

## Dual N-Channel OptiMOS™ MOSFET

### Features

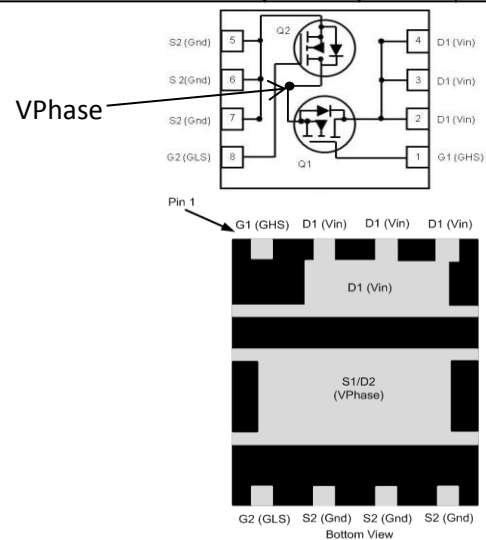
- Dual N-channel OptiMOS™ MOSFET
- Optimized for high performance Buck converter
- Logic level (4.5V rated)
- N-channel
- Qualified according to JEDEC<sup>1)</sup> for target applications
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21



| Type      | Package    | Marking |
|-----------|------------|---------|
| BSC0911ND | PG-TISON-8 | 0911ND  |

### Product Summary

|                  |                       | Q1  | Q2  |    |
|------------------|-----------------------|-----|-----|----|
| $V_{DS}$         |                       | 25  | 25  | V  |
| $R_{DS(on),max}$ | $V_{GS}=10\text{ V}$  | 3.2 | 1.2 | mΩ |
|                  | $V_{GS}=4.5\text{ V}$ | 4.8 | 1.7 |    |
| $I_D$            |                       | 40  | 40  | A  |



**Maximum ratings, at  $T_j=25\text{ °C}$ , unless otherwise specified<sup>2)</sup>**

| Parameter                           | Symbol         | Conditions  | Value       |     | Unit |
|-------------------------------------|----------------|---|-------------|-----|------|
|                                     |                |   | Q1          | Q2  |      |
| Continuous drain current            | $I_D$          | $T_C=70\text{ °C}$ , $V_{GS}=10\text{ V}$                                       | 40          | 40  | A    |
|                                     |                | $T_A=25\text{ °C}$ , $V_{GS}=4.5\text{ V}^{3)}$                                 | 18          | 30  |      |
|                                     |                | $T_A=70\text{ °C}$ , $V_{GS}=4.5\text{ V}^{3)}$                                 | 14          | 24  |      |
|                                     |                | $T_A=25\text{ °C}$ , $V_{GS}=4.5\text{ V}^4)$                                   | 14          | 22  |      |
| Pulsed drain current <sup>5)</sup>  | $I_{D,pulse}$  | $T_C=70\text{ °C}$  | 160         | 160 |      |
| Avalanche energy, single pulse      | $E_{AS}$       | Q1: $I_D=20\text{ A}$ ,<br>Q2: $I_D=20\text{ A}$ ,<br>$R_{GS}=25\text{ }\Omega$ | 20          | 160 | mJ   |
| Gate source voltage                 | $V_{GS}$       |   | ±20         |     | V    |
| Power dissipation                   | $P_{tot}$      | $T_A=25\text{ °C}^{2)}$   | 2.5         | 2.5 | W    |
|                                     |                | $T_A=25\text{ °C}$ , minimum footprint <sup>3)</sup>                            | 1.0         | 1.0 |      |
| Operating and storage temperature   | $T_j, T_{stg}$ |   | -55 ... 150 |     | °C   |
| IEC climatic category; DIN IEC 68-1 |                |   | 55/150/56   |     |      |

<sup>1)</sup> J-STD20 and JESD22

<sup>2)</sup> One transistor active

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

**Thermal characteristics**

|  |    |            |   |   |   |     |     |
|--|----|------------|---|---|---|-----|-----|
| Thermal resistance, junction - case                  | Q1 | $R_{thJC}$ |   | - | - | 3.4 | K/W |
|  | Q2 |            |   | - | - | 1.5 |     |
| Thermal resistance, junction - ambient <sup>1)</sup> | Q1 | $R_{thJA}$ | 6 cm <sup>2</sup> cooling area <sup>3)</sup>  | - | - | 50  |     |
|  | Q2 |            |   |   |   |     |     |
|  | Q1 |            | minimal footprint, steady state <sup>4)</sup> | - | - | 125 |     |
|  | Q2 |            |   |   |   |     |     |

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

|                                  |    |               |  |     |     |     |               |
|----------------------------------|----|---------------|--|-----|-----|-----|---------------|
| Drain-source breakdown voltage   | Q1 | $V_{(BR)DSS}$ | $V_{GS}=0\text{ V}, I_D=1\text{ mA}$                                   | 25  | -   |     | V             |
|                                  | Q2 |               |  |     |     |     |               |
| Gate threshold voltage           | Q1 | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\text{ }\mu\text{A}$                            | 1.2 | 1.6 | 2   |               |
|                                  | Q2 |               |  |     |     |     |               |
| Zero gate voltage drain current  | Q1 | $I_{DSS}$     | $V_{DS}=25\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ }^\circ\text{C}$  | -   | -   | 1   | $\mu\text{A}$ |
|                                  | Q2 |               |  |     |     |     |               |
|                                  | Q1 |               | $V_{DS}=25\text{ V}, V_{GS}=0\text{ V}, T_j=150\text{ }^\circ\text{C}$ | -   | -   | 100 |               |
|                                  | Q2 |               |  |     |     |     |               |
| Gate-source leakage current      | Q1 | $I_{GSS}$     | $V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$                                | -   | -   | 100 | nA            |
|                                  | Q2 |               |  |     |     |     |               |
| Drain-source on-state resistance | Q1 | $R_{DS(on)}$  | $V_{GS}=4.5\text{ V}, I_D=20\text{ A}$                                 | -   | 3.7 | 4.8 | m $\Omega$    |
|                                  | Q2 |               |  |     | -   | 1.3 |               |
|                                  | Q1 |               | $V_{GS}=10\text{ V}, I_D=20\text{ A}$                                  | -   | 2.5 | 3.2 |               |
|                                  | Q2 |               |  |     | -   | 0.9 |               |
| Gate resistance                  | Q1 | $R_G$         |  | 0.5 | 0.9 | 1.8 | $\Omega$      |
|                                  | Q2 |               |  |     | 0.3 | 0.6 |               |
| Transconductance                 | Q1 | $g_{fs}$      | $ V_{DS} >2 I_D R_{DS(on)max}, I_D=20\text{ A}$                        | 38  | 77  | -   | S             |
|                                  | Q2 |               |  |     | 65  | 130 |               |

<sup>3)</sup> Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical in still air.

