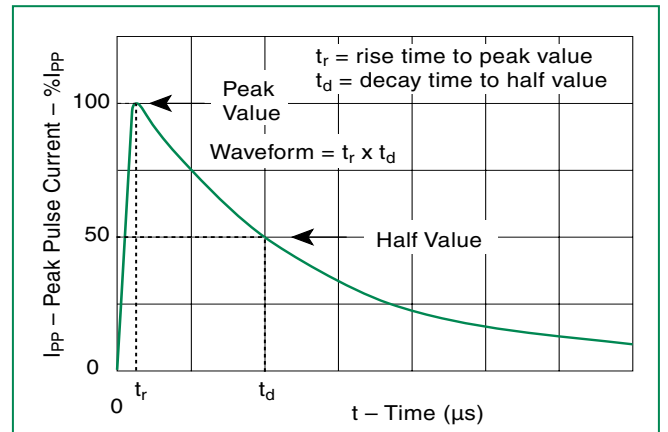
### Thermal Considerations

| Package  | Symbol           | Parameter                               | Value       | Unit |
|--|------------------|---|-------------|------|
| Modified TO-220<br> | T <sub>j</sub>   | Operating Junction Temperature Range    | -40 to +150 | °C   |
|  | T <sub>s</sub>   | Storage Temperature Range               | -65 to +150 | °C   |
|  | R <sub>θJA</sub> | Thermal Resistance: JUNCTION to Ambient | 60          | °C/W |

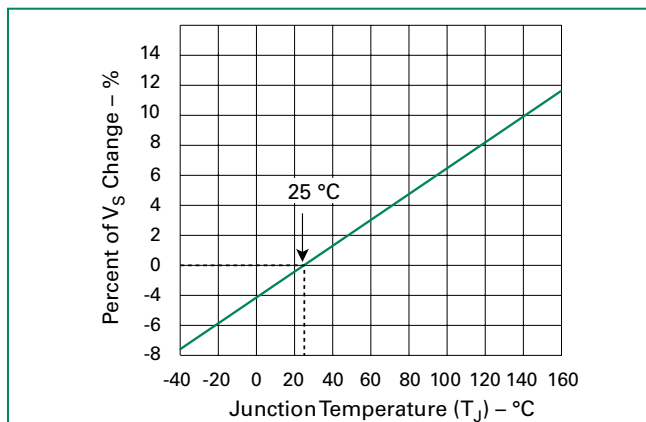
### V-I Characteristics



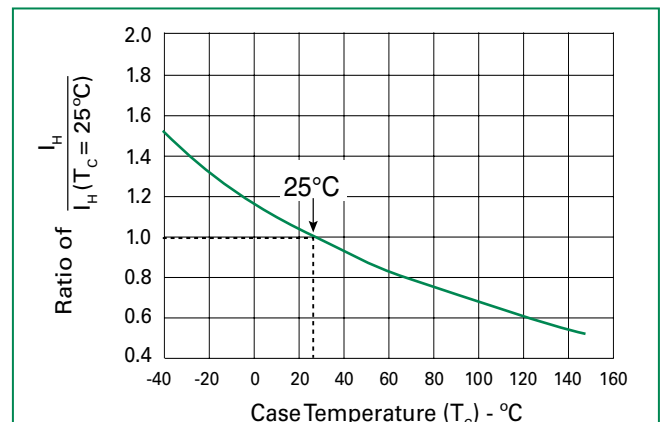
### t<sub>r</sub> x t<sub>d</sub> Pulse Waveform



