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Conductive Polymer Aluminum Capacitors SMD (Chip), Low Impedance



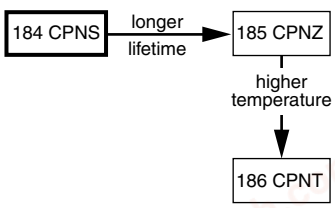

Fig. 1

QUICK REFERENCE DATA	
DESCRIPTION	**VALUE**
Nominal case sizes (L x W x H in mm)	4.0 x 4.0 x 5.5 to 10.0 x 10.0 x 12.4
Rated capacitance range, C_R	4.7 µF to 3300 µF
Tolerance on C_R	± 20 %
Rated voltage range, U_R	2.5 V to 100 V
Category temperature range	-55 °C to +105 °C
Endurance test at 105 °C	2000 h
Useful life at 105 °C	2000 h
Shelf life at 0 V, 105 °C	1000 h
Based on sectional specification	IEC 60384-25 / CECC 32300
Climatic category IEC 60068	55 / 105 / 56

FEATURES

Pb-free RoHS COMPLIANT

- Useful life: up to 2000 h at 105 °C
- Very low ESR and high ripple current
- High voltages up to 100 V
- SMD-version with base plate, lead (Pb)-free reflow solderable
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Industrial and professional applications
- Telecommunications and IT
- Portable and mobile equipment

MARKING

- Rated capacitance (in µF)
- Rated voltage (in V)
- Date code, in accordance with IEC 60062
- Black mark or "-" sign indicating the cathode (the anode is identified by beveled edges)
- Code indicating group number (84)

PACKAGING

Supplied in blister tape on reel

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SELECTION CHART FOR C_R, U_R (2.5 V TO 20 V), AND RELEVANT NOMINAL CASE SIZES
(L x W x H in mm)

C_R (µF)	U_R (V)					
	2.5	4.0	6.3	10	16	20
10	→	→	→	4.0 x 4.0 x 5.5	5.0 x 5.0 x 5.8 6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7	5.0 x 5.0 x 5.8 6.3 x 6.3 x 5.8
22	→	→	→	4.0 x 4.0 x 5.5	5.0 x 5.0 x 5.8 6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7	6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7
33	→	→	→	→	5.0 x 5.0 x 5.8 6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7	-
47	→	5.0 x 5.0 x 5.8	5.0 x 5.0 x 5.5	5.0 x 5.0 x 5.5 6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7	5.0 x 5.0 x 5.8 6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7	6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7
68	→	→	→	→	6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7	-
100	6.3 x 6.3 x 5.8	5.0 x 5.0 x 5.8 6.3 x 6.3 x 5.8	5.0 x 5.0 x 5.5 5.0 x 5.0 x 5.8 6.3 x 6.3 x 5.8	5.0 x 5.0 x 5.5 6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7	6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7	8.0 x 8.0 x 11.7 10.0 x 10.0 x 12.4
120	→	→	→	→	→	6.3 x 6.3 x 5.8
220	5.0 x 5.0 x 5.8 6.3 x 6.3 x 5.8	5.0 x 5.0 x 5.8 6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7	6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7	6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7 8.0 x 8.0 x 11.7	8.0 x 8.0 x 11.7 10.0 x 10.0 x 12.4	8.0 x 8.0 x 11.7 10.0 x 10.0 x 12.4
330	6.3 x 6.3 x 5.8	6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7	6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7 8.0 x 8.0 x 11.7	6.3 x 6.3 x 7.7	8.0 x 8.0 x 11.7 10.0 x 10.0 x 12.4	10.0 x 10.0 x 12.4
390	→	→	→	→	→	8.0 x 8.0 x 11.7
470	6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7	6.3 x 6.3 x 7.7	8.0 x 8.0 x 11.7	8.0 x 8.0 x 11.7 10.0 x 10.0 x 12.4	10.0 x 10.0 x 12.4	-
560	→	→	→	→	8.0 x 8.0 x 11.7	-
680	→	→	10.0 x 10.0 x 12.4	8.0 x 8.0 x 11.7 10.0 x 10.0 x 12.4	→	10.0 x 10.0 x 12.4
820	→	→	10.0 x 10.0 x 12.4	-	-	-
1000	→	8.0 x 8.0 x 11.7	8.0 x 8.0 x 11.7	10.0 x 10.0 x 12.4	10.0 x 10.0 x 12.4	-
1200	→	8.0 x 8.0 x 11.7 10.0 x 10.0 x 12.4	-	-	-	-
1500	8.0 x 8.0 x 11.7	8.0 x 8.0 x 11.7 10.0 x 10.0 x 12.4	→	10.0 x 10.0 x 12.4	-	-
2200	→	10.0 x 10.0 x 12.4	10.0 x 10.0 x 12.4	-	-	-
2700	→	10.0 x 10.0 x 12.4	-	-	-	-
3300	10.0 x 10.0 x 12.4	-	-	-	-	-

