MOSFET

600V CoolMOS™ CM8 Power Transistor

PG-TO247-4

Built on Infineon's world-class super-junction MOSFET platform with an integrated fast body diode, making it suitable for a wide range of applications. It enables highest power density at lowest possible system cost with superior reliability. It is enhancing Infineon's WBG offering and the successor of the 600 V CoolMOS™ 7 MOSFET family.

Features

- Best-In-Class SJ Mosfet Performance
- Address broad hard and soft switching applications with outstanding commutation ruggedness
- Integrated fast body diode and ESD protection
- .XT interconnection technology for best-in-class thermal performance

Benefits

- Provides the best price performance ratio with Best-In-Class SJ Mosfet Performance
- Ease of use and shorter design in cycle
- Enable multiple topologies
- 14-42% lower R_{th} for improved thermal performance

Potential applications

- Datacenter, AI server, Telecom Power Supply
- Micro and Residential Hybrid Inverter
- Portable and Residential Energy Storage, UPS
- EV Charging, Light electric vehicles, Electric Forklift
- High Voltage Solid State Power Distribution
- Home & Professional Tools

Product validation

Fully qualified according to JEDEC for Industrial Applications

Please note: For MOSFET paralleling the use of ferrite beads on the gate or separate totem poles is generally recommended.

Drain
Pin 1, Tab

Gate
Pin 4

Driver
Source
Pin 3

Power
Source
Pin 2

1: Internal body diode

Hal   Pb

RoHS

Table 1   Key performance parameters

Parameter	Value	Unit
V_{DS} @ $T_{j,max}$	650	V
$R_{DS(on),max}$	70	mΩ
$Q_{g,typ}$	43	nC
$I_{D,pulse}$	124	A
E_{oss} @ 400V	5.9	µJ
Body diode di_F/dt	1300	A/µs
ESD class (HBM)	2	

Type / Ordering code	Package	Marking	Related links
IPZA60R070CM8	PG-TO247-4	60R070C8	see Appendix A
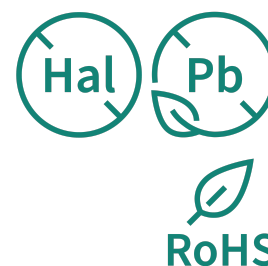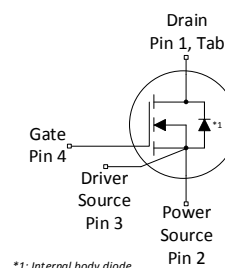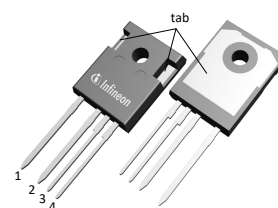
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1 Maximum ratings

at T_j = 25°C, unless otherwise specified

Table 2   Maximum ratings

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Continuous drain current [1]	I_D	-	-	37	A	T_C=25°C
Continuous drain current	I_D	-	-	23	A	T_C=100°C
Pulsed drain current [2]	$I_{D,pulse}$	-	-	124	A	T_C=25°C
Avalanche energy, single pulse	E_{AS}	-	-	73	mJ	I_D=3.5A; V_{DD}=50V; see table 10
Avalanche energy, repetitive	E_{AR}	-	-	0.36	mJ	
Avalanche current, single pulse	I_{AS}	-	-	3.5	A	-
MOSFET dv/dt ruggedness	dv/dt	-	-	120	V/ns	V_{DS}=0...400V
Gate source voltage (static)	V_{GS}	-20	-	20	V	static;
Gate source voltage (dynamic)	V_{GS}	-30	-	30	V	AC (f>1 Hz)
Power dissipation	P_{tot}	-	-	201	W	T_C=25°C
Storage temperature	T_{stg}	-55	-	150	°C	-
Operating junction temperature	T_j	-55	-	150	°C	
Extended operating junction temperature	T_j	150	-	175	°C	≤50 h in the application lifetime
Mounting torque	-	-	-	60	Ncm	M3 and M3.5 screws
Continuous diode forward current	I_S	-	-	37	A	T_C=25°C
Diode pulse current [2]	$I_{S,pulse}$	-	-	124	A	
Reverse diode dv/dt [3]	dv/dt	-	-	70	V/ns	V_{DS}=0...400V, I_{SD}≤37A, T_j=25°C see table 8
Maximum diode commutation speed	di_F/dt	-	-	1300	A/µs	
Insulation withstand voltage	V_{ISO}	-	-	n.a.	V	V_{rms}, T_C=25°C, t=1min

[1]   Limited by $T_{j,max}$.