<sup>4)</sup> Device mounted on a minimum pad (one layer, 70  $\mu\text{m}$  thick). One transistor active

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

**Dynamic characteristics**

|                              |    |              |  |   |      |      |    |
|------------------------------|----|--------------|--|---|------|------|----|
| Input capacitance            | Q1 | $C_{iss}$    | $V_{GS}=0\text{ V},$<br>$V_{DS}=12\text{ V}, f=1\text{ MHz}$                         | - | 1200 | 1600 | pF |
|                              | Q2 |              |  | - | 3800 | 5100 |    |
| Output capacitance           | Q1 | $C_{oss}$    |  | - | 470  | 625  | ns |
|                              | Q2 |              |  | - | 1400 | 1862 |    |
| Reverse transfer capacitance | Q1 | $C_{rss}$    |  | - | 51   | -    |    |
|                              | Q2 |              |  | - | 150  | -    |    |
| Turn-on delay time           | Q1 | $t_{d(on)}$  | $V_{DD}=12\text{ V},$<br>$V_{GS}=10\text{ V}, R_G=1.6\ \Omega,$<br>$I_D=20\text{ A}$ | - | 3.3  | -    |    |
|                              | Q2 |              |  | - | 3.8  | -    |    |
| Rise time                    | Q1 | $t_r$        |  | - | 2.8  | -    |    |
|                              | Q2 |              |  | - | 5.4  | -    |    |
| Turn-off delay time          | Q1 | $t_{d(off)}$ |  | - | 15   | -    |    |
|                              | Q2 |              |  | - | 25   | -    |    |
| Fall time                    | Q1 | $t_f$        |  | - | 2.2  | -    |    |
|                              | Q2 |              |  | - | 4.0  | -    |    |

**Gate Charge Characteristics**

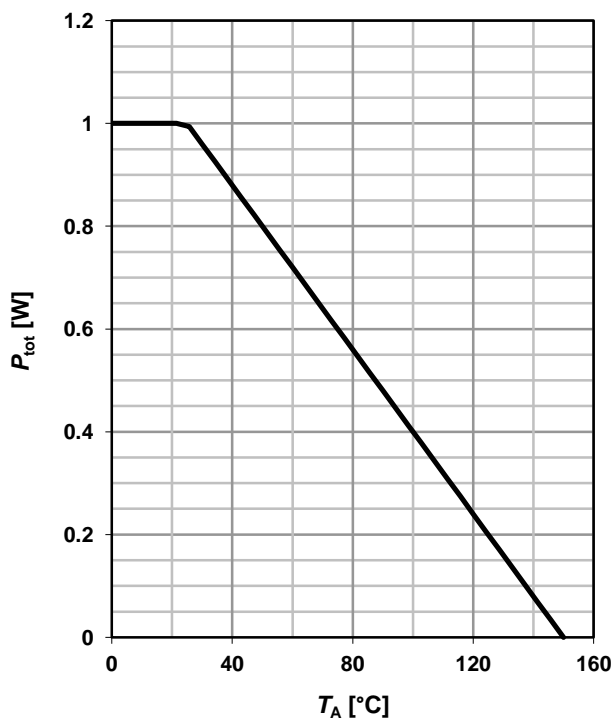
|                       |    |               |  |   |     |     |    |    |
|-----------------------|----|---------------|--|---|-----|-----|----|----|
| Gate to source charge | Q1 | $Q_{gs}$      | $V_{DD}=12\text{ V},$<br>$I_D=20\text{ A},$<br>$V_{GS}=0\text{ to }4.5\text{ V}$ | -                                       | 3.0 | 3.9 | nC |    |
| Gate to drain charge  |    | $Q_{gd}$      |  | -                                       | 1.8 | 2.7 |    |    |
| Gate charge total     |    | $Q_g$         |  | -                                       | 7.7 | 12  |    |    |
| Gate plateau voltage  |    | $V_{plateau}$ |  | -                                       | 2.6 | -   | V  |    |
| Gate to source charge | Q2 | $Q_{gs}$      |  | -                                       | 8.8 | 12  | nC |    |
| Gate to drain charge  |    | $Q_{gd}$      |  | -                                       | 5.5 | 8.3 |    |    |
| Gate charge total     |    | $Q_g$         |  | -                                       | 25  | 37  |    |    |
| Gate plateau voltage  |    | $V_{plateau}$ |  | -                                       | 2.3 | -   | V  |    |
| Output charge         | Q1 | $Q_{oss}$     |  | $V_{DD}=12\text{ V}, V_{GS}=0\text{ V}$ | -   | 9   | 12 | nC |
|                       | Q2 |               |  |   | -   | 28  | 37 |    |

<sup>5)</sup> See figure 3 for more detailed information.

| Parameter                        | Symbol | Conditions    | Values  |      |      | Unit |    |
|----------------------------------|--------|---------------|---|------|------|------|----|
|                                  |        |               | min.  | typ. | max. |      |    |
| <b>Reverse Diode</b>             |        |               |   |      |      |      |    |
| Diode continuous forward current | Q1     | $I_S$         | $T_C=25\text{ °C}$  | -    | -    | 37   | A  |
|                                  | Q2     |               |   |      |      | 40   |    |
| Diode pulse current              | Q1     | $I_{S,pulse}$ | $T_C=25\text{ °C}$  | -    | -    | 160  |    |
|                                  | Q2     |               |   | -    | -    | 160  |    |
| Diode forward voltage            | Q1     | $V_{SD}$      | $V_{GS}=0\text{ V}, I_F=20\text{ A},$<br>$T_j=25\text{ °C}$       | -    | 0.84 | -    | V  |
|                                  | Q2     |               |   | -    | 0.79 | -    |    |
| Reverse recovery charge          | Q1     | $Q_{rr}$      | $V_R=15\text{ V}, I_F=I_S,$<br>$di_F/dt=100\text{ A}/\mu\text{s}$ | -    | 10   | -    | nC |
|                                  | Q2     |               |   | -    | 20   | -    | nC |

