

Leaded ceramic multilayer capacitors

Mono-kap™ series

FEATURES

- Very high capacitance per unit volume
- Low cost.

APPLICATIONS

These conformally coated radial leaded capacitors are designed for commercial and industrial applications in three dielectrics, NP0 (ultra-stable), X7R (stable) and Z5U (general purpose). Applications include timing, coupling/decoupling, signal comparison and biasing. Mono-kap™ capacitors are suitable for automatic insertion equipment.

DESCRIPTION

The basic capacitor construction consists of ceramic dielectric materials processed into a tape with a typical thickness range from 0.025 to 0.076 mm. Metal electrode patterns are applied using a thick film screening process. Multiple layers are stacked and laminated in such a manner that electrodes are alternately exposed when the pattern is cut into individual chip capacitors. The capacitors are fired through a high temperature profile to mature the ceramic and metal into a homogeneous unit.

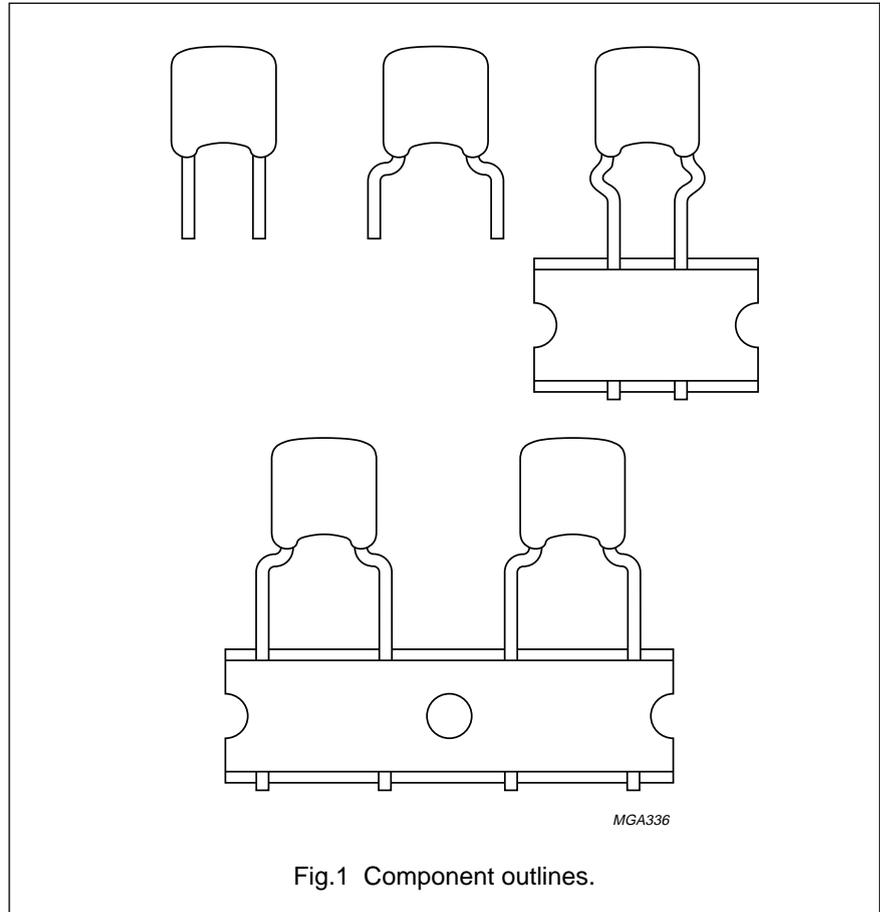


Fig.1 Component outlines.

Metal end terminations are applied and fired to provide electrical connection between the individual layers. Tinned leads are attached using a solder.

Encapsulation consists of a moisture-resistant gold colour conformal epoxy coating that meets the flame requirements of "UL94V-0".

