

PMEGxx05EH/EJ series

0.5 A very low V_F MEGA Schottky barrier rectifiers

Rev. 01 — 12 April 2005

Product data sheet

1. Product profile

1.1 General description

Planar Maximum Efficiency General Application (MEGA) Schottky barrier rectifier with an integrated guard ring for stress protection encapsulated in small SMD package.

Table 1: Product overview

Type number	Package		Configuration
	Philips	JEITA	
PMEG2005EH	SOD123F	-	single diode
PMEG3005EH			
PMEG4005EH			
PMEG2005EJ	SOD323F	SC-90	single diode
PMEG3005EJ			
PMEG4005EJ			

1.2 Features

- Forward current: 0.5 A
- Very low forward voltage
- Flat lead SMD package

1.3 Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch mode power supply
- Inverse polarity protection
- Low power consumption applications

PHILIPS

1.4 Quick reference data

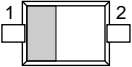

Table 2: Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_F	forward current	$T_{sp} \leq 55 \text{ }^\circ\text{C}$	-	-	0.5	A
V_R	reverse voltage					
	PMEG2005EH, PMEG2005EJ		-	-	20	V
	PMEG3005EH, PMEG3005EJ		-	-	30	V
	PMEG4005EH, PMEG4005EJ		-	-	40	V
V_F	forward voltage	$I_F = 500 \text{ mA}$	[1]			
	PMEG2005EH, PMEG2005EJ		-	355	390	mV
	PMEG3005EH, PMEG3005EJ		-	380	430	mV
	PMEG4005EH, PMEG4005EJ		-	420	470	mV

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

2. Pinning information

Table 3: Pinning

Pin	Description	Simplified outline	Symbol
1	cathode		
2	anode		

sym001

[1] The marking bar indicates the cathode.

3. Ordering information

Table 4: Ordering information

Type number	Package		Version
	Name	Description	
PMEG2005EH	-	plastic surface mounted package; 2 leads	SOD123F
PMEG3005EH			
PMEG4005EH			
PMEG2005EJ	SC-90	plastic surface mounted package; 2 leads	SOD323F
PMEG3005EJ			
PMEG4005EJ			

4. Marking

Table 5: Marking codes

Type number	Marking code
PMEG2005EH	A3
PMEG3005EH	A4
PMEG4005EH	A5
PMEG2005EJ	CC
PMEG3005EJ	CD
PMEG4005EJ	CE

5. Limiting values

Table 6: Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit	
V_R	reverse voltage					
	PMEG2005EH, PMEG2005EJ		-	20	V	
	PMEG3005EH, PMEG3005EJ		-	30	V	
	PMEG4005EH, PMEG4005EJ		-	40	V	
I_F	forward current	$T_{sp} \leq 55\text{ °C}$	-	0.5	A	
I_{FRM}	repetitive peak forward current	$t_p \leq 1\text{ ms}; \delta \leq 0.25$	-	7	A	
I_{FSM}	non-repetitive peak forward current	$t = 8\text{ ms square wave}$	-	10	A	
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$				
	SOD123F		[1]	-	375	mW
			[2]	-	830	mW
	SOD323F		[1]	-	360	mW
			[2]	-	830	mW
T_j	junction temperature		-	150	°C	
T_{amb}	ambient temperature		-65	+150	°C	
T_{stg}	storage temperature		-65	+150	°C	

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

6. Thermal characteristics

Table 7: Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1][2]			
	SOD123F		-	-	330	K/W
	SOD323F		-	-	350	K/W
			[1][3]	-	-	150
$R_{th(j-sp)}$	thermal resistance from junction to solder point					
	SOD123F		-	-	60	K/W
	SOD323F		-	-	55	K/W

[1] Schottky barrier diodes thermal run-away has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses. Nomograms for determining the reverse power losses P_R and $I_{F(AV)}$ rating will be available on request.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

