

DATA SHEET

Radial series Leaded ceramic multilayer capacitors

Product specification
File under BCE Sud Passive Components,

2003 Oct 16

Leaded ceramic multilayer capacitors

Radial 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 four dielectrics, NP0 (ultra-stable), X7R (stable) and Y5V (general purpose). Applications include timing, coupling/decoupling, signal comparison and biasing. Radial 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. Metal end terminations are applied and fired to provide electrical

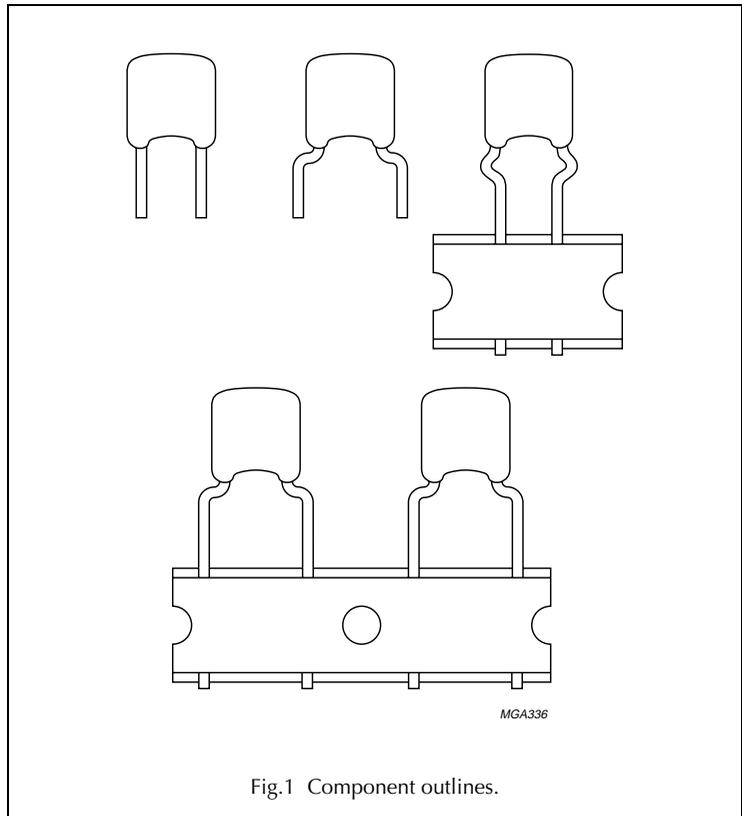


Fig.1 Component outlines.

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		
	0050 730	0050 731	0050 732
Capacitance range	10 to 47000 pF	100 pF to 1.0 μ F	1000 pF to 1.0 μ F
Rated DC voltage	50 V; 100 V	50 V; 100 V; 250 V	25 V; 50 V
Tolerance on capacitance	\pm 5%; \pm 10%	\pm 10%; \pm 20%	+80%/-20%
Temperature coefficient	NP0 (C0G)	X7R	Y5V

