4 Channel EMI Filter Array with ESD Protection

Features

- Four channels of EMI filtering with ESD protection
- Greater than 30dB of attenuation from 800MHz to 3GHz
- ±15kV ESD protection (IEC 61000-4-2, contact discharge)
- ±30kV ESD protection (HBM)
- 8-lead TDFN package (2mm x 2mm), 0.5mm pitch
- Lead-free version available

Applications

- I/O port protection for mobile handsets, notebook computers, PDAs etc.
- EMI filtering for data ports in cell phones, PDAs or notebook computers.
- EMI filtering for LCD and chip-to-chip data lines

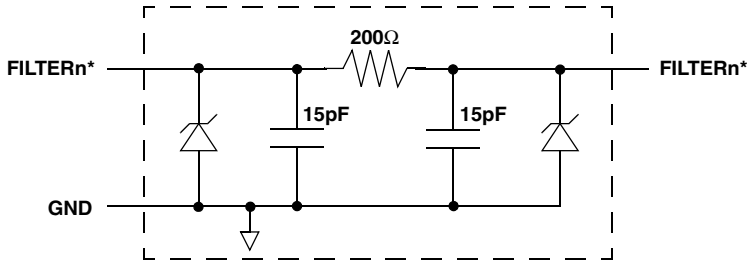
Product Description

California Micro Devices's CM1406 is an EMI filter array with ESD protection, which integrates 4 pi filters (C-R-C). The CM1406 has component values of 15pF-200Ω-15pF. The parts include ESD protection diodes on every pin, 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 are designed and characterized to safely dissipate ESD strikes of ±15kV contact discharge, twice the specification requirement of the IEC 61000-4-2, Level 4 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 ±30kV.

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 CM1406 is ideal for EMI filtering and protecting data lines from ESD in wireless handsets.

The CM1406 is available in a space-saving, low-profile, 8-lead, 2mm x 2mm TDFN package. It is fabricated with California Micro Devices' Centurion™ process and available with optional lead-free finishing.

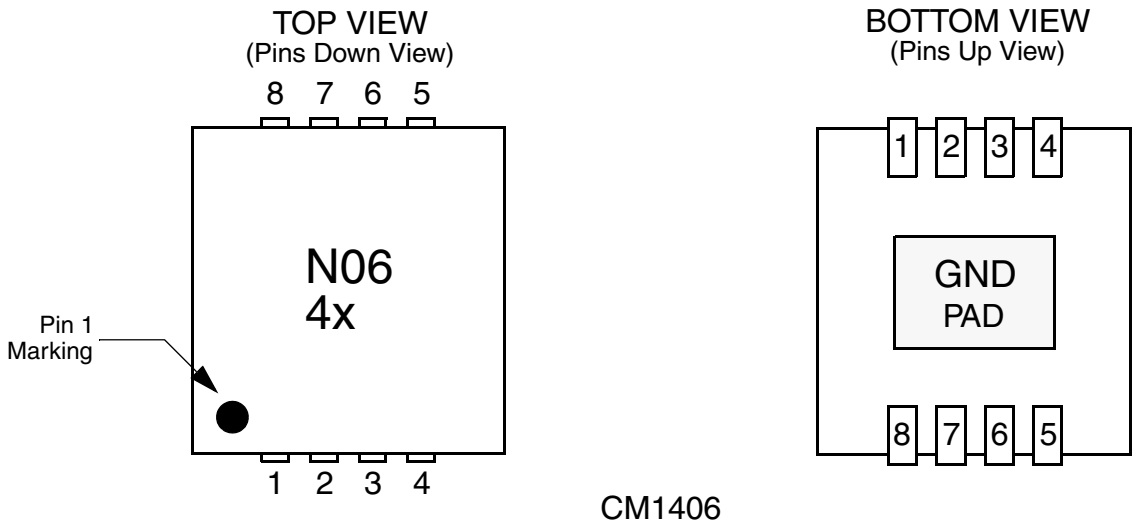
Electrical Schematic



1 of 4 EMI Filtering + ESD Channels

*** See Package/Pinout Diagram for expanded pin information.**

PACKAGE / PINOUT DIAGRAMS



CM1406
8-Lead TDFN Package

Notes:
1) This drawing is not to scale.
2) See Ordering Information section below for device specific marking.

