ON Semiconductor®

Praetorian III® EMI Filter for T-Flash/MicroSD Interfaces

CM1624

Features

- Bidirectional EMI/RFI filtering and line termination with integrated ESD protection
- Provides ESD protection to IEC61000-4-2:
  - ±15kV contact discharge
- TVS working voltage: 5V
- Termination resistors: 40Ω
- Pull-up resistors: 25kΩ
- Typical capacitance per line: 12pF (V_{IN}= 2.5V)
- Protection and termination for six lines + Vcc
- Solid-state technology

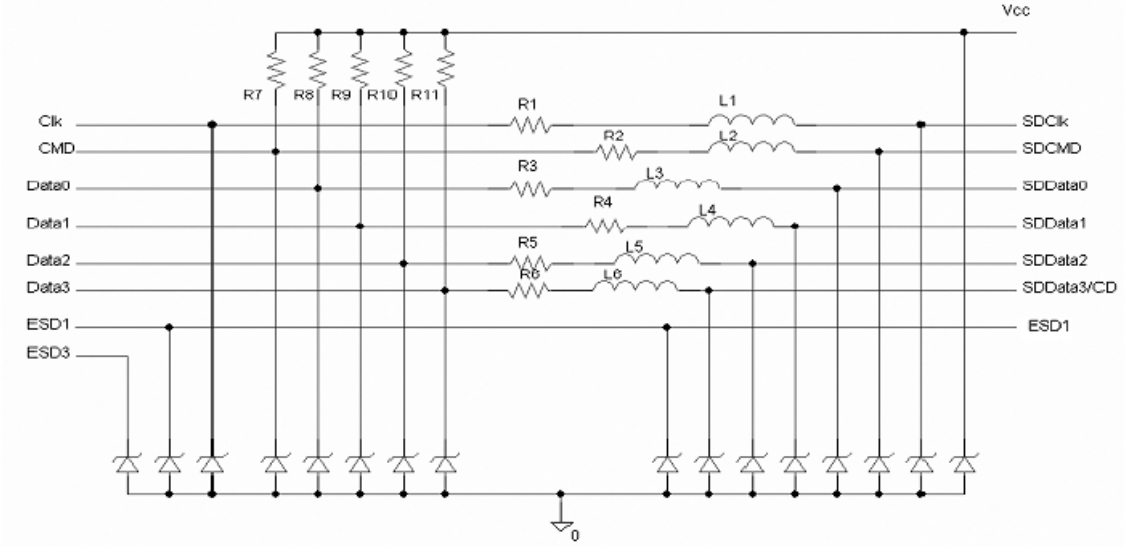
Applications

- T-Flash / MicroSD interfaces
- MMC interfaces
- CDMA, GSM, 3G cell phones

Mechanical Characteristics

- 0.40mm, uDFN 16-pin package
- RoHS/WEEE compliance, lead-free finish
- Nominal dimensions: 3.30 x 1.35 x 0.50mm
- Pitch: 0.4mm
- Pin-lead finish: NiPd

Electrical Schematic



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May 2010 – Rev. 2

Publication Order Number:
CM1624/D

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.

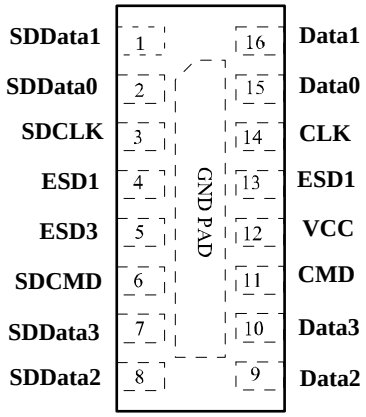
The CM1624 consists of six circuits that includes series impedance matching resistors and pull-up resistors as required by the SD specification. TVS diodes are included on each line for ESD protection. An additional TVS diode connection is included for protection of the voltage (Vcc) bus. Termination resistor value of 40Ω is provided on the SDData0, SDData1, SDData2, SDData3, CMD, and CLK lines.

Pull-up resistors of 25kΩ 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 ±15kV (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 0.50mm. The leads are spaced at a pitch of 0.4mm and are finished with lead-free NiPd.

Package/Pin Information

PACKAGE / PINOUT DIAGRAMS

Top View



Note:
1) This drawing is not to scale.

