

### Features

- Packaged in lead-free Flip Chip
- Very low resistance: 0.35 Ω
- High attenuation: -45 dB at 900 MHz
- Very low PCB space consumption: 0.89 mm x 1.26 mm
- Very thin package: 0.65 mm
- High efficiency in ESD suppression IEC6 1000-4-2 level 4
- High reliability offered by monolithic integration
- High reduction of parasitic elements through integration and wafer level packaging

### Complies with the following standards

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

### Application

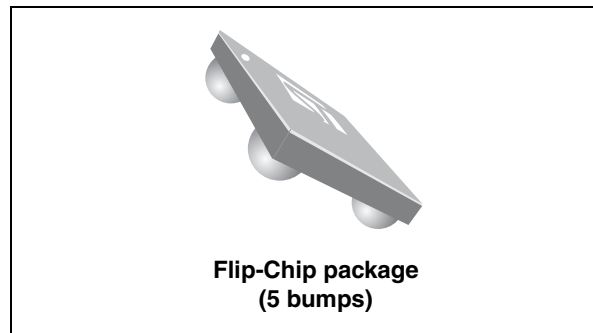
- Mobile phones

### Description

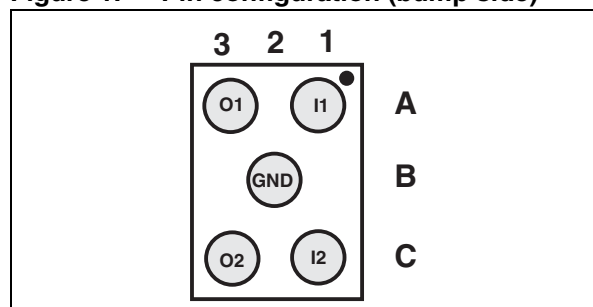
The EMIF02-SPK02F2 chip is a highly integrated device designed to suppress EMI/RFI noise for interface line filtering.

The EMIF02-SPK02F2 flip-chip packaging means the package size is equal to the die size. That's why the EMIF02-SPK02F2 is a very small device.

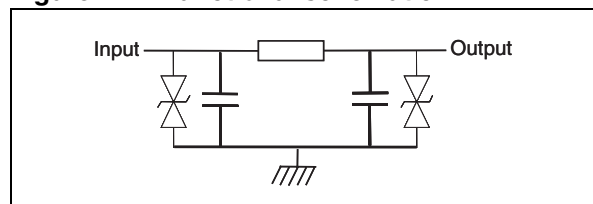
Additionally, this filter includes ESD protection circuitry, which prevents damage to the protected device when subjected to ESD surges up to 30 kV.



**Figure 1. Pin configuration (bump side)**



**Figure 2. Functional schematic**



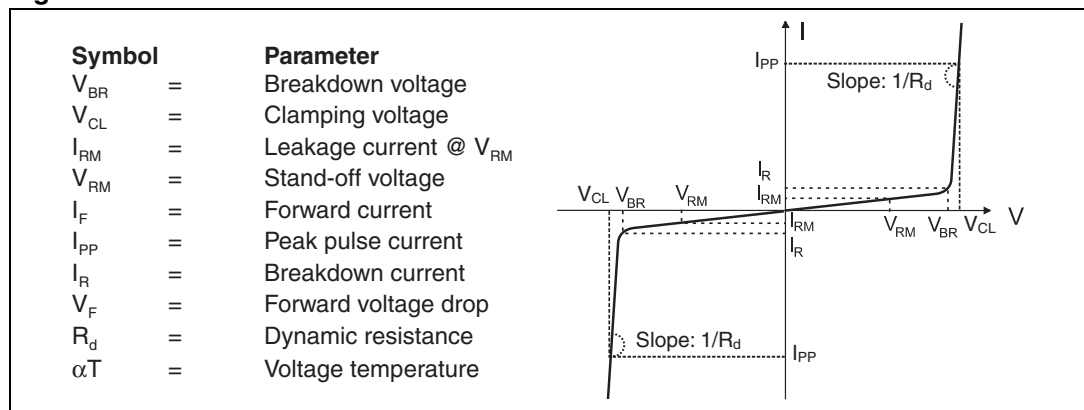
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# 1 Characteristics

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

Symbol	Parameter	Value	Unit
$V_{PP}$	ESD discharge IEC 61000-4-2		
	Air discharge	30	kV
	Contact discharge	30	
$I_{SPK}$	Maximum rms current per channel	350	mA
$T_j$	Junction temperature range	-30 to 125	°C
$T_{stg}$	Storage temperature range	-55 to + 150	°C

**Figure 3. Electrical characteristics - definitions**



**Table 2. Electrical characteristics - values ( $T_{amb} = 25\text{ °C}$ )**

Symbol	Test conditions	Min	Typ	Max	Unit
$V_{BR}$	$I_R = 1\text{ mA}$	6			V
$I_{RM}$	$V_{RM} = 3\text{ V}$			400	nA
$R_{I/O}$			0.35	0.8	$\Omega$
$C_{LINE}$	$V_R = 0\text{ V DC}, 1\text{ MHz}$	185	250	315	pF
$F_c$	Cut-off frequency: $Z_{SOURCE} = Z_{LOAD} = 50\ \Omega$		20		MHz

