

Final datasheet  
CoolSiC™ 1200 V SiC MOSFET G2 : Silicon Carbide MOSFET with .XT interconnection technology

Features

- $V_{DS} = 1200\text{ V}$  at  $T_{vj} = 25^{\circ}\text{C}$
- $I_{DC} = 20\text{ A}$  at  $T_C = 100^{\circ}\text{C}$
- $R_{DS(on)} = 78\text{ m}\Omega$  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

- General purpose drives (GPD)
- EV Charging
- Online UPS / Industrial UPS
- String inverter
- Energy storage systems (ESS)
- Welding

Product validation

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

Description

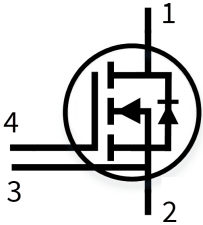
Pin definition:

- Pin 1 – Drain
- Pin 2 – Source
- Pin 3 – Kelvin sense contact
- Pin 4 – Gate

Note: the source and sense pins are not exchangeable, their exchange might lead to malfunction



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



| Type           | Package        | Marking  |
|----------------|----------------|----------|
| IMZA120R078M2H | PG-TO247-4-U02 | 12M2H078 |



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## 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                               | $T_{sold}$    | Wave soldering 1.6 mm (0.063 in.) from case for 10 s |        |      | 260  | °C   |
| Mounting torque                                     | $M$           | M3 screw, Maximum of mounting processes: 3           |        |      | 0.6  | Nm   |
| Thermal resistance, junction-ambient                | $R_{th(j-a)}$ |                                                      |        |      | 62   | K/W  |
| MOSFET/body diode thermal resistance, junction-case | $R_{th(j-c)}$ |                                                      |        | 0.8  | 1.04 | 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 $T_{vj(max)}$ | $I_{DDC}$ | $V_{GS} = 18\text{ V}$                                                                                                   | $T_c = 25\text{ °C}$  | 28       | A             |
|                                                                              |           |                                                                                                                          | $T_c = 100\text{ °C}$ | 20       |               |
| Peak drain current, $t_p$ limited by $T_{vj(max)}$ <sup>1)</sup>             | $I_{DM}$  | $V_{GS} = 18\text{ V}$                                                                                                   |                       | 98.5     | 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                                               | $E_{AS}$  | $I_D = 9\text{ A}$ , $V_{DD} = 50\text{ V}$ , $L = 2.8\text{ mH}$ , $T_{vj(start)} = 25\text{ °C}$                       |                       | 112      | mJ            |
| Avalanche energy, repetitive                                                 | $E_{AR}$  | $I_D = 9\text{ A}$ , $V_{DD} = 50\text{ V}$ , $L = 14.1\text{ }\mu\text{H}$ , $T_{vj(start)} = 25\text{ °C}$             |                       | 0.56     | 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 $T_{vj(max)}$                                  | $P_{tot}$ |                                                                                                                          | $T_c = 25\text{ °C}$  | 143      | W             |
|                                                                              |           |                                                                                                                          | $T_c = 100\text{ °C}$ | 71       |               |

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             | $R_{DS(on)}$ | $I_D = 9\text{ A}$                                                                                               | $T_{vj} = 25\text{ }^{\circ}\text{C}$ ,<br>$V_{GS(on)} = 18\text{ V}$  |        | 78   | 103  | mΩ   |
|                                              |              |                                                                                                                  | $T_{vj} = 150\text{ }^{\circ}\text{C}$ ,<br>$V_{GS(on)} = 18\text{ V}$ |        | 159  |      |      |
|                                              |              |                                                                                                                  | $T_{vj} = 175\text{ }^{\circ}\text{C}$ ,<br>$V_{GS(on)} = 18\text{ V}$ |        | 185  |      |      |
|                                              |              |                                                                                                                  | $T_{vj} = 25\text{ }^{\circ}\text{C}$ ,<br>$V_{GS(on)} = 15\text{ V}$  |        | 97   | 130  |      |
| Gate-source threshold voltage                | $V_{GS(th)}$ | $I_D = 2.8\text{ mA}$ , $V_{DS} = V_{GS}$<br>(tested after 1 ms pulse at $V_{GS} = 20\text{ V}$ )                | $T_{vj} = 25\text{ }^{\circ}\text{C}$                                  | 3.5    | 4.2  | 5.1  | V    |
|                                              |              |                                                                                                                  | $T_{vj} = 175\text{ }^{\circ}\text{C}$                                 |        | 3.2  |      |      |
| Zero gate-voltage drain current              | $I_{DSS}$    | $V_{DS} = 1200\text{ V}$ , $V_{GS} = 0\text{ V}$                                                                 | $T_{vj} = 25\text{ }^{\circ}\text{C}$                                  |        |      | 80   | μA   |
|                                              |              |                                                                                                                  | $T_{vj} = 175\text{ }^{\circ}\text{C}$                                 |        | 1    |      |      |
| 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                     | $g_{fs}$     | $I_D = 9\text{ A}$ , $V_{DS} = 20\text{ V}$                                                                      |                                                                        |        | 6    |      | S    |
| Internal gate resistance                     | $R_{G,int}$  | $f = 1\text{ MHz}$ , $V_{AC} = 25\text{ mV}$                                                                     |                                                                        |        | 10   |      | Ω    |
| Input capacitance                            | $C_{iss}$    | $V_{DS} = 800\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 100\text{ kHz}$ , $V_{AC} = 25\text{ mV}$                 |                                                                        |        | 700  |      | pF   |
| Output capacitance                           | $C_{oss}$    | $V_{DS} = 800\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 100\text{ kHz}$ , $V_{AC} = 25\text{ mV}$                 |                                                                        |        | 28   |      | pF   |
| Reverse transfer capacitance                 | $C_{rss}$    | $V_{DS} = 800\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 100\text{ kHz}$ , $V_{AC} = 25\text{ mV}$                 |                                                                        |        | 2    |      | pF   |
| $C_{oss}$ stored energy                      | $E_{oss}$    | Calculated based on $C_{oss} = f(V_{DD})$                                                                        |                                                                        |        | 12   |      | μJ   |
| Output charge                                | $Q_{oss}$    | Calculated based on $C_{oss} = f(V_{DD})$                                                                        |                                                                        |        | 43   |      | nC   |
| Effective output capacitance, energy related | $C_{o(er)}$  | $V_{DS} = 0...800\text{ V}$ , $V_{GS} = 0\text{ V}$ ,<br>Calculated based on $E_{oss}$                           |                                                                        |        | 38   |      | pF   |
| Effective output capacitance, time related   | $C_{o(tr)}$  | $I_D = \text{constant}$ , $V_{DS} = 0...800\text{ V}$ , $V_{GS} = 0\text{ V}$ ,<br>Calculated based on $Q_{oss}$ |                                                                        |        | 54   |      | pF   |
| Total gate charge                            | $Q_G$        | $V_{DD} = 800\text{ V}$ , $I_D = 9\text{ A}$ , $V_{GS} = 0/18\text{ V}$ , turn-on pulse                          |                                                                        |        | 21   |      | nC   |

(table continues...)

