

# High Frequency Single Layer Microchip Capacitors



### **EU RoHS Compliant**

- All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment."
- For more details, please refer to our website 'Murata's Approach for EU RoHS' (<http://www.murata.com/info/rohs.html>).

# CONTENTS

<b>Part Numbering</b>	2
<b>High Frequency Single Layer Microchip Capacitors</b>	3
Temperature Compensating 5C Characteristics ( $0\pm 30\text{ppm}/^\circ\text{C}$ )	4
Temperature Compensating 6U Characteristics ( $-750\pm 60\text{ppm}/^\circ\text{C}$ )	5
Temperature Compensating 7K Characteristics ( $-2200\pm 500\text{ppm}/^\circ\text{C}$ )	6
High Dielectric B5 Characteristics ( $\pm 10\%$ )	7
High Dielectric F9 Characteristics (+30%, -80%)	8
High Dielectric W1 Characteristics (+30%, -90%)	9
Multi-plate Type	9
<b>Specifications and Test Methods</b>	10
<b>Notice</b>	12

## ● Part Numbering

### High Frequency Single Layer Microchip Capacitors

(Part Number) 

CL	B	05	B5	390	K	1	000	TC1
①	②	③	④	⑤	⑥	⑦	⑧	⑨

#### ① Product ID

Product ID	
<b>CL</b>	High Frequency Microchip Capacitors

#### ② Series

Code	Series
<b>B</b>	with Border on Both Sides

#### ③ Size

Code	Size (L×W)
<b>0A</b>	0.25×0.25mm
<b>0B</b>	0.30×0.25mm
<b>0C</b>	0.35×0.25mm
<b>0D</b>	0.38×0.38mm
<b>0E</b>	0.55×0.38mm
<b>0H</b>	0.71×0.38mm
<b>05</b>	0.50×0.50mm
<b>0G</b>	0.70×0.50mm
<b>0K</b>	0.90×0.50mm
<b>0F</b>	0.64×0.64mm
<b>1A</b>	1.00×0.64mm
<b>0J</b>	0.76×0.76mm
<b>1B</b>	1.09×0.76mm
<b>09</b>	0.90×0.90mm
<b>1E</b>	1.49×0.90mm
<b>1C</b>	1.27×1.27mm
<b>1G</b>	1.73×1.27mm
<b>2C</b>	2.19×1.27mm
<b>1H</b>	1.78×1.78mm
<b>2L</b>	2.95×1.78mm
<b>2E</b>	2.29×2.29mm
<b>3G</b>	3.71×2.29mm

#### ④ Temperature Characteristics

Code	Temperature Range	Capacitance Change
<b>5C</b>	-25 to 85°C	0±30ppm/°C
<b>6U</b>	-25 to 85°C	-750±60ppm/°C
<b>7K</b>	-25 to 85°C	-2200±500ppm/°C
<b>B5</b>	-25 to 85°C	±10%
<b>F9</b>	-25 to 85°C	+30,-80%
<b>W1</b>	-25 to 85°C	+30,-90%

\*Reference Temp. : 25°C

#### ⑤ Capacitance

Expressed by three figures. The unit is pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two numbers. If there is a decimal point, it is expressed by the capital letter "R". In this case, all figures are significant digits.

#### ⑥ Capacitance Tolerance

Code	Capacitance Tolerance
<b>B</b>	±0.1pF
<b>K</b>	±10%
<b>M</b>	±20%
<b>Z</b>	+80%, -20%

