THB Metallized Polypropylene DC-Link Film Capacitor 85 °C / 85 % RH 1000 h at U_{NDC} - Automotive Grade



FEATURES

- High robustness under high humidity
- THB 85 °C, 85 % RH, 1000 h at rated U_{NDC}
- AEC-Q200 qualified, revision D at $T_{max.}$ = 85 °C ($T_{max.}$ = 105 °C available on request)
- High ripple current capability, low ESR, low ESL
- Mounting: radial
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

Pb-free

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

APPLICATIONS

- Ideal for out-of-doors applications or in other harsh environments
- Renewable energies inverters
- UPS
- Battery chargers
- Motor drives

QUICK REFERENCE DATA	
Rated capacitance range	1 µF to 80 µF
Capacitance tolerance	± 5 %, ± 10 %
Climatic testing class	40 / 085 / 56
Rated temperature	85 °C
Maximum permissible case temperature	105 °C, observing voltage derating
Maximum applicable peak to peak ripple voltage	0.2 x U_{NDC}
Reference standards	IEC 61071, IEC 60068
Dielectric	Polypropylene film
Electrodes	Metallized dielectric capacitor
Construction	Mono construction
Encapsulation	Plastic case sealed with resin; flame retardant UL 94 V-0
Terminals	Tinned wire
Self inductance (L_S)	< 1 nH per mm of lead spacing
Withstanding DC voltage between terminals (1)	1.5 U_{NDC} for 10 s, cut off current 10 mA, rise time ≤ 1000 V/s
Insulation resistance	RC between leads, after 1 min > 10 000 s, measuring voltage: 500 V
Life time expectancy (2)	Useful life time: > 100 000 h at U_{NDC} and 70 °C FIT: < 10 x 10^{-9}/h (10 per 10^9 component h) at 0.5 x U_{NDC}, 40 °C
Marking	Manufacturer's name; C-value; tolerance; rated voltage; manufacturer's type designation; code for dielectric material, manufacturer location, year and week

Notes

- For more detailed data and test requirements, contact dc-film@vishay.com
- For general information like characteristics and definitions used for film capacitors follow the link: www.vishay.com/doc?28147

(1) See document "Voltage Proof Test for Metalized Film Capacitors" (www.vishay.com/doc?28169)

(2) Statements about life time results from calculations which are based on internal tests. They have to be understood exclusively as estimations. Also due to external factors, the life time in the field application may deviate from the calculated life time

DC VOLTAGE RATINGS					
U_{NDC} at 85 °C	500 V	700 V	800 V	920 V	1200 V
U_{OPDC} at 70 °C	600 V	800 V	960 V	1100 V	1440 V
U_{OPDC} at 105 °C	350 V	450 V	560 V	650 V	850 V

For technical questions, contact: dc-film@vishay.com

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COMPOSITION OF CATALOG NUMBER

MULTIPLIER (nF)	
10	4
100	5
1000	6
10 000	7

CAPACITANCE (numerically)		
Example:		
510	1000 nF	1 µF
610	10 000 nF	10 µF
710	100 000 nF	100 µF

P1 (mm)	PITCH CODE
27.5	K
37.5	P
52.5	Y

MKP	1848H	6	12	90	J	P	4

- MKP: METALLIZED POLYPROPYLENE
- 1848H: TYPE CONSTRUCTION

VOLTAGE
U_{NDC} = 50 = 500 V_{DC}
U_{NDC} = 70 = 700 V_{DC}
U_{NDC} = 80 = 800 V_{DC}
U_{NDC} = 90 = 920 V_{DC}
U_{NDC} = 12 = 1200 V_{DC}

TOLERANCE	
J	± 5 %
K	± 10 %

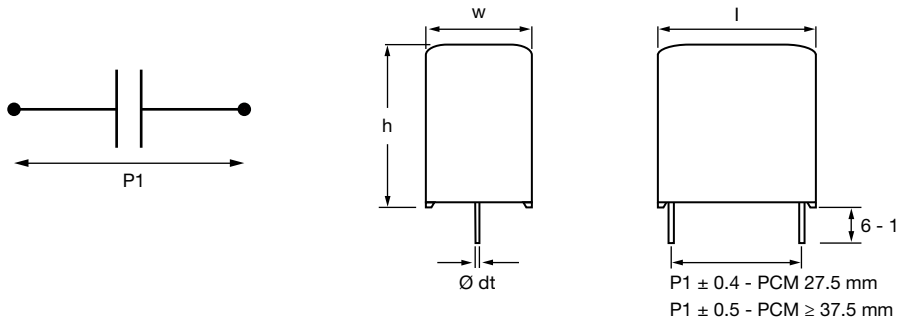
SPECIAL CODE FOR TERMINAL	
2	2 pins
4	4 pins P2 = 10.2 mm
5	4 pins P2 = 20.3 mm
(1)	Customized

Note

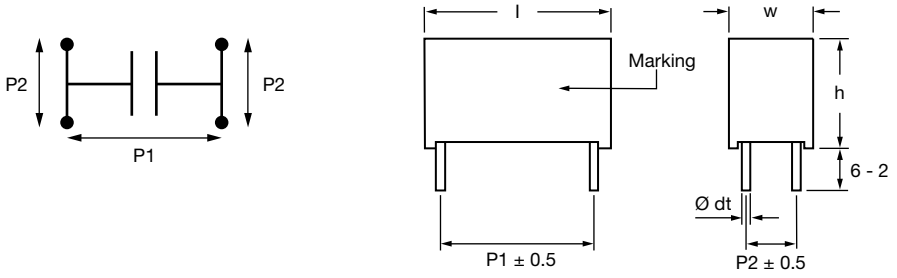
(1) Tabs terminals or customized terminals are available on request

DIMENSIONS in millimeters

2 PINS



4 PINS



Note

- Ø dt ± 10 % of standard diameter specified

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ELECTRICAL DATA AND ORDERING CODE

