Description

SPxxxxSD series is a type of semiconductor protection thyristor with surface mount package solution. It is designed to protect baseband equipment from damaging overvoltage transients, such as modems, telephones, line cards, answering machines, FAX machines, T1/E1, xDSL and more.

Schematic Symbol

Features

- Lower capacitance
- Low profile package
- Low on-state voltage
- Max Surge capability 10 × 700 μs @40 Ω:8 kV
- Excellent capability of absorbing transient surge
- Quick response to surge voltage (ns Level)
- Eliminates overvoltage caused by fast rising transients
- Moisture sensitivity level: Level 1
- Non degenerative
- Flammability Rating: UL 94 V-0
- Halogen free and RoHS compliant

Order Information (Example)

Type	Package	Marking Code	Delivery Form	Delivery Quantity
SP2600SD	DO-214AA(SMB)	P26D	13” T&R	3000 PCS

Limiting Values

(T_A = 25 °C, unless otherwise specified)

Symbol	Parameter	Conditions	Min	Max	Unit
I_{PP}	Repetitive peak pulse current	10 / 1000 μs	200	-	A
T_J	Operating Temperature Range	-	-40	150	℃
T_{stg}	Storage Temperature Range	-	-55	150	℃

Surge Rating	I_{PP} (A) min			
	2 / 10 μs[1]	8 / 20 μs[1]	10 / 700 μs[2]	10 / 1000 μs[1]
D	800	700	8kV	200

Notes:

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

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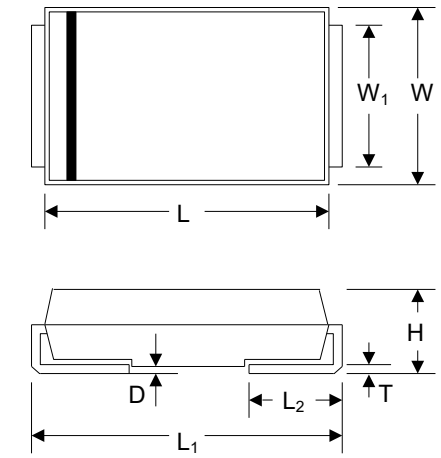
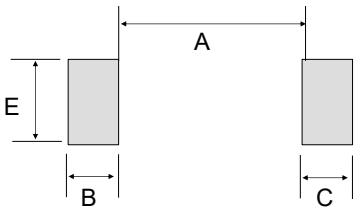
Package Dimensions

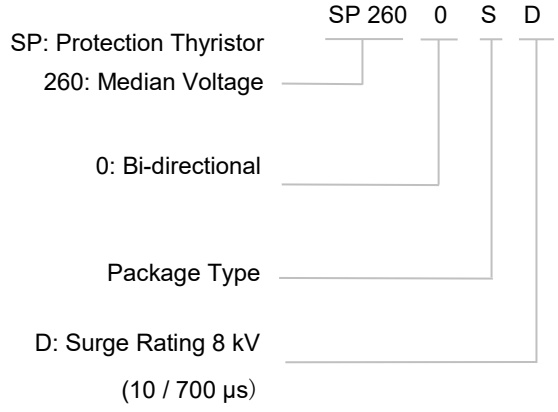


Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
L	4.06	4.75	0.160	0.187
W	3.30	3.94	0.130	0.155
W_1	1.93	2.20	0.076	0.086
H	1.99	2.61	0.078	0.103
T	0.152	0.305	0.006	0.012
L_1	5.21	5.59	0.205	0.220
L_2	0.76	1.52	0.030	0.060
D	-	0.203	-	0.008
A	-	2.74	-	0.107
B	2.16	-	0.085	-
C	2.16	-	0.085	-
E	2.26	-	0.089	-

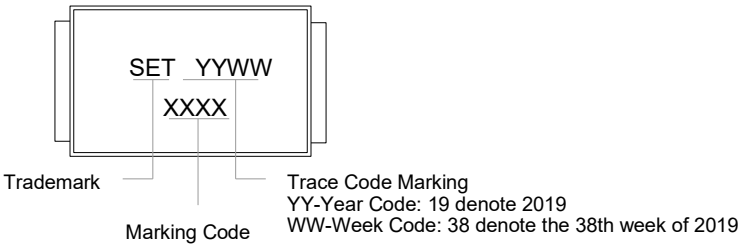


(Mounting Pad Layout)

