

CoolGaN™
CoolGaN™ Transistor 100 V G3

PG-TSON-4

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 3x3 package

Potential applications

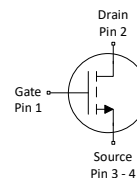
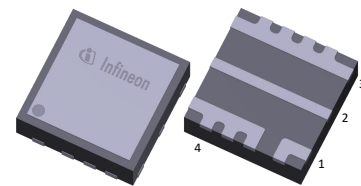
- Telecom & Datacenter 48V IBC
- Sync Rectification for AC-DC and DC-DC converters
- Robotics and drones
- Battery powered tools
- 48V servo drive
- e-Mobility, UAVs
- Class D Audio
- Solar & Energy storage systems
- Point of Load Converters

Product validation

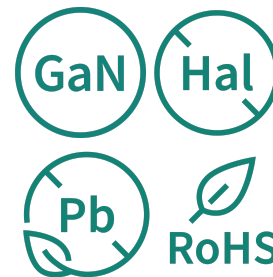
Fully qualified according to JEDEC for Industrial Applications

Table 1 Key performance parameters

Parameter	Value	Unit
V_{DS}	100	V
$R_{DS(on)}$	5.0	mΩ
I_D	38	A
Q_{oss}	25	nC
Q_G	6.1	nC
Q_{rr}	0	nC



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



Part number	Package	Marking	Related links
IGB070S10S1	PG-TSON-4	AA1	see Appendix A

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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}	-	-	100	V	$V_{GS}=0\text{ V}$
Pulsed drain-source voltage ¹⁾	$V_{DS,pulse}$	-	-	120	V	$V_{GS}=0\text{ V}$, 1 h total time
Continuous drain current	I_D	-	-	38 13	A	$V_{GS}=5\text{ V}$, $T_C=25\text{ °C}$ $V_{GS}=5\text{ V}$, $T_A=25\text{ °C}$, $R_{thJA}=48\text{ °C/W}$ ²⁾
Pulsed drain current ³⁾	$I_{D,pulse}$	-	-	360 170	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}	-	-	23 2.6	W	$T_C=25\text{ °C}$ $T_A=25\text{ °C}$, $R_{thJA}=48\text{ °C/W}$ 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}	-4.0	5.0	5.5	V	-

3 Thermal characteristics

Table 4 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case, top	R_{thJC}	-	1.1	1.3	°C/W	-
Thermal resistance, junction - case, bottom	R_{thJC}	-	3.7	5.4	°C/W	-
Thermal resistance, junction - ambient 1s0p	R_{thJA}	-	68	-	°C/W	On 1 layer PCB, vertical in still air.
Thermal resistance, junction - ambient 2s2p	R_{thJA}	-	48	-	°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	2.1	2.9	V	$V_{DS}=V_{GS}$, $I_D=4.5\text{ mA}$
Drain-source leakage current	I_{DSS}	-	0.2 3.0	1.0 25	μA	$V_{DS}=100\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$ $V_{DS}=100\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=125\text{ °C}$
Gate-source leakage current	I_{GSS}	-	11 0.01 70 0.01	100 0.03 640 0.04	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	$R_{DS(on)}$	-	5.0	7.0	$\text{m}\Omega$	$V_{GS}=5\text{ V}$, $I_D=13\text{ A}$
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}	-	650	740	pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}	-	310	340	pF	
Reverse transfer capacitance	C_{rss}	-	3.6	4.7	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}	-	1.8	-	nC	$V_{DS}=50\text{ V}$, $I_D=13\text{ A}$, $V_{GS}=0\text{ to }5\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	1.3	-	nC	
Gate to drain charge ⁶⁾	Q_{gd}	-	1.7	-	nC	
Switching charge	Q_{sw}	-	2.2	-	nC	
Gate charge total ⁶⁾	Q_g	-	6.1	7.9	nC	
Gate plateau voltage	$V_{plateau}$	-	2.8	-	V	
Output charge ⁶⁾	Q_{oss}	-	25	28	nC	$V_{DS}=50\text{ V}$, $V_{GS}=0\text{ V}$

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	-	-	7.4	A	$T_C=25\text{ °C}$
Pulsed current, reverse	$I_{S,pulse}$	-	-	152	A	
Source-Drain reverse voltage	V_{SD}	-	2.7 2.3	3.5 -	V	$V_{GS}=0\text{ V}, I_{S,pulse}=13\text{ A}, T_j=25\text{ °C}$ $V_{GS}=0\text{ V}, I_{S,pulse}=0.5\text{ A}, T_j=25\text{ °C}$
Reverse recovery charge ⁷⁾	Q_{rr}	-	0	-	nC	$V_R=50\text{ V}, I_{S,pulse}=13\text{ A}, di_{S,pulse}/dt=100\text{ A}/\mu\text{s}$