U_{NDC} AT 85 °C (V)	CAP. (µF)	DIMENSION (5) (mm)			P1 (mm)	P2 (mm)	du/dt (V/µs)	I_{PEAK} (A)	I_{RMS} (2) (A)		ESR (3) 10 kHz (mΩ)		tan δ (4) 10 kHz < (x 10^{-4})		ORDERING CODE (1)
		w	h	l					2 PINS	4 PINS	2 PINS	4 PINS	2 PINS	4 PINS	
	U_{OPDC} AT 70 °C = 600 V; U_{OPDC} AT 105 °C = 350 V														
500	5	15.0	25.0	32.0	27.5	-	40	200	7.0	-	10.1	-	65	-	MKP1848H55050+K2
	6	15.0	25.0	32.0	27.5	-	40	240	7.6	-	8.6	-	65	-	MKP1848H56050+K2
	7	18.0	28.0	32.0	27.5	-	40	280	8.8	-	7.6	-	65	-	MKP1848H57050+K2
	8	18.0	28.0	32.0	27.5	-	40	320	9.3	-	6.8	-	65	-	MKP1848H58050+K2
	10	21.0	31.0	32.0	27.5	-	40	400	11.0	-	5.7	-	65	-	MKP1848H61050+K2
	12	21.0	31.0	32.0	27.5	-	40	480	11.7	-	5.0	-	65	-	MKP1848H61250+K2
	15	22.0	38.0	32.0	27.5	-	40	600	13.9	-	4.3	-	65	-	MKP1848H61550+K2
	20	21.5	38.5	42.0	37.5	10.2	20	400	13.6	14.4	5.3	4.8	145	130	MKP1848H62050+P*
	22	21.5	38.5	42.0	37.5	10.2	20	440	14.1	14.8	5.0	4.5	145	130	MKP1848H62250+P*
	25	21.5	38.5	42.0	37.5	10.2	20	500	14.7	15.5	4.6	4.1	145	130	MKP1848H62550+P*
	30	30.0	45.0	42.0	37.5	10.2 / 20.3	20	600	18.1	19.1	4.1	3.7	145	130	MKP1848H63050+P*
	35	30.0	45.0	42.0	37.5	10.2 / 20.3	20	700	18.9	19.9	3.8	3.4	145	130	MKP1848H63550+P*
	40	30.0	45.0	42.0	37.5	10.2 / 20.3	20	800	19.6	20.7	3.5	3.2	145	130	MKP1848H64050+P*
	45	30.0	45.0	42.0	37.5	10.2 / 20.3	20	900	20.2	21.3	3.3	3.0	145	130	MKP1848H64550+P*
	50	30.0	45.0	57.5	52.5	20.3	10	500	20.9	22.0	3.9	3.5	250	225	MKP1848H65050+Y*
	55	30.0	45.0	57.5	52.5	20.3	10	550	21.2	22.3	3.8	3.4	250	225	MKP1848H65550+Y*
	60	30.0	45.0	57.5	52.5	20.3	10	600	21.4	22.5	3.7	3.3	250	225	MKP1848H66050+Y*
	65	30.0	45.0	57.5	52.5	20.3	10	650	21.6	22.7	3.6	3.3	250	225	MKP1848H66550+Y*
	70	35.0	50.0	57.5	52.5	20.3	10	700	23.5	24.8	3.6	3.2	250	225	MKP1848H67050+Y*
	75	35.0	50.0	57.5	52.5	20.3	10	750	23.6	24.9	3.5	3.2	250	225	MKP1848H67550+Y*
	80	35.0	50.0	57.5	52.5	20.3	10	800	23.8	25.1	3.5	3.2	250	225	MKP1848H68050+Y*
	U_{OPDC} AT 70 °C = 800 V; U_{OPDC} AT 105 °C = 450 V														
700	4	15.0	25.0	32.0	27.5	-	50	200	7.0	-	10.0	-	55	-	MKP1848H54070+K2
	5	18.0	28.0	32.0	27.5	-	50	250	8.4	-	8.2	-	55	-	MKP1848H55070+K2
	6	18.0	28.0	32.0	27.5	-	50	300	9.1	-	7.0	-	55	-	MKP1848H56070+K2
	7	21.0	31.0	32.0	27.5	-	50	350	10.6	-	6.2	-	55	-	MKP1848H57070+K2
	8	21.0	31.0	32.0	27.5	-	50	400	11.1	-	5.6	-	55	-	MKP1848H58070+K2
	10	22.0	38.0	32.0	27.5	-	50	500	13.3	-	4.7	-	55	-	MKP1848H61070+K2
	12	22.0	38.0	32.0	27.5	-	50	600	14.2	-	4.1	-	55	-	MKP1848H61270+K2
	15	21.5	38.5	42.0	37.5	10.2	25	375	14.6	15.3	4.7	4.2	100	90	MKP1848H61570+P*
	20	21.5	38.5	42.0	37.5	10.2	25	500	15.6	16.5	4.0	3.6	100	90	MKP1848H62070+P*
	22	30.0	45.0	42.0	37.5	10.2 / 20.3	25	550	18.7	19.7	3.9	3.5	100	90	MKP1848H62270+P*
	25	30.0	45.0	42.0	37.5	10.2 / 20.3	25	625	19.2	20.2	3.7	3.3	100	90	MKP1848H62570+P*
	30	30.0	45.0	42.0	37.5	10.2 / 20.3	25	750	19.9	21.0	3.4	3.1	100	90	MKP1848H63070+P*
	35	30.0	45.0	57.5	52.5	20.3	12	420	19.7	20.8	4.3	3.9	215	195	MKP1848H63570+Y*
	40	30.0	45.0	57.5	52.5	20.3	12	480	20.1	21.2	4.2	3.8	215	195	MKP1848H64070+Y*
	45	30.0	45.0	57.5	52.5	20.3	12	540	20.5	21.6	4.0	3.6	215	195	MKP1848H64570+Y*
	50	35.0	50.0	57.5	52.5	20.3	12	600	22.4	23.6	3.9	3.5	215	195	MKP1848H65070+Y*
	55	35.0	50.0	57.5	52.5	20.3	12	660	22.7	23.9	3.9	3.5	215	195	MKP1848H65570+Y*
	60	35.0	50.0	57.5	52.5	20.3	12	720	22.9	24.1	3.8	3.4	215	195	MKP1848H66070+Y*

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ELECTRICAL DATA AND ORDERING CODE

U_{NDC} AT 85 °C (V)	CAP. (µF)	DIMENSION (5) (mm)			P1 (mm)	P2 (mm)	du/dt (V/µs)	I_{PEAK} (A)	I_{RMS} (2) (A)		ESR (3) 10 kHz (mΩ)		tan δ (4) 10 kHz < (x 10^{-4})		ORDERING CODE (1)
		w	h	l					2 PINS	4 PINS	2 PINS	4 PINS	2 PINS	4 PINS	
	U_{OPDC} AT 70 °C = 960 V; U_{OPDC} AT 105 °C = 560 V														
800	3	15.0	25.0	32.0	27.5	-	60	180	6.3	-	12.3	-	50	-	MKP1848H53080+K2
	4	18.0	28.0	32.0	27.5	-	60	240	7.7	-	9.8	-	50	-	MKP1848H54080+K2
	5	21.0	31.0	32.0	27.5	-	60	300	9.1	-	8.4	-	50	-	MKP1848H55080+K2
	6	21.0	31.0	32.0	27.5	-	60	360	9.7	-	7.4	-	50	-	MKP1848H56080+K2
	7	21.0	31.0	32.0	27.5	-	60	420	10.1	-	6.7	-	50	-	MKP1848H57080+K2
	8	22.0	38.0	32.0	27.5	-	60	480	11.6	-	6.2	-	50	-	MKP1848H58080+K2
	10	22.0	38.0	32.0	27.5	-	60	600	12.3	-	5.4	-	50	-	MKP1848H61080+K2
	12	21.5	38.5	42.0	37.5	10.2	30	360	11.8	12.5	7.1	6.4	100	90	MKP1848H61280+P*
	15	21.5	38.5	42.0	37.5	10.2	30	450	12.8	13.5	6.1	5.5	100	90	MKP1848H61580+P*
	20	30.0	45.0	42.0	37.5	10.2 / 20.3	30	600	16.3	17.2	5.1	4.6	100	90	MKP1848H62080+P*
	22	30.0	45.0	42.0	37.5	10.2 / 20.3	30	660	16.8	17.7	4.8	4.3	100	90	MKP1848H62280+P*
	25	30.0	45.0	42.0	37.5	10.2 / 20.3	30	750	17.4	18.3	4.5	4.0	100	90	MKP1848H62580+P*
	30	30.0	45.0	57.5	52.5	20.3	15	450	17.4	18.3	5.6	5.0	210	190	MKP1848H63080+Y*
	35	30.0	45.0	57.5	52.5	20.3	15	525	18.3	19.3	5.0	4.5	210	190	MKP1848H63580+Y*
	40	35.0	50.0	57.5	52.5	20.3	15	600	20.7	21.8	4.6	4.2	210	190	MKP1848H64080+Y*
	45	35.0	50.0	57.5	52.5	20.3	15	675	21.5	22.7	4.3	3.9	210	190	MKP1848H64580+Y*
	50	35.0	50.0	57.5	52.5	20.3	15	750	22.2	23.4	4.0	3.6	210	190	MKP1848H65080+Y*
	U_{OPDC} AT 70 °C = 1100 V; U_{OPDC} AT 105 °C = 650 V														
920	2	15.0	25.0	32.0	27.5	-	65	130	5.7	-	15.2	-	40	-	MKP1848H52090+K2
	3	18.0	28.0	32.0	27.5	-	65	195	7.4	-	10.8	-	40	-	MKP1848H53090+K2
	4	18.0	28.0	32.0	27.5	-	65	260	8.3	-	8.5	-	40	-	MKP1848H54090+K2
	5	21.0	31.0	32.0	27.5	-	65	325	9.8	-	7.2	-	40	-	MKP1848H55090+K2
	6	22.0	38.0	32.0	27.5	-	65	390	11.5	-	6.3	-	40	-	MKP1848H56090+K2
	7	22.0	38.0	32.0	27.5	-	65	455	12.1	-	5.6	-	40	-	MKP1848H57090+K2
	8	22.0	38.0	32.0	27.5	-	65	520	12.6	-	5.2	-	40	-	MKP1848H58090+K2
	10	21.5	38.5	42.0	37.5	10.2	35	350	11.8	12.4	7.2	6.4	90	80	MKP1848H61090+P*
	12	30.0	45.0	42.0	37.5	10.2 / 20.3	35	420	14.6	15.4	6.3	5.7	90	80	MKP1848H61290+P*
	15	30.0	45.0	42.0	37.5	10.2 / 20.3	35	525	15.7	16.5	5.5	4.9	90	80	MKP1848H61590+P*
	20	30.0	45.0	42.0	37.5	10.2 / 20.3	35	700	17.0	18.0	4.7	4.2	90	80	MKP1848H62090+P*
	22	30.0	45.0	57.5	52.5	20.3	18	396	16.3	17.2	6.4	5.7	150	135	MKP1848H62290+Y*
	25	30.0	45.0	57.5	52.5	20.3	18	450	17.2	18.2	5.7	5.1	150	135	MKP1848H62590+Y*
	30	30.0	45.0	57.5	52.5	20.3	18	540	18.5	19.5	4.9	4.4	150	135	MKP1848H63090+Y*
	35	35.0	50.0	57.5	52.5	20.3	18	630	21.2	22.4	4.4	3.9	150	135	MKP1848H63590+Y*
	40	35.0	50.0	57.5	52.5	20.3	18	720	22.3	23.5	4.0	3.6	150	135	MKP1848H64090+Y*
	U_{OPDC} AT 70 °C = 1440 V; U_{OPDC} AT 105 °C = 850 V														
1200	1	15.0	25.0	32.0	27.5	-	85	85	4.5	-	24.8	-	35	-	MKP1848H51012+K2
	2	18.0	28.0	32.0	27.5	-	85	170	6.5	-	13.7	-	35	-	MKP1848H52012+K2
	3	21.0	31.0	32.0	27.5	-	85	255	8.3	-	10.0	-	35	-	MKP1848H53012+K2
	4	22.0	38.0	32.0	27.5	-	85	340	10.0	-	8.2	-	35	-	MKP1848H54012+K2
	5	21.5	38.5	42.0	37.5	10.2	40	200	9.8	10.4	10.3	9.2	55	50	MKP1848H55012+P*
	6	21.5	38.5	42.0	37.5	10.2	40	240	10.7	11.2	8.7	7.8	55	50	MKP1848H56012+P*
	7	30.0	45.0	42.0	37.5	10.2 / 20.3	40	280	13.3	14.0	7.6	6.9	55	50	MKP1848H57012+P*
	8	30.0	45.0	42.0	37.5	10.2 / 20.3	40	320	14.1	14.9	6.8	6.1	55	50	MKP1848H58012+P*
	10	30.0	45.0	42.0	37.5	10.2 / 20.3	40	400	15.5	16.3	5.6	5.1	55	50	MKP1848H61012+P*
	12	30.0	45.0	57.5	52.5	20.3	20	240	13.8	14.6	8.9	8.0	120	105	MKP1848H61212+Y*
	15	30.0	45.0	57.5	52.5	20.3	20	300	15.2	16.0	7.3	6.6	120	105	MKP1848H61512+Y*
	20	35.0	50.0	57.5	52.5	20.3	20	400	18.5	19.5	5.8	5.2	120	105	MKP1848H62012+Y*
	22	35.0	50.0	57.5	52.5	20.3	20	440	19.2	20.2	5.4	4.8	120	105	MKP1848H62212+Y*

