



## EMIF04-MMC02F3

# 4 LINES EMI FILTER AND ESD PROTECTION FOR MULTIMEDIA CARD

### Main product characteristics:

Where EMI filtering in ESD sensitive equipment is required :

- MultiMedia Card for mobile phones, Personal Digital Assistant, Digital Camera, MP3 players...

### Description

The EMIF04-MMC02F3 is a highly integrated device designed to suppress EMI/RFI noise for MultiMedia Card ports. The EMIF04 Flip-Chip packaging means the package size is equal to the die size.

This filter includes ESD protection circuitry which prevents damage to the application when subjected to ESD surges up to 15kV.

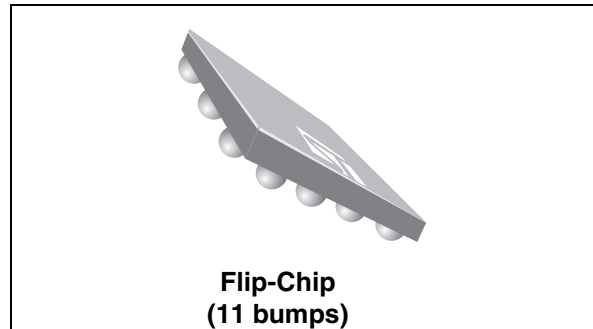
### Benefits

- EMI symmetrical (I/O) low-pass filter
- High efficiency in EMI filtering
- Lead free package
- 400µm pitch
- Compatible with high speed data rate
- Very low PCB space consuming: < 2 mm<sup>2</sup>
- Very thin package: 0.60 mm
- High efficiency in ESD suppression
- High reliability offered by monolithic integration
- High reducing of parasitic elements through integration and wafer level packaging

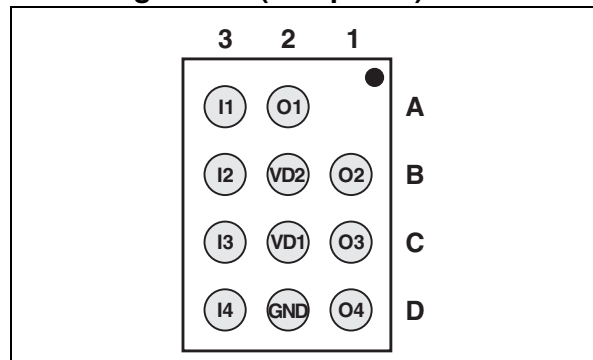
### Complies with the following standards:

#### IEC61000-4-2:

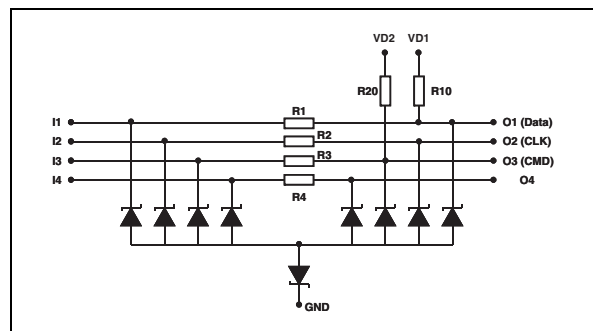
Level 4	15kV	(air discharge)
	8kV	(contact discharge)



### Pin configuration (bump side)



### Schematic



### Order codes

Part number	Marking
EMIF04-MMC02F3	GP

**Table 1. Absolute maximum rating (limiting values)**

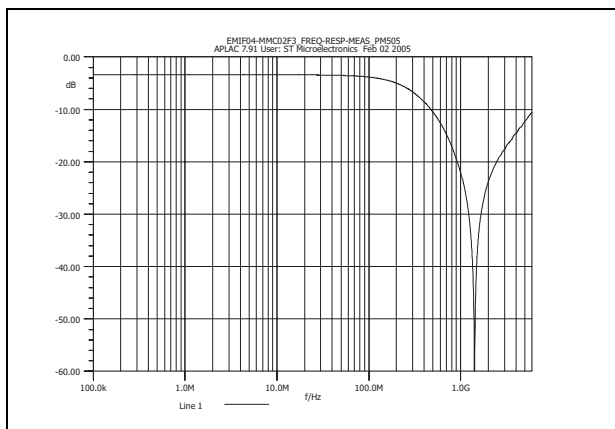
Symbol	Parameter	Value	Unit
V <sub>PP</sub>	ESD discharge IEC61000-4-2, air discharge ESD discharge IEC61000-4-2, contact discharge	15 8	kV
T <sub>j</sub>	Junction temperature	125	°C
T <sub>op</sub>	Operating temperature range	-40 to + 85	°C
T <sub>stg</sub>	Storage temperature range	-55 to +150	°C

