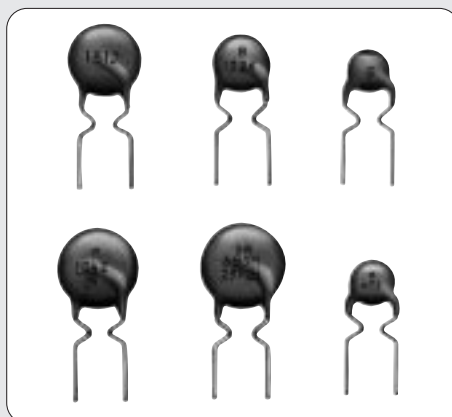




# CERAMIC CAPACITORS 12V/16V/25V/50V/500V

## DD100 • DD10 • DD300 • DD400 Series

# CERAMIC CAPACITORS



*Innovator  
in Electronics*

Murata  
Manufacturing Co., Ltd.

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**■GENERAL DESCRIPTION OF CERAMIC CAPACITORS**

Ceramic capacitors are produced by sandwiching a ceramic-dielectric layer of titanium oxide (TiO<sub>2</sub>) or barium titanate (BaTiO<sub>3</sub>) between two electrodes. Special features include high reliability, compact size, large capacitance, excellent high-frequency characteristics, and simple mass production. Furthermore, their low cost enables wide application in electronic circuits designed for by-pass, coupling, and resonant functions.

Ceramic capacitors are divided into two distinctive types according to structure — monolithic and disc type.

The latter type is available in a larger variety, with rated voltages of 50V, 250V, 500V, 1kV, 2kV, 3.15kV and 6.3kV, besides AC voltage. Murata has meanwhile developed its original BC capacitors — semiconductive ceramic capacitors which are much more compact in size and much larger in capacitance than conventional ceramic capacitors. BC capacitors are available in rated voltages of 12V, 16V, 25V and 50V.

**■MURATA'S DISC TYPE CERAMIC CAPACITORS**

DESCRIPTION	SERIES	TYPE			RATED VOLTAGE	CAPACITANCE RANGE (pF)								
		1	2	3		1	10	100	1000	10000	100000	500000		
CERAMIC CAPACITORS	DD100 DD10	○	○	—	50V 500V	1	10	100	1000	10000	47000			
BC CAPACITORS	DD300 DD400	—	—	○	12V 16V 25V 50V				1000	10000	470000			
HIGH-VOLTAGE CERAMIC CAPACITORS	GENERAL HR	○	○	○	250V 500V 1kV 2kV 3.15kV 6.3kV		10	100	1000	10000				
SAFETY STANDARD RECOGNIZED CERAMIC CAPACITORS	KH KX AC250V	—	○	—	AC250V			100	1000	10000				

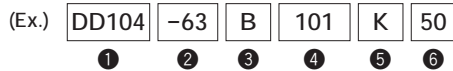
**MURATA'S CERAMIC CAPACITORS**

**1. TABLE OF CAPACITANCE RANGE**

Series	DC Rated Voltage (V)	Temp. Char.	Type	Nominal Capacitance Range (pF)													Page
				1	50	100	200	500	1000	2000	5000	10000	20000	50000	100000	200000	
DD100	50	CΔ	1	1-270													5-8
		SL		1-1000													
		B	2	100-10000													
		F		2200-47000													
DD10	500	CΔ	1	1-270													9-12
		SL		1-560													
		B	2	100-10000													
		E		1000-10000													
DD300 (Surface layer)	50	F	3	22000-100000													13-15
	25	F		22000-100000													
	16	F		220000													
	12	F		100000-470000													
DD400 (Boundary layer)	25	SR	3	1000-100000													
	16	SR		10000-100000													

**2. PART NUMBERING**

(Please specify the part number when ordering.)



**① Type**

Series	Code
DD100 DD300 DD400	DDXXX DD plus the first digit denotes the series; the next two digits denote nominal body diameter. (Example) DD1 06 └───┬─── └─── Nominal Body Dia. 6mm └─── DD100 Series
DD10	DDXX The two digits denote the nominal body diameter. (Example) DD 07 └─── └─── Nominal Body Dia. 7.5mm

**② Lead Configuration**




Code	Configuration
-63	Inside Crimp
-64	
-959	Crimp Taping
-989	
-999	

**③ Temperature Characteristics**

Code	Cap. Change or Temp. Coeff.	Temperature Range (°C)
CK	0±250 (ppm/°C)	-25 to +85
CJ	0±120 (ppm/°C)	
CH	0± 60 (ppm/°C)	
SL	+350 to -1000 (ppm/°C)	+20 to +85
B	Within ±10%	-25 to +85
E	Within ± $\frac{20}{80}$ %	
F	Within ± $\frac{30}{80}$ %	
SR	Within ±15%	

**④ Nominal Capacitance**

The first two digits denote significant figures; the last digit denotes the multiplier of 10 in pF.  
(Example)  
 $472=47 \times 10^2=4700\text{pF}$

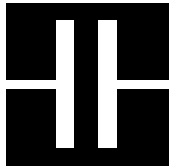
Photo	Special Feature and Application Fields
	<p>High reliability and low cost due to simple structure.                      Low residual inductance permits application at high frequency.                      The temperature-compensating type, in particular, is much more stable than conventional capacitors against temperature variations.                      The temperature-compensating type is applied mainly in oscillation, tuning, and coupling circuits; the high dielectric-constant type in decoupling and by-pass capacitors.</p>
	<p>Widely used in electronic circuits for TV and power sources.</p>
	<p>BC capacitors have been designed to be more compact in size than the conventional ceramic capacitors and are available at a lower cost.                      The series is divided into two types by structure surface-layer and boundary-layer.                      The surface-layer series can be used in the same way as the high dielectric-constant type of ceramic capacitors.                      The boundary-layer series can replace polyester-film capacitors because of similar characteristics.</p>

5 Capacitance Tolerance

Code	Tolerance
C	$\pm 0.25\text{pF}$
D	$\pm 0.5\text{pF}$
J	$\pm 5\%$
K	$\pm 10\%$
M	$\pm 20\%$
P	$\pm 10\%$
Z	$\pm 8\%$

6 Rated Voltage

Code	DC Rated Voltage
12	12V
16	16V
25	25V
50	50V
500	500V



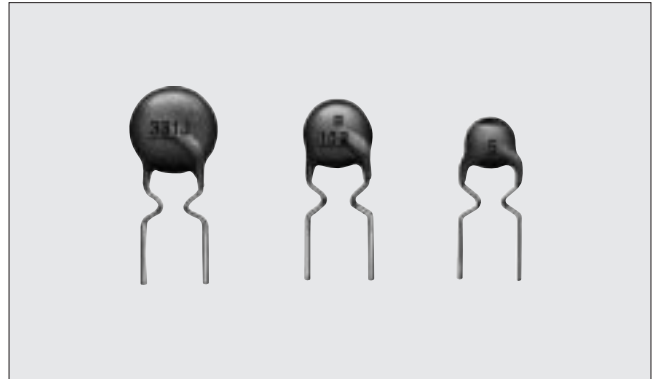
# CERAMIC CAPACITORS



## 50V Ceramic Capacitors DD100 Series

### FEATURES

1. High reliability and low cost.
2. Little residual inductance. Can be used in the high frequencies.
3. Temperature compensating type with high Q and stable against temperature changes.
4. 50V-capacitors are designed to be suitable for 63V-applications.



### DIMENSIONS

Packaging form	Bulk	Taping*2
Configuration	Inside Crimp	Inside Crimp
Lead code	-63	-989, -999, -959
Dimensions (in mm)	<p>Coating extension not exceed the center of crimp.</p> <p>Dimensions: <math>5.0 \pm 0.8</math>, <math>4.8 \pm 0.4</math>, <math>3.5 \text{ max.}^{*1}</math>, <math>\phi 0.6 \begin{smallmatrix} +0.06 \\ -0.05 \end{smallmatrix}</math></p>	<p>Lead spacing F : 5.0 Pitch of component P : 12.7 Pitch of sprocket hole P<sub>0</sub> : 12.7</p>

\*1 4.0 max. in the case of temperature compensating type of 22pF and under, and high dielectric constant type of 470pF and under.

\*2 Please see page 16 on other taping specification.

### MARKING

Item	Type Temp. Char.	Temperature Compensating Type		High Dielectric Constant Type	
		CK, CJ, CH	SL	B	F
DD104–DD106					
DD107 & DD108					
DD109–DD112					
Temperature Characteristics		Identified by color (Black).	Omitted.	Identified by code.	Omitted.
Nominal Capacitance		Under 100pF : Actual value. 100pF and over : Identified by 3-figure code.			
Capacitance Tolerance		Identified by code. Omitted for Nom. Dia. $\phi 6\text{mm}$ and under except F103Z.			
Rated Voltage		Identified by horizontal line under capacitance.			
Manufacturer's Identification		Identified by . Omitted for Nom. Dia. $\phi 8\text{mm}$ and under except F223Z.			
Manufactured Date		Abbreviation. Omitted for Nom. Dia. $\phi 8\text{mm}$ and under except F223Z.			