[2]   Pulse width t_p limited by $T_{j,max}$

[3]   Identical low side and high side switch with identical R_G

2 Thermal characteristics

Table 3 **Thermal characteristics**

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	0.62	K/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	62	K/W	leaded
Thermal resistance, junction - ambient for SMD version	R_{thJA}	-	-	-	K/W	-
Soldering temperature, wavesoldering only allowed at leads	T_{sold}	-	-	260	°C	1.6mm (0.063 in.) from case for 10s

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	$V_{(BR)DSS}$	600	-	-	V	V_{GS}=0V, I_D=1mA
Gate threshold voltage	$V_{(GS)th}$	3.7	4.2	4.7	V	V_{DS}=V_{GS}, I_D=0.36mA
Zero gate voltage drain current	I_{DSS}	-	- 45.1	1 -	µA	V_{DS}=600V, V_{GS}=0V, T_j=25°C V_{DS}=600V, V_{GS}=0V, T_j=150°C
Gate-source leakage current	I_{GSS}	-	-	0.1	µA	V_{GS}=20V, V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	0.058 0.127	0.070 -	Ω	V_{GS}=10V, I_D=14.3A, T_j=25°C V_{GS}=10V, I_D=14.3A, T_j=150°C
Gate resistance	R_G	-	5.6	-	Ω	f=1MHz

Table 5   Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	1878	-	pF	V_{GS}=0V, V_{DS}=400V, f=250kHz
Output capacitance	C_{oss}	-	25	-	pF	
Effective output capacitance, energy related [4]	$C_{o(er)}$	-	73	-	pF	V_{GS}=0V, V_{DS}=0...400V
Effective output capacitance, time related [5]	$C_{o(tr)}$	-	750	-	pF	I_D=constant, V_{GS}=0V, V_{DS}=0...400V
Turn-on delay time	$t_{d(on)}$	-	17.8	-	ns	V_{DD}=400V, V_{GS}=13V, I_D=7.3A, R_G=5.3Ω; see table 9
Rise time	t_r	-	6.2	-	ns	
Turn-off delay time	$t_{d(off)}$	-	94.9	-	ns	
Fall time	t_f	-	8	-	ns	

[4] $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 400V

[5] $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 400V

Table 6   Gate charge characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	11	-	nC	V_{DD}=400V, I_D=7.3A, V_{GS}=0 to 10V
Gate to drain charge	Q_{gd}	-	16	-	nC	
Gate charge total	Q_g	-	43	-	nC	
Gate plateau voltage	$V_{plateau}$	-	6.0	-	V	

Table 7   Reverse diode characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode forward voltage	V_{SD}	-	0.9	-	V	V_{GS}=0V, I_F=7.3A, T_j=25°C
Reverse recovery time	t_{rr}	-	90.14	112.68	ns	V_R=400V, I_F=7.3A, di_F/dt=100A/µs; see table 8
Reverse recovery charge	Q_{rr}	-	0.41	0.61	µC	
Peak reverse recovery current	I_{rrm}	-	9.34	-	A	

4 Electrical characteristics diagrams

Diagram 1: Power dissipation	Diagram 2: Safe operating area
P_{tot}=f(T_C)	I_D=f(V_{DS}); T_C=25 °C; D=0; parameter: t_p

