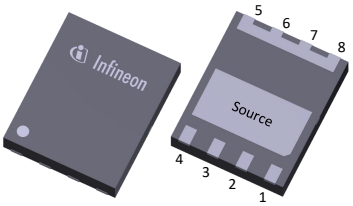
# CoolGaN™ G5

PG-TSON-8

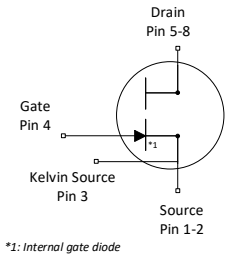



## CoolGaN™ Transistor 700 V G5

Infineon's CoolGaN™ is a highly efficient gallium nitride (GaN) transistor designed for power conversion at 700 V. It enables higher power density, supports reduced system BOM cost, and facilitates miniaturized form factors. Produced using 200 mm (8 inch) wafer technology and fully automated production lines, it features narrow production tolerances and the highest product quality.

## Features

- Enhancement mode transistor
- Ultra-fast switching
- No reverse-recovery charge
- Capable of reverse conduction
- Low gate and output charge
- Superior commutation ruggedness
- 2 kV HBM ESD standards




*1: Internal gate diode

## Benefits

- Normally OFF transistor technology ensures safe operation
- Enables rapid and precise power delivery control
- Improves system efficiency and reliability
- Ensures robust performance under challenging conditions

These features collectively make CoolGaN™ a game-changer in the realm of power conversion, offering a compelling combination of efficiency, compactness, and reliability.

## Potential applications

Consumer applications like charger, adapter, TV power, home appliance

## Product validation

Qualified according to JEDEC Standard

**Table 1 Key performance parameters**

| Parameter | Value | Unit |
|---|---|---|
| $V_{DS,max}$ | 700 | V |
| $V_{DS,trans-max}$ | 900 | V |
| $R_{DS(on),max}$ | 330 | mΩ |
| $Q_{g,typ}$ | 1 | nC |
| $I_{D,pulse}$ | 13 | A |
| $Q_{oss}$ @ 400 V | 7.8 | nC |
| $Q_{rr}$ | 0 | nC |

| Part number | Package | Marking | Related links |
|---|---|---|---|
| IGLR70R270D2S | PG-TSON-8 | 70R270D | see Appendix A |

# Table of contents

Description . . . . . 1
Maximum ratings . . . . . 3
Thermal characteristics . . . . . 5
Electrical characteristics . . . . . 6
Electrical characteristics diagrams . . . . . 8
Test circuits . . . . . 13
Package outlines . . . . . 14
Appendix A . . . . . 17
Revision history . . . . . 18
Trademarks . . . . . 19
Disclaimer . . . . . 19

# 1 Maximum ratings

at $T_j$ = 25°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. | | |
| Drain source voltage, continuous | $V_{DS,max}$ | - | - | 700 | V | $V_{GS}$ = 0 V; derating recommendation according JEDEC JEP198 |
| Leakage current at drain source transient voltage | $I_{DS,trans}$ | - | - | 2.6 | mA | $V_{GS}$ = 0 V; $V_{DS,trans}$ = 900 V |
| Drain source voltage transient | $V_{DS,trans}$ | - | - | 900 | V | <1% duty cycle; <1 µs; 1 million pulses |
| Drain source voltage, pulsed | $V_{DS,pulsed}$ | - | - | 750 | V | $T_j$ = 25°C; $V_{GS}$ ≤ 0 V; cumulated stress time ≤ 10 h |
| | | | | | | $T_j$ = 125°C; $V_{GS}$ ≤ 0 V; cumulated stress time ≤ 1 h |
| Switching surge voltage, pulsed | $V_{DS,surge}$ | - | - | 750 | V | DC bus voltage = 700 V; turn off $V_{DS,pulse}$ = 750 V; turn on $I_{D,pulse}$ =5.8 A; f ≤ 100 kHz; $T_j$ = 105°C; t ≤100 s (10 million pulses) |
| Continuous current, drain source [1] | $I_D$ | - | - | 7.3 | A | $T_C$=25°C; $T_j$ = $T_{j,max}$ |
| Pulsed current, drain source | $I_{D,pulse}$ | -13 | - | 13 | A | $T_j$=25°C; $I_G$=5.6 mA; See Diagram 3, 5 |
| | | -7.7 | | 7.7 | | $T_j$=125°C; $I_G$=5.6 mA; See Diagram 4, 6 |
| Gate current, continuous [2] | $I_{G,avg}$ | - | - | 4.2 | mA | $T_j$=-55°C to $T_j$=150°C; See Table 9 |
| Gate current, pulsed [2] | $I_{G,pulsed}$ | -0.42 | - | 0.42 | A | $T_j$=-55°C to $T_j$=150°C; $t_{pulse}$= 50 ns; f = 100 kHz; See Table 9 |
| Gate source voltage, continuous [2] | $V_{GS}$ | -10 | - | - | V | $T_j$=-55°C to $T_j$=150°C; See Diagram 12 |
| Gate source voltage, pulsed [2] | $V_{GS,pulse}$ | -25 | - | - | V | $T_j$=-55°C to $T_j$=150°C; $t_{pulse}$= 50 ns; f = 100 kHz; open drain |
| Power dissipation | $P_{tot}$ | - | - | 28 | W | $T_C$=25°C |
| Operating junction temperature [3] | $T_j$ | -40 | - | 150 | °C | - |
| Storage temperature | $T_{stg}$ | -55 | - | 150 | °C | Max shelf life depends on storage conditions |
| Drain-source voltage slew-rate | dv/dt | - | - | 200 | V/ns | - |

[1] Limited by $T_{j,max}$. Maximum duty cycle D = 0.75

[2] We recommend using an advanced driving technique to optimize the device performance. Please see gate drive application note for more details.

[3] For optimum lifetime and reliability, Infineon recommends average $T_j$ operating temperature below 100°C. For further information, contact your local Infineon sales office.

# 2 Thermal characteristics

**Table 3 Thermal characteristics**

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Thermal resistance, junction - case | $R_{thJC}$ | - | - | 4.4 | °C/W | - |
| Thermal resistance, junction - ambient | $R_{thJA}$ | - | - | 163 | °C/W | Device on PCB, minimum footprint |
| Thermal resistance, junction - ambient for SMD version | $R_{thJA}$ | - | - | 74 | °C/W | Device on 40 mm*40 mm*1.5 mm epoxy PCB FR4 with 6 $cm^2$ (one layer, 70 µm thickness) copper area for tab (source) connection and cooling. PCB is vertical without air stream cooling. |
| Soldering temperature | $T_{sold}$ | - | - | 260 | °C | MSL3, wave & reflow soldering allowed |

