

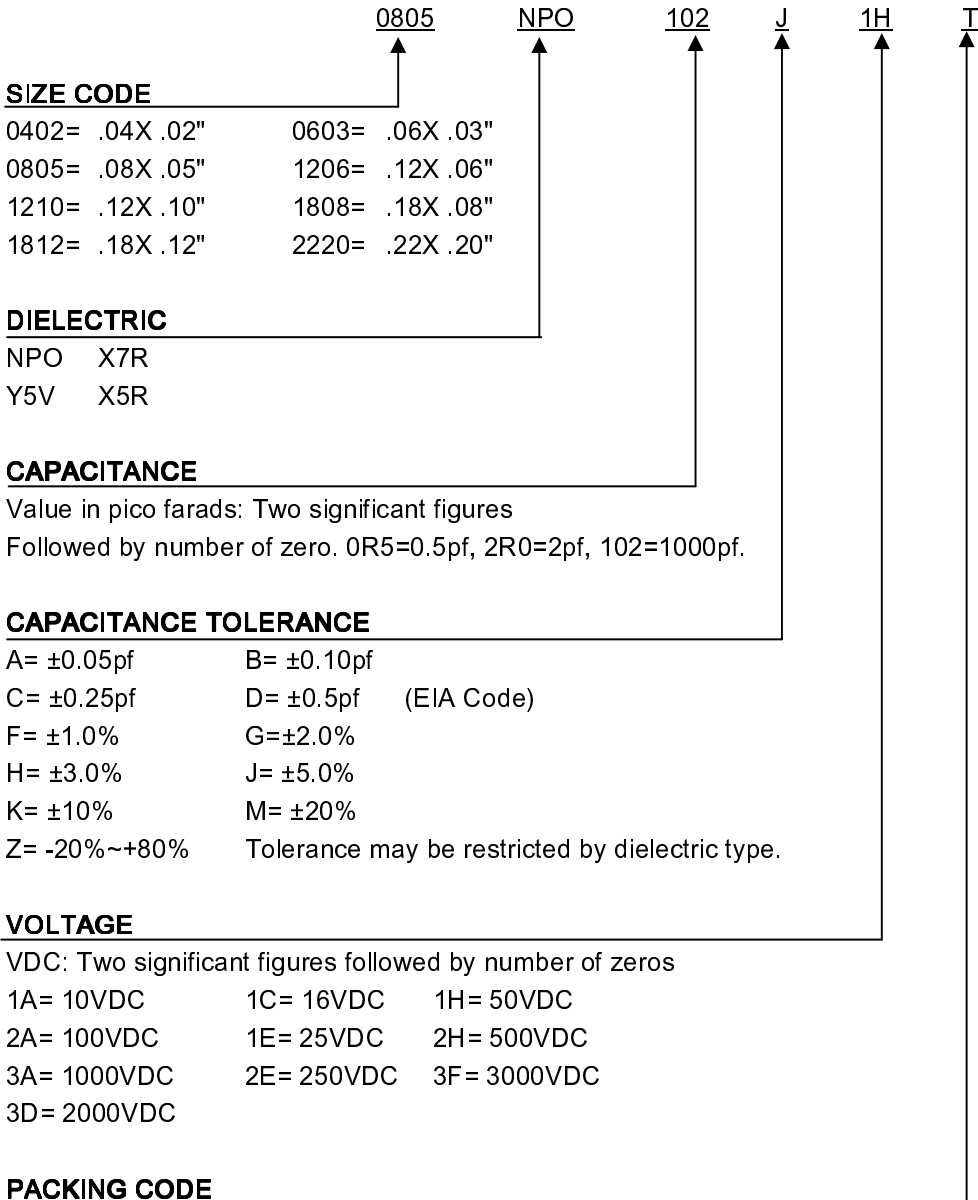
# CERAMIC CHIP CAPACITORS -(T.C.)



## EIA RS 198-CLASS 1 JIS C 6423-TYPE I

### HOW TO ORDER:

#### PART NUMBER DESIGNATION:



#### SIZE CODE

0402= .04X .02"	0603= .06X .03"
0805= .08X .05"	1206= .12X .06"
1210= .12X .10"	1808= .18X .08"
1812= .18X .12"	2220= .22X .20"

#### DIELECTRIC

NPO	X7R
Y5V	X5R

#### CAPACITANCE

Value in pico farads: Two significant figures  
 Followed by number of zero. 0R5=0.5pf, 2R0=2pf, 102=1000pf.

#### CAPACITANCE TOLERANCE

A= ±0.05pf	B= ±0.10pf	
C= ±0.25pf	D= ±0.5pf	(EIA Code)
F= ±1.0%	G=±2.0%	
H= ±3.0%	J= ±5.0%	
K= ±10%	M= ±20%	
Z= -20%~+80%	Tolerance may be restricted by dielectric type.	

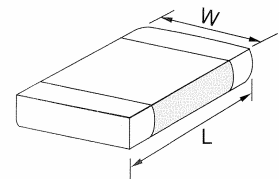
#### VOLTAGE

VDC: Two significant figures followed by number of zeros

1A= 10VDC	1C= 16VDC	1H= 50VDC
2A= 100VDC	1E= 25VDC	2H= 500VDC
3A= 1000VDC	2E= 250VDC	3F= 3000VDC
3D= 2000VDC		

#### PACKING CODE

B= Bulk  
 1= 1K/Reel      2= 2K/Reel      3= 3K/Reel      (for plastic tape only)  
 T= 4K/Reel      U=10K/Reel      V= 16K/Reel      W= 20K/Reel



#### DIMENSION:

mm	0402	0603	0805	1206	1210	1808	1812	2220
L	1.00 ±0.05	1.60 ±0.10	2.00 ±0.20	3.20 ±0.20	3.20 ±0.30	4.50 ±0.30	4.50 ±0.30	5.70 ±0.40
W	0.50 ±0.05	0.80 ±0.10	1.25 ±0.20	1.60 ±0.20	2.50 ±0.20	2.00 ±0.20	3.20 ±0.30	5.00 ±0.40

#### STORAGE

- Storage condition: To be sure the ambient temperature is 40 Celsius maximum and humidity is 80% Relative Humidity Maximum.
- Storage environment: Do not store where the soldering quality can be destroyed by harmful gas such as sulfurous gas, chlorine gas, etc.
- Store period: Should be used within 6 months after unpacking from the original reel or bulk products. Otherwise, check the solder ability before applied.

