

PESD5V0L7BAS; PESD5V0L7BS

Low capacitance 7-fold bidirectional ESD protection diode arrays

Rev. 4 — 23 June 2010

Product data sheet

1. Product profile

1.1 General description

Low capacitance 7-fold bidirectional ESD protection diode arrays in small plastic packages designed for the protection of up to seven transmission or data lines from damage caused by ElectroStatic Discharge (ESD) and other transients.

Table 1. Product overview

Type number	Package	
	Name	NXP
PESD5V0L7BAS	TSSOP8	SOT505-1
PESD5V0L7BS	SO8	SOT96-1

1.2 Features and benefits

- ESD protection of up to seven lines
- Low diode capacitance
- Max. peak pulse power: $P_{PP} = 35 \text{ W}$
- Low clamping voltage: $V_{CL} = 17 \text{ V}$
- Ultra low leakage current: $I_{RM} = 3 \text{ nA}$
- ESD protection of up to 10 kV
- IEC 61000-4-2, level 4 (ESD)
- IEC 61000-4-5 (surge); $I_{PP} = 2.5 \text{ A}$

1.3 Applications

- Computers and peripherals
- Communication systems
- Audio and video equipment
- High-speed data lines
- Parallel ports

1.4 Quick reference data

Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RWM}	reverse standoff voltage		-	-	5	V
C_d	diode capacitance	$V_R = 0 \text{ V};$ $f = 1 \text{ MHz}$	-	8	10	pF



2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
TSSOP8			
1	cathode 1		<p style="text-align: right;"><i>sym005</i></p>
2	cathode 2		
3	cathode 3		
4	cathode 4		
5	cathode 5		
6	cathode 6		
7	cathode 7		
8	cathode 8		
SO8			
1	cathode 1		<p style="text-align: right;"><i>sym005</i></p>
2	cathode 2		
3	cathode 3		
4	cathode 4		
5	cathode 5		
6	cathode 6		
7	cathode 7		
8	cathode 8		

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PESD5V0L7BAS	TSSOP8	plastic thin shrink small outline package; 8 leads; body width 3 mm	SOT505-1
PESD5V0L7BS	SO8	plastic small outline package; 8 leads; body width 3.9 mm	SOT96-1

4. Marking

Table 5. Marking codes

Type number	Marking code
PESD5V0L7BAS	5V07B
PESD5V0L7BS	5V0L7BS

5. Limiting values

Table 6. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
Per diode					
P_{PP}	peak pulse power	$t_p = 8/20 \mu\text{s}$	[1] -	35	W
I_{PP}	peak pulse current	$t_p = 8/20 \mu\text{s}$	[1] -	2.5	A
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-65	+150	°C
T_{stg}	storage temperature		-65	+150	°C

[1] Non-repetitive current pulse 8/20 μs exponentially decaying waveform according to IEC 61000-4-5; see [Figure 1](#).

Table 7. ESD maximum ratings

Symbol	Parameter	Conditions	Min	Max	Unit
V_{ESD}	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[1] -	10	kV
		MIL-STD-883 (human body model)	-	10	kV

[1] Device stressed with ten non-repetitive ElectroStatic Discharge (ESD) pulses; see [Figure 2](#).

Table 8. ESD standards compliance

Standard	Conditions
IEC 61000-4-2; level 4 (ESD); see Figure 2	> 8 kV (contact)
MIL-STD-883; class 3 (human body model)	> 4 kV

