US2 · Board-Mount · 6000 h/105 °C

High Ripple · Stronger Terminals and Cap · High Voltage

These capacitors combine both the advantage of screw type capacitors (higher CV values and higher ripple current capabilities) as well as the compact size and the termination of snap mount parts.

Diese Kondensatoren vereinen die Vorteile der Schraubanschlusstypen (höhere CV-Werte und hohere Wechselstrombelastbarkeit) mit denen für die Leiterplattenmontage (kompakte Bauformen und Snap-Mount-Anschlüsse).

› Specifications · Spezifikationen

Items	Characteristics
Temperature range	-40°C ~ + 105°C
Capacitance tolerance (at 20°C)	Standard +/- 20%, -10%/+30% on request
Surge voltage	Repetitive max. 30 sec per 6 Minutes
Leakage current max. I_L (20°C, 5 min)	0.01 • C • V_r [µA] or 3 mA, which is smaller.
Useful life	6 000 hours at 105°C
Field failure rate	0.5 FIT = 0.5 • 10^{-9} Failures/hour
RoHS conform	Directive 2011/65/EU & (EU)2015/863
Specification / Vibration	JIS C 5101-4 / 0.75mm, 10…55Hz, 10g, 3x2h

› Outline Drawings · Bauformen

Refer to page 8 for available terminal shapes and dimensions. · Auf Seite 8 finden Sie die verfügbaren Bauformen und Maße.

› Product Code · Bestellbezeichnung

Example: Series US2 · 420 V · 1200 µF ±20 % · 51 x 70 mm · T-type terminal

US2 **420V** **122** **M** **T** **C** **( )**

Type of series

Capacitance code

The first two digits are significant. The last digit indicates the number of following zeros in µF.

Terminal symbol code

- R: 2-pin terminal
- S: 4-pin terminal
- T: T-type terminal

Length code

Code	L	Code	L
Ly	y	S10	64
S6	45	S11	70
S7	51	S13	80
S8	55	S15	90
S9	61	S17	100

Rated voltage code

Code	Voltage	Code	Voltage
2D	200	2W	450
2E	250	2H	500
2G	400	2L	550
420V	420	600V	600

Capacitance tolerance

- M : ± 20%
- Q : -10% ~ +30%

Case code diameter

Code	ØD
A	35
B	41
H	46
C	51

Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 105°C/120Hz I_r [A RMS]	Ripple Current at 40°C/120Hz [A RMS]	ESR (typ) at 20°C/100Hz [mΩ]	Dissipation Factor at 20°C/100Hz Tan δ	DxL [mm]	Product Code
200 VDC Code: 2D Surge Voltage 250 VDC	**1 500**	4.39	12.29	76	0.15	41x45	US22D152MSB
	2 200	5.28	14.78	52	0.15	41x55	US22D222MSB
		4.94	13.83	52	0.15	46x51	US22D222MSH
	2 700	5.32	14.90	43	0.15	51x51	US22D272MTC
		5.91	16.55	42	0.15	41x64	US22D272MSB
	3 300	6.12	17.14	34	0.15	46x61	US22D332MSH
	3 900	6.63	18.56	29	0.15	46x70	US22D392MSH
		6.46	18.09	30	0.15	51x61	US22D392MTC
	4 700	7.06	19.77	25	0.15	51x70	US22D472MTC
250 VDC Code: 2E Surge Voltage 300 VDC	**1 000**	3.59	10.05	115	0.15	41x45	US22E102MSB
	1 500	4.36	12.21	76	0.15	41x55	US22E152MSB
	1 800	4.82	13.50	63	0.15	41x64	US22E182MSB
		4.47	12.52	63	0.15	46x51	US22E182MSH
		4.34	12.15	67	0.15	51x51	US22E182MTC
	2 200	4.99	13.97	52	0.15	46x61	US22E222MSH
	2 700	5.37	15.04	45	0.15	51x61	US22E272MTC
		5.52	15.46	42	0.15	46x70	US22E272MSH
	3 300	5.92	16.58	38	0.15	51x70	US22E332MTC
400 VDC Code: 2G Surge Voltage 450 VDC	**470**	2.68	7.50	158	0.15	35x42	US22G471MRAS5
		3.21	8.99	158	0.15	41x45	US22G471MSB
	680	3.38	9.46	109	0.15	35x52	US22G681MRA
		3.85	10.78	109	0.15	41x55	US22G681MSB
	820	3.74	10.47	90	0.15	35x61	US22G821MRA
		4.26	11.93	69	0.15	41x64	US22G821MSB
		4.26	11.93	69	0.15	46x51	US22G821MSHL51
		4.43	12.40	69	0.15	51x51	US22G821MTC
	1 000	4.61	12.91	80	0.15	41x68	US22G102MSBL68
		4.76	13.33	80	0.15	46x61	US22G102MSH
	1 200	5.17	14.48	66	0.15	41x78	US22G122MSBL78
		5.20	14.56	66	0.15	46x70	US22G122MSH
		5.41	15.15	66	0.15	51x61	US22G122MTC
	1 500	6.03	16.88	38	0.15	51x70	US22G152MTC
	1 800	6.71	18.79	44	0.15	46x80	US22G182MSHL80
420 VDC Code: 420V Surge Voltage 470 VDC	**390**	2.82	7.90	190	0.15	41x45	US2420V391MSB
	560	3.34	9.35	132	0.15	41x55	US2420V561MSB
	680	3.73	10.44	109	0.15	46x51	US2420V681MSH
	820	4.09	11.45	90	0.15	41x64	US2420V821MSB
		4.14	11.59	90	0.15	46x61	US2420V821MSH
		4.26	11.93	90	0.15	51x51	US2420V821MTC
	1 000	4.57	12.80	80	0.15	46x70	US2420V102MSH
		4.74	13.27	80	0.15	51x61	US2420V102MTC
	1 200	5.18	14.50	66	0.15	51x70	US2420V122MTC