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

5 Electrical characteristics diagrams

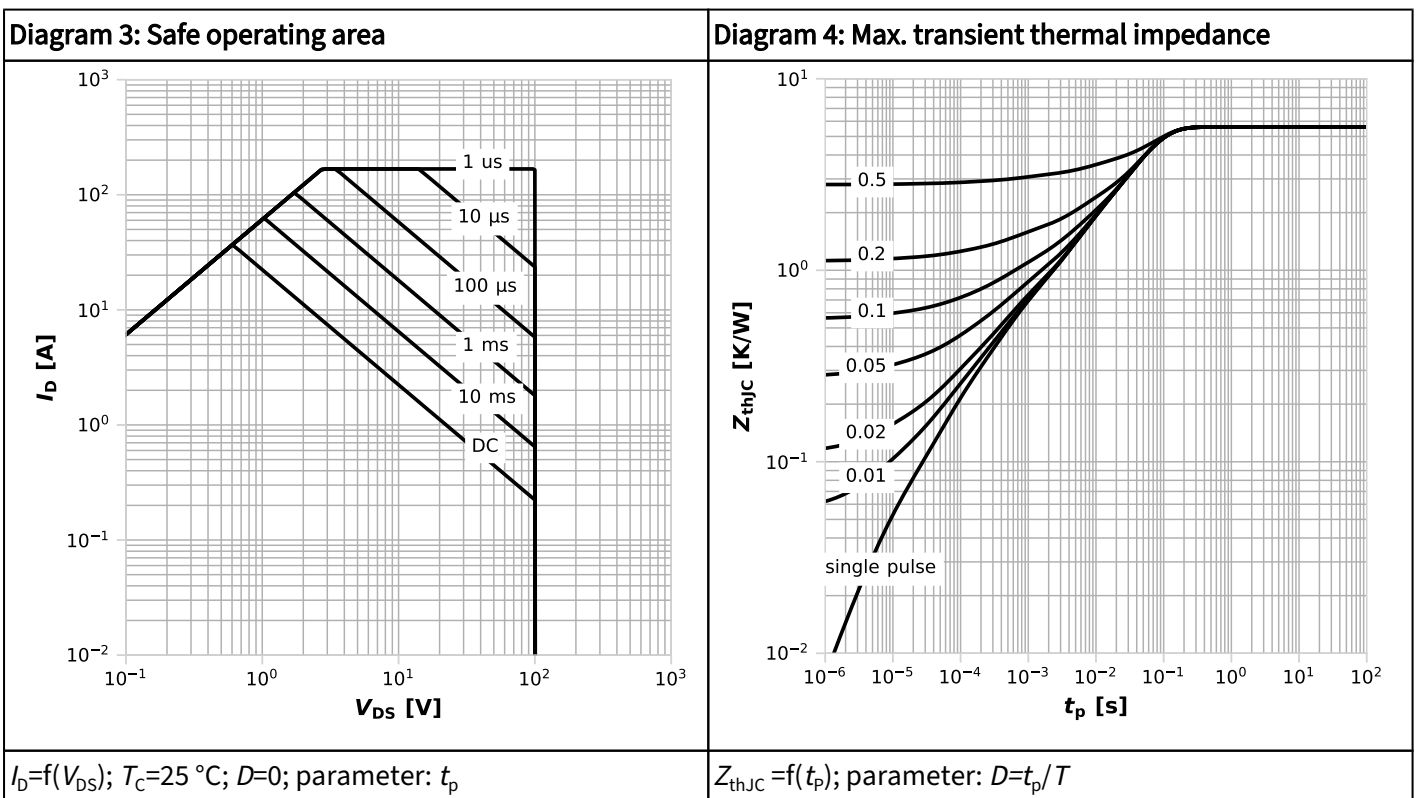