Diagram 3: Safe operating area	Diagram 4: Max. transient thermal impedance
I_D=f(V_{DS}); T_C=80 °C; D=0; parameter: t_p	Z_{thJC} =f(t_P); parameter: D=t_p/T
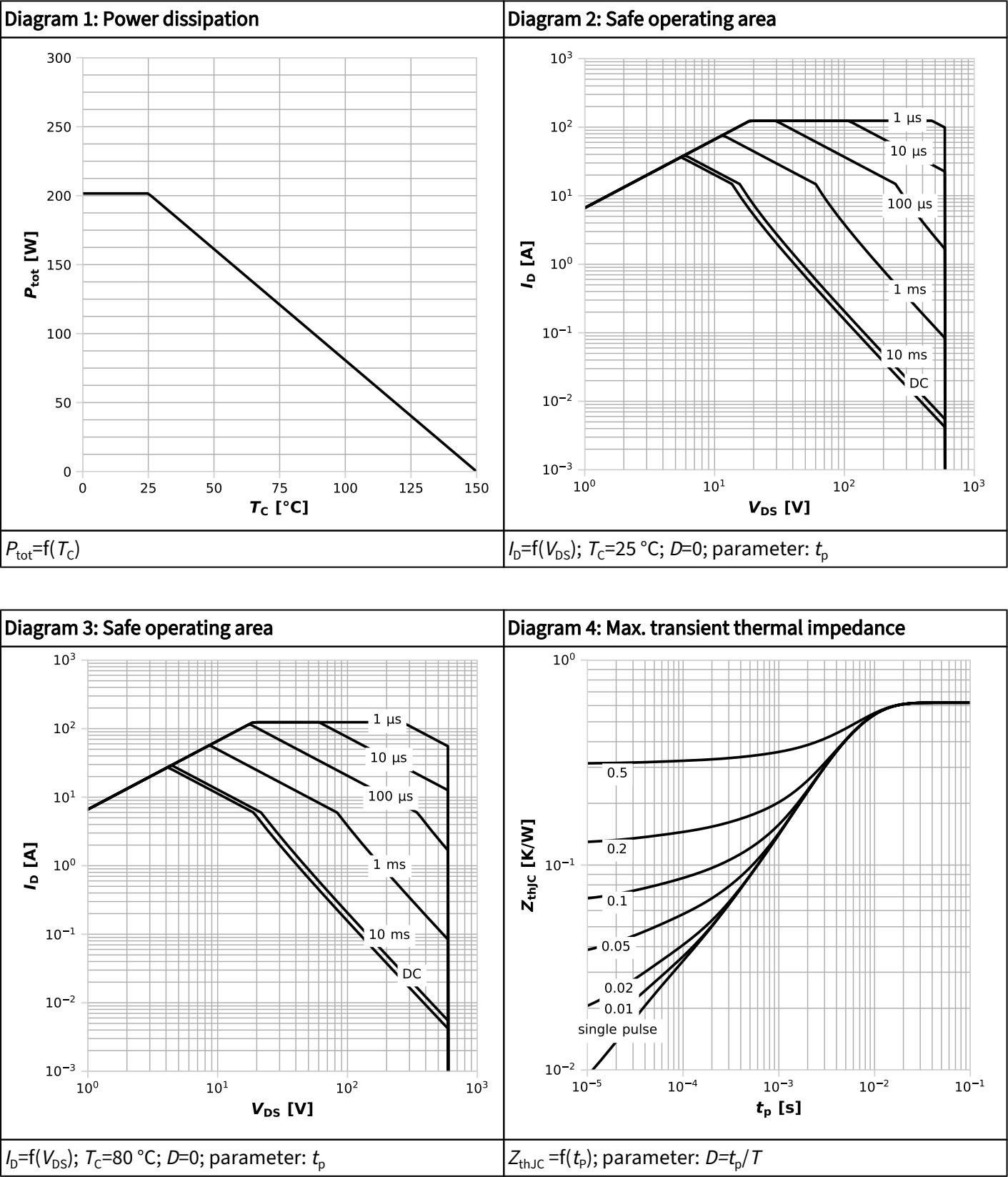
Diagram 5: Typ. output characteristics
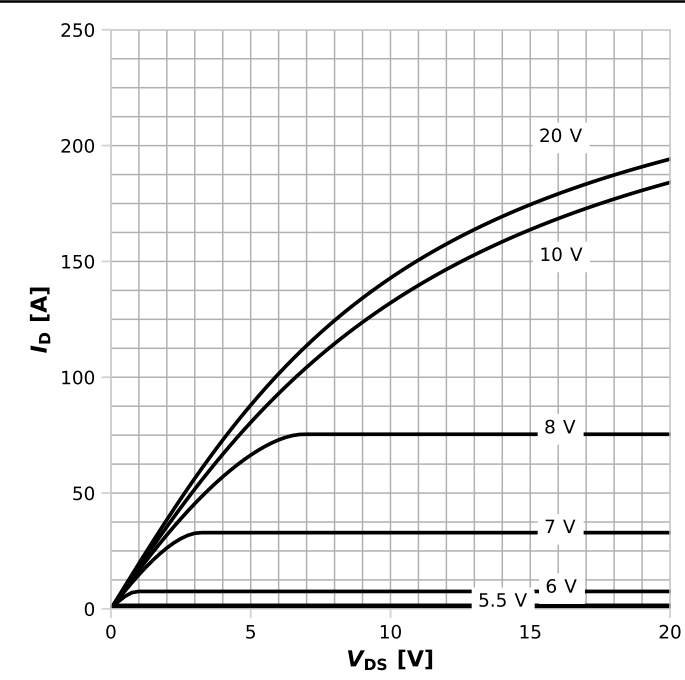
I_D=f(V_{DS}); T_j=25 °C; parameter: V_{GS}

Diagram 6: Typ. output characteristics
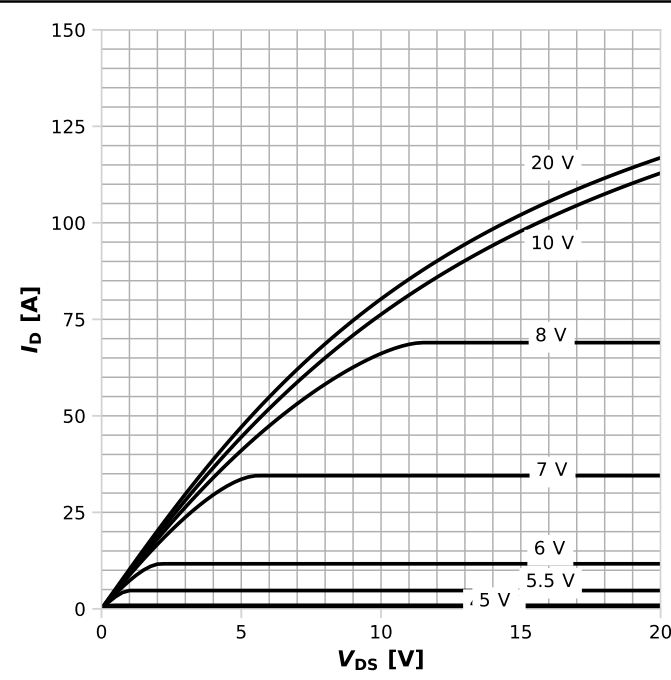
I_D=f(V_{DS}); T_j=125 °C; parameter: V_{GS}

