



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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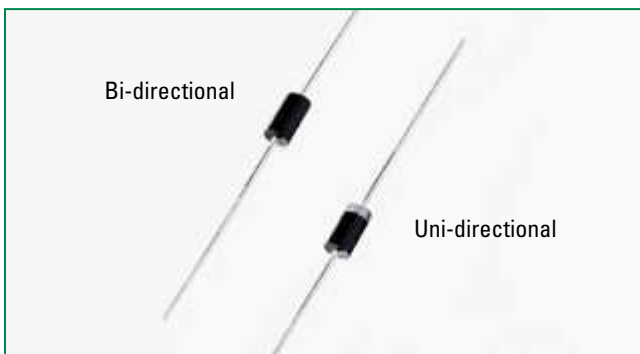
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SA Series



Agency Approvals

AGENCY	AGENCY FILE NUMBER
	E230531

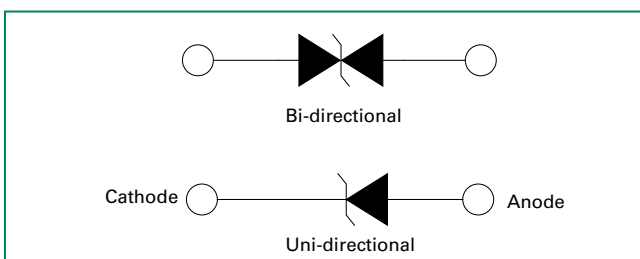
Maximum Ratings and Thermal Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10/1000µs Test Waveform (Fig.2) (Note 1)	P _{PPM}	500	W
Steady State Power Dissipation on Infinite Heat Sink at T _L =75°C	P _D	3.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional Only (Note 2)	I _{FSM}	70	A
Maximum Instantaneous Forward Voltage at 35A for Unidirectional Only	V _F	3.5	V
Operating Junction and Storage Temperature Range	T _J , T _{STG}	-65 to 175	°C
Typical Thermal Resistance Junction to Lead	R _{θJL}	20	°C/W
Typical Thermal Resistance Junction to Ambient	R _{θJA}	75	°C/W

Notes:

1. Non-repetitive current pulse, per Fig. 4 and derated above T_J (initial) =25°C per Fig. 3.
2. Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 per minute maximum.

Functional Diagram



Description

The SA Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

Features

- 500W peak pulse capability at 10/1000µs waveform, repetition rate (duty cycles):0.01%
- V_{BR} @ T_J= V_{BR}@25°C x (1+ α T x (T_J - 25)) (α T: Temperature Coefficient, typical value is 0.1%)
- Glass passivated chip junction in DO-15 Package
- Fast response time: typically less than 1.0ps from 0 Volts to BV min
- Excellent clamping capability
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- IEC-61000-4-2 ESD 30kV(Air), 30kV (Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2
- EFT protection of data lines in accordance with IEC 61000-4-4
- Low incremental surge resistance
- Typical I_R less than 1µA when V_{BR} max>13V
- High temperature to reflow soldering guaranteed: 260°C/40sec / 0.375"/(9.5mm) lead length, 5 lbs., (2.3kg) tension
- Plastic package is flammability rated V-0 per Underwriters Laboratories
- Matte tin lead-free plated
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

Applications

TVS devices are ideal for the protection of I/O interfaces, V_{CC} bus and other vulnerable circuits used in telecom, computer, industrial and consumer electronic applications.

