

ZR2 · Snap-In · 8000 h/105 °C

Highest Ripple Current · Side Vent · Low ESR · Compact Design

> Specifications · Spezifikationen

Items	Characteristics
Temperature range	-25°C (-40°C on request) ~ + 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)	0.02 · C · V _r [μA] or 3 mA, which is smaller.
Useful life	8000 hours at 105°C
Field failure rate	0.5 FIT = 0.5 · 10 ⁻⁹ Failures/hour
Reference standards	IEC 60384-4, JIS C 5101-4
Vibration	0.75mm, 10...55Hz, 10g, 3x2h
Sleeve withstanding voltage	3000 Vac/1 min between terminals bundled and plate*
Product Compliance	RoHS, REACH, Conflict Minerals a.o. - refer to p. 12-13



* Typical value using sleeve which is free from any scratches and damages

> Outline Drawings · Bauformen

Refer to page 7 for available terminal shapes and dimensions. · Auf Seite 7 finden Sie die verfügbaren Bauformen und Maße.

> Product Code · Bestellbezeichnung

Example: Series ZR2 · 400 V · 470 μF ± 20 % · 30x50 mm · 2-pin short · without plate

ZR2		2G		471		M		C		Z		S7		WPEC	
Type of series		Capacitance code		Terminal symbol code		Diameter code		Outer design code		Rated voltage code		Capacitance tolerance		Length code	
		The first two digits are significant. The last digit indicates the number of following zeros in μF.		R: 2-claw 6.3 mm S: 4-claw 6.3 mm C: 2-claw short 4.0 mm X: 4-claw short 4.0 mm E: 3-claw short 4.0 mm T: 2-lugs 4.5 mm		Code ØD		None: PET sleeve and PVC plate WPEC: PET sleeve without plate		Code Voltage		Code L*		Code L*	
						Y 25 Z 30 A 35 B 40				2G 400 2W 450		S2 25 S3 30 S4 35 S5 40 S6 45		S7 50 S9 60 S13 80 S17 100	
				M : ± 20% Q : -10% ~ +30%											

