EMIF02-MIC02F2

2 LINES EMI FILTER INCLUDING 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 EMIF02-MIC02 is a highly integrated devices designed to suppress EMI/RFI noise in all systems subjected to electromagnetic interferences. The EMIF02 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
■ Lead free package
■ Very low PCB space consuming: 1.07mm x 1.57mm
■ 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 on input pins 15kV (air discharge)
                       8kV   (contact discharge)

Level 1 on output pins 2kV   (air discharge)
                       2kV   (contact discharge)
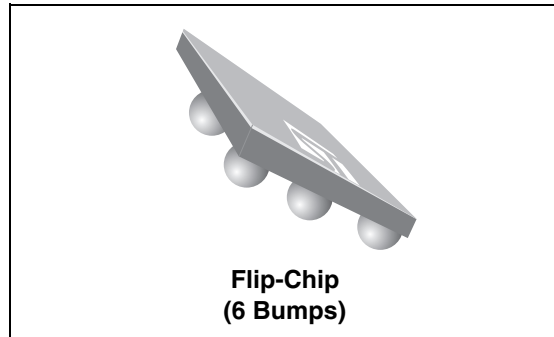
**Flip-Chip
(6 Bumps)**

Table 1: Order Code

Part Number	Marking
EMIF02-MIC02F2	FJ

Figure 1: Pin Configuration (Ball side)
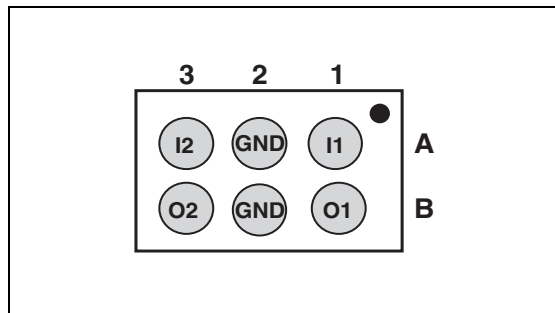
Figure 2: Basic Cell Configuration

$Ri/o = 470\Omega$
$Cline = 16pF$
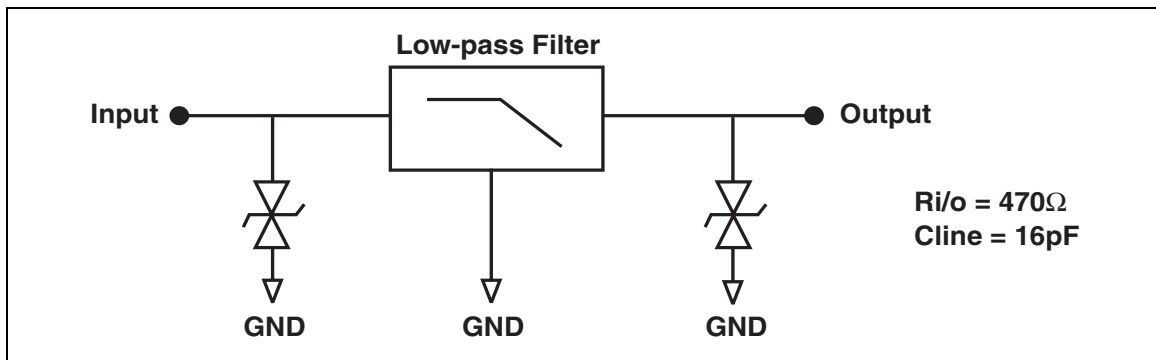
TM: IPAD is a trademark of STMicroelectronics.

Table 2: Absolute Ratings (limiting values)

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

Table 3: Electrical Characteristics ($T_{amb} = 25°C$)

Symbol	Parameter
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_{line}	Input capacitance per line
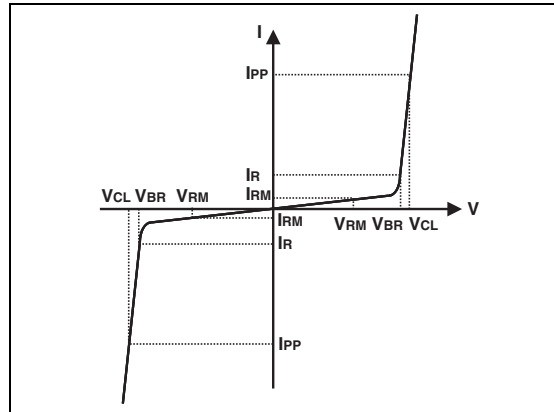
Symbol	Test conditions	Min.	Typ.	Max.	Unit
V_{BR}	$I_R = 1$ mA	14	16		V
I_{RM}	$V_{RM} = 12V$ per line			500	nA
$R_{I/O}$		423	470	517	Ω
C_{line}	@ 0V		16		pF