Notes

(1) Change the "*" symbol with special code for the terminals and "+" for tolerance

(2) Maximum RMS current at 10 kHz, +85 °C, Δt = +15 °C, capacitance tolerance ± 5 %, a typical ESR value at 10 kHz

(3) Equivalent series resistance typical values at 10 kHz

(4) Maximum tan δ values at 10 kHz

(5) Standard dimensions, for maximum dimension please consult "Dimensions Tolerances"

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PACKAGING INFORMATION

U_{NDC} AT 85 °C (V)	CAP. (1) (µF)	DIMENSION (mm)			Ø dt (mm)	ORDERING CODE (2)	MASS (g)	SPQ (3) (pcs)
		w	h	l				
500	U_{OPDC} AT 70 °C = 600 V; U_{OPDC} AT 105 °C = 350 V							
	5	15.0	25.0	32.0	0.8	MKP1848H55050+K2	14.5	100
	6	15.0	25.0	32.0	0.8	MKP1848H56050+K2	14.5	100
	7	18.0	28.0	32.0	0.8	MKP1848H57050+K2	20.5	80
	8	18.0	28.0	32.0	0.8	MKP1848H58050+K2	20.5	80
	10	21.0	31.0	32.0	0.8	MKP1848H61050+K2	27.5	56
	12	21.0	31.0	32.0	0.8	MKP1848H61250+K2	27	56
	15	22.0	38.0	32.0	0.8	MKP1848H61550+K2	34	56
	20	21.5	38.5	42.0	1.0	MKP1848H62050+P*	42.5	91
	22	21.5	38.5	42.0	1.0	MKP1848H62250+P*	42	91
	25	21.5	38.5	42.0	1.0	MKP1848H62550+P*	41	91
	30	30.0	45.0	42.0	1.0	MKP1848H63050+P*	70.5	63
	35	30.0	45.0	42.0	1.0	MKP1848H63550+P*	73	63
	40	30.0	45.0	42.0	1.0	MKP1848H64050+P*	70.5	63
	45	30.0	45.0	42.0	1.0	MKP1848H64550+P*	69.5	63
	50	30.0	45.0	57.5	1.2	MKP1848H65050+Y*	95.5	45
	55	30.0	45.0	57.5	1.2	MKP1848H65550+Y*	94	45
	60	30.0	45.0	57.5	1.2	MKP1848H66050+Y*	91.5	45
	65	30.0	45.0	57.5	1.2	MKP1848H66550+Y*	89.5	45
	70	35.0	50.0	57.5	1.2	MKP1848H67050+Y*	127	40
	75	35.0	50.0	57.5	1.2	MKP1848H67550+Y*	124.5	40
	80	35.0	50.0	57.5	1.2	MKP1848H68050+Y*	120.5	40
700	U_{OPDC} AT 70 °C = 800 V; U_{OPDC} AT 105 °C = 450 V							
	4	15.0	25.0	32.0	0.8	MKP1848H54070+K2	14.5	100
	5	18.0	28.0	32.0	0.8	MKP1848H55070+K2	20.5	80
	6	18.0	28.0	32.0	0.8	MKP1848H56070+K2	20	80
	7	21.0	31.0	32.0	0.8	MKP1848H57070+K2	27	56
	8	21.0	31.0	32.0	0.8	MKP1848H58070+K2	26.5	56
	10	22.0	38.0	32.0	0.8	MKP1848H61070+K2	33.5	56
	12	22.0	38.0	32.0	0.8	MKP1848H61270+K2	33.5	56
	15	21.5	38.5	42.0	1.0	MKP1848H61570+P*	42	91
	20	21.5	38.5	42.0	1.0	MKP1848H62070+P*	39	91
	22	30.0	45.0	42.0	1.0	MKP1848H62270+P*	71	63
	25	30.0	45.0	42.0	1.0	MKP1848H62570+P*	69	63
	30	30.0	45.0	42.0	1.0	MKP1848H63070+P*	70	63
	35	30.0	45.0	57.5	1.2	MKP1848H63570+Y*	91.5	45
	40	30.0	45.0	57.5	1.2	MKP1848H64070+Y*	93.5	45
	45	30.0	45.0	57.5	1.2	MKP1848H64570+Y*	90	45
	50	35.0	50.0	57.5	1.2	MKP1848H65070+Y*	119	40
	55	35.0	50.0	57.5	1.2	MKP1848H65570+Y*	123	40
	60	35.0	50.0	57.5	1.2	MKP1848H66070+Y*	120	40