Part Numbering System (Example)



Marking



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Electrical Characteristics

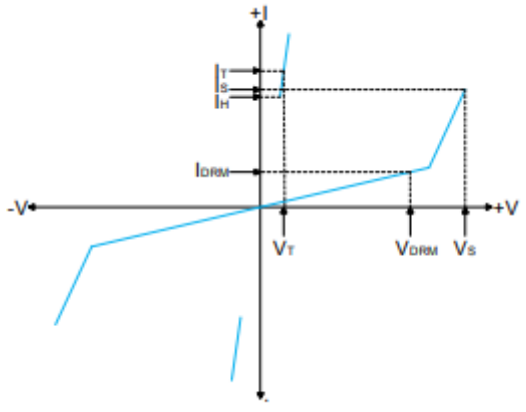
(T_A = 25 °C, unless otherwise specified)

Part Number	I_{DRM}@V_{DRM}		V_S [1]@I_S		V_T@ I_T		I_H	Capacitance [2]	Marking Code
	μA	V	V	mA	V	A	mA	pF	
	max		max	max	max	max	min	max	
SP0800SD*	1	6	15	800	4	2.2	50	150	P08D
SP0300SD*	1	25	40	800	4	2.2	50	150	P03D
SP0640SD*	1	58	77	800	4	2.2	50	150	P06D
SP0720SD*	1	65	87	800	4	2.2	50	150	P07D
SP0900SD*	1	75	98	800	4	2.2	50	140	P09D
SP1100SD	1	90	130	800	4	2.2	50	110	P11D
SP1300SD	1	120	160	800	4	2.2	50	100	P13D
SP1500SD	1	140	180	800	4	2.2	50	100	P15D
SP1800SD	1	170	220	800	4	2.2	50	100	P18D
SP2300SD	1	190	260	800	4	2.2	50	100	P23D
SP2600SD	1	220	300	800	4	2.2	50	100	P26D
SP3100SD	1	275	350	800	4	2.2	50	100	P31D
SP3500SD	1	320	400	800	4	2.2	50	100	P35D
SP3800SD	1	340	450	800	4	2.2	50	100	P38D
SP4200SD	1	400	520	800	4	2.2	50	100	P42D

Notes:

1. Vs is measured at 100 kV / S.
2. Off-state capacitance is measured in VDC=2 V, VRMS=1 V, f=1 MHz.
3. Part number with * : T_J—Operating Temperature Max. 125℃

Symbol	Parameter
V_{DRM}	Peak off-state voltage
I_{DRM}	Off-state current
V_S	Switching voltage
I_S	Switching current
V_T	On-state voltage
I_T	On-state current
I_H	Holding current
C_O	Off-state capacitance



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Performance Curve for Reference

(T_A=25 °C unless otherwise noted)