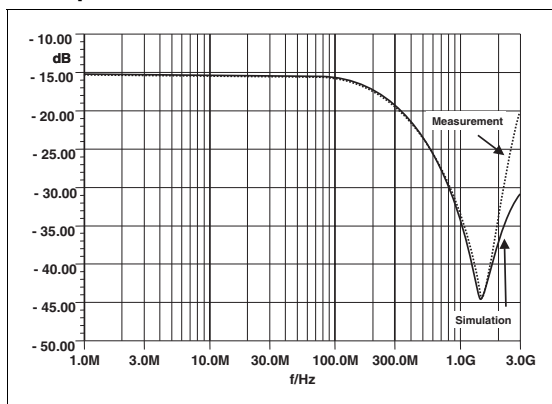**Figure 3: S21 (dB) attenuation measurement and Aplac simulation**
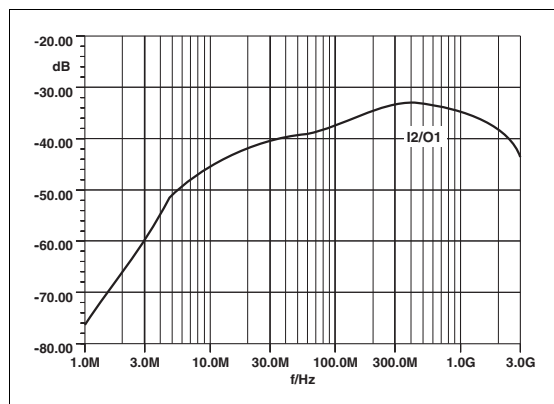

Figure 4: Analog crosstalk measurements
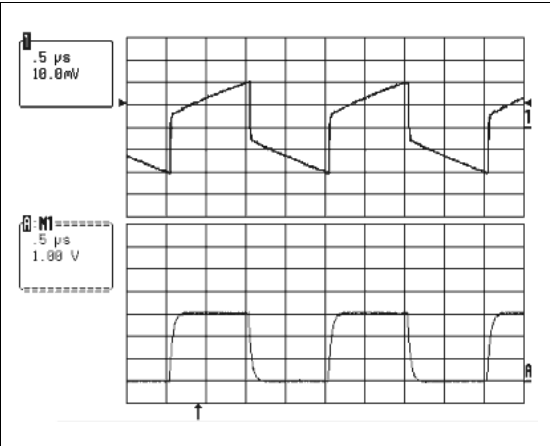
Figure 5: Digital crosstalk measurement

Figure 6: ESD response to IEC61000-4-2 (+15kV air discharge) on one input V(in) and on one output (Vout)
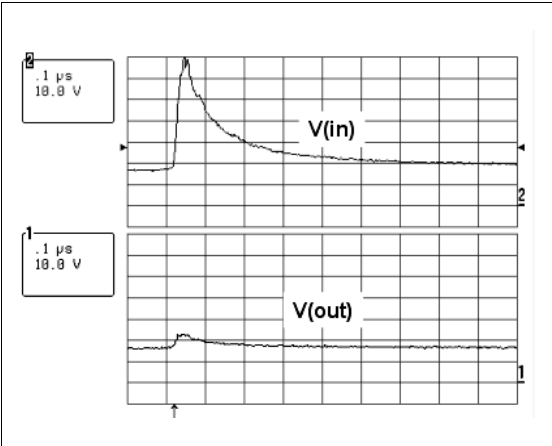

Figure 7: ESD response to IEC61000-4-2 (+15kV air discharge) on one input V(in) and on one output (Vout)
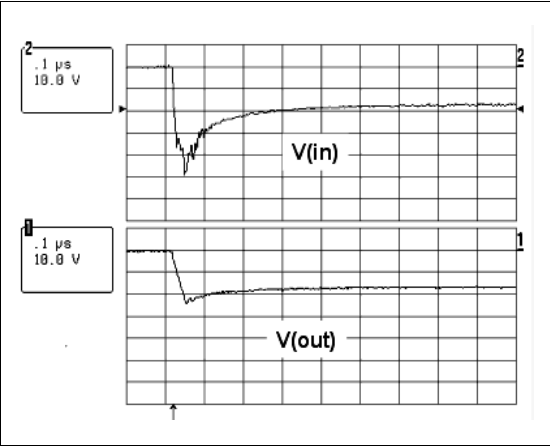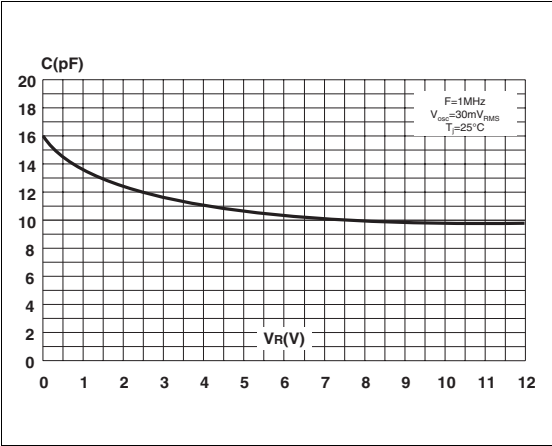

