



# TDZxJ series

## Single Zener diodes

Rev. 2 — 29 July 2011

Product data sheet

## 1. Product profile

### 1.1 General description

General-purpose Zener diodes in a SOD323F (SC-90) very small and flat lead Surface-Mounted Device (SMD) plastic package.

### 1.2 Features and benefits

- Non-repetitive peak reverse power dissipation:  $\leq 180$  W
- Total power dissipation:  $\leq 500$  mW
- Very small plastic package suitable for surface-mounted design
- Low differential resistance
- AEC-Q101 qualified

### 1.3 Applications

- General regulation functions

### 1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 100$ mA	[1] -	-	1.1	V
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	[2] -	-	500	mW

[1] Pulse test:  $t_p \leq 300$   $\mu$ s;  $\delta \leq 0.02$ .

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for cathode  $16$  mm<sup>2</sup>.

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode [1]		 006aaa152
2	anode		

[1] The marking bar indicates the cathode.

### 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
TDZxJ series	SC-90	plastic surface-mounted package; 2 leads	SOD323F

### 4. Marking

Table 4. Marking codes

Type number	Marking code	Type number	Marking code
TDZ2V4J	3A	TDZ9V1J	3Q
TDZ2V7J	3B	TDZ10J	3R
TDZ3V0J	3C	TDZ11J	3S
TDZ3V3J	3D	TDZ12J	3T
TDZ3V6J	3E	TDZ13J	3U
TDZ3V9J	3F	TDZ15J	3V
TDZ4V3J	3G	TDZ16J	3W
TDZ4V7J	3H	TDZ18J	3Y
TDZ5V1J	3J	TDZ20J	3Z
TDZ5V6J	JQ	TDZ22J	4A
TDZ6V2J	3K	TDZ24J	4B
TDZ6V8J	3L	TDZ27J	4C
TDZ7V5J	3N	TDZ30J	4D
TDZ8V2J	3P	-	-

## 5. Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$I_F$	forward current		-	250	mA
$I_{ZSM}$	non-repetitive peak reverse current		[1] -	see Table 8 and 10	
$P_{ZSM}$	non-repetitive peak reverse power dissipation		[1]		
	TDZ2V4J to TDZ5V6J		-	180	W
	TDZ6V2J to TDZ6V8J		-	100	W
	TDZ7V5J to TDZ30J		-	40	W
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[2] -	500	mW
$T_j$	junction temperature		-	150	°C
$T_{amb}$	ambient temperature		-55	+150	°C
$T_{stg}$	storage temperature		-65	+150	°C

[1]  $t_p = 100\ \mu\text{s}$ ; square wave;  $T_j = 25\text{ °C}$  before surge.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 16 mm<sup>2</sup>.

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] -	-	250	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[2] -	-	25	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 16 mm<sup>2</sup>.

[2] Soldering point of cathode tab.

## 7. Characteristics

**Table 7. Characteristics**

$T_j = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage		[1]			
		$I_F = 10\text{ mA}$	-	-	0.9	V
		$I_F = 100\text{ mA}$	-	-	1.1	V

[1] Pulse test:  $t_p \leq 300\ \mu\text{s}$ ;  $\delta \leq 0.02$ .

