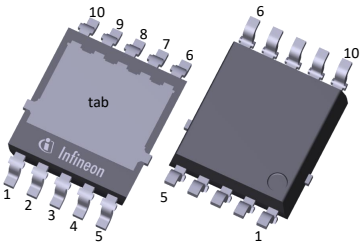
Automotive MOSFET

OptiMOS™ 7 Power-Transistor

PG-LHDSO-10



Features

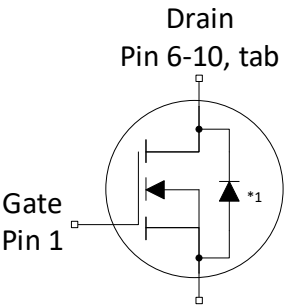
- OptiMOS™ power MOSFET for automotive applications
- N-channel - Enhancement mode - Normal Level
- Extended qualification beyond AEC-Q101
- Enhanced electrical testing
- Robust design
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- RoHS compliant
- 100% Avalanche tested
- Top Side Cooling

Potential applications

General automotive applications.

Product validation

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



*1: Internal body diode

Table 1 Key performance parameters

Parameter	Value	Unit
V_{DS}	40	V
$R_{DS(on)}$	1.39	mΩ
I_D(chip limited)	202	A

AEC Qualified

Extended quality

RoHS

Part number	Package	Marking	Related links
IAUCN04S7N013T	PG-LHDSO-10	7D4	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	-	-	202	A	Chip limitation, V_{GS} = 10 V [1) 2)]
				175		DC current, V_{GS} = 10 V
				65		R_{thJA} on 2s2p, V_{GS} = 10 V, T_a = 100 °C [1) 3)]
Pulsed drain current [1)]	$I_{D,pulse}$	-	-	595	A	T_C = 25 °C, t_p = 100 µs
Avalanche energy, single pulse [1)]	E_{AS}	-	-	97	mJ	I_D = 54 A
Avalanche current, single pulse	I_{AS}	-	-	108	A	-
Gate source voltage	V_{GS}	-20		20	V	
Power dissipation	P_{tot}	-	-	104	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) The current is limited by the overall system design, including the customer-specific PCB.

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

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case [4]	R_{thJC}	-	-	1.4	K/W	-
Thermal characterisation parameter, source pin [4] [5]	Ψ_{source}		5.3	-		
Thermal characterisation parameter, drain pin [4] [6]	Ψ_{drain}		5.4	-		
Thermal resistance, junction - heatsink [4] [7]	R_{thJH}		7.5	-		
Thermal resistance, junction - ambient [4] [8]	R_{thJA}		49	-		

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

[5] Thermal characterization parameter, calculated as $\Psi_{source} = (T_{source} - T_{ambient})/P_{dis}$ in condition of 3). Used to determine PCB temperature at source pins for given power.

[6] Thermal characterization parameter, calculated as $\Psi_{drain} = (T_{drain} - T_{ambient})/P_{dis}$ in condition of 3). Used to determine PCB temperature at drain pins for given power.

[7] Device on 2s2p FR4 PCB defined in acc. with JEDEC standards (JESD51-5,-7) without thermal vias, heatsink of 71 x 110 x 2 mm is attached through TIM with 3.3 W/(m*K) and 400 µm thickness to top side pad. Heatsink fixed to 85°C ambient temperature.

[8] 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 = 45 µA
Zero gate voltage drain current	I_{DSS}	-	-	1	µA	V_{DS} = 40 V, T_J = 25 °C, V_{GS} = 0 V
				11		V_{DS} = 40 V, T_J = 100 °C, V_{GS} = 0 V [9]
Gate-source leakage current	I_{GSS}	-	-	100	nA	V_{DS} = 0 V, V_{GS} = 20 V
Drain-source on-state resistance	$R_{DS(on)}$	-	1.50	1.70	mΩ	I_D = 44 A, V_{GS} = 7 V
			1.24	1.39		I_D = 88 A, V_{GS} = 10 V
Gate resistance [9]	R_G	-	1.9	-	Ω	-

[9] 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 [10]	C_{iss}	-	2850	3710	pF	V_{DS} = 20 V, V_{GS} = 0 V, f = 1 MHz
Output capacitance [10]	C_{oss}		1420	1850		
Reverse transfer capacitance [10]	C_{rss}		44	66		
Turn-on delay time [10]	$t_{d(on)}$	-	10	-	ns	I_D = 88 A, V_{GS} = 10 V, V_{DD} = 20 V, R_G = 3.5 Ω
Rise time [10]	t_r		16			
Turn-off delay time [10]	$t_{d(off)}$		23			
Fall time [10]	t_f		20			

[10] 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 [11]	Q_{gs}	-	12	16	nC	I_D = 88 A, V_{DS} = 20 V, V_{GS} = 0 V to 10 V
Gate to drain charge [11]	Q_{gd}		9	14	nC	
Gate charge total [11]	Q_g		45	60	nC	
Gate plateau voltage [11]	$V_{plateau}$		4.2	-	V	

