# ISZ230N10NM6ATMA1 Datasheet




| | |
|---|---|
| DiGi Electronics Part Number | ISZ230N10NM6ATMA1-DG |
| Manufacturer | Infineon Technologies |
| Manufacturer Product Number | ISZ230N10NM6ATMA1 |
| Description | TRENCH >=100V PG-TSDSON-8 |
| Detailed Description | N-Channel 100 V 7.7A (Ta), 31A (Tc) 3W (Ta), 48W ( Tc) Surface Mount PG-TSDSON-8 FL |

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## Purchase and inquiry

| Manufacturer Product Number: | Manufacturer: |
| --- | --- |
| ISZ230N10NM6ATMA1 | Infineon Technologies |
| Series: | Product Status: |
| OptiMOS™ 6 | Active |
| FET Type: | Technology: |
| N-Channel | MOSFET (Metal Oxide) |
| Drain to Source Voltage (Vdss): | Current - Continuous Drain (Id) @ 25°C: |
| 100 V | 7.7A (Ta), 31A (Tc) |
| Drive Voltage (Max Rds On, Min Rds On): | Rds On (Max) @ Id, Vgs: |
| 8V, 10V | 23mOhm @ 10A, 10V |
| Vgs(th) (Max) @ Id: | Gate Charge (Qg) (Max) @ Vgs: |
| 3.3V @ 13µA | 9.3 nC @ 10 V |
| Vgs (Max): | Input Capacitance (Ciss) (Max) @ Vds: |
| ±20V | 690 pF @ 50 V |
| FET Feature: | Power Dissipation (Max): |
| - | 3W (Ta), 48W (Tc) |
| Operating Temperature: | Mounting Type: |
| -55°C ~ 175°C (TJ) | Surface Mount |
| Supplier Device Package: | Package / Case: |
| PG-TSDSON-8 FL | 8-PowerTDFN |
| Base Product Number: | |
| ISZ230 | |

## Environmental & Export classification

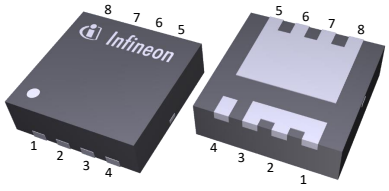
| RoHS Status: | Moisture Sensitivity Level (MSL): |
| --- | --- |
| ROHS3 Compliant | 1 (Unlimited) |
| REACH Status: | ECCN: |
| REACH Unaffected | EAR99 |
| HTSUS: | |
| 8541.29.0095 | |

# ISZ230N10NM6

# MOSFET

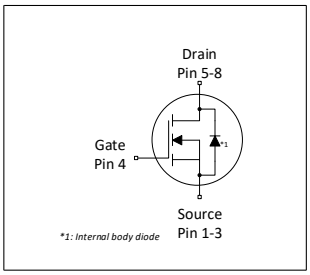
## OptiMOS™ 6 Power-Transistor, 100 V

PG-TSDSON-8 FL




### Features

- N-channel, normal level
- Very low on-resistance $R_{DS(on)}$
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Very low reverse recovery charge ($Q_{rr}$)
- High avalanche energy rating
- 175°C operating temperature
- Optimized for high frequency switching and synchronous rectification
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21
- MSL 1 classified according to J-STD-020




### Product validation

Fully qualified according to JEDEC for Industrial Applications

### Table 1 Key Performance Parameters

| Parameter | Value | Unit |
|---|---|---|
| $V_{DS}$ | 100 | V |
| $R_{DS(on),max}$ | 23 | mΩ |
| $I_D$ | 31 | A |
| $Q_{oss}$ | 14 | nC |
| $Q_G$(0V...10V) | 7.4 | nC |
| $Q_{rr}$ (100A/µs) | 23 | nC |

| Type / Ordering Code | Package | Marking | Related Links |
|---|---|---|---|
| ISZ230N10NM6 | PG-TSDSON-8 FL | 230N1N6 | - |

# OptiMOS™ 6 Power-Transistor, 100 V

**ISZ230N10NM6**

## Table of Contents

# OptiMOS™ 6 Power-Transistor, 100 V
**ISZ230N10NM6**

## 1 Maximum ratings
at $T_A$=25 °C, unless otherwise specified

### Table 2 Maximum ratings

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Continuous drain current[1] | $I_D$ | -<br>-<br>-<br>- | -<br>-<br>-<br>- | 31<br>22<br>19<br>7.7 | A | $V_{GS}$=10 V, $T_C$=25 °C<br>$V_{GS}$=10 V, $T_C$=100 °C<br>$V_{GS}$=8 V, $T_C$=100 °C<br>$V_{GS}$=10V, $T_A$=25°C, $R_{thJA}$=50°C/W[2] |
| Pulsed drain current[3] | $I_{D,pulse}$ | - | - | 124 | A | $T_A$=25 °C |
| Avalanche current, single pulse[4] | $I_{AS}$ | - | - | 10 | A | $T_C$=25 °C |
| Avalanche energy, single pulse | $E_{AS}$ | - | - | 65 | mJ | $I_D$=4 A, $R_{GS}$=25 Ω |
| Gate source voltage | $V_{GS}$ | -20 | - | 20 | V | - |
| Power dissipation | $P_{tot}$ | -<br>- | -<br>- | 48<br>3.0 | W | $T_C$=25 °C<br>$T_A$=25 °C, $R_{thJA}$=50 °C/W[2] |
| Operating and storage temperature | $T_j$, $T_{stg}$ | -55 | - | 175 | °C | - |