PIN DESCRIPTIONS

PIN(s)	NAME	DESCRIPTION		PIN(s)	NAME	DESCRIPTION
1	FILTER1	Filter Channel 1		5	FILTER4	Filter Channel 4
2	FILTER2	Filter Channel 2		6	FILTER3	Filter Channel 3
3	FILTER3	Filter Channel 3		7	FILTER2	Filter Channel 2
4	FILTER4	Filter Channel 4		8	FILTER1	Filter Channel 1
GND Pad	GND	Device Ground				

Ordering Information

PART NUMBERING INFORMATION

		Standard Finish		Lead-free Finish	
Leads/Pins	Package	Ordering Part Number[1]	Part Marking	Ordering Part Number[1]	Part Marking
8	TDFN-08	CM1406-04DF	N06 4F	CM1406-04DE	N06 4E

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 Power per Resistor	100	mW
DC Package Power Rating	300	mW

STANDARD OPERATING CONDITIONS		
PARAMETER	**RATING**	**UNITS**
Operating Temperature Range	-40 to +85	°C

ELECTRICAL OPERATING CHARACTERISTICS (SEE NOTE 1)						
SYMBOL	**PARAMETER**	**CONDITIONS**	**MIN**	**TYP**	**MAX**	**UNITS**
R	Resistance		160	200	240	Ω
C	Capacitance	At 2.5V DC, 1MHz, 30mV AC	12	15	18	pF
V_{DIODE}	Diode Standoff Voltage	I_{DIODE} = 10µA	5.5			V
I_{LEAK}	Diode Leakage Current (reverse bias)	V_{DIODE} = 3.3V		100		nA
V_{SIG}	Signal Voltage Positive Clamp Negative Clamp	 I_{LOAD} = 10mA I_{LOAD} = -10mA	 5.6 -0.4	 6.8 -0.8	 9.0 -1.5	 V 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	Notes 2,4 and 5	 ±30 ±15			 kV kV
V_{CL}	Clamping Voltage during ESD Discharge MIL-STD-883 (Method 3015), 8kV Positive Transients Negative Transients	Notes 2,3,4 and 5		 +12 -7		 V V
f_C	Cut-off Frequency Z_{SOURCE}=50Ω Z_{LOAD}=50Ω	R = 200Ω, C = 15pF		 105		 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: Clamping voltage is measured at the opposite side of the EMI filter to the ESD pin. For example, if ESD is applied to Pin 1, then clamping voltage is measured at Pin 8.
Note 4: Unused pins are left open
Note 5: These parameters are guaranteed by design and characterization.

Performance Information

Typical Filter Performance (nominal conditions unless specified otherwise, 0V DC Bias, 50 Ohm Environment)

