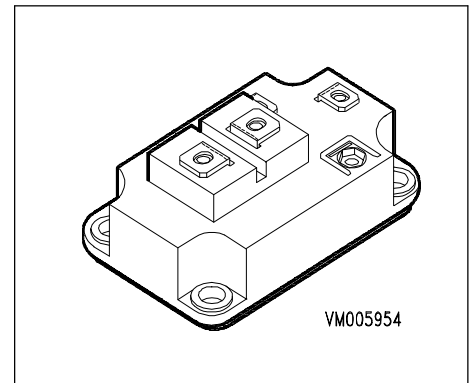


## IGBT Power Module

- Single switch
- Including fast free-wheeling diodes
- Package with insulated metal base plate



| Type                 | $V_{CE}$ | $I_C$ | Package         | Ordering Code    |
|----------------------|----------|-------|-----------------|------------------|
| BSM 300 GA 120 DN2   | 1200V    | 430A  | SINGLE SWITCH 1 | C67076-A2007-A70 |
| BSM 300 GA 120 DN2 S | 1200V    | 430A  | SSW SENSE 1     | C67070-A2017-A70 |

## Maximum Ratings

| Parameter                                     | Symbol      | Values        | Unit               |
|-----------------------------------------------|-------------|---------------|--------------------|
| Collector-emitter voltage                     | $V_{CE}$    | 1200          | V                  |
| Collector-gate voltage                        | $V_{CGR}$   |               |                    |
| $R_{GE} = 20\text{ k}\Omega$                  |             | 1200          |                    |
| Gate-emitter voltage                          | $V_{GE}$    | $\pm 20$      |                    |
| DC collector current                          | $I_C$       |               | A                  |
| $T_C = 25\text{ }^{\circ}\text{C}$            |             | 430           |                    |
| $T_C = 80\text{ }^{\circ}\text{C}$            |             | 300           |                    |
| Pulsed collector current, $t_p = 1\text{ ms}$ | $I_{Cpuls}$ |               |                    |
| $T_C = 25\text{ }^{\circ}\text{C}$            |             | 860           |                    |
| $T_C = 80\text{ }^{\circ}\text{C}$            |             | 600           |                    |
| Power dissipation per IGBT                    | $P_{tot}$   |               | W                  |
| $T_C = 25\text{ }^{\circ}\text{C}$            |             | 2500          |                    |
| Chip temperature                              | $T_j$       | + 150         | $^{\circ}\text{C}$ |
| Storage temperature                           | $T_{stg}$   | -40 ... + 125 |                    |
| Thermal resistance, chip case                 | $R_{thJC}$  | $\leq 0.05$   | K/W                |
| Diode thermal resistance, chip case           | $R_{thJCD}$ | $\leq 0.125$  |                    |
| Insulation test voltage, $t = 1\text{min.}$   | $V_{is}$    | 2500          | Vac                |
| Creepage distance                             | -           | 20            | mm                 |
| Clearance                                     | -           | 11            |                    |
| DIN humidity category, DIN 40 040             | -           | F             | sec                |
| IEC climatic category, DIN IEC 68-1           | -           | 40 / 125 / 56 |                    |

Electrical Characteristics, at  $T_j = 25\text{ °C}$ , unless otherwise specified

| Parameter | Symbol | Values |      |      | Unit |
|-----------|--------|--------|------|------|------|
|           |        | min.   | typ. | max. |      |

### Static Characteristics

|                                                                                                                                                                                |               |        |            |          |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|------------|----------|----|
| Gate threshold voltage<br>$V_{GE} = V_{CE}, I_C = 12\text{ mA}$                                                                                                                | $V_{GE(th)}$  | 4.5    | 5.5        | 6.5      | V  |
| Collector-emitter saturation voltage<br>$V_{GE} = 15\text{ V}, I_C = 300\text{ A}, T_j = 25\text{ °C}$<br>$V_{GE} = 15\text{ V}, I_C = 300\text{ A}, T_j = 125\text{ °C}$      | $V_{CE(sat)}$ | -<br>- | 2.5<br>3.1 | 3<br>3.7 |    |
| Zero gate voltage collector current<br>$V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_j = 25\text{ °C}$<br>$V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_j = 125\text{ °C}$ | $I_{CES}$     | -<br>- | 4<br>16    | 5.6<br>- |    |
| Gate-emitter leakage current<br>$V_{GE} = 20\text{ V}, V_{CE} = 0\text{ V}$                                                                                                    | $I_{GES}$     | -      | -          | 320      | nA |

### AC Characteristics

|                                                                                               |           |     |     |   |    |
|-----------------------------------------------------------------------------------------------|-----------|-----|-----|---|----|
| Transconductance<br>$V_{CE} = 20\text{ V}, I_C = 300\text{ A}$                                | $g_{fs}$  | 124 | -   | - | S  |
| Input capacitance<br>$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$            | $C_{iss}$ | -   | 22  | - | nF |
| Output capacitance<br>$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$           | $C_{oss}$ | -   | 3.3 | - |    |
| Reverse transfer capacitance<br>$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$ | $C_{rss}$ | -   | 1.2 | - |    |

**Electrical Characteristics, at  $T_j = 25\text{ °C}$ , unless otherwise specified**

| Parameter | Symbol | Values |      |      | Unit |
|-----------|--------|--------|------|------|------|
|           |        | min.   | typ. | max. |      |

