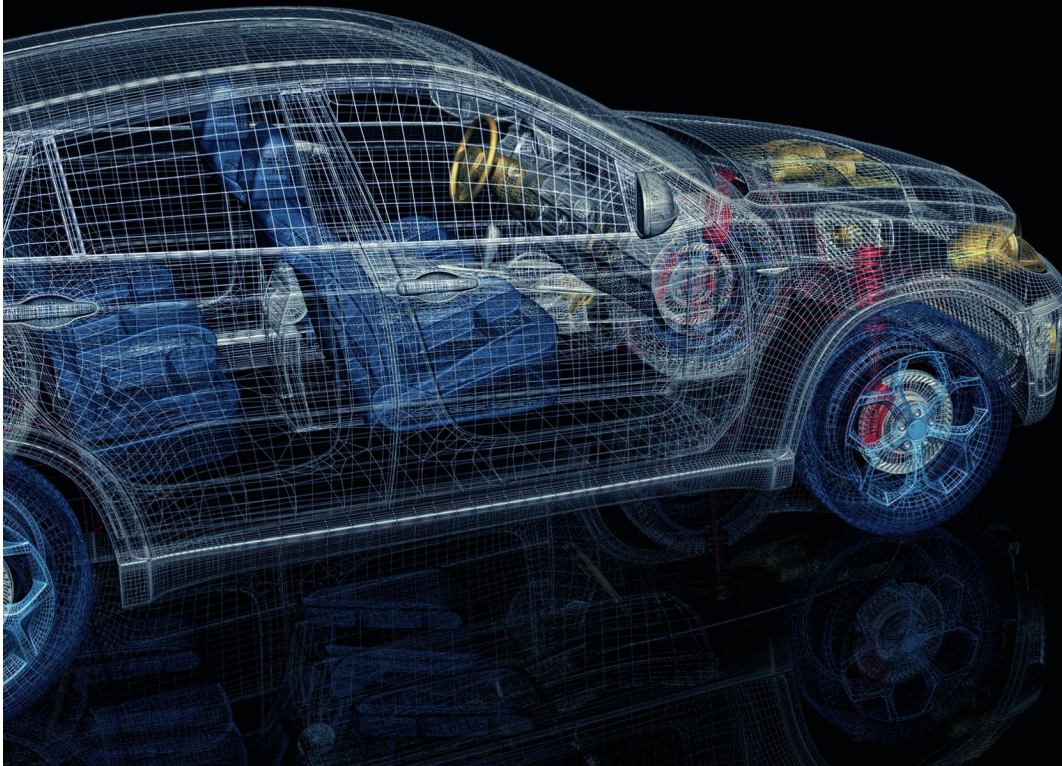


November 2019



MULTILAYER CERAMIC CAPACITORS for AUTOMOTIVE



To ensure safe drive



SAMSUNG
ELECTRO-MECHANICS



CL **10** **B** **104** **K** **B** **8** **W** **P** **N** **C**
1 **2** **3** **4** **5** **6** **7** **8** **9** **10** **11**

1 SERIES CODE

CL = Multilayer Ceramic Capacitors

2 SIZE CODE

Code	inch(mm)	Code	inch(mm)	Code	inch(mm)
05	0402(1005)	21	0805(2012)	32	1210(3225)
10	0603(1608)	31	1206(3216)		

3 DIELECTRIC CODE

Class I

Symbol	EIA Code	Operation Temperature Range(°C)	Temperature Coefficient(ppm / °C)
C	COG	-55 ~ +125	0 ± 30

Class II

Symbol	EIA Code	Operation Temperature Range(°C)	Capacitance Change(ΔC %)
B	X7R	-55 ~ +125	± 15
Y	X7S	-55 ~ +125	± 22
Z	X7T	-55 ~ +125	-33 ~ +22

4 CAPACITANCE CODE

Capacitance expressed in pF. 2 significant digits plus number of zeros.
 example) 106=10×10⁶=10,000,000pF

For Values < 10pF, Letter R denotes decimal point
 example) 1R5 = 1.5pF

5 TOLERANCE CODE

Capacitance Tolerance

Code	Capacitance Tolerance	TC	Capacitance series	Remark
C	± 0.25pF	COG	E-12 series*	under 5pF
D	± 0.5pF	COG	E-12 series*	5pF < Cp < 10pF
J	± 5%	COG	E-12 series	≥ 10pF
K	± 10%	X7R/X7S	E-6 series	
M	± 20%	X7R/X7S	E-6 series	

* E-24 series is also available

※ This code has only typical specifications. Please refer to individual specifications.

