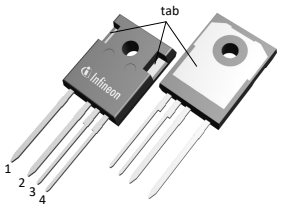
CoolSiC™

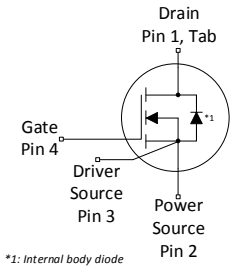
400V CoolSiC™ G2 MOSFET

PG-TO247-4



Features

- Ideal for high frequency switching and synchronous rectification
- Commutation robust fast body diode with low Q_{fr}
- Low $R_{DS(on)}$ dependency on temperature
- Benchmark gate threshold voltage, $V_{GS(th)}$ = 4.5 V
- Recommended gate driving voltage 0 V to 18 V
- .XT interconnection technology for best-in-class thermal performance
- 100% avalanche tested



Potential applications

- SMPS
- Solar PV inverters
- Energy storage, UPS and battery formation
- Class-D audio
- Motor drives

Product validation

Qualified for industrial applications according to the relevant tests of JEDEC JESD47, JESD22 and J-STD-020.

Table 1 Key performance parameters

Parameter	Value	Unit
V_{DS}	400	V
$R_{DS(on),typ}$	25.5	mΩ
I_D	65	A
Q_{oss}	59	nC
E_{oss}	4.2	µJ
Q_G	36	nC

Part number	Package	Marking	Related links
IMZA40R025M2H	PG-TO247-4	40R025M2	-

Table of contents

1 Maximum ratings

at T_A=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	-	-	65	A	V_{GS}=18 V, T_C=25 °C
				46		V_{GS}=18 V, T_C=100 °C
Pulsed drain current [2]	$I_{D,pulse}$	-	-	195	A	T_C=25 °C
Avalanche energy, single pulse [3]	E_{AS}	-	-	93	mJ	I_D=15.7 A, R_{GS}=25 Ω
Avalanche energy, repetitive	E_{AR}			0.47		
Gate source voltage (static)	$V_{GS,DC}$	-7	-	23	V	-
Gate source voltage (transient)	$V_{GS,AC}$	-10	-	25	V	t_{pulse}≤500 ns, duty cycle≤1%
Power dissipation	P_{tot}	-	-	195	W	T_C=25 °C
Storage temperature	T_{stg}	-55	-	150	°C	-
Operating junction temperature	T_j			175		

[1] Rating refers to the product only with datasheet specified absolute maximum values, maintaining case temperature at 25°C. For higher case temperature please refer to Diagram 2. De-rating will be required based on the actual environmental conditions.

[2] See Diagram 3 for more detailed information.

[3] See Diagram 19 for more detailed information.

2 Thermal characteristics

Table 3 Thermal characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	0.77	°C/W	-

3 Operating range

Table 4 Operating range

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Recommended turn-on voltage	$V_{GS(on)}$	-	18	-	V	-
Recommended turn-off voltage	$V_{GS(off)}$		0			

4 Electrical characteristics

at T_j=25 °C, unless otherwise specified

Table 5 Static characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	400	-	-	V	V_{GS}=0 V, I_D=0.56 mA
Gate threshold voltage [4]	$V_{GS(th)}$	3.5	4.5	5.6	V	V_{DS}=V_{GS}, I_D=5.6 mA
Zero gate voltage drain current	I_{DSS}	-	1	75	µA	V_{DS}=400 V, V_{GS}=0 V, T_j=25 °C
			2	-		V_{DS}=400 V, V_{GS}=0 V, T_j=175 °C
Gate-source leakage current	I_{GSS}	-	1	100	nA	V_{GS}=20 V, V_{DS}=0 V
Drain-source on-state resistance	$R_{DS(on)}$	-	25.5	32.1	mΩ	V_{GS}=18 V, I_D=15.7 A, T_j=25 °C
			36.6	-		V_{GS}=18 V, I_D=15.7 A, T_j=175 °C
			31.2	-		V_{GS}=15 V, I_D=15.7 A, T_j=25 °C
Gate resistance	R_G	-	3.3	-	Ω	-

[4] Tested after 1ms pulse at V_{GS} = +20V.

Table 6 Dynamic characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	1200	-	pF	V_{GS}=0 V, V_{DS}=200 V, f=1 MHz
Output capacitance	C_{oss}		180			
Reverse transfer capacitance	C_{rss}		14			
Effective output capacitance, energy related [5]	$C_{o(er)}$	-	211	-	pF	V_{GS}=0 V, V_{DS}=0...200 V
Effective output capacitance, time related [6]	$C_{o(tr)}$	-	290	-	pF	I_D=constant, V_{GS}=0 V, V_{DS}=0...200 V
Turn-on delay time [7]	$t_{d(on)}$	-	8.3	-	ns	V_{DD}=200 V, V_{GS}=0...18 V, I_D=15.7 A, $R_{G,ext}$=1.8 Ω
Rise time [7]	t_r		8.2			
Turn-off delay time [7]	$t_{d(off)}$	-	20.7	-	ns	V_{DD}=200 V, V_{GS}=18...0 V, I_D=15.7 A, $R_{G,ext}$=1.8 Ω
Fall time [7]	t_f		6.3			

[5] $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 200 V.

[6] $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 200 V.

[7] Refer to Table 9 for test setup.

Table 7 Gate Charge Characteristics [8)]

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	9.8	-	nC	V_{DD}=200 V, I_D=15.7 A, V_{GS}=0 to 18 V
Gate to drain charge	Q_{gd}		7.5			
Gate charge total	Q_g		36			
Gate charge total, sync. FET	$Q_{g(sync)}$	-	34	-	nC	V_{DS}=0.1 V, V_{GS}=0 to 18 V
Output charge	Q_{oss}	-	59	-	nC	V_{DS}=200 V, V_{GS}=0 V
Output Energy	E_{oss}		4.2		µJ	

[8)] As per JEP192, Guidelines for Gate Charge (Q_G) Test Method for SiC MOSFET.

