

# 3 Teccor<sup>®</sup> Brand *SIDACtor*<sup>®</sup> Devices

SIDACtor Devices

This section presents complete electrical specifications for Littelfuse's *SIDACtor* solid state overvoltage protection devices.

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## SIDACtor® Device



DO-214AA *SIDACtor* solid state protection devices protect telecommunications equipment such as modems, line cards, and CPE (telephones, answering machines, and fax machines).

*SIDACtor* devices enable equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21 and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> $\mu$ Amps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
P0080S_L	6	25	4	5	800	2.2	50
P0220S_L	15	32	4	5	800	2.2	50
P0300S_L	25	40	4	5	800	2.2	50
P0640S_L	58	77	4	5	800	2.2	150
P0720S_L	65	88	4	5	800	2.2	150
P0900S_L	75	98	4	5	800	2.2	150
P1100S_L	90	130	4	5	800	2.2	150
P1300S_L	120	160	4	5	800	2.2	150
P1500S_L	140	180	4	5	800	2.2	150
P1800S_L	170	220	4	5	800	2.2	150
P2100S_L	180	240	4	5	800	2.2	150
P2300S_L	190	260	4	5	800	2.2	150
P2600S_L	220	300	4	5	800	2.2	150
P3100S_L	275	350	4	5	800	2.2	150
P3500S_L	320	400	4	5	800	2.2	150

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.  
For individual "SA", "SB", and "SC" surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/ $\mu$ s.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.


### Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/ $\mu$ s
A	20	150	150	90	50	75	75	45	75	20	500
B	25	250	250	150	100	100	125	80	100	30	500
C	50	500	400	200	150	200	175	100	200	30	500

\* Current waveform in  $\mu$ s

\*\* Voltage waveform in  $\mu$ s

**Thermal Considerations**

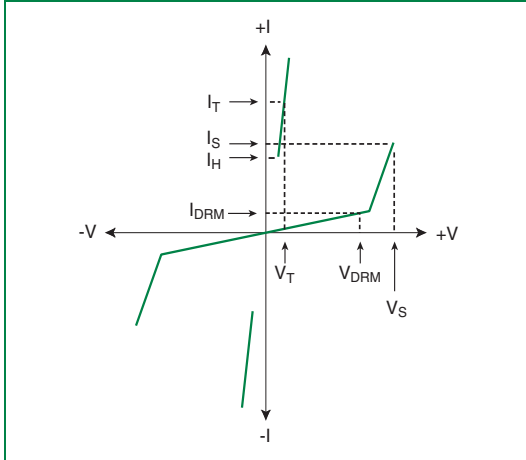
Package	Symbol	Parameter	Value	Unit
	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	90	°C/W

**Capacitance Values**

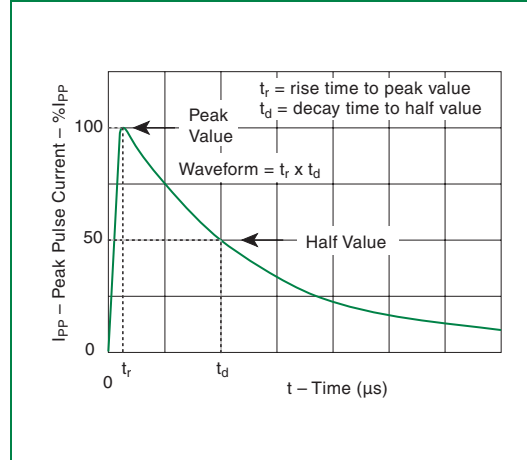
Part Number *	pF	
	MIN	MAX
P0080S[A/B]L	25	150
P0080SCL	35	260
P0220SAL	25	150
P0220SBL	25	150
P0220SCL	30	240
P0300S[A/B]L	15	140
P0300SCL	25	250
P0640S[A/B]L	40	60
P0640SCL	55	155
P0720SAL	35	60
P0720SBL	35	75
P0720SCL	50	150
P0900SAL	35	55
P0900SBL	35	70
P0900SCL	45	140
P1100SAL	30	50
P1100SBL	30	70
P1100SCL	45	115
P1300SAL	25	45
P1300SBL	25	60
P1300SCL	40	105
P1500SAL	25	40
P1500SBL	25	55
P1500SCL	35	95
P1800SAL	25	35
P1800SBL	25	50
P1800SCL	35	90
P2100S[A/B]L	20	35
P2100SCL	30	90
P2300SAL	25	35
P2300SBL	25	50
P2300SCL	30	80
P2600SAL	20	35
P2600SBL	20	45
P2600SCL	30	80
P3100SAL	20	35
P3100SBL	20	45
P3100SCL	30	70
P3500SAL	20	35
P3500SBL	20	40
P3500SCL	25	65

\* [A/B] in part number indicates that values are for both A and B surge ratings.  
 Note: Off-state capacitance (C<sub>0</sub>) is measured at 1 MHz with a 2 V bias.

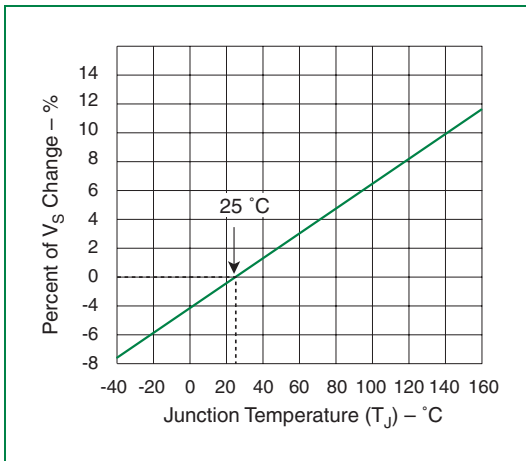
SIDACtor Devices



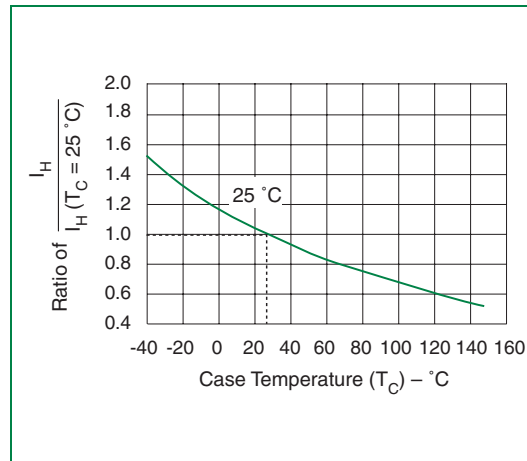
V-I Characteristics



$t_r \times t_d$  Pulse Waveform



Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

## MicroCapacitance (MC) SC *SIDACtor*® Device



These DO-214AA SMC *SIDACtor* devices are intended for applications sensitive to load values. Typically, high speed connections, such as xDSL and T1/E1, require a lower capacitance.  $C_O$  values for the MicroCapacitance device are 40 percent lower than a standard SC part.

This SMC *SIDACtor* series enables equipment to comply with various regulatory requirements including GR 1089, IEC 60950, UL 60950, TIA-968-A (formerly known as FCC Part 68), and ITU K.20, K.21, and K.45.

SIDACtor Devices

### Electrical Parameters

Part Number *	$V_{DRM}$ Volts	$V_S$ Volts	$V_T$ Volts	$I_{DRM}$ $\mu$ Amps	$I_S$ mAmps	$I_T$ Amps	$I_H$ mAmps
P0080SCMCL	6	25	4	5	800	2.2	50
P0220SCMCL	15	32	4	5	800	2.2	50
P0300SCMCL	25	40	4	5	800	2.2	50
P0640SCMCL	58	77	4	5	800	2.2	150
P0720SCMCL	65	88	4	5	800	2.2	150
P0900SCMCL	75	98	4	5	800	2.2	150
P1100SCMCL	90	130	4	5	800	2.2	150
P1200SCMCL	100	130	4	5	800	2.2	120
P1300SCMCL	120	160	4	5	800	2.2	150
P1500SCMCL	140	180	4	5	800	2.2	150
P1800SCMCL	170	220	4	5	800	2.2	150
P2000SCMCL	180	220	4	5	800	2.2	120
P2100SCMCL	180	240	4	5	800	2.2	150
P2300SCMCL	190	260	4	5	800	2.2	150
P2500SCMCL	230	290	4	5	800	2.2	120
P2600SCMCL	220	300	4	5	800	2.2	150
P3100SCMCL	275	350	4	5	800	2.2	150
P3500SCMCL	320	400	4	5	800	2.2	150

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.

For surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C.  $I_{PP}$  applies to -40 °C through +85 °C temperature range.
- $I_{PP}$  is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- $V_{DRM}$  is measured at  $I_{DRM}$ .
- $V_S$  is measured at 100 V/ $\mu$ s.
- Special voltage ( $V_S$  and  $V_{DRM}$ ) and holding current ( $I_H$ ) requirements are available upon request.

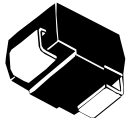
### Surge Ratings in Amps

Series	$I_{PP}$										$I_{TSM}$ 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *			
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **			
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/ $\mu$ s	
C	50	500	400	200	150	200	175	100	200	30	500	

\* Current waveform in  $\mu$ s

\*\* Voltage waveform in  $\mu$ s

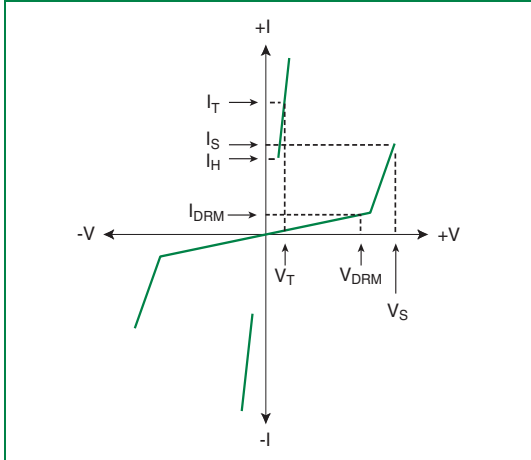
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
DO-214AA 	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	90	°C/W

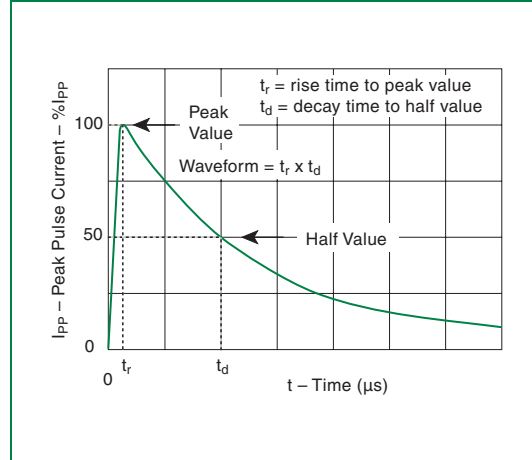
**Capacitance Values**

Part Number	pF	
	MIN	MAX
P0080SCMCL	35	75
P0220SCMCL	30	65
P0300SCMCL	25	45
P0640SCMCL	55	85
P0720SCMCL	50	75
P0900SCMCL	45	70
P1100SCMCL	45	70
P1200SCMCL	45	65
P1300SCMCL	40	60
P1500SCMCL	35	55
P1800SCMCL	35	50
P2000SCMCL	35	50
P2100SCMCL	30	50
P2300SCMCL	30	50
P2500SCMCL	30	45
P2600SCMCL	30	45
P3100SCMCL	30	45
P3500SCMCL	25	40

Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

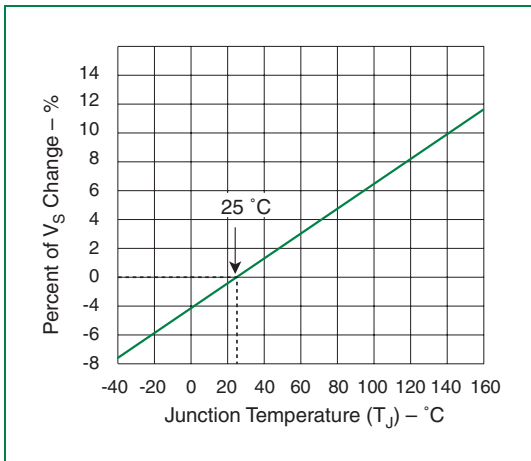


V-I Characteristics

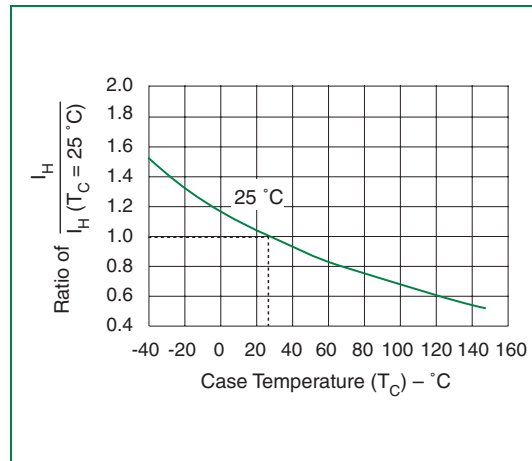


$t_r \times t_d$  Pulse Waveform

SIDACtor Devices



Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

## MicroCapacitance (MC) SA *SIDACtor*® Device



These DO-214AA SAMC *SIDACtor* devices are intended for applications sensitive to load values. Typically, high speed connections, such as Ethernet, xDSL, and T1/E1, require a lower capacitance.  $C_O$  values for the MicroCapacitance device are 40% lower than a standard SA part.

This SAMC *SIDACtor* series enables equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21, and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

### Electrical Parameters

Part Number *	$V_{DRM}$ Volts	$V_S$ Volts	$V_T$ Volts	$I_{DRM}$ $\mu$ Amps	$I_S$ mAmps	$I_T$ Amps	$I_H$ mAmps
P0080SAMCL	6	25	4	5	800	2.2	50
P0220SAMCL	15	32	4	5	800	2.2	50
P0300SAMCL	25	40	4	5	800	2.2	50

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.  
For surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C.  $I_{PP}$  applies to -40 °C through +85 °C temperature range.
- $I_{PP}$  is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- $V_{DRM}$  is measured at  $I_{DRM}$ .
- $V_S$  is measured at 100 V/ $\mu$ s.
- Special voltage ( $V_S$  and  $V_{DRM}$ ) and holding current ( $I_H$ ) requirements are available upon request.

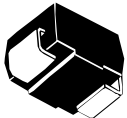
### Surge Ratings in Amps

Series	$I_{PP}$									$I_{TSM}$ 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/ $\mu$ s
A	20	150	150	90	50	75	75	45	75	20	500

\* Current waveform in  $\mu$ s

\*\* Voltage waveform in  $\mu$ s

**Thermal Considerations**

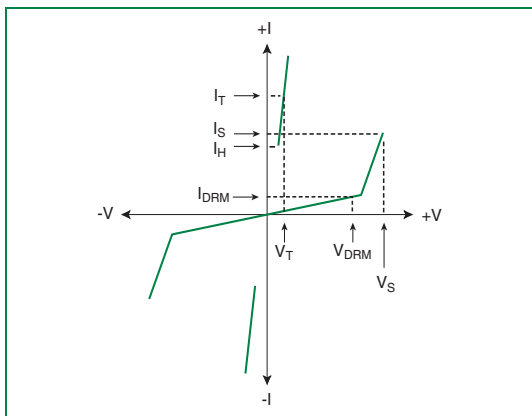
Package	Symbol	Parameter	Value	Unit
	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	90	°C/W

**Capacitance Values**

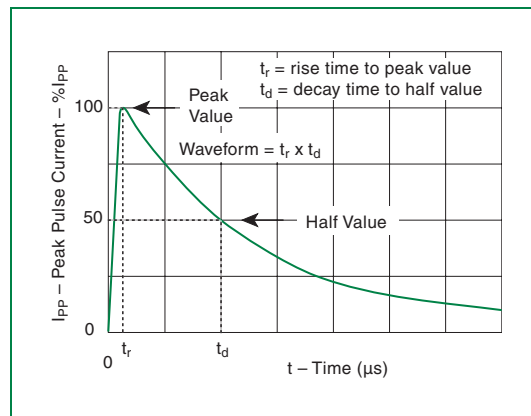
Part Number	pF	
	MIN	MAX
P0080SAMCL	25	55
P0220SAMCL	25	50
P0300SAMCL	15	35

Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

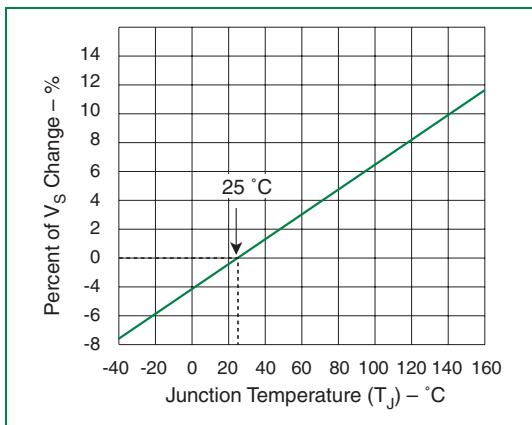
SIDACtor Devices



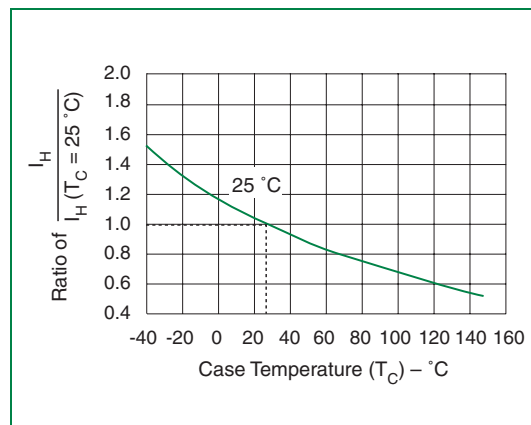
V-I Characteristics



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



Normalized V<sub>S</sub> Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

## High Surge Current (D-rated) *SIDACTor*® Device



DO-214AA *SIDACTor* solid state protection devices with a D surge rating protect telecommunications equipment located in hostile environments. These *SIDACTor* devices withstand the simultaneous surges outlined in GR 1089 lightning tests. (See “First Level Lightning Surge Test” on page 7-5.) Surge ratings are twice that of a device with a C surge rating. This provides a method for building an SMT version of the balanced ‘Y’ configuration. (US Patent 4,905,119) *SIDACTor* devices enable equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21 and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps **	I <sub>H</sub> mAmps
P0080SDL	6	25	4	5	800	2	50
P0640SDL	58	77	4	5	800	2.2	50
P0720SDL	65	88	4	5	800	2.2	50
P0900SDL	75	98	4	5	800	2.2	50
P1100SDL	90	130	4	5	800	2.2	50
P1300SDL	120	160	4	5	800	2.2	50
P1500SDL	140	180	4	5	800	2.2	50
P1800SDL	170	220	4	5	800	2.2	50
P2300SDL	190	260	4	5	800	2.2	50
P2600SDL	220	300	4	5	800	2.2	50
P3100SDL	275	350	4	5	800	2.2	50
P3500SDL	320	400	4	5	800	2.2	50

\* “L” in part number indicates RoHS compliance. For non-RoHS compliant device, delete “L” from part number.  
For surge ratings, see table below.

\*\* The 2.2 A version cannot be used to meet 4.4 A requirements.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACTor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.

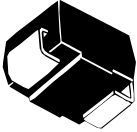
### Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/μs
D	—	—	1000	—	—	—	—	200	—	50	1000

\* Current waveform in μs

\*\* Voltage waveform in μs

**Thermal Considerations**

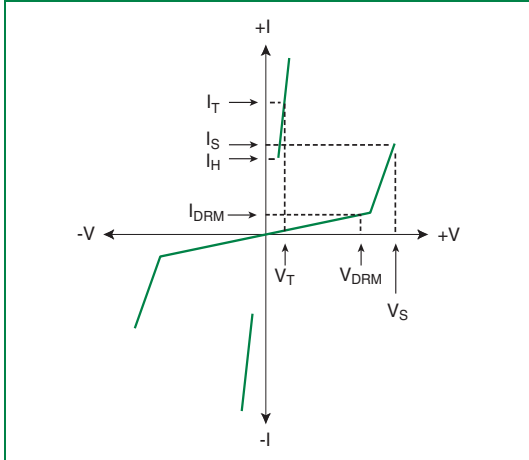
Package	Symbol	Parameter	Value	Unit
	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	90	°C/W

**Capacitance Values**

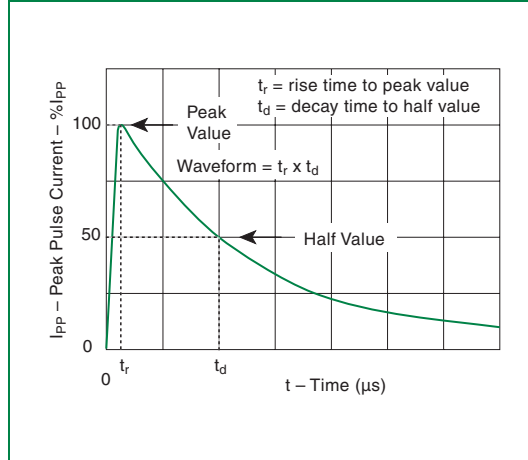
Part Number	pF	
	MIN	MAX
P0080SDL	50	110
P0640SDL	100	160
P0720SDL	100	150
P0900SDL	95	140
P1100SDL	75	115
P1300SDL	65	100
P1500SDL	60	90
P1800SDL	50	90
P2300SDL	50	80
P2600SDL	50	75
P3100SDL	45	70
P3500SDL	45	65

Note: Off-state capacitance (C<sub>0</sub>) is measured at 1 MHz with a 2 V bias.

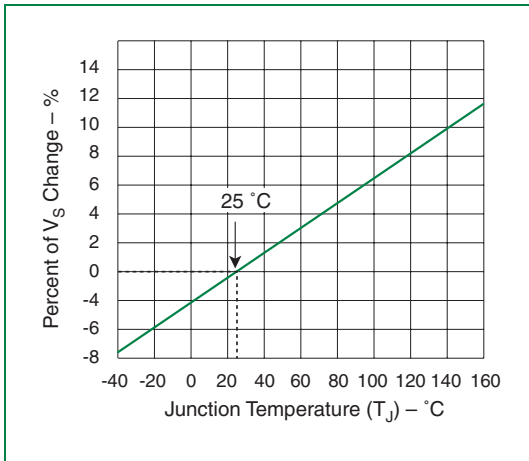
SIDACtor Devices



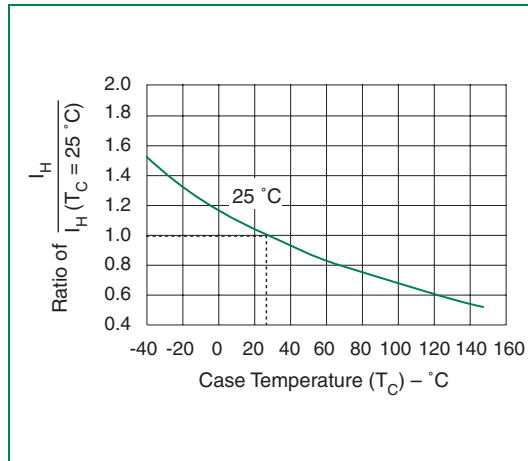
V-I Characteristics



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

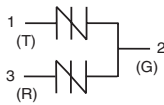


Normalized V<sub>S</sub> Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

# Compak TwinCHIP™ SIDACtor® Device



The modified DO-214AA SIDACtor devices provide low-cost, longitudinal protection.

SIDACtor devices enable equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21, and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

## Electrical Parameters

Part Number	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
	Pins 1-2, 2-3		Pins 1-3						
P1402C_L	58	77	116	154	4	5	800	2.2	120
P1602C_L	65	95	130	190	4	5	800	2.2	120
P2202C_L	90	130	180	260	4	5	800	2.2	120
P2702C_L	120	160	240	320	4	5	800	2.2	120
P3002C_L	140	180	280	360	4	5	800	2.2	120
P3602C_L	170	220	340	440	4	5	800	2.2	120
P4202C_L	190	250	380	500	4	5	800	2.2	120
P4802C_L	220	300	440	600	4	5	800	2.2	120
P6002C_L	275	350	550	700	4	5	800	2.2	120

SIDACtor Devices

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.  
For surge ratings, see table below.

### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed SIDACtor devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.
- UL 60950 creepage requirements must be considered.

## Surge Ratings in Amps

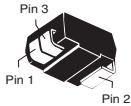
Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt Amps/μs
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/μs
A	20	150	150	90	50	75	75	45	75	20	500
B	25	250	250	150	100	100	125	80	100	30	500

\* Current waveform in μs

\*\* Voltage waveform in μs

Note: Contact factory for release date of Series B.

