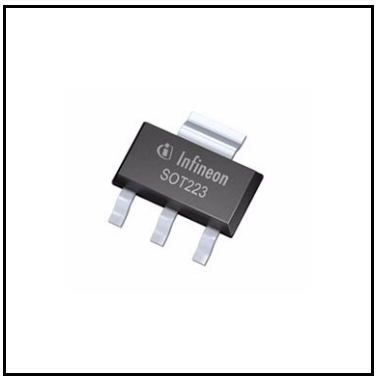
OPTIREG™ linear TLE4264-2

5 V low drop fixed voltage regulator

AEC Qualified RoHS



Features

- Output voltage tolerance ≤ ±3% (±2% up to 50 mA)
- 150 mA current capability
- Low-drop voltage
- Very low current consumption: 40 µA
- Overtemperature protection
- Short-circuit proof
- Suitable for use in automotive electronics
- Reverse polarity proof
- Green Product (RoHS-compliant)

Potential applications

General automotive applications.

Product validation

Qualified for automotive applications. Product validation according to AEC-Q100.

Description

The OPTIREG™ linear TLE4264-2 is a monolithic integrated low-drop fixed voltage regulator which can supply loads up to 150 mA. It is functional compatible to the TLE4264, but has a reduced quiescent current of typ. 40 µA. The TLE4264-2 is especially designed for all applications which require very low quiescent currents. The device is available in the small surface mount PG-SOT223-4 package. The device is pin compatible to the TLE4264. The regulator is designed to supply microprocessor systems under the severe condition of automotive applications and is therefore equipped with additional protection against overload, short-circuit and overtemperature. Of course the TLE4264-2 can be used in all other applications, wherever a stabilized voltage is required.

An input voltage V_I in the range of 5.5 V < V_I < 45 V is regulated to $V_{Q,nom}$ = 5 V with an accuracy of ±3%. An accuracy of ±2% is kept for a load current range up to 50 mA.

The device operates in the temperature range of T_j = -40°C to 150°C.