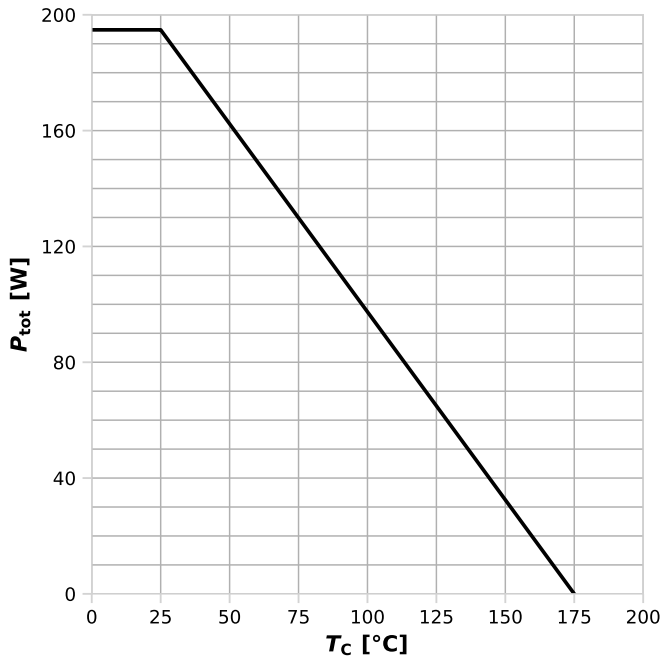
Table 8 Reverse diode characteristics

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode continuous forward current	I_S	-	-	30	A	T_C=25 °C
Diode pulse current	$I_{S,pulse}$	-	-	195	A	T_C=25 °C, t_{pulse}≤250 ns
Diode forward voltage	V_{SD}	-	3.5	4.3	V	V_{GS}=0 V, I_S=15.7 A, T_j=25 °C
MOSFET forward recovery time	t_{fr}	-	12.8	-	ns	V_R=200 V, I_S=15.7 A, di_S/dt=1000 A/µs
			8.7			V_R=200 V, I_S=15.7 A, di_S/dt=4000 A/µs
MOSFET forward recovery charge [9)]	Q_{fr}	-	66.5	-	nC	V_R=200 V, I_S=15.7 A, di_S/dt=1000 A/µs
			134.5			V_R=200 V, I_S=15.7 A, di_S/dt=4000 A/µs

[9)] Q_{fr} includes Q_{oss}. Refer to Table 10 for test setup.

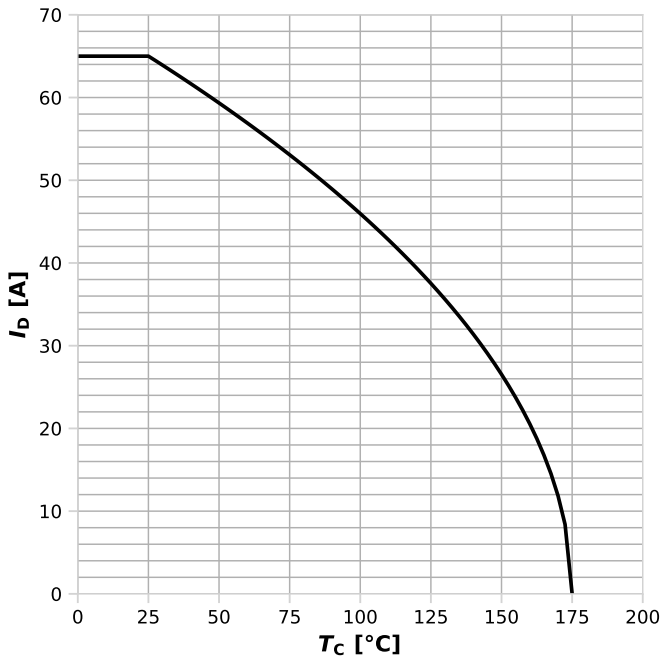
5 Electrical characteristics diagrams

Diagram 1: Power dissipation



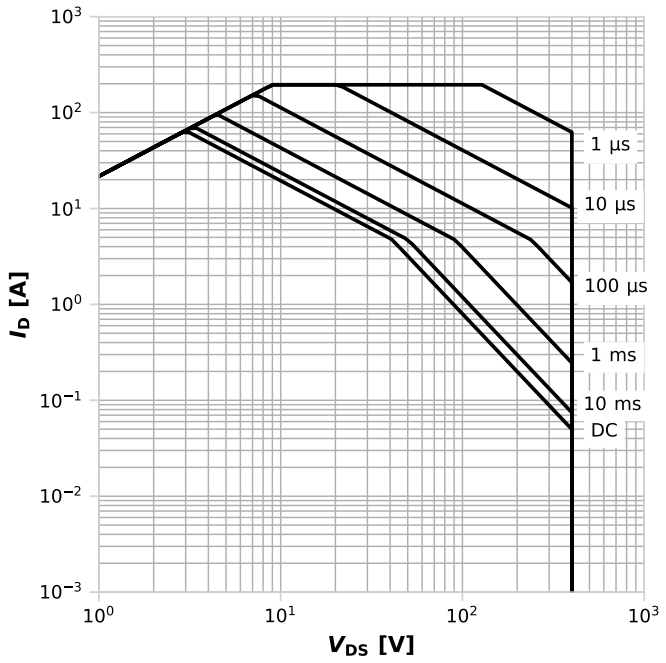
P_{tot}=f(T_C)

