



Features

- Four, six and eight channels of EMI filtering with integrated ESD protection
- Pi-style EMI filters in a capacitor-resistor-capacitor (C-R-C) network
- $\pm 15\text{kV}$ ESD protection on each channel (IEC 61000-4-2 Level 4, contact discharge)
- $\pm 30\text{kV}$ ESD protection on each channel (HBM)
- Greater than 20dB attenuation (typical) at 1 GHz
- TDFN package with 0.40mm lead pitch:
 - 4-ch. = 8-lead TDFN
 - 6-ch. = 12-lead TDFN
 - 8-ch. = 16-lead TDFN
- Tiny TDFN package size:
 - 8-lead: 1.7mm x 1.35mm
 - 12-lead: 2.5mm x 1.35mm
 - 16-lead: 3.3mm x 1.35mm
- Increased robustness against vertical impacts during manufacturing process
- Lead-free version available

Applications

- LCD and Camera data lines 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.
- Wireless handsets
- Handheld PCs/PDAs
- LCD and camera modules

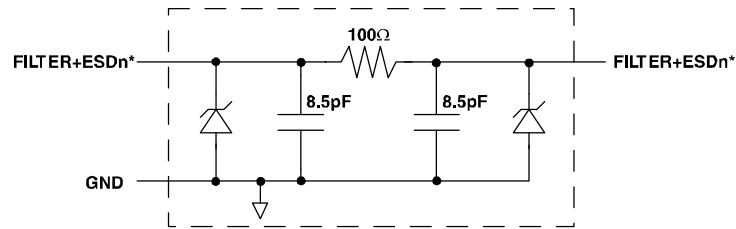
Product Description

The CM1430 is a family of pi-style EMI filter arrays with ESD protection, which integrates four, six and eight filters (C-R-C) in small form factor TDFN 0.40mm pitch packages. The CM1430 has component values of 8.5pF-100 Ω -8.5pF per channel. The CM1430 has a cut-off frequency of 200MHz and can be used in applications with data rates up to 80Mbps. The parts include ESD 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 protection diodes safely dissipate ESD strikes of $\pm 15\text{kV}$, well 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 $\pm 30\text{kV}$.

These devices are particularly well-suited for portable electronics (e.g. wireless handsets, PDAs, notebook computers) because of their small package and easy-to-use pin assignments. In particular, the CM1430 is ideal for EMI filtering and protecting data and control lines for the I/O data ports, LCD display and camera interface in mobile handsets.

The CM1430 is housed in space-saving, low-profile 8-,12- and 16-lead TDFN packages with a 0.4mm pitch and is available with lead-free finishing. This new small TDFN package provides up to 42% board space savings vs. the 0.50mm pitch TDFN packages.