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PACKAGING INFORMATION

U_{NDC} AT 85 °C (V)	CAP. (1) (µF)	DIMENSION (mm)			Ø dt (mm)	ORDERING CODE (2)	MASS (g)	SPQ (3) (pcs)
		w	h	l				
800	U_{OPDC} AT 70 °C = 960 V; U_{OPDC} AT 105 °C = 560 V							
	3	15.0	25.0	32.0	0.8	MKP1848H53080+K2	14.5	100
	4	18.0	28.0	32.0	0.8	MKP1848H54080+K2	20.5	80
	5	21.0	31.0	32.0	0.8	MKP1848H55080+K2	26.5	56
	6	21.0	31.0	32.0	0.8	MKP1848H56080+K2	27	56
	7	21.0	31.0	32.0	0.8	MKP1848H57080+K2	26.5	56
	8	22.0	38.0	32.0	0.8	MKP1848H58080+K2	33	56
	10	22.0	38.0	32.0	0.8	MKP1848H61080+K2	33	56
	12	21.5	38.5	42.0	1.0	MKP1848H61280+P*	42	91
	15	21.5	38.5	42.0	1.0	MKP1848H61580+P*	40.5	91
	20	30.0	45.0	42.0	1.0	MKP1848H62080+P*	69	63
	22	30.0	45.0	42.0	1.0	MKP1848H62280+P*	71	63
	25	30.0	45.0	42.0	1.0	MKP1848H62580+P*	69.5	63
	30	30.0	45.0	57.5	1.2	MKP1848H63080+Y*	89	45
	35	30.0	45.0	57.5	1.2	MKP1848H63580+Y*	91.5	45
	40	35.0	50.0	57.5	1.2	MKP1848H64080+Y*	119	40
	45	35.0	50.0	57.5	1.2	MKP1848H64580+Y*	124	40
	50	35.0	50.0	57.5	1.2	MKP1848H65080+Y*	119.5	40
920	U_{OPDC} AT 70 °C = 1100 V; U_{OPDC} AT 105 °C = 650 V							
	2	15.0	25.0	32.0	0.8	MKP1848H52090+K2	15	100
	3	18.0	28.0	32.0	0.8	MKP1848H53090+K2	20.5	80
	4	18.0	28.0	32.0	0.8	MKP1848H54090+K2	20	80
	5	21.0	31.0	32.0	0.8	MKP1848H55090+K2	27	56
	6	22.0	38.0	32.0	0.8	MKP1848H56090+K2	34.5	56
	7	22.0	38.0	32.0	0.8	MKP1848H57090+K2	34	56
	8	22.0	38.0	32.0	0.8	MKP1848H58090+K2	33.5	56
	10	21.5	38.5	42.0	1.0	MKP1848H61090+P*	42	91
	12	30.0	45.0	42.0	1.0	MKP1848H61290+P*	77	63
	15	30.0	45.0	42.0	1.0	MKP1848H61590+P*	74	63
	20	30.0	45.0	42.0	1.0	MKP1848H62090+P*	69.5	63
	22	30.0	45.0	57.5	1.2	MKP1848H62290+Y*	98	45
	25	30.0	45.0	57.5	1.2	MKP1848H62590+Y*	94	45
	30	30.0	45.0	57.5	1.2	MKP1848H63090+Y*	89.5	45
	35	35.0	50.0	57.5	1.2	MKP1848H63590+Y*	124	40
	40	35.0	50.0	57.5	1.2	MKP1848H64090+Y*	119.5	40
1200	U_{OPDC} AT 70 °C = 1440 V; U_{OPDC} AT 105 °C = 850 V							
	1	15.0	25.0	32.0	0.8	MKP1848H51012+K2	15	100
	2	18.0	28.0	32.0	0.8	MKP1848H52012+K2	20	80
	3	21.0	31.0	32.0	0.8	MKP1848H53012+K2	26.5	56
	4	22.0	38.0	32.0	0.8	MKP1848H54012+K2	33.5	56
	5	21.5	38.5	42.0	1.0	MKP1848H55012+P*	42.5	91
	6	21.5	38.5	42.0	1.0	MKP1848H56012+P*	41	91
	7	30.0	45.0	42.0	1.0	MKP1848H57012+P*	76	63
	8	30.0	45.0	42.0	1.0	MKP1848H58012+P*	74.5	63
	10	30.0	45.0	42.0	1.0	MKP1848H61012+P*	70.5	63
	12	30.0	45.0	57.5	1.2	MKP1848H61212+Y*	97.5	45
	15	30.0	45.0	57.5	1.2	MKP1848H61512+Y*	92.5	45
	20	35.0	50.0	57.5	1.2	MKP1848H62012+Y*	122.5	40
	22	35.0	50.0	57.5	1.2	MKP1848H62212+Y*	119.5	40

Notes

(1) Intermediate capacitance values available on request
(2) Change the "*" symbol with special code for the terminals, and "+" for tolerance
(3) SPQ = Standard Packing Quantity

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CONSTRUCTION DESCRIPTION

Low inductive wound cell elements of metallized polypropylene film, potted with resin in a flame retardant case.

SPECIFIC METHOD OF MOUNTING TO WITHSTAND VIBRATION AND SHOCK

The capacitor unit is designed for mounting on a printed circuit board.

In order to withstand vibration and shock tests, it must be insured that the stand-off pips are in good contact with the printed circuit board.

The capacitors shall be mechanically fixed by the leads and the body clamped.

DIMENSIONS TOLERANCES

For the maximum product dimensions for length ($l_{max.}$), width ($w_{max.}$), and height ($h_{max.}$) use the following tolerances:

$l_{max.} = l + \Delta l$, $w_{max.} = w + \Delta w$, and $h_{max.} = h + \Delta h$

Pitch = 27.5 mm, $\Delta w = \Delta l = \Delta h = 0.7$ mm

Pitch = 37.5 mm, $\Delta w = \Delta l = \Delta h = 0.7$ mm

Pitch = 52.5 mm, $\Delta w = \Delta l = \Delta h = 1.0$ mm

$l_{min.} = l - \Delta l$, $w_{min.} = w - \Delta w$, and $h_{min.} = h - \Delta h$

Pitch = 27.5 mm, $\Delta w = \Delta l = \Delta h = 1.0$ mm

Pitch = 37.5 mm, $\Delta w = \Delta l = \Delta h = 1.0$ mm

Pitch = 52.5 mm, $\Delta w = \Delta l = \Delta h = 1.5$ mm

SPACE REQUIREMENTS ON PRINTED-CIRCUIT BOARD

For product height with seating plane as given by “IEC 60717” as reference.

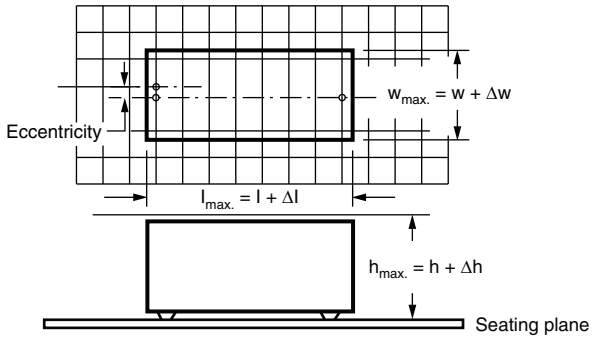
For 2 pins:

The maximum space for length ($l_{max.}$), width ($w_{max.}$), and height ($h_{max.}$) of film capacitors to take in account on the printed circuit board is shown in the drawings.

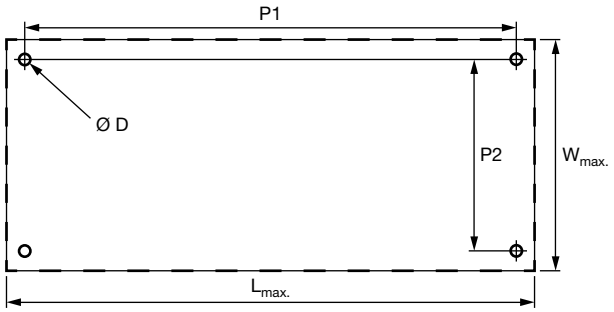
- For products with pitch ≤ 27.5 mm, $\Delta w = \Delta l = \Delta h = 0.7$ mm
- For products with pitch = 37.5 mm, $\Delta w = \Delta l = \Delta h = 0.7$ mm
- For products with pitch = 52.5 mm, $\Delta w = \Delta l = \Delta h = 1.0$ mm

Eccentricity defined as in drawing. The maximum eccentricity is smaller than or equal to the lead diameter of the product concerned.

