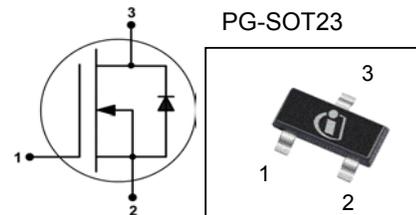


OptiMOS™ 2 Small-Signal-Transistor
Features

- N-channel
- Enhancement mode
- Logic level (4.5V rated)
- Avalanche rated
- Qualified according to AEC Q101
- 100% lead-free; RoHS compliant


Product Summary

| | | | |
|------------------|-----------------------|-----|------------|
| V_{DS} | | 30 | V |
| $R_{DS(on),max}$ | $V_{GS}=10\text{ V}$ | 57 | m Ω |
| | $V_{GS}=4.5\text{ V}$ | 93 | |
| I_D | | 2.3 | A |



| Type | Package | Tape and Reel Information | Marking | Lead Free | Packing |
|---------|---------|---------------------------|---------|-----------|---------|
| BSS306N | SOT23 | L6327: 3000 pcs/ reel | SWs | Yes | Non dry |

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

| Parameter | Symbol | Conditions | Value | Unit |
|-------------------------------------|-------------------|--|----------------------|-------------------|
| Continuous drain current | I_D | $T_A=25\text{ }^\circ\text{C}$ | 2.3 | A |
| | | $T_A=70\text{ }^\circ\text{C}$ | 1.8 | |
| Pulsed drain current | $I_{D,pulse}$ | $T_A=25\text{ }^\circ\text{C}$ | 9 | |
| Avalanche energy, single pulse | E_{AS} | $I_D=2.3\text{ A}$, $R_{GS}=25\text{ }\Omega$ | 10.8 | mJ |
| Reverse diode dv/dt | dv/dt | $I_D=2.3\text{ A}$, $V_{DS}=16\text{ V}$, $di/dt=200\text{ A}/\mu\text{s}$, $T_{j,max}=150\text{ }^\circ\text{C}$ | 6 | kV/ μs |
| Gate source voltage | V_{GS} | | ± 20 | V |
| Power dissipation | P_{tot} | $T_A=25\text{ }^\circ\text{C}$ | 0.5 | W |
| Operating and storage temperature | T_j , T_{stg} | | -55 ... 150 | $^\circ\text{C}$ |
| ESD Class | | JESD22-A114 -HBM | 0 (<250V) | |
| Soldering Temperature | | | 260 $^\circ\text{C}$ | |
| IEC climatic category; DIN IEC 68-1 | | | 55/150/56 | |

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

Thermal characteristics

| | | | | | | |
|--|------------|---------------------------------|---|---|-----|-----|
| Thermal resistance, junction - ambient | R_{thJA} | minimal footprint ¹⁾ | - | - | 250 | K/W |
|--|------------|---------------------------------|---|---|-----|-----|

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

| | | | | | | |
|----------------------------------|---------------|--|-----|-----|-----|------------------|
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}=0\text{ V}, I_D=250\text{ }\mu\text{A}$ | 30 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=11\text{ }\mu\text{A}$ | 1.2 | 1.6 | 2 | |
| Drain-source leakage current | I_{DSS} | $V_{DS}=30\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$ | - | - | 1 | μA |
| | | $V_{DS}=30\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ °C}$ | - | - | 100 | |
| Gate-source leakage current | I_{GSS} | $V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$ | - | - | 100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}=4.5\text{ V}, I_D=1.85\text{ A}$ | - | 67 | 93 | $\text{m}\Omega$ |
| | | $V_{GS}=10\text{ V}, I_D=2.3\text{ A}$ | - | 44 | 57 | |
| Transconductance | g_{fs} | $ V_{DS} >2 I_D R_{DS(on)max}, I_D=1.8\text{ A}$ | - | 5 | - | S |

¹⁾ Performed on 40mm² FR4 PCB. The traces are 1mm wide, 70 μm thick and 20mm long; they are on both sides of the PCB.