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

Ordering Information

PART NUMBERING INFORMATION (Note 1)			
PIN	**PACKAGE**	**LEAD-FREE FINISH**	**Part Marking**
16	uDFN-16 (0.40mm)	CM1624 -08DE	1624(x) (Note 2)

Note 1: Parts are shipped in Tape and Reel form unless otherwise specified.
Note 2: (x) = single character date code.

Specifications

ABSOLUTE MAXIMUM RATINGS*		
PARAMETER	**RATING**	**UNITS**
Operating Temperature Range	-40 to +85	°C
Storage Temperature Range	-55 to +150	°C

*Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL OPERATING CHARACTERISTICS (SEE 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} = 0V; 1MHz; 30mV_{RMS}	16	20	24	pF
		V_{IN} = 2.5V; 1MHz; 30m$V_{RMS;}$		12		pF
R_{UP}	Pull-up Resistance (R7 to R11)		21	25	29	kΩ
I_{LEAK}	Diode Leakage Current per Channel	V_{IN} = 3V		0.1	0.5	μA
V_{SIG}	Signal Clamp Voltage Positive Clamp Negative Clamp	 I_{LOAD} = 10mA I_{LOAD} = -10mA	 5.6 -1.5	 6.8 -0.8	 9.0 -0.4	 V 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		 ±15 ±15			 kV kV
f_C	Cut-off frequency Z_{SOURCE} = 50Ω, Z_{LOAD} = 50Ω			300		MHz

Note 1: All parameters specified at T_A = 25°C unless otherwise noted.

Performance Information

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

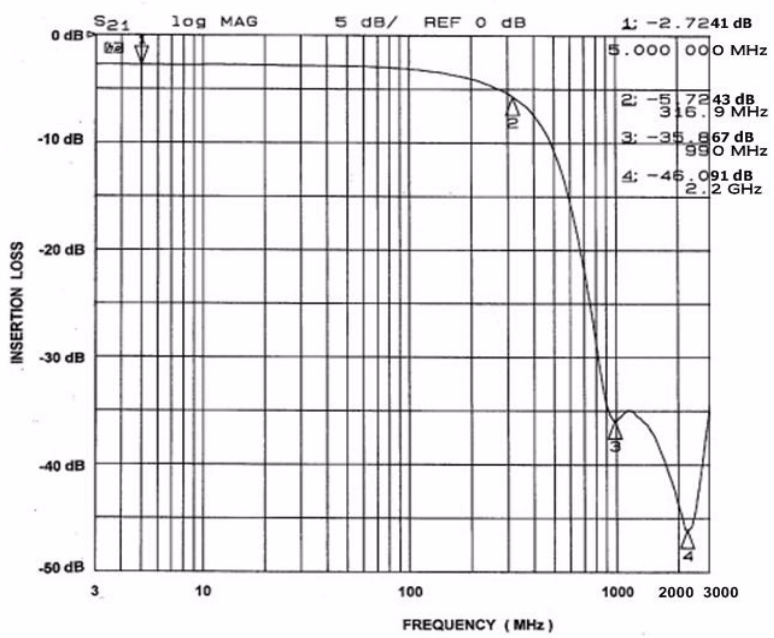


Figure 1. Insertion Loss VS. Frequency (Pins 1 and 16)

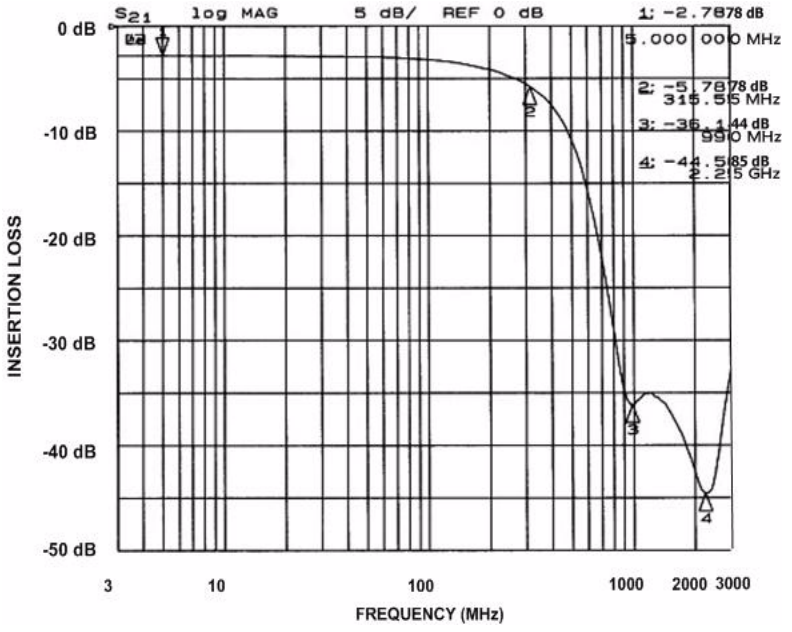


Figure 2. Insertion Loss VS. Frequency (Pins 2 and 15)

