

# Diode

Silicon Carbide Schottky Diode

## IDH16G120C5

5<sup>th</sup> Generation thinQ!<sup>TM</sup> 1200 V SiC Schottky Diode

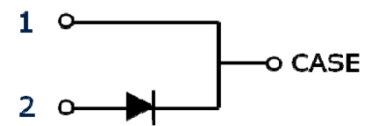
### Final Datasheet

Rev. 2.0 2015-09-03

## thinQ!<sup>TM</sup> SiC Schottky Diode

### Features:

- Revolutionary semiconductor material - Silicon Carbide
- No reverse recovery current / No forward recovery
- Temperature independent switching behavior
- Low forward voltage even at high operating temperature
- Tight forward voltage distribution
- Excellent thermal performance
- Extended surge current capability
- Specified dv/dt ruggedness
- Qualified according to JEDEC<sup>1)</sup> for target applications
- Pb-free lead plating; RoHS compliant



### Benefits

- System efficiency improvement over Si diodes
- Enabling higher frequency / increased power density solutions
- System size / cost savings due to reduced heatsink requirements and smaller magnetics
- Reduced EMI
- Highest efficiency across the entire load range
- Robust diode operation during surge events
- High reliability
- RelatedLinks: [www.infineon.com/sic](http://www.infineon.com/sic)



### Applications

- Solar inverters
- Uninterruptable power supplies
- Motor drives
- Power Factor Correction

### Package pin definitions

- Pin 1 and backside – cathode
- Pin 2 – anode



### Key Performance and Package Parameters

| Type        | V <sub>DC</sub> | I <sub>F</sub> | Q <sub>C</sub> | T <sub>j,max</sub> | Marking | Package      |
|-------------|-----------------|----------------|----------------|--------------------|---------|--------------|
| IDH16G120C5 | 1200V           | 16A            | 57nC           | 175°C              | D1612C5 | PG-TO220-2-1 |

1) J-STD20 and JEDEC22

**Table of Contents**

|  |    |
|--|----|
| Description .....                        | 2  |
| Table of Contents .....                  | 3  |
| Maximum Ratings .....                    | 4  |
| Thermal Resistances .....                | 4  |
| Electrical Characteristics .....         | 5  |
| Electrical Characteristics Diagram ..... | 6  |
| Package Drawings .....                   | 9  |
| Revision History .....                   | 10 |
| Disclaimer .....                         | 10 |

**Maximum ratings**

| Parameter   | Symbol         | Value          | Unit             |
|---|----------------|----------------|------------------|
| Repetitive peak reverse voltage   | $V_{RRM}$      | 1200           | V                |
| Continues forward current for $R_{th(j-c,max)}$<br>$T_C = 145^\circ\text{C}$ , D=1<br>$T_C = 135^\circ\text{C}$ , D=1<br>$T_C = 25^\circ\text{C}$ , D=1 | $I_F$          | 16<br>19<br>40 | A                |
| Surge non-repetitive forward current,<br>sine halfwave<br>$T_C=25^\circ\text{C}$ , $t_p=10\text{ms}$<br>$T_C=150^\circ\text{C}$ , $t_p=10\text{ms}$     | $I_{F,SM}$     | 140<br>120     | A                |
| Non-repetitive peak forward current<br>$T_C = 25^\circ\text{C}$ , $t_p=10 \mu\text{s}$  | $I_{F,max}$    | 850            | A                |
| $i^2t$ value<br>$T_C = 25^\circ\text{C}$ , $t_p=10 \text{ms}$<br>$T_C = 150^\circ\text{C}$ , $t_p=10 \text{ms}$   | $\int i^2 dt$  | 99<br>71       | A <sup>2</sup> s |
| Diode $dv/dt$ ruggedness<br>$V_R=0\dots960\text{V}$   | $dv/dt$        | 80             | V/ns             |
| Power dissipation<br>$T_C = 25^\circ\text{C}$   | $P_{tot}$      | 250            | W                |
| Operating and storage temperature   | $T_J; T_{stg}$ | -55...175      | °C               |
| Soldering temperature,<br>wavesoldering only allowed at leads,<br>1.6mm (0.063 in.) from case for 10 s  | $T_{sold}$     | 260            | °C               |
| Mounting torque<br>M3 and M4 screws   | $M$            | 0.7            | Nm               |