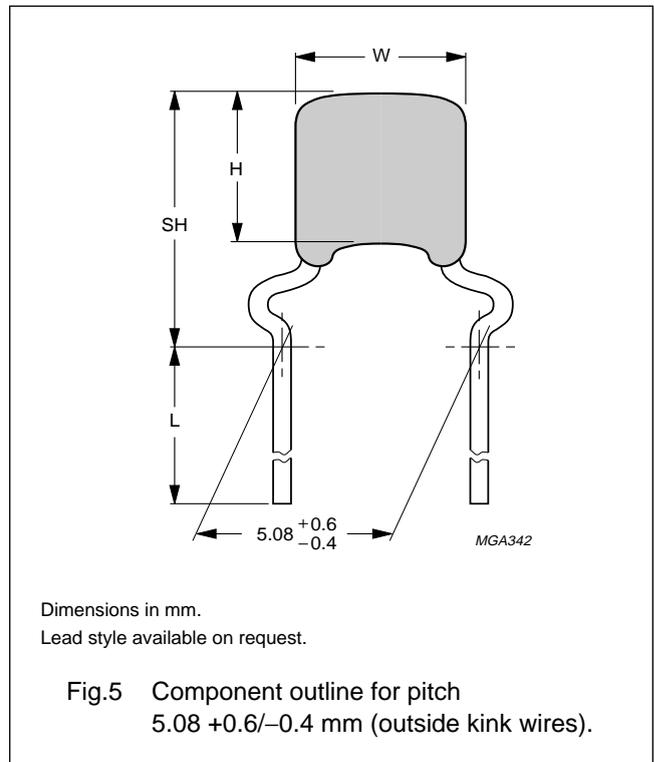
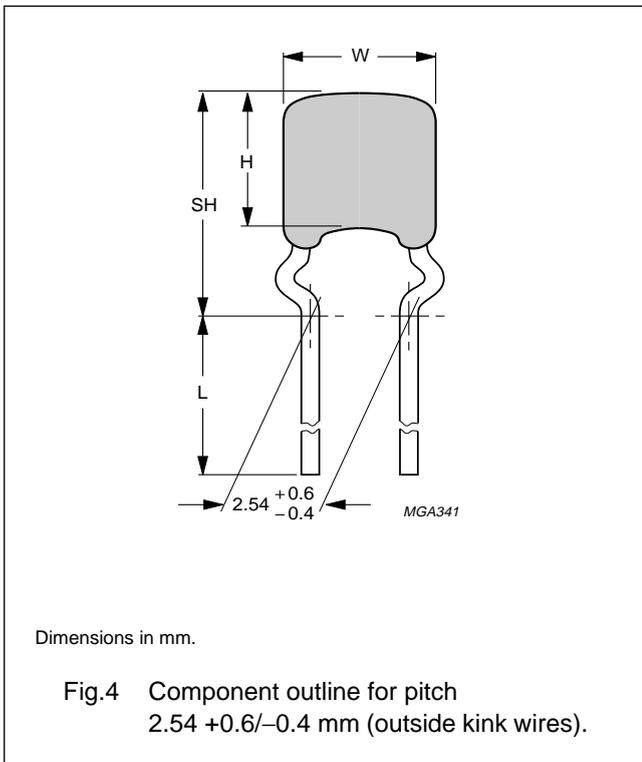
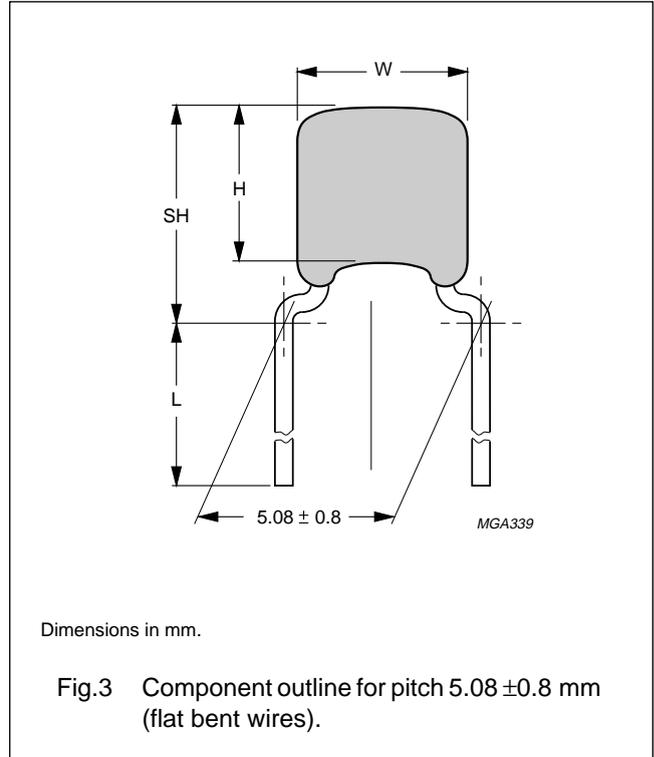
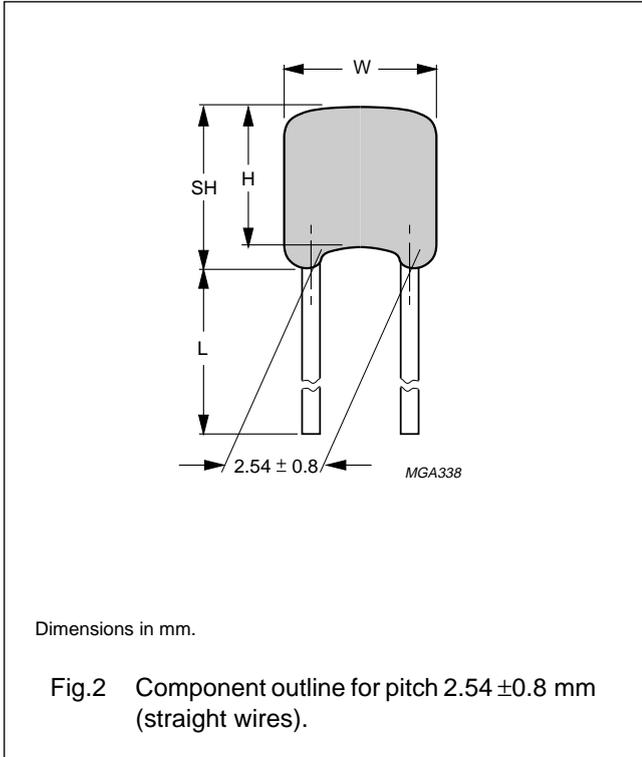
QUICK REFERENCE DATA

