

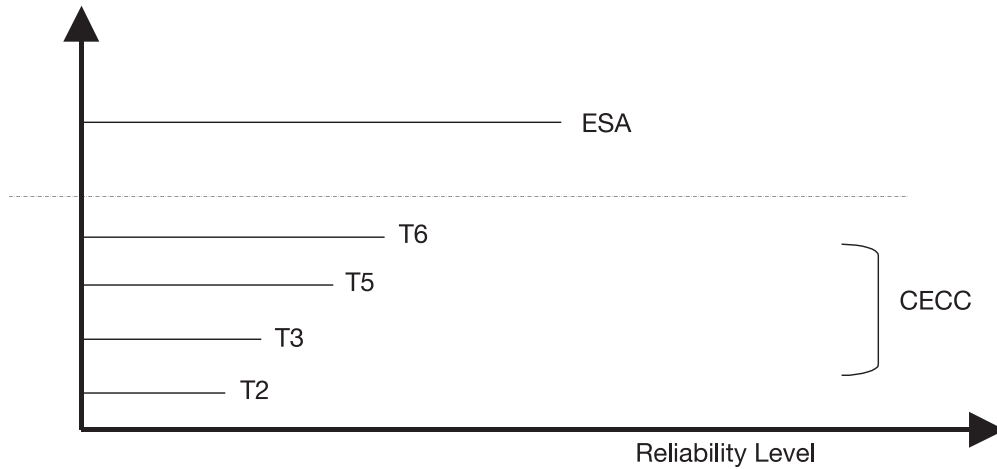
# QPL ESCC 3009 and CECC Surface Mount MLCC, Type I & II

## AVAILABLE TYPES

MLC CHIPS vs ESA ESCC & vs CECC 32101-002, 003 (established reliability) from 25V up to 500V.

## AVAILABLE RELIABILITY LEVELS

ESA QUALIFIED		with or without LVT 1,2a,2b,3
CECC + 100% Burn in /168H + Thermal shock + 85/85 humidity test + on 40 samples per batch + DPA	T6	
CECC + 100% Burn in /168H + DPA	T5	
CECC + 100% Burn in /48H + DPA	T3	
CECC + DPA	T2	



- ▶ Level T5 & T6: Reliability Level = MIL S
- ▶ Level T3: Reliability Level = MIL R

## AVAILABLE RELIABILITY LEVELS SUMMARY/TYPES

Types	Products		Reliability Level	
			T6 to T2	ESA
MLC Chips	AN, AC & AD 12, 13, 14, 15, 20 (NP0, X7R)	CECC	X	
MLC Chips ESA Qualified/3009	A...C NP0 A...Z X7R A...G 2C1	ESA ESCC		X

## RELEVANT STANDARDS

Type of Component	Reliability Level	
	T2 / T3 / T5 / T6	ESA Level
MLC Chips	CECC 32101-002 32101-003 32101-801	ESA ESCC 3009
	IEC 60384-21/22	

# QPL ESCC 3009 and CECC Surface Mount MLCC, Type I & II



## DIELECTRIC TYPES USED

### Type I

► NP0      ► AVX Code: C

### Type II

► X7R      ► AVX Code: Z  
► 2C1      ► AVX Code: G

## ELECTRICAL MEASUREMENT CONDITIONS FOR CECC CHIPS: T2 / T3 / T5 / T6

Type		1	2
AVX code		C	Z
Classification	IEC/CECC EIA DIN MIL	1B COG NP0 CG	2R1 X7R
Capacitance change With temperature & :	Ubias = 0 Ubias = UR	±30ppm/°C	± 15% N.A.
Typical ageing (%/dec.)		0	1.5
Reference temperature		22°C ±3°C	22°C ±3°C
Capacitance and D.F. measurement	Frequency Voltage	C ≤ 1000 pF      F = 1MHz C > 1000 pF      F = 1 kHz Um ≤ 5 Vrms	C ≤ 100 pF      F = 1MHz C > 100 pF      F = 1 kHz Um ≤ 0.3 Vrms ± 0.2
Dissipation Factor (DF)		C ≤ 50 pF    DF < 1.5 (150/C + 7) · 10 <sup>-4</sup> C > 50 pF    DF < 15 · 10 <sup>-4</sup>	DF < 250 · 10 <sup>-4</sup>
Insulation Resistance under UR /1 mn		For C ≤ 10nF: Ri > 100 GΩ or For C > 10nF: Ri x Cr > 1000s	For C ≤ 10nF: Ri > 100 GΩ or For C > 10nF: Ri x C > 1000s
Proof voltage		For UR ≤ 100V : 2.5 x UR For UR > 100V : 1.5 UR + 100V	For UR ≤ 100V: 2.5 x UR For UR > 100V: 1.5 x UR + 100V

Note: ESA Chips are strictly measured vs ESA spec. 3009 + detail spec.

