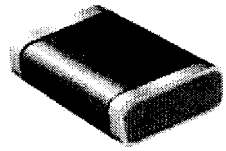
CAPACITORS



Ceramic Chip

.pdf

**TDK`s** new Sub-Miniature chip capacitor additions answer the electronics industry`s need for higher density packaging. TDK`s advanced technology allows for smaller size, highest capacitance, increased reliability, and automated assembly. Applications include computers and peripherals, telecommunications, measuring and medical equipment, and any application that requires miniaturization.

Electrical Specification

Capacitance Range

10pF to 10.0μF
lVrms, 1kHz 25 ℃
NPO 1,000pF and less: 1MHz

Capacitance Tolerance

□.5pF, □%, □0%
□0%, +80-20%

Operating Temperature Range

At the same condition as temperature characteristics

Working Voltage (DC WV)

6.3V, 10V, 16V, 25V, 50V

Dielectric Strength

250% DC WV

Insulation Resistance (DC WV) (I.R.)

Greater than 10G ohms or 500 ohms-F whichever is smaller
16V, 10V, 6.3V: 10G ohms or 100 ohms-F whichever is smaller

Part Number Configuration

CC	0603	H	NPO	101	J
(1)	(2)	(3)	(4)	(5)	(6)
Capacitor Type	*Case Size*	*Voltage*	*Temperature Characteristics*	*Capacitance (pF)*	*Capacitance Tolerance*

(1) Capacitor Type	
CC:	Chip Capacitor

(3) Voltage	
J:	6.3V
A:	10V
C:	16V
E:	25V
H:	50V

(4) Temperature Characteristics		
NPO:	Temp. Compensating Type	0□0ppm/캜 (-55캜 to + 125캜)
X7R:	Stable Type	□5% (-55캜 to +125캜)
X5R:	Stable Type	□5% (-55캜 to +85캜)
Y5V:	General purpose	+22-82% (-30캜 to +85캜)
Z5U:		+22-56% (+10캜 to +85캜)

(5) Capacitance (pF)	
First two digits:	Significant figure
Last digit:	Number of zeros to follow

(6) Capacitance Tolerance	
D:	□.5pF
J:	□%
K:	□0%
M:	□0%
Z:	+80-20%

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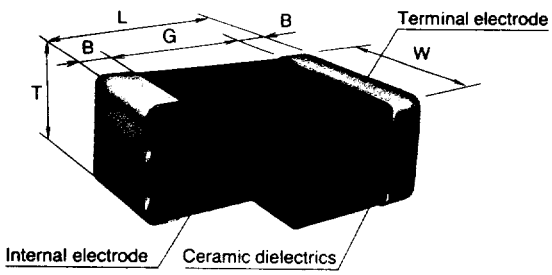
Ceramic Capacitors

MULTILAYER CERAMIC CHIP CAPACITORS

C TYPE [16,25, 50Vdc], CLASS I AND CLASS II



Type	EIA style	Dimensions (mm) [inches] L	W	T	B min.	G min.
C1005	CC0402	1 ± 0.05 [.039 ± .002]	0.5 ± 0.05 [.020 ± .002]	0.55 max. [.022]	0.15 [.006]	0.3 [.012]
C1608	CC0603	1.6 ± 0.1 [.063 ± .004]	0.8 ± 0.1 [.031 ± .004]	0.9 max. [.035]	0.2 [.008]	0.3 [.012]
C2012	CC0805	2 ± 0.2 [.079 ± .008]	1.25 ± 0.2 [.049 ± .008]	0.6 ± 0.15 [.024 ± .006]	0.2 [.008]	0.5 [.020]
				0.85 ± 0.15 [.033 ± .006]		
				1.25 ± 0.2 [.049 ± .008]		
C3216	CC1216	3.2 ± 0.2 [.126 ± .008]	1.6 ± 0.2 [.063 ± .008]	0.6 ± 0.15 [.024 ± .006]	0.2 [.008]	1 [.039]
				0.85 ± 0.15 [.033 ± .006]		
				1.1 ± 0.2 [.043 ± .008]		
				1.3 ± 0.2 [.051 ± .008]		
C3225	CC1210	3.2 ± 0.4 [.126 ± .016]	2.5 ± 0.3 [.098 ± .016]	0.85 ± 0.15 [.033 ± .006]	0.3 [.012]	1 [.039]
				1.1 ± 0.2 [.043 ± .008]		
C4532	CC1812	4.5 ± 0.5 [.177 ± .020]	3.2 ± 0.4 [.126 ± .016]	0.85 ± 0.15 [.033 ± .006]	0.4 [.016]	2 [.079]
				1.1 ± 0.2 [.043 ± .008]		
C5650	CC2220	5.6 ± 0.5 [.220 ± .020]	5 ± 0.5 [.197 ± .020]	0.85 ± 0.15 [.033 ± .006]	0.4 [.016]	2 [.079]
				1.1 ± 0.2 [.043 ± .008]		