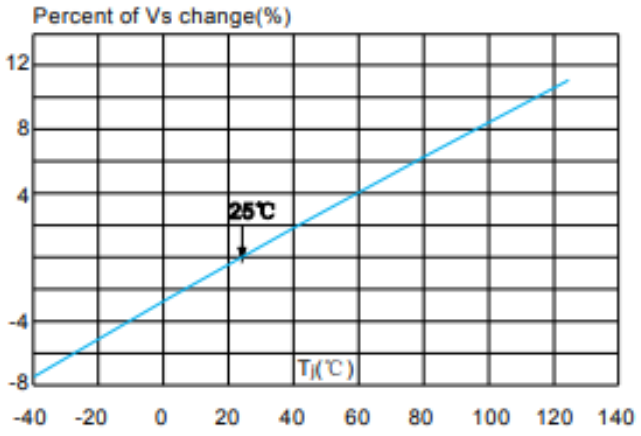

FIGURE 1

Normalized VS. Change VS. Junction Temperature

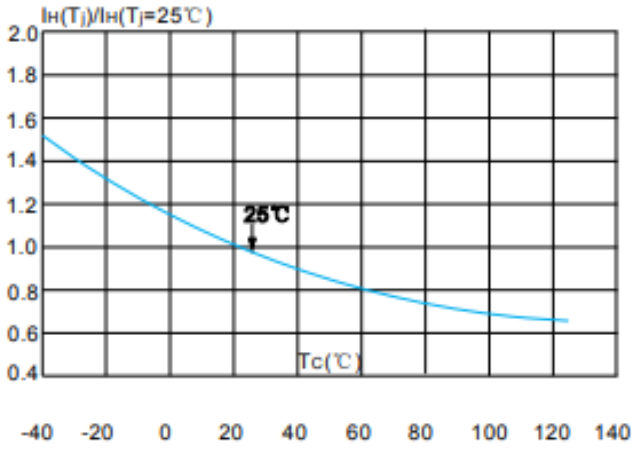

FIGURE 2

Normalized DC Holding Current VS. Case Temperature

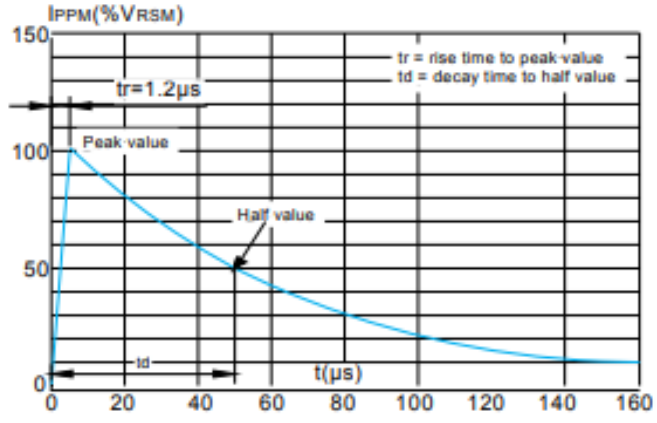

FIGURE 3

tr × td Pulse Waveform

Environmental Specifications

High Temp. Storage	JESD22-A103
HTRB	JESD22-A108
Temperature Cycling	JESD22-A104
MSL	JESDEC-J-STD-020, Level 1
H3TRB	JESD22-A101
RSH	JESD22-A111

Physical Specifications

Weight	0.003 ounce,0.094 grams
Case	JESD22DO214AA. Molded plastic body over glass passivated junction
Polarity	Color band denotes positive end (cathode) except Bidirectional
Terminal	Matte Tin-plated leads, Solderability per JESD22-B102

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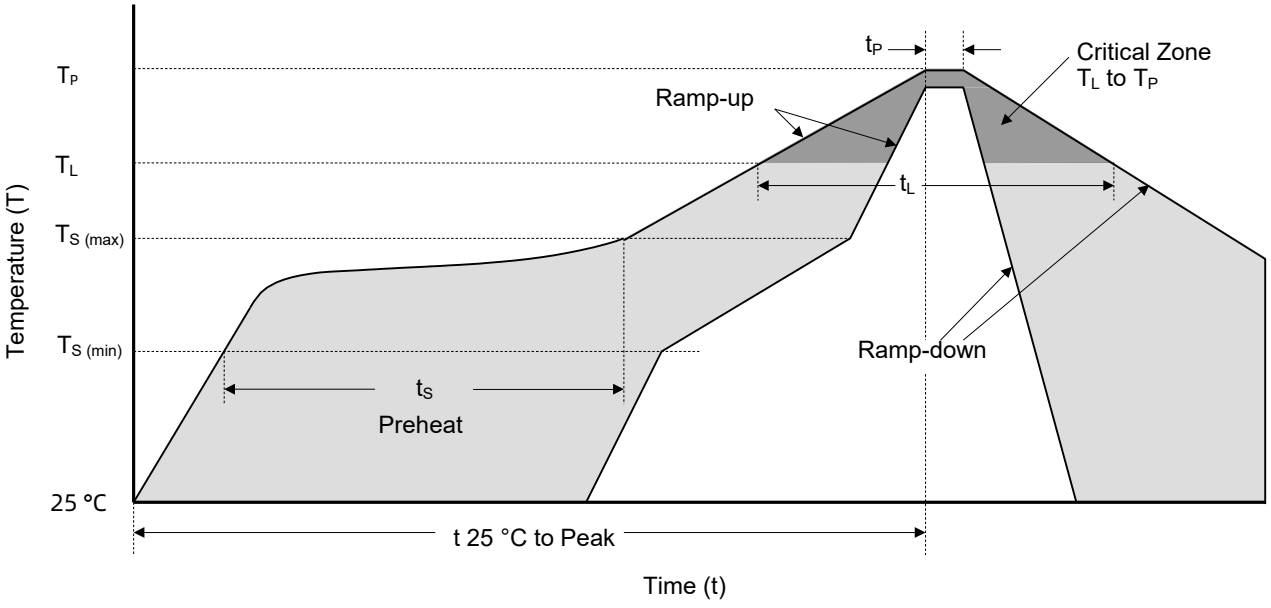
Soldering Parameters



