

## EMI filter with integrated ESD protection for micro-SD Card™

Datasheet – production data

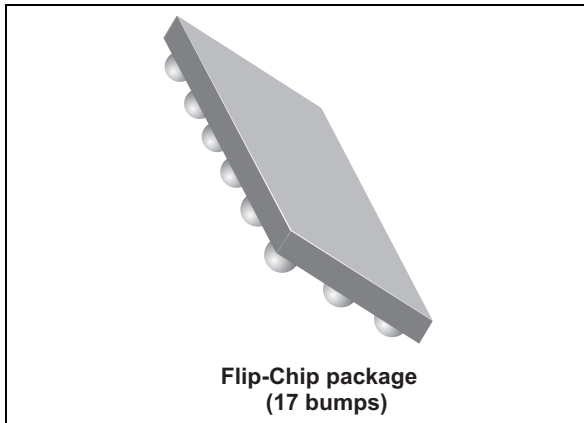


Figure 1. Pin configuration (bump side)

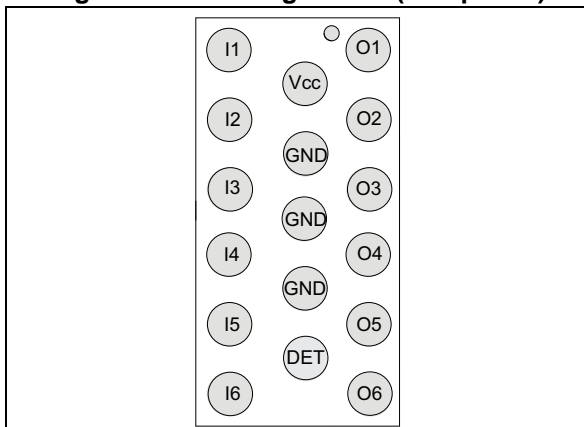
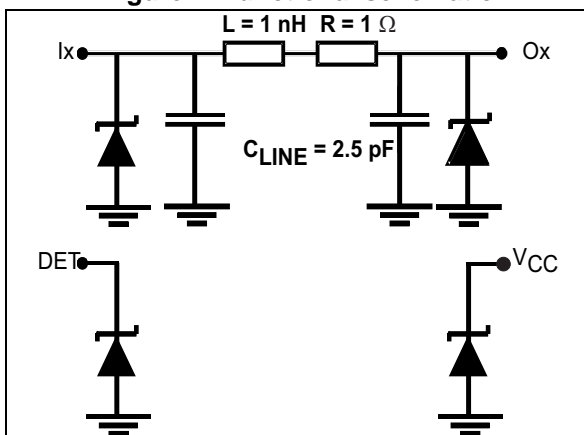


Figure 2. Functional schematic



### Features

- Very low line capacitance to compensate long PCB tracks (2.5 pF typ.)
- High efficiency in ESD suppression up to 18 kV (IEC 61000-4-2)
- Very low PCB space consumption:
  - 1.1 x 2.4 mm
- Ultralow leakage current: 20 nA max.
- Very thin package: 0.605 mm
- Smart pinout for easier PCB layout
- High reduction of parasitic elements through integration and wafer level packaging
- Lead-free package
- Complies with the following standards:
  - IEC 61000-4-2 level 4:  $\pm 15 \text{ kV}$  (air discharge),  $\pm 8 \text{ kV}$  (contact discharge)

### Application

- SD3.0, UHS-1 SDR104 (208 MHz)