# CERAMIC CHIP CAPACITORS -(T.C.)



## EIA RS 198-CLASS 1 JIS C 6423-TYPE I

## CERAMIC CHIP CAPACITORS NPO (COG) DIELECTRIC

### APPLICATION

NPO(COG) dielectric properties ; suited for precision circuits, requiring stable dielectric characteristics:

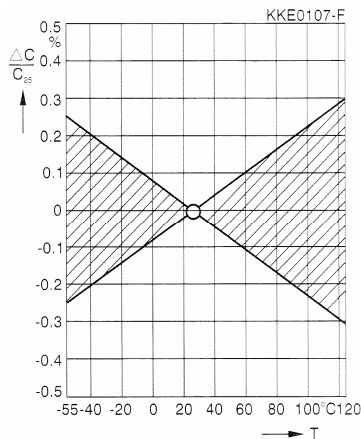
- \* Negligible dependence of capacitance and dissipation factor on time, voltage, and frequency
- \* Low-loss (High Q)
- \* Predictable linear temperature coefficient
- \* No piezoelectric behavior

### GENERAL SPECIFICATION

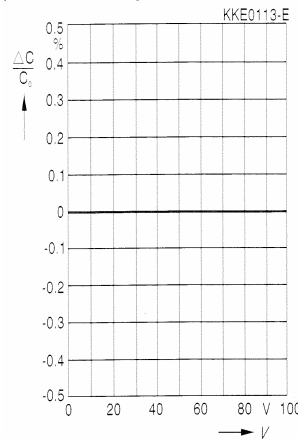
- \* Operating temperature range: -55~+125°C
- \* Capacitance range: 0.5pf~100,000pf (1.0±0.2Vrms, 1MHz, for C>1000pf use 1KHz)
- \* Capacitance tolerance: Preferred±5%, ±10%  
Others available: ±0.1pf, ±0.25pf, ±0.5pf, ±1%, ±2%
- \* Voltage rating: 25V, 50V, 100V, 250V, 500V, 1000V, 2000V, 3000VDC
- \* Q Value:  $Q \geq 1000$  for  $C > 30\text{pf}$ ,  $Q \geq 400 + 20 \times C$  (1MHz, 1KHz for  $C > 1000\text{pf}$ , 1Vrms, 25°C)
- \* Insulation resistance: (rated voltage applied at 25°C) 100,000MΩ or 500Ω-F min.
- \* Dielectric strength:  $2.5 \times \text{WV (DC.)}$  for 25~100V,  $2 \times \text{WV}$  for 200 & 250V,  $1.5 \times \text{WV}$  for 500V,  $1.2 \times \text{WV}$  for  $\geq 1000\text{V}$

### Characteristics

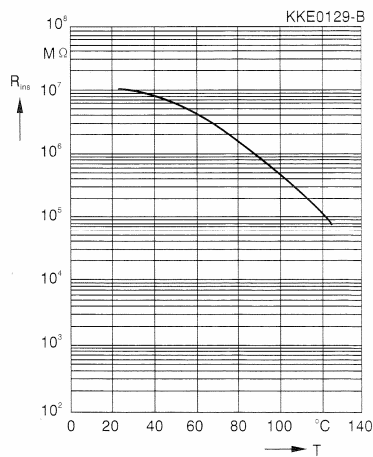
Capacitance change  $\Delta C/C_{25}$  versus Temperature T (tolerance range)



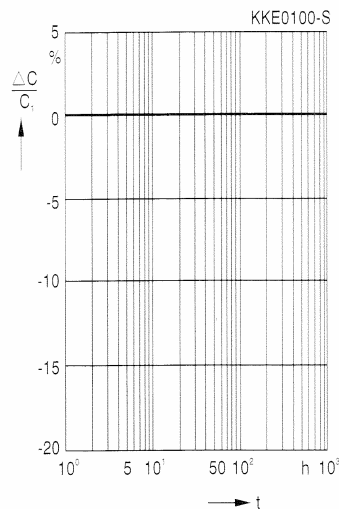
Capacitance change  $\Delta C/C_0$  versus Superimposed DC voltage V



Insulation resistance  $R_{ins}$  versus Temperature T



Capacitance change  $\Delta C/C_1$  versus time



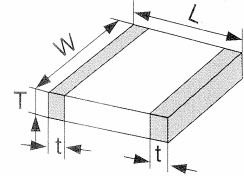
# CERAMIC CHIP CAPACITORS -(T.C.)



## EIA RS 198-CLASS 1 JIS C 6423-TYPE I

### CERAMIC CHIP CAPACITORS NPO (COG) DIELECTRIC

0805	NPO	101	J	1H	R
SIZE	T.C.	CAPACITANCE CODE	Tolerance	Voltage	Package Code
0402	NPO	Two significant digits+	B= ±0.1pf	1E= 250V	R= Tape/Reel
0603	X7R	No. of zeros	C= ±0.25pf	1H= 500V	B= Bulk
0805	Y5V	Example:	D= ±0.5pf	2A= 1000V	
1206		100= 10pf	F= ±1%		
1210		101= 100pf	G= ±2%		
1808		102= 1000pf	J= ±5%		
1812		1R2= 1.2pf	K= ±10%		
2220		R47=0.47pf			



#### SIZE AND VALUES AVAILABLE (NPO) 25V-100V

SIZE	0402		0603		0805		1206		1210		1812				
Length (L)	mm	1.00±0.05	1.60±0.10		2.00±0.20		3.20±0.20		3.20±0.30		4.50±0.30				
Width (W)	mm	0.50±0.05	0.80±0.10		1.25±0.20		1.60±0.20		2.50±0.20		3.20±0.30				
Max. Thickness (T)	mm	0.50±0.05	0.80±0.12		1.25±0.20		1.25±0.20		1.25±0.20		1.50±0.20				
Terminal (t)	mm	0.15~0.35		0.27~0.60		0.30~0.70		0.30~0.70		0.30~0.70		0.35±1.00			
Capacitance //W.V.(DC)		25	50	25	50	100	25	50	100	25	50	100	25	50	100
0.5	pf	S	S		P	P		M	M		M	M			
1	pf	S	S		P	P		M	M		M	M			
10	pf	S	S		P	P		M	M		M	M			
12	pf	S	S		P	P		M	M		M	M			
15	pf	S	S		P	P		M	M		M	M			
18	pf	S	S		P	P		M	M		M	M			
22	pf	S	S		P	P		M	M		M	M			
27	pf	S	S		P	P		M	M		M	M			
33	pf	S	S		P	P		M	M		M	M			
39	pf	S	S		P	P		M	M		M	M			
47	pf	S	S		P	P		M	M		M	M			
56	pf	S	S		P	P		M	M		M	M			
68	pf	S	S		P	P		M	M		M	M			
82	pf	S	S		P	P		M	M		M	M			
100	pf	S	S		P	P		M	M		M	M			
120	pf	S	S		P	P		M	M		M	M			
150	pf	S	S		P	P		M	M		M	M			
180	pf	S	S		P	P		M	M		M	M			
220	pf	S	S		P	P		M	M		M	M			
270	pf	S			P	P		M	M		M	M			
330	pf	S			P	P		M	M		M	M			
390	pf	S			P	P		M	M		M	M			
470	pf	S			P	P		M	M		M	M			
560	pf				P	P		M	M		M	M			
680	pf				P	P		H	H		M	M			
820	pf				P	P		H	H		M	M			
1.0	nf				P	P		H	H		M	M		X	
1.2	nf				P	P		H	H		M	H		X	
1.5	nf				P	P		H	H		M	H		X	X
1.8	nf				P	P		H	X		M	H		X	X
2.2	nf				P	P		H	X		M	H		X	X
2.7	nf							H	X		M	H		X	X
3.3	nf							X			M	H		X	X
3.9	nf							X			H	H		X	X
4.7	nf							X			H	X		X	F
5.6	nf							H			H	X		X	F
6.8	nf							H			H	X		X	F
8.2	nf							H			H	X		X	F
10	nf							X			H	X		X	F
12	nf							X			H			S	X
15	nf							X			H			S	X
18	nf										H			S	
22	nf										X			H	
27	nf										X				
33	nf										X				
47	nf										X				
56	nf														X
68	nf														X
82	nf														X
100	nf														X

