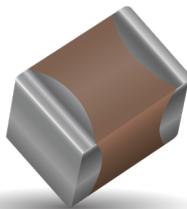


X7R Dielectric, KGM Series

General Specifications



The X7R dielectric is the most popular of the intermediate EIA class II materials due to its relative temperature stability. While the capacitance change is non-linear, temperature variation is within $\pm 15\%$ from -55°C to $+125^\circ\text{C}$.

Capacitance for X7R varies under the influence of electrical operating conditions such as voltage and frequency. X7R dielectric chip usage covers a broad spectrum of industrial applications where known changes in capacitance due to applied voltages are acceptable.

SpicAT is an additional online resource that KYOCERA AVX offers to help create engineering simulations. Please visit spicat.kyocera-avx.com for more information.

HOW TO ORDER

KGM	03	A	R7	1E	101	M	N	
Series	Size	Thickness	Dielectric	Voltage	Capacitance Code	Tolerance	Packaging	
General Purpose Tin/Nickel Finish	02= 01005 03= 0201 05= 0402 15= 0603 21= 0805 31= 1206	32= 1210 43= 1812 44= 1825 55= 2220 56= 2225	See Cap Chart	R7 = X7R	0G = 4.0V 0J = 6.3V 1A = 10V 1C = 16V 1E = 25V	1H = 50V 2A = 100V 2D = 200V 2E = 250V 2H = 500V	2 Significant Digits + Number of zeros eg. 106 = 10 μF 103 = 10nF	J* = +/- 5% K = +/- 10% M = +/- 20%

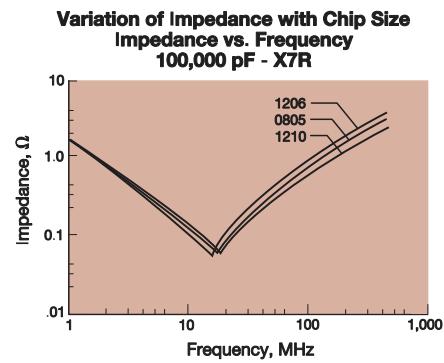
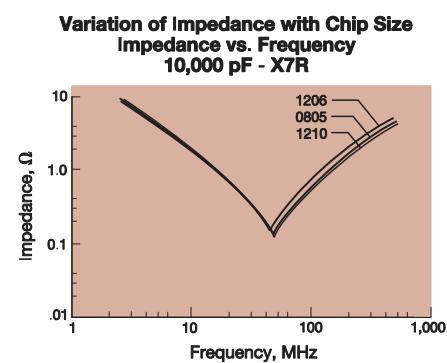
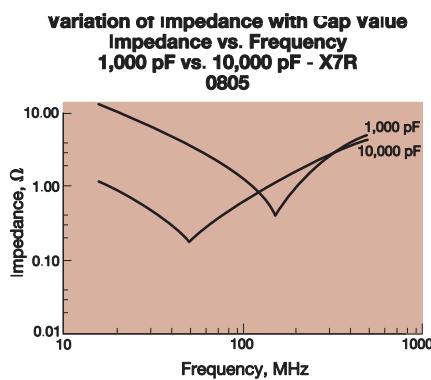
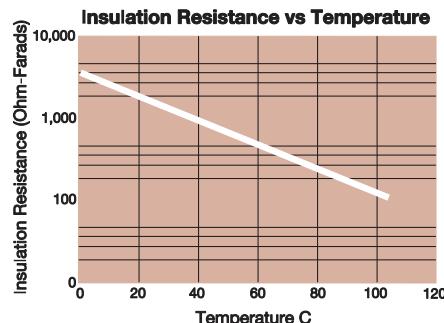
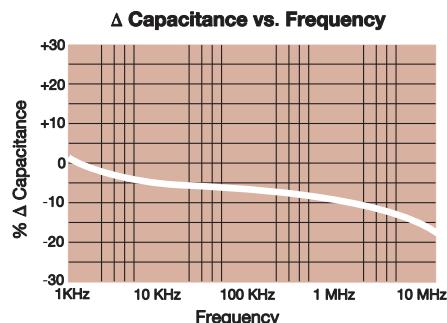
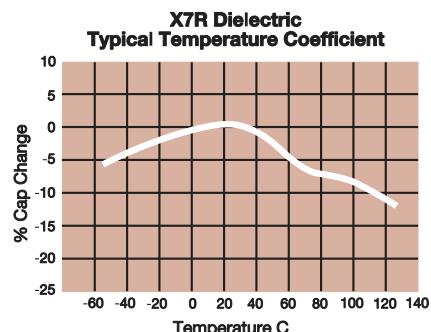
* $\leq 1\mu\text{F}$ only, contact factory for additional values



PACKAGING CODES

Code	EIA (inch)	IEC(mm)	7" Paper	7" Embossed	13" Paper	13" Embossed
02	01005	0402	H			
03	0201	0603	H		N	
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
43	1812	4532		V		S
44	1825	4564		V		S
55	2220	5750		V		S
56	2225	5763		V		S

*Note: The thickness determines if packaging is paper or embossed.



