

SA SERIES

FEATURES: GENERAL PURPOSE RADIAL TYPE FOR CONSUMER ELECTRONICS MARKET.
REFERENCE STANDARDS: IS4317/ IEC 384-4.

ENDURANCE: +85°C, 2000 Hrs

PRODUCT MARKING



PROVIDED WITH ORANGE OLOUR SLEEVE AND BLACK PRINT

■SPECIFICATIONS

PARAMETERS.	PERFORMANCE CHARACTERISTICS													
Operating Temperature	- 40°C to +85 °C for WV ≤ 250 Vdc, -25°C to + 85°C for WV > 250 Vdc.													
Working Voltage	6.3 Vdc to 450 Vdc. (500 Wvdc on request)													
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 500 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)	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
	For Capacitor ratings with cap value >1000µF add 2% for every 1000µF increase													
Low Temperature Stability	Impedance Ratio at 100 Hz.													
	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	-	-				
	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	Tests		Endurance DC Life Test							Storage Shelf Life Test				
	(i). Endurance Test at High Temperature +85°C at WV.	Test Condition	Capacitor under rated voltage At +85°C for 2000 Hrs Measurements after recovery to +27°C							Capacitor under no voltage At +85°C for 1000 Hrs Measurements after recovery to +27°C				
		Parameters												
	(ii). Storage Test at High Temperature +85°C at 0V.	Δ Capacitance	Within ± 30% for 6.3 to 16 V Within ± 25% for 25 to 100 V Within ± 20% for 160 to 500V							} of initial measured Value				
		Tan δ	Within 200% of initial limits for WV 6.3 ~16 V Within 150% of initial limits for WV 25 ~ 500 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> 100v					

■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.

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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																47 HS	4	47 HS	4
0.22																47 HS	5	47 HS	5
0.33																47 HS	6	47 HS	6
0.47																47 HS	7	47 HS	7
1.0																47 HS	11	47 HS	11
2.2																47 HS	16	47 HS	16
3.3																47 HS	20	47 HS	20
4.7																47 HS	24	47 HS	24
10																47 HS	33	47 HS	33
22								47 HS	41	67 HS	59	61	HS	65	HS	67	70	AS	83
33			47 HS	48	47 HS	48	47 HS	48	68	HS	74	HS	80	AS	94	AS	97	AS	125
47	47	52	47 HS	55	67 HS	64	80	HS	82	67 HS	86	89	HS	110	AS	115	AS	120	150
68	HS	90	HS	94	HS	98	HS	98	HS	AS	111	125	AS	130	BB	165	BB	170	180
100	HS	105	67 HS	110	HS	120	67 HS	115	120	AS	150	AS	160	BB	200	BB	205	BB	245
150	HS	130	HS	134	AS	165	AS	170	AS	BB	178	220	BB	235	BB	245	CB	280	325
220	AS	180	AS	195	AS	200	AS	205	BB	270	BB	285	CB	320	CB	330	CB	340	395
330	BB	265	BB	290	BB	295	BB	300	BB	330	CB	400	CD	430	CD	445	CG	505	605
470	BB	315	BB	345	BB	355	BB	360	CB	440	CD	515	CG	560	CD	530	CG	600	720
680	BB	402	BB	422	CB	505	CD	535	CD	580	CG	675	DG	775	CG	695	DG	835	1060
1000	CB	520	CB	590	CD	640	CD	645	CG	765	CK	895	DG	940	DK	1045	DK	1085	1290
1500	CD	615	CD	665	CG	790	CG	805	DG	950	DK	1105	EK	1225	EK	1265	EK	1360	1570
2200	CG	830	CG	860	CK	940	CK	965	DG	1025	DK	1165	ER	1400	ER	1565	EU	1715	2000
3300	DG	1070	DG	1100	DK	1250	DK	1275	EK	1550	ER	1765	EU	1875	EU	2075	SH	2135	2545
4700	DK	1305	EK	1585	EK	1620	EK	1640	ER	1885	SH	2250	SJ	2360	SJ	2415	TJ	2730	2800
6800	EK	1695	EK	1850	ER	1990	ER	2005	EU	2235	TH	2755	TJ	2900	TJ	2955	TM	3315	3080
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.

