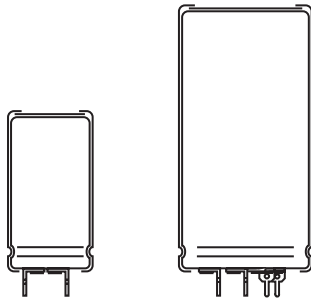


Aluminum Capacitors Power Printed Wiring Style



Component outlines



FEATURES

- Polarized aluminum electrolytic capacitors, non-solid electrolyte
- Large types, minimized dimensions, cylindrical aluminum case, insulated with a blue sleeve
- Provided with keyed polarity
- Very long useful life: 5000 h at 105 °C
- Low ESR, high ripple current capability
- Temperature range up to 105 °C
- High resistance to shock and vibration

APPLICATIONS

- Computer, telecommunication and industrial systems
- Smoothing and filtering
- Standard and switched mode power supplies
- Energy storage in pulse systems

MARKING

The capacitors are marked (where possible) with the following information:

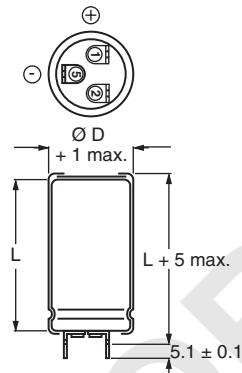
- Rated capacitance (in μF)
- Tolerance on rated capacitance, code letter in accordance with IEC 60062 (M for $\pm 20\%$)
- Rated voltage (in V)
- Date code (YYMM)
- Name of manufacturer
- Code for factory of origin
- Polarity of the terminals and '-' sign to indicate the negative terminal, visible from the top and/or side of the capacitor
- Code number
- Climatic category in accordance with IEC 60068

QUICK REFERENCE DATA	
DESCRIPTION	VALUE
Nominal case size ($\varnothing D \times L$ in mm)	25 x 30 to 40 x 100
Rated capacitance range (E6 series), C_R	470 μF to 150 000 μF 68 μF to 3300 μF
Tolerance on C_R	$\pm 20\%$
Rated voltage range, U_R	10 V to 100 V 200 V to 400 V
Category temperature range	- 40 °C to + 105 °C
Endurance test at 105 °C	2000 h
Useful life at 105 °C	5000 h
Useful life at 40 °C, $1.9 \times I_R$ applied	150 000 h
Shelf life at 0 V, 105 °C	500 h
Based on sectional specification	IEC 60384-4/EN130300
Climatic category IEC 60068	40/105/56

SELECTION CHART FOR C_R , U_R AND RELEVANT NOMINAL CASE SIZES ($\varnothing D \times L$ in mm)

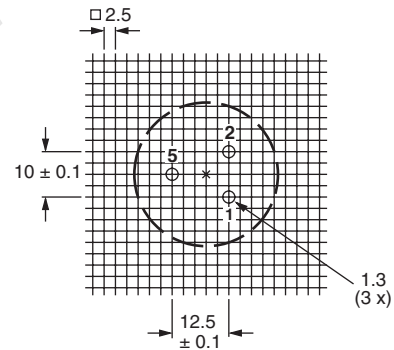
C_R (μF)	U_R (V)					
	10	16	25	40	63	100
470	-	-	-	-	-	25 x 30
680	-	-	-	-	-	25 x 40
1000	-	-	-	-	25 x 30	30 x 40
1500	-	-	-	-	25 x 40	35 x 40
2200	-	-	-	25 x 30	30 x 40	35 x 50
	-	-	-	-	-	40 x 40
3300	-	-	-	25 x 40	35 x 40	40 x 50
4700	-	-	25 x 30	30 x 40	35 x 50	40 x 70
	-	-	-	-	40 x 40	-
6800	-	25 x 30	25 x 40	35 x 40	40 x 50	40 x 100
10 000	25 x 30	25 x 40	30 x 40	35 x 50	40 x 70	-
	-	-	-	40 x 40	-	-
15 000	25 x 40	30 x 40	35 x 40	40 x 50	40 x 100	-
	30 x 40	35 x 40	35 x 50	40 x 70	-	-
22 000	-	-	40 x 40	-	-	-
	35 x 40	35 x 50	40 x 50	40 x 100	-	-
	-	40 x 40	-	-	-	-
33 000	35 x 40	35 x 50	40 x 70	-	-	-
	-	40 x 40	-	-	-	-
47 000	35 x 50	40 x 50	40 x 70	-	-	-
	40 x 40	-	-	-	-	-
68 000	40 x 50	40 x 70	40 x 100	-	-	-
100 000	40 x 70	40 x 100	-	-	-	-
150 000	40 x 100	-	-	-	-	-

