

CMS Surge Series (CMS)
Descriptions 产品描述

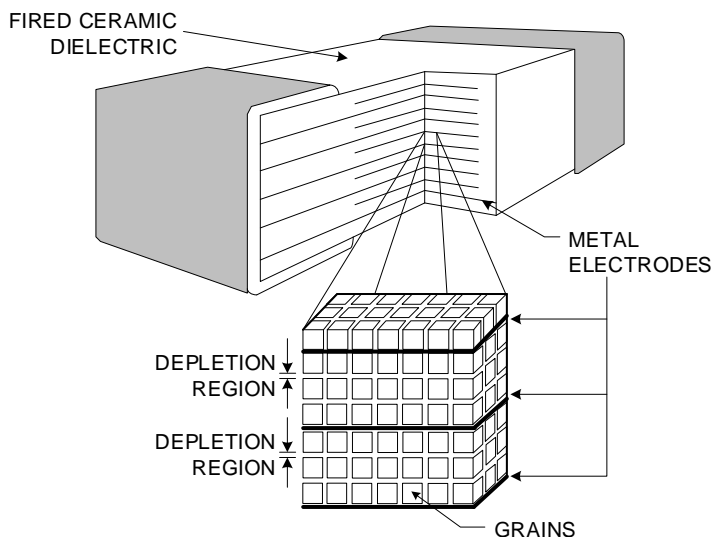
The Ceramic Micro-Surge Protection Device (CMS) is manufactured from semiconducting ceramics which offer rugged protection and excellent transient energy absorption in a small SMD package. These devices are designed to suppress a variety of transient events, including those specified in IEC61000-4-2, IEC61000-4-5 and other standards used for Electromagnetic Compliance (EMC).

These devices are available in ceramic leadless chip form, eliminating lead inductance and assuring fast speed of response to transient surges. In addition, The CMS transient suppressors have temperature independent suppression characteristics, affording protection from -55°C to 125°C, which is much better than suppressors based on silicon semiconductor technology.

The CMS-P Series is specially designed for AC power-lines protection applications. It features a very high current protection capability with a very small size, also a very fast response thus a ultra low clamping voltage. These characteristics make CMS-P Series devices the best replacement of TVS and improvement of metal oxide (MOV) in high working voltage applications.

Features 产品特征

- Multi-Layers Construction Provides Higher Power Dissipation
- High Surge Current Capability
- Better than UL94V-0 Flammability Rating
- No Temperature Derating up to 125°C Ambient
- Low leakage current <30μA
- Inherent Bi-directional Clamping
- Low Clamping Voltage
- SMD type Body size 0604, 0806, 1206, 1210, 1812, 2220
- “Zero” Lead Inductance
- RoHS compliant


Multilayer Internal Construction
Applications 产品应用

- LED
- Surge protection for IEC/EN 61547
- Surge protection for IEC61000-4-5
- EFT protection for IEC 61000-4-4 (Level 4)
- ESD protection for IEC 61000-4-2 (Level 4)

Order Information 包装信息

Device Size	Quantity	Reel Size
0604	3000 pcs	7 Inch (178mm)
0806	2000 pcs	
1206	2000 pcs	
1210	1500 pcs	13 Inch (330mm)
1812	2000 pcs	
2220	2000 pcs	

