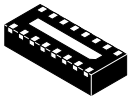
CM1431

LCD and Camera EMI Filter Array with ESD Protection

ON Semiconductor®

http://onsemi.com



WDFN8
DF/DE SUFFIX
CASE 511BF

WDFN12
DF/DE SUFFIX
CASE 511BC

WDFN16
DF/DE SUFFIX
CASE 511AW

Product Description

The CM1431 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 WDFN 0.40 mm pitch packages. The CM1431 has component values of 15 pF − 100 Ω − 15 pF per channel. The CM1431 has a cut−off frequency of 120 MHz and can be used in applications with data rates up to 48 Mbps. 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 ±15 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 ±30 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 CM1431 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 CM1431 is housed in space−saving, low−profile 8−, 12− and 16−lead WDFN packages with a 0.40 mm pitch and is available with lead−free finishing. This smaller size WDFN package provides up to 42% board space saving vs. the 0.50 mm pitch WDFN packages.

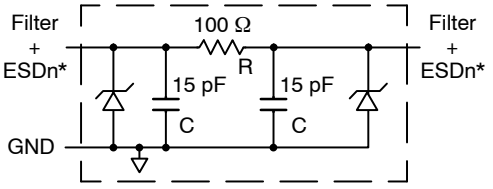
Features

- 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
- ±15 kV ESD Protection on Each Channel (IEC 61000−4−2 Level 4, Contact Discharge)
- ±30 kV ESD Protection on Each Channel (HBM)
- Greater than 35 dB Attenuation (Typical) at 1 GHz
- WDFN Package with 0.40 mm Lead Pitch:
  - 4−ch. = 8−lead WDFN
  - 6−ch. = 12−lead WDFN
  - 8−ch. = 16−lead WDFN
- Tiny WDFN Package Size:
  - 8−lead: 1.7 mm X 1.35 mm
  - 12−lead: 2.5 mm X 1.35 mm
  - 16−lead: 3.3 mm X 1.35 mm
- Increased Robustness against Vertical Impacts During Manufacturing Process
- These Devices are Pb−Free and are RoHS Compliant

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

BLOCK DIAGRAM



1 of 4, 6 or 8 EMI/RFI + ESD Channels

* See Package/Pinout Diagrams for expanded pin information.

MARKING DIAGRAM

WF/WE	N31F/N31E	N318F/N318E

WF/WE = CM1431−04DF/CM1431−04DE
N31F/N31E = CM1431−06DF/CM1431−06DE
N318F/N318E = CM1431−08DF/CM1431−08DE

ORDERING INFORMATION

Device	Package	Shipping†
CM1431−04DF	WDFN−8 (Pb−Free)	3000/Tape & Reel
CM1431−04DE	WDFN−8 (Pb−Free)	3000/Tape & Reel
CM1431−06DF	WDFN−12 (Pb−Free)	3000/Tape & Reel
CM1431−06DE	WDFN−12 (Pb−Free)	3000/Tape & Reel
CM1431−08DF	WDFN−16 (Pb−Free)	3000/Tape & Reel
CM1431−08DE	WDFN−16 (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.

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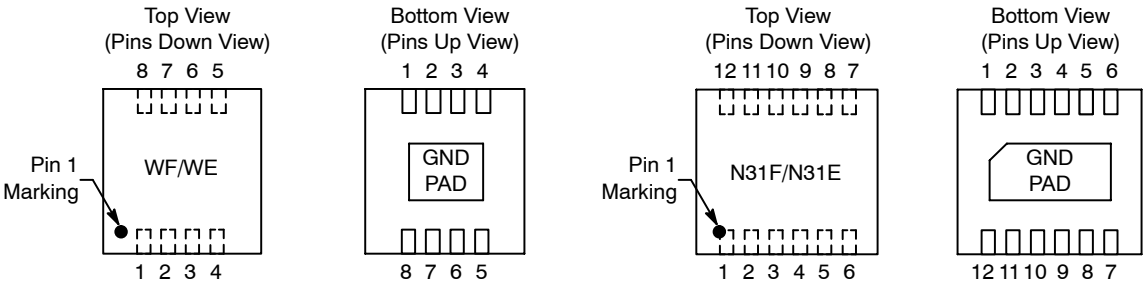
PACKAGE / PINOUT DIAGRAMS



