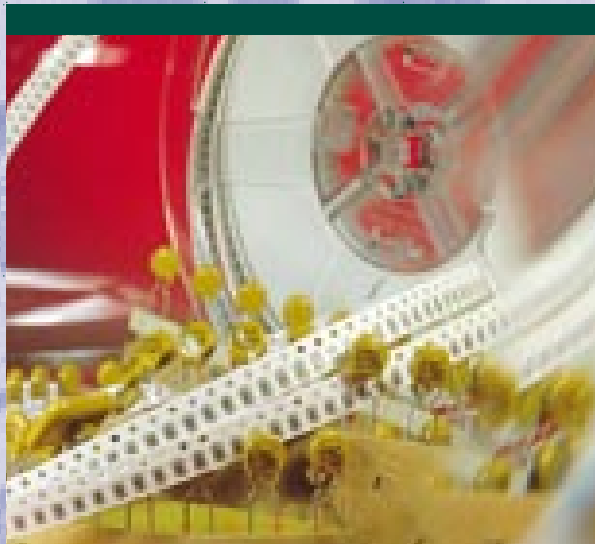


Multilayer ceramic capacitors

SMD - Dipped - Moulded



Multilayer Ceramic Chip Capacitors

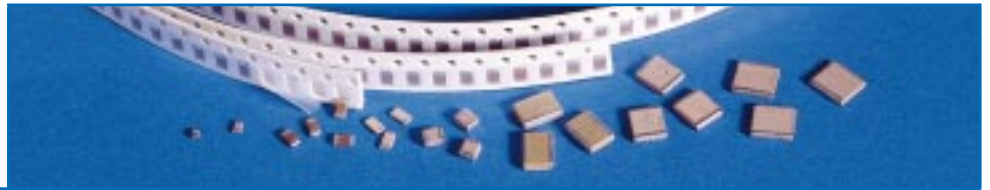
AgPdPt terminations



Dielectric type	Voltage (U _r)	Capacitance Range	AC11 0504	AC12 0805	AC20 1206	AC13 1210	AC14 1812	AC15 2220	AC45 1825	AC43 2225
NPO	50	Min Max	0109 0271	0109 0152	0109 0472	0100 0103	0101 0223	0471 0473	0102 0473	0102 0563
	100	Min Max	0109 0221	0109 0681	0109 0272	0100 0682	0101 0153	0471 0273	0102 0273	0102 0333
	200	Min Max	— —	(1) (1)	0100 0102	0220 0222	0470 0472	0101 0103	— —	— —
	500	Min Max	— —	(1) (1)	0100 0681	0100 0152	0101 0222	0471 0562	— —	— —
X7R	50	Min Max	0272 0682	0471 0683	0102 0154	0103 0334	0473 0684	0104 0155	0104 0125	0104 0155
	100	Min Max	0221 0222	0471 0183	0102 0683	0472 0154	0103 0394	0473 0105	0104 0684	0104 0105
	200	Min Max	— —	(1) (1)	0101 0473	0471 0104	0102 0184	0472 0474	— —	— —
	500	Min Max	— —	(1) (1)	0101 0153	0471 0273	0102 0563	0472 0104	— —	— —
Z5U	50	Min Max	0682 0103	0103 0154	0103 0334	0473 0105	0104 0225	0104 0475	0104 0475	0104 0475
	100	Min Max	0152 0472	0103 0104	0103 0224	0473 0474	0104 0105	0104 0225	0104 0155	0104 0225
	200	Min Max	— —	(1) (1)	0472 0104	0103 0224	0223 0474	0473 0684	— —	— —
	500	Min Max	— —	(1) (1)	0472 0223	0472 0473	0103 0683	0223 0154	— —	— —
			(1) 0805/200 and 500 V, please consult us.							

