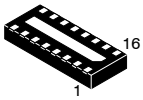
EMI Filter for T-Flash / MicroSD Interfaces

CM1624



UDFN16
DE SUFFIX
CASE 517BE

Description

The CM1624 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 CM1624 has been optimized for protection of T−Flash/MicroSD interfaces in cellular phones and other portable electronics.

The CM1624 consists of six circuits that includes series impedance matching resistors and pull−up 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.

Pull−up resistors of 25 kΩ are included on the SDData0, SDData1, SDData2, SDData3 and CMD lines, as well. These may be configured for devices operating in SD or SPI mode. The TVS diodes provide effective suppression of ESD voltages in excess of ±15 kV (contact discharge) per IEC 61000−4−2, level 4. The CM1624 is in a 16−pin, RoHS/WEEE compliant, UDFN 16−pin package. It measures 3.30 x 1.35 x 0.50 mm.

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: 5 V
- Termination Resistors: 40 Ω
- Pull−up Resistors: 25 kΩ
- Typical Capacitance per Line: 12 pF (V_{IN} = 2.5 V)
- Protection and Termination for Six Lines + Vcc
- Solid−state Technology

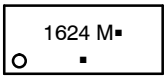
Applications

- T−Flash / MicroSD Interfaces
- MMC Interfaces
- CDMA, GSM, 3G Cell Phones

Mechanical Characteristics

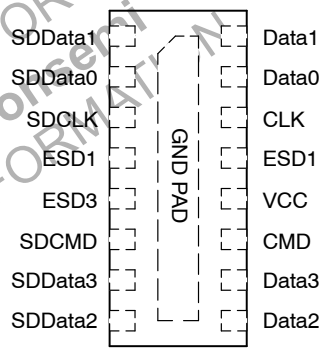
- 0.40 mm, uDFN 16−pin Package
- Nominal Dimensions: 3.30 x 1.35 x 0.50 mm
- Pitch: 0.4 mm
- RoHS/WEEE Compliance, Lead−free Finish

MARKING DIAGRAM



1624 = 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†
CM1624−08DE	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

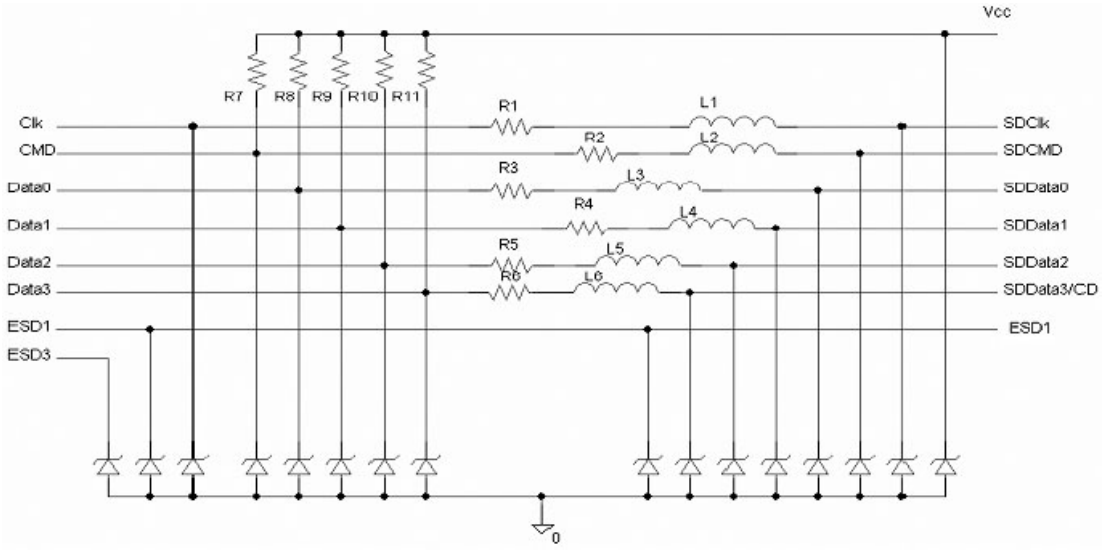

Table 1. PIN DESCRIPTIONS

Pin	Name	Description
1	SDData1	Data line #1 input/output with pull−up resistor
2	SDData0	Data line #0 input/output with pull−up resistor
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 with pull−up resistor
8	SDData2	Data line #2 input/output with pull−up resistor
9	Data2	Data line #2 input/output with pull−up resistor
10	Data3	Data line #3 input/output with pull−up resistor
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 with pull−up resistor
16	Data1	Data line #1 input/output with pull−up resistor
GND PAD	GND	Ground return to shield

