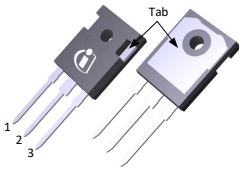
# MOSFET

PG-TO247-3

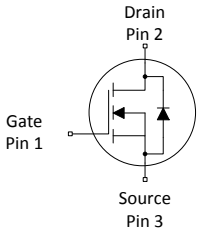
## StrongIRFET™ Power MOSFET, 100 V

## Features




- High Efficiency Synchronous Rectification in SMPS
- Uninterruptible Power Supply
- High Speed Power Switching
- 175°C operating temperature
- Hard Switched and High Frequency Circuits
- Product validation according to JEDEC standard

## Benefits




- Improved Gate, Avalanche and Dynamic dV/dt Ruggedness
- Fully Characterized Capacitance and Avalanche SOA
- Pb-free lead plating; RoHS compliant
- Lead free, Halogen-free according to IEC61249-2-21

## Product validation

Fully qualified according to JEDEC for Industrial Applications

**Table 1 Key performance parameters**

| Parameter | Value | Unit |
|---|---|---|
| $V_{DS}$ | 100 | V |
| $R_{DS(on),max}$ | 2.6 | mΩ |
| $I_D$ | 195 | A |
| $Q_{oss}$ | 149 | nC |
| $Q_G$ (0V..10V) | 363 | nC |

| Type / Ordering code | Package | Marking | Related links |
|---|---|---|---|
| IRFPW4468PbF | PG-TO247-3 | IRFPW4468 | - |

## Table of contents

# 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] | $I_D$ | - | - | 195<br>150<br>25 | A | $V_{GS}$=10 V, $T_C$=25 °C<br>$V_{GS}$=10 V, $T_C$=100 °C<br>$V_{GS}$=10 V, $T_A$=25 °C, $R_{THJA}$=40 °C/W [2] |
| Pulsed drain current [3] | $I_{D,pulse}$ | - | - | 780 | A | $T_C$=25 °C |
| Avalanche energy, single pulse [4] | $E_{AS}$ | - | - | 740 | mJ | $I_D$=180 A, $R_{GS}$=25 Ω |
| Gate source voltage | $V_{GS}$ | -20 | - | 20 | V | - |
| Power dissipation | $P_{tot}$ | - | - | 517<br>3.8 | W | $T_C$=25 °C<br>$T_A$=25 °C, $R_{THJA}$=40 °C/W [2] |
| Operating and storage temperature | $T_j$, $T_{stg}$ | -55 | - | 175 | °C | - |

[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 $cm^2$ (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.

# 2 Thermal characteristics

**Table 3 Thermal characteristics**

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Thermal resistance, junction - case | $R_{thJC}$ | - | 0.2 | 0.29 | °C/W | - |
| Thermal resistance, junction - ambient [5)] | $R_{thJA}$ | - | - | 40 | °C/W | |
| Case-to-Sink, Flat Greased Surface | $R_{thCS}$ | - | 0.24 | - | °C/W | |

[5)] Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 $cm^2$ (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

# 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 | $V_{GS(th)}$ | 2.0 | 3.0 | 4.0 | V | $V_{DS}$=$V_{GS}$, $I_D$=1000 µA |
| Zero gate voltage drain current | $I_{DSS}$ | - | 0.1<br>10 | 1<br>100 | µA | $V_{DS}$=100 V, $V_{GS}$=0 V, $T_j$=25 °C<br>$V_{DS}$=100 V, $V_{GS}$=0 V, $T_j$=125 °C |
| Gate-source leakage current | $I_{GSS}$ | - | 10 | 100 | nA | $V_{GS}$=20 V, $V_{DS}$=0 V |
| Drain-source on-state resistance | $R_{DS(on)}$ | - | 2.27 | 2.60 | mΩ | $V_{GS}$=10 V, $I_D$=180 A |
| Gate resistance | $R_G$ | - | 0.90 | - | Ω | - |
| Transconductance [6] | $g_{fs}$ | 185 | 370 | - | S | $\|V_{DS}\|\geq 2\|I_D\|R_{DS(on)max}$, $I_D$=180 A |

[6] Defined by design. Not subject to production test.

