

OptiMOS[®] -T Power-Transistor

Features

- N-channel - Enhancement mode
- Automotive AEC Q101 qualified
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- Green package (RoHS compliant)
- 100% Avalanche tested

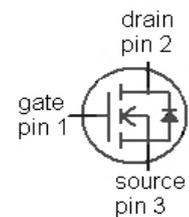
Product Summary

| | | |
|--------------------------------|-----|------------|
| V_{DS} | 40 | V |
| $R_{DS(on),max}$ (SMD version) | 5.4 | m Ω |
| I_D | 80 | A |

PG-TO263-3-2 PG-TO262-3-1 PG-TO220-3-1



| Type | Package | Marking |
|---------------|--------------|---------|
| IPB80N04S3-06 | PG-TO263-3-2 | 3N0406 |
| IPI80N04S3-06 | PG-TO262-3-1 | 3N0406 |
| IPP80N04S3-06 | PG-TO220-3-1 | 3N0406 |


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

| Parameter | Symbol | Conditions | Value | Unit |
|-------------------------------------|----------------|---|--------------|------|
| Continuous drain current | I_D | $T_C=25\text{ °C}$, $V_{GS}=10\text{V}^{1)}$ | 80 | A |
| | | $T_C=100\text{ °C}$, $V_{GS}=10\text{V}^{2)}$ | 71 | |
| Pulsed drain current ²⁾ | $I_{D,pulse}$ | $T_C=25\text{ °C}$ | 320 | |
| Avalanche energy, single pulse | E_{AS} | $I_D=80\text{ A}$ | 125 | mJ |
| Gate source voltage | V_{GS} | | ± 20 | V |
| Power dissipation | P_{tot} | $T_C=25\text{ °C}$ | 100 | W |
| Operating and storage temperature | T_j, T_{stg} | | -55 ... +175 | °C |
| IEC climatic category; DIN IEC 68-1 | | | 55/175/56 | |

| Parameter | Symbol | Conditions | Values | | | Unit |
|--|------------|--|--------|------|------|------|
| | | | min. | typ. | max. | |
| Thermal characteristics²⁾ | | | | | | |
| Thermal resistance, junction - case | R_{thJC} | | - | - | 1.5 | K/W |
| Thermal resistance, junction - ambient, leaded | R_{thJA} | | - | - | 62 | |
| SMD version, device on PCB | R_{thJA} | minimal footprint | - | - | 62 | |
| | | 6 cm ² cooling area ³⁾ | - | - | 40 | |

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

| | | | | | | |
|----------------------------------|---------------|---|-----|-----|-----|---------------|
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}=0\text{ V}, I_D=1\text{ mA}$ | 40 | - | - | V |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=52\text{ }\mu\text{A}$ | 2.1 | 3.0 | 4.0 | |
| Zero gate voltage drain current | I_{DSS} | $V_{DS}=40\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$ | - | - | 1 | μA |
| | | $V_{DS}=40\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ °C}^{2)}$ | - | - | 100 | |
| Gate-source leakage current | I_{GSS} | $V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$ | - | - | 100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $V_{GS}=10\text{ V}, I_D=80\text{ A}$ | - | 4.6 | 5.7 | m Ω |
| | | $V_{GS}=10\text{ V}, I_D=80\text{ A},$ SMD version | - | 4.3 | 5.4 | |

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

Dynamic characteristics²⁾

| | | | | | | |
|------------------------------|--------------|---|---|------|------|----|
| Input capacitance | C_{iss} | $V_{GS}=0\text{ V}, V_{DS}=25\text{ V},$ $f=1\text{ MHz}$ | - | 2500 | 3250 | pF |
| Output capacitance | C_{oss} | | - | 660 | 860 | |
| Reverse transfer capacitance | C_{rss} | | - | 100 | 130 | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}=20\text{ V}, V_{GS}=10\text{ V},$ $I_D=80\text{ A}, R_G=6\ \Omega$ | - | 15 | - | ns |
| Rise time | t_r | | - | 10 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 20 | - | |
| Fall time | t_f | | - | 10 | - | |