Diagram 7: Typ. drain-source on-state resistance
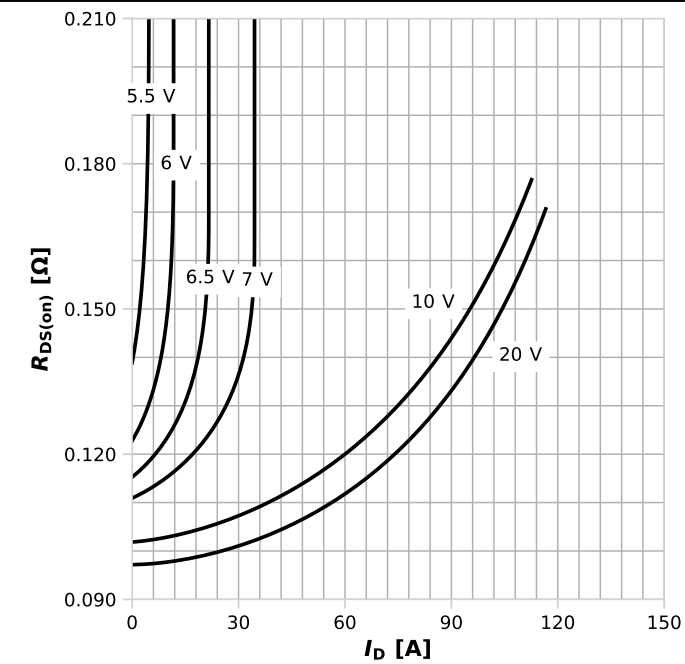
$R_{DS(on)}$=f(I_D); T_j=125 °C; parameter: V_{GS}

Diagram 8: Drain-source on-state resistance
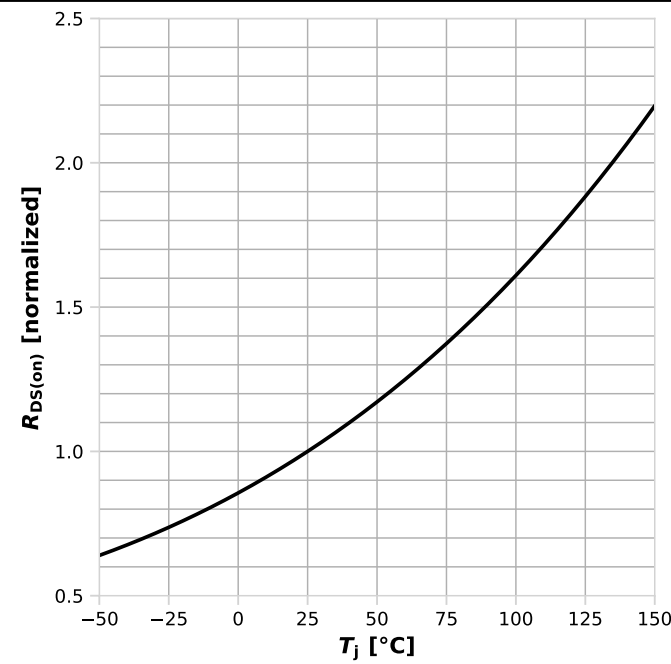
$R_{DS(on)}$=f(T_j); I_D=14.3 A; V_{GS}=10 V

Diagram 9: Typ. transfer characteristics
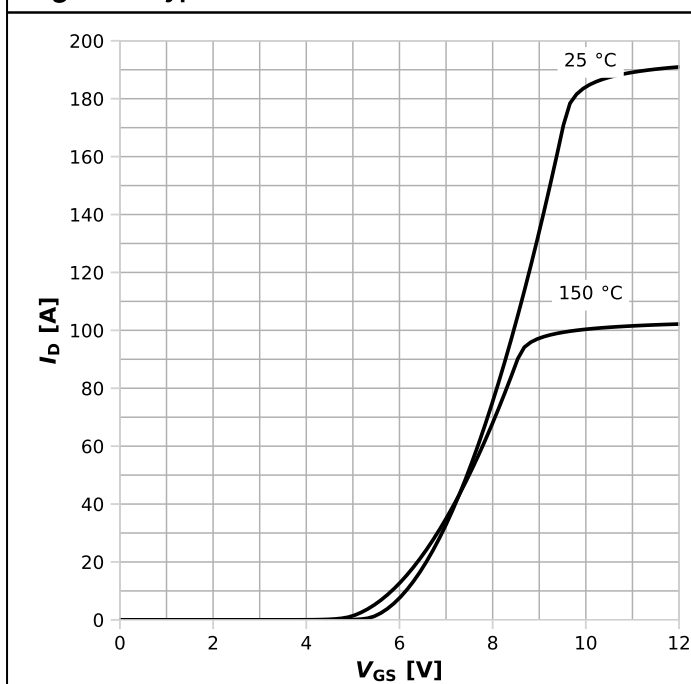
I_D=f(V_{GS}); V_{DS}=20V; parameter: T_j

