

# HIGH VOLTAGE CERAMIC CHIP CAPACITOR

## - CHV SERIES -

### SCOPE

- Cal-Chip's unique construction process ensures excellent volumetric efficiency and stability of capacitance with temperature.
- Our high voltage capacitors have extended values to those previously offered.

### FEATURES

- Special internal electrode design offers the highest voltage rating.
- Surface mount suitable for wave and reflow soldering
- High reliability
- RoHS compliant

### APPLICATIONS

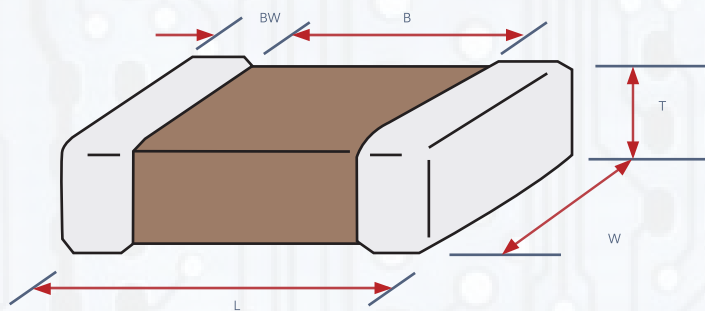
- Suitable for LAN/WLAN interface
- Back-lighting inverter, DC-DC converters,
- Ballast, Modems and Power Supplies



### ELECTRICAL SPECIFICATIONS

Operating Temperature	-55°C to 125°C
Rating Voltage	100Vdc to 5000Vdc
Temperature Coefficient	NPO: $\leq \pm 30 \text{ppm}/^\circ\text{C}$ , -55°C ~ +125°C (EIA Class I) X7R: $\leq \pm 15 \text{ppm}/^\circ\text{C}$ , -55°C ~ +125°C (EIA Class II)
Dissipation Factor	NPO: $Q > 1000$ , X7R: D.F. $\leq 2.5\%$
Insulation Resistance	10GΩ or 500/CΩ whichever is smaller
Aging	NPO: 0%, X&R: Typically 1.0% per decade of time
Dielectric Strength	100 ≤ V < 500V, 200% Rated Voltage
	500 ≤ V < 1000V, 150% Rated Voltage
	1000 ≤ V, 120% Rated Voltage

### CONSTRUCTION & DIMENSIONS



TYPE (MM)	L (MM)	W (MM)	T (MAX) (MM)	B (MIN) (MM)	BW (MIN) (MM)
0402	1.00+/-0.05	0.5+/-0.05	*	0.3	0.15
0603	1.60±0.10	0.80±0.10	*	0.4	0.15
0805	2.00±0.20	1.25±0.20	*	0.7	0.20
1206	3.20±0.30	1.60±0.20	*	1.5	0.30
1210	3.20±0.30	2.50±0.20	*	1.6	0.30
1808	4.60±0.30	2.00±0.20	*	2.5	0.30
1812	4.60±0.30	3.20±0.30	*	2.5	0.30
1825	4.60±0.30	6.35±0.40	*	2.5	0.30
2220	5.70±0.40	5.00±0.40	*	3.5	0.30
2225	5.70±0.40	6.35±0.40	*	3.5	0.30

### ORDERING INFORMATION

CHV	0805	N	250	103	K	X	T	D
PRODUCT TYPE	SIZE	TERMINATION OPTIONS	RATED VOLTAGE	CAPACITANCE	TOLERANCE	DIELECTRIC	PACKAGING	PACKAGING
	0402 : 0402 0603 : 0603 0805 : 0805 1206 : 1206 1210 : 1210 1808 : 1808 1812 : 1812 1825 : 1825 2220 : 2220 2225 : 2225	N: Nickel Barrier  A: Nickel Barrier/ Arc Protection  P: Pd/Ag	250 : 250V 450 : 450V 500 : 500V 630 : 630V 1K0 : 1KV 1K5 : 1.5KV 2K0 : 2KV 2K5 : 2.5KV 3K0 : 3KV 4K0 : 4KV 5K0 : 5KV 6K0 : 6KV	Two significant digits followed by no. of zeros. And R in place of decimal point.	B: $\pm 0.1 \text{pF}$ C: $\pm 0.25 \text{pF}$ D: $\pm 0.50 \text{pF}$ F: $\pm 1\%$ G: $\pm 2\%$ J: $\pm 5\%$ K: $\pm 10\%$ M: $\pm 20\%$	C: COG X: X7R	T: 7" REEL	D Optional 10K reel (from 0603-1210 size)

