Revision of November 2018

High Surge Protection Devices

Super High Current (SC) Series

Features:

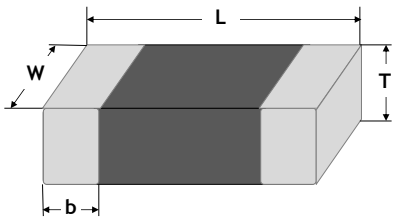
- SMD type – 1206~2220 sizes
- Bidirectional and symmetrical V/I characteristics
- Meet IEC61000-4-5/K21 standard
- Large withstanding surge current capability à 500~8000A (@8/20μs)
- Excellent low leakage current <15μA
- Multilayer construction provides higher power dissipation
- RoHS compliant

Application Fields:

- Telecom equipment RJ45, LAN connector, Ethernet
- Outdoor/Indoor AP/IAD
- Security system IP CAM
- Low voltage power line
- Base station

Shape and Dimensions:

Unit (mm)	1206	1210	1812	2220
Length (L)	3.2 +0.6/-0.2	3.2 +0.6/-0.2	4.5 +0.6/-0.2	6.0 +0.7/-0.3
Width (W)	1.6 +0.4/-0.2	2.5 +0.4/-0.2	3.2 +0.5/-0.2	5.3 +0.5/-0.3
Thickness (T)	1.90 Max.	2.60 Max.	3.50 Max.	3.60 Max.
Termination bandwidth (b)	0.5±0.20	0.5±0.25	0.5 +0.35/-0.1	0.5 +0.35/-0.1



Product Identification:

HSP	1206	SC	012V	0500
Category Code	**Size Code**	**Application Code**	**Breakdown Voltage Code**	**Surge Current Code**
HSP = High Surge Protection Device	**Inch** 1206 1210 1812 2220	**SC** = Super High Current	**012V** = 12V **024V** = 24V **047V** = 47V **056V** = 56V **075V** = 75V **082V** = 82V	**0500** = 500A **1000** = 1000A **2000** = 2000A **3000** = 3000A **5000** = 5000A **8000** = 8000A

Surge Waveform:

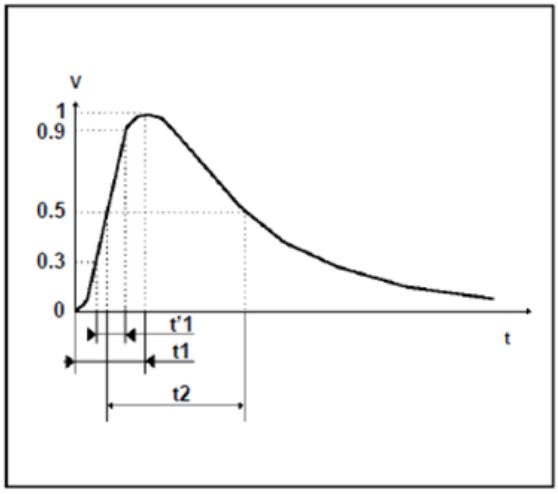


Fig. 1 8/20 μs surge definition

Severity Level	t1 (=1.67t'1)	t2
1	8 μs	20 μs

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Electrical Characteristics:

Part Number	Size	Working Voltage		Breakdown Voltage @1mA (V) [1]	Clamping Voltage (V) [2]	Surge Current @ 8/20μs (A) [3]
		VAC	VDC			
HSP1206SC012V0500	1206	6	9	12 (12~20)	<25	500
HSP1206SC024V0500	1206	14	18	24 (±10%)	<45	500
HSP1206SC047V0500	1206	30	38	47 (±10%)	<85	500
HSP1206SC075V0500	1206	48	60	75 (±10%)	<100	500
HSP1210SC024V1000	1210	14	18	24 (±10%)	<45	1000
HSP1210SC047V1000	1210	30	38	47 (±10%)	<85	1000
HSP1210SC075V1000	1210	48	60	75 (±10%)	<100	1000
HSP1812SC047V2000	1812	30	38	47 (±10%)	<85	2000
HSP1812SC075V2000	1812	48	60	75 (±10%)	<100	2000
HSP2220SC047V5000	2220	30	38	47 (±10%)	<85	5000
HSP2220SC047V8000	2220	30	38	47 (±10%)	<85	8000
HSP2220SC075V3000	2220	48	60	75 (±10%)	<100	3000