**Table 8. Characteristics per type; Zener TDZ2V4J to Zener TDZ24J** $T_j = 25\text{ °C}$  unless otherwise specified.

TDZxxxJ	Working voltage $V_Z$ (V)		Differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu$ A)		Temperature coefficient $S_Z$ (mV/K)		Diode capacitance $C_d$ (pF) <sup>[1]</sup>	Non-repetitive peak reverse current $I_{ZSM}$ (A) <sup>[2]</sup>
	$I_Z = 5\text{ mA}$		$I_Z = 1\text{ mA}$	$I_Z = 5\text{ mA}$	Max	$V_R$ (V)	$I_Z = 5\text{ mA}$			
	Min	Max	Max	Max			Min	Max	Max	Max
2V4	2.35	2.45	400	100	50	1.0	-3.5	0	450	15
2V7	2.65	2.75	450	100	20	1.0	-3.5	0	440	15
3V0	2.94	3.06	500	95	10	1.0	-3.5	0	425	15
3V3	3.23	3.37	500	95	5	1.0	-3.5	0	410	15
3V6	3.53	3.67	500	90	5	1.0	-3.5	0	390	15
3V9	3.82	3.98	500	90	3	1.0	-3.5	0	370	15
4V3	4.21	4.39	600	90	3	1.0	-3.5	0	350	15
4V7	4.61	4.79	500	80	3	2.0	-3.5	0.2	325	15
5V1	5.00	5.20	480	60	2	2.0	-2.7	1.2	300	15
5V6	5.49	5.71	400	40	10	2.5	-2	2.5	275	15
6V2	6.08	6.32	150	10	3	4.0	0.4	3.7	250	12
6V8	6.66	6.94	80	15	2	4.0	1.2	4.5	215	12
7V5	7.5	7.65	80	10	1	5.0	2.5	5.3	170	4.0
8V2	8.04	8.36	80	10	0.70	5.0	3.2	6.2	150	4.0
9V1	8.92	9.28	100	10	0.50	6.0	3.8	7.0	120	3.0
10	9.80	10.20	150	10	0.20	7.0	4.5	8.0	110	3.0
11	10.80	11.20	150	10	0.10	8.0	5.4	9.0	108	2.5
12	11.80	12.20	150	10	0.10	8.0	6.0	10	105	2.5
13	12.70	13.30	170	10	0.10	8.0	7.0	11	103	2.5
15	14.70	15.30	200	15	0.05	10.5	9.2	13	99	2.0
16	15.70	16.30	200	20	0.05	11.2	10.4	14	97	1.5
18	17.6	18.4	225	20	0.05	12.6	12.4	16	93	1.5
20	19.6	20.4	225	20	0.05	14.0	14.4	18	88	1.5
22	21.6	22.4	250	25	0.05	15.4	16.4	20	84	1.25
24	23.5	24.5	250	30	0.05	16.8	18.4	22	80	1.25

[1]  $f = 1\text{ MHz}$ ;  $V_R = 0\text{ V}$ [2]  $t_p = 100\text{ }\mu\text{s}$ ; square wave;  $T_j = 25\text{ °C}$  before surge.**Table 9. Characteristics per type; Zener TDZ5V6J** $T_j = 25\text{ °C}$  unless otherwise specified.

TDZxxxJ	Working voltage $V_Z$ (V)		Differential resistance $r_{dif}$ ( $\Omega$ )		Temperature coefficient $S_Z$ (mV/K)	
	$I_Z = 10\text{ mA}$		$I_Z = 0.5\text{ mA}$	$I_Z = 10\text{ mA}$	$I_Z = 5\text{ mA}$	
	Min	Max	Max	Max	Min	Max
5V6	5.20	6.00	500	7	-1.7	2.8