Diagram 10: Typ. gate charge
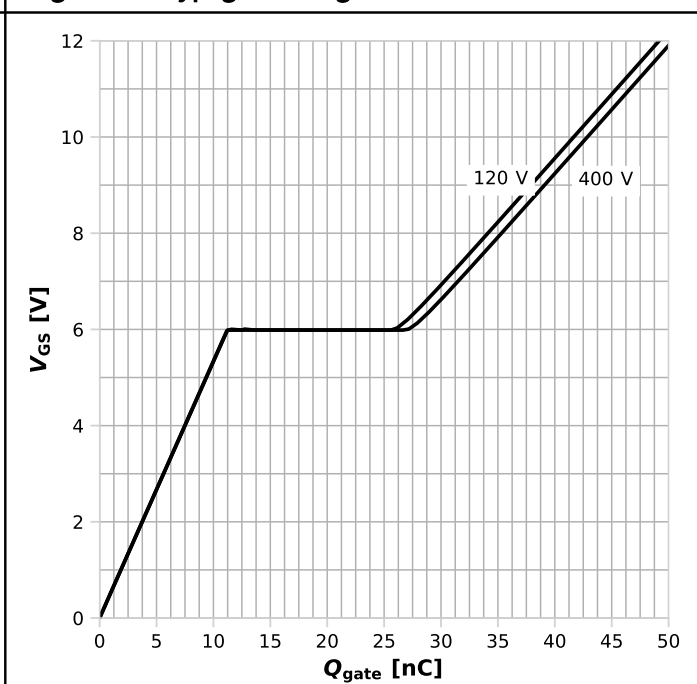
V_{GS}=f(Q_{gate}); I_D=7.3 A pulsed; parameter: V_{DD}

Diagram 11: Forward characteristics of reverse diode
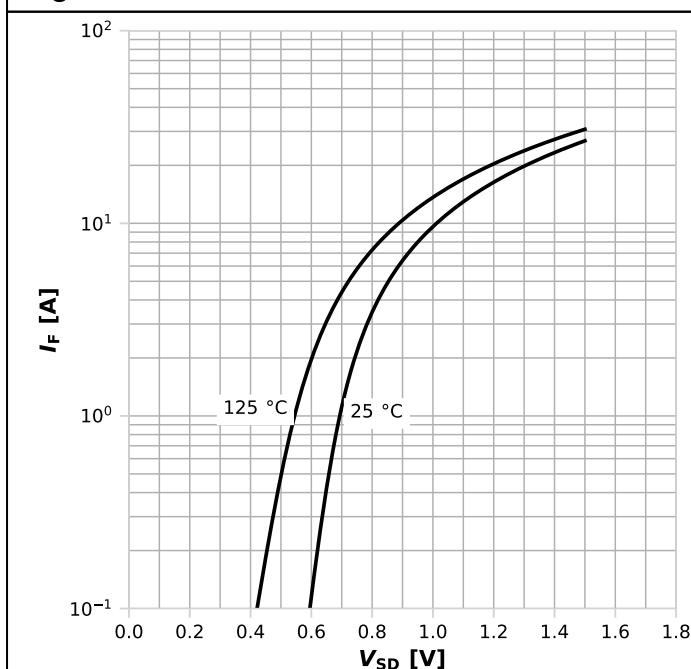
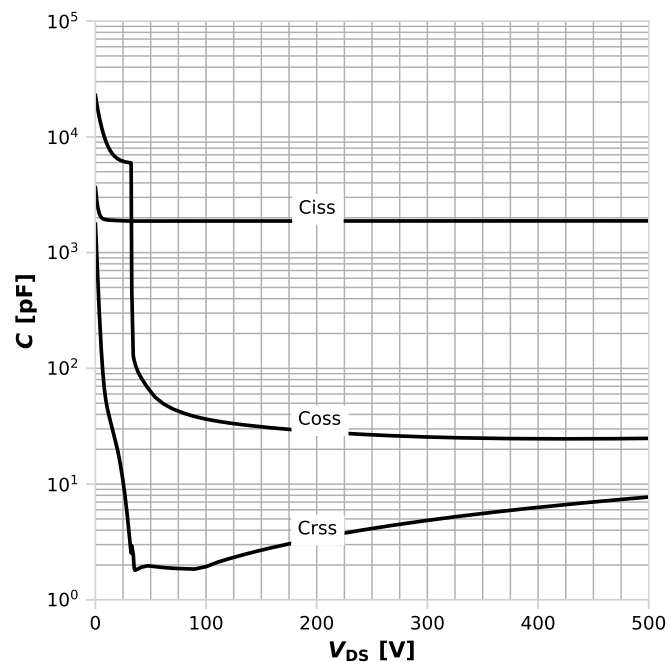I_F=f(V_{SD}); parameter: T_j

