

OptiMOS™2 Power-Transistor
Features

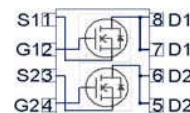
- Dual N-channel, normal level
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Low on-resistance $R_{DS(on)}$
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC¹⁾ for target application
- Ideal for high-frequency switching and synchronous rectification
- 100% avalanche tested
- Halogen-free according to IE61249-2-21


Product Summary

| | | |
|------------------|-----|------------|
| V_{DS} | 100 | V |
| $R_{DS(on),max}$ | 75 | m Ω |
| I_D | 13 | A |

PG-TDSON-8


| Type | Package | Marking |
|---------------|------------|----------|
| BSC750N10ND G | PG-TDSON-8 | 750N10ND |


Maximum ratings, at $T_j=25\text{ °C}$, unless otherwise specified

| Parameter | Symbol | Conditions | Value | | Unit |
|-------------------------------------|----------------|--|-------------|--------------|-------------------|
| | | | ≤10 secs | steady state | |
| Continuous drain current | I_D | $V_{GS}=10\text{ V}, T_C=25\text{ °C}$ | 13 | | A |
| | | $V_{GS}=10\text{ V}, T_C=100\text{ °C}$ | 8.5 | | |
| | | $V_{GS}=10\text{ V}, T_A=25\text{ °C}^3)$ | 5.0 | 3.2 | |
| Pulsed drain current ²⁾ | $I_{D,pulse}$ | $T_C=25\text{ °C}$ | 52 | | |
| Avalanche energy, single pulse | E_{AS} | $I_D=13\text{ A}, R_{GS}=25\text{ }\Omega$ | 17 | | mJ |
| Reverse diode dv/dt | dv/dt | $I_D=13\text{ A}, V_{DS}=80\text{ V},$ $di/dt=100\text{ A}/\mu\text{s},$ $T_{j,max}=150\text{ °C}$ | 6 | | kV/ μs |
| Gate source voltage | V_{GS} | | ±20 | | V |
| Power dissipation | P_{tot} | $T_C=25\text{ °C}$ | 26 | | W |
| | | $T_A=25\text{ °C}^3)$ | 3.6 | 1.5 | |
| Operating and storage temperature | T_j, T_{stg} | | -55 ... 150 | | °C |
| IEC climatic category; DIN IEC 68-1 | | | 55/150/56 | | |

¹⁾ J-STD20 and JESD22

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

Thermal characteristics

| | | | | | | |
|--|------------|--------------|---|---|-----|-----|
| Thermal resistance, junction - case | R_{thJC} | bottom | - | - | 4.9 | K/W |
| | | top | | | 20 | |
| Thermal resistance, junction - ambient, 6 cm ² cooling area ³⁾ | R_{thJA} | t≤10 s | - | - | 35 | |
| | | steady state | - | - | 85 | |

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

Static characteristics

| | | | | | | |
|----------------------------------|---------------|---|-----|-----|-----|---------------|
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}=0\text{ V}, I_D=1\text{ mA}$ | 100 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=12\text{ }\mu\text{A}$ | 2 | 3 | 4 | |
| Zero gate voltage drain current | I_{DSS} | $V_{DS}=100\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$ | - | 0.1 | 1 | μA |
| | | $V_{DS}=100\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ °C}$ | - | 10 | 100 | |
| Gate-source leakage current | I_{GSS} | $V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$ | - | 1 | 100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}=10\text{ V}, I_D=13\text{ A}$ | - | 62 | 75 | m Ω |
| Gate resistance | R_G | | - | 0.8 | - | Ω |
| Transconductance | g_{fs} | $ V_{DS} >2 I_D R_{DS(on)max}, I_D=13\text{ A}$ | 6.5 | 13 | - | S |

²⁾ See figure 3

³⁾ Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical in still air. One transistor active.

