

# AVX's Mil Prf 32535, NASA, European Space Agency and CECC Approved Ceramic Capacitor Products

European Space  
www.avx.com



Version 18-4



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***All products to be considered Not RoHS Compliant unless otherwise indicated.***

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# MIL PRF 32535 BME X7R MLCC



## Defense Logistics Agency Approved



AVX has been approved by the Defense Logistics Agency (DLA) for its qualification of its Mil Prf 32535 BME X7R MLCC technology.

Using its leading edge technology AVX can now offer Mil Prf 32535 approved capacitors from 0402 to 2220 case sizes. With capacitance & voltage ranges ranging from 2.2nF to 22 $\mu$ F, 16–100 volts, currently. AVXs Mil Prf 32535 meets the designer needs by boosting the CV range compared to the standard surface mount Mil Ranges and reduces the gap between commercial and Mil Spec product ranges while meeting the Mil reliability levels. The results of this technology has several key benefits for the Mil design engineer resulting in , ability to downsize case sizes, reducing PCB weight and allowing more efficient use of the PCB area available with the higher CV MLCCs. These surface mount components also incorporate Flexitem<sup>®</sup>, which greatly enhances resistance to any of the thermo-mechanical stress experienced by MLCCs during PCB assembly and during its life time.

## FEATURES

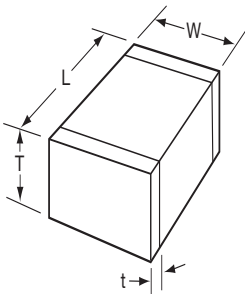
- “M” and “T” reliability levels available.
- Higher CV capability than standard Mil based capacitors resulting in reduced size/weight of components and saving in PCB space required.
- Flexitem<sup>®</sup> technology used as standard in range for enhanced thermos-mechanical stress resistance.
- Case sizes 0402-2220, cap values 2.2nF–22.0 $\mu$ F available.
- Voltages 16-100 Volts

## HOW TO ORDER

M32535	08	E2	Z	226	K	R	M	B
<b>Mil Spec</b> M32535	<b>Slash Sheet Number</b> 02 = 0402 03 = 0603 04 = 0805 05 = 1206 06 = 1210 07 = 1812 08 = 2220	<b>Characteristic</b> E2 (X7R $\pm$ 15%)	<b>Voltage</b> Y = 16V Z = 25V A = 50V B = 100V	<b>Capacitance</b> 682 = 6.8nF 103 = 10nF 474 = 470nF 475 = 4.7 $\mu$ F 226 = 22 $\mu$ F	<b>Tolerance</b> J = $\pm$ 5% K = $\pm$ 10% M = $\pm$ 20%	<b>Termination</b> R = Epoxy Ni Sn/Pb	<b>Product Level</b> M = Standard T = Space Level	<b>Electrode</b> B = BME

Please note all parts are terminated with a minimum 10% Pb plating.

## DIMENSIONS



mm (inches)

Size	M3253502		M3253503		M3253504		M3253505		M3253506		M3253507		M3253508	
	0402		0603		0805		1206		1210		1812		2220	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
(L) Length	0.92 (0.036)	1.12 (0.044)	1.45 (0.057)	1.75 (0.069)	1.79 (0.069)	2.26 (0.089)	3.00 (0.118)	3.45 (0.136)	2.94 (0.116)	3.35 (0.136)	4.19 (0.165)	4.80 (0.190)	5.2 (0.208)	6.1 (0.24)
(W) Width	0.41 (0.016)	0.61 (0.024)	0.66 (0.026)	0.97 (0.038)	1.01 (0.040)	1.52 (0.060)	1.35 (0.053)	1.85 (0.073)	2.25 (0.088)	2.74 (0.108)	2.89 (0.114)	3.50 (0.138)	4.59 (0.181)	5.41 (0.213)
(T) Thickness	0.61 (0.24) Max.		0.99 (0.039) Max.		1.52 (0.060)		1.78 (0.070) Max.		2.80 (0.110) Max.		2.80 (0.110) Max.		2.80 (0.110) Max.	
(t) terminal	0.1 (0.004)	0.30 (0.012)	0.20 (0.008)	0.61 (0.024)	0.25 (0.010)	0.75 (0.030)	0.15 (0.006)	0.86 (0.034)	0.15 (0.006)	0.86 (0.034)	0.15 (0.006)	1.1 (0.042)	0.17 (0.007)	1.09 (0.043)

# MIL PRF 32535 BME X7R MLCC



Defense Logistics Agency Approved

## MIL PRF 32535 X7R APPROVED RANGE

Mil		M3253502			M3253503			M3253504			M3253505			M3253506			M3253507			M3253508		
Case Sizes		0402			0603			0805			1206			1210			1812			2220		
Code	Value	16/25V	50V	100V	16/25V	50V	100V	16/25V	50V	100V	16/25V	50V	100V	16/25V	50V	100V	16/25V	50V	100V	16/25V	50V	100V
222	2.2 (nF)																					
272	2.7																					
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125	1.2																					
155	1.5																					
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275	2.7																					
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395	3.9																					
475	4.7																					
565	5.6																					
685	6.8																					
825	8.2																					
106	10																					
126	12																					
156	15																					
186	18																					
226	22																					

# NASA SPACE LEVEL BME X7R MLCC



## S311-P838 Approved



AVX is the first company to be awarded the NASA S311-P838 specification for its Space BME X7R MLCC technology.

This technology delivers an advanced capacitance voltage capability compared to conventional PME (Precious Metal Electrode) technologies while meeting the reliability levels demanded by NASA's space industry. The technology has several key benefits, downsizing case sizes, reducing weight and allowing more efficient use of the PCB area available. The range is tested using Mil spec standards and methods including 100% ultrasonic examination in compliance with the NASA space specification. These surface mount components also incorporate Flexitem®<sup>®</sup>, which greatly enhances resistance to any of the mechanical stress experienced by MLCCs during PCB assembly and in operation.

## FEATURES

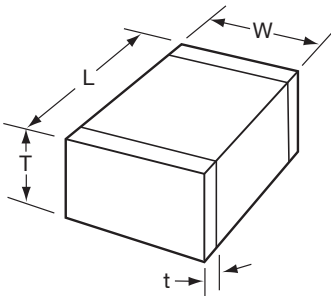
- Higher CV capability than standard capacitors resulting in reduced size / weight of components and saving in PCB space required.
- Every production lot will have a C of C, DPA and a summary data package.
- Use of Flexitem®<sup>®</sup> technology for enhanced mechanical stress resistance.
- Case sizes: 0603 - 1812, cap values 2.2nF - 8.2uF available.
- Voltages: 16 - 100 Volts

## HOW TO ORDER

<b>G311P838</b>	<b>A</b>	<b>F</b>	<b>X</b>	<b>825</b>	<b>J</b>	<b>1</b>	<b>R</b>	<b>3</b>
<b>GSFC Identifier</b>	<b>Ultrasonic Examination</b> A = 100%	<b>Size Code</b> A = 0402 B = 0603 C = 0805 D = 1206 E = 1210 F = 1812	<b>Dielectric Type</b> X = X7R	<b>Capacitance in pF</b> 2 significant digits + number of zeros e.g. 103 = 10nF 225 = 2.2µF	<b>Tolerance</b> J = ±5% K = ±10% M = ±20%	<b>Voltage</b> 1 = 25Vdc 2 = 50Vdc 3 = 100Vdc 6 = 16Vdc	<b>Termination</b> R = Sn/Pb plated	<b>Packaging/ Marking</b> 1 = T/R unmarked capacitors 2 = T/R marked capacitors 3 = Waffle Pack, unmarked capacitors 4 = Waffle Pack, marked capacitors

Please note all parts are terminated with a minimum 10% Pb plating.

## DIMENSIONS



mm (inches)

Size	0603		0805		1206		1210		1812	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
(L) Length	1.48 (0.058)	1.75 (0.069)	1.79 (0.070)	2.29 (0.090)	3.00 (0.118)	3.40 (0.134)	3.00 (0.118)	3.40 (0.124)	4.19 (0.165)	4.95 (0.195)
(W) Width	0.66 (0.026)	0.97 (0.038)	1.01 (0.040)	1.45 (0.057)	1.40 (0.055)	1.80 (0.071)	2.25 (0.088)	2.70 (0.108)	2.79 (0.115)	3.56 (0.140)
(T) Thickness	1.02 (0.040) Max.		1.52 (0.060) Max.		1.80 (0.071) Max.		2.80 (0.110) Max.		2.80 (0.110) Max.	
(t) terminal	0.20 (0.008)	0.50 (0.020)	0.25 (0.010)	0.75 (0.030)	0.25 (0.010)	0.75 (0.030)	0.25 (0.010)	0.75 (0.030)	0.25 (0.010)	0.95 (0.037)

# NASA SPACE LEVEL BME X7R MLCC



S311-P838 Approved

## PREFERRED SIZES ARE SHADED

Case Size		B (0603)				C (0805)				D (1206)				E (1210)				F (1812)				
Code	Value	16V	25V	50V	100V	16V	25V	50V	100V	16V	25V	50V	100V	16V	25V	50V	100V	16V	25V	50V	100V	
222	2.2 (nF)																					
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685	6.8																					
825	8.2																					
106	10																					

### ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

Charateristics	Symbol	Test Method and Conditions	Tolerance (± %)	Limits		Unit
				Min.	Max.	
Capacitance	C <sub>A</sub>	MIL-STD-202 Method 305 25°C, 1KHz, 1V <sub>rms</sub>	5	0.95C <sub>n</sub>	1.05C <sub>n</sub>	pF
			10	0.9C <sub>n</sub>	1.1C <sub>n</sub>	
			20	0.8C <sub>n</sub>	1.2C <sub>n</sub>	
Insulation Resistance	R <sub>I</sub>	MIL-STD-202 Method 302 120 sec, 25°C For C <sub>n</sub> ≤ 10000pF: For C <sub>n</sub> > 10000pF:	All	100	–	GΩ
				1000	–	GΩ nF
Dissipation Factor	D <sub>f</sub>	Measured 25°C, 1KHz, 1V <sub>rms</sub> , 16-25 Volts > 25 Volts	All		3.5	%
					2.5	%
Voltage Proof	VP	MIL-STD-202 Method 301 60 sec	All	2.5U <sub>R</sub>	–	V

### ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURE

Charateristics	Symbol	Test Method and Conditions (Note 1)	Limits		Unit
			Min.	Max.	
Insulation Resistance	R <sub>I</sub>	MIL-STD-202 Method 302 For C <sub>n</sub> ≤ 10000pF: For C <sub>n</sub> > 10000pF:	10	–	GΩ
			100		GΩ nF

# Space Level BME X7R MLCC



ESCC QPL 3009041 Approved



The AVX Space, 3009041, BME ( Base Metal Electrode ) X7R surface mount MLCC QPL approved since 2015.

The technology utilises the leading edge technology in MLCC construction and processing. This technology delivers high reliability with a superior capacitance voltage capability compared values in the smaller case sizes not only reduces the amount of board space used but also the weight of components. The surface mount components also incorporate Flexitem®, which greatly improves the resistance to the mechanical stress experienced by MLCCs.

## BENEFITS

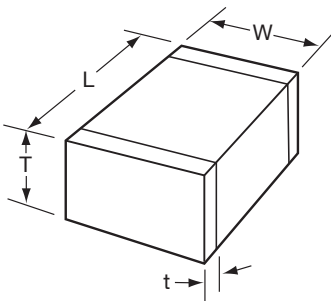
- Space BME enables customers to down size MLCCs and save PCB space.
- The Space BME range provides a high CV range 16 – 100 volts, 2.2 n F – 22 u F
- The range comes with Flexitem® termination which protection against board flexure either during assembly or product lifetime.

## HOW TO ORDER

<b>3009041</b>	<b>07</b>	<b>226</b>	<b>J</b>	<b>E</b>
↓	↓	↓	↓	↓
<b>Detailed Spec</b> 3009041	<b>Component Variant</b> 01 (0402) 02 (0603) 03 (0805) 04 (1206) 05 (1210) 06 (1812) 07 (2220)	<b>Capacitance Code</b> 2 significant digits + number of zeros e.g. 103 = 10nF 225 = 2.2µF 226 = 22µF	<b>Capacitance Tolerance</b> J = 5% K = 10% M = 20%	<b>Voltage</b> X = 16V A = 25V C = 50V E = 100V

Please note all parts are terminated with a minimum 10% Pb plating. Parts packed in waffles as standard, tape and reel available upon request. Lot Validation Testing (LVT) can be ordered separately, LVT Groups 3, 2b, 2a, 1.

