

### **General Multilayer Ceramic Capacitors**



MLCC is an electronic part that temporarily stores an electrical charge and the most prevalent type of capacitor today. New technologies have enabled the MLCC manufacturers to follow the trend dictated by smaller and smaller electronic devices such as Cellular telephones, Computers, DSC, DVC

Thickness Option

Packaging Type

8 Product & Plating Method

Samsung Control Code

Reserved For Future Use

#### **General Features**

- Miniature Size
- Wide Capacitance and Voltage Range
- Tape & Reel for Surface Mount Assembly
- Low ESR

#### **Applications**

- General Electronic Circuit

#### Part Numbering

CL	10	<u>B</u>	104	K	( <u>B</u>	8	N N	N	N.	<u>C</u>
00	2	8	4	6	6	0	8	9	1	T)

- Samsung Multilayer Ceramic Capacitor
- 2 Size(mm)
- 3 Capacitance Temperature Characteristic
- 4 Nominal Capacitance
- **6** Capacitance Tolerance
- 6 Rated Voltage
- Samsung Multilayer Ceramic Capacitor
- 2 SIZE(mm)

11007.	WITH W 100	T. OM. I
Code	EIA CODE	Size(mm)
03	0201	0.6 × 0.3
05	0402	1.0 × 0.5
10	0603	1.6 × 0.8
21	0805	2.0 × 1.25
31	1206	3.2 × 1.6
32	1210	3.2 × 2.5
43	1812	4.5 × 3.2
55 NV	2220	5.7 × 5.0





#### **3** CAPACITANCE TEMPERATURE CHARACTERISTIC

Code	M.M.100X.	Temperatu	ıre Characte	ristics	Temperature Range
С	WWW.100	COG	C△	0 ± 30(ppm/ °C)	W
Р	JN 1. 101	P2H	N P△	-150 ± 60	TW
R	MMM.1	R2H	R△	-220 ± 60	UTW
S	Class	S2H	∆√S∆	-330 ± 60	-55 ~ +125℃
COM.TW	MMM	T2H	TΔ	-470 ± 60	M.TW
COMUN	MM	U2J	UA	-750 ± 60	OM.TW
Y.CONL.TW		S2L	SA	+350 ~ -1000	CONTIN
CA		X5R	X5R	±15%	-55 ~ +85℃
(B)	Class II	X7R	X7R	±15%	-55 ~ +125℃
.1 XOM	Class	X6S	X6S	±22%	-55 ~ +105℃
V. TUO FCON	TW	Y5V	Y5V	+22 ~ -82%	-30 ~ +85℃

#### **\* Temperature Characteristic**

Temperature Characteristics	Below 2.0pF	2.2 ~ 3.9pF	Above 4.0pF	Above 10pF
СФ	C0G	COG	COG	COG
ΡΔ	M.TW - W	P2J	P2H	P2H
RΔ	OM.TW_	R2J	R2H	R2H
SΔ	ONTIN	S2J	S2H	S2H
ТΔ	COMIT	T2J	T2H	T2H
UΔ	CON	U2J	U2J	U2J

J : ±120PPM/℃, H : ±60PPM/℃, G : ±30PPM/℃

#### **4** NOMINAL CAPACITANCE

Nominal capacitance is identified by 3 digits.

The first and second digits identify the first and second significant figures of the capacitance. WWW.100Y.COM.TV

The third digit identifies the multiplier. 'R' identifies a decimal point.

# ● Example

Code	Nominal Capacitance
1R5	1.5pF
103 COM	10,000pF, 10nF, 0.01 μF
104	100,000pF, 100nF, 0.1 μ F





#### **6** CAPACITANCE TOLERANCE

Code	Tolerance	Nominal Capacit
A	±0.05pF	WWW.100 COM. TW
B WW	±0.1pF	MMM.100X.COM.TM
TW C WW	±0.25pF	Less than 10p (Including 10pf
ATW D W	± 0.5pF	WWW.100 COM.10
M.TWF W	±1pF	MM. 100X. COM.
OM.TY	±1%	MAM. Ton Y. COM
G	±2%	MMM.TooX'COJ
.COM.JTW	±5%	More than 10p
Y.CO.K.TW	±10%	More than 10p
M.TW	±20%	LEM MAN TOOK
OOY.CZMITW	+80, -20%	V.TV W.1003

#### **6** RATED VOLTAGE

Code	Rated Voltage	Code	Rated Voltage
VR CO	4.0V	TOO TOO DAY	200V
NQ JUNE CO	6.3V	· TOON CENTY	250V
WPN.100Y.C	10V	V. 100 Y. G	500V
NO WILDOX	16V	W. 100 H COM. T	630V
YAW 1007	25V	WW.100 L. COM	1,000V
ENM.100	35V	MMM:100 T.CON	2,000V
B WWW.10	50V	WWW.KOY.CO	3,000V
C WWW.	100V	M.M. 1007.Ca	MTW WWW.

WWW.100Y.COM.TW





## THICKNESS OPTION W.100Y.COW.T

Size	Code	Thickness(T)	Size	Code	Thickness(T
0201(0603)	3	0.30±0.03	WWW.1002	COF	1.25±0.20
0402(1005)	5	0.50±0.05	MMM.100	Y.CH	1.6±0.20
0603(1608)	8	0.80±0.10	1812(4532)	OX-COM	2.0±0.20
WI.W	A	0.65±0.10	WW.	OOYJOD	2.5±0.20
	C	0.85±0.10	NW.	100 F. CC	3.2±0.30
0805(2012)	F	1.25±0.10	N WW	V.10F <sub>F</sub> Y.C	1.25±0.20
Y.COM.TW	Q	1.25±0.15	M MM	Hoy	1.6±0.20
	Y	1.25±0.20	2220(5750)	100	2.0±0.20
1206(3216)	С	0.85±0.15	LTW V	J. 100	2.5±0.20
	F	1.25±0.15	M.TW	WALAN TO	3.2±0.30
	Н	1.6±0.20	OMATW	WWW.)	ON.COM.
	F	1.25±0.20	COMITW	MMM	1700 Y. COM.
	H	1.6±0.20	COMITY	WW	M.100Y.COM
1210(3225)	OMITY	2.0±0.20	Y.COM.TW	N V	M. TOOX.
	COM.TW	2.5±0.20	$O_{M,I,A}$		MM. John CO
	CON	2.5±0.30	ON COM.		