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

Dynamic characteristics

| | | | | | | |
|------------------------------|--------------|--|---|-----|-----|----|
| Input capacitance | C_{iss} | $V_{GS}=0\text{ V}, V_{DS}=15\text{ V},$ $f=1\text{ MHz}$ | - | 207 | 275 | pF |
| Output capacitance | C_{oss} | | - | 75 | 100 | |
| Reverse transfer capacitance | C_{rss} | | - | 12 | 17 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}=15\text{ V}, V_{GS}=10\text{ V},$ $I_D=2.3\text{ A}, R_G=6\ \Omega$ | - | 4.4 | - | ns |
| Rise time | t_r | | - | 2.3 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 8.3 | - | |
| Fall time | t_f | | - | 1.4 | - | |

Gate Charge Characteristics

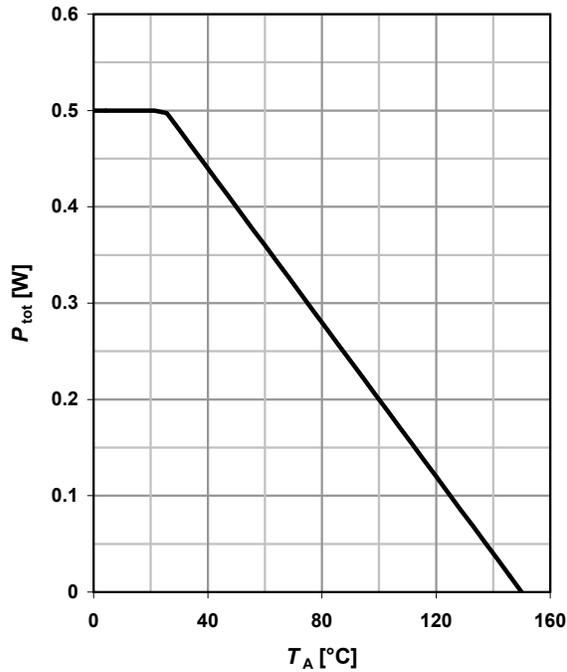
| | | | | | | |
|-----------------------|---------------|--|---|------|---|----|
| Gate to source charge | Q_{gs} | $V_{DD}=15\text{ V}, I_D=2.3\text{ A},$ $V_{GS}=0\text{ to }5\text{ V}$ | - | 0.65 | - | nC |
| Gate to drain charge | Q_{gd} | | - | 0.45 | - | |
| Gate charge total | Q_g | | - | 1.5 | - | |
| Gate plateau voltage | $V_{plateau}$ | | - | 3.1 | - | V |

Reverse Diode

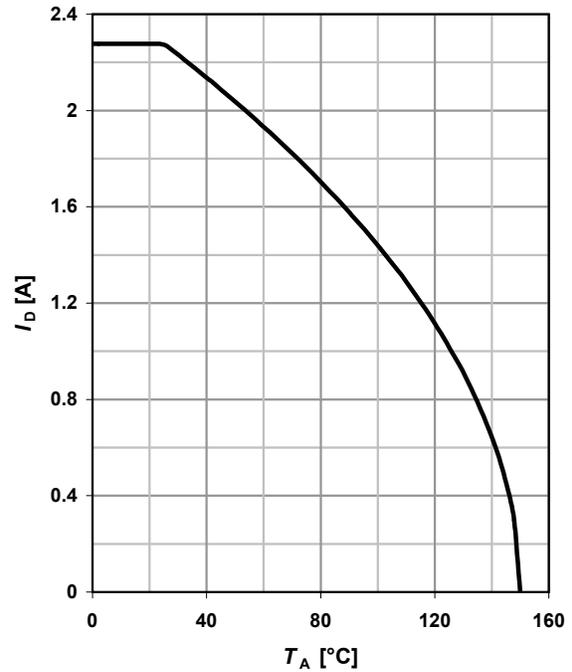
| | | | | | | |
|----------------------------------|---------------|--|---|------|-----|----|
| Diode continuous forward current | I_S | $T_A=25\text{ }^\circ\text{C}$ | - | - | 0.5 | A |
| Diode pulse current | $I_{S,pulse}$ | | - | - | 9 | |
| Diode forward voltage | V_{SD} | $V_{GS}=0\text{ V}, I_F=2.3\text{ A},$ $T_j=25\text{ }^\circ\text{C}$ | - | 0.83 | 1.1 | V |
| Reverse recovery time | t_{rr} | $V_R=10\text{ V}, I_F=2.3\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$ | - | 14.4 | - | ns |
| Reverse recovery charge | Q_{rr} | | - | 2.9 | - | |