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SELECTION CHART FOR C_R, U_R (25 V TO 100 V), AND RELEVANT NOMINAL CASE SIZES
(L x W x H in mm)

C_R (µF)	U_R (V)					
	25	35	50	63	80	100
4.7	→	→	→	→	→	6.3 x 6.3 x 7.7
5.6	→	→	→	6.3 x 6.3 x 5.8	-	-
8.2	→	→	6.3 x 6.3 x 5.8	6.3 x 6.3 x 5.8	-	-
10	6.3 x 6.3 x 5.8	→	8.0 x 8.0 x 11.7	→	→	8.0 x 8.0 x 11.7
12	→	→	6.3 x 6.3 x 5.8	→	8.0 x 8.0 x 11.7	-
15	→	→	6.3 x 6.3 x 5.8	-	-	-
22	6.3 x 6.3 x 7.7	6.3 x 6.3 x 5.8	8.0 x 8.0 x 11.7	8.0 x 8.0 x 11.7	10.0 x 10.0 x 12.4	10.0 x 10.0 x 12.4
33	6.3 x 6.3 x 5.8 6.3 x 6.3 x 7.7	→	8.0 x 8.0 x 11.7	8.0 x 8.0 x 11.7 10.0 x 10.0 x 12.4	-	-
47	6.3 x 6.3 x 5.8 8.0 x 8.0 x 11.7	6.3 x 6.3 x 7.7	8.0 x 8.0 x 11.7	10.0 x 10.0 x 12.4	10.0 x 10.0 x 12.4	-
56	→	→	8.0 x 8.0 x 11.7	-	-	-
68	→	→	→	10.0 x 10.0 x 12.4	-	-
100	8.0 x 8.0 x 11.7 10.0 x 10.0 x 12.4	10.0 x 10.0 x 12.4	10.0 x 10.0 x 12.4	-	-	-
150	→	8.0 x 8.0 x 11.7	-	-	-	-
220	8.0 x 8.0 x 11.7 10.0 x 10.0 x 12.4	10.0 x 10.0 x 12.4	-	-	-	-
270	10.0 x 10.0 x 12.4	-	-	-	-	-
330	→	10.0 x 10.0 x 12.4	-	-	-	-
390	10.0 x 10.0 x 12.4	-	-	-	-	-
470	10.0 x 10.0 x 12.4	-	-	-	-	-

2-pin:

