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With the principle of "Quality Parts, Customers Priority, Honest Operation, and Considerate Service", our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip, ALPS, ROHM, Xilinx, Pulse, ON, Everlight and Freescale. Main products comprise IC, Modules, Potentiometer, IC Socket, Relay, Connector. Our parts cover such applications as commercial, industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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# Multi-layer ceramic chip capacitors

# MCH03 (0603 size, chip capacitor)

#### Features

- 1) Small size (0.6 x 0.3 x 0.3 mm) makes it perfect for lightweight portable devices.
- 2) Comes packed either in tape to enable automatic mounting.
- 3) Precise uniformity of shape and dimensions facilitates highly efficient automatic mounting.
- 4) Barrier layer and end terminations to improve solderability.

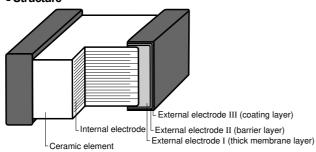
# 0.6±0.03 0.6±0.03 0.6±0.03 0.6±0.03

0.3±0.03

●External dimensions (Units: mm)

0.1Min. 0.17Min.





#### Product designation

- 1 roudet doorgraden										
					Code P	roduct thickness	Pack	aging specifications	Reel	Basic ordening unit (pcs.)
					К	0.3mm	Paper t	ape (width 8 mm, pitch 2 mm)	φ180mm (7in.)	15,000
					Reel (¢1	80, ¢330mm) :	compati	ble with EIAJ ET-7200A		
Part No.					Packa	iging style				
	$\neg$									
			ᅟ		. ———		_	<b>-</b>		
$ \mathbf{M}  \mathbf{C}  $	$\mathbf{H} \cup \mathbf{I}$	n II	3	2     F    N	1  0  2	7	K			
	<u></u> L'	الك	<u> </u>			ا کا ا	1			
			-		. ——					
Rated v	voltage		Capaci	tance-temperature ch	aracteristics	Nominal	Capa	citance tolerance		
Code \	√oltage	Code	Code	Operating temperature (°C)	Temp. coefficient or percent change	capacitance	Code	tolerance		
2	25V	Α	CG(C0G)	<i>−</i> 55~+125	0±30ppm/°C		ပ	± 0.25pF (0.5 ~ 5pF)		
3	16V	CN	R	-55~+125	±15%			± 0.5pF (5.1 ~ 10pF)		
5	50V		В	-25~+85	±10%	3-digit designation	J	± 5% (11pF or more)		
			(X7R)	(-55~+125)	(±15%)	according to IEC	lκ	± 10%		
		FN	F	-25~+85	+30%,-80%			± 10%		
			(Y5V)	(-30~+85)	(+22%,-82%)		Z	+ 80%, –20%		

<sup>\*</sup>The design and specifications are subject to change without prior notice. Before ordering or using, please check the latest technical specification.

# ● Capacitance range

For thermal compensation

For thermal compensation					
Part n	umber	MCH03			
Capacitance (pF)	Temperature characteristics  Rated voltage	(CG) (C0G)			
	Tolerance (V)	25V			
0.5 0.75 1					
1.1 1.2 1.3					
1.5 1.6 1.8	C ( ± 0.25pF)				
2 2.2 2.4					
2.7 3 3.3					
3.6 3.9 4					
4.3 4.7 5					
5.1 5.6 6					
6.2 6.8 7	D ( ± 0.5pF)				
7.5 8 8.2	( = 3.5 p. )				
9 9.1 10					

Part n	Part number		
Capacitance (pF)	Temperature characteristics	A (CG) (C0G)	
Сараспапсе (рг)	Rated voltage (V) Tolerance	25V	
11			
12			
13			
15			
16			
18			
20			
22	I / I F0/ \		
24	J ( ± 5%)		
27			
30			
33			
36			
39			
43			
47			

Product thickness (mm) 0.3±0.03

## High dielectric constant

riigir dicicctiic corist	righ delectric constant				
Part n	umber	MCH03			
Conscitones (nF)	Temperature characteristics	CN (R) (B) (X7R)	FN (F) (Y5V)		
Capacitance (pF)	Rated voltage (V)	25V	25V		
	Tolerance	K ( ±10%)	Z ( +80, -20%)		
100					
150					
200					
330					
470					
680					
1,000					
1,500					
2,200					
4,700					
10,000					