DESCRIPTION	VALUE		
	2222 730	2222 731	2222 733
Capacitance range (E12 series)	10 pF to 0.022 µF	220 pF to 1.0 µF	1000 pF to 1.0 µF
Rated DC voltage	50 and 100 V	50 and 100 V	50 and 100 V
Tolerance on capacitance	±5%; ±10%	±10%; ±20%	±20%; -20%/+80%
Temperature coefficient	NP0 (C0G)	X7R	Z5U

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MECHANICAL DATA



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Physical dimensions

Table 1 Capacitor dimensions and mass; notes 1 and 2

SIZE	W _{max} (mm)	H _{max} (mm)	T _{max} ⁽³⁾ (mm)	MAX. SEATING HEIGHT (SH) (mm)				MASS (g)
				Fig.2	Fig.3	Fig.4	Fig.5	
15	3.81 (0.150)	3.81 (0.150)	2.54 (0.100)	5.38 (0.212)	6.35 (0.250)	6.99 (0.275)	6.99 (0.275)	≈0.15
20	5.08 (0.200)	5.08 (0.200)	3.18 (0.125)	6.65 (0.262)	7.62 (0.300)	8.26 (0.325)	8.26 (0.325)	≈0.16
30	7.62 (0.300)	7.62 (0.300)	3.81 (0.150)	–	10.16 (0.400)	–	10.80 (0.425)	≈0.42

Notes

1. Bulk packed products have a standard lead length $L \geq 25.4$ mm.
2. Dimensions between the parentheses are in inches.
3. Thickness defined as T.

