

**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**

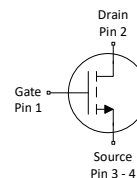
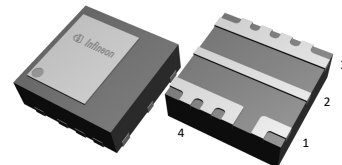
- Telecom & Datacenter 48V IBC
- Sync Rectification for AC-DC and DC-DC converters
- Robotics and drones
- Battery powered tools
- 48V servo drive
- e-Mobility, UAVs
- Class D Audio
- Solar & Energy storage systems
- Point of Load Converters

**Product validation**

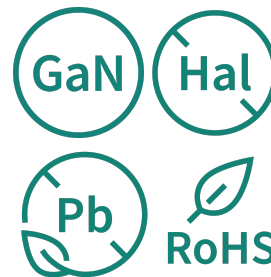
Fully qualified according to JEDEC for Industrial Applications

**Table 1 Key performance parameters**

Parameter	Value	Unit
$V_{DS}$	100	V
$R_{DS(on)}$	9.4	mΩ
$I_D$	23	A
$Q_{oss}$	14	nC
$Q_G$	3.4	nC
$Q_{rr}$	0	nC



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



Type / Ordering code	Package	Marking	Related links
IGB110S10S1	PG-TSON-4	BA1	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 <sup>1)</sup>	$V_{DS,pulse}$	-	-	120	V	$V_{GS}=0\text{ V}$ , 1 h total time
Continuous drain current	$I_D$	-	-	23 9.0	A	$V_{GS}=5\text{ V}$ , $T_C=25\text{ °C}$ $V_{GS}=5\text{ V}$ , $T_A=25\text{ °C}$ , $R_{thJA}=50\text{ °C/W}$ <sup>2)</sup>
Pulsed drain current <sup>3)</sup>	$I_{D,pulse}$	-	-	210 97	A	$T_j=25\text{ °C}$ $T_j=150\text{ °C}$
Pulsed gate-source voltage <sup>1)</sup>	$V_{GS}$	-6.5	-	6.5	V	Pulsed 100 h total time
Power dissipation	$P_{tot}$	-	-	15 2.5	W	$T_C=25\text{ °C}$ $T_A=25\text{ °C}$ , $R_{thJA}=50\text{ °C/W}$ <sup>2)</sup>
Storage temperature	$T_{stg}$	-55	-	150	°C	-
Junction temperature	$T_j$	-40	-	150	°C	-

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

<sup>2)</sup> Device on 4-layer FR4 PCB, vertical in still air.

<sup>3)</sup> 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	$R_{thJC}$	-	1.4	1.7	°C/W	-
Thermal resistance, junction - case, bottom	$R_{thJC}$	-	5.6	8.1	°C/W	-
Thermal resistance, junction - ambient 1s0p	$R_{thJA}$	-	70	-	°C/W	On 1 layer PCB, vertical in still air.
Thermal resistance, junction - ambient 2s2p	$R_{thJA}$	-	50	-	°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	2.0	2.9	V	$V_{DS}=V_{GS}$ , $I_D=3.0\text{ mA}$
Drain-source leakage current	$I_{DSS}$	-	0.1 2.0	0.5 20	$\mu\text{A}$	$V_{DS}=100\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=25\text{ °C}$ $V_{DS}=100\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=125\text{ °C}$
Gate-source leakage current	$I_{GSS}$	-	5.0 0.003 40 0.003	50 0.009 370 0.012	$\mu\text{A}$	$V_{GS}=5\text{ V}$ , $T_j=25\text{ °C}$ $V_{GS}=-4\text{ V}$ , $T_j=25\text{ °C}$ $V_{GS}=5\text{ V}$ , $T_j=125\text{ °C}$ $V_{GS}=-4\text{ V}$ , $T_j=125\text{ °C}$
Drain-source on-state resistance	$R_{DS(on)}$	-	9.4	11	$\text{m}\Omega$	$V_{GS}=5\text{ V}$ , $I_D=10\text{ A}$
Gate resistance <sup>4)</sup>	$R_G$	-	0.5	-	$\Omega$	-

<sup>4)</sup> Defined by design. Not subject to production test.

**Table 6 Capacitance characteristics <sup>5)</sup>**

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Input capacitance	$C_{iss}$	-	300	340	pF	$V_{GS}=0\text{ V}$ , $V_{DS}=50\text{ V}$ , $f=1\text{ MHz}$
Output capacitance	$C_{oss}$	-	140	150	pF	
Reverse transfer capacitance	$C_{rss}$	-	2.3	3.0	pF	

<sup>5)</sup> 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	$Q_{gs}$	-	1.0	-	nC	$V_{DS}=50\text{ V}$ , $I_D=10\text{ A}$ , $V_{GS}=0\text{ to }5\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	0.7	-	nC	
Gate to drain charge <sup>6)</sup>	$Q_{gd}$	-	0.9	-	nC	
Switching charge	$Q_{sw}$	-	1.2	-	nC	
Gate charge total <sup>6)</sup>	$Q_g$	-	3.4	4.4	nC	
Gate plateau voltage	$V_{plateau}$	-	2.8	-	V	
Output charge <sup>6)</sup>	$Q_{oss}$	-	14	15	nC	$V_{DS}=50\text{ V}$ , $V_{GS}=0\text{ V}$

<sup>6)</sup> 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	$I_S$	-	-	5.0	A	$T_C=25\text{ °C}$
Pulsed current, reverse	$I_{S,pulse}$	-	-	92	A	
Source-Drain reverse voltage	$V_{SD}$	-	2.6 2.2	3.4 -	V	$V_{GS}=0\text{ V}, I_{S,pulse}=10\text{ A}, T_j=25\text{ °C}$ $V_{GS}=0\text{ V}, I_{S,pulse}=0.5\text{ A}, T_j=25\text{ °C}$
Reverse recovery charge <sup>7)</sup>	$Q_{rr}$	-	0	-	nC	$V_R=50\text{ V}, I_{S,pulse}=10\text{ A}, di_{S,pulse}/dt=100\text{ A}/\mu\text{s}$

<sup>7)</sup> Defined by design. Not subject to production test.

