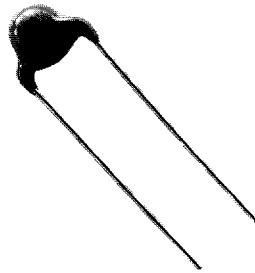
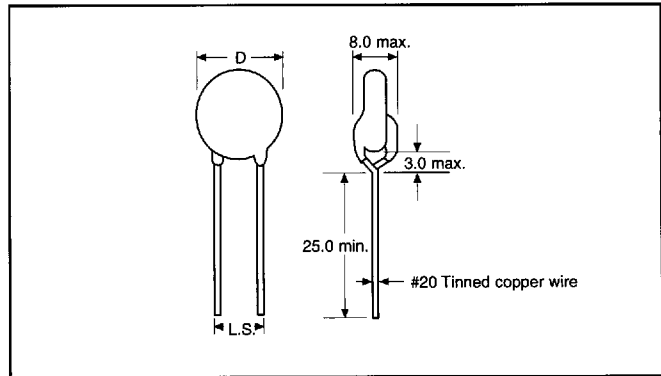


CERAMIC CAPACITORS SAFETY RECOGNIZED CAPACITORS—KD TYPE 4KVAC FLASH

muRata



DIMENSIONS: mm



PART NUMBERING SYSTEM

TYPE DE 1010	TEMP. CHAR.* B	CAPACITANCE 101	TOL. K	TEST VOLTAGE ACT4K	KD
CAPACITOR TYPE AND SIZE	TEMPERATURE CHARACTERISTICS Temperature Range -25°C to +85°C MAX. CAP. CHANGE OVER TEMP. RANGE: B = ±10% E = +20%, -55%	CAPACITANCE VALUE Expressed in picofarads and identified by a three- digit number. First two digits represent significant figures. Last digit specifies the number of zeros to follow.	CAPACITANCE TOLERANCE K = ±10% M = ±20%	TEST VOLTAGE 4KVAC	LISTED TYPE DESIGNATION

*B and E are JIS TC codes that are similar to EIA Temperature Characteristics Y5P and Y5U.

TYPICAL MARKING

Part Number	D max. mm	L.S.	Cap. Value (pF)
*DE1010 B 101K ACT4K-KD	10.0	10	100
*DE1010 B 151K ACT4K-KD	10.0	10	150
*DE1010 B 221K ACT4K-KD	10.0	10	220
*DE1010 B 331K ACT4K-KD	10.0	10	330
*DE1010 B 471K ACT4K-KD	10.0	10	470
*DE1010 E 681M ACT4K-KD	10.0	10	680
*DE1110 E 102M ACT4K-KD	11.0	10	1000
*DE1410 E 222M ACT4K-KD	14.0	10	2200
*DE1610 E 332M ACT4K-KD	16.0	10	3300
*DE1710 E 392M ACT4K-KD	17.0	10	3900
*DE1910 E 472M ACT4K-KD	19.0	10	4700

Note: Please refer to page 92 for Standard Recognitions by Part Number.
*Available as standard through authorized Murata Electronics Distributors.

Item	Example
UL Recognized Mark	
VDE Approval Mark	
SEMCO Approval Mark	
IMQ Approval Mark	
CSA Monogram	
SEV Approval Mark	
FIMKO Approval Mark	
NEMKO Approval Mark	
DEMKO Approval Mark	
BSI Approval Mark	
Class Code	X 1, Y 1
Rated Voltage	250~
Type Designation	KD
Nominal Capacitance	—
Capacitance Tolerance	—
Testing Voltage	T4KV
Manufacturer's Name	@3
Manufactured Date Code	—