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

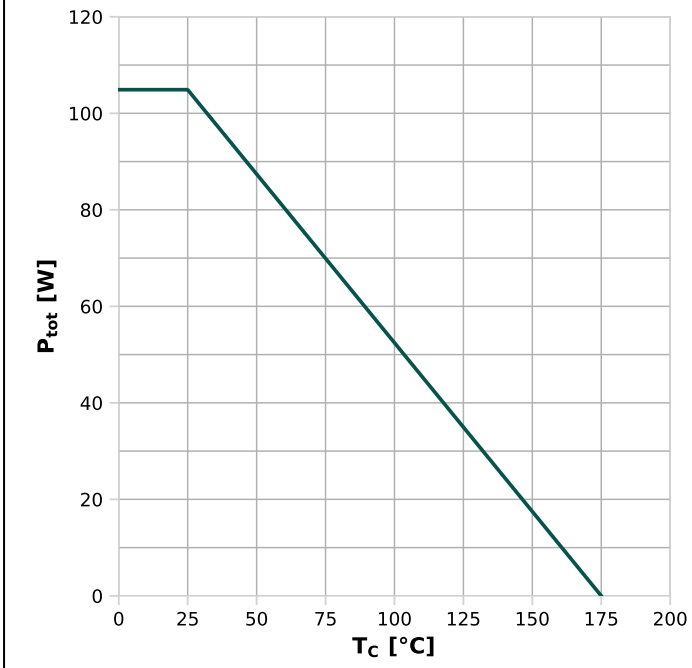
Table 7 Reverse Diode

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode continuous forward current [12]	I_S	-	-	175	A	T_C = 25 °C
Diode pulse current [12]	$I_{S,pulse}$	-	-	595	A	T_C = 25 °C, t_p = 100 µs
Diode forward voltage	V_{SD}	-	0.8	0.95	V	T_J = 25 °C, V_{GS} = 0 V, I_F = 88 A
Reverse recovery time [12]	t_{rr}	-	33	50	ns	di_F/dt =100 A/µs, V_R = 20 V, I_F = 50 A
Reverse recovery charge [12]	Q_{rr}		19	38	nC	

