



MULTILAYER CERAMIC CAPACITORS

CAT. No. E1002E Version2.0

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Item	Series	Rated Voltage Range (V _{dc})	Rated Capacitance Range(μF)	Category Temperature Range (°C)	Features
Chip Type	THC	25 to 200	0.047 to 47	-55 to +125	<ul style="list-style-type: none">• Downsized and Large capacitance.• Excellent high frequency characteristic due to low ESR.• Two types of terminal electrodes are available. (Silver for reflow soldering and solder or tin plating for flow and reflow soldering).
Metal cap Type	THP	25 to 200	0.45 to 100	-55 to +125	<ul style="list-style-type: none">• Downsized.• Excellent temperature cycle durability• High permissible ripple current.• Excellent high frequency characteristics.• For reflow soldering use.
Lead Type	THD	25 to 250	0.1 to 470	-55 to +125	<ul style="list-style-type: none">• Downsized.• More small in size and wide capacitance range.• Excellent high frequency characteristics due to low ESR.• High permissible ripple current.

For Environmentally friendly capacitors (Lead-free / non-PVC sleeving products), please consult us.

Information

Nippon Chemi-Con Corporation has decided that effective with the 2004 fiscal year we will introduce our "New Part Numbering System". We will publish the details and parameters of this new part numbering system in advance of its inception.



1 In designing device circuits

- (1) Confirming the installation and operating environment of capacitors, use them within the rated performance limits prescribed in their catalog or product specifications. Otherwise, excessive use conditions cause the capacitors to have catastrophic failure such as short circuit, open circuit or firing.
- (2) Consult us for devices that requires high reliability. For components which are used to the devices whose failure affects human life or causes social loss by serious damage, higher reliable designs than general purpose components are required.
- (3) Some types of capacitors change in capacitance as time passes by, and they may be not suitable for time constant circuits etc.

2 In designing PC boards

- (1) Put the proper volume of solder (the size of fillet) on PC boards for installing surface mount capacitors, because it directly affects the installed capacitors. The design of copper pad patterns and dimensions should be set so that the proper volume of solder can be provided.
- (2) Bending the PC boards where surface mount capacitors were soldered may crack the capacitors.
- (3) For a leaded capacitor, design the PC boards with the correct terminal hole space equal to the lead space of the capacitor.

3 Installation

- (1) When installing leaded capacitors in the PC boards by means of an automatic insertion machine, minimize the mechanical shock applied to the capacitors by the lead clinch unit of the machine.
- (2) Do not apply shock to the bodies of capacitors when installing on PC boards.
- (3) Periodically maintain and inspect installation machines.
- (4) Where an adhesive is used to pre-anchor capacitors on PC boards, use appropriate copper pad dimensions, type of adhesive, coating volume, curing temperature and time, etc. to prevent the capacitors from deteriorating.

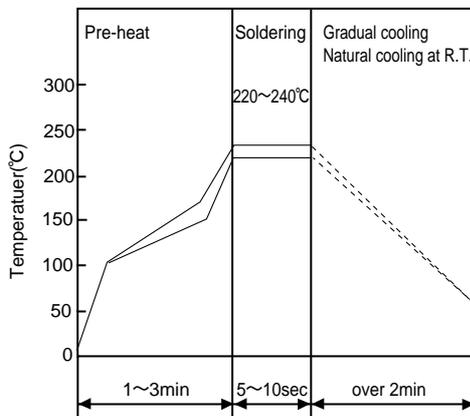
4 Soldering

- (1) Use flux with a halogen content of less than 0.1 wt. %. Do not use strong acid flux.
- (2) Minimize a volume of flux to coat the PC boards with.
- (3) Follow the soldering conditions prescribed in the catalog or product specifications. Excessive thermal stress affects the performance of the capacitors.
- (4) Note that surface mount capacitors with the size 3.2×1.6 or smaller tend to stand up during vapor phase reflow soldering.
- (5) For reflow soldering, place surface mount capacitors on the PC boards as soon as possible after solder paste was coated.
- (6) Please pay attention to a substrate stress by thermal transformation during a substrate mounting process. Especially, if a substrate that already mounted chip parts is applied a flow soldering process to mount leaded parts, then please pay sufficient attention to transformation of the substrate during the process. Since it would occur cracking of capacitor element, electrical breakdown, degradation of insulation resistance, etc. by a stress of substrate transformation, please verify to have no abnormality under actual mounting condition.

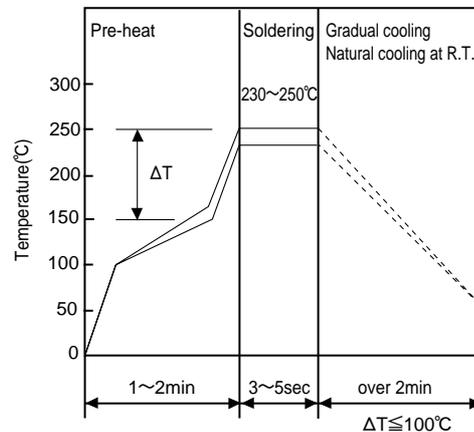
- (7) Due to the nature of ceramic, radical heating or cooling and partial heating may crack the ceramic capacitor element. Please have enough pre-heating process before soldering.
- (8) As termination material of THCR is silver, electrodes may disappear when chips are immersed in too high temperature molten solder for too long time.
- (9) Ultrasonic cleaning time shall be ten minutes maximum.
When the power of ultrasonic cleaner is too high, the strength of terminations may drop.
Therefore, carefully examine the cleaning conditions before use.
- (10) Land width of PC boards shall not exceed the width of chips.
- (11) Adjust the amount of solder cream in order that solder fillet shall be 1/2 to 2/3 height of chips. (20, 30 & 40 size)
- (12) When more than two chips are mounted on a common land, please separate the chips by the solder resist.
- (13) In hand soldering, please take into consideration the following items.
 1. Fully pre-heat on a heating plate whose surface temperature is 100°C to 150°C .
 2. Soldering iron power shall not exceed 30W.
 3. Soldering iron tip diameter shall not exceed 3mm.
 4. Temperature of iron tip shall be adjusted to not exceed 300°C.
 5. The soldering iron tip shall not touch ceramic body directly.
 6. After soldering, let the products to be room temperature to cool gradually.

