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What is "[Embedded - Microcontrollers](#)"?

"[Embedded - Microcontrollers](#)" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "[Embedded - Microcontrollers](#)"

Details

Product Status	Active
Core Processor	ARM® Cortex®-M3
Core Size	32-Bit Single-Core
Speed	67MHz
Connectivity	I ² C, LINbus, SPI, UART/USART, USB
Peripherals	CapSense, DMA, LCD, POR, PWM, WDT
Number of I/O	62
Program Memory Size	256KB (256K x 8)
Program Memory Type	FLASH
EEPROM Size	2K x 8
RAM Size	64K x 8
Voltage - Supply (Vcc/Vdd)	1.71V ~ 5.5V
Data Converters	A/D 1x12b; D/A 2x8b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Surface Mount
Package / Case	100-LQFP
Supplier Device Package	100-TQFP (14x14)
Purchase URL	https://www.e-xfl.com/product-detail/infineon-technologies/cy8c5468axi-lp106

Chip Resistors General Information

Ordering information - North America

Phycomp CTC ordering code - North America

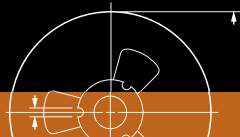
Ordering example: 9C06031A10R0FKHFT = R-Chip 0603, 10R0, 1%, 5K reel

1-2	3-6	7-8	9-12	13	14	15-16	17
XX	XXXX	XX	XXXX	X	X	XX	X
Series name (code 1-2)	Size code (standard resistors, code 3-6)	Power rating (code 7-8)	Resistance value (code 9-12)	Tolerance (code 13)	T. C. R. (code 14)	Special coding (code 15-16)	Packing style (code 17)
9C = Phycomp thick film chip resistors 9T = Phycomp thin film chip resistors	0201 0201 (0603) 0402 0402 (1005) 0603 0603 (1608) 0805 0805 (2012) 1206 1206 (3216) 1210 1210 (3225) 1218 1218 (3248) 2010 2010 (5025) 2512 2512 (6432) AC34 0603 (1608) 4R concave array AV34 0603 (1608) 4R convex array AV22 0402 (1005) 2R convex array AV24 0402 (1005) 4R convex array AV28 0402 (1005) 8R convex array RN31 10P8R in 1206 convex network FR01 1206 (3216) Fusible FR21 0603 (1608) Fusible SR01 1206 (3216) Surge VR01 1206 (3216) High voltage 5% VR02 1206 (3216) High voltage 1% VR11 0805 (2012) High voltage 5% VR12 0805 (2012) High voltage 1% VR21 2512 (6432) High voltage 5% MR22 2512 (6432) Current sensor - low T. C. R. MF22 2512 (6432) Current sensor - low T. C. R. V321 0404 (1010) RF attenuator	1A 1/16W 0.063W (0402) 1A 1/10W 0.10W (0603) 2A 1/8W 0.125W (0805) 3A 1/4W 0.25W (1206) 5A 1/2W 0.5W (1210) 7A 1/20W 0.05W (0201) 8A 1/32W 0.03125W (RN31) 12 3/4W 0.75W (2010) 1W 1W 1W (1218/2512) 2W 2W 2W	0R00 = Jumper R0XX < 0.1Ω RXXX = 0.1Ω - 0.976Ω XRXX = 1Ω - 9.76Ω XXRX = 10Ω - 97.6Ω XXX0 = 100Ω - 976Ω XXX1 = 1K - 9.76K XXX2 = 10K - 97.6K XXX3 = 100K - 9.78K XXX4 = 1M - 9.76M XXX5 = 10M - 97.6M XXX6 = 100M+ XXDB = 1 - 20DB	E = ±0.01% A = ±0.05% B = ±0.1%; 0.2dB C = ±0.25%; 0.3dB D = ±0.5%; 0.5dB F = ±1%; 1dB G = ±2%; 2dB J = ±5% N = 0/-20% R = 0/-30%	C = ±10 ppm/°C D = ±15 ppm/°C A = ±25 ppm/°C B = ±50 ppm/°C K = ±100 ppm/°C L = ±200 ppm/°C E = ±250 ppm/°C M = ±300 ppm/°C G = ±500 ppm/°C F = 0/+500 ppm/°C R = ±600 ppm/°C Q = -100/+600 ppm/°C P = ±750 ppm/°C H = ±1000 ppm/°C I = ±1500 ppm/°C J = ±2000 ppm/°C N = ±3000 ppm/°C	HF = SnPb PF = Lead-free AF = NiAu	T = 5K paper 3 = 10K paper 4 = 20K paper 5 = 4K blister 6 = 5K blister 7 = 50K paper P = 25K bulk case

dB values apply to
attenuators

Right values apply to
trimmable resistors





Chip Resistors General Information

IEC publication 63, SPQ, last digit of 12NC

Standard of values in a decade according to "IEC publication 63"												
E24 series	10	11	12	13	15	16	18	20	22	24	27	30
	33	36	39	43	47	51	56	62	68	75	82	91
E96 series	100	102	105	107	110	113	115	118	121	124	127	130
	133	137	140	143	147	150	154	158	162	165	169	174
	178	182	187	191	196	200	205	210	215	221	226	232
	237	243	249	255	261	267	274	280	287	294	301	309
	316	324	332	340	348	357	365	374	383	392	402	412
	422	432	442	453	464	475	487	499	511	523	536	549
	562	576	590	604	619	634	649	665	681	698	715	732
	750	768	787	806	825	845	866	887	909	931	953	976

Packing quantities								
Size code	Tape width	178mm / Ø7" reel		254mm / Ø10" reel	330mm / Ø13" reel		Weight	Volume
		Paper	Embossed	Paper	Paper	Embossed	g /100pcs	mm³
0100	8mm	20 000	---	---	---	---	0.007	0.0104
0201	8mm	10 000 / 20 000	---	---	50 000	---	0.016	0.041
0402	8mm	10 000 / 20 000	---	20 000	50 000	---	0.058	0.175
0603	8mm	5 000	---	10 000	20 000	---	0.192	0.576
0612	8mm	---	5 000	---	---	---	0.862	2.728
0805	8mm	4 000 / 5 000	---	10 000	20 000	---	0.450	1.250
0815	8mm	---	4 000	---	---	---	1.71	4.44
0830	12mm	---	4 000	---	---	---	4.594	5.55
1206	8mm	4 000 / 5 000	4 000	10 000	20 000	---	0.862	2.728
1210	8mm	5 000	---	10 000	20 000	---	1.471	4.030
1218	12mm	---	4 000	---	---	---	2.703	7.590
2010	12mm	---	4 000 / 2 000	---	---	16 000	2.273	6.875
2512	12mm	---	4 000	---	---	---	3.704	10.827
4527	24mm	---	1 000	---	---	---	16.225	48.3
YC102	8mm	10 000	---	---	---	---	0.052	---
YC104	8mm	10 000	---	---	---	---	0.099	---
AF/YC122	8mm	10 000	---	---	50 000	---	0.100	---
TC122	8mm	10 000	---	---	50 000	---	0.112	---
ATV321	8mm	10 000	--	---	---	---	0.100	---
AF/YC124	8mm	10 000	---	20 000	40 000	---	0.281	---
TC124	8mm	10 000	---	20 000	40 000	---	0.311	---
YC162	8mm	5 000	---	--	---	---	0.376	---
YC164	8mm	5 000	---	10 000	20 000	---	0.833	---
TC164	8mm	5 000	---	10 000	20 000	---	1.030	---
YC158	8mm	5 000	---	---	20 000	---	0.855	---
YC248	12mm	5 000	4 000	---	---	---	0.885	---
YC324	12mm	---	4 000	---	---	---	2.703	---
YC358	12mm	---	4 000	---	---	---	3.333	---

12NC Ordering information

The first 8 or 9 digits of the 12 digit catalogue number are given under section "Phycomp worldwide - Traditional type" on following pages.

The remaining 4 or 3 digits represent the resistance value with the last digit indicating the multiplier as shown in table on the right.