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

| Parameter                            | Symbol       | Note or test condition                                                                                                                                                                       | Values                                |      |      | Unit          |
|--------------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------|------|---------------|
|                                      |              |                                                                                                                                                                                              | Min.                                  | Typ. | Max. |               |
| Plateau gate charge                  | $Q_{GS(pl)}$ | $V_{DD} = 800 \text{ V}$ , $I_D = 9 \text{ A}$ , $V_{GS} = 0/18 \text{ V}$ , turn-on pulse                                                                                                   |                                       | 5    |      | nC            |
| Gate-drain charge                    | $Q_{GD}$     | $V_{DD} = 800 \text{ V}$ , $I_D = 9 \text{ A}$ , $V_{GS} = 0/18 \text{ V}$ , turn-on pulse                                                                                                   |                                       | 5    |      | nC            |
| Turn-on delay time                   | $t_{d(on)}$  | $V_{DD} = 800 \text{ V}$ , $I_D = 9 \text{ A}$ ,<br>$V_{GS} = 0/18 \text{ V}$ ,<br>$R_{G,ext} = 2.3 \Omega$ , $L_\sigma = 12 \text{ nH}$ ,<br>diode: body diode at<br>$V_{GS} = 0 \text{ V}$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  | 5    |      | ns            |
|                                      |              |                                                                                                                                                                                              | $T_{vj} = 175 \text{ }^\circ\text{C}$ | 4.1  |      |               |
| Rise time                            | $t_r$        | $V_{DD} = 800 \text{ V}$ , $I_D = 9 \text{ A}$ ,<br>$V_{GS} = 0/18 \text{ V}$ ,<br>$R_{G,ext} = 2.3 \Omega$ , $L_\sigma = 12 \text{ nH}$ ,<br>diode: body diode at<br>$V_{GS} = 0 \text{ V}$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  | 3.2  |      | ns            |
|                                      |              |                                                                                                                                                                                              | $T_{vj} = 175 \text{ }^\circ\text{C}$ | 2.8  |      |               |
| Turn-off delay time                  | $t_{d(off)}$ | $V_{DD} = 800 \text{ V}$ , $I_D = 9 \text{ A}$ ,<br>$V_{GS} = 0/18 \text{ V}$ ,<br>$R_{G,ext} = 2.3 \Omega$ , $L_\sigma = 12 \text{ nH}$ ,<br>diode: body diode at<br>$V_{GS} = 0 \text{ V}$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  | 11.7 |      | ns            |
|                                      |              |                                                                                                                                                                                              | $T_{vj} = 175 \text{ }^\circ\text{C}$ | 13.6 |      |               |
| Fall time                            | $t_f$        | $V_{DD} = 800 \text{ V}$ , $I_D = 9 \text{ A}$ ,<br>$V_{GS} = 0/18 \text{ V}$ ,<br>$R_{G,ext} = 2.3 \Omega$ , $L_\sigma = 12 \text{ nH}$ ,<br>diode: body diode at<br>$V_{GS} = 0 \text{ V}$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  | 4.8  |      | ns            |
|                                      |              |                                                                                                                                                                                              | $T_{vj} = 175 \text{ }^\circ\text{C}$ | 5.6  |      |               |
| Turn-on energy                       | $E_{on}$     | $V_{DD} = 800 \text{ V}$ , $I_D = 9 \text{ A}$ ,<br>$V_{GS} = 0/18 \text{ V}$ ,<br>$R_{G,ext} = 2.3 \Omega$ , $L_\sigma = 12 \text{ nH}$ ,<br>diode: body diode at<br>$V_{GS} = 0 \text{ V}$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  | 57   |      | $\mu\text{J}$ |
|                                      |              |                                                                                                                                                                                              | $T_{vj} = 175 \text{ }^\circ\text{C}$ | 114  |      |               |
| Turn-off energy                      | $E_{off}$    | $V_{DD} = 800 \text{ V}$ , $I_D = 9 \text{ A}$ ,<br>$V_{GS} = 0/18 \text{ V}$ ,<br>$R_{G,ext} = 2.3 \Omega$ , $L_\sigma = 12 \text{ nH}$ ,<br>diode: body diode at<br>$V_{GS} = 0 \text{ V}$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  | 22   |      | $\mu\text{J}$ |
|                                      |              |                                                                                                                                                                                              | $T_{vj} = 175 \text{ }^\circ\text{C}$ | 30   |      |               |
| Total switching energy <sup>1)</sup> | $E_{tot}$    | $V_{DD} = 800 \text{ V}$ , $I_D = 9 \text{ A}$ ,<br>$V_{GS} = 0/18 \text{ V}$ ,<br>$R_{G,ext} = 2.3 \Omega$ , $L_\sigma = 12 \text{ nH}$ ,<br>diode: body diode at<br>$V_{GS} = 0 \text{ V}$ | $T_{vj} = 25 \text{ }^\circ\text{C}$  | 110  |      | $\mu\text{J}$ |
|                                      |              |                                                                                                                                                                                              | $T_{vj} = 175 \text{ }^\circ\text{C}$ | 233  |      |               |

(table continues...)

**Table 4** (continued) Characteristic values

| Parameter                                    | Symbol         | Note or test condition                                                                                                                                                                                  | Values                                 |      |      | Unit             |
|----------------------------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------|------|------------------|
|                                              |                |                                                                                                                                                                                                         | Min.                                   | Typ. | Max. |                  |
| Turn-on energy at -5 V                       | $E_{on}$       | $V_{DD} = 800 \text{ V}$ , $I_D = 9 \text{ A}$ ,<br>$V_{GS} = -5/18 \text{ V}$ ,<br>$R_{G,ext} = 2.3 \text{ } \Omega$ , $L_\sigma = 12 \text{ nH}$ ,<br>diode: body diode at<br>$V_{GS} = -5 \text{ V}$ | $T_{vj} = 25 \text{ } ^\circ\text{C}$  | 50   |      | $\mu\text{J}$    |
|                                              |                |                                                                                                                                                                                                         | $T_{vj} = 175 \text{ } ^\circ\text{C}$ | 109  |      |                  |
| Turn-off energy at -5 V                      | $E_{off}$      | $V_{DD} = 800 \text{ V}$ , $I_D = 9 \text{ A}$ ,<br>$V_{GS} = -5/18 \text{ V}$ ,<br>$R_{G,ext} = 2.3 \text{ } \Omega$ , $L_\sigma = 12 \text{ nH}$ ,<br>diode: body diode at<br>$V_{GS} = -5 \text{ V}$ | $T_{vj} = 25 \text{ } ^\circ\text{C}$  | 12   |      | $\mu\text{J}$    |
|                                              |                |                                                                                                                                                                                                         | $T_{vj} = 175 \text{ } ^\circ\text{C}$ | 12   |      |                  |
| Total switching energy at -5 V <sup>1)</sup> | $E_{tot}$      | $V_{DD} = 800 \text{ V}$ , $I_D = 9 \text{ A}$ ,<br>$V_{GS} = -5/18 \text{ V}$ ,<br>$R_{G,ext} = 2.3 \text{ } \Omega$ , $L_\sigma = 12 \text{ nH}$ ,<br>diode: body diode at<br>$V_{GS} = -5 \text{ V}$ | $T_{vj} = 25 \text{ } ^\circ\text{C}$  | 93   |      | $\mu\text{J}$    |
|                                              |                |                                                                                                                                                                                                         | $T_{vj} = 175 \text{ } ^\circ\text{C}$ | 226  |      |                  |
| Virtual junction temperature                 | $T_{vj}$       |                                                                                                                                                                                                         | -55                                    |      | 175  | $^\circ\text{C}$ |
| Virtual junction temperature                 | $T_{vj(over)}$ | overload, cumulative max. 100 h <sup>2)</sup>                                                                                                                                                           |                                        |      | 200  | $^\circ\text{C}$ |

1) including  $E_{fr}$

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

### 3 Body diode (MOSFET)

**Table 5** Maximum rated values

| Parameter                                                                         | Symbol    | Note or test condition                   |                                     | Values | Unit |
|-----------------------------------------------------------------------------------|-----------|------------------------------------------|-------------------------------------|--------|------|
| Drain-source voltage                                                              | $V_{DSS}$ | $T_{vj} \geq 25 \text{ } ^\circ\text{C}$ |                                     | 1200   | V    |
| Continuous reverse drain current for $R_{th(j-c,max)}$ , limited by $T_{vj(max)}$ | $I_{SDC}$ | $V_{GS} = 0 \text{ V}$                   | $T_c = 25 \text{ } ^\circ\text{C}$  | 24     | A    |
|                                                                                   |           |                                          | $T_c = 100 \text{ } ^\circ\text{C}$ | 14     |      |
| Peak reverse drain current, $t_p$ limited by $T_{vj(max)}$                        | $I_{SM}$  | $V_{GS} = 0 \text{ V}$                   |                                     | 60     | A    |