## 5 Electrical characteristics diagrams

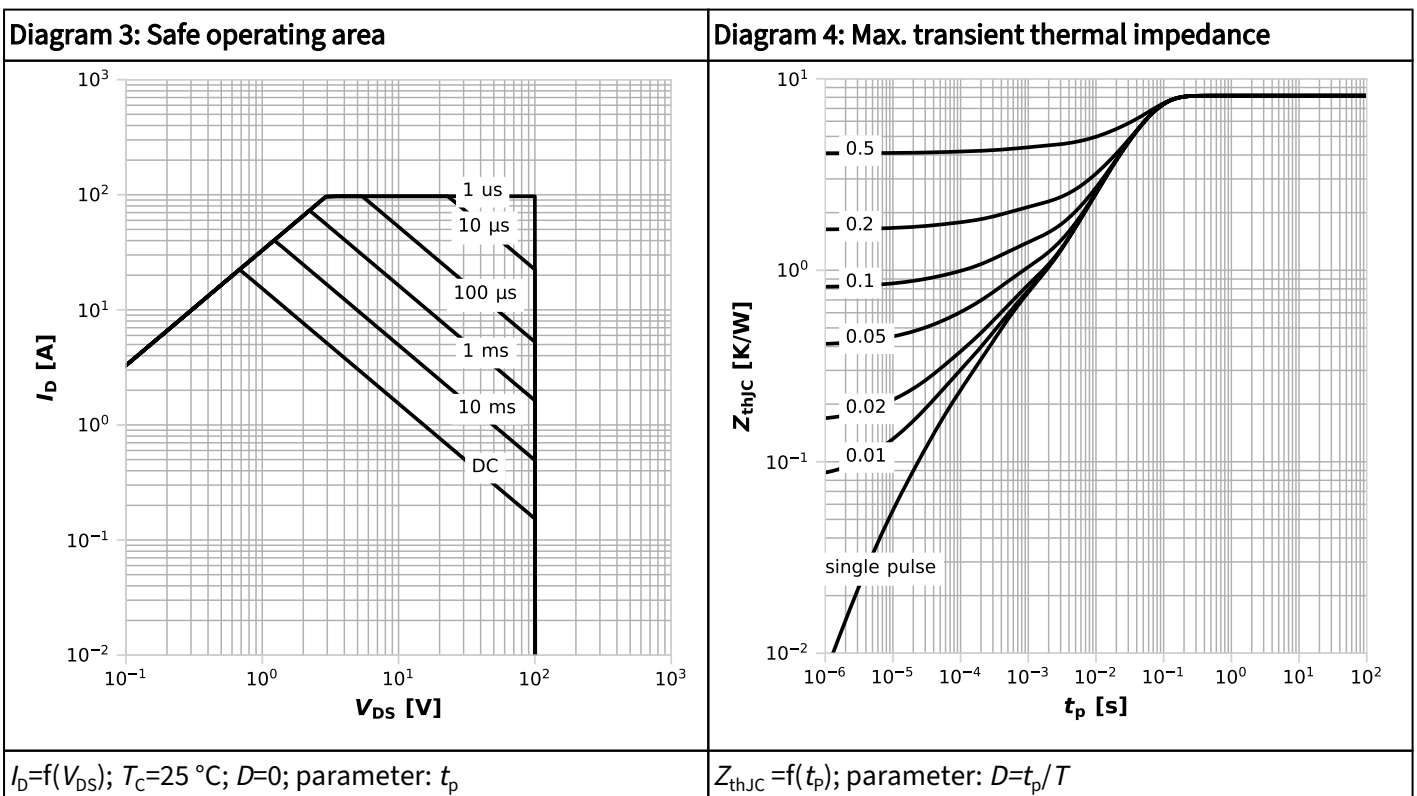