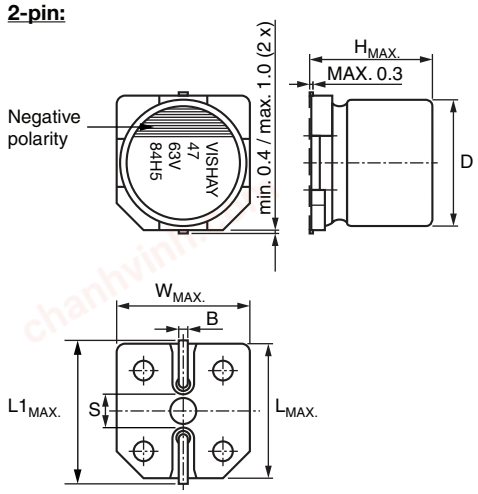

Fig. 2 - Dimensional outline

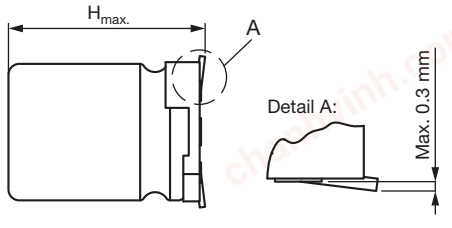

Fig. 3 - Coplanarity of pins

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Table 1

DIMENSIONS in millimeters **AND MASS**									
NOMINAL CASE SIZE L x W x H	**CASE CODE**	**$L_{MAX.}$**	**$W_{MAX.}$**	**$H_{MAX.}$**	**Ø D**	**$B_{MAX.}$**	**S**	**$L1_{MAX.}$**	**MASS (g)**
4.0 x 4.0 x 5.5	0406	4.5	4.5	5.8	4.0	0.8	1.0	5.1	0.1
5.0 x 5.0 x 5.5	0505	5.5	5.5	5.8	5.0	0.8	1.4	6.1	0.2
5.0 x 5.0 x 5.8	0506	5.5	5.5	6.1	5.0	0.8	1.4	6.1	0.2
6.3 x 6.3 x 5.8	0606	6.8	6.8	6.1	6.3	0.8	2.2	7.4	0.3
6.3 x 6.3 x 7.7	0608	6.8	6.8	8.0	6.3	0.8	2.2	7.4	0.4
8.0 x 8.0 x 11.7	0812	8.5	8.5	12.0	8.0	1.1	3.1	9.2	0.8
10.0 x 10.0 x 12.4	1012	10.5	10.5	12.7	10.0	1.1	4.5	11.2	1.3

Table 2

TAPE AND REEL DIMENSIONS in millimeters, **PACKAGING QUANTITIES**						
NOMINAL CASE SIZE L x W x H	**CASE CODE**	**PITCH P_1**	**TAPE WIDTH W**	**TAPE THICKNESS T_2**	**REEL DIAMETER**	**PACKAGING QUANTITY PER REEL**
4.0 x 4.0 x 5.5	0406	8	12	5.7	380	2000
5.0 x 5.0 x 5.5	0505	12	12	5.7	380	1000
5.0 x 5.0 x 5.8	0506	12	12	6.1	380	1000
6.3 x 6.3 x 5.8	0606	12	16	6.2	380	1000
6.3 x 6.3 x 7.7	0608	12	16	8.0	380	900
8.0 x 8.0 x 11.7	0812	16	24	13.0	380	400
10.0 x 10.0 x 12.4	1012	16	24	12.9	380	400

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 layout and / or adjacent components.

For recommended soldering pad dimensions, refer to Fig. 4 and Table 3.

SOLDERING

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

For maximum conditions refer to Fig. 5.

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.

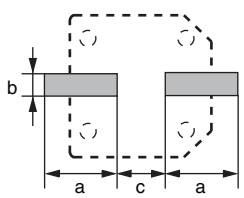

Fig. 4 - Recommended soldering pad dimensions

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Table 3

RECOMMENDED SOLDERING PAD DIMENSIONS in millimeters				
NOMINAL CASE SIZE L x W x H	**CASE CODE**	**a**	**b**	**c**
4.0 x 4.0 x 5.5	0406	2.6	1.6	1.0
5.0 x 5.0 x 5.5	0505	3.0	1.6	1.4
5.0 x 5.0 x 5.8	0506	3.0	1.6	1.4
6.3 x 6.3 x 5.8	0606	3.5	1.6	2.1
6.3 x 6.3 x 7.7	0608	3.5	1.6	2.1
8.0 x 8.0 x 11.7	0812	4.2	1.9	2.8
10.0 x 10.0 x 12.4	1012	4.4	1.9	4.3