SV: Surge voltage in volts.

Cap: Capacitance in microfarad.

CC: Case code.

RC: Maximum Ripple current allowed in milli ampere at 100 Hz/ +85°C.

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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.
- Cap: Capacitance in microfarad.
- RC : Maximum Ripple current allowed in milli ampere at 100 Hz/ +85°C.

- SV: Surge voltage in volts.
- CC: Case code.

Frequency Multiplier for Ripple Current

Voltage	Freq Cap range	50	100	120	300	1K	10K or more
		6.3-100	<47	0.81	1	1.07	1.44
	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-	0.47-220	0.85	1	1.06	1.32	1.48	1.70
450	330-1500	0.93	1	1.05	1.15	1.18	1.20

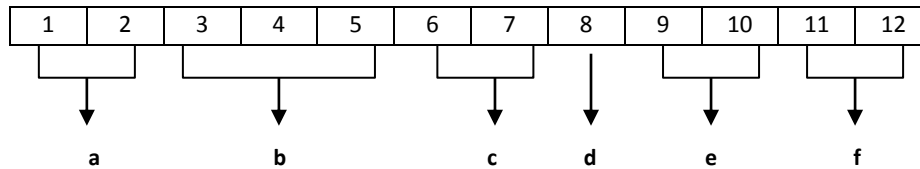
Temperature Multiplier for Ripple Current

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

SA SERIES

1. CAPACITOR ORDERING INFORMATION:

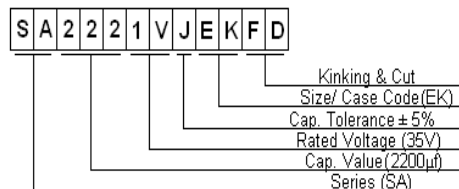
Capacitors are identified with the help of 12-digit code. Expansion of Part Nos. for SA series capacitors are detailed below.



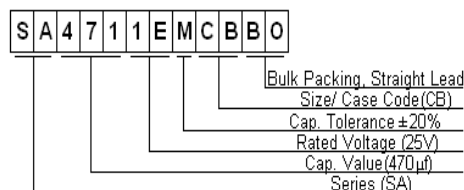
a																				
Series Code. Eg: SA																				
b																				
Capacitance Value Code																				
Capacitance (µF)	0.1	1	0.22	2.2	22	220	2200	22000												
Code	R10	010	R22	2R2	220	221	222	223												
c																				
Voltage Code																				
Working Voltage (V)	6.3	10	12	16	25	35	40	50	63	100	160	200	250	315	350	400	420	450	500	
Code	0J	1A	1B	1C	1E	1V	1G	1H	1J	2A	2C	2D	2E	2P	2V	2G	2U	2W	2H	
d																				
Tolerance Code																				
Tolerance	Capacitance Tolerance															Spec'l. Cap Tolerance	Spec'l. Tanδ Tolerance			
	Code	±5%	±10%	±20%	±30%	-10% +30%	-10% +50%											A	S	
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; SA Series
Kinking & Cut