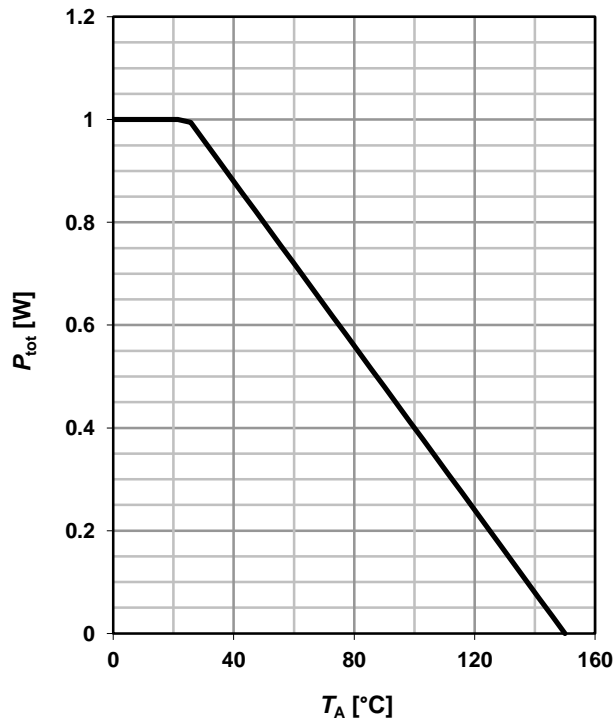
**1 Power dissipation (Q1)**

$$P_{tot}=f(T_A)^4$$



**2 Power dissipation (Q2)**

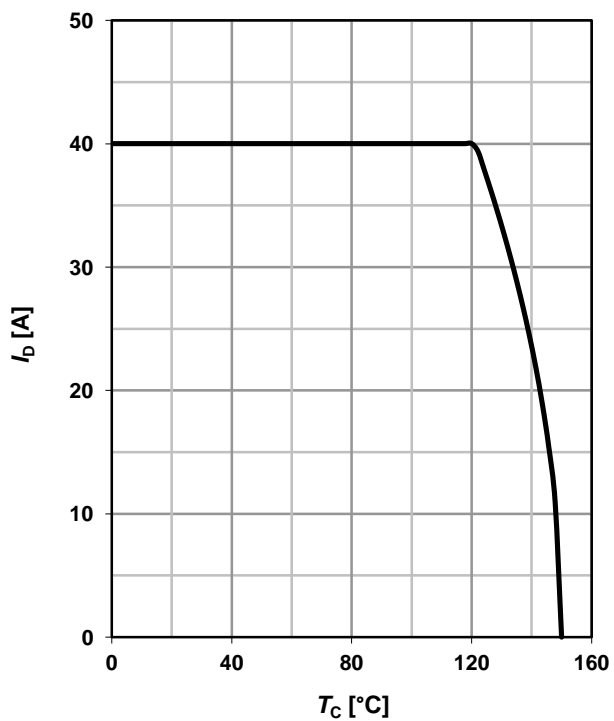
$$P_{tot}=f(T_A)^4$$



**3 Drain current (Q1)**

$$I_D=f(T_C)$$

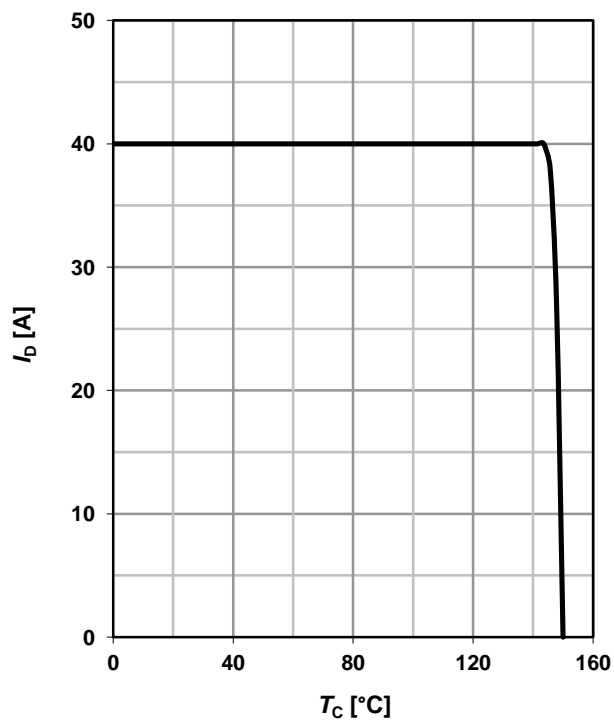
parameter:  $V_{GS} \geq 10$  V



**4 Drain current (Q2)**

$$I_D=f(T_C)$$

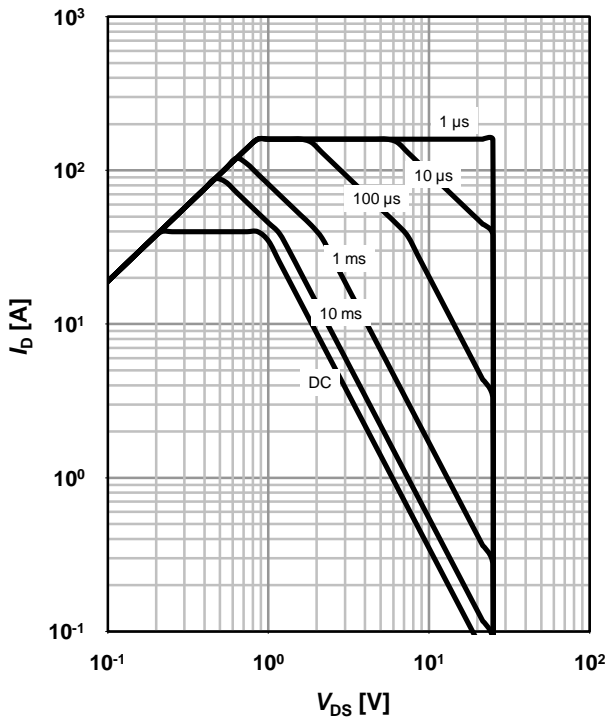
parameter:  $V_{GS} \geq 10$  V



**5 Safe operating area (Q1)**

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

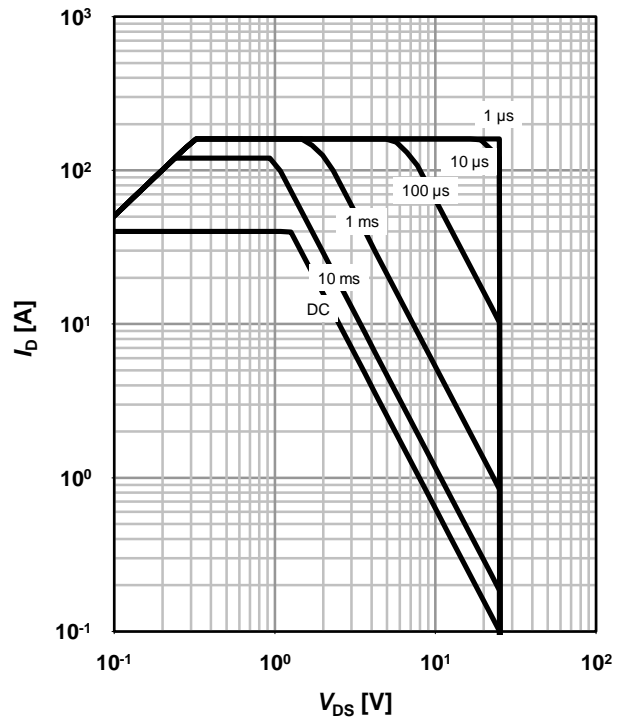
parameter:  $t_p$



**6 Safe operating area (Q2)**

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

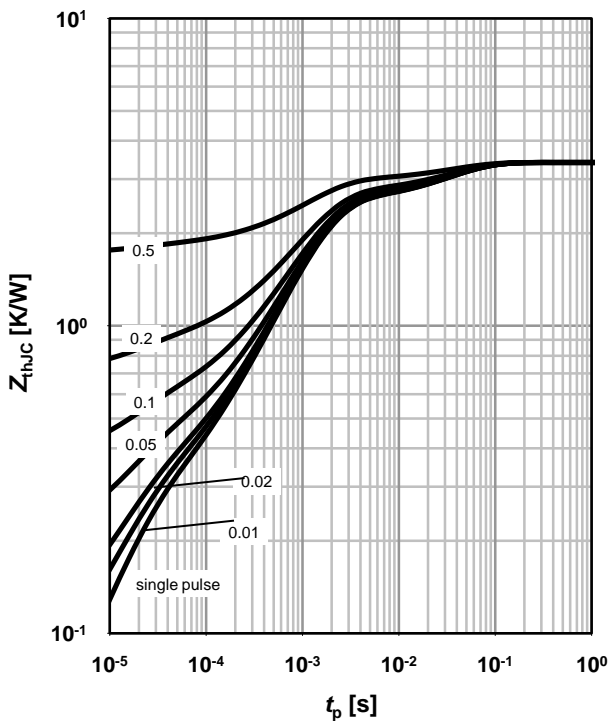
parameter:  $t_p$



**7 Max. transient thermal impedance (Q1)**

$Z_{thJC}=f(t_p)$