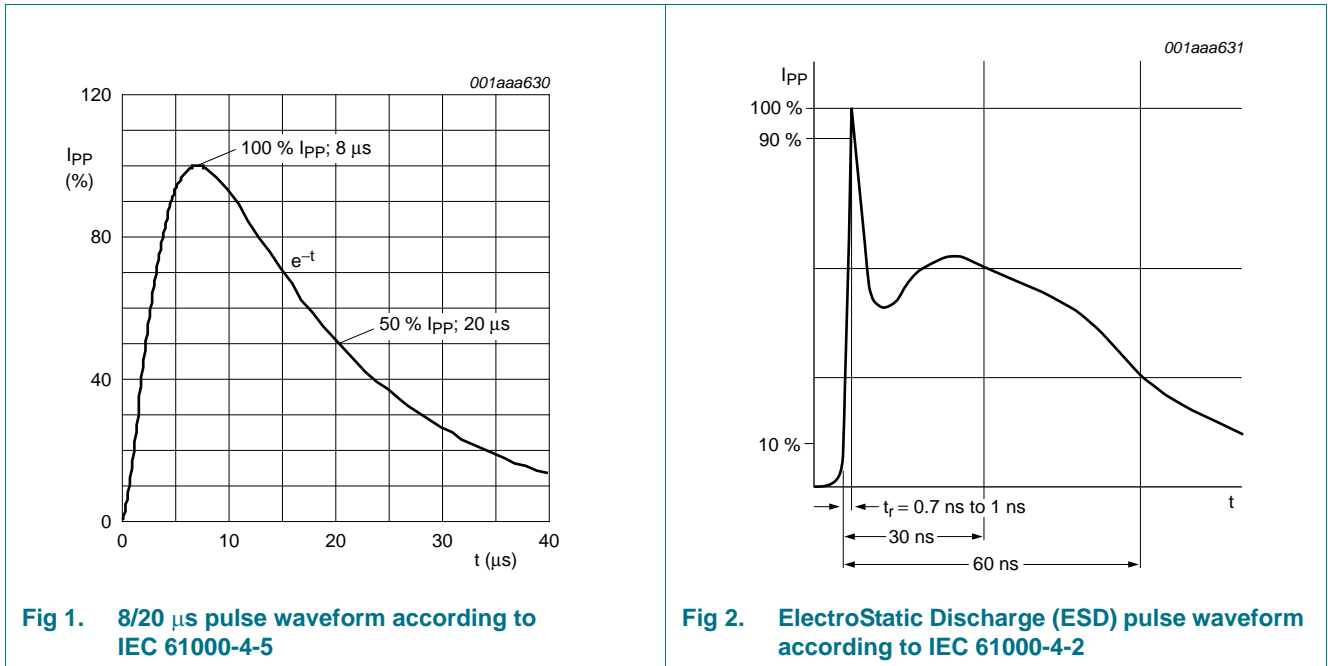


Fig 1. 8/20 μs pulse waveform according to IEC 61000-4-5

Fig 2. ElectroStatic Discharge (ESD) pulse waveform according to IEC 61000-4-2

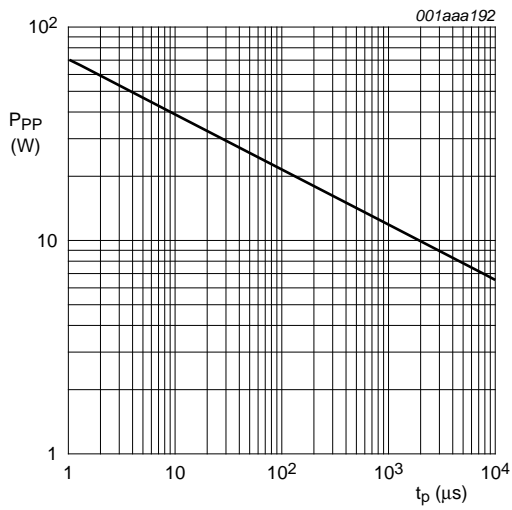
6. Characteristics

Table 9. Characteristics

T_{amb} = 25 °C unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V _{RWM}	reverse standoff voltage		-	-	5	V
I _{RM}	reverse leakage current	V _{RWM} = 5 V; see Figure 6	-	3	25	nA
V _{CL}	clamping voltage	I _{PP} = 1 A	[1]	-	11	V
		I _{PP} = 2.5 A	[1]	-	17	V
V _{BR}	breakdown voltage	I _R = 1 mA	7.2	7.6	7.9	V
r _{dif}	differential resistance	I _R = 1 mA	-	-	100	Ω
C _d	diode capacitance	V _R = 0 V; f = 1 MHz; see Figure 5	-	8	10	pF

[1] Non-repetitive current pulse 8/20 μs exponentially decaying waveform according to IEC 61000-4-5; see [Figure 1](#).



$T_{amb} = 25\text{ }^{\circ}\text{C}$

Fig 3. Peak pulse power as a function of exponential pulse duration t_p ; typical values

