



# ESDAVLC6-1BF4

Single-line low capacitance Transil™,  
transient surge voltage suppressor (TVS)

Datasheet — production data

## Features

- Bidirectional device
- Multiple ESD strike sustainability
- Very low capacitance: 7 pF max at 0 V
- Low leakage current
- Ultra small PCB area
- RoHS compliant

## Complies with the following standards

- IEC 61000-4-2:
  - ±15 kV (air discharge)
  - ±8 kV (contact discharge)

## Applications

Where transient over voltage protection in ESD sensitive equipment is required, such as:

- Portable multiplayers and accessories
- Notebooks
- Digital camera and camcorders
- Communication systems
- Cellular phone handsets and accessories

## Description

The ESDAVLC6-1BF4 is a bidirectional single line TVS diode designed to protect the data lines or other I/O ports against ESD transients.

The device is ideal for applications where both reduced line capacitance and board space saving are required.

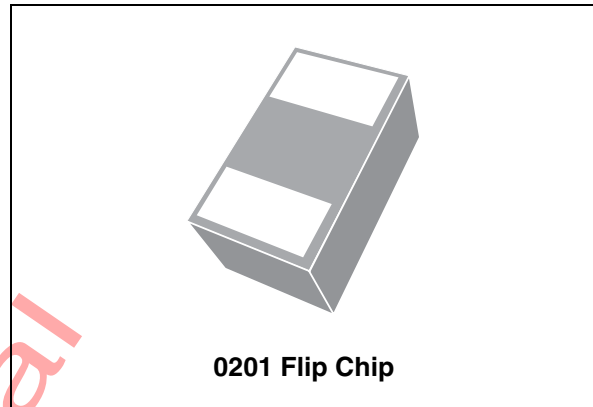
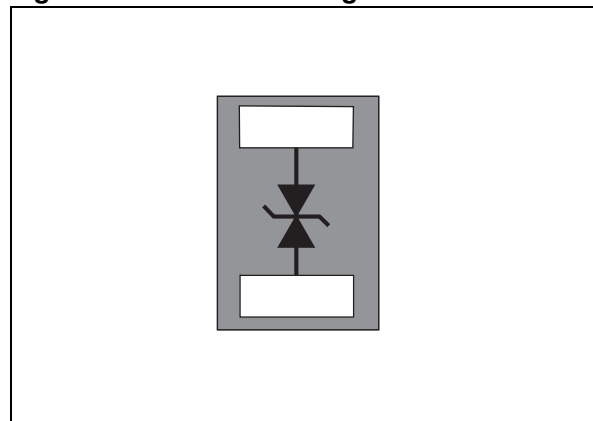


