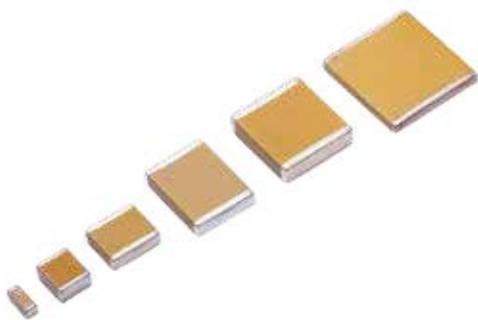


Non Magnetic Chips Series

Low and Medium Voltage Chips Capacitors



FEATURES

- Case sizes: 0505 to 2220
- NPO and X7R dielectrics
- Capacitance range: 10pF to 1μF
- Low ESR/ESL [R12N Series]
- RoHS compliant capacitors

PHYSICAL CHARACTERISTICS

MLCC capacitors with:

- Copper barrier + pur Tin or Silver Palladium terminations for surface mounting.

PACKAGING

Sizes	Ag/Pd/Pt termination [A code]	Cu termination [C code]
	Parts / reel *	Parts / reel *
R12N (0505)	-	3,000
R14 (0603)	[C code]	3,000 / 4,000
R15 (0805)	Parts / reel *	Parts / reel *
R18 (1206)	3,000 - 4,000	3,000
S41 (1210)	2,000 - 4,000	1,000 - 2,000 - 3,000
S43 (1812)	500 - 1,000	-
S47 (2220)	500 - 1,000	-

* Note: the quantity of parts in a reel depends upon their thicknesses.

Please, consult us for more accurate data.

ELECTRICAL SPECIFICATIONS

Description	NPO dielectric	X7R dielectric
Dielectric code	N	X
According to CECC class	1B / CG	2R1
EIA class	Class I	Class II
Temperature range	-55°C to +125°C	-55°C to +125°C
Temperature coefficient	(0±30) ppm/°C	NA
Maximum ΔC/°C over temperature range without DC voltage applied	NA	±15%
Rated voltage (U _R)	50V _{DC} to 500V _{DC}	63V _{DC} to 500V _{DC}
Dielectric withstanding voltage	250% rated voltage	250% rated voltage
Insulation resistance (I _R) at 25°C under U _R	100GΩ or 1,000Ω.F whichever is less	100GΩ or 1,000Ω.F whichever is less
Aging	None	≤ 2.5% per decade hour

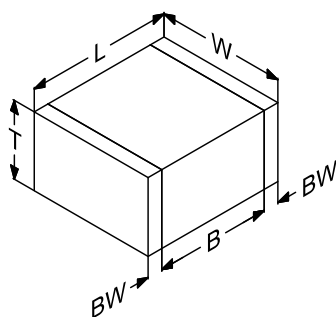
HOW TO ORDER

630	S41	N	472	J	C	E
Rated voltage	Exxelia Size Code	Dielectric code	Capacitance	Tolerance	Termination	Packaging
500 = 50V 630 = 63V 101 = 100V 151 = 150V 201 = 200V 501 = 500V	R12 = 0505 R14 = 0603 R15 = 0805 R18 = 1206 S41 = 1210 S43 = 1812 S47 = 2220	N = NPO X = X7R	Capacitance value in code. 1 st two digits represent significant figures; last digit specifies the number of zeros to follow. Examples: 101 = 100pF 472 = 4.7nF 683 = 68nF 564 = 0.56μF 105 = 1μF	NPO: F = ±1% G = ±2% J = ±5% K = ±10% M = ±20% X7R: K = ±10% M = ±20%	C = Pure Tin plated Copper barrier on Pure Silver termination A = Silver Palladium Platinum termination	- = Bulk E = tape & reel (see packaging paragraph for details) See page 13

Low and Medium Voltage Chips Capacitors

Non Magnetic Chips Series

DIMENSIONS in inches (mm)