1 Power dissipation

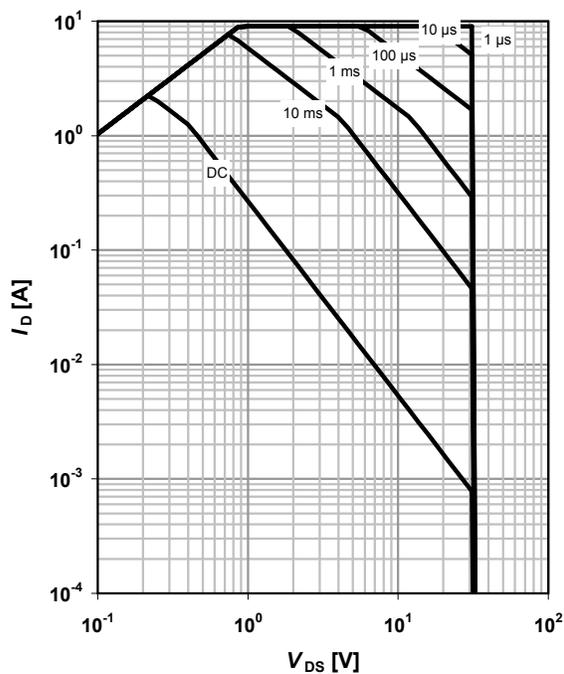
$$P_{\text{tot}} = f(T_A)$$


2 Drain current

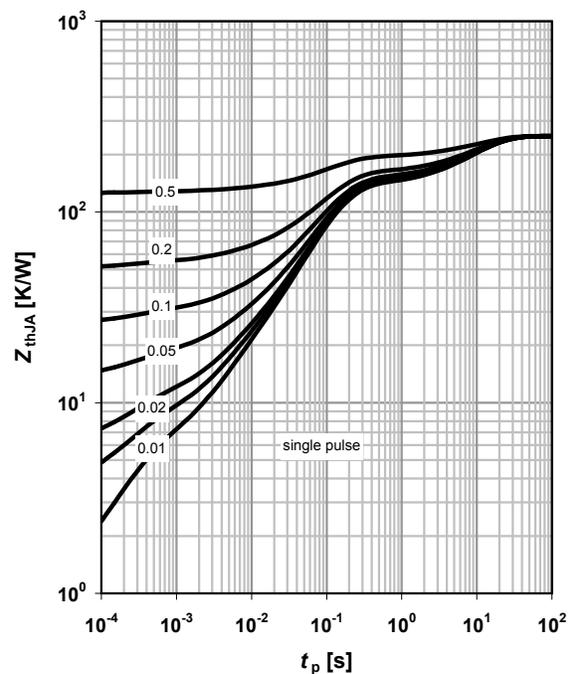
$$I_D = f(T_A); V_{\text{GS}} \geq 10 \text{ V}$$


