

英飞凌工业级CoolGaN™

英飞凌IGC037S12S1工业级 CoolGaN™ 晶体管 120 V G3

特性

- 超快速开关和高效率
- 节省空间且高度稳健的封装
- 不含反向恢复电荷
- 超低栅极电荷和输出电荷
- 裸露的芯片可实现顶部散热性能
- 防潮等级 MSL1
- 工业级3x5封装

潜在应用

- 电池供电工具
- AC-DC 和 DC-DC 转换器的同步整流
- 机器人和无人机
- 电动汽车、无人机
- 太阳能和储能系统

产品验证

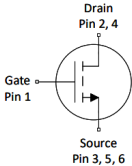
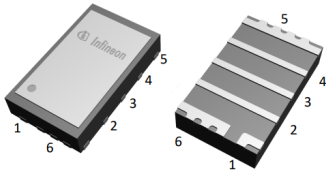
完全符合 JEDEC 工业应用标准

表 1 主要性能参数

Parameter	Value	Unit
V_{DS}	120	V
$R_{DS(on)}$	2.7	mΩ
I_D	71	A
Q_{OSS}	49	nC
Q_G	10	nC
Q_{rr}	0	nC

Part number	Package	Marking	Related links
IGC037S12S1	PG-TSON-6	37SE1	see Appendix A

PG-TSON-6



顶部是暴露的硅衬底，
内部连接至源端子。不建议用作电气
连接。



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1 最大额定值

除非另有说明，否则 $T_j = 25^\circ\text{C}$ 。超过最大额定值的应力可能会对器件造成永久性损坏。为获得最佳使用寿命和可靠性，英飞凌建议运行条件不要持续超过所述最大额定值的 80%（除非另有明确说明）。如需更多信息，请联系您当地的英飞凌销售办事处。

表 2 最大额定值

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Continuous drain-source voltage	V_{DS}	-	-	120	V	$V_{GS}=0\text{ V}$
Pulsed drain-source voltage ¹⁾	$V_{DS, pulse}$	-	-	144	V	$V_{GS}=0\text{ V}$, 1 h total time
Continuous drain current	I_D	-	-	71	A	$V_{GS}=5\text{ V}$, $T_C=25^\circ\text{C}$
				19		$V_{GS}=5\text{ V}$, $T_A=25^\circ\text{C}$, $R_{thJA}=38^\circ\text{C/W}$ ²⁾
Pulsed drain current ³⁾	$I_{D, pulse}$	-	-	520	A	$T_j=25^\circ\text{C}$
				270		$T_j=150^\circ\text{C}$
Pulsed gate-source voltage ¹⁾	V_{GS}	-6.5	-	6.5	V	Pulsed 100 h total time
Power dissipation	P_{tot}	-	-	45	W	$T_C=25^\circ\text{C}$
				3.3		$T_A=25^\circ\text{C}$, $R_{thJA}=38^\circ\text{C/W}$ ²⁾
Storage temperature	T_{stg}	-55	-	150	$^\circ\text{C}$	-
Junction temperature	T_j	-40				

1) 作为异常操作条件下的稳健性测量，不建议用于正常运行。

2) 器件位于 4 层 FR4 PCB 上，垂直放置在静止空气中。

3) 脉冲电流受转移特性限制。

2 推荐运行条件

表 3 推荐运行条件

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate-source voltage	V_{GS}	-4.0	5.0	5.5	V	-

3 热特性

表4 热特性

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case, top	R_{thJC}	-	0.5	0.6	°C/W	-
Thermal resistance, junction - case, bottom			1.9	2.8		
Thermal resistance, junction - ambient 1s0p	R_{thJA}	-	60	-	°C/W	On 1 layer PCB, vertical in still air.
Thermal resistance, junction - ambient 2s2p	R_{thJA}	-	38	-	°C/W	With vias on 4 layer PCB, vertical in still air.

4 电气特性

除非另有规定, $T_j = 25\text{ }^{\circ}\text{C}$

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	$V_{DS}=V_{GS}, I_D=7.0\text{ mA}$
Drain-source leakage current	I_{DSS}	-	0.15	2.1	μA	$V_{DS}=120\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ }^{\circ}\text{C}$
			6.0	50		$V_{DS}=120\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ }^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}	-	15	250	μA	$V_{GS}=5\text{ V}, T_j=25\text{ }^{\circ}\text{C}$
			0.01	0.1		$V_{GS}=-4\text{ V}, T_j=25\text{ }^{\circ}\text{C}$
			110	1010		$V_{GS}=5\text{ V}, T_j=125\text{ }^{\circ}\text{C}$
			0.01	0.1		$V_{GS}=-4\text{ V}, T_j=125\text{ }^{\circ}\text{C}$
Drain-source on-state resistance	$R_{DS(on)}$	-	2.7	3.7	m Ω	$V_{GS}=5\text{ V}, I_D=18\text{ A}$
Gate resistance ⁴⁾	R_G	-	0.5	-	Ω	-

⁴⁾ 由设计定义。未经过生产测试。

表 6 电容值特性 ⁵⁾

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	1000	1100	pF	$V_{GS}=0\text{ V}, V_{DS}=60\text{ V}, f=1\text{ MHz}$
Output capacitance	C_{oss}		500	550		
Reverse transfer capacitance	C_{rss}		4.9	6.4		

⁵⁾ 由设计定义。未经过生产测试。

表 7 栅极电荷特性

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	2.7	-	nC	$V_{DS}=60\text{ V}, I_D=18\text{ A}, V_{GS}=0\text{ to }5\text{ V}$
Gate charge at threshold	$Q_{g(th)}$		2.0	-	nC	
Gate to drain charge ⁶⁾	Q_{gd}		2.3	-	nC	
Switching charge	Q_{sw}		3.0	-	nC	
Gate charge total ⁶⁾	Q_g		10	13	nC	
Gate plateau voltage	$V_{plateau}$		2.7	-	V	
Output charge ⁶⁾	Q_{oss}	-	49	54	nC	$V_{DS}=60\text{ V}, V_{GS}=0\text{ V}$

