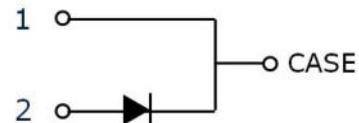


# CoolSiC™ Automotive Schottky Diode 650V G5

650V/10A Silicon Carbide Schottky Diode in D2PAK (Real 2 Pins)

## Features

- Revolutionary semiconductor material - Silicon Carbide
- Benchmark switching behavior
- No reverse recovery/ No forward recovery
- Temperature independent switching behavior
- High surge current capability
- Pb-free lead plating; RoHS compliant
- Junction Temperature range from -40°C to 175°C
- System efficiency improvement over Si diodes
- System cost / size savings due to reduced cooling requirements
- Enabling higher frequency / increased power density solutions
- Higher system reliability due to lower operating temperatures
- Reduced EMI



## Potential Applications

- Traction inverter
- Booster / DCDC Converter
- On board Charger / PFC



## Product Validation

“Qualified for Automotive Applications. Product Validation according to AEC-Q100/101”

## Description

The 5th Generation CoolSiC™ Automotive Schottky Diode represents Infineon leading edge technology for Silicon Carbide Schottky Barrier diodes. Thanks to a compact design and a technology based on thin wafers, this family of products shows improved efficiency over all load conditions resulting from both its thermal characteristics and low figure of merit ( $Q_c \times V_f$ ). This product family has been designed to complement Infineon's IGBT and CoolMOS™ portfolio. This ensures meeting the most stringent application requirements in the 650V voltage class.

Product Information	
Ordering Code	AIDK10S65C5
Marking	AD1065C5
Package	PG-T0263-2-1
SP Number	SP001725150

Parameter	Value/Unit
$V_{DC,max}$	650 V
$I_F; T_C < 124^\circ\text{C}$	10 A
$Q_c; V_R = 400 \text{ V}$	15 nC
$E_c; V_R = 400 \text{ V}$	3.5 $\mu\text{J}$
$T_{j,max}$	175 °C

Pin	Definition
Pin 1,case	Cathode
Pin 2	Anode

---

Table of Contents

**Table of Contents**

Features.....	1
Potential Applications.....	1
Product Validation.....	1
Description.....	1
Table of Contents.....	2
1    Maximum Ratings.....	3
2    Thermal Characteristics.....	4
3    Electrical Characteristics.....	5
4    Electrical Characteristics Diagrams.....	6
5    Package Outlines.....	9
Revision History.....	10

Maximum Ratings

## 1 Maximum Ratings

Table 1 Maximum ratings<sup>1</sup>

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage	$V_{RRM}$	650	V
Continuous forward current for $R_{thJC,max}$ $T_C = 124^\circ\text{C}$ , $D=1$	$I_F$	10	A
Surge non-repetitive forward current, sine halfwave $T_C = 25^\circ\text{C}$ , $t_p=10\text{ms}$	$I_{F,SM}$	42	A
$T_C = 150^\circ\text{C}$ , $t_p=10\text{ms}$		33	
Non-repetitive peak forward current $T_C = 25^\circ\text{C}$ , $t_p=10\mu\text{s}$	$I_{F,max}$	431	A
$i^2t$ value $T_C = 25^\circ\text{C}$ , $t_p=10\text{ms}$	$\int i^2 dt$	9	$\text{A}^2\text{s}$
$T_C = 150^\circ\text{C}$ , $t_p=10\text{ms}$		5	
Diode dv/dt ruggedness $V_R=0\ldots 480\text{V}$	dv/dt	100	$\text{V}/\text{ns}$
Power dissipation $T_C = 25^\circ\text{C}$	$P_{tot}$	53	W
Operating temperature	$T_j$	-40...175	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55...150	$^\circ\text{C}$
ESD			
Human body model, $R= 1.5 \text{ k}\Omega$ , $C = 100 \text{ pF}$		8	kV
Charged device model		2	

## Thermal Characteristics

## 2 Thermal Characteristics

Table 2 Thermal Characteristics<sup>1</sup>

Parameter	Symbol	Values			Unit	Note/Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction-case <sup>2</sup>	$R_{thJC}$	-	2.2	2.9	K/W	
Thermal resistance, junction-ambient <sup>2</sup>	$R_{thJA}$	-	-	62	K/W	

