

# Axial Leaded Multilayer Ceramic Capacitors for General Purpose

## Class 1 and Class 2, 50 V<sub>DC</sub>, 100 V<sub>DC</sub>, 200 V<sub>DC</sub>, 500 V<sub>DC</sub>


**FEATURES**

- High capacitance with small size
- High reliability
- Axial mounting style
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

**APPLICATIONS**

- Temperature compensation
- Coupling and decoupling

QUICK REFERENCE DATA								
DESCRIPTION	VALUE							
Ceramic Class	1				2			
Ceramic Dielectric	C0G				X7R			
Voltage (V <sub>DC</sub> )	50	100	200	500	50	100	200	500
Min. Capacitance (pF)	10	10	33	33	100	100	100	100
Max. Capacitance (pF)	10 000	5600	2200	1000	1 000 000	220 000	47 000	33 000
Mounting	Axial							

**MARKING**

Marking indicates capacitance value and tolerance in accordance with “EIA 198” and voltage marks.

**OPERATING TEMPERATURE RANGE**

C0G, X7R: -55 °C to +125 °C

**TEMPERATURE CHARACTERISTICS**

Class 1: C0G

Class 2: X7R

**SECTIONAL SPECIFICATIONS**

Climatic category (acc. to EN 60058-1)

Class 1 and 2: 55/125/21

**APPROVALS**

EIA 198

IEC 60384-9

**DESIGN**

- The capacitors consist of a general purpose MLCC
- The lead wires are 0.5 mm and are made of 100 % tinned copper clad steel wire
- Coating is made of yellow colored flame retardant epoxy resin in accordance with UL 94 V-0

**CAPACITANCE RANGE**

10 pF to 1 μF

**TOLERANCE ON CAPACITANCE**

± 5 %, ± 10 %, ± 20 %

**RATED VOLTAGE**

50 V<sub>DC</sub>, 100 V<sub>DC</sub>, 200 V<sub>DC</sub>, 500 V<sub>DC</sub>

**TEST VOLTAGE**

- 50 V<sub>DC</sub> and 100 V<sub>DC</sub>: 250 % of rated voltage
- 200 V<sub>DC</sub>: 150 % of rated voltage + 100 V<sub>DC</sub>
- 500 V<sub>DC</sub>: 130 % of rated voltage + 100 V<sub>DC</sub>

**INSULATION RESISTANCE AT 500 V<sub>DC</sub>**

- 50 V<sub>DC</sub> and 100 V<sub>DC</sub>: 100 GΩ or 1000 ΩF whichever is less at rated voltage within 2 min of charging
- 200 V<sub>DC</sub> and 500 V<sub>DC</sub>: 10 GΩ or 100 ΩF whichever is less at rated voltage within 2 min of charging

**DISSIPATION FACTOR**

Class 1: 0.1 % max. when C ≥ 30 pF  
(at 1 MHz; 1 V where C ≤ 1000 pF,  
and at 1 kHz; 1 V where C > 1000 pF)  
For C < 30 pF: DF = 100/(400 + 20 × C)  
DF = dissipation factor in %;  
C = capacitance value in pF

Class 2: 2.5 % max. (at 1 kHz; 1 V)

DIMENSIONS (in millimeters)		
SIZE CODE	Lb <sub>MAX.</sub>	Ø D <sub>MAX.</sub>
15	3.8	2.6
20	5.1	3.1

**Note**

- The leads are matte tinned FeCu wire

MARKING	
<p><b>CAPACITANCE VALUE &lt; 100 pF</b></p> <p><b>Side one</b></p> <p>Logo mark (BC or Vishay) DDD: Date code</p> <p><b>Side two</b></p> <p>XX: Capacitance code t: Tolerance code T: T.C. code V: Voltage code</p>	<p><b>CAPACITANCE VALUE ≥ 100 pF</b></p> <p><b>Side one</b></p> <p>Logo mark (BC or Vishay) DDD: Date code</p> <p><b>Side two</b></p> <p>XXX: Capacitance code t: Tolerance code T: T.C. code V: Voltage code</p>

