

6th Generation CoolSiC™

650V SiC Schottky Diode

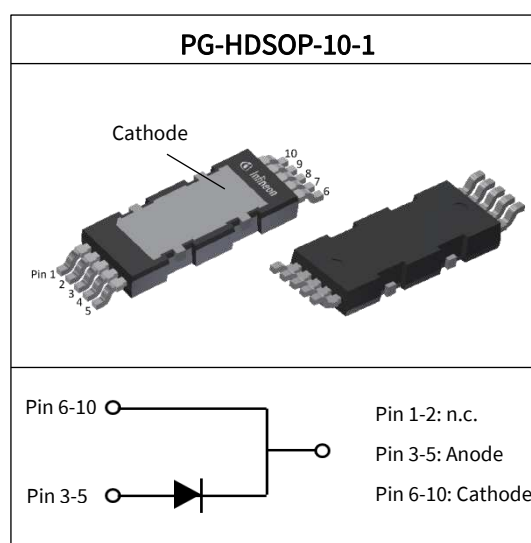
The CoolSiC™ generation 6 (G6) is the leading edge technology from Infineon for the SiC Schottky barrier diodes. The Infineon proprietary innovative G5 technology was enhanced in G6 by introducing further advancements like a novel Schottky metal system. The result is a family of products with improved efficiency over all load conditions, resulting from a lower figure of merit ($Q_C \times V_F$). The CoolSiC™ Schottky diode 650 V G6 has been designed to complement our 600 V and 650 V CoolMOS™ 7 families, meeting the most stringent application requirements in this voltage range.

Table 1 Key performance parameters

Parameter	Value	Unit
V_{RRM}	650	V
Q_C ($V_R = 400$ V)	14.7	nC
E_C ($V_R = 400$ V)	2.7	μJ
I_F ($T_C \leq 150$ °C, $D = 1$)	10	A
V_F ($I_F = 10$ A, $T_j = 25$ °C)	1.25	V

Table 2 Package information

Type / ordering Code	Package	Marking
IDDD10G65C6	PG-HDSOP-10-1	D1065C6



Features

- Best in class forward voltage (1.25 V)
- Best in class figure of merit ($Q_C \times V_F$)
- High dv/dt ruggedness (150 V/ns)

Benefits

- System efficiency improvement
- System cost and size savings due to the reduced cooling requirements
- Enabling higher frequency and increased power density

Potential Applications

- Power factor correction in SMPS
- Solar inverter
- Uninterruptible power supply

Product Validation

- Qualified for industrial applications according to the relevant tests of JEDEC (J-STD20 and JESD22)



Table of Content

1	Maximum ratings	3
2	Thermal characteristics	3
3	Electrical characteristics	4
3.1	Static characteristics	4
3.2	AC characteristics	4
4	Diagrams	5
5	Simplified forward characteristic	7
6	Package outlines	8

1 Maximum ratings

Table 3 Maximum ratings

Parameter	Symbol	Values			Unit	Note/Test condition
		Min.	Typ.	Max.		
Continuous forward current	I_F	–	–	10	A	$T_C \leq 150\text{ °C}, D = 1$
		–	–	15		$T_C \leq 125\text{ °C}, D = 1$
		–	–	29		$T_C \leq 25\text{ °C}, D = 1$
Surge-repetitive forward current, sine halfwave ¹	$I_{F, RM}$	–	–	44		$T_C = 25\text{ °C}, t_p = 10\text{ ms}$
Surge non-repetitive forward current, sine halfwave	$I_{F, SM}$	–	–	55		$T_C = 25\text{ °C}, t_p = 10\text{ ms}$
		–	–	44		$T_C = 150\text{ °C}, t_p = 10\text{ ms}$
Non-repetitive peak forward current	$I_{F, max}$	–	–	600		$T_C = 25\text{ °C}, t_p = 10\text{ }\mu\text{s}$
i^2t value	$\int i^2 dt$	–	–	15	A ² s	$T_C = 25\text{ °C}, t_p = 10\text{ ms}$
		–	–	10		$T_C = 150\text{ °C}, t_p = 10\text{ ms}$
Repetitive peak reverse voltage	V_{RRM}	–	–	650	V	$T_C = 25\text{ °C}$
Diode dv/dt ruggedness	dv/dt	–	–	150	V/ns	$V_R = 0..480\text{ V}$
Power dissipation	P_{tot}	–	–	105	W	$T_C = 25\text{ °C}, R_{thJC, max}$
Operating and storage temperature	T_j T_{stg}	–55	–	175	°C	–

