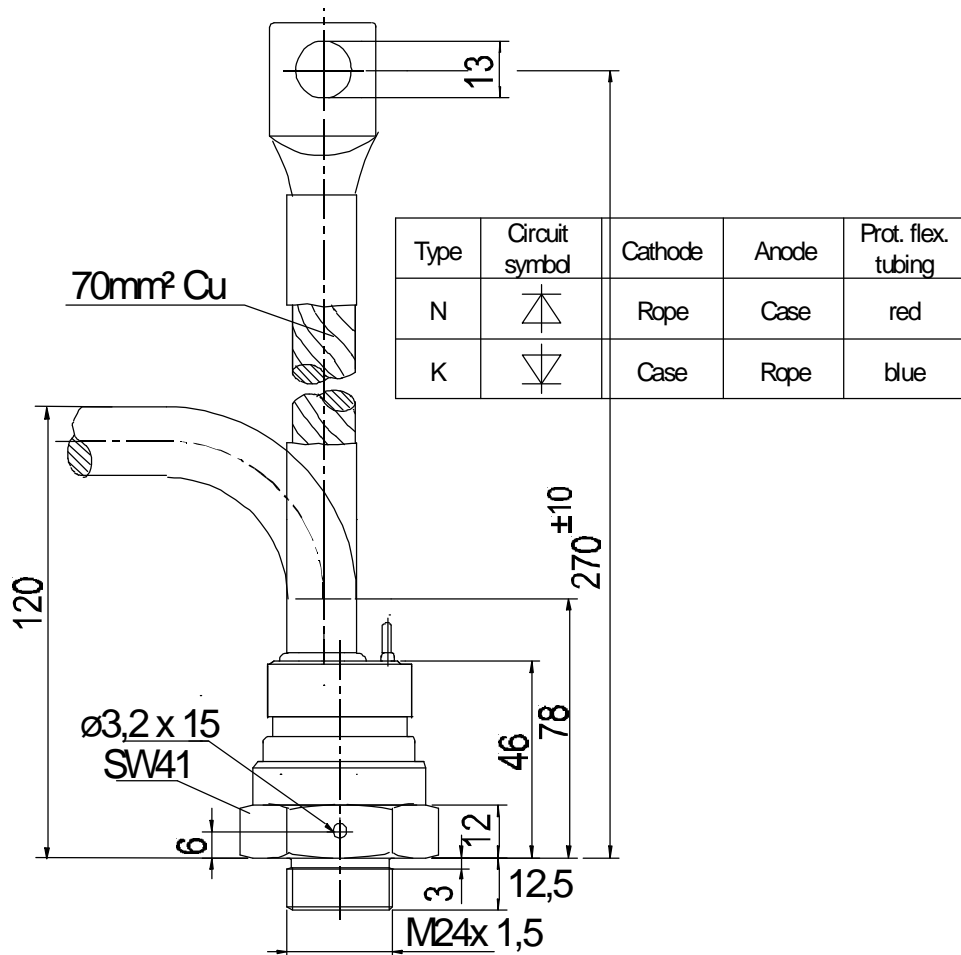


European Power-Semiconductor and Electronics Company GmbH + Co. KG

# Leistungsgleichrichterdioden Power Rectifier Diodes D 400 N



# D 400 N

## Elektrische Eigenschaften

## Electrical properties

### Höchstzulässige Werte

### Maximum rated values

Periodische Spitzensperrspannung	repetitive peak reverse voltage	$t_{vj} = -40^{\circ}\text{C} \dots t_{vj \max}$	$V_{RRM}$	1200, 1600 1800, 2200	V V
Stoßspitzensperrspannung	non-repetitive peak reverse voltage	$t_{vj} = +25^{\circ}\text{C} \dots t_{vj \max}$	$V_{RSM} = V_{RRM}$	+ 100	V
Durchlaßstrom-Grenzeffektivwert	RMS forward current		$I_{FRMSM}$	710	A
Dauergrenzstrom	mean forward current	$t_c = 130^{\circ}\text{C}$ $t_c = 121^{\circ}\text{C}$	$I_{FAVM}$	400 450	A A
Stoßstrom-Grenzwert	surge forward current	$t_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$ $t_{vj} = t_{vj \max}, t_p = 10 \text{ ms}$	$I_{FSM}$	12,2 9,7	kA kA
Grenzlastintegral	$I^2 t$ -value	$t_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$ $t_{vj} = t_{vj \max}, t_p = 10 \text{ ms}$	$I^2 t$	744 470,5	$\text{kA}^2\text{s}$ $\text{kA}^2\text{s}$