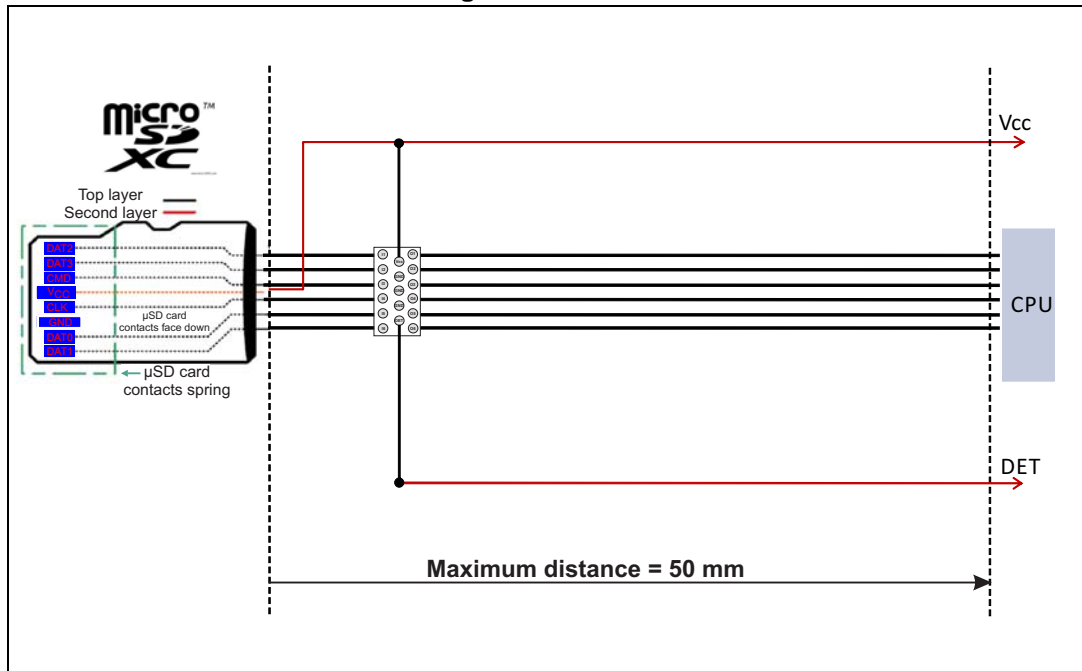
### Description

The EMIF06-HSD03F3 chip is a highly integrated device designed to suppress EMI/RFI noise for interface line filtering.

The EMIF06-HSD03F3 Flip-Chip packaging means the package size is equal to the die size. That's why EMIF06-HSD03F3 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 18 kV.

# 1 Application diagram

Figure 3. Schema



## 2 Characteristics

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

Symbol	Parameter	Value	Unit
$V_{PP}$	ESD discharge IEC 61000-4-2, level 4 for Ix pins:		
	Air discharge	18	kV
	Contact discharge	18	
	ESD discharge IEC 61000-4-2, level 1 for Ox pins:		
Contact discharge	10		
$T_j$	Maximum junction temperature	125	$^{\circ}\text{C}$
$T_{OP}$	Operating temperature range	- 30 to + 85	$^{\circ}\text{C}$
$T_{stg}$	Storage temperature range	- 55 to +150	$^{\circ}\text{C}$

**Figure 4. Electrical characteristics (definitions)**

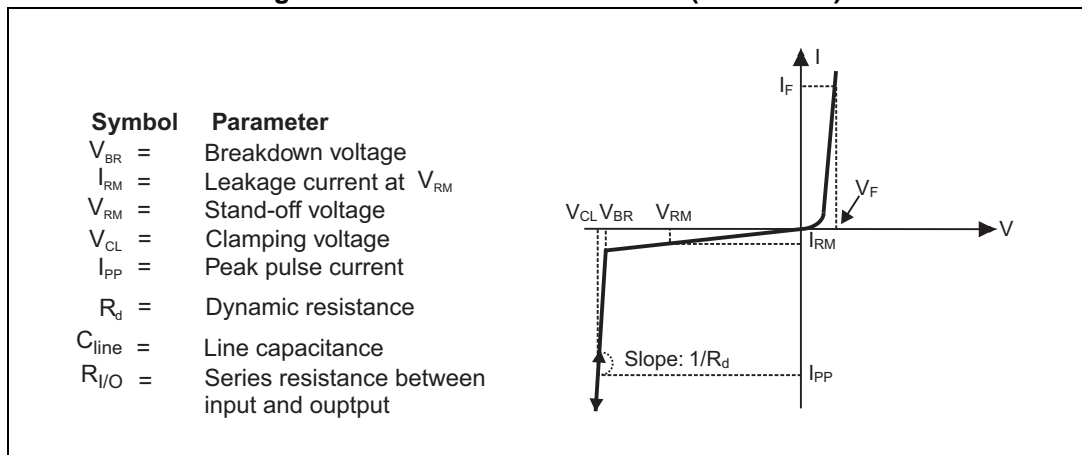


Table 2. Electrical characteristics ( $T_{amb} = 25\text{ °C}$ )