## 2 Thermal characteristics

### Table 3 Thermal characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Thermal resistance, junction - case, bottom | $R_{thJC}$ | - | 1.6 | 3.1 | °C/W | - |
| Thermal resistance, junction - case, top | $R_{thJC}$ | - | - | 20 | °C/W | - |
| Thermal resistance, junction - ambient, 6 cm² cooling area | $R_{thJA}$ | - | - | 50 | °C/W | - |

[1] Rating refers to the product only with datasheet specified absolute maximum values, maintaining case temperature as specified. For other case temperatures please refer to Diagram 2. De-rating will be required based on the actual environmental conditions.
[2] 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.
[3] See Diagram 3 for more detailed information
[4] See Diagram 13 for more detailed information

# 3 Electrical characteristics

at $T_j$=25 °C, unless otherwise specified

## Table 4 Static characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | 100 | - | - | V | $V_{GS}$=0 V, $I_D$=1 mA |
| Gate threshold voltage | $V_{GS(th)}$ | 2.3 | 2.8 | 3.3 | V | $V_{DS}$=$V_{GS}$, $I_D$=13 µA |
| Zero gate voltage drain current | $I_{DSS}$ | -<br>- | 0.1<br>10 | 1.0<br>100 | µA | $V_{DS}$=80 V, $V_{GS}$=0 V, $T_j$=25 °C<br>$V_{DS}$=80 V, $V_{GS}$=0 V, $T_j$=125 °C[1)] |
| Gate-source leakage current | $I_{GSS}$ | - | 10 | 100 | nA | $V_{GS}$=20 V, $V_{DS}$=0 V |
| Drain-source on-state resistance | $R_{DS(on)}$ | -<br>- | 19.6<br>23.8 | 23<br>30 | mΩ | $V_{GS}$=10 V, $I_D$=10 A<br>$V_{GS}$=8 V, $I_D$=5 A |
| Gate resistance | $R_G$ | 0.55 | 1.0 | 1.65 | Ω | - |
| Transconductance | $g_{fs}$ | 6.3 | 13 | - | S | \|$V_{DS}$\|≥2\|$I_D$\|$R_{DS(on)max}$, $I_D$=10 A |

## Table 5 Dynamic characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Input capacitance | $C_{iss}$ | - | 530 | 690 | pF | $V_{GS}$=0 V, $V_{DS}$=50 V, $f$=1 MHz |
| Output capacitance[1)] | $C_{oss}$ | - | 120 | 150 | pF | $V_{GS}$=0 V, $V_{DS}$=50 V, $f$=1 MHz |
| Reverse transfer capacitance[1)] | $C_{rss}$ | - | 6.5 | 9.8 | pF | $V_{GS}$=0 V, $V_{DS}$=50 V, $f$=1 MHz |
| Turn-on delay time | $t_{d(on)}$ | - | 4 | - | ns | $V_{DD}$=50 V, $V_{GS}$=10 V, $I_D$=5 A, $R_{G,ext}$=1.6 Ω |
| Rise time | $t_r$ | - | 1 | - | ns | $V_{DD}$=50 V, $V_{GS}$=10 V, $I_D$=5 A, $R_{G,ext}$=1.6 Ω |
| Turn-off delay time | $t_{d(off)}$ | - | 6.5 | - | ns | $V_{DD}$=50 V, $V_{GS}$=10 V, $I_D$=5 A, $R_{G,ext}$=1.6 Ω |
| Fall time | $t_f$ | - | 7 | - | ns | $V_{DD}$=50 V, $V_{GS}$=10 V, $I_D$=5 A, $R_{G,ext}$=1.6 Ω |

## Table 6 Gate charge characteristics[2)]

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Gate to source charge[1)] | $Q_{gs}$ | - | 2.5 | 3.3 | nC | $V_{DD}$=50 V, $I_D$=5 A, $V_{GS}$=0 to 10 V |
| Gate charge at threshold[1)] | $Q_{g(th)}$ | - | 1.5 | 1.8 | nC | $V_{DD}$=50 V, $I_D$=5 A, $V_{GS}$=0 to 10 V |
| Gate to drain charge[1)] | $Q_{gd}$ | - | 1.5 | 2.3 | nC | $V_{DD}$=50 V, $I_D$=5 A, $V_{GS}$=0 to 10 V |
| Switching charge | $Q_{sw}$ | - | 2.5 | - | nC | $V_{DD}$=50 V, $I_D$=5 A, $V_{GS}$=0 to 10 V |
| Gate charge total[1)] | $Q_g$ | - | 7.4 | 9.3 | nC | $V_{DD}$=50 V, $I_D$=5 A, $V_{GS}$=0 to 10 V |
| Gate plateau voltage | $V_{plateau}$ | - | 4.8 | - | V | $V_{DD}$=50 V, $I_D$=5 A, $V_{GS}$=0 to 10 V |
| Gate charge total, sync. FET | $Q_{g(sync)}$ | - | 6.5 | - | nC | $V_{DS}$=0.1 V, $V_{GS}$=0 to 10 V |
| Output charge[1)] | $Q_{oss}$ | - | 14 | 17 | nC | $V_{DS}$=50 V, $V_{GS}$=0 V |

[1)] Defined by design. Not subject to production test.
[2)] See ″Gate charge waveforms″ for parameter definition