3 Safe operating area

$$I_D = f(V_{\text{DS}}); T_A = 25 \text{ °C}; D = 0$$

 parameter: t_p

4 Max. transient thermal impedance

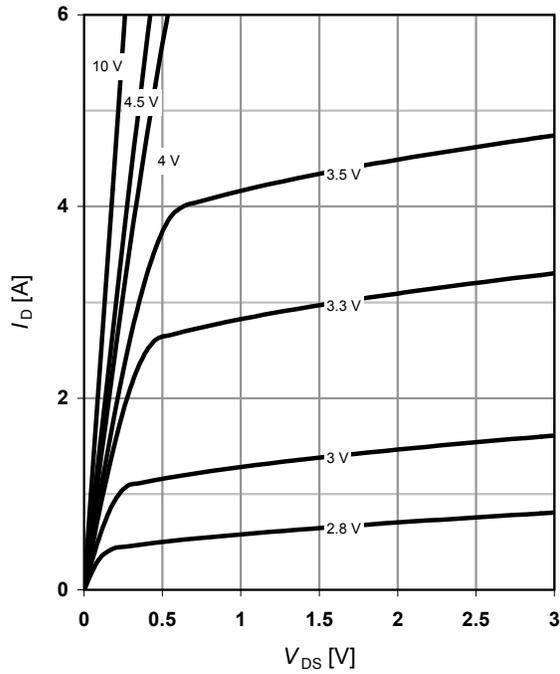
$$Z_{\text{thJA}} = f(t_p)$$

 parameter: $D = t_p / T$


5 Typ. output characteristics

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

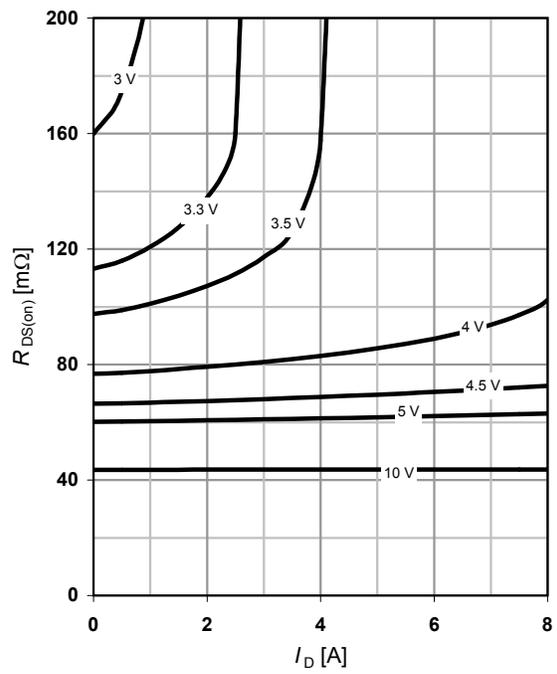
parameter: V_{GS}



6 Typ. drain-source on resistance

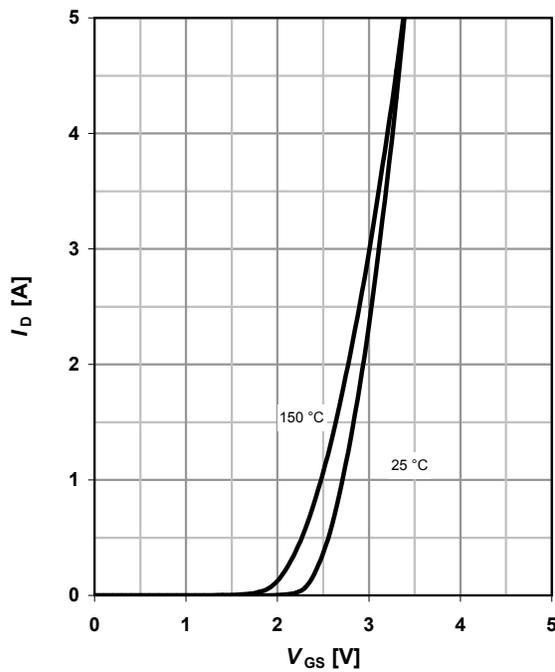
$R_{DS(on)} = f(I_D); T_j = 25\text{ }^\circ\text{C}$