# 3 Electrical characteristics

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

**Table 4 Static characteristics**

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Gate threshold voltage | $V_{GS(th)}$ | 0.9 | 1.2 | 1.6 | V | $I_{DS}$=0.56 mA; $V_{DS}$=10 V; $T_j$=25°C |
| | | - | 1 | - | | $I_{DS}$=0.56 mA; $V_{DS}$=10 V; $T_j$=150°C |
| Gate-Source reverse clamping voltage | $V_{GS,\ clamp}$ | - | - | -8 | V | $I_{GS}$=-1 mA |
| Drain-Source leakage current | $I_{DSS}$ | - | 1 | 100 | µA | $V_{DS}$=700 V; $V_{GS}$=0 V; $T_j$=25°C |
| | | | 20 | - | | $V_{DS}$=700 V; $V_{GS}$=0 V; $T_j$=150°C |
| Drain-Source on-state resistance | $R_{DS(on)}$ | - | 0.270 | 0.330 | Ω | $I_G$=5.6 mA; $I_D$=1.7 A; $T_j$=25°C |
| | | | 0.580 | - | | $I_G$=5.6 mA; $I_D$=1.7 A; $T_j$=150°C |
| Gate resistance | $R_{G,int}$ | - | 0.84 | - | Ω | LCR impedance measurement; $f$=$f_{res}$, open drain |

**Table 5 Dynamic characteristics**

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Input capacitance | $C_{iss}$ | - | 74 | - | pF | $V_{GS}$=0 V; $V_{DS}$=400 V; $f$=1 MHz |
| Output capacitance | $C_{oss}$ | | 12 | | | |
| Reverse transfer capacitance | $C_{rss}$ | | 0.17 | | | |
| Effective output capacitance, time related [4] | $C_{o(tr)}$ | - | 19 | - | pF | $V_{GS}$=0 V; $V_{DS}$=0 to 400 V; $I_D$=const |
| Effective output capacitance, energy related [5] | $C_{o(er)}$ | - | 14 | - | pF | $V_{DS}$=0 to 400 V |
| Output charge | $Q_{oss}$ | | 7.8 | - | nC | |
| Coss stored energy | $E_{oss}$ | | 1.1 | . | µJ | |
| Turn-on delay time | $t_{d(on)}$ | - | 7 | - | ns | $I_D$= 1.7 A; $R_{ON}$=27 Ω; $R_{OFF}$=27 Ω; $R_{SS}$=1500 Ω; $C_C$=0.68 nF; $V_{DRV}$=12 V; see Table 8 |
| Turn-off delay time | $t_{d(off)}$ | | 9 | | | |
| Rise time | $t_r$ | | 6 | | | |
| Fall time | $t_f$ | | 31 | | | |

[4] $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as $C_{oss}$ while $V_{DS}$ is rising from 0 to 400 V

[5] $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as $C_{oss}$ while $V_{DS}$ is rising from 0 to 400 V

**Table 6 Gate charge characteristics**

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Gate charge | $Q_G$ | - | 1 | - | nC | $V_{GS}$=0 to 3 V; $V_{DS}$=400 V; $I_D$=1.7 A |

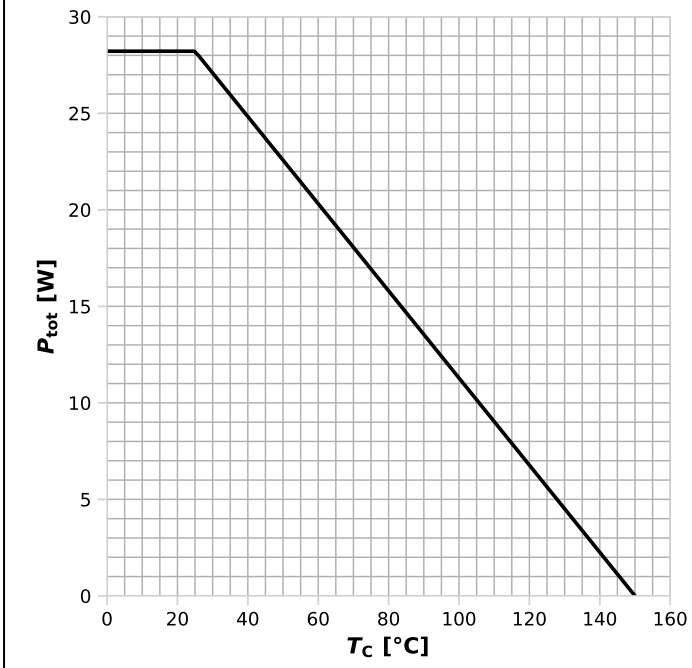
**Table 7 Reverse conduction characteristics**

| Parameter | Symbol | Values | | | Unit | Note / Test condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Source-Drain reverse voltage | $V_{SD}$ | - | 2.0 | 2.4 | V | $V_{GS}$=0 V; $I_{SD}$=1.7 A |
| Pulsed current, reverse | $I_{SD,pulse}$ | - | - | 13 | A | $I_G$=5.6 mA |
| Reverse recovery charge [6)] | $Q_{rr}$ | - | 0 | - | nC | $I_{SD}$=1.7 A; $V_{DS}$=400 V |

6) Excluding Qoss

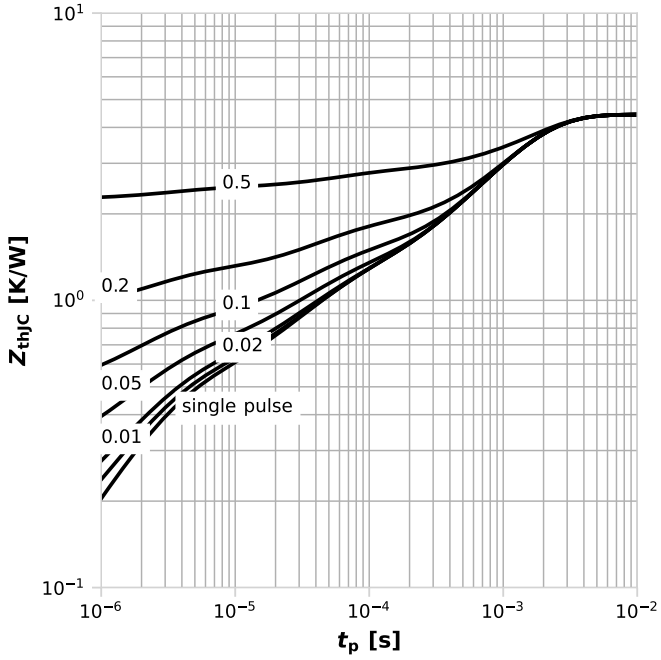
# 4 Electrical characteristics diagrams

**Diagram 1: Power dissipation**



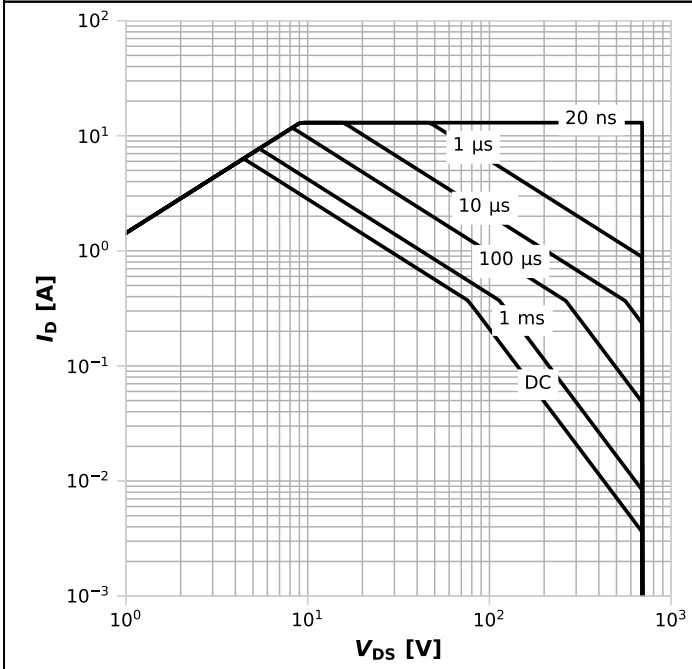

$P_{tot}$=f($T_C$)

