

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

Datasheet – production data

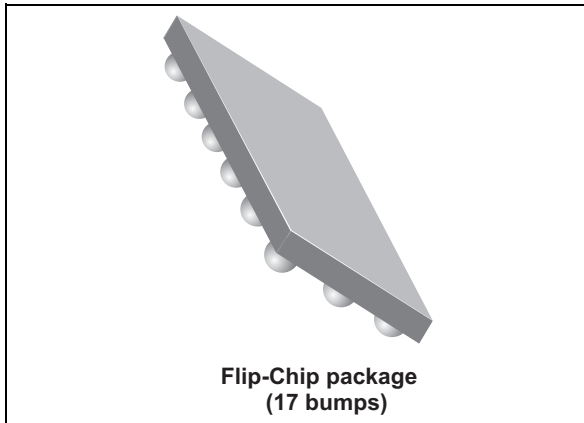


Figure 1. Pin configuration (bump side)

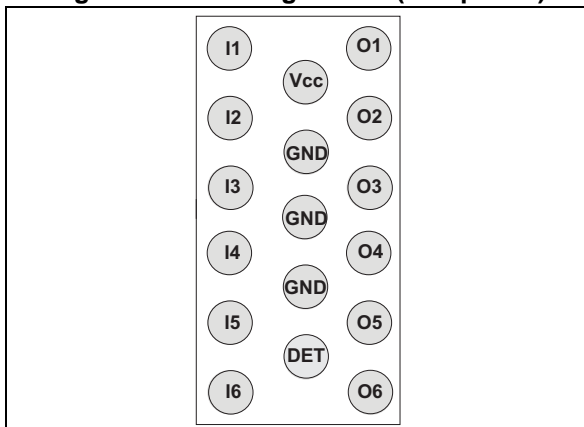
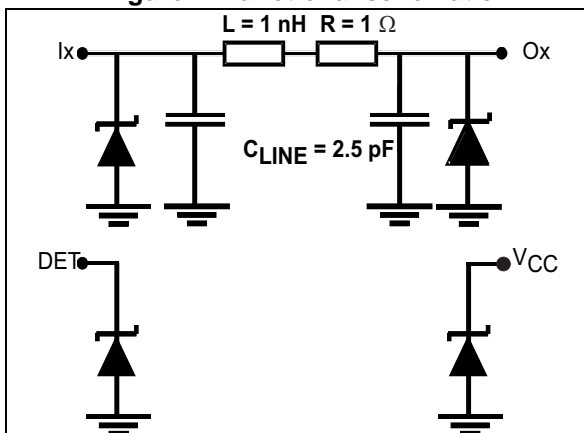


Figure 2. Functional schematic



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
 - ±15 kV (air discharge)
 - ±8 kV (contact discharge)