**Thermal Considerations**

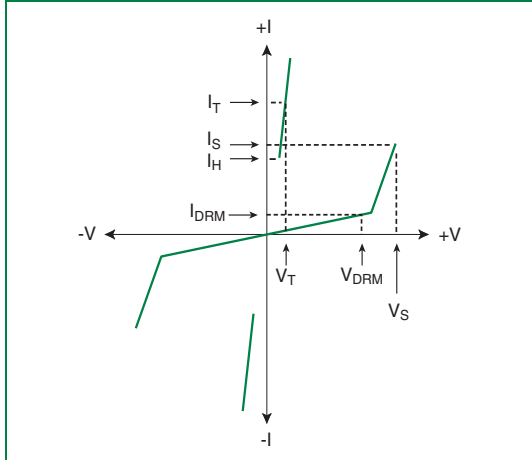
Package	Symbol	Parameter	Value	Unit
	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	85	°C/W

**Capacitance Values**

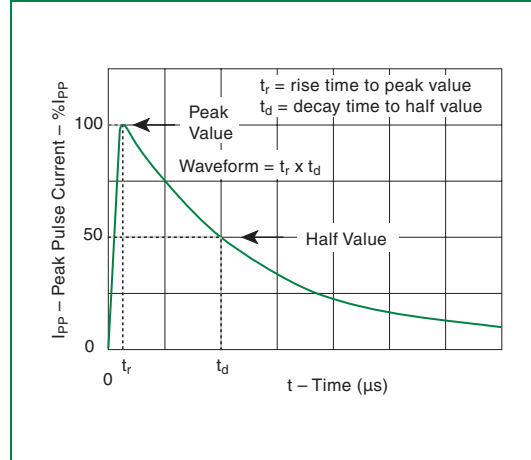
Part Number *	pF Pin 1-2 / 3-2 Tip-Ground, Ring-Ground		pF Pin 1-3 Tip-Ring	
	MIN	MAX	MIN	MAX
P1402C[A/B]L	30	55	15	35
P1602C[A/B]L	30	55	15	30
P2202C[A/B]L	25	50	15	30
P2702C[A/B]L	25	45	10	25
P3002C[A/B]L	20	40	10	25
P3602C[A/B]L	20	40	10	25
P4202C[A/B]L	20	40	10	25
P4802C[A/B]L	20	35	10	20
P6002C[A/B]L	15	35	10	20

\* [A/B] in part number indicates that values are for both A and B surge ratings.

Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

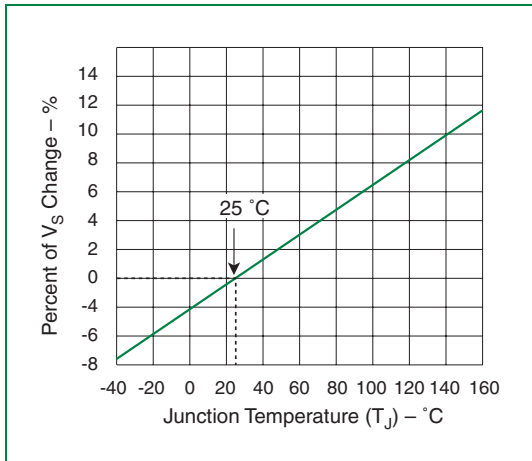


V-I Characteristics

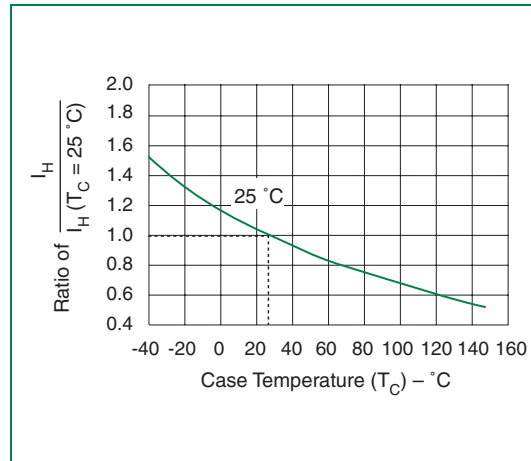


$t_r \times t_d$  Pulse Waveform

SIDACtor Devices



Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

## Broadband Optimized™ SIDACTor® Device



The DO-214AA SIDACTor Broadband Optimized protection devices are intended for applications sensitive to load values. Typically, high speed connections require a lower capacitance.  $C_O$  values are 40% lower than standard devices.

SIDACTor devices enable equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21 and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

### Electrical Parameters

Part Number *	$V_{DRM}$ Volts	$V_S$ Volts	$V_T$ Volts	$I_{DRM}$ $\mu$ Amps	$I_S$ mAmps	$I_T$ Amps	$I_H$ mAmps
P0642S_L	58	77	4	5	800	2.2	120
P0722S_L	65	88	4	5	800	2.2	120
P0902S_L	75	98	4	5	800	2.2	120
P1102S_L	90	130	4	5	800	2.2	120
P1302S_L	120	160	4	5	800	2.2	120
P1502S_L	140	180	4	5	800	2.2	120
P1802S_L	170	220	4	5	800	2.2	120
P2302S_L	190	260	4	5	800	2.2	120
P2602S_L	220	300	4	5	800	2.2	120
P3002S_L	280	360	4	5	800	2.2	120
P3502S_L	320	400	4	5	800	2.2	120
P4202S_L	190	250	8	5	800	2.2	120
P4802S_L	440	600	4	5	800	2.2	120
P6002S_L	275	350	8	5	800	2.2	120

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.  
For surge ratings, see table below.

#### General Notes:

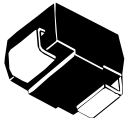
- All measurements are made at an ambient temperature of 25 °C.  $I_{PP}$  applies to -40 °C through +85 °C temperature range.
- $I_{PP}$  is a repetitive surge rating and is guaranteed for the life of the product.
- Listed SIDACTor devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- $V_{DRM}$  is measured at  $I_{DRM}$ .
- $V_S$  is measured at 100 V/ $\mu$ s.
- Special voltage ( $V_S$  and  $V_{DRM}$ ) and holding current ( $I_H$ ) requirements are available upon request.

### Surge Ratings in Amps

Series	$I_{PP}$									$I_{TSM}$ 50 / 60 Hz Amps	di/dt Amps/ $\mu$ s
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps
A	20	150	150	90	50	75	75	45	75	20	500
B	25	250	250	150	100	100	125	80	100	30	500

\* Current waveform in  $\mu$ s  
\*\* Voltage waveform in  $\mu$ s

**Thermal Considerations**

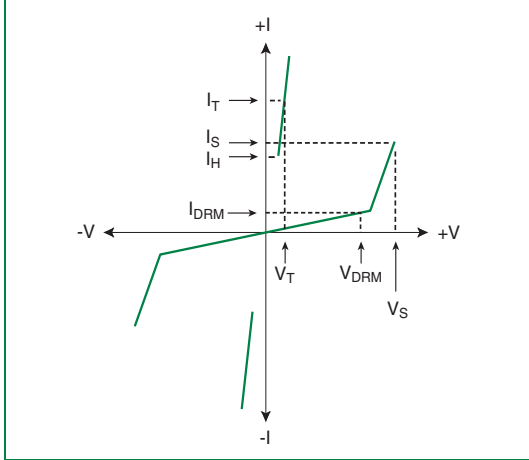
Package	Symbol	Parameter	Value	Unit
	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	90	°C/W

**Capacitance Values**

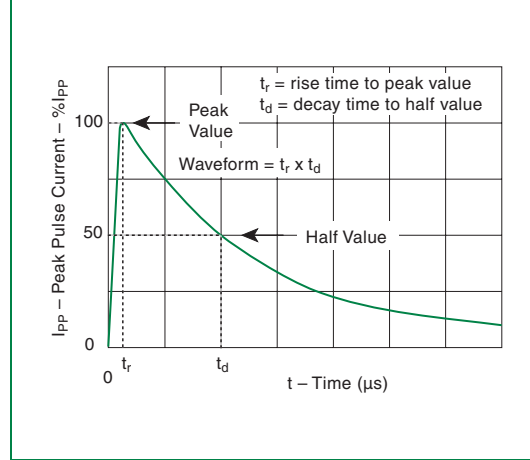
Part Number *	pF	
	MIN	MAX
P0642S[A/B]L	25	45
P0722S[A/B]L	20	45
P0902S[A/B]L	20	40
P1102S[A/B]L	15	35
P1302S[A/B]L	15	35
P1502S[A/B]L	15	30
P1802S[A/B]L	10	30
P2302S[A/B]L	10	25
P2602S[A/B]L	10	25
P3002S[A/B]L	10	25
P3502S[A/B]L	10	20
P4202S[A/B]L	10	20
P4802S[A/B]L	5	20
P6002S[A/B]L	5	20

\* [A/B] in part number indicates that values are for both A and B surge ratings.  
 Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

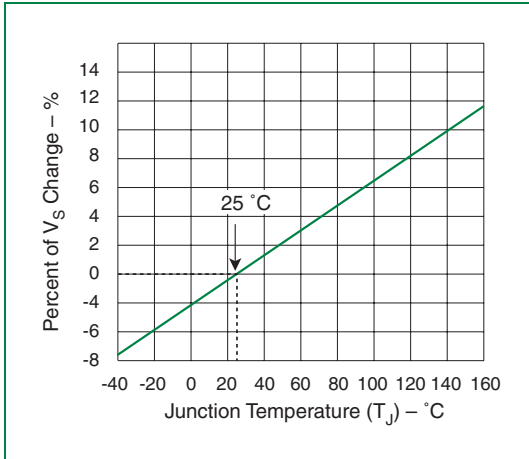
SIDACTor Devices



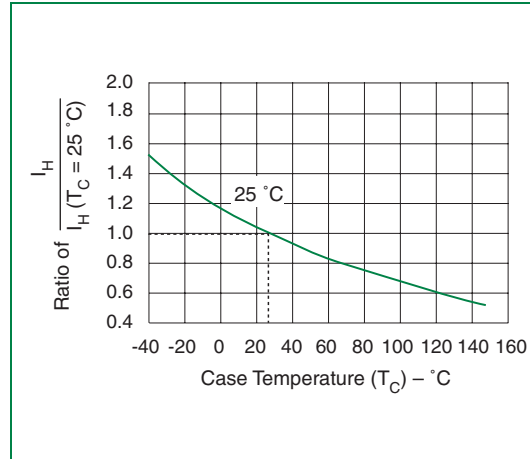
V-I Characteristics



$t_r \times t_d$  Pulse Waveform



Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

## SIDACtor® Device



TO-92 *SIDACtor* solid state protection devices protect telecommunications equipment such as modems, line cards, and CPE (telephones, answering machines, and fax machines).

*SIDACtor* devices enable equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21 and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

SIDACtor Devices

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> $\mu$ Amps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
P0080E_L	6	25	4	5	800	2.2	50
P0300E_L	25	40	4	5	800	2.2	50
P0640E_L	58	77	4	5	800	2.2	150
P0720E_L	65	88	4	5	800	2.2	150
P0900E_L	75	98	4	5	800	2.2	150
P1100E_L	90	130	4	5	800	2.2	150
P1300E_L	120	160	4	5	800	2.2	150
P1500E_L	140	180	4	5	800	2.2	150
P1800E_L	170	220	4	5	800	2.2	150
P2300E_L	190	260	4	5	800	2.2	150
P2600E_L	220	300	4	5	800	2.2	150
P3100E_L	275	350	4	5	800	2.2	150
P3500E_L	320	400	4	5	800	2.2	150

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number. For individual "EA", "EB", and "EC" surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/ $\mu$ s.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.


### Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/ $\mu$ s
A	20	150	150	90	50	75	75	45	75	20	500
B	25	250	250	150	100	100	125	80	100	30	500
C	50	500	400	200	150	200	175	100	200	30	500

\* Current waveform in  $\mu$ s

\*\* Voltage waveform in  $\mu$ s

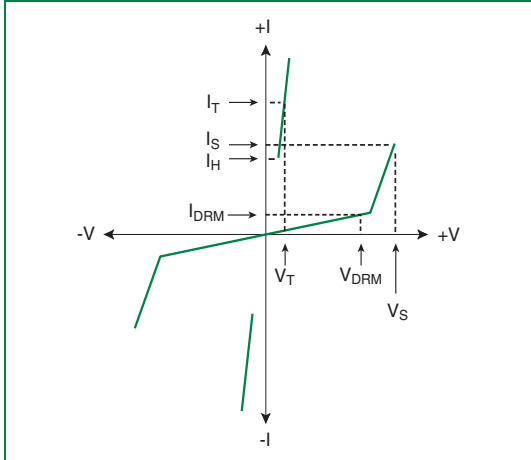
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
TO-92 	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	90	°C/W

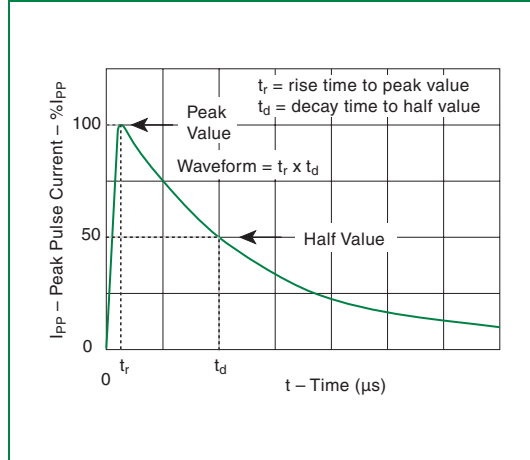
**Capacitance Values**

Part Number *	pF	
	MIN	MAX
P0080E[A/B]L	25	150
P0080ECL	35	260
P0300E[A/B]L	15	140
P0300ECL	25	250
P0640E[A/B]L	40	60
P0640ECL	55	155
P0720EAL	35	60
P0720EBL	35	75
P0720ECL	50	150
P0900EAL	35	55
P0900EBL	35	70
P0900ECL	45	140
P1100EAL	30	50
P1100EBL	30	70
P1100ECL	45	115
P1300EAL	25	45
P1300EBL	25	60
P1300ECL	40	105
P1500EAL	25	40
P1500EBL	25	55
P1500ECL	35	95
P1800EAL	25	35
P1800EBL	25	50
P1800ECL	35	90
P2300EAL	25	35
P2300EBL	25	50
P2300ECL	30	80
P2600EAL	20	35
P2600EBL	20	45
P2600ECL	30	80
P3100EAL	20	35
P3100EBL	20	45
P3100ECL	30	70
P3500EAL	20	35
P3500EBL	20	40
P3500ECL	25	65

\* [A/B] in part number indicates that values are for both A and B surge ratings.  
 Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

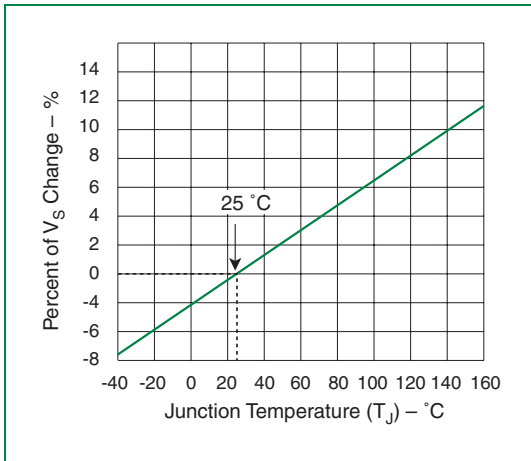


V-I Characteristics

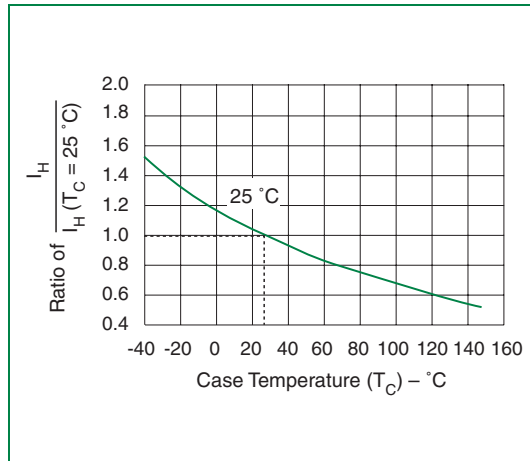


$t_r \times t_d$  Pulse Waveform

SIDACtor Devices



Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

## MicroCapacitance (MC) *SIDACTor*® Device



These TO-92 MC *SIDACTor* devices are intended for applications sensitive to load values. Typically, high speed connections, such as xDSL and T1/E1, require a lower capacitance.  $C_0$  values for the MicroCapacitance device are 40 percent lower than a standard EC part.

This MC *SIDACTor* series enables equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21, and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68) without the need of series resistors.

### Electrical Parameters

Part Number *	$V_{DRM}$ Volts	$V_S$ Volts	$V_T$ Volts	$I_{DRM}$ $\mu$ Amps	$I_S$ mAmps	$I_T$ Amps	$I_H$ mAmps
P0080ECMCL	6	25	4	5	800	2.2	50
P0300ECMCL	25	40	4	5	800	2.2	50
P0640ECMCL	58	77	4	5	800	2.2	150
P0720ECMCL	65	88	4	5	800	2.2	150
P0900ECMCL	75	98	4	5	800	2.2	150
P1100ECMCL	90	130	4	5	800	2.2	150
P1300ECMCL	120	160	4	5	800	2.2	150
P1500ECMCL	140	180	4	5	800	2.2	150
P1800ECMCL	170	220	4	5	800	2.2	150
P2300ECMCL	190	260	4	5	800	2.2	150
P2600ECMCL	220	300	4	5	800	2.2	150
P3100ECMCL	275	350	4	5	800	2.2	150
P3500ECMCL	320	400	4	5	800	2.2	150

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.

For surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C.  $I_{PP}$  applies to -+40 °C through +85 °C temperature range.
- $I_{PP}$  is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACTor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- $V_{DRM}$  is measured at  $I_{DRM}$ .
- $V_S$  is measured at 100 V/ $\mu$ s.
- Special voltage ( $V_S$  and  $V_{DRM}$ ) and holding current ( $I_H$ ) requirements are available upon request.


### Surge Ratings in Amps

Series	$I_{PP}$									$I_{TSM}$ 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/ $\mu$ s
C	50	500	400	200	150	200	175	100	200	30	500

\* Current waveform in  $\mu$ s

\*\* Voltage waveform in  $\mu$ s

**Thermal Considerations**

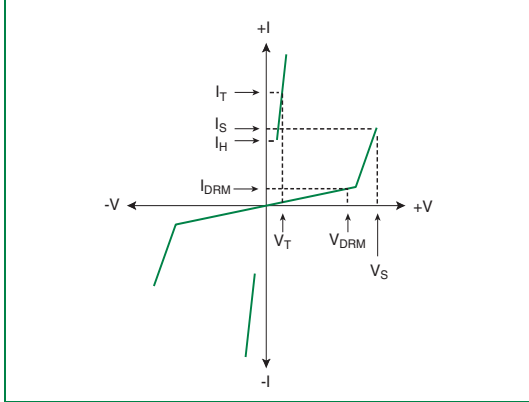
Package	Symbol	Parameter	Value	Unit
TO-92 	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	90	°C/W

**Capacitance Values**

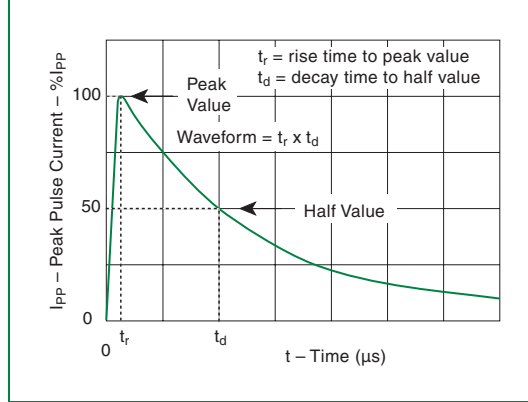
Part Number	pF	
	MIN	MAX
P0080ECMCL	35	75
P0300ECMCL	25	45
P0640ECMCL	55	85
P0720ECMCL	50	75
P0900ECMCL	45	70
P1100ECMCL	45	70
P1300ECMCL	40	60
P1500ECMCL	35	55
P1800ECMCL	35	50
P2300ECMCL	30	50
P2600ECMCL	30	45
P3100ECMCL	30	45
P3500ECMCL	25	40

Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

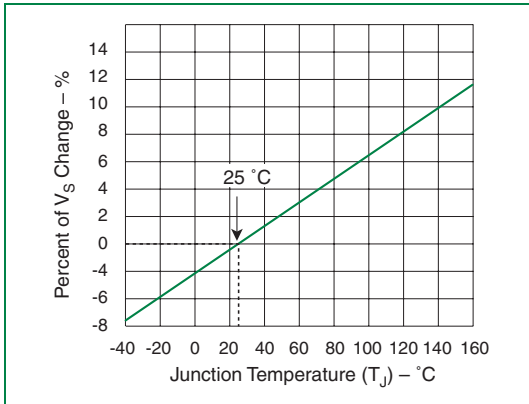
SIDACtor Devices



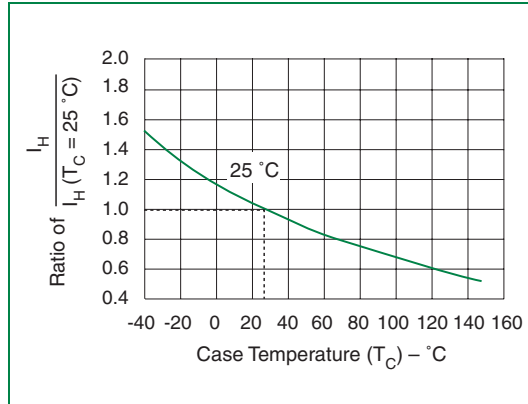
V-I Characteristics



$t_r \times t_d$  Pulse Waveform



Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

# T10A *SIDACtor*® Device



The bi-directional T10A devices are a through-hole technology *SIDACtor* protector. It is intended for cost-sensitive telecommunication applications. This T10 *SIDACtor* series enables equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21, and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

SIDACtor Devices

## Electrical Parameters

Part Number *	V <sub>DRM</sub> @ 5 μA Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>S</sub> mAmps	I <sub>H</sub> mAmps	pF TYP
T10A060B	58	80	4	800	120	50
T10A060E	58	80	4	800	180	50
T10A062	60	82	4	800	150	50
T10A068	65	90	4	800	150	50
T10A080B	75	120	4	800	120	43
T10A080E	75	120	4	800	180	43
T10A100	100	133	4	800	150	43
T10A110B	110	135	4	800	120	38
T10A110E	110	135	4	800	180	38
T10A120	120	160	4	800	150	38
T10A130	130	173	4	800	150	38
T10A140B	140	170	4	800	120	34
T10A140E	140	170	4	800	180	34
T10A180	180	240	4	800	150	34
T10A180B	175	210	4	800	120	32
T10A180E	175	210	4	800	180	32
T10A200	200	267	4	800	150	30
T10A220	220	293	4	800	150	30
T10A220B	215	265	4	800	120	30
T10A220E	215	265	4	800	180	30
T10A240	240	320	4	800	150	30
T10A270	270	360	4	800	150	30
T10A270B	270	360	4	800	120	30
T10A270E	270	360	4	800	180	30

\* For surge ratings, see table below.

### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 0.5 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.


## Surge Ratings in Amps

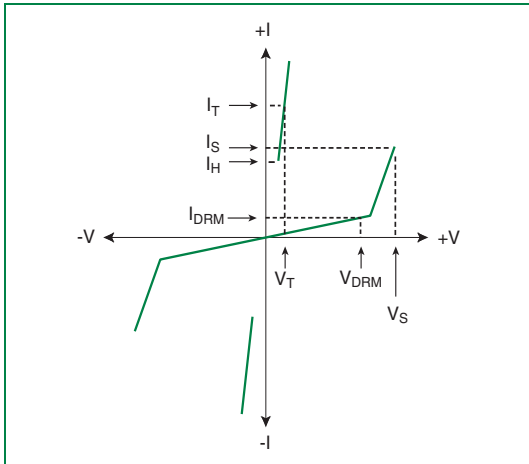
Series	I <sub>PP</sub>			I <sub>TSM</sub> 50 / 60 Hz Amps	di/dt Amps/μs
	8x20 * 1.2x50 **	5x310 * 10x700 **	10x1000 * 10x1000 **		
	Amps	Amps	Amps		
A	100	37.5	50	30	100

\* Current waveform in μs

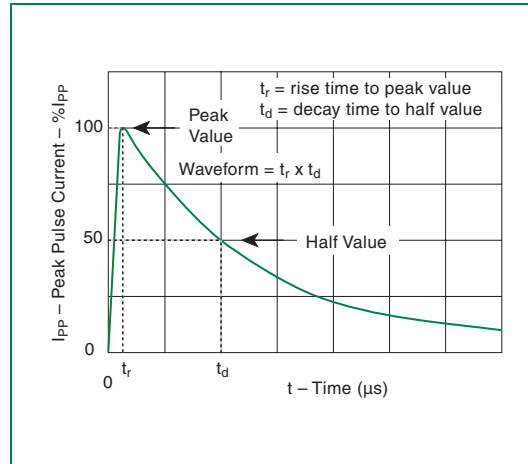
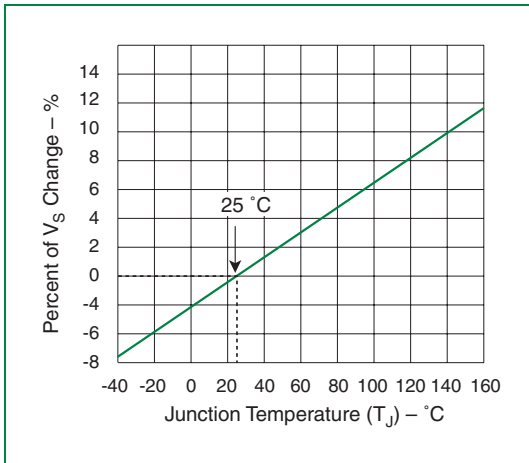
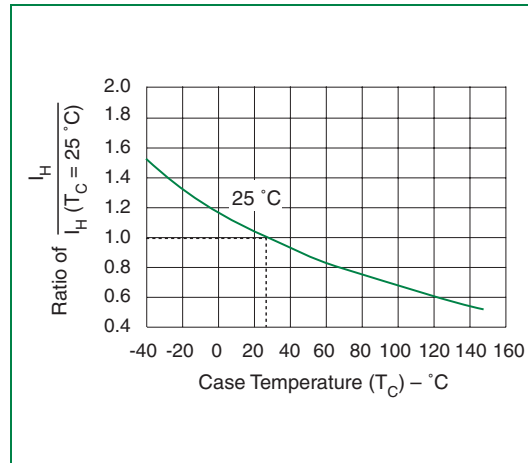
\*\* Voltage waveform in μs

## Thermal Considerations

Package	Symbol	Parameter	Value	Unit
 DO-15	$T_J$	Operating Junction Temperature Range	150	°C
	$T_S$	Storage Temperature Range	-40 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	60	°C/W



V-I Characteristics


 $t_r \times t_d$  Pulse Waveform

 Normalized  $V_S$  Change versus Junction Temperature


Normalized DC Holding Current versus Case Temperature

## T10B *SIDACtor*® Device



The bi-directional T10B devices are a through-hole technology *SIDACtor* protector. It is intended for cost-sensitive telecommunication applications.