## DIMENSIONS



mm (inches)

Size	0402		0603		0805		1206		1210		1812		2220	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Length (L)	0.90 (0.035)	1.15 (0.045)	1.45 (0.057)	1.75 (0.069)	1.80 (0.071)	2.20 (0.087)	3.00 (0.118)	3.40 (0.134)	3.00 (0.118)	3.40 (0.124)	4.20 (0.165)	4.80 (0.189)	5.3 (0.208)	6.1 (0.24)
Width (W)	0.41 (0.016)	0.61 (0.024)	0.65 (0.026)	0.95 (0.037)	1.05 (0.041)	1.45 (0.057)	1.40 (0.055)	1.80 (0.071)	2.30 (0.091)	2.70 (0.106)	3.00 (0.118)	3.40 (0.124)	4.60 (0.18)	5.41 (0.213)
Thickness (T)	0.61 Max. (0.024)		1.00 Max. (0.039)		1.52 Max. (0.060)		1.80 Max. (0.071)		2.80 Max. (0.110)		2.80 Max. (0.110)		2.80 Max. (0.110)	
terminal (t)	0.1 (0.004)	0.40 (0.015)	0.20 (0.008)	0.50 (0.020)	0.25 (0.010)	0.75 (0.030)	0.25 (0.010)	0.75 (0.030)	0.25 (0.010)	0.75 (0.030)	0.25 (0.010)	0.95 (0.037)	0.25 (0.009)	1.03 (0.041)





# Space Level BME X7R MLCC



ESCC QPL 3009041 Approved

## PREFERRED SIZES ARE SHADED

Case Size		0402			0603			0805			1206			1210			1812			2220			
Code	Value	16V/25V	50V	100V	16V/25V	50V	100V	16V/25V	50V	100V	16V/25V	50V	100V	16V/25V	50V	100V	16V/25V	50V	100V	16V/25V	50V	100V	
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126	12																						
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186	18																						
226	22																						

# Space Level BME X7R MLCC



ESCC QPL 3009/041 Approved

## ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

The measurements shall be performed at  $T_{amb} = +22 \pm 3^{\circ}\text{C}$ .

Charateristics	Symbol	Test Method and Conditions	Tolerance ( $\pm$ %)	Limits		Unit
				Min.	Max.	
Capacitance (Note 1)	$C_A$	ESCC No. 3009	5 10 20	$0.95C_n$ $0.9C_n$ $0.8C_n$	$1.05C_n$ $1.1C_n$ $1.2C_n$	pF
Tangent of Loss Angle	$tg\delta$	ESCC No. 3009 For $U_R = 50V, 100V$ : For $U_R = 16V, 25V$ :	All	- -	$250 \times 10^{-4}$ $300 \times 10^{-4}$	- -
Insulation Resistance	$R_i$	ESCC No. 3009 For $C_n \leq 10000\text{pF}$ : For $C_n > 10000\text{pF}$ :	All	100 1000	- -	$G\Omega$ $G\Omega \text{ nF}$
Voltage Proof	VP	ESCC No. 3009	All	$2.5U_R$	-	V

NOTE: 1. 300 max for 16 volt and 25 volt rated components

## ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURE

Charateristics	Symbol	Test Method and Conditions (Note 1)	Limits		Unit
			Min.	Max.	
Insulation Resistance	$R_i$	ESCC No. 3009 For $C_n \leq 10000\text{pF}$ : For $C_n > 10000\text{pF}$ :	10 100	-	$G\Omega$ $G\Omega \text{ nF}$
Temperature Characteristic	TC	ESCC No. 3009 $T_{amb} = -55 \pm 2^{\circ}\text{C}, +20 \pm 2^{\circ}\text{C}, +125 \pm 2^{\circ}\text{C}$ (Note 2 and 3) For VT = no voltage applied:	-15	+15	%

NOTE: 1. Single Sample, Inspection Level S3, AQL = 2.5%  
2. If 1 failure out of 5 parts, then test 100%. 1.0% rejects maximum allowed in case of 100% testing.  
3. X7R dielectric: Delta C/C at  $U_R$  is typically -10% to -70% dependant on capacitance value. (See curves on next page)

## LVT 3009041 TEST DETAIL

L V T Group Test Number	LVT 3009041 Test Detail, Parametric Data Recorded	Min No. Of Pcs for Test
3	Solderability	3
2b	PCB Mounting, Capacitance Temperature Characteristics and Robustness of Termination	3
2a	PCB Mounting, Life testing for 1000 hours, 2 x RV @ 125°C	10
1	PCB Mounting, Rapid Change of Temperature , Steady state humidity testing, (1.5 Volts DC @ 85°C / 85% Hum) 1000 hours, external visual inspection	20

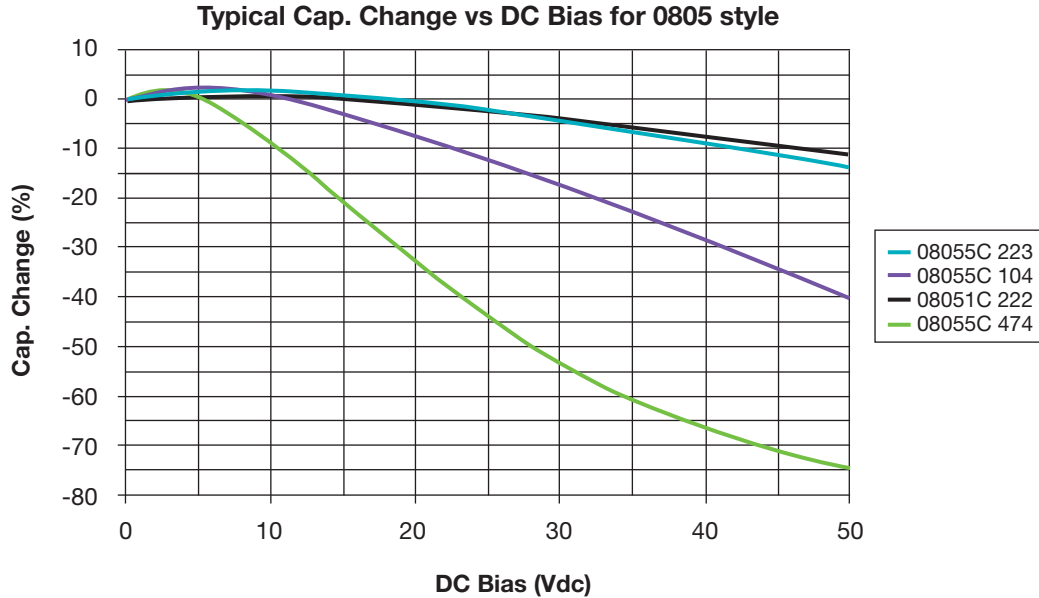
# Space Level BME X7R MLCC



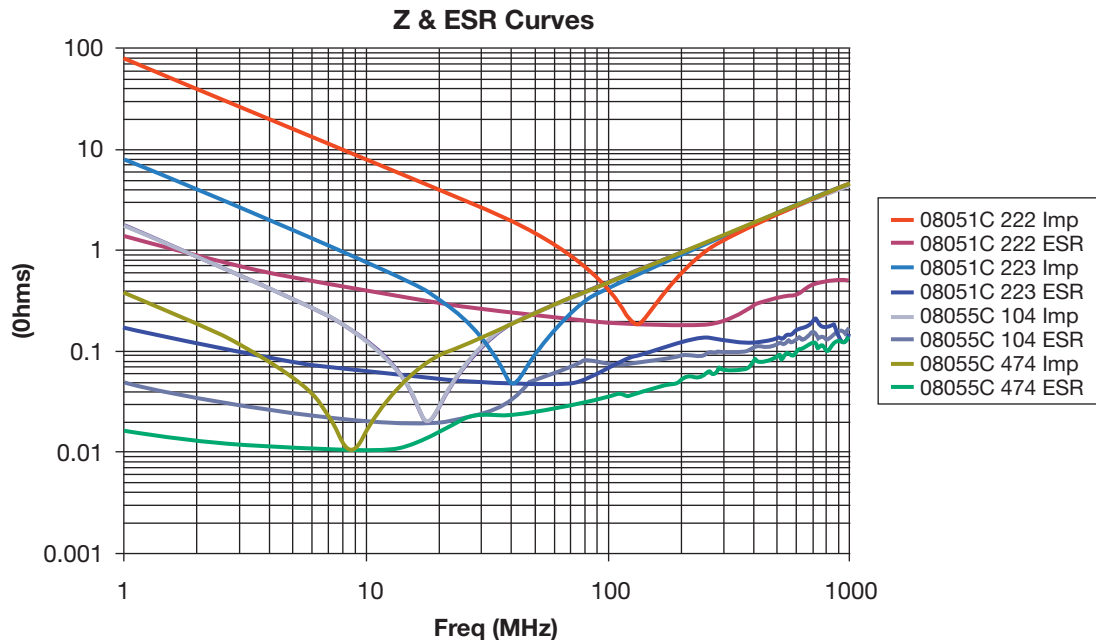
ESCC QPL 3009/041 Approved

## TYPICAL ELECTRICAL CHARACTERISTICS FOR ESCC BME SURFACE MOUNT

### CAPACITANCE TEMPERATURE CHARACTERISTICS FOR 0805 STYLE (WITH DC BIAS)



### IMPEDANCE WITH ESR CHARACTERISTICS FOR 0805 CAPACITANCE RANGE



If required AVX will produce a data sheet for each part number with the following information:

- Impedance/ESR Frequency Sweep
- Capacitance Change with Temperature from  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Capacitance Change with DC Voltage up to the rated voltage of the component
- Temperature Change with AC Current applied for higher capacitance values.



# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products

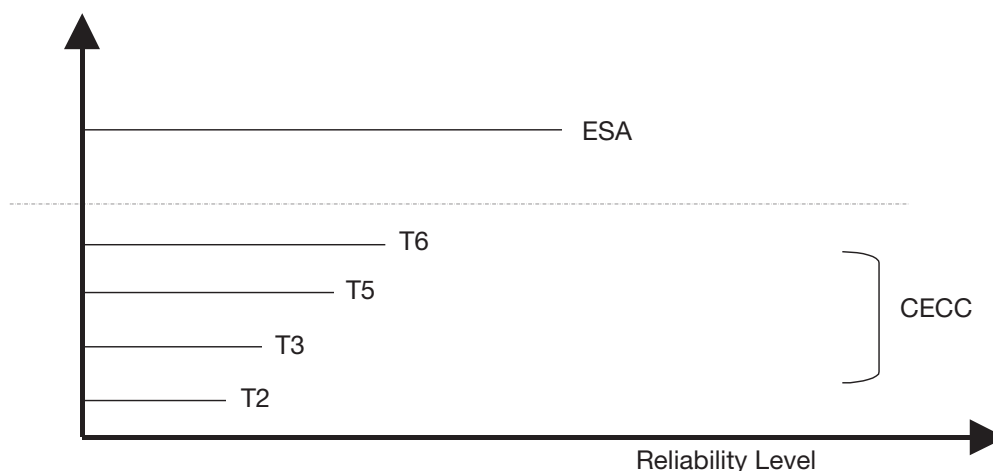


## AVAILABLE TYPES

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)	<b>CECC</b>	X	
MLC Chips ESA Qualified/3009	A...C NP0 A...Z X7R A...G 2C1	<b>ESA ESCC</b>		X

## RELEVANT STANDARDS

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

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products



## DIELECTRIC TYPES USED

### Type I

▶ NP0      ▶ TPC Code: C

### Type II

▶ X7R      ▶ TPC Code: Z  
▶ 2C1      ▶ TPC Code: G

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

Type		1	2
TPC code		<b>C</b>	<b>Z</b>
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	
TPC code		<b>C</b>	<b>Z</b>	<b>G</b>
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	

