

CoolGaN

CoolGaN™ Transistor 200 V G3

- 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

Product validation

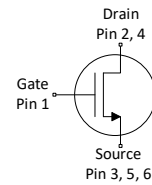
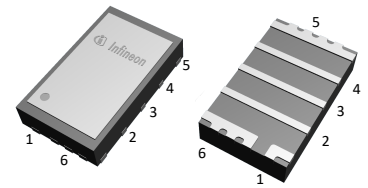
Fully qualified according to JEDEC for Industrial Applications

Table 1 Key Performance Parameters

Parameter	Value	Unit
V_{DS}	200	V
$R_{DS(on),max}$	9	mΩ
I_D	43	A
Q_{OSS}	50	nC
Q_G	8.2	nC
Q_{rr}	0	nC

Type/Ordering Code	Package	Marking	Related Links
IGC090S20S1	PG-TSON-6	90SB1	-

PG-TSON-6



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

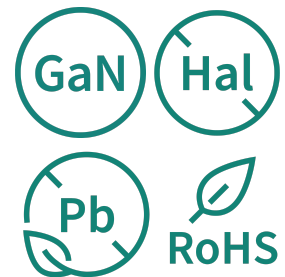


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datasheet

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}	-	-	200	V	$V_{GS}=0\text{ V}$
Pulsed drain-source voltage ¹⁾	$V_{DS,pulse}$	-	-	240	V	$V_{GS}=0\text{ V}$, 1 h total time
Continuous drain current	I_D	-	-	45 12	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	$I_{D,pulse}$	-	-	280 135	A	$T_j=25\text{ °C}$ ³⁾ $T_j=150\text{ °C}$
Pulsed gate-source voltage ¹⁾	V_{GS}	-6.5	-	6.5	V	100 h total time
Power dissipation	P_{tot}	-	-	45 3.3	W	$T_C=25\text{ °C}$ $T_A=25\text{ °C}$, $R_{THJA}=38\text{ °C/W}$
Storage temperature	T_{stg}	-55	-	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	-
Operating temperature	T_j	-40	-	150	°C	-

Datasheet

3 Thermal characteristics

Table 4 Thermal characteristics

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case, top	$R_{thJC(top)}$	-	0.5	0.6	°C/W	-
Thermal resistance, junction - case, bottom	$R_{thJC(bottom)}$	-	1.9	2.8	°C/W	-
Thermal resistance, junction - Ambient on 1 layer PCB	R_{thJA}	-	60	70	°C/W	1s0p
Thermal resistance, junction - Ambient on 4 layer PCB	R_{thJA}	-	38	45	°C/W	2s2p with vias

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 ⁴⁾	$V_{GS(th)}$	1.2	2	2.9	V	$V_{DS}=V_{GS}$, $I_D=5\text{ mA}$, 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}	-	0.2 20	-	μA	$V_{DS}=160\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=25\text{ °C}$ $V_{DS}=160\text{ V}$, $V_{GS}=0\text{ V}$, $T_j=125\text{ °C}$
Gate-source leakage current	I_{GSS}	-	23 0.01 130 15	-	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 ⁵⁾	$R_{DS(on)}$	-	6.7	9	$\text{m}\Omega$	$V_{GS}=5\text{ V}$, $I_D=10\text{ A}$
Gate resistance ⁶⁾	R_G	-	0.5	-	Ω	-

4) 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.

5) $R_{DS(on)}$ is measured without prior drain bias or switching stress.

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

Table 6 Dynamic characteristics ⁷⁾

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	700	910	pF	$V_{GS}=0\text{ V}$, $V_{DS}=100\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}	-	310	400	pF	$V_{GS}=0\text{ V}$, $V_{DS}=100\text{ V}$, $f=1\text{ MHz}$
Reverse transfer capacitance	C_{rss}	-	3.7	4.8	pF	$V_{GS}=0\text{ V}$, $V_{DS}=100\text{ V}$, $f=1\text{ MHz}$

