

# RS INDUSTRY LIMITED

RS Chip Array ESD Suppressor

## APPROVAL SHEET

### Customer Information

<b>Customer :</b>			
<b>Part Name :</b>			
<b>Part No. :</b>			
<b>Model No. :</b>			
	<b>COMPANY</b>	<b>PURCHASE</b>	<b>R&amp;D</b>

### Vendor Information

<b>Name:</b>	<b>RS INDUSTRY LIMITED</b>
<b>Part Name</b>	<b>ARRAY TYPE MULTILAYER VARISTOR</b>
<b>Part No.</b>	<b>RS 0508-5V500F</b>
<b>Lot No.</b>	

# RS INDUSTRY LIMITED

## RS Chip Array ESD Suppressor

### 1. Part Number Identification

RS 0508 - 5V 500 F

**Company Logo** ←

**Size**

Model	0508 Series
Length(L)	2.00 ±0.15mm
Width(W)	1.20 ±0.15mm

**Max Working Voltage**

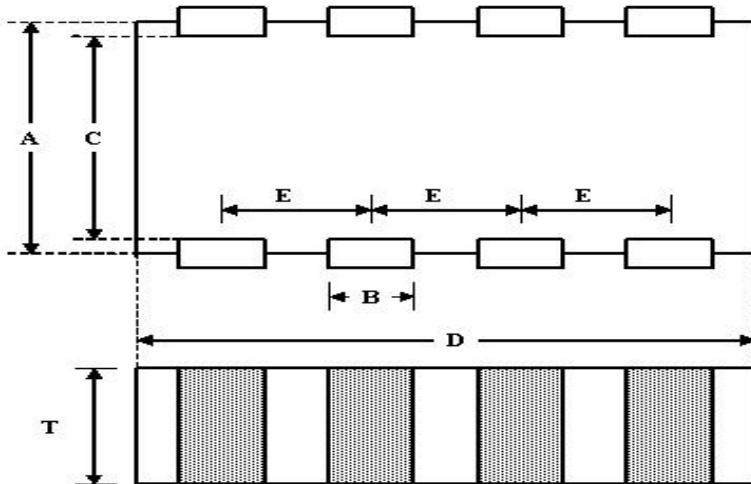
5V ←

**Channel :**

4 ports

**Capacitance :**

500 =  $50 \times 10^0 = 50(\text{PF})$



	mm	
	min	max
A	1.05	1.35
B	0.20	0.30
C		1.00 <sub>ref.</sub>
D	1.85	2.15
E		0.50 <sub>ref.</sub>
T	0.65	0.80

### 2. Performance Characteristic

Part Number	Working Voltage	Breakdown Voltage	Clamping Voltage	Leakage Current	Insulation Resistance	Capacitance Value	Lead Content
<b>Symbol</b>	DC	$V_{BDV}(*1)$	$V(*2)$	$\mu A(*3)$	M ohm(*4)	$\mu F(*5)$	ppm
RS 0508-5V500F	5(Max)	18~28	< 50	< 1.0	> 10	50	< 1000

- \* 1 The Breakage Voltage was measured at 1mA DC.
- \* 2 The Clamping Voltage was measured at 8/20  $\mu$  s waveform, 1A current.
- \* 3 The Leakage Current was measured at working voltage.
- \* 4 The Insulation Resistance was measured at working voltage.
- \* 5 The Capacitance was measured at 1M Hz, tolerance  $\pm 30\%$ .
- \* 6 The components shall be employed within 1 year, in the nitrogen condition.
- \* 7 The Product compliance with the RoHs demand.

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## RS Chip Array ESD Suppressor

### 3. PHYSICAL SPECIFICATIONS

◆ **Material :**

Body : Zinc Oxide (ZnO)

Terminations : Ag/Ni/Sn

◆ **ESD testing: IEC61000-4-2 level 4**

◆ **Soldering Parameters :**

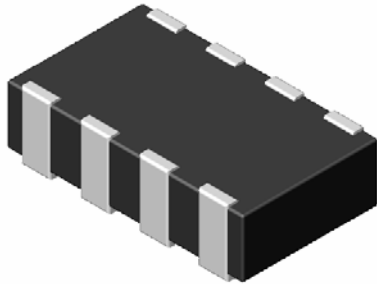
Reflow Solder : 260°C , 3sec (Max)