* exact length is mentioned in the product table

Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [μ F]	Ripple Current at 105°C/120Hz I_r [A RMS]	Ripple Current at 40°C/120Hz [A RMS]	ESR (typ) at 20°C/100Hz [m Ω]	Dissipation Factor at 20°C/100Hz Tan δ	DxL [mm]	Product Code # = variable value, see terminal code in the product code
400 VDC Code: 2G Surge Voltage 450 VDC	220	2.14	5.35	280	0.20	30x30	ZR22G221M#ZS3
	270	2.46	6.15	230	0.20	30x35	ZR22G271M#ZS4
	330	2.81	7.03	190	0.20	30x40	ZR22G331M#ZS5
		2.76	6.90	190	0.20	35x31	ZR22G331M#AS3
	390	3.14	7.85	160	0.20	30x45	ZR22G391M#ZS6
		3.13	7.83	160	0.20	35x36	ZR22G391M#AS4
	470	3.52	8.80	140	0.20	30x50	ZR22G471M#ZS7
		3.54	8.85	140	0.20	35x41	ZR22G471M#AS5
		3.36	8.40	140	0.20	40x30	ZR22G471M#BS3
		3.47	8.68	140	0.20	40x35	ZR22G471M#BS4
	560	3.96	9.90	115	0.20	30x60	ZR22G561M#ZS9
		3.96	9.90	115	0.20	35x46	ZR22G561M#AS6
		3.89	9.73	115	0.20	40x40	ZR22G561M#BS5
	680	4.49	11.23	95	0.20	30x75	ZR22G681M#ZS12
		4.45	11.13	95	0.20	35x51	ZR22G681M#AS7
		4.38	10.95	95	0.20	40x45	ZR22G681M#BS6
	820	4.94	12.35	80	0.20	30x80	ZR22G821M#ZS13
		5.04	12.60	80	0.20	35x61	ZR22G821M#AS9
		4.89	12.23	80	0.20	40x50	ZR22G821M#BS7
	1 000	5.44	13.60	65	0.20	30x100	ZR22G102M#ZS17
5.69		14.23	65	0.20	35x76	ZR22G102M#AS12	
5.52		13.80	65	0.20	40x61	ZR22G102M#BS9	
1 200	6.26	15.65	55	0.20	35x81	ZR22G122M#AS13	
1 500	6.96	17.40	50	0.20	35x100	ZR22G122M#AS17	
450 VDC Code: 2W Surge Voltage 500 VDC	180	1.87	4.68	350	0.20	30x30	ZR22W181M#ZS3
	220	2.15	5.38	290	0.20	30x35	ZR22W221M#ZS4
	270	2.42	6.05	230	0.20	30x40	ZR22W271M#ZS5
		2.35	5.88	230	0.20	35x31	ZR22W271M#AS3
	330	2.72	6.80	190	0.20	30x46	ZR22W331M#ZS6
		2.71	6.78	190	0.20	35x36	ZR22W331M#AS4
		2.65	6.63	190	0.20	40x30	ZR22W331M#BS3
		2.74	6.85	190	0.20	40x35	ZR22W331M#BS4
	390	3.02	7.55	170	0.20	30x50	ZR22W391M#ZS7
		3.04	7.60	170	0.20	35x41	ZR22W391M#AS5
	470	3.42	8.55	140	0.20	30x60	ZR22W471M#ZS9
		3.45	8.63	140	0.20	35x46	ZR22W471M#AS6
		3.36	8.40	140	0.20	40x40	ZR22W471M#AS5
	560	3.84	9.60	120	0.20	30x75	ZR22W561M#ZS12
		3.81	9.53	120	0.20	35x50	ZR22W561M#AS7
		3.74	9.35	120	0.20	40x45	ZR22W561M#BS6
		3.81	9.53	120	0.20	40x50	ZR22W561M#BS7
	680	4.25	10.63	100	0.20	30x80	ZR22W681M#ZS13
		4.33	10.83	100	0.20	35x61	ZR22W681M#AS9
	820	4.64	11.60	85	0.20	30x100	ZR22W821M#ZS17
4.87		12.18	85	0.20	35x76	ZR22W821M#AS12	
4.88		12.20	85	0.20	35x81	ZR22W821M#AS13	
4.72		11.80	85	0.20	40x61	ZR22W821M#BS9	
1 000	5.36	13.40	70	0.20	35x100	ZR22W102M#AS17	
1 500	5.67	14.18	65	0.20	40x101	ZR22W152M#BS17	
	5.39	13.48	65	0.20	46x83	ZR22W152M#HS13	

Additional designs on request · Weitere Designs auf Anfrage

> Ripple Current Multiplier · Wechselstrommultiplikator

Frequency [Hz]	50/60		120		300		1k		≥ 10k	
Multiplier	0.70		1.00		1.30		1.50		1.60	

T _a (°C)	40	45	50	55	60	65	70	75	80	85	90	95	100	105
Multiplier	2.5	2.4	2.3	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.2	1.1	1.0

Forced cooling – Wind speed [m/sec]	v < 0.25	v ≥ 0.25	v ≥ 0.5	v ≥ 1.0	v ≥ 2.0	v ≥ 3.0
Multiplier	1.00	1.10	1.15	1.25	1.30	1.35

> Life Time Table · Brauchbarkeitsdauer – Tabelle

ZR2 400V	Ripple Current Multiplier													
	T _a	1.0	1.1	1.2	1.4	1.5	1.6	1.7	1.8	2.0	2.1	2.2	2.3	2.4
40°C	250	250	250	250	250	250	250	250	250	250	210	152	108	76
45°C	250	250	250	250	250	250	250	250	244	182	133	96	68	
50°C	250	250	250	250	250	250	250	250	155	115	84	61		
55°C	250	250	250	250	250	250	219	170	98	73	53			
60°C	250	250	250	250	220	176	138	107	62	46				
65°C	250	250	250	172	139	111	88	68	39					
70°C	218	187	159	109	88	70	55	43						
75°C	138	118	100	69	56	44	35							
80°C	87	75	63	43	35	28								
85°C	55	47	40	28	22									
90°C	35	30	25	17										
95°C	22	19	16											
100°C	14	12												
105°C	8													

khrs Max. value limited to 250 000 hours.