Diagram 12: Avalanche energy
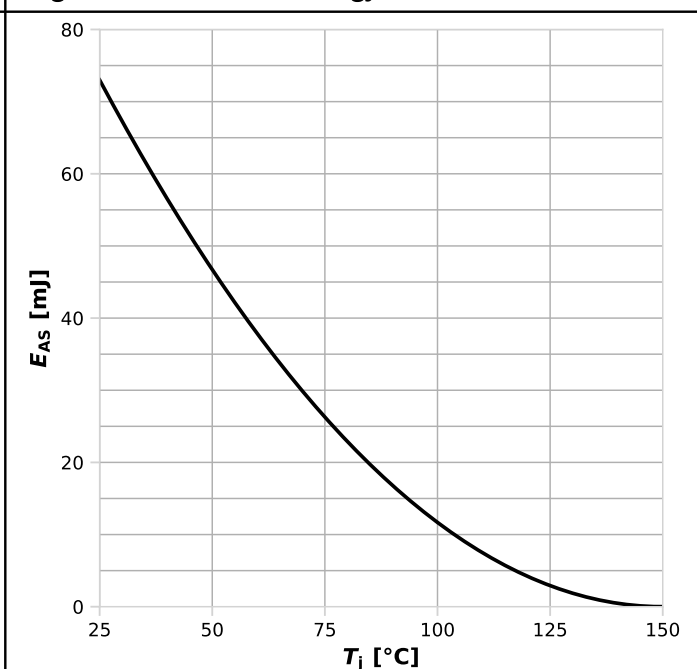
E_{AS}=f(T_j); I_D=3.5 A; V_{DD}=50 V

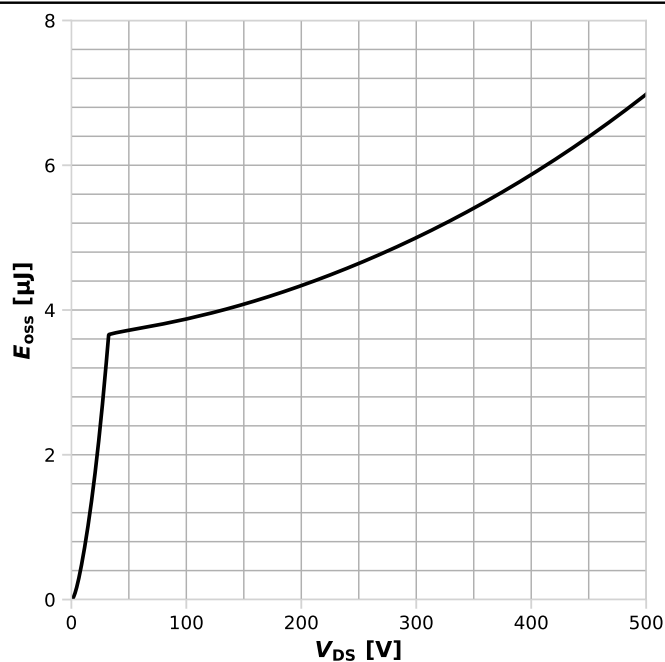**Diagram 13: Drain-source breakdown voltage**
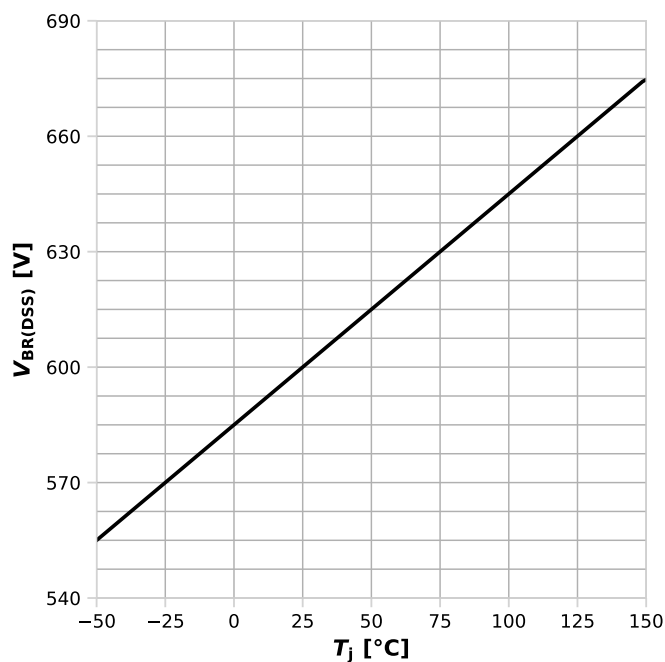
$V_{BR(DSS)}$=f(T_j); I_D=1 mA

