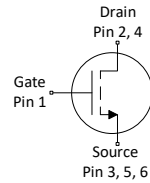
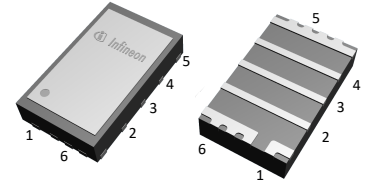


CoolGaN™
CoolGaN™ Transistor 80 V G3

PG-TSON-6

Features

- Ultra fast switching and high efficiency
- Space saving and highly robust package
- No reverse recovery charge
- Ultra low gate charge and output charge
- Exposed die for top-side thermal excellence
- Moisture rating MSL1
- Industrial grade 3x5 package



Top side is exposed silicon substrate, internally connected to source terminal. Not recommended to use as an electrical connection.

Potential applications

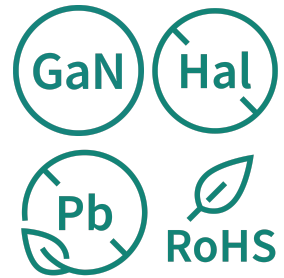
- Telecom & Datacenter 48V IBC
- Sync Rectification for AC-DC and DC-DC converters
- Robotics and drones
- Battery powered tools
- 48V servo drive
- e-Mobility, UAVs
- Point of Load Converters
- Solar & Energy storage systems

Product validation

Fully qualified according to JEDEC for Industrial Applications

Table 1 Key performance parameters

| Parameter | Value | Unit |
|--------------|-------|------|
| V_{DS} | 80 | V |
| $R_{DS(on)}$ | 1.8 | mΩ |
| I_D | 86 | A |
| Q_{oss} | 40 | nC |
| Q_G | 12 | nC |
| Q_{rr} | 0 | nC |



| Type / Ordering code | Package | Marking | Related links |
|----------------------|-----------|---------|----------------|
| IGC025S08S1 | PG-TSON-6 | 25SD1 | see Appendix A |

Table of contents

| | |
|---|----|
| Description | 1 |
| Maximum ratings | 3 |
| Recommended operating conditions | 4 |
| Thermal characteristics | 5 |
| Electrical Characteristics | 6 |
| Electrical characteristics diagrams | 8 |
| Package outlines | 13 |
| Appendix A | 16 |
| Revision history | 17 |
| Trademarks | 17 |
| Disclaimer | 17 |

Preiminary

1 Maximum ratings

at $T_j = 25\text{ °C}$, unless otherwise specified. Stresses beyond max ratings may cause permanent damage to the device. For optimum lifetime and reliability, Infineon recommends operating conditions that do not continuously exceed 80 % of the maximum ratings stated (unless otherwise explicitly stated). For further information, contact your local Infineon sales office.

Table 2 Maximum ratings

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|---|----------------|--------|------|------------|------|--|
| | | Min. | Typ. | Max. | | |
| Continuous drain-source voltage | V_{DS} | - | - | 80 | V | $V_{GS}=0\text{ V}$ |
| Pulsed drain-source voltage ¹⁾ | $V_{DS,pulse}$ | - | - | 96 | V | $V_{GS}=0\text{ V}$, 1 h total time |
| Continuous drain current | I_D | - | - | 86 23 | A | $V_{GS}=5\text{ V}$, $T_C=25\text{ °C}$ $V_{GS}=5\text{ V}$, $T_A=25\text{ °C}$, $R_{thJA}=38\text{ °C/W}$ ²⁾ |
| Pulsed drain current ³⁾ | $I_{D,pulse}$ | - | - | 550 290 | A | $T_j=25\text{ °C}$ $T_j=150\text{ °C}$ |
| Pulsed gate-source voltage ¹⁾ | V_{GS} | -6.5 | - | 6.5 | V | Pulsed 100 h total time |
| Power dissipation | P_{tot} | - | - | 45 3.3 | W | $T_C=25\text{ °C}$ $T_A=25\text{ °C}$, $R_{thJA}=38\text{ °C/W}$ ²⁾ |
| Storage temperature | T_{stg} | -55 | - | 150 | °C | - |
| Junction temperature | T_j | -40 | - | 150 | °C | - |

¹⁾ Provided as measure of robustness under abnormal operating conditions and not recommended for normal operation.

²⁾ Device on 4-layer FR4 PCB, vertical in still air.

³⁾ Pulse current limited by transfer characteristic.

2 Recommended operating conditions

Table 3 Recommended operating conditions

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|---------------------|----------|--------|------|------|------|-----------------------|
| | | Min. | Typ. | Max. | | |
| Gate-source voltage | V_{GS} | -4 | 5 | 5.5 | V | - |

Preliminary

3 Thermal characteristics

Table 4 Thermal characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|---|------------|--------|------|------|------|--|
| | | Min. | Typ. | Max. | | |
| Thermal resistance, junction - case, top | R_{thJC} | - | 0.5 | 0.6 | °C/W | - |
| Thermal resistance, junction - case, bottom | R_{thJC} | - | 1.9 | 2.8 | °C/W | - |
| Thermal resistance, junction - ambient 1s0p | R_{thJA} | - | 60 | - | °C/W | On 1 layer PCB, vertical in still air. |
| Thermal resistance, junction - ambient 2s2p | R_{thJA} | - | 38 | - | °C/W | With vias on 4 layer PCB, vertical in still air. |

4 Electrical Characteristics

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

Table 5 Static characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|----------------------------------|--------------|--------|-----------------------------|------|------------------|--|
| | | Min. | Typ. | Max. | | |
| Gate threshold voltage | $V_{GS(th)}$ | 1.2 | 2 | 2.9 | V | $V_{DS}=V_{GS}$, $I_D=10\text{ mA}$ |
| Drain-source leakage current | I_{DSS} | - | 0.4 7 | - | μA | $V_{DS}=80\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$ $V_{DS}=80\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=125\text{ °C}$ |
| Gate-source leakage current | I_{GSS} | - | 19 0.012 140 0.012 | - | μA | $V_{GS}=5\text{ V}$, $T_j=25\text{ °C}$ $V_{GS}=-4\text{ V}$, $T_j=25\text{ °C}$ $V_{GS}=5\text{ V}$, $T_j=125\text{ °C}$ $V_{GS}=-4\text{ V}$, $T_j=125\text{ °C}$ |
| Drain-source on-state resistance | $R_{DS(on)}$ | - | 1.8 | 2.5 | $\text{m}\Omega$ | $V_{GS}=5\text{ V}$, $I_D=25\text{ A}$ |
| Gate resistance ⁴⁾ | R_G | - | 0.5 | - | Ω | - |

⁴⁾ Defined by design. Not subject to production test.