5 Soldering profile

Reflow Soldering Profile



Flow Soldering Profile



*Flow Soldering : THCS Series 20,30,40,50 size only

6 Cleaning

- (1) In the case that the assembly boards are washed, choose the appropriate cleaning agent for the washing purpose.
- (2) To determine the cleaning conditions, make sure by means of the actual washing equipment that the performance of the capacitors is not affected.
- (3) In the case that water-soluble flux was used, sufficiently wash the assembly boards.



7 Coating materials

- (1) Before setting up coating conditions, make sure that the capacitors and devices are not affected by the coating materials.
- (2) Confirm that harmful resolution or formation gasses are not generated from the coating materials during the curing process or by spontaneously leaving the coated assembly boards.
- (3) Because a dip type capacitor uses resin as its exterior covering, do not expose the capacitor to high temperature exceeding the operating temperature of the capacitor. If a coating material is cured at higher temperatures than the Category temperature of the capacitor, the exterior resin will deteriorate resulting in the capacitor damage.

8 Handling

- (1) When cutting off a multi-board to make individual units, curving or twisting the board may crack the capacitors. Appropriate tools should be used to cut it off.
- (2) Please do not apply excessive stress, especially to large size products as it may cause cracks in ceramic capacitor element.
It is recommended that possibly damaged capacitors caused by excessive stress are not be used.
- (3) Use leaded capacitors without bending their lead wires as much as possible.
- (4) When inspecting each assembly board, do not distort the board by the pressure of check pins etc. Also, hold the board with supporting pins or appropriate tools to prevent the board from vibrating.

9 Storage

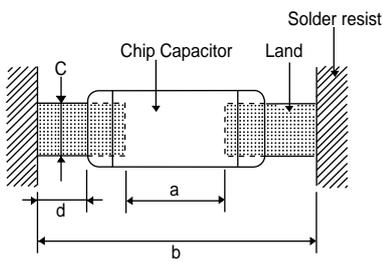
- (1) Do not store and use capacitors in the following environment. Water or salt water splashes, dew wets or toxic gasses (hydrogen sulfide, sulfurous acid, chlorine, ammonium) fills, Vibration or mechanical shock exceeding the limits prescribed in the catalog or product specifications.
- (2) Do not store capacitors in places that direct sunlight pours down or dewy places.
- (3) Avoid high temperature and humidity.
The storage conditions should be : Temperature=Lower than 40°C
Humidity=Lower than 70% RH

10 Design

- (1) In choosing capacitance, take into consideration temperature and DC bias characteristics.
- (2) Surge voltage shall not exceed specified withstand voltage.
- (3) When large high frequency ripple current acrosses multilayer ceramic capacitor, the capacitor can vibrate. The phenomenon occurs as the capacitor, has natural vibration frequency due to the mechanical dimensions, resonates to the large high frequency ripple current.
To prevent the resonance, please select the capacitor or change the ripple current frequency.
For your information, we indicate the following resonance frequency to each case size.

Size Code		Chip Size	(kHz)
Chip or metal cap	Dip		
20		2.0×1.25	900, 1400, 1800
30		3.2×1.6	600, 1200, 1500
40	21	3.2×2.5	600, 750, 1200
50	30	4.5×3.2	400, 600, 1200
60	31	5.7×5.0	300, 400, 900
70	41	7.5×6.3	250, 350, 750
	51	10.0×9.0	180, 200, 600
	60	20.0×12.7	90, 140, 600
	61	25.0×12.7	70, 140, 600

11 Soldering land design



●THC Series

(mm)

Size Code	20	30	40	50	60	70
a	1.0 to 1.4	1.8 to 2.5	1.8 to 2.5	2.5 to 3.5	2.7 to 4.7	3.8 to 5.0
b	3.0 to 4.6	4.2 to 5.8	4.2 to 5.8	5.5 to 6.1	6.7 to 8.3	8.8 to 10.8
c	0.9 to 1.2	1.2 to 1.6	1.8 to 2.5	2.3 to 3.2	3.5 to 5.0	4.7 to 6.3
d	0.3 to 0.6	0.4 to 0.8	0.5 to 1.0	0.6 to 1.1	0.7 to 1.2	0.8 to 1.3

●THP Series

(mm)

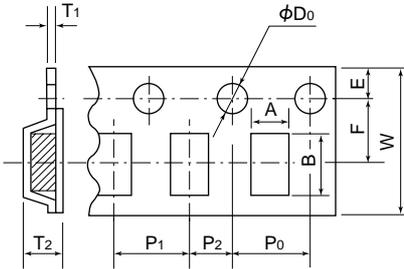
Size Code	50	60	70
a	2.5 to 3.5	3.5 to 4.5	5.5 to 6.5
b	5.5 to 6.1	6.5 to 7.5	8.8 to 9.8
c	2.3 to 3.2	4.0 to 5.0	5.5 to 6.5
d	0.6 to 1.1	0.5 to 1.5	0.8 to 1.8

12 Catalogs

Specifications in catalogs may be subject to change without notice. Performance test data in the catalogs show typical values, which are not assured in the catalogs.

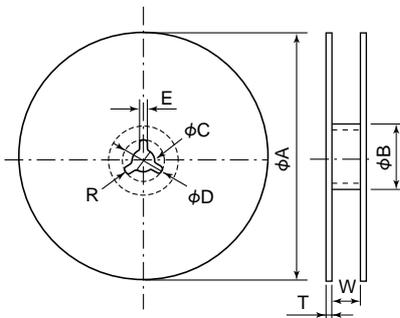
◆TAPING SPECIFICATION

●THC / THP Series



Size Code	Dimensions (mm)										
	A ±0.1	B ±0.1	W ±0.3	F ±0.05	E ±0.1	P1 ±0.1	P2 ±0.05	P0 ±0.1	φD ±0.1	T1 max.	T2 max.
THC 20	1.45	2.5	8.0	3.5	1.75	4.0	2.0	4.0	1.5	0.6	1.5
THC 30	1.9	3.5	8.0	3.5	1.75	4.0	2.0	4.0	1.5	0.6	1.5
THC 40	2.8	3.5	8.0	3.5	1.75	4.0	2.0	4.0	1.5	0.6	2.5
THC 50	3.65	4.95	12.0	5.5	1.75	8.0	2.0	4.0	1.5	0.6	2.8
THC 60	5.5	6.25	12.0	5.5	1.75	8.0	2.0	4.0	1.5	0.6	2.8
THC 70	6.85	8.05	16.0	7.5	1.75	12.0	2.0	4.0	1.5	0.6	3.0
THP 50	3.8	5.2	12.0	5.5	1.75	8.0	2.0	4.0	1.5	0.6	6.0
THP 60	5.3	6.4	16.0	7.5	1.75	8.0	2.0	4.0	1.5	0.6	6.0
THP 70	6.9	8.2	16.0	7.5	1.75	12.0	2.0	4.0	1.5	0.6	7.5

