

Praetorian[®] L-C EMI Filter with ESD Protection for Headset Speaker Applications

Features

- Two channels of EMI filtering
- $\pm 8\text{kV}$ ESD protection (IEC 61000-4-2, contact discharge)
- $\pm 15\text{kV}$ ESD protection (HBM)
- Greater than -40dB of attenuation at 1GHz
- 8-lead, $2.00\text{mm} \times 2.00\text{mm}$, 0.5mm pitch uDFN package
- RoHS-compliant, lead-free finishing

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

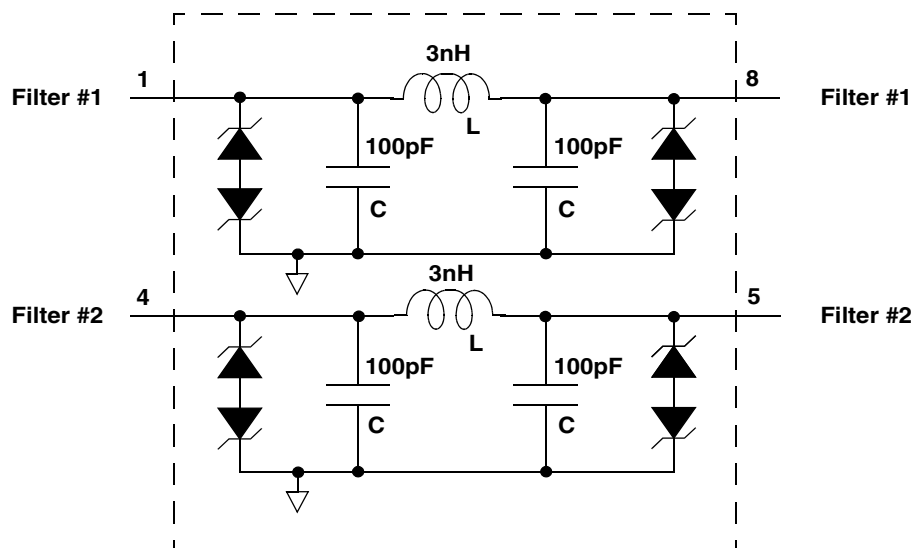
Product Description

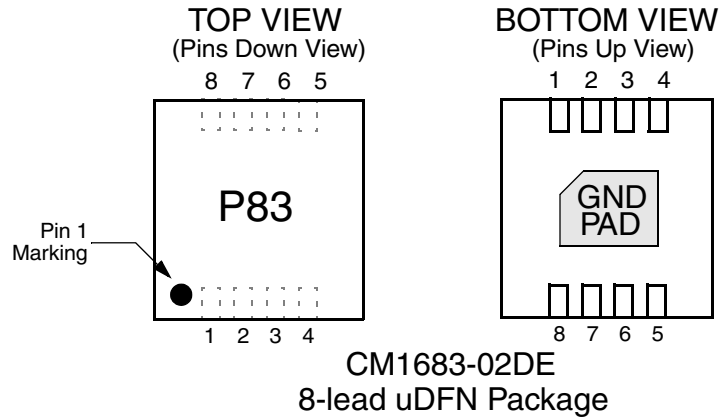
California Micro Devices' CM1683 is an L-C EMI filter array with ESD protection, which integrates two Pi-filters (C-L-C) for the headset speaker. The CM1683 has component values of 100pF - 3nH - 100pF . The parts

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 $\pm 8\text{kV}$, 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 $\pm 15\text{kV}$.

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.

Electrical Schematic



PACKAGE / PINOUT DIAGRAMS


Note: This drawing is not to scale.

PIN DESCRIPTIONS

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
DAP	GND	Ground

Ordering Information
PART NUMBERING INFORMATION

Pins	Package	Lead-free Finish	
		Ordering Part Number ¹	Part Marking
8	uDFN	CM1683-02DE	P83

Note 1: Parts are shipped in Tape & Reel form unless otherwise specified.

