DATA SHEET

150 CLZ

Aluminum electrolytic capacitors SMD (Chip)
Long life base plate, very low impedance

Preliminary specification
Supersedes data of 26th September 2001
File under BCcomponents, BC01

2002 Feb 27

BC COMPONENTS

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FEATURES

- Polarized aluminum electrolytic capacitors, non-solid electrolyte, self healing
- SMD-version with base plate, reflow solderable
- Very low impedance, very high ripple current
- Very long useful life: 3000 hours at 105 °C
- Charge and discharge proof, no peak current limitation
- Supplied in blister tape on reel.

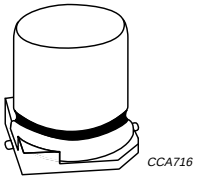
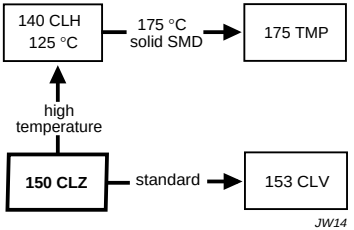


Fig.1 Component outline.

APPLICATIONS

- SMD technology, for high mounting density
- Industrial and professional applications
- Automotive, general industrial
- Smoothing, filtering, buffering.



QUICK REFERENCE DATA

DESCRIPTION	VALUE
Nominal case sizes (L × W × H in mm)	8 × 8 × 10 to 10 × 10 × 14
Rated capacitance range, C_R	33 to 1000 µF
Tolerance on C_R	±20%
Rated voltage range, U_R	6.3 to 63 V
Category temperature range	–55 to +105 °C
Endurance test at 105 °C:	2000 hours
Useful life at 105 °C:	
case size ≤10 × 10 × 10	2500 hours
case size 10 × 10 × 14	3000 hours
Useful life at 40 °C; 1.8 × I_R applied:	
case size ≤10 × 10 × 10	125000 hours
case size 10 × 10 × 14	150000 hours
Shelf life at 0 V, 105 °C	1000 hours
Based on sectional specification	IEC 60384-18/CECC32300
Climatic category IEC 60068	55/105/56

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

Preferred types in **bold**.

C_R (μF)	U_R (V)						
	6.3	**10**	**16**	**25**	**35**	**50**	**63**
33	–	–	–	–	–	–	8 × 8 × 10
47	–	–	–	–	–	–	**8 × 8 × 10**
	–	–	–	–	–	–	**10 × 10 × 10**
68	–	–	–	–	–	8 × 8 × 10	10 × 10 × 10
100	–	–	–	–	**8 × 8 × 10**	**10 × 10 × 10**	10 × 10 × 14
150	–	–	–	8 × 8 × 10	–	–	–
220	–	–	8 × 8 × 10	**8 × 8 × 10**	**10 × 10 × 10**	**10 × 10 × 14**	–
330	–	8 × 8 × 10	**8 × 8 × 10**	10 × 10 × 10	10 × 10 × 14	–	–
470	8 × 8 × 10	**8 × 8 × 10**	**10 × 10 × 10**	**10 × 10 × 14**	–	–	–
680	–	10 × 10 × 10	10 × 10 × 14	–	–	–	–
1000	10 × 10 × 10	**10 × 10 × 14**	–	–	–	–	–

MARKING

- Rated capacitance (in μF)
- Rated voltage (in V)
- Black mark or '–' sign indicating the cathode (the anode is identified by bevelled edges)
- Code indicating group number (Z)
- Date code, in accordance with *"IEC 60062"*.

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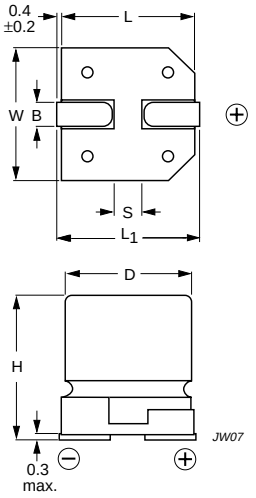
MECHANICAL DATA



Dimensions in mm.
For dimensions see Table 1.