X7R Dielectric, KGM Series

Specifications and Test Methods



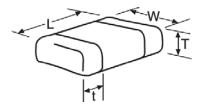
Parameter/Test	X7R Specification Limits	Measuring Conditions (Complies with JIS C5101 / IEC60384)
Operating Temperature Range	-55°C to +125°C	Temperature Cycle Chamber
Capacitance	Within specified tolerance	Measure after heat treatment Capacitance Frequency Volt C≤10μF Frequency : 1kHz±10% Volt : 1.0±0.2Vrms *0.5±0.2Vrms
Dissipation Factor / Tanδ	Refer to https://spicat.kyocera-avx.com for individual part number specification	C>10μF Frequency : 120Hz±10% Volt : 0.5±0.2Vrms The charge and discharge current of the capacitor must not exceed 50mA.
Insulation Resistance	Refer to https://spicat.kyocera-avx.com for individual part number specification	Apply the rated voltage for 1 minute, and measure it in normal temperature and humidity. The charge and discharge current of the capacitor must not exceed 50mA.
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.
Bending Strength	No significant damage with 1mm bending	Glass epoxy PCB: Fulcrum spacing: 90mm, duration time 10 seconds. Soaking condition Sn-3Ag-0.5Cu 245±5°C 3±0.5 sec.
Solderability	Solder coverage : 95% min.	
Resistance to Solder Heat	Appearance	No problem observed
	Capacitance Variation	≤ ±7.5%
	Dissipation Factor / Tanδ	Within specification
	Insulation Resistance	Within specification
	Withstanding Voltage / Dielectric Strength	Resist without problem
Thermal Shock	Appearance	No visual defects
	Capacitance Variation	≤ ±7.5%
	Dissipation Factor	Within specification
	Insulation Resistance	Within specification
	Withstanding Voltage / Dielectric Strength	Resist without problem
Load Life	Appearance	No visual defects
	Capacitance Variation	≤ ±12.5%
	Dissipation Factor / Tanδ	≤ Initial Value x 2.0 (See Above)
	Insulation Resistance	Over 1000MΩ or 50MΩ · μF, whichever is less. *Exceptions Listed Below
Load Humidity	Appearance	No visual defects
	Capacitance Variation	≤ ±12.5%
	Dissipation Factor / Tanδ	Within specification
	Insulation Resistance	Over 1000MΩ or 50MΩ · μF, whichever is less. *Exceptions Listed Below
Appearance	No problem observed	Microscope
Termination Strength	No problem observed	Apply a sideward force of 500g (5N) to a PCB-mounted sample. note : 2N for 0201 size, and 1N for 01005 size.
Vibration	Appearance	No problem observed
	Capacitance	Within tolerance
	Tanδ	Within tolerance
Heat Treatment	Expose sample in the temperature of 150+0/-10°C for 1 hour and leave the sample in normal temperature and humidity for 24±2 hours.	

Voltage to be applied in the High Temperature Load (Applied voltage is the multiple of the rated voltage)