Type	Package	Marking
TLE4264-2G	PG-SOT223-4	4264-2

Table of contents

1 Block diagram

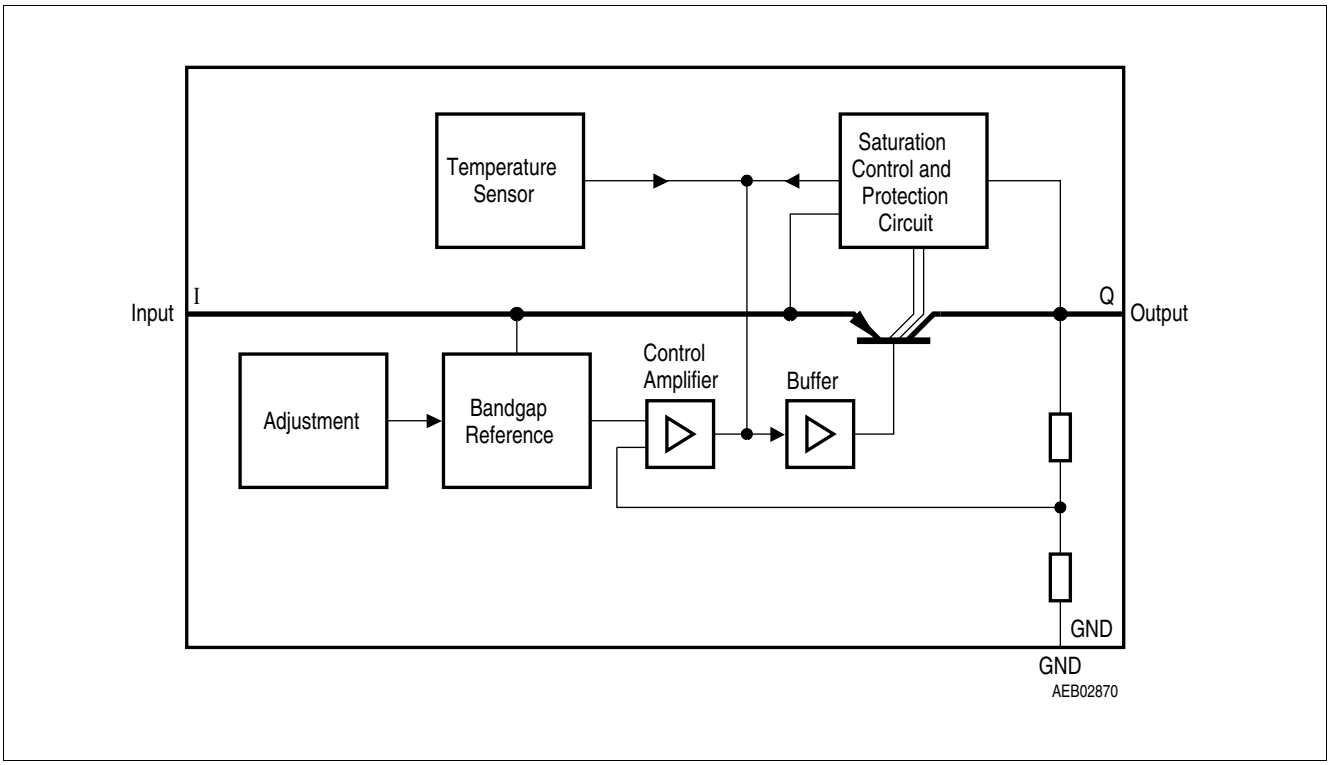


Figure 1 Block diagram

2 Pin configuration

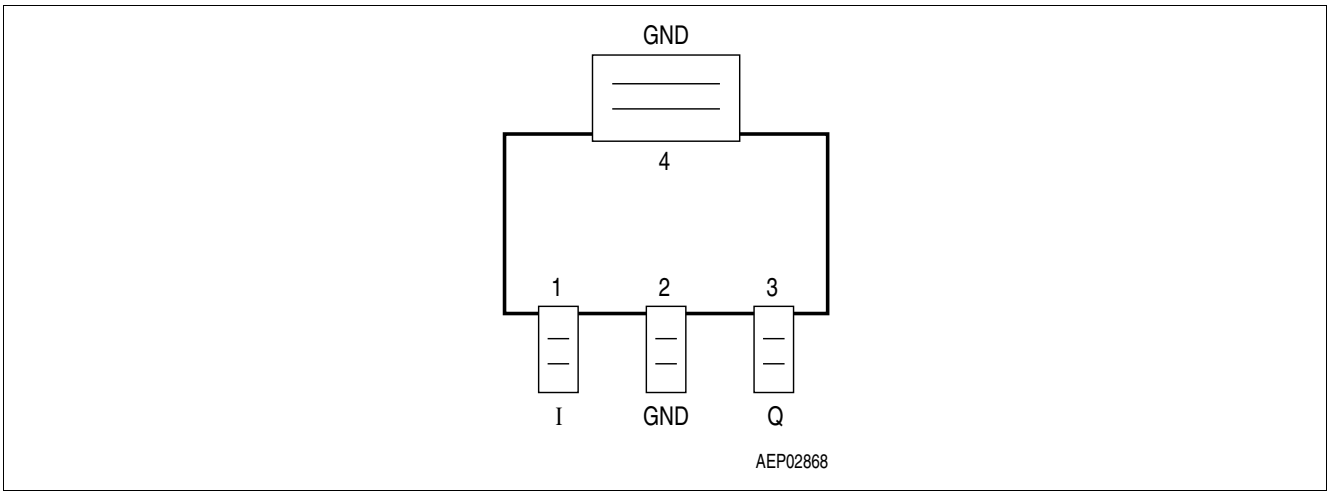


Figure 2 Pin configuration (top view)

Table 1 Pin definitions and functions

Pin	Symbol	Function
1	*I*	**Input voltage** Block to ground directly with a ceramic capacitor.
2, 4	GND	**Ground**
3	*Q*	**5 V output voltage** Block to ground with a capacitor $C_Q \geq 10$ µF, ESR ≤ 4 Ω.

