Snap-In Series Data

HP3 · HU3 · HU · HL · HL2 · DH · ZLR · CU

AICtech

HP3 · Snap-In · 6000 h/85 °C

Standard Performances

› Specifications · Spezifikationen

Items	Characteristics
Temperature range	-40°C ~ + 85°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, 5min)	0.02 • C • V_r [µA] or 3 mA, which is smaller.
Useful life	6 000 hours at 85°C
Field failure rate	0.5 FIT = 0.5 • 10^{-9} Failures/hour
RoHS conform	Directive 2011/65/EU & (EU)2015/863
Specifications	JIS C 5101-4, AEC-Q200 qualified
Vibration	0.75mm, 10...55Hz, 10g, 3x2h
Sleeve withstanding voltage	3000 Vac/1 min between terminals bundled and plate*

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

› Outline Drawings · Bauformen

Refer to page 5 for available terminal shapes and dimensions. · Auf Seite 5 finden Sie die verfügbaren Bauformen und Maße.

› Product Code · Bestellbezeichnung

Example: Series HP3 · 350 V · 1200 µF ±20 % · 35x80 mm · 4-Pin terminal · without plate

HP3 **2V** **122** **M** **S** **A** **S13** **WPEC**

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
C: 2-pin short terminal
X: 4-pin short terminal
E: 3-pin short terminal

Diameter code

Code	ØD
W	20
X	22
Y	25
Z	30
A	35
B	40
H	46
C	50

Outer design code

None:
PET sleeve and PVC plate

WPEC:
PET sleeve without plate

Others on request

Rated voltage code

Code	Voltage	Code	Voltage	Code	Voltage
1C	16	2A	100	2G	400
1E	25	2C	160	420V	420
1V	35	2P	180	2W	450
1H	50	2D	200	2H	500
1J	63	2E	250		
1K	80	2V	350		

Capacitance tolerance

M : ± 20%
Q : -10% ~ +30%

Length code

Code	L	Code	L	Code	L
S1	20	S8	55	S15	90
S2	25	S9	60	S16	95
S3	30	S10	65	S17	100
S4	35	S11	70	S18	105
S5	40	S12	75	S19	110
S6	45	S13	80		
S7	50	S14	85		

Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 85°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 # = variable value, see fixing code in the product code
16 VDC Code: 1C Surge Voltage 20 VDC	**6 800**	1.96	3.72	51	0.50	22x25	HP31C682M#XS2
	10 000	2.13	4.06	41	0.50	22x30	HP31C103M#XS3
		2.11	4.02	41	0.50	25x25	HP31C103M#YS2
	15 000	2.92	5.54	28	0.50	22x40	HP31C153M#XS5
		2.77	5.27	28	0.50	25x30	HP31C153M#YS3
	22 000	3.87	7.36	22	0.50	25x45	HP31C223M#YS6
		3.55	6.75	22	0.50	30x30	HP31C223M#ZS3
	33 000	4.71	8.94	17	0.50	30x45	HP31C333M#ZS6
		4.53	8.61	17	0.50	35x35	HP31C333M#AS4
	47 000	5.67	10.77	12	0.50	35x40	HP31C473M#AS5
	68 000	7.12	13.52	12	0.90	35x60	HP31C683M#AS9
	100 000	8.88	16.86	10	1.20	40x60	HP31C104M#BS9
25 VDC Code: 1E Surge Voltage 32 VDC	**4 700**	1.63	3.09	88	0.40	22x25	HP31E472M#XS2
	6 800	2.08	3.95	70	0.40	22x30	HP31E682M#XS3
		2.06	3.91	70	0.40	25x25	HP31E682M#YS2
	10 000	2.27	4.30	48	0.40	22x35	HP31E103M#XS4
		2.27	4.30	48	0.40	25x30	HP31E103M#YS3
		2.27	4.30	48	0.40	30x25	HP31E103M#ZS2
	15 000	2.94	5.58	32	0.40	25x35	HP31E153M#YS4
		2.94	5.58	32	0.40	30x30	HP31E153M#ZS3
		2.94	5.58	32	0.40	35x25	HP31E153M#AS2
	18 000	3.36	6.38	27	0.40	22x45	HP31E183M#XS6
	22 000	3.87	7.36	22	0.40	25x45	HP31E223M#YS6
		3.75	7.13	22	0.40	30x35	HP31E223M#ZS4
	33 000	4.90	9.31	17	0.40	30x50	HP31E333M#ZS7
		4.74	9.01	17	0.40	35x40	HP31E333M#AS5
35 VDC Code: 1V Surge Voltage 44 VDC	**3 300**	1.52	2.88	165	0.35	22x25	HP31V332M#XS2
	4 700	1.73	3.28	115	0.35	22x30	HP31V472M#XS3
		1.72	3.26	115	0.35	25x25	HP31V472M#YS2
	6 800	2.21	4.20	80	0.35	22x35	HP31V682M#XS4
		2.21	4.20	80	0.35	25x30	HP31V682M#YS3
		2.21	4.20	80	0.35	30x25	HP31V682M#ZS2
	10 000	2.50	4.74	55	0.35	22x45	HP31V103M#XS6
		2.40	4.55	55	0.35	25x35	HP31V103M#YS4
		2.40	4.55	55	0.35	30x30	HP31V103M#ZS3
	15 000	3.33	6.34	35	0.35	25x50	HP31V153M#YS7
		3.10	5.90	35	0.35	30x35	HP31V153M#ZS4
		3.10	5.90	35	0.35	35x30	HP31V153M#AS3
	18 000	3.48	6.60	35	0.35	30x35	HP31V183M#ZS4
		3.55	6.75	30	0.35	30x40	HP31V183M#ZS5
	20 000	3.34	6.36	28	0.35	30x40	HP31V203M#ZS5
	22 000	4.10	7.80	25	0.35	30x45	HP31V223M#ZS6
		4.14	7.85	25	0.35	35x40	HP31V223M#AS5
	27 000	4.48	8.51	25	0.35	35x35	HP31V273M#AS4
	33 000	4.84	9.20	20	0.40	30x50	HP31V333M#ZS7
		5.14	9.76	20	0.40	35x50	HP31V333M#AS7
50 VDC Code: 1H Surge Voltage 63 VDC	**2 200**	1.24	2.37	108	0.30	22x25	HP31H222M#XS2
	3 300	1.62	3.07	72	0.30	22x30	HP31H332M#XS3
		1.61	3.05	72	0.30	25x25	HP31H332M#YS2
	4 700	1.84	3.49	50	0.30	22x35	HP31H472M#XS4
		1.84	3.49	50	0.30	25x30	HP31H472M#YS3

Additional designs on request · Weitere Designs auf Anfrage

Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 85°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 # = variable value, see fixing code in the product code
50 VDC Code: 1H Surge Voltage 63 VDC	**6 800**	2.54	4.83	35	0.30	22x50	HP31H682M#XS7
		2.43	4.62	35	0.30	25x40	HP31H682M#YS5
		2.34	4.46	35	0.30	30x30	HP31H682M#ZS3
	10 000	2.73	5.18	32	0.35	25x50	HP31H103M#YS7
		2.53	4.81	32	0.35	35x30	HP31H103M#AS3
	15 000	3.53	6.71	25	0.35	30x50	HP31H153M#ZS7
		3.41	6.48	25	0.35	35x40	HP31H153M#AS5
63 VDC Code: 1J Surge Voltage 79 VDC	**1 500**	1.19	2.26	159	0.25	22x25	HP31J152M#XS2
	2 200	1.32	2.51	108	0.25	22x30	HP31J222M#XS3
		1.31	2.49	108	0.25	25x25	HP31J222M#YS2
	3 300	1.72	3.26	80	0.25	22x35	HP31J332M#XS4
		1.72	3.26	80	0.25	25x30	HP31J332M#YS3
		1.72	3.26	80	0.25	30x25	HP31J332M#ZS2
	3 900	1.86	3.53	70	0.25	25x30	HP31J392M#YS3
	4 700	2.02	3.85	60	0.25	22x45	HP31J472M#XS6
		1.95	3.70	60	0.25	25x35	HP31J472M#YS4
		1.95	3.70	60	0.25	30x30	HP31J472M#ZS3
	6 800	2.66	5.06	40	0.25	25x50	HP31J682M#YS7
		2.48	4.71	40	0.25	30x35	HP31J682M#ZS4
	8 200	2.68	5.10	42	0.25	35x30	HP31J822M#AS3
	10 000	2.77	5.27	42	0.35	30x45	HP31J103M#ZS6
		2.78	5.29	35	0.35	35x40	HP31J103M#AS5
	15 000	3.70	7.02	35	0.35	35x50	HP31J153M#AS7
	27 000	5.90	11.20	20	0.35	40x80	HP31J273M#BS13
80 VDC Code: 1K Surge Voltage 100 VDC	**1 000**	0.97	1.84	230	0.20	22x25	HP31K102M#XS2
	1 200	1.06	2.00	155	0.20	22x25	HP31K122M#XS2
	1 500	1.27	2.41	155	0.20	22x30	HP31K152M#XS3
		1.24	2.37	105	0.20	25x25	HP31K152M#YS2
	2 200	1.47	2.81	105	0.20	22x40	HP31K222M#XS5
		1.41	2.67	105	0.20	25x30	HP31K222M#YS3
	3 300	1.98	3.76	70	0.25	22x50	HP31K332M#XS7
		1.89	3.60	70	0.25	25x40	HP31K332M#YS5
		1.82	3.45	70	0.25	30x30	HP31K332M#ZS3
	4 700	2.21	4.20	50	0.25	25x50	HP31K472M#YS7
		2.16	4.09	50	0.25	30x40	HP31K472M#ZS5
		2.06	3.91	50	0.25	35x30	HP31K472M#AS3
	6 800	2.82	5.35	35	0.25	30x50	HP31K682M#ZS7
		2.72	5.16	35	0.25	35x40	HP31K682M#AS5
	8 200	3.32	6.31	30	0.30	30x60	HP31K822M#ZS9
	10 000	3.74	7.11	25	0.30	41x50	HP31K103M#BS7
	12 000	7.70	14.63	25	0.30	35x60	HP31K123M#AS9
100 VDC Code: 2A Surge Voltage 125 VDC	**1 000**	1.03	1.97	180	0.20	22x30	HP32A102M#XS3
		1.02	1.95	180	0.20	25x25	HP32A102M#YS2
	1 500	1.34	2.55	120	0.20	22x35	HP32A152M#XS4
		1.34	2.55	120	0.20	30x25	HP32A152M#ZS2
	2 200	1.62	3.07	82	0.20	22x50	HP32A222M#XS7
		1.55	2.95	82	0.20	25x40	HP32A222M#YS5
		1.49	2.83	82	0.20	30x30	HP32A222M#ZS3

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 85°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 # = variable value, see fixing code in the product code
100 VDC Code: 2A Surge Voltage 125 VDC	**3 300**	2.07	3.93	60	0.20	25x50	HP32A332M#YS7
		2.01	3.83	60	0.20	30x40	HP32A332M#ZS5
		1.93	3.66	60	0.20	35x30	HP32A332M#AS3
	4 700	2.33	4.43	45	0.25	30x50	HP32A472M#ZS7
		2.26	4.29	45	0.25	35x40	HP32A472M#AS5
	5 600	2.45	4.66	40	0.25	35x40	HP32A562M#AS5
		2.57	4.90	40	0.25	35x45	HP32A562M#AS6
	6 800	2.95	5.60	35	0.25	35x50	HP32A682M#AS7
160 VDC Code: 2C Surge Voltage 200 VDC	**390**	1.65	3.14	365	0.15	22x25	HP32C391M#XS2
	470	1.94	3.67	305	0.15	22x30	HP32C471M#XS3
		1.91	3.64	305	0.15	25x25	HP32C471M#YS2
	560	2.23	4.25	255	0.15	22x35	HP32C561M#XS4
		2.22	4.22	255	0.15	25x30	HP32C561M#YS3
	680	2.60	4.93	210	0.15	22x40	HP32C681M#XS5
		2.46	4.69	210	0.15	25x30	HP32C681M#YS3
		2.46	4.69	210	0.15	30x25	HP32C681M#ZS2
	820	2.99	5.69	175	0.15	22x45	HP32C821M#XS6
		2.87	5.46	175	0.15	25x35	HP32C821M#YS4
		2.87	5.46	175	0.15	30x30	HP32C821M#ZS3
	1 000	3.44	6.55	145	0.15	22x50	HP32C102M#XS7
		3.30	6.27	145	0.15	25x40	HP32C102M#YS5
		3.17	6.02	145	0.15	30x30	HP32C102M#ZS3
	1 200	3.78	7.19	120	0.15	25x45	HP32C122M#YS6
		3.67	6.99	120	0.15	30x35	HP32C122M#ZS4
	1 500	4.30	8.17	95	0.15	30x40	HP32C152M#ZS5
		4.36	8.27	95	0.15	35x35	HP32C152M#AS4
	1 800	4.92	9.34	80	0.15	30x45	HP32C182M#ZS6
		4.77	9.08	80	0.15	35x35	HP32C182M#AS4
	3 300	8.11	15.40	45	0.20	41x61	HP32C332M#BS9
180 VDC Code: 2P Surge Voltage 225 VDC	**330**	1.52	2.88	375	0.15	22x25	HP32P331M#XS2
	390	1.76	3.34	320	0.15	22x30	HP32P391M#XS3
		1.74	3.30	320	0.15	25x25	HP32P391M#YS2
	470	1.94	3.67	265	0.15	22x30	HP32P471M#XS3
		1.91	3.64	265	0.15	25x25	HP32P471M#YS2
	560	2.23	4.25	225	0.15	22x35	HP32P561M#XS4
		2.23	4.25	225	0.15	25x30	HP32P561M#YS3
		2.23	4.25	225	0.15	30x25	HP32P561M#ZS2
	680	2.60	4.93	185	0.15	22x40	HP32P681M#XS5
		2.59	4.92	185	0.15	25x35	HP32P681M#YS4
		2.46	4.69	185	0.15	30x25	HP32P681M#ZS2
	820	2.99	5.69	155	0.15	25x40	HP32P821M#YS5
		2.87	5.46	155	0.15	30x30	HP32P821M#ZS3
	1 000	3.45	6.57	125	0.15	25x45	HP32P102M#YS6
		3.17	6.02	125	0.15	35x25	HP32P102M#AS2
	1 200	3.95	7.50	105	0.15	25x50	HP32P122M#YS7
		3.84	7.29	105	0.15	30x40	HP32P122M#ZS5
		4.49	8.53	85	0.15	30x45	HP32P152M#ZS6
		4.36	8.27	85	0.15	35x35	HP32P152M#AS4
	1 800	4.95	9.41	70	0.15	35x40	HP32P182M#AS5
		5.02	9.53	70	0.15	40x36	HP32P182M#BS4

Additional designs on request · Weitere Designs auf Anfrage

Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 85°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 # = variable value, see fixing code in the product code
200 VDC Code: 2D Surge Voltage 250 VDC	**220**	1.50	2.84	485	0.15	22x25	HP32D221M#XS2
	270	1.65	3.14	395	0.15	22x25	HP32D271M#XS2
	330	1.82	3.45	325	0.15	22x25	HP32D331M#XS2
		1.94	3.67	325	0.15	22x30	HP32D331M#XS3
	390	2.09	3.97	275	0.15	25x25	HP32D391M#YS2
	470	2.13	4.06	230	0.15	22x30	HP32D471M#XS3
		2.11	4.02	230	0.15	25x25	HP32D471M#YS2
		2.45	4.66	230	0.15	25x30	HP32D471M#YS3
		2.45	4.66	230	0.15	30x25	HP32D471M#ZS2
	560	2.48	4.71	190	0.15	22x35	HP32D561M#XS4
		2.45	4.66	190	0.15	25x30	HP32D561M#YS3
	680	2.87	5.46	160	0.15	22x40	HP32D681M#XS5
		3.15	5.97	160	0.15	25x35	HP32D681M#YS4
		3.15	5.97	160	0.15	30x30	HP32D681M#ZS3
	820	3.59	6.81	130	0.15	25x40	HP32D821M#YS5
		3.44	6.55	130	0.15	30x30	HP32D821M#ZS3
	1 000	3.81	7.23	110	0.15	25x45	HP32D102M#YS6
		4.00	7.61	110	0.15	30x35	HP32D102M#ZS4
	1 200	4.61	8.76	90	0.15	30x40	HP32D122M#ZS5
		4.04	7.67	90	0.15	35x30	HP32D122M#AS3
	1 500	4.74	9.01	75	0.15	35x35	HP32D152M#AS4
		5.49	10.43	75	0.15	40x36	HP32D152M#BS4
	1 800	5.67	10.77	60	0.15	35x45	HP32D182M#AS6
		6.42	12.21	60	0.15	35x50	HP32D182M#AS7
		6.23	11.83	60	0.15	40x41	HP32D182M#BS5
	2 200	6.68	12.68	50	0.15	35x50	HP32D222M#AS7
	2 700	6.56	12.45	50	0.15	35x50	HP32D272M#AS7
	4 700	9.36	17.78	27	0.15	35x80	HP32D472M#AS13
250 VDC Code: 2E Surge Voltage 300 VDC	**220**	1.50	2.84	485	0.15	22x25	HP32E221M#XS2
	270	1.52	2.88	395	0.15	22x25	HP32E271M#XS2
		1.76	3.34	395	0.15	22x30	HP32E271M#XS3
	330	1.79	3.41	325	0.15	22x30	HP32E331M#XS3
		2.06	3.91	325	0.15	22x35	HP32E331M#XS4
		1.76	3.34	325	0.15	25x25	HP32E331M#YS2
		2.05	3.88	325	0.15	25x30	HP32E331M#YS3
	390	2.24	4.27	275	0.15	22x35	HP32E391M#XS4
		2.24	4.27	275	0.15	25x30	HP32E391M#YS3
	470	2.59	4.92	230	0.15	22x40	HP32E471M#XS5
		2.59	4.92	230	0.15	25x35	HP32E471M#YS4
		2.62	4.97	230	0.15	35x25	HP32E471M#AS2
	560	2.73	5.18	190	0.15	22x45	HP32E561M#XS6
		2.82	5.35	190	0.15	25x35	HP32E561M#YS4
		2.85	5.41	190	0.15	30x30	HP32E561M#ZS3
	680	3.40	6.46	160	0.15	22x50	HP32E681M#XS7
		3.42	6.50	160	0.15	25x45	HP32E681M#YS6
		2.86	5.43	160	0.15	30x30	HP32E681M#ZS3
	820	3.44	6.55	130	0.15	25x45	HP32E821M#YS6
		3.31	6.29	130	0.15	30x35	HP32E821M#ZS4
	1 000	4.21	8.01	110	0.15	30x40	HP32E102M#ZS5
		4.27	8.11	110	0.15	35x35	HP32E102M#AS4

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 85°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 # = variable value, see fixing code in the product code
250 VDC Code: 2E Surge Voltage 300 VDC	**1 200**	4.39	8.34	90	0.15	30x45	HP32E122M#ZS6
		4.84	9.20	90	0.15	35x40	HP32E122M#AS5
	1 500	5.65	10.75	75	0.15	35x45	HP32E152M#AS6
		5.82	11.06	75	0.15	40x41	HP32E152M#BS5
	1 600	5.23	9.93	72	0.15	30x60	HP32E162M#ZS9
	1 800	6.42	12.21	60	0.15	35x50	HP32E182M#AS7
		6.72	12.77	60	0.15	40x51	HP32E182M#BS7
	2 100	6.94	13.19	50	0.15	30x80	HP32E212M#ZS13
	2 200	6.48	12.31	50	0.15	35x60	HP32E222M#AS9
	2 300	7.46	14.17	50	0.15	30x85	HP32E232M#ZS14
	2 700	8.67	16.47	45	0.15	30x100	HP32E272M#ZS17
350 VDC Code: 2V Surge Voltage 400 VDC	**100**	0.84	1.58	1065	0.15	22x25	HP32V101M#XS2
	120	0.92	1.76	885	0.15	22x25	HP32V121M#XS2
		0.97	1.84	885	0.15	25x25	HP32V121M#YS2
	150	1.09	2.07	710	0.15	22x30	HP32V151M#XS3
		1.08	2.05	710	0.15	25x25	HP32V151M#YS2
	180	1.20	2.28	590	0.15	22x30	HP32V181M#XS3
		1.27	2.41	590	0.15	22x35	HP32V181M#XS4
		1.19	2.26	590	0.15	25x25	HP32V181M#YS2
		1.27	2.41	590	0.15	30x25	HP32V181M#ZS2
	220	1.41	2.67	485	0.15	22x35	HP32V221M#XS4
		1.40	2.65	485	0.15	25x30	HP32V221M#YS3
		1.41	2.67	485	0.15	30x25	HP32V221M#ZS2
	270	1.73	3.28	395	0.15	22x45	HP32V271M#XS6
		1.64	3.11	395	0.15	25x35	HP32V271M#YS4
		1.55	2.95	395	0.15	30x25	HP32V271M#ZS2
	330	1.97	3.74	325	0.15	25x40	HP32V331M#YS5
		1.82	3.45	325	0.15	30x30	HP32V331M#ZS3
		1.82	3.45	325	0.15	35x25	HP32V331M#AS2
	390	2.16	4.09	275	0.15	25x45	HP32V391M#YS6
		2.08	3.95	275	0.15	30x35	HP32V391M#ZS4
		2.09	3.97	275	0.15	35x30	HP32V391M#AS3
	470	2.28	4.32	230	0.15	30x35	HP32V471M#ZS4
		2.30	4.37	230	0.15	35x30	HP32V471M#AS3
	560	2.73	5.18	190	0.15	30x45	HP32V561M#ZS6
		2.63	4.99	190	0.15	35x35	HP32V561M#AS4
	680	3.04	5.76	160	0.15	35x40	HP32V681M#AS5
		3.17	6.02	160	0.15	35x45	HP32V681M#AS6
		3.19	6.06	160	0.15	40x41	HP32V681M#BS5
	1 000	4.28	8.13	110	0.15	35x50	HP32V102M#AS7
		4.18	7.94	110	0.15	40x51	HP32V102M#BS7
	1 200	4.86	9.24	90	0.15	35x75	HP32V122M#AS12
		4.88	9.28	90	0.15	40x61	HP32V122M#BS9
	1 500	5.58	10.59	78	0.15	35x80	HP32V152M#AS13
		5.52	10.49	78	0.15	40x71	HP32V152M#BS11
	1 800	6.44	12.24	65	0.15	40x80	HP32V182M#BS13
	2 200	7.95	15.11	50	0.15	40x110	HP32V222M#BS19
400 VDC Code: 2G Surge Voltage 450 VDC	**82**	0.89	1.69	1259	0.20	20x25	HP32G820M#WS2
		0.91	1.74	1259	0.20	22x25	HP32G820M#XS2
	100	0.98	1.86	1065	0.20	20x25	HP32G101M#WS2
		1.01	1.93	1065	0.20	22x25	HP32G101M#XS2
		1.06	2.00	1065	0.20	25x25	HP32G101M#YS2