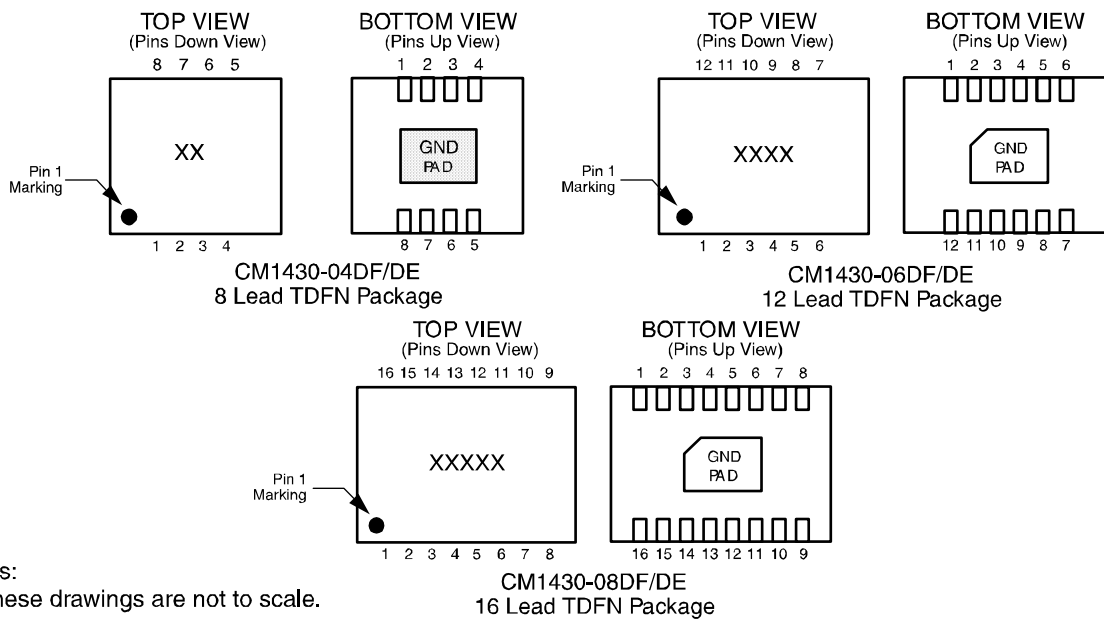
Electrical Schematic



**1 of 4, 6 or 8 EMI/RFI Filter Channels
with Integrated ESD Protection**

* See Package/Pinout Diagram for expanded pin information.

PACKAGE / PINOUT DIAGRAMS



CM1430

PIN DESCRIPTIONS

| DEVICE PIN(s) | | | NAME | DESCRIPTION | DEVICE PIN(s) | | | NAME | DESCRIPTION |
|---------------|-----|-----|---------|------------------------|---------------|-----|-----|---------|------------------------|
| -04 | -06 | -08 | | | -04 | -06 | -08 | | |
| 1 | 1 | 1 | FILTER1 | Filter + ESD Channel 1 | 8 | 12 | 16 | FILTER1 | Filter + ESD Channel 1 |
| 2 | 2 | 2 | FILTER2 | Filter + ESD Channel 2 | 7 | 11 | 15 | FILTER2 | Filter + ESD Channel 2 |
| 3 | 3 | 3 | FILTER3 | Filter + ESD Channel 3 | 6 | 10 | 14 | FILTER3 | Filter + ESD Channel 3 |
| 4 | 4 | 4 | FILTER4 | Filter + ESD Channel 4 | 5 | 9 | 13 | FILTER4 | Filter + ESD Channel 4 |
| | 5 | 5 | FILTER5 | Filter + ESD Channel 5 | | 8 | 12 | FILTER5 | Filter + ESD Channel 5 |
| | 6 | 6 | FILTER6 | Filter + ESD Channel 6 | | 7 | 11 | FILTER6 | Filter + ESD Channel 6 |
| | | 7 | FILTER7 | Filter + ESD Channel 7 | | | 10 | FILTER7 | Filter + ESD Channel 7 |
| | | 8 | FILTER8 | Filter + ESD Channel 8 | | | 9 | FILTER8 | Filter + ESD Channel 8 |
| GND PAD | | | GND | Device Ground | | | | | |

Ordering Information

PART NUMBERING INFORMATION

| Pins | Package | Standard Finish | | Lead-free Finish | |
|------|---------|-----------------------------------|--------------|-----------------------------------|--------------|
| | | Ordering Part Number ¹ | Part Marking | Ordering Part Number ¹ | Part Marking |
| 8 | TDFN-8 | CM1430-04DF | VF | CM1430-04DE | VE |
| 12 | TDFN-12 | CM1430-06DF | N30F | CM1430-06DE | N30E |
| 16 | TDFN-16 | CM1430-08DF | N308F | CM1430-08DE | N308E |

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 | 500 | mW |

STANDARD OPERATING CONDITIONS

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

ELECTRICAL OPERATING CHARACTERISTICS (SEE NOTE1)

| SYMBOL | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|--------------------|--|---|-------------|-------------|-------------|----------|
| R | Resistance | | 80 | 100 | 120 | Ω |
| C _{TOTAL} | Total Channel Capacitance | At 2.5VDC Reverse Bias, 1MHz, 30mVAC | 14 | 17 | 22 | pF |
| C | Capacitance C1 | At 2.5VDC Reverse Bias, 1MHz, 30mVAC | 7 | 8.5 | 11 | pF |
| V _{DIODE} | Standoff Voltage | I _{DIODE} =10μA | | 6.0 | | V |
| I _{LEAK} | Diode Leakage Current (reverse bias) | V _{DIODE} =+3.3V | | 0.1 | 1.0 | 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} | 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 | 30 15 | | | kV kV |
| R _{DYN} | Dynamic Resistance Positive Negative | | | 2.3 0.9 | | Ω Ω |
| f _c | Cut-off Frequency Z _{SOURCE} =50Ω, Z _{LOAD} =50Ω | Channel R = 100Ω, Channel C = 8.5pF | | 200 | | 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.