#### ⑦ Number of Electrodes

Code	Number of Electrodes
<b>1</b>	1
<b>3</b>	3
<b>4</b>	4
<b>5</b>	5

#### ⑧ Individual Specification Code

Code	Individual Specification Code
<b>000</b>	Standard

#### ⑨ Packaging

Code	Packaging
<b>TC1</b>	Tray

# High Frequency Single Layer Microchip Capacitors



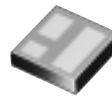
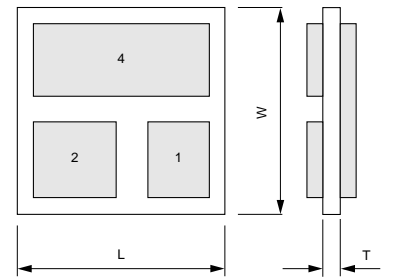
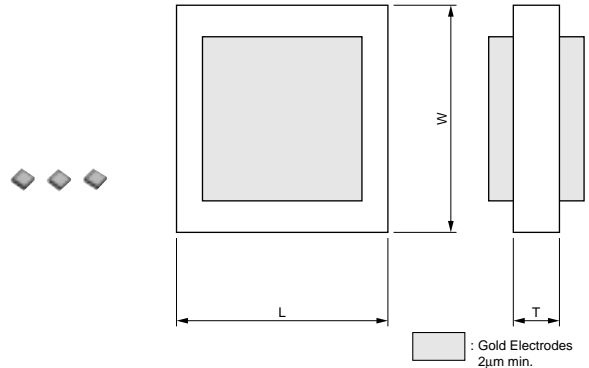
## High Frequency Single Layer Microchip Capacitors

### ■ Features

1. Fine grained high-density ceramic dielectric, pure gold electrode and simple single layer structure provide very reliable performance and excellent frequency characteristics.
2. A wide selection of sizes from very miniature 0.25mm square is suited to high-density mounting.
3. For compatibility with the gold electrodes, die bonding with Au-Sn is possible and wire bonding with gold wire is possible.
4. To improve handling of bonding, Au-Sn coating is available on one side or both sides.
5. Custom made type (dimensions, cap. values, etc.) are also available upon request.

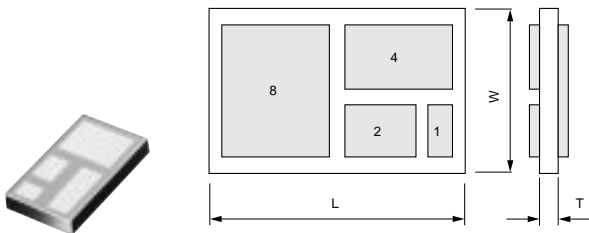
### ■ Applications

1. Microwave Integrated Circuits
2. Microwave Devices
3. Optical Devices
4. Measuring Equipments



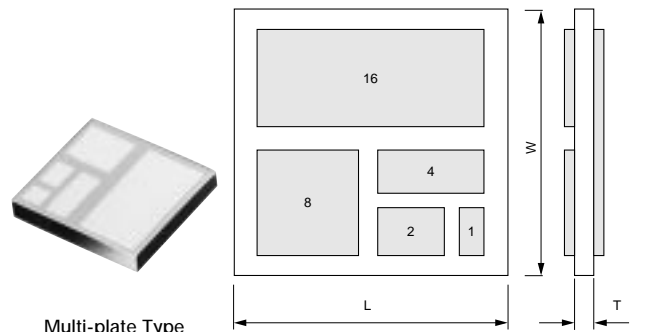
Multi-plate Type  
CLB057K1R5K3000TC1  
CLB056U0R7K3000TC1

Gold Electrodes  
2µm min.



Multi-plate Type  
CLB0K7K3R0K4000TC1  
CLB0K6U1R5K4000TC1

Gold Electrodes  
2µm min.



Multi-plate Type  
CLB096U3R0K5000TC1  
CLB097K5R9K5000TC1

Gold Electrodes  
2µm min.

