Non-solid Al - electrolytic capacitors Axial, Smallest Diameter

ASD 117

FEATURES

- Polarized aluminium electrolytic capacitors, non-solid
- Axial leads, cylindrical aluminium case, insulated with a blue sleeve
- Taped for automatic insertion
- Charge and discharge proof
- Ultra miniature, diameter 3.3 mm.

APPLICATIONS

- General purpose, low profile and lightweight equipment
- Smoothing, filtering, buffering, decoupling, timing
- Boards with restricted mounting height.

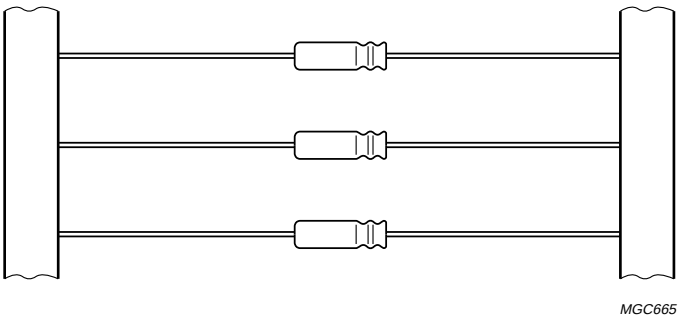
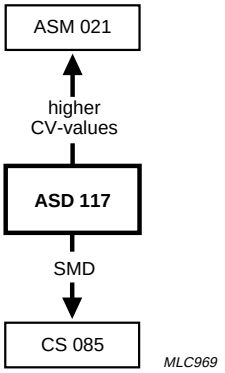


Fig.1 Component outlines.



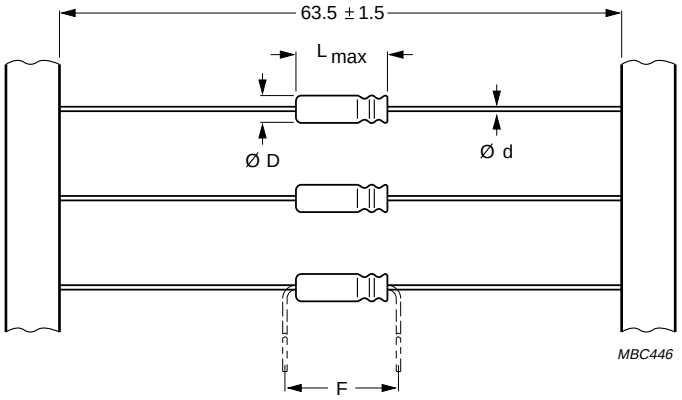
QUICK REFERENCE DATA

DESCRIPTION	VALUE
Case sizes ($\varnothing D_{nom} \times L_{nom}$ in mm)	3.3×8 and 3.3×11
Rated capacitance range, C_R	0.47 to 22 μF
Tolerance on C_R	−10 to +50% (±20% to special order)
Rated voltage range, U_R	6.3 to 63 V
Category temperature range	−40 to +85 °C
Endurance test at 85 °C	1500 hours
Useful life at 85 °C	2000 hours
Useful life at 40 °C, 1.4 I_R applied	60000 hours
Shelf life at 0 V, 85 °C	500 hours
Based on sectional specification	IEC 384-4/CECC 30300, GP grade
Climatic category IEC 68 (DIN 40040)	40/085/56 (GPF)

Selection chart for C_R, U_R and relevant nominal case sizes (∅D × L in mm)

C_R (μF)	U_R (V)					
	6.3	**10**	**16**	**25**	**40**	**63**
0.47	–	–	–	–	–	3.3 × 8
1.0	–	–	–	–	–	3.3 × 8
2.2	–	–	–	–	3.3 × 8	3.3 × 11
3.3	–	–	–	3.3 × 8	–	3.3 × 11
4.7	–	–	3.3 × 8	–	3.3 × 11	–
6.8	–	3.3 × 8	–	3.3 × 11	–	–
10	3.3 × 8	–	3.3 × 11	–	–	–
22	3.3 × 11	–	–	–	–	–

MECHANICAL DATA, AVAILABLE FORMS AND PACKAGING QUANTITIES



Dimensions in mm.
Form BR: Taped on reel.
Form BA: Taped in box.
Case ∅D × L = 3.3 × 8 and 3.3 × 11 mm.
For dimensions see Table 1.