Application

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

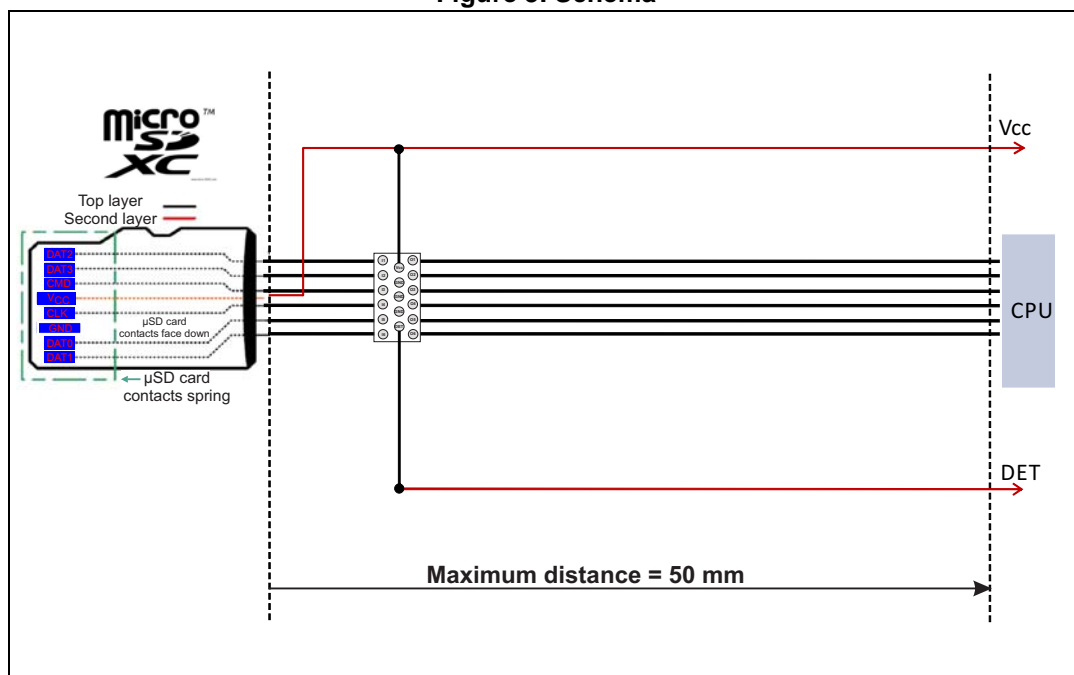
Description

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)

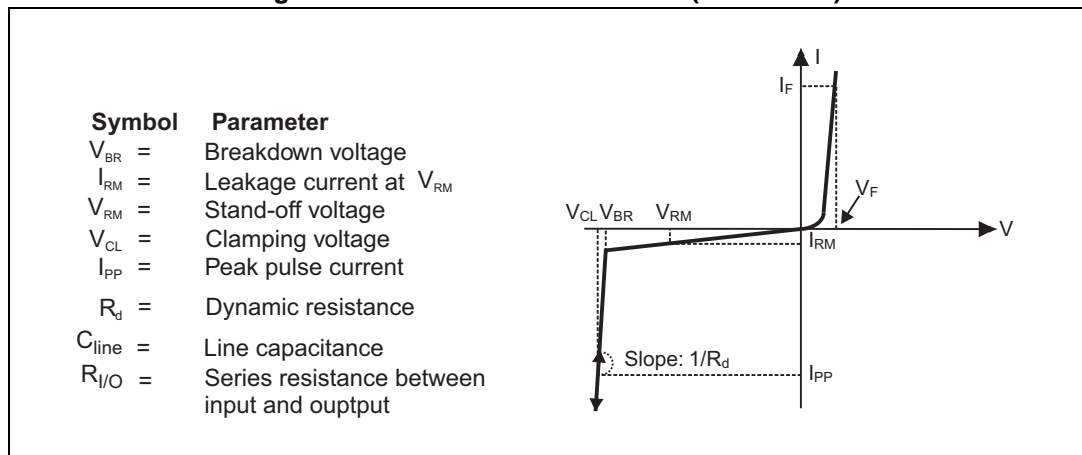


Table 2. Electrical characteristics ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

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		Ω
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 Ω
		GND-IO (negative polarity)		320	
V_{CC}					
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
DET					
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 5. Attenuation versus frequency
 I_X, O_X

