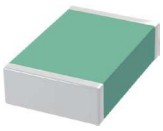
SMD High Voltage Class I

1KV - 15KV

High Voltage Products. High Voltage Experts

APPLICATIONS

- **Typical uses : timing, precision circuitry, filtering**



RoHS compliant

FEATURES

- **Ultra stable temperature compensating class I ceramic**
- **Custom voltage, package size, capacitance value on request**
- **Tested in accordance to CECC 32100 and AEC-Q200**
- **CECC 30600 et NFC 83-131 compliant**
- **Available in stack or radial**
- **Surface coating can be necessary to prevent surface arcing**

ELECTRICAL PARAMETERS

ELECTRICAL CHARACTERISTICS :
at + 25°C unless otherwise specified

OPERATING TEMPERATURE :
- 55°C, + 125°C

TEMPERATURE COEFFICIENT :
± 30ppm with 0Vdc applied

DISSIPATION FACTOR :
≤ 1.10-3 at 1Vrms and 1MHz for values ≤ 1000pF
≤ 1.10-3 at 1Vrms and 1KHz for values > 1000pF

INSULATION RESISTANCE (IR) :
25°C/Un 10^5 MOhm or 1000 Ohm-Farad whichever is less
125°C/Un 10^4 MOhm or 100 Ohm-Farad whichever is less

DIELECTRIC STRENGTH TEST :
1.2Un for 5s with 50mA max charging current

QUICK REFERENCE DATA

	0805	1206	1210	1808	1812	1825	2220	2225	2825	3640	4040	5440	5550	6660	8060	80150	15080
Min	0.1 pF	0.4 pF	0.4 pF	1.0 pF	1.0 pF	1.0 pF	1.0 pF	1.0 pF	4.7 pF	10 pF	10 pF	10 pF	10 pF	10 pF	10 pF	22 pF	22 pF
1KV	820 pF	2.7 nF	6.8 nF	6.8 nF	15 nF	33 nF	39 nF	47 nF	56 nF	120 nF	120 nF	180 nF	220 nF	330 nF	390 nF	1.0 µF	1.0 µF
1.5KV	330 pF	1.0 nF	2.7 nF	2.7 nF	8.2 nF	18 nF	18 nF	27 nF	33 nF	68 nF	68 nF	100 nF	120 nF	180 nF	220 nF	560 nF	560 nF
2KV	150 pF	560 pF	1.5 nF	1.2 nF	3.9 nF	10 nF	12 nF	15 nF	18 nF	39 nF	47 nF	56 nF	82 nF	120 nF	120 nF	330 nF	330 nF
3KV		180 pF	470 pF	470 pF	1.2 nF	2.7 nF	2.7 nF	3.9 nF	4.7 nF	10 nF	12 nF	15 nF	18 nF	27 nF	33 nF	82 nF	82 nF
4KV		82 pF	220 pF	220 pF	680 pF	1.8 nF	1.8 nF	2.2 nF	3.3 nF	6.8 nF	8.2 nF	10 nF	12 nF	18 nF	22 nF	56 nF	56 nF
5KV				150 pF	390 pF	1.0 nF	1.2 nF	1.8 nF	2.2 nF	4.7 nF	5.6 nF	6.8 nF	8.2 nF	12 nF	15 nF	39 nF	39 nF
8KV				47 pF	120 pF	330 pF	330 pF	390 pF	470 pF	1.0 nF	1.2 nF	1.8 nF	2.2 nF	3.3 nF	3.9 nF	10 nF	10 nF
10KV				22 pF	82 pF	180 pF	220 pF	270 pF	330 pF	680 pF	820 pF	1.2 nF	1.5 nF	2.2 nF	2.7 nF	6.8 nF	6.8 nF
12KV										470 pF	560 pF	820 pF	1.0 nF	1.5 nF	1.8 nF	4.7 nF	4.7 nF
15KV										270 pF	330 pF	470 pF	680 pF	820 pF	1.0 nF	2.7 nF	2.7 nF

ORDERING INFORMATION

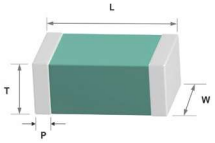
5440	A	101	K	H	X	B	-
SIZE	**DIELECTRIC**	**CAPACITANCE**	**TOLERANCE**	**VOLTAGE**	**TERMINATION**	**PACKAGING**	**SPECIAL PARAMETERS**
0805 1206 1210 1808 1812 1825 2220 2225 2825 3033 3640 4040 4055 5440 5550 6660 8060 80150 15080	A = NPO	Expressed in picofarads (pF). The first two digits are significant, the third digit gives the number of noughts. Example : 102 = 1 000pF For special values R is used as decimal separator Example 12R7 = 12.7pF 1340R0 = 1340pF	A = ±0,5% if > 10pF and ±0,05pF si < 10pF B = ± 0.1pF C = ± 0,25pF D = ± 0,5pF E = 0.1% F = ± 1% G = ± 2% J = ± 5% K = ± 10%	G = 1KV O = 1.5KV H =2KV T = 2.5KV I = 3KV K = 4KV L = 5KV 6 = 6KV 8 = 8KV 10 = 10KV 12 = 12KV 15 = 15KV	X = Nickel Tin F = Palladium-Silver P = Polymer Tin C = Copper Tin W = Nickel Gold Q = Solderable Silver	B = Reel V = Bulk	- BM = BME Dxx = Reliability spec Exx = Sorting spec

For other sizes, voltage, tolerance contact us

DIMENSIONS IN MILLIMETERS

		0805	1206	1210	1808	1812	1825	2220	2225	2825	3640	4040	5440	5550	6660	8060	80150	15080
Length (L)		2.00 ± 0.2	3.20 ± 0.2	3.20 ± 0.2	4.60 ± 0.3	4.60 ± 0.3	4.60 ± 0.4	5.60 ± 0.4	5.60 ± 0.4	7.10 ± 0.4	9.15 ± 0.8	10.20 ± 0.8	13.70 ± 1.0	14.00 ± 1.0	16.80 ± 1.0	20.30 ± 1.0	20.30 ± 1.0	20.30 ± 1.0
Width (W)		1.25 ± 0.2	1.60 ± 0.2	2.50 ± 0.2	2.00 ± 0.2	3.20 ± 0.2	6.35 ± 0.3	5.10 ± 0.4	6.35 ± 0.4	6.35 ± 0.4	10.20 ± 0.8	10.20 ± 0.8	10.20 ± 1.0	12.70 ± 1.0	15.20 ± 1.0	15.20 ± 1.0	38.10 ± 1.0	38.10 ± 1.0
Thickness max (T)		1.40	1.70	2.50	2.20	3.30	3.60	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Termination (P)	Min	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	Max	0.70	0.70	0.80	0.80	0.80	0.80	0.80	1.00	1.00	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50

For P termination (Polymer type) add 0.10mm to Length (L) and 0.05 to Width (W)



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STANDARD SIZE : 0805 to 3640