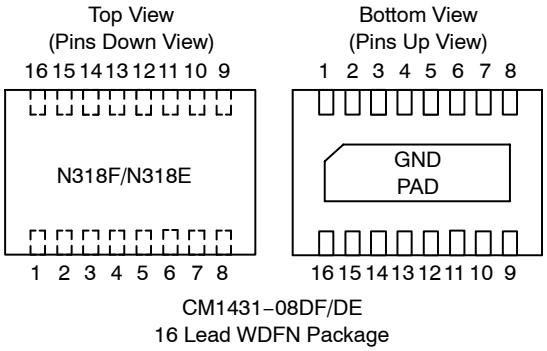


Table 1. PIN DESCRIPTIONS

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	−	−	−	−	

SPECIFICATIONS

Table 2. 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

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
R	Resistance		80	100	120	Ω
C_{TOTAL}	Total Channel Capacitance	At 2.5 V DC Reverse Bias, 1 MHz, 30 mV AC	24	30	36	pF
C	Capacitance C	At 2.5 V DC Reverse Bias, 1 MHz, 30 mV AC	12	15	18	pF
V_{DIODE}	Stand−off Voltage	I_{DIODE} = 10 μA		6.0		V
I_{LEAK}	Diode Leakage Current (Reverse Bias)	V_{DIODE} = 3.3 V		0.1	1.0	μA
V_{SIG}	Signal Clamp Voltage Positive Clamp Negative Clamp	 I_{LOAD} = 10 mA I_{LOAD} = −10 mA	 5.6 −1.5	 6.8 −0.8	 9.0 −0.4	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
R_{DYN}	Dynamic Resistance Positive Negative			 2.3 0.9		Ω
f_C	Cut−off Frequency Z_{SOURCE} = 50 Ω, Z_{LOAD} = 50 Ω	 R = 100 Ω, C = 15 pF		 110		MHz
A_{1GHz}	Absolute Attenuation @ 1 GHz from 0 dB Level	Z_{SOURCE} = 50 Ω, Z_{LOAD} = 50 Ω, DC Bias = 0 V (Notes 1 and 3)		35		dB
$A_{800Mhz\ to\ 6GHz}$	Absolute Attenuation @ 800 MHz to 6 GHz from 0 dB Level	Z_{SOURCE} = 50 Ω, Z_{LOAD} = 50 Ω, DC Bias = 0 V (Notes 1 and 3)		30		dB

1. T_A = 25°C unless otherwise specified.
2. ESD applied to input and output pins with respect to GND, one at a time.
3. Attenuation / RF curves characterized by a network analyzer using microprobes.

PERFORMANCE INFORMATION

Typical Filter Performance (T_A = 25°C, DC Bias = 0 V, 50 Ω Environment)