3 General product characteristics

3.1 Absolute maximum ratings

Table 2 Absolute maximum ratings

Parameter	Symbol	Values			Unit	Note or Test Condition	Number
		Min.	Typ.	Max.			
Input I							
Input voltage	V_I	-42	–	45	V	–	P_3.1.1
Input current	I_I	–	–	–	–	Limited internally	P_3.1.2
Output Q							
Output voltage	V_Q	-0.3	–	32	V	–	P_3.1.3
Output current	I_Q	–	–	–	–	Limited internally	P_3.1.4
Ground GND							
Current	I_{GND}	50	–	–	mA	–	P_3.1.5
Temperature							
Junction temperature	T_j	–	–	150	°C	–	P_3.1.6
Storage temperature	T_{stg}	-50	–	150	°C	–	P_3.1.7
Thermal resistance							
Junction-ambient	$R_{thj\text{-}a}$	–	–	164	K/W	[1] PG-SOT223-4	P_3.1.8
Junction-ambient	$R_{thj\text{-}a}$	–	–	81	K/W	PG-SOT223-4, 300 mm² heat sink area	P_3.1.9
Junction-pin	$R_{thj\text{-}p}$	–	–	17	K/W	[2] PG-SOT223-4	P_3.1.10
Operating range							
Input voltage	V_I	5.5	–	45	V	–	P_3.1.11
Junction temperature	T_j	-40	–	150	°C	–	P_3.1.12

1) Package mounted on PCB 80 × 80 × 1.5 mm³; 35 µ Cu; 5 µ Sn; Footprint only; zero airflow.

2) Measured to pin 4.

3.2 Electrical characteristics

Table 3 Electrical characteristics

V_I = 13.5 V; T_j = -40°C to 125°C, unless specified otherwise

Parameter	Symbol	Values			Unit	Note or Test Condition	Number
		Min.	Typ.	Max.			
Output voltage	V_Q	4.85	5.0	5.15	V	I_Q = 5 mA to 100 mA V_I = 6 V to 21 V	P_3.2.1
Output voltage	V_Q	4.9	5.0	5.1	V	I_Q = 5 mA to 50 mA V_I = 9 V to 16 V	P_3.2.2
Output-current limiting	I_Q	150	200	500	mA	–	P_3.2.3
Current consumption $I_q = I_I - I_Q$	I_q	–	40	60	µA	I_Q = 100 µA $T_j \leq$ 85°C	P_3.2.4
Current consumption $I_q = I_I - I_Q$	I_q	–	40	70	µA	I_Q = 100 µA	P_3.2.5
Current consumption $I_q = I_I - I_Q$	I_q	–	1.7	4	mA	I_Q = 50 mA	P_3.2.6
Drop voltage	V_{dr}	–	0.22	0.5	V	[1] I_Q = 100 mA	P_3.2.7
Load regulation	$\Delta V_{Q,lo}$	–	50	90	mV	I_Q = 1 mA to 100 mA V_I = 13.5 V	P_3.2.8
Line regulation	$\Delta V_{Q,li}$	–	5	30	mV	V_I = 6 V to 28 V I_Q= 1 mA	P_3.2.9
Power supply ripple rejection	*PSRR*	–	68	–	dB	f_r = 100 Hz V_r = 0.5 Vpp	P_3.2.10
Output capacitor	C_Q	10	–	–	µF	ESR ≤ 4 Ω at 10 kHz	P_3.2.11

1) Drop voltage = V_I - V_Q (measured where V_Q has dropped 100 mV from the nominal value obtained at V_I = 13.5 V).