### Charakteristische Werte

### Characteristic values

Durchlaßspannung	on-state voltage	$t_{vj} = t_{vj \max}, I_F = 1,4 \text{ kA}$	$V_T$	max.	1,57	V
Schleusenspannung	threshold voltage	$t_{vj} = t_{vj \max}$	$V_{T(TO)}$		0,7	V
Ersatzwiderstand	slope resistance	$t_{vj} = t_{vj \max}$	$r_T$		0,58	$\text{m}\Omega$
Sperrstrom	reverse current	$t_{vj} = t_{vj \max}, V_R = V_{RRM}$	$I_R$	max.	40	mA

### Thermische Eigenschaften

### Thermal properties

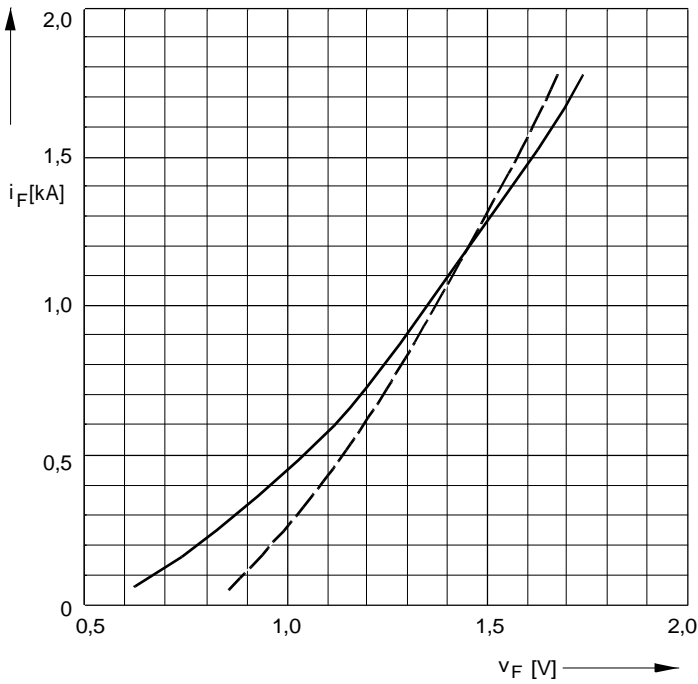
Innerer Widerstand	thermal resistance, junction	$\Theta = 180^{\circ} \text{ sin}$	$R_{thJC}$	max.	0,098	$^{\circ}\text{C}/\text{W}$
	to case	DC		max.	0,094	$^{\circ}\text{C}/\text{W}$
Übergangs-Wärmewiderstand	thermal resistance, case to heatsink	ohne Anschlußlasche/without contact lug	$R_{thCK}$	max.	0,03	$^{\circ}\text{C}/\text{W}$
		mit Anschlußlasche/with contact lug		max.	0,04	$^{\circ}\text{C}/\text{W}$
Höchstzul.Sperrschichttemperatur	max. junction temperature		$t_{vj \max}$		180	$^{\circ}\text{C}$
Betriebstemperatur	operating temperature		$t_{c \text{ op}}$		-40...+180	$^{\circ}\text{C}$
Lagertemperatur	storage temperature		$t_{stg}$		-40...+180	$^{\circ}\text{C}$