# OptiMOS™ 6 Power-Transistor, 100 V
**ISZ230N10NM6**

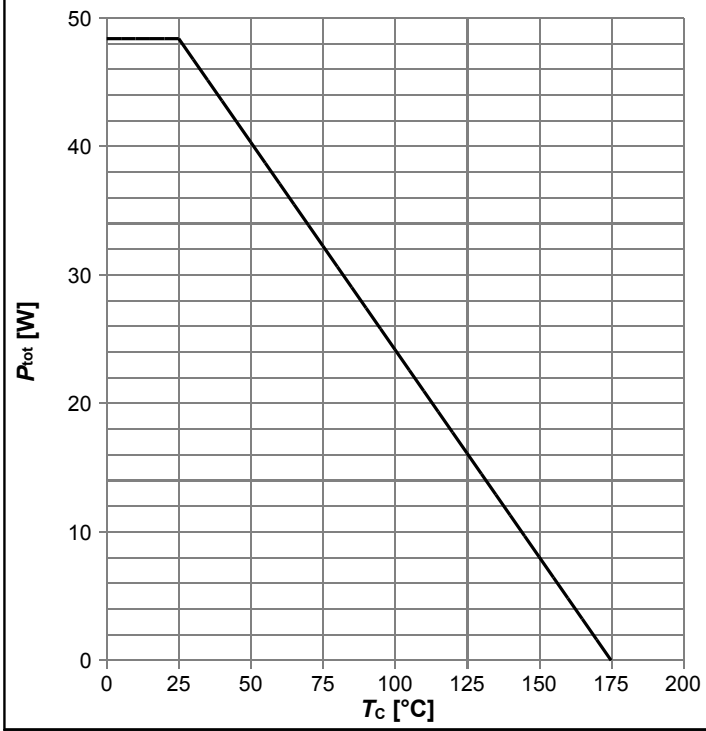
## Table 7 Reverse diode

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Diode continuous forward current | $I_S$ | - | - | 31 | A | $T_C$=25 °C |
| Diode pulse current | $I_{S,pulse}$ | - | - | 124 | A | $T_C$=25 °C |
| Diode forward voltage | $V_{SD}$ | - | 0.84 | 1.0 | V | $V_{GS}$=0 V, $I_F$=10 A, $T_j$=25 °C |
| Reverse recovery time[1)] | $t_{rr}$ | - | 30 | 45 | ns | $V_R$=50 V, $I_F$=5 A, d$i_F$/d$t$=100 A/µs |
| Reverse recovery charge[1)] | $Q_{rr}$ | - | 23 | 34.5 | nC | $V_R$=50 V, $I_F$=5 A, d$i_F$/d$t$=100 A/µs |
| Reverse recovery time[1)] | $t_{rr}$ | - | 14 | 21 | ns | $V_R$=50 V, $I_F$=5 A, d$i_F$/d$t$=1000 A/µs |
| Reverse recovery charge[1)] | $Q_{rr}$ | - | 86.5 | 130 | nC | $V_R$=50 V, $I_F$=5 A, d$i_F$/d$t$=1000 A/µs |

[1)] Defined by design. Not subject to production test.