Marking on one side

For DE1910E472MACT4K-KD

CERAMIC CAPACITORS SAFETY RECOGNIZED CAPACITORS—KC, KH & KD TYPE STANDARDS



TYPE KC

Part Number	Recognized Standard No.				
	IEC384-14 2nd Edition (1993)	UL1414	C22.2 No. 0, No. 1	BSI EN60065	AS3250
	X1/Y2	—	—	X1/Y2	—
DE7090 B 101 K VA1-KC	○	○	○	○	○
DE7090 B 151 K VA1-KC	○	○	○	○	○
DE7090 B 221 K VA1-KC	○	○	○	○	○
DE7090 B 331 K VA1-KC	○	○	○	○	○
DE7090 B 471 K VA1-KC	○	○	○	○	○
DE7090 B 102 K VA1-KC	○	○	○	○	○
DE7090 F 152 M VA1-KC	○	○	○	○	○
DE7100 F 222 M VA1-KC	○	○	○	○	○
DE7120 F 332 M VA1-KC	○	○	○	○	○
DE7120 F 392 M VA1-KC	○	○	○	○	○
DE7150 F 472 M VA1-KC	○	○	○	○	○
DE7100 F 472 M VA1-KC	○	○	○	○	○
DE7150 F 103 M VA1-KC	○	○	○	○	○
DE7100 FZ 472 P VA1-KC	—	○	○	—	○
DE7150 FZ 103 P VA1-KC	—	○	○	—	○
AC Rated Voltage	250	250	125	250	250

TYPE KH

Part Number	Recognized Standard No.				
	IEC384-14 2nd Edition (1993)	UL1414	C22.2 No. 1	BSI EN60065	AS3250
	X1/Y2	—	—	X1/Y2	—
DE0807 B 101K-KH	○	○	○	○	○
DE0807 B 151K-KH	○	○	○	○	○
DE0807 B 221K-KH	○	○	○	○	○
DE0807 B 331K-KH	○	○	○	○	○
DE0807 B 471K-KH	○	○	○	○	○
DE0907 B 681K-KH	○	○	○	○	○
DE0807 E 102M-KH	○	○	○	○	○
DE0907 E 152M-KH	○	○	○	○	○
DE1007 E 222M-KH	○	○	○	○	○
DE1207 E 332M-KH	○	○	○	○	○
DE1307 E 472M-KH	○	○	○	○	○
DE1607 F 103M-KH	○	○	○	○	○
AC Rated Voltage	250	250	125	250	250

TYPE KD

Part Number	Recognized Standard No.			
	IEC384-14 2nd Edition (1993)	UL1414	C22.2 No. 0, No. 1	BSI EN60065
	X1/Y1	—	—	X1/Y1
DE1010 B 101 K ACT4K-KD	○	○	○	○
DE1010 B 151 K ACT4K-KD	○	○	○	○
DE1010 B 221 K ACT4K-KD	○	○	○	○
DE1010 B 331 K ACT4K-KD	○	○	○	○
DE1010 B 471 K ACT4K-KD	○	○	○	○
DE1010 E 681 M ACT4K-KD	○	○	○	○
DE1110 E 102 M ACT4K-KD	○	○	○	○
DE1410 E 222 M ACT4K-KD	○	○	○	○
DE1610 E 332 M ACT4K-KD	○	○	○	○
DE1710 E 392 M ACT4K-KD	○	○	○	○
DE1910 E 472 M ACT4K-KD	○	○	○	○
AC Rated Voltage	250	250	125	250

Notes:

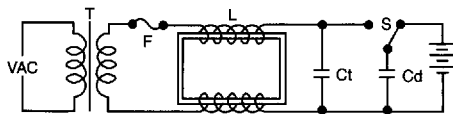
- (1) ○: Recognized —: Not Recognized
- (2) X capacitors are for use only in positions where failure of the capacitor would not expose anyone to electrical shock. UL/CSA designates the "X" type capacitor for "Across-The-Line" applications.
- (3) Y capacitors are for use in positions where failure of the capacitor may expose someone to dangerous electrical shock. UL/CSA designates the "Y" type capacitor for "Antenna Coupling" and "Line-By-Pass" applications.
- (4) IEC384-14 2nd Edition (1993) – Approval Standard for SEMKO, VDE, IMQ, SEV, FIMKO, NEMKO, DEMKO.