\*REFERENCE CHARTS BELOW



**CAPACITANCE RANGE**

DIMENSION (MM)		CHV0402	CHV0603				CHV0805							
L(L1)		1.0 ± 0.05	1.6 ± 0.1				2.00 ± 0.2							
W		0.5 ± 0.05	0.8 ± 0.1				1.25 ± 0.2							
BW(L2/L3)		0.1 ~ 0.35	0.40 ± 0.05				0.7 ± 0.2							
DIELECTRIC		COG	COG		X7R		COG				X7R			
T (max)		0.55	0.95				1.45				1.45			
RATED VOLTAGE		250	250	500	250	500	250	500	630	1KV	250	500	630	1KV
1.0pF	1R0													
1.1	1R1													
1.2	1R2													
1.3	1R3													
1.5	1R5													
1.8	1R8													
2.0	2R0													
2.2	2R2													
2.4	2R4													
2.5	2R5													
2.7	2R7													
3.0	3R0													
3.3	3R3													
3.6	3R6													
3.9	3R9													
4.0	4R0													
4.3	4R3													
4.7	4R7													
5.0	5R0													
5.1	5R1													
5.6	5R6													
6.0	6R0													
6.2	6R2													
6.8	6R8													
7.0	7R0													
7.5	7R5													
8.0	8R0													
8.2	8R2													
9	9R0													
9.1	9R1													
10	100													
11	110													
12	120													
13	130													
15	150													
16	160													
18	180													
20	200													
22	220													
24	240													
27	270													
30	300													
33	330													
36	360													
39	390													
43	430													
47	470													
56	560													
68	680													
100	101													
120	121													
150	151													
180	181													
220	221													

CAPACITANCE RANGE





# CAPACITANCE RANGE

DIMENSION (MM)		CHV0603					CHV0805								
L(L1)		1.6±0.1					2.00 ± 0.2								
W		0.8±0.1					1.25 ± 0.2								
BW(L2/L3)		0.40 ± 0.05					0.7 ± 0.2								
DIELECTRIC		COG		X7R			COG				X7R				
T (max)		0.95	0.95	0.95	0.95	0.95	1.45				1.45				
RATED VOLTAGE		250	500	250	500	1KV	250	500	630	1KV	250	500	630	1KV	
CAPACITANCE RANGE	240	241													
	270	271													
	300	301													
	330	331													
	360	361													
	390	391													
	430	431													
	470	471													
	510	511													
	560	561													
	620	621													
	680	681													
	750	751													
	820	821													
	910	911													
	1.0nF	102													
	1.2	122													
	1.3	132													
	1.5	152													
	1.6	162													
	1.8	182													
	2.0	202													
	2.2	222													
	2.7	272													
	3.3	332													
	3.9	392													
	4.7	472													
	5.6	562													
	6.8	682													
	8.2	822													
	10	103													
	12	123													
	15	153													
	18	183													
22	223														
27	273														
33	333														
39	393														
47	473														
56	563														
68	683														
82	823														
100	104														