Specifications

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

STANDARD OPERATING CONDITIONS

PARAMETER	RATING	UNITS
Operating Temperature Range	-40 to +85	°C

ELECTRICAL OPERATING CHARACTERISTICS (NOTE 1)

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
L	Inductance	Note 3		3.0		nH
R	DC Channel Resistance	Note 3		0.75	1	Ω
C _{TOT}	Total Channel Capacitance	2.5V DC; 1MHz, 30mV AC	160	200	240	pF
C	Capacitance C	2.5V DC; 1MHz, 30mV AC		100		pF
I _{LEAK}	Diode Leakage Current	V _{IN} = +5V		0.1	1.0	μ A
		V _{IN} = -5V	-1.0	-0.1		μ A
V _{SIG}	Signal Clamp Voltage Positive Clamp Negative Clamp	I _{LOAD} = 10mA I _{LOAD} = -10mA	5	7	15	V
			-15	-10	-5	V
V _{ESD}	In-system ESD Withstand Voltage Human Body Model, MIL-STD-883, Method 3015 Contact Discharge per IEC 61000- 4-2 Level 4	Notes 2 & 3	\pm 15			kV
			\pm 8			kV
f _C	Cut-off frequency Z _{SOURCE} = 50 Ω , Z _{LOAD} = 50 Ω	L = 3nH, C = 100pF		31		MHz

Note 1: T_A = 25°C unless otherwise specified.

Note 2: ESD applied to input and output pins with respect to GND, one at a time.

Note 3: These parameters guaranteed by design and characterization.

Performance Information

Typical Filter Performance (nominal conditions unless specified otherwise, 50 ohm environment)

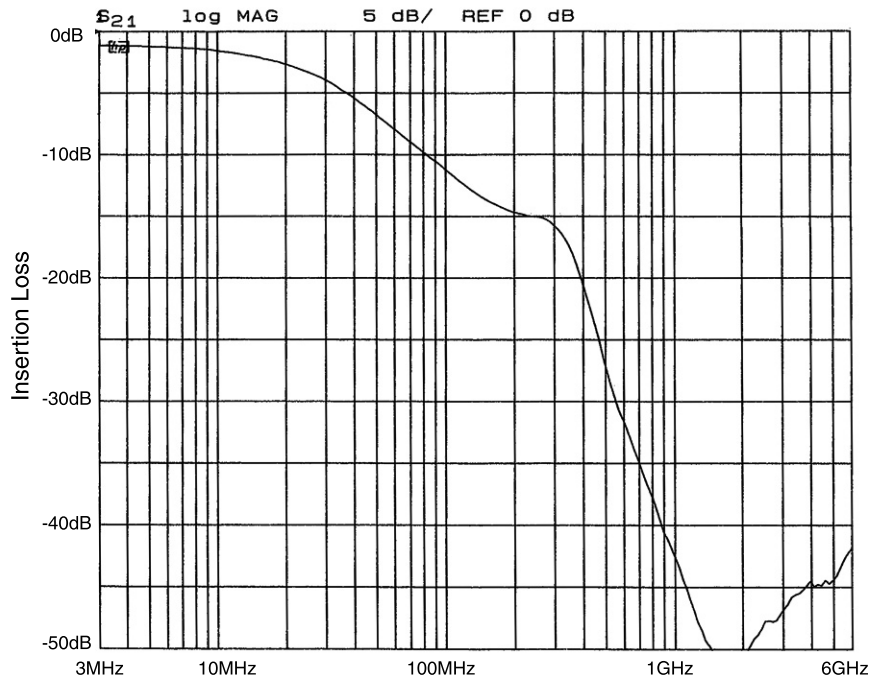


Figure 1. Insertion Loss vs. Frequency (Filter #1 to GND)

