## **General Specifications**

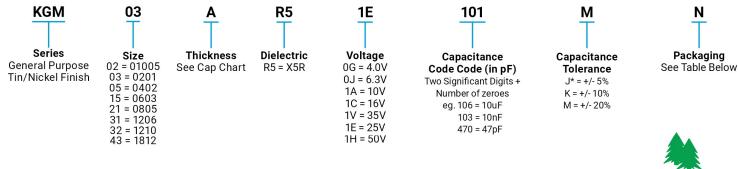




#### **GENERAL DESCRIPTION**

- · 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**

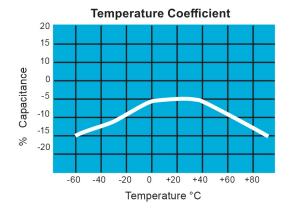


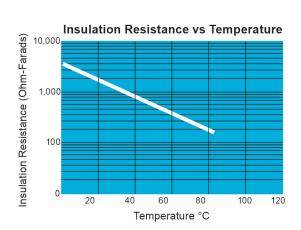
NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers. Contact factory for non-specified capacitance values.

## **PACKAGING CODES**

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

#### TYPICAL ELECTRICAL CHARACTERISTICS







🔯 KUDCER3 | 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	Specification Limits	X5R Specification Limits	Measuring Conditions (Complies with JIS C5101 / IEC60384)						
Operation	ng Temperature Range	-55°C to +85°C	Temperature Cycle Chamber						
	Capacitance	Within specified tolerance	Measure after heat treatment						
Dissi	pation Factor / Tanô	Refer to https://spicat.kyocera-avx.com for individual part number specification	Capacitance Frequency Volt  Ca10µF  Frequency: 1kHz±10%  Volt: 1.0±0.2Vrms *0.5±0.2Vrms  *:KGM02AF50J104, KGM02AF50J474,  KGM03CR50J225, KGM03BR50J225  KGM03DR50J475, KGM03CR50G475,  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.						
Inst	ulation 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.						
Di	electric 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						
В	ending 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.						
	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						
Resistance to Solder	Dissipation Factor / Tanδ	Within specification	heat treatment. (Pre-heating conditions)						
Heat	Insulation Resistance	Within specification	Order Temperature Time 1 80 to 100°C 2 minutes						
	Withstanding Voltage / Dielectric Strength	Resist without problem	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.						
	Appearance	No visual defects	Take the initial value after heat treatment. (Cycle)						
	Capacitance Variation	≤±7.5%	Room temperature (3 min.) —>  Lowest operation temperature (30 min.) —>						
Thermal Shock	Dissipation Factor	Within specification	Room temperature (30 min.) —>						
	Insulation Resistance	Within specification	Highest operation temperature (30 min.)						
	Withstanding Voltage / Dielectric Strength	Resist without problem	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.						
	Appearance	No visual defects	Take the initial value after heat treatment.						
Load Life	Capacitance Variation	s ±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.  The charge and discharge current of the capacitor must not exceed 50mA for IR measurement.						
	Dissipation Factor / Tanδ	≤ Initial Value x 2.0 (See Above)	*Apply 1.0 times when the rated voltage is 4V or less. Applied voltages for respective products are indicated						
	Insulation Resistance	Over 1000MΩ or 50MΩ⊞μF, whichever is less. *Exceptions Listed Below	in the chart below.						
	Appearance	No visual defects	Take the initial value after heat treatment.						
Load Humidity	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						
	Dissipation Factor / Tanδ Insulation Resistance	Within specification Over 1000ΜΩ or 50ΜΩ · μF, whichever is less. *Exceptions Listed Below	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.						
	Appearance	No problem observed	The charge and discharge current of the capacitor must not exceed some for its measurement.  Microscope						
Ter	mination 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.						
To	Appearance	No problem observed	Таке the initial value after heat treatment.  Vibration frequency: 10 to 55 (Hz)						
Vibration	Capacitance	Within tolerance	Amplitude: 1.5mm  Sweeping condition: 10 -> 55 -> 10Hz/1 minute in X, Y and Z directions: 2						
	Tanδ	Within tolerance	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 samp d voltage is the multiple of the rated voltage)	le 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
	6.3V	KGM02AR50J224, KGM02AR50J474, KGM03BR50J225, KGM03CR50J225, KGM03DR50J475, KGM05CR50J106, KGM05BR50J156, KGM05DR50J226, KGM21AR50J476
	10V	KGM02AR51A104, KGM03CR51A225, KGM15CR51A226
	16V	KGM03CR51C105, KGM05AR51C225, KGM05CR51C475, KGM15CR51C226
×1.0	25V	KGM05AR51E105, KGM05AR51E225, KGM05CR51E225, KGM05CR51E475, KGM15CR51E475, KGM15CR51E106, KGM21AR51E226
	35V	KGM05AR51V105, KGM15CR51V475, KGM15CR51V106
	100V	KGM31AR52A225
×1.2	6.3V	KGM03BR50J105
	6.3V	KGM02AR50J153-104, KGM03AR50J474
×1.3	10V	KGM03AR51A223-224, KGM05AR51A105-225
	16V	KGM05AR51C105