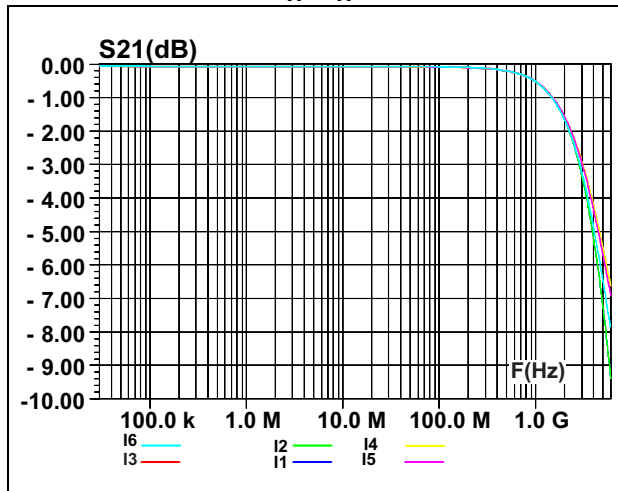


Figure 6. Attenuation versus frequency
 V_{CC}, DET

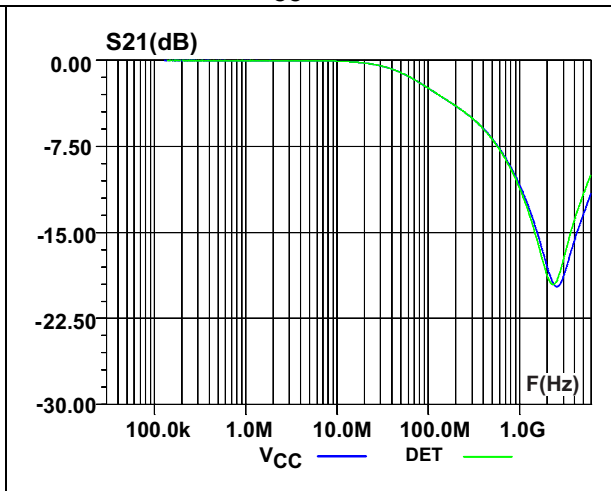


Figure 7. ESD response to IEC 61000-4-2
(+8 kV contact discharge)

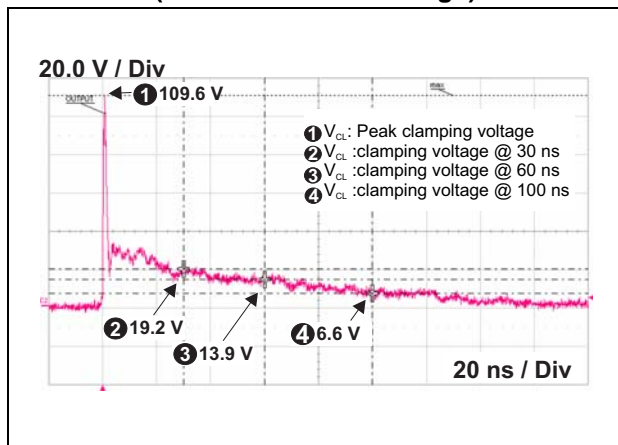


Figure 8. ESD response to IEC 61000-4-2
(-8 kV contact discharge)

