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CM1683

Praetorian[®] L-C EMI Filter with ESD Protection for Headsets/Speakers

Product Description

The CM1683 is an L-C EMI filter array with ESD protection, which integrates two Pi-filters (C-L-C) for the headset speaker. The CM1683 has component values of 100 pF – 3 nH – 100 pF. The parts include ESD protection diodes on all input/output pins, which provide a very high level of protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). The ESD diodes connected to the filter ports safely dissipate ESD strikes of ± 8 kV, beyond the maximum requirement of the IEC61000-4-2 international standard. Using the MIL-STD-883 (Method 3015) specification for Human Body Model (HBM) ESD, the pins are protected for contact discharges at greater than ± 15 kV.

This device is particularly well suited for portable electronics (e.g. mobile handsets, PDAs, notebook computers) because of its small package format and easy-to-use pin assignments. In particular, the CM1683 is ideal for EMI filtering and protecting speaker output lines from ESD for the headset speaker in mobile handsets. Most speakers have impedance of 8Ω and in order to maximize the power output, the resistance of an EMI filter needs to be as low as possible and the CM1683 addresses this by having a C-L-C based EMI filter where the inductor has less than 1Ω of resistance.

Features

- Two Channels of EMI Filtering
- ± 8 kV ESD Protection (IEC 61000-4-2, Contact Discharge)
- ± 15 kV ESD Protection (HBM)
- Greater than -40 dB of Attenuation at 1 GHz
- 8-Lead, 2.00 mm x 2.00 mm, 0.5 mm Pitch CUDFN Package
- These Devices are Pb-Free and are RoHS Compliant

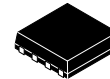
Applications

- Headset Speaker Port in Mobile Handsets
- I/O Port Protection for Mobile Handsets, Notebook Computers, PDAs, etc.
- EMI Filtering for Data Ports in Cell Phones, PDAs or Notebook Computers



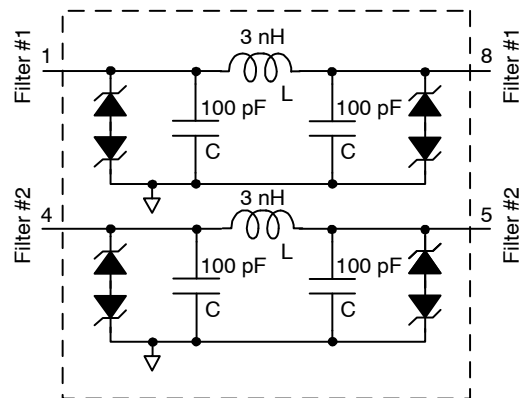
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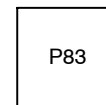


CUDFN8
DE SUFFIX
CASE 505AF

ELECTRICAL SCHEMATIC



MARKING DIAGRAM



P83 = CM1683-02DE

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|-------------|-------------------|-----------------------|
| CM1683-02DE | CUDFN-8 (Pb-Free) | 3000/Tape & Reel |

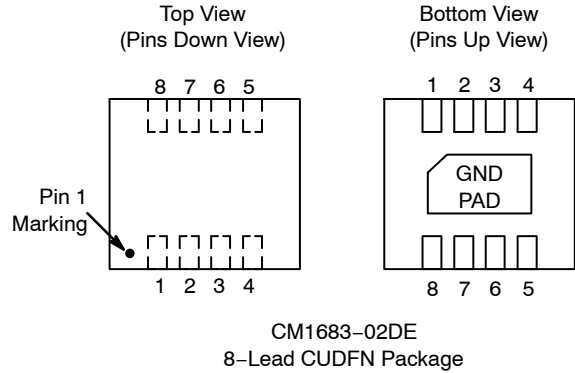
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

CM1683

Table 1. PIN DESCRIPTIONS

| 8-Lead CUDFN Package | | |
|----------------------|-----------|-------------|
| Pin | Name | Description |
| 1 | Filter #1 | Filter #1 |
| 2 | NC | No connect |
| 3 | NC | No connect |
| 4 | Filter #2 | Filter #2 |
| 5 | Filter #2 | Filter #2 |
| 6 | NC | No connect |
| 7 | NC | No connect |
| 8 | Filter #1 | Filter #1 |
| GND PAD | GND | Ground |

PACKAGE / PINOUT DIAGRAMS



SPECIFICATIONS

Table 2. ABSOLUTE MAXIMUM RATINGS

| Parameter | Rating | Units |
|---------------------------|-------------|-------|
| Storage Temperature Range | -65 to +150 | °C |
| DC current per inductor | 30 | mA |
| DC package power rating | 0.5 | W |