Fig.2 Components insulated with a blue plastic sleeve.

Table 1 Physical dimensions, mass and packaging quantities; see Fig.2

NOMINAL CASE SIZE ∅D × L (mm)	CASE CODE	AXIAL: F0RM BA and BR				MASS (g)	PACKAGING QUANTITIES	
		∅d (mm)	$\varnothing D_{max}$ (mm)	L_{max} (mm)	F_{min} (mm)		FORM BA	FORM BR
3.3 × 8	1a	0.6	3.5	9	12.5	≈0.3	1000	4000
3.3 × 11	1	0.6	3.5	12	15	≈0.35	1000	4000

MARKING

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

- Rated capacitance (in μF)
- Rated voltage (in V)
- Group number (117)
- Name of manufacturer (PHILIPS)
- Date code, in accordance with *"IEC 62"*
- Code indicating factory of origin
- Band to identify the negative terminal.

ELECTRICAL DATA AND ORDERING INFORMATION

Unless otherwise specified, all electrical values in Table 2 apply at T_{amb} = 20 °C, P = 86 to 106 kPa, RH = 45 to 75%.

SYMBOL	DESCRIPTION
C_R	rated capacitance at 100 Hz, tolerance –10 to +50%
I_R	rated RMS ripple current at 100 Hz, 85 °C
I_{L1}	max. leakage current after 1 minute at U_R
I_{L5}	max. leakage current after 5 minutes at U_R
Tan δ	max. dissipation factor at 100 Hz
ESR	equivalent series resistance at 100 Hz (calculated from tan δ_{max} and C_R)
Z	max. impedance at 10 kHz

Ordering example

Electrolytic capacitor ASD 117

10 µF/16 V; –10/+50%

Nominal case size: ∅3.3 × 11 mm; Form BA

Catalogue number: 2222 117 35109.

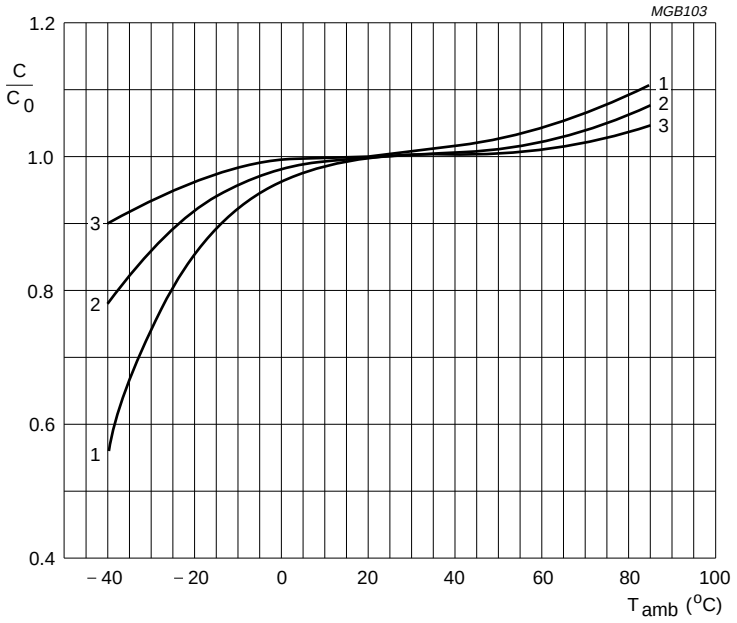
Table 2 Electrical data and ordering information