Gate Charge Characteristics²⁾

| | | | | | | |
|-----------------------|---------------|--|---|-----|----|----|
| Gate to source charge | Q_{gs} | $V_{DD}=32\text{ V}, I_D=80\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$ | - | 15 | 20 | nC |
| Gate to drain charge | Q_{gd} | | - | 9 | 16 | |
| Gate charge total | Q_g | | - | 36 | 47 | |
| Gate plateau voltage | $V_{plateau}$ | | - | 6.0 | - | V |

Reverse Diode

| | | | | | | |
|--|---------------|---|---|----|-----|----|
| Diode continuous forward current ²⁾ | I_S | $T_C=25\text{ }^\circ\text{C}$ | - | - | 80 | A |
| Diode pulse current ²⁾ | $I_{S,pulse}$ | | - | - | 320 | |
| Diode forward voltage | V_{SD} | $V_{GS}=0\text{ V}, I_F=80\text{ A},$ $T_j=25\text{ }^\circ\text{C}$ | - | 1 | 1.3 | V |
| Reverse recovery time ²⁾ | t_{rr} | $V_R=20\text{ V}, I_F=I_S,$ $di_F/dt=100\text{ A}/\mu\text{s}$ | - | 34 | - | ns |
| Reverse recovery charge ²⁾ | Q_{rr} | | - | 36 | - | |

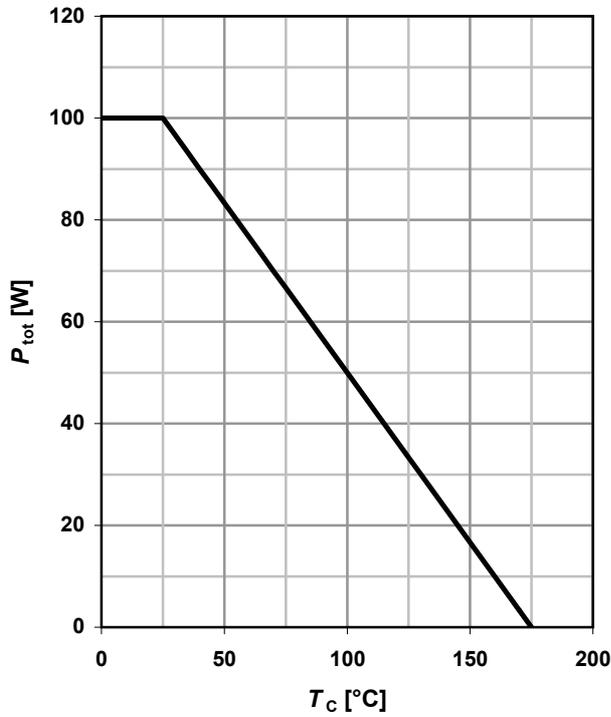
¹⁾ Current is limited by bondwire; with an $R_{thJC} = 1.5\text{K/W}$ the chip is able to carry 100A at 25°C. For detailed information see Application Note ANPS071E at www.infineon.com/optimos

²⁾ Defined by design. Not subject to production test.

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.