⁶⁾ 由设计定义。未经过生产测试。

表8 反向操作

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Reverse continuous current	I_S	-	-	15	A	$T_C=25\text{ °C}$
Pulsed current, reverse	$I_{S,pulse}$			284		
Source-Drain reverse voltage	V_{SD}	-	2.6	3.4	V	$V_{GS}=0\text{ V}, I_{S,pulse}=18\text{ A}, T_J=25\text{ °C}$
			2.1	-		$V_{GS}=0\text{ V}, I_{S,pulse}=0.5\text{ A}, T_J=25\text{ °C}$
Reverse recovery charge ⁷⁾	Q_{rr}	-	0	-	nC	$V_R=60\text{ V}, I_{S,pulse}=18\text{ A}, di_{S,pulse}/dt=100\text{ A}/\mu\text{s}$

⁷⁾ 由设计定义。未经过生产测试。

5 电气特性图

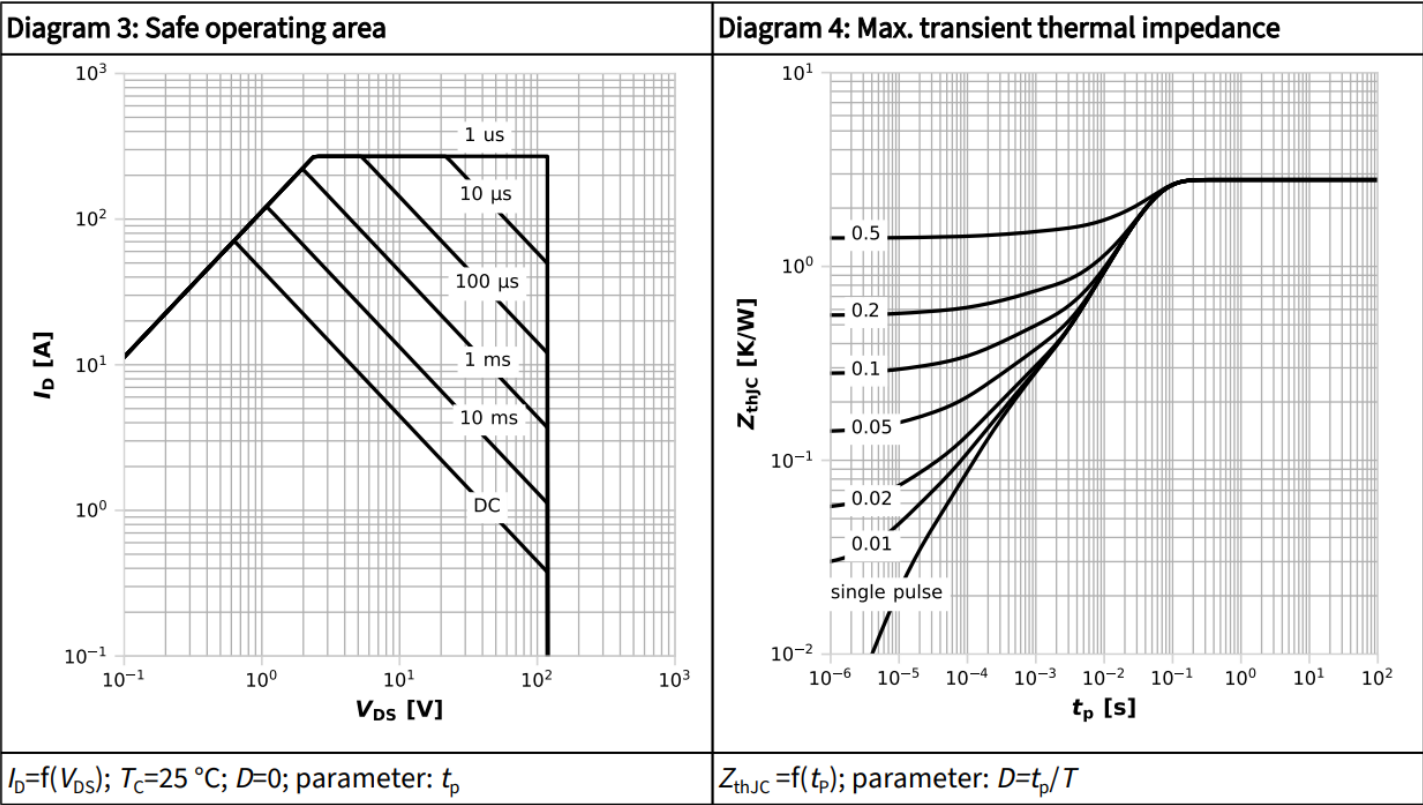
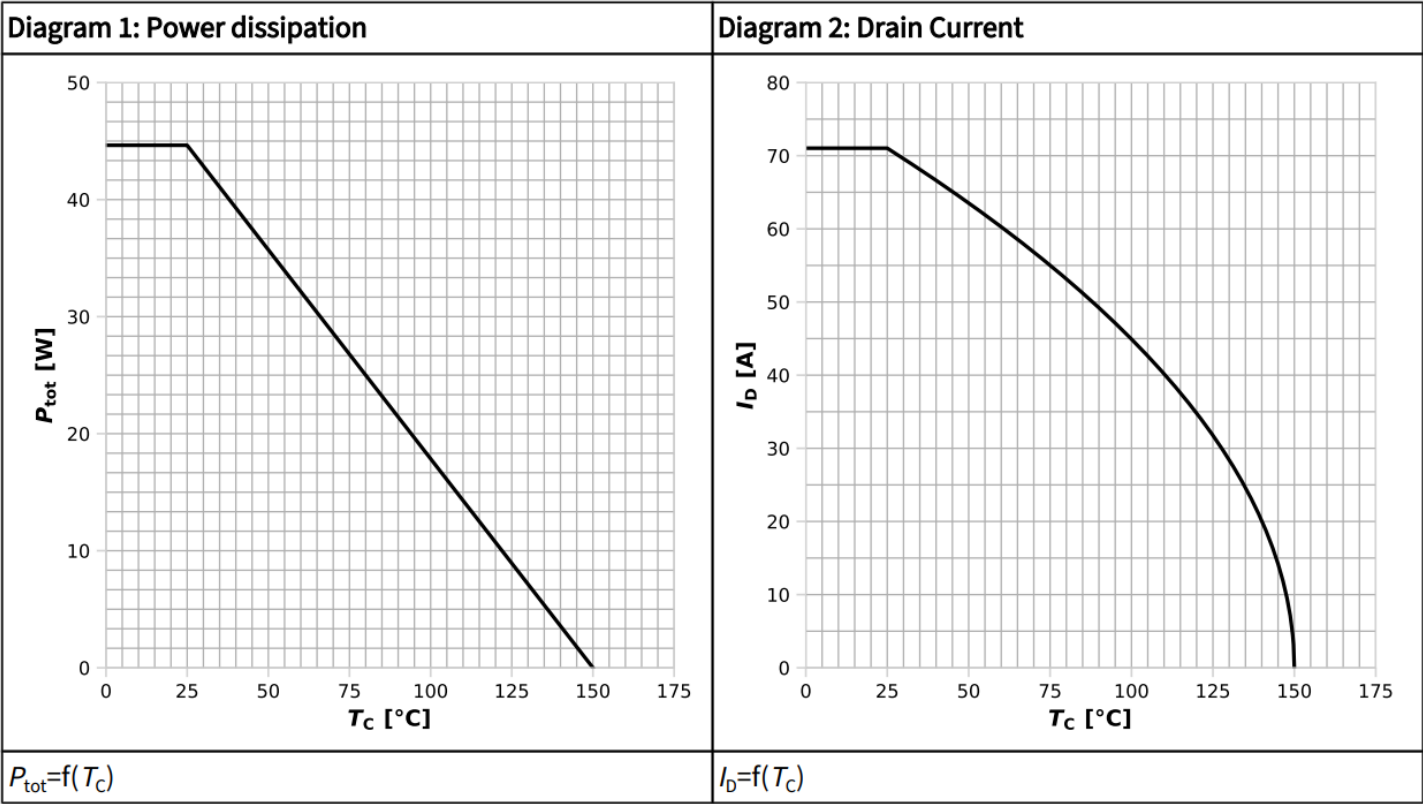
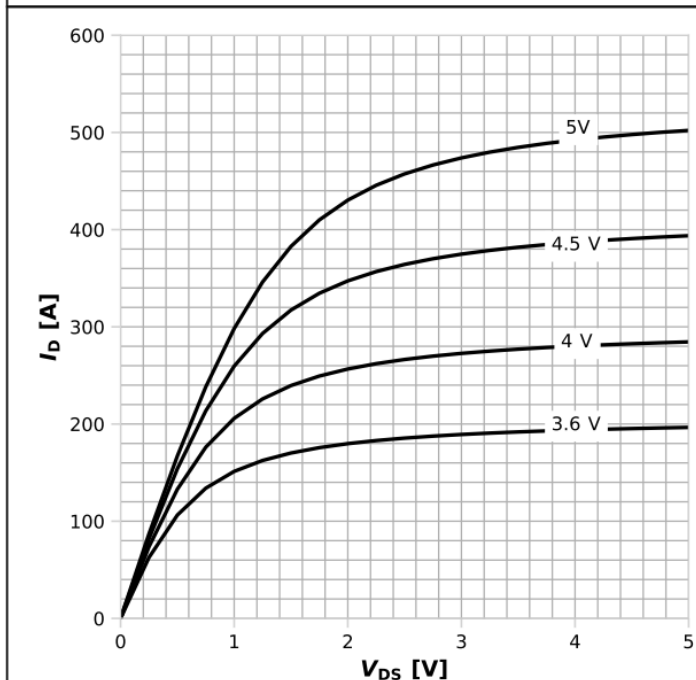
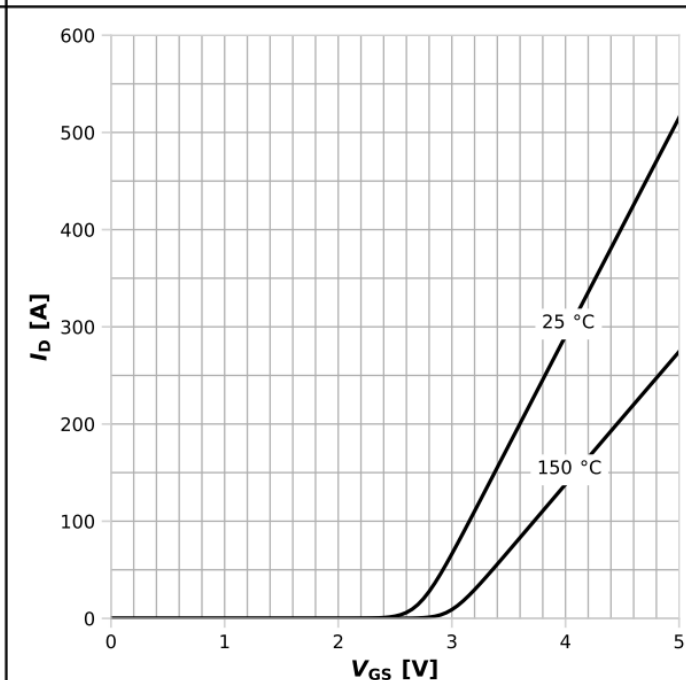