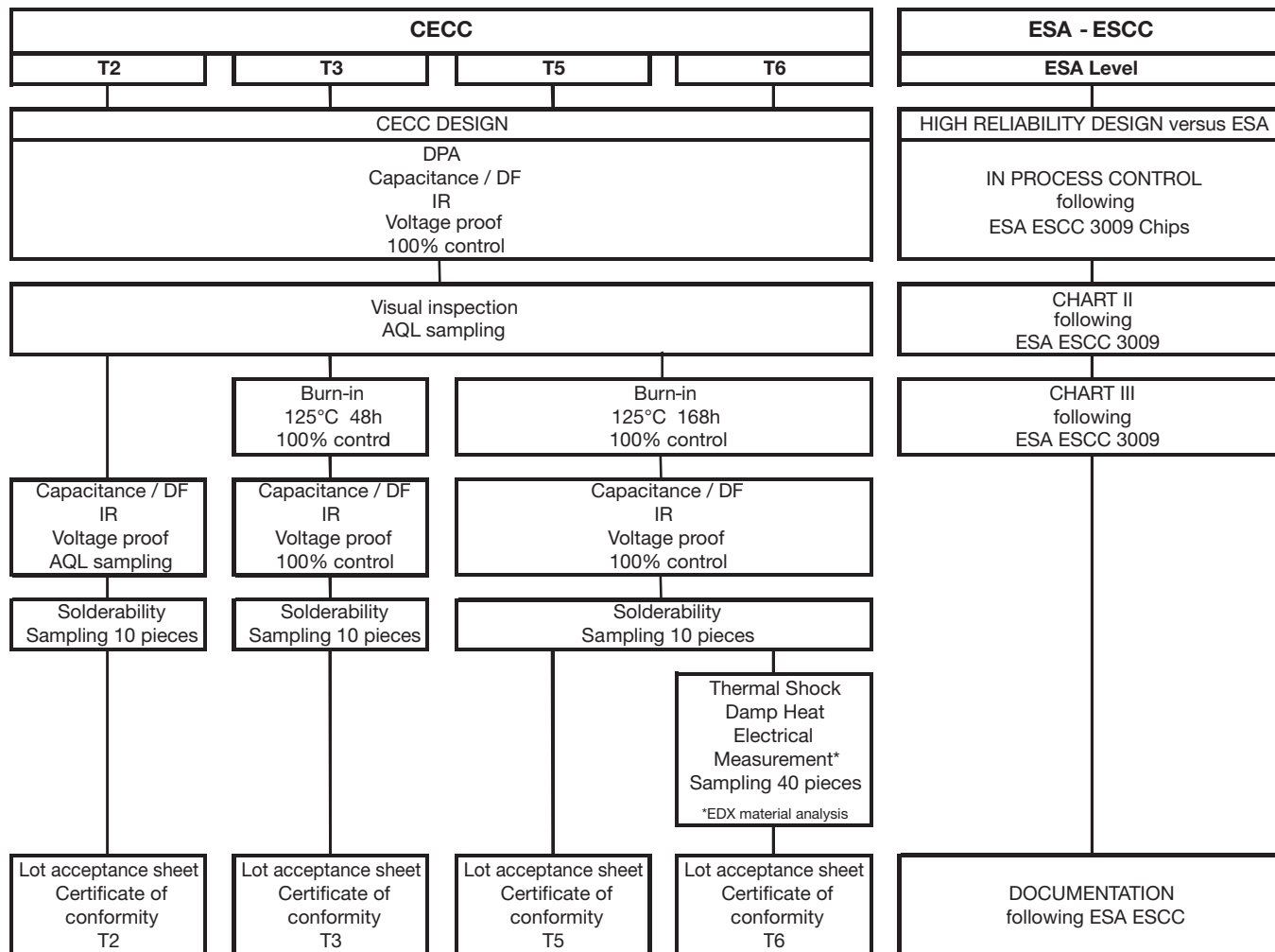
\*Typical value for this dielectric class

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

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products



## RELIABILITY LEVELS DESCRIPTION



# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products



## 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

TPC Code eg: A.12	ESA Version	
	Code	Termination
A312	03	Silver Palladium Platinum
A612C... A612G...	06	ESA Preferred Termination Nickel Barrier + Tin Lead Finish
A612Z...	07	X7R Dielectric + ESA Preferred Termination Nickel Barrier + Tin Lead Finish

## PACKAGING

- Plastic Tape – Minimum Order Quantity: 1000p for CECC and ESA products
- 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:

CECC	T6/T5/T3/T2	On packaging label only - versus TPC code
ESA Level		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

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products



## ESA QUALIFIED CHIPS TYPE I - NP0

Size	TPC Code	Dielectric Class	Voltage (V)	Capacitance Range		Tol %	Relevant Specification
				min.	max.		
0805	A.12C..	NP0	50 & 100	4.7	1500pF	1, 2, 5, 10 %	QPL - ESA ESCC 3009 - 003
1206	A.20C..	NP0	50 & 100	10	3900pF		QPL - ESA ESCC 3009 - 022
1210	A.13C..	NP0	50 & 100 50	22 8200	6800pF 10000pF	±0.5pF	QPL - ESA ESCC 3009 - 004
1812	A.14C..	NP0	50 & 100	0.1	15 nF	for C <10pF	QPL - ESA ESCC 3009 - 005
2220	A.15C..	NP0	50 & 100	0.47	33 nF		QPL - ESA ESCC 3009 - 006

Available Terminations:

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



# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products



## ESA QUALIFIED CHIPS TYPE II - 2C1

Size	TPC Code	Dielectric Class	Voltage (V)	Capacitance Range		Tol %	Qualified Following Specification
				min.	max.		
0805	A.12G	2C1	100	820pF	10 nF	5, 10, 20	QPL - ESA ESCC 3009 - 008
			50	820pF	27 nF		
			25	820pF	47 nF		
1206	A.20G	2C1	100	2.2nF	22 nF	5, 10, 20	QPL - ESA ESCC 3009 - 023
			50	2.2nF	68 nF		
			25	2.2nF	100 nF		
1210	A.13G	2C1	100	3.9nF	47 nF	5, 10, 20	QPL - ESA ESCC 3009 - 009
			50	3.9nF	150 nF		
			25	3.9nF	220 nF		
1812	A.14G	2C1	100	6.8nF	82 nF	5, 10, 20	QPL - ESA ESCC 3009 - 010
			50	6.8nF	270 nF		
			25	6.8nF	470 nF		
2220	A.15G	2C1	100	18nF	180 nF	5, 10, 20	QPL - ESA ESCC 3009 - 011
			50	18nF	680 nF		
			25	18nF	1000 nF		

Available Terminations:

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

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

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

Size	TPC Code	Dielectric Class	Voltage (V)	Capacitance Range		Tol %	Qualified Specification
				min.	max.		
0805	A612Z..	X7R	200	330pF	15 nF	5, 10, 20	QPL - ESA ESCC 3009 - 008
			100	2700pF	47 nF		
			50	2700pF	68 nF		
			25	2700pF	100 nF		
1206	A620Z..	X7R	200	0.47nF	47 nF	5, 10, 20	QPL - ESA ESCC 3009 - 023
			100	3.3nF	100 nF		
			50	3.3nF	150 nF		
			25	3.3nF	220 nF		
1210	A613Z..	X7R	200	0.68nF	68 nF	5, 10, 20	QPL - ESA ESCC 3009 - 009
			100	3.9nF	220 nF		
			50	3.9nF	330 nF		
			25	3.9nF	470 nF		
1812	A614Z..	X7R	200	3.3nF	150 nF	5, 10, 20	QPL - ESA ESCC 3009 - 010
			100	22nF	470 nF		
			50	22nF	680 nF		
			25	22nF	1000 nF		
2220	A615Z..	X7R	200	6.8nF	330 nF	5, 10, 20	QPL - ESA ESCC 3009 - 011
			100	100nF	1000 nF		
			50	100nF	1500 nF		
			25	100nF	2200 nF		
1206	A.20Z	X7R	400	0.27nF	4.7 nF	5, 10, 20	According to "ESA ESCC 3009"
1210	A.13Z	X7R	400	0.68nF	10 nF	5, 10, 20	
1812	A.14Z	X7R	400	3.3nF	47 nF	5, 10, 20	
2220	A.15Z	X7R	400	6.8nF	68 nF	5, 10, 20	

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products



## CECC CHIPS TYPE I – NP0 (AVAILABLE RELIABILITY LEVEL: T6 TO T2) CECC UPGRADED

Size	TPC Code	Dielectric Class	Voltage (V)	Capacitance Range		Tol %	Relevant Specification
				min.	max.		
0805/ CEC2	A. 12CF	NP0	200	4.7	470 pF	1, 2, 5, 10%  ±0.5pF if C < 10pF	IEC 60384-21/22  CECC 32100 - 32101/801
	A. 12CE		100	4.7	1800 pF		
	A. 12CD		50/25	4.7	1800 pF		
1206/ CEC12	A. 20CJ	NP0	500	12	330 pF		
	A. 20CF		200	12	1500 pF		
	A. 20CE		100	12	4700 pF		
	A. 20CD		50/25	12	4700 pF		
1210/ CEC4	A. 13CJ	NP0	500	15	1500 pF		
	A. 13CF		200	15	2700 pF		
	A. 13CE		100	15	10000 pF		
	A. 13CD		50/25	15	10000 pF		
1812/ CEC6	A. 14CJ	NP0	500	100	1000 pF		
	A. 14CF		200	100	5600 pF		
	A. 14CE		100	100	18000 pF		
	A. 14CD		50/25	100	18000 pF		
2220/ CEC7	A. 15CJ	NP0	500	470	3300 pF		
	A. 15CF		200	470	12000 pF		
	A. 15CE		100	470	39000 pF		
	A. 15CD		50/25	470	39000 pF		

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

## CECC CHIPS TYPE II – X7R (AVAILABLE RELIABILITY LEVEL: T6 TO T2) CECC UPGRADED

Size	TPC Code	Dielectric Class	Voltage (V)	Capacitance Range		Tol %	Relevant Specification
				min.	max.		
0805/ CNC2	A. 12ZF	X7R	200	0.33	18 nF	5, 10 & 20%	IEC 60384-21/22  CECC 32100 - 32101/801
	A. 12ZE		100	0.33	47 nF		
	A. 12ZD		50	0.33	100 nF		
1206/ CNC12	A. 20ZJ	X7R	500	1	8.2 nF		
	A. 20ZF		200	1	39 nF		
	A. 20ZE		100	1	100 nF		
	A. 20ZD		50	1	180 nF		
1210/ CNC4	A. 13ZJ	X7R	500	2.2	22 nF		
	A. 13ZF		200	2.2	100 nF		
	A. 13ZE		100	2.2	220 nF		
	A. 13ZD		50	2.2	330 nF		
1812/ CNC6	A. 14ZJ	X7R	500	2.7	47 nF		
	A. 14ZF		200	2.7	180 nF		
	A. 14ZE		100	2.7	470 nF		
	A. 14ZD		50	2.7	680 nF		
	A. 14ZC		25	1000	1000 nF		
2220/ CNC7	A. 15ZJ	X7R	500	4.7	68 nF		
	A. 15ZF		200	4.7	390 nF		
	A. 15ZE		100	4.7	1000 nF		
	A. 15ZD		50	4.7	1500 nF		

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

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products

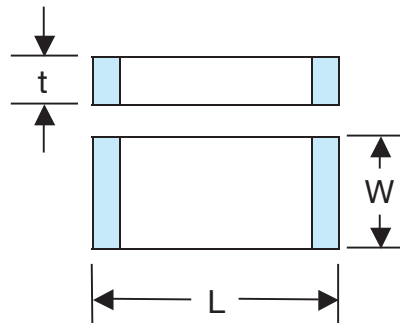


## DIMENSIONS

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

mm (inches)

Size	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...

mm (inches)

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)	1.3 (0.051)	1.8 (0.071)	1.3 (0.051)
1206	2.8 (0.110)	3.6 (0.142)	1.3 (0.051)	1.9 (0.075)	1.8 (0.071)	2.3 (0.091)	1.6 (0.063)
1210	2.8 (0.110)	3.6 (0.142)	2.2 (0.087)	2.8 (0.110)	1.8 (0.071)	2.3 (0.091)	1.8 (0.071)
1812	4.0 (0.157)	5.0 (0.197)	2.8 (0.110)	3.6 (0.142)	1.8 (0.071)	2.3 (0.091)	1.8 (0.071)
2220	5.2 (0.205)	6.2 (0.244)	4.5 (0.177)	5.5 (0.217)	1.8 (0.071)	2.3 (0.091)	1.8 (0.071)