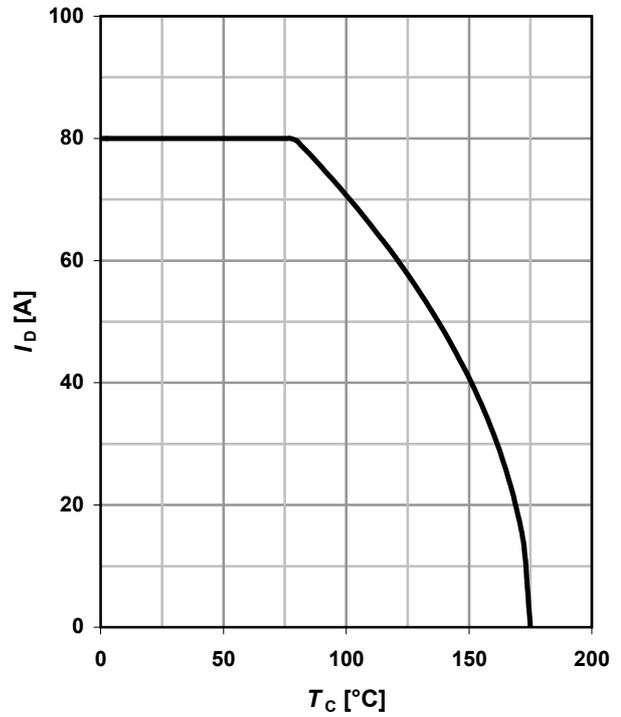
1 Power dissipation

$P_{tot} = f(T_C); V_{GS} \geq 6 V$



2 Drain current

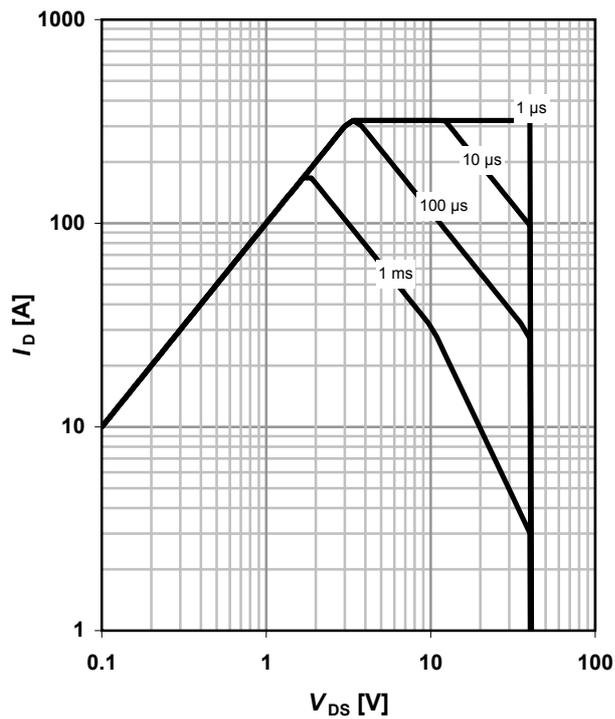
$I_D = f(T_C); V_{GS} \geq 6 V$



3 Safe operating area

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

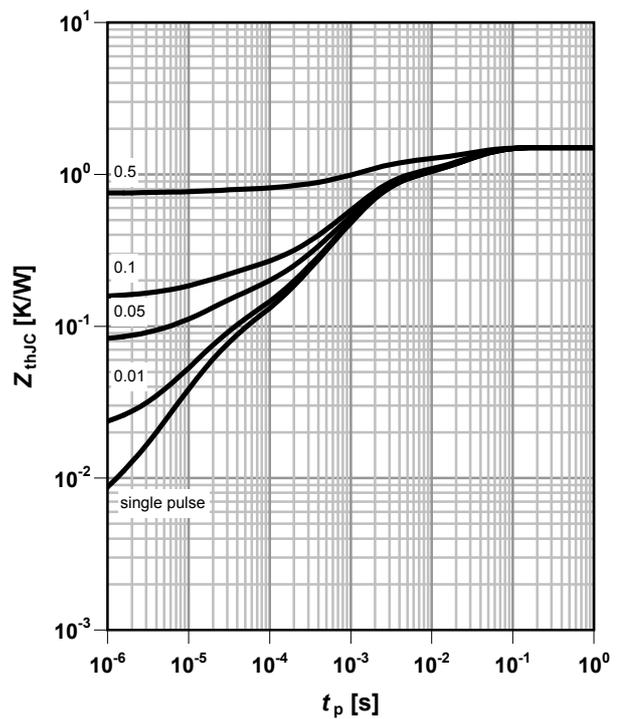
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

