

**SDP Series - SOT23-5**



**Description**

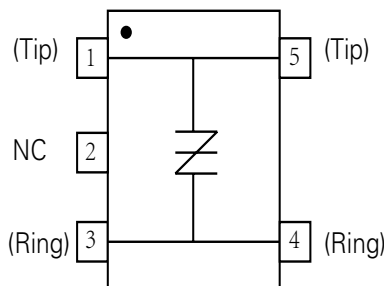
This new SIDACtor series thyristors are targeted for the tertiary or line driver side protection position for VDSL2+, ADSL2 applications and general I/O protection functions. This new low capacitance over voltage protection does not require a bias voltage and is sufficiently robust for the chip-side position behind the coupling transformer.

This SOT23-5 solution, with its flow-through design, minimizes PCB trace layout routing, while its four different stand-off voltage values offer compatibility with a variety of line drivers. Its low capacitance makes it compatible with ADSL2 and VDSL2, and the 30MHz bandplan of VDSL2+.

**Agency Approvals**

Agency	Agency File Number
	E133083

**Schematic Symbol**



**Features & Benefits**

- Lower overshooting protection than clamping
- SOT23-5 surface mount package
- Low insertion loss
- Low capacitance
- Bidirectional transient voltage protection
- Robust surge rating
- Starts to switch in nanoseconds
- RoHS compliant and Halogen-Free
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

**Applicable Global Standards**

- YD/T 950
- YD/T 993
- YD/T 1082
- GR 1089 Inter-building
- GR 1089 Intra-building
- IEC 61000-4-2
- IEC 61000-4-5 2nd edition
- ITU K.20/21/45 Basic Level
- ITU K.20/21/45 Enhanced Level
- TIA-968-A
- TIA-968-B

**Additional Information**



Datasheet



Resources



Samples

**Electrical Characteristics**

Part Number	Marking	$V_{DRM} @ I_{DRM}=5\mu A$	$V_S @ 250V/\mu s$	$I_H$	$I_S$	$V_T @ I_T=1.0$ Amps	$Co @ f=1MHz, 2V$	
		V min	V max	mA typ	mA max	V max	pF typ	pF max
SDP0080T023G5RP	P8G	8	15	30	500	4.0	8.0	9.0
SDP0120T023G5RP	P12G	12	20	30	500	4.0	7.8	9.0
SDP0180T023G5RP	P18G	18	25	30	500	4.0	7.3	8.3
SDP0240T023G5RP	P24G	24	35	30	500	4.0	5.7	6.5

Notes:

- All measurement are made at an ambient temperature of 25°C.
- Ipp applies to -40°C through +85°C temperature range.
- Ipp is repetitive surge rating and is guaranteed for the life of the product.
- SIDACtor components are bidirectional. All electrical parameters and surge rating apply to forward and reverse polarities.

**Maximum Ratings**

Parameter Name	Symbol	Test Conditions	Value	Units	
Lightning surge waveforms	$I_{pp}$	8/20 <sup>1</sup> 1.2/50 <sup>2</sup>	SDP0080T023G5RP	50	A
			SDP0120T023G5RP	70	
		5/310 <sup>1</sup> 10/700 <sup>2</sup>	SDP0180T023G5RP	70	
			SDP0240T023G5RP	70	
Operating Free Temperature Range	$T_A$		min	max	
Junction temperature	$T_J$		-40	+85	°C
Storage temperature	$T_{STG}$		-40	+150	°C

Notes:

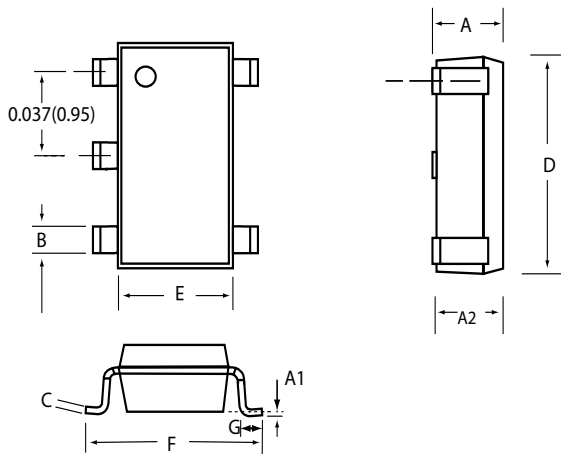
- 1. Voltage waveform in  $\mu s$
- 2. Current waveform in  $\mu s$

-The device also complies with IEC 61000-4-2 ESD  $\pm 15kV$  (air discharge),  $\pm 8 kV$  (contact discharge) and IEC 61000-4-4 EFT 40A(5/50ns) in equipment level ESD test when used behind the xDSL transformer.