Diagram 2: Drain current



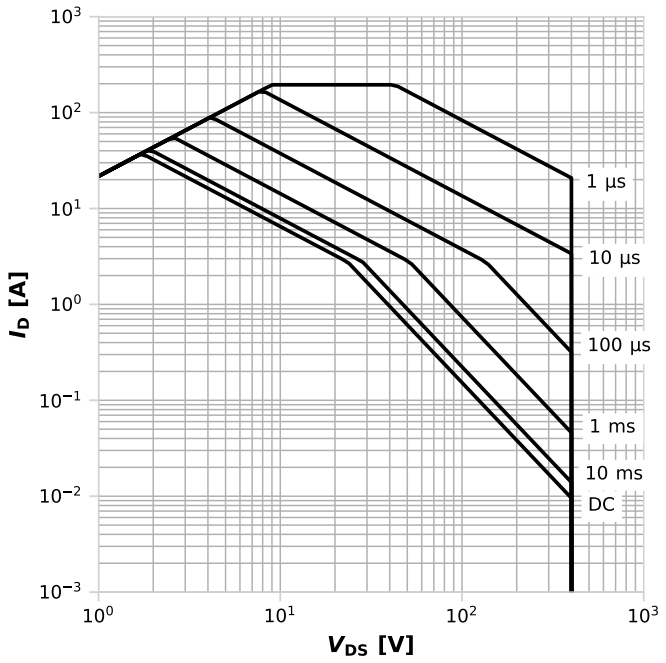
I_D=f(T_C); V_{GS}≥18 V

Diagram 3: Safe operating area



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

Diagram 4: Safe operating area



I_D=f(V_{DS}); T_C=125 °C; D=0; parameter: t_p

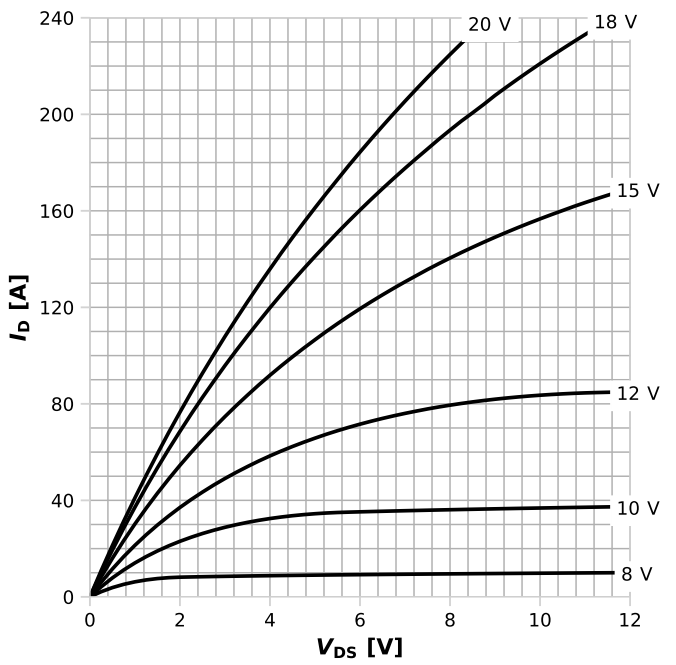
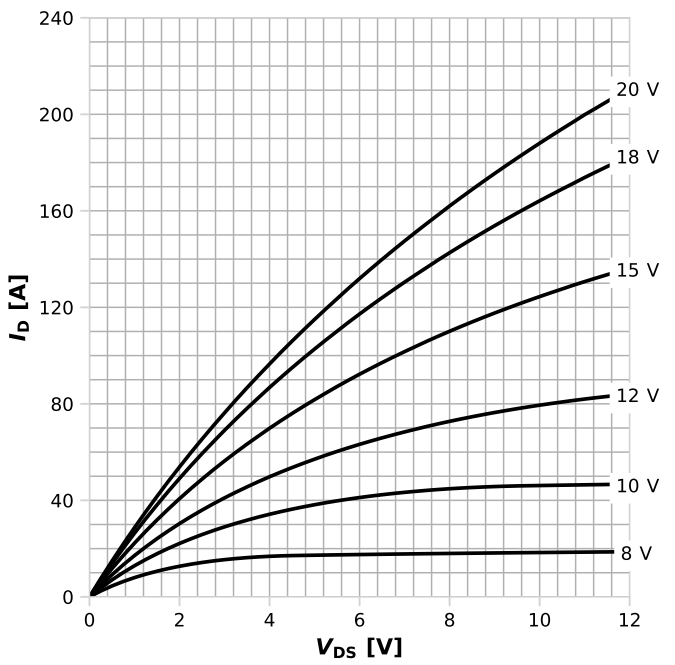
Diagram 5: Typ. output characteristics	Diagram 6: Typ. output characteristics
	
I_D=f(V_{DS}), T_j=25 °C; parameter: V_{GS}	I_D=f(V_{DS}), T_j=175 °C; parameter: V_{GS}

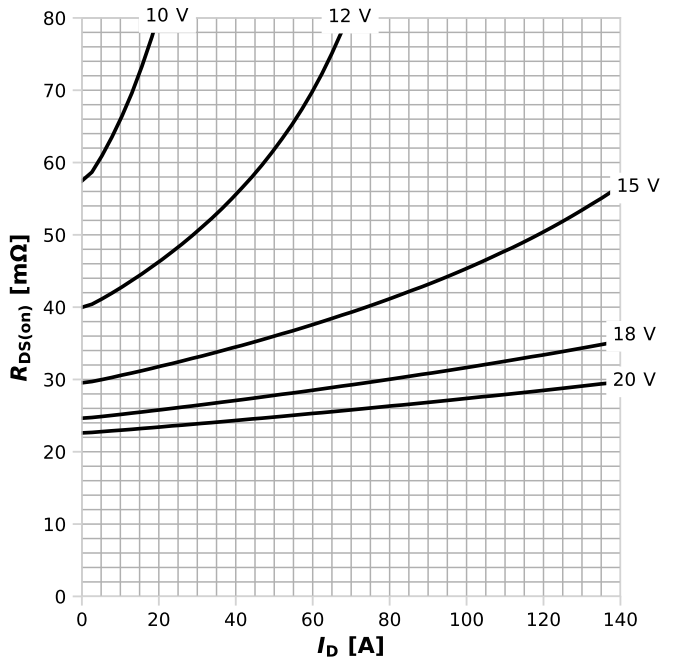
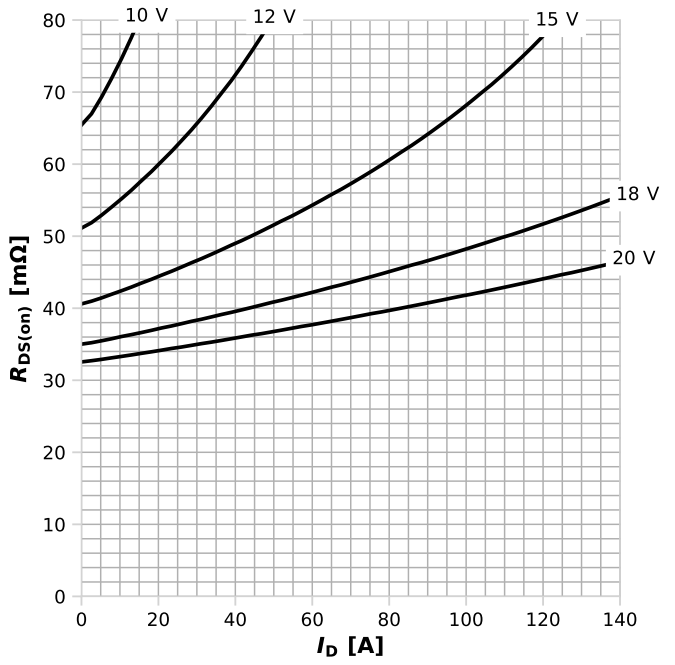
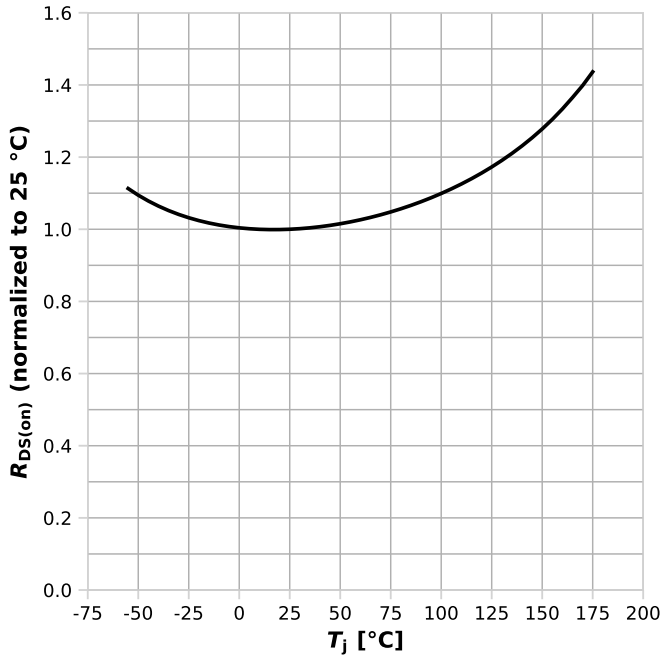
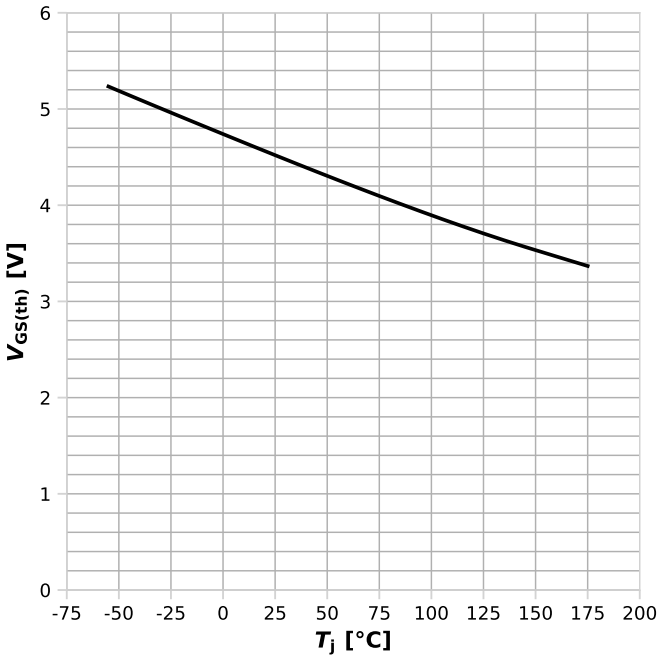
Diagram 7: Typ. drain-source on resistance	Diagram 8: Typ. drain-source on resistance
	