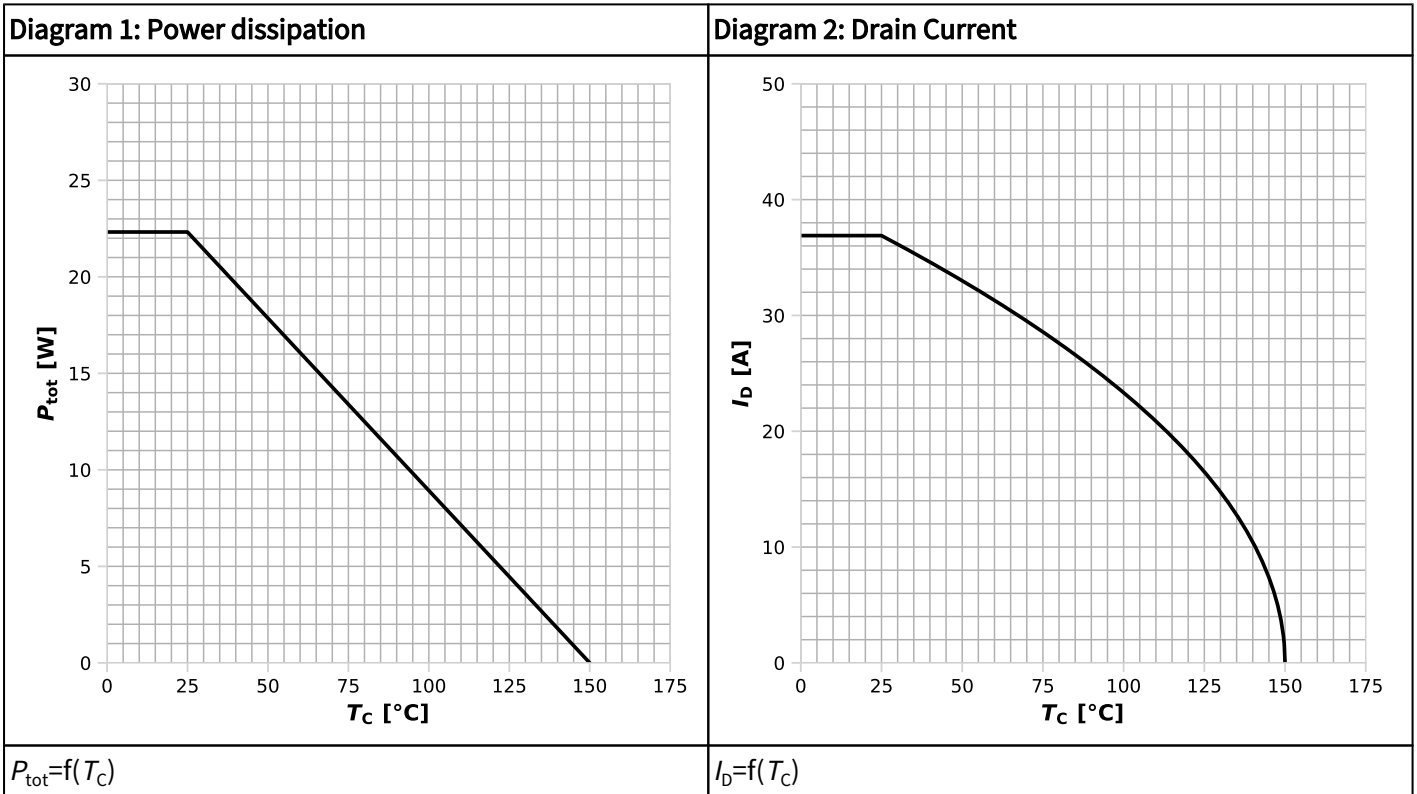
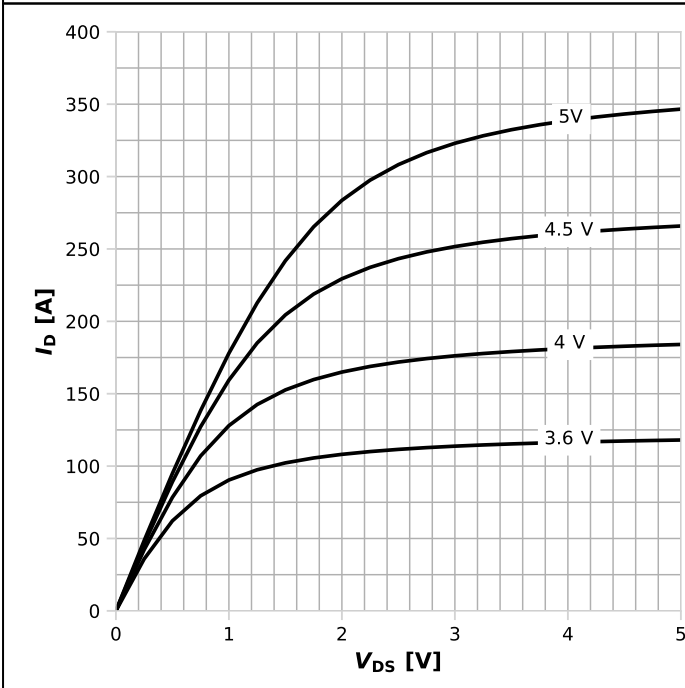
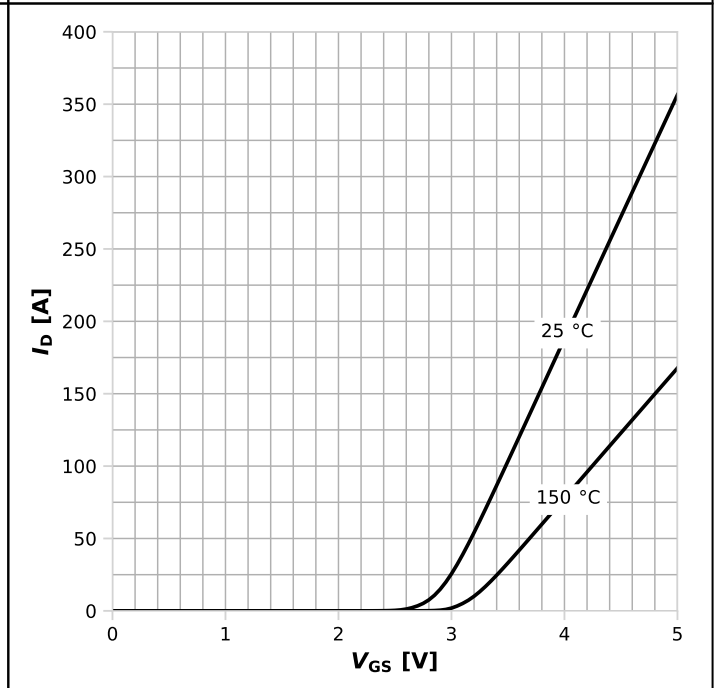