The maximum length and width of film capacitors is shown in the figure.



For 4 pins:



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P1 (mm)	$L_{max.}$ (mm)	$W_{max.}$ (mm)	Ø D (mm)	Δh (mm)
37.5	l + 1.5	w + 1.8	1.5	h + 0.7
52.5	l + 1.8	w + 2.0	1.7	h + 0.7

SOLDERING CONDITIONS

For general soldering conditions and wave soldering profile we refer to the document “Soldering Conditions Vishay Film Capacitors”: www.vishay.com/doc?26033

STORAGE TEMPERATURE

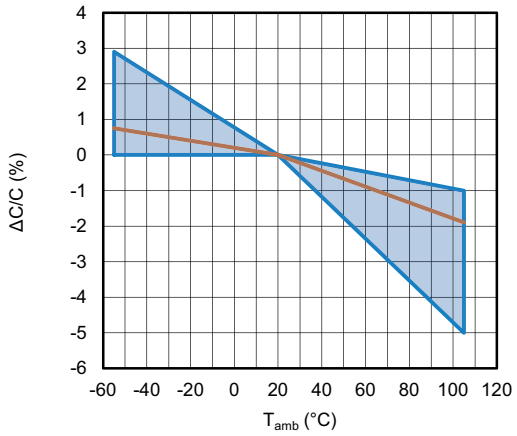
T_{stg} = -25 °C to +35 °C with RH maximum 75 % without condensation.

RATINGS AND CHARACTERISTICS REFERENCE CONDITIONS

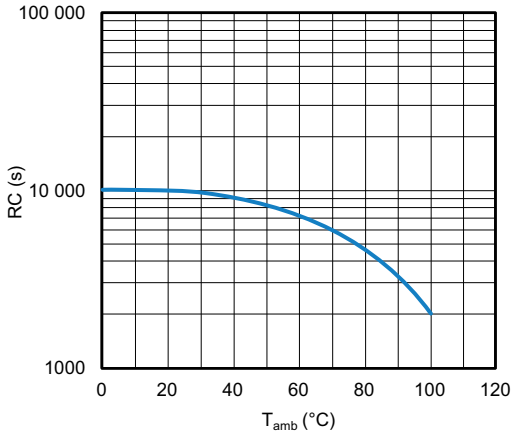
Unless otherwise specified, all electrical values apply to an ambient temperature of 23 °C ± 1 °C, an atmospheric pressure of 86 kPa to 106 kPa, and a relative humidity of 50 % ± 2 %.

For reference testing, a conditioning period shall be applied over 96 h ± 4 h by heating the products in a circulating air oven at the rated temperature and a relative humidity not exceeding 20 %.

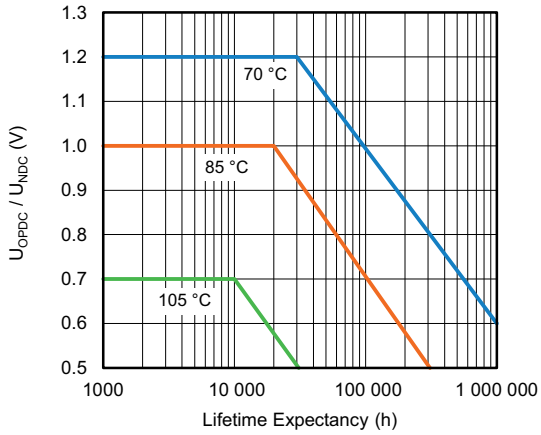
CHARACTERISTICS



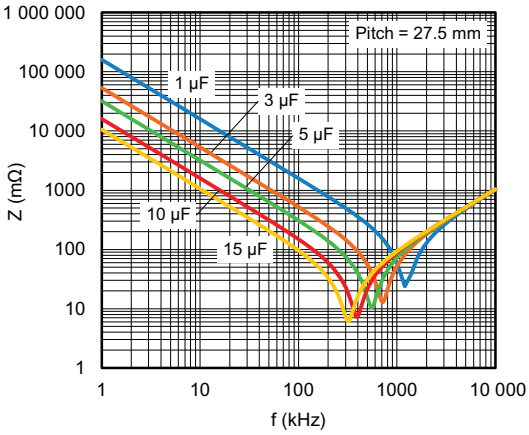
Capacitance as a function of ambient temperature (typical)



Insulation resistance as a function of ambient temperature (typical)



Lifetime expectancy by case temperature (typical)



Impedance as a function of frequency (typical)

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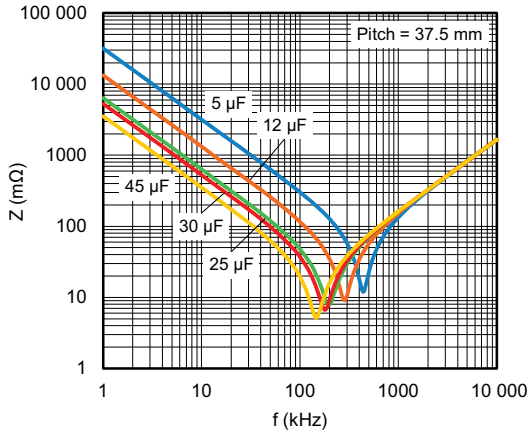
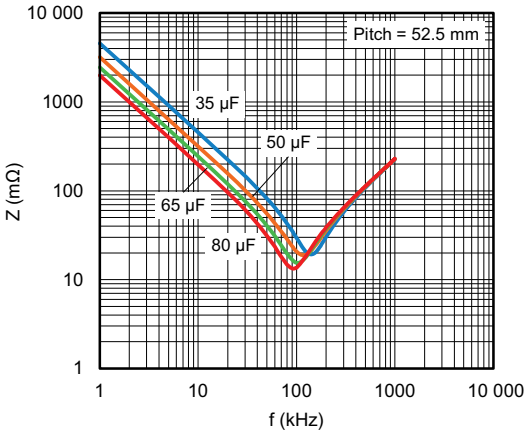
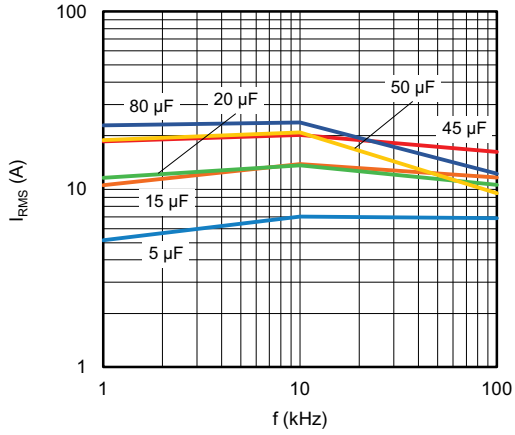


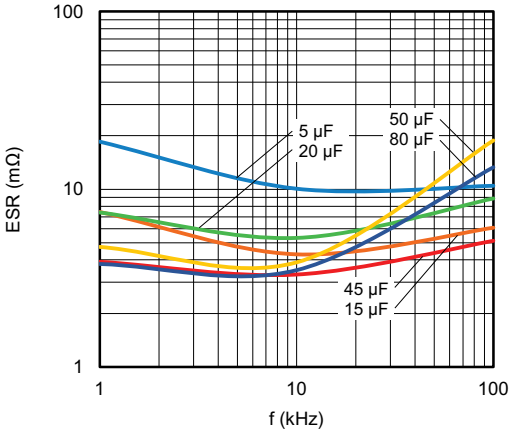
Impedance as a function of frequency (typical)



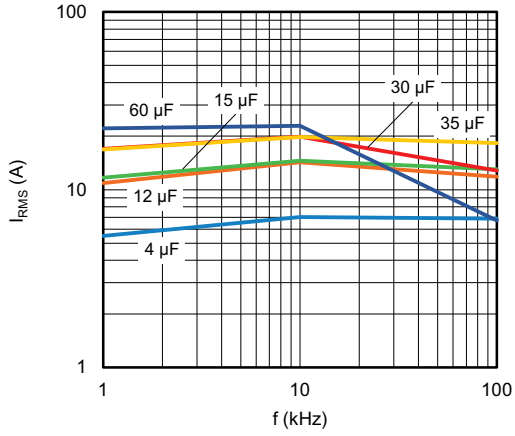
Impedance as a function of frequency (typical)