# CERAMIC CHIP CAPACITORS -(T.C.)



EIA RS 198-CLASS 1 JIS C 6423-TYPE I

CERAMIC CHIP CAPACITORS NPO (COG) DIELECTRIC

## SIZE AND VALUES AVAILABLE (NPO) 250V-3000V

SIZE	0603	0805			1206			1210			1808			1812				
(L)	1.60±0.10	2.00±0.20			3.20±0.20			3.20±0.30			4.50±0.30			4.50±0.30				
(W)	0.80±0.10	1.25±0.20			1.60±0.20			2.50±0.20			2.00±0.20			3.20±0.30				
(T)	0.80±0.12	1.25±0.20			1.65±0.20			1.65±0.20			1.65±0.20			2.00±0.20				
(t)	0.27±0.60	0.30~0.70			0.30~0.70			0.30~0.70			0.35~1.00			0.35~1.00				
Cap./W.V.	250	250	500	1KV	250	500	1KV	2KV	250	500	1KV	2KV	3KV	250	500	1KV	2KV	3KV
0.5-10pf	P	M	H	H	M	H	H	H			X	X				X	X	X
12	P	M	H	H	M	H	H	H			X	X				X	X	X
15	P	M	H	H	M	H	H	H			X	X				X	X	X
18	P	M	H	H	M	H	H	H			X	X				X	X	X
22	P	M	H	H	M	H	H	H			X	X				X	X	X
27	P	M	H	H	M	H	H	H			X	X				X	X	X
33	P	M	H	H	M	H	H	H			X	X				X	X	X
39	P	M	H	H	M	H	H	H			X	X				X	X	X
47	P	M	H	H	M	H	H	H			X	X				X	X	X
56	P	M	H	H	M	H	H	H			X	X				X	X	X
68	P	M	H	H	M	H	H	H			X	X				X	X	X
82	P	M	H	H	M	H	H	H			X	X				X	X	X
100	P	M	H	X	M	H	H	X			X	X				X	X	X
120		M	H	X	M	H	H	X			X	X				X	X	X
150		M	H	X	M	H	H	X			X	X				X	X	X
180		M	H	X	M	H	H	X			X	X				X	X	X
220		M	H	X	M	H	H	X			X	X				X	X	X
270		M	H	X	M	X	X	L			X	X				X	X	X
330		M	H		M	X	X				X	X				X	X	F
390		M	H		M	X	X				X	F				X	X	F
470		M	H		M	X	X				X	F				X	X	
560		H			M	X	X				X	L				X	X	
680		H			H	X	X				X					X	X	
820		H			H	X	X				X					X	X	F
1000		H			H	X	X		X	X	X			X	X	X	X	F
1200		X			H	X	X		X	X	X			X	X	X	X	L
1500		X			H	X	X		X	X	X			X	X	X	X	
1800					H	L			X	X	X			X	X	X	X	
2200					X	L			X	X	F			X	X	X	X	
2700					X				X	X				X	X	X	X	
3300					X				X	F				X	F		X	F
3900					X				X					X		X	X	F
4700									X					X		X	X	F
5600									X			F				F	F	
6800									F			F				F	F	
8200																F		
10000																F		
12000																F		

### TICKNESS CODE:

S= 0.50± 0.05

P= 0.80± 0.12

M= 0.70± 0.12

H= 0.85± 0.15

X= 1.25± 0.20

F= 1.50± 0.20

L= 1.65± 0.20

# CERAMIC CHIP CAPACITORS -(T.C.)



## EIA RS 198-CLASS 1 JIS C 6423-TYPE I

## CERAMIC CHIP CAPACITORS X7R/X5R DIELECTRIC

### APPLICATION

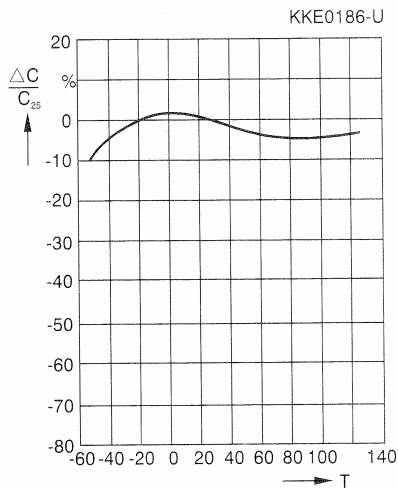
X7R dielectric properties; suited for by-pass and coupling purposes, filtering, frequency discrimination, DC blockage, and as voltage transient suppression elements.

