

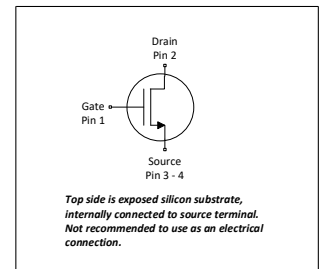
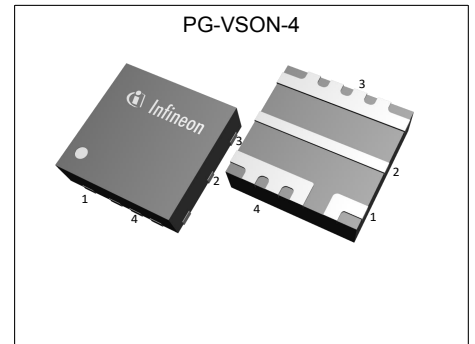
## CoolGaN™ Transistor 100 V G3

### Features

- Enhancement mode power transistor - normally OFF switch
- No reverse recovery charge
- Reverse conduction capability
- Low gate charge, low output charge
- Qualified according to JEDEC for target applications

### Potential applications

- Telecom AC/DC Synchronous Rectifiers
- Telecom DC/DC Synchronous Rectifiers
- Robotics
- Battery powered tool
- e-Mobility, UAVs
- Wireless charging
- ClassD Audio



**Table 1 Key Performance Parameters**

Parameter	Value	Unit
$V_{DS}$	100	V
$R_{DS(on),max}$	11	mΩ
$I_D$	24	A
$Q_{oss}$	14	nC
$Q_G$	3.4	nC
$Q_{rr}$	0	nC



Type / Ordering Code	Package	Marking	Related Links
IGB110S101	PG-VSON-4	BA1	-

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## 1 Maximum ratings

**Table 2 Maximum ratings**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Continuous drain-source voltage	$V_{DS}$	-	-	100	V	$V_{GS}=0$ V
Pulsed drain-source voltage <sup>1)</sup>	$V_{DS, pulse}$	-	-	120	V	$V_{GS}=0$ V, 1 h total time
Continuous drain current	$I_D$	-	-	24 10	A	$V_{GS}=5$ V, $T_C=25$ °C $V_{GS}=5$ V, $T_A=25$ °C, $R_{THJA}=50$ °C/W <sup>2)</sup>
Pulsed drain current <sup>3)</sup>	$I_{D, pulse}$	-	-	80 40	A	$T_j=25$ °C $T_j=150$ °C
Gate-source voltage	$V_{GS}$	-4 -6.5	5 -	5.5 6.5	V	Continuous Pulsed
Power dissipation	$P_{tot}$	-	-	15 2.5	W	$T_C=25$ °C $T_A=25$ °C, $R_{THJA}=50$ °C/W
Storage temperature	$T_{stg}$	-55	-	150	°C	-
Operating temperature	$T_j$	-40	-	150	°C	-

## 2 Thermal characteristics

**Table 3 Thermal characteristics**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case, top	$R_{thJC(top)}$	-	22	33	°C/W	-
Thermal resistance, junction - case, bottom	$R_{thJC(bottom)}$	-	5.6	8.4	°C/W	-
Device on 1 layer PCB	$R_{thJA}$	-	71	80	°C/W	1s0p
Device on 4 layer PCB	$R_{thJA}$	-	50	-	°C/W	2s2p with vias

<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. See diagram 6.

### 3 Electrical characteristics

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

**Table 4 Static characteristics**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate threshold voltage <sup>1)</sup>	$V_{GS(th)}$	1.2	2.0	2.9	V	$V_{DS}=V_{GS}$ , $I_D=3\text{ mA}$ , measured within 10 ms after a pre-bias at $V_{GS}=5\text{ V}$ , $V_{DS}=0\text{ V}$ for at least 5 ms
Drain-source leakage current	$I_{DSS}$	-	0.1 20	10 250	$\mu\text{A}$	$V_{DS}=100\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=25\text{ °C}$ $V_{DS}=100\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=125\text{ °C}$
Gate-source leakage current	$I_{GSS}$	-	7.6 0.01 53 15	-	$\mu\text{A}$	$V_{GS}=5\text{ V}$ , $T_j=25\text{ °C}$ $V_{GS}=-4\text{ V}$ , $T_j=25\text{ °C}$ $V_{GS}=5\text{ V}$ , $T_j=125\text{ °C}$ $V_{GS}=-4\text{ V}$ , $T_j=125\text{ °C}$
Drain-source on-state resistance <sup>2)</sup>	$R_{DS(on)}$	-	8	11	$\text{m}\Omega$	$V_{GS}=5\text{ V}$ , $I_D=10\text{ A}$
Gate resistance <sup>3)</sup>	$R_G$	-	1.2	-	$\Omega$	-

**Table 5 Dynamic characteristics<sup>3)</sup>**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Input capacitance	$C_{iss}$	-	390	-	pF	$V_{GS}=0\text{ V}$ , $V_{DS}=50\text{ V}$ , $f=1\text{ MHz}$
Output capacitance	$C_{oss}$	-	160	-	pF	$V_{GS}=0\text{ V}$ , $V_{DS}=50\text{ V}$ , $f=1\text{ MHz}$
Reverse transfer capacitance	$C_{rss}$	-	2.7	-	pF	$V_{GS}=0\text{ V}$ , $V_{DS}=50\text{ V}$ , $f=1\text{ MHz}$