STANDARD RATINGS

Size		0505	0603		0805		1206	
Exxelia size code		R12N NEW	R14		R15		R18	
Termination code		C	C	A	C	A	C	A
Dimensions inches (mm)	L	0.055 ± 0.010 (1.4 ± 0.25)	0.063 ± 0.012 (1.6 ± 0.3)	0.063 ± 0.012 (1.6 ± 0.3)	0.079 ± 0.012 (2 ± 0.3)	0.079 ± 0.012 (2 ± 0.3)	0.126 ± 0.012 (3.2 ± 0.3)	0.126 ± 0.012 (3.2 ± 0.3)
	W	0.055 ± 0.010 (1.4 ± 0.25)	0.032 ± 0.008 (0.8 ± 0.2)	0.032 ± 0.008 (0.8 ± 0.2)	0.049 ± 0.012 (1.25 ± 0.3)	0.049 ± 0.012 (1.25 ± 0.3)	0.063 ± 0.012 (1.6 ± 0.3)	0.063 ± 0.012 (1.6 ± 0.3)
	B min.	0.019 (0.5)	0.015 (0.4)	0.015 (0.4)	0.027 (0.7)	0.019 (0.5)	0.059 (1.5)	0.055 (1.4)
	BW min.	0.004 (0.1)	0.005 (0.15)	0.005 (0.15)	0.007 (0.2)	0.005 (0.13)	0.011 (0.3)	0.009 (0.25)
	T max.	0.055 (1.4)	0.038 (0.95)	0.038 (0.95)	0.058 (1.45)	0.058 (1.45)	0.071 (1.80)	0.071 (1.80)
Dielectric	NPO		NPO	X7R	NPO	X7R	NPO	X7R
	N		N	X	N	X	N	X
Rated voltage (U _{RC})	50V	680pF to 1nF	-	-	-	-	-	-
	63V	-	-	1nF to 6.8nF	-	-	680pF to 15nF	10nF to 47nF
	100V	-	47pF to 180pF	-	-	47pF to 1nF	47pF to 1nF	100pF to 2.2nF
	150V	120pF to 620pF	-	-	-	-	-	-
	200V	-	-	-	-	150pF to 220pF	150pF to 220pF	560pF to 4.7nF
	500V	-	-	-	-	33pF to 180pF	33pF to 180pF	270pF to 2.2nF

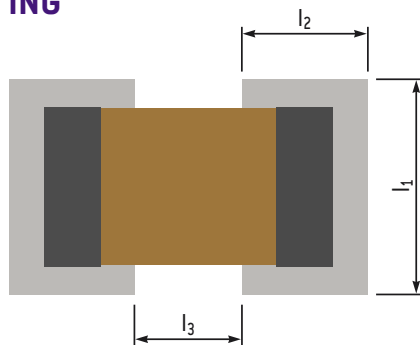
Size		1210				1812				2220			
Exxelia size code		S41				S43				S47			
Termination code		C		A		C		A		C		A	
Dimensions inches (mm)	L	0.126 ± 0.016 (3.2 ± 0.4)		0.126 ± 0.016 (3.2 ± 0.4)		-		0.177 ± 0.02 (4.5 ± 0.5)		-		0.224 ± 0.02 (5.7 ± 0.5)	
	W	0.098 ± 0.012 (2.5 ± 0.3)		0.098 ± 0.012 (2.5 ± 0.3)		-		0.126 ± 0.016 (3.2 ± 0.4)		-		0.197 ± 0.02 (5 ± 0.5)	
	B min.	0.062 (1.6)		0.055 (1.4)		-		0.086 (2.2)		-		0.114 (2.9)	
	BW min.	0.011 (0.3)		0.009 (0.25)		-		0.009 (0.25)		-		0.009 (0.25)	
	T max.	0.103 (2.6)		0.099 (2.5)		-		0.119 (3)		-		0.119 (3)	
Dielectric		NPO	X7R	NPO	X7R	NPO	X7R	NPO	X7R	NPO	X7R	NPO	X7R
		N	X	N	X	N	X	N	X	N	X	N	X
Rated voltage (U _{RC})	63V	-	4.7nF to 100nF	-	33nF to 330nF	-	-	-	47nF to 1µF	-	-	-	330nF to 1µF
	100V	470pF to 6.8nF	-	470pF to 6.8nF	-	-	-	1.8nF to 10nF	-	-	-	6.8nF to 22nF	-
	200V	390pF to 2.7nF	-	390pF to 2.7nF	10nF to 47nF	-	-	820pF to 5.6nF	10nF to 150nF	-	-	560pF to 10nF	6.8nF to 220nF
	500V	100pF to 1nF	-	100pF to 1nF	1.5nF to 22nF	-	-	180pF to 2.2nF	2.7nF to 47nF	-	-	680pF to 4.7nF	6.8nF to 100nF

