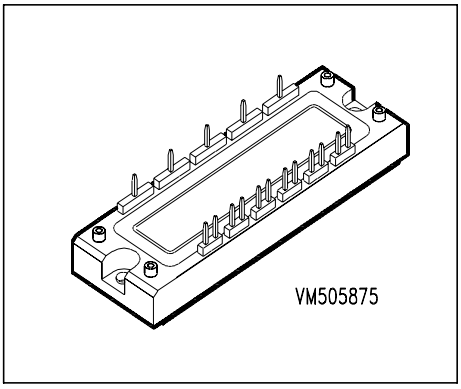
**IGBT Power Module**




- Power module
- 3-phase full-bridge
- Including fast free-wheel diodes
- Package with insulated metal base plate

| Type | $V_{CE}$ | $I_C$ | Package | Ordering Code |
|---|---|---|---|---|
| BSM 50 GD 120 DN2 | 1200V | 72A | ECONOPACK 2K | C67076-A2514-A67 |

**Maximum Ratings**

| Parameter | Symbol | Values | Unit |
|---|---|---|---|
| Collector-emitter voltage | $V_{CE}$ | 1200 | V |
| Collector-gate voltage<br>$R_{GE}$ = 20 kΩ | $V_{CGR}$ | 1200 | |
| Gate-emitter voltage | $V_{GE}$ | ± 20 | |
| DC collector current<br>$T_C$ = 25 °C<br>$T_C$ = 80 °C | $I_C$ | 72<br>50 | A |
| Pulsed collector current, $t_p$ = 1 ms<br>$T_C$ = 25 °C<br>$T_C$ = 80 °C | $I_{Cpuls}$ | 144<br>100 | |
| Power dissipation per IGBT<br>$T_C$ = 25 °C | $P_{tot}$ | 350 | W |
| Chip temperature | $T_j$ | + 150 | °C |
| Storage temperature | $T_{stg}$ | -55 ... + 150 | |
| Thermal resistance, chip case | $R_{thJC}$ | ≤ 0.35 | K/W |
| Diode thermal resistance, chip case | $R_{thJCD}$ | ≤ 0.7 | |
| Insulation test voltage, $t$ = 1min. | $V_{is}$ | 2500 | Vac |
| Creepage distance | - | 16 | mm |
| Clearance | - | 11 | |
| DIN humidity category, DIN 40 040 | - | F | sec |
| IEC climatic category, DIN IEC 68-1 | - | 55 / 150 / 56 | |

**Electrical Characteristics**, at $T_j$ = 25 °C, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **Static Characteristics** | | | | | |
| Gate threshold voltage<br>$V_{GE} = V_{CE}$, $I_C$ = 2 mA | $V_{GE(th)}$ | 4.5 | 5.5 | 6.5 | V |
| Collector-emitter saturation voltage<br>$V_{GE}$ = 15 V, $I_C$ = 50 A, $T_j$ = 25 °C<br>$V_{GE}$ = 15 V, $I_C$ = 50 A, $T_j$ = 125 °C | $V_{CE(sat)}$ | -<br>- | 2.5<br>3.1 | 3<br>3.7 | |
| Zero gate voltage collector current<br>$V_{CE}$ = 1200 V, $V_{GE}$ = 0 V, $T_j$ = 25 °C<br>$V_{CE}$ = 1200 V, $V_{GE}$ = 0 V, $T_j$ = 125 °C | $I_{CES}$ | -<br>- | 0.8<br>4 | 1<br>- | mA |
| Gate-emitter leakage current<br>$V_{GE}$ = 20 V, $V_{CE}$ = 0 V | $I_{GES}$ | - | - | 200 | nA |
| **AC Characteristics** | | | | | |
| Transconductance<br>$V_{CE}$ = 20 V, $I_C$ = 50 A | $g_{fs}$ | 23 | - | - | S |
| Input capacitance<br>$V_{CE}$ = 25 V, $V_{GE}$ = 0 V, $f$ = 1 MHz | $C_{iss}$ | - | 3300 | - | pF |
| Output capacitance<br>$V_{CE}$ = 25 V, $V_{GE}$ = 0 V, $f$ = 1 MHz | $C_{oss}$ | - | 500 | - | |
| Reverse transfer capacitance<br>$V_{CE}$ = 25 V, $V_{GE}$ = 0 V, $f$ = 1 MHz | $C_{rss}$ | - | 220 | - | |