**Table 5 Dynamic characteristics**

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Input capacitance [7] | $C_{iss}$ | - | 22000 | 29000 | pF | $V_{GS}$=0 V, $V_{DS}$=50 V, $f$=1 MHz |
| Output capacitance [7] | $C_{oss}$ | - | 1300 | 1700 | pF | |
| Reverse transfer capacitance [7] | $C_{rss}$ | - | 580 | 1000 | pF | |
| Turn-on delay time | $t_{d(on)}$ | - | 53 | - | ns | $V_{DD}$=65 V, $V_{GS}$=10 V, $I_D$=180 A, $R_{G,ext}$=2.7 Ω |
| Rise time | $t_r$ | - | 245 | - | ns | |
| Turn-off delay time | $t_{d(off)}$ | - | 171 | - | ns | |
| Fall time | $t_f$ | - | 278 | - | ns | |

[7] Defined by design. Not subject to production test.

**Table 6 Gate charge characteristics** [8]

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Gate to source charge | $Q_{gs}$ | - | 104 | - | nC | $V_{DD}$=50 V, $I_D$=180 A, $V_{GS}$=0 to 10 V |
| Gate charge at threshold | $Q_{g(th)}$ | - | 65 | - | nC | |
| Gate to drain charge [9] | $Q_{gd}$ | - | 96 | 144 | nC | |
| Switching charge | $Q_{sw}$ | - | 134 | - | nC | |
| Gate charge total [9] | $Q_g$ | - | 363 | 540 | nC | |
| Gate plateau voltage | $V_{plateau}$ | - | 4.8 | - | V | |
| Gate charge total, sync. FET | $Q_{g(sync)}$ | - | 312 | - | nC | $V_{DS}$=0.1 V, $V_{GS}$=0 to 10 V |
| Output charge [9] | $Q_{oss}$ | - | 149 | 224 | nC | $V_{DS}$=50 V, $V_{GS}$=0 V |

[8] See figure 16 for gate charge parameter definition

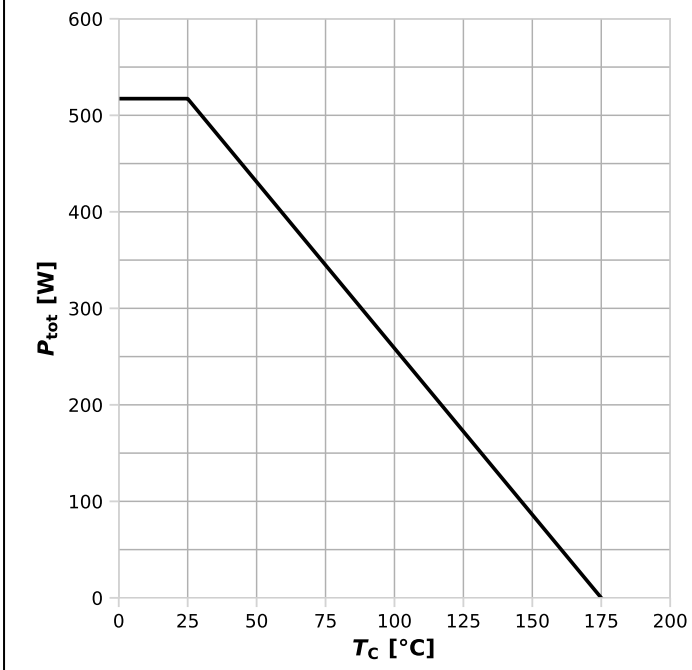
[9] Defined by design. Not subject to production test.

**Table 7 Reverse diode**

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Diode continuous forward current | $I_S$ | - | - | 177 | A | $T_C$=25 °C |
| Diode pulse current | $I_{S,pulse}$ | - | - | 780 | A | |
| Diode forward voltage | $V_{SD}$ | - | 0.96 | 1.3 | V | $V_{GS}$=0 V, $I_F$=180 A, $T_j$=25 °C |
| Reverse recovery time | $t_{rr}$ | - | 88 | - | ns | $V_R$=85 V, $I_F$=180 A, d$i_F$/d$t$=100 A/µs |
| Reverse recovery charge | $Q_{rr}$ | - | 333 | - | nC | |

