



# MULTILAYER CERAMIC CHIP CAPACITORS

## THC Series / TMC Series (High Reliability)



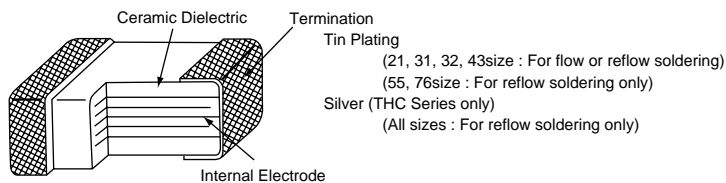
### ◆FEATURES

1. Small size and large capacitance, high ripple current.
2. Temperature characteristic is Y5U in EIA code.
3. Superior humidity characteristic and long life.
4. Excellent noise absorption.

### ◆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 <sub>dc</sub>
3. Rated Capacitance Range	0.047 to 47μF
4. Rated Capacitance Tolerance	M (±20%) , Z (±20%)
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 <sub>R</sub> (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 <sub>rms</sub>														
4	Dissipation Factor	5.0% maximum.	Temperature : 20±2°C Frequency : 1±0.1kHz Voltage : 1±0.2V <sub>rms</sub>														
5	Rated Ripple Current	<table border="1"> <tr> <td>Size code</td> <td>21</td> <td>31</td> <td>32</td> <td>43</td> <td>55</td> <td>76</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	21	31	32	43	55	76	Arms	0.2	0.3	0.5	1.0	2.0	3.0	10kHz~1MHz (sine curve) Ripple voltage V <sub>p</sub> shall be less than the rated voltage.
Size code	21	31	32	43	55	76											
Arms	0.2	0.3	0.5	1.0	2.0	3.0											

### ◆SPECIFICATIONS

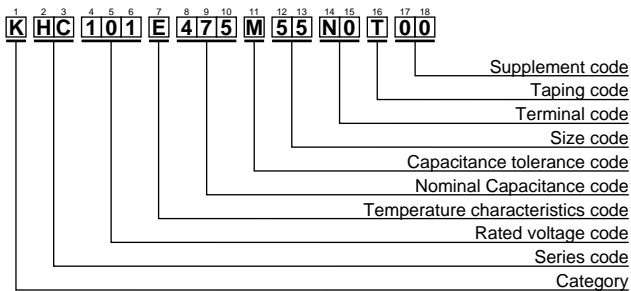
No.	Items	Specification	Test Condition															
6	Adhesion	No visible damage.	<p>Substrate 5N (0.51kgf) for 10±1 seconds Capacitor</p>															
7	Bend strength of the face plating	Appearance : No visible damage. $\Delta C/C : \pm 15\%$	<p>The substrate shall be bend by 1mm at a rate of 1mm/s for 5 seconds.</p> <p>Press Press bar Capacitor Substrate 1.0mm Support 45±2mm 45±2mm</p>															
8	Solderability	Min. 75% of surface of the termination shall be covered with new solder	<table border="1"> <thead> <tr> <th>Solder</th> <th>Pb Free</th> <th>Eutectic</th> </tr> </thead> <tbody> <tr> <td>Solder Temperature</td> <td>245±5°C</td> <td>235±5°C</td> </tr> <tr> <td>Dipping Time</td> <td colspan="2">2±0.5sec.</td> </tr> </tbody> </table>	Solder	Pb Free	Eutectic	Solder Temperature	245±5°C	235±5°C	Dipping Time	2±0.5sec.							
Solder	Pb Free	Eutectic																
Solder Temperature	245±5°C	235±5°C																
Dipping Time	2±0.5sec.																	
9	Resistance to Soldering Heat	Appearance : No visible damage. $\Delta C/C : \pm 15\%$ D.F. : To meet the initial specification. I.R. : To meet the initial specification.	<p>Solder Temperature : 260±5°C Dipping Time : 2±0.5 seconds</p>															
10	Temperature Cycle	Appearance : No visible damage. $\Delta C/C : \pm 15\%$ D.F. : To meet the initial specification. I.R. : To meet the initial specification.	<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 ±3</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>3 max.</td> </tr> </tbody> </table> <p>&lt;Cycle&gt; THC series : 5 cycles TMC series : 100 cycles</p>	Step	Temperature (°C)	(min.)	1	Min. Category temperature ±3	30±3	2	Room temperature	3 max.	3	Max. Category temperature ±3	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 ±3	30±3																
4	Room temperature	3 max.																
11	Humidity Load Life	Appearance : No abnormality. $\Delta C/C : \pm 20\%$ D.F. : 7% maximum I.R. : 50/C <sub>R</sub> (MΩ) or 1000(MΩ) whichever is less.	<p>Temperature : 40±2°C Humidity : 90 to 95%RH Voltage : Rated voltage Time : 500±<sup>24</sup><sub>0</sub>hours</p>															
12	Endurance	Appearance : No abnormality. $\Delta C/C : \pm 20\%$ D.F. : 7% maximum I.R. : 100/C <sub>R</sub> (MΩ) or 1000(MΩ) whichever is less.	<p>Temperature : 85±2°C Voltage : 200% of rated voltage. Time : 1000±<sup>48</sup><sub>0</sub>hours</p>															
			<p>Temperature : 125±3°C Voltage : Rated voltage Time : 1000±<sup>48</sup><sub>0</sub>hours</p>															

