

## High Surge Protection Devices Super High Voltage (SV) Series

### Features:

- SMD type body size 0806, 1206, 1208, 1210, 1812, 2220 and 3220
- Bidirectional and symmetrical V/I characteristics
- Meet IEC61000-4-5 Standard
- Large withstanding surge voltage capability - 0.5~2KV (@1.2/50 $\mu$ s, 2 $\Omega$ )
- Large withstanding surge current capability - 100~1000A (@8/20 $\mu$ s)
- Multilayer construction provides higher power dissipation
- RoHS compliant

### Application Fields:

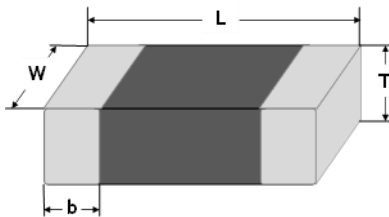
- LED lighting
- Power board
- Base station
- AC power supply
- Industrial equipment and controllers

### Application Fields:

Recognized under the components program of UL and CSA

### Shape and Dimensions:

Unit (mm)	0806	1206	1210	1812	2220	3220
<b>Length (L)</b>	2.20 $\pm$ 0.20	3.20+0.60/-0.20	3.20+0.60/-0.20	4.50+0.60/-0.20	6.00+0.70/-0.30	8.10+0.70/-0.30
<b>Width (W)</b>	1.70 $\pm$ 0.20	1.60+0.40/-0.20	2.50+0.40/-0.20	3.20+0.50/-0.20	5.30+0.50/-0.30	5.30+0.60/-0.30
<b>Thickness (T)</b>	1.80 Max.	1.90 Max.	2.60 Max.	3.50 Max.	3.60 Max.	3.70 Max.
<b>Termination bandwidth (b)</b>	0.25 $\pm$ 0.10	0.50 $\pm$ 0.20	0.50 $\pm$ 0.25	0.50+0.35/-0.10	0.50+0.35/-0.10	0.80+0.50/-0.10



### Product Identification:

HSP	2220	SV	390V	0800
<b><u>Category Code</u></b>	<b><u>Size Code</u></b>	<b><u>Application Code</u></b>	<b><u>Breakdown Voltage Code</u></b>	<b><u>Surge Current Code</u></b>
HSP = High Surge Protection Device	Inch 0806 1206 1210 1812 2220 3220	SV = Super High Voltage	240V = 240V 270V = 270V 390V = 390V 430V = 430V 470V = 470V	0100 = 100A 0200 = 200A 0350 = 350A 0500 = 500A 0800 = 800A 1000 = 1000A

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## Super High Voltage (SV) Series