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

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products



## HOW TO ORDER ESA NP0 WITH 3009 SPEC

**3009**

**Spec**  
3009

**003**

**Component Variant**  
003 = 0805  
022 = 1206  
004 = 1210  
005 = 1812  
006 = 2220

**06**

**Term Type**  
03 = Ag Pd Pt  
06 = Ni/SnPb

**1002**

**Capacitance Code**  
3 significant digits  
+ number of zeros  
e.g.  
1002 = 10nF  
1001 = 1nF

**J**

**Capacitance Tolerance**  
F = 1%  
G = 2%  
J = 5%  
K = 10%

**C**

**Voltage**  
C = 50V  
E = 100V

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

**3009**

**Spec**  
3009

**008**

**Component Variant**  
008 = 0805  
023 = 1206  
009 = 1210  
010 = 1812  
011 = 2220

**07**

**Term Type**  
03 = Ag Pd Pt  
06 = Ni/SnPb  
07 = Ni/SnPb (X7R)

**103**

**Capacitance Code**  
2 significant digits  
+ number of zeros  
e.g.  
103 = 10nF  
105 = 1 $\mu$ F

**K**

**Capacitance Tolerance**  
J = 5%  
K = 10%  
M = 20%

**C**

**Voltage**  
A = 25  
C = 50V  
E = 100V  
G = 200V  
K = 400V


# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products



## HOW TO ORDER ESA MLCC

<p><b>A6</b></p> <p><b>Termination</b></p> <p>A3 = AgPdPt Terminations A6 = Nickel Barrier Terminations with Tin Lead Finish</p>	<p><b>14</b></p> <p><b>Size</b></p> <p>12 = 0805 13 = 1210 14 = 1812 15 = 2220 20 = 1206 43 = 2225</p>	<p><b>C</b></p> <p><b>Class</b></p> <p>Z = X7R C = NP0 G = 2C1</p>	<p><b>E</b></p> <p><b>Voltage</b></p> <p>C = 25V D = 50/63V E = 100V F = 200V G = 250V I = 400V J = 500V</p>	<p><b>0222</b></p> <p><b>Capacitance</b></p> <p>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 <math>\blacktriangleright</math> 10 pF and <math>\blacktriangleright</math> 990 <math>\mu</math>F: the number of ZEROS to be added to the capacitance value - for values <math>\blacktriangleright</math> 1 pF and <math>\blacktriangleright</math> 9.9 pF: the figure 9 signifying that the capacitance value is to be multiplied by 0.1 - for values <math>&lt;</math>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</p> <p>Capacitance expressed by 3 significant figures <b>7th, 8th and 9th digits:</b> the 3 significant figures of the capacitance value <b>10th digit:</b> - for values <math>&gt;</math>100 pF and <math>\blacktriangleright</math> 990 <math>\mu</math>F: the number of ZEROS to be added to the capacitance value - for values <math>&gt;</math>10 pF and <math>&lt;</math>100 pF: the figure 9 signifying that the capacitance value is to be multiplied by 0.1 - for values <math>&gt;</math>1 pF and <math>&lt;</math>10 pF: the figure 8 signifying that the capacitance value is to be multiplied by 0.01. <b>Examples:</b> 196 pF: 1960 47.2 pF: 4729 8.28 pF: 8288</p>	<p><b>K</b></p> <p><b>Tolerance</b></p> <p>C <math>&lt;</math> 10 pF Code <math>\pm</math> 0.5pF D</p> <p>C <math>\blacktriangleright</math> 10 pF Code <math>\pm</math> 1% F <math>\pm</math> 2% G <math>\pm</math> 5% J <math>\pm</math> 10% K <math>\pm</math> 20% M</p>	<p><b>NC</b></p> <p><b>Suffix</b></p> <p>TPC suffix / ESCC NC = See Note 1 2J = See Note 2 NB = See Note 3</p>
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**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

<p><b>AN</b></p> <p><b>Termination</b></p> <p>AC = AgPdPt Terminations AN = Nickel Barrier Terminations with Tin Lead Finish AD = Nickel Barrier Terminations with Tin Finish</p>	<p><b>14</b></p> <p><b>Size</b></p> <p>12 = 0805 13 = 1210 14 = 1812 15 = 2220 20 = 1206 43 = 2225</p>	<p><b>C</b></p> <p><b>Class</b></p> <p>Z = X7R C = NP0</p>	<p><b>E</b></p> <p><b>Voltage</b></p> <p>C = 25V D = 50/63V E = 100V F = 200V G = 250V I = 400V J = 500V</p>	<p><b>0222</b></p> <p><b>Capacitance</b></p> <p>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 <math>\blacktriangleright</math> 10 pF and <math>\blacktriangleright</math> 990 <math>\mu</math>F: the number of ZEROS to be added to the capacitance value - for values <math>\blacktriangleright</math> 1 pF and <math>\blacktriangleright</math> 9.9 pF: the figure 9 signifying that the capacitance value is to be multiplied by 0.1 - for values <math>&lt;</math>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</p> <p>Capacitance expressed by 3 significant figures <b>7th, 8th and 9th digits:</b> the 3 significant figures of the capacitance value <b>10th digit:</b> - for values <math>&gt;</math>100 pF and <math>\blacktriangleright</math> 990 <math>\mu</math>F: the number of ZEROS to be added to the capacitance value - for values <math>&gt;</math>10 pF and <math>&lt;</math>100 pF: the figure 9 signifying that the capacitance value is to be multiplied by 0.1 - for values <math>&gt;</math>1 pF and <math>&lt;</math>10 pF: the figure 8 signifying that the capacitance value is to be multiplied by 0.01. <b>Examples:</b> 196 pF: 1960 47.2 pF: 4729 8.28 pF: 8288</p>	<p><b>K</b></p> <p><b>Tolerance</b></p> <p>C <math>&lt;</math> 10 pF Code <math>\pm</math> 0.5pF D</p> <p>C <math>\blacktriangleright</math> 10 pF Code <math>\pm</math> 1% F <math>\pm</math> 2% G <math>\pm</math> 5% J <math>\pm</math> 10% K <math>\pm</math> 20% M</p>	<p><b>T6</b></p> <p><b>CECC Suffix</b></p> <table border="0"> <tr> <td>Burn-in 100% 168H</td> <td>T6</td> </tr> <tr> <td>+TS +HR</td> <td></td> </tr> <tr> <td>Burn-in 100% 168H</td> <td>T5</td> </tr> <tr> <td>Burn-in 100% 48H</td> <td>T3</td> </tr> <tr> <td>No Burn-in</td> <td>T2</td> </tr> <tr> <td>T5 + Tape</td> <td>2K</td> </tr> <tr> <td>T3 + Tape</td> <td>2L</td> </tr> <tr> <td>T2 + Tape</td> <td>2Y</td> </tr> <tr> <td>T6 + Tape</td> <td>24</td> </tr> <tr> <td>T5 + Waffle Pack</td> <td>9Y</td> </tr> </table>	Burn-in 100% 168H	T6	+TS +HR		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
Burn-in 100% 168H	T6																									
+TS +HR																										
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																									

**Not RoHS Compliant**



LEAD-FREE  
LEAD-FREE COMPATIBLE COMPONENT

*For RoHS compliant products, please select correct termination style.*

# ESCC Qualified SMPS Capacitors



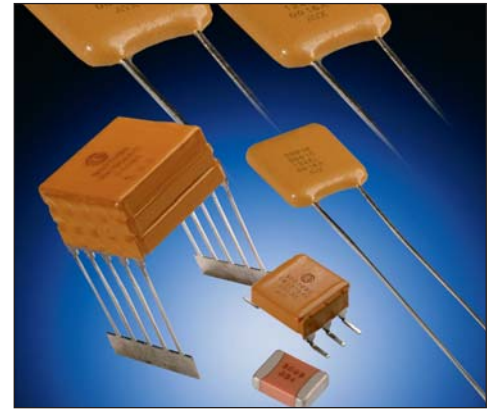
## High Voltage Chip/Leaded Capacitors

### HIGH VOLTAGE CHIP CAPACITORS

Capacitors, Fixed, Chip, Ceramic Dielectric, Type II, High Voltage, Based on Styles 1812 and 1825 for use in ESCC space programs, according to ESCC Generic Specification 3009 and associated Detail Specification 3009/034 as recommended by the Space Components Coordination Group. (ranges in table below)

Note: Variants 01 to 12: metallized pads suitable for Hybrid circuits, glue or wire bonding

Variants 13 to 24: finished with Sn coating suitable for soldering  
Variants 13 - 24 are tested "in accordance with"



Size	Variant	Rated Voltage (kV)	Tolerance (%)	Capacitance Code (E12)
1812	01 / 13	1.0	±10	392 - 223
	02 / 14		±20	
	03 / 15	2.0	±10	152 - 182
	04 / 16		±20	
	05 / 17	3.0	±10	821 - 102
06 / 18	±20			
1825	07 / 19	1.0	±10	273 - 563
	08 / 20		±20	
	09 / 21	2.0	±10	222 - 682
	10 / 22		±20	
	11 / 23	3.0	±10	821 - 392
12 / 24	±20			

### HOW TO ORDER

Parts should be ordered using the ESCC variant number as follows:

**3009034**

**XX**

**XXX**

Detail Spec Number

Type Variant (per table)

Capacitance Code

The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e.  
102 = 1000pF  
103 = 10000pF

Eg 300903401223

For LVT testing, please refer to 3009 LVT Spec

### HIGH VOLTAGE LEADED CAPACITORS

Capacitors, Fixed, Ceramic Dielectric, Type II, High Voltage, 1.0 to 5.0 kV, Based on Case Styles VR, CV and CH for use in ESCC space programs, according to ESCC Generic Specification 3001 and associated Detail Specification 3001/034 as recommended by the Space Components Coordination Group. (ranges in table)

Note 1: Lead Types

- a - Leaded Radial (epoxy coated)
- b - Leaded Radial (Polyurethane Varnish)
- c - Straight Dual in Line
- d - L Dual in Line

Note 2: Tolerances of ±10% and ±20% are available

Case Size	Variant	Lead Type	Capacitance Code (E12)				
			1.0kV	2.0kV	3.0kV	4.0kV	5.0kV
VR30S	01	a	392 - 203	152 - 182	821 - 102		
VR30	02	a	273 - 563	222 - 682	821 - 392		
VR40	03	a	473 - 124	822 - 153	472 - 103	182 - 222	
VR50	04	a	154 - 274	183 - 333	123 - 183	562 - 822	332 - 392
VR66	05	a	224 - 564	393 - 823	223 - 393	103 - 153	682 - 103
VR84	06	a	684 - 105	473 - 154	473 - 683	183 - 393	123 - 183
VR90	07	a	125 - 275	184 - 334	823 - 184	473 - 124	223 - 563
CV41	08	b	473 - 124	822 - 153	472 - 103	182 - 222	
CH41	09	c	473 - 124	822 - 153	472 - 103	182 - 222	
CH41	10	d	473 - 124	822 - 153	472 - 103	182 - 222	
CV51	11	b	154 - 274	183 - 333	123 - 183	562 - 822	332 - 392
CH51	12	c	154 - 274	183 - 333	123 - 183	562 - 822	332 - 392
CH51	13	d	154 - 274	183 - 333	123 - 183	562 - 822	332 - 392
CV61	14	b	224 - 564	393 - 823	223 - 393	103 - 153	682 - 103
CH61	15	c	224 - 564	393 - 823	223 - 393	103 - 153	682 - 103
CH61	16	d	224 - 564	393 - 823	223 - 393	103 - 153	682 - 103
CV76	17	b	684 - 105	473 - 154	473 - 683	183 - 393	123 - 183
CH76	18	c	684 - 105	473 - 154	473 - 683	183 - 393	123 - 183
CH76	19	d	684 - 105	473 - 154	473 - 683	183 - 393	123 - 183
CV91	20	b	125 - 275	184 - 334	823 - 184	473 - 124	223 - 563
CH91	21	c	125 - 275	184 - 334	823 - 184	473 - 124	223 - 563
CH91	22	d	125 - 275	184 - 334	823 - 184	473 - 124	223 - 563