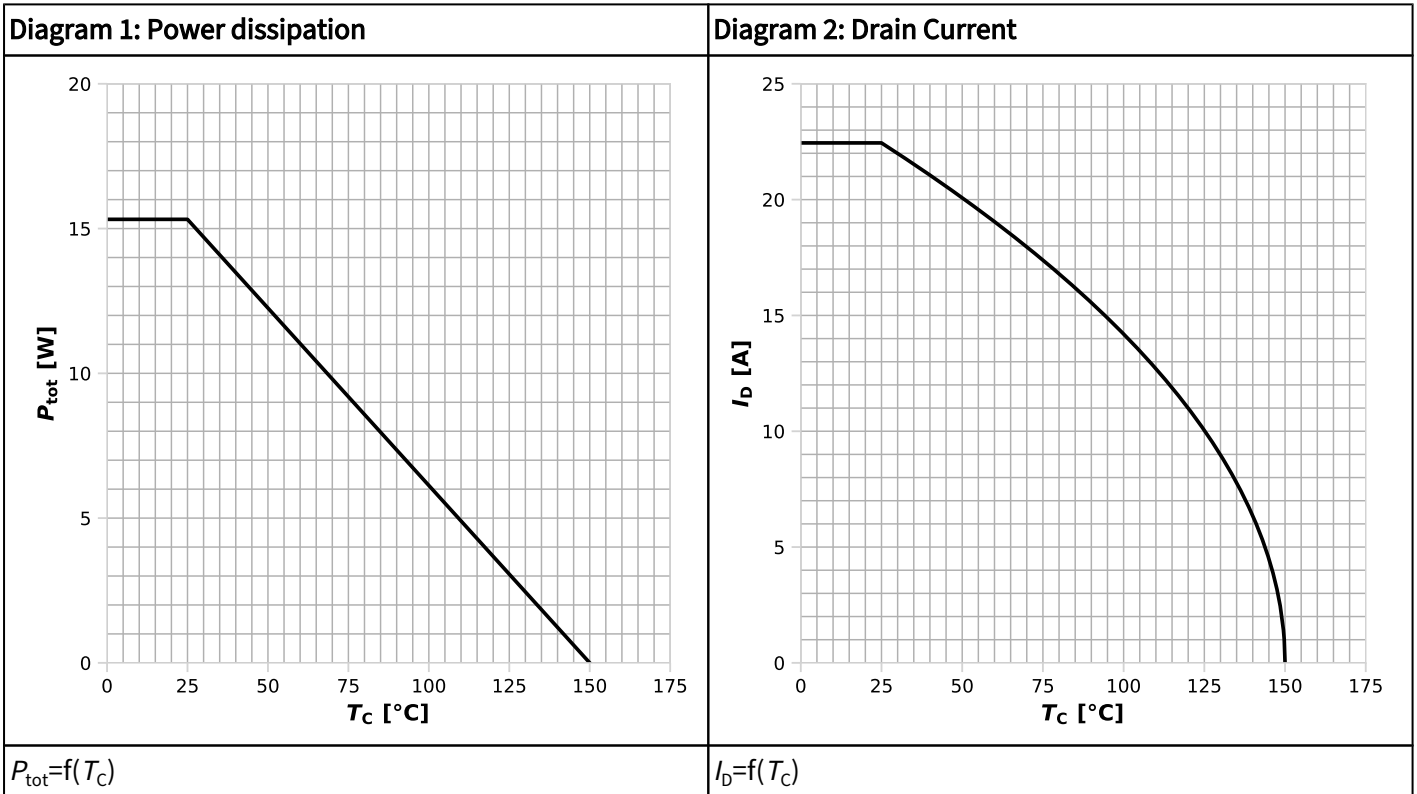
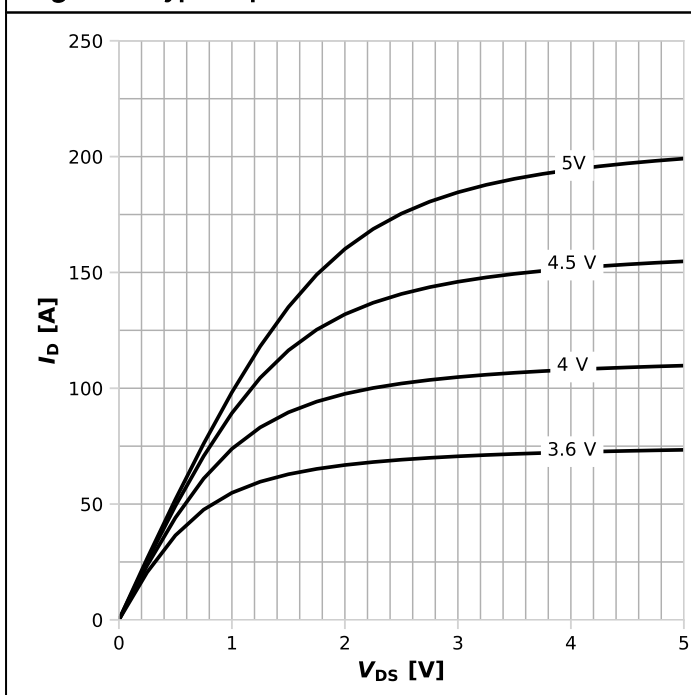