◆REEL SPECIFICATIONS (for THC and THP serieses)



Size Code	Dimensions (mm)				
	THC			THP	
	20, 30, 40	50, 60	70	50	60, 70
φA	178±2	178±2	178±2	178±2	382±2
φB	50min.	50min.	50min.	50min.	80min.
φC	13±0.5	13±0.5	13±0.5	13±0.5	13±0.5
φD	21±0.8	21±0.8	21±0.8	21±0.8	21±0.8
E	2±0.5	2±0.5	2±0.5	2±0.5	2±0.5
W	10±0.5	14±0.5	18±0.5	14±0.5	18±0.5
T	2±0.5	2±0.5	2±0.5	2±0.5	2±0.5
R	1.0	1.0	1.0	1.0	1.0

THC Series quantity per reel (pcs. / reel)

Size Code	20	30	40	50	60	70
Quantity	3,000	3,000	1,600	800	800	500

THP Series quantity per reel (pcs. / reel)

Size Code	50	60	70
Quantity	500	2,000	1,200

Note : Above quantity may vary for rating of capacitor.

Note : Above quantity may vary for rating of capacitor.

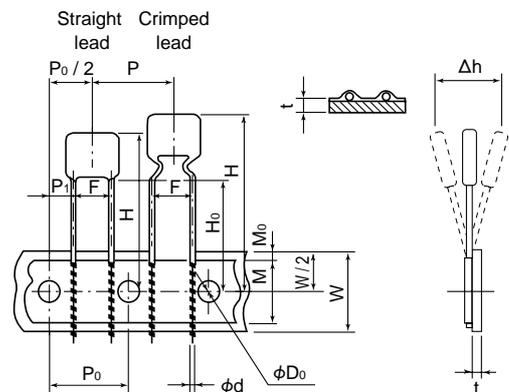
●THD Series

Available for 21, 30, 31, 41 sizes. Ammo Packaging.

Size Code	Dimensions H (mm)		Quantity per Packing (pcs.)
	Straight lead	Crimped lead	
21	23max.	25max.	2,000
30	24max.	26max.	
31	26max.	28max.	
41	29max.	30max.	1,500

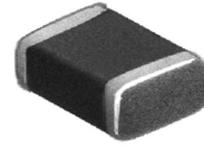
Taping Code Table

Code	Type
T	Straight lead taping
T 710	Crimped lead taping



Code	P	P0	P1	P0 / 2	F	W	W / 2	M	Mo	Ho	φD0	φd	t	Δh
Dimensions (mm)	12.7	12.7	3.85	6.35	5.0	18.0	9.0	13.0	1.5	16.0	4.0	0.5	0.6	0
	±1	±0.3	±0.7	±1.3	+0.8 -0.2	+1.0 -0.5	±0.5	±1	±1.5	min.	±0.2	±0.05	±0.2	±2

THC Series Surface Mount Device (Down sized)



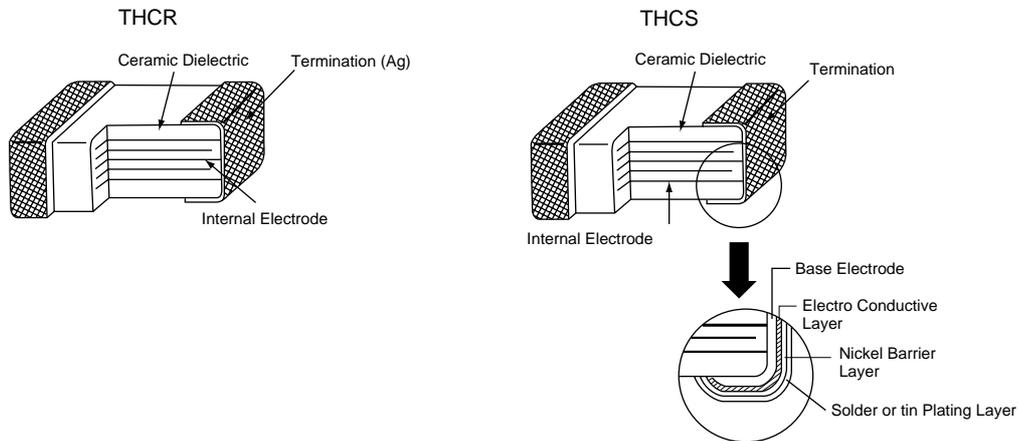
◆FEATURES

1. Small in size and wide capacitance range.
2. Temperature characteristic is Y5U in EIA code.
Small temperature and DC bias dependency of capacitance.
3. Superior humidity characteristic and long life.
4. Excellent high frequency characteristic due to low ESR.
5. High rated ripple current.
6. Two types of terminal electrodes are available.
Silver for reflow soldering and solder or tin plating for flow and reflow soldering.
7. 200V_{dc} items are available.

◆APPLICATIONS

1. Smoothing circuit of small size DC-DC converter.
2. On-board power supply.
3. Noise suppressor for various kinds of equipments.
4. By-pass or decoupling circuits.

