

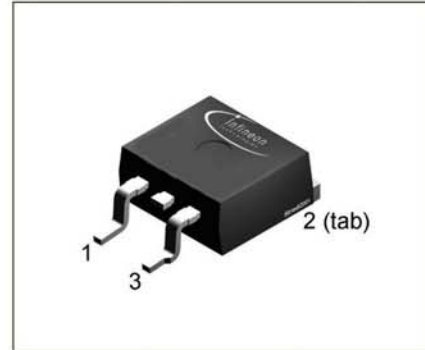
## BUZ31 H3045 A

### SIPMOS® Power Transistor

- N channel
- Enhancement mode
- Avalanche-rated
- **Pb-free lead plating; RoHS compliant**
- Halogen-free according to IEC61249-2-21



Halogen-Free



| Pin 1 | Pin 2 | Pin 3 |
|-------|-------|-------|
| G     | D     | S     |

| Type         | V <sub>DS</sub> | I <sub>D</sub> | R <sub>DS(on)</sub> | Package    | Pb-free |
|--------------|-----------------|----------------|---------------------|------------|---------|
| BUZ31 H3045A | 200 V           | 14.5 A         | 0.2 Ω               | PG-TO263-3 | Yes     |

### Maximum Ratings

| Parameter                                                                                                                                                | Symbol      | Values        | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------|------|
| Continuous drain current<br>$T_C = 30\text{ °C}$                                                                                                         | $I_D$       | 14.5          | A    |
| Pulsed drain current<br>$T_C = 25\text{ °C}$                                                                                                             | $I_{Dpuls}$ | 58            |      |
| Avalanche current, limited by $T_{jmax}$                                                                                                                 | $I_{AR}$    | 14.5          |      |
| Avalanche energy, periodic limited by $T_{jmax}$                                                                                                         | $E_{AR}$    | 9             | mJ   |
| Avalanche energy, single pulse<br>$I_D = 14.5\text{ A}$ , $V_{DD} = 50\text{ V}$ , $R_{GS} = 25\text{ Ω}$<br>$L = 1.42\text{ mH}$ , $T_j = 25\text{ °C}$ | $E_{AS}$    | 200           |      |
| Gate source voltage                                                                                                                                      | $V_{GS}$    | ± 20          | V    |
| Power dissipation<br>$T_C = 25\text{ °C}$                                                                                                                | $P_{tot}$   | 95            | W    |
| Operating temperature                                                                                                                                    | $T_j$       | -55 ... + 150 | °C   |
| Storage temperature                                                                                                                                      | $T_{stg}$   | -55 ... + 150 |      |
| Thermal resistance, chip case                                                                                                                            | $R_{thJC}$  | ≤ 1.32        | K/W  |
| Thermal resistance, chip to ambient                                                                                                                      | $R_{thJA}$  | 75            |      |
| DIN humidity category, DIN 40 040                                                                                                                        |             | E             |      |
| IEC climatic category, DIN IEC 68-1                                                                                                                      |             | 55 / 150 / 56 |      |

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

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

**Static Characteristics**

|                                                                                                                                                                                              |               |        |           |          |               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|-----------|----------|---------------|
| Drain- source breakdown voltage<br>$V_{GS} = 0\text{ V}$ , $I_D = 0.25\text{ mA}$ , $T_j = 25^\circ\text{C}$                                                                                 | $V_{(BR)DSS}$ | 200    | -         | -        | V             |
| Gate threshold voltage<br>$V_{GS} = V_{DS}$ , $I_D = 1\text{ mA}$                                                                                                                            | $V_{GS(th)}$  | 2.1    | 3         | 4        |               |
| Zero gate voltage drain current<br>$V_{DS} = 200\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25^\circ\text{C}$<br>$V_{DS} = 200\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 125^\circ\text{C}$ | $I_{DSS}$     | -<br>- | 0.1<br>10 | 1<br>100 | $\mu\text{A}$ |
| Gate-source leakage current<br>$V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$                                                                                                                | $I_{GSS}$     | -      | 10        | 100      | nA            |
| Drain-Source on-resistance<br>$V_{GS} = 10\text{ V}$ , $I_D = 9\text{ A}$                                                                                                                    | $R_{DS(on)}$  | -      | 0.16      | 0.2      | $\Omega$      |