### Electrical Characteristics:

Operating temperature: -55 to +85°C

Part Number	Size	Working Voltage		Breakdown Voltage <sup>1</sup> @1mA (V)	Clamping Voltage <sup>2</sup> (V)	Surge Voltage <sup>3</sup> @1.2/50µs, 2Ω (kV)		Surge Current <sup>3</sup> @8/20µs (A)		Energy Max. @10/1000 µs (J)	Capacitance <sup>4</sup> @1kHz (pF)	Safety Certification	
		Vac	Vdc			1 time	15 times	1 time	15 times			UL <sup>5</sup>	CSA <sup>6</sup>
HSP0806SV240V0200	0806	150	200	240 (±10%)	395	0.5	200	100	4.4	95	Pending		
HSP0806SV430V0100	0806	275	350	430 (±10%)	705	0.5	100	100	4.3	45	Pending		
HSP1206SV240V0350	1206	150	200	240 (±10%)	395	0.5	350	200	7.7	180	Pending		
HSP1210SV390V0200	1210	250	320	390 (±10%)	647	0.5	200	100	7.2	105	✓		
HSP1210SV470V0250	1210	300	385	470 (±10%)	775	0.5	250	150	11.9	100	Pending		
HSP1210SV470V0500	1210	300	385	470 (±10%)	775	1.0	500	250	23.8	190	Pending		
HSP1812SV270V0500	1812	175	225	270 (±10%)	450	1.0	500	250	22.0	275	✓		
HSP1812SV470V0500	1812	300	385	470 (±10%)	775	1.0	500	250	23.0	200	✓	✓	
HSP1812SV430V0800	1812	275	350	430 (±10%)	705	2.0	800	500	38.0	340	✓	✓	
HSP1812SV470V0800	1812	300	385	470 (±10%)	775	2.0	800	500	38.0	310	✓	✓	
HSP2220SV270V0500	2220	175	225	270 (±10%)	450	1.0	500	250	13.8	390	Pending		
HSP2220SV390V0500	2220	250	320	390 (±10%)	647	1.0	500	250	19.8	235	✓		
HSP2220SV430V0500	2220	275	350	430 (±10%)	705	1.0	500	250	21.6	215	✓		
HSP2220SV470V0500	2220	300	385	470 (±10%)	775	1.0	500	250	23.7	195	✓		
HSP2220SV240V0800	2220	139	195	240 (±10%)	295	2.0	800	500	21.0	430	Pending		
HSP2220SV390V0800	2220	250	320	390 (±10%)	647	2.0	800	500	31.8	320	✓		
HSP2220SV430V0800	2220	275	350	430 (±10%)	705	2.0	800	500	34.7	305	✓	✓	
HSP2220SV470V0800	2220	300	385	470 (±10%)	775	2.0	800	500	38.0	290	✓	✓	
HSP3220SV430V1000	3220	275	350	430 (±10%)	705	2.0	1000	500	46.8	490	Pending		
HSP3220SV470V1000	3220	300	385	470 (±10%)	775	2.0	1000	500	51.5	450	Pending		

<sup>1</sup> The breakdown voltage was measured at 1 mA current.

<sup>2</sup> The clamping voltage was measured at standard current 1210 (2.5A), 1812 (5A), 2220 (10A) and 3220 (10A).

<sup>3</sup> The surge voltage was tested at 1.2/50 µs waveform and 2Ω. The surge current was tested at 8/20 µs waveform.

<sup>4</sup> The capacitance value only for customer reference, it's not formal specification.

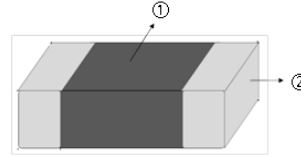
<sup>5</sup> The UL safety approval complies with standard UL1449 3<sup>rd</sup>.

<sup>6</sup> The CSA safety approval complies with standard CSA C22.2 No. 8.

## High Surge Protection Devices

### Construction and Materials:

Body ①	Termination ②
Nano special ceramic	Ag/Ni/Sn



### Packaging:

Chip Size	Parts on 7 inch (178mm) Reel
0806	2,000
1206	2,000
1210	1,500
1812	500
2220	500
3220	500

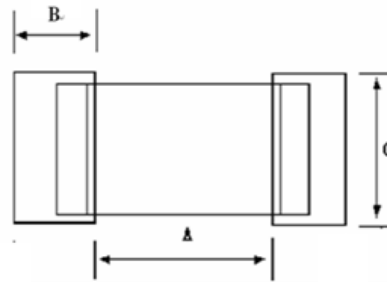
### Environmental Test:

Test item	Test condition	Requirement
High Temperature Storage	*Temperature : 125±2°C * Time : 1000±2 hours *Test after placing in ambient temperature for 24 hours	* Breakdown voltage change : within ±10% * No mechanical damage
Low Temperature Storage	*Temperature : -40±2°C * Time : 1000±2 hours *Test after placing in ambient temperature for 24 hours	* Breakdown voltage change : within ±10% * No mechanical damage
Temperature Cycle	* Step 1 : -40±3°C for 30±3min * Step 2 : 25°C for 1 hour * Step 3 : 125±3°C for 30±3min * Step 4 : 25°C for 1 hour * Number of cycle : 5 times *Test after placing in ambient temperature for 24 hours	* Breakdown voltage change : within ±10% * No mechanical damage
High Temperature Load	*Temperature : 85±2°C * Rated working voltage applied * Time : 1000±2 hours *Test after placing in ambient temperature for 24 hours	* Breakdown voltage change : within ±10% * No mechanical damage
Damp Heat Load/Humidity Load	*Temperature : 40±2°C * Humidity : 90~95% RH * Rated working voltage applied * Time : 500±2 hours *Test after placing in ambient temperature for 24 hours	* Breakdown voltage change : within ±10% * No mechanical damage