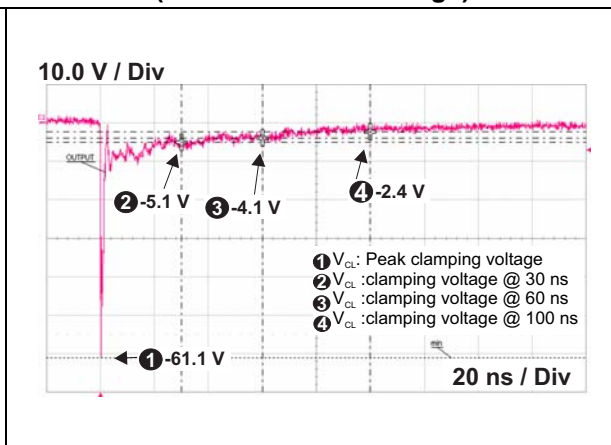


Figure 9. Digital crosstalk I1-O2

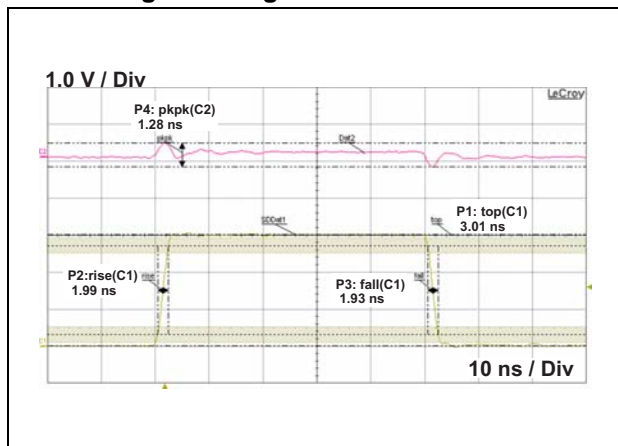


Figure 10. Analog crosstalk versus frequency

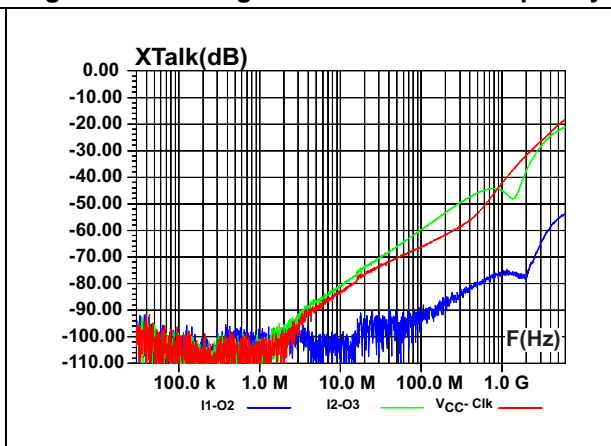
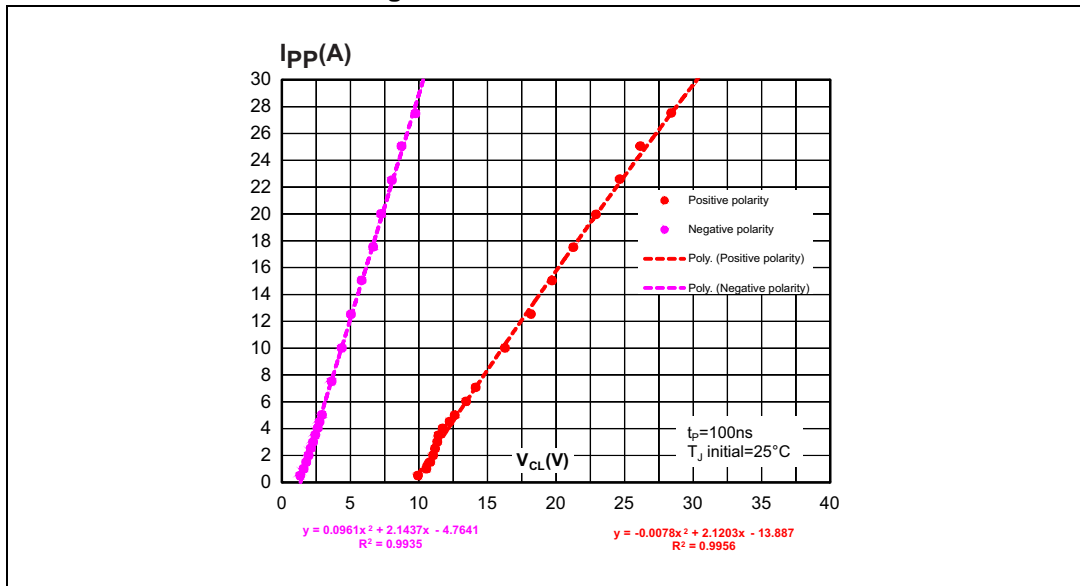


Figure 11. TLP measurement



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® 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.

