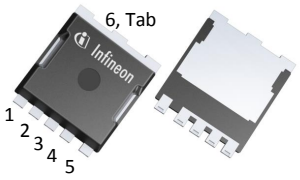
Automotive MOSFET

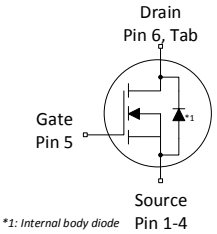
OptiMOS™ 7 Power-Transistor

PG-HSOF-5



Features

- OptiMOS™ power MOSFET for automotive applications
- N-channel - Enhancement mode - Normal Level
- Extended qualification beyond AEC-Q101
- Enhanced electrical testing
- Robust design
- MSL2a up to 260°C peak reflow
- 175°C operating temperature
- RoHS compliant
- 100% Avalanche tested



Potential applications

General automotive applications.

Product validation

Qualified according to Automotive applications.
Product validation according to AEC-Q101.

Table 1 Key performance parameters

Parameter	Value	Unit
V_{DS}	40	V
$R_{DS(on)}$	1.43	mΩ
I_D(chip limited)	182	A

Part number	Package	Marking	Related links
IAUAN04S7N014	PG-HSOF-5	7N04N014	see Appendix A

Table of contents

1 Maximum ratings

at Tj=25 °C, unless otherwise specified

Table 2 Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Continuous drain current	I_D	-	-	182	A	Chip limitation, V_{GS} = 10 V [1) 2)]
				160		DC current, V_{GS} = 10 V
				34		R_{thJA} on 2s2p, V_{GS} = 10 V, T_a = 100 °C [1)]
Pulsed drain current [1)]	$I_{D,pulse}$	-	-	520	A	T_C = 25 °C, t_p = 100 µs
Avalanche energy, single pulse [1)]	E_{AS}	-	-	69	mJ	I_D = 50 A
Avalanche current, single pulse	I_{AS}	-	-	100	A	-
Gate source voltage	V_{GS}	-20		20	V	
Power dissipation	P_{tot}	-	-	90	W	T_C = 25 °C
Operating temperature	T_j	-55	-	175	°C	-

1) The parameter is not subject to production testing - specified by design.

2) In practice, the current is limited by the overall system design, including the customer-specific PCB.

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case [3]	R_{thJC}	-	-	1.66	K/W	-
Thermal resistance, junction - ambient [4] [3]	R_{thJA}		24.2	-		

[3] The parameter is not subject to production testing - specified by design.

[4] Device on 2s2p FR4 PCB defined in accordance with JEDEC standards (JESD51-5, -7). PCB is vertical in still air.

3 Electrical characteristics

at T_j=25 °C, unless otherwise specified

Table 4 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	40	-	-	V	I_D = 1 mA, V_{GS} = 0 V
Gate threshold voltage	$V_{GS(th)}$	2.2	2.6	3	V	V_{DS}=V_{GS}, I_D = 35 µA
Zero gate voltage drain current	I_{DSS}	-	-	1	µA	V_{DS} = 40 V, T_J = 25 °C, V_{GS} = 0 V
				9		V_{DS} = 40 V, T_J = 100 °C, V_{GS} = 0 V [5]
Gate-source leakage current	I_{GSS}	-	-	100	nA	V_{DS} = 0 V, V_{GS} = 20 V
Drain-source on-state resistance	$R_{DS(on)}$	-	1.57	1.86	mΩ	I_D = 40 A, V_{GS} = 7 V
			1.22	1.43		I_D = 80 A, V_{GS} = 10 V
Gate resistance [5]	R_G	-	1.6	-	Ω	-

[5] The parameter is not subject to production testing - specified by design.

Table 5 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Input capacitance [6]	C_{iss}	-	2260	2930	pF	V_{DS} = 20 V, V_{GS} = 0 V, f = 1 MHz
Output capacitance [6]	C_{oss}		1320	1710		
Reverse transfer capacitance [6]	C_{rss}		46	69		
Turn-on delay time [6]	$t_{d(on)}$	-	9	-	ns	I_D = 80 A, V_{GS} = 10 V, V_{DD} = 20 V, R_G = 3.5 Ω
Rise time [6]	t_r		4			
Turn-off delay time [6]	$t_{d(off)}$		15			
Fall time [6]	t_f		7			

[6] The parameter is not subject to production testing - specified by design.

Table 6 Gate Charge Characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate to source charge [7]	Q_{gs}	-	10	13	nC	I_D = 80 A, V_{DS} = 20 V, V_{GS} = 0 V to 10 V
Gate to drain charge [7]	Q_{gd}		7	11	nC	
Gate charge total [7]	Q_g		33	43	nC	
Gate plateau voltage [7]	$V_{plateau}$		4.4	-	V	

[7] The parameter is not subject to production testing - specified by design.

