

Final datasheet  
CoolSiC™ 1200 V SiC MOSFET G2 : Silicon Carbide MOSFET

Features

- $V_{DS} = 1200\text{ V}$  at  $T_{vj} = 25^{\circ}\text{C}$
- $I_{DC} = 102\text{ A}$  at  $T_C = 100^{\circ}\text{C}$
- $R_{DS(on)} = 12.2\text{ m}\Omega$  at  $V_{GS} = 18\text{ V}$ ,  $T_{vj} = 25^{\circ}\text{C}$
- Very low switching losses
- Overload operation up to  $T_{vj} = 200^{\circ}\text{C}$
- Short circuit withstand time  $2\text{ }\mu\text{s}$
- Benchmark gate threshold voltage,  $V_{GS(th)} = 4.2\text{ V}$
- Robust against parasitic turn on,  $0\text{ V}$  turn-off gate voltage can be applied
- Robust body diode for hard commutation
- .XT interconnection technology for best-in-class thermal performance
- Suitable Infineon gate drivers can be found under <https://www.infineon.com/gdfinder>

Potential applications

- EV Charging
- Online UPS/Industrial UPS
- String inverter
- General purpose drives (GPD)

Product validation

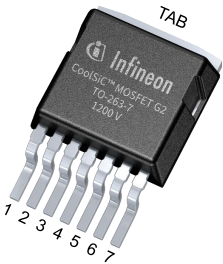
- Qualified for industrial applications according to the relevant tests of JEDEC47/20/22

Description

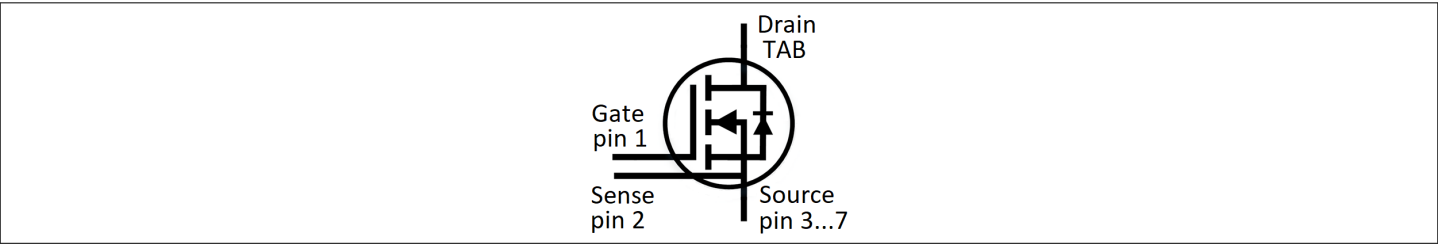
Pin definition:

- Pin 1 - Gate
- Pin 2 - Kelvin sense contact
- Pin 3...7 - Source
- Tab - Drain

Note: the source and sense pins are not exchangeable, their exchange might lead to malfunction (only for 4pin, TO263-7L )



- Halogen-free
- Green
- Lead-free
- RoHS



| Type           | Package        | Marking  |
|----------------|----------------|----------|
| IMBG120R012M2H | PG-TO263-7-U01 | 12M2H012 |



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**1 Package**

## 1 Package

**Table 1** Characteristic values

| Parameter                                           | Symbol        | Note or test condition                               | Values |      |      | Unit |
|-----------------------------------------------------|---------------|------------------------------------------------------|--------|------|------|------|
|                                                     |               |                                                      | Min.   | Typ. | Max. |      |
| Storage temperature                                 | $T_{stg}$     |                                                      | -55    |      | 150  | °C   |
| Soldering temperature                               | $T_{sold}$    | reflow soldering (MSL1 according to JEDEC J-STD-020) |        |      | 260  | °C   |
| Thermal resistance, junction-ambient                | $R_{th(j-a)}$ |                                                      |        |      | 62   | K/W  |
| MOSFET/body diode thermal resistance, junction-case | $R_{th(j-c)}$ |                                                      |        | 0.19 | 0.25 | K/W  |

## 2 MOSFET

**Table 2** Maximum rated values

| Parameter                                                                    | Symbol    | Note or test condition                                                                                                   |                       | Values   | Unit          |
|------------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------------------------------------------------------|-----------------------|----------|---------------|
| Drain-source voltage                                                         | $V_{DSS}$ | $T_{vj} \geq 25\text{ °C}$                                                                                               |                       | 1200     | V             |
| Continuous DC drain current for $R_{th(j-c,max)}$ , limited by $T_{vj(max)}$ | $I_{DDC}$ | $V_{GS} = 18\text{ V}$                                                                                                   | $T_c = 25\text{ °C}$  | 144      | A             |
|                                                                              |           |                                                                                                                          | $T_c = 100\text{ °C}$ | 102      |               |
| Peak drain current, $t_p$ limited by $T_{vj(max)}$ <sup>1)</sup>             | $I_{DM}$  | $V_{GS} = 18\text{ V}$                                                                                                   |                       | 306      | A             |
| Gate-source voltage, max. transient voltage                                  | $V_{GS}$  | $t_p \leq 0.5\text{ }\mu\text{s}$ , $D < 0.01$                                                                           |                       | -10...25 | V             |
| Gate-source voltage, max. static voltage <sup>2)</sup>                       | $V_{GS}$  |                                                                                                                          |                       | -7...23  | V             |
| Avalanche energy, single pulse                                               | $E_{AS}$  | $I_D = 56.7\text{ A}$ , $V_{DD} = 50\text{ V}$ , $L = 0.4\text{ mH}$                                                     |                       | 712      | mJ            |
| Avalanche energy, repetitive                                                 | $E_{AR}$  | $I_D = 56.7\text{ A}$ , $V_{DD} = 50\text{ V}$ , $L = 2.2\text{ }\mu\text{H}$                                            |                       | 3.56     | mJ            |
| Short-circuit withstand time                                                 | $t_{SC}$  | $V_{DD} \leq 800\text{ V}$ , $V_{DS,peak} < 1200\text{ V}$ , $V_{GS(on)} = 15\text{ V}$ , $T_{vj(start)} = 25\text{ °C}$ |                       | 2        | $\mu\text{s}$ |
| Power dissipation, limited by $T_{vj(max)}$                                  | $P_{tot}$ |                                                                                                                          | $T_c = 25\text{ °C}$  | 600      | W             |
|                                                                              |           |                                                                                                                          | $T_c = 100\text{ °C}$ | 300      |               |

1) verified by design.

2) The maximum gate-source voltage in the application design should be in accordance to IPC-9592B.

**Table 3 Recommended values**

| Parameter                         | Symbol        | Note or test condition | Values  | Unit |
|-----------------------------------|---------------|------------------------|---------|------|
| Recommended turn-on gate voltage  | $V_{GS(on)}$  |                        | 15...18 | V    |
| Recommended turn-off gate voltage | $V_{GS(off)}$ |                        | -5...0  | V    |

