HCGH Screw-Terminal 6000 h / 105°C

▶Specifications / Spezifikationen

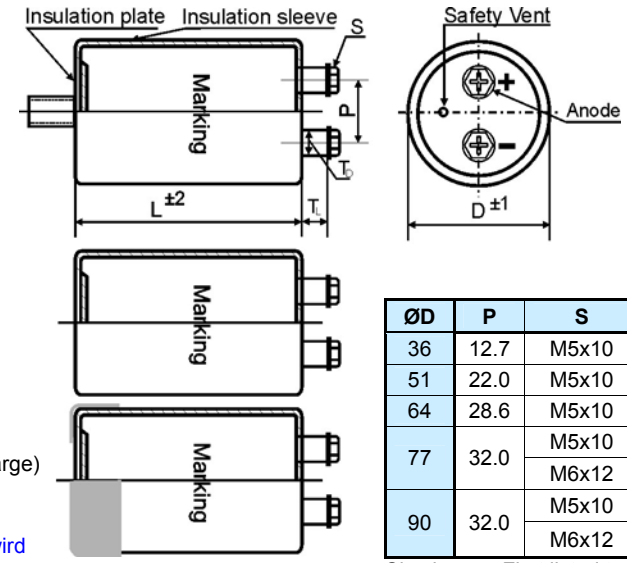
Items	Characteristics
Temperature range	-40°C ~ + 105°C
Capacitance tolerance	+/- 20%
Surge voltage	Repetitive max. 30 sec per 6 Minutes
Leakage current max. I_L (20°C, 5 min)	0.01 • C • V_r [µA] or 3 mA, which is smaller.
Useful life	6000 h at 105°C
Field failure rate	0.5 FIT = 0.5 • 10^{-9} Failures/hour
RoHS conform	Directive 2002/95/ECff Annex
Specification / Vibration	JIS C 5101-4 / 0.75mm, 10...55Hz, 10g, 3x2h

▶Outline Drawings / Bauformen

Shape: B (ØD = 51-90)
(for Bolt – Mounting, M12x16, stud bolt is not isolated)
Form: B (ØD = 51-90)
(für Bolzenbefestigung, M12x16, Bolzen nicht isoliert)

Shape: N (for PBT-Holder ØD = 77-90 and Press Ring ØD = 77-90)
Form: N (für PBT-Halter ØD = 77-90 und Einpressring ØD = 77-90)

Shape: I (ØD = 36)
Shape: Y (ØD = 51-90)
(double sleeve, bracket free of charge)
Form: I (ØD = 36)
Form: Y (ØD = 51-90)
(mit doppelter Isolierung, Schelle wird kostenlos mitgeliefert)



ØD	P	S	T_L	T_D	Cap material
36	12.7	M5x10	7.0	8	PPS
51	22.0	M5x10	4.5	10	PPS
64	28.6	M5x10	4.5	10	PPS
77	32.0	M5x10	4.5	10	PPS
		M6x12	5.0	16	PPS
90	32.0	M5x10	4.0	10	PPS
		M6x12	4.0	16	PPS

Size in mm. First listed terminal is standard.

▶Ripple Current Multiplier / Wechselstrommultiplikator

Frequency [Hz]	50/60	120	300	1k	≥ 10k
multiplier	0.80	1.00	1.18	1.34	1.45

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

▶Product Code / Bestellbezeichnung

Example: 4700µF 250V D=64mm L=115mm with Y-Bracket

HCGH 2E 472 Y D 115 ( )

Type of series

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

Rated voltage code

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

Fixing symbol code
- B : Bolt ØD = 51 - 90
- N : No double sleeve (PBT-Safety-holder or press ring)
- Y : 3 Stoppers Bracket ØD = 51 - 90
- I : 2 Stoppers Bracket ØD = 36

refer to pages 113 – 119

Case code diameter

ØD	Code
36	A
51	C
64	D
77	E
90	F

Case Code length
Length in mm (3 digits)