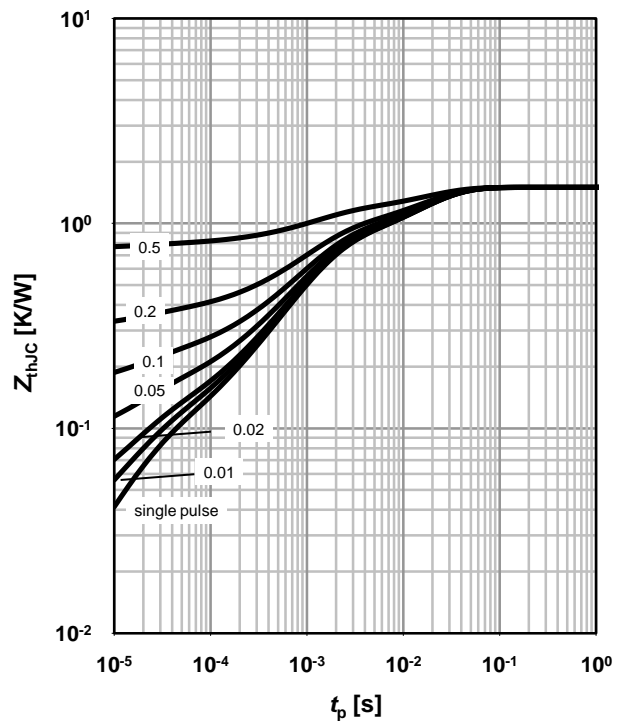
parameter:  $D=t_p/T$



**8 Max. transient thermal impedance (Q2)**

$Z_{thJC}=f(t_p)$

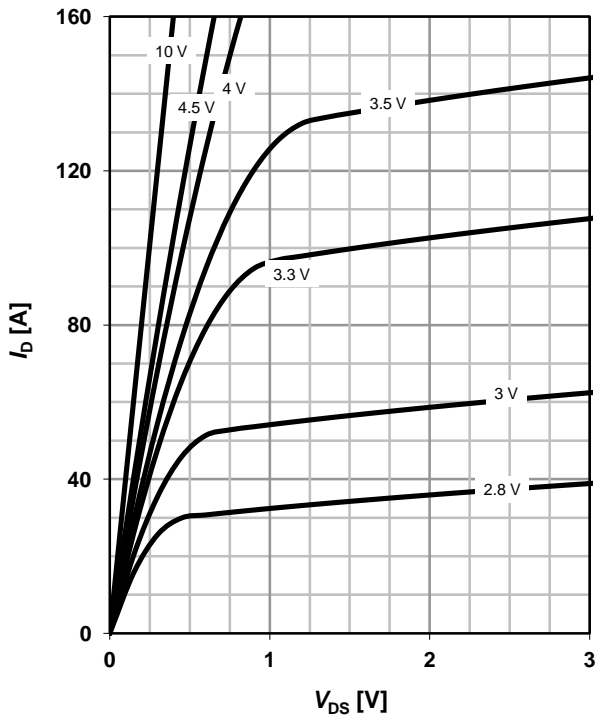
parameter:  $D=t_p/T$



**9 Typ. output characteristics (Q1)**

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

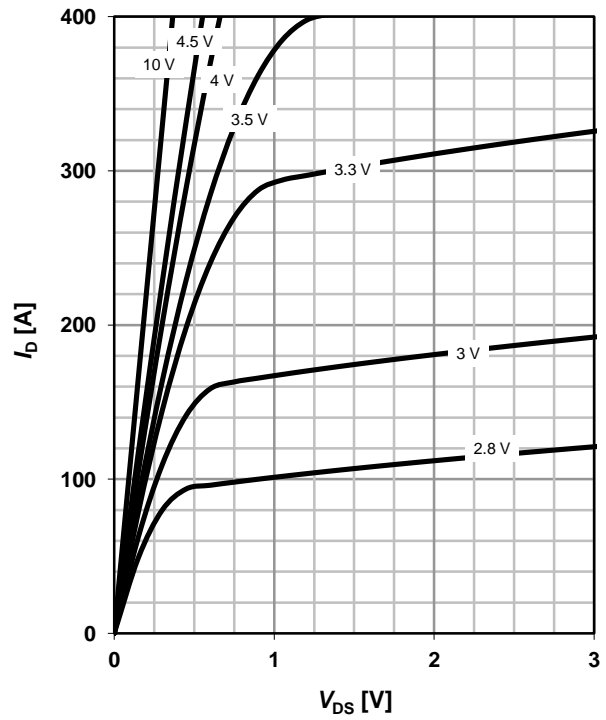
parameter:  $V_{GS}$



**10 Typ. output characteristics (Q2)**

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

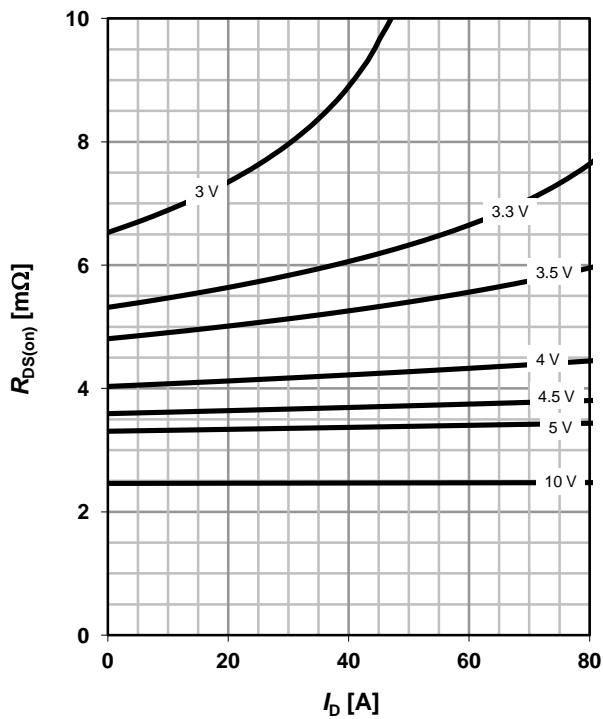
parameter:  $V_{GS}$



**11 Typ. drain-source on resistance (Q1)**

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

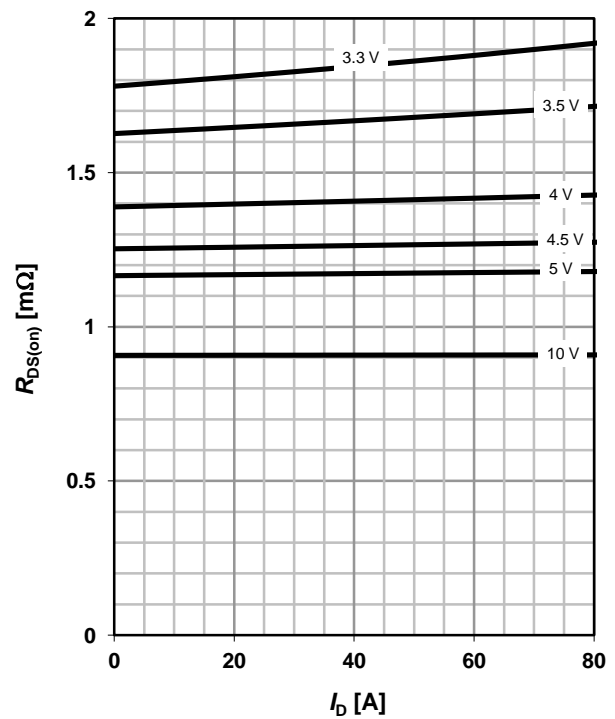
parameter:  $V_{GS}$