Agency Information 安规认证

- UL/cUL: E498596
- TUV: B002653 0001 Rev.01
- CQC: CQC21001318502

Electrical Characteristics 电参数

型号 Part Number	最大持续电压 Maximum Continuous Voltage		压敏电压 Nominal Varistor Voltage @1mA	最大钳位电压 Max. Clamping Voltage @8/20μs		能量 Energy @10/1000μs	峰值浪涌电流 Peak Pulse Current @8/20μs	CQC	UL	TUV
	AC (V)	DC (V)	V _N (V)	V _C (V)	I _C (A)	E _T (J)	I _{PP} (A)			
CMS0604V151P500	95	125	150[135-185]	250	1.0	0.30	50			
CMS0604V241P500	150	200	240[216-264]	360	1.0	0.30	50			
CMS0604V271P500	175	225	270[243-297]	410	1.0	0.30	50		●	
CMS0604V301P500	195	250	300[270-330]	450	1.0	0.30	50			
CMS0604V331P300	210	270	330[297-363]	500	1.0	0.30	30			
CMS0604V361P300	230	300	360[324-396]	540	1.0	0.30	30			
CMS0604V391P300	250	320	390[351-429]	590	1.0	0.30	30			
CMS0604V431P300	275	350	430[387-473]	650	1.0	0.30	30			
CMS0806V151P700	95	125	150[135-185]	250	5.0	0.80	70	●		
CMS0806V241P101	150	200	240[216-264]	360	5.0	0.50	100	●	●	●
CMS0806V271P151	175	225	270[243-297]	410	5.0	0.50	150	●	●	●
CMS0806V301P101	195	250	300[270-330]	450	5.0	0.50	100	●		
CMS0806V331P500	210	270	330[297-363]	500	5.0	0.50	50	●		
CMS0806V361P500	230	300	360[324-396]	540	5.0	0.50	50	●		
CMS0806V391P500	250	320	390[351-429]	590	5.0	0.50	50	●	●	
CMS0806V431P500	275	350	430[387-473]	650	5.0	0.50	50	●	●	●
CMS0806V431P500-E	275	350	430[387-473]	650	5.0	0.70	70	●	●	●
CMS0806V471P500	300	385	470[423-517]	710	5.0	0.50	50	●	●	●
CMS0806V471P500-E	300	385	470[423-517]	710	5.0	0.70	70	●	●	●
CMS0806V511P500	320	410	510[459-561]	840	5.0	0.50	50	●	●	
CMS0806V511P500-E	320	410	510[459-561]	840	5.0	0.70	70	●	●	
CMS1206V151P301	95	125	150[135-185]	360	5.0	1.0	300	●		
CMS1206V241P201	150	200	240[216-264]	360	5.0	1.0	200	●	●	●
CMS1206V271P201	175	225	270[243-297]	410	5.0	1.0	200	●	●	●
CMS1206V301P201	195	250	300[270-330]	450	5.0	1.0	200	●		
CMS1206V331P151	210	270	330[297-363]	500	5.0	1.0	150	●		
CMS1206V361P151	230	300	360[324-396]	540	5.0	1.0	150	●		
CMS1206V391P101	250	320	390[351-429]	590	5.0	1.0	100	●	●	