SIZE		0805			1206					1210					1808						1812						1825						2220						2225						3640						
CODE	CAP	1KV	1.5KV	2KV	1KV	1.5KV	2KV	3KV	4KV	1KV	1.5KV	2KV	3KV	4KV	1KV	1.5KV	2KV	3KV	4KV	5KV	1KV	1.5KV	2KV	3KV	4KV	5KV	1KV	1.5KV	2KV	3KV	4KV	5KV	1KV	1.5KV	2KV	3KV	4KV	5KV	1KV	1.5KV	2KV	3KV	4KV	5KV	1KV	1.5KV	2KV	3KV	4KV	5KV
0R1	0.1 pF																																															
0R3	0.3 pF																																															
0R5	0.5 pF																																															
0R8	0.8 pF																																															
1R0	1.0 pF																																															
1R2	1.2 pF																																															
1R5	1.5 pF																																															
1R8	1.8 pF																																															
2R2	2.2 pF																																															
2R7	2.7 pF																																															
3R3	3.3 pF																																															
3R9	3.9 pF																																															
4R7	4.7 pF																																															
5R6	5.6 pF																																															
6R8	6.8 pF																																															
8R2	8.2 pF																																															
100	10 pF																																															
120	12 pF																																															
150	15 pF																																															
180	18 pF																																															
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330	33 pF																																															
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470	47 pF																																															
560	56 pF																																															
680	68 pF																																															
820	82 pF																																															
101	100 pF																																															
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221	220 pF																																															
271	270 pF																																															
331	330 pF																																															
391	390 pF																																															
471	470 pF																																															
561	560 pF																																															
681	680 pF																																															
821	820 pF																																															
102	1.0 nF																																															
122	1.2 nF																																															
152	1.5 nF																																															
182	1.8 nF																																															
222	2.2 nF																																															
272	2.7 nF																																															
332	3.3 nF																																															
392	3.9 nF																																															
472	4.7 nF																																															
562	5.6 nF																																															
682	6.8 nF																																															
822	8.2 nF																																															
103	10 nF																																															
123	12 nF																																															
153	15 nF																																															
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273	27 nF																																															
333	33 nF																																															
393	39 nF																																															
473	47 nF																																															
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154	150 nF																																															
184	180 nF																																															
224	220 nF																																															
274	270 nF																																															
334	330 nF																																															

STANDARD SIZE : 4040 to 80150

SIZE		4040									5440									5550									6660									8060									80150									SIZE	
CODE	CAP	1KV	1.5KV	2KV	3KV	4KV	5KV	8KV	10KV	12KV	15KV	1KV	1.5KV	2KV	3KV	4KV	5KV	8KV	10KV	12KV	15KV	1KV	1.5KV	2KV	3KV	4KV	5KV	8KV	10KV	12KV	15KV	1KV	1.5KV	2KV	3KV	4KV	5KV	8KV	10KV	12KV	15KV	1KV	1.5KV	2KV	3KV	4KV	5KV	8KV	10KV	12KV	15KV	CAP	CODE
1R2	1.2 pF																																																			1.2 pF	1R2
1R5	1.5 pF																																																			1.5 pF	1R5
1R8	1.8 pF																																																			1.8 pF	1R8
2R2	2.2 pF																																																			2.2 pF	2R2
2R7	2.7 pF																																																			2.7 pF	2R7
3R3	3.3 pF																																																			3.3 pF	3R3
3R9	3.9 pF																																																			3.9 pF	3R9
4R7	4.7 pF																																																			4.7 pF	4R7
5R6	5.6 pF																																																			5.6 pF	5R6
6R8	6.8 pF																																																			6.8 pF	6R8
8R2	8.2 pF																																																			8.2 pF	8R2
100	10 pF																																																			10 pF	100
120	12 pF																																																			12 pF	120
150	15 pF																																																			15 pF	150
180	18 pF																																																			18 pF	180
220	22 pF																																																			22 pF	220
270	27 pF																																																			27 pF	270
330	33 pF																																																			33 pF	330
390	39 pF																																																			39 pF	390
470	47 pF																																																			47 pF	470
560	56 pF																																																			56 pF	560
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271	270 pF																																																			270 pF	271
331	330 pF																																																			330 pF	331
391	390 pF																																																			390 pF	391
471	470 pF																																																			470 pF	471
561	560 pF																																																			560 pF	561
681	680 pF																																																			680 pF	681
821	820 pF																																																			820 pF	821
102	1.0 nF																																																			1.0 nF	102
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222	2.2 nF																																																			2.2 nF	222
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392	3.9 nF																																																			3.9 nF	392
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103	10 nF																																																			10 nF	103
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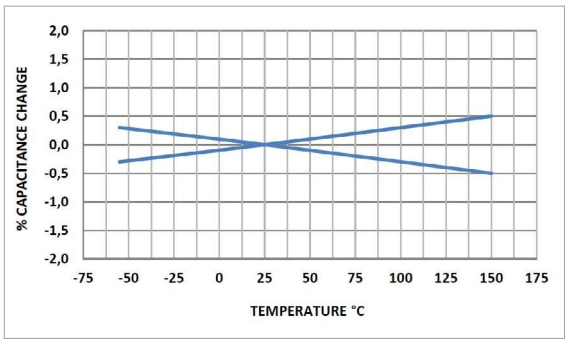
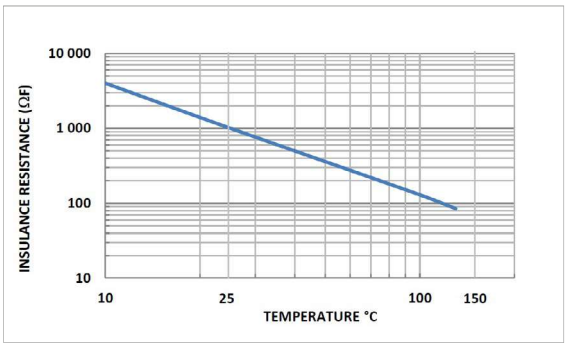
274	270 nF																																																			270 nF	274
334	330 nF																																																			330 nF	334
394	390 nF																																																			390 nF	394
474	470 nF																																																			470 nF	474
564	560 nF																																																			560 nF	564
684	680 nF																																																			680 nF	684
824	820 nF																																																			820 nF	824
105	1.0 µF																																																			

TYPICAL CHARACTERISTICS

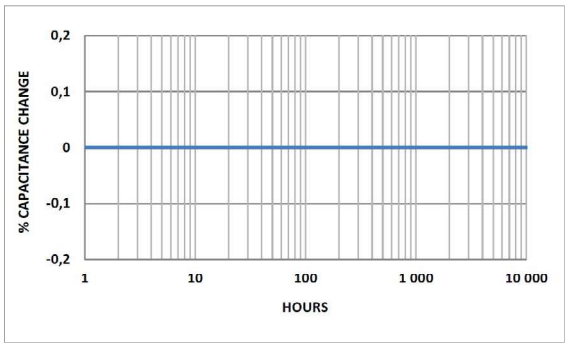
NPO Temperature coefficient of capacitance



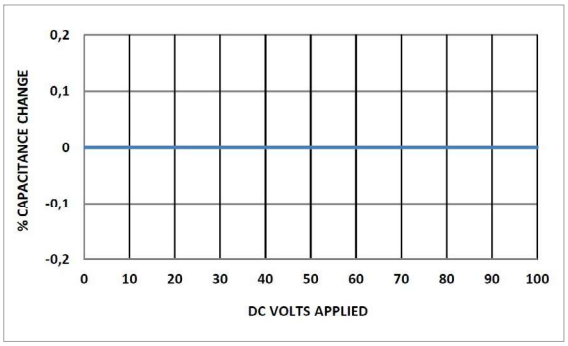
NPO Insulation resistance vs. temperature