Performance Information (cont'd)

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

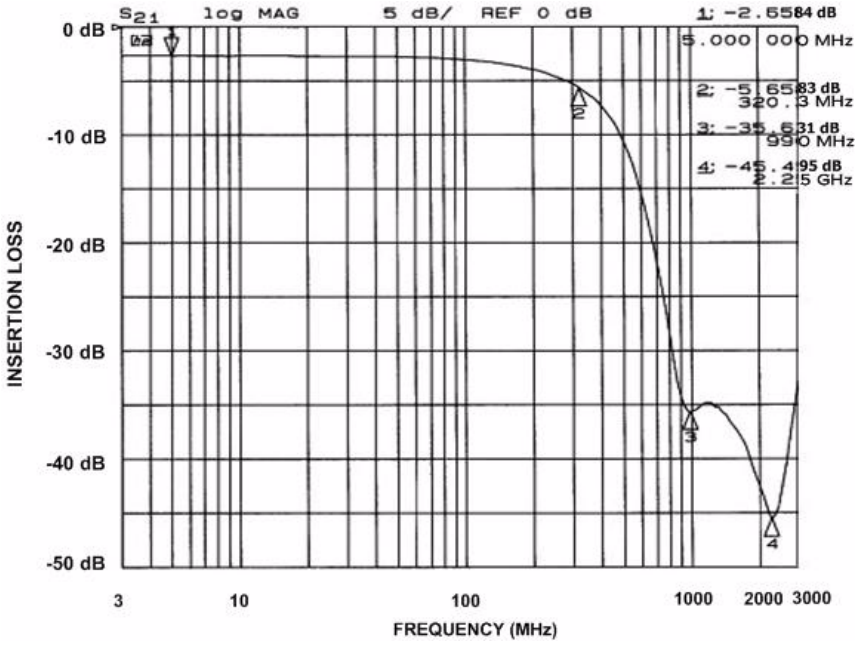


Figure 3. Insertion Loss VS. Frequency (Pins 3 and 14)

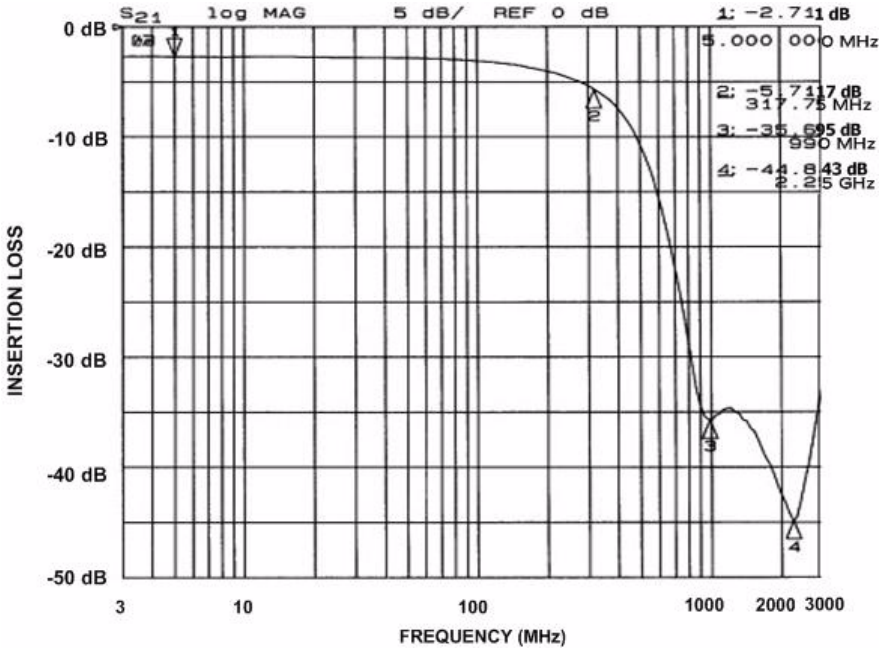


Figure 4. Insertion Loss VS. Frequency (Pins 6 and 11)