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Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 85°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 # = variable value, see fixing code in the product code
400 VDC Code: 2G Surge Voltage 450 VDC	**120**	1.14	2.18	885	0.20	20x30	HP32G121M#WS3
		1.10	2.09	885	0.20	22x25	HP32G121M#XS2
		1.17	2.21	885	0.20	25x25	HP32G121M#YS2
	140	1.25	2.39	765	0.20	25x25	HP32G141M#YS2
	150	1.36	2.60	710	0.20	20x35	HP32G151M#WS4
		1.32	2.51	710	0.20	22x30	HP32G151M#XS3
		1.30	2.46	710	0.20	25x25	HP32G151M#YS2
		1.39	2.63	710	0.20	30x25	HP32G151M#ZS2
	180	1.45	2.76	590	0.20	22x30	HP32G181M#XS3
		1.61	3.05	590	0.20	22x40	HP32G181M#XS5
		1.42	2.70	590	0.20	25x25	HP32G181M#YS2
	220	1.69	3.22	485	0.20	22x35	HP32G221M#XS4
		1.94	3.67	485	0.20	22x50	HP32G221M#XS7
		1.67	3.18	485	0.20	25x30	HP32G221M#YS3
		1.86	3.53	485	0.20	25x40	HP32G221M#YS5
		1.67	3.18	485	0.20	30x25	HP32G221M#ZS2
	270	1.97	3.74	395	0.20	22x30	HP32G271M#XS3
		2.07	3.93	395	0.20	22x45	HP32G271M#XS6
		2.07	3.93	395	0.20	25x40	HP32G271M#YS5
		2.16	4.09	395	0.20	25x45	HP32G271M#YS6
		1.86	3.53	395	0.20	30x25	HP32G271M#ZS2
		2.09	3.97	395	0.20	30x35	HP32G271M#ZS4
	330	2.39	4.53	325	0.20	22x50	HP32G331M#XS7
		2.28	4.32	325	0.20	25x40	HP32G331M#YS5
		2.49	4.72	325	0.20	25x50	HP32G331M#YS7
		2.18	4.14	325	0.20	30x30	HP32G331M#ZS3
		2.29	4.35	325	0.20	30x35	HP32G331M#ZS4
		2.18	4.14	325	0.20	35x25	HP32G331M#AS2
	390	2.60	4.93	275	0.20	25x45	HP32G391M#YS6
		2.71	5.14	275	0.20	25x50	HP32G391M#YS7
		2.50	4.74	275	0.20	30x35	HP32G391M#ZS4
		2.75	5.23	275	0.20	30x45	HP32G391M#ZS6
		2.38	4.51	275	0.20	35x25	HP32G391M#AS2
		2.66	5.06	275	0.20	35x35	HP32G391M#AS4
	470	2.97	5.64	230	0.20	25x50	HP32G471M#YS7
		2.87	5.46	230	0.20	30x40	HP32G471M#ZS5
		3.18	6.04	230	0.20	30x50	HP32G471M#ZS7
		2.75	5.23	230	0.20	35x30	HP32G471M#AS3
		3.04	5.76	230	0.20	35x40	HP32G471M#AS5
	560	3.28	6.23	190	0.20	30x45	HP32G561M#ZS6
		3.41	6.48	190	0.20	30x50	HP32G561M#ZS7
		3.16	6.00	190	0.20	35x35	HP32G561M#AS4
		3.44	6.55	190	0.20	35x45	HP32G561M#AS6
		3.48	6.60	190	0.20	40x41	HP32G561M#BS5
	620	3.32	6.31	175	0.20	35x35	HP32G621M#AS4
	680	3.60	6.83	160	0.20	30x45	HP32G681M#ZS6
		3.91	7.43	160	0.20	30x55	HP32G681M#ZS8
		3.64	6.92	160	0.20	35x40	HP32G681M#AS5
		4.24	8.05	160	0.20	35x60	HP32G681M#AS9
		4.05	7.69	160	0.20	40x35	HP32G681M#BS4

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Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 85°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 # = variable value, see fixing code in the product code
400 VDC Code: 2G Surge Voltage 450 VDC	**770**	4.25	8.06	150	0.20	35x50	HP32G771M#AS7
	820	4.17	7.92	130	0.20	35x45	HP32G821M#AS6
		4.64	8.82	130	0.20	35x60	HP32G821M#AS9
		4.53	8.61	130	0.20	40x51	HP32G821M#BS7
	870	4.47	8.48	130	0.20	35x50	HP32G871M#AS7
	1 000	4.79	9.10	110	0.20	35x50	HP32G102M#AS7
		5.13	9.74	110	0.20	35x60	HP32G102M#AS9
		4.57	8.68	110	0.20	40x50	HP32G102M#BS7
	1 100	5.13	9.74	110	0.20	35x60	HP32G112M#AS9
		5.48	10.41	110	0.20	35x81	HP32G112M#AS13
	1 200	4.86	9.24	100	0.20	35x75	HP32G122M#AS12
		4.72	8.97	100	0.20	40x55	HP32G122M#BS8
		4.91	9.35	90	0.20	40x60	HP32G122M#BS9
		5.04	9.57	90	0.20	40x76	HP32G122M#BS12
	1 400	6.23	11.83	80	0.20	35x100	HP32G142M#AS17
		6.82	12.96	80	0.20	40x80	HP32G142M#BS13
	1 500	6.45	12.24	75	0.20	35x100	HP32G152M#AS17
		6.58	12.50	75	0.20	40x81	HP32G152M#BS13
	1 600	6.88	13.07	70	0.20	40x60	HP32G162M#BS9
		6.88	13.07	70	0.20	40x85	HP32G162M#BS14
	1 800	8.00	15.19	62	0.20	40x100	HP32G182M#BS17
	2 100	9.58	18.21	51	0.20	40x101	HP32G212M#BS17
420 VDC Code: 420V Surge Voltage 470 VDC	**68**	0.80	1.53	1620	0.20	20x25	HP3420V680M#WS2
		0.84	1.58	1620	0.20	22x25	HP3420V680M#XS2
	82	0.89	1.69	1340	0.20	20x25	HP3420V820M#WS2
		0.95	1.79	1340	0.20	22x30	HP3420V820M#XS3
	100	1.05	1.99	1100	0.20	20x30	HP3420V101M#WS3
		1.01	1.93	1100	0.20	22x25	HP3420V101M#XS2
		1.08	2.05	1100	0.20	22x30	HP3420V101M#XS3
	120	1.14	2.18	915	0.20	20x30	HP3420V121M#WS3
		1.22	2.32	915	0.20	20x35	HP3420V121M#WS4
		1.11	2.11	915	0.20	22x25	HP3420V121M#XS2
		1.24	2.37	915	0.20	22x35	HP3420V121M#XS4
		1.17	2.21	915	0.20	25x25	HP3420V121M#YS2
	150	1.36	2.60	735	0.20	20x35	HP3420V151M#WS4
		1.32	2.51	735	0.20	22x30	HP3420V151M#XS3
		1.46	2.78	735	0.20	22x40	HP3420V151M#XS5
		1.30	2.46	735	0.20	25x25	HP3420V151M#YS2
		1.45	2.76	735	0.20	25x35	HP3420V151M#YS4
	180	1.53	2.90	610	0.20	22x35	HP3420V181M#XS4
		1.67	3.18	610	0.20	22x45	HP3420V181M#XS6
		1.52	2.88	610	0.20	25x30	HP3420V181M#YS3
		1.67	3.18	610	0.20	25x40	HP3420V181M#YS5
		1.52	2.88	610	0.20	30x25	HP3420V181M#ZS2
		1.61	3.05	610	0.20	35x25	HP3420V181M#AS2
	220	1.78	3.39	500	0.20	22x40	HP3420V221M#XS5
		1.87	3.55	500	0.20	22x45	HP3420V221M#XS6
		1.77	3.37	500	0.20	25x35	HP3420V221M#YS4

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Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 85°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 # = variable value, see fixing code in the product code
420 VDC Code: 420V Surge Voltage 470 VDC	**220**	1.94	3.67	500	0.20	25x45	HP3420V221M#YS6
		1.67	3.18	500	0.20	30x25	HP3420V221M#ZS2
		1.78	3.39	500	0.20	30x30	HP3420V221M#ZS3
	270	2.07	3.93	407	0.20	22x45	HP3420V271M#XS6
		1.95	3.70	407	0.20	25x35	HP3420V271M#YS4
		1.97	3.74	407	0.20	30x30	HP3420V271M#ZS3
		2.00	3.81	407	0.20	35x25	HP3420V271M#AS2
		2.23	4.25	407	0.20	25x50	HP3420V271M#YS7
	330	2.39	4.53	335	0.20	25x45	HP3420V331M#YS6
		2.29	4.35	335	0.20	30x35	HP3420V331M#ZS4
		2.18	4.14	335	0.20	35x25	HP3420V331M#AS2
		2.45	4.66	335	0.20	35x35	HP3420V331M#AS4
	390	2.71	5.14	283	0.20	25x50	HP3420V391M#YS7
		2.50	4.74	283	0.20	30x35	HP3420V391M#ZS4
		2.85	5.41	283	0.20	30x50	HP3420V391M#ZS7
		2.51	4.76	283	0.20	35x30	HP3420V391M#AS3
		2.76	5.25	283	0.20	35x40	HP3420V391M#AS5
	470	2.87	5.46	235	0.20	30x40	HP3420V471M#ZS5
		3.00	5.71	235	0.20	30x45	HP3420V471M#ZS6
		2.50	4.75	240	0.20	35x30	HP3420V471M#AS3
		2.89	5.50	235	0.20	35x35	HP3420V471M#AS4
		3.03	5.75	235	0.20	35x40	HP3420V471M#AS5
		3.17	6.02	235	0.20	35x45	HP3420V471M#AS6
		3.28	6.23	235	0.20	35x50	HP3420V471M#AS7
		3.18	6.04	235	0.20	40x41	HP3420V471M#BS5
	560	3.41	6.48	200	0.20	30x50	HP3420V561M#ZS7
		3.31	6.29	200	0.20	35x40	HP3420V561M#AS5
		3.44	6.55	200	0.20	35x45	HP3420V561M#AS6
		3.60	6.83	200	0.20	35x50	HP3420V561M#AS7
	680	3.75	7.13	170	0.20	30x50	HP3420V681M#ZS7
		3.80	7.22	165	0.20	35x45	HP3420V681M#AS6
		3.95	7.50	165	0.20	35x50	HP3420V681M#AS7
	820	3.84	7.29	135	0.20	30x75	HP3420V821M#ZS12
		4.33	8.24	135	0.20	35x50	HP3420V821M#AS7
	1 000	4.44	8.45	112	0.20	35x75	HP3420V102M#AS12
		4.30	8.17	112	0.20	40x56	HP3420V102M#BS8
		4.48	8.50	112	0.20	40x61	HP3420V102M#BS9
	1 200	4.99	9.49	135	0.20	35x80	HP3420V122M#AS13
		5.49	10.43	100	0.20	35x100	HP3420V122M#AS17
		5.05	9.59	100	0.20	40x76	HP3420V122M#BS12
	1 500	5.96	11.33	75	0.20	40x86	HP3420V152M#BS14
	1 800	6.95	13.21	70	0.20	40x101	HP3420V182M#BS17
450 VDC Code: 2W Surge Voltage 500 VDC	**56**	0.74	1.40	1965	0.20	20x25	HP32W560M#WS2
	68	0.80	1.53	1620	0.20	20x25	HP32W680M#WS2
	82	0.89	1.69	1340	0.20	20x25	HP32W820M#WS2
		0.95	1.79	1340	0.20	20x30	HP32W820M#WS3
		0.91	1.74	1340	0.20	22x25	HP32W820M#XS2
		0.98	1.86	1340	0.20	22x30	HP32W820M#XS3
		0.97	1.84	1340	0.20	25x25	HP32W820M#YS2

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Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 85°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 # = variable value, see fixing code in the product code
450 VDC Code: 2W Surge Voltage 500 VDC	**100**	1.05	1.99	1100	0.20	20x30	HP32W101M#WS3
		1.01	1.93	1100	0.20	22x25	HP32W101M#XS2
		1.06	2.00	1100	0.20	25x25	HP32W101M#YS2
		1.13	2.16	1100	0.20	25x30	HP32W101M#YS3
		1.13	2.16	1100	0.20	30x25	HP32W101M#ZS2
	120	1.22	2.32	915	0.20	20x35	HP32W121M#WS4
		1.11	2.11	915	0.20	22x25	HP32W121M#XS2
		1.31	2.49	915	0.20	22x40	HP32W121M#XS5
		1.17	2.21	915	0.20	25x25	HP32W121M#YS2
		1.24	2.37	915	0.20	30x25	HP32W121M#ZS2
	150	1.32	2.51	735	0.20	22x30	HP32W151M#XS3
		1.39	2.63	735	0.20	22x35	HP32W151M#XS4
		1.53	2.90	735	0.20	22x45	HP32W151M#XS6
		1.39	2.63	735	0.20	25x30	HP32W151M#YS3
		1.47	2.81	735	0.20	25x35	HP32W151M#YS4
		1.39	2.63	735	0.20	30x25	HP32W151M#ZS2
		1.47	2.81	735	0.20	30x30	HP32W151M#ZS3
	180	1.53	2.90	610	0.20	22x35	HP32W181M#XS4
		1.76	3.34	610	0.20	22x50	HP32W181M#XS7
		1.52	2.88	610	0.20	25x30	HP32W181M#YS3
		1.67	3.18	610	0.20	25x40	HP32W181M#YS5
		1.52	2.88	610	0.20	30x25	HP32W181M#ZS2
		1.61	3.05	610	0.20	30x30	HP32W181M#ZS3
		1.61	3.05	610	0.20	35x25	HP32W181M#AS2
	220	1.78	3.39	500	0.20	22x40	HP32W221M#XS5
		1.77	3.37	500	0.20	25x35	HP32W221M#YS4
		1.94	3.67	500	0.20	25x45	HP32W221M#YS6
		1.67	3.18	500	0.20	30x25	HP32W221M#ZS2
		1.89	3.60	500	0.20	30x35	HP32W221M#ZS4
	270	2.07	3.93	407	0.20	22x45	HP32W271M#XS6
		2.06	3.91	407	0.20	25x40	HP32W271M#YS5
		2.16	4.09	407	0.20	25x45	HP32W271M#YS6
		1.97	3.74	407	0.20	30x30	HP32W271M#ZS3
		2.19	4.16	407	0.20	30x40	HP32W271M#ZS5
		1.97	3.74	407	0.20	35x25	HP32W271M#AS2
		2.22	4.22	407	0.20	35x35	HP32W271M#AS4
	330	2.27	4.30	340	0.20	25x40	HP32W331M#YS5
		2.49	4.72	335	0.20	25x50	HP32W331M#YS7
		2.29	4.35	335	0.20	30x35	HP32W331M#ZS4
		2.52	4.79	335	0.20	30x45	HP32W331M#ZS6
		2.18	4.14	335	0.20	35x25	HP32W331M#AS2
		2.45	4.66	335	0.20	35x35	HP32W331M#AS4
	390	2.71	5.14	283	0.20	25x50	HP32W391M#YS7
		2.50	4.74	283	0.20	30x35	HP32W391M#ZS4
		2.73	5.18	283	0.20	30x45	HP32W391M#ZS6
		2.51	4.76	283	0.20	35x30	HP32W391M#AS3
		2.64	5.02	283	0.20	35x35	HP32W391M#AS4
		2.76	5.25	283	0.20	35x40	HP32W391M#AS5

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Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 85°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 # = variable value, see fixing code in the product code
450 VDC Code: 2W Surge Voltage 500 VDC	**470**	2.87	5.46	235	0.20	30x40	HP32W471M#ZS5
		3.00	5.71	235	0.20	30x45	HP32W471M#ZS6
		3.12	5.94	235	0.20	30x50	HP32W471M#ZS7
		2.89	5.50	235	0.20	35x35	HP32W471M#AS4
		3.03	5.75	235	0.20	35x40	HP32W471M#AS5
		3.17	6.02	235	0.20	35x45	HP32W471M#AS6
		3.18	6.04	235	0.20	40x41	HP32W471M#BS5
	560	3.41	6.48	200	0.20	30x50	HP32W561M#ZS7
		3.31	6.29	200	0.20	35x40	HP32W561M#AS5
		3.44	6.55	200	0.20	35x45	HP32W561M#AS6
		3.41	6.48	200	0.20	35x50	HP32W561M#ZS7
		3.75	7.13	200	0.20	40x51	HP32W561M#BS7
		4.74	9.01	110	0.20	40x51	HP32W561M#BS7CCR
	630	4.04	7.67	170	0.20	30x60	HP32W631M#ZS9
		3.45	6.57	170	0.20	35x50	HP32W631M#AS7
		3.36	6.38	170	0.20	40x41	HP32W631M#BS5
	680	4.19	7.96	165	0.20	30x75	HP32W681M#ZS12
		3.80	7.22	165	0.20	35x45	HP32W681M#AS6
		3.94	7.48	165	0.20	35x50	HP32W681M#AS7
		4.24	8.05	165	0.20	35x60	HP32W681M#AS9
		4.13	7.84	165	0.20	40x51	HP32W681M#BS7
	820	4.33	8.24	135	0.20	35x50	HP32W821M#AS7
		4.64	8.82	135	0.20	35x60	HP32W821M#AS9
		4.95	9.41	135	0.20	35x80	HP32W821M#AS13
		4.85	9.22	135	0.20	40x61	HP32W821M#BS9
	1 000	5.13	9.75	120	0.20	35x60	HP32W102M#AS9
		5.05	9.59	115	0.20	35x70	HP32W102M#AS11
		5.50	10.45	115	0.20	35x70	HP32W102M#AS112P
		5.47	10.38	115	0.20	35x80	HP32W102M#AS13
		6.45	12.24	115	0.20	35x80	HP32W102M#AS132P
		5.37	10.20	110	0.20	40x60	HP32W102M#BS9
	1 100	5.18	9.85	100	0.20	40x75	HP32W112M#BS12
	1 200	5.23	9.93	100	0.20	35x70	HP32W122M#AS11
		5.70	10.82	97	0.20	40x76	HP32W122M#BS12
		5.78	10.98	97	0.20	40x80	HP32W122M#BS13
		6.06	11.52	97	0.20	40x85	HP32W122M#BS14
	1 400	5.59	10.62	86	0.20	40x80	HP32W142M#BS13
	1 500	5.81	11.03	80	0.20	40x80	HP32W152M#BS13
		6.34	12.03	75	0.20	40x100	HP32W152M#BS17
	1 600	6.55	12.44	70	0.20	40x100	HP32W162M#BS17
	2 200	8.34	15.84	53	0.20	46x100	HP32W222M#HS17
500 VDC Code: 2H Surge Voltage 550 VDC	**56**	0.68	1.30	2135	0.20	22x30	HP32H560M#XS3
		0.65	1.23	2135	0.20	25x25	HP32H560M#YS2
	68	0.79	1.51	1758	0.20	22x35	HP32H680M#XS4
	82	0.92	1.76	1458	0.20	22x40	HP32H820M#XS5
		0.85	1.61	1458	0.20	25x30	HP32H820M#YS3

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Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 85°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 # = variable value, see fixing code in the product code
500 VDC Code: 2H Surge Voltage 550 VDC	**100**	1.07	2.02	960	0.20	22x45	HP32H101M#XS6
		0.98	1.86	960	0.20	25x35	HP32H101M#YS4
		0.95	1.79	960	0.20	30x25	HP32H101M#ZS2
	120	1.22	2.32	800	0.20	22x50	HP32H121M#XS7
		1.13	2.16	800	0.20	25x40	HP32H121M#YS5
		1.10	2.09	800	0.20	30x30	HP32H121M#ZS3
		1.10	2.09	800	0.20	35x25	HP32H121M#AS2
	150	1.32	2.51	640	0.20	25x45	HP32H151M#YS6
		1.30	2.46	640	0.20	30x35	HP32H151M#ZS4
		1.43	2.72	640	0.20	35x30	HP32H151M#AS3
	180	1.52	2.88	535	0.20	25x50	HP32H181M#YS7
		1.50	2.84	535	0.20	30x40	HP32H181M#ZS5
		1.43	2.72	535	0.20	35x30	HP32H181M#AS3
	220	1.73	3.28	434	0.20	30x45	HP32H221M#ZS6
		1.66	3.16	434	0.20	35x35	HP32H221M#AS4
	270	1.99	3.78	360	0.20	30x50	HP32H271M#ZS7
		1.93	3.66	360	0.20	35x40	HP32H271M#AS5
	330	2.12	4.04	365	0.20	35x40	HP32H331M#AS5
		2.21	4.20	290	0.20	35x45	HP32H331M#AS6
	390	2.40	4.55	308	0.20	35x45	HP32H391M#AS6
		2.50	4.74	245	0.20	35x50	HP32H391M#AS7
	470	2.51	4.76	240	0.20	35x50	HP32H471M#AS7
		2.94	5.58	210	0.20	35x60	HP32H471M#AS9
		3.14	5.96	210	0.20	35x80	HP32H471M#AS13
		3.10	5.90	210	0.20	40x50	HP32H471M#BS7
	560	3.65	6.94	170	0.20	40x76	HP32H561M#BS12
	680	4.53	8.61	140	0.20	40x100	HP32H681M#BS17
	820	3.72	7.06	140	0.20	40x70	HP32H821M#BS11
		4.69	8.90	140	0.20	40x100	HP32H821M#BS17
	1 000	4.50	8.55	115	0.20	40x80	HP32H102M#BS13
		4.94	9.39	115	0.20	40x80	HP32H102M#BS13CC
		5.18	9.85	100	0.20	40x100	HP32H102M#BS17
	1 200	5.91	11.22	90	0.20	40x110	HP32H122M#BS19
	1 500	6.89	13.08	77	0.20	46x100	HP32H152M#HS17
	1 600	7.26	13.79	65	0.15	50x90	HP32H162M#CS15

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› Ripple Current Multiplier · Wechselstrommultiplikator

Frequency [Hz]		50/60	120	300	1k	≥ 10k
Multiplier	16V – 100V	0.70	1.00	1.10	1.20	1.20
	160V – 500V	0.70	1.00	1.18	1.34	1.45

Forced cooling [m/sec]	v < 1.0	v ≥ 1.0
Multiplier	1.0	1.1

Temperature [°C]	40	45	50	55	60	65	70	75	80	85
Multiplier	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.0

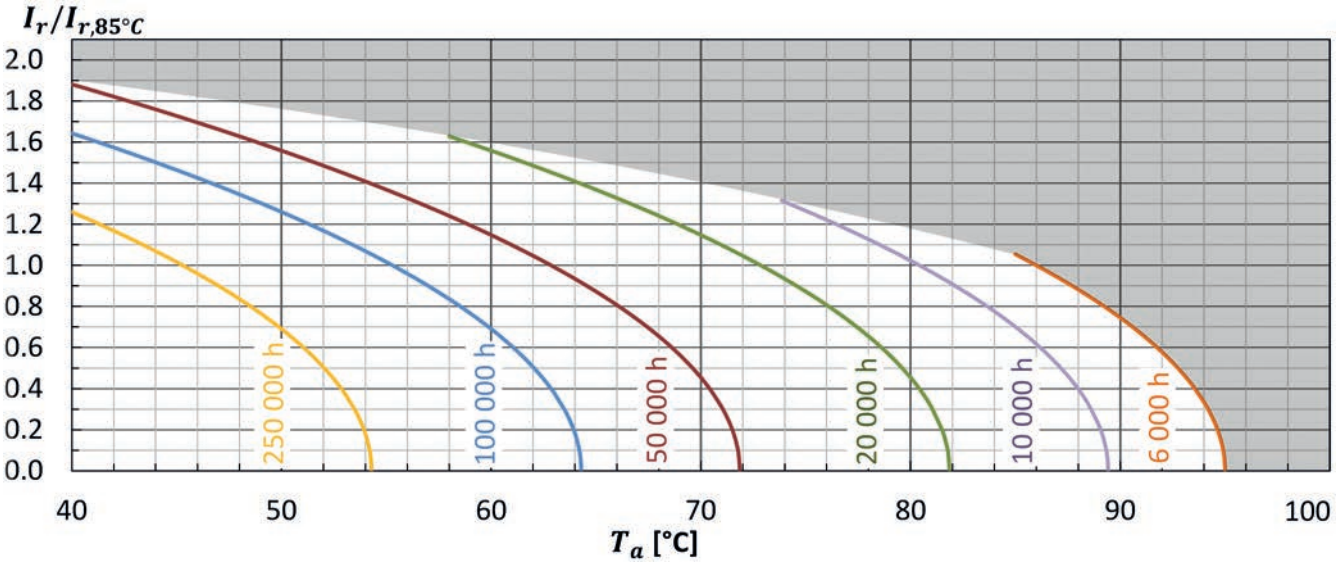
› Life Time Table · Brauchbarkeitsdauer – Tabelle

HP3	Useful life as function of ambient temperature and ripple current									
I_r at 85°C	x 1.0	x 1.1	x 1.2	x 1.3	x 1.4	x 1.5	x 1.6	x 1.7	x 1.8	x 1.9
T_a = 40°C	250	250	250	229	184	144	112	85	64	47
T_a = 45°C	250	216	178	145	116	91	70	54	40	
T_a = 50°C	162	136	113	91	73	57	44	34		
T_a = 55°C	102	86	71	58	46	36	28			
T_a = 60°C	64	54	45	36	29	23				
T_a = 65°C	41	34	28	23	18					
T_a = 70°C	25	21	18	14						
T_a = 75°C	16	13	11							
T_a = 80°C	10	8								
T_a = 85°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 $I_{r,\ 85°C,120Hz}$

Brauchbarkeitsdauer in Abhängigkeit von Umgebungstemperatur T_a und Wechselstrombelastung I_r im Verhältnis zur max. Wechselstrombelastung bei oberer Kategorietemperatur $I_{r,\ 85°C,120Hz}$



› Life Time Tests and Requirements · Anforderungen Brauchbarkeitsdauer

Life time test	Test procedure	Life time criteria
Endurance test	T_a = 85°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 16~350VDC	T_a = 85°C; V_r, I_r applied 6000 hours	ΔC/C ≤ 20% (of initial value) Tanδ < 200% (of specified value) I_L ≤ specified value
Useful life 400~500VDC	T_a = 85°C; V_r, I_r applied 6000 hours	ΔC/C ≤ 30% (of initial value) Tanδ < 300% (of specified value) I_L ≤ specified value

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

HU3 · Snap-In · 6000 h/105 °C

Standard Performances · Higher Ripple

› 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)	0.02 • 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
Specifications	JIS C 5101-4, AEC-Q200 qualified
Vibration	0.75mm, 10...55Hz, 10g, 3x2h
Sleeve withstanding voltage	3000 Vac/1 min between terminals bundled and plate*

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

› Outline Drawings · Bauformen

Refer to page 5 for available terminal shapes and dimensions. · Auf Seite 5 finden Sie die verfügbaren Bauformen und Maße.