MARKING CODE DESCRIPTION				
DDD	xxx	t	v	T
Date Code	Capacitance Code	Tolerance Code	Voltage Code	T.C. Code
The first digit is the year, the last two digits are the week. For example: 109 = 2011, 9 <sup>th</sup> week 217 = 2012, 17 <sup>th</sup> week	Two significant digits followed by one digit for the multiplier as given below. 1 = * 10, 2 = * 100, 3 = * 1000, 4 = * 10 000, 5 = * 100 000	J = ± 5 % K = ± 10 % M = ± 20 %	1 = 100 V 2 = 200 V 4 = 500 V 5 = 50 V	A = COG (NP0) C = X7R

**Note**

- The capacitance code indicates actual capacitance in pF when capacitance value < 100 pF

ORDERING CODE INFORMATION							
Product Type	Capacitance (pF)	Capacitance Tolerance	Size Code	TC Code	Rated Voltage	Lead Diameter	Packaging
A = axial leaded MLCC	The first two digits are the significant figures of capacitance and the last digit is a multiplier as follows: 0 = * 1 1 = * 10 2 = * 100 3 = * 1000 4 = * 10 000 5 = * 100 000	J = ± 5 % K = ± 10 % M = ± 20 %	Please refer to relevant datasheet	Please refer to relevant datasheet	F = 50 V <sub>DC</sub> H = 100 V <sub>DC</sub> K = 200 V <sub>DC</sub> L = 500 V <sub>DC</sub>	5 = 0.50 mm ± 0.05 mm	TAA = reel UAA = ammo



ORDERING CODES

DIELECTRIC COG				
CAP. (pF)	50 V <sub>DC</sub>	100 V <sub>DC</sub>	200 V <sub>DC</sub>	500 V <sub>DC</sub>
10	A100#15C0GF5###	A100#15C0GH5###	-	-
12	A120#15C0GF5###	A120#15C0GH5###	-	-
15	A150#15C0GF5###	A150#15C0GH5###	-	-
18	A180#15C0GF5###	A180#15C0GH5###	-	-
22	A220#15C0GF5###	A220#15C0GH5###	-	-
27	A270#15C0GF5###	A270#15C0GH5###	-	-
33	A330#15C0GF5###	A330#15C0GH5###	A330#15C0GK5###	A330#15C0GL5###
39	A390#15C0GF5###	A390#15C0GH5###	A390#15C0GK5###	A390#15C0GL5###
47	A470#15C0GF5###	A470#15C0GH5###	A470#15C0GK5###	A470#15C0GL5###
56	A560#15C0GF5###	A560#15C0GH5###	A560#15C0GK5###	A560#15C0GL5###
68	A680#15C0GF5###	A680#15C0GH5###	A680#15C0GK5###	A680#15C0GL5###
82	A820#15C0GF5###	A820#15C0GH5###	A820#15C0GK5###	A820#15C0GL5###
100	A101#15C0GF5###	A101#15C0GH5###	A101#15C0GK5###	A101#15C0GL5###
120	A121#15C0GF5###	A121#15C0GH5###	A121#15C0GK5###	A121#15C0GL5###
150	A151#15C0GF5###	A151#15C0GH5###	A151#15C0GK5###	A151#15C0GL5###
180	A181#15C0GF5###	A181#15C0GH5###	A181#15C0GK5###	A181#15C0GL5###
220	A221#15C0GF5###	A221#15C0GH5###	A221#15C0GK5###	A221#15C0GL5###
270	A271#15C0GF5###	A271#15C0GH5###	A271#15C0GK5###	A271#15C0GL5###
330	A331#15C0GF5###	A331#15C0GH5###	A331#15C0GK5###	A331#15C0GL5###
390	A391#15C0GF5###	A391#15C0GH5###	A391#15C0GK5###	A391#15C0GL5###
470	A471#15C0GF5###	A471#15C0GH5###	A471#15C0GK5###	A471#20C0GL5###
560	A561#15C0GF5###	A561#15C0GH5###	A561#15C0GK5###	A561#20C0GL5###
680	A681#15C0GF5###	A681#15C0GH5###	A681#15C0GK5###	A681#20C0GL5###
820	A821#15C0GF5###	A821#15C0GH5###	A821#15C0GK5###	A821#20C0GL5###
1000	A102#15C0GF5###	A102#20C0GH5###	A102#20C0GK5###	A102#20C0GL5###
1200	A122#15C0GF5###	A122#20C0GH5###	A122#20C0GK5###	-
1500	A152#15C0GF5###	A152#20C0GH5###	A152#20C0GK5###	-
1800	A182#15C0GF5###	A182#20C0GH5###	A182#20C0GK5###	-
2200	A222#15C0GF5###	A222#20C0GH5###	A222#20C0GK5###	-
2700	A272#20C0GF5###	A272#20C0GH5###	-	-
3300	A332#20C0GF5###	A332#20C0GH5###	-	-
3900	A392#20C0GF5###	A392#20C0GH5###	-	-
4700	A472#20C0GF5###	A472#20C0GH5###	-	-
5600	A562#20C0GF5###	A562#20C0GH5###	-	-
6800	A682#20C0GF5###	-	-	-
8200	A822#20C0GF5###	-	-	-
10 000	A103#20C0GF5###	-	-	-