**Table 6 Gate charge characteristics<sup>4)</sup>**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Gate to source charge	$Q_{gs}$	-	1.1	-	nC	$V_{DD}=50\text{ V}$ , $I_D=10\text{ A}$ , $V_{GS}=0\text{ to }5\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	0.8	-	nC	$V_{DD}=50\text{ V}$ , $I_D=10\text{ A}$ , $V_{GS}=0\text{ to }5\text{ V}$
Gate to drain charge <sup>3)</sup>	$Q_{gd}$	-	0.7	-	nC	$V_{DD}=50\text{ V}$ , $I_D=10\text{ A}$ , $V_{GS}=0\text{ to }5\text{ V}$
Switching charge	$Q_{sw}$	-	1.0	-	nC	$V_{DD}=50\text{ V}$ , $I_D=10\text{ A}$ , $V_{GS}=0\text{ to }5\text{ V}$
Gate charge total <sup>3)</sup>	$Q_g$	-	3.4	-	nC	$V_{DD}=50\text{ V}$ , $I_D=10\text{ A}$ , $V_{GS}=0\text{ to }5\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	2.7	-	V	$V_{DD}=50\text{ V}$ , $I_D=10\text{ A}$ , $V_{GS}=0\text{ to }5\text{ V}$
Output charge <sup>3)</sup>	$Q_{oss}$	-	14	-	nC	$V_{DD}=50\text{ V}$ , $V_{GS}=0\text{ V}$

<sup>1)</sup> When tested without the specified  $V_{GS}$  pre-bias,  $V_{GS(th)}$  will typically be 0.7 V lower than the threshold voltage measured under the specified conditions.

<sup>2)</sup>  $R_{DS(ON)}$  is measured without prior drain bias or switching stress. An upcoming application note will provide detailed information about dynamic  $R_{DS(ON)}$  and recommendations for *in situ* measurement in target application conditions.

<sup>3)</sup> Defined by design. Not subject to production test.

<sup>4)</sup> See "Gate charge waveforms" for parameter definition

**Table 7 Reverse operation**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Reverse continuous current	$I_S$	-	-	4	A	$T_C=25\text{ °C}$
Pulsed current, reverse	$I_{S,pulse}$	-	-	80	A	$T_C=25\text{ °C}$
Source-Drain reverse voltage	$V_{SD}$	-	2.5	3.4	V	$V_{GS}=0\text{ V}, I_{S,pulse}=10\text{ A}, T_j=25\text{ °C}$
Reverse recovery charge <sup>1)</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>1)</sup> Defined by design. Not subject to production test.