Diagram 5: Typ. output characteristics



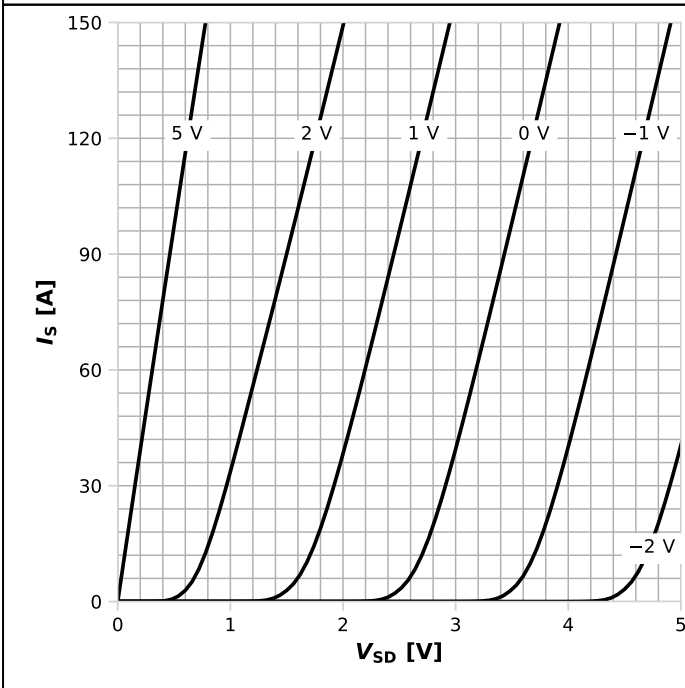
$I_D = f(V_{DS}); T_j = 25\text{ }^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 6: Typ. transfer characteristics



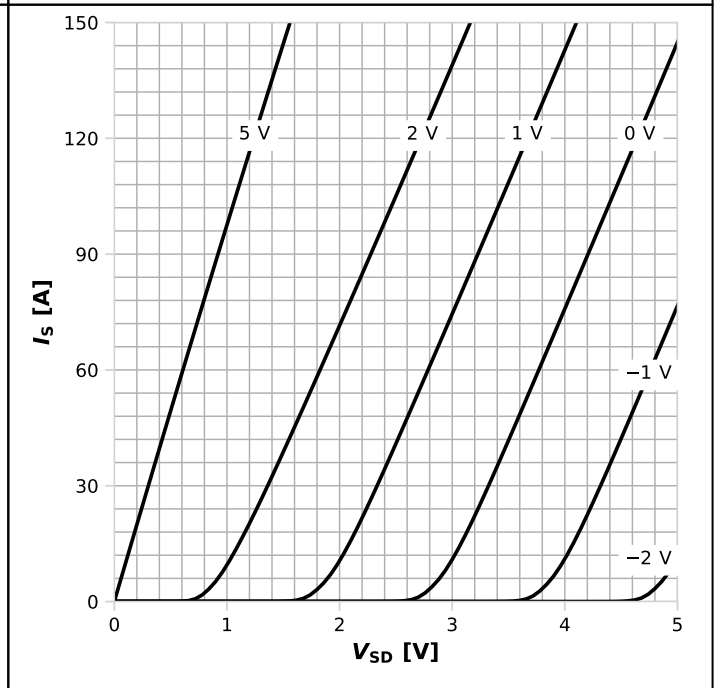
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}; \text{parameter: } T_j$

Diagram 7: Typ. channel reverse characteristics



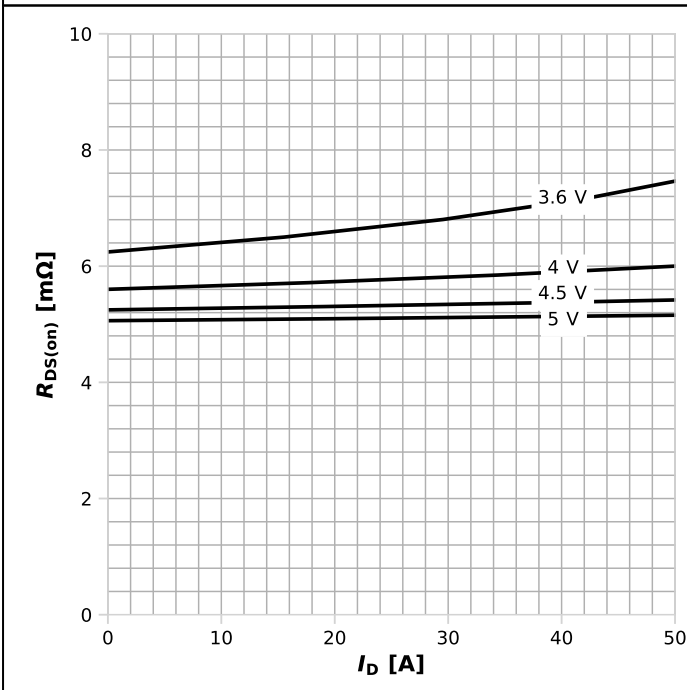
$I_S = f(V_{SD}); T_j = 25\text{ }^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 8: Typ. channel reverse characteristics