$R_{DS(on)}$=f(I_D), T_j=25 °C; parameter: V_{GS}	$R_{DS(on)}$=f(I_D), T_j=175 °C; parameter: V_{GS}

Diagram 9: Normalized drain-source on resistance



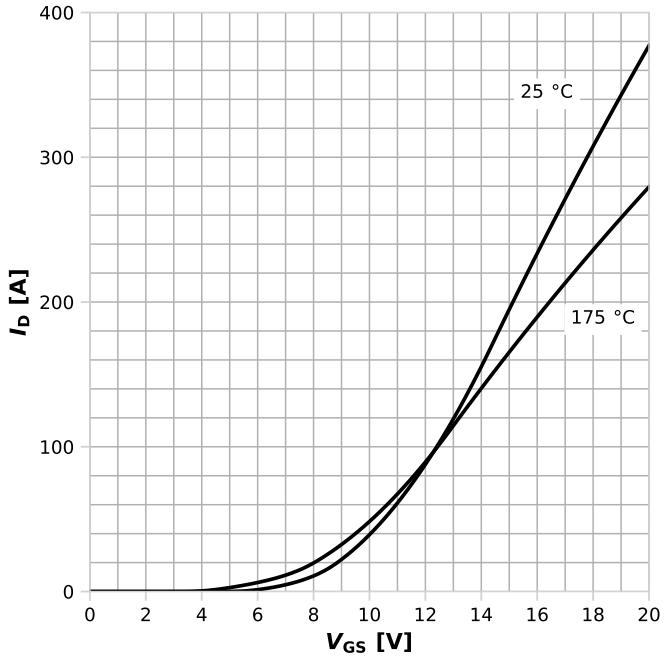
$R_{DS(on)}$=f(T_j), I_D=15.7 A, V_{GS}=18 V

Diagram 10: Typ. gate threshold voltage



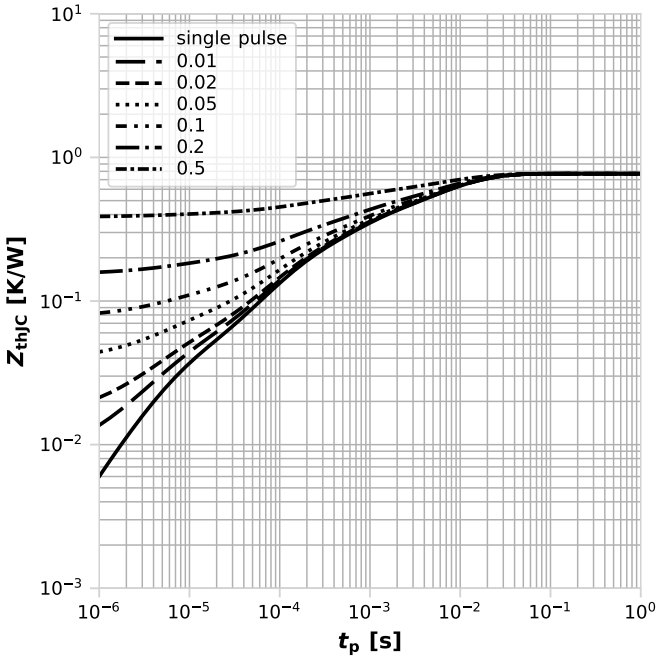
$V_{GS(th)}$=f(T_j), V_{GS}=V_{DS}, I_D=5.6 mA

Diagram 11: Typ. transfer characteristics



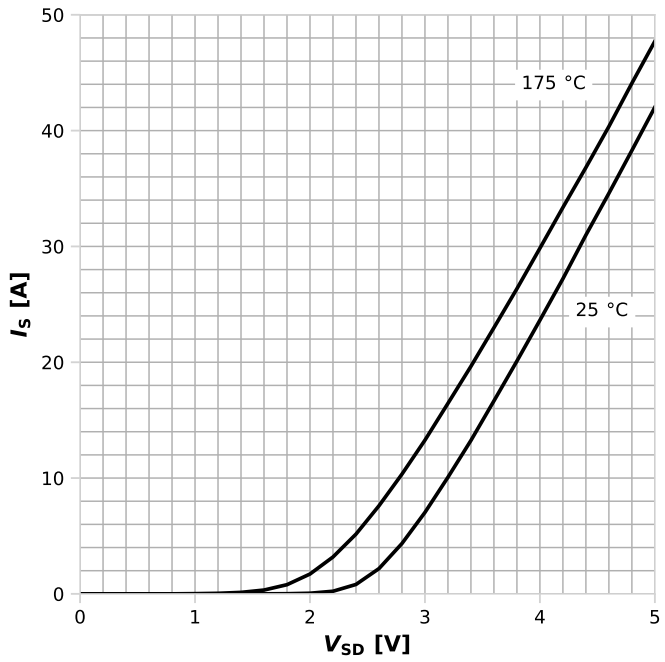
I_D=f(V_{GS}), |V_{DS}|>2|I_D|$R_{DS(on)max}$; parameter: T_j

