

BZX84J series

Single Zener diodes

Rev. 2 — 1 August 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: ≤ 40 W
- Total power dissipation: ≤ 550 mW
- AEC-Q101 qualified
- Small plastic package suitable for surface-mounted design
- Wide working voltage range: nominal 2.4 V to 75 V (E24 range)
- Two tolerance series: ±2 % and ±5 %
- Low differential resistance

1.3 Applications

- General regulation functions

1.4 Quick reference data

Table 1. Quick reference data

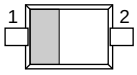
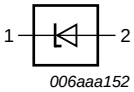
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 100 mA	[1]	-	-	1.1	V
P_{ZSM}	non-repetitive peak reverse power dissipation		[2]	-	-	40	W

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

[2] t_p = 100 μs; square wave; T_j = 25 °C prior to surge

2. Pinning information

Table 2. Pinning

Pin	Description		Simplified outline	Symbol
1	cathode	[1]		
2	anode			

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BZX84J-B2V4 to BZX84J-C75[1]	SC-90	plastic surface-mounted package; 2 leads	SOD323F

[1] The series consists of 74 types with nominal working voltages from 2.4 V to 75 V.

4. Marking

Table 4. Marking codes

Type number	Marking code	Type number	Marking code	Type number	Marking code	Type number	Marking code
BZX84J-B2V4	SL	BZX84J-B15	SC	BZX84J-C2V4	U3	BZX84J-C15	TV
BZX84J-B2V7	SM	BZX84J-B16	SD	BZX84J-C2V7	U4	BZX84J-C16	TW
BZX84J-B3V0	ST	BZX84J-B18	SE	BZX84J-C3V0	U9	BZX84J-C18	TX
BZX84J-B3V3	SU	BZX84J-B20	SF	BZX84J-C3V3	UA	BZX84J-C20	TY
BZX84J-B3V6	SV	BZX84J-B22	SG	BZX84J-C3V6	UB	BZX84J-C22	TZ
BZX84J-B3V9	SW	BZX84J-B24	SH	BZX84J-C3V9	UC	BZX84J-C24	U1
BZX84J-B4V3	SZ	BZX84J-B27	SK	BZX84J-C4V3	UF	BZX84J-C27	U2
BZX84J-B4V7	TA	BZX84J-B30	SN	BZX84J-C4V7	UG	BZX84J-C30	U5
BZX84J-B5V1	TD	BZX84J-B33	SP	BZX84J-C5V1	UL	BZX84J-C33	U6
BZX84J-B5V6	TE	BZX84J-B36	SR	BZX84J-C5V6	UM	BZX84J-C36	U7
BZX84J-B6V2	TH	BZX84J-B39	SS	BZX84J-C6V2	UR	BZX84J-C39	U8
BZX84J-B6V8	TK	BZX84J-B43	SX	BZX84J-C6V8	US	BZX84J-C43	UD
BZX84J-B7V5	TM	BZX84J-B47	SY	BZX84J-C7V5	UU	BZX84J-C47	UE
BZX84J-B8V2	TN	BZX84J-B51	TB	BZX84J-C8V2	UV	BZX84J-C51	UH
BZX84J-B9V1	TP	BZX84J-B56	TC	BZX84J-C9V1	UW	BZX84J-C56	UK
BZX84J-B10	S8	BZX84J-B62	TF	BZX84J-C10	TR	BZX84J-C62	UN
BZX84J-B11	S9	BZX84J-B68	TG	BZX84J-C11	TS	BZX84J-C68	UP
BZX84J-B12	SA	BZX84J-B75	TL	BZX84J-C12	TT	BZX84J-C75	UT
BZX84J-B13	SB	-	-	BZX84J-C13	TU	-	-

All information provided in this document is subject to legal disclaimers.

© NXP B.V. 2011. All rights reserved.

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 9	
P_{ZSM}	non-repetitive peak reverse power dissipation		[1]	-	40	W
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[2]	-	550	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			−55	+150	°C
T_{stg}	storage temperature			−65	+150	°C

[1] $t_p = 100$ µs; square wave; $T_j = 25$ °C prior to surge

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.

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]	-	-	230	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[2]	-	-	55	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.

[2] Soldering point of cathode tab.