Table 6 Capacitance characteristics ⁵⁾

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|------------------------------|-----------|--------|------|------|------|---|
| | | Min. | Typ. | Max. | | |
| Input capacitance | C_{iss} | - | 1250 | - | pF | $V_{GS}=0\text{ V}$, $V_{DS}=40\text{ V}$, $f=1\text{ MHz}$ |
| Output capacitance | C_{oss} | - | 570 | - | pF | |
| Reverse transfer capacitance | C_{rss} | - | 10 | - | pF | |

⁵⁾ Defined by design. Not subject to production test.

Table 7 Gate charge characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|------------------------------------|---------------|--------|------|------|------|--|
| | | Min. | Typ. | Max. | | |
| Gate to source charge | Q_{gs} | - | 3.6 | - | nC | $V_{DS}=40\text{ V}$, $I_D=25\text{ A}$, $V_{GS}=0\text{ to }5\text{ V}$ |
| Gate charge at threshold | $Q_{g(th)}$ | - | 2.5 | - | nC | |
| Gate to drain charge ⁶⁾ | Q_{gd} | - | 3.1 | - | nC | |
| Switching charge | Q_{sw} | - | 4.2 | - | nC | |
| Gate charge total ⁶⁾ | Q_g | - | 12 | - | nC | |
| Gate plateau voltage | $V_{plateau}$ | - | 2.8 | - | V | |
| Output charge ⁶⁾ | Q_{oss} | - | 40 | - | nC | $V_{DS}=40\text{ V}$, $V_{GS}=0\text{ V}$ |

⁶⁾ Defined by design. Not subject to production test.

Table 8 Reverse operation

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|---------------------------------------|---------------|--------|------------|------|------|---|
| | | Min. | Typ. | Max. | | |
| Reverse continuous current | I_S | - | - | 15 | A | $T_C=25\text{ °C}$ |
| Pulsed current, reverse | $I_{S,pulse}$ | - | - | 344 | A | |
| Source-Drain reverse voltage | V_{SD} | - | 2.6 2.1 | - | V | $V_{GS}=0\text{ V}, I_{S,pulse}=25\text{ A}, T_j=25\text{ °C}$ $V_{GS}=0\text{ V}, I_{S,pulse}=0.5\text{ A}, T_j=25\text{ °C}$ |
| Reverse recovery charge ⁷⁾ | Q_{rr} | - | 0 | - | nC | $V_R=40\text{ V}, I_{S,pulse}=25\text{ A}, di_{S,pulse}/dt=100\text{ A}/\mu\text{s}$ |

⁷⁾ Defined by design. Not subject to production test.