◆CONSTRUCTION



◆RATINGS

1. Category Temperature Range	-55 to +125°C
2. Rated Voltage Range	25, 50, 100, 200V _{dc}
3. Rated Capacitance Range	0.047 to 47μF
4. Rated Capacitance Tolerance	M (±20%), Z (±80%)
5. Temperature Characteristics	E (JIS) ≒ Y5U (EIA)
6. Rated Ripple Current	See No.5 on the following table

◆SPECIFICATIONS

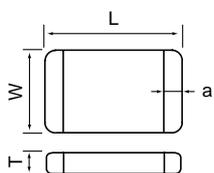
No.	Items	Specification	Test Condition														
1	Withstand Voltage	No abnormality.	250% of rated voltage shall be applied for 5 seconds.														
2	Insulation Resistance	1000/C _R (MΩ) or 10000(MΩ) whichever is less.	Rated voltage shall be applied for 60±5 seconds at temperature 20±2°C.														
3	Rated Capacitance	Within specified tolerance.	Temperature : 20±2°C Frequency : 1±0.1kHz Voltage : 1±0.2V _{rms}														
4	Dissipation Factor	5.0% maximum.	Temperature : 20±2°C Frequency : 1±0.1kHz Voltage : 1±0.2V _{rms}														
5	Rated Ripple Current	<table border="1"> <tr> <td>Size code</td> <td>20</td> <td>30</td> <td>40</td> <td>50</td> <td>60</td> <td>70</td> </tr> <tr> <td>Arms</td> <td>0.2</td> <td>0.3</td> <td>0.5</td> <td>1.0</td> <td>2.0</td> <td>3.0</td> </tr> </table>	Size code	20	30	40	50	60	70	Arms	0.2	0.3	0.5	1.0	2.0	3.0	10kHz~1MHz (sine curve) Ripple voltage V _p shall be less than the rated voltage.
Size code	20	30	40	50	60	70											
Arms	0.2	0.3	0.5	1.0	2.0	3.0											

◆SPECIFICATIONS

No.	Items	Specification	Test Condition															
6	Adhesion	No visible damage.	<p>Substrate 5N (0.51kgf) for 10±1 seconds Capacitor</p>															
7	Bend strength of the face plating	Appearance : No visible damage. ΔC/C : ±15%	<p>The substrate shall be bend by 1mm at a rate of 1mm/s for 5 seconds.</p> <p>Press Press bar Substrate Capacitor Support 1.0mm 45±2mm 45±2mm</p>															
8	Solderability	Min. 75% of surface of the termination shall be covered with new solder	<p>Solder Temperature : 235±5°C Dipping Time : 2±0.5 sec. Solder : Eutectic solder containing Ag2.5 to 3wt%</p>															
9	Resistance to Soldering Heat	Appearance : No visible damage. ΔC/C : ±15% D.F. : To meet the initial specification. I.R. : To meet the initial specification. Withstand voltage : No abnormality.	<p>Solder Temperature : 260±5°C Dipping Time : 2±0.5 seconds Solder : Eutectic solder containing Ag2.5 to 3wt%</p>															
10	Temperature Cycle	Appearance : No visible damage. ΔC/C : ±15% D.F. : To meet the initial specification. I.R. : To meet the initial specification. Withstand voltage : No abnormality.	<table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>(min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. Category temperature ±3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>3 max.</td> </tr> <tr> <td>3</td> <td>Max. Category temperature ±2</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>3 max.</td> </tr> </tbody> </table> <p>For 5 cycles for above temperature cycle.</p>	Step	Temperature (°C)	(min.)	1	Min. Category temperature ±3	30±3	2	Room temperature	3 max.	3	Max. Category temperature ±2	30±3	4	Room temperature	3 max.
Step	Temperature (°C)	(min.)																
1	Min. Category temperature ±3	30±3																
2	Room temperature	3 max.																
3	Max. Category temperature ±2	30±3																
4	Room temperature	3 max.																
11	Humidity Load Life	Appearance : No abnormality. ΔC/C : ±20% D.F. : 7% maximum I.R. : 50/C _R (MΩ) or 1000(MΩ) whichever is less. Withstand voltage : No abnormality.	<p>Temperature : 40±2°C Humidity : 90 to 95%RH Voltage : Rated voltage Time : 500±²⁴₀hours</p>															
12	Endurance	Appearance : No abnormality. ΔC/C : ±20% D.F. : 7% maximum I.R. : 100/C _R (MΩ) or 1000(MΩ) whichever is less. Withstand voltage : No abnormality.	<p>Temperature : 85±2°C Voltage : 200% of rated voltage. Time : 1000±⁴⁸₀hours</p> <p>Temperature : 125±3°C Voltage : Rated voltage Time : 1000±⁴⁸₀hours</p>															

*C_R : Rated Capacitance(μF)

◆DIMENSIONS



Size Code	Dimensions (mm)			
	L	W	T max.	a
20	2.0±0.2	1.25±0.2	1.25	0.3±0.2
30	3.2±0.2	1.6±0.2	1.6	0.5±0.3
40	3.2±0.2	2.5±0.2	2.0 or 2.5	0.6±0.3
50	4.5±0.3	3.2±0.2	2.2 or 3.0	0.6±0.3
60	5.7±0.4	5.0±0.4	2.2 or 3.0	0.8±0.5
70	7.5±0.5	6.3±0.5	2.5 or 3.0	0.8±0.5



MULTILAYER CERAMIC CHIP CAPACITORS

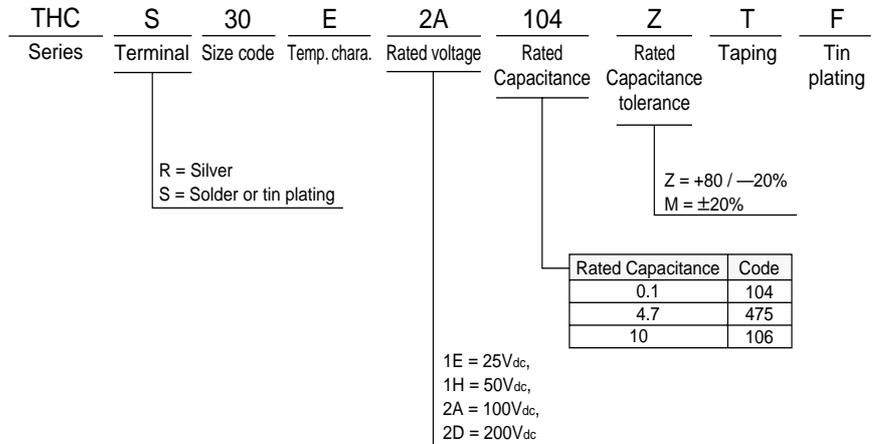
THC Series

◆STANDARD RATING

μF \ V _{dc}	25	50	100	200
0.047			20	30
0.068			20	30
0.1		20	30	40
0.15		20	30	40
0.22		20	30	40
0.33	20	30	40	50
0.47	20	30	40	50
0.68	20	30	40	60
1.0	30	40	50	60
1.5	30	40	50	70
2.2	30	40	50	70
3.3	40	50	60	
4.7	40	50	60	
6.8	50	60	70	
10	50	60		
15	50	60		
22	60	70		
33	60			
47	70			

*A code in the table represents size code.