\*C<sub>R</sub> : Rated Capacitance(μF)

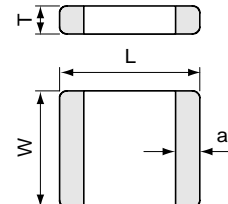
## ◆STANDARD RATINGS

Rated voltage (Vdc)	Rated Capacitance (μF)	Dimensions(mm)				Maximum ripple current (Arms)	Part Number	Previous Part Number (Just for your reference)	
		L	W	Tmax.	a				
25	0.33	2.0±0.2	1.25±0.2	1.25	0.3±0.2	0.2	KHC250E334M21N0T00	THCS20E1E334MTF	
	0.47						KHC250E474M21N0T00	THCS20E1E474MTF	
	0.68						KHC250E684M21N0T00	THCS20E1E684MTF	
	1.0	3.2±0.2	1.6±0.2	1.6	0.5±0.3	0.3	KHC250E105M31N0T00	THCS30E1E105MTF	
	1.5						KHC250E155M31N0T00	THCS30E1E155MTF	
	2.2						KHC250E225M31N0T00	THCS30E1E225MTF	
	3.3	3.2±0.2	2.5±0.2	2.0	0.6±0.3	0.5	KHC250E335M32N0T00	THCS40E1E335MTF	
	4.7						KHC250E475M32N0T00	THCS40E1E475MTF	
	6.8						KHC250E685M43N0T00	THCS50E1E685MTF	
	10	4.5±0.3	3.2±0.2	2.2	0.6±0.3	1.0	KHC250E106M43N0T00	THCS50E1E106MTF	
	15			3.0			KHC250E156M43N0T00	THCS50E1E156MTF	
	22			2.2			KHC250E226M55N0T00	THCS60E1E226MTF	
	33	5.7±0.4	5.0±0.4	3.0	0.8±0.5	2.0	KHC250E336M55N0T00	THCS60E1E336MTF	
	47			3.0			KHC250E476M76N0T00	THCS70E1E476MTF	
6.8	2.2			KHC250E685M55N0T00			THCS60E1H685MTF		
50	0.1	2.0±0.2	1.25±0.2	1.25	0.3±0.2	0.2	KHC500E104M21N0T00	THCS20E1H104MTF	
	0.15						KHC500E154M21N0T00	THCS20E1H154MTF	
	0.22						KHC500E224M21N0T00	THCS20E1H224MTF	
	0.33	3.2±0.2	1.6±0.2	1.6	0.5±0.3	0.3	KHC500E334M31N0T00	THCS30E1H334MTF	
	0.47						KHC500E474M31N0T00	THCS30E1H474MTF	
	0.68						KHC500E684M31N0T00	THCS30E1H684MTF	
	1.0	3.2±0.2	2.5±0.2	2.0	0.6±0.3	0.5	KHC500E105M32N0T00	THCS40E1H105MTF	
	1.5						KHC500E155M32N0T00	THCS40E1H155MTF	
	2.2						KHC500E225M32N0T00	THCS40E1H225MTF	
	3.3	4.5±0.3	3.2±0.2	2.2	0.6±0.3	1.0	KHC500E335M43N0T00	THCS50E1H335MTF	
	4.7			3.0			KHC500E475M43N0T00	THCS50E1H475MTF	