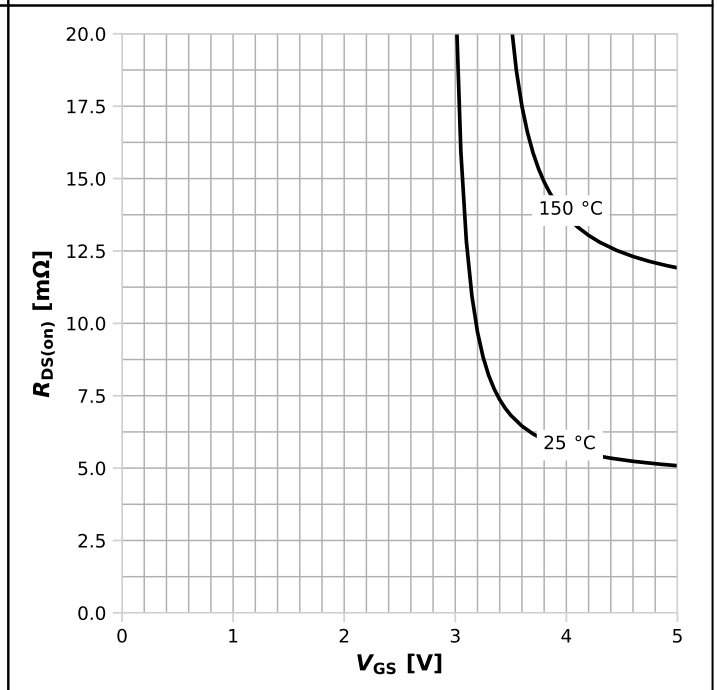
$I_S = f(V_{SD}); T_j = 125\text{ }^\circ\text{C}; \text{parameter: } V_{GS}$

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



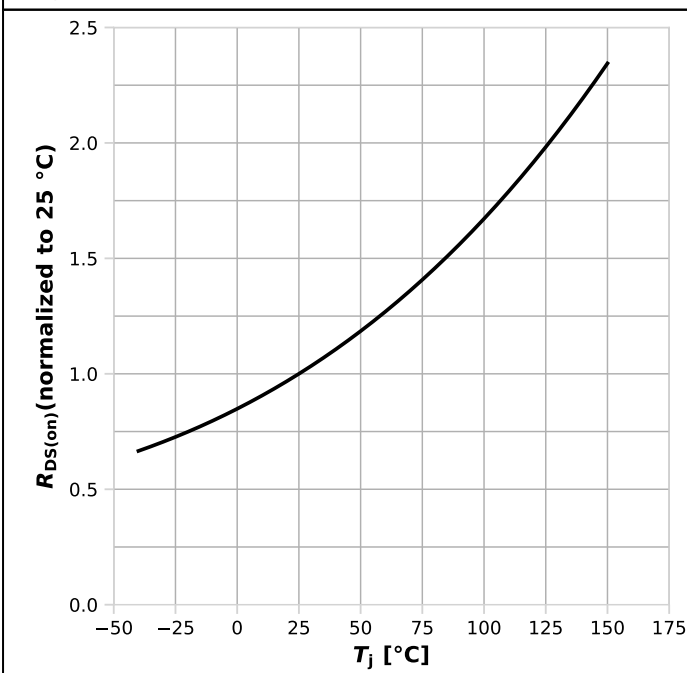
$R_{DS(on)}=f(I_D); T_j=25\text{ °C}; \text{parameter: } V_{GS}$

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



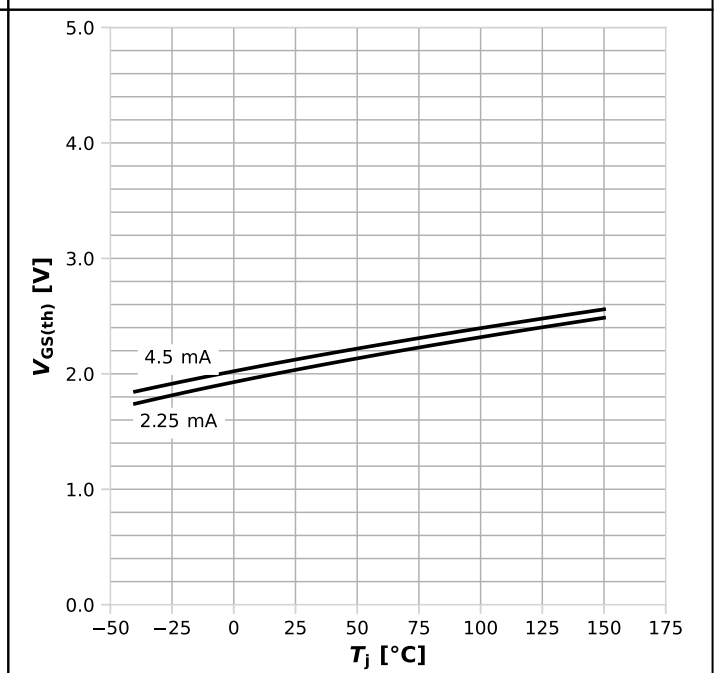
$R_{DS(on)}=f(V_{GS}); I_D=13\text{ A}; \text{parameter: } T_j$

Diagram 11: Drain-source on-state resistance



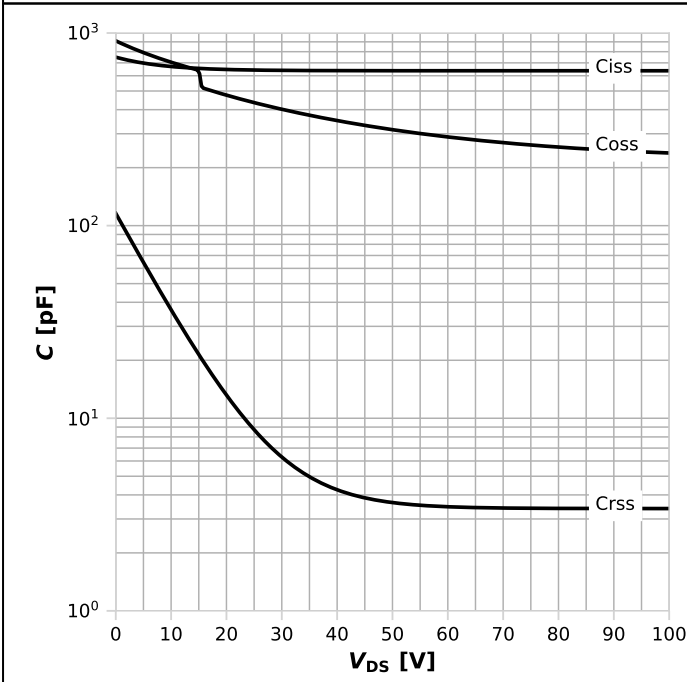
$R_{DS(on)}=f(T_j); I_D=13\text{ A}, V_{GS}=5V$