CERAMIC CAPACITORS SAFETY RECOGNIZED CAPACITORS-KC, KH & KD TYPE SPECIFICATIONS

Discharge Test II

A single layer of cheesecloth is to be placed around the body of the test capacitor. Each sample is to be subjected to 4 discharges from a dump capacitor charged to a voltage that, when discharged, places 5KV (KC, KH, KD type) across Ct. The interval between successive discharges is to be 5 seconds. A 240V, 60Hz potential is to be applied across Ct and is to be maintained for 30 seconds after the fourth discharge, unless the circuit is otherwise opened sooner due to breakdown of Ct. The test circuit is shown as Figure 1 and the test results shall meet the parameters of Table 1.

Fig. 1



The direct current supply is to be adjusted to provide a potential in accordance with the following.

$$VDC = \frac{5000(Cd + Ct)}{Cd} (V)$$

- VDC : Variable direct-current voltage source
S : High-voltage switch
L : Choke coil of approximately 3mH and 0.03Ω
F : Plug fuse rate 30A and 250V
VAC : Supply source rated 240V, 60Hz and 30A
Ct : Capacitor under test
Cd : Dump capacitor

Capacitance Value(s) and Dissipation Factor(s) are as follows:

TABLE 1

Item	Series	
	KC, KH, KD	
Cap. Value of Ct	0 to 0.005μF	0.0051 to 0.05μF
Cap. Value of Cd	0.005μF	0.05μF
D.F.	0.5% max.	
Appearance	The cheesecloth around capacitor shall not glow or flame.	

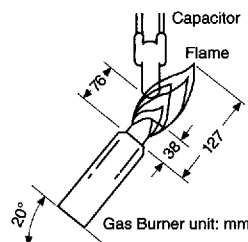
Flame Test

Capacitor shall be subjected to Figure 2 for 15 sec. and then removed for 15 sec. for 5 cycles.

1st to 4th cycles : 30 sec. max.

5th cycle : 60 sec. max. with flame extinguished

Fig. 2



Dimensions: mm

Encapsulation

Conformally coated in epoxy resin, which conforms to UL94V-φ.

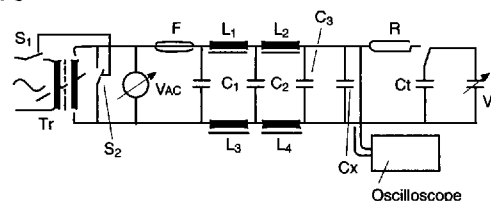
Active Flammability

The cheesecloth shall not be on fire when the following testing method is performed.

Testing Method

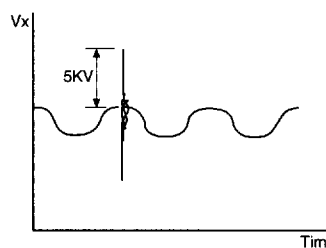
The specimens shall be individually wrapped in at least two complete layers of cheesecloth. The specimens shall be subjected to 20 discharges. The interval between successive discharges shall be 5 sec. The VAC shall be maintained for 2 min. after the last discharge. See Figures 3 & 4 below.

Fig. 3



- C_{1,2} : 1μF ± 10%, C₃ : 0.33μF ± 5% 10KV
L₁₋₄ : 1.5mH ± 20% 16A Rod core choke
R : 100Ω ± 2%, Ct : 3μF ± 5% 10KV
VAC : VR ± 5%, VR : Rated working voltage
Cx : Capacitor, F : Fuse, Rated 10A
Vt : Voltage applied to Ct

Fig. 4



Passive Flammability

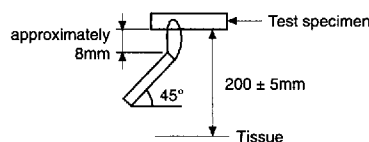
The test specimen shall be held in the flame and the time shall not exceed 30 sec. The tissue paper shall not ignite. See Figure 5 below.

Testing Method

The capacitor under test shall be held in the flame in the position which best promotes burning. Each specimen shall only be exposed once to the flame. Time of exposure to flame: 30sec.

- Length of flame : 12 ± 1mm
Gas burner : Length 35mm min.
Inside diameter : 0.5 ± 0.1mm
Outside diameter : 0.9mm max.
Gas : Butane gas purity 95% min.