# 1 ELECTRICAL CHARACTERISTICS (T<sub>amb</sub> = 25°C)

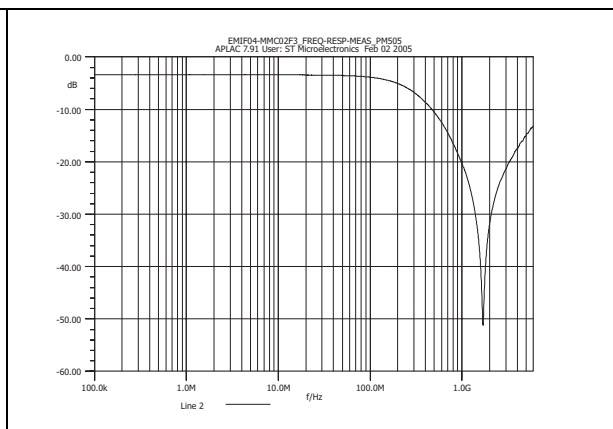
Symbol	Parameter
V <sub>BR</sub>	Breakdown voltage
I <sub>RM</sub>	Leakage current
V <sub>RM</sub>	Stand-off voltage
V <sub>CL</sub>	Clamping voltage
I <sub>PP</sub>	Peak pulse current
R <sub>I/O</sub>	Series resistance between Input & Output
Cline	Input capacitance per line

Symbol	Test conditions	Min.	Typ.	Max.	Unit
V <sub>BR</sub>	I <sub>R</sub> = 1 mA	6			V
I <sub>RM</sub>	V <sub>RM</sub> = +3V		100	250	nA
Cline	V <sub>LINE</sub> = 0 V, V <sub>OSC</sub> = 30 mV, F = 1MHz			20	pF
R <sub>1</sub> , R <sub>2</sub> , R <sub>3</sub> , R <sub>4</sub>	Tolerance ± 10%		47		Ω
R <sub>10</sub>	Tolerance ± 10%		13		kΩ
R <sub>20</sub>	Tolerance ± 10%		56		kΩ

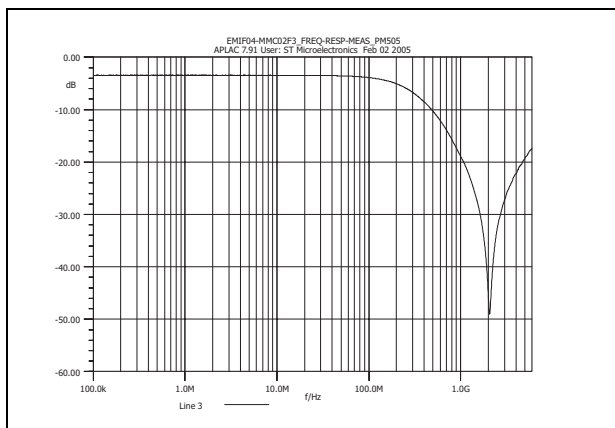
**Figure 1. S21 attenuation measurements A2 - A3 line**



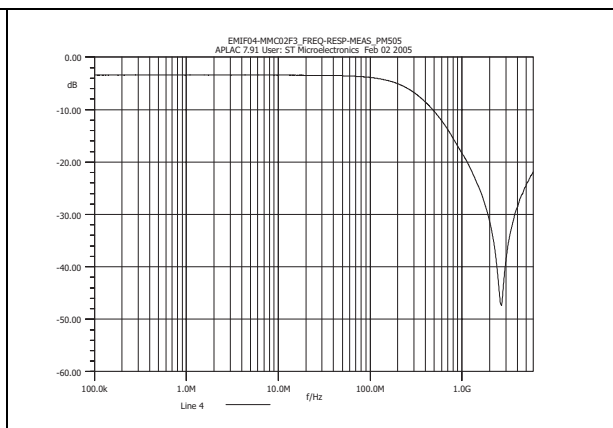
**Figure 2. S21 attenuation measurements B1 - B3 line**



