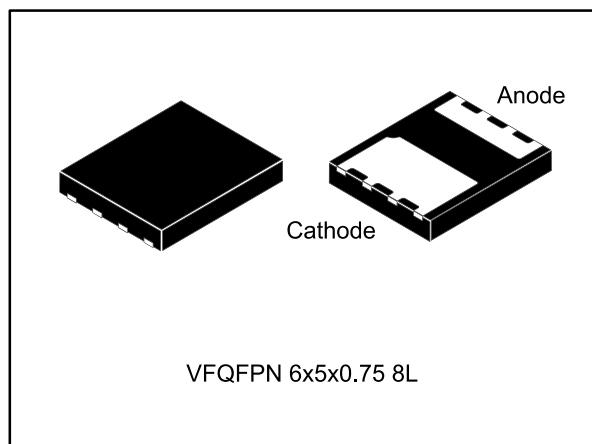


12 V reverse voltage cool bypass switch

Datasheet - preliminary data



- Junction temperature range T_J from $-40\text{ }^{\circ}\text{C}$ to $150\text{ }^{\circ}\text{C}$

Applications

- Photovoltaic panels
- Solar farm

Description

The SPV1512 is a cool bypass switch with a very low forward voltage drop and ultra low reverse leakage current. The former drastically reduces the power dissipation in bypass mode and prolongs the lifetime of the device, by reducing maintenance costs and shutdown due to a device failure. The latter allows the device to work at very high temperature avoiding thermal runaway phenomenon. These are clearly key benefits for all those applications requiring low power consumption to increase the system lifetime and maximize the power transfer from harvesting source to the load. For all these reasons and the strong ESD robustness, the cool bypass switch is the significant evolution with respect to the traditional standard Schottky diode.

Features

- Maximum forward current $I_F = 16\text{ A}$
- Maximum reverse recovery mode V_R up to 12 V
- Very low forward voltage drop:
 - $V_F = 120\text{ mV}$ @ $I_F = 10\text{ A}$, $T_{AMB} = 125\text{ }^{\circ}\text{C}$
- Ultra low reverse leakage current:
 - $I_R = 100\text{ }\mu\text{A}$ @ $V_R = 12\text{ V}$, $T_{AMB} = 125\text{ }^{\circ}\text{C}$
- ESD HBM level (JESD22-A114) up to 8 kV
- Surge test level (IEC61000-4-5) up to 2 kV

Table 1: Device summary

Order code	Operating temperature range	Package	Packing
SPV1512N	$-40\text{ to }125\text{ }^{\circ}\text{C}$	VFQFPN (6x5x0.75) 8L	Tape and reel

Contents

1	Electrical ratings	3
2	Electrical characteristics	4
3	Recommended footprint on the application board	6
4	Package information	7
4.1	VFQFPN (6x5x0.75) package information	8
4.2	VFQFPN (6x5x0.75) packing information.....	9
5	Revision history	11

1 Electrical ratings

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_R	Max. DC reverse voltage	12	V
I_F	Max. forward current	16	A
T_J	Junction temperature range	-40 to 150	°C
T_{STG}	Storage temperature range	-40 to 175	°C
$R_{TH(j-c)}$	Thermal resistance, junction-to-case	4	°C/W
ESD	Human body model	8	kV

2 Electrical characteristics

$T_{AMB} = 25\text{ °C}$ unless otherwise specified

Table 3: Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_F	Forward voltage drop	$I_F = 1\text{ A}$	$T_J = 25\text{ °C}$	-	100	mV
			$T_J = 125\text{ °C}$	-	110	
		$I_F = 10\text{ A}$	$T_J = 25\text{ °C}$	-	115	
			$T_J = 125\text{ °C}$	-	130	
		$I_F = 16\text{ A}$	$T_J = 25\text{ °C}$	-	140	
			$T_J = 125\text{ °C}$	-	160	
I_R	Reverse leakage current	$V_R = 12\text{ V}$	$T_J = 25\text{ °C}$	-	10	μA
			$T_J = 125\text{ °C}$	-	100	