Fig.2 Dimensional outline.

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

NOMINAL CASE SIZE L × W × H (mm)	CASE CODE	L_{max} (mm)	W_{max} (mm)	H_{max} (mm)	∅D (mm)	B_{max} (mm)	S (mm)	$L_{1\ max}$ (mm)	MASS (g)
8 × 8 × 10	0810	8.5	8.5	10.5	8.0	1.0	3.1	9.9	≈1.0
10 ×10 × 10	1010	10.5	10.5	10.5	10.0	1.0	4.5	11.8	≈1.3
10 × 10 × 14	1014	10.5	10.5	14.3	10.0	1.0	4.5	11.8	≈1.5

PACKAGING

Supplied in blister tape on reel. For general packaging information refer to data handbook BC01, section *"Packaging"*.

Table 2 Tape and reel dimensions

NOMINAL CASE SIZE L × W × H (mm)	CASE CODE	PITCH P_1 (mm)	TAPE WIDTH W (mm)	TAPE THICKNESS T_2 (mm)	REEL DIA. (mm)	PACKAGING QUANTITY PER REEL
8 × 8 × 10	0810	16	24	11.8	380	500
10 ×10 × 10	1010	16	24	11.8	380	500
10 × 10 × 14	1014	16	24	15.0	330	250

MOUNTING

The capacitors are designed for automatic placement on to printed-circuit boards.

Optimum dimensions of soldering pads depend amongst others on soldering method, mounting accuracy, print lay-out and/or adjacent components.

For recommended soldering pad dimensions, refer to Fig.3 and Table 3

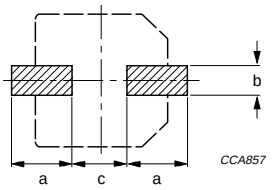
Soldering

Soldering conditions are defined by the curve, temperature versus time, where the temperature is that measured on the soldering pad during processing.

For maximum conditions refer to Fig.4.

Any temperature versus time curve which does not exceed the specified maximum curves may be applied.

AS A GENERAL PRINCIPLE, TEMPERATURE AND DURATION SHALL BE THE **MINIMUM** NECESSARY REQUIRED TO ENSURE GOOD SOLDERING CONNECTIONS. HOWEVER, THE SPECIFIED MAXIMUM CURVES SHOULD NEVER BE EXCEEDED.



For dimensions see Table 3.

Fig.3 Recommended soldering pad dimensions.

Table 3 Recommended soldering pad dimensions; see Fig.3

CASE CODE	a (mm)	b (mm)	c (mm)
0810	3.5	2.5	3.0
1010	4.3	2.5	4.0
1014	4.3	2.5	4.0

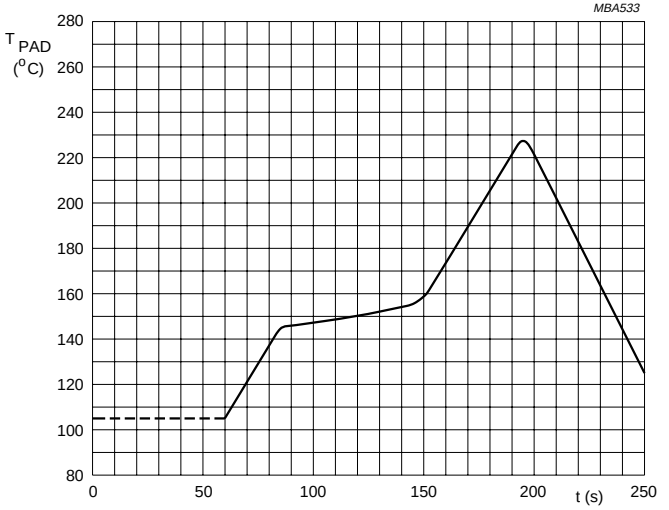


Fig.4 Maximum temperature load during infrared reflow soldering measured on the soldering pad.