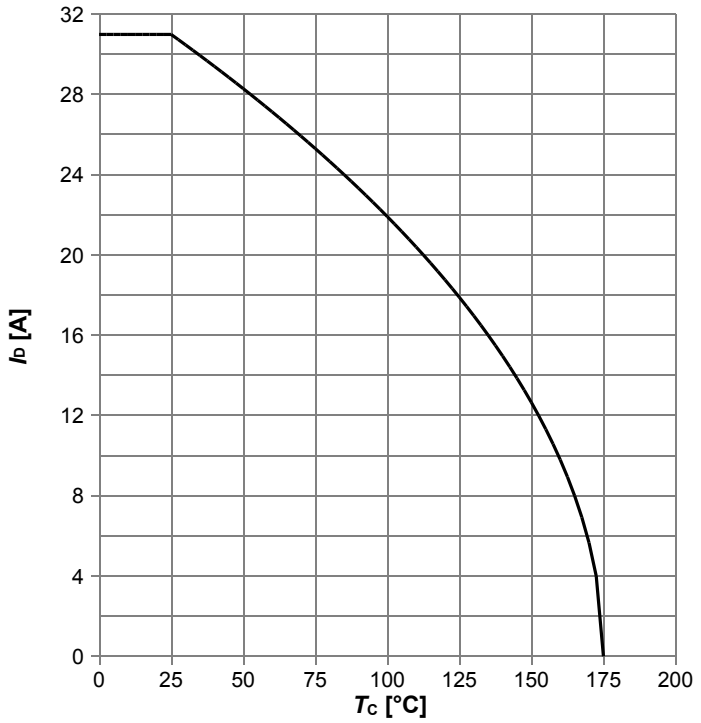
# 4 Electrical characteristics diagrams

**Diagram 1: Power dissipation**



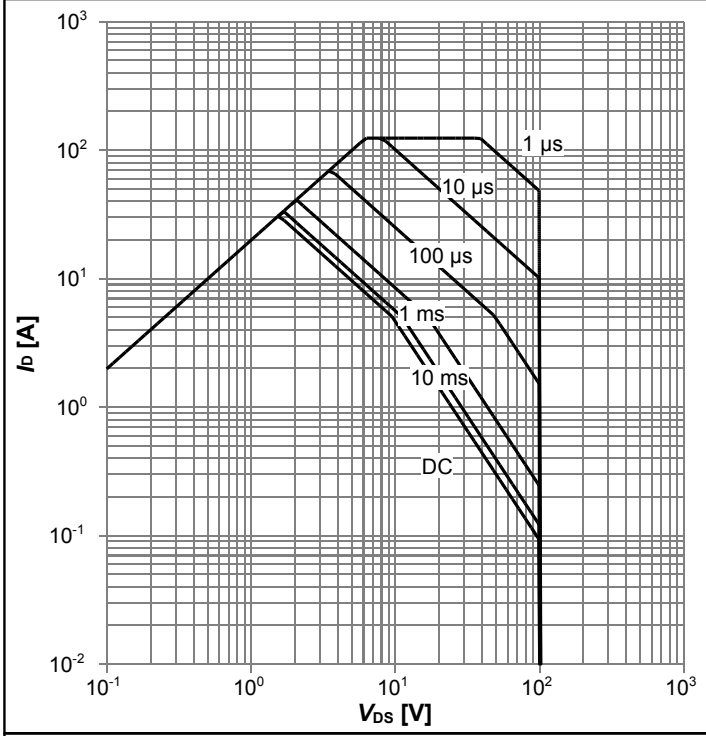

$P_{tot}=f(T_C)$

**Diagram 2: Drain current**



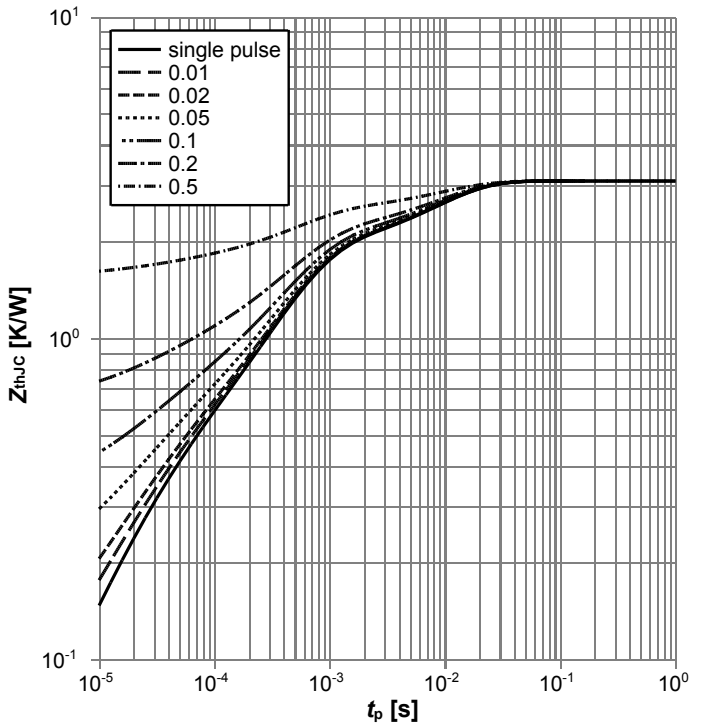

$I_D=f(T_C)$; $V_{GS}\geq 10$ V

**Diagram 3: Safe operating area**




$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$; parameter: $t_p$

**Diagram 4: Max. transient thermal impedance**

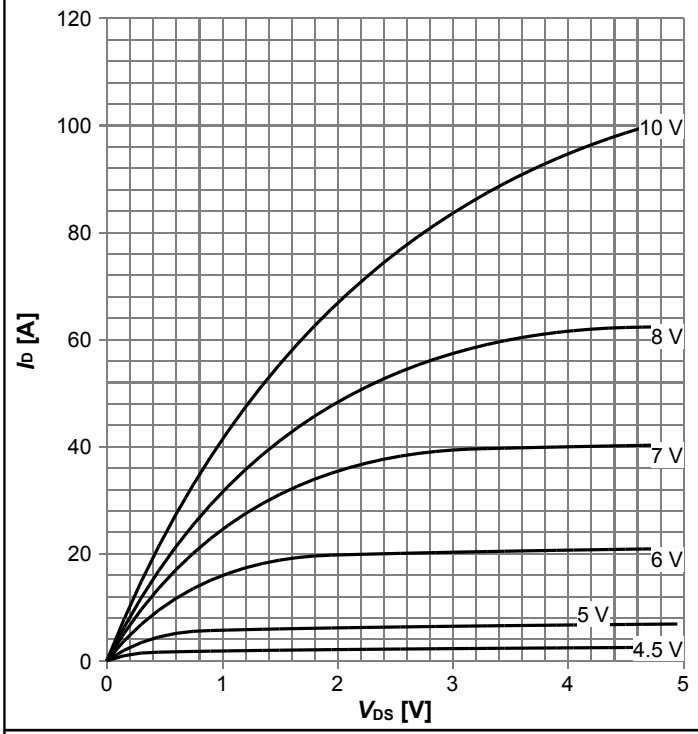



$Z_{thJC}=f(t_p)$; parameter: $D=t_p/T$