Diagram 5: Typ. output characteristics



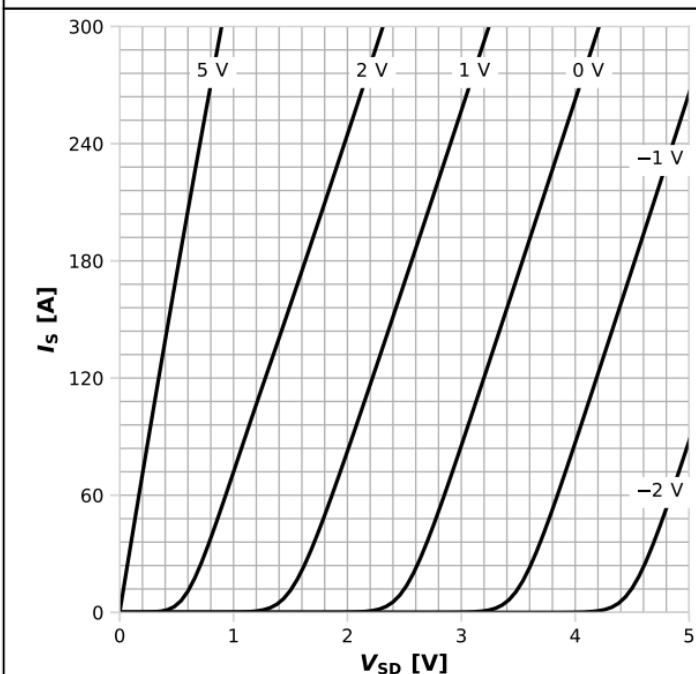
$I_D = f(V_{DS})$; $T_j = 25^\circ\text{C}$; parameter: V_{GS}

Diagram 6: Typ. transfer characteristics



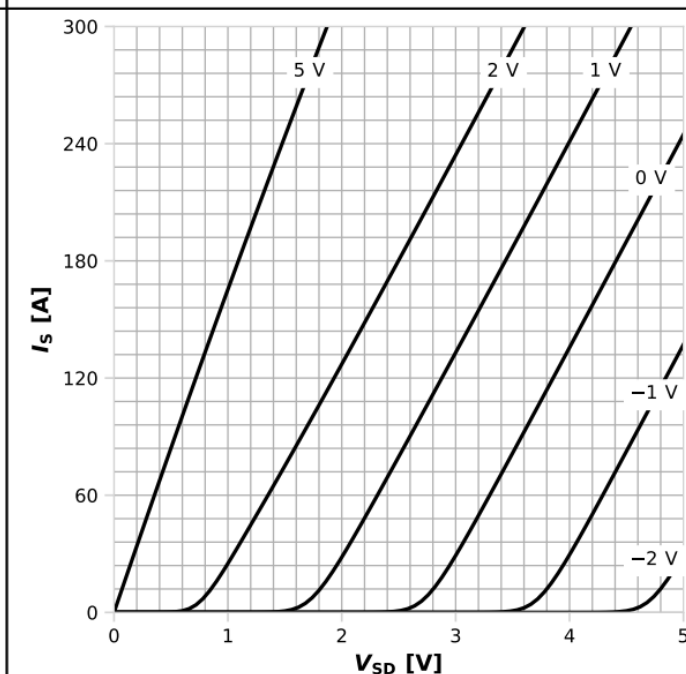
$I_D = f(V_{GS})$; $|V_{DS}| > 2|I_D|R_{DS(on)max}$; parameter: T_j