### HOW TO ORDER

Parts should be ordered using the ESCC variant number as follows:

**3001034**

**XX**

**XXX**

**K**

**X**

Detail Spec Number

Type Variant (per table above)

Capacitance Code

Capacitance Tolerance

Voltage

The first two digits represent significant figures and the third digit specifies the number of zeros to follow; i.e.  
102 = 1000pF  
103 = 10000pF

K = 10%  
M = 20%

M = 1kV  
P = 2kV  
R = 3kV  
S = 4kV  
Z = 5kV

Eg 300103412274M

LAT and Serialization testing can still be preformed. Contact plant for further details

For LVT testing, please refer to 3001 LVT spec



# ESCC Qualified SMPS Capacitors



## High Capacitance

### HIGH CAPACITANCE LEADED CAPACITORS

Capacitors, Fixed, Ceramic Dielectric, Type II, High Capacitance, Based on Case Styles BR, CV and CH for use in ESCC space programs, according to ESCC Generic Specification 3001 and associated Detail Specification 3001/030 as recommended by the Space Components Coordination Group. (see ranges in table below)

Note 1: Lead Types

- a - Leaded Radial (epoxy coated)
- b - Leaded Radial (Polyurethane Varnish)
- c - Straight Dual in Line
- d - L Dual in Line

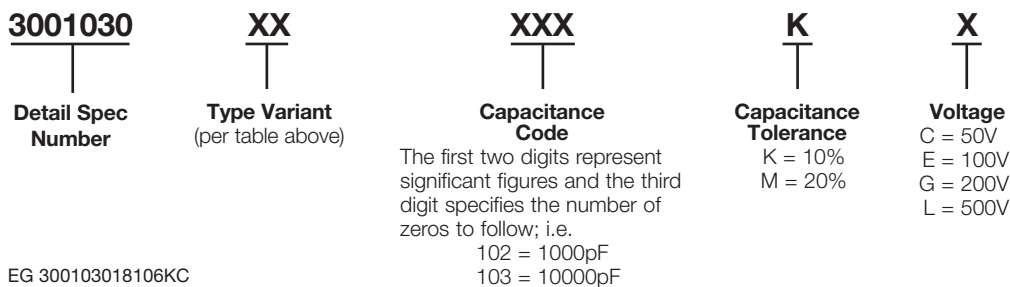
Note 2: Tolerances of ±10% and ±20% are available

Case Size	Variant	Figure	Capacitance Code (E12)			
			50V	100V	200V	500V
BR40	01	a	185 - 335	125 - 395	334 - 564	124 - 224
BR50	02	a	395 - 565	225 - 395	684 - 105	274 - 394
BR66	03	a	685 - 106	475 - 825	105 - 225	474 - 105
BR72	04	a	126 - 186	825 - 156	225 - 335	824 - 155
BR84	05	a	126 - 186	825 - 156	225 - 335	824 - 155
CV41	06	b	185 - 335	125 - 275	334 - 564	124 - 224
CH41	07	c	185 - 335	125 - 275	334 - 564	124 - 224
CH41	08	d	185 - 335	125 - 275	334 - 564	124 - 224
CH42	09	c	395 - 685	335 - 565	684 - 125	274 - 474
CH42	10	d	395 - 685	335 - 565	684 - 125	274 - 474
CH43	11	c	825 - 106	685 - 825	155 - 185	564 - 684
CH43	12	d	825 - 106	685 - 825	155 - 185	564 - 684
CH44	13	c	126	106	225	824 - 105
CH44	14	d	126	106	225	824 - 105
CV51	15	b	395 - 565	225 - 395	684 - 105	274 - 394
CH51	16	c	395 - 565	225 - 395	684 - 105	274 - 394
CH51	17	d	395 - 565	225 - 395	684 - 105	274 - 394
CH52	18	c	685 - 106	475 - 825	125 - 225	474 - 824
CH52	19	d	685 - 106	475 - 825	125 - 225	474 - 824
CH53	20	c	126 - 156	106 - 126	275 - 335	105 - 125
CH53	21	d	126 - 156	106 - 126	275 - 335	105 - 125
CH54	22	c	186 - 226	156	395	155
CH54	23	d	186 - 226	156	395	155
CV61	24	b	685 - 106	475 - 825	105 - 225	474 - 105
CH61	25	c	685 - 106	475 - 825	105 - 225	474 - 105
CH61	26	d	685 - 106	475 - 825	105 - 225	474 - 105
CH62	27	c	126 - 226	106 - 156	275 - 475	105 - 185
CH62	28	d	126 - 226	106 - 156	275 - 475	105 - 185
CH63	29	c	276 - 336	186 - 226	565 - 685	225 - 275
CH63	30	d	276 - 336	186 - 226	565 - 685	225 - 275
CH64	31	c	396	276 - 336	825 - 106	335
CH64	32	d	396	276 - 336	825 - 106	335
CV71	33	b	126 - 186	825 - 156	225 - 335	824 - 155
CH71	34	c	126 - 186	825 - 156	225 - 335	824 - 155
CH71	35	d	126 - 186	825 - 156	225 - 335	824 - 155
CH72	36	c	226 - 396	186 - 276	395 - 685	185 - 335
CH72	37	d	226 - 396	186 - 276	395 - 685	185 - 335

Case Size	Variant	Figure	Capacitance Code (E12)			
			50V	100V	200V	500V
CH73	38	c	476 - 566	336 - 396	825 - 106	395 - 475
CH73	39	d	476 - 566	336 - 396	825 - 106	395 - 475
CH74	40	c	686	476	126	565
CH74	41	d	686	476	126	565
CV76	42	b	126 - 186	825 - 156	225 - 335	824 - 155
CH76	43	c	126 - 186	825 - 156	225 - 335	824 - 155
CH76	44	d	126 - 186	825 - 156	225 - 335	824 - 155
CH77	45	c	226 - 396	186 - 276	395 - 685	185 - 335
CH77	46	d	226 - 396	186 - 276	395 - 685	185 - 335
CH78	47	c	476 - 566	336 - 396	825 - 106	395 - 475
CH78	48	d	476 - 566	336 - 396	825 - 106	395 - 475
CH79	49	c	686	476	126	565
CH79	50	d	686	476	126	565
CH81	51	c	156 - 226	126 - 186	225 - 395	824 - 155
CH81	52	d	156 - 226	126 - 186	225 - 395	824 - 155
CH82	53	c	276 - 476	226 - 396	475 - 825	
CH82	54	d	276 - 476	226 - 396	475 - 825	
CH83	55	c	566 - 686	476 - 566	106 - 126	
CH83	56	d	566 - 686	476 - 566	106 - 126	
CH84	57	c	826	686	156	
CH84	58	d	826	686	156	
CH86	59	c	226 - 336	156 - 276	395 - 685	155 - 225
CH86	60	d	226 - 336	156 - 276	395 - 685	155 - 225
CH87	61	c	396 - 686	336 - 566	825 - 156	
CH87	62	d	396 - 686	336 - 566	825 - 156	
CH88	63	c	826 - 107	686 - 826	186 - 226	
CH88	64	d	826 - 107	686 - 826	186 - 226	
CH89	65	c	127	107	276	
CH89	66	d	127	107	276	
CH91	67	c	396 - 476	336 - 396	825 - 106	
CH91	68	d	396 - 476	336 - 396	825 - 106	
CH92	69	c	566 - 107	476 - 826	126 - 226	
CH92	70	d	566 - 107	476 - 826	126 - 226	
CH93	71	c	127 - 157	107 - 127	276 - 336	
CH93	72	d	127 - 157	107 - 127	276 - 336	
CH94	73	c	187	157	396	
CH94	74	d	187	157	396	

### HOW TO ORDER

Parts should be ordered using the ESCC variant number as follows:



EG 300103018106KC

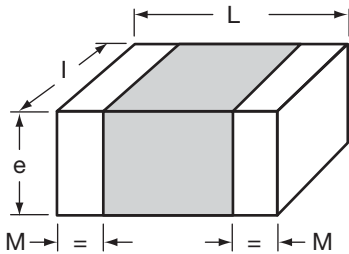
LAT and Serialization testing can still be preformed.  
Contact plant for further details



## LVT 3001 TEST DETAIL

L V T Group	LVT 3001 Test Detail	Min No. Pcs Tested
1A	Rapid Change of Temperature, Steady state humidity testing, external visual inspection	20
1B	Rapid Change of Temperature, Vibration, Shock, External visual inspection	3
2A	Extended Life testing, 1000 hrs	10
2B	Capacitance Temperature Change	3
3	Solderability, resistance Soldering, Permance of marking	3

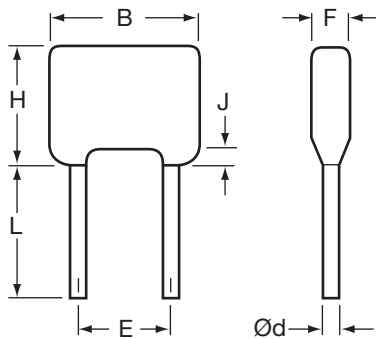
## ESCC DETAIL SPECIFICATION NO. 3009/034 PHYSICAL DIMENSIONS



Millimeters (Inches)

Symbol	Variants 01 to 06		Variants 07 to 12	
	Min.	Max.	Min.	Max.
L	4.20 (0.165)	5.00 (0.197)	4.20 (0.165)	5.00 (0.197)
l	2.80 (0.110)	3.60 (0.142)	5.67 (0.223)	6.67 (0.263)
e	-	3.00 (0.118)	-	3.30 (0.130)
M	0.25 (0.010)	0.75 (0.030)	0.25 (0.010)	0.75 (0.030)

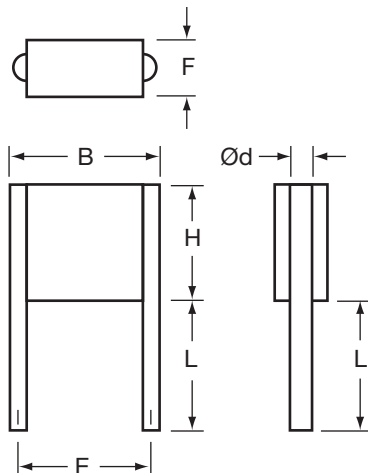
## ESCC DETAIL SPECIFICATION NO. 3001/034 PHYSICAL DIMENSIONS – VR STYLE



Millimeters (Inches)

Variant	Case Size	B	Ød		E		F	H	J	L
		Max.	Min.	Max.	Min.	Max.	Max.	Max.	Max.	Min.
01	VR30S	7.62 (0.300)	0.46 (0.018)	0.56 (0.022)	4.58 (0.180)	5.58 (0.220)	5.00 (0.197)	4.60 (0.181)	1.50 (0.059)	31.7 (1.248)
02	VR30	7.62 (0.300)	0.46 (0.018)	0.56 (0.022)	4.58 (0.180)	5.58 (0.220)	5.00 (0.197)	9.62 (0.379)	1.50 (0.059)	31.7 (1.248)
03	VR40	10.16 (0.400)	0.46 (0.018)	0.56 (0.022)	4.58 (0.180)	5.58 (0.220)	5.00 (0.197)	11.7 (0.461)	1.50 (0.059)	31.7 (1.248)
04	VR50	12.7 (0.500)	0.59 (0.023)	0.69 (0.027)	9.66 (0.380)	10.66 (0.420)	5.10 (0.201)	14.2 (0.559)	1.50 (0.059)	31.7 (1.248)
05	VR66	17.5 (0.689)	0.86 (0.034)	0.96 (0.038)	14.2 (0.559)	15.2 (0.598)	6.40 (0.252)	16.5 (0.650)	1.50 (0.059)	31.7 (1.248)
06	VR84	23.62 (0.930)	0.86 (0.034)	0.96 (0.038)	20.4 (0.803)	22.0 (0.866)	6.40 (0.252)	19.78 (0.779)	1.50 (0.059)	31.7 (1.248)
07	VR90	23.5 (0.925)	0.86 (0.034)	0.96 (0.038)	20.4 (0.803)	22.0 (0.866)	6.40 (0.252)	42.0 (1.654)	1.50 (0.059)	31.7 (1.248)

