

### EMIF04-1502QCF

# 4 LINE LOW CAPACITANCE EMI FILTER AND ESD PROTECTION

IPAD™

#### MAIN PRODUCT CHARACTERISTICS:

Where EMI filtering in ESD sensitive equipment is required:

- LCD and camera for Mobile phones
- Computers and printers
- Communication systems
- MCU Boards

#### **DESCRIPTION**

The EMIF04-1502QCF is a 4 line highly integrated device designed to suppress EMI/RFI noise in all systems subjected to electromagnetic interferences. This filter includes an ESD protection circuitry, which prevents the device from destruction when subjected to ESD surges up 15kV on the input pins.

#### **BENEFITS**

- EMI symmetrical (I/O) low-pass filter
- High efficiency in EMI filtering
- Very low PCB space consuming: 2mm x 2mm
- Very thin package: 1 mm max.
- High efficiency in ESD suppression on input pins (IEC61000-4-2 level 4)
- 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 input pins 15kV (air discharge) 8kV (contact discharge)

MIL STD 833E - Method 3015-6 Class 3

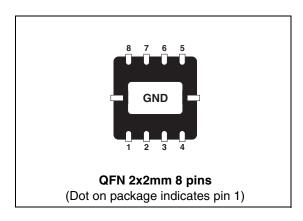


Table 1: Order Code

Part Number	Marking	
EMIF04-1502QCF	F4	

Figure 1: Pin Configuration (back side)

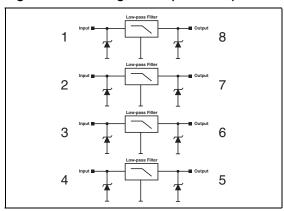
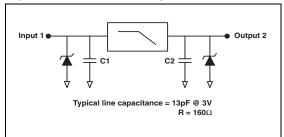


Figure 2: Basic Cell Configuration



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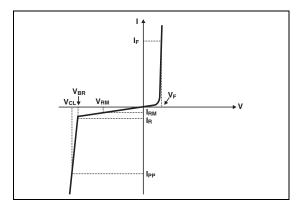
October 2005 REV. 4 1/6

Table 2: Absolute Ratings (limiting values)

Symbol	Parameter	Value	Unit
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

**Table 3: Electrical Characteristics**  $(T_{amb} = 25^{\circ}C)$ 

Symbol	Parameter		
$V_{BR}$	Breakdown voltage		
I <sub>RM</sub>	Leakage current @ V <sub>RM</sub>		
V <sub>RM</sub>	Stand-off voltage		
V <sub>CL</sub>	Clamping voltage		
R <sub>d</sub>	Dynamic resistance		
I <sub>PP</sub>	Peak pulse current		
R <sub>I/O</sub>	Series resistance between Input & Output		
C <sub>line</sub>	Input capacitance per line		



Symbol	Test conditions	Min.	Тур.	Max.	Unit
V <sub>BR</sub>	I <sub>R</sub> = 1 mA	6	8	10	V
I <sub>RM</sub>	V <sub>RM</sub> = 3V per line			200	nA
R <sub>I/O</sub>	Tolerance ± 10%		160		Ω
C <sub>line</sub>	V <sub>R</sub> = 3V		13	15	pF

Figure 3: S21(dB) attenuation measurement

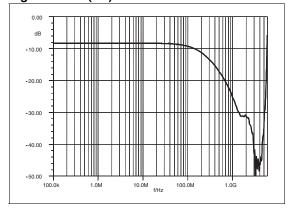


Figure 4: Analog cross talk measurements

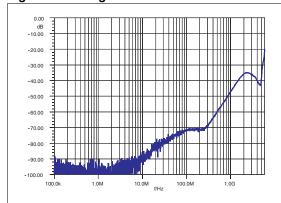


Figure 5: ESD response to IEC61000-4-2 (+15kV air discharge) on one input ( $V_{in}$ ) and on one output ( $V_{out}$ )