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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 those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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} (Note 2)	16	20	24	pF
		V_{IN} = 2.5 V; 1 MHz; 30 mV_{RMS} (Note 2)		12		pF
R_{UP}	Pull−up Resistance (R7 to R11)		21	25	29	kΩ
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

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

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PERFORMANCE INFORMATION

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ω Environment)

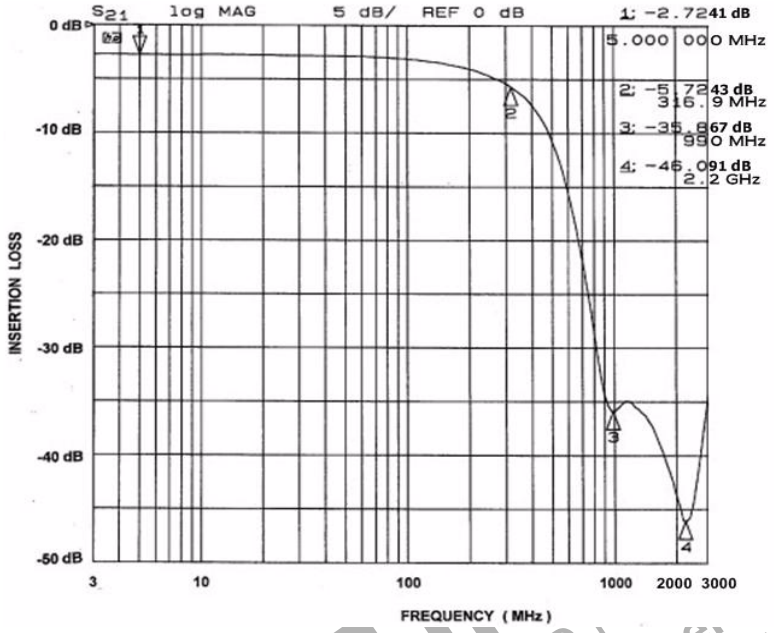

Figure 1. Insertion Loss vs. Frequency (Pins 1 and 16)

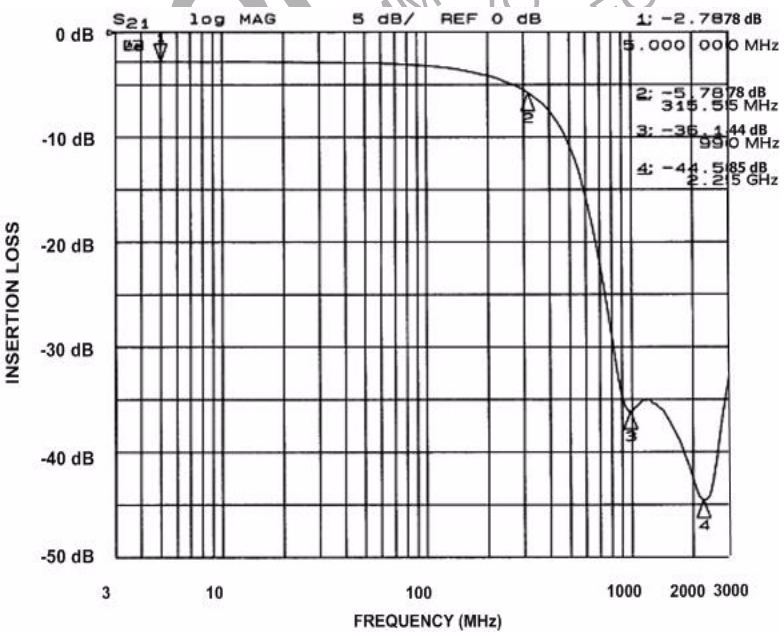

Figure 2. Insertion Loss vs. Frequency (Pins 2 and 15)

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PERFORMANCE INFORMATION (cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ω Environment)