#### PRODUCT & PLATING METHOD

-117	TOOK.	MAN TONE COM	CON CON
ode	Electrode	Termination	Plating Type
A	Pd	Ag	Sn_100%
N	WW.100 NiCOM	Cu V. Luo V. C.	Sn_100%
G	Cu COM	Cu Cu Cu	Sn_100%

#### SAMSUNG CONTROL CODE

ode	Description of the code	Code	Description of the code
Α	Array (2-element)	N	Normal
В	Array (4-element)	P	Automotive
C	High - Q	L	LICC





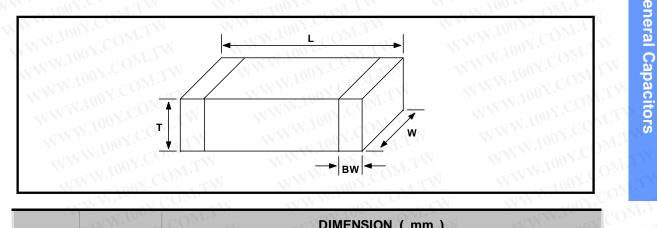
### 100Y.COM.TW **TRESERVED FOR FUTURE USE**

1	RESERVED FO	R FUTURE USE	WWW.100X.COM.TW
	Code	MITW I	Description of the code
	EN N WWW	100Y.COM.TW	Reserved for future use
	TW WWW	1100Y.	M. 21001.2 W.L.

### MW.100X.COM 1 PACKAGING TYPE WWW.100Y.CC

Code	Packaging Type	Code	Packaging Type
COM B	Bulk	F	Embossing 13" (10,000EA)
I.COMPTW	Bulk Case	N LWW	Paper 13" (15,000EA)
N.CO.C.IN	Paper 7"	0	Paper 10"
DM.TV	Paper 13" (10,000EA)	S V	Embossing 10"
100X-EOM.T	Embossing 7"	M.TW	N.M. TOOX CONT.TW

#### APPEARANCE AND DIMENSION



CODE	EIA CODE		DIMENSIO	N ( mm )	
CODE	EIA CODE	Y.CON LTW	W	T (MAX)	BW
03	0201	0.6 ± 0.03	0.3 ± 0.03	0.33	0.15 ± 0.05
05	0402	1.0 ± 0.05	0.5 ± 0.05	0.55	0.2 +0.15/-0.1
10	0603	1.6 ± 0.1	0.8 ± 0.1	0.9	0.3 ± 0.2
21	0805	2.0 ± 0.1	1.25 ± 0.1	1.35	0.5 +0.2/-0.3
24	1206	3.2 ± 0.15	1.6 ± 0.15	1.40	0.5 +0.2/-0.3
31	1206	3.2 ± 0.2	1.6 ± 0.2	1.8	0.5 +0.3/-0.3
20	4040	$3.2 \pm 0.3$	2.5 ± 0.2	2.7	0.0   0.0
32	1210	3.2 ± 0.4	2.5 ± 0.3	2.8	0.6 ± 0.3
43	1812	4.5 ± 0.4	3.2 ± 0.3	3.5	0.8 ± 0.3
55	2220	5.7 ± 0.4	5.0 ± 0.4	3.5	1.0 ± 0.3
		MM	·		

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#### **RELIABILTY TEST CONDITION**

100Y,COM.TW

WWW.100Y.COM.TW

NO	ITI	EM N	PEI	RFORMANCE	TES	T CONDITION				
1	Appea	rance	No Abnormal Exterio	r Appearance	Through Microscope(x1	0)				
2		ation tance	Rated Voltage is belo	whichever is smaller ow 16V; whichever is smaller	Apply the Rated Voltag	ge For 60 ~ 120	Sec.			
3	Withst		No Dielectric Breakdov Mechanical Breakdov		Class I: 300% of the Rat Class II: 250% of the Rat with less than 50mA curre	ed Voltage for 1~5				
, <b>1</b>	COM	01	MAN	ON COM	Capacitance	Frequency	Voltage			
	MOD	Class	Within the specif	ied tolerance	≤ 1,000 pF	1Mz ±10%	0.5 5 \/			
100	Capacita	T	W V		>1,000 pF	1kHz ±1 0%	0.5 ~ 5 Vrms			
4	nce	WTI	M	100Y.Co.11.TW	Capacitance	Frequency	Voltage			
	T.CO	Class	Within the spec	ified tolerance	≤ 10 µF	1kHz ±1 0%	1.0±0.2Vrms			
	100 × 1 C!	П	W TWY		>10 µF	120Hz±20%	0.5±0.1Vrms			
M	700,	$OM_{ij}$	Capacitance ≥ 30pF	: Q ≥ 1,000	Capacitance	Frequency	Voltage			
5	5 Q Class		< 30	oF: Q ≥ 400 +20C	≤ 1,000 pF	1Mz ±10%	0.51.5.1/			
			W W	C : Capacitance )	>1,000 pF	1kHz ±1 0%	0.5 ~ 5 Vrms			
W			1. Characteristic : A	(X5R), B(X7R), X(X6S)	Capacitance	Frequency	Voltage			
	M. 100X	W.100 X.CO	Rated Voltage	Spec	≤ 10 μF	1kHz ±10%	1.0±0.2Vrms			
	10 10	07.0	≥ 25V	0.025 max	>10 µF	120Hz±20%	0.5±0.1Vrms			
	WWW.100			16V	0.035 max	VIII.	VW.100 1	OM.I		
	MAIN.	OOY.C	10V	0.05 max	* 1.11	720.1 C>0.022uF 0.402 C>0.22uF 0.603 C>2.2uF				
	WWW	OOV	6.3V	0.05 max/ 0.10max*1		, 0402 C≥0.22uF, 0603 C≥2.2uF,				
	WWV	N.100,	2. Characteristic : F	(Y5V)	1812 C≥47uF, 222 All Low Profile Cap	U805 C≥4.7uF, 1206 C≥10uF, 1210 C≥22uF, 1812 C≥47uF, 2220 C≥100uF, All Low Profile Capacitors (P.16).				
6	Tan $\delta$	Class	Rated Voltage	Spec	*2 0603 C≥0.47uF, 0					
-		П	50V	0.05 max, 0.07max*2	*3. 0402 C≥0.033uF, ( All 0805, 1206 siz		IF OV COM			
	W	N 1	35V	0.07 max	*4 1210 C>6.8uF	5, 1210 0 - 0.00	ION TON			
	×		25V	0.05 max/ 0.07 max* <sup>3</sup> / 0.09max* <sup>4</sup>	*5 0402 C≥0.22uF					
		N N	16V	0.09 max/ 0.125max*5	OWIT					
		MM	10V	0.125 max/ 0.16max*6	DOY.COM.TW					
		WW	6.3V	0.16max	JOON'COM LAN					
		W	MM·100X·CO		V.100Y.COM.TY					
			16V 10V	0.07 max*3/ 0.09max*4 0.09 max/ 0.125max*5 0.125 max/ 0.16max*6 0.16max	*6 All 1812 size		M.M.M. M.M.M. M.M.M. M.M.M. M.M.M. M.M.M. M.M.M. M.M.M. M.M.M. M.M. M.M. M			