This T10 *SIDACtor* series enables equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21, and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

SIDACtor Devices

### Electrical Parameters

Part Number *	V <sub>DRM</sub> @ 5 $\mu$ A Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>S</sub> mAmps	I <sub>H</sub> mAmps	pF TYP
T10B080B	80	120	4	800	120	60
T10B080E	80	120	4	800	180	60
T10B110B	105	135	4	800	120	55
T10B110E	105	135	4	800	180	55
T10B140B	140	170	4	800	120	48
T10B140E	140	170	4	800	180	48
T10B180B	175	210	4	800	120	44
T10B180E	175	210	4	800	180	44
T10B220B	214	265	4	800	120	41
T10B220E	214	265	4	800	180	41
T10B270B	270	360	4	800	120	36
T10B270E	270	360	4	800	180	36

\* For surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 0.5 V/ $\mu$ s.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.


### Surge Ratings in Amps

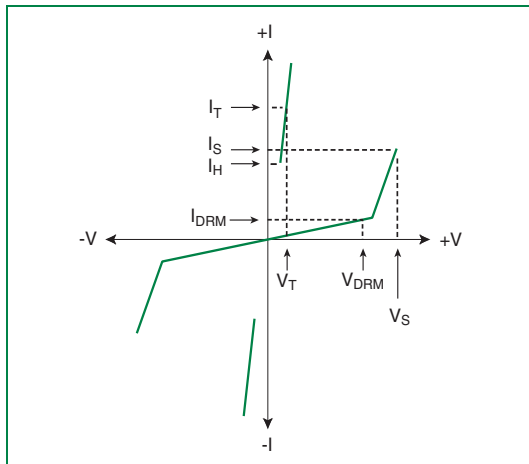
Series	I <sub>PP</sub>			I <sub>TSM</sub> 50 / 60 Hz	di/dt
	8x20 * 1.2x50 **	5x310 * 10x700 **	10x1000 * 10x1000 **		
	Amps	Amps	Amps	Amps	Amps/ $\mu$ s
B	250	125	100	50	100

\* Current waveform in  $\mu$ s

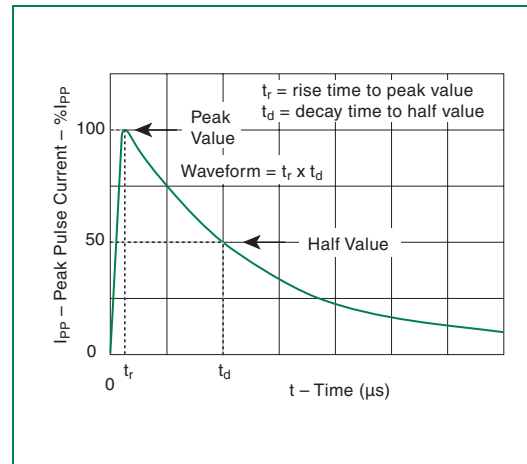
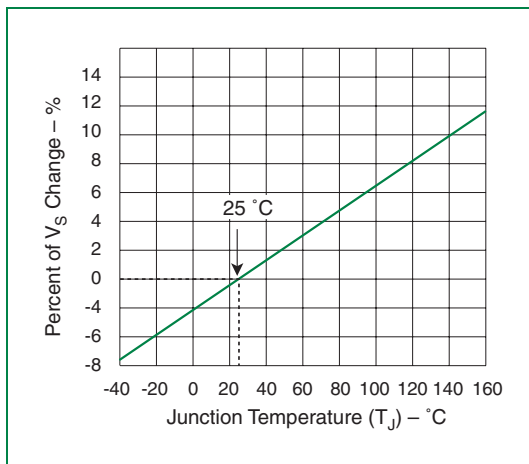
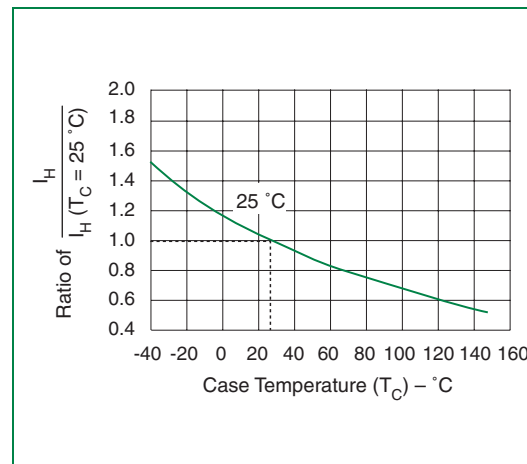
\*\* Voltage waveform in  $\mu$ s

## Thermal Considerations

Package	Symbol	Parameter	Value	Unit
 DO-201AD	$T_J$	Operating Junction Temperature Range	150	°C
	$T_S$	Storage Temperature Range	-40 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	60	°C/W

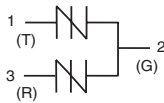


V-I Characteristics


 $t_r \times t_d$  Pulse Waveform

 Normalized  $V_S$  Change versus Junction Temperature


Normalized DC Holding Current versus Case Temperature

## T10C *SIDACtor*<sup>®</sup> Device



The bi-directional T10C devices are a through-hole technology *SIDACtor* protector. It is intended for cost-sensitive telecommunication applications. The three-terminal configuration matches G.D.T. pin configuration; for plug-in applications, the T10C fits in the KRONE™ three-point connector block (5B).

This T10 *SIDACtor* series enables equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21, and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

For primary protection applications, integrated failsafe options are available.

SIDACtor Devices

### Electrical Parameters

Part Number *	V <sub>DRM</sub> @ 5 μA Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>S</sub> mAmps	I <sub>H</sub> mAmps	pF Pin 1-2 / 3-2 Tip-Ground, Ring-Ground TYP	pF Pin 1-3 Tip-Ring TYP
T10C080B	80	120	4	800	120	110	61
T10C080E	80	120	4	800	180	110	61
T10C110B	105	135	4	800	120	90	51
T10C110E	105	135	4	800	180	90	51
T10C140B	140	170	4	800	120	83	48
T10C140E	140	170	4	800	180	83	48
T10C180B	175	210	4	800	120	77	44
T10C180E	175	210	4	800	180	77	44
T10C220B	214	265	4	800	120	74	42
T10C220E	214	265	4	800	180	74	42
T10C270B	270	360	4	800	120	68	38
T10C270E	270	360	4	800	180	68	38

\* For failsafe option, add "F" at end of part number. See Section 9, "Mechanical Data" for mechanical view of failsafe option. For surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub> across Pins 1-2 / 3-2.
- V<sub>S</sub> is measured at 0.5 V/μs across Pins 1-2 / 3-2.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.

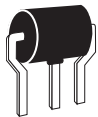
### Surge Ratings in Amps

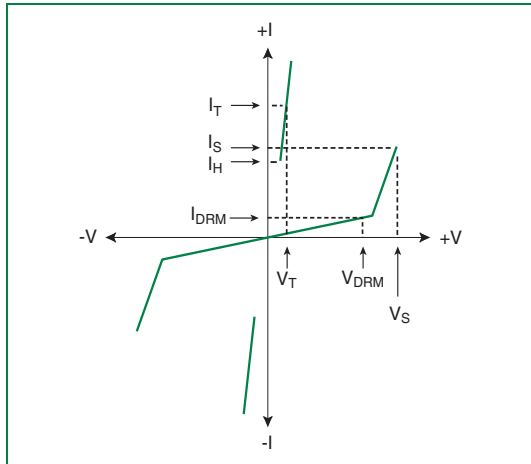
Series	I <sub>PP</sub>			I <sub>TSM</sub> 50 / 60 Hz Amps	di/dt Amps/μs
	8x20 * 1.2x50 **	5x310 * 10x700 **	10x1000 * 10x1000 **		
	Amps	Amps	Amps		
C	250	125	100	50	100

\* Current waveform in μs

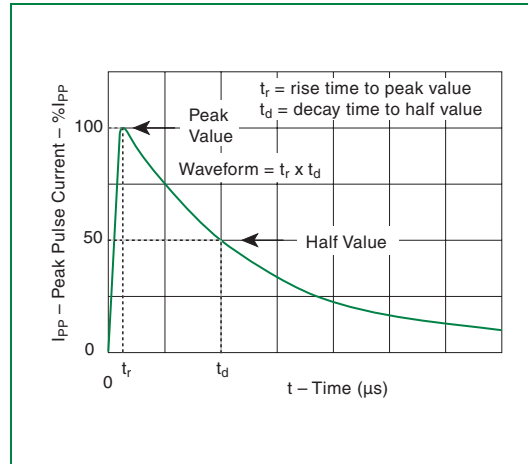
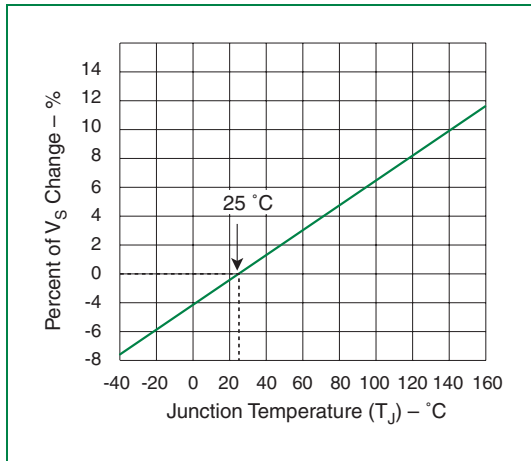
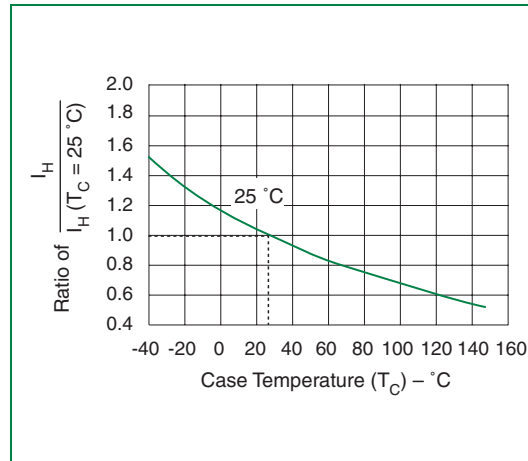
\*\* Voltage waveform in μs

## Thermal Considerations

Package	Symbol	Parameter	Value	Unit
 [T10C]	$T_J$	Operating Junction Temperature Range	150	°C
	$T_S$	Storage Temperature Range	-40 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	60	°C/W

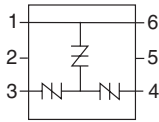


V-I Characteristics


 $t_r \times t_d$  Pulse Waveform

 Normalized  $V_S$  Change versus Junction Temperature


Normalized DC Holding Current versus Case Temperature

## Balanced Three-chip *SIDACtor*<sup>®</sup> Device



This six-pin SMT package offers a guaranteed balanced protection, based on a Littelfuse patent (US Patent 4,905,119). The 'Y' configuration offers identical metallic and longitudinal protection all in one package.

*SIDACtor* devices enable equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21, and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

SIDACtor Devices

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
	Pins 1-3, 1-4		Pins 3-4						
P1553U_L	130	180	130	180	8	5	800	2.2	150
P1803U_L	150	210	150	210	8	5	800	2.2	150
P2103U_L	170	250	170	250	8	5	800	2.2	150
P2353U_L	200	270	200	270	8	5	800	2.2	150
P2703U_L	230	300	230	300	8	5	800	2.2	150
P3203U_L	270	350	270	350	8	5	800	2.2	150
P3403U_L	300	400	300	400	8	5	800	2.2	150
P5103U_L	420	600	420	600	8	5	800	2.2	150

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
	Pins 1-3, 1-4		Pins 3-4						
A2106U_3L **	170	250	50	80	8	5	800	2.2	120
A5030U_3L **	400	550	270	340	8	5	800	2.2	120

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.

For individual "UA", "UB", and "UC" surge ratings, see table below.

\*\* Asymmetrical

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.
- Device is designed to meet balance requirements of GTS 8700 and GR 974.

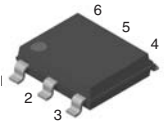
### Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/μs
A	20	150	150	90	50	75	75	45	75	20	500
B	25	250	250	150	100	100	125	80	100	30	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in μs

\*\* Voltage waveform in μs

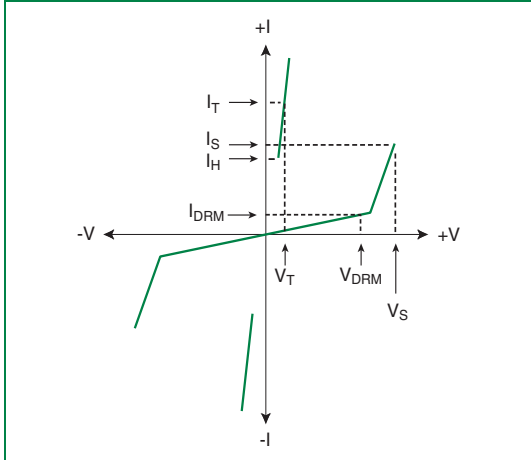
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
 Modified MS-013	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +125	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	60	°C/W

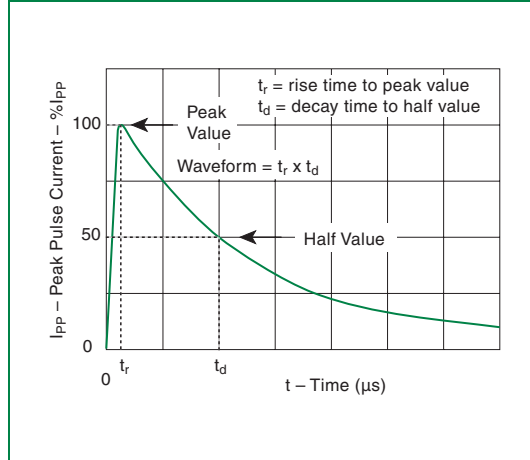
**Capacitance Values**

Part Number	pF Pin 3-4 Tip-Ring		pF Pin 1-3 (4-6) Tip-Ground, Ring-Ground	
	MIN	MAX	MIN	MAX
P1553UAL	10	95	10	60
P1553UBL	25	95	15	60
P1553UCL	30	95	20	60
P1803UAL	20	85	10	55
P1803UBL	25	85	15	55
P1803UCL	30	85	15	55
P2103UAL	15	85	10	55
P2103UBL	20	85	10	55
P2103UCL	30	85	15	55
P2353UAL	15	75	10	50
P2353UBL	20	75	10	50
P2353UCL	25	75	15	50
P2703UAL	15	75	10	50
P2703UBL	20	75	10	50
P2703UCL	25	75	15	50
P3203UAL	15	70	10	45
P3203UBL	20	70	10	45
P3203UCL	45	70	25	45
P3403UAL	15	65	10	45
P3403UBL	15	65	10	45
P3403UCL	20	65	15	45
P5103UAL	10	60	10	40
P5103UBL	15	60	10	40
P5103UCL	20	60	10	40
A2106UA3L	20	70	10	45
A2106UB3L	20	70	10	45
A2106UC3L	20	70	10	45
A5030UA3L	15	60	10	40
A5030UB3L	15	60	10	40
A5030UC3L	30	60	25	40

 Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

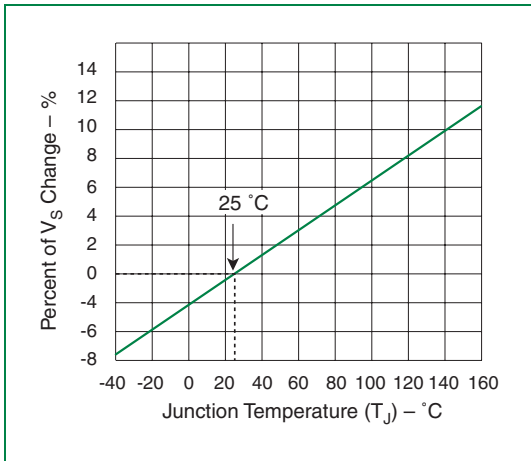


V-I Characteristics

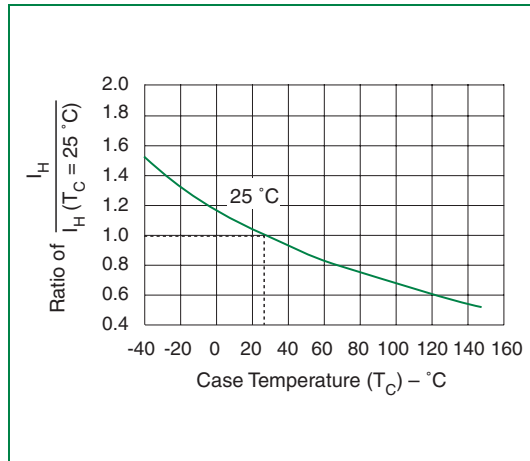


$t_r \times t_d$  Pulse Waveform

SIDACtor Devices

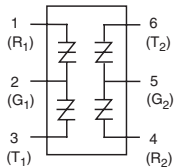


Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

# Multiport *SIDACTor*<sup>®</sup> Device



The multiport line protector is an integrated multichip solution used for protecting multiple twisted pair from overvoltage conditions. Based on a six-pin surface mount SOIC package, it is equivalent to four discrete DO-214AA. This multiport line protector is ideal for densely populated, high-speed line cards that cannot tolerate PCB inefficiencies nor the use of series power resistors.

*SIDACTor* devices enable equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21, and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

## Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
	Pins 1-2, 3-2, 4-5, 6-5		Pins 1-3, 4-6						
P0084U_L	6	25	12	50	4	5	800	2.2	50
P0304U_L	25	40	50	80	4	5	800	2.2	50
P0644U_L	58	77	116	154	4	5	800	2.2	150
P0724U_L	65	88	130	176	4	5	800	2.2	150
P0904U_L	75	98	150	196	4	5	800	2.2	150
P1104U_L	90	130	180	260	4	5	800	2.2	150
P1304U_L	120	160	240	320	4	5	800	2.2	150
P1504U_L	140	180	280	360	4	5	800	2.2	150
P1804U_L	170	220	340	440	4	5	800	2.2	150
P2304U_L	190	260	380	520	4	5	800	2.2	150
P2604U_L	220	300	440	600	4	5	800	2.2	150
P3104U_L	275	350	550	700	4	5	800	2.2	150
P3504U_L	320	400	640	800	4	5	800	2.2	150

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.  
For individual "UA", "UB", and "UC" surge ratings, see table below.

### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACTor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>, and V<sub>S</sub> is measured at 100 V/μs.

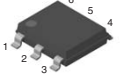
## Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/μs
A	20	150	150	90	50	75	75	45	75	20	500
B	25	250	250	150	100	100	125	80	100	30	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in μs

\*\* Voltage waveform in μs

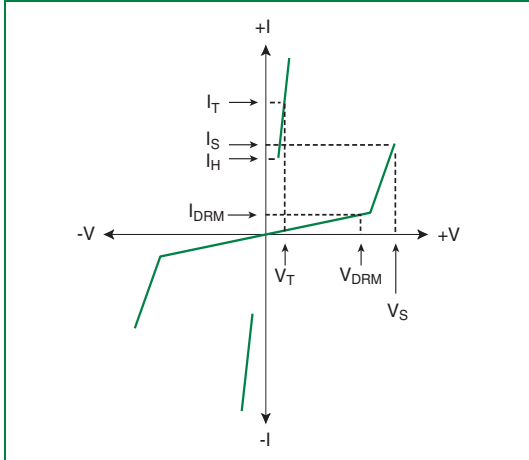
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
 Modified MS-013	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

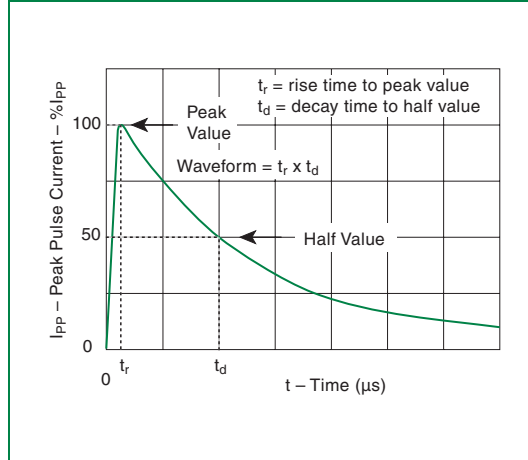
**Capacitance Values**

Part Number	pF Pin 1-2 / 3-2 (4-5 / 6-5) Tip-Ground, Ring-Ground		pF Pin 1-3 (4-6) Tip-Ring	
	MIN	MAX	MIN	MAX
P0084UAL	25	155	15	90
P0084UBL	25	155	15	90
P0084UCL	35	285	20	165
P0304UAL	15	140	10	90
P0304UBL	15	140	10	90
P0304UCL	25	250	10	145
P0644UAL	40	60	20	35
P0644UBL	40	155	20	90
P0644UCL	55	155	30	90
P0724UAL	35	60	20	35
P0724UBL	50	145	20	85
P0724UCL	50	145	25	85
P0904UAL	35	55	20	30
P0904UBL	35	55	20	30
P0904UCL	45	135	25	80
P1104UAL	30	50	15	30
P1104UBL	30	115	15	65
P1104UCL	45	115	25	65
P1304UAL	25	45	15	25
P1304UBL	25	105	15	60
P1304UCL	40	105	20	60
P1504UAL	25	40	15	25
P1504UBL	25	95	15	55
P1504UCL	35	95	20	55
P1804UAL	25	35	10	20
P1804UBL	25	90	10	50
P1804UCL	35	90	15	50
P2304UAL	25	35	10	20
P2304UBL	25	85	10	50
P2304UCL	30	85	15	50
P2604UAL	20	35	10	20
P2604UBL	20	85	10	50
P2604UCL	30	85	15	50
P3104UAL	20	35	10	20
P3104UBL	20	80	10	45
P3104UCL	30	80	15	45
P3504UAL	20	35	10	20
P3504UBL	20	75	10	45
P3504UCL	25	75	15	45

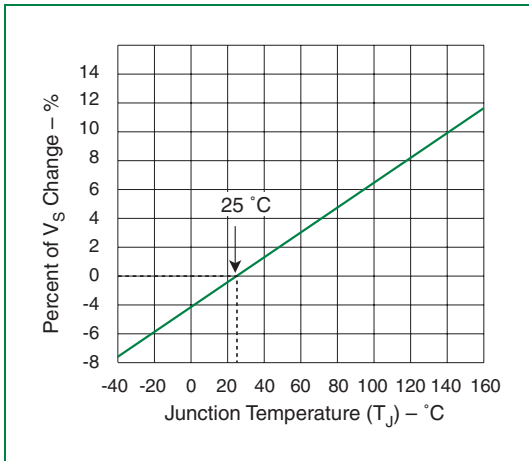
 Note: Off-state capacitance (C<sub>0</sub>) is measured at 1 MHz with a 2 V bias.