7. Characteristics

Table 7. Characteristics

T_j = 25 °C unless otherwise specified.

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

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

All information provided in this document is subject to legal disclaimers.

© NXP B.V. 2011. All rights reserved.

Table 8. Characteristics per type; BZX84J-B2V4 to BZX84J-C24

T_j = 25 °C unless otherwise specified.

BZX84J-xxx	Sel	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Reverse current I_R (μA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)[1]	Non-repetitive peak reverse current I_{ZSM} (A)[2]
		I_Z = 5 mA		I_Z = 1 mA	I_Z = 5 mA			I_Z = 5 mA			
		Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max	Max
2V4	B	2.35	2.45	400	100	50	1	−3.5	0	450	12
	C	2.2	2.6								
2V7	B	2.65	2.75	450	100	20	1	−3.5	0	440	12
	C	2.5	2.9								
3V0	B	2.94	3.06	500	95	10	1	−3.5	0	425	12
	C	2.8	3.2								
3V3	B	3.23	3.37	500	95	5	1	−3.5	0	410	12
	C	3.1	3.5								
3V6	B	3.53	3.67	500	90	5	1	−3.5	0	390	12
	C	3.4	3.8								
3V9	B	3.82	3.98	500	90	3	1	−3.5	0	370	12
	C	3.7	4.1								
4V3	B	4.21	4.39	600	90	3	1	−3.5	0	350	12
	C	4	4.6								
4V7	B	4.61	4.79	500	80	3	2	−3.5	0.2	325	12
	C	4.4	5								
5V1	B	5	5.2	480	60	2	2	−2.7	1.2	300	12
	C	4.8	5.4								
5V6	B	5.49	5.71	400	40	1	2	−2	2.5	275	12
	C	5.2	6								
6V2	B	6.08	6.32	150	10	3	4	0.4	3.7	250	12
	C	5.8	6.6								
6V8	B	6.66	6.94	80	15	2	4	1.2	4.5	215	12
	C	6.4	7.2								
7V5	B	7.35	7.65	80	10	1	5	2.5	5.3	170	4
	C	7	7.9								
8V2	B	8.04	8.36	80	10	0.7	5	3.2	6.2	150	4
	C	7.7	8.7								
9V1	B	8.92	9.28	100	10	0.5	6	3.8	7	120	3
	C	8.5	9.6								
10	B	9.8	10.2	150	10	0.2	7	4.5	8	110	3
	C	9.4	10.6								
11	B	10.8	11.2	150	10	0.1	8	5.4	9	108	2.5
	C	10.4	11.6								
12	B	11.8	12.2	150	10	0.1	8	6	10	105	2.5
	C	11.4	12.7								

All information provided in this document is subject to legal disclaimers.

© NXP B.V. 2011. All rights reserved.

Table 8. Characteristics per type; BZX84J-B2V4 to BZX84J-C24 *…continued*

T_j = 25 °C unless otherwise specified.

BZX84J-xxx	Sel	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Reverse current I_R (μA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)[1]	Non-repetitive peak reverse current I_{ZSM} (A)[2]
		I_Z = 5 mA		I_Z = 1 mA	I_Z = 5 mA			I_Z = 5 mA			
		Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max	Max
13	B	12.7	13.3	170	10	0.1	8	7	11	103	2.5
	C	12.4	14.1								
15	B	14.7	15.3	200	15	0.05	10.5	9.2	13	99	2
	C	13.8	15.6								
16	B	15.7	16.3	200	20	0.05	11.2	10.4	14	97	1.5
	C	15.3	17.1								
18	B	17.6	18.4	225	20	0.05	12.6	12.4	16	93	1.5
	C	16.8	19.1								
20	B	19.6	20.4	225	20	0.05	14	14.4	18	88	1.5
	C	18.8	21.2								
22	B	21.6	22.4	250	25	0.05	15.4	16.4	20	84	1.25
	C	20.8	23.3								
24	B	23.5	24.5	250	30	0.05	16.8	18.4	22	80	1.25
	C	22.8	25.6								

[1] f = 1 MHz; V_R = 0 V

[2] t_p = 100 μs; square wave; T_j = 25 °C prior to surge

All information provided in this document is subject to legal disclaimers.

© NXP B.V. 2011. All rights reserved.