2 Thermal characteristics

Table 4 Thermal characteristics

Parameter	Symbol	Values			Unit	Note/Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction-case	R_{thJC}	–	0.9	1.4	K/W	–
Thermal resistance, junction-ambient	R_{thJA}	–	–	62		Device on PCB, minimal footprint
Thermal resistance, junction-ambient for SMD version	R_{thJA}	–	35	45		Device on 40*40*1.5 mm epoxy PCB FR4 (one layer, 70 μm thickness) with 6 cm^2 copper for cathode connection and cooling, PCB vertically placed without air stream cooling
Soldering temperature	T_{sold}	–	–	260	°C	Allowed only reflow soldering

¹ The surge-repetitive forward current test was performed with 1000 pulses (half-wave rectified sine with the 10 ms period).

3 Electrical characteristics

3.1 Static characteristics

Table 5 Static characteristics

Parameter	Symbol	Values			Unit	Note/Test condition
		Min.	Typ.	Max.		
DC blocking voltage	V_{DC}	650	–	–	V	$T_j = 25\text{ °C}$
Diode forward voltage	V_F	–	1.25	1.35		$I_F = 10\text{ A}, T_j = 25\text{ °C}$
		–	1.5	–		$I_F = 10\text{ A}, T_j = 150\text{ °C}$
Reverse current	I_R	–	1.0	33	μA	$V_R = 420\text{ V}, T_j = 25\text{ °C}$
		–	33	–		$V_R = 420\text{ V}, T_j = 125\text{ °C}$
		–	77	–		$V_R = 420\text{ V}, T_j = 150\text{ °C}$

3.2 AC characteristics

Table 6 AC characteristics

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Total capacitive charge	Q_c	–	14.7	–	nC	$V_R = 400\text{ V}, T_j = 150\text{ °C},$ $di/dt = 200\text{ A}/\mu\text{s}, I_F \leq I_{F,MAX}$
Total capacitance	C	–	495	–	pF	$V_R = 1\text{ V}, f = 1\text{ MHz},$ $T_j = 25\text{ °C}$
		–	29	–		$V_R = 300\text{ V}, f = 1\text{ MHz},$ $T_j = 25\text{ °C}$
		–	28	–		$V_R = 600\text{ V}, f = 1\text{ MHz},$ $T_j = 25\text{ °C}$