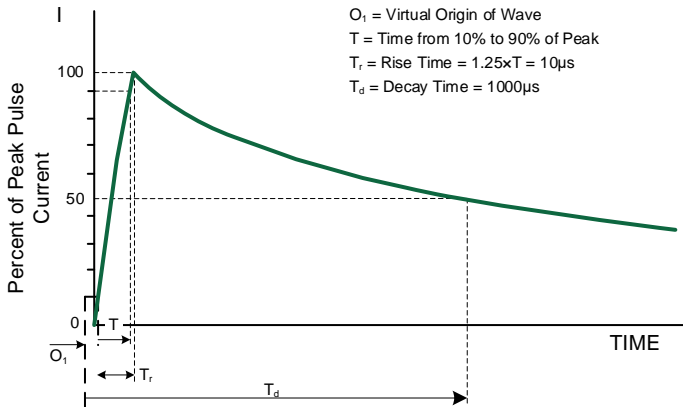
Electrical Characteristics 电参数

型号 Part Number	最大持续电压 Maximum Continuous Voltage		压敏电压 Nominal Varistor Voltage @1mA	最大钳位电压 Max. Clamping Voltage @8/20µs		能量 Energy @10/1000µs	峰值浪涌电流 Peak Pulse Current @8/20µs	CQC	UL	TUV
	AC (V)	DC (V)	V _N (V)	V _C (V)	I _C (A)	E _T (J)	I _{PP} (A)			
CMS1206V431P101	275	350	430[387-473]	650	5.0	1.0	100	●	●	●
CMS1206V431P101-E	275	350	430[387-473]	650	5.0	1.3	150	●	●	●
CMS1206V471P101	300	385	470[423-517]	710	5.0	1.0	100	●	●	●
CMS1206V471P101-J	300	385	470[423-517]	710	5.0	0.5	50	●	●	●
CMS1206V471P101-E	300	385	470[423-517]	710	5.0	1.3	150	●	●	●
CMS1206V511P500	320	410	510[459-561]	840	5.0	1.0	50	●	●	●
CMS1206V511P500-E	320	410	510[459-561]	840	5.0	1.3	120	●	●	●
CMS1206V511P500-J	320	410	510[459-561]	840	5.0	0.5	50	●	●	●
CMS1206V511P500-H	320	410	500-561	840	5.0	1.0	50	●	●	●
CMS1206V561P500	320	410	560 [504-616]	950	5.0	1.0	50	●		
CMS1206V511P500-G1	320	410	560-620	1020	5.0	0.8	50	●	●	●
CMS1210V241P601	150	200	240[216-264]	360	5.0	2.2	600	●	●	
CMS1210V241P601-J	150	200	240[216-264]	360	5.0	2.0	400	●	●	
CMS1210V271P601	175	225	270[243-297]	410	5.0	2.2	600	●	●	
CMS1210V271P601-J	175	225	270[243-297]	410	5.0	2.0	400	●	●	
CMS1210V301P401	195	250	300[270-330]	450	5.0	2.0	400	●		
CMS1210V331P301	210	270	330[297-363]	500	5.0	2.0	300	●		
CMS1210V331P501	210	270	330[297-363]	500	5.0	2.5	500	●		
CMS1210V361P301	230	300	360[324-396]	540	5.0	2.0	300	●		
CMS1210V391P201	250	320	390[351-429]	590	5.0	2.0	200	●		
CMS1210V431P201	275	350	430[387-473]	650	5.0	2.0	200	●	●	●
CMS1210V431P201-E	275	350	430[387-473]	650	5.0	2.5	300	●	●	●
CMS1210V431P401	275	350	430[387-473]	650	5.0	2.7	400	●		
CMS1210V471P201	300	385	470[423-517]	710	5.0	2.0	200	●	●	●
CMS1210V471P201-E	300	385	470[423-517]	710	5.0	2.5	300	●	●	●
CMS1210V471P401	300	385	470[423-517]	710	5.0	2.7	400	●		
CMS1210V511P151	320	410	510[459-561]	840	5.0	2.0	150	●		●
CMS1210V511P151-E	320	410	510[459-561]	840	5.0	2.5	250	●		●
CMS1210V511P401	320	410	510[459-561]	840	5.0	2.0	400	●		
CMS1210V561P101	320	410	560[504-616]	950	5.0	2.0	100	●		●