Electrical Characteristics

### 3 Electrical Characteristics

Table 3 Static Characteristics

Parameter	Symbol	Values			Unit	Note/Test condition
		Min.	Typ.	Max.		
DC blocking voltage	$V_{DC}$	650	-	-		$T_j = 25^\circ\text{C}, I_R = 0.06 \text{ mA}$
Diode forward voltage <sup>3</sup>	$V_F$	-	1.5	1.7	V	$T_j = 25^\circ\text{C}, I_F = 10 \text{ A}$
		-	1.8	2.1		$T_j = 150^\circ\text{C}, I_F = 10 \text{ A}$
Reverse current	$I_R$	-	2	60	$\mu\text{A}$	$V_R = 650 \text{ V}, T_j = 25^\circ\text{C}$
		-	12	-		$V_R = 650 \text{ V}, T_j = 150^\circ\text{C}$

Table 4 Dynamic Characteristics at  $T_j=25^\circ\text{C}$  unless noted otherwise

Parameter	Symbol	Values			Unit	Note/Test condition
		Min.	Typ.	Max.		
Total capacitive charge	$Q_C$	-	15	-	nC	$V_R = 400 \text{ V}, di/dt = 200 \text{ A}/\mu\text{s}, I_F \leq I_{F,MAX}, T_j = 150^\circ\text{C}$
Total capacitance	$C$	-	303	-	pF	$V_R = 1 \text{ V}, f = 1 \text{ MHz}$
		-	40	-		$V_R = 300 \text{ V}, f = 1 \text{ MHz}$
		-	39	-		$V_R = 600 \text{ V}, f = 1 \text{ MHz}$

Footnotes:

<sup>1</sup> The parameter is not subject to production test- verified by design/characterization.

<sup>2</sup>  $R_{th,JC}$  defined as per JESD-51-14.  $R_{th,JA}$  defined as per JESD-51-5/7.

<sup>3</sup> Only the value at  $25^\circ\text{C}$  is subject to production test. The value at  $150^\circ\text{C}$  is only verified by design/characterization.