Notes

- Lead diameter is 0.5 mm
- # 5<sup>th</sup> digit is capacitance tolerance code: ± 5 % = J; ± 10 % = K
- # 13<sup>th</sup>, 14<sup>th</sup> and 15<sup>th</sup> digits are packaging code: reel = TAA; ammo = UAA



DIELECTRIC X7R				
CAP. (pF)	50 V <sub>DC</sub>	100 V <sub>DC</sub>	200 V <sub>DC</sub>	500 V <sub>DC</sub>
100	A101#15X7RF5###	A101#15X7RH5###	A101#15X7RK5###	A101#15X7RL5###
120	A121#15X7RF5###	A121#15X7RH5###	A121#15X7RK5###	A121#15X7RL5###
150	A151#15X7RF5###	A151#15X7RH5###	A151#15X7RK5###	A151#15X7RL5###
180	A181#15X7RF5###	A181#15X7RH5###	A181#15X7RK5###	A181#15X7RL5###
220	A221#15X7RF5###	A221#15X7RH5###	A221#15X7RK5###	A221#15X7RL5###
270	A271#15X7RF5###	A271#15X7RH5###	A271#15X7RK5###	A271#15X7RL5###
330	A331#15X7RF5###	A331#15X7RH5###	A331#15X7RK5###	A331#15X7RL5###
390	A391#15X7RF5###	A391#15X7RH5###	A391#15X7RK5###	A391#15X7RL5###
470	A471#15X7RF5###	A471#15X7RH5###	A471#15X7RK5###	A471#15X7RL5###
560	A561#15X7RF5###	A561#15X7RH5###	A561#15X7RK5###	A561#15X7RL5###
680	A681#15X7RF5###	A681#15X7RH5###	A681#15X7RK5###	A681#15X7RL5###
820	A821#15X7RF5###	A821#15X7RH5###	A821#15X7RK5###	A821#15X7RL5###
1000	A102#15X7RF5###	A102#15X7RH5###	A102#15X7RK5###	A102#15X7RL5###
1200	A122#15X7RF5###	A122#15X7RH5###	A122#15X7RK5###	A122#15X7RL5###
1500	A152#15X7RF5###	A152#15X7RH5###	A152#15X7RK5###	A152#15X7RL5###
1800	A182#15X7RF5###	A182#15X7RH5###	A182#15X7RK5###	A182#15X7RL5###
2200	A222#15X7RF5###	A222#15X7RH5###	A222#15X7RK5###	A222#15X7RL5###
2700	A272#15X7RF5###	A272#15X7RH5###	A272#15X7RK5###	A272#15X7RL5###
3300	A332#15X7RF5###	A332#15X7RH5###	A332#15X7RK5###	A332#20X7RL5###
3900	A392#15X7RF5###	A392#15X7RH5###	A392#15X7RK5###	A392#20X7RL5###
4700	A472#15X7RF5###	A472#15X7RH5###	A472#15X7RK5###	A472#20X7RL5###
