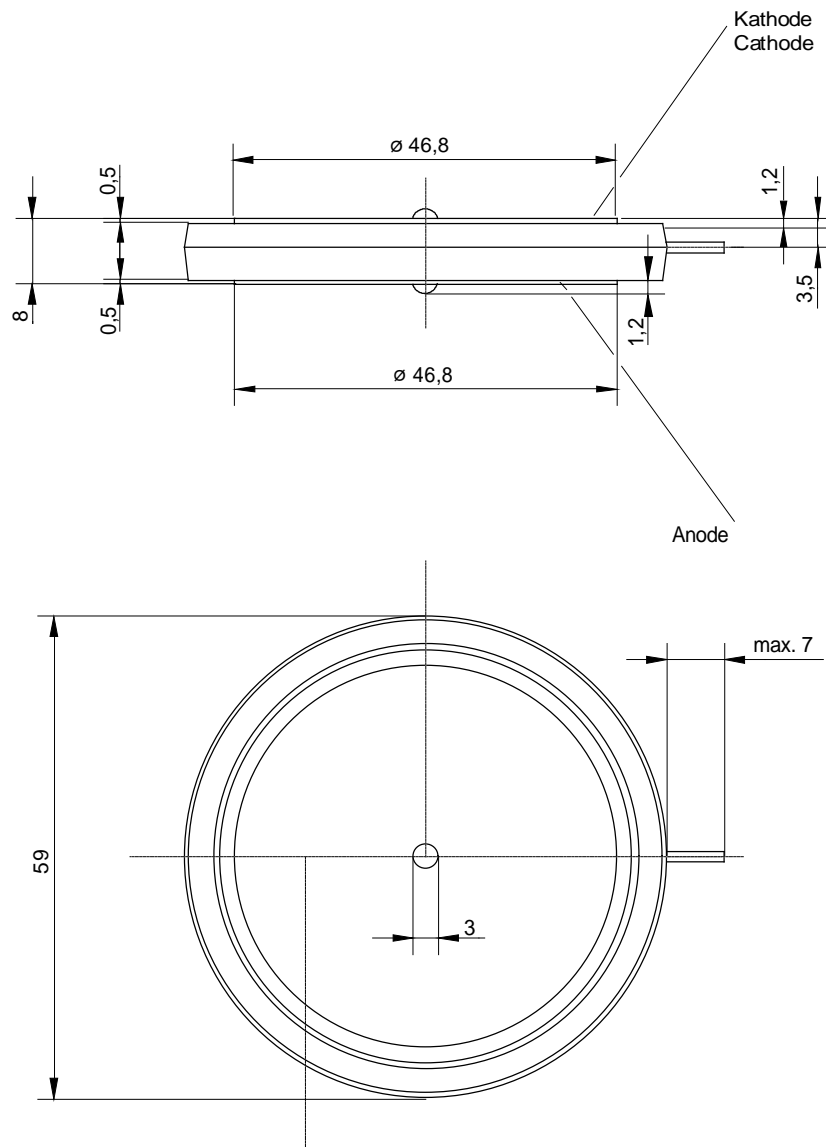


European Power-Semiconductor and Electronics Company GmbH + Co. KG

Leistungsgleichrichterdioden Power Rectifier Diodes D 4457 N



D 4457 N

Elektrische Eigenschaften

Electrical properties

Höchstzulässige Werte

Maximum rated values

Periodische Spitzensperrspannung	repetitive peak reverse voltage	$t_{vj} = -40^{\circ}\text{C} \dots t_{vj \text{ max}}$	V_{RRM}	200, 400	V
				600	V
Stoßspitzensperrspannung	non-repetitive peak reverse voltage	$t_{vj} = +25^{\circ}\text{C} \dots t_{vj \text{ max}}$	$V_{RSM} = V_{RRM}$	+ 50	V
Durchlaßstrom-Grenzeffektivwert	RMS forward current		I_{FRMSM}	7	kA
Dauergrenzstrom	mean forward current	$t_c = 111^{\circ}\text{C}$	I_{FAVM}	4,46	kA
		$t_c = 130^{\circ}\text{C}$		3,52	kA
Stoßstrom-Grenzwert	surge forward current	$t_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$	I_{FSM}	60	kA
		$t_{vj} = t_{vj \text{ max}}, t_p = 10 \text{ ms}$		52	kA
Grenzlastintegral	$I^2 t$ -value	$t_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$	$I^2 t$	18'000.000	A ² s
		$t_{vj} = t_{vj \text{ max}}, t_p = 10 \text{ ms}$		13'500.000	A ² s