Electrical Characteristics Diagrams

4 Electrical Characteristics Diagrams

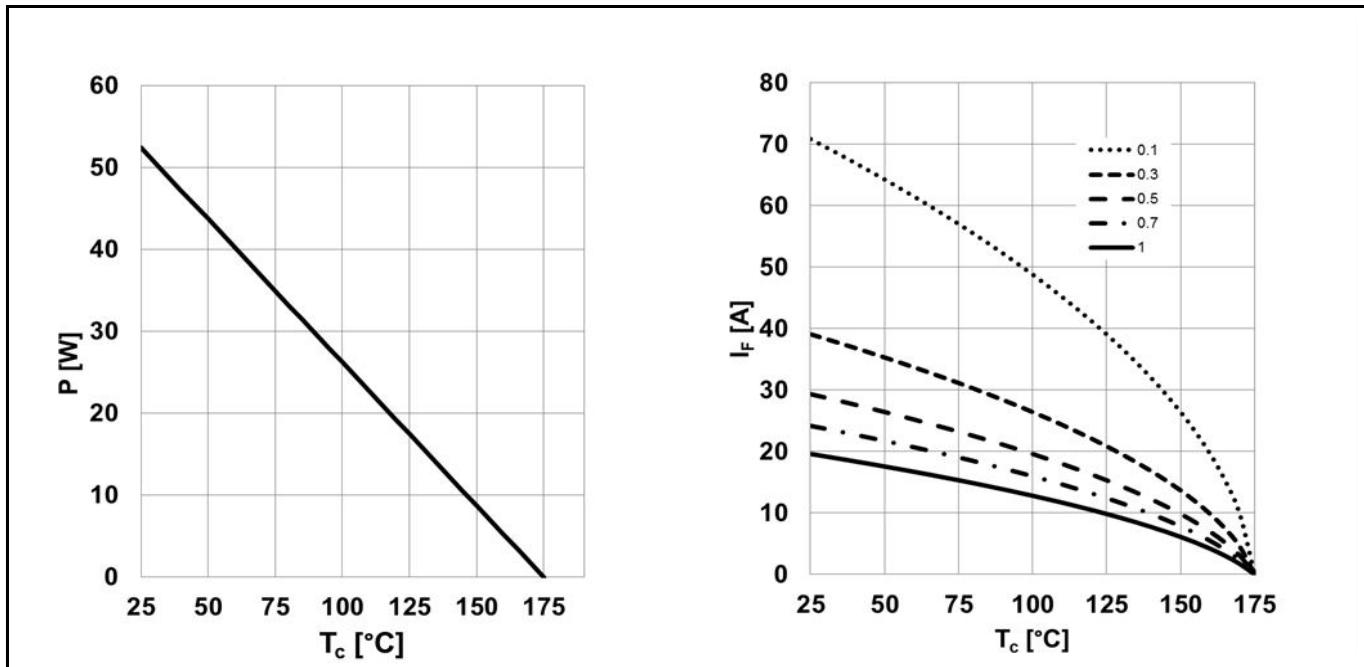


Figure 1 (LEFT) Power dissipation;  $P_{tot} = f(T_c)$ ;  $R_{thJC,max}$   
(RIGHT) Diode forward current;  $I_F = f(T_c)$ ;  $T_j \leq 175$  °C;  $R_{thJC,max}$ ; parameter: D=duty cycle

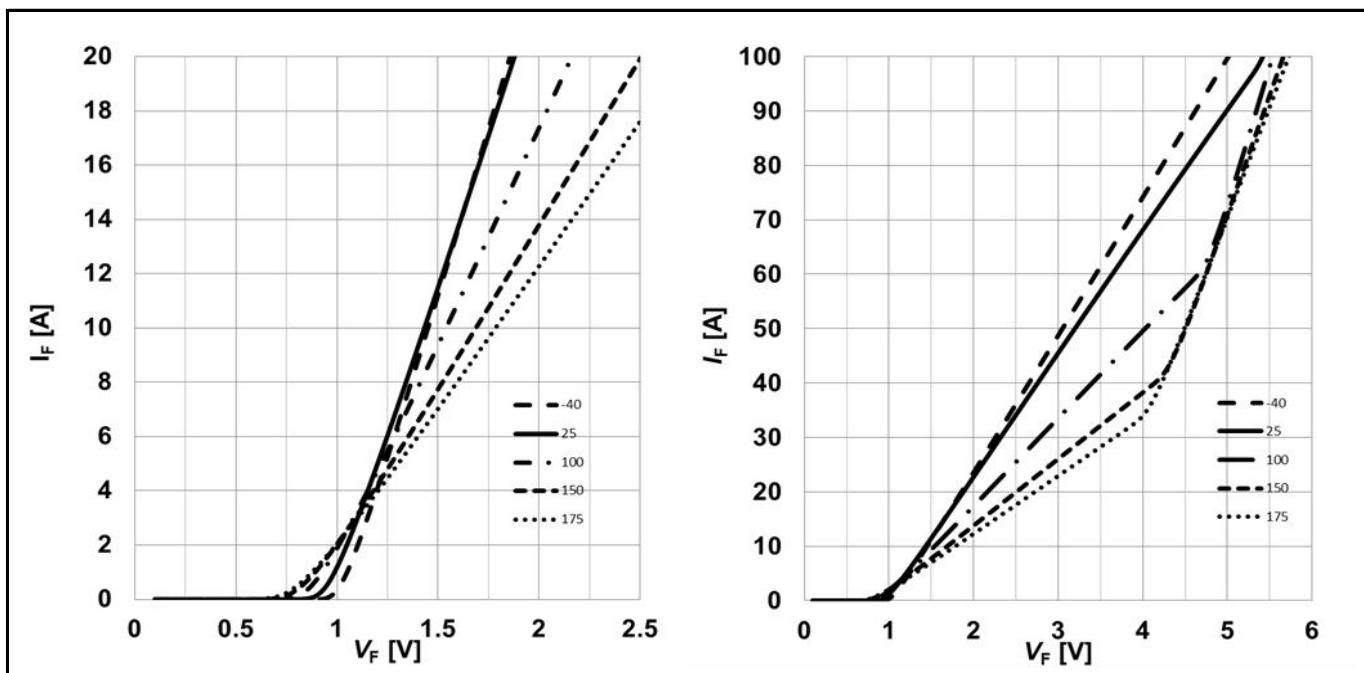


Figure 2 (LEFT) Typical forward characteristic;  $I_F = f(V_F)$ ;  $t_p = 20$  µs; parameter:  $T_j$   
(RIGHT) Typical forward characteristics in surge current;  $I_F = f(V_F)$ ;  $t_p = 20$  µs; parameter:  $T_j$