Symbol	Test conditions	Min.	Typ.	Max.	Unit
$V_{BR}$	Data lines, $I_R = 1\text{ mA}$	5		9	V
$I_{RM}$	$V_{RM} = 3\text{ V}$ per line			20	nA
$R_{I/O}$			1		$\Omega$
$C_{line}$	$V_{line} = 0\text{ V}$ , $V_{osc} = 30\text{ mV}$ , $F = 1\text{ MHz}$		2.5	3	pF
L			1		nH
Rd	Dynamics resistance, $t_p = 100\text{ ns}$	IO-GND (positive polarity)		650	m $\Omega$
		GND-IO (negative polarity)		320	
<b>V<sub>CC</sub></b>					
$V_{BR}$	$I_R = 1\text{ mA}$	5		9	V
$I_{RM}$	$V_{RM} = 3\text{ V}$			20	nA
$C_{line}$	$V_{line} = 0\text{ V}$ , $V_{osc} = 30\text{ mV}$ , $F = 1\text{ MHz}$		40		pF
<b>DET</b>					
$V_{BR}$	$I_R = 1\text{ mA}$	5		9	V
$I_{RM}$	$V_{RM} = 3\text{ V}$			20	nA
$C_{line}$	$V_{line} = 0\text{ V}$ , $V_{osc} = 30\text{ mV}$ , $F = 1\text{ MHz}$		40		pF