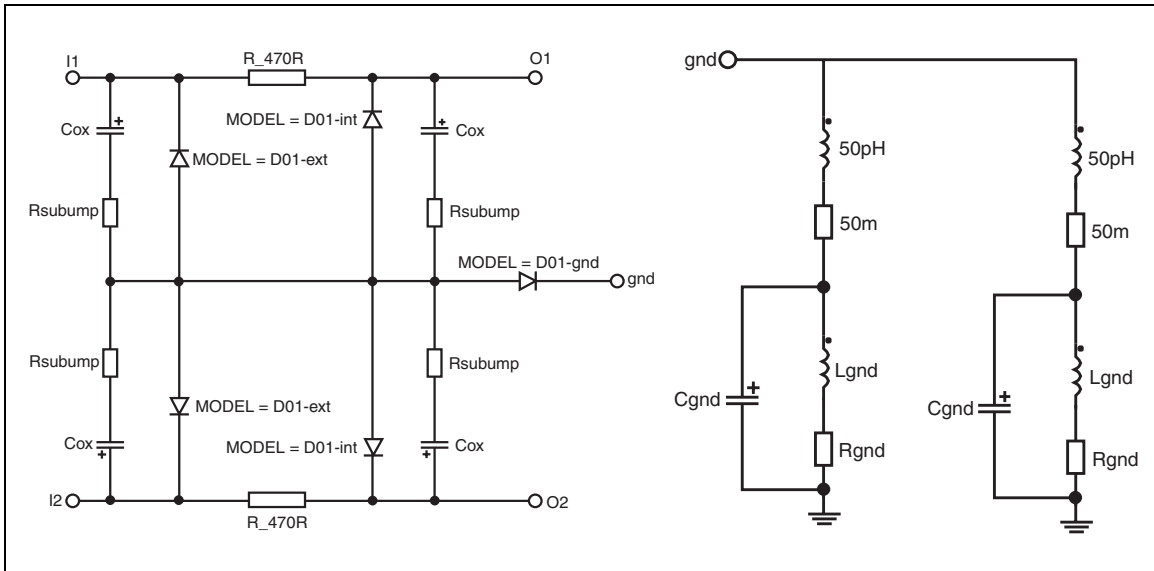**Figure 8: Line capacitance versus applied voltage**

Figure 9: Aplac model

Figure 10: Aplac parameters

Model D01-ext	Model D01-int	Model D01-gnd	
BV = 7	BV = 7	BV = 7	Ls 400pH
CJO = Cz_ext	CJO = Cz_int	CJO = Cz_gnd	Rs 100m
IBV = 1u	IBV = 1u	IBV = 1u	
IKF = 1000	IKF = 1000	IKF = 1000	R_470R 482.6
IS = 10f	IS = 10f	IS = 10f	Cz_ext 8.73pF
ISR = 100p	ISR = 100p	ISR = 100p	Rs_ext 850m
N = 1	N = 1	N = 1	Cz_int 2.9pF
M = 0.3333	M = 0.3333	M = 0.3333	Rs_int 850m
RS = Rs_ext	RS = Rs_int	RS = Rs_gnd	Cz_gnd 215.61pF
VJ = 0.6	VJ = 0.6	VJ = 0.6	Rs_gnd 470m
TT = 50n	TT = 50n	TT = 50n	
			Rgnd 10m
			Lgnd 48pH
			Cgnd 0.15pF
			Cox 3.05pF
			Rsubump 200m

Figure 11: Ordering Information Scheme

EMIF yy - xxx zz Fx

EMI Filter

Number of lines

Information
x = resistance value (Ohms)
z = capacitance value / 10(pF)
or
3 letters = application
2 digits = version