Example:

0.001 Ω = 0010 or 010

0.02 Ω = 0200 or 200

0.3 Ω = 3007 or 307

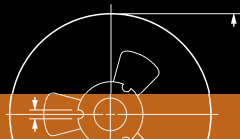
1 Ω = 1008 or 108

33 kΩ = 3303 or 333

10 MΩ = 1006 or 106

Last digit of 12NC	
Resistance	Last digit
0.001 to 0.0976 Ω	0
0.1 to 0.976 Ω	7
1 to 9.76 Ω	8
10 to 97.6 Ω	9
100 to 976 Ω	1
1 to 9.76 kΩ	2
10 to 97.6 kΩ	3
100 to 976 kΩ	4
1 to 9.76 MΩ	5
10 to 97.6 MΩ	6



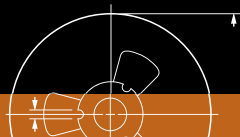


Chip Resistors Selection Charts

PT - Thick film low ohmic low T. C. R. chip resistors, wide termination, 0815

Electrical characteristics					
Type	Power P_{70}	Operating Temp. range	Max. working voltage	Tolerance	Resistance range & T. C. R.
PT0815	1/2W	-55°C to +155°C	$(P \times R)^{1/2}$	E24 $\pm 2\%$, $\pm 5\%$ E24/E96 $\pm 1\%$	$25\text{m}\Omega \leq R \leq 50\text{m}\Omega$ $\pm 100 \text{ ppm}/^\circ\text{C}$
	1W				

Environmental characteristics				
Performance test		Test method	Procedure	Requirements
Life		MIL-STD-202G-method 108A	1 000 hours at $70 \pm 5^\circ\text{C}$ applied RCWV 1.5 hours on, 0.5 hours off, still air required	$\pm(1\% + 0.0005\Omega)$
High temperature exposure		MIL-STD-202G-method 108A	1 000 hours at maximum operating temperature depending on specification, unpowered	$\pm(1\% + 0.0005\Omega)$
Moisture resistance		MIL-STD-202G-method 106F	Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H	$\pm(0.5\% + 0.0005\Omega)$
Solderability	Wetting	J-STD-002B testB	Electrical test not required. Magnification 50X Lead-free solder bath at $245 \pm 3^\circ\text{C}$ Dipping time: 3 ± 0.5 seconds	Well tinned ($\geq 95\%$ covered) No visible damage
	Resistance to soldering heat	MIL-STD-202G-method 210F	Lead-free solder, 260°C , 10 seconds immersion time	$\pm(0.5\% + 0.0005\Omega)$ No visible damage
Short time overload		MIL-R-55342D-para 4.7.5	PT standard power: 6.25 times of rated power for 5 seconds at room temperature PT high power: 5 times of rated power for 5 seconds at room temperature	$\pm(1\% + 0.0005\Omega)$ No visible damage



Chip Resistors Selection Charts

AR - NiAu termination chip resistors, 0402 to 1206

Electrical characteristics								
Type	Power P_{70}	Operating Temp. range	MWV	RCOV	DWV	Resistance range & tolerance	T. C. R. (ppm/°C)	Jumper criteria (unit: A)
AR0402	1/16W	-55°C to +155°C	50V	100V	100V	E24 $\pm 5\%$ $1\Omega \leq R \leq 10M\Omega$ E24/E96 $\pm 1\%$ $1\Omega \leq R \leq 10M\Omega$ Jumper $< 50M\Omega$	$10\Omega < R \leq 10M\Omega$ ± 100 $1\Omega \leq R \leq 10\Omega$ ± 200	Rated current 1.0 Max. current 2.0
AR0603	1/10W	-55°C to +155°C	50V	100V	100V			Rated current 1.0 Max. current 2.0
AR0805	1/8W	-55°C to +155°C	150V	300V	300V			Rated current 2.0 Max. current 5.0
AR1206	1/4W	-55°C to +155°C	200V	500V	500V			Rated current 2.0 Max. current 10.0

Environmental characteristics				
Performance test		Test method	Procedure	Requirements
Life		MIL-STD-202G-method 108A	1 000 hours at 70 $\pm 5^\circ\text{C}$ applied RCWV 1.5 hours on, 0.5 hours off, still air required	$\pm(2\% + 0.05\Omega)$ $< 100m\Omega$ for jumper
High temperature exposure		MIL-STD-202G-method 108A	1 000 hours at maximum operating temperature depending on specification, unpowered	$\pm(1\% + 0.05\Omega)$ $< 50m\Omega$ for jumper
Moisture resistance		MIL-STD-202G-method 106F	Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H	$\pm(2\% + 0.05\Omega)$ $< 100m\Omega$ for jumper
Thermal shock		MIL-STD-202G-method 107G	LCT / UCT, number of cycles required is 300 Maximum transfer time is 20 seconds	$\pm(0.5\% + 0.05\Omega)$ for 10K to 10M $\pm(1\% + 0.05\Omega)$ for others $< 50m\Omega$ for jumper
Solderability	Wetting	J-STD-002B testB	Electrical test not required. Magnification 50X Lead-free solder bath at 245 $\pm 3^\circ\text{C}$ Dipping time: 3 ± 0.5 seconds	Well tinned ($\geq 95\%$ covered) No visible damage
	Resistance to soldering heat	MIL-STD-202G-method 210F	Lead-free solder, 260°C, 10 seconds immersion time	$\pm(1\% + 0.05\Omega)$ $< 50m\Omega$ for jumper No visible damage
Short time overload		MIL-R-55342D-para 4.7.5	2.5 times RCWV or maximum overload voltage which- ever is less for 5 seconds at room temperature	$\pm(2\% + 0.05\Omega)$ $< 50m\Omega$ for jumper No visible damage

Chip Resistors Selection Charts

AF - Sulfur resistant chip resistors, 0201 to 2512

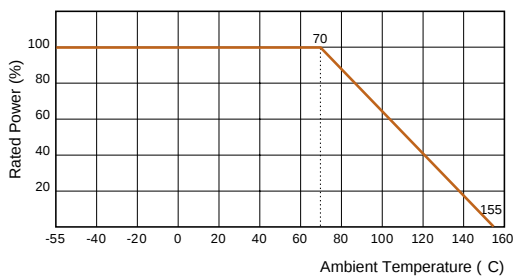


Features

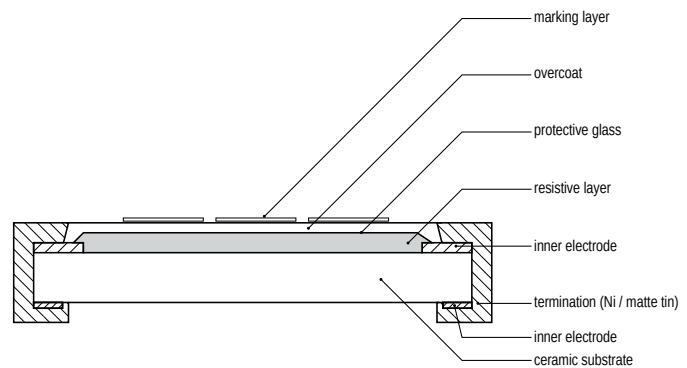
- Superior resistance against sulfur containing atmosphere
- Highly reliable multilayer electrode construction
- Compatible with all soldering processes
- Highly stable in auto-placement surface mounting applications
- Barrier layer end termination
- Halogen free product and production

Derating curve

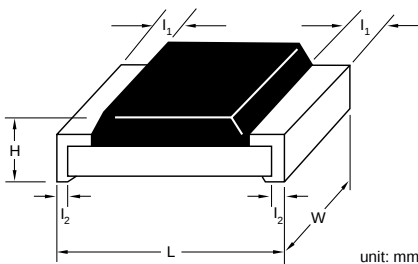
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature (T_{amb}).