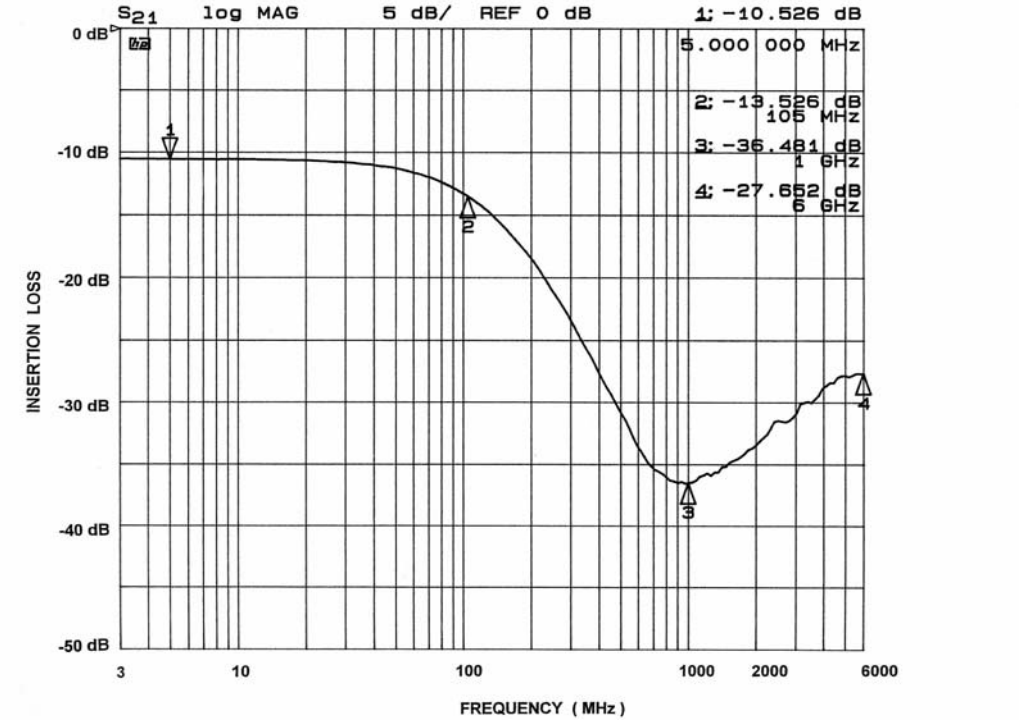


Figure 1. Channel 1 (Pin 1 - Pin 8) EMI Filter Performance

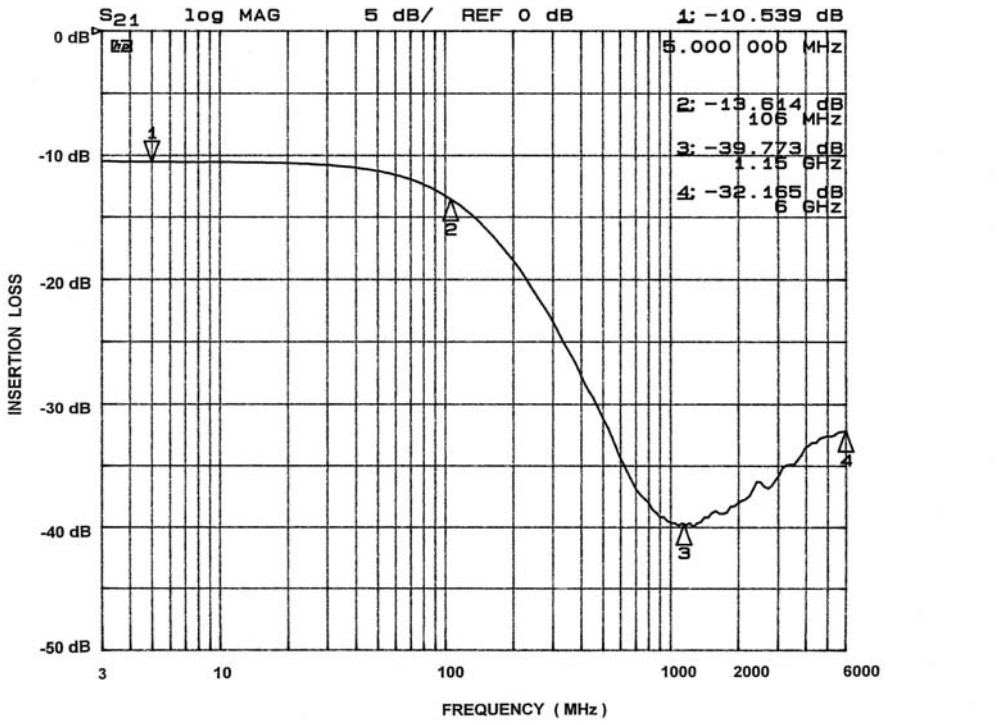


Figure 2. Channel 2 (Pin 2 - Pin 7) EMI Filter Performance

Performance Information (cont'd)