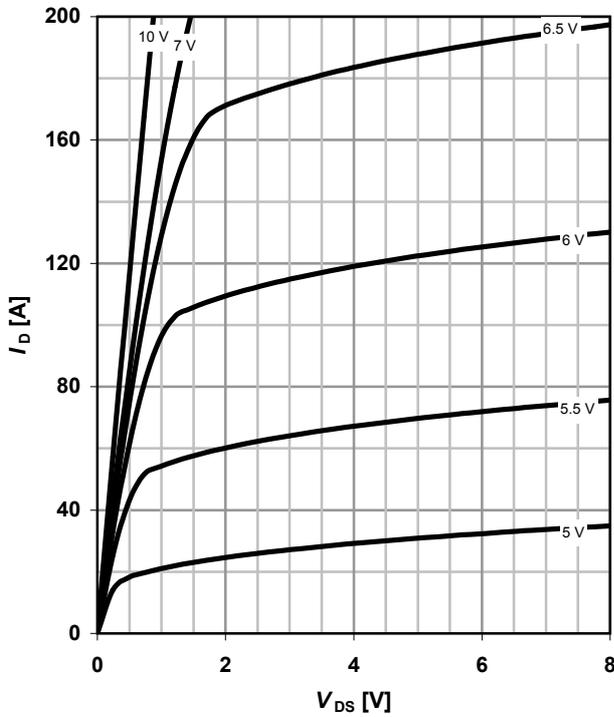
parameter: $D = t_p/T$



5 Typ. output characteristics

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

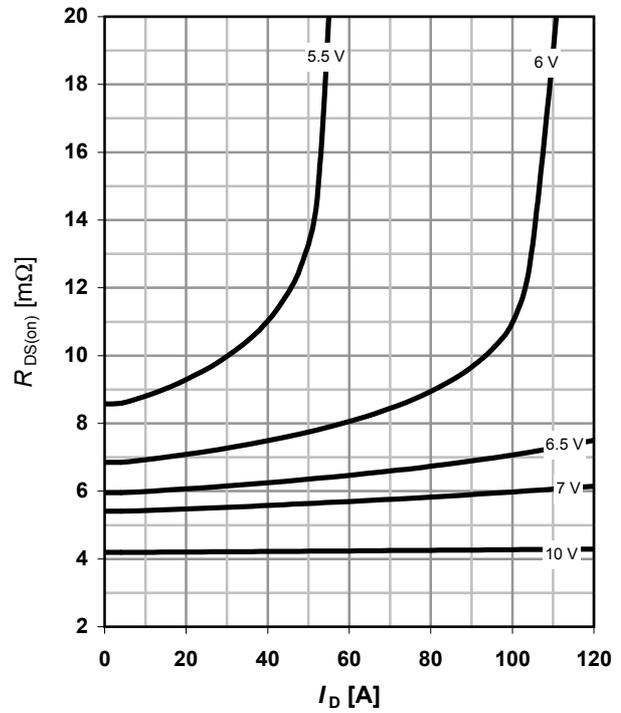
parameter: V_{GS}



6 Typ. drain-source on-state resistance

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

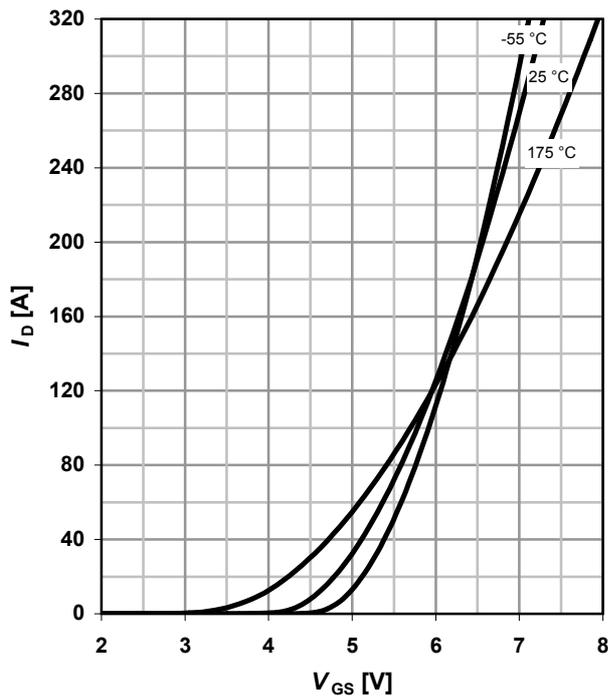