**Thermal Resistances**

| Parameter                                    | Symbol        | Conditions | Value |      |      | Unit |
|--|---------------|------------|-------|------|------|------|
|  |               |            | min.  | typ. | max. |      |
| <b>Characteristic</b>                        |               |            |       |      |      |      |
| Diode thermal resistance,<br>junction – case | $R_{th(j-c)}$ |            | -     | 0.46 | 0.60 | K/W  |
| Thermal resistance,<br>junction – ambient    | $R_{th(j-a)}$ | leaded     | -     | -    | 62   | K/W  |

**Electrical Characteristics**
**Static Characteristics, at  $T_j=25^\circ\text{C}$ , unless otherwise specified**

| Parameter                    | Symbol   | Conditions                                    | Value |      |      | Unit          |
|------------------------------|----------|---|-------|------|------|---------------|
|                              |          |   | min.  | typ. | max. |               |
| <b>Static Characteristic</b> |          |   |       |      |      |               |
| DC blocking voltage          | $V_{DC}$ | $T_j = 25^\circ\text{C}$                      | 1200  | -    | -    | V             |
| Diode forward voltage        | $V_F$    | $I_F = 16\text{A}, T_j = 25^\circ\text{C}$    | -     | 1.65 | 1.95 | V             |
|                              |          | $I_F = 16\text{A}, T_j = 150^\circ\text{C}$   | -     | 2.25 | 2.85 |               |
| Reverse current              | $I_R$    | $V_R = 1200\text{V}, T_j = 25^\circ\text{C}$  |       | 5.5  | 80   | $\mu\text{A}$ |
|                              |          | $V_R = 1200\text{V}, T_j = 150^\circ\text{C}$ |       | 28   | 410  |               |

**Dynamic Characteristics, at  $T_j=25^\circ\text{C}$ , unless otherwise specified**

| Parameter                      | Symbol | Conditions   | Value |      |      | Unit |
|--------------------------------|--------|--|-------|------|------|------|
|                                |        |  | min.  | typ. | max. |      |
| <b>Dynamic Characteristics</b> |        |  |       |      |      |      |
| Total capacitive charge        | $Q_C$  | $V_R = 800\text{V}, T_j = 150^\circ\text{C}$<br>$Q_C = \int_0^{V_R} C(V) dV$ | -     | 57   | -    | nC   |
| Total Capacitance              | $C$    | $V_R = 1\text{V}, f = 1\text{MHz}$   | -     | 730  | -    | pF   |
|                                |        | $V_R = 400\text{V}, f = 1\text{MHz}$   | -     | 52   | -    |      |
|                                |        | $V_R = 800\text{V}, f = 1\text{MHz}$   | -     | 40   | -    |      |

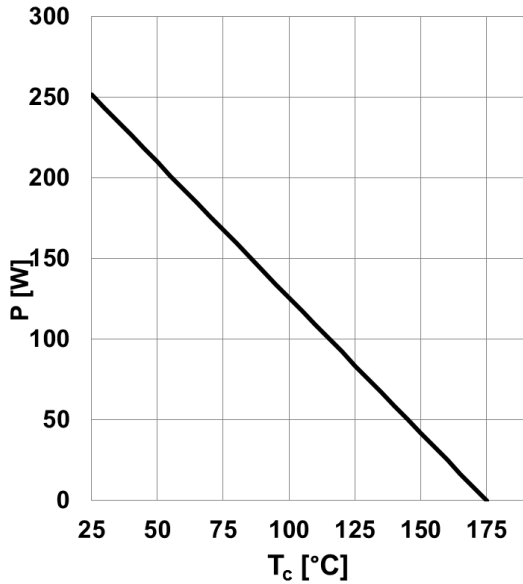


Figure 1. Power dissipation as a function of case temperature,  $P_{tot}=f(T_c, R_{th(j-c),max})$