CAPACITANCE RANGE

DIMENSION (MM)		CHV1206													
L(L1)		3.2±0.30													
W		1.6±0.2													
BW(L2/L3)		1.50±0.3													
DIELECTRIC		COG							X7R						
H (max)		1.9							1.45				1.8		
RATED VOLTAGE		250	500	630	1KV	2KV	3KV	250	500	630	1KV	1.5KV	2KV	2.5KV	3KV
1.0pF	1R0														
2.0	2R0														
3.3	3R3														
3.9	3R9														
5.0	5R0														
8.2	8R2														
10	100														
12	120														
15	150														
18	180														
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33	330														
39	390														
47	470														
56	560														
68	680														
82	820														
100	101														
120	121														
150	151														
180	181														
220	221														
270	271														
330	331														
390	391														
470	471														
560	561														
680	681														
820	821														
1.0nF	102														
1.2	122														
1.5	152														
1.8	182														
2.2	222														
2.7	272														
3.3	332														
3.9	392														
4.7	472														
5.6	562														
6.8	682														
8.2	822														
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12	123														
15	153														
18	183														
22	223														
27	273														
33	333														
39	393														
47	473														
56	563														
68	683														
82	823														
100	104														
120	124														
150	154														
180	184														
220	224														
270	274														
334	334														
390	394														
560	564														
684	684														
820	824														
1.0uF	105														
2.2	225														

CAPACITANCE RANGE





# CAPACITANCE RANGE

DIMENSION (MM)		CHV1210											
L(L1)		3.20±0.30											
W		2.50±0.20											
BW(L2/L3)		1.60±0.30											
DIELECTRIC		COG						X7R					
T (max)		2.2						2.6	2.2	2.6			
RATED VOLTAGE		250	500	630	1KV	1.5KV	2KV	250	500	630	1KV	1.5KV	2KV
2.0pF	2R0												
3.3	3R3												
3.9	3R9												
5.0	5R0												
8.2	8R2												
10	100												
12	120												
15	150												
18	180												
22	220												
27	270												
33	330												
39	390												
47	470												
56	560												
68	680												
82	820												
100	101												
120	121												
150	151												
180	181												
220	221												
270	271												
330	331												
390	391												
470	471												
560	561												
680	681												
820	821												
1.0nF	102												
1.2	122												
1.5	152												
1.8	182												
2.2	222												
2.7	272												
3.3	332												
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6.8	682												
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47	473												
56	563												
68	683												
82	823												
100	104												
120	124												
150	154												
180	184												
220	224												
270	274												
330	334												
390	394												
470	474												
560	564												
680	684												
820	824												
1.0uF	105												
2.2	225												
3.3	335												
6.8	685												

CAPACITANCE RANGE





CAPACITANCE RANGE

DIMENSION (MM)		CHV1808														
L(L1)		4.60±0.30														
W		2.00±0.20														
BW(L2/L3)		2.50±0.30														
DIELECTRIC		COG							X7R							
T (max)		1.8			2.2				2.2			2.2	2.2	2.2		
RATED VOLTAGE		250	500	630	1KV	2KV	3KV	4KV	5KV	250	500	630	1KV	2KV	3KV	4KV
2.0pF	2R0															
3.3	3R3															
3.9	3R9															
5.0	5R0															
8.2	8R2															
10	100															
12	120															
15	150															
18	180															
22	220															
27	270															
33	330															
39	390															
47	470															
56	560															
68	680															
82	820															
100	101															
120	121															
150	151															
180	181															
220	221															
270	271															
330	331															
390	391															
470	471															
560	561															
680	681															
820	821															
1.0nF	102															
1.2	122															
1.5	152															
1.8	182															
2.2	222															
2.7	272															
3.3	332															
3.9	392															
4.7	472															
5.6	562															
6.8	682															
8.2	822															
10	103															
12	123															
15	153															
18	183															
22	223															
27	273															
33	333															
39	393															
47	473															
56	563															
68	683															
82	823															
100nF	104															