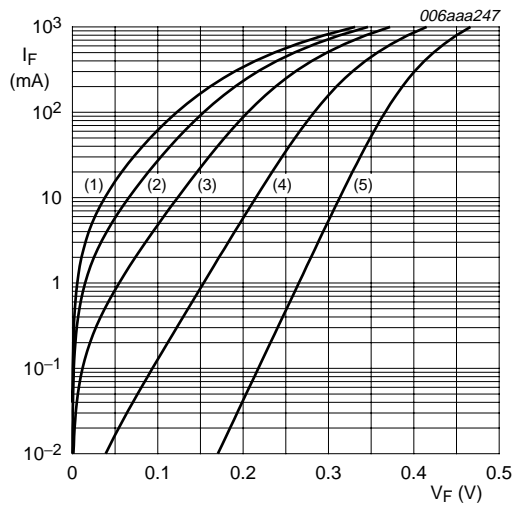
7. Characteristics

Table 8: Characteristics
 $T_{amb} = 25^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
V_F	forward voltage		[1]				
	PMEG2005EH, PMEG2005EJ	$I_F = 0.1\text{ mA}$	-	90	130	mV	
		$I_F = 1\text{ mA}$	-	150	190	mV	
		$I_F = 10\text{ mA}$	-	210	240	mV	
		$I_F = 100\text{ mA}$	-	280	330	mV	
		$I_F = 500\text{ mA}$	-	355	390	mV	
	PMEG3005EH, PMEG3005EJ	$I_F = 0.1\text{ mA}$	-	90	130	mV	
		$I_F = 1\text{ mA}$	-	150	200	mV	
		$I_F = 10\text{ mA}$	-	215	250	mV	
		$I_F = 100\text{ mA}$	-	285	340	mV	
		$I_F = 500\text{ mA}$	-	380	430	mV	
	PMEG4005EH, PMEG4005EJ	$I_F = 0.1\text{ mA}$	-	95	130	mV	
		$I_F = 1\text{ mA}$	-	155	210	mV	
		$I_F = 10\text{ mA}$	-	220	270	mV	
		$I_F = 100\text{ mA}$	-	295	350	mV	
		$I_F = 500\text{ mA}$	-	420	470	mV	
	I_R	reverse current		[1] [2]			
		PMEG2005EH, PMEG2005EJ	$V_R = 10\text{ V}$	-	15	40	μA
			$V_R = 20\text{ V}$	-	40	200	μA
PMEG3005EH, PMEG3005EJ		$V_R = 10\text{ V}$	-	12	30	μA	
		$V_R = 30\text{ V}$	-	40	150	μA	
PMEG4005EH, PMEG4005EJ		$V_R = 10\text{ V}$	-	7	20	μA	
		$V_R = 40\text{ V}$	-	30	100	μA	
C_d	diode capacitance		$V_R = 1\text{ V}; f = 1\text{ MHz}$				
	PMEG2005EH, PMEG2005EJ	-	66	80	pF		
		-	55	70	pF		
	PMEG3005EH, PMEG3005EJ	-	43	50	pF		
-							

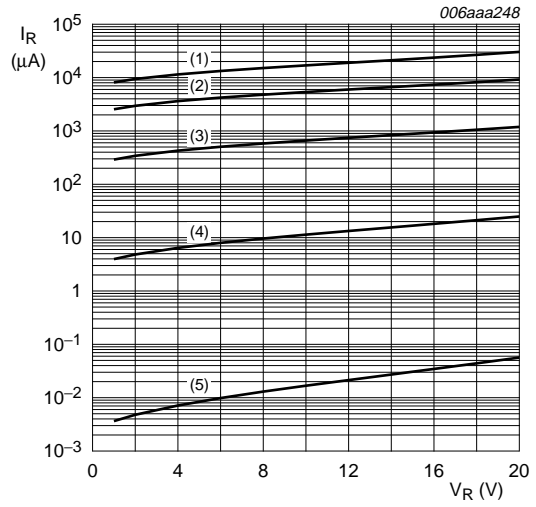
[1] Pulse test: $t_p \leq 300\ \mu\text{s}$; $\delta \leq 0.02$.