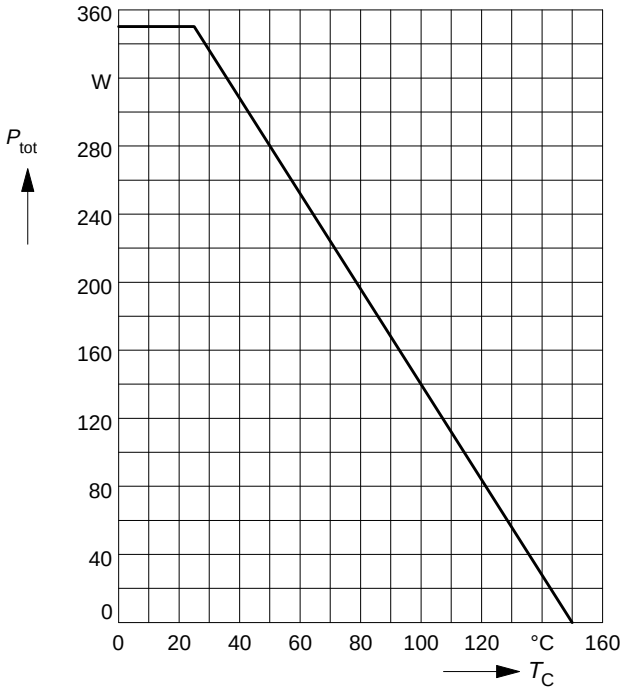
**Electrical Characteristics**, at $T_j$ = 25 °C, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **Switching Characteristics, Inductive Load at $T_j$ = 125 °C** | | | | | |
| Turn-on delay time<br>$V_{CC}$ = 600 V, $V_{GE}$ = 15 V, $I_C$ = 50 A<br>$R_{Gon}$ = 22 Ω | $t_{d(on)}$ | - | 44 | 100 | ns |
| Rise time<br>$V_{CC}$ = 600 V, $V_{GE}$ = 15 V, $I_C$ = 50 A<br>$R_{Gon}$ = 22 Ω | $t_r$ | - | 56 | 100 | |
| Turn-off delay time<br>$V_{CC}$ = 600 V, $V_{GE}$ = -15 V, $I_C$ = 50 A<br>$R_{Goff}$ = 22 Ω | $t_{d(off)}$ | - | 380 | 500 | |
| Fall time<br>$V_{CC}$ = 600 V, $V_{GE}$ = -15 V, $I_C$ = 50 A<br>$R_{Goff}$ = 22 Ω | $t_f$ | - | 70 | 100 | |
| **Free-Wheel Diode** | | | | | |
| Diode forward voltage<br>$I_F$ = 50 A, $V_{GE}$ = 0 V, $T_j$ = 25 °C<br>$I_F$ = 50 A, $V_{GE}$ = 0 V, $T_j$ = 125 °C | $V_F$ | -<br>- | 2.3<br>1.8 | 2.8<br>- | V |
| Reverse recovery time<br>$I_F$ = 50 A, $V_R$ = -600 V, $V_{GE}$ = 0 V<br>$di_F/dt$ = -800 A/µs, $T_j$ = 125 °C | $t_{rr}$ | - | 0.2 | - | µs |
| Reverse recovery charge<br>$I_F$ = 50 A, $V_R$ = -600 V, $V_{GE}$ = 0 V<br>$di_F/dt$ = -800 A/µs<br>$T_j$ = 25 °C<br>$T_j$ = 125 °C | $Q_{rr}$ | -<br>- | 2.8<br>8 | -<br>- | µC |