### 4 Electrical characteristics diagrams

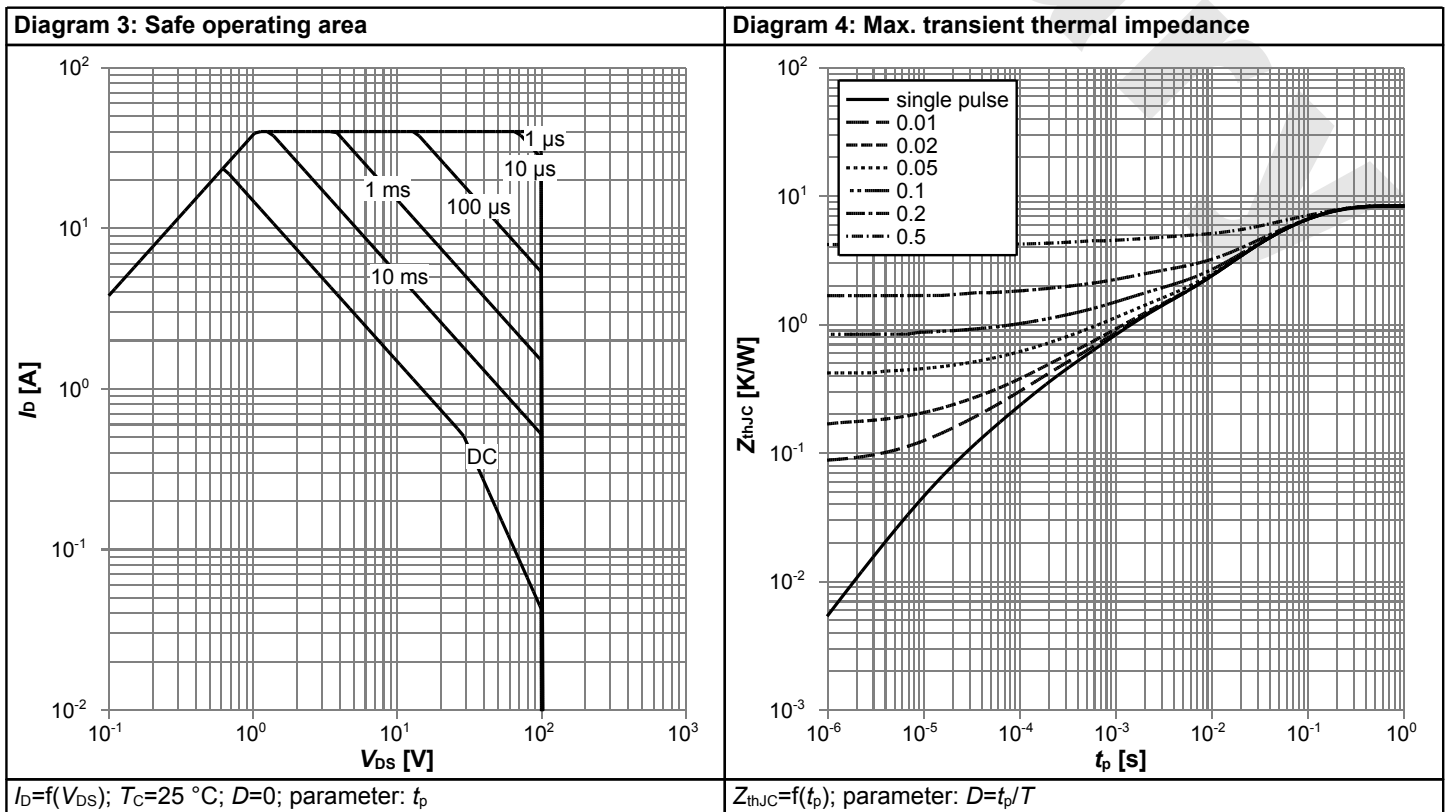
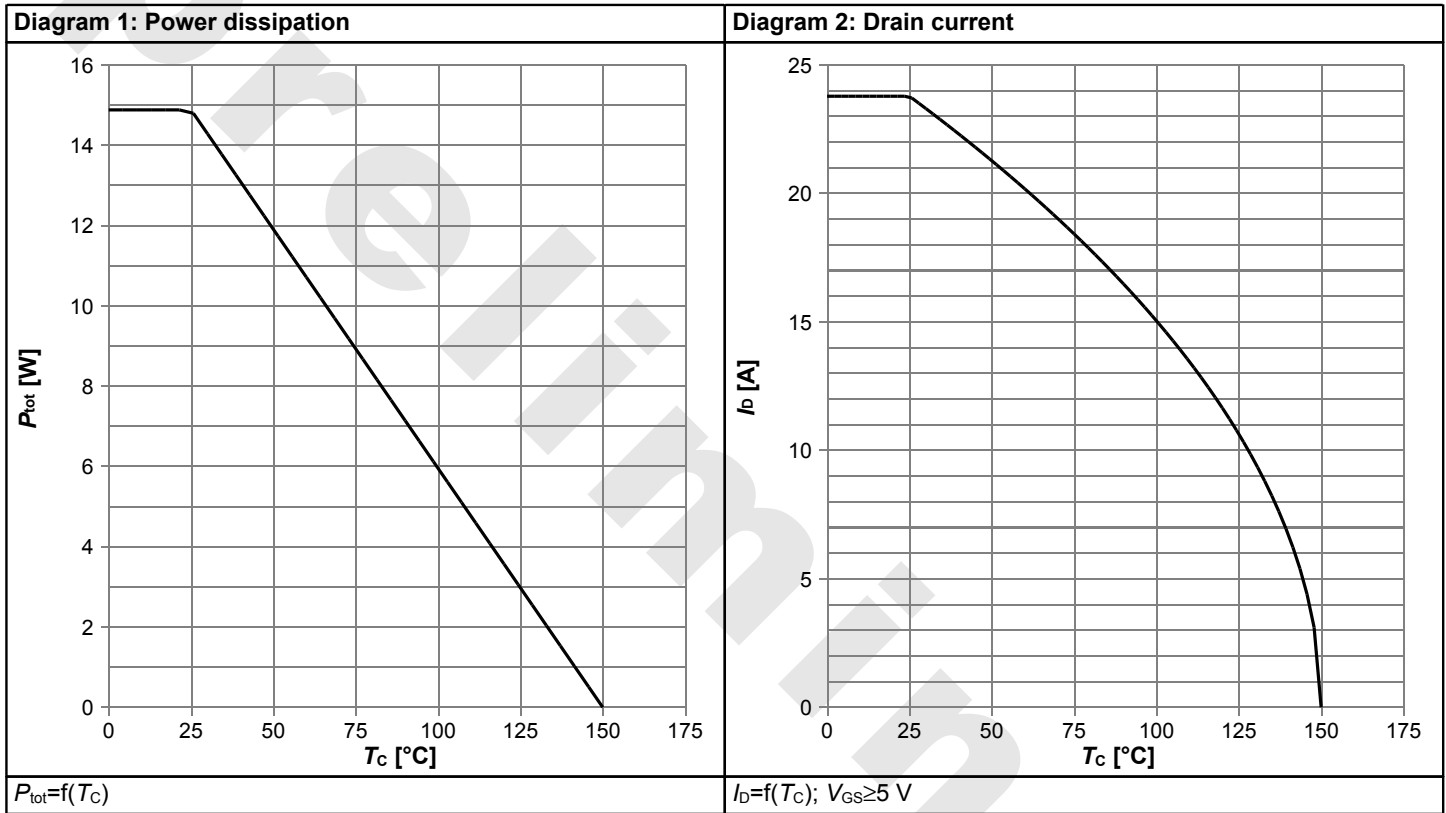
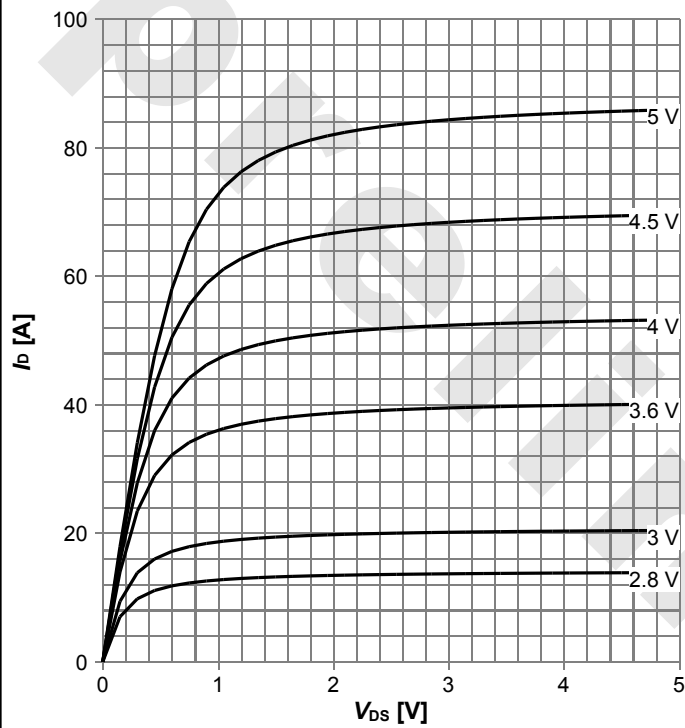
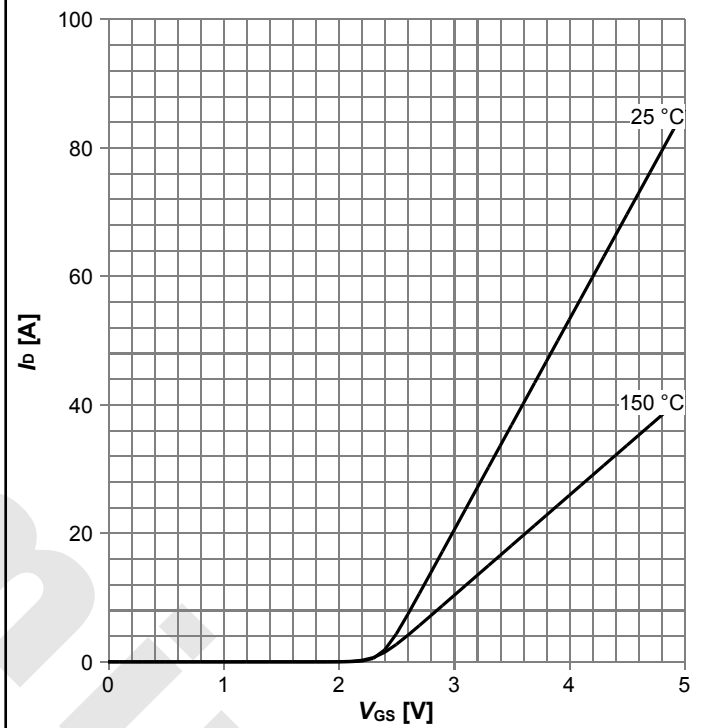


