EMI9106

EMI Filter for MicroSD Interfaces

Description

The EMI9106 is a combination EMI filter and line termination device with integrated TVS diodes for use on Multimedia Card interfaces. This state−of−the−art device utilizes solid−state, silicon−avalanche technology for superior clamping performance and DC electrical characteristics. The EMI9106 has been optimized for protection of MicroSD interfaces in cellular phones and other portable electronics.

The EMI9106 consists of six circuits that includes series impedance matching resistors as required by the SD specification. TVS diodes are included on each line for ESD protection. An additional TVS diode connection is included for protection of the voltage (Vcc) bus. Termination resistor value of 40 Ω is provided on the SDData0, SDData1, SDData2, SDData3, CMD, and CLK lines.

The TVS diodes provide effective suppression of ESD voltages in excess of ±15 kV (contact discharge) per IEC 61000−4−2, level 4. The EMI9106 is in a 16−pin, RoHS/WEEE compliant, UDFN 16−pin package. It measures 3.30 x 1.35 x 0.50 mm. The leads are spaced at a pitch of 0.4 mm and are finished with lead−free NiPd.

Features

- Bidirectional EMI/RFI Filtering and Line Termination with Integrated ESD Protection
- Provides ESD Protection to IEC61000−4−2:
  ±15 kV Contact Discharge
- TVS Working Voltage: 3.3 V
- Termination Resistors: 40 Ω
- Typical Capacitance per Line: 12 pF (V_{IN} = 2.5 V)
- Protection and Termination for Six Lines + Vcc
- Solid−state Technology

Applications

- MicroSD Interfaces
- MMC Interfaces
- CDMA, GSM, 3G Cell Phones

Mechanical Characteristics

- 0.40 mm, uDFN 16−pin Package
- Nominal Dimensions: 3.30 x 1.35 x 0.50 mm
- Pitch: 0.4 mm
- Pin−lead Finish: NiPd
- RoHS/WEEE Compliance, Lead−free Finish

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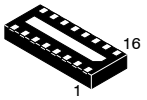
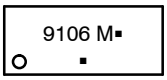


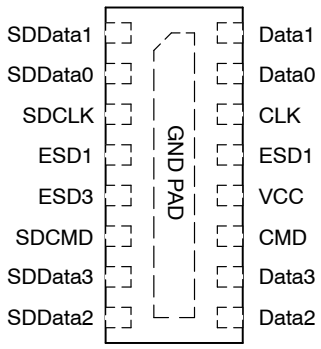
UDFN16
CASE 517BE

MARKING DIAGRAM



9106 = Specific Device Code
M = Single Character Date Code
▪ = Pb−Free Package
(*Note: Microdot may be in either location)

PINOUT DIAGRAM



(Top View)

ORDERING INFORMATION

Device	Package	Shipping†
EMI9106MUTAG	UDFN16 (Pb−Free)	3000/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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ELECTRICAL SCHEMATIC

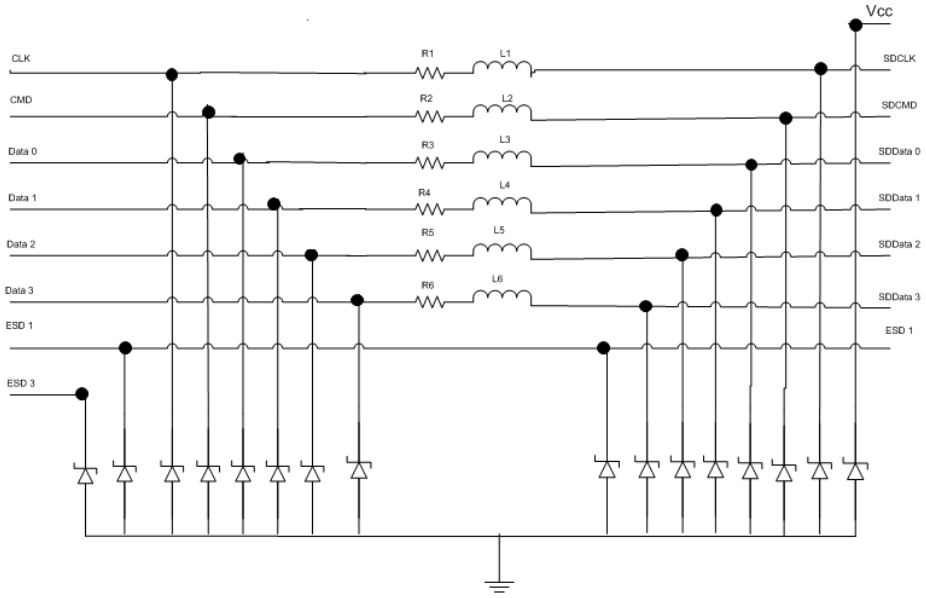


Table 1. PIN DESCRIPTIONS

Pin	Name	Description
1	SDData1	Data line #1 input/output
2	SDData0	Data line #0 input/output
3	SDCLK	Clock line Input/Output
4	ESD1	Single ESD
5	ESD3	Single ESD
6	SDCMD	Command Line Input/Output
7	SDData3	Data line #3 input/output
8	SDData2	Data line #2 input/output
9	Data2	Data line #2 input/output
10	Data3	Data line #3 input/output
11	CMD	Command Line Input/Output
12	VCC	Power Supply ESD Protection
13	ESD1	Single ESD
14	CLK	Clock line Input/Output
15	Data0	Data line #0 input/output
16	Data1	Data line #1 input/output
GND PAD	GND	Ground return to shield