Diagram 12: Typ. gate threshold voltage



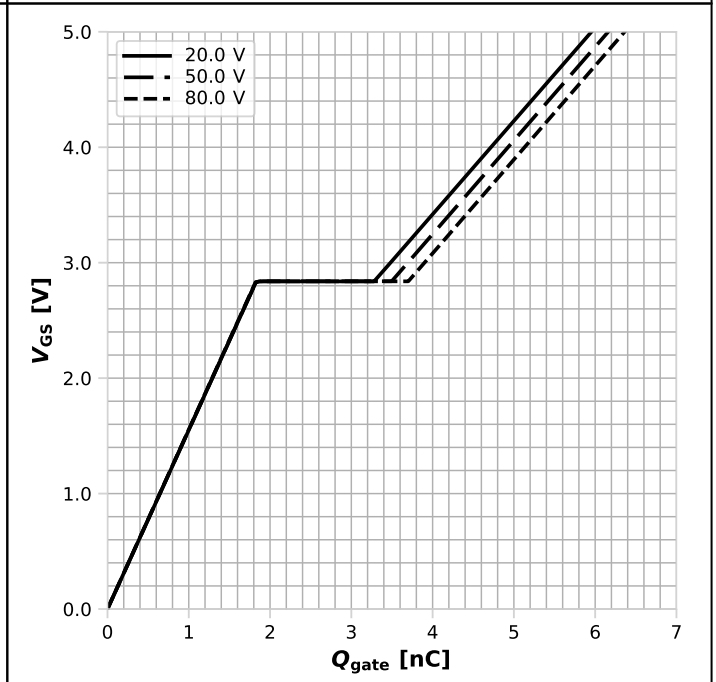
$V_{GS(th)}=f(T_j), V_{GS}=V_{DS}; \text{parameter: } I_D$

Diagram 13: Typ. capacitances



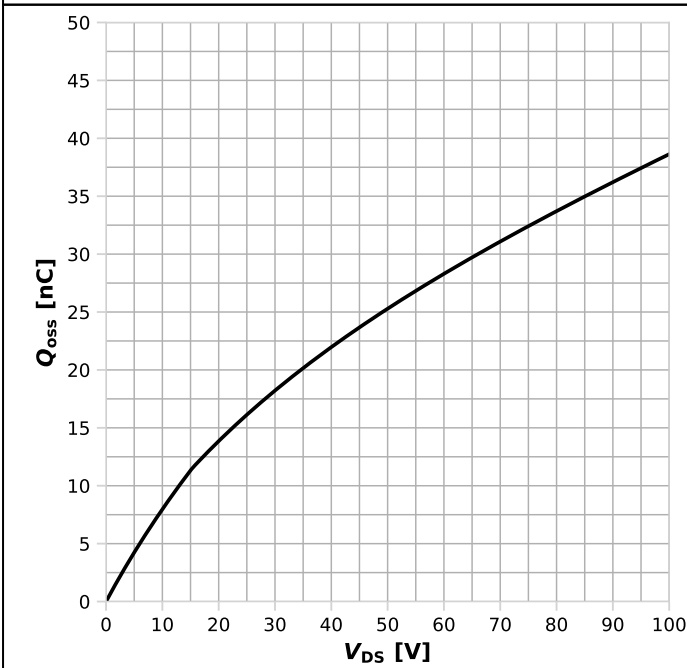
$C=f(V_{DS}); V_{GS}=0\text{ V}$

Diagram 14 Typ. gate charge



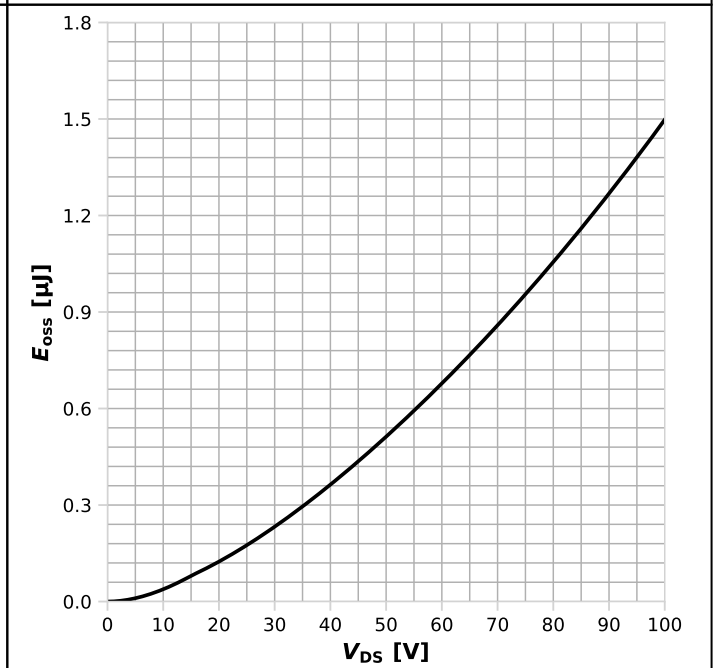
$V_{GS}=f(Q_{gate}); I_D=13\text{ A pulsed}; \text{parameter: } V_{DS}$