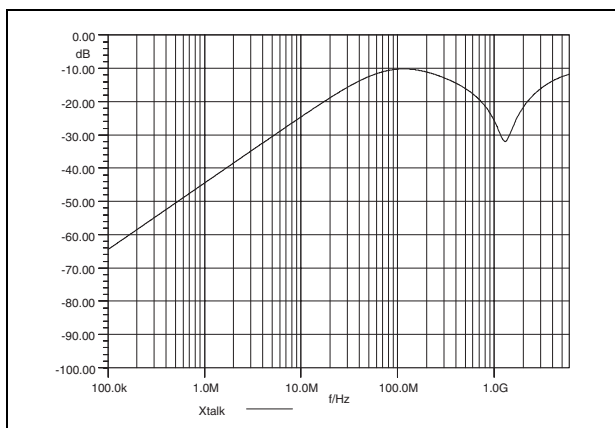
**Figure 3. S21 attenuation measurements C1 - C3 line**



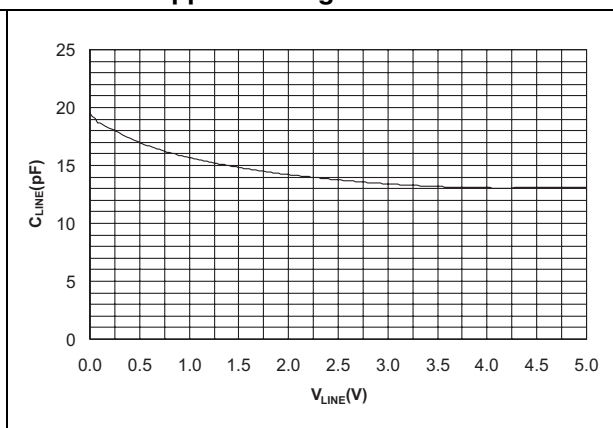
**Figure 4. S21 attenuation measurements D1 - D3 line**



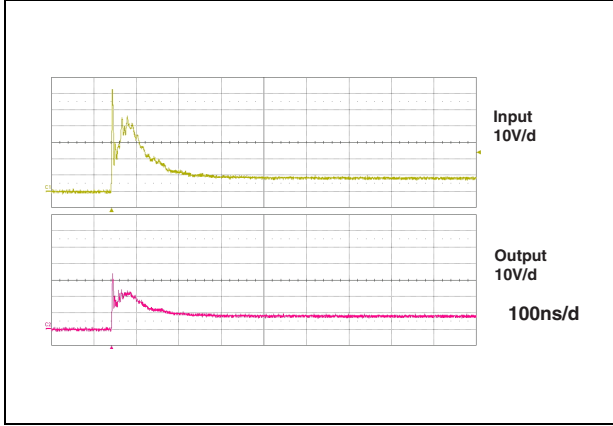
**Figure 5. Crosstalk behaviour (A2 - B3 line)**



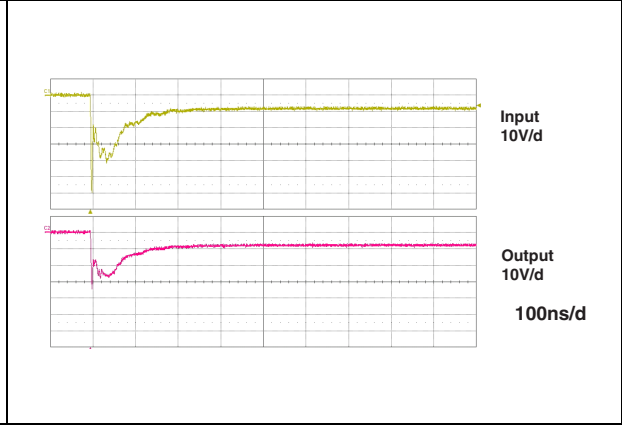
**Figure 6. Line capacitance versus reverse applied voltage**