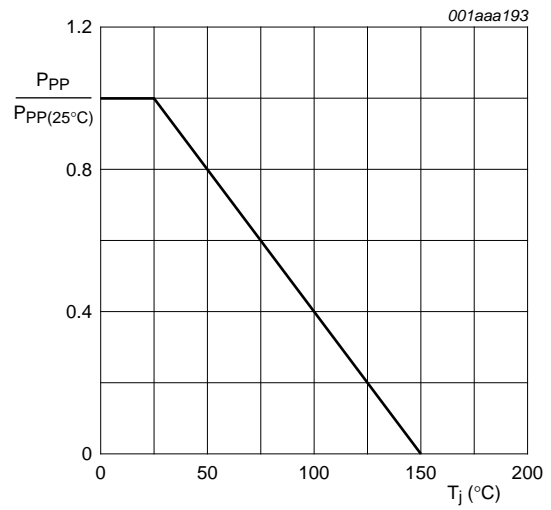
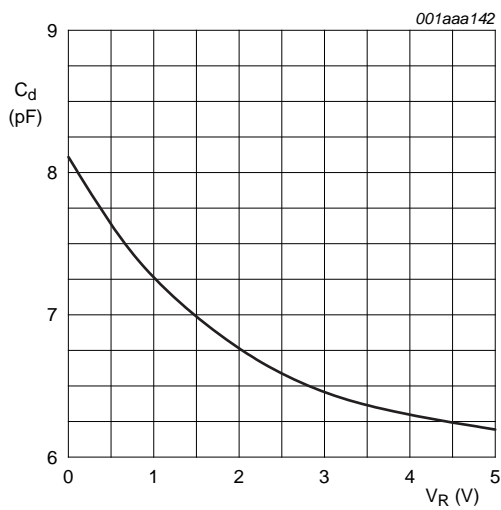


Fig 4. Relative variation of peak pulse power as a function of junction temperature; typical values



$T_{amb} = 25\text{ }^{\circ}\text{C}; f = 1\text{ MHz}$

Fig 5. Diode capacitance as a function of reverse voltage; typical values

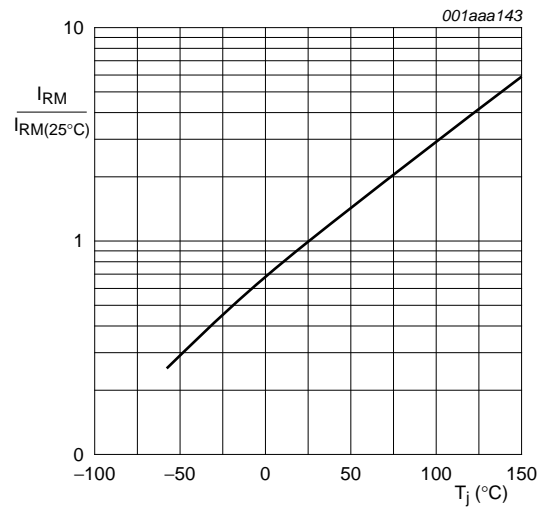


Fig 6. Relative variation of reverse leakage current as a function of junction temperature; typical values