4 Functional description

4.1 Application circuit

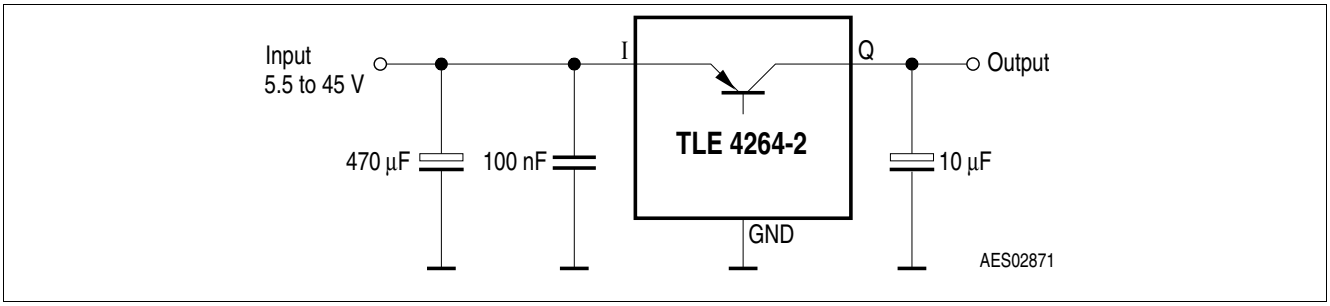


Figure 3 Application circuit

The control amplifier compares a reference voltage, which is kept highly precise by resistance adjustment, to a voltage that is proportional to the output voltage and drives the base of the series transistor via a buffer.

Saturation control, working as a function of load current, prevents any over-saturation of the power element.

The IC is additionally protected against overload, overtemperature and reverse polarity.

In the TLE4264-2 the output voltage is divided and compared to an internal reference of 2.5 V typical. The regulation loop controls the output to achieve an output voltage of 5 V with an accuracy of ±3% at an input voltage range of 5.5 V < V_I < 45 V.

Figure 3 shows a typical application circuit. For stability of the control loop the TLE4264-2 output requires an output capacitor C_Q of at least 10 µF with a maximum permissible ESR of 4 Ω. Tantalum as well as multi layer ceramic capacitors are suitable.

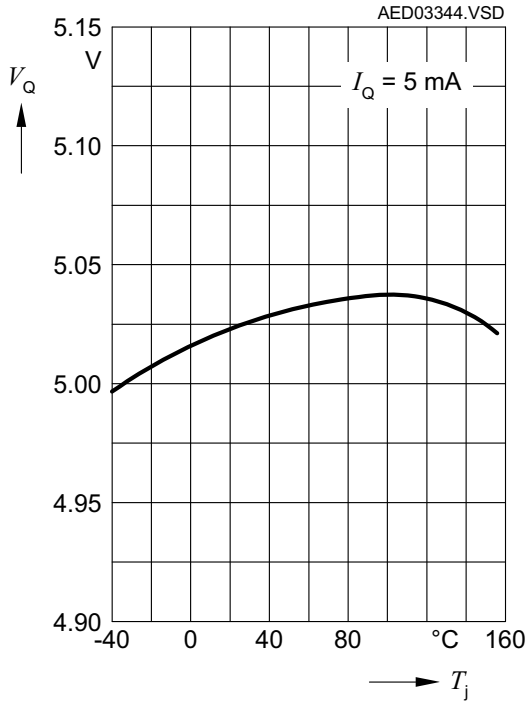
At the input of the regulator an input capacitor is necessary for compensating line influences (100 nF ceramic capacitor recommended). A resistor of approx. 1 Ω in series with C_I, can damp any oscillation occurring due to the input inductivity and the input capacitor.

In the application circuit shown in **Figure 3** an additional electrolytic input capacitor of 470 µF is added in order to buffer supply line influences. This capacitor is recommended, if the device is sourced via long supply lines of several meters.

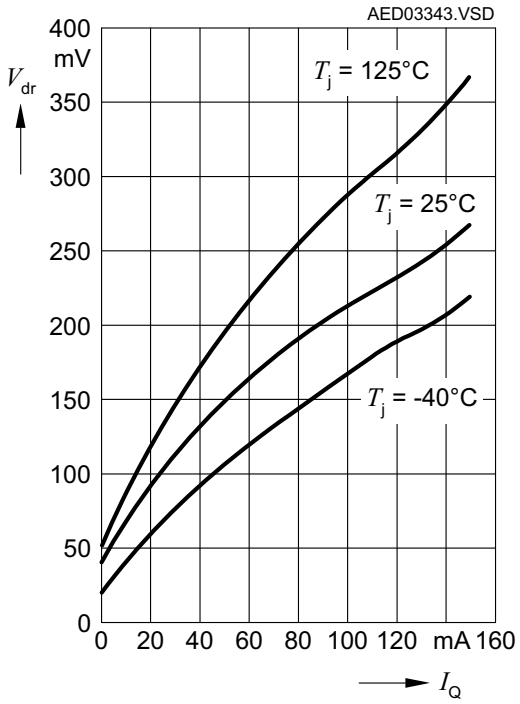
The TLE4264-2 can supply up to 150 mA. However for protection for high input voltage above 25 V, the output current is reduced (SOA protection).