Diagram 12: Max. transient thermal impedance



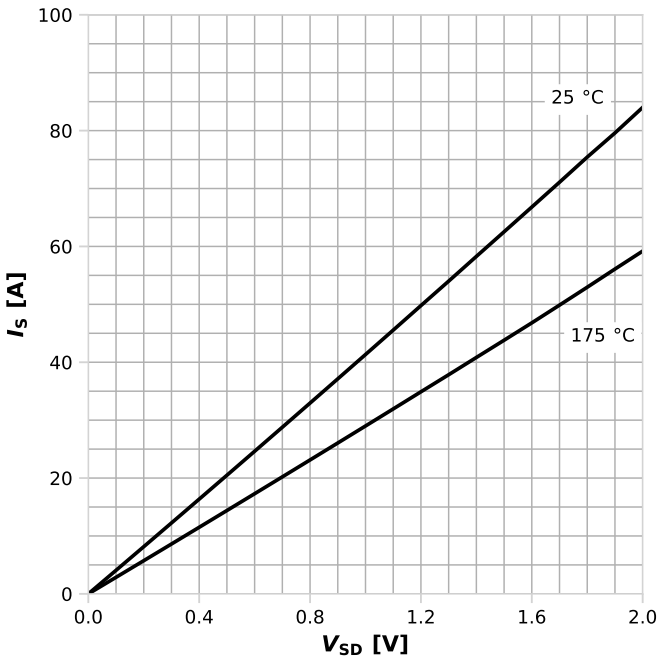
Z_{thJC}=f(t_p); parameter: D=t_p/T

Diagram 13: Reverse output characteristics



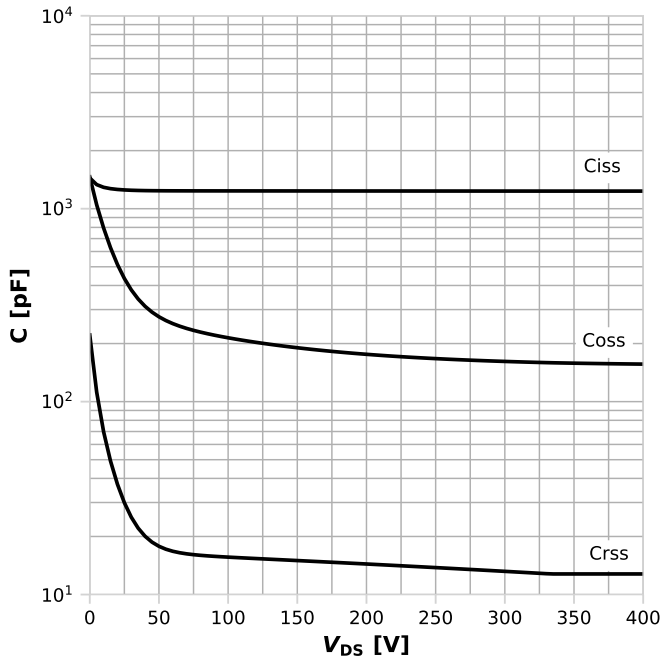
I_F=f(V_{SD}), V_{GS}=0 V; parameter: T_j

Diagram 14: Reverse output characteristics



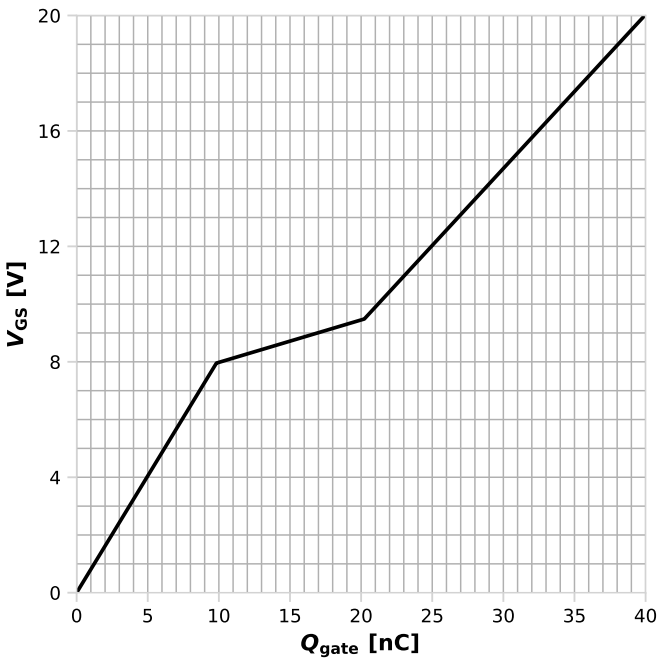
I_F=f(V_{SD}), V_{GS}=18 V; parameter: T_j