■STANDARD LIST

Temperature Compensating Type	DD100 Series
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CK Characteristics (0±250ppm/°C)



CJ Characteristics (0±120ppm/°C)

CH Characteristics (0± 60ppm/°C)

Nominal Capacitance (pF)	Body Dia. D (mm max.)	Capacitance Tolerance	DC Rated Voltage (V)	Part Number (□ : means optional lead code shown on the right.)	Lead Code	
					Bulk	Taping
					Inside Crimp 	Crimp 
1	4	±0.25pF	50	DD104 □ CK 010 C 50	-63	
1.5				DD104 □ CK 1R5 C 50		
2				DD104 □ CK 020 C 50		
3				DD104 □ CJ 030 C 50		
4				DD104 □ CH 040 C 50		
5				DD104 □ CH 050 C 50		
6		DD104 □ CH 060 D 50		-989		
7		DD104 □ CH 070 D 50				
8		DD104 □ CH 080 D 50				
9		DD104 □ CH 090 D 50				
10		DD104 □ CH 100 D 50				
12		DD104 □ CH 120 J 50				
15		DD104 □ CH 150 J 50				
18		DD104 □ CH 180 J 50				
22		DD104 □ CH 220 J 50				
27		DD104 □ CH 270 J 50				
33		DD104 □ CH 330 J 50				
39		DD104 □ CH 390 J 50				
47		DD104 □ CH 470 J 50				
56		5		±5%		
68	6		DD106 □ CH 680 J 50			
82		DD106 □ CH 820 J 50	-999			
100	7.5		DD107 □ CH 101 J 50			
120		DD107 □ CH 121 J 50				
150	8		DD108 □ CH 151 J 50			
180	9.5		DD109 □ CH 181 J 50			
220		DD109 □ CH 221 J 50				
270		10.5	DD110 □ CH 271 J 50	-959		

<b>Temperature Compensating Type</b>	<b>DD100 Series</b>
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




SL Characteristics (+350 to -1000ppm/°C)

Nominal Capacitance (pF)	Body Dia. D (mm max.)	Capacitance Tolerance	DC Rated Voltage (V)	Part Number (□ : means optional lead code shown on the right.)	Lead Code	
					Bulk	Taping
					Inside Crimp 	Crimp 
1	4	±0.25pF	50	DD104 □ SL 010 C 50	-63	
1.5				DD104 □ SL 1R5 C 50		
2				DD104 □ SL 020 C 50		
3				DD104 □ SL 030 C 50		
4				DD104 □ SL 040 C 50		
5				DD104 □ SL 050 C 50		
6		±0.5pF		DD104 □ SL 060 D 50		
7				DD104 □ SL 070 D 50		
8				DD104 □ SL 080 D 50		
9		DD104 □ SL 090 D 50				
10		DD104 □ SL 100 D 50				
12		±5%		DD104 □ SL 120 J 50		
15				DD104 □ SL 150 J 50		
18				DD104 □ SL 180 J 50		
22				DD104 □ SL 220 J 50		
27				DD104 □ SL 270 J 50		
33				DD104 □ SL 330 J 50		
39				DD104 □ SL 390 J 50		
47				DD104 □ SL 470 J 50		
56				DD104 □ SL 560 J 50		
68				DD104 □ SL 680 J 50		
82				DD104 □ SL 820 J 50		
100				DD104 □ SL 101 J 50		
120		DD104 □ SL 121 J 50				
150		5		DD105 □ SL 151 J 50		
180		6		DD106 □ SL 181 J 50		
220				DD106 □ SL 221 J 50		
270	7.5	DD107 □ SL 271 J 50				
330		DD107 □ SL 331 J 50				
390		DD107 □ SL 391 J 50				
470	8	DD108 □ SL 471 J 50				
560	9.5	DD109 □ SL 561 J 50				
680	10.5	DD110 □ SL 681 J 50				
820		DD110 □ SL 821 J 50				
1000	12.5	DD112 □ SL 102 J 50				
						-989
						-999
						-959
						—





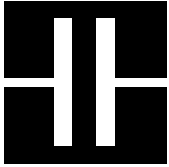
<b>High Dielectric Constant Type</b>	<b>DD100 Series</b>
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**B Characteristics (±10%)**

Nominal Capacitance (pF)	Body Dia. D (mm max.)	Capacitance Tolerance (%)	DC Rated Voltage (V)	Part Number (□ : means optional lead code shown on the right.)	Lead Code			
					Bulk	Taping		
					Inside Crimp	Crimp		
100	4	±10	50	DD104 □ B 101 K 50				
120				DD104 □ B 121 K 50				
150				DD104 □ B 151 K 50				
180				DD104 □ B 181 K 50				
220				DD104 □ B 221 K 50				
270				DD104 □ B 271 K 50				
330				DD104 □ B 331 K 50				
390				DD104 □ B 391 K 50				
470				DD104 □ B 471 K 50				
560				DD104 □ B 561 K 50				
680				DD104 □ B 681 K 50				
820				DD104 □ B 821 K 50				
1000				DD104 □ B 102 K 50				
1200				DD104 □ B 122 K 50				
1500				DD104 □ B 152 K 50				
1800	5	±10	50	DD105 □ B 182 K 50				
2200	6			DD106 □ B 222 K 50				
2700				DD106 □ B 272 K 50				
3300	7.5			DD107 □ B 332 K 50				
3900				DD107 □ B 392 K 50				
4700				DD107 □ B 472 K 50				
5600	8			DD108 □ B 562 K 50				
6800	9.5			DD109 □ B 682 K 50				
8200	10.5			DD110 □ B 822 K 50				
10000	11			DD111 □ B 103 K 50				
				DD111 □ B 103 K 50				

**F Characteristics (±30%)**

Nominal Capacitance (pF)	Body Dia. D (mm max.)	Capacitance Tolerance (%)	DC Rated Voltage (V)	Part Number (□ : means optional lead code shown on the right.)	Lead Code	
					Bulk	Taping
					Inside Crimp	Crimp
2200	4	+80 -20	50	DD104 □ F 222 Z 50		
4700				DD104 □ F 472 Z 50		
6800	5			DD105 □ F 682 Z 50		
10000	6			DD106 □ F 103 Z 50		
22000	8			DD108 □ F 223 Z 50		
47000	10.5			DD110 □ F 473 Z 50		



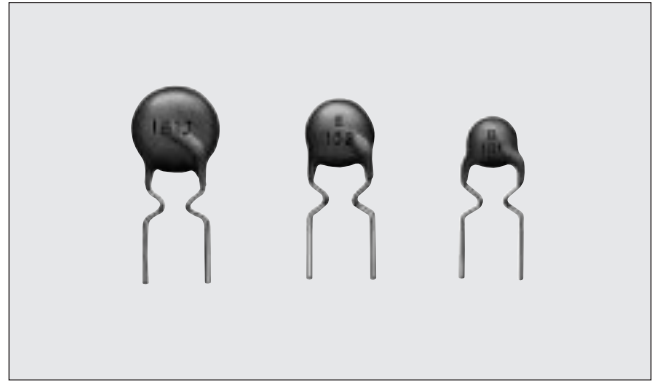
# CERAMIC CAPACITORS



## 500V Ceramic Capacitors DD10 Series

### FEATURES

1. High reliability and low cost.
2. Little residual inductance. Can be used in the high frequencies.
3. Temperature compensating type with high Q and stable against temperature changes.



### DIMENSIONS

Packaging form	Bulk	Taping*2
Configuration	Inside Crimp	Inside Crimp
Lead code	-63, -64	-989, -999, -959
Dimensions (in mm)		

\*1 F : 5.0 (Lead code : -63) or F : 10.0 (Lead code : -64)

\*2 Please see page 16 on other taping specification.

### MARKING

Item	Type Temp. Char.	Temperature Compensating Type		High Dielectric Constant Type	
		CK, CJ, CH	SL	B	E
DD05 & DD06					
DD07 & DD08					
DD09–DD18					
Temperature Characteristics		Identified by color (Black).	Omitted.	Identified by code.	Identified by code.
Nominal Capacitance		Under 100pF : Actual value. 100pF and over : Identified by 3-figure code.			
Capacitance Tolerance		Identified by code. Omitted for Nom. Dia. φ6mm and under.			
Rated Voltage		Omitted.			
Manufacturer's Identification		Identified by . Omitted for Nom. Dia. φ8mm and under.			
Manufactured Date		Abbreviation. Omitted for Nom. Dia. φ8mm and under.			