Diagram 7: Typ. channel reverse characteristics



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

Diagram 8: Typ. channel reverse characteristics



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

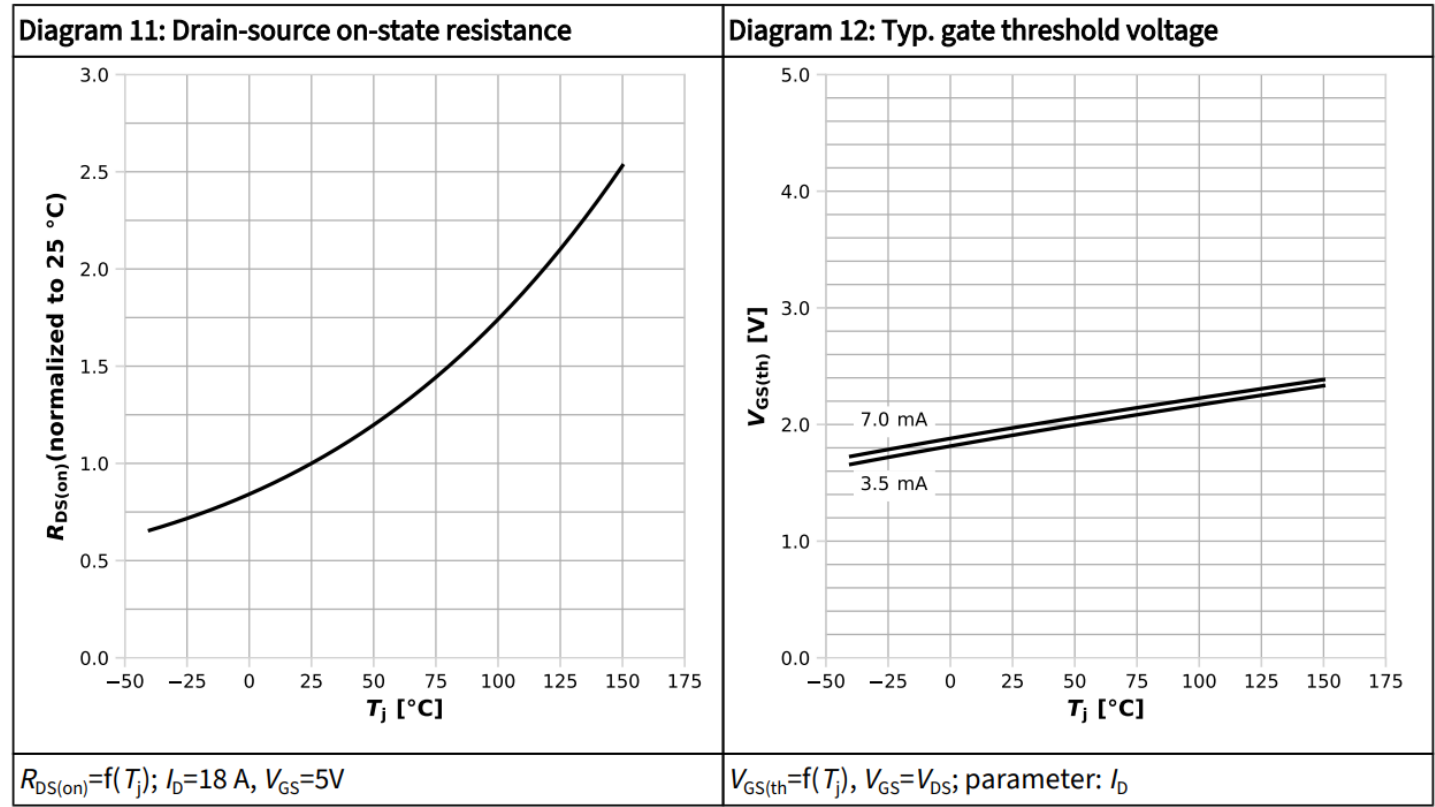
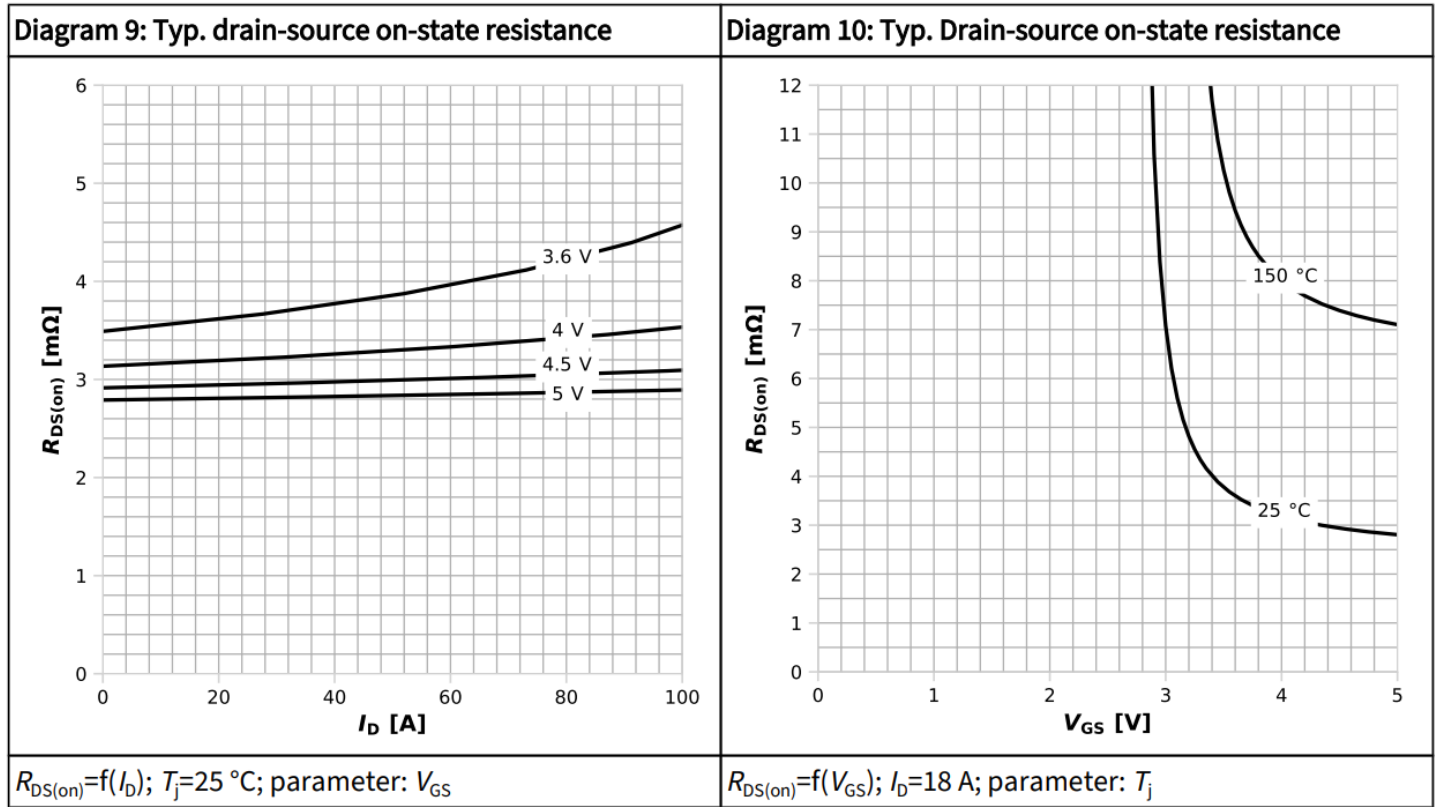
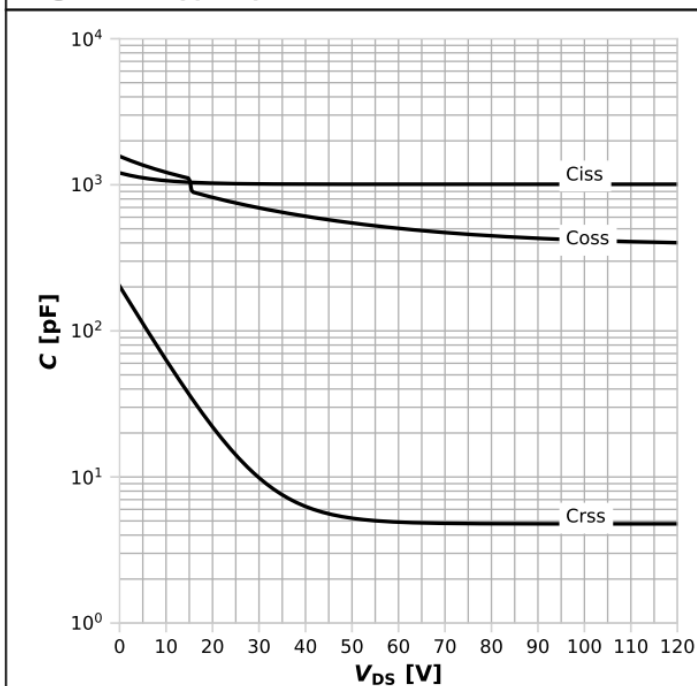
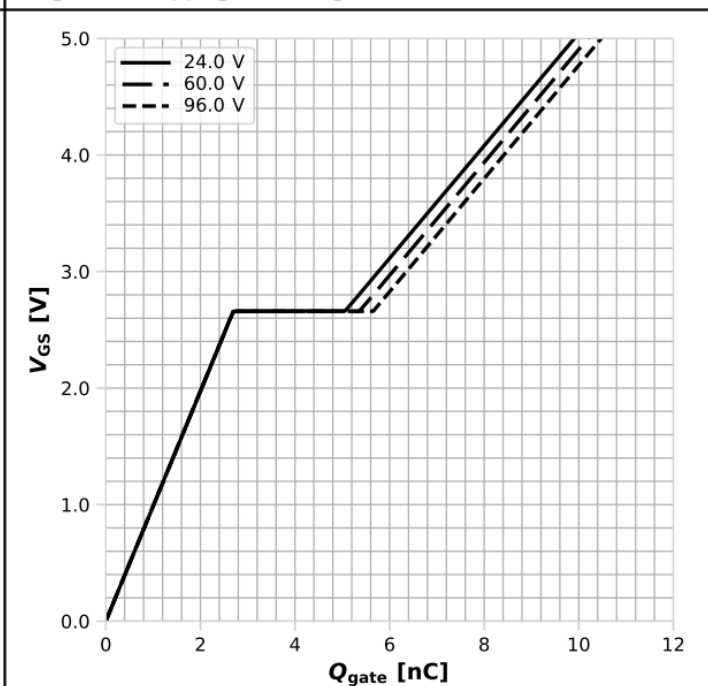


