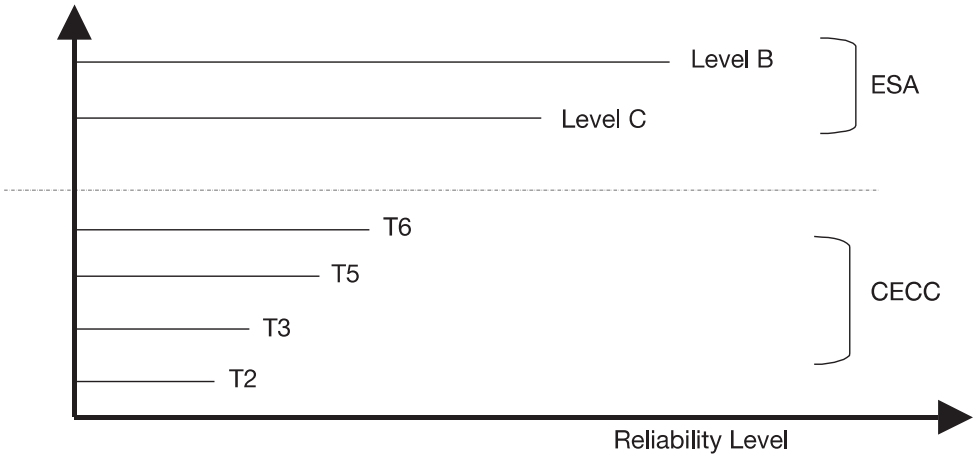
AVX European Space Agency and CECC Surface Mount Ceramic Capacitor Products

AVAILABLE TYPES

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

AVAILABLE RELIABILITY LEVELS

ESA QUALIFIED - 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 + 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	Level B	Level C
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	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

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		C	Z
Classification	IEC/CECC EIA DIN MIL	1B C0G 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^{-4} C>50 pF DF < 15.10^{-4}	DF < 250 .10^{-4}
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

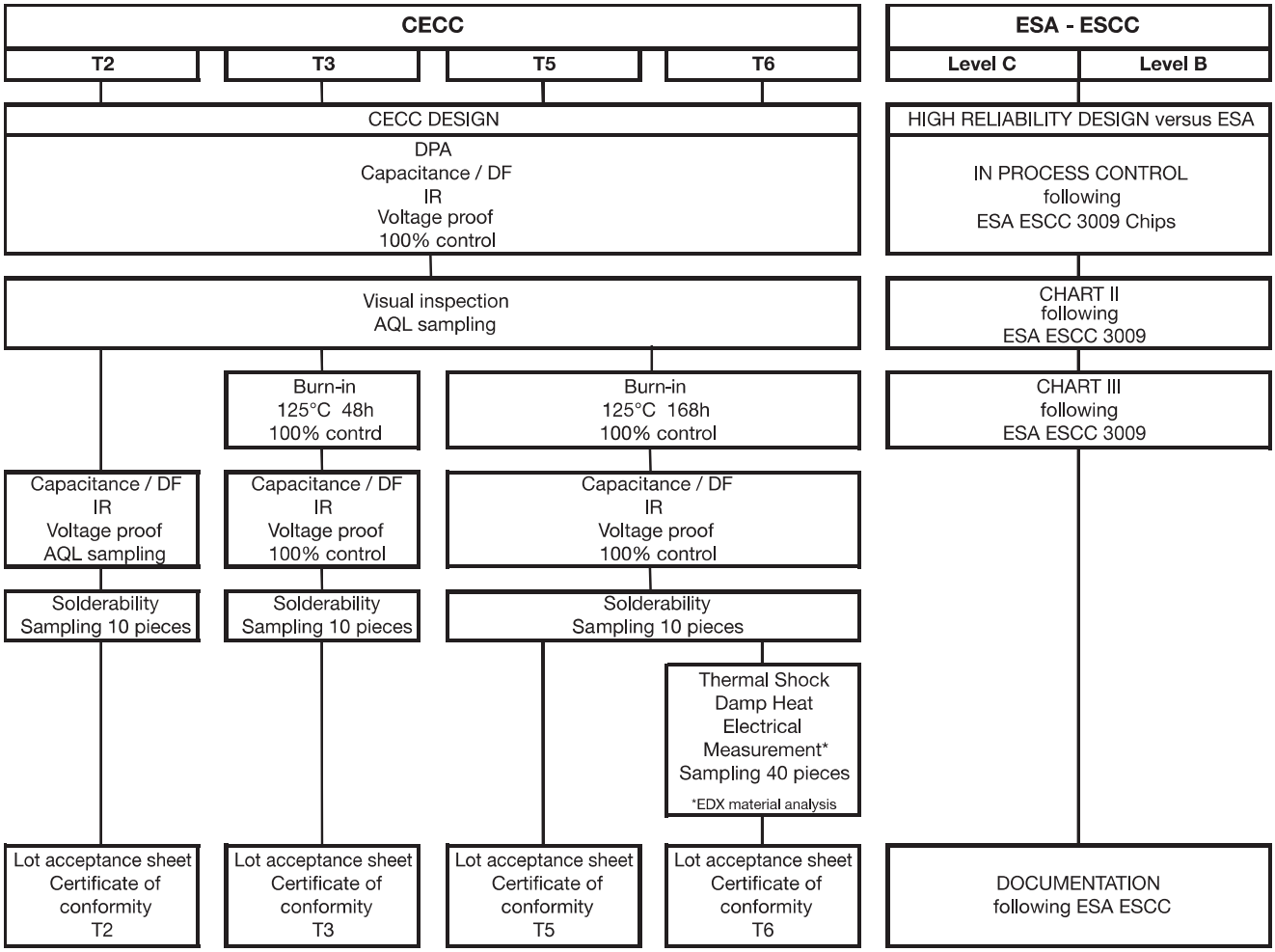
Note: ESA Chips are strictly measured vs ESA spec. 3009 + detail spec.