Diagram 5: Typ. output characteristics



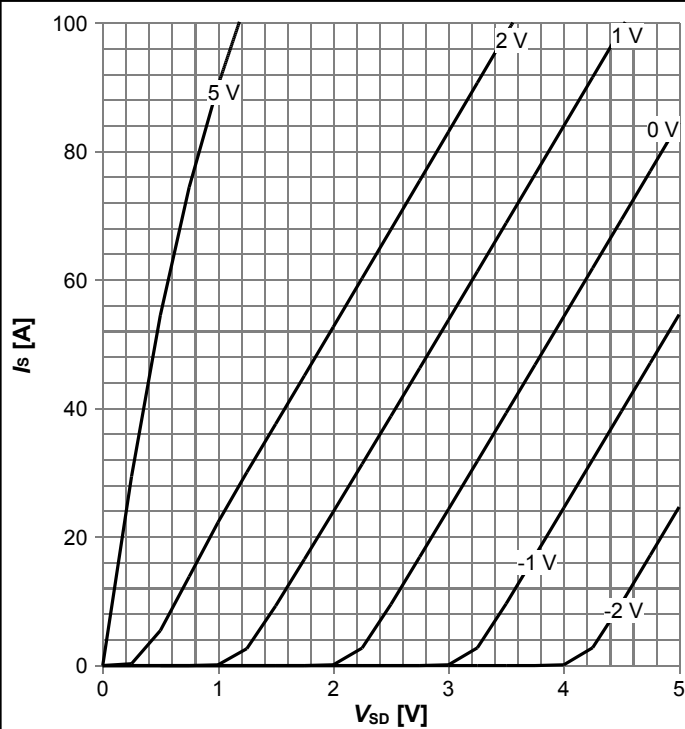
$I_D = f(V_{DS})$ ,  $T_j = 25\text{ °C}$ ; parameter:  $V_{GS}$

Diagram 6: Typ. transfer characteristics



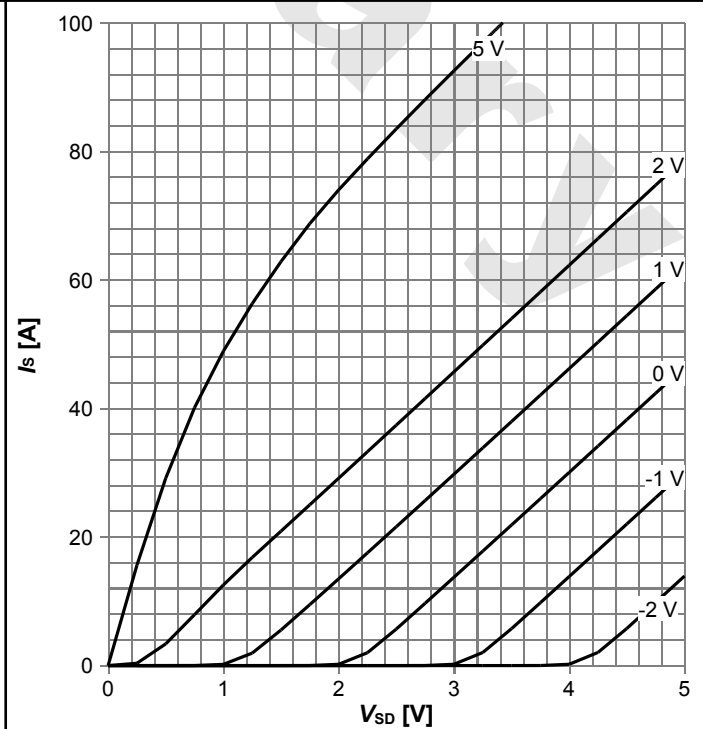
$I_D = f(V_{GS})$ ,  $|V_{DS}| > 2|I_D|R_{DS(on)max}$ ; parameter:  $T_j$