Available capacitance values:

E6, E12 [see page 14]. Specific values upon request.

Note: some capacitance values in these tables may not be proposed for small quantities. Please, contact us for confirmation.

SOLDERING ADVICES FOR REFLOW SOLDERING



Large chips above size 2225 are not recommended to be mounted on epoxy board due to thermal expansion coefficient mismatch between ceramic capacitor and epoxy. Where larger sizes are required, it is recommended to use components with ribbon or other adapted leads so as to absorb thermo-mechanical strains.

Dimensions in inches (in mm)	Reflow soldering						Wave soldering					
	l_1		l_2		l_3		l_1		l_2		l_3	
0402	0.043	[1.1]	0.035	[0.9]	0.012	[0.3]	0.043	[1.1]	0.047	[1.2]	0.012	[0.3]
0403	0.055	[1.4]	0.035	[0.9]	0.012	[0.3]	0.055	[1.4]	0.047	[1.2]	0.012	[0.3]
0504	0.063	[1.6]	0.051	[1.3]	0.016	[0.4]	0.063	[1.6]	0.063	[1.6]	0.016	[0.4]
0603	0.055	[1.4]	0.059	[1.5]	0.02	[0.5]	0.055	[1.4]	0.071	[1.8]	0.02	[0.5]
0805	0.073	[1.85]	0.065	[1.65]	0.024	[0.6]	0.073	[1.85]	0.077	[1.95]	0.024	[0.6]
0907	0.094	[2.4]	0.065	[1.65]	0.035	[0.9]	0.094	[2.4]	0.077	[1.95]	0.035	[0.9]
1005	0.073	[1.85]	0.067	[1.7]	0.039	[1]	0.073	[1.85]	0.079	[2]	0.039	[1]
1206	0.083	[2.1]	0.067	[1.7]	0.059	[1.5]	0.083	[2.1]	0.079	[2]	0.059	[1.5]
1210	0.118	[3]	0.069	[1.75]	0.059	[1.5]	0.118	[3]	0.081	[2.05]	0.059	[1.5]
1605	0.073	[1.85]	0.071	[1.8]	0.087	[2.2]	0.073	[1.85]	0.083	[2.1]	0.087	[2.2]
1806	0.087	[2.2]	0.073	[1.85]	0.102	[2.6]	0.087	[2.2]	0.085	[2.15]	0.102	[2.6]
1812	0.152	[3.85]	0.073	[1.85]	0.102	[2.6]	0.152	[3.85]	0.085	[2.15]	0.102	[2.6]
1825	0.281	[7.15]	0.073	[1.85]	0.102	[2.6]	0.281	[7.15]	0.085	[2.15]	0.102	[2.6]
2210	0.13	[3.3]	0.079	[2]	0.146	[3.7]	0.13	[3.3]	0.091	[2.3]	0.146	[3.7]
2220	0.228	[5.8]	0.079	[2]	0.146	[3.7]	0.228	[5.8]	0.091	[2.3]	0.146	[3.7]
2225	0.281	[7.15]	0.079	[2]	0.146	[3.7]	0.281	[7.15]	0.091	[2.3]	0.146	[3.7]

RECOMMENDED FOOTPRINT FOR SMD CAPACITORS

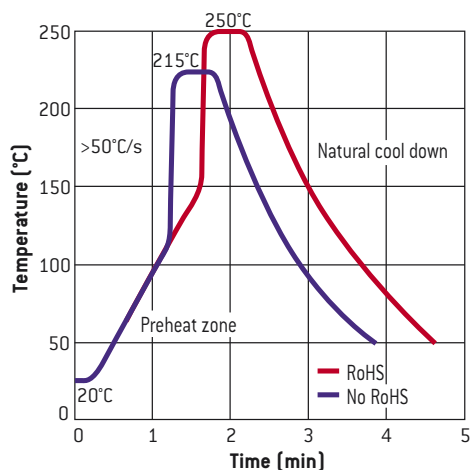
Ceramic is by nature a material which is sensitive both thermally and mechanically. Stresses caused by the physical and thermal properties of the capacitors, substrates and solders are attenuated by the leads.