### GENERAL SPECIFICATION

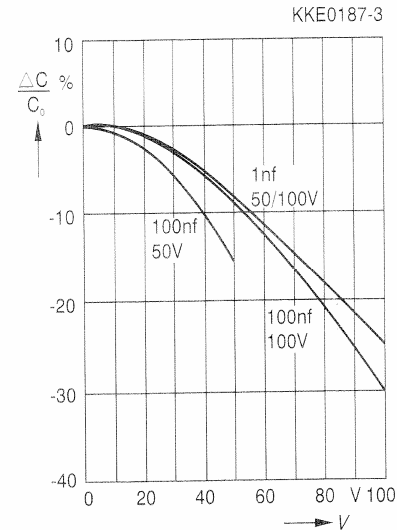
- \* Operating temperature range: X7R -55~+125°C, X5R -55~+85°C
- \* Capacitance range: 100pf~100uf (1.0 ± 0.2 Vrms, 1KHz)
- \* Capacitance tolerance: Preferred ±10%, ±20%, others available: ±5%
- \* Voltage Ratings: 6.3V, 10V, 16V, 25V, 50V, 100V, 250V, 500V, 1000V, 2000V & 3000VDC
- \* Dissipation factor: (1 KHz, 1.0 Vrms, 25) 2.5% Max. (≥50V), 3.5% Max (25V, 16V) 5% Max. (10V)
- \* Insulation resistance: (rated voltage applied at 25) 10,000MΩ or 100 Ω-Fmin
- \* Dielectric strength: 2.5 × WV. For 10~100V, 2 × WV for 200& 250V, 1.5 × WV for 500V, 1.2 × WV for ≥1000V

### Characteristics

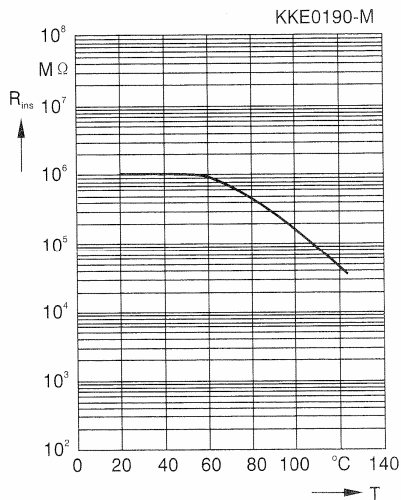
Capacitance change  $\Delta C/C_{25}$  versus Temperature T (tolerance range)



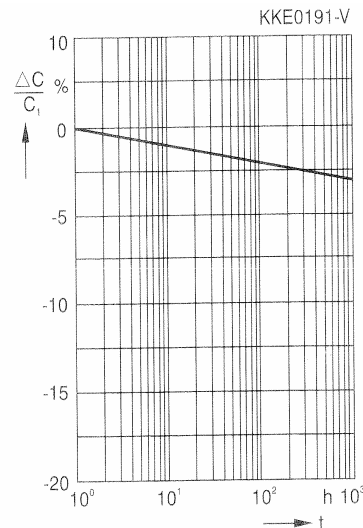
Capacitance change  $\Delta C/C_0$  versus Superimposed DC voltage V



Insulation resistance  $R_{ins}$  versus Temperature T



Capacitance change  $\Delta C/C_1$  versus time (aging rate)



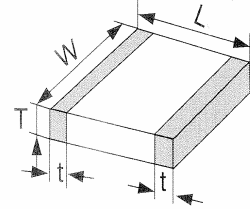
# CERAMIC CHIP CAPACITORS -(T.C.)



## EIA RS 198-CLASS 1 JIS C 6423-TYPE I

### CERAMIC CHIP CAPACITORS X7R/X5R DIELECTRIC

<u>1206</u>	<u>X7R</u>	<u>103</u>	<u>K</u>	<u>2H</u>	<u>I</u>
SIZE	T.C.	CAPACITANCE CODE	Tolerance	Voltage	Package Code
0402	X7R	Two significant digits+	J= ±5%	1C= 16V	T= Tape/Reel
0603	X5R	No. of zeros	K= ±10%	1E= 25V	
0805		Example:	M= ±20%	1H= 50V	
1206		101= 100pf		2A=100V	
1210		102= 1000pf		2E= 250V	
1808		223= 22000pf		2H= 500V	
1812		104= 100000pf		3A= 1kV	
2220				3D= 2KV	
				3F= 3KV	



### SIZE AND VALUES AVAILABLE (X7R) 10V-100V

SIZE	Cap./W.V.	0402			0603			0805			1206			1210			1812				
		10	16	25	50	10	16	25	50	100	10	16	25	50	100	25	50	100	50	100	
120	pf				S																
150	pf				S																
180	pf				S																
220	pf				S																
270	pf				S																
330	pf				S																
390	pf				S																
470	pf				S																
560	pf				S																
680	pf				S																
820	pf				S																
1000	pf				S																
1200	pf				S																
1500	pf				S																
1800	pf				S																
2200	pf				S																
2700	pf				S																
3300	pf				S																
3900	pf				S																
4700	pf				S																
5600	pf				S																
6800	pf				S																
8200	pf				S																
10	nf				S																
12	nf				S																
15	nf				S																
18	nf				S																
22	nf				S																
27	nf				S																
33	nf				S																
39	nf				S																
47	nf				S																
56	nf																				
68	nf																				
82	nf																				
100	nf																				
120	nf																				
150	nf																				
220	nf																				
330	nf																				
470	nf																				
680	nf																				
1.0	uf																				
2.2	uf																				
3.3	uf																				
4.7	uf																				

