

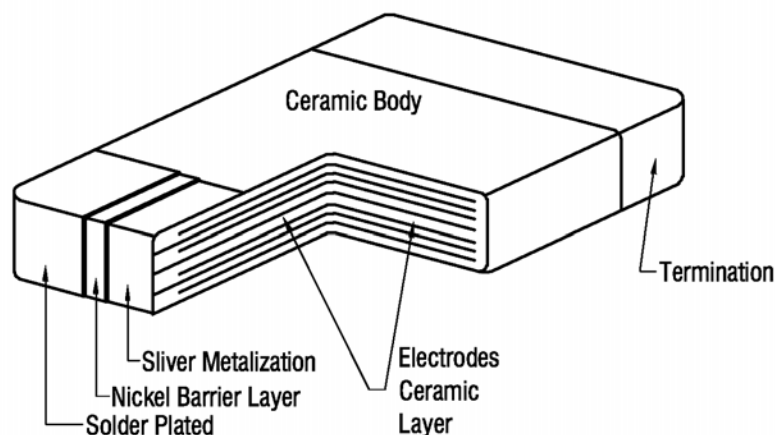
# CPH Series

## Multilayer Ceramic Chip Capacitors

**TRIGON**  
COMPONENTS



### Configuration



Capacitor

## FEATURES

- Standard EIA Chip Size Available.
- Wide range of capacitance 1.0pF – 3.3uF is available for various circuit needs.
- The CP series is available in both bulk or tape & reel packaging for automatic SMD placement.

## ORDERING CODE

**CPH 05 T 101 Z 500 N**  
(1) (2) (3) (4) (5) (6) (7)

- (1) Chip Capacitor
- (2) Size Code
- (3) Package
- (4) Capacitance Code
- (5) Tolerance Code
- (6) Rated Voltage Code
- (7) Dielectric Code

※Please refer to complete Ordering Code ( Multilayer Ceramic Chip Capacitor – P.B-184 ) for more ordering options.

### Resistance To Soldering

Termination Material	Code	Test Condition
Nickel-Barrier, Solder Plated	N	260°C, 60 Sn/40.Pb Solder, 10 sec.

### Tolerances available

Dielectric		Available Tolerance	Capacitance
EIA	IEC		
NPO, COG	1BCG	± 0.25 pF ± 0.5 pF ±1%, ±2%, ±5%, ±10%	≤ 5pF 5pF < CAP < 10pF ≥ 10pF
X7R	2R1	±5%, ±10%, ±20%	All values
Z5U	2E6	±20%, +80% -20%	All values
Y5V	2F4	±20%, +80% -20%	All values

# CPH Series

## Multilayer Ceramic Chip Capacitors

**TRIGON**  
COMPONENTS

### PERFORMANCE SPECIFICATIONS

Dielectric Code	EIA	NPO / COG	X7R
	IEC	1BCG	2R1
Temperature Characteristics	*1	0±30 ppm/°C, C > 20pF 0 <sup>+120</sup> <sub>-40</sub> ppm/°C, C ≤ 20pF	ΔC ± 15% maximum Over -55°C to +125°C
Operating Temperature Range		-55°C to +125°C	-55°C to +125°C
Measuring Conditions for Capacitance and D.F.	*2	1 MHz, 1 Vrms, C ≤ 1000pF 1 KHz, 1 Vrms, C > 1000pF	1 KHz, 1 Vrms
Dissipation Factor (D.F.) And Tangent of Loss Angle ( tan δ )		≤ 0.1% for C ≥ 30pF ≤ $\frac{100\%}{(400+20C)}$ for C < 30pF	Rated voltage ≤ 2.5% ≥ 50V ≤ 3.5% 25V 16V ≤ 5.0% 10V 6.3V
Insulation Resistance (I.R.) after 60 sec. Charging at rated voltage, 25°C, 55% RH max.		≥ 100 GOhms or ≥ 1000 MΩ · μF whichever is less	≥ 10 GOhms or ≥ 100 MΩ · μF whichever is less
Voltage Proof, 25°C, 1-5 sec.		2.5 X Rated Voltage	2.5 X Rated Voltage
Capacitance Aging		0	≅ 1.5% per decade hour

