![ST logo]

EMIF10-1K010F1

10 LINES EMI FILTER AND ESD PROTECTION

IPAD™

MAIN PRODUCT CHARACTERISTICS:

Where EMI filtering in ESD sensitive equipment is required :
- Mobile phones and communication systems
- Computers, printers and MCU Boards

DESCRIPTION

The EMIF10-1K010F1 is a highly integrated devices designed to suppress EMI/RFI noise in all systems subjected to electromagnetic interferences. The EMIF10 flip chip packaging means the package size is equal to the die size.
This filter includes an ESD protection circuitry which prevents the device from destruction when subjected to ESD surges up 15kV.
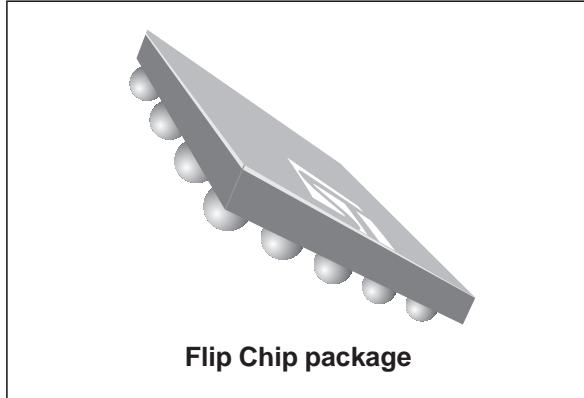
BENEFITS

- EMI symmetrical (I/O) low-pass filter
- High efficiency in EMI filtering
- Very low PCB space consuming: 2.57mm x 2.57mm
- Very thin package: 0.65 mm
- High efficiency in ESD suppression
- High reliability offered by monolithic integration
- High reducing of parasitic elements through integration & wafer level packaging.

COMPLIES WITH THE FOLLOWING STANDARDS:
IEC61000-4-2

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

MIL STD 883E - Method 3015-6 Class 3

Flip Chip package

PIN CONFIGURATION (ball side)

	5	4	3	2	1	
A	I7	GND	GND	I3	●
B	I9	GND	GND	I5	I1
C	I10	I8	I6	I4	I2
D	O9	O7	O5	O3	O1
E	O10	O8	O6	O4	O2

BASIC CELL CONFIGURATION

Low-pass Filter

Input ● — Output

$R_{i/o}$ = 1kΩ
C_{line} = 100pF

GND   GND   GND
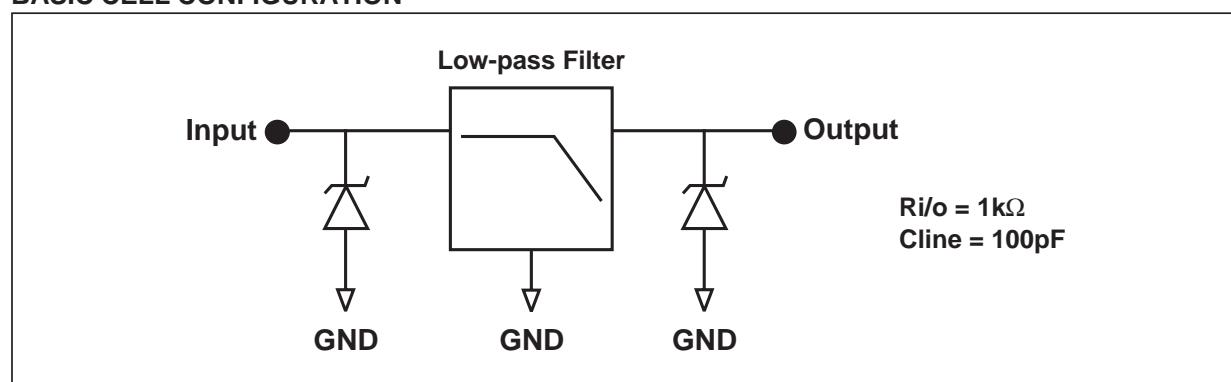
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August 2003 - Ed: 4A

ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\,°C$)

Symbol	Parameter and test conditions	Value	Unit
T_j	Junction temperature	125	°C
T_{op}	Operating temperature range	-40 to + 85	°C
T_{stg}	Storage temperature range	-55 to +150	°C

ELECTRICAL CHARACTERISTICS ($T_{amb} = 25°C$)