## Temperature Compensating 5C Characteristics (0±30ppm/°C)

Part Number	CLB																			
Size Code	0A	0C	0D	05	0E	0F	0G	0H	0J	09	1A	1B	1C	1E	1G	1H	2C	2E	2L	3G
L	0.25	0.35	0.38	0.50	0.55	0.64	0.70	0.71	0.76	0.90	1.00	1.09	1.27	1.49	1.73	1.78	2.19	2.29	2.95	3.71
W	0.25	0.25	0.38	0.50	0.38	0.64	0.50	0.38	0.76	0.90	0.64	0.76	1.27	0.90	1.27	1.78	1.27	2.29	1.78	2.29
T (max.)	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.45	0.45	0.45	0.45	0.45
Capacitance and Tolerance																				
0.1pF (0R1)	B																			
0.2pF (0R2)		B	B																	
0.3pF (0R3)			B	B		B														
0.4pF (0R4)			B	B		B			B											
0.5pF (0R5)				B	B	B			B	B										
0.6pF (0R6)				B	B	B			B	B										
0.7pF (0R7)						B	B	B	B	B										
0.8pF (0R8)						B	B	B	B	B										
0.9pF (0R9)						B	B		B	B										
1.0pF (1R0)						K	K		K	K			K							
1.1pF (1R1)									K	K	K		K							
1.2pF (1R2)									K	K	K		K							
1.3pF (1R3)									K	K	K		K							
1.5pF (1R5)										K	K	K	K							
1.6pF (1R6)										K	K	K	K							
1.8pF (1R8)										K		K	K			K				
2.0pF (2R0)												K	K	K		K				
2.2pF (2R2)													K	K		K				
2.4pF (2R4)													K	K		K				
2.7pF (2R7)													K	K		K				
3.0pF (3R0)													K			K		K		
3.3pF (3R3)													K			K		K		
3.6pF (3R6)													K			K		K		
3.9pF (3R9)														K	K			K		
4.3pF (4R3)														K	K			K		
4.7pF (4R7)														K	K			K		
5.1pF (5R1)																K	K	K		
5.6pF (5R6)																K		K		
6.2pF (6R2)																K		K		
6.8pF (6R8)																K		K		
7.5pF (7R5)																		K	K	
8.2pF (8R2)																		K	K	
9.1pF (9R1)																		K	K	
10pF (100)																		K	K	
11pF (110)																				K
12pF (120)																				K
13pF (130)																				K
15pF (150)																				K
16pF (160)																				K

Custom capacitors (dimensions, capacitance, etc.) are available upon request. Please consult us for details.

The digits shown in ( ) following capacitance are part numbering codes.

Dimensions are shown in mm.

Capacitance Tolerance B: ±0.1pF, K: ±10%

## Temperature Compensating 6U Characteristics (-750±60ppm/°C)

Part Number	CLB																
Size Code	0A	0B	0C	0D	05	0E	0F	0G	0H	0J	09	1A	1B	1C	1E	1H	2E
L	0.25	0.30	0.35	0.38	0.50	0.55	0.64	0.70	0.71	0.76	0.90	1.00	1.09	1.27	1.49	1.78	2.29
W	0.25	0.25	0.25	0.38	0.50	0.38	0.64	0.50	0.38	0.76	0.90	0.64	0.76	1.27	0.90	1.78	2.29
T (max.)	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.45	0.45
<b>Capacitance and Tolerance</b>																	
0.3pF (0R3)	B																
0.4pF (0R4)	B																
0.5pF (0R5)	B																
0.6pF (0R6)	B																
0.7pF (0R7)	B																
0.8pF (0R8)		B															
0.9pF (0R9)			B	B													
1.0pF (1R0)				K	K												
1.1pF (1R1)				K	K												
1.2pF (1R2)				K	K												
1.3pF (1R3)				K	K												
1.5pF (1R5)				K	K												
1.6pF (1R6)				K	K												
1.8pF (1R8)					K	K											
2.0pF (2R0)					K	K	K										
2.2pF (2R2)					K	K	K										
2.4pF (2R4)					K	K	K										
2.7pF (2R7)							K	K	K								
3.0pF (3R0)							K	K		K							
3.3pF (3R3)							K			K	K						
3.6pF (3R6)							K			K	K						
3.9pF (3R9)							K			K	K						
4.3pF (4R3)							K			K	K						
4.7pF (4R7)										K	K	K					
5.1pF (5R1)										K	K	K					
5.6pF (5R6)										K	K	K					
6.2pF (6R2)										K	K	K					
6.8pF (6R8)											K		K				
7.5pF (7R5)													K	K	K		
8.2pF (8R2)														K	K		
9.1pF (9R1)														K	K		
10pF (100)														K			
11pF (110)														K			
12pF (120)														K			
13pF (130)														K		K	
15pF (150)														K		K	
20pF (200)																	K

Custom capacitors (dimensions, capacitance, etc.) are available upon request. Please consult us for details.

The digits shown in ( ) following capacitance are part numbering codes.