Multilayer Ceramic Chip Capacitors

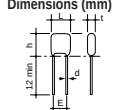
Nickel - barrier terminations



Dielectric type	Voltage (U _r)	Capacitance Range	AN21 0603	AN12 0805	AN20 1206	AN13 1210	AN14 1812	AN15 2220	AN45 1825	AN43 2225
NPO	50	Min Max	0109 0471	0109 0152	0109 0332	0100 0682	0101 0153	0471 0333	0102 0333	0102 0393
	100	Min Max	— —	0109 0561	0109 0222	0100 0222	0101 0682	0471 0153	0102 0153	0102 0183
	200	Min Max	— —	(1) (1)	0100 0102	0220 0222	0470 0472	0101 0103	— —	— —
	500	Min Max	— —	(1) (1)	0100 0681	0100 0152	0101 0222	0471 0562	— —	— —
X7R	16	Min Max	0473 0104	0224 0474	0334 0105	(2)	(2)	(2)	— —	— —
	25	Min Max	0822 0473	0333 0224	0154 0474	(2)	(2)	(2)	— —	— —
	50	Min Max	0271 0103	0471 0683	0102 0154	0103 0334	0473 0684	0104 0155	0104 0125	0104 0155
	100	Min Max	— —	0471 0183	0102 0683	0472 0154	0103 0394	0473 0105	0104 0684	0104 0105
	200	Min Max	— —	(1) (1)	0101 0473	0471 0104	0102 0184	0472 0474	— —	— —
	500	Min Max	— —	(1) (1)	0101 0153	0471 0273	0102 0563	0472 0104	— —	— —
Z5U	50	Min Max	0472 0473	0103 0224	0103 0474	0473 0105	0104 0225	0104 0475	0104 0475	0104 0475
	100	Min Max	— —	0103 0104	0103 0224	0103 0474	0104 0105	0104 0225	0104 0155	0104 0225
	200	Min Max	— —	(1) (1)	0472 0104	0103 0224	0223 0474	0473 0684	— —	— —
	500	Min Max	— —	(1) (1)	0472 0223	0472 0473	0103 0683	0223 0154	— —	— —
Y5V	16	Min Max	0224 0224	0105 0105	0225 0225	— —	— —	— —	— —	— —
	25	Min Max	0473 0104	0104 0474	0105 0105	— —	— —	— —	— —	— —
	50	Min Max	0472 0473	0103 0334	0103 0474	— —	— —	— —	— —	— —
			(1) 0805/200 and 500 V, please consult us.							

Dipped Multilayer Ceramic Capacitors



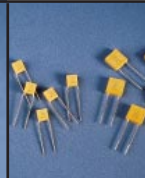
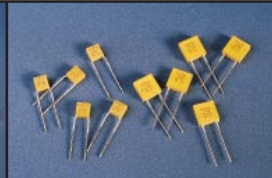
Type		Radial Dipped "Ecocaps" (1)											
Size		ECO4				ECO5				ECO8			
	Lmax	3.8				5.0				7.6			
	hmax	5.8				7.5				9.6			
	tmax	2.5				3.1				3.8			
	d ± 10 %	0.5				0.6				0.6			
	E + 0.6 - 0.1	2.54 (2)				2.54 (2)				5.08			
Dielectric class		CECC/IEC EIA											
		1B COG	2C1	2R1 X7R	2F4 Z5U	1B COG	2C1	2R1 X7R	2F4 Z5U	1B COG	2C1	2R1 X7R	2F4 Z5U
CECC Standards		CE72 CE77	CN72 CN77	CN72 CN77	CN72 CN77	CE73 CE78	CN73 CN78	CN73 CN78	CN73 CN78	CE74 CE79	CN74 CN79	CN74 CN79	CN74 CN79
Approvals (3)		30601 - 015	30701 - 031	30701 - 045	30701 - 044	30601 - 015	30701 - 031	30701 - 045	30701 - 044	30601 - 015	30701 - 031	30701 - 045	30701 - 044
Voltage (U _r)		200 100 50	200 100 50	200 100 50	200 100 50	200 100 50	200 100 50	200 100 50	200 100 50	200 100 50	200 100 50	200 100 50	200 100 50
Capacitance													
4.7 pF													
10													
47													
100													
470													
560													
820													
1000													
1200													
1800													
2200													
2700													
3300													
4700													
6800													
10 nF													
15													
22													
33													
47													
68													
100													
150													
220													
330													
470													
680													
1 μF													
1.5													
2.2													
3.3													
4.7													
6.8													

(1) For larger capacitance values, please consult our catalogue "Ceramic capacitors for professional applications" for EC61 to EC64 types

(2) EC04 and EC05 types are also available with leadspacing E = 5.08 mm.
For ordering, use suffix HB (bulk) or D. (tape)

(3) CE77, CE78, CE79, CN77, CN78, CN79 (class 2C1) are registered in "GAM-T1" list
CE72, CE73, CE74, CN72, CN73, CN74 are registered in "LNZ" list.