**Diagram 2: Max. transient thermal impedance**



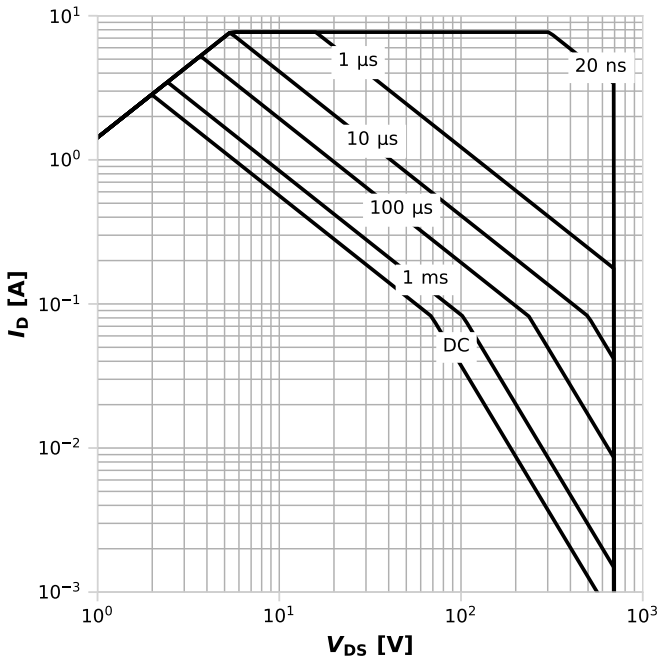

$Z_{thJC}$ =f($t_P$); parameter: $D$=$t_p$/$T$

**Diagram 3: Safe operating area**

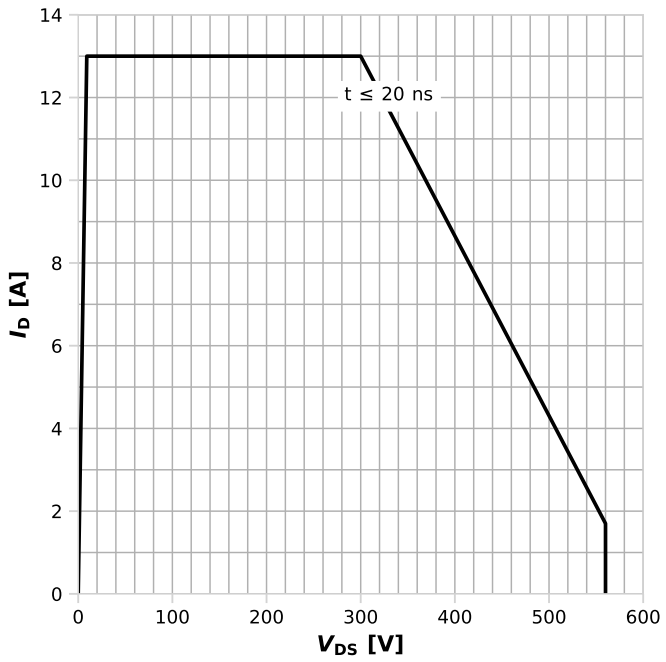
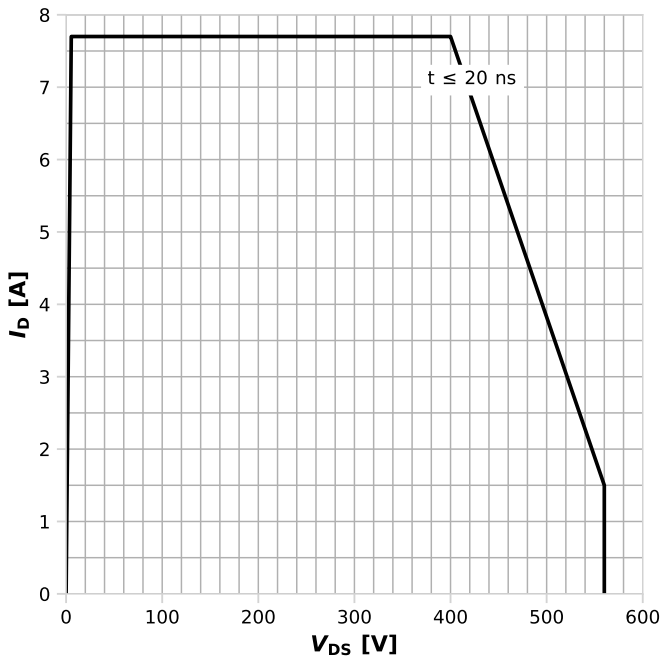


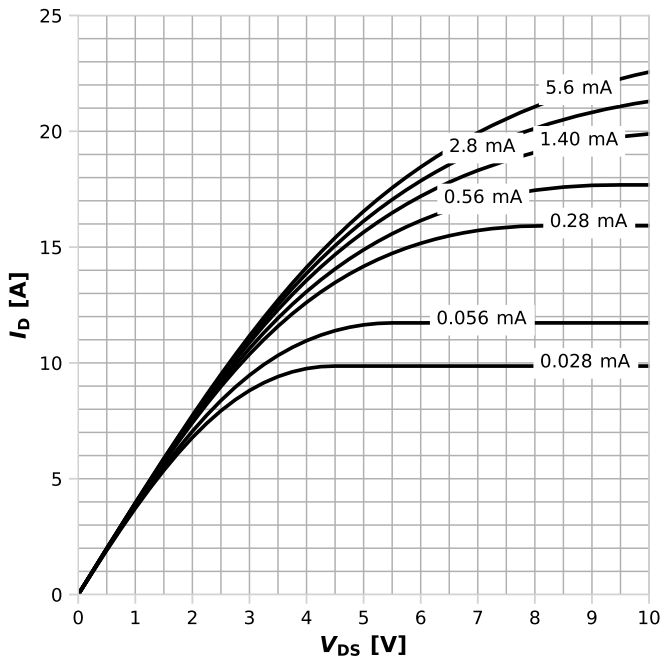
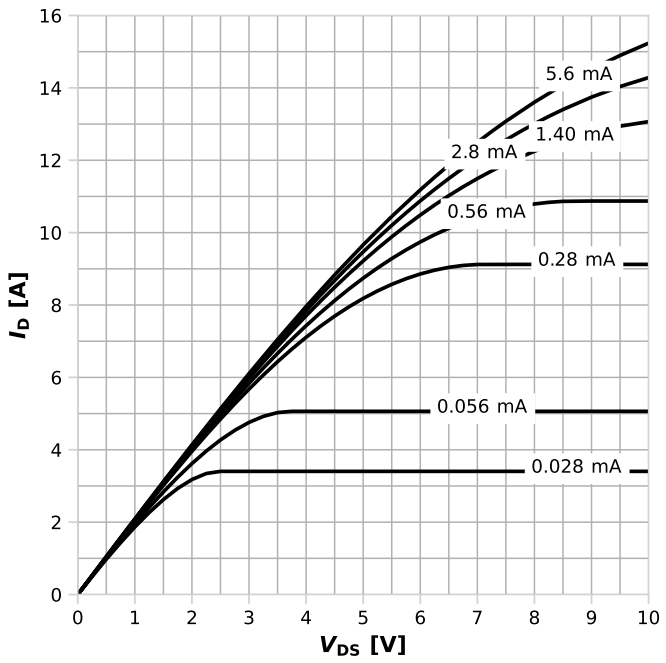