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

Table 7 Gate charge characteristics ⁸⁾

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	tbd	-	nC	$V_{DD}=100\text{ V}$, $I_D=10\text{ A}$, $V_{GS}=0\text{ to }5\text{ V}$
Gate charge at threshold	$Q_{g(th)}$	-	tbd	-	nC	$V_{DD}=100\text{ V}$, $I_D=10\text{ A}$, $V_{GS}=0\text{ to }5\text{ V}$
Gate to drain charge ⁹⁾	Q_{gd}	-	tbd	-	nC	$V_{DD}=100\text{ V}$, $I_D=10\text{ A}$, $V_{GS}=0\text{ to }5\text{ V}$
Switching charge	Q_{sw}	-	tbd	-	nC	$V_{DD}=100\text{ V}$, $I_D=10\text{ A}$, $V_{GS}=0\text{ to }5\text{ V}$
Gate charge total ⁹⁾	Q_g	-	8.2	11	nC	$V_{DD}=100\text{ V}$, $I_D=10\text{ A}$, $V_{GS}=0\text{ to }5\text{ V}$
Gate plateau voltage	$V_{plateau}$	-	2.6	-	V	$V_{DD}=100\text{ V}$, $I_D=10\text{ A}$, $V_{GS}=0\text{ to }5\text{ V}$
Output charge ⁹⁾	Q_{oss}	-	50	65	nC	$V_{DD}=100\text{ V}$, $I_D=10\text{ A}$, $V_{GS}=0\text{ to }5\text{ V}$

⁸⁾ See "Gate charge waveforms" for parameter definition

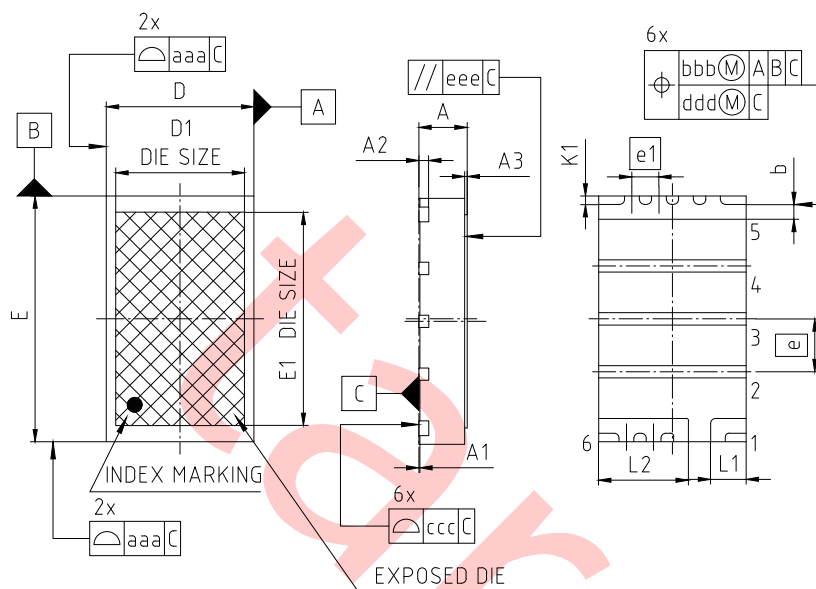
⁹⁾ Defined by design. Not subject to production test.

Table 8 Reverse operation

Parameter	Symbol	Values			Unit	Note/ Test Condition
		Min.	Typ.	Max.		
Reverse continuous current	I_S	-	-	tbd	A	$T_C=25\text{ °C}$
Pulsed current, reverse	$I_{S,pulse}$	-	-	tbd	A	$T_C=25\text{ °C}$
Source-Drain reverse voltage	V_{SD}	-	2.4	3.4	V	$V_{GS}=0\text{ V}$, $I_{S,pulse}=10\text{ A}$, $T_J=25\text{ °C}$
Reverse recovery charge ¹⁰⁾	Q_{rr}	-	0	-	nC	$V_R=100\text{ V}$, $I_{S,pulse}=10\text{ A}$, $di_{S,pulse}/dt=100\text{ A}/\mu\text{s}$

¹⁰⁾ Defined by design. Not subject to production test.