Diagram 14: Typ. capacitances

C=f(V_{DS}); V_{GS}=0 V; f=250 kHz

Diagram 15: Typ. Coss stored energy

E_{oss}=f(V_{DS})

5 Test circuits

Table 8 Diode characteristics

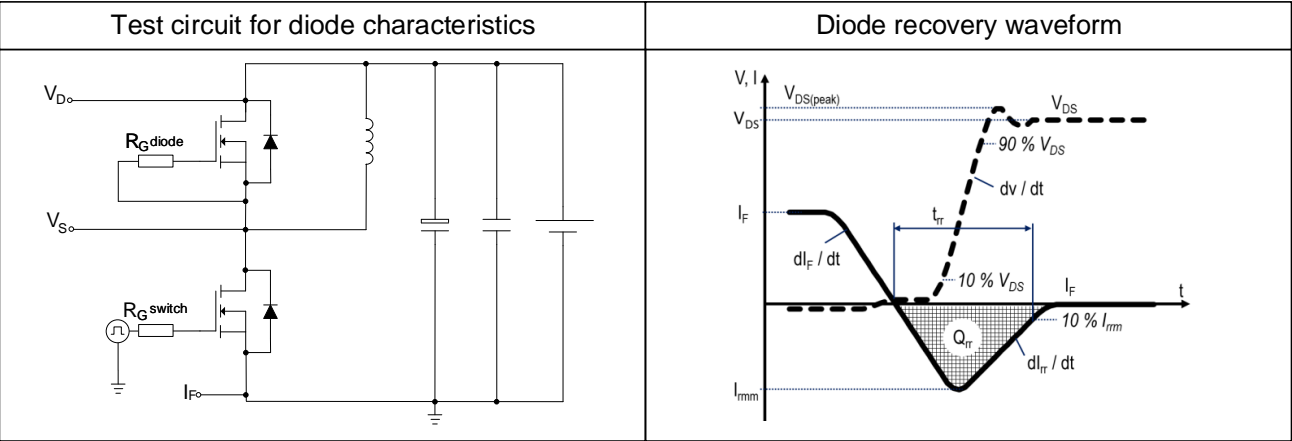| Test circuit for diode characteristics	Diode recovery waveform

Table 9 Switching times

Switching times test circuit for inductive load	Switching times waveform
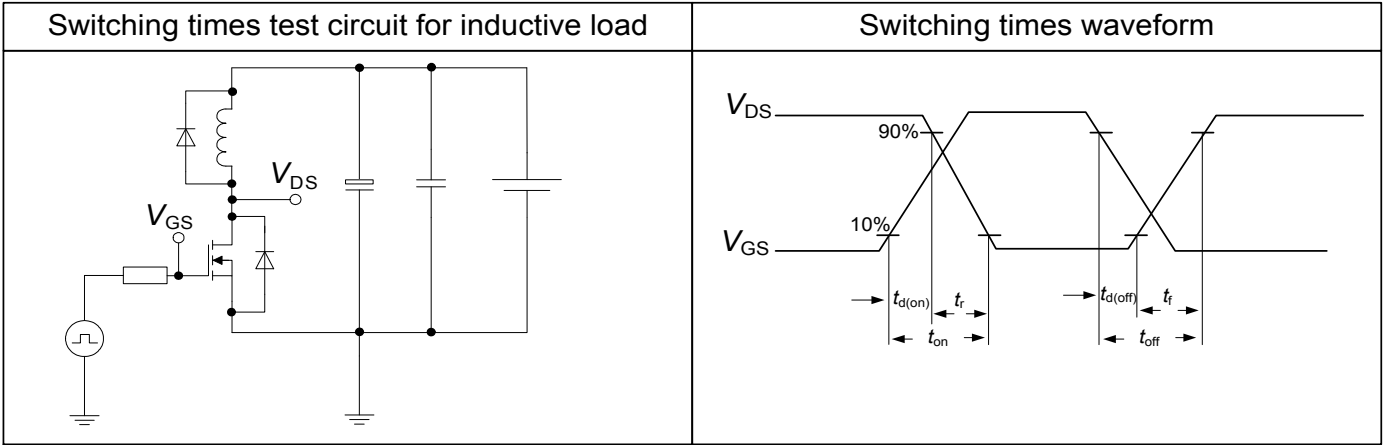
Table 10 Unclamped inductive load