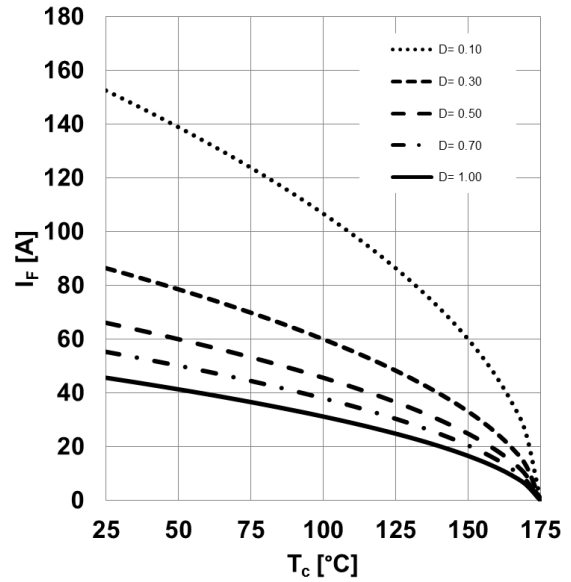


Figure 2. Diode forward current as function of temperature,  $T_j \leq 175^\circ\text{C}$ ,  $R_{th(j-c),max}$ , parameter  $D$ =duty cycle,  $V_{th}$ ,  $R_{diff}$  @  $T_j=175^\circ\text{C}$

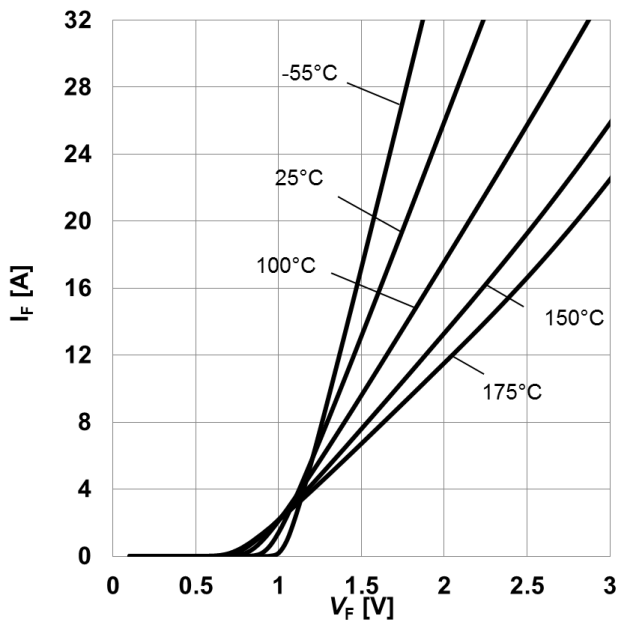


Figure 3. Typical forward characteristics,  $I_F=f(V_F)$ ,  $t_p=10\ \mu\text{s}$ , parameter:  $T_j$