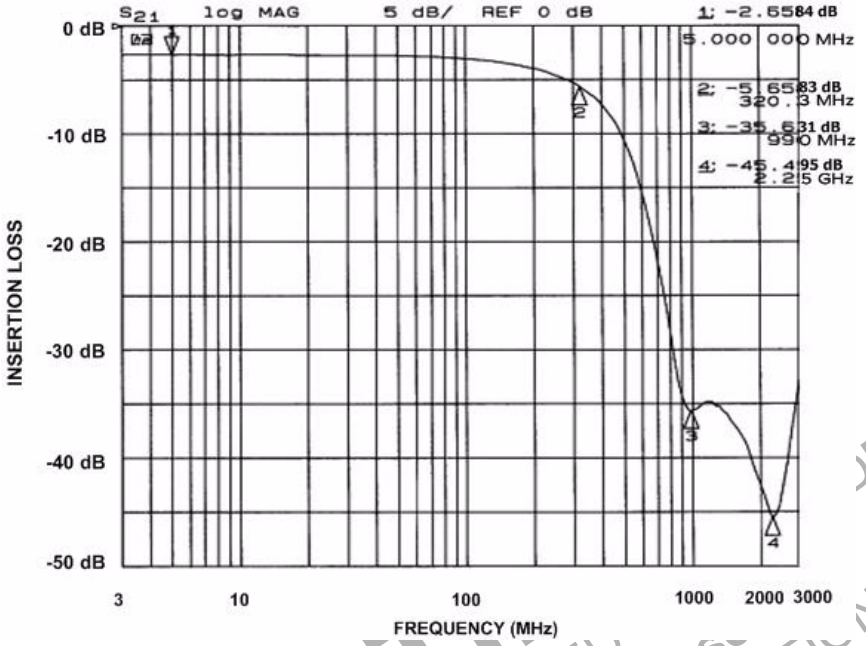

Figure 3. Insertion Loss vs. Frequency (Pins 3 and 14)

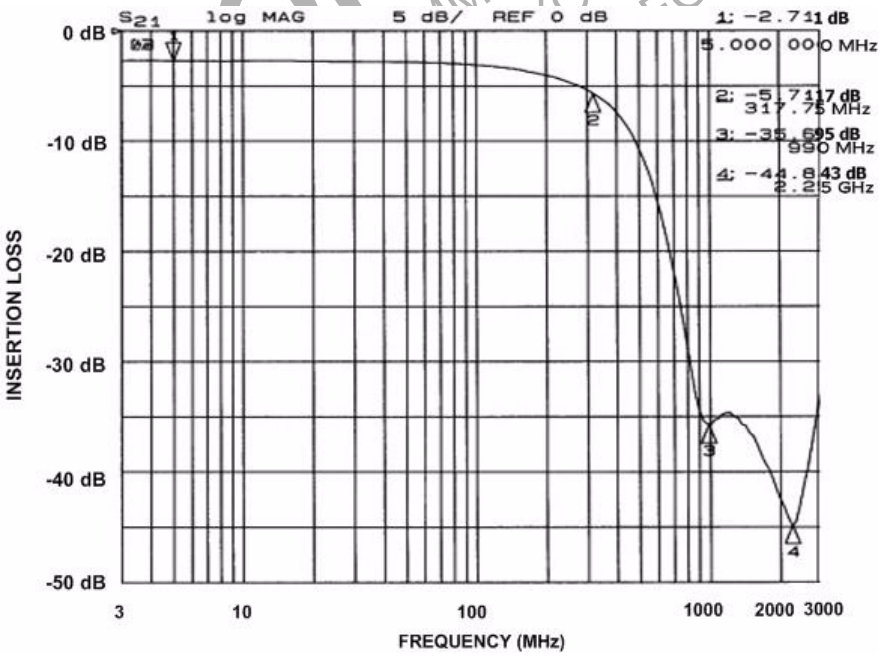

Figure 4. Insertion Loss vs. Frequency (Pins 6 and 11)

PERFORMANCE INFORMATION (cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 50 Ω Environment)

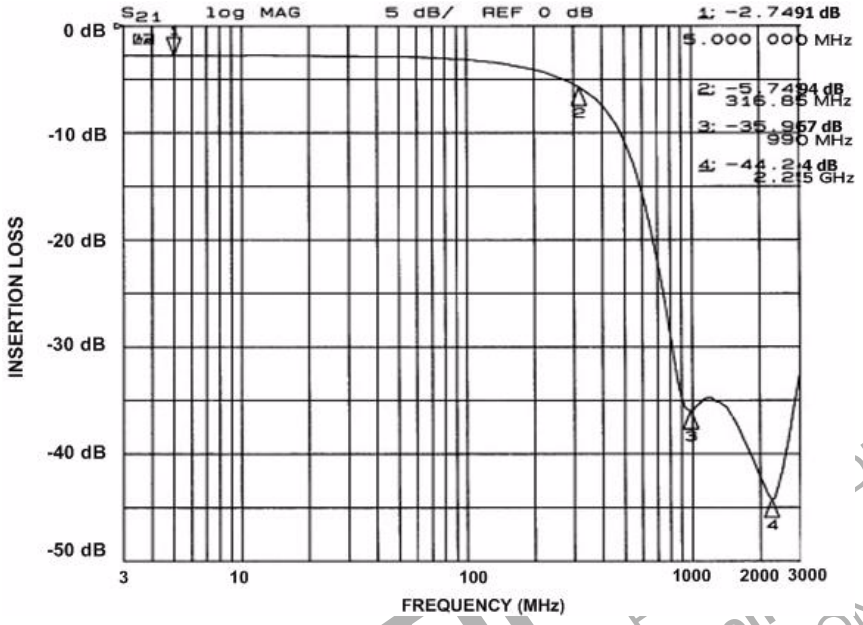

Figure 5. Insertion Loss vs. Frequency (Pins 7 and 10)