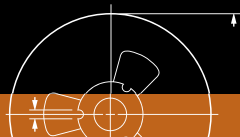
Construction



Dimensions

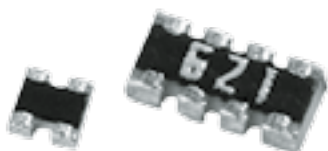


Type	L	W	H	l_1	l_2
AF0201	0.60±0.03	0.30±0.03	0.23 ±0.03	0.10±0.05	0.15±0.05
AF0402	1.00 ±0.05	0.50 ±0.05	0.32 ±0.05	0.20 ±0.10	0.25 ±0.10
AF0603	1.60 ±0.10	0.80 ±0.10	0.45 ±0.10	0.25 ±0.15	0.25 ±0.15
AF0805	2.00 ±0.10	1.25 ±0.10	0.50 ±0.10	0.35 ±0.20	0.35 ±0.20
AF1206	3.10 ±0.10	1.60 ±0.10	0.55 ±0.10	0.45 ±0.20	0.40 ±0.20
AF1210	3.10±0.10	2.60±0.15	0.50 ±0.10	0.45±0.15	0.50±0.20
AF1218	3.10±0.10	4.60±0.10	0.55 ±0.10	0.45±0.20	0.40±0.20
AF2010	5.00±0.10	2.50±0.15	0.55±0.10	0.55±0.15	0.50±0.20
AF2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.20	0.50±0.20



Chip Resistors Selection Charts

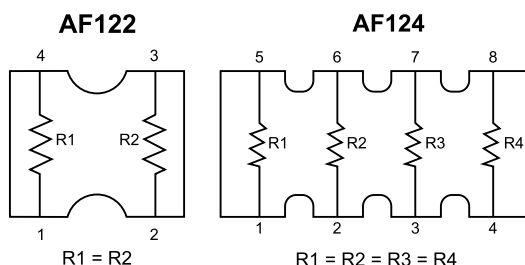
AF - Sulfur resistant chip resistors, Arrays



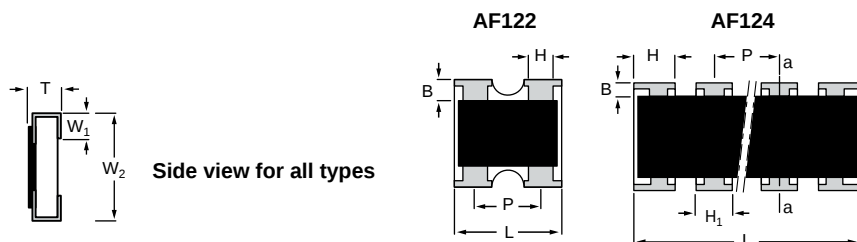
Features

- Superior resistance against sulfur containing atmosphere
- Highly reliable multilayer electrode construction
- Compatible with all soldering processes
- Highly stable in auto-placement surface mounting applications
- Barrier layer end termination
- Halogen free product and production

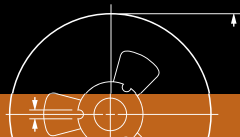
Schematics



Dimensions



Type	H / H1	B	P	L	T	W1	W2
AF122	0.30 +0.10/-0.05	0.24 ± 0.10	0.67 ± 0.05	1.00 ± 0.10	0.30 ± 0.10	0.25 ± 0.10	1.00 ± 0.10
AF124	H : 0.45 ± 0.05 H1 : 0.30 ± 0.05	0.20 ± 0.15	0.50 ± 0.05	2.00 ± 0.10	0.45 ± 0.10	0.30 ± 0.15	1.00 ± 0.10



Chip Resistors Selection Charts

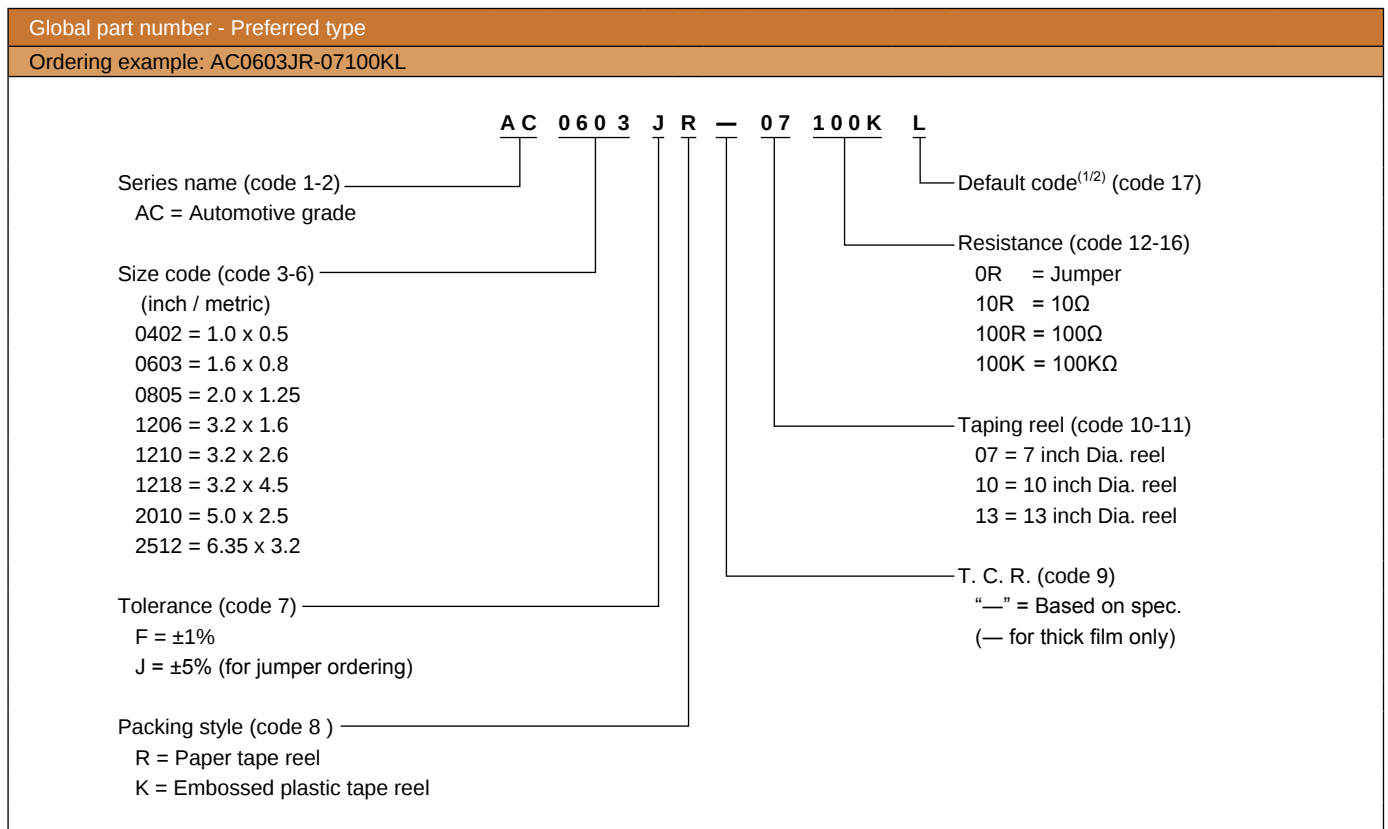
AC - Automotive grade chip resistors, 0402 to 2512

Electrical characteristics								
Type	Power P_{70}	Operating Temp. range	MWV	RCOV	DWV	Resistance range & tolerance	T. C. R. (ppm/°C)	Jumper criteria (unit: A)
AC0402	1/16W	-55°C to +155°C	50V	100V	100V	$E24 \pm 5\%$ $1\Omega \leq R \leq 10M\Omega$ $E24/E96 \pm 0.5\%, \pm 1\%$ $1\Omega \leq R \leq 10M\Omega$ Jumper $< 0.05\Omega$	$1\Omega \leq R \leq 10\Omega \pm 200$ $10\Omega < R \leq 10M\Omega \pm 100$	Rated current 1.0 Max. current 2.0
AC0603	1/10W	-55°C to +155°C	50V	100V	100V			Rated current 1.0 Max. current 2.0
AC0805	1/8W	-55°C to +155°C	150V	300V	300V			Rated current 2.0 Max. current 5.0
AC1206	1/4W	-55°C to +155°C	200V	400V	500V			Rated current 2.0 Max. current 10.0
AC1210	1/2W	-55°C to +155°C	200V	500V	500V			Rated current 2.0 Max. current 10.0
AC1218	1W	-55°C to +155°C	200V	500V	500V			Rated current 6.0 Max. current 10.0
AC2010	3/4W	-55°C to +155°C	200V	500V	500V			Rated current 2.0 Max. current 10.0
AC2512	1W	-55°C to +155°C	200V	500V	500V			Rated current 2.0 Max. current 10.0