◆PART NUMBERING SYSTEM



◆THC SERIES STANDARD RATINGS

Part Number	Rated voltage (V _{dc})	Rated Capacitance (μF)	Dimensions (mm)			
			L	W	Tmax.	a
THC○20E1E334□ THC○20E1E474□ THC○20E1E684□	25	0.33	2.0±0.2	1.25±0.2	1.25	0.3±0.2
0.47						
0.68						
THC○30E1E105□ THC○30E1E155□ THC○30E1E225□		3.2±0.2	1.0	1.6±0.2	1.6	0.5±0.3
1.5						
2.2						
THC○40E1E335□ THC○40E1E475□		3.2±0.2	3.3	2.5±0.2	2.0	0.6±0.3
4.7						
6.8						
THC○50E1E685□ THC○50E1E106□ THC○50E1E156□		4.5±0.3	10	3.2±0.2	2.2	0.6±0.3
15						
3.0						
THC○60E1E226□ THC○60E1E336□		5.7±0.4	22	5.0±0.4	2.2	0.8±0.5
33						
3.0						
THC○70E1E476□	7.5±0.5	47	6.3±0.5	3.0	0.8±0.5	
THC○20E1H104□ THC○20E1H154□ THC○20E1H224□	50	0.1	2.0±0.2	1.25±0.2	1.25	0.3±0.2
0.15						
0.22						
THC○30E1H334□ THC○30E1H474□ THC○30E1H684□		3.2±0.2	0.33	1.6±0.2	1.6	0.5±0.3
0.47						
0.68						
THC○40E1H105□ THC○40E1H155□ THC○40E1H225□		3.2±0.2	1.0	2.5±0.2	2.0	0.6±0.3
1.5						
2.2						
THC○50E1H335□ THC○50E1H475□		4.5±0.3	3.3	3.2±0.2	2.2	0.6±0.3
4.7						
3.0						
THC○60E1H685□ THC○60E1H106□ THC○60E1H156□		5.7±0.4	6.8	5.0±0.4	2.2	0.8±0.5
10						
15						
THC○70E1H226□	7.5±0.5	22	6.3±0.5	2.5	0.8±0.5	
THC○20E2A473□ THC○20E2A683□	100	0.047	2.0±0.2	1.25±0.2	1.25	0.3±0.2
0.068						
0.1						
THC○30E2A104□ THC○30E2A154□ THC○30E2A224□		3.2±0.2	0.15	1.6±0.2	1.6	0.5±0.3
0.22						
0.33						
THC○40E2A334□ THC○40E2A474□ THC○40E2A684□		3.2±0.2	0.47	2.5±0.2	2.0	0.6±0.3
0.68						
2.5						
THC○50E2A105□ THC○50E2A155□ THC○50E2A225□		4.5±0.3	1.0	3.2±0.2	2.2	0.6±0.3
1.5						
3.0						
THC○60E2A335□ THC○60E2A475□		5.7±0.4	3.3	5.0±0.4	2.2	0.8±0.5
4.7						
3.0						
THC○70E2A685□	7.5±0.5	6.8	6.3±0.5	3.0	0.8±0.5	
THC○30E2D473□ THC○30E2D683□	200	0.047	3.2±0.2	1.6±0.2	1.6	0.5±0.3
0.068						
0.1						
THC○40E2D104□ THC○40E2D154□ THC○40E2D224□		3.2±0.2	0.15	2.5±0.2	2.0	0.6±0.3
0.22						
2.5						
THC○50E2D334□ THC○50E2D474□		4.5±0.3	0.33	3.2±0.2	2.2	0.6±0.3
0.47						
3.0						
THC○60E2D684□ THC○60E2D105□		5.7±0.4	0.68	5.0±0.4	2.2	0.8±0.5
1.0						
3.0						
THC○70E2D155□ THC○70E2D225□		7.5±0.5	1.5	6.3±0.5	2.5	0.8±0.5
2.2						
3.0						

*Specify R (Silver Termination) or S (Plating Termination) in ○.

Specify M or Z in □.

THCS60 and THCS70 sizes are for reflow soldering use only.



METAL CAP TYPE MULTILAYER CERAMIC CAPACITORS

THP Series

Metal Cap Type Surface Mount Device (Down sized)

◆FEATURES

1. Small mounting area.
2. Small in size and large capacitance. (maximum 100μF)
3. High rated ripple current.
4. Excellent temperature cycle durability and most suitable for aluminum substrate.
5. Y5U temperature characteristics.
6. Excellent high frequency characteristics.
7. 200V_{dc} items are available.
8. For reflow soldering use.



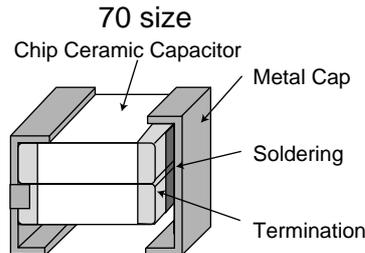
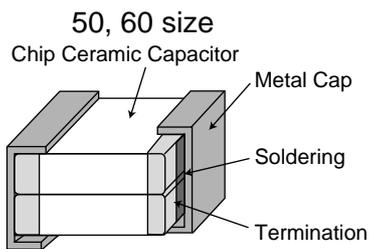
◆APPLICATIONS

1. Smoothing circuit of switching mode AC-DC or DC-DC converter.
2. On-board power supply.
3. Noise suppressor for various kinds of equipments.

◆CUSTOM MADE PRODUCTS

We can offer custom made one element metal cap type capacitors for request of customers.
Please contact us if you have questions for details.

