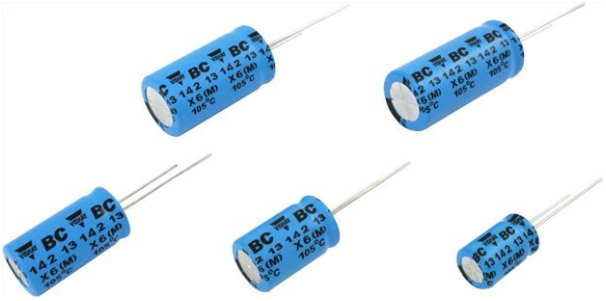
Aluminum Capacitors
Radial High Temperature Standard



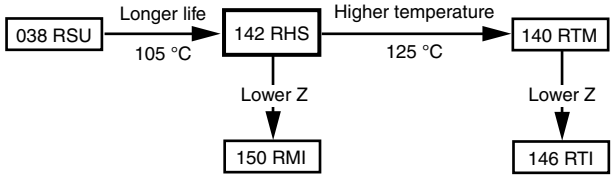


Fig. 1

QUICK REFERENCE DATA	
DESCRIPTION	**VALUE**
Nominal case sizes (Ø D x L in mm)	5 x 11 to 18 x 40
Rated capacitance range, C_R	1 µF to 22 000 µF
Tolerance on C_R	± 20 %
Rated voltage range, U_R	10 V to 450 V
Category temperature range	- 40 °C to + 105 °C
Endurance test at 105 °C	2000 h
Useful life at 105 °C	2500 h
Useful life at 40 °C, 1.6 x I_R applied	140 000 h
Shelf life at 0 V, 105 °C	1000 h
Based on sectional specification	IEC 60384-4/EN130300
Climatic category IEC 60068	40/105/56

FEATURES

Pb-free
RoHS COMPLIANT

- Useful life of 2500 h at 105 °C
- Miniaturized, high CV-product per unit volume
- Charge and discharge proof
- Polarized aluminum electrolytic capacitors, non-solid electrolyte
- Radial leads, cylindrical aluminum case, insulated with a blue sleeve
- Pressure relief for case Ø D ≥ 6.3 mm
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Industrial, telecom and domestic appliances
- Decoupling, smoothing, filtering, buffering in SMPS
- Portable and mobile equipment (small size, low mass)

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 ± 20 %)
- Rated voltage (in V)
- Date code, in accordance with IEC 60062
- Code indicating factory of origin
- Name or logo of manufacturer
- Negative terminal identification
- Series number (142)

SELECTION CHART FOR C_R, U_R, AND RELEVANT NOMINAL CASE SIZES (Ø D x L in mm)							
C_R (µF)	U_R (V)						
	10	16	25	35	50	63	100
1.0	→	→	→	→	→	→	→
2.2	→	→	→	→	→	→	5 x 11
4.7	→	→	→	→	→	5 x 11	6.3 x 11
10	→	→	→	→	→	5 x 11	8 x 12
22	→	→	→	→	5 x 11	6.3 x 11	8 x 12
33	→	→	→	→	6.3 x 11	6.3 x 11	10 x 12
47	→	→	5 x 11	5 x 11	8 x 12	8 x 12	10 x 16
100	→	5 x 11	6.3 x 11	6.3 x 11	10 x 12	10 x 12	10 x 20
220	→	6.3 x 11	8 x 12	8 x 12	10 x 16	10 x 16	12.5 x 25
330	6.3 x 11	8 x 12	→	10 x 12	10 x 16	10 x 20	16 x 25
470	8 x 12	10 x 12	10 x 12	10 x 16	12.5 x 20	12.5 x 20	16 x 31
1000	10 x 12	10 x 16	10 x 20	12.5 x 20	12.5 x 25	16 x 25	18 x 40
2200	10 x 20	12.5 x 20	12.5 x 25	16 x 25	16 x 35	18 x 40	-
3300	→	12.5 x 25	16 x 25	16 x 31	18 x 35	-	-
4700	12.5 x 25	16 x 25	16 x 31	18 x 35	-	-	-
6800	16 x 25	16 x 31	18 x 35	-	-	-	-
10 000	16 x 31	18 x 31	-	-	-	-	-
22 000	18 x 40	-	-	-	-	-	-