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MECHANICAL DATA

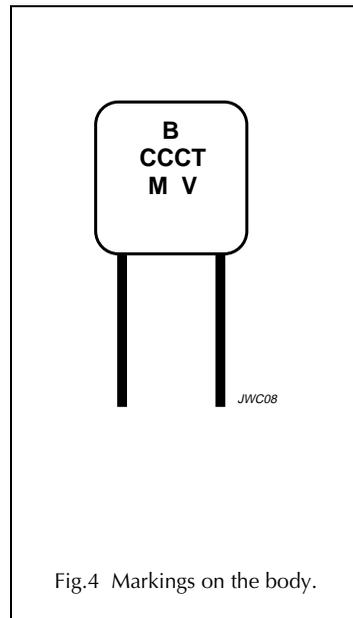
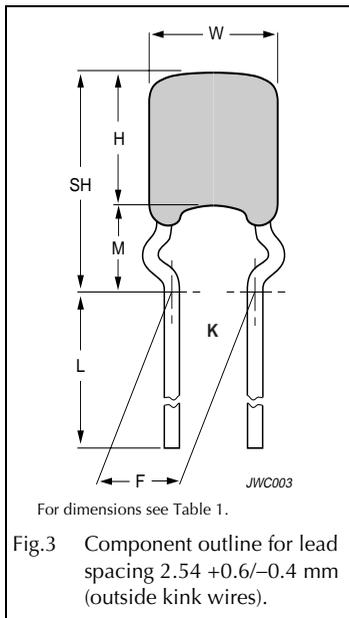
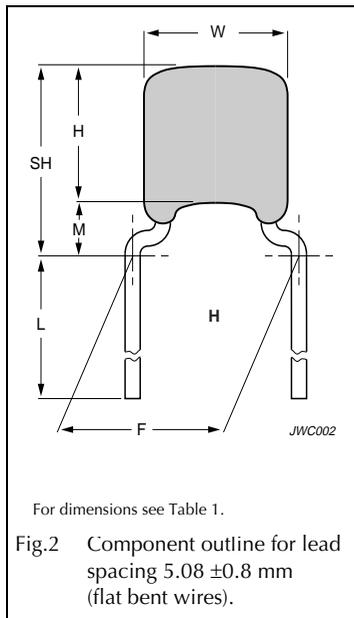


Table 1 Capacitor dimensions and mass; see Figs 2 and 3

SIZE CODE	LEAD STYLE	W _{max} (mm)	H _{max} (mm)	T _{max} ⁽¹⁾ (mm)	M (mm)	F (mm)	L (mm)	SH _{max} (mm)		MASS (g)
								Fig.2	Fig.3	
A	H	4.50	3.81	3.18	2.54	5.08	3.0 ± 0.5	6.35	–	≈0.15
	K				3.50	2.54		–	7.31	
	L ⁽²⁾				1.00	2.54		25 min.	–	
B	H	5.08	5.08	4.00	2.54	5.08	3.0 ± 0.5	7.62	–	≈0.16
	K				3.50	2.54/5.08		–	8.58	
	L ⁽²⁾				1.00	2.54		25 min.	–	
C	L ⁽²⁾	8.50	8.50	4.50	2.54	5.08	25 min.	–	–	≈0.40

Notes

1. Thickness defined as T.
2. Straight leads (lead style L) are available on request.
3. Preferred types in **bold**.

Marking (see Fig.4)

Capacitance code (CCC):

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).

Capacitance tolerance (T):
Standard EIA tolerance.

Material code (M):

A = NP0 (C0G)
C = X7R
Y = Y5V.

Voltage code (V):

1 = 100 V
3 = 25 V
5 = 50 V
? = 250 V.

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CAPACITANCE RANGE CHART AND CATALOGUE NUMBERS; see Table 2

CAP. (pF)	RATED VOLTAGE, DIELECTRIC, CATALOGUE NUMBER 0050 ... xx ⁽¹⁾ ... and SIZE CODE							LAST 3 DIGITS OF THE CATALOGUE NUMBER
	25 V	50 V			100 V		250 V	
	Y5V	NPO	X7R	Y5V	NPO	X7R	X7R	
	0050 732 xx ...	0050 730 xx ...	0050 731 xx ...	0050 732 xx ...	0050 730 xx ...	0050 731 xx ...	0050 731 xx ...	
10								109
12								129
15								159
18								189
22								229
27								279
33								339
39								399
47								479
56								569
68								689
82					A			829
100								101
120								121
150								151
180								181
220								221
270		A						271
330								331
390								391
470								471
560								561
680								681
820								821
1000								102
1200								122
1500								152
1800			A					182
2200								222
2700						B		272
3300					B			332
3900								392
4700								472
5600				A			B	562
6800		B						682
10000	A							103
22000								223
27000								273
33000		C						333
47000								473
56000								563
68000								683
100000								104
220000								224
330000								334
470000						C	C	474
560000			B	B				564
680000								684
1000000								105

Note

1. 8th and 9th digit of the catalogue number to be completed with the packaging code; see Table 2.