Dielectric Code	EIA	Z5U	Y5V
	IEC	2E6	2F6
Temperature Characteristics	*1	ΔC ± 22%, -56% maximum Over +10°C to +85°C	ΔC ± 22%, -82% maximum Over -30°C to +85°C
Operating Temperature Range		+10°C to +85°C	-30°C to +85°C
Measuring Conditions for Capacitance and D.F.	*2	1 KHz, 0.5 Vrms	1 KHz, 1.0 Vrms
Dissipation Factor (D.F.) And Tangent of Loss Angle ( tan δ )		≤ 4.0% 50V ≤ 6.0% 25V	Rated voltage ≤ 5.0% 50V ≤ 7.0% 25V 16V ≤ 10.0% 10V 6.3V
Insulation Resistance (I.R.) after 60 sec. Charging at rated voltage, 25°C, 55% RH max.		≥ 10 GOhms or ≥ 100 MΩ · μF whichever is less	≥ 10 GOhms or ≥ 100 MΩ · μF whichever is less
Voltage Proof, 25°C, 1-5 sec.		2.5 X Rated Voltage	2.5 X Rated Voltage
Capacitance Aging		≅ 5% per decade hour	≅ 3% per decade hour

※ \*1. Class II (X7R,Z5U,Y5V) capacitors shall be made a special pre-conditioning before a test or a sequence of tests under the following conditions;  
Exposure at 150±10°C for 1 hr, followed by setting the capacitor at room temperature for 24±1 hr.

※ \*2. Capacitance is within specified tolerance; measured 1000 hours after date of manufacture because of capacitance aging of Class II capacitor.