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

[2] The clamping voltage was measured at standard current 1206 (1A), 1210 (2.5A), 1812 (5A) and 2220 (10A)

[3] The surge current was tested at 8/20 μs waveform

Part Number	Non-linear Coefficient (α)	Leakage Current (μA)		Capacitance [4] @ 1kHz (pF)	Response Time (T_{rise})	Operating Temperature (°C)
		Before Surge Test	After Surge Test			
HSP1206SC012V0500	20	<10	<80	3500	< 1ns	-55 to +125
HSP1206SC024V0500	20	<10	<80	2300		
HSP1206SC047V0500	30	<10	<80	690		
HSP1206SC075V0500	30	<10	<80	300		
HSP1210SC024V1000	20	<15	<80	2300		
HSP1210SC047V1000	30	<10	<80	1550		
HSP1210SC075V1000	30	<10	<80	930		
HSP1812SC047V2000	30	<15	<80	2100		
HSP1812SC075V2000	30	<15	<80	1650		
HSP2220SC047V5000	35	<15	<80	9900		
HSP2220SC047V8000	35	<15	<80	7500		
HSP2220SC075V3000	40	<15	<80	2000		

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

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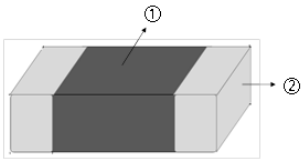
Construction and Materials:

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

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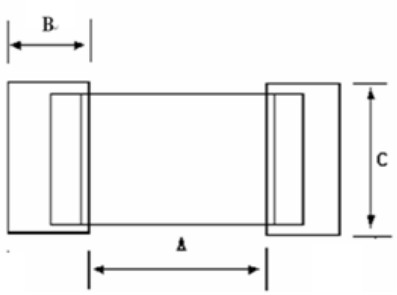
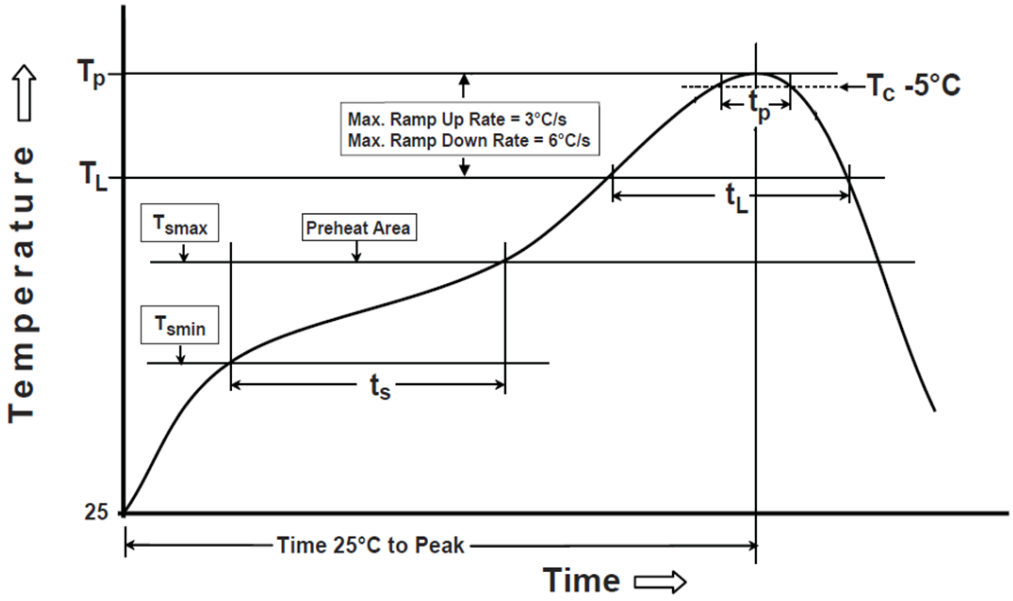
Recommended Foot Print Dimensions:

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
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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