Figure 4. Attenuation measurements versus frequency

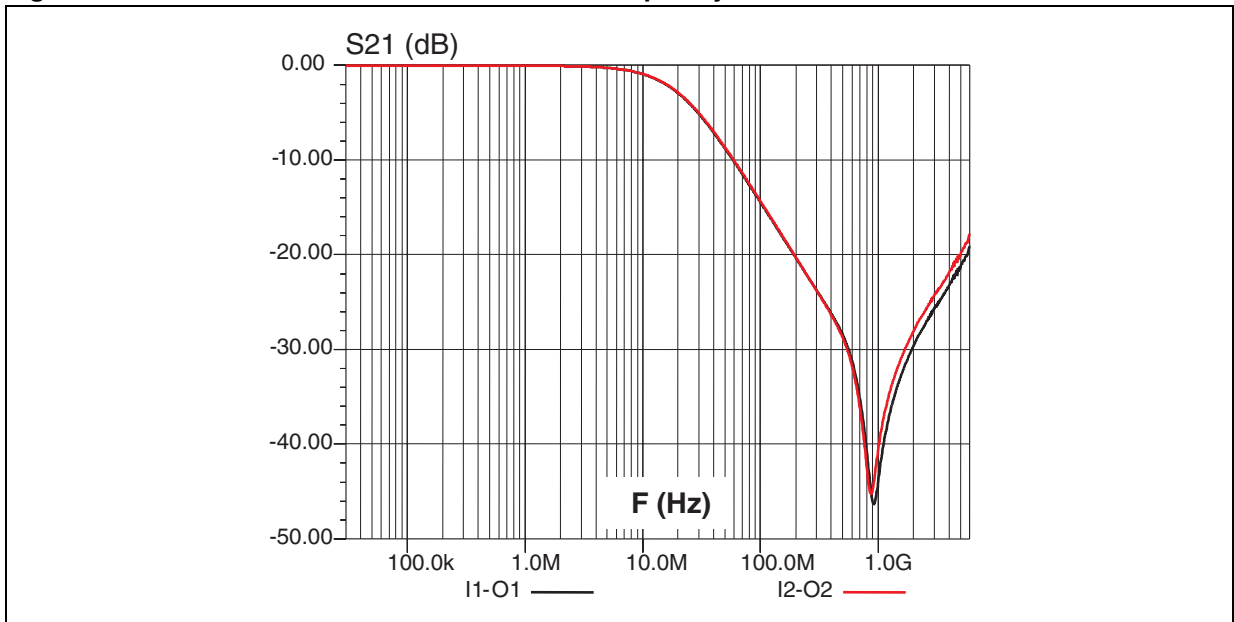


Figure 5. Crosstalk measurements versus frequency

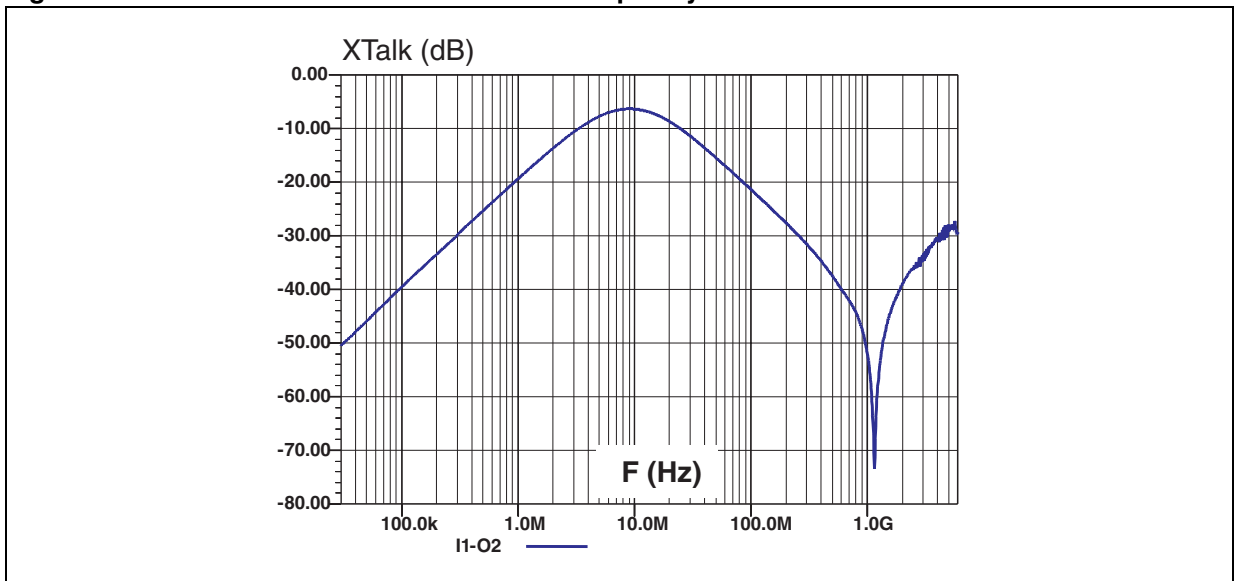


Figure 6. ESD test conditions

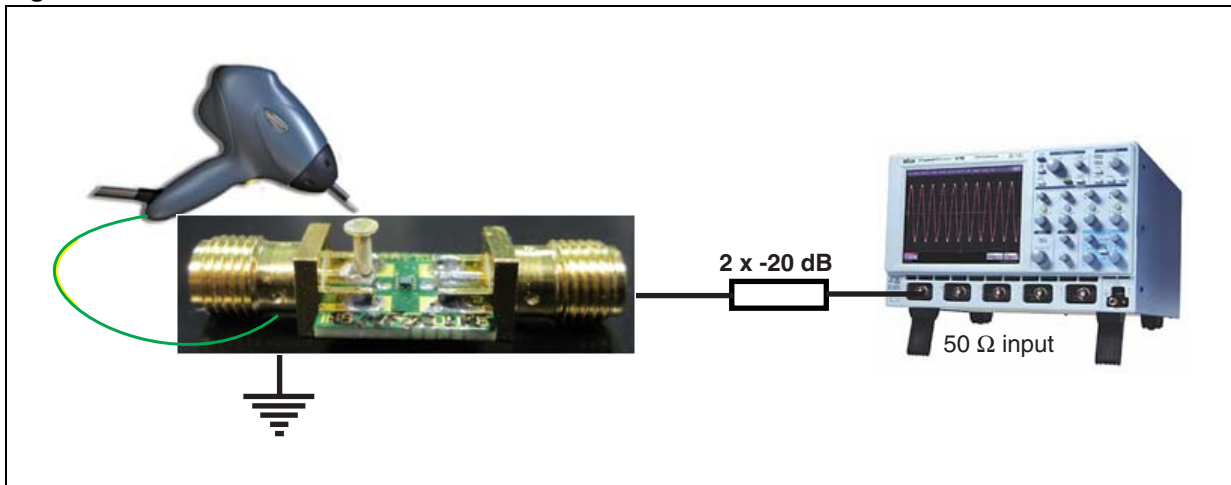
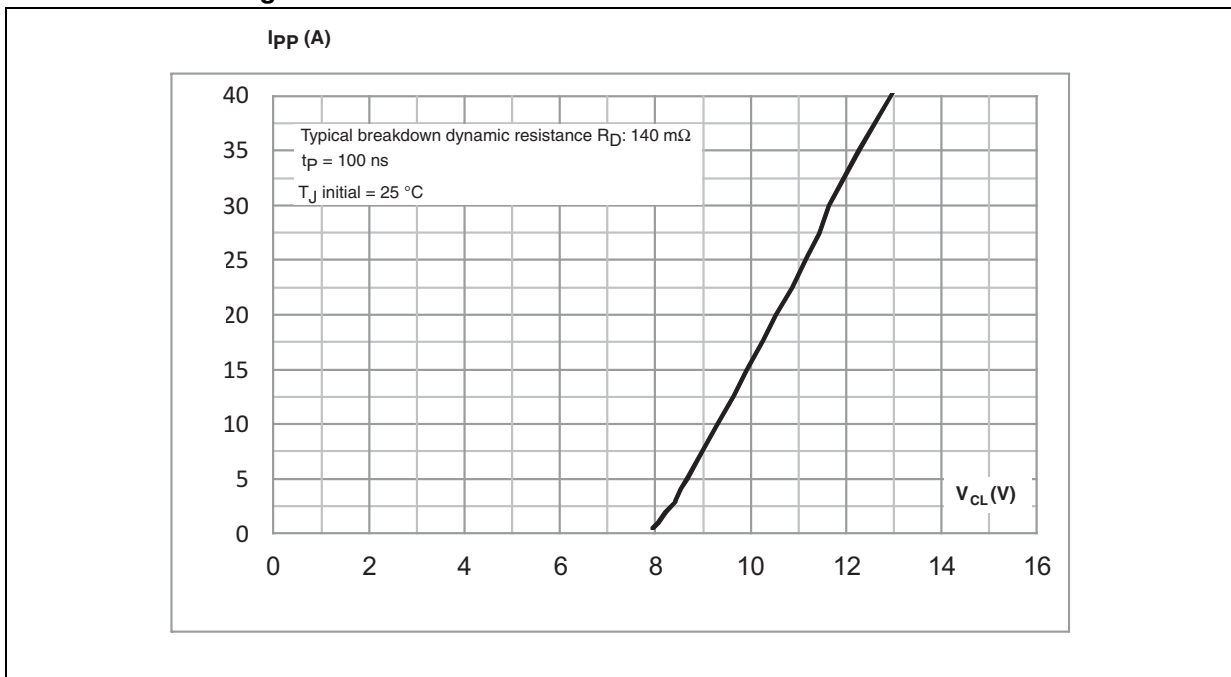


Figure 7. Clamping voltage  $V_{CL}$  versus peak pulse current  $I_{PP}$  for short pulse duration such as ESD surges



Note: For further information on the dynamic characteristic see the STMicroelectronics' application note AN4022, "TVS short pulse  $R_D$  measurement and correlation with TVS clamping voltage during ESD".