5 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

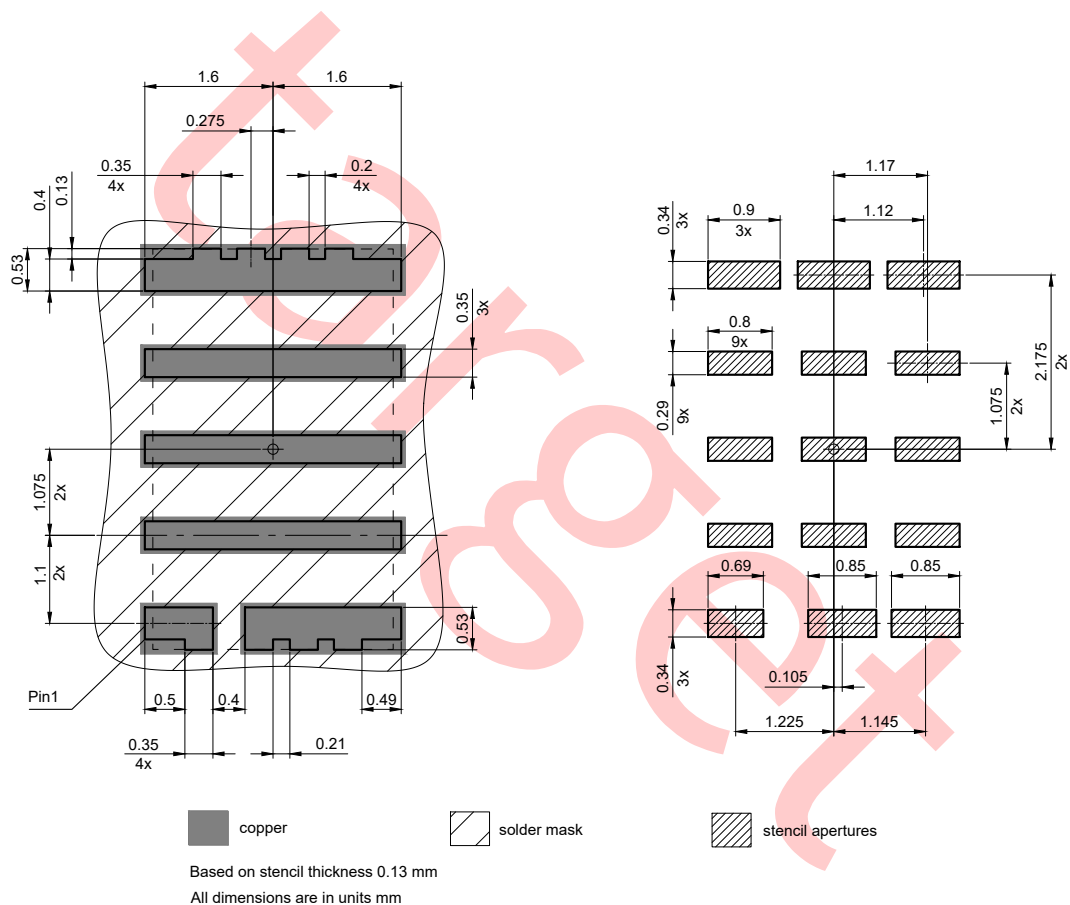


Figure 2 Outline PG-TSON-6, dimensions in mm

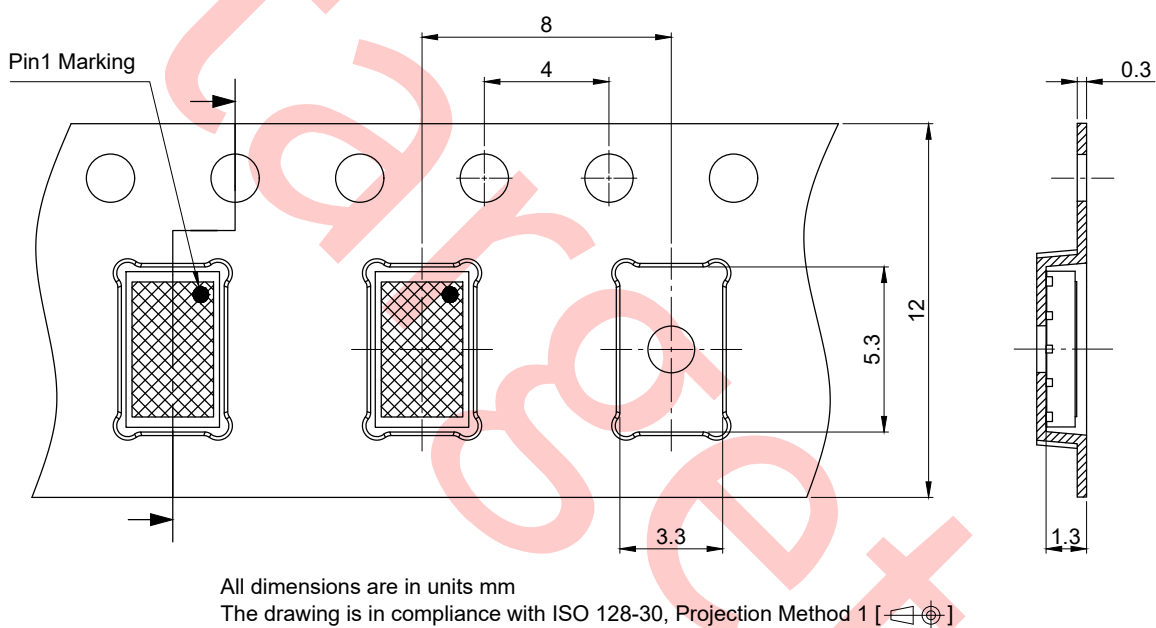


Figure 3 Outline PG-TSON-6, dimensions in mm

Revision History

IGC090S20S1

Revision 2024-07-04, Rev. 0.1

Previous Revision

Revision	Date	Subjects (major changes since last revision)
0.1	2024-07-04	Release of target

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