**Figure 7. ESD response to IEC61000-4-2 (+15kV air discharge) on one input V(in) and on one output (Vout).**



**Figure 8. ESD response to IEC61000-4-2 (-15kV air discharge) on one input V(in) and on one output (Vout).**



## 2 Aplac model

**Figure 9. Device structure**

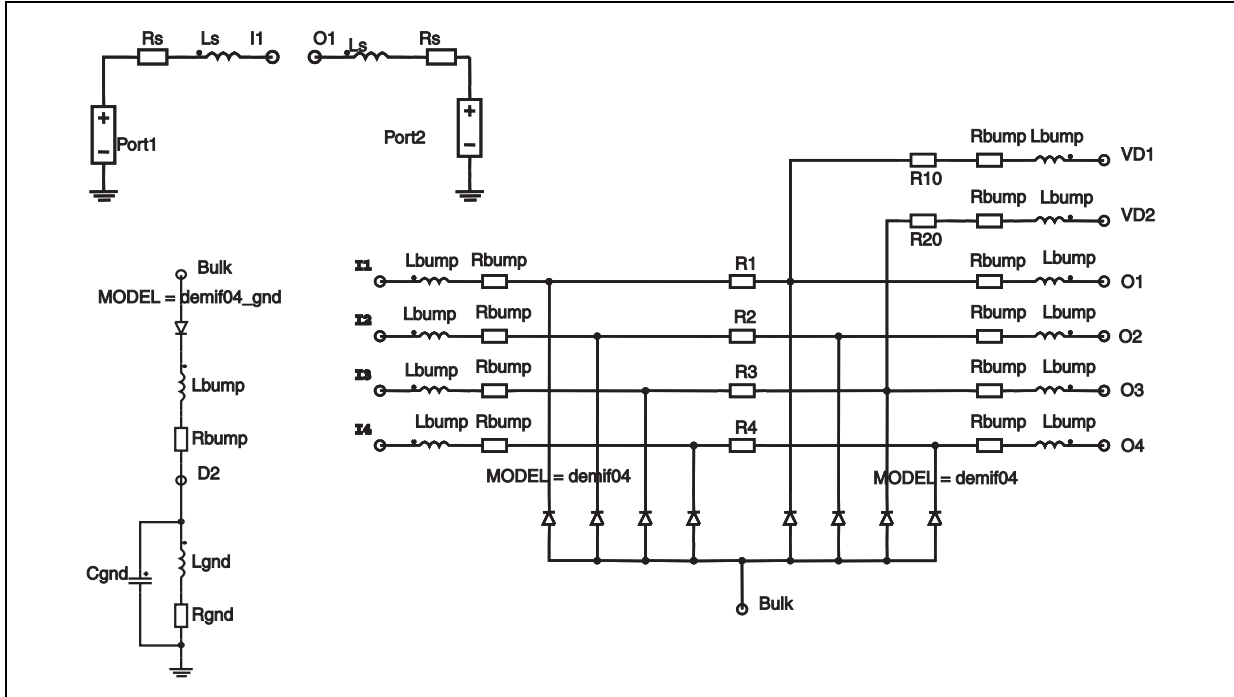
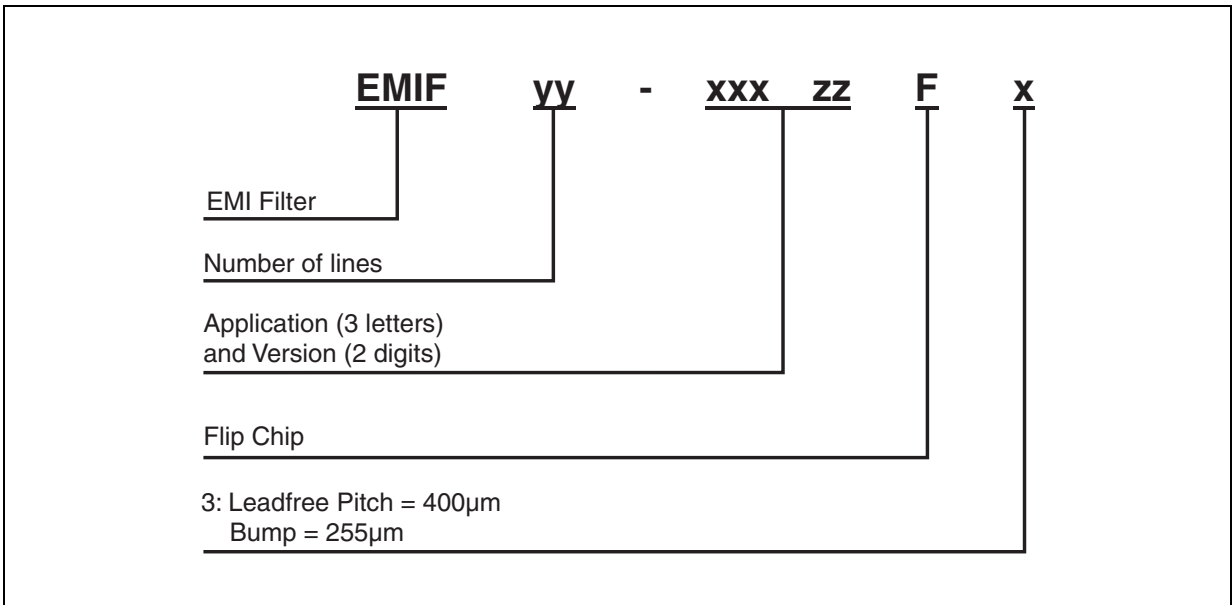