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

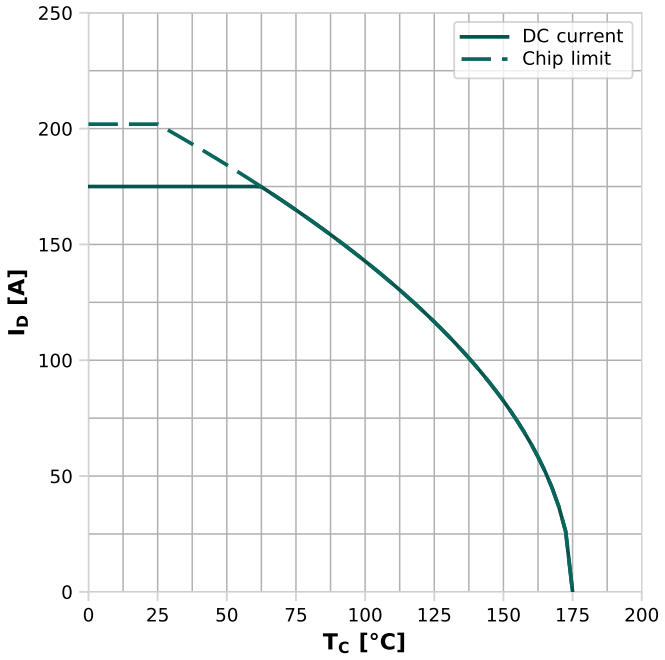
4 Electrical characteristics diagrams

Diagram 1: Power dissipation



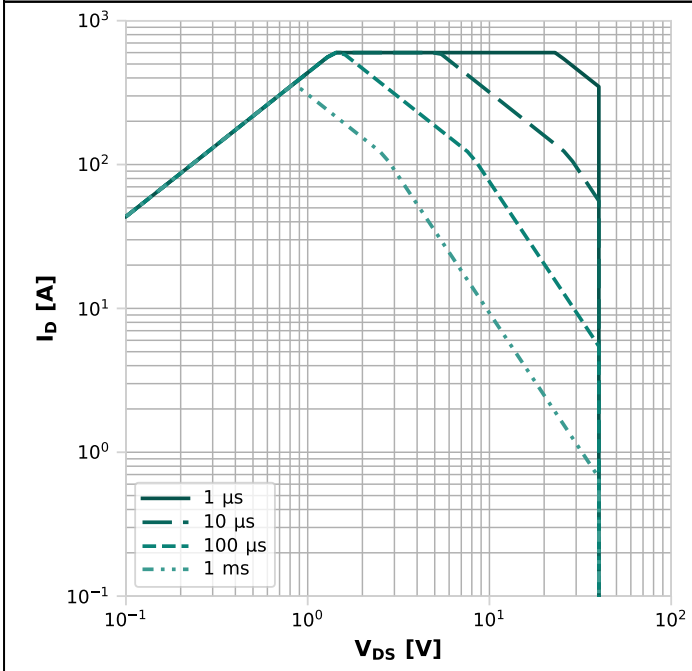
$P_{tot}=f(T_C)$; $V_{GS} \geq 6$ V

Diagram 2: Drain Current



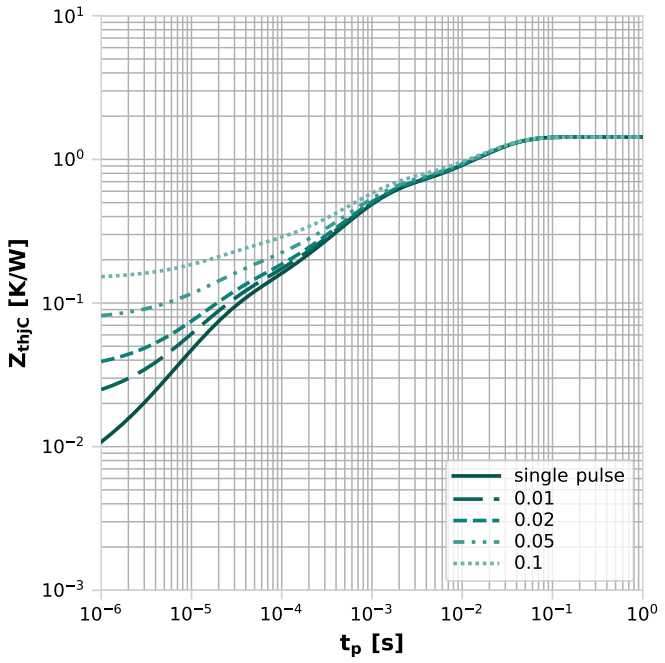
$I_D=f(T_C)$; $V_{GS} \geq 6$V

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: $D=t_p/T$

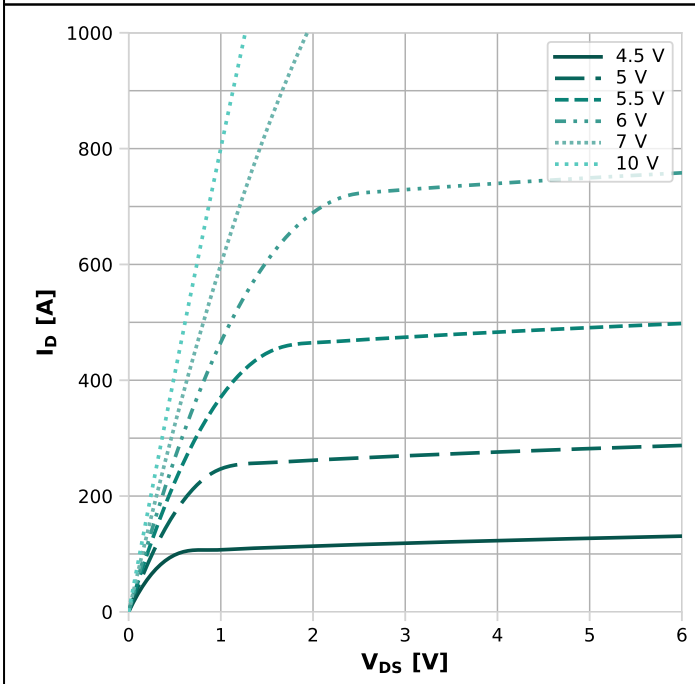
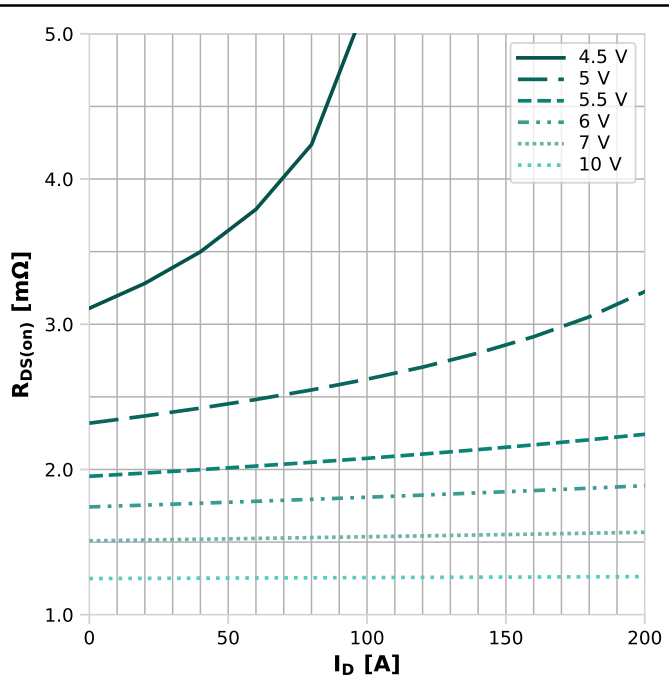
Diagram 5: Typ. output characteristics	Diagram 6: Typ. drain-source on-state resistance
	
$I_D=f(V_{DS})$; T_j= 25 °C, parameter: V_{GS}	$R_{DS(on)}=f(I_D)$; T_j= 25 °C; parameter: V_{GS}