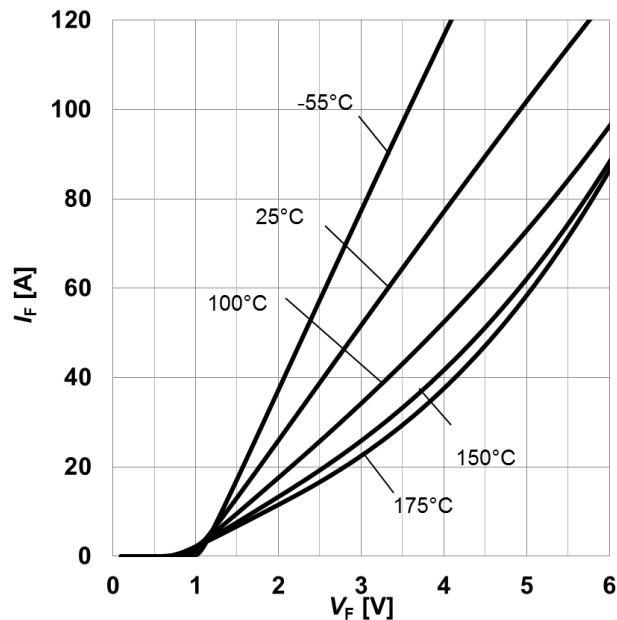


Figure 4. Typical forward characteristics in surge current,  $I_F=f(V_F)$ ,  $t_p=10\ \mu\text{s}$ , parameter:  $T_j$

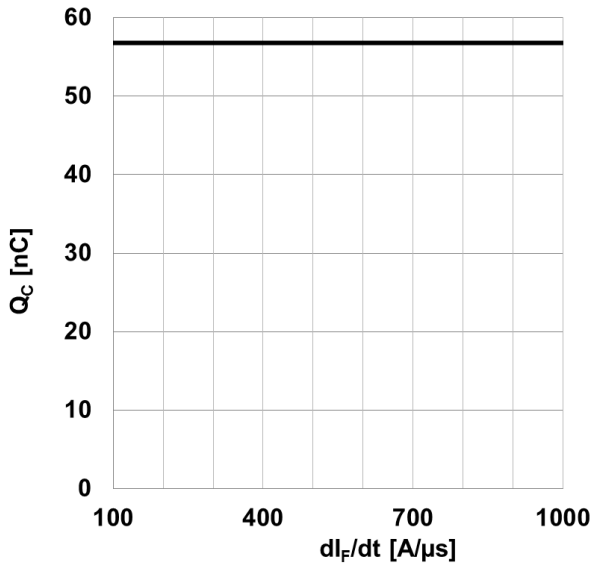


Figure 5. **Typical capacitive charge as function of current slope<sup>1</sup>**,  $Q_C=f(di_F/dt)$ ,  $T_j=150^\circ\text{C}$   
 1) Only capacitive charge, guaranteed by design.

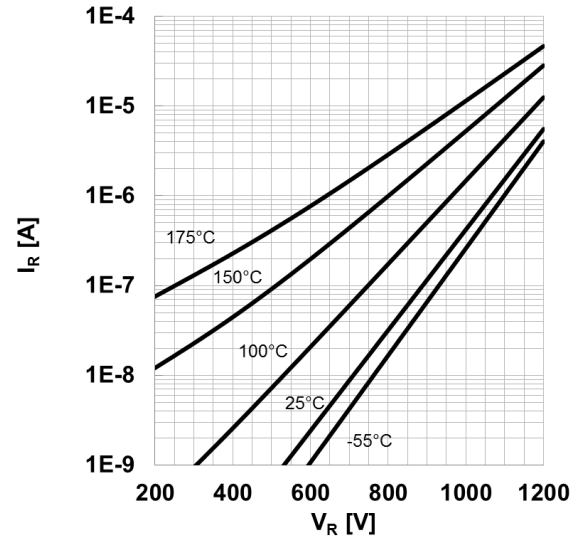


Figure 6. **Typical reverse current as function of reverse voltage**,  $I_R=f(V_R)$ , parameter:  $T_j$