Performance Information

Typical Filter Performance ($T_A=25^\circ\text{C}$, DC Bias=0V, 50 Ohm Environment)

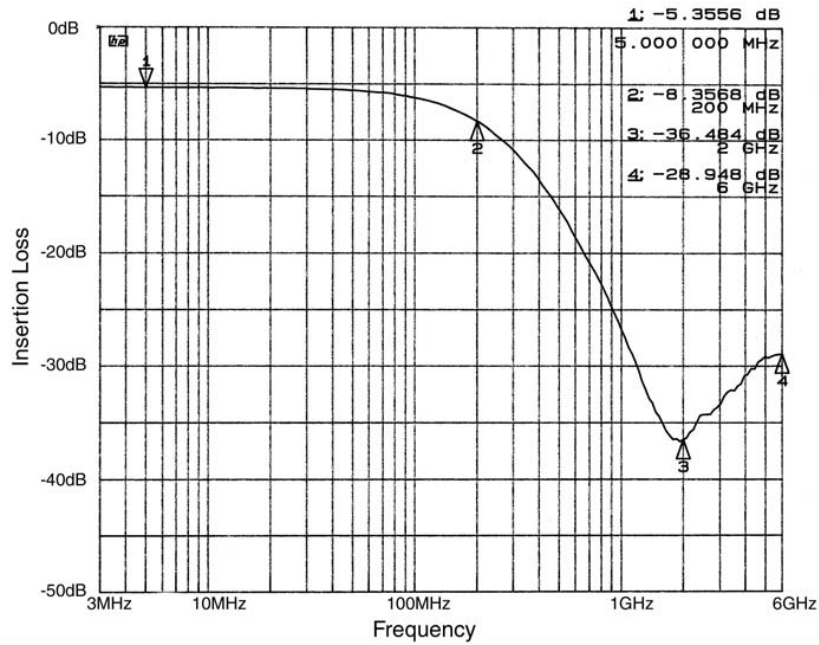


Figure 1. Insertion Loss vs. Frequency (FILTER1 Input to GND)

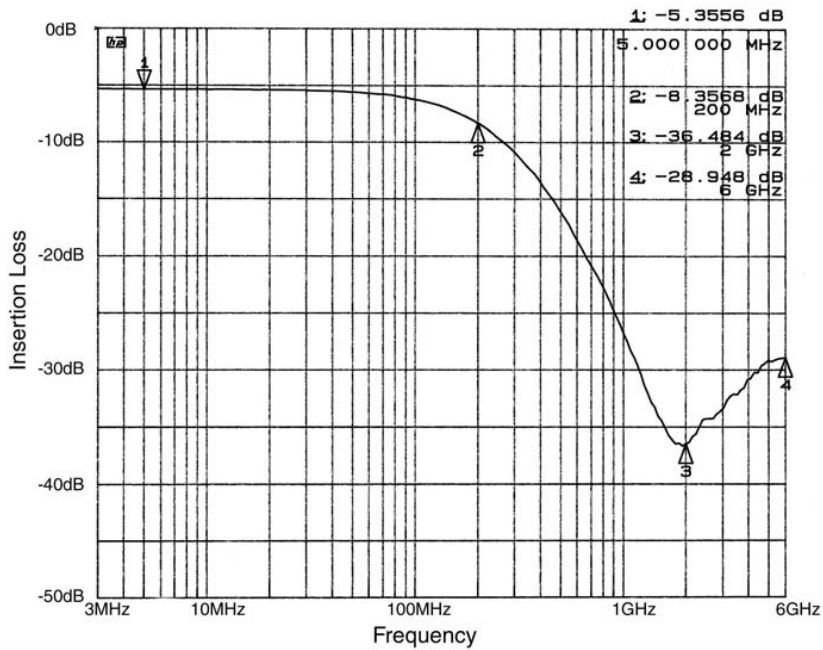


Figure 2. Insertion Loss vs. Frequency (FILTER2 Input to GND)