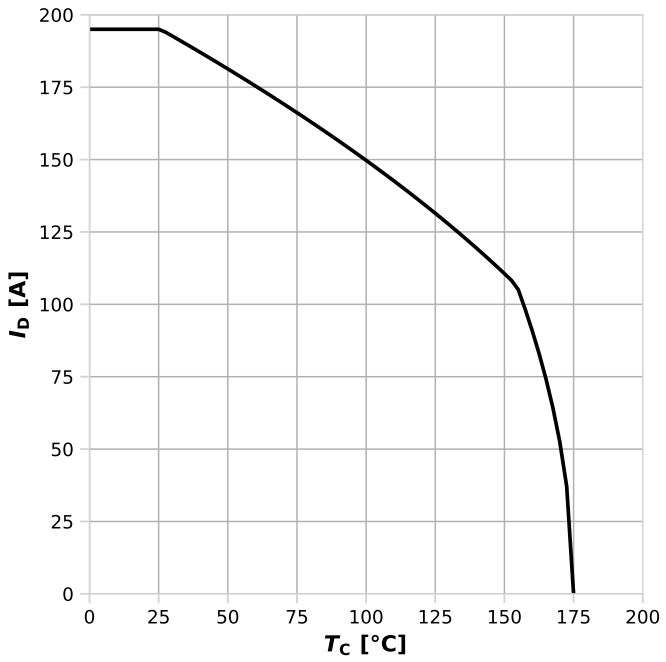
# 4 Electrical characteristics diagrams

**Diagram 1: Power dissipation**



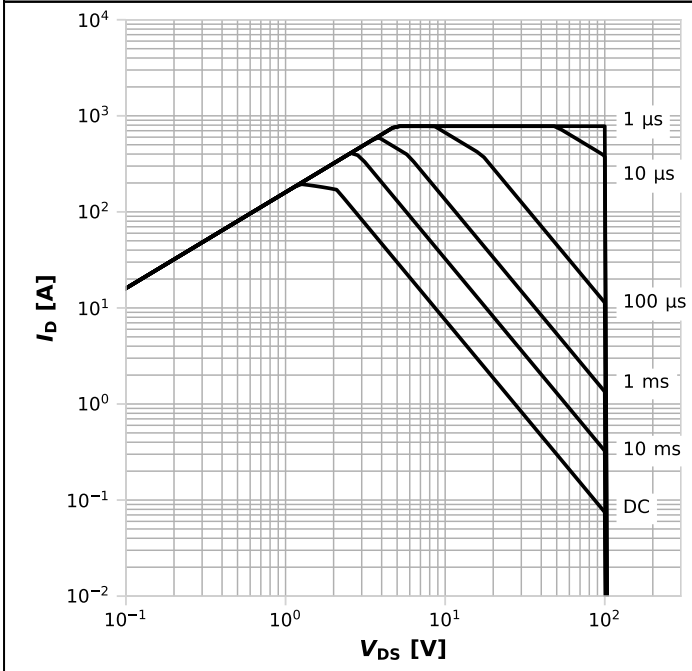

$P_{tot}$=f($T_C$)