■STANDARD LIST

Temperature Compensating Type	DD10 Series
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CK Characteristics (0±250ppm/°C)



CJ Characteristics (0±120ppm/°C)

CH Characteristics (0± 60ppm/°C)

Nominal Capacitance (pF)	Body Dia. D (mm max.)	Capacitance Tolerance	DC Rated Voltage (V)	Part Number (□ : means optional lead code shown on the right.)	Lead Code	
					Bulk	Taping
					Inside Crimp 	Crimp 
1	5	±0.25pF	500	DD05 □ CK 010 C 500	-63	-989
1.5				DD05 □ CK 1R5 C 500		
2				DD05 □ CK 020 C 500		
3				DD05 □ CJ 030 C 500		
4				DD05 □ CH 040 C 500		
5		DD05 □ CH 050 C 500				
6		DD05 □ CH 060 D 500				
7		DD05 □ CH 070 D 500				
8		DD05 □ CH 080 D 500				
9		DD05 □ CH 090 D 500				
10		DD05 □ CH 100 D 500				
12		DD05 □ CH 120 J 500				
15		DD05 □ CH 150 J 500				
18		DD05 □ CH 180 J 500				
22		DD05 □ CH 220 J 500				
27	6	±5%	DD06 □ CH 270 J 500	-999		
33	7.5		DD07 □ CH 330 J 500	-959		
39			DD07 □ CH 390 J 500			
47			DD07 □ CH 470 J 500			
56	8		DD08 □ CH 560 J 500			
68	9.5		DD09 □ CH 680 J 500			
82			DD09 □ CH 820 J 500			
100	10.5		DD10 □ CH 101 J 500			
120			DD10 □ CH 121 J 500			
150	11		DD11 □ CH 151 J 500			
180	12.5	DD12 □ CH 181 J 500				
220	14.5	DD14 □ CH 221 J 500	-			
270		DD14 □ CH 271 J 500				



<b>Temperature Compensating Type</b>	<b>DD10 Series</b>
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SL Characteristics (+350 to -1000ppm/°C)

Nominal Capacitance (pF)	Body Dia. D (mm max.)	Capacitance Tolerance	DC Rated Voltage (V)	Part Number (□ : means optional lead code shown on the right.)	Lead Code	
					Bulk	Taping
					Inside Crimp 	Crimp 
1	5	±0.25pF	500	DD05 □ SL 010 C 500	-63	
1.5				DD05 □ SL 1R5 C 500		
2				DD05 □ SL 020 C 500		
3				DD05 □ SL 030 C 500		
4				DD05 □ SL 040 C 500		
5				DD05 □ SL 050 C 500		
6				DD05 □ SL 060 D 500		
7				DD05 □ SL 070 D 500		
8				DD05 □ SL 080 D 500		
9				DD05 □ SL 090 D 500		
10		DD05 □ SL 100 D 500				
12		DD05 □ SL 120 J 500				
15		DD05 □ SL 150 J 500				
18		DD05 □ SL 180 J 500				
22		DD05 □ SL 220 J 500				
27		DD05 □ SL 270 J 500				
33		DD05 □ SL 330 J 500				
39		DD05 □ SL 390 J 500				
47		DD05 □ SL 470 J 500				
56		DD05 □ SL 560 J 500				
68	DD05 □ SL 680 J 500					
82	6	±5%	DD06 □ SL 820 J 500		-989	
100			DD06 □ SL 101 J 500		-999	
120	7.5		DD07 □ SL 121 J 500		-959	
150			DD07 □ SL 151 J 500			
180	8		DD08 □ SL 181 J 500			
220			DD09 □ SL 221 J 500			
270	9.5		DD09 □ SL 271 J 500			
330			DD10 □ SL 331 J 500			
390	10.5		DD10 □ SL 391 J 500			
470			DD11 □ SL 471 J 500			
560	11	DD11 □ SL 471 J 500				
	12.5	DD12 □ SL 561 J 500				—

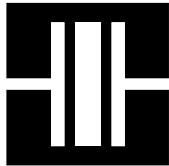
<b>High Dielectric Constant Type</b>	<b>DD10 Series</b>
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**B Characteristics (±10%)**

Nominal Capacitance (pF)	Body Dia. D (mm max.)	Capacitance Tolerance (%)	DC Rated Voltage (V)	Part Number (□ : means optional lead code shown on the right.)	Lead Code		
					Bulk	Taping	
					Inside Crimp	Crimp	
100	5	±10	500	DD05 □ B 101 K 500			
120							
150							
180							
220							
270							
330							
390							
470							
560							
680	6			DD05 □ B 221 K 500	-63	-989	
820							
1000	7.5			DD06 □ B 681 K 500			-999
1200							
1500	8			DD06 □ B 821 K 500			-959
1800							
2200	9.5			DD07 □ B 102 K 500			
2700							
3300	11			DD07 □ B 122 K 500			
3900							
4700	12.5	DD08 □ B 152 K 500	-64	—			
5600							
6800	14.5	DD08 □ B 182 K 500					
8200							
10000	16.5	DD09 □ B 222 K 500					
10000							
10000	18.5	DD10 □ B 272 K 500					
10000							
10000	18.5	DD11 □ B 332 K 500					
10000							
10000	18.5	DD11 □ B 392 K 500					
10000							
10000	18.5	DD12 □ B 472 K 500					
10000							
10000	18.5	DD14 □ B 562 K 500					
10000							
10000	18.5	DD14 □ B 682 K 500					
10000							
10000	18.5	DD16 □ B 822 K 500					
10000							
10000	18.5	DD18 □ B 103 K 500					
10000							

**E Characteristics (±20/-55%)**

Nominal Capacitance (pF)	Body Dia. D (mm max.)	Capacitance Tolerance (%)	DC Rated Voltage (V)	Part Number (□ : means optional lead code shown on the right.)	Lead Code	
					Bulk	Taping
					Inside Crimp	Crimp
1000	6	+100 - 0	500	DD06 □ E 102 P 500	-63	-999
1500						
2200	7.5			DD07 □ E 152 P 500	-959	
3300						
4700	8			DD08 □ E 222 P 500		
6800	9.5			DD09 □ E 332 P 500	-64	—
10000						
10000	10.5			DD10 □ E 472 P 500		
10000	12.5	DD12 □ E 682 P 500				
10000	14.5	DD14 □ E 103 P 500				



# BC CAPACITORS

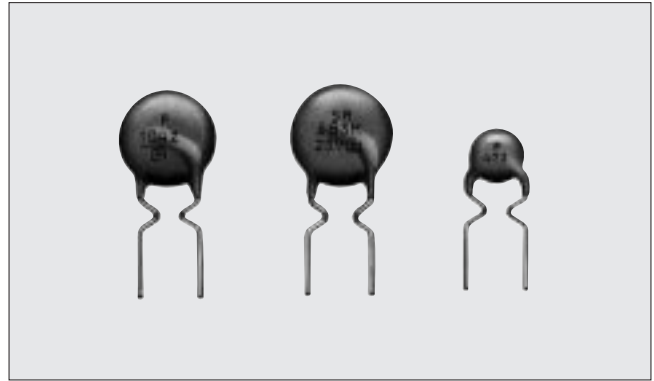


## 12/16/25/50V BC Capacitors DD300/DD400 Series

### FEATURES

Murata has devoted constant effort to developing semiconductive ceramics technology. We design capacitors in much more compact sizes than conventional ceramic capacitors, having reduced the diameter by 50% and the effective thickness by 90%. Capacitance values available are 0.001 to 0.47 $\mu$ F, perfect for meeting the need for high density assemblies.

There are two kinds of BC capacitors, both designated by their inside construction — DD300 series (Surface layer type) and DD400 series (Boundary layer type).



### COMPARATIVE LIST OF EACH SERIES

Series	DD300 Series (Surface Layer)	DD400 Series (Boundary Layer)
Item		
Inside Construction and Equivalent Circuit		

### DIMENSIONS

Packaging form	Bulk	Taping*2
Configuration	Inside Crimp	Inside Crimp
Lead code	-63	-989, -999, -959
Dimensions (in mm)		<p>Lead spacing F : 5.0 Pitch of component P : 12.7 Pitch of sprocket hole Po : 12.7</p>

\*1 3.5mm max. in case of DD312

\*2 Please see page 16 on other taping specification.

■ MARKING

Series	DD300 Series		DD400 Series	
Temp. Char.	F		Temp. Char.	SR
Rated Voltage	12V 16V 25V	50V	Rated Voltage	16V 25V
Type			Type	
DD304 DD305			DD404 DD405	
DD306			DD406 DD407	
DD308			DD408	
DD310 DD312		—	DD410	
Temperature Characteristics	Identified by code.		Identified by code.	
Nominal Capacitance	Identified by 3-figure code.		Identified by 3-figure code.	
Capacitance Tolerance	Identified by code. Omitted for Nom. Dia. φ5mm and under.		Identified by code.	
Rated Voltage	12/16/25V	Identified by code. Omitted for Nom. Dia. φ5mm and under.	Identified by code. Omitted for Nom. Dia. φ5mm and under.	
	50V	Identified by horizontal line (—) under capacitance.		
Manufacturer's Identification	Identified by . Omitted for Nom. Dia. φ6.3mm and under.		Identified by . Omitted for Nom. Dia. φ7mm and under.	
Manufactured Date	Abbreviation. Omitted for Nom. Dia. φ8mm and under.		Abbreviation. Omitted for Nom. Dia. φ8mm and under.	