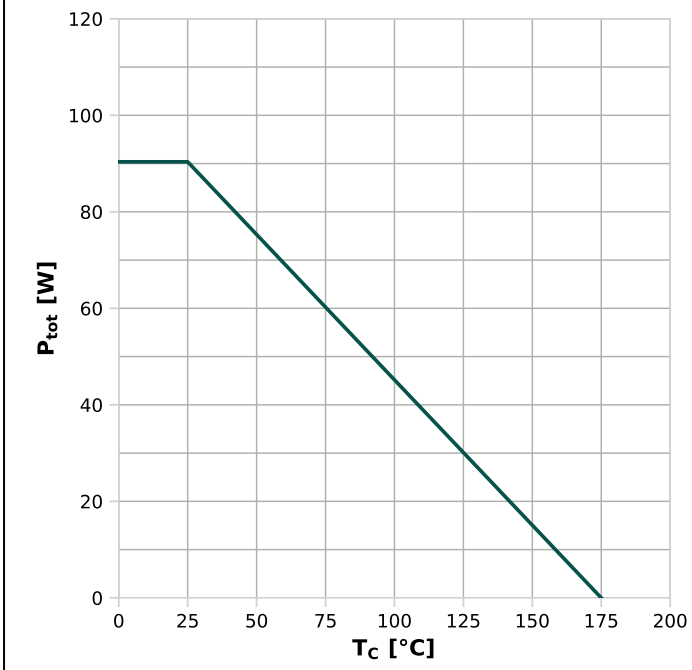
Table 7 Reverse Diode

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	160	A	T_C = 25 °C [8]
Diode pulse current [8]	$I_{S,pulse}$	-	-	520	A	T_C = 25 °C, t_p = 100 µs
Diode forward voltage	V_{SD}	-	0.85	0.95	V	T_J = 25 °C, V_{GS} = 0 V, I_F = 80 A
Reverse recovery time [8]	t_{rr}	-	33	50	ns	di_F/dt =100 A/µs, V_R = 20 V, I_F = 50 A
Reverse recovery charge [8]	Q_{rr}		17	34	nC	

[8] The parameter is not subject to production testing - specified by design.