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

Dynamic characteristics

| | | | | | | |
|------------------------------|--------------|---|---|-----|-----|----|
| Input capacitance | C_{iss} | $V_{GS}=0\text{ V}, V_{DS}=50\text{ V},$ $f=1\text{ MHz}$ | - | 540 | 720 | pF |
| Output capacitance | C_{oss} | | - | 76 | 100 | |
| Reverse transfer capacitance | C_{rss} | | - | 8 | 12 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}=50\text{ V}, V_{GS}=10\text{ V},$ $I_D=13\text{ A}, R_G=2.4\ \Omega$ | - | 9 | 13 | ns |
| Rise time | t_r | | - | 4 | 6 | |
| Turn-off delay time | $t_{d(off)}$ | | - | 13 | 18 | |
| Fall time | t_f | | - | 3 | 4 | |

Gate Charge Characteristics⁴⁾

| | | | | | | |
|-----------------------|---------------|--|---|---|----|----|
| Gate to source charge | Q_{gs} | $V_{DD}=50\text{ V}, I_D=13\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$ | - | 3 | 4 | nC |
| Gate to drain charge | Q_{gd} | | - | 2 | 3 | |
| Switching charge | Q_{sw} | | - | 4 | 6 | |
| Gate charge total | Q_g | | - | 8 | 11 | |
| Gate plateau voltage | $V_{plateau}$ | | - | 6 | - | |
| Output charge | Q_{oss} | $V_{DD}=50\text{ V}, V_{GS}=0\text{ V}$ | - | 8 | 10 | |

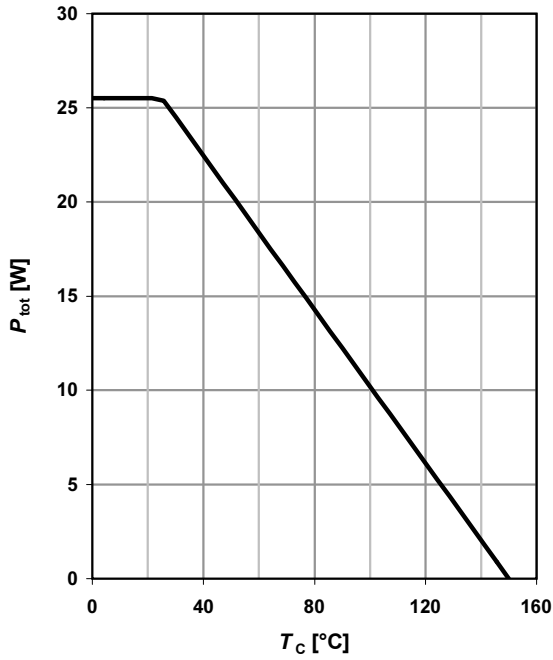
Reverse Diode

| | | | | | | |
|----------------------------------|---------------|---|---|-----|-----|----|
| Diode continuous forward current | I_S | $T_C=25\text{ }^\circ\text{C}$ | - | - | 13 | A |
| Diode pulse current | $I_{S,pulse}$ | | - | - | 52 | |
| Diode forward voltage | V_{SD} | $V_{GS}=0\text{ V}, I_F=13\text{ A},$ $T_j=25\text{ }^\circ\text{C}$ | - | 1 | 1.2 | V |
| Reverse recovery time | t_{rr} | $V_R=50\text{ V}, I_F=I_S,$ $di_F/dt=100\text{ A}/\mu\text{s}$ | - | 67 | | ns |
| Reverse recovery charge | Q_{rr} | | - | 114 | - | nC |