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ELECTRICAL DATA AND ORDERING INFORMATION

Unless otherwise specified, all electrical values in Table 4 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 ±20%
I_R	rated RMS ripple current at 100 kHz, 105 °C
I_{L2}	max. leakage current after 2 minutes at U_R
Tan δ	max. dissipation factor at 100 Hz
Z	max. impedance at 100 kHz

Electrolytic capacitor 150 CLZ series

220 μF/50 V; ±20%

Nominal case size:
10 × 10 × 14 mm; taped on reel

Catalogue number: 2222 150 95102.

Ordering example

Table 4 Electrical data and ordering information; preferred types in **bold**

U_R (V)	C_R (μF)	NOMINAL CASE SIZE L × W × H (mm)	I_R 105 °C (mA) 100 kHz	I_{L2} 2 min (μA)	Tan δ 100 Hz	Z 100 kHz +20 °C (Ω)	CATALOGUE NUMBER 2222 150 .....
6.3	470	8 × 8 × 10	435	30	0.24	0.25	95311
	1000	10 × 10 × 10	670	63	0.24	0.13	95301
10	330	8 × 8 × 10	435	33	0.20	0.25	95411
	470	**8 × 8 × 10**	435	47	0.20	0.25	**95412**
	680	10 × 10 × 10	670	68	0.20	0.13	95401
	1000	**10 × 10 × 14**	850	100	0.20	0.10	**95402**
16	220	8 × 8 × 10	435	35	0.16	0.25	95511
	330	**8 × 8 × 10**	435	53	0.16	0.25	**95512**
	470	**10 × 10 × 10**	670	75	0.16	0.13	**95501**
	680	10 × 10 × 14	850	109	0.16	0.10	95502
25	150	8 × 8 × 10	420	38	0.14	0.28	95611
	220	**8 × 8 × 10**	420	55	0.14	0.28	**95612**
	330	10 × 10 × 10	640	83	0.14	0.14	95601
	470	**10 × 10 × 14**	820	118	0.14	0.11	**95602**
35	**100**	**8 × 8 × 10**	405	35	0.12	0.30	**95011**
	220	**10 × 10 × 10**	630	77	0.12	0.15	**95001**
	330	10 × 10 × 14	790	116	0.12	0.12	95002
50	68	8 × 8 × 10	333	34	0.12	0.48	95111
	100	**10 × 10 × 10**	490	50	0.12	0.24	**95101**
	220	**10 × 10 × 14**	620	110	0.12	0.19	**95102**
63	33	8 × 8 × 10	270	21	0.10	0.65	95812
	47	**8 × 8 × 10**	270	30	0.10	0.65	**95811**
	47	**10 × 10 × 10**	390	30	0.10	0.38	**95801**
	68	10 × 10 × 10	390	43	0.10	0.38	95802
	100	10 × 10 × 14	507	63	0.10	0.29	95803

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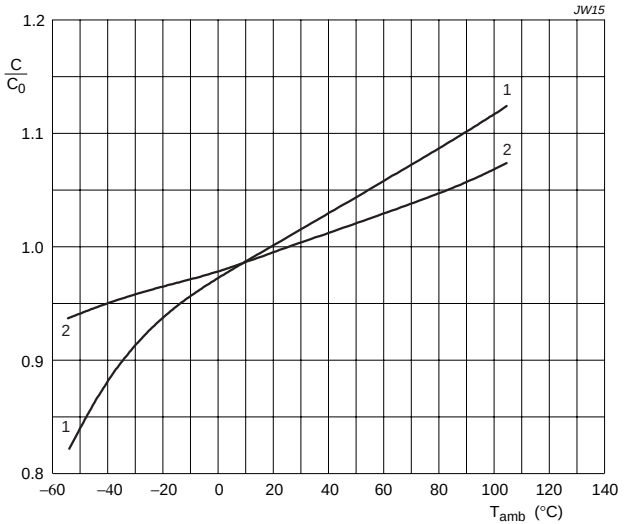
Additional electrical data