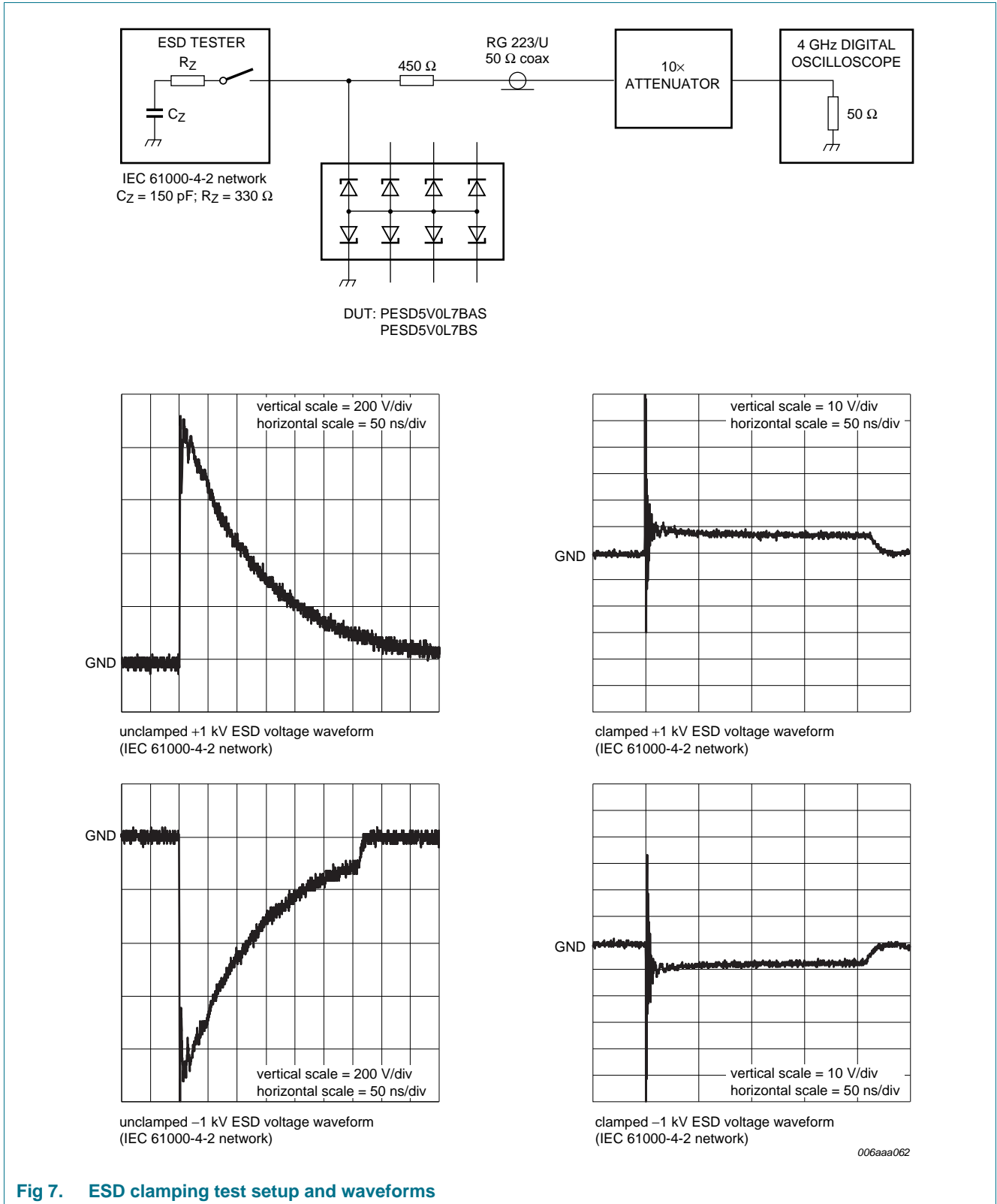


Fig 7. ESD clamping test setup and waveforms

7. Application information

The PESD5V0L7BAS and the PESD5V0L7BS are designed for the protection of up to seven bidirectional data lines from the damage caused by ElectroStatic Discharge (ESD) and surge pulses. The PESD5V0L7BAS and the PESD5V0L7BS may be used on lines where the signal polarities are above and below ground.

The PESD5V0L7BAS and the PESD5V0L7BS provide a surge capability of 35 W per line for a 8/20 μ s waveform.

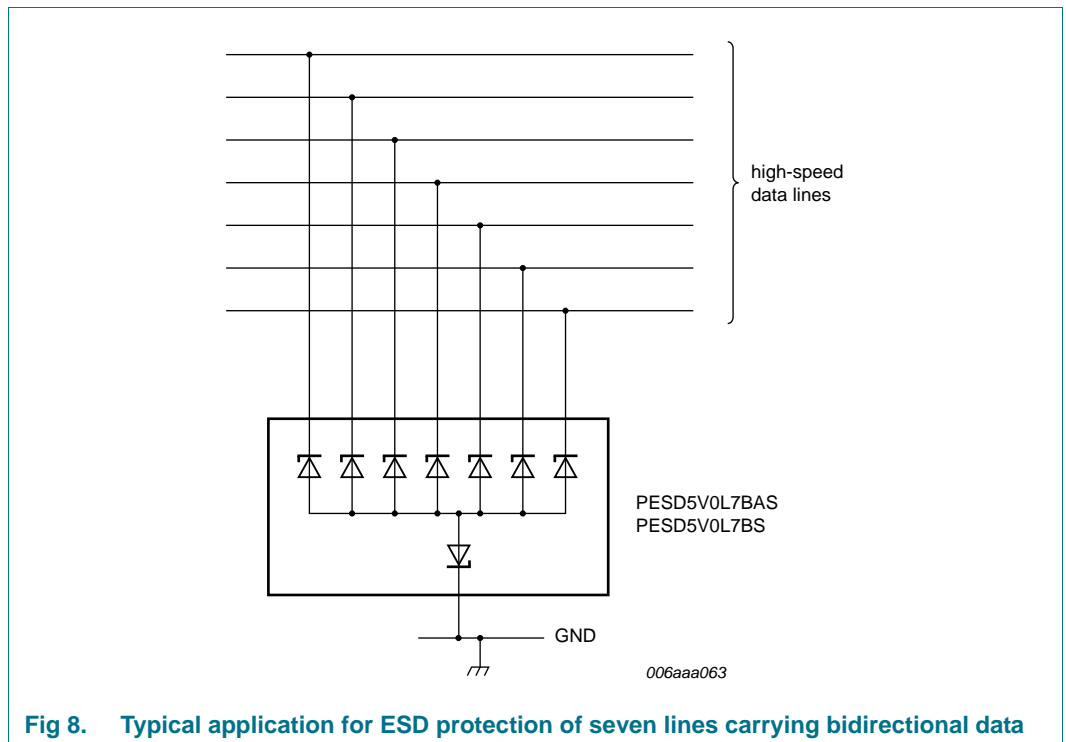


Fig 8. Typical application for ESD protection of seven lines carrying bidirectional data