**12 Typ. drain-source on resistance (Q2)**

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

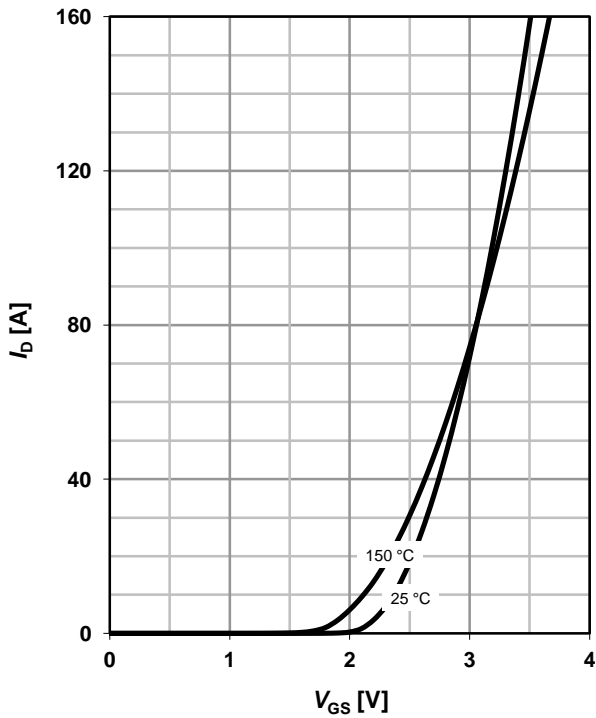
parameter:  $V_{GS}$



**13 Typ. transfer characteristics (Q1)**

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

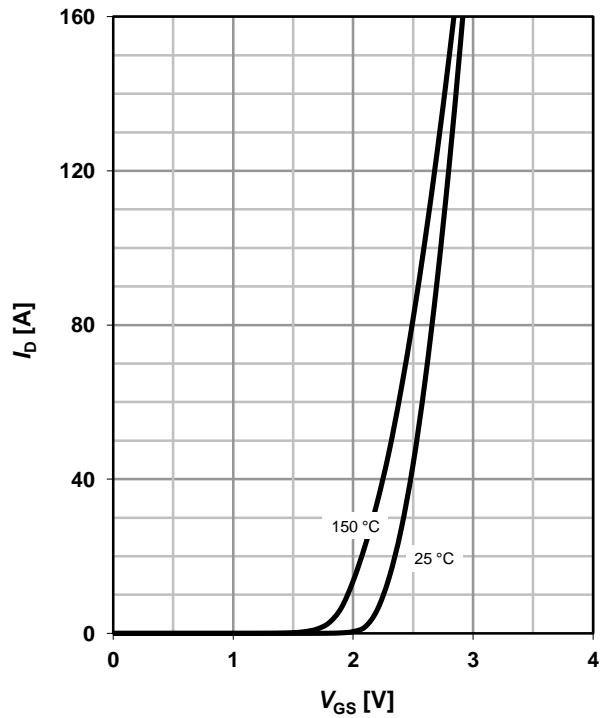
parameter:  $T_j$



**14 Typ. transfer characteristics (Q2)**

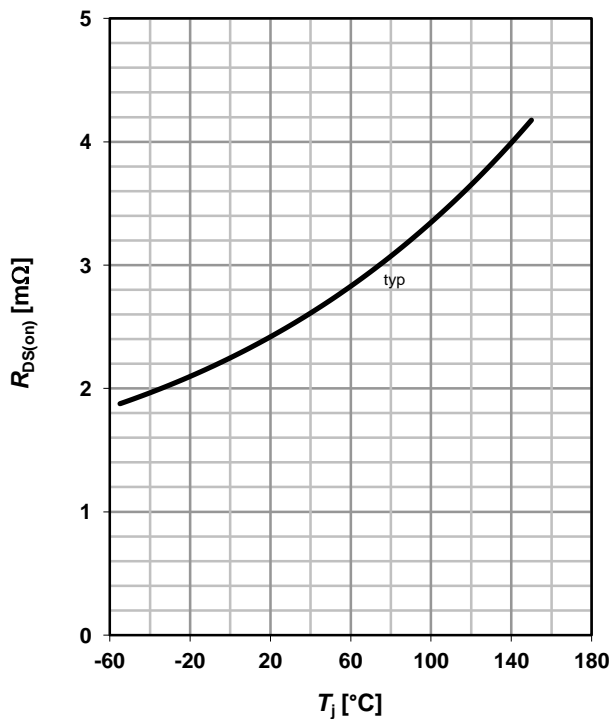
$$I_D = f(V_{GS}); |V_{DS}| > 2 |I_D| R_{DS(on)max}$$

parameter:  $T_j$



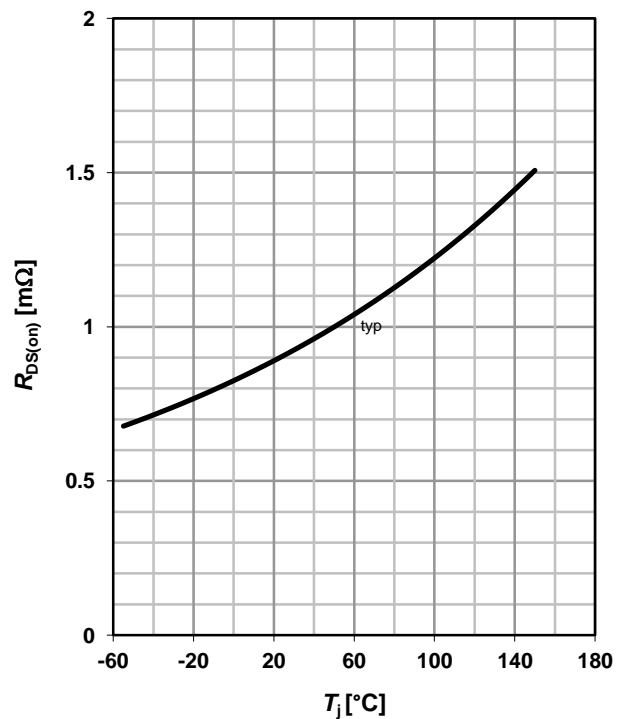
**15 Drain-source on-state resistance (Q1)**

$$R_{DS(on)} = f(T_j); I_D = 20 \text{ A}; V_{GS} = 10 \text{ V}$$



**16 Drain-source on-state resistance (Q2)**

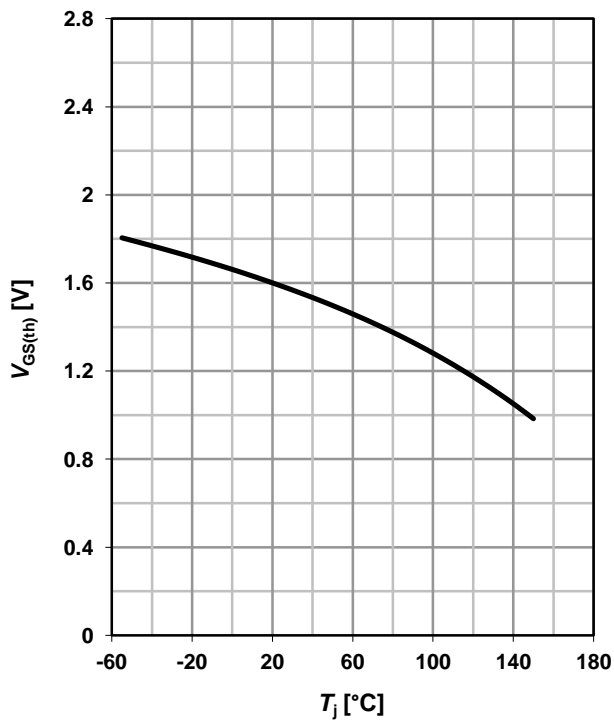
$$R_{DS(on)} = f(T_j); I_D = 20 \text{ A}; V_{GS} = 10 \text{ V}$$