Marking⁽¹⁾ (see Fig.6)

Capacitance value (CCCT):

10 pF to 99 pF; actual value in pF
(2 digits only)

100 pF and above; coded
capacitance value (same as used
in P/N).

Tolerance (CCCT):

Standard EIA tolerance.

Material code (M V):

Standard EIA TC code

A = NP0 (C0G)

C = X7R

E = Z5U.

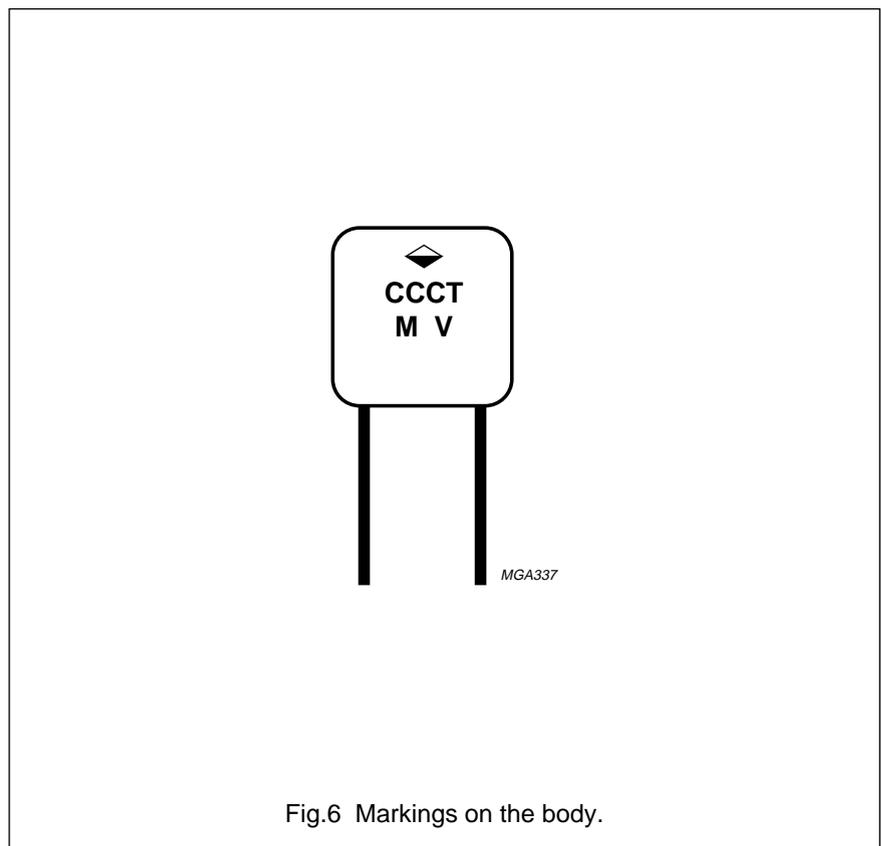
Voltage code (M V):

Standard EIA voltage code

1 = 100 V

5 = 50 V.

(1) Sizes 15 and 20 are marked with capacitance value and tolerance only.



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PACKAGING

For details refer to this handbook, Chapter "Leaded ceramic multilayer capacitors", Section "General data".

ORDERING INFORMATION**Table 2** Catalogue numbers

CAP. TOL.	PITCH ⁽²⁾ P (mm)	LEAD ⁽²⁾ DIA. d (mm)	CATALOGUE NUMBER 2222 73. ⁽¹⁾								
			BULK PACKED			ON TAPE ON REEL			ON TAPE IN AMMOPACK		
			U _R (DC)		Fig.	U _R (DC)		Fig.	U _R (DC)		Fig.
			50 V	100 V		50 V	100 V		50 V	100 V	
±5%	2.54 (0.1); note 3	0.5 (0.020)	05...	37...	2	09...	41...	4	13...	45...	4
±10%			06...	38...	2	10...	42...	4	14...	46...	4
±20%			07...	39...	2	11...	43...	4	15...	47...	4
-20/+80%			08...	40...	2	12...	44...	4	16...	48...	4
±5%	5.08 (0.2)	0.5 (0.020)	17...	49...	3	21...	53...	3	25...	57...	3
±10%			18...	50...	3	22...	54...	3	26...	58...	3
±20%			19...	51...	3	23...	55...	3	27...	59...	3
-20/+80%			20...	52...	3	24...	56...	3	28...	60...	3