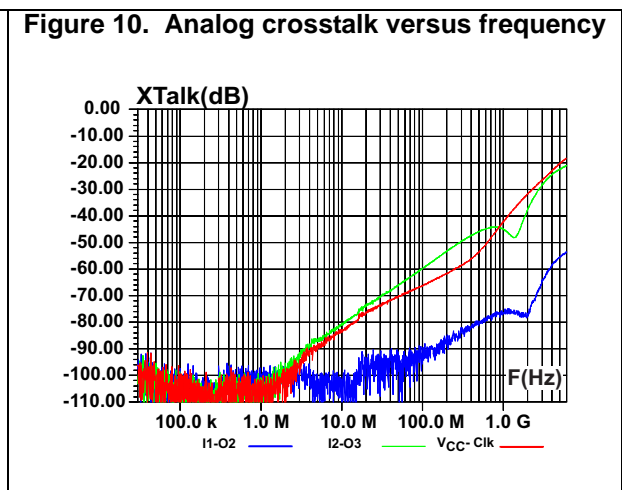
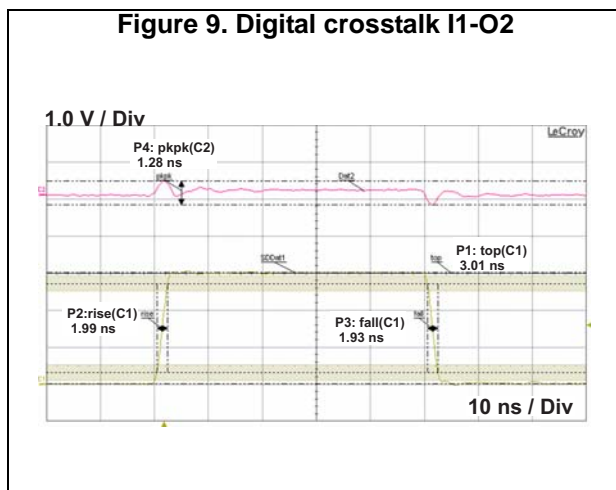
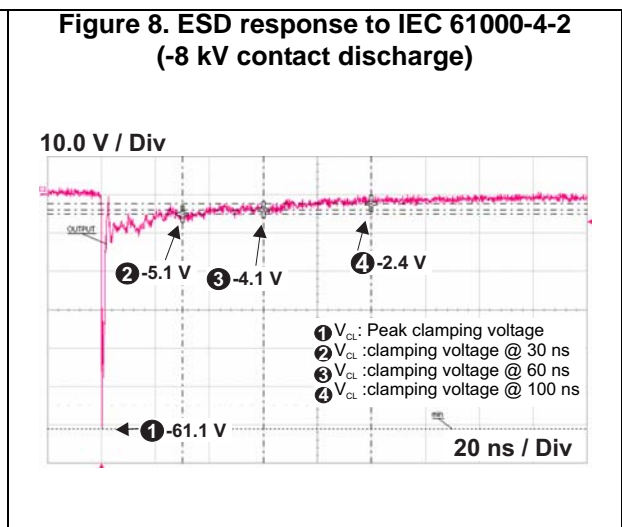
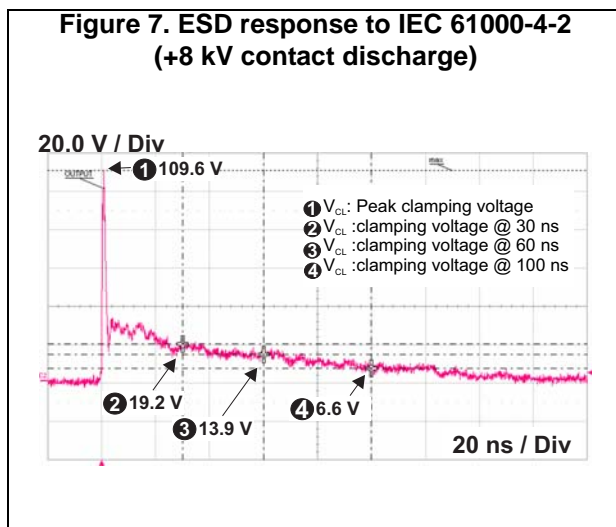