› Product Code · Bestellbezeichnung

Example: Series HU3 · 400 V · 390 µF ±20 % · 30x50 mm · 2-Pin terminal · without plate

HU3 **2G** **391** **M** **R** **Z** **S7** **WPEC**

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
- C: 2-pin short terminal
- X: 4-pin short terminal
- E: 3-pin short terminal

Diameter code

Code	ØD
W	20
X	22
Y	25
Z	30
A	35
B	40
C	50

Outer design code

None:
PET sleeve and PVC plate

WPEC:
PET sleeve without plate

Others on request

Rated voltage code

Code	Voltage	Code	Voltage	Code	Voltage
1C	16	2A	100	2G	400
1E	25	2C	160	420V	420
1V	35	2P	180	2W	450
1H	50	2D	200	2H	500
1J	63	2E	250		
1K	80	2V	350		

Capacitance tolerance

- M : ± 20%
- Q : -10% ~ +30%

Length code

Code	L	Code	L	Code	L
S1	20	S8	55	S15	90
S2	25	S9	60	S16	95
S3	30	S10	65	S17	100
S4	35	S11	70	S18	105
S5	40	S12	75	S19	110
S6	45	S13	80		
S7	50	S14	85		

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 # = variable value, see fixing code in the product code
16 VDC Code: 1C Surge Voltage 20 VDC	**4 700**	1.63	4.40	95	0.50	22x25	HU31C472M#XS2
	6 800	2.22	6.00	65	0.50	22x35	HU31C682M#XS4
		2.98	8.05	45	0.50	22x45	HU31C103M#XS6
		2.12	5.73	65	0.50	25x30	HU31C682M#YS3
		2.66	7.19	45	0.50	30x25	HU31C103M#ZS2
	15 000	3.69	9.95	30	0.50	25x45	HU31C153M#YS6
		3.62	9.77	30	0.50	30x35	HU31C153M#ZS4
		3.62	9.77	30	0.50	35x30	HU31C153M#AS3
	22 000	4.82	13.01	20	0.50	30x45	HU31C223M#ZS6
		4.63	12.50	20	0.50	35x35	HU31C223M#AS4
	33 000	6.38	17.23	15	0.50	35x50	HU31C333M#AS7
	47 000	3.52	9.50	15	0.50	35x50	HU31C473M#AS7
25 VDC Code: 1E Surge Voltage 32 VDC	**3 300**	1.53	4.13	130	0.40	22x25	HU31E332M#XS2
	4 700	1.94	5.23	90	0.40	22x30	HU31E472M#XS3
		1.85	4.99	90	0.40	25x25	HU31E472M#YS2
	6 800	2.49	6.71	65	0.40	22x35	HU31E682M#XS4
		2.45	6.62	65	0.40	25x30	HU31E682M#YS3
		2.45	6.62	65	0.40	30x25	HU31E682M#ZS2
	10 000	3.33	9.00	45	0.40	22x45	HU31E103M#XS6
		3.15	8.49	45	0.40	25x35	HU31E103M#YS4
		3.15	8.49	45	0.40	30x30	HU31E103M#ZS3
		3.15	8.49	45	0.40	35x25	HU31E103M#AS2
	15 000	4.13	11.14	30	0.40	25x45	HU31E153M#YS6
		4.05	10.93	30	0.40	30x35	HU31E153M#ZS4
		4.05	10.93	30	0.40	35x30	HU31E153M#AS3
	22 000	5.38	14.52	20	0.40	30x45	HU31E223M#ZS6
		5.38	14.52	20	0.40	35x40	HU31E223M#AS5
	33 000	7.13	19.25	15	0.40	35x50	HU31E333M#AS7
35 VDC Code: 1V Surge Voltage 44 VDC	**2 200**	1.33	3.59	160	0.35	22x25	HU31V222M#XS2
	3 300	1.74	4.69	105	0.35	22x30	HU31V332M#XS3
		1.66	4.48	105	0.35	25x25	HU31V332M#YS2
	4 700	2.21	5.97	75	0.35	22x35	HU31V472M#XS4
		2.18	5.88	75	0.35	25x25	HU31V472M#YS2
		2.18	5.88	75	0.35	30x25	HU31V472M#ZS2
	5 600	2.30	6.21	65	0.35	25x30	HU31V562M#YS3
	6 800	3.05	8.23	55	0.35	22x50	HU31V682M#XS7
		2.76	7.45	55	0.35	25x40	HU31V682M#YS5
		2.76	7.45	55	0.35	30x30	HU31V682M#ZS3
	8 200	3.03	8.17	45	0.35	25x40	HU31V822M#YS5
		3.03	8.17	45	0.35	35x25	HU31V822M#AS2
	10 000	3.76	10.16	35	0.35	25x50	HU31V103M#YS7
		3.53	9.53	35	0.35	30x35	HU31V103M#ZS4
		3.53	9.53	35	0.35	35x30	HU31V103M#AS3
	15 000	4.93	13.31	25	0.35	30x50	HU31V153M#ZS7
		4.76	12.86	25	0.35	35x40	HU31V153M#AS5
	22 000	6.25	16.87	20	0.35	35x50	HU31V223M#AS7

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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 # = variable value, see fixing code in the product code
50 VDC Code: 1H Surge Voltage 63 VDC	**1 500**	1.19	3.21	215	0.30	22x25	HU31H152M#XS2
	2 200	1.53	4.13	145	0.30	22x30	HU31H222M#XS3
		1.46	3.95	145	0.30	25x25	HU31H222M#YS2
	3 300	2.00	5.41	100	0.30	22x35	HU31H332M#XS4
		1.96	5.29	100	0.30	25x30	HU31H332M#YS3
		1.97	5.32	100	0.30	30x25	HU31H332M#ZS2
	4 700	2.64	7.13	70	0.30	22x45	HU31H472M#XS6
		2.46	6.65	70	0.30	25x35	HU31H472M#YS4
		2.49	6.71	70	0.30	30x30	HU31H472M#ZS3
	6 800	3.34	9.03	50	0.30	25x50	HU31H682M#YS7
		3.15	8.49	50	0.30	30x35	HU31H682M#ZS4
		3.15	8.49	50	0.30	35x30	HU31H682M#AS3
	10 000	4.20	11.35	35	0.35	30x45	HU31H103M#ZS6
		4.20	11.35	35	0.35	35x40	HU31H103M#AS5
	15 000	5.58	15.06	25	0.35	35x50	HU31H153M#AS7
63 VDC Code: 1J Surge Voltage 79 VDC	**1 000**	1.07	2.88	265	0.25	22x25	HU31J102M#XS2
	1 500	1.39	3.74	180	0.25	22x30	HU31J152M#XS3
		1.32	3.56	180	0.25	25x25	HU31J152M#YS2
	2 200	1.79	4.84	120	0.25	22x35	HU31J222M#XS4
		1.74	4.69	120	0.25	25x30	HU31J222M#YS2
		1.76	4.75	120	0.25	30x25	HU31J222M#ZS2
	3 300	2.42	6.53	80	0.25	25x40	HU31J332M#YS5
		2.28	6.15	80	0.25	30x30	HU31J332M#ZS3
		2.41	6.50	80	0.25	30x35	HU31J332M#ZS4
	4 700	3.05	8.23	60	0.25	25x50	HU31J472M#YS7
		2.86	7.72	60	0.25	30x35	HU31J472M#ZS4
	5 600	3.28	8.85	50	0.25	35x35	HU31J562M#AS4
	6 800	3.78	10.22	40	0.25	30x45	HU31J682M#ZS6
		3.78	10.22	40	0.25	35x40	HU31J682M#AS5
	8 200	4.35	11.73	35	0.25	35x45	HU31J822M#AS6
	10 000	4.98	13.45	30	0.35	35x50	HU31J103M#AS7
80 VDC Code: 1K Surge Voltage 100 VDC	**1 000**	1.27	3.42	230	0.20	22x30	HU31K102M#XS3
		1.21	3.27	230	0.20	25x25	HU31K102M#YS2
	1 500	1.65	4.46	155	0.20	22x35	HU31K152M#XS4
		1.63	4.40	155	0.20	25x30	HU31K152M#YS3
		1.63	4.40	155	0.20	30x25	HU31K152M#ZS2
	2 200	2.11	5.70	105	0.20	25x40	HU31K222M#YS5
		2.08	5.61	105	0.20	30x30	HU31K222M#ZS3
		2.08	5.61	105	0.20	35x25	HU31K222M#AS2
	3 300	2.85	7.69	70	0.20	25x50	HU31K332M#YS7
		2.74	7.40	70	0.20	30x40	HU31K332M#ZS5
		2.68	7.25	70	0.20	35x30	HU31K332M#AS3
	4 700	3.65	9.86	50	0.25	30x50	HU31K472M#ZS7
		3.53	9.53	50	0.25	35x40	HU31K472M#AS5
	6 800	4.60	12.41	35	0.25	35x50	HU31K682M#AS7

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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 # = variable value, see fixing code in the product code
100 VDC Code: 2A Surge Voltage 125 VDC	**560**	0.89	2.41	325	0.20	22x25	HU32A561M#XS2
	1 000	1.27	3.42	180	0.20	22x30	HU32A102M#XS3
		1.21	3.27	180	0.20	25x25	HU32A102M#YS2
	1 500	1.73	4.66	130	0.20	22x40	HU32A152M#XS5
		1.73	4.66	130	0.20	25x35	HU32A152M#YS4
		1.63	4.40	130	0.20	30x25	HU32A152M#ZS2
		1.89	5.11	130	0.20	30x40	HU32A152M#ZS5
	2 200	2.23	6.03	90	0.20	25x45	HU32A222M#YS6
		1.87	5.05	90	0.20	30x30	HU32A222M#ZS3
	3 300	2.95	7.96	60	0.20	30x45	HU32A332M#ZS6
		2.83	7.63	60	0.20	35x35	HU32A332M#AS4
	4 700	3.70	9.98	45	0.25	35x45	HU32A472M#AS6
160 VDC Code: 2C Surge Voltage 200 VDC	**330**	1.08	2.91	430	0.15	22x25	HU32C331M#XS2
	390	1.21	3.27	365	0.15	22x30	HU32C391M#XS3
		1.20	3.24	365	0.15	25x25	HU32C391M#YS2
	470	1.33	3.59	305	0.15	22x30	HU32C471M#XS3
		1.31	3.53	305	0.15	25x25	HU32C471M#YS2
	560	1.54	4.16	255	0.15	22x35	HU32C561M#XS4
		1.54	4.16	255	0.15	25x30	HU32C561M#YS3
		1.54	4.16	255	0.15	30x25	HU32C561M#ZS2
	680	1.78	4.81	210	0.15	22x40	HU32C681M#XS5
		1.69	4.57	210	0.15	30x25	HU32C681M#ZS2
	820	2.05	5.52	175	0.15	22x45	HU32C821M#XS6
		1.97	5.32	175	0.15	30x30	HU32C821M#ZS3
	1 000	2.37	6.39	145	0.15	25x45	HU32C102M#YS6
		2.30	6.21	145	0.15	30x35	HU32C102M#ZS4
		2.18	5.88	145	0.15	35x25	HU32C102M#AS2
	1 200	2.71	7.31	120	0.15	25x50	HU32C122M#YS7
		2.52	6.80	120	0.15	30x35	HU32C122M#ZS4
		2.52	6.80	120	0.15	35x30	HU32C122M#AS3
	1 500	3.08	8.32	95	0.15	30x45	HU32C152M#ZS6
		2.99	8.08	95	0.15	35x35	HU32C152M#AS4
	1 800	3.40	9.18	80	0.15	35x40	HU32C182M#AS5
		3.44	9.30	80	0.15	40x36	HU32C182M#BS4
180 VDC Code: 2P Surge Voltage 225 VDC	**270**	0.95	2.55	460	0.15	22x25	HU32P271M#XS2
	330	1.03	2.79	375	0.15	22x25	HU32P331M#XS2
		1.11	3.00	375	0.15	22x30	HU32P331M#XS3
		1.10	2.97	375	0.15	25x25	HU32P331M#YS2
	390	1.21	3.27	320	0.15	22x30	HU32P391M#XS3
		1.20	3.24	320	0.15	25x25	HU32P391M#YS2
	470	1.32	3.56	265	0.15	22x30	HU32P471M#XS3
		1.31	3.53	265	0.15	25x25	HU32P471M#YS2
		1.41	3.80	265	0.15	25x30	HU32P471M#YS3

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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 # = variable value, see fixing code in the product code
180 VDC Code: 2P Surge Voltage 225 VDC	**560**	1.53	4.13	225	0.15	22x35	HU32P561M#XS4
		1.54	4.16	225	0.15	25x30	HU32P561M#YS3
		1.54	4.16	225	0.15	30x25	HU32P561M#ZS2
	680	1.77	4.78	185	0.15	22x40	HU32P681M#XS5
		1.79	4.84	185	0.15	25x35	HU32P681M#YS4
		1.69	4.57	185	0.15	30x25	HU32P681M#ZS2
	820	2.04	5.49	155	0.15	22x45	HU32P821M#XS6
		2.06	5.55	155	0.15	25x40	HU32P821M#YS5
		1.97	5.32	155	0.15	30x30	HU32P821M#ZS3
	1 000	2.37	6.39	125	0.15	25x45	HU32P102M#YS6
		2.30	6.21	125	0.15	30x35	HU32P102M#ZS4
		2.30	6.21	125	0.15	35x30	HU32P102M#AS3
	1 200	2.63	7.10	105	0.15	30x40	HU32P122M#ZS5
		2.52	6.80	105	0.15	35x30	HU32P122M#AS3
	1 500	3.07	8.29	85	0.15	30x45	HU32P152M#ZS6
		3.20	8.64	85	0.15	30x50	HU32P152M#ZS7
		2.99	8.08	85	0.15	35x35	HU32P152M#AS4
	1 800	3.40	9.18	70	0.15	35x40	HU32P182M#AS5
		3.44	9.30	70	0.15	40x36	HU32P182M#BS4
200 VDC Code: 2D Surge Voltage 250 VDC	**220**	1.01	2.73	485	0.15	22x25	HU32D221M#XS2
	270	1.13	3.06	395	0.15	22x25	HU32D271M#XS2
	330	1.14	3.09	325	0.15	22x25	HU32D331M#XS2
		1.33	3.59	325	0.15	22x30	HU32D331M#XS3
		1.32	3.56	325	0.15	25x25	HU32D331M#YS2
	390	1.32	3.56	275	0.15	22x30	HU32D391M#XS3
		1.53	4.13	275	0.15	22x35	HU32D391M#XS4
		1.44	3.89	275	0.15	25x25	HU32D391M#YS2
	470	1.54	4.16	230	0.15	22x35	HU32D471M#XS4
		1.95	5.26	230	0.15	22x50	HU32D471M#XS7
		1.44	3.89	230	0.15	25x25	HU32D471M#YS2
		1.69	4.57	230	0.15	30x25	HU32D471M#ZS2
	560	1.77	4.78	190	0.15	22x40	HU32D561M#XS5
		1.67	4.51	190	0.15	25x30	HU32D561M#YS3
		1.67	4.51	190	0.15	30x25	HU32D561M#ZS2
	680	1.95	5.26	160	0.15	22x40	HU32D681M#XS5
		1.96	5.29	160	0.15	25x35	HU32D681M#YS4
		1.86	5.02	160	0.15	30x25	HU32D681M#ZS2
	820	2.26	6.09	130	0.15	25x40	HU32D821M#YS5
		2.17	5.85	130	0.15	30x30	HU32D821M#ZS3
		2.16	5.82	130	0.15	35x25	HU32D821M#AS2
	1 000	2.61	7.04	110	0.15	25x45	HU32D102M#YS6
		2.52	6.80	110	0.15	30x35	HU32D102M#ZS4
		2.76	7.45	110	0.15	35x30	HU32D102M#AS3
	1 200	2.89	7.81	90	0.15	30x40	HU32D122M#ZS5
		2.76	7.45	90	0.15	35x30	HU32D122M#AS3

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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 # = variable value, see fixing code in the product code
200 VDC Code: 2D Surge Voltage 250 VDC	**1 500**	3.40	9.18	75	0.15	35x40	HU32D152M#AS5
		3.72	10.04	75	0.15	35x45	HU32D152M#AS6
		3.77	10.19	75	0.15	40x36	HU32D152M#BS4
	1 800	3.88	10.48	60	0.15	35x45	HU32D182M#AS6
		4.41	11.91	60	0.15	35x50	HU32D182M#AS7
		4.28	11.55	60	0.15	40x41	HU32D182M#BS5
	2 200	4.07	10.99	50	0.15	35x50	HU32D222M#AS7
250 VDC Code: 2E Surge Voltage 300 VDC	**220**	1.01	2.73	445	0.15	22x25	HU32E221M#XS2
		1.10	2.97	445	0.15	22x30	HU32E221M#XS2
		1.08	2.91	445	0.15	25x25	HU32E221M#YS2
	270	1.28	3.45	360	0.15	22x35	HU32E271M#XS4
		1.19	3.21	360	0.15	25x25	HU32E271M#YS2
	330	1.41	3.80	295	0.15	22x35	HU32E331M#XS4
		1.31	3.53	295	0.15	25x25	HU32E331M#YS2
		1.41	3.80	295	0.15	30x25	HU32E331M#ZS2
	390	1.63	4.40	250	0.15	22x40	HU32E391M#XS5
		1.61	4.34	250	0.15	25x35	HU32E391M#YS4
		1.53	4.13	250	0.15	30x25	HU32E391M#ZS2
	470	1.94	5.23	210	0.15	22x50	HU32E471M#XS7
		1.86	5.02	210	0.15	25x40	HU32E471M#YS5
		1.79	4.84	210	0.15	30x30	HU32E471M#ZS3
		1.78	4.81	210	0.15	35x25	HU32E471M#AS2
	560	2.12	5.73	175	0.15	25x45	HU32E561M#YS6
		2.06	5.55	175	0.15	30x35	HU32E561M#ZS4
		1.96	5.29	175	0.15	35x25	HU32E561M#AS2
	680	2.44	6.59	145	0.15	25x50	HU32E681M#YS7
		2.27	6.12	145	0.15	30x35	HU32E681M#ZS4
		2.27	6.12	145	0.15	35x30	HU32E681M#AS3
	820	2.73	7.37	120	0.15	30x45	HU32E821M#ZS6
		2.65	7.16	120	0.15	35x35	HU32E821M#AS4
	1 000	3.04	8.20	100	0.15	35x40	HU32E102M#AS5
		3.08	8.32	100	0.15	40x36	HU32E102M#BS4
	1 200	3.45	9.33	85	0.15	35x45	HU32E122M#AS6
		3.49	9.41	85	0.15	40x41	HU32E122M#BS5
	1 500	3.86	10.42	65	0.15	35x45	HU32E152M#AS6
		4.03	10.87	65	0.15	35x50	HU32E152M#AS7
	1 800	4.62	12.47	55	0.15	40x51	HU32E182M#BS7
	2 200	4.91	13.25	45	0.15	40x60	HU32E222M#BS9
300 VDC Code: 300V Surge Voltage 350 VDC	**680**	2.43	6.56	180	0.15	30x50	HU3300V681M#ZS7
	750	2.55	6.89	165	0.15	30x50	HU3300V751M#ZS7
	1 000	2.74	7.40	165	0.15	35x50	HU3300V102M#AS7
	2 000	4.68	12.62	55	0.15	40x85	HU3300V202M#BS14
	2 200	5.23	14.11	40	0.15	40x100	HU3300V222M#BS17
		6.19	16.72	40	0.15	40x110	HU3300V222M#BS19

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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 # = variable value, see fixing code in the product code
350 VDC Code: 2V Surge Voltage 400 VDC	**82**	0.52	1.40	1126	0.15	22x25	HU32V820M#XS2
	100	0.62	1.66	924	0.15	22x30	HU32V101M#XS3
		0.61	1.63	924	0.15	25x25	HU32V101M#YS2
	120	0.63	1.69	770	0.15	22x25	HU32V121M#XS2
		0.67	1.81	770	0.15	22x30	HU32V121M#XS3
		0.66	1.78	770	0.15	25x25	HU32V121M#YS2
	150	0.75	2.02	615	0.15	22x30	HU32V151M#XS3
		0.79	2.14	615	0.15	22x35	HU32V151M#XS4
		0.74	1.99	615	0.15	25x25	HU32V151M#YS2
	180	0.87	2.35	520	0.15	22x35	HU32V181M#XS4
		0.87	2.35	520	0.15	25x30	HU32V181M#YS3
		0.87	2.35	520	0.15	30x25	HU32V181M#ZS2
	220	1.06	2.85	450	0.15	22x45	HU32V221M#XS6
		1.01	2.73	450	0.15	25x35	HU32V221M#YS4
		0.96	2.58	450	0.15	30x25	HU32V221M#ZS2
	270	1.18	3.18	366	0.15	25x40	HU32V271M#YS5
		1.13	3.06	366	0.15	30x30	HU32V271M#ZS3
		1.12	3.03	366	0.15	35x25	HU32V271M#AS2
	330	1.36	3.68	299	0.15	25x45	HU32V331M#YS6
		1.32	3.56	299	0.15	30x35	HU32V331M#ZS4
		1.24	3.36	299	0.15	35x25	HU32V331M#AS2
	390	1.50	4.04	253	0.15	30x40	HU32V391M#ZS5
		1.43	3.86	253	0.15	35x30	HU32V391M#AS3
	470	1.65	4.46	210	0.15	35x35	HU32V471M#AS4
		1.76	4.75	210	0.15	40x36	HU32V471M#BS4
	560	1.96	5.29	181	0.15	30x50	HU32V561M#ZS7
		1.89	5.11	181	0.15	35x40	HU32V561M#AS5
		1.98	5.35	181	0.15	40x41	HU32V561M#BS5
	1 000	2.85	7.69	90	0.15	35x51	HU32V102M#AS7
400 VDC Code: 2G Surge Voltage 450 VDC	**68**	0.57	1.54	1300	0.15	22x25	HU32G680M#XS2
	82	0.66	1.78	1080	0.15	22x30	HU32G820M#XS3
		0.66	1.78	1080	0.15	25x25	HU32G820M#YS2
	100	0.63	1.69	890	0.15	22x25	HU32G101M#XS2
		0.74	1.99	890	0.15	22x30	HU32G101M#XS3
		0.73	1.96	890	0.15	25x25	HU32G101M#YS2
	120	0.86	2.32	740	0.15	22x35	HU32G121M#XS4
		0.85	2.29	740	0.15	25x30	HU32G121M#YS3
		0.86	2.32	740	0.15	30x25	HU32G121M#ZS2
	150	0.87	2.35	590	0.15	22x35	HU32G151M#XS4
		0.87	2.35	590	0.15	25x30	HU32G151M#YS3
		0.87	2.35	590	0.15	30x25	HU32G151M#ZS2
	180	1.00	2.70	490	0.15	22x40	HU32G181M#XS5
		1.00	2.70	490	0.15	25x35	HU32G181M#YS4
		0.96	2.58	490	0.15	30x25	HU32G181M#ZS2
		1.11	3.00	490	0.15	35x25	HU32G181M#AS2