**Switching Characteristics, Inductive Load at  $T_j = 125\text{ °C}$** 

|                                                                                                                                   |              |   |     |     |    |
|-----------------------------------------------------------------------------------------------------------------------------------|--------------|---|-----|-----|----|
| Turn-on delay time<br>$V_{CC} = 600\text{ V}$ , $V_{GE} = 15\text{ V}$ , $I_C = 300\text{ A}$<br>$R_{Gon} = 3.3\text{ }\Omega$    | $t_{d(on)}$  | - | 100 | 200 | ns |
| Rise time<br>$V_{CC} = 600\text{ V}$ , $V_{GE} = 15\text{ V}$ , $I_C = 300\text{ A}$<br>$R_{Gon} = 3.3\text{ }\Omega$             | $t_r$        | - | 110 | 220 |    |
| Turn-off delay time<br>$V_{CC} = 600\text{ V}$ , $V_{GE} = -15\text{ V}$ , $I_C = 300\text{ A}$<br>$R_{Goff} = 3.3\text{ }\Omega$ | $t_{d(off)}$ | - | 600 | 800 |    |
| Fall time<br>$V_{CC} = 600\text{ V}$ , $V_{GE} = -15\text{ V}$ , $I_C = 300\text{ A}$<br>$R_{Goff} = 3.3\text{ }\Omega$           | $t_f$        | - | 80  | 120 |    |

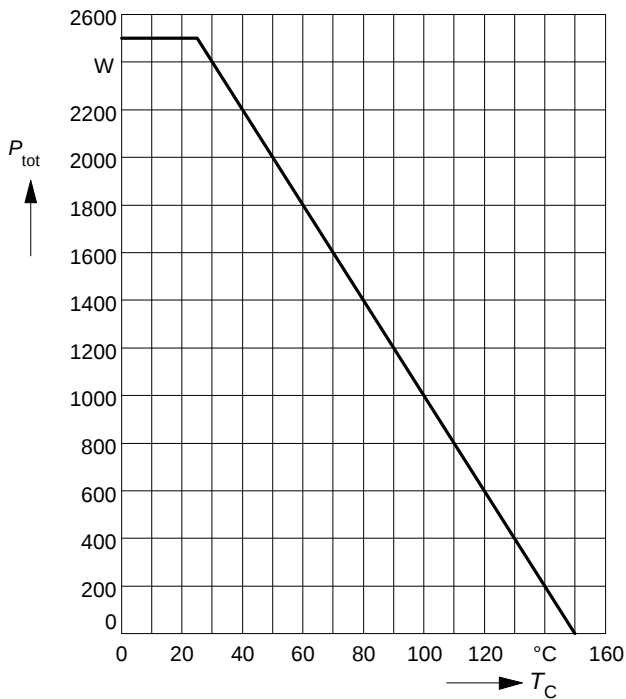
**Free-Wheel Diode**

|                                                                                                                                                                                            |          |   |            |          |               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---|------------|----------|---------------|
| Diode forward voltage<br>$I_F = 300\text{ A}$ , $V_{GE} = 0\text{ V}$ , $T_j = 25\text{ °C}$<br>$I_F = 300\text{ A}$ , $V_{GE} = 0\text{ V}$ , $T_j = 125\text{ °C}$                       | $V_F$    | - | 2.3<br>1.8 | 2.8<br>- | V             |
| Reverse recovery time<br>$I_F = 300\text{ A}$ , $V_R = -600\text{ V}$ , $V_{GE} = 0\text{ V}$<br>$di_F/dt = -2500\text{ A}/\mu\text{s}$ , $T_j = 125\text{ °C}$                            | $t_{rr}$ | - | 0.55       | -        |               |
| Reverse recovery charge<br>$I_F = 300\text{ A}$ , $V_R = -600\text{ V}$ , $V_{GE} = 0\text{ V}$<br>$di_F/dt = -2500\text{ A}/\mu\text{s}$<br>$T_j = 25\text{ °C}$<br>$T_j = 125\text{ °C}$ | $Q_{rr}$ | - | 14<br>40   | -<br>-   | $\mu\text{C}$ |
|                                                                                                                                                                                            |          | - |            |          |               |