⁴⁾ See figure 16 for gate charge parameter definition

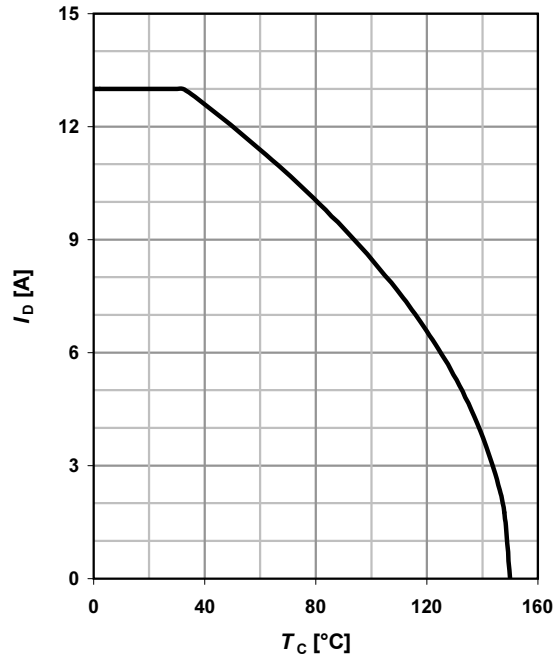
1 Power dissipation

$P_{tot}=f(T_C)$



2 Drain current

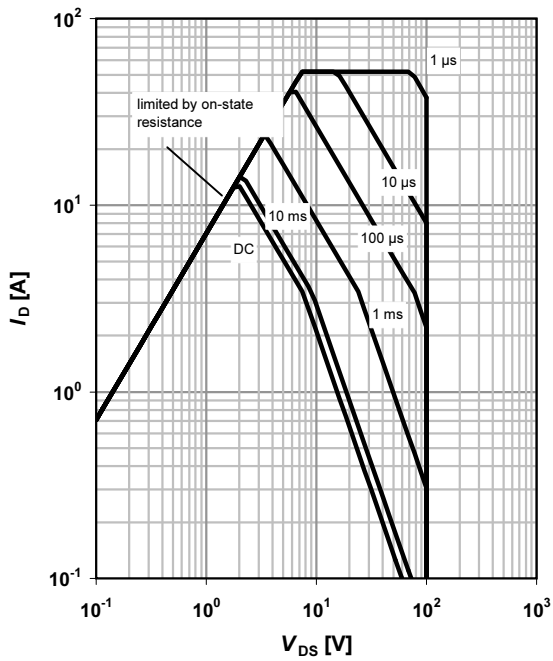
$I_D=f(T_C); V_{GS} \geq 10 V$



3 Safe operating area

$I_D=f(V_{DS}); T_C=25^\circ C; D=0$

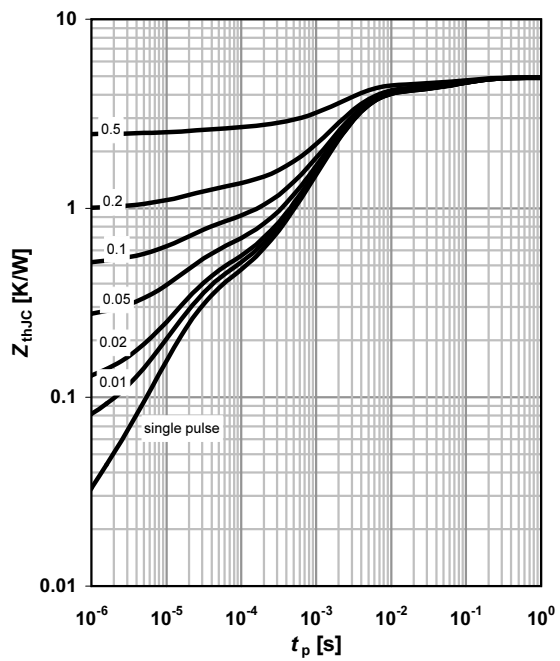
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC}=f(t_p)$