Environmental characteristics				
Performance test		Test method	Procedure	Requirements
Life		AEC-Q200-REV C-Test 8 MIL-STD-202 Method 108	1 000 hours at 125°C applied RCWV 1.5 hours on, 0.5 hours off	$\pm(1\% + 0.05\Omega)$ $< 100m\Omega$ for jumper
High temperature exposure		AEC-Q200-REV C-Test 3 MIL-STD-202 Method 108	1 000 hours at maximum operating temperature depending on specification	$\pm(1\% + 0.05\Omega)$ $< 50m\Omega$ for jumper
Moisture resistance		AEC-Q200-REV C-Test 6 MIL-STD-202 Method 106	Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H.	$\pm(0.5\% + 0.05\Omega)$ for 1% tol. $\pm(2\% + 0.05\Omega)$ for 5% tol. $< 100m\Omega$ for jumper
Biased humidity		AEC-Q200-REV C-Test 7 MIL-STD-202 Method 103	1 000 hours; + 85°C 85% R.H.; 10% of operating power Measured at 24 $\pm$ 2 hours after test	$\pm(1\% + 0.05\Omega)$ $< 100m\Omega$ for jumper
Thermal shock		AEC-Q200-REV C-Test 16 MIL-STD-202 Method 107	LCT / UCT, number of cycles required is 300 Maximum transfer time is 20 seconds	$\pm(1\% + 0.05\Omega)$ $< 50m\Omega$ for jumper
Solderability	Wetting	AEC-Q200-REV C-Test 18 J-STD-002B testB	Electrical test not required. Magnification 50X Lead-free solder bath at 245 $\pm$ 3°C Dipping time: 3 $\pm$ 0.5 seconds	Well tinned ($\geq 95\%$ covered) No visible damage
	Resistance to soldering heat	AEC-Q200-REV C-Test 15 MIL-STD-202 Method 215	Lead-free solder, 260°C, 10 seconds immersion time	$\pm(1\% + 0.05\Omega)$ $< 50m\Omega$ for jumper No visible damage
Short time overload		MIL-R-55342D- para 4.7.5	2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature	$\pm(1\% + 0.05\Omega)$ $< 100m\Omega$ for jumper No visible damage

Chip Resistors Selection Charts

AC - Automotive grade chip resistors, 0402 to 2512

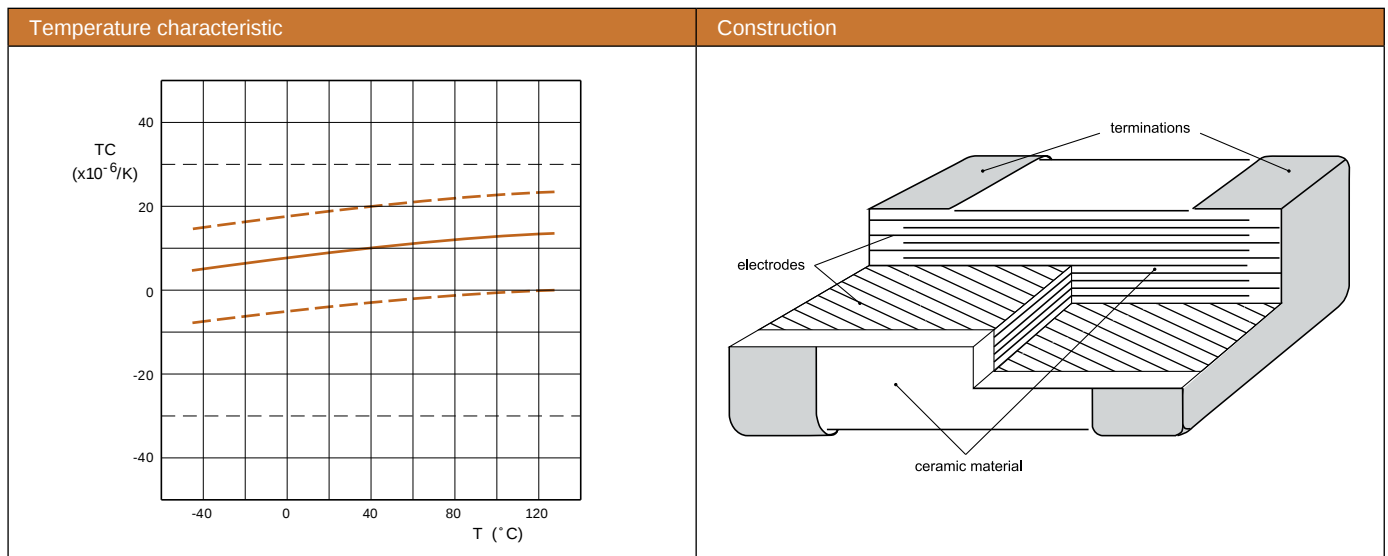


Note: 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
 2. Letter L is system default code for ordering only
 3. AC series products are available by "Global part number" only

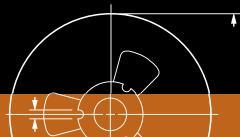


Features

- Capable of operating at high voltage levels
- For high frequency snubber
- Decoupling / smoothing function



Dimensions							
Discrete capacitors - Medium and High voltage							
	Case size designation		Dimensions in mm				
	Inch-based	Metric	L ₁	W	L ₂ / L ₃ min	L ₂ / L ₃ max	L ₄ min
	0402	1005M	1.0 ±0.05	0.5 ±0.05	0.15	0.30	0.40
	0603	1608M	1.6 ±0.10	0.8 ±0.10	0.20	0.60	0.40
	0805	2012M	2.0 ±0.20	1.25 ±0.20	0.25	0.75	0.55
	1206	3216M	3.2 ±0.30	1.6 ±0.20	0.25	0.75	1.40
	1210	3225M	3.2 ±0.40	2.5 ±0.30	0.25	0.75	1.40
	1808	4520M	4.5 ±0.40	2.0 ±0.30	0.25	0.75	2.20
	1812	4532M	4.5 ±0.40	3.2 ±0.30	0.25	0.75	2.20



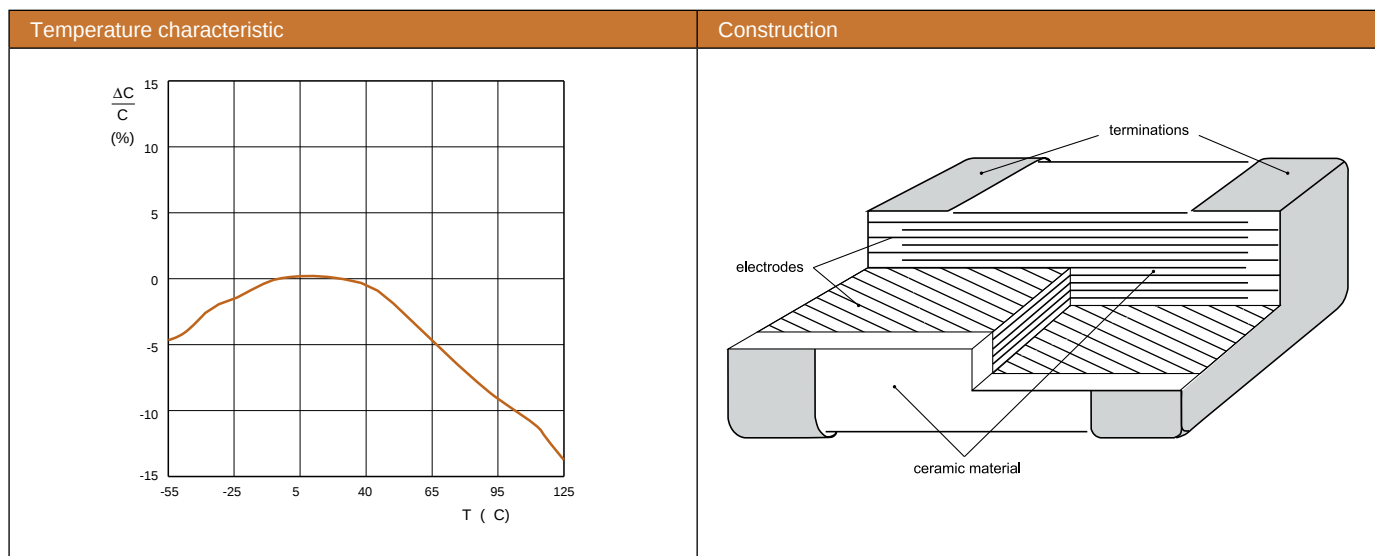
MLCC Selection Charts

X7R - General purpose & High capacitance, 01005 to 2220



Features

- Semi-stable on capacitance and high K
- High volumetric efficiency
- Highly reliable in high temperature application
- High insulation resistance