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ORDERING INFORMATION

Components may be ordered by using either a simple 8-digit clear text code, or our unique 12NC ordering code.

Clear text code

EXAMPLE: R103KXF54H = RADIAL/10000 pF/ $\pm 10\%$ /X7R/50 V/5.08 mm/4 ± 0.05 mm/flat bent

PRODUCT TYPE	CAPACITANCE (pF)	TOLERANCE	DIELECTRIC	RATED VOLTAGE (DC)	LEAD SPACE (mm)	LEAD LENGTH (mm)	LEAD STYLE
R = radial	two significant digits followed by the number of zeros: 100 = 10 101 = 100 103 = 10000 105 = 1000000	J = $\pm 5\%$ K = $\pm 10\%$ M = $\pm 20\%$ Z = $+80\%/-20\%$	C = NP0 X = X7R F = Y5V	E = 25 V F = 50 V H = 100 V K = 250 V	2 = 2.54 (0.100") 5 = 5.08 (0.200")	1 = 25 (min) 4 = 4 ± 0.5 mm 5 = 5 ± 0.5 mm T = ammo; H ₀ 16 mm ammo; H ₀ 18 mm	H = flat bent K = outside kink straight leads available on request

Ordering code 12NC

Table 2 Catalogue numbers 12NC

CAP. TOL.	LEAD SPACING (mm)	LEAD DIA. (mm)	CATALOGUE NUMBER 0050 73. ⁽¹⁾ ⁽²⁾									
			BULK					AMMO, H ₀ = 16 mm				
			U _R (DC)				Fig.	U _R (DC)				Fig.
			25 V	50 V	100 V	250 V		25 V	50 V	100 V	250 V	
$\pm 5\%$	2.54 (0.100"); note 3	0.5 (0.020); note 3	-	05...	37...	-	3	-	09...	41...	-	3
$\pm 10\%$			-	06...	38...	-	3	-	10...	42...	58...	3
$\pm 20\%$			67...	07...	39...	-	3	75...	11...	43...	59...	3
$+80/-20\%$			68...	08...	40...	-	3	76...	12...	44...	-	3
$\pm 5\%$	5.08 (0.200"); note 3	0.5 (0.020); note 3	-	17...	49...	-	2	-	21...	53...	-	2
$\pm 10\%$			-	18...	50...	81...	2	-	22...	54...	60...	2
$\pm 20\%$			71...	19...	51...	82...	2	79...	23...	55...	61...	2
$+80/-20\%$			72...	20...	52...	-	2	80...	24...	56...	-	2

Notes

- 7th digit is the dielectric code: NP0 = 0; X7R = 1; Y5V = 2.
- Last 3 digits for required series and capacitance; see "Capacitance range chart and catalogue numbers".
- Dimensions between parentheses are in inches.

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ELECTRICAL CHARACTERISTICS

Table 3 Electrical data for NP0, X7R and Y5V

The capacitors meet the essential requirements of "IEC 60384-8", "IEC 60384-9" 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 47000 pF
Tolerance on the capacitance	$\pm 5\%$; $\pm 10\%$
Rated DC voltage	50 V; 100 V
Dielectric strength	250% of rated voltage
Insulation resistance at rated voltage	100000 M Ω or 1000 M $\Omega \times \mu\text{F}$, whichever is less at rated voltage within 2 minutes of charging
Temperature coefficient of the capacitance	$0 \times 10^{-6}/\text{K}$
Tolerance on the temperature coefficient	$\pm 30 \times 10^{-6}/\text{K}$
Dissipation factor: at 1 MHz, 1 V; where $C \leq 30$ pF	$< \frac{1}{(400 + 20 \times C)}$
at 1 MHz; where $C > 30$ pF	$< 15 \times 10^{-4}$
at 1 kHz, 1 V; where $C > 1000$ pF	$< 15 \times 10^{-4}$
Operating temperature range	-55 to +125 °C
Storage temperature	25 \pm 15 °C
Capacitors with temperature coefficient X7R	
Capacitance range at 1 kHz, 1 V	100 pF to 1.0 μF
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 V; 100 V; 250 V
Dielectric strength	250% of rated voltage
Insulation resistance at rated voltage	100000 M Ω or 1000 M $\Omega \times \mu\text{F}$, whichever is less at rated voltage within 2 minutes of charging
Dissipation factor at 1 kHz, 1 V	$\leq 2.5\%$
Operating temperature range	-55 to +125 °C
Storage temperature	25 \pm 15 °C
Ageing	typical 1% per time decade