**Power dissipation**

$P_{tot} = f(T_C)$

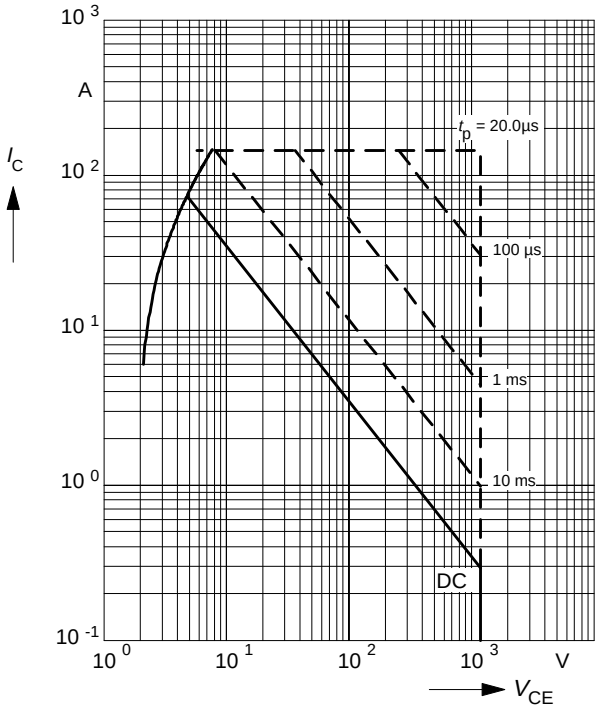
parameter: $T_j \leq 150$ °C




**Safe operating area**

$I_C = f(V_{CE})$

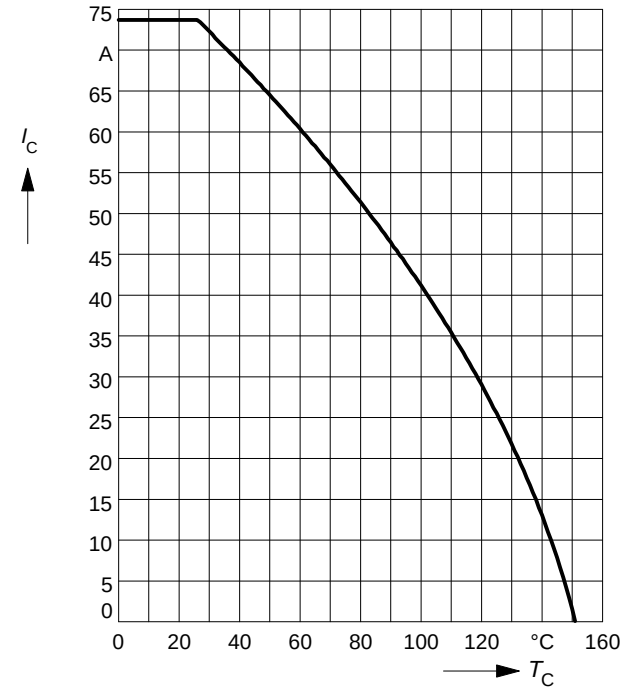
parameter: $D = 0$, $T_C = 25$°C , $T_j \leq 150$ °C




**Collector current**

$I_C = f(T_C)$

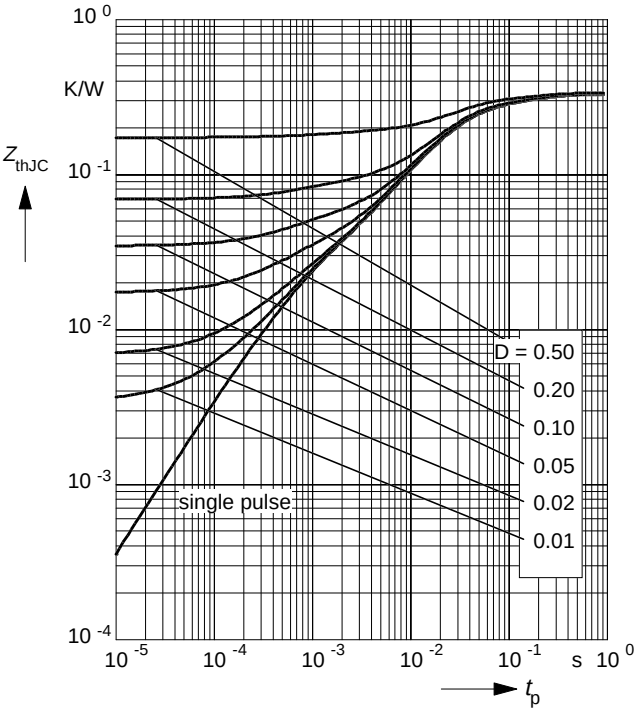
parameter: $V_{GE} \geq 15$ V , $T_j \leq 150$ °C