Diagram 7: Typ. reverse output characteristics



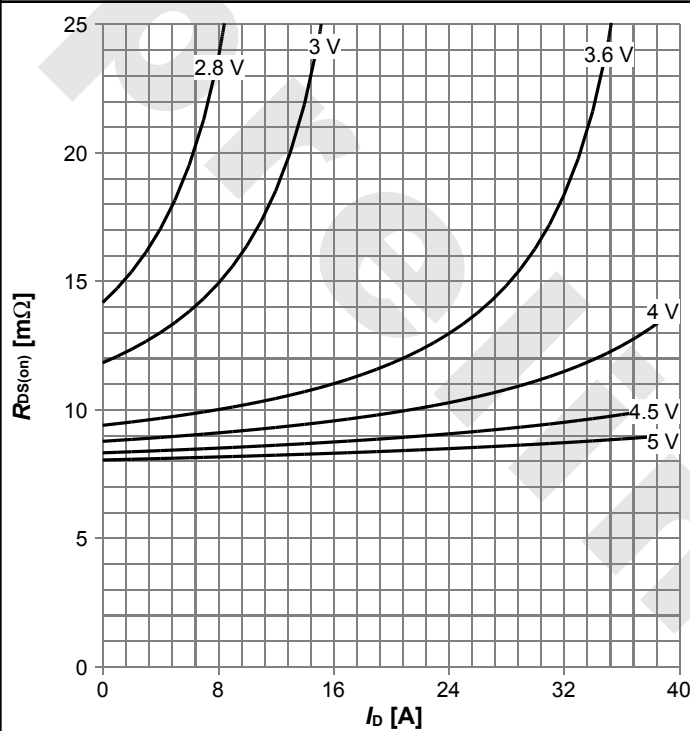
$I_F = f(V_{SD})$ ,  $T_j = 25\text{ °C}$ ; parameter:  $V_{GS}$

Diagram 8: Typ. reverse output characteristics



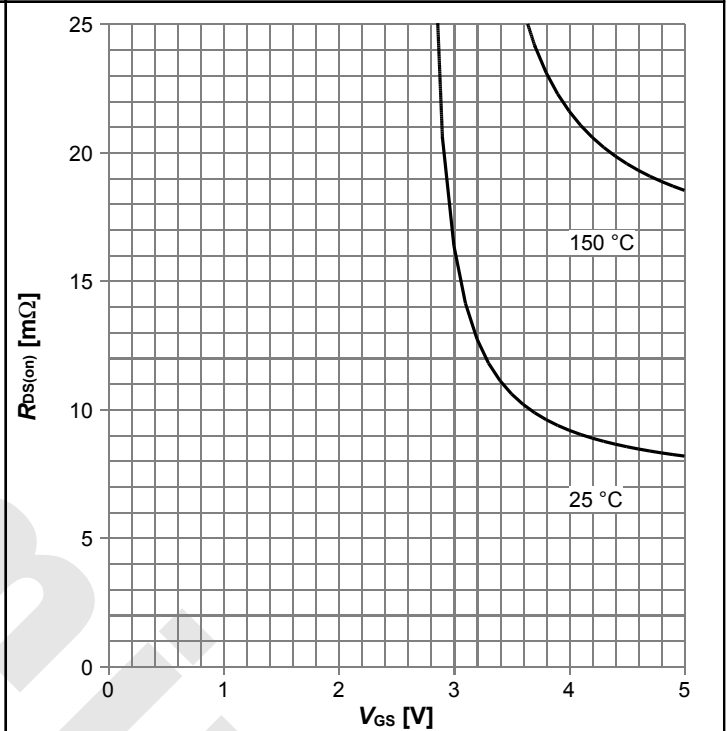
$I_F = f(V_{SD})$ ,  $T_j = 125\text{ °C}$ ; parameter:  $V_{GS}$

Diagram 9: Typ. drain-source on resistance



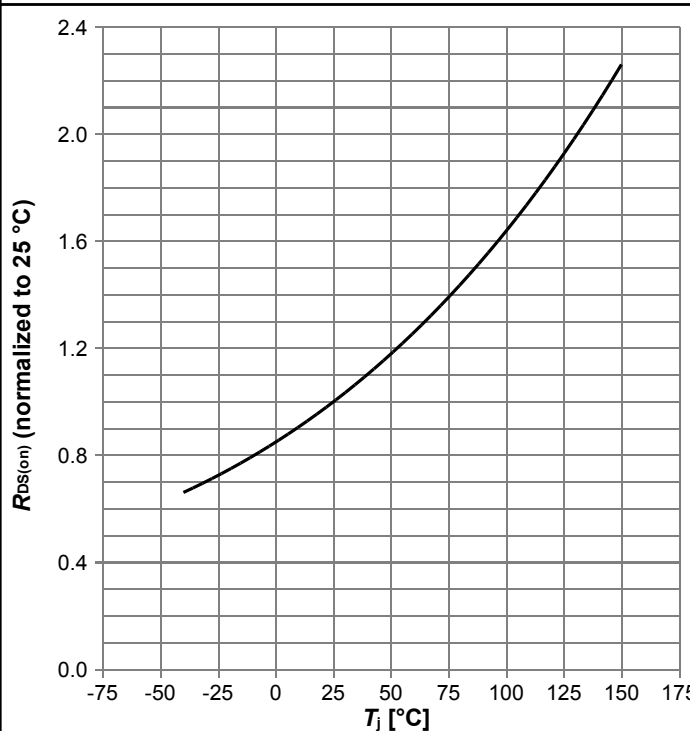
$R_{DS(on)}=f(I_D)$ ,  $T_j=25\text{ }^\circ\text{C}$ ; parameter:  $V_{GS}$