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

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

**Dynamic Characteristics**

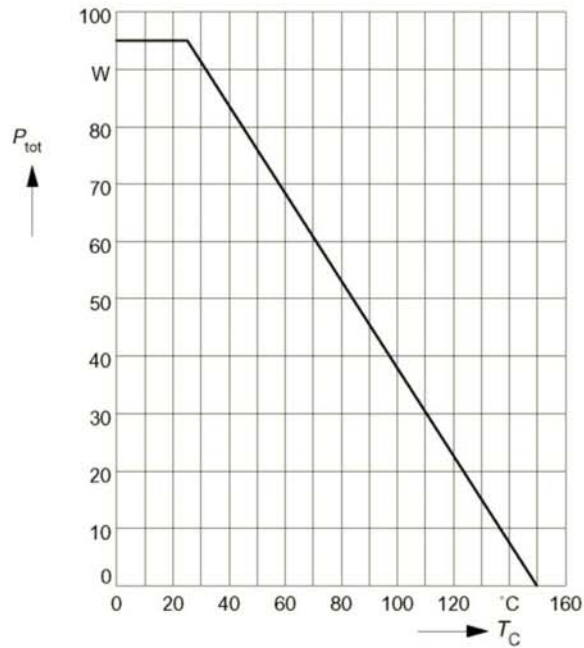
|                                                                                                                      |              |   |     |      |    |
|----------------------------------------------------------------------------------------------------------------------|--------------|---|-----|------|----|
| Transconductance<br>$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 9\text{ A}$                               | $g_{fs}$     | 5 | 10  | -    | S  |
| Input capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                             | $C_{iss}$    | - | 840 | 1120 | pF |
| Output capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                            | $C_{oss}$    | - | 180 | 270  |    |
| Reverse transfer capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                  | $C_{rss}$    | - | 95  | 150  |    |
| Turn-on delay time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$  | $t_{d(on)}$  | - | 12  | 20   | ns |
| Rise time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$           | $t_r$        | - | 50  | 75   |    |
| Turn-off delay time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$ | $t_{d(off)}$ | - | 150 | 200  |    |
| Fall time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 3\text{ A}$<br>$R_{GS} = 50\ \Omega$           | $t_f$        | - | 60  | 80   |    |

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

| Parameter                                                                                      | Symbol   | Values |      |      | Unit          |
|------------------------------------------------------------------------------------------------|----------|--------|------|------|---------------|
|                                                                                                |          | min.   | typ. | max. |               |
| Reverse Diode                                                                                  |          |        |      |      |               |
| Inverse diode continuous forward current<br>$T_C = 25\text{ }^{\circ}\text{C}$                 | $I_S$    | -      | -    | 14.5 | A             |
| Inverse diode direct current,pulsed<br>$T_C = 25\text{ }^{\circ}\text{C}$                      | $I_{SM}$ | -      | -    | 58   |               |
| Inverse diode forward voltage<br>$V_{GS} = 0\text{ V}, I_F = 29\text{ A}$                      | $V_{SD}$ | -      | 1.1  | 1.6  | V             |
| Reverse recovery time<br>$V_R = 100\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$   | $t_{rr}$ | -      | 170  | -    | ns            |
| Reverse recovery charge<br>$V_R = 100\text{ V}, I_F = I_S, di_F/dt = 100\text{ A}/\mu\text{s}$ | $Q_{rr}$ | -      | 1.1  | -    | $\mu\text{C}$ |