Product thickness (mm) 0.3±0.03

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#### Characteristics

Class 1 (For thermal compensation)

	Temperature characteristics		Test methods/conditions		
Item		A (CG) (C0G)	(based on JIS C 5102)		
Operating temperature		–55°C ∼ 125°C			
Nominal capac	citance (C)	Must be within the specified tolerance range.	Based on paragraph 7.8 and paragraph 9 Measured at room temperature and standard humidity,		
Dissipation factor (tanδ)		100/(400+20C)% or less: Less than 30 pF 0.1% or less : 30 pF or larger	$\begin{array}{c} 1000 \text{pF or less Measurement frequency}: 1\pm 0.1 \text{MHz} \\ \text{Measurement voltage} & :1\pm 0.1 \text{Vrms}. \\ \text{Over } 1000 \text{pF} & \text{Measurement frequency}: 1\pm 0.1 \text{kHz} \\ \text{Measurement voltage} & :1\pm 0.1 \text{Vrms}. \\ \end{array}$		
Insulation resis	stance (IR)	10,000MΩ or 500MΩ $\cdot$ μF, whichever is smaller	Based on paragraph 7.6 Measurement is made after rated voltage is applied for 60 $\pm$ 5s.		
Withstanding v	roltage	The insulation must not be damaged.	Based on paragraph 7.1 Apply 300% of the rated voltage for 1 to 5s then measure.		
Temperature c	haracteristics	Within 0 ± 30ppm/°C	The temperature coefficients in table 12, paragraph 7.12 are calculated at 20°C and high temperature.		
Terminal adher	rence	No detachment or signs of detachment.	Based on paragraph 8.11. 2.  Apply 2N for 10 ± 1s in the direction indicated by the arrow.  Pressure (2)  Capacitor		
	Appearance	There must be no mechanical damage.	Chip is mounted to a board in the manner		
Resistance to vibration	Rate of capacitance change	Must be within initial tolerance.	shown on the right, subjected to vibration (type A in paragraph 8.2) and measured		
	Dissipation factor (tanδ)	Must satisfy initial specified value.	24 ± 2 hrs. later.		
Solderability		At least 3/4 of the surface of the two terminals must be covered with new solder.	Based on paragraph 8.13 Soldering temperature: $235 \pm 5^{\circ}$ C Soldering time : $2 \pm 0.5$ s		
	Appearance	There must be no mechanical damage.			
	Rate of capacitance change	$\pm$ 2.5% or $\pm$ 0.25 pF, whichever is larger.	Based on paragraph 8.14.		
Resistance to soldering	Dissipation factor (tanδ)	Must satisfy initial specified value.	Soldering temperature: 260 ± 5°C Soldering time : 5 ± 0.5s Preheating : 150 ± 10°C for 1 to 2 min		
heat	Insulation resistance	10,000MΩ or 500MΩ $\cdot$ μF, whichever is smaller			
	Withstanding voltage	The insulation must not be damaged.			
	Appearance	There must be no mechanical damage.			
	Rate of capacitance change	$\pm$ 2.5% or $\pm$ 0.25 pF, whichever is larger.	Based on paragraph 9.3		
Temperature cycling	Dissipation factor (tanδ)	Must satisfy initial specified value.	Number of cycles : 5		
	Insulation resistance	10,000MΩ or 500MΩ $\cdot$ μF, whichever is smaller	Capacitance measured after 24 ± 2 hrs.		
	Appearance	There must be no mechanical damage.	Based on paragraph 9.9		
Humidity load test	Rate of capacitance change	$\pm$ 7.5% or $\pm$ 0.75 pF, whichever is larger.	Test temperature: 40 ± 2°C  Relative humidity: 90% to 95%		
	Dissipation factor (tanδ)	0.5% or less	Applied voltage : rated voltage		
	Insulation resistance	500M $\Omega$ or 25M $\Omega \cdot \mu F$ , whichever is smaller	Test time : 500 to 524 hrs. Capacitance measured after 24 ± 2 hrs.		
High- temperature load test	Appearance	There must be no mechanical damage.	Based on paragraph 9.10		
	Rate of capacitance change	$\pm~3.0\%$ or $\pm~0.3$ pF, whichever is larger.	Test temperature: Max. operating temp.		
	Dissipation factor (tanδ)	0.3% or less	Applied voltage : rated voltage × 200% Test time : 1,000 to 1,048 hrs.		
	Insulation resistance	1,000M $\Omega$ or 50M $\Omega \cdot \mu F$ , whichever is smaller	Capacitance measured after 24 ± 2 hrs.		