Customers` specification

HCGH Series — Screw-Terminal — 6 000 h / 105°C

Rated Voltage Code (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 40°C/120Hz [A RMS]	Ripple Current at 105°C/120Hz I_r [A RMS]	ESR (typ) at 20°C/100Hz [mΩ]	Zmax at 20°C/10kHz [mΩ]	ESL (typ) [nH]	DxL [mm]	Product Code
25 1E (32)	**10 000**	15.8	3.3	32	30	15	36x53	HCGH1E103□A053
	15 000	23.0	4.8	27	27	15	36x83	HCGH1E153□A083
	22 000	28.3	5.9	22	23	15	36x83	HCGH1E223□A083
	33 000	34.6	7.2	15	16	15	36x100	HCGH1E333□A100
	47 000	44.2	9.2	10	11	17	51x75	HCGH1E473□C075
	68 000	55.2	11.5	7	8	17	51x115	HCGH1E683□C115
	100 000	62.4	13.0	6	7	18	64x96	HCGH1E104□D096
	150 000	71.0	14.8	6	7	18	64x115	HCGH1E154□D115
	220 000	81.6	17.0	4	5	20	77x115	HCGH1E224□E115
	330 000	109.9	22.9	4	5	20	90x131	HCGH1E334□F131
35 1V (44)	**6 800**	14.4	3.0	42	37	15	36x53	HCGH1V682□A053
	10 000	20.6	4.3	29	31	15	36x83	HCGH1V103□A083
	15 000	25.0	5.2	19	20	15	36x83	HCGH1V153□A083
	22 000	30.2	6.3	14	15	15	36x100	HCGH1V223□A100
	33 000	37.0	7.7	12	13	17	51x75	HCGH1V333□C075
	47 000	44.6	9.3	8	9	17	51x96	HCGH1V473□C096
	68 000	55.2	11.5	7	8	17	51x115	HCGH1V683□C115
	100 000	66.7	13.9	6	7	18	64x115	HCGH1V104□D115
	150 000	76.3	15.9	5	7	20	77x115	HCGH1V154□E115
	220 000	97.0	20.2	5	7	20	90x131	HCGH1V224□F131
50 1H (63)	**3 300**	12.0	2.5	90	80	15	36x53	HCGH1H332□A053
	4 700	18.2	3.8	64	58	15	36x53	HCGH1H472□A053
	6 800	18.7	3.9	44	39	15	36x83	HCGH1H682□A083
	10 000	22.6	4.7	30	28	15	36x83	HCGH1H103□A083
	15 000	26.9	5.6	20	20	15	36x100	HCGH1H153□A100
	22 000	32.6	6.8	14	15	17	51x75	HCGH1H223□C075
	33 000	43.2	9.0	13	14	17	51x115	HCGH1H333□C115
	47 000	52.3	10.9	11	12	18	64x96	HCGH1H473□D096
	68 000	63.8	13.3	8	9	18	64x115	HCGH1H683□D115
	100 000	77.8	16.2	6	7	20	77x115	HCGH1H104□E115
	140 000	107.5	22.4	5	8	20	77x137	HCGH1H144□E137
	150 000	104.2	21.7	5	7	20	90x131	HCGH1H154□F131
63 1J (79)	**2 200**	11.5	2.4	95	87	15	36x53	HCGH1J222□A053
	3 300	12.0	2.5	63	58	15	36x53	HCGH1J332□A053
	4 700	17.3	3.6	54	50	15	36x83	HCGH1J472□A083
	6 800	20.6	4.3	38	35	15	36x83	HCGH1J682□A083
	10 000	24.5	5.1	28	28	15	36x100	HCGH1J103□A100
	15 000	31.7	6.6	21	22	17	51x75	HCGH1J153□C075
	22 000	37.4	7.8	13	14	17	51x96	HCGH1J223□C096
	33 000	50.9	10.6	10	11	18	64x96	HCGH1J333□D096
	47 000	54.1	11.3	8	9	20	90x77	HCGH1J473□F077
		60.0	12.5	8	9	18	64x115	HCGH1J473□D115
	68 000	72.0	15.0	7	8	20	77x115	HCGH1J683□E115
	100 000	95.0	19.8	7	8	20	90x131	HCGH1J104□F131
80 1K (100)	**2 200**	11.5	2.4	68	63	15	36x53	HCGH1K222□A053
	3 300	16.8	3.5	45	42	15	36x83	HCGH1K332□A083
	4 700	19.7	4.1	32	30	15	36x83	HCGH1K472□A083
	6 800	22.1	4.6	22	23	15	36x100	HCGH1K682□A100
	10 000	28.8	6.0	15	16	17	51x75	HCGH1K103□C075
	15 000	34.1	7.1	10	11	17	51x96	HCGH1K153□C096
	22 000	45.1	9.4	9	10	18	64x96	HCGH1K223□D096
	33 000	53.8	11.2	7	7	20	77x96	HCGH1K333□E096
	47 000	69.1	14.4	6	7	20	77x115	HCGH1K473□E115
	68 000	90.7	18.9	4	7	20	90x131	HCGH1K683□F131