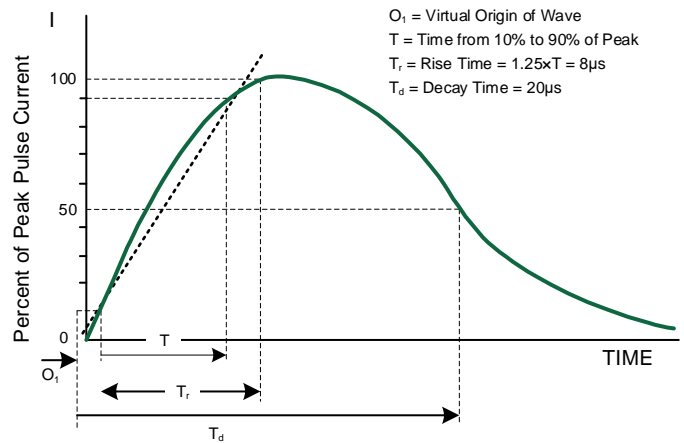
Electrical Characteristics 电参数

型号 Part Number	最大持续电压 Maximum Continuous Voltage		压敏电压 Nominal Varistor Voltage @1mA	最大钳位电压 Max. Clamping Voltage @8/20μs		能量 Energy @10/1000μs	峰值浪涌电流 Peak Pulse Current @8/20μs	CQC	UL	TUV
	AC (V)	DC (V)	V _N (V)	V _C (V)	I _C (A)	E _T (J)	I _{PP} (A)			
CMS1812V241P801	150	200	240[216-264]	360	5.0	4.5	800	●	●	
CMS1812V271P801	175	225	270[243-297]	410	5.0	4.5	800	●	●	●
CMS1812V301P601	195	250	300[270-330]	450	5.0	4.5	600	●		
CMS1812V331P501	210	270	330[297-363]	500	5.0	4.5	500	●		
CMS1812V361P501	230	300	360[324-396]	540	5.0	4.5	500	●		
CMS1812V391P401	250	320	390[351-429]	590	5.0	4.5	400	●		
CMS1812V431P401	275	350	430[387-473]	650	5.0	4.5	400	●	●	●
CMS1812V431P401-E	275	350	430[387-473]	650	5.0	5.5	600	●	●	●
CMS1812V471P401	300	385	470[423-517]	710	5.0	4.5	400	●	●	●
CMS1812V471P401-E	300	385	470[423-517]	710	5.0	5.5	600	●	●	●
CMS1812V471P801	300	385	470[423-517]	710	5.0	6.5	800	●		
CMS1812V511P251	320	410	510[459-561]	840	5.0	4.5	250	●		●
CMS1812V511P251-E	320	410	510[459-561]	840	5.0	5.5	400	●		●
CMS1812V511P601	320	410	510[459-561]	840	5.0	6.5	600	●		
CMS1812V561P251	350	460	560[504-616]	950	5.0	4.5	250	●		●
CMS2220V241P152	150	200	240[216-264]	395	10.0	7.0	1500	●		
CMS2220V271P152	175	225	270[243-297]	455	10.0	7.5	1500	●		●
CMS2220V301P122	195	250	300[270-330]	495	10.0	7.5	1200	●		
CMS2220V331P102	210	270	330[297-363]	500	10.0	7.0	1000	●		
CMS2220V361P102	230	300	360[324-396]	595	10.0	7.0	1000	●		
CMS2220V391P801	250	320	390[351-429]	650	10.0	7.0	800	●		
CMS2220V431P801	275	350	430[387-473]	710	10.0	7.5	800	●		●
CMS2220V471P801	300	385	470[423-517]	775	10.0	8.0	800	●		●
CMS2220V471P152	300	385	470[423-517]	775	10.0	10	1500	●		
CMS2220V511P401	320	410	510[459-561]	840	10.0	7.0	400	●		●
CMS2220V511P801	320	410	510[459-561]	840	10.0	8.5	800	●		
CMS2220V511P152	320	410	510[459-561]	840	10.0	10	1500	●		
CMS2220V561P401	320	410	560[504-616]	950	10.0	7.0	400	●		●