◆ **Operating Temperature Range :**

-50 °C to +85 °C

◆ **Store Temperature Range :**

-50 °C to +150 °C

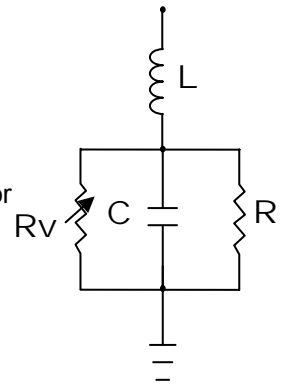


### IEC61000-4-2 STANDARDS

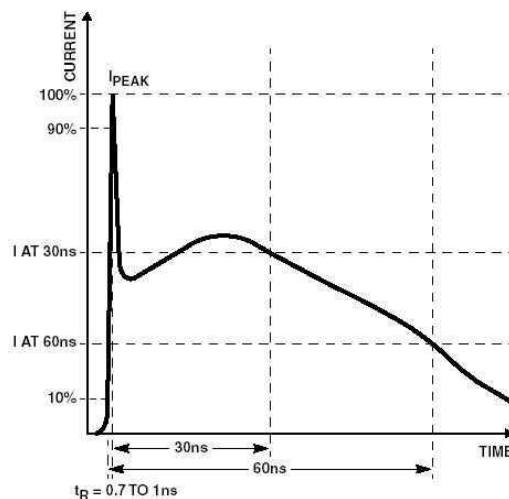
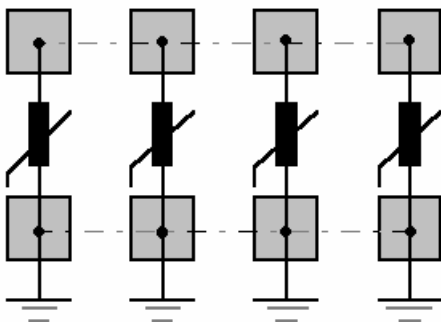
SEVERITY LEVEL	AIR DISCHARGE	DIRECT DISCHARGE
1	2 KV	2 KV
2	4 KV	4 KV
3	8 KV	6 KV
4	15 KV	8 KV

### EQUIVALENT CIRCUIT

- ☆ **L** Body Inductance
- ☆ **C** Device Capacitance
- ☆ **Rv** Voltage Variable Resistor
- ☆ **R** Insulation Resistor



### Inner Circuit



\*\*\* Pin to Pin for Package SOT323 \*\*\*

TYPICAL WAVEFORM OF THE OUTPUT CURRENT OF THE HBM ESD GENERATOR AS SPECIFIED IN THE IEC61000-4-2 STANDARD

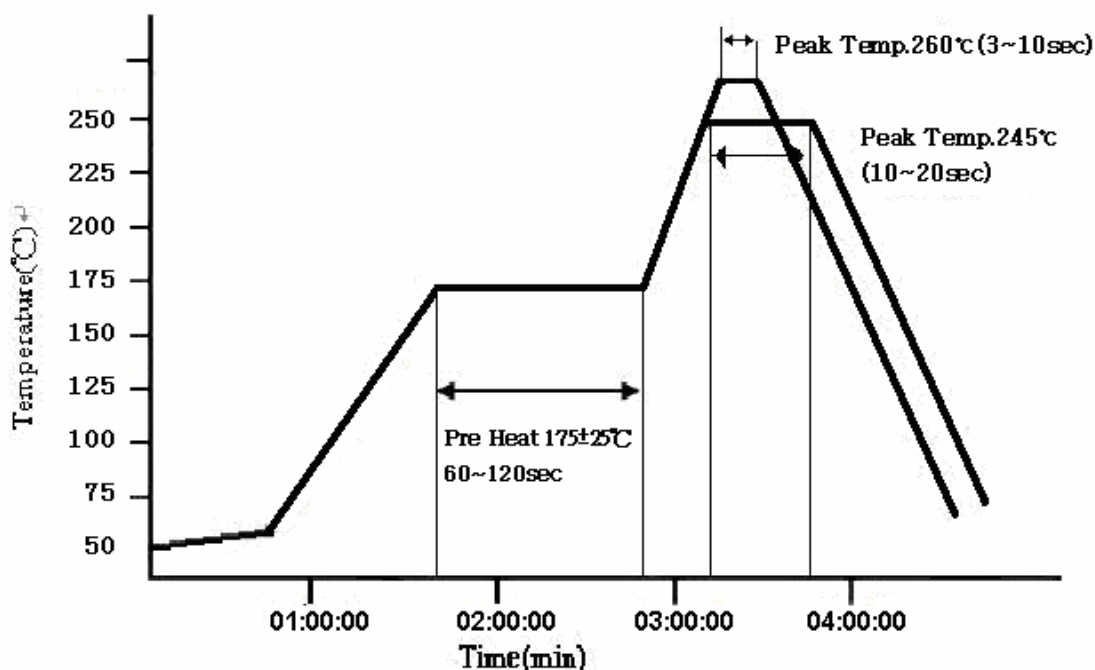
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### 4. Environmental Reliability Test