# OptiMOS™ 6 Power-Transistor, 100 V

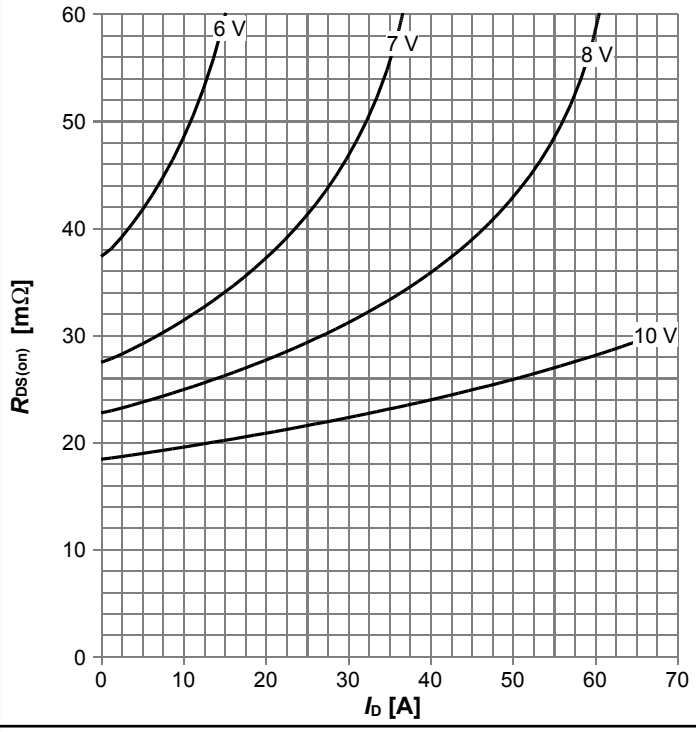
**ISZ230N10NM6**

**Diagram 5: Typ. output characteristics**



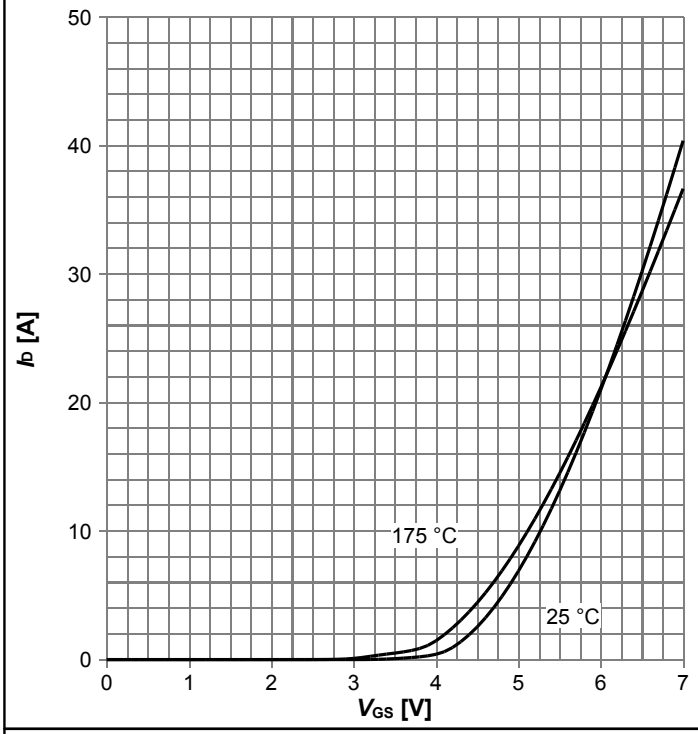

$I_D$=f($V_{DS}$), $T_j$=25 °C; parameter: $V_{GS}$

**Diagram 6: Typ. drain-source on resistance**



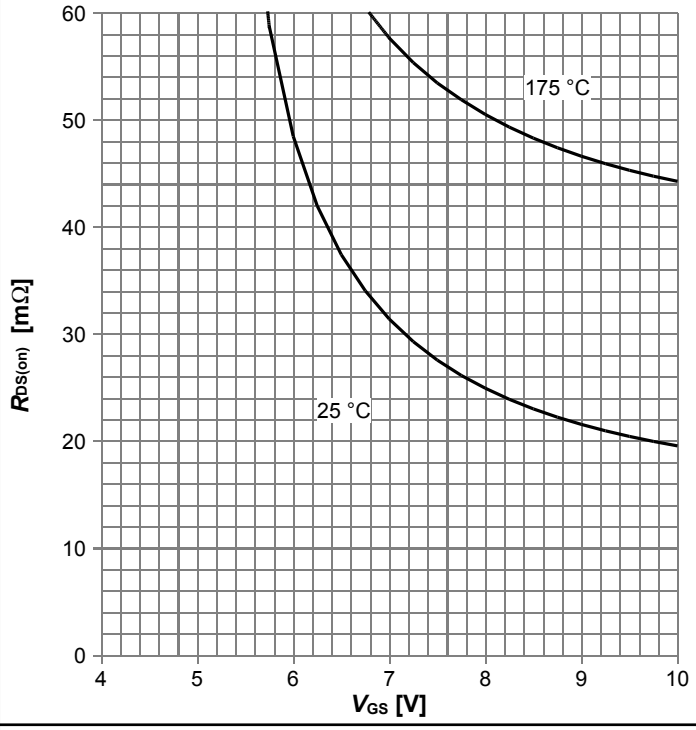

$R_{DS(on)}$=f($I_D$), $T_j$=25 °C; parameter: $V_{GS}$

**Diagram 7: Typ. transfer characteristics**




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

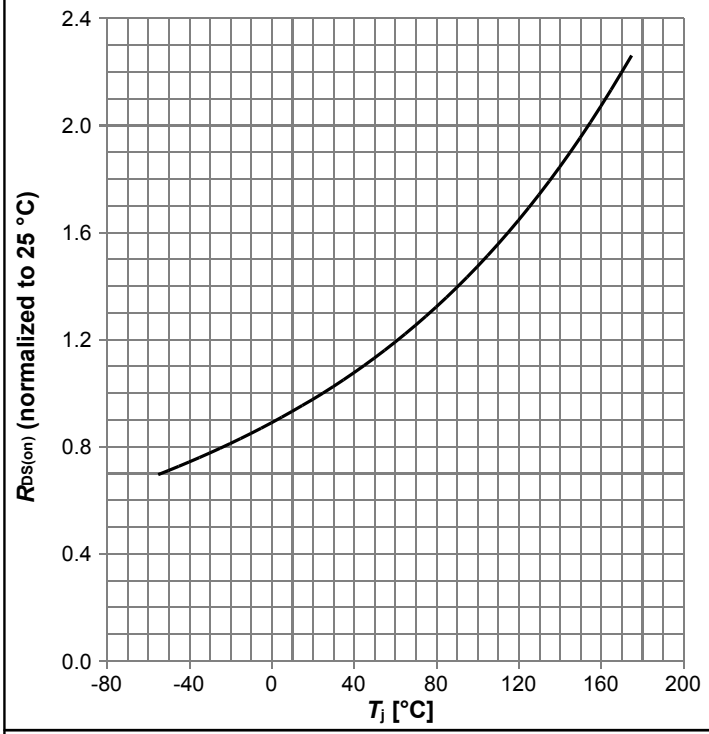
**Diagram 8: Typ. drain-source on resistance**