parameter: V_{GS}



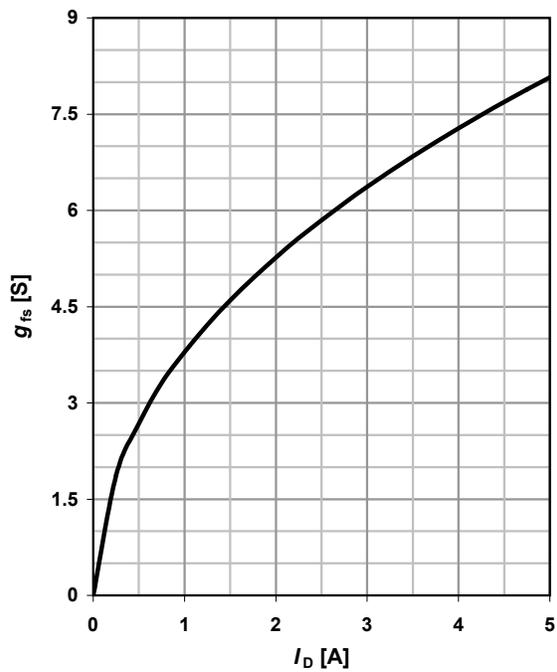
7 Typ. transfer characteristics

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



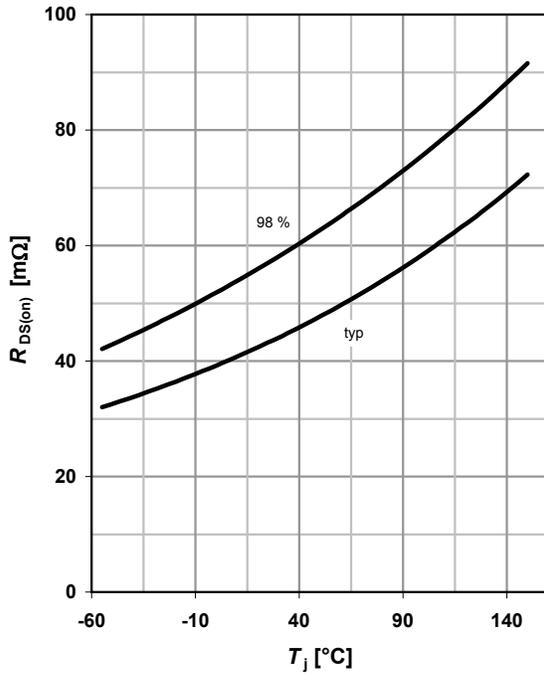
8 Typ. forward transconductance

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



9 Drain-source on-state resistance

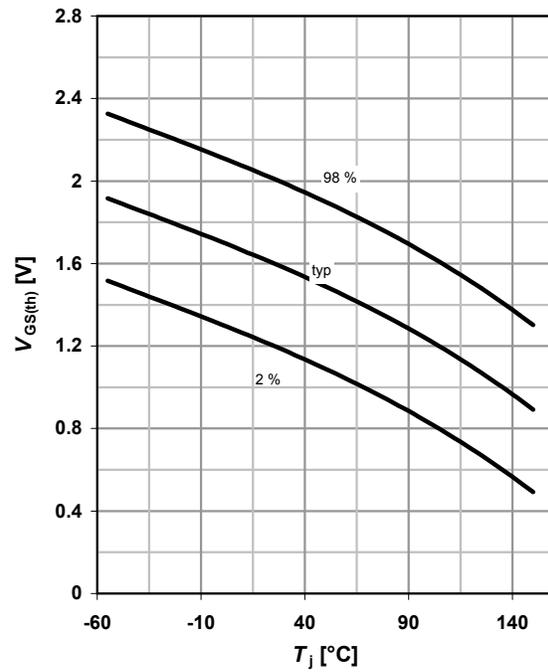
$R_{DS(on)} = f(T_j); I_D = 2.3 \text{ A}; V_{GS} = 10 \text{ V}$