CAPACITANCE TEMPERATURE CHARACTERISTICS

Class I

Temperature coefficient symbol	Temperature coefficient (ppm/°C)	Temperature range (°C) [°F]
C0G	0 ± 30	−55 to +125 [−67 to +125]
CH	0 ± 60	−25 to +85 [−13 to +185]
PH	−150 ± 60	−25 to +85 [−13 to +185]
RH	−220 ± 60	−25 to +85 [−13 to +185]
SH	−330 ± 60	−25 to +85 [−13 to +185]
TH	−470 ± 60	−25 to +85 [−13 to +185]
UJ	−750 ± 120	−25 to +85 [−13 to +185]
SL	+350 to −1000	20 to 85 [68 to 185]

Class II

Temperature characteristics	Capacitance change (%)	Temperature range (°C) [°F]
X8R	±15	−55 to +150 [−67 to +302]
X7R	±15	−55 to +125 [−67 to +257]
X7S	±22	−55 to +125 [−67 to +257]
Z5U	+22 −56	10 to 85 [50 to 185]
Y5V	+22 −82	−30 to +85 [−22 to +185]

CAPACITANCE AND TOLERANCE

Capacitance tolerance	Capacitance 0.5 to 10 pF	Step value for capacitance of over 10pF [$\times 10^{n}$*]
C (±0.25pF), D (±0.5pF), F (±1.0pF)	0.5 1 1.5 2 3 4 5 6 7 8 9 10	
Z (+80, −20%)		1 1.5 2.2 3.3 4.7 6.8
M (±20%)		1 1.5 2.2 3.3 4.7 6.8
K (±10%)		1 1.2 1.5 1.8 2.2 2.7 3.3 3.9 4.7 5.6 6.8 8.2
J (±5%)		1 1.1 1.2 1.3 1.5 1.6 1.8 2 2.2 2.4 2.7 3 3.3 3.6 3.9 4.3 4.7 5.1 5.6 6.2 6.8 7.5 8.2 9.1

** Step value $\times 10^{n}$ = capacitance value by pF unit. See the tables for the service range of actual rated capacitance (P. 3 - 2).*

Ceramic Capacitors

CAPACITANCE RANGE

Class I

25Vdc

Part No.	Capacitance (pF)
C1005C0G1E○○○*1□*2	0.5 to 120
C1005CH1E○○○□	0.5 to 120
C1005SL1E○○○□	0.5 to 330

*1. Capacitance code *2. Capacitance tolerance code

50Vdc

Part No.	Capacitance (pF)
C1608C0G1H○○○*1□*2	0.5 to 330
C1608PH1H○○○□	0.5 to 180
C1608RH1H○○○□	0.5 to 220
C1608SH1H○○○□	0.5 to 270
C1608TH1H○○○□	0.5 to 330
C1608UJ1H○○○□	0.5 to 470
C1608SL1H○○○□	0.5 to 1000
C2012C0G1H○○○□	0.5 to 1100
C2012PH1H○○○□	0.5 to 820
C2012RH1H○○○□	0.5 to 1000
C2012SH1H○○○□	0.5 to 1000
C2012TH1H○○○□	0.5 to 1000
C2012UJ1H○○○□	0.5 to 1300
C2012SL1H○○○□	0.5 to 2700
C3216C0G1H○○○□	0.5 to 2200
C3216PH1H○○○□	0.5 to 1500
C3216RH1H○○○□	0.5 to 2200
C3216SH1H○○○□	0.5 to 2700
C3216TH1H○○○□	0.5 to 2700
C3216UJ1H○○○□	0.5 to 3300
C3216SL1H○○○□	0.5 to 6800
C3225C0G1H○○○□	2400 to 3900
C3225SL1H○○○□	7500 to 12000
C4532C0G1H○○○□	4300 to 8200
C4532SL1H○○○□	13000 to 30000
C5650C0G1H○○○□	9100 to 15000
C5650SL1H○○○□	33000, 36000, 39000