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

VED / DE	03	KGM03BR51A105, KGM03CR51C224, KGM03CR51E224
ASK/ KS	05	KGM05BR51A475, KGM05CR51A106, KGM05CR51V225





	Case Size			01005				0201						0402							0603				0805								
	Soldering		Re	eflow O	nly		Re	eflow O	nly				Re	flow/W	ave					Ref	flow/Wa	ave			Reflow/Wave								
	Packaging		Pape	r/Embo	ssed		,	All Pape	er				,	All Pape	er					-	All Pape	r			All Embossed								
(L) Length		mm (in.)		.40 ± 0.0				.60 ± 0. 024 ± 0.						.00 ± 0.:				1.60 ± 0.20 (0.063 ± 0.008)							2.01 ± 0.20 (0.079 ± 0.008)								
W) Width		mm (in.)		.20 ± 0.0 08 ± 0.0				.30 ± 0. )11 ± 0.						.50 ± 0.: 120 ± 0.:							80 ± 0.2 31 ± 0.0				1.25 ± 0.20 (0.049 ± 0.008)								
(t) Terminal		mm (in.)		.10 ± 0.0 04 ± 0.0				.15 ± 0. 006 ± 0.						.25 ± 0.1 10 ± 0.1							35 ± 0.1 14 ± 0.0							.50 ± 0.2 20 ± 0.0					
	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		Α	Α					Α																							
	150	151		Α	Α					Α																		1	~	W_	_		
	220	221		Α	Α					Α							Α										4	<		7	r T		
	330	331		Α	Α					Α							Α												۱_	ولا	-		
	470	471		Α	Α					Α							Α											<u></u>	1				
	680	681		Α	Α					Α							Α											T t			. $\neg$		
	1000	102		Α	Α				Α	Α							Α																
	1500	152	Α	Α	Α				Α	Α							Α																
	2200	222	Α	Α	Α			Α	А	Α							Α																
	3300	332	Α	А	Α			Α	А	А							Α																
	4700	472	Α	А	Α			Α	Α	Α					Α									Α									
	6800	682	Α	Α	Α			Α	А	Α					Α									Α									
Cap (µF)	0.010	103	Α	А	Α		İ	Α	Α	А					Α							Α	Α	Α									
	0.015	153	Α												Α							Α	Α	Α									
	0.022	223	Α				Α	Α	Α	Α				Α	Α							Α	Α	Α							К		
	0.033	333	Α					Α						Α								Α	Α	Α							К		
	0.047	473	Α				Α	Α	Α	Α				Α	Α							Α	А	Α							К		
	0.068	683	Α					Α						Α								Α		Α							К		
	0.10	104	Α	Α			Α	Α	Α	В			Α	Α	Α		Α					Α	Α	Α					K	K	K		
	0.15	154																				Α							К	К			
	0.22	224	Α			Α	А	Α	С			Α	Α	Α	Α		Α	В	В	В	В	В	В	В					К	К	К		
	0.33	334																В	В	В	В	В							Α				
	0.47	474	Α			Α	Α				Α	Α	Α	F	Н		Н	В	В	В	В	В	В	В					Α	Α	Α		
	0.68	684																В	В	В	В	В							Α	Α	Α		
	1	105				В	В	С	С		Α	Α	Α	Α	Α	Α		В	В	В	В	В	В	В				Α	Α	Α	Α		
	2.2	225				С	B/C	С			Α	Α	Α	Α	Α			В	В	В	В	В	С	С			Α	Α	Α	Α	Α		
	4.7	475				С	D				Н	С	С	С	С			В	В	В	В	С			Α	Α	Α	Α	Α	Α	Α		
	10	106									С	С	С					С	С	С	С	С			Α	Α	Α	Α	Α				
	15	156									В	В																					
	22	226									С	D						С	С	С	С	С			Α	Α	Α	Α	Α				
	47	476																С	С						Α	Α	Α						
	100	107																							Α	Α							
	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 (	(GM03)				0402 (H	(GM05)				0603 (k	0805 (KGM21)						
Thickness Letter	А	Α	В	С	D	Α	F	В	С	Н	D	Α	В	С	D	K	Α			
Max Thickness (mm)	0.22	0.33	0.35	0.39	0.55	0.56	0.6	0.65	0.70	0.75	0.8	0.90	0.95	1	1.02	1.40	1.45			
Carrier Tape	PAPER		PAI	PER					PAF	EMB										
Packaging Code 7"reel	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Т	Т	Т	Т	U	U			
Packaging Code 13"reel	Р	N	N	N	N	N	N	N	N	N	N	М	М	М	М	Ĺ	L			
	PAPER												EMBOSSED (EMB)							

