

1 Characteristics

Table 1. Absolute ratings (limiting values at $T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit
V_{PP}	ESD discharge IEC61000-4-2 air discharge on input and output pins	15	kV
	ESD discharge IEC61000-4-2 contact discharge on input and output pins	8	
T_j	Junction temperature	125	$^{\circ}\text{C}$
T_{op}	Operating temperature range	-40 to + 85	$^{\circ}\text{C}$
T_{stg}	Storage temperature range	-55 to +150	$^{\circ}\text{C}$

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

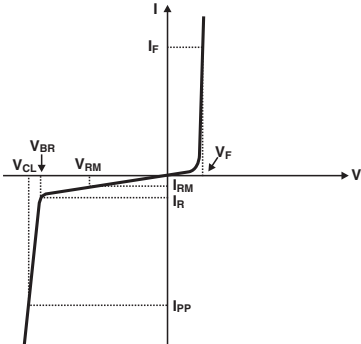
Symbol	Parameter				
V_{BR}	Breakdown voltage				
I_{RM}	Leakage current @ V_{RM}				
V_{RM}	Stand-off voltage				
V_{CL}	Clamping voltage				
R_d	Dynamic resistance				
I_{PP}	Peak pulse current				
$R_{I/O}$	Series resistance between Input & Output				
C_{line}	Input capacitance per line				
Symbol	Test conditions	Min.	Typ.	Max.	Unit
V_{BR}	$I_R = 1\text{ mA}$	5	6.5	8	V
I_{RM}	$V_{RM} = 3\text{ V per line}$			100	nA
$R_{I/O}$	Tolerance $\pm 10\%$		100		Ω
C_{line}	$V_R = 0\text{ V}_{DC}$, $V_{OSC} = 30\text{ mV}$, $F = 1\text{ MHz}$		30	39	pF
S21	$F = 900\text{ MHz}$			-26	dB

Figure 4. Analog cross talk measurements

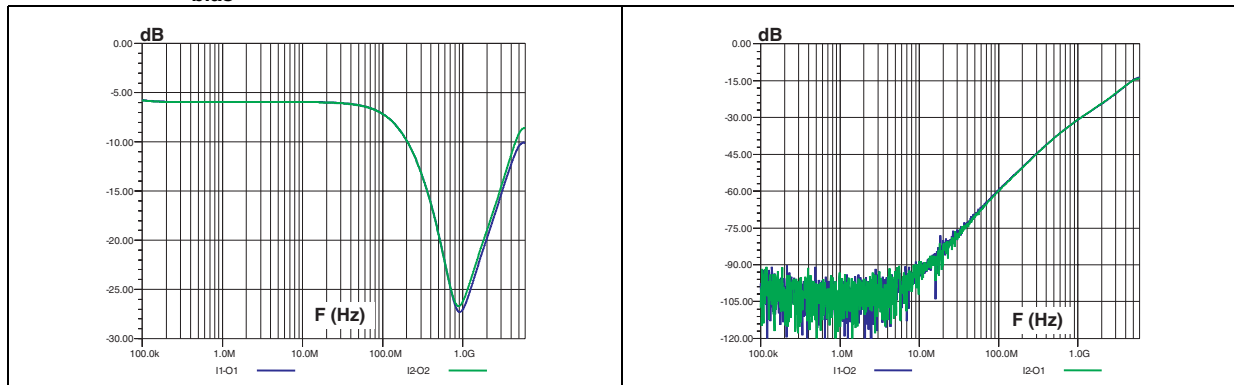
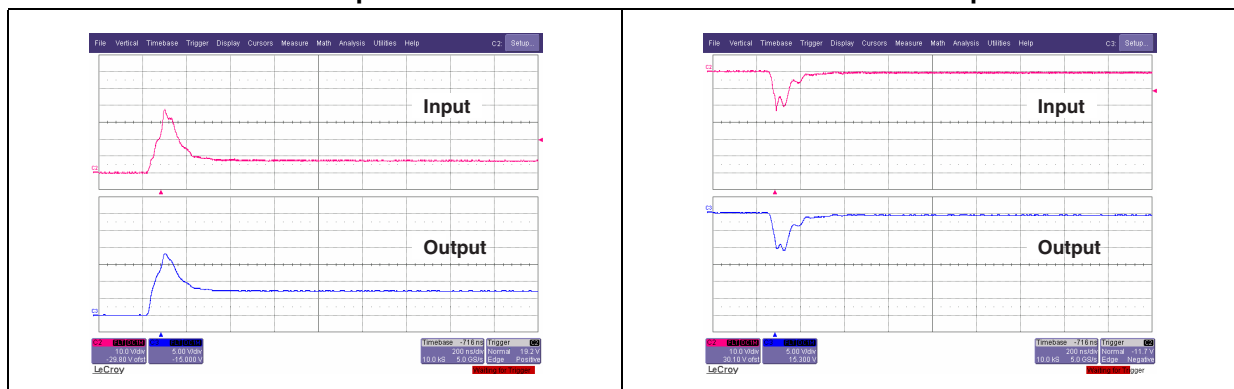