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. STANDARD OPERATING CONDITIONS

| Parameter | Rating | Units |
|-----------------------------|------------|-------|
| Operating Temperature Range | -40 to +85 | °C |

Table 4. ELECTRICAL OPERATING CHARACTERISTICS (Note 1)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-------------------|---|---|-----------|----------|----------|-------|
| L | Inductance | | | 3.0 | | nH |
| R | DC Channel Resistance | | | 0.75 | 1 | Ω |
| C _{TOT} | Total Channel Capacitance | 2.5 V DC; 1 MHz, 30 mV AC | 160 | 200 | 240 | pF |
| C | Capacitance C | 2.5 V DC; 1 MHz, 30 mV AC | | 100 | | pF |
| I _{LEAK} | Diode Leakage Current | V _{IN} = +5.0 V | | 0.1 | 1.0 | μA |
| | | V _{IN} = -5.0 V | -1.0 | -0.1 | | μA |
| V _{SIG} | Signal Clamp Voltage Positive Clamp Negative Clamp | I _{LOAD} = 10 mA I _{LOAD} = -10 mA | 5 -15 | 7 -10 | 15 -5 | V |
| V _{ESD} | In-system ESD Withstand Voltage: a) Human Body Model, MIL-STD-883, Method 3015 b) Contact Discharge per IEC 61000-4-2 Level 4 | (Note 2) | ±15 ±8 | | | kV |
| f _C | Cut-off frequency Z _{SOURCE} = 50 Ω, Z _{LOAD} = 50 Ω | L = 3 nH, C = 100 pF | | 31 | | MHz |

1. T_A = 25°C unless otherwise specified.
2. ESD applied to input and output pins with respect to GND, one at a time.

PERFORMANCE INFORMATION

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

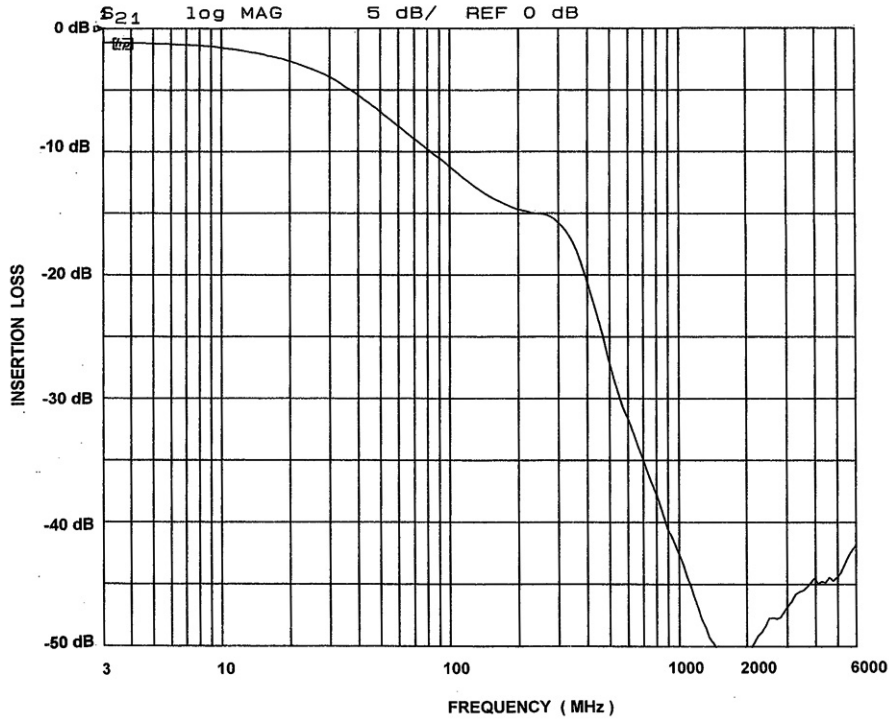


Figure 1. Insertion Loss vs. Frequency (Filter #1 to GND)