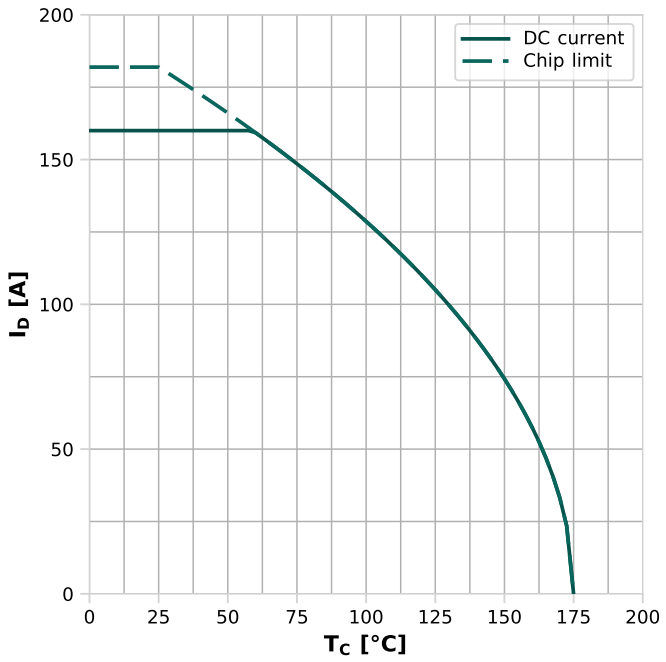
4 Electrical characteristics diagrams

Diagram 1: Power dissipation



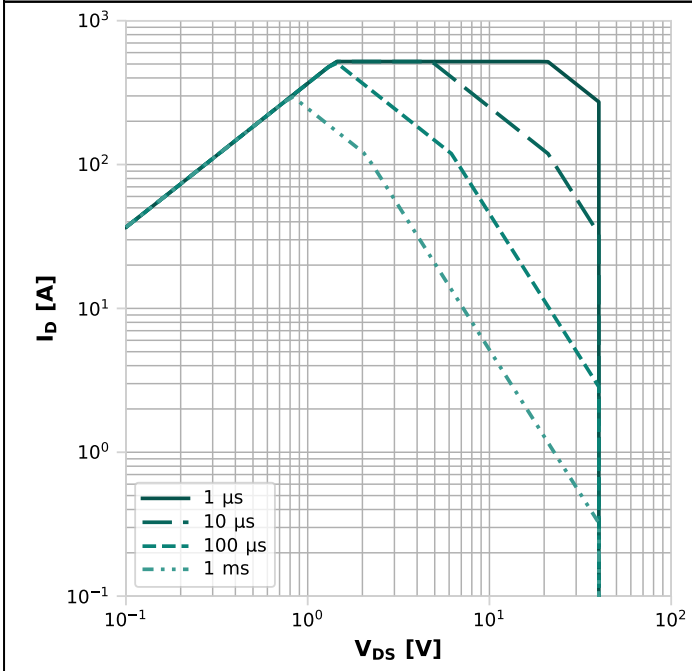
$P_{tot}=f(T_C)$; $V_{GS} \geq 6$ V

Diagram 2: Drain Current



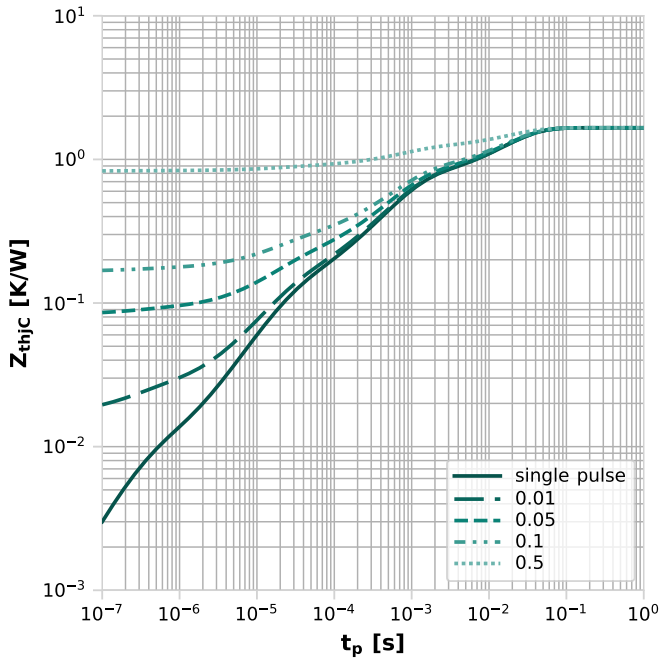
$I_D=f(T_C)$; $V_{GS} \geq 6$V

Diagram 3: Safe operating area



$I_D=f(V_{DS})$; T_C= 25 °C; D=0; parameter: t_p

Diagram 4: Max. transient thermal impedance



$Z_{thjC}=f(t_p)$; parameter: $D=t_p/T$

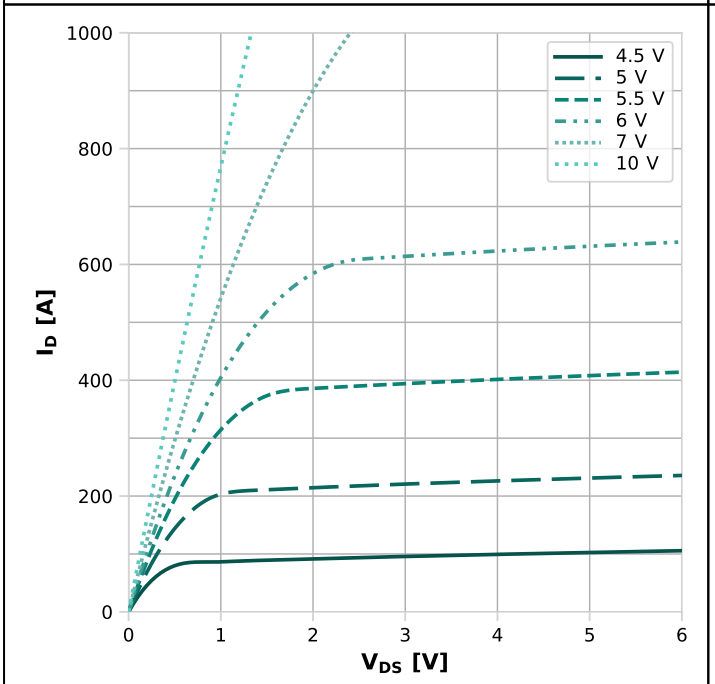
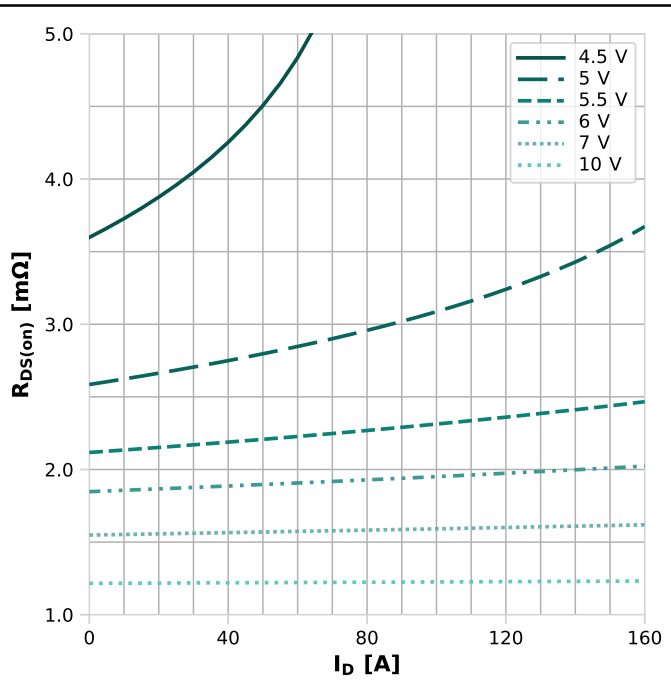
Diagram 5: Typ. output characteristics	Diagram 6: Typ. drain-source on-state resistance
	
$I_D=f(V_{DS})$; T_j= 25 °C, parameter: V_{GS}	$R_{DS(on)}=f(I_D)$; T_j= 25 °C; parameter: V_{GS}