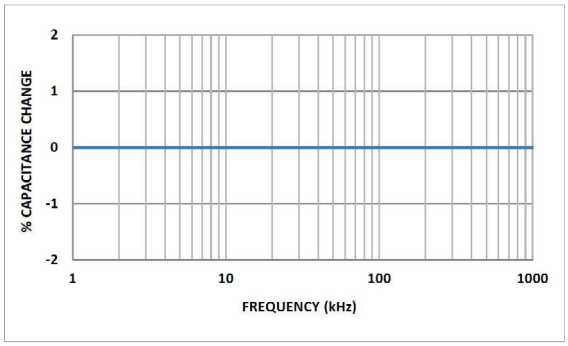
NPO Aging rate



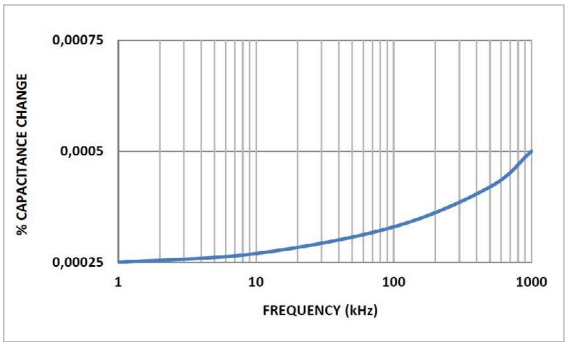
NPO Voltage coefficient of capacitance



NPO Change of Capacitance with Frequency



NPO Dissipation factor vs. frequency



Dielectric Types

High Voltage Products. High Voltage Experts

Different types of dielectrics display very different behaviours when it comes to withstanding power and heat, and don't demonstrate the same capacitance potential. We propose a wide range of ceramics. You'll find in the page below more information about what type of ceramic is better suited to your needs.

Class I Dielectrics

Class I Dielectrics are the most stable type and are used when the application demands highly stable performance and cannot allow electrical noise or dielectric loss. Variations of voltage and temperature have minimum consequences on this class of dielectrics. Consequently, they are most used for DC blocking, decoupling applications as well as filtering with low capacitance.

Q (Code Q)

- High Q (>2000)
- RF application up to 30 Ghz
- High Current

NP0 (Code A)

- Most stable type
- Lower capacitance
- Good for avoiding electrical noise

Class 1 N2200 Dielectrics

Class I stability with close to Class II volumetric capacitance

N2T (Code P)

- Ultra stable
- No piezo electric effect
- High current pulse discharge

Class II Dielectrics

Class II Dielectrics display stable performance and possess a better volumetric efficiency than class I. Thus, they are used in bypassing, filtering, coupling and decoupling applications.

X7R (Code Y)

- Good volumetric efficiency
- High capacitance
- Stable

BX/BY (Code X/2C1)

- Improved ESR
- Better voltage coefficient
- MIL specifications

X5R/X7S/X6S/Y5V (Code R/T/S/V)

- Highest capacitance per volume
- Less stable
- Low voltage

	Class I			Class II						
Dielectric	High Q	NP0/COG	N2T	X7R	BX	2C1	X5R	X7S	X6S	Y5V
Code	Q	A	P	Y	X	2C1	R	T	S	V
Type	Ultra Stable			Stable						
Temperature Range	-55°C +125°C (250°C)		-55°C +125°C				-55°C +85°C	-55°C +125°C	--55°C +105°C	-25°C +85°C
T° Coefficient no DC applied	± 30ppm		2200ppm ± 350	± 15%		± 20%	± 15%	± 22%		+30% -80%
T° Coefficient rated DC applied	-		-	-	+15 -25%	+20 -30%	-	-	-	
Dielectric constant	10-100		450	2000-3000			3000-20000			
Dissipation Factor	0.01% 0.05%	0.05% 0.1%		1% 3.5%			2.5% 15%			5% 20%
IR 25°C/Un	100 GΩ or 1000 Ω-F whichever is less						10 GΩ or 100 Ω-F whichever is less			
Dielectric strenght ≤200V	2.5 Ur 5 seconds 50mA max									
Dielectric strenght <500V	Ur + 250V 5 seconds 50mA max									
Dielectric strenght <1000V	1.5 Ur 5 seconds 50mA max									
Dielectric strenght ≥1000V	1.2 Ur 5 seconds 50mA max									
Piezo effect	No piezo			piezo effect						
Ageing	None			2% per decade	1% per decade		4% per decade	5% per decade		7% per decade
Tolerance	± 0.25pF ± 0.5pF ± 1% ± 2% ± 5% ± 10%			± 5% ± 10% ± 20%			± 10% ± 20%			-20% +80%
Termination	X,C,H	X,F,P,C,W,H,I		X,P			X			

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Terminations details

High Voltage Products. High Voltage Experts

All our capacitors are available with a wide range of termination to fit your specific needs :

Tin (Code X)

- Standard termination
- ROHS
- Dipped Silver, Nickel barrier, Sn plated

Polymer (Code P)

- Flexible termination
- Improve bending tolerance
- ROHS
- Avaible on all components
- Designed for gluing

Silver-Palladium (Code F)

- Excellent contact properties
- Resist to leaching during hand soldering
- Dipped Silver-Palladium
- ROHS

Gold Flash (Code W)

- Glueing
- ROHS
- Max 0.2µm Gold Flash

Gold Thick (Code G)

- Microelectronic applications
- Wire Bonding/glueing
- ROHS
- Min 2.5µm Gold

Non Magnetic (Code C/CP)

- High Tesla Applications
- IRM, particule accelerators
- Dipped Silver, Copper barrier, Sn plated
- ROHS

Solderable Silver (Code Q)

- Medical or space application
- Whiskers free
- High temperature
- ROHS

Dipped SAC 305 (Code S/SP)

- Sn96.5 Ag3 Cu0.5
- Medical, space and oil application
- Whiskers free
- High reliability
- ROHS

Dipped Tin-Lead (Code H/HP)

- Sn62 Pb36 Ag2
- Medical or Oil application
- Whiskers free
- High reliability

Electrolytical Tin-Lead (Code I/IP)

- Minimum Pb 10%
- Medical or space application
- Whiskers free
- High reliability

TERMINATION	CODE	ROHS	NON MAGNETIC	IMPROVED BOARD FLEX	SOLDERING	GLUING	WIRE BONDING
Sn	X	O			O		
Polymer	P	O		O	O		
AgPd	F	O			O	O	
Gold Flash	W	O			O	O	
Gold Thick	G	O			O	O	O
Non Magnetic	C	O	O		O		
Solderable Silver	Q	O			O		
Dipped SnPb	H				O		
Dipped SAC	S	O			O		
Electrolytical SnPb	I				O		
Lead	-	O		O	O		
Non Magn Lead	C	O	O	O	O		
Lead Frame	-	O		O	O		
Non Magn Lead Frame	C	O	O	O	O		

O = COMPLIANT

STORAGE

To prevent the damage of solderability of terminations, the following storage conditions are recommended :
Indoors under 5 ~ 40°C and 20% ~ 70% RH.
No harmful gases containing sulfuric acid, ammonia, hydrogen sulfide or chlorine.
Packaging should not be opened until the capacitors are required for use. If opened, the pack should be re-sealed as soon as possible. Taped products should be stored out of direct sunlight, which might promote deterioration in tape or adhesion performance. The product is recommended to be used within 24 months after shipment. Extended shelf life over this period require a solderability check before use.

HANDLING

Chip capacitors are dense, hard, brittle, and abrasive materials. They are liable to suffer mechanical damage, in the form of cracks or chips. Chip Capacitors should be handled with care to avoid contamination or damage. To use vacuum or plastic tweezers to pick up or plastic tweezers is recommended for manual placement. Tape and reeled packages are suitable for automatic pick and placement machine.

PREHEAT

In order to minimize the risk of thermal shock during soldering, a carefully controlled preheat is required.
The rate of preheat should not exceed 3°C per second.

SOLDERING FLUX

Use mildly activated rosin RA and RMA fluxes, but do not use activated flux. The amount of solder in each solder joint should be controlled to prevent the damage of chip capacitors caused by the stress between solder, chips, and substrate.