# CERAMIC CHIP CAPACITORS -(T.C.)



EIA RS 198-CLASS 1 JIS C 6423-TYPE I

CERAMIC CHIP CAPACITORS X7R/X5R DIELECTRIC

## SIZE AND VALUES AVAILABLE (X7R) 250V-3000V

SIZE		0805			1206				1210				1808					1812				2220			
(L)	mm	2.00±0.20			3.20±0.20				3.20±0.30				4.50±0.30					4.50±0.30				5.70±0.40			
(W)	mm	1.25±0.20			1.60±0.20				2.50±0.20				2.00±0.20					3.20±0.30				5.00±0.40			
(T)	mm	1.25±0.20			1.65±0.20				1.65±0.20				2.00±0.20					2.00±0.20				3.00±0.20			
(t)	mm	0.30~0.70			0.30~0.70				0.35~1.00				0.35~1.00					0.35~1.00				0.35~1.00			
Cap./W.V.		250	500	1K	250	500	1K	2K	250	500	1K	2K	250	500	1K	2K	3K	250	500	1K	2K	3K	500	1K	2K
150	pf	M	M	H	H	H	H	X		X	X	X		X	X	X	L	X	X	X	X	X			
180	pf	M	M	H	H	H	H	X		X	X	X		X	X	X	L	X	X	X	X	X			
220	pf	M	M	H	H	H	H	X		X	X	X		X	X	X	L	X	X	X	X	X			
270	pf	M	M	H	H	H	H	X		X	X	X		X	X	X	L	X	X	X	X	X			
330	pf	M	M	H	H	H	H	X		X	X	X		X	X	X	L	X	X	X	X	X			
390	pf	M	M	H	H	H	H	X		X	X	X		X	X	X	L	X	X	X	X	X			
470	pf	M	M	H	H	H	H	X		X	X	X		X	X	X	L	X	X	X	X	X			
560	pf	M	M	H	H	H	X	X		X	X	X		X	X	X	L	X	X	X	X	X			
680	pf	M	M	H	H	H	X	L		X	X	X		X	X	X	L	X	X	X	X	X			
820	pf	M	M	H	H	H	X	L		X	X	X		X	X	X	L	X	X	X	X	X			
1000	pf	M	M	H	H	H	X	L		X	X	X		X	X	X	L	X	X	X	X	X			
1200	pf	M	M	X	H	H	X			X	X	X		X	X	X	L	X	X	X	X	L			
1500	pf	M	M	X	H	H	X			X	X	X		X	X	X	L	X	X	X	X	L			
1800	pf	M	M	X	H	H	X			X	X	F		X	X	L	L	X	X	X	X	L			
2200	pf	M	M	X	H	H	X			X	X			X	X			X	X	X	X	L			
2700	pf	M	M	X	H	H	X			X	X			X	X			X	X	X	F				
3300	pf	M	H		H	H	X			X	F			X	F			X	X	X	F				
3900	pf	M	X		H	H				X	F			X	L			X	X	X	L				
4700	pf	H	X		H	H				X				X				X	X	X	Z				
5600	pf	H	X		H	H				X				X				X	X	X					
6800	pf	H			H	H				X				X				X	X	X				Z	
8200	pf	H			H	X				X				X				X	X	F				Z	
10	nf	H			H	X				X				X				X	X	F				Z	
12	nf	H			H	X				X				X				X	X	Z				Z	
15	nf	H			H	X				X				X				X	X	Z				Z	
18	nf	H			H	X				X				X				X	X	Z				Z	
22	nf	H			H	X				X				X				X	X	Z				Z	
27	nf				X									F				X	X	Z				Z	
33	nf				X									L				X	X					Z	
39	nf				X									L				X	X					Z	
47	nf				X									L				X	X					Z	
56	nf									F								X	F					Z	
68	nf									F								X	F					Z	
82	nf									F								X	F					Z	
100	nf									L								X	L					Z	
120	nf																	F						Z	
150	nf																	F						Z	
180	nf																	F						Z	
220	nf																	F						Z	
270	nf																	Z						Z	
330	nf																	Z						Z	
470	nf																	Z						Z	

# CERAMIC CHIP CAPACITORS -(T.C.)



EIA RS 198-CLASS 1 JIS C 6423-TYPE I

CERAMIC CHIP CAPACITORS X7R/X5R DIELECTRIC

## SIZE AND VALUES AVAILABLE (X5R) 6.3V-50V

SIZE		0402		0603		0805			1206			1210				1812			2220		
(L)	mm	1.00±0.05		1.60±0.10		2.00±0.20			3.20±0.20			3.20±0.30				4.50±0.30			5.70±0.40		
(W)	mm	0.50±0.05		0.80±0.10		1.25±0.20			1.60±0.20			2.50±0.20				3.20±0.30			5.00±0.40		
(T)	mm	0.50±0.05		0.80±0.12		1.50±0.20			2.00±0.20			2.50±0.20				3.00±0.20			3.00±0.20		
(t)	mm	0.15~0.35		0.27~0.60		0.30~0.70			0.30~0.70			0.30~0.70				0.35~1.00			0.35~1.00		
Cap./W.V.		6.3	10	6.3	10	6.3	10	16	6.3	10	16	6.3	10	16	50	6.3	16	6.3	16	50	
47	nf		S																		
56	nf		S																		
68	nf		S																		
82	nf		S																		
100	nf	S	S																		
120	nf	S																			
150	nf	S																			
220	nf	S																			
330	nf				P			F													
470	nf				P			F													
680	nf				P			F													
1.0	uf			P			F	F													
2.2	uf			P		X	F			L						E					
3.3	uf					X	F			L	L					E					
4.7	uf					X	F			L	L										
6.8	uf					F									Z						
10	uf					F			L	Z					Z						E
22	uf											E	E				E				
47	uf											E				E				E	
100	uf															Y		Y			

### THICKNESS CODE:

- S= 0.50 ± 0.05
- P= 0.80 ± 0.12
- M= 0.70 ± 0.12
- H= 0.85 ± 0.15
- X= 1.25 ± 0.20
- F= 1.50 ± 0.20
- L= 1.65 ± 0.20
- Z= 2.00 ± 0.20
- E= 2.50 ± 0.20
- Y= 3.00 ± 0.20



# CERAMIC CHIP CAPACITORS -(T.C.)



## EIA RS 198-CLASS 1 JIS C 6423-TYPE I

## CERAMIC CHIP CAPACITORS Y5V DIELECTRIC

### APPLICATION

The Hi-K (Y5V) dielectrics deliver high capacitance density and are ideally suited for applications where space is at a premium, or as replacement for tantalum capacitors. Typical applications include use as by-pass or decoupling elements.

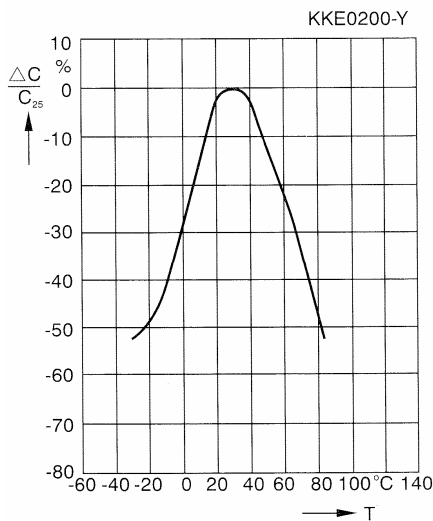
Best performance is obtained at or near room temperature, with low D.C. bias.

### GENERAL SPECIFICATION

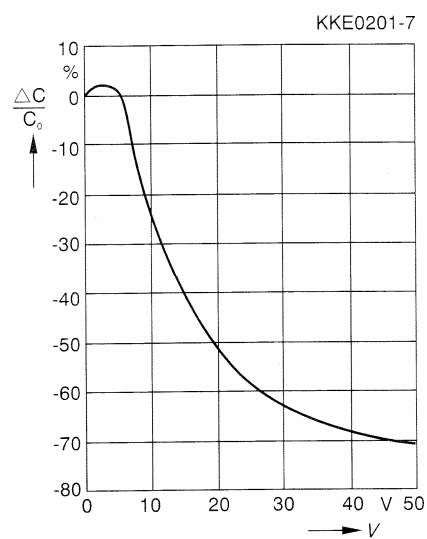
- \* Operating temperature range: -30~+85°C
- \* Capacitance range: 100nf~100uf
- \* Capacitance tolerance:  $\pm 20\%$ , +80-20%
- \* Voltage ratings: 10VDC, 16VDC, 25VDC, 50VDC
- \* Dissipation factor: (1KHz, 0.5Vrms, 25) 5% Max. (50V), 7% Max. (16/25V), 10% Max. (10/6.3V)
- \* Insulation resistance: (rated voltage applied at 25) 10,000M $\Omega$  or 100 $\Omega$ -F min
- \* Dielectric strength: 2.5  $\times$  WV.DC.

