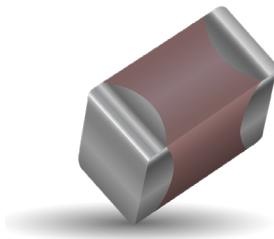


X5R Dielectric, KGM Series

General Specifications



GENERAL DESCRIPTION

- General Purpose Dielectric for Ceramic Capacitors
- EIA Class II Dielectric
- Temperature variation of capacitance is within $\pm 15\%$ from -55°C to $+85^{\circ}\text{C}$
- Well suited for decoupling and filtering applications
- Available in High Capacitance values (up to $100\mu\text{F}$)

HOW TO ORDER

KGM	03	A	R5	1E	101	M	N
Series	Size	Thickness	Dielectric	Voltage	Capacitance Code Code (in pF)	Capacitance Tolerance	Packaging
General Purpose Tin/Nickel Finish	02 = 01005 03 = 0201 05 = 0402 15 = 0603 21 = 0805 31 = 1206 32 = 1210 43 = 1812	See Cap Chart	R5 = X5R	0G = 4.0V 0J = 6.3V 1A = 10V 1C = 16V 1V = 35V 1E = 25V 1H = 50V	Two Significant Digits + Number of zeroes eg. 106 = $10\mu\text{F}$ 103 = 10nF 470 = 47pF	J* = $\pm 5\%$ K = $\pm 10\%$ M = $\pm 20\%$	See Table Below

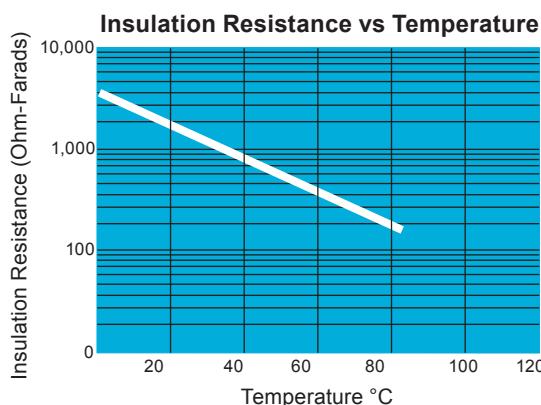
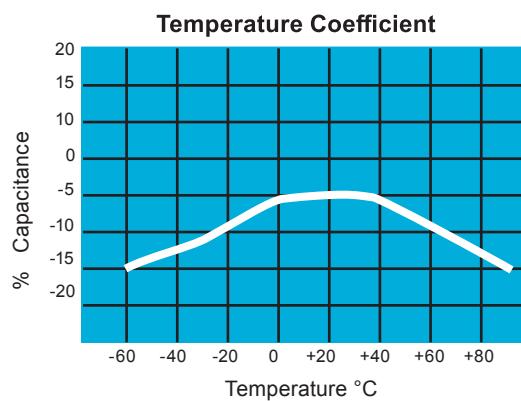
NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.
Contact factory for non-specified capacitance values.



PACKAGING CODES

Code	EIA (inch)	IEC(mm)	7" Paper	7" Embossed	13" Paper	13" Embossed
02	01005	0402	H	P	N	
03	0201	0603	H		N	
05	0402	1005	H		N	
15	0603	1608	T		M	
21	0805	2012		U		L
31	1206	3216		U		L
32	1210	3225		U		L
43	1812	4532		V		S