*1. Capacitance code *2. Capacitance tolerance code

Class II

16Vdc

Part No.	Capacitance (pF)
C1005X7R1C○○○*1□*2	5600 to 10000
C1005Y5V1C○○○□	22000, 33000
C1608X7R1C○○○□	12000 to 47000
C1608X7S1C○○○□	22000 to 82000
C1608Y5V1C○○○□	47000 to 330000
C2012X7R1C○○○□	27000 to 220000
C2012X7S1C○○○□	27000 to 390000
C2012Y5V1C○○○□	100000 to 2200000
C3216X7R1C○○○□	68000 to 680000
C3216X7S1C○○○□	68000 to 1000000
C3216Y5V1C○○○□	220000 to 4700000

*1. Capacitance code *2. Capacitance tolerance code

25Vdc

Part No.	Capacitance (pF)
C1005X7R1E○○○*1□*2	220 to 4700
C1005Y5V1E○○○□	1000 to 15000
C1608X7R1E○○○□	8200 to 15000
C1608Y5V1E○○○□	47000, 100000
C2012X7R1E○○○□	12000 to 100000
C2012Z5U1E○○○□	4700 to 390000
C2012Y5V1E○○○□	22000 to 470000
C3216X7R1E○○○□	12000 to 330000
C3216Z5U1E○○○□	10000 to 220000
C3216Y5V1E○○○□	47000 to 680000

*1. Capacitance code *2. Capacitance tolerance code

50Vdc

Part No.	Capacitance (pF)
C1608X7R1H○○○*1□*2	220 to 15000
C1608Y5V1H○○○□	1000 to 33000
C2012X8R1H○○○□	1000 to 56000
C2012X7R1H○○○□	470 to 100000
C2012Z5U1H○○○□	4700 to 68000
C2012Y5V1H○○○□	4700 to 100000
C3216X8R1H○○○□	1000 to 150000
C3216X7R1H○○○□	470 to 150000
C3216Z5U1H○○○□	10000 to 150000
C3216Y5V1H○○○□	4700 to 220000
C3225X7R1H○○○□	180000, 220000
C3225Z5U1H○○○□	220000, 330000
C3225Y5V1H○○○□	330000, 470000
C4532X7R1H○○○□	270000 to 390000
C4532Y5V1H○○○□	1000000
C5650X7R1H○○○□	47000 to 680000
C5650Y5V1H○○○□	1500000

*1. Capacitance code *2. Capacitance tolerance code

Ceramic Capacitors

C TYPE [BASEMETAL ELECTRODE, 16, 25, 50Vdc], CLASS II

CAPACITANCE RANGE

16 Vdc

Part No.	Capacitance (pF)
C1608Y5V1C○○○*1□*2	47000 to 150000
C2012Y5V1C○○○□	100000 to 1000000
C3216Y5V1C○○○□	220000 to 2200000

*1. Capacitance code *2. Capacitance tolerance code

50Vdc

Part No.	Capacitance (pF)
C1608Y5V1H○○○*1□*2	1000 to 22000
C2012Y5V1H○○○□	4700 to 47000
C3216Y5V1H○○○□	4700 to 150000

*1. Capacitance code *2. Capacitance tolerance code

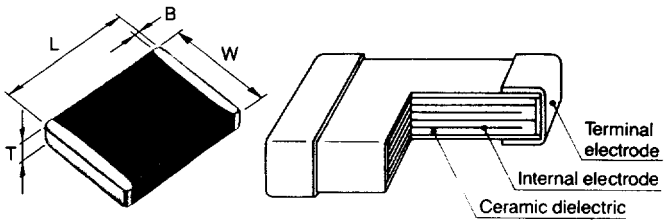
25Vdc

Part No.	Capacitance (pF)
C1608Y5V1E○○○*1□*2	1000 to 33000
C2012Y5V1E○○○□	22000 to 100000
C3216Y5V1E○○○□	22000 to 220000

*1. Capacitance code *2. Capacitance tolerance code

CATALOG NO. BBE-008, EVE-001, EVE-005

HC TYPE [LARGECAPACITANCE, 16, 25,50, 75Vdc], CLASS II HIGH DIELECTRIC CONSTANT



Dimensions in mm [inches]

Type	L ± 1.5 [.059]	W ± 0.8 [.031]	T max.	B ± 0.5 [.020]
HC8050	8 [.315]	5 [.197]	6 [.236]	1.5 [.059]
HC1063	10 [.394]	6.3 [.248]	6 [.236]	1.5 [.059]
HC1280	12.5 [.492]	8 [.315]	6 [.236]	1.5 [.059]
HC1612	16 [.630]	12.5 [.492]	6 [.236]	1.5 [.059]

CAPACITANCE RANGE (Operating temperature range: - 25 to +85°C [-13 to +185°F])