WWW.100Y.COM.TW





NO	ITE	M	COMP. P	PERFOR	MANCE	W.Com.	TEST CONDITION
M.		WW.100	N COM.	TIN	MMM'II	Capacitance s	shall be measured by the steps
	7.	W. 100	L.CON		Temp. Coefficient	shown in the	following table.
	T.TW	WW. 10	Characteris	stics	(PPW°C)	Step	Temp.(℃)
	WTD	MM	C0G	117	0 ± 30	1001	25 ± 2
	Wr.	Class	PH	Mr.	-150 ± 60	2	Min. operating temp. ± 2
	OM.TW	I	RH	$O_{M^{*}}$	-220 ± 60	3	25 ± 2
	COM.TW		SH	100	-330 ± 60	4	Max. operating temp $\pm$ 2
	COM.TW	MAN	TH		-470 ± 60	5	25 ± 2
	CONTRACTIV	WW	UL	Con	-750 ± 120	(1) Class I	25 ± 2
	17 ( ) ) 5 1		SL	VCD	+350 ~ -1000	LT TO THE	Coefficient shall be calculated from
	Temperature		WW.100	37 C	OM.	the formula a	
7.	Characteristics of Capacitance		WWW.10			Temp, Coefficie	$ \text{nnt} = \frac{\text{C2 - C1}}{\text{C1} \times \triangle \text{T}} \times 10^6 \text{ [ppm/°C]} $ nnce at step 3
	LIONY.COM	I.TV	Characteri	stics	Capacitance Change with No Bias	C2: Capacita  △T: 60 ℃ (=8	
	11007	Class	A(X5R) B(X7R	)/ <u>1</u>	± 15%	(2) CLASS II	
	MM.TOO C	OM. T.	X(X6S		± 22%	Capacitance (	Change shall be calculated from the
	M.100 1.	OM.I	F(Y5V	) N N -	+22% ~ -82%	formula as be	elow.
8	Adhesive of Term		No Indication		ling Shall Occur On The	Apply 500g.f	* Pressure for 10±1 sec. 201 case size.
	W	Apperance	No mechan	No mechanical damage shall occur.			; 1mm 1.0mm/SEC.
	N	MM.100X	Characte	ristics	Capacitance Change	Keep the test Then measure	board at the limit point in 5 sec., e capacitance.
0	Bending	MMM'TO	Class	LTW M.TV	Within $\pm$ 5% or $\pm$ 0. 5 pF whichever is larger	50	R=230
9	Strength	Capacitance	1001.	A(X5R)/ B(X7R)/ X(X6S)	Within ± 12.5%	7	<b>→</b>
		WW	Class II		TIN IN	45±1	Bending limit





NO	ı	ГЕМ (1.10)	COMP	PERF	ORMANCE	COMP	TEST CONDIT	TION		
M		1001	More Tha	n 75% of tl	he terminal surface is to	Solder	Sn-3Ag-0.5Cu	63Sn-37Pb		
OM	TW			ed newly, S or dissolve	o metal part does not	Solder Temp.	245±5℃	235±5℃		
10	Sold	erability	N.CON		7-/ 4/4/27	Flux RMA Type				
CC	WILL		<b>→</b> // / <del>/</del> —			Dip Time 3±0.3 sec. 5±0.5 sec.				
	OM.TW		903.	OM		Pre-heating	at 80~120℃	for 10~30 sec.		
	ON.TW	Apperance	No mech	anical dam	nage shall occur.	Solder Tem	perature : 270±5°	C		
101.	COM.TW		Characteristics Capacitance Change			Dip Time : 10±1 sec.				
100 100	Y.COM.TV	NW WW	Clas	ss I	Within ±2.5% or ±0.25 pF whichever is larger	Each termination shall be fully immersed and preheated as below :				
	$0^{\gamma,COM,T}$	Capacitance	N.10	A(X5R)/	larger	STEP	TEMP.(℃)	TIME(SEC.)		
	DOY. COM!		Law.1	B(X7R)	Within ±7.5%	1/1/1	80~100	60		
	TOOX.COM	TW	Class II	X(X6S)	Within ±15%	2	150~180	60		
	Resistance to	T.TW	MMM	10FY.	Within ±20%	Leave the o	apacitor in ambie	ent condition for		
11	Soldering heat	Q	Capacita	nce ≥ 30pF <30pF	: Q≥ 1000 : Q≥ 400+20×C	Leave the capacitor in ambient condition for specified time* before measurement  * 24 ± 2 hours (Class I)				
	NW.100Y.CC	(Class I)	VVV		(C: Capacitance)	24 ± 2 ho	ours (Class II)			
	M.M.100X;	Tan δ (Class Ⅱ)	Within th	e specified	l initial value	W				
	MMM.100	Insulation Resistance	Within th	e specified	l initial value	MMM.100X.COM.TM				
	WWW.10	Withstanding Voltage	Within the	e specified	l initial value	W	MMM.10	ov.com.T		
	WWW.	Appearance	No mechanical damage shall occur.			TW WWW.100Y.COM				
	MMM	100X.CO	Characteristics		Capacitance Change	MITH WW. 100X. CO.				
	MM		Clas	ss I	Within ±2.5% or ±0.25 pF whichever is larger	The capacitor shall be subjected to a Harmonic Motion having a total amplitude of 1.5mm changing frequency from 10Hz to 55				
	Vibration	Capacitance	Class	A(X5R)/ B(X7R)	Within ±5%	CONT	10Hz In 1 min.	MM.100X.		
12	Test	MAN. TOUX	СОЛ	X(X6S)	Within ±10%	perpendicula	for 2hours each	iii 3 mutualiy		
		MMN.In	I COMP.	F(Y5V)	Within ±20%	Polpondiodic	TW			
		Q (Class I)	Within th	e specified	l initial value	ON.COM				
		Tan $\delta$ (Class ${\mathbb I}$ )	Within the	e specified	l initial value	100X.CO				
		Insulation Resistance	Within th	Within the specified initial value			W.100X.COW.TW WWW.			