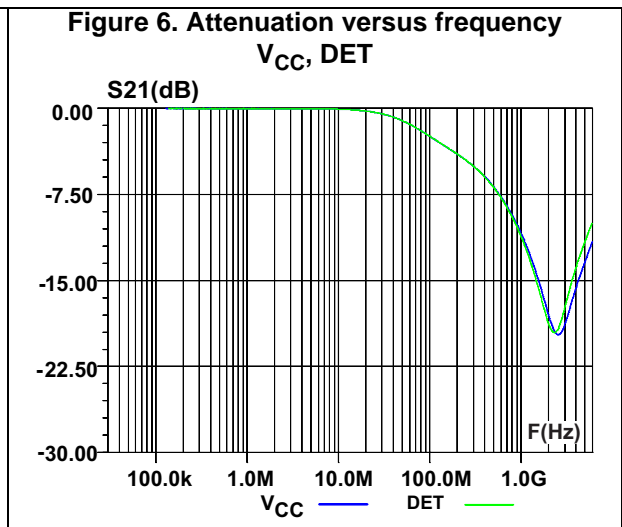
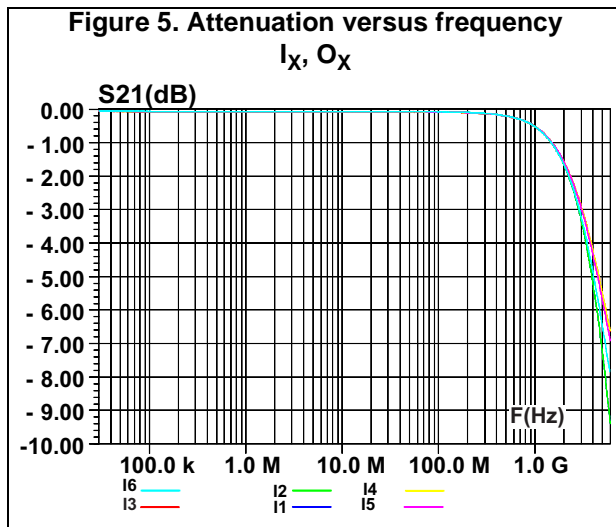
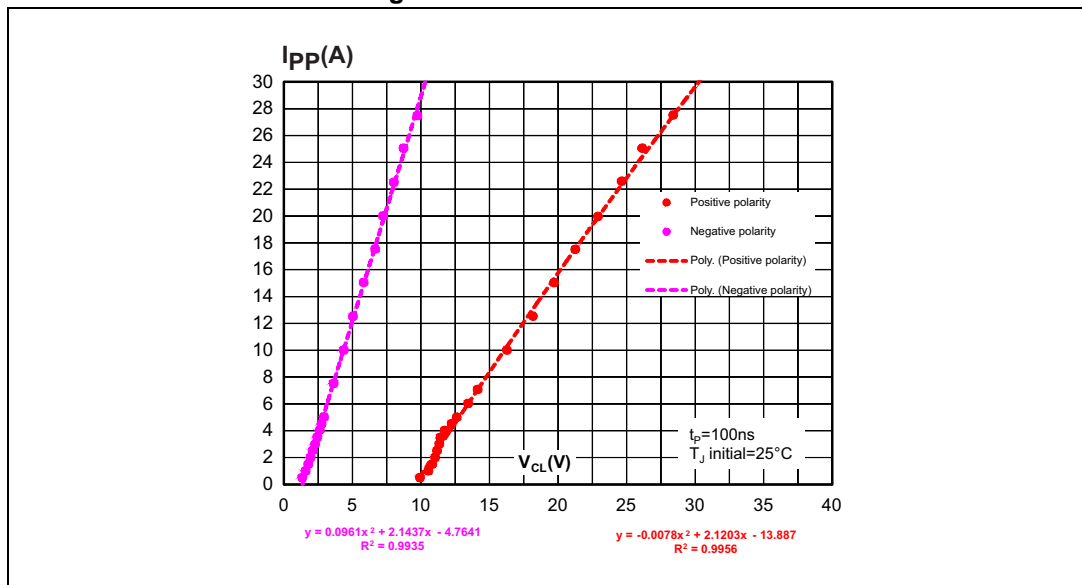