Dimensions are shown in mm.

Capacitance Tolerance B: ±0.1pF, K: ±10%

## Temperature Compensating 7K Characteristics (-2200±500ppm/°C)

Part Number	CLB																	
Size Code	0A	0B	0C	0D	05	0E	0F	0G	0H	0J	09	1A	1B	1C	1E	1G	1H	2E
L	0.25	0.30	0.35	0.38	0.50	0.55	0.64	0.70	0.71	0.76	0.90	1.00	1.09	1.27	1.49	1.73	1.78	2.29
W	0.25	0.25	0.25	0.38	0.50	0.38	0.64	0.50	0.38	0.76	0.90	0.64	0.76	1.27	0.90	1.27	1.78	2.29
T (max.)	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.45	0.45
<b>Capacitance and Tolerance</b>																		
0.8pF (0R8)	B																	
0.9pF (0R9)	B																	
1.0pF (1R0)	K																	
1.1pF (1R1)	K																	
1.2pF (1R2)	K																	
1.3pF (1R3)	K																	
1.5pF (1R5)		K																
1.6pF (1R6)		K																
1.8pF (1R8)			K	K														
2.0pF (2R0)				K														
2.2pF (2R2)				K	K													
2.4pF (2R4)				K	K													
2.7pF (2R7)				K	K													
3.0pF (3R0)				K	K													
3.3pF (3R3)					K	K												
3.6pF (3R6)					K	K	K											
3.9pF (3R9)					K	K	K											
4.3pF (4R3)					K	K	K											
4.7pF (4R7)					K		K		K									
5.1pF (5R1)							K	K	K									
5.6pF (5R6)							K	K		K								
6.2pF (6R2)							K			K	K							
6.8pF (6R8)							K			K	K							
7.5pF (7R5)							K			K	K							
8.2pF (8R2)										K	K	K						
9.1pF (9R1)										K	K	K						
10pF (100)										K	K	K						
11pF (110)										K	K	K						
12pF (120)											K		K					
13pF (130)											K							
15pF (150)														K	K			
16pF (160)														K	K			
18pF (180)														K				
20pF (200)														K				
22pF (220)														K				
27pF (270)																	K	
33pF (330)																K		
39pF (390)																		K
43pF (430)																		K
47pF (470)																		K

Custom capacitors (dimensions, capacitance, etc.) are available upon request. Please consult us for details.

The digits shown in ( ) following capacitance are part numbering codes.

Dimensions are shown in mm.

Capacitance Tolerance B: ±0.1pF, K: ±10%



## High Dielectric B5 Characteristics (±10%)

Part Number	CLB																
	0A	0B	0C	0D	05	0E	0F	0G	0H	0J	09	1A	1C	1E	1G	1H	2E
L	0.25	0.30	0.35	0.38	0.50	0.55	0.64	0.70	0.71	0.76	0.90	1.00	1.27	1.49	1.73	1.78	2.29
W	0.25	0.25	0.25	0.38	0.50	0.38	0.64	0.50	0.38	0.76	0.90	0.64	1.27	0.90	1.27	1.78	2.29
T (max.)	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.45	0.45
<b>Capacitance and Tolerance</b>																	
2.0pF (2R0)	K																
2.2pF (2R2)	K																
2.4pF (2R4)	K																
2.7pF (2R7)	K																
3.0pF (3R0)	K																
3.3pF (3R3)		K															
3.6pF (3R6)		K															
3.9pF (3R9)			K														
4.3pF (4R3)			K														
4.7pF (4R7)	K																
5.1pF (5R1)	K			K													
5.6pF (5R6)	K			K	K												
6.2pF (6R2)	K			K	K												
6.8pF (6R8)	K			K	K												
7.5pF (7R5)	K			K	K												
8.2pF (8R2)	K				K	K											
9.1pF (9R1)	K				K	K											
10pF (100)	K				K	K	K										
11pF (110)	K			K	K		K										
12pF (120)	K			K	K		K										
13pF (130)		K		K	K		K										
15pF (150)		K		K	K		K			K							
16pF (160)			K	K	K		K			K	K						
18pF (180)			K	K	K		K			K	K						
20pF (200)				K	K		K			K	K						
22pF (220)				K	K		K			K	K						
24pF (240)				K	K		K			K	K						
27pF (270)				K	K		K			K	K						
30pF (300)				K	K		K			K	K						
33pF (330)					K	K	K			K	K		K				
36pF (360)					K	K	K			K	K		K				
39pF (390)					K	K	K			K	K		K				
43pF (430)					K	K	K			K	K		K				
47pF (470)							K	K	K	K	K		K				
51pF (510)							K	K	K	K	K		K				
56pF (560)							K	K	K	K	K		K				
62pF (620)							K	K		K	K		K				
68pF (680)							K	K		K	K						
75pF (750)							K			K	K		K				
82pF (820)										K	K	K	K				
91pF (910)										K	K	K	K				
100pF (101)										K	K	K	K				
110pF (111)										K	K	K	K				
120pF (121)											K	K	K				
130pF (131)											K		K			K	
150pF (151)													K	K		K	
160pF (161)													K	K		K	
180pF (181)													K			K	
200pF (201)													K			K	K
220pF (221)																K	K
240pF (241)																K	K