Diagram 10: Typ. drain-source on resistance



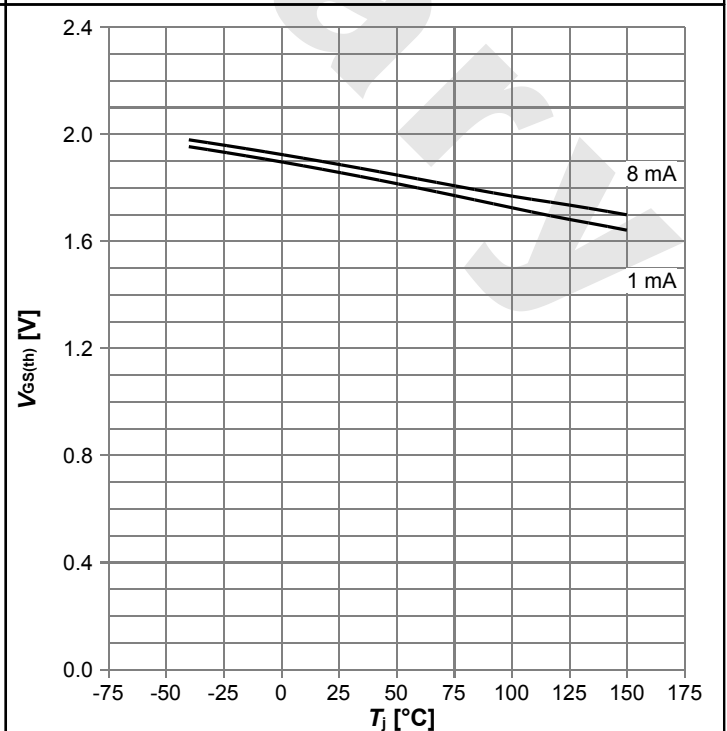
$R_{DS(on)}=f(V_{GS})$ ,  $I_D=10\text{ A}$ ; parameter:  $T_j$