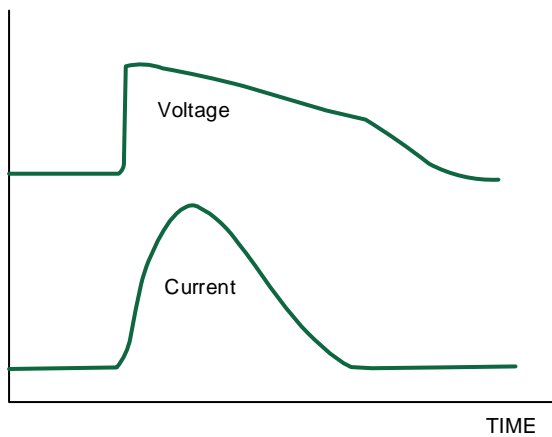
Pulse Waveform - 10/1000µs waveform



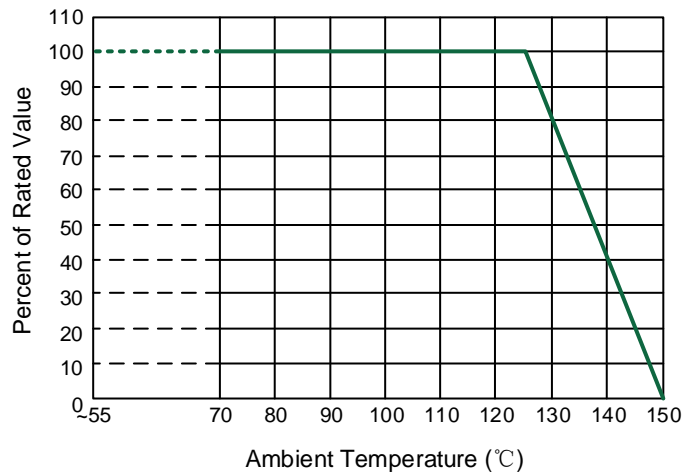
Pulse Waveform - 8/20µs waveform



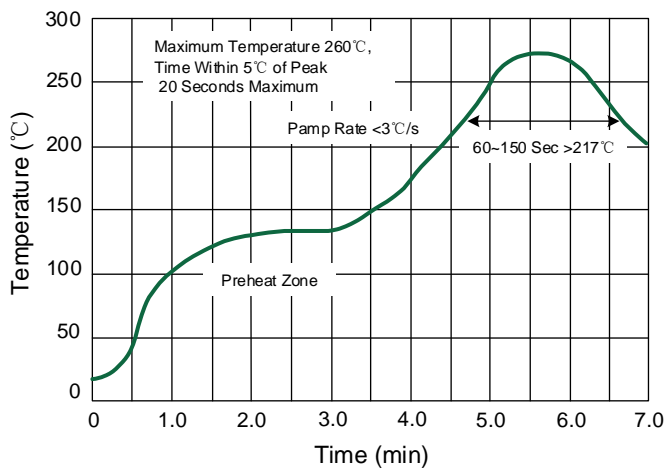
Surge Response - 8/20µs waveform



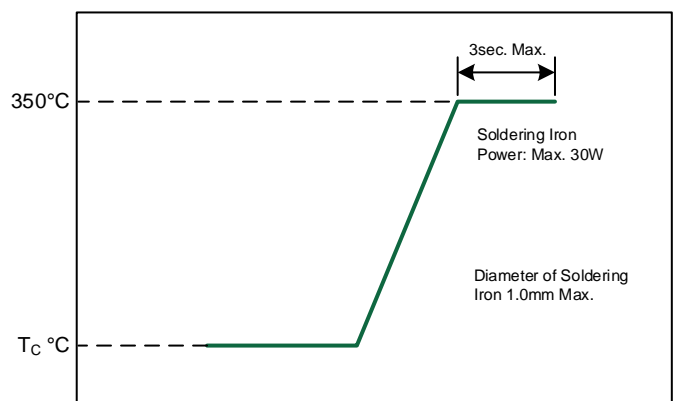
Current, Energy and Power Derating Curve