### Mechanische Eigenschaften

### Mechanical properties

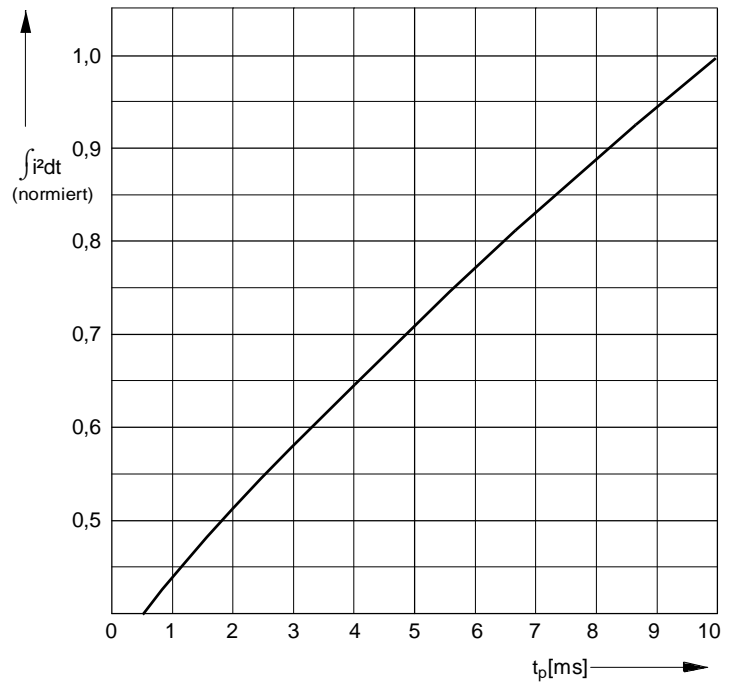
Si-Element mit Druckkontakt	Si-pellet with pressure contact	$\varnothing = 30 \text{ mm}$				
Anzugsdrehmoment	tightening torque	Gehäuseform/case design B	M		60	Nm
Gewicht	weight		G	typ.	600	g
Kriechstrecke	creepage distance				21	mm
Feuchteklasse	humidity classification	DIN 40040				C
Schwingfestigkeit	vibration resistance	$f = 50 \text{ Hz}$			50	$\text{m}/\text{s}^2$
Maßbild	outline					Seite/page
Polarität	polarity					Anode=Gehäuse/case