Figure 1: Forward power dissipation vs. forward current

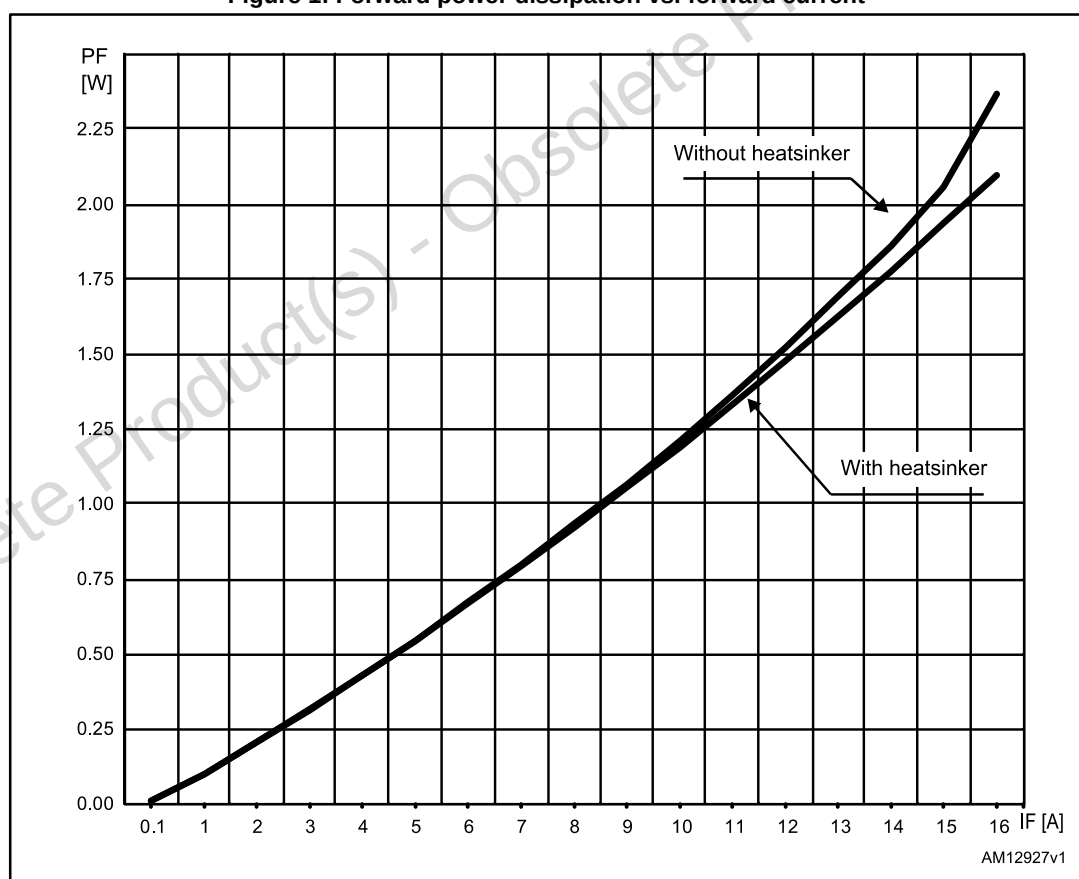