**Table 4 Characteristic values**

| Parameter                                    | Symbol       | Note or test condition                                                                               | Values |                                                            |      | Unit |
|----------------------------------------------|--------------|------------------------------------------------------------------------------------------------------|--------|------------------------------------------------------------|------|------|
|                                              |              |                                                                                                      | Min.   | Typ.                                                       | Max. |      |
| Drain-source on-state resistance             | $R_{DS(on)}$ | $I_D = 56.7 \text{ A}$                                                                               |        | $T_{vj} = 25 \text{ °C}$ ,<br>$V_{GS(on)} = 18 \text{ V}$  | 12.2 | mΩ   |
|                                              |              |                                                                                                      |        | $T_{vj} = 150 \text{ °C}$ ,<br>$V_{GS(on)} = 18 \text{ V}$ | 25   |      |
|                                              |              |                                                                                                      |        | $T_{vj} = 175 \text{ °C}$ ,<br>$V_{GS(on)} = 18 \text{ V}$ | 28.9 |      |
|                                              |              |                                                                                                      |        | $T_{vj} = 25 \text{ °C}$ ,<br>$V_{GS(on)} = 15 \text{ V}$  | 15.3 |      |
| Gate-source threshold voltage                | $V_{GS(th)}$ | $I_D = 17.8 \text{ mA}$ , $V_{DS} = V_{GS}$<br>(tested after 1 ms pulse at $V_{GS} = 20 \text{ V}$ ) | 3.5    | $T_{vj} = 25 \text{ °C}$                                   | 4.2  | V    |
|                                              |              |                                                                                                      |        | $T_{vj} = 175 \text{ °C}$                                  | 3.2  |      |
| Zero gate-voltage drain current              | $I_{DSS}$    | $V_{DS} = 1200 \text{ V}$ , $V_{GS} = 0 \text{ V}$                                                   |        | $T_{vj} = 25 \text{ °C}$                                   | 490  | μA   |
|                                              |              |                                                                                                      |        | $T_{vj} = 175 \text{ °C}$                                  | 8.4  |      |
| Gate leakage current                         | $I_{GSS}$    | $V_{DS} = 0 \text{ V}$                                                                               |        | $V_{GS} = 23 \text{ V}$                                    | 120  | nA   |
|                                              |              |                                                                                                      |        | $V_{GS} = -10 \text{ V}$                                   | -120 |      |
| Forward transconductance                     | $g_{fs}$     | $I_D = 56.7 \text{ A}$ , $V_{DS} = 20 \text{ V}$                                                     |        | 38.1                                                       |      | S    |
| Internal gate resistance                     | $R_{G,int}$  | $f = 1 \text{ MHz}$ , $V_{AC} = 25 \text{ mV}$                                                       |        | 4                                                          |      | Ω    |
| Input capacitance                            | $C_{iss}$    | $V_{DD} = 800 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 100 \text{ kHz}$ , $V_{AC} = 25 \text{ mV}$ |        | 4050                                                       |      | pF   |
| Output capacitance                           | $C_{oss}$    | $V_{DD} = 800 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 100 \text{ kHz}$ , $V_{AC} = 25 \text{ mV}$ |        | 176                                                        |      | pF   |
| Reverse transfer capacitance                 | $C_{rss}$    | $V_{DD} = 800 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 100 \text{ kHz}$ , $V_{AC} = 25 \text{ mV}$ |        | 15                                                         |      | pF   |
| $C_{oss}$ stored energy                      | $E_{oss}$    | $V_{DD} = 800 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 100 \text{ kHz}$ , $V_{AC} = 25 \text{ mV}$ |        | 74                                                         |      | μJ   |
| Output charge                                | $Q_{oss}$    | Calculated by $C_{oss}(f)V_{DS}$ @100 kHz                                                            |        | 275.3                                                      |      | nC   |
| Effective output capacitance, energy related | $C_{o(er)}$  | $V_{DD} = 0...800 \text{ V}$ , $V_{GS} = 0 \text{ V}$                                                |        | 231.3                                                      |      | pF   |
| Effective output capacitance, time related   | $C_{o(tr)}$  | $I_D = \text{constant}$ , $V_{DD} = 0...800 \text{ V}$ , $V_{GS} = 0 \text{ V}$                      |        | 344.1                                                      |      | pF   |
| Total gate charge                            | $Q_G$        | $V_{DD} = 800 \text{ V}$ , $I_D = 56.7 \text{ A}$ , $V_{GS} = -2/18 \text{ V}$ , turn-on pulse       |        | 124                                                        |      | nC   |

(table continues...)

**Table 4** (continued) **Characteristic values**

| Parameter            | Symbol       | Note or test condition                                                                                                                                                                                                        | Values                                |      |      | Unit          |
|----------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------|------|---------------|
|                      |              |                                                                                                                                                                                                                               | Min.                                  | Typ. | Max. |               |
| Plateau gate charge  | $Q_{GS(pl)}$ | $V_{DD} = 800 \text{ V}$ , $I_D = 56.7 \text{ A}$ , $V_{GS} = -2/18 \text{ V}$ , turn-on pulse                                                                                                                                |                                       | 26   |      | nC            |
| Gate-to-drain charge | $Q_{GD}$     | $V_{DD} = 800 \text{ V}$ , $I_D = 56.7 \text{ A}$ , $V_{GS} = -2/18 \text{ V}$ , turn-on pulse                                                                                                                                |                                       | 34   |      | nC            |
| Turn-on delay time   | $t_{d(on)}$  | $V_{DD} = 800 \text{ V}$ , $I_D = 56.7 \text{ A}$ ,<br>$V_{GS} = 0/18 \text{ V}$ ,<br>$R_{GS(on)} = 2.3 \Omega$ ,<br>$R_{GS(off)} = 2.3 \Omega$ ,<br>$L_\sigma = 15 \text{ nH}$ , diode: body diode at $V_{GS} = 0 \text{ V}$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  | 10   |      | ns            |
|                      |              |                                                                                                                                                                                                                               | $T_{vj} = 175 \text{ }^\circ\text{C}$ | 10   |      |               |
| Rise time            | $t_r$        | $V_{DD} = 800 \text{ V}$ , $I_D = 56.7 \text{ A}$ ,<br>$V_{GS} = 0/18 \text{ V}$ ,<br>$R_{GS(on)} = 2.3 \Omega$ ,<br>$R_{GS(off)} = 2.3 \Omega$ ,<br>$L_\sigma = 15 \text{ nH}$ , diode: body diode at $V_{GS} = 0 \text{ V}$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  | 20.6 |      | ns            |
|                      |              |                                                                                                                                                                                                                               | $T_{vj} = 175 \text{ }^\circ\text{C}$ | 20   |      |               |
| Turn-off delay time  | $t_{d(off)}$ | $V_{DD} = 800 \text{ V}$ , $I_D = 56.7 \text{ A}$ ,<br>$V_{GS} = 0/18 \text{ V}$ ,<br>$R_{GS(on)} = 2.3 \Omega$ ,<br>$R_{GS(off)} = 2.3 \Omega$ ,<br>$L_\sigma = 15 \text{ nH}$ , diode: body diode at $V_{GS} = 0 \text{ V}$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  | 19.7 |      | ns            |
|                      |              |                                                                                                                                                                                                                               | $T_{vj} = 175 \text{ }^\circ\text{C}$ | 34.5 |      |               |
| Fall time            | $t_f$        | $V_{DD} = 800 \text{ V}$ , $I_D = 56.7 \text{ A}$ ,<br>$V_{GS} = 0/18 \text{ V}$ ,<br>$R_{GS(on)} = 2.3 \Omega$ ,<br>$R_{GS(off)} = 2.3 \Omega$ ,<br>$L_\sigma = 15 \text{ nH}$ , diode: body diode at $V_{GS} = 0 \text{ V}$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  | 13.2 |      | ns            |
|                      |              |                                                                                                                                                                                                                               | $T_{vj} = 175 \text{ }^\circ\text{C}$ | 15.5 |      |               |
| Turn-on energy       | $E_{on}$     | $V_{DD} = 800 \text{ V}$ , $I_D = 56.7 \text{ A}$ ,<br>$V_{GS} = 0/18 \text{ V}$ ,<br>$R_{GS(on)} = 2.3 \Omega$ ,<br>$R_{GS(off)} = 2.3 \Omega$ ,<br>$L_\sigma = 15 \text{ nH}$ , diode: body diode at $V_{GS} = 0 \text{ V}$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  | 620  |      | $\mu\text{J}$ |
|                      |              |                                                                                                                                                                                                                               | $T_{vj} = 175 \text{ }^\circ\text{C}$ | 1160 |      |               |
| Turn-off energy      | $E_{off}$    | $V_{DD} = 800 \text{ V}$ , $I_D = 56.7 \text{ A}$ ,<br>$V_{GS} = 0/18 \text{ V}$ ,<br>$R_{GS(on)} = 2.3 \Omega$ ,<br>$R_{GS(off)} = 2.3 \Omega$ ,<br>$L_\sigma = 15 \text{ nH}$ , diode: body diode at $V_{GS} = 0 \text{ V}$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  | 270  |      | $\mu\text{J}$ |
|                      |              |                                                                                                                                                                                                                               | $T_{vj} = 175 \text{ }^\circ\text{C}$ | 350  |      |               |

(table continues...)

