Description

SPxxxxSA 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: 4 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
SP2300SA	DO-214AC(SMA)	P23A	13” T&R	7500 PCS

Limiting Values

(T_A = 25 °C, unless otherwise specified)

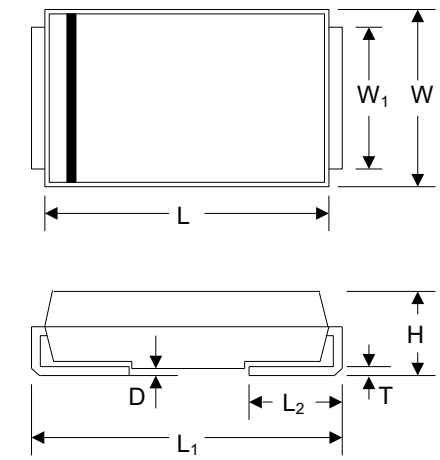
Symbol	Parameter	Conditions	Min	Max	Unit
I_{PP}	Repetitive peak pulse current	10 / 1000 μs	80	-	A
T_J	Operating Temperature Range	-	-40	150	℃
T_{stg}	Storage Temperature Range	-	-55	150	℃

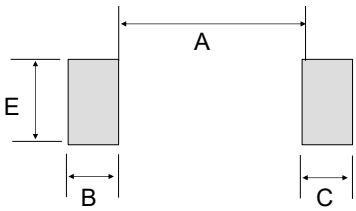
Surge Rating	I_{PP} (A) min				
	2 / 10 μs[1]	8 / 20 μs[1]	10 / 360 μs[1]	10 / 700 μs[2]	10 / 1000 μs[1]
A	250	250	125	100	80

Notes:

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

Package Dimensions

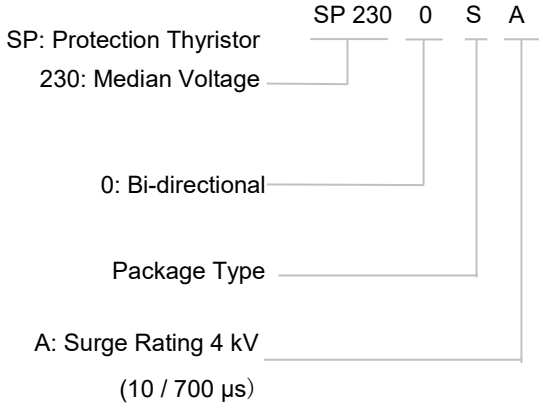




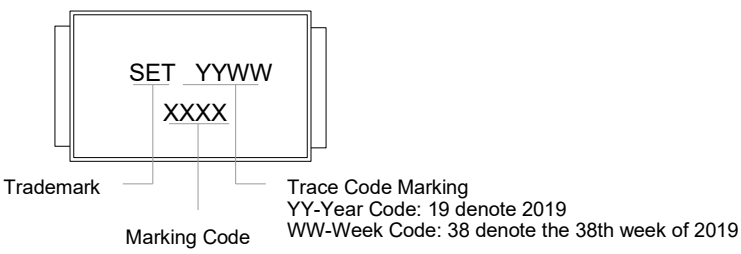
(Mounting Pad Layout)

Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
L	3.99	4.60	0.157	0.181
W	2.30	2.79	0.095	0.110
W_1	1.25	1.65	0.049	0.065
H	1.90	2.29	0.075	0.090
T	0.152	0.305	0.006	0.012
L_1	4.80	5.28	0.189	0.208
L_2	0.78	1.52	0.030	0.060
D	-	0.203	-	0.008
A	-	2.30	-	0.090
B	2.10	-	0.082	-
C	2.10	-	0.082	-
E	1.80	-	0.070	-

Part Numbering System (Example)



Marking



Electrical Characteristics

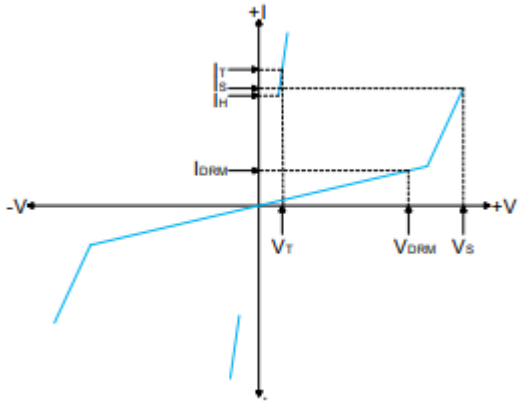
(T_A = 25 °C, unless otherwise specified)