### Characteristics

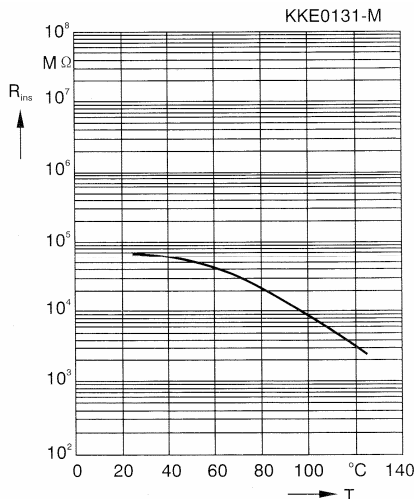
Capacitance change  $\Delta C/C_{25}$  versus Temperature T



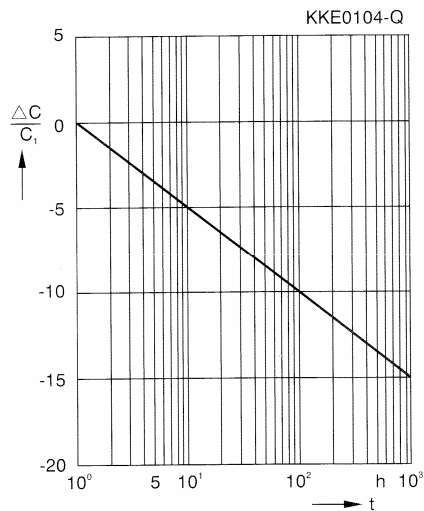
Capacitance change  $\Delta C/C_0$  versus Superimposed DC voltage V



Insulation resistance  $R_{ins}$  versus Temperature T



Capacitance change  $\Delta C/C_1$  versus time (aging rate)



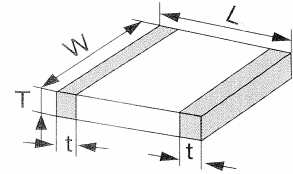
# CERAMIC CHIP CAPACITORS -(T.C.)



EIA RS 198-CLASS 1 JIS C 6423-TYPE I

CERAMIC CHIP CAPACITORS Y5V DIELECTRIC

0805	Y5V	104	M	1H	I
SIZE	T.C.	CAPACITANCE CODE	Tolerance	Voltage	Package Code
0402	Y5V	Two significant digits+	M= ±20%	1C= 16V	T=Tape/Reel
0603		No. of zeros	Z= +80/-20%	1E= 25V	
0805		Example:		1H= 50V	
1206		102= 1000pf			
1210		223= 22000pf			
1812		104= 100000pf			



## SIZE AND VALUES AVAILABLE (Y5V) 6.3V-50V

SIZE	0402			0603			0805					1206				1210			1812								
(L)	mm			1.00±0.05			1.60±0.10			2.00±0.20					3.20±0.20				3.20±0.30			4.50±0.30					
(W)	mm			0.50±0.05			0.80±0.10			1.25±0.20					1.60±0.20				2.50±0.20			3.20±0.30					
(T)	mm			0.50±0.05			0.80±0.12			1.25±0.20					1.60±0.20				2.00±0.20			2.50±0.20					
(t)	mm			0.15~0.35			0.27~0.60			0.30~0.70					0.30~0.70				0.30~0.70			0.35~1.00					
Cap./W.V.	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	10	16	25	50	10	16	25	10	16	25	10	16	25	50
10	nf		S	S				P	P					S				S									
12	nf		S	S				P	P					S				S									
18	nf		S	S				P	P					S				S									
22	nf		S	S				P	P					S				S									
27	nf		S	S				P	P					S				S									
33	nf		S	S				P	P					S				S									
39	nf		S	S				P	P					S				S									
47	nf	S	S	S				P	P					S				S									
56	nf	S						P	P					S				S									
68	nf	S						P	P					S				S									
82	nf	S						P	P					S				S									
100	nf	S						P	P				S	S			S	S									
120	nf							P					S	S			S	S									
150	nf							P					S	S			S	S									
220	nf							P	P				S	S			S	S									
330	nf							P					M	M	H		H	H									
470	nf							P	P				H	H	H		H	H									
680	nf							P	P				X	X	X		H	H									
1.0	uf							P	P				X	X	X		X	X									
2.2	uf					P							X	X		X	X										
3.3	uf												X			X	X										
4.7	uf												X			X	X										
10	uf										X	X				L						L	L				Z
22	uf															L						Z	Z				Z
33	uf																					Z					
47	uf																					Z				E	
100	uf																					E			E		

### THICKNESS CODE:

S= 0.50 ± 0.05;	P= 0.80 ± 0.12	M= 0.70 ± 0.12	H= 0.85 ± 0.15
X= 1.25 ± 0.20;	F= 1.50 ± 0.20	L= 1.65 ± 0.20	Z= 2.00 ± 0.20
E= 2.50 ± 0.20			

# CERAMIC CHIP CAPACITORS -(T.C.)



## EIA RS 198-CLASS 1 JIS C 6423-TYPE I

## CERAMIC CHIP CAPACITORS Z5U DIELECTRIC

### APPLICATION

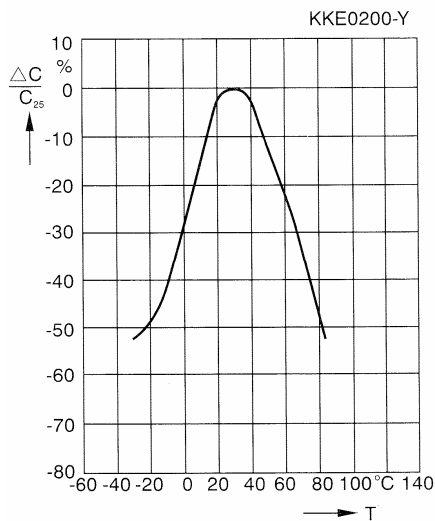
The Z5U dielectrics deliver high volumetric efficiency with non-polar construction. Typical applications include use as by-pass, decoupling and filtering.