U_R (V)	C_R 100 Hz (µF)	NOMINAL CASE SIZE ∅D × L (mm)	CASE CODE	I_R 100 Hz 85 °C (mA)	I_{L1} 1 min (µA)	I_{L5} 5 min (µA)	Tan δ 100 Hz	ESR 100 Hz (Ω)	Z 10 kHz (Ω)	CATALOGUE NUMBER 2222	
										ON REEL FORM BR	IN BOX FORM BA
6.3	10	3.3 × 8	1a	11	4	3	0.30	48	20	117 23109	117 33109
	22	3.3 × 11	1	20	6	3	0.30	22	9	117 23229	117 33229
10	6.8	3.3 × 8	1a	10	4	3	0.25	59	24	117 24688	117 34688
16	4.7	3.3 × 8	1a	9	5	3	0.20	68	26	117 25478	117 35478
	10	3.3 × 11	1	16	6	3	0.20	32	12	117 25109	117 35109
25	3.3	3.3 × 8	1a	8	5	3	0.18	87	27	117 26338	117 36338
	6.8	3.3 × 11	1	14	6	3	0.18	42	13	117 26688	117 36688
40	2.2	3.3 × 8	1a	7	5	3	0.16	120	32	117 27228	117 37228
	4.7	3.3 × 11	1	13	7	3	0.16	54	15	117 27478	117 37478
63	0.47	3.3 × 8	1a	4	4	3	0.10	340	120	117 28477	117 38477
	1	3.3 × 8	1a	6	4	3	0.12	190	55	117 28108	117 38108
	2.2	3.3 × 11	1	11	6	3	0.14	87	25	117 28228	117 38228
	3.3	3.3 × 11	1	13	7	3	0.14	68	17	117 28338	117 38338

Additional electrical data

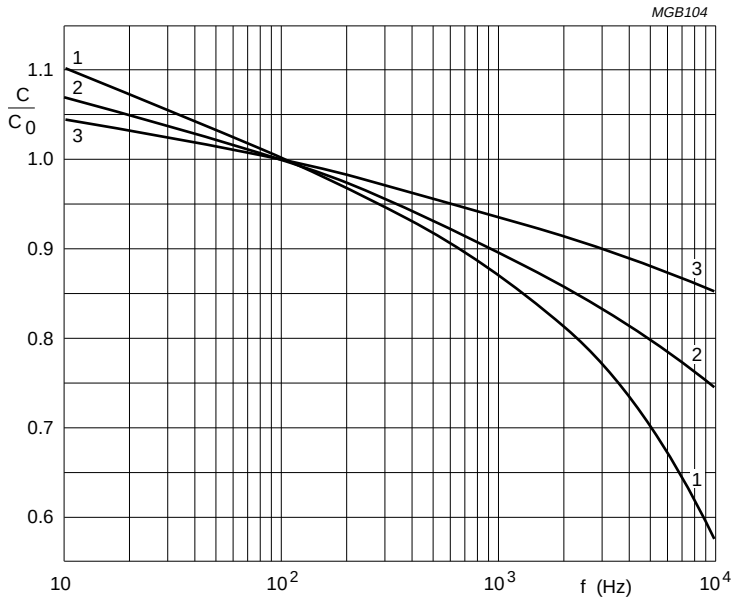
PARAMETER	CONDITIONS	VALUE
Voltage		
Surge voltage for short periods		$U_S \leq 1.15 \times U_R$
Reverse voltage		$U_{rev} \leq 1$ V
Current		
Leakage current	after 1 minute at U_R	$I_{L1} \leq 0.02C_R \times U_R + 3$ µA
	after 5 minutes at U_R	$I_{L5} \leq 0.002C_R \times U_R + 3$ µA
Inductance		
Equivalent series inductance (ESL)	case ∅D × L = 3.3 × 8 mm	typ. 13 nH
	case ∅D × L = 3.3 × 11 mm	typ. 15 nH

Capacitance (C)



Curve 1: 6.3 V.
Curve 2: 25 V.
Curve 3: 63 V.
C_0 = capacitance at 20 °C, 100 Hz.

