# T 120 F

## Elektrische Eigenschaften — Electrical properties

### Höchstzulässige Werte — Maximum rated values

| | | | | | | |
|---|---|---|---|---|---|---|
| Periodische Vorwärts- und Rückwärts-Spitzensperrspannung | repetitive peak forward off-state and reverse voltages | $t_{vj} = -40°C \ldots t_{vj\,max}$ | $V_{DRM}$, $V_{RRM}$ | | 800, 1000 | V |
| | | | | | 1100, 1200 | v |
| | | | | | 1300, 1400* | v |
| Vorwärts-Stoßspitzen-sperrspannung | non repetitive peak forward off-state voltage | $t_{vj} = -40°C \ldots t_{vj\,max}$ | $V_{DSM} = V_{DRM}$ | | | |
| Rückwärts-Stoßspitzen-sperrspannung | non repetitive peak reverse voltage | $t_{vj} = +25°C \ldots t_{vj\,max}$ | $V_{RSM} = V_{RRM}$ | | + 100 | v |
| Durchlaßstrom-Grenzeffektivwert | RMS on-state current | | $I_{TRMSM}$ | | 240 | A |
| Dauergrenzstrom | average on-state current | $t_C = 85°C$ | $I_{TAVM}$ | | 120 | A |
| | | $t_C = 70°C$ | | | 152 | A |
| Stoßstrom-Grenzwert | surge current | $t_{vj} = 25°C, t_p = 10$ ms | $I_{TSM}$ | | 3300 | A |
| | | $t_{vj} = t_{vj\,max}, t_p = 10$ ms | | | 2900 | A |
| Grenzlastintegral | $I^2t$-value | $t_{vj} = 25°C, t_p = 10$ ms | $I^2t$ | | 54500 | $A^2s$ |
| | | $t_{vj} = t_{vj\,max}, t_p = 10$ ms | | | 42000 | $A^2s$ |
| Kritische Stromsteilheit | critical rate of rise of on-state current | $v_D \leq 67\%\ v_{DRM}$, f = 50 Hz | $(di/dt)_{cr}$ | | 160 | Alus |
| | | $i_{GM} = 0{,}6$ A, $di_G/dt = 0{,}6$ A/µs | | | [1] [2] | |
| Kritische Spannungssteilheit | critical rate of rise of off-state voltage | $t_{vj} = t_{vj\,max}$, $v_D = 67\%\ V_{DRM}$ | $(dv/dt)_{cr}$ | B: | 50 50 | V/µs |
| | | | | c*: | 500 500 | V/µs |
| | | | | L: | 500 50 | V/µs |
| | | | | M*: | 1000 500 | V/µs |

### Charakteristische Werte — Characteristic values

| | | | | | | |
|---|---|---|---|---|---|---|
| Durchlaßspannung | on-state voltage | $t_{vj} = t_{vj\,max}, i_T = 500$ A | $v_T$ | max. | 2,2 | v |
| Schleusenspannung | threshold voltage | $t_{vj} = t_{vj\,max}$ | $V_{T(TO)}$ | | 1,2 | v |
| Ersatzwiderstand | slope resistance | $t_{vj} = t_{vj\,max}$ | $r_T$ | | 1,6 | mΩ |
| Zündstrom | gate trigger current | $t_{vj} = 25°C, v_D = 12$ V | $I_{GT}$ | max. | 150 | mA |
| Zündspannung | gate trigger voltage | $t_{vj} = 25°C, v_D = 12$ V | $V_{GT}$ | max. | 2 | v |
| Nicht zündender Steuerstrom | gate non-trigger current | $t_{vj} = t_{vj\,man}, v_D = 12$ V | $I_{GD}$ | max. | 10 | mA |
| Nicht zündende Steuerspannung | gate non-trigger voltage | $t_{vj} = t_{vj\,max}, v_D = 0{,}5\ V_{DRM}$ | $V_{GD}$ | max. | 0,25 | V |
| Haltestrom | holding current | $t_{vj} = 25°C, v_D = 12$ V, $R_A = 10\ \Omega$ | $I_H$ | max. | 250 | mA |
| Einraststrom | latching current | $t_{vj} = 25°C, v_D = 12$ V, $R_{GK} \geq 10\ \Omega$ | $I_L$ | max. | 1 | A |
| | | $i_{GM} = 0{,}6$ A, $di_G/dt = 0{,}6$ A/µs, $t_g = 20$ µs | | | | |
| Vorwärts- u. Rückwärts-Sperrstrom | forward off-state and reverse Currents | $t_{vj} = t_{vj\,max}, v_D = V_{DRM}, v_R = V_{RRM}$ | $i_D$, $i_R$ | max. | 30 | mA |
| Zündverzug | gate controlled delay time | $t_{vj} = 25°C, i_{GM} = 0{,}6$ A, $di_G/dt = 0{,}6$ A/µs | $t_{gd}$ | max. | 1,4 | µs |
| Freiwerdezeit | circuit commutated turn-off time | siehe Techn. Erl./see Techn. Inf. | $t_q$ | s: max. | 18 | µs |
| | | | | E: max. | 20 | µs |
| | | | | F: max. | 25 | µs |