◆CONSTRUCTION



◆RATINGS

1. Category Temperature Range	-55~+125°C
2. Rated Voltage Range	25, 50, 100, 200V _{dc}
3. Rated Capacitance Range	0.45 to 100μF
4. Rated Capacitance Tolerance	M(±20%), Z(±80%)
5. Temperature Characteristics	E(JIS)≒Y5U(EIA)
6. Rated Ripple Current	See No.5 on the following table

◆SPECIFICATIONS

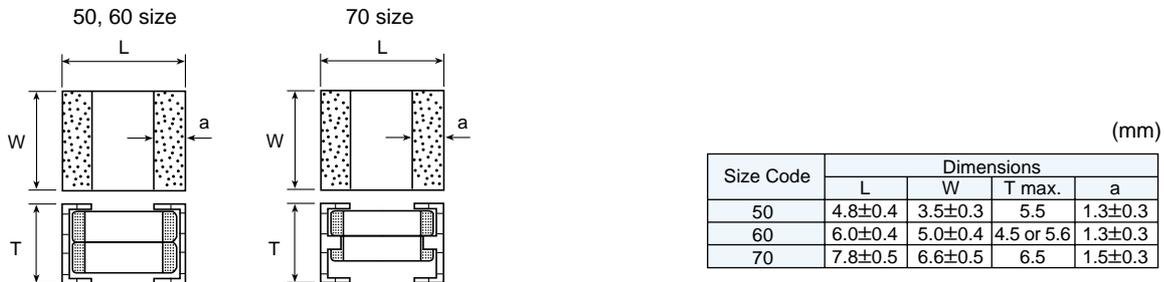
No.	Items	Specification	Test Condition								
1	Withstand Voltage	No abnormality.	250% of rated voltage shall be applied for 5 seconds.								
2	Insulation Resistance	1000/C _R (MΩ) or 10000(MΩ) whichever is less.	Rated voltage shall be applied for 60±5 seconds at temperature 20±2°C.								
3	Rated Capacitance	Within specified tolerance.	Temperature : 20±2°C Frequency : 1±0.1kHz Voltage : 1±0.2V _{rms}								
4	Dissipation Factor	5.0% maximum	Temperature : 20±2°C Frequency : 1±0.1kHz Voltage : 1±0.2V _{rms}								
5	Rated Ripple Current	<table border="1"> <tr> <td>Size</td> <td>50</td> <td>60</td> <td>70</td> </tr> <tr> <td>Arms</td> <td>1.5</td> <td>3.0</td> <td>4.0</td> </tr> </table>	Size	50	60	70	Arms	1.5	3.0	4.0	10kHz~1MHz (sine curve) Ripple voltage V _p shall be less than the rated voltage.
Size	50	60	70								
Arms	1.5	3.0	4.0								

◆SPECIFICATIONS

No.	Items	Specification	Test Condition															
6	Temperature Cycle	Appearance : No visible damage. ΔC/C : ±15% D.F. : To meet the initial specification. I.R. : To meet the initial specification. Withstand voltage : No abnormality.	<table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>(min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. Category temperature ±3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>3 max.</td> </tr> <tr> <td>3</td> <td>Max. Category temperature ±2</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>3 max.</td> </tr> </tbody> </table>	Step	Temperature (°C)	(min.)	1	Min. Category temperature ±3	30±3	2	Room temperature	3 max.	3	Max. Category temperature ±2	30±3	4	Room temperature	3 max.
			Step	Temperature (°C)	(min.)													
1	Min. Category temperature ±3	30±3																
2	Room temperature	3 max.																
3	Max. Category temperature ±2	30±3																
4	Room temperature	3 max.																
			For 100 cycles for above temperature cycle.															
7	Humidity Load Life	Appearance : No abnormality. ΔC/C : ±20% D.F. : 7% max. I.R. : 50/C _R (MΩ) or 1000(MΩ) whichever is less. Withstand voltage : No abnormality.	Temperature : 40±2°C Humidity : 90 to 95%RH Voltage : Rated voltage Time : 500± ²⁴ ₀ hours															
8	Endurance	Appearance : No abnormality. ΔC/C : ±20% D.F. : 7% max. I.R. : 100/C _R (MΩ) or 1000(MΩ) whichever is less. Withstand voltage : No abnormality.	Temperature : 85±2°C Voltage : 200% of rated voltage. Time : 1000± ⁴⁸ ₀ hours															
			Temperature : 125±3°C Voltage : Rated voltage Time : 1000± ⁴⁸ ₀ hours															

*C_R : Rated Capacitance(μF)

◆DIMENSIONS



◆PART NUMBERING SYSTEM

THP	70	E	1E	107	Z	T	002								
Series	Size code	Temp. chara.	Rated voltage	Rated capacitance	Rated capacitance tolerance	Taping	Design code								
			<p>1E = 25V_{dc}, 1H = 50V_{dc}, 2A = 100V_{dc}, 2D = 200V_{dc}</p>		<p>Z = +80 / -20%, M = ±20%</p> <table border="1"> <thead> <tr> <th>Rated Capacitance</th> <th>Code</th> </tr> </thead> <tbody> <tr> <td>2.2</td> <td>225</td> </tr> <tr> <td>47</td> <td>476</td> </tr> <tr> <td>100</td> <td>107</td> </tr> </tbody> </table>			Rated Capacitance	Code	2.2	225	47	476	100	107
Rated Capacitance	Code														
2.2	225														
47	476														
100	107														

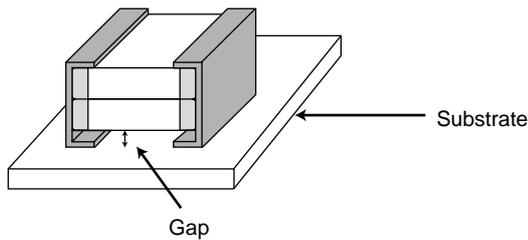
◆STANDARD RATING

μF \ V_{dc}	25	50	100	200
0.45				50
0.68				50
1.0				50
1.5			50	60
2.0 or 2.2			50	60
3.0 or 3.3			50	70
4.5 or 4.7		50	60	70
6.8		50	60	
10		60	60	
15	50	60	70	
20 or 22	50	60		
33	60	70		
47	60	70		
68	60			
100	70			

*A code in the table represents size code.