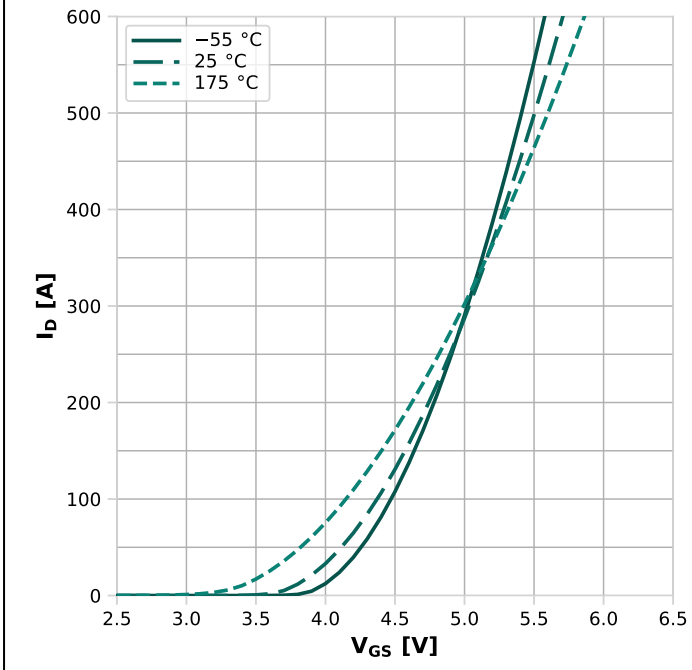
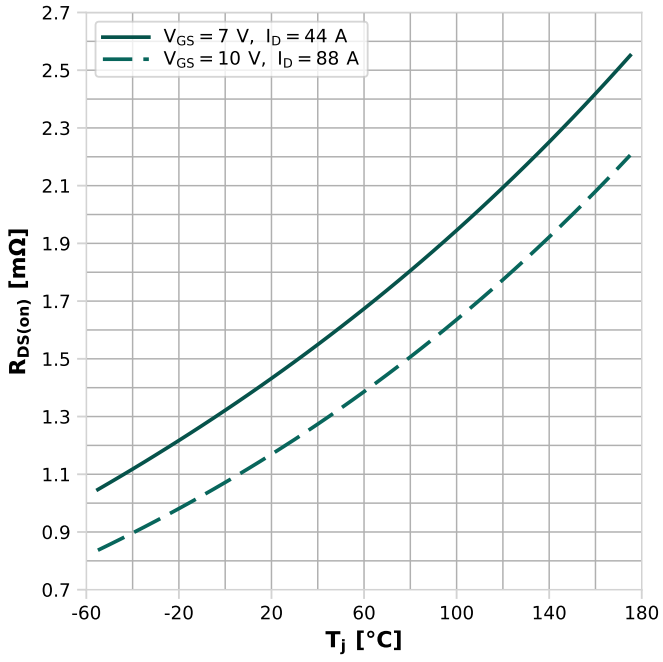
Diagram 7: Typ. transfer characteristics	Diagram 8: Typ. drain-source on-state resistance
	
$I_D=f(V_{GS})$; V_{DS}= 6 V; parameter: T_j	$R_{DS(on)}=f(T_j)$; parameter: I_D, V_{GS}

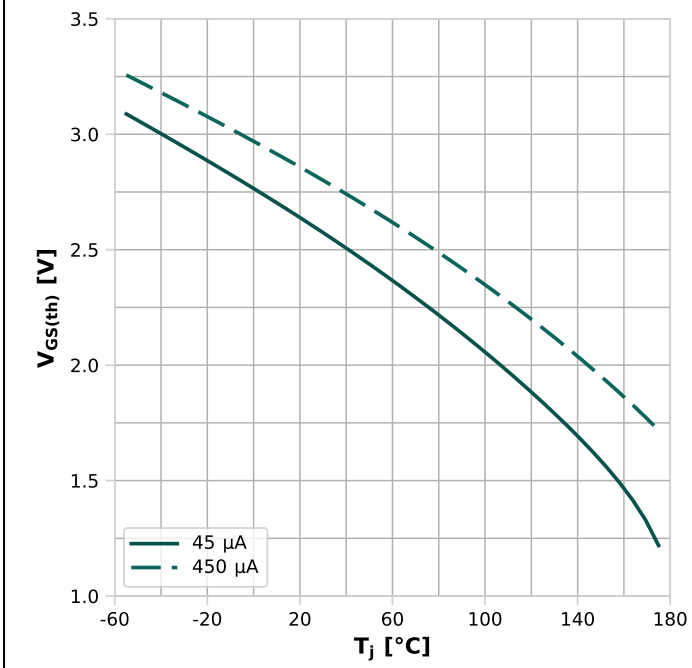
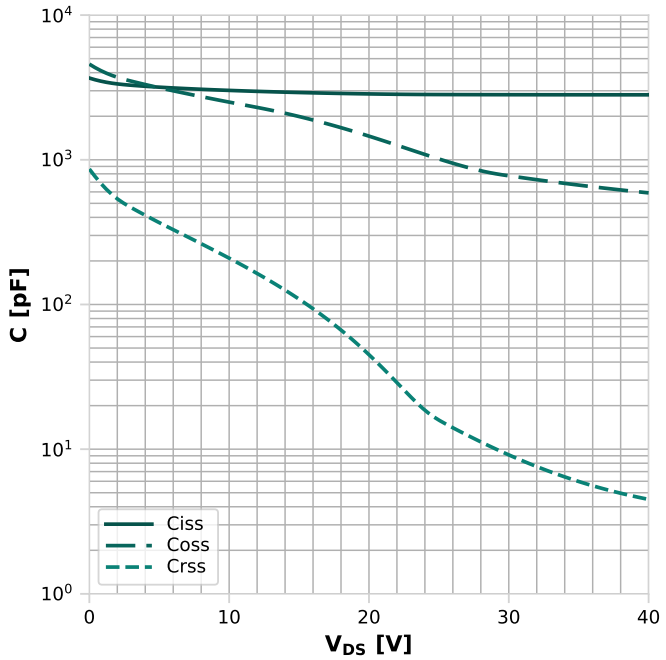
Diagram 9: Typ. gate threshold voltage	Diagram 10: Typ. capacitances
	
$V_{GS(th)}=f(T_j)$; $V_{GS}= V_{DS}$; parameter: I_D	$C=f(V_{DS})$; $V_{GS}= 0$ V; f=1 MHz