Electrical Characteristics Diagrams

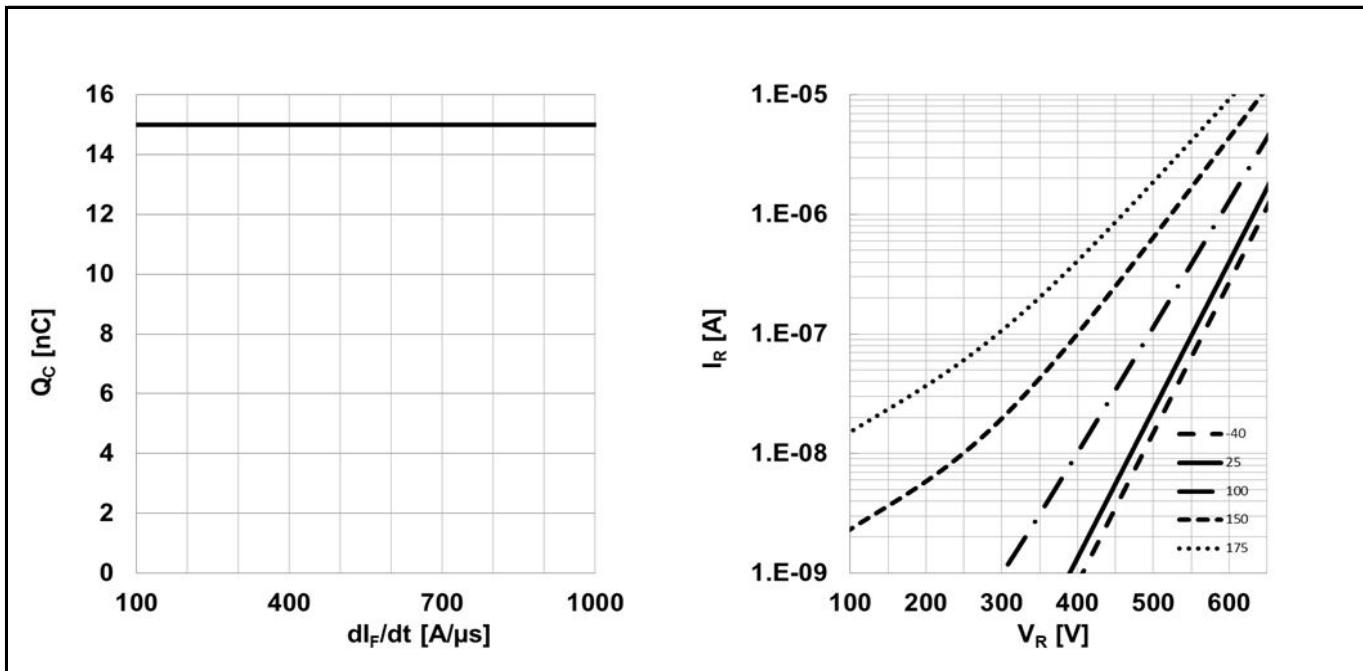


Figure 3 (LEFT) Typical capacitive charge versus current slope (only capacitive charge, guaranteed by design);  $Q_C = f(dI_F/dt)$ ;  $T_j = 150^\circ\text{C}$ ;  $V_R = 400\text{V}$ ;  $I_F \leq I_{F,\text{max}}$   
(RIGHT) Typical reverse current versus reverse voltage;  $I_R = f(V_R)$ ; parameter:  $T_j$