5600	A562#15X7RF5###	A562#15X7RH5###	A562#15X7RK5###	A562#20X7RL5###
6800	A682#15X7RF5###	A682#15X7RH5###	A682#15X7RK5###	A682#20X7RL5###
8200	A822#15X7RF5###	A822#15X7RH5###	A822#15X7RK5###	A822#20X7RL5###
10 000	A103#15X7RF5###	A103#15X7RH5###	A103#15X7RK5###	A103#20X7RL5###
12 000	A123#15X7RF5###	A123#15X7RH5###	A123#15X7RK5###	A123#20X7RL5###
15 000	A153#15X7RF5###	A153#15X7RH5###	A153#15X7RK5###	A153#20X7RL5###
18 000	A183#15X7RF5###	A183#15X7RH5###	A183#15X7RK5###	A183#20X7RL5###
22 000	A223#15X7RF5###	A223#15X7RH5###	A223#15X7RK5###	A223#20X7RL5###
27 000	A273#15X7RF5###	A273#20X7RH5###	A273#20X7RK5###	A273#20X7RL5###
33 000	A333#15X7RF5###	A333#20X7RH5###	A333#20X7RK5###	A333#20X7RL5###
39 000	A393#15X7RF5###	A393#20X7RH5###	A393#20X7RK5###	-
47 000	A473#15X7RF5###	A473#20X7RH5###	A473#20X7RK5###	-
56 000	A563#15X7RF5###	A563#20X7RH5###	-	-
68 000	A683#15X7RF5###	A683#20X7RH5###	-	-
82 000	A823#15X7RF5###	A823#20X7RH5###	-	-
100 000	A104#15X7RF5###	A104#20X7RH5###	-	-
150 000	A154#20X7RF5###	A154#20X7RH5###	-	-
220 000	A224#20X7RF5###	A224#20X7RH5###	-	-
330 000	A334#20X7RF5###	-	-	-
470 000	A474#20X7RF5###	-	-	-
560 000	A564#20X7RF5###	-	-	-
680 000	A684#20X7RF5###	-	-	-
1 000 000	A105#20X7RF5###	-	-	-

Notes

- Lead diameter is 0.5 mm
- # 5<sup>th</sup> digit is capacitance tolerance code: ± 10 % = K; ± 20 % = M
- # 13<sup>th</sup>, 14<sup>th</sup> and 15<sup>th</sup> digits are packaging code: reel = TAA; ammo = UAA



### TAPING AND PACKAGING

#### LABELLING

Each reel is provided with a label showing the following details:

Manufacturer, A style, capacitance, tolerance, batch number, quantity of components, rated voltage, dielectric.

On special request other designations can be shown.

For example:

