

CM1624

EMI Filter for T-Flash / MicroSD Interfaces

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 k Ω 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. 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: 5 V
- Termination Resistors: 40 Ω
- Pull-up Resistors: 25 k Ω
- 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

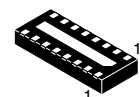
Mechanical Characteristics

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



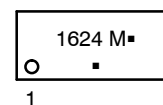
ON Semiconductor®

<http://onsemi.com>



UDFN16
DE SUFFIX
CASE 517BE

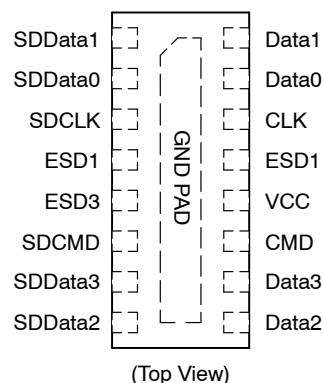
MARKING DIAGRAM



- 1624 = Specific Device Code
M = Single Character Date Code
▪ = Pb-Free Package

(*Note: Microdot may be in either location)

PINOUT DIAGRAM



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

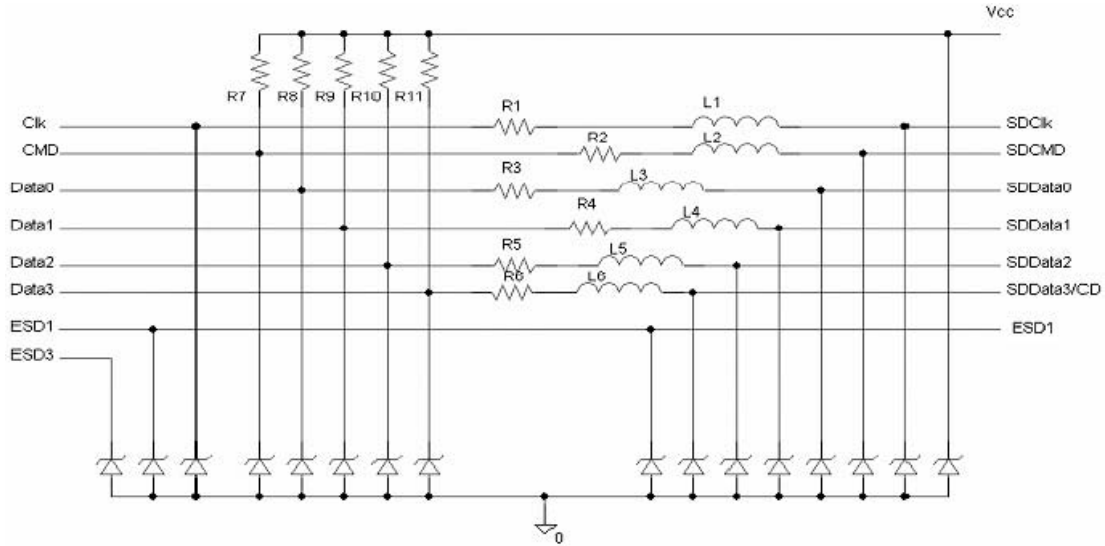


Table 1. PIN DESCRIPTIONS

| 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 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 |
| 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 | | | | | V |
| | 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 _{ESD} | ESD Protection – Peak Discharge Voltage at any channel input, in system: | | | | | kV |
| | 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 | | | |
| 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