Performance Information (cont'd)

Typical Filter Performance ($T_A=25^\circ\text{C}$, DC Bias=0V, 50 Ohm Environment)

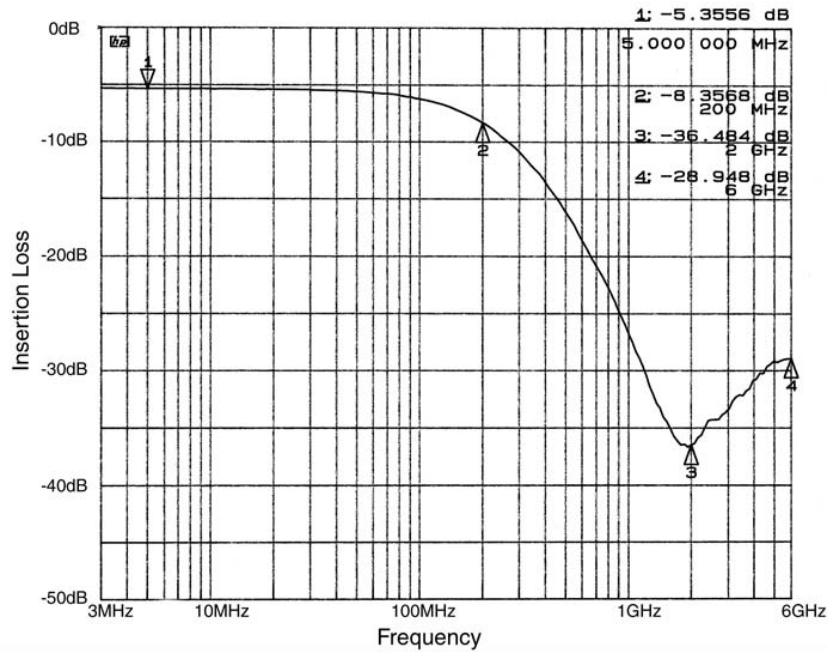


Figure 3. Insertion Loss vs. Frequency (FILTER3 Input to GND)

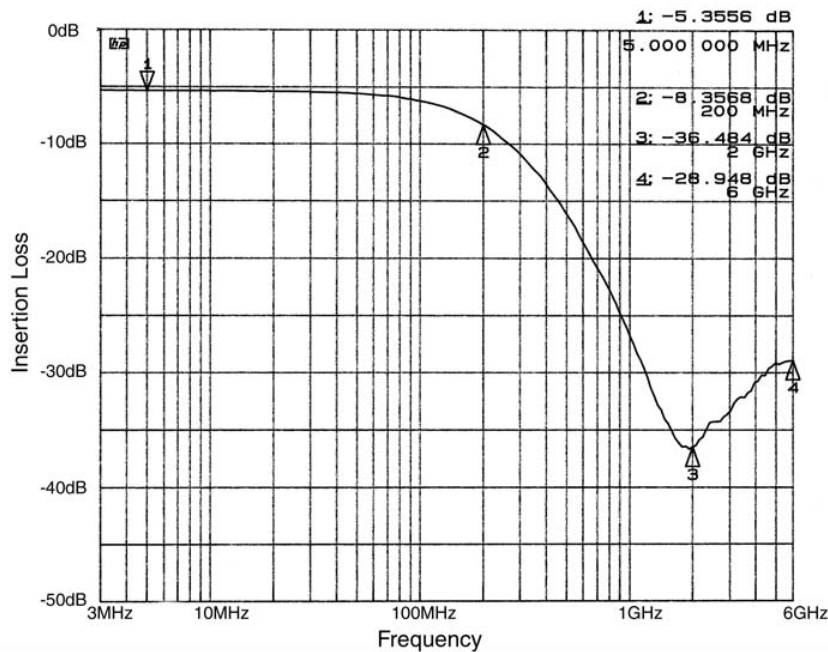
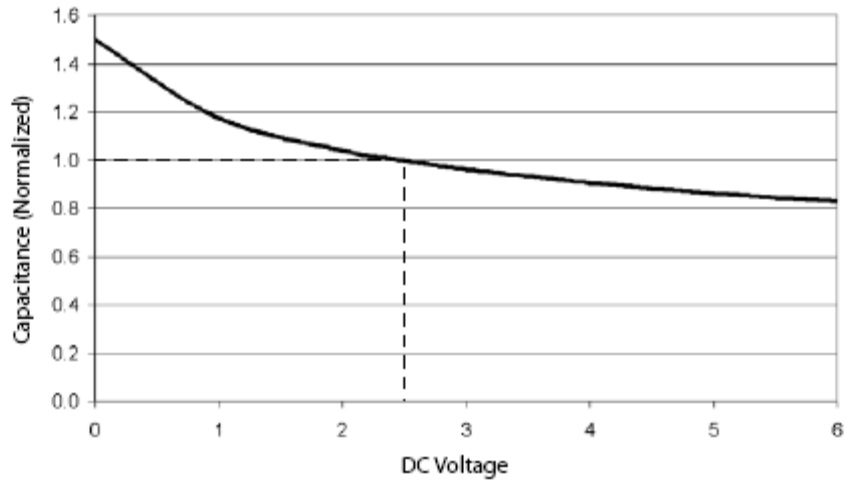