**Diagram 2: Drain current**



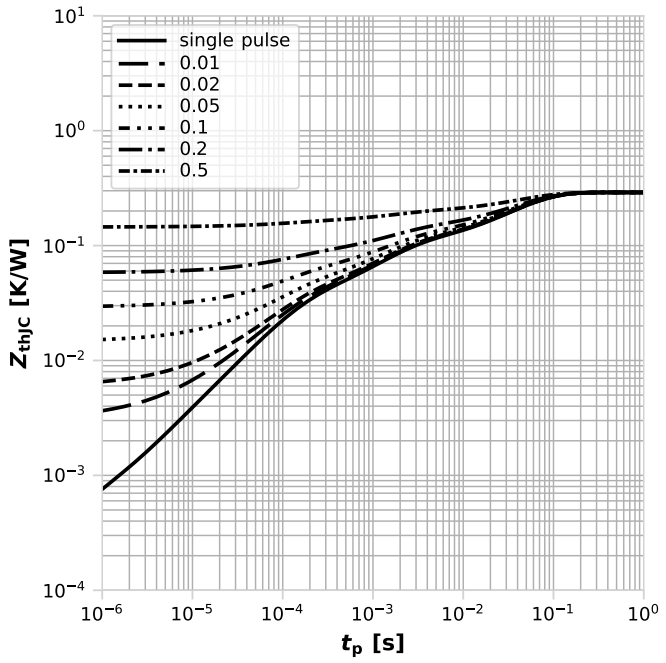

$I_D$=f($T_C$); $V_{GS}$≥10 V

**Diagram 3: Safe operating area**



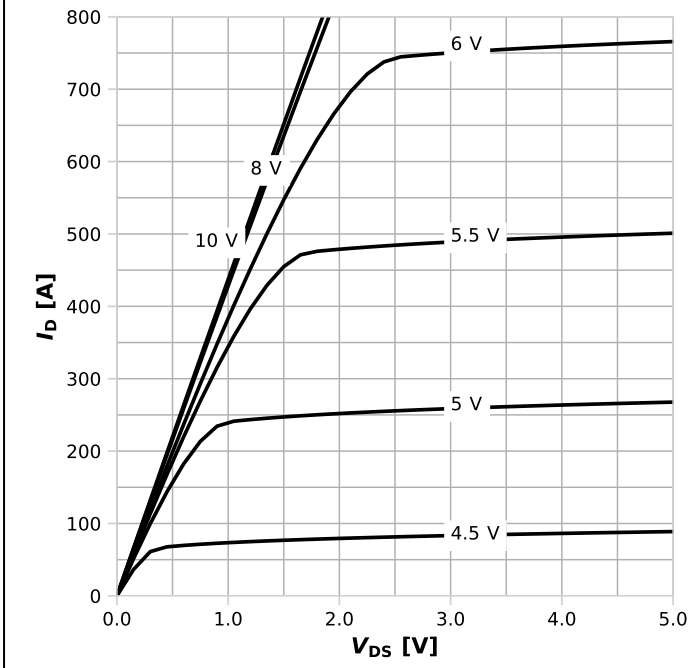

$I_D$=f($V_{DS}$); $T_C$=25 °C; $D$=0; parameter: $t_p$

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



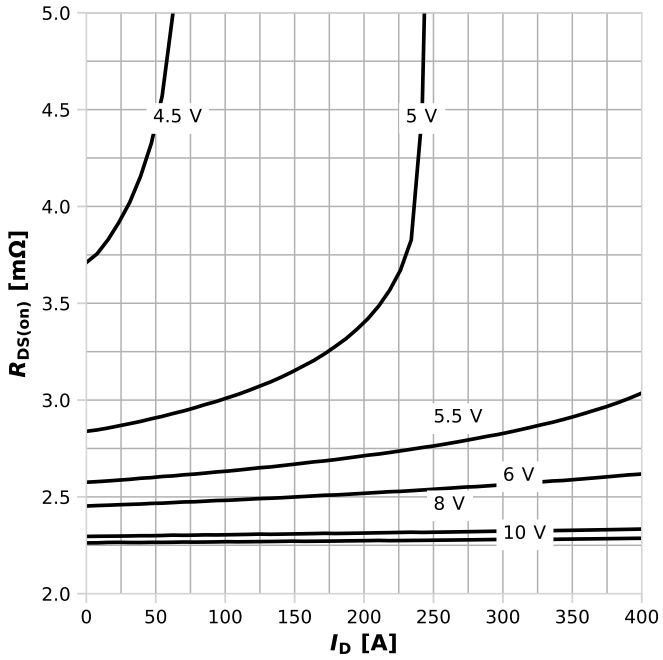

$Z_{thJC}$=f($t_p$); parameter: $D$=$t_p$/$T$