**Table 4** (continued) Characteristic values

| Parameter                            | Symbol                | Note or test condition                                                                                                                                                                                                                                                         | Values                                         |      |      | Unit               |
|--------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------|------|--------------------|
|                                      |                       |                                                                                                                                                                                                                                                                                | Min.                                           | Typ. | Max. |                    |
| Total switching energy <sup>1)</sup> | $E_{\text{tot}}$      | $V_{\text{DD}} = 800 \text{ V}$ , $I_{\text{D}} = 56.7 \text{ A}$ ,<br>$V_{\text{GS}} = 0/18 \text{ V}$ ,<br>$R_{\text{GS(on)}} = 2.3 \Omega$ ,<br>$R_{\text{GS(off)}} = 2.3 \Omega$ ,<br>$L_{\sigma} = 15 \text{ nH}$ , diode: body<br>diode at $V_{\text{GS}} = 0 \text{ V}$ | $T_{\text{vj}} = 25 \text{ }^{\circ}\text{C}$  | 970  |      | $\mu\text{J}$      |
|                                      |                       |                                                                                                                                                                                                                                                                                | $T_{\text{vj}} = 175 \text{ }^{\circ}\text{C}$ | 1750 |      |                    |
| Virtual junction temperature         | $T_{\text{vj}}$       |                                                                                                                                                                                                                                                                                | -55                                            |      | 175  | $^{\circ}\text{C}$ |
| Virtual junction temperature         | $T_{\text{vj(over)}}$ | overload, cumulative max. 100 h <sup>2)</sup>                                                                                                                                                                                                                                  |                                                |      | 200  | $^{\circ}\text{C}$ |

1) including  $E_{\text{fr}}$

2) up to 5000 cycles. Maximum  $\Delta T$  limited to 100 K.

**Note:** The chip technology was characterized up to 200 kV/ $\mu\text{s}$ . The measured  $dV/dt$  was limited by measurement test setup and package.

Characteristics at  $T_{\text{vj}} = 25^{\circ}\text{C}$ , unless otherwise specified.

### 3 Body diode (MOSFET)

**Table 5** Maximum rated values

| Parameter                                                                     | Symbol           | Note or test condition                           | Values | Unit |
|-------------------------------------------------------------------------------|------------------|--------------------------------------------------|--------|------|
| Drain-source voltage                                                          | $V_{\text{DSS}}$ | $T_{\text{vj}} \geq 25 \text{ }^{\circ}\text{C}$ | 1200   | V    |
| Peak reverse drain current,<br>$t_{\text{p}}$ limited by $T_{\text{vj(max)}}$ | $I_{\text{SM}}$  | $V_{\text{GS}} = 0 \text{ V}$                    | 145    | A    |

**Table 6** Characteristic values

| Parameter                            | Symbol           | Note or test condition                                                                                                                                                                                         | Values                                         |      |      | Unit          |
|--------------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------|------|---------------|
|                                      |                  |                                                                                                                                                                                                                | Min.                                           | Typ. | Max. |               |
| Drain-source reverse voltage         | $V_{\text{SD}}$  | $I_{\text{SD}} = 56.7 \text{ A}$ , $V_{\text{GS}} = 0 \text{ V}$                                                                                                                                               | $T_{\text{vj}} = 25 \text{ }^{\circ}\text{C}$  | 4.2  | 5.5  | V             |
|                                      |                  |                                                                                                                                                                                                                | $T_{\text{vj}} = 100 \text{ }^{\circ}\text{C}$ | 4.11 |      |               |
|                                      |                  |                                                                                                                                                                                                                | $T_{\text{vj}} = 175 \text{ }^{\circ}\text{C}$ | 4.05 |      |               |
| MOSFET forward recovery charge       | $Q_{\text{fr}}$  | $V_{\text{DD}} = 800 \text{ V}$ ,<br>$I_{\text{SD}} = 56.7 \text{ A}$ , $V_{\text{GS}} = 0 \text{ V}$ ,<br>$-di_{\text{SD}}/dt = 1000 \text{ A}/\mu\text{s}$ , $Q_{\text{fr}}$<br>includes also $Q_{\text{C}}$ | $T_{\text{vj}} = 25 \text{ }^{\circ}\text{C}$  | 0.55 |      | $\mu\text{C}$ |
|                                      |                  |                                                                                                                                                                                                                | $T_{\text{vj}} = 175 \text{ }^{\circ}\text{C}$ | 1.06 |      |               |
| MOSFET peak forward recovery current | $I_{\text{frm}}$ | $V_{\text{DD}} = 800 \text{ V}$ ,<br>$I_{\text{SD}} = 56.7 \text{ A}$ , $V_{\text{GS}} = 0 \text{ V}$ ,<br>$-di_{\text{SD}}/dt = 1000 \text{ A}/\mu\text{s}$ , $Q_{\text{fr}}$<br>includes also $Q_{\text{C}}$ | $T_{\text{vj}} = 25 \text{ }^{\circ}\text{C}$  | 10.1 |      | A             |
|                                      |                  |                                                                                                                                                                                                                | $T_{\text{vj}} = 175 \text{ }^{\circ}\text{C}$ | 15.9 |      |               |

(table continues...)

**Table 6** (continued) Characteristic values

| Parameter                      | Symbol         | Note or test condition                                                                                                                                             |                                       | Values |      |      | Unit             |
|--------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|--------|------|------|------------------|
|                                |                |                                                                                                                                                                    |                                       | Min.   | Typ. | Max. |                  |
| MOSFET forward recovery energy | $E_{fr}$       | $V_{DD} = 800 \text{ V}$ ,<br>$I_{SD} = 56.7 \text{ A}$ , $V_{GS} = 0 \text{ V}$ ,<br>$-di_{SD}/dt = 1000 \text{ A}/\mu\text{s}$ , $Q_{fr}$<br>includes also $Q_C$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  |        | 80   |      | $\mu\text{J}$    |
|                                |                |                                                                                                                                                                    | $T_{vj} = 175 \text{ }^\circ\text{C}$ |        | 240  |      |                  |
| Virtual junction temperature   | $T_{vj}$       |                                                                                                                                                                    |                                       | -55    |      | 175  | $^\circ\text{C}$ |
| Virtual junction temperature   | $T_{vj(over)}$ | overload, cumulative max. 100 h <sup>1)</sup>                                                                                                                      |                                       |        |      | 200  | $^\circ\text{C}$ |

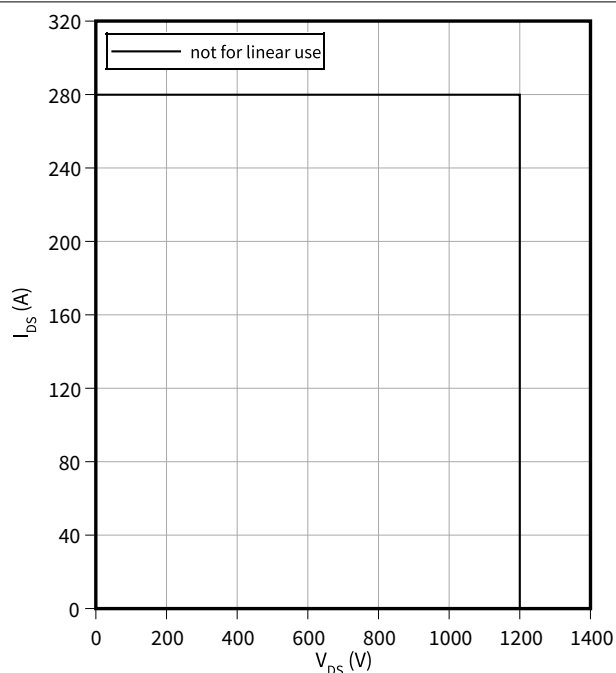
1) up to 5000 cycles. Maximum  $\Delta T$  limited to 100 K.