## Power dissipation

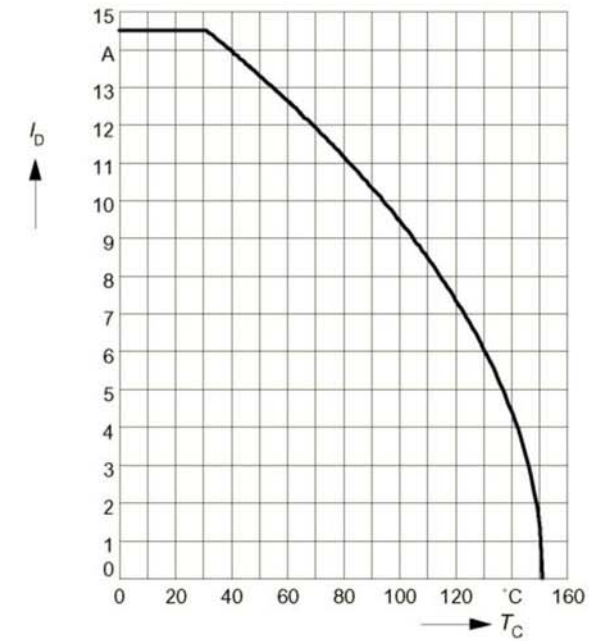
$$P_{\text{tot}} = f(T_C)$$



## Drain current

$$I_D = f(T_C)$$

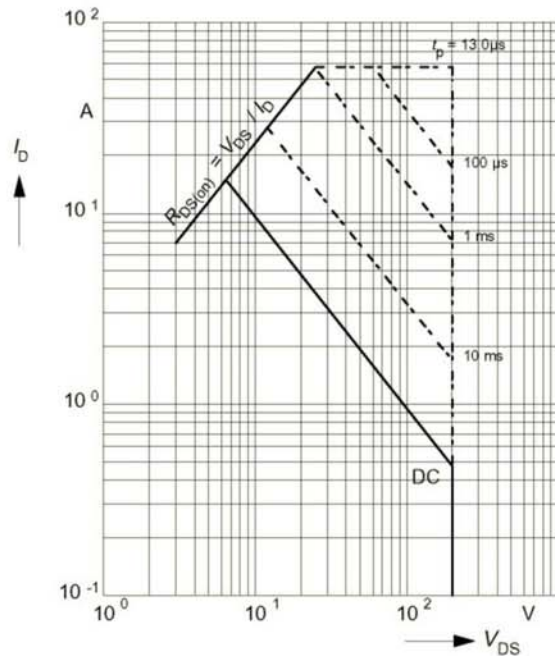
parameter:  $V_{\text{GS}} \geq 10 \text{ V}$



## Safe operating area

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

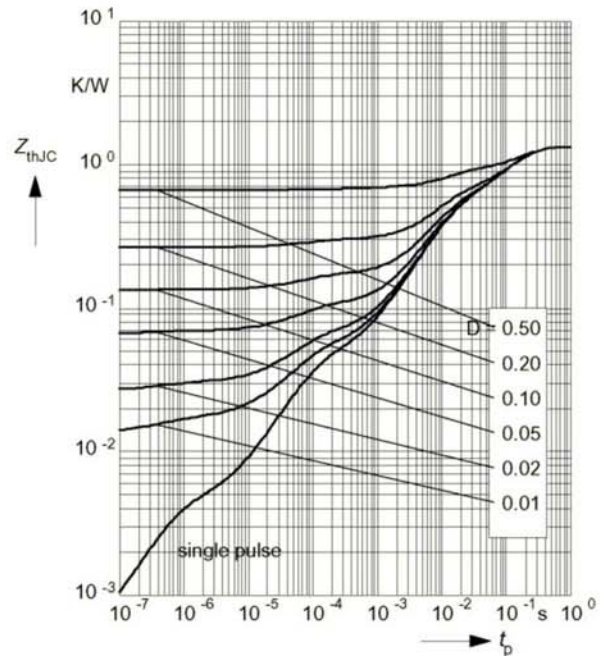
parameter:  $D = 0.01$ ,  $T_C = 25^\circ\text{C}$