I6Vdc

Part No.	Capacitance (pF)
HC8050Y5T1C685M	6800000 [6.8μF]
HC1063Y5T1C106M	10000000 [10μF]
HC1280Y5T1C156M	15000000 [15μF]
HC1280Y5T1C226M	22000000 [22μF]
HC1612Y5T1C336M	33000000 [33μF]
HC1612Y5T1C476M	47000000 [47μF]

50Vdcc

Part No.	Capacitance (pF)
HC8050Y5T1H335M	3300000 [3.3μF]
HC1063Y5T1H475M	4700000 [4.7μF]
HC1280Y5T1H685M	6800000 [6.8μF]
HC1280Y5T1H106M	10000000 [10μF]
HC1612Y5T1H156M	15000000 [15μF]
HC1612Y5T1H226M	22000000 [22μF]

25Vdc

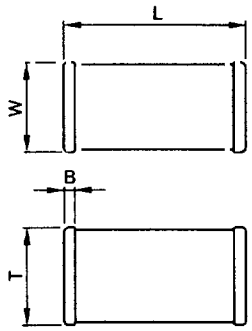
Part No.	Capacitance (pF)
HC8050Y5T1E335M	3300000 [3.3μF]
HC1063Y5T1E475M	4700000 [4.7μF]
HC1063Y5T1E685M	6800000 [6.8μF]
HC1280Y5T1E106M	10000000 [10μF]
HC1612Y5T1E156M	15000000 [15μF]
HC1612Y5T1E226M	22000000 [22μF]

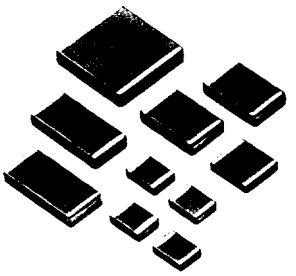
75Vdc

Part No.	Capacitance (pF)
HC8050Y5T1N155M	1500000 [1.5μF]
HC1063Y5T1N255M	2200000 [2.2μF]
HC1280Y5T1N335M	3300000 [3.3μF]
HC1280Y5T1N475M	4700000 [4.7μF]
HC1280Y5T1N685M	6800000 [6.8μF]
HC1612Y5T1N106M	10000000 [10μF]

Ceramic Capacitors

C TYPE [HIGH VOLTAGE]
CLASS I [3kVdc] AND CLASS II [500Vdc,1k, 2kVdc]





Type	EIA style	Dimensions (mm) [inches]			
		L	W	T max.	B min.
C3216	CC1206	3.2±0.2 [.126±.008]	1.6±0.15 [.063±.006]	1.75 [.069]	0.2 [.008]
C3225	CC1210	3.2±0.3 [.126±.012]	2.5±0.2 [.098±.008]	2 [.079]	0.3 [.012]
C4532	CC1812	4.5±0.3 [.177±.012]	3.2±0.3* [.126±.012]	2.5 [.098] 3 [.118]	0.4 [.016]
C5650	CC2220	5.6±0.5 [.220±.020]	5±0.5 [.197±.020]	2.5 [.098] 3.2 [.126]	0.4 [.016]
C8050		8±0.5 [.315±.020]	5±0.5 [.197±.020]	2.5 [.098]	1±0.5 [.039±.020]
C1050		10.6±0.5 [.417±.020]	5±0.5 [.197±.020]	3.4 [.134]	0.2 [.008]
C1010		10.6±0.5 [.417±.020]	10±0.5 [.394±.020]	3.4 [.134]	0.2 [.008]

** 3kV products: 3.2±0.4 [.126±.016]*

CAPACITANCE TEMPERATURE CHARACTERISTICS

Class I

Temperature coefficient symbol	Temperature coefficient (ppm/°C)	Temperature range (°C)
SL	+350 to −1000	25 to 85

Class II

Temperature characteristics	Capacitance change (%)	Temperature range (°C)
X7R	±15	−55 to +125

CAPACITANCE RANGE

Class I
3kVdc

Part No.	Capacitance (pF)
C4532SL○○○*1□*2	10 to 100

Class II
500Vdc

Part No.	Capacitance (pF)
C3216X7R○○○□	100 to 2200
C3225X7R○○○□	330 to 6800
C4532X7R○○○□	1200 to 33000
C5650X7R○○○□	39000 to 82000
C8050X7R○○○□	100000, 120000

lkVdc

Part No.	Capacitance (pF)
C4532X7R○○○□	820 to 10000
C5650X7R○○○□	12000 to 33000

2kVdc

Part No.	Capacitance (pF)
C1050X7R○○○□	470 to 15000
C1010X7R○○○□	18000 to 33000

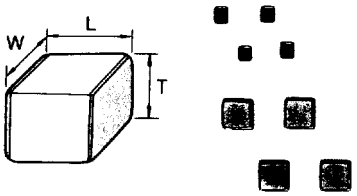
**1. Capacitance code*
**2. Capacitance tolerance code*