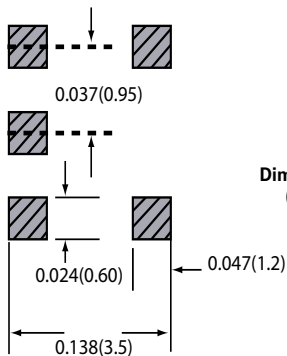
- The component must initially be in thermal equilibrium with  $-40^{\circ}C \leq T_{Ji} \leq +150^{\circ}C$
- The lightning surge may be repeated after the device returns to its initial conditions.

**Mechanical dimensions, recommended layout dimensions**

The epoxy meets UL 94V-0 ratings.

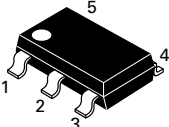


Dimension	Inches		Millimeters	
	Min	Max	Min	Max
<b>A</b>	0.035	0.057	0.90	1.45
<b>A1</b>	0	0.004	0	0.10
<b>A2</b>	0.035	0.051	0.90	1.30
<b>B</b>	0.014	0.020	0.35	0.50
<b>C</b>	0.004	0.008	0.09	0.20
<b>D</b>	0.11	0.118	2.80	3.00
<b>E</b>	0.059	0.069	1.50	1.75
<b>F</b>	0.102	0.118	2.6	3.00
<b>G</b>	0.004	0.024	0.10	0.60

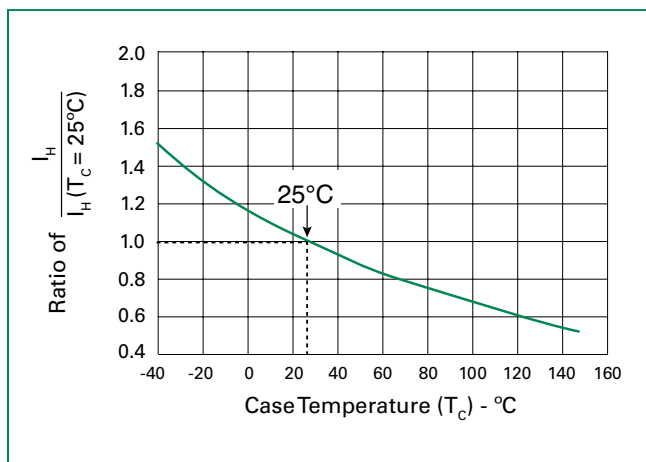


Dimension are in inches  
(and millimeters).

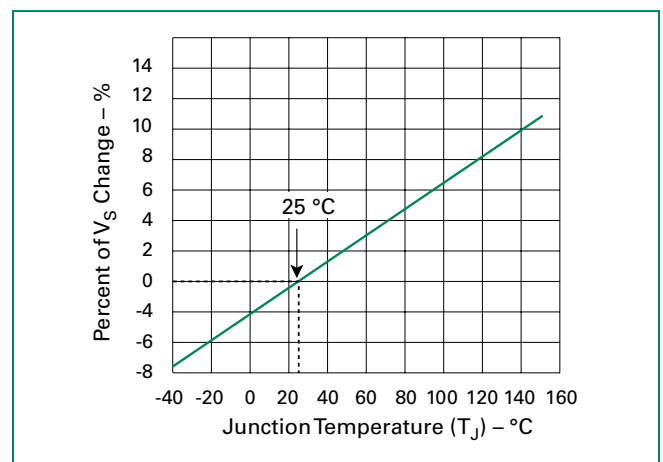
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
	$T_J$	Operating Junction Temperature Range	-40 to +150	°C
	$T_{STG}$	Storage Temperature Range	-40 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	120	°C/W