Continued on the following page.

Continued from the preceding page.

Part Number	CLB																
Size Code	0A	0B	0C	0D	05	0E	0F	0G	0H	0J	09	1A	1C	1E	1G	1H	2E
L	0.25	0.30	0.35	0.38	0.50	0.55	0.64	0.70	0.71	0.76	0.90	1.00	1.27	1.49	1.73	1.78	2.29
W	0.25	0.25	0.25	0.38	0.50	0.38	0.64	0.50	0.38	0.76	0.90	0.64	1.27	0.90	1.27	1.78	2.29
T (max.)	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.45	0.45
Capacitance and Tolerance																	
270pF (271)																K	K
300pF (301)															K	K	K
330pF (331)																K	K
360pF (361)																K	K
390pF (391)																K	K
430pF (431)																K	K
470pF (471)																	K
510pF (511)																	K
560pF (561)																	K
620pF (621)																	K

Custom capacitors (dimensions, capacitance, etc.) are available upon request. Please consult us for details.

The digits shown in ( ) following capacitance are part numbering codes.

Dimensions are shown in mm.

Capacitance Tolerance K: ±10%

### High Dielectric F9 Characteristics (+30%, -80%)

Part Number	CLB												
Size Code	0A	0B	0C	0D	05	0E	0F	0G	0H	0J	09	1A	
L	0.25	0.30	0.35	0.38	0.50	0.55	0.64	0.70	0.71	0.76	0.90	1.00	
W	0.25	0.25	0.25	0.38	0.50	0.38	0.64	0.50	0.38	0.76	0.90	0.64	
T (max.)	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	
Capacitance and Tolerance													
27pF (270)	M												
30pF (300)	M												
33pF (330)	M												
36pF (360)		M											
39pF (390)		M											
43pF (430)			M										
47pF (470)			M										
51pF (510)			M										
62pF (620)				M									
68pF (680)				M									
75pF (750)				M	M								
82pF (820)				M	M								
91pF (910)					M	M							
100pF (101)					M	M							
110pF (111)					M	M							
120pF (121)					M	M							
130pF (131)					M		M		M				
150pF (151)							M	M	M				
160pF (161)							M	M					
180pF (181)							M	M					
200pF (201)							M	M		M	M		
220pF (221)							M			M	M		
240pF (241)										M	M	M	
270pF (271)										M	M	M	
300pF (301)										M	M	M	
330pF (331)											M	M	
360pF (361)											M	M	
390pF (391)											M		

Custom capacitors (dimensions, capacitance, etc.) are available upon request. Please consult us for details.

The digits shown in ( ) following capacitance are part numbering codes.

Dimensions are shown in mm.