**Power dissipation**

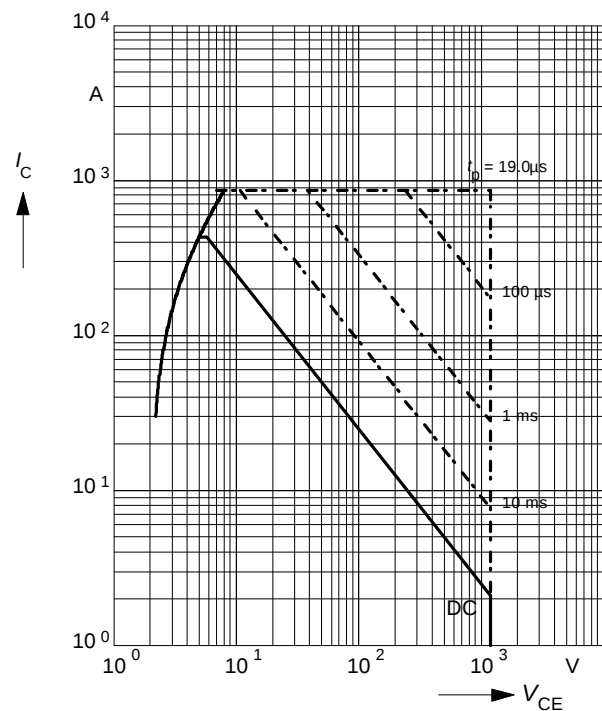
$$P_{\text{tot}} = f(T_C)$$

parameter:  $T_j \leq 150^\circ\text{C}$

**Safe operating area**

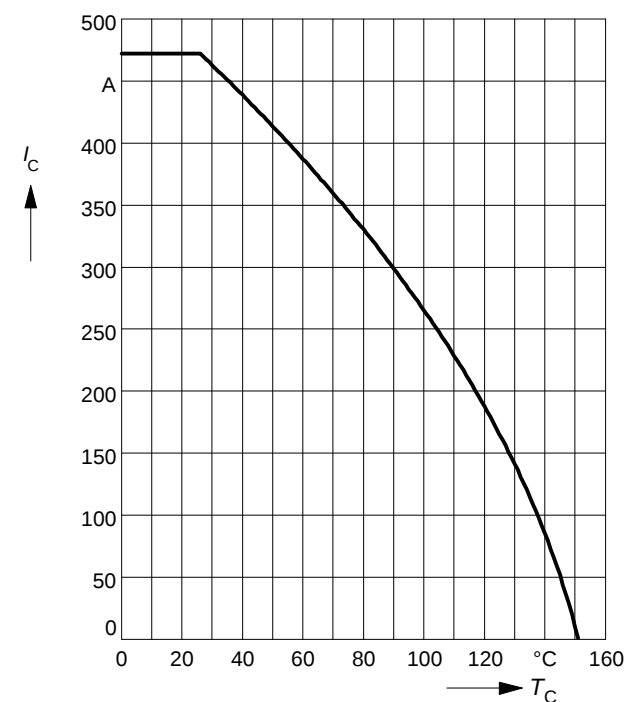
$$I_C = f(V_{CE})$$

parameter:  $D = 0$ ,  $T_C = 25^\circ\text{C}$ ,  $T_j \leq 150^\circ\text{C}$

**Collector current**

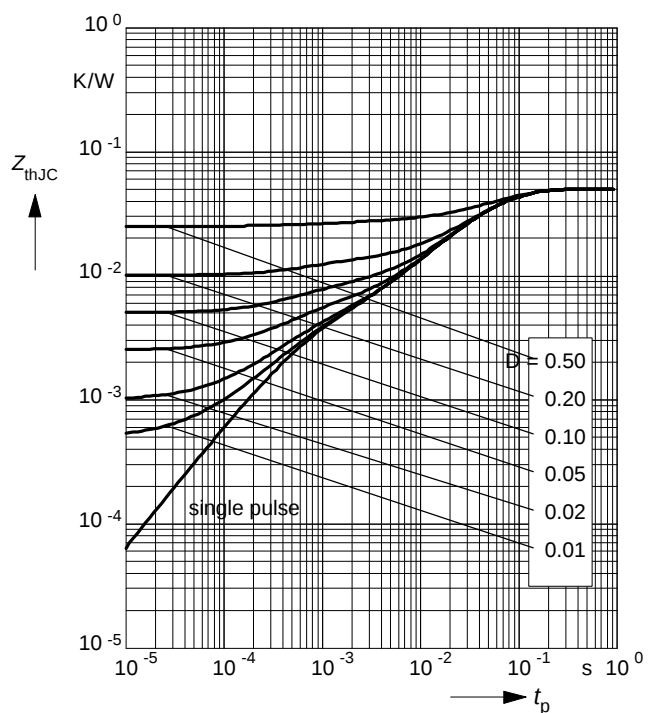
$$I_C = f(T_C)$$

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

**Transient thermal impedance IGBT**

$$Z_{\text{thJC}} = f(t_p)$$