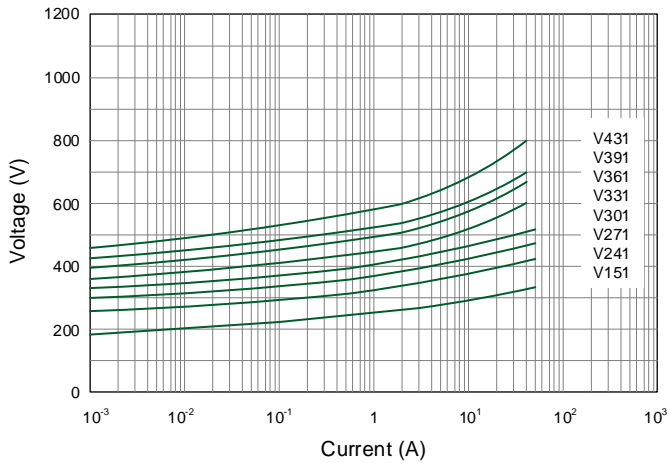
Lead-free Re-flow Solder Profile



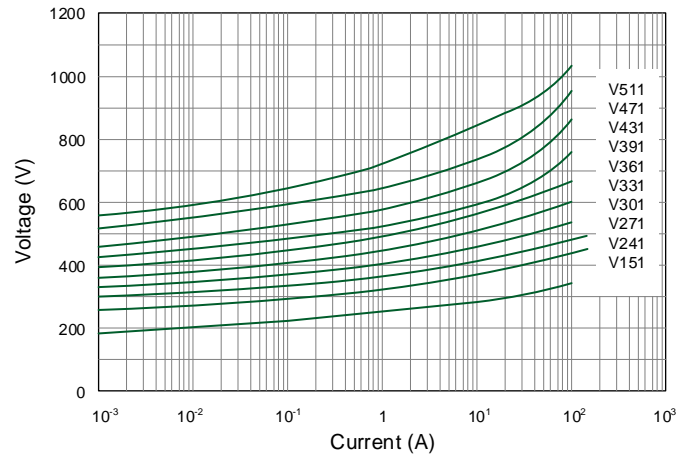
Iron Soldering Profile



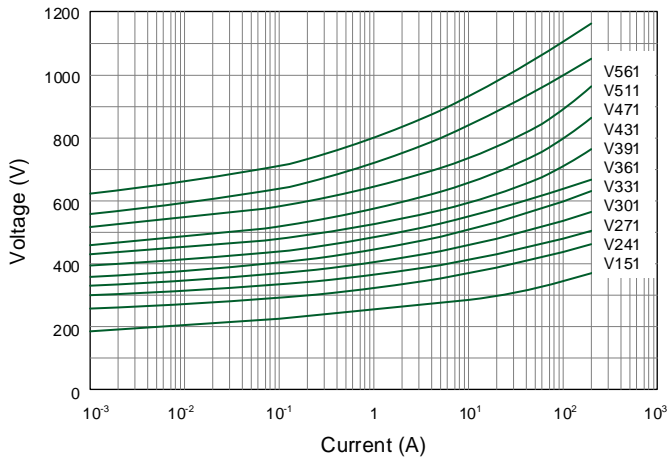
Max. Clamping Voltage for 0604 Series



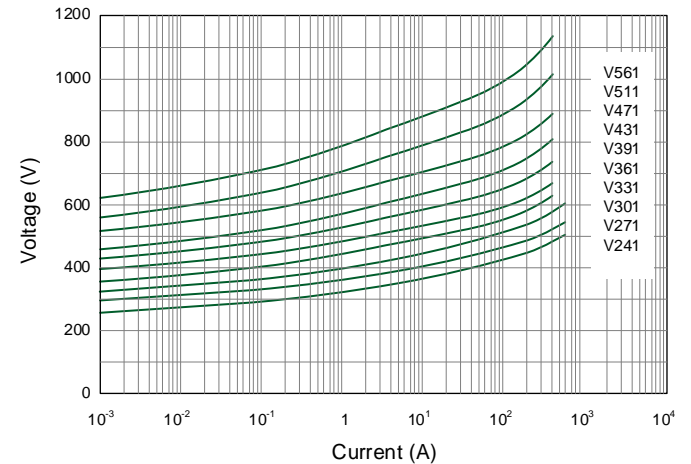
Max. Clamping Voltage for 0806 Series



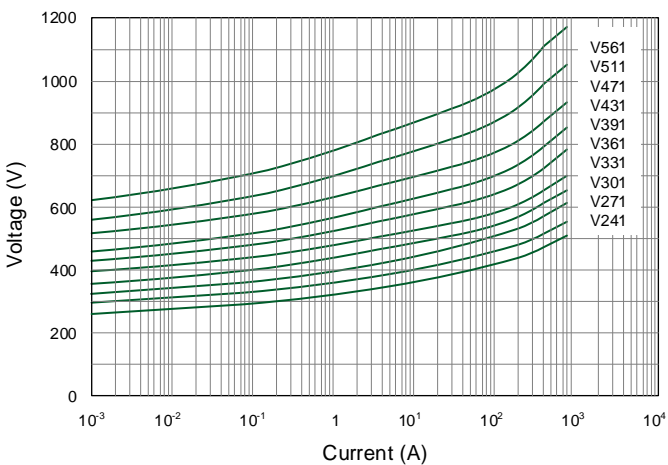
Max. Clamping Voltage for 1206 Series



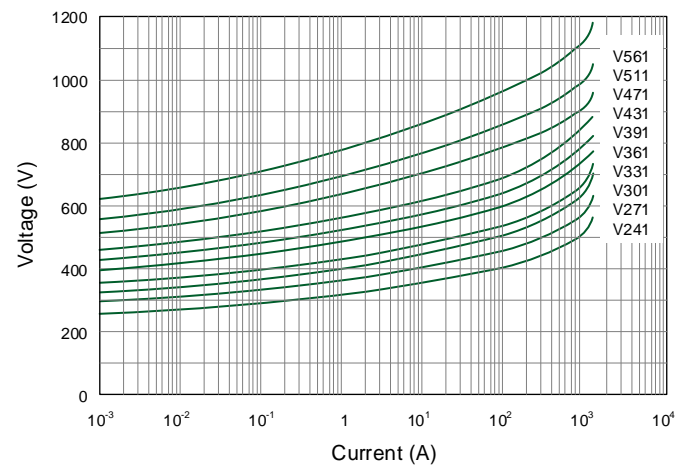
Max. Clamping Voltage for 1210 Series

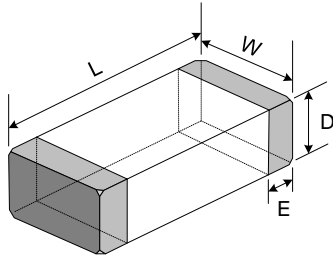
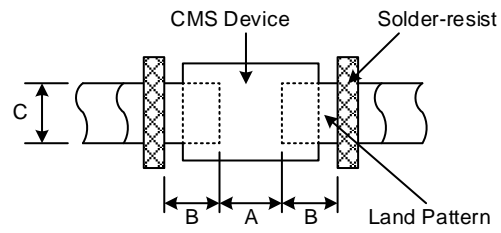