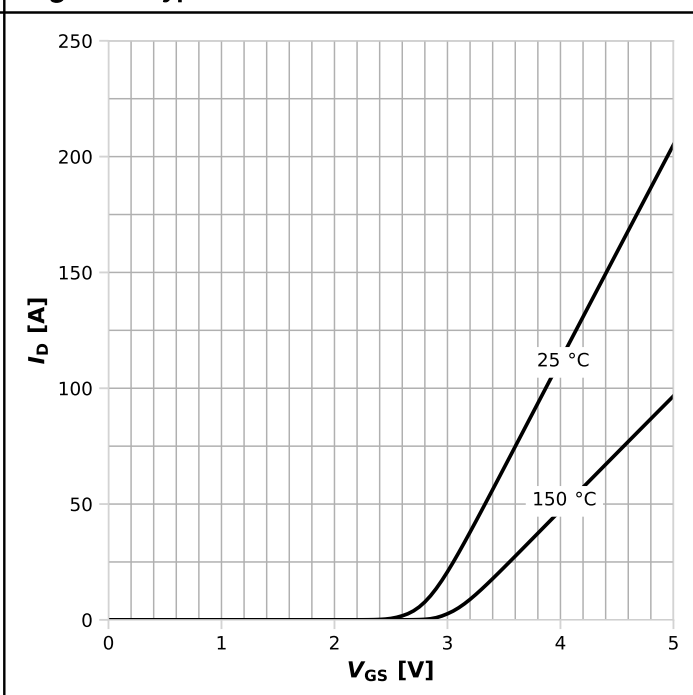


Diagram 5: Typ. output characteristics



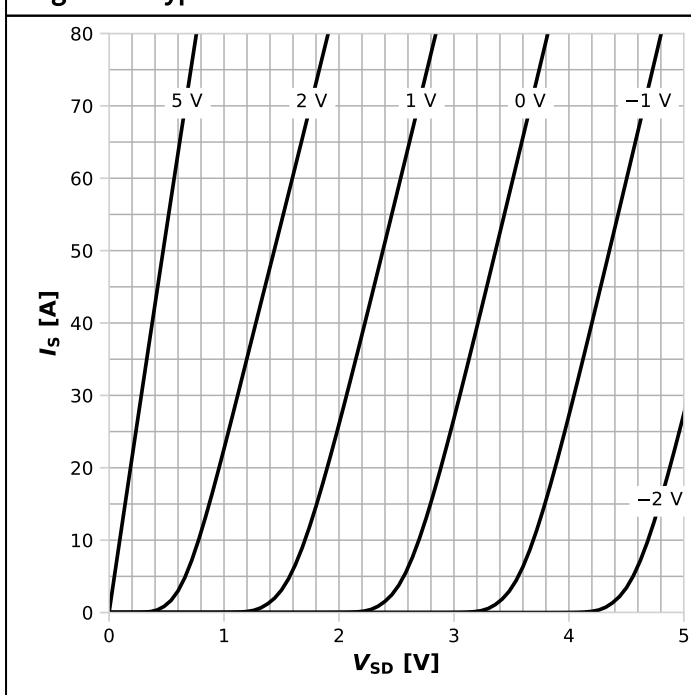
$I_D = f(V_{DS}); T_j = 25\text{ °C};$  parameter:  $V_{GS}$

Diagram 6: Typ. transfer characteristics



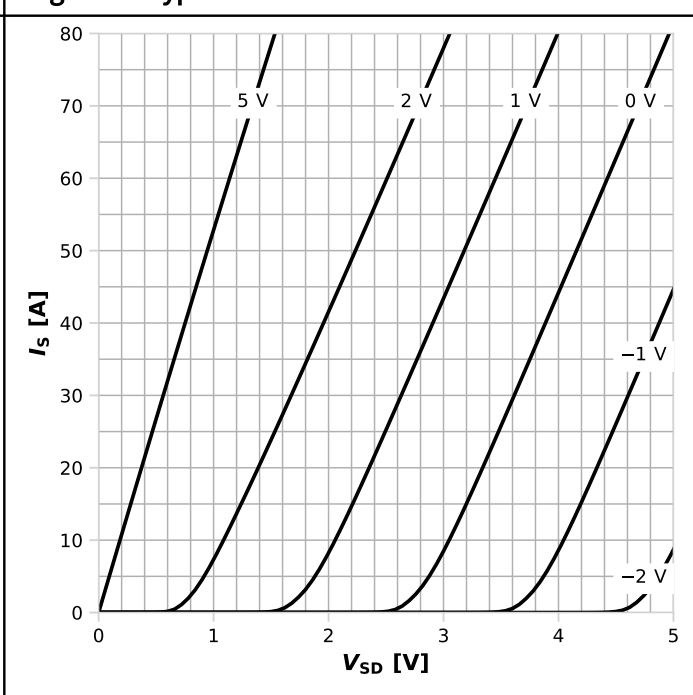
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max};$  parameter:  $T_j$

Diagram 7: Typ. channel reverse characteristics



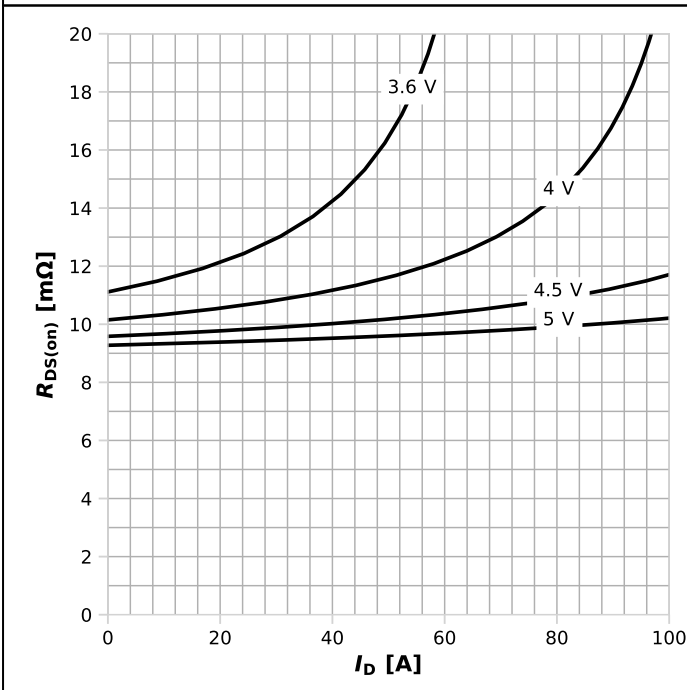
$I_S = f(V_{SD}); T_j = 25\text{ °C};$  parameter:  $V_{GS}$