Characteristic	Test method and description			
High Temperature Storage	The specimen shall be subjected to $150 \pm 2^{\circ}\text{C}$ for $1000 \pm 12$ hours in a thermostatic bath without load and then stored at room temperature and normal humidity for 1 to 2 hours. The change of varistor voltage shall be within 10 % .			
Temperature Cycle	The temperature cycle of specified temperature shall be repeated five times and then stored at room temperature and normal humidity for one or two hours. The change of varistor voltage shall be within 10 % and mechanical damage shall be examined.	Step	Temperature	Period
		1	$-40 \pm 3^{\circ}\text{C}$	30Min $\pm$ 3
		2	Room Temperature	1 hour
		3	$125 \pm 3^{\circ}\text{C}$	30Min $\pm$ 3
	4	Room Temperature	1 hour	
High Temperature Load	After being continuously applied the maximum allowable voltage at $85 \pm 2^{\circ}\text{C}$ for $1000 \pm 2$ hours, the specimen shall be stored at room temperature and normal humidity for one or two hours, the change of varistor voltage shall be within 10% .			
Damp Heat Load/ Humidity Load	The specimen should be subjected to $40 \pm 2^{\circ}\text{C}$ , 90 to 95 % RH environment, and the maximum allowable voltage applied for 1000 hours, then stored at room temperature and normal humidity for one or two hours. The change of varistor voltage shall be within 10% .			
Low Temperature Storage	The specimen should be subjected to $-50 \pm 2^{\circ}\text{C}$ , without load for 1000 hours and then stored at room temperature for one or two hours. The change of varistor voltage shall be within 10 % .			

#### 4.1 The IR reflow and temperature of Soldering for Pb Free



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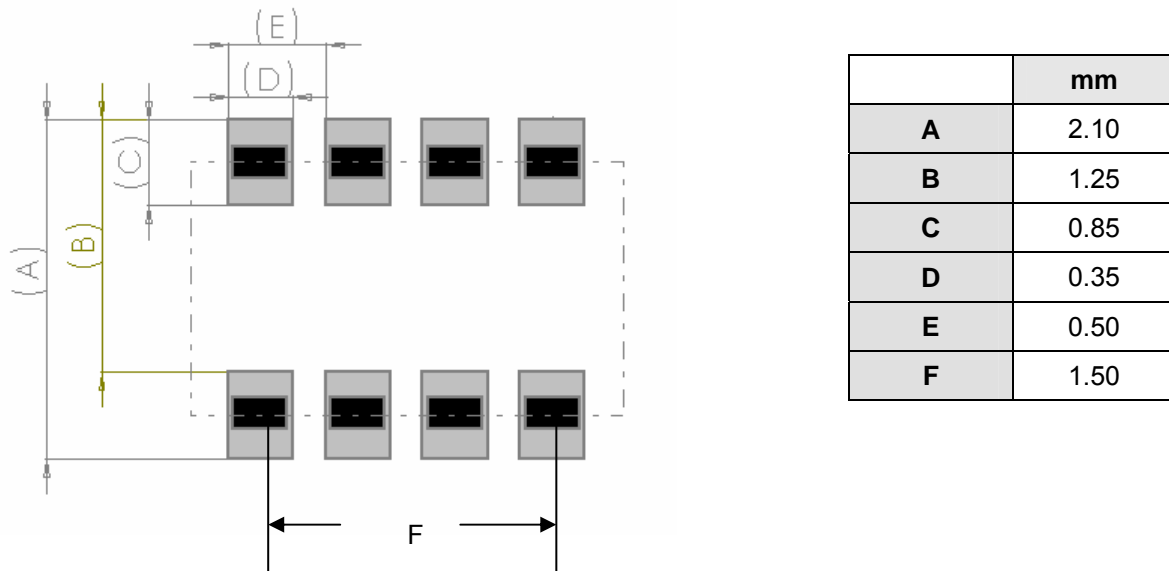
☆ **IR reflow Pb Free Process suggestion profile**

- (1) The solder recommend is Sn96.5/Ag 3.5 of 120 to 150  $\mu$  m
- (2) Ramp-up rate (217 $^{\circ}$ C to Peak) + 3 $^{\circ}$ C/second max
- (3) Temp. maintain at 175 +/-25 $^{\circ}$ C 180 seconds max
- (4) Temp. maintain above 217  $^{\circ}$ C 60-150 seconds
- (5) Peak temperature range 245 $^{\circ}$ C +20 $^{\circ}$ C/ -10  $^{\circ}$ C time within 5  $^{\circ}$ C of actually peak temperature (tp) 10~20 seconds
- (6) Ramp down rate +6  $^{\circ}$ C/second max.