Max. Clamping Voltage for 1812 Series

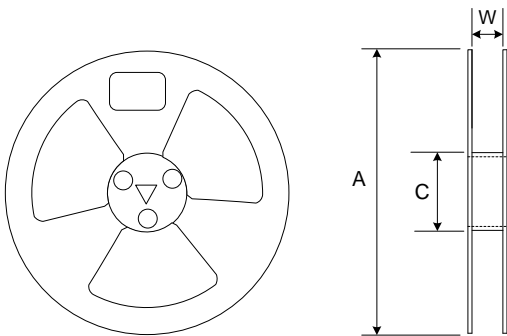


Max. Clamping Voltage for 2220 Series

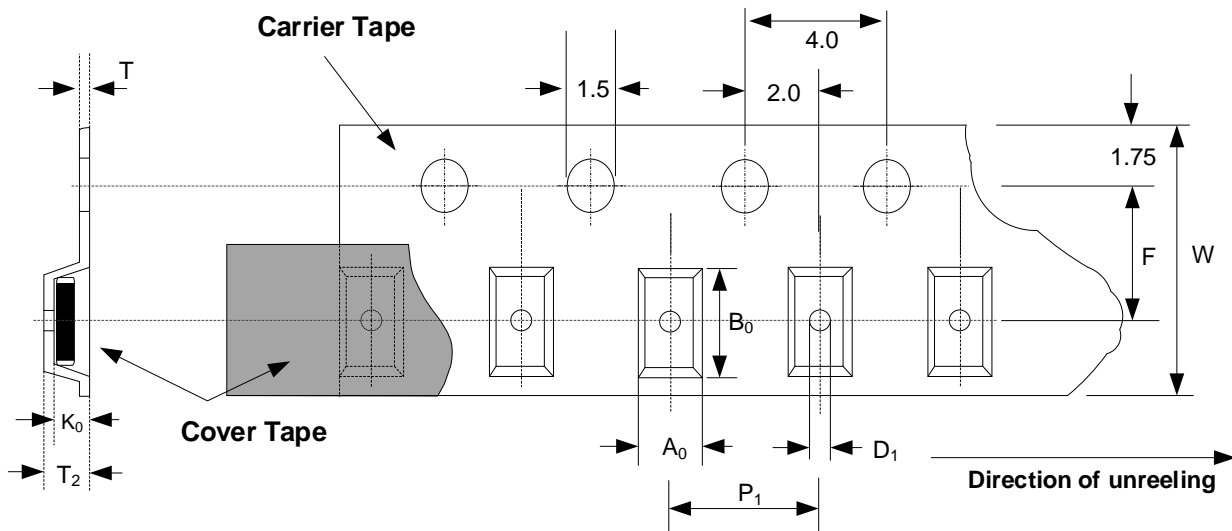


Product Dimensions 产品尺寸

Product Dimensions

Recommended PCB Pattern

SIZE	L	W	D	E	A	B	C
0604	1.6 +0.30/-0.20	0.80 +0.40/-0.20	0.8~1.3	0.10~0.50	0.8~1.0	0.6~0.8	0.8~1.2
0806	2.20 +0.40/-0.20	1.60 +0.40/-0.20	0.9~2.0	0.12~0.70	1.2~1.6	0.8~1.2	1.6~2.0
1206	3.20 +0.60/-0.20	1.60 +0.40/-0.20	1.3~2.0	0.20~0.75	1.8~2.5	1.0~1.5	1.6~2.2
1210	3.20 +0.60/-0.20	2.50 +0.40/-0.20	2.0~2.6	0.20~0.75	1.9~2.5	1.2~1.6	2.6~3.0
1812	4.50 +0.80/-0.20	3.20 +0.80/-0.20	2.2~3.6	0.25~0.80	2.8~3.2	1.5~1.9	3.3~3.9
2220	6.00 +0.70/-0.30	5.30 +0.50/-0.30	2.2~4.0	0.25~0.90	4.0~4.4	1.8~2.2	5.2~5.8

Reel Dimension 卷盘尺寸


Type	Spec.	Dimensions(mm)		
		A	W	C
0604 Series	7"*8mm	178	8.4+1.5/-0.0	58
0806 Series				
1206 Series				
1210 Series				
1812 Series	13"*12mm	330	12.4+2.0/-0.0	100
2220 Series				