**Diagram 5: Typ. output characteristics**



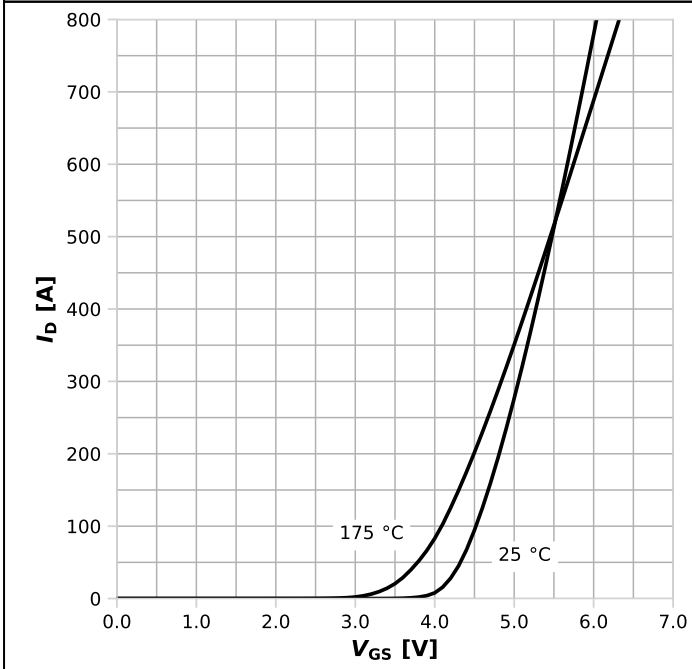

$I_D$=f($V_{DS}$), $T_j$=25 °C; parameter: $V_{GS}$

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



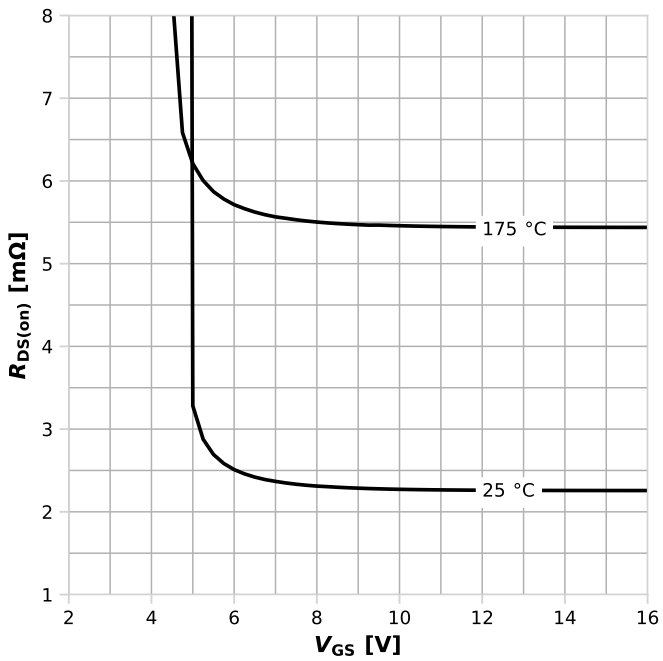

$R_{DS(on)}$=f($I_D$), $T_j$=25 °C; parameter: $V_{GS}$

**Diagram 7: Typ. transfer characteristics**



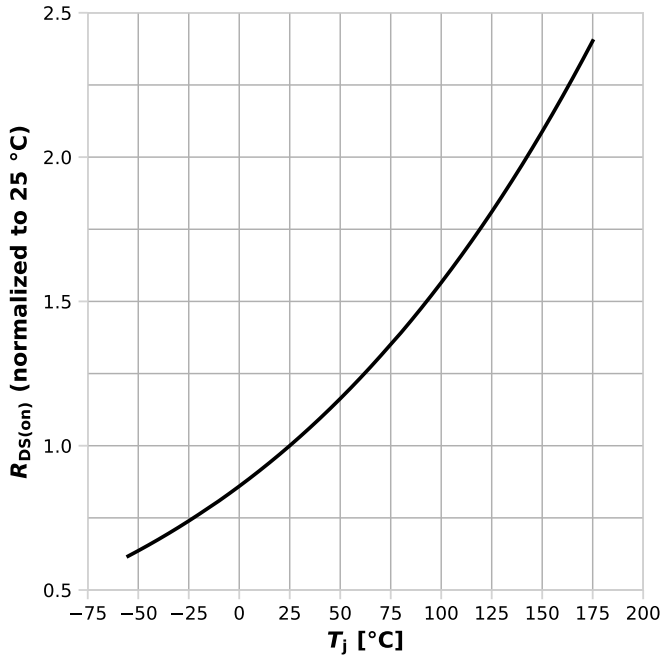