Figure 6. ESD response to IEC 61000-4-2 (- 15 kV air discharge) on one input and on one output

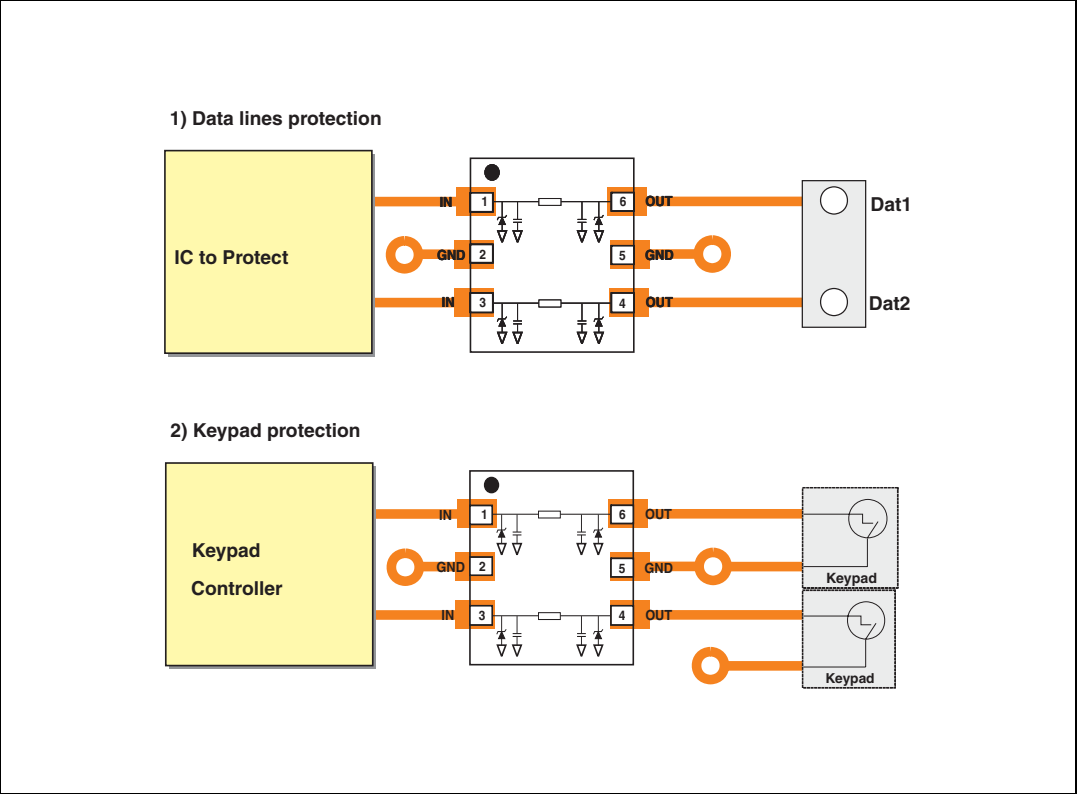


The graph shows the relationship between C_{LINE} (pF) and V_{LINE} (V). The y-axis ranges from 0 to 35 pF with major grid lines every 5 units. The x-axis ranges from 0 to 5 V with major grid lines every 1 unit. A green curve starts at approximately (0, 30) and decreases monotonically, reaching about 15 pF at 5 V.

