

X8R/X8L Dielectric, KGM Series

General Specifications



KYOCERA AVX has developed a range of multilayer ceramic capacitors designed for use in applications up to 150°C. These capacitors are manufactured with an X8R and an X8L dielectric material. X8R material has capacitance variation of $\pm 15\%$ between -55°C and +150°C. The X8L material has capacitance variation of $\pm 15\%$ between -55°C to 125°C to 125°C and +15/40% from +125°C to +150°C.

The need for X8R and X8L performance has been driven by customer requirements for parts that operate at elevated temperatures. They provide a highly reliable capacitor with low loss and stable capacitance over temperature.

They are ideal for various industrial applications. Typical industrial application would be drilling monitoring system. They can also be used as bulk capacitors for high temperature camera modules.

HOW TO ORDER

KGM	05	A	R8	1E	101	M	N
Series	Size	Thickness	Dielectric	Voltage	Capacitance Code Code (in pF)	Capacitance Tolerance	Packaging
General Purpose Tin/Nickel Finish	05 = 0402 15 = 0603 21 = 0805 31 = 1206 32 = 1210	See Cap Chart	X8R = R8 X8L = L8	0G = 4.0V 0J = 6.3V 1A = 10V 1C = 16V 1E = 25V 1H = 50V 2A = 100V	2 Significant Digits +Number of zeros eg. 10 μ F = 106 10nF = 103 47pF = 470	J* = +/- 5% K = +/- 10% M = +/- 20%	See Table Below

PACKAGING CODES

Code	EIA (inch)	IEC(mm)	7" Paper	7" Embossed	13" Paper	13" Embossed
05	0402	1005	H		N	
15	0603	1608	T		M	
21	0805	2012	T	U	M	L
31	1206	3216	T	U	M	L
32	1210	3225		U		L

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Capacitance Range

X8R

SIZE		0402			0603			0805			1206		
Soldering		Reflow/Wave			Reflow/Wave			Reflow/Wave			Reflow/Wave		
(L) Length	mm	1.0 ± 0.1			1.6 ± 0.15			2.01 ± 0.2			3.2 ± 0.2		
	(in.)	(0.04 ± 0.1)			(0.063 ± 0.006)			(0.079 ± 0.008)			(0.126 ± 0.008)		
(W) Width	mm	0.5 ± 0.1			0.81 ± 0.15			1.25 ± 0.2			1.6 ± 0.2		
	(in.)	(0.02 ± 0.004)			(0.032 ± 0.006)			(0.049 ± 0.008)			(0.063 ± 0.008)		
(t)	mm	0.25 ± 0.15			0.35 ± 0.15			0.5 ± 0.25			0.5 ± 0.25		
	(in.)	(0.01 ± 0.006)			(0.014 ± 0.006)			(0.02 ± 0.01)			(0.02 ± 0.01)		
Terminal		50V			25V 50V 100V			25V 50V 100V			25V 50V 100V		
271	Cap 270	A	A	A	A								
331	(pF) 330	A	A	A	A	B	B	B					
471	470	A	A	A	A	B	B	B					
681	680	A	A	A	A	B	B	B					
102	1000	A	A	A	A	B	B	B	B	B	B		
152	1500	A	A	A	A	B	B	B	B	B	B		
182	1800	A	A	A	A	B	B	B	B	B	B		
222	2200	A	A	A	A	B	B	B	B	B	B		
272	2700	A	A	A	A	B	B	B	B	B	B		
332	3300	A	A	A	A	B	B	B	B	B	B		
392	3900	A	A	A	A	B	B	B	B	B	B		
472	4700	A	A	A	A	B	B	B	B	B	B		
562	5600		A	A	A	B	B	B	B	B	B		
682	6800		A	A	A	B	B	B	B	B	B		
822	8200		A	A	A	B	B	B	B	B	B		
103	Cap 0.01		A	A	A	B	B	B	B	B	B		
123	(uF) 0.012		A	A		B	B	B	B	B	B		
153	0.015		A	A		B	B	A	B	B	B		
183	0.018		A	A		B	B	A	B	B	B		
223	0.022		A	A		B	B	A	B	B	B		
273	0.027		A	A		B	B		B	B	B		
333	0.033		A	A		B	B		B	B	B		
393	0.039		A	A		B	B		B	B	B		
473	0.047		A	A		B	B		B	B	B		
563	0.056		A			A	A		N	N	N		
683	0.068		A			A	A		N	N	N		
823	0.082					A	A		N	N	N		
104	0.1					A	A		N	N	N		
124	0.12					A	A		N	N	N		
154	0.15					A	A		N	N	N		
184	0.18					A			N	N			
224	0.22					A			N	N			
274	0.27								N	N			
334	0.33								N	N			
394	0.39								E	G			
474	0.47								E	G			
684	0.68								G	G			
824	0.82								G	G			
105	1								G	G			
	WVDC	50V			25V 50V 100V			25V 50V 100V			25V 50V 100V		
	SIZE	0402			0603			0805			1206		