## Transient thermal impedance

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

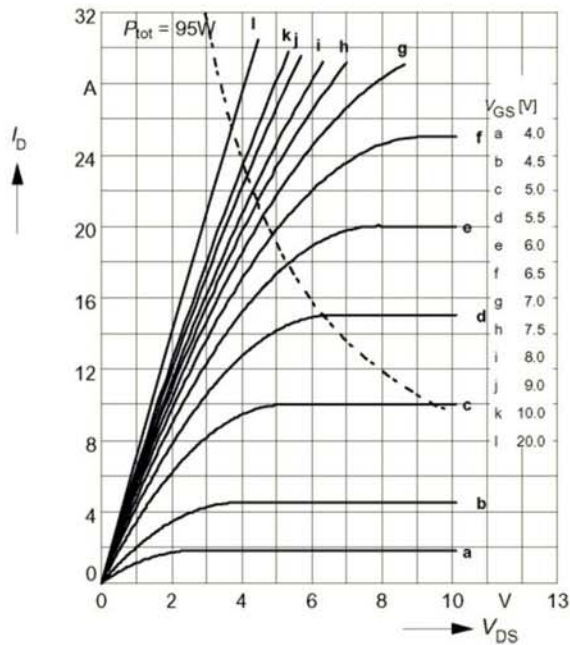
parameter:  $D = t_p / T$



## Typ. output characteristics

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

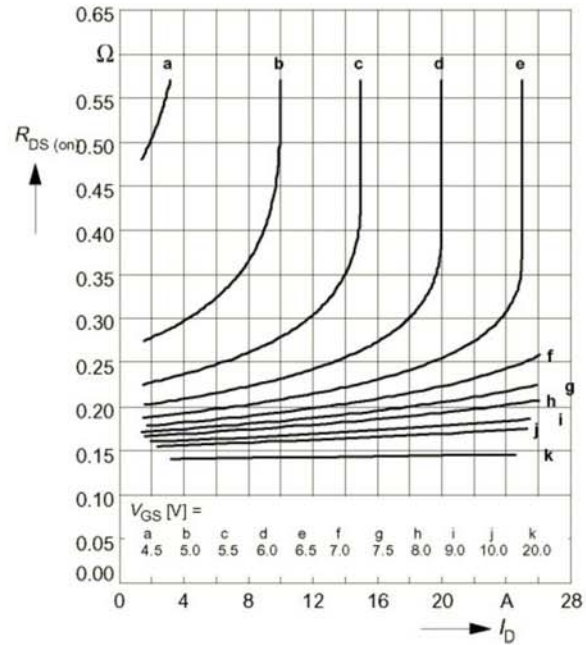
parameter:  $t_p = 80 \mu s$



## Typ. drain-source on-resistance

$$R_{DS(on)} = f(I_D)$$

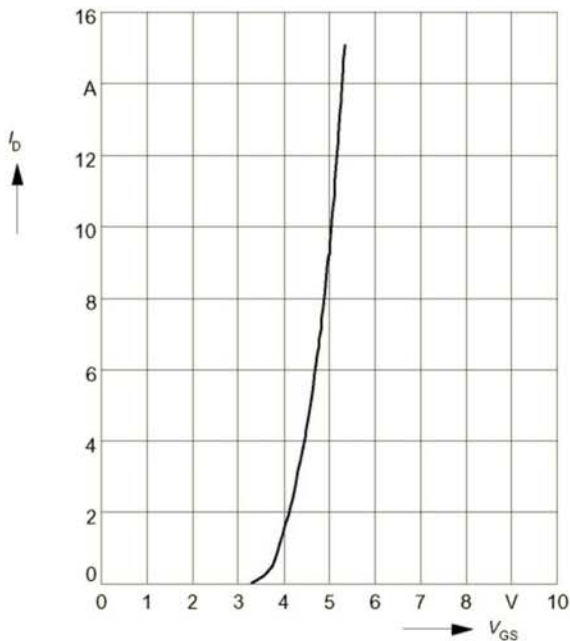
parameter:  $V_{GS}$