V_{LINE} (V)	C_{LINE} (pF)
0	30
1	22
2	18
3	16
4	15
5	15

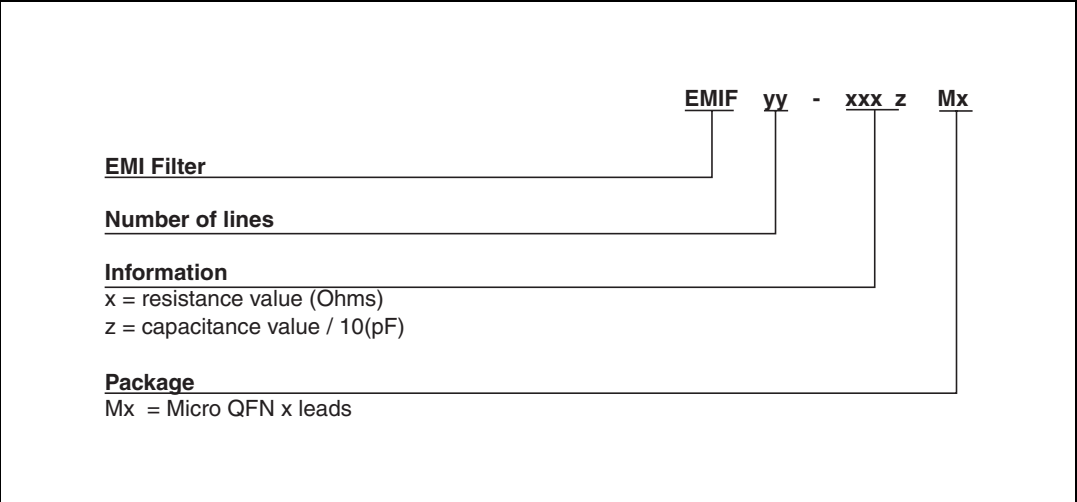
2 Application schematic

Figure 8. Application schematic



3 Ordering information scheme

Figure 9. Ordering information scheme



4 Package information

- Epoxy meets UL94, V0

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 3. Micro QFN 1.45 x 1.00 6L dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.50	0.55	0.60	0.020	0.022	0.024
A1	0.00	0.02	0.05	0.000	0.001	0.002
b	0.18	0.25	0.30	0.007	0.010	0.012
D		1.45			0.057	
E		1.00			0.039	
e		0.50			0.020	
K	0.20			0.008		
L	0.30	0.35	0.40	0.012	0.014	0.016

Figure 10. Footprint in mm [inches]

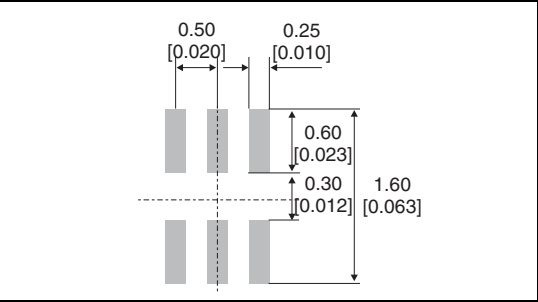
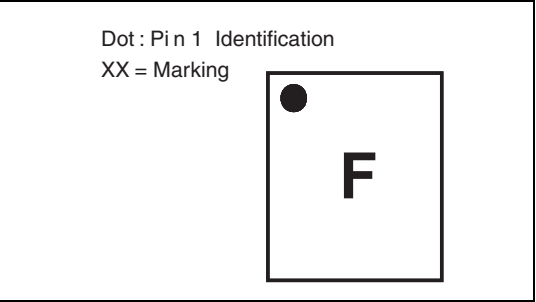


Figure 11. Marking



Technical drawing of a film strip frame showing dimensions and pin 1 location. The drawing includes a side view on the left and a top view on the right. The top view shows a rectangular frame with a central square area containing a dot and a small 'F' mark. Dimensions are provided for the frame and the dot location.

Dimensions and tolerances:

- Overall width: 8.0 ± 0.3
- Overall height: 1.75 ± 0.1
- Distance from left edge to first dot: 0.75
- Distance between dots: 1.20
- Distance from last dot to right edge: 4.00
- Dot diameter: $\phi 1.5 \pm 0.1$
- Distance from left edge to first dot (horizontal): 2.0 ± 0.05
- Distance between dots (horizontal): 4.00 ± 0.1
- Distance from last dot to right edge (horizontal): 4.00 ± 0.1
- Distance from left edge to first dot (vertical): 1.65
- Distance from last dot to right edge (vertical): 3.5 ± 0.03

Text labels:

- Dot identifying pin 1 location
- User direction of unreeling

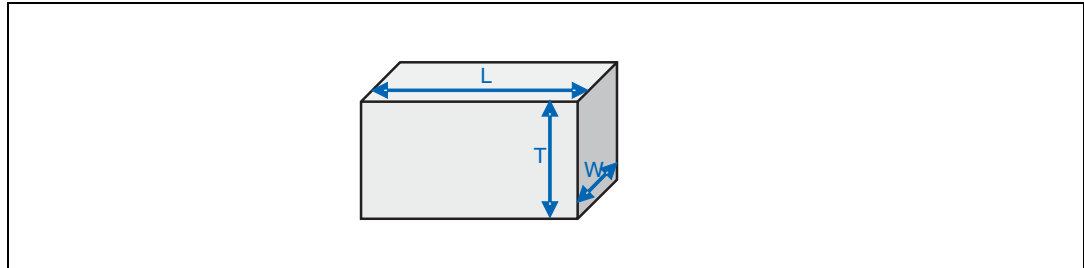
Note: Product marking may be rotated by 90° for assembly plant differentiation. In no case should this product marking be used to orient the component for its placement on a PCB. Only pin 1 mark is to be used for this purpose.