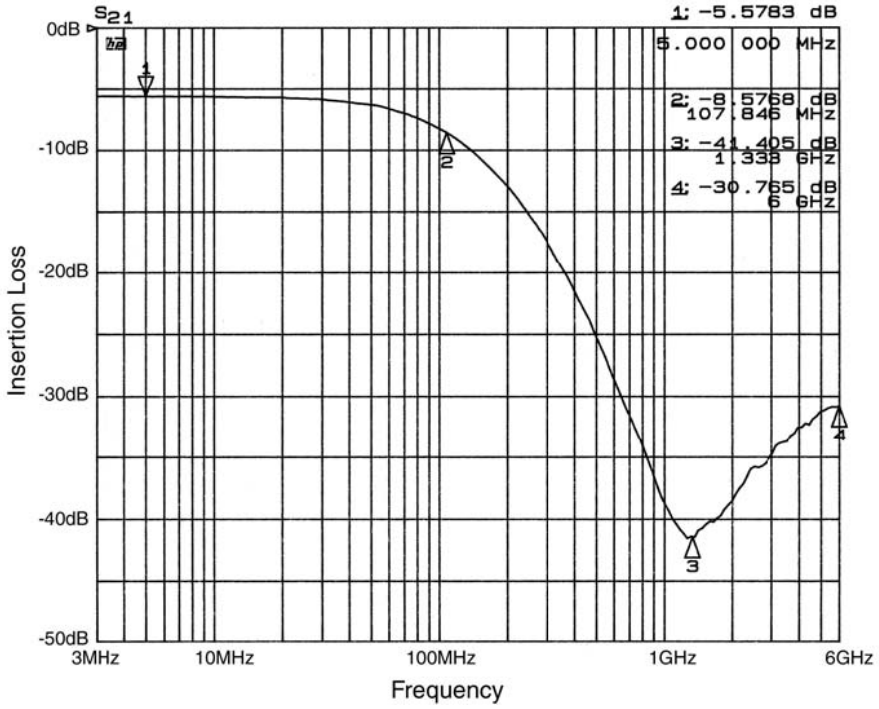


Figure 1. Insertion Loss vs. Frequency (FILTER1 Input to GND)

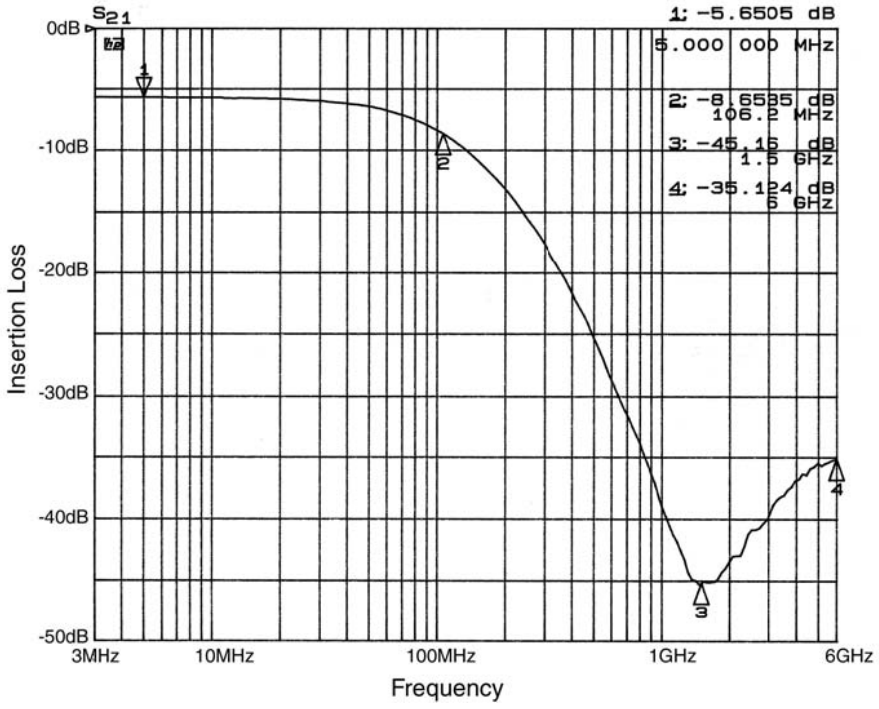


Figure 2. Insertion Loss vs. Frequency (FILTER2 Input to GND)

PERFORMANCE INFORMATION (Cont'd)

Typical Filter Performance (T_A = 25°C, DC Bias = 0 V, 50 Ω Environment)