Additional Information



[Datasheet](#)



[Resources](#)



[Samples](#)

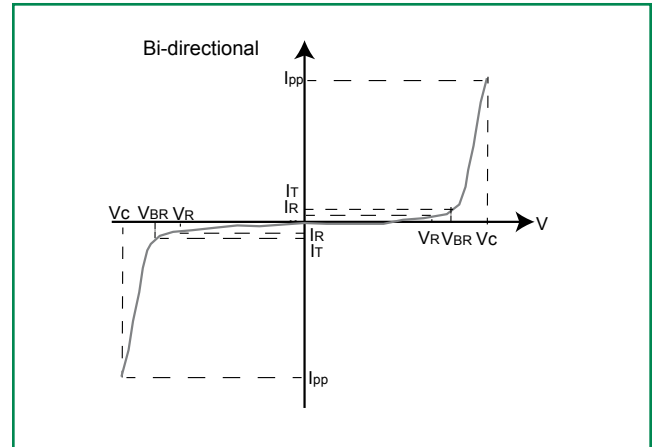
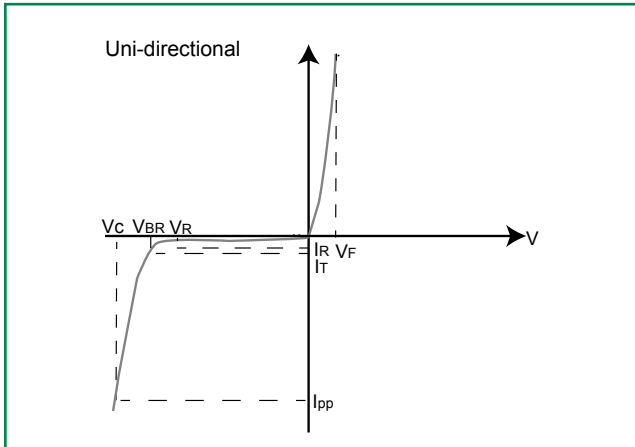
Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage V_R (V)	Breakdown Voltage V_{BR} (Volts) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage $V_C @ I_{PP}$ (V)	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage $I_R @ V_R$ (μA)	Agency Approval 
			MIN	MAX					
SA5.0A	SA5.0CA	5.0	6.40	7.00	10	9.2	55.4	600	X
SA6.0A	SA6.0CA	6.0	6.67	7.37	10	10.3	49.5	600	X
SA6.5A	SA6.5CA	6.5	7.22	7.98	10	11.2	45.5	400	X
SA7.0A	SA7.0CA	7.0	7.78	8.60	10	12.0	42.5	150	X
SA7.5A	SA7.5CA	7.5	8.33	9.21	1	12.9	39.5	50	X
SA8.0A	SA8.0CA	8.0	8.89	9.83	1	13.6	37.5	25	X
SA8.5A	SA8.5CA	8.5	9.44	10.40	1	14.4	35.4	10	X
SA9.0A	SA9.0CA	9.0	10.00	11.10	1	15.4	33.1	5	X
SA10A	SA10CA	10.0	11.10	12.30	1	17.0	30.0	3	X
SA11A	SA11CA	11.0	12.20	13.50	1	18.2	28.0	1	X
SA12A	SA12CA	12.0	13.30	14.70	1	19.9	25.6	1	X
SA13A	SA13CA	13.0	14.40	15.90	1	21.5	23.7	1	X
SA14A	SA14CA	14.0	15.60	17.20	1	23.2	22.0	1	X
SA15A	SA15CA	15.0	16.70	18.50	1	24.4	20.9	1	X
SA16A	SA16CA	16.0	17.80	19.70	1	26.0	19.6	1	X
SA17A	SA17CA	17.0	18.90	20.90	1	27.6	18.5	1	X
SA18A	SA18CA	18.0	20.00	22.10	1	29.2	17.5	1	X
SA20A	SA20CA	20.0	22.20	24.50	1	32.4	15.7	1	X
SA22A	SA22CA	22.0	24.40	26.90	1	35.5	14.4	1	X
SA24A	SA24CA	24.0	26.70	29.50	1	38.9	13.1	1	X
SA26A	SA26CA	26.0	28.90	31.90	1	42.1	12.1	1	X
SA28A	SA28CA	28.0	31.10	34.40	1	45.4	11.2	1	X
SA30A	SA30CA	30.0	33.30	36.80	1	48.4	10.5	1	X
SA33A	SA33CA	33.0	36.70	40.60	1	53.3	9.6	1	X
SA36A	SA36CA	36.0	40.00	44.20	1	58.1	8.8	1	X
SA40A	SA40CA	40.0	44.40	49.10	1	64.5	7.9	1	X
SA43A	SA43CA	43.0	47.80	52.80	1	69.4	7.3	1	X
SA45A	SA45CA	45.0	50.00	55.30	1	72.7	7.0	1	X
SA48A	SA48CA	48.0	53.30	58.90	1	77.4	6.6	1	X
SA51A	SA51CA	51.0	56.70	62.70	1	82.4	6.2	1	X
SA54A	SA54CA	54.0	60.00	66.30	1	87.1	5.9	1	X
SA58A	SA58CA	58.0	64.40	71.20	1	93.6	5.4	1	X
SA60A	SA60CA	60.0	66.70	73.70	1	96.8	5.3	1	X
SA64A	SA64CA	64.0	71.10	78.60	1	103.0	5.0	1	X
SA70A	SA70CA	70.0	77.80	86.00	1	113.0	4.5	1	X
SA75A	SA75CA	75.0	83.30	92.10	1	121.0	4.2	1	X
SA78A	SA78CA	78.0	86.70	95.80	1	126.0	4.0	1	X
SA85A	SA85CA	85.0	94.40	104.00	1	137.0	3.7	1	X
SA90A	SA90CA	90.0	100.00	111.00	1	146.0	3.5	1	X
SA100A	SA100CA	100.0	111.00	123.00	1	162.0	3.1	1	X
SA110A	SA110CA	110.0	122.00	135.00	1	177.0	2.9	1	X
SA120A	SA120CA	120.0	133.00	147.00	1	193.0	2.6	1	X
SA130A	SA130CA	130.0	144.00	159.00	1	209.0	2.4	1	X
SA150A	SA150CA	150.0	167.00	185.00	1	243.0	2.1	1	X
SA160A	SA160CA	160.0	178.00	197.00	1	259.0	2.0	1	X
SA170A	SA170CA	170.0	189.00	209.00	1	275.0	1.9	1	X
SA180A	SA180CA	180.0	200.00	221.00	1	289.0	1.7	1	X