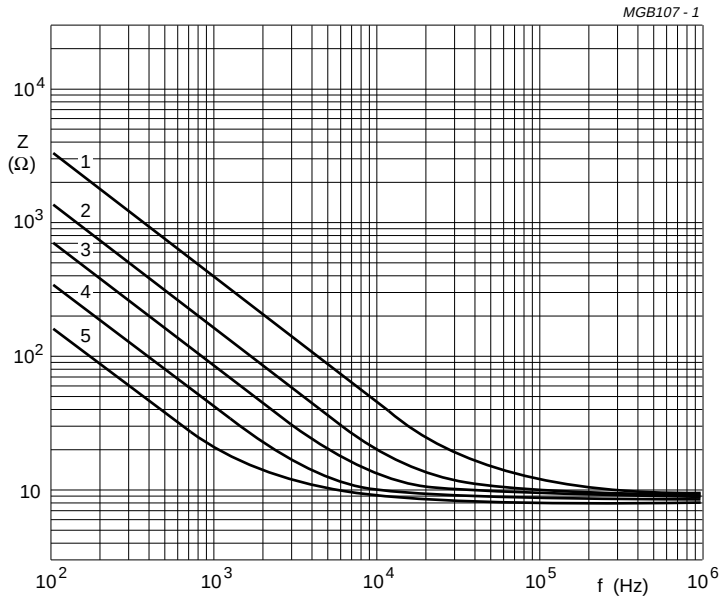
Fig.3 Typical multiplier of capacitance as a function of ambient temperature.



Curve 1: 6.3 V.
Curve 2: 25 V.
Curve 3: 63 V.
C_0 = capacitance at 20 °C, 100 Hz.

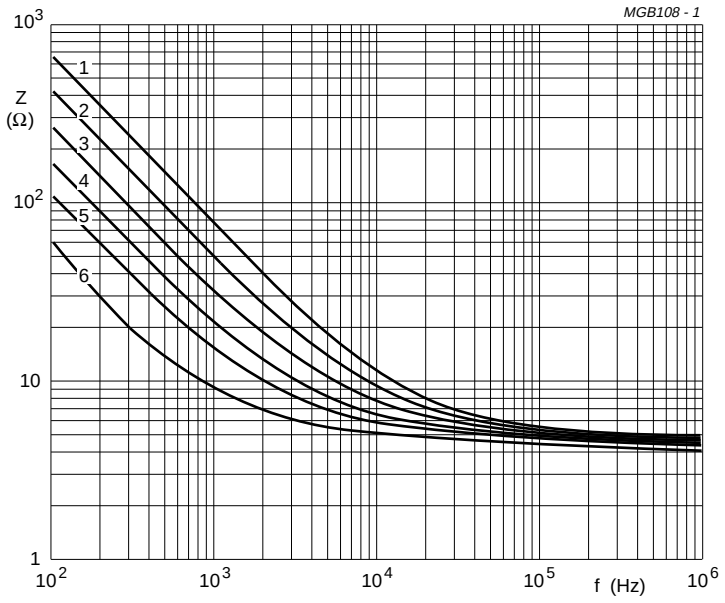
Fig.4 Typical multiplier of capacitance as a function of frequency.

Impedance (Z)



Curve 1: 0.47 µF.
Curve 2: 1 µF.
Curve 3: 2.2 µF.
Curve 4: 4.7 µF.
Curve 5: 10 µF.
Case ∅D × L = 3.3 × 8 mm.
T_{amb} = 20 °C.

Fig.5 Typical impedance as a function of frequency.