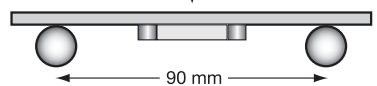
X8L

SIZE		0603			0805			1206			1210		
Soldering		Reflow/Wave			Reflow/Wave			Reflow/Wave			Reflow/Wave		
(L) Length	mm	1.6 ± 0.15			2.01 ± 0.2			3.2 ± 0.2			3.2 ± 0.2		
	(in.)	(0.063 ± 0.006)			(0.079 ± 0.008)			(0.126 ± 0.008)			(0.126 ± 0.008)		
(W) Width	mm	0.81 ± 0.15			1.25 ± 0.2			1.6 ± 0.2			2.5 ± 0.2		
	(in.)	(0.032 ± 0.006)			(0.049 ± 0.008)			(0.063 ± 0.008)			(0.098 ± 0.008)		
(t)	mm	0.35 ± 0.15			0.5 ± 0.25			0.5 ± 0.25			0.5 ± 0.25		
	(in.)	(0.014 ± 0.006)			(0.02 ± 0.01)			(0.02 ± 0.01)			(0.02 ± 0.01)		
Terminal		25V 50V 100V			25V 50V 100V			16V 25V 50V 100V			10V 25V 50V 100V		
271	Cap 270	A	A										
331	(pF) 330	A	A	A	B	B	B						
471	470	A	A	A	B	B	B						
681	680	A	A	A	B	B	B						
102	1000	A	A	A	B	B	B		B	B			
152	1500	A	A	A	B	B	B		B	B	B		
182	1800	A	A	A	B	B	B		B	B	B		
222	2200	A	A	A	B	B	B		B	B	B		
272	2700	A	A	A	B	B	B		B	B	B		
332	3300	A	A	A	B	B	B		B	B	B		
392	3900	A	A	A	B	B	B		B	B	B		
472	4700	A	A	A	B	B	B		B	B	B		
562	5600	A	A	A	B	B	B		B	B	B		
682	6800	A	A	A	B	B	B		B	B	B		
822	8200	A	A	A	B	B	B		B	B	B		
103	Cap 0.01	A	A	A	B	B	B		B	B	B		
123	(uF) 0.012	A	A	A	B	B	B		B	B	B		
153	0.015	A	A	A	B	B	B		B	B	B		
183	0.018	A	A	A	B	B	B		B	B	B		
223	0.022	A	A	A	B	B	B		B	B	B		
273	0.027	A	A	A	B	B	B		B	B	B		
333	0.033	A	A	A	B	B	A		B	B	B		
393	0.039	A	A		B	B	A		B	B	B		
473	0.047	A	A		B	B	A		B	B	B		
563	0.056	A	A		B	B	A		B	B	B		
683	0.068	A	A		B	B	A		B	B	B		
823	0.082	A	A		B	B	A		B	B	N		
104	0.1	A	A		B	B	A		B	B	N		
124	0.12				B	A			B	B	N		
154	0.15				B	A			B	B	N		
184	0.18				A	A			B	B	B	G	
224	0.22				A	A			B	B	B	G	
274	0.27				A				B	N	N		
334	0.33				A				B	N	E		
394	0.39				A				N	N	E		
474	0.47				A				N	N	E		
684	0.68				A				N	G	G		
824	0.82				A				N	G	G		
105	1				A				N	G	G		
155	1.5				A				G	G	G		
225	2.2				A				G	G	G		
475	4.7											L	
106	10											L	
	WVDC	25V 50V 100V			25V 50V 100V			16V 25V 50V 100V			10V 25V 50V 100V		
	SIZE	0603			0805			1206			1210		