Figure 11. TLP measurement



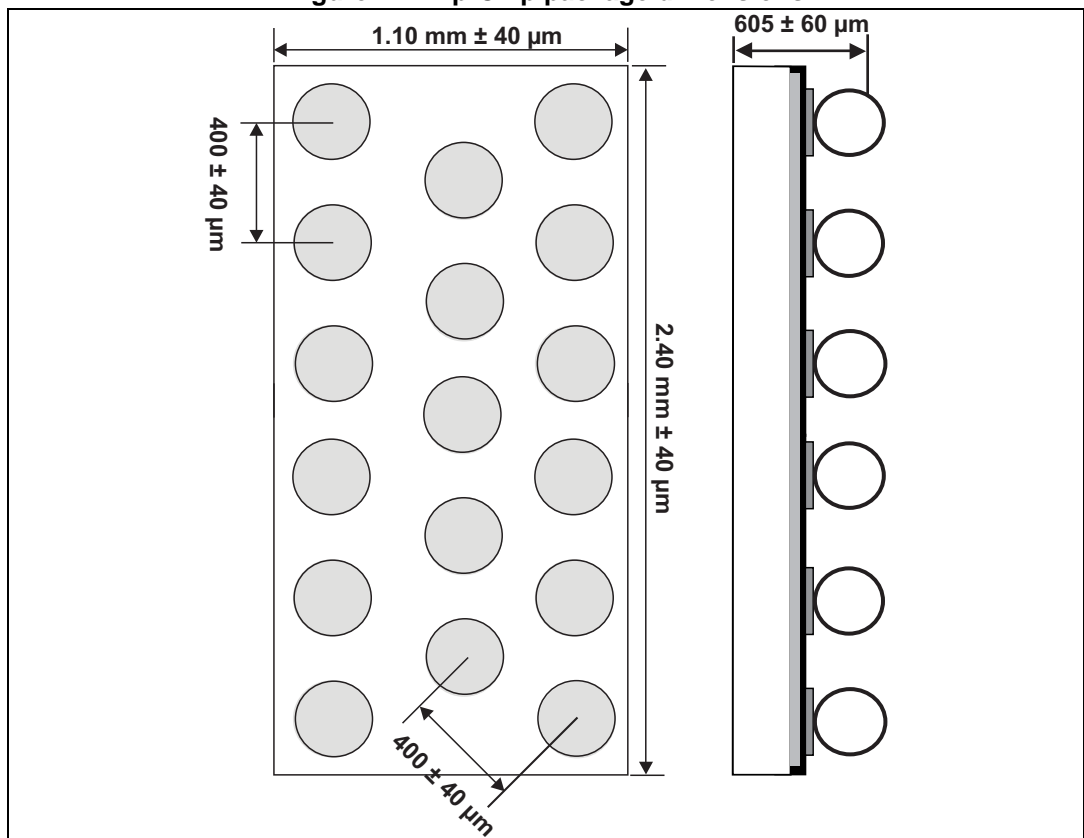
### 3 Package information

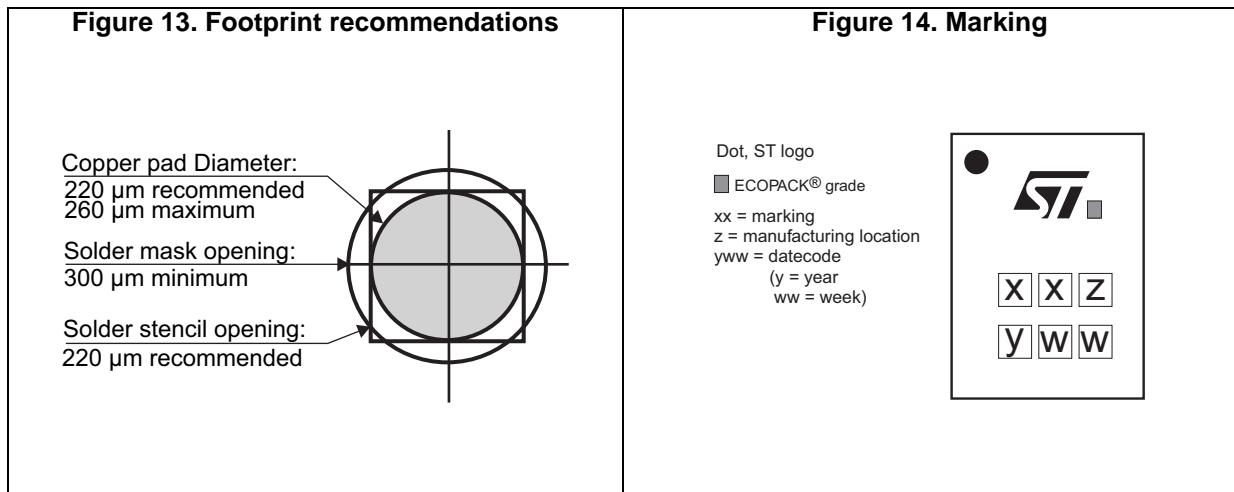
- Epoxy meets UL94, V0
- Lead-free package

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.