Figure 1. Functional diagram



TM: Transil is a trademark of STMicroelectronics

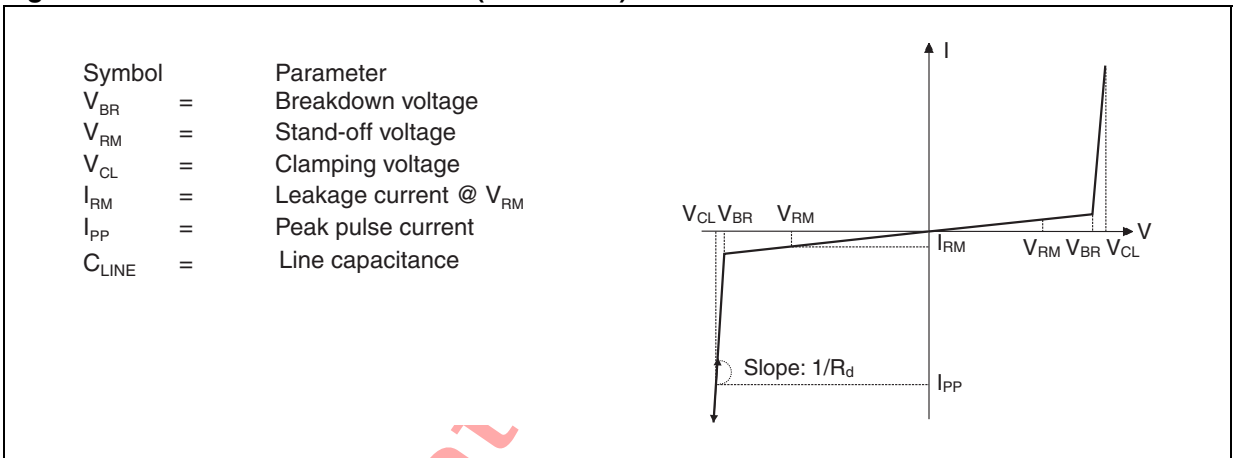
# 1 Characteristics

**Table 1. Absolute maximum ratings ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

Symbol	Parameter		Value	Unit
$V_{PP}^{(1)}$	Peak pulse voltage	IEC 61000-4-2 contact discharge IEC 61000-4-2 air discharge	$\pm 15$	kV
$T_{op}$	Operating temperature range		-30 to +85	$^{\circ}\text{C}$
$T_{stg}$	Storage temperature range		- 55 to +150	$^{\circ}\text{C}$

1. For a surge greater than the maximum values, the diode will fail in short-circuit.

**Figure 2. Electrical characteristics (definitions)**



**Table 2. Electrical characteristics (values,  $T_{amb} = 25\text{ }^{\circ}\text{C}$ )**

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{BR}$	Breakdown voltage	$I_R = 1\text{ mA}$	6		10	V
$I_{RM}$	Leakage current	$V_{RM} = 3\text{ V per line}$			100	nA
$C_{line}$	Line capacitance	$V_{line} = 0\text{ V}, F = 1\text{ MHz}, V_{ocs} 30\text{ mV}$	4		7	pF

Figure 3. ESD response to IEC 61000-4-2 (typical values, +8 kV contact discharge)

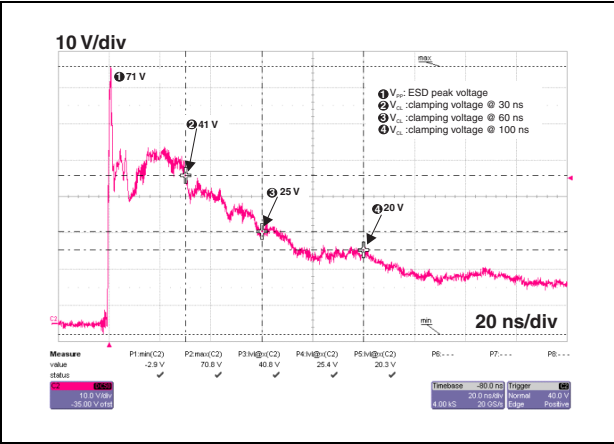


Figure 4. ESD response to IEC 61000-4-2 (typical values, -8 kV contact discharge)

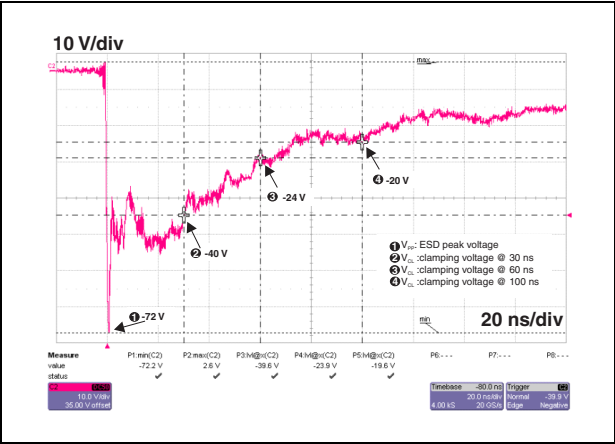


Figure 5. Junction capacitance versus reverse applied voltage (typical values)

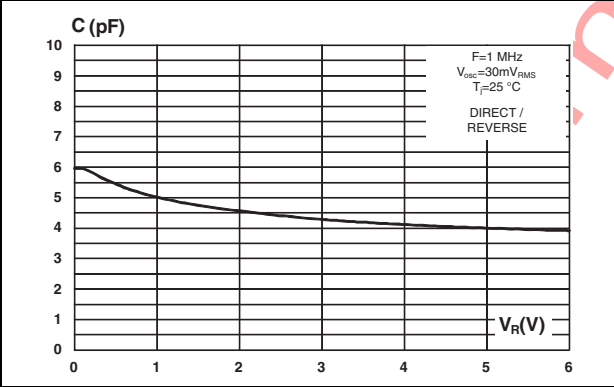


Figure 6. Relative variation of peak pulse power versus initial junction temperature

