

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

European Space  
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Version 8.1

**AVX**  
A KYOCERA GROUP COMPANY

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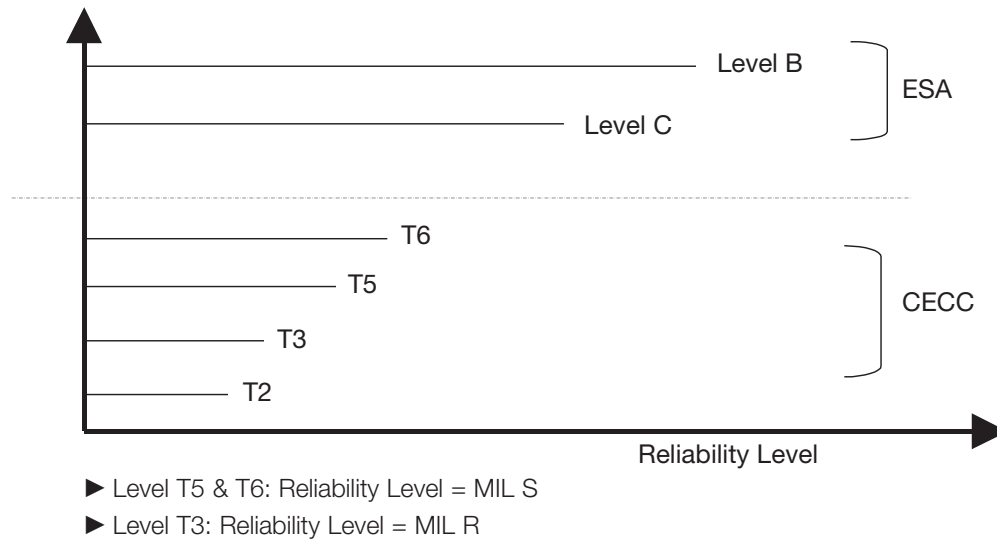


## AVAILABLE TYPES

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

## AVAILABLE RELIABILITY LEVELS

ESA QUALIFIED - LEVEL B	NB	with or without LAT I, II or III
ESA QUALIFIED - LEVEL C	NC	
CECC + 100% Burn in /168H + Thermal shock + 85/85 humidity test + on 40 samples per batch + PDA	T6	
CECC + 100% Burn in /168H + PDA	T5	
CECC + 100% Burn in /48H + PDA	T3	
CECC + PDA	T2	



## AVAILABLE RELIABILITY LEVELS SUMMARY/TYPES

Types	Products	CECC ESA ESCC	Reliability Level		
			T6 to T2	Level B	Level C
MLC Chips	AN & AC12, 13, 14, 15, 20 (NP0, X7R)		X		
MLC Chips ESA Qualified/3009	A...C NP0 A...Z X7R A...G 2C1			X	X

## RELEVANT STANDARDS

Type of Component	Reliability Level	
	T2 / T3 / T5 / T6	Level B & C
MLC Chips	CECC 32101-002 32101-003 32101-801 (IEC 384-8-9-10)	ESA ESCC 3009