Notes

1. Catalogue numbers to be completed by adding the 7th digit for the required dielectric and the last 3 digits for the required series and capacitance (see Tables 3, 4 and 5).
2. Dimensions between the parentheses are in inches.
3. Sizes 15 and 20 only.

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Table 3 Range of values for **NP0 (C0G)**, 2222 730; see Table 6 for conditions

CAPACITANCE VALUE (pF)	SIZE (see Table 1)		SUFFIX OF CATALOGUE NUMBER (see Table 2)
	U _R = 50 V (DC)	U _R = 100 V (DC)	
10	15	15	..109
12	15	15	..129
15	15	15	..159
18	15	15	..189
22	15	15	..229
27	15	15	..279
33	15	15	..339
39	15	15	..399
47	15	15	..479
56	15	15	..569
68	15	15	..689
82	15	15	..829
100	15	15	..101
120	15	15	..121
150	15	15	..151
180	15	15	..181
220	15	15	..221
270	15	15	..271
330	15	15	..331
390	15	15	..391
470	15	15	..471
560	15	15	..561
680	15	15	..681
820	15	15	..821
1000	15	20	..102
1200	20	20	..122
1500	20	20	..152
1800	20	20	..182
2200	20	20	..222
2700	20	20	..272
3300	20	20	..332
3900	20	20	..392
4700	20	20	..472
5600	30	30	..562
6800	30	30	..682
8200	30	30	..822
10000	30	30	..103
12000	30	–	..123
15000	30	–	...153
18000	30	–	..183
22000	30	–	..223

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Table 4 Range of values for X7R, 2222 731; see Table 6 for conditions

CAPACITANCE VALUE (pF)	SIZE (see Table 1)		SUFFIX OF CATALOGUE NUMBER (see Table 2)
	U _R = 50 V (DC)	U _R = 100 V (DC)	
220	15	15	..221
270	15	15	..271
330	15	15	..331
390	15	15	..391
470	15	15	..471
560	15	15	..561
680	15	15	..681
820	15	15	..821
1000	15	15	..102
1200	15	15	..122
1500	15	15	..152
1800	15	15	..182
2200	15	15	..222
2700	15	15	..272
3300	15	15	..332
3900	15	15	..392
4700	15	15	..472
5600	15	15	..562
6800	15	15	..682
8200	15	15	..822
10000	15	15	..103
12000	15	20	..123
15000	15	20	...153
18000	15	20	..183
22000	15	20	..223
27000	15	20	..273
33000	15	20	..333
39000	20	20	..393
47000	20	20	..473
56000	20	20	..563
68000	20	20	..683
82000	20	20	..823
100000	20	20	..104
120000	20	30	..124
150000	20	30	..154
180000	20	30	..184
220000	20	30	..224
270000	30	30	..274

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CAPACITANCE VALUE (pF)	SIZE (see Table 1)		SUFFIX OF CATALOGUE NUMBER (see Table 2)
	U _R = 50 V (DC)	U _R = 100 V (DC)	
330000	30	30	..334
390000	30	–	..394
470000	30	–	..474
560000	30	–	..564
680000	30	–	..684
820000	30	–	..824
1000000	30	–	..105

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Table 5 Range of values for Z5U, 2222 733; see Table 6 for conditions