**Transient thermal impedance IGBT**

$Z_{th\,JC} = f(t_p)$

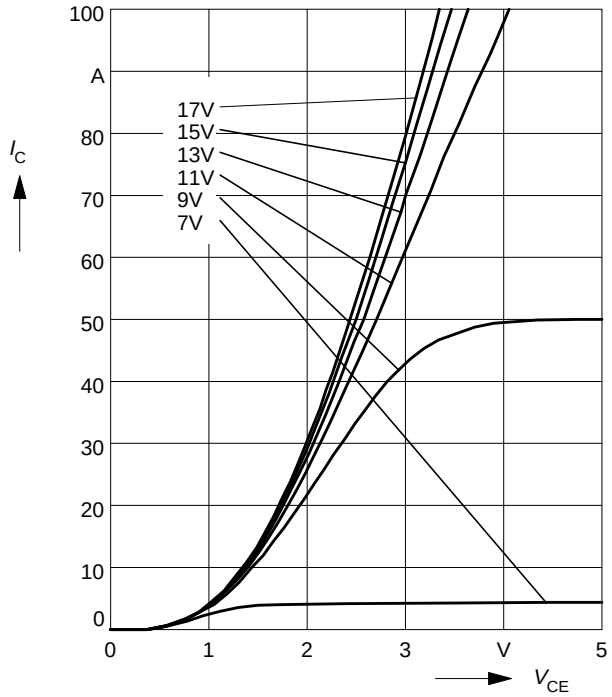
parameter: $D = t_p / T$



**Typ. output characteristics**

$I_C = f(V_{CE})$

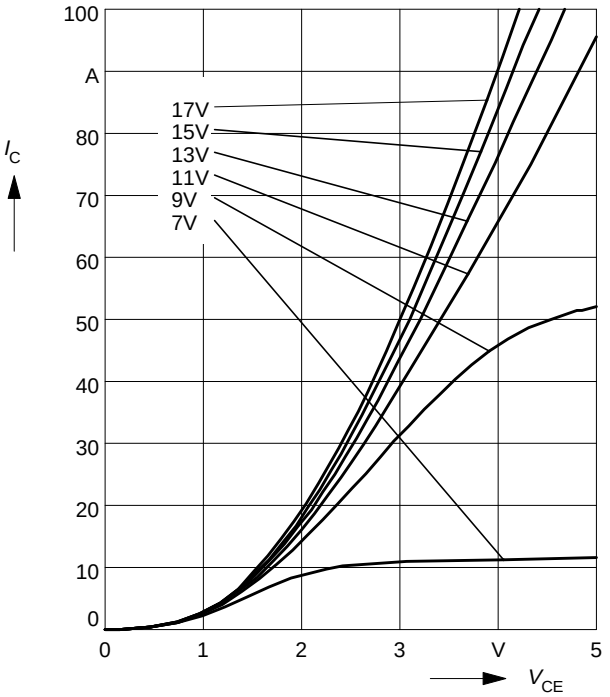
parameter: $t_p$ = 80 µs, $T_j$ = 25 °C




**Typ. output characteristics**

$I_C = f(V_{CE})$

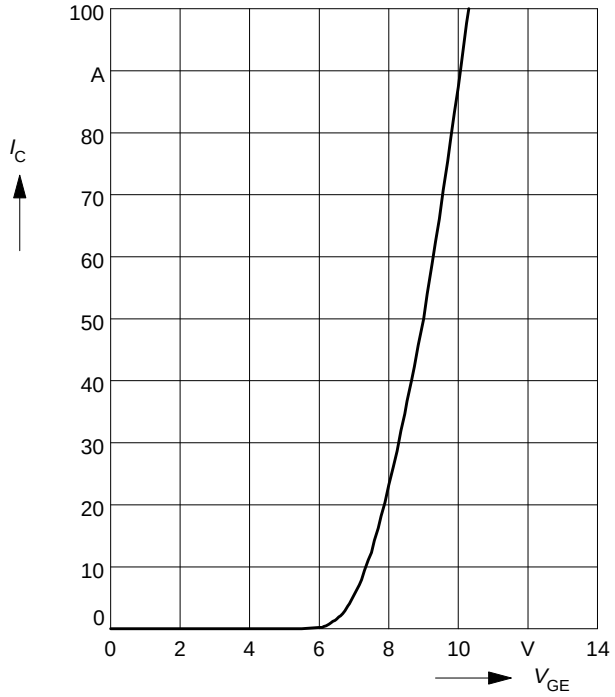
parameter: $t_p$ = 80 µs, $T_j$ = 125 °C