Reflowing Condition

Reflow Soldering Parameters		Lead-Free Assembly
Pre-heat	Temperature Min ($T_{S\ (min)}$)	150 °C
	Temperature Max ($T_{S\ (max)}$)	200 °C
	Time (min to max) (t_s)	60 ~ 120 seconds
Average Ramp Up Rate (Liquidus Temp (T_L) to Peak Temp (T_P))		3 °C / second max.
T_S (max) to T_L-Ramp-up Rate		3 °C / second max.
Reflow	Temperature (T_L)	217 °C
	Time (t_L)	60 ~ 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time of within 5 °C of Actual Peak Temperature (t_P)		30 seconds
Ramp-down Rate		6 °C / second max.
Time From 25 °C to Peak Temperature		8 Minutes max.
Do Not Exceed		260 °C

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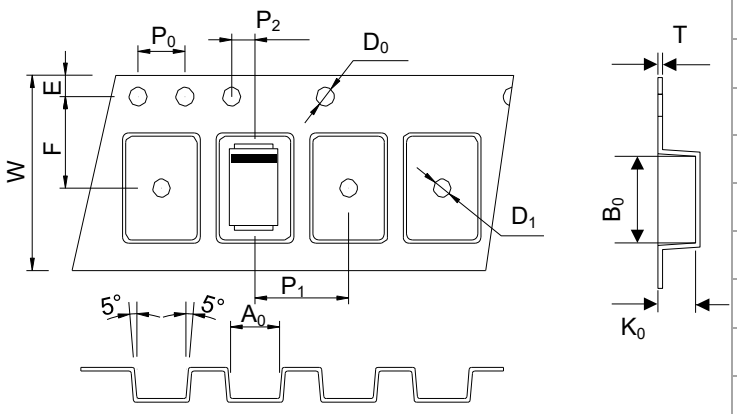
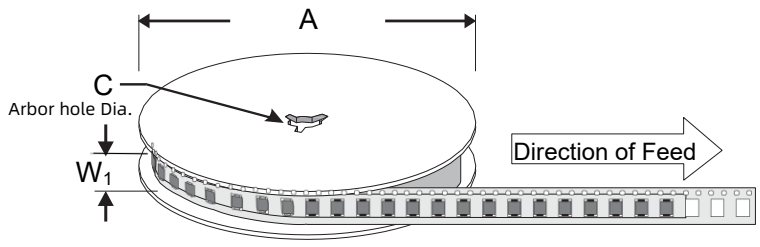
Packaging Information

Tape	Symbol	Dimension (mm)
	W	12.00+0.30/-0.10
	P_0	4.00±0.10
	P_1	8.00±0.10
	P_2	2.00±0.05
	D_0	1.55±0.05
	D_1	1.55±0.05
	E	1.75±0.1
	F	5.50±0.05
	A_0	3.78±0.10
	B_0	5.65±0.15
	K_0	2.70±0.10
	T	0.30±0.05

Reel Size	Symbol	Dimension (mm)
	A	330 mm
	C	13.2 mm
	W_1	12.5 mm

Part Number	Package	QTY (Reel)	Packaging Option	Packaging Specification
SPxxxxSD	DO-214AA	3000 PCS	Tape & Reel – 12 mm tape/13” reel	EIA STD RS-481

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ATTENTION

Usage

1. TSS must be operated in the specified ambient temp..
2. Do not clean the TSS with strong polar solvent such as ketone, esters, benzene and halogenated hydrocarbon, to avoid damaging the encapsulating layer.
3. Please do not apply severe vibration, shock or pressure to TSS, to avoid element cracking.