$I_D$=f($V_{DS}$); $T_C$=25°C; $D$=0; parameter: $t_p$

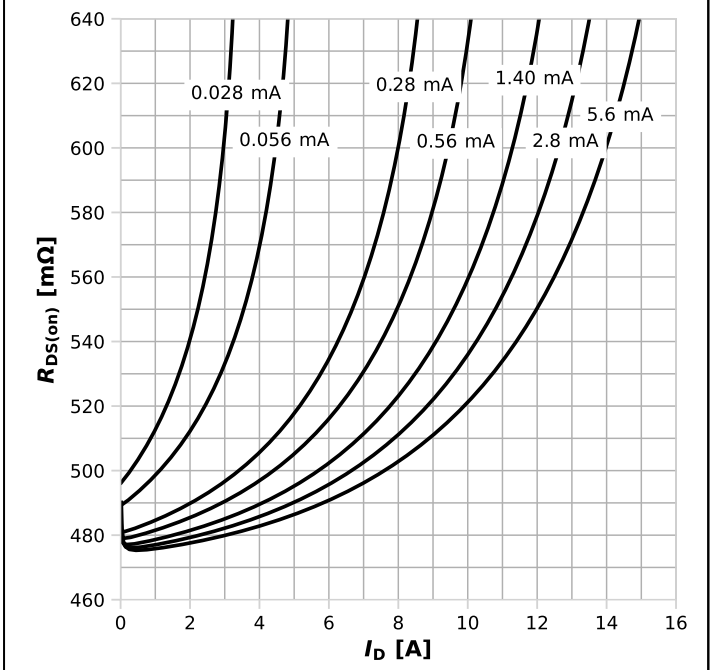
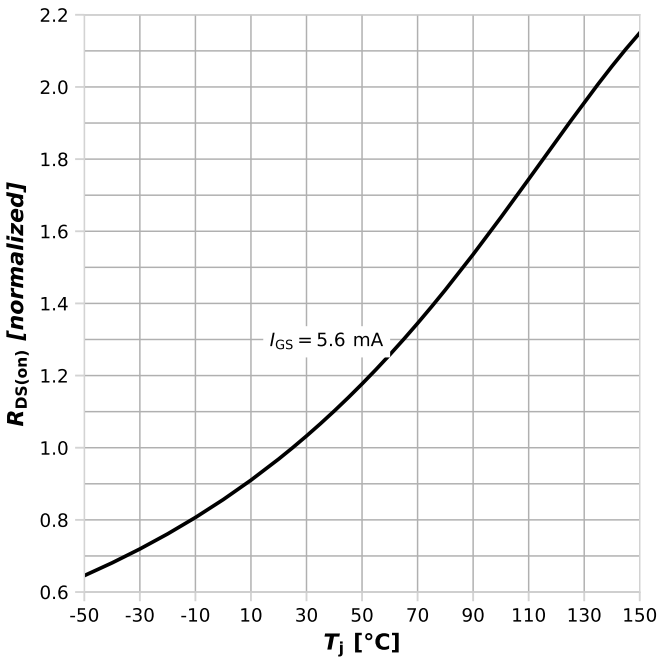
**Diagram 4: Safe operating area**




$I_D$=f($V_{DS}$); $T_C$=125°C; $D$=0; parameter: $t_p$

| Diagram 5: Repetitive safe operating area | Diagram 6: Repetitive safe operating area |
|---|---|
|  |  |
| $I_D$=f($V_{DS}$); $T_C$=25°C; $T_j$≤150°C; parameter: $t_p$ | $I_D$=f($V_{DS}$); $T_C$=125°C; $T_j$≤150°C; parameter: $t_p$ |

| Diagram 7: Typ. output characteristics | Diagram 8: Typ. output characteristics |
|---|---|
|  |  |
| $I_D$=f($V_{DS}$); $T_j$=25°C; parameter: $I_{GS}$ | $I_D$=f($V_{DS}$); $T_j$=125°C; parameter: $I_{GS}$ |

| Diagram 9: Typ. Drain-source on-state resistance | Diagram 10: Drain-source on-state resistance |
|---|---|
|  |  |
| $R_{DS(on)}$=f($I_D$); $T_j$=125°C; parameter: $I_{GS}$ | $R_{DS(on)}$=f($T_j$); $I_D$=1.7 A |