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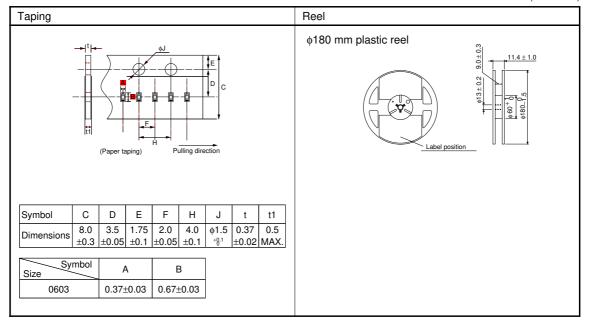
Class 2 (High dielectric constant)

Dissipation factor (tanδ)   2.5% or less (when rated voltage is 16V: 3.5% or less) (when rated voltage is 16V: 7.5% or less)   Measurement frequency: 1 ± 0.1 kHz Measurement voltage : 1.0 ± 0.2 Vrms.	Siass 2 (Flight die	iootiio ooristaritj		,		
Nominal capacitance (C)   Must be within the specified tolerance range.   Based on paragraph 7.8   Measurement counterportation and standard humidition (back)   2.5% or less   5.0% or		Temperature characteristics	CN (R) (B) (X7R)	FN (F) (Y5V)		
Dissipation factor (tank)   2.5% or less   S.0%	Operating temp	perature	−55°C ~ +125°C	−30°C ~ +85°C		
Despetion factor (tank)   Very factor (tank)	Nominal capac	itance (C)	Must be within the spe	Measured at room temperature and standard humidity Measurement frequency: 1 ± 0.1 kHz		
Insulation resistance (IR)  Withstanding voltage  The insulation must not be damaged.  Based on paragraph 7.12. Apply 287% of the rated voltage is applied to 9.5 file.  Withstanding voltage  Temperature characteristics  Within ± 15%  1 + 22, + 82%  The insulation must not be damaged.  The detection indicated by the arrow of 10 ± 1s in the direction indicated by the arrow of 10	Dissipation factor	or (tanδ)				
Temperature characteristics   Within ± 15%   ±22, +82%   The temperature coefficients in paragraph 7, 12, take 0, condition B, are based on measurements carried out at 20°C, with no voitage applied.    Terminal adherence	Insulation resis	stance (IR)	10,000MΩ or 500MΩ · μF, whichever is smaller		Measurement is made after rated voltage	
Terminal achievence  No detachment or signs of detachment  No detachment or signs of detachment  Resistance to vibration Despation factor (tank)  Appearance There must be no mechanical damage.  Rate of capacitance change Must be within initial tolerance.  Despation factor (tank)  At least 3/4 of the surface of the two terminals must be covered with new solder.  Solderability  Appearance There must be no mechanical damage.  Based on paragraph 8. 13 Soldering temperature: 235 ± 5°C Soldering time : 2 ± 0.5s  Soldering temperature: 250 ± 5°C Soldering temperature: 250 ± 5°C Soldering time: : 2 ± 0.5s  Preheating Insulation resistance  Appearance There must be no mechanical damage.  Temperature Quilling Appearance There must be no mechanical damage.  Temperature Quilling Appearance There must be no mechanical damage.  Temperature Quilling Appearance There must be no mechanical damage.  Temperature Quilling Appearance There must be no mechanical damage.  Temperature Quilling Appearance There must be no mechanical damage.  Temperature Quilling Appearance There must be no mechanical damage.  Temperature Quilling Appearance There must be no mechanical damage.  Temperature Quilling Appearance There must be no mechanical damage.  Temperature Quilling Appearance There must be no mechanical damage.  Test temperature: 40 ± 2°C Relative humidity: 90% to 95% Appearance There must be no mechanical damage.  Based on paragraph 9.9  Test temperature: 40 ± 2°C Relative humidity: 90% to 95% Applied voltage: railed voltage Test time: : 500 to 524 hrs.  Chip is mounted to a board in the direction indicated to vibration (type in fight, subjected to vibration (type in fight, subjected to vibration (type in paragraph 2.10)  Test temperature: 40 ± 2°C Relative humidity: 90% to 95% Applied voltage: railed voltage Test time: : 500 to 524 hrs.  Chips in direction (the bight is paragraph 2.10)  Test	Withstanding v	roltage	The insulation must not be damaged.		Based on paragraph 7.1 Apply 250% of the rated voltage for 1 to 5s then measure	