SELECTION CHART FOR C_R, U_R, AND RELEVANT NOMINAL CASE SIZES (Ø D x L in mm)					
C_R (µF)	U_R (V)				
	200	250	350	400	450
1.0	5 x 11	5 x 11	6.3 x 11	6.3 x 11	8 x 12
2.2	6.3 x 11	6.3 x 11	8 x 12	8 x 12	10 x 12
4.7	8 x 12	8 x 12	10 x 12	10 x 12	10 x 16
10	10 x 12	10 x 12	10 x 16	10 x 20	12.5 x 20
22	10 x 16	10 x 20	12.5 x 20	12.5 x 25	16 x 20
33	→	12.5 x 20	→	→	16 x 25
47	12.5 x 20	12.5 x 25	16 x 25	16 x 31	16 x 35
100	16 x 25	16 x 31	18 x 35	18 x 40	-
220	18 x 35	-	-	-	-

DIMENSIONS in millimeters **AND AVAILABLE FORMS**

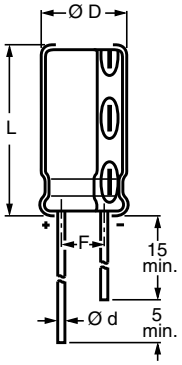


Fig. 2 - **Form CA**
Long leads

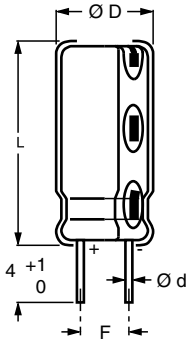
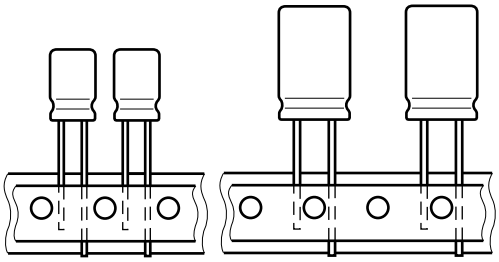
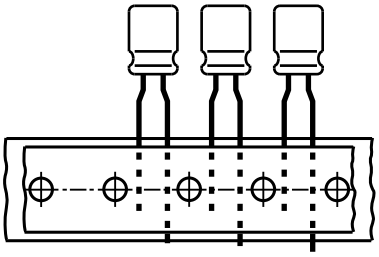