NO	ITE	M	V.CO	FERFO	RMANCE	TEST CONDITION		
M.		Appearance	No mechanic	al damage sha	Il occur.	Temperature : 40±2 ℃		
	TW	WY TIL	Charac	teristics	Capacitance Change	Relative humidity: 90~95 %RH		
COJ	LTW	WWW.	Class I		Within ±5.0% or ±0.5pF whichever is larger	Duration time : 500 +12/-0 hr.		
I.CC	ON.TW	Capacitance	Class II	A(X5R)/ B(X7R)/ X(X6S)	Within ±12.5%	Leave the capacitor in ambient condition for specified time* before measurement.  CLASS I : 24±2 Hr.		
OV.	WILW	THE STATE OF THE S	1007	F(Y5V)	Within ±30%	CLASSII : 24±2 Hr.		
13	Humidity (Steady	Q CLASSI	Capacitance $\geq 30 \text{pF}$ : Q $\geq 350$ $10^{\leq}$ Capacitance $<30 \text{pF}$ : Q $\geq 275 + 2.5 \text{xC}$ Capacitance $< 10 \text{pF}$ : Q $\geq 200 + 10 \text{xC}$ (C: Capacitance)			MY.COM.TW		
Too	State)		Characteris		2. Characteristic : F(Y5V)	TOOY.COMETW		
MM: M:N:10 M:10	100X.COM;	Tan ∂ CLASS II	B(X7R) 0.05max (16V and over) 0.075max (10V) 0.075max (6.3V except Table 1)		0.075max (25V and over) 0.1max (16V, C<1.0  0.125max(16V, C≥ 1.0  0.15max (10V)	W.100X.COM.TW W.100X.COM.TW		
	N.100Y.CO	WELL	0.125max*	1 100 Y	0.15max (10V) 0.195max (6.3V)	W.100Y. COM.TW		
A A A A A A A A A A A A A A A A A A A	W.T. CONY.CO	TW	(refer to Table	e 1)	CUMTIN W	WY. 100Y. COMITW		
	M.100X.C	Insulation Resistance		50MΩ·μF whiche	ver is smaller.	WWW.100Y.COM.TW		
	171W 100 1	Appearance	No mechanic	al damage sha	Il occur.	Applied Voltage: rated voltage		
	N 100	COMIT	Characteristics Capacitance Change		Capacitance Change	Temperature : 40±2 ℃		
	WWW.IO	Capacitance		ss IN	Within ±5.0% or ±0.5pF whichever is larger	Humidity::90~95%RH  Duration Time: 500 +12/-0 Hr.  Charge/Discharge Current: 50m\ max.		
			Capacitance	A(X5R)/ B(X7R)/ X(X6S)	Within ±12.5% Within ±12.5% Within ±30%	Perform the initial measurement according to Note1.		
	N T		Class II	-1	Within ±30%	A SAMM'IDO N'COM		
	WW		COM.TW	F(Y5V)	Within ±30%	Perform the final measurement according to Note2.		
14	Moisture Resistance	Q (Class I)	- 1	≥ 30pF : Q≥ 2 <30pF : Q≥ 10	200 200 + 10/3×C (C: Capacitance)	TW WWW.100Y.C		
		Tan $\delta$ (Class ${\mathbb I}$ )		stic: A(X5R), B(X7R)  and over)  t Table 1)	2. Characteristic : F(Y5V)  0.075max (25V and over)  0.1max (16V, C<1.0  0.125max(16V, C≥ 1.0  0.15max (10V)  0.195max (6.3V)	OM.TW WWW.100 COM.TW WWW.10 Y.COM.TW WWW.10 Y.COM.TW		
		V	X(X6S) 0.11m	nax (6.3V and	below)	10.5.		
		Insulation Resistance	500 MΩ or 25	MΩ·μF whicheve	r is smaller.			