SOLDERING TYPE

Lead containing solders, such as Sn60, Sn62 or Sn63 and lead free solders, such as SnAgCu, can all be used with our MLCCs.
In case of non-magnetic termination code C, use lead containing or lead (Pb)-free SAC305 solders.

SOLDERING HEIGHT

The solder climbing minimum height is suggesting to 25% of chip thickness or 500um whichever is less.
(Reference from IPC-610E)

COOLING

After soldering, cool the chips and the substrate gradually to room temperature. Natural cooling in air is recommended to minimize stress in the solder joint.

CLEANING

All flux residues must be removed by using suitable electronic-grade vapor-cleaning solvents to eliminate contamination that could cause electrolytic surface corrosion. Good results can be obtained by using ultrasonic cleaning of the solvent. The choice of the proper system is depends upon many factors such as component mix, flux, and solder paste and assembly method. The ability of the cleaning system to remove flux residues and contamination from under the chips is very important.

SOLDERING CONDITIONS

SIZE	THICKNESS	WAVE	REFLOW
0201	All	O	O
0402	All	O	O
0505	All	O	O
0603	All	O	O
0805	< 1.25mm	O	O
0805	≥ 1.25mm		O
1111	< 1.25mm	O	O
1111	≥ 1.25mm		O
1206	< 1.25mm	O	O
1206	≥ 1.25mm		O
1210	< 1.25mm	O	O
1210	≥ 1.25mm		O
larger than 1210	All		O
High compact	All		O

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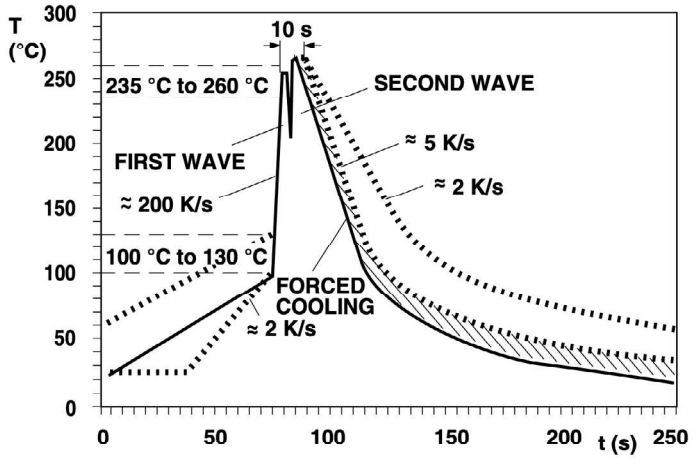
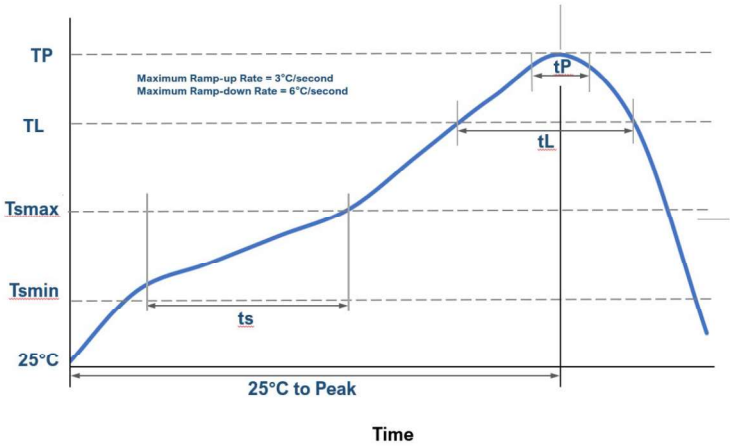
WAVE SOLDERING PROFILE

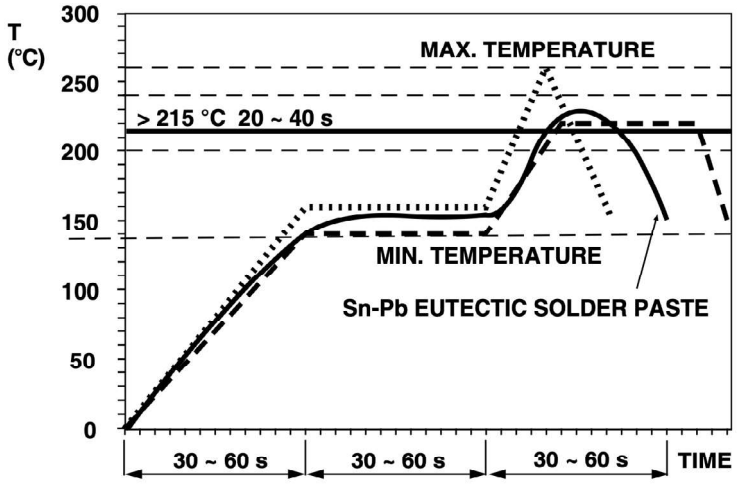


LEADFREE REFLOW SOLDERING PROFILE

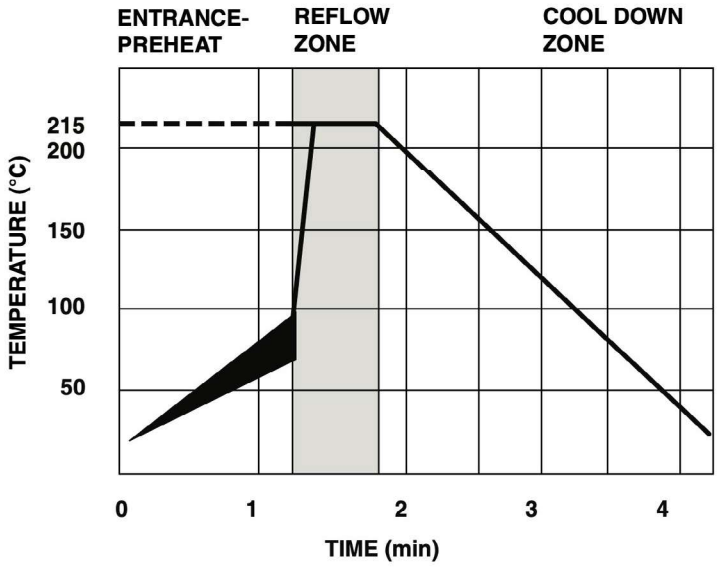


PROFILE FEATURE	LEAD FREE (SAC 305)
Tsmin	150°C
Tsmax	190°C
Time from Tsmin to Tsmax	60 - 120 seconds
Ramp-up Rate	3°C/second max
Liquidous Temperature	217°C
Time above Liquidous	60 - 120 seconds
Peak Temperature	250°C
Time within 5°C of maximum Peak Temperature	10 seconds max
Ramp-down Rate	6°C/second max
Time 25°C to Peak	8min max

SNPB REFLOW SOLDERING PROFILE



VAPOUR PHASE REFLOW PROFILE



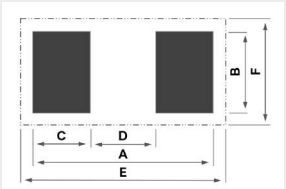
HAND SOLDERING

Hand soldering is not recommanded as the thermal shock may cause a crack, hot air pencil use is advised, however if used the following recommendations should be taken :

- Soldering iron tip diameter ≤3.0 mm and wattage max. 20W.
- The Capacitors shall be pre-heated to 150°C and that the temperature gradient between the devices and the tip of the soldering iron.
- Tip temperature ≤280°C and should't be applied for more than 5 seconds.
- The required amount of solder shall be melted on the soldering tip.
- The tip of iron should not contact the ceramic body directly.
- The Capacitors shall be cooled gradually at room temperature after soldering.
- Forced air cooling is not allowed.