Diagram 11: Normalized drain-source on resistance



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

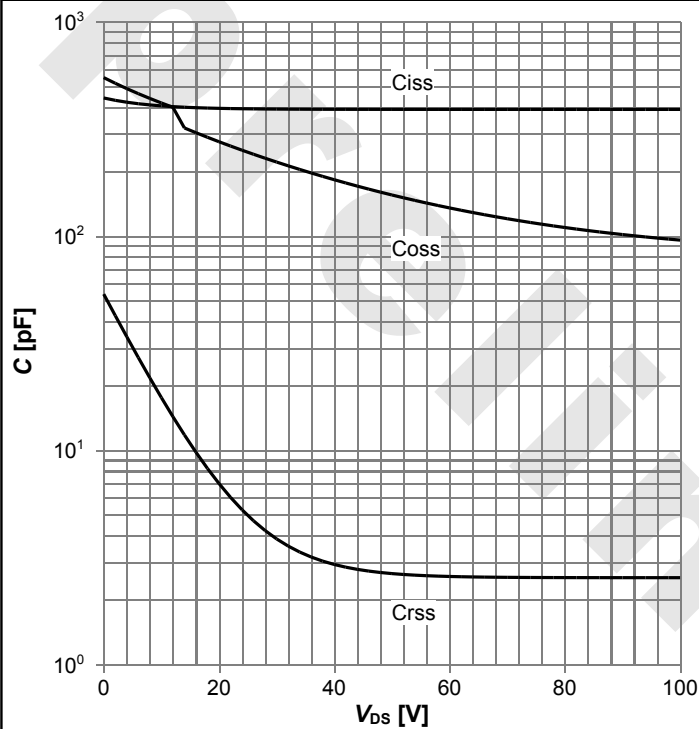
Diagram 12: Typ. gate threshold voltage



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

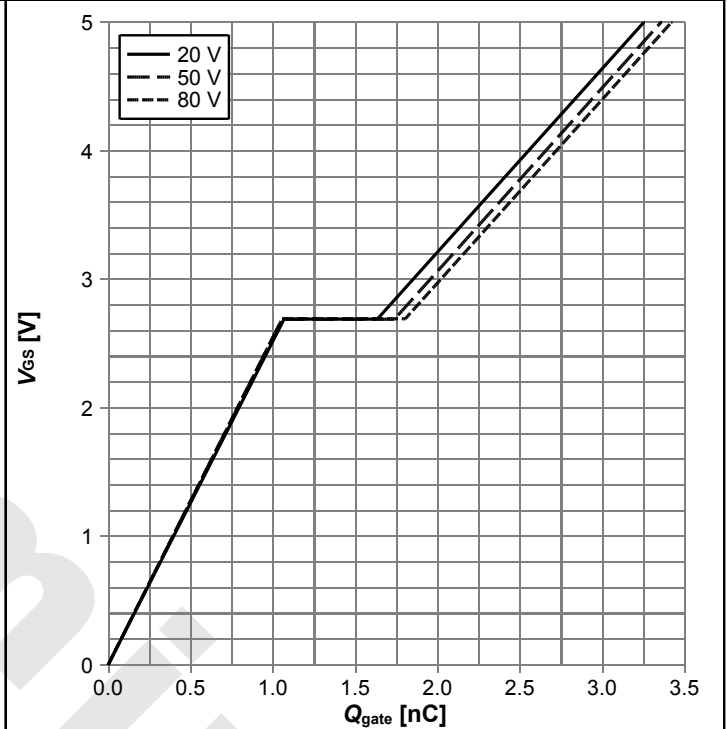


Diagram 13: Typ. capacitances



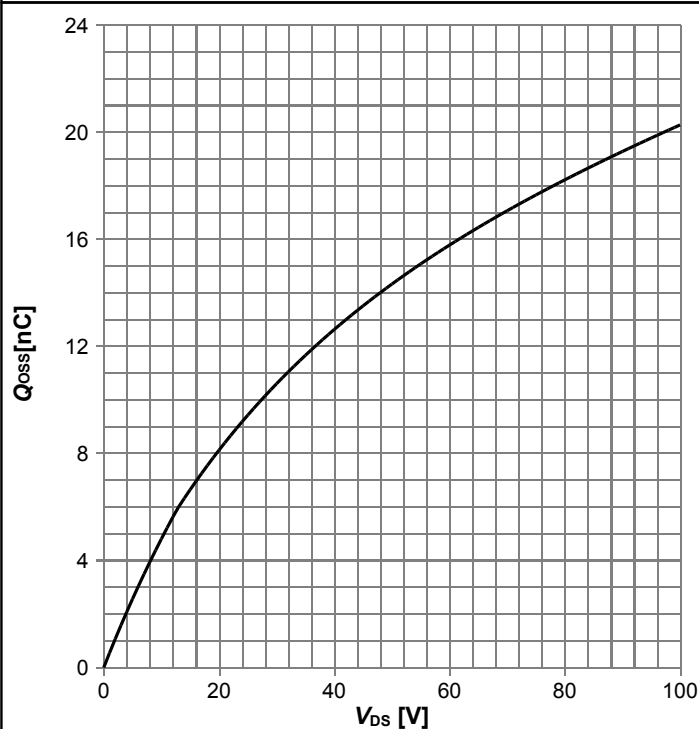
$C=f(V_{DS})$ ;  $V_{GS}=0$  V;  $f=1$  MHz

Diagram 14: Typ. gate charge



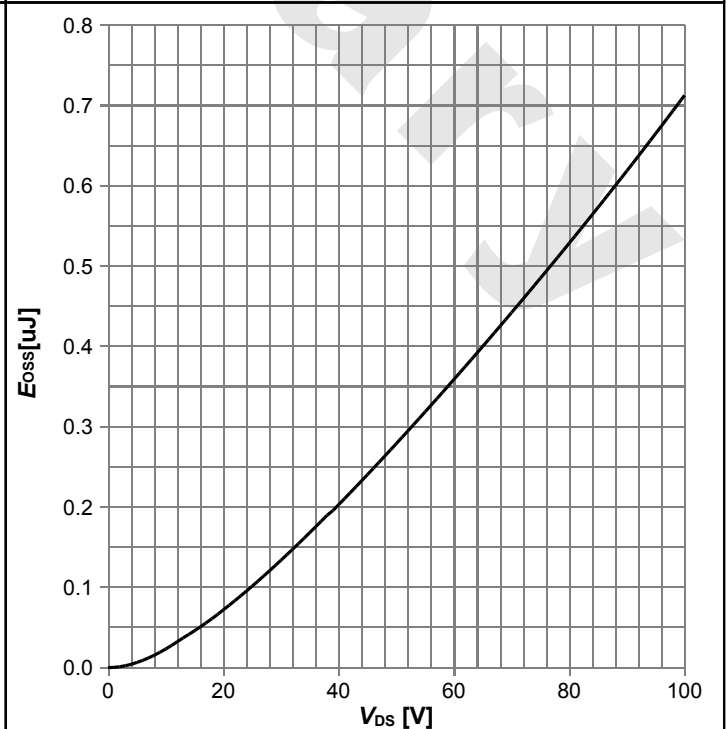
$V_{GS}=f(Q_{gate})$ ,  $I_D=10$  A pulsed,  $T_j=25$  °C; parameter:  $V_{DD}$

