

SD SERIES
**FEATURES: GENERAL PURPOSE RADIAL TYPE FOR
CONSUMER ELECTRONICS MARKET.**
REFERENCE
STANDARDS: IS4317/ IEC 384-4.
**PRODUCT
MARKING**

ENDURANCE: +105°C, 1000 Hrs
**PROVIDED WITH ORANGE COLOUR
SLEEVE AND BLACK PRINT**
■ SPECIFICATIONS

PARAMETERS.	PERFORMANCE CHARACTERISTICS																														
Operating Temperature	- 40° C to +105 °C for WV ≤ 250 Vdc, -25° C to +105 °C for WV > 250 Vdc.																														
Working Voltage	6.3 Vdc to 450 Vdc.																														
Capacitance Range	0.10 to 22000µF (at +27° C, 100 Hz)																														
Capacitance Tolerance	±20%, (Other tolerance on request)																														
Leakage Current (After 3mt charging through 1000 Ω resistor) IL in µA	IL ≤ 0.01 CV or 4 µA, whichever is greater for WV 6.3 to 100 V ≤ 0.02 CV+ 10µA for WV 160 to 450 V, Where IL = Leakage current in µA C= Capacitance(µF) , V= Working Voltage in Volt																														
Dissipation factor (Tan δ) Max (at + 27° C, 100 Hz)	<table border="1"> <tr> <td>WV Vdc</td> <td>6.3</td> <td>10</td> <td>12</td> <td>16</td> <td>25</td> <td>35</td> <td>40</td> <td>50</td> <td>63</td> <td>100</td> <td>160</td> <td>200</td> <td>250 ~500</td> </tr> <tr> <td>Tan δ %</td> <td>26</td> <td>22</td> <td>21</td> <td>20</td> <td>17</td> <td>15</td> <td>14</td> <td>13</td> <td>12</td> <td>10</td> <td>15</td> <td>18</td> <td>20</td> </tr> </table>	WV Vdc	6.3	10	12	16	25	35	40	50	63	100	160	200	250 ~500	Tan δ %	26	22	21	20	17	15	14	13	12	10	15	18	20		
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For Capacitor ratings with cap value >1000µF add 2% for every 1000µF increase																															
Low Temperature Stability	Impedance Ratio at 100 Hz.																														
	<table border="1"> <tr> <td>Rated Voltage (V)</td> <td>6.3</td> <td>10~12</td> <td>16</td> <td>25</td> <td>35~40</td> <td>50~100</td> <td>160</td> <td>200~350</td> <td>400~500</td> </tr> <tr> <td>Z -25° C/Z + 27° C</td> <td>6</td> <td>4</td> <td>4</td> <td>3</td> <td>3</td> <td>2</td> <td>3</td> <td>6</td> <td>7</td> </tr> <tr> <td>Z -40° C/ Z + 27° C</td> <td>12</td> <td>9</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>4</td> <td>-</td> <td>-</td> </tr> </table>	Rated Voltage (V)	6.3	10~12	16	25	35~40	50~100	160	200~350	400~500	Z -25° C/Z + 27° C	6	4	4	3	3	2	3	6	7	Z -40° C/ Z + 27° C	12	9	8	6	4	3	4	-	-
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Add 0.5 to the Ratio for Z- 25° C, 1.0 to the Ratio Z- 40° C Per 1000µF, for Cap>1000µF																															