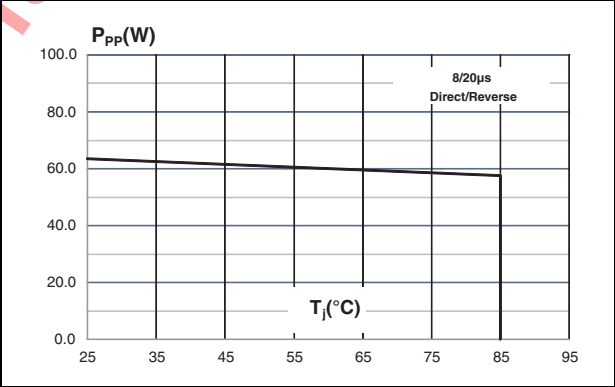


Figure 7. Peak pulse power versus exponential pulse duration

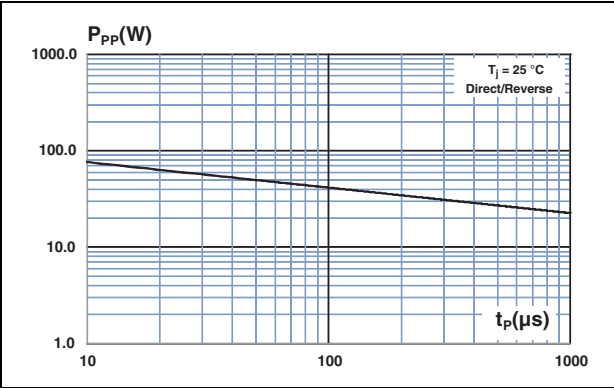
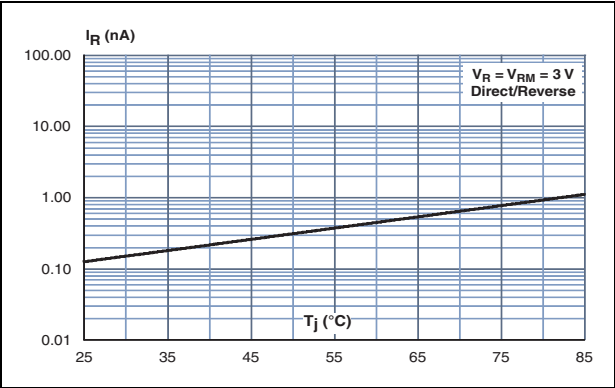
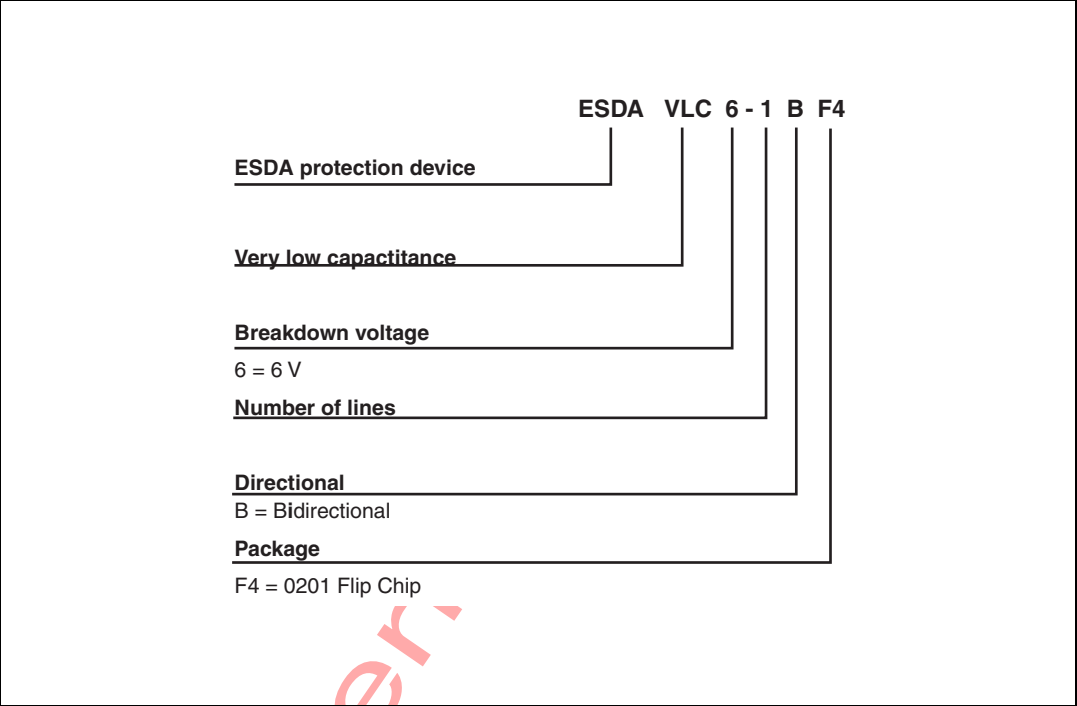