### Normalized V<sub>s</sub> Change vs. Junction Temperature

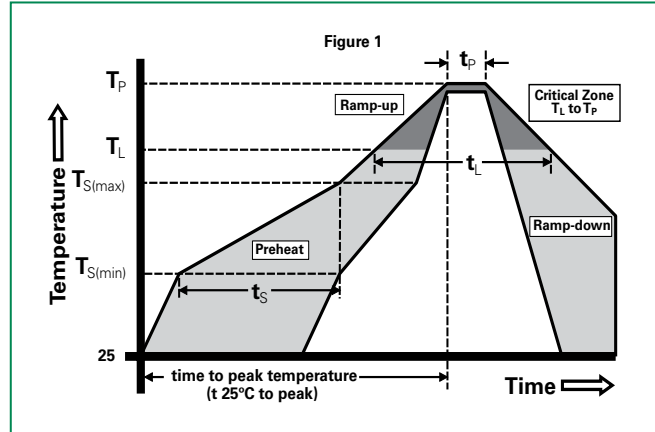


### Normalized DC Holding Current vs. Case Temperature



**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                        |



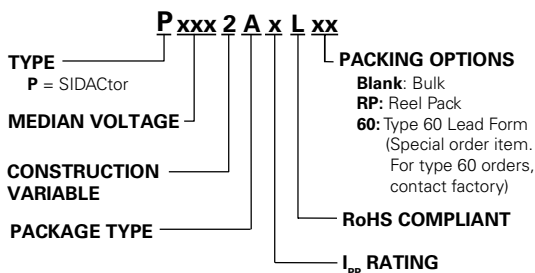
**Physical Specifications**

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

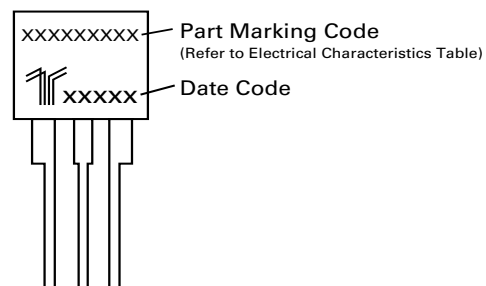
**Environmental Specifications**

|   |  |
|---|--|
| <b>High Temp Voltage Blocking</b>       | 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 |
| <b>Temp Cycling</b>                     | -65°C to +150°C, 15 min. dwell, 10 up to 100 cycles. MIL-STD-750 (Method 1051) EIA/JEDEC, JESD22-A104                  |
| <b>Biased Temp &amp; Humidity</b>       | 52 $V_{DC}$ (+85°C) 85%RH, 504 up to 1008 hrs. EIA/JEDEC, JESD22-A-101   |
| <b>High Temp Storage</b>                | +150°C 1008 hrs. MIL-STD-750 (Method 1031) JEDEC, JESD22-A-101   |
| <b>Low Temp Storage</b>                 | -65°C, 1008 hrs.   |
| <b>Thermal Shock</b>                    | 0°C to +100°C, 5 min. dwell, 10 sec. transfer, 10 cycles. MIL-STD-750 (Method 1056) JEDEC, JESD22-A-106                |
| <b>Autoclave (Pressure Cooker Test)</b> | +121°C, 100%RH, 2atm, 24 up to 168 hrs. EIA/JEDEC, JESD22-A-102  |
| <b>Resistance to Solder Heat</b>        | +260°C, 30 secs. MIL-STD-750 (Method 2031)   |
| <b>Moisture Sensitivity Level</b>       | 85%RH, +85°C, 168 hrs., 3 reflow cycles (+260°C Peak). JEDEC-J-STD-020, Level 1  |