Charakteristische Werte

Characteristic values

Durchlaßspannung	on-state voltage	$t_{vj} = t_{vj \text{ max}}, i_F = 14 \text{ kA}$	V_T	max.	1,36	V
Schleusenspannung	threshold voltage	$t_{vj} = t_{vj \text{ max}}$	$V_{T(TO)}$		0,7	V
Ersatzwiderstand	slope resistance	$t_{vj} = t_{vj \text{ max}}$	r_T		0,047	mΩ
Sperrstrom	reverse current	$t_{vj} = t_{vj \text{ max}}, V_R = V_{RRM}$	i_R	max.	60	mA

Thermische Eigenschaften

Thermal properties

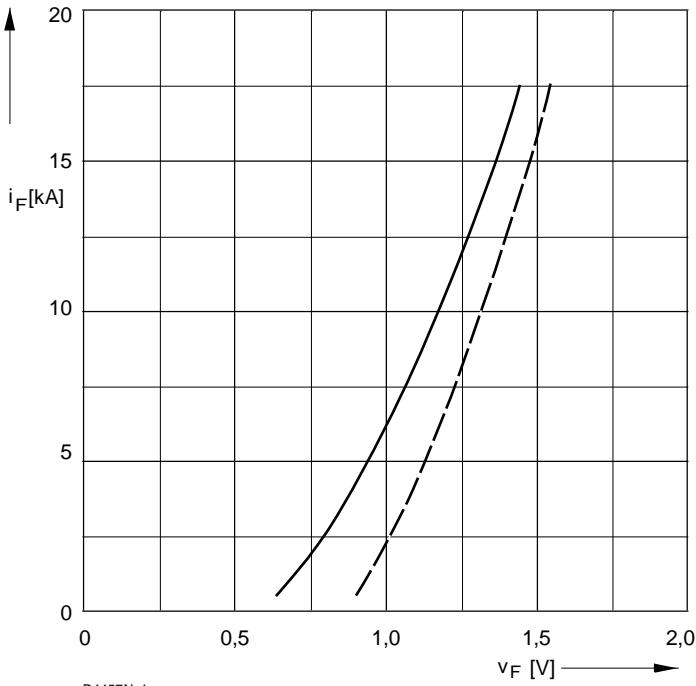
Innerer Widerstand	thermal resistance, junction to case	beidseitig/two-sided, $\Theta = 180^{\circ} \text{ sin}$	R_{thJC}	max.	0,0128	°C/W
		beidseitig/two sided, DC		max.	0,0120	°C/W
		Anode/anode, $\Theta = 180^{\circ} \text{ sin}$		max.	0,0208	°C/W
		Anode/anode, DC		max.	0,0200	°C/W
		Kathode/cathode, $\Theta = 180^{\circ} \text{ sin}$		max.	0,0308	°C/W
		Kathode/cathode, DC		max.	0,0300	°C/W
Übergangs-Wärmewiderstand	thermal resistance, case to heatsink	beidseitig /two-sided	R_{thCK}	max.	0,003	°C/W
		einseitig /single-sided		max.	0,006	°C/W
Höchstzul.Sperrschichttemperatur	max. junction temperature		$t_{vj \text{ max}}$		180	°C
Betriebstemperatur	operating temperature		$t_{c \text{ op}}$		-40...+150	°C
Lagertemperatur	storage temperature		t_{stg}		-40...+150	°C