Figure 8. Leakage current versus junction temperature (typical values)



2      Ordering information scheme

Figure 9.    Ordering information scheme



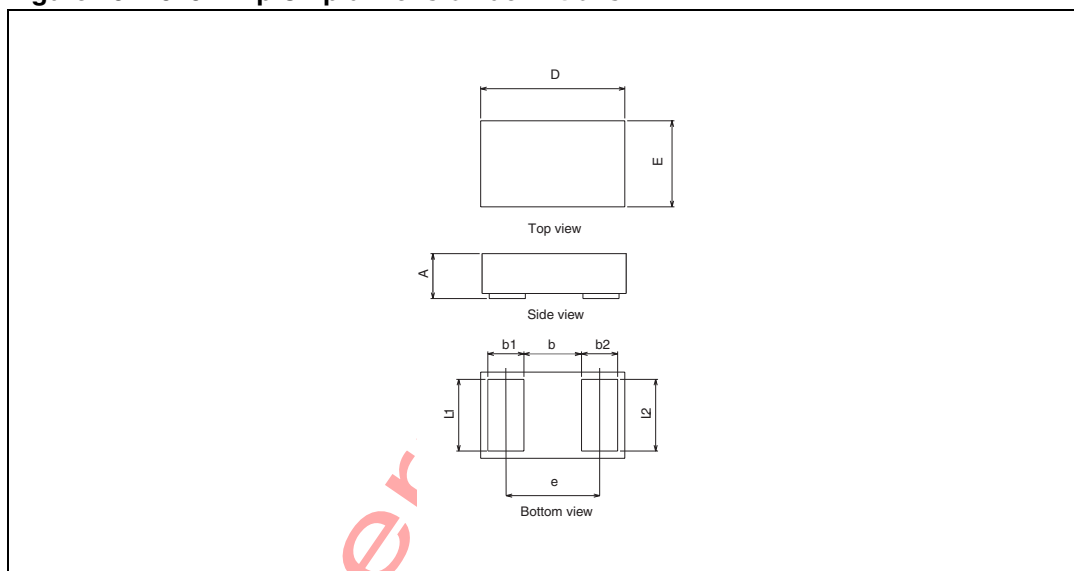
Internal

Internal

### 3 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](http://www.st.com). ECOPACK® is an ST trademark.

**Figure 10. 0201 Flip Chip dimension definitions**



**Table 3. 0201 Flip Chip dimension values**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.28	0.30	0.32	0.0110	0.0118	0.0126
b	0.19	0.21	0.23	0.0075	0.0082	0.0091
b1	0.125	0.14	0.155	0.0049	0.0055	0.0061
b2	0.125	0.14	0.155	0.0049	0.0055	0.0061
D	0.57	0.60	0.63	0.0224	0.0236	0.0257
e	0.33	0.35	0.37	0.0130	0.0138	0.0146
E	0.27	0.30	0.33	0.0106	0.0118	0.0130
L1	0.175	0.19	0.205	0.0069	0.0075	0.0081
L2	0.175	0.19	0.205	0.0069	0.0075	0.0081

[illegible]

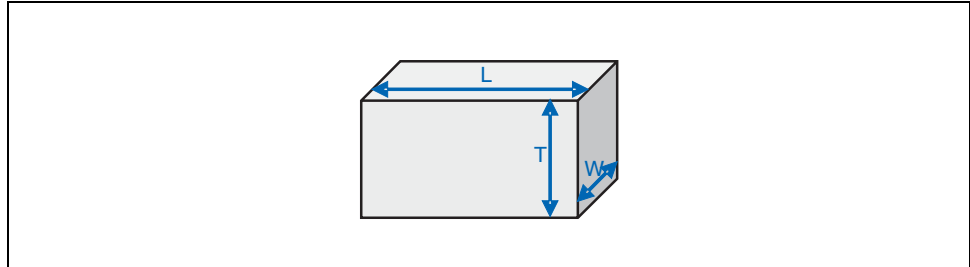
# Internal

## 4 Recommendation on PCB assembly

### 4.1 Stencil opening design

1. General recommendation on stencil opening design

- a) Stencil Opening Dimensions: L (Length), W (Width), T (Thickness).



