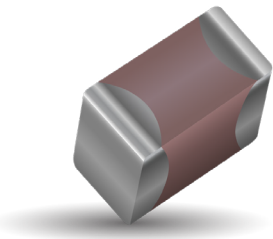


# X5R Dielectric, KGM Series

## General Specifications



### GENERAL DESCRIPTION

- General Purpose Dielectric for Ceramic Capacitors
- EIA Class II Dielectric
- Temperature variation of capacitance is within  $\pm 15\%$  from  $-55^{\circ}\text{C}$  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 1E = 25V 1H = 50V	Two Significant Digits + Number of zeroes eg. 106 = 10uF 103 = 10nF 470 = 47pF	J* = +/- 5% K = +/- 10% M = +/- 20%	See Table Below

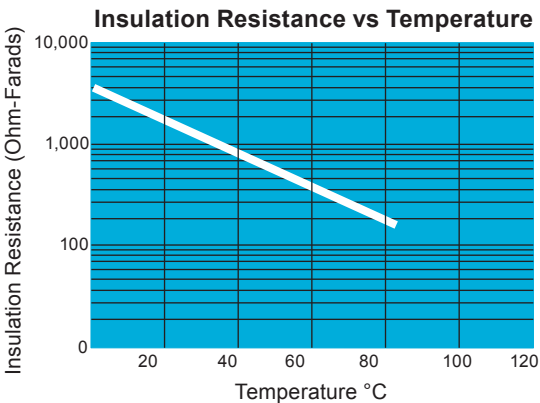
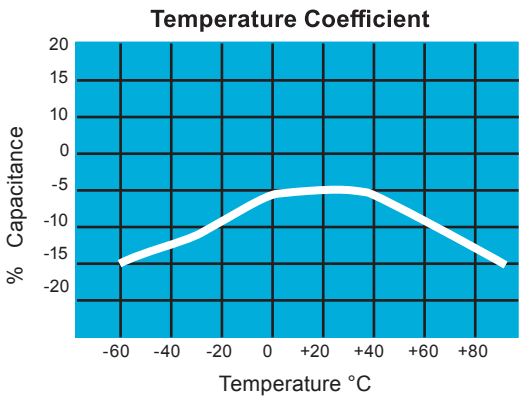
NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.  
Contact factory for non-specified capacitance values.



### 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



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

# 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				
Dissipation Factor / Tanδ		Refer to <a href="https://spicat.kyocera-avx.com">https://spicat.kyocera-avx.com</a> for individual part number specification	Measure after heat treatment Capacitance Frequency Volt C≤10μF Frequency : 1kHz±10% Volt : 1.0±0.2Vrms *0.5±0.2Vrms * .KGM02AR50J104, KGM02AR50J474, KGM03CR50J225, KGM03BR50J225 KGM03DR50J475, KGM03CR50G475, KGM05CR50J106  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 <a href="https://spicat.kyocera-avx.com">https://spicat.kyocera-avx.com</a> 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) * KGM31AR52A225: 200% of rated voltage			
Bending Strength		No significant damage with 1mm bending	Glass epoxy PCB: Fulcrum spacing: 90mm, duration time 10 seconds.			
Solderability		Solder coverage : 95% min.	Soaking condition Sn-3Ag-0.5Cu 245±5°C 3±0.5 sec.			
Resistance to Solder Heat	Appearance	No problem observed	Take the initial value after heat treatment.			
	Capacitance Variation	≤ ±7.5%	Soak the sample in 260°C±5°C solder for 10±0.5 seconds and place in nor- mal temperature and humidity, and measure after heat treatment. (Pre-heating conditions)			
	Dissipation Factor / Tanδ	Within specification				
	Insulation Resistance	Within specification	Order	Temperature	Time	
	Withstanding Voltage / Dielectric Strength	Resist without problem	1	80 to 100°C	2 minutes	
			2	150 to 200°C	2 minutes	
			The charge and discharge current of the capacitor must not exceed 50mA for IR and withstanding voltage measurement.			
Thermal Shock	Appearance	No visual defects	Take the initial value after heat treatment.			
	Capacitance Variation	≤ ±7.5%	(Cycle)			
	Dissipation Factor	Within specification	Room temperature (3 min.) → Lowest operation temperature (30 min.) → Room temperature (3 min.) → Highest operation temperature (30 min.)			
	Insulation Resistance	Within specification	After 5 cycles, measure after heat treatment.			
	Withstanding Voltage / Dielectric Strength	Resist without problem	The charge and discharge current of the capacitor must not exceed 50mA for IR and withstanding voltage measurement.			
Load Life	Appearance	No visual defects	Take the initial value after heat treatment.			
	Capacitance Variation	≤ ±12.5%	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.			
	Dissipation Factor / Tanδ	≤ Initial Value x 2.0 (See Above)	The charge and discharge current of the capacitor must not exceed 50mA for IR measurement.			
	Insulation Resistance	Over 1000MQ or 50MQ/μF, whichever is less. *Exceptions Listed Below	*Apply 1.0 times when the rated voltage is 4V or less. Applied voltages for respective products are indicated in the chart below.			
Load Humidity	Appearance	No visual defects	Take the initial value after heat treatment.			
	Capacitance Variation	≤ ±12.5%	After applying rated voltage for 500±12/ -0 hours in the condition of 40°C±2°C and 90 to 95%RH, and place in normal temperature and humidity, then measure the sample after heat treatment.			
	Dissipation Factor / Tanδ	Within specification				
	Insulation Resistance	Over 1000MQ or 50MQ · 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	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	Take the initial value after heat treatment.			
	Capacitance	Within tolerance	Vibration frequency: 10 to 55 (Hz) Amplitude: 1.5mm			
	Tanδ	Within tolerance	Sweeping condition: 10 → 55 → 10Hz/ 1 minute in X, Y and Z directions: 2 hours each, 6 hours in total, and place in normal temperature and humidity, then measure the sample after heat treatment.			
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)