Life Tests	<table border="1"> <thead> <tr> <th>Tests</th> <th>Endurance DC Life Test</th> <th>Storage Shelf Life Test</th> </tr> </thead> <tbody> <tr> <td> <table border="1"> <tr> <td>Test Condition</td> <td>Capacitor at rated voltage At +105° C for 1000 Hrs Measurements after recovery to +27° C</td> <td>Capacitor under no voltage At +105° C for 1000 Hrs Measurements after recovery to +27° C</td> </tr> <tr> <td>Parameters</td> <td></td> <td></td> </tr> </table> </td> <td></td> <td></td> </tr> <tr> <td>Δ Capacitance</td> <td> Within ± 30% for 6.3 to 16 V Within ± 25% for 25 to 100 V Within ± 20% for 160 to 450V </td> <td rowspan="2">} of initial measured Value</td> <td> Within ± 25% of initial measured Value for WV≤100 Within ± 20% of initial measured Value for WV>100 </td> </tr> <tr> <td>Tan δ</td> <td> Within 200% of initial limits for WV 6.3 ~16 V Within 150% of initial limits for WV 25 ~ 450 V </td> <td>Within 150% of initial limit</td> </tr> <tr> <td>D.C Leakage Current</td> <td>Within initial limit</td> <td></td> <td> Within 150% of initial limit for WV ≤100V Within 300% of initial limit for WV>100 </td> </tr> </tbody> </table>	Tests	Endurance DC Life Test	Storage Shelf Life Test	<table border="1"> <tr> <td>Test Condition</td> <td>Capacitor at rated voltage At +105° C for 1000 Hrs Measurements after recovery to +27° C</td> <td>Capacitor under no voltage At +105° C for 1000 Hrs Measurements after recovery to +27° C</td> </tr> <tr> <td>Parameters</td> <td></td> <td></td> </tr> </table>	Test Condition	Capacitor at rated voltage At +105° C for 1000 Hrs Measurements after recovery to +27° C	Capacitor under no voltage At +105° C for 1000 Hrs Measurements after recovery to +27° C	Parameters					Δ Capacitance	Within ± 30% for 6.3 to 16 V Within ± 25% for 25 to 100 V Within ± 20% for 160 to 450V	} of initial measured Value	Within ± 25% of initial measured Value for WV≤100 Within ± 20% of initial measured Value for WV>100	Tan δ	Within 200% of initial limits for WV 6.3 ~16 V Within 150% of initial limits for WV 25 ~ 450 V	Within 150% of initial limit	D.C Leakage Current	Within initial limit		Within 150% of initial limit for WV ≤100V Within 300% of initial limit for WV>100							
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(i). Endurance Test at High Temperature +105° C at WV.																															
(ii). Storage Test at High Temperature +105° C at 0V.																															