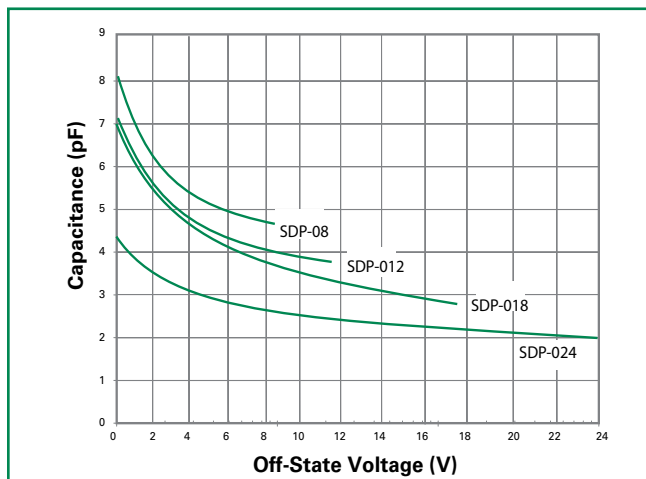
**Holding Current vs. Case Temperature**



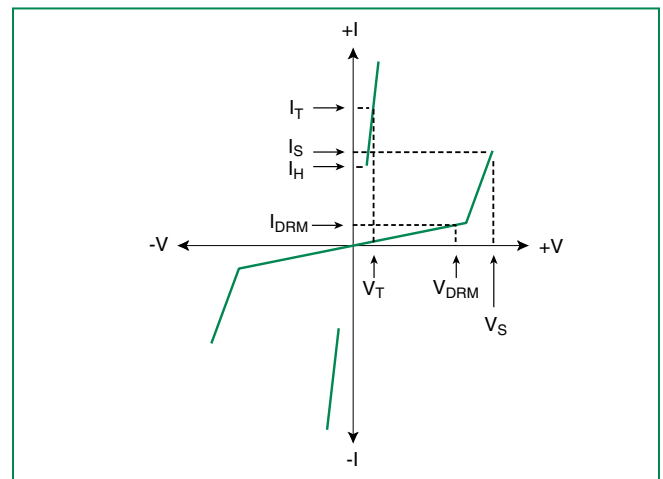
**$V_S$  vs. Junction Temperature**



**Capacitance vs. Bias Voltage**



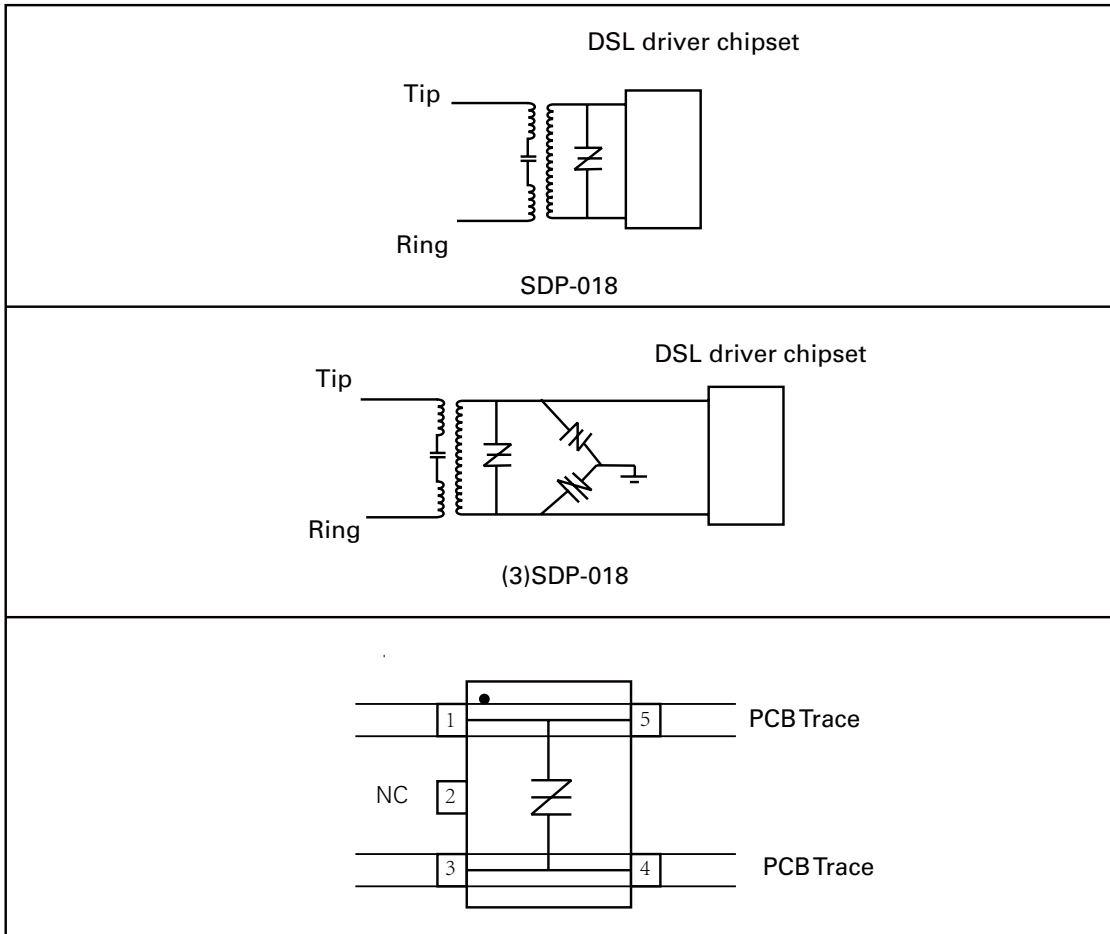
**V-I Characteristics**



**SDP-xxx Application example**

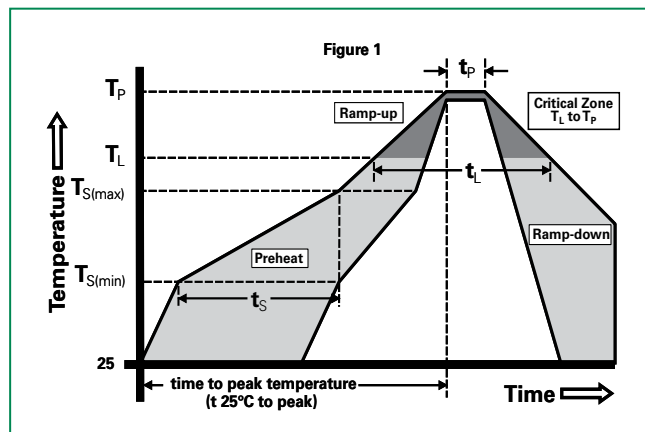
The following schematics show alternate protection solutions for a typical DSL interface that connects to outside wiring. This surface mount SOT23-5 chip-side solution provides a minimum footprint solution appropriate for high density card designs. The SDP-xxx0T023 will protect the interface from lightning induced surges on the chip-side of the coupling transformer. This tertiary protector may be preceded by line-side protection such as the TeleLink over-current protector

and the SDP3500Q38CB overvoltage protector. GDTs may also be used on the line side of the coupling transformer. The flow-through design of the SOT23-5 package is illustrated below. If