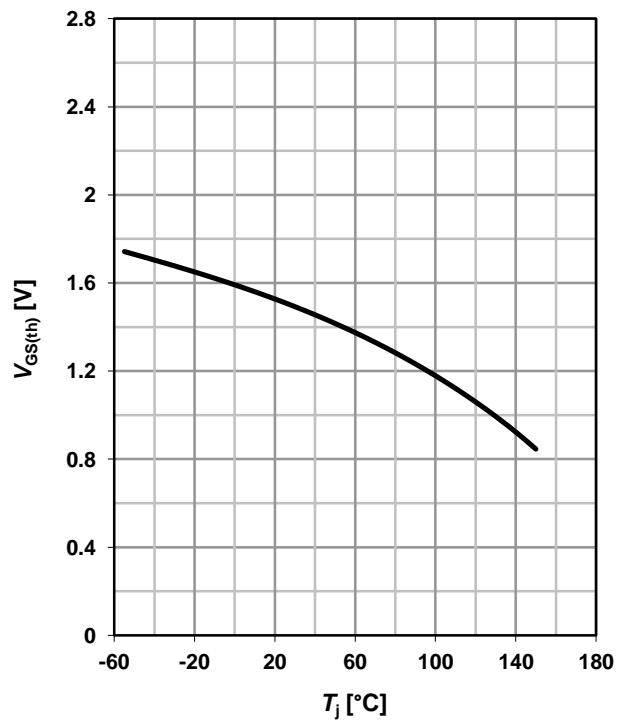
**17 Typ. gate threshold voltage (Q1)**

$V_{GS(th)}=f(T_j); V_{GS}=V_{DS}; I_D=250 \mu A$



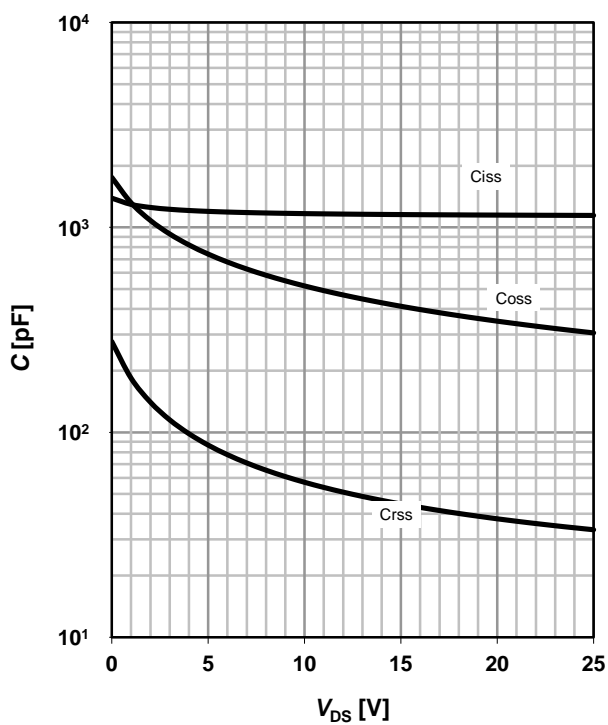
**18 Typ. gate threshold voltage (Q2)**

$V_{GS(th)}=f(T_j); V_{GS}=V_{DS}; I_D=250 \mu A$



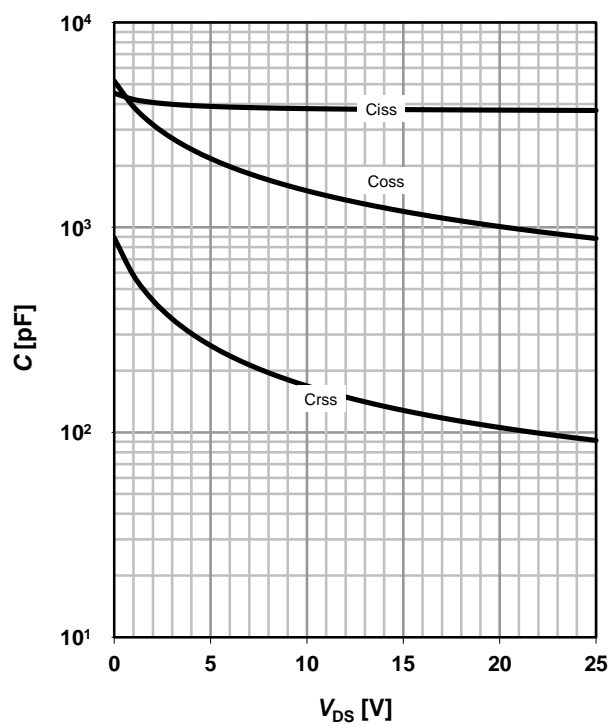
**19 Typ. capacitances (Q1)**

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



**20 Typ. capacitances (Q2)**

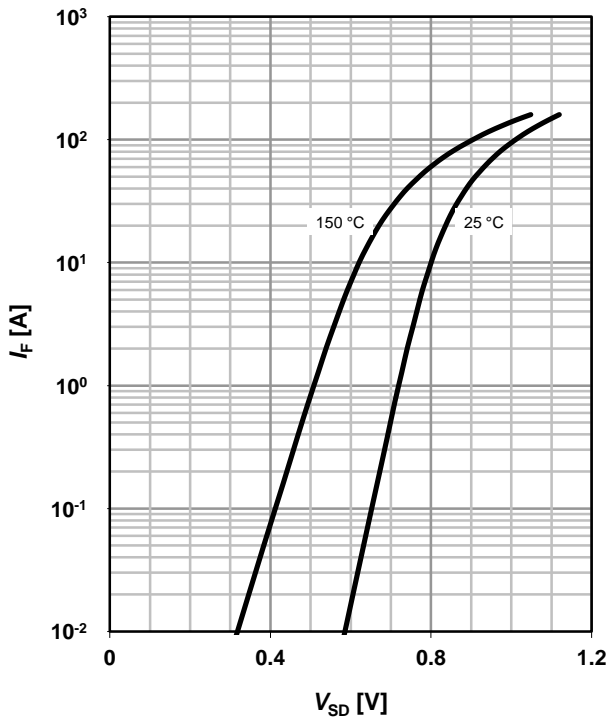
$C=f(V_{DS}); V_{GS}=0 V; f=1 MHz$



**21 Forward characteristics of reverse diode (Q1)**

$I_F=f(V_{SD})$

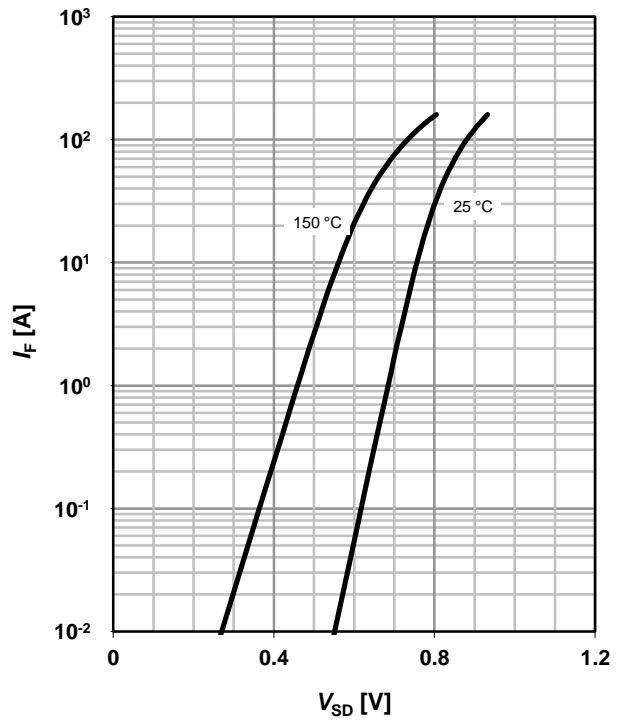
parameter:  $T_j$



**22 Forward characteristics of reverse diode (Q2)**

$I_F=f(V_{SD})$

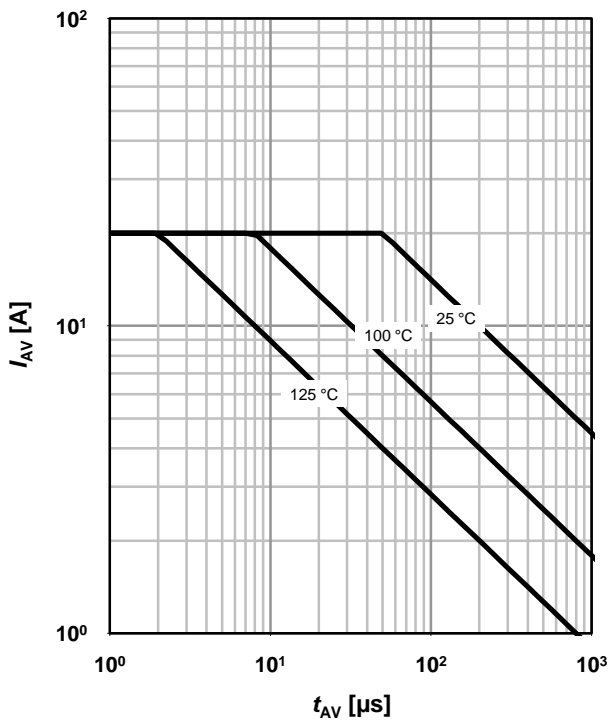