For bidirectional type having V_R of 10 volts and less, the I_R limit is double.

For parts without A, the V_{BR} is $\pm 10\%$ and V_C is 5% higher than with A parts.

I-V Curve Characteristics



P_{PPM} Peak Pulse Power Dissipation – Max power dissipation

V_R Stand-off Voltage – Maximum voltage that can be applied to the TVS without operation

V_{BR} Breakdown Voltage – Maximum voltage that flows through the TVS at a specified test current (I_T)

V_C Clamping Voltage – Peak voltage measured across the TVS at a specified I_{ppm} (peak impulse current)

I_R Reverse Leakage Current – Current measured at V_R

V_F Forward Voltage Drop for Uni-directional

Ratings and Characteristic Curves (T_A = 25°C unless otherwise noted)

Figure 1 - TVS Transients Clamping Waveform

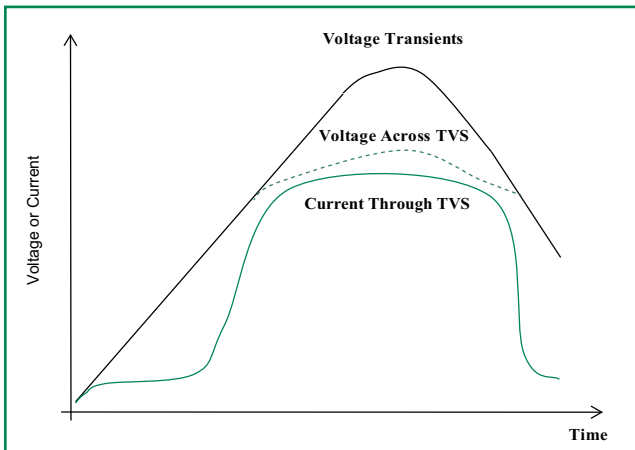
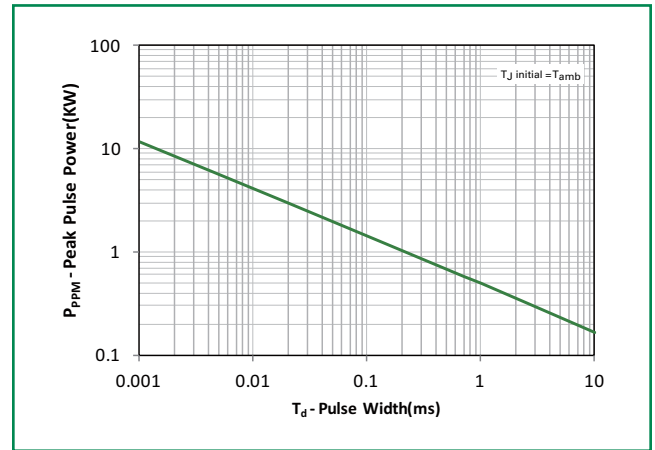


Figure 2 - Peak Pulse Power Rating



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Ratings and Characteristic Curves ($T_A=25^\circ\text{C}$ unless otherwise noted) (Continued)