	6.8			2.2			KHC500E685M55N0T00	THCS60E1H685MTF	
	10	5.7±0.4	5.0±0.4	3.0	0.8±0.5	2.0	KHC500E106M55N0T00	THCS60E1H106MTF	
	15			3.0			KHC500E156M55N0T00	THCS60E1H156MTF	
22	2.5			KHC500E226M76N0T00			THCS70E1H226MTF		
100	0.047	2.0±0.2	1.25±0.2	1.25	0.3±0.2	0.2	KHC101E473M21N0T00	THCS20E2A473MTF	
	0.068						KHC101E683M21N0T00	THCS20E2A683MTF	
	0.1						KHC101E104M31N0T00	THCS30E2A104MTF	
	0.15	3.2±0.2	1.6±0.2	1.6	0.5±0.3	0.3	KHC101E154M31N0T00	THCS30E2A154MTF	
	0.22						KHC101E224M31N0T00	THCS30E2A224MTF	
	0.33						KHC101E334M32N0T00	THCS40E2A334MTF	
	0.47	3.2±0.2	2.5±0.2	2.0	0.6±0.3	0.5	KHC101E474M32N0T00	THCS40E2A474MTF	
	0.68						2.5	KHC101E684M32N0T00	THCS40E2A684MTF
	1.0						KHC101E105M43N0T00	THCS50E2A105MTF	
	1.5	4.5±0.3	3.2±0.2	2.2	0.6±0.3	1.0	KHC101E155M43N0T00	THCS50E2A155MTF	
	2.2			3.0			KHC101E225M43N0T00	THCS50E2A225MTF	
	3.3			2.2			KHC101E335M55N0T00	THCS60E2A335MTF	
	4.7	5.7±0.4	5.0±0.4	3.0	0.8±0.5	2.0	KHC101E475M55N0T00	THCS60E2A475MTF	
	6.8			3.0			KHC101E685M76N0T00	THCS70E2A685MTF	
10	2.2			KHC101E685M76N0T00			THCS70E2A685MTF		
200	0.047	3.2±0.2	1.6±0.2	1.6	0.5±0.3	0.3	KHC201E473M31N0T00	THCS30E2D473MTF	
	0.068						KHC201E683M31N0T00	THCS30E2D683MTF	
	0.1						KHC201E104M32N0T00	THCS40E2D104MTF	
	0.15	3.2±0.2	2.5±0.2	2.0	0.6±0.3	0.5	KHC201E154M32N0T00	THCS40E2D154MTF	
	0.22						2.5	KHC201E224M32N0T00	THCS40E2D224MTF
	0.33						2.2	KHC201E334M43N0T00	THCS50E2D334MTF
	0.47	4.5±0.3	3.2±0.2	3.0	0.6±0.3	1.0	KHC201E474M43N0T00	THCS50E2D474MTF	
	0.68			2.2			KHC201E684M55N0T00	THCS60E2D684MTF	
	1.0			3.0			KHC201E105M55N0T00	THCS60E2D105MTF	
	1.5	5.7±0.4	5.0±0.4	2.5	0.8±0.5	2.0	KHC201E475M55N0T00	THCS60E2A475MTF	
	2.2			3.0			KHC201E685M76N0T00	THCS70E2D685MTF	
	3.3			2.2			KHC201E225M76N0T00	THCS70E2D225MTF	