**Table 6** Characteristic values

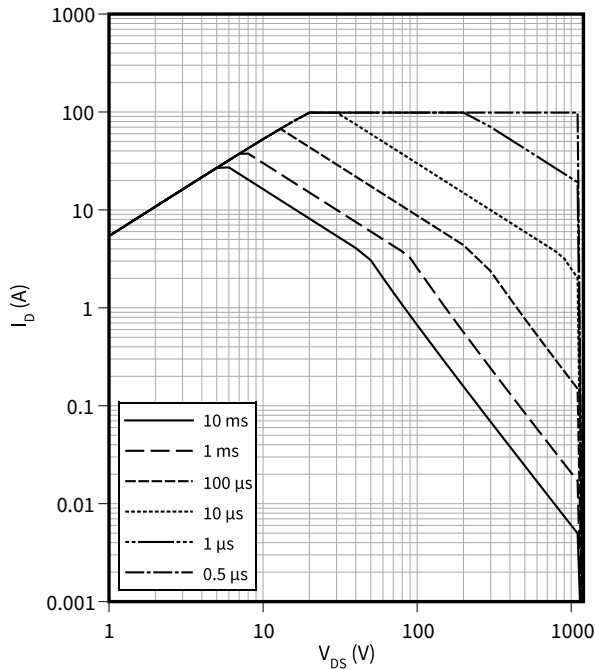
| Parameter                              | Symbol         | Note or test condition                                                                                                                           |                          | Values |      |      | Unit               |
|----------------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------|------|------|--------------------|
|                                        |                |                                                                                                                                                  |                          | Min.   | Typ. | Max. |                    |
| Drain-source reverse voltage           | $V_{SD}$       | $I_{SD} = 9\text{ A}$ , $V_{GS} = 0\text{ V}$                                                                                                    | $T_{vj} = 25\text{ °C}$  |        | 4.2  | 5.5  | V                  |
|                                        |                |                                                                                                                                                  | $T_{vj} = 100\text{ °C}$ |        | 4.11 |      |                    |
|                                        |                |                                                                                                                                                  | $T_{vj} = 175\text{ °C}$ |        | 4.05 |      |                    |
| MOSFET forward recovery charge         | $Q_{fr}$       | $V_{DD} = 800\text{ V}$ , $I_{SD} = 9\text{ A}$ ,<br>$V_{GS} = 0\text{ V}$ , $R_{GS(on)} = 2.3\text{ }\Omega$ ,<br>$Q_{fr}$ includes also $Q_C$  | $T_{vj} = 25\text{ °C}$  |        | 0.1  |      | $\mu\text{C}$      |
|                                        |                |                                                                                                                                                  | $T_{vj} = 175\text{ °C}$ |        | 0.18 |      |                    |
| MOSFET peak forward recovery current   | $I_{frm}$      | $V_{DD} = 800\text{ V}$ , $I_{SD} = 9\text{ A}$ ,<br>$V_{GS} = 0\text{ V}$ , $R_{GS(on)} = 2.3\text{ }\Omega$ ,<br>$Q_{fr}$ includes also $Q_C$  | $T_{vj} = 25\text{ °C}$  |        | 19.9 |      | A                  |
|                                        |                |                                                                                                                                                  | $T_{vj} = 175\text{ °C}$ |        | 32.5 |      |                    |
| MOSFET forward recovery energy         | $E_{fr}$       | $V_{DD} = 800\text{ V}$ , $I_{SD} = 9\text{ A}$ ,<br>$V_{GS} = 0\text{ V}$ , $R_{GS(on)} = 2.3\text{ }\Omega$ ,<br>$Q_{fr}$ includes also $Q_C$  | $T_{vj} = 25\text{ °C}$  |        | 31   |      | $\mu\text{J}$      |
|                                        |                |                                                                                                                                                  | $T_{vj} = 175\text{ °C}$ |        | 89   |      |                    |
| MOSFET forward recovery energy at -5 V | $E_{fr}$       | $V_{DD} = 800\text{ V}$ , $I_{SD} = 9\text{ A}$ ,<br>$V_{GS} = -5\text{ V}$ , $R_{GS(on)} = 2.3\text{ }\Omega$ ,<br>$Q_{fr}$ includes also $Q_C$ | $T_{vj} = 25\text{ °C}$  |        | 31   |      | $\mu\text{J}$      |
|                                        |                |                                                                                                                                                  | $T_{vj} = 175\text{ °C}$ |        | 105  |      |                    |
| 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

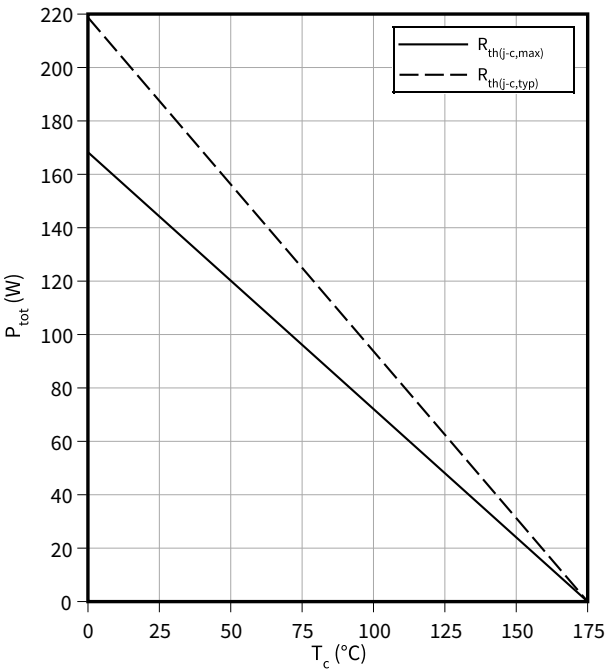
Safe operating area (SOA)

$I_D = f(V_{DS})$   
 $T_{vj} \leq 175\text{ }^{\circ}\text{C}, T_c = 25\text{ }^{\circ}\text{C}$



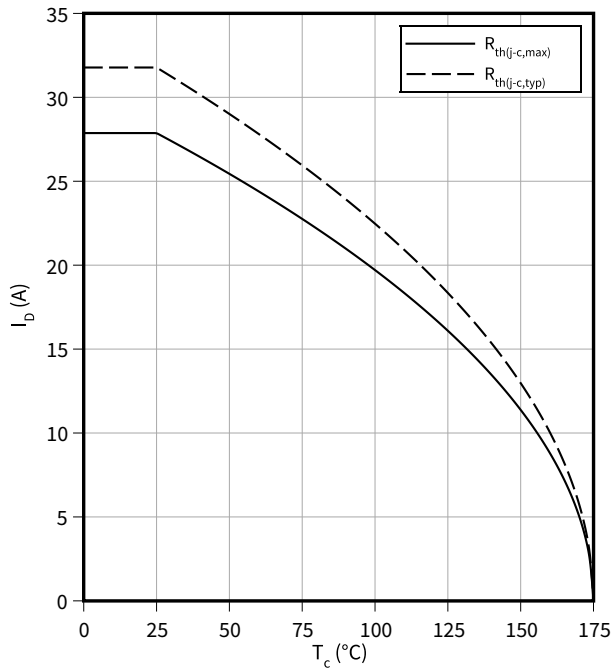
Power dissipation as a function of case temperature

$P_{tot} = f(T_c)$



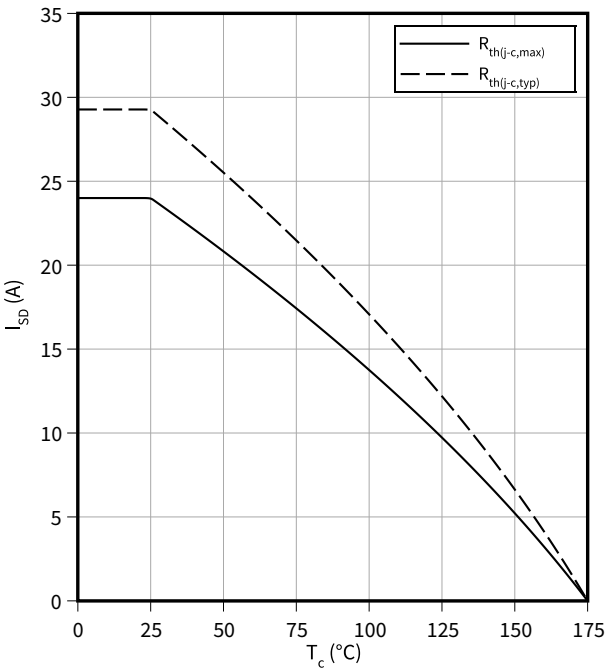
Maximum DC drain to source current as a function of case temperature limited by bond wire

$I_D = f(T_c)$



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

$I_{SD} = f(T_c)$   
 $V_{GS} = 0\text{ V}$

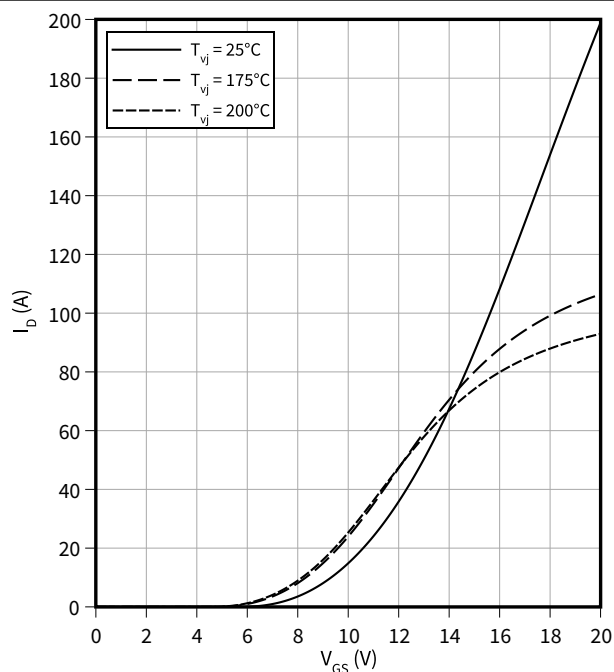


**4 Characteristics diagrams**

**Typical transfer characteristic**

$$I_D = f(V_{GS})$$

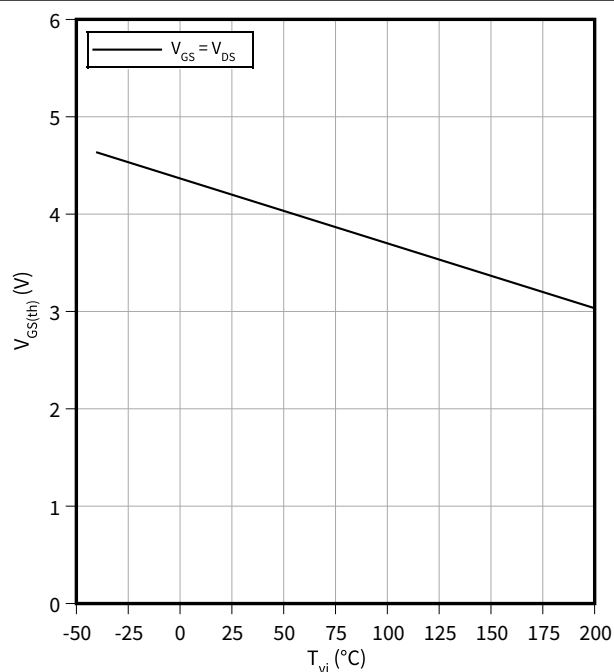
$V_{DS} = 20 \text{ V}$ ,  $t_p = 20 \mu\text{s}$