Typical Filter Performance (nominal conditions unless specified otherwise, 0V DC Bias, 50 Ohm Environment)

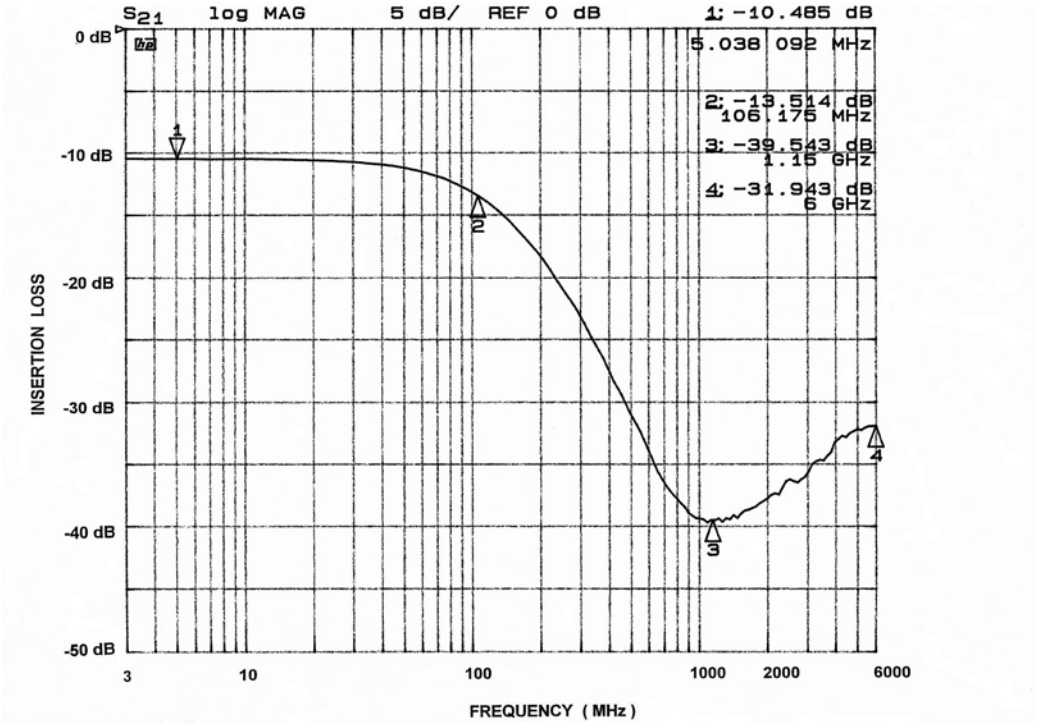


Figure 3. Channel 3 (Pin 3 - Pin 6) EMI Filter Performance

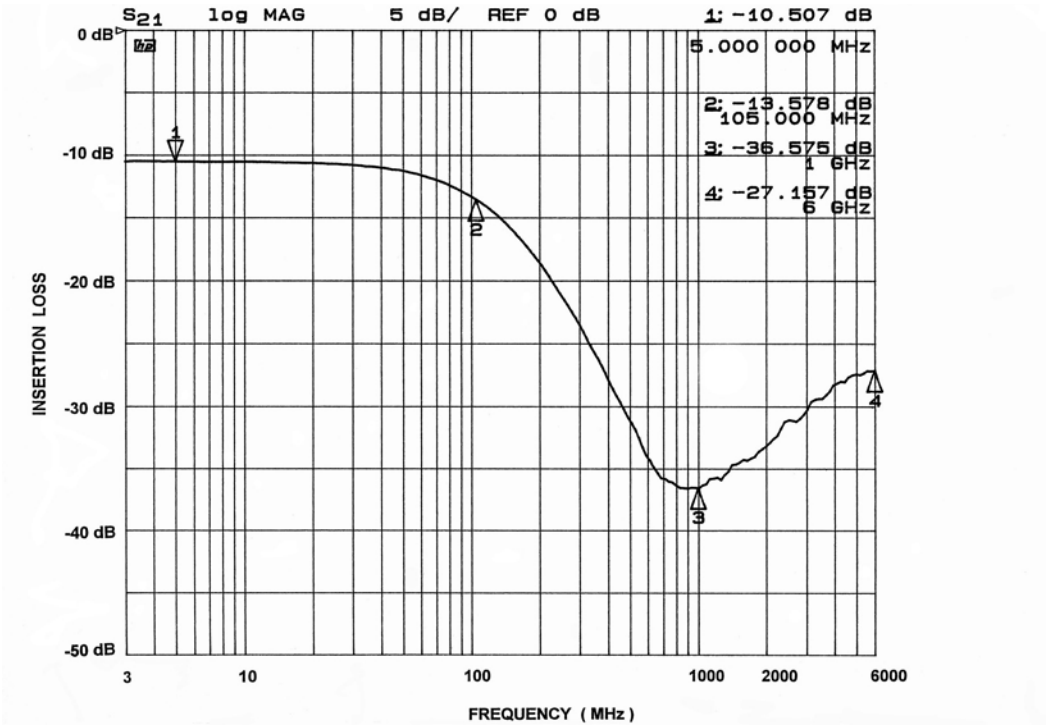