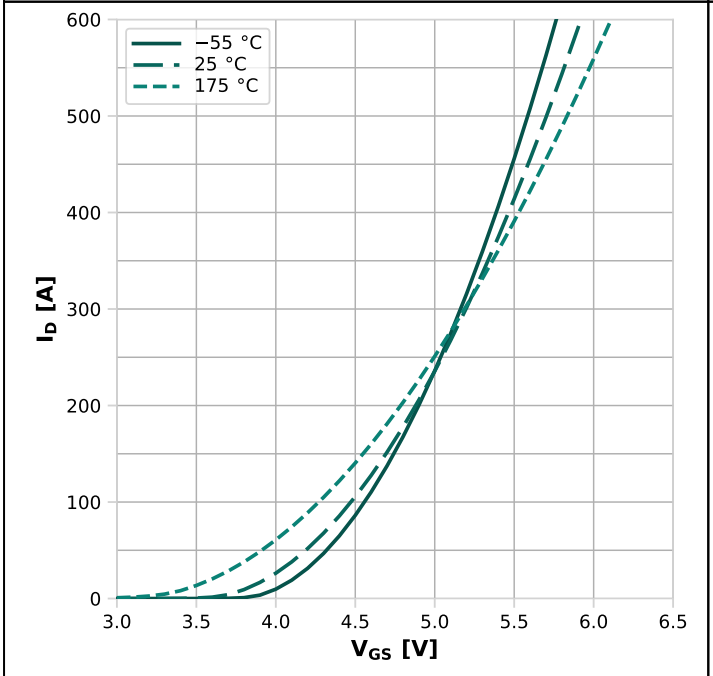
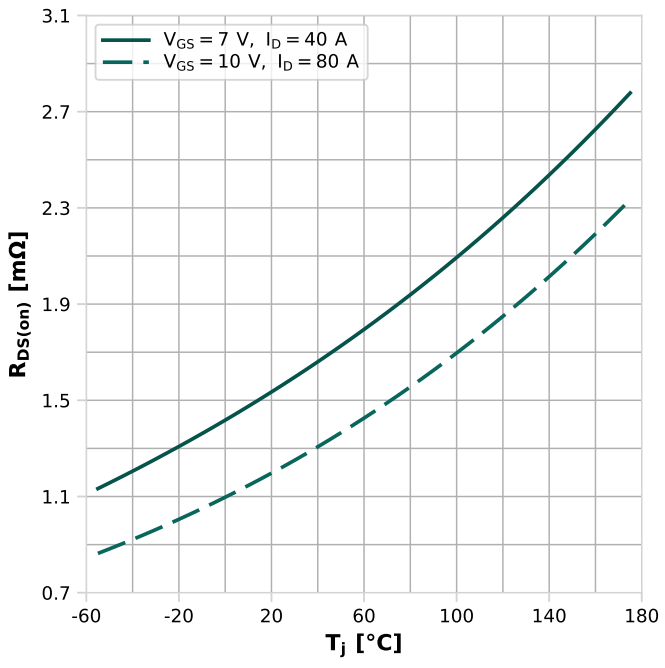
Diagram 7: Typ. transfer characteristics	Diagram 8: Typ. drain-source on-state resistance
	
$I_D=f(V_{GS})$; V_{DS}= 6 V; parameter: T_j	$R_{DS(on)}=f(T_j)$; parameter: I_D, V_{GS}

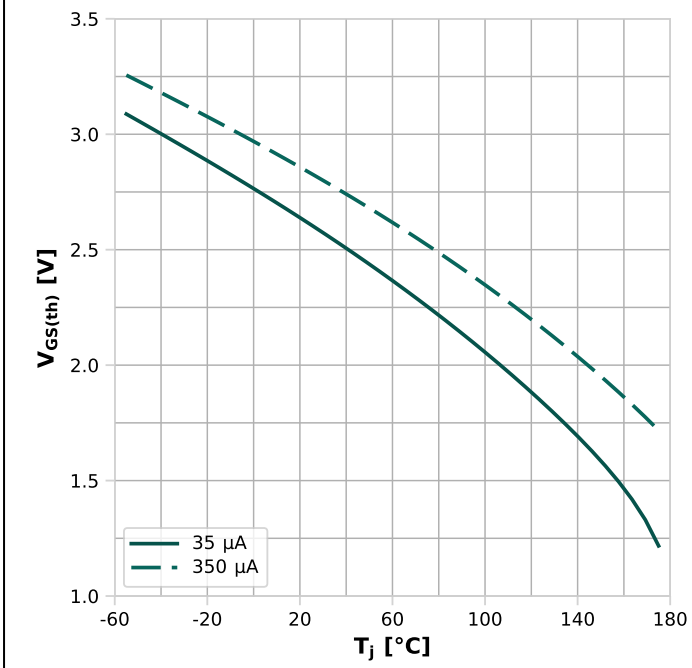
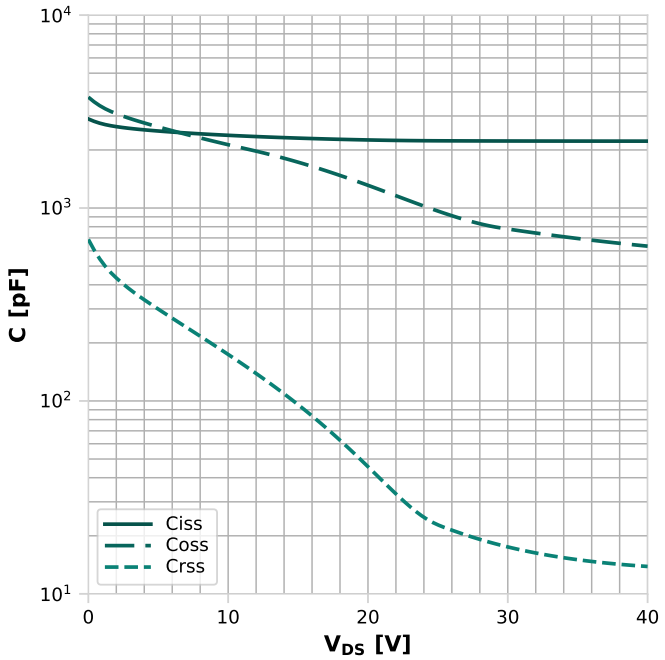
Diagram 9: Typ. gate threshold voltage	Diagram 10: Typ. capacitances
	