4 Diagrams

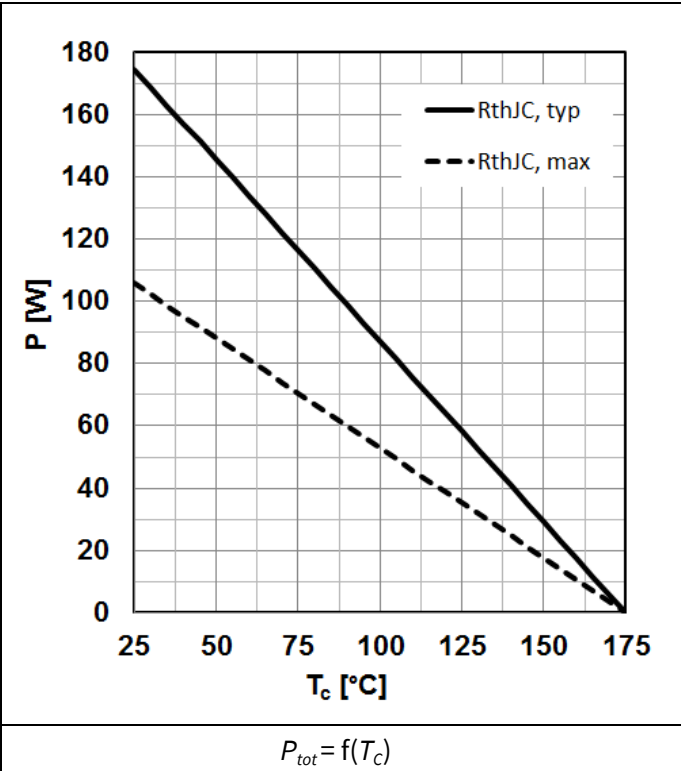


Figure 1 Power dissipation

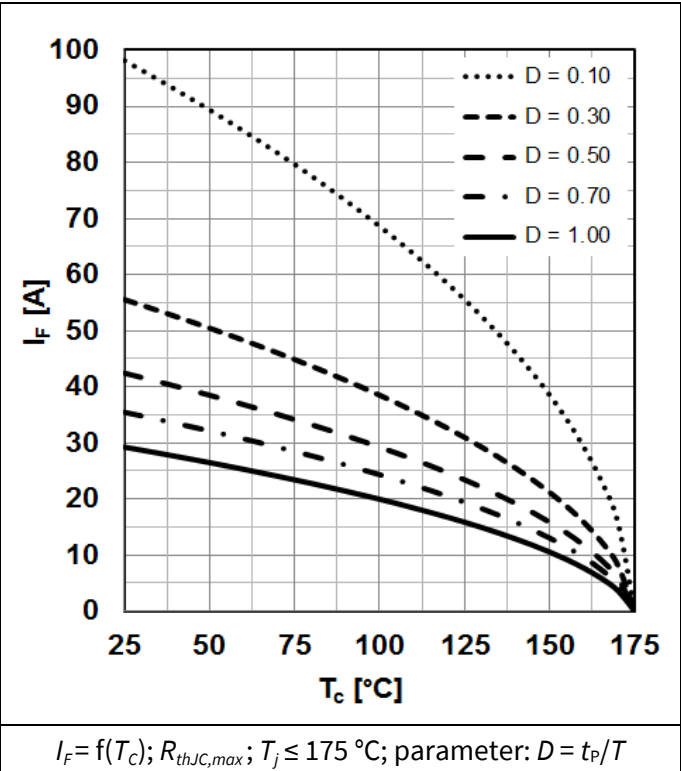


Figure 2 Max. forward current

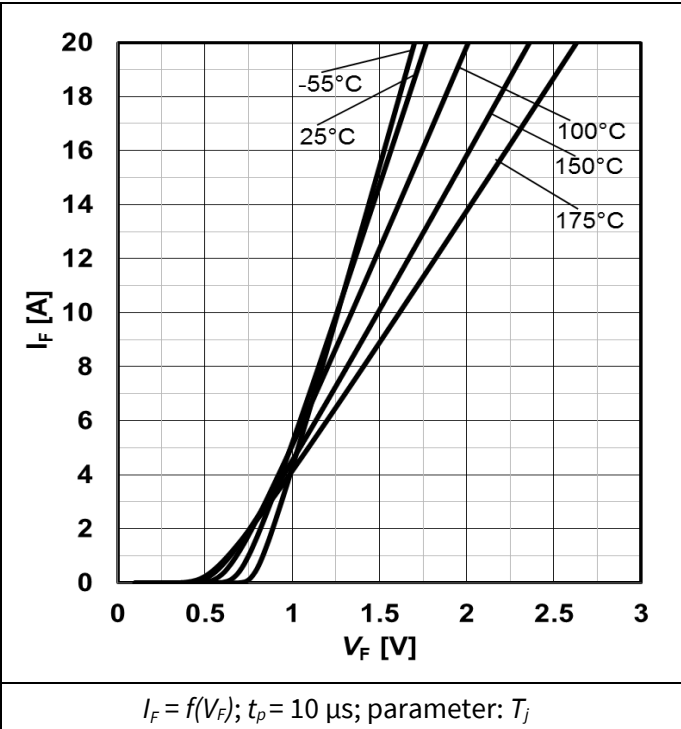