## 4 Characteristics diagrams

### Reverse bias safe operating area (RBSOA)

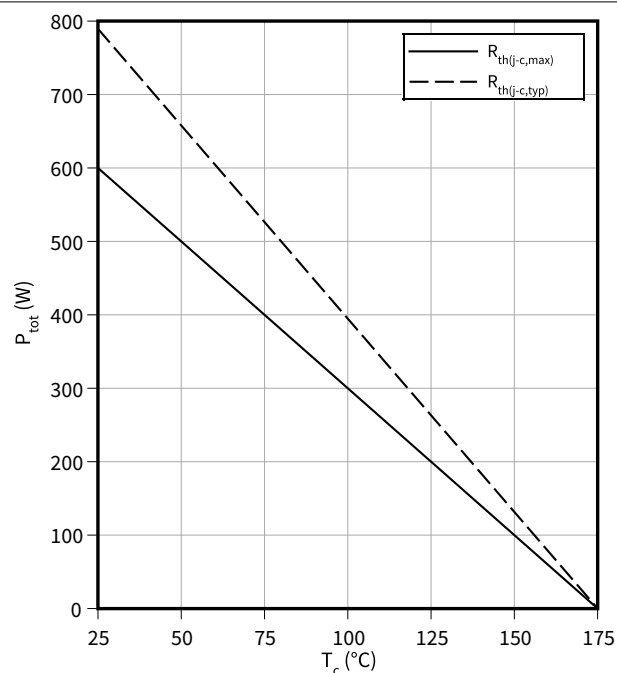
$$I_{DS} = f(V_{DS})$$

$$T_{vj} \leq 200\text{ °C}, V_{GS} = 0/18\text{ V}, T_c = 25\text{ °C}$$



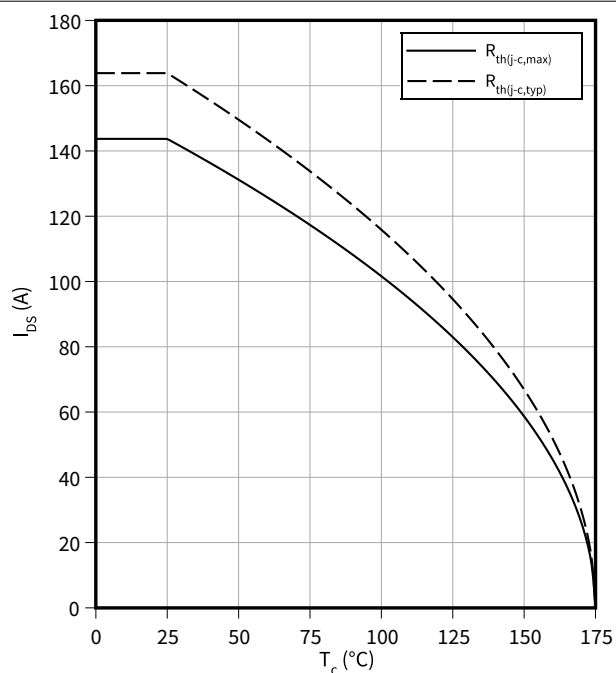
### Power dissipation as a function of case temperature

$$P_{tot} = f(T_c)$$



### Maximum DC drain to source current as a function of case temperature limited by bond wire

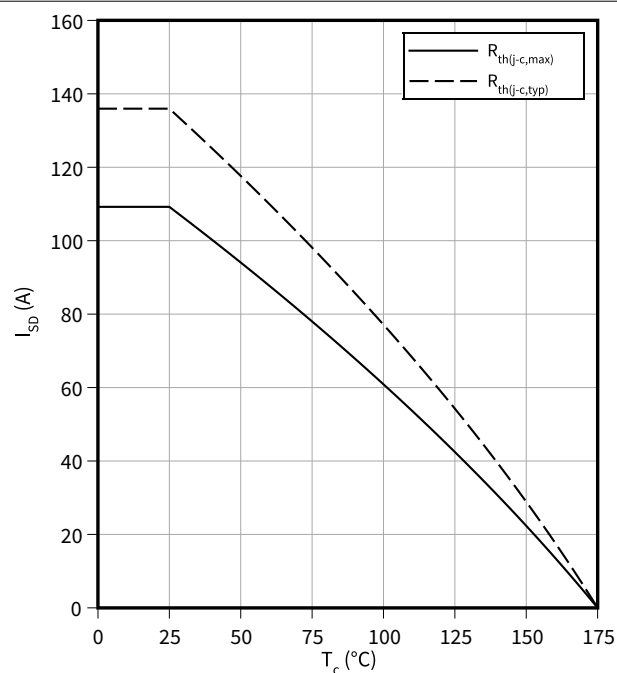
$$I_{DS} = f(T_c)$$



### Maximum source to drain current as a function of case temperature limited by bond wire

$$I_{SD} = f(T_c)$$

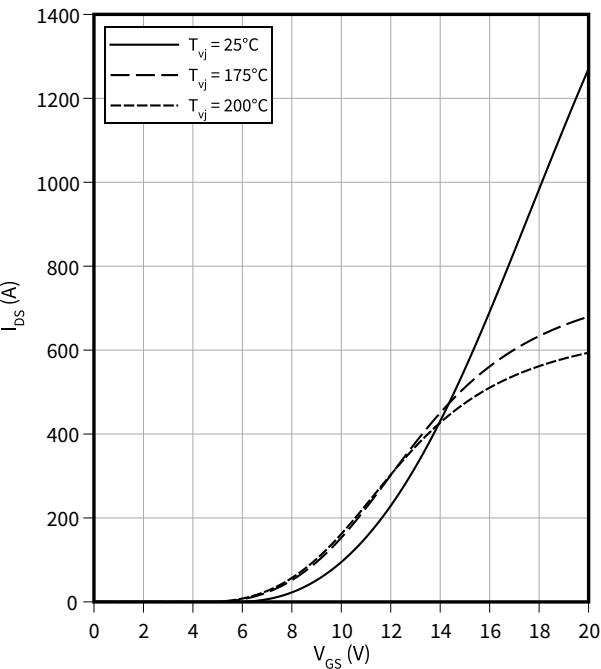
$$V_{GS} = 0\text{ V}$$



4 Characteristics diagrams

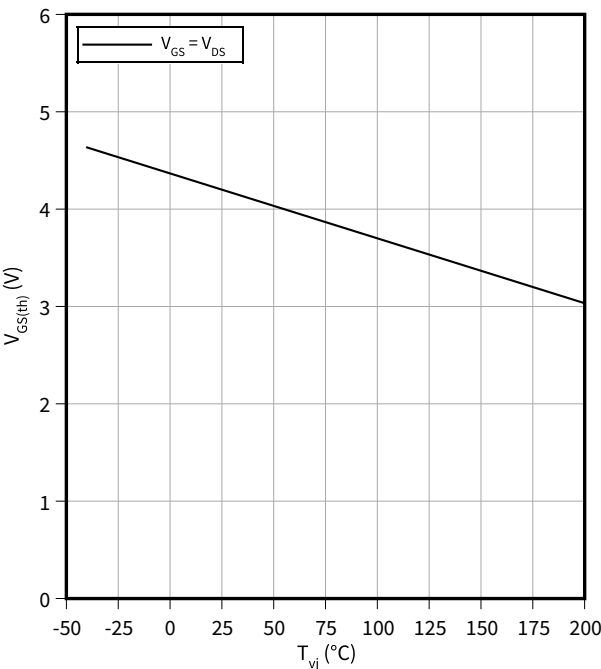
Typical transfer characteristic

$I_{DS} = f(V_{GS})$   
 $V_{DS} = 20\text{ V}$ ,  $t_p = 20\text{ }\mu\text{s}$



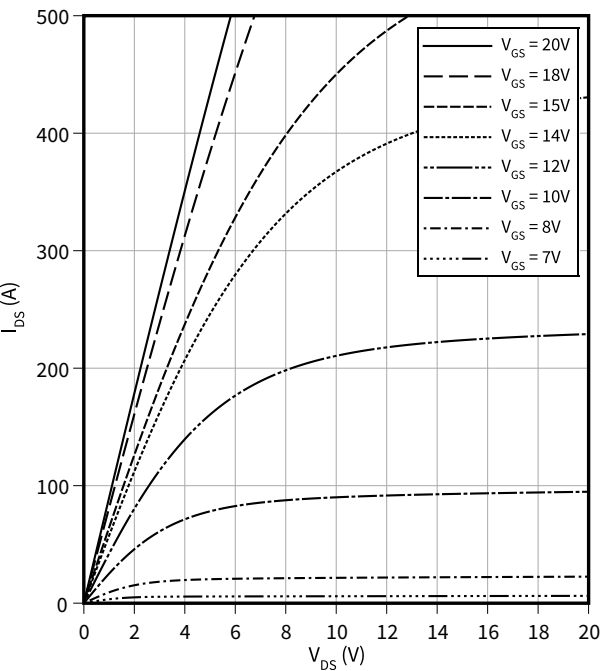
Typical gate-source threshold voltage as a function of junction temperature

$V_{GS(th)} = f(T_{vj})$   
 $I_D = 17.8\text{ mA}$



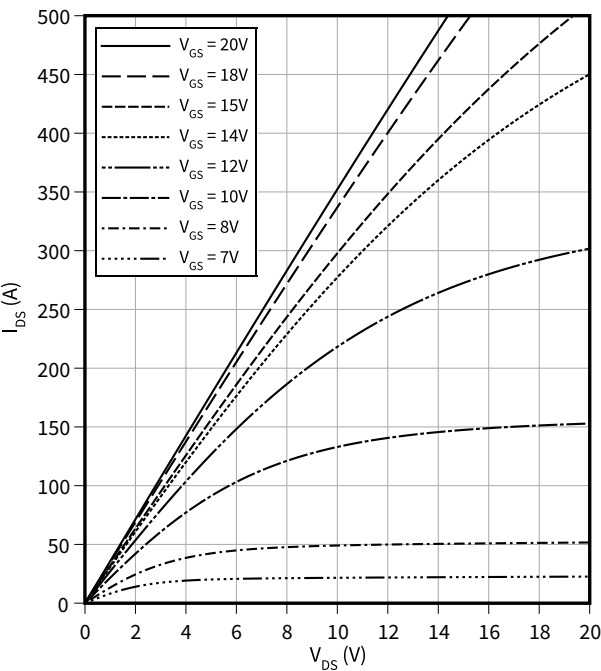
Typical output characteristic,  $V_{GS}$  as parameter