CAPACITANCE RANGE





# CAPACITANCE RANGE

DIMENSION (MM)		CHV1812																		
L(L1)		4.60±0.30																		
W		3.20±0.30																		
BW(L2/L3)		2.50±0.30																		
DIELECTRIC		COG									X7R									
T (max)		1.8	1.8	2.6	2.2	2.6	2.6	2.6	2.7	2.6	3			2.2	2.7	2.7	2.7			
RATED VOLTAGE		250	500	630	1KV	2KV	3KV	4KV	5KV	6KV	250	500	630	1KV	1.5KV	2KV	3KV	4KV	5KV	6KV
2.0pF	2R0																			
3.3	3R3																			
3.9	3R9																			
5.0	5R0																			
8.2	8R2																			
10	100																			
12	120																			
15	150																			
18	180																			
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270	274																			
330	334																			
390	394																			
470	474																			
560	564																			
680	684																			
820	824																			
1.0uF	105																			
2.2	225																			
3.3	335																			
4.7	475																			
6.8	685																			

CAPACITANCE RANGE

**CAPACITANCE RANGE**

DIMENSION (MM)		CHV1825															
L(L1)		4.60±0.30															
W		6.35±0.40															
BW(L2/L3)		2.50±0.30															
DIELECTRIC		COG									X7R						
T (max)		1.8	2.6	2.6	2.6	2.6	2.6	2.6	2.6	3.0	1.8	2.2		2.6	2.6	2.7	
RATED VOLTAGE		250	500	630	1KV	1.5KV	2KV	2.5KV	3KV	250	500	630	1KV	2KV	3KV	4KV	5KV
2.0pF	2R0																
3.3	3R3																
3.9	3R9																
5.0	5R0																
8.2	8R2																
10	100																
12	120																
15	150																
18	180																
22	220																
27	270																
33	330																
39	390																
47	470																
56	560																
68	680																
82	820																
100	101																
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390	391																
470	471																
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680	681																
820	821																
1.0nF	102																
1.2	122																
1.5	152																
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270	274																
330	334																
390	394																
470	474																
560	564																
680	684																
820	824																
1.0uF	105																
2.2	225																
3.3	335																
4.7	475																
6.8	685																
8.2	825																
100	106																

CAPACITANCE RANGE







# CAPACITANCE RANGE

DIMENSION (MM)		CHV2220																			
L(L1)		5.70±0.40																			
W		5.00±0.40																			
BW(L2/L3)		3.50±0.30																			
DIELECTRIC		COG									X7R										
T (MAX)		1.8			2.2	2.2	1.8	2.5	3	3.1			2.6	1.8	1.8	2.2	2.7				
RATED VOLTAGE		250	500	630	1KV	1.5KV	2KV	3KV	4KV	5KV	6KV	250	500	630	1KV	2KV	3KV	4KV	5KV	6KV	
2.0pF	2R0																				
3.3	3R3																				
3.9	3R9																				
5.0	5R0																				
8.2	8R2																				
10	100																				
12	120																				
15	150																				
18	180																				
22	220																				
27	270																				
33	330																				
39	390																				
47	470																				
56	560																				
68	680																				
82	820																				
100	101																				
120	121																				
150	151																				
180	181																				
220	221																				
270	271																				
330	331																				
390	391																				
470	471																				
560	561																				
600	601																				
680	681																				
820	821																				
1.0nF	102																				
1.2	122																				
1.5	152																				
1.8	182																				
2.2	222																				
2.7	272																				
3.3	332																				
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560	564																				
680	684																				
820	824																				
1.0uF	105																				
2.2	225																				
3.3	335																				
4.7	475																				
6.8	685																				
8.2	825																				
100	106																				