# CPH Series

## Multilayer Ceramic Chip Capacitors

**TRIGON**  
COMPONENTS

### ENVIRONMENTAL CHARACTERISTICS

Test	Test Conditions	Post-Test Inspection Requirements																				
Solderability	<b>IEC 384-10 4.11 / JIS C 5102 8.13</b> Solder 60 Sn/40 Pb, 235 ± 5°C Immersed for 5 secs.	At least 75% of termination area should be well tinned. No visible damage.																				
*1 Resistance to Soldering Heat	<b>IEC 384-10 4.10 / JIS C 5102 8.14</b> Immersed In solder bath at 260 ± 5°C for 10±1 secs. Recovery: 6 ~ 24 hrs. (COG) 24 ± 2 hrs. (X7R, Z5U, Y5V)	At least 75% of termination area should be covered by solder . No visible damage <table border="1"> <thead> <tr> <th></th> <th>COG(1BCG)</th> <th>X7R(2R1)</th> <th>Z5U(2E6)</th> <th>Y5V(2F4)</th> </tr> </thead> <tbody> <tr> <td><math>\Delta C/C</math></td> <td>≤ ±0.5%, or ±0.5pF whichever is greater</td> <td>≤ +10% -5%</td> <td>≤ +20% -10%</td> <td>≤ +20% -10%</td> </tr> </tbody> </table>		COG(1BCG)	X7R(2R1)	Z5U(2E6)	Y5V(2F4)	$\Delta C/C$	≤ ±0.5%, or ±0.5pF whichever is greater	≤ +10% -5%	≤ +20% -10%	≤ +20% -10%										
	COG(1BCG)	X7R(2R1)	Z5U(2E6)	Y5V(2F4)																		
$\Delta C/C$	≤ ±0.5%, or ±0.5pF whichever is greater	≤ +10% -5%	≤ +20% -10%	≤ +20% -10%																		
*2 Rapid Change of Temperature	<b>IEC 384-10 4.12 / JIS C 5102 9.3</b> -55°C to +125°C, 5 cycles (COG, X7R) Duration: 30 mins. Recovery: 6 ~ 24 hrs. (COG) 24 ± 2 hrs. (X7R)	No visible damage <table border="1"> <thead> <tr> <th></th> <th>COG(1BCG)</th> <th>X7R(2R1)</th> </tr> </thead> <tbody> <tr> <td><math>\Delta C/C</math></td> <td>≤ ± 1%, or ± 1pF whichever is greater</td> <td>≤ ±10%</td> </tr> <tr> <td>D.F.</td> <td colspan="2">≤ 1.5 X initial requirement</td> </tr> <tr> <td>I.R.</td> <td colspan="2">≥ 0.25 X initial requirement</td> </tr> </tbody> </table>		COG(1BCG)	X7R(2R1)	$\Delta C/C$	≤ ± 1%, or ± 1pF whichever is greater	≤ ±10%	D.F.	≤ 1.5 X initial requirement		I.R.	≥ 0.25 X initial requirement									
	COG(1BCG)	X7R(2R1)																				
$\Delta C/C$	≤ ± 1%, or ± 1pF whichever is greater	≤ ±10%																				
D.F.	≤ 1.5 X initial requirement																					
I.R.	≥ 0.25 X initial requirement																					
*3 Endurance (Lift Test)	<b>IEC 384-10 4.15</b> 1,000 hrs. at maximum temperature with 1.5 x rated voltage applied. Recovery: 6 ~ 24 hrs. (COG) 24 ± 2 hrs. (X7R, Z5U, Y5V)	No visible damage <table border="1"> <thead> <tr> <th></th> <th>COG(1BCG)</th> <th>X7R(2R1)</th> <th>Z5U(2E6)</th> <th>Y5V(2F4)</th> </tr> </thead> <tbody> <tr> <td><math>\Delta C/C</math></td> <td>≤ ± 2%, or ± 1pF whichever is greater</td> <td>≤ ±20%</td> <td>≤ ±20%</td> <td>≤ ±30%</td> </tr> <tr> <td>D.F.</td> <td>≤ 2.0 X initial requirement</td> <td colspan="3">≤ 1.5 X initial requirement</td> </tr> <tr> <td>I.R.</td> <td colspan="4">≥ 0.25 X initial requirement</td> </tr> </tbody> </table>		COG(1BCG)	X7R(2R1)	Z5U(2E6)	Y5V(2F4)	$\Delta C/C$	≤ ± 2%, or ± 1pF whichever is greater	≤ ±20%	≤ ±20%	≤ ±30%	D.F.	≤ 2.0 X initial requirement	≤ 1.5 X initial requirement			I.R.	≥ 0.25 X initial requirement			
	COG(1BCG)	X7R(2R1)	Z5U(2E6)	Y5V(2F4)																		
$\Delta C/C$	≤ ± 2%, or ± 1pF whichever is greater	≤ ±20%	≤ ±20%	≤ ±30%																		
D.F.	≤ 2.0 X initial requirement	≤ 1.5 X initial requirement																				
I.R.	≥ 0.25 X initial requirement																					
*4 Humidity Test (Damp heat, steady state)	<b>IEC 384-10 4.14 / JIS C 5102 9.5</b> 500 HRS. AT 40 ± 2°C, 90-95% RH Recovery: 6 ~ 24 hrs. (COG) 24 ± 2 hrs. (X7R, Z5U, Y5V)	No visible damage <table border="1"> <thead> <tr> <th></th> <th>COG(1BCG)</th> <th>X7R(2R1)</th> <th>Z5U(2E6)</th> <th>Y5V(2F4)</th> </tr> </thead> <tbody> <tr> <td><math>\Delta C/C</math></td> <td>≤ ± 2%, or ± 1pF whichever is greater</td> <td>≤ +10%</td> <td>≤ +20%</td> <td>≤ ±30%</td> </tr> <tr> <td>D.F.</td> <td>≤ 2.0 X initial requirement</td> <td colspan="3">≤ 1.5 X initial requirement</td> </tr> <tr> <td>I.R.</td> <td colspan="4">≥ 0.25 X initial requirement</td> </tr> </tbody> </table>		COG(1BCG)	X7R(2R1)	Z5U(2E6)	Y5V(2F4)	$\Delta C/C$	≤ ± 2%, or ± 1pF whichever is greater	≤ +10%	≤ +20%	≤ ±30%	D.F.	≤ 2.0 X initial requirement	≤ 1.5 X initial requirement			I.R.	≥ 0.25 X initial requirement			
	COG(1BCG)	X7R(2R1)	Z5U(2E6)	Y5V(2F4)																		
$\Delta C/C$	≤ ± 2%, or ± 1pF whichever is greater	≤ +10%	≤ +20%	≤ ±30%																		
D.F.	≤ 2.0 X initial requirement	≤ 1.5 X initial requirement																				
I.R.	≥ 0.25 X initial requirement																					
Adhesion	<b>IEC 384-10 4.8 / JIS C 5102 8.11.2</b> capacitors mounted on a substrate, a force of 5N applied perpendicular to the plane of substrate and parallel the line joining the center of terminations for 10 ± 1 sec.	No visible damage																				

※ \*1 ~ \*4: Class II (X7R, Z5U, Y5V) capacitors shall be made a special pre-conditioning before a test or a sequence of tests under the following conditions: Exposure at 150 ± 10°C for 1 hr., followed by setting the capacitor at room temperature for 24 ± 1 hr..