Figure 2: Reverse current vs. reverse voltage

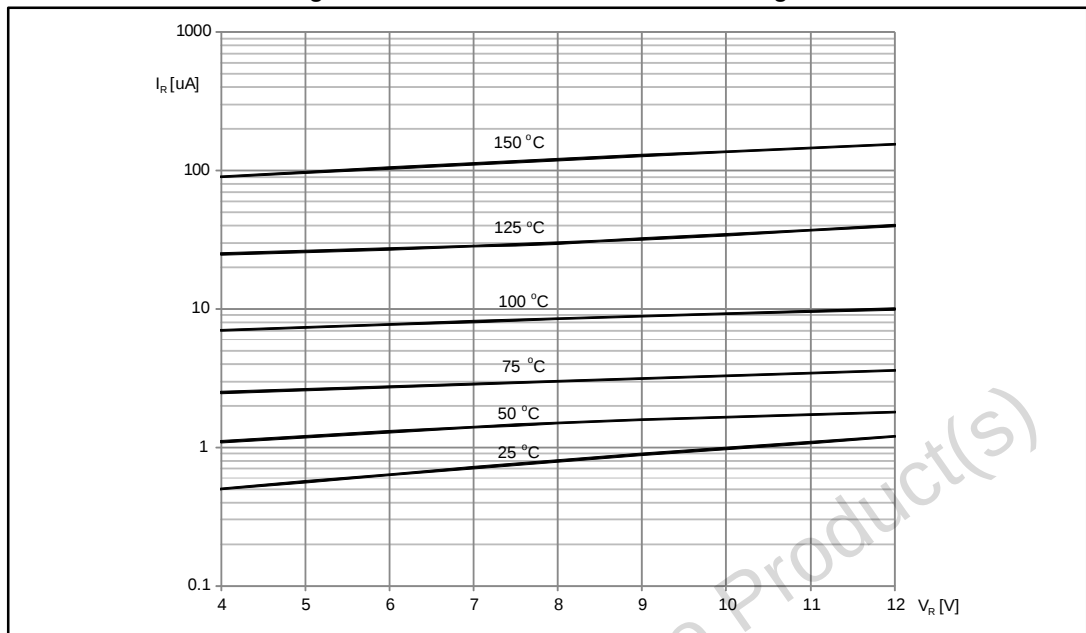
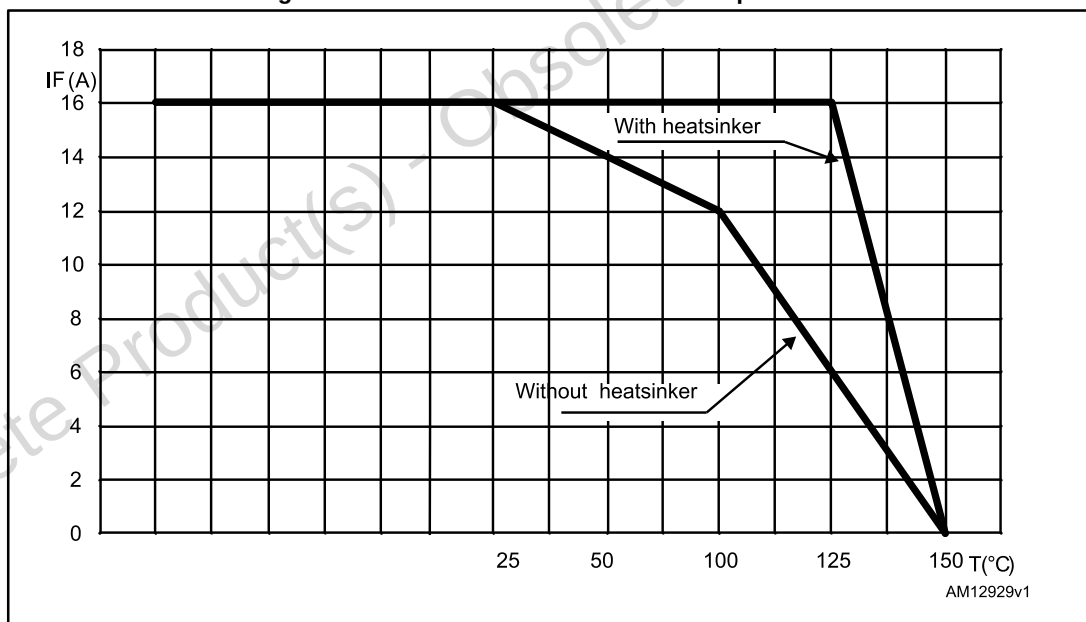