Circuit board layout and protection device placement:

Circuit board layout is critical for the suppression of ESD, Electrical Fast Transient (EFT) and surge transients. The following guidelines are recommended:

1. Place the device as close to the input terminal or connector as possible.
2. The path length between the device and the protected line should be minimized.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit Board (PCB) conductive loops including power and ground loops.
6. Minimize the length of the transient return path to ground.
7. Avoid using shared transient return paths to a common ground point.
8. Ground planes should be used whenever possible. For multilayer PCBs, use ground vias.

8. Package outline

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm

SOT505-1

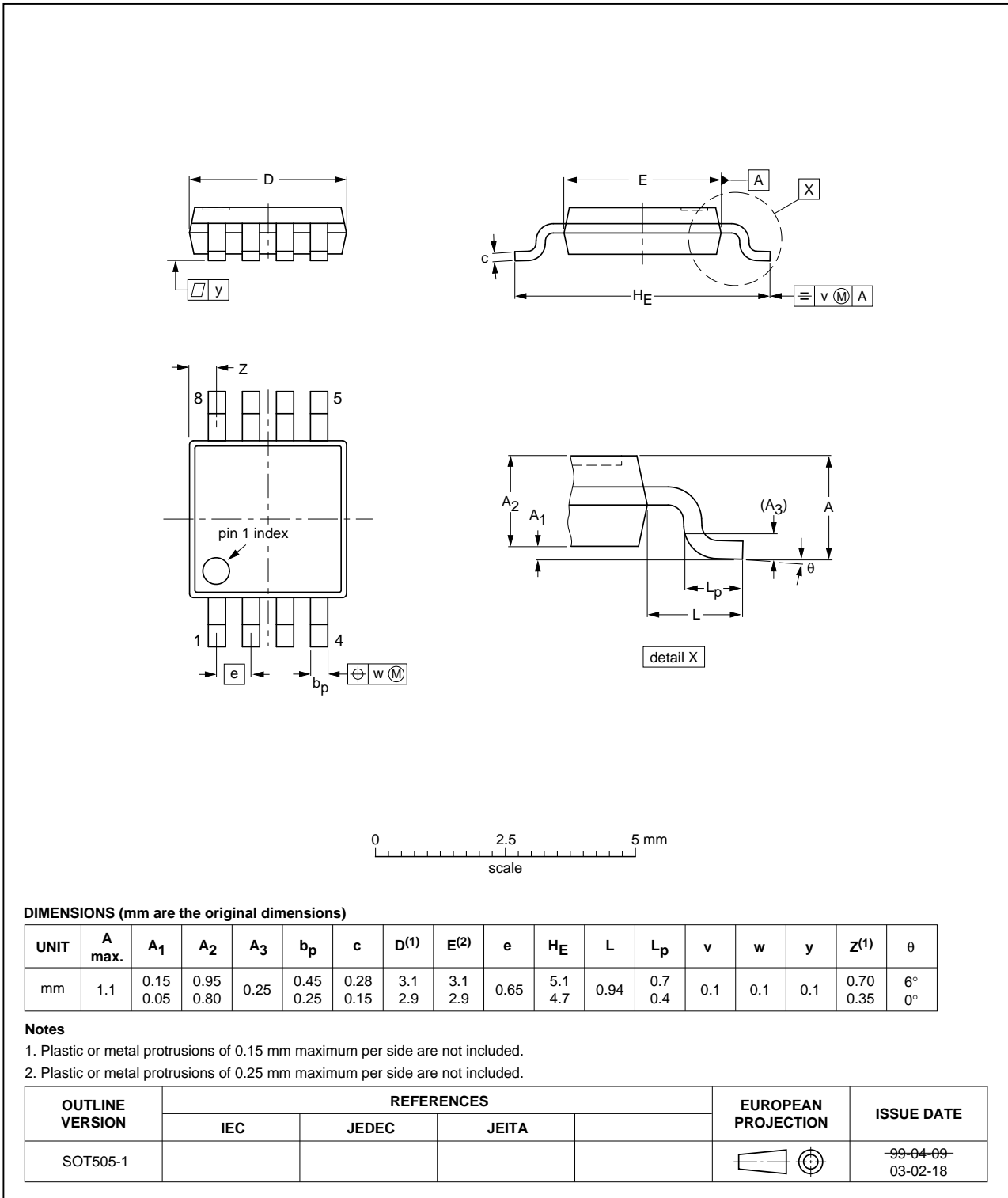


Fig 9. Package outline SOT505-1 (TSSOP8)