Figure 8. Output filter ESD response to IEC 61000-4-2 (+8 kV contact discharge) I1 to O1

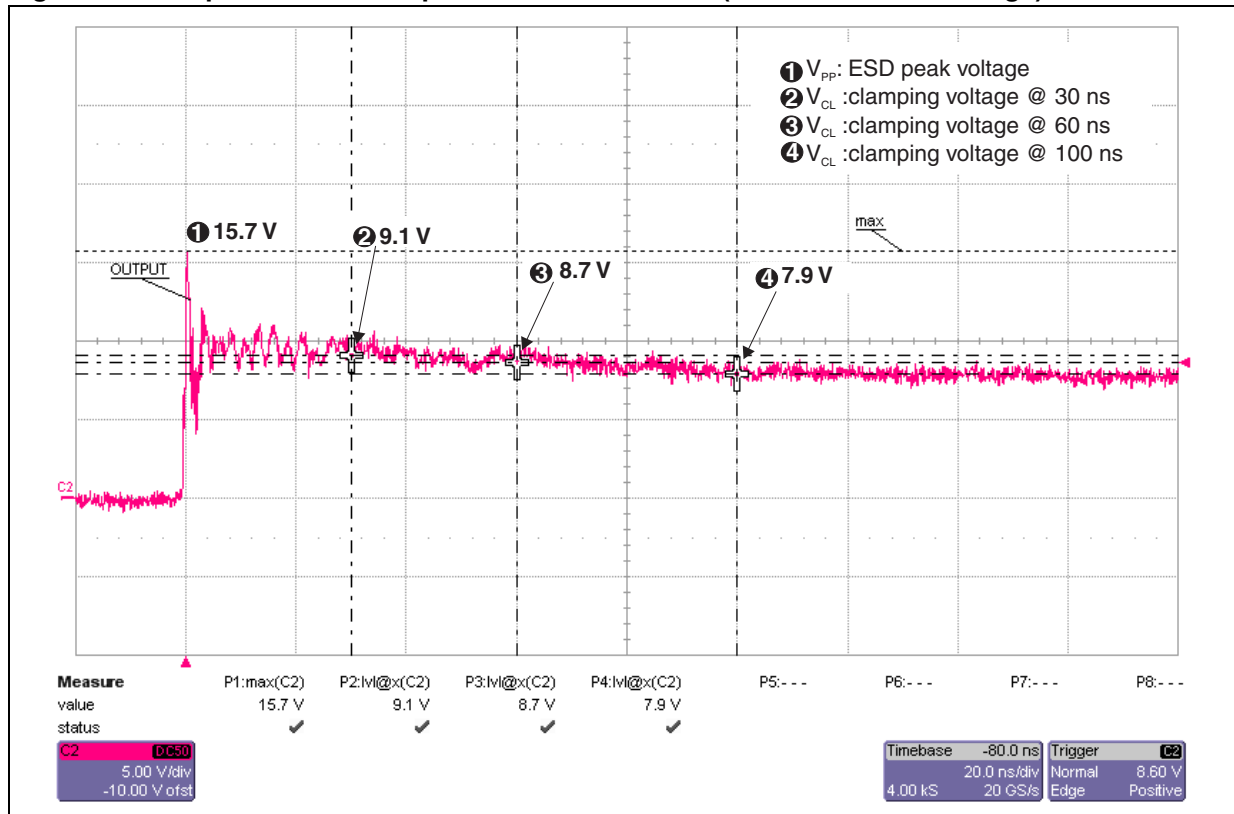


Figure 9. Output filter ESD response to IEC 61000-4-2 (-8 kV contact discharge) I1 to O1

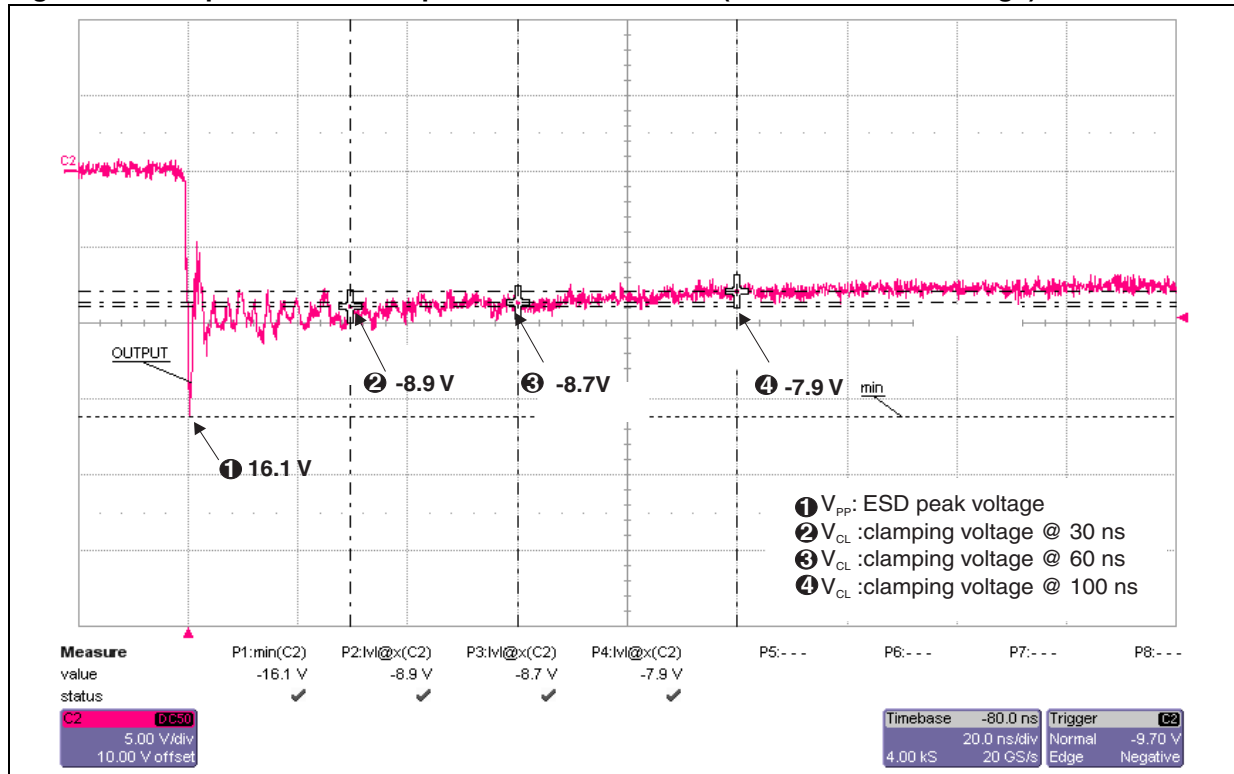


Figure 10. Output filter ESD response to IEC 61000-4-2 (+15 kV contact discharge) I1 to O1