Diagram 15: Typ. capacitances



C=f(V_{DS}); V_{GS}=0 V; f=1 MHz

Diagram 16: Typ. gate charge



V_{GS}=f(Q_{gate}), V_{DD}=200 V, I_D=15.7 A pulsed, T_j=25 °C

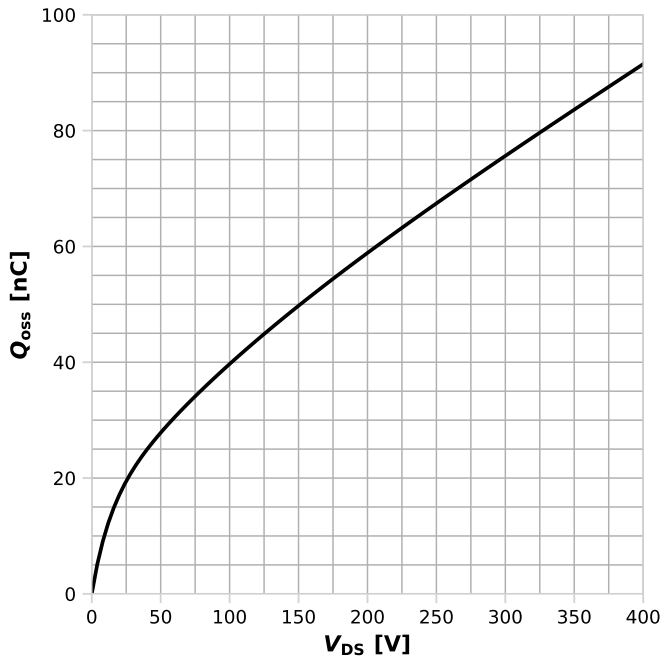
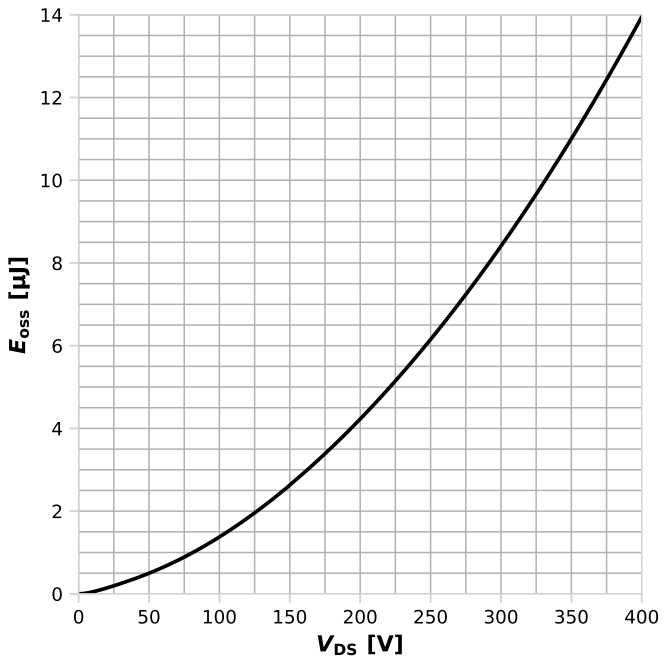
Diagram 17: Typ. output charge	Diagram 18: Typ. output energy
	
Q_{oss}=f(V_{DS}), V_{GS}=0 V	E_{oss}=f(V_{DS}), V_{GS}=0 V

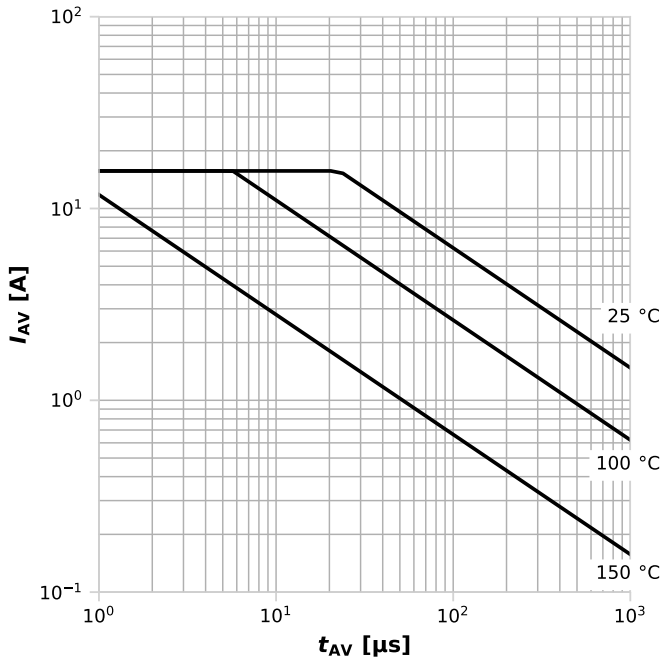
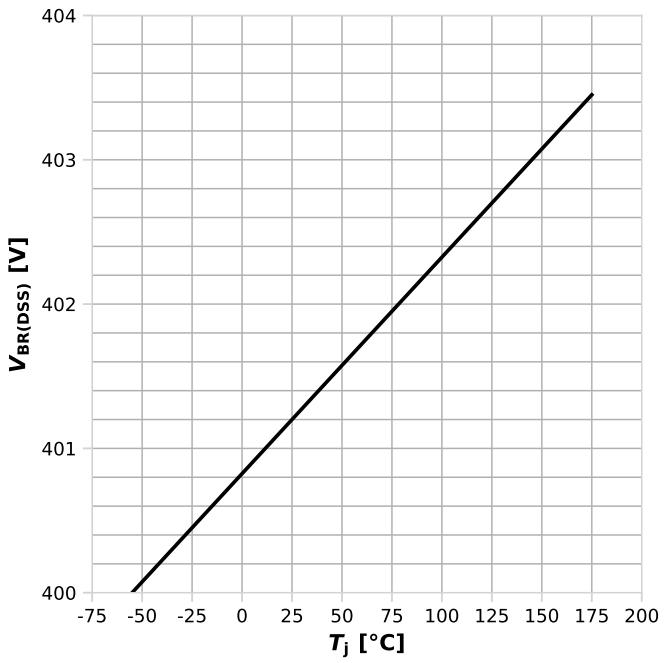
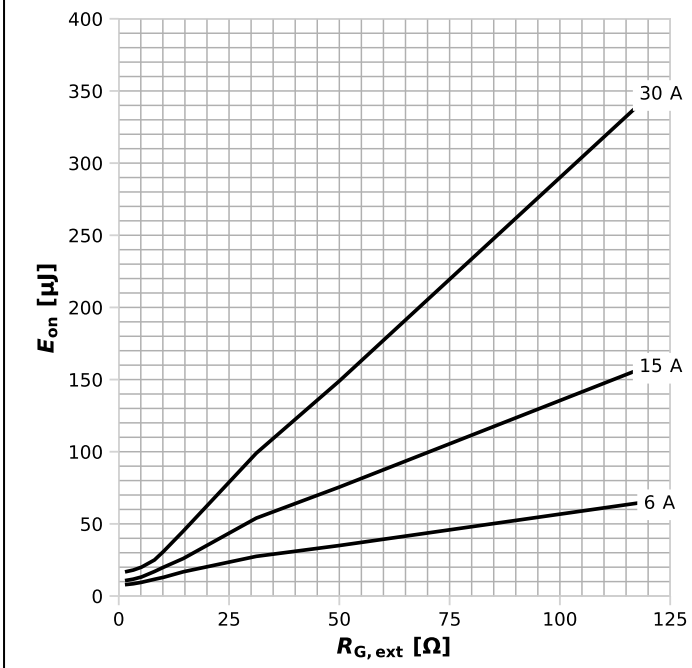
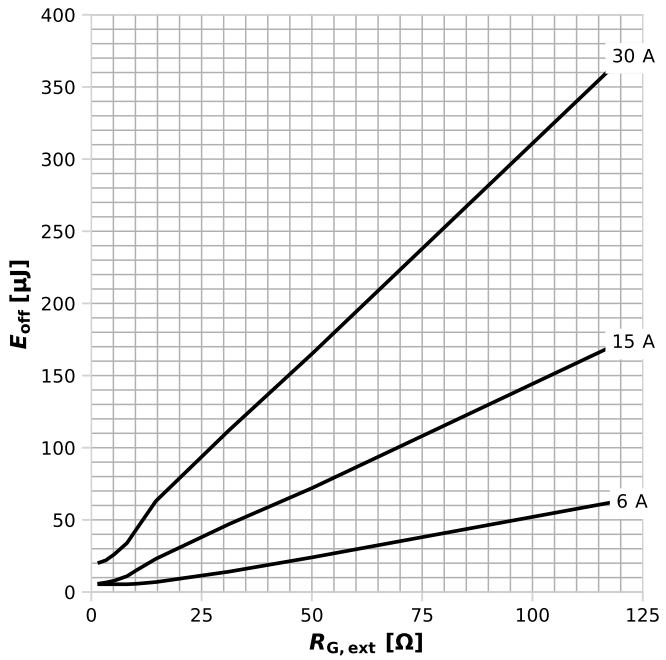
Diagram 19: Avalanche characteristics	Diagram 20: Min. drain-source breakdown voltage
	