[2] Schottky barrier rectifier thermal run-away has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses. Nomograms for determining the reverse power losses P_R and $I_{F(AV)}$ rating will be available on request.



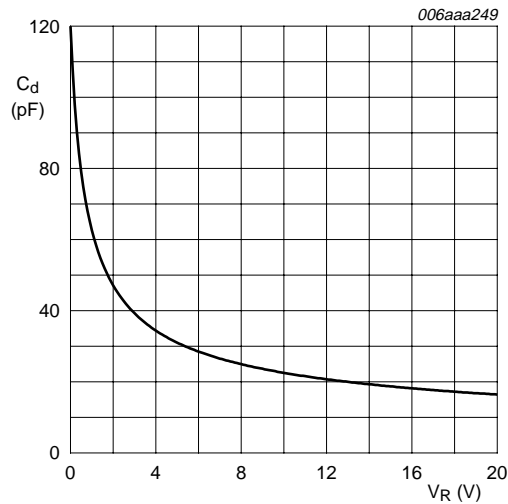
- (1) $T_{amb} = 150\text{ °C}$
- (2) $T_{amb} = 125\text{ °C}$
- (3) $T_{amb} = 85\text{ °C}$
- (4) $T_{amb} = 25\text{ °C}$
- (5) $T_{amb} = -40\text{ °C}$

Fig 1. PMEG2005EH, PMEG2005EJ: Forward current as a function of forward voltage; typical values



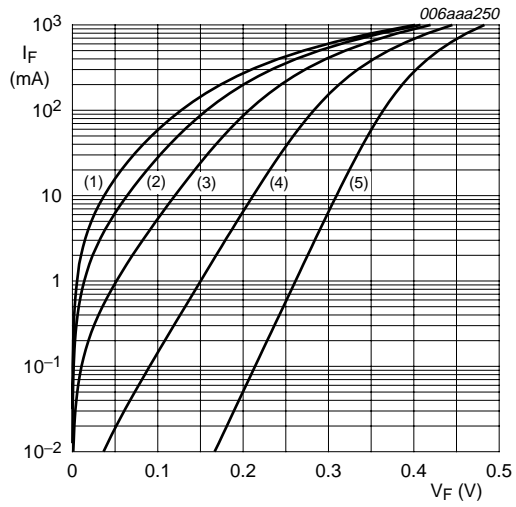
- (1) $T_{amb} = 150\text{ °C}$
- (2) $T_{amb} = 125\text{ °C}$
- (3) $T_{amb} = 85\text{ °C}$
- (4) $T_{amb} = 25\text{ °C}$
- (5) $T_{amb} = -40\text{ °C}$

Fig 2. PMEG2005EH, PMEG2005EJ: Reverse current as a function of reverse voltage; typical values



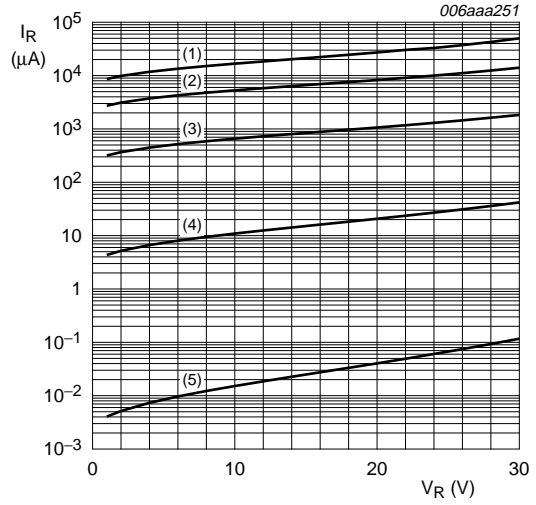
$T_{amb} = 25\text{ °C}; f = 1\text{ MHz}$

Fig 3. PMEG2005EH, PMEG2005EJ: Diode capacitance as a function of reverse voltage; typical values