SELECTION CHART FOR C_R, U_R AND RELEVANT NOMINAL CASE SIZES ($\varnothing D \times L$ in mm)				
C_R (μF)	U_R (V)			
	200	250	385	400
68	-	-	25 x 30	25 x 30
100	-	25 x 30	25 x 40	25 x 40
150	25 x 30	25 x 40	30 x 40	30 x 40
220	25 x 40	30 x 40	35 x 40	35 x 40
330	30 x 40	35 x 40	35 x 50	35 x 50
	-	-	40 x 40	40 x 40
470	35 x 40	35 x 50	40 x 50	40 x 50
	-	40 x 40	-	-
680	35 x 50	40 x 50	40 x 70	40 x 70
	40 x 50	-	-	-
1000	40 x 50	40 x 70	40 x 100	40 x 100
1500	40 x 70	40 x 100	-	-
2200	40 x 100	-	-	-

DIMENSIONS in millimeters AND AVAILABLE FORMS


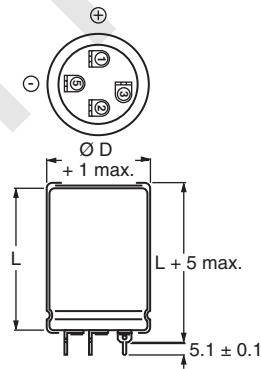
1 = Positive terminal
 5 = Negative terminal
 Case $\varnothing D = 25$ mm

Fig.1 Printed wiring pin version



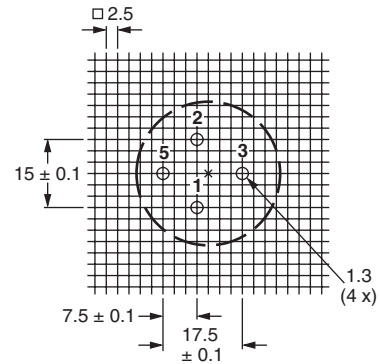
Case $\varnothing D = 25$ mm

Fig.2 Mounting hole pattern viewed from the component side



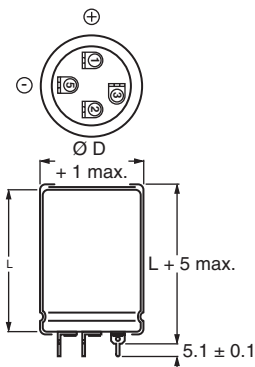
1 = Positive terminal
 5 = Negative terminal
 Case $\varnothing D = 30$ mm and 35 mm

Fig.3 Printed wiring pin version



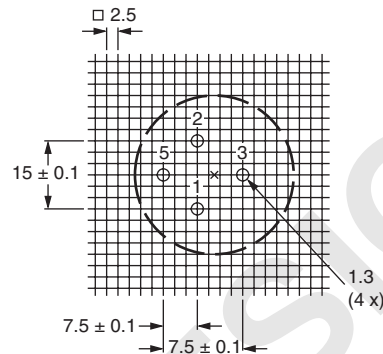
Case $\varnothing D = 30$ mm and 35 mm

Fig.4 Mounting hole pattern viewed from the component side



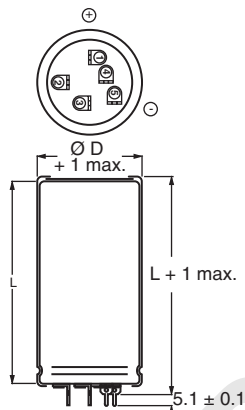
1 = Positive terminal;
5 = Negative terminal
Case Ø D = 35 mm

