Revision of May 2019

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 (@1.2/50μs, 2Ω)
- Large withstanding surge current capability - 100~1000A (@8/20μs)
- Multilayer construction provides higher power dissipation
- RoHS compliant

Application Fields:

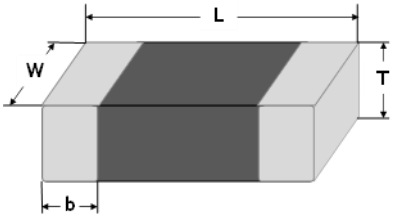
- LED lighting
- Power board
- Base station
- AC power supply
- Industrial equipment and controllers

Application Fields:

Recognized under the components program of UL and CSA

Shape and Dimensions:

Unit (mm)	0806	1206	1210	1812	2220	3220
Length (L)	2.20±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
Width (W)	1.70±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
Thickness (T)	1.80 Max.	1.90 Max.	2.60 Max.	3.50 Max.	3.60 Max.	3.70 Max.
Termination bandwidth (b)	0.25±0.10	0.50±0.20	0.50±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
Category Code	**Size Code**	**Application Code**	**Breakdown Voltage Code**	**Surge Current Code**
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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Electrical Characteristics:

Operating temperature: -55 to +85°C

Part Number	Size	Working Voltage		Breakdown Voltage[1] @1mA (V)	Clamping Voltage[2] (V)	Surge Voltage[3] @1.2/50μs, 2Ω (kV)	Surge Current[3] @8/20μs (A)		Energy Max. @10/1000 μs (J)	Capacitance[4] @1kHz (pF)	Safety Certification	
		Vac	Vdc			1 time	1 time	15 times			UL[5]	CSA[6]
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	

[1] The breakdown voltage was measured at 1 mA current.

[2] The clamping voltage was measured at standard current 1210 (2.5A), 1812 (5A), 2220 (10A) and 3220 (10A).

[3] The surge voltage was tested at 1.2/50 μs waveform and 2Ω. The surge current was tested at 8/20 μs waveform.

[4] The capacitance value only for customer reference, it's not formal specification.

[5] The UL safety approval complies with standard UL1449 3rd.

[6] The CSA safety approval complies with standard CSA C22.2 No. 8.

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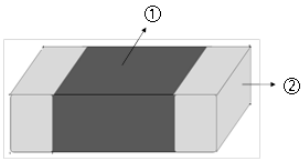
Construction and Materials:

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

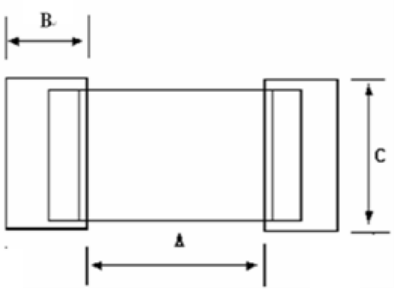
Environmental Test:

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

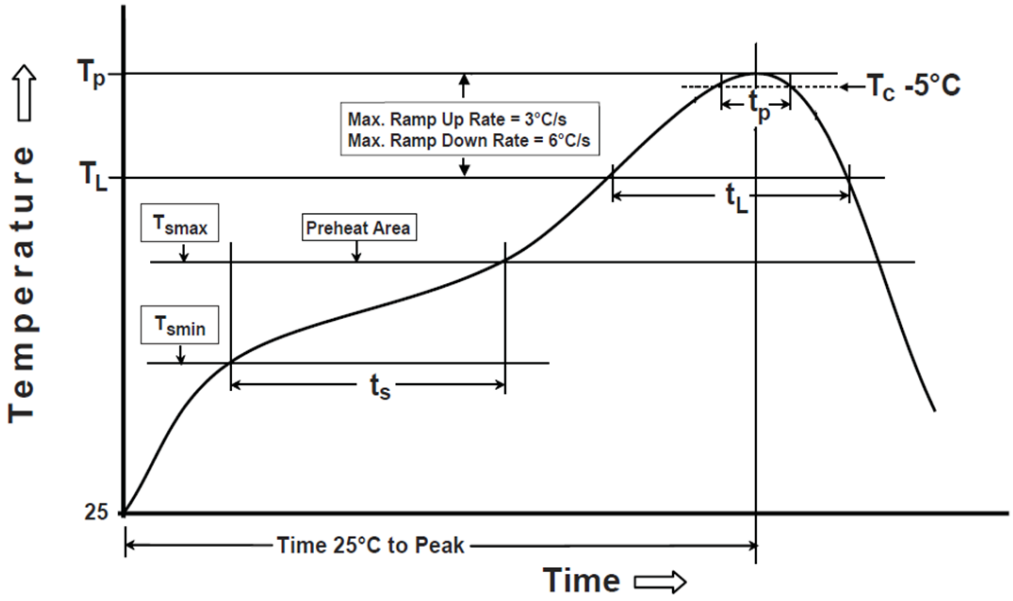
High Surge Protection Devices

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
Preheat/Soak 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-uprate (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	

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