Table 9. Characteristics per type; BZX84J-B27 to BZX84J-C75

T_j = 25 °C unless otherwise specified.

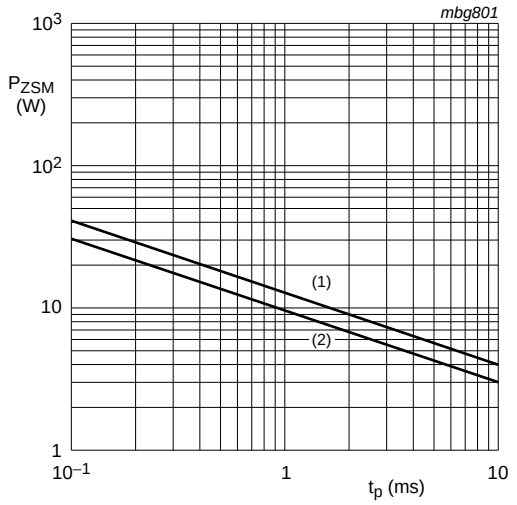
BZX84J-xxx	Sel	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Reverse current I_R (μA)		Temperature coefficient S_Z (mV/K)		Diode capacitance C_d (pF)[1]	Non-repetitive peak reverse current I_{ZSM} (A)[2]
		I_Z = 2 mA		I_Z = 0.5 mA	I_Z = 2 mA			I_Z = 2 mA			
		Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max	Max
27	B	26.5	27.5	250	40	0.05	18.9	21.4	25.3	73	1
	C	25.1	28.9								
30	B	29.4	30.6	250	40	0.05	21	24.4	29.4	66	1
	C	28	32								
33	B	32.3	33.7	275	40	0.05	23.1	27.4	33.4	60	0.9
	C	31	35								
36	B	35.3	36.7	300	60	0.05	25.2	30.4	37.4	59	0.8
	C	34	38								
39	B	38.2	39.8	300	75	0.05	27.3	33.4	41.2	58	0.7
	C	37	41								
43	B	42.1	43.9	325	80	0.05	30.1	37.6	46.6	56	0.6
	C	40	46								
47	B	46.1	47.9	325	90	0.05	32.9	42	51.8	55	0.5
	C	44	50								
51	B	50	52	350	110	0.05	35.7	46.6	57.2	52	0.4
	C	48	54								
56	B	54.9	57.1	375	120	0.05	39.2	52.2	63.8	49	0.3
	C	52	60								
62	B	60.8	63.2	400	140	0.05	43.4	58.8	71.6	44	0.3
	C	58	66								
68	B	66.6	69.4	400	160	0.05	47.6	65.6	79.8	40	0.25
	C	64	72								
75	B	73.5	76.5	400	175	0.05	52.5	73.4	88.6	35	0.2
	C	70	79								

[1] f = 1 MHz; V_R = 0 V

[2] t_p = 100 μs; square wave; T_j = 25 °C prior to surge

All information provided in this document is subject to legal disclaimers.

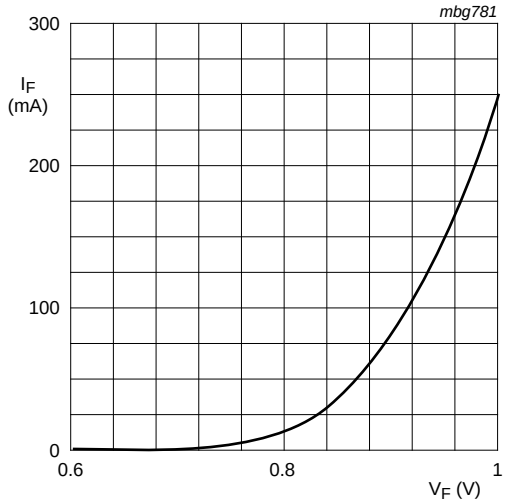
© NXP B.V. 2011. All rights reserved.