$I_{DS} = f(V_{DS})$   
 $T_{vj} = 25\text{ }^\circ\text{C}$ ,  $t_p = 20\text{ }\mu\text{s}$



Typical output characteristic,  $V_{GS}$  as parameter

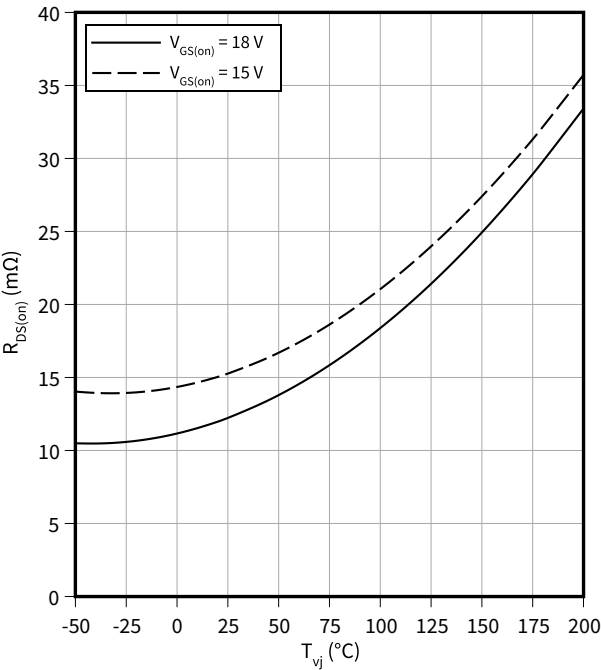
$I_{DS} = f(V_{DS})$   
 $T_{vj} = 175\text{ }^\circ\text{C}$ ,  $t_p = 20\text{ }\mu\text{s}$



4 Characteristics diagrams

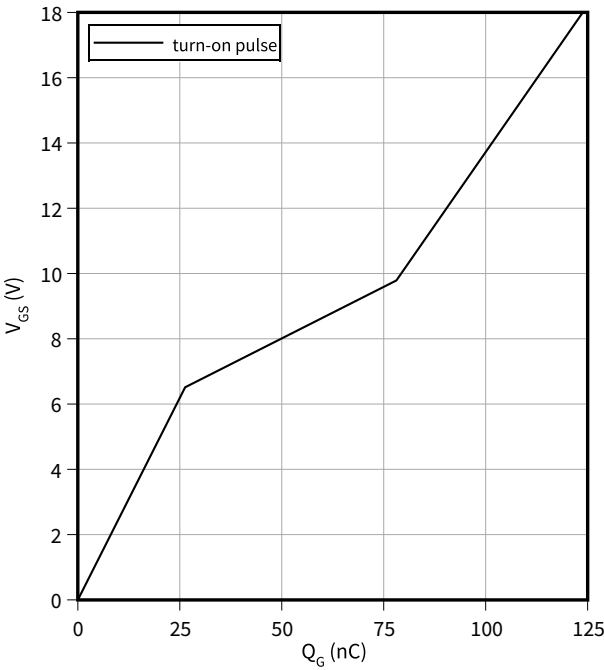
Typical on-state resistance as a function of junction temperature

$R_{DS(on)} = f(T_{vj})$   
 $I_D = 56.7\text{ A}$



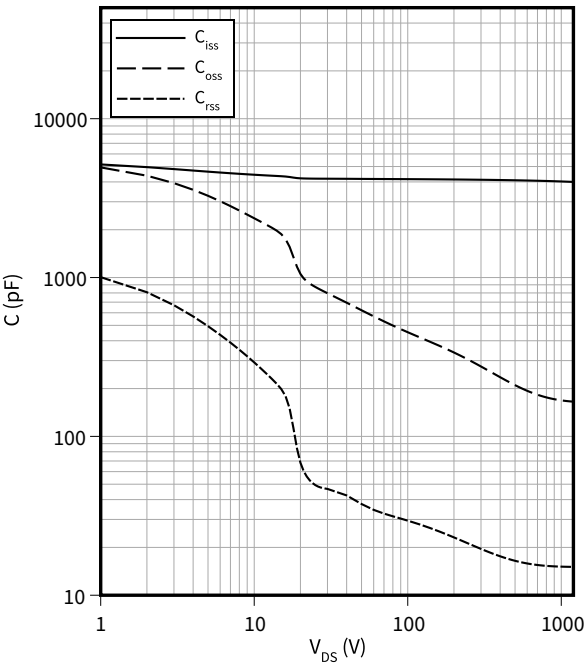
Typical gate charge

$V_{GS} = f(Q_G)$   
 $I_D = 56.7\text{ A}, V_{DS} = 800\text{ V}$



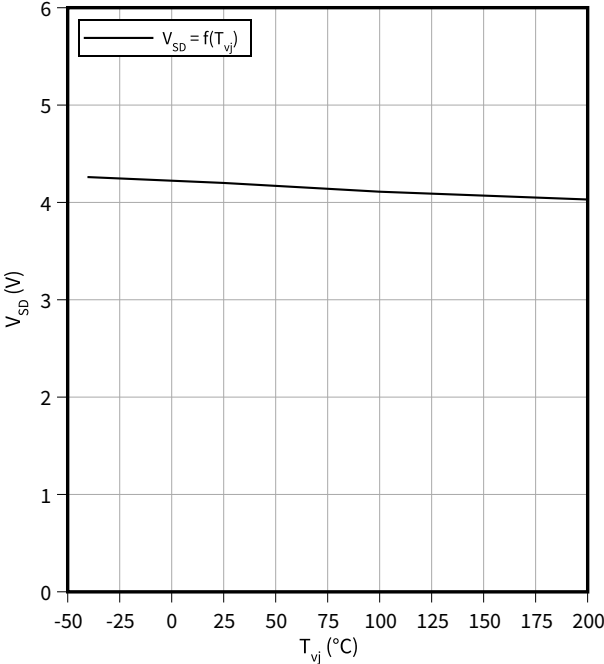
Typical capacitance as a function of drain-source voltage

$C = f(V_{DS})$   
 $f = 100\text{ kHz}, V_{GS} = 0\text{ V}$



Typical reverse drain voltage as function of junction temperature

$V_{SD} = f(T_{vj})$   
 $I_{SD} = 56.7\text{ A}, V_{GS} = 0\text{ V}$

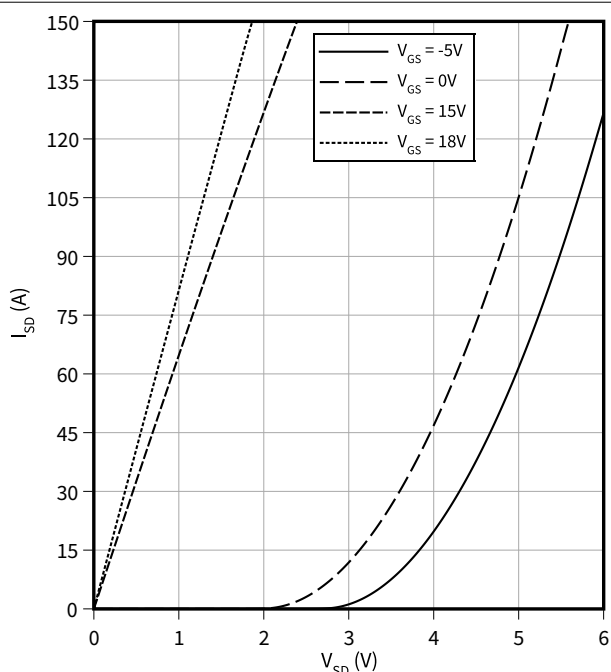


4 Characteristics diagrams

**Typical reverse drain current as function of reverse drain voltage,  $V_{GS}$  as parameter**

$$I_{SD} = f(V_{SD})$$

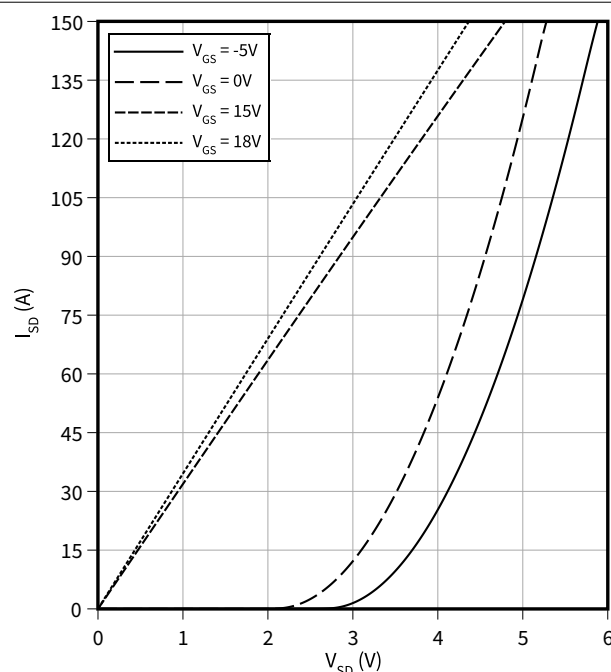
$T_{vj} = 25\text{ °C}$ ,  $t_p = 20\text{ }\mu\text{s}$