# CPH Series

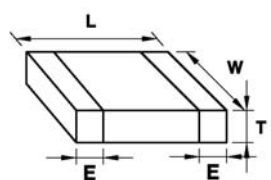
## Multilayer Ceramic Chip Capacitors

**TRIGON**  
COMPONENTS

### CAPACITANCE RANGE: NPO/COG

unit : LxWxE : in(mm) , T(Thickness) : mm

EIA/IEC Electric Code	COG/BCG							
	0402		0603		0805	1206	1210	1812
<b>(L)Length</b>	0.04±0.002 (1.00±0.05)		0.63±0.006 (1.60±0.15)		0.080±0.008 (2.00±0.20)	0.126±0.008 (3.20±0.20)	0.126±0.012 (3.20±0.30)	0.177±0.016 (4.50±0.40)
<b>(W)Width</b>	0.02±0.002 (0.50±0.05)		0.032±0.006 (0.80±0.15)		0.050±0.008 (1.20±0.20)	0.63±0.008 (1.60±0.20)	0.100±0.012 (2.50±0.30)	0.126±0.012 (3.20±0.30)
<b>(E)Termination</b>	0.004 min. (0.10 min.)		0.016±0.08 (0.40±0.20)		0.020±0.08 (0.50±0.20)	0.020±0.008 (0.50±0.20)	0.020±0.008 (0.50±0.20)	0.025±0.015 (0.64±0.38)
W.V.D.C	25	50	25	50	50	50	50	50
Cap. (pF)	0.5		1.0		1.2		1.5	
	1.8		2.2		2.7		3.3	
	3.9		4.7		5.6		6.8	
	8.2		10		12		15	
	18		22		27		33	
	39		47		56		68	
	82		100		120		150	
	180		220		270		330	
	390		470		560		680	
	820		1000		1200		1500	
	1800		2200		2700		3300	
	3900		4700		5600		6800	
	8200		0.010		0.012		0.015	
	0.018		0.015		0.018		0.022	
	0.022							

Note:

1. Dimensions are in millimeters, dimensions in parenthesis are in inches.
2. Other capacitance values and voltages are available upon request.
3. The thickness of chip capacitors might be changed due to the improvement of the production technology.

# CPH Series

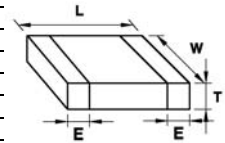
## Multilayer Ceramic Chip Capacitors

**TRIGON**  
COMPONENTS

### CAPACITANCE RANGE: X7R

unit : LxWxE: in(mm), T(Thickness) : mm

Code	X7R/2R1														
Size	0402				0603			0805			1206			1210	1812
(L)Length	0.04±0.002 (1.00±0.05)				0.63±0.006 (1.60±0.15)			0.080±0.008 (2.00±0.20)			0.126±0.008 (3.20±0.20)			0.126±0.012 (3.20±0.30)	0.177±0.016 (4.50±0.40)
(W)Width	0.02±0.002 (0.50±0.05)				0.032±0.006 (0.80±0.15)			0.050±0.008 (1.20±0.20)			0.63±0.008 (1.60±0.20)			0.100±0.012 (2.50±0.30)	0.126±0.012 (3.20±0.30)
(E)Termination	0.004 min. (0.10 min.)				0.016±0.08 (0.40±0.20)			0.020±0.08 (0.50±0.20)			0.020±0.008 (0.50±0.20)			0.020±0.008 (0.50±0.20)	0.025±0.015 (0.64±0.38)
W.V.D.C	10	16	25	50	16	25	50	16	25	50	16	25	50	50	50
100															
120															
150															
180															
220															
270															
330	T =	T =	T =	T =											
390	0.5	0.5	0.5	0.5											
470	±0.05	±0.05	±0.05	±0.05											
560															
680															
820															
1000															
1200					T =	T =	T =	T =	T =	T =					
1500					0.80	0.80	0.80	0.65	0.65	0.65					
1800					±0.15	±0.15	±0.15	±0.10	±0.10	±0.10					
2200															
2700															
3300											T =	T =	T =		
3900											0.85	0.85	0.85		
4700											±0.10	±0.10	±0.10		
5600															
6800															
8200															
0.010															
0.012															
0.015															
0.018															
0.022															
0.027															
0.033															
0.039															
0.047															
0.056															
0.068															
0.082															
0.10								0.85	0.85	0.85					
0.12								±0.10	±0.10	±0.10					
0.15											1.25±0.10	1.10	1.10	1.10	
0.18											±0.10	±0.10	±0.10		
0.22													1.60±0.10	1.15±0.10	
0.27															
0.33															1.15 ± 0.10
0.39															
0.47															1.45 ± 0.10



Capacitor

- Note:
1. Dimensions are in millimeters, dimensions in parenthesis are in inches.
  2. Other capacitance values and voltages are available upon request.
  3. The thickness of chip capacitors might be changed due to the improvement of the production technology.