Diagram 15: Typ. output charge

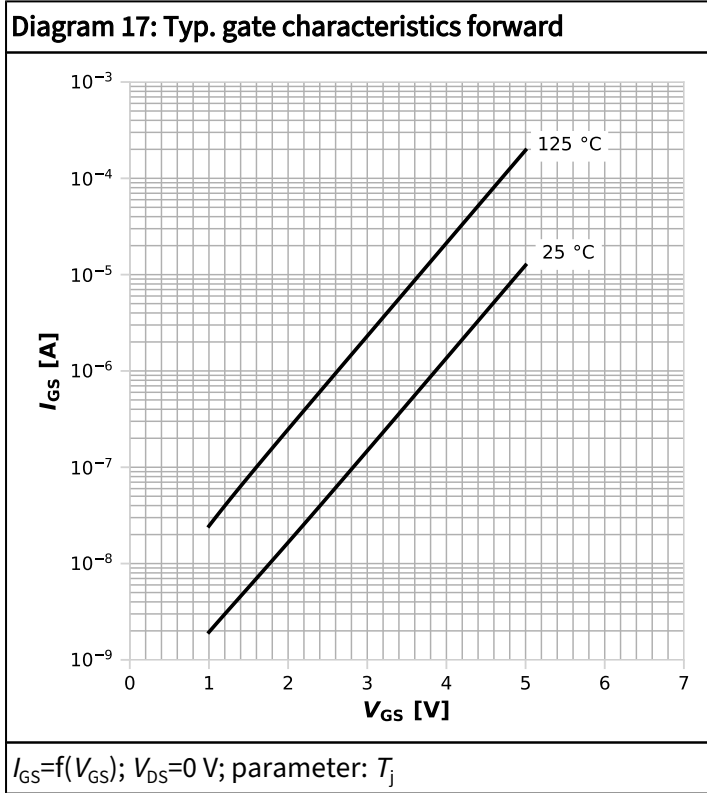


$Q_{oss}=f(V_{DS}), V_{GS}=0\text{ V}$

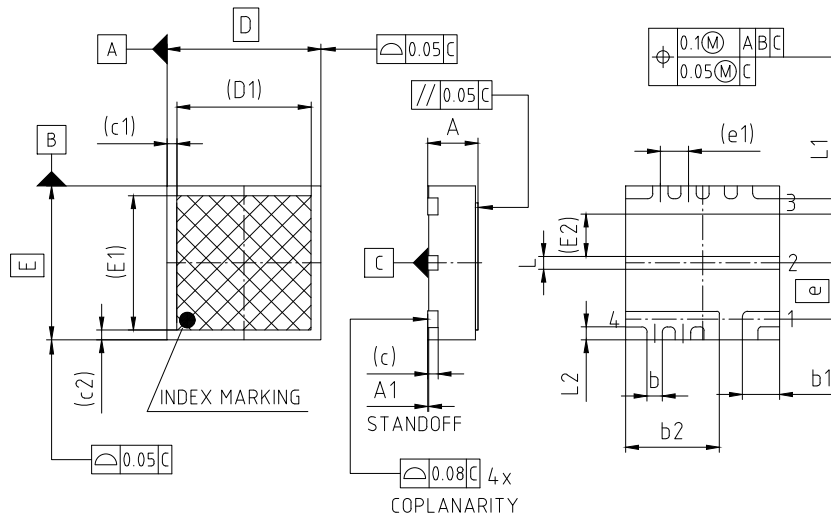
Diagram 16: Typ. Coss stored Energy



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



6 Package outlines



PACKAGE - GROUP NUMBER: PG-TSON-4-U02		
DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	0.832	1.032
A1	---	0.05
b	0.20	0.40
b1	0.625	0.825
b2	1.725	1.925
c	0.20	
c1	0.192	
c2	0.192	
D	3.00	
D1	2.62	
E	3.00	
E1	2.62	
E2	0.825	
L	0.20	0.30
L1	0.25	0.35
L2	0.20	0.30
e	1.10	
e1	0.55	