Example (iv) 470µf / 25V; SA Series
Bulk Packing - Straight Lead



SA SERIES

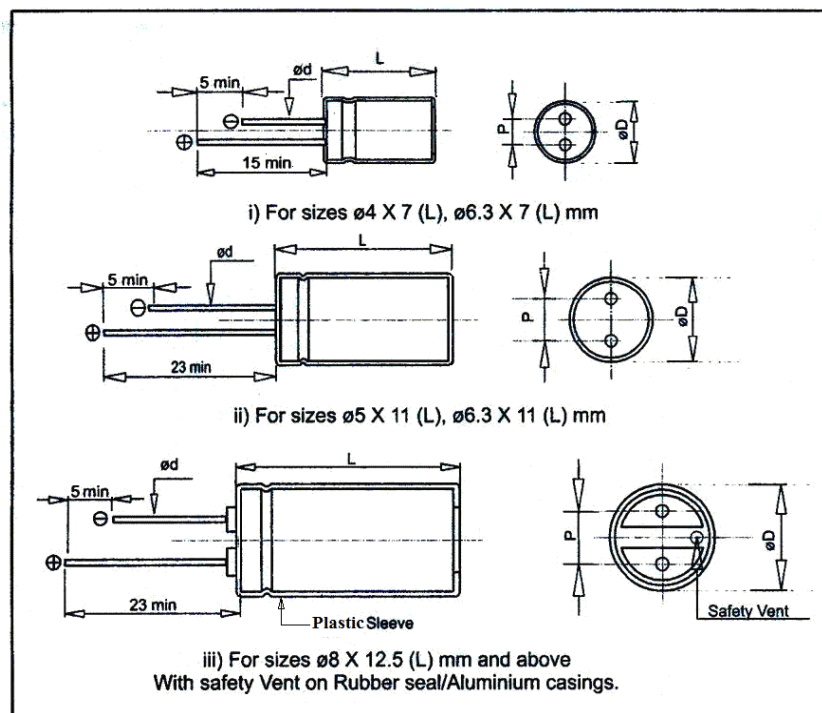
2. DIMENSIONAL SPECIFICATION FOR RADIAL LEAD TYPE CAPACITORS

Dimensions of SA 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)
47	4	7	1.5	0.45
67	6.3	7	2.5	0.45
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



SA SERIES

3. MARKING ON THE CAPACITOR

Marking specifications of SA 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 for SA 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

SA SERIES

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

LEAD CONFIGURATION

SA capacitors are available in the following lead configuration.

1. STRAIGHT LEAD – Applicable to case code starting from 47 (Size $\Phi 4 \times 7$ 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 47, 67, HS, AS, BB, CB and CD.
5. TAPED FORM (2.5 mm lead pitch) – Applicable to case code 47, 67, HS and AS.

PRIMARY PACKING STANDARD BULK PACKING

SA 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)	4x7	6.3x7	5x11	6.3x11	8x12.5	10x12.5	10x16	10x21	10x25	12.5x21
Case code	47	67	HS	AS	BB	CB	CD	CG	CK	DG
Nos/ Bag	500	500	500	500	500	300	300	300	200	200
Nos/ Carton	5000	5000	5000	4000	2500	1800	1500	1200	1000	800
Wt. (Kg) 1000 Nos (Approx)	1.2	2.1	2.2	2.6	2.6	3.3	3.0	2.9	3.3	3.2

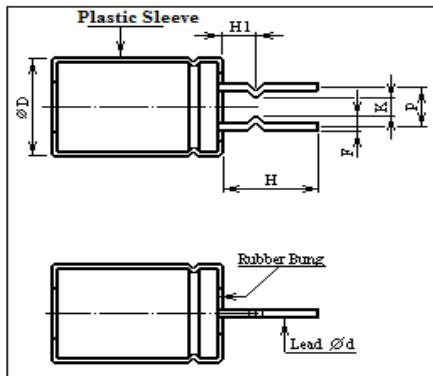
Size (Φ D x Lmm)	12.5x25	16x25	16x31	16x36	18x31	18x37	18x41	22x37	22x41	22x52
Case code	DK	EK	ER	EU	SR	SH	SJ	TH	TJ	TM
Nos/ Bag	200	100	100	100	50	50	50	50	25	25
Nos/ Carton	600	400	300	300	200	200	200	150	125	75
Wt. (Kg) 1000 Nos (Approx)	2.8	2.7	2.9	3.3	2.4	2.8	3.2	3.1	2.8	2.2

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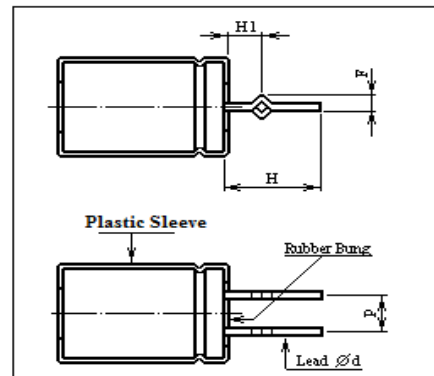
LEAD FORMED & CUT AND KINKING & CUT CAPACITORS.