Figure 12. Flip-Chip package dimensions

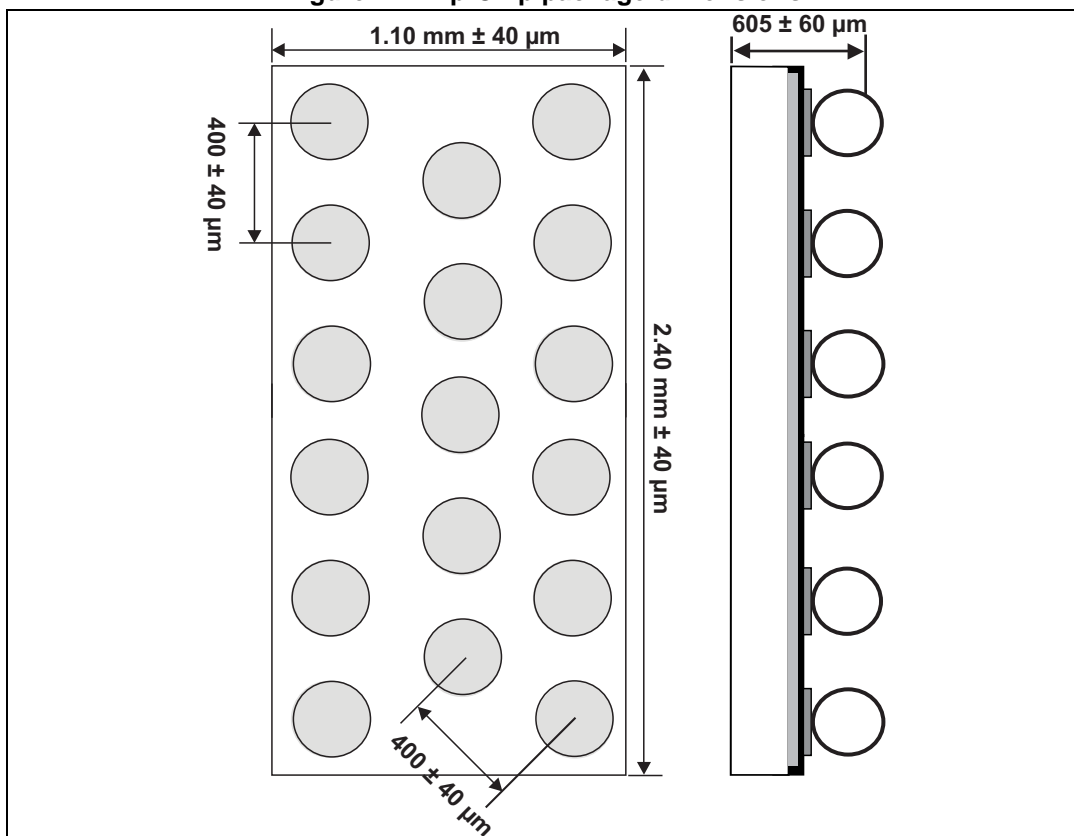


Figure 13. Footprint recommendations

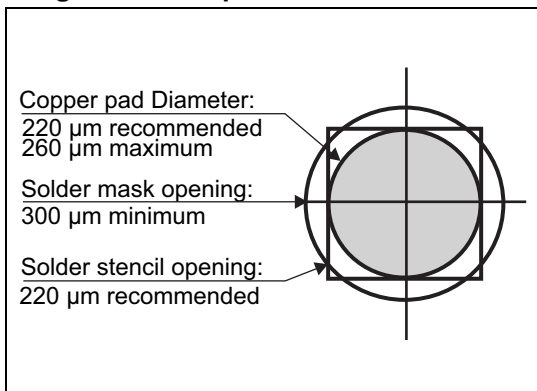


Figure 14. Marking

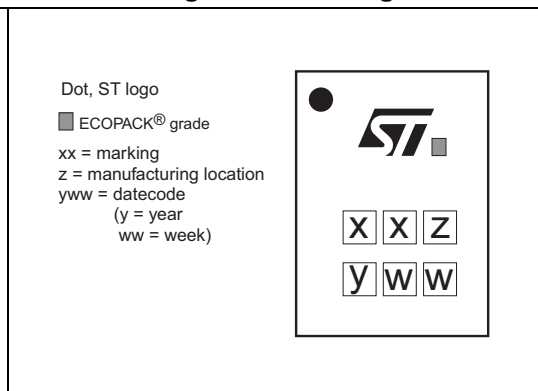
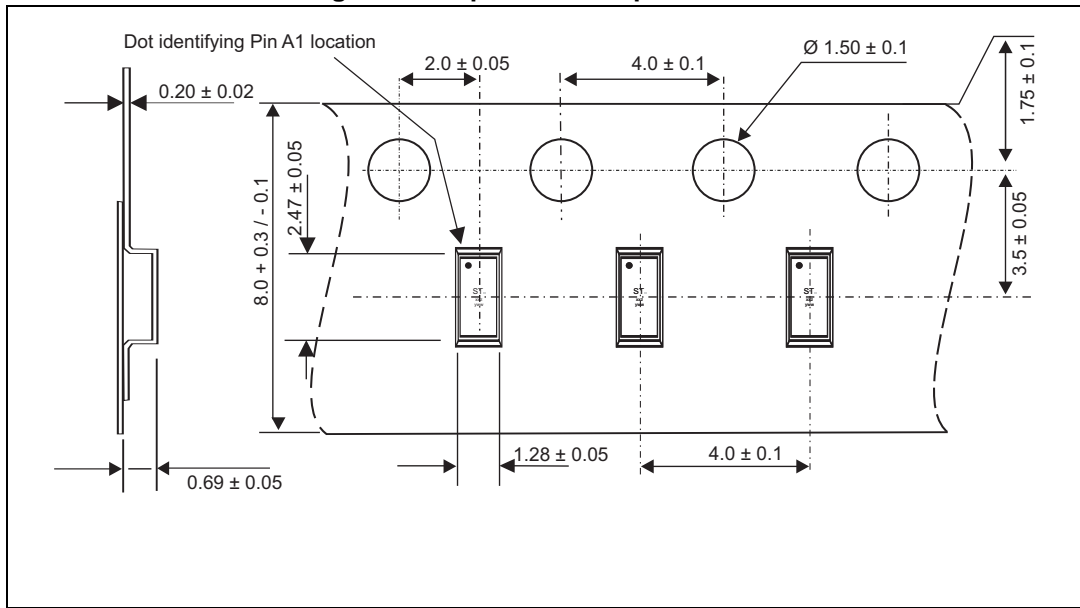