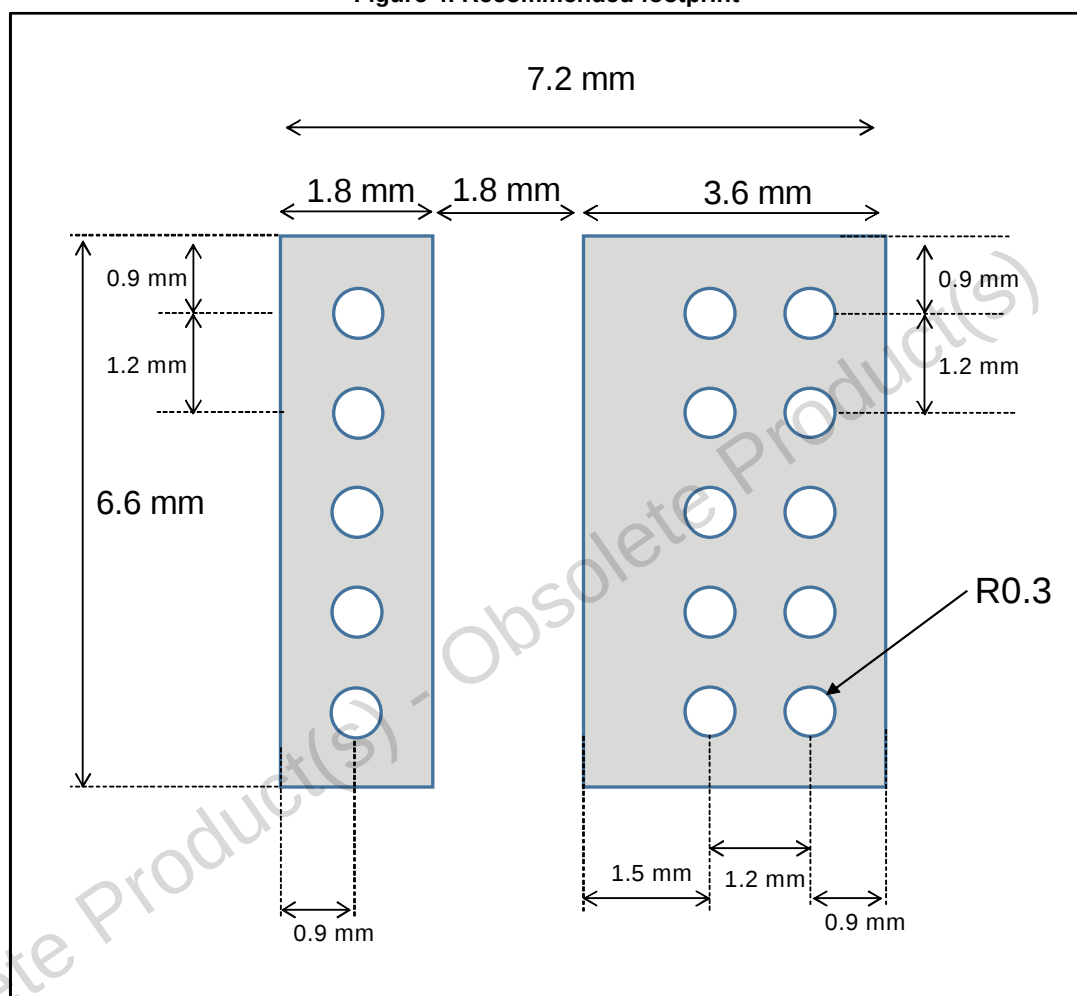
Figure 3: Forward current vs. ambient temperature



3 Recommended footprint on the application board

The below figure shows the suggested footprint on the board, in order to improve heat dissipation.

Figure 4: Recommended footprint



4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Obsolete Product(s) - Obsolete Product(s)

