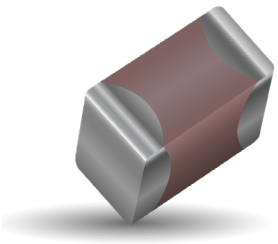
THE DATASHEET OF

0402YD475MAT2A

X5R Dielectric, KGM Series

General Specifications



GENERAL DESCRIPTION

- General Purpose Dielectric for Ceramic Capacitors
- EIA Class II Dielectric
- Temperature variation of capacitance is within ±15% from -55°C to +85°C
- Well suited for decoupling and filtering applications
- Available in High Capacitance values (up to 100µF)

HOW TO ORDER

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

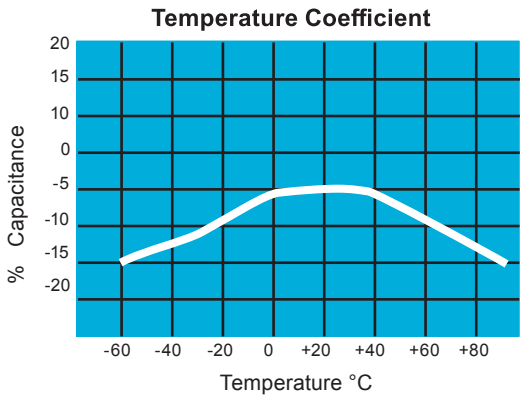
NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.
Contact factory for non-specified capacitance values.

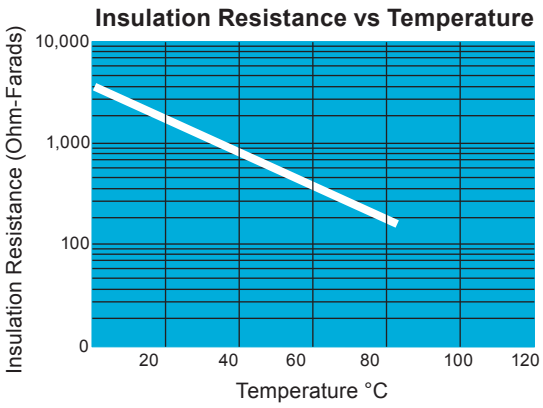
RoHS COMPLIANT

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		-55ºC to +85ºC	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 * :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.
Dissipation Factor / Tanδ		Refer to https://spicat.kyocera-avx.com for individual part number specification	
Insulation Resistance		Refer to https://spicat.kyocera-avx.com for individual part number specifiction	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±5ºC 3±0.5 sec.
Resistance to Solder Heat	Appearance	No problem observed	Take the initial value after heat treatment. Soak the sample in 260ºC±5ºC solder for 10±0.5 seconds and place in nor- mal temperature and humidity, and measure after heat treatment. (Pre-heating conditions) Order Temperature Time 1 80 to 100ºC 2 minutes 2 150 to 200ºC 2 minutes The charge and discharge current of the capacitor must not exceed 50mA for IR and withstanding voltage measurement.
	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	Take the initial value after heat treatment. (Cycle) Room temperature (3 min.) —> Lowest operation temperature (30 min.) —> Room temperature (3 min.) —> Highest operation temperature (30 min.) After 5 cycles, measure after heat treatment. The charge and discharge current of the capacitor must not exceed 50mA for IR and withstanding voltage measurement.
	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	Take the initial value after heat treatment. 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. The charge and discharge current of the capacitor must not exceed 50mA for IR measurement. *Apply 1.0 times when the rated voltage is 4V or less. Applied voltages for respective products are indicated in the chart below.
	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	Take the initial value after heat treatment. After applying rated voltage for 500+12/ −0 hours in the condition of 40ºC±2ºC and 90 to 95%RH, and place in normal temperature and humidity, then measure the sample after heat treatment. The charge and discharge current of the capacitor must not exceed 50mA for IR measurement.
	Capacitance Variation	≤ ±12.5%	
	Dissipation Factor / Tanδ	Within specification	
	Insulation Resistance	Over 1000MΩ · 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	Take the initial value after heat treatment. Vibration frequency: 10 to 55 (Hz) Amplitude: 1.5mm 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.
	Capacitance	Within tolerance	
	Tanδ	Within tolerance	
Heat treatment		Expose sample in the temperature of 150+0/ −10ºC 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

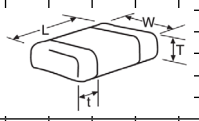
<Load Life / Load Humidity>Insulation Resistance : Over 10MΩ·µF

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	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	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	K
	0.33	334																B	B	B	B	B							A		
	0.47	474	A			A	A				A	A	A	H	A		H	B	B	B	B	B	B	B					A	A	A
	0.68	684																B	B	B	B	B							A	A	A
	1	105				B	B	B/C	C		A	A	A	A	A	A		B	B	B	B	B	B	B				A	A	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	A	A	A
	4.7	475				C	D				C	H	B/C	C	C			B	B	B	B	C	C		A	A	A	A	A	A	A
	10	106									C	C	C					C	C	C	C	C	C		A	A	A	A	A		
	15	156									B	B																			
	22	226									C	D						C	C	C	C	C			A	A	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	0.56	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																						
	3900	392																						
	4700	472																						
Cap (µF)	5600	562																						
	6800	682																						
	0.01	103																						
	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												
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)								

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