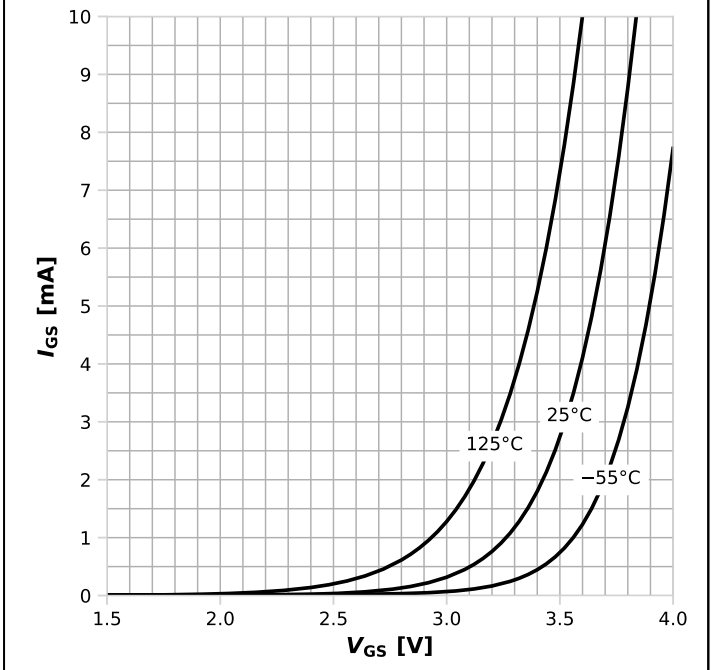
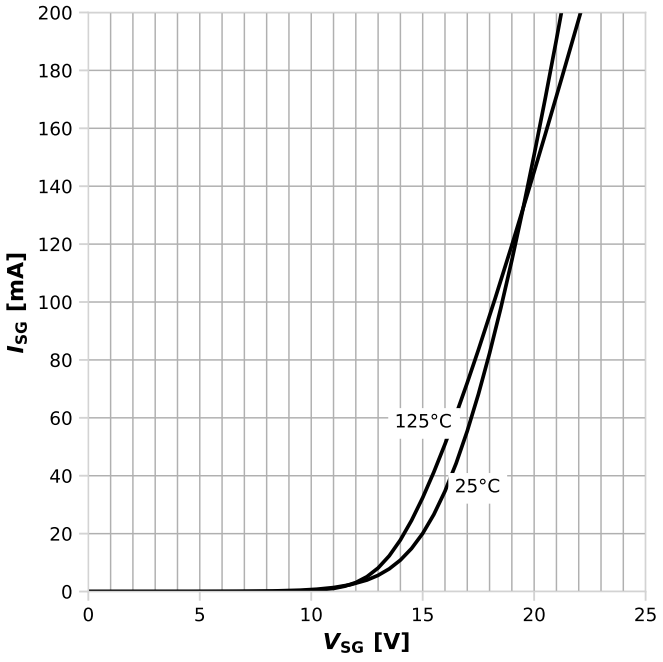
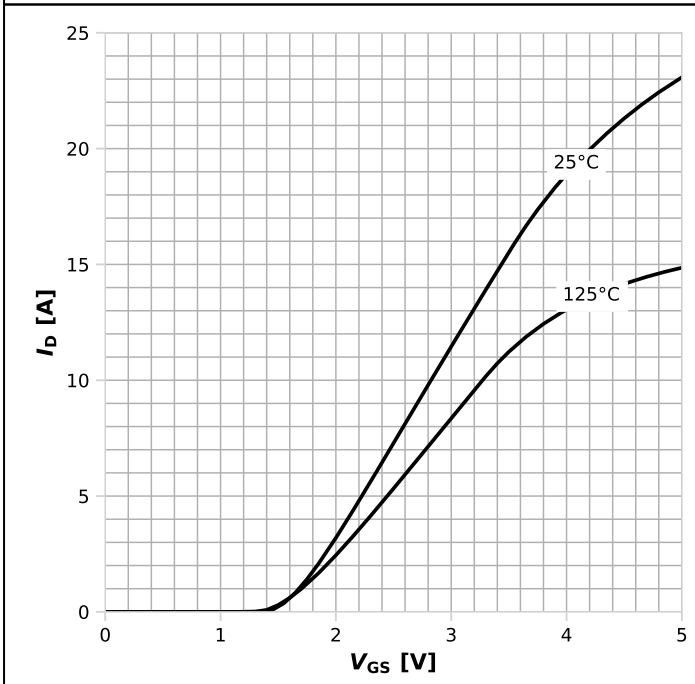
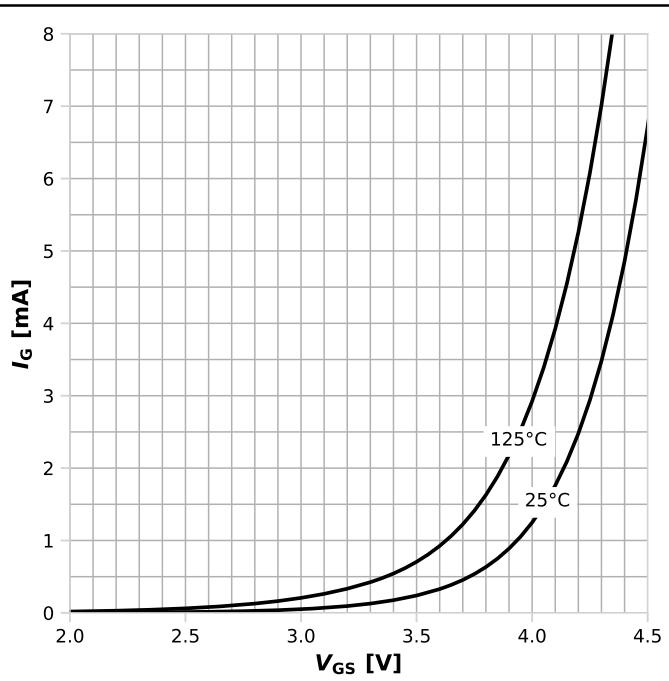
| Diagram 11: Typ. gate characteristics forward | Diagram 12: Typ. gate characteristics reverse |
|---|---|
|  |  |
| $I_{GS}$=f($V_{GS}$); open drain; parameter: $T_j$ | $I_{SG}$=f($V_{SG}$); parameter: $T_j$ |