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DESCRIPTION	VALUE
Capacitors with temperature coefficient Y5V	
Capacitance range at 1 kHz, 1 V	0.1 to 1.0 μ F
Tolerance on the capacitance	+80%/-20%
Maximum capacitance variation with respect to capacitance value at 25 °C	-82%/+22%
Rated DC voltage	25 V; 50 V
Dielectric strength	250% of rated voltage
Insulation resistance at rated voltage	10000 M Ω or 1000 M Ω \times μ F, whichever is less at rated voltage within 2 minutes of charging
Dissipation factor at 1 kHz, 1 V	\leq 5%
Operating temperature range	10 to 85 °C
Storage temperature	25 \pm 15 °C
Ageing	typical 6% per time decade

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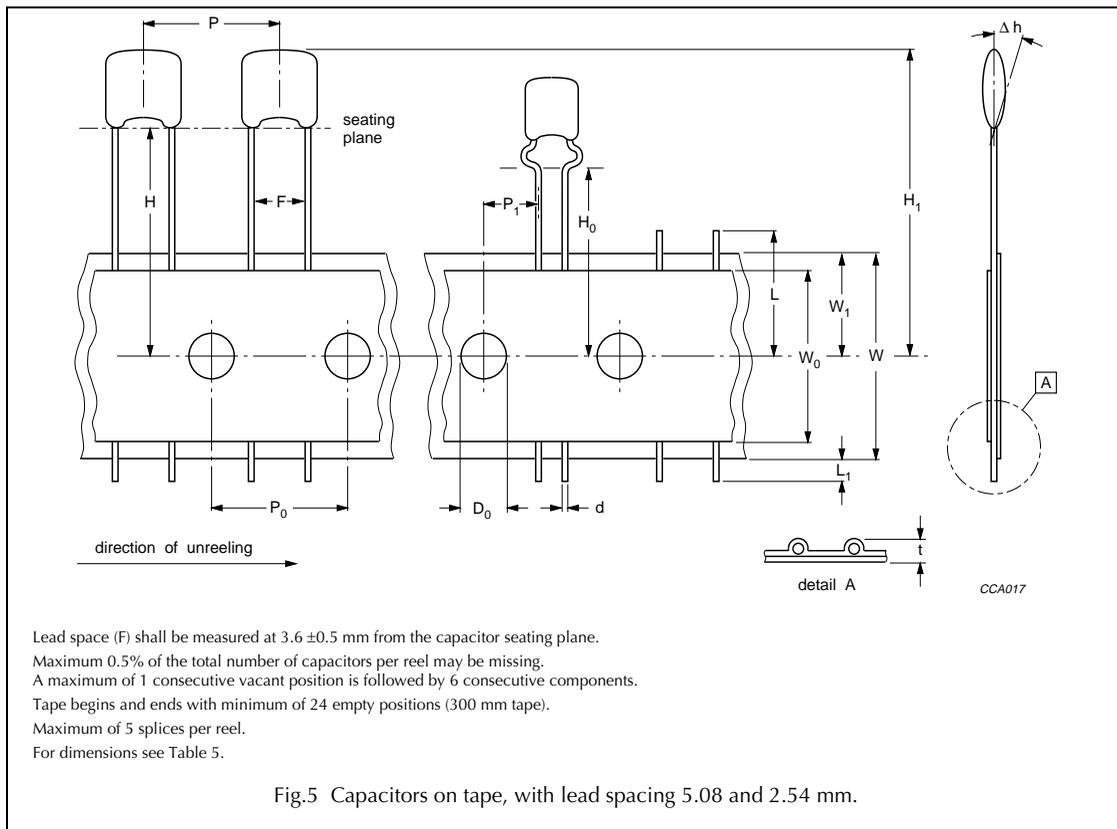
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PACKAGING