NO	ITE	M		PER	FORMANCE			TEST CONDIT	ION
Mr.	TW	Appearance	No mechani	cal damage	shall occur.	100 Y.C		oltage: 200%* of the	<del>-</del>
$O_{N_1}$		MMM	Charact	teristics	Capacitance Char	nge		re: max. operating t "ime: 1000 +48/-0 H	•
CO	M.TW OM.TW COM.TW	MM	Class I		Within ±3% or ±0.3pF, Whichever is larger		N.CO	charge Current: 50nt table(3): 150%/100	
y.C		Capacitance	MN. 100A	A(X5R)/ B(X7R)	Within ±12.5%	WW.19	voltage		
0.21			Class II	X(X6S)	Within ±25%	WW.	Perform th	e initial measurement	t according to
00 3		N	MMM'I	F(Y5V)	Within ±30%		Note1 for	Class II	
100			WWW.	(130)	Within ±30%	WW	N.100		
15	High Temperature	Q (Class I)	Capacitance $\geq 30  \mathrm{pF}$ : Q $\geq 350$ $10^{\leq}$ Capacitance $< 30  \mathrm{pF}$ : Q $\geq 275 + 2.5 \times \mathrm{C}$ Capacitance $< 10  \mathrm{pF}$ : Q $\geq 200 + 10 \times \mathrm{C}$ (C: Capacitance) 1. Characteristic : A(X5R),   2. Characteristic : F(Y5V)			Perform th Note2.	e final measurement	according to	
Resistance		OM.TW	B(X7R 0.05max (16V and over) 0.075max (10V)		R) 0.075max (25V and over) 0.1max(16V, C<1.0μΓ)		MMA		
1		Tan δ (Class Ⅱ)	0.075max (6.3V excel) 0.125max* (refer to Ta		0.125max(16V, C≥ 0.15max (10V) 0.195max (6.3V)	1.0μF)	M		
	WWW.	100X'CO	X(X6S) 0.11max (6.3V and below)  1,000 MΩ or 50MΩ-μF whichever is smaller.				W WWW.tooy.COM.  TW WWW.tooy.COM.  TW WWW.tooy.COM.  TW WWW.tooy.COM.  M.TW WWW.tooy.COM.		
		Insulation Resistance							
		Appearance	No mechani	cal damage	shall occur.	A.Co.	Mrs.	shall be subjected	d to 5 cycles.
		111110	Charact	teristics	Capacitance Char	nge	The same of	for 1 cycle :	100
		WWW.I	Class	s I	Within ±2.5% or ±0.25	i pF	Step	Temp.(°C)	Time(min.)
		Capacitance	1001.00	A(X5R)/	Whichever is larger	100X.	co <sup>1</sup> M.	Min. operating temp.+0/-3	30
Temperature		Supudianoe	Class	B(X7R)/	Within ±7.5%		2	25	2~3
	Temperature	N M	N.190	X(X6S)	Within ±15%	W.100	30	Max. operating	30
	Cycle	N V	W.100 X	F(Y5V)	Within ±20%	1M.10	V.C	temp.+3/-0	WW
		Q (Class I)	Within the s	pecified initia	al value		4	25	2~3
		(Class I)  Tan $\delta$ (Class II)	Within the s	pecified initia	al value	WWW	for specif	e capacitor in amb ied time* before m hours (Class I)	
		Insulation Resistance	Within the s	pecified initia	al value		24 ± 2	hours (Class ${\mathbb I}$ )	

WWW.





#### **RELIABILTY TEST CONDITION**

WWW WWW	Reco	mmended Solo	lering Method			
	Size	Temperature	MM:100 CO	Cond	lition	
WILL MA	inch (mm)	Characteristic	Capacitance	Flow	Reflow	
MITH W	0201 (0603)	WT	MMM.100X	COMITY	0	
ON.	0402 (1005)		WWW.	CONTRACTIV		
COM:1	MAN TOO	Class I	W. Ive	A CO.O.	0	
OM.TW	0603 (1608)	Olana II	C < 1μF	00/10/1	0	
I.COM	MM 1007.	Class II	C ≥ 1μF	DY. OM.TV	0	
Recommended	MMM.	Class I	M-M	MY. O	N 0	
8 Soldering Method	0805 (2012)	COM	$C < 4.7\mu F$	OUND	0	
By Size & Capacitance	0805 (2012)	Class II	C ≥ 4.7μF	Ing - COM.	0	
By Olze a Capacitatice	WW -1100	Array	-7/	11.100 1: COM	0	
OX.COM. TW	MMM	Class I	- MM	1100	OWE	
COM	4000 (0040)		C < 10μF	M. OV.CO.	770	
M 100 1. COW. I.A.	1206 (3216)	Class II	C ≥ 10µF	MAN TO CO	0	
100X.COM.TV	MAIN	Array	- 1	7. 100 r.	01.10	
M. TOOX COM	1210 (3225)	100Y.C	TW	1007.0	0	
M. Inc. COM.	1808 (4520)		WT	MANN. TOOK.	0	
W.100 r. COM.	1812 (4532)	W.100 CO!	VI. 1	WWW.In	CONO	
1007.	2220 (5750)		MIL	M. 100,	000	

Note1. Initial Measurement For Class  ${\mathbb I}$ 

Perform the heat treatment at 150℃+0/-10℃ for 1 hour. Then Leave the capacitor in ambient condition for 48±4 hours before measurement. Then perform the measurement.

#### Note2. Latter Measurement

1. CLASS I

Leave the capacitor in ambient condition for 24±2 hours before measurement

Then perform the measurement.

2. Class  ${\mathbb I}$ 

Perform the heat treatment at 150°C+0/-10°C for 1 hour. Then Leave the capacitor in ambient condition for 48±4 hours before measurement. Then perform the measurement.

\*Table1.

Tan  $\delta$ 0.125max\* 0201 C  $\geq 0.022 \mu F$  $0402 \ C \ge 0.22 \mu F$ 0603 C ≥ 2.2 $\mu$ F 0805 C ≥  $4.7\mu$ F Class  ${\mathbb I}$ 1206 C ≥ 10.0 μF √ A(X5R), 1210 C ≥ 22.0  $\mu$ F B(X7R) 1812 C  $\geq$  47.0  $\mu$ F 2220 C ≥ 100.0*μ*F All Low Profile Capacitors (P.16).

\*Table2

⊿C (Y5V)	± 30%
$^{1}$ CO $_{M}$ .	0402 C $\geq$ 0.47 $\mu$ F
COM	0603 C ≥ 2.2μF
Class II	0805 C ≥ $4.7\mu$ F
F(Y5V)	1206 C ≥ 10.0 <i>μ</i> F
F(15V)	1210 C ≥ 22.0 μF
100 2	1812 C ≥ 47.0 $\mu$ F
1007.	2220 C ≥ 100.0 $\mu$ F

\*Table3.