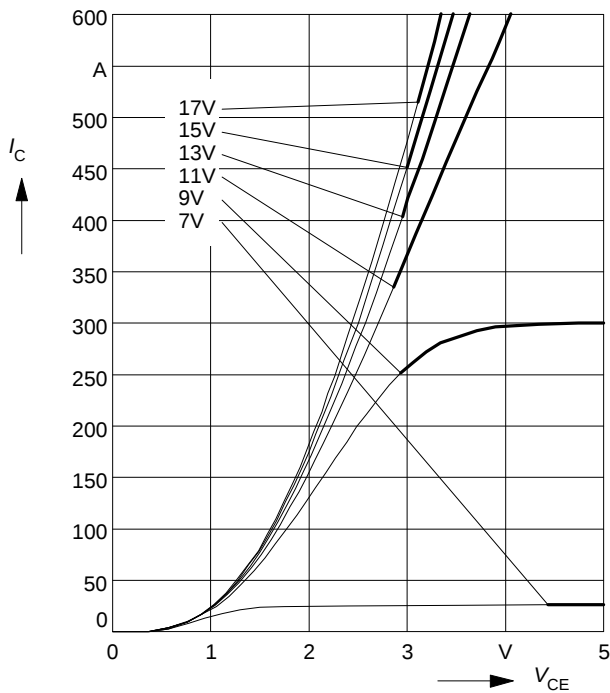
parameter:  $D = t_p / T$



**Typ. output characteristics**

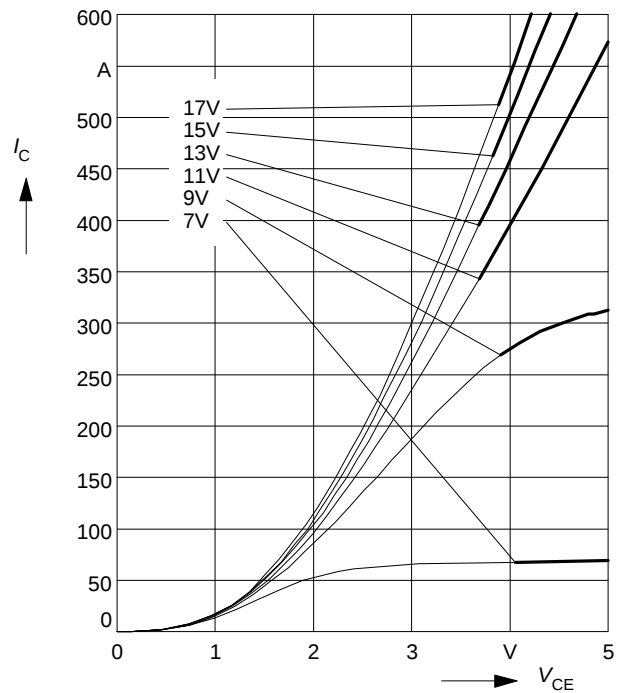
$$I_C = f(V_{CE})$$

parameter:  $t_p = 80 \mu s$ ,  $T_j = 25^\circ C$

**Typ. output characteristics**

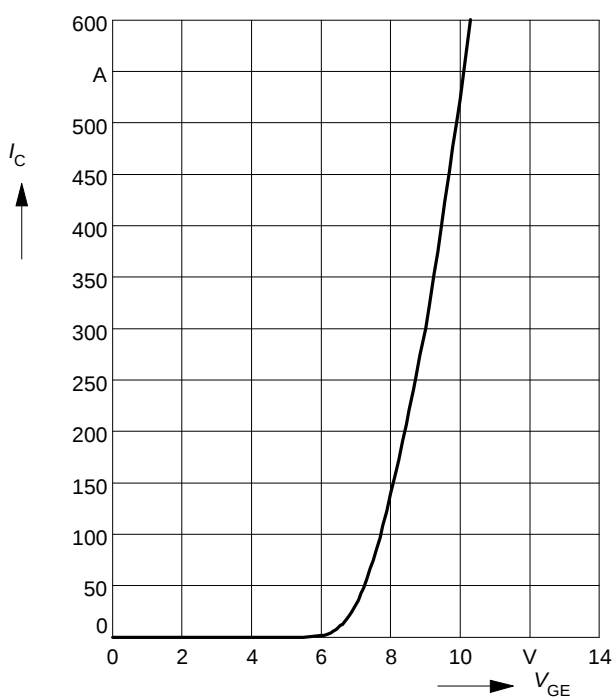
$$I_C = f(V_{CE})$$

parameter:  $t_p = 80 \mu s$ ,  $T_j = 125^\circ C$

**Typ. transfer characteristics**

$$I_C = f(V_{GE})$$

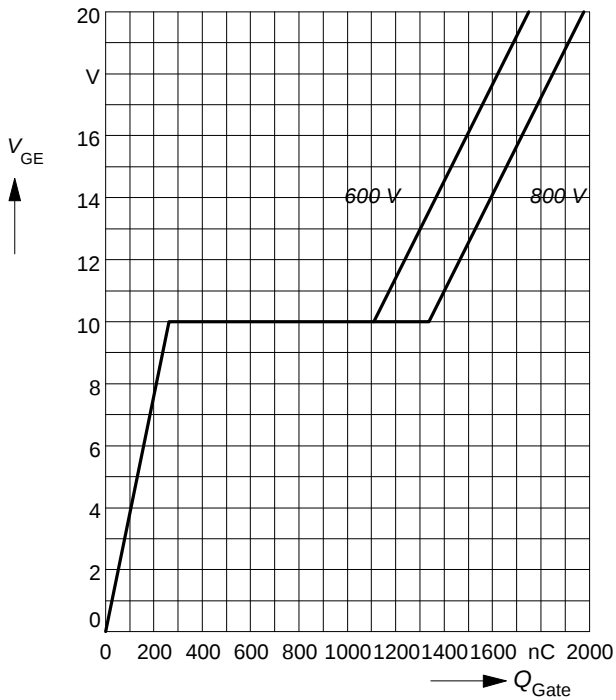
parameter:  $t_p = 80 \mu s$ ,  $V_{CE} = 20 V$