## ELECTRICAL MEASUREMENT CONDITIONS FOR ESA CHIPS

Type		1	2	
AVX code		C	Z	G
Classification	IEC/CECC EIA DIN MIL	1B COG NP0 CG	2R1 X7R	2C1 BX
Capacitance change With temperature & :	Ubias = 0 Ubias = UR	±30ppm/°C	± 20% *-60/+20%	± 20% -30/+20%
Typical ageing (%/dec.)		0	1.5	1.5
Reference temperature		22°C ±3°C	22°C ±3°C	22°C ±3°C
Capacitance and D.F. measurement	Frequency Voltage	C ≤ 1000 pF      F = 1MHz C > 1000 pF      F = 1 kHz Um ≤ 5 Vrms	C ≤ 100 pF      F = 1MHz C > 100 pF      F = 1 kHz Um ≤ 1 Vrms	
Dissipation Factor (DF)		C ≤ 50 pF    DF < 1.5 (150/C + 7) · 10 <sup>-4</sup> C > 50 pF    DF < 15 · 10 <sup>-4</sup>	DF < 250 · 10 <sup>-4</sup>	
Insulation Resistance under UR /1 mn		Ri > 100 GΩ	For C ≤ 10nF: Ri > 100 GΩ or For C > 10nF: Ri x C > 1000s	
Proof voltage		For UR < 500V : 2.5 x UR	For UR < 500V: 2.5 x UR For UR = 500V: 2 x UR	

\*Typical value for this dielectric class

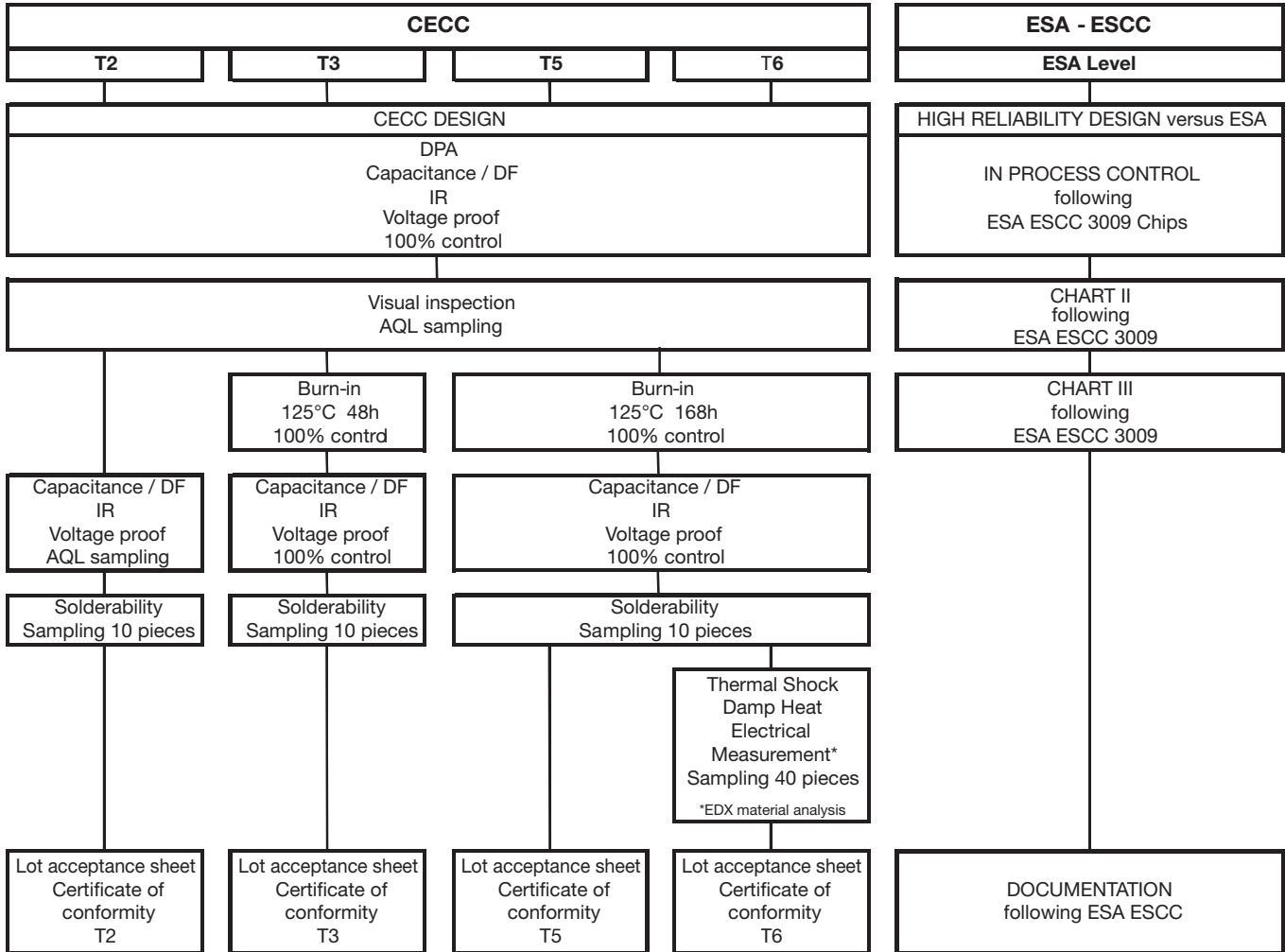
Note: ESA Chips are strictly measured vs ESA spec. 3009 + detail spec.