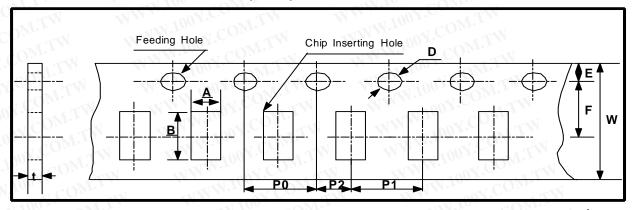
Y.Co.	High Temperature Res	istance test
Applied Voltage	100% of the rated voltage	150% of the rated voltage
Class II A(X5R), B(X7R), X(X6S), F(Y5V)	0201 C $\geq 0.1 \mu\text{F}$ 0402 C $\geq 1.0 \mu\text{F}$ 0603 C $\geq 4.7 \mu\text{F}$ 0805 C $\geq 22.0 \mu\text{F}$ 1206 C $\geq 47.0 \mu\text{F}$ 1210 C $\geq 100.0 \mu\text{F}$ All Low Profile Capacitors (P.16).	0201 C $\geq 0.022 \mu F$ 0402 C $\geq 0.47 \mu F$ 0603 C $\geq 2.2 \mu F$ 0805 C $\geq 4.7 \mu F$ 1206 C $\geq 10.0 \mu F$ 1210 C $\geq 22.0 \mu F$ 1812 C $\geq 47.0 \mu F$ 2220 C $\geq 100.0 \mu F$





### **PACKAGING**

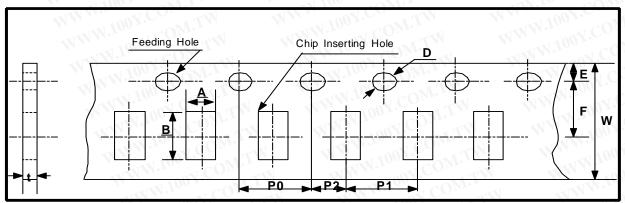
### **● CARDBOARD PAPER TAPE (4mm)**



unit : mm

	ymbol Type	ATV	В	W	100F.C	OWELM	P1	P2	PO	DTV	t
D i m	0603 (1608)	1.1 ±0.2	1.9 ±0.2	MM	N 100X	$co_{M,T}$	N	MMA	N.1002	COM.	W
e n s	0805 (2012)	1.6 ±0.2	2.4 ±0.2	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	Ф1.5 +0.1/-0	1.1 Below
i o n	1206 (3216)	2.0 ±0.2	3.6 ±0.2		MM.TO	OV.CON	M.TW	W	WW.	OON.CO	M.TW

### ● CARDBOARD PAPER TAPE (2mm)



unit: mm

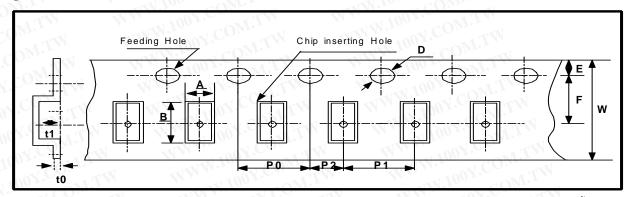
	ymbol Type	A	BV.10	o wco	FW	E	P1	P2	P0	N D	WWW.I
D i m e	0201 (0603)	0.38 ±0.03	0.68 ±0.03	8.0	3.5	1.75	2.0	2.0	4.0	Ф1.5	0.37 ±0.03
n s i o n	0402 (1005)	0.62 ±0.04	1.12 ±0.04	±0.3	±0.05	±0.1	±0.05	±0.05	±0.1	+0.1/-0.03	0.6 ±0.05





### **PACKAGING**

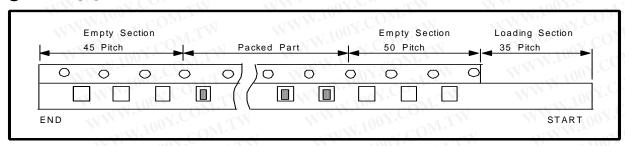
#### **• EMBOSSED PLASTIC TAPE**



unit: mm

. 4	m bol	A	Мв	W	FOON	EM	P1	P2	PO	D	t1	t0
	0805 (2012)	1.45 ±0.2	2.3 ±0.2	W	MW.100	T.CO	1.17		MW.10	ov.co	VI.TV	
D i	1206 (3216)	1.9 ±0.2	3.5 ±0.2	8.0 ±0.3	3.5 ±0.05	OX. CO	4.0 ±0.1		WWW.1	OO Y.C	2.5 max	V
m e	1210 (3225)	2.9 ±0.2	3.7 ±0.2		WW.	1.75		2.0	4.0	Ф1.5		0.6
n s i	1808 (4520)	2.3 ±0.2	4.9 ±0.2	(I	WWW	±0.1	OMIT	±0.05	±0.1	+0.1/-0	$CO_{M^*}$	Below
o n	1812 (4532)	3.6 ±0.2	4.9 ±0.2	12.0 ±0.3	5.60 ±0.05	1.100	8.0 ±0.1	TW	WW	M. 100	3.8 max	WT
	2220 (5750)	5.5 ±0.2	6.2 ±0.2		WW	W.100		TW	W	111.100		WT

#### TAPING SIZE



Type	Symbol	Size	Cardboard Paper Tape	Symbol	Size	Embossed Plastic Tape	
	W	0201(0603)	10,000	WWW.1	All Size ≤3216 1210(3225),1808(4520) (t≤1.6mm)	2,000	
7" Reel	С	0402(1005)	10,000	E	1210(3225)(t≥2.0mm)	1,000	
		OTHERS	4,000		1808(4520)(t≥2.0mm)	1,000	
10" Reel	0	11/11/11/10/3	10,000	2000	1100Y. OM.TW	TON.	
	D	0402(1005)	50,000	WW	All Size ≤3216 1210(3225),1808(4520) (t<1.6mm)	10,000	
		OTHERS	10,000		$1210(3225)(1.6 \le t < 2.0 \text{mm})$ $1206(3216)(1.6 \le t)$	8,000	
13" Reel		0603(1608)	10,000 or 15,000	F	$1210(3225),1808(4520) $ $(t \ge 2.0 \text{mm})$	4,000	
	L	0805(2012) (t≤0.85mm)	15,000 or 10,000(Option)		1812(4532)(t≤2.0mm)	4,000	
		1206(3216) (t≤0.85mm)	10,000	N	1812(4532)(t>2.0mm) 5750(2220)	2,000	