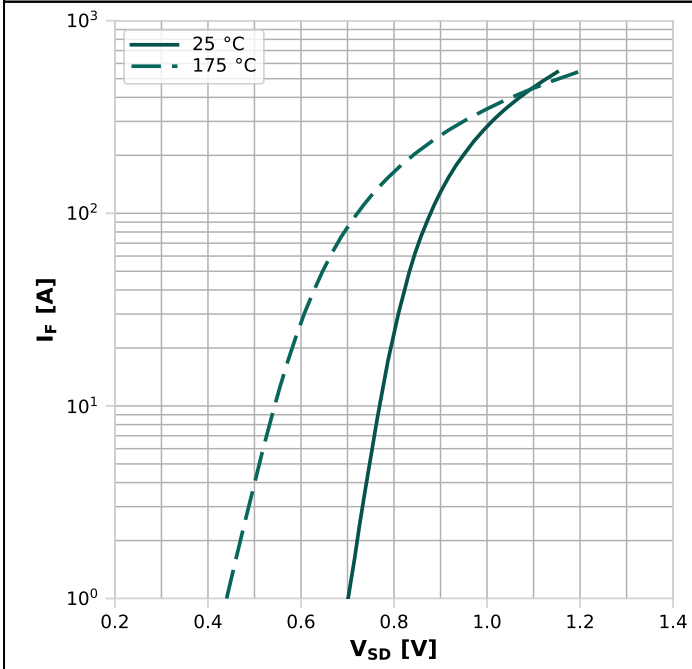
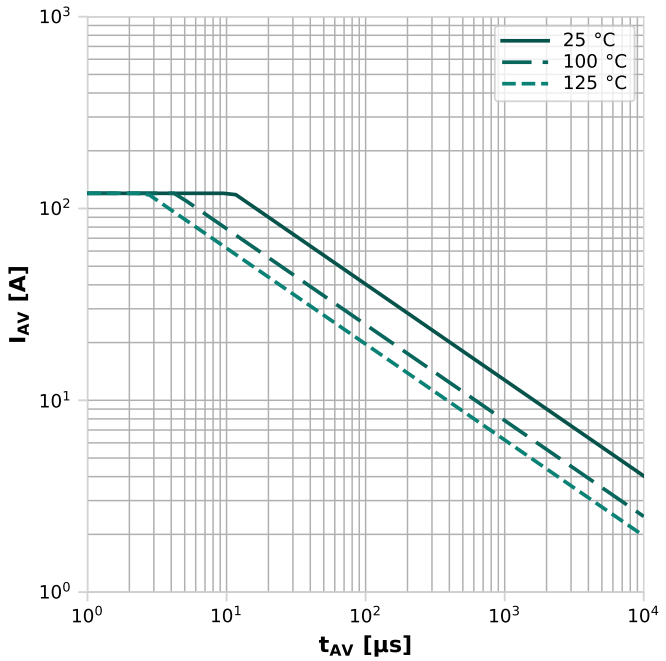
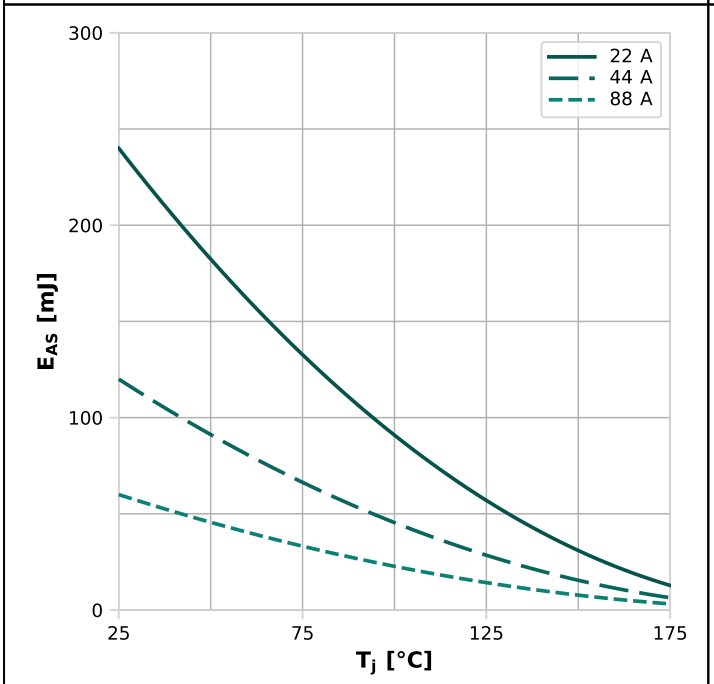
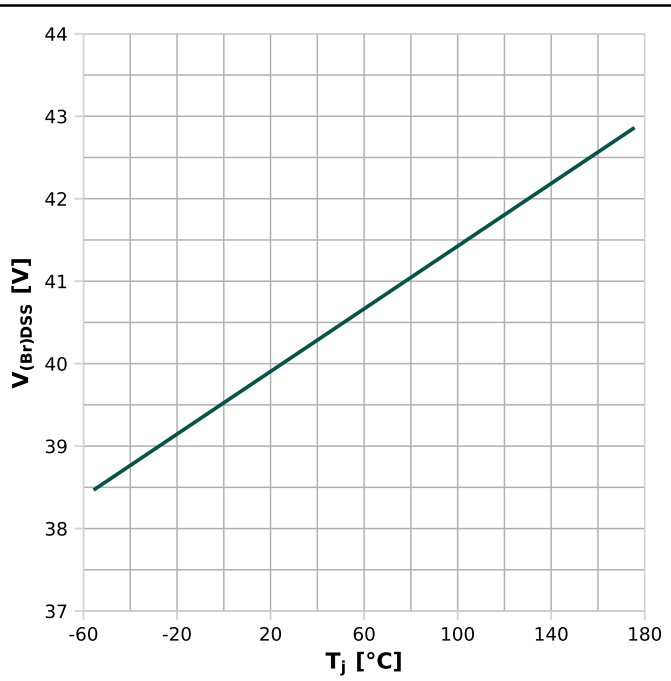
Diagram 11: Typ. forward diode characteristics	Diagram 12: Typ. avalanche characteristics
	