Fig. 5



CERAMIC CAPACITORS SAFETY RECOGNIZED CAPACITORS—KC, KH & KD TYPE SPECIFICATIONS



Operating Temperature Range

–25°C to +85°C (KC and KD)

–25°C to +125°C (KH except UL, CSA and VDE)

Capacitance

Measured at $1 \pm 0.1\text{KHz}$, 5Vrms max. and 20°C

Dissipation Factor (D.F.)

Measured at $1 \pm 0.1\text{KHz}$, 5Vrms max. and 20°C

TC	D.F.
B	$\leq 2.5\%$
E	$\leq 2.5\%$
F, FZ	$\leq 5.0\%$

Insulation Resistance (I.R.)

$10,000\text{M}\Omega$ min. (at 500V DC for 1 minute).

Dielectric Strength

Between both leads:

KC and KH Type : $2,600\text{ VAC}$ for 1 minute.
KD Type : $4,000\text{ VAC}$ for 1 minute.

Temperature Characteristics

TC	Change Over Temp. Range
B	$\pm 10\%$
E	$+20, -55\%$
F	$+30, -80\%$
FZ	$+30, -85\%$ (-10°C to $+60^\circ\text{C}$)

Humidity

Capacitor shall be subjected to $40 \pm 2^\circ\text{C}$ and a relative humidity of 90 to 95% for 500 ± 12 hours. After placing at room temperature for 1 or 2 hours, conditions shall be as in Table 1.

TABLE 1

Item	Series	
	KC	KH, KD
Appearance	No physical damage	No physical damage
I.R.	B, F: $3000\text{M}\Omega$ min. FZ: $1500\text{M}\Omega$ min.	$3000\text{M}\Omega$ min.
Dielectric Strength	See above	

Life Test

Capacitor shall be placed in a circulating air chamber under the following conditions and meet the parameters of Table 2 measured 24 ± 2 hours after testing:

KC Type : $85 \pm 2^\circ\text{C}$, 50% RH max., Apply 425 VAC for 1000 hours increasing to 1000 VAC for 0.1 seconds once each hour.

KH Type : $125 \pm 2^\circ\text{C}$, 50% RH max., Apply 425 VAC for 1000 hours increasing to 1000 VAC for 0.1 seconds once each hour.

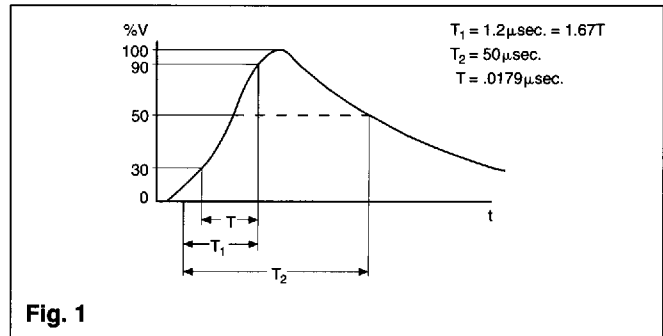
KD Type : $85 \pm 2^\circ\text{C}$, 50% RH max., Apply 800 VAC for 1500 hours increasing to 1600 VAC for 0.1 seconds once each hour.

TABLE 2

Item	Series	
	KC	KH, KD
Appearance	No physical damage	No physical damage
I.R.	B, F: $3000\text{M}\Omega$ min. FZ: $1500\text{M}\Omega$ min.	$3000\text{M}\Omega$ min.
Dielectric Strength	See dielectric strength item at left	
Discharge Test II	See page 95	

Impulse Voltage Test

After the capacitors are subjected to the life test, each individual capacitor shall be subjected to a 5kV (KD : 8kV) impulse voltage as shown in Figure 1.



Discharge Test 1

As in Figure 2, discharge is made 50 times at 5 second intervals from C_d charged to 10kV DC (KC, KH, KD type); the measured results shall meet the parameters of Table 3.