Diagram 15: Typ output charge



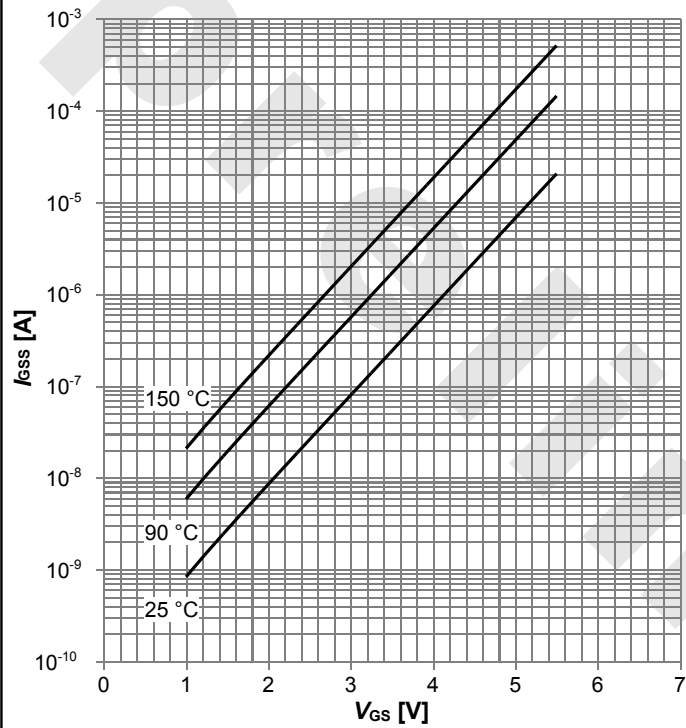
$Q_{oss}=f(V_{DS})$ ,  $V_{GS}=0$  V

Diagram 16: Typ output energy



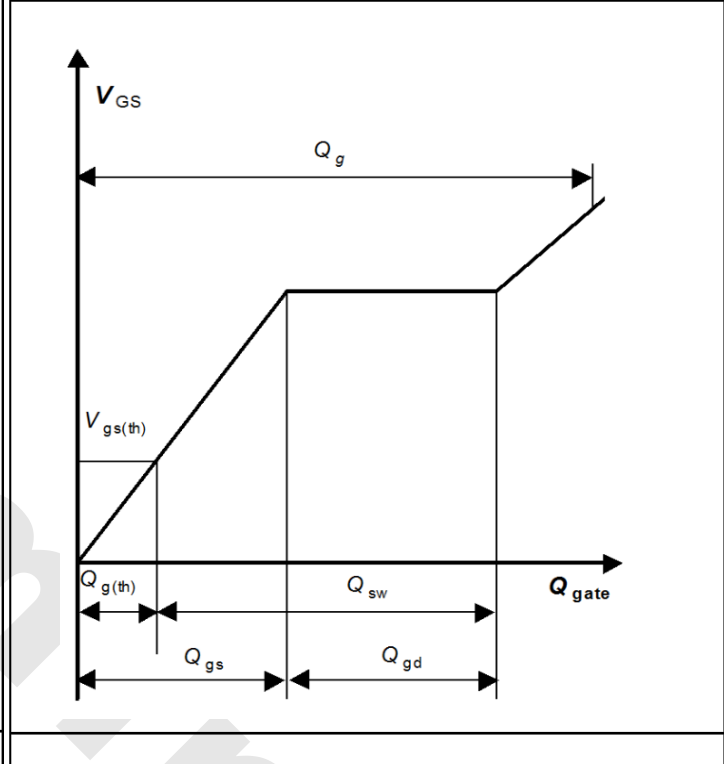
$E_{oss}=f(V_{DS})$ ,  $V_{GS}=0$  V

Diagram 17: Typ gate-source leakage current

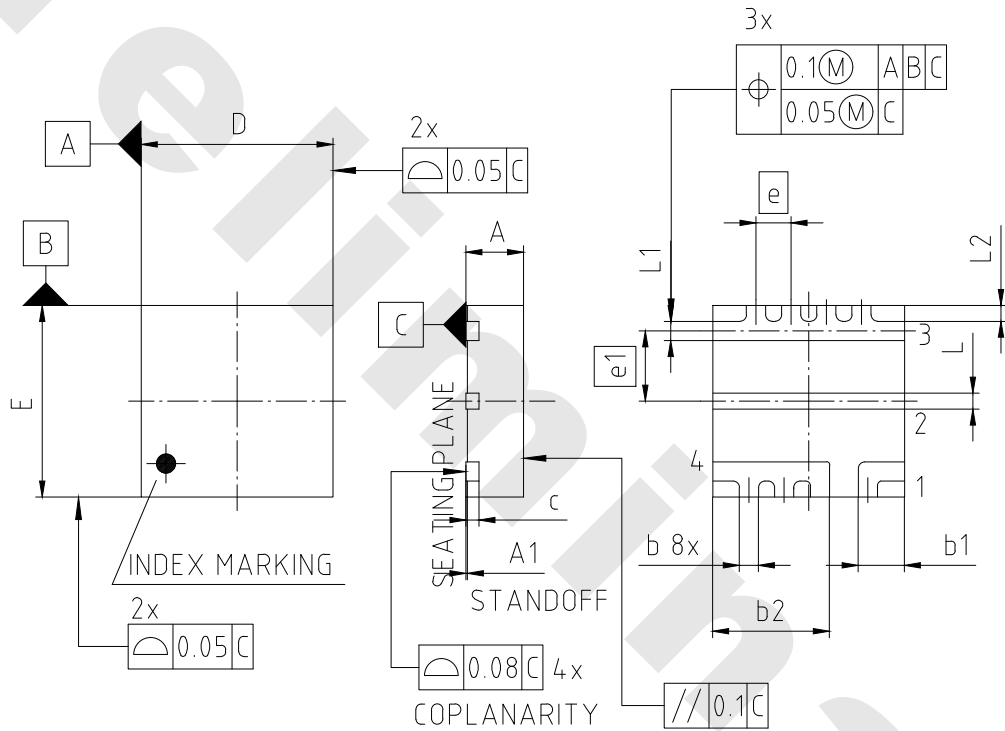


$I_{GSS}=f(V_{GS}), V_{DS}=0\text{ V}; \text{parameter: } T_j$

Diagram Gate charge waveforms



## 5 Package Outlines



PACKAGE - GROUP NUMBER: <b>PG-VSON-4-U01</b>		
DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A		1.00
A1		0.05
b	0.20	0.40
b1	0.715	0.735
b2	1.815	1.835
c		0.20
D	2.90	3.10
E	2.90	3.10
L	0.20	0.30
L1	0.25	0.35
L2	0.20	0.30
e	0.55	
e1	1.10	
N	4	

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

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

## Revision History

IGB110S101

**Revision: 2024-05-20, Rev. 0.9**

Previous Revision

Revision	Date	Subjects (major changes since last revision)
0.9	-	Release of preliminary version

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