Figure 10. Aplac model variables

aplacvar R1 47		
aplacvar R2 47		
aplacvar R3 47		
aplacvar R4 47		
aplacvar R10 13k		
aplacvar R20 56k	Diode Demif04	Diode Demif04_gnd
aplacvar Rsub 120m	BV=7	BV=7
aplacvar Cz 16.65pF	IBV=1m	IBV=1m
aplacvar Cz_gnd 49.95pF	CJO=Cz	CJO=Cz_gnd
aplacvar RS_gnd 480m	M=0.31	M=0.31
aplacvar Ls 950pH	RS=1	RS=RS_gnd
aplacvar Rs 150m	VJ=0.6	VJ=0.6
aplacvar Rbump 20m	TT=100n	TT=100n
aplacvar Lbump 50pH		
aplacvar Lgnd 250pH		
aplacvar Rgnd 200m		
aplacvar Cgnd 0.6pF		

### 3 Order code



# 4 Package information

Figure 11. Mechanical data

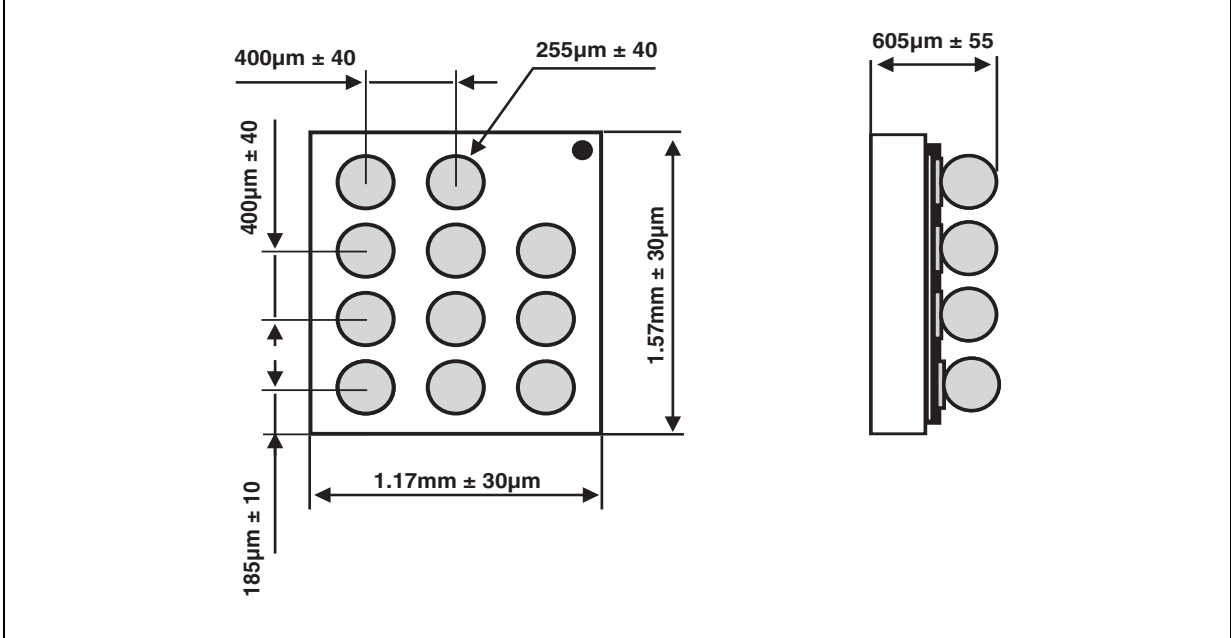


Figure 12. Foot print recommendations