Fig. 3 - **Form CB**
Cut leads



Dimensions of lead space F see Table 2

Fig. 4 - **Form TNA, Form TFA**
Taped in box (ammopack), straight leads



Case Ø D = 5 mm to 8 mm;
Lead space F is 5 mm

Fig. 5 - **Form TFA**
Taped in box (ammopack), formed leads

Table 1

DIMENSIONS in millimeters, **MASS AND PACKAGING QUANTITIES**									
NOMINAL CASE SIZE Ø D x L	**CASE CODE**	**Ø d**	**Ø $D_{max.}$**	**$L_{max.}$**	**F**	**MASS (g)**	**PACKAGING QUANTITIES**		
							FORM CA	**FORM CB**	**FORM TFA, TNA**
5 x 11	11	0.5	5.5	12.5	2.0 ± 0.5	≈ 0.4	5000	-	2000
6.3 x 11	12	0.5	6.8	12.5	2.5 ± 0.5	≈ 0.6	5000	-	2000
8 x 12	13	0.6	8.5	13.0	3.5 ± 0.5	≈ 1.1	5000	-	1000
10 x 12	14	0.6	10.5	13.5	5.0 ± 0.5	≈ 1.6	3000	1000	500
10 x 16	15	0.6	10.5	17.5	5.0 ± 0.5	≈ 1.9	2500	1000	500
10 x 20	16	0.6	10.5	22.0	5.0 ± 0.5	≈ 2.2	2000	800	500
12.5 x 20	17	0.6	13.0	22.0	5.0 ± 0.5	≈ 4.0	1500	400	300
12.5 x 25	18	0.6	13.0	27.0	5.0 ± 0.5	≈ 5.0	1000	400	300
16 x 20	19a	0.8	16.5	22.0	7.5 ± 0.5	≈ 6.0	1000	200	200
16 x 25	19	0.8	16.5	27.0	7.5 ± 0.5	≈ 8.0	750	200	200
16 x 31	20	0.8	16.5	33.5	7.5 ± 0.5	≈ 9.0	600	200	200
16 x 35	21	0.8	16.5	37.5	7.5 ± 0.5	≈ 11.0	500	200	-
18 x 31	1831	0.8	18.5	33.5	7.5 ± 0.5	≈ 12.5	400	150	-
18 x 35	22	0.8	18.5	37.5	7.5 ± 0.5	≈ 14.5	400	150	-
18 x 40	23	0.8	18.5	42.0	7.5 ± 0.5	≈ 16.0	400	150	-

Note

- For detailed tape dimensions please refer to packaging information: www.vishay.com/doc?28360

ELECTRICAL DATA	
SYMBOL	DESCRIPTION
C_R	Rated capacitance at 100 Hz, tolerance ± 20 %
I_R	Rated RMS ripple current at 100 Hz, 105 °C
I_{L2}	Max. leakage current after 2 min at U_R = 10 V to 100 V
I_{L5}	Max. leakage current after 5 min at U_R = 200 V to 450 V
tan δ	Max. dissipation factor at 100 Hz