Additional designs on request · Weitere Designs auf Anfrage

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Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 105°C/120Hz I_r [A RMS]	Ripple Current at 40°C/120Hz [A RMS]	ESR (typ) at 20°C/100Hz [mΩ]	Dissipation Factor at 20°C/100Hz Tan δ	DxL [mm]	Product Code
450 VDC Code: 2W Surge Voltage 500 VDC	**330**	2.58	7.22	225	0.15	41x45	US22W331MSB
	470	2.74	7.67	158	0.15	35x52	US22W471MRA
		3.07	8.60	158	0.15	41x55	US22W471MSB
	560	3.38	9.46	132	0.15	41x64	US22W561MSB
		3.38	9.46	132	0.15	46x51	US22W561MSH
	680	3.77	10.56	109	0.15	46x61	US22W681MSH
		3.87	10.84	109	0.15	51x51	US22W681MTC
	820	4.12	11.54	90	0.15	46x70	US22W821MSH
		4.29	12.01	90	0.15	51x61	US22W821MTC
	1 000	4.48	12.54	80	0.15	41x78	US22W102MSBL78
		4.73	13.24	80	0.15	51x70	US22W102MTC
	1 200	4.73	13.24	70	0.15	41x90	US22W122MSBL90
		5.41	15.15	70	0.15	41x100	US22W122MSBL100
	1 500	5.34	14.95	60	0.15	46x80	US22W152MSHS13
		5.26	14.73	60	0.15	51x70	US22W152MTCS11
500 VDC Code: 2H Surge Voltage 550 VDC	**470**	2.68	7.50	210	0.15	41x64	US22H471MSBL64
	560	2.55	7.14	180	0.15	41x81	US22H561MSBL81CR
		2.67	7.48	180	0.15	51x61	US22H561MTCS9
	680	3.28	9.18	150	0.15	46x70	US22H681MSH
	1 000	3.84	10.75	100	0.15	46x100	US22H102MSHS17
600 VDC Code: 600V Surge Voltage 650 VDC	**120**	2.53	6.32	930	0.25	41x45	US2600V121MSBS6
	180	3.08	7.70	620	0.25	41x55	US2600V181MSBS8
	220	3.48	8.70	510	0.25	41x64	US2600V221MSBS10
		3.58	8.95	510	0.25	46x51	US2600V221MSHS7
	270	4.03	10.07	420	0.25	46x61	US2600V271MSHS9
		4.23	10.57	420	0.25	51x51	US2600V271MTCS7
	330	4.4	11.00	340	0.25	46x70	US2600V331MSHS11
	390	5.15	12.87	290	0.25	51x61	US2600V391MTCS9
	470	6.28	15.70	240	0.25	51x70	US2600V471MTCS11
	560	6.97	17.43	200	0.25	51x70	US2600V561MTCS11
	640	7.45	18.62	180	0.25	51x80	US2600V641MTCS13

› Ripple Current Multiplier · Wechselstrommultiplikator

Frequency [Hz]		50/60	120	300	1k	≥ 10k
Multiplier	200V – 500V	0.70	1.00	1.18	1.34	1.45
	600V	0.70	1.00	1.20	1.50	1.70