(1) T_j = 25 °C (prior to surge)

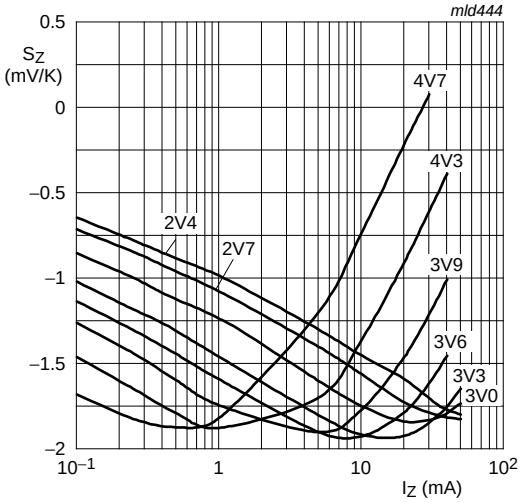
(2) T_j = 150 °C (prior to surge)

Fig 1. Non-repetitive peak reverse power dissipation as a function of pulse duration; maximum values



T_j = 25 °C

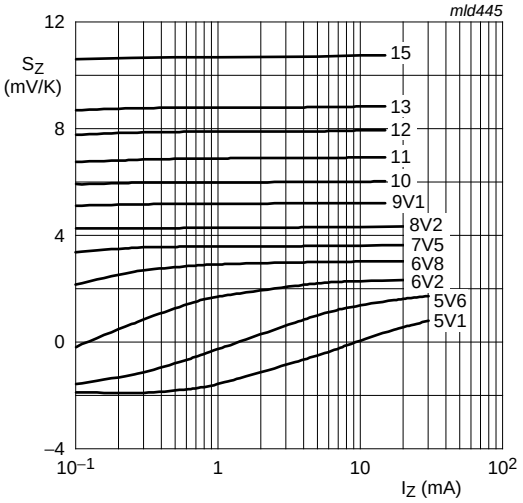
Fig 2. Forward current as a function of forward voltage; typical values



BZX84J-B/C2V4 to BZX84J-B/C4V7

T_j = 25 °C to 150 °C

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



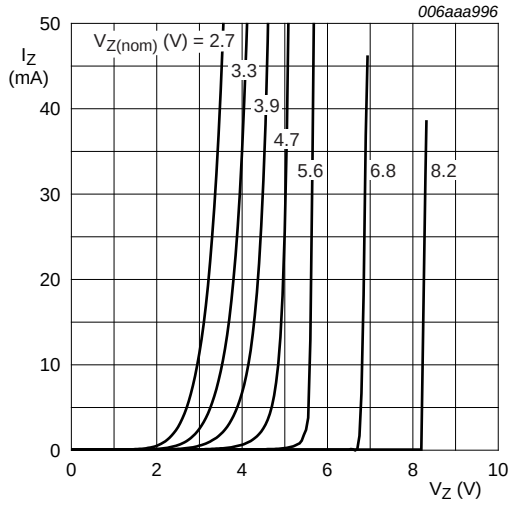
BZX84J-B/C5V1 to BZX84J-B/C15

T_j = 25 °C to 150 °C

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

All information provided in this document is subject to legal disclaimers.

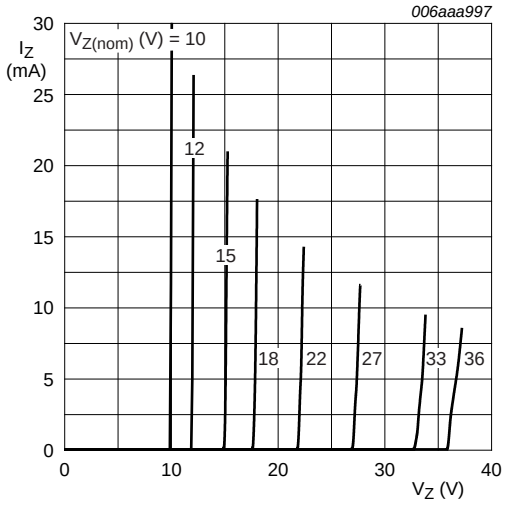
© NXP B.V. 2011. All rights reserved.



T_j = 25 °C

BZX84J-B/C2V7 to BZX84J-B/C8V2

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



T_j = 25 °C

BZX84J-B/C10 to BZX84J-B/C36

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.

All information provided in this document is subject to legal disclaimers.

© NXP B.V. 2011. All rights reserved.