Table 4 Packaging quantities and box dimensions

PACKAGING	SIZE CODE	PACKAGING QUANTITY		BOX DIMENSIONS L × W × H (mm)
		BOX (pieces)	BAG (pieces)	
Ammopack	A, B and C	2000	–	323 × 150 × 50
Bulk	A, B and C	–	1000	–

Capacitors on tape, lead spacing 5.08 and 2.54 mm



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Table 5 Dimensions of tape; see Fig.5

SYMBOL	PARAMETER	DIMENSIONS	
		mm	inch
L	cut off length	≤11	≤0.443
L ₁	lead end protrusion	≤1	≤0.039
H	height to seating plane (straight leads)	≥16	≥0.709
H ₀	height to seating plane (formed leads)	16 ±0.5	0.630 ±0.020
H ₁	top of component height	≤32	≤1.260
Δh	body inclination	0.0 ±1.0	0 ±0.039
W	carrier tape width	18 +1.0/-0.5	0.709 +0.039/-0.020
W ₀	hold down tape width	15 ref.; note 1	0.591 ref.; note 1
W ₁	sprocket hole position	9 +0.075/-0.5	0.354 +0.030/-0.020
F	1e lead space; note 2	2.54 +0.6/-0.4	0.100 +0.024/-0.016
	2e lead space; note 2	5.08 +0.6/-0.4	0.200 +0.024/-0.016
P ₀	sprocket hole pitch	12.7 ±0.3	0.500 ±0.012
P ₁	1e sprocket hole centre to lead centre; note 2	5.08 ±0.7	0.200 ±0.028
	2e sprocket hole centre to lead centre; note 2	3.85 ±0.7	0.150 ±0.028
D ₀	sprocket hole diameter	4 ±0.3	0.157 ±0.012
t	overall tape thickness	≤0.9	≤0.035
d	wire lead diameter	0.5 ±0.05	0.02 ±0.002
P	taping pitch	12.7 ref.	0.500 ref.

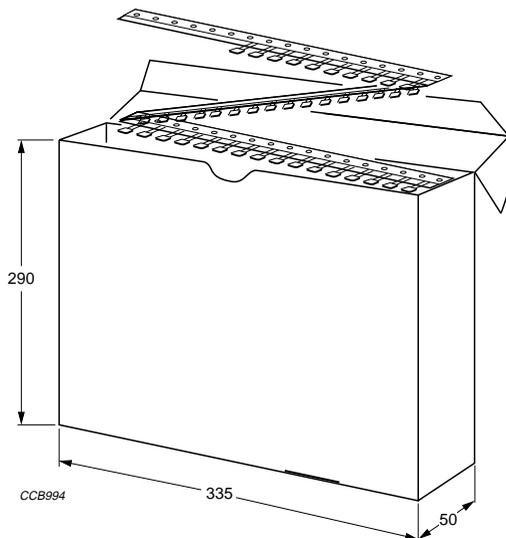
Notes

1. Tape width of 6 mm (0.236 inches) permissible.
2. e = 2.54 mm.

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AMMOPACK DATA



Dimensions in mm.

Maximum 0.5% of the total number of capacitors per box may be missing.

A maximum of 2 consecutive vacant positions is followed by 6 consecutive components.

Tape begins and ends with minimum of 24 empty positions (300 mm tape).

Maximum of 5 splices per box.

Cumulative pitch tolerance over 20 consecutive units not to exceed ± 1.0 mm.

Lead space (F) shall be measured at 3.6 ± 0.5 mm from the capacitor seating plane.

Fig.6 Ammopack with capacitors on tape.