the inter winding capacitance of the transformer is allowing some common mode events to get coupled across, then the SDP-xxx0T023 can be placed in a three chip mode, as shown below for additional chip-side protection.



### Soldering Parameters

Reflow Condition	Pb-Free assembly (see Fig. 1)	
Pre Heat	-Temperature Min ( $T_{s(min)}$ )	+150°C
	-Temperature Max ( $T_{s(max)}$ )	+200°C
	-Time (Min to Max) ( $t_s$ )	60-180 secs.
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)	3°C/sec. Max.	
$T_{s(max)}$ to $T_L$ - Ramp-up Rate	3°C/sec. Max.	
Reflow	-Temperature ( $T_L$ ) (Liquidus)	+217°C
	-Temperature ( $t_L$ )	60-150 secs.
Peak Temp ( $T_p$ )	+260(+0/-5)°C	
Time within 5°C of actual Peak Temp ( $t_p$ )	30 secs. Max.	
Ramp-down Rate	6°C/sec. Max.	
Time 25°C to Peak Temp ( $T_p$ )	8 min. Max.	
Do not exceed	+260°C	



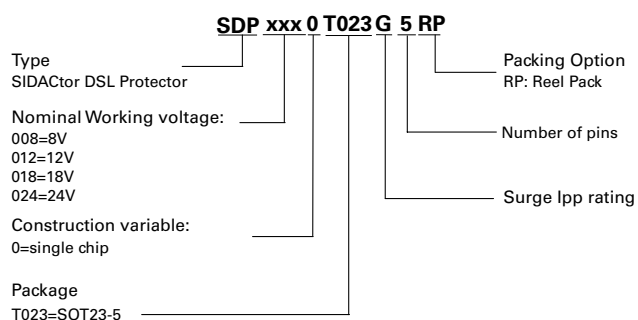
### Physical Specifications

<b>Terminal Material</b>	100% Matte-Tin Plated
<b>Solderability</b>	EIA J-STD-002, TEST A.