**Diagram 13: Typ. transfer characteristics**



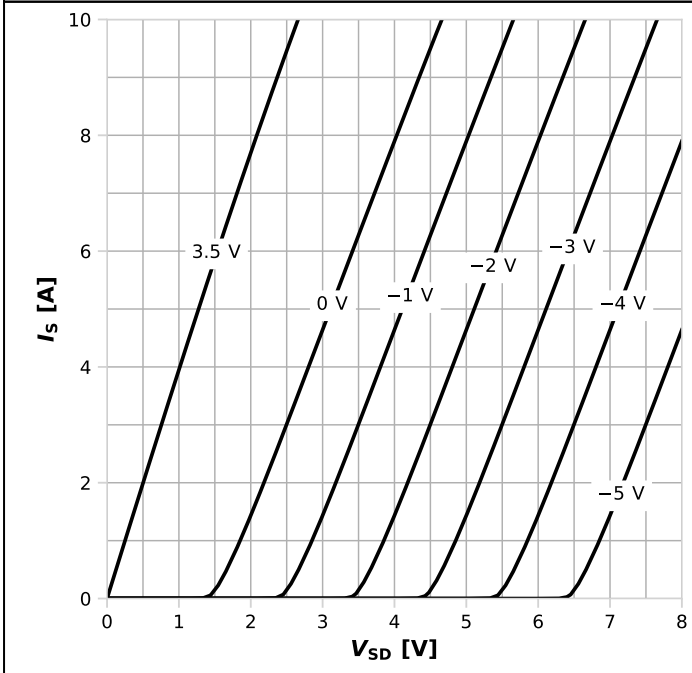

$I_D$=f($I_{GS}$); $V_{DS}$=8V; parameter: $T_j$

**Diagram 14: Typ. transfer gate current characteristic**



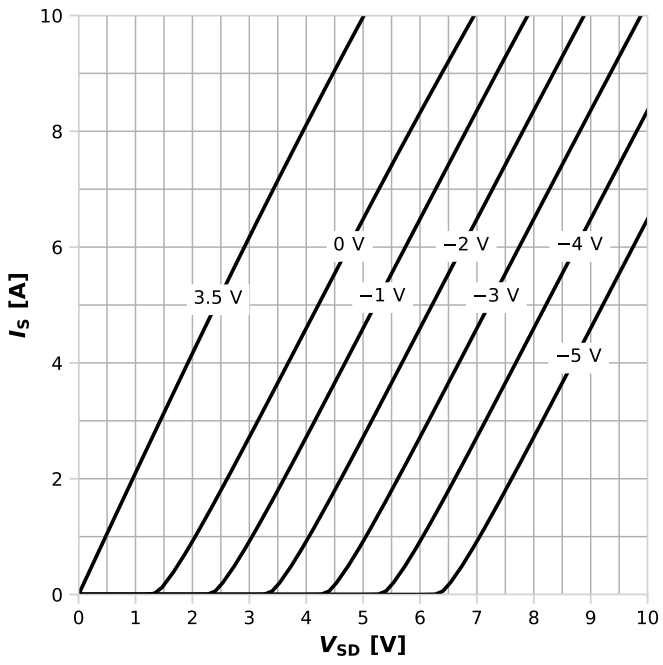

$I_G$=f($V_{GS}$); $V_{DS}$=8V; parameter: $T_j$

**Diagram 15: Typ. channel reverse characteristics**

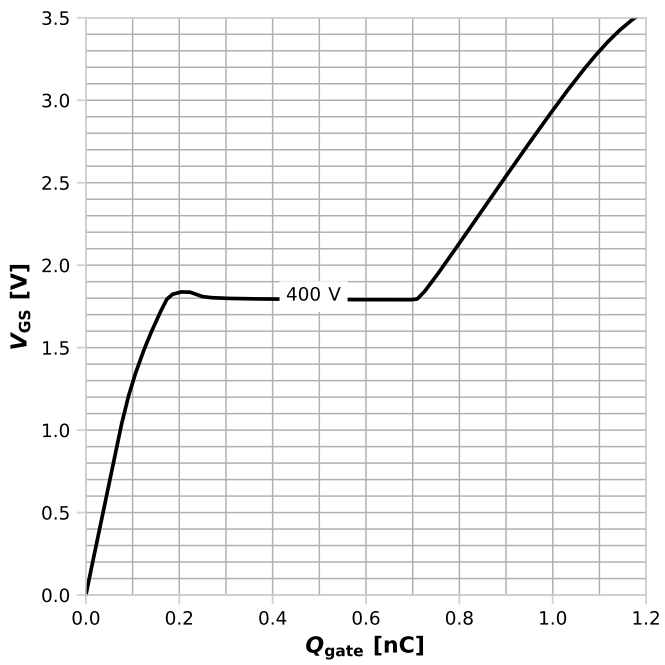
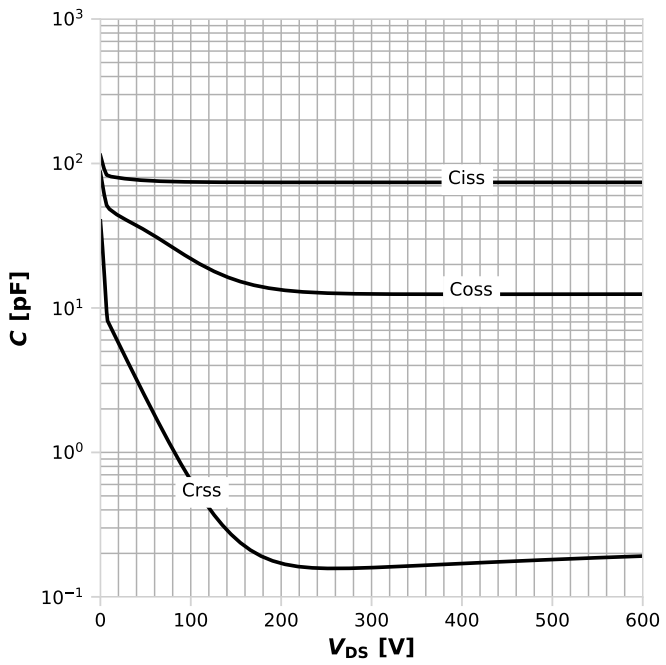


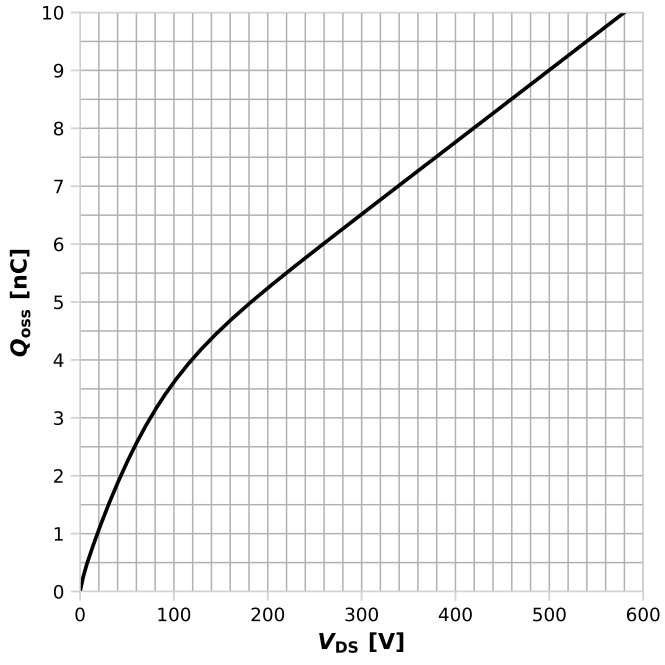
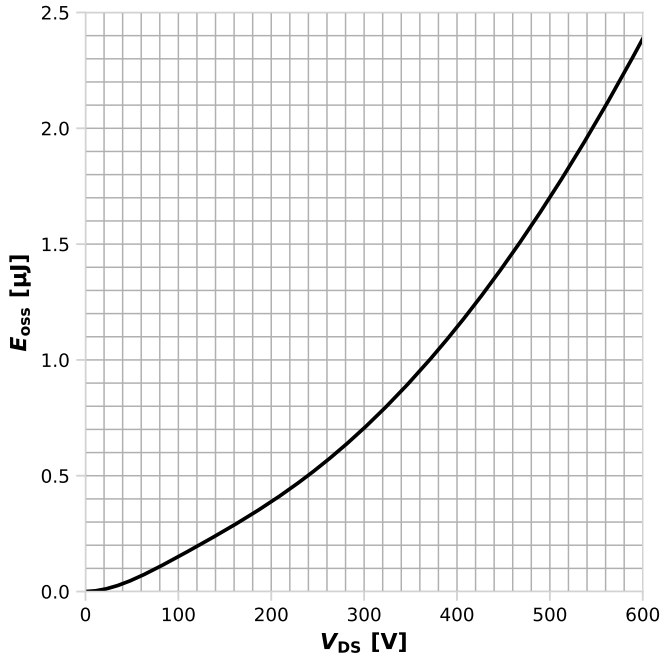

$I_S$=f($V_{SD}$); $T_j$=25°C; parameter: $V_{GS}$

**Diagram 16: Typ. channel reverse characteristics**




$I_S$=f($V_{SD}$); $T_j$=125°C; parameter: $V_{GS}$

| Diagram 17 Typ. gate charge | Diagram 18: Typ. capacitances |
|---|---|
|  |  |
| $V_{GS}$=f($Q_{gate}$); $I_D$=1.7 A pulsed; $I_G$=4.5 mA; parameter: $V_{DD}$ | $C$=f($V_{DS}$); $V_{GS}$=0 V |

| Diagram 19: Typ. output charge | Diagram 20: Typ. Coss stored energy |
|---|---|
|  |  |
| $Q_{oss}$=f($V_{DS}$) | $E_{oss}$=f($V_{DS}$) |