parameter: V_{GS}



7 Typ. transfer characteristics

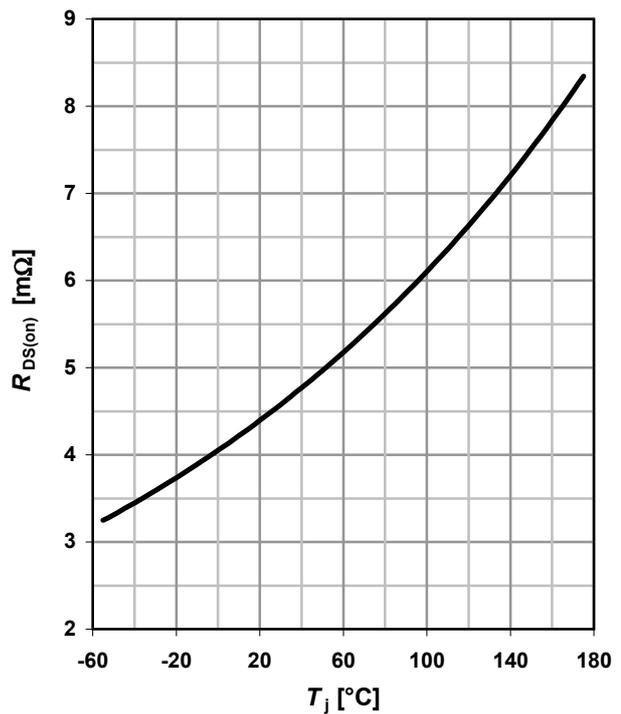
$I_D = f(V_{GS}); V_{DS} = 6\text{ V}$

parameter: T_j



8 Typ. drain-source on-state resistance

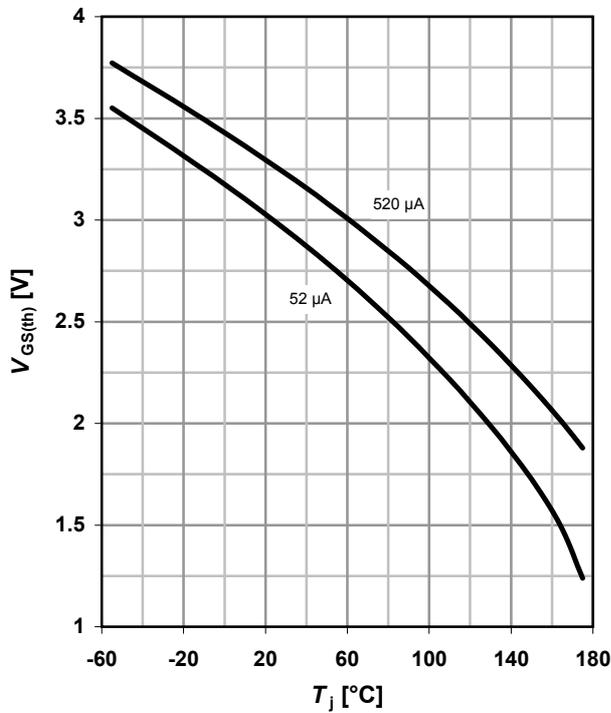
$R_{DS(on)} = f(T_j); I_D = 80\text{ A}; V_{GS} = 10\text{ V}; \text{SMD}$