$V_{GS(th)}=f(T_j)$; $V_{GS}= V_{DS}$; parameter: I_D	$C=f(V_{DS})$; $V_{GS}= 0$ V; f=1 MHz

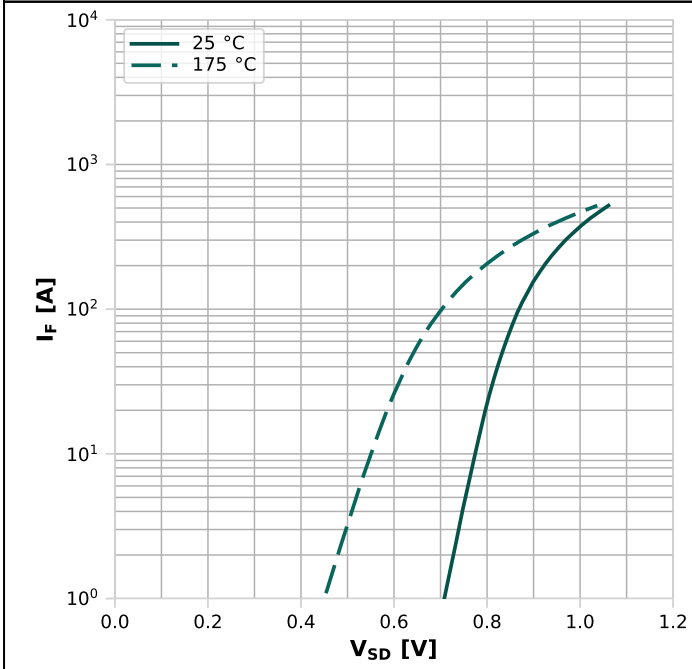
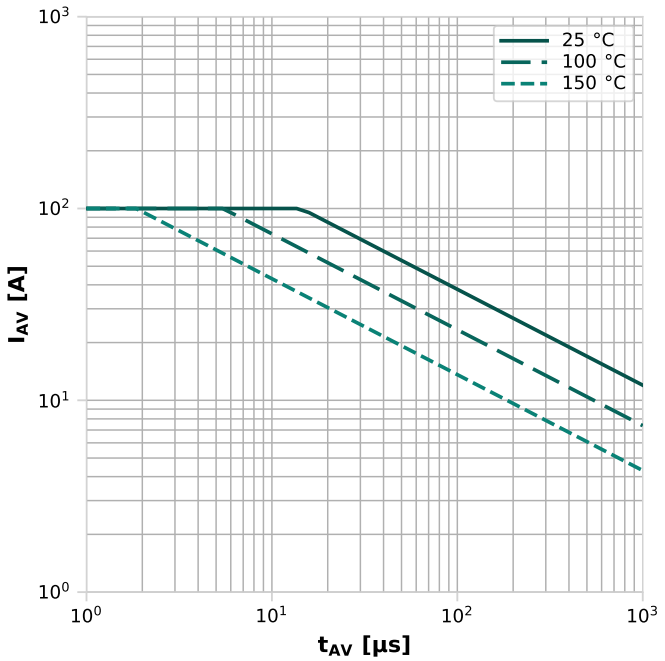
Diagram 11: Typ. forward diode characteristics	Diagram 12: Typ. avalanche characteristics
	