Symbol	Parameters
V_{BR}	Breakdown voltage
I_{RM}	Leakage current @ V_{RM}
V_{RM}	Stand-off voltage
V_{CL}	Clamping voltage
R_d	Dynamic impedance
I_{PP}	Peak pulse current
$R_{I/O}$	Series resistance between Input & Output
C_{in}	Input capacitance per line
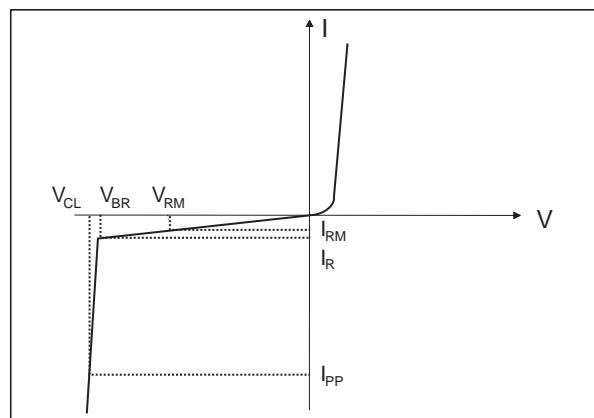
Symbol	Test conditions	Min	Typ	Max	Unit
V_{BR}	$I_R = 1mA$	6	8	10	V
I_{RM}	$V_{RM} = 3V$ per line			500	nA
$R_{I/O}$		900	1000	1100	Ω
C_{line}	At 0V bias	80	100	120	pF