Fig.5 Printed wiring pin version



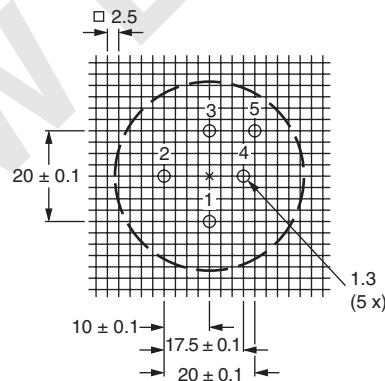
Case Ø D = 35 mm

Fig.6 Mounting hole pattern viewed from the component side



1 = Positive terminal;
5 = Negative terminal
Case Ø D = 40 mm

Fig.7 Printed wiring pin version



Case Ø D = 40 mm

Fig.8 Mounting hole pattern viewed from the component side

DIMENSIONS in millimeters, MASS AND PACKAGING QUANTITIES PW versions					
NOMINAL CASE SIZE Ø D x L	Ø D _{max.}	L _{max.}	MASS (g)	PACKAGING QUANTITIES (units per box)	CARDBOARD BOX DIMENSIONS L x W x H
25 x 30	26	35	≈ 24	100	290 x 280 x 50
25 x 40	26	45	≈ 28	100	290 x 280 x 60
30 x 40	31	45	≈ 38	100	340 x 330 x 60
35 x 40	36	45	≈ 51	50	390 x 198 x 60
35 x 50	36	55	≈ 66	50	390 x 198 x 70
40 x 40	41	45	≈ 78	50	440 x 223 x 60
40 x 50	41	55	≈ 82	50	440 x 223 x 70
40 x 70	41	75	≈ 110	25	230 x 230 x 90
40 x 100	41	105	≈ 176	25	230 x 230 x 120

MOUNTING

When a number of capacitors are connected in a bank, they must not be closer together than 15 mm, when no derating of ripple current and/or temperature is applied.

Pin numbers 2, 3 and 4 (if present) must be free from the electrical circuit.



Aluminum Capacitors
Power Printed Wiring Style

Vishay Roederstein

ELECTRICAL DATA	
SYMBOL	DESCRIPTION
C _R	rated capacitance at 100 Hz
I _R	rated RMS ripple current at 100 Hz and 105 °C
I _{L1}	max. leakage current after 1 minute at U _R
I _{L5}	max. leakage current after 5 minutes at U _R
ESR	max. equivalent series resistance at 100 Hz
Z	max. impedance at 10 kHz

ORDERING EXAMPLE

10 000 µF/25 V; ± 20 %

Nominal case size: Ø 30 x 40 mm

Ordering code: MALPEYZ00BB510E02W

Note

(1) Unless otherwise specified, all electrical values in Tables 2 and 3 apply at T_a = 20 °C, P = 86 kPa to 106 kPa, RH = 45 % to 75 %