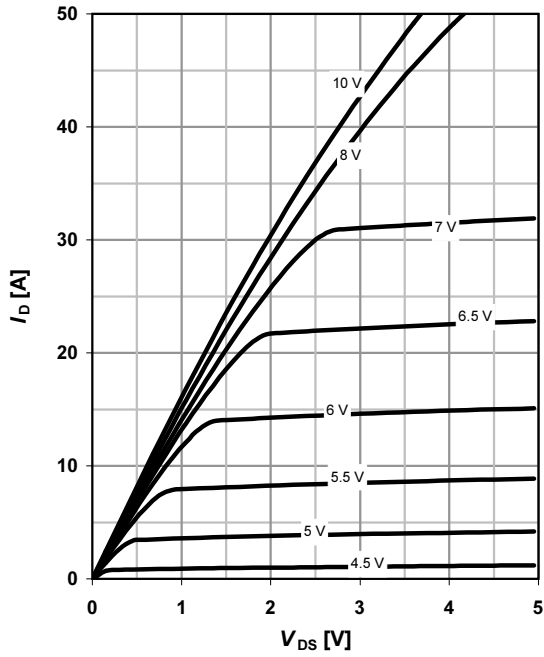
parameter: $D=t_p/T$



5 Typ. output characteristics

$I_D = f(V_{DS}); T_j = 25\text{ }^\circ\text{C}$

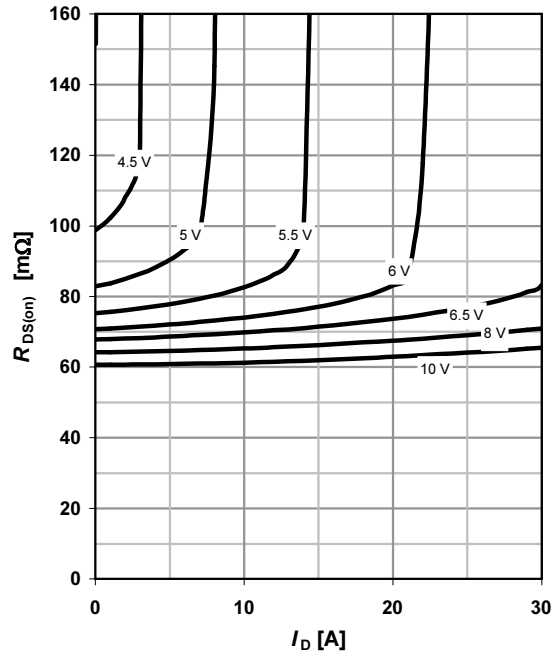
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)} = f(I_D); T_j = 25\text{ }^\circ\text{C}$

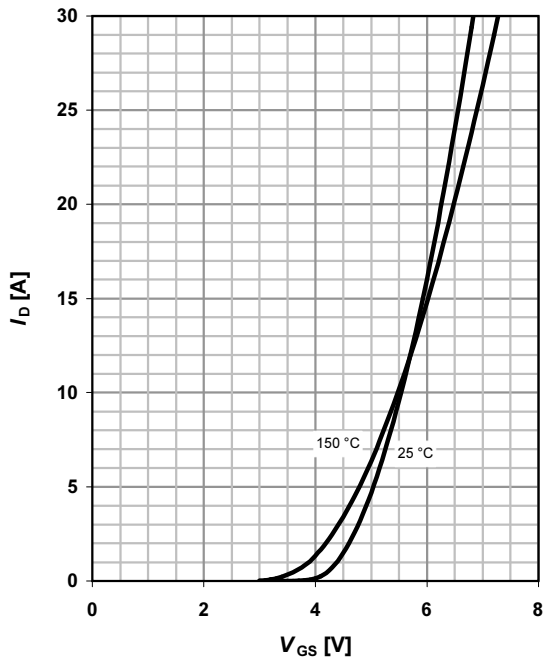
parameter: V_{GS}



7 Typ. transfer characteristics

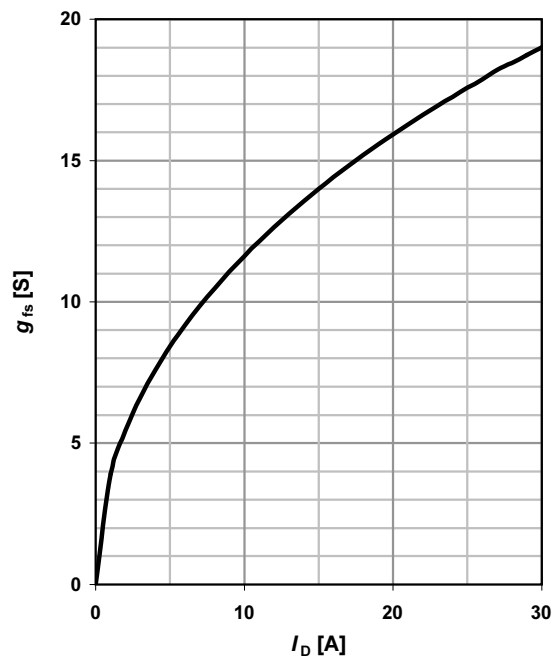
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter: T_j