**Typ. gate charge**

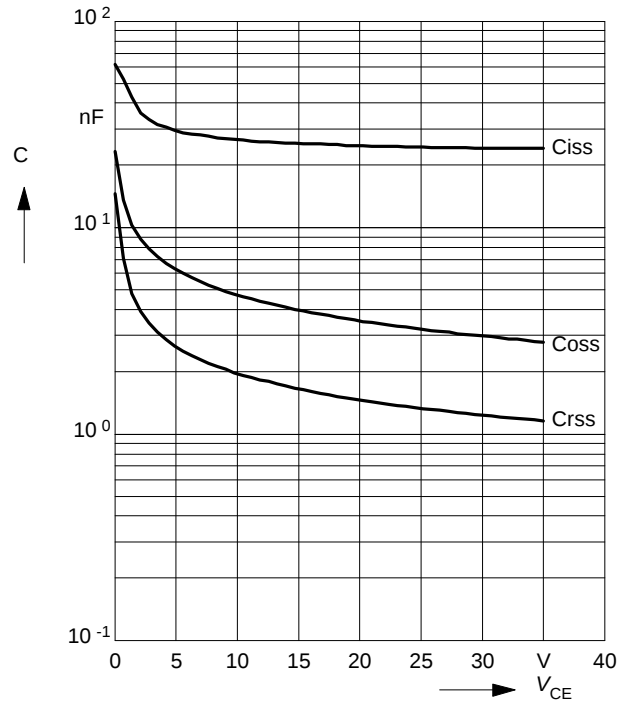
$$V_{GE} = f(Q_{Gate})$$

parameter:  $I_{C\ puls} = 300\ A$

**Typ. capacitances**

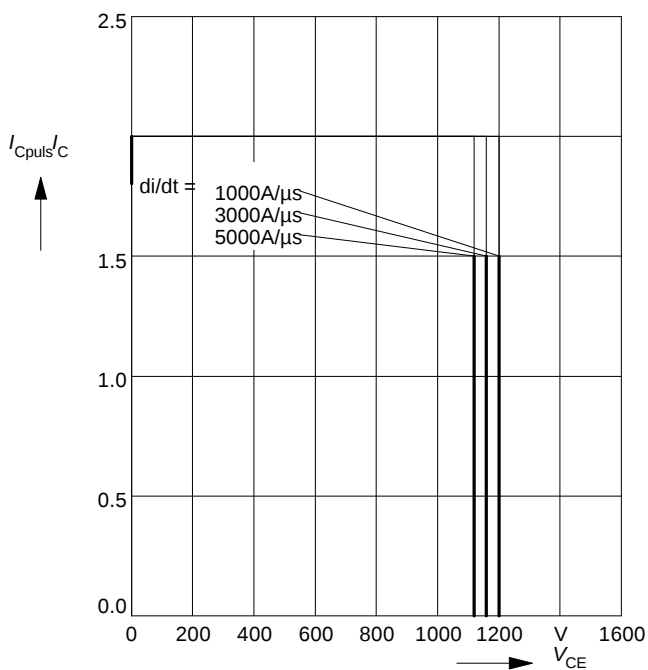
$$C = f(V_{CE})$$

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

**Reverse biased safe operating area**

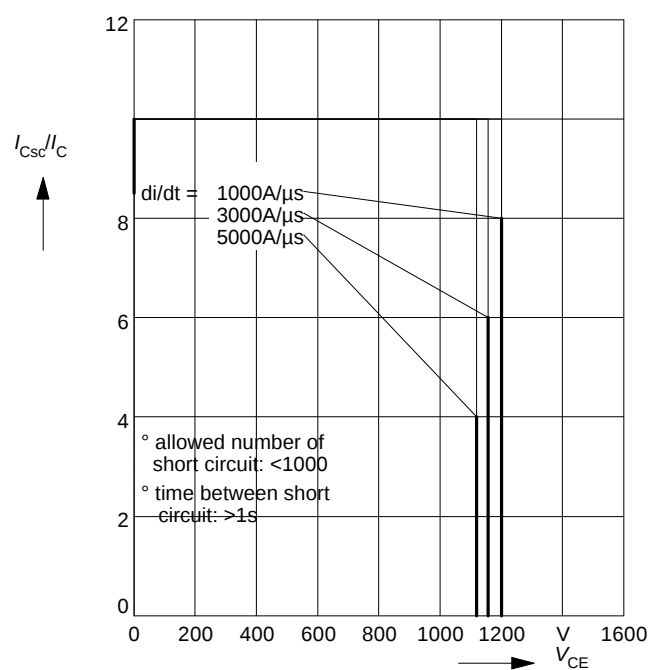
$$I_{C\ puls} = f(V_{CE}), T_j = 150^\circ C$$

