

# 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

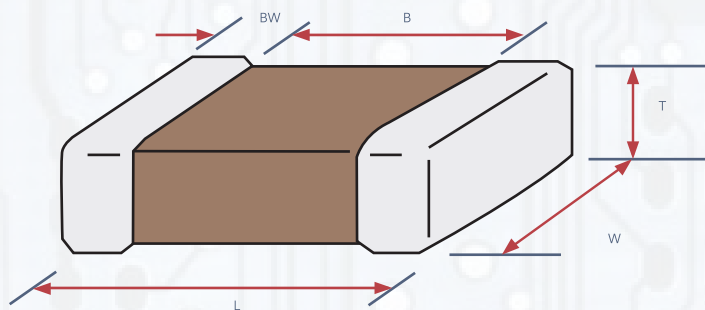
- Suitable for LAN/WLAN interface
- Back-lighting inverter, DC-DC converters,
- Ballast, Modems and Power Supplies



### 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)
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

\*REFERENCE CHARTS BELOW

### ORDERING INFORMATION

CHV	0805	N	250	103	K	X	T	D
PRODUCT TYPE	SIZE	TERMINATION OPTIONS	RATED VOLTAGE	CAPACITANCE	TOLERANCE	DIELECTRIC	PACKAGING	PACKAGING
	0603 : 0603 0805 : 0805 1206 : 1206 1210 : 1210 1808 : 1808 1812 : 1812 1825 : 1825 2220 : 2220 2225 : 2225	N: Nickel Barrier  X: Nickel Barrier/ Flex Term.  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: ± 1pF C: ±0.25pF D: ±0.50pF F: ±1% G: ±2% J: ±5% K: ±10% M: ±20%	C: COG X: X7R	T: 7" REEL	D Optional 10K reel (from 0603-1210 size)



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	1.45	1.45	1.45	1.45	1.45
RATED VOLTAGE		250	500	250	500	250	500	250	500	1KV
CAP. RANGE										
1.0pF	1R0									
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									
6.8	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									





# 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	1.45	1.45	1.45	1.45
RATED VOLTAGE		250	500	250	500	1KV	250	500	1KV	250	500	1KV
CAP. RANGE												
47	470											
51	510											
56	560											
62	620											
68	680											
75	750											
82	820											
91	910											
100	101											
120	121											
130	131											
150	151											
160	161											
180	181											
200	201											
220	221											
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											

HIGH VOLTAGE CERAMIC CHIP CAPACITOR - CHV SERIES





# 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)		1.8							1.45					1.8	
RATED VOLTAGE		250	500	630	1KV	2KV	3KV	250	500	630	1KV	1.5KV	2KV	2.5KV	3KV
CAP. RANGE															
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														
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														
100	104														
124	124														
154	154														
184	184														
224	224														
274	274														
334	334														
393	394														
564	564														
684	684														
824	824														
1.0uF	105														
2.2	225														



**CAPACITANCE RANGE**

DIMENSION (MM)		CHV1210										
<b>L(L1)</b>		3.20±0.30										
<b>W</b>		2.50±0.20										
<b>BW(L2/L3)</b>		1.60±0.30										
DIELECTRIC		COG					X7R					
<b>T (max)</b>		2.2					2.6	2.2	2.6			
RATED VOLTAGE		250	500	630	1KV	1.5KV	2KV	250	500	1KV	1.5KV	2KV
CAP. RANGE												
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											
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8.2	822											
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12	123											
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33	333											
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47	473											
56	563											
68	683											
82	823											
100	104											
124	124											
154	154											
184	184											
224	224											
274	274											
334	334											
393	394											
474	474											
564	564											
684	684											
824	824											
1.0uF	105											
2.2	225											
3.3	335											
6.8	685											





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	2.2	
RATED VOLTAGE		250	500	630	1KV	2KV	3KV	4KV	5KV	250	500	1KV	2KV	3KV	4KV
CAP. RANGE															
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**

DIMENSION (MM)		<b>CHV1812</b>																
<b>L(L1)</b>		4.60±0.30																
<b>W</b>		3.20±0.30																
<b>BW(L2/L3)</b>		2.50±0.30																
DIELECTRIC		COG								X7R								
<b>T (max)</b>		1.8	1.8		2.6	2.2	2.6	2.6	2.6	2.7	2.6	3		1.8	2.2	2.7	2.7	2.7
<b>RATED VOLTAGE</b>		250	500	630	1KV	2KV	3KV	4KV	5KV	6KV	250	500	1KV	2KV	3KV	4KV	5KV	6KV
<b>CAP. RANGE</b>																		
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																	
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68	680																	
82	820																	
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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																	
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334	334																	
393	394																	
474	474																	
564	564																	
684	684																	
824	824																	
1.0uF	105																	
2.2	225																	
3.3	335																	
4.7	475																	
6.8	685																	