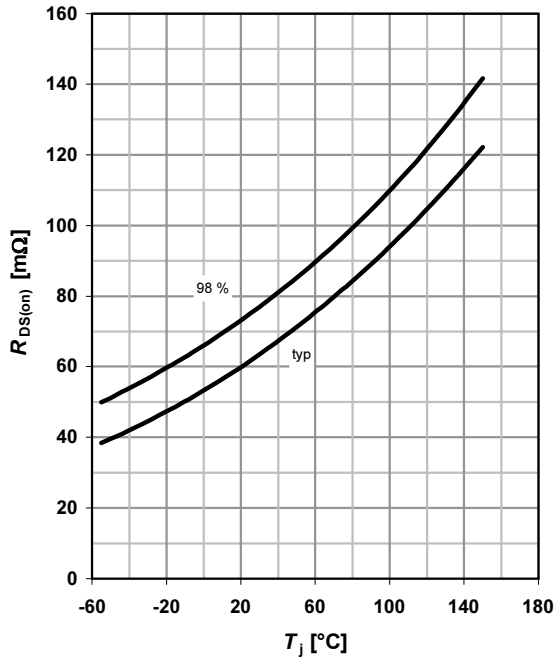
8 Typ. forward transconductance

$g_{fs} = f(I_D); T_j = 25\text{ }^\circ\text{C}$



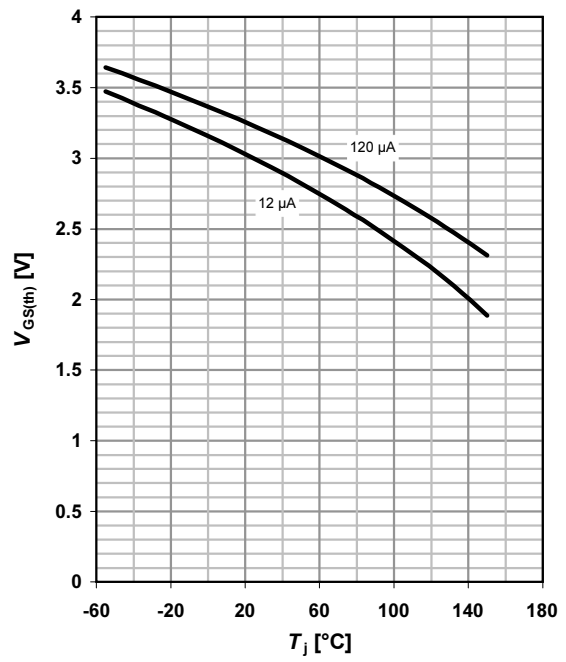
9 Drain-source on-state resistance

$R_{DS(on)} = f(T_j); I_D = 13 \text{ A}; V_{GS} = 10 \text{ V}$



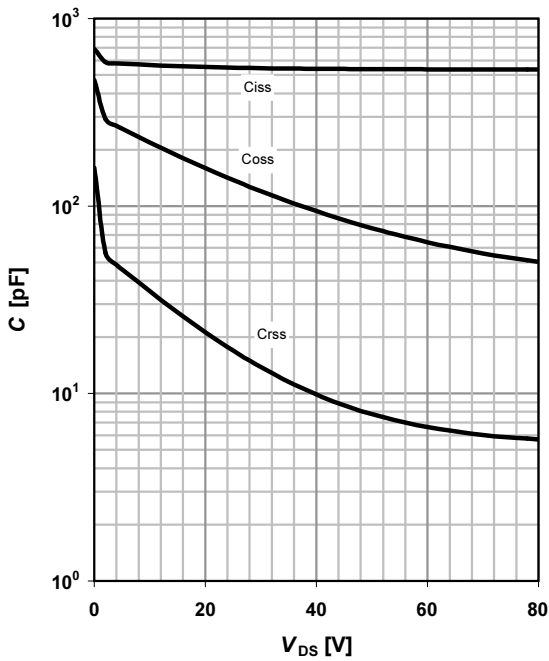
10 Typ. gate threshold voltage

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



11 Typ. capacitances

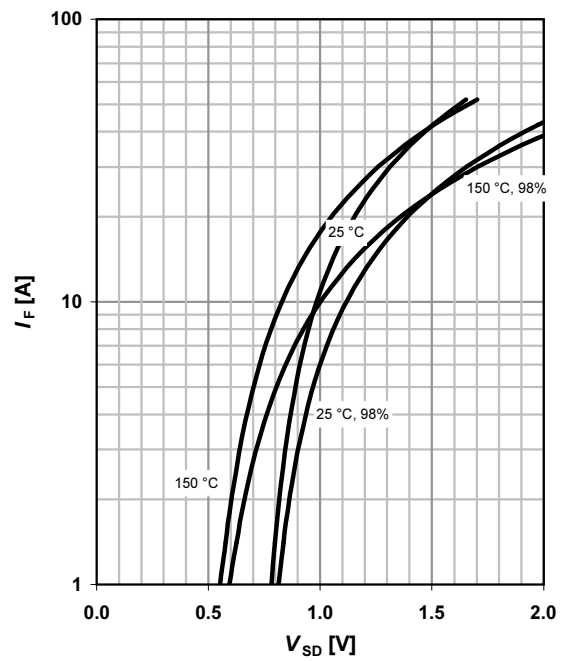
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