● Marking of color : color of red

■ STANDARD LIST



DD300 Series

F Characteristics ( $\pm 30\%$ )

Nominal Capacitance (pF)	Body Dia. D (mm)	Capacitance Tolerance (%)	DC Rated Voltage (V)	Part Number (□ : means optional lead code shown on the right.)	Lead Code		
					Bulk	Taping	
					Inside Crimp	Crimp	
100000	5±1	+80 -20	12	DD305 □ F 104 Z 12	-63		
220000	8±1			DD308 □ F 224 Z 12			
330000	10±1			DD310 □ F 334 Z 12			
470000	12.5±1.3			DD312 □ F 474 Z 12			
220000	10±1		16	DD310 □ F 224 Z 16			-959
22000	4±1		25	DD304 □ F 223 Z 25			-989
33000				DD304 □ F 333 Z 25			
47000				DD304 □ F 473 Z 25			
100000	6.3±1		50	DD306 □ F 104 Z 25			-959
22000	4±1			DD304 □ F 223 Z 50			-989
33000	5±1			DD305 □ F 333 Z 50			-999
47000	6.3±1			DD306 □ F 473 Z 50			-959
100000	8±1	DD308 □ F 104 Z 50					

**DD400 Series**

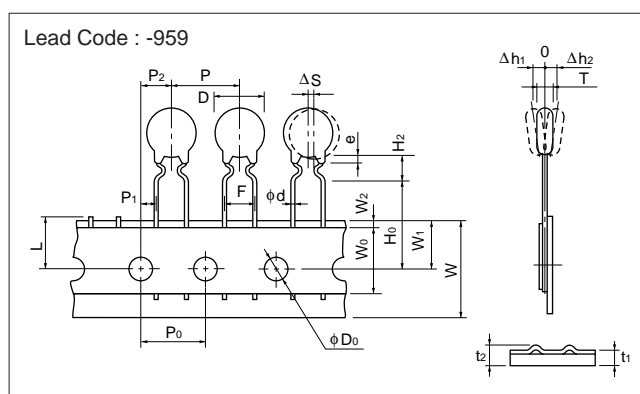
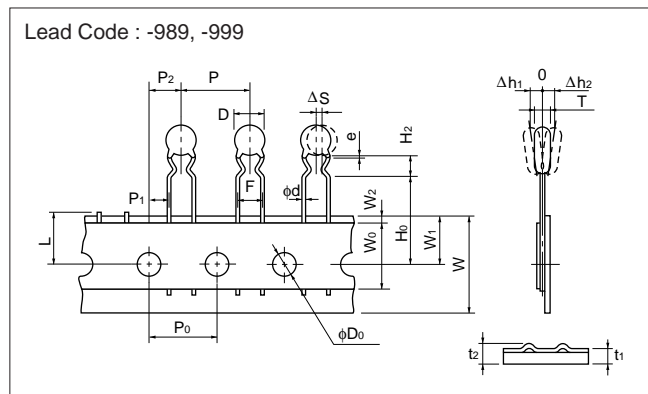
**SR Characteristics (±15%)**

Nominal Capacitance (pF)	Body Dia. D (mm)	Capacitance Tolerance (%)	DC Rated Voltage (V)	Part Number (□ : means optional lead code shown on the right.)	Lead Code		
					Bulk	Taping	
					Inside Crimp 	Crimp 	
10000	4±1	±20	16	DD404 □ SR 103 M 16	-63	-989	
12000				DD404 □ SR 123 M 16			
15000				DD404 □ SR 153 M 16			
18000				DD404 □ SR 183 M 16			
22000				DD404 □ SR 223 M 16			
27000	DD405 □ SR 273 M 16			-999			
33000	DD405 □ SR 333 M 16						
39000	DD405 □ SR 393 M 16						
47000	DD405 □ SR 473 M 16						
56000	DD406 □ SR 563 M 16						
68000	6.3±1			DD406 □ SR 683 M 16			-959
82000	7±1			DD407 □ SR 823 M 16			
100000				DD407 □ SR 104 M 16			
1000	4±1			25			DD404 □ SR 102 M 25
1200			DD404 □ SR 122 M 25				
1500			DD404 □ SR 152 M 25				
1800			DD404 □ SR 182 M 25				
2200			DD404 □ SR 222 M 25				
2700			DD404 □ SR 272 M 25				
3300			DD404 □ SR 332 M 25				
3900		DD404 □ SR 392 M 25					
4700		DD404 □ SR 472 M 25					
5600		DD404 □ SR 562 M 25					
6800		DD404 □ SR 682 M 25					
8200		DD404 □ SR 822 M 25					
10000		DD404 □ SR 103 M 25					
12000		DD404 □ SR 123 M 25					
15000		DD404 □ SR 153 M 25					
18000		5±1	DD405 □ SR 183 M 25	-999			
22000		DD405 □ SR 223 M 25					
27000		6.3±1	DD406 □ SR 273 M 25	-959			
33000			DD406 □ SR 333 M 25				
39000		7±1	DD407 □ SR 393 M 25				
47000	DD407 □ SR 473 M 25						
56000	8±1	DD408 □ SR 563 M 25					
68000		DD408 □ SR 683 M 25					
82000	10±1	DD410 □ SR 823 M 25					
100000		DD410 □ SR 104 M 25					

• Capacitance tolerance K (±10%) is also available.





### 4. TAPING SPECIFICATIONS



Item	Code	Dimensions (mm)	Item	Code	Dimensions (mm)
Pitch of component	P	12.7	Diameter of sprocket hole	φD <sub>0</sub>	4.0±0.1
Pitch of sprocket hole	P <sub>0</sub>	12.7±0.3	Lead diameter	φd	0.6±0.008
Lead spacing	F	5.0±0.2	Total tape thickness	t <sub>1</sub>	0.6±0.3
Length from hole center to component center	P <sub>2</sub>	6.35±1.3	Total thickness, tape and lead wire	t <sub>2</sub>	1.5 max.
Length from hole center to lead	P <sub>1</sub>	3.85±0.7	Body thickness	T	See the individual product specification
Body diameter	D	See the individual product specification	Deviation across tape	Δh <sub>1</sub> , Δh <sub>2</sub>	1.0 max.
Deviation along tape, left or right	ΔS	0±1.0	Portion to cut in case of defect	L	11.0±0.0
Carrier tape width	W	18.0±0.5	Hold down tape width	W <sub>0</sub>	9.5 min.
Position of sprocket hole	W <sub>1</sub>	9.0±0.5	Hold down tape position	W <sub>2</sub>	1.5±1.5
Lead distance between reference and bottom planes	H <sub>2</sub>	6.0 max. (-989)	Coating extension on lead	e	Up to the center of crimp
		5.0 max. (-999)			
		4.8 max. (-959)			
	H <sub>0</sub>	16.0±0.5			

### 5. PACKAGING STYLES

Bulk	Taping
Polyethylene Bag 	Flat Pack 

■ **MINIMUM QUANTITY\*** (Order in Sets Only)  
 [Bulk] 1,000 (pcs.) [Taping] 2,000 (pcs.)

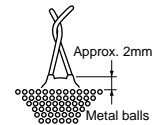
■ **MINIMUM ORDER QUANTITY**  
 10,000 (pcs.)

\* "Minimum Quantity" means the numbers of units of each delivery or order. The quantity should be an integral multiple of the "minimum quantity".  
 (Please note that the actual delivery quantity in a package may change sometimes.)

## 6. SPECIFICATION AND TEST METHOD

### 6-1. TEMPERATURE COMPENSATING TYPE DD100/DD10 SERIES

Item		Specification	Testing Method																		
1	Operating Temperature Range	-25 to +85°C	—																		
2	Capacitance	Within Specified tolerance.	The capacitance shall be measured at 20°C with 1±0.2MHz and AC5V (r.m.s.) max..																		
3	Q	C ≥ 30pF : Q ≥ 1000 C < 30pF : Q ≥ 400+20C*1	Same condition as capacitance.																		
4	Insulation Resistance (I. R.)	10000MΩ min.	The insulation resistance shall be measured with DC10±1V (DC500±50V for DD10 Series) within 60±5 s of charging.																		
5	Dielectric Strength	Between lead wires	No failure.  The capacitor shall not be damage when DC voltage of 300% of the rated voltage are applied between the lead wires for 1 to 5 s. (Charge/discharge current ≤ 50mA)																		
		Body Insulation	No failure.  The capacitor is placed in the container with metal balls of diameter 1mm so that each lead wire, short-circuited, is kept approximately 2mm off the balls as shown in the figure, and DC voltage of 250% of the rated voltage is applied for 1 to 5 s between capacitor lead wires and small metals. (Charge/discharge current ≤ 50mA)																		
6	Temperature Characteristic	Temperature Coefficient	Within specified tolerance. (See Table A)																		
		Capacitance Drift	Within ±0.2% or ±0.05pF whichever is greater.																		
			<table border="1"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>CΔ</td> <td>20±2°C</td> <td>-25±3°C</td> <td>20±2°C</td> <td>85±2°C</td> <td>20±2°C</td> </tr> <tr> <td>SL</td> <td>—</td> <td>—</td> <td>20±2°C</td> <td>85±2°C</td> <td>20±2°C</td> </tr> </tbody> </table>	Step	1	2	3	4	5	CΔ	20±2°C	-25±3°C	20±2°C	85±2°C	20±2°C	SL	—	—	20±2°C	85±2°C	20±2°C
Step	1	2	3	4	5																
CΔ	20±2°C	-25±3°C	20±2°C	85±2°C	20±2°C																
SL	—	—	20±2°C	85±2°C	20±2°C																
7	Vibration Resistance	Appearance	No marked defect.																		
		Capacitance	Within specified tolerance.																		
		Q	C ≥ 30pF : Q ≥ 1000 C < 30pF : Q ≥ 400+20C*1																		
8	Soldering Effect	Appearance	No marked defect.																		
		Capacitance Change	Within ±2.5% or ±0.25pF whichever is greater.																		
		Dielectric Strength (Between lead wires)	Pass the item No. 5.																		
9	Humidity (Under steady state)	Appearance	No marked defect.																		
		Capacitance Change	Within ±5% or ±0.5pF whichever is greater.																		
		Q	C ≥ 30pF : Q ≥ 350 10 ≤ C < 30pF : Q ≥ 275 + $\frac{5}{2}C$ *1 C < 10pF : Q ≥ 200+10C*1																		
		I. R.	1000MΩ min.																		
		Dielectric Strength (Between lead wires)	Pass the item No. 5.																		