TYPICAL ELECTRICAL CHARACTERISTICS



X5R Dielectric, KGM Series

Specifications and Test Methods



X5R Specification Limits		X5R Specification Limits		Measuring Conditions (Complies with JIS C5101 / IEC60384)		
Operating Temperature Range		-55°C to +85°C			Temperature Cycle Chamber	
Capacitance		Within specified tolerance			Measure after heat treatment	
Dissipation Factor / Tanδ		Refer to https://spicat.kyocera-avx.com for individual part number specification			Capacitance Frequency Volt C≤10μF Frequency : 1kHz±10% Volt : 1.0±0.2Vrms *0.5±0.2Vrms *:KGM02AR50J104, KGM02AR50J474, KGM03CR50J225, KGM03BR50J225 KGM03DR50J475, KGM03CR50G475, KGM05CR50J106	
Insulation Resistance		Refer to https://spicat.kyocera-avx.com for individual part number specification			C>10μF Frequency : 120Hz±10% Volt : 0.5±0.2Vrms	
Dielectric Strength		No breakdown or visual defects			The charge and discharge current of the capacitor must not exceed 50mA.	
Bending Strength		No significant damage with 1mm bending			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.	
Solderability		Solder coverage : 95% min.			Charge device with 250% of rated voltage for 1-5 seconds, w/ charge and discharge current limited to 50 mA (max) *: KGM31AR52A225: 200% of rated voltage	
Resistance to Solder Heat	Appearance	No problem observed			Glass epoxy PCB: Fulcrum spacing: 90mm, duration time 10 seconds.	
	Capacitance Variation	≤ ±7.5%			Soaking condition	
	Dissipation Factor / Tanδ	Within specification			Sn-3Ag-0.5Cu 245±5°C 3±0.5 sec.	
	Insulation Resistance	Within specification			Take the initial value after heat treatment.	
	Withstanding Voltage / Dielectric Strength	Resist without problem			Soak the sample in 260°C±5°C solder for 10±0.5 seconds and place in normal temperature and humidity, and measure after heat treatment. (Pre-heating conditions)	
Thermal Shock	Appearance	No visual defects			Order Temperature Time	
	Capacitance Variation	≤ ±7.5%			1 80 to 100°C 2 minutes	
	Dissipation Factor	Within specification			2 150 to 200°C 2 minutes	
	Insulation Resistance	Within specification			The charge and discharge current of the capacitor must not exceed 50mA for IR and withstand voltage measurement.	
	Withstanding Voltage / Dielectric Strength	Resist without problem			The charge and discharge current of the capacitor must not exceed 50mA for IR and withstand voltage measurement.	
Load Life	Appearance	No visual defects			Take the initial value after heat treatment.	
	Capacitance Variation	≤ ±12.5%			(Cycle)	
	Dissipation Factor / Tanδ	≤ Initial Value x 2.0 (See Above)			Room temperature (3 min.) →>	
	Insulation Resistance	Over 1000MΩ or 50MΩ·μF, whichever is less. *Exceptions Listed Below			Lowest operation temperature (30 min.) →>	
Load Humidity	Appearance	No visual defects			Room temperature (3 min.) →>	
	Capacitance Variation	≤ ±12.5%			Highest operation temperature (30 min.) →>	
	Dissipation Factor / Tanδ	Within specification			After 5 cycles, measure after heat treatment.	
	Insulation Resistance	Over 1000MΩ or 50MΩ·μF, whichever is less. *Exceptions Listed Below			The charge and discharge current of the capacitor must not exceed 50mA for IR measurement.	
Appearance		No problem observed			The charge and discharge current of the capacitor must not exceed 50mA for IR and withstand voltage measurement.	
Termination Strength		No problem observed			Microscope	
Vibration	Appearance	No problem observed			After applying *1.5 the rated voltage at the highest operation temperature for 1000+12/-0 hours, and measure the sample after heat treatment in normal temperature and humidity.	
	Capacitance	Within tolerance			The charge and discharge current of the capacitor must not exceed 50mA for IR measurement.	
	Tanδ	Within tolerance			*Apply 1.0 times when the rated voltage is 4V or less. Applied voltages for respective products are indicated in the chart below.	
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.			Take the initial value after heat treatment.	

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

Rated Voltage		Products
x1.0	6.3V	KGM02AR50J224, KGM02AR50J474, KGM03BR50J225, KGM03CR50J225, KGM03DR50J475, KGM05CR50J106, KGM05BR50J156, KGM05DR50J226, KGM21AR50J476
	10V	KGM02AR51A104, KGM03CR51A225, KGM15CR51A226
	16V	KGM03CR51C105, KGM05AR51C225, KGM05CR51C475, KGM15CR51C226
	25V	KGM05AR51E105, KGM05AR51E225, KGM05CR51E225, KGM05CR51E475, KGM15CR51E475, KGM15CR51E106, KGM21AR51E226
	35V	KGM05AR51V105, KGM15CR51V475, KGM15CR51V106
	100V	KGM31AR52A225
x1.2	6.3V	KGM03BR50J105
x1.3	6.3V	KGM02AR50J153-104, KGM03AR50J474
	10V	KGM03AR51A223-224, KGM05AR51A105-225
	16V	KGM05AR51C105