Rated Voltage Code (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 40°C/120Hz [A RMS]	Ripple Current at 105°C/120Hz I_r [A RMS]	ESR (typ) at 20°C/100Hz [mΩ]	Zmax at 20°C/10kHz [mΩ]	ESL (typ) [nH]	DxL [mm]	Product Code
100 2A (125)	**1 000**	7.7	1.6	112	100	15	36x53	HCGH2A102□A053
	1 500	9.6	2.0	75	87	15	36x53	HCGH2A152□A053
	2 200	13.9	2.9	51	47	15	36x83	HCGH2A222□A083
	3 300	16.8	3.5	34	32	15	36x83	HCGH2A332□A083
	4 700	21.6	4.5	24	24	15	36x100	HCGH2A472□A100
	6 800	27.8	5.8	19	20	17	51x75	HCGH2A682□C075
	10 000	36.0	7.5	13	14	17	51x96	HCGH2A103□C096
	15 000	41.8	8.7	11	12	18	64x96	HCGH2A153□D096
	22 000	53.8	11.2	8	9	20	77x96	HCGH2A223□E096
	33 000	65.3	13.6	6	7	20	77x130	HCGH2A333□E130
	47 000	83.0	17.3	5	7	20	90x131	HCGH2A473□F131
160 2C (200)	**470**	5.8	1.2	277	261	15	36x53	HCGH2C471□A053
	680	6.2	1.3	191	180	15	36x53	HCGH2C681□A053
	1 000	9.6	2.0	130	120	15	36x83	HCGH2C102□A083
	1 500	11.0	2.3	87	80	15	36x83	HCGH2C152□A083
	2 200	14.9	3.1	59	53	15	36x100	HCGH2C222□A100
	3 300	19.2	4.0	40	35	17	51x75	HCGH2C332□C075
	4 700	24.5	5.1	30	25	17	51x96	HCGH2C472□C096
	6 800	32.6	6.8	22	23	18	64x96	HCGH2C682□D096
	10 000	41.8	8.7	15	16	20	77x96	HCGH2C103□E096
	15 000	56.6	11.8	14	14	20	77x130	HCGH2C153□E130
	22 000	73.0	15.2	10	10	20	90x131	HCGH2C223□F131
200 2D (250)	**330**	4.3	0.9	395	372	15	36x53	HCGH2D331□A053
	470	5.8	1.2	277	261	15	36x53	HCGH2D471□A053
	680	6.2	1.3	191	180	15	36x53	HCGH2D681□A053
	1 000	9.6	2.0	120	100	15	36x83	HCGH2D102□A083
	1 500	12.0	2.5	100	85	15	36x100	HCGH2D152□A100
	2 200	15.4	3.2	68	60	17	51x75	HCGH2D222□C075
	3 300	20.6	4.3	45	35	17	51x96	HCGH2D332□C096
	4 700	26.9	5.6	31	27	18	64x96	HCGH2D472□D096
	6 800	34.6	7.2	21	20	18	64x115	HCGH2D682□D115
		40.3	8.4	21	20	20	77x145	HCGH2D682□E145
	10 000	44.6	9.3	14	14	20	77x115	HCGH2D103□E115
		49.0	10.2	14	14	20	77x145	HCGH2D103□E145
	15 000	60.0	12.5	10	10	20	90x131	HCGH2D153□F131
	22 000	85.0	17.7	7	7	20	77x215	HCGH2D223□E215
250 2E (300)	**330**	4.3	0.9	285	268	15	36x53	HCGH2E331□A053
	470	5.8	1.2	200	187	15	36x53	HCGH2E471□A053
	680	7.7	1.6	138	131	15	36x83	HCGH2E681□A083
	1 000	10.6	2.2	84	70	15	36x100	HCGH2E102□A100
	1 500	12.5	2.6	56	50	17	51x75	HCGH2E152□C075
	2 200	17.3	3.6	50	45	17	51x96	HCGH2E222□C096
	3 300	23.0	4.8	36	35	18	64x96	HCGH2E332□D096
	4 700	29.8	6.2	25	23	18	64x115	HCGH2E472□D115
	6 800	37.9	7.9	18	18	20	77x115	HCGH2E682□E115
	10 000	51.4	10.7	13	13	20	77x155	HCGH2E103□E155
	15 000	67.2	14.0	9	9	20	90x157	HCGH2E153□F157
400 2G (450)	**1 000**	11.0	2.9	102	105	17	51x75	HCGH2G102□C075
	1 200	13.3	3.5	85	88	17	51x96	HCGH2G122□C096
	1 500	15.6	4.1	68	70	17	51x115	HCGH2G152□C115
	1 800	17.9	4.7	57	58	17	51x130	HCGH2G182□C130
	2 200	18.2	4.8	46	48	17	51x105	HCGH2G222□C105
		19.8	5.2	46	48	18	64x96	HCGH2G222□D096
	2 700	23.2	6.1	38	40	18	64x115	HCGH2G272□D115
	3 300	26.2	6.9	30	32	20	77x105	HCGH2G332□E105
		27.0	7.1	30	32	18	64x130	HCGH2G332□D130
	3 900	29.6	7.8	26	28	20	77x115	HCGH2G392□E115
		31.5	8.3	26	28	18	64x155	HCGH2G392□D155