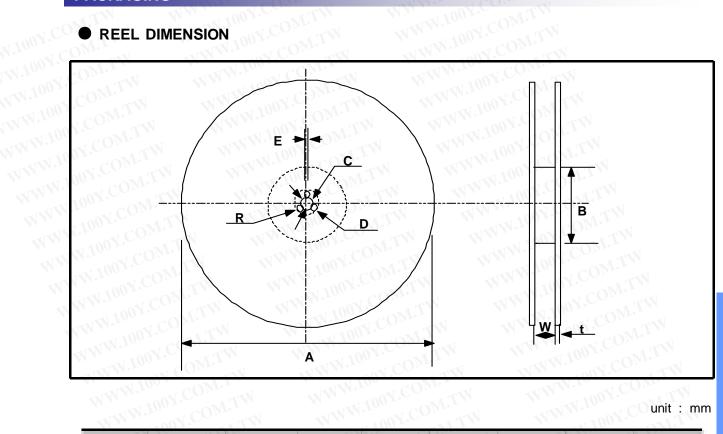
WWW.100Y



#### **PACKAGING**

#### REEL DIMENSION

100Y.COM.TW



unit : mm

WWW.100Y.COM.T

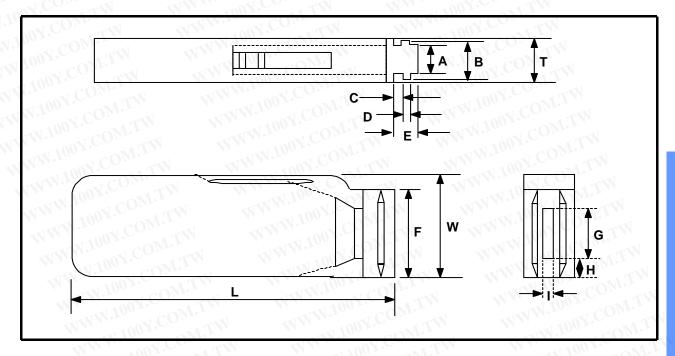
	10A	M.TB'	C	DY.	ELIV	W	TW toox	R
7" Reel	ф180+0/ -3	φ60+1/ -3	140 100	1007	20105	0.14.5	1.2±0.2	V.COM
13" Reel	ф330±2.0	φ80+1/ -3	φ13±0.3	25±0.5	2.0±0.5	9±1.5	2.2±0.2	1.0





#### **BULK CASE PACKAGING**

- Bulk case packaging can reduce the stock space and transportation costs.
- The bulk feeding system can increase the productivity.
- It can eliminate the components loss.



unit : mm

Symbol	AOY.CC	В	WYT 100	CITY	D	M.100E. CON
Dimension	6.8±0.1	8.8±0.1	12±0.1	1.5+0.1/-0	2+0/-0.1	3.0+0.2/-0

Symbol	FN.1003	W	G	TOO HOOM.	L	WW. Foo
imension	31.5+0.2/-0	36+0/-0.2	19±0.35	7±0.35	110±0.7	5±0.35
	W 10	OXIOMITY	N. T.	N.100 1 CO	W.I.	W.10

#### QUANTITY OF BULK CASE PACKAGING

	TANAL TOOLS	WIN WITTE	0.804	unit : pcs
Size	0402(1005)	0603(1608)	T=0.65mm	T=0.85mm
uantity	50,000	10,000 or 15,000	10,000	5,000 or 10,000

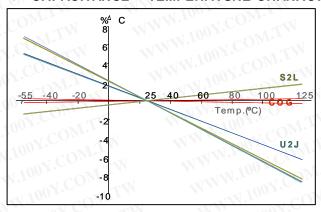


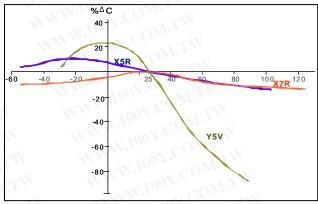


#### **APPLICATION MANUAL**

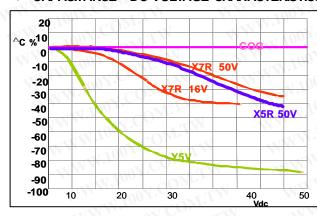
#### ELECTRICAL CHARACTERISTICS

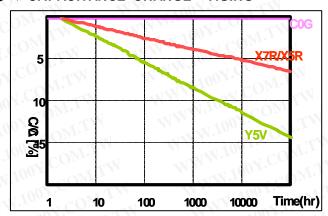
#### ► CAPACITANCE - TEMPERATURE CHARACTERISTICS



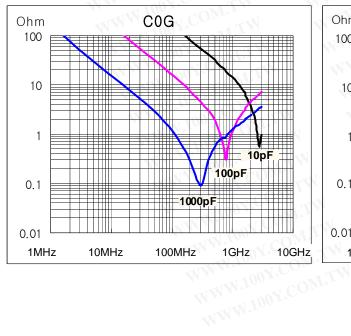


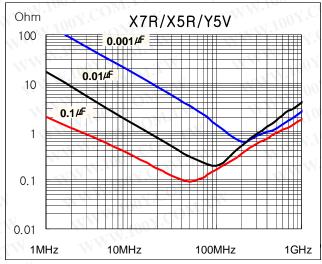
#### ► CAPACITANCE - DC VOLTAGE CHARACTERISTICS ► CAPACITANCE CHANGE - AGING





#### **▶ IMPEDANCE - FREQUENCY CHARACTERISTICS**









#### STORAGE CONDITION

#### Storage Environment

The electrical characteristics of MLCCs were degraded by the environment of high temperature or humidity. Therefore, the MLCCs shall be stored in the ambient temperature and the relative humidity of less than 40 ℃ and 70%, respectively.

Guaranteed storage period is within 6 months from the outgoing date of delivery.

#### Corrosive Gases

Since the solderability of the end termination in MLCC was degraded by a chemical atmosphere such as chlorine, acid or sulfide gases, MLCCs must be avoid from these gases.

#### Temperature Fluctuations

Since dew condensation may occur by the differences in temperature when the MLCCs are taken out of storage, it is important to maintain the temperature-controlled environment.

#### DESIGN OF LAND PATTERN

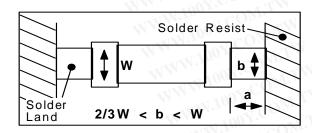
When designing printed circuit boards, the shape and size of the lands must allow for the proper amount of solder on the capacitor.

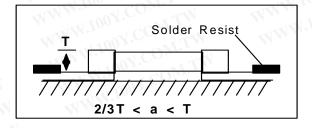
The amount of solder at the end terminations has a direct effect on the crack.