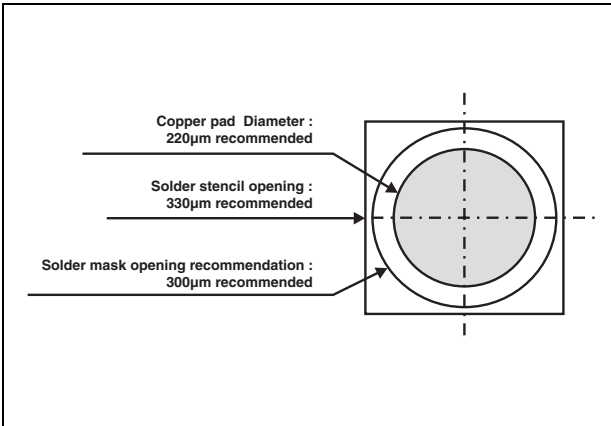
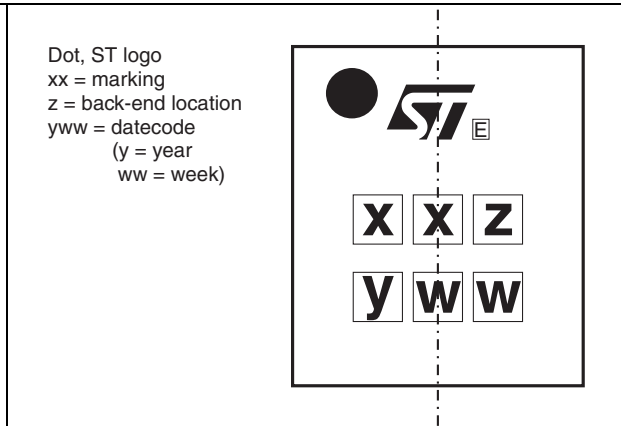
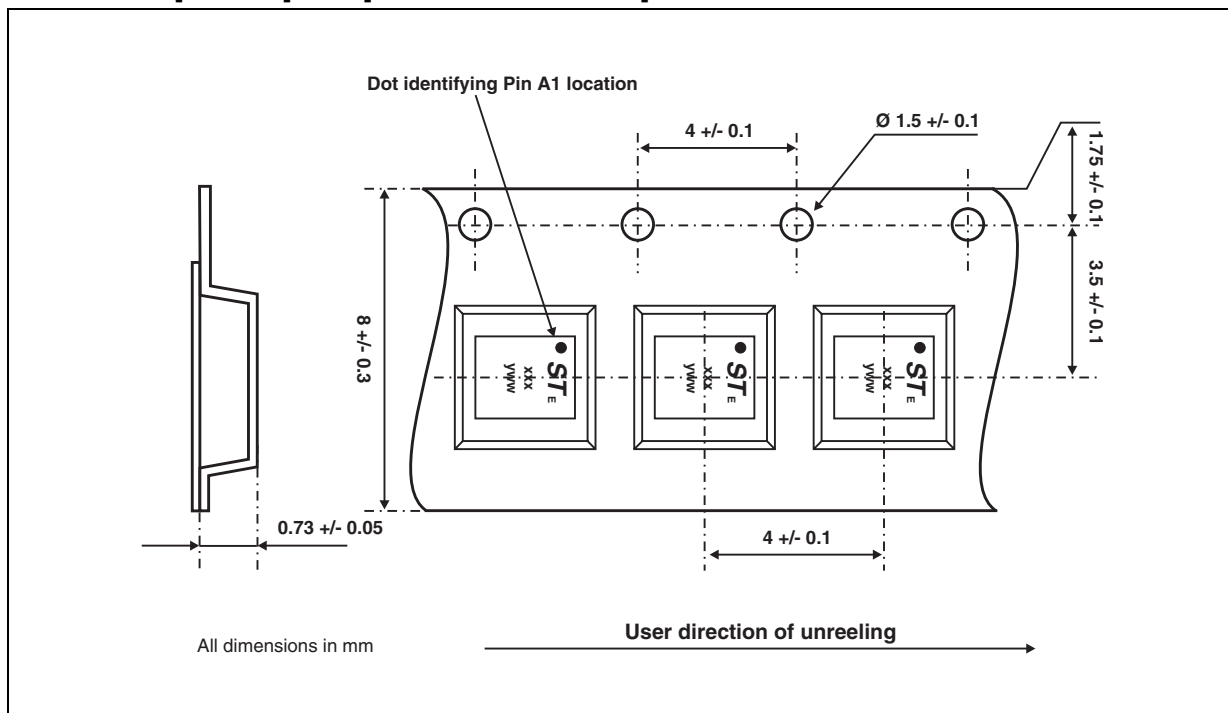


Figure 13. Marking



## 5 Flip-chip tape and reel specification



## 6 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
EMIF04-MMC02F3	GP	Flip-Chip	2.4 mg	5000	Tape and reel 7"

Note: More information is available in the application notes:

- AN1235: "Flip-Chip: Package description and recommendations for use"
- AN1751: "EMI Filters: Recommendations and measurements"

## 7 Revision history

Date	Revision	Description of Changes
16-Jun-2005	1	First issue



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