# QPL ESCC 3009 and CECC Surface Mount MLCC, Type I & II



## RELIABILITY LEVELS DESCRIPTION



# QPL ESCC 3009 and CECC Surface Mount MLCC, Type I & II

## AVAILABLE TERMINATIONS

### Summary

Type	CECC Level T2/T3/T5/T6	ESA Level	Remark
Ag - Pd - Pt	AC	A3..	-
Nickel Barrier + Tin Lead Finish <sup>(1)</sup>	AN	A6...	Preferred Version
Nickel Barrier + Tin Finish <sup>(2)</sup>	AD		

<sup>(1)</sup> "No Pure Tin" terminations.

<sup>(2)</sup> Lead Free terminations.

## TERMINATION CODES FOR ESA MLC PARTS

AVX Code	ESA Version	
e.g. A.12	Code	Termination
A312C...	03	Silver Palladium Platinum
A312G...		
A312Z...	10	X7R Dielectric + Silver Palladium Platinum
A612C...	06	ESA Preferred Termination Nickel Barrier + Tin Lead Finish
A612G...		
A612Z....	07	X7R Dielectric + ESA Preferred Termination Nickel Barrier + Tin Lead Finish

## PACKAGING

- Plastic Tape – Minimum Order Quantity: 1000p for CECC and ESA products\*  
\*Note for smaller quantities contact plant
- Waffle Pack – Anti-static material only ESA Products – Minimum Order Quantity: 50p for ESA products
- Vacuum Pack only CECC Products – Minimum Order Quantity: 1Kp for CECC products

## MARKING

Chips:

<b>CECC</b>	T6/T5/T3/T2	On packaging label only - versus AVX code
<b>ESA Level</b>		On packaging label only - versus ESA code

## AVAILABLE CLIMATIC AND ELECTRIC TESTS

Test P/N	Test Description	Qty. of Parts	Average Lead Time
XX00--5028---	DPA versus EIA RS469	25/X + 25/Y	1 to 2 weeks
MX00--5056---	85/85 Humidity test / ESA 3009 / 5.2.2 85°C / 85% HR / 1.5Vdc / 240h	50	3 weeks
MX00--5059---	85/85 Humidity test / MIL STD 202 Method 103 40°C / 95 HR / 100Vdc / 240h	50	3 weeks
MX00--5060---	85°C/85° HR / 240h Humidity test	12	3 weeks
XX00--5080-00	100% burn in (same as "5079" but limited to 48H)	100%	1 week
XX00--5079-00	100% burn in versus ESA 3009 (168H / 2x Ur)	100%	3 weeks
XX00--5090-00	Halt test (accelerated burn-in 140°C / 3Ur)	100pc	4 weeks
XX00--5100-00	Life test 1000 or 2000H versus ESA 3009/9.10	100pc	7 or 14 weeks
XX00--5082-00	Solderability test (bath method vs. ESA or CECC)	20pc	2 weeks
XX00--5091-00	Electric test (Cr; DF; IR) 100%	100%	Tbd
XX00--5092-00	Rapid change of temperature (-55° to 125°C)	50pc	Tbd
XX00--5093-00	Climatic test sequence	50pc	Tbd
XX00--5094-00	Visual insp. Versus ESA or customer spec.	100%	Tbd