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## DIELECTRIC TYPES USED

### Type I

- ▶ NP0                   ▶ TPC Code: C

### Type II

- ▶ X7R                   ▶ TPC Code: Z
- ▶ BX or 2C1           ▶ TPC Code: G

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

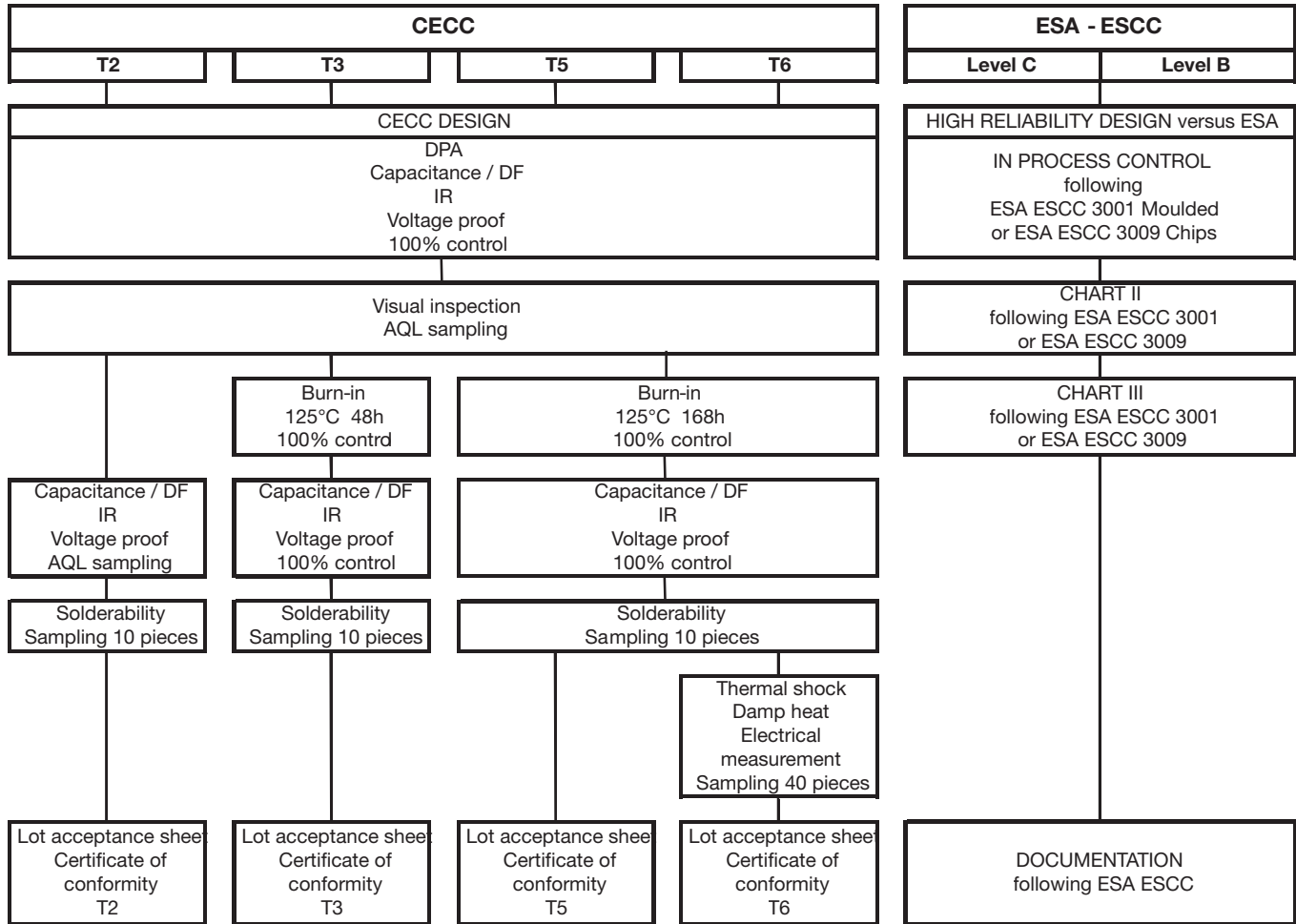
Type		1	2	
TPC code		<b>C</b>	<b>Z</b>	<b>G</b>
Classification	IEC/CECC EIA DIN MIL	1B COG NP0 CG	2R1 X7R	2C1  BX
Capacitance change With temperature & : Ubias = 0 Ubias = UR		±30ppm/°C	± 15% N.A.	± 20% + 20% , -30%
Typical ageing (%/dec.)		0	1.5	1.5
Reference temperature		22°C ±3°C	22°C ±3°C	22°C ±3°C
Capacitance and D.F. measurement	Frequency  Voltage	C ▶ 1000 pF   F = 1mHz C > 1000 pF   F = 1 kHz Um = 1 Vrms	C ▶ 100 pF    F = 1mHz C > 100 pF    F = 1 kHz Um = 0.5 Vrms	
Dissipation Factor (Tg ▶)		C ▶ 50 pF   Tg ▶ < 1.5 (150/Cr + 7).10 <sup>-4</sup> C>50 pF   Tg▶ < 15.10 <sup>-4</sup>	Tg ▶ < 250 .10 <sup>-4</sup>	
Insulation Resistance under UR /1 mn		Ri > 100 G ▶ or <100V	Ri > 100 G ▶ or Ri x Cr > 1000s	
Proof voltage		For UR < 500V : 2.5 x UR UR = >100 : 1.5 UR + 100V	2.5 x UR 1.5 x UR	