$I_D$=f($V_{GS}$), $|V_{DS}|>2|I_D|R_{DS(on)max}$; parameter: $T_j$

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



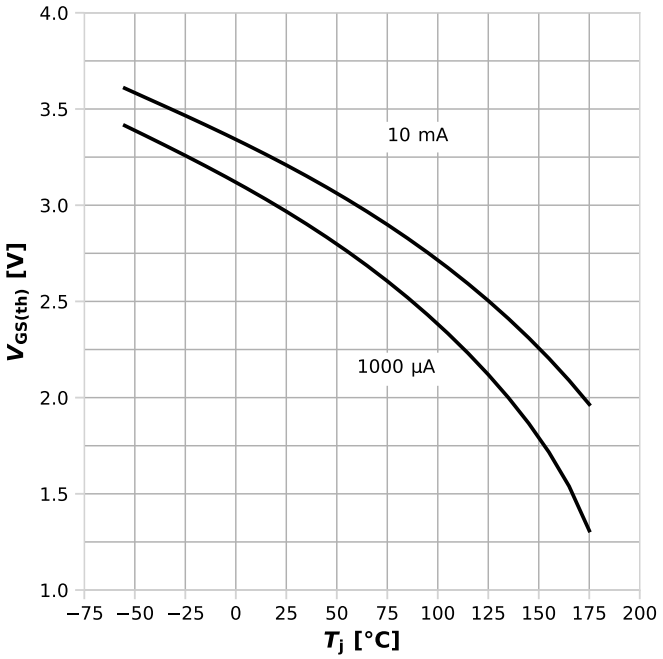

$R_{DS(on)}$=f($V_{GS}$), $I_D$=180 A; parameter: $T_j$

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



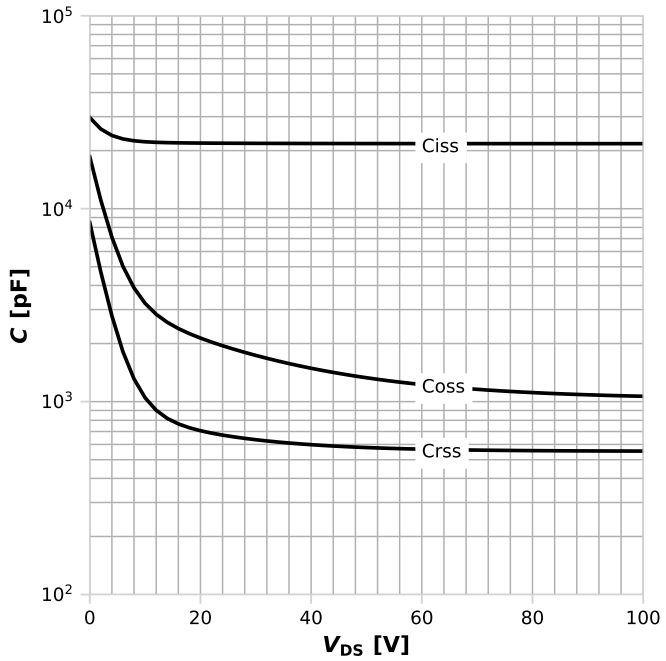

$R_{DS(on)}$=f($T_j$), $I_D$=180 A, $V_{GS}$=10 V