Figure 4. Insertion Loss vs. Frequency (FILTER4 Input to GND)

Performance Information (cont'd)

Typical Diode Capacitance vs. Input Voltage



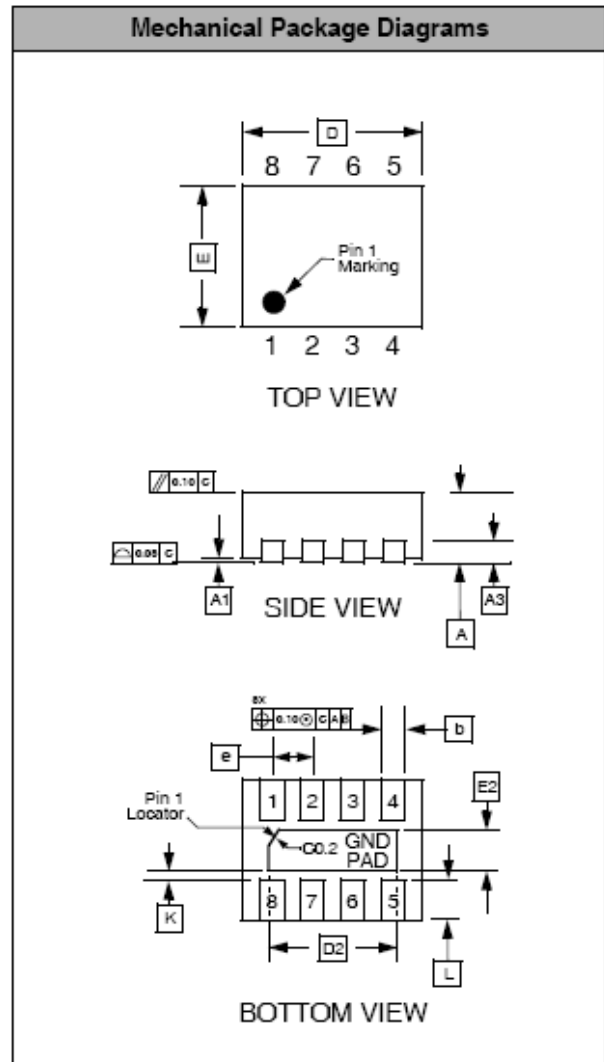
**Figure 5. Filter Capacitance vs. Input Voltage
(normalized to capacitance at 2.5VDC and 25°C)**

Mechanical Details

CM1430-04DF/DE Mechanical Specifications

Dimensions for the CM1430-04DF/DE supplied in a 8-lead, 0.4mm pitch TDFN package are presented below. For complete information on the TDFN-8, see the California Micro Devices TDFN Package Information document.