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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 # = variable value, see fixing code in the product code
400 VDC Code: 2G Surge Voltage 450 VDC	**220**	1.17	3.15	400	0.15	25x40	HU32G221M#YS5
		1.12	3.03	400	0.15	30x30	HU32G221M#ZS3
		1.12	3.03	400	0.15	35x25	HU32G221M#AS2
	270	1.35	3.65	330	0.15	25x45	HU32G271M#YS6
		1.31	3.53	330	0.15	30x35	HU32G271M#ZS4
		1.24	3.36	330	0.15	35x25	HU32G271M#AS2
	330	1.52	4.10	270	0.15	30x40	HU32G331M#ZS5
		1.73	4.66	270	0.15	30x45	HU32G331M#ZS6
		1.45	3.92	270	0.15	35x30	HU32G331M#AS3
		1.67	4.51	270	0.15	35x35	HU32G331M#AS4
	390	1.96	5.29	230	0.15	30x50	HU32G391M#ZS7
		1.66	4.48	230	0.15	35x35	HU32G391M#AS4
		1.90	5.14	230	0.15	35x40	HU32G391M#AS5
		1.91	5.17	230	0.15	40x36	HU32G391M#BS4
	470	1.98	5.35	190	0.15	35x45	HU32G471M#AS6
		2.26	6.09	190	0.15	35x50	HU32G471M#AS7
		2.18	5.88	190	0.15	40x41	HU32G471M#BS5
	560	2.23	6.03	160	0.15	30x55	HU32G561M#ZS8
		2.17	5.85	160	0.15	35x45	HU32G561M#AS6
		2.45	6.62	160	0.15	35x50	HU32G561M#AS7
		2.29	6.18	181	0.15	40x36	HU32G561M#BS4
	680	2.65	7.16	130	0.15	35x50	HU32G681M#AS7
		2.90	7.84	130	0.15	35x60	HU32G681M#AS9
	820	3.18	8.58	110	0.15	35x60	HU32G821M#AS9
		3.27	8.82	110	0.15	40x61	HU32G821M#BS9
	1 000	3.63	9.80	80	0.15	35x60	HU32G102M#AS92P
		3.52	9.50	90	0.15	40x76	HU32G102M#BS12
		3.80	10.25	90	0.15	41x81	HU32G102M#BS13
	1 200	3.75	10.13	75	0.15	40x75	HU32G122M#BS12
		3.61	9.74	75	0.15	40x86	HU32G122M#BS14
	1 500	4.95	13.37	68	0.15	35x100	HU32G152M#AS17
		4.95	13.37	60	0.15	40x100	HU32G152M#BS17
420 VDC Code: 420V Surge Voltage 470 VDC	**47**	0.42	1.13	1880	0.15	22x25	HU3420V470M#XS2
	68	0.55	1.49	1300	0.15	22x30	HU3420V680M#XS3
	82	0.57	1.54	1080	0.15	22x25	HU3420V820M#XS2
		0.59	1.60	1080	0.15	22x30	HU3420V820M#XS3
		0.59	1.60	1080	0.15	25x25	HU3420V820M#YS2
	100	0.67	1.81	890	0.15	22x30	HU3420V101M#XS3
		0.67	1.81	890	0.15	25x25	HU3420V101M#YS2
	120	0.78	2.11	740	0.15	22x35	HU3420V121M#XS4
		0.73	1.96	740	0.15	25x25	HU3420V121M#YS2
		0.77	2.08	740	0.15	30x25	HU3420V121M#ZS2
	150	0.91	2.47	590	0.15	22x40	HU3420V151M#XS5
		0.87	2.35	590	0.15	25x30	HU3420V151M#YS3
		0.87	2.35	590	0.15	30x25	HU3420V151M#ZS2

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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 # = variable value, see fixing code in the product code
420 VDC Code: 420V Surge Voltage 470 VDC	**180**	1.00	2.70	490	0.15	25x35	HU3420V181M#YS4
		0.96	2.58	490	0.15	30x25	HU3420V181M#ZS2
		1.00	2.70	490	0.15	30x30	HU3420V181M#ZS3
		0.99	2.67	490	0.15	35x25	HU3420V181M#AS2
	220	1.22	3.30	400	0.15	25x45	HU3420V221M#YS6
		1.12	3.03	400	0.15	30x30	HU3420V221M#ZS3
		1.16	3.12	400	0.15	30x35	HU3420V221M#ZS4
		1.12	3.03	400	0.15	35x25	HU3420V221M#AS2
	270	1.31	3.53	330	0.15	30x35	HU3420V271M#ZS4
		1.34	3.62	330	0.15	30x40	HU3420V271M#ZS5
		1.31	3.53	330	0.15	35x30	HU3420V271M#AS3
		1.35	3.65	330	0.15	35x35	HU3420V271M#AS4
	330	1.58	4.28	270	0.15	30x45	HU3420V331M#ZS6
		1.64	4.43	270	0.15	30x50	HU3420V331M#ZS7
		1.53	4.13	270	0.15	35x35	HU3420V331M#AS4
		1.55	4.19	270	0.15	35x40	HU3420V331M#AS5
	390	1.74	4.69	230	0.15	35x40	HU3420V391M#AS5
		1.77	4.78	230	0.15	35x45	HU3420V391M#AS6
	470	2.04	5.49	140	0.15	35x50	HU3420V471M#AS7
450 VDC Code: 2W Surge Voltage 500 VDC	**47**	0.46	1.25	1880	0.15	22x25	HU32W470M#XS2
	68	0.52	1.40	1300	0.15	22x25	HU32W680M#XS2
		0.61	1.63	1300	0.15	22x30	HU32W680M#XS3
		0.59	1.60	1300	0.15	25x25	HU32W680M#YS2
	82	0.61	1.63	1080	0.15	22x30	HU32W820M#XS3
		0.70	1.90	1080	0.15	22x35	HU32W820M#XS4
		0.61	1.63	1080	0.15	25x25	HU32W820M#YS2
		0.70	1.90	1080	0.15	25x30	HU32W820M#YS3
	100	0.72	1.93	890	0.15	22x35	HU32W101M#XS4
		0.81	2.20	890	0.15	22x40	HU32W101M#XS5
		0.70	1.90	890	0.15	25x30	HU32W101M#YS3
		0.81	2.20	890	0.15	25x35	HU32W101M#YS4
		0.78	2.11	890	0.15	30x25	HU32W101M#ZS2
	120	0.83	2.23	740	0.15	22x40	HU32W121M#XS5
		0.94	2.52	740	0.15	22x45	HU32W121M#XS6
		0.78	2.11	740	0.15	25x30	HU32W121M#YS3
		0.88	2.38	740	0.15	25x35	HU32W121M#YS4
		0.78	2.11	740	0.15	30x25	HU32W121M#ZS2
		0.90	2.44	740	0.15	30x30	HU32W121M#ZS3
		0.90	2.44	740	0.15	35x25	HU32W121M#AS2
	150	0.97	2.61	590	0.15	25x40	HU32W151M#YS5
		1.10	2.97	590	0.15	25x45	HU32W151M#YS6
		0.92	2.49	590	0.15	30x30	HU32W151M#ZS3
		1.06	2.85	590	0.15	30x35	HU32W151M#ZS4
		0.92	2.49	590	0.15	35x25	HU32W151M#AS3
		1.06	2.85	590	0.15	35x30	HU32W151M#AS3

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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 # = variable value, see fixing code in the product code
450 VDC Code: 2W Surge Voltage 500 VDC	**180**	1.11	3.00	490	0.15	25x45	HU32W181M#YS6
		1.25	3.39	490	0.15	25x50	HU32W181M#YS7
		1.01	2.73	490	0.15	30x30	HU32W181M#ZS3
		1.17	3.15	490	0.15	30x35	HU32W181M#ZS4
		1.01	2.73	490	0.15	35x25	HU32W181M#AS2
		1.17	3.15	490	0.15	35x30	HU32W181M#AS3
	220	1.18	3.18	400	0.15	30x35	HU32W221M#ZS4
		1.34	3.62	400	0.15	30x40	HU32W221M#ZS5
		1.19	3.21	400	0.15	35x30	HU32W221M#AS3
		1.38	3.72	400	0.15	35x35	HU32W221M#AS4
	270	1.43	3.86	330	0.15	30x45	HU32W271M#ZS6
		1.63	4.40	330	0.15	30x50	HU32W271M#ZS7
		1.51	4.07	330	0.15	35x35	HU32W271M#AS4
		1.57	4.25	330	0.15	35x40	HU32W271M#AS5
	330	1.60	4.31	270	0.15	35x40	HU32W331M#AS5
		1.80	4.87	270	0.15	35x45	HU32W331M#AS6
	390	1.80	4.87	230	0.15	35x45	HU32W391M#AS6
		2.05	5.52	230	0.15	35x50	HU32W391M#AS7
	470	2.11	5.7	220	0.15	30x60	HU32W471M#ZS9
		2.24	6.06	140	0.15	35x50	HU32W471M#AS7
		2.33	6.30	140	0.15	35x55	HU32W471M#AS8
	560	2.55	6.89	160	0.15	35x60	HU32W561M#AS9
		2.70	7.28	160	0.15	40x61	HU32W561M#BS9
		2.84	7.66	160	0.15	40x75	HU32W561M#BS12
	680	2.71	7.32	150	0.15	35x50	HU32W681M#AS72P
		2.48	7.81	150	0.15	35x60	HU32W681M#AS9
		3.01	8.14	150	0.15	35x75	HU32W681M#AS12
		3.06	8.26	150	0.15	40x61	HU32W681M#BS9
	750	3.26	8.79	128	0.15	35x81	HU32W751M#AS13
		3.01	8.14	128	0.15	40x61	HU32W751M#BS9
		3.37	9.09	128	0.15	40x81	HU32W751M#BS13
	820	2.67	7.21	125	0.15	35x70	HU32W821M#AS11
		3.39	9.15	110	0.15	35x80	HU32W821M#AS13
		2.84	7.66	110	0.15	40x76	HU32W821M#BS12
		3.43	9.27	110	0.15	40x91	HU32W821M#BS15
	1 000	3.80	10.25	100	0.15	40x76	HU32W102M#BS12
	1 200	3.80	10.25	70	0.15	40x100	HU32W122M#BS17
		3.64	9.83	83	0.15	41x86	HU32W122M#BS14
	1 300	3.97	10.72	69	0.15	40x96	HU32W132M#BS16
500 VDC Code: 2H Surge Voltage 550 VDC	**39**	0.39	1.04	2440	0.20	22x30	HU32H390M#XS3
	47	0.45	1.22	2030	0.20	22x35	HU32H470M#XS4
	56	0.52	1.40	1700	0.20	22x40	HU32H560M#XS5
	68	0.59	1.60	1400	0.20	22x45	HU32H680M#XS6
		0.54	1.46	1400	0.20	30x25	HU32H680M#ZS2

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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 # = variable value, see fixing code in the product code
500 VDC Code: 2H Surge Voltage 550 VDC	**82**	0.68	1.84	1165	0.20	22x45	HU32H820M#XS5
		0.68	1.84	1165	0.20	22x50	HU32H820M#XS7
		0.64	1.72	1165	0.20	25x40	HU32H820M#YS5
		0.63	1.69	1165	0.20	30x30	HU32H820M#ZS3
		0.62	1.66	1165	0.20	35x25	HU32H820M#AS2
	100	0.74	1.99	960	0.20	25x45	HU32H101M#YS6
		0.73	1.96	960	0.20	30x35	HU32H101M#ZS4
		0.73	1.96	960	0.20	35x30	HU32H101M#AS3
	120	0.85	2.29	800	0.20	25x50	HU32H121M#YS7
		0.79	2.14	800	0.20	30x35	HU32H121M#ZS4
		0.84	2.26	800	0.20	30x40	HU32H121M#ZS5
		0.79	2.14	800	0.20	35x30	HU32H121M#AS3
	150	0.95	2.55	640	0.20	25x50	HU32H151M#YS7
		0.94	2.52	640	0.20	30x40	HU32H151M#ZS5
		0.97	2.61	640	0.20	30x45	HU32H151M#ZS6
		0.94	2.52	640	0.20	35x35	HU32H151M#AS4
	180	1.11	3.00	535	0.20	30x50	HU32H181M#ZS7
		1.07	2.88	535	0.20	35x40	HU32H181M#AS5
	220	1.18	3.18	434	0.20	35x40	HU32H221M#AS5
		1.23	3.33	434	0.20	35x45	HU32H221M#AS6
	250	1.36	3.68	390	0.20	30x55	HU32H251M#ZS8
	270	1.42	3.83	360	0.20	35x50	HU32H271M#AS7
	330	1.57	4.25	290	0.20	35x50	HU32H331M#AS7
		1.68	4.54	290	0.20	35x60	HU32H331M#AS9
	390	1.83	4.93	245	0.20	35x60	HU32H391M#AS9
		1.90	5.14	245	0.20	35x75	HU32H391M#AS12
	470	2.01	5.43	210	0.20	35x60	HU32H471M#AS9
		2.17	5.85	210	0.20	35x85	HU32H471M#AS14
		2.09	5.64	210	0.20	40x61	HU32H471M#BS9
		2.17	5.85	210	0.20	40x76	HU32H471M#BS12
	560	2.42	6.53	188	0.20	40x81	HU32H561M#BS13
	680	2.67	7.22	140	0.20	40x81	HU32H681M#BS13
	820	3.21	8.67	128	0.20	40x101	HU32H821M#BS17
	1 000	3.78	10.22	100	0.20	50x85	HU32H821M#CS14

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› Ripple Current Multiplier · Wechselstrommultiplikator

Frequency [Hz]		50/60	120	300	1k	≥ 10k
Multiplier	16V – 100V	0.70	1.00	1.10	1.20	1.20
	160V – 500V	0.70	1.00	1.18	1.34	1.45

Forced cooling [m/sec]	v < 1.0	v ≥ 1.0
Multiplier	1.0	1.1

Temperature [°C]	40	45	50	55	60	65	70	75	80	85	90	95	100	105
Multiplier	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.5	1.2	1,1	1.0

› Life Time Table · Brauchbarkeitsdauer – Tabelle

HU3	Useful life as function of ambient temperature and ripple current												
I_r at 105°C	x 1.0	x 1.2	x 1.5	x 1.8	x 1.9	x 2.0	x 2.1	x 2.2	x 2.3	x 2.4	x 2.5	x 2.6	x 2.7
T_a = 40°C	250	250	250	250	250	250	250	250	250	250	250	250	214
T_a = 45°C	250	250	250	250	250	250	250	250	250	245	203	166	
T_a = 50°C	250	250	250	250	250	250	250	222	186	155	128		
T_a = 55°C	250	250	250	250	227	195	166	140	118	98			
T_a = 60°C	250	250	243	165	143	123	105	88	74				
T_a = 65°C	250	211	154	104	90	78	66	56					
T_a = 70°C	158	133	97	66	57	49	42						
T_a = 75°C	100	84	61	41	36	31							
T_a = 80°C	63	53	39	26	22								
T_a = 85°C	40	33	24	16									
T_a = 90°C	25	21	15										
T_a = 95°C	16	13											
T_a = 100°C	10												
T_a = 105°C	6												

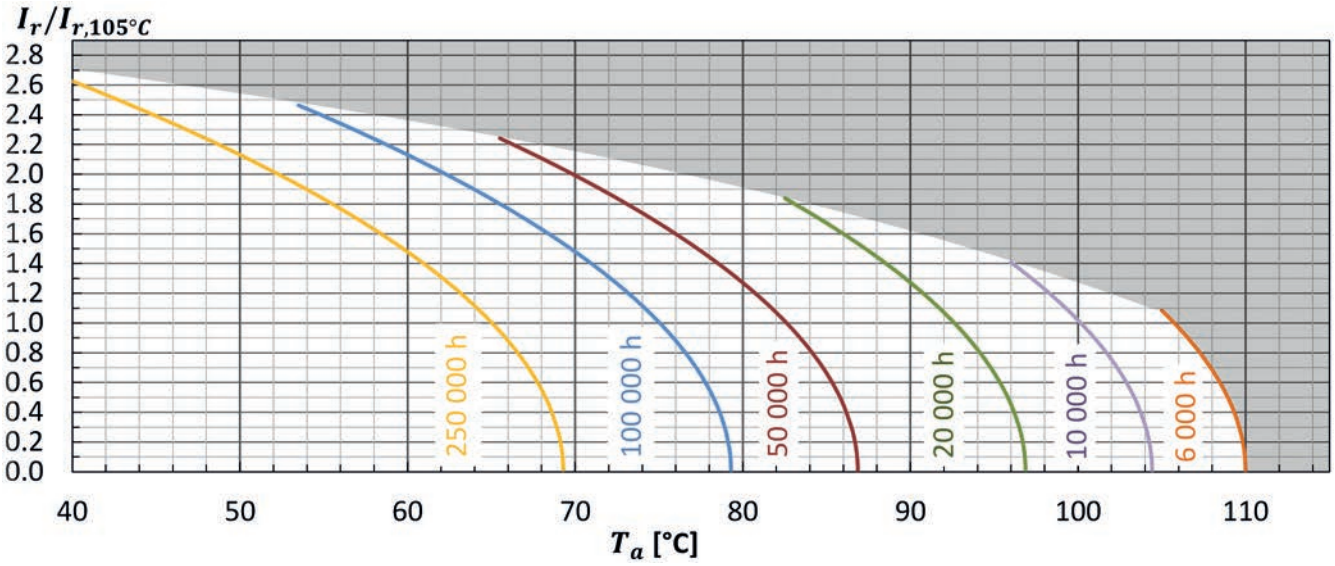
khrs

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 $I_{r,\ 105°C,120Hz}$



› 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

HU · Snap-In · 6000h/105 °C

Standard Performances · Compact Design

› Specifications · Spezifikationen

Items	Characteristics
Temperature range	-40°C ~ + 105°C (200VDC - 250VDC) -25°C ~ + 105°C (400VDC - 550VDC)
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	6000h at 105°C
Field failure rate	0.5 FIT = 0.5 • 10^{-9} Failures/hour
RoHS conform	Directive 2011/65/EU & (EU)2015/863
Specifications	JIS C 5101-4, AEC-Q200 qualified
Vibration	0.75mm, 10...55Hz, 10g, 3x2h
Sleeve withstanding voltage	3000 Vac/1 min between terminals bundled and plate*

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

› Outline Drawings · Bauformen

Refer to page 5 for available terminal shapes and dimensions. · Auf Seite 5 finden Sie die verfügbaren Bauformen und Maße.

› Product Code · Bestellbezeichnung

Example: Series HU · 400 V · 330 µF ±20 % · 30x30 mm · 2-pin terminal · without plate

HU **2G** **331** **M** **R** **Z** **S3** **WEPC**

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
- C: 2-pin short terminal
- X: 4-pin short terminal
- E: 3-pin short terminal

Outer design code

None:
PET sleeve and PVC plate

WPEC:
PET sleeve without plate

Others on request

Rated voltage code

Code	Voltage
2D	200
2E	250
2V	350
2G	400
420V	420
2W	450
2H	500
2L	550

Capacitance tolerance

- M : ± 20%
- Q : -10% ~ +30%

Diameter code

Code	ØD
W	20
X	22
Y	25
Z	30
A	35
B	40
H	46
C	50

Length code

Code	L	Code	L
S1	20	S10	65
S2	25	S11	70
S3	30	S12	75
S4	35	S13	80
S5	40	S14	85
S6	45	S15	90
S7	50	S16	95
S8	55	S17	100
S9	60	S18	105

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 # = variable value, see fixing code in the product code
200 VDC Code: 2D Surge Voltage 250 VDC	**330**	1.07	2.46	330	0.15	22x25	HU2D331M#XS2
	390	1.24	2.85	280	0.15	22x30	HU2D391M#XS3
	470	1.31	3.01	240	0.15	25x25	HU2D471M#YS2
	560	1.58	3.63	200	0.15	22x35	HU2D561M#XS4
		1.52	3.50	200	0.15	25x30	HU2D561M#YS3
	680	1.83	4.21	160	0.15	22x40	HU2D681M#XS5
		1.77	4.07	160	0.15	25x35	HU2D681M#YS4
		1.60	3.68	160	0.15	30x25	HU2D681M#ZS2
	820	2.20	5.06	140	0.15	22x50	HU2D821M#XS7
		2.05	4.72	140	0.15	25x40	HU2D821M#YS5
		1.86	4.28	140	0.15	30x30	HU2D821M#ZS3
		1.52	3.50	140	0.15	35x25	HU2D821M#AS2
	1 000	2.37	5.45	110	0.15	25x45	HU2D102M#YS6
		2.17	4.99	110	0.15	30x35	HU2D102M#ZS4
	1 200	2.70	6.21	100	0.15	25x50	HU2D122M#YS7
		2.49	5.73	100	0.15	30x40	HU2D122M#ZS5
		1.94	4.46	100	0.15	35x30	HU2D122M#AS3
	1 500	2.91	6.69	80	0.15	30x45	HU2D152M#ZS6
		2.29	5.27	80	0.15	35x35	HU2D152M#AS4
	1 800	3.32	7.64	70	0.15	30x50	HU2D182M#ZS7
		2.62	6.03	70	0.15	35x40	HU2D182M#AS5
	2 200	3.02	6.95	50	0.15	35x45	HU2D222M#AS6
	2 700	3.86	8.88	50	0.15	35x50	HU2D272M#AS7
250 VDC Code: 2E Surge Voltage 300 VDC	**220**	0.95	2.19	440	0.15	22x25	HU2E221M#XS2
	330	1.30	2.99	290	0.15	20x35	HU2E331M#WS4
		1.24	2.85	290	0.15	22x30	HU2E331M#XS3
		1.19	2.74	290	0.15	25x25	HU2E331M#YS2
	390	1.42	3.27	250	0.15	22x35	HU2E391M#XS4
		1.37	3.15	250	0.15	25x30	HU2E391M#YS3
	470	1.65	3.80	210	0.15	22x40	HU2E471M#XS5
		1.42	3.27	210	0.15	30x25	HU2E471M#ZS2
	560	1.88	4.32	180	0.15	22x45	HU2E561M#XS6
		1.74	4.00	180	0.15	25x35	HU2E561M#YS4
	680	2.16	4.97	150	0.15	22x50	HU2E681M#XS7
		2.01	4.62	150	0.15	25x40	HU2E681M#YS5
		2.11	4.85	150	0.15	25x45	HU2E681M#YS6
		1.82	4.19	150	0.15	30x30	HU2E681M#ZS3
		1.52	3.50	150	0.15	35x25	HU2E681M#AS2
	820	2.41	5.54	120	0.15	25x50	HU2E821M#YS7
		2.10	4.83	120	0.15	30x35	HU2E821M#ZS4
		1.76	4.05	120	0.15	35x30	HU2E821M#AS3
	1 000	2.43	5.59	100	0.15	30x40	HU2E102M#ZS5
		2.04	4.69	100	0.15	35x35	HU2E102M#AS4
	1 200	2.89	6.65	80	0.15	30x50	HU2E122M#ZS7
		2.34	5.38	80	0.15	35x40	HU2E122M#AS5
	1 500	2.73	6.28	70	0.15	35x45	HU2E152M#AS6
	1 800	3.11	7.15	60	0.15	35x50	HU2E182M#AS7