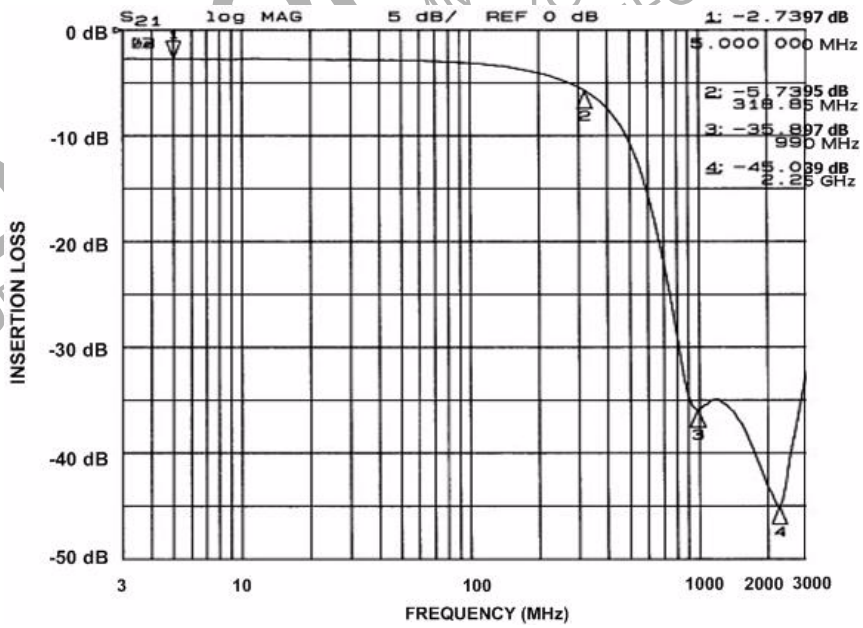

Figure 6. Insertion Loss vs. Frequency (Pins 8 and 9)

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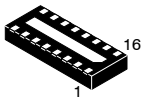
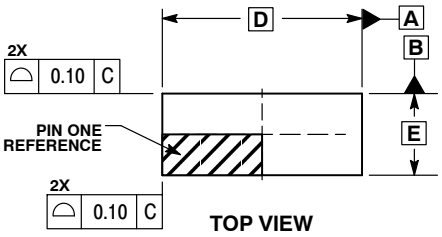


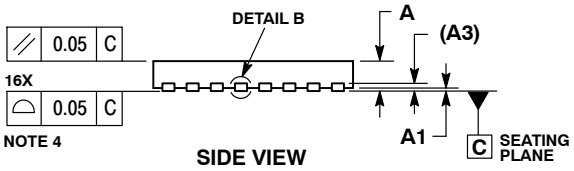
SCALE 4:1

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

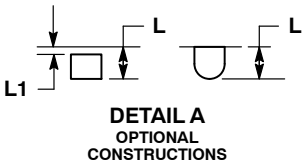
DATE 18 NOV 2009



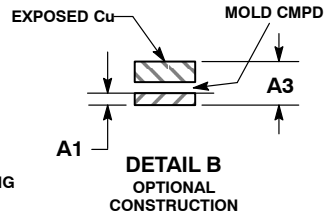
TOP VIEW



SIDE VIEW



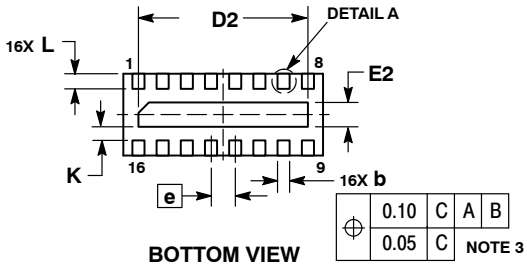
DETAIL A
OPTIONAL CONSTRUCTIONS



DETAIL B
OPTIONAL CONSTRUCTION

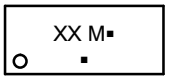
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.25 mm FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	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*

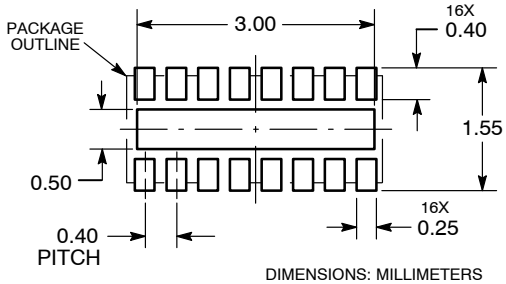


XX = Specific Device Code
M = Month Code
▪ = Pb−Free Package

(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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