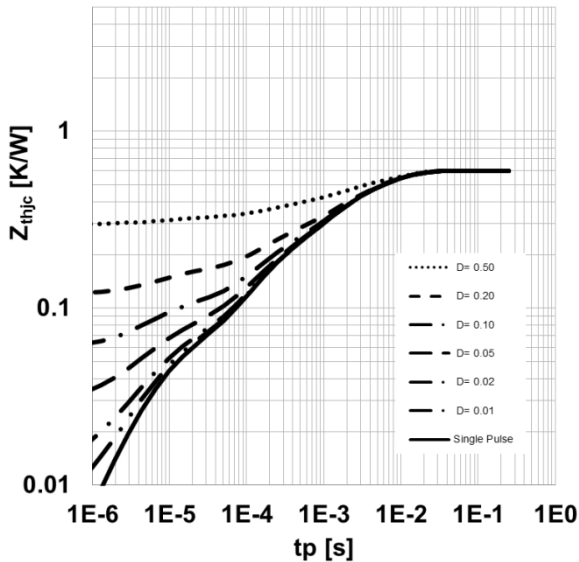


Figure 7. **Max. transient thermal impedance**,  $Z_{th,jc}=f(t_p)$ , parameter:  $D=t_p/T$

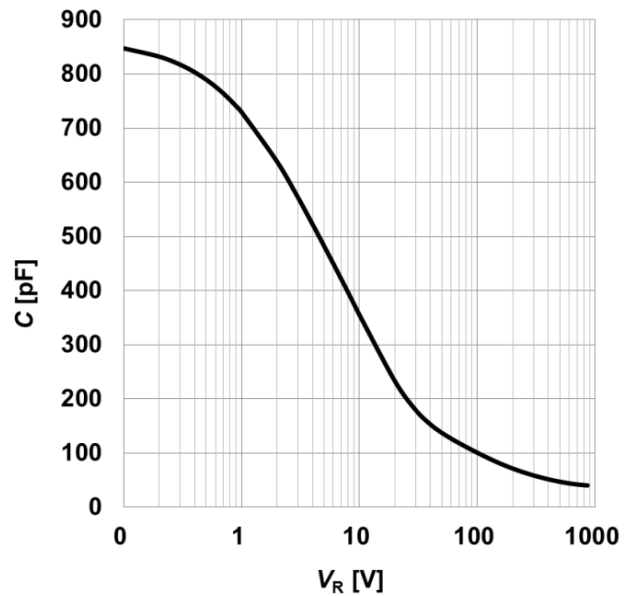


Figure 8. **Typical capacitance as function of reverse voltage**,  $C=f(V_R)$ ;  $T_j=25^\circ\text{C}$ ;  $f=1\text{ MHz}$