**Typ. transfer characteristics**

$I_C = f(V_{GE})$

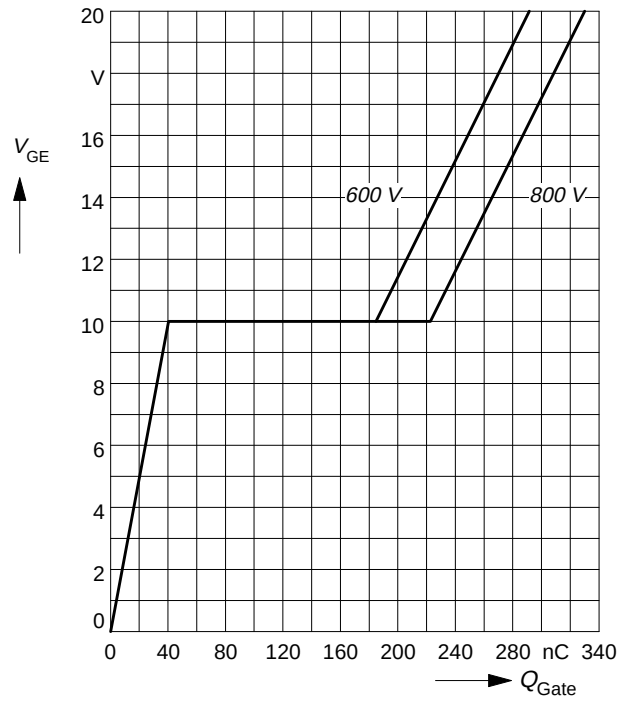
parameter: $t_p$ = 80 µs, $V_{CE}$ = 20 V