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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 # = variable value, see fixing code in the product code
400 VDC Code: 2G Surge Voltage 450 VDC	**82**	0.63	1.45	1170	0.20	22x25	HU2G820M#XS2
	120	0.77	1.77	800	0.20	22x25	HU2G121M#XS2
	150	0.92	2.12	640	0.20	22x30	HU2G151M#XS3
	180	1.01	2.32	540	0.20	22x30	HU2G181M#XS3
		1.05	2.42	540	0.20	22x35	HU2G181M#XS4
		0.99	2.28	540	0.20	25x25	HU2G181M#YS2
	220	1.11	2.55	440	0.20	22x30	HU2G221M#XS3
		1.22	2.81	440	0.20	22x40	HU2G221M#XS5
		1.10	2.53	440	0.20	25x25	HU2G221M#YS2
		1.16	2.67	440	0.20	25x30	HU2G221M#YS3
	270	1.29	2.97	360	0.20	22x35	HU2G271M#XS4
		1.40	3.22	360	0.20	22x45	HU2G271M#XS6
		1.28	3.46	360	0.20	25x30	HU2G271M#YS3
		1.35	3.11	360	0.20	25x35	HU2G271M#YS4
		1.28	2.94	360	0.20	30x25	HU2G271M#ZS2
	330	1.54	3.54	290	0.20	22x45	HU2G331M#XS6
		1.59	3.66	290	0.20	22x50	HU2G331M#XS7
		1.49	3.43	290	0.20	25x35	HU2G331M#YS4
		1.55	3.57	290	0.20	25x40	HU2G331M#YS5
		1.41	3.24	290	0.20	30x25	HU2G331M#ZS2
		1.49	3.43	290	0.20	30x30	HU2G331M#ZS3
		1.46	3.36	290	0.20	35x25	HU2G331M#AS2
	390	1.73	3.98	250	0.20	22x50	HU2G391M#XS7
		1.68	3.86	250	0.20	25x40	HU2G391M#YS5
		1.74	4.00	250	0.20	25x45	HU2G391M#YS6
		1.62	3.72	250	0.20	30x30	HU2G391M#ZS3
		1.70	3.91	250	0.20	30x35	HU2G391M#ZS4
		1.59	3.66	250	0.20	35x25	HU2G391M#AS2
		1.87	4.30	250	0.20	35x30	HU2G391M#AS3
	470	1.92	4.41	210	0.20	25x45	HU2G471M#YS6
		1.98	4.55	210	0.20	25x50	HU2G471M#YS7
		1.86	4.28	210	0.20	30x35	HU2G471M#ZS4
		1.94	4.46	210	0.20	30x40	HU2G471M#ZS5
		1.84	4.23	210	0.20	35x30	HU2G471M#AS3
	560	2.16	4.97	180	0.20	25x50	HU2G561M#YS7
		2.11	4.85	180	0.20	30x40	HU2G561M#ZS5
		2.19	5.04	180	0.20	30x45	HU2G561M#ZS6
		2.01	4.62	180	0.20	35x30	HU2G561M#AS3
		2.09	4.81	180	0.20	35x35	HU2G561M#AS4
	680	2.41	5.54	150	0.20	30x45	HU2G681M#ZS6
		2.48	5.70	150	0.20	30x50	HU2G681M#ZS7
		2.31	5.31	150	0.20	35x35	HU2G681M#AS4
		2.40	5.52	150	0.20	35x40	HU2G681M#AS5
	770	2.51	5.77	132	0.20	35x50	HU2G771M#AS7

Additional designs on request · Weitere Designs auf Anfrage

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 # = variable value, see fixing code in the product code
400 VDC Code: 2G Surge Voltage 450 VDC	**820**	2.81	6.46	120	0.20	30x55	HU2G821M#ZS8
		2.63	6.05	120	0.20	35x40	HU2G821M#AS5
		2.72	6.26	120	0.20	35x45	HU2G821M#AS6
		2.78	6.39	120	0.20	35x50	HU2G821M#AS7
	950	4.00	9.20	75	0.20	35x55	HU2G951S#AS82PCC
	1 000	3.09	7.11	100	0.20	35x50	HU2G102M#AL51
		2.86	6.58	120	0.20	35x60	HU2G102M#AS9
	1 200	3.44	7.91	80	0.20	35x75	HU2G122M#AS12
	1 500	3.93	9.04	80	0.20	35x100	HU2G152M#AS17
		3.99	9.18	80	0.20	40x75	HU2G152M#BS12
	1 700	6.00	13.80	45	0.20	40x90	HU2G172Q#BS15CC
	1 800	4.47	10.28	60	0.20	40x100	HU2G182M#BS17
420 VDC Code: 420V Surge Voltage 470 VDC	**100**	0.71	1.63	1020	0.20	22x25	HU420V101M#XS2
	120	0.77	1.77	850	0.20	22x25	HU420V101M#XS2
	150	0.87	2.00	680	0.20	22x25	HU420V151M#XS2
		0.92	2.12	680	0.20	22x30	HU420V151M#XS3
		0.90	2.07	680	0.20	25x25	HU420V151M#YS2
	180	1.01	2.32	570	0.20	22x30	HU420V181M#XS3
		1.05	2.42	570	0.20	22x35	HU420V181M#XS4
		1.05	2.42	570	0.20	25x30	HU420V181M#YS3
	220	1.17	2.69	470	0.20	22x35	HU420V221M#XS4
		1.22	2.81	470	0.20	22x40	HU420V221M#XS5
		1.21	2.78	470	0.20	25x35	HU420V221M#YS4
		1.15	2.65	470	0.20	30x25	HU420V221M#ZS2
	270	1.35	3.11	380	0.20	22x40	HU420V271M#XS5
		1.40	3.22	380	0.20	22x45	HU420V271M#XS6
		1.35	3.11	380	0.20	25x35	HU420V271M#YS4
		1.28	2.94	380	0.20	30x25	HU420V271M#ZS2
		1.38	3.17	380	0.20	35x25	HU420V271M#AS2
	330	1.54	3.54	310	0.20	22x45	HU420V331M#XS6
		1.59	3.66	310	0.20	22x50	HU420V331M#XS7
		1.55	3.57	310	0.20	25x40	HU420V331M#YS5
		1.61	3.70	310	0.20	25x45	HU420V331M#YS6
		1.49	3.43	310	0.20	30x30	HU420V331M#ZS3
		1.56	3.59	310	0.20	30x35	HU420V331M#ZS4
		1.46	3.36	310	0.20	35x25	HU420V331M#AS2
	390	1.74	4.00	270	0.20	25x45	HU420V391M#YS6
		1.80	4.14	270	0.20	25x50	HU420V391M#YS7
		1.62	3.73	270	0.20	30x30	HU420V391M#ZS3
		1.76	4.05	270	0.20	30x40	HU420V391M#ZS5
		1.59	3.66	270	0.20	35x25	HU420V391M#AS2
		1.67	3.84	270	0.20	35x30	HU420V391M#AS3
	470	1.98	4.55	220	0.20	25x50	HU420V471M#YS7
		1.86	4.28	220	0.20	30x35	HU420V471M#ZS4
		1.94	4.46	220	0.20	30x40	HU420V471M#ZS5

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 # = variable value, see fixing code in the product code
420 VDC Code: 420V Surge Voltage 470 VDC	**470**	2.00	4.60	220	0.20	30x45	HU420V471M#ZS6
		1.84	4.23	220	0.20	35x30	HU420V471M#AS3
		1.92	4.42	220	0.20	35x35	HU420V471M#AS4
	520	2.18	5.01	190	0.20	30x45	HU420V521M#ZS6
	560	2.27	5.22	190	0.20	25x60	HU420V561M#YS9
		2.11	4.85	190	0.20	30x40	HU420V561M#ZS5
		2.25	5.18	190	0.20	30x50	HU420V561M#ZS7
		2.09	4.81	190	0.20	35x35	HU420V561M#AS4
		2.18	5.01	190	0.20	35x40	HU420V561M#AS5
	680	2.48	5.70	150	0.20	30x50	HU420V681M#ZS7
		2.40	5.52	150	0.20	35x40	HU420V681M#AS5
		2.48	5.70	150	0.20	35x45	HU420V681M#AS6
		2.56	5.89	150	0.20	35x50	HU420V681M#AS7
	720	2.55	5.86	140	0.20	35x45	HU420V721M#AS6
	820	2.81	6.46	130	0.20	30x55	HU420V821M#ZS8
		2.72	6.26	130	0.20	35x45	HU420V821M#AS6
		2.80	6.44	130	0.20	35x50	HU420V821M#AS7
	920	2.96	6.81	120	0.20	35x60	HU420V921M#AS9
	1000	3.25	7.48	110	0.20	35x60	HU420V102M#AS9
		3.30	7.59	110	0.20	40x56	HU420V102M#BS8
	1200	3.57	8.21	90	0.20	40x75	HU420V122M#BS12
		3.46	7.96	90	0.20	35x80	HU420V122M#AS13
	1500	4.07	9.36	70	0.20	40x100	HU420V152M#BS17
	1600	4.20	9.66	70	0.20	40x100	HU420V162M#BS17
	1800	4.45	10.24	67	0.20	40x100	HU420V182M#BS17
450 VDC Code: 2W Surge Voltage 500 VDC	**100**	0.71	1.63	1020	0.20	20x30	HU2W101M#WS3
		0.71	1.63	1020	0.20	22x25	HU2W101M#XS2
		0.75	1.73	1020	0.20	22x30	HU2W101M#XS3
		0.72	1.66	1020	0.20	30x20	HU2W101M#ZS1
	120	0.82	1.89	850	0.20	22x30	HU2W121M#XS3
		0.81	1.86	850	0.20	25x25	HU2W121M#YS2
	150	0.92	2.12	680	0.20	22x30	HU2W151M#XS3
		0.96	2.21	680	0.20	22x35	HU2W151M#XS4
		0.90	2.07	680	0.20	25x25	HU2W151M#YS2
	180	1.01	2.32	570	0.20	22x30	HU2W181M#XS3
		1.05	2.42	570	0.20	22x35	HU2W181M#XS4
		1.09	2.51	570	0.20	22x40	HU2W181M#XS5
		0.99	2.28	570	0.20	25x25	HU2W181M#YS2
		1.05	2.42	570	0.20	25x30	HU2W181M#YS3
		1.09	2.51	570	0.20	25x35	HU2W181M#YS4
		1.04	2.39	570	0.20	30x25	HU2W181M#ZS2
	220	1.17	2.69	470	0.20	22x35	HU2W221M#XS4
		1.22	2.81	470	0.20	22x40	HU2W221M#XS5
		1.25	2.88	470	0.20	22x45	HU2W221M#XS6

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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 # = variable value, see fixing code in the product code
450 VDC Code: 2W Surge Voltage 500 VDC	220	1.16	2.67	470	0.20	25x30	HU2W221M#YS3
		1.21	2.78	470	0.20	25x35	HU2W221M#YS4
		1.15	2.65	470	0.20	30x25	HU2W221M#ZS2
	270	1.40	3.22	380	0.20	22x45	HU2W271M#XS6
		1.44	3.31	380	0.20	22x50	HU2W271M#XS7
		1.35	3.11	380	0.20	25x35	HU2W271M#YS4
		1.40	3.22	380	0.20	25x40	HU2W271M#YS5
		1.28	2.94	380	0.20	30x25	HU2W271M#ZS2
		1.35	3.11	380	0.20	30x30	HU2W271M#ZS3
		1.38	3.17	380	0.20	35x25	HU2W271M#AS2
	330	1.59	3.66	310	0.20	22x50	HU2W331M#XS7
		1.55	3.57	310	0.20	25x40	HU2W331M#YS5
		1.61	3.70	310	0.20	25x45	HU2W331M#YS6
		1.65	3.80	310	0.20	25x50	HU2W331M#YS7
		1.49	3.43	310	0.20	30x30	HU2W331M#ZS3
		1.56	3.59	310	0.20	30x35	HU2W331M#ZS4
		1.46	3.36	310	0.20	35x25	HU2W331M#AS2
		1.53	3.52	310	0.20	35x30	HU2W331M#AS3
	390	1.74	4.00	270	0.20	25x45	HU2W391M#YS6
		1.80	4.14	270	0.20	25x50	HU2W391M#YS7
		1.70	3.91	270	0.20	30x35	HU2W391M#ZS4
		1.76	4.05	270	0.20	30x40	HU2W391M#ZS5
		1.59	3.66	270	0.20	35x25	HU2W391M#AS2
	470	2.04	4.69	220	0.20	25x55	HU2W471M#YS8
		2.29	5.27	220	0.20	25x60	HU2W471M#YS9
		1.94	4.46	220	0.20	30x40	HU2W471M#ZS5
		2.00	4.60	220	0.20	30x45	HU2W471M#ZS6
		2.08	4.78	220	0.20	30x50	HU2W471M#ZS7
		1.84	4.23	220	0.20	35x30	HU2W471M#AS3
		1.92	4.42	220	0.20	35x35	HU2W471M#AS4
		1.99	4.58	220	0.20	35x40	HU2W471M#AS5
	560	2.27	5.22	190	0.20	25x60	HU2W561M#YS9
		2.25	5.18	190	0.20	30x50	HU2W561M#ZS7
		2.09	4.81	190	0.20	35x35	HU2W561M#AS4
		2.18	5.01	190	0.20	35x40	HU2W561M#AS5
		2.26	5.20	190	0.20	35x45	HU2W561M#AS6
	680	2.48	5.70	150	0.20	25x70	HU2W681M#YS11
		2.48	5.70	150	0.20	30x51	HU2W681M#ZS7
		2.56	5.89	150	0.20	30x55	HU2W681M#ZS8
		2.48	5.70	150	0.20	35x45	HU2W681M#AS6
		2.55	5.87	150	0.20	35x50	HU2W681M#AS7
	820	2.87	6.60	130	0.20	30x60	HU2W821M#ZS9
		2.80	6.44	130	0.20	35x50	HU2W821M#AS7
	1000	3.25	7.48	110	0.20	35x60	HU2W102M#AS9
		3.15	7.25	110	0.20	35x70	HU2W102M#AS11
	1200	4.01	9.22	90	0.20	35x82	HU2W122M#AS13CC
		3.51	8.05	90	0.20	35x100	HU2W122M#AS17

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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 # = variable value, see fixing code in the product code
450 VDC Code: 2W Surge Voltage 500 VDC	**1200**	3.57	8.21	90	0.20	40x75	HU2W122M#BS12
		4.01	9.22	90	0.20	40x90	HU2W122M#BS15
	1500	4.02	9.25	70	0.20	40x81	HU2W152M#BS13
		4.07	9.36	70	0.20	40x100	HU2W152M#BS17
		4.00	9.20	70	0.20	46x97	HU2W152M#HL97
	2200	5.33	12.26	50	0.20	46x100	HU2W222M#HS17
500 VDC Code: 2H Surge Voltage 550 VDC	**56**	0.42	0.97	1710	0.20	22x25	HU2H560M#XS2
	68	0.45	1.04	1410	0.20	22x25	HU2H680M#XS2
		0.48	1.10	1410	0.20	22x30	HU2H680M#XS3
		0.55	1.27	1410	0.20	25x25	HU2H680M#YS2
	82	0.53	1.22	1170	0.20	22x30	HU2H820M#XS3
		0.54	1.24	1170	0.20	25x25	HU2H820M#YS2
		0.57	1.31	1170	0.20	25x30	HU2H820M#YS3
	100	0.59	1.36	960	0.20	22x30	HU2H101M#XS3
		0.62	1.43	960	0.20	22x35	HU2H101M#XS4
		0.65	1.50	960	0.20	22x40	HU2H101M#XS5
		0.61	1.40	960	0.20	25x25	HU2H101M#YS3
		0.64	1.47	960	0.20	25x30	HU2H101M#YS4
		0.63	1.45	960	0.20	30x25	HU2H101M#ZS3
	120	0.69	1.59	800	0.20	22x35	HU2H121M#XS4
		0.72	1.66	800	0.20	22x40	HU2H121M#XS5
		0.71	1.63	800	0.20	25x30	HU2H121M#YS3
		0.74	1.70	800	0.20	25x35	HU2H121M#YS4
		0.75	1.73	800	0.20	30x25	HU2H121M#ZS2
	150	0.82	1.89	640	0.20	22x40	HU2H151M#XS5
		0.85	1.96	640	0.20	22x45	HU2H151M#XS6
		0.84	1.93	640	0.20	25x35	HU2H151M#YS4
		0.88	2.02	640	0.20	25x40	HU2H151M#YS6
		0.85	1.96	640	0.20	30x25	HU2H151M#ZS2
		0.90	2.07	640	0.20	30x30	HU2H151M#ZS3
		0.94	2.16	640	0.20	35x25	HU2H151M#AS2
	180	0.97	2.23	540	0.20	22x50	HU2H181M#XS7
		0.98	2.25	540	0.20	25x40	HU2H181M#YS5
		1.01	2.32	540	0.20	25x45	HU2H181M#YS6
		0.99	2.28	540	0.20	30x30	HU2H181M#ZS3
		1.04	2.39	540	0.20	30x35	HU2H181M#ZS4
		1.04	2.39	540	0.20	35x25	HU2H181M#AS2
	220	1.13	2.60	440	0.20	25x45	HU2H221M#YS6
		1.17	2.69	440	0.20	25x50	HU2H221M#YS7
		1.17	2.69	440	0.20	30x35	HU2H221M#ZS4
		1.21	2.78	440	0.20	30x40	HU2H221M#ZS5
		1.22	2.81	440	0.20	35x30	HU2H221M#AS3
	270	1.36	3.13	360	0.20	30x40	HU2H271M#ZS5
		1.41	3.24	360	0.20	30x45	HU2H271M#ZS6
		1.37	3.15	360	0.20	35x30	HU2H271M#AS3
		1.44	3.31	360	0.20	35x35	HU2H271M#AS4

Additional designs on request · Weitere Designs auf Anfrage

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500 VDC Code: 2H Surge Voltage 550 VDC	**330**	1.58	3.63	290	0.20	30x45	HU2H331M#ZS6
		1.63	3.75	290	0.20	30x50	HU2H331M#ZS7
		1.61	3.70	290	0.20	35x35	HU2H331M#AS5
		1.67	3.84	290	0.20	35x40	HU2H331M#AS5
	390	1.79	4.12	250	0.20	30x50	HU2H391M#ZS7
		1.84	4.23	250	0.20	35x40	HU2H391M#AS5
		1.90	4.37	250	0.20	35x45	HU2H391M#AS6
	470	2.10	4.83	210	0.20	30x60	HU2H471M#ZS9
		2.12	4.88	210	0.20	35x45	HU2H471M#AS6
		2.18	5.01	210	0.20	35x50	HU2H471M#AS7
	560	2.53	5.82	180	0.20	35x60	HU2H561M#AS9
550 VDC Code: 2L Surge Voltage 600 VDC	**82**	0.59	1.18	2920	0.25	30x25	HU2L820M#ZS2
	120	0.77	1.54	1990	0.25	30x30	HU2L121M#ZS3
		0.80	1.60	1990	0.25	35x25	HU2L121M#AS2
	150	0.91	1.82	1600	0.25	30x35	HU2L151M#ZS4
		0.96	1.92	1600	0.25	35x30	HU2L151M#AS3
	180	1.05	2.10	1330	0.25	30x40	HU2L181M#ZS5
		1.11	2.22	1330	0.25	35x35	HU2L181M#AS4
	220	1.26	2.52	1090	0.25	30x50	HU2L221M#ZS7
		1.29	2.58	1090	0.25	35x40	HU2L221M#AS5
	270	1.50	3.00	890	0.25	35x45	HU2L271M#AS6
	330	1.73	3.46	730	0.25	35x50	HU2L331M#AS7
	390	2.00	4.00	620	0.25	35x60	HU2L391M#AS9

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	1.18	1.34	1.45

Forced cooling [m/sec]	v < 1.0	v ≥ 1.0
Multiplier	1.0	1.1

Temperature [°C]		40	60	70	85	105
Multiplier	200~500V	2.3	2.0	1.8	1.4	1.0
	550V	2.0	1.7	1.5	1.3	1.0

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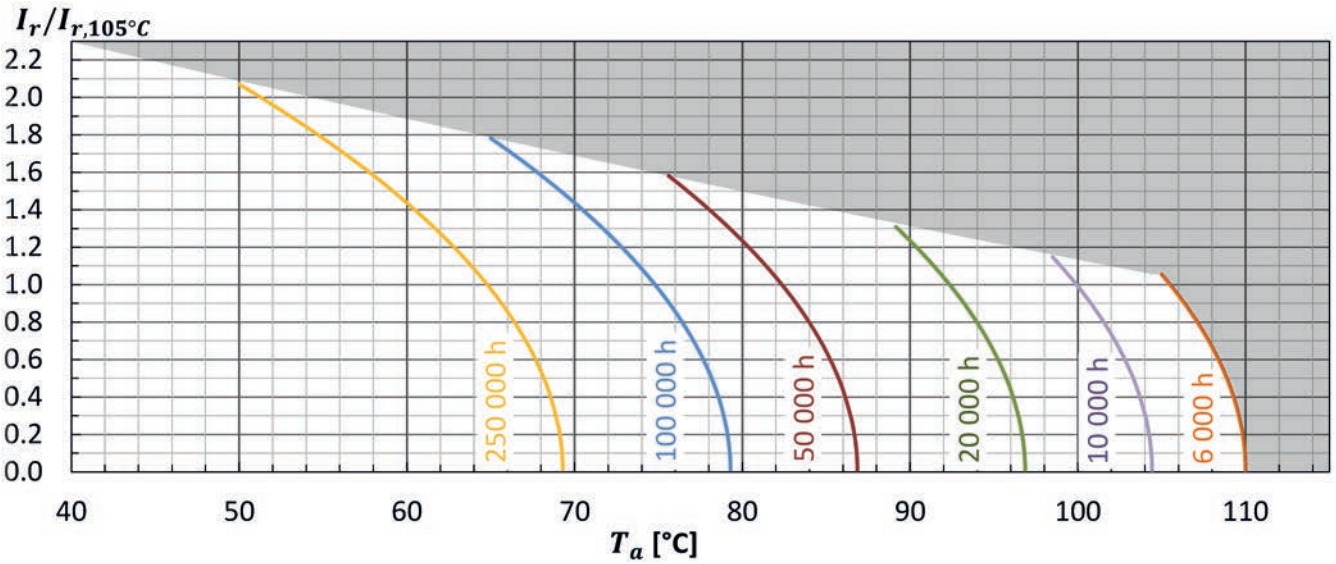
› Life Time Table · Brauchbarkeitsdauer – Tabelle

HU	Useful life as function of ambient temperature and ripple current													
I_r at 105°C	x 1.0	x 1.1	x 1.2	x 1.3	x 1.4	x 1.5	x 1.6	x 1.7	x 1.8	x 1.9	x 2.0	x 2.1	x 2.2	x 2.3
T_a = 40°C	250	250	250	250	250	250	250	250	250	250	250	250	250	250
T_a = 45°C	250	250	250	250	250	250	250	250	250	250	250	250	250	
T_a = 50°C	250	250	250	250	250	250	250	250	250	250	250	238		
T_a = 55°C	250	250	250	250	250	250	250	250	243	209	178			
T_a = 60°C	250	250	250	250	250	231	203	177	154	132	113			
T_a = 65°C	245	225	204	184	165	146	128	112	97	84				
T_a = 70°C	155	142	129	116	104	92	81	71	62					
T_a = 75°C	98	90	81	73	66	58	51							
T_a = 80°C	62	56	51	46	41	37								
T_a = 85°C	39	36	32	29	26									
T_a = 90°C	24	22	20	19										
T_a = 95°C	15	14	13											
T_a = 100°C	9	9												
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 $I_{r,\ 105°C,120Hz}$



› 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 ≤ 20% (of initial value) Tanδ ≤ 200% (of specified value) I_L ≤ specified value
Useful life	T_a = 105°C; V_r, I_r applied 6000 hours	ΔC/C ≤ 30% (of initial value) Tanδ < 300% (of specified value) I_L ≤ specified value

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

HL · Snap-In · 12000 h/105 °C

Compact Design · Long Life

› Specifications · Spezifikationen

Items	Characteristics
Temperature range	-40°C ~ + 105°C (200VDC - 250VDC) -25°C ~ + 105°C (315VDC - 500VDC)
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	12 000 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
Specifications	JIS C 5101-4, AEC-Q200 qualified
Vibration	0.75mm, 10...55Hz, 10g, 3x2h
Sleeve withstanding voltage	3000 Vac/1 min between terminals bundled and plate*

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

› Outline Drawings · Bauformen

Refer to page 5 for available terminal shapes and dimensions. · Auf Seite 5 finden Sie die verfügbaren Bauformen und Maße.