5 Recommendation on PCB assembly

5.1 Stencil opening design

1. General recommendation on stencil opening design
 - a) Stencil Opening Dimensions: L (Length), W (Width), T (Thickness).

Figure 13. Stencil opening dimensions



- b) General Design Rule
 - Stencil thickness (T) = 75 ~ 125 μm
 - Aspect Ratio = $\frac{W}{T} \geq 1.5$
 - Aspect Area = $\frac{L \times W}{2T(L + W)} \geq 0.66$
2. Reference design
 - a) Stencil opening thickness: 100 μm
 - b) Stencil opening for central exposed pad: Opening to footprint ratio is 50%.
 - c) Stencil opening for leads: Opening to footprint ratio is 90%.

5.2 Solder paste

1. Halide-free flux qualification ROL0 according to ANSI/J-STD-004.
2. "No clean" solder paste is recommended.
3. Offers a high tack force to resist component movement during high speed
4. Solder paste with fine particles: powder particle size is 20-45 μm .

5.3 Placement

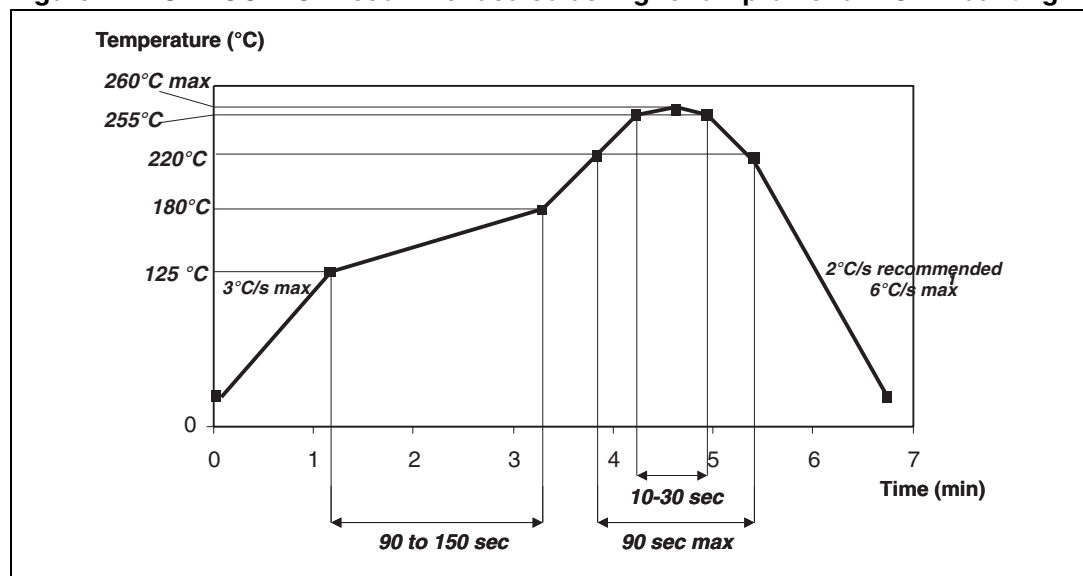
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering
3. Standard tolerance of ± 0.05 mm is recommended.
4. 3.5 N placement force is recommended. Too much placement force can lead to squeezed out solder paste and cause solder joints to short. Too low placement force can lead to insufficient contact between package and solder paste that could cause open solder joints or badly centered packages.
5. To improve the package placement accuracy, a bottom side optical control should be performed with a high resolution tool.
6. For assembly, a perfect supporting of the PCB (all the more on flexible PCB) is recommended during solder paste printing, pick and place and reflow soldering by using optimized tools.

5.4 PCB design preference

1. To control the solder paste amount, the closed via is recommended instead of open vias.
2. The position of tracks and open vias in the solder area should be well balanced. The symmetrical layout is recommended, in case any tilt phenomena caused by asymmetrical solder paste amount due to the solder flow away.

5.5 Reflow profile

Figure 14. ST ECOPACK recommended soldering reflow profile for PCB mounting



Note: Minimize air convection currents in the reflow oven to avoid component movement.

6 Ordering information

Table 4. Ordering information

Part number	Marking	Package	Weight	Base qty	Delivery mode
EMIF02-1003M6	F ⁽¹⁾	Micro QFN	2.2 mg	3000	Tape and reel (7")

1. The marking can be rotated by 90° to differentiate assembly location

7 Revision history

Table 5. Document revision history

Date	Revision	Changes
07-Oct-2007	1	Initial release.

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