5 Electrical characteristics diagrams

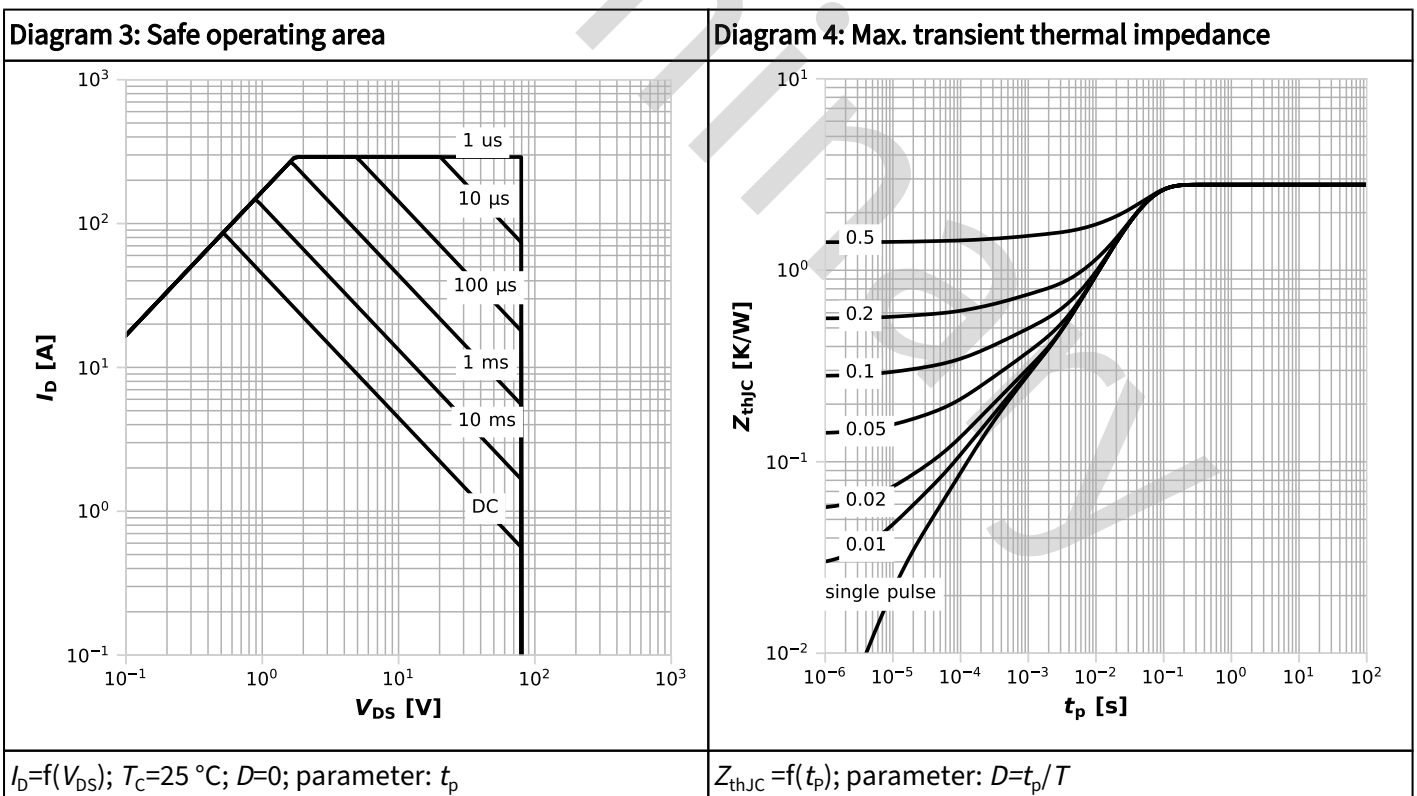
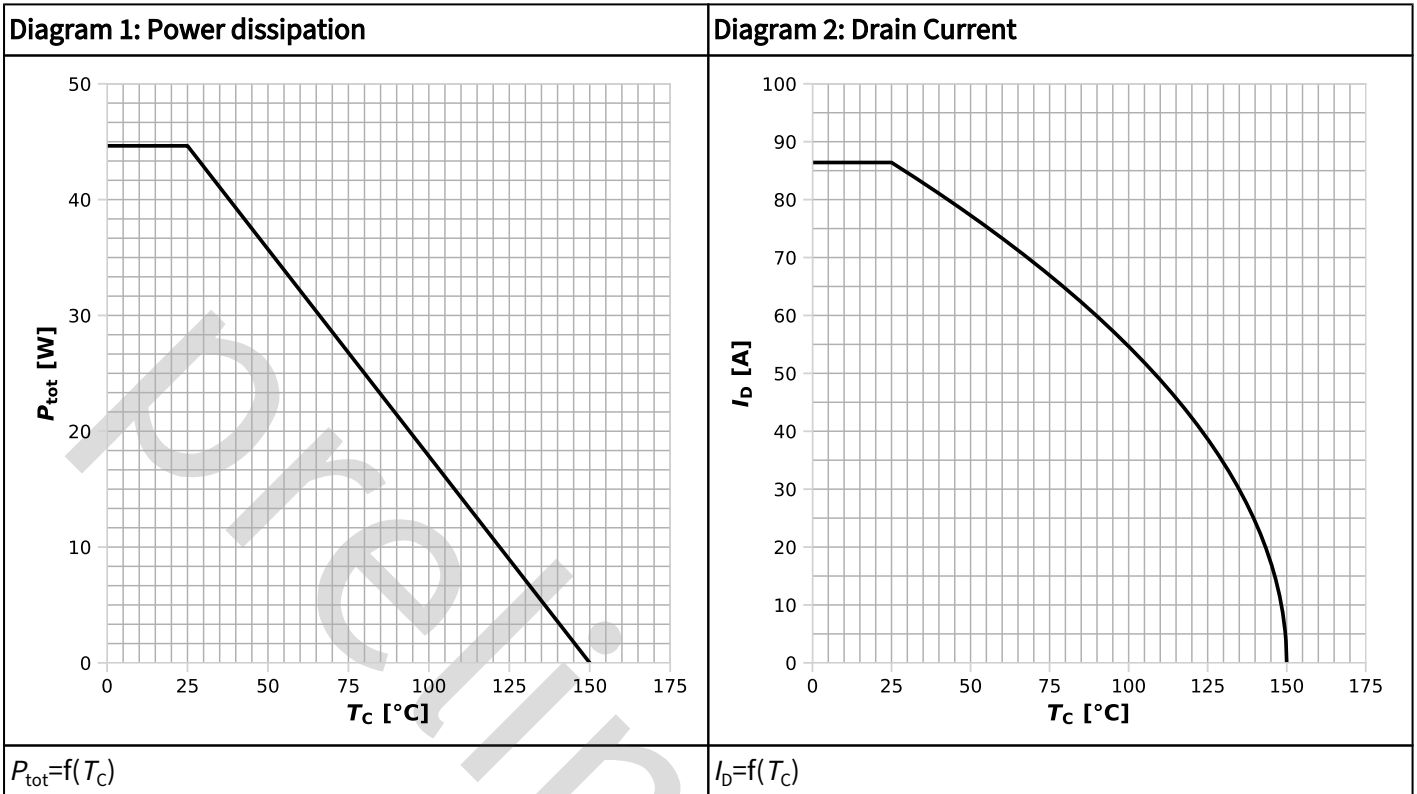
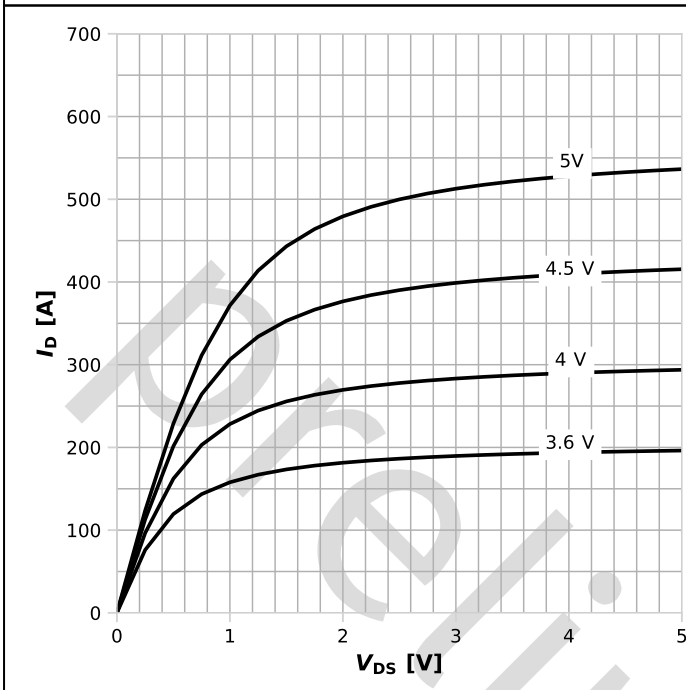
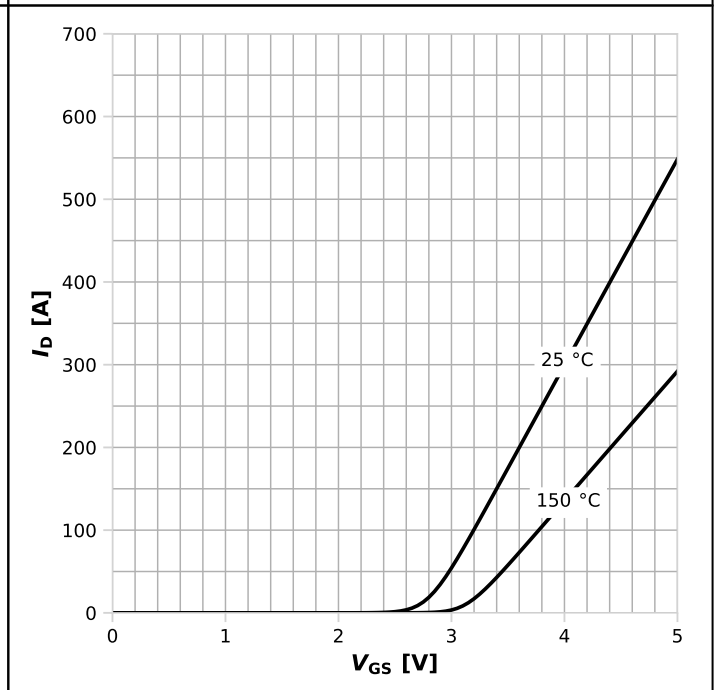