<Load Life / Load Humidity> Insulation Resistance : Over 10MΩ·μF

X5R / R5	03	KGM03BR51A105, KGM03CR51C224, KGM03CR51E224
	05	KGM05BR51A475, KGM05CR51A106, KGM05CR51V225



The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at www.kyocera-avx.com/disclaimer/ by reference and should be reviewed in full before placing any order.

X5R Dielectric, KGM Series

Capacitance Range

Case Size	01005				0201				0402								0603								0805																		
Soldering	Reflow Only				Reflow Only				Reflow/Wave								Reflow/Wave								Reflow/Wave																		
Packaging	Paper/Embossed				All Paper				All Paper								All Paper								All Embossed																		
(L) Length (in.)	mm (0.016 ± 0.008)	0.40 ± 0.02	0.60 ± 0.09	(0.024 ± 0.004)	1.00 ± 0.20	(0.040 ± 0.008)	1.60 ± 0.20	(0.063 ± 0.008)	2.01 ± 0.20	(0.079 ± 0.008)	0.20 ± 0.02	0.30 ± 0.09	(0.011 ± 0.004)	0.50 ± 0.20	(0.020 ± 0.008)	0.80 ± 0.20	(0.031 ± 0.008)	1.25 ± 0.20	(0.049 ± 0.008)	0.35 ± 0.15	(0.010 ± 0.004)	0.50 ± 0.25	(0.020 ± 0.010)	0.40 ± 0.04	(0.004 ± 0.0016)	0.15 ± 0.05	(0.006 ± 0.002)	0.25 ± 0.10	(0.010 ± 0.004)	0.35 ± 0.15	(0.014 ± 0.006)	0.50 ± 0.25	(0.020 ± 0.010)										
(t) Terminal (in.)	mm (0.004 ± 0.0016)	6.3	10	16	4	6.3	10	16	25	4	6.3	10	16	25	35	50	4	6.3	10	16	25	35	50	4	6.3	10	16	25	35	50	4	6.3	10	16	25	35	50						
Voltage:	6.3	10	16	4	6.3	10	16	25	4	6.3	10	16	25	35	50	4	6.3	10	16	25	35	50	4	6.3	10	16	25	35	50	4	6.3	10	16	25	35	50							
Cap (pF)	100	101	A	A				A																																			
	150	151	A	A				A																																			
	220	221	A	A				A																																			
	330	331	A	A				A																																			
	470	471	A	A				A																																			
	680	681	A	A				A																																			
	1000	102	A	A				A	A																																		
	1500	152	A	A	A			A	A																																		
	2200	222	A	A	A			A	A	A																																	
	3300	332	A	A	A			A	A	A																																	
	4700	472	A	A	A			A	A	A																																	
	6800	682	A	A	A			A	A	A																																	
Cap (μF)	0.010	103	A	A	A			A	A	A																																	
	0.015	153	A																																								
	0.022	223	A					A	A	A	A																												K				
	0.033	333	A					A																															K				
	0.047	473	A					A	A	A	A																												K				
	0.068	683	A					A																															K				
	0.10	104	A	A				A	A	A	B																											K	K	K			
	0.15	154						A	A	A	C																												K				
	0.22	224	A					A	A	A	C																												K				
	0.33	334																																						A			
	0.47	474	A					A	A																														A	A	A		
	0.68	684																																						A	A	A	
	1	105						B	B	C	C																												A	A	A		
	2.2	225						C	B/C	C																													A	A	A		
	4.7	475						C	D																														EMB				
	10	106						D																															U	U			
	15	156																																									
	22	226																																									
	47	476																																									
	100	107																																									
Voltage:	6.3	10	16	4	6.3	10	16	25	4	6.3	10	16	25	35	50	4	6.3	10	16	25	35	50	4	6.3	10	16	25	35	50	4	6.3	10	16	25	35	50	4	6.3	10	16	25	35	50
Case Size	01005				0201				0402								0603								0805																		