Radial Moulded Multilayer Ceramic Capacitors (1)

																																	
Type	MC										MJ				MQ				MK														
Size	MC04		MC05		MC08		MC10		MJ05		MJ08		MQ05		MQ06		MK05		MK06														
Dimensions (mm)	L	3.5 ± 0.5		5.0 ± 0.5		7.5 ± 0.5		10 ± 0.5		4.8 ± 0.2		7.4 ± 0.2		5 ± 0.2		7.5 ± 0.2		4.8 ± 0.2		7.4 ± 0.2													
	Hmax	4.5		6.0		8.5		11		4.8 ± 0.2		7.4 ± 0.2		5		7.5		4.8 ± 0.2		7.4 ± 0.2													
	h	3.5 ± 0.5		5.0 ± 0.5		7.5 ± 0.5		10 ± 0.5						3.8 ± 0.2		7.1 ± 0.2																	
	T ± 0.2	2.5		2.5		2.5		3.5		2.3		2.3		2.3		2.3		2.3		2.3													
	d ± 5 %	0.6		0.6		0.6		0.8		0.6		0.6		0.6		0.6		0.6		0.6													
E ± 0.2	2.54 (2)		2.54 (2)		5.08		5.08		5.08		5.08		5.08		5.08		5.08		5.08														
Dielectric class	NPO		2C1		NPO		2C1		NPO		2C1		NPO		2C1		NPO		BX		NPO		BX										
Voltage (Ur)	100	63	100	63	100	63	100	63	100	63	100	63	250	100	63	250	100	63	250	100	63	200	100	50	200	100	50	200	100	50			
CECC standards	CE13	CE61	CN31	CN61	CE13	CE62	CN31	CN62	CE13	CE63	CN31	CN63	CN30	CE13	CE64	CN31	CN30	CN19				CN50		CN60		CC05		CK05		CC06		CK06	
Other standards (3)																																	
Approvals	CECC 30601-001 (NPO / 100 V - 63 V) and CECC 30701-011 (2C1 / 100 V - 63 V) (CE11-CE13)										30701-016				30701-016				MIL-C-20 / MIL-C11015D														
QPL	ESA/LNZ/GAM-T1										LNZ				GAM-T1				ESA														
Capacitance																																	
1 pF																																	
4.7																																	
10																																	
47																																	
56																																	
100																																	
220																																	
330																																	
470																																	
680																																	
1000																																	
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470																																	
680																																	
1 μF																																	
Rated																																	
250 V																																	
200 V																																	
100 V																																	
63 V																																	
50 V																																	

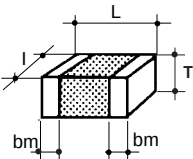
(1) For higher capacitance values or higher voltages, please consult our catalogue "Ceramic capacitors for professional applications"

(2) MC04 and MC05 types are also available with leadspacing E = 5.08 mm. For ordering, use suffix HB or D.

(3) MC, MJ and MK types are available as High Reliability products. MC and MK types are "ESA" approved, according to ESA/SCC 3001 (CLC, CCR and CKR types).

MULTILAYER CERAMIC CHIP CAPACITORS

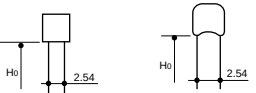
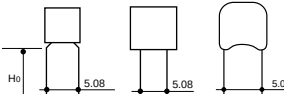
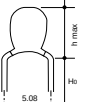
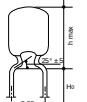
Styles and dimensions

IEC40 Types		0504	0603	0805	1206	1210	1812	2220	1825	2225
CECC Types		CEC1		CEC2	CEC12	CEC4	CEC6	CEC7		
TPC Codes - Nickel-barrier terminations			AN21	AN12	AN20	AN13	AN14	AN15	AN45	AN43
TPC Codes - Silver-palladium-platinum terminations		AC11		AC12	AC20	AC13	AC14	AC15	AC45	AC43
	Length (L)	1.25 ± 0.20	1.60 ± 0.15	2.00 ± 0.2	3.2 ± 0.2	3.2 ± 0.3	4.5 ± 0.4	5.7 ± 0.4	4.5 ± 0.4	5.7 ± 0.4
	Width (l)	1.00 ± 0.20	0.80 ± 0.15	1.25 ± 0.25	1.6 ± 0.2	2.5 ± 0.3	3.2 ± 0.3	5.0 ± 0.4	6.3 ± 0.4	6.3 ± 0.4
	Thickness (T)	Depending on voltage and capacitance value								
	bm mini	0.15	0.15	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Standards : All ceramic chips capacitors are made according to CECC standards and IEC 286 for packaging. Approvals : CEC 2/4/6/7/12 types (NPO and X7R classes) are approved according to CECC 32101-801 standard. Other types : For other sizes : 1005 (AC16), 1808 (AC19), please consult us. Other voltages : For ceramic chips with rated voltage of 1 kV or more, please consult our catalogue "ceramic capacitors for professional applications". High reliability : High reliability products from the ESA Qualified Parts List are available upon request.				Available capacitance values and tolerances :						
				Dielectric		Tolerance (%)		Cap. value series		
						C < 10 pF	C ≥ 10 pF			
				NPO		± 1 pF ± 0.5 pF ± 0.25 pF	± 10 % ± 5 % ± 2 % ± 1 %	E12 E12 E24 (upon request) E24 (upon request)		
				X7R			± 20 % ± 10 %	E6 E12		
Z5U			- 20 + 80 % ± 20 %	E3 E6						