# QPL ESCC 3009 and CECC Surface Mount MLCC, Type I & II



## ESA QUALIFIED CHIPS TYPE I - NP0

Case Sizes		0805		1206		1210		1812		2220	
Cap Tolerance		1,2,5,10 %, +/- 0.5pf for C < 10pf									
ESA QPL		3009003..		3009022..		3009004..		3009005..		3009006..	
AVX CODE		A_12C..		A_20C..		A_13C..		A_14C..		A_15C..	
Value	Code	50v	100v	50v	100v	50v	100v	50v	100v	50v	100v
4.7pf	4R7										
5.6pf	5R6										
6.8pf	6R8										
8.2pf	8R2										
10pf	100										
12pf	120										
15pf	150										
18pf	180										
22pf	220										
27pf	270										
33pf	330										
39pf	390										
47pf	470										
56pf	560										
68pf	680										
82pf	820										
100pf	101										
120pf	121										
150pf	151										
180pf	181										
220pf	221										
270pf	271										
330pf	331										
390pf	391										
470pf	471										
560pf	561										
680pf	681										
820pf	821										
1.0 nf	102										
1.2nf	122										
1.5nf	152										
1.8 nf	182										
2.2nf	222										
2.7nf	272										
3.3nf	332										
3.9nf	392										
4.7nf	472										
5.6nf	562										
6.8nf	682										
8.2nf	822										
10nf	103										
12nf	123										
15nf	153										
18nf	183										
22nf	223										
27 nf	273										
33 nf	333										

Available Terminations:

A3.. Silver Palladium Platinum (ESA variant 03) and

A6.. Nickel Barrier with Tin Lead Finish (ESA variant 06)

# QPL ESCC 3009 and CECC Surface Mount MLCC, Type I & II



## ESA QUALIFIED CHIPS TYPE II - 2C1

Case Sizes		0805			1206			1210			1812			2220		
Cap Tolerance		5, 10, 20 %														
ESA QPL		3009008..			3009023..			3009009..			3009010..			3009011..		
AVX CODE		A_12G..			A_20G..			A_13G..			A_14G..			A_15G..		
Value	Code	25 v	50v	100v	25v	50v	100v	25v	50v	100v	25v	50v	100v	25v	50v	100v
820 pf	821															
1.0nf	102															
1.2nf	122															
1.5nf	152															
1.8 nf	182															
2.2nf	222															
2.2nf	222															
2.7nf	272															
3.3nf	332															
3.9nf	392															
4.7nf	472															
5.6nf	562															
6.8nf	682															
8.2nf	822															
10nf	103															
12nf	123															
15nf	153															
18nf	183															
22nf	223															
27nf	273															
33nf	333															
39nf	393															
47nf	473															
56nf	563															
68nf	683															
82nf	823															
100nf	104															
120nf	124															
150nf	154															
180nf	184															
220nf	224															
270nf	274															
330nf	334															
390nf	394															
470nf	474															
560nf	564															
680nf	684															
820nf	824															
1uf	105															
1.2uf	125															
1.5uf	155															
1.8uf	185															
2.2uf	225															
2.7uf	275															
3.3uf	335															
3.9uf	395															
4.7uf	475															
5.6uf	565															
6.8uf	685															
8.2uf	825															
10uf	106															
22 uf	226															

Available Terminations:

- A3.. Silver Palladium Platinum (ESA variant 03) and
- A6.. Nickel Barrier with Tin Lead Finish (ESA variant 06)