■ OTHER INFORMATION

Standard rating size, Ripple current, Temperature multiplier and Frequency multiplier	For details refer to page no. 2 & 3.
Capacitor Codification System	For details refer to page no. 4
Dimensional Specification	For details refer to page no. 5
Marking Specification	For details refer to page no. 6
Type of Packing and Lead Configuration.	(1) Bulk Packing - Straight Lead / Lead Formed and Cut / Kinking and Cut. (2) Taped Ammo Pack – 5mm Pitch / 2.5mm Pitch. For details refer to page no. 7,8&9

SD SERIES

STANDARD RATING TABLE: -

Provides detailed information regarding applicable case size and the appropriate ripple current handling capability of the defined case size.

WV SV Cap(µF)	6.3		10		12		16		25		35		40		50		63			
	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC		
0.1															HS	5	HS	5		
0.22															HS	7	HS	8		
0.33															HS	9	HS	9		
0.47															HS	10	HS	11		
1.0															HS	15	HS	16		
2.2															HS	22	HS	23		
3.3															HS	27	HS	28		
4.7															HS	32	HS	34		
10														HS	45	HS	47	HS	49	
22									HS	61	HS	65	HS	67	HS	70	AS	83		
33							HS	68	HS	74	HS	80	AS	94	AS	97	AS	94	125	
47			HS	78	HS	80	HS	82	HS	89	HS	98	AS	115	AS	120	BB	150		
68	HS	90	HS	94	HS	98	HS	98	HS	111	AS	130	BB	165	BB	170	BB	180		
100	HS	105	HS	115	HS	120	HS	120	AS	150	AS	160	BB	200	BB	205	BB	215	245	
150	HS	130	HS	134	AS	165	AS	170	AS	178	BB	235	BB	245	CB	280	CD	310	325	
220	AS	180	AS	195	AS	200	AS	205	BB	270	BB	285	CB	330	CB	340	CD	375	395	430
330	BB	265	BB	290	BB	295	BB	300	BB	330	CB	400	CD	445	CG	505	DG	605		
470	BB	315	BB	345	BB	355	BB	360	CB	440	CD	515	CG	530	CG	600	DG	720	775	
680	BB	402	BB	422	CB	505	CD	535	CD	580	CG	675	CG	695	DG	835	EK	1060		
1000	CB	520	CB	590	CD	640	CD	645	CG	765	CK	895	DG	1045	DK	1085	EK	1290	1395	
1500	CD	615	CD	665	CG	790	CG	805	DG	950	DK	1105		1265	EK	1360	EU	1570	1695	
2200	CG	830	CG	860	CK	940	CK	965	DG	1025	EK	1400	ER	1565	EU	1715	SJ	2000	2105	
3300	DG	1070	DG	1100	DK	1250	DK	1275	DK	1420	ER	1765	EU	1925	SH	2135	TH	2420	2545	
4700	DK	1305	EK	1585	EK	1620	EK	1640	ER	1885	SH	2250	SJ	2415	TJ	2730	TJ	2800	3080	
6800	EK	1695	EK	1850	ER	1990	ER	2005	EU	2235	TH	2755	TJ	2955	TM	3315				
10000	ER	2075	EU	2310	EU	2420	EU	2410	SJ	2730	TM	3480								
15000	SH	2625	SJ	2860	SJ	2820	SJ	2900	TM	3510										
22000	SJ	2970	TJ	3385	TJ	3300	TJ	3335												

Abbreviations used:

WV: Working voltage of the capacitor in Volts.

Cap: Capacitance in microfarad.

RC : Maximum Ripple current allowed in milli ampere at 100 Hz/ +105°C

SV: Surge voltage in volts.

CC: Case code.

SD SERIES

STANDARD RATING TABLE (Contd.)

WV SV Cap (µF)	100		160		200		250		315		350		400		450		500	
	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC	CC	RC
0.1	HS	5																
0.22	HS	8																
0.33	HS	10																
0.47	HS	12												BB	12			
1.0	HS	17	HS	14	AS	14	AS	14	AS	14	AS	14	AS BB	14 17	BB	17	CB	19
2.2	HS	25	HS AS	19 23	AS	21	AS	20	BB	25	BB	25	CB	28	CB CD	28 30	CD	30
3.3	HS	31	AS	29	AS BB	28 32	BB	30	BB	30	CB	34	CB CD	32 37	CD	37	CD	37
4.7	HS	37	AS	34	BB	38	BB	36	BB	36	CB	40	CD	44	CD CG	44 48	CG	48
6.8	HS AS	43 50	BB	50	BB CB	46 51	CB	49	CB	49	CD CG	50 58	CG	58	CG DG	58 67	DG	67
10	AS	61	CB CD	68 75	CB CD	60 68	CD	65	CG	70	CG	70	CG DG	70 81	CG DK	70 87	DK	87
22	BB	110	CD	115	CG	115	CK DG	110 125	DG	125	DK	125	EK	150	DK EK ER	130 150 160	ER EU	160 170
33	CB	155	CG	150	CK DG	140 155	DG DK	145 160	EK	185	EK ER	190 200	ER	200	ER	200	EU	210
47	CB CD	185 200	CK DG	190 205	DG DK	190 200	DK	190	EK	220	ER	235	EU	250	EU SR SH	230 255 270		
68	CD CG	242 260	DG DK	250 265	EK	275	EK	260	ER	285	EU	300	SH	325	SH	325		
100	CG CK DG	315 330 365	EK	365	EK EU	360 385	EU	365	SH	395	SJ	405	TH	435	TJ	455		
150	DG DK	465 480	ER EU	485 515	EU SH	475 510	SH	480	TH	530	TM	580						
220	DK EK	525 660	EU SH	565 670	SJ TH	620 685	TH	640										
330	EK ER	820 880	SJ TH	810 905	TJ	870	TJ	825										
470	ER EU	1020 1115	TJ	1135														
680	SH	1445																
1000	TH	1930																
1500	TJ	2135																

Abbreviations used:

WV: Working voltage of the capacitor in Volts.