$R_{DS(on)}$=f($V_{GS}$), $I_D$=10 A; parameter: $T_j$

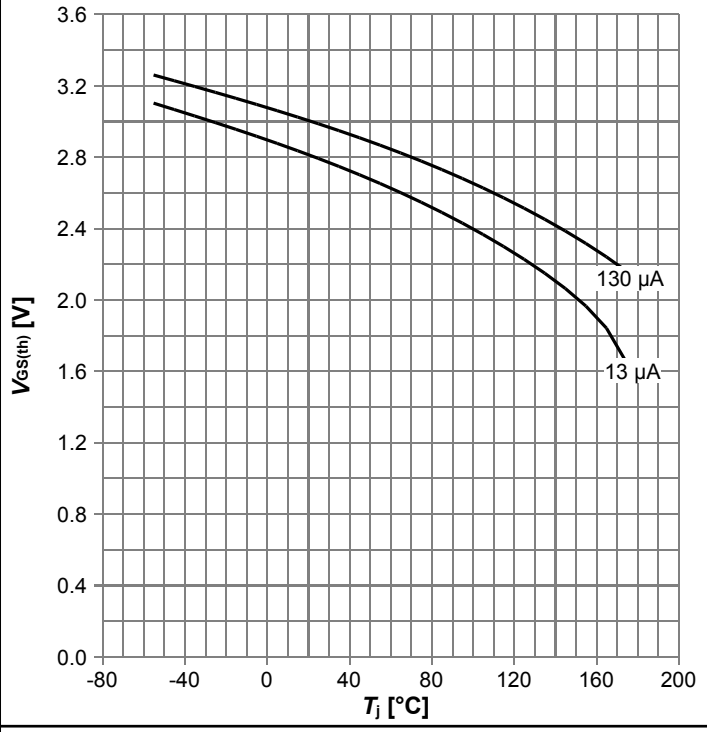
# OptiMOS™ 6 Power-Transistor, 100 V
## ISZ230N10NM6