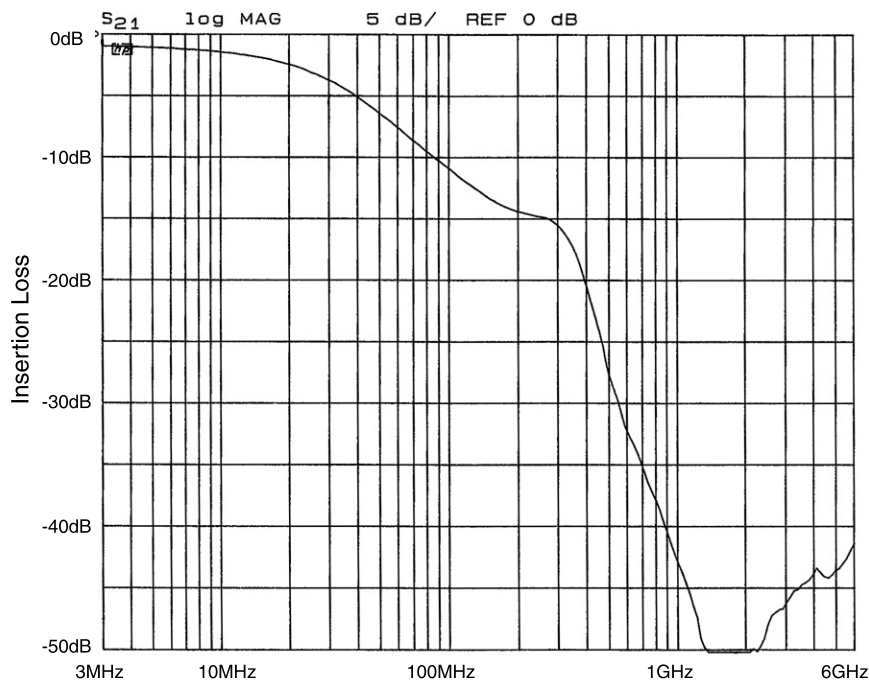


Figure 2. Insertion Loss vs. Frequency (Filter #2 to GND)

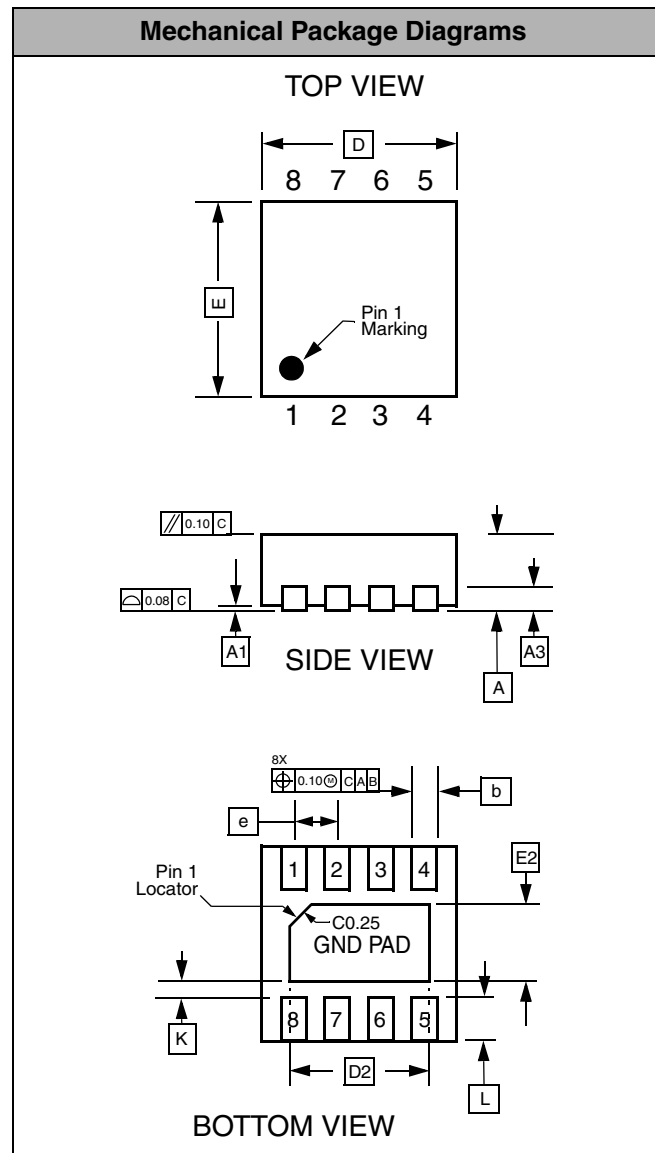
Mechanical Details

uDFN-08 Mechanical Specifications, 0.5mm

Dimensions for the CM1683 supplied in a 2mmx2mm, 8-lead, 0.5mm pitch uDFN package are presented below.

PACKAGE DIMENSIONS						
Package	uDFN					
JEDEC No.	MO-229C [†]					
Leads	8					
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	0.20	0.25	0.30	0.008	0.010	0.012
D	1.90	2.00	2.10	0.075	0.079	0.083
D2	1.50	1.60	1.70	0.059	0.063	0.067
E	1.90	2.00	2.10	0.075	0.079	0.083
E2	0.80	0.90	1.00	0.031	0.035	0.039
e	0.50 BSC			0.020 BSC		
K	0.20			0.008		
L	0.20	0.30	0.40	0.008	0.012	0.016
# 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.



Dimensions for 8-Lead, 0.5mm pitch uDFN package