Figure 4. Channel 4 (Pin 4 - Pin 5) EMI Filter Performance

Performance Information (cont'd)

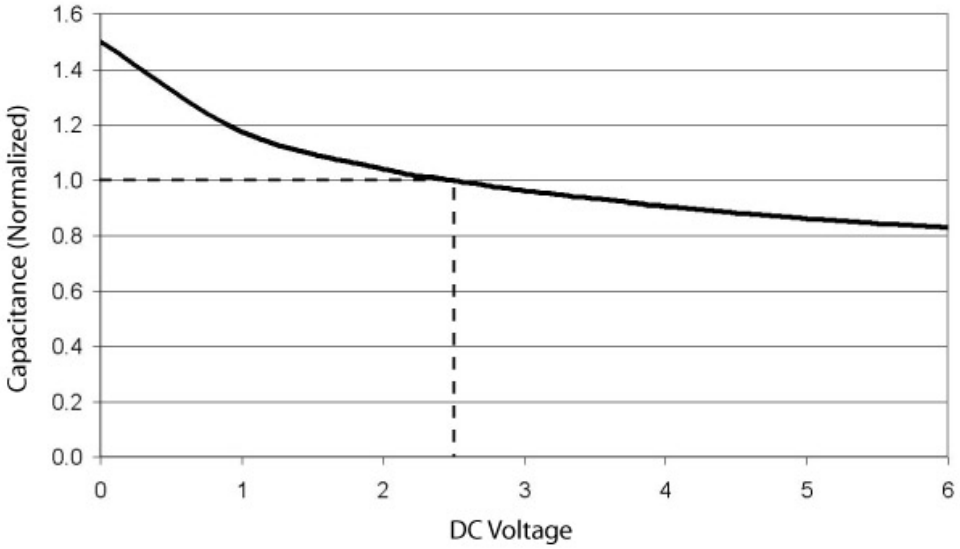


Figure 5. Filter Capacitance vs. Input Voltage over Temperature (normalized to capacitance at 2.5VDC and 25°C)