# QPL ESCC 3009 and CECC Surface Mount MLCC, Type I & II



## ESA QUALIFIED CHIPS TYPE II - X7R ESA VARIANT 07

Case Sizes		0805				1206					1210					1812					2220					
Cap Tolerance		5, 10, 20 %																								
ESA QPL		3009008..				3009023..					3009009..					3009010..					3009011..					
AVX CODE		A_12Z..				A_20Z..					A_13Z..					A_14Z..					A_15Z..					
Value	Code	25v	50v	100v	200v	25v	50v	100v	200v	400v	25v	50v	100v	200v	400v	25v	50v	100v	200v	400v	25v	50v	100v	200v	400v	
270 pf	271																									
330 pf	331																									
390 pf	391																									
470 pf	471																									
560 pf	561																									
680 pf	681																									
820 pf	821																									
1.0 nf	102																									
1.2nf	122																									
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33nf	333																									
39nf	393																									
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120nf	124																									
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270nf	274																									
330nf	334																									
390nf	394																									
470nf	474																									
560nf	564																									
680nf	684																									
820nf	824																									
1uf	105																									
1.2uf	125																									
1.5uf	155																									
1.8uf	185																									
2.2uf	225																									

**Key**   Supplied "in accordance with "

# QPL ESCC 3009 and CECC Surface Mount MLCC, Type I & II



## CECC CHIPS TYPE I – NP0 (AVAILABLE RELIABILITY LEVEL: T6 TO T2) CECC UPGRADED IEC 60384-21/22, CECC 32100-32101/801

Case Sizes		0805			1206				1210				1812				2220			
Cap Tolerance		1,2,5,10 %, +/- 0.5pf for C < 10pf																		
AVX CODE		A_12C..			A_20C..				A_13C..				A_14C..				A_15C..			
Value	Code	25/50v	100v	200v	25/50v	100v	200v	500v	25/50v	100v	200v	500v	25/50v	100v	200v	500v	25/50v	100v	200v	500v
4.7pf	4R7																			
5.6pf	5R6																			
6.8pf	6R8																			
8.2pf	8R2																			
10pf	100																			
12pf	120																			
15pf	150																			
18pf	180																			
22pf	220																			
27pf	270																			
33pf	330																			
39pf	390																			
47pf	470																			
56pf	560																			
68pf	680																			
82pf	820																			
100pf	101																			
120pf	121																			
150pf	151																			
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220pf	221																			
270pf	271																			
330pf	331																			
390pf	391																			
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8.2nf	822																			
10nf	103																			
12nf	123																			
15nf	153																			
18nf	183																			
22nf	223																			
27 nf	273																			
33 nf	333																			
39 nf	<b>393</b>																			

Note: 3 terminations available: Ag Pd Pt ► AC, Nickel Barrier with Tin Lead finish ► AN, Nickel Barrier with Tin finish ► AD  
Size 2225 available on request



# QPL ESCC 3009 and CECC Surface Mount MLCC, Type I & II



## CECC CHIPS TYPE II – X7R (AVAILABLE RELIABILITY LEVEL: T6 TO T2) CECC UPGRADED IEC 60384-21/22, CECC 32100-32101/801

Case Sizes		0805			1206					1210					1812					2220						
Cap Tolerance		5, 10, 20 %																								
AVX CODE		A_12Z..			A_20Z..					A_13Z..					A_14Z..					A_15Z..						
Value	Code	25/50v	100v	200v	25v	50v	100v	200v	500v	25v	50v	100v	200v	500v	25v	50v	100v	200v	500v	25v	50v	100v	200v	500v		
330 pf	331																									
390 pf	391																									
470 pf	471																									
560 pf	561																									
680 pf	681																									
820 pf	821																									
1000 pf	102																									
1.2nf	122																									
1.5nf	152																									
1.8 nf	182																									
2.2nf	222																									
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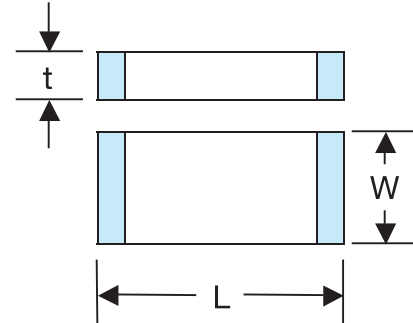
Note: 3 terminations available: Ag Pd Pt ► AC, Nickel Barrier with Tin Lead finish ► AN, Nickel Barrier with Tin finish ► AD  
Size 2225 available on request