PARAMETER	CONDITIONS	VALUE
Voltage		
Surge voltage for short periods	IEC 60384-18, subclause 4.14	$U_s \leq 1.15 \times U_R$
Reverse voltage for short periods	IEC 60384-18, subclause 4.16	$U_{rev} \leq 1$ V
Current		
Leakage current	after 2 minutes at U_R	$I_{L2} \leq 0.01 \times C_R \times U_R$
Inductance		
Equivalent series inductance (ESL)		typ. 16 nH
Resistance		
Equivalent series resistance (ESR) at 100 Hz	calculated from tan δ_{max} and C_R (see Table 4)	ESR = tan δ / $2\pi f C_R$

Capacitance (C)



Curve 1: 10 V.
Curve 2: 63 V.
C_0 = capacitance at 20 °C, 100 Hz.

Fig.5 Typical multiplier of capacitance as a function of ambient temperature.

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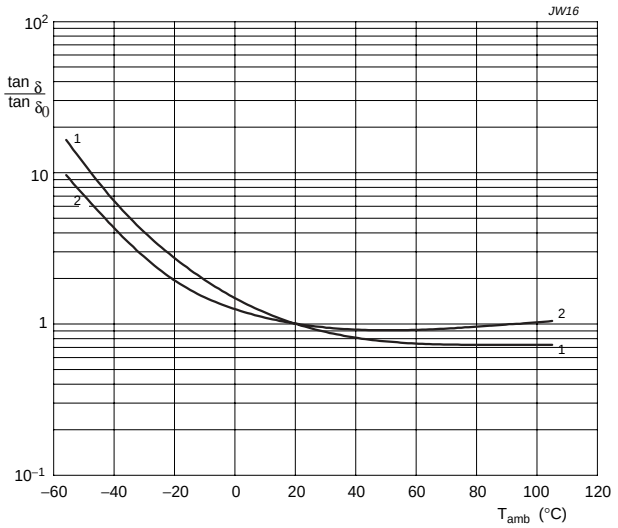
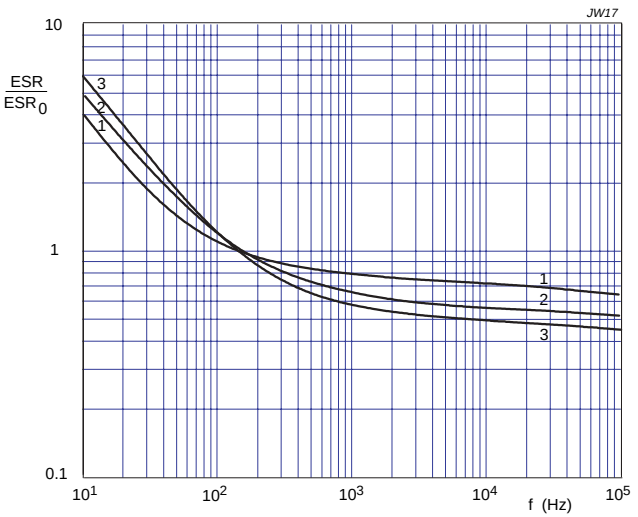
Dissipation factor (tan δ)



Curve 1: 10 V.
Curve 2: 63 V.
Tan δ_0 = typical tan δ at 20 °C, 100 Hz.

Fig.6 Multiplier of dissipation factor (tan δ) as a function of ambient temperature.

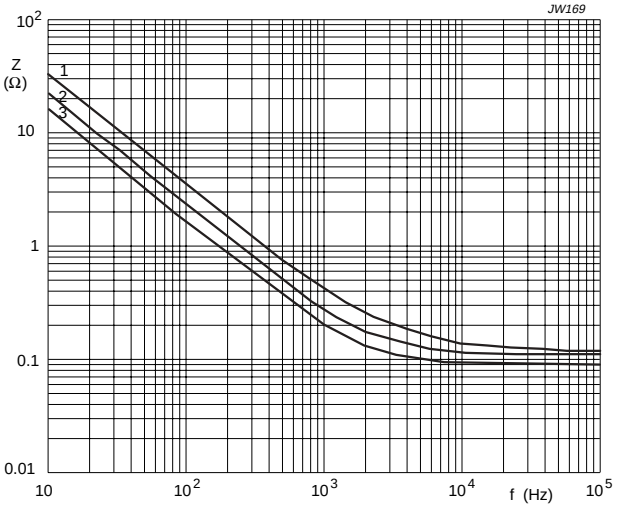
Equivalent series resistance (ESR)



Curve 1: 10 V.
Curve 2: 35 V.
Curve 3: 63 V.
ESR_0 = typical ESR at 20 °C, 100 Hz.