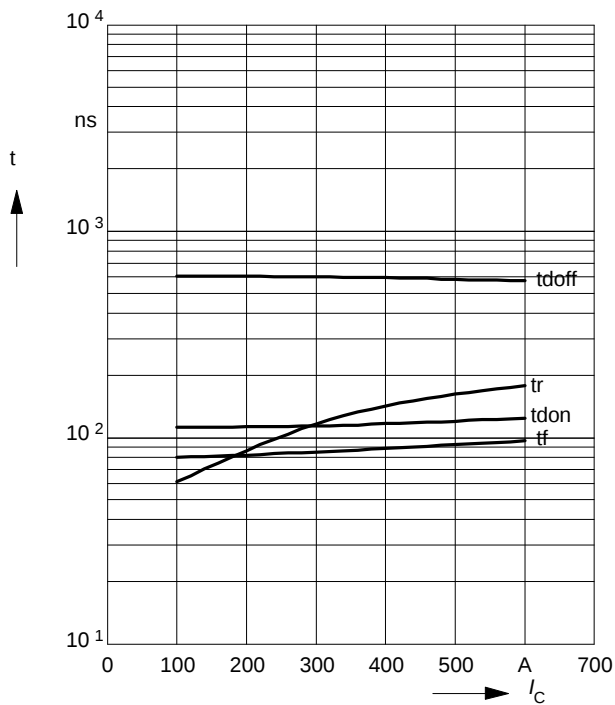
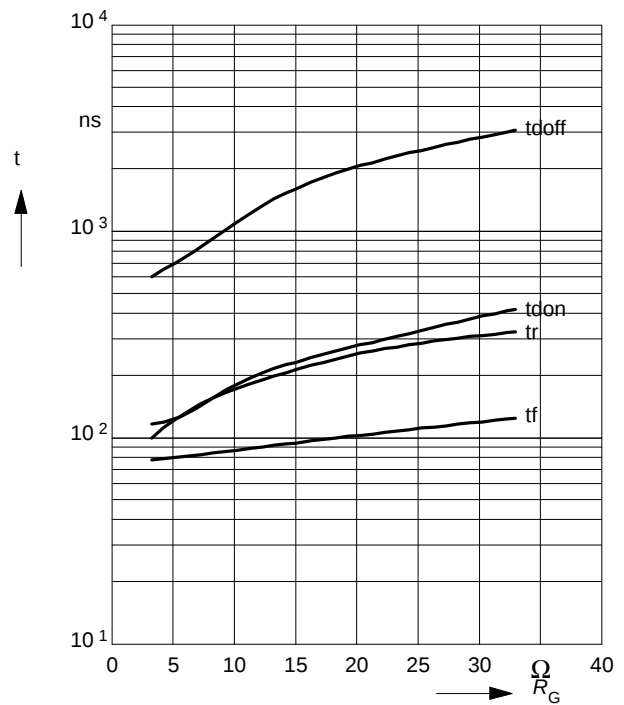
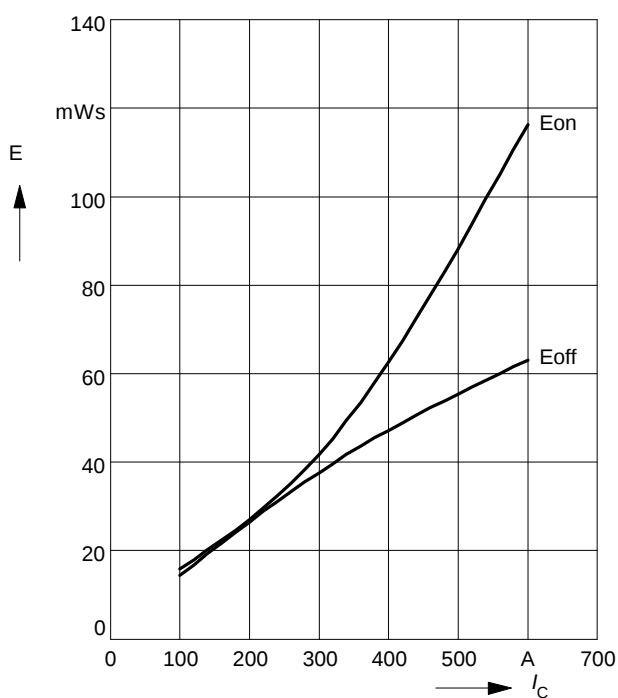
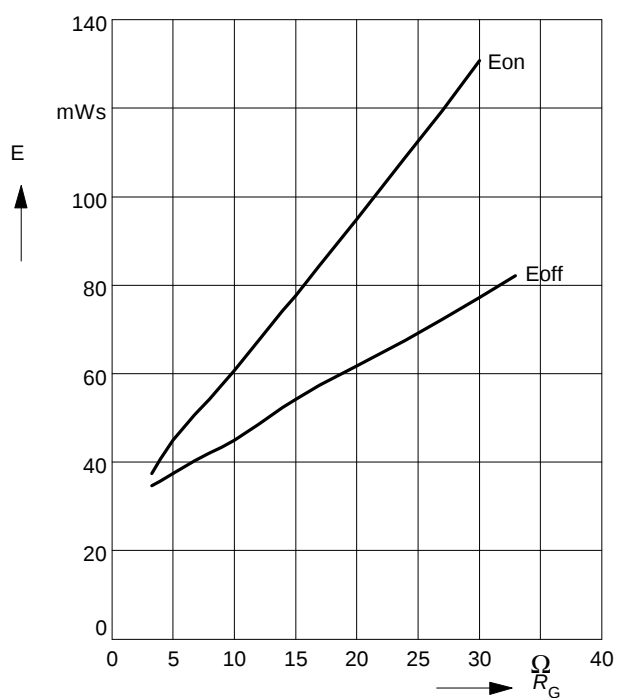
parameter:  $V_{GE} = \pm 15\ V$ ,  $t_p \leq 1\ ms$ ,  $L < 20\ nH$