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

$$V_{GS(th)} = f(T_{vj})$$

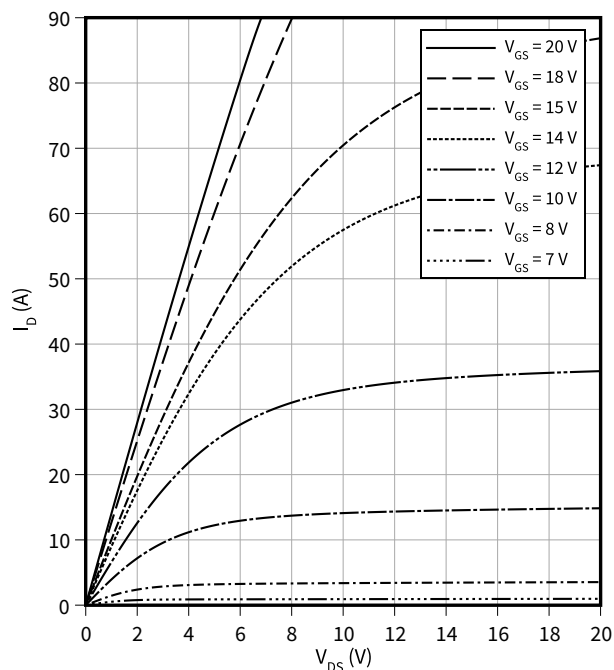
$I_D = 2.8 \text{ mA}$



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

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

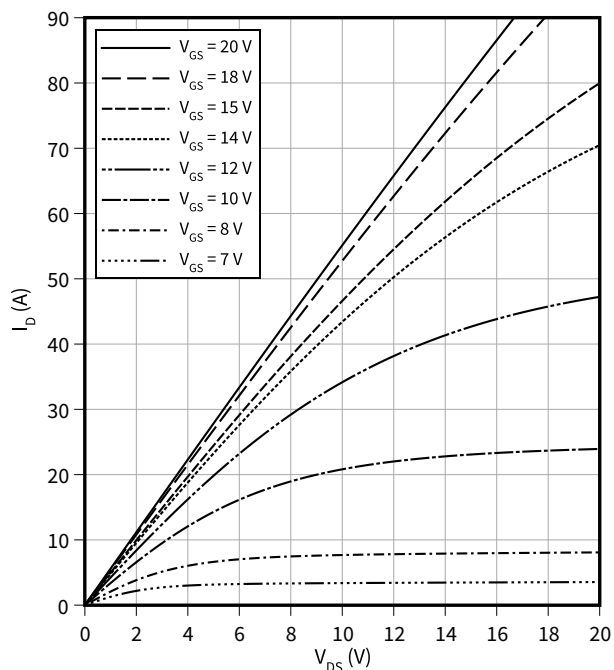
$T_{vj} = 25^\circ\text{C}$ ,  $t_p = 20 \mu\text{s}$



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

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

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

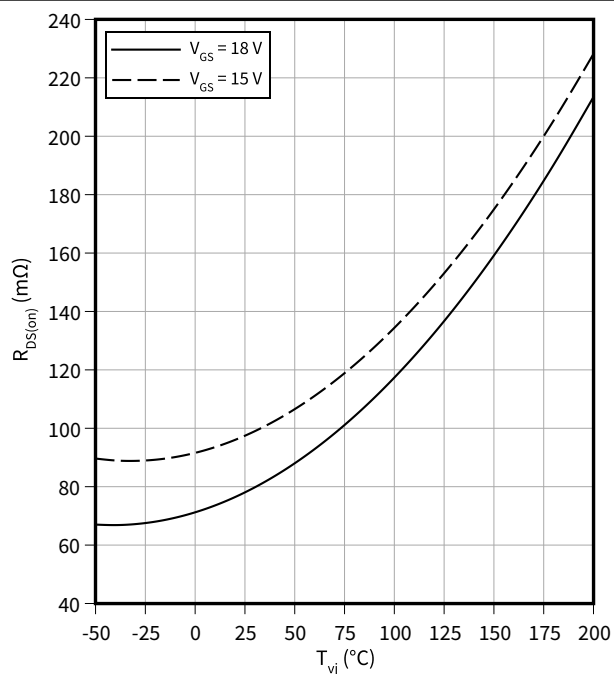


4 Characteristics diagrams

**Typical on-state resistance as a function of junction temperature**

$$R_{DS(on)} = f(T_{vj})$$

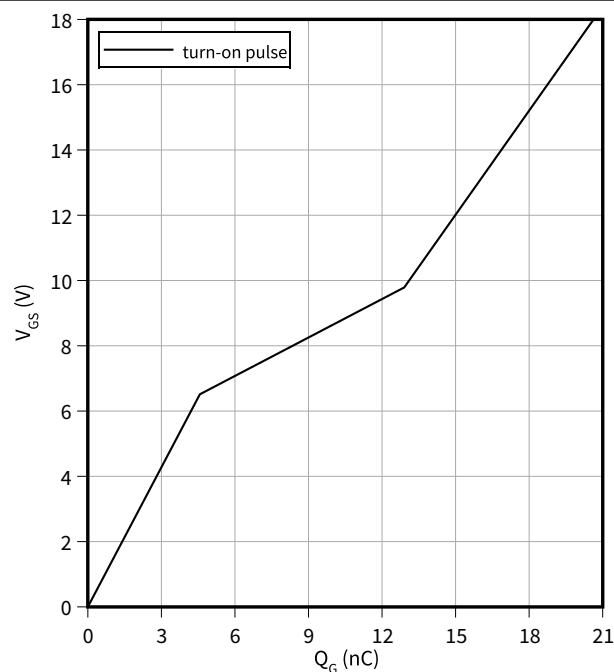
$$I_D = 9 \text{ A}$$



**Typical gate charge**

$$V_{GS} = f(Q_G)$$

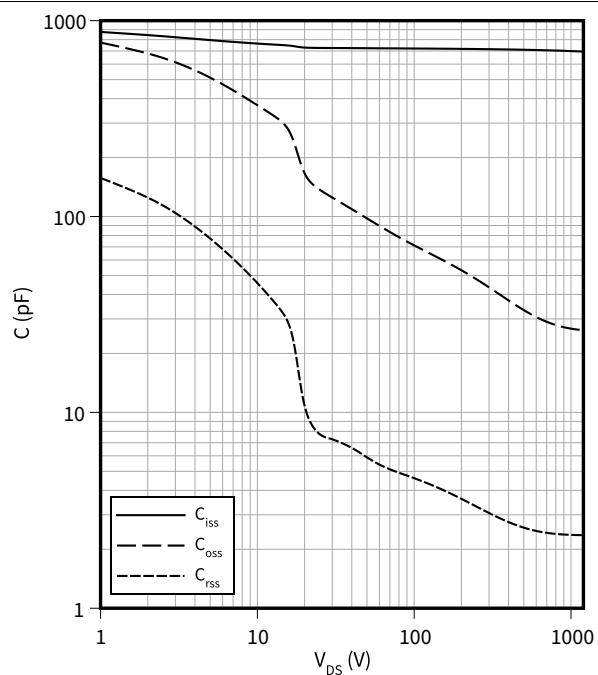
$$I_D = 9 \text{ A}, V_{DS} = 800 \text{ V}$$