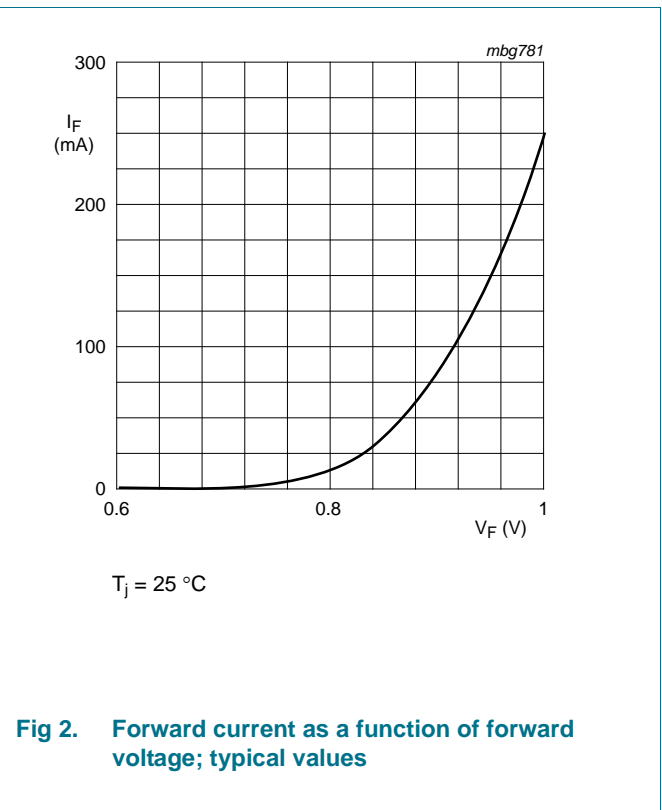
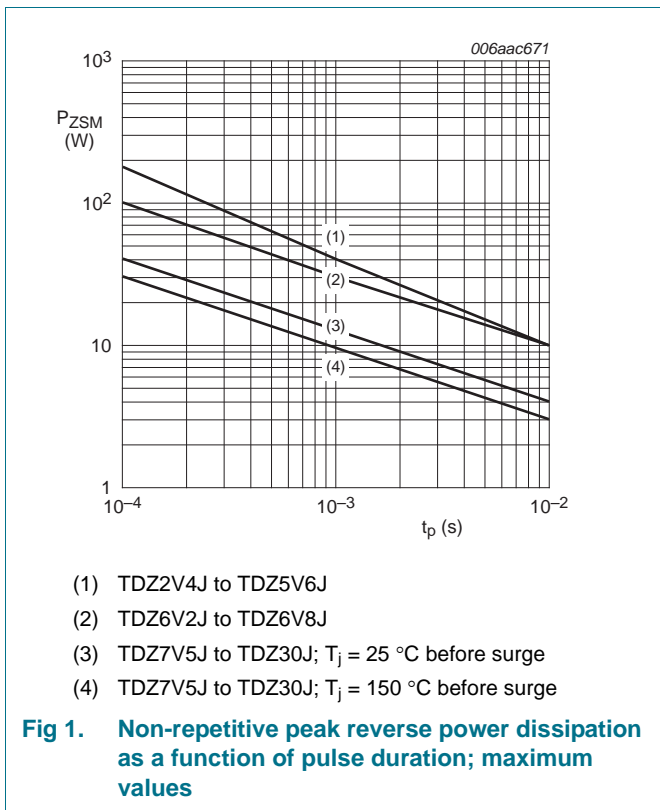
**Table 10. Characteristics per type; Zener TDZ27J to Zener TDZ30J**

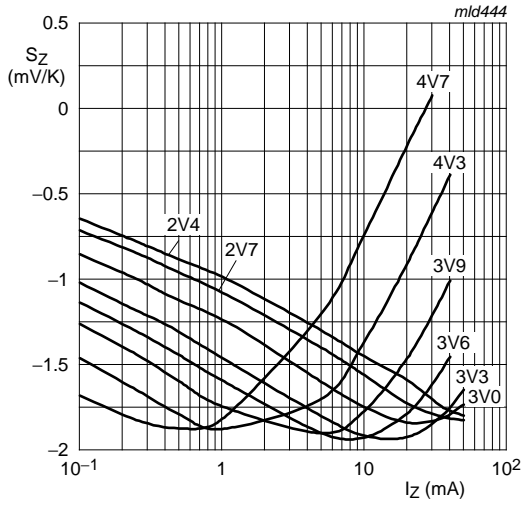
$T_j = 25\text{ °C}$  unless otherwise specified.