# CPH Series

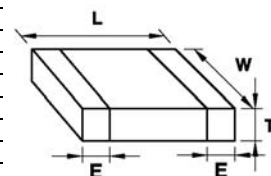
## Multilayer Ceramic Chip Capacitors

**TRIGON**  
COMPONENTS

### CAPACITANCE RANGE: Z5U

Unit : LxWxE : in(mm), T(Thickness) : mm

EIA/IEC Electric Code	Z5U/ZE6									
	0603		0805		1206		1210		1812	
<b>(L)Length</b>	0.063±0.006 (1.60±0.15)		0.080±0.008 (2.00±0.20)		0.126±0.008 (3.20±0.20)		0.126±0.012 (3.20±0.30)		0.177±0.016 (4.50±0.40)	
<b>(W)Width</b>	0.032±0.006 (0.8±0.15)		0.050±0.008 (1.20±0.20)		0.63±0.008 (1.60±0.20)		0.100±0.012 2.50(±0.30)		0.126±0.012 (3.20±0.30)	
<b>(E)Termination</b>	0.016±0.008 (0.40±0.20)		0.020±0.08 (0.50±0.20)		0.020±0.008 (050±0.20)		0.020±0.008 (0.50±0.20)		0.025±0.015 (0.64±0.38)	
Configuration										
W.V.D.C	25	50	25	50	25	50	25	50	25	50
Cap. 2700										
(pF) 3300										
3900										
4700										
5600										
6800										
8200	0.80	0.80	0.65	0.65						
Cap. 0.010	±0.15	±0.15	±0.10	±0.10						
(μF) 0.012										
0.015										
0.018										
0.022										
0.027										
0.033										
0.039										
0.047										
0.056										
0.068										
0.082										
0.10										
0.12										
0.15										
0.18										
0.22										
0.27										
0.33										
0.39										
0.47										
0.56										
0.68										
1.00										
1.20										
1.50										
1.80										



Note:

1. Dimensions are in millimeters, dimensions in parenthesis are in inches.
2. Other capacitance values and voltages are available upon request.
3. The thickness of chip capacitors might be changed due to the improvement of the production technology.

# CPH Series

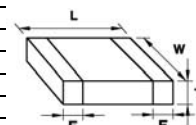
## Multilayer Ceramic Chip Capacitors

**TRIGON**  
COMPONENTS

### CAPACITANCE RANGE: Y5V

Unit : LxWxE : in(mm), T(Thickness) : mm

Code	Y5V/2F4																
Size	0402			0603				0805			1206			1210		1812	
(L)Length	0.04±0.002 (1.00±0.05)			0.63±0.006 (1.60±0.15)				0.080±0.008 (2.00±0.20)			0.126±0.008 (3.20±0.20)			0.126±0.012 (3.20±0.30)		0.177±0.016 (4.50±0.40)	
(W)Width	0.02±0.002 (0.50±0.05)			0.032±0.006 (0.80±0.15)				0.050±0.008 (1.20±0.20)			0.63±0.008 (1.60±0.20)			0.100±0.012 (2.50±0.30)		0.126±0.012 (3.20±0.30)	
(E)Termination	0.004 min. (0.10 min.)			0.016±0.08 (0.40±0.20)				0.020±0.08 (0.50±0.20)			0.020±0.008 (0.50±0.20)			0.020±0.008 (0.50±0.20)		0.025±0.015 (0.64±0.38)	
W.V.D.C	10	16	25	10	16	25	50	16	25	50	16	25	50	25	50	25	50
Cap. 0.010																	
(μF) 0.012																	
0.015																	
0.018	T=	T=	T=														
0.022	±0.05	±0.05	±0.05														
0.027																	
0.033																	
0.039				T=	T=	T=	T=										
0.047				±0.15	±0.15	±0.15	±0.15										
0.056																	
0.068								T=	T=	T=							
0.082								±0.10	±0.10	±0.10							
0.10																	
0.12																	
0.15																	
0.18																	
0.22																	
0.27																	
0.33																	
0.39																	
0.47								0.85±0.10	0.85±0.10								
0.56																	
0.68								1.25±0.10									
0.82																	
1.0																	
1.2																	
1.5											1.10±0.10						
1.8																	
2.2																	
2.7																	
3.3																	



Note:

1. Dimensions are in millimeters, dimensions in parenthesis are in inches.
2. Other capacitance values and voltages are available upon request.
3. The thickness of chip capacitors might be changed due to the improvement of the production technology.