HIGH VOLTAGE CERAMIC CHIP CAPACITOR - CHV SERIES





# 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	1KV	2KV	3KV	4KV	5KV
CAP. RANGE																
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															
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390	391															
470	471															
560	561															
680	681															
820	821															
1.0nF	102															
1.2	122															
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224	224															
274	274															
334	334															
393	394															
474	474															
564	564															
684	684															
824	824															
1.0uF	105															
2.2	225															
3.3	335															
4.7	475															
6.8	685															
8.2	825															
100	106															





# 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	2.2	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	1KV	2KV	3KV	4KV	5KV	6KV
CAP. RANGE																			
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																		
3.9	392																		
4.7	472																		
5.6	562																		
6.8	682																		
8.2	822																		
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18	183																		
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33	333																		
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47	473																		
56	563																		
68	683																		
82	823																		
100	104																		
124	124																		
154	154																		
184	184																		
224	224																		
274	274																		
334	334																		
393	394																		
474	474																		
564	564																		
684	684																		
824	824																		
1.0uF	105																		
2.2	225																		
3.3	335																		
4.7	475																		
6.8	685																		
8.2	825																		
100	106																		

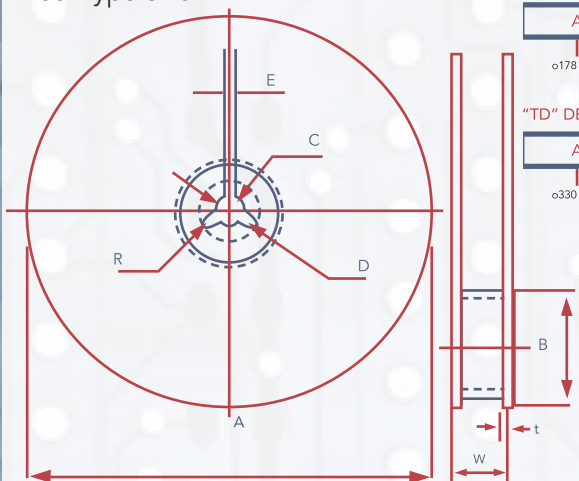
**CAPACITANCE RANGE**

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	1KV	2KV	3KV	4KV	5KV
CAP. RANGE																
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															
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33	330															
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47	470															
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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															
100	104															
124	124															
154	154															
184	184															
224	224															
274	274															
334	334															
393	394															
474	474															
564	564															
684	684															
824	824															
1.0uF	105															
1.2	125															
2.2	225															
3.3	335															
4.7	475															
6.8	685															
8.2	825															
100	106															



# PACKAGING (TAPING)

## Reel Type Size



STANDARD REEL

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

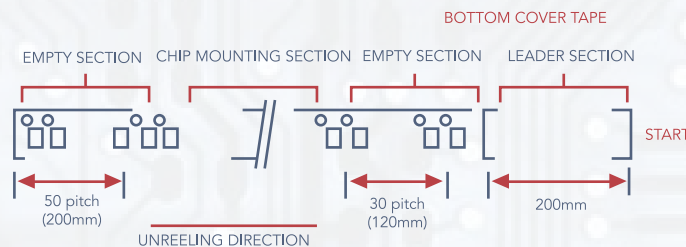
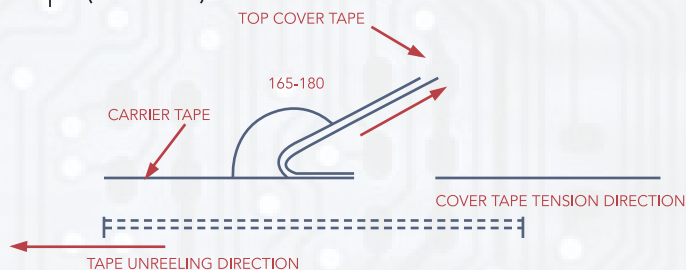
UNIT: mm

"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

## Carrier Tape (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

UNIT=mm

TYPE	A	B	W	F	E	P1	P2	P0	D0	t1	t2	MOUNTING HOLE	STD. REEL QTY 7"
0402	$0.7 \pm 0.2$	$1.3 \pm 0.2$	$8.0 \pm 0.3$	$3.5 \pm 0.05$	$1.75 \pm 0.1$	$4.0 \pm 0.1$	$2.0 \pm 0.5$	$4.0 \pm 0.1$	$1.5 \pm 0.1$	$1.1 \text{ max}$	$1.4 \text{ max}$	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)