Ceramic Capacitors

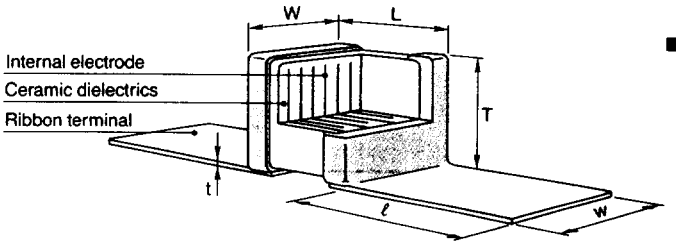
FC AND FR TYPE [LOWLOSS FOR VHF/UHF] CLASS I [50,100, 200,300, 500Vdc] AND CLASS II [50Vdc]

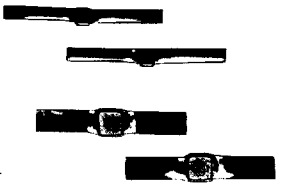
Multilayer Ceramic Capacitors for high frequency and low loss are designed for 100 to 1000MHz power circuit applications.

FC type



FR type





Dimensions in mm [inches]

Type	L	W	T max.	ℓ min.	w	t
FC1414	1.4±0.4 [.055±.016]	1.4±0.3 [.055±.012]	1.6 [.063]	—	—	—
FC2828	$2.8^{+0.5}_{-0.3}$ [$.110^{+.020}_{-.012}$]	2.8±0.4 [.110±.016]	3 [.118]	—	—	—
FR1414	1.4±0.4 [.055±.016]	1.4±0.3 [.055±.012]	1.6 [.063]	2 [.079]	1.3±0.3 [.051±.012]	$0.1^{+0.3}_{-0.01}$ [$.004^{+.012}_{-0}$]
FR2828	$2.8^{+0.5}_{-0.3}$ [$.110^{+.020}_{-.016}$]	$2.8^{+0.5}_{-0.7}$ [$.110^{+.020}_{-.028}$]	3 [.118]	2 [.079]	2.2±0.3 [.087±.012]	$0.1^{+0.3}_{-0.01}$ [$.004^{+.012}_{-0}$]

CAPACITANCE AND TOLERANCE

Capacitance tolerance	Capacitance 0.5 to 10 pF	Step value for capacitance of over 10pF [$\times 10^{n*}$]
C (±0.25pF), D (±0.5pF), F (±1.0pF)	0.5 1.5 2 2.5 3 3.5 4 4.5 5 6 7 8 9 10	
J (±5%), K (±10%)		1 1.1 1.2 1.3 1.5 1.6 1.8 2 2.2 2.4 2.7 3 3.3 3.6 3.9 4.3 4.7 5.1 5.6 6.2 6.8 7.5 8.2 9.1
Class II K (±10%), M (±20%)		1 1.2 1.5 1.8 2.2 2.7 3.3 3.9 4.7 5.6 6.8 8.2

** Step value $\times 10^n$ = capacitance value by pF unit. See the below tables for the service range of actual rated capacitance.*

CAPACITANCE RANGE (Operating temperature range: -55 to +125°C [-67 to +257°F])

Class I
50,100, 200, 300, 500Vdc

Part No.	Rated voltage (V)	Capacitance (pF)
FC1414C0G1H○○○*1□*2	50	0.5 to 100
FC2828C0G1H○○○□	50	620 to 1000
FR1414C0G1H○○○□	50	0.5 to 100
FR2828C0G1H○○○□	50	620 to 1000
FC2828C0G2A○○○□	100	510 to 560
FR2828C0G2A○○○□	100	510 to 560
FC2828C0G2D○○○□	200	200 to 470
FR2828C0G2D○○○□	200	200 to 470
FC2828C0G2F○○○□	300	110 to 180
FR2828C0G2F○○○□	300	110 to 180
FC2828C0G2H○○○□	500	0.5 to 100
FR2828C0G2H○○○□	500	0.5 to 100

**1. Capacitance code *2. Capacitance tolerance code*

Class II
50Vdc

Part No.	Capacitance (pF)
FC1414X7R1H○○○*1□*2	150 to 3300
FC2828X7R1H○○○□	470 to 22000
FR1414X7R1H○○○□	150 to 3300
FR2828X7R1H○○○□	470 to 22000

**1. Capacitance code *2. Capacitance tolerance code*