## Thermische Eigenschaften — Thermal properties

| | | | | | |
|---|---|---|---|---|---|
| Innerer Wärmewiderstand | thermal resistance, junction to case | | | | |
| | | Θ = 180° el, sin | $R_{thJC}$ | max. | 0,2 °C/W |
| | | DC | | max. | 0,186 °C/W |
| Höchstzul. Sperrschichttemperatur | max. junction temperature | | $t_{vj\,max}$ | | 125°C |
| Betriebstemperatur | Operating temperature | | $t_{c\,op}$ | | −40 ... + 125°C |
| Lagertemperatur | storage temperature | | $t_{stg}$ | | −40 ... + 150°C |

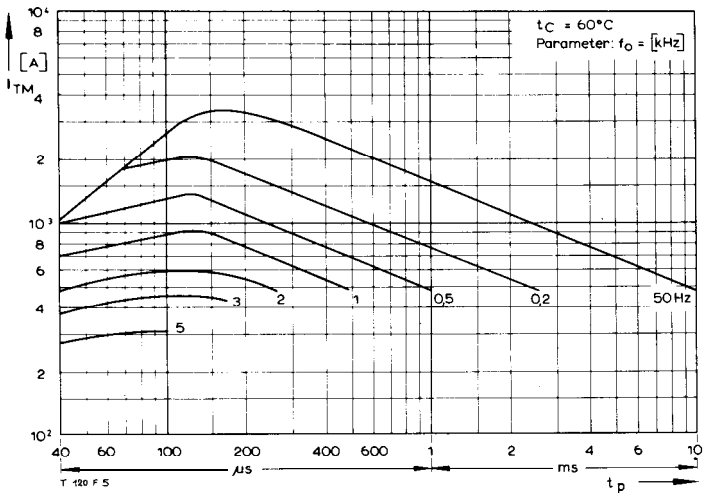
## Mechanische Eigenschaften — Mechanical properties

| | | | | | |
|---|---|---|---|---|---|
| Si-Element mit Druckkontakt | Si-pellet with pressure contact | | | | |
| Anzugsdrehmoment | tightening torque | | M | | 20 Nm |
| Gewicht | weight | | G | typ. | 150 g |
| Kriechstrecke | Creepage distance | | | | 8 mm |
| Feuchteklasse | humidity classification | DIN 40040 | | | C |
| Schwingfestigkeit | Vibration resistance | f = 50 Hz | | | 50 m/s² |
| Maßbild B | outline B | DIN 41892-204B3 | | | Seite/page 154 |

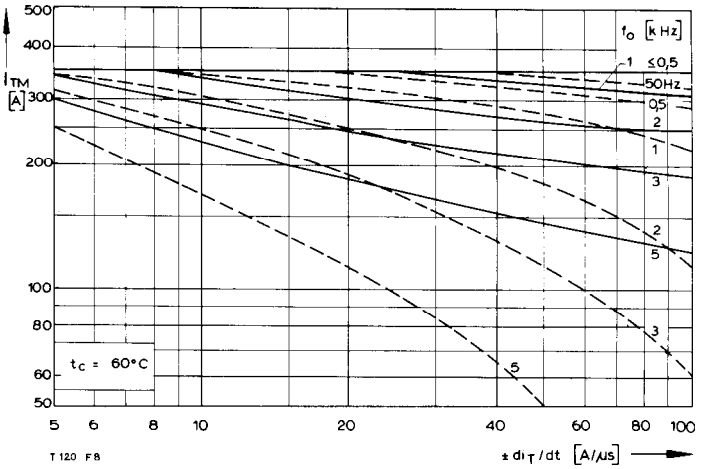
* Für größere Stückzahlen bitte Liefertermin erfragen/Delivery for larger quantities on request