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



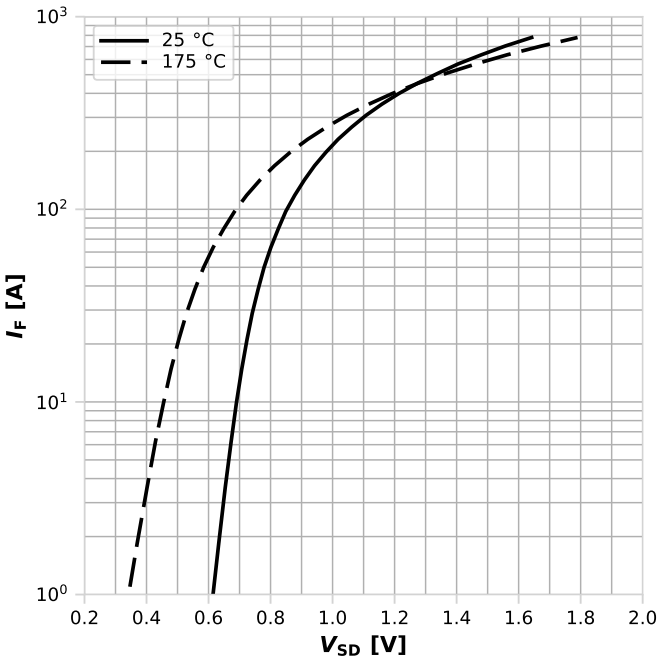

$V_{GS(th}$=f($T_j$), $V_{GS}$=$V_{DS}$; parameter: $I_D$

**Diagram 11: Typ. capacitances**

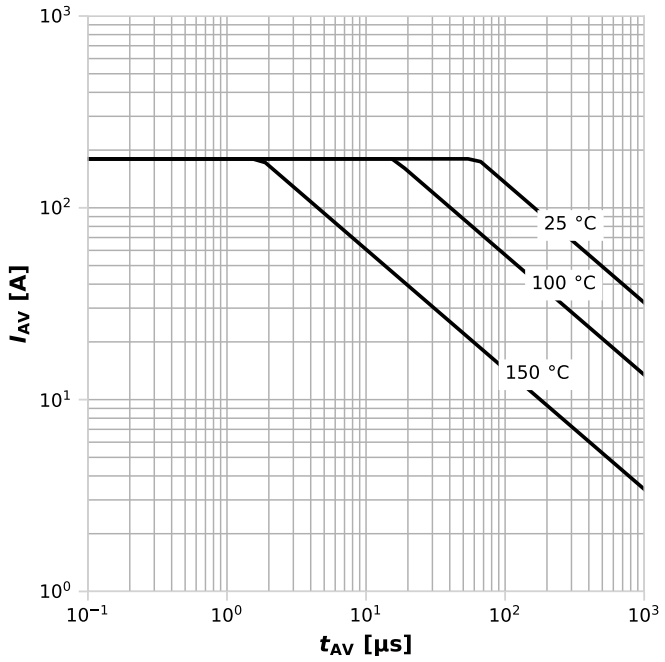
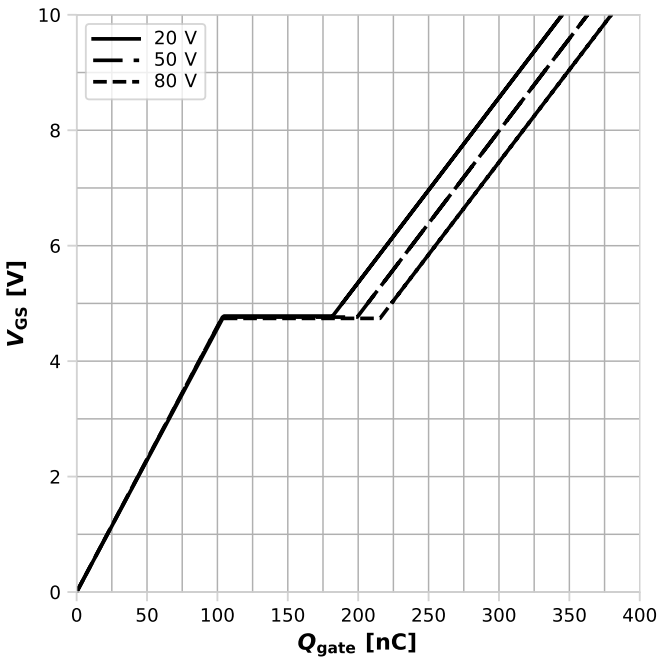


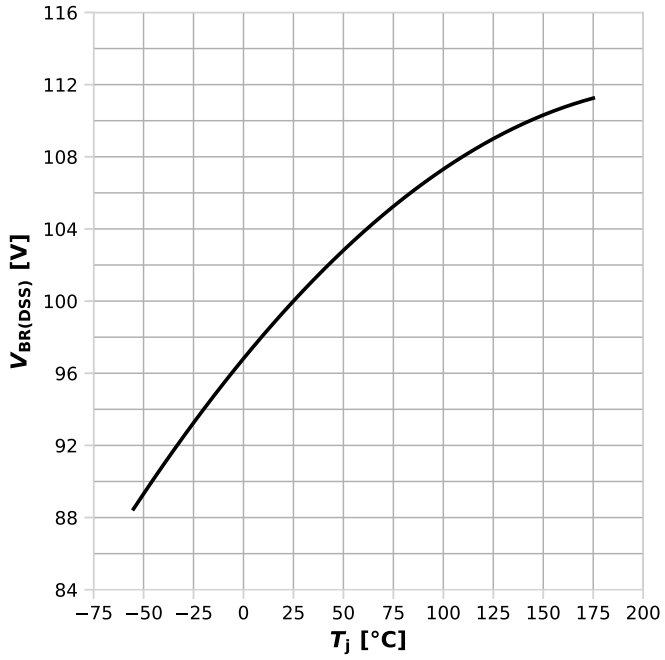
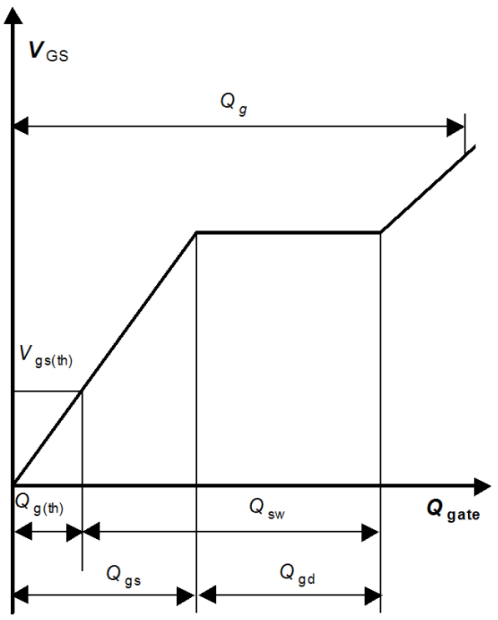