Diagram 5: Typ. output characteristics



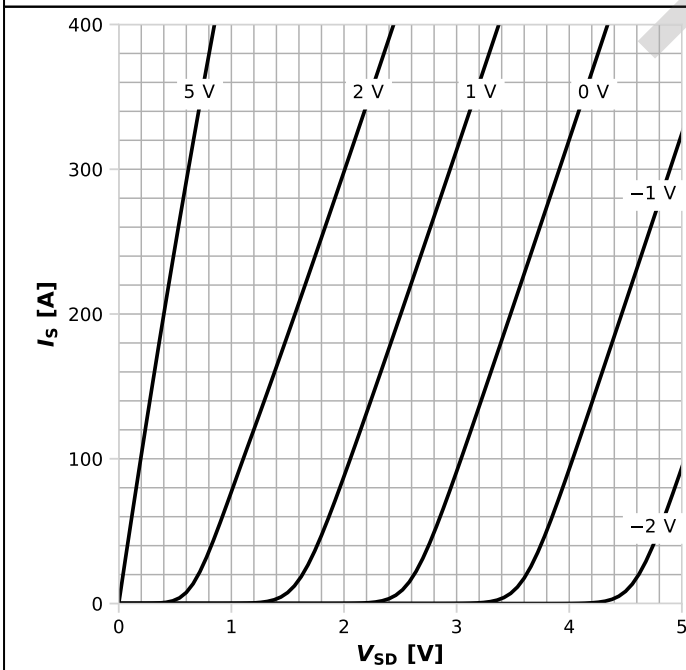
$I_D = f(V_{DS}); T_j = 25\text{ }^\circ\text{C};$ parameter: V_{GS}

Diagram 6: Typ. transfer characteristics



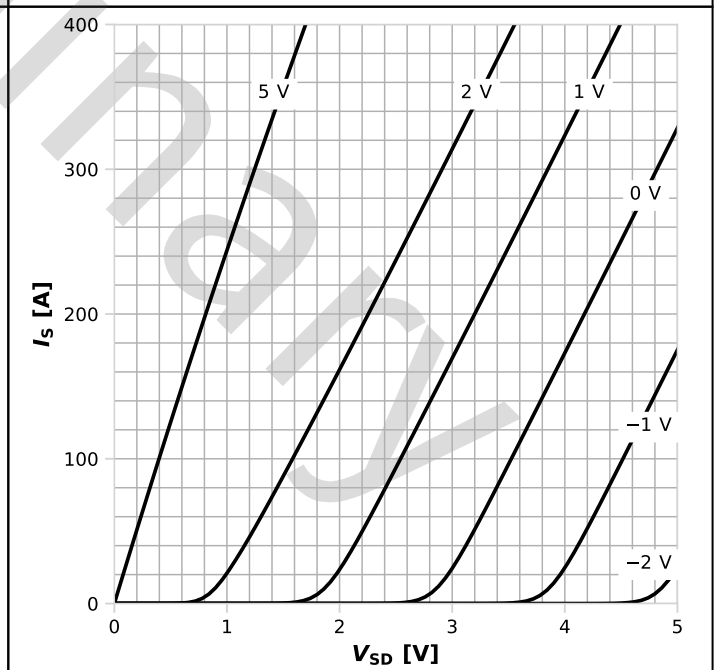
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max};$ parameter: T_j