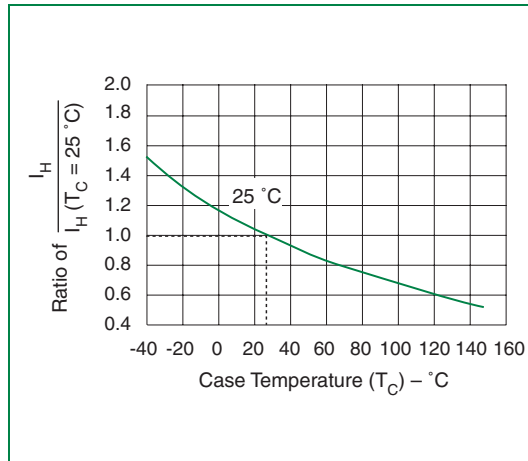
V-I Characteristics



$t_r \times t_d$  Pulse Waveform

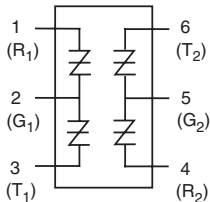


Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

## Multiport MicroCapacitance (MC) *SIDACTor*<sup>®</sup> Device



The multiport MC line protector is an integrated, multichip solution used for protecting multiple twisted pair from overvoltage conditions. It is intended for applications sensitive to load values. Typically, high speed connections require lower capacitance.  $C_0$  values for the MC devices are 40% lower than standard UC devices.

This six-pin surface mount SOIC is equivalent to four discrete DO-214AA, which makes it ideal for densely populated, high-speed line cards that cannot tolerate PCB inefficiencies nor the use of series power resistors. Surge current ratings up to 500 A are available.

*SIDACTor* devices enable equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21, and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

### Electrical Parameters

Part Number *	$V_{DRM}$ Volts	$V_S$ Volts	$V_{DRM}$ Volts	$V_S$ Volts	$V_T$ Volts	$I_{DRM}$ $\mu$ Amps	$I_S$ mAmps	$I_T$ Amps	$I_H$ mAmps
	Pins 1-2, 3-2, 4-5, 6-5		Pins 1-3, 4-6						
P0084UCMCL	6	25	12	50	4	5	800	2.2	50
P0304UCMCL	25	40	50	80	4	5	800	2.2	50
P0644UCMCL	58	77	116	154	4	5	800	2.2	150
P0724UCMCL	65	88	130	176	4	5	800	2.2	150
P0904UCMCL	75	98	150	196	4	5	800	2.2	150
P1104UCMCL	90	130	180	260	4	5	800	2.2	150
P1304UCMCL	120	160	240	320	4	5	800	2.2	150
P1504UCMCL	140	180	280	360	4	5	800	2.2	150
P1804UCMCL	170	220	340	440	4	5	800	2.2	150
P2304UCMCL	190	260	380	520	4	5	800	2.2	150
P2604UCMCL	220	300	440	600	4	5	800	2.2	150
P3104UCMCL	275	350	550	700	4	5	800	2.2	150
P3504UCMCL	320	400	640	800	4	5	800	2.2	150

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.  
For surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C.  $I_{PP}$  applies to -40 °C through +85 °C temperature range.
- $I_{PP}$  is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACTor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- $V_{DRM}$  is measured at  $I_{DRM}$ .
- $V_S$  is measured at 100 V/ $\mu$ s.
- Special voltage ( $V_S$  and  $V_{DRM}$ ) and holding current ( $I_H$ ) requirements are available upon request.

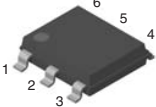
### Surge Ratings in Amps

Series	$I_{PP}$										$I_{TSM}$ 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *	10x700 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **			
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/ $\mu$ s	
C	50	500	400	200	150	200	175	100	200	50	500	

\* Current waveform in  $\mu$ s

\*\* Voltage waveform in  $\mu$ s

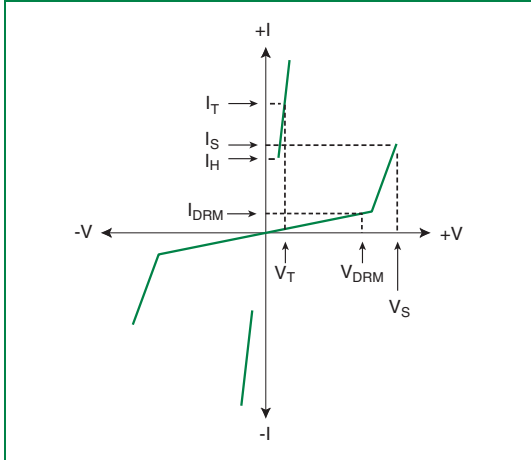
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
 Modified MS-013	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 <sup>63</sup>	60	°C/W

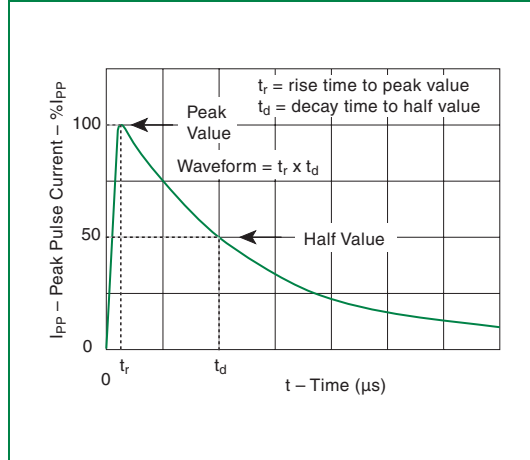
**Capacitance Values**

Part Number	pF Pin 1-2 / 3-2 (4-5 / 6-5) Tip-Ground, Ring-Ground		pF Pin 1-3 (4-6) Tip-Ring	
	MIN	MAX	MIN	MAX
P0084UCMCL	35	75	20	45
P0304UCMCL	25	45	10	25
P0644UCMCL	55	85	30	50
P0724UCMCL	50	75	25	45
P0904UCMCL	45	70	25	40
P1104UCMCL	45	70	25	40
P1304UCMCL	40	60	20	35
P1504UCMCL	35	55	20	35
P1804UCMCL	35	50	15	30
P2304UCMCL	30	50	15	30
P2604UCMCL	30	45	15	30
P3104UCMCL	30	45	15	25
P3504UCMCL	25	40	15	25

Note: Off-state capacitance (C<sub>0</sub>) is measured at 1 MHz with a 2 V bias.

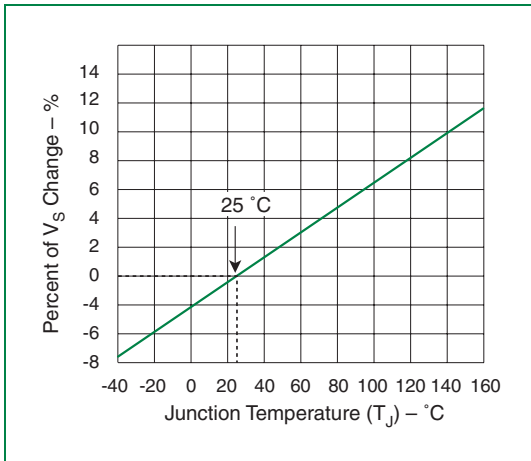


V-I Characteristics

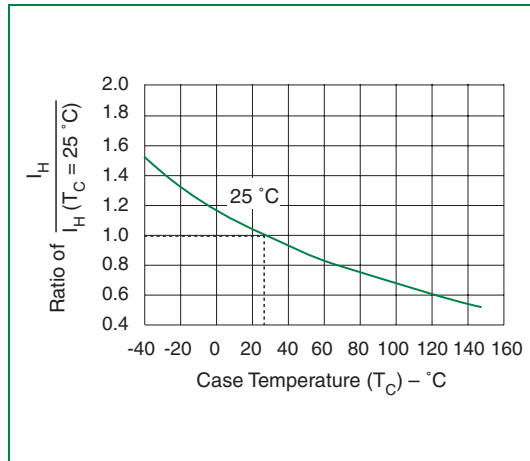


$t_r \times t_d$  Pulse Waveform

SIDACtor Devices

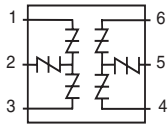


Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

## Multiport Balanced *SIDACTor*<sup>®</sup> Device



This six-pin SMT package offers a guaranteed balanced protection, based on a Littelfuse patent (US Patent 4,905,119). The 'Y' configuration offers identical metallic and longitudinal protection all in one package. *SIDACTor* devices enable equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21, and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>DRM</sub> Volt	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
	Pins 1-2, 2-3, 1-3		Pins 4-5, 5-6, 4-6						
P1556U_L	130	180	130	180	8	5	800	2.2	150
P1806U_L	150	210	150	210	8	5	800	2.2	150
P2106U_L	170	250	170	250	8	5	800	2.2	150
P2356U_L	200	270	200	270	8	5	800	2.2	150
P2706U_L	230	300	230	300	8	5	800	2.2	150
P3206U_L	270	350	270	350	8	5	800	2.2	150
P3406U_L	300	400	300	400	8	5	800	2.2	150
P5106U_L	420	600	420	600	8	5	800	2.2	150

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>DRM</sub> Volt	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
	Pins 1-2, 2-3, 4-5, 5-6		Pins 4-6, 1-3						
A2106U_6L	170	250	50	80	3.5	5	800	2.2	120
A5030U_6L	400	550	270	340	3.5	5	800	2.2	150

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.  
For individual "UA", "UB", and "UC" surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACTor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.
- Device is designed to meet balance requirements of GTS 8700 and GR 974.

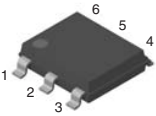
### Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/μs
A	20	150	150	90	50	75	75	45	75	20	500
B	25	250	250	150	100	100	125	80	100	30	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in μs

\*\* Voltage waveform in μs

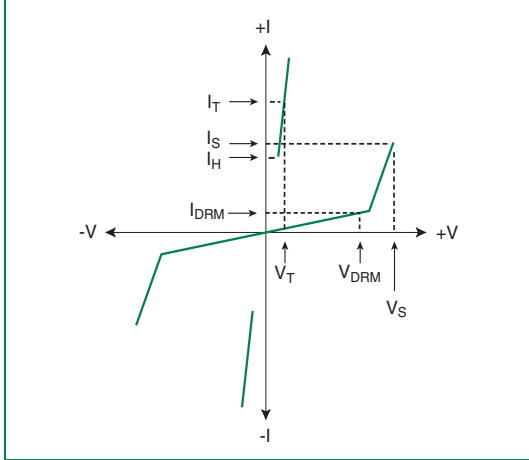
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +125	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	60	°C/W

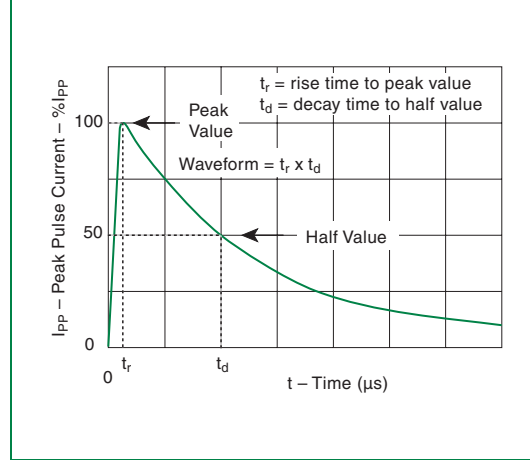
**Capacitance Values**

Part Number	pF Pin 1-2 / 3-2 (4-5 / 6-5) Tip-Ground, Ring-Ground		pF Pin 1-3 (4-6) Tip-Ring	
	MIN	MAX	MIN	MAX
P1556UAL	10	30	10	45
P1556UBL	15	60	25	95
P1556UCL	20	60	30	55
P1806UAL	10	55	20	85
P1806UBL	15	55	25	85
P1806UCL	15	55	30	85
P2106UAL	15	55	15	85
P2106UBL	20	55	20	85
P2106UCL	15	55	30	85
P2356UAL	15	50	15	75
P2356UBL	15	50	20	75
P2356UCL	15	50	25	75
P2706UAL	10	50	15	75
P2706UBL	10	50	20	75
P2706UCL	15	50	25	75
P3206UAL	10	45	15	70
P3206UBL	10	45	20	70
P3206UCL	25	45	45	70
P3406UAL	10	45	15	65
P3406UBL	10	45	15	65
P3406UCL	15	45	20	65
P5106UAL	10	45	15	35
P5106UBL	10	45	15	35
P5106UCL	30	45	25	40
A2106UA6L	10	30	20	60
A2106UB6L	10	30	20	60
A2106UC6L	10	45	20	70
A5030UA6L	10	45	15	35
A5030UB6L	10	45	15	35
A5030UC6L	20	35	25	40

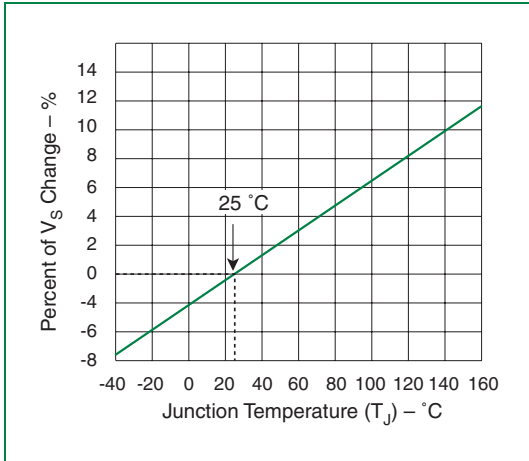
 Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.



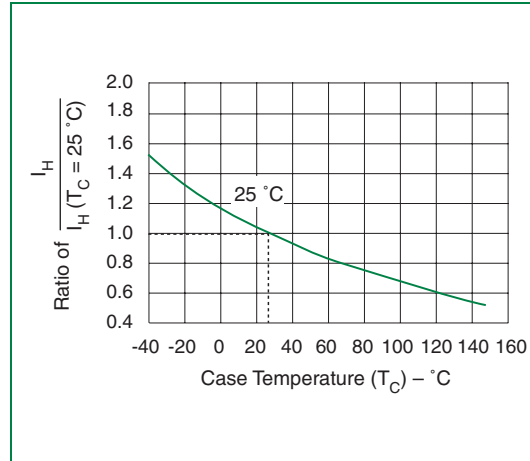
V-I Characteristics



$t_r \times t_d$  Pulse Waveform



Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

## SIDACtor<sup>®</sup> Device



This modified TO-220 package with Type 61 lead spacing offers a through-hole technology *SIDACtor* protection solution.

*SIDACtor* devices enable equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21 and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

SIDACtor Devices

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
P2000AA61L	180	220	4	5	800	2.2	150
P2200AA61L	200	240	4	5	800	2.2	150
P2400AA61L	220	260	4	5	800	2.2	150
P2500AA61L	240	290	4	5	800	2.2	150
P3000AA61L	270	330	4	5	800	2.2	150
P3300AA61L	300	360	4	5	800	2.2	150

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.

For surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.

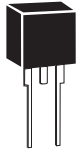
### Surge Ratings in Amps

Series	I <sub>PP</sub>										I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *	0.5x700 **		
	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **				
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/μs	
A	20	150	150	90	50	75	75	45	75	20	500	

\* Current waveform in μs

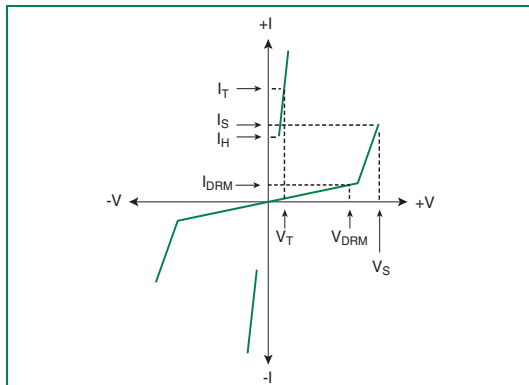
\*\* Voltage waveform in μs

**Thermal Considerations**

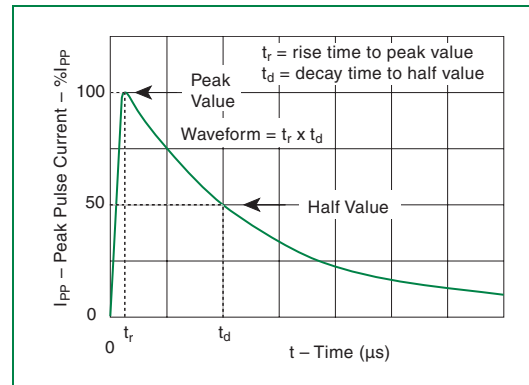
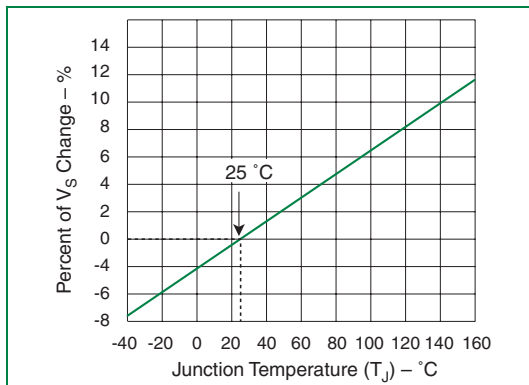
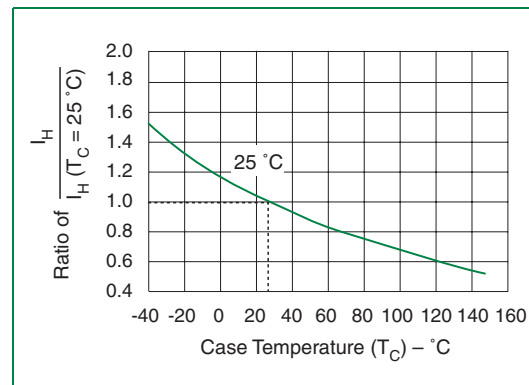
Package	Symbol	Parameter	Value	Unit
Modified TO-220 Type 61 	$T_J$	Operating Junction Temperature Range	-40 to +150	°C
	$T_S$	Storage Temperature Range	-65 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	50	°C/W

**Capacitance Values**

Part Number	pF	
	MIN	MAX
P2000AA61L	25	35
P2200AA61L	25	35
P2400AA61L	25	35
P2500AA61L	20	35
P3000AA61L	20	35
P3300AA61L	20	35

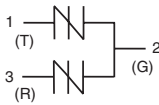
 Note: Off-state capacitance ( $C_O$ ) is measured at 1 MHz with a 2 V bias.


V-I Characteristics


 $t_r \times t_d$  Pulse Waveform

 Normalized  $V_S$  Change versus Junction Temperature


Normalized DC Holding Current versus Case Temperature

## Two-chip *SIDACtor*® Device



The two-chip *SIDACtor* design provides a through-hole technology protection solution. It is intended for telecom applications that do not require a balanced solution. For primary protection applications, devices with higher holding current and integrated failsafe options are available.

*SIDACtor* devices enable equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21 and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

SIDACtor Devices

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
	Pins 1-2, 3-2		Pins 1-3						
P0602A_L	25	40	50	80	4	5	800	2.2	50
P1402A_L	58	77	116	154	4	5	800	2.2	150
P1602A_L	65	95	130	190	4	5	800	2.2	150
P2202A_L	90	130	180	260	4	5	800	2.2	150
P2702A_L	120	160	240	320	4	5	800	2.2	150
P3002A_L	140	180	280	360	4	5	800	2.2	150
P3602A_L	170	220	340	440	4	5	800	2.2	150
P4202A_L	190	250	380	500	4	5	800	2.2	150
P4802A_L	220	300	440	600	4	5	800	2.2	150
P6002A_L	275	350	550	700	4	5	800	2.2	150

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number. For individual "AA", "AB", and "AC" surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.

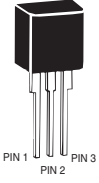
### Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50/60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/μs
A	20	150	150	90	50	75	75	45	75	20	500
B	25	250	250	150	100	100	125	80	100	30	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in μs

\*\* Voltage waveform in μs

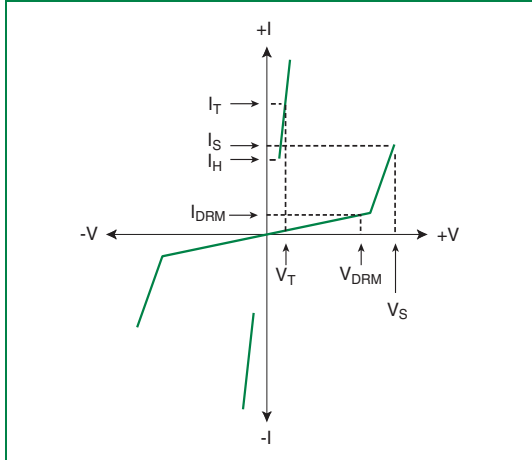
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
Modified TO-220 	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	50	°C/W

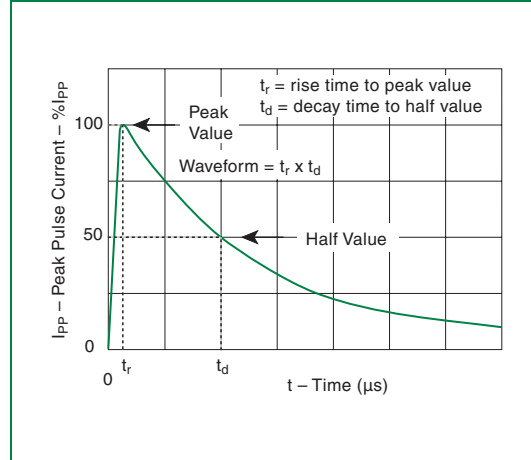
**Capacitance Values**

Part Number	pF Pin 1-2 / 3-2 Tip-Ground, Ring-Ground		pF Pin 1-3 Tip-Ring	
	MIN	MAX	MIN	MAX
P0602AAL	15	145	10	90
P0602ABL	15	250	10	145
P0602ACL	25	250	10	145
P1402AAL	40	60	20	35
P1402ABL	40	155	20	90
P1402ACL	55	155	30	90
P1602AAL	35	60	20	35
P1602ABL	35	145	20	85
P1602ACL	45	145	25	85
P2202AAL	30	50	15	30
P2202ABL	30	115	15	65
P2202ACL	45	115	25	65
P2702AAL	25	45	15	25
P2702ABL	25	105	15	60
P2702ACL	40	105	20	60
P3002AAL	25	40	15	25
P3002ABL	25	95	15	55
P3002ACL	35	95	20	55
P3602AAL	25	35	10	20
P3602ABL	25	90	10	50
P3602ACL	35	90	15	50
P4202AAL	25	35	10	20
P4202ABL	25	85	10	50
P4202ACL	30	85	15	50
P4802AAL	20	35	10	20
P4802ABL	20	85	10	50
P4802ACL	30	85	15	50
P6002AAL	20	35	10	20
P6002ABL	20	80	10	45
P6002ACL	30	80	15	45

 Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

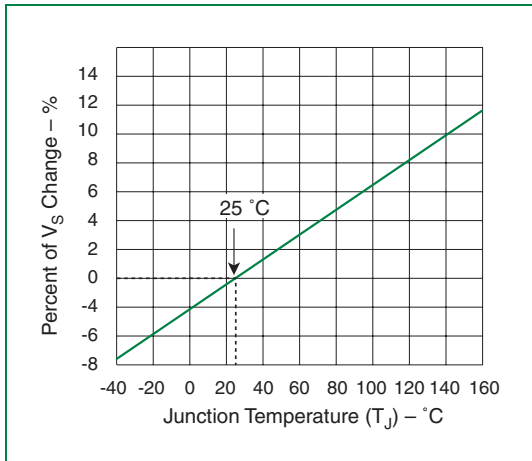


V-I Characteristics

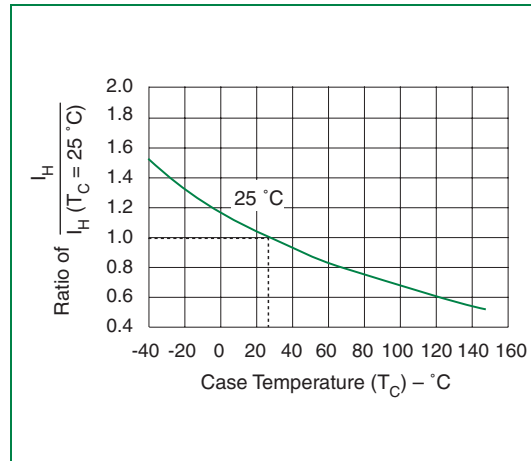


$t_r \times t_d$  Pulse Waveform

SIDACtor Devices

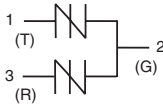


Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

## Two-chip MicroCapacitance (MC) *SIDACtor*® Device



This two-chip MicroCapacitance *SIDACtor* design provides a through-hole technology protection solution. It is intended for telecom applications that do not require a balanced solution. For primary protection applications, devices with higher holding current and integrated failsafe options are available.