10 Typ. gate threshold voltage

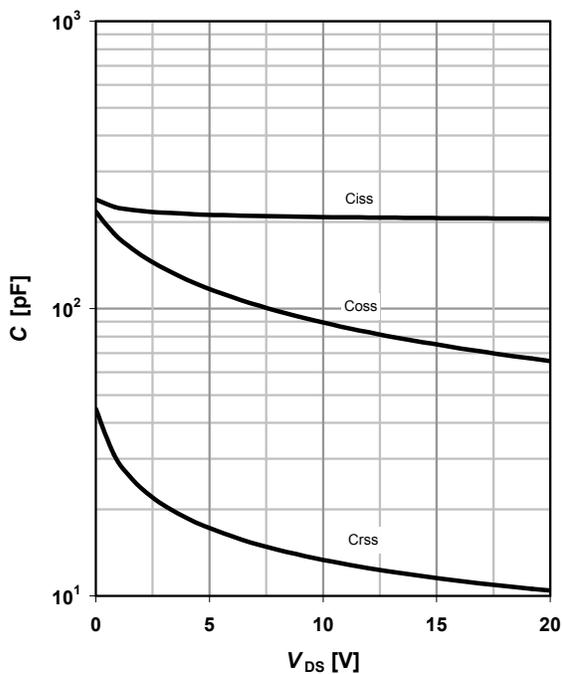
$V_{GS(th)} = f(T_j); V_{DS} = V_{GS}; I_D = 11 \mu\text{A}$

parameter: I_D



11 Typ. capacitances

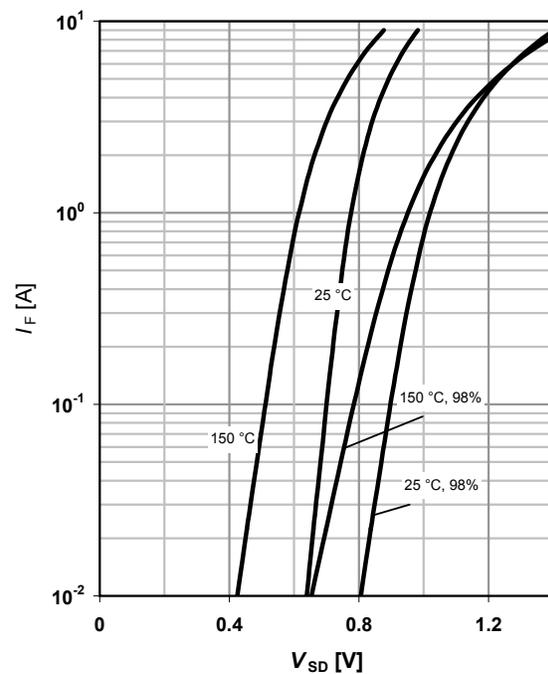
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}; T_j = 25^\circ\text{C}$