## ESCC DETAIL SPECIFICATION NO. 3001/034 PHYSICAL DIMENSIONS – CV STYLE



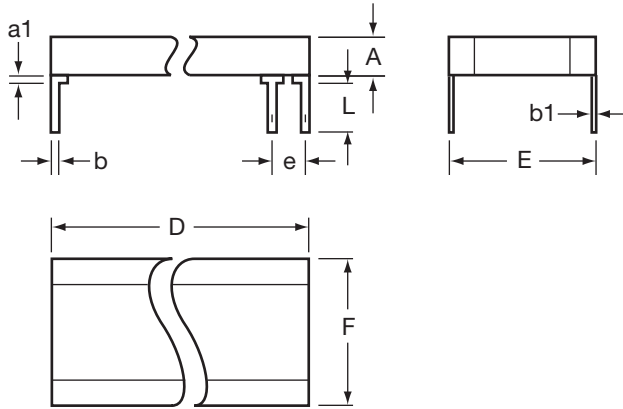
Millimeters (Inches)

Variant	Case Size	B	Ød		E		F	H	L	
		Max.	Min.	Max.	Min.	Max.	Max.	Max.	Min.	Max.
08	CV41	10.6 (0.417)	0.65 (0.026)	0.75 (0.030)	7.70 (0.303)	8.70 (0.343)	3.80 (0.150)	8.70 (0.343)	22.0 (0.866)	28.0 (1.102)
11	CV51	11.9 (0.469)	0.85 (0.033)	0.95 (0.037)	9.66 (0.380)	10.66 (0.420)	3.80 (0.150)	10.7 (0.421)	22.0 (0.866)	28.0 (1.102)
14	CV61	16.5 (0.650)	0.85 (0.033)	0.95 (0.037)	14.74 (0.580)	15.74 (0.620)	3.80 (0.150)	13.6 (0.535)	22.0 (0.866)	28.0 (1.102)
17	CV76	22.7 (0.894)	0.85 (0.033)	0.95 (0.037)	20.4 (0.803)	22.0 (0.866)	3.80 (0.150)	16.6 (0.654)	22.0 (0.866)	28.0 (1.102)
20	CV91	22.7 (0.894)	1.15 (0.045)	1.25 (0.049)	20.4 (0.803)	22.0 (0.866)	3.80 (0.150)	40.6 (1.598)	22.0 (0.866)	28.0 (1.102)



## ESCC DETAIL SPECIFICATION NO. 3001/034 PHYSICAL DIMENSIONS – CH STYLE, D.I.L.

Millimeters (Inches)



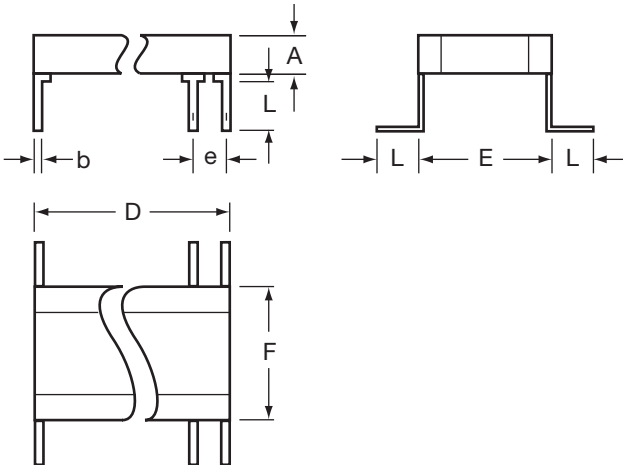
Symbol	Min.	Max.	Notes
a1	-	2.00 (0.079)	1
b	0.45 (0.018)	0.55 (0.022)	1
b1	0.204 (0.008)	0.304 (0.012)	1
e	2.49 (0.098)	2.59 (0.102)	2
L	12.0 (0.472)	14.0 (0.551)	1

Notes: 1 – All leads  
2 – Each space

Variant	Case Size	A	D	E		F
		Max.	Max.	Min.	Max.	Max.
07	CH41	3.80 (0.150)	8.70 (0.343)	7.70 (0.303)	8.70 (0.343)	9.20 (0.362)
09	CH42	7.40 (0.291)	8.70 (0.343)	7.70 (0.303)	8.70 (0.343)	9.20 (0.362)
11	CH43	11.1 (0.437)	8.70 (0.343)	7.70 (0.303)	8.70 (0.343)	9.20 (0.362)
13	CH44	14.8 (0.583)	8.70 (0.343)	7.70 (0.303)	8.70 (0.343)	9.20 (0.362)
16	CH51	3.80 (0.150)	10.7 (0.421)	9.66 (0.380)	10.66 (0.420)	10.7 (0.421)
18	CH52	7.40 (0.291)	10.7 (0.421)	9.66 (0.380)	10.66 (0.420)	10.7 (0.421)
20	CH53	11.1 (0.437)	10.7 (0.421)	9.66 (0.380)	10.66 (0.420)	10.7 (0.421)
22	CH54	14.8 (0.583)	10.7 (0.421)	9.66 (0.380)	10.66 (0.420)	10.7 (0.421)
25	CH61	3.80 (0.150)	13.6 (0.535)	13.5 (0.531)	14.5 (0.571)	14.9 (0.587)
27	CH62	7.40 (0.291)	13.6 (0.535)	13.5 (0.531)	14.5 (0.571)	14.9 (0.587)
29	CH63	11.1 (0.437)	13.6 (0.535)	13.5 (0.531)	14.5 (0.571)	14.9 (0.587)
31	CH64	14.8 (0.583)	13.6 (0.535)	13.5 (0.531)	14.5 (0.571)	14.9 (0.587)
34	CH71	3.80 (0.150)	21.6 (0.850)	14.74 (0.580)	15.74 (0.620)	16.8 (0.661)
36	CH72	7.40 (0.291)	21.6 (0.850)	14.74 (0.580)	15.74 (0.620)	16.8 (0.661)
38	CH73	11.1 (0.437)	21.6 (0.850)	14.74 (0.580)	15.74 (0.620)	16.8 (0.661)
40	CH74	14.8 (0.583)	21.6 (0.850)	14.74 (0.580)	15.74 (0.620)	16.8 (0.661)
43	CH76	3.80 (0.150)	16.6 (0.654)	19.52 (0.769)	21.12 (0.831)	21.6 (0.850)
45	CH77	7.40 (0.291)	16.6 (0.654)	19.52 (0.769)	21.12 (0.831)	21.6 (0.850)
47	CH78	11.1 (0.437)	16.6 (0.654)	19.52 (0.769)	21.12 (0.831)	21.6 (0.850)
49	CH79	14.8 (0.583)	16.6 (0.654)	19.52 (0.769)	21.12 (0.831)	21.6 (0.850)
51	CH81	3.80 (0.150)	38.2 (1.504)	9.66 (0.380)	10.66 (0.420)	12.0 (0.472)
53	CH82	7.40 (0.291)	38.2 (1.504)	9.66 (0.380)	10.66 (0.420)	12.0 (0.472)
55	CH83	11.1 (0.437)	38.2 (1.504)	9.66 (0.380)	10.66 (0.420)	12.0 (0.472)
57	CH84	14.8 (0.583)	38.2 (1.504)	9.66 (0.380)	10.66 (0.420)	12.0 (0.472)
59	CH86	3.80 (0.150)	38.2 (1.504)	14.74 (0.580)	15.74 (0.620)	18.9 (0.744)
61	CH87	7.40 (0.291)	38.2 (1.504)	14.74 (0.580)	15.74 (0.620)	18.9 (0.744)
63	CH88	11.1 (0.437)	38.2 (1.504)	14.74 (0.580)	15.74 (0.620)	18.9 (0.744)
65	CH89	14.8 (0.583)	38.2 (1.504)	14.74 (0.580)	15.74 (0.620)	18.9 (0.744)
67	CH91	3.80 (0.150)	40.6 (1.598)	19.52 (0.769)	21.12 (0.831)	24.0 (0.945)
69	CH92	7.40 (0.291)	40.6 (1.598)	19.52 (0.769)	21.12 (0.831)	24.0 (0.945)
71	CH93	11.1 (0.437)	40.6 (1.598)	19.52 (0.769)	21.12 (0.831)	24.0 (0.945)
73	CH94	14.8 (0.583)	40.6 (1.598)	19.52 (0.769)	21.12 (0.831)	24.0 (0.945)

## ESCC DETAIL SPECIFICATION NO. 3001/034 PHYSICAL DIMENSIONS – CH STYLE, L

Millimeters (Inches)



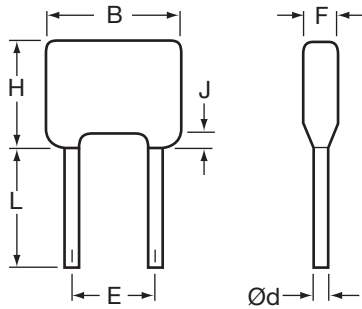
Variant	Case Size	A	D	E		F
		Max.	Max.	Min.	Max.	Max.
10	CH41	3.80 (0.150)	8.70 (0.343)	7.70 (0.303)	8.70 (0.343)	9.20 (0.362)
13	CH51	3.80 (0.150)	10.7 (0.421)	9.66 (0.380)	10.66 (0.420)	10.7 (0.421)
16	CH61	3.80 (0.150)	13.6 (0.535)	13.5 (0.531)	14.5 (0.571)	14.9 (0.587)
19	CH76	3.80 (0.150)	16.6 (0.654)	19.52 (0.769)	21.12 (0.831)	21.6 (0.850)
22	CH91	3.80 (0.150)	40.6 (1.598)	19.52 (0.769)	21.12 (0.831)	24.0 (0.945)

Symbol	Min.	Max.	Notes
b	0.45 (0.018)	0.55 (0.022)	1
e	2.49 (0.098)	2.59 (0.102)	2
L	2.04 (0.080)	3.01 (0.120)	1

Notes: 1 – All leads  
2 – Each space

## ESCC DETAIL SPECIFICATION NO. 3001/030 PHYSICAL DIMENSIONS – BR STYLE

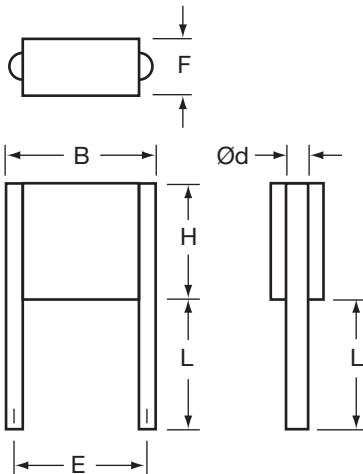
Millimeters (Inches)



Variant	Case Size	B		Ød		E		F	H	J	L
		Max.	Min.	Max.	Min.	Max.	Max.	Max.	Max.	Min.	
01	BR40	10.16 (0.400)	0.46 (0.018)	0.56 (0.022)	4.58 (0.180)	5.58 (0.220)	5.00 (0.197)	11.7 (0.461)	1.50 (0.059)	31.7 (1.248)	
02	BR50	12.7 (0.500)	0.59 (0.023)	0.69 (0.027)	9.66 (0.380)	10.66 (0.420)	5.10 (0.201)	14.2 (0.559)	1.50 (0.059)	31.7 (1.248)	
03	BR66	17.5 (0.689)	0.86 (0.034)	0.96 (0.038)	14.2 (0.559)	15.2 (0.598)	6.40 (0.252)	16.5 (0.650)	1.50 (0.059)	31.7 (1.248)	
04	BR72	19.3 (0.760)	0.86 (0.034)	0.96 (0.038)	14.74 (0.580)	15.74 (0.620)	6.40 (0.252)	24.0 (0.945)	1.50 (0.059)	31.7 (1.248)	
05	BR84	23.62 (0.930)	0.71 (0.028)	0.81 (0.032)	18.93 (0.745)	20.83 (0.820)	6.40 (0.252)	19.78 (0.779)	1.50 (0.059)	31.7 (1.248)	