Wave soldering is unsuitable for sizes larger than 2220 and for the higher ends of capacitance ranges due to possible thermal shock (capacitance values given upon request).

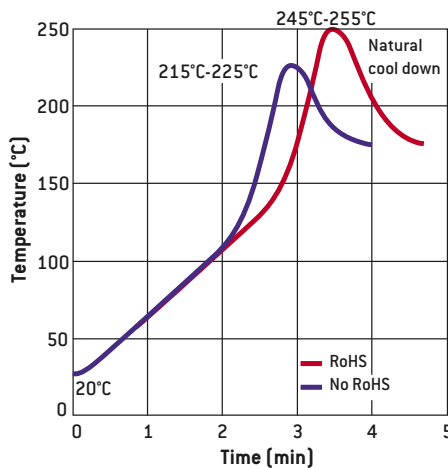
Infrared and vapor phase reflow, are preferred for high reliability applications as inherent thermo-mechanical strains are lower than those inherent to wave soldering.

Whatever the soldering process is, it is highly recommended to apply a thermal cycle, see hereafter our recommended soldering profile:

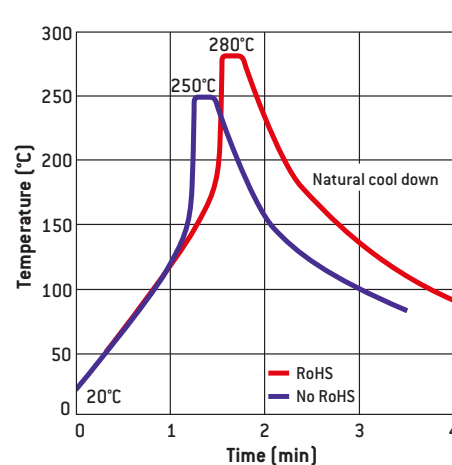
RECOMMENDED VAPOR PHASE REFLOW PROFILE



RECOMMENDED IR REFLOW PROFILE



RECOMMENDED WAVE SOLDERING PROFILE



SOLDERING ADVICES FOR IRON SOLDERING

Attachment with a soldering iron is discouraged due to ceramic brittleness and the process control limitations. In the event that a soldering iron must be used, the following precautions should be observed:

- Use a substrate with chip footprints big enough to allow putting side by side one end of the capacitor and the iron tip without any contact between this tip and the component,
- place the capacitor on this footprint,

- heat the substrate until the capacitor's temperature reaches 150°C minimum (preheating step, maximum 1°C per second),
- place the hot iron tip (a flat tip is preferred) on the footprint **without touching the capacitor**. Use a regulated iron with a 30 watts maximum power. The recommended temperature of the iron is 270 ±10°C. The temperature gap between the capacitor and the iron tip must not exceed 120°C,

User Guide

- leave the tip on the footprint for a few seconds in order to increase locally the footprint's temperature,
- use a cored wire solder and put it down on the iron tip. In a preferred way use Sn/Pb/Ag 62/36/2 alloy,
- wait until the solder fillet is formed on the capacitor's termination,
- take away iron and wire solder,
- wait a few minutes so that the substrate and capacitor come back down to

the preheating temperature,

- solder the second termination using the same procedure as the first,
- let the soldered component cool down slowly to avoid any thermal shock.

PACKAGING

TAPE AND REEL

The films used on the reels correspond to standard IEC 60286-3. Films are delivered on reels in compliance with document IEC 286-3 dated 1991.

Minimum quantity is 250 chips.