X7R Dielectric, KGM Series



Capacitance Range

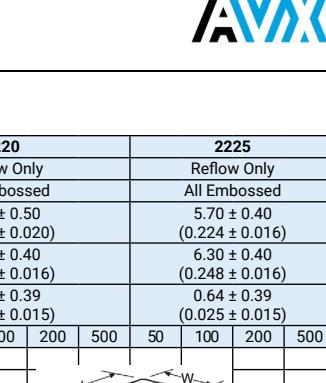


SIZE	01005	0201				0402				0603				0805				1206																					
Soldering	Reflow Only	Reflow Only				Reflow/Wave				Reflow/Wave				Reflow/Wave				Reflow/Wave																					
Packaging	All Paper	All Paper				All Paper				Paper/Embossed				Paper/Embossed				Paper/Embossed																					
(L) Length (in.)	mm 0.40 ± 0.02 (0.016 ± 0.0008)	mm 0.60 ± 0.03 (0.024 ± 0.001)				mm 1.00 ± 0.10 (0.040 ± 0.004)				mm 1.60 ± 0.15 (0.063 ± 0.006)				mm 2.01 ± 0.20 (0.079 ± 0.008)				mm 3.20 ± 0.30 (0.126 ± 0.012)																					
W) Width (in.)	mm 0.20 ± 0.02 (0.008 ± 0.0008)	mm 0.30 ± 0.03 (0.011 ± 0.001)				mm 0.50 ± 0.10 (0.020 ± 0.004)				mm 0.81 ± 0.15 (0.032 ± 0.006)				mm 1.25 ± 0.20 (0.049 ± 0.008)				mm 1.60 ± 0.30 (0.063 ± 0.012)																					
(t) Terminal	mm 0.10 ± 0.04 (0.004 ± 0.0016)	mm 0.15 ± 0.05 (0.006 ± 0.002)				mm 0.25 ± 0.15 (0.010 ± 0.006)				mm 0.35 ± 0.15 (0.014 ± 0.006)				mm 0.50 ± 0.25 (0.020 ± 0.010)				mm 0.50 ± 0.25 (0.020 ± 0.010)																					
WVDC	16	6.3	10	16	25	50	6.3	10	16	25	50	100	6.3	10	16	25	50	100	200	250	500	6.3	10	16	25	50	100	200	250	500									
Cap 100 101	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B					B																	
(pF) 150 151	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B					B																	
220 221	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	B	B	B	B	B	T	T	D								
330 331	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	B	B	B	B	B	T	T	D								
470 471	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	B	B	B	B	B	T	T	D								
680 681	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	B	B	B	B	B	T	T	D								
1000 102	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	B	B	B	B	B	T	T	D								
1500 152	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	B	B	B	B	B	T	T	D								
2200 222	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	B	B	B	B	B	T	T	D								
3300 332	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	A	A	A	B	B	B	T	T	D							
3900 392	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	A	A	A	B	B	B	T	T	D							
4700 472	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	A	A	A	B	B	B	T	T	D							
5600 562	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	A	A	A	B	B	B	T	T	D							
6800 682	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	A	A	A	B	B	B	T	T	D							
Cap 0.010 103	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	A	A	A	B	B	B	D	D	D							
(μF) 0.012 123																		A	A	A	A	A	A	B	B	B	B	B	D	D	D								
0.015 153																		A	A	A	A	A	A	B	B	B	B	B	D	D	D								
0.018 183																		A	A	A	A	A	A	B	B	B	B	B	D	D	D								
0.022 223	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	N	N	N	N	N	N	A	A	A	B	B	B	D	D	A							
0.027 273																		A	A	A	A	A	A	B	B	B	B	B	D	D	A								
0.033 333																		A	A	A	A	A	A	B	B	B	B	B	A	A	A								
0.039 393																		A	A	A	A	A	A	B	B	B	B	B	B	A	A	A							
0.047 473																		A	A	A	A	A	A	B	B	B	B	B	B	A	A	A							
0.068 683																		A	A	A	A	B	B	B	B	B	B	B	D	A	A								
0.082 823																		A	A	A	C	A	A	B	B	B	B	B	N	N	N								
0.1 104	A																	A	A	A	C	A	A	B	B	B	B	B	B	D	A	A							
0.12 124																		A	A	A	B	B		N	N	N	E	A											
0.15 154																		A	A	A	B	B		E	E	E	E	A	V	V	M	M	A	A	A				
0.22 224																		A	A	B	B	B	B	A	A	A	A	A	V	V	V	M	M	A	A	A			
0.33 334																		B	B	B	B	B	B	A	A	A	A	A	V	V	V	M	P	A					
0.47 474																		A	A	B	B	B	B	A	A	A	A	A	H	H	H	H	H	A					
0.68 684																		B	B	B	B	B	B	A	A	A	A	A	H	H	H	H	H	H					
1.0 105																		B	B	B	B	B	C	A	A	A	A	A	H	H	H	H	H	H					
2.2 225																		B	B	B	C			A	A	A	A	A	H	H	H	H	H	H					
4.7 475																		C						A	A	A	A	A	H	H	H	A	A	A					
10 106																								A	A	A	A	A	H	H	A	A	A	H					
22 226																																							
47 476																																							
100 107																																							
WVDC	16	6.3	10	16	25	50	6.3	10	16	25	50	100	6.3	10	16	25	50	100	200	250	6.3	10	16	25	50	100	200	250	500	6.3	10	16	25	50	100	200	250	500	
SIZE	01005	0201				0402				0603				0805				1206																					