Package
F = Flip-Chip
x   = 1: 500µm, Bump = 315µm
     = 2: Leadfree Pitch = 500µm, Bump = 315µm
     = 3: Leadfree Pitch = 400µm, Bump = 250µm
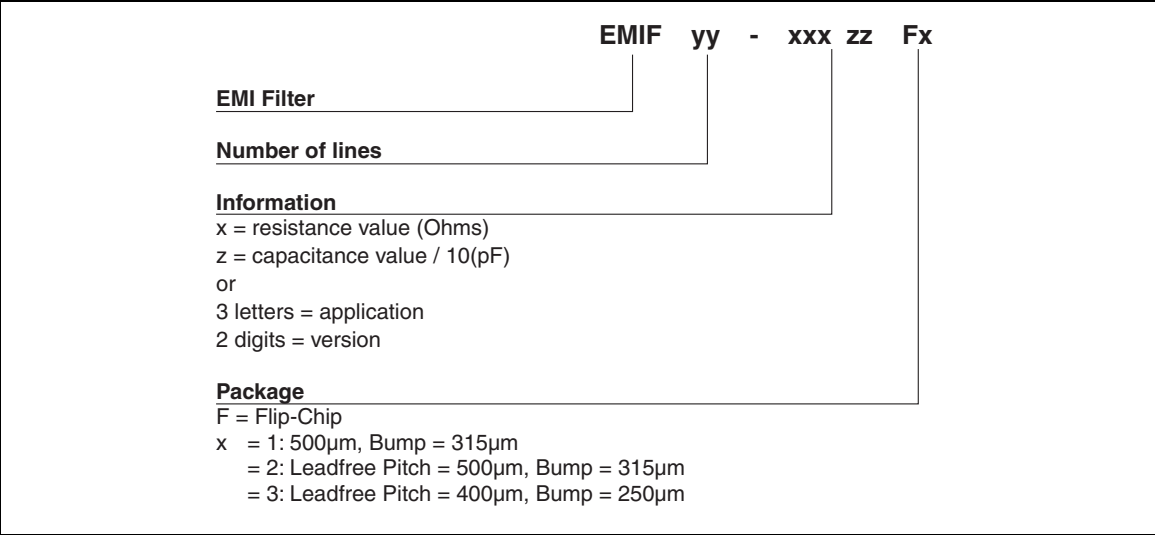
Figure 12: FLIP-CHIP Package Mechanical Data

500µm ± 50   315µm ± 50   650µm ± 65

500µm ± 50

1.57mm ± 50µm

1.07mm ± 50µm
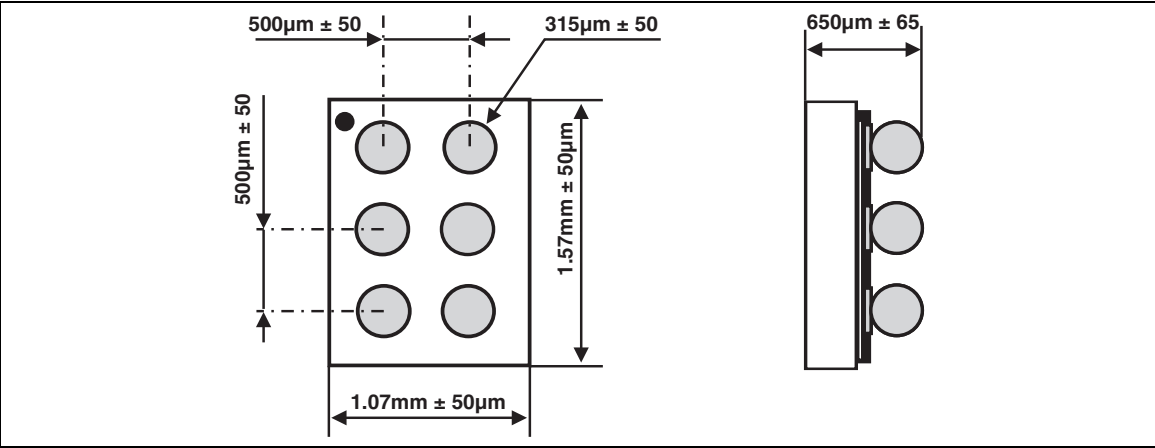
Figure 13: Foot print recommendations

Copper pad Diameter :
250µm recommended , 300µm max

Solder stencil opening : 330µm

Solder mask opening recommendation :
340µm min for 300µm copper pad diameter

Figure 14: Marking

Dot, ST logo
xx = marking
z = packaging
location
yww = datecode
    (y = year
     ww = week)