$I_F=f(V_{SD})$; parameter: T_j	$I_{AS}=f(t_{AV})$; parameter: $T_{j(start)}$

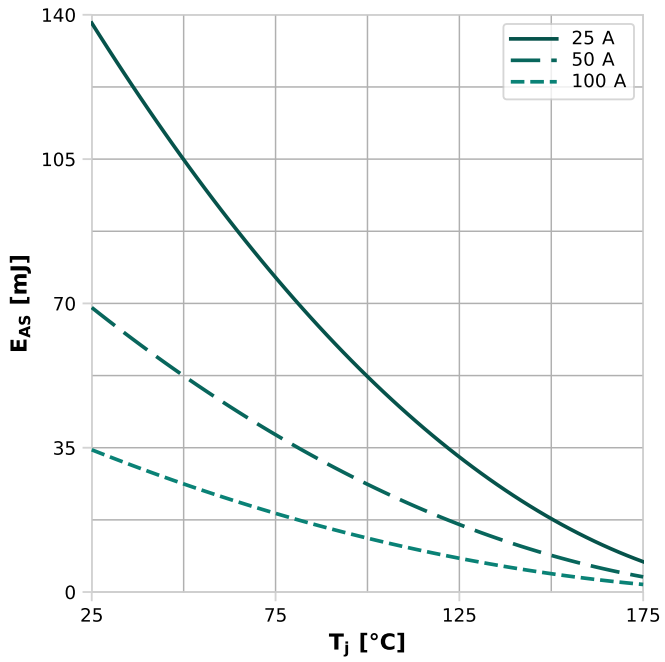
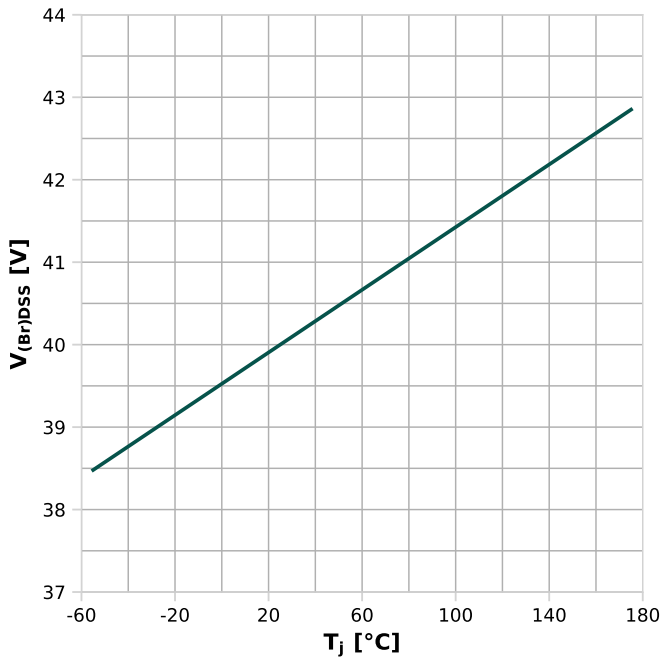
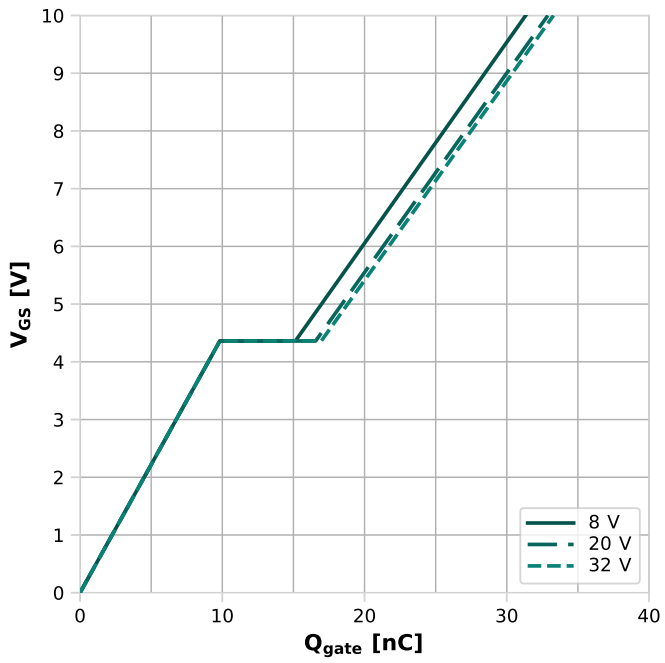
Diagram 13: Typical avalanche Energy	Diagram 14: Drain-source breakdown voltage
	
$E_{AS}=f(T_j)$; parameter: I_D	$V_{(Br)DSS}=f(T_j)$; I_D= 1 mA

Diagram 15: Typ. gate charge

$V_{GS}=f(Q_{gate})$; I_D= 80 A pulsed; parameter: V_{DD}

5 Test circuits

Table 8 Diode characteristics

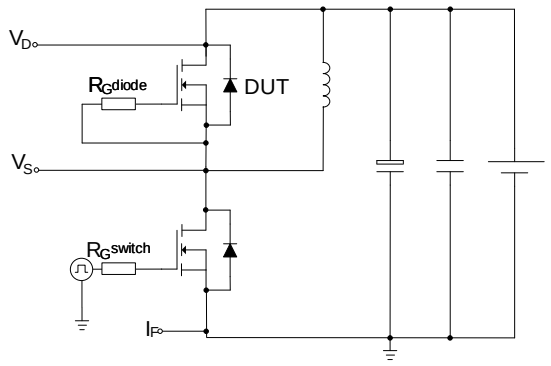
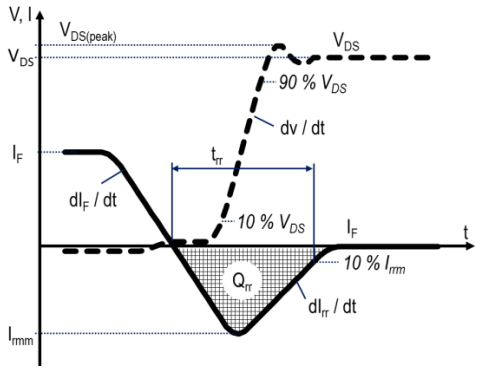
Test circuit for diode characteristics	Diode recovery waveform
	