Figure 3 Typ. forward characteristics

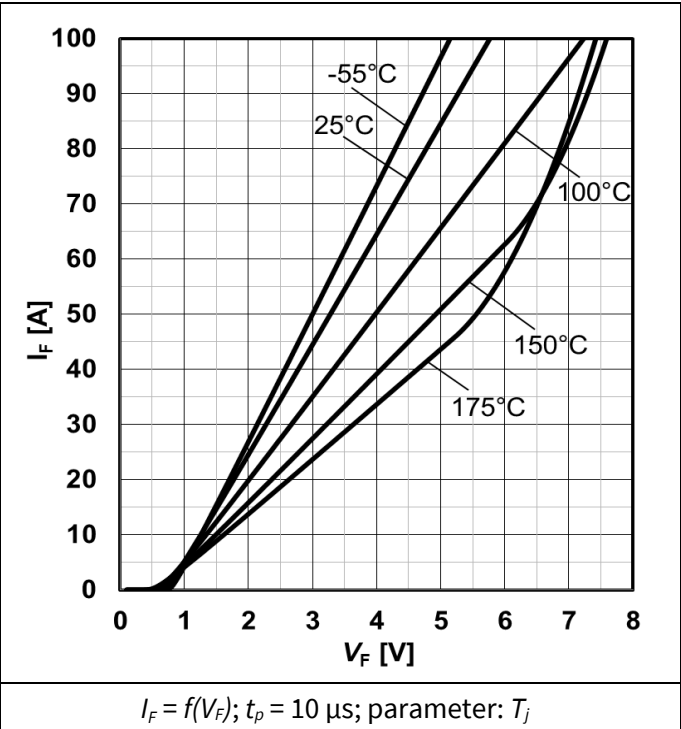
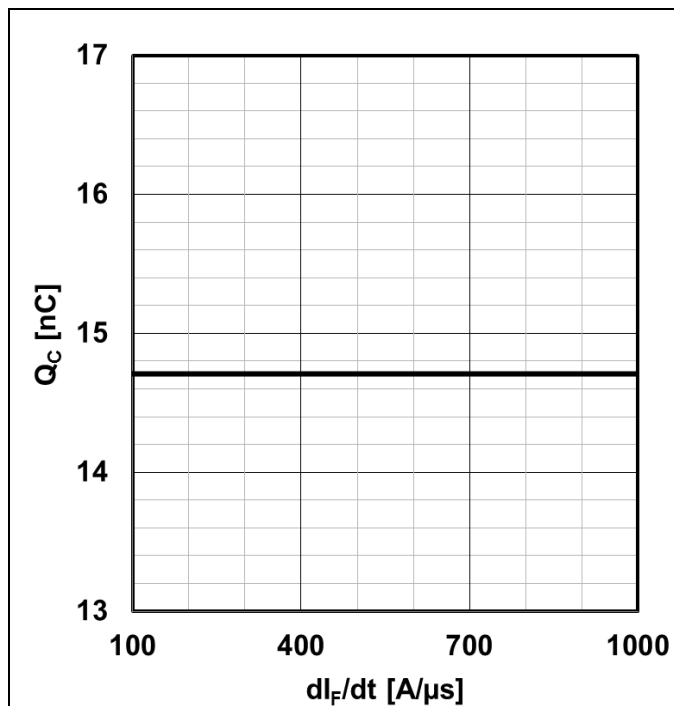
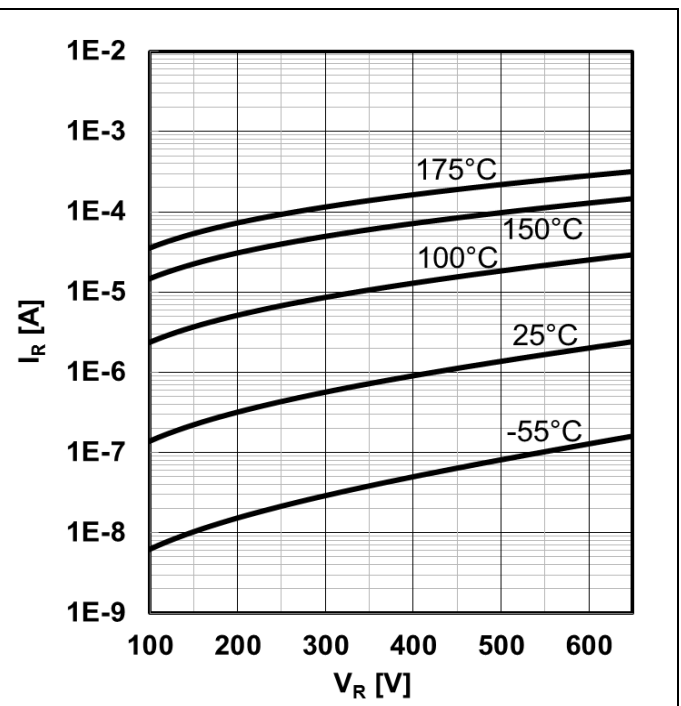