$I_F=f(V_{SD})$; parameter: T_j	$I_{AS}=f(t_{AV})$; parameter: $T_{j(start)}$

Diagram 13: Typical avalanche Energy



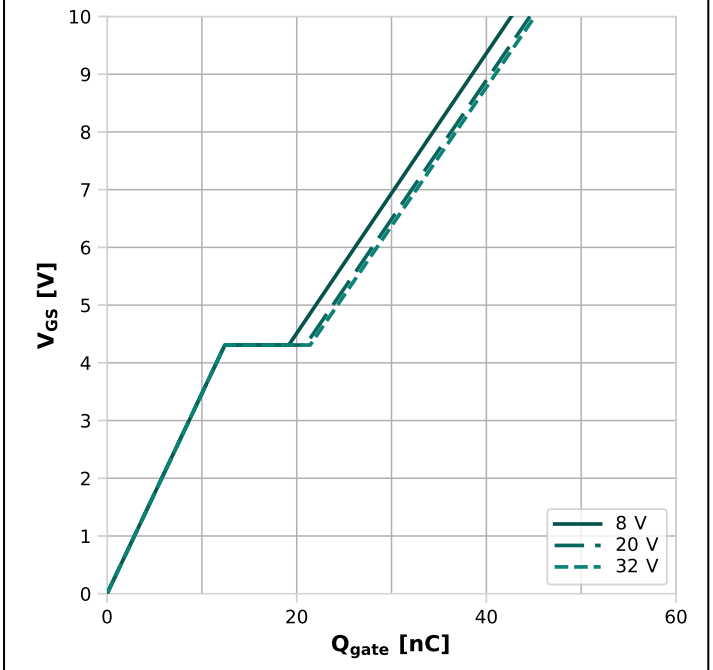
$E_{AS}=f(T_j)$; parameter: I_D

Diagram 14: Drain-source breakdown voltage



$V_{(Br)DSS}=f(T_j)$; I_D= 1 mA

Diagram 15: Typ. gate charge



$V_{GS}=f(Q_{gate})$; I_D= 88 A pulsed; parameter: V_{DD}

5 Test circuits

Table 8 Diode characteristics

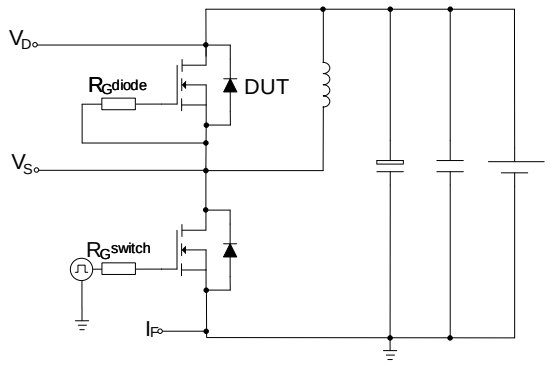
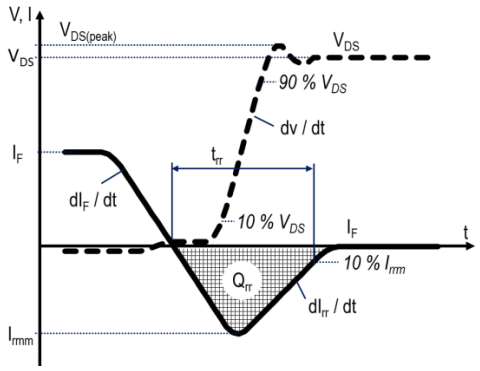
Test circuit for diode characteristics	Diode recovery waveform
	