| PACKAGE DIMENSIONS | | | | | | |
|------------------------------------|-------------|------|------|-----------|-------|-------|
| Package | TDFN | | | | | |
| JEDEC No. | MO-229C | | | | | |
| Leads | 8 | | | | | |
| Dim. | Millimeters | | | Inches | | |
| | Min | Nom | Max | Min | Nom | Max |
| A | 0.70 | 0.75 | 0.80 | 0.028 | 0.030 | 0.031 |
| A1 | 0.00 | 0.02 | 0.05 | 0.000 | 0.001 | 0.002 |
| A3 | 0.20 REF | | | 0.008 REF | | |
| b | 0.15 | 0.20 | 0.25 | 0.006 | 0.008 | 0.010 |
| D | 1.60 | 1.70 | 1.80 | 0.063 | 0.067 | 0.071 |
| D2 | 1.10 | 1.20 | 1.30 | 0.043 | 0.047 | 0.051 |
| 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 | 0.20 | | | 0.008 | | |
| L | 0.15 | 0.25 | 0.35 | 0.006 | 0.010 | 0.014 |
| # per tape and reel | 3000 pieces | | | | | |
| Controlling dimension: millimeters | | | | | | |



Dimensions for 8-Lead, 0.4mm pitch TDFN package

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.

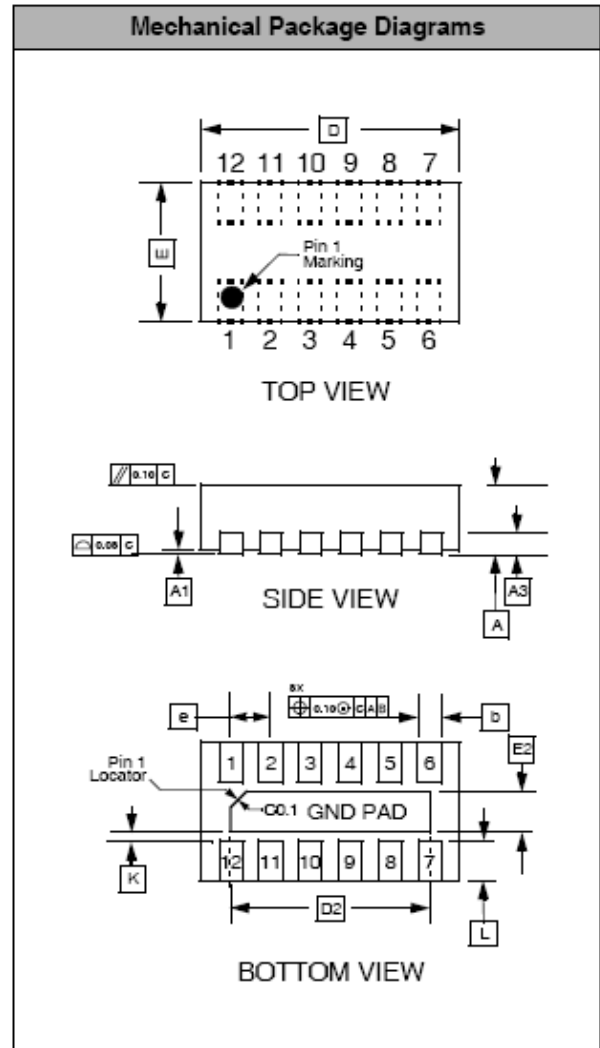
CM1430

Mechanical Details (cont'd)

CM1430-06DF/DE Mechanical Specifications

Dimensions for the CM1430-06DF/DE supplied in a 12-lead, 0.4mm pitch TDFN package are presented below.

| PACKAGE DIMENSIONS | | | | | | |
|------------------------------------|-------------|------|------|-----------|-------|-------|
| Package | TDFN | | | | | |
| JEDEC No. | MO-229C | | | | | |
| Leads | 12 | | | | | |
| Dim. | Millimeters | | | Inches | | |
| | Min | Nom | Max | Min | Nom | Max |
| A | 0.70 | 0.75 | 0.80 | 0.028 | 0.030 | 0.031 |
| A1 | 0.00 | 0.02 | 0.05 | 0.000 | 0.001 | 0.002 |
| A3 | 0.20 REF | | | 0.008 REF | | |
| b | 0.15 | 0.20 | 0.25 | 0.006 | 0.008 | 0.010 |
| D | 2.40 | 2.50 | 2.60 | 0.094 | 0.098 | 0.102 |
| D2 | 1.90 | 2.00 | 2.10 | 0.075 | 0.079 | 0.083 |
| 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 | 0.20 | | | 0.008 | | |
| L | 0.15 | 0.25 | 0.35 | 0.006 | 0.010 | 0.014 |
| # per tape and reel | 3000 pieces | | | | | |
| Controlling dimension: millimeters | | | | | | |