**Typical reverse drain current as function of reverse drain voltage,  $V_{GS}$  as parameter**

$$I_{SD} = f(V_{SD})$$

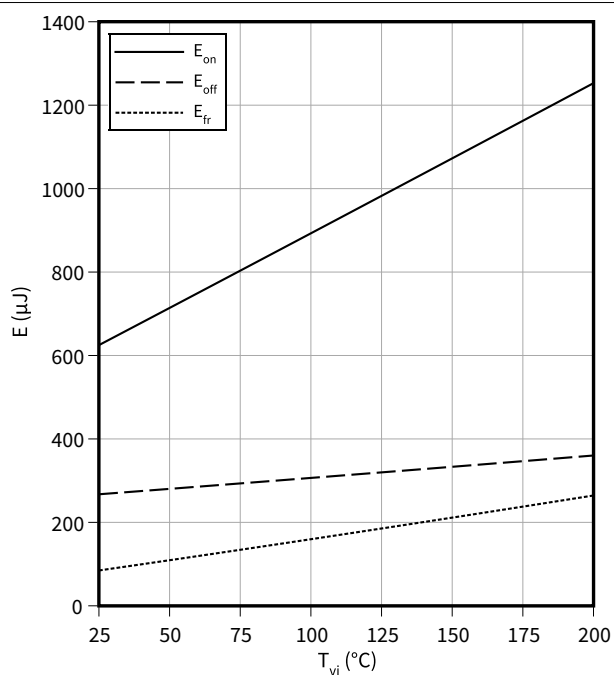
$T_{vj} = 175\text{ °C}$ ,  $t_p = 20\text{ }\mu\text{s}$



**Typical switching energy as a function of junction temperature, test circuit in Fig. F, 2nd device own body diode:  $V_{GS} = 0\text{ V}$**

$$E = f(T_{vj})$$

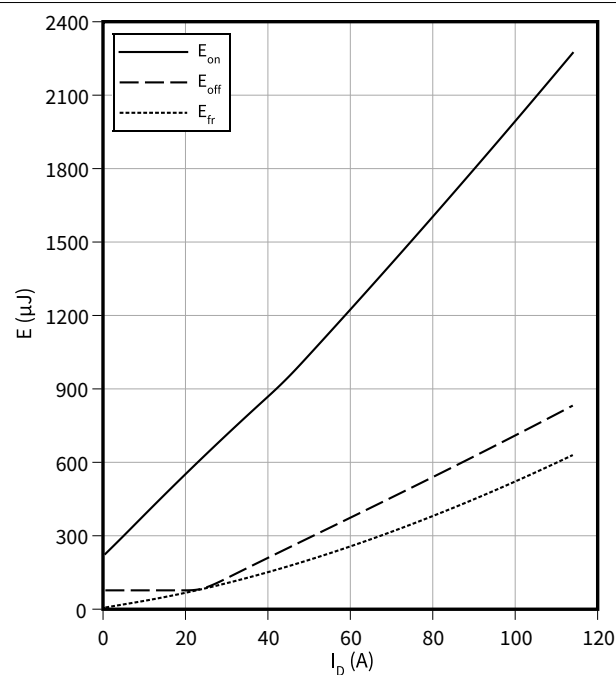
$V_{GS} = 0/18\text{ V}$ ,  $I_D = 56.7\text{ A}$ ,  $R_{G,ext} = 2.3\text{ }\Omega$ ,  $V_{DD} = 800\text{ V}$



**Typical switching energy as a function of drain current, test circuit in Fig. F, 2nd device own body diode:  $V_{GS} = 0\text{ V}$**

$$E = f(I_D)$$

$V_{GS} = 0/18\text{ V}$ ,  $T_{vj} = 175\text{ °C}$ ,  $R_{G,ext} = 2.3\text{ }\Omega$ ,  $V_{DD} = 800\text{ V}$

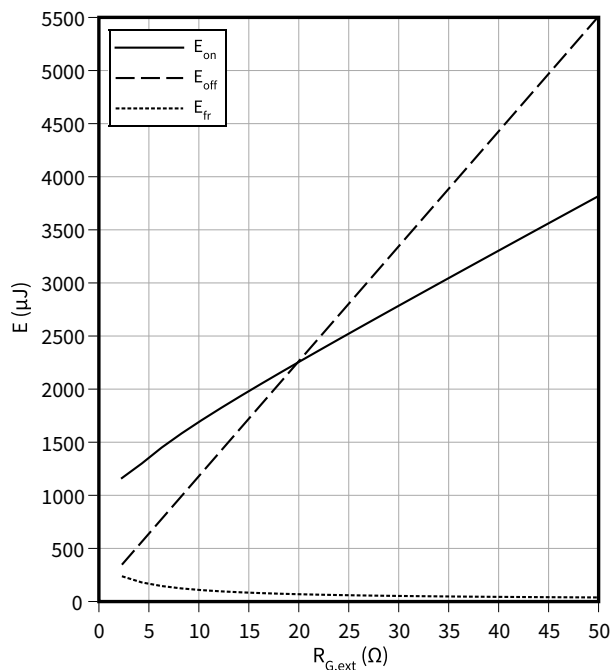


4 Characteristics diagrams

**Typical switching energy as a function of gate resistance, test circuit in Fig. F, 2nd device own body diode:  $V_{GS} = 0$  V**

$$E = f(R_{G,ext})$$

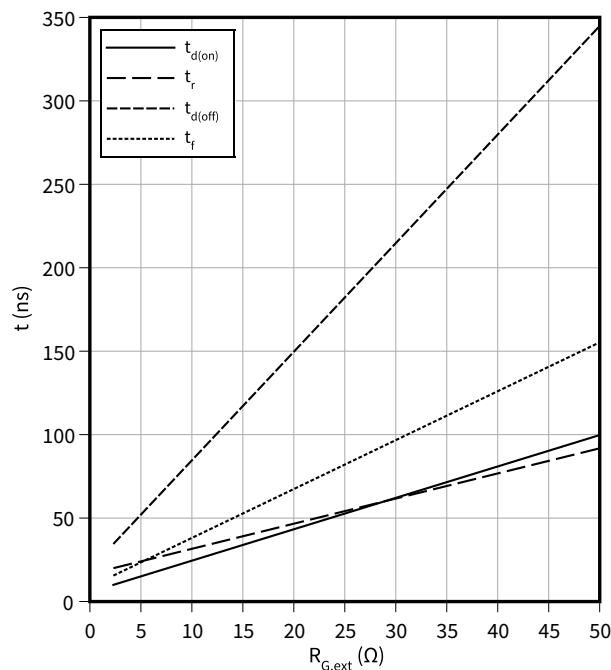
$V_{GS} = 0/18$  V,  $I_D = 56.7$  A,  $T_{vj} = 175$  °C,  $V_{DD} = 800$  V