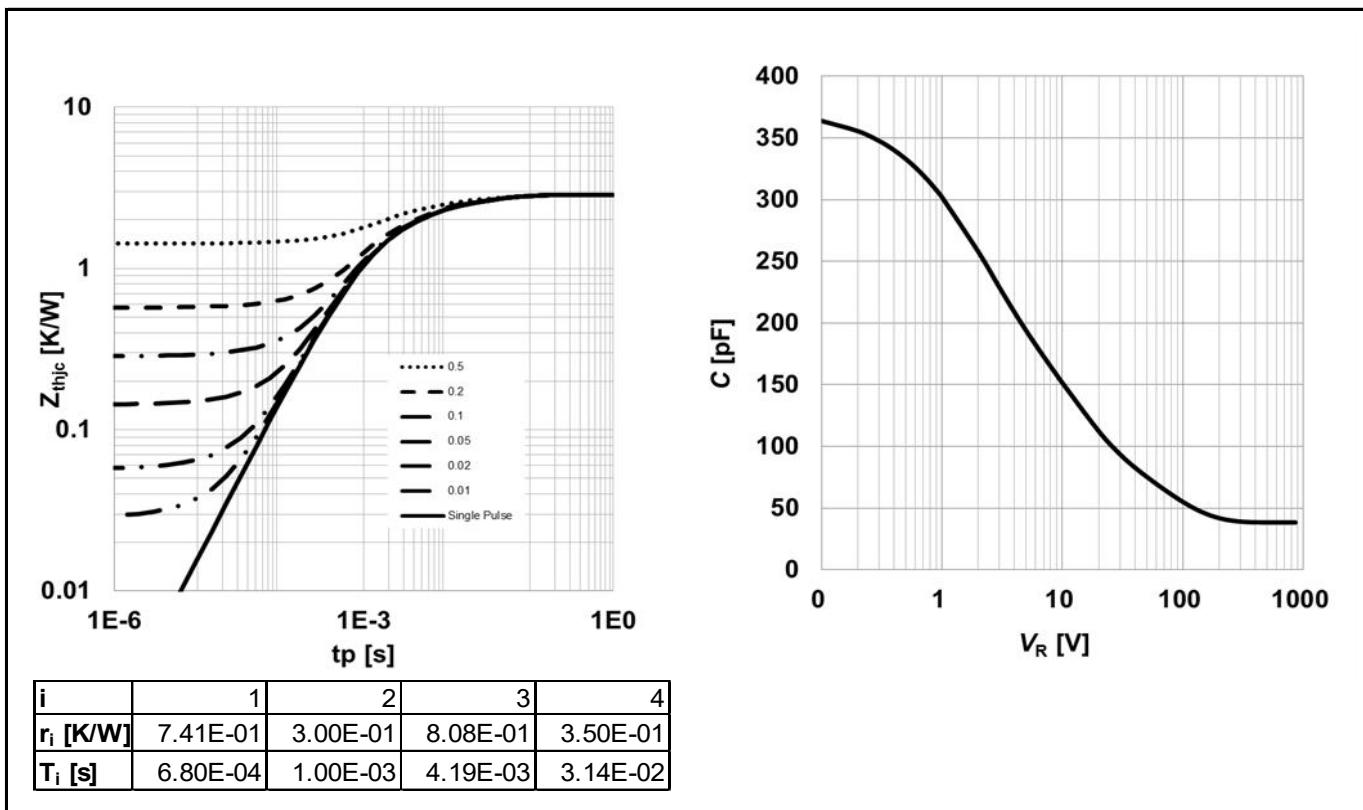


Figure 4 (LEFT) Max. Transient thermal impedance;  $Z_{thJC} = f(t_p)$ ; parameter:  $D = t_p/T$   
(RIGHT) Typ. Capacitance vs. Reverse voltage;  $C = f(V_R)$ ;  $T_j = 25^\circ\text{C}$ ;  $f = 1\text{ MHz}$