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Frequency Multiplier for Ripple Current

Voltage	Freq Cap range	50	100	120	300	1K	10K or more
		0	0	0	0	0	0
6.3-100	<47	0.81	1	1.07	1.44	1.68	2.14
	100-470	0.85	1	1.06	1.30	1.42	1.59
	1000-22000	0.89	1	1.05	1.15	1.18	1.20
160-450	0.47-220	0.85	1	1.06	1.32	1.48	1.70
	330-1500	0.93	1	1.05	1.15	1.18	1.20

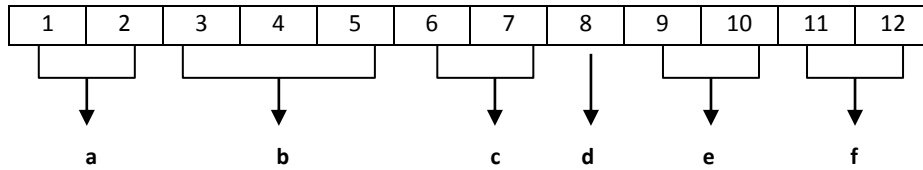
Temperature Multiplier for Ripple Current

Temp (°C)	40	60	70	85
Multipliers	1.3	1.28	1.15	1

SD SERIES

1. CAPACITOR ORDERING INFORMATION:

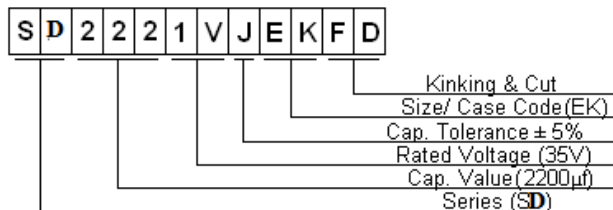
Capacitors are identified with the help of 12-digit code. Expansion of Part Nos. for SD series capacitors are detailed below.



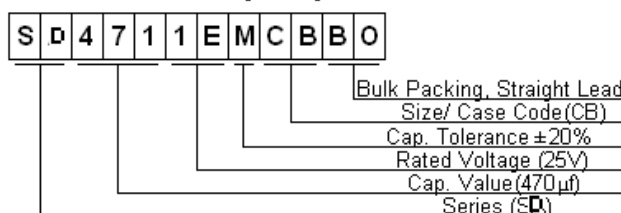
a																		
Series Code. Eg: SD																		
b																		
Capacitance Value Code																		
Capacitance (µF)	0.1	1	0.22	2.2	22	220	2200	22000										
Code	R10	010	R22	2R2	220	221	222	223										
c																		
Voltage Code																		
Working Voltage (V)	6.3	10	12	16	25	35	40	50	63	100	160	200	250	315	350	400	420	450
Code	0J	1A	1B	1C	1E	1V	1G	1H	1J	2A	2C	2D	2E	2P	2V	2G	2U	2W
d																		
Tolerance Code																		
Tolerance	Capacitance Tolerance						Spec'l. Cap Tolerance	Spec'l. Tanδ Tolerance										
	±5%	±10%	±20%	±30%	-10% +30%	-10% +50%			A	S								
Code	J	K	M	N	Q	T												
e				f														
Size Code				Capacitor Lead wire Termination Code														
Follow respective Dimensional specification. Eg: HS, AS, BB etc.				Provided by the factory based on customer requirements. Eg:														
				Item	Taped 5mm pitch	Taped 2.5mm pitch	Formed & cut	Kinking & cut	Bulk packing straight lead									
				Code	T0	T2	F0	FD	B0									