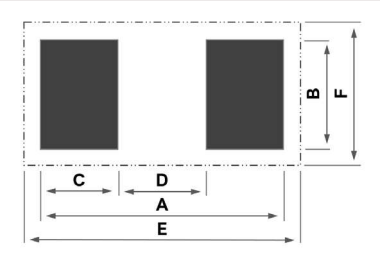
TYPICAL SMD FOOTPRINT WAVE SOLDERING

SIZE	FOOTPRINT DIMENSIONS IN MM					
	A	B	C	D	E	F
0603	2.40	0.80	0.70	1.00	3.10	1.40
0805	3.20	1.30	0.90	1.40	4.10	1.85
1206	4.80	1.70	1.25	2.30	5.90	2.25
1210	4.80	2.60	1.25	2.30	5.90	3.15



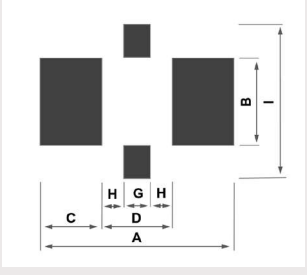
TYPICAL SMD FOOTPRINT REFLOW SOLDERING

SIZE	FOOTPRINT DIMENSIONS IN mm					
	A	B	C	D	E	F
0201	0.65	0.30	0.21	0.23	0.90	0.60
0204	1.00	1.00	0.30	0.40	1.25	1.45
0402	1.50	0.50	0.40	0.70	1.75	0.95
0306	1.30	1.60	0.40	0.50	1.55	2.05
0404	1.50	1.00	0.40	0.70	1.75	1.45
0504	1.90	1.00	0.40	1.10	2.15	1.45
0505	1.90	1.30	0.50	0.80	2.15	1.75
0508	1.90	2.00	0.50	0.90	2.15	2.55
0603	2.30	0.80	0.60	1.10	2.55	1.35
0612	2.30	3.20	0.60	1.10	2.55	3.75
0805	2.90	1.25	0.90	1.10	3.15	1.80
1206	4.10	1.60	0.90	2.30	4.35	2.25
1210	4.10	2.50	1.00	2.10	4.35	3.15
1808	5.50	2.10	1.20	3.10	5.75	2.75
1812	5.50	3.30	1.20	3.10	5.75	3.95
1825	5.50	6.55	1.20	3.10	5.75	7.20
2211	6.80	3.00	1.40	4.00	7.05	3.65
2220	6.80	5.40	1.40	4.00	7.05	6.05
2225	6.80	6.70	1.65	3.50	7.05	7.50
2525	7.70	6.75	1.65	4.40	7.95	7.55
2825	8.40	6.70	1.65	5.10	8.65	7.50
3033	9.00	8.80	1.95	5.10	9.25	9.60
3640	10.55	10.70	2.35	5.85	10.80	11.50
4017	11.60	4.60	2.35	6.90	11.85	5.25
4020	11.60	5.40	2.35	6.90	11.85	6.05
4040	11.60	10.70	2.35	6.90	11.85	11.50
40100	11.60	26.20	2.35	6.90	11.85	27.00
5550	15.50	13.20	2.35	10.80	15.75	14.00
6080	16.70	20.80	2.35	12.00	16.95	21.60
6660	18.30	15.70	2.35	13.60	18.55	16.50
8060	21.90	15.70	2.35	17.20	22.15	16.50
80150	21.90	38.90	2.35	17.20	22.15	39.70
HIGH COMPACT 1210	4.15	2.60	1.15	1.85	5.05	3.30
HIGH COMPACT 1812	5.75	3.40	1.35	3.05	6.70	4.20
HIGH COMPACT 2220	6.80	5.50	1.70	3.40	7.70	6.30



TYPICAL FILTER FOOTPRINT REFLOW SOLDERING

SIZE	FOOTPRINT DIMENSIONS IN mm						
	A	B	C	D	G	H	I
0603	2.30	0.80	0.45	1.40	0.60	0.40	1.50
0805	2.90	1.25	0.90	1.80	0.80	0.50	2.00
1206	4.10	1.60	0.90	2.40	1.00	0.70	3.00
1806	5.50	1.60	1.20	3.20	1.00	1.10	3.00
1812	5.50	3.30	1.20	3.90	1.50	1.20	4.80
2220	6.80	5.40	1.40	4.50	1.50	1.50	7.00



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ORDERING INFORMATION

SRMC	-	0603	Y	102	J	A	-	L	040	-	-	-	B	-
SERIE	HT	SIZE	DIELECTRIC	CAPACITANCE	TOLERANCE	VOLTAGE	TERMINAISON	FORM	HEIGHT	LEADS	COATING/ MARKING	CUR-RENT	PACKAGING	SPECIAL
- FK FH SREV MCF M2F MPF SRMC SRTV SR SA SF H	- H = High Temp	0201 0204 0402 0303 0306 0404 0504 0505 0508 0603 0612 0805 1206 1210 1808 1812 1825 2211 2220 2225 2325 2525 2825 3033 3640 4040 40100 5550 6080 6660 7274 7565 8060 80150 15080 40 to 94	Q = High Q A = NP0 P = N2T X = BX Y=X7R BY=2C1 T = X7S S = X5R R = X6S V = Y5V U = X8R	Expressed in picofarads (pF) The first two digits are significant, the third digit gives the number of noughts Example : 102 = 1 000pF For special values R is used as decimal separator Example 12R7 = 12.7pF 1340R0 = 1340pF	A = ± 0.05pF/0.1% B = ± 0.1pF C = ± 0,25pF D = ± 0,5pF E = ± 0.5% F = ± 1% G = ± 2% J = ± 5% K = ± 10% M = ± 20% Z = -20% +80%	Y = 4V R = 6.3V Q = 10V J = 16V X = 25V Z = 35V A = 50V U = 63V B = 100V N = 150V C = 200V P = 250V D = 300V E = 500V F = 630V G = 1000V 1K2 = 1200V 1K4 = 1400V O = 1500V 1K7 = 1700V 1K8 = 1800V H = 2000V T = 2500V I = 3000V M = 3600V K = 4000V L= 5000V 6 = 6000V S = 7200V 8 = 8000V 10 = 10000V 12 =12000V 15 = 15000V	- = Sn lead/lead frame X = Nickel Tin F = Palladium-Silver P = Polymer Tin (Flex) C = Copper Tin (Non magnetic) CP = Copper Polymer Tin (Non magnetic) W = Nickel Gold Flash G = Nickel Gold Thick HP = Dipped SnPb Polymer H = Dipped SnPb S = Dipped SAC SP = Polymer Dipped SAC I = Electrolytic SnPb IP = Polymer Eletrolytical SnPb Q = Solderable Silver M = Microstrip A = Axial Ribbon R = Radial Ribbon U = Axial Wire V = Radial Wire CM = Microstrip (Non magnetic) CA = Axial Ribbon (Non magnetic) CR = Radia Ribbon (Non magnetic) CU = Axial Wire (Non magnetic) CV = Radial Wire (Non magnetic)	- J L D M T = 2 leads U = 4 leads	020 030 040 050 060 070 080 090 100 110 120 130 140 160 180	- 2 to 10 B	- I = Conformal-Coating H = Epoxy Coating M = Marked R = Resistor	- 1 2	B = Reel V = Bulk T = Tray Package W = Waffle Pack	- BM = BME Dxx = Reliability spec Exx = Sorting spec