4.1 VFQFPN (6x5x0.75) package information

Figure 5: VFQFPN (6x5x0.75) package outline

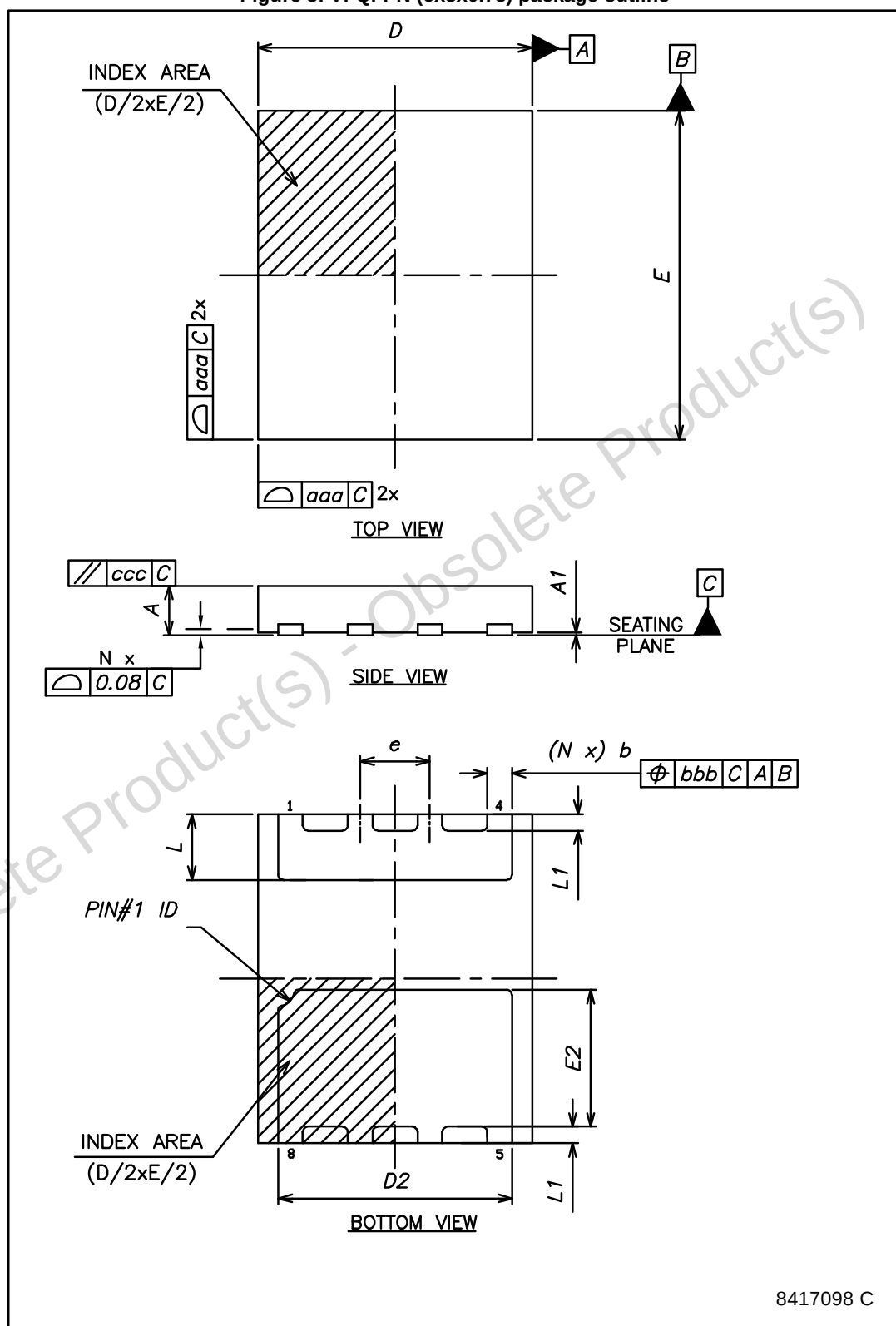
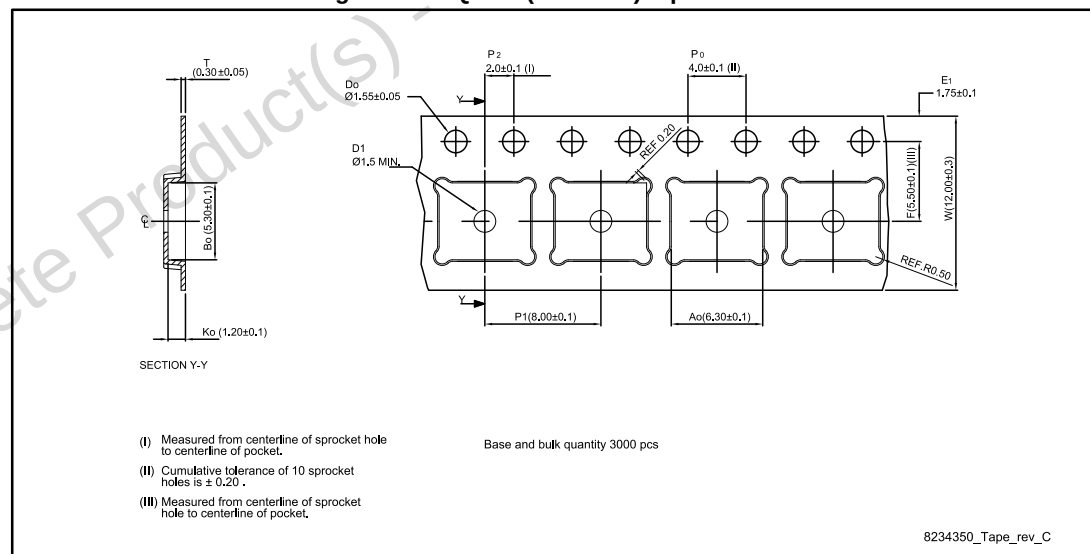