Appearance   Appearance   Appearance   There must be no mechanical damage.   Chip is mounted to a board in the manner shown on the right, subjected to vibration   Dissipation factor (tanis)   Must satisfy initial specified value.   Chip is mounted to a board in the manner shown on the right, subjected to vibration   Dissipation factor (tanis)   At least 3/4 of the surface of the two terminals must be covered with new solder.   Soldering time   2 ± 0.5s	Temperature c	haracteristics	Within ± 15%	+ 22, + 82%	table 8, condition B, are based on measurements	
Rate of capacitance change   Must be within initial tolerance.   Based on paragraph 8. 13.   Soldering temperature: 285 ± 5°C Sol	Terminal adher	rence	No detachment or signs of detachment		Apply 2N for 10 ± 1s in the direction indicated Pressure (2N)	
Rate of capacitance change   Must be within initial tolerance.   Tolerance   Must be within initial tolerance.   Tolerance   Must be within initial tolerance.   Tolerance   Must satisfy initial specified value.   Soldering temperature : 235 ± 5°C   Soldering temperature : 225 ± 5°C   Soldering time : 2 ± 0.5s   So		Appearance	There must be no n	nechanical damage.	Chip is mounted to a board in the	
Dissipation factor (tan6)   Must satisfy initial specified value.   Based on paragraph 8. 13   Soldering time   1.2 ± 0.5s		Rate of capacitance change	Must be within initial tolerance.		manner shown on the right, subjected to vibration (type A in paragraph 8.2),	
A least 3/4 of the surface of the two terminals must be covered with new solder.  Resistance Resistance to soldering heat  Appearance Rate of capacitance change Within ± 5.0%  Must satisfy initial specified value.  Insulation resistance  Appearance Rate of capacitance change Within ± 7.5%  Within ± 20.0%  Rate of capacitance change Within ± 7.5%  Within ± 20.0%  Rate of capacitance change Within ± 7.5%  Must satisfy initial specified value.  Rate of capacitance change  Appearance  Appearance  There must be no mechanical damage.  Rate of capacitance change Rate of capacitance change  Appearance  There must be no mechanical damage.  Rate of capacitance change  ± 12.5% or less (when rated voltage is 160: 10.0%)  Papearance  There must be no mechanical damage.  Rate of capacitance change  Appearance  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  There must be no mechanical damage.  Rate of capacitance change  T		Dissipation factor (tanδ)	Must satisfy initial specified value.			
Rate of capacitance change   Within ± 5.0%   Within ± 20.0%	Solderability		At least 3/4 of the surface of the two terminals must be covered with new solder.		Soldering temperature : 235 ± 5°C	
Dissipation factor (tanδ)   Must satisfy initial specified value.		Appearance	There must be no mechanical damage.			
Dissipation factor (tan6)   Must satisfy initial specified value.		Rate of capacitance change	Within ± 5.0%	Within ± 20.0%	Resed on paragraph 8, 1/	
Insulation resistance   10,000MΩ or 500MΩ · μF, whichever is smaller	to soldering	Dissipation factor (tanδ)	Must satisfy initial specified value.		$ \begin{array}{lll} \mbox{Soldering temperature} : 260 \pm 5^{\circ}\mbox{C} \\ \mbox{Soldering time} & : 5 \pm 0.5\mbox{s} \\ \mbox{Preheating} & : 150 \pm 10^{\circ}\mbox{C for} \\ \end{array} $	