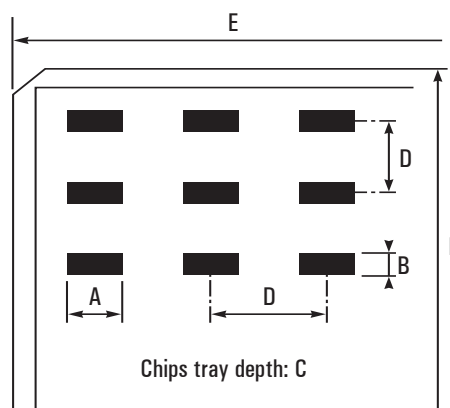
Maximum quantities per reel are as follows:

- Super 8 reel - Ø 180: 2,500 chips.
- Super 8 reel - Ø 330: 10,000 chips.
- Super 12 reel - Ø 180: 1,000 chips.

Reel marking is according to CECC 32100 standard:

- Model.
- Rated capacitance.
- Capacitance tolerance.
- Rated voltage.
- Batch number.

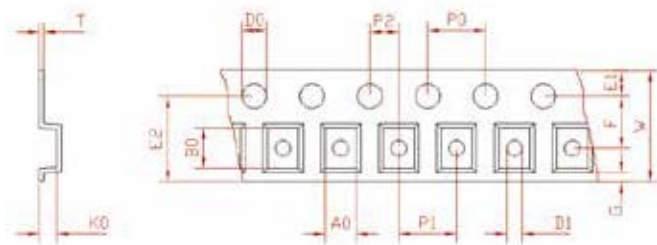
TRAY PACKAGES



DIMENSIONAL CHARACTERISTICS OF CHIPS TRAY PACKAGES

Sizes	Nr. of chips/ package	Oriented chips	Dimensions in inches (in mm)				
			A	B	C	D	E
0402	100	No	0 0.112 [0 3.02]		0.065 [1.65]	0.167 [4.24]	2 [50.8]
0403	100	No	0 0.112 [0 3.02]		0.065 [1.65]	0.167 [4.24]	2 [50.8]
0504	100	Yes	0.059 [1.5]	0.045 [1.14]	0.035 [0.89]	0.167 [4.24]	2 [50.8]
0603	340	Yes	0.1 [2.54]	0.06 [1.52]	0.045 [1.14]	0.167 [4.24]	2 [50.8]
0805	100	Yes	0.1 [2.54]	0.06 [1.52]	0.045 [1.14]	0.167 [4.24]	2 [50.8]
1206	100	No	0.14 [3.56]	0.14 [3.56]	0.06 [1.52]	0.167 [4.24]	2 [50.8]
1210	100	Yes	0.14 [3.56]	0.14 [3.56]	0.06 [1.52]	0.167 [4.24]	2 [50.8]
1812	100	No	0.25 [6.35]	0.25 [6.35]	0.13 [3.3]	0.345 [8.76]	4 [101.6]
	25	Yes	0.24 [6.1]	0.265 [6.73]	0.07 [1.78]	0.345 [8.76]	2 [50.8]
2220	100	Yes	0.25 [6.35]	0.25 [6.35]	0.13 [3.3]	0.345 [8.76]	4 [101.6]
	25	Yes	0.24 [6.1]	0.265 [6.73]	0.07 [1.78]	0.345 [8.76]	2 [50.8]

HIGH Q CAPACITORS TAPE AND REEL PACKAGING SPECIFICATIONS



User Guide

EIA STANDARD CAPACITANCE VALUES

Following EIA standard, the values and multiples that are indicated in the chart below can be ordered. E48, E96 series and intermediary values are available upon request.

E6 (± 20%)	E12 (± 10%)	E24 (± 5%)
10	10	10
	12	11
		12
15	15	13
		15
	18	16
		18
22	22	20
		22
	27	24
		27
33	33	30
		33
	39	36
		39
47	47	43
		47
	56	51
		56
68	68	62
		68
	82	75
		82
		91

Voltage (V)	Code	Letter code
25	250	A
40	400	B
50	500	C
63	630	D
100	101	E
200	201	G
250	251	H
400	401	K
500	501	L
1,000	102	M
2,000	202	P
3,000	302	R
4,000	402	S
5,000	502	T
7,500	752	U
10,000	103	W

EIA CAPACITANCE CODE

The capacitance is expressed in three digit codes and in units of pico Farads (pF). The first and second digits are significant figures of the capacitance value and the third digit identifies the multiplier.