# D 400 N



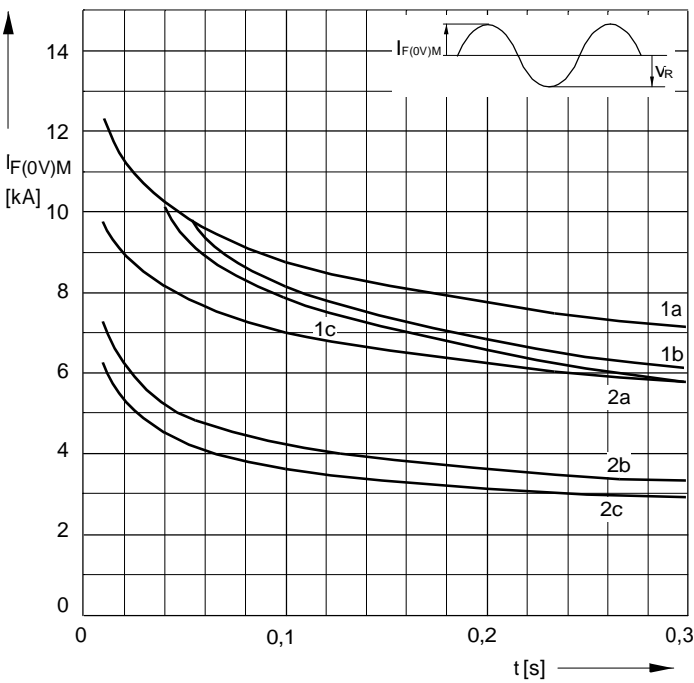
D400N\_1

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



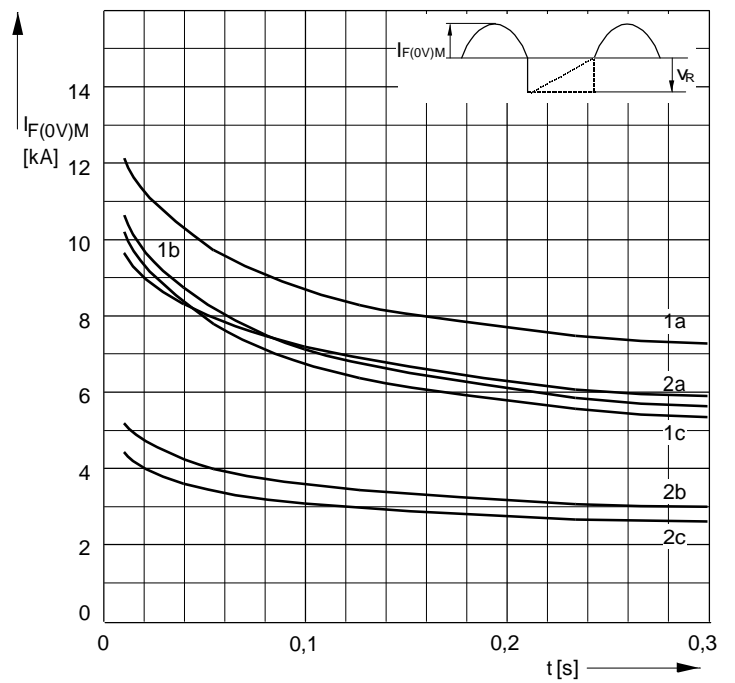
D400N\_4

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



D400N\_5

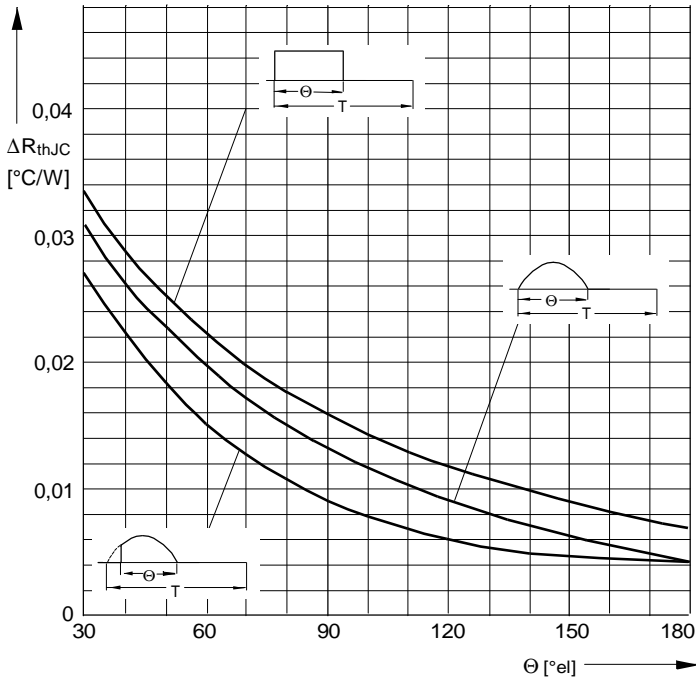
Bild / Fig. 3  
Grenzstrom / Maximum overload forward current  $I_{F(0V)M} = f(t)$   
1 -  $I_{FAV(vor)} = 0\text{ A}$ ;  $t_j = t_c = 25\text{ °C}$   
2 -  $I_{FAV(vor)} = 400\text{ A}$ ;  $t_c = 130\text{ °C}$ ;  $t_j = 180\text{ °C}$   
a -  $V_R \leq 50\text{ V}$   
b -  $V_R = 0,5\text{ }V_{RRM}$   
c -  $V_R = 0,8\text{ }V_{RRM}$