RELIABILITY/SCREENING LEVEL

OPTIONAL CODE	TESTING DETAIL
D20	Generic AECQ-200
D55681	DPA & 100% Burn-In Per Group A of MIL-PRF-55681
D123	Group A & B Per MIL-PRF-123
D3009CFM	Screened and LAT according to ECSS-3009 for space application C Level
D3009CEM	Evaluation version for space development according to ECSS-2310 C Level
COTS1	Class 1 COTS+ according to ECSS-Q-ST-60-13C-Rev1
COTS2	Class 2 COTS+ according to ECSS-Q-ST-60-13C-Rev1
COTS3	Class 3 COTS+ according to ECSS-Q-ST-60-13C-Rev1
D03	High Temperature application Burn-In 100% 125° 168H 2Un, 6.5% AQL
D05	Burn-In 100% 125° 168H 2Un, less than 5% default allowed VRT CEI 68-2-14 10 cycles 0V -55°C/+125°C, less than 5% default allowed 20 pieces life test 125°C, 1.5Un, 1 default allowed

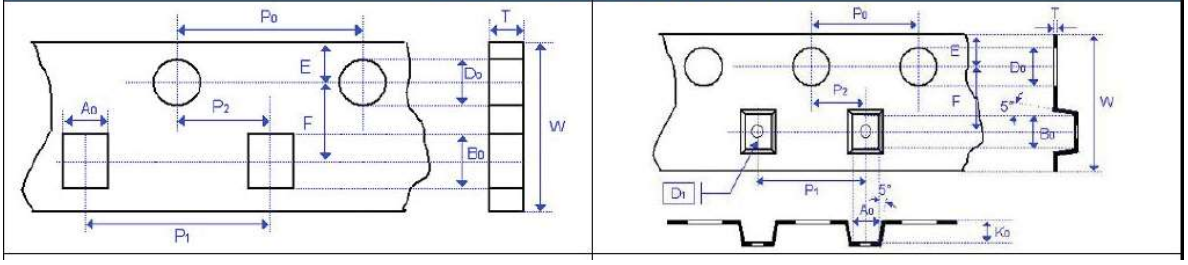
SORTING

OPTIONAL CODE	SORTING DETAIL
E01	2 cells sorting 0 to +2,5 & +2,5 to +5 (% or pF accoding to value)
E02	4 cells sorting -5 to –2,5 ; -2,5 to 0 ; 0 to +2,5 & +2,5 to 5 (% or pF accoding to value)
E21	2% cells

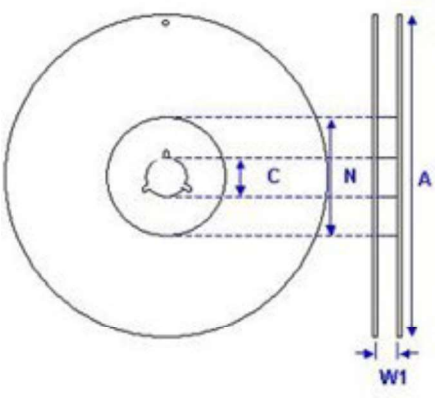
PACKAGE DIMENSION AND QUANTITY

SIZE	THICKNESS	PAPER TAPE		PLASTIC TAPE	
		7 REEL	13 REEL	7' REEL	13 REEL
0201	0.3 ± 0.05	10 K	50 K		
0402	0.5 ± 0.05	10 K	50 K		
0504	0.6 ± 0.05			4K	15K
	0.9 ± 0.05			4K	15K
0603	0.7 ± 0.07	4K		4K	15K
	0.9 ± 0.07	4K	15K	4K	15K
	0.9 ± 0.07			4K	15K
	1.1 ± 0.07			4K	15K
0805	0.8 ± 0.07	4K	15K	4K	15K
	0.9 ± 0.07			4K	10K
	1.1 ± 0.07			3K	10K
	1.3 ± 0.07			3K	10K
1206	1.1 ± 0.1			3K	10K
	1.4 ± 0.1			3K	8K
	1.8 ± 0.1			2K	8K
1210	1.4 ± 0.1			3K	8K
	1.8 ± 0.1			1K	6K
1808	1.4 ± 0.1			3K	8K
1812	1.6 ± 0.1			2K	8K
	2.1 ± 0.1			1K	6K
	2.8 ± 0.1			1K	6K
2220	1.8 ± 0.1			1K	6K
	3.0 ± 0.1			0.5K	2K
2225	3.0 ± 0.1			0.5K	2K
3033	3.0 ± 0.1			0.5K	2K
3640	3.0 ± 0.1			0.5K	2K
5440	3.9 ± 0.1				0.5K - 1K
HIGH COMPACT 1210				1K	6K
HIGH COMPACT 1812				1K	6K
HIGH COMPACT 2220				0.5K	2K

EMBOSSED TAPE DIMENSIONS



REEL SIZE	7	7	13
C	13.0 +0.5/-0.2	13.0 +0.5/-0.2	13.0 +0.7/-0.3
W1	8.4 +1.5/-0	12.4 +2.0/-0	8.4 +2.0/-0
A	178.0 ±0.10	178.0 ±0.10	330.0 ±1.0
N	60.0 ±1.0	80.0 ±1.0	100 ±1.0



PRODUCTION CONTROL

	TEST/STRESS	STANDARD SMD	STACKS SRMC RADIALS	HIGH TEMPERATURE	PER ESCC3009	COTS1	COTS2	COTS3	PER MIL-PRF-55681 GROUP A	PER MIL-PRF-123 GROUP A
	CODE			D03	D3009CFM	COTS1	COTS2	COTS3	D55681	D123
	SCOPE	**PME MLCC X7R, BX, NPO, N2T, High Q**	**Encapsulated, Dipped radial and Stacks SRMC**	**Type 1, Type 2 Chips**	**SRT PME BME, Radials, Stacks, X7R, BX, N2T, NPO, High Q**	**Class 1 BME Chips**	**Class 2 BME Chips**	**Class 3 BME Chips**	**PME MLCC X7R, NPO, BX, N2T, High Q**	**PME MLCC X7R, BX, NPO, N2T, High Q**
PROCESS / SCREENING	Burn-In		100% Chips+Stack 168H 125°C 2Un PDA 6.5%	100% 168H 125°C 2Un PDA 6.5%	100% 168H 125°C 2Un PDA 5%	100% 168H 125°C 2Un PDA 5%	100% 168H 125°C 2Un PDA 5% for non AEC-Q200	100% 168H 125°C 2Un PDA 5% for non AEC-Q200	100% 100H Min 125°C 2Un PDA 8%	100% 168H Min 0.1%/1pc last 48H 125°C 2Un PDA 5%
	Capa, DF, IR, VP (25°C)	100%	100%	100%	100%	100%	100%	100%	100%	100%
	IR (125°C)								Sample	Sample
	Voltage Breakdown	10 pcs/lot	10 pcs/lot	10 pcs/lot	10 pcs/lot	10 pcs/lot	10 pcs/lot	10 pcs/lot	10 pcs/lot	10 pcs/lot
	Dimension	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot
	DPA	per lot	per lot	per lot	per lot	per lot	per lot	per lot	per lot	per lot
	Visual	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Resistance to soldering heat	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot
	Solderability	5 pcs/lot	5 pcs/lot	5 pcs/lot	6 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot
	Termination thickness	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot	5 pcs/lot
	TC	per ceramic lot	per ceramic lot	per ceramic lot	per ceramic lot and in LAT	in LAT	in LAT	in LAT	per ceramic lot	per ceramic lot
	LAT	**On request**	**On request**	**On request**	**Flying Part CFM**	**Flying part**	**Flying part**	**Flying part**	**On request**	**On request**
LAT SUBGROUP 1	Mounting				20 serialized pcs on PCB					
	Thermal Shock				10 Cycles 30mn/1mn					
	Humidity				For Un<500V 1000h 85/85					
	Criteria				No visual/electrical default					
LAT SUBGROUP 2A	Mounting				40 serialized pcs on PCB	20 serialized pcs on PCB	20 serialized pcs on PCB	20 serialized pcs on PCB for non AEC-Q200		
	Operationnal Life				1000h ±24 125°C 2Un Un<500V 1.5Un Un=500V 1.3Un 500V<Un≤1250V 1Un Un>1250V	1000h ±24 max T° 2Un Un<500V 1.5Un Un=500V 1.3Un 500V<Un≤1250V 1Un Un>1250V	1000h ±24 max T° 2Un Un<500V 1.5Un Un=500V 1.3Un 500V<Un≤1250V 1Un Un>1250V	1000h ±24 Max T° 2Un Un<500V 1.5Un Un=500V 1.3Un 500V<Un≤1250V 1Un Un>1250V		
	Criteria				No visual/electrical default	No visual/electrical default	No visual/electrical default	No visual/electrical default		
LAT SUBGROUP 2B	Mounting				6 serialized pcs on PCB	6 serialized pcs on PCB non AEC-Q200				
	TC				IR at 125°C Cp at -55°C/20°C+125°C	IR at 125°C Cp at -55°C/20°C+125°C				
	Shear Test				5N 10s	5N 10s				
	Criteria				No visual/electrical default	No visual/electrical default				
LAT SUBGROUP 3	Mounting				6 pcs serialized	6 pcs serialized				
	Solderability				Solder bath 235°C 5s included in screening	Solder bath 235°C 5s included in screening				
	Permanence of Marking				ESCC24800 when applicable	ESCC24800 when applicable				
	Criteria				No visual/electrical default	No visual/electrical default				
	Thermal Cycle (optional)									
	Ultrasonic, Xray (optional)									