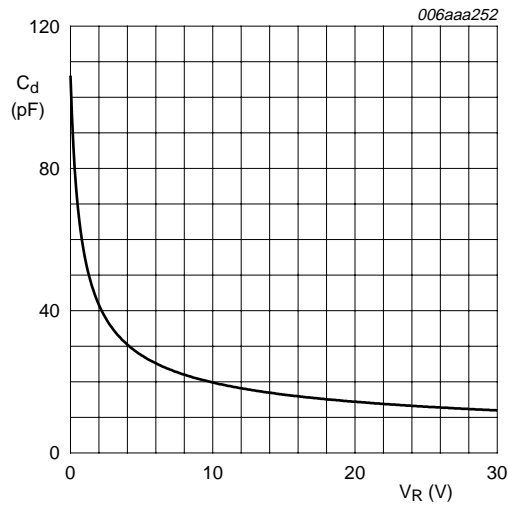
- (1) $T_{amb} = 150\text{ °C}$
- (2) $T_{amb} = 125\text{ °C}$
- (3) $T_{amb} = 85\text{ °C}$
- (4) $T_{amb} = 25\text{ °C}$
- (5) $T_{amb} = -40\text{ °C}$

Fig 4. PMEG3005EH, PMEG3005EJ: Forward current as a function of forward voltage; typical values



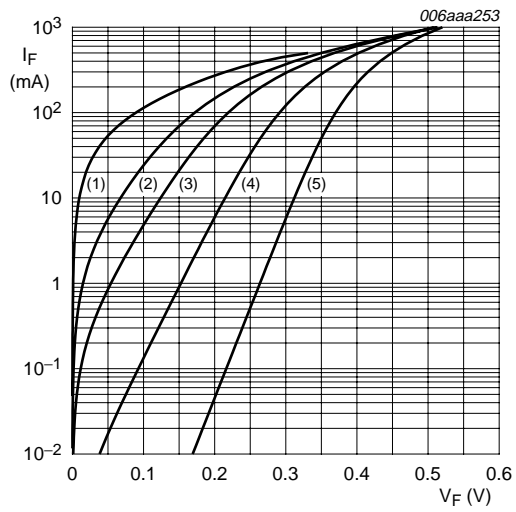
- (1) $T_{amb} = 150\text{ °C}$
- (2) $T_{amb} = 125\text{ °C}$
- (3) $T_{amb} = 85\text{ °C}$
- (4) $T_{amb} = 25\text{ °C}$
- (5) $T_{amb} = -40\text{ °C}$

Fig 5. PMEG3005EH, PMEG3005EJ: Reverse current as a function of reverse voltage; typical values



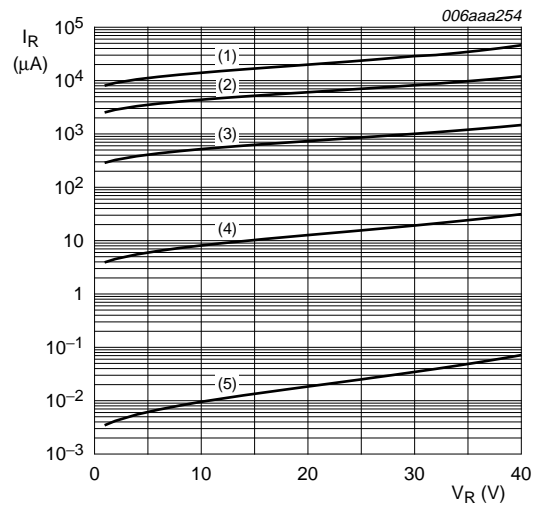
$T_{amb} = 25\text{ °C}; f = 1\text{ MHz}$

Fig 6. PMEG3005EH, PMEG3005EJ: Diode capacitance as a function of reverse voltage; typical values