› Product Code · Bestellbezeichnung

Example: Series HL · 500 V · 470 µF ±20 % · 35x60 mm · 2-pin short · without plate

HL	2H	471	M	C	A	S9	WEPC

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
- C: 2-pin short terminal
- X: 4-pin short terminal
- E: 3-pin short terminal

Outer design code

None:
PET sleeve and PVC plate

WPEC:
PET sleeve without plate

Others on request

Rated voltage code

Code	Voltage
2D	200
2E	250
2F	315
2G	400
420V	420
2W	450
2H	500

Capacitance tolerance

- M : ± 20%
- Q : -10% ~ +30%

Diameter code

Code	ØD
X	22
Y	25
Z	30
A	35
B	40

Length code

Code	L	Code	L
S2	25	S7	50
S3	30	S8	55
S4	35	S9	60
S5	40	S13	80
S6	45	S17	100

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 # = variable value, see fixing code in the product code
200 VDC Code: 2D Surge Voltage 250 VDC	**330**	1.09	2.51	330	0.15	22x25	HL2D331M#XS2
	470	1.37	3.15	240	0.15	22x30	HL2D471M#XS3
		1.36	3.13	240	0.15	25x25	HL2D471M#YS2
	560	1.57	3.61	200	0.15	22x35	HL2D561M#XS4
		1.57	3.61	200	0.15	25x30	HL2D561M#YS3
	680	1.81	4.16	160	0.15	22x40	HL2D681M#XS5
		1.75	4.03	160	0.15	30x25	HL2D681M#ZS2
	820	2.06	4.74	140	0.15	22x45	HL2D821M#XS6
		1.99	4.58	140	0.15	25x35	HL2D821M#YS4
	1000	2.37	5.45	110	0.15	25x45	HL2D102M#YS6
		2.24	5.15	110	0.15	30x30	HL2D102M#ZS3
		1.94	4.46	110	0.15	35x25	HL2D102M#AS2
	1200	2.67	6.14	100	0.15	25x50	HL2D122M#YS7
		2.56	5.89	100	0.15	30x35	HL2D122M#ZS4
		2.23	5.13	100	0.15	35x30	HL2D122M#AS3
	1500	3.08	7.08	80	0.15	30x45	HL2D152M#ZS6
		2.61	6.00	80	0.15	35x35	HL2D152M#AS4
	1800	3.49	8.03	70	0.15	30x50	HL2D182M#ZS7
		2.97	6.83	70	0.15	35x40	HL2D182M#AS5
	2200	3.39	7.80	50	0.15	35x45	HL2D222M#AS6
	2700	3.86	8.88	50	0.15	35x50	HL2D272M#AS7
250 VDC Code: 2E Surge Voltage 300 VDC	**270**	0.98	2.25	360	0.15	22x25	HL2E271M#XS2
	330	1.15	2.65	290	0.15	22x30	HL2E331M#XS3
		1.14	2.62	290	0.15	25x25	HL2E331M#YS2
	390	1.31	3.01	250	0.15	22x35	HL2E391M#XS4
	470	1.50	3.45	210	0.15	22x40	HL2E471M#XS5
		1.43	3.29	210	0.15	25x30	HL2E471M#YS3
		1.45	3.34	210	0.15	30x25	HL2E471M#ZS2
	560	1.70	3.91	180	0.15	22x45	HL2E561M#XS6
		1.64	3.77	180	0.15	25x35	HL2E561M#YS4
	680	1.94	4.46	150	0.15	22x50	HL2E681M#XS7
		1.88	4.32	150	0.15	25x40	HL2E681M#YS5
		1.85	4.26	150	0.15	30x30	HL2E681M#ZS3
		1.60	3.68	150	0.15	35x25	HL2E681M#AS2
	820	2.14	4.92	120	0.15	25x45	HL2E821M#YS6
		2.12	4.88	120	0.15	30x35	HL2E821M#ZS4
		1.84	4.23	120	0.15	35x30	HL2E821M#AS3
	1000	2.44	5.61	100	0.15	30x40	HL2E102M#ZS5
	1200	2.76	6.35	80	0.15	30x45	HL2E122M#ZS6
		2.33	5.36	80	0.15	35x35	HL2E122M#AS4
	1500	2.80	6.44	70	0.15	35x45	HL2E152M#AS6
	1800	3.16	7.27	60	0.15	35x50	HL2E182M#AS7
315 VDC Code: 2F Surge Voltage 365 VDC	**150**	0.86	1.98	850	0.20	22x25	HL2F151M#XS2
	220	1.10	2.53	580	0.20	22x30	HL2F221M#XS3
		1.10	2.53	580	0.20	25x25	HL2F221M#YS2

Additional designs on request · Weitere Designs auf Anfrage

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 # = variable value, see fixing code in the product code
315 VDC Code: 2F Surge Voltage 365 VDC	**270**	1.24	2.85	480	0.20	22x35	HL2F271M#XS4
		1.25	2.88	480	0.20	25x30	HL2F271M#YS3
	330	1.40	3.22	390	0.20	22x40	HL2F331M#XS5
		1.44	3.31	390	0.20	25x35	HL2F331M#YS4
		1.43	3.29	390	0.20	30x25	HL2F331M#ZS2
	390	1.56	3.59	330	0.20	22x45	HL2F391M#XS6
		1.60	3.68	330	0.20	25x40	HL2F391M#YS5
		1.56	3.59	330	0.20	30x30	HL2F391M#ZS3
	470	1.79	4.12	280	0.20	25x45	HL2F471M#YS6
		1.48	3.40	280	0.20	35x25	HL2F471M#AS2
	560	1.99	4.58	230	0.20	25x50	HL2F561M#YS7
		1.93	4.44	230	0.20	30x35	HL2F561M#ZS4
		1.70	3.91	230	0.20	35x30	HL2F561M#AS3
	680	2.19	5.04	190	0.20	30x40	HL2F681M#ZS5
		1.96	4.51	190	0.20	35x35	HL2F681M#AS4
	820	2.51	5.77	160	0.20	30x50	HL2F821M#ZS7
		2.23	5.13	160	0.20	35x40	HL2F821M#AS5
	1000	2.55	5.87	130	0.20	35x45	HL2F102M#AS6
	1200	2.87	6.60	110	0.20	35x50	HL2F122M#AS7
400 VDC Code: 2G Surge Voltage 450 VDC	**120**	0.77	1.77	800	0.20	22x25	HL2G121M#XS2
	150	0.87	2.00	640	0.20	22x25	HL2G151M#XS2
		0.92	2.12	640	0.20	22x30	HL2G151M#XS3
		0.90	2.07	640	0.20	25x25	HL2G151M#YS2
	180	1.01	2.32	540	0.20	22x30	HL2G181M#XS3
		1.05	2.42	540	0.20	22x35	HL2G181M#XS4
		0.99	2.28	540	0.20	25x25	HL2G181M#YS2
		1.05	2.42	540	0.20	25x30	HL2G181M#YS3
	220	1.17	2.69	440	0.20	22x35	HL2G221M#XS4
		1.22	2.81	440	0.20	22x40	HL2G221M#XS5
		1.16	2.67	440	0.20	25x30	HL2G221M#YS3
		1.21	2.78	440	0.20	25x35	HL2G221M#YS4
		1.17	2.69	440	0.20	30x25	HL2G221M#ZS2
	270	1.35	3.11	360	0.20	22x40	HL2G271M#XS5
		1.40	3.22	360	0.20	22x45	HL2G271M#XS6
		1.35	3.11	360	0.20	25x35	HL2G271M#YS4
		1.40	3.22	360	0.20	25x40	HL2G271M#YS5
		1.28	2.94	360	0.20	30x25	HL2G271M#ZS2
	330	1.54	3.54	290	0.20	22x45	HL2G331M#XS6
		1.59	3.66	290	0.20	22x50	HL2G331M#XS7
		1.55	3.57	290	0.20	25x40	HL2G331M#YS5
		1.61	3.70	290	0.20	25x45	HL2G331M#YS6
		1.49	3.43	290	0.20	30x30	HL2G331M#ZS3
		1.52	3.50	290	0.20	35x25	HL2G331M#AS2
	390	1.74	4.00	250	0.20	25x45	HL2G391M#YS6
		1.80	4.14	250	0.20	25x50	HL2G391M#YS7

Additional designs on request · Weitere Designs auf Anfrage

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 # = variable value, see fixing code in the product code
400 VDC Code: 2G Surge Voltage 450 VDC	**390**	1.62	3.73	250	0.20	30x30	HL2G391M#ZS3
		1.70	3.91	250	0.20	30x35	HL2G391M#ZS4
		1.59	3.66	250	0.20	35x25	HL2G391M#AS2
		1.68	3.86	250	0.20	35x30	HL2G391M#AS3
	470	1.98	4.55	210	0.20	25x50	HL2G471M#YS7
		1.86	4.28	210	0.20	30x35	HL2G471M#ZS4
		1.94	4.46	210	0.20	30x40	HL2G471M#ZS5
		1.84	4.23	210	0.20	35x30	HL2G471M#AS3
		1.92	4.42	210	0.20	35x35	HL2G471M#AS4
	560	2.11	4.85	180	0.20	30x40	HL2G561M#ZS5
		2.19	5.04	180	0.20	30x45	HL2G561M#ZS6
		2.09	4.81	180	0.20	35x35	HL2G561M#AS4
		2.18	5.01	180	0.20	35x40	HL2G561M#AS5
	680	2.48	5.70	150	0.20	30x50	HL2G681M#ZS7
		2.40	5.52	150	0.20	35x40	HL2G681M#AS5
		2.48	5.70	150	0.20	35x45	HL2G681M#AS6
	820	2.72	6.26	120	0.20	35x45	HL2G821M#AS6
		2.80	6.44	120	0.20	35x50	HL2G821M#AS7
	1 000	3.09	7.11	120	0.20	35x50	HL2G102M#AS7
420 VDC Code: 420V Surge Voltage 470 VDC	**100**	0.71	1.63	1020	0.20	22x25	HL420V101M#XS2
	120	0.77	1.77	850	0.20	22x25	HL420V121M#XS2
		0.82	1.89	850	0.20	22x30	HL420V121M#XS3
		0.81	1.86	850	0.20	25x25	HL420V121M#YS2
	150	0.92	2.12	680	0.20	22x30	HL420V151M#XS3
		0.96	2.21	680	0.20	22x35	HL420V151M#XS4
		0.90	2.07	680	0.20	25x25	HL420V151M#YS2
	180	1.05	2.42	570	0.20	22x35	HL420V181M#XS4
		1.10	2.53	570	0.20	22x40	HL420V181M#XS5
		0.99	2.28	570	0.20	25x25	HL420V181M#YS2
		1.05	2.42	570	0.20	25x30	HL420V181M#YS3
		1.06	2.44	570	0.20	30x25	HL420V181M#ZS2
	220	1.22	2.81	470	0.20	22x40	HL420V221M#XS5
		1.26	2.90	470	0.20	22x45	HL420V221M#XS6
		1.16	2.67	470	0.20	25x30	HL420V221M#YS3
		1.21	2.78	470	0.20	25x35	HL420V221M#YS4
		1.15	2.65	470	0.20	30x25	HL420V221M#ZS2
	270	1.40	3.22	380	0.20	22x45	HL420V271M#XS6
		1.44	3.31	380	0.20	22x50	HL420V271M#XS7
		1.35	3.11	380	0.20	25x35	HL420V271M#YS4
		1.40	3.22	380	0.20	25x40	HL420V271M#YS5
		1.28	2.94	380	0.20	30x25	HL420V271M#ZS2
		1.35	3.11	380	0.20	30x30	HL420V271M#ZS3
		1.38	3.17	380	0.20	35x25	HL420V271M#AS2
	330	1.59	3.66	310	0.20	22x50	HL420V331M#XS7
		1.55	3.57	310	0.20	25x40	HL420V331M#YS5

Additional designs on request · Weitere Designs auf Anfrage

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 # = variable value, see fixing code in the product code
420 VDC Code: 420V Surge Voltage 470 VDC	**330**	1.61	3.70	310	0.20	25x45	HL420V331M#YS6
		1.66	3.82	310	0.20	25x50	HL420V331M#YS7
		1.49	3.43	310	0.20	30x30	HL420V331M#ZS3
		1.56	3.59	310	0.20	30x35	HL420V331M#ZS4
		1.46	3.36	310	0.20	35x25	HL420V331M#AS2
	390	1.74	4.00	270	0.20	25x45	HL420V391M#YS6
		1.80	4.14	270	0.20	25x50	HL420V391M#YS7
		1.70	3.91	270	0.20	30x35	HL420V391M#ZS4
		1.76	4.05	270	0.20	30x40	HL420V391M#ZS5
		1.67	3.84	270	0.20	35x30	HL420V391M#AS3
	470	1.98	4.55	220	0.20	25x50	HL420V471M#YS7
		1.94	4.46	220	0.20	30x40	HL420V471M#ZS5
		2.00	4.60	220	0.20	30x45	HL420V471M#ZS6
		1.84	4.23	220	0.20	35x30	HL420V471M#AS4
		1.92	4.42	220	0.20	35x35	HL420V471M#AS4
	560	2.19	5.04	190	0.20	30x45	HL420V561M#ZS6
		2.25	5.18	190	0.20	30x50	HL420V561M#ZS7
		2.09	4.81	190	0.20	35x35	HL420V561M#AS4
		2.18	5.01	190	0.20	35x40	HL420V561M#AS5
	680	2.48	5.70	150	0.20	30x50	HL420V681M#ZS7
		2.40	5.52	150	0.20	35x40	HL420V681M#AS5
		2.48	5.70	150	0.20	35x45	HL420V681M#AS6
		2.55	5.87	150	0.20	35x50	HL420V681M#AS7
	820	2.72	6.26	130	0.20	35x45	HL420V821M#AS6
450 VDC Code: 2W Surge Voltage 500 VDC	**82**	0.64	1.47	1250	0.20	22x25	HL2W820M#XS2
	100	0.71	1.63	1020	0.20	22x25	HL2W101M#XS2
	120	0.82	1.89	850	0.20	22x30	HL2W121M#XS3
		0.81	1.86	850	0.20	25x25	HL2W121M#YS2
	150	0.92	2.12	680	0.20	22x30	HL2W151M#XS3
		0.96	2.21	680	0.20	22x35	HL2W151M#XS4
		0.90	2.07	680	0.20	25x25	HL2W151M#Y23
		0.96	2.21	680	0.20	25x30	HL2W151M#YS3
	180	1.05	2.42	570	0.20	22x35	HL2W181M#XS4
		1.10	2.53	570	0.20	22x40	HL2W181M#XS5
		1.05	2.42	570	0.20	25x30	HL2W181M#YS3
		1.10	2.53	570	0.20	25x35	HL2W181M#YS4
		1.06	2.44	570	0.20	30x25	HL2W181M#ZS2
	220	1.22	2.81	470	0.20	22x40	HL2W221M#XS5
		1.26	2.90	470	0.20	22x45	HL2W221M#XS6
		1.30	2.99	470	0.20	22x50	HL2W221M#XS7
		1.21	2.78	470	0.20	25x35	HL2W221M#YS4
		1.27	2.92	470	0.20	25x40	HL2W221M#YS5
		1.15	2.65	470	0.20	30x25	HL2W221M#ZS2
		1.22	2.81	470	0.20	30x30	HL2W221M#ZS3
		1.24	2.85	470	0.20	35x25	HL2W221M#AS2

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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 # = variable value, see fixing code in the product code
450 VDC Code: 2W Surge Voltage 500 VDC	**270**	1.44	3.31	380	0.20	22x50	HL2W271M#XS7
		1.40	3.22	380	0.20	25x40	HL2W271M#YS5
		1.45	3.34	380	0.20	25x45	HL2W271M#YS6
		1.35	3.11	380	0.20	30x30	HL2W271M#ZS3
		1.41	3.24	380	0.20	30x35	HL2W271M#ZS4
		1.32	3.04	380	0.20	35x25	HL2W271M#AS2
	330	1.61	3.70	310	0.20	25x45	HL2W331M#YS6
		1.66	3.82	310	0.20	25x50	HL2W331M#YS7
		1.56	3.59	310	0.20	30x35	HL2W331M#ZS4
		1.62	3.73	310	0.20	30x40	HL2W331M#ZS5
		1.54	3.54	310	0.20	35x30	HL2W331M#AS3
	390	1.76	4.05	270	0.20	30x40	HL2W391M#ZS5
		1.82	4.19	270	0.20	30x45	HL2W391M#ZS6
		1.67	3.84	270	0.20	35x30	HL2W391M#AS3
		1.75	4.03	270	0.20	35x35	HL2W391M#AS4
	470	2.00	4.60	220	0.20	30x45	HL2W471M#ZS6
		2.07	4.76	220	0.20	30x50	HL2W471M#ZS7
		1.92	4.42	220	0.20	35x35	HL2W471M#AS4
		1.99	4.58	220	0.20	35x40	HL2W471M#AS5
	560	2.25	5.18	190	0.20	30x50	HL2W561M#ZS7
		2.18	5.01	190	0.20	35x40	HL2W561M#AS5
		2.25	5.18	190	0.20	35x45	HL2W561M#AS6
	680	2.48	5.70	150	0.20	35x45	HL2W681M#AS6
		2.55	5.87	150	0.20	35x50	HL2W681M#AS7
	1 200	3.86	8.88	85	0.20	35x100	HL2W122M#AS17
500 VDC Code: 2H Surge Voltage 550 VDC	**47**	0.37	0.85	2040	0.20	22x25	HL2H470M#XS2
	56	0.40	0.92	1710	0.20	22x25	HL2H560M#XS2
	68	0.45	1.04	1410	0.20	22x25	HL2H680M#XS2
		0.48	1.10	1410	0.20	22x30	HL2H680M#XS3
		0.49	1.13	1410	0.20	25x25	HL2H680M#YS2
	82	0.54	1.24	1170	0.20	22x30	HL2H820M#XS3
		0.56	1.29	1170	0.20	22x35	HL2H820M#XS4
		0.55	1.27	1170	0.20	25x25	HL2H820M#YS2
		0.57	1.31	1170	0.20	25x30	HL2H820M#YS3
	100	0.62	1.43	960	0.20	22x35	HL2H101M#XS4
		0.65	1.50	960	0.20	22x40	HL2H101M#XS5
		0.64	1.47	960	0.20	25x30	HL2H101M#YS3
		0.67	1.54	960	0.20	25x35	HL2H101M#YS4
		0.68	1.56	960	0.20	30x25	HL2H101M#ZS2
	120	0.72	1.66	800	0.20	22x40	HL2H121M#XS5
		0.75	1.73	800	0.20	22x45	HL2H121M#XS6
		0.74	1.70	800	0.20	25x35	HL2H121M#YS4
		0.77	1.77	800	0.20	25x40	HL2H121M#YS5
		0.75	1.73	800	0.20	30x25	HL2H121M#ZS2
		0.79	1.82	800	0.20	30x30	HL2H121M#ZS3

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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 # = variable value, see fixing code in the product code
500 VDC Code: 2H Surge Voltage 550 VDC	**150**	0.85	1.96	640	0.20	22x45	HL2H151M#XS6
		0.88	2.02	640	0.20	25x40	HL2H151M#YS5
		0.91	2.09	640	0.20	25x45	HL2H151M#YS6
		0.90	2.07	640	0.20	30x30	HL2H151M#ZS3
		0.94	2.16	640	0.20	30x35	HL2H151M#ZS4
		0.94	2.16	640	0.20	35x25	HL2H151M#AS2
	180	1.01	2.32	540	0.20	25x45	HL2H181M#YS6
		1.04	2.39	540	0.20	25x50	HL2H181M#YS7
		1.04	2.39	540	0.20	30x35	HL2H181M#ZS4
		1.08	2.48	540	0.20	30x40	HL2H181M#ZS5
		1.04	2.39	540	0.20	35x25	HL2H181M#AS2
		1.09	2.51	540	0.20	35x30	HL2H181M#AS3
	220	1.17	2.69	440	0.20	25x50	HL2H221M#YS7
		1.21	2.78	440	0.20	30x40	HL2H221M#ZS5
		1.26	2.90	440	0.20	30x45	HL2H221M#ZS6
		1.22	2.81	440	0.20	35x30	HL2H221M#AS3
		1.28	2.94	440	0.20	35x35	HL2H221M#AS4
	270	1.41	3.24	360	0.20	30x45	HL2H271M#ZS6
		1.45	3.34	360	0.20	30x50	HL2H271M#ZS7
		1.44	3.31	360	0.20	35x35	HL2H271M#AS4
		1.49	3.43	360	0.20	35x40	HL2H271M#AS5
	330	1.63	3.75	290	0.20	30x50	HL2H331M#ZS7
		1.67	3.84	290	0.20	35x40	HL2H331M#AS5
		1.73	3.98	290	0.20	35x45	HL2H331M#AS6
	390	1.89	4.35	250	0.20	30x60	HL2H391M#ZS9
		1.90	4.37	250	0.20	35x45	HL2H391M#AS6
		1.96	4.51	250	0.20	35x50	HL2H391M#AS7
	470	2.18	5.01	210	0.20	35x50	HL2H471M#AS7
	560	2.53	5.82	180	0.20	35x60	HL2H561M#AS9
	700	3.55	8.17	140	0.20	35x80	HL2H701M#AS13
	800	3.33	7.66	125	0.20	35x80	HL2H801M#AS13
	1 000	4.07	9.36	100	0.20	40x100	HL2H102M#BS17

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› Ripple Current Multiplier · Wechselstrommultiplikator

Frequency [Hz]	50/60	120	300	1k	≥ 10k
Multiplier	0.70	1.00	1.18	1.34	1.45

Forced cooling [m/sec]	v < 1.0	v ≥ 1.0
Multiplier	1.0	1.1

Temperature [°C]	40	60	70	85	105
Multiplier	2.3	2.0	1.8	1.4	1.0

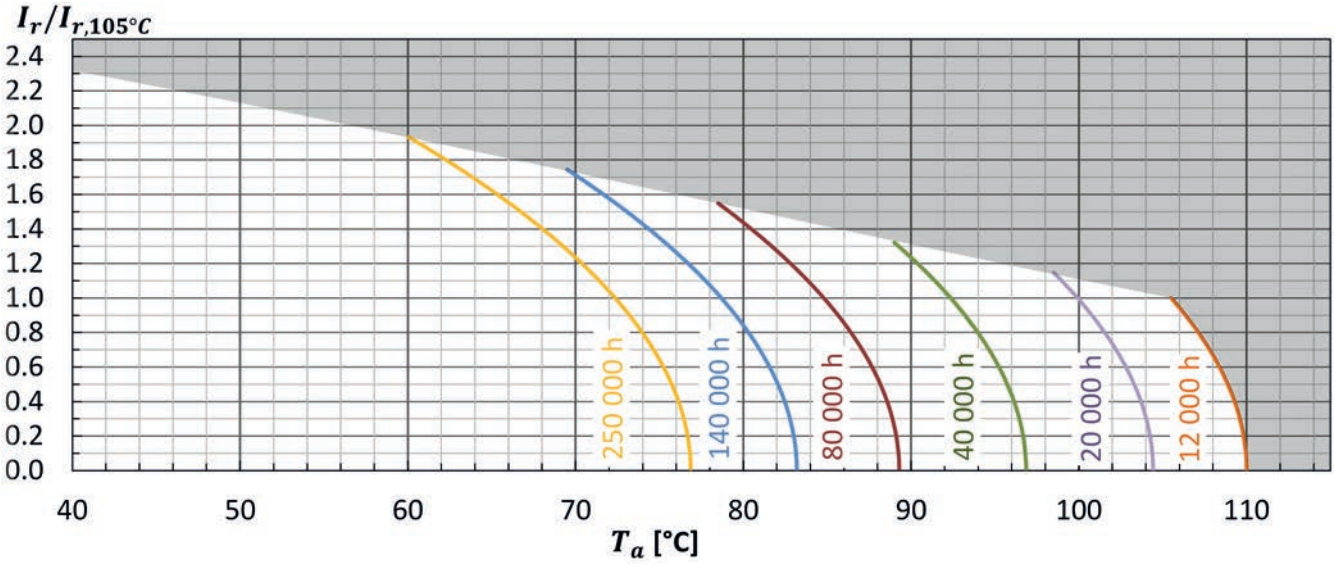
› Life Time Table · Brauchbarkeitsdauer – Tabelle

HL	Useful life as function of ambient temperature and ripple current													
I_r at 105°C	x 1.0	x 1.1	x 1.2	x 1.3	x 1.4	x 1.5	x 1.6	x 1.7	x 1.8	x 1.9	x 2.0	x 2.1	x 2.2	x 2.3
T_a = 40°C	250	250	250	250	250	250	250	250	250	250	250	250	250	250
T_a = 50°C	250	250	250	250	250	250	250	250	250	250	250	250		
T_a = 60°C	250	250	250	250	250	250	250	250	250	250	225			
T_a = 65°C	250	250	250	250	250	250	250	225	194	167				
T_a = 70°C	250	250	250	233	208	185	163	142	123					
T_a = 75°C	196	180	163	147	132	117	103							
T_a = 80°C	124	113	103	93	83	74								
T_a = 85°C	78	72	65	59	52									
T_a = 90°C	49	45	41	37										
T_a = 95°C	31	28	26											
T_a = 100°C	19	18												
T_a = 105°C	12		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 $I_{r,\ 105°C,120Hz}$



› 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 8000 hours	ΔC/C ≤ 20% (of initial value) Tanδ ≤ 200% (of specified value) I_L ≤ specified value
Useful life	T_a = 105°C; V_r, I_r applied 12000 hours	ΔC/C ≤ 30% (of initial value) Tanδ < 300% (of specified value) I_L ≤ specified value

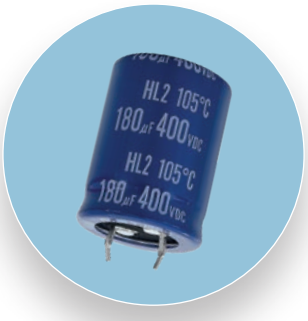
Reference Specification: JIS C 5101-4, JIS C 5102, IEC 60384-4

HL2 · Snap-In · 12000 h/105 °C

Long Life

› 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)	0.02 • C • V_r [µA] or 3 mA, which is smaller.
Useful life	12 000 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
Sleeve withstanding voltage	3000 Vac/1 min between terminals bundled and plate*



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

› Outline Drawings · Bauformen

Refer to page 5 for available terminal shapes and dimensions. · Auf Seite 5 finden Sie die verfügbaren Bauformen und Maße.