# QPL ESCC 3009 and CECC Surface Mount MLCC, Type I & II

## DIMENSIONS

### I - Chips T2/T3/T5/T6 (vs CECC) AN... AC... & AD...

Size	mm (inches)		
	L	W	t max.
0805	2.0 ± 0.3 (0.079 ± 0.012)	1.25 ± 0.3 (0.049 ± 0.012)	1.3 (0.051)
1206	3.2 ± 0.3 (0.126 ± 0.012)	1.6 ± 0.3 (0.063 ± 0.012)	1.6 (0.063)
1210	3.2 ± 0.3 (0.126 ± 0.012)	2.5 ± 0.3 (0.098 ± 0.012)	1.8 (0.071)
1812	4.5 ± 0.3 (0.177 ± 0.012)	3.2 ± 0.3 (0.126 ± 0.012)	1.8 (0.071)
2220	5.7 ± 0.4 (0.224 ± 0.016)	5.0 ± 0.4 (0.197 ± 0.016)	1.8 (0.071)



### II - ESA Level 3009 A3... & A6...

Size	L		W		Thickness max. (t)		
	min.	max.	min.	max.	NP0 Class	2C1 Class	X7R Class
0805	1.7 (0.067)	2.3 (0.091)	1.05 (0.041)	1.45 (0.057)	1.8(0.071)	1.8(0.071)	1.8(0.071)
1206	2.8 (0.110)	3.6 (0.142)	1.3 (0.051)	1.9(0.075)	2.3(0.091)	2.3(0.091)	2.3(0.091)
1210	2.8 (0.110)	3.6 (0.142)	2.2 (0.087)	2.8(0.110)	2.3(0.091)	2.3(0.091)	2.3(0.091)
1812	4.0 (0.157)	5.0 (0.197)	2.8 (0.110)	3.6(0.142)	2.8(0.110)	2.8(0.110)	2.8(0.110)
2220	5.2 (0.205)	6.2 (0.244)	4.5 (0.177)	5.5(0.217)	2.8(0.110)	2.8(0.110)	2.8(0.110)

Part thickness manufactured "according to ESA" exceed above limits.

# QPL ESCC 3009 and CECC Surface Mount MLCC, Type I & II



## HOW TO ORDER ESA NP0 WITH 3009 SPEC

<b>3009</b>	<b>003</b>	<b>06</b>	<b>1002</b>	<b>J</b>	<b>C</b>
<b>Spec</b> 3009	<b>Component Variant</b> 003 = 0805 022 = 1206 004 = 1210 005 = 1812 006 = 2220	<b>Term Type</b> 03 = Ag Pd Pt 06 = Ni/SnPb	<b>Capacitance Code</b> 3 significant digits + number of zeros e.g. 1002 = 10nF 1001 = 1nF	<b>Capacitance Tolerance</b> F = 1% G = 2% J = 5% K = 10%	<b>Voltage</b> C = 50V E = 100V

## HOW TO ORDER ESA 2C1 & X7R WITH 3009 SPEC

<b>3009</b>	<b>008</b>	<b>07</b>	<b>1003</b>	<b>K</b>	<b>C</b>
<b>Spec</b> 3009	<b>Component Variant</b> 008 = 0805 023 = 1206 009 = 1210 010 = 1812 011 = 2220	<b>Term Type</b> 03 = Ag Pd Pt 06 = Ni/SnPb 07 = Ni/SnPb (X7R)	<b>Capacitance Code</b> 2 significant digits + number of zeros e.g. 103 = 10nF 105 = 1µF	<b>Capacitance Tolerance</b> J = 5% K = 10% M = 20%	<b>Voltage</b> A = 25 C = 50V E = 100V G = 200V K = 400V

# QPL ESCC 3009 and CECC Surface Mount MLCC, Type I & II

## HOW TO ORDER ESA MLCC

<b>A6</b>	<b>14</b>	<b>C</b>	<b>E</b>	<b>0222</b>	<b>K</b>	<b>NC</b>
<b>Termination</b>	<b>Size</b>	<b>Class</b>	<b>Voltage</b>	<b>Capacitance</b>	<b>Tolerance</b>	<b>Suffix</b>
A3 = AgPdPt Terminations A6 = Nickel Barrier Terminations with Tin Lead Finish	12 = 0805 13 = 1210 14 = 1812 15 = 2220 20 = 1206 43 = 2225	Z = X7R C = NP0 G = 2C1	C = 25V D = 50/63V E = 100V F = 200V G = 250V I = 400V J = 500V	Capacitance expressed by 2 significant figures <b>7th digit:</b> 0 (zero) <b>8th and 9th digits:</b> the 2 significant figures of the capacitance value. <b>10th digit:</b> - for values > 10 pF and > 990 μF: the number of ZEROS to be added to the capacitance value - for values > 1 pF and > 9.9 pF: the figure 9 signifying that the capacitance value is to be multiplied by 0.1 - for values < 1 pF: the figure 8 signifying that the capacitance value is to be multiplied by 0.01. <b>Examples:</b> 1000 pF: 0102 8.2 pF: 0829 0.47 pF: 0478	<b>C &lt; 10 pF</b> Code ± 0.5pF D  <b>C &gt; 10 pF</b> Code ± 1% F ± 2% G ± 5% J ± 10% K ± 20% M	AVX suffix / ESCC NC = See Note 1 2J = See Note 2 NB = See Note 3