Mechanische Eigenschaften

Mechanical properties

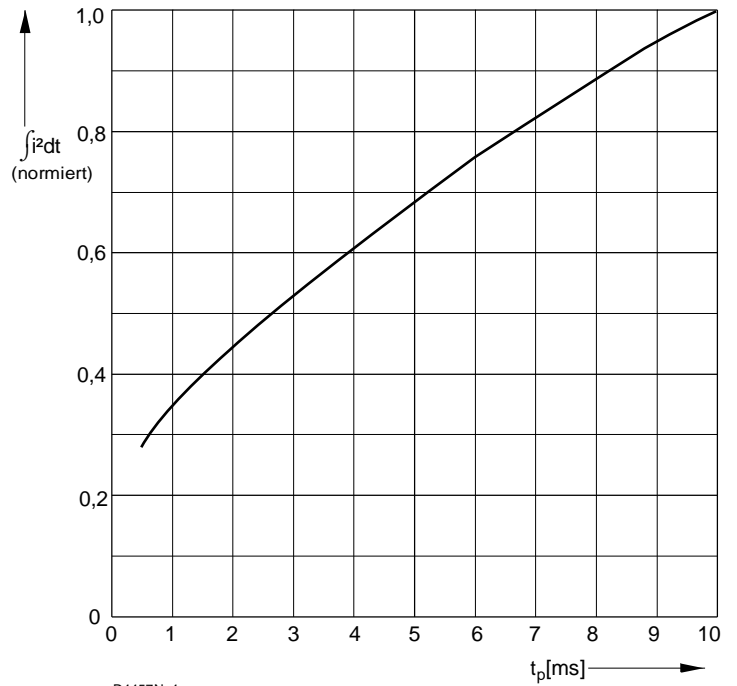
Si-Element mit Druckkontakt	Si-pellet with pressure contact	$\varnothing = 46 \text{ mm}$				
Anpreßkraft	clamping force	Gehäuseform/case design T	F		30...45	kN
Gewicht	weight		G	typ.	125	g
Kriechstrecke	creepage distance				5,5	mm
Feuchteklasse	humidity classification	DIN 40040				C
Schwingfestigkeit	vibration resistance	$f = 50 \text{ Hz}$			50	m/s ²
Maßbild	outline					Seite/page

D 4457 N



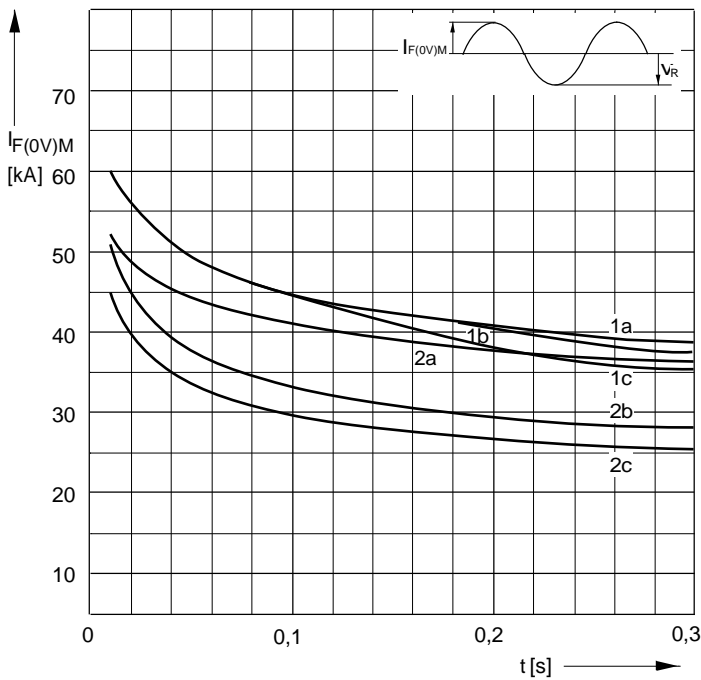
D4457N_1

Bild/ Fig. 1
Grenzdurchlaßkennlinie
Limiting forward characteristic $i_F = f(v_F)$
— $t_{vj} = 180\text{ °C}$
- - - $t_{vj} = 25\text{ °C}$



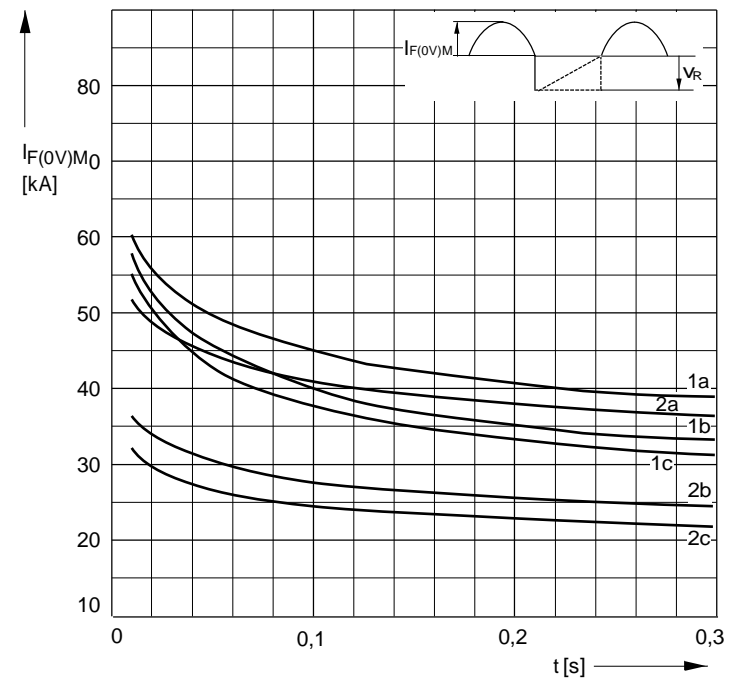
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Bild / Fig. 2
Normiertes Grenzlastintegral / Normalized $i^2 t$
 $\int i^2 dt = f(t_p)$