Fig. 1: S21(dB) attenuation measurement and Aplac simulation.
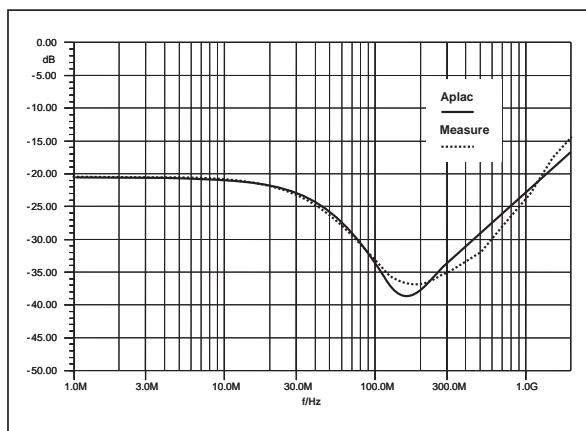
Fig. 2: Analog crosstalk measurements.
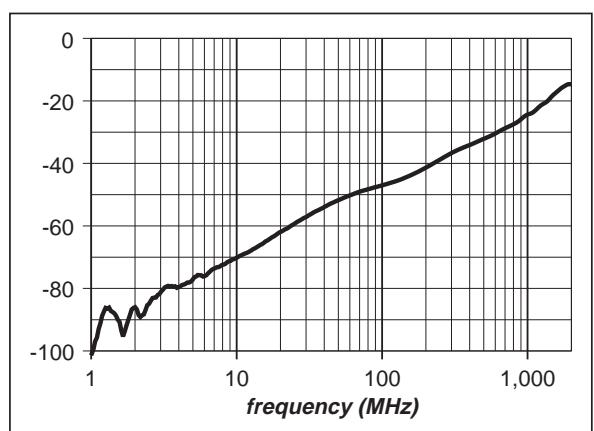
Fig. 3: Digital crosstalk measurement.
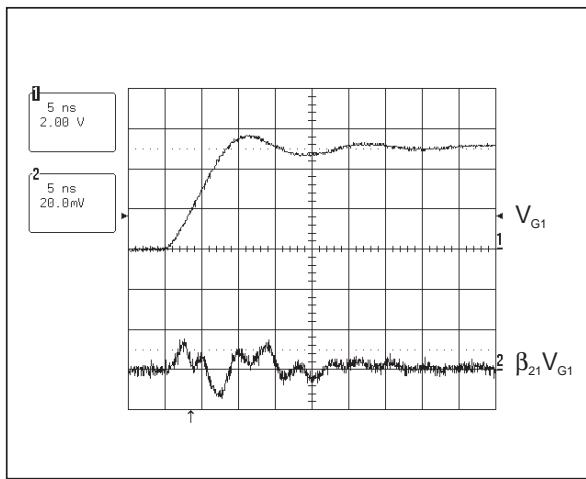
Fig. 4: ESD response to IEC61000-4-2 (+15kV air discharge) on one input V(in) and on one output (Vout).
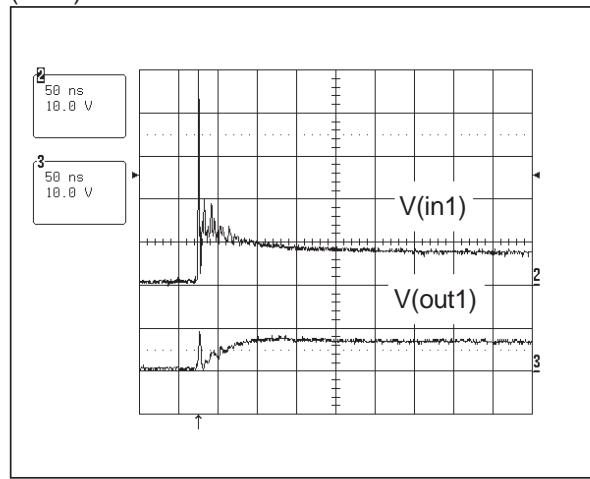
**Fig. 5:** ESD response to IEC61000-4-2 (+15kV air discharge) on one input V(in) and on one output (Vout).
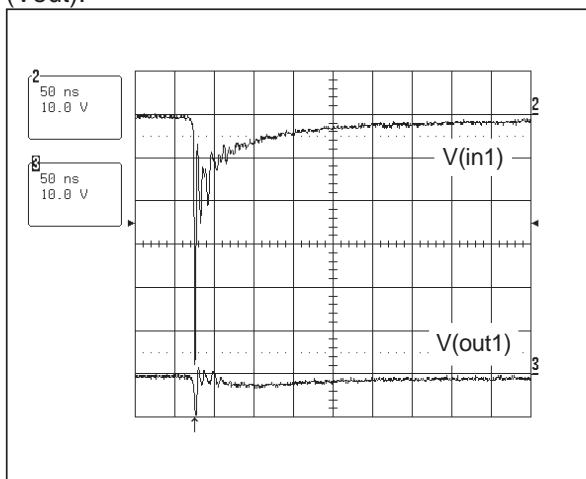
Fig. 6: Line capacitance versus applied voltage.
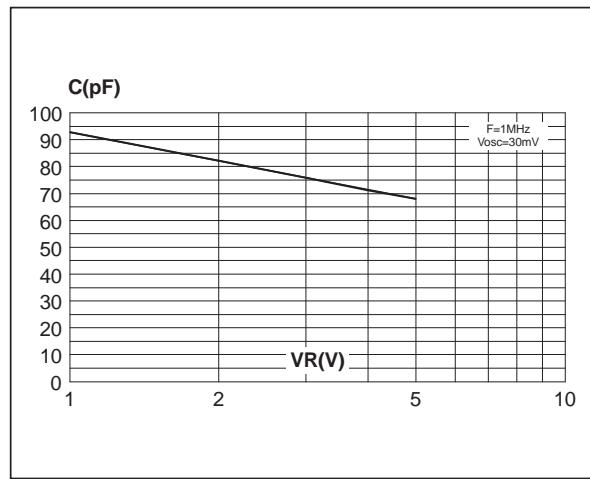
Fig. 7: Aplac model single line structure.
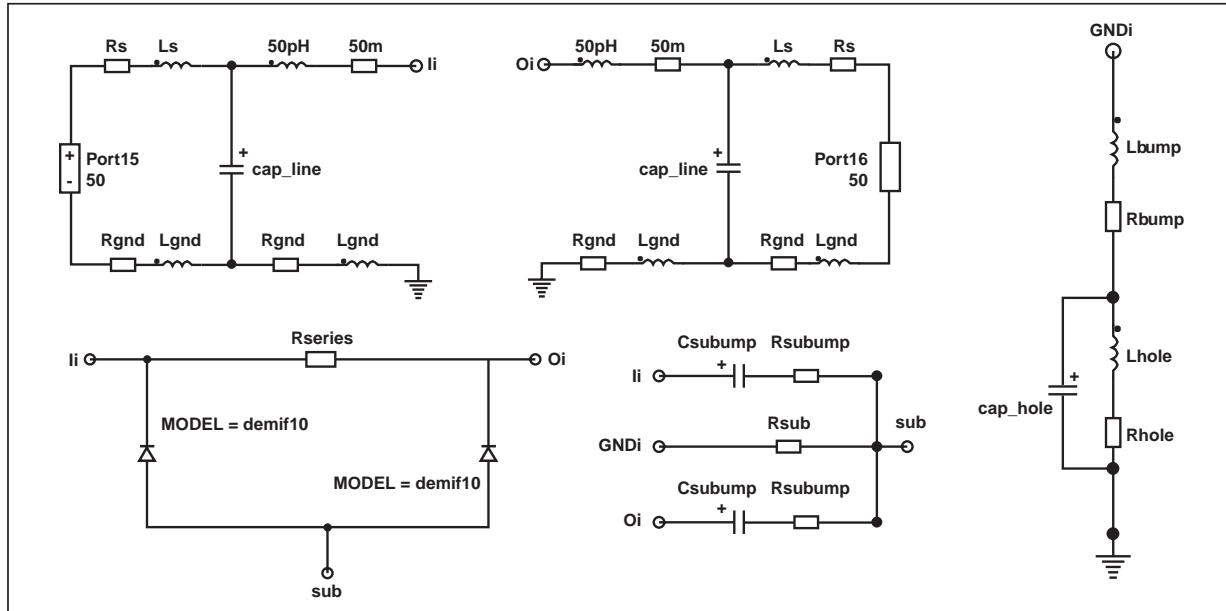
Fig. 8: Aplac model parameters.