12 Forward characteristics of reverse diode

$I_F = f(V_{SD})$

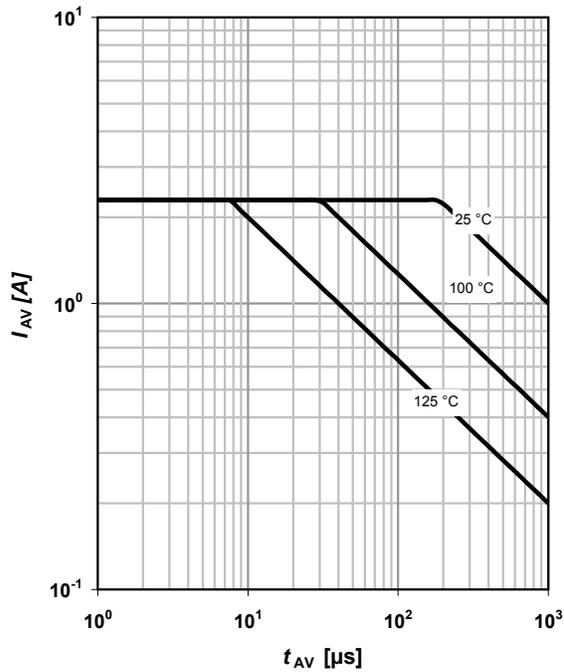
parameter: T_j



13 Avalanche characteristics

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

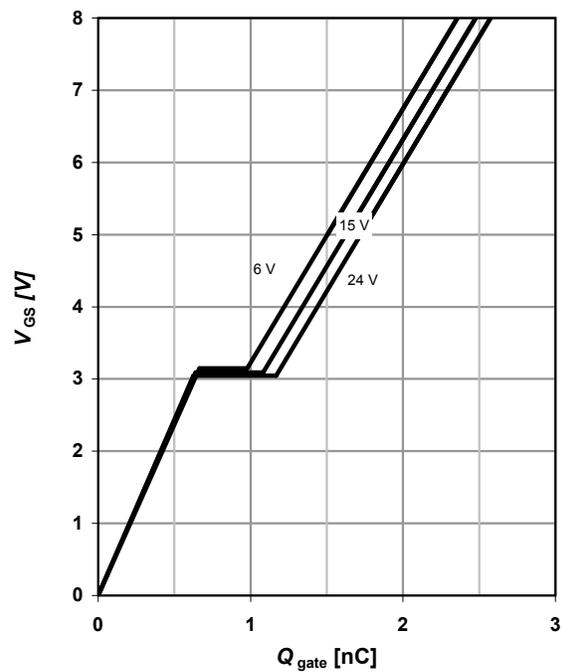
parameter: $T_{j(start)}$



14 Typ. gate charge

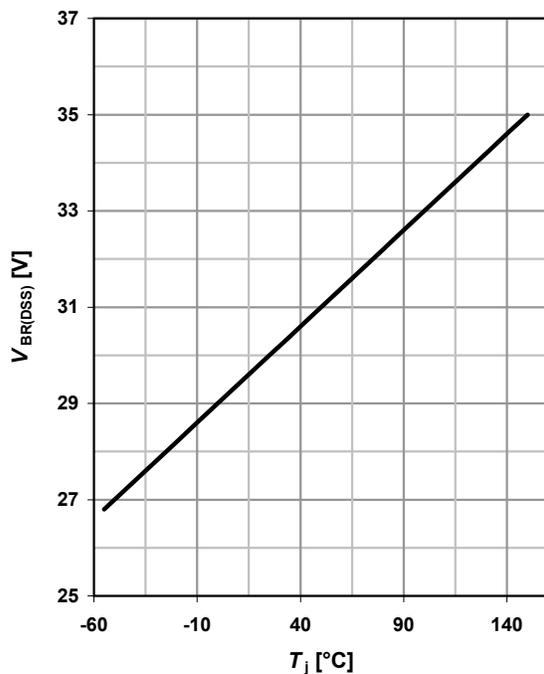
$V_{GS}=f(Q_{gate}); I_D=2.3 \text{ A pulsed}$