1) Werte nach DIN IEC 747-6 (ohne vorausgehende Kommutierung)/Values to DIN IEC 747-6 (without prior commutation)

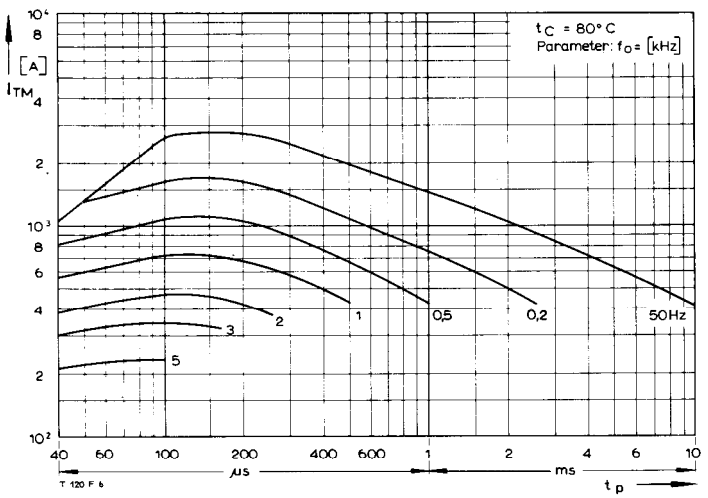
2) Unmittelbar nach der Freiwerdezeit, vgl. Meßbedingungen für $t_q$/Immediately after circuit commutated turn-off time, see Parameters $t_q$