Diagram 8: Typ. channel reverse characteristics



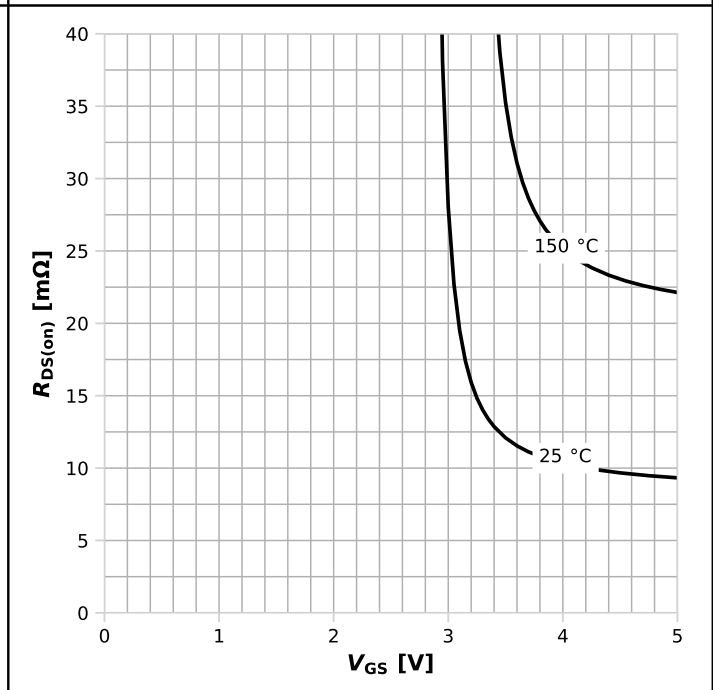
$I_S = f(V_{SD}); T_j = 125\text{ °C};$  parameter:  $V_{GS}$

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



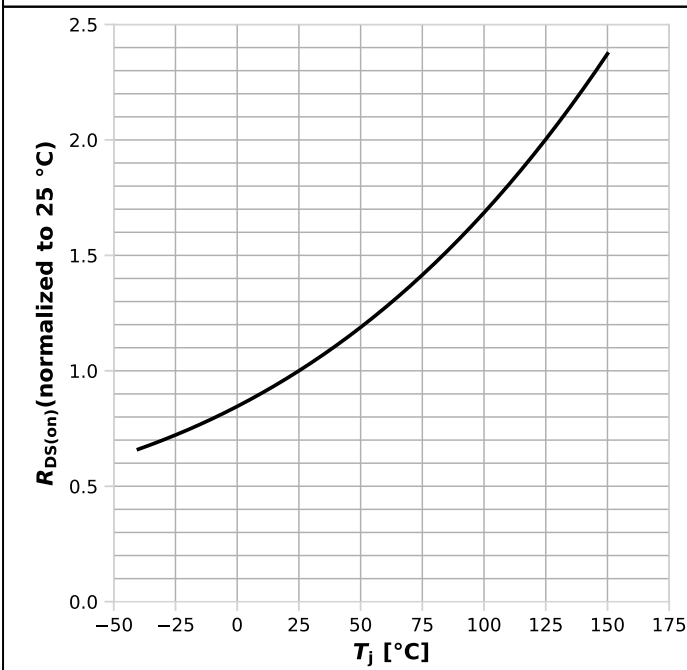
$R_{DS(on)}=f(I_D); T_j=25\text{ }^\circ\text{C}; \text{parameter: } V_{GS}$

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



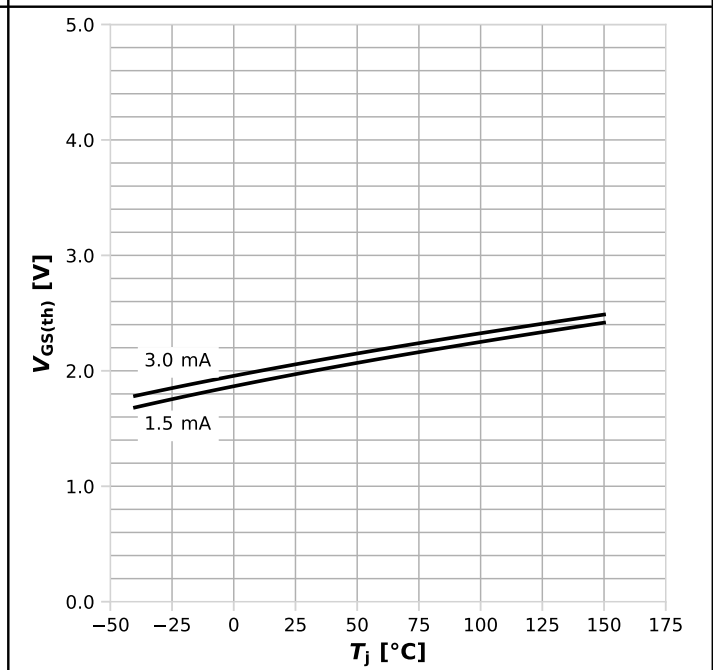
$R_{DS(on)}=f(V_{GS}); I_D=10\text{ A}; \text{parameter: } T_j$

Diagram 11: Drain-source on-state resistance



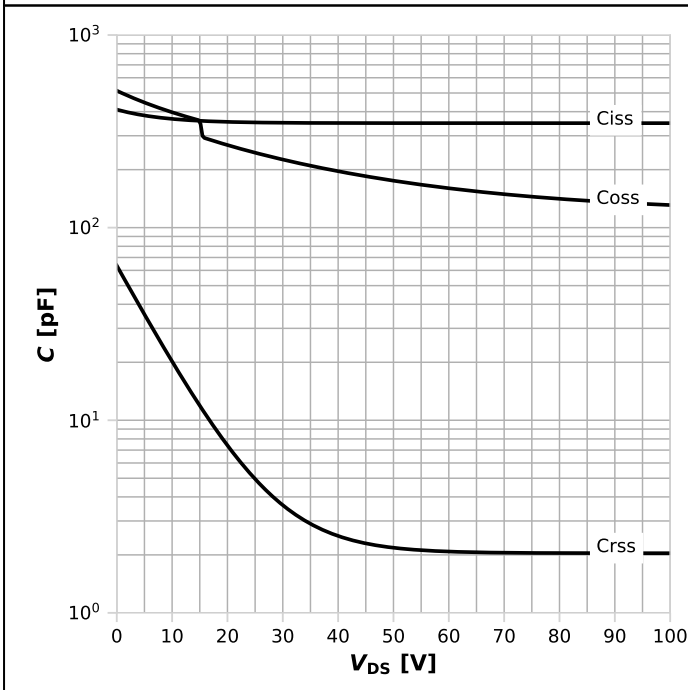
$R_{DS(on)}=f(T_j); I_D=10\text{ A}, V_{GS}=5\text{ V}$