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PERFORMANCE INFORMATION

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

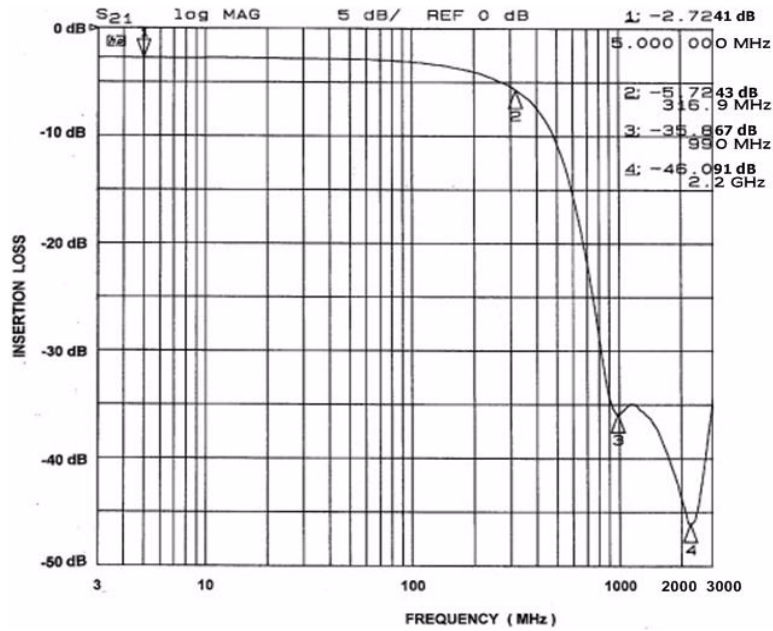


Figure 1. Insertion Loss vs. Frequency (Pins 1 and 16)

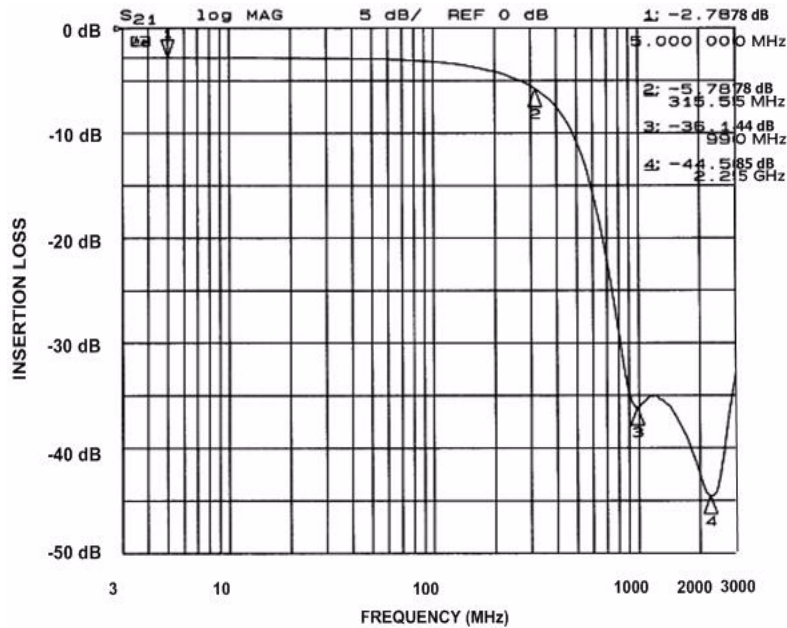


Figure 2. Insertion Loss vs. Frequency (Pins 2 and 15)

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PERFORMANCE INFORMATION (cont'd)

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

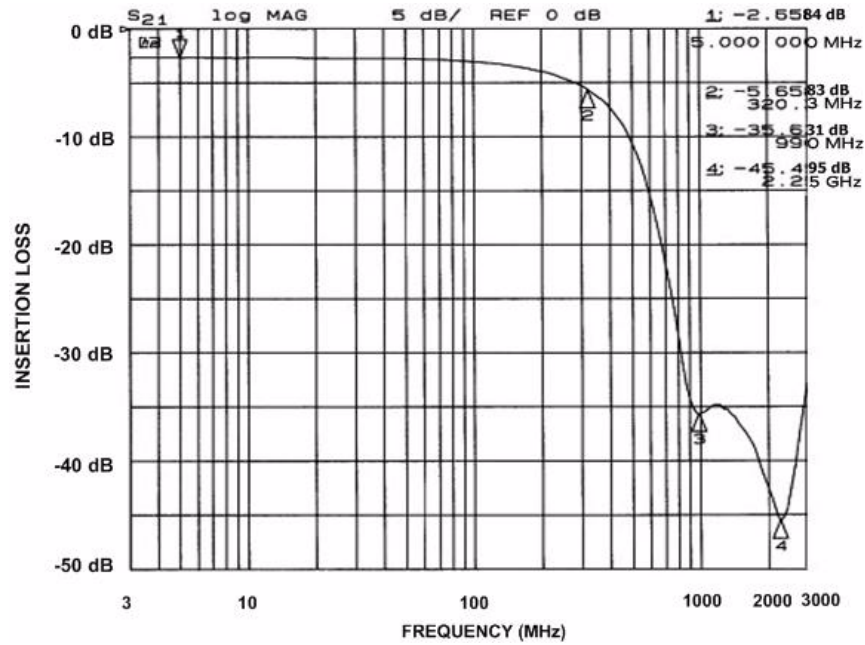


Figure 3. Insertion Loss vs. Frequency (Pins 3 and 14)