**Typical capacitance as a function of drain-source voltage**

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

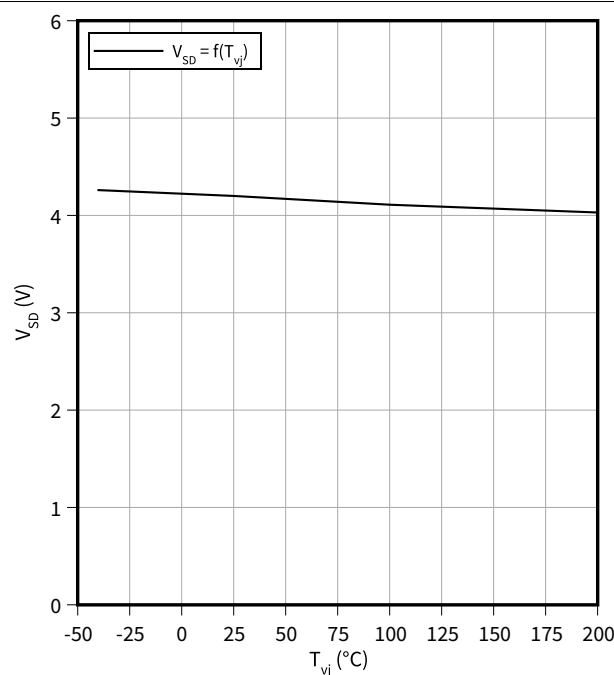
$$V_{GS} = 0 \text{ V}, f = 100 \text{ kHz}$$



**Typical reverse drain voltage as a function of junction temperature**

$$V_{SD} = f(T_{vj})$$

$$I_{SD} = 9 \text{ A}, V_{GS} = 0 \text{ V}$$

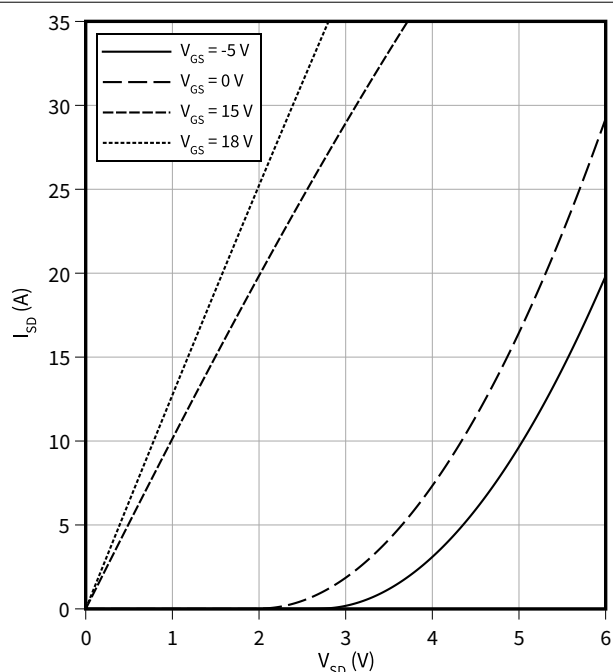


4 Characteristics diagrams

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

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

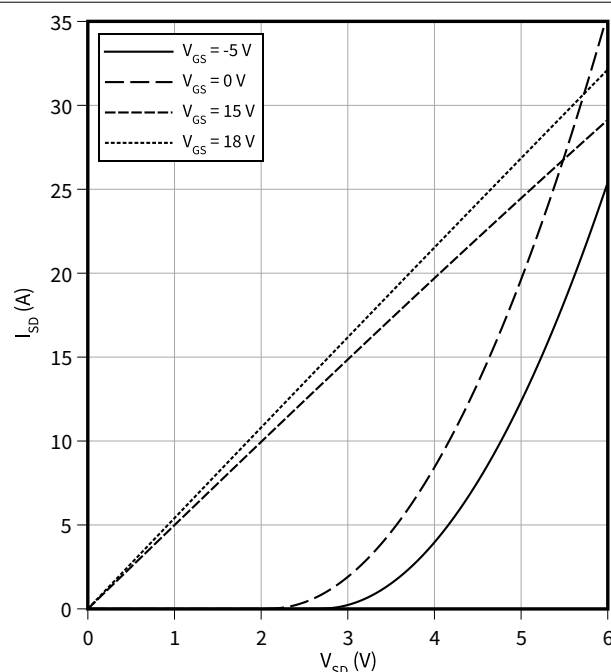
$T_{vj} = 25\text{ °C}$ ,  $t_p = 20\text{ }\mu\text{s}$



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

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

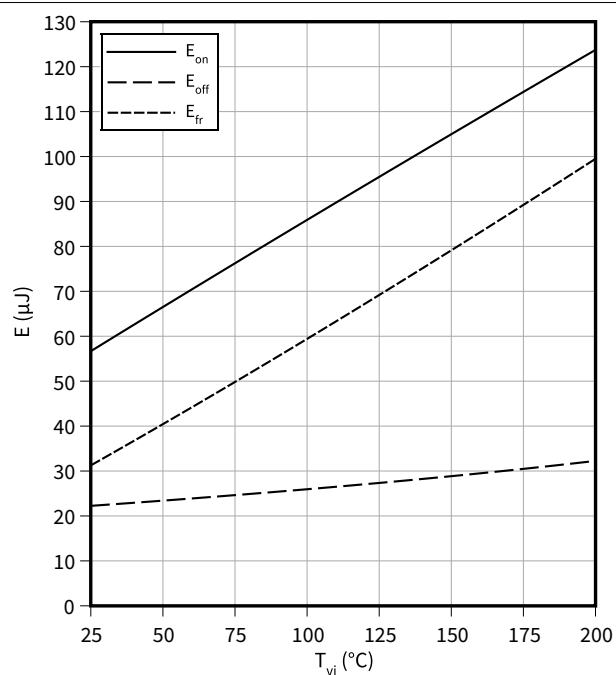
$T_{vj} = 175\text{ °C}$ ,  $t_p = 20\text{ }\mu\text{s}$



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

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

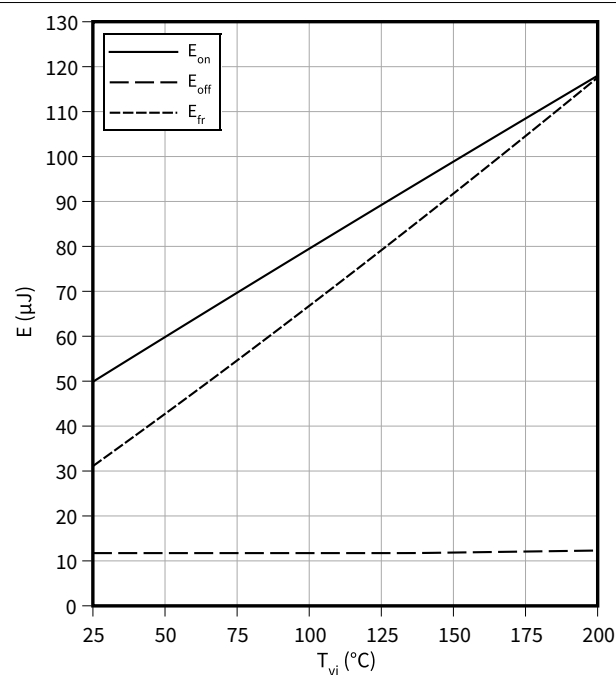
$V_{GS} = 0/18\text{ V}$ ,  $I_D = 9\text{ A}$ ,  $R_{G,ext} = 2.3\text{ }\Omega$ ,  $V_{DD} = 800\text{ V}$



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

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

$V_{GS} = -5/18\text{ V}$ ,  $I_D = 9\text{ A}$ ,  $R_{G,ext} = 2.3\text{ }\Omega$ ,  $V_{DD} = 800\text{ V}$

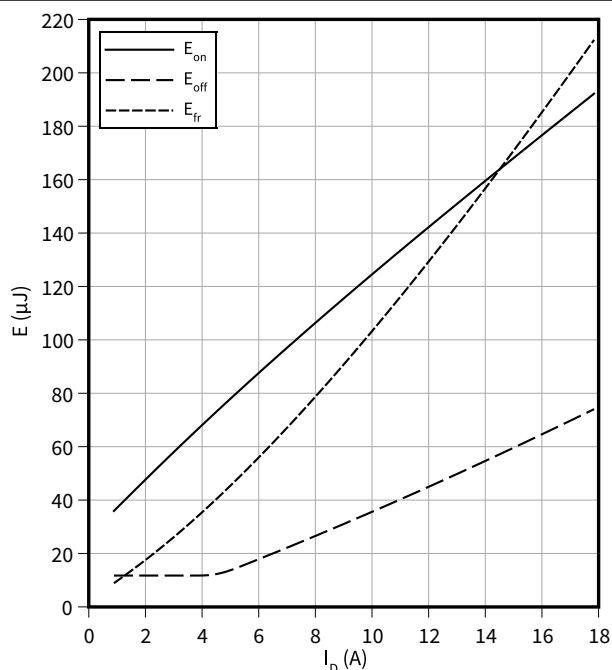


4 Characteristics diagrams

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

$$E = f(I_D)$$

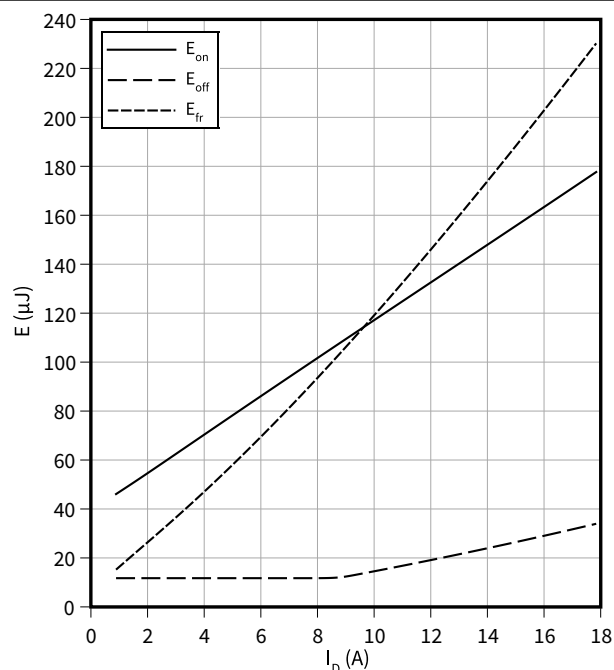
$V_{GS} = 0/18$  V,  $T_{vj} = 175$  °C,  $R_{G,ext} = 2.3$   $\Omega$ ,  $V_{DD} = 800$  V