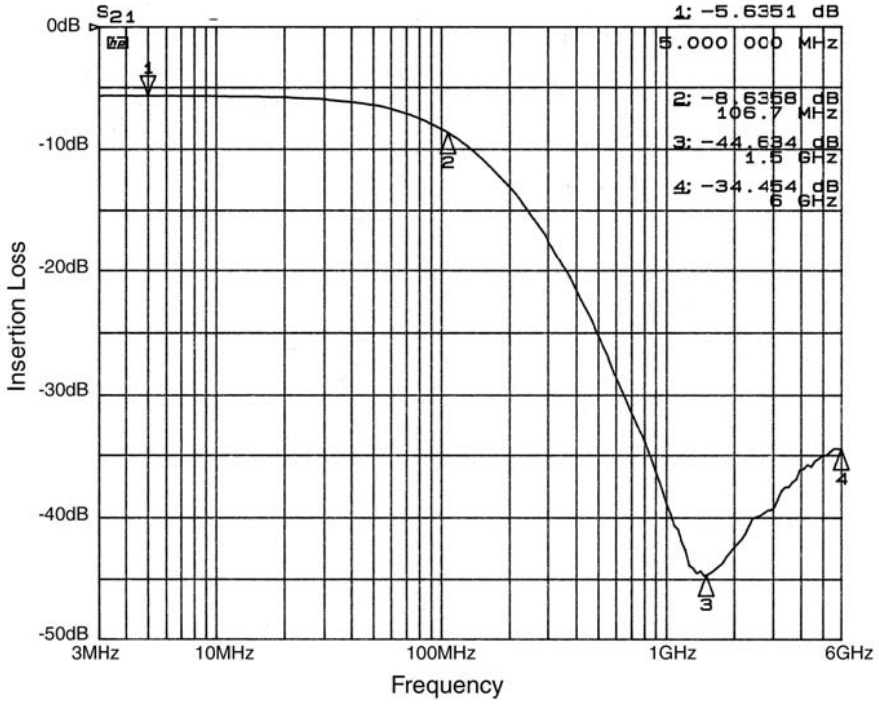


Figure 3. Insertion Loss vs. Frequency (FILTER3 Input to GND)

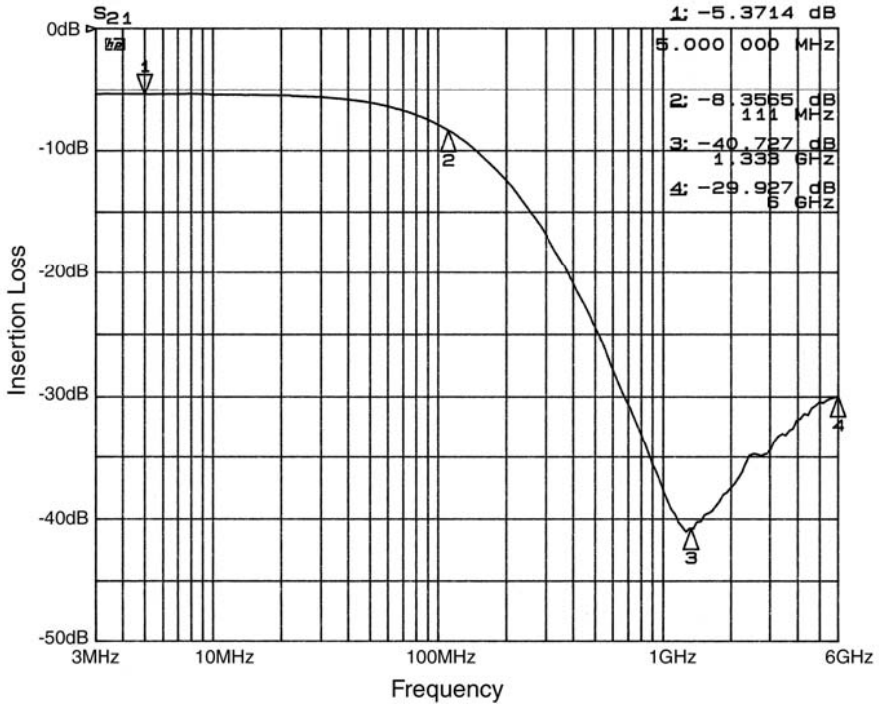


Figure 4. Insertion Loss vs. Frequency (FILTER4 Input to GND)