**Typ. gate charge**

$V_{GE} = f(Q_{Gate})$

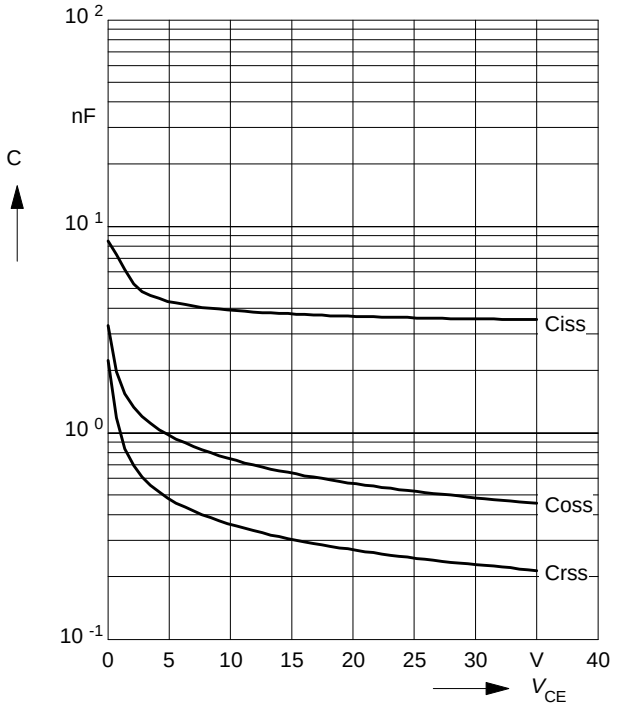
parameter: $I_{C\ puls}$ = 50 A




**Typ. capacitances**

$C = f(V_{CE})$

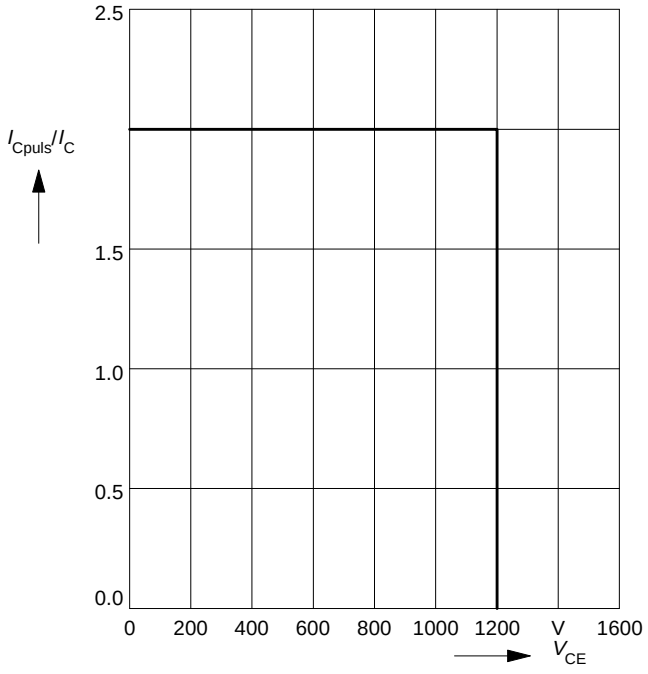
parameter: $V_{GE}$ = 0 V, f = 1 MHz




**Reverse biased safe operating area**

$I_{Cpuls} = f(V_{CE})$ , $T_j$ = 150°C

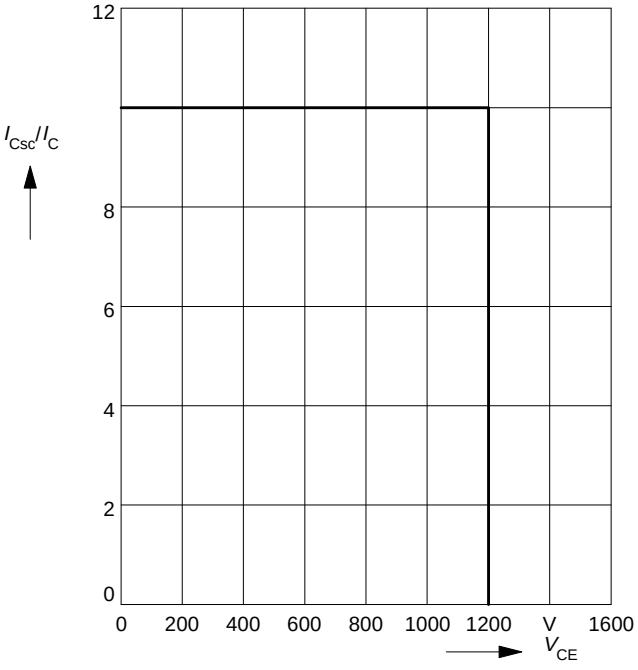
parameter: $V_{GE}$ = 15 V




**Short circuit safe operating area**

$I_{Csc} = f(V_{CE})$ , $T_j$ = 150°C

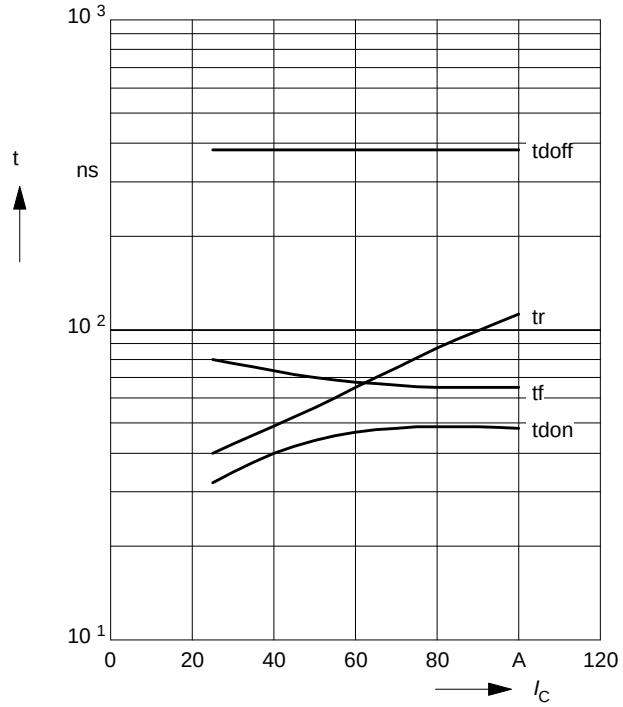
parameter: $V_{GE}$ = ± 15 V, $t_{SC}$ ≤ 10 µs, L < 50 nH



