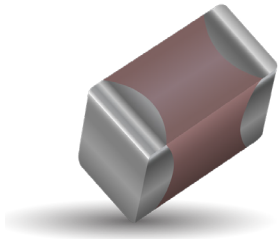


X5R Dielectric, KGM Series

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 μF 103 = 10nF 470 = 47pF | J* = +/- 5% K = +/- 10% M = +/- 20% | See Table Below |

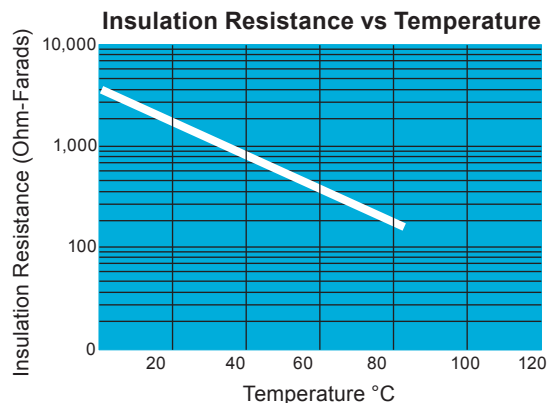
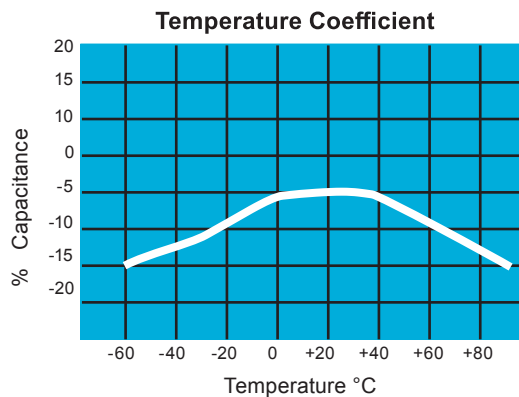
NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.
Contact factory for non-specified capacitance values.



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



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 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 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 normal temperature and humidity, and measure after heat treatment. (Pre-heating conditions) <table border="1"> <thead> <tr> <th>Order</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>80 to 100°C</td> <td>2 minutes</td> </tr> <tr> <td>2</td> <td>150 to 200°C</td> <td>2 minutes</td> </tr> </tbody> </table> The charge and discharge current of the capacitor must not exceed 50mA for IR and withstanding voltage measurement. | Order | Temperature | Time | 1 | 80 to 100°C | 2 minutes | 2 | 150 to 200°C | 2 minutes |
| | Order | Temperature | | Time | | | | | | | | |
| | 1 | 80 to 100°C | | 2 minutes | | | | | | | | |
| | 2 | 150 to 200°C | | 2 minutes | | | | | | | | |
| 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. | | | | | | | | | |
| | Capacitance Variation | ± 7.5% | The charge and discharge current of the capacitor must not exceed 50mA for IR and withstanding voltage measurement. | | | | | | | | | |
| | Dissipation Factor | Within specification | Take the initial value after heat treatment. | | | | | | | | | |
| | Insulation Resistance | Within specification | 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. | | | | | | | | | |
| | Withstanding Voltage / Dielectric Strength | Resist without problem | Take the initial value after heat treatment. | | | | | | | | | |
| Load Life | 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. 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) | | | | | | | | | | |
| | 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. | | | | | | | | | |
| | 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. The charge and discharge current of the capacitor must not exceed 50mA for IR measurement. | | | | | | | | | |
| | 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. | | | | | | | | | |
| | Capacitance | Within tolerance | Vibration frequency: 10 to 55 (Hz) Amplitude: 1.5mm Sweeping condition: 10 → 5 → 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. | | | | | | | | | |
| | Tanδ | Within tolerance | | | | | | | | | | |
| 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 | |



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



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 | 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 | 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 | 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 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 | V | |
| Packaging Code 13"reel | L | L | L | L | L | L | L | L | S | |
| EMBOSSED (EMB) | | | | | | | | | | |

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