◆Note of mountig for THP series.

1. The face of wider gap between a capacitor and a substrate shall be the mounting face.
2. To prevent degradation of heat cycling capability, if need to be careful about amount of solder that would not go into the inner side of terminations.



◆THP SERIES STANDARD RATINGS

Part Number	Rated voltage (V_{dc})	Rated Capacitance (μF)	Dimensions (mm)				
			L	W	T	a	
THP50E1E156□002 THP50E1E206□002	25	15	4.8±0.4	3.5±0.3	5.5	1.3±0.3	
THP60E1E336□002 THP60E1E476□002 THP60E1E686□002		33 47 68			6.0±0.4		5.0±0.4
THP70E1E107□002		100	7.8±0.5	6.6±0.5	6.5	1.5±0.3	
THP50E1H455□002 THP50E1H685□002		50	4.5 6.8	4.8±0.4	3.5±0.3	5.5	1.3±0.3
THP60E1H106□002 THP60E1H156□002 THP60E1H226□002			10 15 22			6.0±0.4	
THP70E1H336□002 THP70E1H476□002	33 47		7.8±0.5	6.6±0.5	6.5	1.5±0.3	
THP50E2A155□002 THP50E2A205□002 THP50E2A305□002	100		1.5 2.0 3.0	4.8±0.4	3.5±0.3	5.5	1.3±0.3
THP60E2A475□002 THP60E2A685□002 THP60E2A106□002			4.7 6.8 10			6.0±0.4	
THP70E2A156□002		15	7.8±0.5	6.6±0.5	6.5	1.5±0.3	
THP50E2D454□002 THP50E2D684□002 THP50E2D105□002		200	0.45 0.68 1.0	4.8±0.4	3.5±0.3	5.5	1.3±0.3
THP60E2D155□002 THP60E2D225□002			1.5 2.2			6.0±0.4	
THP70E2D335□002 THP70E2D475□002	3.3 4.7		7.8±0.5	6.6±0.5	6.5	1.5±0.3	

*Specify M or Z in □.



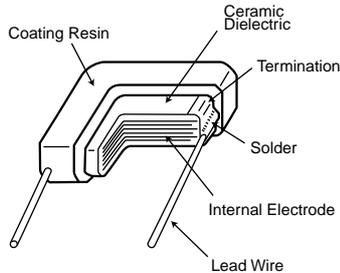
◆FEATURES

1. Small in size and wide capacitance range.
Max. 470 μ F is available.
2. Temperature characteristic is Y5U in EIA code.
Small temperature and DC bias dependency of capacitance.
3. Superior humidity characteristic and long life.
4. Excellent high frequency characteristic due to low ESR.
5. High rated ripple current.
6. 250V_{dc} items are available.
7. Resin(UL94 V-0) used for coating.

◆APPLICATIONS

1. Smoothing circuit of switching mode AC-DC or DC-DC converter.
2. Noise suppressor for various kinds of equipments.
3. By-pass or decoupling circuits.
4. Automotive equipments.

◆CONSTRUCTION



◆RATINGS

1. Category Temperature Range	-55 to +125°C
2. Rated Voltage Range	25, 50, 100, 250 V _{dc}
3. Rated Capacitance Range	0.1 to 470 μ F
4. Rated Capacitance Tolerance	M(\pm 20%), Z(\pm 20%)
5. Temperature Characteristics	E(JIS) \approx Y5U(EIA)
6. Rated Ripple Current	See No.5 on the following table

◆SPECIFICATIONS

No.	Items	Specification	Test Condition
1	Withstand Voltage Between Terminals Terminals to Coating Resin	No abnormality.	250% of rated voltage shall be applied for 5 seconds.
2	Insulation Resistance	1000/C _R (M Ω) or 10000(M Ω) whichever is less.	Rated voltage shall be applied for 60 \pm 5 seconds at temperature 20 \pm 2°C.
3	Rated Capacitance	Within specified tolerance.	Temperature : 20 \pm 2°C Frequency : 1 \pm 0.1kHz(\geq 100 μ F, 120Hz) Voltage : 1 \pm 0.2V _{rms}
4	Dissipation Factor	5.0% maximum.	Temperature : 20 \pm 2°C Frequency : 1 \pm 0.1kHz(\geq 100 μ F, 120Hz) Voltage : 1 \pm 0.2V _{rms}

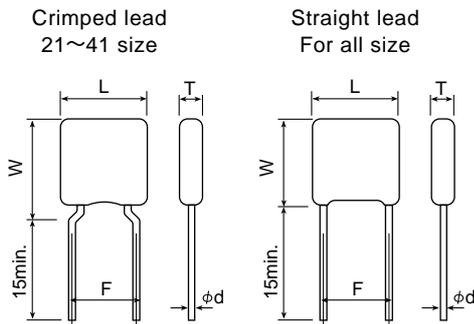
◆THD SERIES STANDARD RATINGS

Part Number	Rated voltage (V _{dc})	Rated Capacitance (μF)	Dimensions (mm)					
			Lmax.	Wmax.	Tmax.	F±0.8	φ±0.05	
THD21E1E335 □ THD21E1E475 □	25	3.3 4.7	5.0	6.5	3.0 3.5	5.0	0.5	
THD30E1E685 □ THD30E1E106 □ THD30E1E156 □		6.8 10 15			6.5 7.0			3.5 4.0
THD31E1E226 □ THD31E1E336 □		22 33	7.5 9.0	4.0 4.5	5.0	0.5		
THD41E1E476 □ THD51E1E686 □ THD51E1E107 □		47 68 100	10.0 13.5 15.0	4.5 5.0	5.0	0.5 0.6		
THD60E1E157 □ THD60E1E227 □ THD61E1E337 □ THD61E1E477 □		150 220 330 470	22.5 20.0 28.5	20.0 6.0 7.5	20.0 25.0	0.8 0.8		
THD21E1H105 □ THD21E1H155 □ THD21E1H225 □		50	1.0 1.5 2.2	5.0	6.5	3.0 3.5	5.0	0.5
THD30E1H335 □ THD30E1H475 □			3.3 4.7			6.5 7.0		
THD31E1H685 □ THD31E1H106 □ THD31E1H156 □			6.8 10 15	7.5 9.0	4.0 4.5	5.0	0.5	
THD41E1H226 □ THD51E1H336 □ THD60E1H476 □ THD60E1H686 □ THD60E1H107 □			22 33 47 68 100	10.0 13.5 22.5 20.0	4.5 5.0 6.0	5.0 10.0 20.0	0.5 0.6 0.8	
THD61E1H157 □ THD61E1H227 □			150 220	28.5 20.0	7.5	25.0	0.8	