CAPACITANCE VALUE (pF)	SIZE (see Table 1)		SUFFIX OF CATALOGUE NUMBER (see Table 2)
	U _R = 50 V (DC)	U _R = 100 V (DC)	
1000	15	15	..102
1200	15	15	..122
1500	15	15	..152
1800	15	15	..182
2200	15	15	..222
2700	15	15	..272
3300	15	15	..332
3900	15	15	..392
4700	15	15	..472
5600	15	15	..562
6800	15	15	..682
8200	15	15	..822
10000	15	15	..103
12000	15	20	..123
15000	15	20	..153
18000	15	20	..183
22000	15	20	..223
27000	15	20	..273
33000	15	20	..333
39000	15	20	..393
47000	15	20	..473
56000	15	20	..563
68000	15	20	..683
82000	15	20	..823
100000	15	20	..104
120000	20	30	..124
150000	20	30	..154
180000	20	30	..184
220000	20	30	..224
270000	20	30	..274
330000	20	30	..334
390000	30	30	..394
470000	30	30	..474
560000	30	–	..564
680000	30	–	..684
820000	30	–	..824
1000000	30	–	..105

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ELECTRICAL CHARACTERISTICS**Table 6** Electrical data for NP0, X7R and Z5U; conditions for Tables 3, 4 and 5

The capacitors meet the essential requirements of "IEC 384-8", "IEC 384-9" and "EIA-198". Unless stated otherwise all electrical values apply at an ambient temperature of 25 ± 3 °C, at barometric pressures of 650 to 800 mm of mercury, and relative humidity not to exceed 75%.

DESCRIPTION	VALUE
Capacitors with temperature coefficient NP0	
Capacitance range: at 1 MHz, 1 V; where $C \leq 1000$ pF at 1 kHz, 1 V; where $C > 1000$ pF	10 to 1000 pF 1200 pF to 0.022 μ F
Tolerance on the capacitance	$\pm 5\%$, $\pm 10\%$
Rated DC voltage	50 and 100 V
DC test voltage; duration 1 minute	250% of rated voltage
Insulation resistance at rated voltage	100000 M Ω or 1000 M $\Omega \times \mu$ F, whichever is less at 25 °C
Temperature coefficient of the capacitance	$0 \times 10^{-6}/K$
Tolerance on the temperature coefficient	$\pm 30 \times 10^{-6}/K$
Dissipation factor: at 1 MHz, 1 V; where $C \leq 1000$ pF at 1 kHz, 1 V; where $C > 1000$ pF	$< 15 \times 10^{-4}$ $< 15 \times 10^{-4}$
Operating temperature range	-55 to +125 °C
Storage temperature range	-55 to +85 °C
Capacitors with temperature coefficient X7R	
Capacitance range at 1 kHz, 1 V	220 pF to 1.0 μ F
Tolerance on the capacitance	$\pm 10\%$, $\pm 20\%$
Maximum capacitance variation with respect to capacitance value at 25 °C	$\pm 15\%$
Rated DC voltage	50 and 100 V
DC test voltage; duration 1 minute	250% of rated voltage
Insulation resistance at rated voltage	100000 M Ω or 1000 M $\Omega \times \mu$ F, whichever is less at 25 °C
Dissipation factor at 1 kHz, 1 V	$\leq 2.5\%$
Operating temperature range	-55 to +125 °C
Storage temperature range	-55 to +85 °C
Ageing	typical 1% per time decade

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DESCRIPTION	VALUE
Capacitors with temperature coefficient Z5U	
Capacitance range at 1 kHz, 0.5 V	1 000 pF to 1.0 μ F
Tolerance on the capacitance	$\pm 20\%$, $-20/+80\%$
Maximum capacitance variation with respect to capacitance value at 25 °C	$-56/+22\%$
Rated DC voltage	50 and 100 V
DC test voltage; duration 1 minute	250% of rated voltage
Insulation resistance at rated voltage	100 000 M Ω or 1 000 M Ω \times μ F, whichever is less at 25 °C
Dissipation factor at 1 kHz, 0.5 V	$\leq 4\%$
Operating temperature range	10 to 85 °C
Storage temperature range	-55 to $+85$ °C
Ageing	typical 6% per time decade