Case dimensions							
Discrete capacitors - General purpose & High capacitance							
	Case size designation		Dimensions in mm				
	Inch-based	Metric	L ₁	W	L ₂ / L ₃ min	L ₂ / L ₃ max	L ₄ min
	01005	0402M	0.4±0.02	0.2±0.02	0.07	0.14	0.14
	0201	0603M	0.6 ±0.03	0.3 ±0.03	0.10	0.20	0.20
			0.6 ±0.05	0.3 ±0.05	0.10	0.20	0.20
	0402	1005M	1.0 ±0.05 ⁽¹⁾	0.5 ±0.05 ⁽¹⁾	0.15	0.30	0.40
			1.0 ±0.20 ⁽²⁾	0.5 ±0.20 ⁽²⁾	0.15	0.30	0.40
	0603	1608M	1.6 ±0.10 ⁽¹⁾	0.8 ±0.10 ⁽¹⁾	0.20	0.60	0.40
			1.6 ±0.15 ⁽²⁾	0.8 ±0.15 ⁽²⁾	0.20	0.60	0.40
	0805	2012M	2.0 ±0.10 ⁽¹⁾	1.25 ±0.10 ⁽¹⁾	0.25	0.75	0.55
			2.0 ±0.20 ⁽²⁾	1.25 ±0.20 ⁽²⁾	0.25	0.75	0.55
	1206	3216M	3.2 ±0.15 ⁽¹⁾	1.6 ±0.15 ⁽¹⁾	0.25	0.75	1.40
			3.2 ±0.30 ⁽²⁾	1.6 ±0.20 ⁽²⁾	0.25	0.75	1.40
	1210	3225M	3.2 ±0.20 ⁽¹⁾	2.5 ±0.20 ⁽¹⁾	0.25	0.75	1.40
			3.2 ±0.40 ⁽²⁾	2.5 ±0.30 ⁽²⁾	0.25	0.75	1.40
	1808	4520M	4.5 ±0.40	2.0 ±0.30	0.25	0.75	2.20
	1812	4532M	4.5 ±0.20 ⁽¹⁾	3.2 ±0.20 ⁽¹⁾	0.25	0.75	2.20
			4.5 ±0.40 ⁽²⁾	3.2 ±0.40 ⁽²⁾	0.25	0.75	2.20
	2220	5750M	5.7 ±0.40	5.0 ±0.30	0.25	0.75	3.40

Note: 1. Dimension for size 0402, C < 4.7 μF; 0603, C < 10 μF; 0805 to 1812, C ≤ 100 nF
 2. Dimension for size 0402, C ≥ 4.7 μF; 0603, C ≥ 10 μF; 0805 to 1812, C > 100 nF

MLCC Selection Charts

X7R - Medium and High voltage, 0402 to 0805

X7R								
Medium voltage & High voltage								
Capacitance	0402	0603		0805				
	100 V	100 V	250 V	100 V	250 V	500 V	630 V	1000 V
100 pF	0.5 ±0.05	0.8 ±0.1						
150 pF								
220 pF								
330 pF			0.8 ±0.1	0.6 ±0.1	0.85 ±0.1	0.85 ±0.1	0.85 ±0.1	0.85 ±0.1
470 pF								
680 pF								
1.0 nF								
1.5 nF								
2.2 nF								
3.3 nF		0.8 ±0.1						
4.7 nF								
6.8 nF					1.25 ±0.2	1.25 ±0.2	1.25 ±0.2	
10 nF								
15 nF				0.85 ±0.1	1.25 ±0.2	1.25 ±0.2	1.25 ±0.2	
22 nF								
33 nF				1.25 ±0.2				
47 nF								
68 nF								
100 nF								
150 nF								
220 nF								
330 nF								
470 nF								
680 nF								
1000 nF								
2.2 µF								
4.7 µF								
10 µF								
22 µF								
47 µF								
100 µF								
Tape width	12 mm							

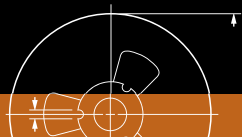
Note: Values in shaded cells indicate thickness class (unit: mm)

MLCC Selection Charts

X7R - Soft termination, 0603 / 0805

X7R											
Soft termination											
Capacitance	0603					0805					
	16 V	25 V	50 V	100 V	250 V	50 V	100 V	250 V	500 V	630 V	1000 V
100 pF	0.8 ±0.15	0.8 ±0.15	0.8 ±0.15	0.8 ±0.15							
150 pF											
180 pF											
220 pF											
330 pF										0.85 ±0.15	0.85 ±0.15
390 pF					0.8 ±0.15						
470 pF											
680 pF								0.85 ±0.15	0.85 ±0.15		
1.0 nF						0.6 ±0.15	0.6 ±0.15				
1.5 nF				0.8 ±0.15							
2.2 nF											
3.3 nF			0.8 ±0.15								
4.7 nF											
6.8 nF											
10 nF											
15 nF											
18 nF											
22 nF											
27 nF						0.85 ±0.15	0.85 ±0.15	1.25 ±0.2			
33 nF											
47 nF											
68 nF						1.25 ±0.2	1.25 ±0.2				
100 nF											
150 nF											
220 nF											
330 nF											
470 nF											
680 nF											
1000 nF											
2.2 µF											
4.7 µF											
10 µF											
22 µF											
47 µF											
100 µF											
Tape width	12 mm										

Note: Values in shaded cells indicate thickness class (unit: mm)



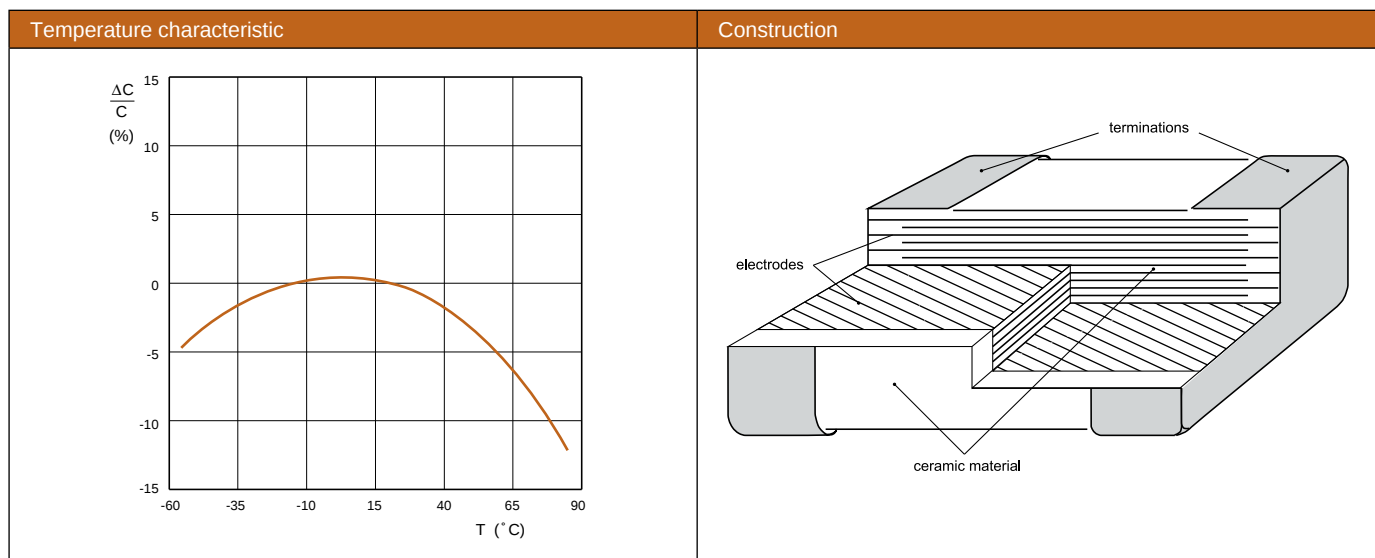
MLCC Selection Charts

X5R - General purpose & High capacitance, 01005 to 1812



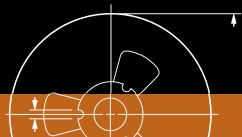
Features

- Semi-stable on capacitance and high K
- High volumetric efficiency
- Highly reliable in high temperature application
- High insulation resistance