Figure 3 - Peak Pulse Power Derating Curve

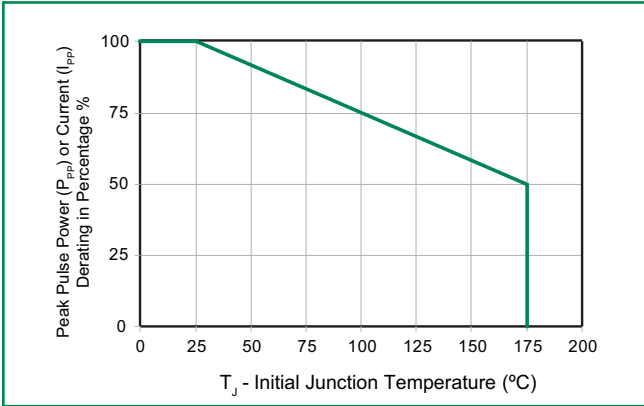


Figure 4 - Pulse Waveform

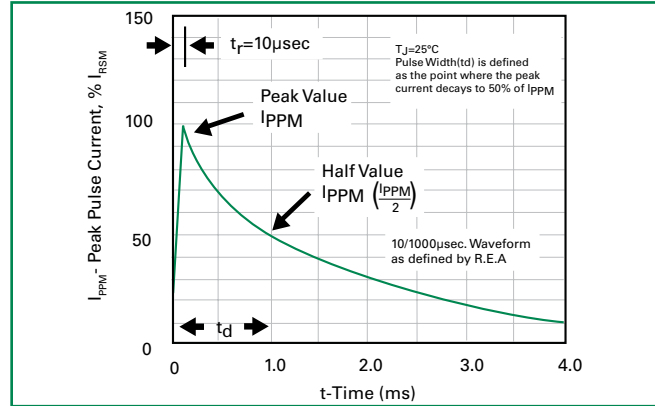


Figure 5 - Typical Junction Capacitance

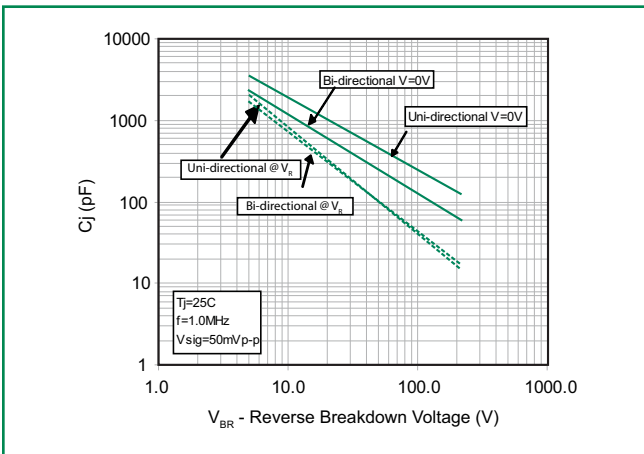


Figure 6 - Typical Transient Thermal Impedance