D4457N_5

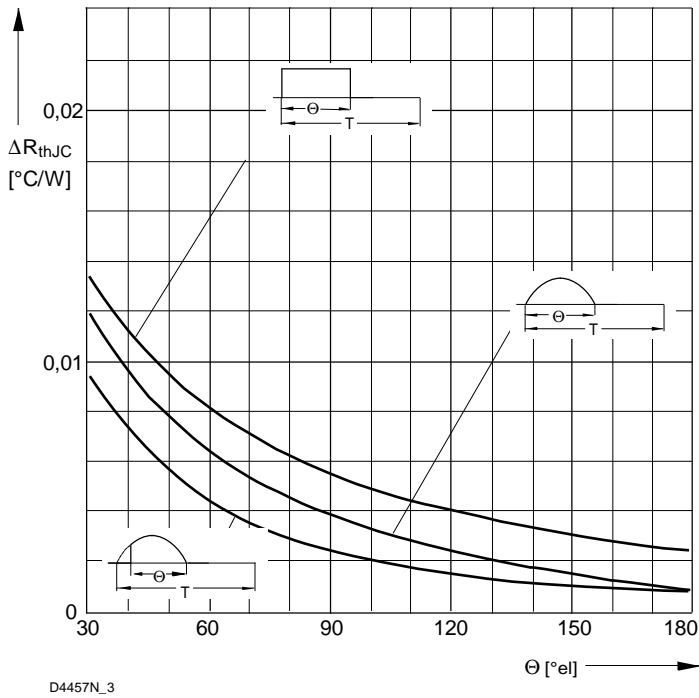
Bild / Fig. 3
Grenzstrom / Maximum overload forward current $I_{F(0V)M} = f(t)$
1 - $I_{FAV(vor)} = 0\text{ A}$; $t_{vj} = t_c = 25\text{ °C}$
2 - $I_{FAV(vor)} = 4460\text{ A}$; $t_c = 106\text{ °C}$; $t_{vj} = 180\text{ °C}$
a - $v_R \leq 50\text{ V}$
b - $v_R = 0,5\text{ }V_{RRM}$
c - $v_R = 0,8\text{ }V_{RRM}$



D4457_6

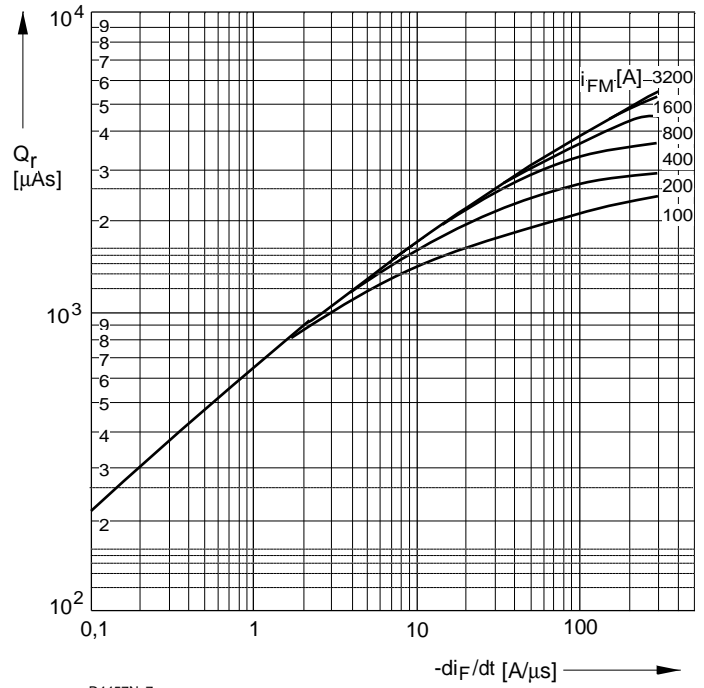
Bild / Fig. 4
Grenzstrom / Maximum overload forward current $I_{F(0V)M0} = f(t)$
1 - $I_{FAV(vor)} = 0\text{ A}$; $t_{vj} = t_c = 25\text{ °C}$
2 - $I_{FAV(vor)} = 4460\text{ A}$; $t_c = 106\text{ °C}$; $t_{vj} = 180\text{ °C}$
a - $v_R \leq 50\text{ V}$
b - $v_R = 0,5\text{ }V_{RRM}$
c - $v_R = 0,8\text{ }V_{RRM}$