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)

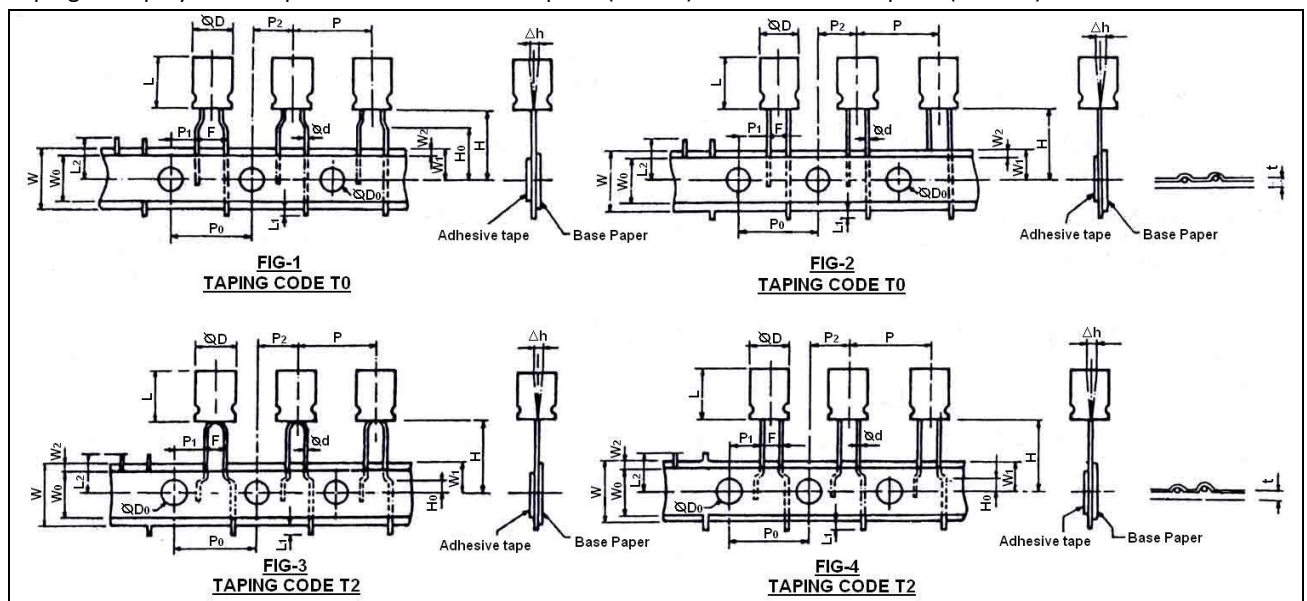
Case Diameter	H ± 0.5	H1	F ± 0.3	P ± 0.5	Ød ± 0.05	K (min)
Ø10	5.0	2.7	1.3	5.0	0.6	2.8
Ø12.5	5.0	2.7	1.3	5.0	0.6	2.8
Ø16	5.0	2.7	1.3	7.5	0.8	5.5
Ø18	5.0	2.7	1.3	7.5	0.8	5.5

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)