Performance Information (cont'd)

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

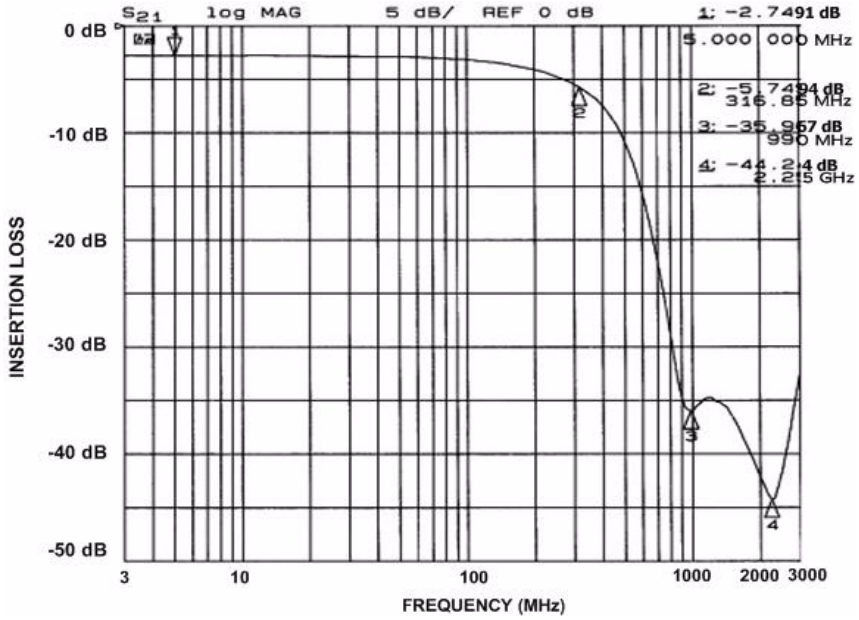


Figure 5. Insertion Loss VS. Frequency (Pins 7 and 10)

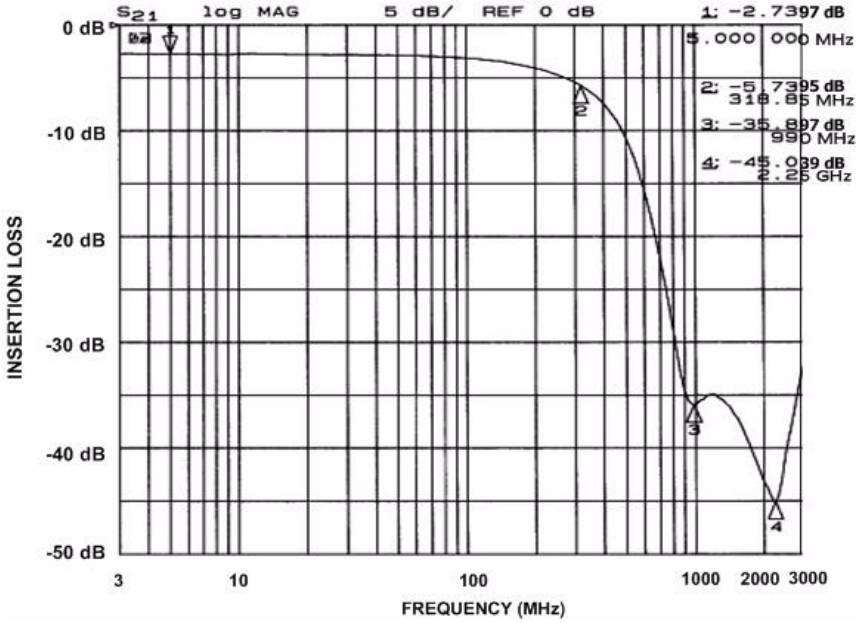


Figure 6. Insertion Loss VS. Frequency (Pins 8 and 9)