12 Forward characteristics of reverse diode

$I_F = f(V_{SD})$

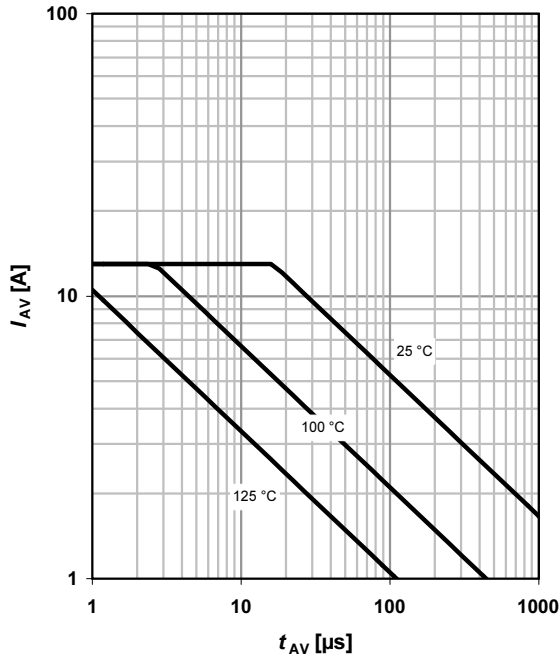
parameter: T_j



13 Avalanche characteristics

$I_{AS}=f(t_{AV}); R_{GS}=25 \Omega$

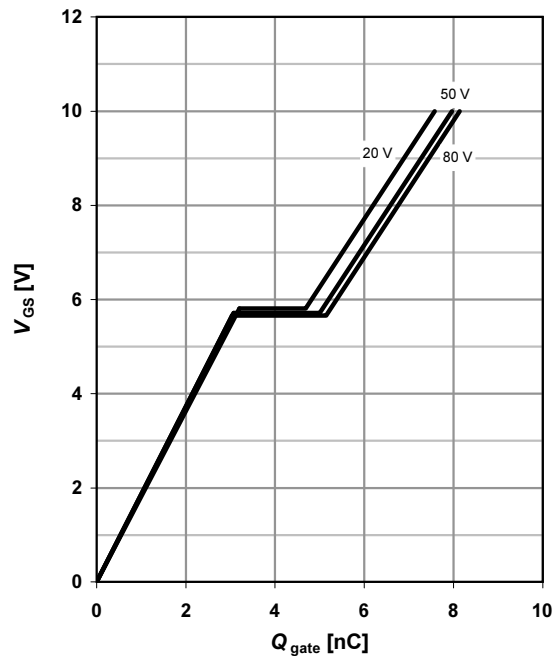
parameter: $T_{j(start)}$



14 Typ. gate charge

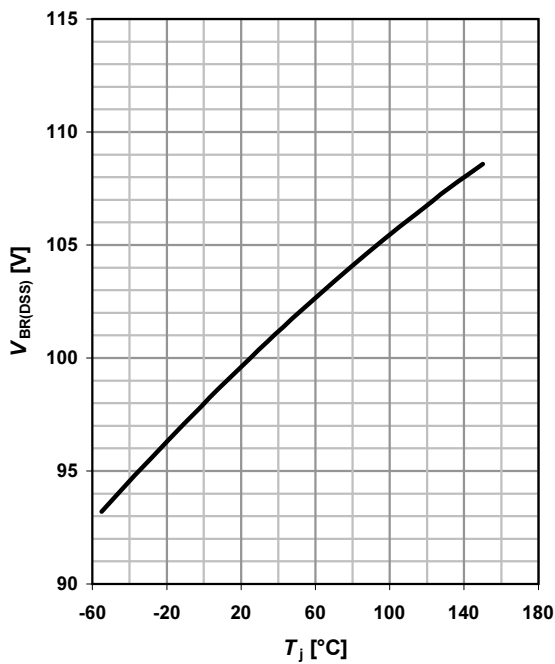
$V_{GS}=f(Q_{gate}); I_D=13 \text{ A pulsed}$