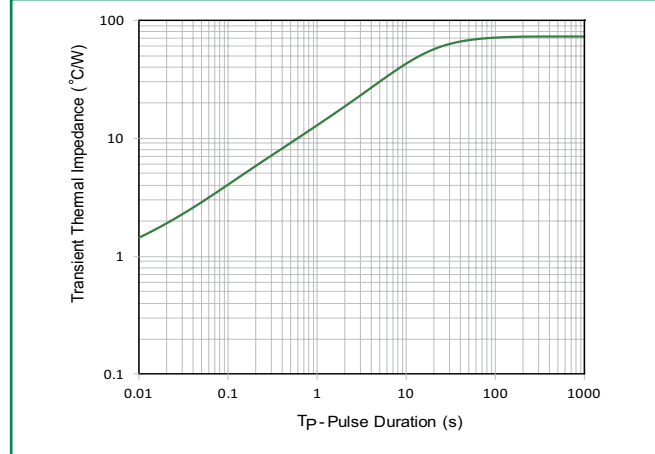


Figure 7 - Maximum Non-Repetitive Forward Surge Current Uni-Directional Only

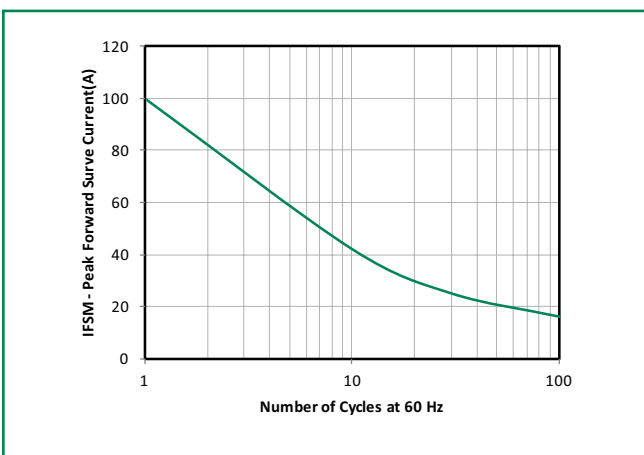
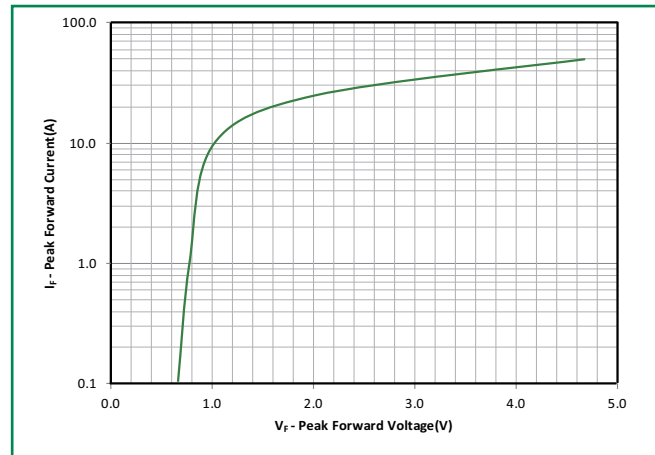
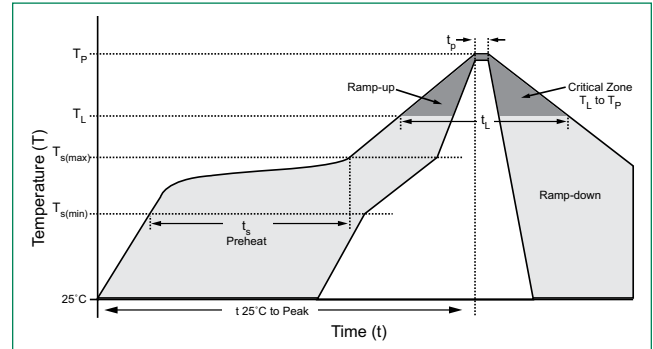


Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)



Soldering Parameters

Reflow Condition		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 – 180 secs
Average ramp up rate (Liquidus Temp (T_A) to peak)		3°C/second max
$T_{s(max)}$ to T_A - Ramp-up Rate		3°C/second max
Reflow	- Temperature (T_A) (Liquidus)	217°C
	- Time (min to max) (t_s)	60 – 150 seconds
Peak Temperature (T_p)		260 ^{+0/-5} °C
Time within 5°C of actual peak Temperature (t_p)		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_p)		8 minutes Max.
Do not exceed		260°C



Flow/Wave Soldering (Solder Dipping)

Peak Temperature :	265°C
Dipping Time :	10 seconds
Soldering :	1 time

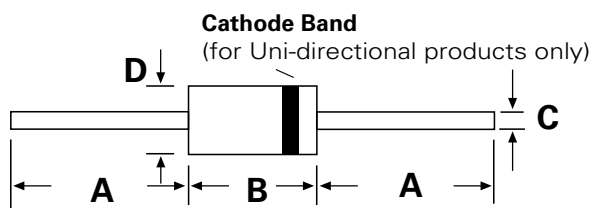
Physical Specifications

Weight	0.015oz., 0.4g
Case	JEDEC DO-204AC (DO-15) molded plastic body over passivated junction.
Polarity	Color band denotes the cathode except Bipolar.
Terminal	Matte Tin axial leads, solderable per JESD22-B102.

Environmental Specifications

High Temp. Storage	JESD22-A103
HTRB	JESD22-A108
Temperature Cycling	JESD22-A104
H3TRB	JESD22-A101
RSH	JESD22-B106

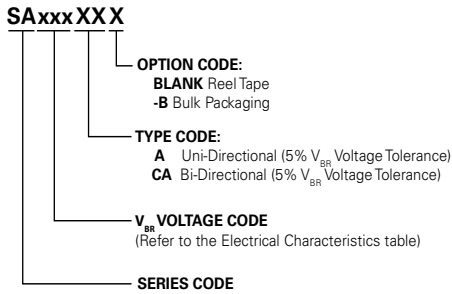
Dimensions



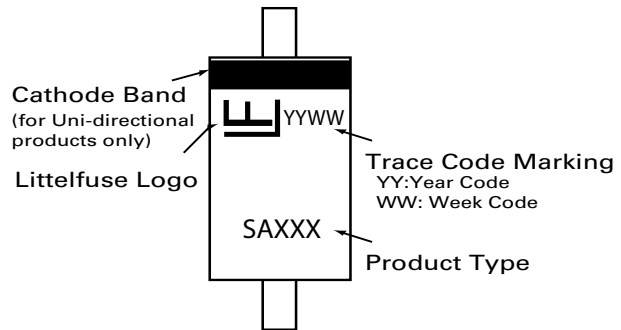
DO-204AC (DO-15)

Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	1.000	-	25.40	-
B	0.230	0.300	5.80	7.60
C	0.028	0.034	0.71	0.86
D	0.104	0.140	2.60	3.60

Part Numbering System



Part Marking System



Packaging

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
SAxxxXX	DO-204AC	4000	Tape & Reel	EIA STD RS-296
SAxxxXX-B	DO-204AC	1000	Bulk	Littelfuse Spec.

Tape and Reel Specification