**Typ. switching time**

$I = f(I_C)$ , inductive load , $T_j$ = 125°C

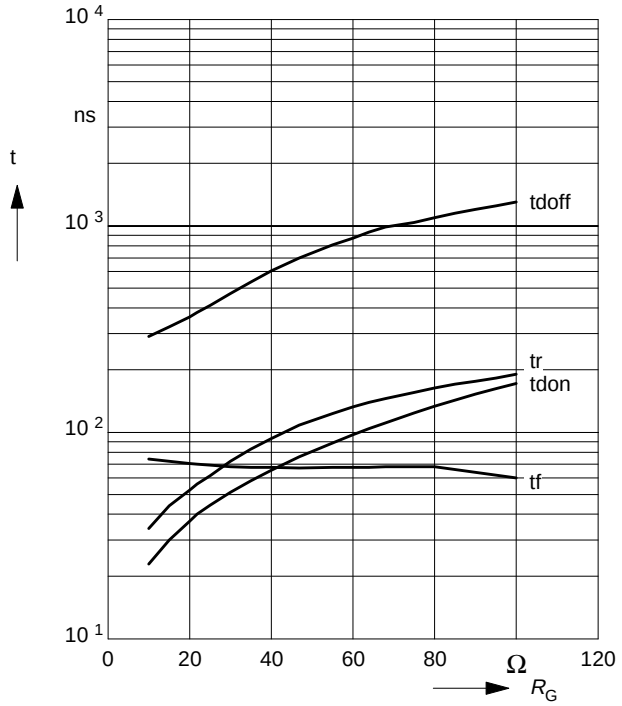
par.: $V_{CE}$ = 600 V, $V_{GE}$ = ± 15 V, $R_G$ = 22 Ω




**Typ. switching time**

$t = f(R_G)$ , inductive load , $T_j$ = 125°C

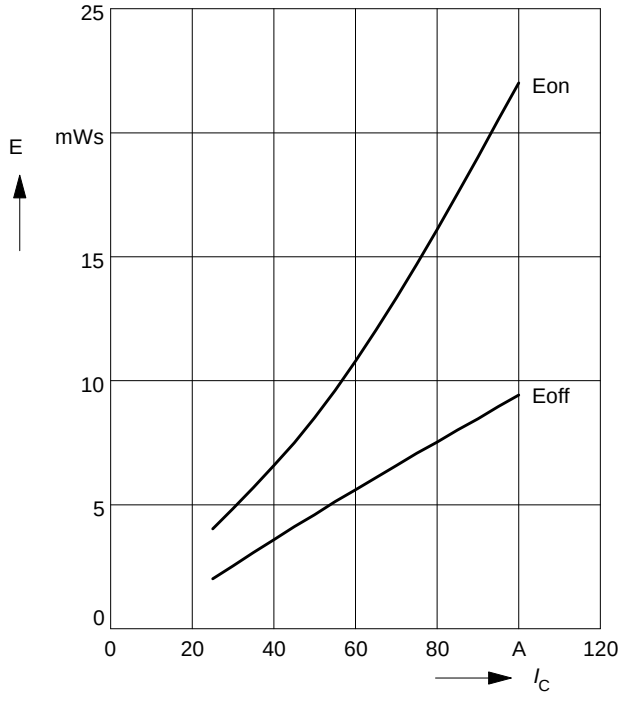
par.: $V_{CE}$ = 600 V, $V_{GE}$ = ± 15 V, $I_C$ = 50 A




**Typ. switching losses**

$E = f(I_C)$ , inductive load , $T_j$ = 125°C

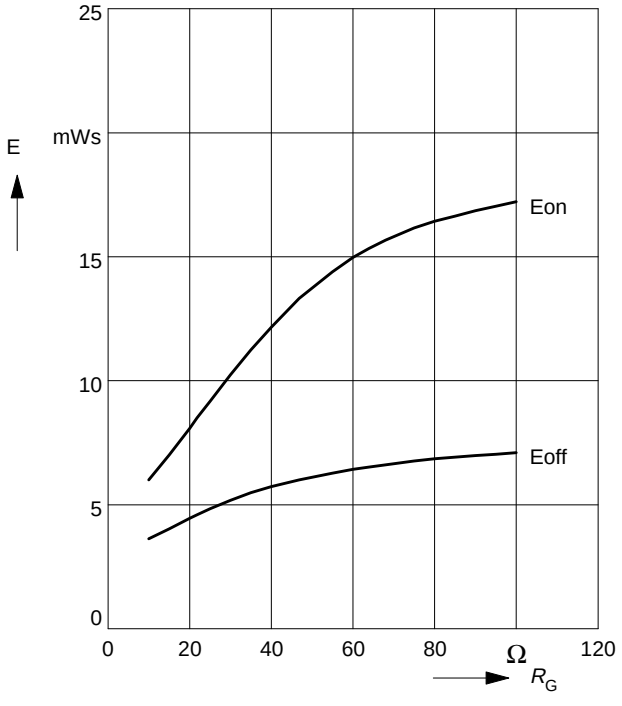
par.: $V_{CE}$ = 600 V, $V_{GE}$ = ± 15 V, $R_G$ = 22 Ω