Capacitance Tolerance M: ±20%

## High Dielectric W1 Characteristics (+30%, -90%)

Part Number	CLB					
Size Code	0A	0D	05	0F	0J	09
L	0.25	0.38	0.50	0.64	0.76	0.90
W	0.25	0.38	0.50	0.64	0.76	0.90
T (max.)	0.35	0.35	0.35	0.35	0.35	0.35
Capacitance and Tolerance						
36pF (360)	Z					
39pF (390)	Z					
43pF (430)	Z					
47pF (470)	Z					
51pF (510)	Z					
56pF (560)	Z					
91pF (910)		Z				
100pF (101)		Z				
110pF (111)		Z				
120pF (121)		Z				
130pF (131)		Z	Z			
150pF (151)		Z	Z			
160pF (161)			Z			
180pF (181)			Z			
200pF (201)			Z			
220pF (221)			Z	Z		
240pF (241)				Z		
270pF (271)				Z		
300pF (301)				Z		
330pF (331)				Z	Z	
360pF (361)				Z	Z	
390pF (391)				Z	Z	Z
430pF (431)					Z	Z
470pF (471)					Z	Z
510pF (511)					Z	Z
560pF (561)					Z	Z
620pF (621)						Z
680pF (681)						Z

Custom capacitors (dimensions, capacitance, etc.) are available upon request. Please consult us for details.

The digits shown in ( ) following capacitance are part numbering codes.

Dimensions are shown in mm.

Capacitance Tolerance Z: +80%, -20%

## Multi-plate Type

Part Number	Size (mm)	Capacitance (pF)	Temperature Coefficient	Rated Voltage (Vdc)
CLB056U0R7K3000TC1	L 0.50 X W 0.50 X T(max) 0.35	0.7	-750±60ppm/°C	100
CLB057K1R5K3000TC1	L 0.50 X W 0.50 X T(max) 0.35	1.5	-2200±500ppm/°C	100
CLB0K6U1R5K4000TC1	L 0.90 X W 0.50 X T(max) 0.35	1.5	-750±60ppm/°C	100
CLB0K7K3R0K4000TC1	L 0.90 X W 0.50 X T(max) 0.35	3.0	-2200±500ppm/°C	100

Custom capacitors (dimensions, capacitance, etc.) are available upon request. Please consult us for details.

Capacitance Tolerance K: ±10%

Capacitance values are of longest plates.

## Specifications and Test Methods

No.	Item	Specifications	Test Methods												
1	Operating Temperature Range	-55 to +125°C													
2	Appearance	No visual damage	Magnification at 20x												
3	Rated Voltage	100Vdc													
4	Capacitance	Within the specified tolerance	MIL-STD-202 Method 305 Test Frequency: Temp. Comp.: 1MHz±10% High K: 1kHz±10% Test Voltage: 1Vrms												
5	Q/Dissipation Factor (D. F.)	5C: Q≥200 6U: Q≥100 7K: Q≥80 B5, F9: D. F. ≤2.5% W1: D. F. ≤4%	MIL-STD-202 Method 306 Test frequency and voltage are the same as those for the capacitance test.												
6	Insulation Resistance (I. R.)	25°C: 10000MΩ min. 125°C: 1000MΩ min.	MIL-STD-202 Method 302 Apply 100Vdc for a max. of 2 minutes with a max. of 50mA limiting the charging current.												
7	Dielectric Withstanding Voltage (D. W. V.)	No damage	MIL-STD-202 Method 301 250Vdc for 1 to 5 seconds with a max. of 50mA limiting the surge current.												
8	Temperature Characteristics (Temperature Coefficient)	5C: 0±30ppm/°C 6U: -750±60ppm/°C 7K: -2200±500ppm/°C B5: ±10% F9: +30, -80% W1: +30, -90%	Capacitance should be measured at the steps shown in the table below. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temp (°C)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>25±2</td> </tr> <tr> <td>2</td> <td>-25±3</td> </tr> <tr> <td>3</td> <td>25±2</td> </tr> <tr> <td>4</td> <td>85±3</td> </tr> <tr> <td>5</td> <td>25±2</td> </tr> </tbody> </table>	Step	Temp (°C)	1	25±2	2	-25±3	3	25±2	4	85±3	5	25±2
Step	Temp (°C)														
1	25±2														
2	-25±3														
3	25±2														
4	85±3														
5	25±2														
9	Mechanical Strength	Bond Strength	MIL-STD-883 Method 2011 Condition D Pull force: 3.0g min. No termination lifting Mount the capacitors on a gold metallized alumina substrate with AuSn (80/20) and bond a 25μm gold wire to the capacitor electrode using ball bonding. Then, pull the wire.												
		Die Shear Strength	MIL-STD-883 Method 2019 Exceed MIL-STD-883 Method 2019 Mount the capacitors on a gold metallized alumina substrate with AuSn (80/20). Apply force parallel to the substrate.												
10	Vibration	Appearance	MIL-STD-202 Method 201 No mechanical damage												
		Capacitance	Ramp frequency from 10 to 55Hz then return to 10Hz all within 1 minute. Amplitude: 1.5mm max. total excursion. Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours).												
		Q/D. F.	Initial requirement												
11	Thermal Shock	Appearance	MIL-STD-202 Method 107 Condition A-1 No mechanical damage												
		Capacitance Change	Note : Temperature in step 3 is +125±3 °C and time for steps 1 and 3 is 30 minutes. 5C, 6U, 7K: ≤±5% or ≤±0.5pF (whichever is greater) B5, F9, W1: ≤±10%												
		Q/D. F.	Initial requirement												
		I. R.	1000MΩ min.												
		D. W. V.	No damage												
12	Humidity (No Load)	Appearance	MIL-STD-202 Method 103 No mechanical damage												
		Capacitance Change	1000±12 hours at 60±5°C in 90 to 95% relative humidity 5C, 6U, 7K: ≤±5% or ≤±0.5pF (whichever is greater) B5, F9, W1: ≤±10%												
		Q/D. F.	5C, 6U: Q≥100 7K: Q≥80 B5, F9: D. F. ≤2.5% W1: D. F. ≤4%												
		I. R.	≥30% of initial requirement												
		D. W. V.	No damage												