Capacitor Codification System:-

Example (ii) 2200µf / 35V: S. Series
Kinking & Cut



Example (iv) 470µf / 25V: S. Series
Bulk Packing - Straight Lead



SD SERIES

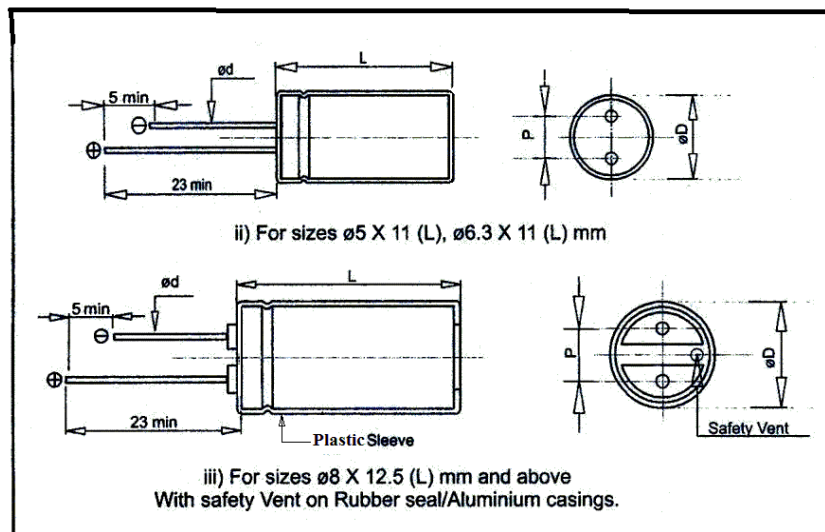
2. DIMENSIONAL SPECIFICATION FOR RADIAL LEAD TYPE CAPACITORS

Dimensions of SD series capacitors are detailed below.

Case Code	Diameter $\varnothing D \pm 0.5$ (mm)	Length $L \pm 1.0$ (mm)	Pitch $P \pm 0.5$ (mm)	Lead Dia $\varnothing d \pm 0.05$ (mm)
HS	5	11	2	0.5
AS	6.3	11	2.5	0.5
BB	8	12.5	3.5	0.6
CB	10	12.5	5	0.6
CD	10	16	5	0.6
CG	10	21	5	0.6
CK	10	25	5	0.6
DG	12.5	21	5	0.6
DK	12.5	25	5	0.6
EK	16	25	7.5	0.8
ER	16	31	7.5	0.8
EU	16	36	7.5	0.8
SR	18	31	7.5	0.8
SH	18	37	7.5	0.8
SJ	18	41	7.5	0.8
TH	22	37	10	0.8
TJ	22	41	10	0.8
TM	22	52	10	0.8

(All Dimensions in mm)


PHYSICAL OUTLINES



SD SERIES

3. MARKING ON THE CAPACITOR

Marking specifications of SD series capacitors are detailed below. Below mentioned details are printed on orange colored vinyl sleeve with black print.

- | | |
|--|--|
| a) Manufacturer's name and logo
 | b) Capacitor series & upper category temperature |
| c) Nominal capacitance value in μF | d) Capacitance tolerance code |
| e) Rated working voltage in V | f) Date code (Year-Month) |
| g) Negative terminals are indicated on the sleeve | |

Note: Manufacturer's logo, capacitor series, upper category temperature and date code are marked only for sizes \varnothing 8mm and above.

Date Code:

Date code is provided on the capacitor sleeve in Year – Month format for sizes \varnothing 8mm and above. Year & Month code of SD capacitor of diameter \varnothing 8mm & above are detailed below.

Year code

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Letter Code	M	N	P	R	S	T	U	V	W	X

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Letter Code	A	B	C	D	E	F	H	J	K	L

Year codes repeats after each cycle of 20 years.

Month Code

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug	Sep.	Oct.	Nov	Dec.
Code	1	2	3	4	5	6	7	8	9	O	N	D

SD SERIES

4. LEAD CONFIGURATION AND PRIMARY PACKING STANDARD FOR RADIAL ALUMINIUM ELECTROLYTIC CAPACITORS

LEAD CONFIGURATION

SD capacitors are available in the following lead configuration.