**Typical switching energy as a function of drain current, test circuit in Fig. F, 2nd device own body diode:  $V_{GS} = -5$  V**

$$E = f(I_D)$$

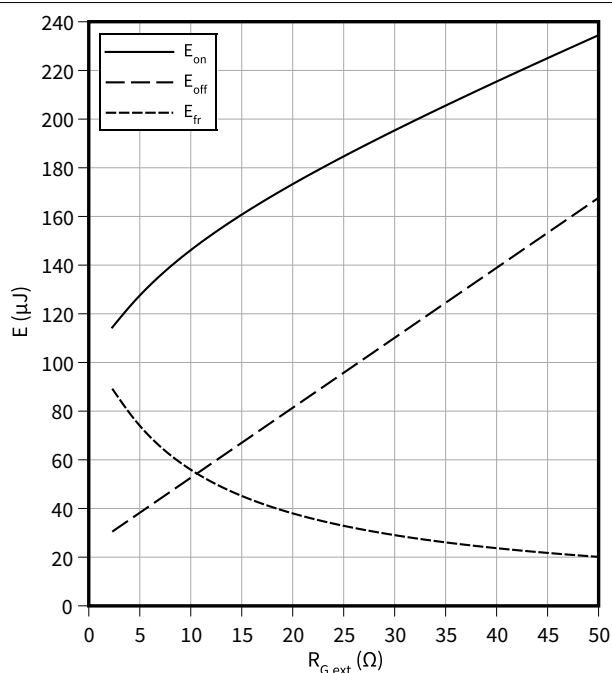
$V_{GS} = -5/18$  V,  $T_{vj} = 175$  °C,  $R_{G,ext} = 2.3$   $\Omega$ ,  $V_{DD} = 800$  V



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

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

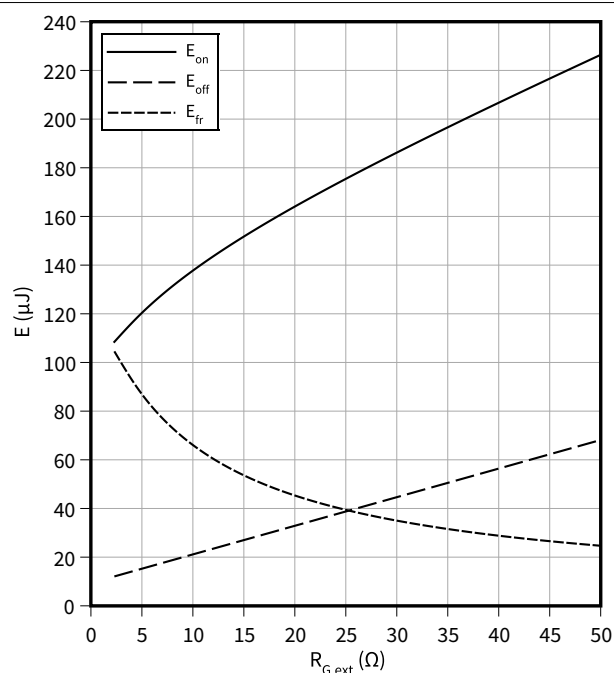
$V_{GS} = 0/18$  V,  $I_D = 9$  A,  $T_{vj} = 175$  °C,  $V_{DD} = 800$  V



**Typical switching energy as a function of gate resistance, test circuit in Fig. F, 2nd device own body diode:  $V_{GS} = -5$  V**

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

$V_{GS} = -5/18$  V,  $I_D = 9$  A,  $T_{vj} = 175$  °C,  $V_{DD} = 800$  V

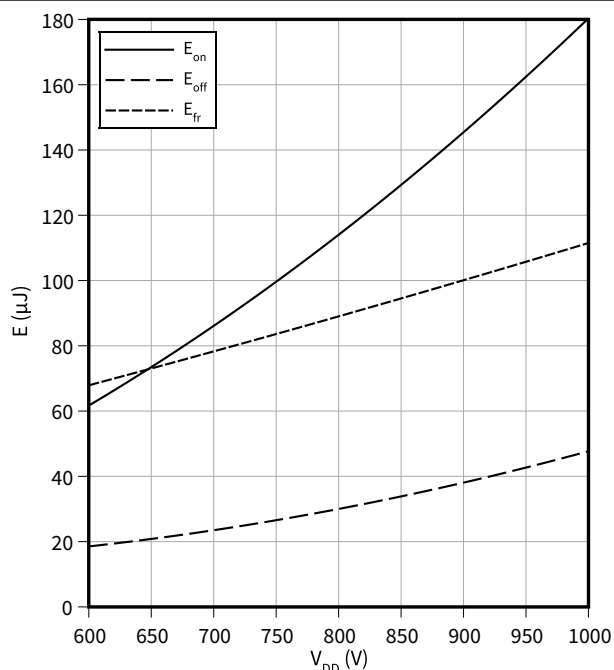


4 Characteristics diagrams

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

$$E = f(V_{DD})$$

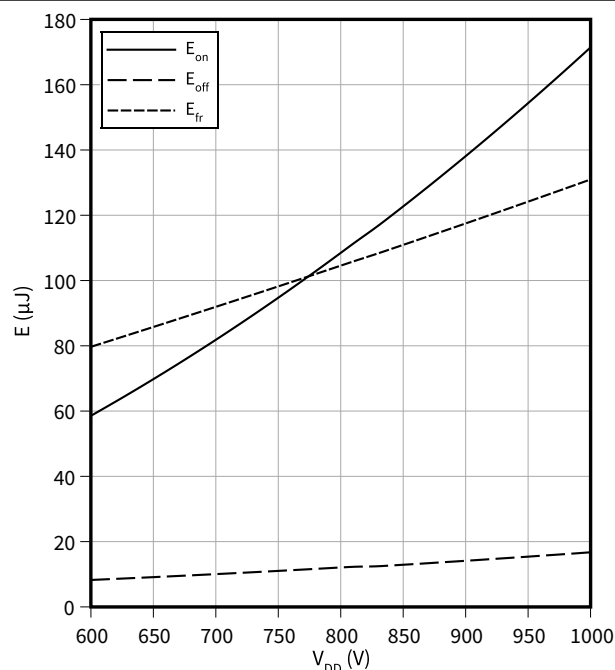
$V_{GS} = 0/18$  V,  $I_D = 9$  A,  $T_{vj} = 175$  °C,  $R_{G,ext} = 2.3$   $\Omega$



**Typical switching energy as a function of DC link voltage, test circuit in Fig. F, 2nd device own body diode:  $V_{GS} = -5$  V**

$$E = f(V_{DD})$$

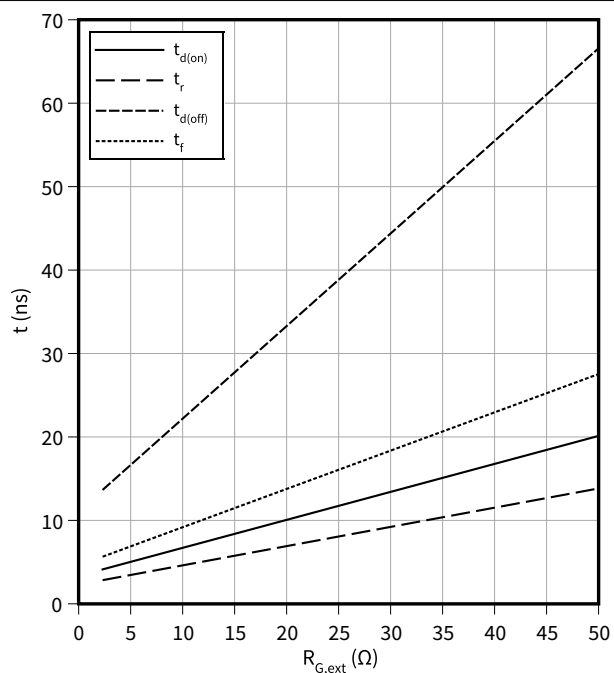
$V_{GS} = -5/18$  V,  $I_D = 9$  A,  $T_{vj} = 175$  °C,  $R_{G,ext} = 2.3$   $\Omega$



