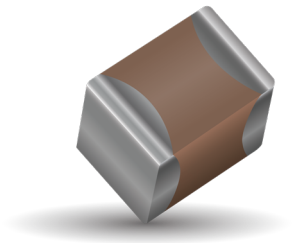
X7S Dielectric, KGM Series

General Specifications



GENERAL DESCRIPTION

X7S formulations are called "temperature stable" ceramics and fall into EIA Class II materials. Its temperature variation of capacitances within ±22% from −55°C to +125°C. This capacitance change is non-linear.

Capacitance for X7S varies under the influence of electrical operating conditions such as voltage and frequency.

X7S dielectric chip usage covers the broad spectrum of industrial applications where known changes in capacitance due to applied voltages are acceptable.

HOW TO ORDER

KGM	05	A	S7	0G	104	M	N
Series General Purpose Tin/Nickel Finish	**Size** 05 = 0402 15 = 0603 21 = 0805 31 = 1206 32 = 1210	**Thickness** See Cap Chart	**Dielectric** S7 = X7S	**Voltage** 0G = 4.0V 0J = 6.3V 1A = 10V 1C = 16V 1E = 25V 1H = 50V 2A = 100V	**Capacitance Code Code (in pF)** 2 Significant Digits +Number of zeros eg. 106 = 10µF 103 = 10nF 470 = 47pF	**Capacitance Tolerance** J = ± 5% K = ±10% M = ±20%	**Packaging** See Table Below

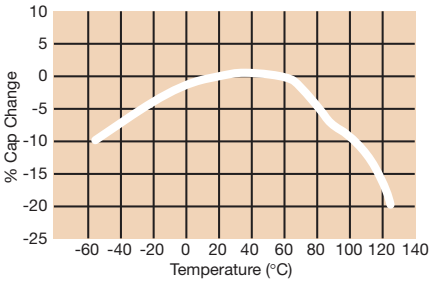
RoHS COMPLIANT

PACKAGING CODES

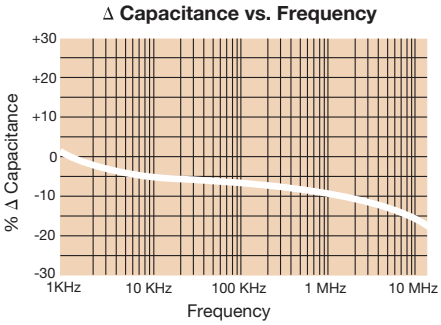
Code	EIA (inch)	IEC(mm)	7" Paper	7" Embossed	13" Paper	13"Embossed
05	0402	1005	H		N	
15	0603	1608	T		M	
21	0805	2012		U		L
31	1206	3216		U		L
32	1210	3225		U		L

TYPICAL ELECTRICAL CHARACTERISTICS

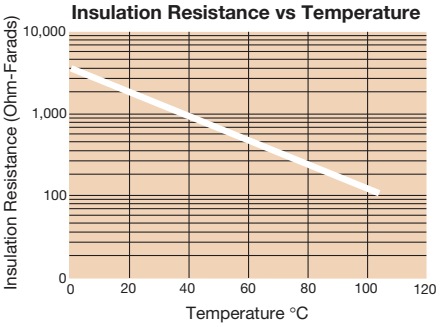
X7S Dielectric
Typical Temperature Coefficient



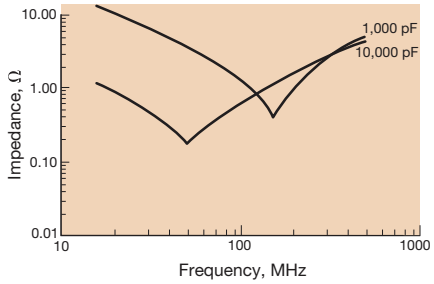
Δ Capacitance vs. Frequency



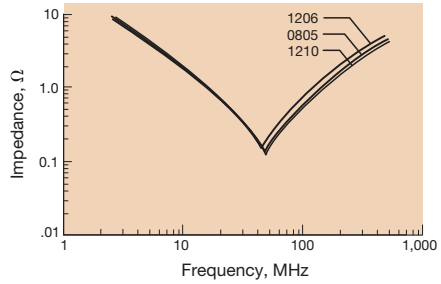
Insulation Resistance vs Temperature



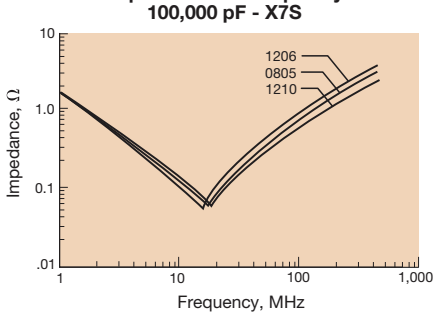
Variation of Impedance with Cap Value
Impedance vs. Frequency
1,000 pF vs. 10,000 pF - X7S
0805