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

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## RELIABILITY LEVELS DESCRIPTION



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## AVAILABLE TERMINATIONS

### Summary

Type	CECC Level T2/T3/T5/T6	ESA Level B & C	Remark
Ag - Pd	AC	A1..	-
Nickel Barrier + Tin Lead Finish*	AN	A6...	Preferred Version

\* "No Pure Tin" terminations.

## TERMINATION CODES FOR ESA MLC PARTS

TPC Code eg: A.12	ESA Version	
	Code	Termination
A112	01	Silver Palladium
A612C... A612G...	06	ESA Preferred Termination Nickel Barrier + Tin Lead Finish

## PACKAGING

- Plastic Tape
- Waffle Pack
- Vacuum Pack

## MARKING

### Chips:

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

## ESA QUALIFIED CHIPS TYPE I - NP0 (AVAILABLE RELIABILITY LEVEL: B & C)

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 %  ±0.5pF for C <10pF	QPL - ESA ESCC 3009 - 003
1206	A.20C..	NP0	50 & 100	10	3900pF		QPL - ESA ESCC 3009 - 022
1210	A.13C..	NP0	50 & 100	22	6800pF		QPL - ESA ESCC 3009 - 004
1812	A.14C..	NP0	50 & 100	0.1	15 nF		QPL - ESA ESCC 3009 - 005
2220	A.15C..	NP0	50 & 100	0.47	33 nF		QPL - ESA ESCC 3009 - 006

Available Terminations:

A1.. Silver Palladium (ESA variant 01) and

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

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## ESA QUALIFIED CHIPS TYPE II - 2C1 (AVAILABLE RELIABILITY LEVEL: B & C)

Size	TPC Code	Dielectric Class	Voltage (V)	Capacitance Range		Tol %	Qualified Following Specification
				min.	max.		
0805	A.12G	2C1	100	820	10000 pF	5, 10, 20	QPL - ESA ESCC 3009 - 008
			50	3.9	27 nF		
			25	10	47 nF		
1206	A.20G	2C1	100	2.2	22 nF	5, 10, 20	QPL - ESA ESCC 3009 - 023
			50	12	68 nF		
			25	27	100 nF		
1210	A.13G	2C1	100	3.9	47 nF	5, 10, 20	QPL - ESA ESCC 3009 - 009
			50	33	120 nF		
			25	47	220 nF		
1812	A.14G	2C1	100	6.8	82 nF	5, 10, 20	QPL - ESA ESCC 3009 - 010
			50	56	270 nF		
			25	82	470 nF		
2220	A.15G	2C1	100	18	180 nF	5, 10, 20	QPL - ESA ESCC 3009 - 011
			50	100	680 nF		
			25	180	1000 nF		
1206	A.20Z	X7R	200 400	0.470 0.27	33 nF 4.7 nF	5, 10, 20	According to "ESA ESCC 3009"
1210	A.13Z	X7R	200 400	0.680 0.680	68 nF 10 nF	5, 10, 20	
1812	A.14Z	X7R	200 400	3.3 3.3	150 nF 47 nF	5, 10, 20	
2220	A.15Z	X7R	200 400	6.8 6.8	270 nF 68 nF	5, 10, 20	

Available Terminations:

A1.. Silver Palladium (ESA variant 01) and

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

## ESA QUALIFIED CHIPS TYPE II - X7R ESA VARIANT 07 (AVAILABLE RELIABILITY LEVEL: B & C)

Size	TPC Code	Dielectric Class	Voltage (V)	Capacitance Range		Tol %	Qualified Specification
				min.	max.		
0805	A612Z..	X7R	100	10nF ->	47 pF	5, 10, 20	QPL - ESA ESCC 3009 - 008
			25, 50	27nF ->	68 nF		
1206	A620Z..	X7R	100	27nF ->	100 nF	5, 10, 20	QPL - ESA ESCC 3009 - 023
			25, 50	47nF ->	150 nF		
1210	A613Z..	X7R	100	47nF ->	220 nF	5, 10, 20	QPL - ESA ESCC 3009 - 009
			25, 50	100nF ->	330 nF		
1812	A614Z..	X7R	100	82nF ->	470 nF	5, 10, 20	QPL - ESA ESCC 3009 - 010
			25, 50	220nF ->	680 nF		
2220	A615Z..	X7R	100	180nF ->	1000 nF	5, 10, 20	QPL - ESA ESCC 3009 - 011
			25, 50	470nF ->	1500 nF		