1. STRAIGHT LEAD – Applicable to case code starting from HS(Size $\Phi 5 \times 11$ mm) to TM (Size $\Phi 22 \times 52$ mm).
2. LEAD FORMED AND CUT – Applicable to case code starting from CB (Size $\Phi 10 \times 12.5$ mm) to SJ (Size $\Phi 18 \times 41$ mm).
3. LEAD KINKED AND CUT – Applicable to case code starting from CB (Size $\Phi 10 \times 12.5$ mm) to SJ (Size $\Phi 18 \times 41$ mm).
4. TAPED FORM (5mm lead pitch) – Applicable to case code HS, AS, BB, CB and CD.
5. TAPED FORM (2.5 mm lead pitch) – Applicable to case code HS and AS.

PRIMARY PACKING STANDARD BULK PACKING

SD series capacitors are generally BULK PACKED in thick polythene bags which are heat sealed to avoid direct atmospheric exposure. Individual primary packing in polythene bag is provided with a LABEL which carries outgoing Inspection Report No, Work Order No, Capacitor Series, Capacitance Value, Working Voltage, Capacitor tolerance, Capacitor size, Capacitor Part No, Temperature, Quantity and Date of packing. **IT IS CUSTOMARY TO RETURN THE PACKING LABEL TO THE FACTORY IN CASE OF QUANTITY/QUALITY NON-CONFORMANCE.**

BULK PACKING QUANTITY DETAILS

Size (Φ D x Lmm)	5x11	6.3x11	8x12.5	10x12.5	10x16	10x21	10x25	12.5x21
Case code	HS	AS	BB	CB	CD	CG	CK	DG
Nos/ Bag	500	500	500	300	300	300	200	200
Nos/ Carton	5000	4000	2500	1800	1500	1200	1000	800
Wt. (Kg) 1000 Nos (Approx)	2.2	2.6	2.6	3.3	3.0	2.9	3.3	3.2

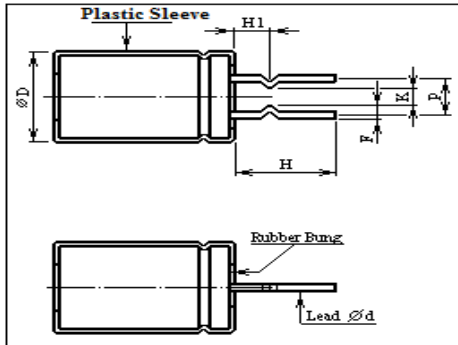
Size (Φ D x Lmm)	12.5x25	16x25	16x31	16x36	18x31	18x37	18x41	22x37	22x41	22x52
Case code	DK	EK	ER	EU	SR	SH	SJ	TH	TJ	TM
Nos/ Bag	200	100	100	100	50	50	50	50	25	25
Nos/ Carton	600	400	300	300	200	200	200	150	125	75
Wt. (Kg) 1000 Nos (Approx)	2.8	2.7	2.9	3.3	2.4	2.8	3.2	3.1	2.8	2.2

SD SERIES

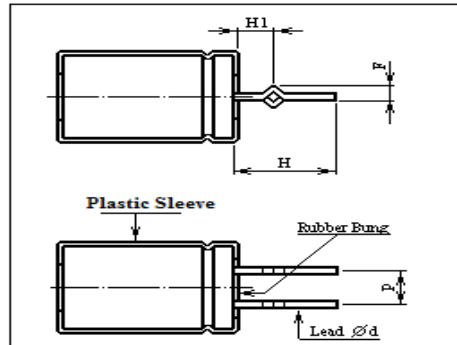
LEAD FORMED & CUT AND KINKING & CUT CAPACITORS.

Radial capacitors of size \varnothing 10mm and above are also available in lead formed and lead kinked and cut configuration for direct insertion in PCB to facilitate wave soldering.