aplacvar	Cz	57pF	Model demif10
aplacvar	Rseries	960	BV = 7
aplacvar	cap_line	0.8pF	IBV = 1m
aplacvar	Ls	0.6nH	CJO = Cz
aplacvar	Rbump	50m	M = 0.3333
aplacvar	Lbump	50pH	Rs = 1
aplacvar	Rs	0.15	VJ = 0.6
aplacvar	Csubump	15pF	TT = 100n
aplacvar	Rsubump	0.15	
aplacvar	Rsub	0.1	
aplacvar	lhole	1.2nH opt	
aplacvar	Rhole	0.15	
aplacvar	cap_hole	0.15pF	
aplacvar	Rgnd	0.25	
aplacvar	lgnd	0.4nH	

ORDER CODE

EMIF   yy - xxx zz F   x

1: Pitch = 500μm Bump = 315μm
2: Leadfree Pitch = 500μm Bump = 315μm
3: Leadfree Pitch = 400μm Bump = 250μm
4: Pitch = 500μm Bump = 250μm

EMI Filter

Number of lines

Flip Chip

x: resistance value (Ohms) z: capacitance value / 10(pF)
or
Application (3 letters) and Version (2 digits)
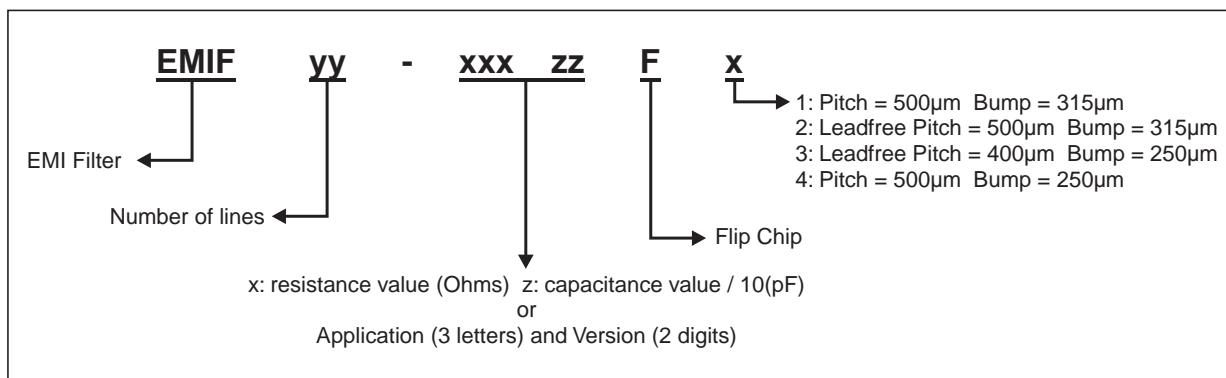
PACKAGE MECHANICAL DATA
FLIP CHIP