### GENERAL SPECIFICATION

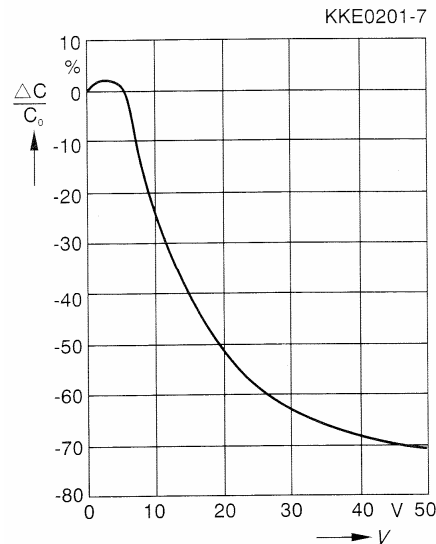
- \* Operating temperature range: +10~+85°C
- \* Capacitance range: 2700pf~1.0uf
- \* Capacitance tolerance: ±20%, +80~20%
- \* Voltage ratings: 25VDC, 50VDC, 100VDC, 250VDC
- \* Dissipation factor: (1KHz, 0.5Vrms, 25), 4% Max. (≥50V), 6% Max. (25V)
- \* Insulation resistance: ( rated voltage applied at 25) 10,000MΩ or 100Ω-Fmin
- \* Dielectric strength:>2.5×WV. For 25-100V, 2×WV for 200& 250V

### Characteristics

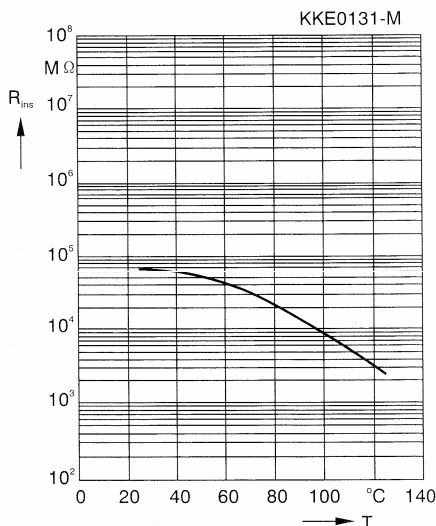
Capacitance change  $\Delta C/C_{25}$  versus Temperature T



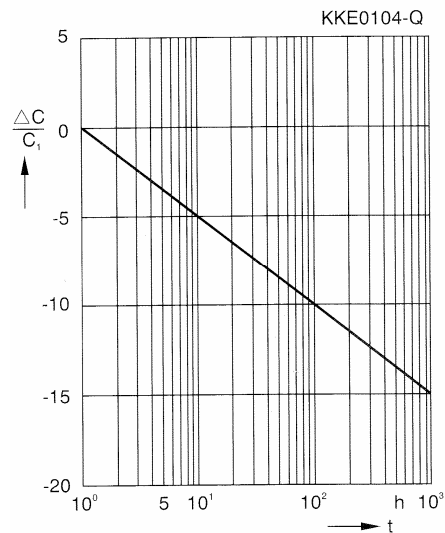
Capacitance change  $\Delta C/C_0$  versus Superimposed DC voltage V



Insulation resistance  $R_{ins}$  versus Temperature T



Capacitance change  $\Delta C/C_1$  versus time (aging rate)



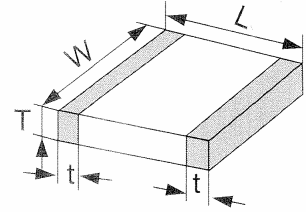
# CERAMIC CHIP CAPACITORS -(T.C.)



## EIA RS 198-CLASS 1 JIS C 6423-TYPE I

### CERAMIC CHIP CAPACITORS Z5U DIELECTRIC

0805	Z5U	104	M	1H	T
SIZE	T.C.	CAPACITANCE CODE	Tolerance	Voltage	Package Code
0603	Z5U	Two significant digits+	M= ±20%	1E= 25V	T= Tape/Reel
0805		No. of zeros	Z= +80/-20%	1H= 50V	
1206		Example:		2A= 100V	
1210		102= 1000pf		2E= 250V	
1812		223= 22000pf			
		104= 100000pf			



### SIZE AND VALUES AVAILABLE (Z5U)

SIZE		0603		0805			1206			1210			1812		
(L)	mm	1.60±0.10		2.00±0.20			3.20±0.20			3.20±0.30			4.50±0.30		
(W)	mm	0.80±0.10		1.25±0.20			1.60±0.20			0.25±0.20			3.20±0.30		
(T)	mm	0.80±0.12		1.25±0.20			1.60±0.20			2.00±0.20			2.50±0.20		
(t)	mm	0.27~0.60		0.30~0.70			0.30~0.70			0.30~0.70			0.35~1.00		
Cap./W.V.		25	50	25	50	100	25	50	100	25	50	100	50	100	250
2.7	nf	P	P	M	M	M									
3.3	nf	P	P	M	M	M									
3.9	nf	P	P	M	M	M									
4.7	nf	P	P	M	M	M									
5.6	nf	P	P	M	M	M									
6.8	nf	P	P	M	M	M									
8.2	nf	P	P	M	M	M	H	H	H						
10	nf	P	P	M	M	M	H	H	H						
12	nf	P	P	M	M	M	H	H	H						
18	nf	P	P	M	M	M	H	H	H						
22	nf	P	P	M	M	M	H	H	H						
27	nf	P	P	M	M	M	H	H	H						
33	nf	P	P	M	M	M	H	H	H						
39	nf	P	P	M	M	M	H	H	H						
47	nf	P	P	M	M	H	H	H	H						
56	nf	P		M	M	H	H	H	H						
68	nf	P		M	M	H	H	H	H						
85	nf	P		M	M	H	H	H	H						
100	nf	P		M	M	H	H	H	H						X
120	nf			M	X		H	H	H						X
150	nf			H			H	H	H						X
220	nf			H			H	H	X	X	X	X			X
330	nf						H	H		X	X	X			X
470	nf						X	X		X	X	X	X	X	L
680	nf									X			X	X	
1.0	uf												X	X	