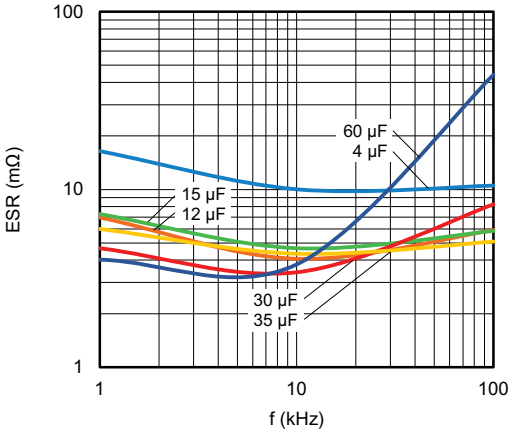
Maximum I_{RMS} current as function of frequency (500 V_{DC}), based T_A + 85 °C, Δt = +15 °C, capacitance tolerance ± 5 %, (typical curve)



ESR as function of frequency (500 V_{DC}) (typical curve)



Maximum I_{RMS} current as function of frequency (700 V_{DC}), based T_A + 85 °C, Δt = +15 °C, capacitance tolerance ± 5 %, (typical curve)



ESR as function of frequency (700 V_{DC}) (typical curve)

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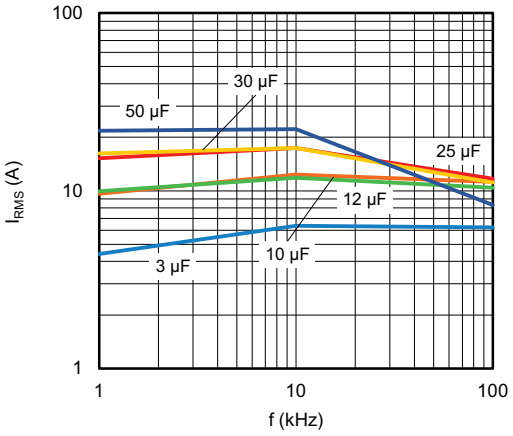
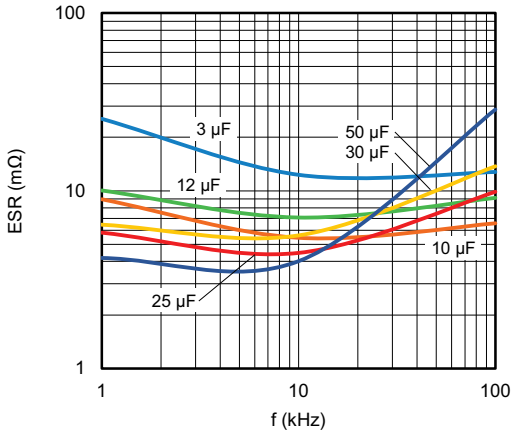
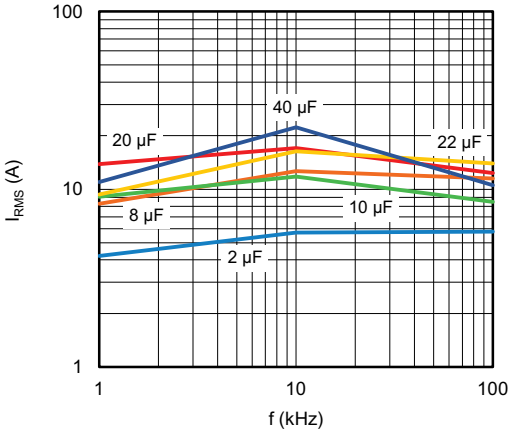


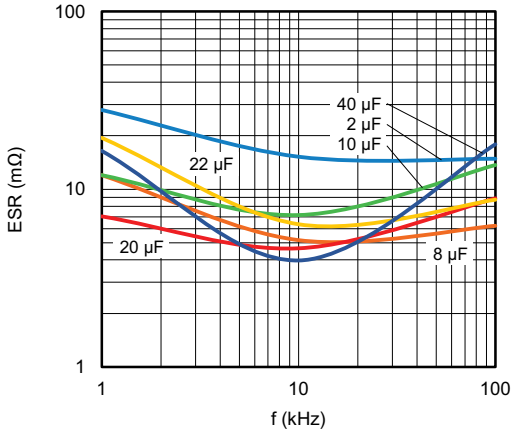
Maximum I_{RMS} current as function of frequency (800 V_{DC}), based T_A + 85 °C, Δt = +15 °C, capacitance tolerance ± 5 %, (typical curve)



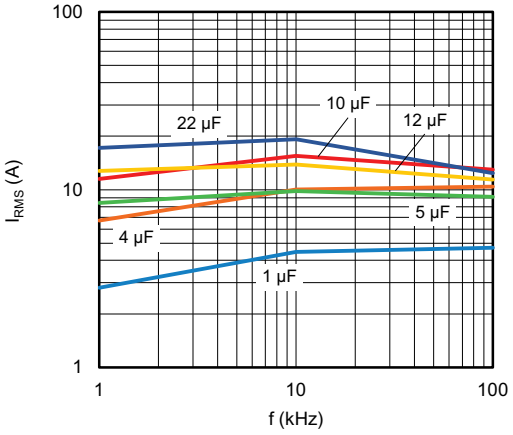
ESR as function of frequency (800 V_{DC}) (typical curve)



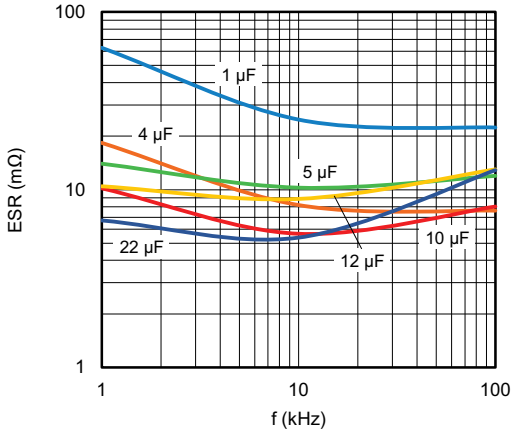
Maximum I_{RMS} current as function of frequency (920 V_{DC}), based T_A + 85 °C, Δt = +15 °C, capacitance tolerance ± 5 %, (typical curve)



ESR as function of frequency (920 V_{DC}) (typical curve)



Maximum I_{RMS} current as function of frequency (1200 V_{DC}), based T_A + 85 °C, Δt = +15 °C, capacitance tolerance ± 5 %, (typical curve)



ESR as function of frequency (1200 V_{DC}) (typical curve)

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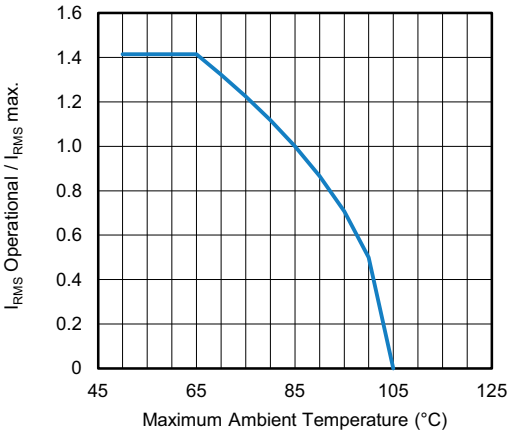
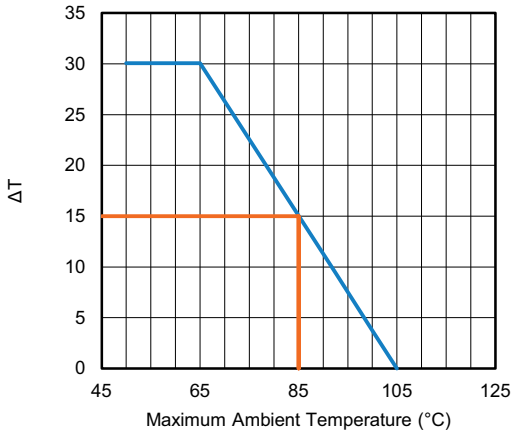


Maximum I_{RMS} current in function of the ambient temperature



Maximum allowed component temperature rise (ΔT) as a function of ambient temperature (T_{amb})

HEAT CONDUCTIVITY			
DIMENSIONS (mm)			HEAT CONDUCTIVITY (mW/°C)
w	h	l	
15.0	25.0	32.0	33
18.0	28.0	32.0	39
21.0	31.0	32.0	46
22.0	38.0	32.0	55
21.5	38.5	42.0	66
30.0	45.0	42.0	90
30.0	45.0	57.5	113
35.0	50.0	57.5	132

POWER DISSIPATION AND MAXIMUM COMPONENT TEMPERATURE RISE

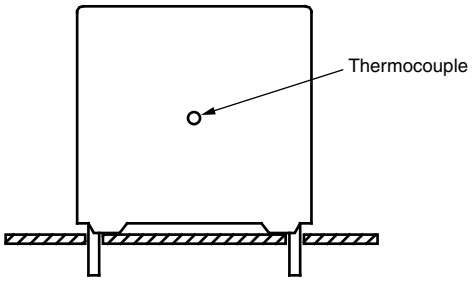
The power dissipation must be limited in order not to exceed the maximum allowed component temperature rise as a function of the free air ambient temperature.