*SIDACtor* devices enable equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21 and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

### Electrical Parameters

Part Number *	$V_{DRM}$ Volts	$V_S$ Volts	$V_{DRM}$ Volts	$V_S$ Volts	$V_T$ Volts	$I_{DRM}$ $\mu$ Amps	$I_S$ mAmps	$I_T$ Amps	$I_H$ mAmps
	Pins 1-2, 3-2		Pins 1-3						
P0302AAMCL	6	25	12	50	4	5	800	2.2	50
P0602AAMCL	25	40	50	80	4	5	800	2.2	50

Part Number *	$V_{DRM}$ Volts	$V_S$ Volts	$V_{DRM}$ Volts	$V_S$ Volts	$V_T$ Volts	$I_{DRM}$ $\mu$ Amps	$I_S$ mAmps	$I_T$ Amps	$I_H$ mAmps
	Pins 1-2, 3-2		Pins 1-3						
P0602ACMCL	25	40	50	80	4	5	800	2.2	50
P1402ACMCL	58	77	116	154	4	5	800	2.2	150
P1602ACMCL	65	95	130	190	4	5	800	2.2	150
P2202ACMCL	90	130	180	260	4	5	800	2.2	150
P2702ACMCL	120	160	240	320	4	5	800	2.2	150
P3002ACMCL	140	180	280	360	4	5	800	2.2	150
P3602ACMCL	170	220	340	440	4	5	800	2.2	150
P4202ACMCL	190	250	380	500	4	5	800	2.2	150
P4802ACMCL	220	300	440	600	4	5	800	2.2	150
P6002ACMCL	275	350	550	700	4	5	800	2.2	150

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number. For surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C.  $I_{PP}$  applies to -40 °C through +85 °C temperature range.
- $I_{PP}$  is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- $V_{DRM}$  is measured at  $I_{DRM}$ .
- $V_S$  is measured at 100 V/ $\mu$ s.
- Special voltage ( $V_S$  and  $V_{DRM}$ ) and holding current ( $I_H$ ) requirements are available upon request.

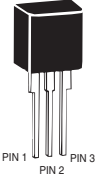
### Surge Ratings in Amps

Series	$I_{PP}$									$I_{TSM}$ 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/ $\mu$ s
A	20	150	150	90	50	75	75	45	75	20	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in  $\mu$ s

\*\* Voltage waveform in  $\mu$ s

**Thermal Considerations**

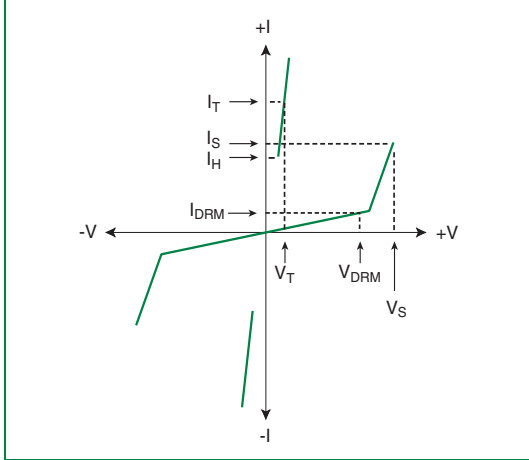
Package	Symbol	Parameter	Value	Unit
Modified TO-220 	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	50	°C/W

**Capacitance Values**

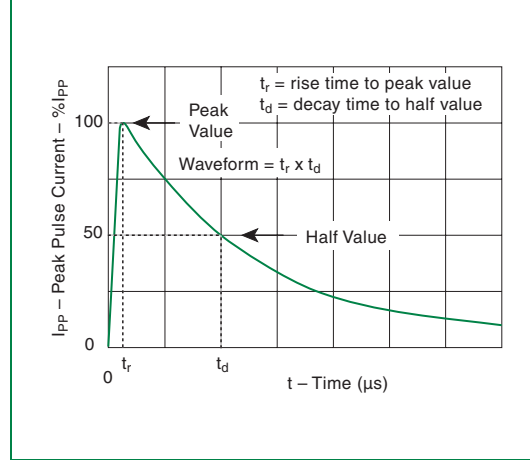
Part Number	pF Pin 1-2 / 3-2 Tip-Ground, Ring-Ground		pF Pin 1-3 Tip-Ring	
	MIN	MAX	MIN	MAX
P0302AAMCL	25	55	15	35
P0602AAMCL	15	35	10	20
P0602ACMCL	25	45	10	25
P1402ACMCL	40	60	20	35
P1602ACMCL	35	55	20	35
P2202ACMCL	45	70	25	40
P2702ACMCL	40	60	20	35
P3002ACMCL	35	55	20	35
P3602ACMCL	35	50	15	30
P4202ACMCL	30	50	15	30
P4802ACMCL	30	45	15	30
P6002ACMCL	30	45	15	25

Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

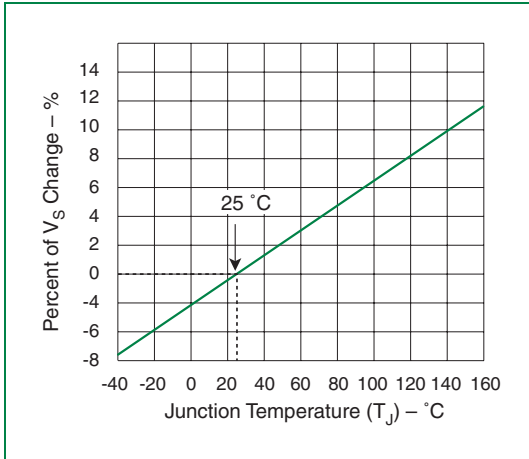
SIDACtor Devices



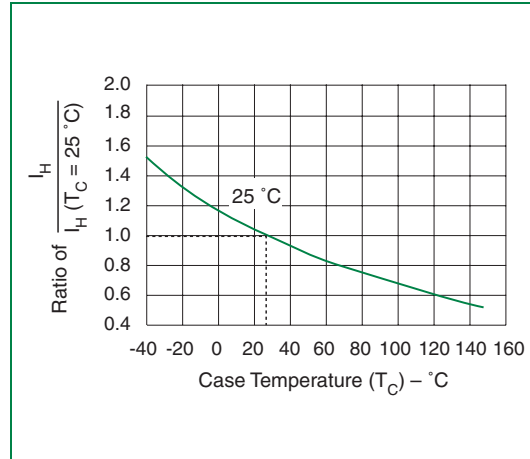
V-I Characteristics



$t_r \times t_d$  Pulse Waveform

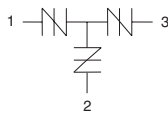


Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

## Balanced Three-chip *SIDACtor*<sup>®</sup> Device



This three-chip *SIDACtor* solution offers a guaranteed balanced protection, based on a Littelfuse patent (US Patent 4,905,119). The ‘Y’ configuration offers identical metallic and longitudinal protection in one through-hole modified TO-220 package. For primary protection applications, devices with higher holding current and integrated failsafe options are available.

*SIDACtor* devices enable equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21 and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

SIDACtor Devices

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
	Pins 1-2, 2-3		Pins 1-3						
P1553A_L	130	180	130	180	8	5	800	2.2	150
P1803A_L	150	210	150	210	8	5	800	2.2	150
P2103A_L	170	250	170	250	8	5	800	2.2	150
P2353A_L	200	270	200	270	8	5	800	2.2	150
P2703A_L	230	300	230	300	8	5	800	2.2	150
P3203A_L	270	350	270	350	8	5	800	2.2	150
P3403A_L	300	400	300	400	8	5	800	2.2	150
P5103A_L	420	600	420	600	8	5	800	2.2	150
A2106A_3L **	170	250	50	80	8	5	800	2.2	120
A5030A_3L **	400	550	270	340	8	5	800	2.2	150

\* “L” in part number indicates RoHS compliance. For non-RoHS compliant device, delete “L” from part number. For individual “AA”, “AB”, and “AC” surge ratings, see table below.

\*\* Asymmetrical

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.
- Device is designed to meet balance requirements of GTS 8700 and GR 974.

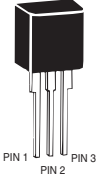
### Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50/60 Hz	di/dt Amps
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/μs
A	20	150	150	90	50	75	75	45	75	20	500
B	25	250	250	150	100	100	125	80	100	30	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in μs

\*\* Voltage waveform in μs

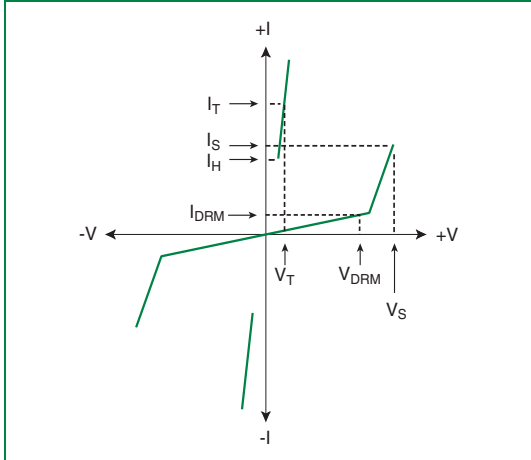
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
Modified TO-220 	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	50	°C/W

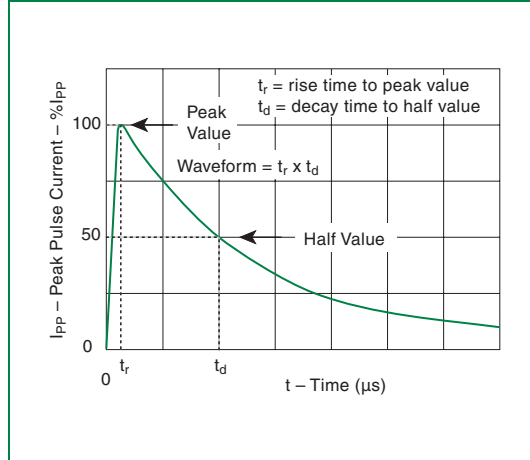
**Capacitance Values**

Part Number	pF Pin 1-2 / 3-2 Tip-Ground, Ring-Ground		pF Pin 1-3 Tip-Ring	
	MIN	MAX	MIN	MAX
P1553AAL	10	45	10	30
P1553ABL	25	95	15	60
P1553ACL	30	95	20	60
P1803AAL	20	40	10	30
P1803ABL	25	85	15	55
P1803ACL	30	85	15	55
P2103AAL	15	35	10	25
P2103ABL	20	85	10	55
P2103ACL	30	85	15	55
P2353AAL	15	35	10	25
P2353ABL	20	75	15	50
P2353ACL	25	75	15	50
P2703AAL	15	35	10	25
P2703ABL	20	75	10	50
P2703ACL	25	75	15	50
P3203AAL	15	30	10	20
P3203ABL	20	70	10	45
P3203ACL	25	70	15	45
P3403AAL	15	30	10	20
P3403ABL	15	65	10	45
P3403ACL	20	65	15	45
P5103AAL	10	60	10	40
P5103ABL	15	60	10	40
P5103ACL	20	60	10	40
A2106AA3L	15	35	10	45
A2106AB3L	20	35	10	45
A2106AC3L	30	45	15	45
A5030AA3L	15	35	25	40
A5030AB3L	20	35	25	40
A5030AC3L	30	45	25	40

Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

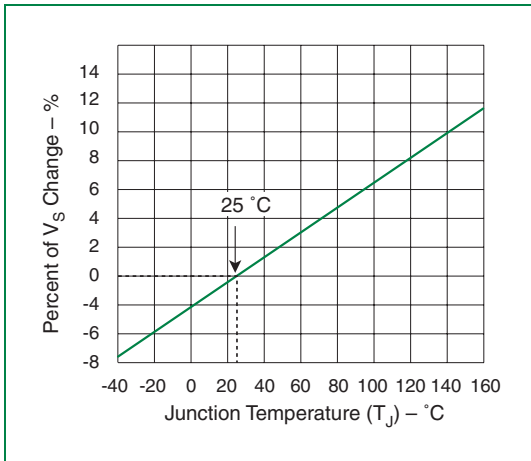


V-I Characteristics

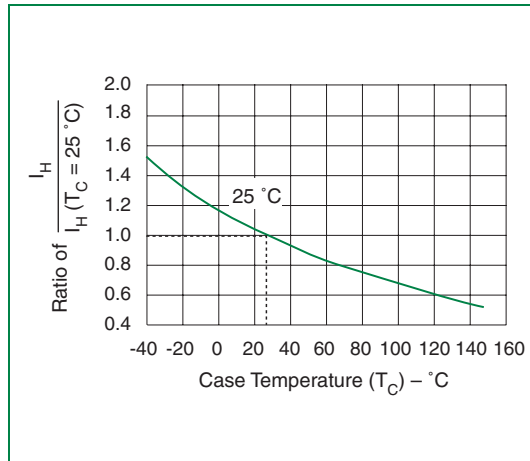


$t_r \times t_d$  Pulse Waveform

SIDACtor Devices



Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

# Balanced Three-chip MicroCapacitance (MC) *SIDACtor*<sup>®</sup> Device



This three-chip MicroCapacitance *SIDACtor* solution offers a guaranteed balanced protection, based on a Littelfuse patent (US Patent 4,905,119). The ‘Y’ configuration offers identical metallic and longitudinal protection in one through-hole modified TO-220 package. C<sub>O</sub> values for the MC are 40% lower than a standard AC part. For primary protection applications, devices with higher holding current and integrated failsafe options are available.

This MC *SIDACtor* series enables equipment to comply with various regulatory requirements including GR 1089, ITU K.20, K.21, and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68) without the need of series resistors.

## Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
	Pins 1-2, 2-3		Pins 1-3						
P1553ACMCL	130	180	130	180	8	5	800	2.2	150
P1803ACMCL	150	210	150	210	8	5	800	2.2	150
P2103ACMCL	170	250	170	250	8	5	800	2.2	150
P2353ACMCL	200	270	200	270	8	5	800	2.2	150
P2703ACMCL	230	300	230	300	8	5	800	2.2	150
P3203ACMCL	270	350	270	350	8	5	800	2.2	150
P3403ACMCL	300	400	300	400	8	5	800	2.2	150
P5103ACMCL	420	600	420	600	8	5	800	2.2	150

\* “L” in part number indicates RoHS compliance. For non-RoHS compliant device, delete “L” from part number. For surge ratings, see table below.

### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.
- Device is designed to meet balance requirements of GTS 8700 and GR 974.

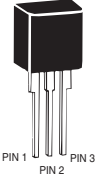
## Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/μs
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in μs

\*\* Voltage waveform in μs

**Thermal Considerations**

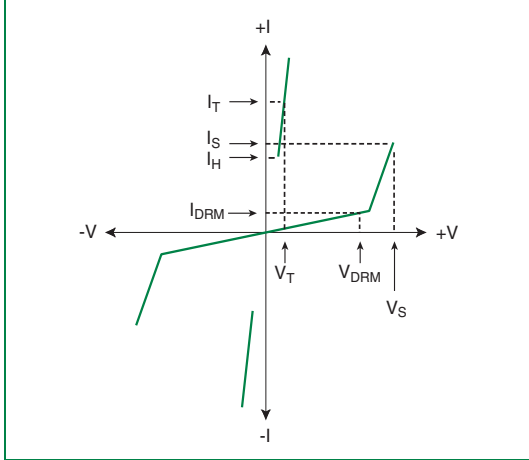
Package	Symbol	Parameter	Value	Unit
Modified TO-220 	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	50	°C/W

**Capacitance Values**

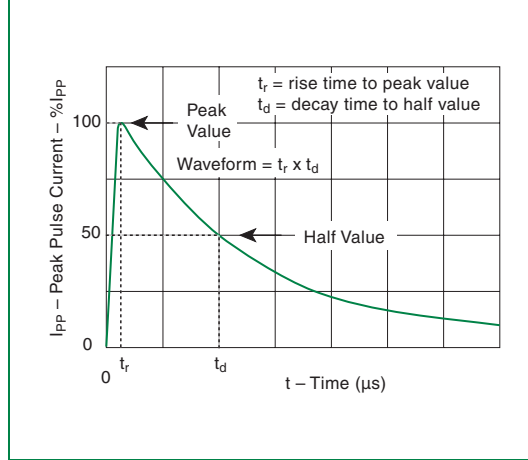
Part Number	pF Pin 1-2 / 3-2 (4-5 / 6-5) Tip-Ground, Ring-Ground		pF Pin 1-3 (4-6) Tip-Ring	
	MIN	MAX	MIN	MAX
P1553ACMCL	30	55	20	35
P1803ACMCL	25	60	15	50
P2103ACMCL	30	45	15	30
P2353ACMCL	25	45	15	30
P2703ACMCL	25	40	15	30
P3203ACMCL	25	40	15	30
P3403ACMCL	20	35	15	25
P5103ACMCL	20	50	10	30

Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

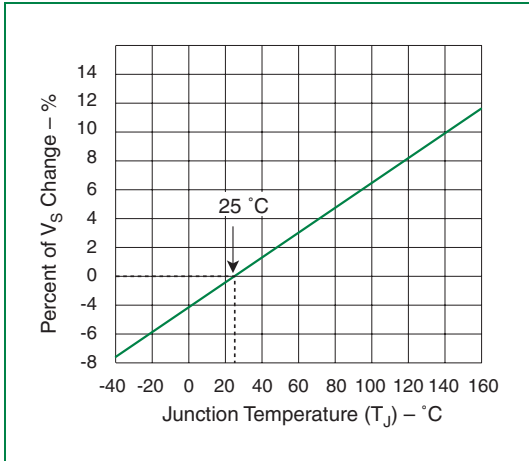
SIDACtor Devices



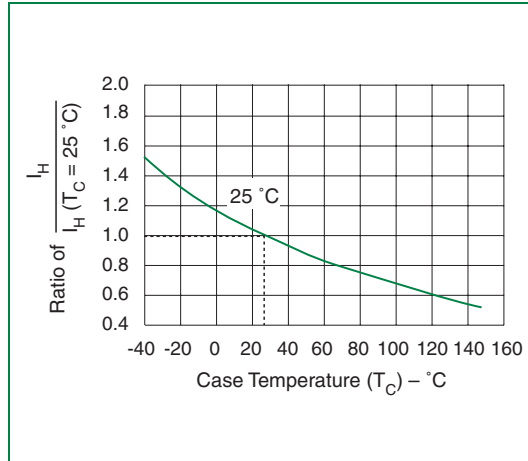
V-I Characteristics



$t_r \times t_d$  Pulse Waveform

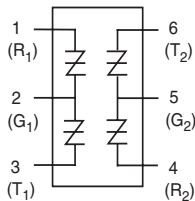


Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

# LCAS Asymmetrical Multiport Device



This is an integrated multichip asymmetrical solution for protecting multiple twisted pair from overvoltage conditions. Based on a six-pin surface mount SOIC package, it is equivalent to four discrete DO-214AA or two TO-220 packages. Available in surge current ratings up to 500 A, the multiport line protector is ideal for densely populated line cards that cannot afford PCB inefficiencies or the use of series power resistors.

For a diagram of an LCAS (Line Circuit Access Switch) application, see the following illustrations in Section 6, "Reference Designs" of this *Telecom Design Guide*: Figure 6.31, Figure 6.34 through Figure 6.36, Figure 6.41, Figure 6.43, and Figure 6.44.

SIDACtor Devices

## Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
	Pins 3-2, 6-5		Pins 1-2, 4-5						
<b>A1220U_4L</b>	100	130	180	220	4	5	800	2.2	120
<b>A1225U_4L</b>	100	130	230	290	4	5	800	2.2	120

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number. For individual "UA", "UB", and "UC" surge ratings, see table below.

### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor*® devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.

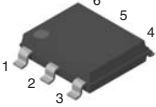
## Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/μs
A	20	150	150	90	50	75	75	45	75	20	500
B	25	250	250	150	100	100	125	80	100	30	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in μs

\*\* Voltage waveform in μs

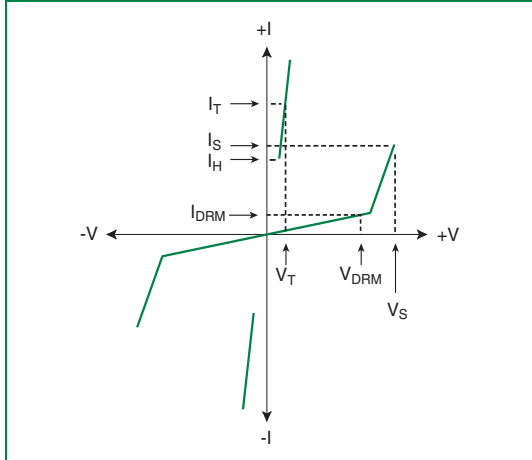
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
Modified MS-013 	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +125	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	60	°C/W

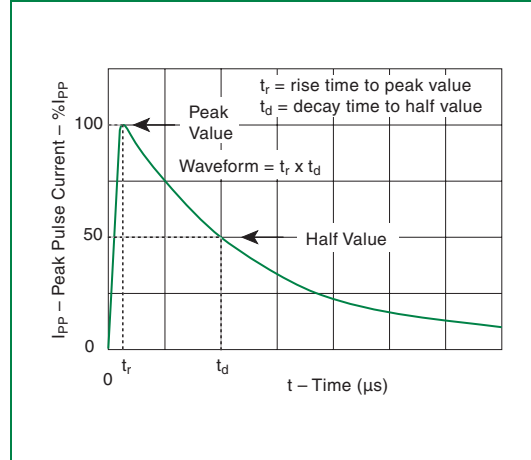
**Capacitance Values**

Part Number	pF Pin 1-2 / 4-5 Ring-Ground		pF Pin 3-2 / 6-5 Tip-Ground		pF Pin 1-3 (4-6) Tip-Ring	
	MIN	MAX	MIN	MAX	MIN	MAX
A1220UA4L	15	25	30	50	5	20
A1220UB4L	15	55	30	110	5	35
A1220UC4L	15	55	30	110	10	35
A1225UA4L	15	25	30	50	5	20
A1225UB4L	15	50	30	90	5	35
A1225UC4L	15	50	30	90	10	35

Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

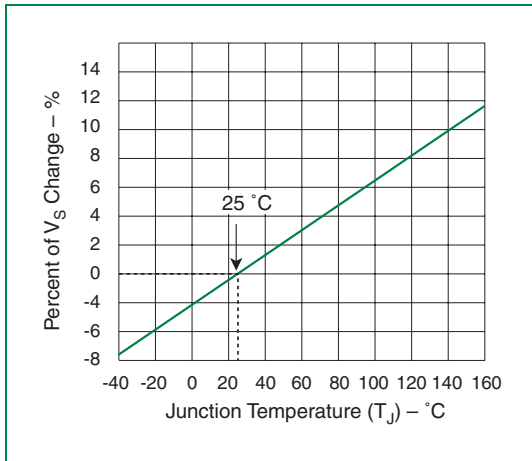


V-I Characteristics

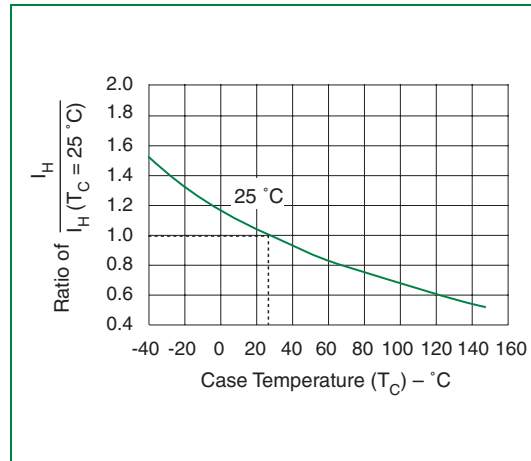


$t_r \times t_d$  Pulse Waveform

SIDACtor Devices



Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

# LCAS Asymmetrical Discrete Device



These DO-214AA *SIDACtor*<sup>®</sup> devices are intended for LCAS (Line Circuit Access Switch) applications that require asymmetrical protection in discrete (individual) packages. They enable the protected equipment to meet various regulatory requirements including GR 1089, ITU K.20, K.21, K.45, IEG 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

## Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
P1200S_L	100	130	4	5	800	2.2	120
P2000S_L	180	220	4	5	800	2.2	120
P2500S_L	230	290	4	5	800	2.2	120

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.  
For individual "SA", "SB", and "SC" surge ratings, see table below.

### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor*<sup>®</sup> devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.

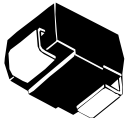
## Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps		
A	20	150	150	90	50	75	75	45	75	20	500
B	25	250	250	150	100	100	125	80	100	30	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in μs

\*\* Voltage waveform in μs

**Thermal Considerations**

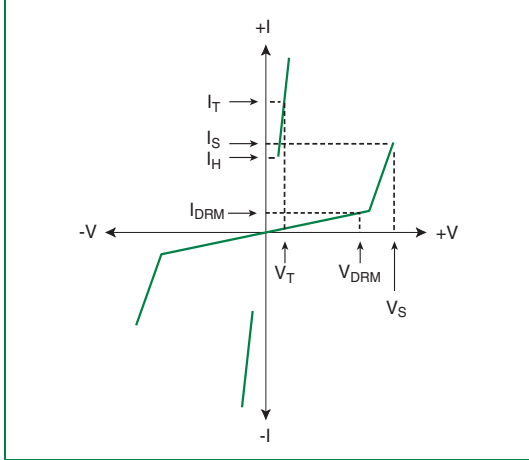
Package	Symbol	Parameter	Value	Unit
DO-214AA 	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	90	°C/W

**Capacitance Values**

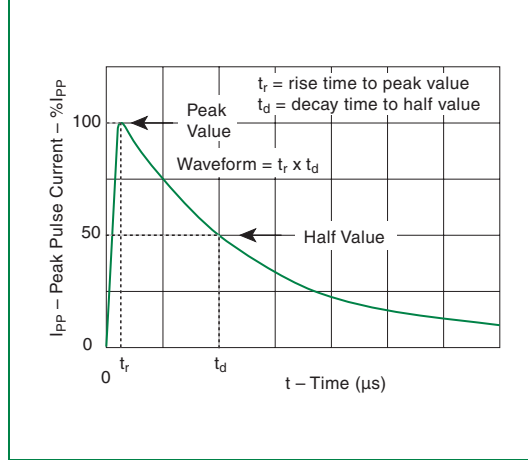
Part Number	pF	
	MIN	MAX
P1200SAL	30	45
P1200SBL	30	65
P1200SCL	45	110
P2000SAL	25	35
P2000SBL	25	95
P2000SCL	35	95
P2500SAL	20	35
P2500SBL	20	35
P2500SCL	30	85

Note: Off-state capacitance (C<sub>0</sub>) is measured at 1 MHz with a 2 V bias.