Forced cooling [m/sec]	v < 0.5	v ≥ 0.5	v ≥ 1.0	v ≥ 2.0
Multiplier	1.00	1.10	1.20	1.25

Temperature [°C]		40	60	70	85
Multiplier	200V – 500V	2.8	2.4	2.1	1.0
	600V	2.5	2.4	2.1	1.0

Additional designs on request · Weitere Designs auf Anfrage

› Life Time Table · Brauchbarkeitsdauer – Tabelle

US2 200-500V	Useful life as function of ambient temperature and ripple current													
I_r at 105°C	x 1.0	x 1.2	x 1.4	x 1.6	x 1.8	x 2.0	x 2.1	x 2.2	x 2.3	x 2.4	x 2.5	x 2.6	x 2.7	x 2.8
T_a = 40°C	250	250	250	250	250	250	250	250	250	250	250	250	216	174
T_a = 45°C	250	250	250	250	250	250	250	250	250	247	204	168	136	
T_a = 50°C	250	250	250	250	250	250	250	223	188	156	129	106		
T_a = 55°C	250	250	250	250	250	196	167	141	118	99	81			
T_a = 60°C	250	250	250	216	166	124	105	89	75	62				
T_a = 65°C	250	211	173	137	105	78	66	56	47					
T_a = 70°C	158	134	109	86	66	49	42							
T_a = 75°C	100	84	69	54	42	31	26							
T_a = 80°C	63	53	43	34	26	19								
T_a = 85°C	40	33	27	21	16	12								
T_a = 90°C	25	21	17	13	10									
T_a = 95°C	16	13	11	8										
T_a = 100°C	10	8												
T_a = 105°C	6		khrs	Max. value limited to 250 000 hours.										

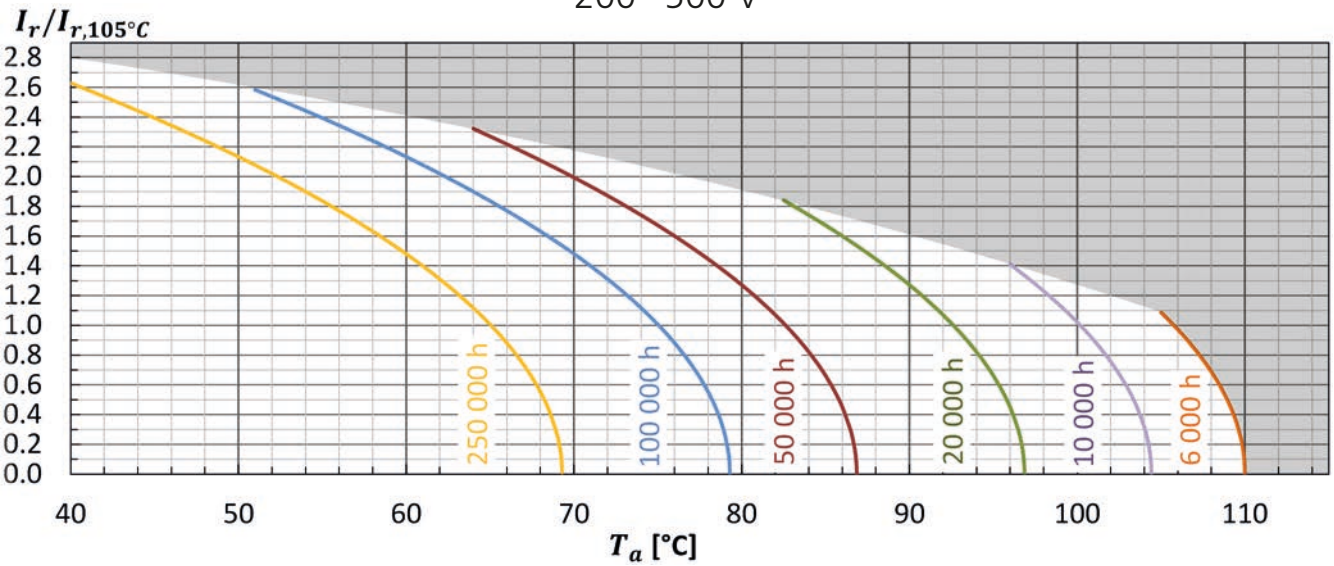
US2 600V	Useful life as function of ambient temperature and ripple current										
I_r at 105°C	x 1.0	x 1.2	x 1.4	x 1.6	x 1.8	x 2.0	x 2.1	x 2.2	x 2.3	x 2.4	x 2.5
T_a = 40°C	250	250	250	250	250	250	250	250	250	250	250
T_a = 45°C	250	250	250	250	250	250	250	250	250	247	204
T_a = 50°C	250	250	250	250	250	250	250	223	188	156	129
T_a = 55°C	250	250	250	250	250	196	167	141	118	99	81
T_a = 60°C	250	250	250	216	166	124	105	89	75	62	
T_a = 65°C	250	211	173	137	105	78	66	56	47		
T_a = 70°C	158	134	109	86	66	49	42				
T_a = 75°C	100	84	69	54	42	31	26				
T_a = 80°C	63	53	43	34	26	19					
T_a = 85°C	40	33	27	21	16	12					
T_a = 90°C	25	21	17	13	10						
T_a = 95°C	16	13	11	8							
T_a = 100°C	10	8									
T_a = 105°C	6		khrs	Max. value limited to 250 000 hours.							