ELECTRICAL DATA AND ORDERING INFORMATION								
U _R (V)	C _R 100 Hz (µF)	NOMINAL CASE SIZE Ø D x L (mm)	I _R 100 Hz 105 °C (A)	I _{L1} 1 min (mA)	I _{L5} 5 min (mA)	ESR 100 Hz (mΩ)	Z 10 kHz (mΩ)	ORDERING CODE
10	10 000	25 x 30	3.17	0.60	0.20	48	37	MALPEYZ00AV510C02W
	15 000	25 x 40	4.21	0.90	0.30	34	27	MALPEYZ00AB515C02W
	22 000	30 x 40	5.05	1.32	0.44	29	23	MALPEYZ00BB522C02W
	33 000	35 x 40	5.63	1.98	0.66	27	22	MALPEYZ00CB533C02W
	47 000	35 x 50	6.19	2.82	0.94	26	21	MALPEYZ00CD547C02W
	47 000	40 x 40	6.19	2.82	0.94	26	21	MALPEYZ00DB547C02W
	68 000	40 x 50	7.64	4.08	1.36	21	18	MALPEYZ00DD568C02W
	100 000	40 x 70	10.0	6.00	2.00	16	15	MALPEYZ00DG610C02W
	150 000	40 x 100	12.9	9.00	3.00	13	12	MALPEYZ00DM615C02W
16	6800	25 x 30	3.11	0.65	0.22	50	37	MALPEYZ00AV468D02W
	10 000	25 x 40	4.09	0.96	0.32	36	27	MALPEYZ00AB510D02W
	15 000	30 x 40	4.97	1.44	0.48	30	23	MALPEYZ00BB515D02W
	22 000	35 x 40	5.53	2.12	0.71	29	22	MALPEYZ00CB522D02W
	33 000	35 x 50	6.08	3.17	1.06	28	21	MALPEYZ00CD533D02W
	33 000	40 x 40	6.08	3.17	1.06	28	21	MALPEYZ00DB533D02W
	47 000	40 x 50	7.46	4.52	1.51	22	18	MALPEYZ00DD547D02W
	68 000	40 x 70	9.70	6.53	2.18	17	15	MALPEYZ00DG568D02W
	100 000	40 x 100	12.90	9.60	3.20	13	12	MALPEYZ00DM610D02W
25	4700	25 x 30	2.94	0.71	0.24	56	37	MALPEYZ00AV447E02W
	6800	25 x 40	3.93	1.02	0.34	39	27	MALPEYZ00AB468E02W
	10 000	30 x 40	4.81	1.50	0.50	32	23	MALPEYZ00BB510E02W
	15 000	35 x 40	5.43	2.25	0.75	30	22	MALPEYZ00CB515E02W
	22 000	35 x 50	5.98	3.30	1.10	29	21	MALPEYZ00CD522E02W
	22 000	40 x 40	5.98	3.30	1.10	29	21	MALPEYZ00DB522E02W
	33 000	40 x 50	7.30	4.95	1.65	23	18	MALPEYZ00DD533E02W
	47 000	40 x 70	9.43	7.05	2.35	18	15	MALPEYZ00DG547E02W
	68 000	40 x 100	12.44	10.20	3.40	14	12	MALPEYZ00DM568E02W
40	2200	25 x 30	2.36	0.53	0.18	87	54	MALPEYZ00AV422G02W
	3300	25 x 40	3.17	0.79	0.27	60	38	MALPEYZ00AB423G02W
	4700	30 x 40	3.93	1.13	0.38	48	33	MALPEYZ00BB447G02W
	6800	35 x 40	4.59	1.63	0.55	42	31	MALPEYZ00CB468G02W
	10 000	35 x 50	5.03	2.40	0.80	41	29	MALPEYZ00CD510G02W
	10 000	40 x 40	5.03	2.40	0.80	41	29	MALPEYZ00DB510G02W
	15 000	40 x 50	6.09	3.60	1.20	33	24	MALPEYZ00DD515G02W
	22 000	40 x 70	8.34	5.28	1.76	23	18	MALPEYZ00DG522G02W
	33 000	40 x 100	10.97	7.92	2.64	18	15	MALPEYZ00DM533G02W
63	1000	25 x 30	1.55	0.38	0.13	202	155	MALPEYZ00AV410J02W
	1500	25 x 40	2.10	0.57	0.19	137	109	MALPEYZ00AB415J02W
	2200	30 x 40	2.72	0.83	0.28	100	79	MALPEYZ00BB422J02W
	3300	35 x 40	3.44	1.25	0.42	75	61	MALPEYZ00CB433J02W
	4700	35 x 50	4.09	1.78	0.60	62	53	MALPEYZ00CD447J02W
	4700	40 x 40	4.09	1.78	0.60	62	53	MALPEYZ00DB447J02W
	6800	40 x 50	5.10	2.57	0.86	47	40	MALPEYZ00DD468J02W
	10 000	40 x 70	6.86	3.78	1.26	34	29	MALPEYZ00DG510J02W
	15 000	40 x 100	9.31	5.67	1.89	25	21	MALPEYZ00DM515J02W