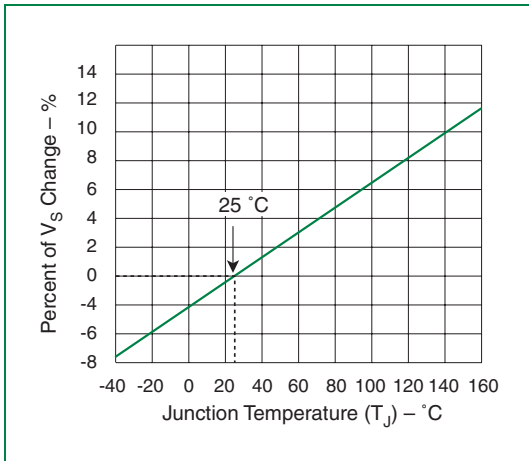
SIDACtor Devices



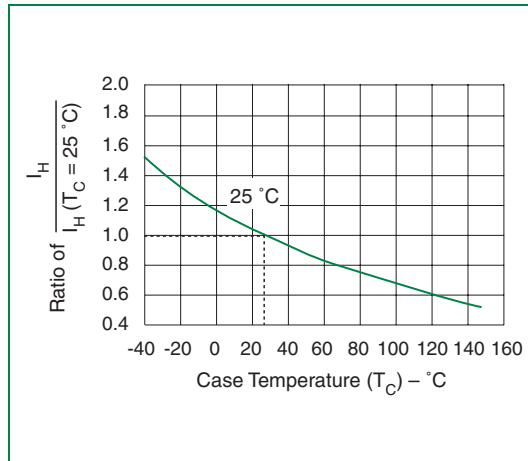
V-I Characteristics



$t_r \times t_d$  Pulse Waveform

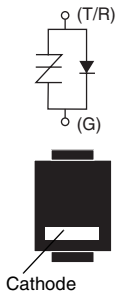


Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

## Fixed Voltage SLIC Protector



These DO-214AA unidirectional protectors are constructed with a *SIDACtor*<sup>®</sup> device and an integrated diode. They protect SLICs (Subscriber Line Interface Circuits) from damage during transient voltage activity and enable line cards to comply with various regulatory requirements including GR 1089, ITU K.20, K.21 and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

For details of specific design criteria, see Figure 6.31 in Section 6, “Reference Designs” of this *Telecom Design Guide*.

SIDACtor Devices

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	V <sub>F</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
P0641S_L	58	77	4	5	5	800	1	120
P0721S_L	65	88	4	5	5	800	1	120
P0901S_L	75	98	4	5	5	800	1	120
P1101S_L	95	130	4	5	5	800	1	120
P1301S_L	120	160	4	5	5	800	1	120
P1701S_L	160	200	4	5	5	800	1	120

\* “L” in part number indicates RoHS compliance. For non-RoHS compliant device, delete “L” from part number.  
For individual “SA” and “SC” surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> and V<sub>F</sub> are measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.
- Parallel capacitive loads may affect electrical parameters.

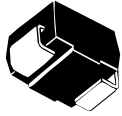
### Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/μs
A	20	150	150	90	50	75	75	45	75	20	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in μs

\*\* Voltage waveform in μs

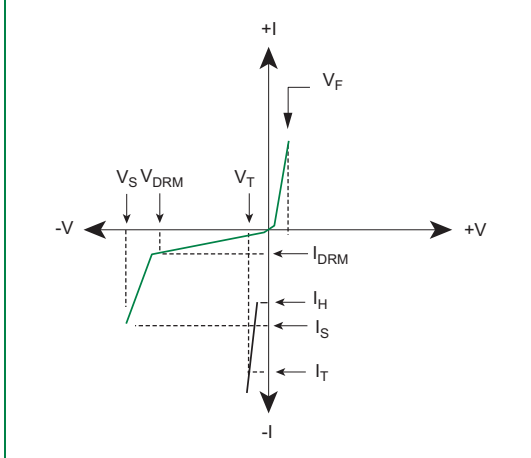
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
DO-214AA 	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	90	°C/W

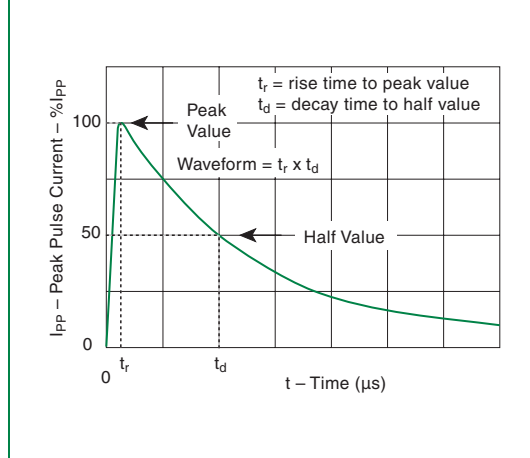
**Capacitance Values**

Part Number	pF	
	MIN	MAX
P0641SAL	50	90
P0641SCL	65	200
P0721SAL	45	85
P0721SCL	60	190
P0901SAL	45	80
P0901SCL	60	180
P1101SAL	40	70
P1101SCL	50	160
P1301SAL	40	70
P1301SCL	50	160
P1701SAL	30	55
P1701SCL	40	130

Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

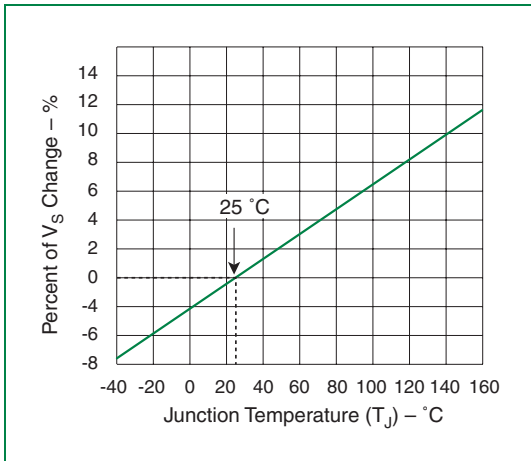


V-I Characteristics

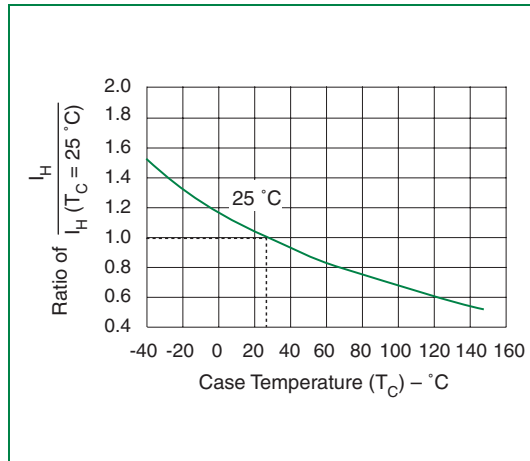


$t_r \times t_d$  Pulse Waveform

SIDACtor Devices

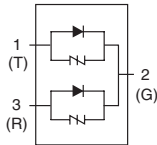


Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

# TwinSLIC™ Protector



This *TwinSLIC* DO-214AA unidirectional protector is constructed with a *SIDACTor*® device and an integrated diode. It protects SLICs (Subscriber Line Interface Circuits) from damage during transient voltage activity and enables line cards to comply with various regulatory requirements including GR 1089, ITU K.20, K.21 and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

For details of specific design criteria, see Figure 6.40 through Figure 6.43 in Section 6, “Reference Designs” of this *Telecom Design Guide*.

## Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	V <sub>F</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
	Pins 1-2, 3-2							
P0641CA2L	58	77	4	5	5	800	1	120
P0721CA2L	65	88	4	5	5	800	1	120
P0901CA2L	75	98	4	5	5	800	1	120
P1101CA2L	95	130	4	5	5	800	1	120
P1301CA2L	120	160	4	5	5	800	1	120
P1701CA2L	160	200	4	5	5	800	1	120

\* “L” in part number indicates RoHS compliance. For non-RoHS compliant device, delete “L” from part number.  
For surge ratings, see table below.

### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> and V<sub>F</sub> are measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.
- Parallel capacitive loads may affect electrical parameters.
- Compliance with GR 1089 or UL 60950 power fault tests may require special design considerations. Contact the factory for further information.

## Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps		
A	20	150	150	90	50	75	75	45	75	20	500

\* Current waveform in μs

\*\* Voltage waveform in μs

**Thermal Considerations**

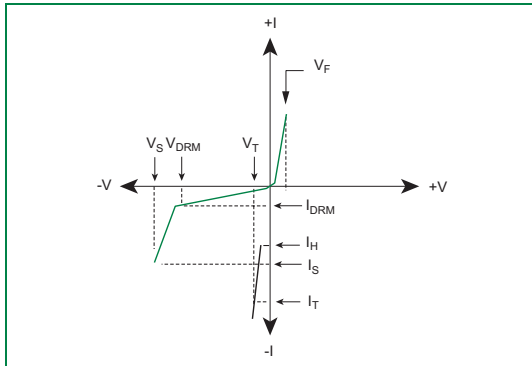
Package	Symbol	Parameter	Value	Unit
Modified DO-214AA 	$T_J$	Operating Junction Temperature Range	-40 to +150	°C
	$T_S$	Storage Temperature Range	-65 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	85	°C/W

**Capacitance Values**

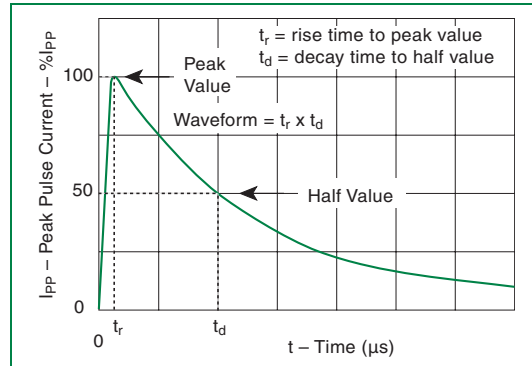
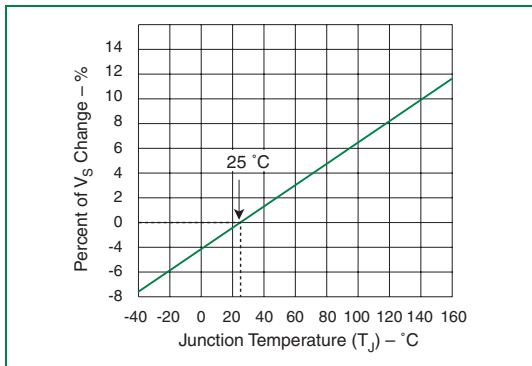
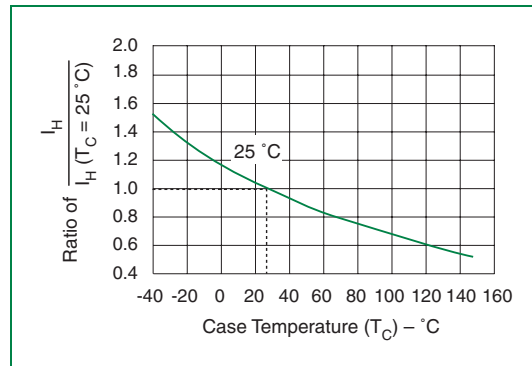
Part Number	pF Pin 1-2 / 3-2 Tip-Ground, Ring-Ground		pF Pin 1-3 Tip-Ring	
	MIN	MAX	MIN	MAX
P0641CA2L	40	200	20	105
P0721CA2L	35	190	20	105
P0901CA2L	30	180	20	105
P1101CA2L	25	160	15	105
P1301CA2L	25	125	15	105
P1701CA2L	25	125	15	105

 Note: Off-state capacitance ( $C_0$ ) is measured at 1 MHz with a 2 V bias.

SIDACtor Devices

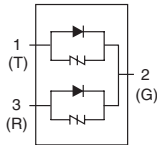


V-I Characteristics


 $t_r \times t_d$  Pulse Waveform

 Normalized  $V_S$  Change versus Junction Temperature


Normalized DC Holding Current versus Case Temperature

## Two-chip SLIC Protector Modified TO-220



This two-chip SLIC modified TO-220 unidirectional protector is constructed with a *SIDACTor*<sup>®</sup> device and an integrated diode. It protects SLICs (Subscriber Line Interface Circuits) from damage during transient voltage activity and enables line cards to comply with various regulatory requirements including GR 1089, ITU K.20, K.21 and K.45, IEC 60950, UL 60950, and TIA-968-A (formerly known as FCC Part 68).

For details of specific design criteria, see Figure 6.40 through Figure 6.43 in Section 6, “Reference Designs” of this *Telecom Design Guide*.

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	V <sub>F</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
	Pins 1-2, 3-2							
P0641A_2L	58	77	4	5	5	800	2.2	120
P0721A_2L	65	88	4	5	5	800	2.2	120
P0901A_2L	75	98	4	5	5	800	2.2	120
P1101A_2L	95	130	4	5	5	800	2.2	120
P1301A_2L	120	160	4	5	5	800	2.2	120
P1701A_2L	160	200	4	5	5	800	2.2	120

\* “L” in part number indicates RoHS compliance. For non-RoHS compliant device, delete “L” from part number.  
For surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> and V<sub>F</sub> are measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.
- Parallel capacitive loads may affect electrical parameters.
- Compliance with GR 1089 or UL 60950 power fault tests may require special design considerations. Contact the factory for further information.

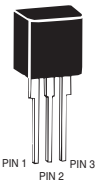
### Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps		
A	20	150	150	90	50	75	75	45	75	20	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in μs

\*\* Voltage waveform in μs

**Thermal Considerations**

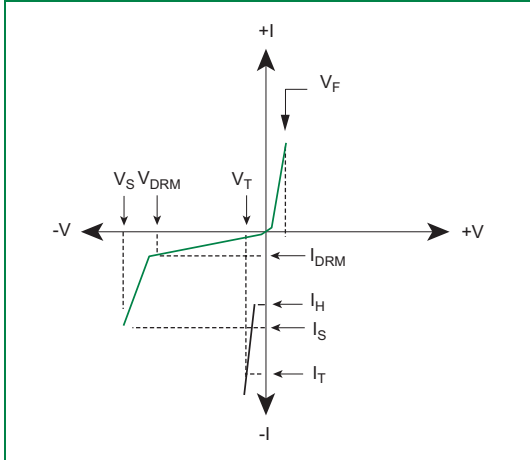
Package	Symbol	Parameter	Value	Unit
Modified TO-220 	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	50	°C/W

**Capacitance Values**

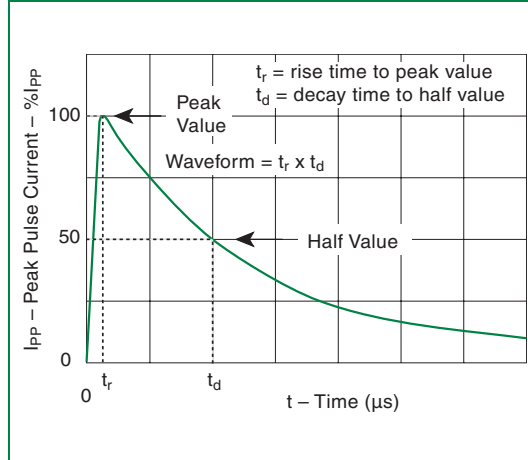
Part Number	pF		pF Pin 1-2 / 3-2 (4-5 / 6-5) Tip-Ground, Ring-Ground	
	MIN	MAX	MIN	MAX
P0641AA2L	40	200	20	105
P0641AC2L	40	200	20	105
P0721AA2L	35	190	20	105
P0721AC2L	35	190	20	105
P0901AA2L	30	180	20	105
P0901AC2L	30	180	20	105
P1101AA2L	25	160	15	105
P1101AC2L	25	160	15	105
P1301AA2L	25	160	15	105
P1301AC2L	25	160	15	105
P1701AA2L	25	125	15	105
P1701AC2L	25	125	15	105

Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

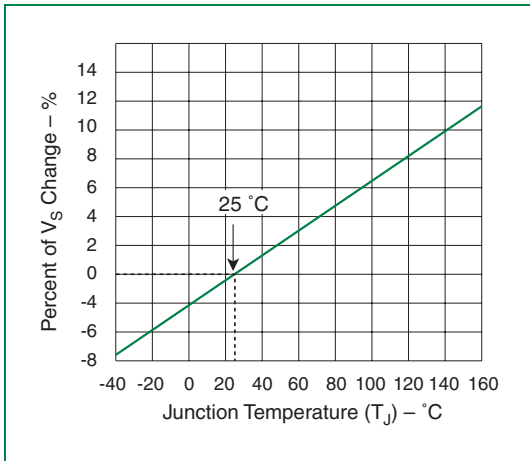
SLIC Protector Devices



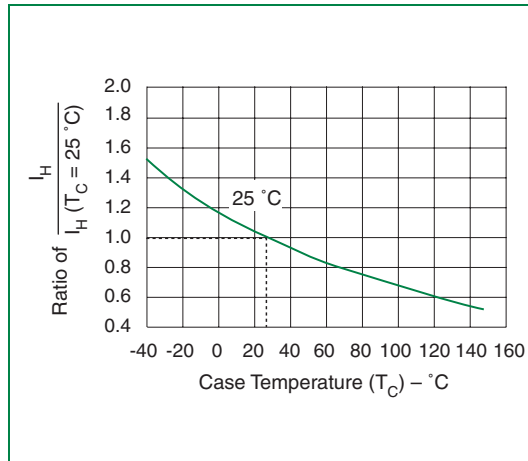
V-I Characteristics



$t_r \times t_d$  Pulse Waveform



Normalized  $V_S$  Change versus Junction Temperature

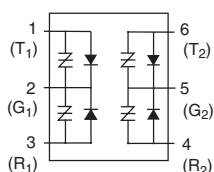


Normalized DC Holding Current versus Case Temperature

## Multiport SLIC Protector

RoHS

Littelfuse®



This multiport line protector is designed as a single-package solution for protecting multiple twisted pair from overvoltage conditions. Based on a six-pin SOIC package, it is equivalent to four discrete DO-214AA packages. Available in surge current ratings up to 500 A for a 2x10  $\mu$ s event, the multiport line protector is ideal for densely populated line cards that cannot afford PCB inefficiencies or the use of series power resistors.

For details of specific design criteria, see Figure 6.44, Figure 6.45, and Figure 6.46 in Section 6, "Reference Designs" of this *Telecom Design Guide*.

SLICtor Devices

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	V <sub>F</sub> Volts	I <sub>DRM</sub> $\mu$ Amps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
	Pins 1-2, 2-3, 4-5, 5-6							
P0641U_L	58	77	4	5	5	800	2.2	120
P0721U_L	65	88	4	5	5	800	2.2	120
P0901U_L	75	98	4	5	5	800	2.2	120
P1101U_L	95	130	4	5	5	800	2.2	120
P1301U_L	120	160	4	5	5	800	2.2	120
P1701U_L	160	200	4	5	5	800	2.2	120

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number. For individual "UA" and "UC" surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> and V<sub>F</sub> are measured at 100 V/ $\mu$ s.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.
- Parallel capacitive loads may affect electrical parameters.

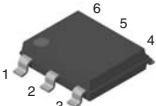
### Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50/60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/ $\mu$ s
A	20	150	150	90	50	75	75	45	75	20	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in  $\mu$ s

\*\* Voltage waveform in  $\mu$ s

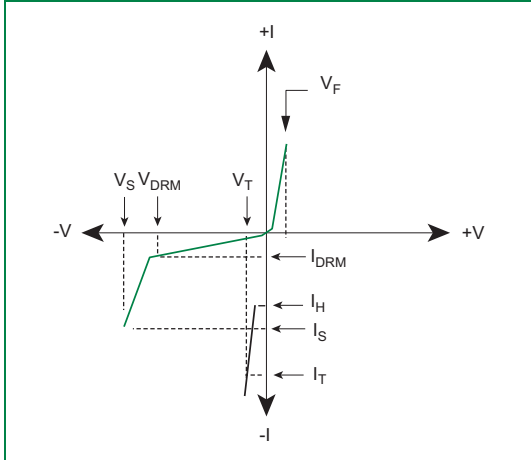
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
 Modified MS-013	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

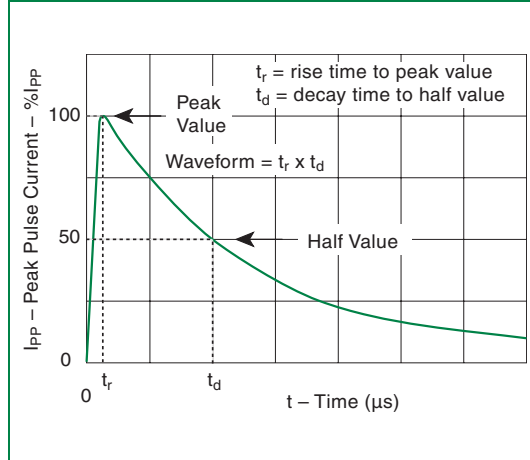
**Capacitance Values**

Part Number	pF Pin 1-2 / 3-2 (4-5 / 6-5) Tip-Ground, Ring-Ground		pF Pin 1-3 (4-6) Tip-Ring	
	MIN	MAX	MIN	MAX
P0641UAL	50	200	20	105
P0641UCL	65	200	20	105
P0721UAL	45	190	20	105
P0721UCL	60	190	20	105
P0901UAL	45	180	20	105
P0901UCL	60	180	20	105
P1101UAL	40	160	15	105
P1101UCL	50	160	15	105
P1301UAL	40	160	15	105
P1301UCL	50	160	15	105
P1701UAL	30	125	15	80
P1701UCL	40	125	15	80

Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

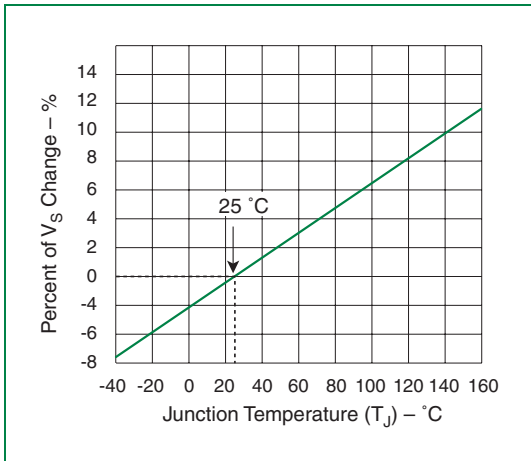


V-I Characteristics

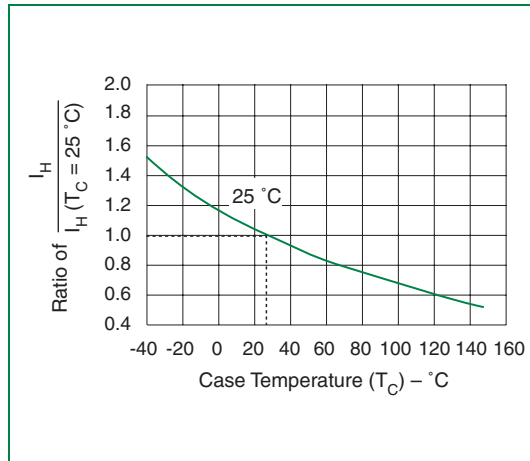


$t_r \times t_d$  Pulse Waveform

SIDACtor Devices

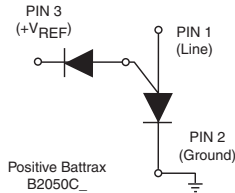
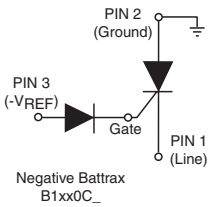


Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

# Battrax® SLIC Protector



The *Battrax* SLIC protector is offered in a negative *Battrax* version and a positive *Battrax* version. The B1xx0C\_ is for a  $-V_{REF}$  and the B2050C\_ is for a  $+V_{REF}$ . Designed using an SCR and a gate diode, the B1xx0C\_ *Battrax* begins to conduct at  $-V_{REF} + I - 1.2 V$  while the B2050C\_ *Battrax* begins to conduct at  $I + V_{REF} + I 1.2 V$ .