D 4457 N



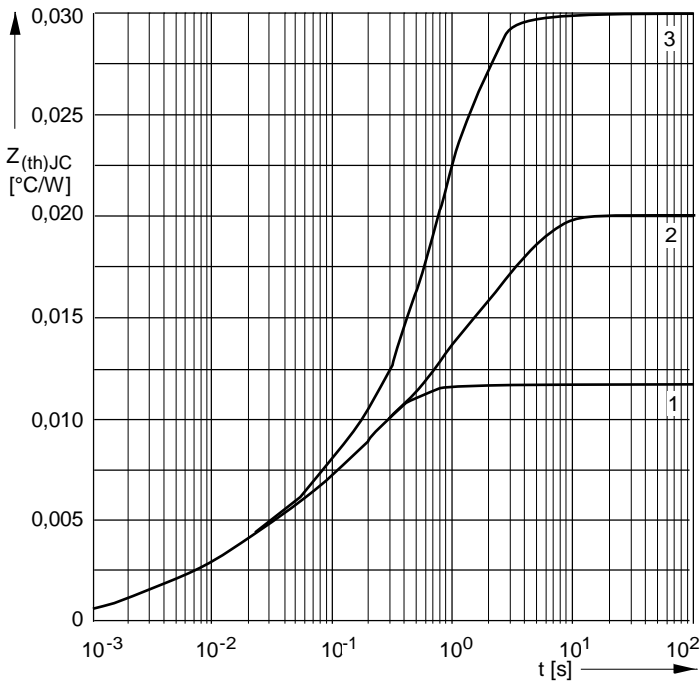
D4457N_3

Bild / Fig. 5
Differenz zwischen den Wärmewiderständen für Pulsstrom und DC
Difference between the values of thermal resistance for pulse current and DC
Parameter: Stromkurvenform / Current waveform



D4457N_7

Bild / Fig. 6
Sperrverzögerungsladung / Recovered charge $Q_r = f(-di_F/dt)$
 $t_{vj} = t_{vjmax}$; $V_R \leq 0,5 V_{RRM}$; $V_{RM} = 0,8 V_{RRM}$
Beschaltung / Snubber: $C = 2,2 \mu F$; $R = 1,8 \Omega$
Parameter: Durchlaßstrom / Forward current i_{FM}



D4457N_2

Bild / Fig. 7
Transienter innerer Wärmewiderstand
Transient thermal impedance $Z_{thJC} = f(t)$, DC
1 - Beidseitige Kühlung / Two-sided cooling
2 - Anodenseitige Kühlung / Anode-sided cooling
3 - Kathodenseitige Kühlung / Cathode-sided cooling

Analytische Elemente des transienten Wärmewiderstandes Z_{thJC} für DC
Analytical elements of transient thermal impedance Z_{thJC} for DC

Kühlg. Cooling	Pos. n	1	2	3	4	5	6	7
1	$R_{thn} \text{ } ^\circ\text{C/W}$	0,000017	0,00015	0,00105	0,000563	0,00163	0,00464	0,00405
	τ_n [s]	0,000014	0,000173	0,0011	0,00436	0,0195	0,124	0,332
2	$R_{thn} \text{ } ^\circ\text{C/W}$	0,000014	0,000176	0,00115	0,0011	0,0037	0,00226	0,0116
	τ_n [s]	0,000012	0,000185	0,0012	0,00836	0,0626	0,172	1,59
3	$R_{thn} \text{ } ^\circ\text{C/W}$	0,00001	0,000144	0,001226	0,00133	0,00198	0,00898	0,01633
	τ_n [s]	0,000008	0,000144	0,00117	0,0128	0,0486	0,368	1,18

- 1 - Beidseitige Kühlung / Two-sided cooling
- 2 - Anodenseitige Kühlung / Anode-sided cooling
- 3 - Kathodenseitige Kühlung / Cathode-sided cooling

Analytische Funktion / Analytical function

$$Z_{thJC} = \sum_{n=1}^{n_{max}} R_{thn} (1 - \text{EXP}(-t/\tau_n))$$

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