**Diagram 9: Normalized drain-source on resistance**



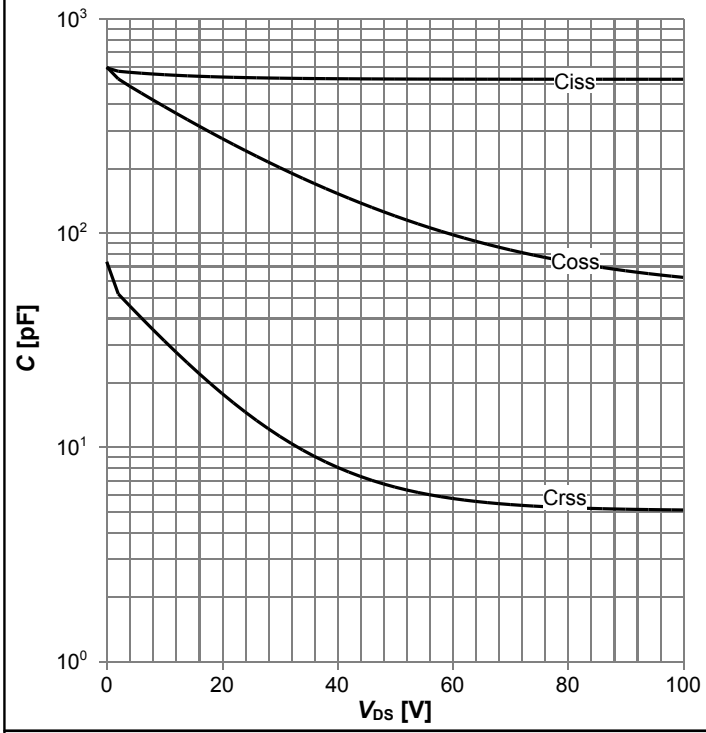

$R_{DS(on)}$=f($T_j$), $I_D$=10 A, $V_{GS}$=10 V

**Diagram 10: Typ. gate threshold voltage**



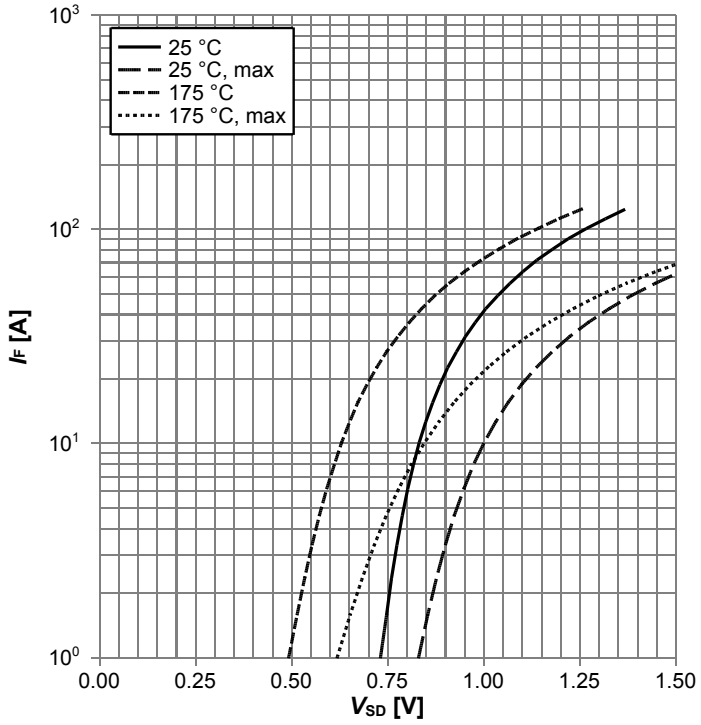

$V_{GS(th)}$=f($T_j$), $V_{GS}$=$V_{DS}$; parameter: $I_D$

**Diagram 11: Typ. capacitances**




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

**Diagram 12: Forward characteristics of reverse diode**




$I_F$=f($V_{SD}$); parameter: $T_j$

# OptiMOS™ 6 Power-Transistor, 100 V

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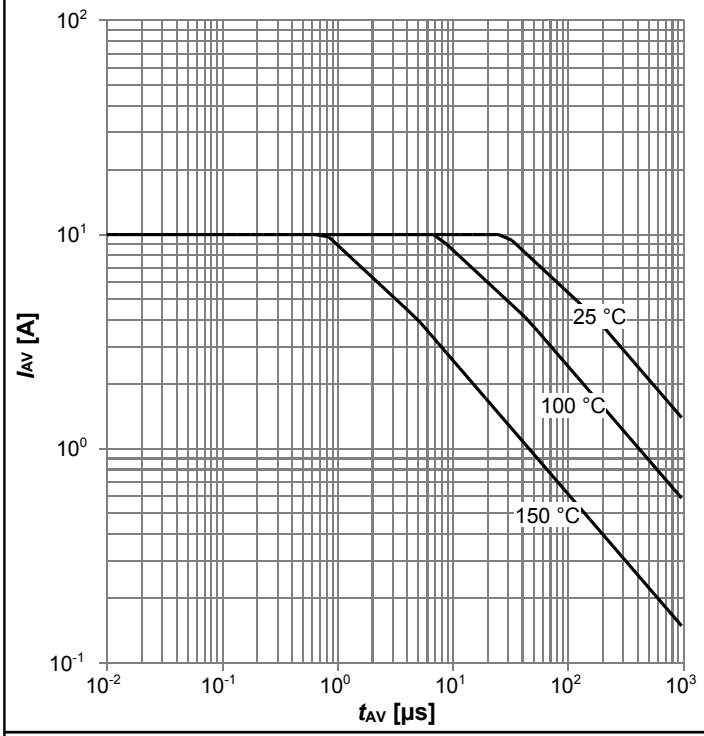
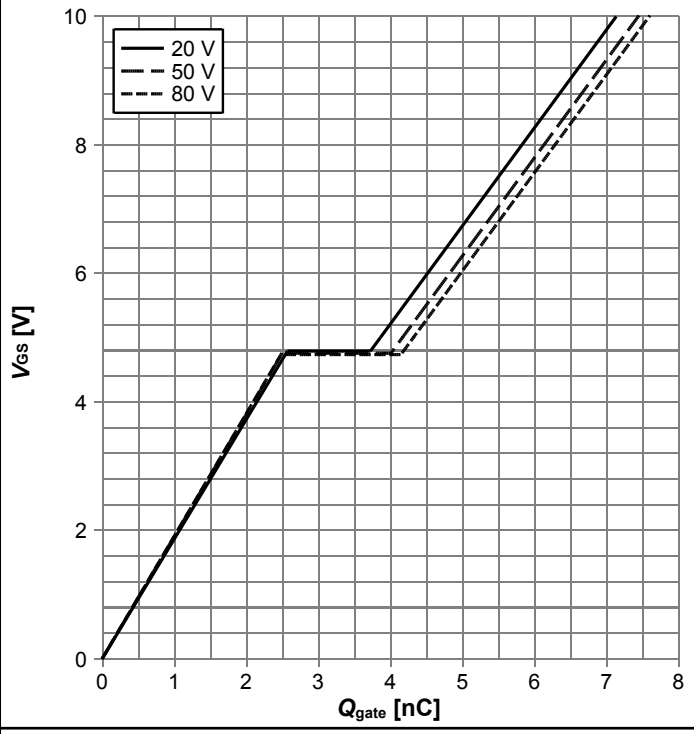
**Diagram 13: Avalanche characteristics**