9 Typ. gate threshold voltage

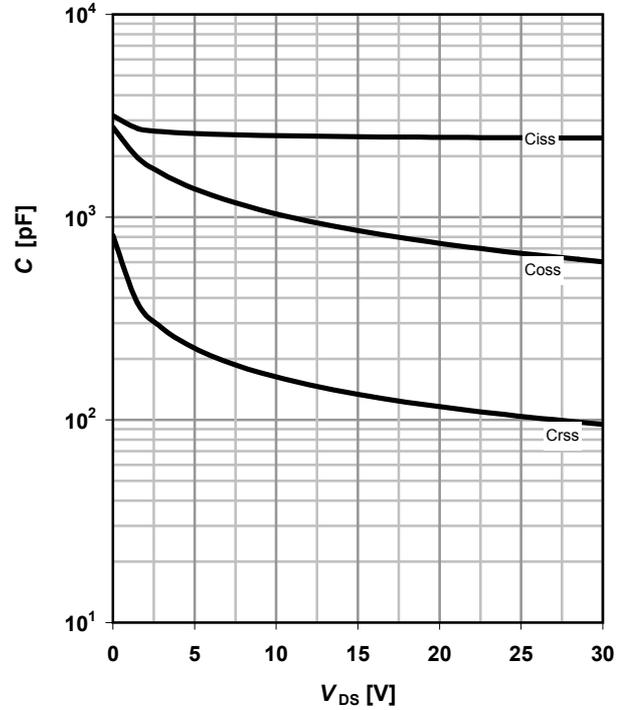
$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$

parameter: I_D



10 Typ. capacitances

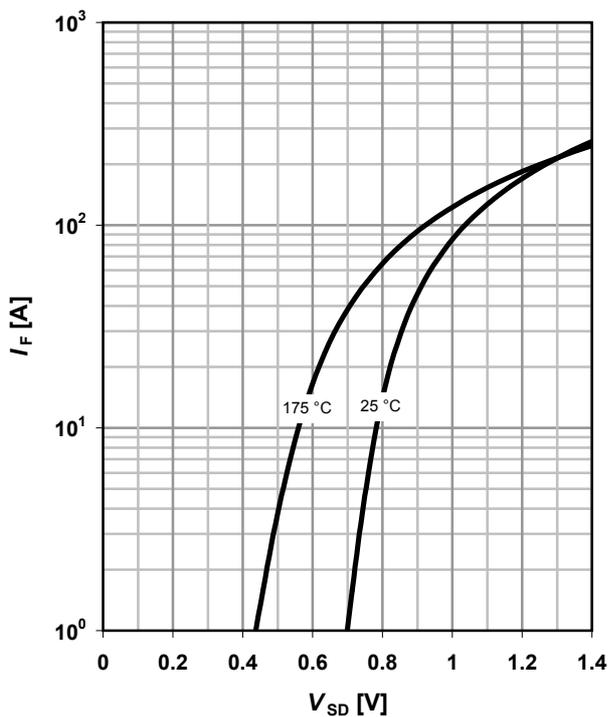
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