Electrical Characteristics Diagrams

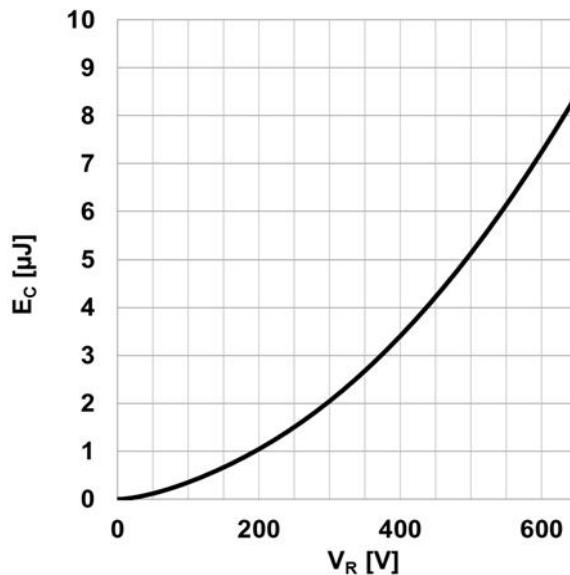
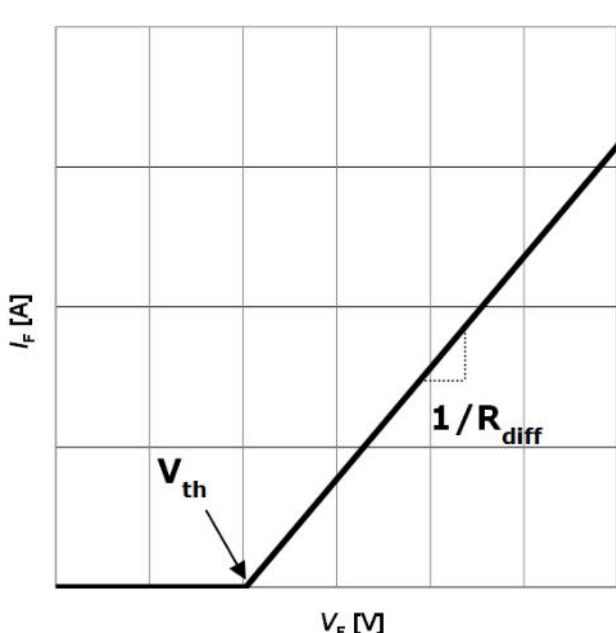


Figure 5 Typical capacitance stored energy;  $E_c = f(V_R)$



$$V_F = V_{th} + R_{diff} \cdot I_F$$

$$V_{th} = A \cdot T_j + B \text{ [V]}$$

$$R_{diff} = C \cdot T_j^2 + D \cdot T_j + E \text{ [\Omega]}$$

A =	-9.2E-04	[V/°C]
B =	1.0E+00	[V]
C =	1.3E-06	[\Omega/(°C) <sup>2</sup> ]
D =	7.3E-05	[\Omega/°C]
E =	4.1E-02	[\Omega]

Figure 6 Simplified forward characteristics model  $V_F = f(I_F)$ ;  
 $-40^\circ\text{C} < T_j < 175^\circ\text{C}; I_F < 20 \text{ A}$