## Electrical Parameters

Part Number *	$V_{DRM}$ Volts	$V_S$ Volts	$V_T$ Volts	$I_{DRM}$ $\mu$ Amps	$I_{GT}$ mAmps	$I_T$ Amps	$I_H$ mAmps
B1100C_L	$-V_{REF} + I - 1.2 V$	$-V_{REF} + I - 10 V$	4	5	100	2.2	100
B1160C_L	$-V_{REF} + I - 1.2 V$	$-V_{REF} + I - 10 V$	4	5	100	2.2	160
B1200C_L	$-V_{REF} + I - 1.2 V$	$-V_{REF} + I - 10 V$	4	5	100	2.2	200

Part Number *	$V_{DRM}$ Volts	$V_S$ Volts	$V_T$ Volts	$I_{DRM}$ $\mu$ Amps	$I_{GT}$ mAmps	$I_T$ Amps	$I_H$ mAmps
B2050C_L	$I + V_{REF} + I 1.2 V$	$I + V_{REF} + I 10 V$	4	5	50	2.2	5

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.

For individual "CA" and "CC" surge ratings, see table below.

### General Notes:

- All measurements are made at an ambient temperature of 25 °C.  $I_{PP}$  applies to -40 °C through +85 °C temperature range.
- $I_{PP}$  is a repetitive surge rating and is guaranteed for the life of the product.
- $I_{PP}$  ratings assume  $V_{REF} = \pm 48 V$ .
- $V_{DRM}$  is measured at  $I_{DRM}$ .
- $V_S$  is measured at 100 V/ $\mu$ s.
- Positive *Battrax* information is preliminary data.
- $V_{REF}$  maximum value for the negative *Battrax* is -200 V.
- $V_{REF}$  maximum value for the positive *Battrax* is 110 V.

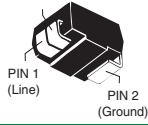
## Surge Ratings in Amps

Series	$I_{PP}$									$I_{TSM}$ 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps		
A	20	150	150	90	50	75	75	45	75	20	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in  $\mu$ s

\*\* Voltage waveform in  $\mu$ s

**Thermal Considerations**

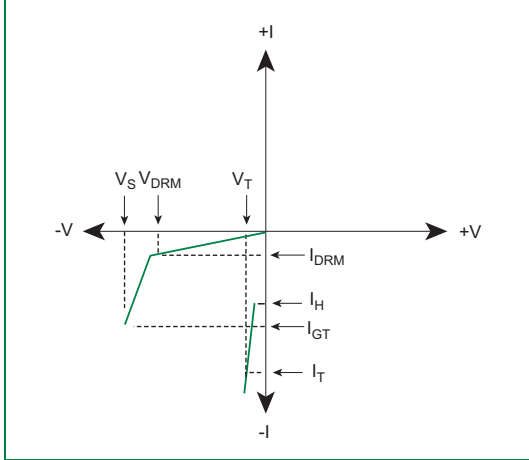
Package	Symbol	Parameter	Value	Unit
Modified DO-214AA PIN 3 (V <sub>REF</sub> )  PIN 1 (Line)      PIN 2 (Ground)	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	85	°C/W

**Capacitance Values**

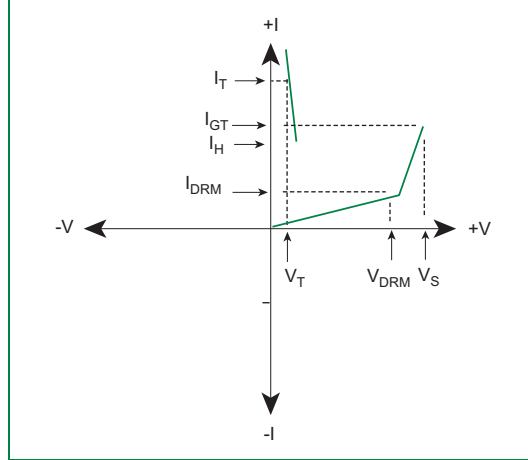
Part Number	pF	
	MIN	MAX
<b>B1100CAL</b>	50	200
<b>B1100CCL</b>	50	200
<b>B1160CAL</b>	50	200
<b>B1160CCL</b>	50	200
<b>B1200CAL</b>	50	200
<b>B1200CCL</b>	50	200
<b>B2050CAL</b>	50	200
<b>B2050CCL</b>	50	200

Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.

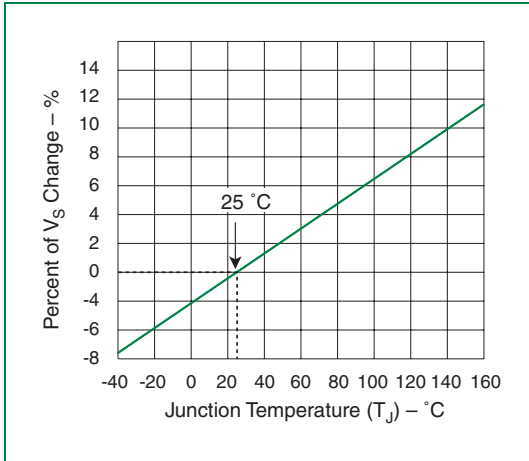
SIDACtor Devices



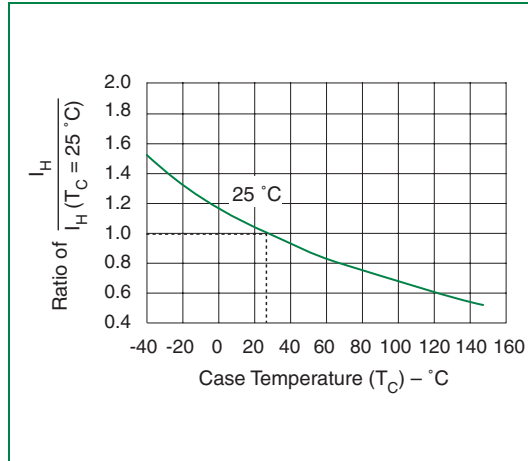
V-I Characteristics for Negative Battrax



V-I Characteristics for Positive Battrax

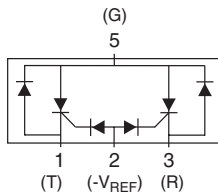


Normalized  $V_S$  Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

## Battrax<sup>®</sup> Single Port Negative SLIC Protector



This programmable *Battrax* device is referenced to a negative voltage source. This dual-chip package includes internal diodes for transient protection from positive surge events.

For a diagram of a *Battrax* application, see Figure 6.47 in Section 6, “Reference Designs” of this *Telecom Design Guide*.

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	V <sub>F</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>GT</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
<b>B1101U_L</b>	I-V <sub>REF</sub> + I-1.2V	I-V <sub>REF</sub> + I-10V	4	5	5	100	2.2	100
<b>B1161U_L</b>	I-V <sub>REF</sub> + I-1.2V	I-V <sub>REF</sub> + I-10V	4	5	5	100	2.2	160
<b>B1201U_L</b>	I-V <sub>REF</sub> + I-1.2V	I-V <sub>REF</sub> + I-10V	4	5	5	100	2.2	200

\* “L” in part number indicates RoHS compliance. For non-RoHS compliant device, delete “L” from part number. For individual “UA” and “UC” surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- I<sub>PP</sub> ratings assume a V<sub>REF</sub> = -48 V.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- V<sub>REF</sub> maximum value for the B1101, B1161, and/or B1201 is -200 V.

### Surge Ratings in Amps

Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/μs
A	20	150	150	90	50	75	75	45	75	20	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in μs

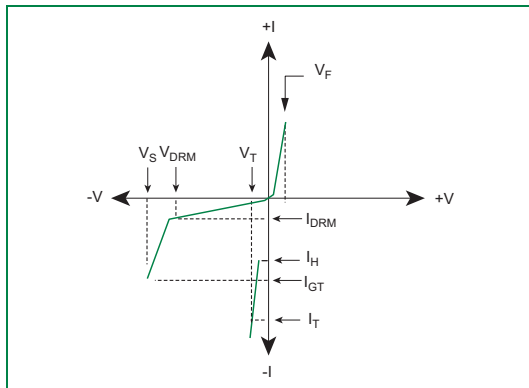
\*\* Voltage waveform in μs

**Thermal Considerations**

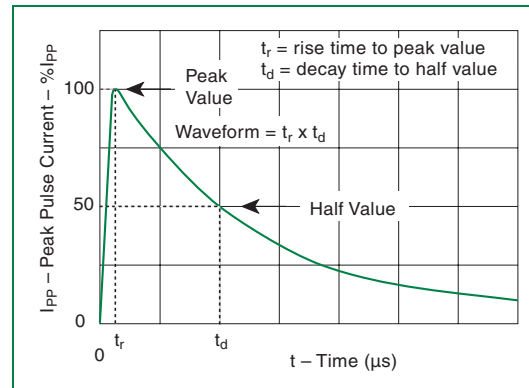
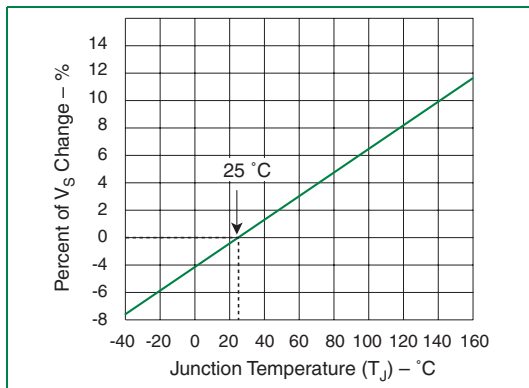
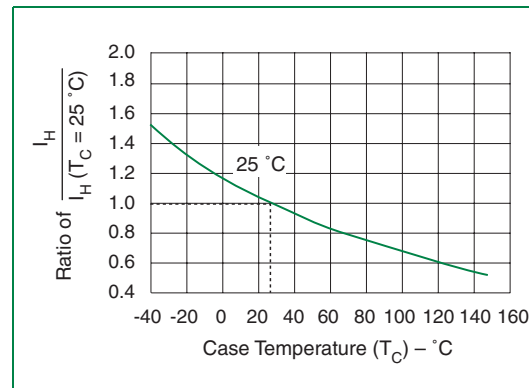
Package	Symbol	Parameter	Value	Unit
Modified MS-013	$T_J$	Operating Junction Temperature Range	-40 to +125	°C
	$T_S$	Storage Temperature Range	-65 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	60	°C/W

**Capacitance Values**

Part Number	pF	
	MIN	MAX
B1101UAL	50	200
B1101UCL	50	200
B1161UAL	50	200
B1161UCL	50	200
B1201UAL	50	200
B1201UCL	50	200

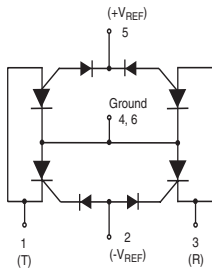
 Note: Off-state capacitance ( $C_O$ ) is measured at 1 MHz with a 2 V bias.


V-I Characteristics


 $t_r \times t_d$  Pulse Waveform

 Normalized  $V_S$  Change versus Junction Temperature


Normalized DC Holding Current versus Case Temperature

# Battrax<sup>®</sup> Single Port Positive/Negative SLIC Protector



This six-pin surface mount package contains programmable protection devices for both negative and positive voltage references.

It is constructed using four SCRs and four gate diodes. The SCRs conduct when a voltage that is more negative than  $-V_{REF}$  or more positive than  $+V_{REF}$  is applied to Pin 1 or 3 of the SCR. During conduction, the SCRs appear as a low-resistive path which forces all transients to be shorted to ground.

For a diagram of a *Battrax* application, see Figure 6.49 in Section 6, “Reference Designs” of this *Telecom Design Guide*.

SIDACtor Devices

## Electrical Parameters

Part Number *	$V_{DRM}$ Volts	$V_S$ Volts	$V_T$ Volts	$I_{DRM}$ $\mu$ Amps	$I_{GT}$ mAmps	$I_T$ Amps	$I_H$ mAmps
<b>B3104U_L</b>	$- V_{REF}  +  \pm 1.2V $	$- V_{REF}  +  \pm 10V $	4	5	100	2.2	100
<b>B3164U_L</b>	$- V_{REF}  +  \pm 1.2V $	$- V_{REF}  +  \pm 10V $	4	5	100	2.2	160
<b>B3204U_L</b>	$- V_{REF}  +  \pm 1.2V $	$- V_{REF}  +  \pm 10V $	4	5	100	2.2	200

\* “L” in part number indicates RoHS compliance. For non-RoHS compliant device, delete “L” from part number.  
For individual “UA” and “UC” surge ratings, see table below.

### General Notes:

- All measurements are made at an ambient temperature of 25 °C.  $I_{PP}$  applies to -40 °C through +85 °C temperature range.
- $I_{PP}$  is a repetitive surge rating and is guaranteed for the life of the product.
- $I_{PP}$  ratings assume a  $V_{REF} = \pm 48$  V.
- $V_{DRM}$  is measured at  $I_{DRM}$ .
- $V_S$  is measured at 100 V/ $\mu$ s.
- Positive *Battrax* information is preliminary data.
- $V_{REF}$  maximum value for the negative *Battrax* is -200 V.
- $V_{REF}$  maximum value for the positive *Battrax* is 110 V.

## Surge Ratings in Amps

Series	$I_{PP}$									$I_{TSM}$ 50 / 60 Hz	di/dt
	0.2x310 * 0.5x700 **	2x10 * 2x10 **	8x20 * 1.2x50 **	10x160 * 10x160 **	10x560 * 10x560 **	5x320 * 9x720 **	10x360 * 10x360 **	10x1000 * 10x1000 **	5x310 * 10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/ $\mu$ s
A	20	150	150	90	50	75	75	45	75	20	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in  $\mu$ s

\*\* Voltage waveform in  $\mu$ s

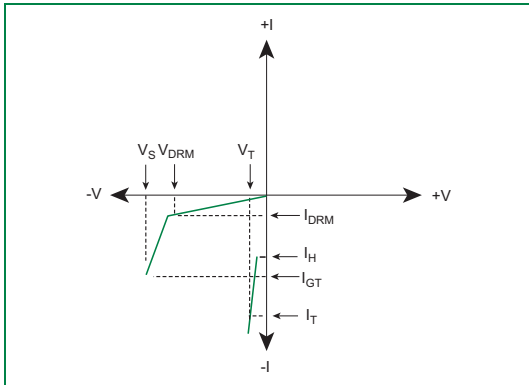
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +125	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	60	°C/W

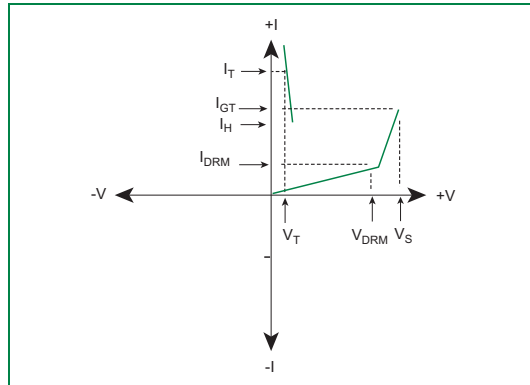
**Capacitance Values**

Part Number	pF	
	MIN	MAX
B3104UAL	50	200
B3104UCL	50	200
B3164UAL	50	200
B3164UCL	50	200
B3204UAL	50	200
B3204UCL	50	200

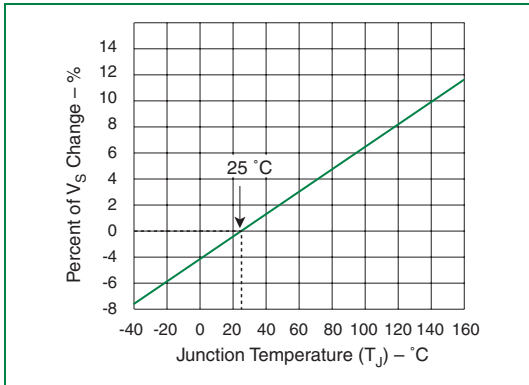
Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.



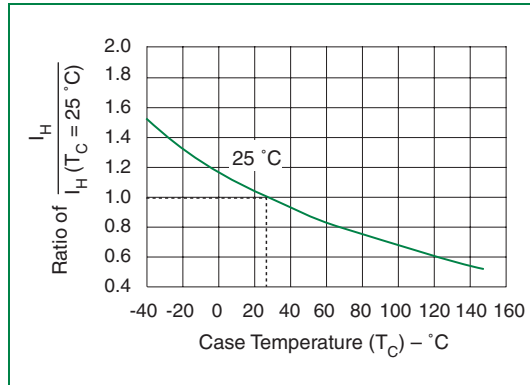
V-I Characteristics for Negative Batrax



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

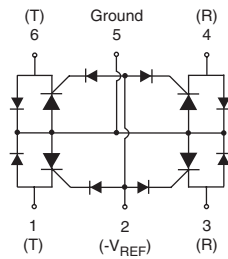


Normalized V<sub>S</sub> Change versus Junction Temperature



Normalized DC Holding Current versus Case Temperature

# Batrax<sup>®</sup> Dual Port Negative SLIC Protector



This *Batrax* device is an integrated overvoltage protection solution for SLIC-based (Subscriber Line Interface Circuit) line cards. This six-pin device is constructed using four SCRs and four gate diodes.

The device is referenced to  $V_{BAT}$  and conducts when a voltage that is more negative than  $-V_{REF}$  is applied to the cathode (Pins 1, 3, 4, or 6) of the SCR. During conduction, all negative transients are shorted to Ground. All positive transients are passed to Ground by the diodes.

For specific diagrams showing these *Batrax* applications, see Figure 6.48 in Section 6, "Reference Designs" of this *Telecom Design Guide*.

SIDACtor Devices

## Electrical Parameters

Part Number *	$V_{DRM}$ Volts	$V_S$ Volts	$V_T$ Volts	$I_{DRM}$ $\mu$ Amps	$I_{GT}$ mAmps	$I_T$ Amps	$I_H$ mAmps
<b>B1101U_4L</b>	$-V_{REF} +  -1.2V $	$-V_{REF} +  -10V $	4	5	100	2.2	100
<b>B1161U_4L</b>	$-V_{REF} +  -1.2V $	$-V_{REF} +  -10V $	4	5	100	2.2	160
<b>B1201U_4L</b>	$-V_{REF} +  -1.2V $	$-V_{REF} +  -10V $	4	5	100	2.2	200

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number. For individual "UA" and "UC" surge ratings, see table below.

### General Notes:

- All measurements are made at an ambient temperature of 25 °C.  $I_{PP}$  applies to -40 °C through +85 °C temperature range.
- $I_{PP}$  is a repetitive surge rating and is guaranteed for the life of the product.
- $I_{PP}$  ratings assume a  $V_{REF} = \pm 48$  V.
- $V_{DRM}$  is measured at  $I_{DRM}$ .
- $V_S$  is measured at 100 V/ $\mu$ s.
- $V_{REF}$  maximum value for the negative *Batrax* is -200 V.

## Surge Ratings in Amps

Series	$I_{PP}$									$I_{TSM}$ 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	0.5x700 **	2x10 **	1.2x50 **	10x160 **	10x560 **	9x720 **	10x360 **	10x1000 **	10x700 **		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps/ $\mu$ s
A	20	150	150	90	50	75	75	45	75	20	500
C	50	500	400	200	150	200	175	100	200	50	500

\* Current waveform in  $\mu$ s

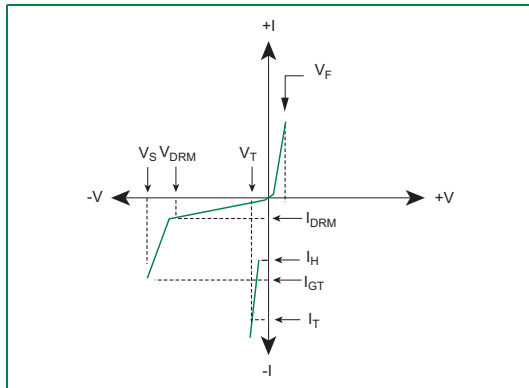
\*\* Voltage waveform in  $\mu$ s

**Thermal Considerations**

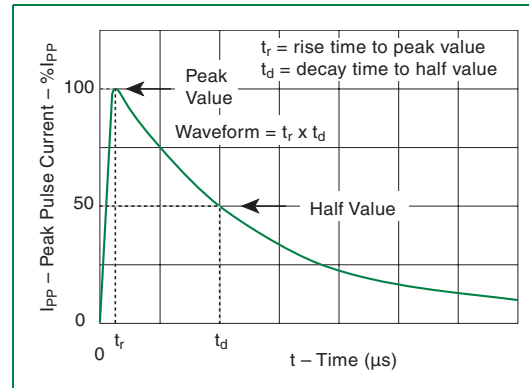
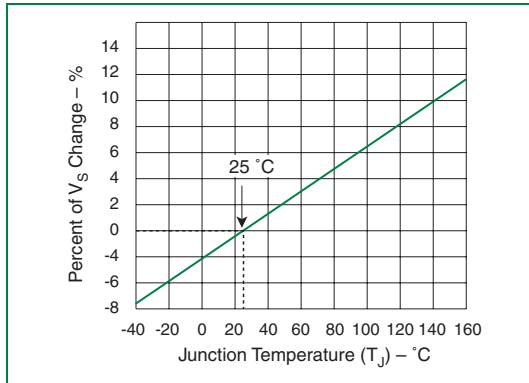
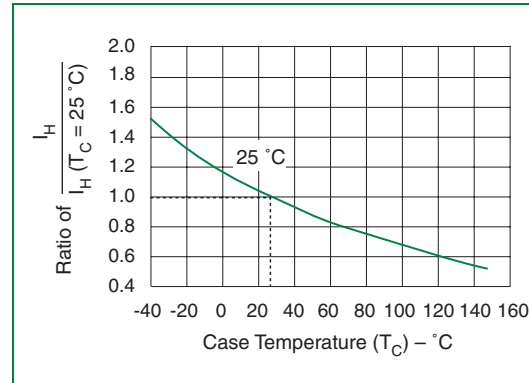
Package	Symbol	Parameter	Value	Unit
Modified MS-013	$T_J$	Operating Junction Temperature Range	-40 to +125	°C
	$T_S$	Storage Temperature Range	-65 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	60	°C/W

**Capacitance Values**

Part Number	pF	
	MIN	MAX
B1101UA 4L	50	200
B1101UC 4L	50	200
B1161UA 4L	50	200
B1161UC 4L	50	200
B1201UA 4L	50	200
B1201UC 4L	50	200

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


V-I Characteristics


 $t_r \times t_d$  Pulse Waveform

 Normalized  $V_S$  Change versus Junction Temperature


Normalized DC Holding Current versus Case Temperature

## High Surge Current Two-pin *SIDACTor*® Device



This *SIDACTor* device is intended for very hostile environments such as CATV (Community Antenna TV) systems and electronics connected to external antennas.

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> $\mu$ Amps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
P1400ADL	120	160	3	5	800	2.2	50
P1800ADL	170	220	3	5	800	2.2	50

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number. For surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACTor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/ $\mu$ s.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.

### Surge Ratings in Amps

Series	I <sub>PP</sub>		I <sub>TSM</sub> 50 / 60 Hz	di/dt Amps/ $\mu$ s
	8x20 * 1.2x50 **	10x1000 * 10x1000 **		
	Amps	Amps	Amps	
D	1000	250	120	500

\* Current waveform in  $\mu$ s

\*\* Voltage waveform in  $\mu$ s

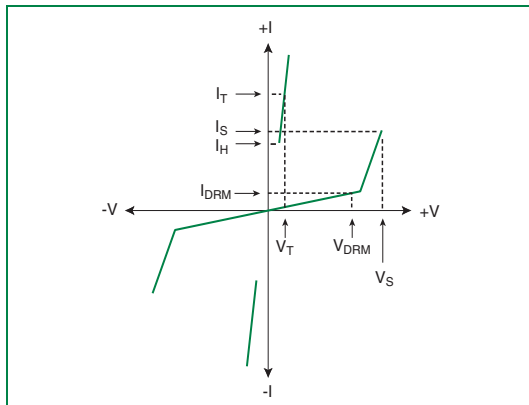
SIDACTor Devices

**Thermal Considerations**

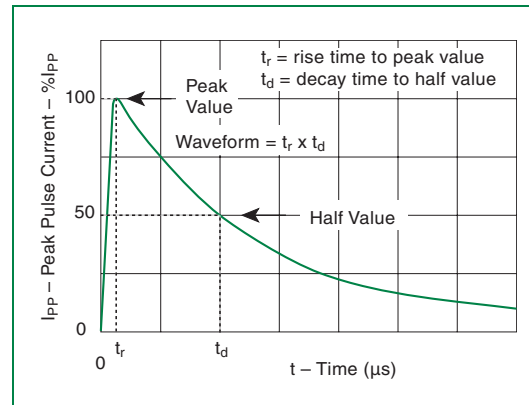
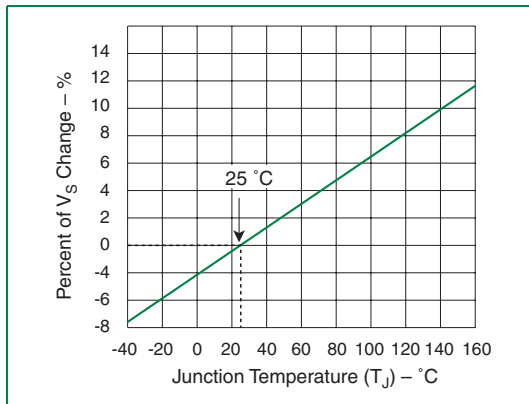
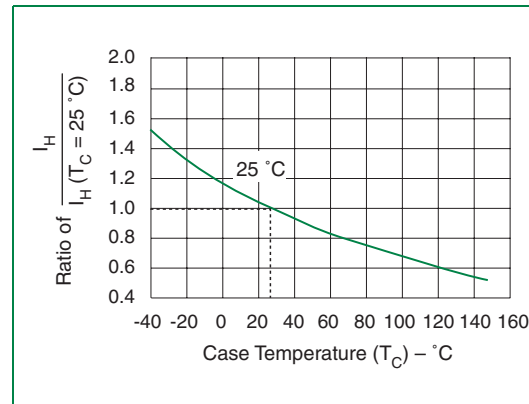
Package	Symbol	Parameter	Value	Unit
Modified TO-220 	$T_J$	Operating Junction Temperature Range	-40 to +150	°C
	$T_S$	Storage Temperature Range	-65 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	60	°C/W

**Capacitance Values**

Part Number	pF	
	MIN	MAX
P1400ADL	140	200
P1800ADL	120	180

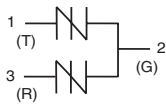
 Note: Off-state capacitance ( $C_0$ ) is measured at 1 MHz with a 2 V bias.