Note

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

ORDERING EXAMPLE

Electrolytic capacitor 142 series

470 µF/25 V; ± 20 %

Nominal case size: Ø 10 mm x 12 mm; Form TFA

Ordering Code: MAL214236471E3

Table 2

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 (mA)	I_{L2} 2 min (µA)	tan δ 100 Hz	ORDERING CODE MAL2142...							
						BULK PACKAGING				TAPED AMMOPACK			
						LONG LEADS		CUT LEADS					
						FORM CA	F (mm)	FORM CB	F (mm)	FORM TNA	F (mm)	FORM TFA	F (mm)
10	330	6.3 x 11	200	33	0.20	54331E3	2.5	-	-	74331E3	2.5	34331E3	5.0
	470	8 x 12	290	47	0.20	54471E3	3.5	-	-	74471E3	3.5	34471E3	5.0
	1000	10 x 12	460	100	0.20	54102E3	5.0	64102E3	5.0	-	-	34102E3	5.0
	2200	10 x 20	760	220	0.22	54222E3	5.0	64222E3	5.0	-	-	34222E3	5.0
	4700	12.5 x 25	1260	470	0.26	54472E3	5.0	64472E3	5.0	-	-	34472E3	5.0
	6800	16 x 25	1690	680	0.28	54682E3	7.5	64682E3	7.5	-	-	34682E3	7.5
	10 000	16 x 31	2120	1000	0.30	54103E3	7.5	64103E3	7.5	-	-	34103E3	7.5
	22 000	18 x 40	3100	2200	0.32	54223E3	7.5	64223E3	7.5	-	-	-	-
16	100	5 x 11	110	16	0.16	55101E3	2.0	-	-	75101E3	2.5	35101E3	5.0
	220	6.3 x 11	190	35	0.16	55221E3	2.5	-	-	75221E3	2.5	35221E3	5.0
	330	8 x 12	270	53	0.16	55331E3	3.5	-	-	75331E3	3.5	35331E3	5.0
	470	10 x 12	370	75	0.16	55471E3	5.0	65471E3	5.0	-	-	35471E3	5.0
	1000	10 x 16	560	160	0.16	55102E3	5.0	65102E3	5.0	-	-	35102E3	5.0
	2200	12.5 x 20	920	352	0.18	55222E3	5.0	65222E3	5.0	-	-	35222E3	5.0
	3300	12.5 x 25	1170	528	0.20	55332E3	5.0	65332E3	5.0	-	-	35332E3	5.0
	4700	16 x 25	1480	752	0.22	55472E3	7.5	65472E3	7.5	-	-	35472E3	7.5
	6800	16 x 31	1930	1088	0.24	55682E3	7.5	65682E3	7.5	-	-	35682E3	7.5
	10 000	18 x 31	2330	1600	0.26	55103E3	7.5	65103E3	7.5	-	-	-	-
25	47	5 x 11	97	12	0.14	56479E3	2.0	-	-	76479E3	2.5	36479E3	5.0
	100	6.3 x 11	142	25	0.14	56101E3	2.5	-	-	76101E3	2.5	36101E3	5.0
	220	8 x 12	236	55	0.14	56221E3	3.5	-	-	76221E3	3.5	36221E3	5.0
	470	10 x 12	380	118	0.14	56471E3	5.0	66471E3	5.0	-	-	36471E3	5.0
	1000	10 x 20	680	250	0.14	56102E3	5.0	66102E3	5.0	-	-	36102E3	5.0
	2200	12.5 x 25	1110	550	0.16	56222E3	5.0	66222E3	5.0	-	-	36222E3	5.0
	3300	16 x 25	1440	825	0.18	56332E3	7.5	66332E3	7.5	-	-	36332E3	7.5
	4700	16 x 31	1710	1175	0.20	56472E3	7.5	66472E3	7.5	-	-	36472E3	7.5
	6800	18 x 35	2160	1700	0.22	56682E3	7.5	66682E3	7.5	-	-	-	-