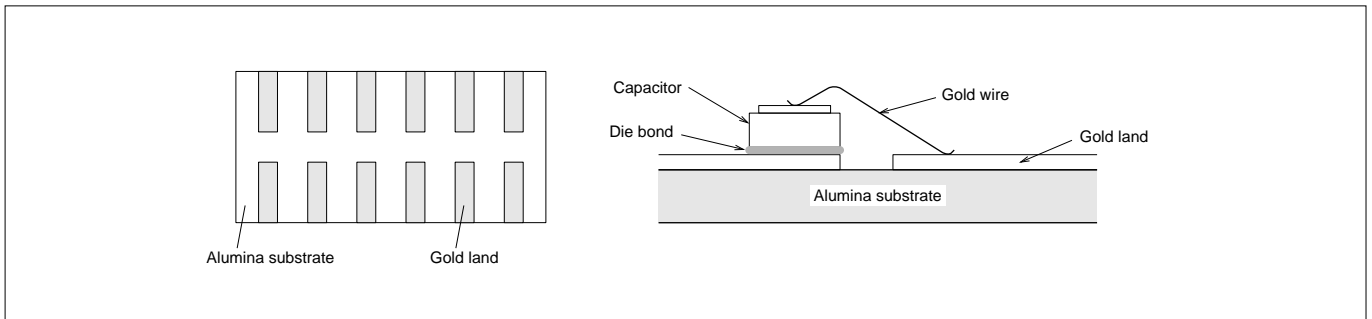
Continued on the following page.

## Specifications and Test Methods

Continued from the preceding page.

No.	Item	Specifications	Test Methods
13	High Temperature Load	Appearance	No mechanical damage
		Capacitance Change	5C, 6U, 7K: $\leq \pm 5\%$ or $\leq \pm 0.5\text{pF}$ (whichever is greater) B5, F9, W1: $\leq \pm 10\%$
		Q/D. F.	5C, 6U: $Q \geq 100$ 7K: $Q \geq 80$ B5, F9: D. F. $\leq 2.5\%$ W1: D. F. $\leq 4\%$
		I. R.	$\geq 30\%$ of initial requirement
		D. W. V.	No damage
14	Humidity Load	Appearance	No mechanical damage
		Capacitance Change	5C, 6U, 7K: $\leq \pm 5\%$ or $\leq \pm 0.5\text{pF}$ (whichever is greater) B5, F9, W1: $\leq \pm 10\%$
		Q/D. F.	5C, 6U: $Q \geq 100$ 7K: $Q \geq 50$ B5, F9: D. F. $\leq 2.5\%$ W1: D. F. $\leq 4\%$
		I. R.	$\geq 10000\text{M}\Omega$
		D. W. V.	No damage
			MIL-STD-202 Method 108 1000 $\pm$ 12 hours at 125 $\pm$ 3°C with 200% of the rated voltage applied
			240 hours at 85 $\pm$ 2°C in 85 $\pm$ 5% relative humidity with applied bias voltage of 1.5Vdc $\pm$ 10%