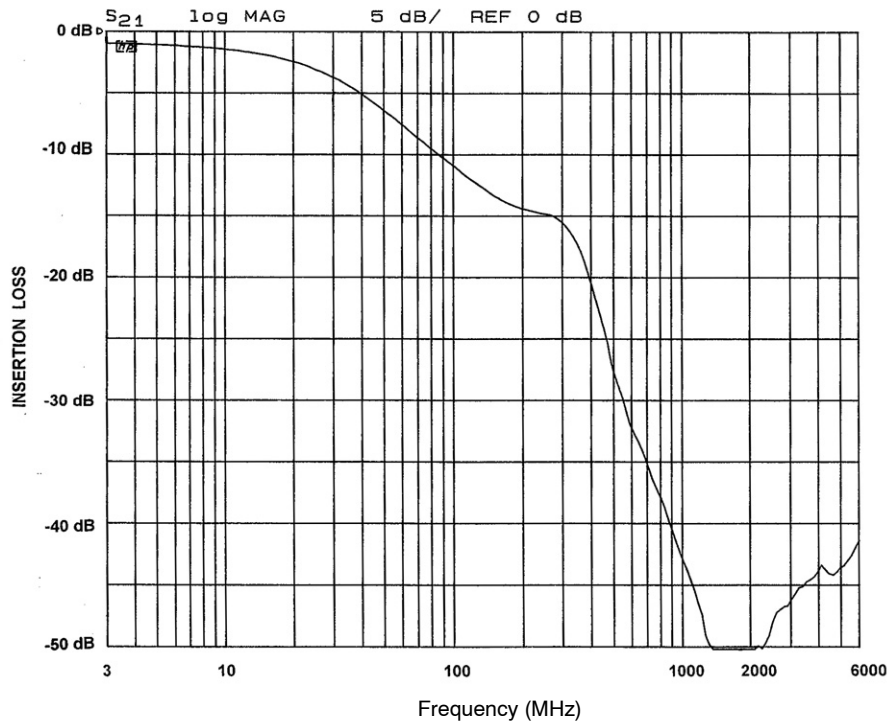
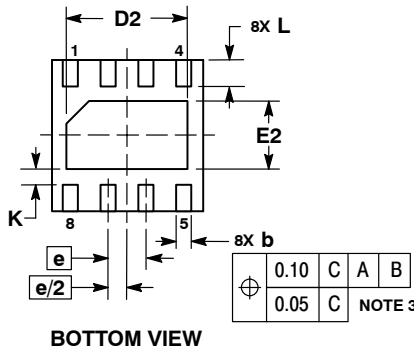
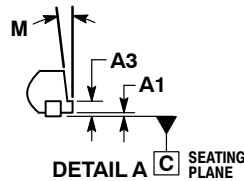
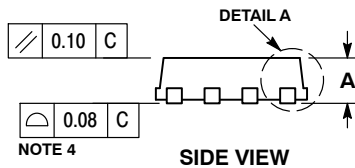
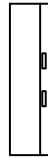
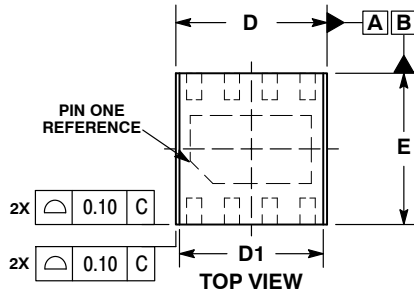


Figure 2. Insertion Loss vs. Frequency (Filter #2 to GND)

CM1683

PACKAGE DIMENSIONS

CUDFN8, 2x2, 0.5P
CASE 505AF-01
ISSUE 0

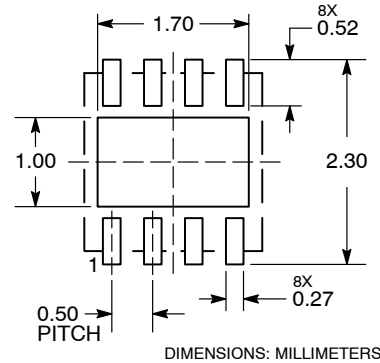


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.10 AND 0.20mm FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| DIM | MILLIMETERS | |
|-----|-------------|------|
| | MIN | MAX |
| A | 0.55 | 0.65 |
| A1 | 0.00 | 0.05 |
| A3 | 0.20 REF | |
| b | 0.15 | 0.25 |
| D | 2.00 BSC | |
| D1 | 1.80 BSC | |
| D2 | 1.50 | 1.70 |
| E | 2.00 BSC | |
| E2 | 0.80 | 1.00 |
| e | 0.50 BSC | |
| K | 0.20 | --- |
| L | 0.25 | 0.35 |
| M | --- | 10° |

RECOMMENDED MOUNTING FOOTPRINT*



*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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