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	
SP0640SA	1	58	77	800	4	2.2	120	35	P06A
SP0720SA	1	65	87	800	4	2.2	120	35	P07A
SP0900SA	1	75	98	800	4	2.2	120	35	P09A
SP1100SA	1	90	130	800	4	2.2	120	35	P11A
SP1300SA	1	120	160	800	4	2.2	120	35	P13A
SP1500SA	1	140	180	800	4	2.2	120	35	P15A
SP1800SA	1	170	220	800	4	2.2	120	35	P18A
SP2300SA	1	190	260	800	4	2.2	120	25	P23A
SP2600SA	1	220	300	800	4	2.2	120	25	P26A
SP3100SA	1	275	350	800	4	2.2	120	25	P31A
SP3500SA	1	320	400	800	4	2.2	120	20	P35A
SP3800SA	1	340	450	800	4	2.2	120	20	P38A

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.

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



Performance Curve for Reference

(T_A=25 °C unless otherwise noted)

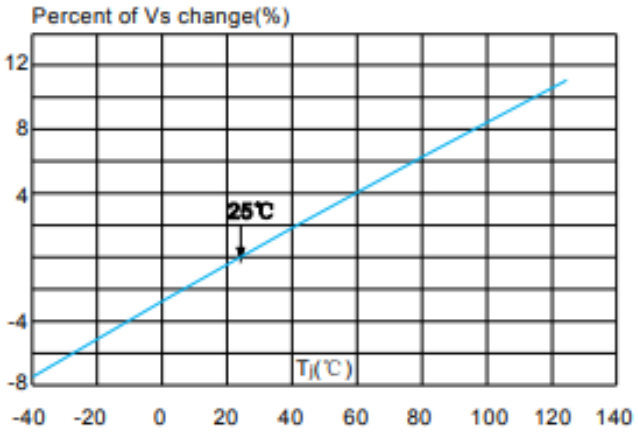


FIGURE 1
Normalized VS. Change VS. Junction Temperature

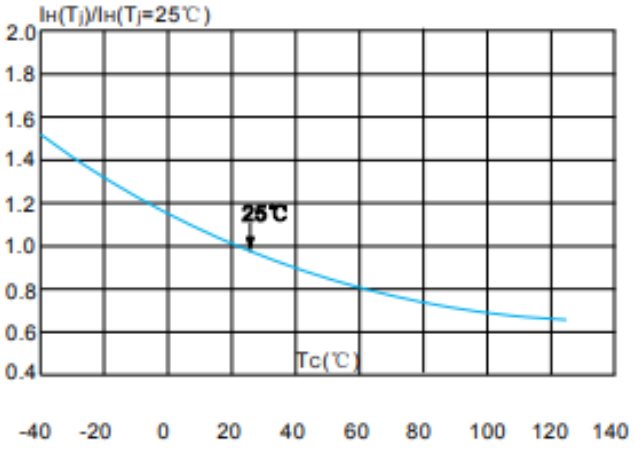


FIGURE 2
Normalized DC Holding Current VS. Case Temperature