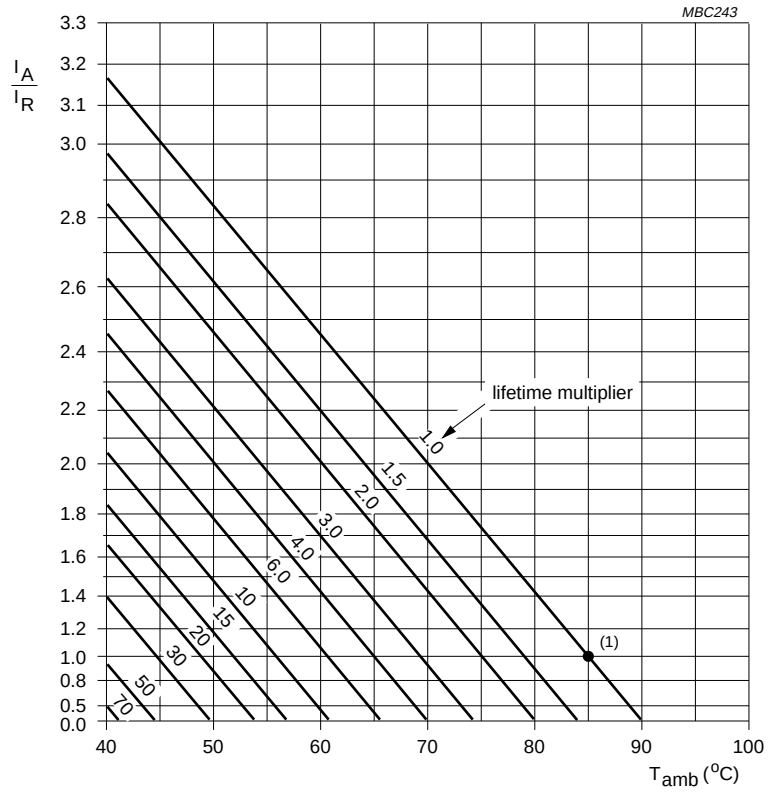
Curve 1: 2.2 µF.
Curve 2: 3.3 µF.
Curve 3: 4.7 µF.
Curve 4: 6.8 µF.
Curve 5: 10 µF.
Curve 6: 22 µF.
Case ∅D × L = 3.3 × 11 mm.
T_{amb} = 20 °C.

Fig.6 Typical impedance as a function of frequency.

RIPPLE CURRENT AND USEFUL LIFE

Table 3 Multiplier of ripple current (I_R/I_{RO}) as a function of frequency; I_{RO} = ripple current at 85 °C, 100 Hz

FREQUENCY (Hz)	I_R MULTIPLIER		
	U_R = 6.3 to 16 V	U_R = 25 to 40 V	U_R = 63 V
50	0.8	0.75	0.7
100	1.0	1.0	1.0
300	1.2	1.3	1.55
1000	1.35	1.55	1.9
3000	1.45	1.7	2.3
≥10000	1.5	1.8	2.5



I_A = actual ripple current at 100 Hz.

I_R = rated ripple current at 100 Hz, 85 °C.

(1) Useful life at 85 °C and I_R applied: 2000 hours.

Fig.7 Multiplier of useful life as a function of ambient temperature and ripple current load.

SPECIFIC TESTS AND REQUIREMENTS

General tests and requirements are specified in this handbook, section *"Tests and Requirements"*.

Table 4 Test procedures and requirements

TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	**REFERENCE**		
Endurance	IEC 384-4/ CECC 30300 subclause 4.13	T_{amb} = 85 °C; U_R applied; 1500 hours	$\Delta C/C$: ±20% tan $\delta \leq 2 \times$ spec. limit $Z \leq 3 \times$ spec. limit $I_{L5} \leq$ spec. limit
Useful life	CECC 30301 subclause 1.8.1	T_{amb} = 85 °C; U_R and I_R applied; 2000 hours	$\Delta C/C$: ±50% tan $\delta \leq 3 \times$ spec. limit $Z \leq 3 \times$ spec. limit $I_{L5} \leq$ spec. limit no short or open circuit total failure percentage: ≤3%
Shelf life (storage at high temperature)	IEC 384-4/ CECC 30300 subclause 4.17	T_{amb} = 85 °C; no voltage applied; 500 hours; after test: U_R to be applied for 30 minutes, 24 to 48 hours before measurement	$\Delta C/C$, tan δ, Z: for requirements see 'Endurance test' above $I_{L5} \leq 2 \times$ spec. limit