LEAD FORMED & CUT CAPACITORS



KINKING & CUT CAPACITORS



PHYSICAL DIMENSIONS; UNIT (mm)

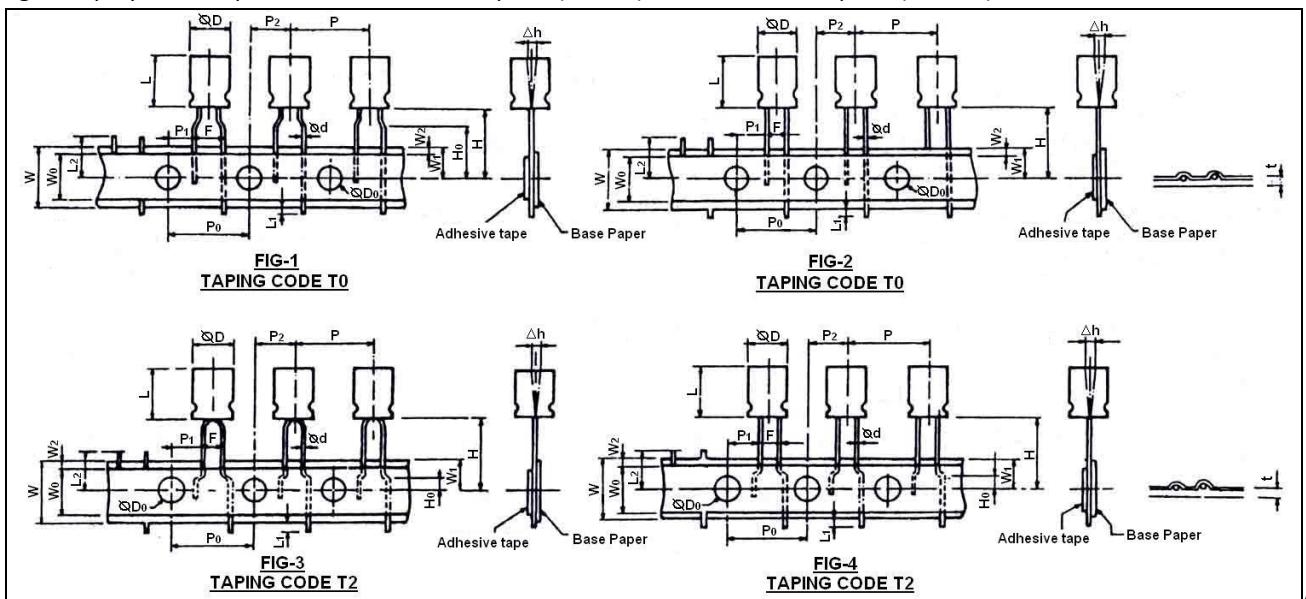
Case Diameter	$H \pm 0.5$	H_1	$F \pm 0.3$	$P \pm 0.5$	$\varnothing d \pm 0.05$	K (min)
$\varnothing 10$	5.0	2.7	1.3	5.0	0.6	2.8
$\varnothing 12.5$	5.0	2.7	1.3	5.0	0.6	2.8
$\varnothing 16$	5.0	2.7	1.3	7.5	0.8	5.5
$\varnothing 18$	5.0	2.7	1.3	7.5	0.8	5.5

Packing Methods of Lead Formed & Cut Capacitors and Kinking & Cut Capacitors

Capacitors are packed in primary cardboard carton using separators and then filled into appropriate Mother & Master carton for despatch.