Figure 4 Typ. forward characteristics
in surge current



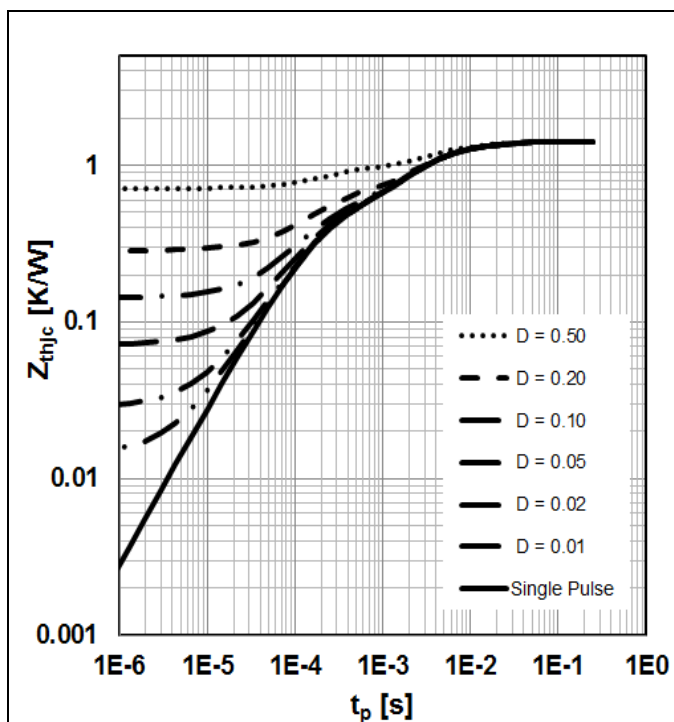
$$Q_C = f(di_F/dt); T_J = 150\text{ °C}; V_R = 400\text{ V}; I_F \leq I_{F,max}$$

Figure 5 Typ. cap. charge vs. current slope



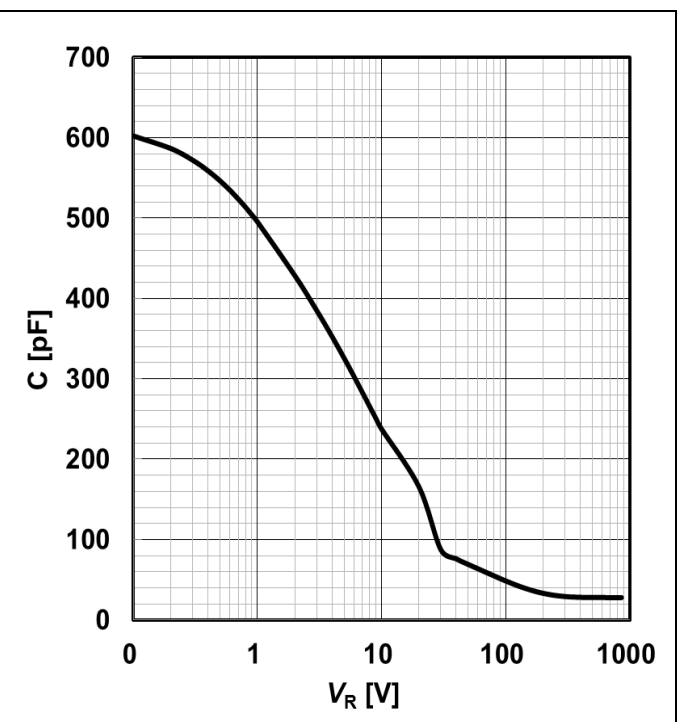
$$I_R = f(V_R); \text{ parameter: } T_J$$