Package Outlines

5 Package Outlines

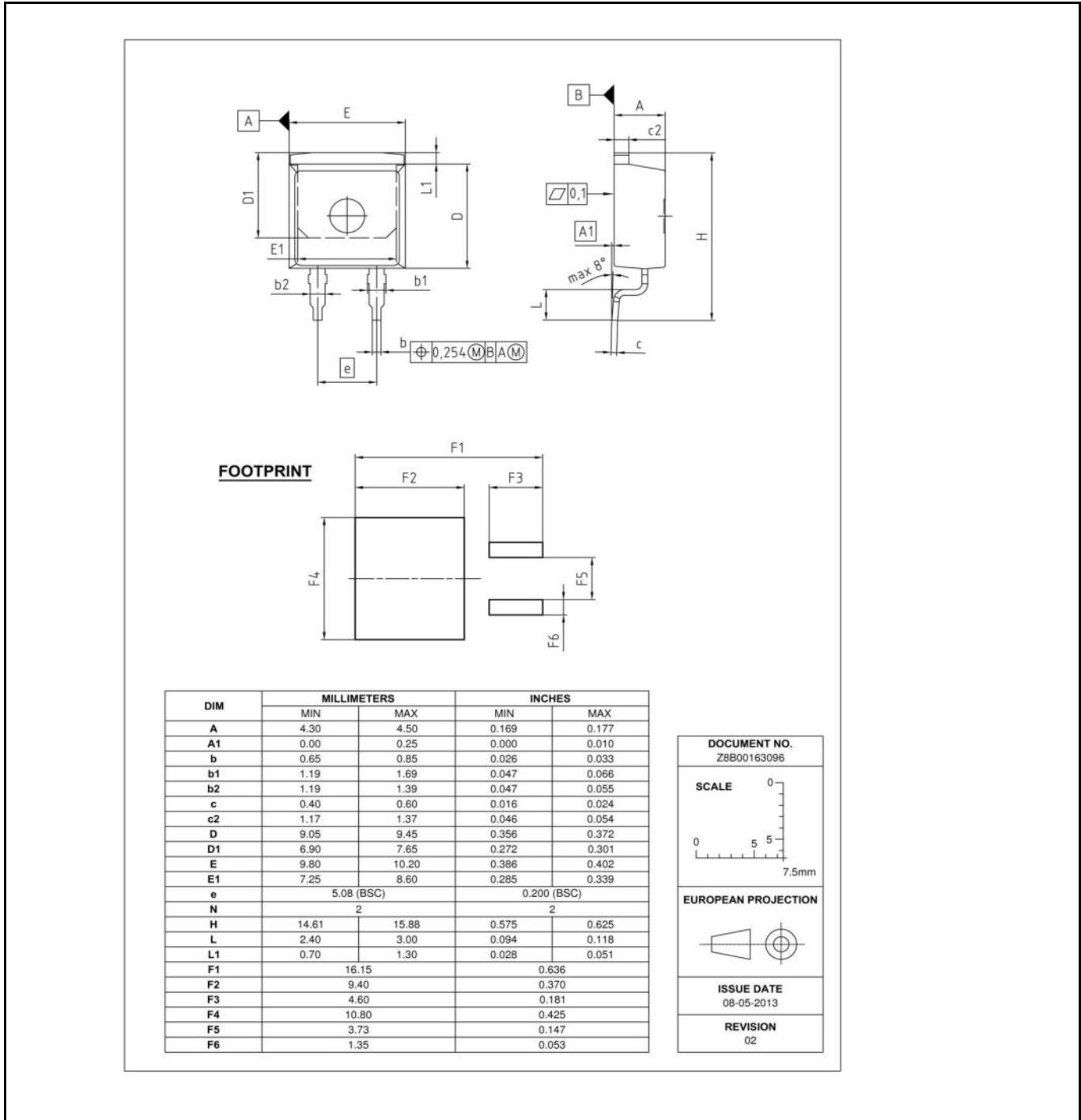


Figure 6 Package outline of PG-T0263-2-1 leaded

## Revision History

### Revision History

Document Version	Date of Release	Description of changes
V3.0	11.06.2019	1st release of Data Sheet

#### Trademarks

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

#### IMPORTANT NOTICE

Edition 2019-06-11

Published by  
Infineon Technologies AG  
81726 München, Germany

© 2017 Infineon Technologies AG.  
All Rights Reserved.

Do you have a question about this  
document?  
Email: [erratum@infineon.com](mailto:erratum@infineon.com)

Document reference

The information given in this document shall in no event For further information on the product, be regarded as a guarantee of conditions or characteristics technology, delivery terms and conditions and ("Beschaffenheitsgarantie"). prices please contact your nearest Infineon Technologies office ([www.infineon.com](http://www.infineon.com)).

With respect to any examples, hints or any typical values stated herein and/or any information regarding the **WARNINGS** application of the product, Infineon Technologies hereby Due to technical requirements products may disclaims any and all warranties and liabilities of any kind, contain dangerous substances. For information including without limitation warranties of non- on the types in question please contact your infringement of intellectual property rights of any third nearest Infineon Technologies office. party.

In addition, any information given in this document is Except as otherwise explicitly approved by subject to customer's compliance with its obligations Infineon Technologies in a written document stated in this document and any applicable legal signed by authorized representatives of Infineon requirements, norms and standards concerning Technologies, Infineon Technologies' products customer's products and any use of the product of may not be used in any applications where a Infineon Technologies in customer's applications. failure of the product or any consequences of the use thereof can reasonably be expected to

The data contained in this document is exclusively result in personal injury. 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.