All Dimensions are in mm and Not to scale

SA SERIES

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

CASE SIZE			LEAD WIRE PITCH 5 mm			
			4 x 7 6.3x 7	5 x 11 6.3x11	8x12.5	10x12.5 10 x 16
ITEM	DESCRIPTION	TOLERANCE	ØDXL			
	Figure. no. Ref		1	1	1	2
Ød	Lead wire dia.	± 0.02	0.45	0.5	0.6	0.6
F	Lead to lead Center	+ 0.8 - 0.2	5	5	5	5
P	Pitch of Components	± 1.0	12.7	12.7	12.7	12.7
P0	Feed hole Pitch*	± 0.3	12.7	12.7	12.7	12.7
P1	Feed hole Centre to lead	± 0.7	3.85	3.85	3.85	3.85
P2	Feedhole Centre to Comp. Centre	± 1.3	6.35	6.35	6.35	6.35
Δh	Component alignment deviation	± 2.0	0	0	0	0
W	Base Paper Width	± 0.2	18	18	18	18
W0	Adhesive Tape Width	+2.0 -0.0	13	13	13	13
W1	Feed hole Position	+0.75 -0.50	9	9	9	9
W2	Adhesive Tape Position	Max	3	3	3	3
H	Comp. Base height from Centre	± 0.75	17.5	18.5	20	20
H0	Lead Wire Clinch height	± 0.5	16	16	16	0
L1	Lead Wire Protrusion	Max	0	0	0	0
ØD0	Feed hole diameters	± 0.3	4	4	4	4
t	Total Tape thickness	± 0.2	0.7	0.7	0.7	0.7
L2	Length of Snapped Lead	Max	11	11	11	11

*Cumulative Pitch Error = 1mm/ 20 Pitch

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

CASE SIZE			LEAD WIRE PITCH 2.5 mm			
			4 x 7	6.3 x 7	5x11	6.3x11
ITEM	DESCRIPTION	TOLERANCE	ØDXL			
	Figure. no. Ref		3	4	3	4
Ød	Lead wire dia.	± 0.02	0.45	0.45	0.5	0.5
F	Lead to lead Center	+ 0.8 - 0.2	2.5	2.5	2.5	2.5
P	Pitch of Components	± 1.0	12.7	12.7	12.7	12.7
P0	Feed hole Pitch*	± 0.3	12.7	12.7	12.7	12.7
P1	Feed hole Centre to lead	± 0.7	5.1	5.1	5.1	5.1
P2	Feedhole Centre to Comp. Centre	± 1.3	6.35	6.35	6.35	6.35
Δh	Component alignment deviation	± 2.0	0	0	0	0
W	Base Paper Width	± 0.2	18	18	18	18
W0	Adhesive Tape Width	+2.0 -0.0	13	13	13	13
W1	Feed hole Position	+0.75 -0.50	9	9	9	9
W2	Adhesive Tape Position	Max	3	3	3	3
H	Comp. Base height from Centre	± 0.75	17.5	17.5	18.5	18.5
H0	Lead Wire Clinch height	Approx	6.0	6.0	6.0	6.0
L1	Lead Wire Protrusion	Max	0	0	0	0
ØD0	Feed hole diameters	± 0.3	4	4	4	4
t	Total Tape thickness	± 0.2	0.7	0.7	0.7	0.7
L2	Length of Snapped Lead	Max	11	11	11	11

*Cumulative Pitch Error = 1mm/ 20 Pitch

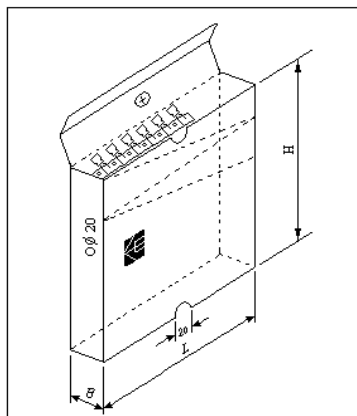
TAPED AMMO PACKING

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

Taped Ammo Packing Quantity Details: -

CAPACITOR SIZE (ØD x L mm)	4x7	6.3x7	5x11	6.3x11	8x12.5	10x12.5	10x16
Case Code	47	67	HS	AS	BB	CB	CD
Nos/ Carton	2000	1500	2000	1500	1000	600	600

All Dimensions in mm



Tape Ammo Box Spec:

Applicable case code	47, 67, HS, AS, BB, CB	CD
Box Dimensions		
L ± 2 (mm)	335	335
B ± 1 ₀ (mm)	46	50
H ± 2 (mm)	230	230