ELECTRICAL DATA AND ORDERING INFORMATION								
U_R (V)	C_R 100 Hz (μ F)	NOMINAL CASE SIZE \varnothing D x L (mm)	I_R 100 Hz 105 °C (A)	I_{L1} 1 min (mA)	I_{L5} 5 min (mA)	ESR 100 Hz (m Ω)	Z 10 kHz (m Ω)	ORDERING CODE
100	470	25 x 30	1.42	0.28	0.10	240	155	MALPEYZ00AV347L02W
	680	25 x 40	1.90	0.41	0.14	167	109	MALPEYZ00AB368L02W
	1000	30 x 40	2.48	0.60	0.20	120	79	MALPEYZ00BB410L02W
	1500	35 x 40	3.17	0.90	0.30	88	61	MALPEYZ00CB415L02W
	2200	35 x 50	3.79	1.32	0.44	72	53	MALPEYZ00CD422L02W
	2200	40 x 40	3.79	1.32	0.44	72	53	MALPEYZ00DB422L02W
	3300	40 x 50	4.81	1.98	0.66	53	40	MALPEYZ00DD433L02W
	4700	40 x 70	6.49	2.82	0.94	38	29	MALPEYZ00DG447L02W
	6800	40 x 100	8.80	4.08	1.36	28	21	MALPEYZ00DM468L02W
200	150	25 x 30	0.72	0.18	0.06	950	710	MALPEYZ00AV315S02W
	220	25 x 40	0.96	0.26	0.09	650	485	MALPEYZ00AB322S02W
	330	30 x 40	1.29	0.40	0.14	442	330	MALPEYZ00BB333S02W
	470	35 x 40	1.66	0.57	0.19	321	240	MALPEYZ00CB347S02W
	680	35 x 50	2.09	0.82	0.28	237	185	MALPEYZ00CD368S02W
	680	40 x 40	2.09	0.82	0.28	237	185	MALPEYZ00DB368S02W
	1000	40 x 50	2.71	1.20	0.40	167	133	MALPEYZ00DD410S02W
	1500	40 x 70	3.75	1.80	0.60	114	90	MALPEYZ00DG415S02W
	2200	40 x 100	5.24	2.64	0.88	79	62	MALPEYZ00DM422S02W
250	100	25 x 30	0.67	0.15	0.05	1060	710	MALPEYZ00AV310N02W
	150	25 x 40	0.92	0.22	0.08	710	485	MALPEYZ00AB315N02W
	220	30 x 40	1.28	0.33	0.11	492	330	MALPEYZ00BB322N02W
	330	35 x 40	1.65	0.49	0.17	325	240	MALPEYZ00CB333N02W
	470	35 x 50	2.01	0.70	0.24	256	185	MALPEYZ00CD347N02W
	470	40 x 40	2.01	0.70	0.24	256	185	MALPEYZ00DB347N02W
	680	40 x 50	2.59	1.02	0.34	182	133	MALPEYZ00DD368N02W
	1000	40 x 70	3.58	1.50	0.50	125	90	MALPEYZ00DG410N02W
	1500	40 x 100	5.05	2.25	0.75	85	62	MALPEYZ00DM415N02W
385	68	25 x 30	0.61	0.16	0.06	1650	1260	MALPEYZ00AV268R02W
	100	25 x 40	0.82	0.23	0.08	1120	855	MALPEYZ00AB310R02W
	150	30 x 40	1.10	0.35	0.12	755	580	MALPEYZ00BB315R02W
	220	35 x 40	1.44	0.51	0.17	525	405	MALPEYZ00CB322R02W
	330	35 x 50	1.84	0.77	0.26	360	280	MALPEYZ00CD333R02W
	330	40 x 40	1.84	0.77	0.26	360	280	MALPEYZ00DB333R02W
	470	40 x 50	2.37	1.09	0.36	260	205	MALPEYZ00DD347R02W
	680	40 x 70	3.24	1.58	0.53	180	140	MALPEYZ00DG368R02W
	1000	40 x 100	4.54	2.31	0.78	125	100	MALPEYZ00DM410R02W
400	68	25 x 30	0.39	0.16	0.06	3200	2660	MALPEYZ00AV268X02W
	100	25 x 40	0.53	0.24	0.08	2180	1810	MALPEYZ00AB310X02W
	150	30 x 40	0.72	0.36	0.12	1460	1210	MALPEYZ00BB315X02W
	220	35 x 40	0.94	0.52	0.17	1010	830	MALPEYZ00CB322X02W
	330	35 x 50	1.24	0.79	0.26	680	570	MALPEYZ00CD333X02W
	330	40 x 40	1.24	0.79	0.26	680	570	MALPEYZ00DB333X02W
	470	40 x 50	1.59	1.12	0.37	485	407	MALPEYZ00DD347X02W
	680	40 x 70	2.18	1.63	0.54	336	282	MALPEYZ00DG368X02W
	1000	40 x 100	3.07	2.40	0.80	230	193	MALPEYZ00DM410X02W