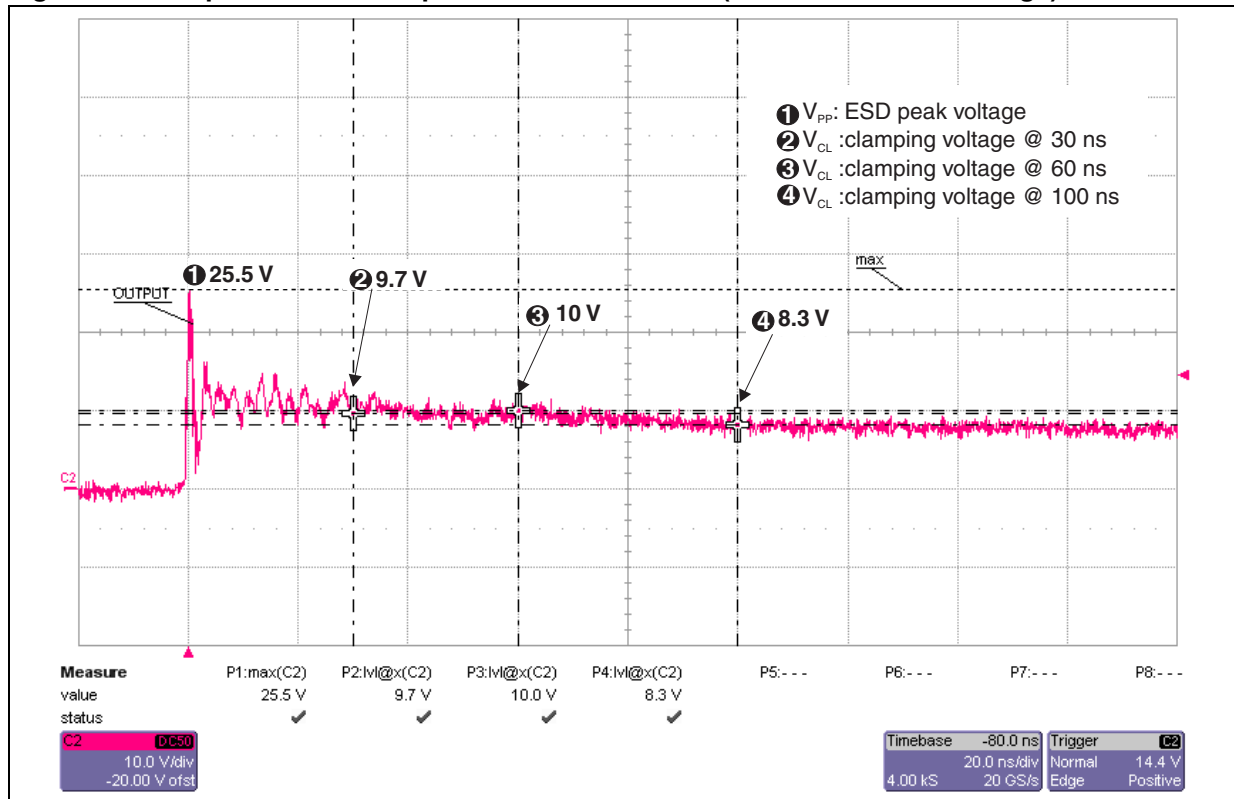


Figure 11. Output filter ESD response to IEC 61000-4-2 (-15 kV contact discharge) I1 to O1