**Typ. switching losses**

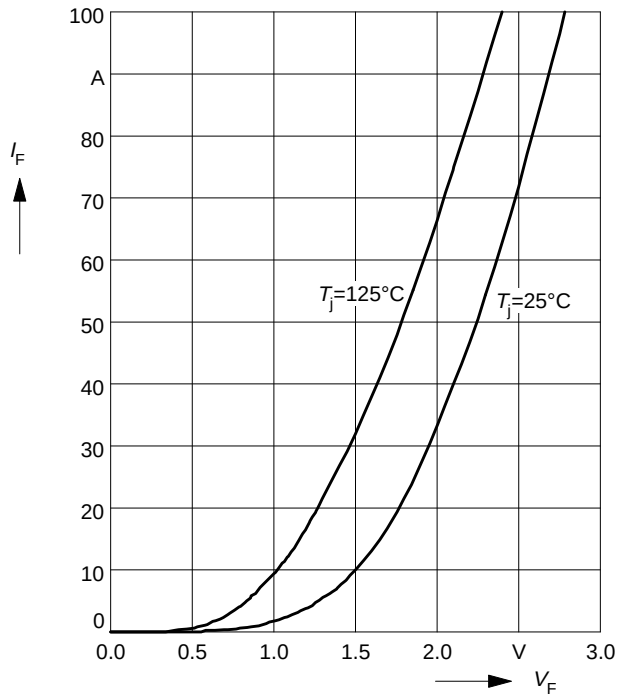
$E = f(R_G)$ , inductive load , $T_j$ = 125°C

par.: $V_{CE}$ = 600V, $V_{GE}$ = ± 15 V, $I_C$ = 50 A



**Forward characteristics of fast recovery reverse diode** $I_F = f(V_F)$

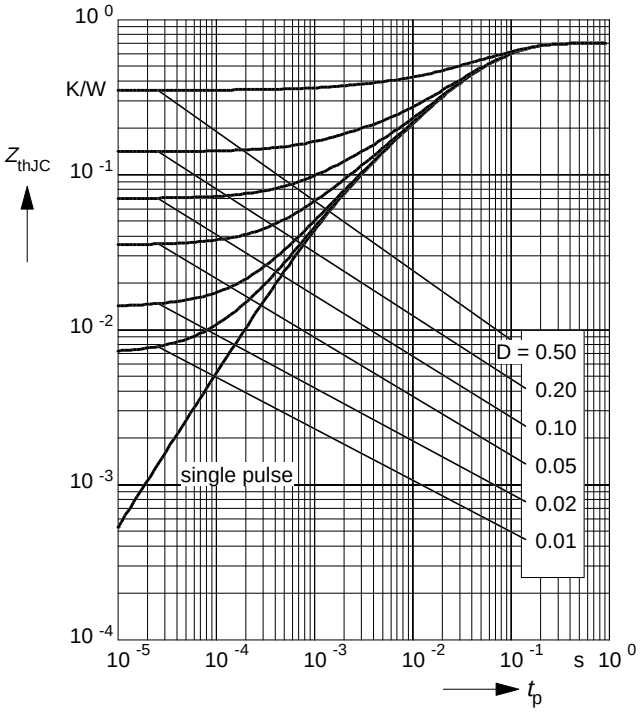
parameter: $T_j$



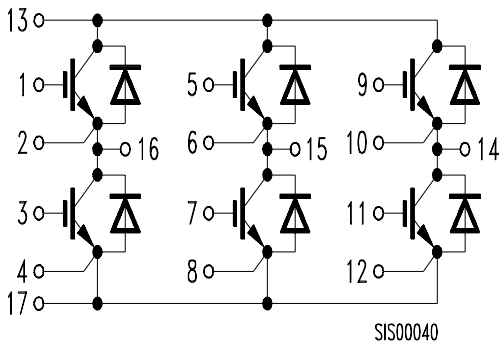

**Transient thermal impedance Diode**

$Z_{th\ JC} = f(t_p)$

parameter: $D = t_p / T$



## Circuit Diagram




## Package Outlines

Dimensions in mm

Weight: 180 g