parameter: V_{DD}

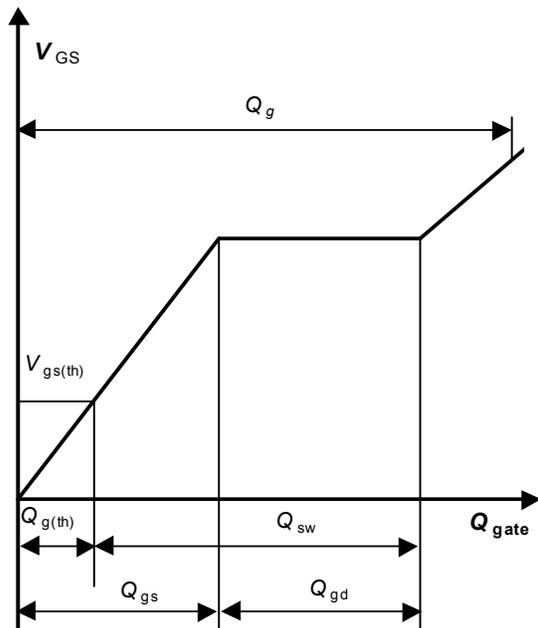


15 Drain-source breakdown voltage

$V_{BR(DSS)}=f(T_j); I_D=250 \mu\text{A}$

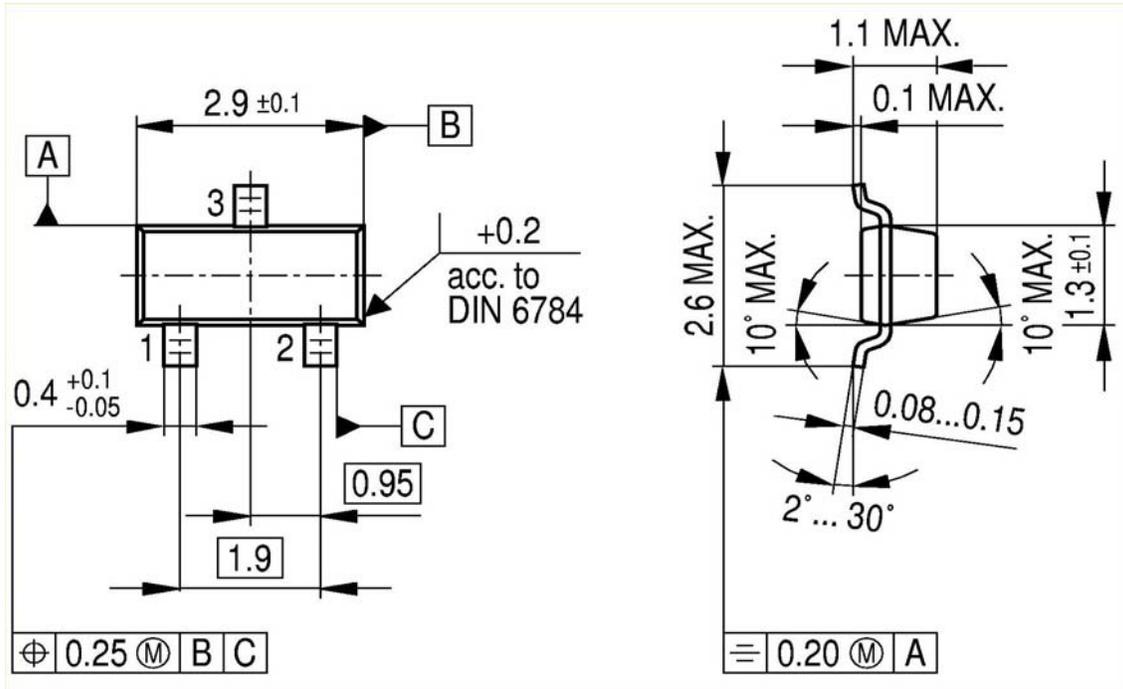


16 Gate charge waveforms

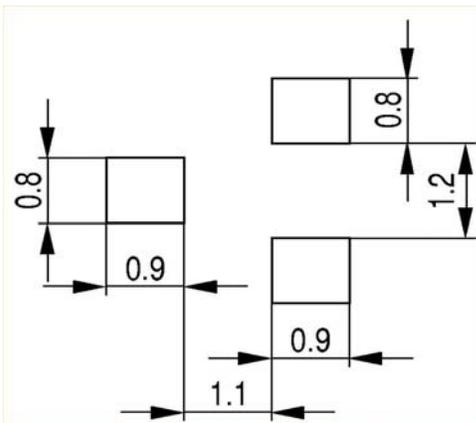


SOT23

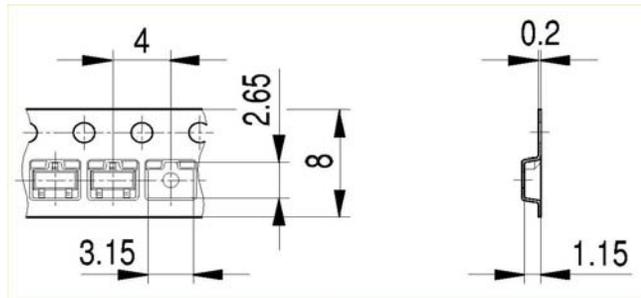
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