› Life Time Graph · Brauchbarkeitsdauer – Diagramm

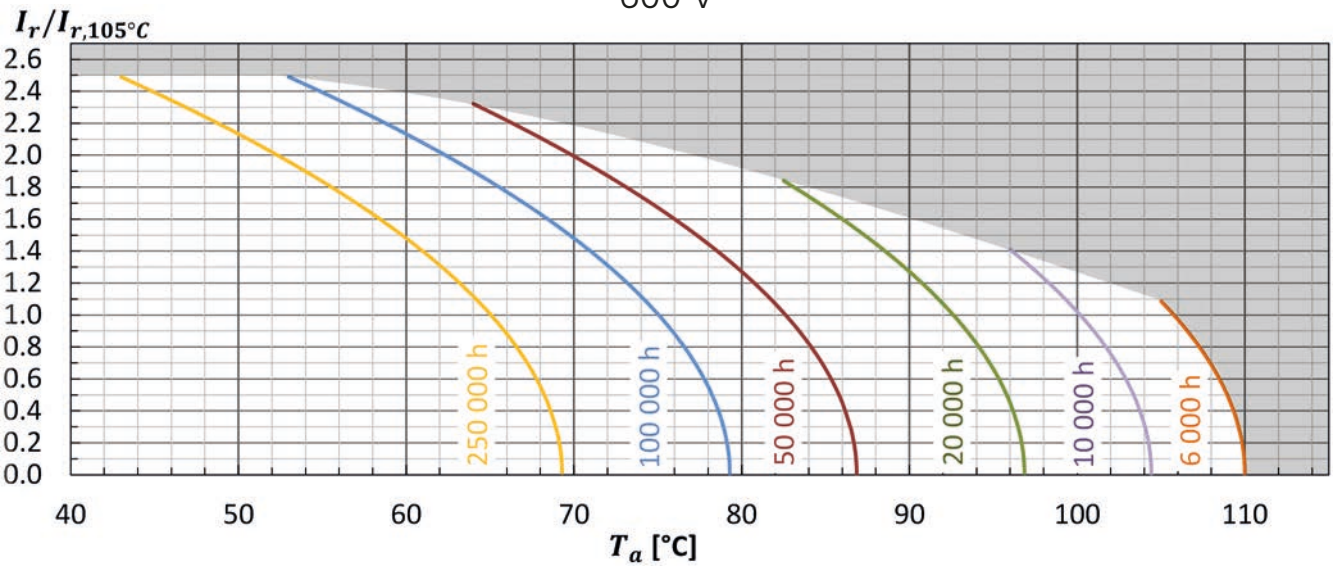
Useful life depending on ambient temperature T_a and ripple current operating conditions I_r versus rated ripple current at the upper category temperature $I_{r,\ 105°C,120Hz}$

Brauchbarkeitsdauer in Abhängigkeit von Umgebungstemperatur T_a und Wechselstrombelastung I_r im Verhältnis zur max. Wechselstrombelastung bei oberer Kategorietemperatur $I_{r,\ 105°C,120Hz}$

200 – 500 V



600 V



› Life Time Tests and Requirements · Anforderungen Brauchbarkeitsdauer

Life time test	Test procedure	Life time criteria
Endurance test	T_a = 105°C; V_r, I_r applied 4000 hours	ΔC/C ≤ 15% (of initial value) Tanδ ≤ 175% (of specified value) I_L ≤ specified value
Useful life	T_a = 105°C; V_r, I_r applied 6000 hours	ΔC/C ≤ 20% (of initial value) Tanδ < 200% (of specified value) I_L ≤ specified value

Reference Specification: JIS C 5101-4, JIS C 5102, IEC 60384-4