## ◆PART NUMBERING SYSTEM



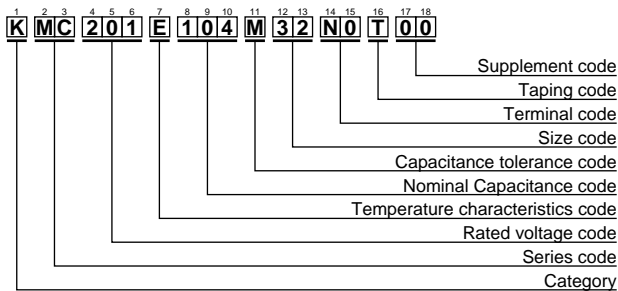
## ◆DIMENSIONS



### ◆STANDARD RATINGS

Rated voltage (Vdc)	Rated Capacitance (μF)	Dimensions(mm)				Maximum ripple current (Arms)	Part Number	Previous Part Number (Just for your reference)						
		L	W	Tmax.	a									
25	0.68	3.2±0.2	1.6±0.2	1.6	0.4±0.2	0.3	KMC250E684M31N0T00	TMCS30E1E684MTF						
	1						KMC250E105M31N0T00	TMCS30E1E105MTF						
	1.5						KMC250E155M31N0T00	TMCS30E1E155MTF						
	2.2						KMC250E225M32N0T00	TMCS40E1E225MTF						
	3.3	3.2±0.2	2.5±0.2	2.2	0.5±0.2		0.5	KMC250E335M32N0T00	TMCS40E1E335MTF					
	4.7							KMC250E475M43N0T00	TMCS50E1E475MTF					
	6.8							4.5±0.3	3.2±0.2	2.5	0.5±0.3	KMC250E685M43N0T00	TMCS50E1E685MTF	
	10											KMC250E106M43N0T00	TMCS50E1E106MTF	
50	0.33	3.2±0.2	1.6±0.2	1.6	0.4±0.2	0.3		KMC500E334M31N0T00	TMCS30E1H334MTF					
	0.47							KMC500E474M31N0T00	TMCS30E1H474MTF					
	0.68							3.2±0.2	2.5±0.2	2.2	0.5±0.2	0.5	KMC500E684M32N0T00	TMCS40E1H684MTF
	1.0												KMC500E105M32N0T00	TMCS40E1H105MTF
	1.5	4.5±0.3	3.2±0.2	2.5	0.5±0.3		1.0	KMC500E155M32N0T00	TMCS40E1H155MTF					
	2.2							KMC500E225M43N0T00	TMCS50E1H225MTF					
	3.3							KMC500E335M43N0T00	TMCS50E1H335MTF					
	4.7							KMC500E475M43N0T00	TMCS50E1H475MTF					
100	0.1	3.2±0.2	1.6±0.2	1.6	0.4±0.2	0.3		KMC101E104M31N0T00	TMCS30E2A104MTF					
	0.15							KMC101E154M31N0T00	TMCS30E2A154MTF					
	0.22							3.2±0.2	2.5±0.2	2.2	0.5±0.2	0.5	KMC101E224M32N0T00	TMCS40E2A224MTF
	0.33												KMC101E334M32N0T00	TMCS40E2A334MTF
	0.47	4.5±0.3	3.2±0.2	2.5	0.5±0.3		1.0	KMC101E474M32N0T00	TMCS40E2A474MTF					
	0.68							KMC101E684M43N0T00	TMCS50E2A684MTF					
	1.0							KMC101E105M43N0T00	TMCS50E2A105MTF					
	1.5							KMC101E155M43N0T00	TMCS50E2A155MTF					
200	0.033	3.2±0.2	1.6±0.2	1.6	0.4±0.2	0.3		KMC201E333M31N0T00	TMCS30E2D333MTF					
	0.047							KMC201E473M31N0T00	TMCS30E2D473MTF					
	0.068							3.2±0.2	2.5±0.2	2.2	0.5±0.2	0.5	KMC201E683M32N0T00	TMCS40E2D683MTF
	0.1												KMC201E104M32N0T00	TMCS40E2D104MTF
	0.15	4.5±0.3	3.2±0.2	2.5	0.5±0.3		1.0	KMC201E154M32N0T00	TMCS40E2D154MTF					
	0.22							KMC201E224M43N0T00	TMCS50E2D224MTF					
	0.33							KMC201E334M43N0T00	TMCS50E2D334MTF					
	0.47							KMC201E474M43N0T00	TMCS50E2D474MTF					

### ◆PART NUMBERING SYSTEM



### ◆DIMENSIONS