- b) General Design Rule

Stencil thickness (T) = 75 ~ 125  $\mu\text{m}$

$$\text{Aspect Ratio} = \frac{W}{T} \geq 1.5$$

$$\text{Aspect Area} = \frac{L \times W}{2T(L + W)} \geq 0.66$$

2. Reference design

- a) Stencil opening thickness: 100  $\mu\text{m}$
- b) Stencil opening for leads: Opening to footprint ratio is 60% to 75%.

### 4.2 Solder paste

1. Halide-free flux qualification ROL0 according to ANSI/J-STD-004.
2. "No clean" solder paste is recommended.
3. Offers a high tack force to resist component movement during high speed
4. Solder paste with fine particles: powder particle size is 20-45  $\mu\text{m}$ .

### 4.3 Placement

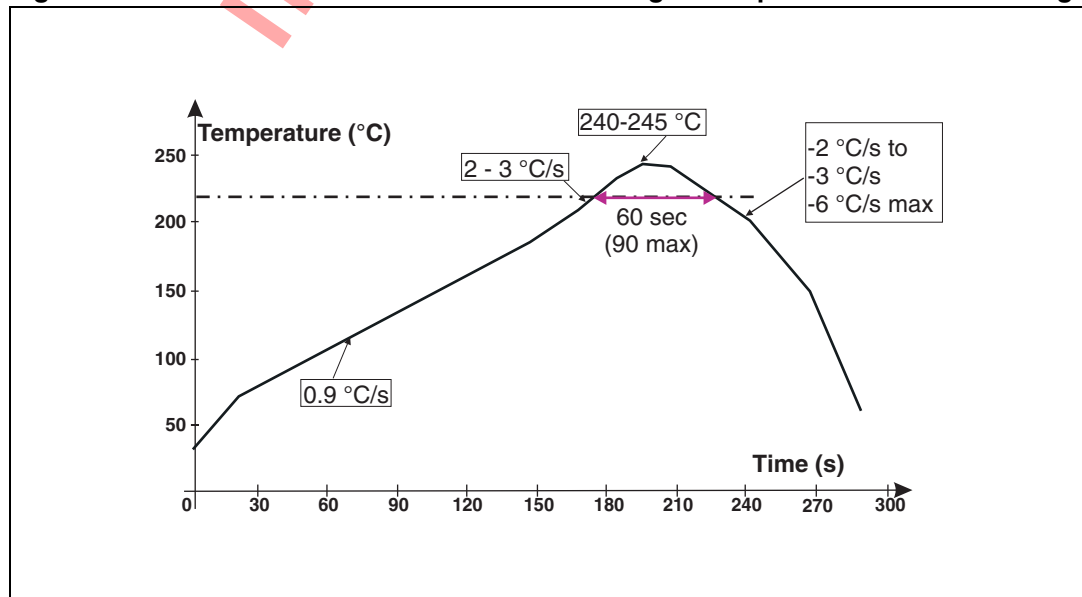
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering
3. Standard tolerance of  $\pm 0.05$  mm is recommended.
4. 3.5 N placement force is recommended. Too much placement force can lead to squeezed out solder paste and cause solder joints to short. Too low placement force can lead to insufficient contact between package and solder paste that could cause open solder joints or badly centered packages.
5. To improve the package placement accuracy, a bottom side optical control should be performed with a high resolution tool.
6. For assembly, a perfect supporting of the PCB (all the more on flexible PCB) is recommended during solder paste printing, pick and place and reflow soldering by using optimized tools.

### 4.4 PCB design preference

1. To control the solder paste amount, the closed via is recommended instead of open vias.
2. The position of tracks and open vias in the solder area should be well balanced. The symmetrical layout is recommended, in case any tilt phenomena caused by asymmetrical solder paste amount due to the solder flow away.

### 4.5 Reflow profile

Figure 12. ST ECOPACK® recommended soldering reflow profile for PCB mounting



Note: Minimize air convection currents in the reflow oven to avoid component movement.



## 5 Ordering information

Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
ESDAVLC6-1BF4	None	0201 Flip Chip	0.116 mg	15 000	Tape and reel

## 6 Revision history

Table 5. Document revision history

Date	Revision	Changes
02-May-2012	1	First issue

Internal

Internal

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**UNLESS EXPRESSLY APPROVED IN WRITING BY TWO AUTHORIZED ST REPRESENTATIVES, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2012 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)