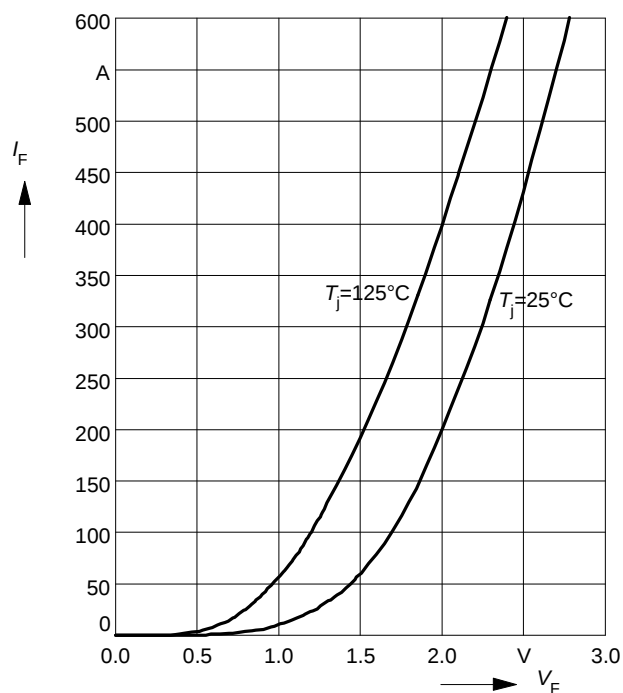
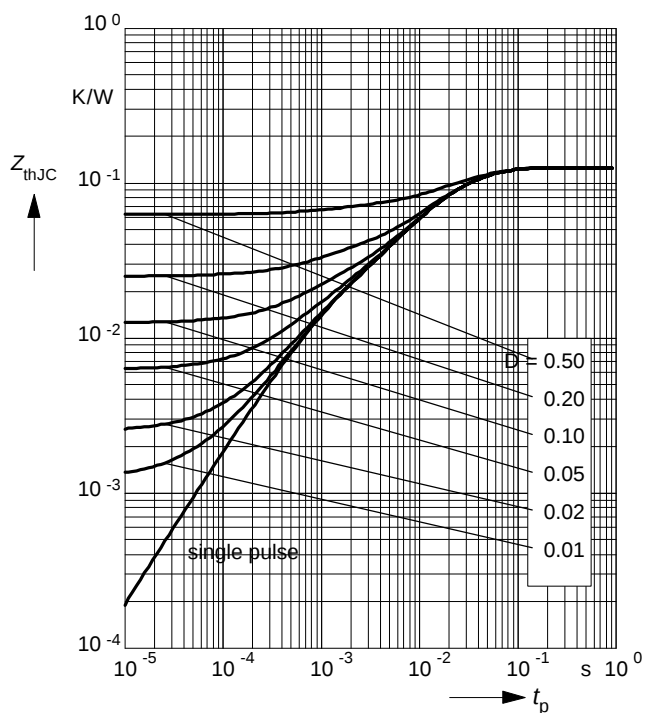
**Short circuit safe operating area**

$$I_{C\ sc} = f(V_{CE}), T_j = 150^\circ C$$

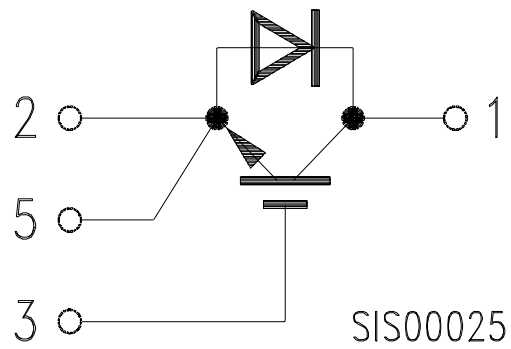
parameter:  $V_{GE} = \pm 15\ V$ ,  $t_{sc} \leq 10\ \mu s$ ,  $L < 20\ nH$



**Typ. switching time** $I = f(I_C)$ , inductive load,  $T_j = 125^\circ\text{C}$ par.:  $V_{CE} = 600\text{ V}$ ,  $V_{GE} = \pm 15\text{ V}$ ,  $R_G = 3.3\ \Omega$ **Typ. switching time** $t = f(R_G)$ , inductive load,  $T_j = 125^\circ\text{C}$ par.:  $V_{CE} = 600\text{ V}$ ,  $V_{GE} = \pm 15\text{ V}$ ,  $I_C = 300\text{ A}$ **Typ. switching losses** $E = f(I_C)$ , inductive load,  $T_j = 125^\circ\text{C}$ par.:  $V_{CE} = 600\text{ V}$ ,  $V_{GE} = \pm 15\text{ V}$ ,  $R_G = 3.3\ \Omega$ **Typ. switching losses** $E = f(R_G)$ , inductive load,  $T_j = 125^\circ\text{C}$ par.:  $V_{CE} = 600\text{ V}$ ,  $V_{GE} = \pm 15\text{ V}$ ,  $I_C = 300\text{ A}$ 

**Forward characteristics of fast recovery****reverse diode**  $I_F = f(V_F)$ parameter:  $T_j$ **Transient thermal impedance Diode** $Z_{thJC} = f(t_p)$ parameter:  $D = t_p / T$ 