ELECTRICAL MEASUREMENT CONDITIONS FOR ESA CHIPS: LEVEL B & C

Type		1	2	
TPC code		C	Z	G
Classification	IEC/CECC EIA DIN MIL	1B C0G 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^{-4} C>50 pF DF < 15.10^{-4}	DF < 250 .10^{-4}	
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.

RELIABILITY LEVELS DESCRIPTION



AVAILABLE TERMINATIONS

Summary

Type	CECC Level T2/T3/T5/T6	ESA Level B & C	Remark
Ag - Pd - Pt	AC	A3..	–
Nickel Barrier + Tin Lead Finish[1]	AN	A6...	Preferred Version
Nickel Barrier + Tin Finish[2]	AD		

[1] "No Pure Tin" terminations.
[2] 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	C & 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

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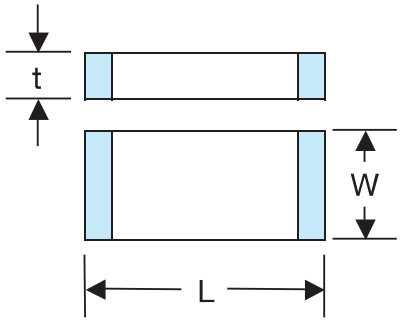
DIMENSIONS

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 - Chips Level B and C (vs ESA 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.

HOW TO ORDER

A6 **14** **C** **E** **0222** **K** **NC**

Chip
ESA
A3 = AgPdPt Terminations
A6 = Nickel Barrier Terminations with Tin Lead Finish
CECC
AC = AgPdPt Terminations
AN = Nickel Barrier Terminations with Tin Lead Finish
AD = Nickel Barrier Terminations with Tin Finish

Size
12 = 0805
13 = 1210
14 = 1812
15 = 2220
20 = 1206
43 = 2225

Class
C = NP0
Z = X7R
G = 2C1

Voltage
C = 25
D = 50/63
E = 100
F = 200
G = 250
I = 400
J = 500

Capacitance
Capacitance expressed by 2 significant figures
7th digit: 0 (zero)
8th and 9th digits: the 2 significant figures of the capacitance value.
10th digit:
- 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.

Examples: 1000 pF : 0102
8.2 pF : 0829
0.47 pF : 0478

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

Tolerance

C < 10 pF	Code
± 0.5pF	D

C ▶ 10 pF	Code
± 1%	F
± 2%	G
± 3%	H
± 5%	J
± 10%	K
± 20%	M

Suffix

ESA Level	TPC
B	NB
C	NC
C + Tape	2J
CECC	
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

Not RoHS Compliant

LEAD-FREE
LEAD-FREE COMPATIBLE COMPONENT

RoHS COMPLIANT

For RoHS compliant products, please select correct termination style.