SOLDERING PROFILE FOR LEAD (Pb)-FREE REFLOW PROCESS

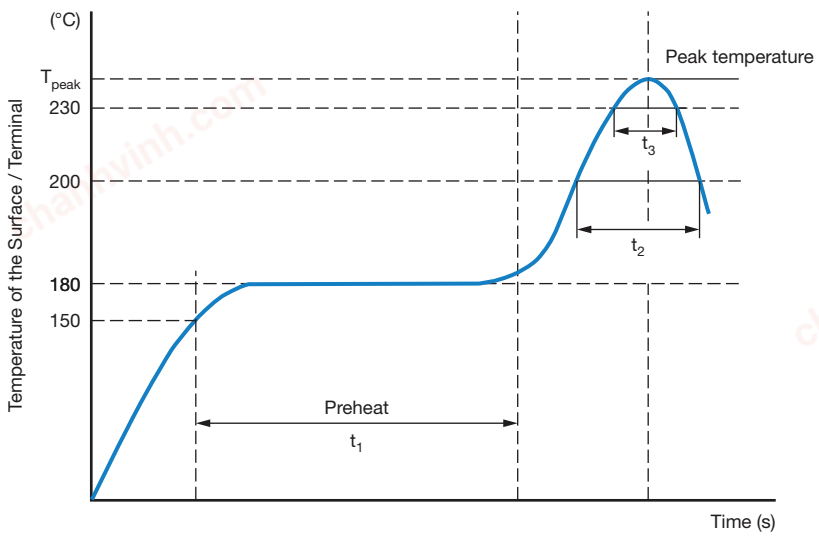

Fig. 5 - Maximum temperature load during reflow soldering

Table 4

REFLOW SOLDERING CONDITIONS for MAL2184xxxxxE3					
PROFILE FEATURES	**2.5 V TO 10 V**		**16 V TO 25 V**		**35 V TO 100 V**
Maximum time between 150 °C to 180 °C (t_1)	120 s		120 s		120 s
Ramp up rate from 217 °C to T_{peak}	0.5 K/s to 3 K/s				
Maximum time above 200 °C (t_2)	90 s		90 s	80 s	70 s
Maximum time above 230 °C (t_3)	60 s		60 s	50 s	30 s
Peak temperature T_{Peak}	260 °C	250 °C	250 °C	240 °C	240 °C
Maximum reflow cycles	1	2	1	2	1
Ramp down rate T_{peak} to 217 °C	6 K/s max.				
Time 25 °C to T_{Peak}	8 min max.				

Note

- Temperature measuring point on top of the case and on terminals

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ELECTRICAL DATA	
SYMBOL	DESCRIPTION
C_R	Rated capacitance at 120 Hz, tolerance ± 20 %
I_R 105 °C	Max. allowed ripple current at 100 kHz
I_{L2}	Max. leakage current after 2 min at U_R
tan δ	Max. dissipation factor at 120 Hz
ESR	Max. ESR at 100 kHz

Note

- Unless otherwise specified, all electrical values in Table 5 apply at T_{amb} = 20 °C, P = 86 kPa to 106 kPa, RH = 45 % to 75 %