※Perform adequate test in advance as the reflow temperature profile will vary according to the conditions of the manufacturing process, and the specification of the reflow furnace.

### 5. Soldering Recommendations

#### 5.1 Recommended solder pad layout



5.2 The solder paste shall be printed in a thickness of 120 to 150 $\mu$ m.

5.3 The SIR test of the solder paste shall be done

#### 5.4 IR Soldering

Rapid heating, partial heating or rapid cooling will easily cause defect of the component. So preheating and gradual cooling process is suggested. IR soldering has the highest yields due to controlled heating rates and solder liquidus times. Make sure that the element is not subjected to a thermal gradient steeper than 4 degrees per second. 2 degrees per second is the ideal gradient. During the soldering process, pre- heating to within 100 degrees of the solders peak temperature is essential to minimize thermal shock.

#### 5.5 Hand Soldering

In hand soldering of the Varistors. Large temperature gradient between preheated the Varistors and the tip of soldering iron may cause electrical failures and mechanical damages such as crackings or breakings of the devices. The soldering shall be carefully controlled and carried out so that the temperature gradient is kept minimum with following recommended conditions for hand soldering.

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### 5.5.1 Recommended Soldering Condition 1

(1) Solder :

**0.12~0.18mm** Thread solder (Sn96.5:Ag3.5) with soldering flux in the core.

Rosin-based and non-activated flux is recommended.

(2) Preheating

The Varistors shall be preheated so that Temperature Gradient between the devices and the tip of soldering iron is 150C or below.

(3) Soldering Iron

Rated Power of 20w max with 3mm soldering tip in diameter.

Temperature of soldering iron tip 300C max ( The required amount of solder shall be melted in advance on the soldering tip.)

(4) Cooling

After soldering. The Varistors shall be cooled gradually at room ambient temperature.

### 5.5.2 Recommended Soldering Condition 2 ( Without preheating )

(1) Solder iron tip shall not directly touch to ceramic dielectrics.

(2) Solder iron tip shall be fully preheated before soldering while soldering iron tip to the external electrode of Varistors.

### 5.6 Post Soldering Cleaning

5.6.1 Residues of corrosive soldering fluxes on the PC board after cleaning may greatly have influences on the electrical characteristic and the reliability (such as humidity resistance)of the Varistors which have been mounted on the board. It shall be confirmed that the characteristic and the reliability of the devices are not affected by the applied cleaning conditions.

5.6.2. When an ultrasonic cleaning is applied to the mounted Varistors on PC Boards. Following conditions are recommended for preventing failures or damages of the devices due to the large vibration energy and the resonance caused by the ultrasonic waves.