CAPACITANCE RANGE

HIGH VOLTAGE CERAMIC CHIP CAPACITOR - CHV SERIES





## CAPACITANCE RANGE

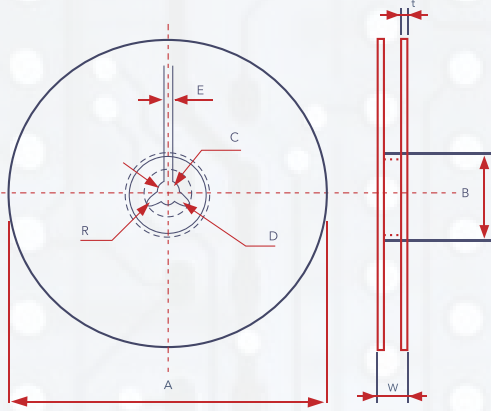
DIMENSION (MM)		CHV2225															
L(L1)		5.70±0.40															
W		6.35±0.40															
BW(L2/L3)		3.50±0.30															
DIELECTRIC		COG								X7R							
T (max)		3.0								3.0	2.2		2.6	1.8	2.2	2.7	
RATED VOLTAGE		250	500	630	1KV	2KV	3KV	4KV	5KV	250	500	630	1KV	2KV	3KV	4KV	5KV
2.0pF	2R0																
3.3	3R3																
3.9	3R9																
5.0	5R0																
8.2	8R2																
10	100																
12	120																
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82	823																
100	104																
120	124																
150	154																
180	184																
220	224																
270	274																
330	334																
390	394																
470	474																
560	564																
680	684																
820	824																
1.0uF	105																
1.2	125																
2.2	225																
3.3	335																
4.7	475																
6.8	685																
8.2	825																
100	106																

CAPACITANCE RANGE



# PACKAGING (TAPING)

## Reel Type Size



STANDARD REEL

A	B	C	D	E	W	t	R
$\phi 178 \pm 2.0$	$\phi 50 \text{ min}$	$\phi 13.0 \pm 0.5$	$\phi 21.0 \pm 0.8$	$2.0 \pm 0.5$	$10.2\text{-}8\text{mm}$ $14.0\text{-}12\text{mm}$ $\pm 1.5$	$0.8 \pm 0.2$	$1.0$

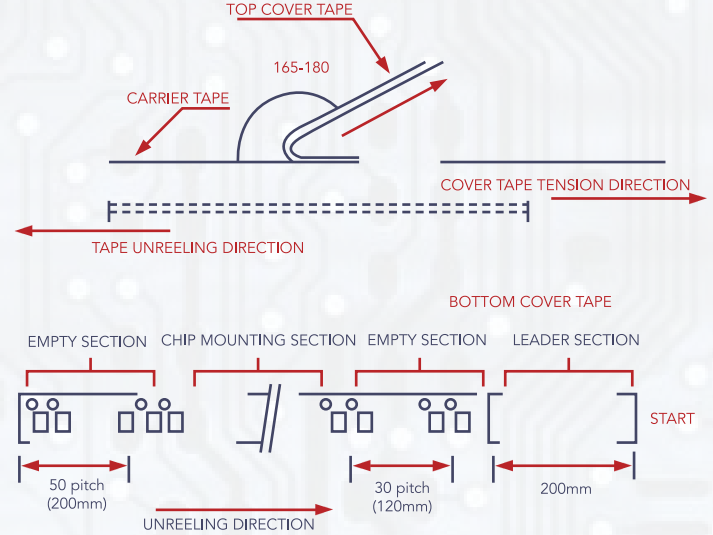
UNIT: mm

"TD" DESIGNATOR FOR OPTIONAL 10/13 INCH REELS

A	B	C	D	E	W	t	R
$\phi 330 \pm 2.0$	$\phi 50 \text{ min}$	$\phi 13.0 \pm 0.5$	$\phi 21.0 \pm 0.8$	$2.0 \pm 0.5$	$10.0 \pm 1.5$	$0.8 \pm 0.2$	$1.0$

UNIT: mm

## CarrierTape (Standard)



- To peel off the cover tape by the method shown in the right figure apply a peel-off force of 20GF - 60GF (card board); 10GF - 75GF (plastic tape).

-The cover tape should not touch the top or bottom of the chip.

- If the cover tape has been peeled off it may be difficult to remove the chip due to punch-hole clearance, dirt, and debris. Make sure therefore that no paper waste will adhere to and block the absorption nozzle.

- If the cover tape has been peeled off from the top, stick it back on with a suitable adhesive.

- Follow the illustration for the start and end of the winding operation.