Table 9 Unclamped inductive load test circuit

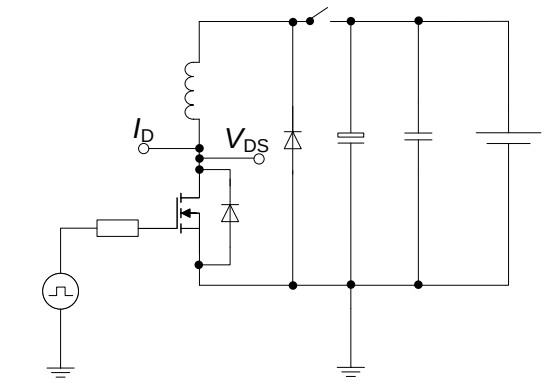
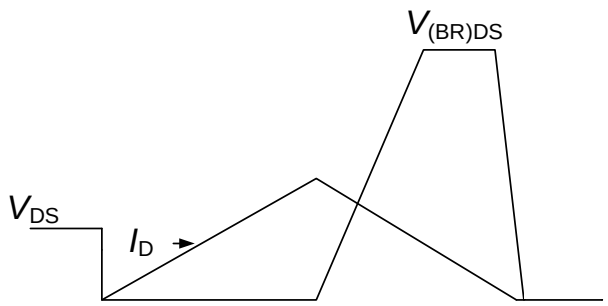
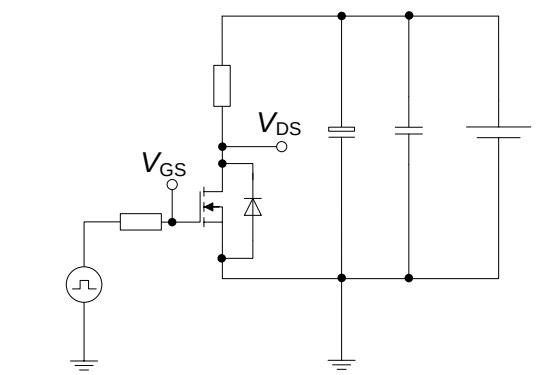
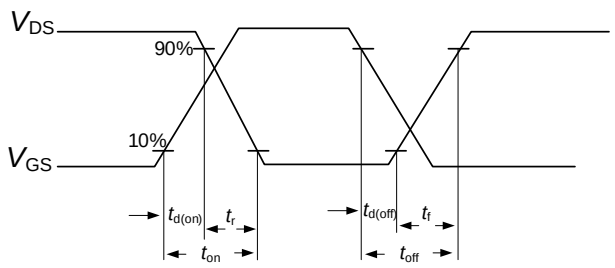
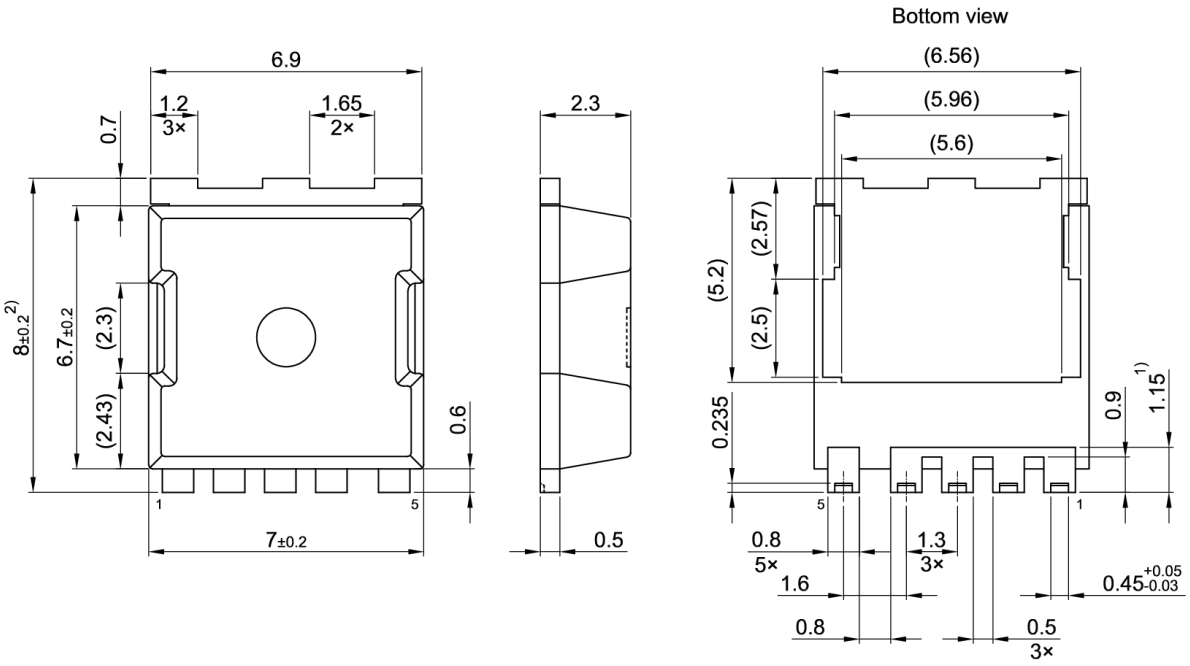
Unclamped inductive load test circuit	Unclamped inductive waveform
	

Table 10 Switching times test circuit for resistive load

Switching times test circuit for resistive load	Switching times waveform
	

6 Package outlines



1) Lead length up to anti flash profile; mold flashes excluded.
2) Excluding burr.
All dimensions are in units mm
The drawing is in compliance with ISO 128-30, Projection Method 1 [⌖]
Drawing according to ISO 8015, general tolerances ±0.1;±1°30'