Mechanical Details

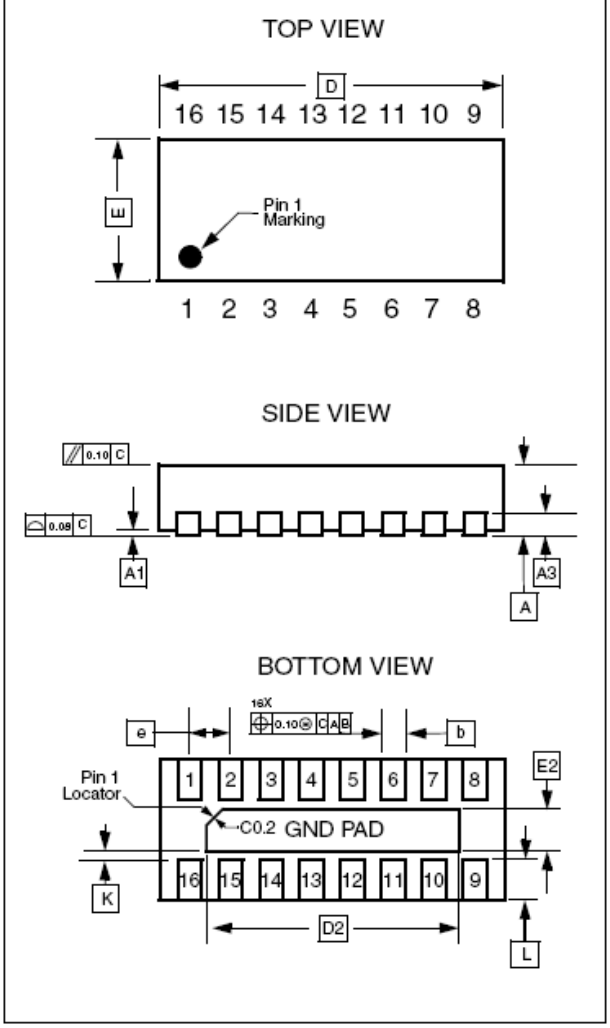
uDFN-16 Mechanical Specifications, 0.4mm

The 16-lead, 0.4mm pitch uDFN package dimensions are presented below.

PACKAGE DIMENSIONS						
Package	uDFN					
JEDEC No.	MO-229C*					
Leads	16					
Dim.	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A	0.45	0.50	0.55	0.018	0.020	0.022
A1	0.00	0.02	0.05	0.000	0.001	0.002
A3	0.127 REF			0.005 REF		
b	0.15	0.20	0.25	0.006	0.008	0.010
D	3.20	3.30	3.40	0.126	0.130	0.134
D2	2.70	2.80	2.90	0.106	0.110	0.114
E	1.25	1.35	1.45	0.049	0.053	0.057
E2	0.30	0.40	0.50	0.012	0.016	0.020
e	0.40 BSC			0.016 BSC		
K	0.22 REF			0.009 REF		
L	0.15	0.25	0.35	0.006	0.010	0.014
# per tape and reel	3000 pieces					
Controlling dimension: millimeters						

*This package is compliant with JEDEC standard MO-229C with the exception of the D, D2, E, E2, K and L dimensions as called out in the table above.

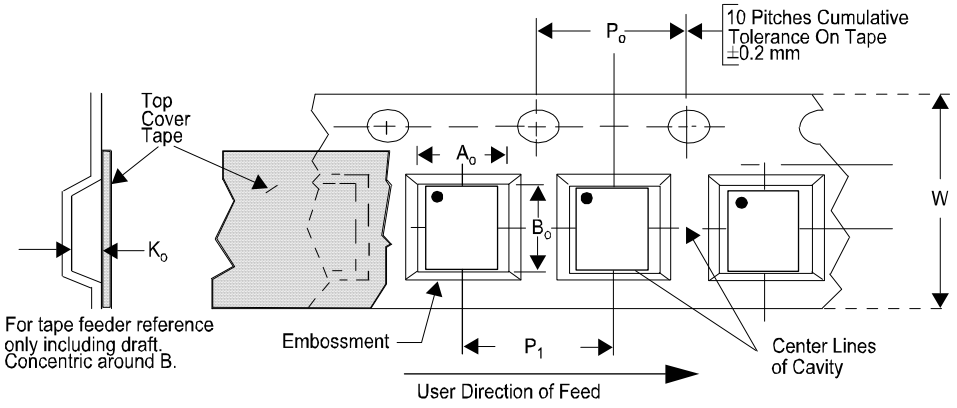
Mechanical Package Diagrams



Dimensions for 16-Lead, 0.4mm pitch uDFN package

Tape and Reel Specifications

PART NUMBER	PACKAGE SIZE (mm)	POCKET SIZE (mm) B_0 X A_0 X K_0	TAPE WIDTH W	REEL DIAMETER	QTY PER REEL	P_0	P_1
CM1624 -08DE	3.30 X 1.35 X 0.50	3.50 X 1.55 X 0.70	12mm	178mm (7")	3000	4mm	4mm



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