TDZxxxJ	Working voltage $V_Z$ (V)		Differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu A$ )		Temperature coefficient $S_Z$ (mV/K)		Diode capacitance $C_d$ (pF) <sup>[1]</sup>	Non-repetitive peak reverse current $I_{ZSM}$ (A) <sup>[2]</sup>
	$I_Z = 2\text{ mA}$		$I_Z = 0.5\text{ mA}$	$I_Z = 2\text{ mA}$	Max	$V_R$ (V)	$I_Z = 2\text{ mA}$			
	Min	Max	Max	Max			Min	Max	Max	Max
27	26.5	27.5	250	40	0.05	18.9	21.4	25.3	73	1
30	29.4	30.6	250	40	0.05	21	24.4	29.4	66	1

[1]  $f = 1\text{ MHz}$ ;  $V_R = 0\text{ V}$

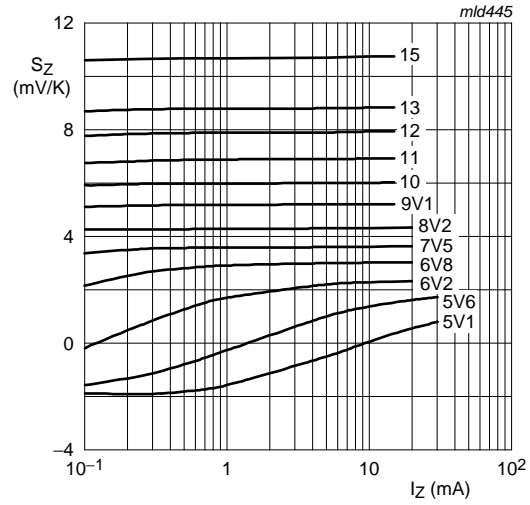
[2]  $t_p = 100\text{ }\mu s$ ; square wave;  $T_j = 25\text{ °C}$  before surge.





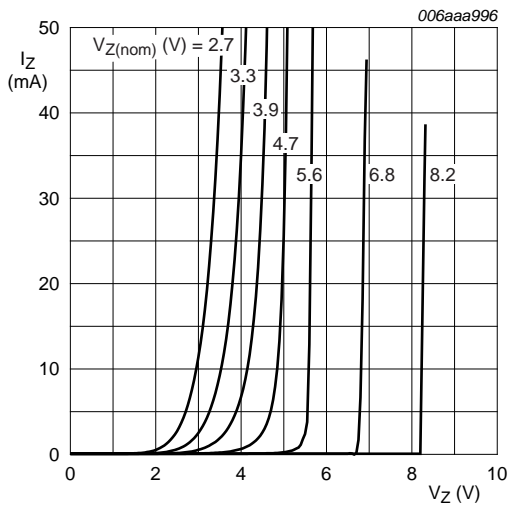
TDZ2V4J to TDZ4V7J  
 $T_j = 25\text{ }^\circ\text{C}$  to  $150\text{ }^\circ\text{C}$

**Fig 3. Temperature coefficient as a function of working current; typical values**



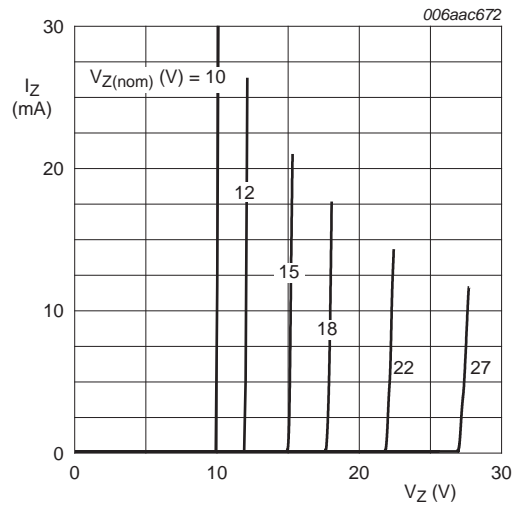
TDZ5V1J to TDZ15J  
 $T_j = 25\text{ }^\circ\text{C}$  to  $150\text{ }^\circ\text{C}$