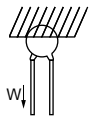


\*1 "C" expresses nominal capacitance value (pF).

\*2 "room condition" temperature : 15 to 35°C relative humidity : 45 to 75% atmospheric pressure : 86 to 106kPa

Table A

Char.	Temp. Coeff. (ppm/°C) between +20°C and +85°C	Cap. Change (%) between +20°C and -25°C		Char.	Temp. Coeff. (ppm/°C) between +20°C and +85°C	Cap. Change (%) between +20°C and -25°C	
		max.	min.			max.	min.
CK	0±250	1.54	-1.13	CH	0±60	0.49	-0.27
CJ	0±120	0.82	-0.54	SL	+350 to -1000	—	—

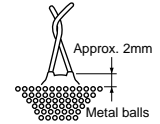
Item		Specification	Testing Method															
10	Humidity Loading	Appearance	Apply the rated voltage for $500 \pm 2 \frac{4}{0}$ h at $40 \pm 2^\circ\text{C}$ in 90 to 95% relative humidity. Post-treatment : Capacitor shall be stored for 1 to 2 h at <sup>*2</sup> room condition. (Charge/discharge current $\leq 50\text{mA}$ )															
		Capacitance Change																
		Q																
		I. R.																
		Dielectric Strength (Between lead wires)																
11	Life	Appearance	Apply a DC voltage of 200% of the rated voltage for $1000 \pm 4 \frac{8}{0}$ h at $85 \pm 2^\circ\text{C}$ . Post-treatment : Capacitor shall be stored for 1 to 2 h at <sup>*2</sup> room condition. (Charge/discharge current $\leq 50\text{mA}$ )															
		Capacitance Change																
		Q																
		I. R.																
		Dielectric Strength (Between lead wires)																
12	Temperature and immersion cycling	Appearance	The capacitor shall be subjected to 5 cycles of temperature variation according to Table 1, then the capacitor shall be immersed into two baths, the one a clean water bath at temperature $65 \pm 5^\circ\text{C}$ and the other a saturated salt water bath at temperature $0 \pm 3^\circ\text{C}$ for 15 min. This immersion cycle shall be repeated 2 times, then the capacitor shall be washed in running water, wiped or dried with air draught. Post-treatment : Capacitor shall be stored for 1 to 2 h at <sup>*2</sup> room condition. (Table 1)															
		Capacitance Change																
		Q																
		I. R.																
		Dielectric Strength (Between lead wires)																
			<table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>-25 \pm \frac{0}{3}</math></td> <td>30 min</td> </tr> <tr> <td>2</td> <td>room temp.</td> <td>3 min</td> </tr> <tr> <td>3</td> <td><math>85 \pm \frac{3}{0}</math></td> <td>30 min</td> </tr> <tr> <td>4</td> <td>room temp.</td> <td>3 min</td> </tr> </tbody> </table>	Step	Temperature (°C)	Time	1	$-25 \pm \frac{0}{3}$	30 min	2	room temp.	3 min	3	$85 \pm \frac{3}{0}$	30 min	4	room temp.	3 min
Step	Temperature (°C)	Time																
1	$-25 \pm \frac{0}{3}$	30 min																
2	room temp.	3 min																
3	$85 \pm \frac{3}{0}$	30 min																
4	room temp.	3 min																
13	Strength of Lead	Pull	As a figure, fix the body of capacitor, apply a tensile weight gradually to each lead wire in the radial direction of capacitor up to 10N and keep it for $10 \pm 1$ s. 															
		Bending																
14	Solderability of Leads	Lead wire shall be soldered with uniformly coated on the axial direction over $\frac{3}{4}$ of the circumferential direction.	The lead wire of a capacitor shall be dipped into a methanol solution of 25wt% rosin and then into molten solder of $235 \pm 5^\circ\text{C}$ for $2 \pm 0.5$ s. In both cases the depth of dipping is up to about 1.5 to 2 mm from the root of lead wires.															

\*1 "C" expresses nominal capacitance value (pF).

\*2 "room condition" temperature : 15 to 35°C relative humidity : 45 to 75% atmospheric pressure : 86 to 106kPa

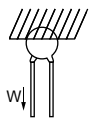
6-2. HIGH DIELECTRIC CONSTANT TYPE DD100/DD10 SERIES

Item		Specification	Testing Method																														
1	Operating Temperature Range	-25 to +85°C	—																														
2	Capacitance	Within Specified tolerance.	The capacitance shall be measured at 20°C with 1±0.2kHz and AC5V (r.m.s.) max..																														
3	Dissipation Factor (D. F.)	B/E : D. F. ≤ 2.5% F : D. F. ≤ 5.0%	Same condition as capacitance.																														
4	Insulation Resistance (I. R.)	C*1 ≤ 0.02μF : 10000MΩ min. C*1 > 0.02μF : 7500MΩ min.	The insulation resistance shall be measured with DC10±1V (DC500±50V for DD10 Series) within 60±5 s of charging.																														
5	Dielectric Strength	Between lead wires	No failure.  The capacitor shall not be damage when DC voltage of 250% of the rated voltage are applied between the lead wires for 1 to 5 s. (Charge/discharge current ≤ 50mA)																														
		Body Insulation	No failure.  The capacitor is placed in the container with metal balls of diameter 1mm so that each lead wire, short-circuited, is kept approximately 2mm off the balls as shown in the figure, and DC voltage of 250% of the rated voltage is applied for 1 to 5 s between capacitor lead wires and small metals. (Charge/discharge current ≤ 50mA)																														
6	Temperature Characteristic	No DC voltage	B : Within ±10% E : Within ±20% F : Within ±30%																														
		With DC voltage	B : Within ±10% E : Within ±20% F : Within ±30%																														
			<p>The capacitance measurement shall be made at each step specified in table and at a sufficient number of intermediate temperatures between step 2 and 7. Capacitance change from the value of step 3 shall not exceed the limit specified.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Temp.</td> <td>20±2°C</td> <td>-25±3°C</td> <td>20±2°C</td> <td>85±2°C</td> </tr> <tr> <td>DC Voltage applied</td> <td>None</td> <td>None</td> <td>None</td> <td>None</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Step</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> </tr> </thead> <tbody> <tr> <td>Temp.</td> <td>85±2°C</td> <td>20±2°C</td> <td>-25±3°C</td> <td>20±2°C</td> </tr> <tr> <td>DC Voltage applied</td> <td>Rated</td> <td>Rated</td> <td>Rated</td> <td>Rated</td> </tr> </tbody> </table> <p>Pre-treatment : Capacitor shall be stored at 85±2°C for 1 h, then placed at *2room condition for 24±2 h before measurements.</p>	Step	1	2	3	4	Temp.	20±2°C	-25±3°C	20±2°C	85±2°C	DC Voltage applied	None	None	None	None	Step	5	6	7	8	Temp.	85±2°C	20±2°C	-25±3°C	20±2°C	DC Voltage applied	Rated	Rated	Rated	Rated
Step	1	2	3	4																													
Temp.	20±2°C	-25±3°C	20±2°C	85±2°C																													
DC Voltage applied	None	None	None	None																													
Step	5	6	7	8																													
Temp.	85±2°C	20±2°C	-25±3°C	20±2°C																													
DC Voltage applied	Rated	Rated	Rated	Rated																													
7	Vibration Resistance	Appearance	No marked defect.																														
		Capacitance	Within specified tolerance.																														
		D. F.	Satisfies initial requirement.																														
8	Soldering Effect	Appearance	No marked defect.																														
		Capacitance Change	B : Within ± 5% E : Within ±15% F : Within ±20%																														
		Dielectric Strength (Between lead wires)	Pass the item No. 5.																														
9	Humidity (Under steady state)	Appearance	No marked defect.																														
		Capacitance Change	B : Within ±10% E : Within ±20% F : Within ±30%																														
		D. F.	B/E : D. F. ≤ 5.0% F : D. F. ≤ 7.5%																														
		I. R.	1000MΩ min.																														
		Dielectric Strength (Between lead wires)	Pass the item No. 5.																														
			<p>Set the capacitor for 500±24 h at 40±2°C in 90 to 95% relative humidity. Pre-treatment : Capacitor shall be stored at 85±2°C for 1 h, then placed at *2room condition for 24±2 h before initial measurements. Post-treatment : Capacitor shall be stored for 1 to 2 h at *2room condition.</p>																														



\*1 "C" expresses nominal capacitance value.