$C$=f($V_{DS}$); $V_{GS}$=0 V; $f$=1 MHz

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

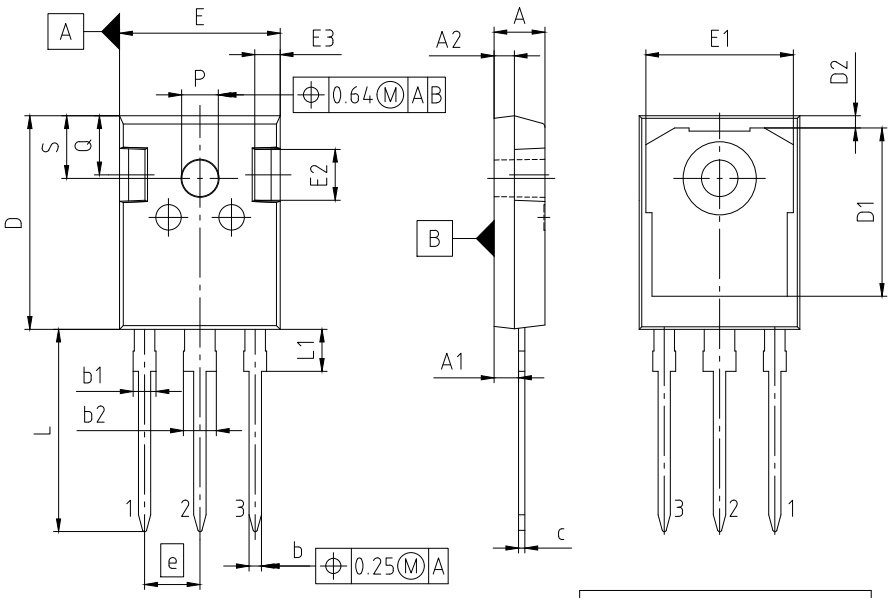



$I_F$=f($V_{SD}$); parameter: $T_j$

| Diagram 13: Avalanche characteristics | Diagram 14: Typ. gate charge |
|---|---|
|  |  |
| $I_{AS}$=f($t_{AV}$); $R_{GS}$=25 Ω; parameter: $T_{j,start}$ | $V_{GS}$=f($Q_{gate}$), $I_D$=180 A pulsed, $T_j$=25 °C; parameter: $V_{DD}$ |

| Diagram 15: Min. drain-source breakdown voltage | Gate charge waveforms |
|---|---|
|  |  |
| $V_{BR(DSS)}$=f($T_j$); $I_D$=1 mA | - |

# 5 Package outlines




| PACKAGE - GROUP NUMBER: | PG-TO247-3-U06 | |
|---|---|---|
| DIMENSIONS | MILLIMETERS | |
| | MIN. | MAX. |
| A | 4.83 | 5.21 |
| A1 | 2.27 | 2.54 |
| A2 | 1.85 | 2.16 |
| b | 1.07 | 1.33 |
| b1 | 1.90 | 2.41 |
| b2 | 2.87 | 3.38 |
| c | 0.55 | 0.68 |
| D | 20.80 | 21.10 |
| D1 | 16.25 | 17.65 |
| D2 | 0.95 | 1.35 |
| E | 15.70 | 16.13 |
| E1 | 13.10 | 14.15 |
| E2 | 3.68 | 5.10 |
| E3 | 1.00 | 2.60 |
| e | 5.44 | |
| N | 3 | |
| L | 19.80 | 20.32 |
| L1 | 3.95 | 4.47 |
| øP | 3.50 | 3.70 |
| Q | 5.49 | 6.00 |
| S | 6.04 | 6.30 |

NOTE:
DIMENSIONS DO NOT INCLUDE MOLDFLASH; PROTRUSION OR GATE BURRS

**Figure 1 Outline PG-TO247-3, dimensions in mm**

## Revision history

IRFPW4468PbF

### Revision 2025-01-10, Rev. 1.0

Previous revisions

| Revision | Date | Subjects (major changes since last revision) |
|---|---|---|
| 1.0 | 2025-01-10 | Release of final datasheet |



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