› Product Code · Bestellbezeichnung

Example: Series HL2 · 400 V · 470 µF ±20 % · 30x50 mm · 4-pin short · without plate

HL2	2G	471	M	X	Z	S7	WPEC

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
- C: 2-pin short terminal
- X: 4-pin short terminal
- E: 3-pin short terminal

Outer design code

None:
PET sleeve and PVC plate

WPEC:
PET sleeve without plate

Others on request

Rated voltage Code

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

Capacitance tolerance

- M : ± 20%
- Q : -10% ~ +30%

Diameter Code

Code	ØD
W	20
X	22
Y	25
Z	30
A	35
B	40

Length Code

Code	L	Code	L
S1	20	S8	55
S2	25	S9	60
S3	30	S10	65
S4	35	S11	70
S5	40	S12	75
S6	45	S13	80
S7	50		

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 # = variable value, see fixing code in the product code
200 VDC Code: 2D Surge Voltage 250 VDC	**220**	0.97	2.72	456	0.15	20x25	HL22D221M#WS2
	270	1.16	3.25	372	0.15	20x30	HL22D271M#WS3
	330	1.35	3.78	304	0.15	20x35	HL22D331M#WS4
		1.31	3.67	304	0.15	22x30	HL22D331M#XS3
		1.25	3.50	304	0.15	25x25	HL22D331M#YS2
	390	1.45	4.06	257	0.15	25x30	HL22D391M#YS3
	470	1.74	4.87	214	0.15	22x40	HL22D471M#XS5
		1.60	4.48	214	0.15	25x30	HL22D471M#YS3
		1.56	4.37	214	0.15	30x25	HL22D471M#ZS2
	560	1.99	5.57	179	0.15	22x45	HL22D561M#XS6
		1.84	5.15	179	0.15	25x35	HL22D561M#YS4
	680	2.12	5.94	148	0.15	25x40	HL22D681M#YS5
		1.99	5.57	148	0.15	30x30	HL22D681M#ZS3
	820	2.44	6.83	122	0.15	25x45	HL22D821M#YS6
		2.31	6.47	122	0.15	30x35	HL22D821M#ZS4
	1 000	2.67	7.48	100	0.15	30x40	HL22D102M#ZS5
		2.26	6.33	100	0.15	35x30	HL22D102M#AS3
	1 200	3.06	8.57	84	0.15	30x45	HL22D122M#ZS6
		2.60	7.28	84	0.15	35x35	HL22D122M#AS4
	1 500	3.04	8.51	67	0.15	35x40	HL22D152M#AS5
250 VDC Code: 2E Surge Voltage 300 VDC	**150**	0.8	2.24	496	0.15	20x25	HL22E151M#WS2
	180	0.94	2.63	413	0.15	20x30	HL22E181M#WS3
		0.9	2.52	413	0.15	22x25	HL22E181M#XS2
	220	1.03	2.88	338	0.15	20x30	HL22E221M#WS3
	270	1.22	3.42	275	0.15	20x35	HL22E271M#WS4
		1.13	3.16	275	0.15	25x25	HL22E271M#YS2
	330	1.39	3.89	225	0.15	22x35	HL22E331M#XS4
		1.33	3.72	225	0.15	25x30	HL22E331M#YS3
	390	1.58	4.42	191	0.15	22x40	HL22E391M#XS5
		1.53	4.28	191	0.15	25x35	HL22E391M#YS4
		1.43	4.00	191	0.15	30x25	HL22E391M#ZS2
	470	1.90	5.32	162	0.15	22x50	HL22E471M#XS7
		1.77	4.96	162	0.15	25x40	HL22E471M#YS5
		1.66	4.65	162	0.15	30x30	HL22E471M#ZS3
	560	2.02	5.66	136	0.15	25x45	HL22E561M#YS6
	680	2.32	6.50	112	0.15	25x50	HL22E681M#YS7
		2.10	5.88	112	0.15	30x35	HL22E681M#ZS4
	820	2.42	6.78	93	0.15	30x40	HL22E821M#ZS5
	1 000	2.90	8.12	76	0.15	30x50	HL22E102M#ZS7
	1 200	2.83	7.92	64	0.15	35x45	HL22E122M#AS6
	1 500	3.29	9.21	61	0.15	35x50	HL22E152M#AS7

Additional designs on request · Weitere Designs auf Anfrage

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 # = variable value, see fixing code in the product code
400 VDC Code: 2G Surge Voltage 450 VDC	**47**	0.46	1.29	1625	0.15	20x25	HL22G470M#WS2
	68	0.56	1.57	1121	0.15	20x25	HL22G680M#WS2
	82	0.64	1.79	1126	0.15	20x25	HL22G820M#WS2
	100	0.77	2.16	781	0.15	20x35	HL22G101M#WS4
		0.75	2.10	781	0.15	22x30	HL22G101M#XS3
		0.72	2.02	781	0.15	25x25	HL22G101M#YS2
	120	0.85	2.38	651	0.15	20x35	HL22G121M#WS4
		0.87	2.44	651	0.15	22x35	HL22G121M#XS4
		0.84	2.35	651	0.15	25x30	HL22G121M#YS3
	150	1.02	2.86	521	0.15	22x40	HL22G151M#XS5
		0.94	2.63	521	0.15	25x30	HL22G151M#YS3
		0.88	2.46	521	0.15	30x25	HL22G151M#ZS2
	180	1.18	3.30	475	0.15	22x45	HL22G181M#XS6
		1.09	3.05	475	0.15	25x35	HL22G181M#YS4
		1.02	2.86	475	0.15	30x30	HL22G181M#ZS3
	220	1.35	3.78	389	0.15	22x50	HL22G221M#XS7
		1.26	3.53	389	0.15	25x40	HL22G221M#YS5
		1.13	3.16	389	0.15	30x30	HL22G221M#ZS3
	270	1.46	4.09	317	0.15	25x45	HL22G271M#YS6
		1.33	3.72	317	0.15	30x35	HL22G271M#ZS4
		1.33	3.72	317	0.15	35x30	HL22G271M#AS3
	330	1.67	4.68	259	0.15	25x50	HL22G331M#YS7
		1.54	4.31	259	0.15	30x40	HL22G331M#ZS5
		1.54	4.31	259	0.15	35x35	HL22G331M#AS4
	390	1.75	4.90	219	0.15	30x45	HL22G391M#ZS6
		1.67	4.68	219	0.15	35x35	HL22G391M#AS4
		2.16	6.04	219	0.15	40x31	HL22G391M#BS3
	470	2.00	5.61	182	0.15	30x50	HL22G471M#ZS7
		1.92	5.38	182	0.15	35x40	HL22G471M#AS5
	560	2.19	6.13	156	0.15	35x45	HL22G561M#AS6
	680	2.51	7.02	126	0.15	35x50	HL22G681M#AS7
		2.75	7.70	124	0.15	35x50	HL22G681M#AS72P
		2.44	6.84	130	0.15	40x40	HL22G681M#BS5
	820	2.98	8.35	105	0.15	35x70	HL22G821M#AS11
	1 000	3.48	9.73	86	0.15	35x80	HL22G102M#AS13
420 VDC Code: 420V Surge Voltage 470 VDC	**150**	0.94	2.63	570	0.15	30x30	HL2420V151M#ZS3
	180	1.08	3.02	475	0.15	30x35	HL2420V181M#ZS4
		1.08	3.02	475	0.15	35x30	HL2420V181M#AS3
	220	1.36	3.82	389	0.15	25x50	HL2420V221M#YS7
		1.20	3.36	389	0.15	30x35	HL2420V221M#ZS4
		1.20	3.36	389	0.15	35x30	HL2420V221M#AS3
	330	1.54	4.31	259	0.15	30x40	HL2420V331M#ZS5

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 # = variable value, see fixing code in the product code
450 VDC Code: 2W Surge Voltage 500 VDC	**47**	0.46	1.29	1820	0.15	20x25	HL22W470M#WS2
	56	0.55	1.54	1527	0.15	20x30	HL22W560M#WS3
		0.53	1.48	1527	0.15	22x25	HL22W560M#XS2
	68	0.60	1.68	1258	0.15	20x30	HL22W680M#WS3
		0.62	1.74	1258	0.15	22x30	HL22W680M#XS3
		0.59	1.65	1258	0.15	25x25	HL22W680M#YS2
	82	0.70	1.96	1043	0.15	20x35	HL22W820M#WS4
	100	0.79	2.21	855	0.15	22x35	HL22W101M#XS4
		0.72	2.00	855	0.15	25x25	HL22W101M#YS2
	120	0.91	2.55	713	0.15	22x40	HL22W121M#XS5
		0.88	2.46	713	0.15	25x35	HL22W121M#YS4
		0.79	2.21	713	0.15	30x25	HL22W121M#ZS2
	150	1.12	3.14	570	0.15	22x50	HL22W151M#XS7
		1.04	2.91	570	0.15	25x40	HL22W151M#YS5
		0.94	2.63	570	0.15	30x30	HL22W151M#ZS3
	180	1.19	3.33	475	0.15	25x45	HL22W181M#YS6
		1.08	3.02	475	0.15	30x35	HL22W181M#ZS4
	220	1.40	3.92	389	0.15	25x40	HL22W221M#YS5
		1.20	3.36	389	0.15	35x30	HL22W221M#AS3
	270	1.45	4.06	317	0.15	30x45	HL22W271M#ZS6
		1.40	3.92	317	0.15	35x35	HL22W271M#AS4
	330	1.67	4.68	259	0.15	30x50	HL22W331M#ZS7
		1.62	4.54	259	0.15	35x40	HL22W331M#AS5
	390	1.83	5.12	224	0.15	35x45	HL22W391M#AS6
	470	2.08	5.82	190	0.15	35x50	HL22W471M#AS7
500 VDC Code: 2H Surge Voltage 550 VDC	**100**	0.74	2.06	960	0.20	25x45	HL22H101M#YS6
	120	0.85	2.37	800	0.20	25x50	HL22H121M#YS7
		0.79	2.22	800	0.20	30x35	HL22H121M#ZS4
		0.79	2.22	800	0.20	35x30	HL22H121M#AS3
	150	0.94	2.62	640	0.20	30x40	HL22H151M#ZS5
		0.94	2.62	640	0.20	35x35	HL22H151M#AS4
	180	1.11	3.11	540	0.20	30x50	HL22H181M#ZS7
		1.07	2.99	540	0.20	35x40	HL22H181M#AS5
	220	1.23	3.45	440	0.20	35x45	HL22H221M#AS6
	270	1.42	3.97	360	0.20	35x50	HL22H271M#AS7
	330	1.56	4.37	340	0.20	35x60	HL22H331M#AS9
	390	1.94	5.43	250	0.20	40x61	HL22H391M#BS9

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	1.18	1.34	1.45

Forced cooling [m/sec]	v < 1.0	v ≥ 1.0
Multiplier	1.0	1.1

Temperature [°C]	40	60	70	85	105
Multiplier	2.8	2.4	2.1	2.0	1.0

› Life Time Table · Brauchbarkeitsdauer – Tabelle

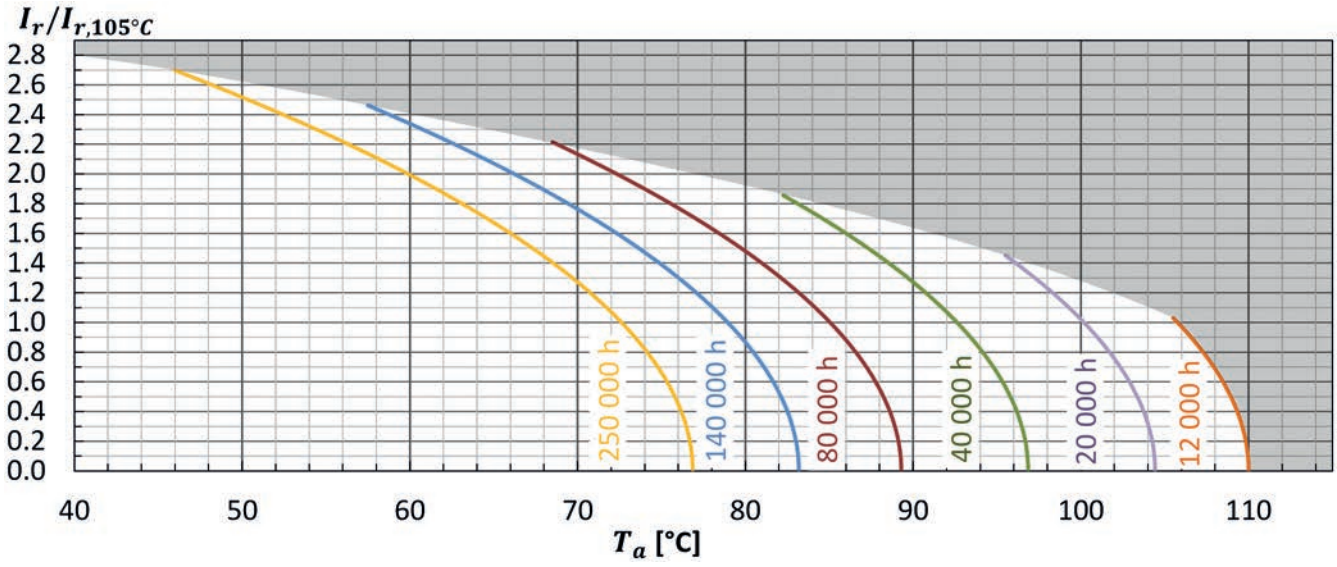
HL2	Useful life as function of ambient temperature and ripple current													
I_r at 105°C	x 1.0	x 1.2	x 1.4	x 1.6	x 1.8	x 2.0	x 2.1	x 2.2	x 2.3	x 2.4	x 2.5	x 2.6	x 2.7	x 2.8
T_a = 40°C	250	250	250	250	250	250	250	250	250	250	250	250	250	250
T_a = 45°C	250	250	250	250	250	250	250	250	250	250	250	250	250	
T_a = 50°C	250	250	250	250	250	250	250	250	250	250	250	211		
T_a = 55°C	250	250	250	250	250	250	250	250	237	198	163			
T_a = 60°C	250	250	250	250	250	248	211	179	150	125				
T_a = 65°C	250	250	250	250	210	156	133	113	94					
T_a = 70°C	250	250	219	173	133	99	84							
T_a = 75°C	201	169	138	109	84	62	53							
T_a = 80°C	127	107	87	69	53	39								
T_a = 85°C	80	67	55	43	33	25								
T_a = 90°C	50	42	35	27	21									
T_a = 95°C	32	27	22	17										
T_a = 100°C	20	17												
T_a = 105°C	12													

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 $I_{r,\ 105°C,120Hz}$



› 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 8000 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 12000 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

DH · Snap-In · 6000h/105 °C

Permanent Charge-Discharge application Design

These capacitors have been developed especially for deep and frequent charge – discharge applications such as AC servo motors, lamp flash, X-ray, etc.

Diese Kondensatoren wurden speziell für Anwendungen mit häufigen und tiefen Lade-/Entladevorgängen entwickelt wie z.B. AC Motoren, Blitzlampen, Röntgengeräte usw.

› Specifications · Spezifikationen

Items	Characteristics
Temperature range	-25°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)	0.02 • 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
Specifications	JIS C 5101-4, AEC-Q200 qualified
Vibration	0.75mm, 10...55Hz, 10g, 3x2h
Charge – Discharge	ΔV = 150VDC, f = 6Hz life ≥ 150 Mio cycles at 40°C
Sleeve withstanding voltage	3000 Vac/1 min between terminals bundled and plate*

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

› Outline Drawings · Bauformen

Refer to page 5 for available terminal shapes and dimensions. · Auf Seite 5 finden Sie die verfügbaren Bauformen und Maße.

› Product Code · Bestellbezeichnung

Example: Series DH · 400 V · 100 µF ±20 % · 22x25 mm · 2-Pin · without plate

DH	2G	101	M	R	X	S2	WPEC

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
- C: 2-pin short terminal
- X: 4-pin short terminal
- E: 3-pin short terminal

Outer design code

- None: PET sleeve and PVC plate
- WPEC: PET sleeve without plate

Others on request

Rated voltage code

Code	Voltage
2G	400
2W	450

Capacitance tolerance

M : ± 20%

Diameter Code

Code	ØD
X	22
Y	25
Z	30
A	35

Length Code

Code	L	Code	L
S2	25	S6	45
S3	30	S7	50
S4	35	S13	80
S5	40		

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 # = variable value, see fixing code in the product code
400 VDC Code: 2G Surge Voltage 450 VDC	**100**	0.70	1.61	1100	0.20	22x25	DH2G101M#XS2
	120	0.82	1.89	920	0.20	22x30	DH2G121M#XS3
		0.81	1.86	920	0.20	25x25	DH2G121M#YS2
	150	0.96	2.21	730	0.20	22x35	DH2G151M#XS4
	180	1.09	2.51	610	0.20	22x40	DH2G181M#XS5
		1.04	2.39	610	0.20	25x30	DH2G181M#YS3
	220	1.25	2.88	500	0.20	22x45	DH2G221M#XS6
		1.21	2.78	500	0.20	25x35	DH2G221M#YS4
		1.15	2.65	500	0.20	30x25	DH2G221M#ZS2
	270	1.44	3.31	410	0.20	22x50	DH2G271M#XS7
		1.39	3.20	410	0.20	25x40	DH2G271M#YS5
		1.34	3.08	410	0.20	30x30	DH2G271M#ZS3
		1.32	3.04	410	0.20	35x25	DH2G271M#AS2
	330	1.60	3.68	330	0.20	25x45	DH2G331M#YS6
		1.55	3.57	330	0.20	30x35	DH2G331M#ZS4
		1.68	3.86	330	0.20	35x30	DH2G331M#AS3
	390	1.76	4.05	280	0.20	30x40	DH2G391M#ZS5
		1.67	3.84	280	0.20	35x30	DH2G391M#AS3
	470	2.00	4.60	230	0.20	30x45	DH2G471M#ZS6
		1.91	4.39	230	0.20	35x35	DH2G471M#AS4
	560	2.25	5.18	200	0.20	30x50	DH2G561M#ZS7
		2.17	4.99	200	0.20	35x40	DH2G561M#AS5
	680	2.47	5.68	160	0.20	35x45	DH2G681M#AS6
	1 500	4.99	11.48	55	0.20	35x80	DH2G152M#AS132PCC
450 VDC Code: 2W Surge Voltage 500 VDC	**82**	0.64	1.47	1220	0.20	22x25	DH2W820M#XS2
	100	0.75	1.73	1000	0.20	22x30	DH2W101M#XS3
		0.74	1.70	1000	0.20	25x25	DH2W101M#YS2
	120	0.86	1.98	830	0.20	22x35	DH2W121M#XS4
		0.85	1.96	830	0.20	25x30	DH2W121M#YS3
	150	1.00	2.30	660	0.20	22x40	DH2W151M#XS5
		1.00	2.30	660	0.20	25x35	DH2W151M#YS4
		0.95	2.19	660	0.20	30x25	DH2W151M#ZS2
	180	1.13	2.60	550	0.20	22x45	DH2W181M#XS6
		1.09	2.51	550	0.20	25x35	DH2W181M#YS4
	220	1.30	2.99	450	0.20	25x45	DH2W221M#YS6
		1.21	2.78	450	0.20	30x30	DH2W221M#ZS3
		1.19	2.74	450	0.20	35x25	DH2W221M#AS2
	270	1.49	3.43	370	0.20	25x50	DH2W271M#YS7
		1.41	3.24	370	0.20	30x35	DH2W271M#ZS4
		1.39	3.20	370	0.20	35x30	DH2W271M#AS3
	300	1.48	3.40	323	0,20	35x30	DH2W301M#AS3
	330	1.62	3.73	300	0.20	30x40	DH2W331M#ZS5
		1.60	3.68	300	0.20	35x35	DH2W331M#AS4
	390	1.88	4.32	260	0.20	30x50	DH2W391M#ZS7
		1.81	4.16	260	0.20	35x40	DH2W391M#AS5
	470	2.05	4.72	210	0.20	35x45	DH2W471M#AS6
	500	2.11	4.85	198	0.20	35x45	DH2W501M#AS6
	560	2.31	5.31	180	0.20	35x50	DH2W561M#AS7

Additional designs on request · Weitere Designs auf Anfrage

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› Ripple Current Multiplier · Wechselstrommultiplikator