parameter: V_{DD}

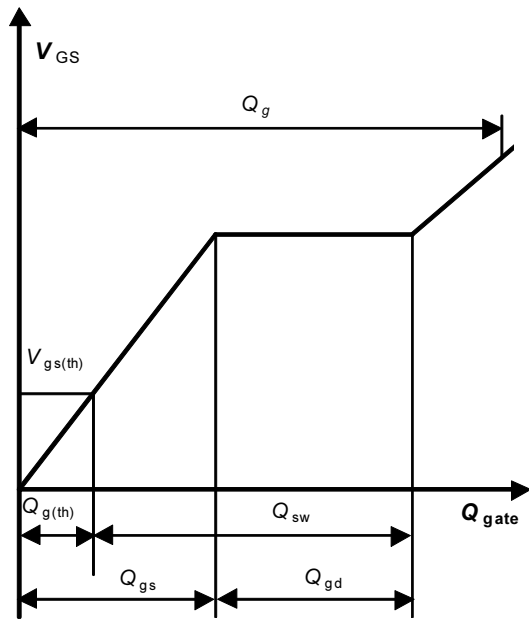


15 Drain-source breakdown voltage

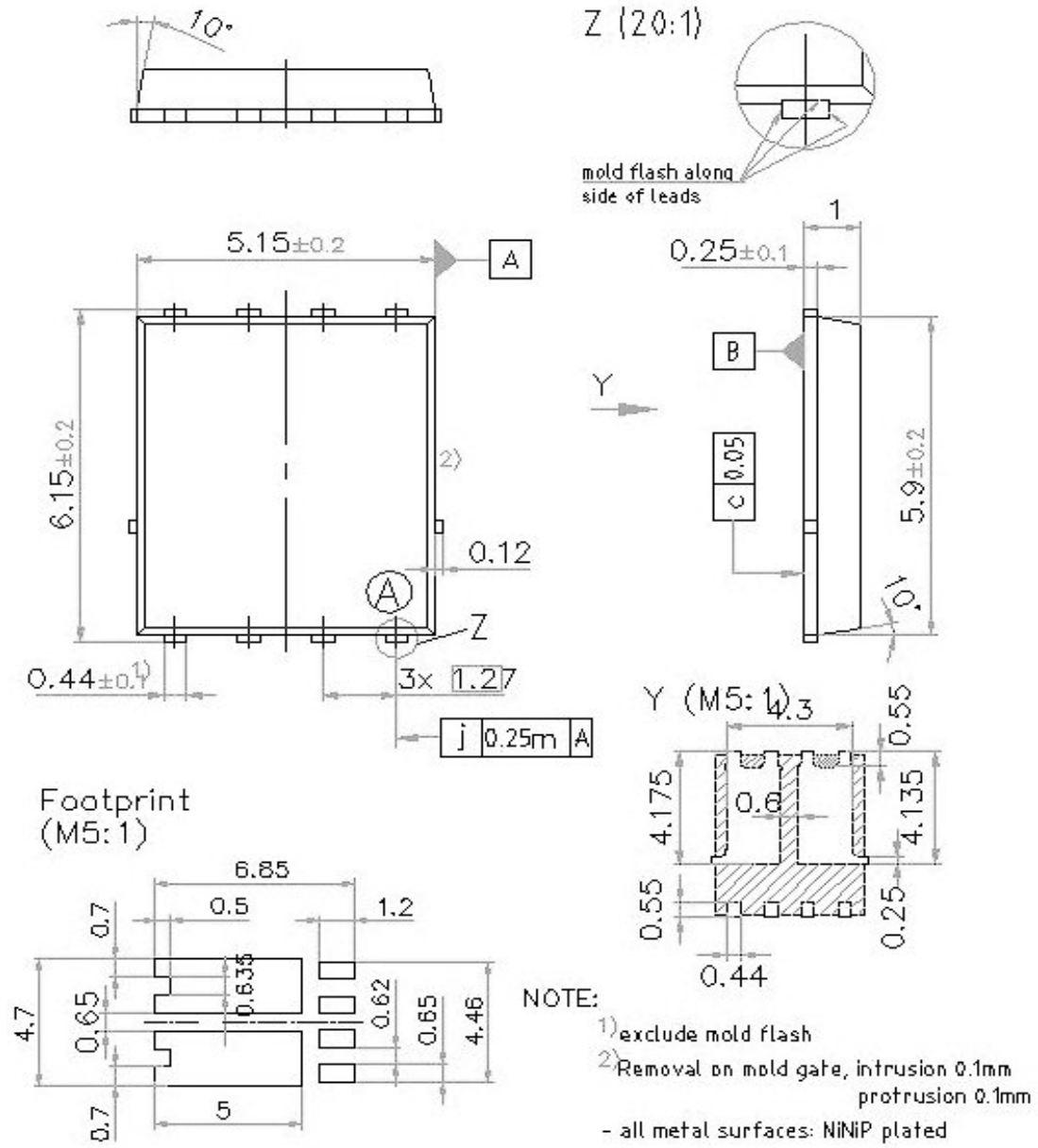
$V_{BR(DSS)}=f(T_j); I_D=1 \text{ mA}$



16 Gate charge waveforms

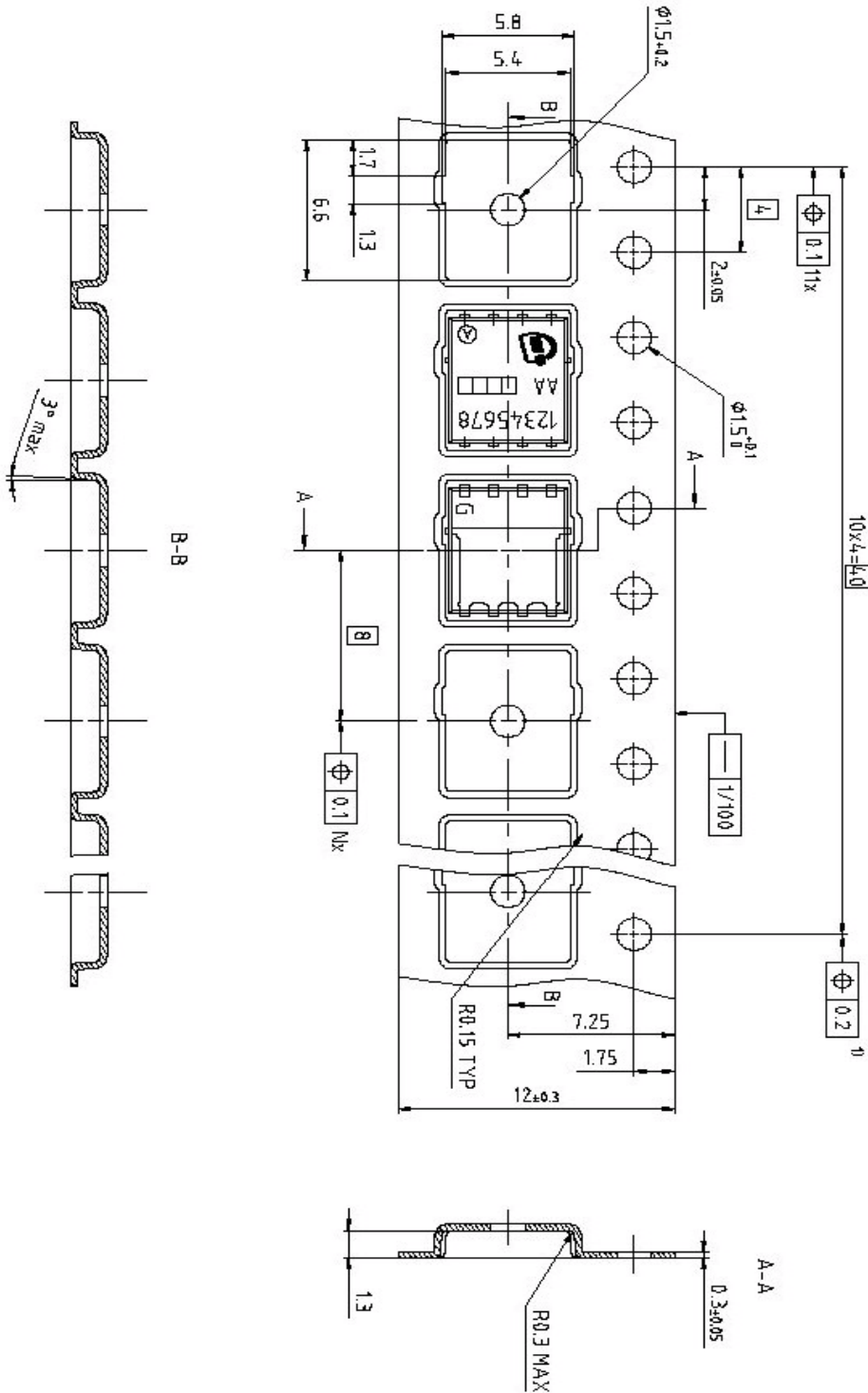


Package Outline and Footprint PG-TDSON-8 dual



Tape

PG-TDSON-8



Dimensions in mm

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Infineon Technologies AG
81726 Munich, Germany
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