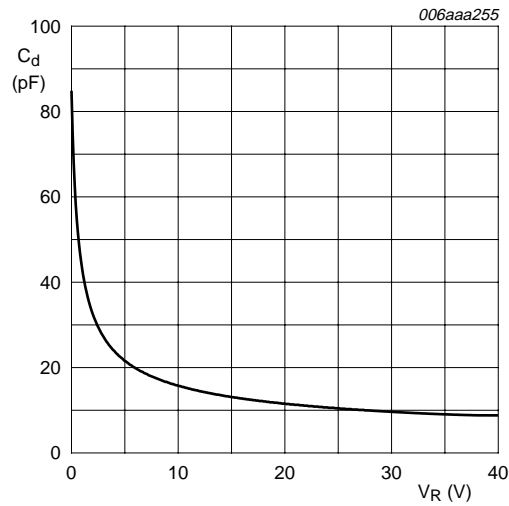
- (1) $T_{amb} = 150\text{ °C}$
- (2) $T_{amb} = 125\text{ °C}$
- (3) $T_{amb} = 85\text{ °C}$
- (4) $T_{amb} = 25\text{ °C}$
- (5) $T_{amb} = -40\text{ °C}$

Fig 7. PMEG4005EH, PMEG4005EJ: Forward current as a function of forward voltage; typical values



- (1) $T_{amb} = 150\text{ °C}$
- (2) $T_{amb} = 125\text{ °C}$
- (3) $T_{amb} = 85\text{ °C}$
- (4) $T_{amb} = 25\text{ °C}$
- (5) $T_{amb} = -40\text{ °C}$

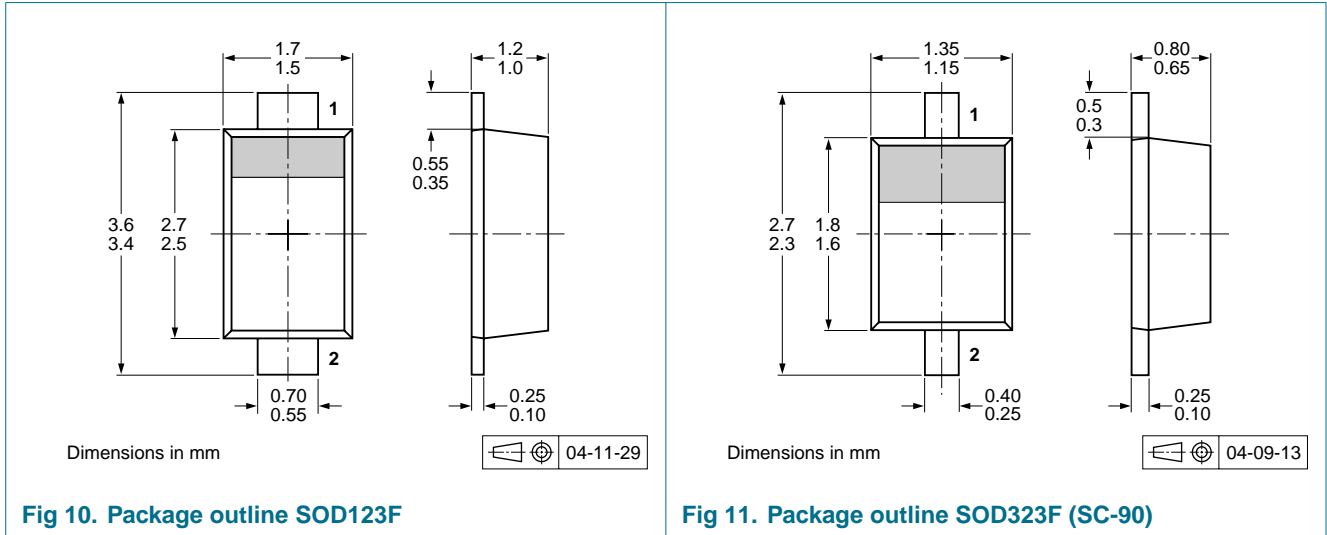
Fig 8. PMEG4005EH, PMEG4005EJ: Reverse current as a function of reverse voltage; typical values