## ESCC DETAIL SPECIFICATION NO. 3001/030 PHYSICAL DIMENSIONS – CV STYLE

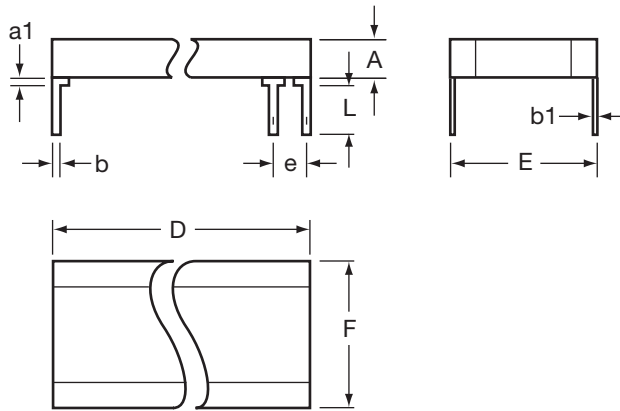
Millimeters (Inches)



Variant	Case Size	B		Ød		E		F	H	L	
		Max.	Min.	Max.	Min.	Max.	Max.	Max.	Min.	Max.	
06	CV41	10.6 (0.417)	0.65 (0.026)	0.75 (0.030)	7.70 (0.303)	8.70 (0.343)	3.80 (0.150)	8.70 (0.343)	22.0 (0.866)	28.0 (1.102)	
15	CV51	11.9 (0.469)	0.85 (0.033)	0.95 (0.037)	9.66 (0.380)	10.66 (0.420)	3.80 (0.150)	10.7 (0.421)	22.0 (0.866)	28.0 (1.102)	
24	CV61	16.5 (0.650)	0.85 (0.033)	0.95 (0.037)	14.74 (0.580)	15.74 (0.620)	3.80 (0.150)	13.6 (0.535)	22.0 (0.866)	28.0 (1.102)	
33	CV71	17.8 (0.701)	0.85 (0.033)	0.95 (0.037)	14.74 (0.580)	15.74 (0.620)	3.80 (0.150)	21.6 (0.850)	22.0 (0.866)	28.0 (1.102)	
42	CV76	22.7 (0.894)	0.85 (0.033)	0.95 (0.037)	20.4 (0.803)	22.0 (0.866)	3.80 (0.150)	16.6 (0.654)	22.0 (0.866)	28.0 (1.102)	

## ESCC DETAIL SPECIFICATION NO. 3001/030 PHYSICAL DIMENSIONS – CH STYLE, D.I.L.

Millimeters (Inches)



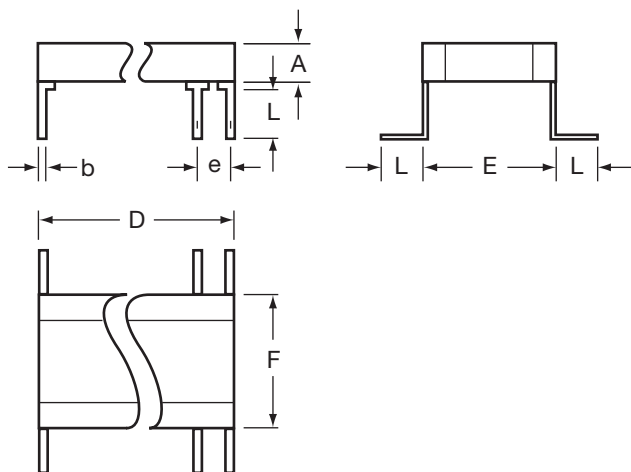
Symbol	Min.	Max.	Notes
a1	-	2.00 (0.079)	1
b	0.45 (0.018)	0.55 (0.022)	1
b1	0.204 (0.008)	0.304 (0.012)	1
e	2.49 (0.098)	2.59 (0.102)	2
L	2.04 (0.080)	3.04 (0.120)	1

Notes: 1 – All leads  
2 – Each space

Variant	Case Size	A	D	E		F
		Max.	Max.	Min.	Max.	Max.
07	CH41	3.80 (0.150)	8.70 (0.343)	7.70 (0.303)	8.70 (0.343)	9.20 (0.362)
09	CH42	7.40 (0.291)	8.70 (0.343)	7.70 (0.303)	8.70 (0.343)	9.20 (0.362)
11	CH43	11.1 (0.437)	8.70 (0.343)	7.70 (0.303)	8.70 (0.343)	9.20 (0.362)
13	CH44	14.8 (0.583)	8.70 (0.343)	7.70 (0.303)	8.70 (0.343)	9.20 (0.362)
16	CH51	3.80 (0.150)	10.7 (0.421)	9.66 (0.380)	10.66 (0.420)	10.7 (0.421)
18	CH52	7.40 (0.291)	10.7 (0.421)	9.66 (0.380)	10.66 (0.420)	10.7 (0.421)
20	CH53	11.1 (0.437)	10.7 (0.421)	9.66 (0.380)	10.66 (0.420)	10.7 (0.421)
22	CH54	14.8 (0.583)	10.7 (0.421)	9.66 (0.380)	10.66 (0.420)	10.7 (0.421)
25	CH61	3.80 (0.150)	13.6 (0.535)	13.5 (0.531)	14.5 (0.571)	14.9 (0.587)
27	CH62	7.40 (0.291)	13.6 (0.535)	13.5 (0.531)	14.5 (0.571)	14.9 (0.587)
29	CH63	11.1 (0.437)	13.6 (0.535)	13.5 (0.531)	14.5 (0.571)	14.9 (0.587)
31	CH64	14.8 (0.583)	13.6 (0.535)	13.5 (0.531)	14.5 (0.571)	14.9 (0.587)
34	CH71	3.80 (0.150)	21.6 (0.850)	14.74 (0.580)	15.74 (0.620)	16.8 (0.661)
36	CH72	7.40 (0.291)	21.6 (0.850)	14.74 (0.580)	15.74 (0.620)	16.8 (0.661)
38	CH73	11.1 (0.437)	21.6 (0.850)	14.74 (0.580)	15.74 (0.620)	16.8 (0.661)
40	CH74	14.8 (0.583)	21.6 (0.850)	14.74 (0.580)	15.74 (0.620)	16.8 (0.661)
43	CH76	3.80 (0.150)	16.6 (0.654)	19.52 (0.769)	21.12 (0.831)	21.6 (0.850)
45	CH77	7.40 (0.291)	16.6 (0.654)	19.52 (0.769)	21.12 (0.831)	21.6 (0.850)
47	CH78	11.1 (0.437)	16.6 (0.654)	19.52 (0.769)	21.12 (0.831)	21.6 (0.850)
49	CH79	14.8 (0.583)	16.6 (0.654)	19.52 (0.769)	21.12 (0.831)	21.6 (0.850)
51	CH81	3.80 (0.150)	38.2 (1.504)	9.66 (0.380)	10.66 (0.420)	12.0 (0.472)
53	CH82	7.40 (0.291)	38.2 (1.504)	9.66 (0.380)	10.66 (0.420)	12.0 (0.472)
55	CH83	11.1 (0.437)	38.2 (1.504)	9.66 (0.380)	10.66 (0.420)	12.0 (0.472)
57	CH84	14.8 (0.583)	38.2 (1.504)	9.66 (0.380)	10.66 (0.420)	12.0 (0.472)
59	CH86	3.80 (0.150)	38.2 (1.504)	14.74 (0.580)	15.74 (0.620)	18.9 (0.744)
61	CH87	7.40 (0.291)	38.2 (1.504)	14.74 (0.580)	15.74 (0.620)	18.9 (0.744)
63	CH88	11.1 (0.437)	38.2 (1.504)	14.74 (0.580)	15.74 (0.620)	18.9 (0.744)
65	CH89	14.8 (0.583)	38.2 (1.504)	14.74 (0.580)	15.74 (0.620)	18.9 (0.744)
67	CH91	3.80 (0.150)	40.6 (1.598)	19.52 (0.769)	21.12 (0.831)	24.0 (0.945)
69	CH92	7.40 (0.291)	40.6 (1.598)	19.52 (0.769)	21.12 (0.831)	24.0 (0.945)
71	CH93	11.1 (0.437)	40.6 (1.598)	19.52 (0.769)	21.12 (0.831)	24.0 (0.945)
73	CH94	14.8 (0.583)	40.6 (1.598)	19.52 (0.769)	21.12 (0.831)	24.0 (0.945)

## ESCC DETAIL SPECIFICATION NO. 3001/030 PHYSICAL DIMENSIONS – CH STYLE, L

Millimeters (Inches)



Symbol	Min.	Max.	Notes
b	0.45 (0.018)	0.55 (0.022)	1
e	2.49 (0.098)	2.59 (0.102)	2
L	2.04 (0.080)	3.04 (0.120)	1


Notes: 1 – All leads  
2 – Each space

Variant	Case Size	A	D	E		F
		Max.	Max.	Min.	Max.	Max.
08	CH41	3.80 (0.150)	8.70 (0.343)	7.70 (0.303)	8.70 (0.343)	9.20 (0.362)
10	CH42	7.40 (0.291)	8.70 (0.343)	7.70 (0.303)	8.70 (0.343)	9.20 (0.362)
12	CH43	11.1 (0.437)	8.70 (0.343)	7.70 (0.303)	8.70 (0.343)	9.20 (0.362)
14	CH44	14.8 (0.583)	8.70 (0.343)	7.70 (0.303)	8.70 (0.343)	9.20 (0.362)
17	CH51	3.80 (0.150)	10.7 (0.421)	9.66 (0.380)	10.66 (0.420)	10.7 (0.421)
19	CH52	7.40 (0.291)	10.7 (0.421)	9.66 (0.380)	10.66 (0.420)	10.7 (0.421)
21	CH53	11.1 (0.437)	10.7 (0.421)	9.66 (0.380)	10.66 (0.420)	10.7 (0.421)
23	CH54	14.8 (0.583)	10.7 (0.421)	9.66 (0.380)	10.66 (0.420)	10.7 (0.421)
26	CH61	3.80 (0.150)	13.6 (0.535)	13.5 (0.531)	14.5 (0.571)	14.9 (0.587)
28	CH62	7.40 (0.291)	13.6 (0.535)	13.5 (0.531)	14.5 (0.571)	14.9 (0.587)
30	CH63	11.1 (0.437)	13.6 (0.535)	13.5 (0.531)	14.5 (0.571)	14.9 (0.587)
32	CH64	14.8 (0.583)	13.6 (0.535)	13.5 (0.531)	14.5 (0.571)	14.9 (0.587)
35	CH71	3.80 (0.150)	21.6 (0.850)	14.74 (0.580)	15.74 (0.620)	16.8 (0.661)
37	CH72	7.40 (0.291)	21.6 (0.850)	14.74 (0.580)	15.74 (0.620)	16.8 (0.661)
39	CH73	11.1 (0.437)	21.6 (0.850)	14.74 (0.580)	15.74 (0.620)	16.8 (0.661)
41	CH74	14.8 (0.583)	21.6 (0.850)	14.74 (0.580)	15.74 (0.620)	16.8 (0.661)
44	CH76	3.80 (0.150)	16.6 (0.654)	19.52 (0.769)	21.12 (0.831)	21.6 (0.850)
46	CH77	7.40 (0.291)	16.6 (0.654)	19.52 (0.769)	21.12 (0.831)	21.6 (0.850)
48	CH78	11.1 (0.437)	16.6 (0.654)	19.52 (0.769)	21.12 (0.831)	21.6 (0.850)
50	CH79	14.8 (0.583)	16.6 (0.654)	19.52 (0.769)	21.12 (0.831)	21.6 (0.850)
52	CH81	3.80 (0.150)	38.2 (1.504)	9.66 (0.380)	10.66 (0.420)	12.0 (0.472)
54	CH82	7.40 (0.291)	38.2 (1.504)	9.66 (0.380)	10.66 (0.420)	12.0 (0.472)
56	CH83	11.1 (0.437)	38.2 (1.504)	9.66 (0.380)	10.66 (0.420)	12.0 (0.472)
58	CH84	14.8 (0.583)	38.2 (1.504)	9.66 (0.380)	10.66 (0.420)	12.0 (0.472)
60	CH86	3.80 (0.150)	38.2 (1.504)	14.74 (0.580)	15.74 (0.620)	18.9 (0.744)
62	CH87	7.40 (0.291)	38.2 (1.504)	14.74 (0.580)	15.74 (0.620)	18.9 (0.744)
64	CH88	11.1 (0.437)	38.2 (1.504)	14.74 (0.580)	15.74 (0.620)	18.9 (0.744)
66	CH89	14.8 (0.583)	38.2 (1.504)	14.74 (0.580)	15.74 (0.620)	18.9 (0.744)
68	CH91	3.80 (0.150)	40.6 (1.598)	19.52 (0.769)	21.12 (0.831)	24.0 (0.945)
70	CH92	7.40 (0.291)	40.6 (1.598)	19.52 (0.769)	21.12 (0.831)	24.0 (0.945)
72	CH93	11.1 (0.437)	40.6 (1.598)	19.52 (0.769)	21.12 (0.831)	24.0 (0.945)
74	CH94	14.8 (0.583)	40.6 (1.598)	19.52 (0.769)	21.12 (0.831)	24.0 (0.945)