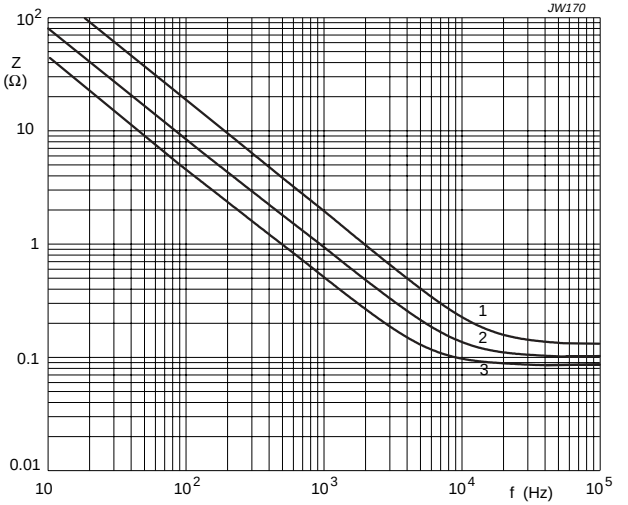
Fig.7 Typical multiplier of ESR as a function of frequency.

Impedance (Z)



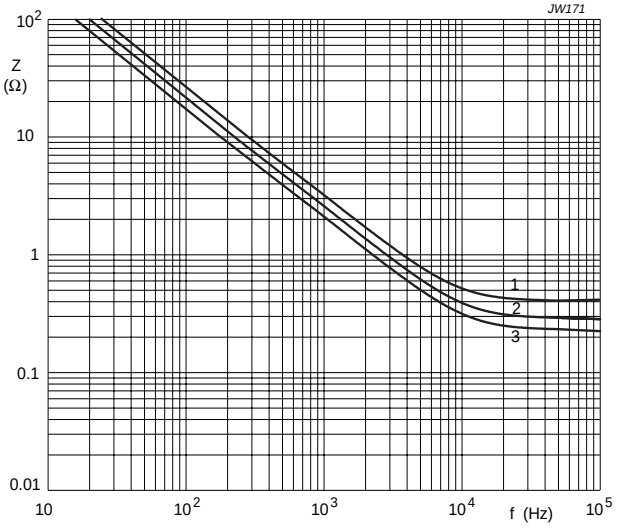
U_R = 10 V
Curve 1: case code 0810, 470 µF.
Curve 2: case code 1010, 680 µF.
Curve 3: case code 1014, 1000 µF.
T_{amb} = 20 °C.

Fig.8 Typical impedance as a function of frequency.



U_R = 35 V
Curve 1: case code 0810, 100 µF.
Curve 2: case code 1010, 220 µF.
Curve 3: case code 1014, 330 µF.
T_{amb} = 20 °C.

Fig.9 Typical impedance as a function of frequency.



U_R = 63 V
Curve 1: case code 0810, 47 µF.
Curve 2: case code 1010, 68 µF.
Curve 3: case code 1014, 100 µF.
T_{amb} = 20 °C.

Fig.10 Typical impedance as a function of frequency.