L: Length

W: Width

T: Thickness

t: Terminal thickness

h: Height

b: Body width

c: Body height

d: Lead thickness

f: Lead height

g: Lead length

h: Lead width

i: Lead height

j: Lead width

k: Lead height

l: Lead width

m: Lead height

n: Lead width

o: Lead height

p: Lead width

q: Lead height

r: Lead width

s: Lead height

t: Lead width

u: Lead height

v: Lead width

w: Lead height

x: Lead width

y: Lead height

z: Lead width

aa: Lead height

bb: Lead width

cc: Lead height

dd: Lead width

ee: Lead height

ff: Lead width

gg: Lead height

hh: Lead width

ii: Lead height

jj: Lead width

kk: Lead height

ll: Lead width

mm: Lead height

nn: Lead width

oo: Lead height

pp: Lead width

qq: Lead height

rr: Lead width

ss: Lead height

tt: Lead width

uu: Lead height

vv: Lead width

ww: Lead height

xx: Lead width

yy: Lead height

zz: Lead width

aa: Lead height

bb: Lead width

cc: Lead height

dd: Lead width

ee: Lead height

ff: Lead width

gg: Lead height

hh: Lead width

ii: Lead height

jj: Lead width

X5R Dielectric, KGM Series

Capacitance Range

PREFERRED SIZES ARE SHADED

Case Size	1206							1210							1812							
Soldering	Reflow/Wave							Reflow Only							Reflow Only							
Packaging	All Embossed							All Embossed							All Embossed							
(L) Length mm (in.)																						
3.20 ± 0.40 (0.126 ± 0.016)																						
(W) Width mm (in.)																						
1.60 ± 0.30 (0.063 ± 0.012)																						
(t) Terminal mm (in.)																						
0.50 ± 0.25 (0.020 ± 0.010)																						
Voltage:	4	6.3	10	16	25	35	50	100	4	6.3	10	16	25	35	50	4	6.3	10	16	25	35	50
Cap 100 101																						
(pF) 150 151																						
220 221																						
330 331																						
470 471																						
680 681																						
1000 102																						
1500 152																						
2200 222																						
3300 332																						
3900 392																						
4700 472																						
5600 562																						
6800 682																						
Cap 0.010 103																						
(μF) 0.012 123																						
0.015 153																						
0.018 183																						
0.022 223																						
0.027 273																						
0.033 333																						
0.039 393																						
0.047 473																						
0.068 683																						
0.082 823																						
0.10 104																						
0.12 124																						
0.15 154																						
0.22 224																						
0.33 334																						
0.47 474	M	M	M	M	M	M	M									C	C					
0.68 684																						
1 105	H	H	H	H	H	H	H		E	E	E	E	E	E	E							
2.2 225	H	H	H	H	H	H	H	A	L	L	L	L	L	L	L							
4.7 475	H	H	H	H	A	H	A		J	J	J	J	J	A	A							
10 106	H	H	H	H	A	H	H		J	J	J	J	J	A	A							J
22 226	H	H	H	A	H				A	A	A	L	A			J	J	J				
47 476	H	H	H	H					L	L	L	L	L									
100 107	H	H							L	L		L										
Voltage:	4	6.3	10	16	25	35	50	100	4	6.3	10	16	25	35	50	4	6.3	10	16	25	35	50
Case Size	1206							1210							1812							

Case Size	1206 (KGM 31)				1210 (KGM 32)				1812 (KGM 43)												
Thickness Letter	M	A	H	C	E	J	A	L	J												
Max Thickness (mm)	1.25	1.8	1.9	1.27	1.45	2.21	2.7	2.80	2.80												
Carrier Tape	EMB	EMB	EMB	EMB	EMB	EMB	EMB	EMB	EMB												
Packaging Code 7" reel	U	U	U	U	U	U	U	U	U	V											
Packaging Code 13" reel	L	L	L	L	L	L	L	L	L	S											
EMBOSSING (EMB)																					