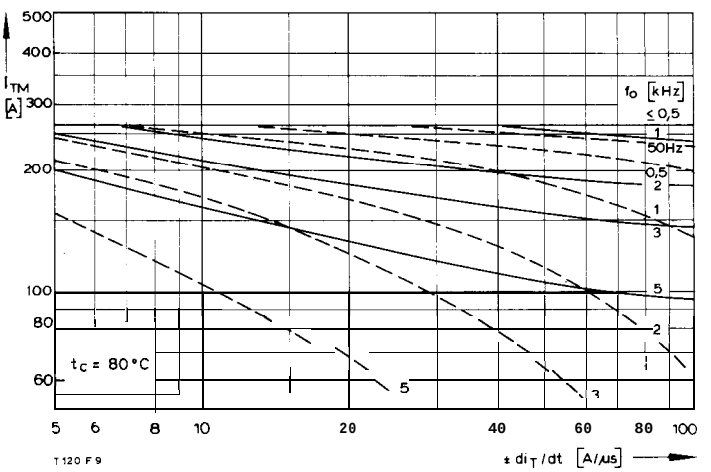

BildlFig. 1



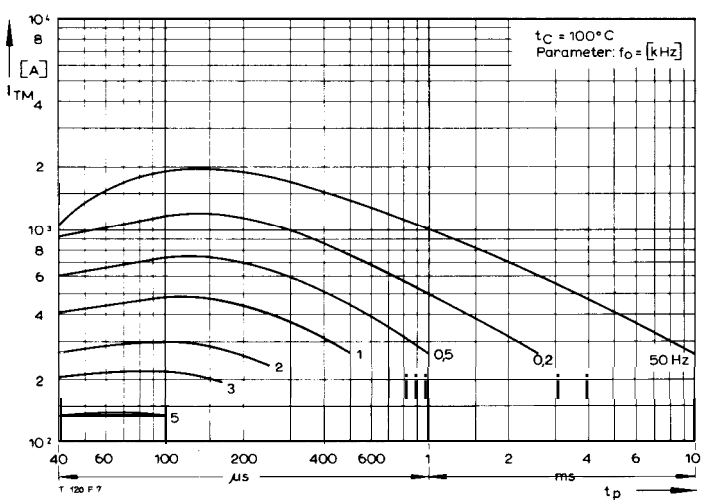

Bild/Fig. 4



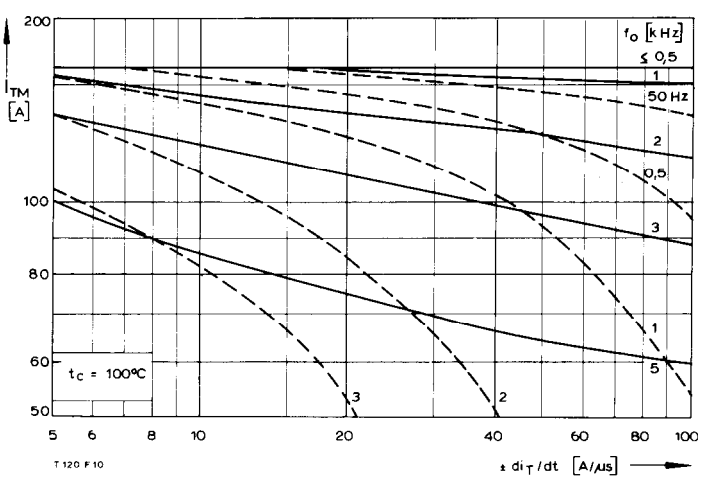

Bild/Fig. 2




Bild/Fig. 5



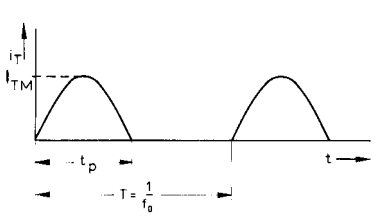

Bild/Fig. 3




BildlFig. 6

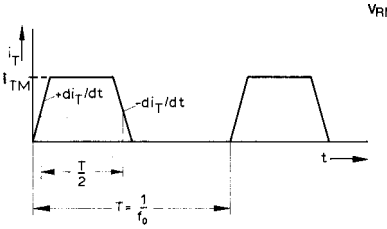
BildlFig. 1, 2, 3
Steuergenerator/pulse generator:
$i_G$ = 0,6 A, $di_G/dt$ = 0,6 A/µs

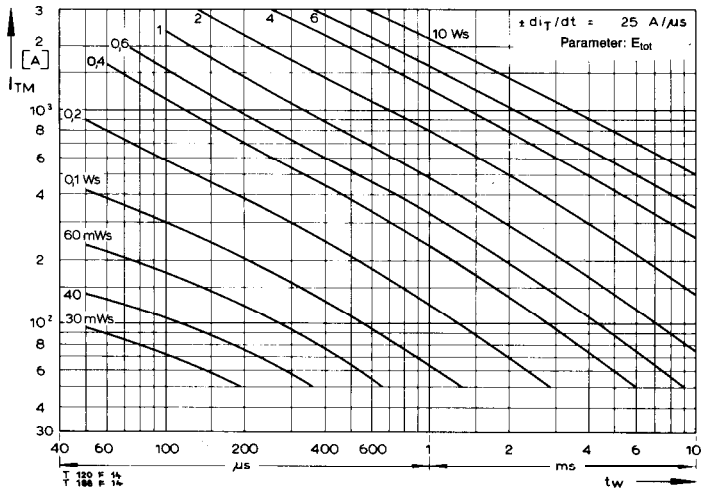
RC-Glied/RC-network:
R [Ω] ≥ 0,02 $v_{DM}$ [V]
C ≤ 0,15 µF
$v_{DM}$ ≤ 0,67 $V_{DRM}$



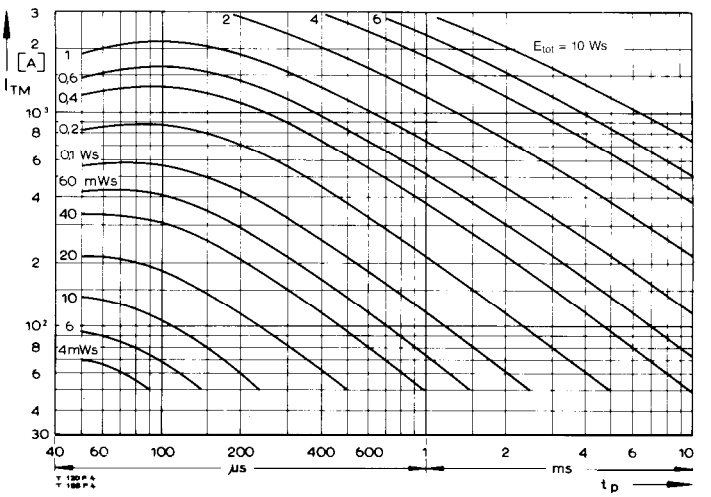

BildlFig. 4, 5, 6
Steuergenerator/pulse generator:
$i_G$ = 0,6 A, $di_G/dt$ = 0,6 A/µs