**Typical switching times as a function of gate resistance, test circuit in Fig. F, 2nd device own body diode:  $V_{GS} = 0$  V**

$$t = f(R_{G,ext})$$

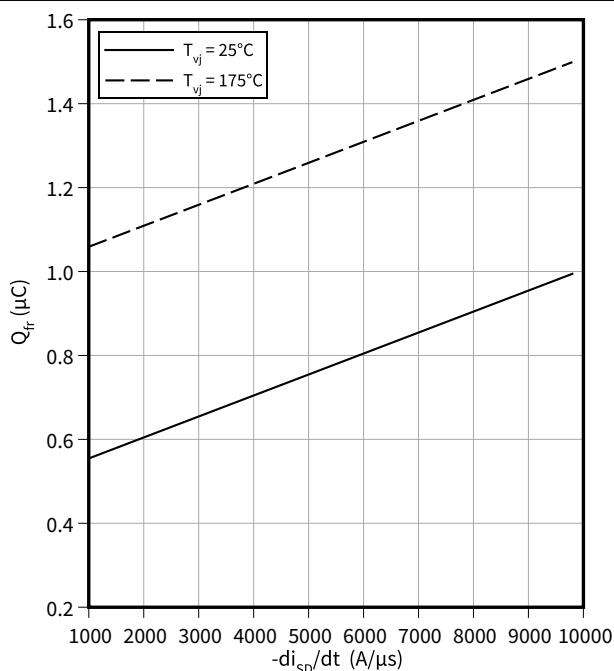
$V_{GS} = 0/18$  V,  $I_D = 56.7$  A,  $T_{vj} = 175$  °C,  $V_{DD} = 800$  V



**Typical reverse recovery charge as a function of reverse drain current slope, test circuit in Fig. F, 2nd device own body diode:  $V_{GS} = 0$  V**

$$Q_{fr} = f(-di_{SD}/dt)$$

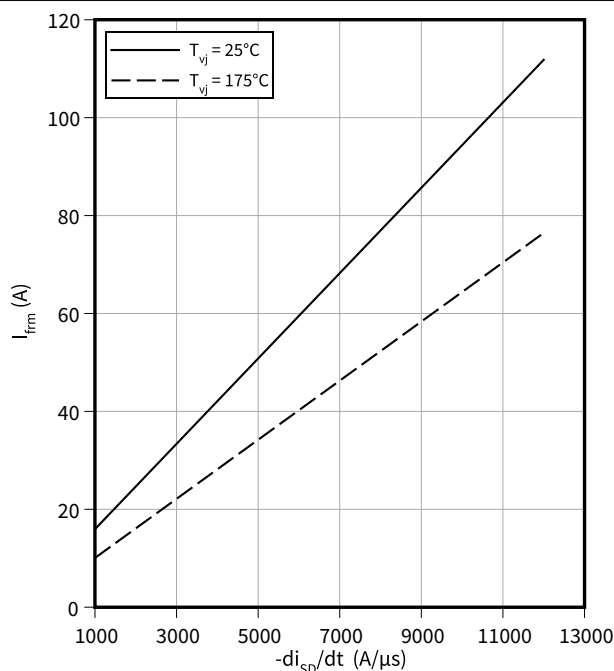
$V_{GS} = 0/18$  V,  $I_{SD} = 56.7$  A,  $V_{DD} = 800$  V



**Typical reverse recovery current as a function of reverse drain current slope, test circuit in Fig. F, 2nd device own body diode:  $V_{GS} = 0$  V**

$$I_{frm} = f(-di_{SD}/dt)$$

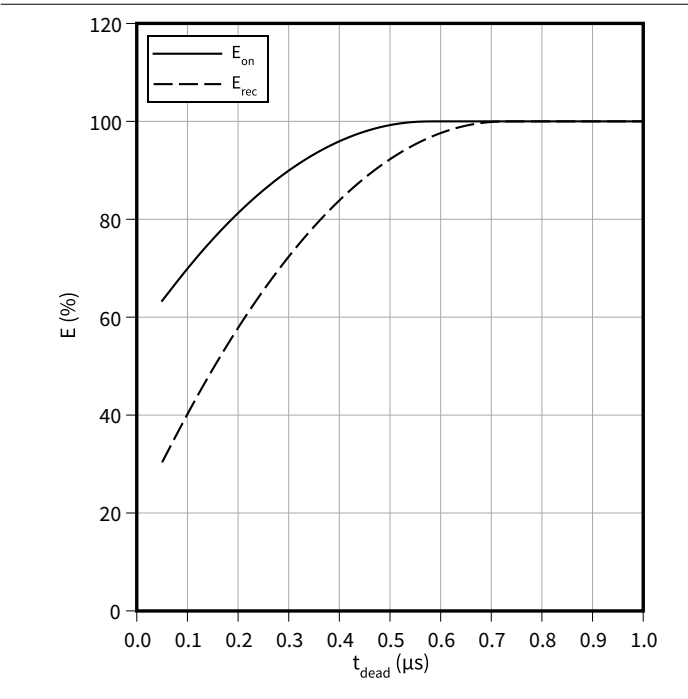
$V_{GS} = 0/18$  V,  $I_{SD} = 56.7$  A,  $V_{DD} = 800$  V



4 Characteristics diagrams

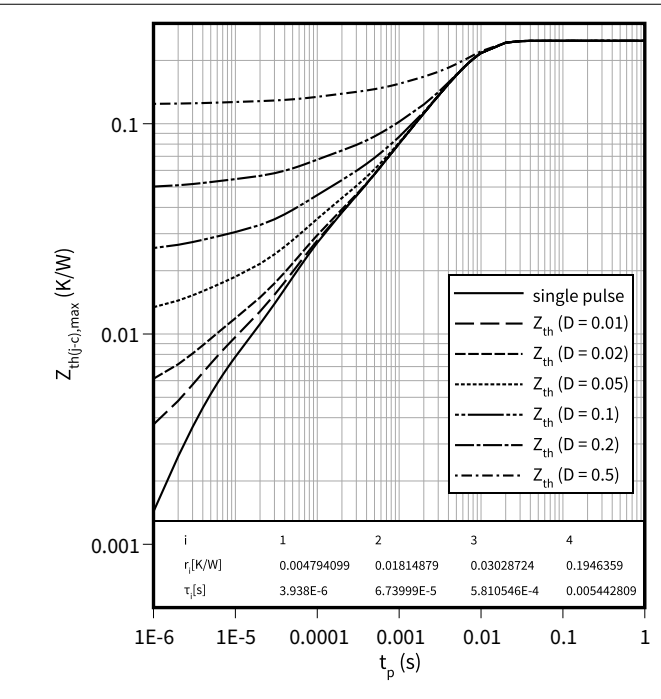
Typical switching energy as a function of dead time / blanking time, test circuit in Fig. F, 2nd device own body diode:  $V_{GS} = -5\text{ V}$

$E = f(t_{dead})$   
 $V_{GS} = 0/18\text{ V}$ ,  $I_D = 56.7\text{ A}$ ,  $T_{vj} = 175\text{ °C}$ ,  $R_{G,ext} = 2.3\text{ }\Omega$   
 $V_{DD} = 800\text{ V}$



Max. transient thermal impedance (MOSFET/diode)