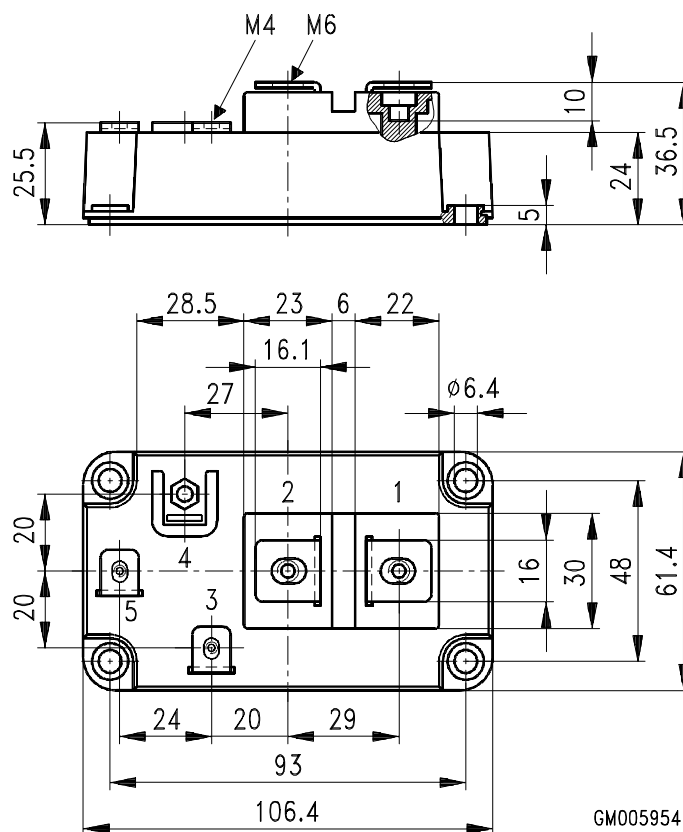
### Circuit Diagram



## Package Outlines

Dimensions in mm

Weight: 420 g





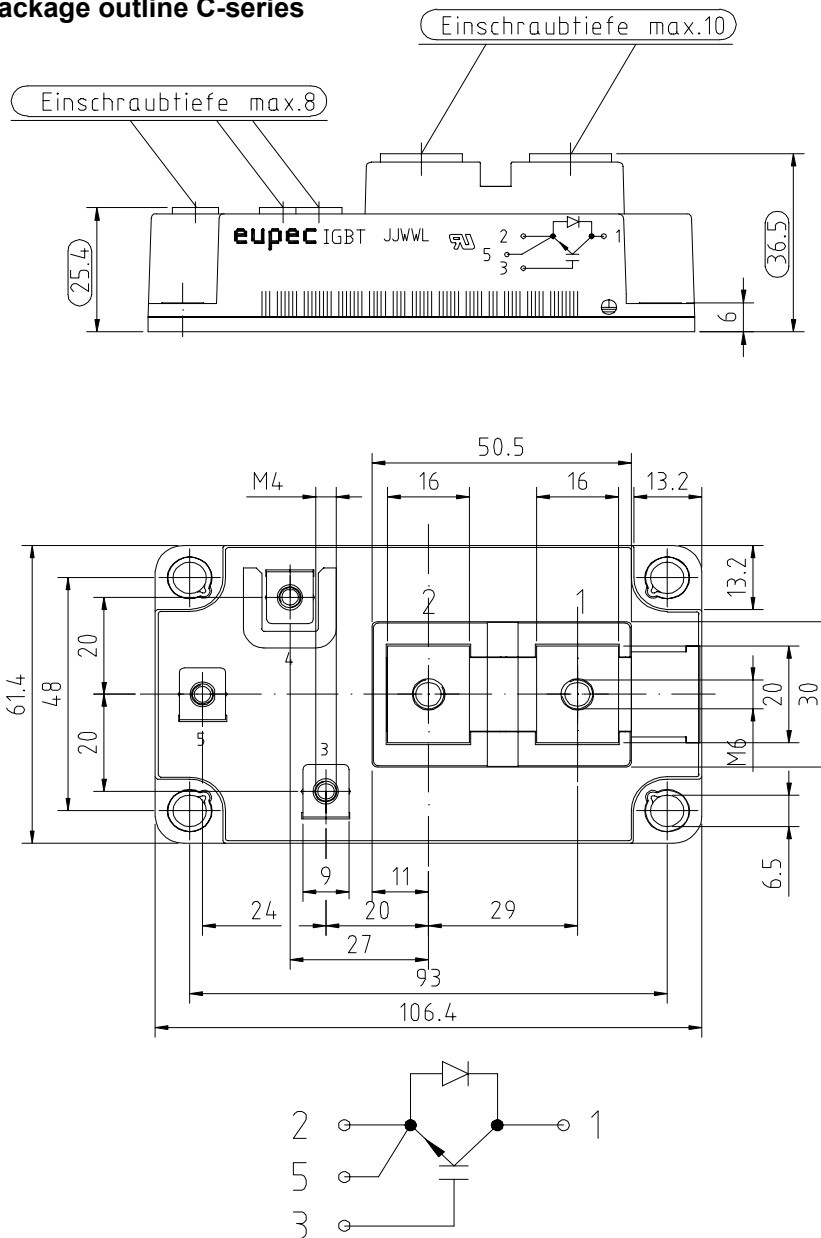
## Anhang C-Serie Appendix C-series

### Gehäuse spezifische Werte Housing specific values

typ.

|                                              |  |           |    |    |
|----------------------------------------------|--|-----------|----|----|
| Modulinduktivität<br>stray inductance module |  | $L_{SCE}$ | 16 | nH |
|----------------------------------------------|--|-----------|----|----|

### Gehäusemaße C-Serie Package outline C-series



## **Terms & Conditions of Usage**

### **Attention**

The present product data is exclusively subscribed to technically experienced staff. This Data Sheet is describing the specification of the products for which a warranty is granted exclusively pursuant the terms and conditions of the supply agreement. There will be no guarantee of any kind for the product and its specifications. Changes to the Data Sheet are reserved.

You and your technical departments will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to such application. Should you require product information in excess of the data given in the Data Sheet, please contact your local Sales Office via "[www.eupec.com](http://www.eupec.com) / sales & contact".

### **Warning**

Due to technical requirements the products may contain dangerous substances. For information on the types in question please contact your local Sales Office via "[www.eupec.com](http://www.eupec.com) / sales & contact".