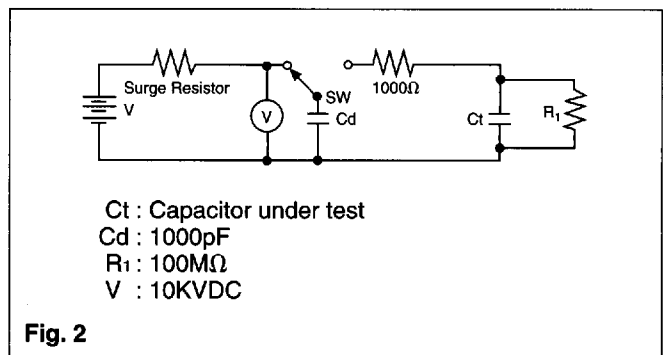
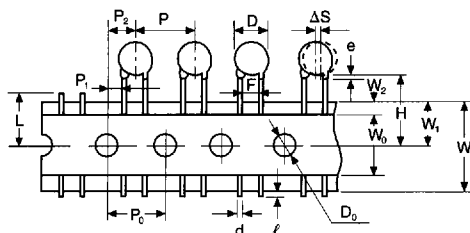


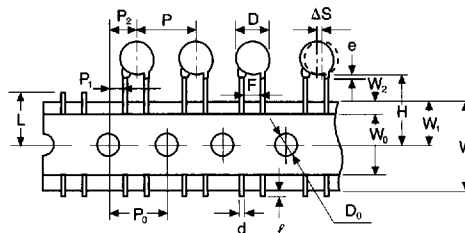
TABLE 3

Item	Series	
	KC, KH, KD	
Appearance	No physical damage	
I.R.	$1000\text{M}\Omega$ min.	
Dielectric Strength	See dielectric strength item at left	

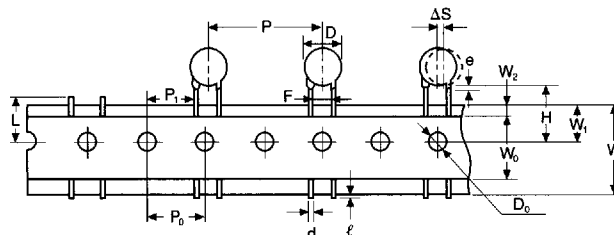
For MKV to 2KVDC, $\leq 11\text{mm}$ Dia.
• 12.7mm pitch/lead spacing 5mm
(Lead Code: -979)



For UP to 13mm Dia., 1-3KVDC &
Safety Caps (DE7090, DE7100 and all KH Series)
• 15mm pitch/lead spacing 7.5mm
(Lead Code: -486)



For MKV $\geq 14\text{mm}$ Dia., 1-3KVDC &
Safety Caps (DE7120 & DE7150)
• 30mm pitch/lead spacing 7.5mm
(Lead Code: -477)



DIMENSIONS: mm

ITEM	CODE	−979	−486	−477
Pitch of component	P	12.7	15.0	30.0
Pitch of sprocket hole	P ₀	12.7 ± 0.3	15.0 ± 0.3	15.0 ± 0.3
Lead spacing	F	5.0 ^{+0.8} _{−0.2}	7.5 ± 1.0	7.5 ± 1.0
Length from hole center to component center	P ₂	6.35 ± 1.3	7.5 ± 1.5	7.5 ± 1.5
Length from hole center to lead	P ₁	3.85 ± 0.7	3.75 ± 1.0	3.75 ± 1.0
Body diameter	D	See individual product specifications		
Deviation along tape, left or right	ΔS	0 ± 1.0	0 ± 2.0	
Carrier tape width	W	18.0 ± 0.5		
Position of sprocket hole	W ₁	9.0 ± 0.5		
Lead distance between reference and bottom planes	H	20.0 ^{+1.5} _{−1.0}		20.0 ^{+1.5} _{−1.0}
Protrusion length	ℓ	+0.5 / −1.0		
Diameter of sprocket hole	D ₀	4.0 ± 0.1		
Lead diameter	d	.6 ± 0.05	.65 ± 0.05	
Total tape thickness	t ₁	0.6 ± 0.3		
Total thickness, tape and lead wire	t ₂	1.5 max.		
Portion to cut in case of defect	L	11.0 ⁺⁰ _{−1.0}		
Hold down tape width	W ₀	11.5 min.		
Hold down tape position	W ₂	1.5 ± 1.5		
Coating extension on lead	e	3.0 max.		