Diagram 13: Typ. capacitances



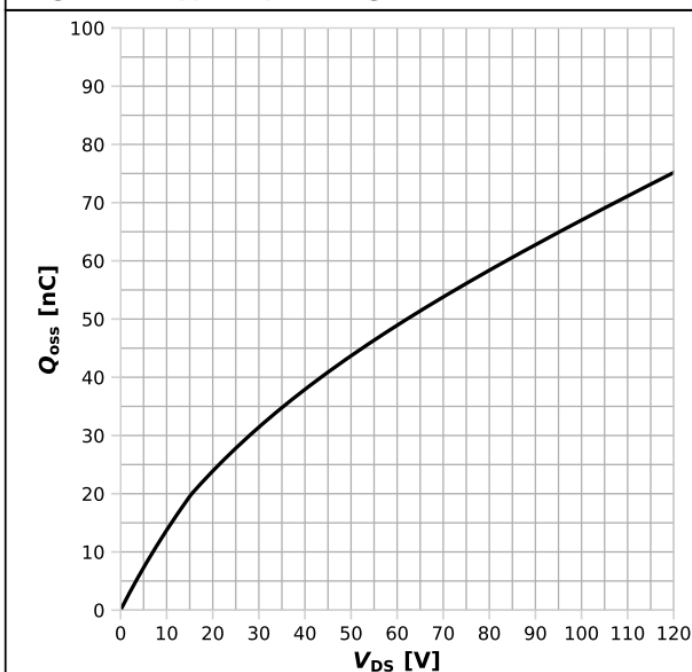
$$C=f(V_{DS}); V_{GS}=0\text{ V}$$

Diagram 14 Typ. gate charge



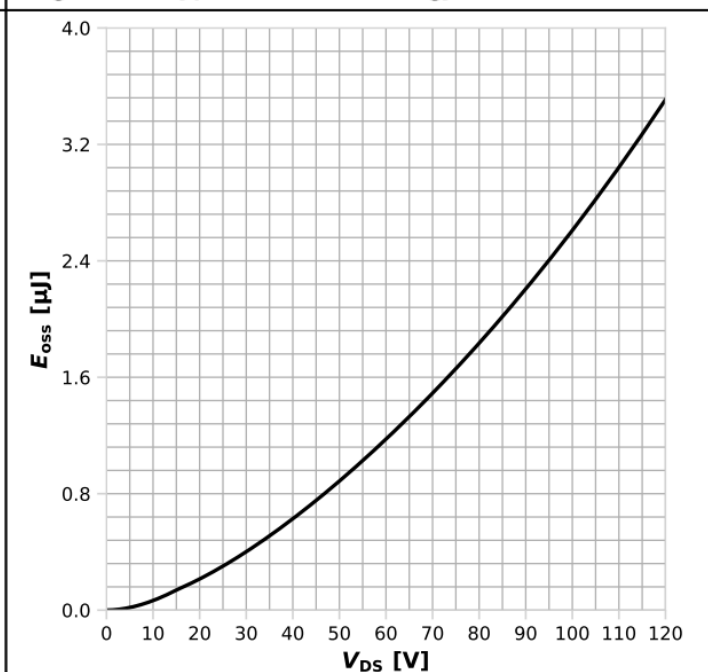
$$V_{GS}=f(Q_{gate}); I_D=18\text{ A pulsed; parameter: }V_{DS}$$