Figure 6 Typ. reverse current vs. reverse voltage



$$Z_{th,jc} = f(t_p); \text{ parameter: } D = t_p/T$$

Figure 7 Max. transient thermal impedance



$$C = f(V_R); T_J = 25\text{ °C}; f = 1\text{ MHz}$$

Figure 8 Typ. capacitance vs. reverse voltage

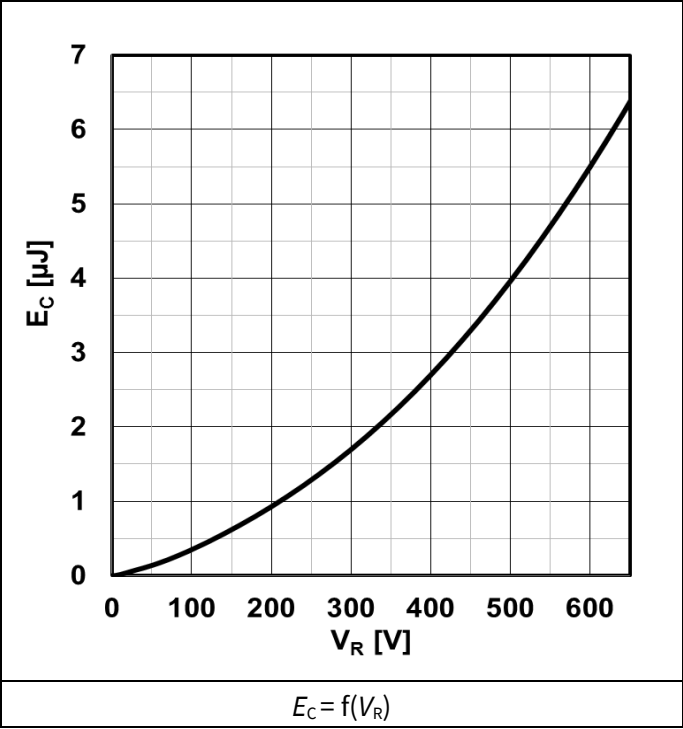


Figure 9 Typ. capacitance stored energy

5 Simplified forward characteristic

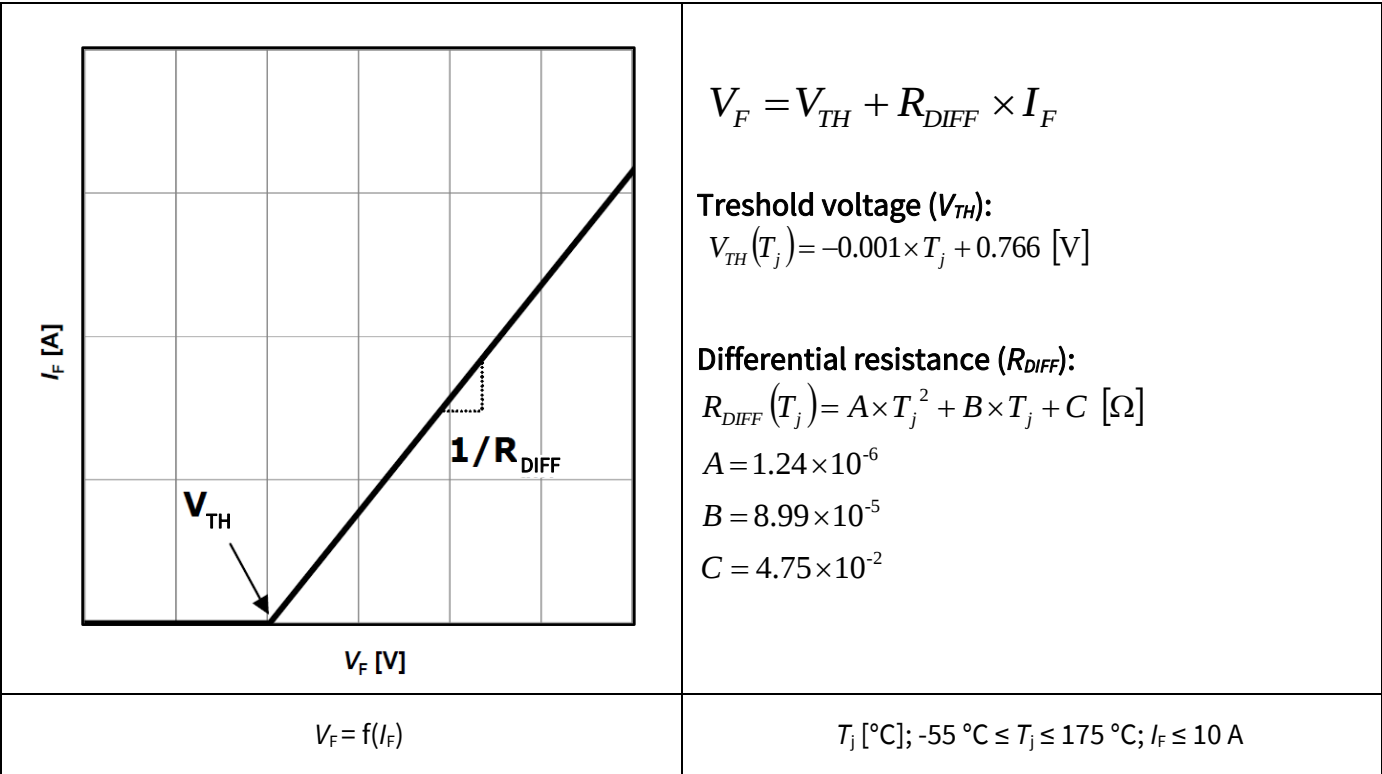


Figure 10 Equivalent forward current curve

Figure 11 Mathematical Equation

6 Package outlines

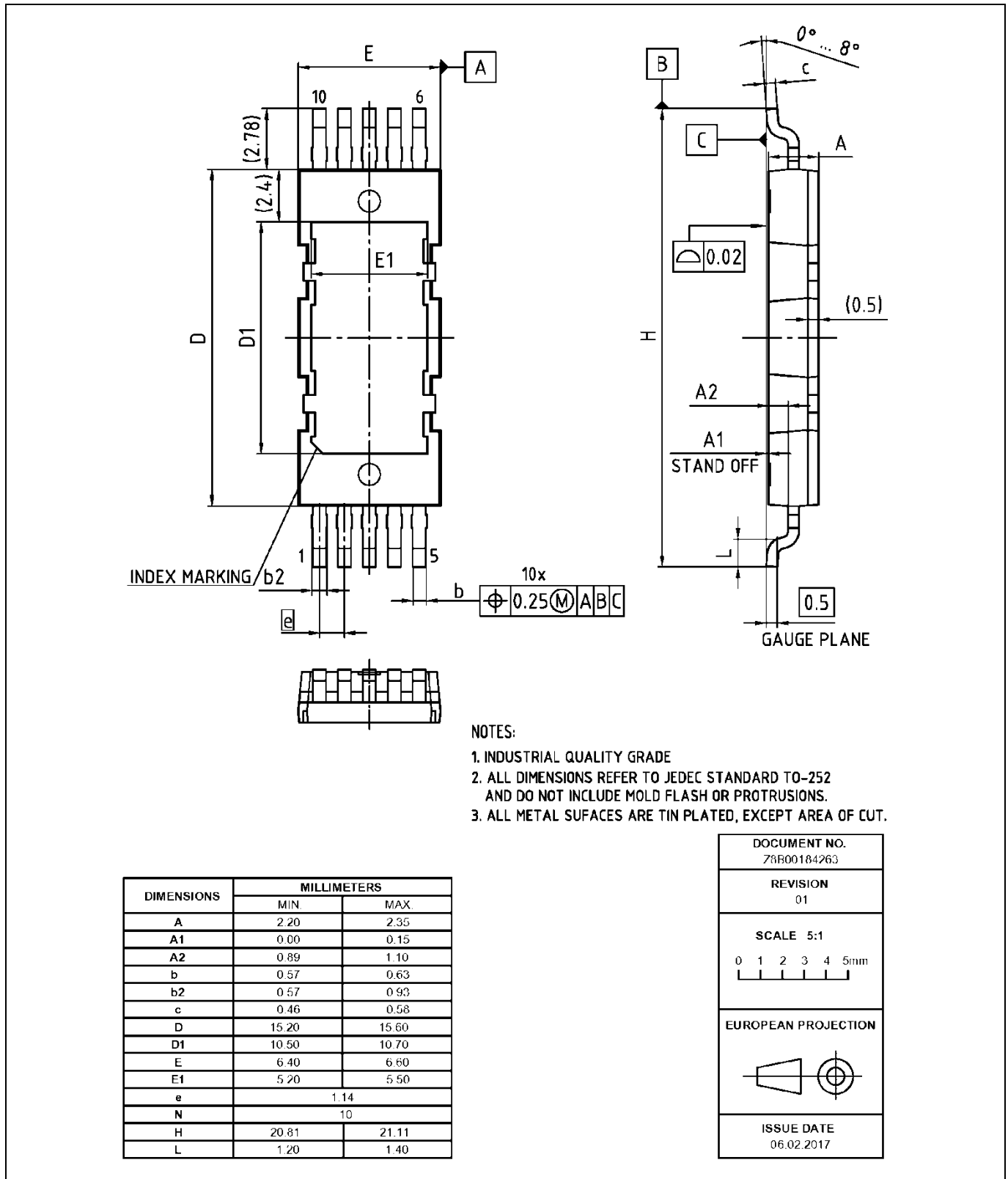