NOTE: DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS

Figure 1 Outline PG-TSON-4, dimensions in mm

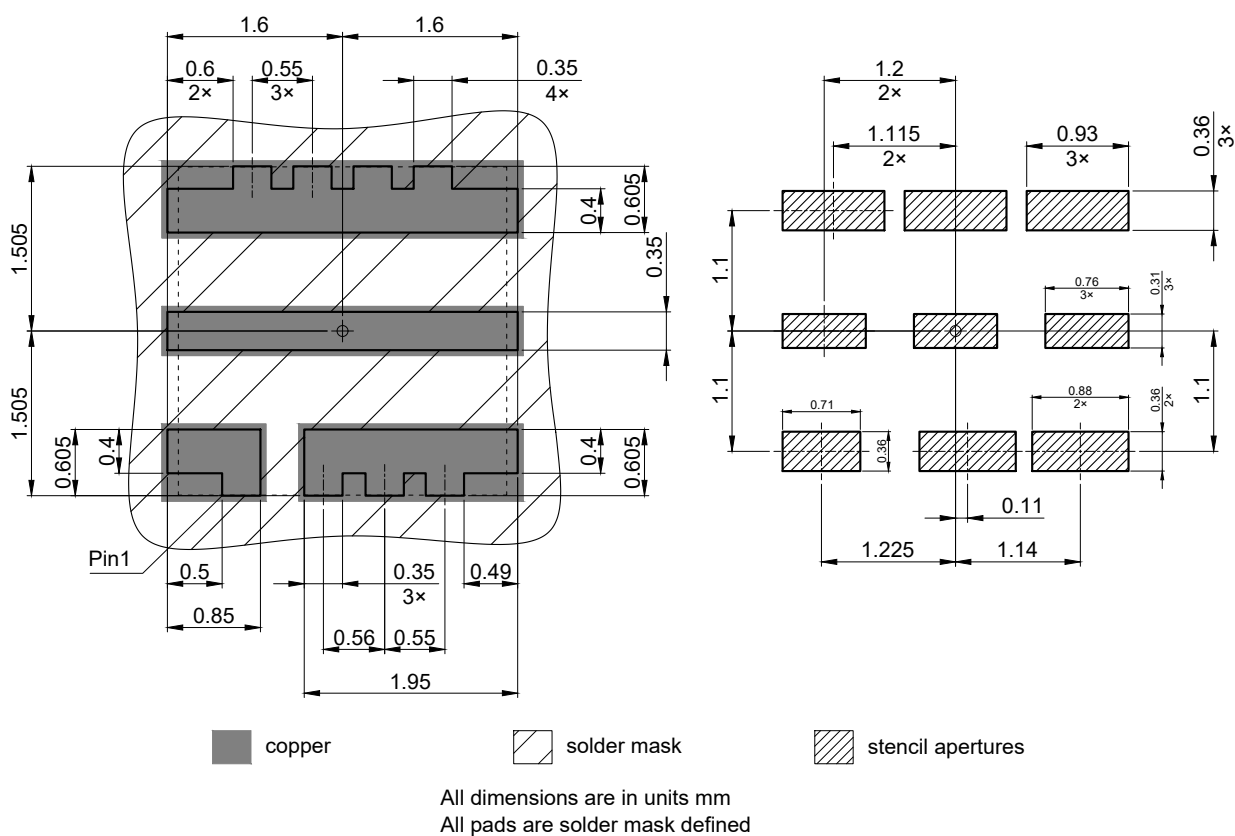
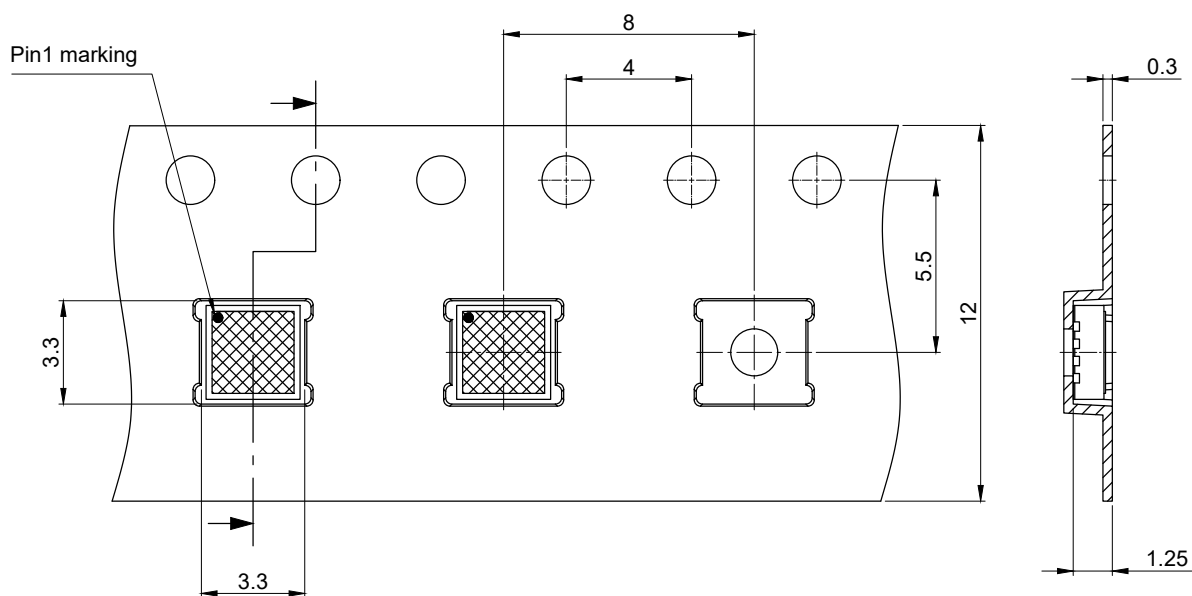


Figure 2 Footprint drawing PG-TSON-4, dimensions in mm



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

Figure 3 Packaging variant PG-TSON-4, 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-4-3](#)

Revision history

IGB070S10S1

Revision 2025-01-27, Rev. 1.0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2025-01-27	Release of final version

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