Capacitance expressed by 3 significant figures **7th, 8th and 9th digits:** the 3 significant figures of the capacitance value  
**10th digit:**  
- for values > 100 pF and > 990 μF: the number of ZEROS to be added to the capacitance value  
- for values > 10 pF and < 100 pF: the figure 9 signifying that the capacitance value is to be multiplied by 0.1  
- for values > 1 pF and < 10 pF: the figure 8 signifying that the capacitance value is to be multiplied by 0.01.  
**Examples:** 196 pF: 1960  
47.2 pF: 4729  
8.28 pF: 8288

**Not RoHS Compliant**



LEAD-FREE  
LEAD-FREE COMPATIBLE  
COMPONENT

For RoHS compliant products, please select correct termination style.

Note 1: NC suffix is for testing level of ESCC 3009 Issue 2 or C testing level of ESCC 3009 Issue 1, waffle-pack packing.  
Note 2: 2J suffix is for testing level of ESCC 3009 Issue 2 or C testing level of ESCC 3009 Issue 1, tape & reel packing.  
Note 3: NB suffix is for serialised B testing level of ESCC 3009 issue 1, waffle-pack packing.

## HOW TO ORDER CECC MLCC

<b>AN</b>	<b>14</b>	<b>C</b>	<b>E</b>	<b>0222</b>	<b>K</b>	<b>T6</b>
<b>Termination</b>	<b>Size</b>	<b>Class</b>	<b>Voltage</b>	<b>Capacitance</b>	<b>Tolerance</b>	<b>CECC Suffix</b>
AC = AgPdPt Terminations AN = Nickel Barrier Terminations with Tin Lead Finish AD = Nickel Barrier Terminations with Tin Finish	12 = 0805 13 = 1210 14 = 1812 15 = 2220 20 = 1206 43 = 2225	Z = X7R C = NP0	C = 25V D = 50/63V E = 100V F = 200V G = 250V I = 400V J = 500V	Capacitance expressed by 2 significant figures <b>7th digit:</b> 0 (zero) <b>8th and 9th digits:</b> the 2 significant figures of the capacitance value. <b>10th digit:</b> - for values > 10 pF and > 990 μF: the number of ZEROS to be added to the capacitance value - for values > 1 pF and > 9.9 pF: the figure 9 signifying that the capacitance value is to be multiplied by 0.1 - for values < 1 pF: the figure 8 signifying that the capacitance value is to be multiplied by 0.01. <b>Examples:</b> 1000 pF: 0102 8.2 pF: 0829 0.47 pF: 0478	<b>C &lt; 10 pF</b> Code ± 0.5pF D  <b>C &gt; 10 pF</b> Code ± 1% F ± 2% G ± 5% J ± 10% K ± 20% M	Burn-in 100% 168H +TS +HR T6 Burn-in 100% 168H T5 Burn-in 100% 48H T3 No Burn-in T2 T5 + Tape 2K T3 + Tape 2L T2 + Tape 2Y T6 + Tape 24 T5 + Waffle Pack 9Y

Capacitance expressed by 3 significant figures **7th, 8th and 9th digits:** the 3 significant figures of the capacitance value  
**10th digit:**  
- for values > 100 pF and > 990 μF: the number of ZEROS to be added to the capacitance value  
- for values > 10 pF and < 100 pF: the figure 9 signifying that the capacitance value is to be multiplied by 0.1  
- for values > 1 pF and < 10 pF: the figure 8 signifying that the capacitance value is to be multiplied by 0.01.  
**Examples:** 196 pF: 1960  
47.2 pF: 4729  
8.28 pF: 8288

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