\*2 "room condition" temperature : 15 to 35°C relative humidity : 45 to 75% atmospheric pressure : 86 to 106kPa

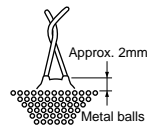
Item		Specification	Testing Method
10	Humidity Loading	Appearance	Apply the rated voltage for $500 \pm 24_0$ h at $40 \pm 2^\circ\text{C}$ in 90 to 95% relative humidity. Pre-treatment : Capacitor shall be stored at $85 \pm 2^\circ\text{C}$ for 1 h, then placed at *2room condition for $24 \pm 2$ h before initial measurements. Post-treatment : Capacitor shall be stored for 1 to 2 h at *2room condition. (Charge/discharge current $\leq 50\text{mA}$ )
		Capacitance Change	
		D. F.	
		I. R.	
		Dielectric Strength (Between lead wires)	
11	Life	Appearance	Apply a DC voltage of 200% of the rated voltage for $1000 \pm 48_0$ h at $85 \pm 2^\circ\text{C}$ . Pre-treatment : Capacitor shall be stored at $85 \pm 2^\circ\text{C}$ for 1 h, then placed at *2room condition for $24 \pm 2$ h before initial measurements. Post-treatment : Capacitor shall be stored for $24 \pm 2$ h at *2room condition. (Charge/discharge current $\leq 50\text{mA}$ )
		Capacitance Change	
		D. F.	
		I. R.	
		Dielectric Strength (Between lead wires)	
12	Temperature and immersion cycling	Appearance	The capacitor shall be subjected to 5 cycles of temperature variation according to Table 1, then the capacitor shall be immersed into two baths, the one a clean water bath at temperature $65 \pm 5_0^\circ\text{C}$ and the other a saturated salt water bath at temperature $0 \pm 3^\circ\text{C}$ for 15 min. This immersion cycle shall be repeated 2 times, then the capacitor shall be washed in running water, wiped or dried with air draught. Pre-treatment : Capacitor shall be stored at $85 \pm 2^\circ\text{C}$ for 1 h, then placed at *2room condition for $24 \pm 2$ h before initial measurements. Post-treatment : Capacitor shall be stored for $24 \pm 2$ h at *2room condition. (Table 1)
		Capacitance Change	
		D. F.	
		I. R.	
		Dielectric Strength (Between lead wires)	
13	Strength of Lead	Pull	As a figure, fix the body of capacitor, apply a tensile weight gradually to each lead wire in the radial direction of capacitor up to 10N and keep it for $10 \pm 1$ s. 
		Bending	
14	Solderability of Leads	Lead wire shall be soldered with uniformly coated on the axial direction over $\frac{3}{4}$ of the circumferential direction.	The lead wire of a capacitor shall be dipped into a methanol solution of 25wt% rosin and then into molten solder of $235 \pm 5^\circ\text{C}$ for $2 \pm 0.5$ s. In both cases the depth of dipping is up to about 1.5 to 2 mm from the root of lead wires.

Step	Temperature ( $^\circ\text{C}$ )	Time
1	$-25 \pm 0_3$	30 min
2	room temp.	3 min
3	$85 \pm 3_0$	30 min
4	room temp.	3 min

\*2 "room condition" temperature : 15 to  $35^\circ\text{C}$  relative humidity : 45 to 75% atmospheric pressure : 86 to 106kPa

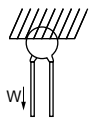
6-3. SEMICONDUCTIVE DIELECTRIC TYPE DD300/DD400 SERIES

Item		Specification	Testing Method															
1	Operating Temperature Range	-25 to +85°C	—															
2	Capacitance	Within Specified tolerance.	The capacitance shall be measured at 20°C with 1±0.2kHz and AC0.1V (r.m.s.) max.. (SR : AC1.0V (r.m.s.) max..)															
3	Dissipation Factor (D. F.)	F : D. F. ≤ 5.0% SR : D. F. ≤ 2.5% (16V) D. F. ≤ 1.0% (25V)	Same condition as capacitance.															
4	Insulation Resistance (I. R.)	F : 5MΩ • μF min. SR : 100MΩ min. (16V) 1000MΩ or 20MΩ • μF min. whichever is smaller. (25V)	The insulation resistance shall be measured with DC10±1V within 60±5 s of charging.															
5	Dielectric Strength	Between lead wires	No failure. The capacitor shall not be damage when DC voltage of 250% of the rated voltage are applied between the lead wires for 1 to 5 s.(Charge/discharge current≤ 10mA)															
		Body Insulation	No failure. The capacitor is placed in the container with metal balls of diameter 1mm so that each lead wire, short-circuited, is kept approximately 2mm off the balls as shown in the figure, and DC voltage of 250% of the rated voltage is applied for 1 to 5 s between capacitor lead wires and small metals. (Charge/discharge current≤ 10mA)															
6	Temperature Characteristic	No DC voltage	The capacitance measurement shall be made at each step specified in table and at a sufficient number of intermediate temperatures between step 2 and 7. Capacitance change from the value of step 3 shall not exceed the limit specified.															
		With DC voltage																
		F : Within $\pm\frac{30}{80}\%$ SR : Within $\pm 15\%$	<table border="1"> <tr><th>Step</th><th>1</th><th>2</th><th>3</th><th>4</th></tr> <tr><td>Temp.</td><td>20±2°C</td><td>-25±3°C</td><td>20±2°C</td><td>85±2°C</td></tr> <tr><td>DC Voltage applied</td><td>None</td><td>None</td><td>None</td><td>None</td></tr> </table>	Step	1	2	3	4	Temp.	20±2°C	-25±3°C	20±2°C	85±2°C	DC Voltage applied	None	None	None	None
Step	1	2	3	4														
Temp.	20±2°C	-25±3°C	20±2°C	85±2°C														
DC Voltage applied	None	None	None	None														
		F : Within $\pm\frac{30}{95}\%$ SR : Within $\pm\frac{15}{30}\%$	<table border="1"> <tr><th>Step</th><th>5</th><th>6</th><th>7</th><th>8</th></tr> <tr><td>Temp.</td><td>85±2°C</td><td>20±2°C</td><td>-25±3°C</td><td>20±2°C</td></tr> <tr><td>DC Voltage applied</td><td><math>\frac{1}{2}</math> Rated</td><td><math>\frac{1}{2}</math> Rated</td><td><math>\frac{1}{2}</math> Rated</td><td><math>\frac{1}{2}</math> Rated</td></tr> </table> <p>Pre-treatment : Capacitor shall be stored at 125±3°C for 1 h, then placed at *room condition for 24±2 h before measurements.</p>	Step	5	6	7	8	Temp.	85±2°C	20±2°C	-25±3°C	20±2°C	DC Voltage applied	$\frac{1}{2}$ Rated	$\frac{1}{2}$ Rated	$\frac{1}{2}$ Rated	$\frac{1}{2}$ Rated
Step	5	6	7	8														
Temp.	85±2°C	20±2°C	-25±3°C	20±2°C														
DC Voltage applied	$\frac{1}{2}$ Rated	$\frac{1}{2}$ Rated	$\frac{1}{2}$ Rated	$\frac{1}{2}$ Rated														
7	Vibration Resistance	Appearance	The capacitor shall firmly be soldered to the supporting lead wire and vibration which is 10 to 55Hz in the vibration frequency range. 1.5mm in total amplitude, and about 1 min in the rate of vibration change from 10Hz to 55Hz and back to 10Hz is applied for a total of 6 h ; 2 h each in 3 mutually perpendicular directions.															
		Capacitance																
		D. F.																
8	Soldering Effect	Appearance	The lead wire shall be immersed into the melted solder of 350±10°C (Nominal body diameter φ4mm 270±5°C) up to about 1.5 to 2mm from the main body for 3.5±0.5 s. (Nominal body diameter φ4mm 5±0.5 s.) Pre-treatment : Capacitor shall be stored at 125±3°C for 1 h, then placed at *room condition for 24±2 h before measurements of capacitance and D. F. Post-treatment : Capacitor shall be stored for 24±2 h at *room condition. Measurement Order : I. R. • Dielectric Strength → Pre-treatment → Capacitance • D. F. → Soldering Effect test → Post-treatment → Capacitance • D. F. • I. R. • Dielectric Strength															
		Capacitance Change																
		D. F.																
		I. R.																
		Dielectric Strength (Between lead wires)																
9	Humidity (Under steady state)	Appearance	Set the capacitor for 500±2% h at 40±2°C in 90 to 95% relative humidity. Pre-treatment : Capacitor shall be stored at 125±3°C for 1 h, then placed at *room condition for 24±2 h before measurements of capacitance and D. F. Post-treatment : Capacitor shall be stored for 1 to 2 h at *room condition. Measurement Order: I. R. • Dielectric Strength → Pre-treatment → Capacitance • D. F. → Humidity test → Post-treatment → Capacitance • D. F. • I. R. • Dielectric Strength															
		Capacitance Change																
		D. F.																
		I. R.																
		Dielectric Strength (Between lead wires)																