## **Capacitance Range**



### **PREFERRED SIZES ARE SHADED**

0 0					10	206							1010							1010							
Case Size	_					206							1210			1812											
Soldering						v/Wave				Reflow Only								Reflow Only									
Packaging						bossed				All Embossed								All Embossed									
(L) Length mn (in.					(0.126	± 0.40 ± 0.016	)			3.20 ± 0.40 (0.126 ± 0.016)								4.50 ± 0.30 (0.177 ± 0.012)									
W) Width mn (in.					(0.063	± 0.30 ± 0.012	)			2.50 ± 0.30 (0.098 ± 0.012)								3.20 ± 0.20 (0.126 ± 0.008)									
(t) Terminal mn (in.						± 0.25 ± 0.010	)						0.50 ± 0.2 020 ± 0.0						.61 ± 0.3 024 ± 0.0								
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 15 <sup>-</sup>																											
220 22																											
330 33																											
470 47																											
680 68																											
1000 102																											
1500 152																											
2200 222	:	$\neg$																									
3300 332	.	$\neg$																									
3900 392	_																										
4700 472	_																										
5600 562	_																										
6800 682	_	$\neg$																									
Cap 0.010 103	_	$\dashv$																									
(μF) 0.012 123	_	$\dashv$																									
0.015 153	_	_																									
0.018 183	_	$\dashv$																									
0.022 223	_	$\dashv$																									
0.027 273	-	+																									
0.033 333	_	-+																									
0.039 393	_	+																									
0.039 393	-	$\dashv$																									
0.068 683	_	$\dashv$																									
0.082 823	_	-																									
	_	-																									
0.10 104	-	-																									
0.12 124	_	$\rightarrow$																									
0.15 154	_	$\rightarrow$																									
0.22 224		-																									
0.33 334	_														_	_											
0.47 474		М	М	М	М	М	М	М							С	С											
0.68 684	_																										
1 10	_	Н	Н	Н	Н	Н	Н	Н		Ε .	Ε .	Ε .	Ε .	Ε .	E	E											
2.2 225	_	Н	Н	Н	Н	Н	Н	Н	Α	L	L	L	L	L	L	L				<u> </u>							
4.7 47	_	Н	Н	Н	Н	Н	Н	Α		J	J	J	J	J	Α	Α											
10 100	_	Н	Н	Н	Н	Α	Н	Н		J	J	J	J	J	Α	Α					J						
22 226	_	Н	Н	Н	Α	Н				Α	Α	Α	Α	Α			J	J	J								
47 476		Н	Н	Н	Н					L	L	L	L	L													
100 107	_	Н	Н							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					12	206							1210							1812							

Case Size	12	.06 (KGM 3	31)			1812 (KGM 43)						
Thickness Letter	М	Α	Н	С	Е	J	Α	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)											