Part Number	Rated voltage (V _{dc})	Rated Capacitance (μF)	Dimensions (mm)					
			Lmax.	Wmax.	Tmax.	F±0.8	φ±0.05	
THD21E2A334 □ THD21E2A474 □ THD21E2A684 □	100	0.33 0.47 0.68	5.0	6.5	3.0 3.5	5.0	0.5	
THD30E2A105 □ THD30E2A155 □ THD30E2A225 □		1.0 1.5 2.2			6.5 7.0			3.5 4.0
THD31E2A335 □ THD31E2A475 □ THD41E2A685 □ THD51E2A106 □ THD51E2A156 □		3.3 4.7 6.8 10 15	7.5 9.0 10.0 13.5 15.0	4.0 4.5	5.0	0.5 0.6		
THD60E2A226 □ THD60E2A336 □ THD61E2A476 □ THD61E2A686 □ THD61E2A107 □		22 33 47 68 100	22.5 20.0 28.5	20.0 6.0 7.5	20.0 25.0	0.8 0.8		
THD30E2E104 □ THD30E2E154 □ THD30E2E224 □ THD30E2E334 □ THD31E2E474 □ THD31E2E684 □		250	0.1 0.15 0.22 0.33	6.5	7.0	3.5 4.0	5.0	0.5
THD41E2E105 □ THD41E2E155 □ THD51E2E225 □ THD60E2E335 □ THD60E2E475 □ THD61E2E685 □ THD61E2E106 □ THD61E2E156 □			0.47 0.68 1.0 1.5 2.2 3.3 4.7 6.8 10 15			7.5 9.0 10.0 11.5 13.5 22.5 20.0 28.5		

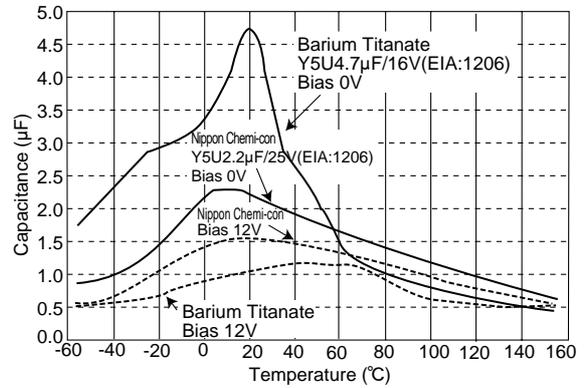
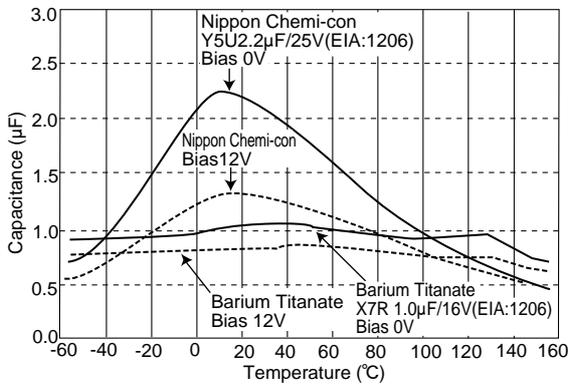
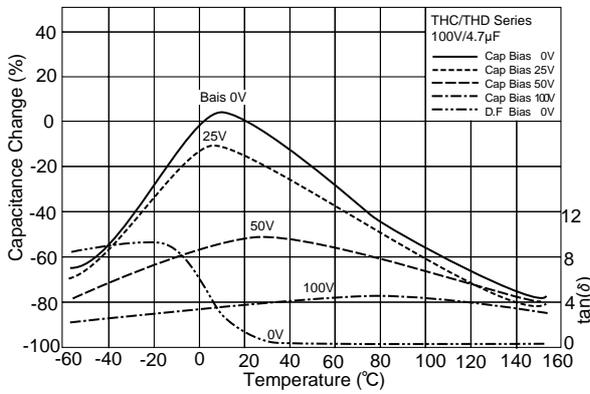
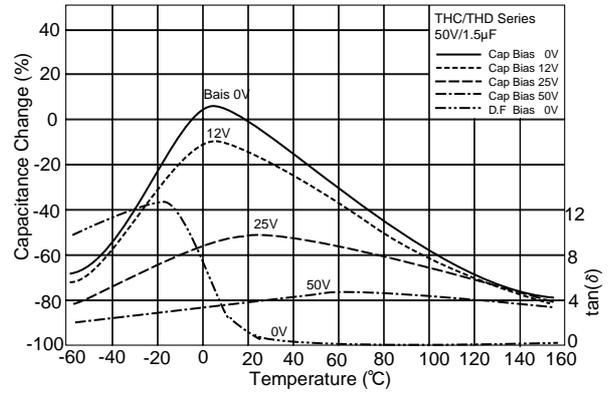
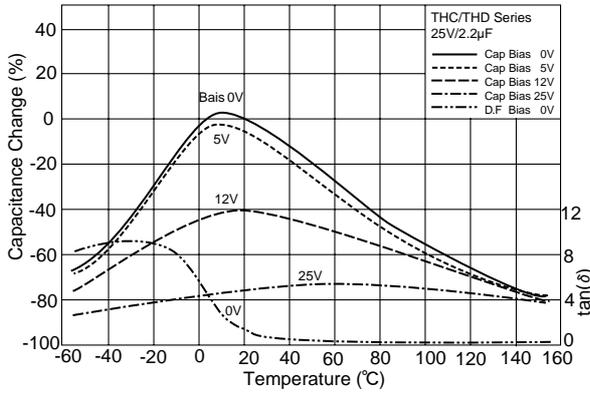
*Specify M or Z in □.

◆DIMENSIONS (mm)



◆THD/THC/THP SERIES

●Temperature and DC voltage Characteristics



●Frequency Characteristics