The crack in MLCC will be easily occurred by the tensile stress which was due to too much amount of solder. In contrast, if too little solder is applied, the termination strength will be insufficiently.

Use the following illustrations as guidelines for proper land design.

Recommendation of Land Shape and Size.









#### ADHESIVES

When flow soldering the MLCCs, apply the adhesive in accordance with the following conditions.

#### ▶ Requirements for Adhesives

They must have enough adhesion, so that, the chips will not fall off or move during the handling of the circuit board.

They must maintain their adhesive strength when exposed to soldering temperature.

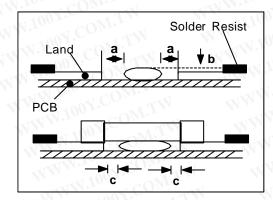
They should not spread or run when applied to the circuit board.

They should harden quickly. They should not corrode the circuit board or chip material.

They should be a good insulator. They should be non-toxic, and not produce harmful gases, nor be harmful when touched.

#### Application Method

It is important to use the proper amount of adhesive. Too little and much adhesive will cause poor adhesion and overflow into the land, respectively.



COMIT	- T.W.	unit : mm
Туре	21	31
aOM.	0.2 min	0.2 min
1100 ApCON	70~100 µm	70~100 µm
W.100c	> 0	> 0

#### Adhesive hardening Characteristics

To prevent oxidation of the terminations, the adhesive must harden at 160 ℃ or less, within 2 minutes or less.

#### MOUNTING

#### ▶ Mounting Head Pressure

Excessive pressure will cause crack to MLCCs. The pressure of nozzle will be 300g maximum during mounting.

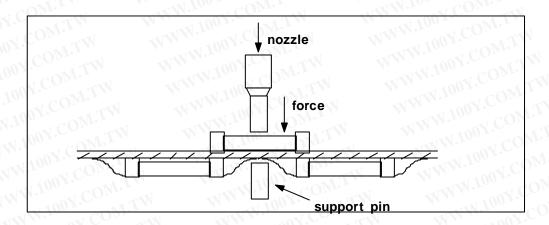




#### ▶ Bending Stress

When double-sided circuit boards are used, MLCCs first are mounted and soldered onto one side of the board. When the MLCCs are mounted onto the other side,

it is important to support the board as shown in the illustration. If the circuit board is not supported, the crack occur to the ready-installed MLCCs by the bending stress.



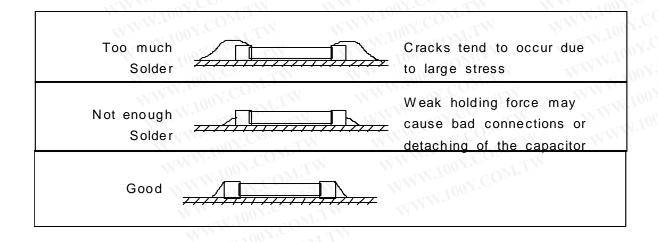
#### Manual Soldering

Manual soldering can pose a great risk of creating thermal cracks in chip capacitors.

The hot soldering iron tip comes into direct contact with the end terminations, and operator's carelessness may cause the tip of the soldering iron to come into direct contact with the ceramic body of the capacitor.

Therefore the soldering iron must be handled carefully, and close attention must be paid to the selection of the soldering iron tip and to temperature control of the tip.

#### Amount of Solder







#### ▶ Cooling

Natural cooling using air is recommended. If the chips are dipped into solvent for cleaning, the temperature difference( $\triangle T$ ) must be less than 100  $^{\circ}$ C

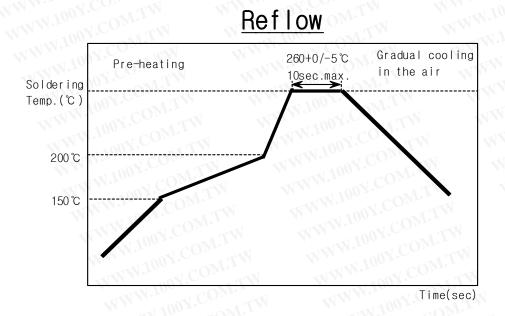
#### Cleaning

If rosin flux is used, cleaning usually is unnecessary. When strongly activated flux is used, chlorine in the flux may dissolve into some types of cleaning fluids, thereby affecting the chip capacitors. This means that the cleaning fluid must be carefully selected, and should always be new.

#### ▶ Notes for Separating Multiple, Shared PC Boards.

A multi-PC board is separated into many individual circuit boards after soldering has been completed. If the board is bent or distorted at the time of separation, cracks may occur in the chip capacitors. Carefully choose a separation method that minimizes the bending often circuit board.

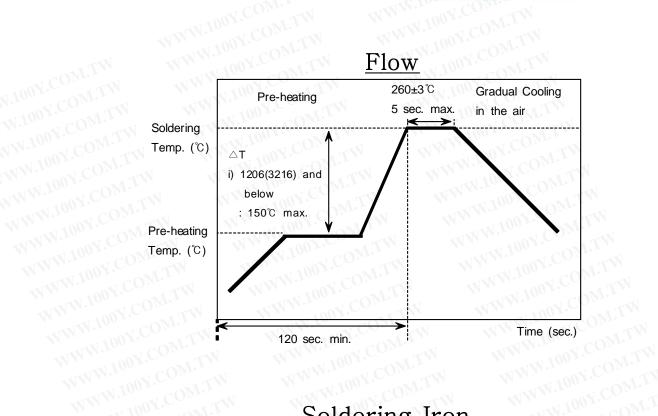
#### ▶ Recommended Soldering Profile



WWW.Inny.COM.1







### Soldering Iron

Variation of Town	Soldering	Pre-heating	Soldering	Cooling
Variation of Temp.	Temp (℃)	Time (Sec)	Time(Sec)	Time(Sec)
△T≤130	300±10℃max	≥ 60	≤ 4	VWD 100X

100 X.CO.	Condition of Iron	facilities	Mar.
Wattage	Tip Diameter	Soldering Time	WW
20W Max	3mm Max	4 Sec Max	N V

W.100Y.COM.TW \* Caution - Iron Tip Should Not Contact With Ceramic Body Directly. WWW.100Y.COM.TW WWW.100Y.COM.TW

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