I_{AS}=f(t_{AV}); R_{GS}=25 Ω; parameter: $T_{j,start}$	$V_{BR(DSS)}$=f(T_j); I_D=0.56 mA

Diagram 21: Typ. turn-on switching losses



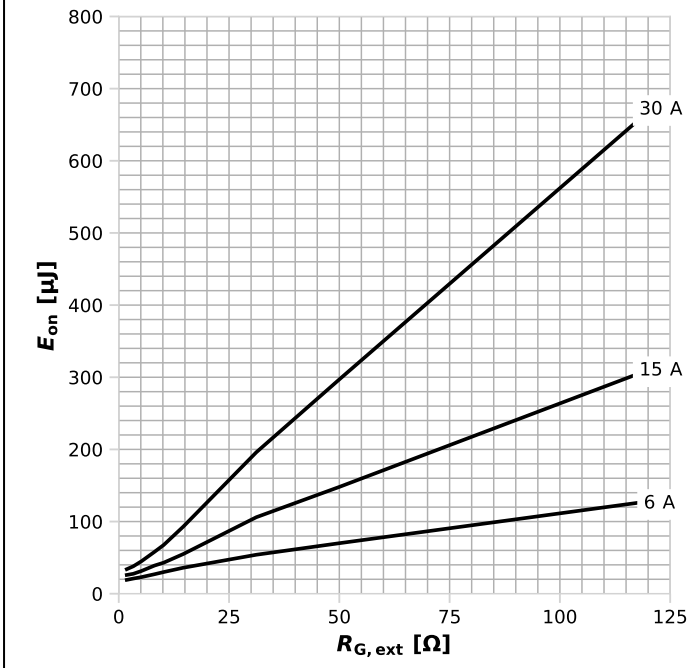
E_{on}=f($R_{g,ext}$), V_{DD}=200 V, V_G=0...18 V; parameter: I_D

Diagram 22: Typ. turn-off switching losses



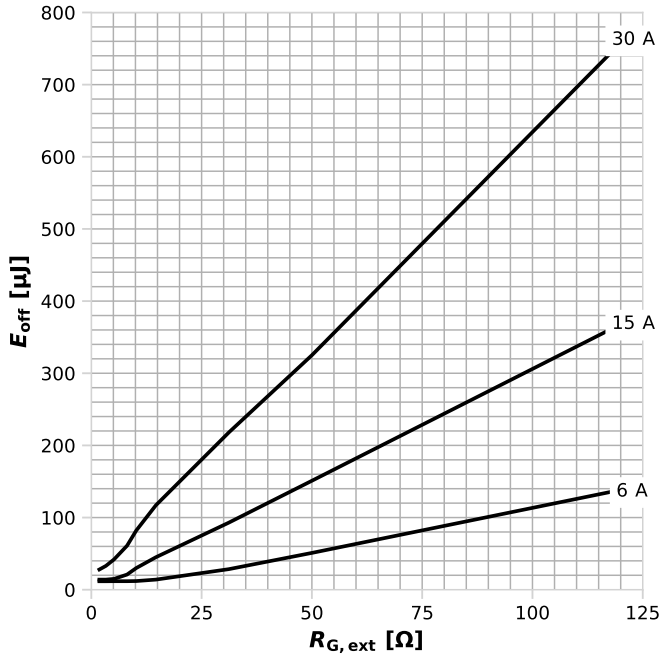
E_{off}=f($R_{g,ext}$), V_{DD}=200 V, V_G=18...0 V; parameter: I_D