One single termination type: A6.. Nickel Barrier with Tin Lead Finish

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## 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	AN12CF	NP0	200	4.7	470 pF	1, 2, 5, 10%	IEC 384-8....10
	AN12CE		100	4.7	1800 pF		
	AN12CD		50/25	4.7	1800 pF		
1206/ CEC12	AN20CJ	NP0	500	12	330 pF		
	AN20CF		200	12	1500 pF		
	AN20CE		100	12	4700 pF		
	AN20CD		50/25	12	4700 pF		
1210/ CEC4	AN13CJ	NP0	500	15	1500 pF		
	AN13CF		200	15	2700 pF		
	AN13CE		100	15	10000 pF		
	AN13CD		50/25	15	10000 pF		
1812/ CEC6	AN14CJ	NP0	500	100	1000 pF		
	AN14CF		200	100	5600 pF		
	AN14CE		100	100	18000 pF		
	AN14CD		50/25	100	18000 pF		
2220/ CEC7	AN15CJ	NP0	500	470	3300 pF		
	AN15CF		200	470	12000 pF		
	AN15CE		100	470	39000 pF		
	AN15CD		50/25	470	39000 pF		

Note: 2 terminations available: Ag Pd ► AC and Nickel Barrier with Tin Lead finish ► AN 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	AN12ZF	X7R	200	0.33	18 nF	5, 10 & 20%	IEC 384-8....10
	AN12ZE		100	0.33	47 nF		
	AN12ZD		50	0.33	100 nF		
1206/ CNC12	AN20ZJ	X7R	500	1	8.2 nF		
	AN20ZF		200	1	39 nF		
	AN20ZE		100	1	100 nF		
	AN20ZD		50	1	180 nF		
1210/ CNC4	AN13ZJ	X7R	500	2.2	22 nF		
	AN13ZF		200	2.2			
	AN13ZE		100	2.2	220 nF		
	AN13ZD		50	2.2	330 nF		
1812/ CNC6	AN14ZJ	X7R	500	2.7	47 nF		
	AN14ZF		200	2.7	180 nF		
	AN14ZE		100	2.7	470 nF		
	AN14ZD		50	2.7	680 nF		
	AN14ZC		25	1000	1000 nF		
2220/ CNC7	AN15ZJ	X7R	500	4.7	68 nF		
	AN15ZF		200	4.7	390 nF		
	AN15ZE		100	4.7	1000 nF		
	AN15ZD		50	4.7	1500 nF		

Note: 2 terminations available: Ag Pd ► AC and Nickel Barrier with Tin Lead finish ► AN. Size 2225 available on request.

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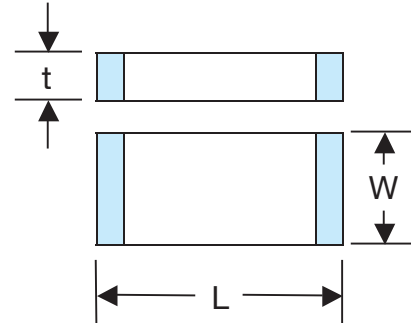


## DIMENSIONS

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

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 - Chips Level B and C (vs ESA 3009) A1... & 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)