365   240

365

X X Z

40

220

y w w

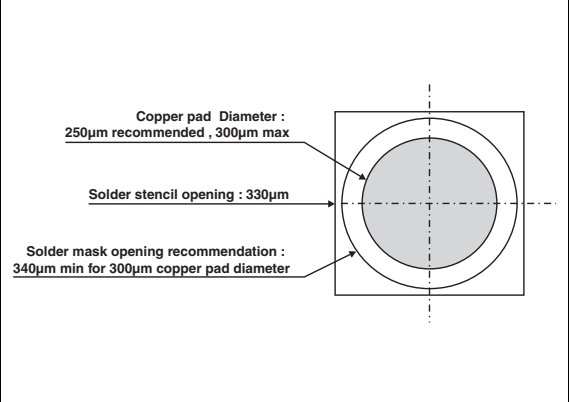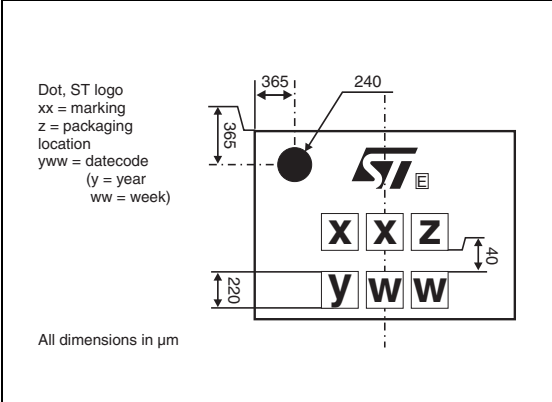All dimensions in µm

Figure 15: FLIP-CHIP Tape and Reel Specification
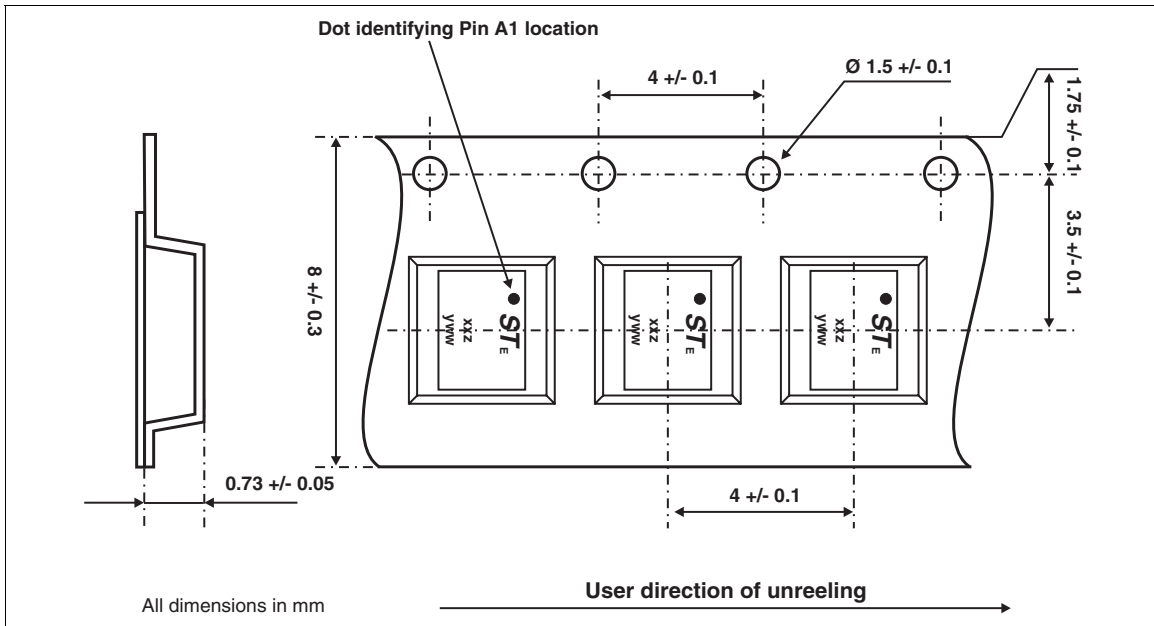
Table 4: Ordering Information

Ordering code	Marking	Package	Weight	Base qty	Delivery mode
EMIF02-MIC02F2	FJ	Flip-Chip	2.3 mg	5000	Tape & reel 7"

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

Table 5: Revision History

Date	Revision	Description of Changes
12-Oct-2004	1	First issue

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