**Fig 4. Temperature coefficient as a function of working current; typical values**



TDZ2V7J to TDZ6V6J  
 $T_j = 25\text{ }^\circ\text{C}$

**Fig 5. Working current as a function of working voltage; typical values**



TDZ10J to TDZ27J  
 $T_j = 25\text{ }^\circ\text{C}$

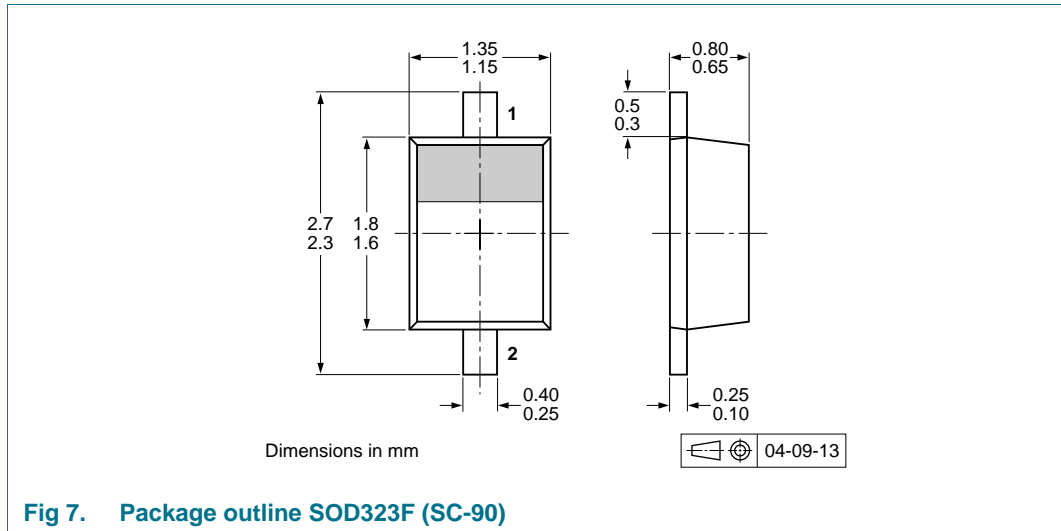
**Fig 6. Working current as a function of working voltage; typical values**

## 8. Test information

### 8.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

## 9. Package outline



## 10. Packing information

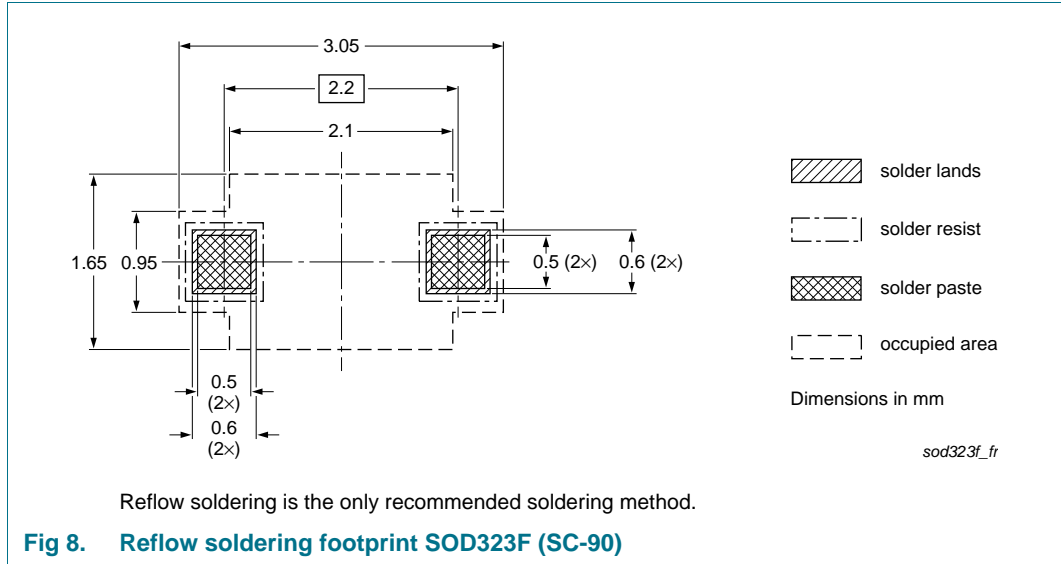
**Table 11. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

Type number	Package	Description	Packing quantity	
			3000	10000
TDZxJ series	SOD323F	4 mm pitch, 8 mm tape and reel	-115	-135