Table 4: VFQFPN (6x5x0.75) package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.70	0.75	0.85
A1	0	0.02	0.05
D		5.00	
D2	4.11	4.26	4.36
E		6.00	
E2	2.35	2.50	2.60
e		1.27	
L	1.10	1.20	1.30
L1		0.30	
b	0.40	0.45	0.50
aaa		0.05	
bbb		0.10	
ccc		0.10	
N		8	

4.2 VFQFPN (6x5x0.75) packing information

Figure 6: VFQFPN (6x5x0.75) tape outline



Technical drawing of a circular mechanical part, showing a top view, a side view, and a core detail.

Top View:

- Overall diameter: 330 (+0/-4.0)
- Central hole diameter: 4.00
- Slot width: 2.50
- Slot depth: 1.00
- Slot radius: R1.00
- Slot spacing: 12.4 (+0/-0.5)
- Slot depth: 12.4 (+0/-0.5)
- Slot width: 2.20
- Slot radius: R1.10
- Slot spacing: 13.00
- Slot depth: 2.20

Side View:

- Overall height: 330 (+0/-4.0)
- Slot depth: 12.4 (+0/-0.5)
- Slot width: 2.20
- Slot radius: R1.10
- Slot spacing: 13.00
- Slot depth: 2.20

Core Detail:

- Overall diameter: 13.00
- Central hole diameter: 4.00
- Slot width: 2.50
- Slot depth: 1.00
- Slot radius: R1.00
- Slot spacing: 12.4 (+0/-0.5)
- Slot depth: 12.4 (+0/-0.5)
- Slot width: 2.20
- Slot radius: R1.10
- Slot spacing: 13.00
- Slot depth: 2.20

Dimensions:

- 330 (+0/-4.0)
- 4.00
- 2.50
- 1.00
- R1.00
- 12.4 (+0/-0.5)
- 12.4 (+0/-0.5)
- 2.20
- R1.10
- 13.00
- 2.20

Notes:

- PART NO.
- RESID LOGO

Legend:

- 1.00
- 2.50
- 12.4 (+0/-0.5)
- 2.20
- R1.10
- 13.00
- 2.20

Material:

- 1.00
- 2.50
- 12.4 (+0/-0.5)
- 2.20
- R1.10
- 13.00
- 2.20

Assembly:

- 1.00
- 2.50
- 12.4 (+0/-0.5)
- 2.20
- R1.10
- 13.00
- 2.20

Dimensions:

- 330 (+0/-4.0)
- 4.00
- 2.50
- 1.00
- R1.00
- 12.4 (+0/-0.5)
- 12.4 (+0/-0.5)
- 2.20
- R1.10
- 13.00
- 2.20

Notes:

- PART NO.
- RESID LOGO

Legend:

- 1.00
- 2.50
- 12.4 (+0/-0.5)
- 2.20
- R1.10
- 13.00
- 2.20

Material:

- 1.00
- 2.50
- 12.4 (+0/-0.5)
- 2.20
- R1.10
- 13.00
- 2.20

Assembly:

- 1.00
- 2.50
- 12.4 (+0/-0.5)
- 2.20
- R1.10
- 13.00
- 2.20

5 Revision history

Table 5: Document revision history

Date	Revision	Changes
31-Aug-2012	1	First release.
08-Oct-2015	2	Updated the cover image, features, applications, description and device summary table. Changed the title. Changed figure titled "Reverse current vs. reverse voltage" and updated the rest of figures relative to section titled "Electrical characteristics". Added a new section titled: "Recommended footprint on the application board".

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2015 STMicroelectronics – All rights reserved