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

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

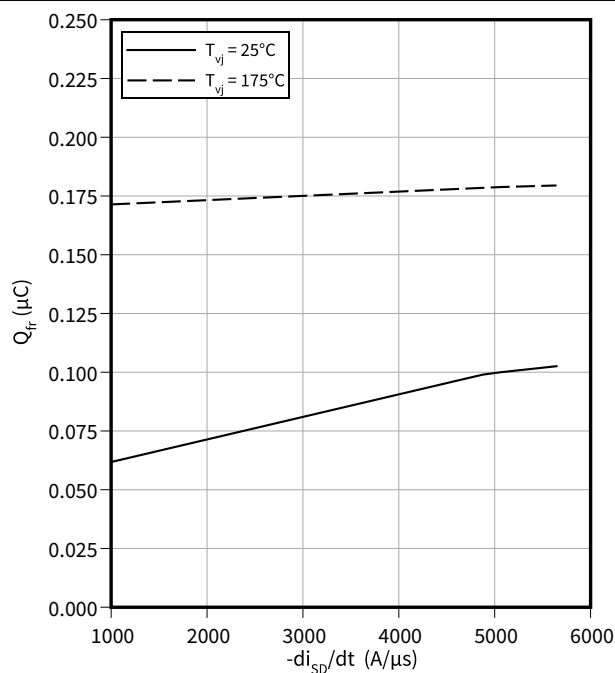
$V_{GS} = 0/18$  V,  $I_D = 9$  A,  $T_{vj} = 175$  °C,  $V_{DD} = 800$  V



**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**

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

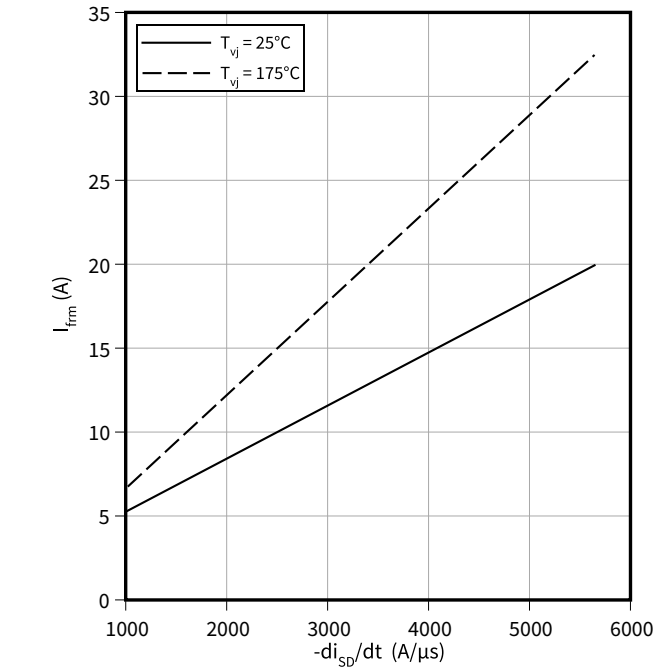
$V_{GS} = 0/18$  V,  $I_{SD} = 9$  A,  $V_{DD} = 800$  V



4 Characteristics diagrams

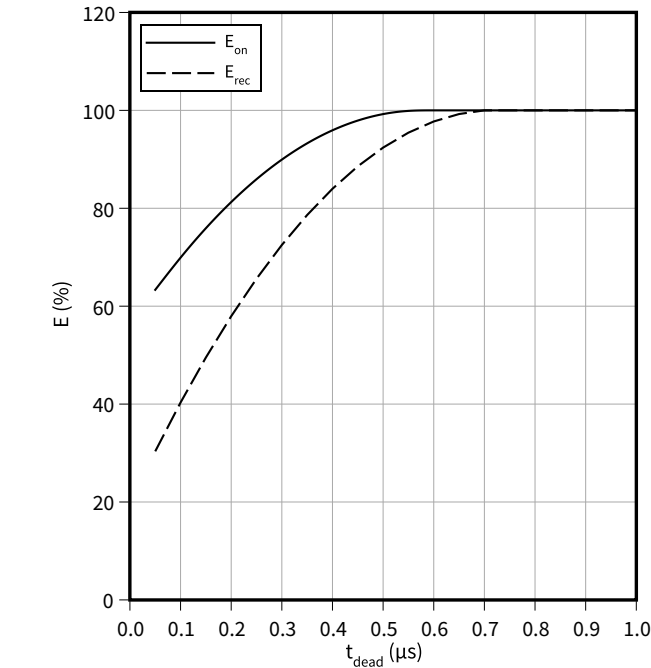
Typical reverse recovery current as a function of reverse drain current slope, test circuit in Fig. F, 2nd device own body diode:  $V_{GS} = 0\text{ V}$

$I_{frm} = f(-di_{SD}/dt)$   
 $V_{GS} = 0/18\text{ V}, I_{SD} = 9\text{ A}, V_{DD} = 800\text{ V}$



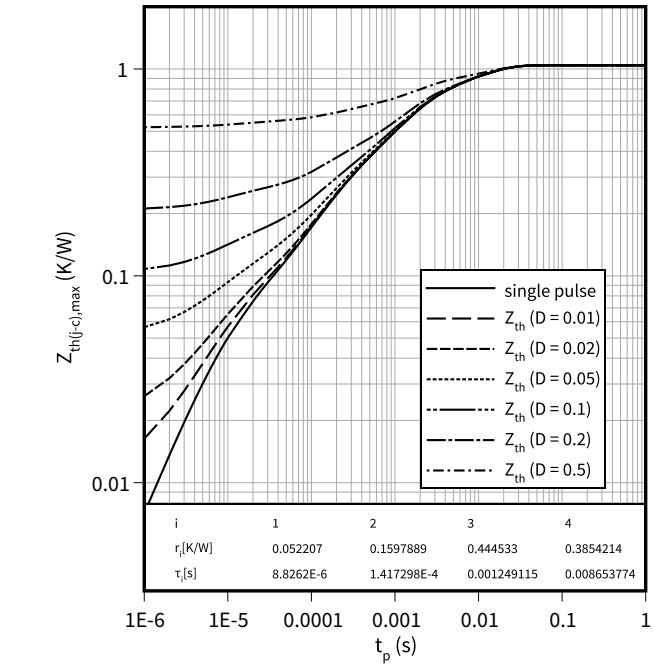
Typical switching energy as a function of dead time / blanking time, test circuit in Fig. F, 2nd device own body diode:  $V_{GS} = 0\text{ V}$

$E = f(t_{dead})$   
 $I_D = 9\text{ A}, V_{GS} = 0/18\text{ V}, T_{vj} = 175\text{ °C}, R_{G,ext} = 2.3\text{ }\Omega$   
 $V_{DD} = 800\text{ V}$