Case Size	0402(KAM05)		0603(KAM15)		0805(KAM21)		1206(KAM31)			1210(KAM32)	
Thickness Letter	A	A	B	B	A	A	B	N	E	G	L
Max Thickness (mm)	0.56	0.90	0.95	0.94	1.45	0.94	1.27	1.52	1.78	2.79	
Carrier Tape	PAPER	PAPER	PAPER	PAPER	EMB	PAPER	EMB	EMB	EMB	EMB	
Packaging Code 7" reel	H	T	T	T	U	T	U	U	U	U	
Packaging Code 13" reel	N	M	M	M	L	M	L	L	L	L	
	PAPER						EMBOSSSED (EMB)				

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Specifications and Test Methods

Parameter/Test		X8R/X8L Specification Limits	Measuring Conditions	
Operating Temperature Range		-55°C to +150°C	Temperature Cycle Chamber	
Capacitance		Within specified tolerance	Freq.: 1.0 kHz ± 10% Voltage: 1.0Vrms ± .2V	
Dissipation Factor		≤ 2.5% for ≥ 50V DC rating ≤ 3.5% for 25V DC and 16V DC rating		
Insulation Resistance		100,000MΩ or 1000MΩ - μF, whichever is less	Charge device with rated voltage for 120 ± 5 secs @ room temp/humidity	
Dielectric Strength		No breakdown or visual defects	Charge device with 250% of rated voltage for 1-5 seconds, w/charge and discharge current limited to 50 mA (max) Note: Charge device with 150% of rated voltage for 500V devices.	
Resistance to Flexure Stresses	Appearance	No defects	Deflection: 2mm Test Time: 30 seconds 1mm/sec 	
	Capacitance Variation	≤ ±12%		
	Dissipation Factor	Meets Initial Values (As Above)		
	Insulation Resistance	≥ Initial Value x 0.3		
Solderability		≥ 95% of each terminal should be covered with fresh solder	Dip device in eutectic solder at 230 ± 5°C for 5.0 ± 0.5 seconds	
Resistance to Solder Heat	Appearance	No defects, <25% leaching of either end terminal	Dip device in eutectic solder at 260°C for 60 seconds. Store at room temperature for 24 ± 2 hours before measuring electrical properties.	
	Capacitance Variation	≤ ±7.5%		
	Dissipation Factor	Meets Initial Values (As Above)		
	Insulation Resistance	Meets Initial Values (As Above)		
	Dielectric Strength	Meets Initial Values (As Above)		
Thermal Shock	Appearance	No visual defects	Step 1: -55°C ± 2°	30 ± 3 minutes
	Capacitance Variation	≤ ±7.5%	Step 2: Room Temp	≤ 3 minutes
	Dissipation Factor	Meets Initial Values (As Above)	Step 3: +125°C ± 2°	30 ± 3 minutes
	Insulation Resistance	Meets Initial Values (As Above)	Step 4: Room Temp	≤ 3 minutes
	Dielectric Strength	Meets Initial Values (As Above)	Repeat for 5 cycles and measure after 24 ± 2 hours at room temperature	
Load Life	Appearance	No visual defects	Charge device with 1.5 rated voltage (≤ 10V) in test chamber set at 150°C ± 2°C for 1000 hours (+48, -0) Remove from test chamber and stabilize at room temperature for 24 ± 2 hours before measuring.	
	Capacitance Variation	≤ ±12.5%		
	Dissipation Factor	≤ Initial Value x 2.0 (See Above)		
	Insulation Resistance	≥ Initial Value x 0.3 (See Above)		
	Dielectric Strength	Meets Initial Values (As Above)		
Load Humidity	Appearance	No visual defects	Store in a test chamber set at 85°C ± 2°C/ 85% ± 5% relative humidity for 1000 hours (+48, -0) with rated voltage applied. Remove from chamber and stabilize at room temperature and humidity for 24 ± 2 hours before measuring..	
	Capacitance Variation	≤ ±12.5%		
	Dissipation Factor	≤ Initial Value x 2.0 (See Above)		
	Insulation Resistance	≥ Initial Value x 0.3 (See Above)		
	Dielectric Strength	Meets Initial Values (As Above)		