Figure 15. Tape and reel specification



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

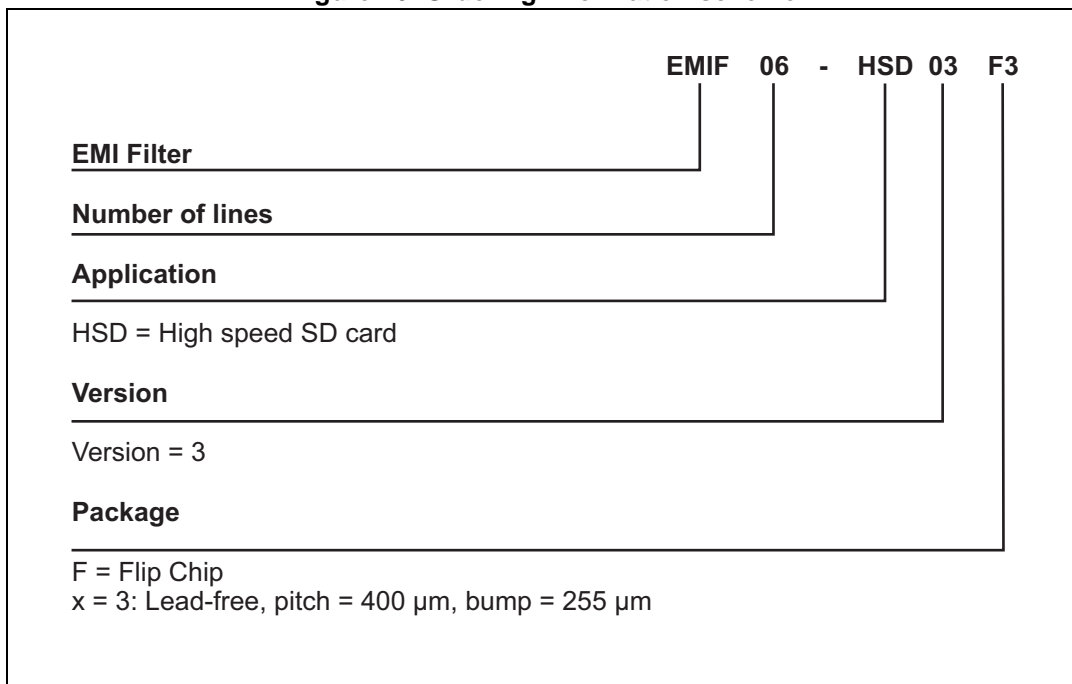


Table 3. Ordering information

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.

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