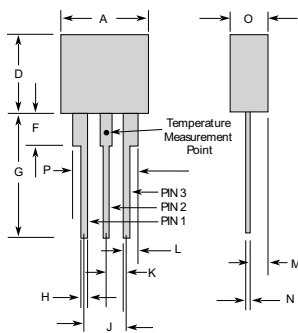
**Part Numbering**



**Part Marking**



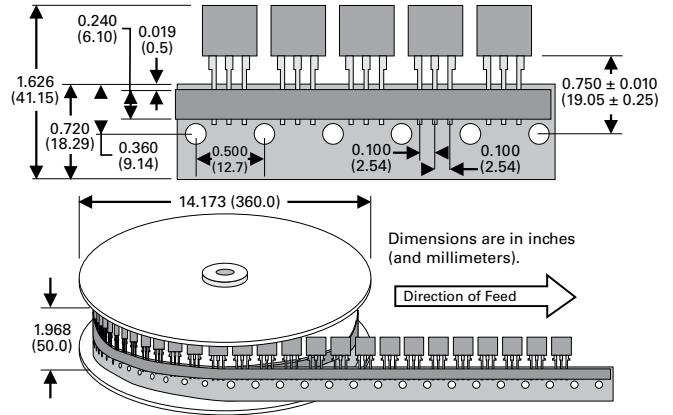
**Dimensions - Modified TO-220**



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   |
| <b>A</b> | 0.400  | 0.410 | 10.16       | 10.42 |
| <b>D</b> | 0.360  | 0.375 | 9.14        | 9.53  |
| <b>F</b> | 0.110  | 0.130 | 2.80        | 3.30  |
| <b>G</b> | 0.540  | 0.575 | 13.71       | 14.61 |
| <b>H</b> | 0.025  | 0.035 | 0.63        | 0.89  |
| <b>J</b> | 0.195  | 0.205 | 4.95        | 5.21  |
| <b>K</b> | 0.095  | 0.105 | 2.41        | 2.67  |
| <b>L</b> | 0.060  | 0.075 | 1.52        | 1.90  |
| <b>M</b> | 0.070  | 0.085 | 1.78        | 2.16  |
| <b>N</b> | 0.018  | 0.024 | 0.46        | 0.61  |
| <b>O</b> | 0.178  | 0.188 | 4.52        | 4.78  |
| <b>P</b> | 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<br>(special order item, contact factory for details) | N/A               |

**Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).**

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

## Littelfuse:

[P1602AA](#) [P3002AB](#) [P3002ABL](#) [P6002ABL](#) [P4202ABL](#) [P2202ABL](#) [P0602AA60](#) [P1602AA60](#) [P4802AA](#) [P4802AB](#)  
[P1602ABL](#) [P3602ABL](#) [P3602AB60](#) [P3002AB60](#) [P2202AB60](#) [P0602AB60](#) [P3002AB62](#) [P0602AA](#) [P3002AB61](#)  
[P1402AB60](#) [P1602AB60](#) [P0602AB](#) [P6002AB](#) [P6002AA](#) [P1402AA](#) [P1402AB](#) [P3002AA](#) [P2202AB](#) [P2202AA](#)  
[P2702ABL](#) [P4202AA](#) [P1602AB](#) [P2702AB](#) [P4202AB](#) [P3602AB](#) [P4802ABL](#) [P1402ABL](#) [P3602AA](#) [P2702AA](#)  
[P4802AB61](#) [P4802AB60](#) [P4802AB69](#) [P2202AC60](#) [P4802ABRP](#) [P4802AARP](#) [P1602AAL60](#) [P1602AAL61](#)  
[P1402AAL](#) [P2702ABRP](#) [P2202ABRP](#) [P4202ABRP](#) [P1402ABRP](#) [P1602ABRP](#) [P3002ABRP](#) [P3602ABRP](#)  
[P3602AARP](#) [P3002AARP](#) [P1602AARP](#) [P1402AARP](#) [P2702AARP](#) [P2202AARP](#) [P4202AARP](#) [P0602AAL60](#)  
[P1402ABLRP](#) [P1602ABLRP](#) [P3002ABLRP](#) [P3602ABLRP](#) [P2202ACL60](#) [P2202ABLRP](#) [P2702ABLRP](#) [P6002ABLRP](#)  
[P4802ABLRP](#) [P4202ABLRP](#) [P0602ABL60](#) [P4802ABL60](#) [P4802ABL61](#) [P4802AALRP](#) [P4202AALRP](#) [P6002AALRP](#)  
[P6002ABL60](#) [P2202ABL60](#) [P2202AALRP](#) [P2702AALRP](#) [P1602ABL60](#) [P1602AALRP](#) [P1402AALRP](#) [P1402ABL60](#)  
[P3002ABL61](#) [P3602AALRP](#) [P3602ABL60](#) [P3002AALRP](#) [P3002ABL60](#) [P6002AB60](#) [P0602AAL](#) [P1602AAL](#)  
[P0602ABL](#) [P2202AAL](#) [P2702AAL](#) [P3002AAL](#) [P3602AAL](#)