SPECIFICATIONS

Table 2. ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Units
Operating Temperature Range	−40 to +85	°C
Storage Temperature Range	−55 to +150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Table 3. ELECTRICAL OPERATING CHARACTERISTICS (Note 1)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
R_{CH}	Channel Resistance (R1 to R6)		34	40	46	Ω
L_{CH}	Channel Inductance			20		nH
C	Capacitance per Channel	V_{IN} = 0 V; 1 MHz; 30 mV_{RMS}	16	20	24	pF
		V_{IN} = 2.5 V; 1 MHz; 30 mV_{RMS}; (Note 2)		12		pF
I_{LEAK}	Diode Leakage Current per Channel	V_{IN} = 3 V		0.1	0.5	μA
V_{SIG}	Signal Clamp Voltage Positive Clamp Negative Clamp	 I_{LOAD} = 10 mA I_{LOAD} = −10 mA	 5.6 −1.5	 6.8 −0.8	 9.0 −0.4	V
V_{ESD}	ESD Protection − Peak Discharge Voltage at any channel input, in system: a) Contact discharge per IEC 61000−4−2 Standard and b) Air discharge per IEC 61000−4−2 Standard	 (Note 2) (Note 2)	 ±15 ±15			kV
f_C	Cut−off frequency Z_{SOURCE} = 50 Ω, Z_{LOAD} = 50 Ω			300		MHz

1. All parameters specified at T_A = 25°C unless otherwise noted.
2. This parameter is guaranteed by design and verified by device characterization

PERFORMANCE INFORMATION

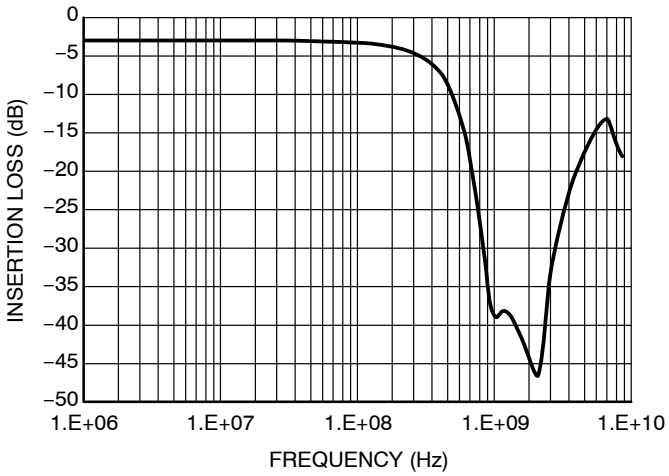
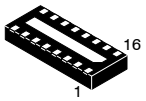


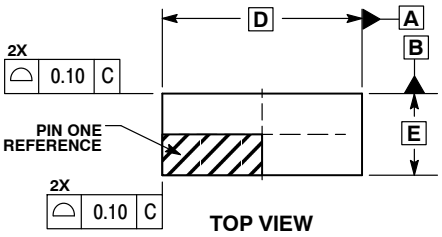
Figure 1. Typical Insertion Loss vs. Frequency (Data0, Data1, Data2, Data3, CLK, CMD)



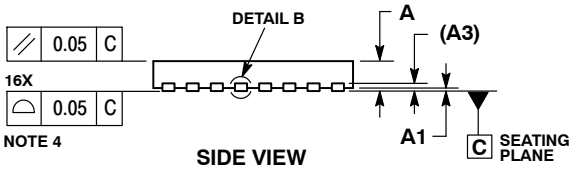
SCALE 4:1

UDFN16, 3.3x1.35, 0.4P
CASE 517BE
ISSUE O

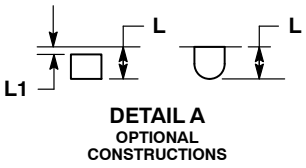
DATE 18 NOV 2009



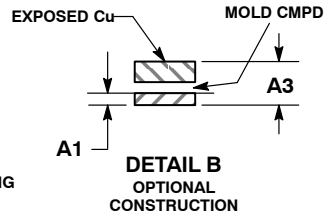
TOP VIEW



SIDE VIEW



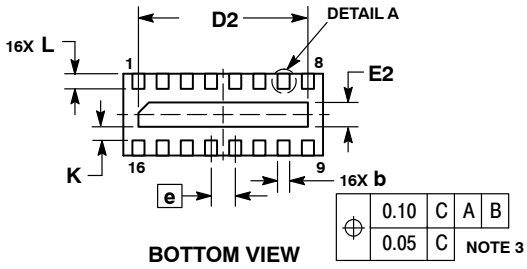
DETAIL A
OPTIONAL CONSTRUCTIONS



DETAIL B
OPTIONAL CONSTRUCTION

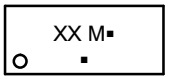
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.25 mm FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.15	0.25
D	3.30 BSC	
D2	2.70	2.90
E	1.35 BSC	
E2	0.30	0.50
e	0.40 BSC	
K	0.15	---
L	0.20	0.30
L1	---	0.05



BOTTOM VIEW

GENERIC MARKING DIAGRAM*

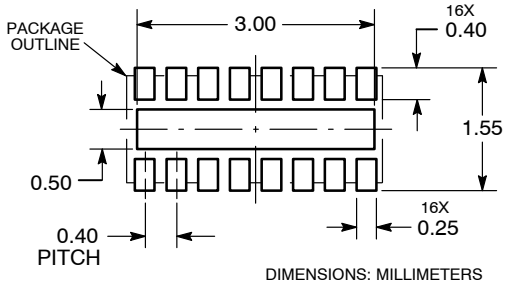


XX = Specific Device Code
M = Month Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking.
Pb−Free indicator, "G" or microdot " ▪", may or may not be present.

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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DESCRIPTION:	**UDFN16, 3.3X1.35, 0.4P**	**PAGE 1 OF 1**

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