Diagram 15: Typ. output charge



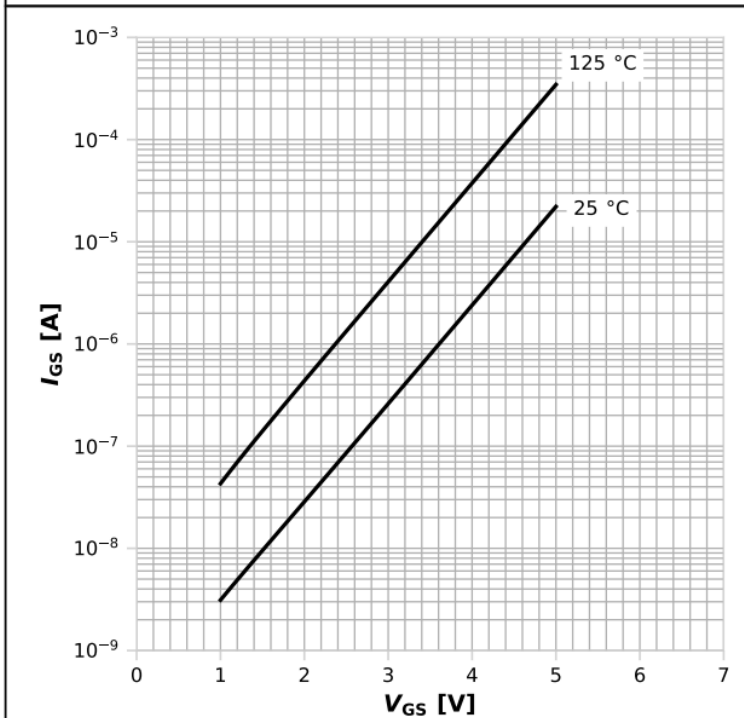
$$Q_{oss}=f(V_{DS}), V_{GS}=0\text{ V}$$

Diagram 16: Typ. Coss stored Energy



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

Diagram 17: Typ. gate characteristics forward

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

6 封装外形

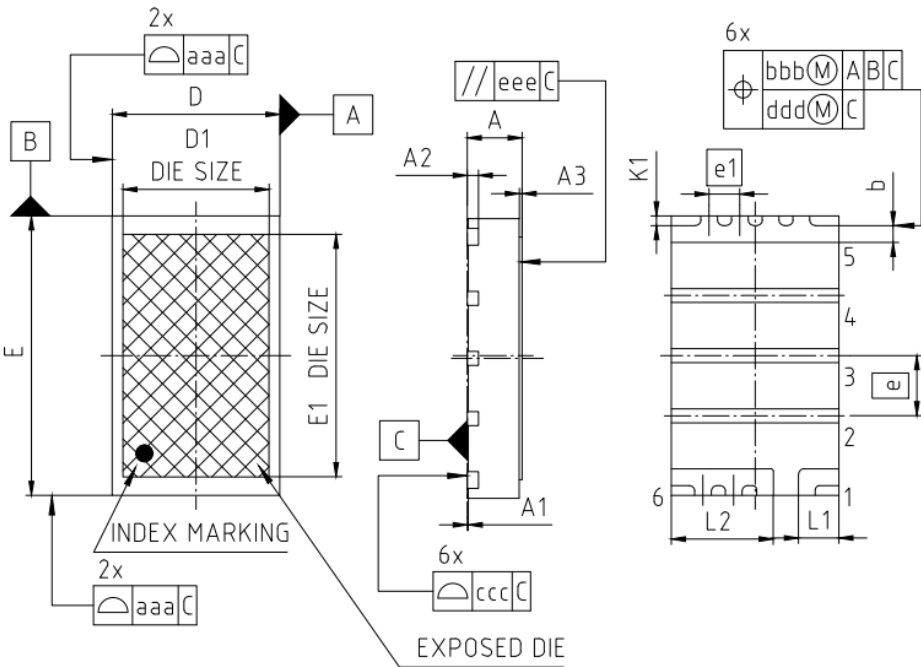


Table with dimensions for PG-TSON-6-U01 in millimeters, including parameters like A, A1, A2, A3, b, D, D1, E, E1, e, e1, K1, L1, L2, aaa, bbb, ccc, ddd, and eee.