The power dissipation can be calculated according type detail specification www.vishay.com/doc?28147

The component temperature rise (ΔT) can be measured (see section “Measuring the Component Temperature” for more details) or calculated by ΔT = P/G:

- $\Delta T = T_C - T_{amb}$ = case temperature rise (°C) with a maximum of 15 °C at rated temperature
- $P = I_{RMS}^2 \times ESR$ = power dissipation of the component (mW)
- G = heat conductivity of the component (mW/°C)

MEASURING THE COMPONENT TEMPERATURE



The case temperature is measured in unloaded condition (T_{amb}) and loaded condition (T_C).

The temperature rise is given by $\Delta T = T_C - T_{amb}$

To avoid external thermal radiation or convection, the capacitor must be tested in a closed area, free from air circulation.

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APPLICATION NOTES AND LIMITING CONDITIONS

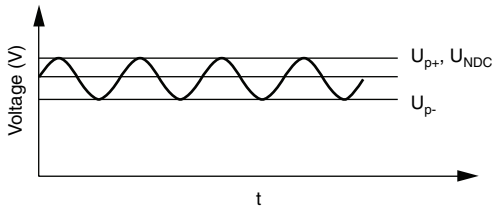
These capacitors are not suitable for mains applications as across-the-line capacitors without additional protection.

These mains applications are strictly regulated in safety standards and therefore electromagnetic interference suppression capacitors conforming the standards must be used.

To select the capacitor for a certain application, the following conditions must be checked:

1. The continuous peak voltage (U_{P+}) shall not exceed the DC voltage rating (U_{NDC})
2. The peak-to-peak ripple voltage (U_{PP}) shall not be greater than 0.2 x (U_{NDC})

Non reversing recurrent waveform



3. For capacitors connected in parallel, normally the proof voltage and possibly the rated voltage must be reduced. For information depending of the capacitance value and the number of parallel connections contact: dc-film@vishay.com
4. The voltage peak slope (du/dt) shall not exceed the pulse slope at the DC voltage rating.
   If the pulse voltage is lower than the rated DC voltage, the rated voltage pulse slope may be multiplied by U_{NDC} and divided by the applied voltage.
   For all other pulses following equation must be fulfilled:

$$2 \times \int_0^T \left(\frac{du}{dt}\right)^2 \times dt < U_{NDC} \times \left(\frac{du}{dt}\right)_{rated}$$

   T is the pulse duration

MAXIMUM REPETITIVE PEAK VOLTAGES	
REPETITIVE SURGE VOLTAGE	**MAXIMUM DURATION PER DAY**
1.1 x U_{NDC}	30 % on load duration
1.15 x U_{NDC}	30 min
1.2 x U_{NDC}	5 min
1.3 x U_{NDC}	1 min
1.5 x U_{NDC}	110 ms

Note

- The capacitor unit may be subjected to the surge above without any significant reduction of lifetime expectancy

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TEST CONDITIONS AND REQUIREMENTS ACCORDING IEC 61071				
SUB-CLAUSE NUMBER AND TEST		**CONDITIONS**		**PERFORMANCE REQUIREMENTS**
ROUTINE TEST - FINAL INSPECTION				
5.14.2-1	External inspection, visual examination			Legible marking as specified
5.14.2-2	Dimensions			See specification drawing
5.3-1	Capacitance	1 kHz at room temperature		See specific reference data
5.3-2	tan δ	10 kHz at room temperature		See specific reference data
5.5.1-2	DC voltage test between terminals	1.5 x U_{NDC} at T_{amb} Duration: 10 s		No visible damage or puncture No flashover
5.7	Insulation resistance	Measuring voltage 500 V at room temperature Duration: 1 min		See specific reference data
TYPE TESTS				
5.14.2	External inspection	Check for finish, marking, and overall dimensions		Legible marking and finish as specified Dimensions: see specific drawing
5.14.0	Initial measurements	Capacitance at 1 kHz tan δ at 10 kHz		
5.14.1-1/4	Robustness of terminations IEC 60068-2-21	Tensile Ua1: duration: 10 s ± 1 s		
		Wire diameter	Section	Load
		d ≤ 0.80 mm	S ≤ 0.5 mm^2	10 N (± 10 %)
		d ≤ 1.25 mm	S ≤ 1.2 mm^2	20 N (± 10 %)
		Bending, Ub method 1: 4 x 90 °, duration 2 s to 3 s/bend		
		Wire diameter	Section	Load
		d ≤ 0.80 mm	Z_x ≤ 0.050 mm^3	5 N (± 10 %)
		d ≤ 1.25 mm	Z_x ≤ 0.019 mm^3	10 N (± 10 %)
5.14.1-6	Resistance to soldering heat IEC 60068-2-20	No predrying, method 1A Solder bath: 280 °C ± 5 °C Duration: 10 s ± 1 s		
5.14.4	Final measurements	Capacitance tan δ		|ΔC/C| ≤ 0.5 % Increase of tan δ ≤ 0.0050 Compared to values measured in 5.14.0
5.14.0	Initial measurements	Capacitance at 1 kHz tan δ at 10 kHz		
5.14.3-1	Vibration IEC 60068-2-6	10 Hz to 55 Hz: amplitude ± 0.35 mm or acceleration 98 m/s^2 Test duration: 10 frequency cycles (3 axes offset from each other by 90°) 1 octave/min Visual examination		No visible damage
5.14.3-2	Shock or impact IEC 60068-2-6	Pulse shape: half sine Acceleration: 490 m/s^2 Duration of pulse: 11 ms		
5.14.4	Final measurements	Visual examination Capacitance tan δ		No visible damage |ΔC/C| ≤ 0.5 % Increase of tan δ ≤ 0.0050 Compared to values measured in 5.14.0