ORDERING EXAMPLE

Conductive polymer 184 CPNS series

100 µF / 16 V; ± 20 %

Nominal case size: 6.3 mm x 6.3 mm x 7.7 mm; taped on reel

Ordering code: MAL218497517E3

Table 5

ELECTRICAL DATA AND ORDERING INFORMATION							
U_R (V)	C_R (µF)	NOMINAL CASE SIZE L x W x H (mm)	I_R 105 °C 100 kHz (mA)	I_{L2} 2 min (µA)	tan δ 120 Hz	ESR 100 kHz 20 °C (mΩ)	ORDERING CODE MAL2184...
2.5	100	6.3 x 6.3 x 5.8	2500	300	0.08	22	97251E3
	220	5.0 x 5.0 x 5.8	2310	300	0.08	25	97252E3
	220	6.3 x 6.3 x 5.8	2800	300	0.08	22	97253E3
	330	6.3 x 6.3 x 5.8	3100	300	0.08	15	97254E3
	470	6.3 x 6.3 x 5.8	2800	300	0.08	20	97255E3
	470	6.3 x 6.3 x 7.7	3600	300	0.08	15	97256E3
	1500	8.0 x 8.0 x 11.7	5400	750	0.08	9	97257E3
	3300	10.0 x 10.0 x 12.4	5600	1650	0.10	9	97258E3
4	47	5.0 x 5.0 x 5.8	2310	300	0.08	25	97351E3
	100	5.0 x 5.0 x 5.8	2310	300	0.08	25	97352E3
	100	6.3 x 6.3 x 5.8	2500	300	0.08	22	97353E3
	220	5.0 x 5.0 x 5.8	2610	300	0.08	22	97354E3
	220	6.3 x 6.3 x 5.8	2800	300	0.08	22	97355E3
	220	6.3 x 6.3 x 7.7	3100	300	0.08	20	97356E3
	330	6.3 x 6.3 x 5.8	3100	300	0.08	15	97357E3
	330	6.3 x 6.3 x 7.7	3600	300	0.08	15	97358E3
	470	6.3 x 6.3 x 7.7	3600	300	0.08	15	97359E3
	1000	8.0 x 8.0 x 11.7	5200	800	0.10	9	97361E3
	1200	8.0 x 8.0 x 11.7	5200	960	0.10	9	97362E3
	1200	10.0 x 10.0 x 12.4	5600	960	0.10	9	97363E3
	1500	8.0 x 8.0 x 11.7	5200	1200	0.10	9	97364E3
	1500	10.0 x 10.0 x 12.4	5600	1200	0.10	9	97365E3
	2200	10.0 x 10.0 x 12.4	5600	1760	0.10	9	97366E3
	2700	10.0 x 10.0 x 12.4	5600	2160	0.10	9	97367E3
6.3	47	5.0 x 5.0 x 5.5	2000	300	0.08	30	97301E3
	100	5.0 x 5.0 x 5.5	2000	300	0.08	30	97302E3
	100	5.0 x 5.0 x 5.8	2310	300	0.08	25	97303E3
	100	6.3 x 6.3 x 5.8	2800	300	0.08	22	97304E3
	220	6.3 x 6.3 x 5.8	3100	300	0.08	15	97305E3
	220	6.3 x 6.3 x 7.7	3600	300	0.08	15	97306E3
	330	6.3 x 6.3 x 5.8	3100	300	0.08	20	97307E3
	330	6.3 x 6.3 x 7.7	4200	300	0.08	10	97308E3
	330	8.0 x 8.0 x 11.7	5200	416	0.08	9	97309E3
	470	8.0 x 8.0 x 11.7	5200	592	0.08	9	97311E3
	680	10.0 x 10.0 x 12.4	5500	856	0.08	9	97312E3
	820	10.0 x 10.0 x 12.4	5500	1033	0.10	9	97313E3
	1000	8.0 x 8.0 x 11.7	5200	1260	0.10	9	97314E3
	2200	10.0 x 10.0 x 12.4	5500	2772	0.10	9	97315E3