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 (mA)	I_{L2} 2 min (µA)	tan δ 100 Hz	ORDERING CODE MAL2142...							
						BULK PACKAGING				TAPED AMMOPACK			
						LONG LEADS		CUT LEADS					
						FORM CA	F (mm)	FORM CB	F (mm)	FORM TNA	F (mm)	FORM TFA	F (mm)
	47	5 x 11	90	16	0.12	50479E3	2.0	-	-	70479E3	2.5	30479E3	5.0
	100	6.3 x 11	150	35	0.12	50101E3	2.5	-	-	70101E3	2.5	30101E3	5.0
	220	8 x 12	270	77	0.12	50221E3	3.5	-	-	70221E3	3.5	30221E3	5.0
	330	10 x 12	350	116	0.12	50331E3	5.0	60331E3	5.0	-	-	30331E3	5.0
35	470	10 x 16	460	165	0.12	50471E3	5.0	60471E3	5.0	-	-	30471E3	5.0
	1000	12.5 x 20	810	350	0.12	50102E3	5.0	60102E3	5.0	-	-	30102E3	5.0
	2200	16 x 25	1260	770	0.14	50222E3	7.5	60222E3	7.5	-	-	30222E3	7.5
	3300	16 x 31	1420	1155	0.16	50332E3	7.5	60332E3	7.5	-	-	30332E3	7.5
	4700	18 x 35	1900	1645	0.18	50472E3	7.5	60472E3	7.5	-	-	-	-
	22	5 x 11	78	11	0.10	51229E3	2.0	-	-	71229E3	2.5	31229E3	5.0
	47	6.3 x 11	120	24	0.10	51479E3	2.5	-	-	71479E3	2.5	31479E3	5.0
	100	8 x 12	188	50	0.10	51101E3	3.5	-	-	71101E3	3.5	31101E3	5.0
	220	10 x 12	240	110	0.10	51221E3	5.0	61221E3	5.0	-	-	31221E3	5.0
50	330	10 x 16	410	165	0.10	51331E3	5.0	61331E3	5.0	-	-	31331E3	5.0
	470	12.5 x 20	530	235	0.10	51471E3	5.0	61471E3	5.0	-	-	31471E3	5.0
	1000	12.5 x 25	950	500	0.10	51102E3	5.0	61102E3	5.0	-	-	31102E3	5.0
	2200	16 x 35	1470	1100	0.12	51222E3	7.5	61222E3	7.5	-	-	-	-
	3300	18 x 35	1770	1650	0.14	51332E3	7.5	61332E3	7.5	-	-	-	-
	4.7	5 x 11	36	3	0.09	58478E3	2.0	-	-	78478E3	2.5	38478E3	5.0
	10	5 x 11	54	6	0.09	58109E3	2.0	-	-	78109E3	2.5	38109E3	5.0
	22	6.3 x 11	86	14	0.09	58229E3	2.5	-	-	78229E3	2.5	38229E3	5.0
	33	6.3 x 11	100	21	0.09	58339E3	2.5	-	-	78339E3	2.5	38339E3	5.0
	47	8 x 12	141	30	0.09	58479E3	3.5	-	-	78479E3	3.5	38479E3	5.0
63	100	10 x 12	235	63	0.09	58101E3	5.0	68101E3	5.0	-	-	38101E3	5.0
	220	10 x 16	335	139	0.09	58221E3	5.0	68221E3	5.0	-	-	38221E3	5.0
	330	10 x 20	510	208	0.09	58331E3	5.0	68331E3	5.0	-	-	38331E3	5.0
	470	12.5 x 20	640	296	0.09	58471E3	5.0	68471E3	5.0	-	-	38471E3	5.0
	1000	16 x 25	930	630	0.09	58102E3	7.5	68102E3	7.5	-	-	38102E3	7.5
	2200	18 x 40	2340	1380	0.09	58222E3	7.5	68222E3	7.5	-	-	-	-
	2.2	5 x 11	30	3	0.08	59228E3	2.0	-	-	79228E3	2.5	39228E3	5.0
	4.7	6.3 x 11	40	5	0.08	59478E3	2.5	-	-	79478E3	2.5	39478E3	5.0
	10	8 x 12	66	10	0.08	59109E3	3.5	-	-	79109E3	3.5	39109E3	5.0
	22	8 x 12	99	22	0.08	59229E3	3.5	-	-	79229E3	3.5	39229E3	5.0
	33	10 x 12	148	33	0.08	59339E3	5.0	69339E3	5.0	-	-	39339E3	5.0
100	47	10 x 16	180	47	0.08	59479E3	5.0	69479E3	5.0	-	-	39479E3	5.0
	100	10 x 20	265	100	0.08	59101E3	5.0	69101E3	5.0	-	-	39101E3	5.0
	220	12.5 x 25	440	220	0.08	59221E3	5.0	69221E3	5.0	-	-	39221E3	5.0
	330	16 x 25	540	330	0.08	59331E3	7.5	69331E3	7.5	-	-	39331E3	7.5
	470	16 x 31	715	470	0.08	59471E3	7.5	69471E3	7.5	-	-	39471E3	7.5
	1000	18 x 40	985	1000	0.08	59102E3	7.5	69102E3	7.5	-	-	-	-