SO8: plastic small outline package; 8 leads; body width 3.9 mm

SOT96-1

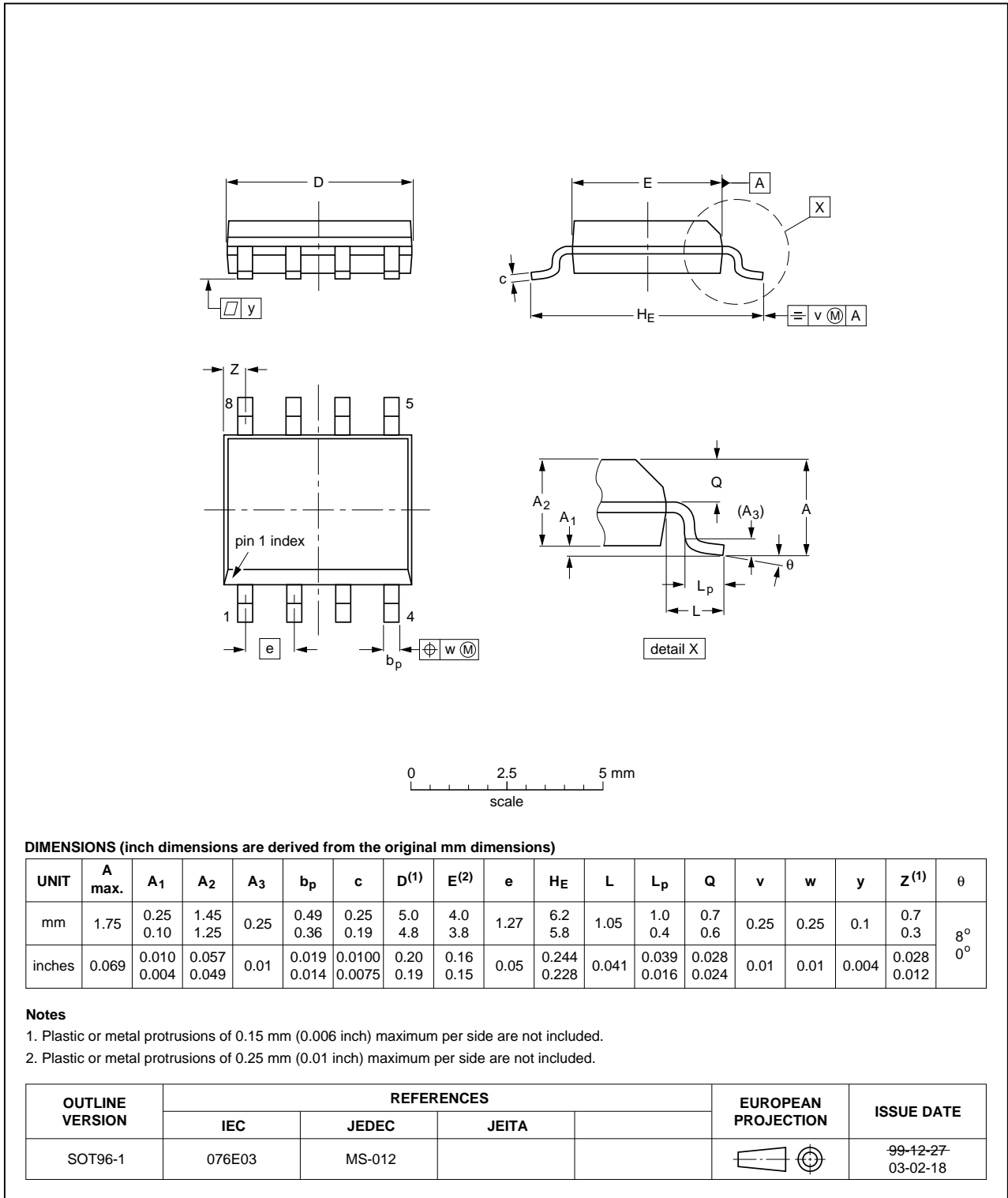


Fig 10. Package outline SOT96-1 (SO8/MS-012)