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering





## 12. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
TDZXJ_SER v.2	20110729	Product data sheet	-	TDZ5V6J v.1
Modifications:		<ul style="list-style-type: none"><li>Added type numbers TDZ2V4J, TDZ2V7J, TDZ3V0J, TDZ3V3J, TDZ3V6J, TDZ3V9J, TDZ4V3J, TDZ4V7J, TDZ5V1J, TDZ6V2J, TDZ6V8J, TDZ7V5J, TDZ8V2J, TDZ9V1J, TDZ10J, TDZ11J, TDZ12J, TDZ13J, TDZ15J, TDZ16J, TDZ18J, TDZ20J, TDZ22J, TDZ24J, TDZ27J and TDZ30J.</li><li>Added <a href="#">Table 8</a> to <a href="#">10</a>.</li><li>Updated <a href="#">Figure 1</a> to <a href="#">4</a> and added <a href="#">Figure 5</a> and <a href="#">6</a>.</li></ul>		
TDZ5V6J v.1	20100823	Product data sheet	-	-

## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nexperia.com>.

### 13.2 Definitions

**Draft** — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Nexperia does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet** — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Nexperia sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

**Product specification** — The information and data provided in a Product data sheet shall define the specification of the product as agreed between Nexperia and its customer, unless Nexperia and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the Nexperia product is deemed to offer functions and qualities beyond those described in the Product data sheet.

### 13.3 Disclaimers

**Limited warranty and liability** — Information in this document is believed to be accurate and reliable. However, Nexperia does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

In no event shall Nexperia be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, Nexperia's aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of Nexperia.

**Right to make changes** — Nexperia reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use** — Nexperia products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or

malfunction of a Nexperia product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Nexperia accepts no liability for inclusion and/or use of Nexperia products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. Nexperia makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using Nexperia products, and Nexperia accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the Nexperia product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

Nexperia does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using Nexperia products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). Nexperia does not accept any liability in this respect.

**Limiting values** — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

**Terms and conditions of commercial sale** — Nexperia products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nexperia.com/profile/terms>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. Nexperia hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of Nexperia products by customer.

**No offer to sell or license** — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Export control** — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from national authorities.

**Quick reference data** — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

## 13.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 14. Contact information

---

For more information, please visit: <http://www.nexperia.com>

For sales office addresses, please send an email to: [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)

## 15. Contents

---

<b>1</b>	<b>Product profile</b> . . . . .	<b>1</b>
1.1	General description . . . . .	1
1.2	Features and benefits . . . . .	1
1.3	Applications . . . . .	1
1.4	Quick reference data . . . . .	1
<b>2</b>	<b>Pinning information</b> . . . . .	<b>1</b>
<b>3</b>	<b>Ordering information</b> . . . . .	<b>2</b>
<b>4</b>	<b>Marking</b> . . . . .	<b>2</b>
<b>5</b>	<b>Limiting values</b> . . . . .	<b>3</b>
<b>6</b>	<b>Thermal characteristics</b> . . . . .	<b>3</b>
<b>7</b>	<b>Characteristics</b> . . . . .	<b>3</b>
<b>8</b>	<b>Test information</b> . . . . .	<b>6</b>
8.1	Quality information . . . . .	6
<b>9</b>	<b>Package outline</b> . . . . .	<b>7</b>
<b>10</b>	<b>Packing information</b> . . . . .	<b>7</b>
<b>11</b>	<b>Soldering</b> . . . . .	<b>8</b>
<b>12</b>	<b>Revision history</b> . . . . .	<b>9</b>
<b>13</b>	<b>Legal information</b> . . . . .	<b>10</b>
13.1	Data sheet status . . . . .	10
13.2	Definitions . . . . .	10
13.3	Disclaimers . . . . .	10
13.4	Trademarks . . . . .	11
<b>14</b>	<b>Contact information</b> . . . . .	<b>11</b>
<b>15</b>	<b>Contents</b> . . . . .	<b>12</b>