Figure 1 Outline PG-HSOF-5, dimensions in mm

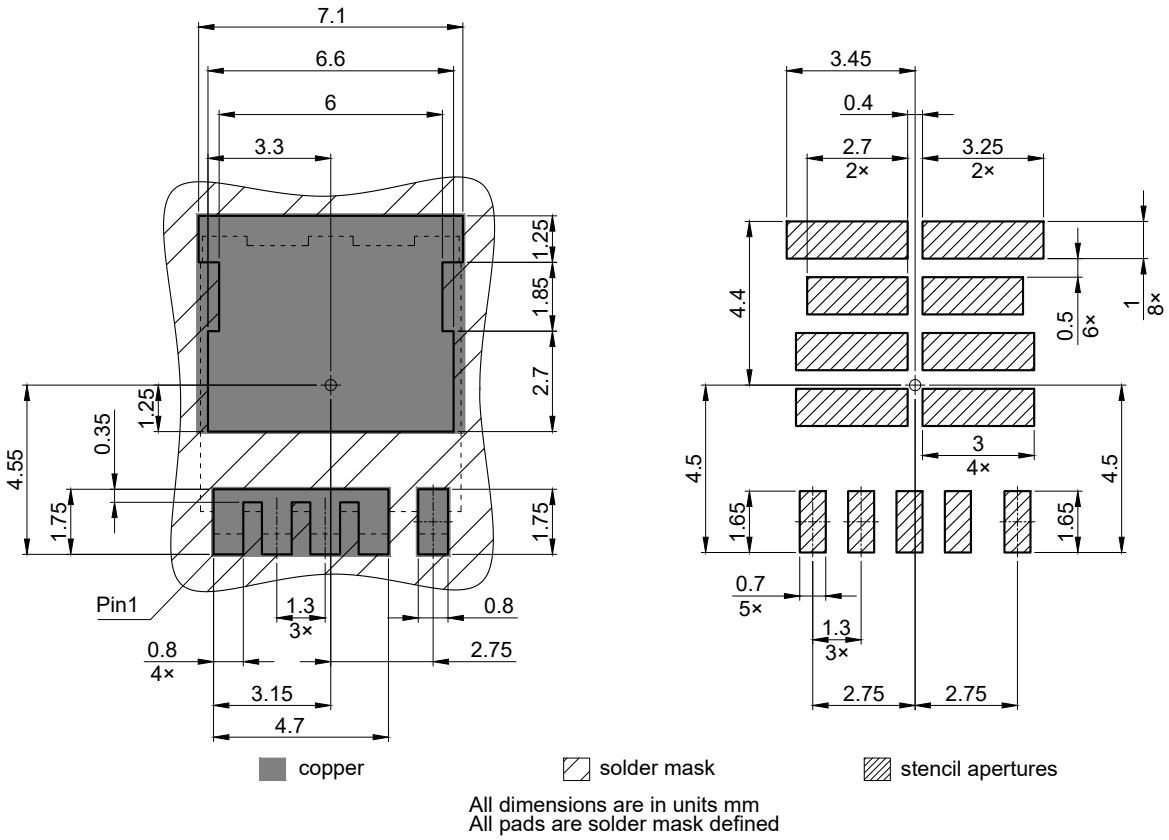


Figure 2 Footprint drawing PG-HSOF-5, dimensions in mm

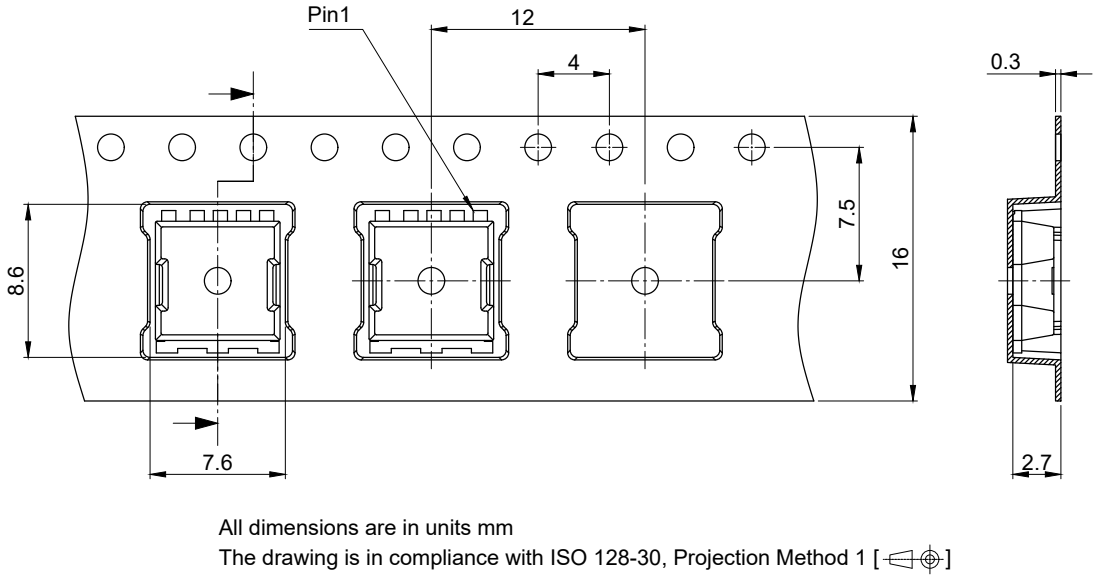


Figure 3 Packaging variant PG-HSOF-5, dimensions in mm

7 Appendix A

Table 11 Related links

- IFX Optimos™ Power-Transistor Webpage

Revision history

IAUAN04S7N014

Revision 2026-01-14, Rev. 1.0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2026-01-14	Final Datasheet

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