### CARDBOARD CARRIER TAPE FOR 0402, 0603, 0805/1206 TYPE

TYPE	A	B	W	F	E	P1	P2	P0	D0	t1	t2	MOUNTING HOLE	STD. REEL QTY 7"
0402	$0.7 \pm 0.2$	$1.3 \pm 0.2$	$8.0 \pm 0.3$	$3.5 \pm 0.05$	$1.75 \pm 0.1$	$4.0 \pm 0.1$	$2.0 \pm 0.5$	$4.0 \pm 0.1$	$1.5 \pm 0.1$	1.1 max	1.4 max	Angular Punch Hole	10,000 (20,000)
0603	$1.1 \pm 0.2$	$1.9 \pm 0.2$											4,000 (10,000)
0805	$1.65 \pm 0.2$	$2.4 \pm 0.2$											4,000 (10,000)
1206	$2.0 \pm 0.2$	$3.6 \pm 0.2$											4,000 (10,000)

UNIT - MM

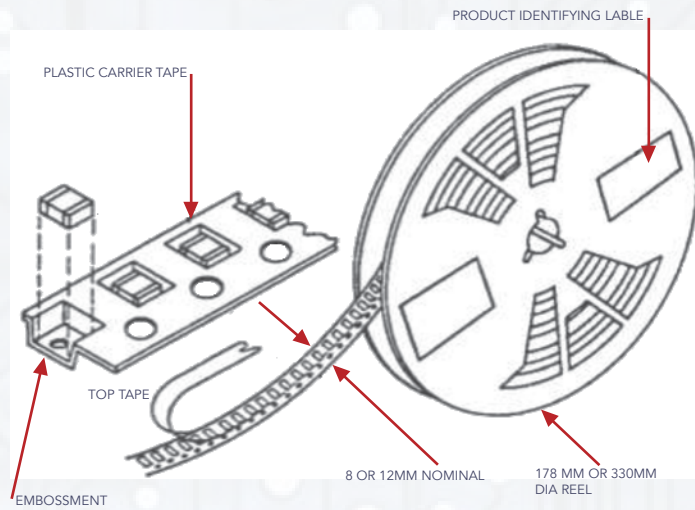
### EMBOSSED PLASTIC CARRIER TAPE FOR 0805/1206 TYPE AND 1210 TYPE

TYPE	A	B	W	F	E	P1	P2	P0	D0	t1	t2	MOUNTING HOLE	STD. REEL QTY 7"	OPTIONAL REEL QTY (10"/13")
0805	$1.45 \pm 0.2$	$2.3 \pm 0.2$	$8.0 \pm 0.3$	$3.5 \pm 0.05$	$1.75 \pm 0.1$	$4.0 \pm 0.1$	$2.0 \pm 0.5$	$4.0 \pm 0.1$	$1.5 \pm 0.1$	0.6 max	2.5 max	Angular Embossed Hole	2,000 3,000	10,000
1206	$2.0 \pm 0.2$	$3.6 \pm 0.2$											2,000 3,000	10,000
1210	$2.9 \pm 0.2$	$3.6 \pm 0.2$											1,000 2,000 3,000	4,000
1808	$3.6 \pm 0.2$	$4.9 \pm 0.2$	$12.0 \pm 0.3$	$5.5 \pm 0.05$	$1.75 \pm 0.1$	$8.0 \pm 0.1$	$2.0 \pm 0.5$	$4.0 \pm 0.1$	$1.5 \pm 0.1$	0.6 max	6.5 max	Angular Embossed Hole	500 1,000	2,000
1812	$3.6 \pm 0.2$	$4.9 \pm 0.2$											500 1,000	2,000
1825	$6.8 \pm 0.3$	$4.9 \pm 0.2$											500 1,000	1,500
2220	$5.5 \pm 0.3$	$6.2 \pm 0.3$											500 700 1,000	1,500
2225	$6.8 \pm 0.3$	$6.2 \pm 0.3$											500	1,000
													700	