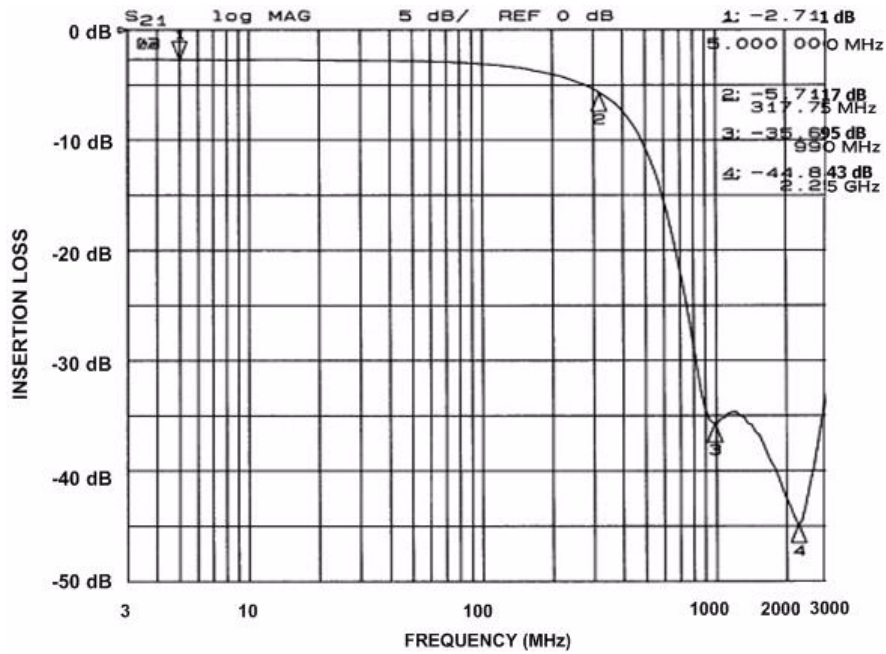


Figure 4. Insertion Loss vs. Frequency (Pins 6 and 11)

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PERFORMANCE INFORMATION (cont'd)

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

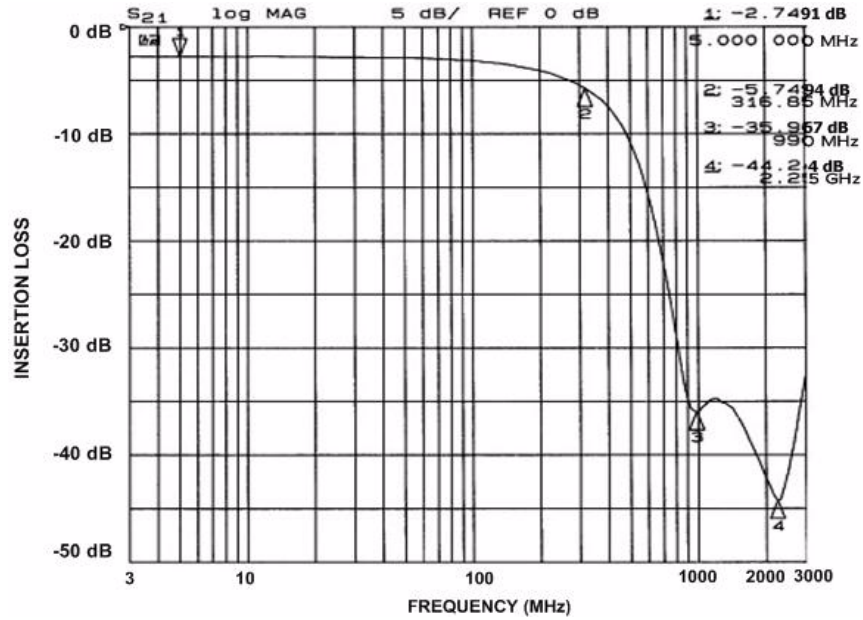


Figure 5. Insertion Loss vs. Frequency (Pins 7 and 10)