Figure 12 Outlines of the package PG-HDSOP-10-1, dimensions in millimeters

Revision History

IDDD10G65C6

Revision: 2018-02-26, Rev. 2.0

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.0	2018-02-26	Release of final version

Trademarks of Infineon Technologies AG

AURIX™, C166™, CanPAK™, CIPOS™, CoolGaN™, CoolMOS™, CoolSET™, CoolSiC™, CORECONTROL™, CROSSAVE™, DAVE™, DI-POL™, DrBlade™, EasyPIM™, EconoBRIDGE™, EconoDUAL™, EconoPACK™, EconoPIM™, EiceDRIVER™, eupec™, FCOS™, HITFET™, HybridPACK™, Infineon™, ISOFACE™, IsoPACK™, i-Wafer™, MIPAQ™, ModSTACK™, my-d™, NovalithIC™, OmniTune™, OPTIGA™, OptiMOS™, ORIGA™, POWERCODE™, PRIMARION™, PrimePACK™, PrimeSTACK™, PROFET™, PRO-SiL™, RASIC™, REAL3™, ReverSave™, SatRIC™, SIEGET™, SiPMOS™, SmartLEWIS™, SOLID FLASH™, SPOC™, TEMPFET™, thinQ!™, TRENCHSTOP™, TriCore™.

Trademarks updated August 2015

Other 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

© 2018 Infineon Technologies AG

All Rights Reserved.

Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

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.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Infineon:](#)

[IDDD10G65C6XTMA1](#)