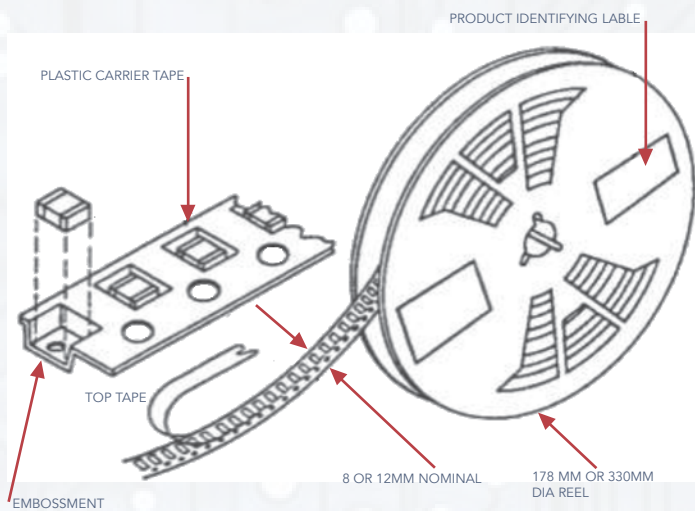
### EMBOSSED PLASTIC CARRIER TAPE FOR 0805/1206 TYPE AND 1210 TYPE

UNIT=mm

TYPE	A	B	W	F	E	P1	P2	P0	D0	t1	t2	MOUNTING HOLE	STD. REEL QTY 7"	OPTIONAL REEL QTY (10/13')
0805	$1.45 \pm 0.2$	$2.3 \pm 0.2$	$8.0 \pm 0.3$	$3.5 \pm 0.05$	$1.75 \pm 0.1$	$4.0 \pm 0.1$	$2.0 \pm 0.5$	$4.0 \pm 0.1$	$1.5 \pm 0.1$	$0.6 \text{ max}$	$2.5 \text{ max}$	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	$3.6 \pm 0.2$	$4.9 \pm 0.2$	$12.0 \pm 0.3$	$5.5 \pm 0.05$	$1.75 \pm 0.1$	$8.0 \pm 0.1$	$2.0 \pm 0.5$	$4.0 \pm 0.1$	$1.5 \pm 0.1$	$0.6 \text{ max}$	$6.5 \text{ max}$	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 1,000	1,500
2225	$6.8 \pm 0.3$	$6.2 \pm 0.3$											500	1,000
													700	

## PACKAGING

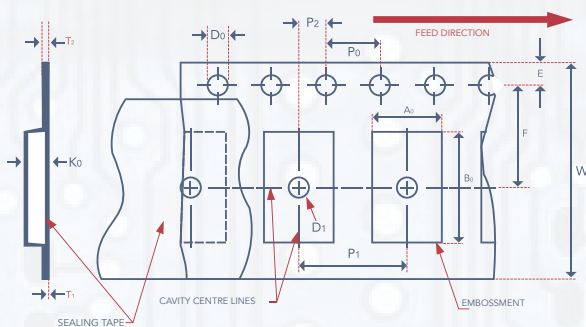
Tape and reel packing of surface mounting chip capacitors for automatic placement are in accordance with IEC286 part 3 and RS481



### Peel Force

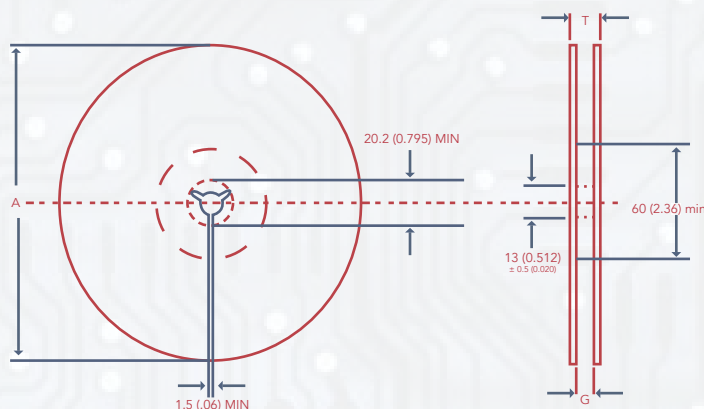
The peel force of the top sealing tape is between 0.2 and 1.0 Newton at 1800. The breaking force of the carrier and sealing tape in the direction of unreeling is greater than 10 Newtons.

### Tape dimensions mm (inches)



SYMBOL	DESCRIPTION	8MM TAPE	12MM 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)	
t <sub>2</sub>	Top tape thickness	0.1 (0.004) max	

### Reel dimensions mm (inches)



SYMBOL	DESCRIPTION	178MM REEL	330MM 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

## RECOMMENDED SOLDERING CONDITIONS

The lead-free termination MLCCs are not only to be used on SMT against lead-free solder paste, but also suitable against lead-containing solder paste. If the optimized solder joint is requested, increasing soldering time, temperature and concentration of N<sub>2</sub> within oven are recommended.