Diagram 7: Typ. channel reverse characteristics



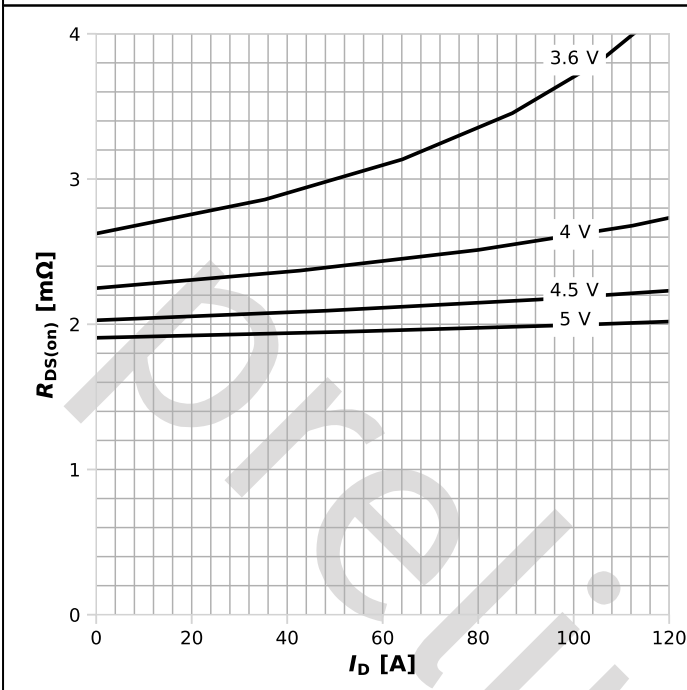
$I_S = f(V_{SD}); T_j = 25\text{ }^\circ\text{C};$ parameter: V_{GS}

Diagram 8: Typ. channel reverse characteristics



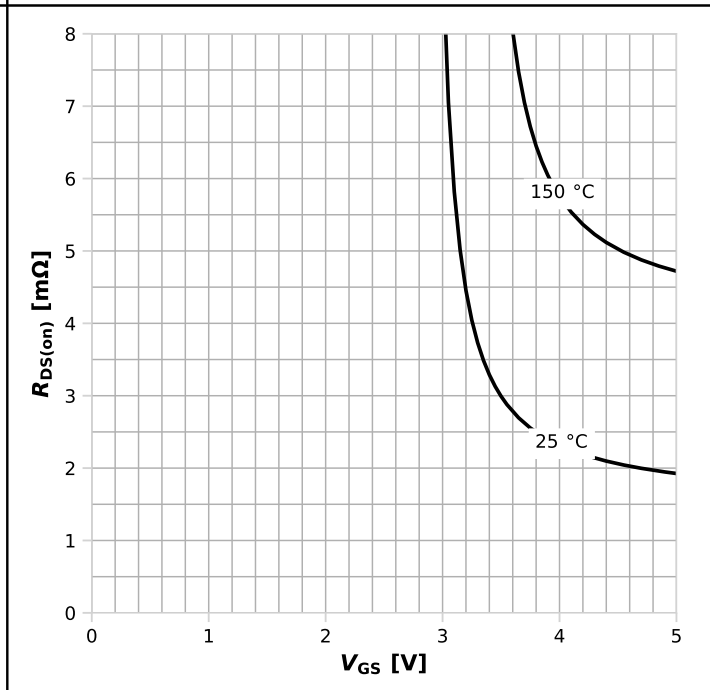
$I_S = f(V_{SD}); T_j = 125\text{ }^\circ\text{C};$ parameter: V_{GS}

Diagram 9: Typ. drain-source on-state resistance



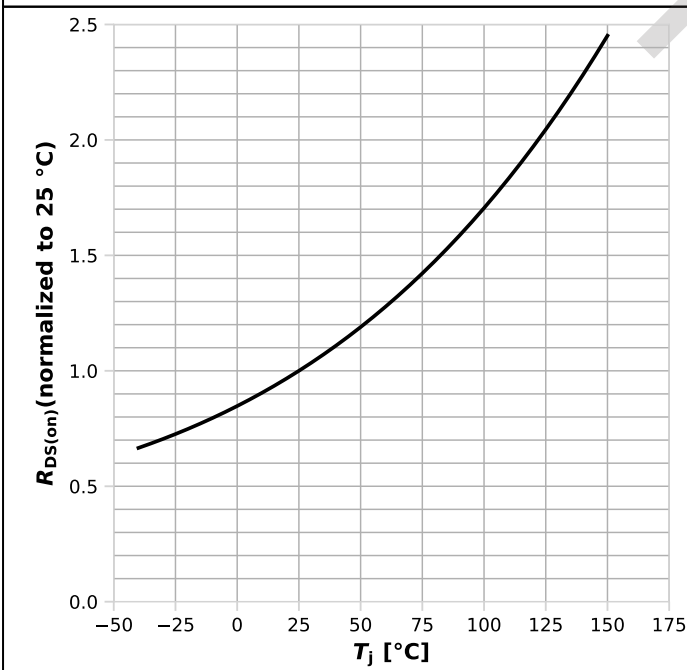
$R_{DS(on)}=f(I_D); T_j=25\text{ }^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 10: Typ. Drain-source on-state resistance



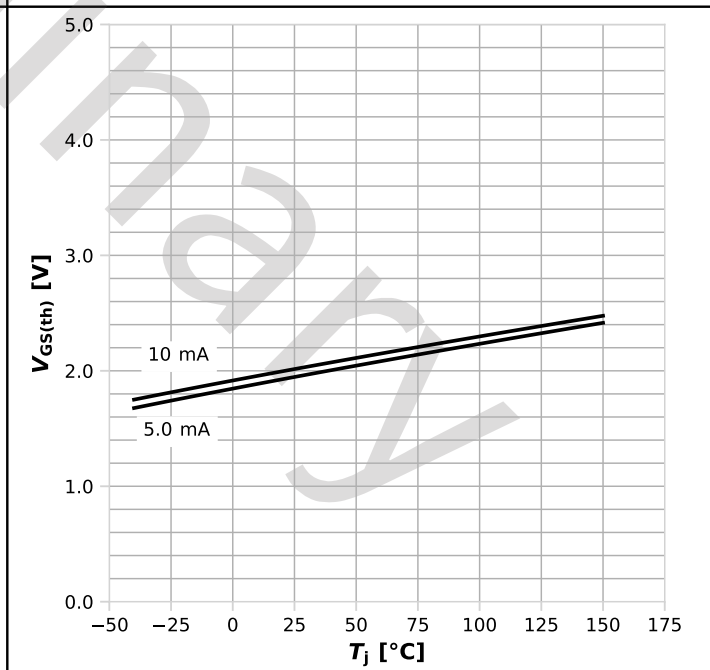
$R_{DS(on)}=f(V_{GS}); \text{parameter: } T_j$