Frequency [Hz]	50/60	120	300	1k	≥ 10k
Multiplier	0.70	1.00	1.18	1.34	1.45

Forced cooling [m/sec]	v < 1.0	v ≥ 1.0
Multiplier	1.0	1.1

Temperature [°C]	40	60	70	85	105
Multiplier	2.3	1.9	1.7	1.4	1.0

› Life Time Table · Brauchbarkeitsdauer – Tabelle

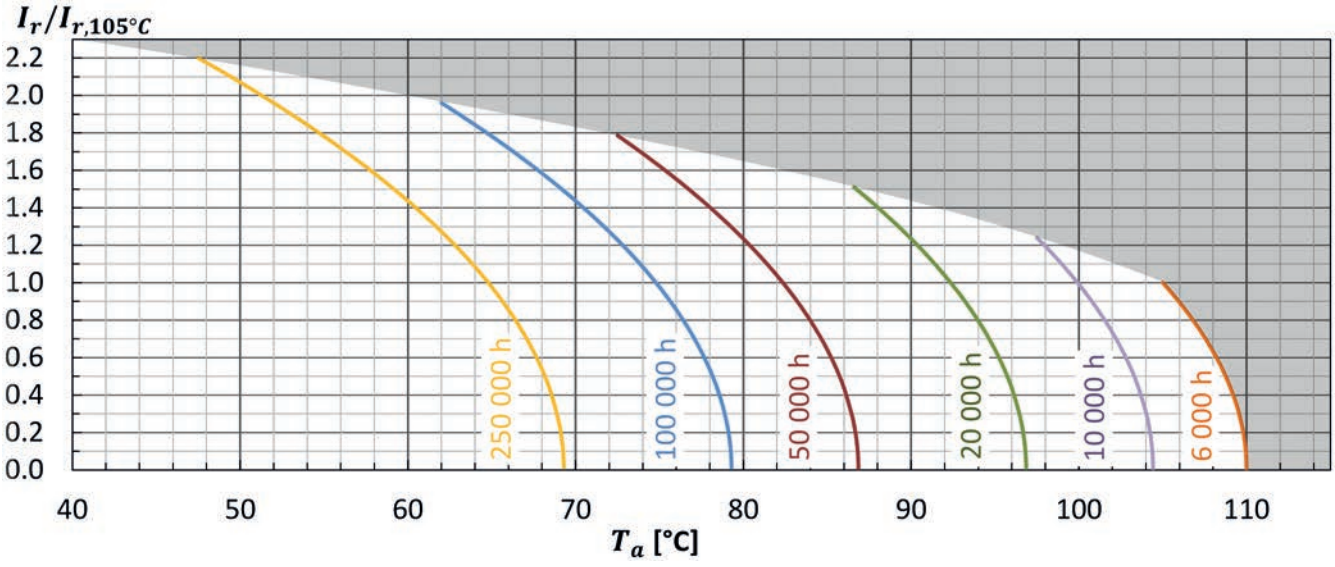
DH	Useful life as function of ambient temperature and ripple current													
I_r at 105°C	x 1.0	x 1.1	x 1.2	x 1.3	x 1.4	x 1.5	x 1.6	x 1.7	x 1.8	x 1.9	x 2.0	x 2.1	x 2.2	x 2.3
T_a = 40°C	250	250	250	250	250	250	250	250	250	250	250	250	250	250
T_a = 45°C	250	250	250	250	250	250	250	250	250	250	250	250		
T_a = 50°C	250	250	250	250	250	250	250	250	250	250	250			
T_a = 55°C	250	250	250	250	250	250	250	250	243	209	178			
T_a = 60°C	250	250	250	250	250	231	203	177	154	132				
T_a = 65°C	245	225	204	184	165	146	128	112	97					
T_a = 70°C	155	142	129	116	104	92	81	71						
T_a = 75°C	98	90	81	73	66	58	51							
T_a = 80°C	62	56	51	46	41									
T_a = 85°C	39	36	32	29	26									
T_a = 90°C	24	22	20											
T_a = 95°C	15	14												
T_a = 100°C	9	9												
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 $I_{r,\ 105°C,120Hz}$



› 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 5000 hours f = 6Hz ≥ 100 Mio cycles at 40°C	ΔC/C ≤ 20% (of initial value) Tanδ ≤ 200% (of specified value) I_L ≤ specified value
Useful life	T_a = 105°C; V_r, I_r applied 6000 hours f = 6Hz ≥ 150 Mio cycles at 40°C	ΔC/C ≤ 30% (of initial value) Tanδ < 300% (of specified value) I_L ≤ specified value

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

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ZLR · Snap-In · 8000 h/105 °C

High Ripple Current · ULTRA low ESR · Compact Design

› Specifications · Spezifikationen

Items	Characteristics
Temperature range	-25°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)	0.02 • C • V_r [µA] or 3 mA, which is smaller.
Useful life	8 000 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
Specifications	JIS C 5101-4, AEC-Q200 qualified
Vibration	0.75mm, 10...55Hz, 10g, 3x2h
Sleeve withstanding voltage	3000 Vac/1 min between terminals bundled and plate*

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

› Outline Drawings · Bauformen

Refer to page 5 for available terminal shapes and dimensions. · Auf Seite 5 finden Sie die verfügbaren Bauformen und Maße.

› Product Code · Bestellbezeichnung

Example: Series ZLR · 450 V · 560 µF ± 20 % · 35 x 50 mm · 2-pin short · without plate

ZLR **2W** **561** **M** **C** **A** **S7** **WPEC**

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
C: 2-pin short terminal
X: 4-pin short terminal
E: 3-pin short terminal

Diameter code

Code	ØD
X	22
Y	25
Z	30
A	35

Outer design code

None: PET sleeve and PVC plate
WPEC: PET sleeve without plate

Rated voltage code

Code	Voltage
2G	400
2W	450

Capacitance tolerance

M : ± 20%
Q : -10% ~ +30%

Length Code

Code	L	Code	L
S2	25	S6	45
S3	30	S7	50
S4	35	S8	55
S5	40	S9	60

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 # = variable value, see fixing code in the product code
400 VDC Code: 2G Surge Voltage 450 VDC	**100**	0.83	2.08	430	0.20	22x25	ZLR2G101M#XS2
	120	0.94	2.35	350	0.20	22x30	ZLR2G121M#XS3
		0.95	2.38	350	0.20	25x25	ZLR2G121M#YS2
	150	1.09	2.73	275	0.20	22x35	ZLR2G151M#XS4
	180	1.22	3.05	225	0.20	22x40	ZLR2G181M#XS5
		1.21	3.03	225	0.20	25x30	ZLR2G181M#YS3
		1.26	3.15	225	0.20	30x25	ZLR2G181M#ZS2
	220	1.37	3.43	180	0.20	22x45	ZLR2G221M#XS6
		1.38	3.45	180	0.20	25x35	ZLR2G221M#YS4
		1.44	3.60	180	0.20	30x30	ZLR2G221M#ZS3
	270	1.54	3.85	145	0.20	22x50	ZLR2G271M#XS7
		1.56	3.90	145	0.20	25x40	ZLR2G271M#YS5
		1.65	4.13	145	0.20	30x35	ZLR2G271M#ZS4
		1.61	4.03	145	0.20	35x25	ZLR2G271M#AS2
	330	1.77	4.43	115	0.20	25x50	ZLR2G331M#YS7
		1.85	4.63	115	0.20	30x40	ZLR2G331M#ZS5
		2.42	5.81	100	0.20	30x50	ZLR2G331Q#ZS7CC
		1.83	4.58	115	0.20	35x30	ZLR2G331M#AS3
	390	2.05	5.13	95	0.20	30x45	ZLR2G391M#ZS6
		2.05	5.13	95	0.20	35x35	ZLR2G391M#AS4
	470	2.27	5.68	80	0.20	30x50	ZLR2G471M#ZS7
		2.29	5.73	80	0.20	35x40	ZLR2G471M#AS5
	560	2.54	6.35	65	0.20	35x45	ZLR2G561M#AS6
		3.16	7.58	50	0.20	35x60	ZLR2G561Q#AS9CCR
	680	2.82	7.05	50	0.20	35x50	ZLR2G681M#AS7
		3.49	8.38	40	0.20	35x60	ZLR2G681Q#AS9CCR
450 VDC Code: 2W Surge Voltage 500 VDC	**68**	0.66	1.65	675	0.20	22x25	ZLR2W680M#XS2
	100	0.83	2.08	450	0.20	22x30	ZLR2W101M#XS3
		0.84	2.10	450	0.20	25x25	ZLR2W101M#YS2
	120	0.94	2.35	365	0.20	22x35	ZLR2W121M#XS4
		0.95	2.38	365	0.20	25x30	ZLR2W121M#YS3
	150	1.07	2.68	285	0.20	22x40	ZLR2W151M#XS5
		1.10	2.75	285	0.20	25x35	ZLR2W151M#YS4
		1.11	2.78	285	0.20	30x25	ZLR2W151M#ZS2
	180	1.19	2.98	235	0.20	22x45	ZLR2W181M#XS6
		1.23	3.08	235	0.20	25x40	ZLR2W181M#YS5
		1.26	3.15	235	0.20	30x30	ZLR2W181M#ZS3
	220	1.34	3.35	190	0.20	22x50	ZLR2W221M#XS7
		1.38	3.45	190	0.20	25x45	ZLR2W221M#YS6
		1.43	3.58	190	0.20	30x35	ZLR2W221M#ZS4
		1.42	3.55	190	0.20	35x25	ZLR2W221M#AS2
	270	1.54	3.85	150	0.20	25x50	ZLR2W271M#YS7
		1.62	4.05	150	0.20	30x40	ZLR2W271M#ZS5
		1.63	4.08	150	0.20	35x30	ZLR2W271M#AS3
	330	1.81	4.53	115	0.20	30x45	ZLR2W331M#ZS6
		1.84	4.60	115	0.20	35x35	ZLR2W331M#AS4
	390	1.99	4.98	95	0.20	30x50	ZLR2W391M#ZS7
		2.04	5.10	95	0.20	35x40	ZLR2W391M#AS5
	470	2.27	5.68	75	0.20	35x45	ZLR2W471M#AS6
	560	2.50	6.25	65	0.20	35x50	ZLR2W561M#AS7
	680	2.87	6.89	55	0.20	35x55	ZLR2W681#AS8

Additional designs on request · Weitere Designs auf Anfrage

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› Ripple Current Multiplier · Wechselstrommultiplikator

Frequency [Hz]	50/60	120	300	1k	≥ 10k
Multiplier	0.70	1.00	1.30	1.50	1.80

Forced cooling [m/sec]	v < 1.0	v ≥ 1.0
Multiplier	1.0	1.1

Ta (°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

› Life Time Table · Brauchbarkeitsdauer – Tabelle

ZLR	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	2.5
40°C	250	250	250	250	250	250	250	250	250	250	250	250	250	227
45°C	250	250	250	250	250	250	250	250	250	250	250	233	184	
50°C	250	250	250	250	250	250	250	250	250	230	185	147		
55°C	250	250	250	250	250	250	250	250	179	145	117			
60°C	250	250	250	250	250	235	198	166	113	92				
65°C	250	250	250	201	174	148	126	105	72					
70°C	207	186	165	127	110	94	79	67						
75°C	131	117	105	80	69	59	50							
80°C	83	74	66	51	44	38								
85°C	52	47	42	32	28									
90°C	33	30	26	20										
95°C	21	19	17											
100°C	13	12												
105°C	8													

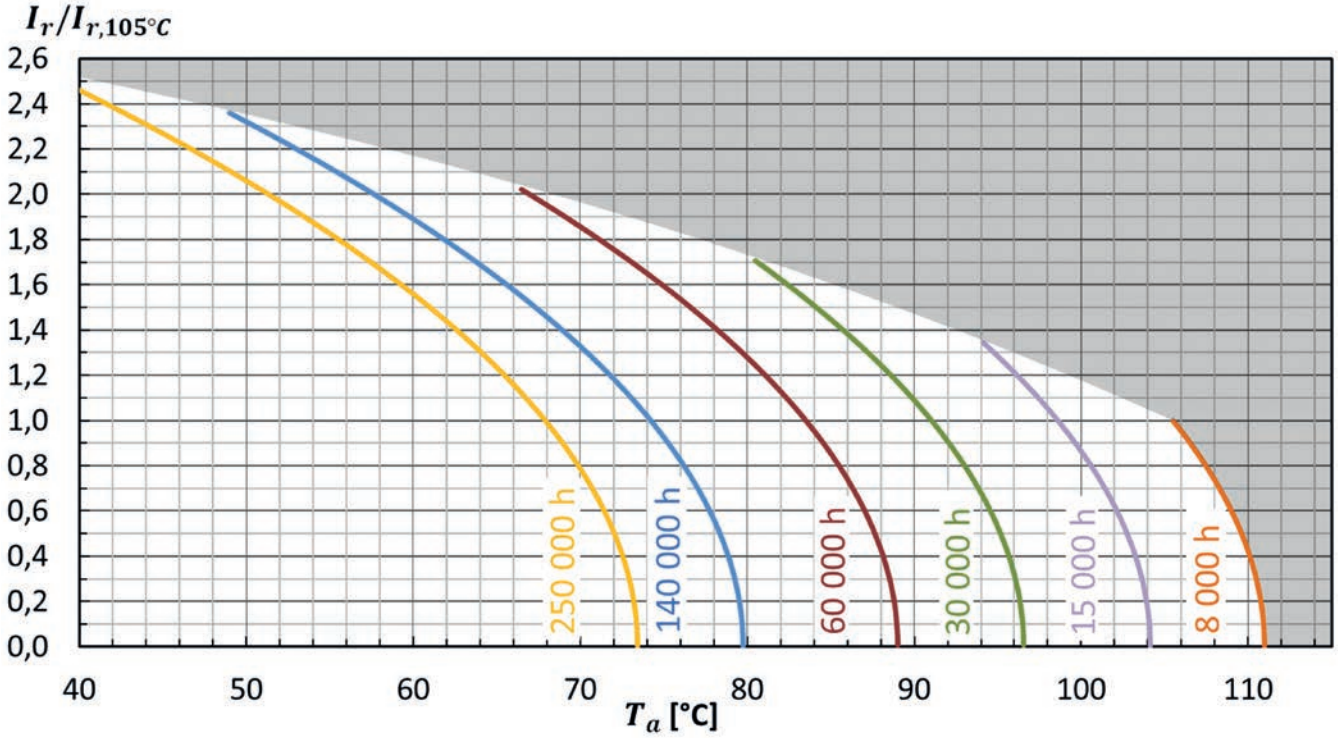
khrs

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 Kategorietemperatur $I_{r,\ 105°C,120Hz}$



› Life Time Tests and Requirements · Anforderungen Brauchbarkeitsdauer

Life time test	Test procedure	Life time criteria
Endurance test	T_a = 105°C; V_r, I_r applied 5000 hours	ΔC/C ≤ 20% (of initial value) Tanδ ≤ 200% (of specified value) I_L ≤ specified value
Useful life	T_a = 105°C; V_r, I_r applied 8000 hours	ΔC/C ≤ 30% (of initial value) Tanδ < 300% (of specified value) I_L ≤ specified value

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

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CU · Snap-In · 6000 h/105 °C

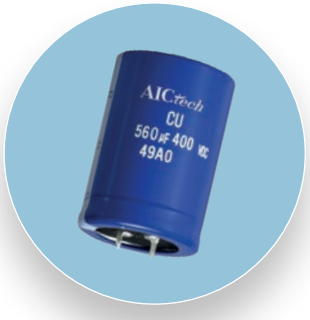
High Ripple Current · Side Vent · Bottom cooling Design

Capacitors of CU series have in average 10 % higher ripple current compared with HU3 series. This is reached i.a. by improved heat radiation. The vent is located at the side of the case, vent position is not fixed.

Die CU Serie hat im Durchschnitt eine 10 % höhere Wechselstrombelastbarkeit im Vergleich zur HU3 Serie. Dies wird u.a. durch eine optimierte Wärmeabstrahlung erreicht. Das Sicherheitsventil befindet sich seitlich am Becher, die Position ist variabel.

› Specifications · Spezifikationen

Items	Characteristics
Temperature range	-25°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)	0.02 • 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
Specifications	JIS C 5101-4, AEC-Q200 qualified
Vibration	0.75mm, 10...55Hz, 10g, 3x2h
Sleeve withstanding voltage	3000 Vac/1 min between terminals bundled and plate*



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

› Outline Drawings · Bauformen

Refer to page 5 for available terminal shapes and dimensions. · Auf Seite 5 finden Sie die verfügbaren Bauformen und Maße.

› Product Code · Bestellbezeichnung

Example: Series CU · 500 V · 470 µF ±20 % · 35x61 mm · 2-Pin short · without plate

CU **2H** **471** **M** **C** **A** **S9** **WPEC**

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
- C: 2-pin short terminal
- X: 4-pin short terminal
- E: 3-pin short terminal

Outer design code

None:
PET sleeve and PVC plate

WPEC:
PET sleeve without plate

Others on request

Rated voltage code

Code	Voltage
2G	400
2W	450
2H	500

Capacitance tolerance

- M : ± 20%
- Q : -10% ~ +30%

Diameter Code

Code	ØD
Z	30
A	35
B	40

Length code

Code	L*	Code	L*
S2	25	S7	50
S3	30	S9	60
S4	35	S13	80
S5	40	S17	100
S6	45		

* exact lenght is mentioned in the product table

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 # = variable value, see fixing code in the product code
400 VDC Code: 2G Surge Voltage 450 VDC	**220**	1.57	3.77	320	0.20	30x30	CU2G221M#ZS3
	270	1.79	4.30	260	0.20	30x35	CU2G271M#ZS4
		1.85	4.44	260	0.20	35x31	CU2G271M#AS3
	330	2.03	4.87	210	0.20	30x40	CU2G331M#ZS5
		2.10	5.04	210	0.20	35x36	CU2G331M#AS4
	390	2.28	5.47	190	0.20	30x50	CU2G391M#ZS7
		2.33	5.59	190	0.20	35x41	CU2G391M#AS5
	470	2.77	6.65	160	0.20	30x47	CU2G471Q#ZS6
		2.57	6.17	140	0.20	30x60	CU2G471M#ZS9
		2.61	6.26	160	0.20	35x46	CU2G471M#AS6
	560	2.89	6.94	130	0.20	35x51	CU2G561M#AS7
		2.64	6.34	130	0.20	40x40	CU2G561M#BS5
	680	3.25	7.80	110	0.20	35x61	CU2G681M#AS9
		2.95	7.08	110	0.20	40x45	CU2G681M#BS6
	820	3.95	9.48	80	0.20	35x76	CU2G821M#AS12R
		3.62	8.69	90	0.20	35x81	CU2G821M#AS13
		3.35	8.04	90	0.20	40x61	CU2G821M#BS9
	1 200	4.08	9.79	90	0.20	40x83	CU2G122M#BS13
450 VDC Code: 2W Surge Voltage 500 VDC	**150**	1.30	3.12	490	0.20	30x30	CU2W151M#ZS3
	180	1.46	3.50	420	0.20	30x35	CU2W181M#ZS4
	220	1.66	3.98	340	0.20	30x40	CU2W221M#ZS5
		1.67	4.01	340	0.20	35x31	CU2W221M#AS3
	270	1.90	4.56	380	0.20	35x36	CU2W271M#AS4
	330	2.10	5.04	230	0.20	30x50	CU2W331M#ZS7
		2.15	5.16	230	0.20	35x41	CU2W331M#AS5
	390	2.34	5.62	200	0.20	30x60	CU2W391M#ZS9
		2.37	5.69	200	0.20	35x46	CU2W391M#AS6
	470	2.64	6.34	160	0.20	35x51	CU2W471M#AS7
		2.42	5.81	160	0.20	40x40	CU2W471M#BS5
	560	2.95	7.08	140	0.20	35x61	CU2W561M#AS9
		2.68	6.43	140	0.20	40x45	CU2W561M#BS6
	680	3.30	7.92	110	0.20	35x81	CU2W681M#AS13
		2.98	7.15	110	0.20	40x50	CU2W681M#BS7
	1 000	3.72	8.93	90	0.20	40x83	CU2W102M#BS13
	1 500	4.93	11.83	60	0.20	40x101	CU2W152M#BS17
500 VDC Code: 2H Surge Voltage 550 VDC	**120**	1.05	2.52	460	0.20	30x30	CU2H121M#ZS3
	150	1.21	2.90	460	0.20	30x35	CU2H151M#ZS4
	180	1.36	3.26	390	0.20	30x40	CU2H181M#ZS5
		1.40	3.36	390	0.20	35x31	CU2H181M#AS3
	220	1.56	3.74	320	0.20	30x50	CU2H221M#ZS7
		1.59	3.82	320	0.20	35x36	CU2H221M#AS4
	270	1.78	4.27	260	0.20	30x60	CU2H271M#ZS9
		1.80	4.32	260	0.20	35x41	CU2H271M#AS5
	330	2.03	4.87	210	0.20	35x46	CU2H331M#AS6
	390	2.25	5.40	180	0.20	35x51	CU2H391M#AS7
	470	2.52	6.05	160	0.20	35x61	CU2H471M#AS9

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› Ripple Current Multiplier · Wechselstrommultiplikator

Frequency [Hz]	120	300	1k	≥ 10k
Multiplier	1.00	1.18	1.34	1.45

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	45	50	55	60	65	70	75	80	85	90	95	100	105
Multiplier	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0

› Life Time Table · Brauchbarkeitsdauer – Tabelle

CU	Useful life as function of ambient temperature and ripple current													
I_r at 105°C	1.0	1.1	1.2	1.3	1.4	1.5	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
T_a = 40°C	250	250	250	250	250	250	250	250	250	250	250	250	250	250
T_a = 45°C	250	250	250	250	250	250	250	250	250	250	250	250	249	
T_a = 50°C	250	250	250	250	250	250	250	250	250	250	228	190		
T_a = 55°C	250	250	250	250	250	250	250	236	202	171	144			
T_a = 60°C	250	250	250	250	250	226	173	149	127	108				
T_a = 65°C	243	222	201	181	162	143	109	94	80					
T_a = 70°C	153	140	127	114	102	90	69	59						
T_a = 75°C	97	89	80	72	64	57	43							
T_a = 80°C	61	56	51	45	41	36								
T_a = 85°C	38	35	32	29	25									
T_a = 90°C	24	22	20	18										
T_a = 95°C	15	14	12	11										
T_a = 100°C	9	9												
T_a = 105°C	6													

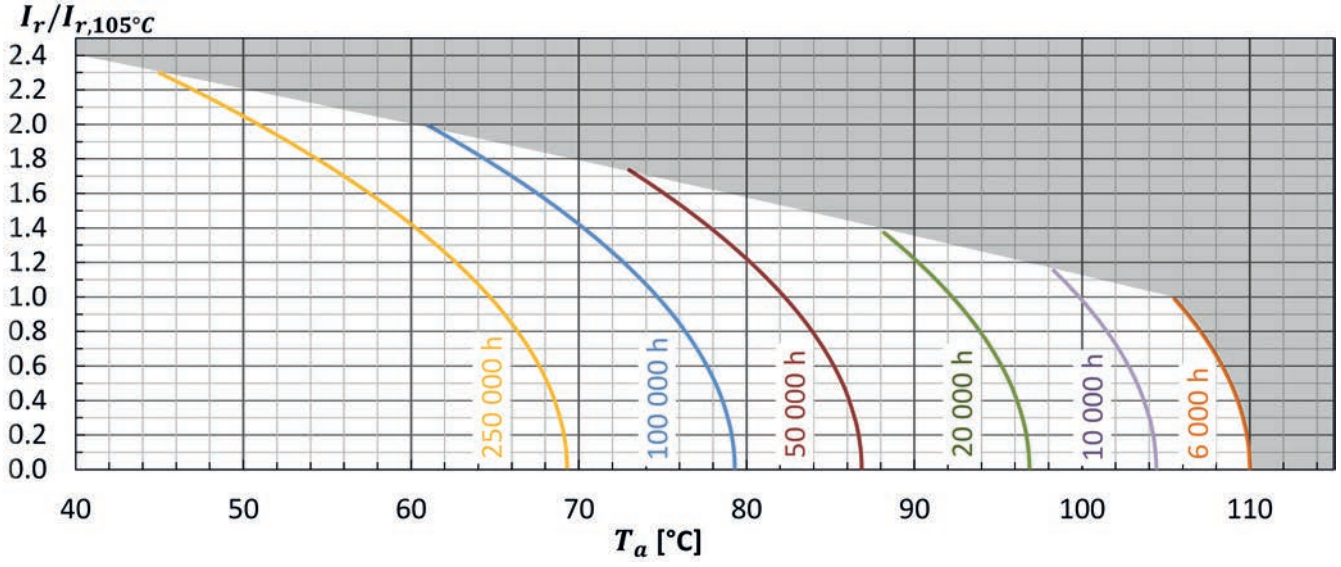
khrs

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 $I_{r,\ 105°C,120Hz}$



› 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 ≤ 20% (of initial value) Tanδ ≤ 200% (of specified value) I_L ≤ specified value
Useful life	T_a = 105°C; V_r, I_r applied 6000 hours	ΔC/C ≤ 30% (of initial value) Tanδ < 300% (of specified value) I_L ≤ specified value

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