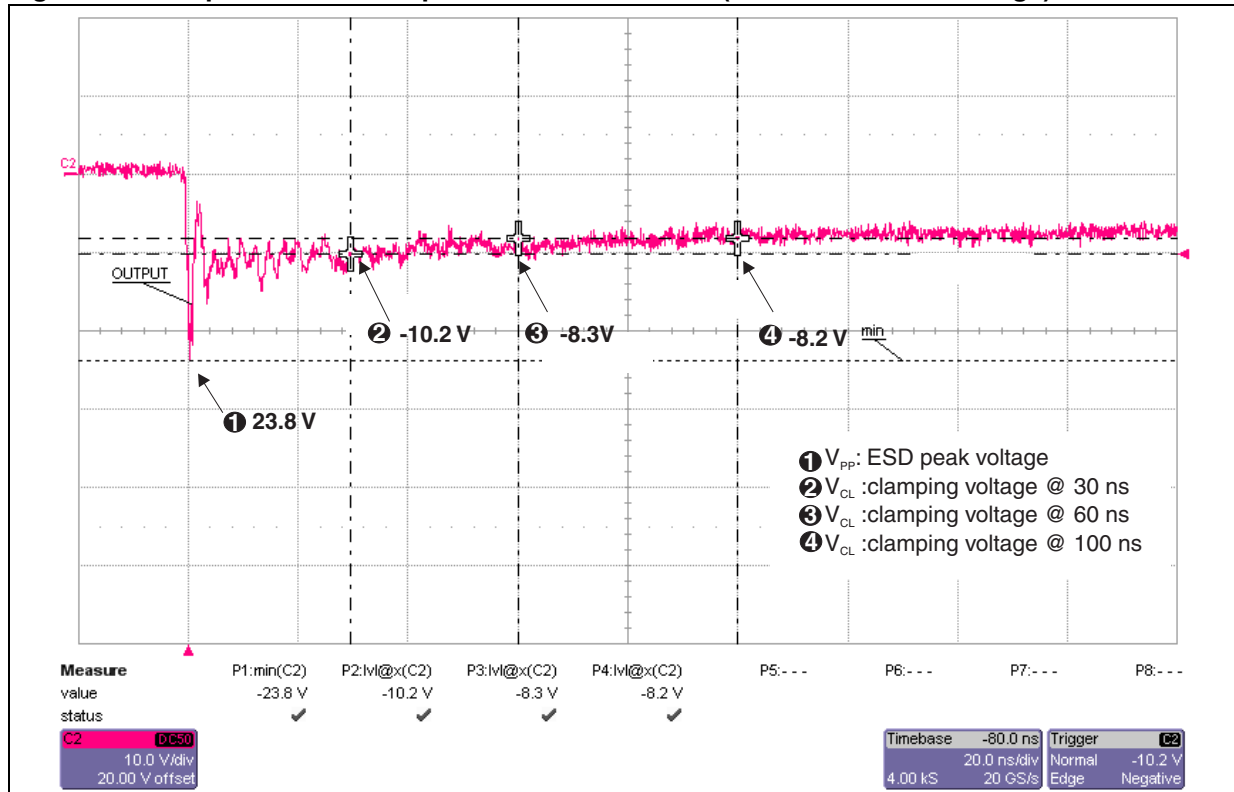


Figure 12. Output filter ESD response to IEC 61000-4-2 (+30 kV contact discharge) I1 to O1