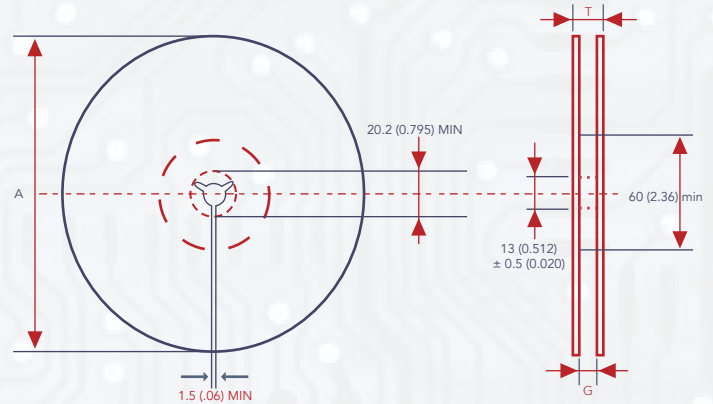
UNIT - MM

## PACKAGING

Tape and reel packing of surface mounting chip capacitors for automatic placement are in accordance with IEC286 part 3 and RS481



### Reel dimensions mm (inches)

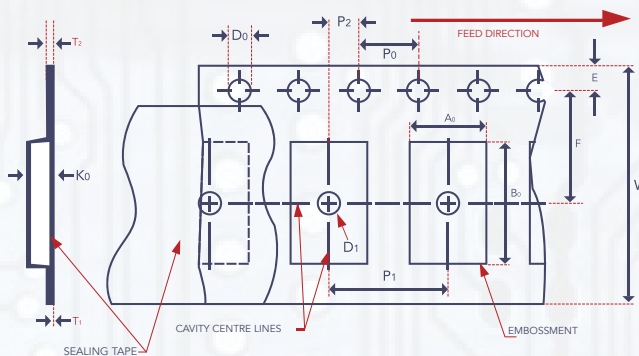


SYMBOL	DESCRIPTION	178 MM REEL	330 MM REEL
A	Reel Diameter	178 (7) ±2 (0.079)	330 (13) max
G	Reel Inside with	8.4 (0.33) ± 1.5 (0.059) - 0	12.4 (0.49) ± 1.5 (0.059) - 0
T	Reel Outside with	14.4 (0.56) max	18.4 (0.72) max

### Peel Force

The peel force of the top sealing tape is between 0.2 and 1.0 Newton at 1800. The breaking force of the carrier and sealing tape in the direction of unreeling is greater than 10 Newtons.

### Tape dimensions mm (inches)



SYMBOL	DESCRIPTION	8 MM TAPE	12 MM TAPE
A <sub>0</sub> B <sub>0</sub> K <sub>0</sub>	Width of cavity Length of cavity Depth of cavity	Dependent of chip size to minimize rotation	
W	Width of tape	8 (0.315) ± 0.2 (0.008)	12 (0.472) ± 0.2 (0.008)
F	Distance between drive hole centres and cavity centres	3.5 (0.138) ± 0.5 (0.002)	5.5 (0.213) ± 0.05 (0.002)
E	Distance between drive hole centres and tape edge	1.75 (0.069) ± 0.1 (0.004)	
P <sub>1</sub>	Distance between cavity centres	4 (0.156) ± 0.1 (0.004)	8 (0.315) ± 0.1 (0.004)
P <sub>2</sub>	Axial distance between drive hole centres and cavity centres	2 (0.079) ± 0.5 (0.002)	
P <sub>0</sub>	Axial distance between drive hole centres	4 (0.156) ± 0.1 (0.004)	
D <sub>0</sub>	Drive to hole diameter	1.5 (0.059) ± 0.1 (0.004) - 0	
D <sub>1</sub>	Diameter of cavity piercing	1 (0.039) ± 0.1 (0.004) - 0	1.5 (0.059) ± 0.1 (0.004) - 0
t <sub>1</sub>	Embossed tape thickness	0.3 (0.012) ± 0.1 (0.004)	0.4 (0.016) ± 0.1 (0.004)
t <sub>2</sub>	Top tape thickness	0.1 (0.004) max	