\* "room condition" temperature : 15 to 35°C relative humidity : 45 to 75% atmospheric pressure : 86 to 106kPa



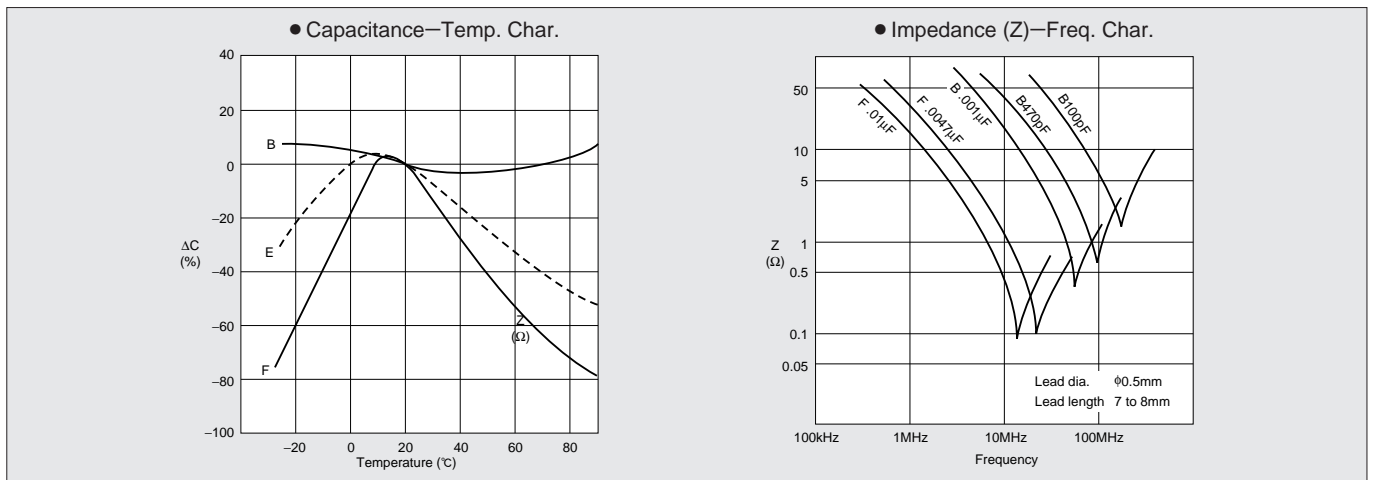
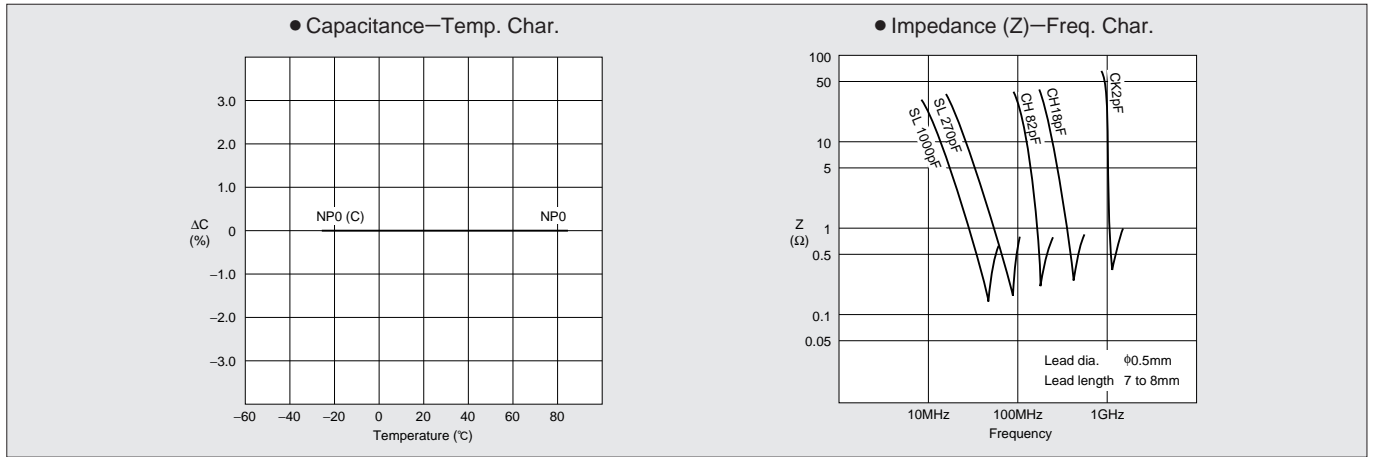
Item		Specification	Testing Method															
10	Humidity Loading	Appearance	No marked defect.															
		Capacitance Change	F : Within $\pm 20\%$ SR : Within $\pm 10\%$															
		D. F.	F : D. F. $\leq 7.5\%$ SR : D. F. $\leq 4.0\%$ (16V) D. F. $\leq 1.5\%$ (25V)															
		I. R.	F : Satisfies initial requirement. SR : $\frac{1}{2}$ of initial requirement or over.															
		Dielectric Strength (Between lead wires)	Pass the item No. 5.															
			Apply the rated voltage for $500 \pm 24$ h at $40 \pm 2^\circ\text{C}$ in 90 to 95% relative humidity. Pre-treatment and Post-treatment : Capacitor shall be stored at $125 \pm 3^\circ\text{C}$ for 1 h, then placed at *room condition for $24 \pm 2$ h before measurements of capacitance and D. F. Measurement Order : I. R. • Dielectric Strength → Pre-treatment → Capacitance • D. F. → Humidity Loading test → I. R. • Dielectric Strength* → Post-treatment → Capacitance • D. F. (Charge/discharge current $\leq 10\text{mA}$ )															
11	Life	Appearance	No marked defect.															
		Capacitance Change	F : Within $\pm 20\%$ SR : Within $\pm 10\%$															
		D. F.	F : D. F. $\leq 7.5\%$ SR : D. F. $\leq 4.0\%$ (16V) D. F. $\leq 1.5\%$ (25V)															
		I. R.	F : Satisfies initial requirement. SR : $\frac{1}{2}$ of initial requirement or over.															
		Dielectric Strength (Between lead wires)	Pass the item No. 5.															
			Apply a DC voltage of 150% of the rated voltage for $1000 \pm 48$ h at $85 \pm 2^\circ\text{C}$ . Pre-treatment and Post-treatment: Capacitor shall be stored at $125 \pm 3^\circ\text{C}$ for 1 h, then placed at *room condition for $24 \pm 2$ h before measurements of capacitance and D. F. Measurement Order: I. R. • Dielectric Strength → Pre-treatment → Capacitance • D. F. → Life test → I. R. • Dielectric Strength* → Post-treatment → Capacitance • D. F. (Charge/discharge current $\leq 10\text{mA}$ )															
12	Temperature and immersion cycling	Appearance	No marked defect.															
		Capacitance Change	F : Within $\pm 20\%$ SR : Within $\pm 10\%$															
		D. F.	F : D. F. $\leq 7.5\%$ SR : D. F. $\leq 4.0\%$ (16V) D. F. $\leq 1.5\%$ (25V)															
		I. R.	F : Satisfies initial requirement. SR : $\frac{1}{2}$ of initial requirement or over.															
		Dielectric Strength (Between lead wires)	Pass the item No. 5.															
			The capacitor shall be subjected to 5 cycles of temperature variation according to Table 1, then the capacitor shall be immersed into two baths, the one a clean water bath at temperature $65 \pm 5^\circ\text{C}$ and the other a saturated salt water bath at temperature $0 \pm 3^\circ\text{C}$ for 15 min. This immersion cycle shall be repeated 2 times, then the capacitor shall be washed in running water, wiped or dried with air draught. Pre-treatment : Capacitor shall be stored at $125 \pm 3^\circ\text{C}$ for 1 h, then placed at *room condition for $24 \pm 2$ h before measurements of capacitance and D. F. Post-treatment : Capacitor shall be stored for $24 \pm 2$ h at *room condition. Measurement Order: I. R. • Dielectric Strength → Pre-treatment → Capacitance • D. F. → Temperature and Immersion cycling test → Post-treatment → Capacitance • D. F. • I.R. • Dielectric Strength (Table 1)															
			<table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (<math>^\circ\text{C}</math>)</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>-25 \pm 0_3</math></td> <td>30 min</td> </tr> <tr> <td>2</td> <td>room temp.</td> <td>3 min</td> </tr> <tr> <td>3</td> <td><math>85 \pm 3_0</math></td> <td>30 min</td> </tr> <tr> <td>4</td> <td>room temp.</td> <td>3 min</td> </tr> </tbody> </table>	Step	Temperature ( $^\circ\text{C}$ )	Time	1	$-25 \pm 0_3$	30 min	2	room temp.	3 min	3	$85 \pm 3_0$	30 min	4	room temp.	3 min
Step	Temperature ( $^\circ\text{C}$ )	Time																
1	$-25 \pm 0_3$	30 min																
2	room temp.	3 min																
3	$85 \pm 3_0$	30 min																
4	room temp.	3 min																
13	Strength of Lead	Pull	Lead wire shall not cut off. Capacitor shall not be broken.															
		Bending	Each lead wire shall be subjected to 5N weight and then a $90^\circ$ bend, at the point of egress, in one direction, return to original position, and then a $90^\circ$ bend in the opposite direction at the rate of one bend in 2 to 3 s.															
			As a figure, fix the body of capacitor, apply a tensile weight gradually to each lead wire in the radial direction of capacitor up to 10N and keep it for $10 \pm 1$ s. 															
14	Solderability of Leads	Lead wire shall be soldered with uniformly coated on the axial direction over $\frac{3}{4}$ of the circumferential direction.	The lead wire of a capacitor shall be dipped into a methanol solution of 25wt% rosin and then into molten solder of $235 \pm 5^\circ\text{C}$ for $2 \pm 0.5$ s. In both cases the depth of dipping is up to about 1.5 to 2 mm from the root of lead wires.															