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products




## QPL CERTIFICATES

Types covered by similarity: Capacitance tolerances 5%, 10%, 20%		Remarks:		
Procurement Specifications	Manufacturer	Nature of Approval	Supervising Authority	Initial Qualification Date
Generic ESCC 3009  Detail ESCC 3009/041	AVX Limited Coleraine Northern Ireland	Qualification	ESA	April 2015
<p>Characteristics: E12 value series</p> <p>Qualified Range: Variant 01 0402, Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated Variant 02 0603, Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated Variant 03 0805, Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated Variant 04 1206, Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated Variant 05 1210, Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated Variant 06 1812, Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated Variant 07 2220, Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated</p> <p>Terminations: Cu and Ag-loaded epoxy + Ni barrier + Sn/Pb plating finish (10% Pb minimum) Operating Temperature Range (°C): -55 to +125</p>				
	<p>CAPACITORS, FIXED, CHIP, BASE METAL ELECTRODE, CERAMIC DIELECTRIC TYPE II, BASED ON TYPE TTP, 0402, 0603, 0805, 1206, 1210, 1812, 2220</p>	Certificate 331A		Page 21 Issue 182

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products




## QPL CERTIFICATES

Types covered by similarity:  Tolerance ( $\pm$ ): 0.5pF, 2, 5, 20%		Remarks: Variant 01 removed																																																			
Procurement Specifications		Manufacturer	Nature of Approval	Supervising Authority	Initial Qualification Date																																																
Generic ESCC 3009  Detail ESCC 3009/003 3009/004 3009/005 3009/006 3009/022		AVX/TPC St. Apollinaire France	Qualification	CNES	Feb 1983																																																
Characteristics: Operating Temp Range ( $^{\circ}$ C), -55 to +125 Variants 03 and 06 are qualified Values covered by ESCC Specification defined below.																																																					
<table border="1"> <thead> <tr> <th>Style</th> <th>Model</th> <th>Detail Spec</th> <th>Variants</th> <th>Capacitance Range (pF)</th> <th>Rated Volt. (V)</th> <th>Tolerance (<math>\pm</math>%)</th> <th>TC (ppm/<math>^{\circ}</math>C)</th> </tr> </thead> <tbody> <tr> <td>0805</td> <td>A_12C</td> <td>3009/003</td> <td>03, 06</td> <td>4.7 to 9.1 10 to 1500</td> <td>50, 100 50, 100</td> <td>0.5pF 1, 2, 5, 10</td> <td><math>\pm</math>30</td> </tr> <tr> <td>1206</td> <td>A_20C</td> <td>3009/022</td> <td>03, 06</td> <td>10 to 3900</td> <td>50, 100</td> <td>1, 2, 5, 10</td> <td><math>\pm</math>30</td> </tr> <tr> <td>1210</td> <td>A_13C</td> <td>3009/004</td> <td>03, 06</td> <td>22 to 6800 8200 to 10000</td> <td>50, 100 50</td> <td>1, 2, 5, 10</td> <td><math>\pm</math>30</td> </tr> <tr> <td>1812</td> <td>A_14C</td> <td>3009/005</td> <td>03, 06</td> <td>100 to 15000</td> <td>50, 100</td> <td>1, 2, 5, 10</td> <td><math>\pm</math>30</td> </tr> <tr> <td>2220</td> <td>A_15C</td> <td>3009/006</td> <td>03, 06</td> <td>470 to 33000</td> <td>50, 100</td> <td>1, 2, 5, 10</td> <td><math>\pm</math>30</td> </tr> </tbody> </table>						Style	Model	Detail Spec	Variants	Capacitance Range (pF)	Rated Volt. (V)	Tolerance ( $\pm$ %)	TC (ppm/ $^{\circ}$ C)	0805	A_12C	3009/003	03, 06	4.7 to 9.1 10 to 1500	50, 100 50, 100	0.5pF 1, 2, 5, 10	$\pm$ 30	1206	A_20C	3009/022	03, 06	10 to 3900	50, 100	1, 2, 5, 10	$\pm$ 30	1210	A_13C	3009/004	03, 06	22 to 6800 8200 to 10000	50, 100 50	1, 2, 5, 10	$\pm$ 30	1812	A_14C	3009/005	03, 06	100 to 15000	50, 100	1, 2, 5, 10	$\pm$ 30	2220	A_15C	3009/006	03, 06	470 to 33000	50, 100	1, 2, 5, 10	$\pm$ 30
Style	Model	Detail Spec	Variants	Capacitance Range (pF)	Rated Volt. (V)	Tolerance ( $\pm$ %)	TC (ppm/ $^{\circ}$ C)																																														
0805	A_12C	3009/003	03, 06	4.7 to 9.1 10 to 1500	50, 100 50, 100	0.5pF 1, 2, 5, 10	$\pm$ 30																																														
1206	A_20C	3009/022	03, 06	10 to 3900	50, 100	1, 2, 5, 10	$\pm$ 30																																														
1210	A_13C	3009/004	03, 06	22 to 6800 8200 to 10000	50, 100 50	1, 2, 5, 10	$\pm$ 30																																														
1812	A_14C	3009/005	03, 06	100 to 15000	50, 100	1, 2, 5, 10	$\pm$ 30																																														
2220	A_15C	3009/006	03, 06	470 to 33000	50, 100	1, 2, 5, 10	$\pm$ 30																																														
		CAPACITORS, CERAMIC, FIXED, CHIP, TYPE I		Certificate  109 L		Page  01-02 001-1																																															

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products




## QPL CERTIFICATES

Types covered by similarity:  Tolerance ( $\pm\%$ ): 10, 20%				Remarks: Variant 01 deleted				
Procurement Specifications			Manufacturer		Nature of Approval	Supervising Authority	Initial Qualification Date	
Generic ESCC 3009  Detail ESCC 3009/008 3009/009 3009/010 3009/011 3009/023			AVX/TPC St. Apollinaire France		Qualification	CNES	Feb 1983	
Characteristics: See Table below. Operating Temp Range ( $^{\circ}\text{C}$ ), -55 to +125								
Style	Model	Detail Spec	Variants	Capacitance Range (pF)	Rated Volt. (V)	Tolerance ( $\pm\%$ )		
0805	A_12G	3009/008	03, 06	820 to 47000	25	5, 10, 20		
				820 to 27000	50	5, 10, 20		
				820 to 10000	100	5, 10, 20		
0805	A612Z	3009/008	07	2700 to 100000	25	5, 10, 20		
				2700 to 100000	50			
				2700 to 47000	100			
1210	A_13G	3009/009	03, 06	3900 to 220000	25	5, 10, 20		
				3900 to 150000	50	5, 10, 20		
				3900 to 47000	100	5, 10, 20		
1210	A613Z	3009/009	07	3900 to 470000	25	5, 10, 20		
				3900 to 330000	50			
				3900 to 220000	100			
1812	A_14G	3009/010	03, 06	6800 to 470000	25	5, 10, 20		
				6800 to 270000	50	5, 10, 20		
				6800 to 82000	100	5, 10, 20		
1812	A614Z	3009/010	07	22000 to 1000000	25	5, 10, 20		
				22000 to 680000	50			
				22000 to 470000	100			
2220	A_15G	3009/011	03, 06	18000 to 1000000	25	5, 10, 20		
				18000 to 680000	50	5, 10, 20		
				18000 to 180000	100	5, 10, 20		
2220	A615Z	3009/011	07	100000 to 2200000	25	5, 10, 20		
				100000 to 1500000	50			
				100000 to 1000000	100			
1206	A_20G	3009/023	03, 06	2200 to 100000	25	5, 10, 20		
				2200 to 68000	50	5, 10, 20		
				2200 to 22000	100	5, 10, 20		
1206	A620Z	3009/023	07	3300 to 220000	25	5, 10, 20		
				3300 to 150000	50			
				3300 to 100000	100			
				470 to 47000	200			
		CAPACITORS, CERAMIC, FIXED, CHIP, TYPE II				Certificate  110 M rev1		Page  01-02 002-1A

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products




## QPL CERTIFICATES

Types covered by similarity:  ±20% Tolerance		Remarks: Capacitors no longer use a varnish finish.		
Procurement Specifications	Manufacturer	Nature of Approval	Supervising Authority	Initial Qualification Date
Generic ESCC 3001  Detail ESCC 3001/030	AVX Limited Coleraine Northern Ireland	Qualification	DRA	Jul 1996
<p>Characteristics: E12 series</p> <p>Qualified Range:</p> <p>Variants 01 to 74 capacitance range for 50V, 100V and 200V, as per Detail Specification Variants 01 to 52, and 59 to 60, for 500V are qualified ±10% tolerance</p> <p>Operating Temperature Range (°C): -55 to +125</p>				
	<p>CAPACITORS, CERAMIC, TYPE II, HIGH CAPACITANCE, BASED ON CASE STYLES BR, CV, AND CH</p>	<p>Certificate  109 L</p>	<p>Page  01-01 005</p>	

# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products



## QPL CERTIFICATES


Types covered by similarity: ±20% Tolerance		Remarks:		
Procurement Specifications	Manufacturer	Nature of Approval	Supervising Authority	Initial Qualification Date
Generic ESCC 3001  Detail ESCC 3001/034	AVX Limited Coleraine Northern Ireland	Qualification	DERA	Sep 2000
Characteristics: E12 series  Qualified Range:  Variants 01 to 22 are qualified ±10% tolerance  Operating Temperature Range (°C):-55 to +125				
	CAPACITORS, CERAMIC, TYPE II, HIGH VOLTAGE, 1.0 TO 5.0 KV, BASED ON CASE STYLES VR, CV, AND CH	Certificate  262 F		Page  01-01 006



# AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products



## QPL CERTIFICATES

Types covered by similarity:  ±20% Tolerance		Remarks:																										
Procurement Specifications		Manufacturer		Initial Qualification Date																								
Generic ESCC 3009  Detail ESCC 3009/034		AVX Limited Coleraine Northern Ireland		Feb 2001																								
Characteristics: E12 series  Qualified Range: Variants 01 to 12 are qualified  Terminations: Variants 01 to 12: metallised pads  Operating Temperature Range (°C): -55 to +125		<table border="1"> <thead> <tr> <th>Style</th> <th>Rated Voltage (kV)</th> <th>Capacitance Range (pF)</th> <th>Tolerance (±%)</th> </tr> </thead> <tbody> <tr> <td rowspan="3">1812</td> <td>1.0</td> <td>3,900 to 22,000</td> <td>10</td> </tr> <tr> <td>2.0</td> <td>1,500 to 1,800</td> <td>10</td> </tr> <tr> <td>3.0</td> <td>820 to 1,000</td> <td>10</td> </tr> <tr> <td rowspan="3">1825</td> <td>1.0</td> <td>27,000 to 56,000</td> <td>10</td> </tr> <tr> <td>2.0</td> <td>2,200 to 6,800</td> <td>10</td> </tr> <tr> <td>3.0</td> <td>820 to 2,700</td> <td>10</td> </tr> </tbody> </table>			Style	Rated Voltage (kV)	Capacitance Range (pF)	Tolerance (±%)	1812	1.0	3,900 to 22,000	10	2.0	1,500 to 1,800	10	3.0	820 to 1,000	10	1825	1.0	27,000 to 56,000	10	2.0	2,200 to 6,800	10	3.0	820 to 2,700	10
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