parameter:  $T_j$



**23 Avalanche characteristics (Q1)**

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

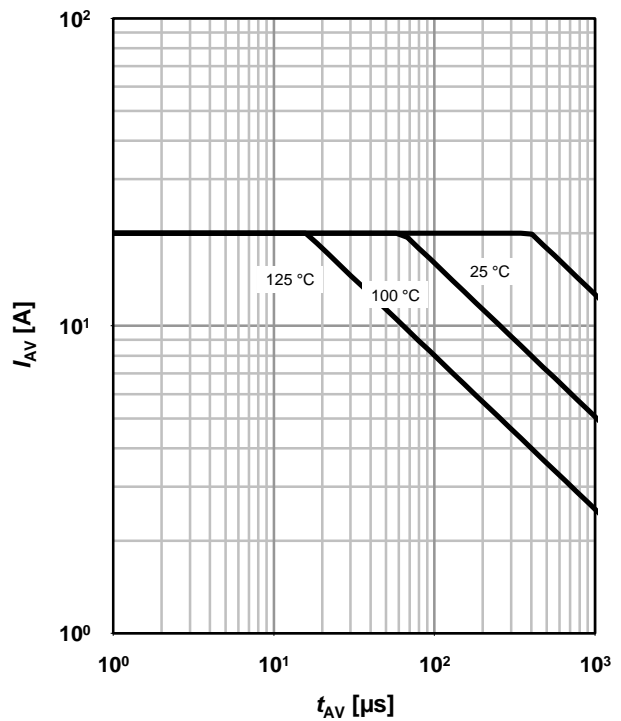
parameter:  $T_{j(start)}$



**24 Avalanche characteristics (Q2)**

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

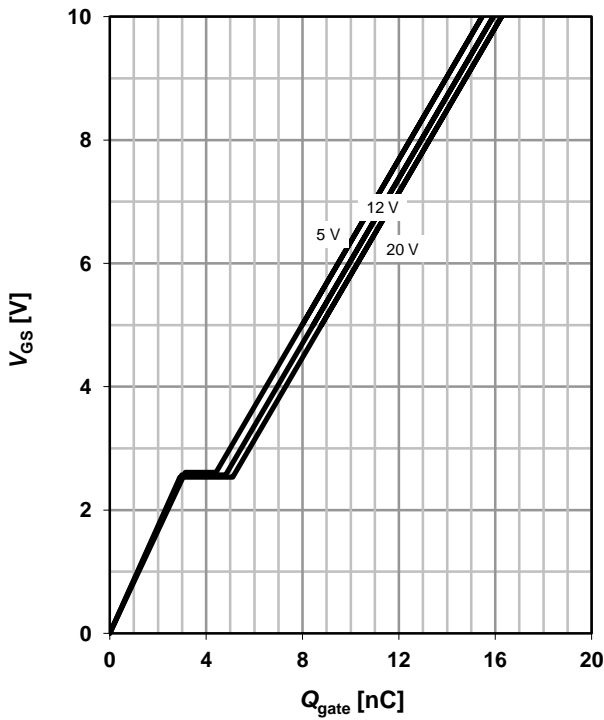
parameter:  $T_{j(start)}$



**25 Typ. gate charge (Q1)**

$V_{GS}=f(Q_{gate}); I_D=20\text{ A pulsed}$

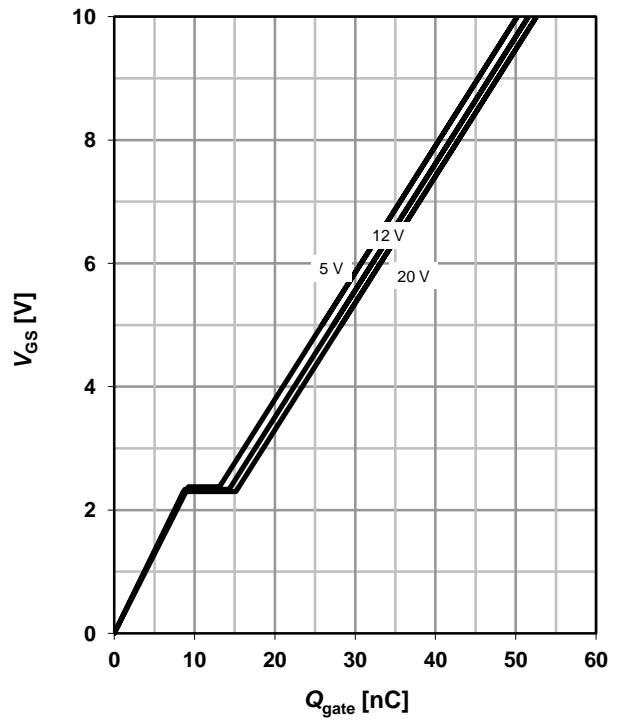
parameter:  $V_{DD}$



**26 Typ. gate charge (Q2)**

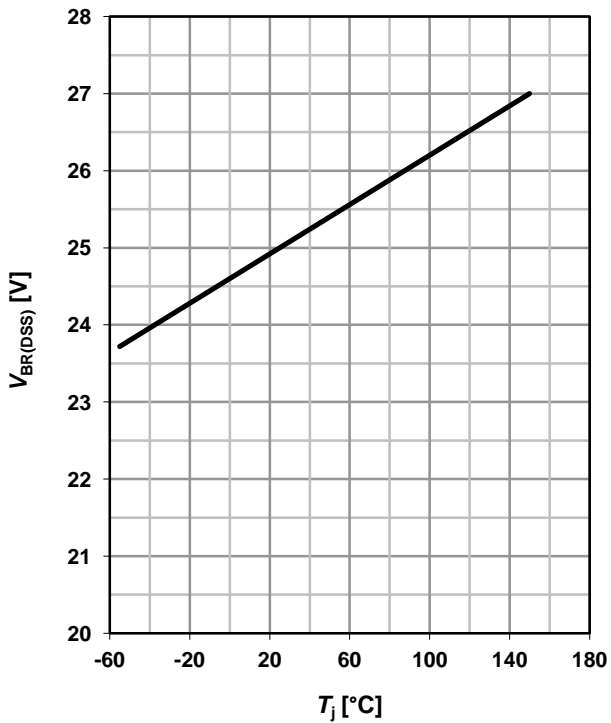
$V_{GS}=f(Q_{gate}); I_D=20\text{ A pulsed}$

parameter:  $V_{DD}$



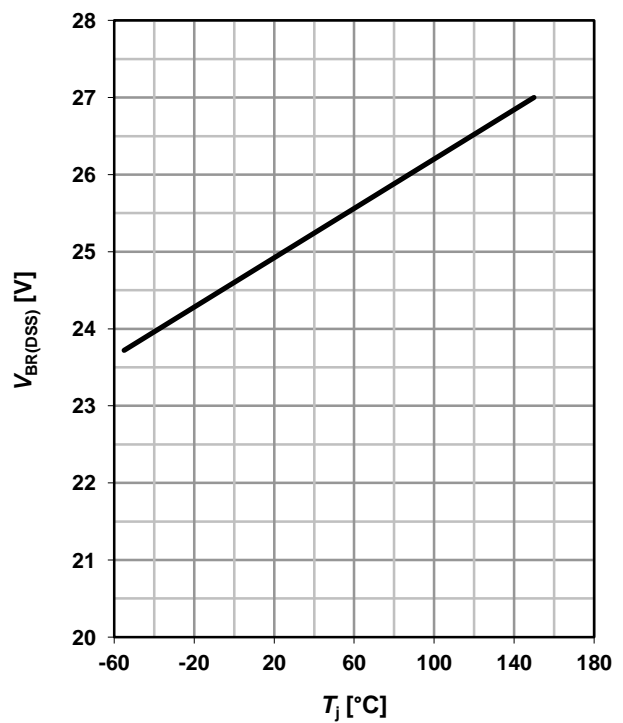
**27 Drain-source breakdown voltage (Q1)**