RC-Glied/RC-network:
R [Ω] ≥ 0,02 $v_{DM}$ [V]
C ≤ 0,22 µF
$v_{DM}$ ≤ 0,67 $V_{DRM}$
$dv_R/dt$ ≤ 600 V/µs
$v_{RM}$ ≤ 0,67 $V_{RRM}$

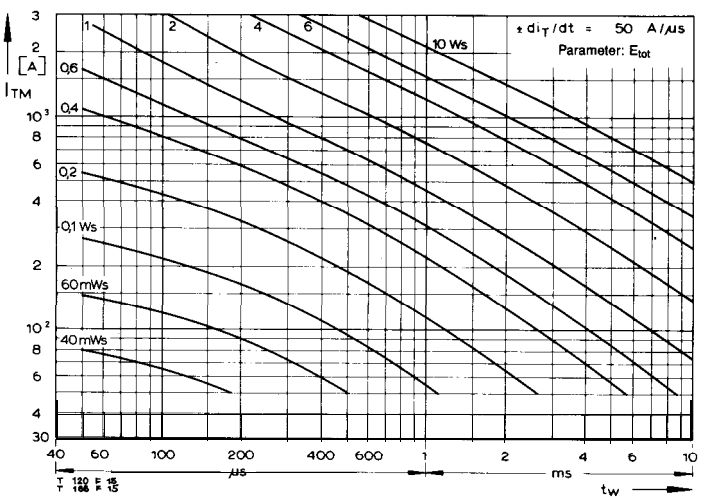




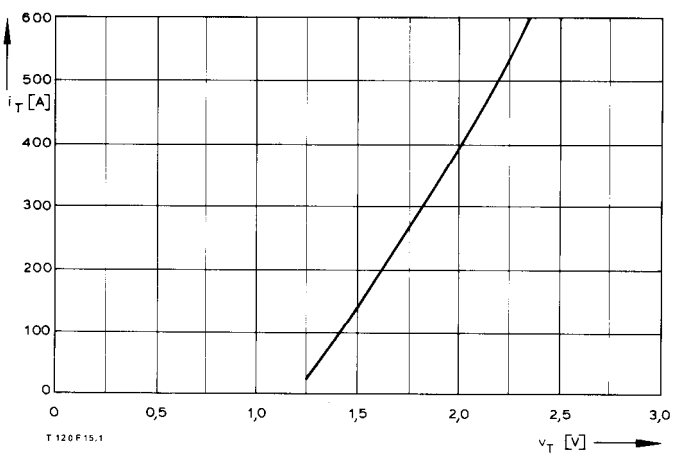

BildIFig. 10



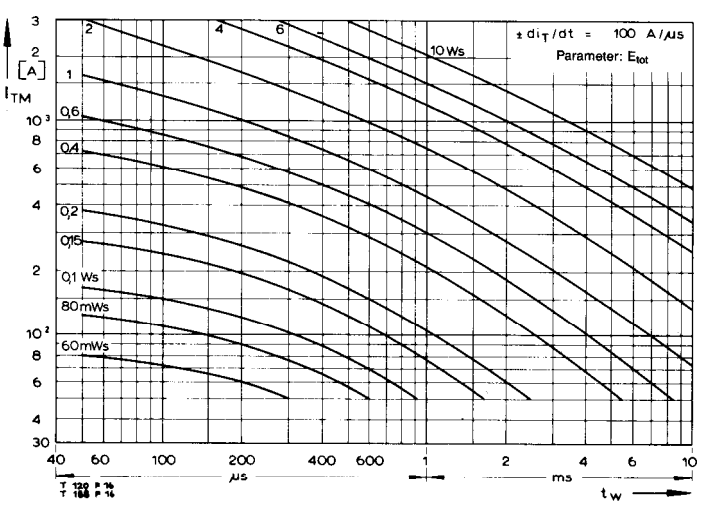

BildIFig. 13



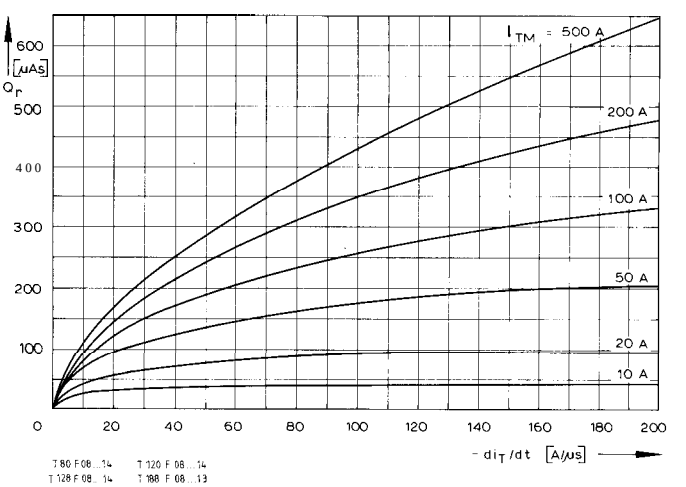

Bild/Fig. 11




BildIFig. 14



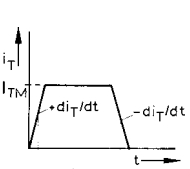

BildIFig. 12




Bild/Fig. 15