X7R Dielectric, KGM Series

Capacitance Range

SIZE	1210						1812						1825						2220						2225								
Soldering	Reflow Only						Reflow Only						Reflow Only						Reflow Only						Reflow Only								
Packaging	Paper/Embossed						All Embossed						All Embossed						All Embossed						All Embossed								
(L) Length mm (in.)	3.30 ± 0.4 (0.130 ± 0.016)						4.50 ± 0.40 (0.177 ± 0.016)						4.50 ± 0.40 (0.177 ± 0.016)						5.70 ± 0.50 (0.224 ± 0.020)						5.70 ± 0.40 (0.224 ± 0.016)								
(W) Width mm (in.)	2.50 ± 0.30 (0.098 ± 0.012)						3.20 ± 0.40 (0.126 ± 0.016)						6.40 ± 0.40 (0.252 ± 0.016)						5.00 ± 0.40 (0.197 ± 0.016)						6.30 ± 0.40 (0.248 ± 0.016)								
(t) Terminal mm (in.)	0.50 ± 0.25 (0.020 ± 0.010)						0.61 ± 0.36 (0.024 ± 0.014)						0.61 ± 0.36 (0.024 ± 0.014)						0.64 ± 0.39 (0.025 ± 0.015)						0.64 ± 0.39 (0.025 ± 0.015)								
WVDC	10	16	25	50	100	200	500	16	25	50	100	200	500	50	100	200	500	25	50	100	200	500	50	100	200	500	50	100	200	500			
Cap 100	101																																
(pF) 150	151																																
220	221	R	R	R	R	R	R	D																									
330	331	R	R	R	R	R	R	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A				
470	471	R	R	R	R	R	R	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A				
680	681	R	R	R	R	R	R	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A				
1000	102	R	R	R	R	R	R	D	A	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
1500	152	R	R	R	R	R	R	D	A	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
2200	222	R	R	R	R	R	R	D	A	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
3300	332	R	R	R	R	R	R	E	A	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
3900	392	R	R	R	R	R	R	E	A	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
4700	472	R	R	R	R	R	R	E	A	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
5600	562	R	R	R	R	R	R	E	A	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
6800	682	R	R	R	R	R	R	E	A	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
Cap 0.010	103	R	R	R	R	R	R	E	A	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
(μF) 0.012	123	R	R	R	R	R	R	E	A	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.015	153	R	R	R	R	R	R	E	A	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.018	183	R	R	R	R	R	R	E	A	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.022	223	R	R	R	R	R	R	E	A	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.027	273	R	R	R	R	R	R	E	H	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.033	333	R	R	R	R	R	R	E	H	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.039	393	R	R	R	R	R	R	E	H	A	A	A	A	B	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.047	473	R	R	R	R	R	R	E	H	A	A	A	A	B	B	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.068	683	R	R	R	R	R	R	H	P	A	A	A	A	B	F	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.082	823	R	R	R	R	R	R	H	P	A	A	A	A	B	F	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.100	104	R	R	R	R	R	R	H	P	A	A	A	B	B	F	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.120	124	R	R	R	R	R	R	H		A	A	A	B	B	J	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.150	154	E	E	E	E	E	L		A	A	A	B	F	J	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.220	224	E	E	E	E	E	L		A	A	A	B	F	J	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.330	334	E	E	E	E	H	L		A	A	A	B	F	J	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.470	474	E	E	E	E	H	L		A	A	A	F	F	J	C	C	C	C	Z	Z	Z	Z	Z	Z	D	D	D	D					
0.680	684	E	E	E	K	L	L		F	F	F	F	J		C	C	C	C	Z	Z	Z	Z	C	D	D	D	G						
1.000	105	E	E	E	G	L			F	F	F	F	J		C	C	C	C	Z	Z	Z	Z	D	D	D	D							
2.200	225	L	L	L	L	L			F	F	F	J			C	C	F		Z	Z	Z	C			D	D	G						
4.700	475	L	L	L	L	L			J	J	J	J			C	F			Z	C	C				D	G							
10	106	L	L	L	A				J	J	J	J			F	F			C	C	D				G	G							
22	226	L	A	L																D	D	H											
47	476	L																															
100	107	L																															
WVDC	1210	10	16	25	50	100	200	500	16	25	50	100	200	500	50	100	200	500	25	50	100	200	500	50	100	200	500	50	100	200	500		
SIZE	1210 (KGM 32) 1812 (KGM 43) 1825 (KGM 44) 2220 (KGM 55) 2225 (KGM56)																																



*Dimension exception for KGM32AR71H106:

(L) 3.2 ± 0.3 mm

(W) 2.5 ± 0.2 mm

Case Size	R	D	E	G	H	P	A	L	A	B	F	J	C	F	Z	C	D	H	G
Thickness Letter																			
Max Thickness (mm)	1.05	1.4	1.45	1.78	1.8	2.2	2.70	2.80	1.4	1.45	2.21	2.80	2.21	2.80	3.3	3.4	2.21	2.80	
Carrier Tape	EMB	EMB	EMB	EMB	EMB	EMB	EMB	EMB	EMB	EMB	EMB	EMB	EMB	EMB	EMB	EMB	EMB	EMB	
Packaging Code 7"reel	U	U	U	U	U	U	U	U	V	V	V	V	V	V	V	V	V	V	
Packaging Code 13"reel	L	L	L	L	L	L	L	L	S	S	S	S	S	S	S	S	S	S	
EMBOSSED (EMB)																			