## HOW TO ORDER

<b>A6</b>	<b>14</b>	<b>C</b>	<b>E</b>	<b>0222</b>	<b>K</b>	<b>NC</b>		
<b>Chip</b>	<b>Size</b>	<b>Class</b>	<b>Voltage</b>	<b>Capacitance</b>	<b>Tolerance</b>	<b>Suffix</b>		
ESA A1 = AgPd Terminations A6 = Nickel Barrier Terminations with Tin Lead Finish CECC AC = AgPd Terminations AN = Nickel Barrier Terminations with Tin Lead Finish	12 = 0805 13 = 1210 14 = 1812 15 = 2220 20 = 1206 43 = 2225	C = NP0 Z = X7R G = 2C1 or BX	C = 25 D = 50/63 E = 100 F = 200 G = 250 I = 400 J = 500	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	C < 10 pF ± 0.5 pF ± 1 pF ± 2 pF  C ► 10 pF ± 1% ± 2% ± 3% ± 5% ± 10% ± 20%	Code C D F G  Code F G H J K M	ESA Level B C B + Tape C + Tape  CECC Burn-in 100% 168H +TS +HR +Tape Burn-in 100% 168H Burn-in 100% 48H No Burn-in T5 + Tape T3 + Tape T2 + Tape	TPC NB NC 2Z 2J  T6 T5 T3 T2 2K 2L 2Y

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:** 1960  
 47.2 pF : 4729  
 8.28 pF : 8288



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



## AVAILABLE CLIMACTIC 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	50	3 weeks
MX00--5059---	85/85 Humidity test/ MIL STD 202 method 103	50	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
XX00--5083-00	Corona (partial discharges) test (25 up to 50°C) Equipment : Robertson + Haefly 0,2kVrms < Utest < 28 kVrms and 50pF < Cr < 12nF (sensitivity 2pC )	50	1 week

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



## QPL CERTIFICATES

Types covered by similarity:  Variants 01 and 06 are qualified Values covered by ESCC Specifications defined below Tolerance ( $\pm$ ): 0.5pF, 2, 5, 20%				Remarks:			
Procurement Specifications Issues in effect on certification date		Manufacturer		Nature of Approval	Supervising Authority	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	
				Extension	CNES	Sep 1986	
				Requalification	CNES	Apr 1992	
				Extension	CNES	Jan 1995	
				Extension	CNES	Jun 1998	
				Extension	CNES	Nov 2000	
				Extension	CNES	Jun 2003	
				Requalification	CNES	Feb 2005	
				Extension	CNES	May 2007	
Characteristics: Operating Temp Range ( $^{\circ}$ C), -55 to +125							
Style	Model	Detail Spec	Variants	Cap Range (pF)	Rated Volt. (V)	Tolerance ( $\pm$ %)	TC (ppm/ $^{\circ}$ C)
0805	A_12C	3000/003	01, 06	4.7 to 9.1 10 to 1500	50,100 50,100	0.5pF 1, 2, 5, 10	$\pm$ 30
1206	A_20C	3000/022	01, 06	10 to 3900	50,100	1, 2, 5, 10	$\pm$ 30
1210	A_13C	3000/004	01, 06	22 to 6800	50,100	1, 2, 5, 10	$\pm$ 30
1812	A_14C	3000/005	01, 06	100 to 15000	50,100	1, 2, 5, 10	$\pm$ 30
2220	A_15C	3000/006	01, 06	470 to 33000	50,100	1, 2, 5, 10	$\pm$ 30
				Current Validity of Qualification			Page
				Certificate No.	Valid Until	01-02	
				109 H	May 2009	001-1	
CAPACITORS, CERAMIC, FIXED, CHIP, TYPE I							

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



## QPL CERTIFICATES

Types covered by similarity:  Tolerance ( $\pm\%$ ): 10, 20				Remarks:																																																																																																																													
Procurement Specifications Issues in effect on certification date			Manufacturer		Nature of Approval	Supervising Authority	Date																																																																																																																										
Generic ESCC 3009			AVX/TPC St. Apollinaire France		Qualification	CNES	Feb 1983																																																																																																																										
Detail ESCC 3009/008					Extension	CNES	Sep 1986																																																																																																																										
3009/009					Requalification	CNES	Apr 1992																																																																																																																										
3009/010					Extension	CNES	Jan 1995																																																																																																																										
3009/011					Extension	CNES	Jun 1998																																																																																																																										
3009/023					Extension	CNES	Nov 2000																																																																																																																										
Characteristics: Operating Temp Range ( $^{\circ}\text{C}$ ), -55 to +125					Extension	CNES	Jun 2003																																																																																																																										
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