Dimensions for 12-Lead, 0.4mm pitch TDFN package

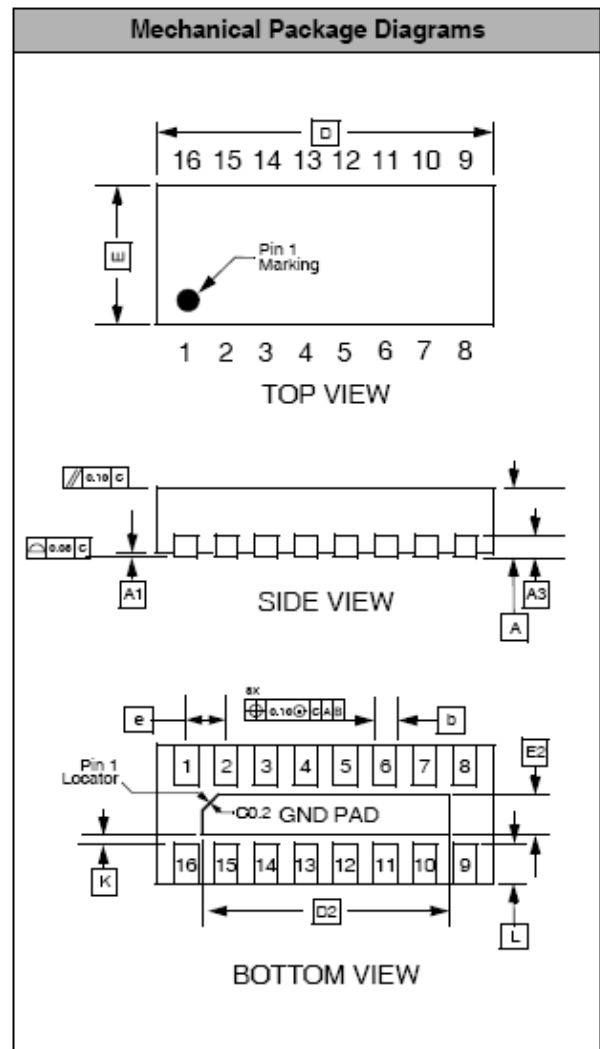
This package is compliant with JEDEC standard MO-229C with the exception of the "D", "D2", "E", "E2", "K" and "L" dimensions as called out in the table above.

Mechanical Details (cont'd)

CM1430-08DF/DE Mechanical Specifications


Dimensions for the CM1430-08DF/DE supplied in a 16-lead, 0.4mm pitch TDFN package are presented below. For complete information on the TDFN-16, see the California Micro Devices TDFN Package Information document.

| PACKAGE DIMENSIONS | | | | | | |
|------------------------------------|-------------|------|------|-----------|-------|-------|
| Package | TDFN | | | | | |
| JEDEC No. | MO-229C | | | | | |
| Leads | 16 | | | | | |
| Dim. | Millimeters | | | Inches | | |
| | Min | Nom | Max | Min | Nom | Max |
| A | 0.70 | 0.75 | 0.80 | 0.028 | 0.030 | 0.031 |
| A1 | 0.00 | 0.02 | 0.05 | 0.000 | 0.001 | 0.002 |
| A3 | 0.200 REF | | | 0.008 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 | 0.20 | | | 0.008 | | |
| L | 0.15 | 0.25 | 0.35 | 0.006 | 0.010 | 0.014 |
| # per tape and reel | 3000 pieces | | | | | |
| Controlling dimension: millimeters | | | | | | |



Dimensions for 16-Lead, 0.4mm pitch TDFN package

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.

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