Appearance Rate of capacitance change Dissipation factor (tanδ) Dissipation factor (tanδ) Must satisfy initial specified value.  Insulation resistance  Appearance Rate of capacitance change Rate of capacitance change  Appearance  There must be no mechanical damage.  Rate of capacitance change  Appearance  Rate of capacitance change  Appearance  Rate of capacitance change  There must be no mechanical damage.  Based on paragraph 9.9  Test temperature: 40 ± 2°C Relative humidity: 90% to 95% Applied voltage: rated voltage Test time: 500 to 524 hrs. Capacitance measured after 48 ± 4 hrs.  Appearance  There must be no mechanical damage.  Based on paragraph 9.9  Test temperature: 40 ± 2°C Relative humidity: 90% to 95% Applied voltage: rated voltage Test time: 500 to 524 hrs. Capacitance measured after 48 ± 4 hrs.  Capacitance measured after 48 ± 4 hrs.  Test temperature: Max. operating tempe	heat	Insulation resistance	10,000MΩ or 500MΩ · μF, whichever is smaller			
Temperature cycling         Rate of capacitance change         Within ± 7.5%         Within ± 20.0%         Based on paragraph 9.3 Number of cycles : 5 Capacitance measured after 48 ± 4 hrs           Insulation resistance         10,000MΩ or 500MΩ · μF, whichever is smaller         Appearance         There must be no mechanical damage.         Based on paragraph 9.9           Humidity load test         Dissipation factor (tanδ)         5.0% or less         Within ± 30.0%         Test temperature : 40 ± 2°C Relative humidity: 90% to 95% Applied voltage : rated voltage trest time : 500 to 524 hrs. Capacitance measured after 48 ± 4 hrs		Withstanding voltage	The insulation must not be damaged.			
Temperature cycling  Dissipation factor (tanδ)  Dissipation factor (tanδ)  Must satisfy initial specified value.  Appearance  Rate of capacitance change  Humidity load test  Dissipation factor (tanδ)  Dissipation factor (tanδ)  Must satisfy initial specified value.  There must be no mechanical damage.  Rate of capacitance change  Linumidity load test  Dissipation factor (tanδ)  Dissipation facto		Appearance	There must be no n			
Dissipation factor (tanδ)   Must satisfy initial specified value.   Capacitance measured after 48 ± 4 hrs		Rate of capacitance change	Within ± 7.5% Within ± 20.0%		Number of cycles : 5	
Appearance  Rate of capacitance change ± 12.5% or less Within ± 30.0%  Humidity load test  Dissipation factor (tanδ) 5.0% or less (when rated voltage is 16V: 10.0%)  High-temperature load test  Appearance There must be no mechanical damage.  Rate of capacitance change ± 12.5% or less (when rated voltage is 16V: 10.0%)  The stemperature is 40 ± 2°C Relative humidity: 90% to 95% Applied voltage: rated voltage rest time is 500 to 524 hrs. Capacitance measured after 48 ± 4 hrs.  There must be no mechanical damage.  Rate of capacitance change Within ± 10.0% Within ± 30.0%  Dissipation factor (tanδ) 5.0% or less (when rated voltage is 16V: 10.0%)  Test temperature: Max. operating temperature is devolved in the properation of the p	cycling	Dissipation factor (tanδ)	Must satisfy initial specified value.			