Case dimensions							
Discrete capacitors - General purpose & High capacitance							
	Case size designation		Dimensions in mm				
	Inch-based	Metric	L ₁	W	L ₂ / L ₃ min	L ₂ / L ₃ max	L ₄ min
		01005	0.4±0.02	0.2±0.02	0.07	0.14	0.14
		0201	0.6 ±0.03 ⁽¹⁾	0.3 ±0.03 ⁽¹⁾	0.10	0.20	0.20
			0.6 ±0.05 ⁽²⁾	0.3 ±0.05 ⁽²⁾	0.10	0.20	0.20
		0402	1.0 ±0.05 ⁽¹⁾	0.5 ±0.05 ⁽¹⁾	0.15	0.30	0.40
			1.0 ±0.20 ⁽²⁾	0.5 ±0.20 ⁽²⁾	0.15	0.30	0.40
		0603	1.6 ±0.10 ⁽¹⁾	0.8 ±0.10 ⁽¹⁾	0.20	0.60	0.40
			1.6 ±0.20 ⁽²⁾	0.8 ±0.20 ⁽²⁾	0.20	0.60	0.40
		0805	2.0 ±0.10 ⁽¹⁾	1.25 ±0.10 ⁽¹⁾	0.25	0.75	0.55
			2.0 ±0.20 ⁽²⁾	1.25 ±0.20 ⁽²⁾	0.25	0.75	0.55
		1206	3.2 ±0.15 ⁽¹⁾	1.6 ±0.15 ⁽¹⁾	0.25	0.75	1.40
			3.2 ±0.30 ⁽²⁾	1.6 ±0.20 ⁽²⁾	0.25	0.75	1.40
		1210	3.2 ±0.20 ⁽¹⁾	2.5 ±0.20 ⁽¹⁾	0.25	0.75	1.40
			3.2 ±0.40 ⁽²⁾	2.5 ±0.30 ⁽²⁾	0.25	0.75	1.40
		1808	4.5 ±0.40	2.0 ±0.30	0.25	0.75	2.20
		1812	4.5 ±0.20 ⁽¹⁾	3.2 ±0.20 ⁽¹⁾	0.25	0.75	2.20
			4.5 ±0.40 ⁽²⁾	3.2 ±0.40 ⁽²⁾	0.25	0.75	2.20

Note: 1. Dimension for size 0201, C < 1 µF; 0402, C < 4.7 µF; 0603, C < 10 µF; 0805 to 1812, C ≤ 100 nF
 2. Dimension for size 0201, C ≥ 1 µF; 0402, C ≥ 4.7 µF; 0603, C ≥ 10 µF; 0805 to 1812, C > 100 nF



MLCC Selection Charts

NP0 / X7R - Automotive grade, 0402 to 1210



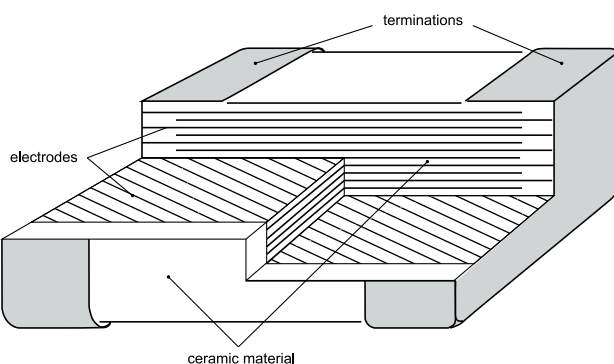
Features

- Comply with AEC-Q200 standard
- MSL class: MSL 1
- J-STD-020D and TS-16949 compliant
- Halogen free epoxy
- RoHS compliant

Applications

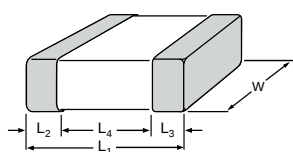
- All general purpose applications
- Entertainment applications
- Comfort / security applications
- Information applications

Construction



Dimensions

Discrete capacitors - Automotive grade



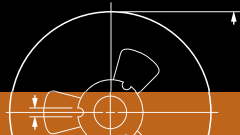
Case size designation		Dimensions in mm				
Inch-based	Metric	L1	W	L2 / L3 min	L2 / L3 max	L4 min
0402	1005M	1.0 ±0.05	0.5 ±0.05	0.15	0.30	0.40
0603	1608M	1.6 ±0.20	0.8 ±0.10	0.20	0.60	0.40
0805	2012M	2.0 ±0.20	1.25 ±0.20	0.25	0.75	0.55
1206	3216M	3.2 ±0.30	1.6 ±0.20	0.25	0.75	1.40
1210	3225M	3.2 ±0.30	2.5 ±0.20	0.25	0.75	1.40

High capacitance sample kits								
X5R 0402			X7R 0603			Y5V 0402		
Capacitance	Rated voltage	Tolerance	Capacitance	Rated voltage	Tolerance	Capacitance	Rated voltage	Tolerance
1 μF	6.3 V	$\pm 10\%$	1 μF	16 V	$\pm 10\%$	1 μF	6.3 V	-20% to +80%
1 μF	10 V	$\pm 10\%$	X7R 0805			1 μF	10 V	-20% to +80%
2.2 μF	6.3 V	$\pm 20\%$	Capacitance	Rated voltage	Tolerance	Y5V 0603		
X5R 0603			1 μF	25 V	$\pm 10\%$	Capacitance	Rated voltage	Tolerance
Capacitance	Rated voltage	Tolerance	2.2 μF	16 V	$\pm 10\%$	1 μF	10 V	-20% to +80%
1 μF	16 V	$\pm 10\%$	2.2 μF	25 V	$\pm 10\%$	1 μF	16 V	-20% to +80%
1 μF	25 V	$\pm 10\%$	X7R 1206			2.2 μF	10 V	-20% to +80%
2.2 μF	6.3 V	$\pm 10\%$	Capacitance	Rated voltage	Tolerance	2.2 μF	16 V	-20% to +80%
2.2 μF	10 V	$\pm 10\%$	1 μF	25 V	$\pm 10\%$	4.7 μF	6.3 V	-20% to +80%
2.2 μF	16 V	$\pm 10\%$	2.2 μF	25 V	$\pm 10\%$	Y5V 0805		
4.7 μF	6.3 V	$\pm 10\%$	4.7 μF	25 V	$\pm 10\%$	Capacitance	Rated voltage	Tolerance
4.7 μF	10 V	$\pm 10\%$	10 μF	16 V	$\pm 10\%$	1 μF	16 V	-20% to +80%
10 μF	6.3 V	$\pm 20\%$				1 μF	25 V	-20% to +80%
X5R 0805						1 μF	50 V	-20% to +80%
Capacitance	Rated voltage	Tolerance				2.2 μF	16 V	-20% to +80%
2.2 μF	25 V	$\pm 10\%$				4.7 μF	10 V	-20% to +80%
4.7 μF	6.3 V	$\pm 10\%$				10 μF	10 V	-20% to +80%
4.7 μF	10 V	$\pm 10\%$				Y5V 1206		
4.7 μF	16 V	$\pm 10\%$				Capacitance	Rated voltage	Tolerance
10 μF	6.3 V	$\pm 10\%$				4.7 μF	16 V	-20% to +80%
10 μF	10 V	$\pm 10\%$				10 μF	10 V	-20% to +80%
10 μF	16 V	$\pm 10\%$				10 μF	16 V	-20% to +80%
22 μF	6.3 V	$\pm 20\%$				22 μF	16 V	-20% to +80%
X5R 1206								
Capacitance	Rated voltage	Tolerance						
4.7 μF	16 V	$\pm 10\%$						
4.7 μF	25 V	$\pm 10\%$						
10 μF	16 V	$\pm 10\%$						
10 μF	25 V	$\pm 10\%$						
22 μF	6.3 V	$\pm 20\%$						