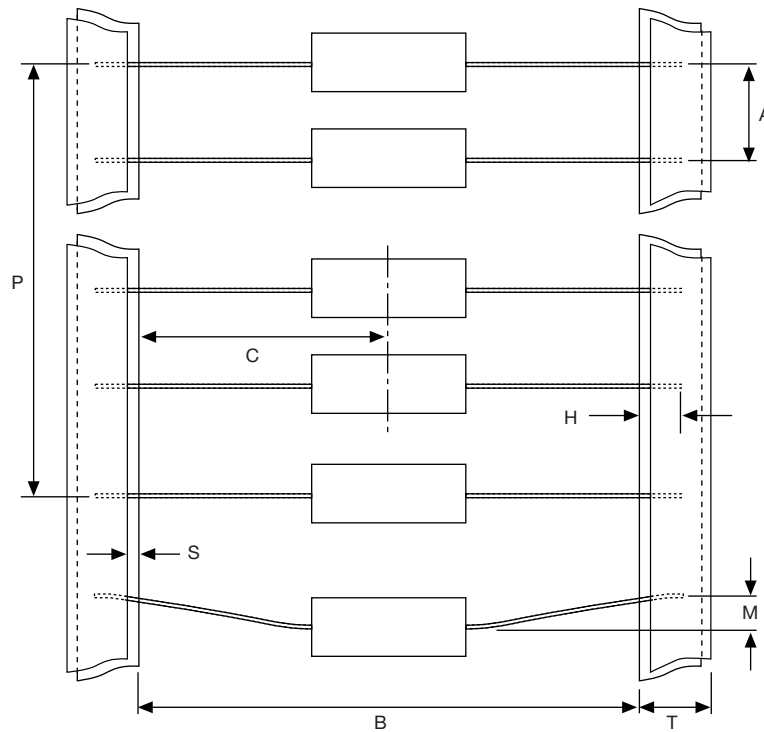


PN: A332K15X7RF5UAA	Lot1: 11W601503	DC1: 0602
QTY: 4000	Lot2:	DC2:
PO:	Batch: 200602CN	
SO:	Region: 9520	SL: 0010
	Ser.No: 0602A03681	



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PACKAGING QUANTITIES AND BOX DIMENSIONS			
PACKAGING	SIZE CODE	SMALLEST PACKAGING QUANTITY (SPQ)	BOX DIMENSIONS L x W x H (mm)
Tape on reel	15, 20	7000	370 x 370 x 90
Ammopack	15, 20	4000	265 x 85 x 95

**CAPACITORS ON BANDOLIER FOR DIPPED AXIAL**


PARAMETER	SYMBOL	DIMENSIONS	
		mm	INCH
Inside tape spacing	B <sup>(1)</sup>	52.4 ± 1.5	2.062 ± 0.059
Center to tape spacing	C	± 0.8	± 0.031
Cumulative pitch, 6 consecutive components	P	± 1.5	± 0.059
Components pitch	A	5.0 ± 0.5	0.197 ± 0.015
Lead bend	M	< 1.2	< 0.047
Exposed adhesive	S	< 0.51	> 0.020
Tape width	T	6.35	0.250
Lead sandwich	H	> 3.96	> 0.156

**Note**

<sup>(1)</sup> Inside tape spacing 26.0 mm + 1.51 mm/- 0.0 mm is available on request

### REEL DATA

A maximum of 0.5 % of the total number of capacitors per reel may be missing.

A maximum of 1 consecutive vacant positions is followed by 6 consecutive components.

Tape begins and ends with a minimum of 4 empty positions (180 mm tape).

Maximum of 5 splicers per reel.

### REEL



REEL DIMENSIONS		
REEL SIZE		(mm)
A	Outer diameter	355.6 max.
L	Hole diameter	28 ± 1
K	Core diameter	90
H <sub>1</sub>	Internal width	69.9 ± 1.5

### AMMOPACK DATA

A maximum of 0.5 % of the total number of capacitors per reel may be missing.

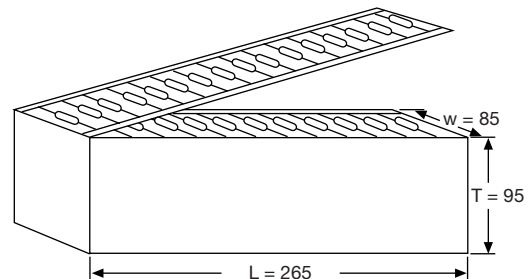
A maximum of 1 consecutive vacant positions is followed by 6 consecutive components.

Tape begins and ends with a minimum of 4 empty positions (180 mm tape).

Maximum of 5 splicers per reel.

The cumulative pitch tolerance over 20 consecutive units is not to exceed ± 1.0 mm.

### AMMOPACK



RELATED DOCUMENTS	
General Information	<a href="http://www.vishay.com/doc?45163">www.vishay.com/doc?45163</a>



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