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 (mA)	I_{L2} 2 min (µA)	tan δ 100 Hz	ORDERING CODE MAL2142...							
						BULK PACKAGING				TAPED AMMOPACK			
						LONG LEADS		CUT LEADS					
						FORM CA	F (mm)	FORM CB	F (mm)	FORM TNA	F (mm)	FORM TFA	F (mm)
200	1.0	5 x 11	18	21	0.14	52108E3	2.0	-	-	72108E3	2.5	32108E3	5.0
	2.2	6.3 x 11	30	28	0.14	52228E3	2.5	-	-	72228E3	2.5	32228E3	5.0
	4.7	8 x 12	54	43	0.14	52478E3	3.5	-	-	72478E3	3.5	32478E3	5.0
	10	10 x 12	94	65	0.14	52109E3	5.0	62109E3	5.0	-	-	32109E3	5.0
	22	10 x 16	142	113	0.14	52229E3	5.0	62229E3	5.0	-	-	32229E3	5.0
	47	12.5 x 20	250	213	0.14	52479E3	5.0	62479E3	5.0	-	-	32479E3	5.0
	100	16 x 25	485	425	0.14	52101E3	7.5	62101E3	7.5	-	-	32101E3	7.5
	220	18 x 35	835	905	0.14	52221E3	7.5	62221E3	7.5	-	-	-	-
250	1.0	5 x 11	16	23	0.17	51083E3	2.0	-	-	71083E3	2.5	31083E3	5.0
	2.2	6.3 x 11	35	32	0.17	52283E3	2.5	-	-	72283E3	2.5	32283E3	5.0
	4.7	8 x 12	60	50	0.17	54783E3	3.5	-	-	74783E3	3.5	34783E3	5.0
	10	10 x 12	92	75	0.17	51093E3	5.0	61093E3	5.0	-	-	31093E3	5.0
	22	10 x 20	215	135	0.17	52293E3	5.0	62293E3	5.0	-	-	32293E3	5.0
	33	12.5 x 20	315	190	0.17	53393E3	5.0	63393E3	5.0	-	-	33393E3	5.0
	47	12.5 x 25	350	260	0.17	54793E3	5.0	64793E3	5.0	-	-	34793E3	5.0
	100	16 x 31	530	525	0.17	51013E3	7.5	61013E3	7.5	-	-	31013E3	7.5
350	1.0	6.3 x 11	23	26	0.20	51085E3	2.5	-	-	71085E3	2.5	31085E3	5.0
	2.2	8 x 12	41	38	0.20	52285E3	3.5	-	-	72285E3	3.5	32285E3	5.0
	4.7	10 x 12	65	58	0.20	54785E3	5.0	64785E3	5.0	-	-	34785E3	5.0
	10	10 x 16	105	95	0.20	51095E3	5.0	61095E3	5.0	-	-	31095E3	5.0
	22	12.5 x 20	210	179	0.20	52295E3	5.0	62295E3	5.0	-	-	32295E3	5.0
	47	16 x 25	365	354	0.20	54795E3	7.5	64795E3	7.5	-	-	34795E3	7.5
	100	18 x 35	505	725	0.20	51015E3	7.5	61015E3	7.5	-	-	-	-
400	1.0	6.3 x 11	21	27	0.25	51086E3	2.5	-	-	71086E3	2.5	31086E3	5.0
	2.2	8 x 12	39	41	0.25	52286E3	3.5	-	-	72286E3	3.5	32286E3	5.0
	4.7	10 x 12	70	63	0.25	54786E3	5.0	64786E3	5.0	-	-	34786E3	5.0
	10	10 x 20	125	105	0.25	51096E3	5.0	61096E3	5.0	-	-	31096E3	5.0
	22	12.5 x 25	235	201	0.25	52296E3	5.0	62296E3	5.0	-	-	32296E3	5.0
	47	16 x 31	390	401	0.25	54796E3	7.5	64796E3	7.5	-	-	34796E3	7.5
	100	18 x 40	530	825	0.25	51016E3	7.5	61016E3	7.5	-	-	-	-
450	1.0	8 x 12	27	29	0.25	57108E3	3.5	-	-	77108E3	3.5	37108E3	5.0
	2.2	10 x 12	48	45	0.25	57228E3	5.0	67228E3	5.0	-	-	37228E3	5.0
	4.7	10 x 16	75	67	0.25	57478E3	5.0	67478E3	5.0	-	-	37478E3	5.0
	10	12.5 x 20	145	115	0.25	57109E3	5.0	67109E3	5.0	-	-	37109E3	5.0
	22	16 x 20	245	223	0.25	57229E3	7.5	67229E3	7.5	-	-	37229E3	7.5
	33	16 x 25	325	322	0.25	57339E3	7.5	67339E3	7.5	-	-	37339E3	7.5
	47	16 x 35	420	448	0.25	57479E3	7.5	67479E3	7.5	-	-	-	-