Final measurement of tests No. 11 to 14 should be taken after stabilization at room temperature for 24 $\pm$ 2 hours (5C, 6U, 7K) or 48 $\pm$ 4 hours (B5, F9, W1).  
 Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No.10 to14 are performed.



## Notice

### ■ Notice (Storage and Operating Condition)

Note the following to prevent poor die bonding and poor wire bonding.

1. Store the capacitors in manufacturer's package in the following conditions without a rapid thermal change in an indoor room.

- Temperature: -10 to 40 degree C
- Humidity: 30 to 70%RH

2. Avoid storing the capacitors in the following conditions.

- (a) Ambient air containing corrosive gas.  
(Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)

(b) Ambient air containing volatile or combustible gas

(c) In environments with a high concentration of airborne particles

(d) In liquid (water, oil, chemical solution, organic solvents, etc.)

(e) In environments easy to dew

(f) In direct sunlight

(g) In freezing environments

3. Do not directly touch capacitors with hand not to cause poor die bonding and poor wire bonding.

### ■ Notice (Soldering and Mounting)

1. Die bonding of capacitors

(1) Using materials and bonding conditions

- Solders: Au-20%Sn
- Bonding temperature: 300 to 320 degree C
- Bonding time: less than 1 minute
- Bonding atmosphere: N2 atmosphere

(2) Notice

- (a) Please mount the capacitors with scrubbing gently.
- (b) Die bonding condition is affected by what kind of solder and base substrate are used. Please evaluate die bonding condition in advance with the same materials as mass production materials and make sure that there is no effect especially crack of the ceramics.

2. Wire Bonding

(1) Using materials and bonding conditions

- Wire lead: 25 microns diameter gold wire
- Bonding temperature: 150 to 250 degree C
- Bonding methods: Thermocompression or thermosonic bonding

(2) Notice

- (a) Please keep bonding away more than 25 microns from the edge of electrode.
- (b) Please do not bond in the area of less than 25 microns from the edge of electrode.

Please contact us before using our products on other bonding conditions not listed above.

**△Note:**

**1. Export Control**

<For customers outside Japan>

No Murata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.

<For customers in Japan>

For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.

**2. Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.**

- |                             |  |
|-----------------------------|--|
| ① Aircraft equipment        | ② Aerospace equipment  |
| ③ Undersea equipment        | ④ Power plant equipment  |
| ⑤ Medical equipment         | ⑥ Transportation equipment (vehicles, trains, ships, etc.)   |
| ⑦ Traffic signal equipment  | ⑧ Disaster prevention / crime prevention equipment   |
| ⑨ Data-processing equipment | ⑩ Application of similar complexity and/or reliability requirements to the applications listed above |

**3. Product specifications in this catalog are as of March 2010. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.**

**4. Please read rating and △ CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.**

**5. This catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.**

**6. Please note that unless otherwise specified, we shall assume no responsibility whatsoever for any conflict or dispute that may occur in connection with the effect of our and/or a third party's intellectual property rights and other related rights in consideration of your use of our products and/or information described or contained in our catalogs. In this connection, no representation shall be made to the effect that any third parties are authorized to use the rights mentioned above under licenses without our consent.**

**7. No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.**

**Head Office**

1-10-1, Higashi Kotari, Nagaokakyo-shi, Kyoto 617-8555, Japan  
Phone: 81-75-951-9111

**International Division**

3-29-12, Shibuya, Shibuya-ku, Tokyo 150-0002, Japan  
Phone: 81-3-5469-6123 Fax: 81-3-5469-6155 E-mail: intl@murata.co.jp