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ELECTRICAL DATA AND ORDERING INFORMATION

U_R (V)	C_R (µF)	NOMINAL CASE SIZE L x W x H (mm)	I_R 105 °C 100 kHz (mA)	I_{L2} 2 min (µA)	tan δ 120 Hz	ESR 100 kHz 20 °C (mΩ)	ORDERING CODE MAL2184...
10	10	4.0 x 4.0 x 5.5	1200	300	0.08	80	97401E3
	22	4.0 x 4.0 x 5.5	1200	300	0.08	80	97402E3
	47	5.0 x 5.0 x 5.5	2000	300	0.08	30	97403E3
	47	6.3 x 6.3 x 5.8	2200	300	0.08	30	97404E3
	47	6.3 x 6.3 x 7.7	2800	300	0.08	20	97405E3
	100	5.0 x 5.0 x 5.5	2000	300	0.08	30	97406E3
	100	6.3 x 6.3 x 5.8	2200	300	0.08	30	97407E3
	100	6.3 x 6.3 x 7.7	2800	300	0.08	20	97408E3
	220	6.3 x 6.3 x 5.8	2610	300	0.08	25	97409E3
	220	6.3 x 6.3 x 7.7	3100	300	0.08	20	97411E3
	220	8.0 x 8.0 x 11.7	5200	440	0.08	9	97412E3
	330	6.3 x 6.3 x 7.7	3100	300	0.08	20	97413E3
	470	8.0 x 8.0 x 11.7	5200	940	0.08	9	97414E3
	470	10.0 x 10.0 x 12.4	5500	940	0.08	9	97415E3
	680	8.0 x 8.0 x 11.7	5200	1360	0.10	9	97416E3
	680	10.0 x 10.0 x 12.4	5500	1360	0.10	9	97417E3
	1000	10.0 x 10.0 x 12.4	5500	2000	0.10	9	97418E3
	1500	10.0 x 10.0 x 12.4	5500	3000	0.10	9	97419E3
16	10	5.0 x 5.0 x 5.8	2000	400	0.08	40	97501E3
	10	6.3 x 6.3 x 5.8	2200	400	0.08	35	97502E3
	10	6.3 x 6.3 x 7.7	2610	400	0.08	30	97503E3
	22	5.0 x 5.0 x 5.8	2000	400	0.08	40	97504E3
	22	6.3 x 6.3 x 5.8	2200	400	0.08	35	97505E3
	22	6.3 x 6.3 x 7.7	2610	400	0.08	30	97506E3
	33	5.0 x 5.0 x 5.8	2000	400	0.08	40	97507E3
	33	6.3 x 6.3 x 5.8	2200	400	0.08	35	97508E3
	33	6.3 x 6.3 x 7.7	2610	400	0.08	30	97509E3
	47	5.0 x 5.0 x 5.8	2000	400	0.08	40	97511E3
	47	6.3 x 6.3 x 5.8	2200	400	0.08	35	97512E3
	47	6.3 x 6.3 x 7.7	2610	400	0.08	30	97513E3
	68	6.3 x 6.3 x 5.8	2200	400	0.08	35	97514E3
	68	6.3 x 6.3 x 7.7	2690	400	0.08	25	97515E3
	100	6.3 x 6.3 x 5.8	2490	400	0.08	30	97516E3
	100	6.3 x 6.3 x 7.7	2690	400	0.08	25	97517E3
	220	8.0 x 8.0 x 11.7	4700	704	0.08	15	97518E3
	220	10.0 x 10.0 x 12.4	5100	704	0.08	15	97519E3
	330	8.0 x 8.0 x 11.7	4700	1056	0.08	15	97525E3
	330	10.0 x 10.0 x 12.4	5100	1056	0.08	15	97521E3
	470	10.0 x 10.0 x 12.4	5100	1504	0.10	15	97522E3
	560	8.0 x 8.0 x 11.7	4950	1792	0.12	14	97523E3
	1000	10.0 x 10.0 x 12.4	5400	3200	0.12	14	97524E3
20	10	5.0 x 5.0 x 5.8	2000	600	0.08	40	97551E3
	10	6.3 x 6.3 x 5.8	2200	600	0.08	40	97552E3
	22	6.3 x 6.3 x 5.8	2200	600	0.08	35	97553E3
	22	6.3 x 6.3 x 7.7	2670	600	0.08	30	97554E3
	47	6.3 x 6.3 x 5.8	2200	600	0.08	35	97555E3
	47	6.3 x 6.3 x 7.7	2670	600	0.08	30	97556E3
	100	8.0 x 8.0 x 11.7	4210	400	0.08	20	97557E3
	100	10.0 x 10.0 x 12.4	4800	400	0.08	20	97558E3
	120	6.3 x 6.3 x 5.8	3200	600	0.12	25	97559E3
	220	8.0 x 8.0 x 11.7	4000	880	0.10	22	97561E3
	220	10.0 x 10.0 x 12.4	4800	880	0.10	20	97562E3
	330	10.0 x 10.0 x 12.4	4800	1320	0.10	20	97563E3
	390	8.0 x 8.0 x 11.7	4950	1560	0.12	14	97564E3
	680	10.0 x 10.0 x 12.4	5000	2720	0.12	16	97565E3