Rated Voltage Code (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 40°C/120Hz [A RMS]	Ripple Current at 105°C/120Hz I_r [A RMS]	ESR (typ) at 20°C/100Hz [mΩ]	Zmax at 20°C/10kHz [mΩ]	ESL (typ) [nH]	DxL [mm]	Product Code
400 2G (450)	**4 700**	34.2	9.0	21	22	20	77x130	HCGH2G472□E130
		38.0	10.0	21	22	18	64x195	HCGH2G472□D195
	5 600	40.3	10.6	18	19	20	77x155	HCGH2G562□E155
		41.8	11.0	18	19	18	64x195	HCGH2G562□D195
	6 800	44.1	11.6	18	18	20	77x155	HCGH2G682□E155
		46.7	12.3	15	15	20	90x157	HCGH2G682□F157
	8 200	50.2	13.2	12	15	20	77x171	HCGH2G822□E171
		51.7	13.6	12	15	20	90x157	HCGH2G822□F157
	10 000	61.6	16.2	10	15	20	90x196	HCGH2G103□F196
	14 000	73.0	19.2	9	8	20	90x196	HCGH2G143□F196
	15 000	74.5	19.6	6	8	20	90x196	HCGH2G153□F196
450 2W (500)	**1 500**	14.4	3.8	67	70	17	51x105	HCGH2W152□C105
	2 200	20.9	5.5	46	48	20	77x103	HCGH2W222□E103
	4 700	33.8	8.9	24	26	20	77x144	HCGH2W472□E144
	5 600	37.2	9.8	21	22	20	77x144	HCGH2W562□E144
	6 000	39.3	10.4	19	20	20	77x155	HCGH2W602□E155