5 Typical performance characteristics

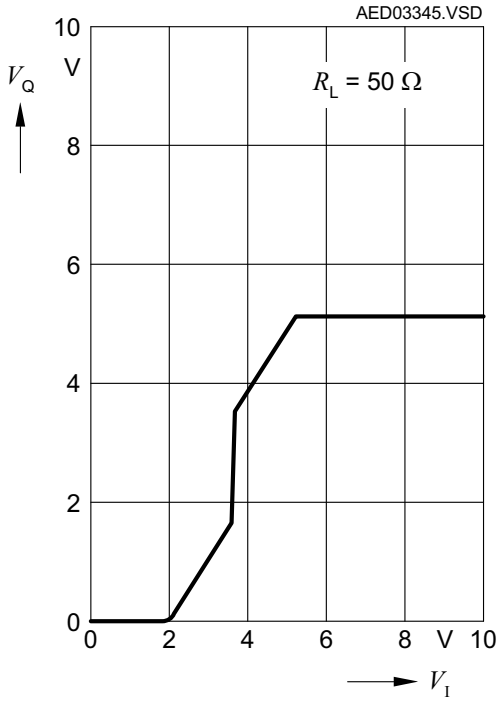
Output voltage V_Q versus junction temperature T_j



Drop voltage V_{dr} versus output current I_Q

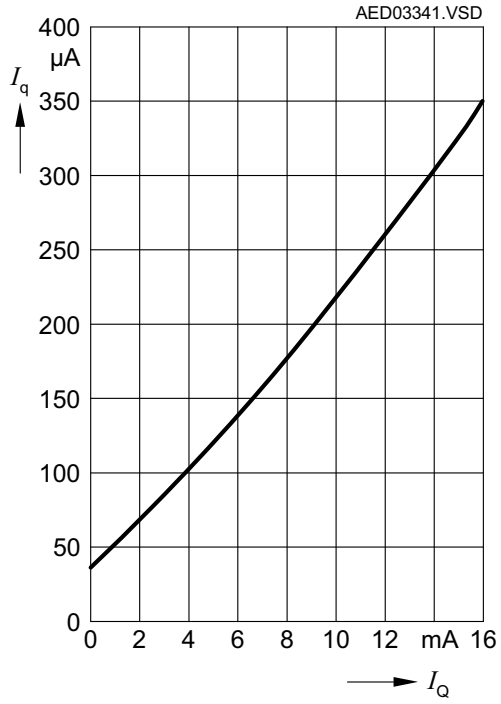


Output voltage V_Q versus input voltage V_I

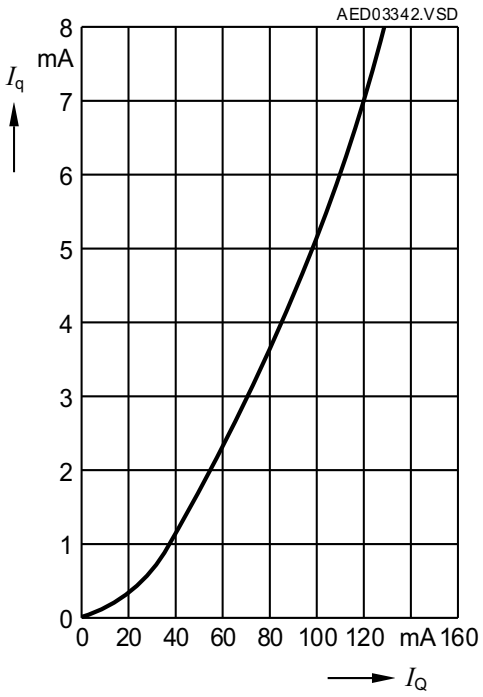


Typical performance characteristics

Current consumption I_q versus output current I_Q



Current consumption I_q versus output current I_Q



6 Package information

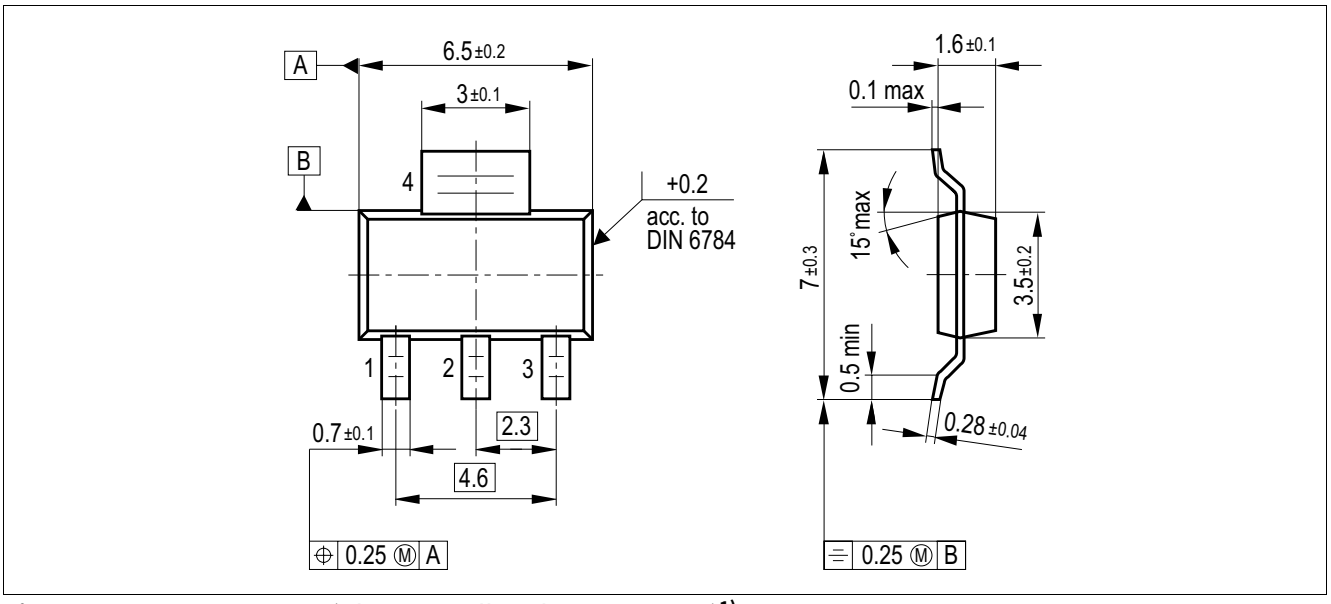


Figure 4 **PG-SOT223-4** (Plastic small outline transistor)[1)]

Green Product (RoHS-compliant)

To meet the world-wide customer requirements for environmentally friendly products and to be compliant with government regulations the device is available as a Green Product. Green Products are RoHS-compliant (Pb-free finish on leads and suitable for Pb-free soldering according to IPC/JEDEC J-STD-020).

Further information on packages

https://www.infineon.com/packages

1) Dimensions in mm

7 Revision history

Revision	Date	Changes
2.72	2024-07-24	Editorial changes, P-numbers assigned
2.71	2019-10-29	Editorial change on page 9
2.7	2019-05-22	Updated layout and structure Updated packaged drawing “PG-SOT223” Editorial changes
2.6	2008-03-10	Simplified package name to PG-SOT223-4 No modification of released product
2.5	2007-03-20	Initial version of RoHS-compliant derivate of TLE4264-2 Page 1: AEC certified statement added Page 1 and Page 10: RoHS compliance statement and Green Product feature added Page 1 and Page 10: Package changed to RoHS compliant version Legal Disclaimer updated

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

Edition 2024-07-24
Published by
Infineon Technologies AG
81726 Munich, Germany

Do you have a question about any aspect of this document?
Email: erratum@infineon.com

Document reference
Z8F55276373

IMPORTANT NOTICE

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.

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

WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.