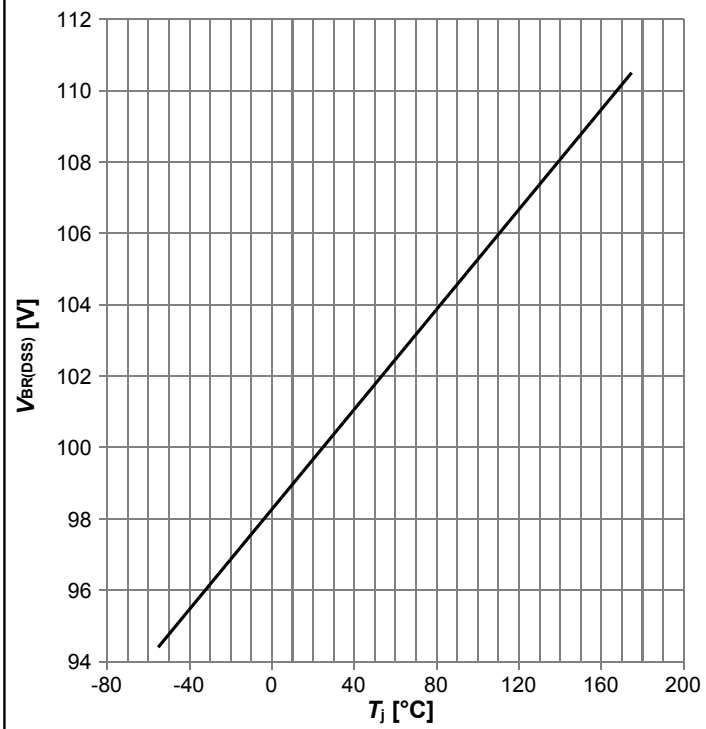

$I_{AS}$=f($t_{AV}$); $R_{GS}$=25 Ω; parameter: $T_{j,start}$

**Diagram 14: Typ. gate charge**



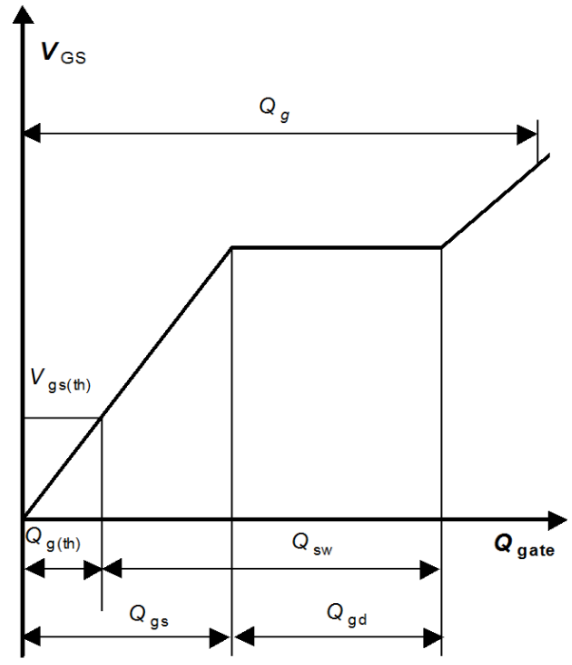

$V_{GS}$=f($Q_{gate}$), $I_D$=5 A pulsed, $T_j$=25 °C; parameter: $V_{DD}$

**Diagram 15: Drain-source breakdown voltage**

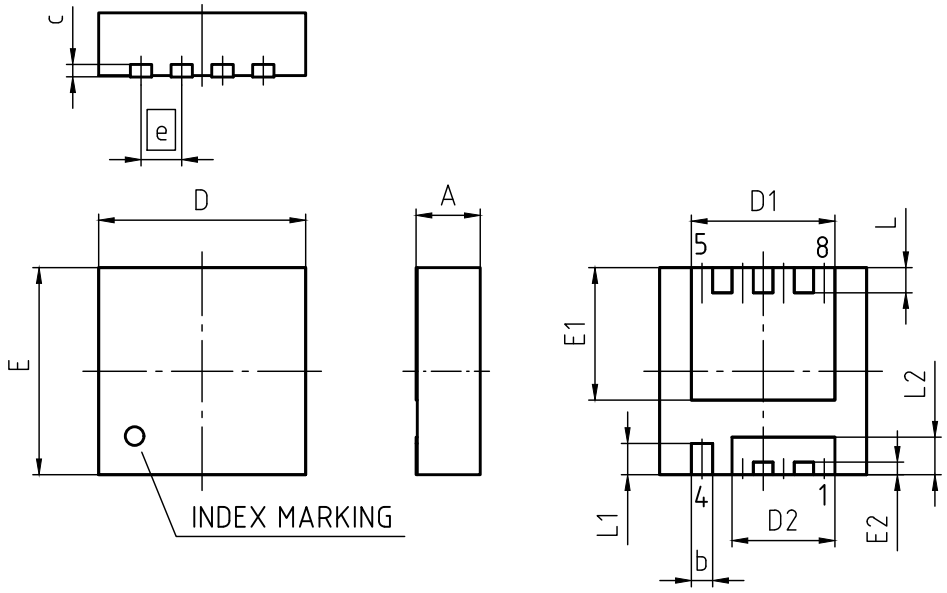



$V_{BR(DSS)}$=f($T_j$); $I_D$=10 mA

**Diagram Gate charge waveforms**



# 5 Package Outlines




| PACKAGE - GROUP NUMBER: | PG-TSDSON-8-U03 | |
|---|---|---|
| REVISION: 03 | DATE: 20.10.2020 | |
| **DIMENSIONS** | **MILLIMETERS** | |
| | MIN. | MAX. |
| **A** | 0.90 | 1.10 |
| **b** | 0.24 | 0.44 |
| **c** | (0.20) | |
| **D** | 3.20 | 3.40 |
| **D1** | 2.19 | 2.39 |
| **D2** | 1.54 | 1.74 |
| **E** | 3.20 | 3.40 |
| **E1** | 2.01 | 2.21 |
| **E2** | 0.10 | 0.30 |
| **e** | 0.65 | |
| **L** | 0.30 | 0.50 |
| **L1** | 0.40 | 0.60 |
| **L2** | 0.50 | 0.70 |
| **aaa** | 0.06 | |

**Figure 1 Outline PG-TSDSON-8 FL, dimensions in mm**

# OptiMOS™ 6 Power-Transistor, 100 V
**ISZ230N10NM6**

## Revision History

ISZ230N10NM6

**Revision: 2023-02-10, Rev. 2.2**

Previous Revision

| Revision | Date | Subjects (major changes since last revision) |
|---|---|---|
| 2.0 | 2021-07-05 | Release of final version |
| 2.1 | 2021-07-20 | Update Diagram 10 and IAS |
| 2.2 | 2023-02-10 | Update SOA Diagram |



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**Infineon Technologies AG**
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