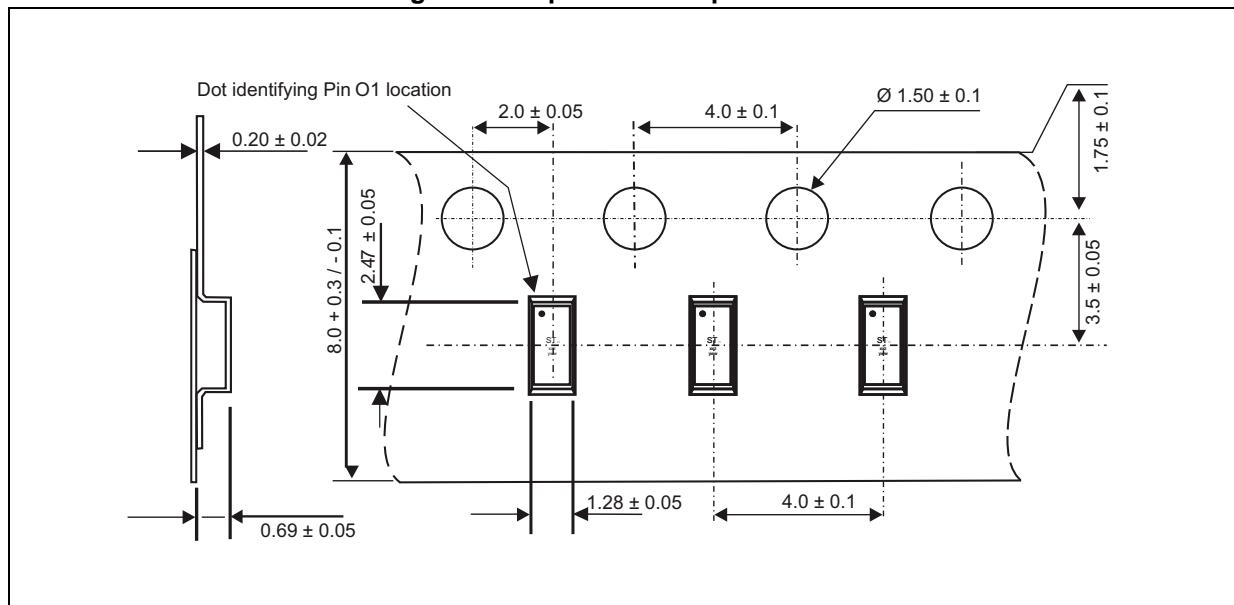
#### 3.1 Flip-Chip package information

Figure 12. Flip-Chip package dimensions





**Figure 15. Tape and reel specification**



**Note:** More information is available in the application notes:  
 AN2348, "IPAD™ 400 μm Flip Chip: package description and recommendations for use"  
 AN1751, "EMI filters: recommendations and measurements"  
 AN4541: "EMI Filters for SD3.0 card: High speed SD card protection and filtering devices"



## 4 Ordering information

Figure 16. Ordering information scheme

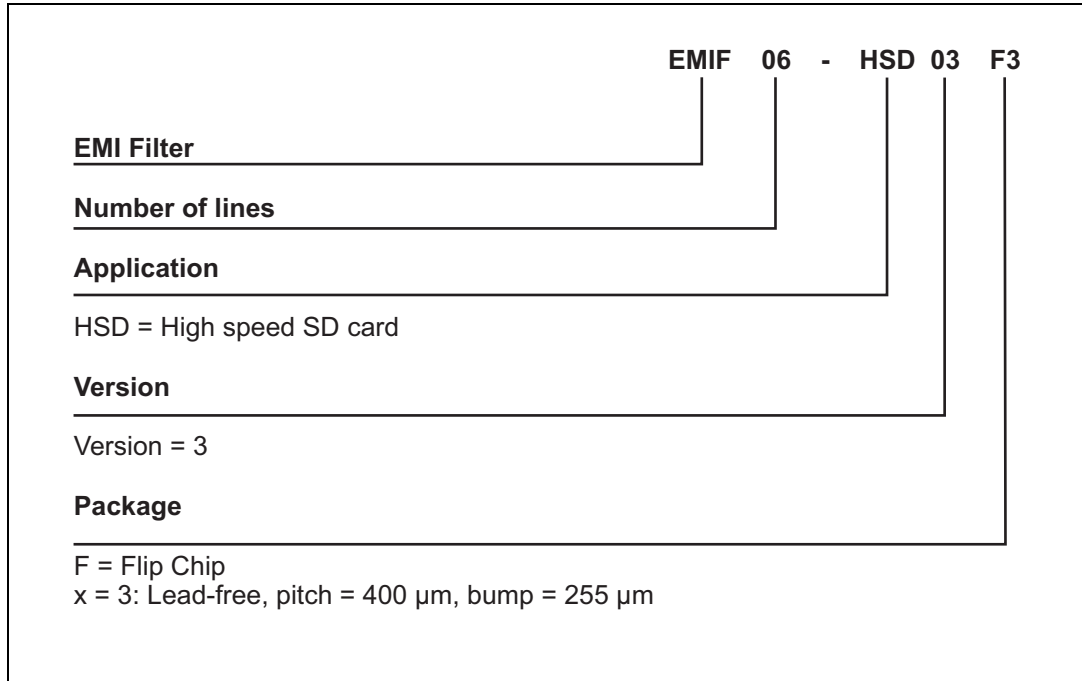


Table 3. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
EMIF06-HSD03F3	KK	Flip Chip	3.4 mg	5000	Tape and reel (7")

## 5 Revision history

Table 4. Document revision history

Date	Revision	Changes
19-Nov-2013	1	Initial release
09-Jan-2014	2	Corrected typographical error.
06-Jan-2015	3	Added mention for new AN4541.
06-Oct-2016		Updated <a href="#">Figure 1</a> .

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