CLASSIFICATION AND CHARACTERISTICS OF THE DIELECTRICS

Type	1		2		
TPC code	C		Z	G	X
Classification IEC/CECC EIA DIN MIL	1B COG NPO		(2R1) X7R	2C1 (BX)	(2F4) Z5U Y5V
Capacitance Change With temperature	0 ± 30 ppm/°C		± 15 % (Um = 0)	± 20 % (Um = 0) + 20, - 30 % (Um = Ur)	+ 22, - 56 % (Um = 0) + 22, - 82 % (Um = 0)
Typical ageing (%/dec.)	0		1	1	4.5 2.5
Reference temperature	25°C ± 2°C		20°C ± 2°C		25°C ± 2°C
Capacitance and D.F. measurement	Frequency	C 1000 pF F = 1 MHz C > 1000 pF F = 1 kHz Um = 1 Vrms	C 1000 pF F = 1 MHz C > 1000 pF F = 1 kHz Um = 1 Vrms Um = 0.5 Vrms		
Dissipation factor (Tgδ)	C 50 pF Tgδ < 1.5 (150/Cr + 7).10 ⁻⁴ C > 50 pF Tgδ < 15.10 ⁻⁴		Tgδ < 250.10 ⁻⁴		Tgδ < 300.10 ⁻⁴ Tgδ < 500.10 ⁻⁴
Insulation resistance under Ur/1 mn	Ri > 100 G or Ri x Cr > 1000 s		Ri > 100 G or Ri x Cr > 1000 s		Ri > 10 G or Ri x Cr > 100 s
Test voltage	2.5 UR for UR < 500 V 1000 V for UR = 500 V		2.5 UR for UR < 500 V 1000 V for UR = 500 V		
Advantages	Stability in temperature and voltage Low losses		High values of capacitance in a reduced size		
Applications	Tuning, coupling ...		Decoupling, filtering, energy storage ...		

DIPPED AND MOULDED PRODUCTS - KINKING/TAPING/PACKAGING CHARACTERISTICS

Leads shape		Types of Products	Packaging	Min lead length (bulk) or Taping height Ho	Suffix for Lead spacing E = 2.54 mm	Suffix for Lead spacing E = 5.08 mm
Straight		MC04/05	Bulk	12	- -	
		EC04	Ammopack reel	16	CA	
		EC05	Ammopack reel	16	CB	
		MJ05/MK05	Bulk	12		- -
		MC08/MJ08/MK06	Ammopack reel	16	DA	
		EC08	Ammopack reel	16	DB	
Kinked		EC04 EC05	Bulk	12		HB
			Ammopack reel	16		DQ
			Ammopack reel	16		DR
			Ammopack reel	19.5		DS
		EC08	Bulk	12		HL
			Ammopack reel	16		DL
			Ammopack reel	16		DM
			Ammopack reel	19.5		DN
		EC04	Ammopack reel	19.5		DP
			Bulk	12	HE	HK
			Ammopack reel	16	CE	DE
	Snap-in		EC04 EC05 EC08		16	CF
Bulk				12	HG *	HH
Ammopack reel				16	CG *	DG
Flat		EC04 EC05 EC08	Bulk			
			Ammopack reel	16	CJ *	DZ
			Ammopack reel		CK *	D1
			Ammopack reel	19.5	CL *	D2
					CM *	D3

* Not available in EC08

CODIFICATION - HOW TO ORDER

[illegible]

Worldwide sales offices

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THOMSON-CSF PASSIVE COMPONENTS BRAZIL Ltda
 Av. Prof. Vicente Rao, 1620
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 SAO PAULO - BRASIL
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 Fax : (5511) 2473059

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 CHARLOTTE NC 28269
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 Fax : (1 704) 597 0553

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