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ELECTRICAL DATA AND ORDERING INFORMATION							
U_R (V)	C_R (µF)	NOMINAL CASE SIZE L x W x H (mm)	I_R 105 °C 100 kHz (mA)	I_{L2} 2 min (µA)	tan δ 120 Hz	ESR 100 kHz 20 °C (mΩ)	ORDERING CODE MAL2184...
25	10	6.3 x 6.3 x 5.8	2200	600	0.08	35	97601E3
	22	6.3 x 6.3 x 7.7	2670	600	0.08	30	97602E3
	33	6.3 x 6.3 x 5.8	2200	600	0.08	35	97603E3
	33	6.3 x 6.3 x 7.7	2670	600	0.08	30	97604E3
	47	6.3 x 6.3 x 5.8	2200	600	0.08	35	97605E3
	47	8.0 x 8.0 x 11.7	4210	235	0.08	20	97606E3
	100	8.0 x 8.0 x 11.7	4210	500	0.10	20	97607E3
	100	10.0 x 10.0 x 12.4	4800	500	0.10	20	97608E3
	220	8.0 x 8.0 x 11.7	3800	1100	0.10	25	97609E3
	220	10.0 x 10.0 x 12.4	4800	1100	0.10	20	97611E3
	270	10.0 x 10.0 x 12.4	4800	1350	0.10	20	97612E3
	390	10.0 x 10.0 x 12.4	4200	1950	0.12	22	97613E3
	470	10.0 x 10.0 x 12.4	3800	2350	0.12	25	97614E3
35	22	6.3 x 6.3 x 5.8	1300	600	0.12	50	97001E3
	47	6.3 x 6.3 x 7.7	1600	600	0.12	50	97002E3
	100	10.0 x 10.0 x 12.4	3800	700	0.12	25	97003E3
	150	8.0 x 8.0 x 11.7	3800	840	0.12	25	97004E3
	220	10.0 x 10.0 x 12.4	4100	1540	0.12	22	97005E3
	330	10.0 x 10.0 x 12.4	4400	2310	0.12	20	97006E3
50	8.2	6.3 x 6.3 x 5.8	800	600	0.12	80	97101E3
	10	8.0 x 8.0 x 11.7	1800	100	0.12	40	97102E3
	12	6.3 x 6.3 x 5.8	800	600	0.12	80	97103E3
	15	6.3 x 6.3 x 5.8	800	600	0.12	80	97104E3
	22	8.0 x 8.0 x 11.7	1800	220	0.12	40	97105E3
	33	8.0 x 8.0 x 11.7	2000	300	0.12	35	97106E3
	47	8.0 x 8.0 x 11.7	2300	470	0.12	30	97107E3
	56	8.0 x 8.0 x 11.7	2500	560	0.12	30	97108E3
	100	10.0 x 10.0 x 12.4	3000	1000	0.12	25	97109E3
63	5.6	6.3 x 6.3 x 5.8	700	600	0.12	100	97801E3
	8.2	6.3 x 6.3 x 5.8	700	600	0.12	100	97802E3
	22	8.0 x 8.0 x 11.7	1800	277	0.12	35	97803E3
	33	8.0 x 8.0 x 11.7	2200	416	0.12	35	97804E3
	33	10.0 x 10.0 x 12.4	2500	416	0.12	30	97805E3
	47	10.0 x 10.0 x 12.4	2500	592	0.12	30	97806E3
	68	10.0 x 10.0 x 12.4	2500	856.8	0.12	30	97807E3
80	12	8.0 x 8.0 x 11.7	1800	192	0.12	40	97701E3
	22	10.0 x 10.0 x 12.4	2300	352	0.12	38	97702E3
	47	10.0 x 10.0 x 12.4	1800	752	0.12	40	97703E3
100	4.7	6.3 x 6.3 x 7.7	1060	600	0.12	100	97901E3
	10	8.0 x 8.0 x 11.7	1700	200	0.12	45	97902E3
	22	10.0 x 10.0 x 12.4	2100	440	0.12	40	97903E3