RIPPLE CURRENT AND USEFUL LIFE

Table 5 Multiplier of ripple current (I_R) as a function of frequency

FREQUENCY (Hz)	I_R MULTIPLIER		
	U_R = 6.3 to 25 V	U_R = 35 V	U_R = 50 to 63 V
100	0.70	0.65	0.60
300	0.80	0.80	0.75
1000	0.85	0.85	0.85
3000	0.93	0.93	0.93
10000	0.95	0.95	0.95
30000	0.97	0.97	0.97
100000	1.00	1.00	1.00

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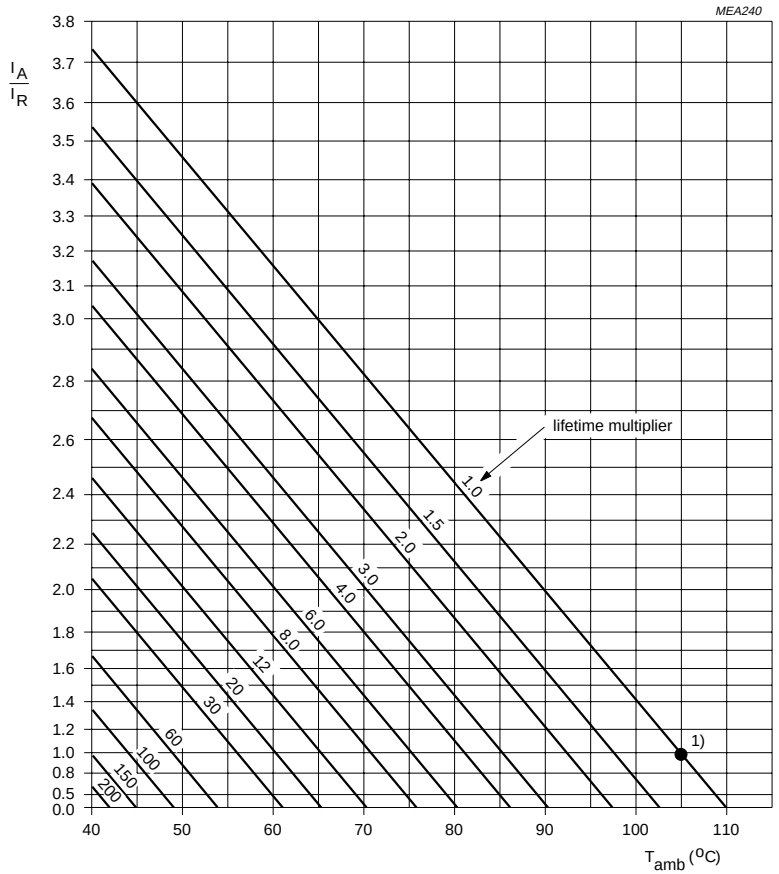

I_A = actual ripple current at 100 kHz.

I_R = rated ripple current at 100 kHz, 105 °C.

(1) Useful life at 105 °C and I_R applied:
case code ≤1010: 2500 hours;
case code = 1014: 3000 hours.

Fig.11 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 data handbook BC01, section *"Tests and Requirements".*

Table 6 Test procedures and requirements

TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	REFERENCE		
Mounting	IEC 60384-18, subclause 4.3	shall be performed prior to tests mentioned below; reflow soldering; for maximum temperature load refer to chapter "Mounting"	$\Delta C/C$: ±5% tan $\delta \leq$ spec. limit $I_{L2} \leq$ spec. limit
Endurance	IEC 60384-18/ CECC32300, subclause 4.15	T_{amb} = 105 °C; U_R applied; 2000 hours	U_R = 6.3 V; $\Delta C/C$: ±25% $U_R \geq$ 10 V; $\Delta C/C$: ±20% tan $\delta \leq 2 \times$ spec. limit $I_{L2} \leq$ spec. limit
Useful life	CECC 30301, subclause 1.8.1	T_{amb} = 105 °C; U_R and I_R applied; case size $\leq 10 \times 10 \times 10$: 2500 hours case size = $10 \times 10 \times 14$: 3000 hours,	$\Delta C/C$: ±50% tan $\delta \leq 3 \times$ spec. limit $I_{L2} \leq$ spec. limit no short or open circuit total failure percentage: ≤1%
Shelf life (storage at high temperature)	IEC 60384-18/ CECC32300, subclause 4.17	T_{amb} = 105 °C; no voltage applied; 1000 hours after test: U_R to be applied for 30 minutes, 24 to 48 hours before measurement	for requirements see 'Endurance test' above