11 Typical forward diode characteristics

$I_F = f(V_{SD})$

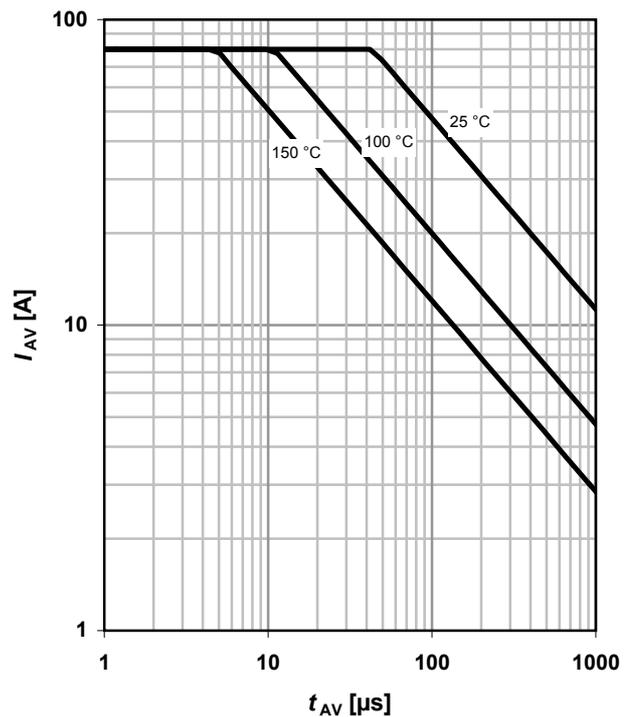
parameter: T_j



12 Typ. avalanche characteristics

$I_{AS} = f(t_{AV})$

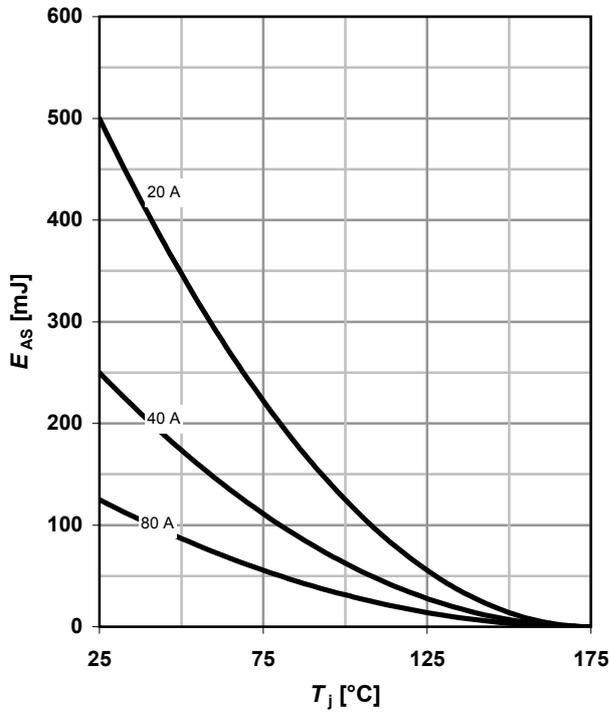
parameter: $T_{j(start)}$



13 Typical avalanche energy

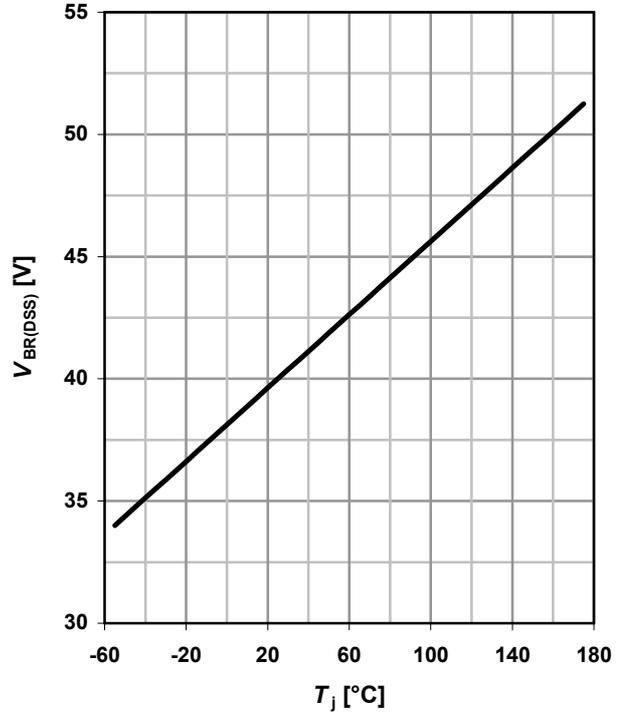
$$E_{AS} = f(T_j)$$

parameter: I_D



14 Typ. drain-source breakdown voltage

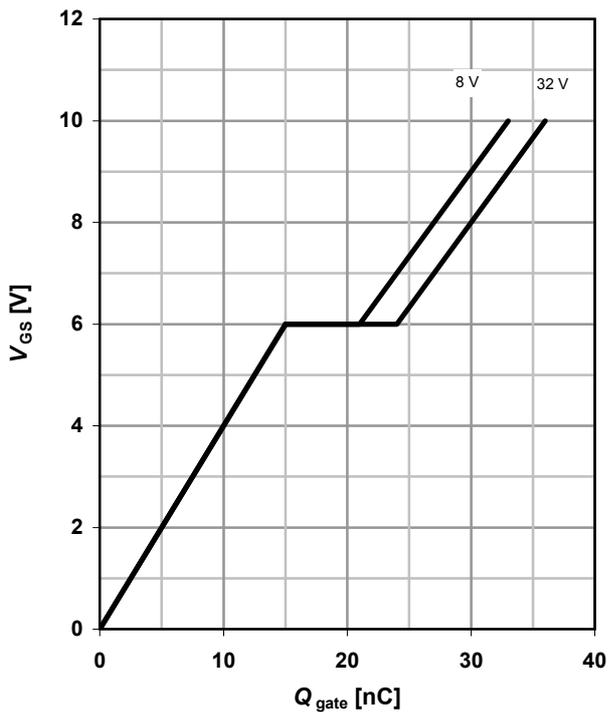
$$V_{BR(DSS)} = f(T_j); I_D = 1 \text{ mA}$$



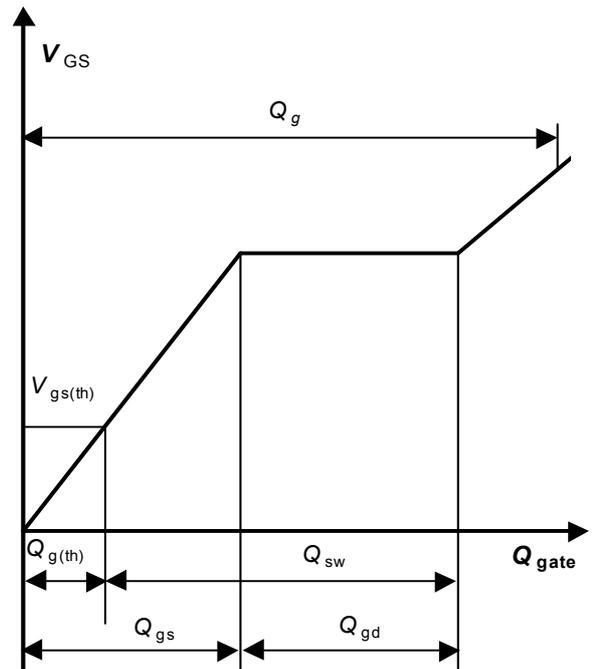
15 Typ. gate charge

$$V_{GS} = f(Q_{gate}); I_D = 80 \text{ A pulsed}$$

parameter: V_{DD}



16 Gate charge waveforms



Published by
Infineon Technologies AG
81726 Munich, Germany

© Infineon Technologies AG 2007
All Rights Reserved.

Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie"). With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

Information

For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office (www.infineon.com).

Warnings

Due to technical requirements components may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies Office. Infineon Technologies Components may only be used in life-support devices or systems with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

Revision History

| Version | Date | Changes |
|---------|------------|--|
| 1.1 | 30.04.2007 | RthJC from 1.7K/W to 1.5K/W |
| 1.1 | 30.04.2007 | RDSon max IPB from 5.8mOhm to 5.4mOhm |
| 1.1 | 30.04.2007 | RDSon max IPP/I from 6.1mOhm to 5.7mOhm |
| 1.1 | 30.04.2007 | Update of diagrams involving RthJC and RDSon_max |
| 1.1 | 30.04.2007 | QGD max from 13nC to 16nC |



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.