Variation of Impedance with Chip Size
Impedance vs. Frequency
10,000 pF - X7S



Variation of Impedance with Chip Size
Impedance vs. Frequency
100,000 pF - X7S



X7S Dielectric, KGM Series

Specifications and Test Methods

Parameter/Test		X7S Specification Limits	Measuring Conditions (Complies with JIS C5101 / IEC60384)
Operating Temperature Range		-55ºC to +125ºC	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 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 tempera ture 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% rated voltage for 500V devices
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℃ 3±0.5 sec.
Resistance to Solder Heat	Appearance	No problem observed	Take the initial value after heat treatment. Soak the sample in 260℃±5℃ 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 100℃ 2 minutes 2 150 to 200℃ 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 40℃±2℃ and 90 to 95%RH, and place in normal temperature and humid- ity, 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 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	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/ −10℃ 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
x 1.0	6.3V	KGM05AS70J105, KGM05BS70J225
	10V	KGM05BS71A225
	100V	KGM31AS72A225, KGM21AS72A105, KGM31HS72A475

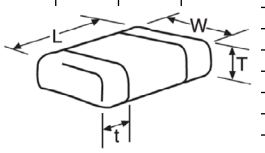
<Load Life / Load Humidity>Insulation Resistance : Over 10MΩ • µF

S7	03	---
	05	KGM05AS70G105, KGM05BS70G225, KGM05AS70J105, KGM05BS70J225, KGM05BS71A225
	21	KGM21AS72A105
	31	KGM31HS72A475

X7S Dielectric, KGM Series

Capacitance Range

SIZE		0402			0603	0805		1206			1210
Soldering		Reflow/Wave			Reflow/Wave	Reflow/Wave		Reflow/Wave			Reflow Only
Packaging		All Paper			All Paper	All Embossed		All Embossed			All Embossed
(L) Length	mm (in.)	1.00 ± 0.10 (0.040 ± 0.004)			1.60 ± 0.15 (0.063 ± 0.006)	2.01 ± 0.20 (0.079 ± 0.008)		3.20 ± 0.20 (0.126 ± 0.008)			3.20 ± 0.20 (0.126 ± 0.008)
W) Width	mm (in.)	0.50 ± 0.10 (0.020 ± 0.004)			0.81 ± 0.15 (0.032 ± 0.006)	1.25 ± 0.20 (0.049 ± 0.008)		1.60 ± 0.20 (0.063 ± 0.008)			2.50 ± 0.20 (0.098 ± 0.008)
(t) Terminal	mm (in.)	0.25 ± 0.15 (0.010 ± 0.006)			0.35 ± 0.15 (0.014 ± 0.006)	0.50 ± 0.25 (0.020 ± 0.010)		0.50 ± 0.25 (0.020 ± 0.010)			0.50 ± 0.25 (0.020 ± 0.010)
	WVDC	4	6.3	10	6.3	4	100	10	50	100	6.3
Cap	100										
(pF)	150										
	220										
	330										
	470										
	680										
	1000										
	1500										
	2200										
	3300										
	4700										
	6800										
Cap	10000										
(µF)	15000										
	22000										
	33000		A								
	47000		A								
	68000		A								
	0.10		A								
	0.15										
	0.22										
	0.33				B						
	0.47				B						
	0.68				B						
	1.0	A	A	B			A				
	1.5					F					
	2.2	B	B	B		F				A	
	3.3					F					
	4.7					F			G	H	
	10										L
	22							A			
	47										
	100										
	WVDC	4	6.3	10	6.3	4	100	10	50	100	6.3
	SIZE	0402			0603	0805		1206			1210



Case Size	0402 (KGM05)		0603 (KGM15)	0805 (KGM21)		1206 (KGM31)			1210 (KGM 32)
Thickness Letter	A	B	B	A	F	G	A	H	L
Max Thickness(mm)	0.55	0.65	0.95	1.45	1.52	1.78	1.80	1.90	2.80
Carrier Tape	PAPER			EMBOSSED					
Packaging Code 7"reel	H	H	T	U	U	U	U	U	U
Packaging Code 13"reel	N	N	M	L	L	L	L	L	L
	PAPER				Embossed(EMB)				

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12061Z475MAT2A 12061Z475KAT2A 12061Z225KAT2A 12065Z475KAT2A 04024Z105MAT2A 04024Z225MAT2A KGM05BS70J225MH KGM05AS70G105MH KGM05BS70G225MH KGM31GS72A225KU KGM31KS72A475KU KGM31HS72A475KU KGM31GS71H475KU KGM31KS72A475MU KGM21AS72A105KU KGM31AS72A225KU