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

Fig 9. PMEG4005EH, PMEG4005EJ: Diode capacitance as a function of reverse voltage; typical values

8. Package outline



9. Packing information

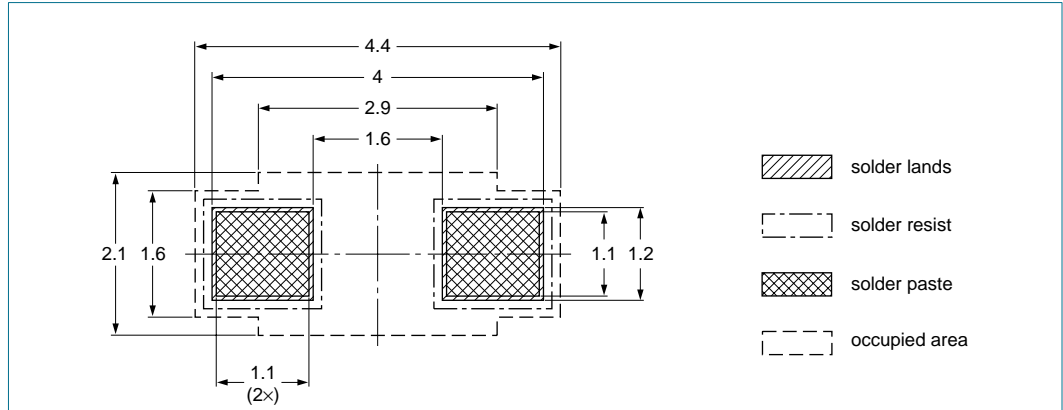
Table 9: Packing methods

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

Type number	Package	Description	Packing quantity	
			3000	10000
PMEG2005EH	SOD123F	4 mm pitch, 8 mm tape and reel	-115	-135
PMEG3005EH				
PMEG4005EH				
PMEG2005EJ	SOD323F	4 mm pitch, 8 mm tape and reel	-115	-135
PMEG3005EJ				
PMEG4005EJ				

[1] For further information and the availability of packing methods, see [Section 15](#).

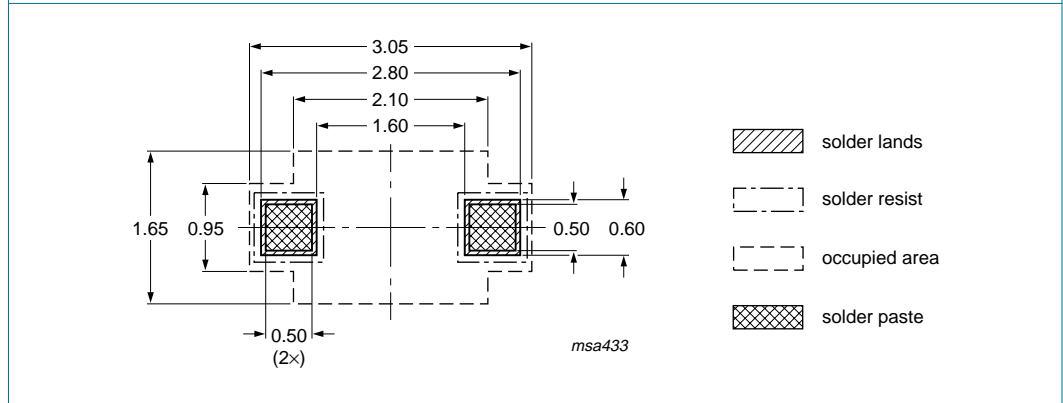
10. Soldering



Reflow soldering is the only recommended soldering method.

Dimensions in mm

Fig 12. Reflow soldering footprint SOD123F



Reflow soldering is the only recommended soldering method.

Dimensions in mm

Fig 13. Reflow soldering footprint SOD323F (SC-90)



11. Revision history

Table 10: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
PMEGXX05EH_EJ_SER_1	20050412	Product data sheet	-	9397 750 14515	-

12. Data sheet status

Level	Data sheet status [1]	Product status [2] [3]	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
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[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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