D400N\_6

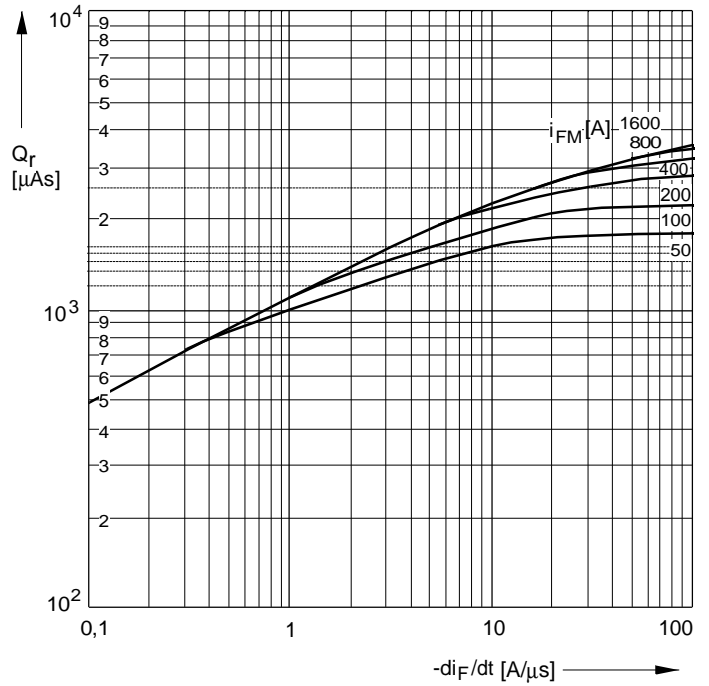
Bild / Fig. 4  
Grenzstrom / Maximum overload forward current  $I_{F(0V)M} = f(t)$   
1 -  $I_{FAV(vor)} = 0\text{ A}$ ;  $t_j = t_c = 25\text{ °C}$   
2 -  $I_{FAV(vor)} = 400\text{ A}$ ;  $t_c = 130\text{ °C}$ ;  $t_j = 180\text{ °C}$   
a -  $V_R \leq 50\text{ V}$   
b -  $V_R = 0,5\text{ }V_{RRM}$   
c -  $V_R = 0,8\text{ }V_{RRM}$

# D 400 N



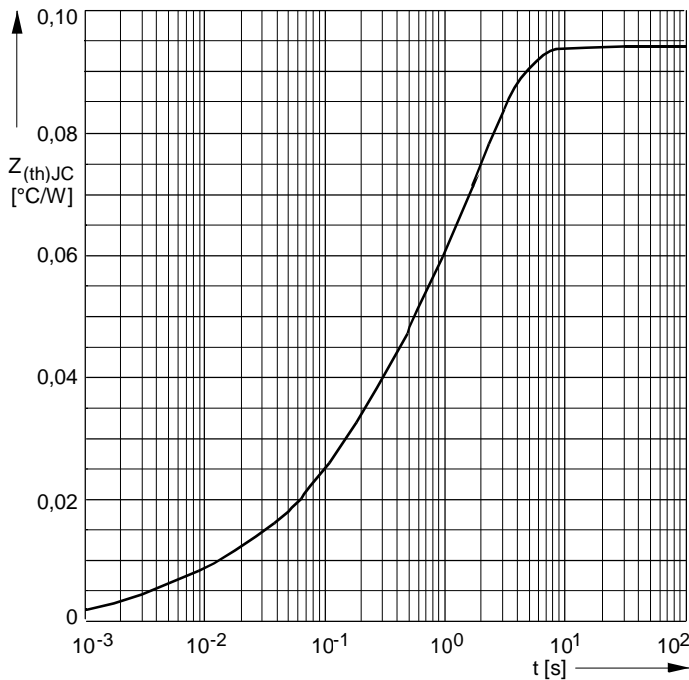
D400N\_3

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



D400N\_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:  $C = 0,68 \mu F$ ;  $R = 5,6 \Omega$   
 Parameter: Durchlaßstrom / Forward current  $i_{FM}$



D400N\_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

Pos. n	1	2	3	4	5	6	7
$R_{thn}$ °C/W	0,000087	0,004051	0,005142	0,0223	0,06242		
$\tau_n$ [s]	0,000096	0,00156	0,0126	0,133	1,67		

Analytische Funktion / Analytical function:

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

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