500µm ± 50

315µm ± 50

650µm ± 65

500µm ± 50

2.57mm ± 50µm

2.57mm ± 50µm

250µm ± 40
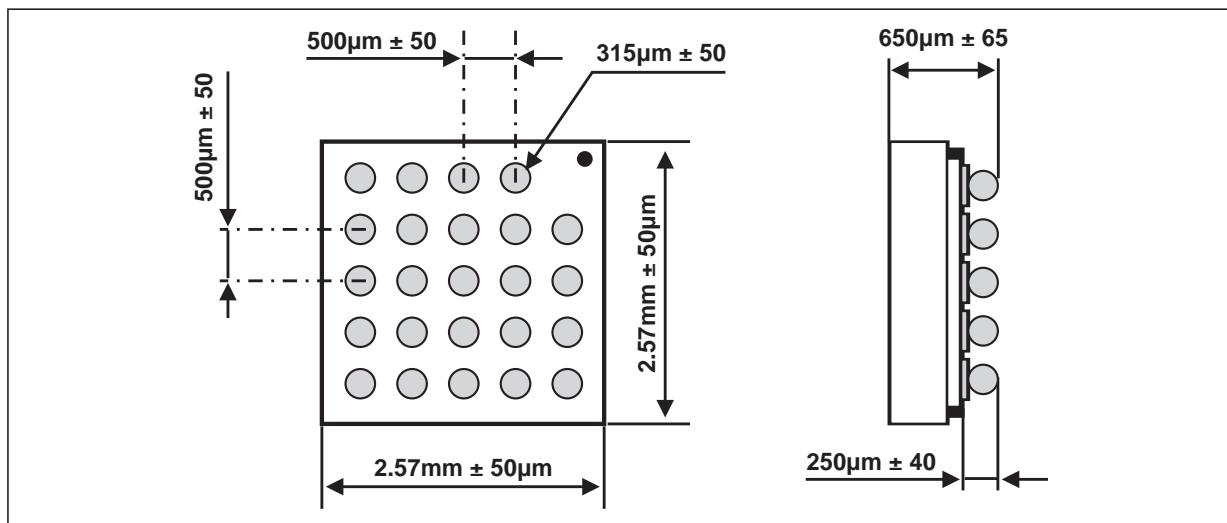
FOOT PRINT RECOMMENDATIONS

Copper pad Diameter :
250µm recommended , 300µm max

Solder stencil opening : 330µm

Solder mask opening recommendation :
340µm min for 315µm copper pad diameter

MARKING

Dot, ST logo
xxx = marking
yww = datecode
(y = year
ww = week)