Diagram 11: Drain-source on-state resistance



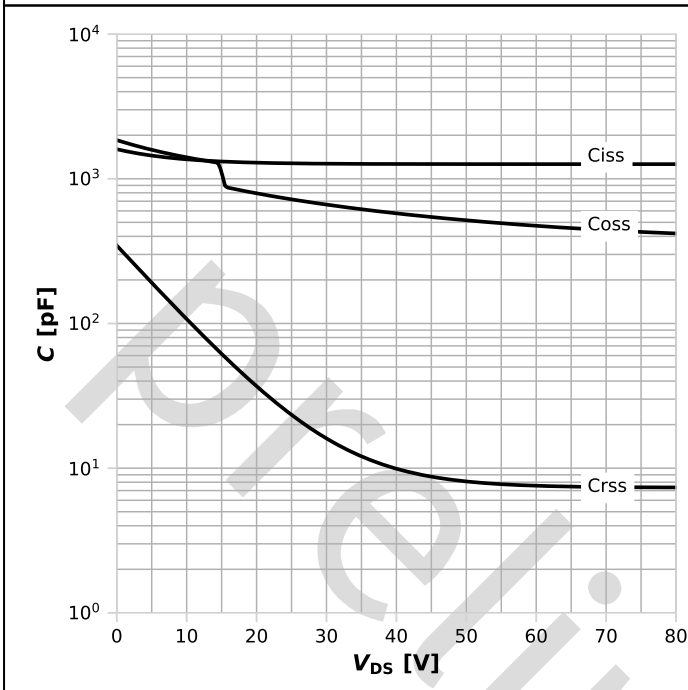
$R_{DS(on)}=f(T_j); I_D=25\text{ A}, V_{GS}=5\text{ V}$

Diagram 12: Typ. gate threshold voltage



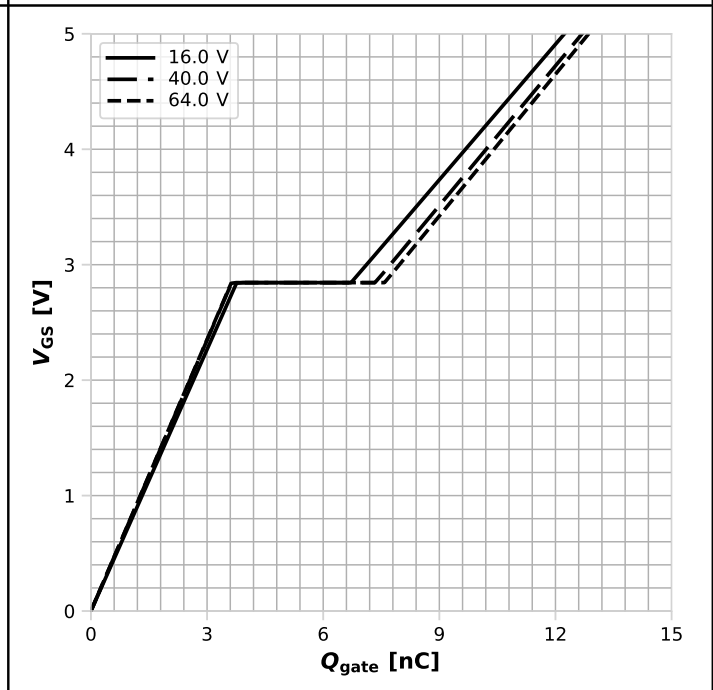
$V_{GS(th)}=f(T_j), V_{GS}=V_{DS}; \text{parameter: } I_D$