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



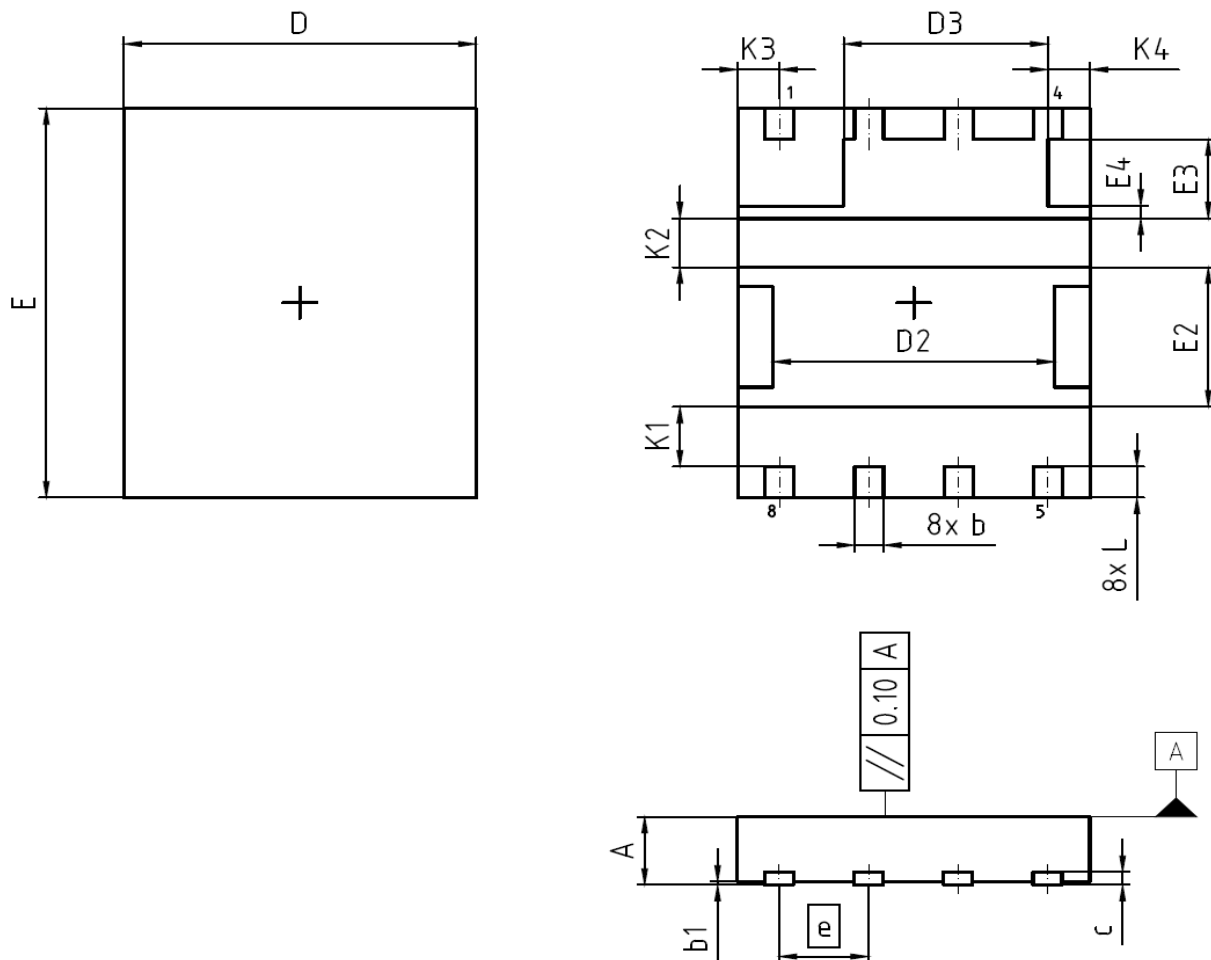
**28 Drain-source breakdown voltage (Q2)**

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



Package Outline

PG-TISON



| DIM     | MILLIMETERS |      | INCHES     |       |
|---------|-------------|------|------------|-------|
|         | MIN         | MAX  | MIN        | MAX   |
| A       | 0.90        | 1.15 | 0.035      | 0.045 |
| b       | 0.31        | 0.51 | 0.012      | 0.020 |
| b1      | 0.00        | 0.05 | 0.000      | 0.002 |
| c       | 0.10        | 0.30 | 0.004      | 0.012 |
| D       | 4.90        | 5.10 | 0.193      | 0.201 |
| D2      | 3.90        | 4.10 | 0.154      | 0.161 |
| D3      | 2.80        | 3.00 | 0.110      | 0.118 |
| E       | 5.90        | 6.10 | 0.232      | 0.240 |
| E2      | 2.05        | 2.25 | 0.081      | 0.089 |
| E3      | 1.12        | 1.32 | 0.044      | 0.052 |
| E4      | 0.10        | 0.30 | 0.004      | 0.012 |
| e       | 1.27 (BSC)  |      | 0.05 (BSC) |       |
| N       | 8           |      | 8          |       |
| L       | 0.38        | 0.58 | 0.015      | 0.023 |
| K1      | 0.82        | 1.02 | 0.032      | 0.040 |
| K2      | 0.65        | 0.85 | 0.026      | 0.033 |
| K3 = K4 | 0.50        | 0.70 | 0.019      | 0.027 |

DOCUMENT NO.  
Z8B00162738

SCALE

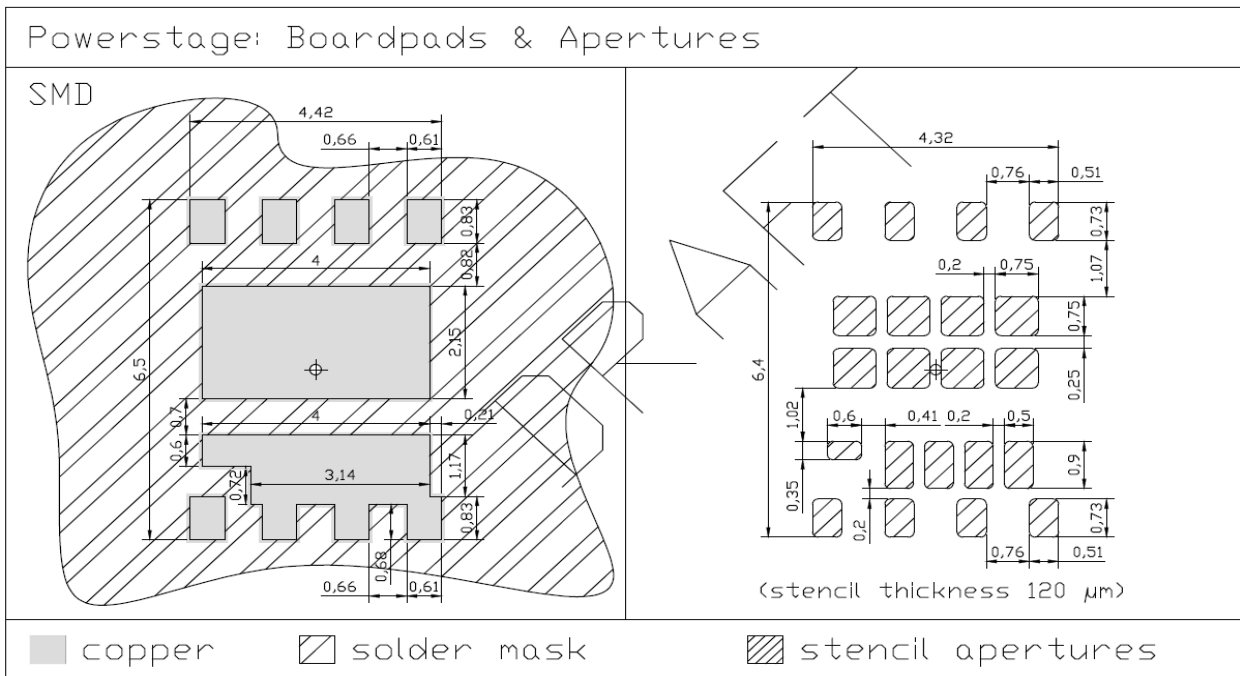
EUROPEAN PROJECTION

ISSUE DATE  
21-09-2011

REVISION  
01

Boardpads & Apertures

PG-TISON



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**Warnings**

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office. Infineon Technologies components may be used in life-support devices or systems only 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.



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

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