ADDITIONAL ELECTRICAL DATA		
PARAMETER	**CONDITIONS**	**VALUE**
Voltage		
Surge voltage		$U_s \leq 1.15 \times U_R$
Reverse voltage		$U_{rev} \leq 1$ V
Current		
Leakage current	After 2 min at U_R = 10 V to 100 V	$I_{L2} \leq 0.01\ C_R \times U_R$ or 3 µA, whichever is greater
	After 5 min at U_R = 200 V to 450 V	$I_{L5} \leq 0.03\ C_R \times U_R + 15$ µA ($C_R \times U_R \leq 1000$) $I_{L5} \leq 0.02\ C_R \times U_R + 25$ µA ($C_R \times U_R > 1000$)
Inductance		
Equivalent series inductance (ESL)	Case Ø D ≤ 8 mm	Typ. 13 nH
	Case Ø D = 10 mm	Typ. 16 nH
	Case Ø D ≥ 12.5 mm	Typ. 18 nH
Resistance		
Equivalent series resistance (ESR)	Calculated from tan $\delta_{max.}$ and C_R (see Table 2)	ESR = tan $\delta/2\ \pi\ f\ C_R$

CAPACITANCE (C)

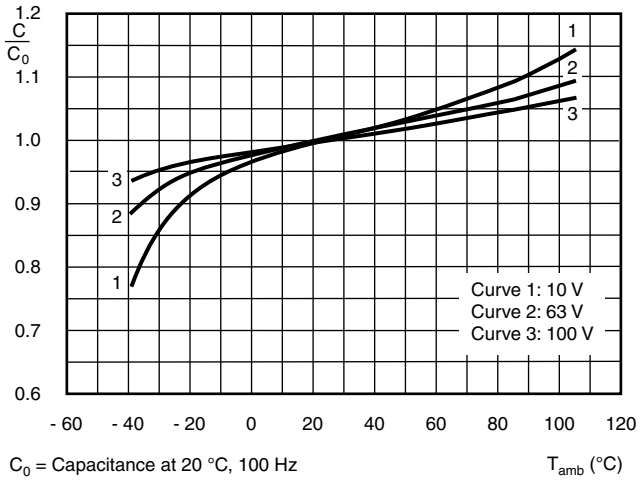


Fig. 6 - Typical multiplier of capacitance as a function of ambient temperature

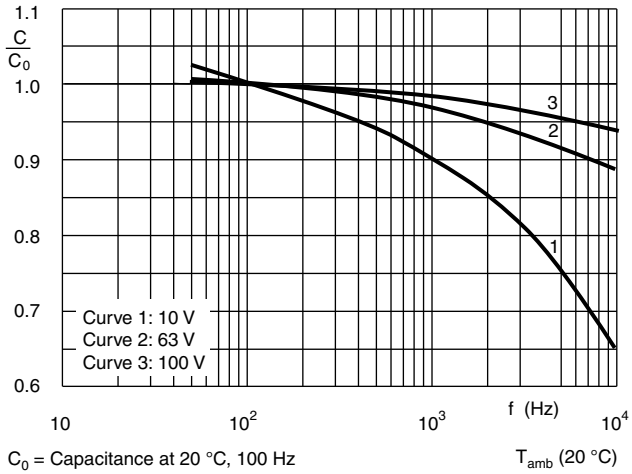
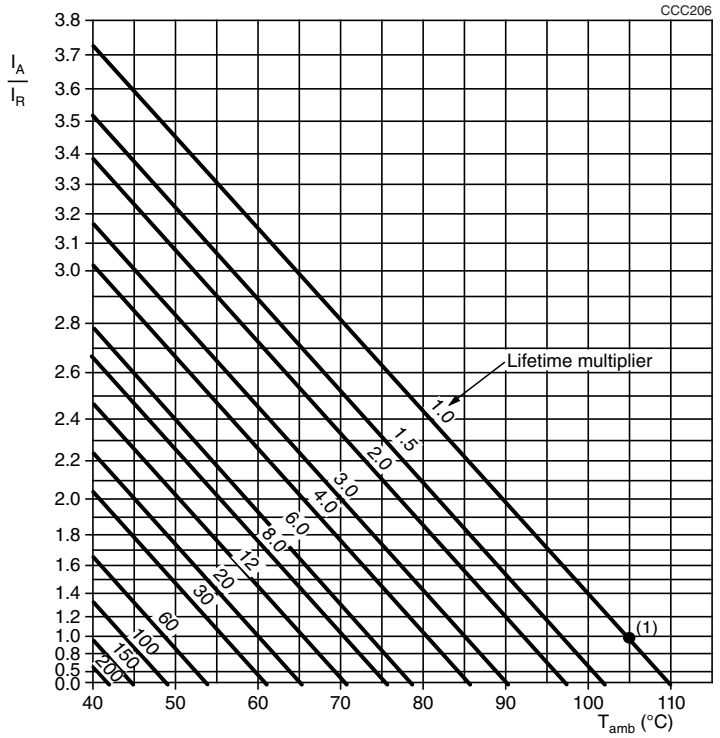


Fig. 7 - Typical multiplier of capacitance as a function of frequency

RIPPLE CURRENT AND USEFUL LIFE



I_A = Actual ripple current at 100 Hz, 105 °C
I_R = Rated ripple current at 100 Hz, 105 °C

(1) Useful life at 105 °C and I_R applied