Humidity load test  Rate of capacitance change $\pm 12.5\%$ or less Within $\pm 30.0\%$ Test temperature: $40 \pm 2^{\circ}C$ Relative humidity: $90\%$ to $95\%$ Applied voltage: rated voltage is $16V: 10.0\%$ Insulation resistance $500M\Omega$ or $25M\Omega \cdot \mu F$ , whichever is smaller  Appearance There must be no mechanical damage.  Rate of capacitance change Within $\pm 10.0\%$ Within $\pm 30.0\%$ Based on paragraph 9.9  Test temperature: $40 \pm 2^{\circ}C$ Relative humidity: $90\%$ to $95\%$ Applied voltage: rated voltage Test time: $500$ to $524$ hrs. Capacitance measured after $48 \pm 4$ hrs.  Capacitance measured after $48 \pm 4$ hrs.  Test temperature: Max. operating temperature load test  Dissipation factor (tan $\delta$ )  Test temperature: Max. operating temperature voltage: rated voltage: rated voltage × $200\%$ Test time: 1,000 to 1,048 hrs. Capacitance measured after $48 \pm 4$ hrs.  Capacitance measured after $48 \pm 4$ hrs.		Insulation resistance	10,000MΩ or 500MΩ $\cdot$ μF, whichever is smaller			
Humidity load test  Dissipation factor ( $tan\delta$ )  Dissipation factor ( $tan\delta$ )  Solve or less $tanda = tanda =$		Appearance	There must be no n	Based on paragraph 9.9		
Humidity load test     Dissipation factor (tanδ)     5.0% or less     7.5% or less (when rated voltage is 16V: 10.0%)     Applied voltage : rated voltage rest time : 500 to 524 hrs. Capacitance measured after 48 ± 4 hrs. Capa		Rate of capacitance change	± 12.5% or less	Within ± 30.0%	Test temperature: 40 ± 2°C	
Appearance   There must be no mechanical damage.		Dissipation factor (tanδ)			Applied voltage : rated voltage Test time : 500 to 524 hrs.	
Rate of capacitance change Within ± 10.0% Within ± 30.0% Based on paragraph 9.10  Test temperature: Max. operating temperature load test  Dissipation factor (tanδ) 5.0% or less (when rated voltage is 16V: 10.0%)  Test temperature: Max. operating tempera		Insulation resistance	500MΩ or 25MΩ $\cdot$ μF, whichever is smaller			
High- temperature load test  Dissipation factor (tan\delta)  Dissipation factor (tan\delta)  5.0% or less (when rated voltage is 16V: 10.0%)  Test temperature: Max. operating temp Applied voltage: rated voltage × 200° Test time: 1,000 to 1,048 hrs. Capacitance measured after 48 ± 4 hrs.	temperature	Appearance	There must be no mechanical damage.		Test temperature: Max. operating tem Applied voltage : rated voltage × 200 Test time : 1,000 to 1,048 hrs.	
temperature load test  Dissipation factor (tanô)  Dissipation factor (tanô)  5.0% or less  (when rated voltage is 16V: 10.0%)  Test time : 1,000 to 1,048 hrs.  Capacitance measured after 48 ± 4 hrs.		Rate of capacitance change	Within ± 10.0% Within ± 30.0%			
		Dissipation factor (tanδ)	5.0% or less			
		Insulation resistance	1,000M $\Omega$ or 50M $\Omega$ · $\mu$	Capacitance measured after $48 \pm 4$ hrs.		

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### Packaging specifications

(Units:mm)



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#### Electrical characteristics

# ■A (C0G) Characteristics

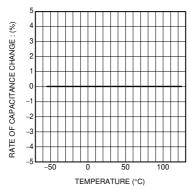


Fig.1 Capacitance-temperature characteristics

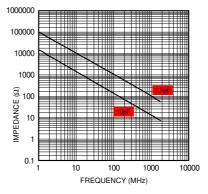


Fig.2 Impedance-frequency characteristics

### ■ CN (X7R) Characteristics

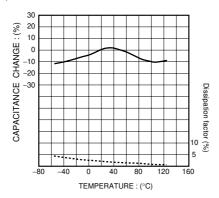


Fig.3 Capacitance-temperature characteristics

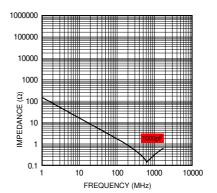


Fig.4 Impedance-frequency characteristics

## ■FN (Y5V) Characteristics

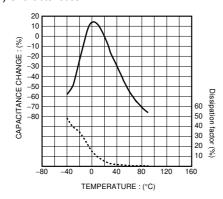


Fig.5 Capacitance-temperature characteristics

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