9. Package outline

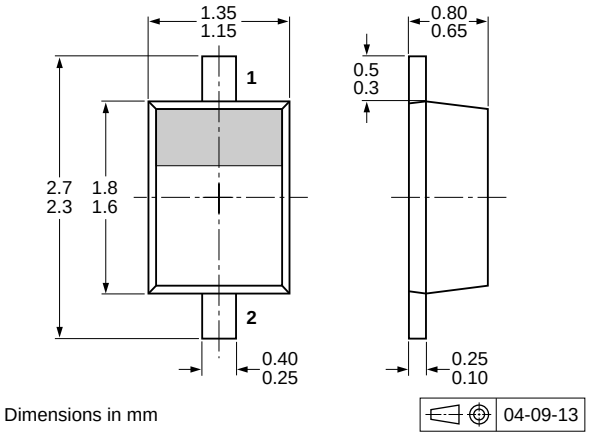


Fig 7. Package outline SOD323F (SC-90)

10. Packing information

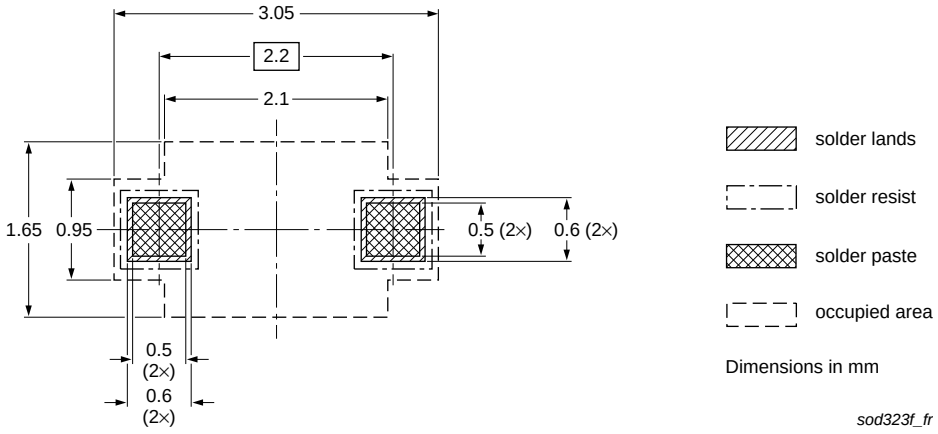
Table 10. Packing methods

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

Type number	Package	Description	Packing quantity	
			3000	10000
BZX84J-B2V4 to BZX84J-C75	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



Reflow soldering is the only recommended soldering method.

Fig 8. Reflow soldering footprint SOD323F (SC-90)

All information provided in this document is subject to legal disclaimers.

© NXP B.V. 2011. All rights reserved.

12. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZX84J_SER v.2	20110801	Product data sheet	-	BZX84J_SER v.1
Modifications:	• Figure 5 and Figure 6 updated • Figure 8 updated • Section 1.2 “Features and benefits” updated • Section 5 “Limiting values” updated • Section 8 “Test information” added • Section 13 “Legal information” updated			
BZX84J_SER v.1	20070301	Product data sheet	-	-

All information provided in this document is subject to legal disclaimers.

© NXP B.V. 2011. All rights reserved.

13. Legal information

13.1 Data sheet status

Document status[1][2]	Product status[3]	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.nxp.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. NXP Semiconductors 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 NXP Semiconductors 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 NXP Semiconductors and its customer, unless NXP Semiconductors and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the NXP Semiconductors 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, NXP Semiconductors 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 NXP Semiconductors 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, NXP Semiconductors' 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 NXP Semiconductors.

Right to make changes — NXP Semiconductors 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 — NXP Semiconductors 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 an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors 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. NXP Semiconductors 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 NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors 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.

NXP Semiconductors 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 NXP Semiconductors 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). NXP 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 — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nxp.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. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors 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.

All information provided in this document is subject to legal disclaimers.

© NXP B.V. 2011. All rights reserved.

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.nxp.com**

For sales office addresses, please send an email to: **salesaddresses@nxp.com**

All information provided in this document is subject to legal disclaimers.

© NXP B.V. 2011. All rights reserved.

15. Contents

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

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

© NXP B.V. 2011. **All rights reserved.**

For more information, please visit: http://www.nxp.com
For sales office addresses, please send an email to: salesaddresses@nxp.com

Date of release: 1 August 2011
Document identifier: BZX84J_SER