V-I Characteristics


 $t_r \times t_d$  Pulse Waveform

 Normalized  $V_S$  Change versus Junction Temperature


Normalized DC Holding Current versus Case Temperature

## High Surge Current Three-pin *SIDACtor*<sup>®</sup> Device



This *SIDACtor* device is a 1000 A solid state protection device offered in a TO-220 package. It protects equipment located in the severe surge environment of CATV (Community Antenna TV) systems and antenna locations.

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> $\mu$ Amps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
<b>P6002ADL</b>	550	700	5.5	5	800	2.2	50

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number. For surge ratings, see table below.



### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> $\mu$ Amps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
<b>P3100ADL</b>	280	360	5.5	5	800	2.2	150

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number. For surge ratings, see table below.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/ $\mu$ s.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.

### Surge Ratings in Amps

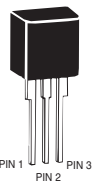
Series	I <sub>PP</sub>		I <sub>TSM</sub> 50 / 60 Hz	di/dt
	8x20 * 1.2x50 **	10x1000 * 10x1000 **		
	Amps	Amps	Amps	Amps/ $\mu$ s
D	1000	250	120	500

\* Current waveform in  $\mu$ s

\*\* Voltage waveform in  $\mu$ s

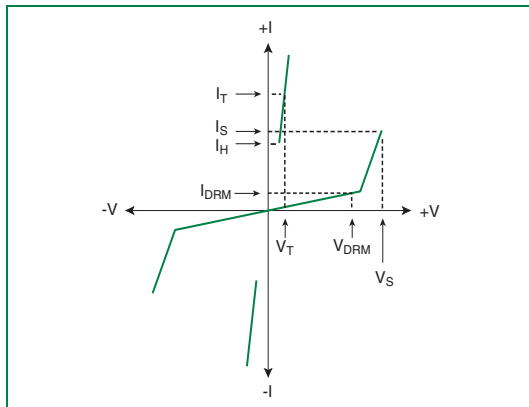
Note: P6002AD is shown. P3100AD has no center lead.

**Thermal Considerations**

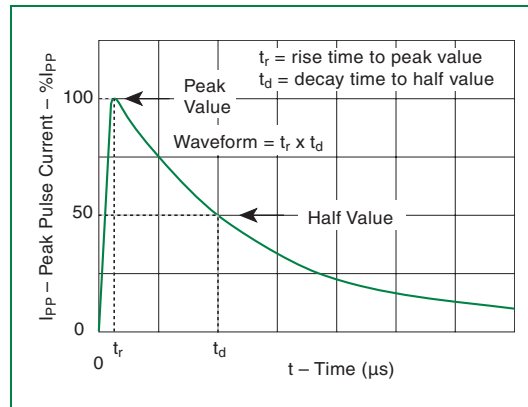
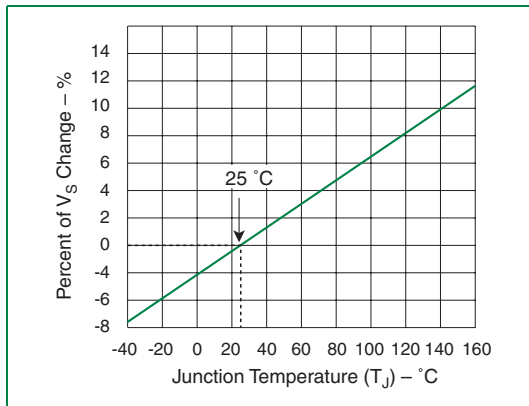
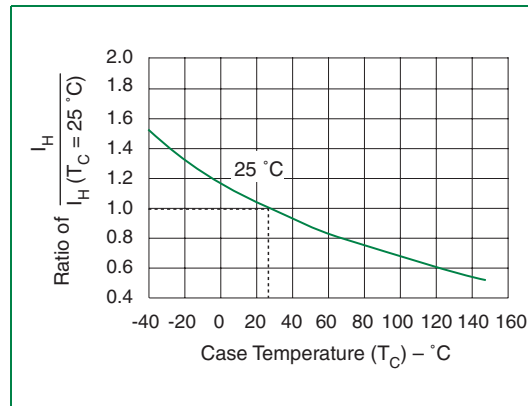
Package	Symbol	Parameter	Value	Unit
Modified TO-220 	$T_J$	Operating Junction Temperature Range	-40 to +150	°C
	$T_S$	Storage Temperature Range	-65 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	60	°C/W

**Capacitance Values**

Part Number	pF	
	MIN	MAX
P6002ADL	60	200
P3100ADL	100	150

 Note: Off-state capacitance ( $C_0$ ) is measured at 1 MHz with a 2 V bias.


V-I Characteristics


 $t_r \times t_d$  Pulse Waveform

 Normalized  $V_S$  Change versus Junction Temperature


Normalized DC Holding Current versus Case Temperature

# CATV Line Amplifiers/Power Inserters 3 kA *SIDACTor*<sup>®</sup> Device



This *SIDACTor* device is a 3000 A solid state protection device offered in a non-isolated TO-263 (D<sup>2</sup>) package. It protects equipment located in the severe surge environment of CATV (Community Antenna TV) systems and antenna locations.

## Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps **	I <sub>H</sub> mAmps
P1500NEL	140	180	4	5	800	2.2/25	50
P1900NEL	140	220	4	5	800	2.2/25	50
P2300NEL	180	260	4	5	800	2.2/25	50

SIDACTor Devices

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number. For surge ratings, see table below.

\*\* I<sub>T</sub> is a free air rating; heat sink I<sub>T</sub> rating is 25 A.

### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACTor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.

## Surge Ratings in Amps

Series	I <sub>PP</sub>		I <sub>TSM</sub> 50 / 60 Hz	di/dt Amps/μs
	8x20 *	1.2x50 **		
	Amps			
E	3000		400	500

\* Current waveform in μs

\*\* Voltage waveform in μs

**Thermal Conditions**

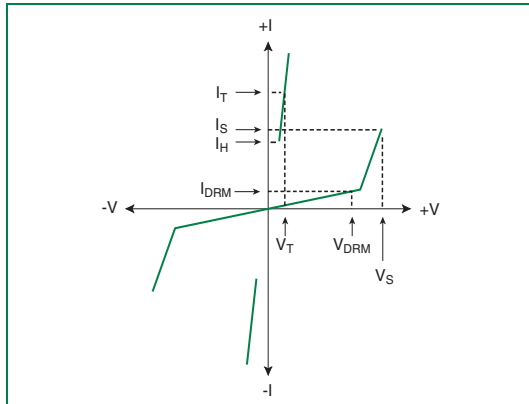
Package	Symbol	Parameter	Value	Unit
TO-263 D <sup>2</sup> PAK 	T <sub>J</sub>	Operating Junction Temperature Range	-40 to +150	°C
	T <sub>S</sub>	Storage Temperature Range	-65 to +150	°C
	T <sub>C</sub>	Maximum Case Temperature	100	°C
	R <sub>θJC</sub> *	Thermal Resistance: Junction to Case	1.7	°C/W
	R <sub>θJA</sub>	Thermal Resistance: Junction to Ambient	56	°C/W

\* R<sub>θJC</sub> rating assumes the use of a heat sink and on state mode for extended time at 25 A, with average power dissipation of 29.125 W.

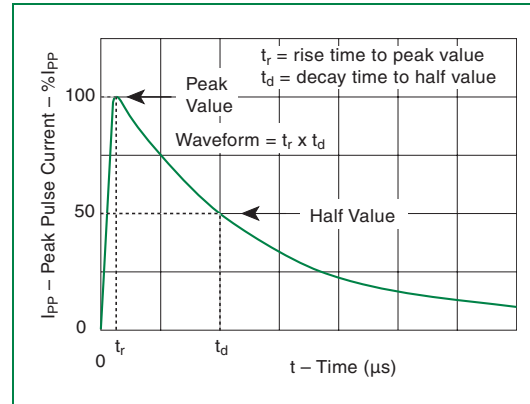
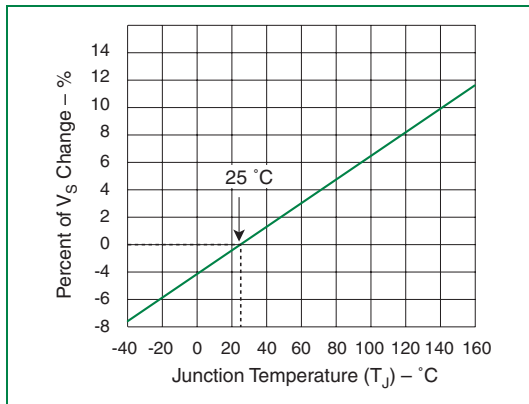
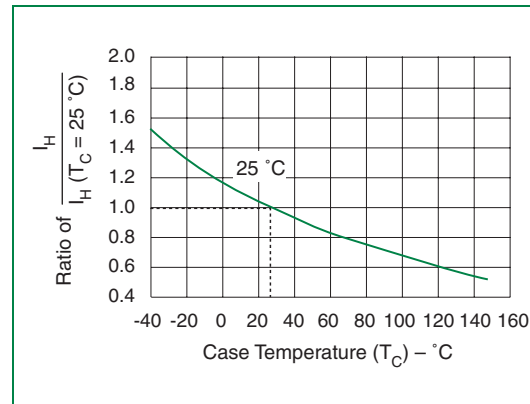
**Capacitance Values**

Part Number	pF	
	MIN	MAX
P1500NEL	260	650
P1900NEL	260	650
P2300NEL	350	600

Note: Off-state capacitance (C<sub>O</sub>) is measured at 1 MHz with a 2 V bias.



V-I Characteristics


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

 Normalized V<sub>S</sub> Change versus Junction Temperature


Normalized DC Holding Current versus Case Temperature

# CATV Line Amplifiers/Power Inserters 3 kA *SIDACtor*<sup>®</sup> Device



This *SIDACtor* device is a 3000 A solid state protection device offered in a non-isolated TO-220 package. It protects equipment located in the severe surge environment of CATV (Community Antenna TV) systems and antenna locations.

## Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps **	I <sub>H</sub> mAmps
P1500REL	140	180	4	5	800	2.2/25	50
P1900REL	140	220	4	5	800	2.2/25	50
P2300REL	180	260	4	5	800	2.2/25	50

SIDACtor Devices

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number. For surge ratings, see table below.

\*\* I<sub>T</sub> is a free air rating; heat sink I<sub>T</sub> rating is 25 A.

### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACtor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.

## Surge Ratings in Amps

Series	I <sub>PP</sub>		I <sub>TSM</sub> 50 / 60 Hz	di/dt
	8x20 *	1.2x50 **		
	Amps		Amps	Amps/μs
E	3000		400	500

\* Current waveform in μs

\*\* Voltage waveform in μs

**Thermal Considerations**

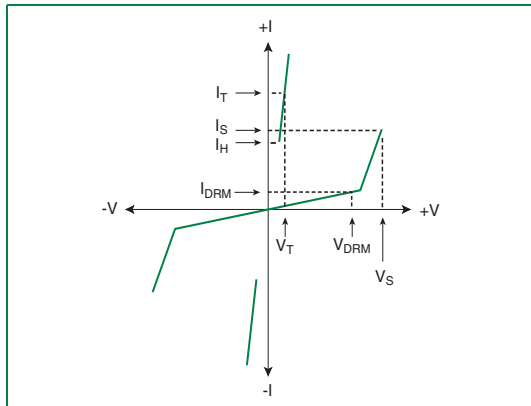
Package	Symbol	Parameter	Value	Unit
TO-220 	$T_J$	Operating Junction Temperature Range	-40 to +150	°C
	$T_S$	Storage Temperature Range	-65 to +150	°C
	$T_C$	Maximum Case Temperature	100	°C
	$R_{\theta JC}^*$	Thermal Resistance: Junction to Case	1.7	°C/W
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	56	°C/W

\*  $R_{\theta JC}$  rating assumes the use of a heat sink and on state mode for extended time at 25 A, with average power dissipation of 29.125 W.

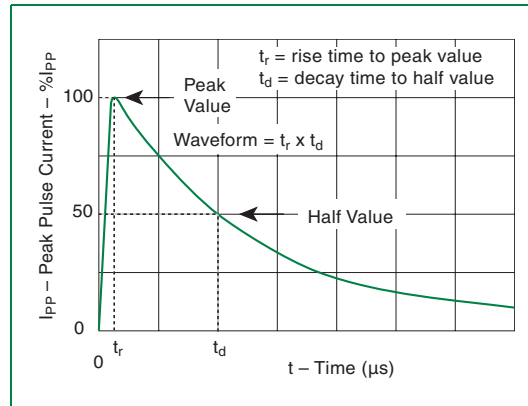
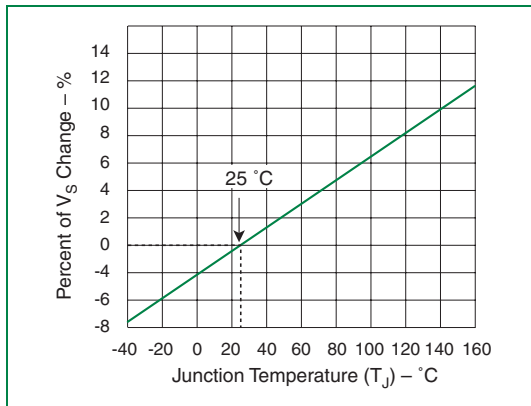
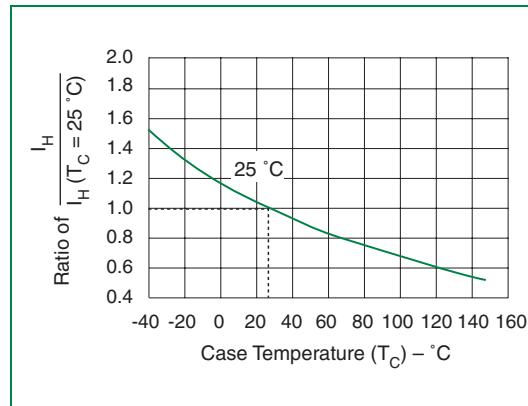
**Capacitance Values**

Part Number	pF	
	MIN	MAX
P1500REL	260	650
P1900REL	180	290
P2300REL	170	270

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



V-I Characteristics


 $t_r \times t_d$  Pulse Waveform

 Normalized  $V_S$  Change versus Junction Temperature


Normalized DC Holding Current versus Case Temperature

## CATV Line Amplifiers/Power Inserters 5 kA *SIDACTor*<sup>®</sup> Device



This *SIDACTor* device is a 5000 A solid state protection device offered in a non-isolated TO-218 package. It protects equipment located in the severe surge environment of CATV (Community Antenna TV) systems and antenna locations.

SIDACTor Devices

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps **	I <sub>H</sub> mAmps
P1500MEL	140	180	4	5	800	2.2/25	50
P1900MEL	140	220	4	5	800	2.2/25	50
P2300MEL	180	260	4	5	800	2.2/25	50

\* "L" in part number indicates RoHS compliance. For non-RoHS compliant device, delete "L" from part number.  
For surge ratings, see table below.

\*\* I<sub>T</sub> is a free air rating; heat sink I<sub>T</sub> rating is 25 A.

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed *SIDACTor* devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.

### Surge Ratings in Amps

Series	I <sub>PP</sub>		I <sub>TSM</sub> 50 / 60 Hz	di/dt
	8x20 *	1.2x50 **		
	Amps		Amps	Amps/μs
E	5000		400	630

\* Current waveform in μs

\*\* Voltage waveform in μs

**Thermal Conditions**

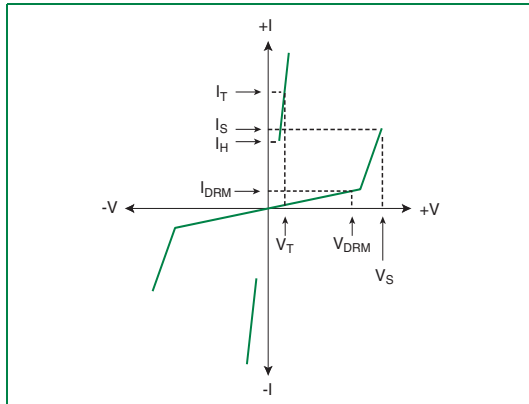
Package	Symbol	Parameter	Value	Unit
TO-218 	$T_J$	Operating Junction Temperature Range	-40 to +150	°C
	$T_S$	Storage Temperature Range	-65 to +150	°C
	$T_C$	Maximum Case Temperature	100	°C
	$R_{\theta JC}$	Thermal Resistance: Junction to Case	1.7	°C/W
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	56	°C/W

$R_{\theta JC}$  rating assumes the use of a heat sink and on state mode for extended time at 25 A, with average power dissipation of 29.125 W.

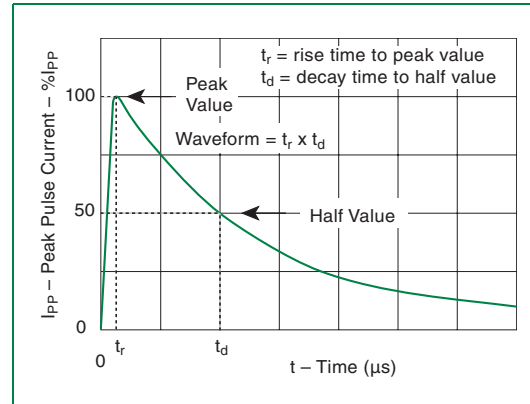
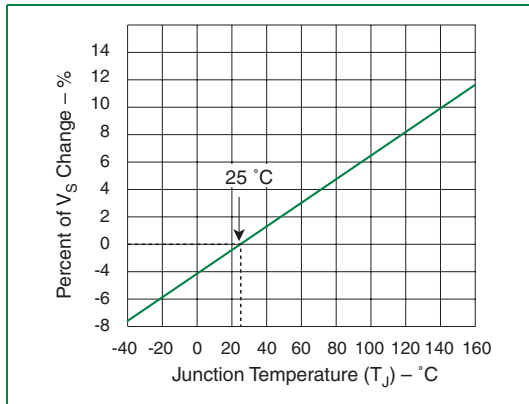
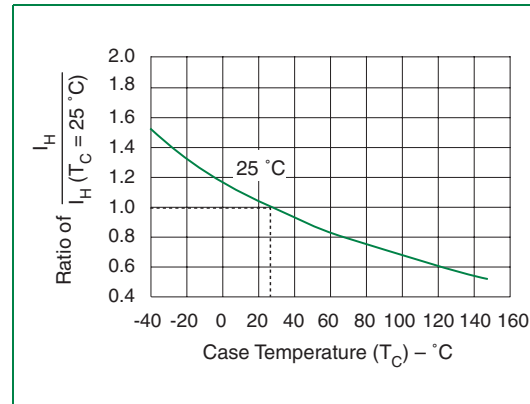
**Capacitance Values**

Part Number	pF	
	MIN	MAX
P1500MEL	400	650
P1900MEL	400	650
P2300MEL	350	600

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



V-I Characteristics


 $t_r \times t_d$  Pulse Waveform

 Normalized  $V_S$  Change versus Junction Temperature


Normalized DC Holding Current versus Case Temperature

## SIDACTor® Cell



SIDACTor cells are used in primary or secondary protection modules.

### Electrical Parameters

Part Number *	V <sub>DRM</sub> Volts	V <sub>S</sub> Volts	V <sub>T</sub> Volts	I <sub>DRM</sub> μAmps	I <sub>S</sub> mAmps	I <sub>T</sub> Amps	I <sub>H</sub> mAmps
P-T100-030	25	40	4	5	800	2.2	150
P-T100-064	58	77	4	5	800	2.2	150
P-T100-090	75	98	4	5	800	2.2	150
P-T100-150	140	180	4	5	800	2.2	150
P-T100-230	190	260	4	5	800	2.2	260
P-T100-350	320	400	4	5	800	2.2	260

SIDACTor Devices

#### General Notes:

- All measurements are made at an ambient temperature of 25 °C. I<sub>PP</sub> applies to -40 °C through +85 °C temperature range.
- I<sub>PP</sub> is a repetitive surge rating and is guaranteed for the life of the product.
- Listed SIDACTor devices are bi-directional. All electrical parameters and surge ratings apply to forward and reverse polarities.
- V<sub>DRM</sub> is measured at I<sub>DRM</sub>.
- V<sub>S</sub> is measured at 100 V/μs.
- Special voltage (V<sub>S</sub> and V<sub>DRM</sub>) and holding current (I<sub>H</sub>) requirements are available upon request.


### Surge Ratings in Amps

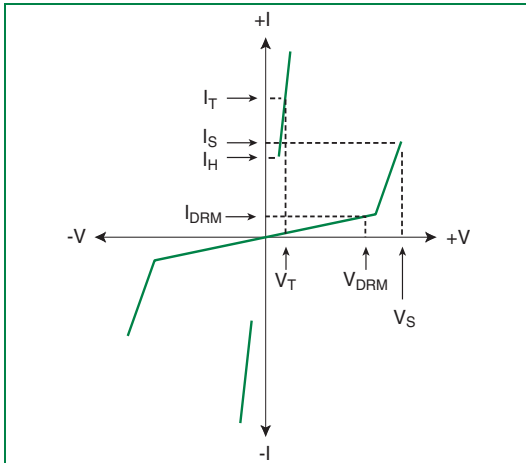
Series	I <sub>PP</sub>									I <sub>TSM</sub> 50 / 60 Hz	di/dt
	0.2x310 *	2x10 *	8x20 *	10x160 *	10x560 *	5x320 *	10x360 *	10x1000 *	5x310 *		
	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps	Amps		
C	50	500	400	200	150	200	175	100	200	30	500

\* Current waveform in μs

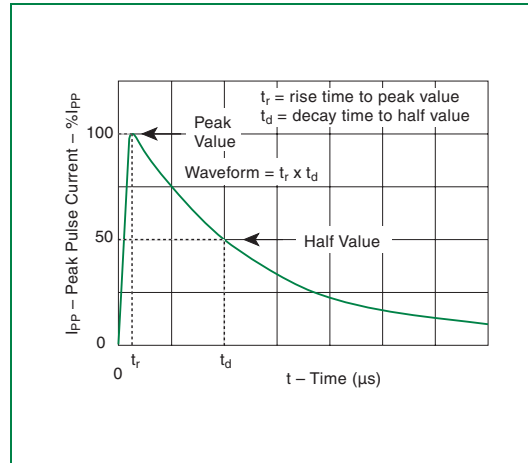
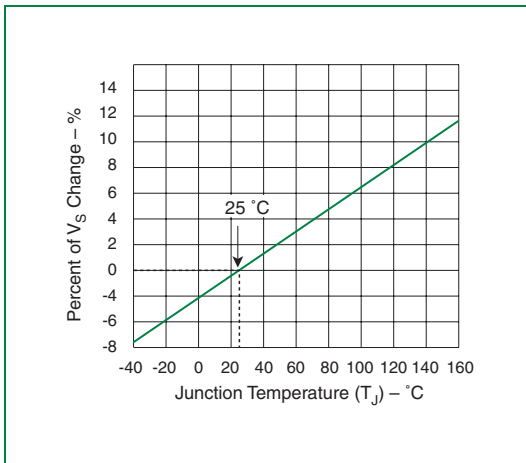
\*\* Voltage waveform in μs

**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
[Cell]	$T_J$	Operating Junction Temperature Range	-40 to +65	°C
	$T_S$	Storage Temperature Range	-65 to +150	°C



V-I Characteristics


 $t_r \times t_d$  Pulse Waveform

 Normalized  $V_S$  Change versus Junction Temperature