Table 9 Unclamped inductive load test circuit

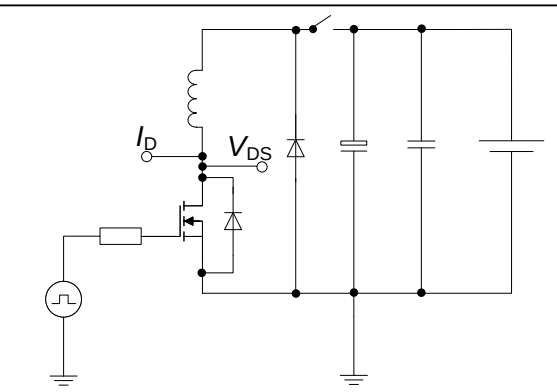
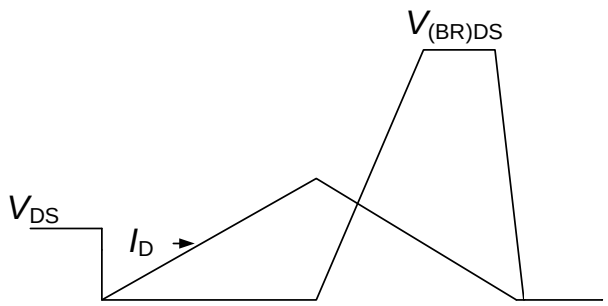
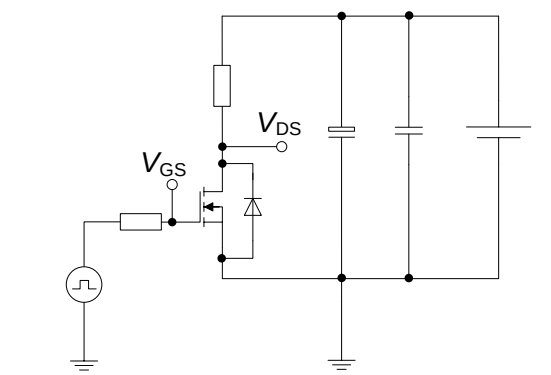
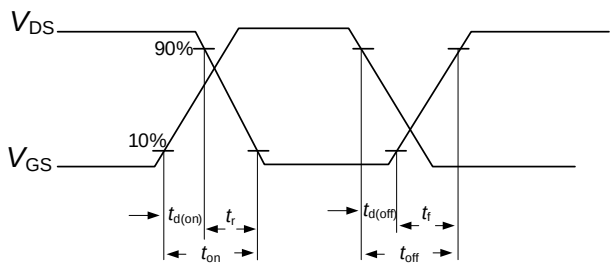
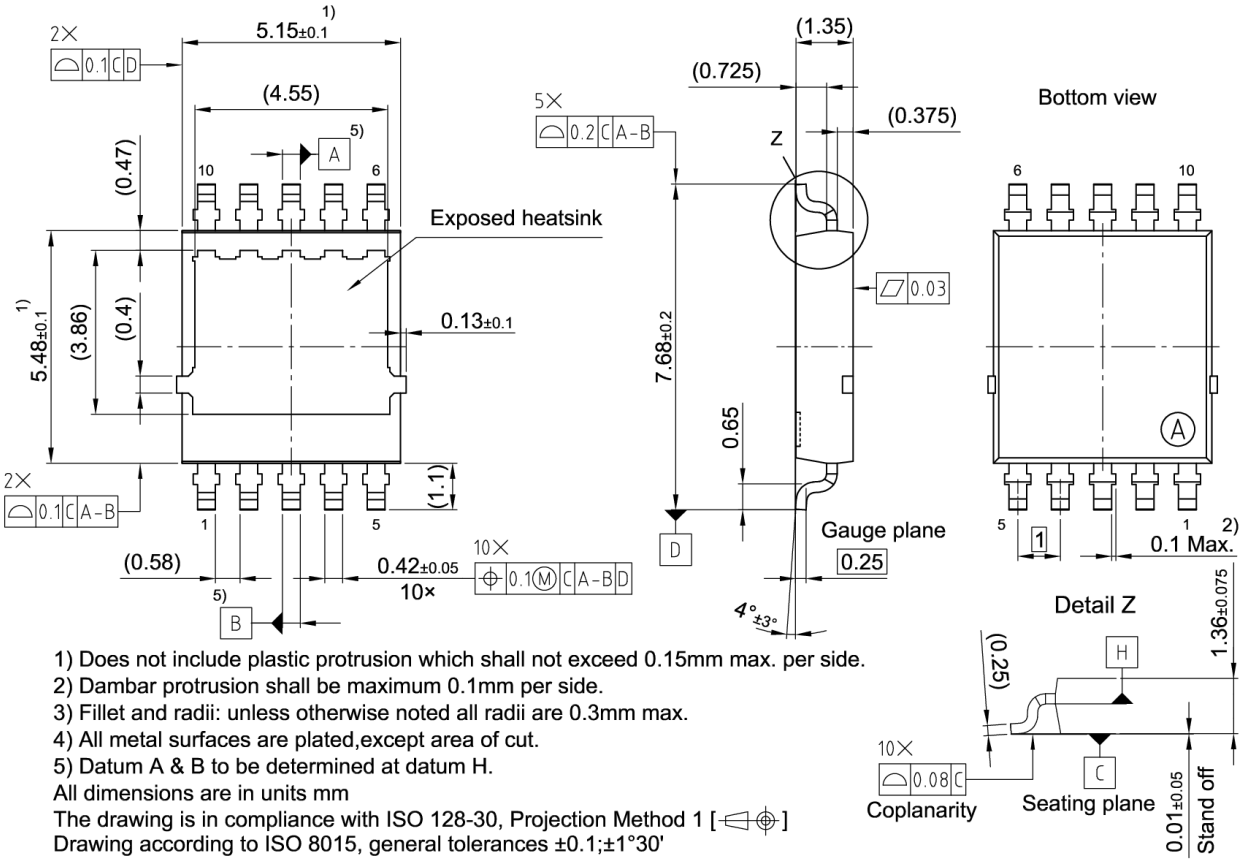
Unclamped inductive load test circuit	Unclamped inductive waveform
	

Table 10 Switching times test circuit for resistive load

Switching times test circuit for resistive load	Switching times waveform
	

6 Package outlines



1) Does not include plastic protrusion which shall not exceed 0.15mm max. per side.
2) Dambar protrusion shall be maximum 0.1mm per side.
3) Fillet and radii: unless otherwise noted all radii are 0.3mm max.
4) All metal surfaces are plated,except area of cut.
5) Datum A & B to be determined at datum H.
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-LHDSO-10, dimensions in mm