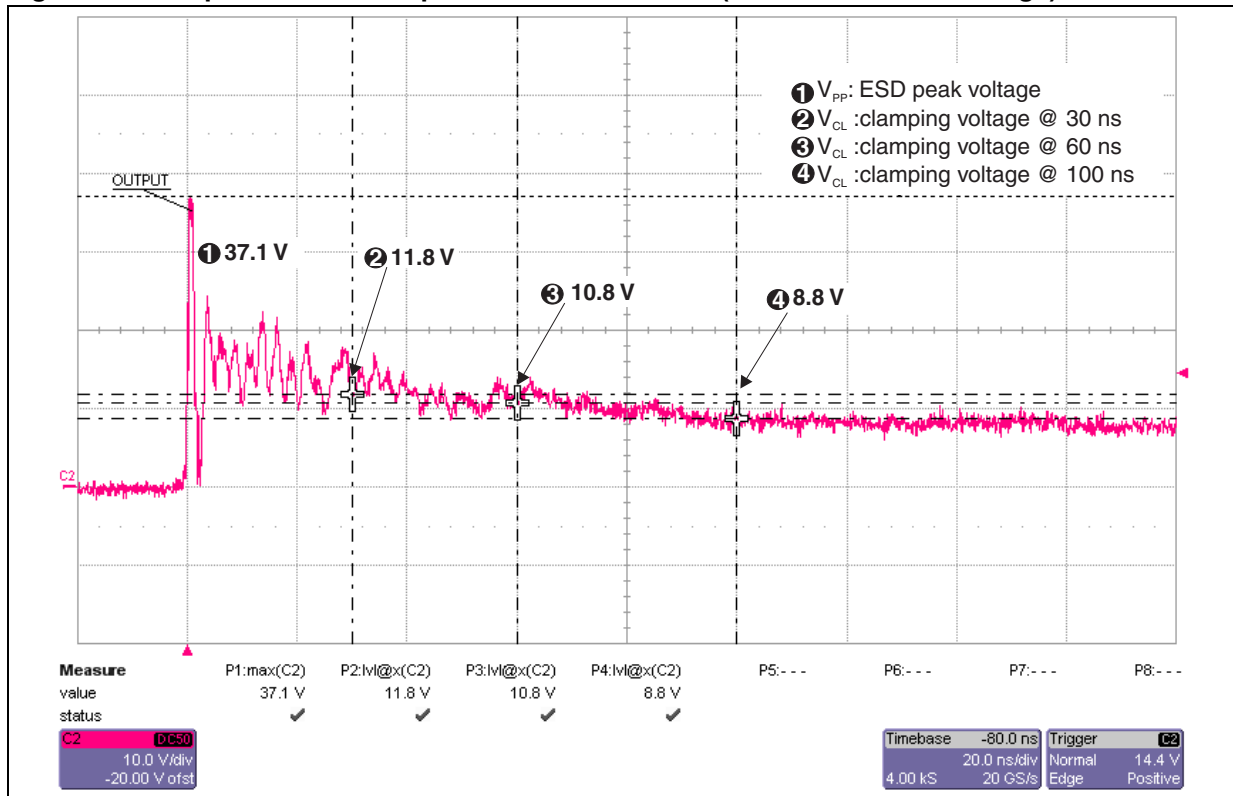
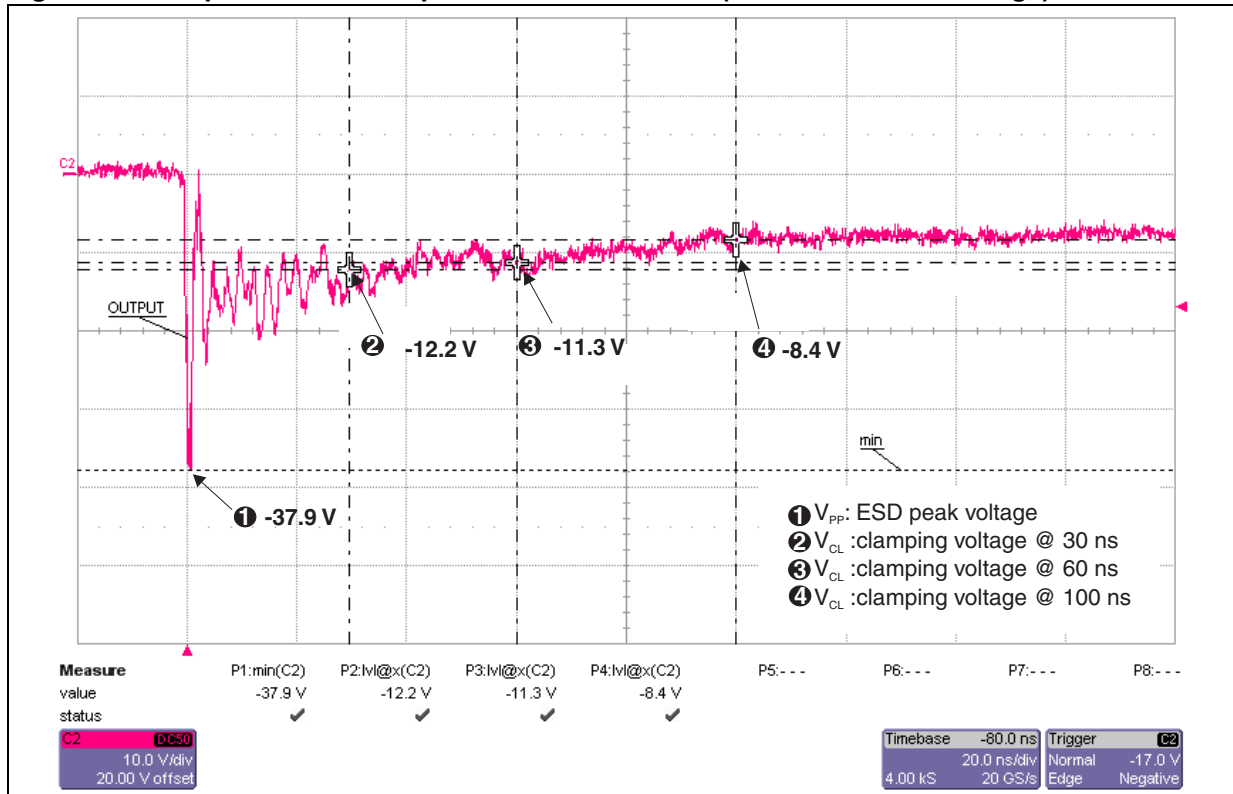
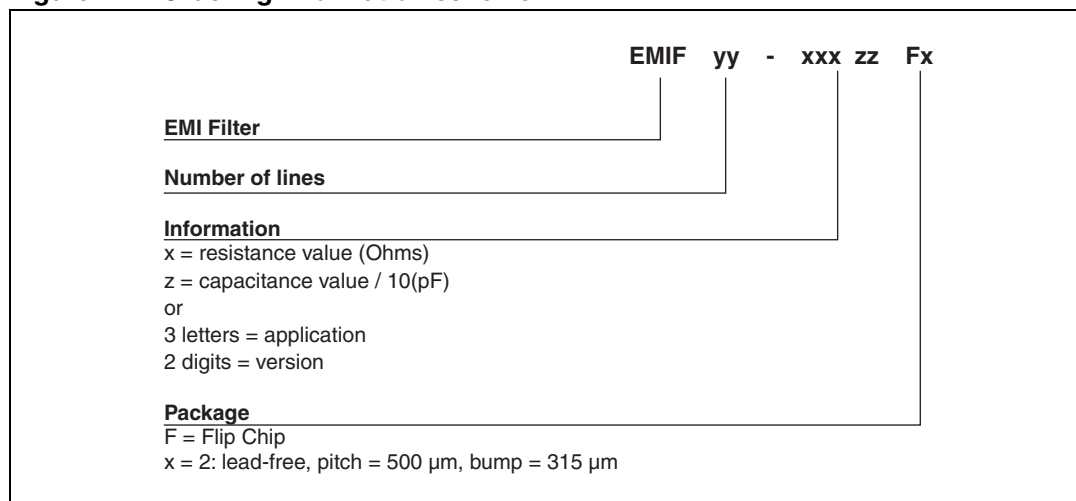


Figure 13. Output filter ESD response to IEC 61000-4-2 (-30 kV contact discharge) I1 to O1