### THICKNESS CODE:

S= 0.50 ± 0.05	P= 0.80 ± 0.12	M= 0.80 ± 0.12	H= 0.85 ± 0.15
X= 1.25 ± 0.20	F= 1.50 ± 0.20	L= 1.65 ± 0.20	Z= 2.00 ± 0.20

# CERAMIC CHIP CAPACITORS -(T.C.)

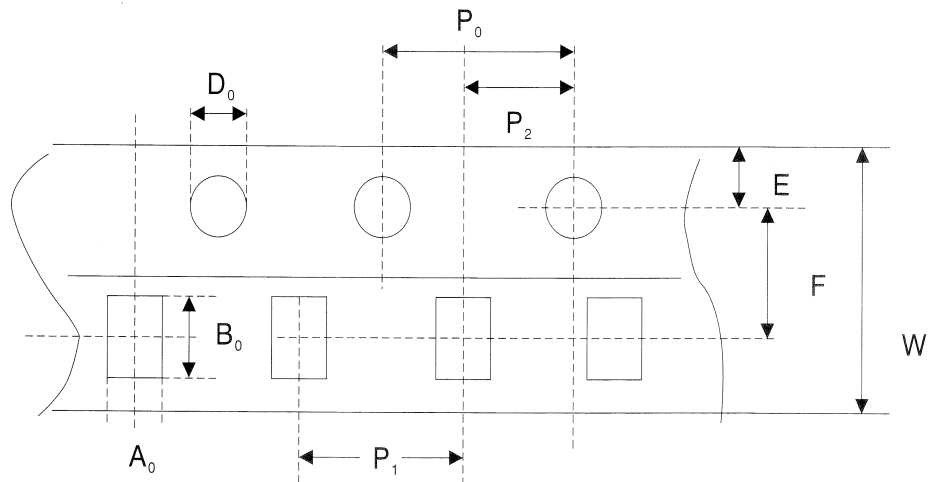


EIA RS 198-CLASS 1 JIS C 6423-TYPE I

SURFACE MOUNT CHIP CAPACITORS

TAPE AND REEL PACKAGING INFORMATION

DIMENSION OF PAPERTAPE



MARK \ CHIP SIZE	0402	0603	0805	1206	TOLERANCE
$A_0$	0.65	1.10	1.50	1.90	$\pm 0.2$
$B_0$	1.15	1.90	2.30	3.50	$\pm 0.2$
$W$	8	8	8	8	$\pm 0.3$
$E$	1.75	1.75	1.75	1.75	$\pm 0.10$
$F$	3.5	3.5	3.5	3.5	$\pm 0.05$
$D_0$	1.55	1.55	1.55	1.55	$\pm 0.10$
$P_1$	2	4	4	4	$\pm 0.05$
$P_2$	2	2	2	2	$\pm 0.05$
$P_0$	4	4	4	4	$\pm 0.05$

Paper thickness: T:  $0.65 \pm 0.05$  m/m (for 0402product)  
 T:  $0.75 \pm 0.05$  m/m (for thickness code S)  
 T:  $0.95 \pm 0.05$  m/m (thickness code: P、M、H)

Note:(1). The top tape and bottom tape shall not protrude beyond the edges of the tape, and shall not cover sprocket holes.  
 (2). Cumulative tolerance of sprocket holes 10 pitch:  $\pm 0.3$ mm

# CERAMIC CHIP CAPACITORS -(T.C.)

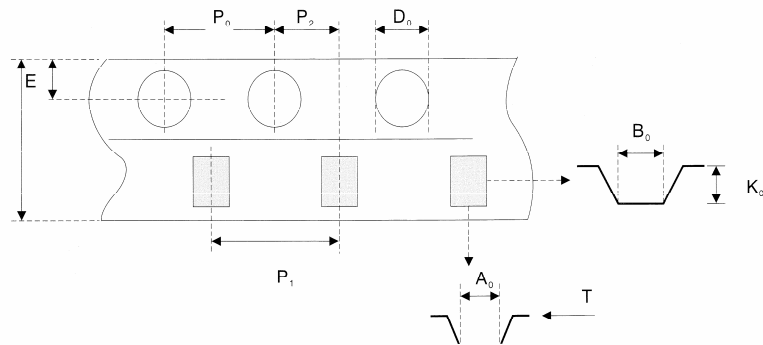


EIA RS 198-CLASS 1 JIS C 6423-TYPE I

SURFACE MOUNT CHIP CAPACITORS

TAPE AND REEL PACKAGING INFORMATION

DIMENSION OF EMBOSSED PACKING (PLASTIC TAPE)

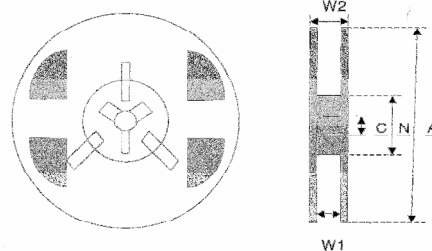


MARK	0805	1206	1210	1808	1812	2220
A <sub>0</sub>	1.50 ± 0.2	1.90 ± 0.2	1.90 ± 0.2	2.5 ± 0.3	3.60 ± 0.3	3.60 ± 0.3
B <sub>0</sub>	2.30 ± 0.2	3.50 ± 0.2	3.60 ± 0.2	4.0 ± 0.3	4.90 ± 0.3	4.90 ± 0.3
K <sub>0</sub>	1.40 max	1.65 max	1.65 max	2.00 max	2.00 max	2.50 max
D <sub>0</sub>	1.55 ± 0.1	1.55 ± 0.1	1.55 ± 0.1	1.55 ± 0.1	1.55 ± 0.1	1.55 ± 0.1
W	8.00 ± 0.2	8.00 ± 0.2	8.00 ± 0.2	12.00 ± 0.2	12.00 ± 0.2	12.00 ± 0.2
P <sub>1</sub>	4.00 ± 0.1	4.00 ± 0.1	4.00 ± 0.1	4.00 ± 0.1	8.00 ± 0.1	8.00 ± 0.1
P <sub>2</sub>	2.00 ± 0.1	2.00 ± 0.1	2.00 ± 0.1	2.00 ± 0.1	2.00 ± 0.1	2.00 ± 0.1
E	1.75 ± 0.1	1.75 ± 0.1	1.75 ± 0.1	1.75 ± 0.1	1.75 ± 0.1	1.75 ± 0.1
T	0.25 ± 0.1	0.25 ± 0.1	0.25 ± 0.1	0.25 ± 0.1	0.25 ± 0.1	0.25 ± 0.1
P <sub>0</sub>	4.00 ± 0.1	4.00 ± 0.1	4.00 ± 0.1	4.00 ± 0.1	4.00 ± 0.1	4.00 ± 0.1

TAPE THICKNESS: 0.25± 0.05mm

Emboss tape: for thickness code X, F, L, Z, E.

DIMENTION OF REEL



Unit: mm

REEL SIZE	A	N	C	W1	W2(max.)
7" (PAPER)	179 ± 2	60 ± 2	13.0 ± 0.5	9.4 ± 1.0	14.4
7" (PLASTIC)	179 ± 2	60 ± 2	13.0 ± 0.5	12.0 ± 1.5	16.0
10"	254 ± 2	100 ± 2	13.0 ± 0.5	9.5 ± 1.0	14.4
13"	330 ± 2	100 ± 2	13.0 ± 0.5	9.5 ± 1.0	14.4