## Typ. transfer characteristics $I_D = f(V_{GS})$

parameter:  $t_p = 80 \mu s$

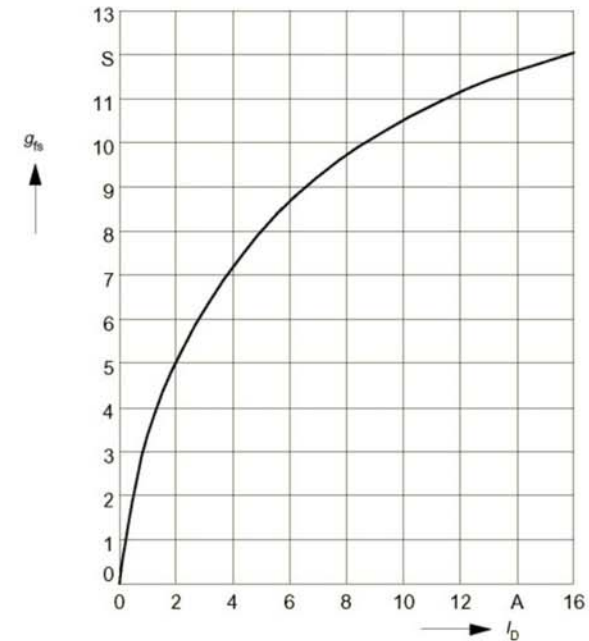
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



## Typ. forward transconductance $g_{fs} = f(I_D)$

parameter:  $t_p = 80 \mu s$ ,

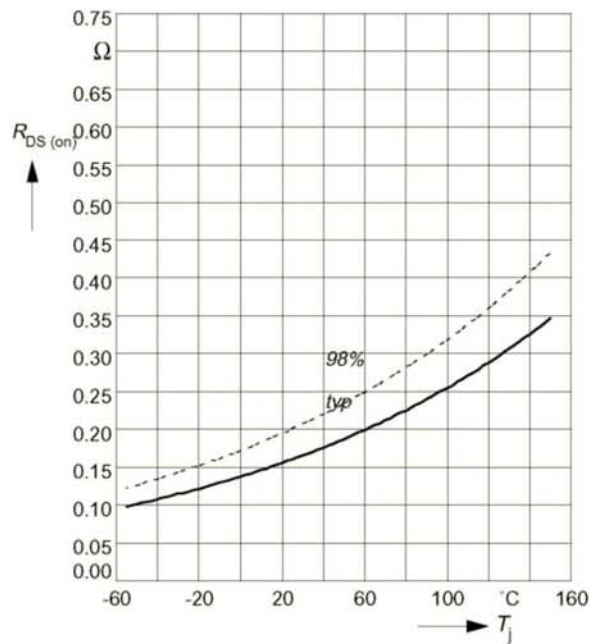
$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$



## Drain-source on-resistance

$$R_{DS(on)} = f(T_j)$$

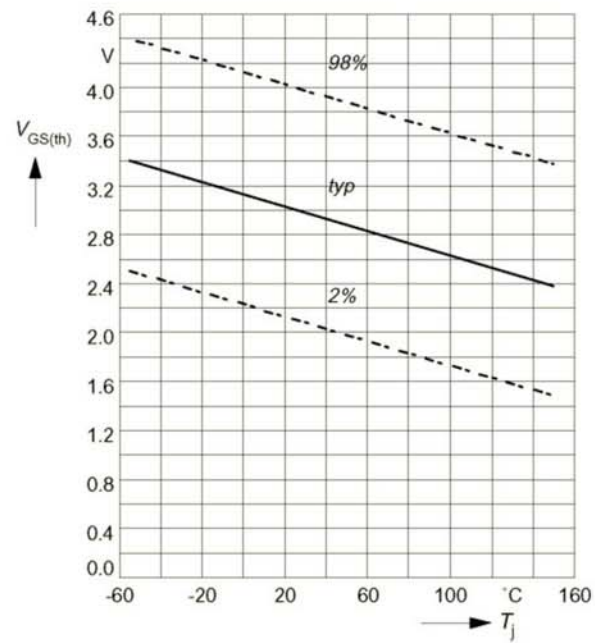
parameter:  $I_D = 9\text{ A}$ ,  $V_{GS} = 10\text{ V}$