►Life Time Tables / Brauchbarkeitsdauer – Tabellen

HCGH $V_r \leq 250V$	Useful life as function of ambient temperature and ripple current													
I_r at 105°C	x 1.0	x 1.6	x 2.1	x 2.4	x 2.7	x 3.0	x 3.3	x 3.5	x 3.8	x 4.0	x 4.2	x 4.4	x 4.6	x 4.8
T_a = 40°C	250	250	250	250	250	250	250	250	250	250	250	246	194	151
T_a = 45°C	250	250	250	250	250	250	250	250	250	241	195	155	122	96
T_a = 50°C	250	250	250	250	250	250	250	249	206	152	123	98		
T_a = 55°C	250	250	250	250	250	250	204	157	130	96	78			
T_a = 60°C	250	250	242	201	175	163	129	99						
T_a = 65°C	245	198	153	127	111	103	81	63						
T_a = 70°C	155	125	97	80	70	65	51							
T_a = 75°C	98	79	61											
T_a = 80°C	62	50												
T_a = 85°C	39	31												
T_a = 90°C	24													
T_a = 95°C	15													
T_a = 100°C	9													
T_a = 105°C	6													

khrs Max. value limited to 250 000 hours.

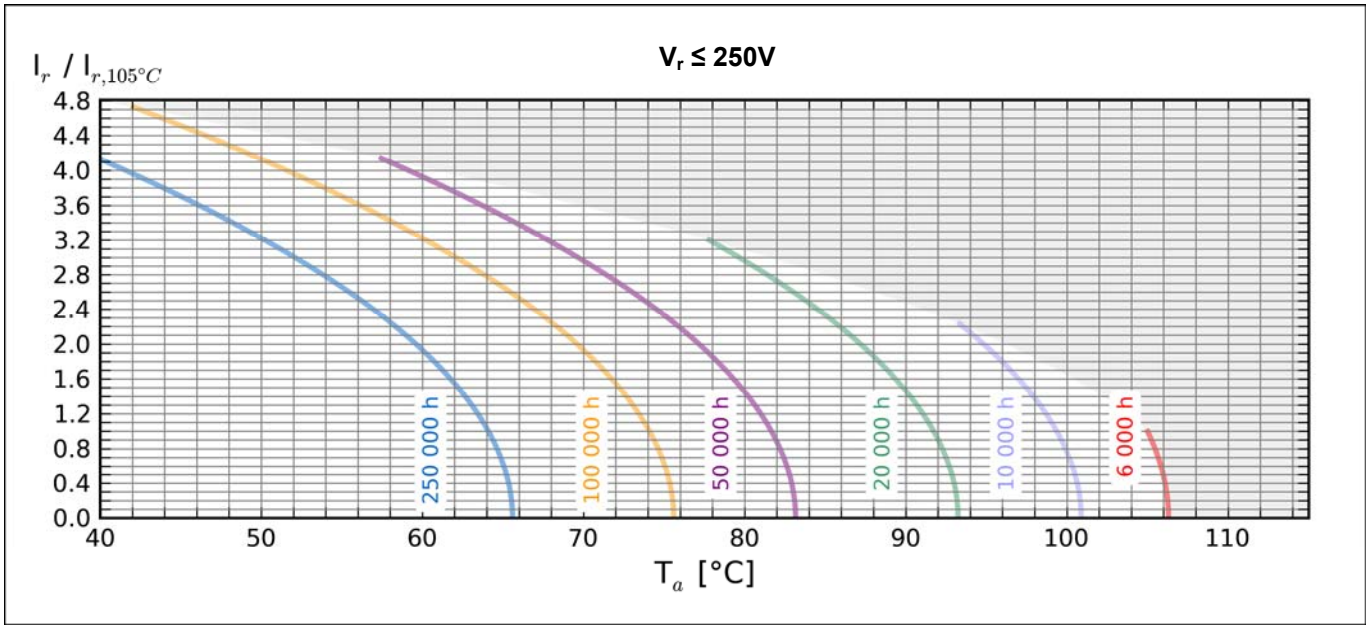
HCGH $V_r \geq 400V$	Useful life as function of ambient temperature and ripple current													
I_r at 105°C	x 1.0	x 1.4	x 1.7	x 2.0	x 2.2	x 2.4	x 2.6	x 2.8	x 3.0	x 3.2	x 3.3	x 3.5	x 3.6	x 3.8
T_a = 40°C	250	250	250	250	250	250	250	250	250	250	250	225	193	139
T_a = 45°C	250	250	250	250	250	250	250	250	250	222	192	142	122	
T_a = 50°C	250	250	250	250	250	250	250	238	184	140	121	90	77	
T_a = 55°C	250	250	250	250	250	238	191	150	116	88	77	57	48	
T_a = 60°C	250	250	250	221	184	150	120	95	73	56	48	36		
T_a = 65°C	250	219	179	140	116	95	76	60	46					
T_a = 70°C	171	138	113	88	73	60								
T_a = 75°C	108	87	71	56	46									
T_a = 80°C	68	55	45	35										
T_a = 85°C	43	35	28	22										
T_a = 90°C	27	22	18											
T_a = 95°C	17	14												
T_a = 100°C	10													
T_a = 105°C	6													