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 %	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	±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)

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 50 25	820 3.9 10	10000 pF 27 nF 47 nF	5, 10, 20	QPL - ESA ESCC 3009 - 008
1206	A.20G	2C1	100 50 25	2.2 12 27	22 nF 68 nF 100 nF	5, 10, 20	QPL - ESA ESCC 3009 - 023
1210	A.13G	2C1	100 50 25	3.9 33 47	47 nF 120 nF 220 nF	5, 10, 20	QPL - ESA ESCC 3009 - 009
1812	A.14G	2C1	100 50 25	6.8 56 82	82 nF 270 nF 470 nF	5, 10, 20	QPL - ESA ESCC 3009 - 010
2220	A.15G	2C1	100 50 25	18 100 180	180 nF 680 nF 1000 nF	5, 10, 20	QPL - ESA ESCC 3009 - 011

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 (AVAILABLE RELIABILITY LEVEL: B & C)

Size	TPC Code	Dielectric Class	Voltage (V)	Capacitance Range		Tol %	Qualified Specification
				min.	max.		
0805	A612Z..	X7R	100 50 25	10nF 27nF 27nF	47 nF 68 nF 100 nF	5, 10, 20	QPL - ESA ESCC 3009 - 008
1206	A620Z..	X7R	100 50 25	27nF 47nF 47nF	100 nF 150 nF 220 nF	5, 10, 20	QPL - ESA ESCC 3009 - 023
1210	A613Z..	X7R	100 50 25	47nF 100nF 100nF	220 nF 330 nF 470 nF	5, 10, 20	QPL - ESA ESCC 3009 - 009
1812	A614Z..	X7R	100 50 25	82nF 220nF 220nF	470 nF 680 nF 1000 nF	5, 10, 20	QPL - ESA ESCC 3009 - 010
2220	A615Z..	X7R	100 50 25	180nF 470nF 470nF	1000 nF 1500 nF 2200 nF	5, 10, 20	QPL - ESA ESCC 3009 - 011
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	

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	A. 12CF A. 12CE A. 12CD	NP0	200 100 50/25	4.7 4.7 4.7	470 pF 1800 pF 1800 pF	1, 2, 5, 10% ±0.5pF if C < 10pF	IEC 384-8....10 CECC 32100 - 32101/801
1206/ CEC12	A. 20CJ A. 20CF A. 20CE A. 20CD	NP0	500 200 100 50/25	12 12 12 12	330 pF 1500 pF 4700 pF 4700 pF		
1210/ CEC4	A. 13CJ A. 13CF A. 13CE A. 13CD	NP0	500 200 100 50/25	15 15 15 15	1500 pF 2700 pF 10000 pF 10000 pF		
1812/ CEC6	A. 14CJ A. 14CF A. 14CE A. 14CD	NP0	500 200 100 50/25	100 100 100 100	1000 pF 5600 pF 18000 pF 18000 pF		
2220/ CEC7	A. 15CJ A. 15CF A. 15CE A. 15CD	NP0	500 200 100 50/25	470 470 470 470	3300 pF 12000 pF 39000 pF 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 A. 12ZE A. 12ZD	X7R	200 100 50	0.33 0.33 0.33	18 nF 47 nF 100 nF	5, 10 & 20%	IEC 384-8....10 CECC 32100 - 32101/801
1206/ CNC12	A. 20ZJ A. 20ZF A. 20ZE A. 20ZD	X7R	500 200 100 50	1 1 1 1	8.2 nF 39 nF 100 nF 180 nF		
1210/ CNC4	A. 13ZJ A. 13ZF A. 13ZE A. 13ZD	X7R	500 200 100 50	2.2 2.2 2.2 2.2	22 nF 100 nF 220 nF 330 nF		
1812/ CNC6	A. 14ZJ A. 14ZF A. 14ZE A. 14ZD A. 14ZC	X7R	500 200 100 50 25	2.7 2.7 2.7 2.7 1000	47 nF 180 nF 470 nF 680 nF 1000 nF		
2220/ CNC7	A. 15ZJ A. 15ZF A. 15ZE A. 15ZD	X7R	500 200 100 50	4.7 4.7 4.7 4.7	68 nF 390 nF 1000 nF 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