Mechanical Details

TDFN-08 Mechanical Specifications

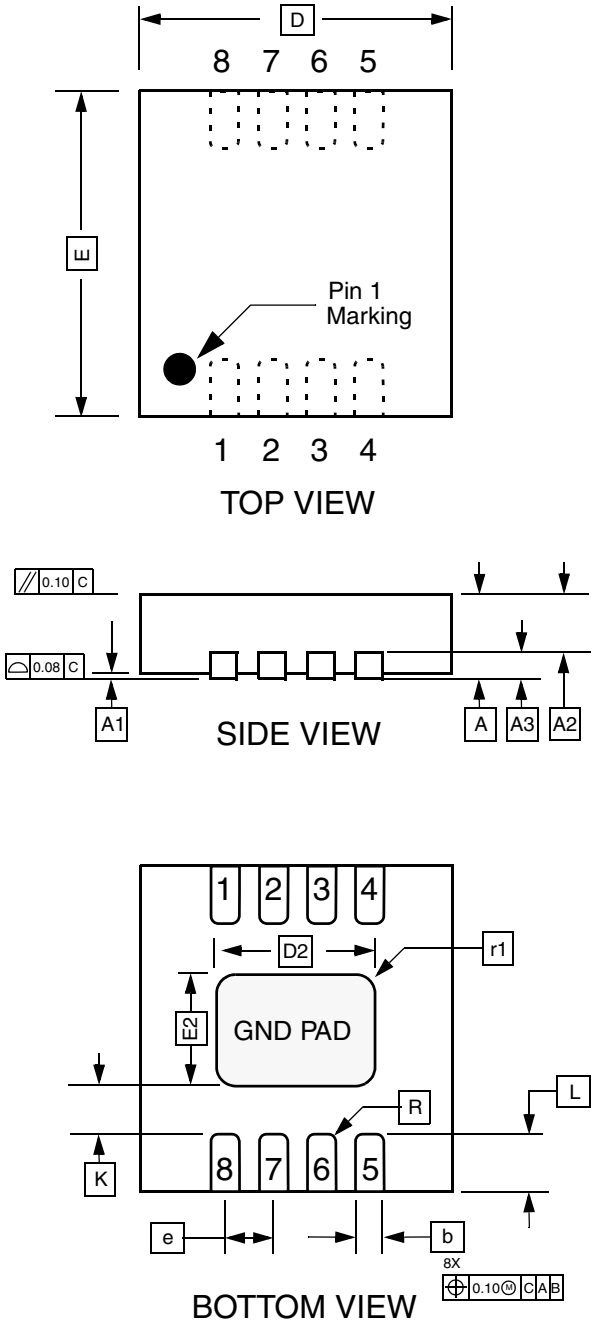
Dimensions for CM1406 device packaged in an 8-lead TDFN package are presented below.

For complete information on the TDFN-08 package, see the California Micro Devices TDFN Package Information document.

PACKAGE DIMENSIONS						
Package	TDFN					
JEDEC No.	MO-229 (Var. VCCD-3)†					
Leads	8					
Dim.	**Millimeters**			**Inches**		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
A	0.80	0.90	1.00	0.031	0.035	0.039
A1	0.00	0.02	0.05	0.000	0.001	0.002
A2	0.55	0.65	0.80	0.022	0.026	0.031
A3		0.20			0.008	
b	0.18	0.25	0.30	0.007	0.010	0.012
D		2.00			0.079	
D2	0.88	0.98	1.08	0.035	0.039	0.043
E		2.00			0.079	
E2	0.46	0.56	0.66	0.018	0.022	0.026
e		0.50			0.020	
K	0.20			0.008		
L	0.20	0.30	0.45	0.008	0.012	0.018
L2			0.13			0.005
R		0.075			0.003	
r1		0.075			0.003	
# per tube	NA					
# per tape and reel	3000 pieces					
Controlling dimension: millimeters						

†This package is compliant with JEDEC standard MO-229, variation VCCD-3 with exception of the "D2" and "E2" dimensions as called out in the table above and the "r1" dimension which is not specified in the MO-229 standard.

Mechanical Package Diagrams



Package Dimensions for 8-Lead TDFN