## 2 Ordering information scheme

Figure 14. Ordering information scheme





### 3 Package information

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

Figure 15. Package dimensions

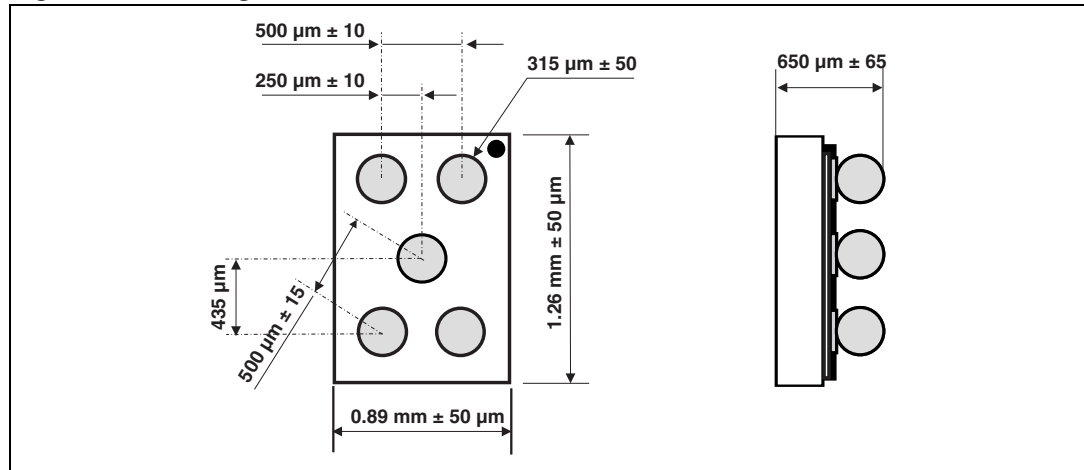


Figure 16. Footprint

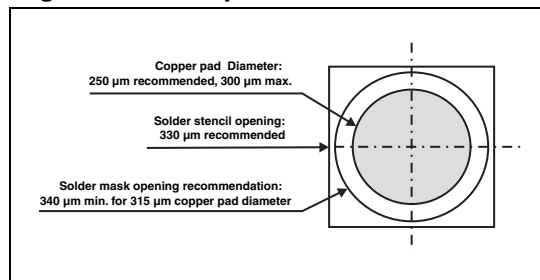


Figure 17. Marking

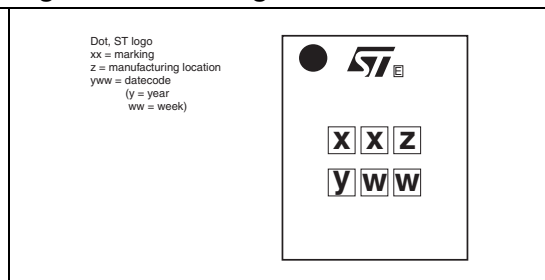
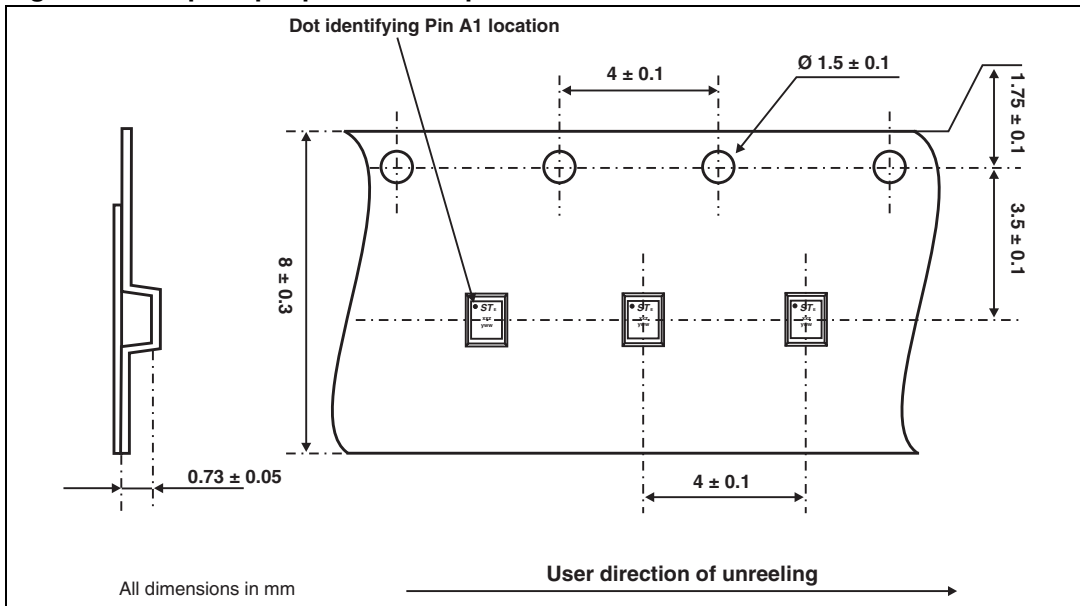


Figure 18. Flip Chip tape and reel specification



Note: More information is available in the application notes:  
AN1235: "Flip Chip: Package description and recommendations for use"  
AN1751: "EMI filters: Recommendations and measurements"

## 4 Ordering information

Table 3. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
EMIF02-SPK02F2	JD	Flip Chip	1.8 mg	5000	Tape and reel 7"

## 5 Revision history

Table 4. Document revision history

Date	Revision	Changes
17-Sep-2008	1	Initial release.
12-Sep-2011	2	Updated <a href="#">Figure 15</a> and <a href="#">Figure 16</a> .
3-Apr-2012	3	Updated cover page features and description. Inserted <a href="#">Figure 6</a> to <a href="#">Figure 13</a> .

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