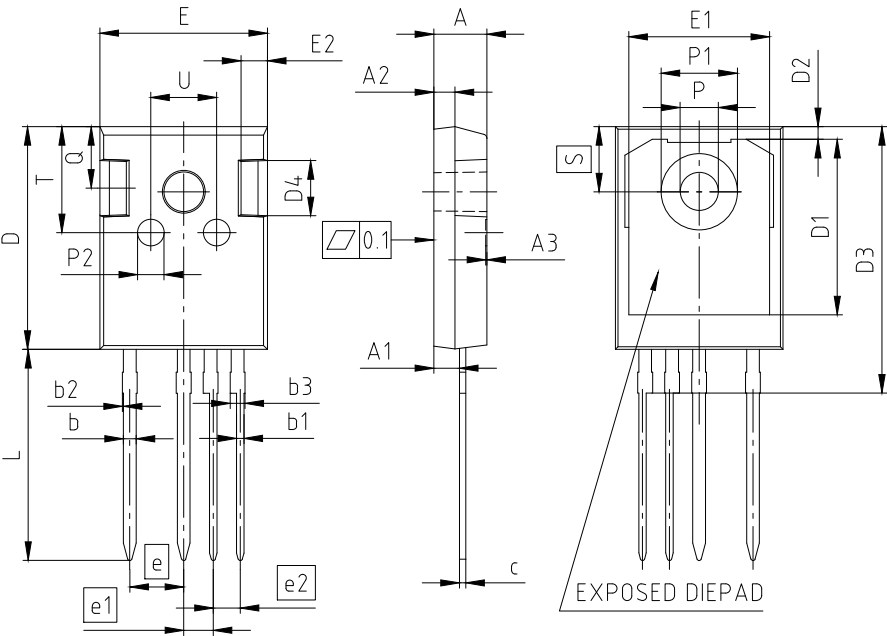| Unclamped inductive load test circuit	Unclamped inductive waveform
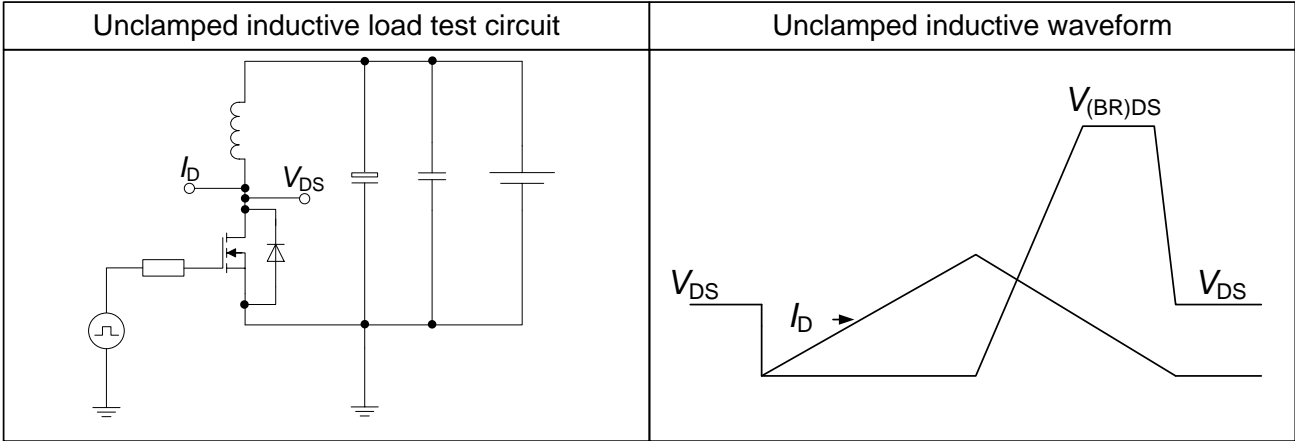
6   Package outlines

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

PACKAGE - GROUP NUMBER:	**PG-TO247-4-U02**					
DIMENSIONS	**MILLIMETERS**		**DIMENSIONS**	**MILLIMETERS**	
	MIN.	MAX.		MIN.	MAX.
A	4.90	5.10	E	15.70	15.90
A1	2.31	2.51	E1	13.10	13.50
A2	1.90	2.10	E2	2.40	2.60
A3	0.05	0.25	e	5.08	
b	1.10	1.30	e1	2.79	
b1	0.65	0.79	e2	2.54	
b2	---	0.20	N	4	
b3	1.34	1.44	L	19.80	20.10
c	0.58	0.66	øP	3.50	3.70
D	20.90	21.10	øP1	7.00	7.40
D1	16.25	16.85	øP2	2.40	2.60
D2	1.05	1.35	Q	5.60	6.00
D3	24.97	25.27	S	6.15	
D4	4.90	5.10	T	9.80	10.20
			U	6.00	6.40

Figure 1   Outline PG-TO247-4, dimensions in mm

7 Appendix A

Table 11   Related links

- IFX CoolMOS CM8 Webpage

- IFX CoolMOS CM8 application note

- IFX CoolMOS CM8 simulation model

- IFX Design tools

Revision history

IPZA60R070CM8

Revision 2024-12-18, Rev. 2.0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
2.0	2024-12-18	Release of final version

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Information

For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office (www.infineon.com).

Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.
The Infineon Technologies component described in this Data Sheet may be used in life-support devices or systems and/or automotive, aviation and aerospace applications or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support, automotive, aviation and aerospace device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.