Code	Capacitance Step																					
	1.0			1.5			2.2			3.3			4.7			6.8						
E-3																						
E-6																						
E-12	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2										
E-24	1.0	1.1	1.2	1.3	2.2	2.4	2.7	3.0	4.7	5.1	5.6	6.2										
	1.5	1.6	1.8	2.0	3.3	3.6	3.9	4.3	6.8	7.5	8.2	9.1										

6 RATED VOLTAGE CODE

R = 4V Q = 6.3V P = 10V O = 16V A = 25V B = 50V C = 100V

7 THICKNESS CODE

Size mm(inch)	Code	Thickness*	Tolerance
1005(0402)	5	0.50	± 0.05
	6	0.50	± 0.20
	8	0.80	± 0.10
1608(0603)	9	0.90	± 0.10
	F	1.25	± 0.10
	Q	1.25	± 0.15
2012(0805)	Y	1.25	± 0.20
	H	1.60	± 0.20
	K	1.60	± 0.30
3216(1206)	J	2.50	± 0.20
	V	2.50	± 0.30

* In case of High Bending Strength, ESD protection capacitors, Please refer to individual specifications.
 ※ This code has only typical specifications. Please refer to individual specifications.

8 DESIGN CODE

Code	Inner electrode	Termination	Plating material	Design
1	Ni	Cu	NLSn 100%	Standard
V	Ni	Cu/Metal Epoxy	NLSn 100%	Standard
W	Ni	Cu/Metal Epoxy	NLSn 100%	Open Mode
X	Ni	Cu/Metal Epoxy	NLSn 100%	Float Mode

9 PRODUCT CODE OR SIZE CONTROL CODE

P = Automotive product meet AEC-Q200.

10 CONTROL CODE

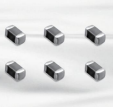
N = Standard J = High Bending Strength E = ESD Protection

11 PACKAGING CODE

Code	Type	Code	Type
C	Carboard Tape, 7'feed	E	Embossed Tape, 7'feed
D/L	Carboard Tape, 13'feed (Quantity option)	F	Embossed Tape, 13'feed

※ If you want to know the code or quantity in detail, please see page 21
 In order to move to the page directly, please click here.

Feature

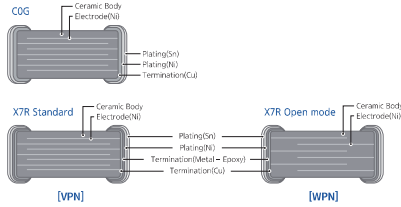
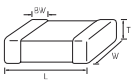


- Automotive products are manufactured in state of the art facilities recommend for registration to ISO 9001 & IATF 16949.
- Automotive products meet AEC-Q200 requirements.
- Automotive products are RoHS compliant.
- Automotive products meet JEDEC-Q20-D requirements.
- X7R dielectric components have BME and metal-epoxy terminations with a Ni/Sn plated overcoat.
- COG dielectric components contain BME and copper terminations with a Ni/Sn plated overcoat. Size 0603/0805/1206 is suitable for flow and reflow soldering. Size 0402 and smaller (≤ 0402) and 1210 and bigger (≥ 1210) is suitable for reflow soldering.

Application

- Automotive Electronic Equipment (Powertrain, Safety, Body & Chassis, Convenience, Infotainment)

Structure and Dimensions



Size Code	EIA Code	Dimension(mm)			
		L	W	T	BW
05	0402	1.00±0.05	0.50±0.05	0.50±0.05	0.25±0.10
10	0603	1.60±0.10	0.80±0.10	0.80±0.10	0.30±0.20
21	0805	2.00±0.10	1.25±0.10	1.25±0.10	0.5±0.2/0.3
31	1206	3.20±0.20	1.60±0.20	1.60±0.20	0.5±0.3
32	1210	3.20±0.30	2.50±0.20	2.00±0.20 2.50±0.20	0.6±0.3

Automotive Capacitance Table (X7R/X7S/X7T)

Size inch (mm)	Thickness (mm)	Rated Voltage (Vdc)	Capacitance											
			nF						uF					
			10	22	47	100	220	470	1	2.2	4.7	10	22	47
0402 (1005)	0.50	10	X7S X7S X7S											
		16	X7S											
		25												
		50												
		100												
0603 (1608)	0.80	6.3	X7T											
		10	X7S											
		16												
		25												
		50												
0805 (2012)	1.25	6.3	X7S											
		10	X7S											
		16	X7S											
		25												
		50												
1206 (3216)	1.60	10												
		1.15												
		16												
		25												
1210 (3225)	2.50	6.3	X7S											
		10	X7S											
		16												
		25	X7S											

Automotive Capacitance Table (COG)

Size inch (mm)	Thickness (mm)	Rated Voltage (Vdc)	Capacitance											
			pF			nF								
			100	220	470	1	2.2	4.7	10	22	47	100	220	
0402 (1005)	0.50	50												
		100												
0603 (1608)	0.80	50												
		100	270											
0805 (2012)	0.60 0.85 1.25	50												
		100												