Tape Specifications 编带规格


Dimension	0604	0806	1206	1210	1812	2220
A_0	1.30 ±0.20	2.10 ±0.20	2.10 ±0.20	3.00 ±0.20	3.80 ±0.20	5.90 ±0.20
B_0	2.00 ±0.20	2.50 ±0.20	3.90 ±0.20	3.90 ±0.20	5.25 ±0.20	6.80 ±0.20
K_0	1.30 Max.	2.20 Max.	2.20 Max.	2.80 Max.	3.80 Max.	4.20 Max.
T	0.30 Max.	0.30 Max.	0.30 Max.	0.30 Max.	0.33 Max.	0.33 Max.
T_2	1.60 Max.	2.60 Max.	2.60 Max.	3.30 Max.	4.30 Max.	4.70 Max.
D_1	1.00 ±0.05	1.00 ±0.05	1.00 ±0.05	1.00 ±0.05	1.50 ±0.05	1.50 ±0.05
P_1	4.00 ±0.10	4.00 ±0.10	4.00 ±0.10	4.00 ±0.10	8.00 ±0.10	8.00 ±0.10
W	8.00 ±0.20	8.00 ±0.20	8.00 ±0.20	8.00 ±0.20	12.00 ±0.20	12.00 ±0.20
F	3.50 ±0.05	3.50 ±0.05	3.50 ±0.05	3.50 ±0.05	5.50 ±0.05	5.50 ±0.05

Storage 存储条件

- Operating and storage temperature range (individual chip without packing): -55°C ~ +125°C.
工作和存储温度范围 (未包装的产品) -55°C ~ +125°C.
- Storage temperature range (packaging conditions): -10°C ~ +40°C RH 70% (Max.).
存储温度范围 (包装情况下) -10°C ~ +40°C RH 70% (最高.).
- The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to high humidity. Package must be stored at 40°C or less and 70% RH or less.
如果将包装存放在暴露的高湿度地方, 则外部电极的可焊性可能会变差。包装必须储存在40°C或更低, RH为70%或更低。
- The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to dust of harmful gas (e.g. HCl, sulfurous gas of H₂S).
如果将包装存放在暴露的有害气体 (例如HCl, H₂S的含硫气体) 以及粉尘地方, 则外部电极的可焊性可能会变差。
- Packaging material may be deformed if package are stored where they are exposed to heat of direct sunlight.
如果包装材料存放在暴露的阳光直射高温下, 包装材料可能会变形。
- Solderability shall be guaranteed for 12 months from the date of delivery on condition that they are stored at the environment specified in Clause 2. For those parts, which passed more than 12 months shall be checked solder-ability before use.
- 自交货之日起, 可焊性应保证12个月, 前提是储存在第2条规定的环境中。对于超过12个月的产品, 应在使用前检查可焊性。

Reliability Test 可靠性测试

Item	Requirement	Test Condition
High Temperature Storage	<ul style="list-style-type: none"> Breakdown voltage change: within $\pm 10\%$ No mechanical damage 	<ul style="list-style-type: none"> Temperature: $150 \pm 2^\circ\text{C}$ Time: 1000 (+24) hours Test after placing in ambient temperature for 1~2hours
Low Temperature Storage	<ul style="list-style-type: none"> Breakdown voltage change: within $\pm 10\%$ No mechanical damage 	<ul style="list-style-type: none"> Temperature: $-55 \pm 2^\circ\text{C}$ Time: 1000 (+24) hours Test after placing in ambient temperature for 1~2hours
Thermal Shock	<ul style="list-style-type: none"> Breakdown voltage change: within $\pm 10\%$ No mechanical damage 	<ul style="list-style-type: none"> Temperature, Time: $-55 (\pm 2)^\circ\text{C}/30\text{min} \sim 125 (\pm 2)^\circ\text{C}/30\text{min}$ Transforming interval: 2~3min. Tested cycle: 100 cycles. Test after placing in ambient temperature for 1~2hours
High Temperature Load	<ul style="list-style-type: none"> Breakdown voltage change: within $\pm 10\%$ No mechanical damage 	<ul style="list-style-type: none"> Temperature: $125 \pm 2^\circ\text{C}$ Rated working voltage applied Time: 1000 (+24) hours Test after placing in ambient temperature for 1~2hours
Damp Heat Load / Humidity Load	<ul style="list-style-type: none"> Breakdown voltage change: within $\pm 10\%$ No mechanical damage 	<ul style="list-style-type: none"> Temperature: $85 \pm 2^\circ\text{C}$ Humidity: $85\% \pm 2\text{RH}$ Rated working voltage applied Time: 500 (+24) hours Test after placing in ambient temperature for 1~2hours

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Specifications are subject to change without notice.

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