## Gate threshold voltage

$$V_{GS(th)} = f(T_j)$$

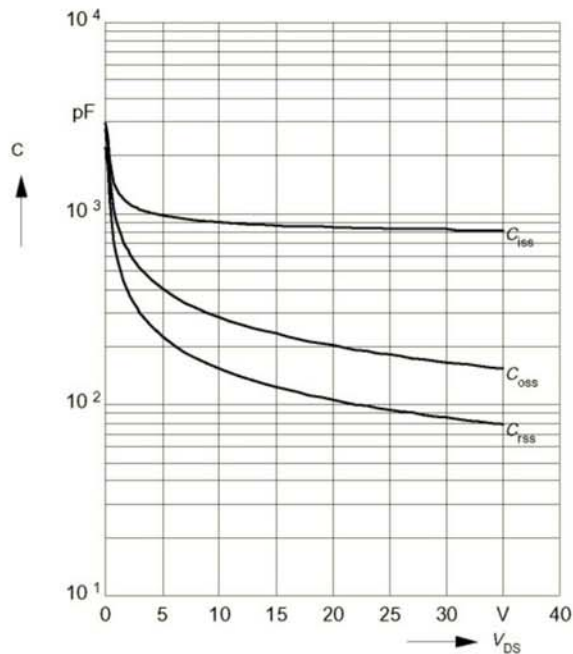
parameter:  $V_{GS} = V_{DS}$ ,  $I_D = 1\text{ mA}$



## Typ. capacitances

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

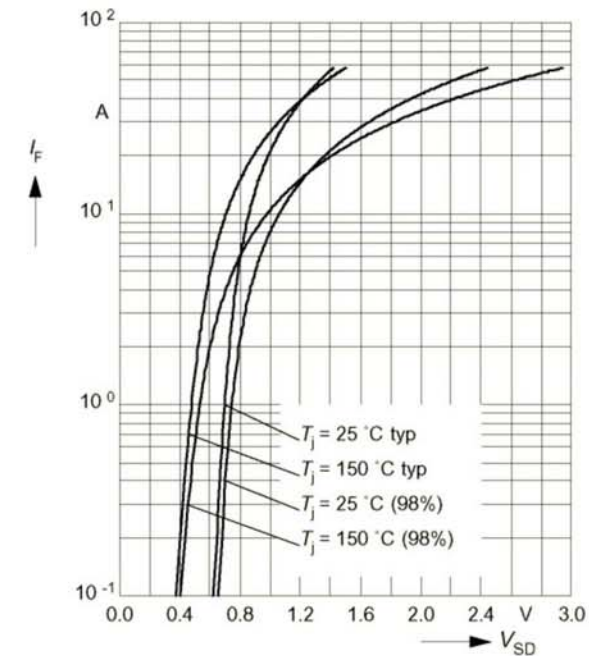
parameter:  $V_{GS} = 0\text{ V}$ ,  $f = 1\text{ MHz}$



## Forward characteristics of reverse diode

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

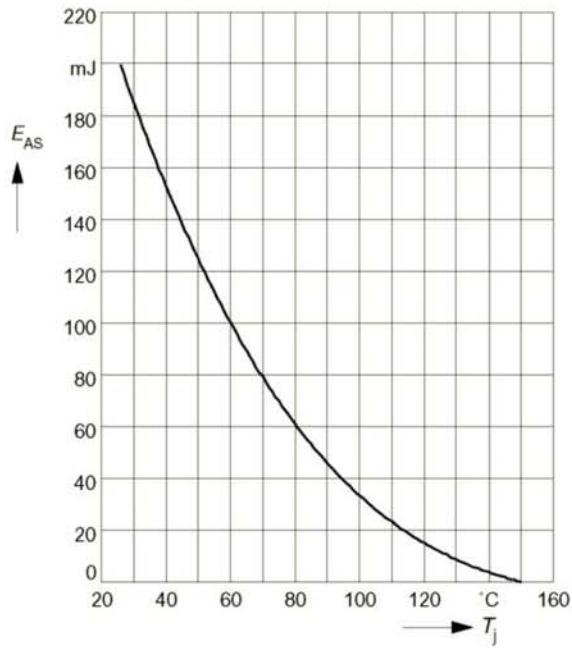
parameter:  $T_j$ ,  $t_p = 80\text{ }\mu\text{s}$