# 5 Test circuits

**Table 8 Reverse channel characteristics test**

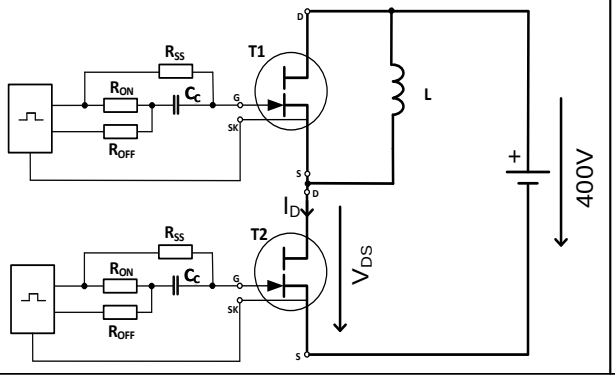
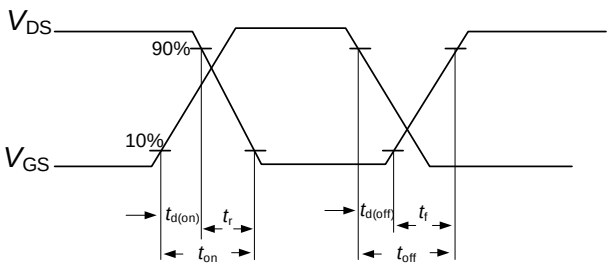
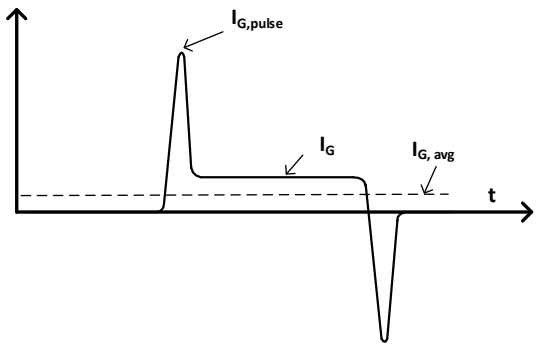
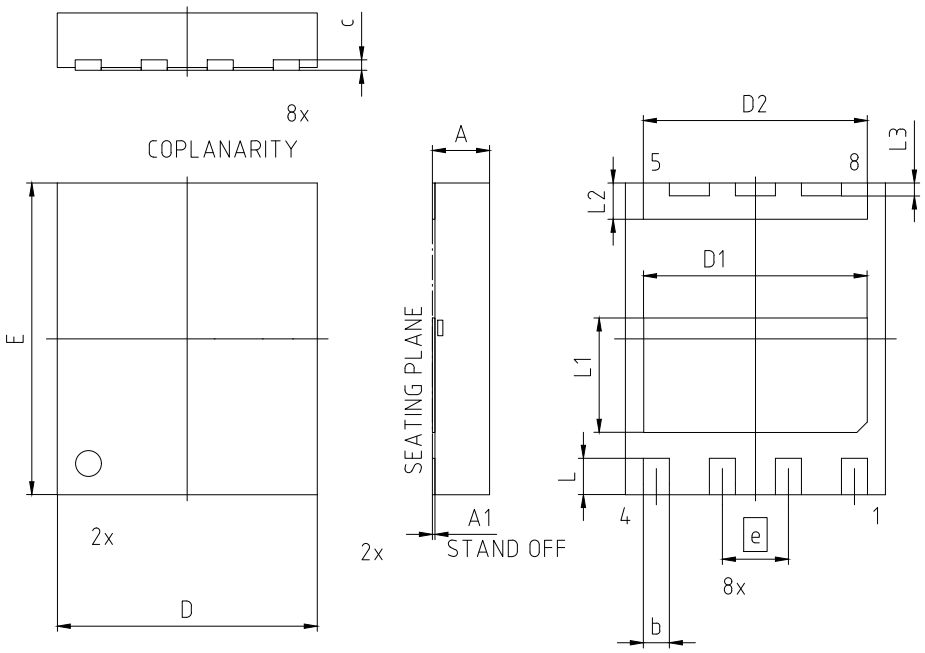
| Switching times with inductive load | Switching times waveform |
|---|---|
|  |  |



**Table 9 Gate current switching waveform**

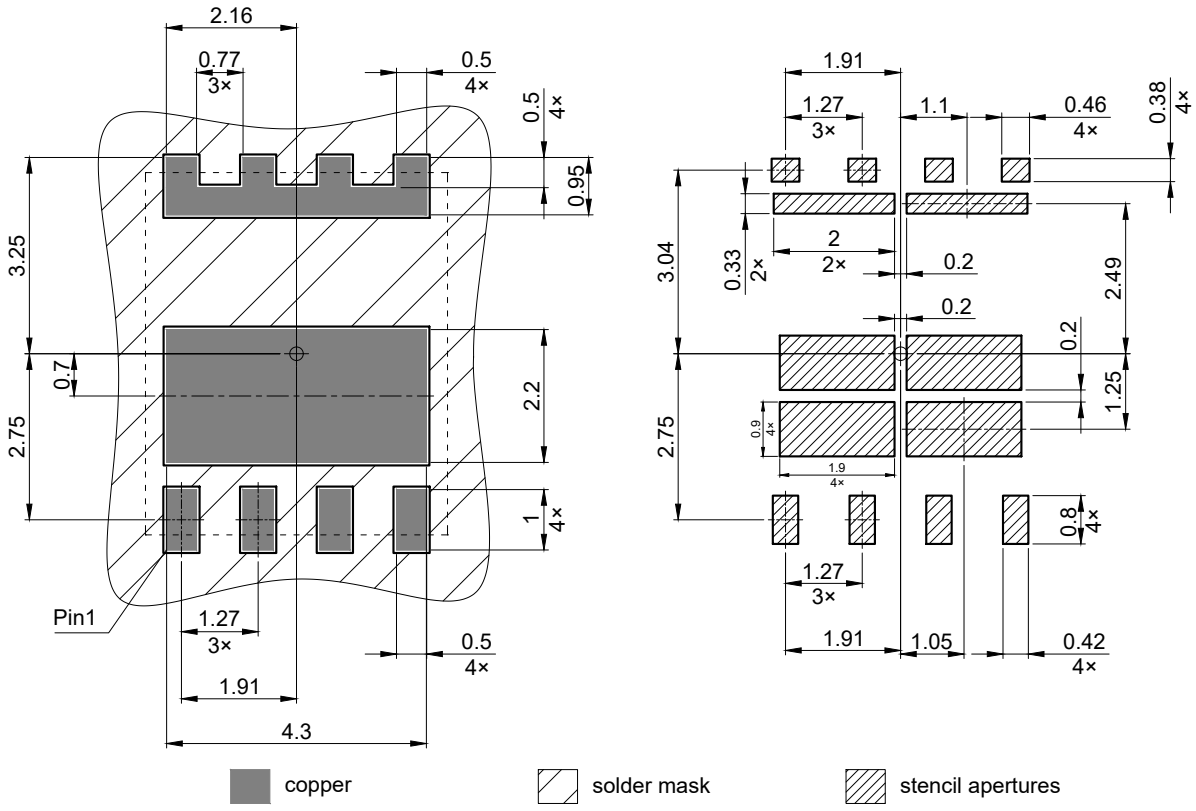
| Gate current switching waveform |
|---|
|  |