Note: 50 pieces per value. Ordering code CC88880000000000 for Yageo brand product

High capacitance sample kits for smart phone								
X5R 0201			X5R 0603			X5R 0805		
Capacitance	Rated voltage	Tolerance	Capacitance	Rated voltage	Tolerance	Capacitance	Rated voltage	Tolerance
100 nF	6.3 V	$\pm 10\%$	1 μF	16 V	$\pm 10\%$	2.2 μF	16 V	$\pm 10\%$
100 nF	10 V	$\pm 10\%$	1 μF	25 V	$\pm 10\%$	2.2 μF	25 V	$\pm 10\%$
220 nF	6.3 V	$\pm 20\%$	2.2 μF	10 V	$\pm 10\%$	4.7 μF	6.3 V	$\pm 10\%$
470 nF	6.3 V	$\pm 20\%$	2.2 μF	16 V	$\pm 10\%$	4.7 μF	10 V	$\pm 10\%$
1 μF	6.3 V	$\pm 20\%$	4.7 μF	6.3 V	$\pm 10\%$	4.7 μF	16 V	$\pm 10\%$
X5R 0402			4.7 μF	10 V	$\pm 10\%$	4.7 μF	25 V	$\pm 10\%$
Capacitance	Rated voltage	Tolerance	10 μF	6.3 V	$\pm 20\%$	10 μF	6.3 V	$\pm 10\%$
1 μF	6.3 V	$\pm 10\%$	22 μF	6.3 V	$\pm 20\%$	10 μF	10 V	$\pm 10\%$
1 μF	10 V	$\pm 10\%$				10 μF	16 V	$\pm 10\%$
1 μF	16 V	$\pm 10\%$				22 μF	6.3 V	$\pm 20\%$
2.2 μF	6.3 V	$\pm 20\%$				47 μF	6.3 V	$\pm 20\%$
4.7 μF	6.3 V	$\pm 20\%$				X5R 1206		
10 μF	6.3 V	$\pm 20\%$				Capacitance	Rated voltage	Tolerance
						10 μF	16 V	$\pm 10\%$
						10 μF	25 V	$\pm 10\%$
						22 μF	6.3 V	$\pm 10\%$
						47 μF	6.3 V	$\pm 20\%$

Note: 50 pieces per value. Ordering code SP8888000000000000 for Yageo brand product



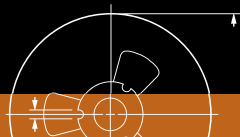
MLCC Engineering Design Kits

High voltage sample kits for general applications

High voltage sample kits for general applications					
NP0 1206			X7R 1206		
Capacitance	Rated voltage	Tolerance	Capacitance	Rated voltage	Tolerance
10 pF	1 kV	±5%	10 nF	1 kV	±10%
100 pF	1 kV	±5%	1 nF	2 kV	±10%
1 nF	1 kV	±5%	1 nF	1 kV	±10%
10 pF	2 kV	±5%	X7R 1210		
100 pF	2 kV	±5%	Capacitance	Rated voltage	Tolerance
NP0 1210			1 nF	1 kV	±10%
Capacitance	Rated voltage	Tolerance	10 nF	1 kV	±10%
10 pF	1 kV	±5%	1 nF	2 kV	±10%
100 pF	1 kV	±5%	X7R 1808		
1 nF	1 kV	±5%	Capacitance	Rated voltage	Tolerance
10 pF	2 kV	±5%	10 nF	1 kV	±10%
100 pF	2 kV	±5%	1 nF	3 kV	±10%
NP0 1808			1 nF	1 kV	±10%
Capacitance	Rated voltage	Tolerance	1 nF	2 kV	±10%
10 pF	1 kV	±5%	X7R 1812		
100 pF	1 kV	±5%	Capacitance	Rated voltage	Tolerance
1 nF	1 kV	±5%	10 nF	2 kV	±10%
10 pF	3 kV	±5%	1 nF	1 kV	±10%
100 pF	3 kV	±5%	10 nF	1 kV	±10%
10 pF	2 kV	±5%			
100 pF	2 kV	±5%			
NP0 1812					
Capacitance	Rated voltage	Tolerance			
10 pF	2 kV	±5%			
100 pF	2 kV	±5%			
1 nF	2 kV	±5%			
10 pF	1 kV	±5%			
100 pF	1 kV	±5%			
1 nF	1 kV	±5%			
10 pF	3 kV	±5%			
100 pF	3 kV	±5%			

Note: 50 pieces per value. Ordering code HV77770000000000 for Yageo brand product





X2Y® Product Selection Charts

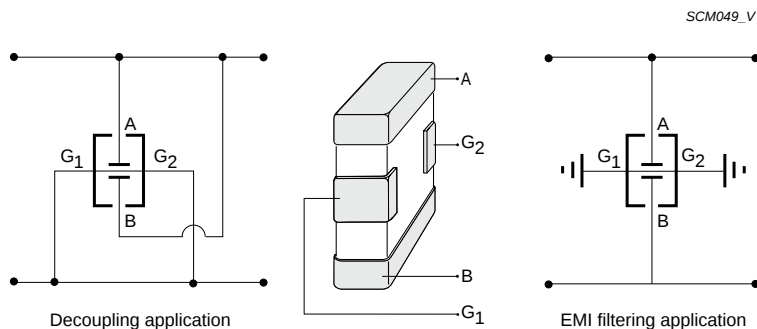
SMD ceramic EMI filter capacitors X2Y® series



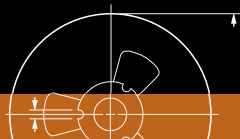
Features

- Broadband Filtering and Decoupling: X2Y® is effective up to 10 GHz and frequencies beyond
- Ultra Low ESL: Noise cancellation within X2Y® makes ESL reducing from nanohenry to picohenry levels
- Bypass: Unlike feedthrough capacitors, X2Y® is in bypass, so no DC current limitations
- Matched Y-caps: Two tightly matched line to ground capacitors in one device
- Superior Balance: Temperature and voltage variations balanced of two Y-caps
- Aging Reliability: Aging effects are equal on two Y-caps

Circuit of typical applications



Benefits	Applications
• Fewer Components in Filtering: One X2Y® can replace multiple inductors and/or capacitors • Superior Performance in Filtering: One X2Y® can eliminate both differential and common mode noises • Fewer Components in Decoupling: Up to 1:7 replacement of MLCC in power delivering system bypass networks • Superior Performance in Decoupling: Large or small, X2Y® components exhibit ultra low ESL • Total Cost Savings: Assembly cost savings through reduced component count and placement costs • Board Level Design Advantages: Dramatically reduces via drills, which blocks routing	• EMI filtering on DC motors • Filtered connectors (airbag connectors, RJ-45 connectors) • High speed data-line filtering • Decoupling of supply-lines in high speed digital circuits • Broadband filtering • Amplifier decoupling and EMI suppression • IC Decoupling, on-package, on-PCB • DC power line filtering • Data line filtering • EMI suppression for DC motors • Sensors • Audio