(1) Frequency 29MHz max

(2) Radiated Power 20w/lithr max

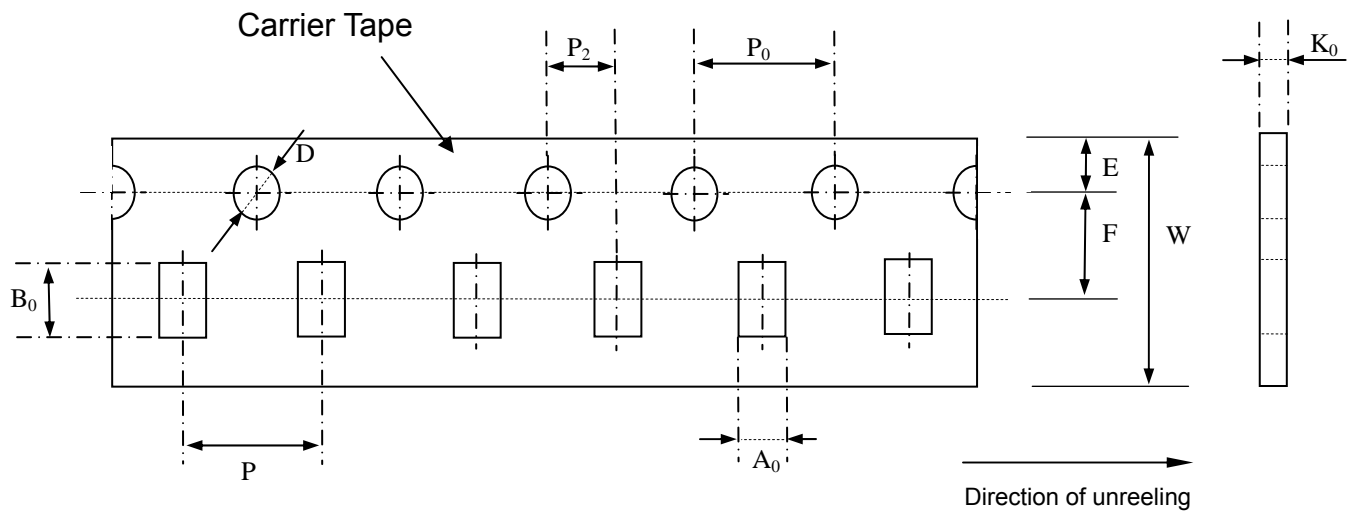
(3) Period 5minuets max

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### 6. Packaging Specification

- 6.1 Carrier tape and transparent cover tape should be heat-sealed to carry the products, and the reel should be used to reel the carrier tape.
- 6.2 The adhesion of the heat-sealed cover tape shall be  $40 \pm 20 / - 15$ grams.
- 6.3 Both the head and the end portion of the taping shall be empty for reel package and SMT auto-pickup machine. And a normal paper tape shall be connected in the head of taping for the operator to handle.

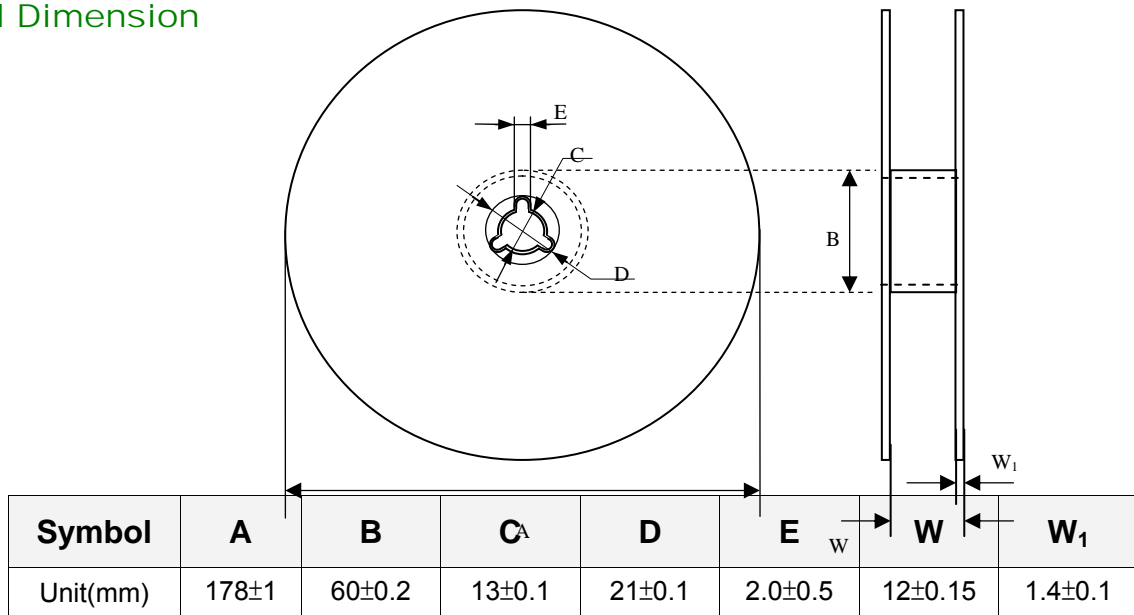


Symbol	$A_0$ $\pm 0.05$	$B_0$ $\pm 0.05$	$K_0$ $\pm 0.05$	$D$ $+0.10$ $-0.05$	$P$ $\pm 0.10$	$P_2$ $\pm 0.10$	$P_0$ $\pm 0.10$	$W$ $\pm 0.10$	$E$ $\pm 0.10$	$F$ $\pm 0.05$
<b>0508</b>	1.50	2.30	0.75	1.56	4.00	2.00	4.00	8.00	1.75	3.50

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### 7.Reel Dimension



### 8.Standard Packaging

Size	0508
Pcs	4000