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TEST CONDITIONS AND REQUIREMENTS ACCORDING IEC 61071		
SUB-CLAUSE NUMBER AND TEST	**CONDITIONS**	**PERFORMANCE REQUIREMENTS**
TYPE TESTS		
5.5.3-1 Initial measurements	Capacitance at 1 kHz tan δ at 10 kHz Insulation resistance	
5.5.3-2 DC voltage test between terminals	1.5 x U_{NDC} at T_{amb} Duration: 60 s	
5.5.3-3 Final measurements	Capacitance tan δ Insulation resistance	|ΔC/C| ≤ 0.5 % Increase of tan δ ≤ 0.0050 IR ≥ 50 % of specified values
5.9-1 Initial measurements	Capacitance at 1 kHz tan δ at 10 kHz Insulation resistance	
5.9-2 Surge discharge test	1.1 x U_{NDC} Number of discharges: 5 Time lapse: every 2 min (10 min total)	
5.9-2 DC voltage test between terminals	Within 5 min after the surge discharge test 1.5 x U_{NDC} at T_{amb} Duration: 60 s	
5.9-3 Final measurements	Capacitance tan δ Insulation resistance	|ΔC/C| ≤ 1.0 % tan δ ≤ 1.2 x initial tan δ + 0.0001 Compared to values measured in 5.9-1 IR ≥ 50 % of specified values
5.11-1 Initial measurements	Capacitance at 1 kHz tan δ at 10 kHz Insulation resistance	
5.11-2 Self healing test	1.5 x U_{NDC} Duration: 10 s increase the voltage at 100 V/s till 5 clearings occur or until voltage reach max. of 2.5 x U_{NDC} for a duration of 10 s	Number of clearings ≤ 5 Clearing = voltage drop of 5 %
5.11-3 Final measurements	Capacitance tan δ Insulation resistance	|ΔC/C| ≤ 0.5 % tan δ ≤ 1.2 x initial tan δ + 0.0001 Compared to values measured in 5.11.1 IR ≥ 50 % of specified values
5.13-0 Initial measurements	Capacitance at 1 kHz tan δ at 10 kHz Insulation resistance	
5.13-1 Change of temperature acc. to IEC 60068-2-14	Test Nb $T_{max.}$ = 85 °C $T_{min.}$ = -40 °C Transition time: 1 h, equivalent to 1 °C/min 5 cycles	
5.13.2 Damp heat steady state acc. to IEC 60068-2-78	Test Ca T = 40 °C ± 2 °C RH = 93 % ± 3 % Duration: 56 days	
5.5.3-2 DC voltage test between terminals	1.5 x U_{NDC} at ambient temperature Duration: 60 s	
5.13.3 Final measurements	Visual examination Capacitance tan δ Insulation resistance	No puncturing or flashover Self healing punctures are permitted |ΔC/C| ≤ 2.0 % Increase of tan δ ≤ 0.0150 Compared to values measured in 5.13-0 IR ≥ 50 % of specified values

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TEST CONDITIONS AND REQUIREMENTS ACCORDING IEC 61071		
SUB-CLAUSE NUMBER AND TEST	**CONDITIONS**	**PERFORMANCE REQUIREMENTS**
TYPE TESTS		
5.13A-0 Initial measurements	Capacitance at 1 kHz tan δ at 1 kHz Insulation resistance	
5.13A.2 Accelerate damp heat steady state with load	T = 85 °C RH = 85 % at U_{NDC} Duration 1000 h	
5.13.3 Final measurements	Capacitance at 1 kHz tan δ at 1 kHz Insulation resistance	|ΔC/C| < 10 % Increase of tan δ ≤ 0.0100 Compared to values measured in 5.13A.0 IR ≥ 50 % of specified values
5.10-0 Initial measurements	Capacitance at 1 kHz tan δ at 10 kHz Insulation resistance	
5.10-1 Thermal stability test under overload conditions	Natural cooling T_{amb} ± 5 °C 1.21 x $P_{max.}$ = 1.21 x (I^2_{RMS}/w x C) x tan δ(f) with w = 2 x π x f for I_{RMS} see specific reference data f = 10 kHz Duration: 48 h	
5.10-2 Final measurements	Measure the temperature every 1.5 h during the last 6 h Capacitance tan δ at 10 kHz Insulation resistance	Temperature rise < 1 °C |ΔC/C| ≤ 2 % Increase of tan δ ≤ 0.0150 IR ≥ 50 % of specified values
5.12 Resonance frequency measurement	Impedance analyzer at T_{amb}	> 0.9 times the value as specified in typical curve “Resonant frequency” of this specification
5.15-0 Initial measurements	Capacitance at 1 kHz tan δ at 10 kHz Insulation resistance	
5.15-1 Endurance test between terminals	Sequence 1.3 x U_{NDC} at 85 °C 1.3 x U_{OPDC} at 105 °C Duration: 500 h 1000 x discharge at 1.4 x $\hat{I}$ (maximum peak current) 1.3 x U_{NDC} at 85 °C 1.3 x U_{OPDC} at 105 °C Duration: 500 h	
5.15-2 Final measurements	Capacitance tan δ Insulation resistance	|ΔC/C| ≤ 3 % Increase of tan δ ≤ 0.0150 Compared to values measured in 5.15-0 IR ≥ 50 % of specified values
5.16.3-0 Initial measurements	Capacitance at 1 kHz	
5.16.3-1 Destruction test sequence for non-segmented film	The capacitors must be put in an oven at $T_{max.}$ = 85 °C, product enveloped with cheese cloth	
High DC voltage test	3 x U_{NDC} or DC voltage until repetitive product healings occur, duration: 15 min	Audible healings or check healings with oscilloscope
High AC voltage test	AC_{RMS} voltage = U_{NDC}/2 √2 with min. 250 V_{AC} Duration: 5 min Repeat destruction sequence 3 x	
5.16.3-2 Final measurements	Visual examination	No puncturing, flashover or burning of the cheese cloth Self healing punctures are permitted

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TEST CONDITIONS AND REQUIREMENTS ACCORDING AEC-Q200 REVISION D				
NO.	**TEST NAME**	**REFERENCE**	**TEST CONDITIONS**	**PERFORMANCE REQUIREMENTS**
1	Pre- and post-stress electrical test	Spec.	-	-
3	High temperature exposure (storage)	MIL-STD 202 method 108	85 °C; unpowered 250 h / 500 h / 1000 h	$\|\Delta C/C\| \leq 3$ % Increase of tan δ (10 kHz) ≤ 0.005 IR > 50 % of initial specified value
4	Temperature cycling	JESD22 method JA-104	1000 cycles: -40 °C / +85 °C 30 min. dwell time at each temperature extreme Transition time < 1 min.	$\|\Delta C/C\| \leq 2$ % Increase of tan δ (10 kHz) ≤ 0.005 IR > 50 % of initial specified value
6	Moisture resistance	MIL-STD 202 method 106	10 cycles at 24 h/cycle unpowered	$\|\Delta C/C\| \leq 2$ % Increase of tan δ (10 kHz) ≤ 0.005 IR > 50 % of initial specified value
7	Biased humidity	MIL-STD 202 method 103	40 °C; 93 % RH; U_{RDC} 250 h / 500 h / 1000 h	$\|\Delta C/C\| \leq 2$ % Increase of tan δ (10 kHz) ≤ 0.005 IR > 50 % of initial specified value
8	Operational life	MIL-STD 202 method 108	T_{amb} = 85 °C; 1.25 x U_{RDC} 250 h / 500 h / 1000 h	$\|\Delta C/C\| \leq 3$ % Increase of tan δ (10 kHz) ≤ 0.005 IR > 50 % of initial specified value
9	External visual	MIL-STD 883 method 2009	Device construction, marking, and workmanship	Device construction and workmanship; legible marking
10	Physical dimension	JESD22 method JB-100	Spec.	Datasheet
11	Terminal strength (leaded)	MIL-STD 202 method 211	Test leaded device lead integrity only. - A (pull-test): 44.1 N (10 s) - C (wire-lead bend test): 227 g (3 x 3 s)	No visual damage
12	Resistance to solvents	MIL-STD 202 method 215	Also aqueous chemical - OKEM clean or equivalent. Do not use banned solvents.	No visual damage Legible marking
13	Mechanical shock	MIL-STD 202 method 213	100 *g*'s; 6 ms half-sine; 3.75 m/s	No visual damage
14	Vibration	MIL-STD 202 method 204	5 *g*'s for 20 min; 12 cycles x 3 directions 10 Hz to 2000 Hz	No visual damage
15	Resistance to soldering heat	MIL-STD 202 method 210	280 °C; 10 s solder within 1.5 mm of device body	$\|\Delta C/C\| \leq 0.5$ % Increase of tan δ (10 kHz) ≤ 0.005 IR > 50 % of initial specified value
17	ESD	-	-	-
18	Solderability	J-STD-002	Leaded: method A at 235 °C, category 3 (245 °C / 3 s)	Good tinning as evidence by free flowing of the solder with wetting of terminations > 95 %
19	Electrical characterization	-	-	-
20	Flammability	UL-94 IEC 60384-1	One flame application Class B	V-0 or V-1 are acceptable. Class B or C acc. IEC is also acceptable

Note

Measurement conditions at 23 °C:

- Capacitance at 1 kHz
- tan δ 10 kHz (additional 1 kHz and ESR 10 kHz)
- Insulation resistance 500 V, 1 min after full charge
- Dimensions w x h x l

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