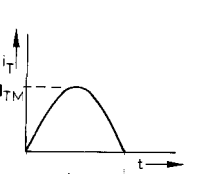
BildIFig. 10, 11, 12
Steuergenerator/pulse generator:
$i_G$ = 0,6 A, $di_G/dt$ = 0,6 A/µs

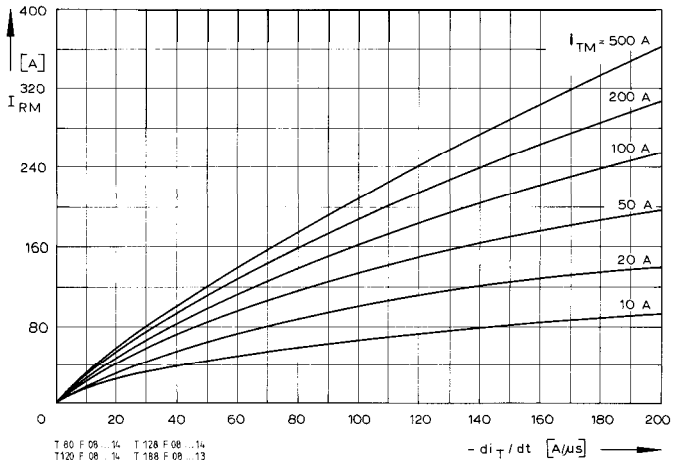
RC-Glied/RC-network:
R [Ω] ≥ 0,02 $v_{DM}$ [V]
C ≤ 0.22 µF
$v_{DM} \leq 0{,}67\ V_{D,,}$
$dv_R/dt \leq 600$ V/µs
$v_{RM} \leq 0{,}67\ V_{RRM}$



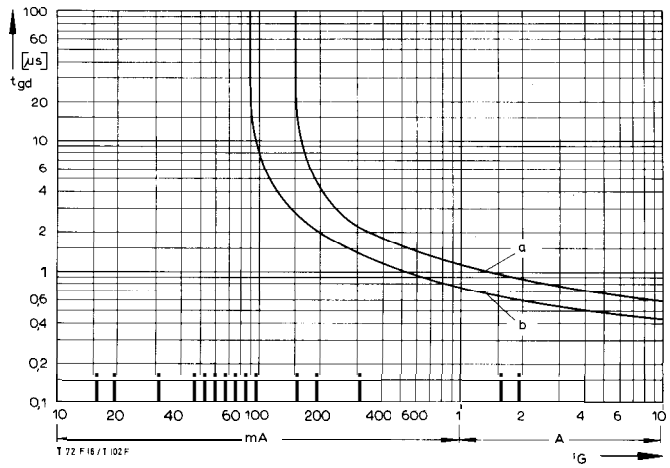

(zu Bild/to Fig. 13)
Steuergenerator/pulse generator:
$i_G$ = 0,6 A, $di_G/dt$ = 0,6 A/µs