Diagram 12: Typ. gate threshold voltage



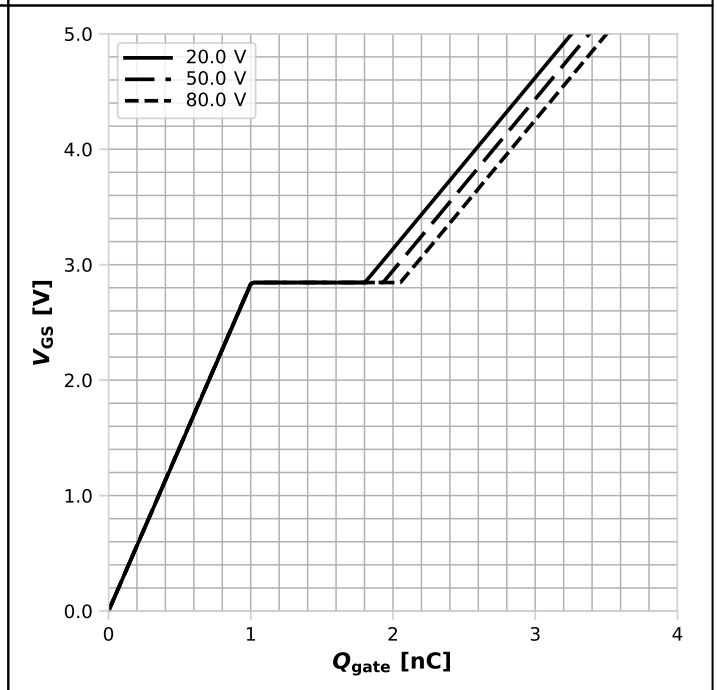
$V_{GS(th)}=f(T_j), V_{GS}=V_{DS}; \text{parameter: } I_D$

Diagram 13: Typ. capacitances



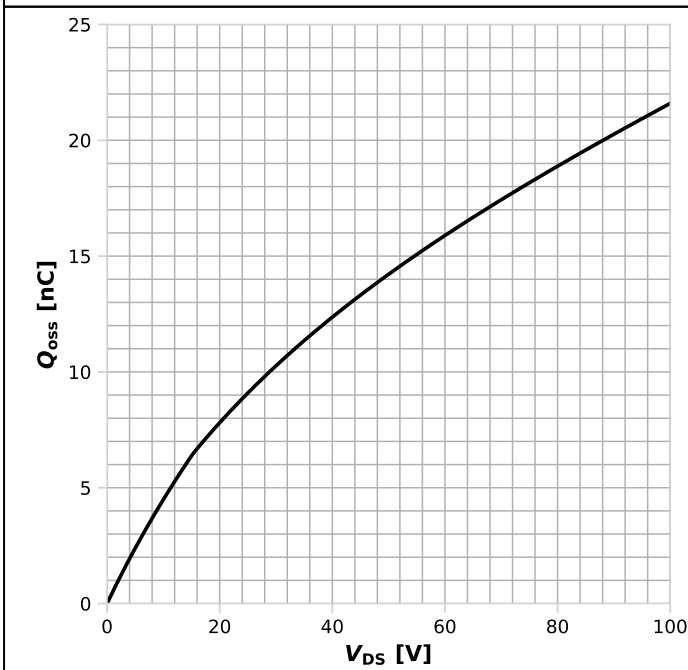
$C=f(V_{DS}); V_{GS}=0\text{ V}$

Diagram 14 Typ. gate charge



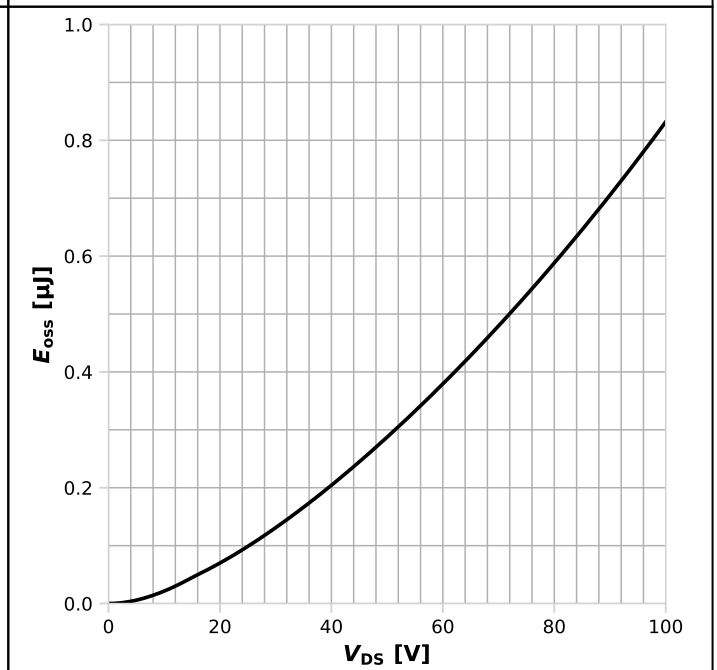
$V_{GS}=f(Q_{gate}); I_D=10\text{ A pulsed}; \text{parameter: } V_{DS}$