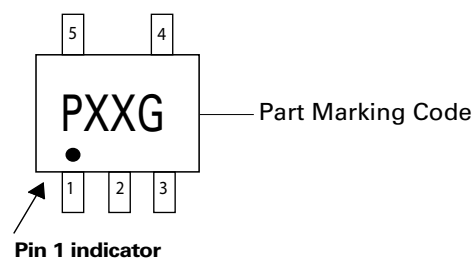
### Environmental Specifications

<b>Temp Cycling</b>	Mil-STD-883, Method 1010.8 Condition C, -65°C to +150°C 168 Hrs, 85°C /60%RH+3IR-Reflow, 260°C +5V, -0°C
<b>Bias Humidity</b>	JESD 22-A101 85°C, 85%CRH. 50V 168 Hrs, 85°C /60%RH+3IR-Reflow, 260°C +5V, -0°C
<b>Pressure Cooker</b>	JEDEC 22-A102 No Bias, 121°C, 100%RH 96Hrs/192Hrs. 168 Hrs, 85°C /60%RH+3IR-Reflow, 260°C +5V, -0°C
<b>High Temp Storage</b>	JESD 22-A103 Con B. 150°C, no bias 1000Hrs
<b>HTRB</b>	JESD 22-108 168 Hrs, 85°C /60%RH+3IR-Reflow, 260°C +5V, -0°C
<b>Thermal Shock</b>	Mil-STD-883, Method 1011.9 Condition A, 0°C to 100°C 168 Hrs, 85°C /60%RH+3IR-Reflow, 260°C +5V, -0°C
<b>C-SAM</b>	As per flow, JSTD-020 pre&post preconditioning test.
<b>Wet Humidity (Tin only)</b>	NEMI standard: 60°C/93%RH

### Part Numbering



### Part Marking

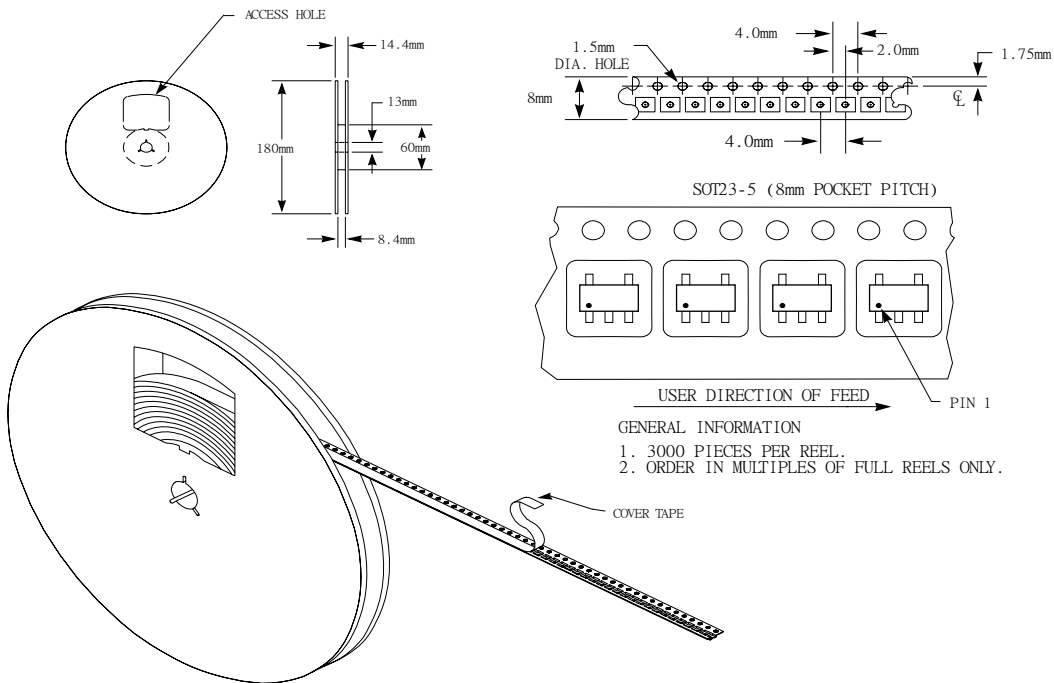


**Packing Options**

Package Type	Description	Quantity	Added Suffix	Min. Order Qty.	Industry Standard
T023	SOT23-5 Tape & Reel Pack	3000	RP	3000	EIA-481-A

**Tape and Reel Specification — SOT23-5**

8mm TAPE AND REEL



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