\* "room condition" temperature : 15 to  $35^\circ\text{C}$  relative humidity : 45 to 75% atmospheric pressure : 86 to 106kPa

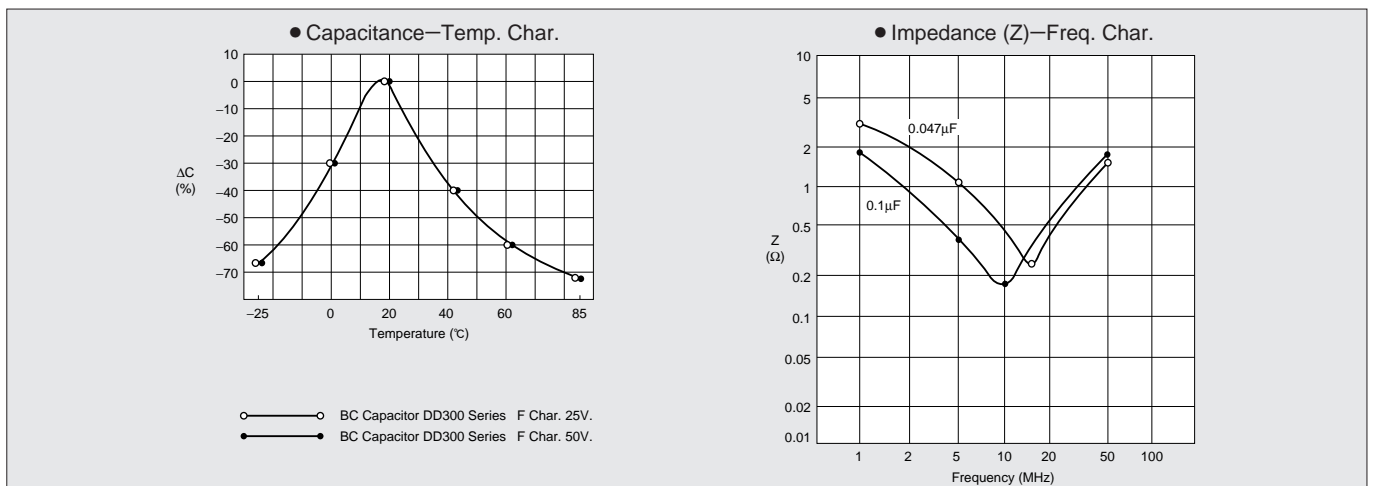
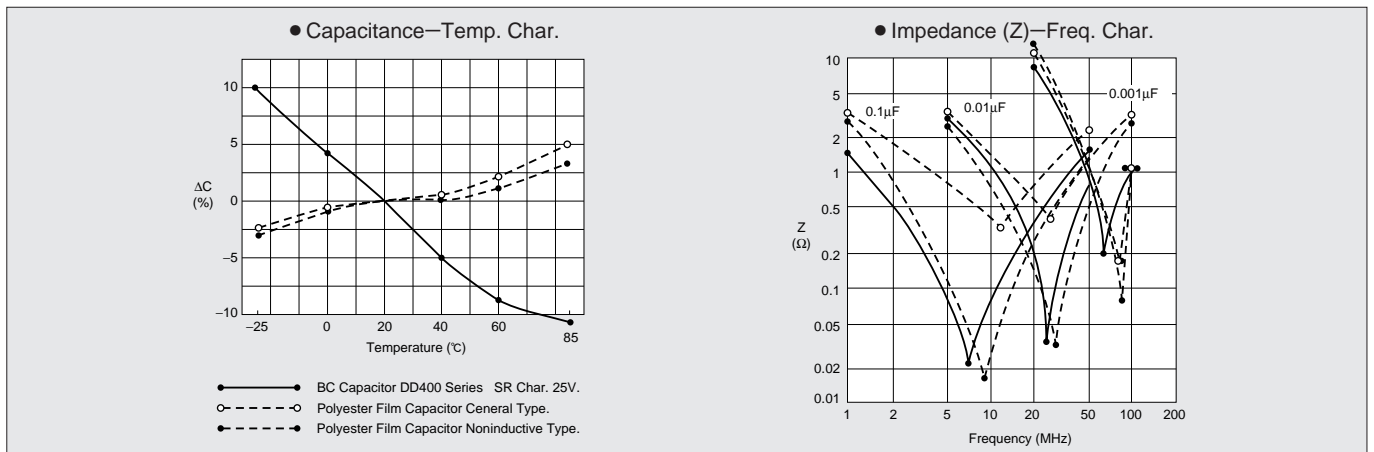
• The measurement of I. R. and Dielectric Strength will be held in 1 to 2 h after Humidity Loading test and in  $24 \pm 2$  h after Life test.

### 7. TYPICAL CHARACTERISTICS DATA

#### 7.1 DD100/DD10 SERIES



#### 7.2 DD300/DD400 SERIES





**■ ⚠ CAUTION****1. Operating voltage**

When DC-rated capacitors are to be used in AC or ripple current signal circuits, be sure to maintain the Vp-p value of the applied voltage signal or the Vo-p which contains DC bias within the rated voltage range.

**2. Operating temperature and self-generated heat**

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself.

When the capacitor is used in a high-frequency circuit, pulse signal circuit or the like, it may have the self-generated heat due to dielectric-loss. Applied voltage should be the load such as self-generated heat is within 20°C on the condition of atmosphere temperature 25°C.

Excessive heat may lead to deterioration of the capacitor's characteristics and reliability.

**3. Operating and storage environment**

The insulating coating of capacitors does not form a perfect seal; therefore, do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. And avoid exposure to moisture. Before cleaning, bonding, or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment.

Store the capacitors where the temperature and relative humidity do not exceed 5 to 40°C and 20 to 70%. Use capacitors within 6 months.

**4. Vibration and impact**

Do not expose a capacitor or its leads to excessive shock or vibration during use.

**5. Soldering**

When soldering this product to a PC board, do not exceed the solder heat resistance specification of the capacitor.

Subjecting this product to excessive heating could melt the internal junction solder and may result in thermal shocks that can crack the ceramic element.

Failure to follow the above cautions may result, worst case, in a short circuit and fuming when the product is used.

**■ NOTICE****1. Cleaning (Ultrasonic cleaning)**

To perform ultrasonic cleaning, observe the following conditions.

Rinse bath capacity : Output of 20 watts per liter or less.

Rinsing time : 5 minutes max..

Do not vibrate the PCB/PWB directly.

Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires.

**■ ISO9000 CERTIFICATIONS**

Manufacturing plants of these products in this catalog have obtained the ISO9000 quality system certificate.

Plant	Certified Date	Organization	Registration No.	Applied standard
Izumo Murata Manufacturing Co., Ltd.	Jul. 25. '97	Under Writers Laboratories Inc.	A5587	ISO9001
Murata Electronics (Thailand), Ltd.	Mar. 17. '98	Under Writers Laboratories Inc.	A6279	ISO9001

**⚠ Note:****1. Export Control**

〈For customers outside Japan〉

Murata products should not be used or sold for use in the development, production, stockpiling or utilization of any conventional weapons or mass-destructive weapons (nuclear weapons, chemical or biological weapons, or missiles), or any other weapons.

〈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 our products listed in this catalog for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property, or when intending to use one of our products for other applications than 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 in the above

**3. Product specifications in this catalog are as of April 2000. 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 your ordering. If there are any questions, please contact our sales representatives or product engineers.****4. The parts numbers and specifications listed in this catalog are for information only. You are requested to approve our product specification or to transact the approval sheet for product specification, before your ordering.****5. 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 third party's intellectual property rights and other related rights in consideration of your using 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.****6. None of ozone depleting substances (ODS) under the Montreal Protocol is used in manufacturing process of us.**