Table 6

ADDITIONAL ELECTRICAL DATA		
PARAMETER	**CONDITIONS**	**VALUE**
Voltage		
Surge voltage for short periods	IEC 60384-25, subclause 4.14	$U_s \leq 1.15 \times U_R$

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USEFUL LIFE AND ENDURANCE

Table 7

ENDURANCE TEST AND USEFUL LIFE							
SERIES	CASE CODE	USEFUL LIFE AT 105 °C (h) (1)	ENDURANCE AT 105 °C (h)	ENDURANCE AT 95 °C (h)	ENDURANCE AT 85 °C (h)	ENDURANCE AT 75 °C (h)	ENDURANCE AT 65 °C (h)
184 CPNS	0406 to 1012	2000	2000	6000	20 000	63 000	200 000

Note

(1) Identical with endurance for this series

Endurance can be calculated by formula below:

$$L = L_{Tmax.} \times 10^{\frac{T_{max.} - T_a}{20}}$$

L: estimated lifetime (h)

$L_{Tmax.}$: base lifetime specified at maximum operating temperature with applied DC voltage (h)

$T_{max.}$: rated maximum operating temperature (°C)

T_a: actual ambient temperature (°C)

Table 8

MULTIPLIER OF RIPPLE CURRENT (I_R) AS A FUNCTION OF FREQUENCY			
FREQUENCY (Hz)			
120	1000	10 000	≥ 100 000
I_R MULTIPLIER			
0.05	0.3	0.7	1

Table 9

TEST PROCEDURES AND REQUIREMENTS			
TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	REFERENCE		
Mounting	IEC 60384-25, subclause 4.3	Shall be performed prior to tests mentioned below; reflow soldering; for maximum temperature load refer to chapter “Mounting”	ΔC/C: ± 5 % tan δ ≤ spec. limit I_{L2} ≤ spec. limit
Endurance	IEC 60384-25 / CECC 32300, subclause 4.15	T_{amb} = 105 °C; U_R applied; for test duration see Table 7	ΔC/C: ± 20 % tan δ ≤ 1.5 x spec. limit I_{L2} ≤ spec. limit ESR ≤ 1.5 x spec. limit
Useful life	CECC 30301, subclause 1.8.1	T_{amb} = 105 °C; U_R and I_R applied; for test duration see Table 7	ΔC/C: ± 20 % tan δ ≤ 1.5 x spec. limit I_{L2} ≤ spec. limit ESR ≤ 1.5 x spec. limit
Shelf life (storage at high temperature)	IEC 60384-25 / CECC 32300, subclause 4.16	T_{amb} = 105 °C; no voltage applied; 1000 h after test: U_R to be applied for 30 min, 24 h to 48 h before measurement	For requirements see “Endurance test” above

Statements about product lifetime are based on calculations and internal testing. They should only be interpreted as estimations. Also due to external factors, the lifetime in the field application may deviate from the calculated lifetime. In general, nothing stated herein shall be construed as a guarantee of durability.

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