TAPING SPECIFICATIONS FOR RADIAL LEAD TYPE CAPACITORS

Taping is employed for capacitors with 5mm lead pitch (Table I) and 2.5 mm lead pitch (Table II)



Dimensions are in mm
Not to scale

SD SERIES

TABLE I - 5mm LEAD PITCH (Taping Code T0)

CASE SIZE			LEAD WIRE PITCH 2.5 mm		
			5 x 11 6.3x11	8x12.5	10x12.5 10 x 16
DESCRIPTION	TOLERANCE				
Figure. no. Ref		1	1	2	
∅d Lead wire dia.	± 0.02	0.5	0.6	0.6	
F Lead to lead Center	+ 0.8 - 0.2	5	5	5	
P Pitch of Components	± 1.0	12.7	12.7	12.7	
P ₀ Feed hole Pitch*	± 0.3	12.7	12.7	12.7	
P ₁ Feed hole Centre to lead	± 0.7	3.85	3.85	3.85	
P ₂ Feedhole Centre to Comp. Centre	± 1.3	6.35	6.35	6.35	
Δh Component alignment deviation	± 2.0	0	0	0	
W Base Paper Width	± 0.2	18	18	18	
W ₀ Adhesive Tape Width	+2.0 -0.0	13	13	13	
W ₁ Feed hole Position	+0.75 -0.50	9	9	9	
W ₂ Adhesive Tape Position	Max	3	3	3	
H Comp. Base height from Centre	± 0.75	18.5	20	20	
H ₀ Lead Wire Clinch height	± 0.5	16	16	0	
L ₁ Lead Wire Protrusion	Max	0	0	0	
∅D ₀ Feed hole diameters	± 0.3	4	4	4	
t Total Tape thickness	± 0.2	0.7	0.7	0.7	
L ₂ Length of Snapped Lead	Max	11	11	11	

TABLE II - 2.5mm LEAD PITCH (Taping Code T2)

CASE SIZE			LEAD WIRE PITCH 2.5 mm	
			5x11	6.3x11
DESCRIPTION	TOLERANCE			
Figure. no. Ref		3	4	
∅d Lead wire dia.	± 0.02	0.5	0.5	
F Lead to lead Center	+ 0.8 - 0.2	2.5	2.5	
P Pitch of Components	± 1.0	12.7	12.7	
P ₀ Feed hole Pitch*	± 0.3	12.7	12.7	
P ₁ Feed hole Centre to lead	± 0.7	5.1	5.1	
P ₂ Feedhole Centre to Comp. Centre	± 1.3	6.35	6.35	
Δh Component alignment deviation	± 2.0	0	0	
W Base Paper Width	± 0.2	18	18	
W ₀ Adhesive Tape Width	+2.0 -0.0	13	13	
W ₁ Feed hole Position	+0.75 -0.50	9	9	
W ₂ Adhesive Tape Position	Max	3	3	
H Comp. Base height from Centre	± 0.75	18.5	18.5	
H ₀ Lead Wire Clinch height	Approx	6.0	6.0	
L ₁ Lead Wire Protrusion	Max	0	0	
∅D ₀ Feed hole diameters	± 0.3	4	4	
t Total Tape thickness	± 0.2	0.7	0.7	
L ₂ Length of Snapped Lead	Max	11	11	

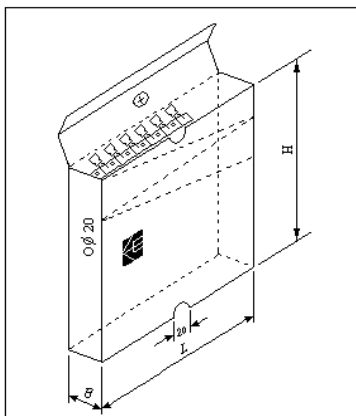
TAPED AMMO PACKING

Radial capacitors are available in Taped Ammo Pack for auto insertion in printed circuit boards.

Taped Ammo Packing Quantity Details: -

CAPACITOR SIZE (∅D x L mm)	5x11	6.3x11	8x12.5	10x12.5	10x16
Case Code	HS	AS	BB	CB	CD
Nos/ Carton	2000	1500	1000	600	600

All Dimensions in mm



Tape Ammo Box Spec:

Applicable case code	HS, AS, BB, CB	CD
Box Dimensions		
L ± 2 (mm)	335	335
B ± 1 ₀ (mm)	46	50
H ± 2 (mm)	230	230