# 6 Package outlines




| PACKAGE - GROUP NUMBER: | PG-TSON-8-U03 | |
|---|---|---|
| DIMENSIONS | MILLIMETERS | |
| | MIN. | MAX. |
| A | - | 1.10 |
| A1 | - | 0.05 |
| b | 0.45 | 0.55 |
| c | 0.20 | |
| D | 5.00 | |
| D1 | 4.20 | 4.40 |
| D2 | 4.21 | 4.41 |
| E | 6.00 | |
| e | 1.27 | |
| L | 0.60 | 0.80 |
| L1 | 2.10 | 2.30 |
| L2 | 0.60 | 0.80 |
| L3 | 0.15 | 0.35 |

**Figure 1 Outline PG-TSON-8, dimensions in mm**




All pads are non-solder mask defined
All dimensions are in units mm

**Figure 2 Footprint drawing PG-TSON-8, dimensions in mm**

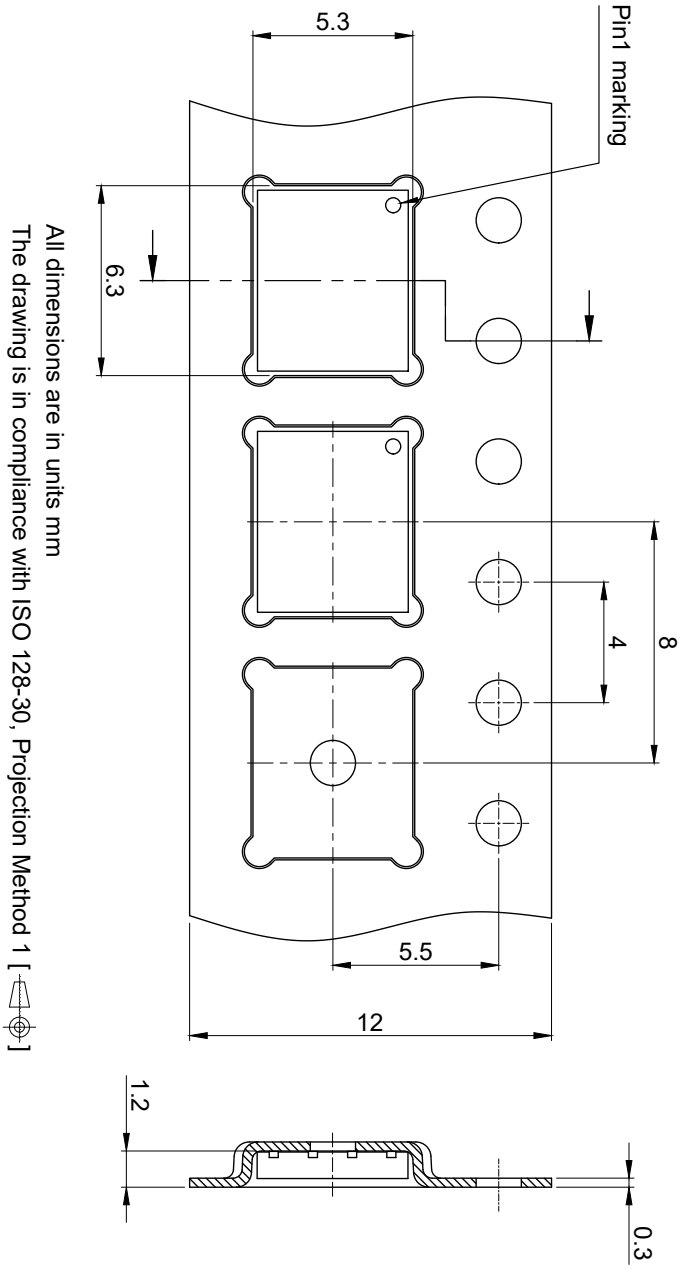



**Figure 3 Packaging variant PG-TSON-8, dimensions in mm**

# 7 Appendix A

**Table 10 Related links**

- CoolGaN™ webpage
- CoolGaN™ reliability white paper
- CoolGaN™ gate driver application note
- CoolGaN™ applications information

## Revision history

IGLR70R270D2S

### Revision 2025-03-27, Rev. 1.1

Previous revisions

| Revision | Date | Subjects (major changes since last revision) |
|---|---|---|
| 1.0 | 2025-01-31 | Release of final version |
| 1.1 | 2025-03-27 | Increased $V_{DS,pulsed}$ |

**Trademarks**
All referenced product or service names and trademarks are the property of their respective owners.

**We Listen to Your Comments** Any information within this document that you feel is wrong, unclear or missing at all? Your feedback will help us to continuously improve the quality of this document. Please send your proposal (including a reference to this document) to: **erratum@infineon.com**

**Published by**
**Infineon Technologies AG**
**81726 München, Germany**
**© 2025 Infineon Technologies AG**
**All Rights Reserved.**

**Important notice**
The products which may also include samples and may be comprised of hardware or software or both ("Product") are sold or provided and delivered by Infineon Technologies AG and its affiliates ("Infineon") subject to the terms and conditions of the frame supply contract or other written agreement(s) executed by a customer and Infineon or, in the absence of the foregoing, the applicable Sales Conditions of Infineon. General terms and conditions of a customer or deviations from applicable Sales Conditions of Infineon shall only be binding for Infineon if and to the extent Infineon has given its express written consent.

For the avoidance of doubt, Infineon disclaims all warranties of non-infringement of third-party rights and implied warranties such as warranties of fitness for a specific use/purpose or merchantability.

Infineon shall not be responsible for any information with respect to samples, the application or customer's specific use of any Product or for any examples or typical values given in this document.

The data contained in this document is exclusively intended for technically qualified and skilled customer representatives. It is the responsibility of the customer to evaluate the suitability of the Product for the intended application and the customer's specific use and to verify all relevant technical data contained in this document in the intended application and the customer's specific use. The customer is responsible for properly designing, programming, and testing the functionality and safety of the intended application, as well as complying with any legal requirements related to its use.

Unless otherwise explicitly approved by Infineon, Products may not be used in any application where a failure of the Product or any consequences of the use thereof can reasonably be expected to result in personal injury. However, the foregoing shall not prevent the customer from using any Product in such fields of use that Infineon has explicitly designed and sold it for, provided that the overall responsibility for the application lies with the customer.

If the Product includes security features:
Because no computing device can be absolutely secure, and despite security measures implemented in the Product, Infineon does not guarantee that the Product will be free from intrusion, data theft or loss, or other breaches ("Security Breaches"), and Infineon shall have no liability arising out of any Security Breaches.

If this document includes or references software:
The software is owned by Infineon under the intellectual property laws and treaties of the United States, Germany, and other countries worldwide. All rights reserved. Therefore, you may use the software only as provided in the software license agreement accompanying the software. If no software license agreement applies, Infineon hereby grants you a personal, non-exclusive, non-transferable license (without the right to sublicense) under its intellectual property rights in the software (a) for software provided in source code form, to modify and reproduce the software solely for use with Infineon hardware products, only internally within your organization, and (b) to distribute the software in binary code form externally to end users, solely for use on Infineon hardware products. Any other use, reproduction, modification, translation, or compilation of the software is prohibited.

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

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

# Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

### Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

**www.entegreci.com**

### Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

**Kategorilere göz atın**

### Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

**Üreticileri görün**

### Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

**Teklif isteyin**

**www.entegreci.com** | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.