Diagram 23: Typ. turn-on switching losses



E_{on}=f($R_{g,ext}$), V_{DD}=320 V, V_G=0...18 V; parameter: I_D

Diagram 24: Typ. turn-off switching losses



E_{off}=f($R_{g,ext}$), V_{DD}=320 V, V_G=18...0 V; parameter: I_D

6 Test circuits

Table 9 Switching times

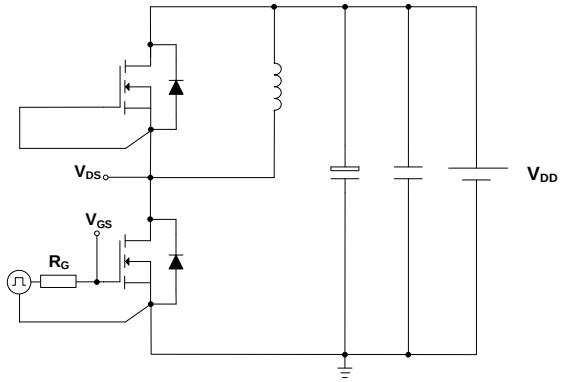
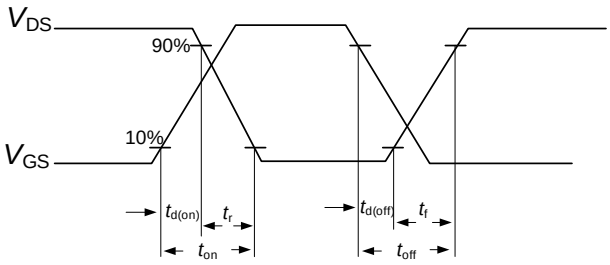
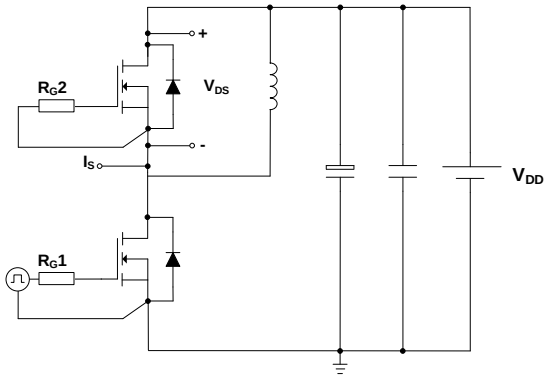
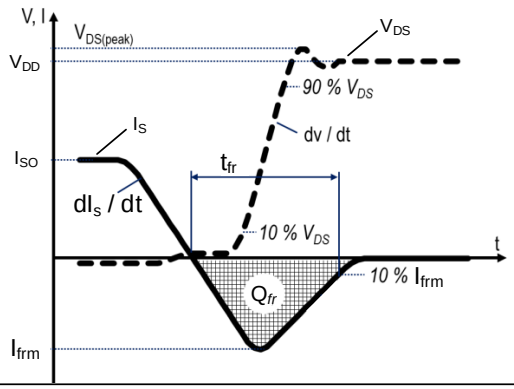
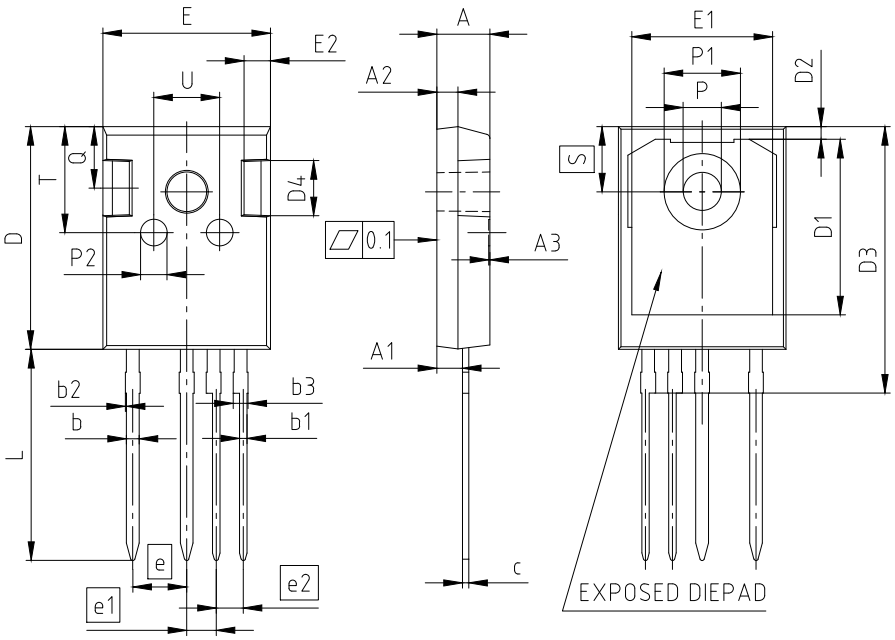
Switching times test circuit for inductive load	Switching times waveform
	

Table 10 Body diode characteristics

Test circuit for body diode characteristics	Body diode recovery waveform
	

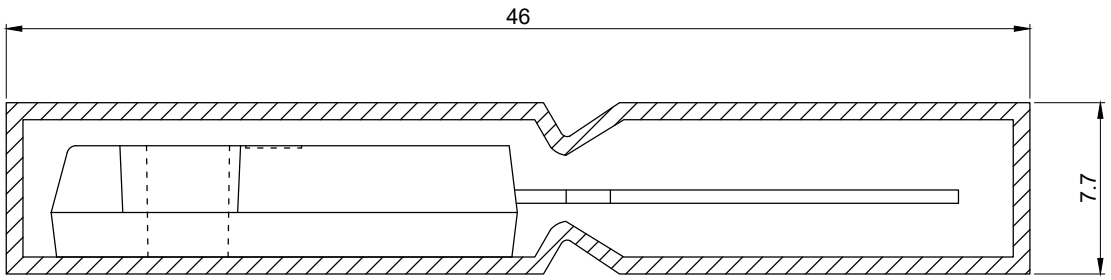
7 Package outlines



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



All dimensions are in units mm
The drawing is in compliance with ISO 128-30, Projection Method 1 [ ]

Figure 2 Packaging variant PG-TO247-4, dimensions in mm

Revision history

IMZA40R025M2H

Revision 2025-07-15, Rev. 1.0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2025-07-15	Release of final datasheet

Trademarks
All referenced product or service names and trademarks are the property of their respective owners.

We Listen to Your Comments Any information within this document that you feel is wrong, unclear or missing at all? Your feedback will help us to continuously improve the quality of this document. Please send your proposal (including a reference to this document) to: **erratum@infineon.com**

Published by
Infineon Technologies AG
81726 München, Germany

Important notice
The products which may also include samples and may be comprised of hardware or software or both ("Product") are sold or provided and delivered by Infineon Technologies AG and its affiliates ("Infineon") subject to the terms and conditions of the frame supply contract or other written agreement(s) executed by a customer and Infineon or, in the absence of the foregoing, the applicable Sales Conditions of Infineon. General terms and conditions of a customer or deviations from applicable Sales Conditions of Infineon shall only be binding for Infineon if and to the extent Infineon has given its express written consent.

For the avoidance of doubt, Infineon disclaims all warranties of non-infringement of third-party rights and implied warranties such as warranties of fitness for a specific use/purpose or merchantability.

Infineon shall not be responsible for any information with respect to samples, the application or customer's specific use of any Product or for any examples or typical values given in this document.

The data contained in this document is exclusively intended for technically qualified and skilled customer representatives. It is the responsibility of the customer to evaluate the suitability of the Product for the intended application and the customer's specific use and to verify all relevant technical data contained in this document in the intended application and the customer's specific use. The customer is responsible for properly designing, programming, and testing the functionality and safety of the intended application, as well as complying with any legal requirements related to its use.

Unless otherwise explicitly approved by Infineon, Products may not be used in any application where a failure of the Product or any consequences of the use thereof can reasonably be expected to result in personal injury. However, the foregoing shall not prevent the customer from using any Product in such fields of use that Infineon has explicitly designed and sold it for, provided that the overall responsibility for the application lies with the customer.

If the Product includes security features:
Because no computing device can be absolutely secure, and despite security measures implemented in the Product, Infineon does not guarantee that the Product will be free from intrusion, data theft or loss, or other breaches ("Security Breaches"), and Infineon shall have no liability arising out of any Security Breaches.

If this document includes or references software:
The software is owned by Infineon under the intellectual property laws and treaties of the United States, Germany, and other countries worldwide. All rights reserved. Therefore, you may use the software only as provided in the software license agreement accompanying the software. If no software license agreement applies, Infineon hereby grants you a personal, non-exclusive, non-transferable license (without the right to sublicense) under its intellectual property rights in the software (a) for software provided in source code form, to modify and reproduce the software solely for use with Infineon hardware products, only internally within your organization, and (b) to distribute the software in binary code form externally to end users, solely for use on Infineon hardware products. Any other use, reproduction, modification, translation, or compilation of the software is prohibited.

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