Fig. 8 - Multiplier of useful life as a function of ambient temperature and ripple current load

Table 3

MULTIPLIER OF RIPPLE CURRENT (I_R) AS A FUNCTION OF FREQUENCY			
FREQUENCY (Hz)	I_R MULTIPLIER		
	C_R < 100 µF	C_R = 100 µF TO 1000 µF	C_R > 1000 µF
50	0.70	0.75	0.80
100	1.00	1.00	1.00
500	1.30	1.20	1.10
1000	1.40	1.30	1.12
≥ 10 000	1.50	1.35	1.15

Table 4

TEST PROCEDURES AND REQUIREMENTS			
TEST		PROCEDURE (quick reference)	REQUIREMENTS
NAME OF TEST	REFERENCE		
Endurance	IEC 60384-4/ EN130300 subclause 4.13	T_{amb} = 105 °C; U_R applied; 2000 h	ΔC/C: ± 20 % tan δ ≤ 2 x spec. limit I_{L5} ≤ spec. limit
Useful life	CECC 30301 subclause 1.8.1	T_{amb} = 105 °C; U_R and I_R applied; 2500 h	ΔC/C: ± 30 % tan δ ≤ 3 x spec. limit I_{L5} ≤ spec. limit no short or open circuit total failure percentage: ≤ 1 %
Shelf life (storage at high temperature)	IEC 60384-4/ EN130300 subclause 4.17	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	ΔC/C: ± 20 % tan δ ≤ 2 x spec. limit I_{L5} ≤ spec. limit
Surge	IEC 60384-4/ EN130300 subclause 4.14	From source of 1.15 x U_R: RC = 0.1 s ± 0.05 s; 1000 cycles of 30 s on, 330 s off, at 105 °C	ΔC/C: ± 25 % tan δ ≤ 1.5 x spec. limit I_{L5} ≤ spec. limit

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.