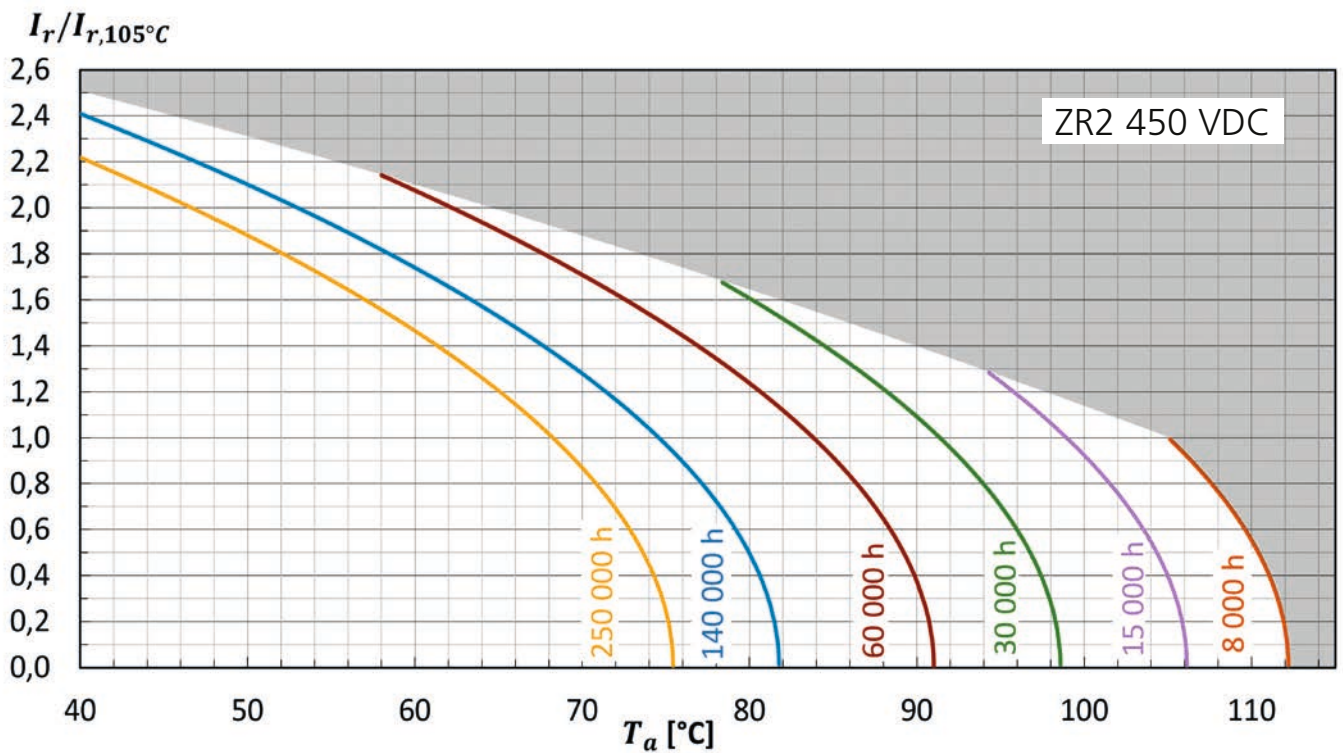
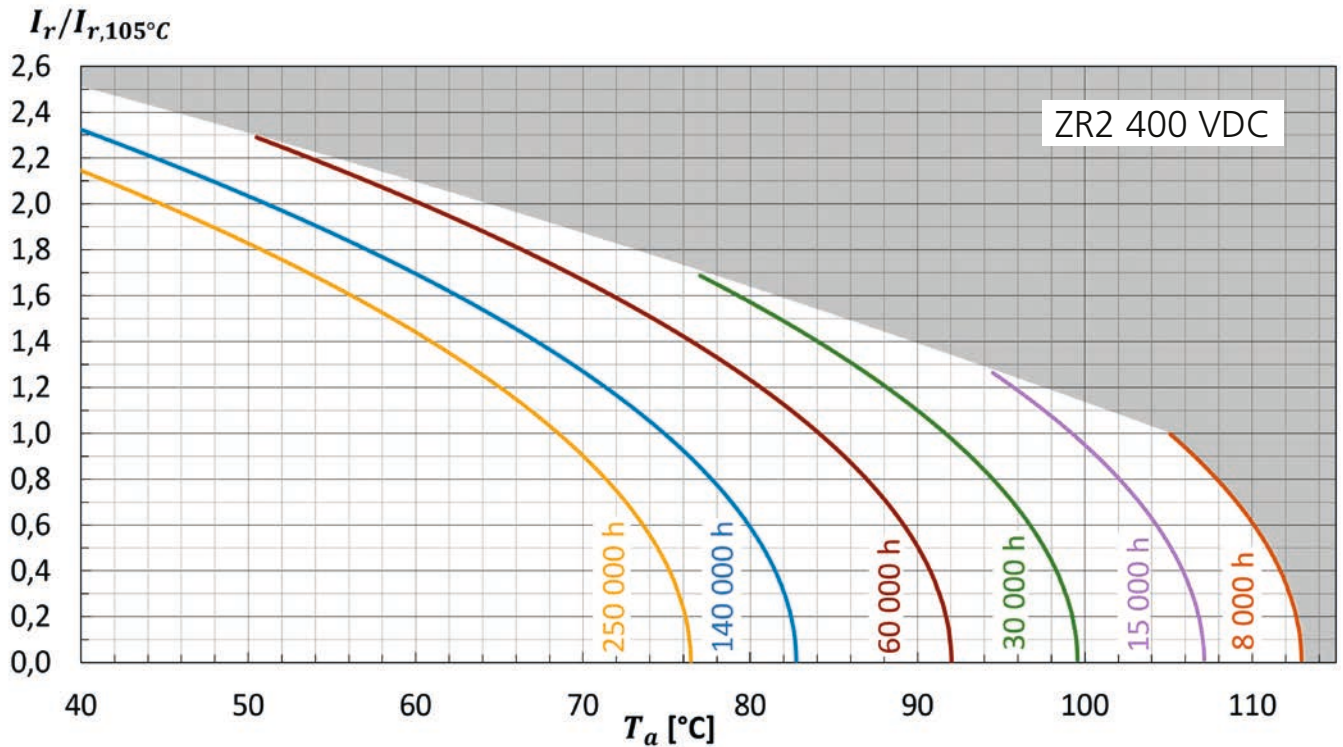
ZR2 450V	Ripple Current Multiplier													
	T _a	1.0	1.1	1.2	1.4	1.5	1.6	1.7	1.8	2.0	2.1	2.2	2.3	2.4
40°C	250	250	250	250	250	250	250	250	250	250	250	196	144	104
45°C	250	250	250	250	250	250	250	250	250	222	167	124	91	
50°C	250	250	250	250	250	250	250	250	184	140	106	78		
55°C	250	250	250	250	250	250	242	192	116	89	67			
60°C	250	250	250	250	233	190	153	121	73	56				
65°C	250	250	250	178	147	120	97	77	46					
70°C	213	185	159	113	93	76	61	49						
75°C	135	117	101	71	59	48	39							
80°C	85	74	64	45	37	30								
85°C	54	47	40	29	24									
90°C	34	30	25	18										
95°C	22	19	16											
100°C	14	12												
105°C	8													

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 Kategorie-temperatur I_{r, 105°C, 120Hz}



> Life Time Tests and Requirements · Anforderungen Brauchbarkeitsdauer

Life time test	Test procedure	Life time criteria
Endurance test	$T_a = 105^\circ C$; V_r, I_r applied 5000 hours	$\Delta C/C \leq 20\%$ (of initial value) $\tan \delta \leq 200\%$ (of specified value) $I_L \leq$ specified value
Useful life	$T_a = 105^\circ C$; V_r, I_r applied 8000 hours	$\Delta C/C \leq 30\%$ (of initial value) $\tan \delta < 300\%$ (of specified value) $I_L \leq$ specified value

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