- **All components components can be proposed with SbPb termination (electrolytical I or Dipped H) with 10% min Pb for whisker mitigation with qualified process according to JDEC JESD201A**
- **Other termination availabe Silver Palladium F, Solderable Silver Q, Thick Gold G, Flash Gold W, Non Magnetic Copper C, Polymer option P**
- **ECSS COTS framework is used to propose space ready components Class 1 to 3 based on our or customer chosen BME chips either AEC-Q200 (prefered) or non AEC-Q200. Size can start from 0201 and resistors can also be proposed and termination be changed.**
- **Specific High Reliability programs can be established to fit customer requirement for medical, defense, space, high stress applications.**

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RELIABILITY PRINCIPLES OVERVIEW GENERAL PRODUCTION

In order to guarantee highly reliable products to their customers, we follow a strict quality policy which is explained below :

- According to AECQ philosophy, each component belongs to a family, which most restrictives members (four corners) have been fully qualified.
- PME components are produced in our Vendôme facility, with very stable process and equipments, in order to ensure Reliability and reproductibility.
- Reliability is based on batch tests, new product or equipment-specific qualifications and periodic requalifications.
- In addition to those regular tests, our quality departement launches regular accelerated tests to further deepens our reliability datas.
- Tests and qualifications of our standard products are based on AECQ methodology and are qualified according to the following limits.
- In accordance to AECQ methodology, specifics tests and limits can be adapted to fit our clients' needs.
- A whole range of stricter reliability tests can be offered for high Reliability products (burn-in, shocks, pulses...) for medical, space and defense applications.
- Based on our reliability database, FIT datas can be provided if necessary.

PRODUCTION CONTROL

Test conducted on each lot according to AECQ-200 framework

FREQUENCY	TEST/STRESS	REFERENCE	AEC-Q	DETAIL
100%	Capa, DF, IR	CECC-32100-4.6		according to datasheet
100%	Visual	CECC-32100-4.5	AEC-Q200-9	no visual defects
50/lot	DPA		AEC-Q200-5	internal component integrity
5/lot	Dimension	CECC-32100-4.5	AEC-Q200-5	according to datasheet
5/lot	Resistance to soldering heat	CECC-32100-4.10	AEC-Q200-15	
5/lot	Solderability	CECC-32100-4.11	AEC-Q200-18	
10/lot	Voltage Breakdown	CECC-32100-4.6.4		
1/ceramic lot	Temperature coefficient	CECC 32100-Prgph4,7		according to datasheet

QUALIFICATIONS

Each component family has been qualified according to CECC and AECQ tests methodology, which are renewed on a periodic basis.

FREQUENCY	TEST/STRESS	REFERENCE	AEC-Q	DETAIL
Qualif	Electrical Characterization	CECC-32100-4.6 4.7	AEC-Q200-19	measure before test according to datasheet and after test according to post environmental limits
Qualif	Temperature Cycling	JESD22 Method-JA method 104	AEC-Q200-4	1,000 cycles -55°C to +125°C Measurement at 24 ± 2 hours after test conclusion
Qualif	Biased Humidity	MIL-STD-202 Method 103	AEC-Q200-7	1,000 hours 85°C/85%RH. Rated voltage. Measurement at 24 ± 2 hours after test conclusion
Qualif	Operational Life	MIL-STD-202 Method 108 condition D	AEC-Q200-8	1,000 hours at 125°C with apllied Voltage : 2xRV RV≤500V, 1.2xRV 500V<RV≤1250V, RV RV>1250V
Qualif	High Temperature Exposure (Storage)	MIL-STD-202 Method 108	AEC-Q200-3	1,000 hours at 150°C with 0V. Measurement at 24 ± 2 hours after test conclusion
Qualif	Terminal Strength	CECC-32100-4.8	AEC-Q200-6	1.8kg 60 seconds
Qualif	Vibration	MIL-STD-202 Method 204	AEC-Q200-14	5g 20min 12cycles 3 orientations 10-2000Hz
Qualif	Board Flex	CEC 32100-4.9	AEC-Q200-21	3mm Type 1, 2mm Type 2, Measurement at 24 ± 2 hours after test conclusion

POST ENVIRONMENTAL STRESS LIMIT

DIELECTRIC	DISSIPATION FACTOR (MAXIMUM)	CAPACITANCE SHIFT	INSULATION RESISTANCE
NPO	≤ 4 10-3	±2%	10% initial limit
N2T	≤ 6 10-3	±4%	10% initial limit
X7R	≤ 0.035	±15%	10% initial limit

SPACE LEVEL COMPONENT SCREENED AND QUALIFIED ACCORDING TO ESCC-3009

We can propose a wide range of BME and PME component qualified and tested according to ESCC-3009 standard for space projects. Both for development en evaluation (D32) and flight ready with full lot validation and ESCC standard documentation.
Specific qualification programms can be included to meet final customer requirement.

PRODUCTION CONTROL/SCREENING

Tests conducted on each lot and screening for evaluation components D3009CEM and flying components D3009CFM

FREQUENCY	TEST/STRESS	REFERENCE	DETAIL
Lot	DPA	ESCC-23400	Construction analysis
3/Lot	Dimension/weight	ESCC-20400/20500	Dimension in spec/max weight in spec
100%	Burn-In Non serialized	ESCC-3009	168H, max T°, 2Ur Ur<500V, 1.5Ur Ur=500V, 1.3Ur 500V<Ur≤1250V, 1Ur Ur>1250V (fail<5%)
100%	Room Temperature Electrical Measurements	ESCC-3009	Cp, DF, IR, VP according to datasheet
5/lot	High and Low Temperatures Electrical Measurements	ESCC-3009	0 fail
100%	Visual Inspection	ESCC-20400/20500	

LOT VALIDATION

Lot validation for flying components D3009CFM

FREQUENCY	TEST/STRESS	REFERENCE	DETAIL
20/Lot	PCB Mounting, Rapid Change of Temperature, Steady State Humidity, external visual inspection	ESCC-3009/ IEC 60384-1/IEC 60068-2-14	
20/Lot	PCB Mounting, Life test	ECSS-3009/IEC 60384-1	1000H, max T°, 2Ur Ur<500V, 1.5Ur Ur=500V, 1.3Ur 500V<Ur≤1250V, 1Ur Ur>1250V
6/Lot	PCB Mounting, Temperature Characterisation, Robustness of Terminations	ESCC-3009/ IEC 60068-2-14/IEC 60384-1	
6/Lot	Solderability, Permanence of Marking	ECSS-3009/ IEC 60068-2-58/ ECSS-24800	

SPACE LEVEL COMPONENT SCREENED ACCORDING TO COTS+ ECSS-Q-ST-60-13C-REV1

We can apply the COTS+ qualification framework to any suitable component AEQ-200 or not, to make them fly ready, offering a wide range of possibilities at competitive cost, either in Class 1 (COTS1), Class 2 (COTS2) or Class 3 (COTS3).