RC-Glied/RC-network:
R [Ω] ≥ 0,02 $v_{DM}$ [V]
C ≤ 0,15 µF

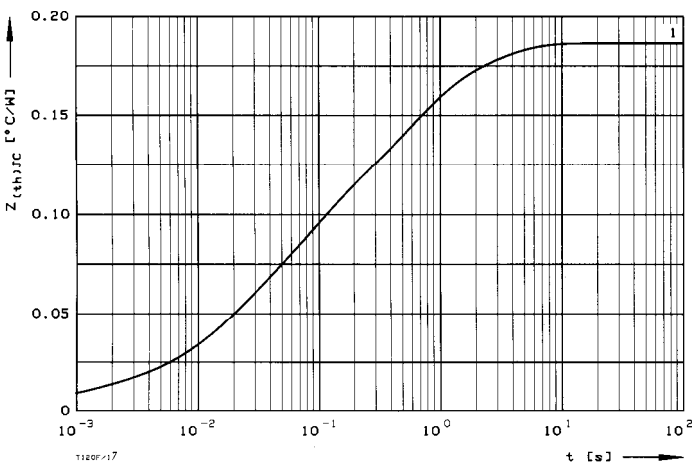




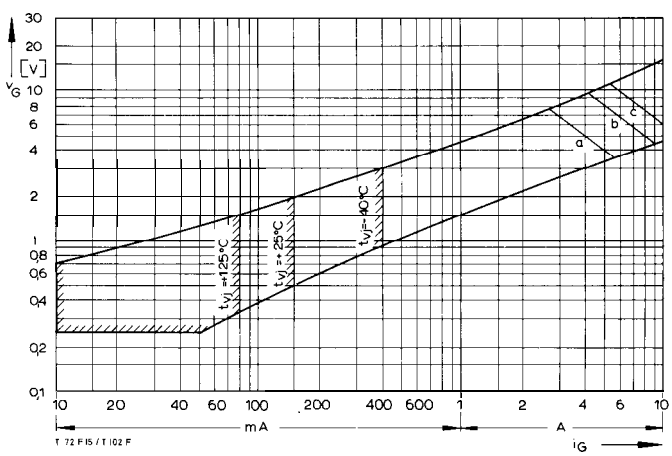

Bild/Fig 16
Rückstromspitze $I_{RM} = f(-di/dt), t_{vj} = t_{vj\,(max)}, v_R = 0{,}5\,V_{RRM}, v_{RM} = 0{,}8\,V_{RRM}$
Peak reverse recovery current $I_{RM} = f(-di/dt), t_{vj} = t_{vj\,(max)}, v_R = 0.5\,V_{RRM}, v_{RM} = 0.8\,V_{RRM}$
Parameter: DurchlaßstromlOn-state current $I_{TM}$




BlldlFlg. 18
ZündverzuglGate controlled delay time $t_{gd} = f(i_{GM}), t_{vj} = 25°C, di_G/dt = i_{GM}/1\,\mu s$
a — Maximaler Verlauf/Limiting characterlstic
b — Typischer Verlauf/Typical characteristic




Bild/Fig. 17
Transienter Innerer Wärmewiderstand $Z_{(th)JC} = f(t)$, DC
Transient thermal impedance $Z_{(th)JC} = f(t)$, DC




BildlFig. 19
Steuercharakteristik mit Zündbereichen/Gata Characteristic with triggering areas
$v_G = f(i_G)$, Vo = 12 V

| Parameter: | | a | b | c |
|---|---|---|---|---|
| Steuerimpulsdauer/Trigger pulse duration tg | [ms] | 10 | 1 | 0,5 |
| Höchstzulässige Spitzensteuerverlustleistung/ Max. rated peak gate power dissipation $P_{GM}$ | [W] | 20 | 40 | 60 |

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] | 0,008134 | 0,032536 | 0,054253 | 0,061911 | 0.029501 | | |
| $\tau_n$ [s] | 0.000814 | 0.013651 | 0.066196 | 0.496428 | 2.293634 | | |

Analytische Funktion/analytical function:

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