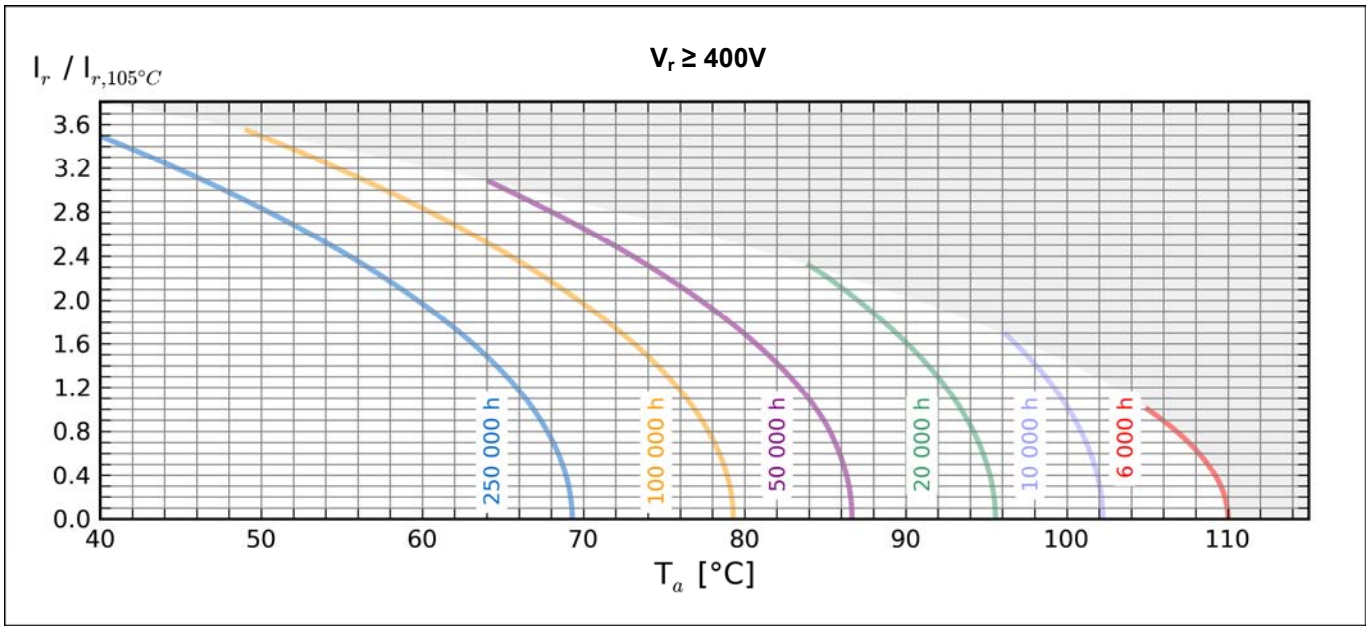
khrs Max. value limited to 250 000 hours.

▶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 $I_{r105°C,120Hz}$

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