9. Packing information

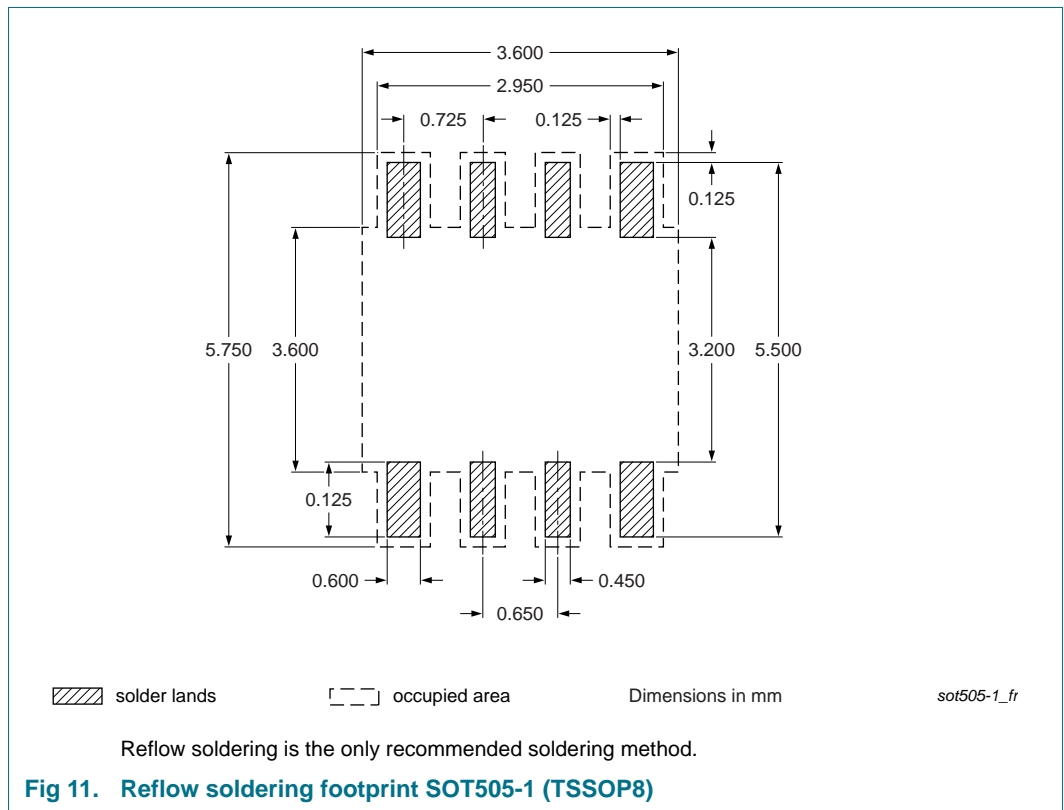
Table 10. Packing methods

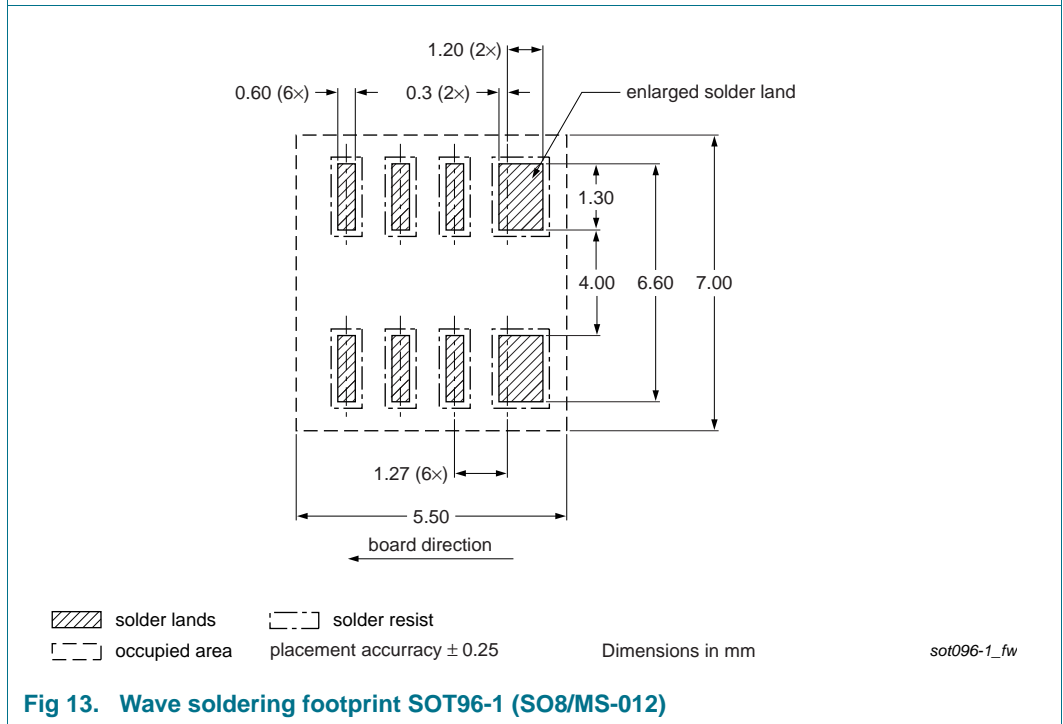
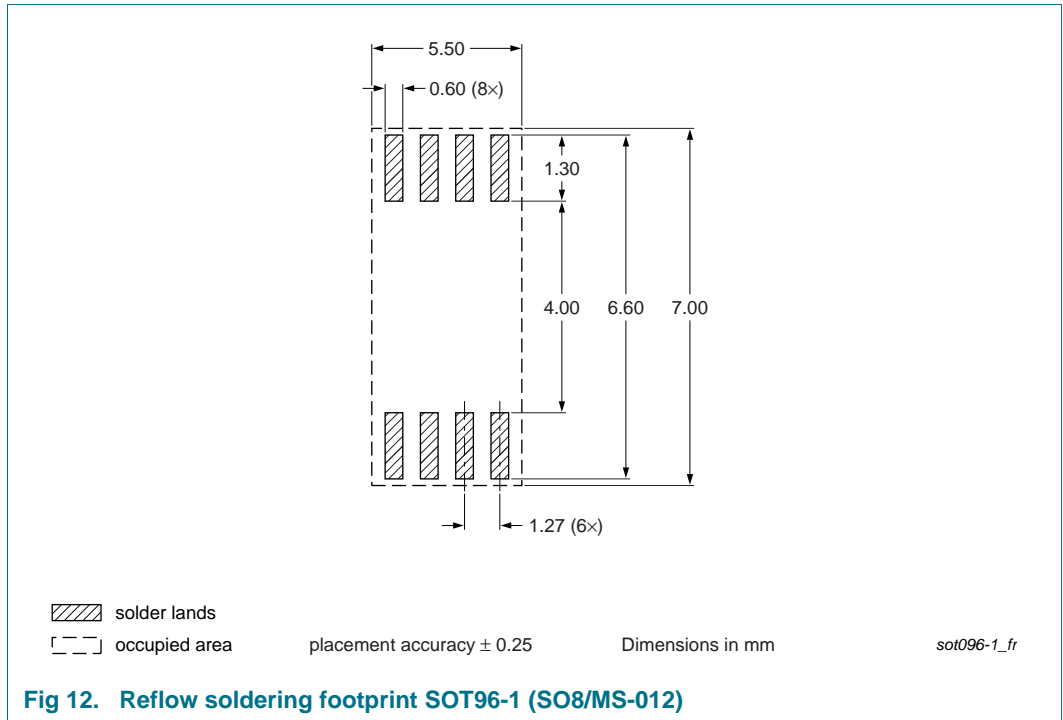
The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity	
			1000	2500
PESD5V0L7BAS	SOT505-1	8 mm pitch, 12 mm tape and reel	-	-118
PESD5V0L7BS	SOT96-1	8 mm pitch, 12 mm tape and reel	-115	-118

[1] For further information and the availability of packing methods, see [Section 13](#).

10. Soldering





11. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PESD5V0L7BAS_BS v.4	20100623	Product data sheet	-	PESD5V0L7BAS_BS_3
Modifications:	<ul style="list-style-type: none">• Section 4 "Marking": marking code corrected for PESD5V0L7BAS• Section 10 "Soldering": added• Section 12 "Legal information": updated			
PESD5V0L7BAS_BS_3	20090820	Product data sheet	-	PESD5V0L7BAS_BS_2
PESD5V0L7BAS_BS_2	20041125	Product data sheet	-	PESD5V0L7BS_1
PESD5V0L7BS_1	20040315	Product specification	-	-

12. Legal information

12.1 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>.

12.2 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.

12.3 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.

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.

12.4 Trademarks

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

13. Contact information

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

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

14. 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	2
3	Ordering information	2
4	Marking	2
5	Limiting values	3
6	Characteristics	4
7	Application information	7
8	Package outline	8
9	Packing information	10
10	Soldering	10
11	Revision history	12
12	Legal information	13
12.1	Data sheet status	13
12.2	Definitions	13
12.3	Disclaimers	13
12.4	Trademarks	14
13	Contact information	14
14	Contents	15

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. 2010. 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: 23 June 2010
 Document identifier: PESD5V0L7BAS_BS