Diagram 15: Typ. output charge

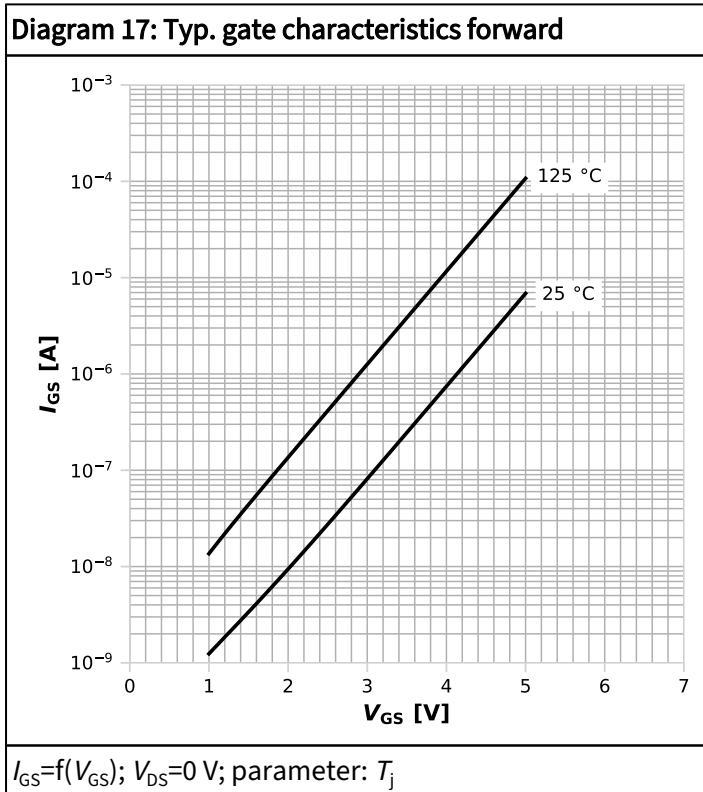


$Q_{oss}=f(V_{DS}), V_{GS}=0\text{ V}$

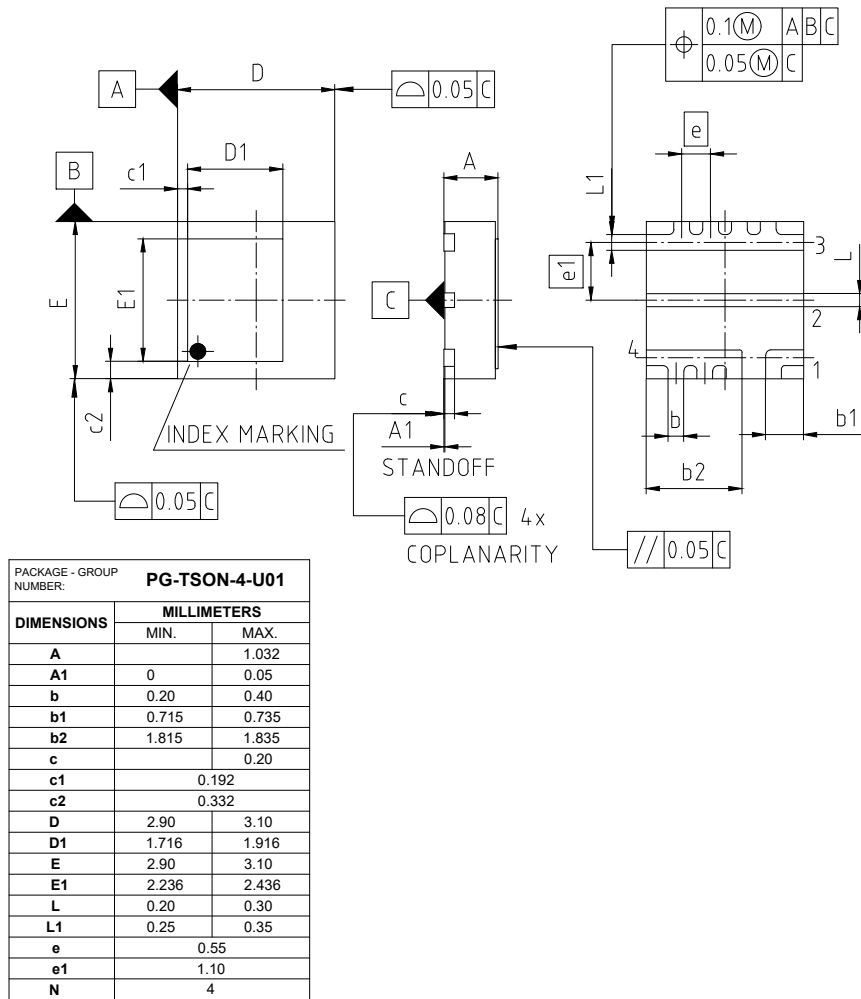
Diagram 16: Typ. Coss stored Energy



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

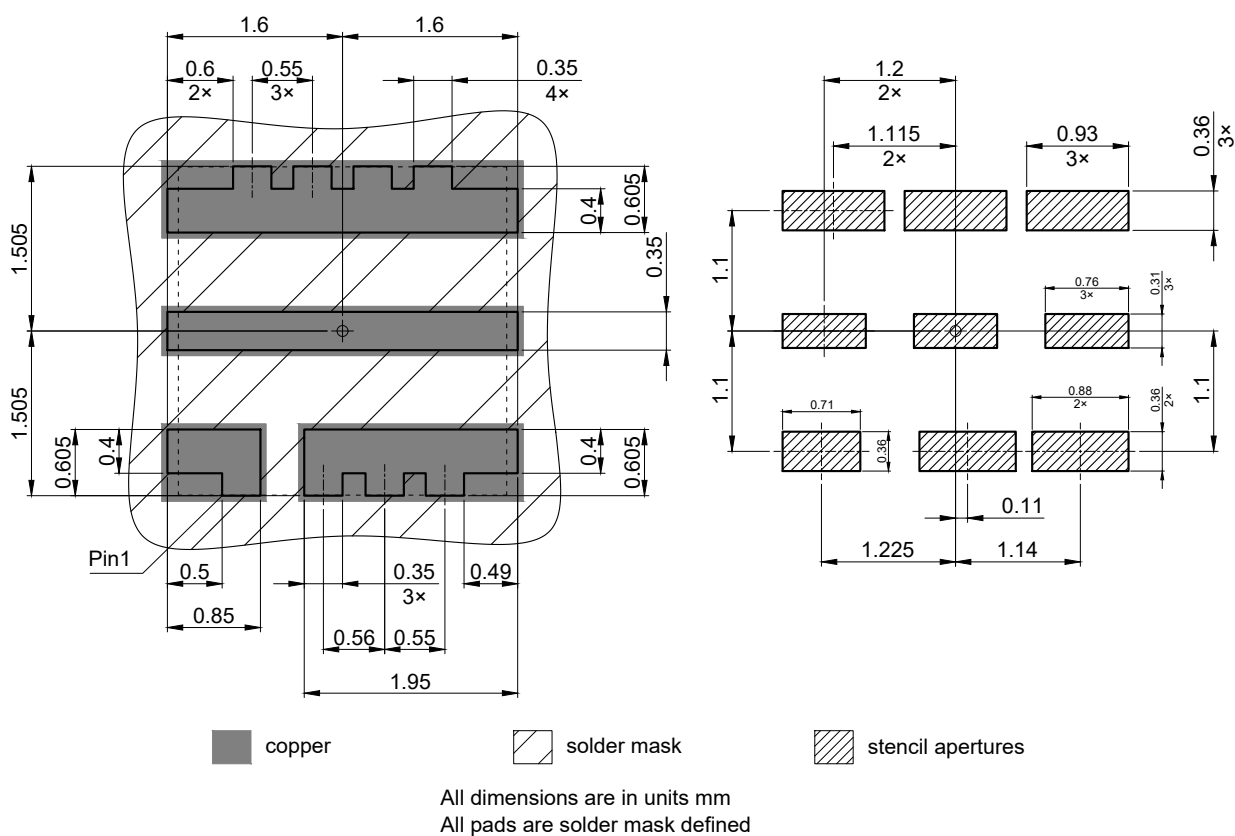


## 6 Package outlines

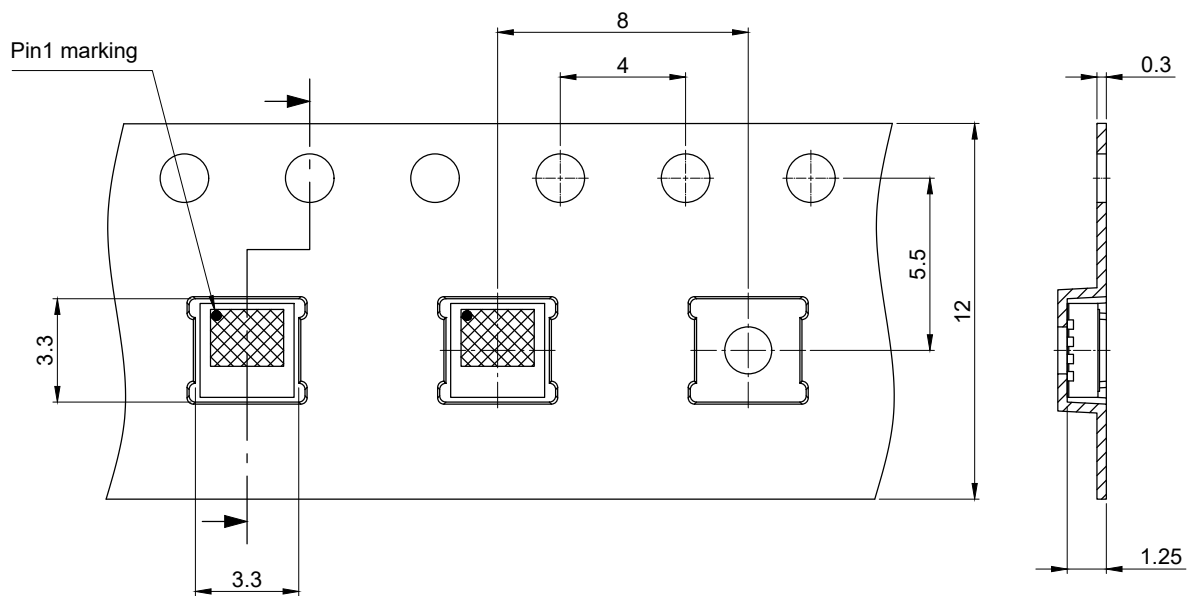


NOTE:  
DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS

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-4-2](#)



## Revision history

IGB110S10S1

### Revision 2024-12-13, Rev. 1.0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2024-12-13	Release of final version

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