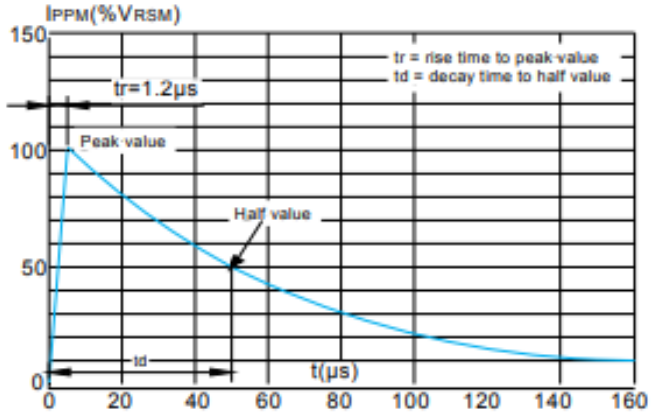


FIGURE 3
tr × td Pulse Waveform

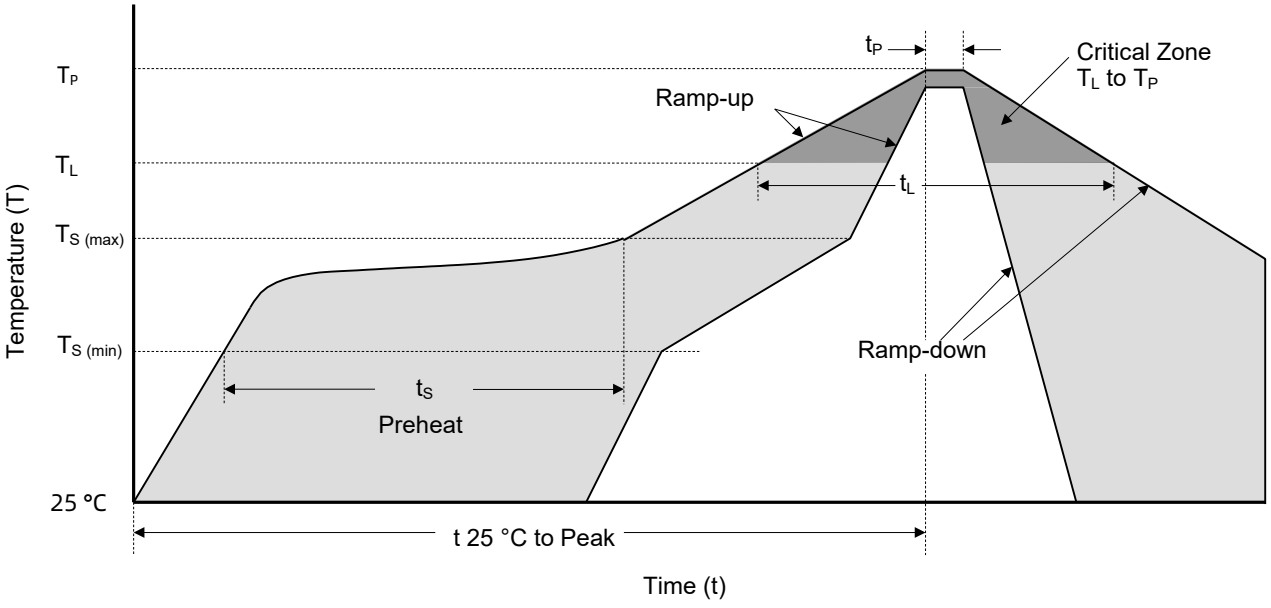
Environmental Specifications

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	0.002ounce,0.061grams
Case	JESD22DO214AC. 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

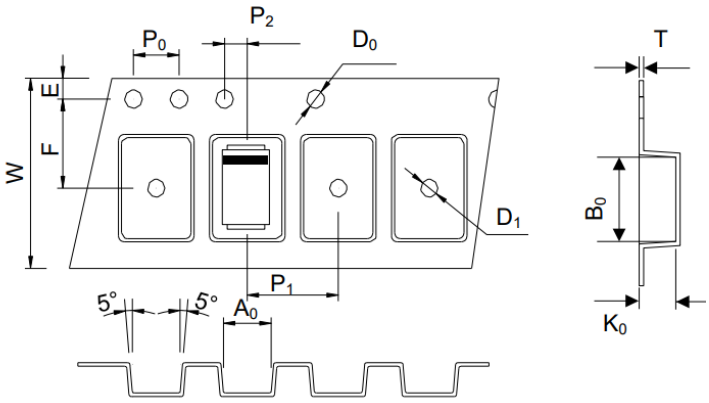
Soldering Parameters

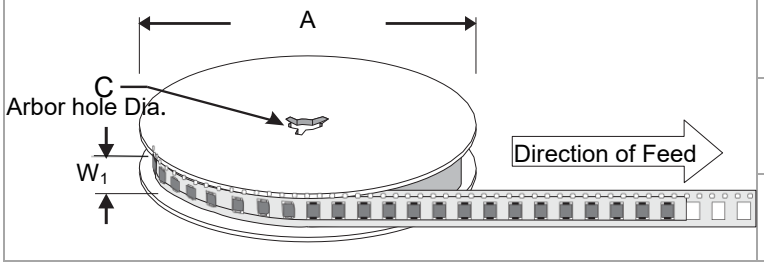


Reflowing Condition

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

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 ± 0.10
	F	5.50 ± 0.05
	A_0	2.79 ± 0.10
	B_0	5.33 ± 0.10
	K_0	2.36 ± 0.10
	T	0.30 ± 0.05

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

Part Number	Package	QTY's (Reel)	Packaging Option	Packaging Specification
SPxxxxSA	DO-214AC	7500 PCS	Tape & Reel – 12 mm tape / 13” reel	EIA STD RS-481

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.