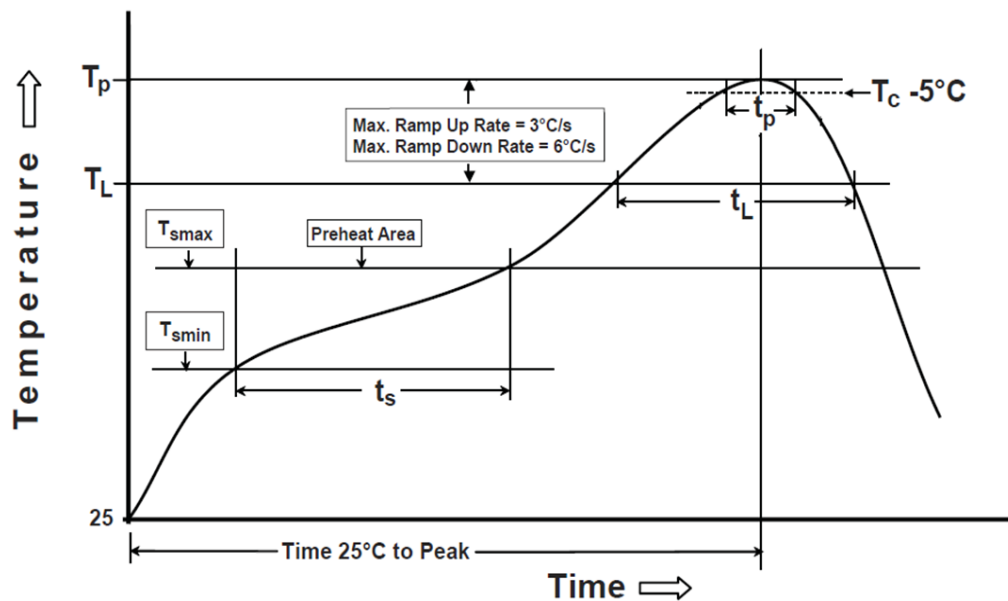
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### Recommended Foot Print Dimensions:

Size	A (mm)	B (mm)	C (mm)
0806	1.2~1.6	0.8~1.2	1.6~2.2
1206	1.8~2.5	1.2~1.8	1.5~2.0
1210	1.8~2.5	1.3~2.0	2.2~3.0
1812	2.5~2.9	1.6~2.0	3.2~3.6
2220	3.8~4.6	1.3~2.2	4.8~5.5
3220	6.2~7.0	1.6~2.6	4.8~5.8



### Recommended Reflow Soldering Profile:



Profile Feature	Pb-Free Assembly
<b>Preheat/Soak</b> Temperature Min ( $T_{smin}$ ) Temperature Max ( $T_{smax}$ ) Time ( $t_s$ ) from ( $T_{smin}$ to $T_{smax}$ )	150°C 200°C 60~120 seconds
Ramp-up rate ( $T_L$ to $T_p$ )	3°C/second max.
Liquidous temperature ( $T_L$ ) Time ( $t_L$ ) maintained above $T_L$	217°C 60~150 seconds
Peak package body temperature ( $T_p$ )	260°C
Time ( $t_p$ )*within 5°C of the specified classification temperature ( $T_c$ )	30 seconds *
Ramp-down rate ( $T_p$ to $T_L$ )	6°C/second max.
Time 25°C to peak temperature	8 minutes max.
* Tolerance for peak profile temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum	

## Disclaimer

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