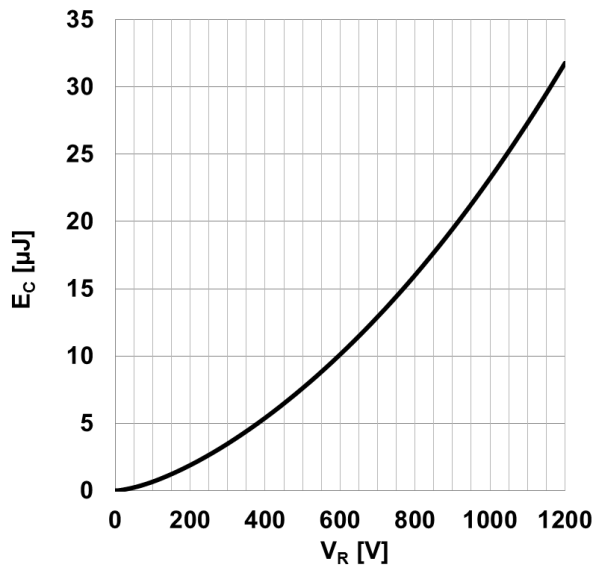
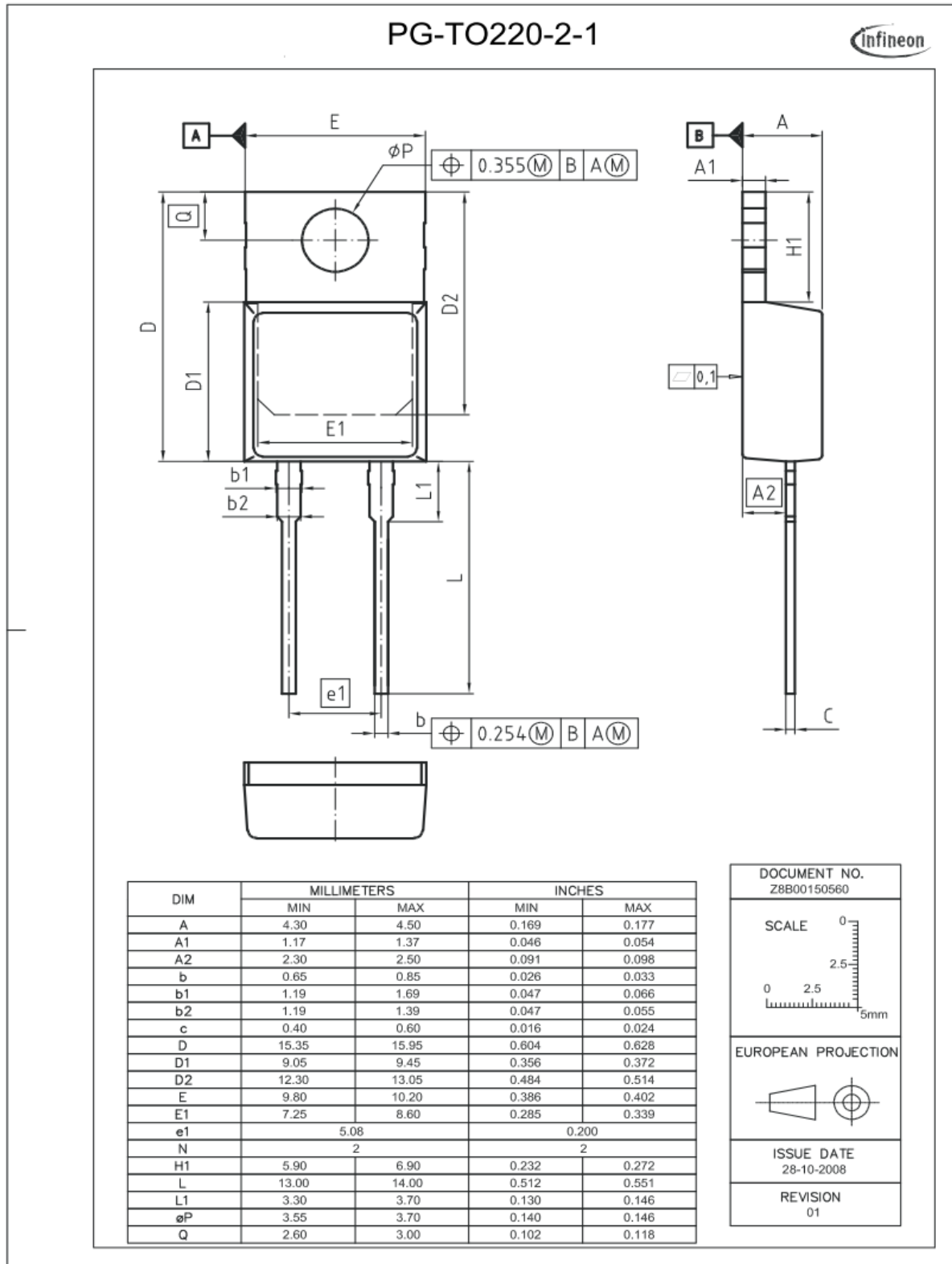


Figure 9. Typical capacitively stored energy as function of reverse voltage,

$$E_C = \int_0^{V_R} C(V)VdV$$





## Revision History

IDH16G120C5

### Revision: 2015-09-03, Rev. 2.0

Previous Revision:

| Revision | Date | Subjects (major changes since last version) |
|----------|------|---|
| 2.0      | -    | Final data sheet                            |

### 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](mailto:erratum@infineon.com)

### Published by

**Infineon Technologies AG**

**81726 Munich, Germany**

**© 2015 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. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, 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.

### Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office ([www.infineon.com](http://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.