Rated Voltage		Products
×1.0	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
×1.2	6.3V	KGM03BR50J105
×1.3	6.3V	KGM02AR50J153-104, KGM03AR50J474
	10V	KGM03AR51A223-224, KGM05AR51A105-225
	16V	KGM05AR51C105

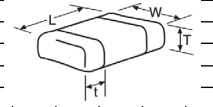
<Load Life / Load Humidity>Insulation Resistance : Over 10MΩ · μF

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

# 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	mm (in.)	0.40 ± 0.02 (0.016 ± 0.0008)			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)								
(W) Width	mm (in.)	0.20 ± 0.02 (0.008 ± 0.0008)			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)								
(t) Terminal	mm (in.)	0.10 ± 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)								
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
Cap (pF)	100	101	A	A					A																					
	150	151	A	A					A																					
	220	221	A	A					A							A														
	330	331	A	A					A							A														
	470	471	A	A					A							A														
	680	681	A	A					A							A														
	1000	102	A	A					A	A						A														
	1500	152	A	A	A				A	A						A														
	2200	222	A	A	A				A	A	A					A														
	3300	332	A	A	A				A	A	A					A														
	4700	472	A	A	A				A	A	A				A												A			
	6800	682	A	A	A				A	A	A					A											A			
Cap (μF)	0.010	103	A	A	A				A	A	A					A					A	A	A							
	0.015	153	A													A					A	A	A							
	0.022	223	A				A	A	A						A	A					A	A	A							K
	0.033	333	A				A							A							A	A	A							K
	0.047	473	A				A	A	A	A				A	A						A	A	A							K
	0.068	683	A				A							A							A		A							K
	0.10	104	A	A			A	A	A	B			A	A	A		A				A	A	A						K	K
	0.15	154																			A								K	K
	0.22	224	A				A	A	A	C	C			A	A	A	A		A	B	B	B	B	B	B	B			K	K
	0.33	334																	B	B	B	B	B						A	K
	0.47	474	A				A	A					A	A	A	H	A		H	B	B	B	B	B	B	B			A	A
	0.68	684																	B	B	B	B	B						A	A
	1	105					B	B	B/C	C			A	A	A	A	A	A		B	B	B	B	B	B	B			A	A
	2.2	225					C	B/C	C				A	A	A	A	A/C	C		B	B	B	B	B	C	C			A	A
	4.7	475					C	D					C	C	H	B/C	C	C		B	B	B	B	C	C			A	A	A
	10	106											C	C	C	C				C	C	C	C	C				A	A	A
	15	156											B	B																
	22	226											C	D						C	C	C	C					A	A	A
	47	476																		C	C							A	A	A
	100	107																											A	
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
Case Size		01005			0201			0402							0603							0805								



Case Size	01005 (KGM 02)	0201 (KGM03)				0402 (KGM05)					0603 (KGM15)				0805 (KGM21)		
Thickness Letter	A	A	B	C	D	A	B	C	H	D	A	B	C	D	K	A	
Max Thickness (mm)	0.22	0.33	0.35	0.39	0.55	0.55	0.65	0.70	0.75	0.8	0.90	0.95	1	1.02	1.40	1.45	
Carrier Tape	PAPER	PAPER				PAPER					PAPER				EMB		
Packaging Code 7"reel	H	H	H	H	H	H	H	H	H	H	T	T	T	T	U	U	
Packaging Code 13"reel	P	N	N	N	N	N	N	N	N	N	M	M	M	M	L	L	
		PAPER								EMBOSSED (EMB)							

# 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)								3.20 ± 0.40 (0.126 ± 0.016)								4.50 ± 0.30 (0.177 ± 0.012)							
(W) Width	mm (in.)	1.60 ± 0.30 (0.063 ± 0.012)								2.50 ± 0.30 (0.098 ± 0.012)								3.20 ± 0.20 (0.126 ± 0.008)							
(t) Terminal	mm (in.)	0.50 ± 0.25 (0.020 ± 0.010)								0.50 ± 0.25 (0.020 ± 0.010)								0.61 ± 0.36 (0.024 ± 0.014)							
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 (pF)	100	101																							
	150	151.0																							
	220	221																							
	330	331																							
	470	471																							
	680	681																							
	1000	102																							
	1500	152																							
	2200	222																							
	3300	332																							
Cap (pF)	3900	392																							
	4700	472																							
	5600	562																							
	6800	682																							
	0.01	103																							
	0.012	123																							
	0.015	153																							
	0.018	183																							
	0.022	223																							
	0.027	273																							
Cap (pF)	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																							
Cap (pF)	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													
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	V
Packaging Code 13"reel	L	L	L	L	L	L	L	L	S
EMBOSSED (EMB)									