Diagram 13: Typ. capacitances



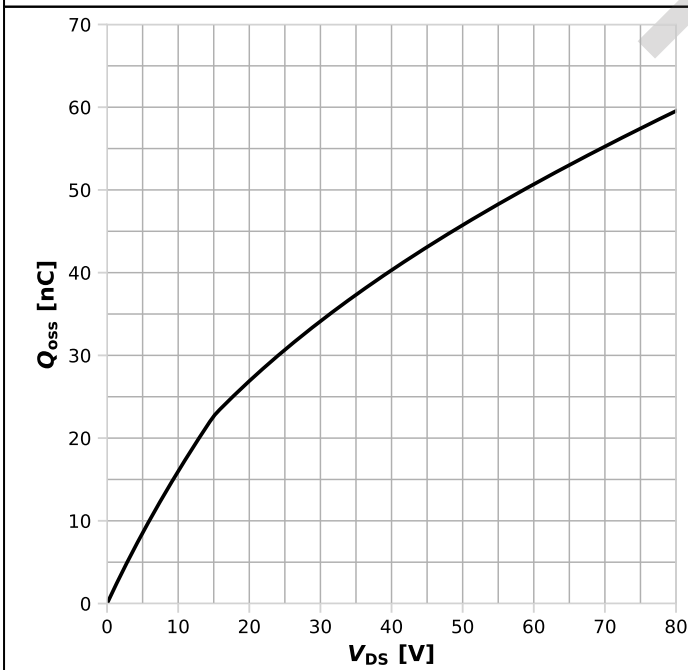
$C=f(V_{DS}); V_{GS}=0\text{ V}$

Diagram 14 Typ. gate charge



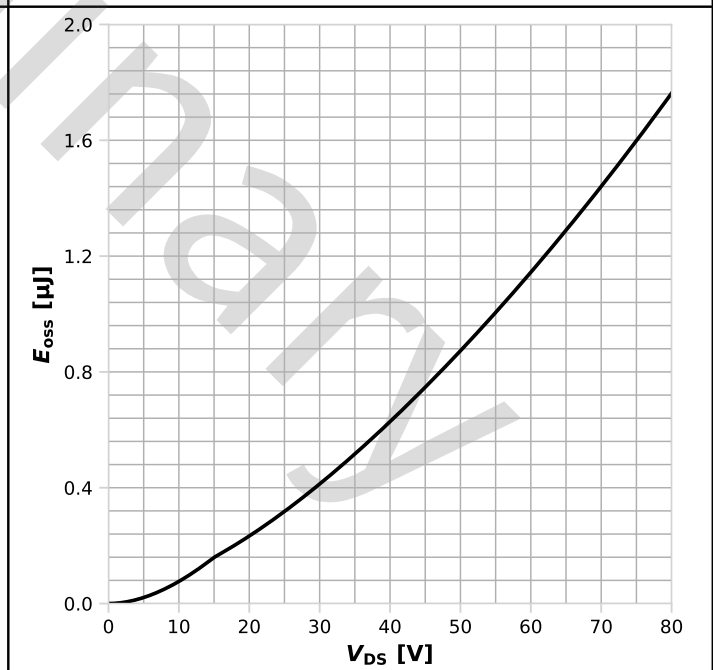
$V_{GS}=f(Q_{gate}); I_D=25\text{ A pulsed}; \text{parameter: } V_{DS}$

Diagram 15: Typ. output charge

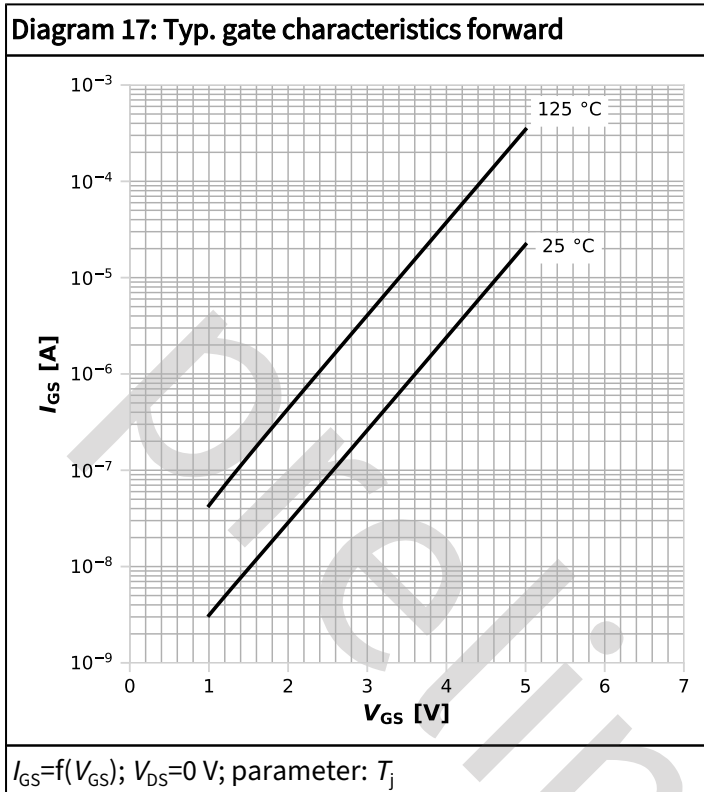


$Q_{oss}=f(V_{DS}), V_{GS}=0\text{ V}$

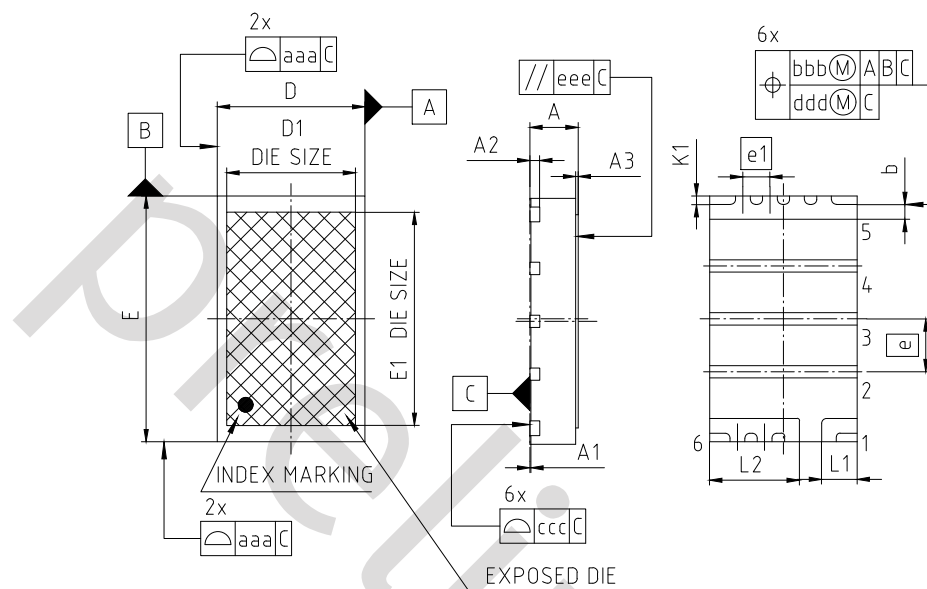
Diagram 16: Typ. Coss stored Energy



$E_{oss}=f(V_{DS}), V_{GS}=0\text{ V}$



6 Package outlines



| PACKAGE - GROUP NUMBER: | | PG-TSON-6-U01 | |
|-------------------------|-------------|---------------|--|
| DIMENSIONS | MILLIMETERS | | |
| | MIN. | MAX. | |
| A | - | 1.032 | |
| A1 | - | 0.05 | |
| A2 | 0.20 | | |
| A3 | - | 0.05 | |
| b | 0.18 | 0.30 | |
| D | 2.90 | 3.10 | |
| D1 | 2.616 | | |
| E | 4.90 | 5.10 | |
| E1 | 4.336 | | |
| e | 1.075 | | |
| e1 | 0.55 | | |
| K1 | 0.125 | 0.225 | |
| L1 | 0.625 | 0.825 | |
| L2 | 1.725 | 1.925 | |
| aaa | 0.05 | | |
| bbb | 0.10 | | |
| ccc | 0.08 | | |
| ddd | 0.05 | | |
| eee | 0.10 | | |