## Avalanche energy $E_{AS} = f(T_j)$

parameter:  $I_D = 14.5 \text{ A}$ ,  $V_{DD} = 50 \text{ V}$

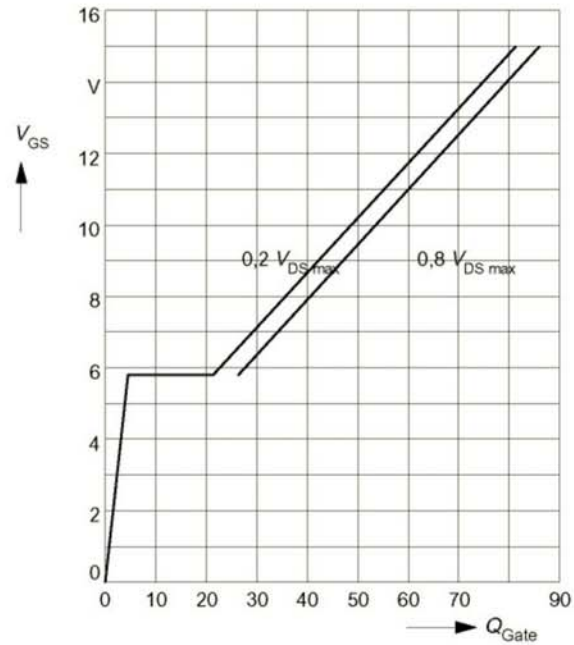
$R_{GS} = 25 \Omega$ ,  $L = 1.42 \text{ mH}$