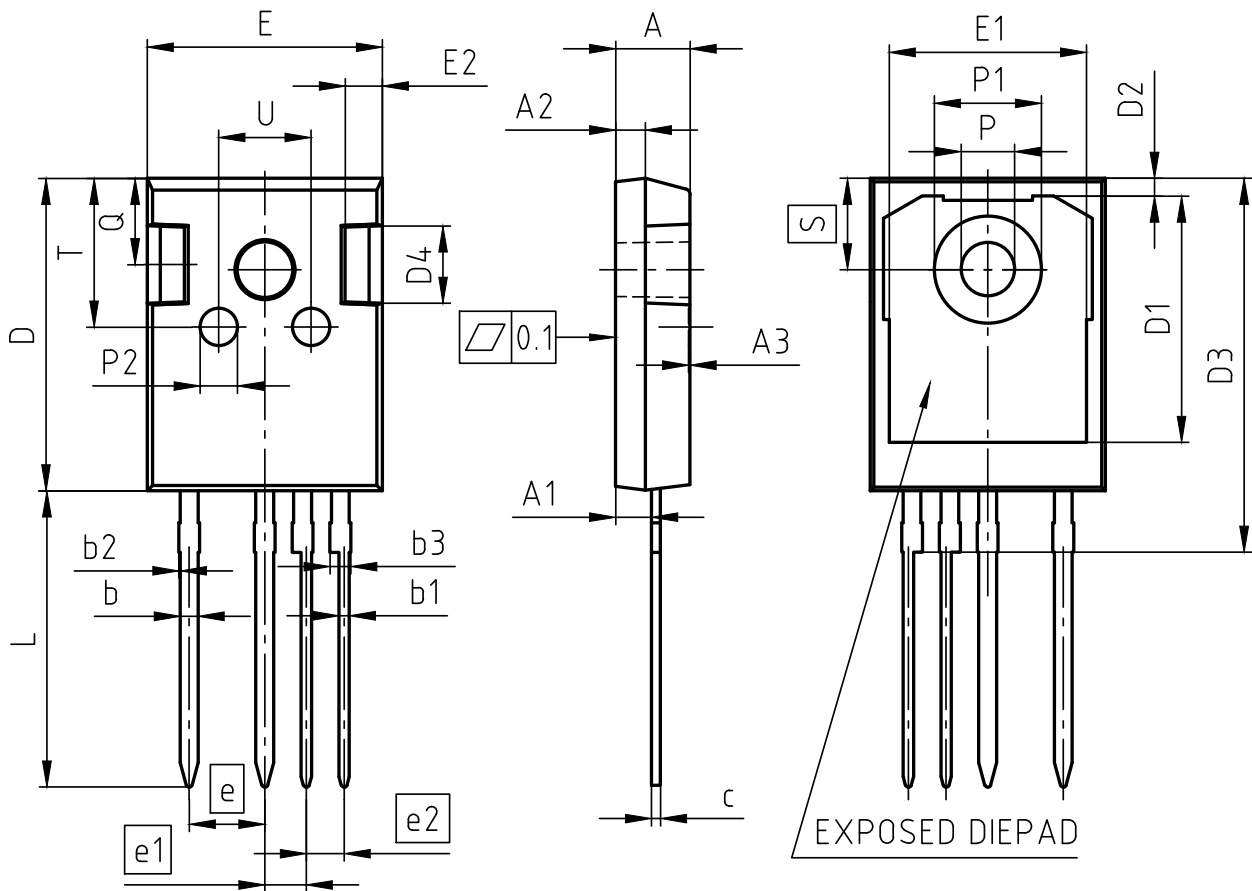


Max. transient thermal impedance (MOSFET/diode)

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



5 Package outlines



NOTES:  
ALL DIMENSIONS DO NOT INCLUDE MOLD FLASH  
OR PROTRUSIONS.

| PACKAGE - GROUP<br>NUMBER: PG-TO247-4-U02 |             |       |            |             |       |
|-------------------------------------------|-------------|-------|------------|-------------|-------|
| DIMENSIONS                                | MILLIMETERS |       | DIMENSIONS | MILLIMETERS |       |
|                                           | MIN.        | MAX.  |            | MIN.        | MAX.  |
| A                                         | 4.90        | 5.10  | E          | 15.70       | 15.90 |
| A1                                        | 2.31        | 2.51  | E1         | 13.10       | 13.50 |
| A2                                        | 1.90        | 2.10  | E2         | 2.40        | 2.60  |
| A3                                        | 0.05        | 0.25  | e          | 5.08        |       |
| b                                         | 1.10        | 1.30  | e1         | 2.79        |       |
| b1                                        | 0.65        | 0.79  | e2         | 2.54        |       |
| b2                                        | ---         | 0.20  | N          | 4           |       |
| b3                                        | 1.34        | 1.44  | L          | 19.80       | 20.10 |
| c                                         | 0.58        | 0.66  | øP         | 3.50        | 3.70  |
| D                                         | 20.90       | 21.10 | øP1        | 7.00        | 7.40  |
| D1                                        | 16.25       | 16.85 | øP2        | 2.40        | 2.60  |
| D2                                        | 1.05        | 1.35  | Q          | 5.60        | 6.00  |
| D3                                        | 24.97       | 25.27 | S          | 6.15        |       |
| D4                                        | 4.90        | 5.10  | T          | 9.80        | 10.20 |
|                                           |             |       | U          | 6.00        | 6.40  |

Figure 1

## 6 Testing conditions

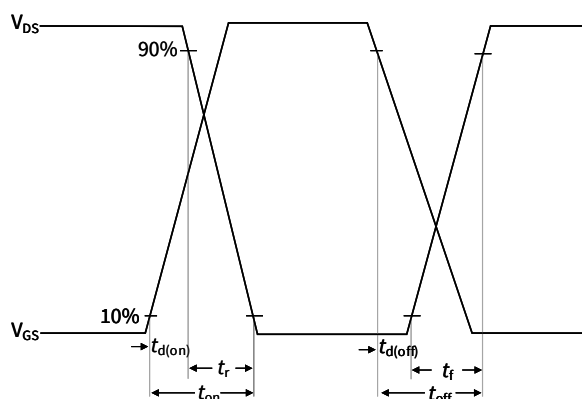


Figure A. Definition of switching times

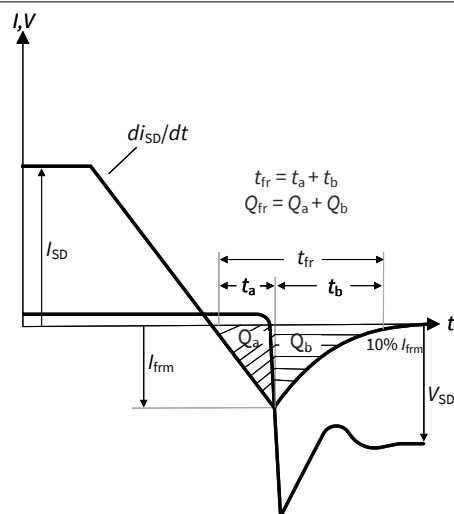


Figure B. Definition of body diode switching characteristics

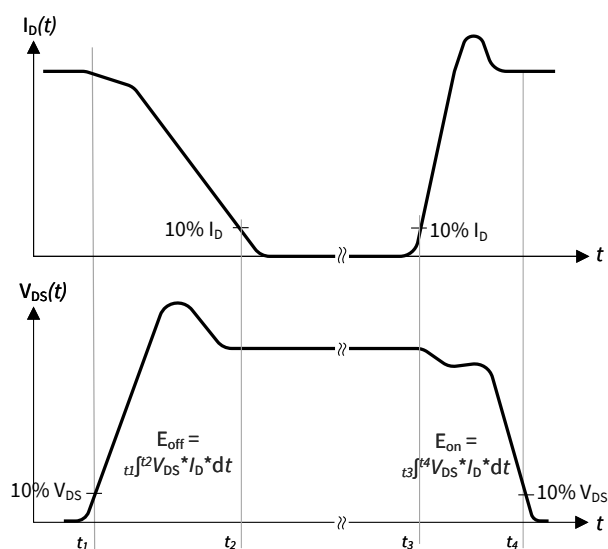


Figure C. Definition of switching losses

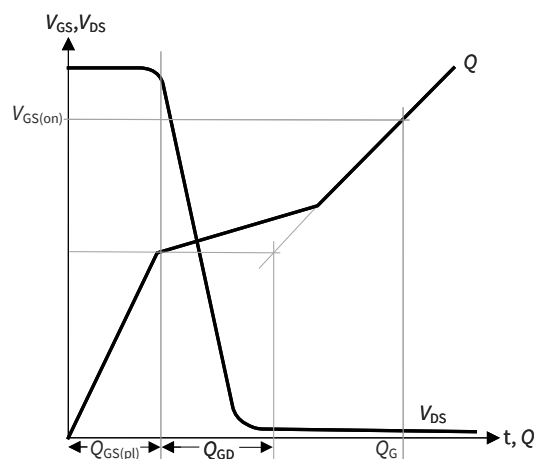


Figure D. Definition of QGD



Figure E. Thermal equivalent circuit

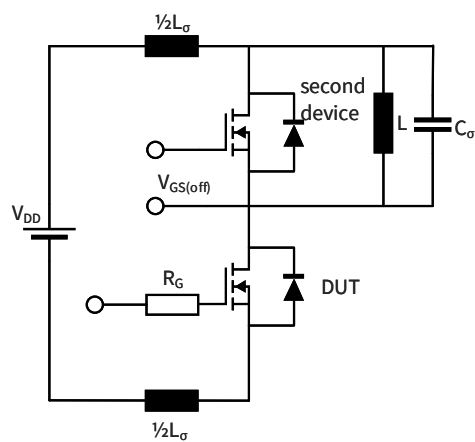


Figure F. Dynamic test circuit

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

Figure 2



Revision history

Revision history

| Document revision | Date of release | Description of changes                                                                                                                                                                                                                                                                                                                        |
|-------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0.10              | 2025-03-24      | Preliminary datasheet                                                                                                                                                                                                                                                                                                                         |
| 1.00              | 2025-03-25      | Final datasheet                                                                                                                                                                                                                                                                                                                               |
| 1.10              | 2025-07-04      | Increased $I_{DM}$ in Table 2<br>Added switching information for $V_{GS} = -5/18\text{ V}$ in Table 5 and 6 and corresponding diagrams<br>Added $I_{SDC}$ in Table 5<br>Added SOA diagram on page 8<br>Added diagram $E = f(V_{DD}) @ V_{GS} = 0/18\text{ V}$<br>Added diagram $E = f(V_{DD}) @ V_{GS} = -5/18\text{ V}$<br>Editorial changes |

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