EVALUATION/SCREENING/LAT

Class 1 (COTS1), Class 2 (COTS2), Class 3 (COTS3)

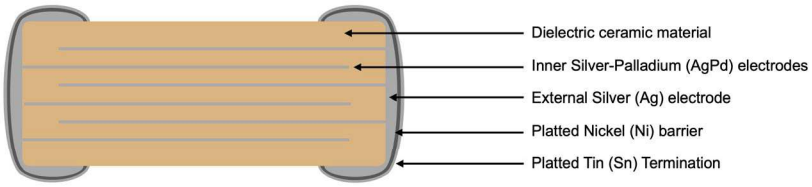
AECQ-200	CLASS 1	CLASS 2	CLASS 3	CATEGORY	TEST TYPE	SAMPLE	PROCEDURE
Yes	X	X	X	Evaluation	Construction Analysis	5	ESCC21001
Yes	X	X	X	Evaluation	Temperature characterization	5	ESCC3009 8.10
Yes	X			Evaluation	Life Test 2000h	40	ESCC3009 8.6 + 8.9
Yes	X			Screening	Complete screening	100%	ESCC3009 chart F3
Yes	X	X	X	LAT	DPA	3	ESCC21001
Yes	X	X		LAT	Life Test 1000h	20	ESCC3009 8.6 + 8.9
No	X	X	X	Evaluation	Construction Analysis	5	ESCC21001
No	X	X	X	Evaluation	Temperature characterization	5	ESCC 3009 8.10
No	X	X		Evaluation	Complete evaluation	72	ESCC 3009 chart F4
No			X	Evaluation	Life Test 1000h	40	ESCC3009 8.6 + 8.9
No	X	X	X	Screening	Complete screening	100%	ESCC3009 chart F3
No	X	X	X	LAT	DPA	3	ESCC21001
No	X			LAT	Complete LAT	52	ESCC 3009 chart F4
No		X	X	LAT	Life Test 1000h	20	ESCC3009 8.6 + 8.9

TINNING

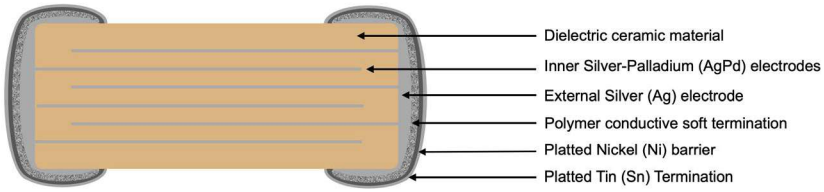
All component for space application can be proposed with dipped SnPb termination (Sn62 Pb36 Ag2) or SAC 305 (Sn96.5 Ag3 Cu0.5) for maximum reliability and whiskers avoidance.

This document is subject to change without notice.

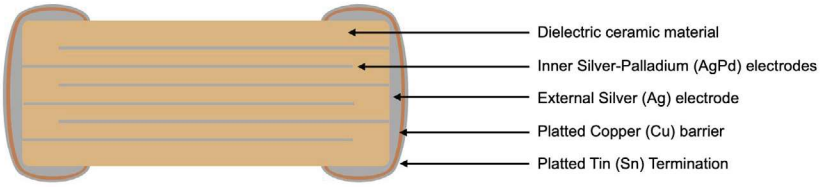
PME (Precious Metal Electrodes)



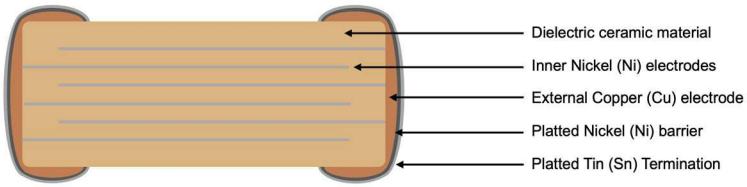
PME (Precious Metal Electrodes) Polymer Soft Termination



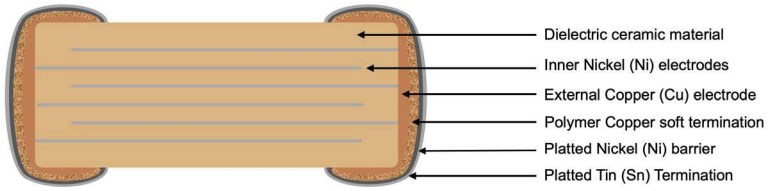
PME (Precious Metal Electrodes) Non Magnetic



BME (Basis Metal Electrodes) code BM



BME (Basis Metal Electrodes) code BM Polymer Soft Termination



REACH Compliance

- We deliver non-chemical articles only.
- These contain no substances which are intented to be released under normal or reasonably foreseeable conditions of use according Reach article 7(1).

We confirm hereby that our products contain none of the substances which are listed in the present candidate list of the European Chemicals Agency (ECHA), above a concentration of 0.1% by weight of the whole component.

Candidate list of substances (European Chemicals Agency ECHA) :
http://echa.europa.eu/fr/candidate-list-table

ROHS COMPLIANCE

We herewith confirm that our RoHS-compliant products are conforming to the following EU directives:
EU directive 2015/863/EU EU directive 2011/65/EU EU directive 2003/11/EC

Following restricted materials are not used and do not exceed the legal limits: Lead (Pb, see exemptions),
- Mercury (Hg)
- Cadmium (Cd)
- Chromium (Cr VI)
- Polybrominated biphenyls (PBB) Polybrominated diphenyl ethers (PBDE) Bis(2-Ethylhexyl) phtalate (DEHP) Benzyl butyl phtalate (BBP)
- Dibutyl phtalate (DBP) Diisobutyl phtalate (DIBP)

Exemptions: The following exemptions according tot he RoHS annexe are applicable:
Identity 7(a) :
- Lead in high melting temperature type solders (i.e lead-based alloys containing 85% by weight or more lead).

Identity 7(c)-I :
- Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound.

The components are suitable for a lead-free process according to EN 60068-2-58 and in accordance with the IPC/JEDEC standard J-Std-020D.
The lead free process has been tested using solder alloy sn96.5Ag3Cu0.5

Export controls and dual-use regulations

Some of our components fall under ‘dual-use’ items under international export controls definition - those that can be used for civil or mili- tary purposes which meet certain specified technical standards.

The defining criteria for a dual use component is one with a voltage rating of >750Vdc and a capacitance value of >250nF when measured at 750Vdc and a series inductance <10nH. Components defined as dual-use under the above criteria may require a licence for export across international borders. Please contact us for further information on specific part numbers.

ISO9001:2015

In their design, research and development as well as the manufacturing of MLCC capacitors, customer service and distribution we use and maintain a Management System audited and certified in accordance to : **ISO9001:2015**

You may contact us for any inquiry regarding the regulations and compliance listed above.