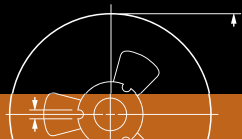
Wireless Components Selection Charts

Antenna - 2.4 GHz

2.4 GHz			
Model	Part No./ Description	Electrical Data	Mechanical Data
	ANT1204F001R2400A / CAN4311059012451K 1204 2.4GHz PIFA Chip Antenna	Freq. Range: 2400~2500 MHz VSWR *: 2.0 (Max) Polarization: Linear Peak Gain : 6.66 dBi(Typ.)	Size (mm) : 12*4*2.0 Operating Temp.: -40 ~ 105°C RoHS Compliance
	ANT1004F002R2400A / CAN4311041022451K 1004 2.4GHz PIFA Chip Antenna	Freq. Range: 2400~2500 MHz VSWR *: 2.0 (Max) Polarization: Linear Peak Gain : 1.55 dBi(Typ.)	Size (mm) : 10*4*2.0 Operating Temp.: -40 ~ 105°C RoHS Compliance
	ANT9520LL06R2400A / CAN4311795062452K 9520 2.4GHz Chip Antenna	Freq. Range: 2400~2500 MHz VSWR *: 2.5 (Max) Polarization: Linear Peak Gain : 2.85 dBi(Typ.)	Size (mm) : 9.5*2.0*1.2 Operating Temp.: -40 ~ 105°C RoHS Compliance
	ANT8010LL04R2400A / CAN4311781042453K 8010 2.4GHz Chip Antenna	Freq. Range: 2400~2500 MHz VSWR *: 2.0 (Max) Polarization: Linear Peak Gain : 5.88 dBi(Typ.)	Size (mm) : 8.0*1.0*1.0 Operating Temp.: -40 ~ 105°C RoHS Compliance
	ANT7836A003R2400A / CAN4311278032451K 7836 2.4GHz Chip Antenna	Freq. Range: 2400~2500 MHz VSWR *: 2.0 (Max) Polarization: Linear Peak Gain : 3.93 dBi dBi(Typ.)	Size (mm) : 7.8*3.6*0.5 Operating Temp.: -40 ~ 105°C RoHS Compliance
	ANT7020LL05R2400A / CAN4311772052452K 7020 2.4GHz Chip Antenna	Freq. Range: 2400~2500 MHz VSWR *: 2.8 (Max) Polarization: Linear Peak Gain : 2.62 dBi dBi(Typ.)	Size (mm) : 7.0*2.0*0.8 Operating Temp.: -40 ~ 105°C RoHS Compliance
	ANT5320LL45R2400A / CAN4311753452451K 5320 2.4GHz Chip Antenna	Freq. Range: 2400~2500 MHz VSWR *: 2.0 (Max) Polarization: Linear Peak Gain : 5.5 dBi dBi(Typ.)	Size (mm) : 5.3*2.0*1.2 Operating Temp.: -40 ~ 105°C RoHS Compliance
	ANT5320LL24R2400A / CAN4311753242452K 5320 2.4GHz PIFA Chip Antenna	Freq. Range: 2400~2500 MHz VSWR *: 2.0 (Max) Polarization: Linear Peak Gain : 2.78 dBi(Typ.)	Size (mm) : 5.3*2.0*1.25 Operating Temp.: -40 ~ 105°C RoHS Compliance
	ANT5010LL04R2400A / CAN4311751042453K 5010 2.4GHz Chip Antenna	Freq. Range: 2400~2500 MHz VSWR *: 2.8 (Max) Polarization: Linear Peak Gain : 2.28 dBi(Typ.)	Size (mm) : 5.0*1.0*1.0 Operating Temp.: -40 ~ 105°C RoHS Compliance
	ANT3216LL00R2400A / CAN4311712002453K 3216 2.4Ghz Chip Antenna	Freq. Range: 2400~2500 MHz VSWR *: 2.5 (Max) Polarization: Linear Peak Gain : 5 dBi(Typ.)	Size (mm) : 3.2*1.6*1.3 Operating Temp.: -40 ~ 105°C RoHS Compliance
	ANT3216A063R2400A / CAN4311212632453K 3216 2.4GHz PIFA Chip Antenna	Freq. Range: 2400~2500 MHz VSWR *: 2.0 (Max) Polarization: Linear Peak Gain : 1.69 dBi(Typ.)	Size (mm) : 3.2*1.6*0.5 Operating Temp.: -40 ~ 105°C RoHS Compliance
	ANT3012LL04R2400A / CAN4311792042453K 3012 2.4GHz Chip Antenna	Freq. Range: 2400~2500 MHz VSWR *: 2.0 (Max) Polarization: Linear Peak Gain : 1.84 dBi(Typ.)	Size (mm) : 3.0*1.2*1.2 Operating Temp.: -40 ~ 105°C RoHS Compliance

* VSWR depends on the environment



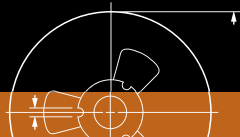


Wireless Components Selection Charts

Antenna - Others

FM			
Model	Part No./ Description	Electrical Data	Mechanical Data
	ANT2405F001R0098A / CAN4311050010882K	Freq. Range : 88 MHz VSWR* : 2.0 (Max)	Size (mm) : 24*5*1.6 Operating Temp. : -40 ~ 105°C
	2405 FM Chip Antenna	Polarization : Linear Peak Gain : N/A	RoHS Compliance
	ANT1105LF00R0098A / CAN4311858000882K	Freq. Range : 88 MHz VSWR* : 2.0 (Max)	Size (mm) : 11*5*1.3 Operating Temp. : -40 ~ 105°C
	1105 FM (Ferrite) Chip Antenna	Polarization : Linear Peak Gain : N/A	RoHS Compliance
SDARS			
Model	Part No./ Description	Electrical Data	Mechanical Data
	ANT2525B00DT2300A / CAN43134250D2301B	Freq. Range : 2320~2345 MHz VSWR* : 2.0 (Max)	Size (mm) : 25*25*4 Operating Temp. : -40 ~ 105°C
	25254 SDARS Patch Antenna	Polarization : LHCP Peak Gain : 6 dBic(Typ.)	Mounting : PIN RoHS Compliance
1.88~2.1 GHz			
Model	Part No./ Description	Electrical Data	Mechanical Data
	ANT8868LL00R1880A / CAN4311788001881K	Freq. Range : 1880~2000 MHz VSWR* : 2.0 (Max)	Size (mm) : 8.8*6.8*0.9 Operating Temp. : -40 ~ 105°C
	8868 DECT Chip Antenna	Polarization : Linear Peak Gain : 6.13 dBi(Typ.)	RoHS Compliance

* VSWR depends on the environment



Wireless components Engineering Design Kits

Sample Kits

M2M Application : Antenna Ordering code ANT5B000000020140		
Product Series	PART NUMBER	Frequency Range (MHz)
2.4GHz	ANT1204F001R2400A	2400 - 2500
	ANT8010LL04R2400A	2400 - 2500
	ANT5320LL24R2400A	2400 - 2500
	ANT3216A063R2400A	2400 - 2500
	ANT3216LL00R2400A	2400 - 2500
	ANT2012LL13R2400A	2400 - 2500
	ANTX200P001B24003	2400 - 2500
2.4/5 GHz	ANT5320LL04R2455A	2400 - 2500 5150 - 5875
	ANT5320LL24R2455A	2400 - 2500 5150 - 5875
	ANTX100P001B24553	2400 - 2500 5150 - 5875
	ANTX200P002B24553	2400 - 2500 5150 - 5875
GPS	ANT6230LL01R1575A	1575
	ANT5320LL14R1575A	1575
	ANT3216LL15R1575A	1575
	ANT1212B00DT1575A	1575
	ANT1515B00FT1575A	1575
	ANT1818B00AT1575A	1575
	ANT2525B00BT1575A	1575
	ANT2525B00FT1575A	1575
GPS& GLONASS	ANT1818B00BT1516A	1575 / 1602
	ANT1818B00DT1516A	1575 / 1602
	ANT2525B00BT1516A	1575 / 1602
	ANT2525B00DT1516A	1575 / 1602
Active GPS	ANT1818JB30B1575A	1575
2.4GHz + GPS	ANT5320LL17R1524A	1575 / 2400
Cellular WWAN	ANT2112A010B0918A	824 - 960 1710 - 1990
	ANT1204LL00R0918A	900 / 1800
	ANT3505B000TWPENA	824 - 960 1710 - 2170
	ANTX100P001BWPEN3	824 - 960 1710 - 2170
Short-Range	ANT2405F001R0169A	169
	ANT1204F002R0433A	315 / 433
	ANT1204LL08R0870A	870
	ANT1204LL05R0915A	915
FM	ANT1105LF00R0098A	88
SDARS	ANT2525B00DT2300A	2320 - 2345