Replacement

1. If TSS is visually damaged, please replace it.
2. TSS is a non-repairable product. For safety sake, please use equivalent TSS for replacement.

Storage

1. Storage Temp. Range: (-55 to 150) °C.
2. Do not store the TSS at the high temp., high humidity or corrosive gas environment, to avoid influencing the solder- ability of the lead wires. The product shall be used up within 1 year after receiving the goods.

Environmental Conditions

1. TSS should not be exposed to the open air, nor direct sunshine.
2. TSS should avoid rain, water vapor or other condition of high temp. and high humidity.
3. TSS should avoid sand dust, salt mist, or other harmful gases.

Max. Typical Capacitance of TSS

The typical capacitance of TSS is listed in the specifications. Designers may refer to it when designing TSS in High frequency circuit.

Installation Mechanical Stress

1. Do not knock TSS when installing, to avoid mechanical damage.
2. Please do not apply severe vibration, shock or pressure to TSS, to avoid surface resin or element cracking.

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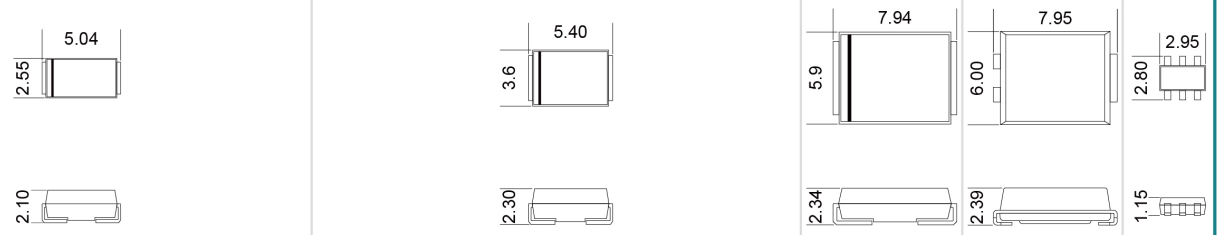
Thyristor Surge Suppressors (Surface Mount) Feature Overview

Package Type \ Series	A	B	C	SPxxxxSB	SPxxxxSC	SPxxxxSD	SPxxxxSDT	SP0080SDT-3L	SIP5024G
DO-214AA	○	○	○	SPxxxxSB	SPxxxxSC	SPxxxxSD	○	○	○
DO-214AB	○	○	○	○	○	○	SPxxxxSDT	SP0080SDT-3L	○
DO-214AC	SP0080TALC	SP0080TBLC	SPxxxxSA	○	○	○	○	○	○
SOD-23-6	○	○	○	○	○	○	○	○	SIP5024G

Product Outline (mm)



	A	B	B	B	C	D	DT	DT	NA
Surge Rating	(2 kV @ 10/700 μs)	(4 kV @ 10/700 μs)	(4 kV @ 10/700 μs)	(4 kV @ 10/700 μs)	(6 kV @ 10/700 μs)	(8 kV @ 10/700 μs)	(6 kV@ 1.2/50 μs)	(6 kV@ 1.2/50 μs)	
V_{DRM} (V) Peak off-state voltage	6	6	58 ~ 340	6 ~ 400	6 ~ 440	6 ~ 400	6, 15, 400	6	24
I_{PP} (A) (8/20 μs) Repetitive peak pulse current	90	250	250	250	400	700	3000	3000	35
C_J (pF) capacitance	10	30	20 ~ 35	25 ~ 50	35 ~ 60	40 ~ 150	500, 250, 170	700	11
Operating Temperature (°C)	-55 to +150								

TSS
Thyristor Surge Suppressors
SPxxxxSD DO-214AA

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