545

400

545

100

230

All dimensions in µm

PACKING

Dot identifying Pin A1 location

4 +/- 0.1

Ø 1.5 +/- 0.1

1.75 +/- 0.1

3.5 +/- 0.1

8 +/- 0.3

0.73 +/- 0.05

4 +/- 0.1

All dimensions in mm
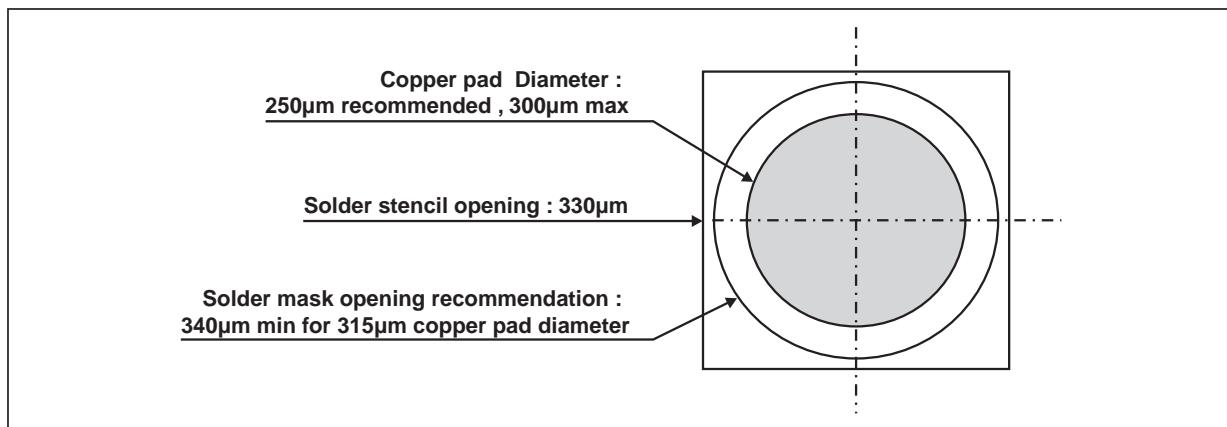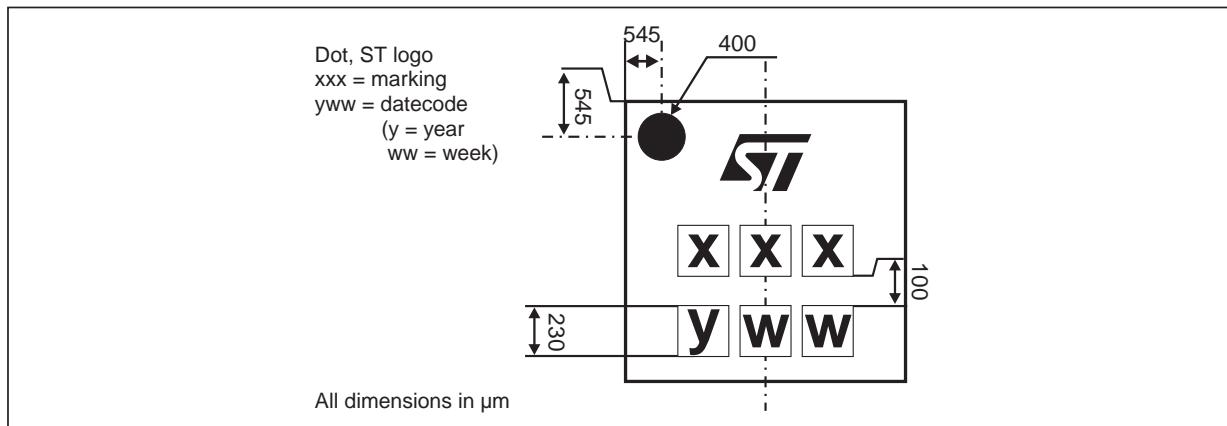
User direction of unreeling
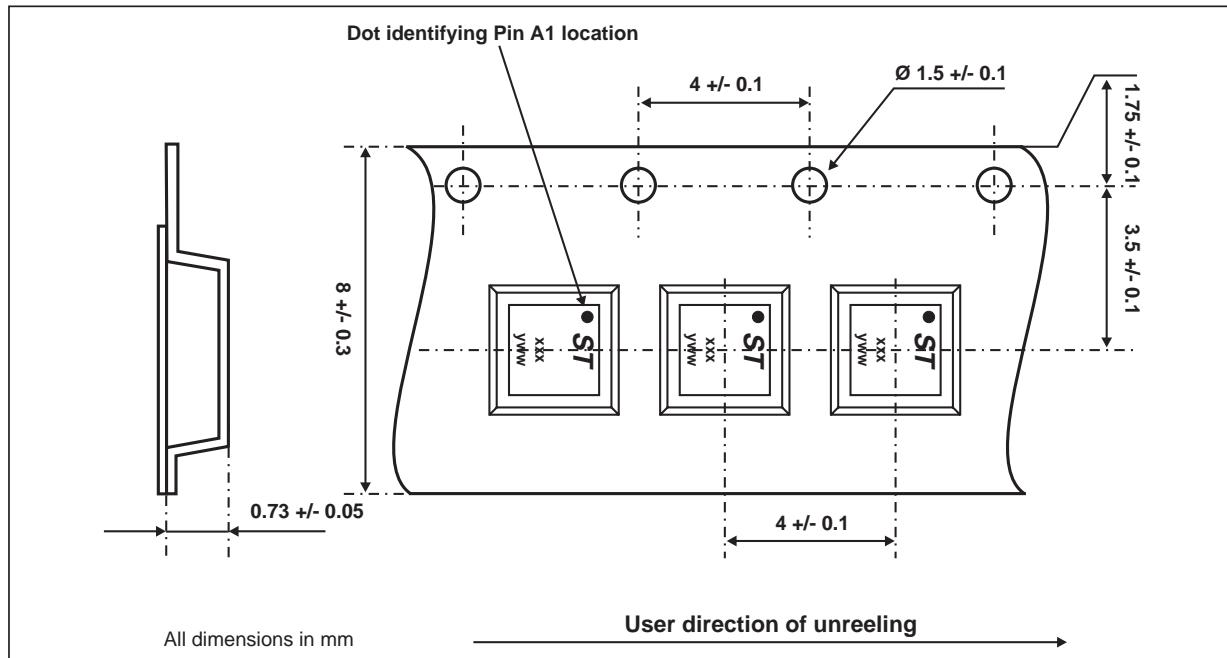
OTHER INFORMATION

Ordering code	Marking	Package	Weight	Base qty	Delivery mode
EMIF10-1K010F1	FDT	Flip Chip	9.2 mg	5000	Tape & reel (7")

Note: More information are available in the application notes:
- AN1235: "Flip-Chip: Package description and recommandations for use"
- AN1751: "EMI Filters: Recommendations and measurements"