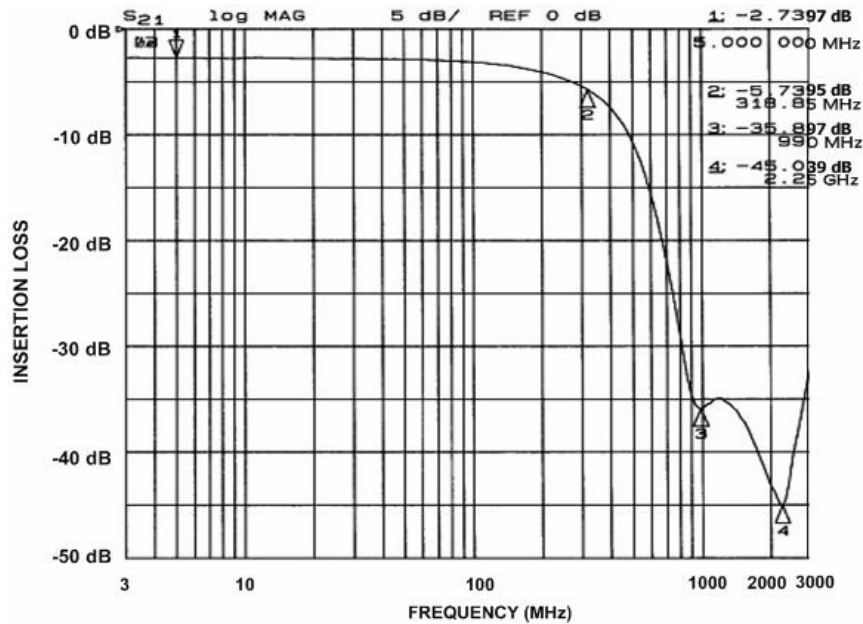
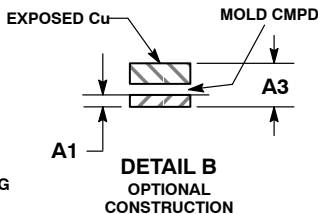
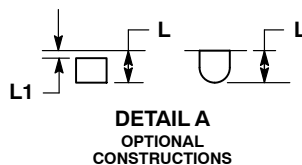
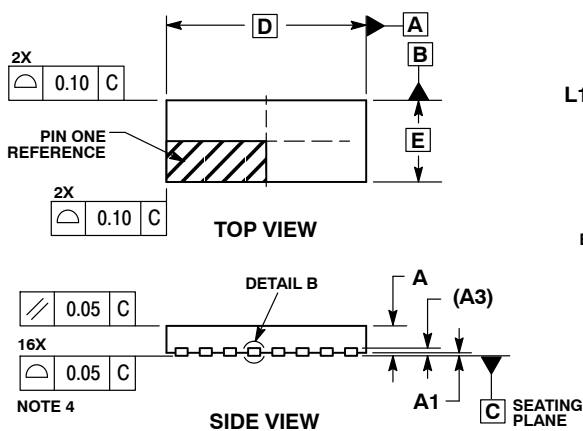


Figure 6. Insertion Loss vs. Frequency (Pins 8 and 9)

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PACKAGE DIMENSIONS

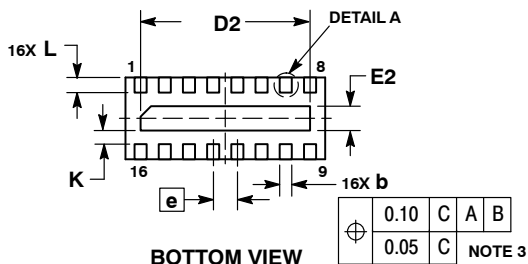
UDFN16, 3.3x1.35, 0.4P
CASE 517BE-01
ISSUE O



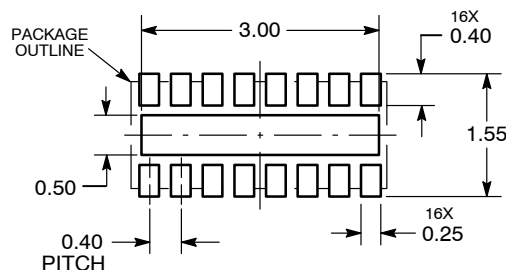
NOTES:

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 |



RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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

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