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

图 1 PG-TSON-6 外形图，尺寸单位为毫米

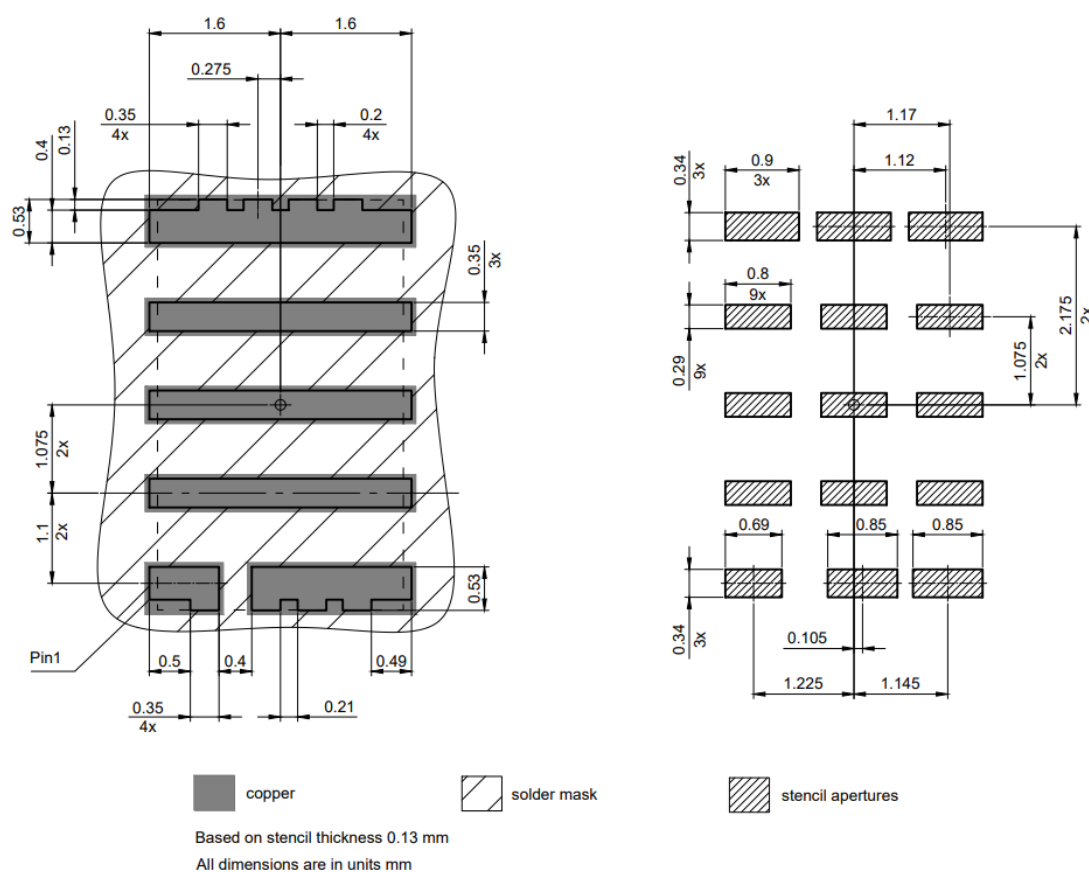


图 2 PG-TSON-6封装图，尺寸单位为毫米

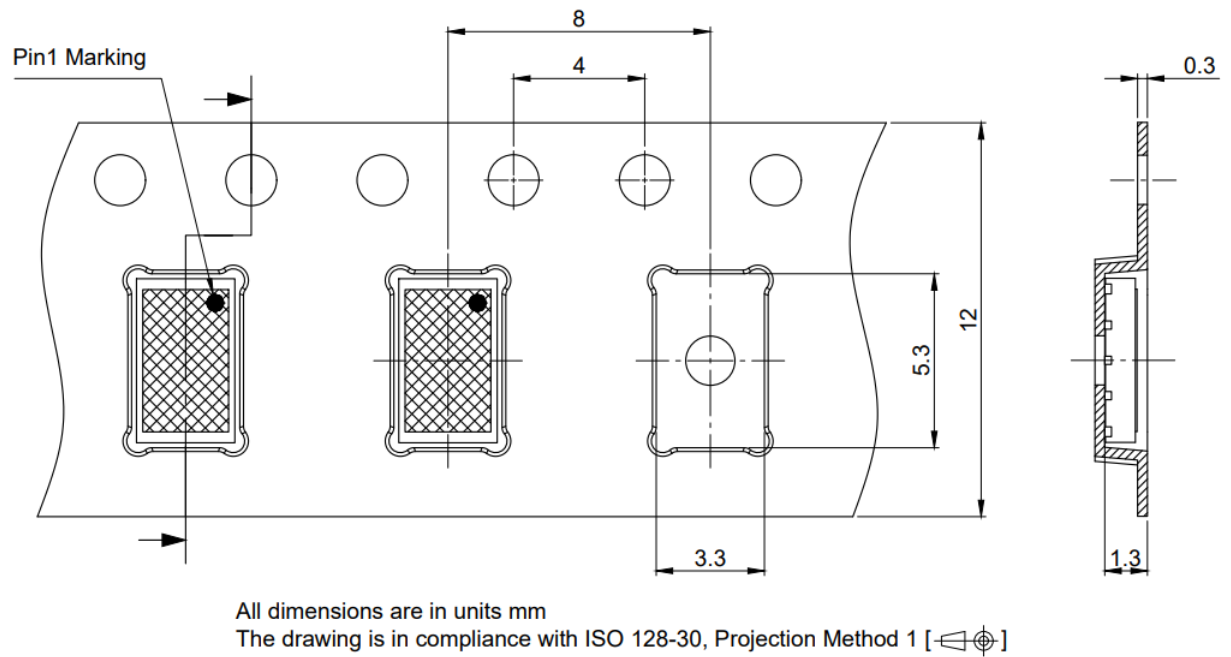


Figure 3 Packaging variant PG- TSON- 6 , dimensions in mm

7 附录A

表 9 相关链接

- [IFX CoolGaN™ GaN网页](#)
- [IFX CoolGaN™ 可靠性白皮书](#)
- [IFX CoolGaN™ 栅极驱动器应用手册](#)
- [IFX CoolGaN™ 评估板](#)
- [IFX 封装说明-PG-TSON-6-2](#)

修订记录

IGC037S12S1

Revision 2025 - 02 - 21 , Rev. 1 . 1

历史修订记录

Revision	Date	Subjects (major changes since last revision)
1.0	2025-01-28	Release of final version
1.1	2025-02-21	Diagram harmonization

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