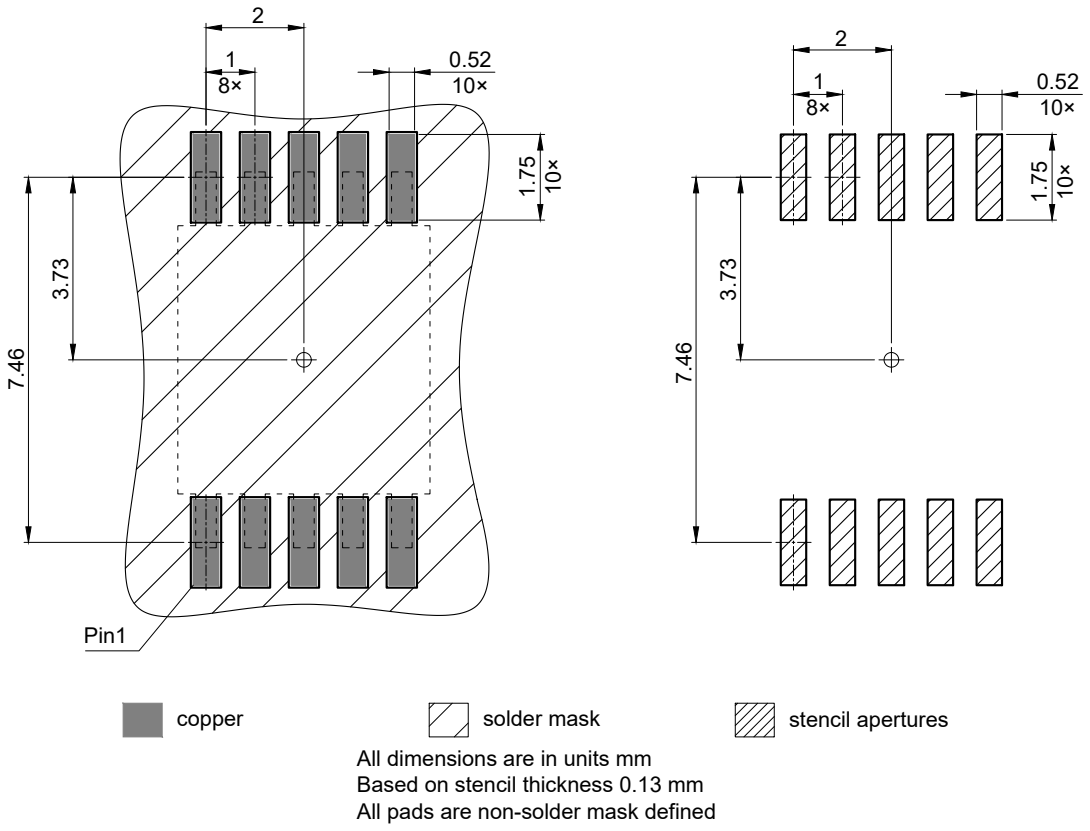


Figure 2 Footprint drawing PG-LHDSO-10, dimensions in mm

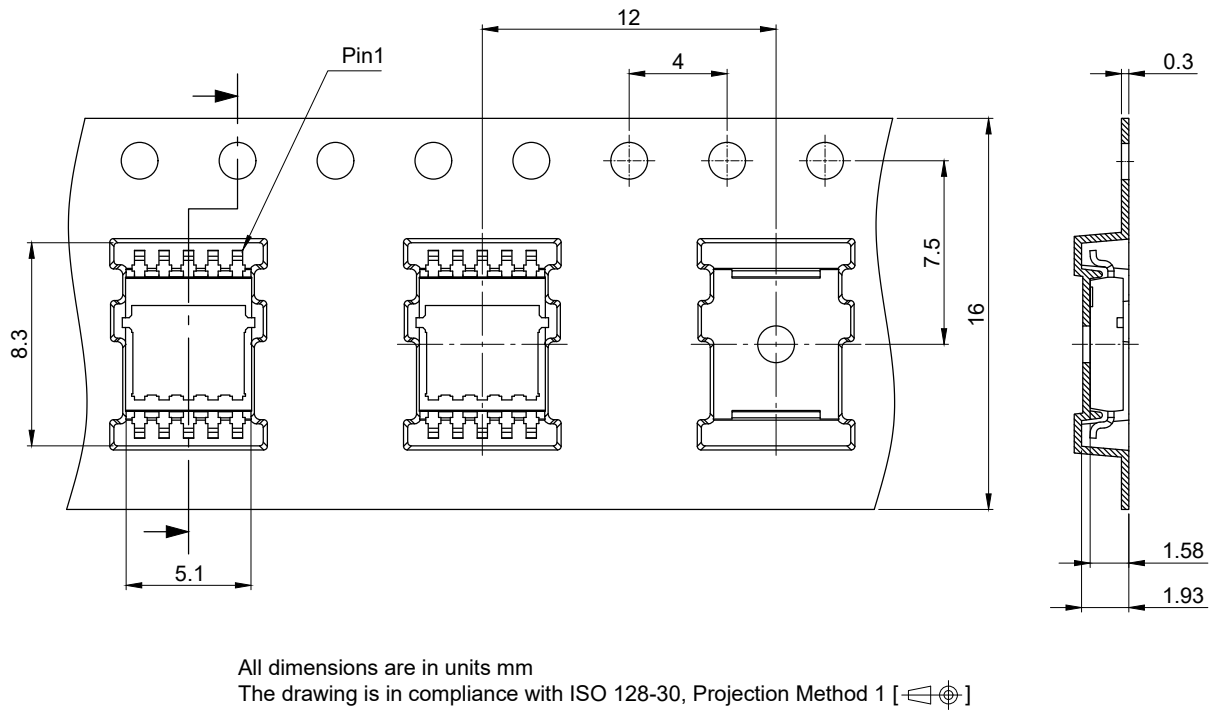


Figure 3 Packaging variant PG-LHDSO-10, dimensions in mm

7 Appendix A

Table 11 Related links

- IFX Optimos™ Power-Transistor Webpage

Revision history

IAUCN04S7N013T

Revision 2026-08-06, Rev. 1.0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2026-08-06	Final Datasheet

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