For capacitance value < 10pF, R designates a decimal point.

See examples below:

EIA code	Capacitance value		
	in pF	in nF	in μ F
2R2	2.2	0.0022	0.0000022
6R8	6.8	0.0068	0.0000068
220	22	0.022	0.000022
470	47	0.047	0.000047
181	180	0.18	0.00018
221	220	0.22	0.00022
102	1,000	1	0.001
272	2,700	2.7	0.0027
123	12,000	12	0.012
683	68,000	68	0.068
124	120,000	120	0.12
564	560,000	560	0.56
335	3,300,000	3,300	3.3
825	8,200,000	8,200	8.2
156	15,000,000	15,000	15
686	68,000,000	68,000	68
107	100,000,000	100,000	100
227	220,000,000	220,000	220

PART MARKING TOLERANCE CODES

Use the following tolerance code chart for part markings:

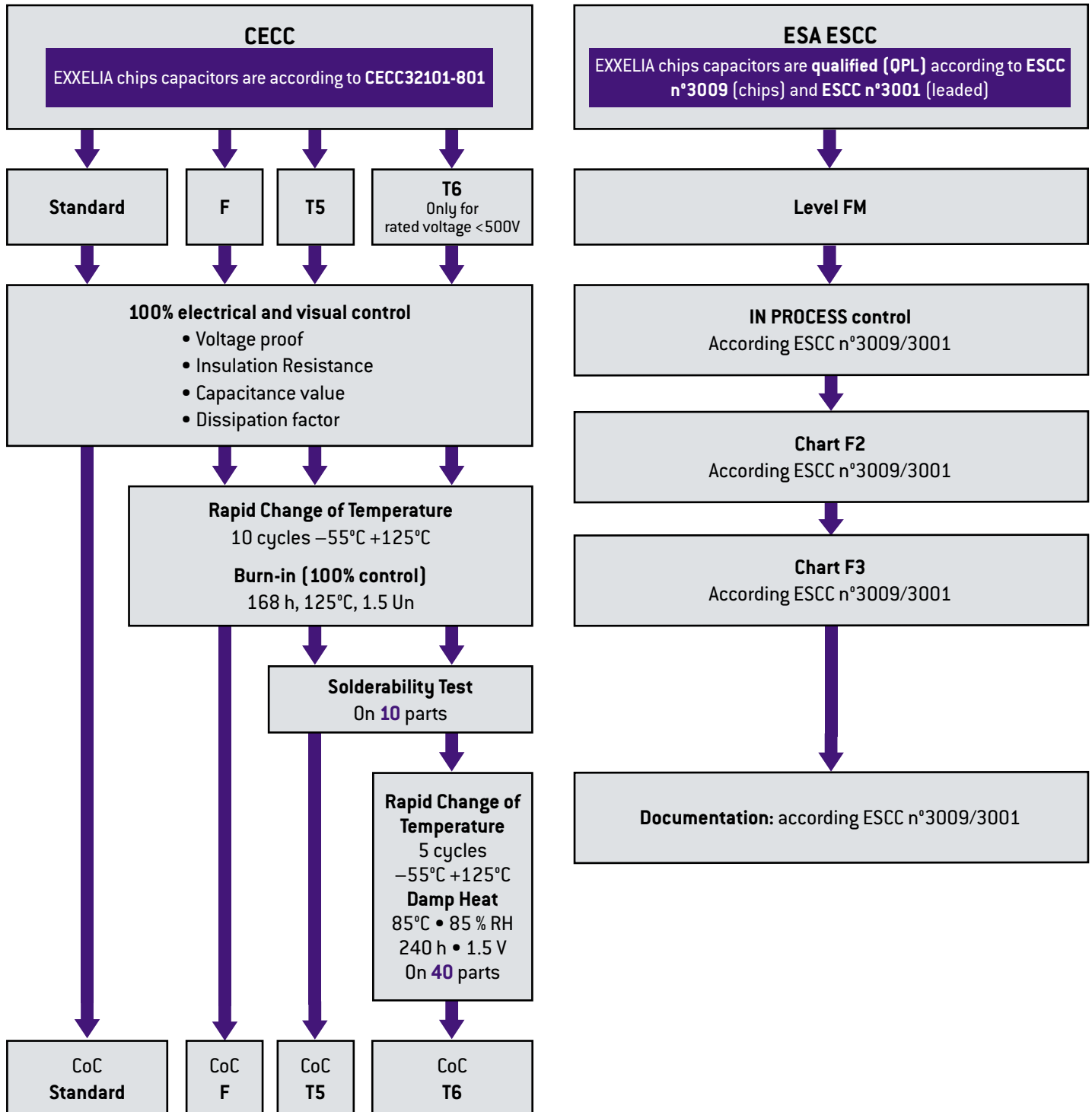
Tolerance	Letter code
±0.25pF	CU
±0.5pF	DU
±1pF	FU
±1%	F
±2%	G
±5%	J
±10%	K
±20%	M