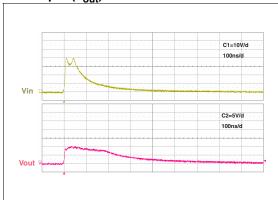


Figure 7: Line capacitance versus applied voltage (typical value)

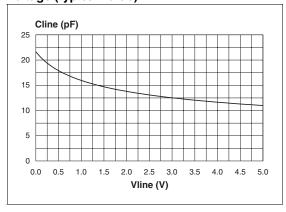


Figure 6: ESD response to IEC61000-4-2 (-15kV air discharge) on one input ( $V_{in}$ ) and on one output ( $V_{out}$ )

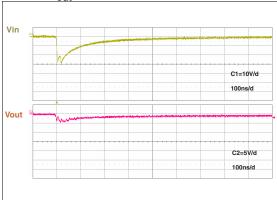


Figure 8: Ordering Information Scheme

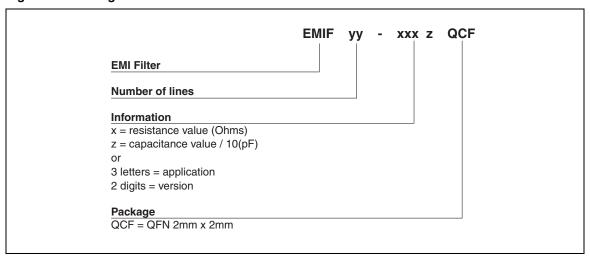
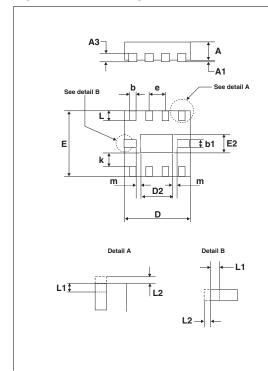
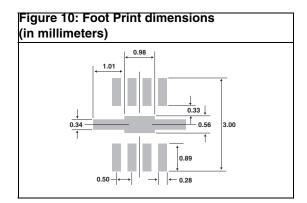
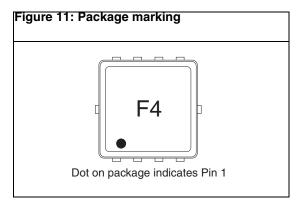


Figure 9: QFN Package Mechanical Data



	DIMENSIONS			DIMEN			
REF.	Mi	llimete	rs Inches			i	
	Min.	Тур.	Max	Min.	Тур.	Max.	
Α	0.50		1.00	0.020		0.039	
A1	0.00	0.03	0.05	0.00	0.001	0.002	
А3			0.25			0.010	
b	0.18		0.30	0.007		0.012	
b1	0.17		0.44	0.007		0.017	
D	1.90	2.00	2.10		0.079		
D2	0.88	0.98	1.08	0.035	0.039	0.043	
Е	1.90	2.00	2.10		0.079		
E2	0.46	0.56	0.65	0.018	0.022	0.026	
е		0.50			0.020		
L	0.20	0.29	0.45	0.008		0.018	
L1			0.15			0.006	
L2			0.13			0.005	
k	0.20			0.008			
m	0.12	0.17	0.23				





In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

**Table 4: Ordering Information** 

Part Number	Marking	Package	Weight	Base qty	Delivery mode
EMIF04-1502QCF	F4	QFN	8.4 mg	3000	Tape & reel (7")

Note: Further packing information available in the application note - AN1751: "EMI Filters: Recommendations and measurements"

**Table 5: Revision History** 

Date	Revision	Description of Changes	
06-Dec-2004	1	First issue.	
16-Mar-2005	2	QFN package mechanical data update: 1/ A min: 0.50 mm instead of 0.80 2/ A typ: deleted 3/ b1 max: 0.44 mm instead of 0.30	
01-Apr-2005	3	QFN package mechanical data update: 1/ Reference Details A and B added	
19-Oct-2005	4	Added ECOPACK statement.  Added Figure 11 to show package marking  QFN package mechanical data update:  1/ Added dimension m  2/ Added min and max values for dimensions D and E  3/ Added typical value for dimension L	

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