Figure 1 Outline PG-TSON-6, dimensions in mm

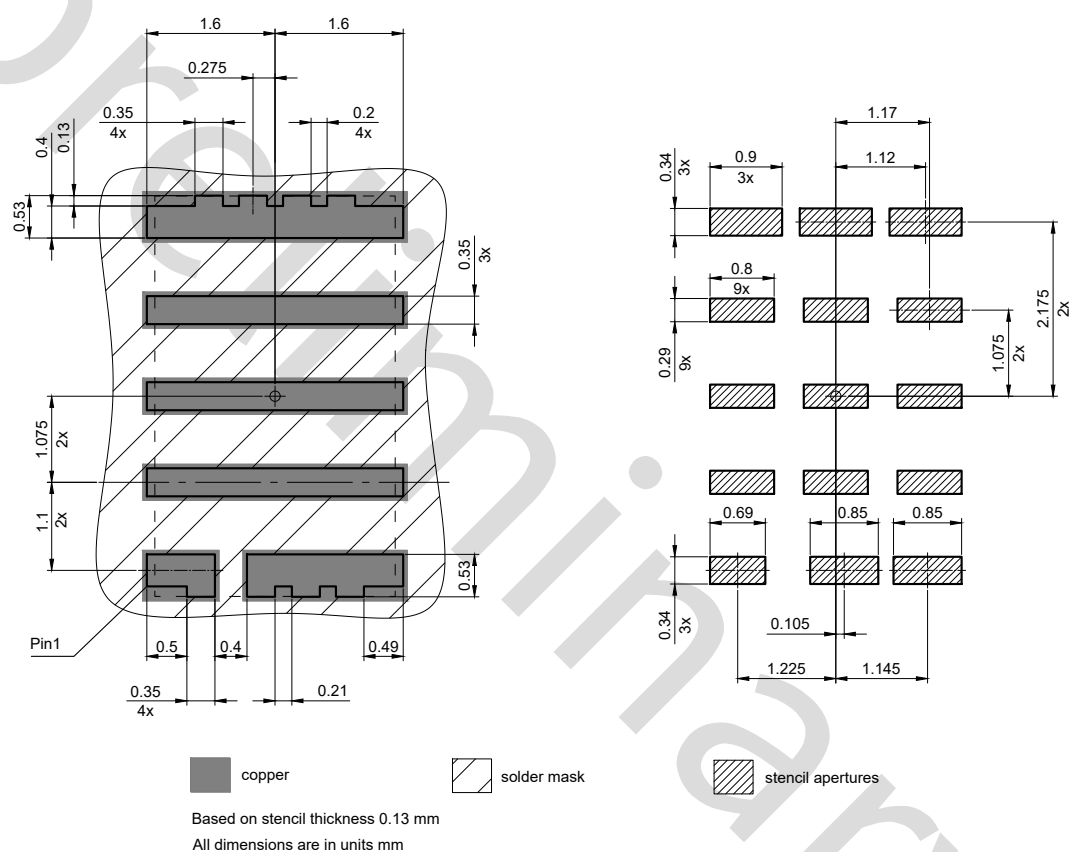
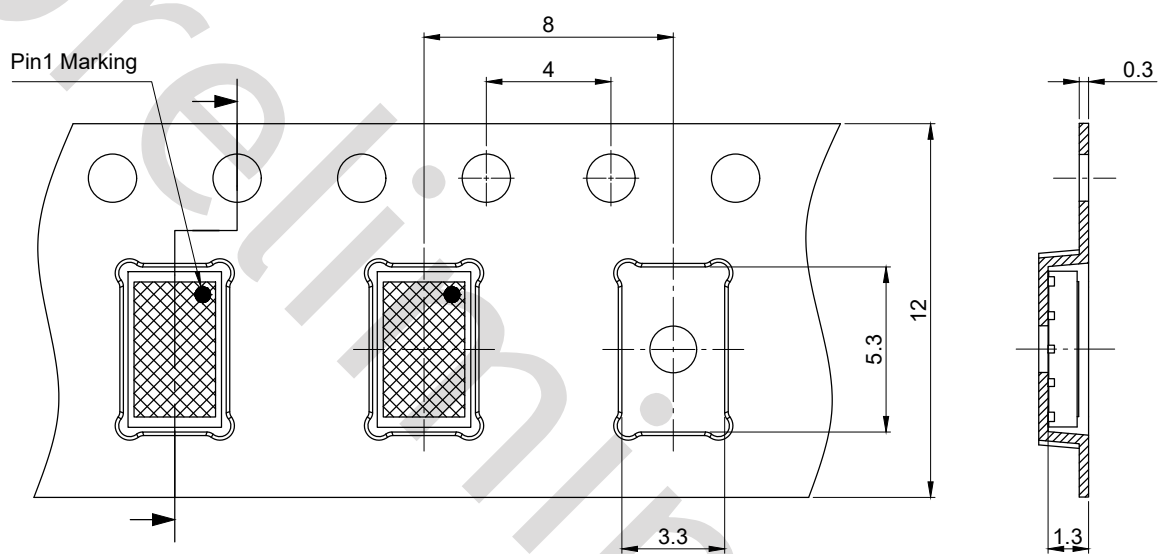


Figure 2 Footprint drawing PG-TSON-6, dimensions in mm



All dimensions are in units mm
The drawing is in compliance with ISO 128-30, Projection Method 1 []

Figure 3 Packaging variant PG-TSON-6, dimensions in mm

7 Appendix A

Table 9 Related links

- [IFX CoolGaN™ GaN webpage](#)
- [IFX CoolGaN™ reliability white paper](#)
- [IFX CoolGaN™ gate driver application note](#)
- [IFX CoolGaN™ Evaluation Boards](#)
- [IFX Packages Description-PG-TSON-6-2](#)

Preliminary

Revision history

IGC025S08S1

Revision 2024-11-28, Rev. 0.1

Previous revisions

| Revision | Date | Subjects (major changes since last revision) |
|----------|------------|--|
| 0.1 | 2024-11-28 | Release of preliminary |

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