## Typ. gate charge

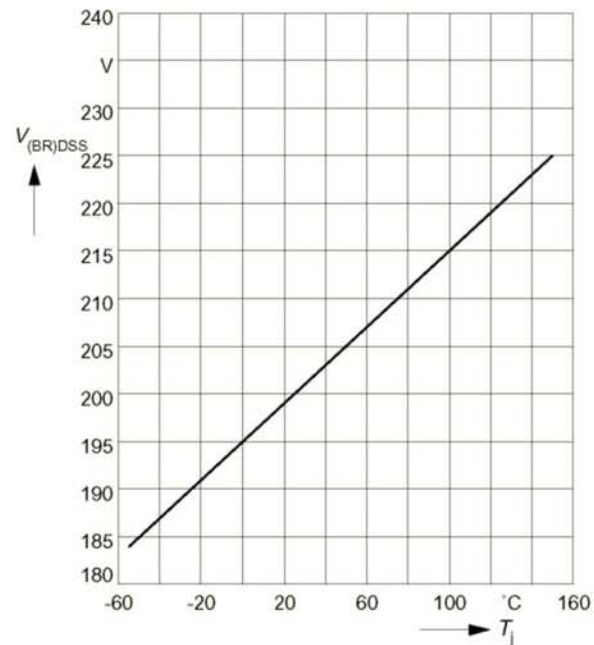
$V_{GS} = f(Q_{Gate})$

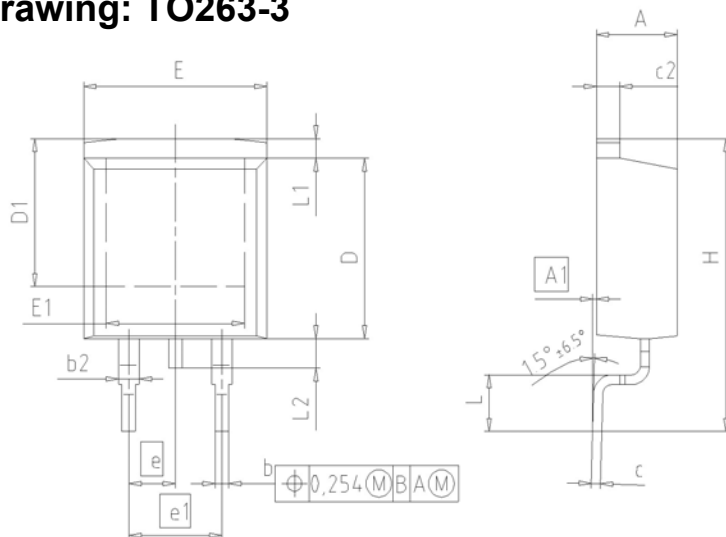
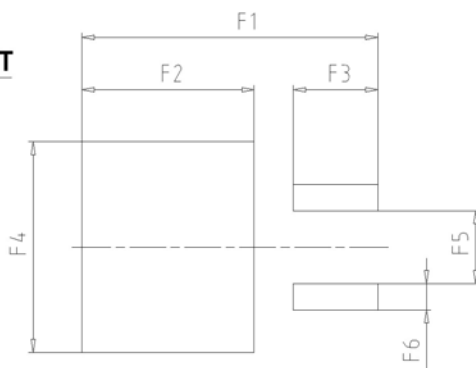
parameter:  $I_{D \text{ puls}} = 20 \text{ A}$



## Drain-source breakdown voltage

$V_{(BR)DSS} = f(T_j)$

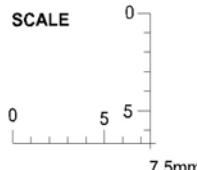


**Package Drawing: TO263-3**

**FOOTPRINT**


| DIM | MILLIMETERS |       | INCHES |       |
|-----|-------------|-------|--------|-------|
|     | MIN         | MAX   | MIN    | MAX   |
| A   | 4.30        | 4.57  | 0.169  | 0.180 |
| A1  | 0.00        | 0.25  | 0.000  | 0.010 |
| b   | 0.65        | 0.85  | 0.026  | 0.033 |
| b2  | 0.95        | 1.15  | 0.037  | 0.045 |
| c   | 0.33        | 0.65  | 0.013  | 0.026 |
| c2  | 1.17        | 1.40  | 0.046  | 0.055 |
| D   | 8.51        | 9.45  | 0.335  | 0.372 |
| D1  | 7.10        | 7.90  | 0.280  | 0.311 |
| E   | 9.80        | 10.31 | 0.386  | 0.406 |
| E1  | 6.50        | 8.60  | 0.256  | 0.339 |
| e   | 2.54        |       | 0.100  |       |
| e1  | 5.08        |       | 0.200  |       |
| N   | 2           |       | 2      |       |
| H   | 14.61       | 15.88 | 0.575  | 0.625 |
| L   | 2.29        | 3.00  | 0.090  | 0.118 |
| L1  | 0.70        | 1.60  | 0.028  | 0.063 |
| L2  | 1.00        | 1.78  | 0.039  | 0.070 |
| F1  | 16.05       | 16.25 | 0.632  | 0.640 |
| F2  | 9.30        | 9.50  | 0.366  | 0.374 |
| F3  | 4.50        | 4.70  | 0.177  | 0.185 |
| F4  | 10.70       | 10.90 | 0.421  | 0.429 |
| F5  | 3.65        | 3.85  | 0.144  | 0.152 |
| F6  | 1.25        | 1.45  | 0.049  | 0.057 |

**DOCUMENT NO.**  
Z8B00003324

**SCALE**



**EUROPEAN PROJECTION**



**ISSUE DATE**  
30-08-2007

**REVISION**  
01

**Published by**  
**Infineon Technologies AG**  
**81726 Munich, Germany**  
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