PART MARKING VOLTAGE CODES

Use the following voltage code chart for part markings:

RELIABILITY LEVELS

Exxelia proposes different reliability levels for the ceramic capacitors for both NP0 and X7R ceramics.



User Guide

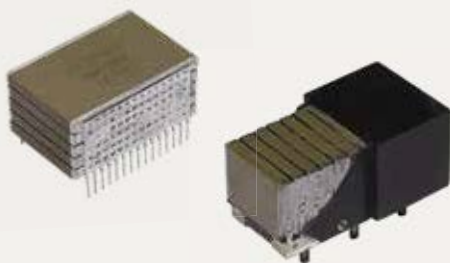
As the world's leading manufacturer of specific passive components, we stand apart through our ability to quickly evaluate the application specific engineering challenges and provide a cost-effective and efficient solutions.

For requirements that cannot be met by catalog products, we offer leading edge solutions in custom configuration: custom geometries, packaging, characteristics, all is possible thanks to our extensive experience and robust development process, while maintaining the highest level of reliability.

Where necessary, special testing is done to verify requirements, such as low dielectric absorption, ultra-high insulation resistance, low dissipation factor, stability under temperature cycling or under specified environmental conditions, etc.

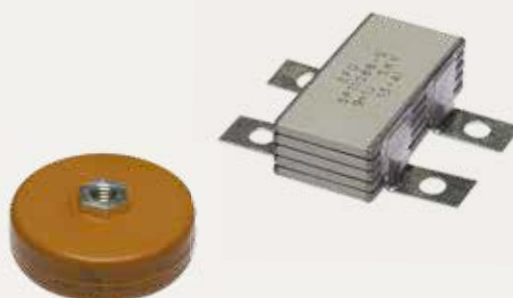
HIGH CAPACITANCE

- High energy density
- Specific case sizes
- Specific shape of connections (high resistance to vibrations)



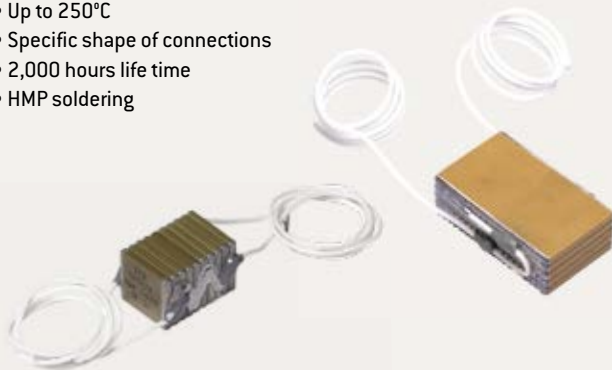
HIGH VOLTAGE

- Up to 50 kV
- Specific circular shape



HIGH TEMPERATURE

- Up to 250°C
- Specific shape of connections
- 2,000 hours life time
- HMP soldering



OTHERS

- Screen printed resistors
- Complex components
- Full functions available