$Z_{th(j-c),max} = f(t_p)$   
 $D = t_p/T$



5 Package outlines

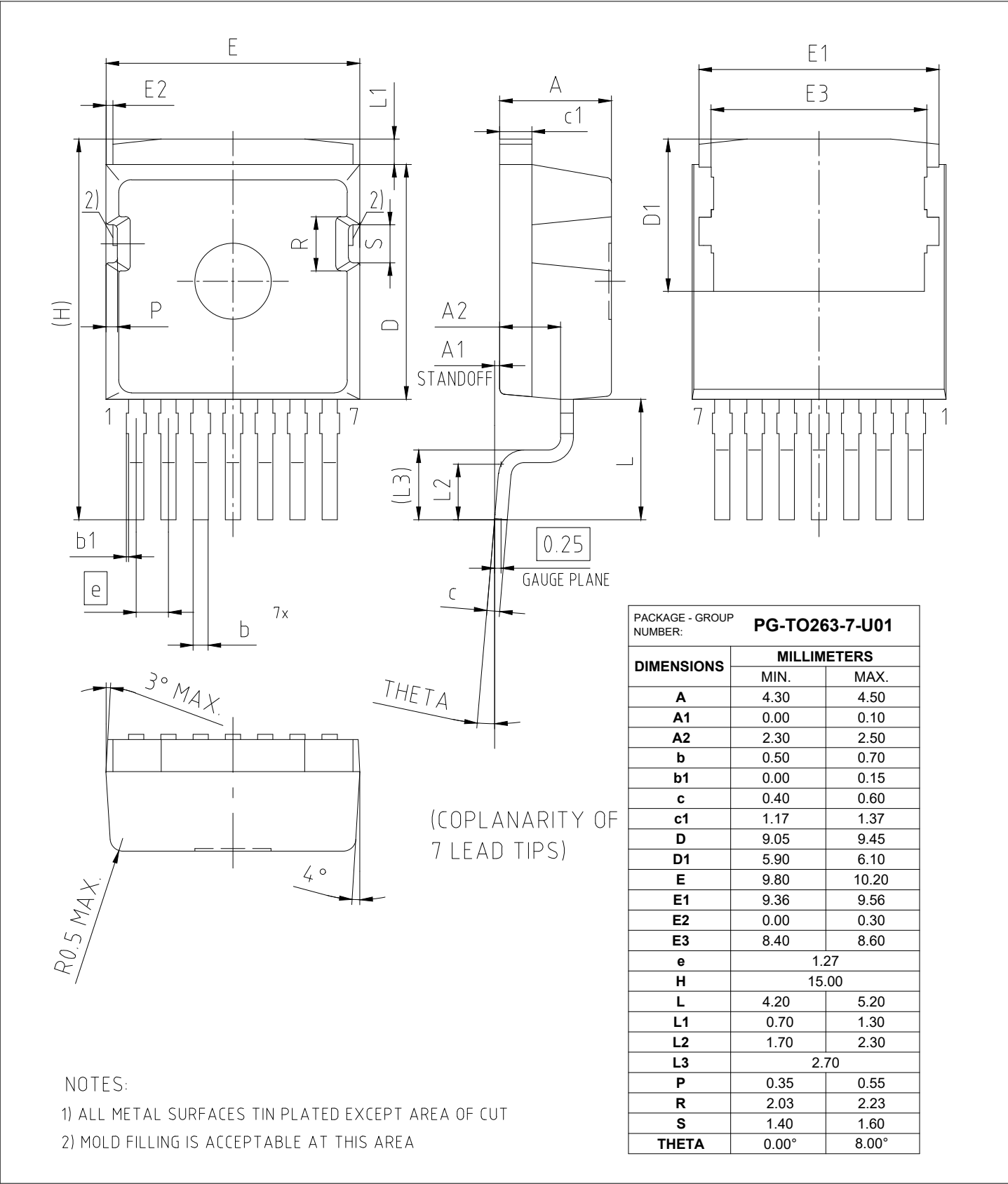


Figure 1

## 6 Testing conditions

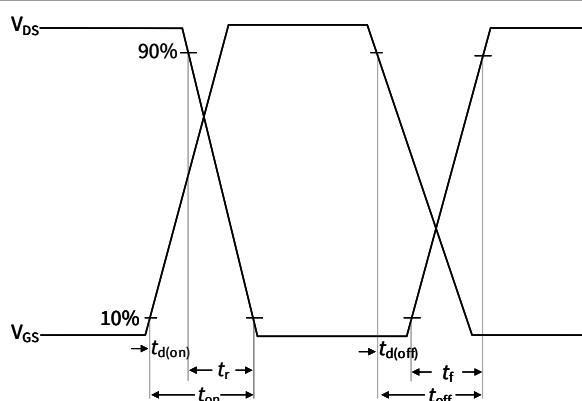


Figure A. Definition of switching times

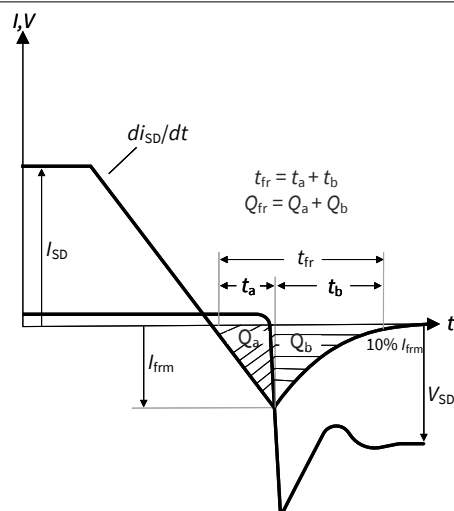


Figure B. Definition of body diode switching characteristics

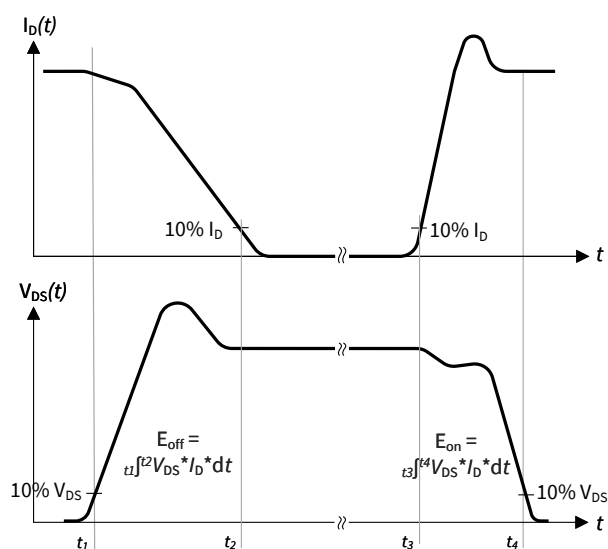


Figure C. Definition of switching losses

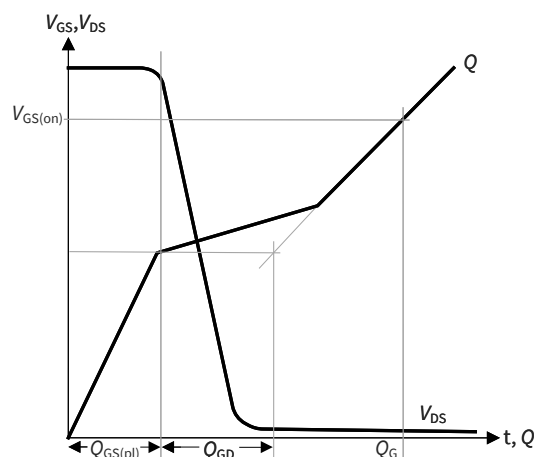


Figure D. Definition of QGD

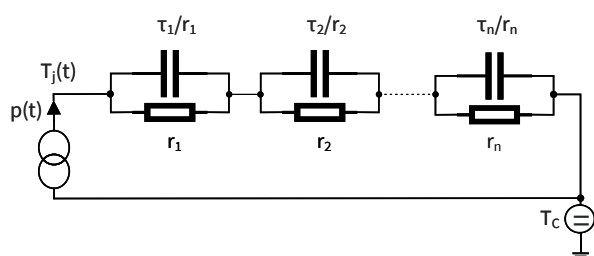


Figure E. Thermal equivalent circuit

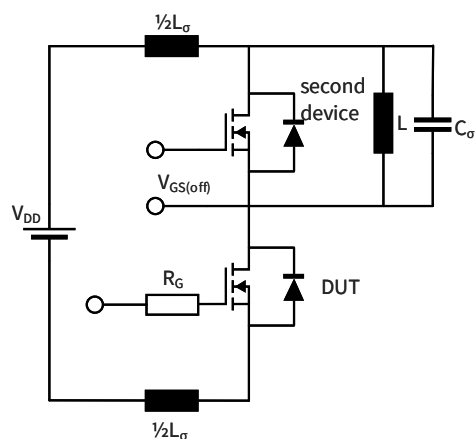


Figure F. Dynamic test circuit

Parasitic inductance  $L_{\sigma}$ ,  
Parasitic capacitor  $C_{\sigma}$ ,

Figure 2

## Revision history

| Document revision | Date of release | Description of changes                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.10              | 2023-08-08      | Preliminary datasheet                                                                                                                                                                                                                                                                                                                                                                        |
| 1.00              | 2023-09-29      | Final datasheet                                                                                                                                                                                                                                                                                                                                                                              |
| 1.10              | 2024-01-12      | Negative gate voltage values updated<br>Additional capacitance & charge values added<br>$E = f(t_{\text{dead}})$ graph y-axis correction to percentage values<br>Editorial changes                                                                                                                                                                                                           |
| 1.20              | 2024-06-26      | Updated „Potential applications“<br>Corrected package name<br>Corrected static and dynamic gate-source voltage<br>Corrected unit of L to $\mu\text{H}$ for “Avalanche energy, repetitive”<br>Corrected value of $g_{fs}$ in the Table 4<br>Corrected diagrams "Typical transfer characteristic" and "Max. transient thermal impedance (MOSFET/diode)"<br>Updated Figure D. Definition of QGD |

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**Edition 2024-07-01**

**Published by**

**Infineon Technologies AG**

**81726 Munich, Germany**

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**IFX-ABH435-004**

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