ADDITIONAL ELECTRICAL DATA		
PARAMETER	CONDITIONS	VALUE
Voltage		
Surge voltage	≤ 200 V versions	$U_s = 1.15 \times U_R$
	≥ 385 V versions	$U_s = 1.1 \times U_R$
Reverse voltage		$U_{rev} \leq 1$ V
Current		
Leakage current	After 1 minute at U_R	$I_{L1} \leq 0.006 C_R \times U_R + 4 \mu$ A
	After 5 minutes at U_R	$I_{L5} \leq 0.002 C_R \times U_R + 4 \mu$ A
Inductance		
Equivalent series inductance (ESL)	Case \varnothing D = 25 mm	max. 25 nH
	Case \varnothing D = 30 and 35 mm	max. 30 nH
	Case \varnothing D = 40 mm	max. 35 nH

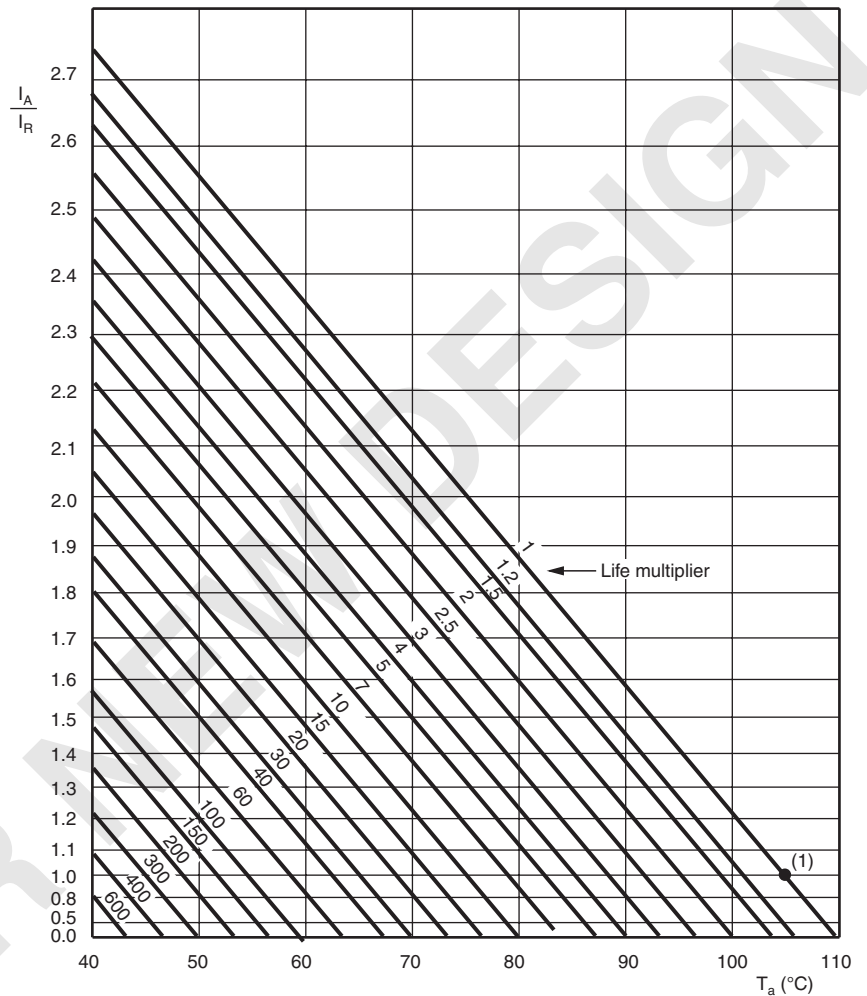
RIPPLE CURRENT AND USEFUL LIFE


Fig.9 Multiplier of useful life as a function of ambient temperature and ripple current load

MULTIPLIER OF RIPPLE CURRENT (I_R) AS A FUNCTION OF FREQUENCY			
FREQUENCY (Hz)	I_R MULTIPLIER		
	$U_R = 10\text{ V to }25\text{ V}$	$U_R = 40\text{ V to }100\text{ V}$	$U_R = 200\text{ V to }400\text{ V}$
50	0.93	0.91	0.86
100	1.00	1.00	1.00
200	1.04	1.05	1.13
400	1.07	1.09	1.21
1000	1.11	1.13	1.29
2000	1.13	1.15	1.32
4000	1.15	1.18	1.35
≥ 10 000	1.18	1.22	1.40

TEST PROCEDURES AND REQUIREMENT

TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	REFERENCE		
Endurance	IEC 60384-4/ EN130300 subclause 4.13	$T_a = 105\text{ }^\circ\text{C}$; U_R applied; 2000 h	$U_R \leq 100\text{ V}$; $\Delta C/C: \pm 15\%$ $U_R > 100\text{ V}$; $\Delta C/C: \pm 10\%$ $ESR \leq 1.3 \times \text{spec. limit}$ $Z \leq 2 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$
Useful life	CECC 30301 subclause 1.8.1	$T_a = 105\text{ }^\circ\text{C}$; U_R and I_R applied; 5000 h	$U_R \leq 100\text{ V}$; $\Delta C/C: \pm 45\%$ $U_R > 100\text{ V}$; $\Delta C/C: \pm 30\%$ $ESR \leq 3 \times \text{spec. limit}$ $Z \leq 3 \times \text{spec. limit}$ $I_{L5} \leq \text{spec. limit}$ no short or open circuit, no visible damage total failure percentage: $U_R \leq 100\text{ V}: \leq 1\%$; $U_R > 100\text{ V}: \leq 3\%$
Shelf life (storage at high temperature)	IEC 60384-4/ EN130300 subclause 4.17	$T_a = 105\text{ }^\circ\text{C}$; no voltage applied; 500 h After test: U_R to be applied for 30 min, 24 to 48 h before measurement	$\Delta C/C: \pm 10\%$ $ESR \leq 1.2 \times \text{spec. limit}$ $I_{L5} \leq 2 \times \text{spec. limit}$



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