PERFORMANCE INFORMATION (Cont'd)

Typical Diode Capacitance vs. Input Voltage

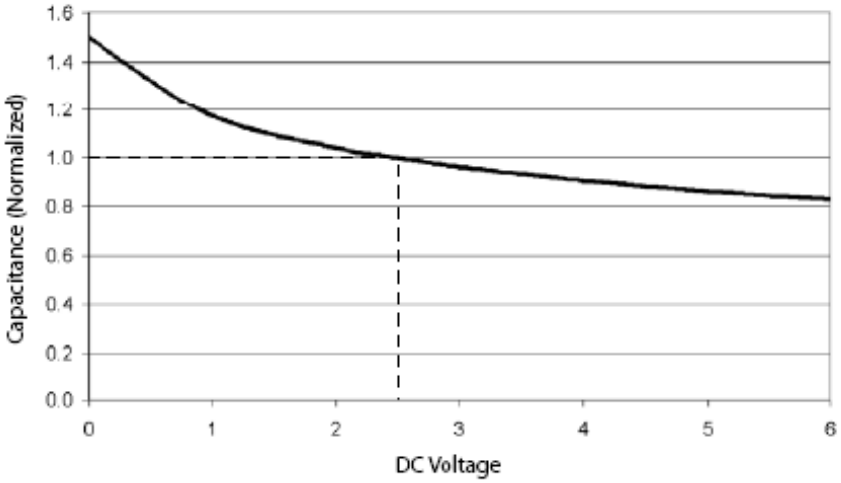
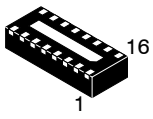


Figure 5. Filter Capacitance vs. Input Voltage (normalized to capacitance at 2.5 V DC and 25°C)



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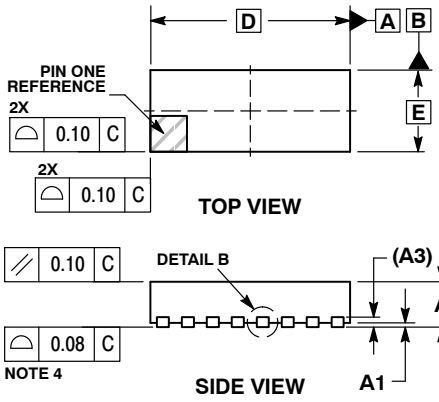
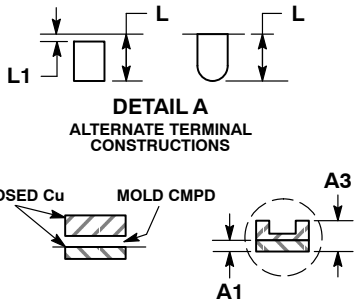
WDFN16, 3.3x1.35, 0.4P
CASE 511AW
ISSUE O

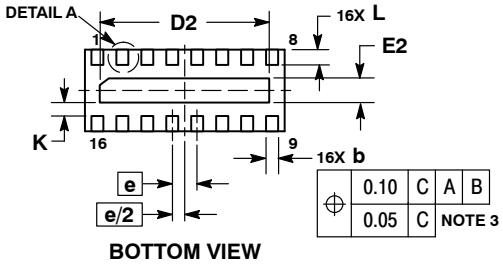
DATE 06 JUL 2010



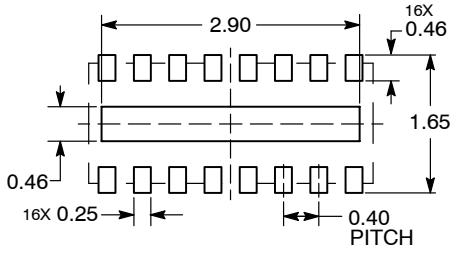


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 MM FROM TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.70	0.80
A1	0.00	0.05
A3	0.20 REF	
b	0.15	0.25
D	3.30 BSC	
D2	2.70	2.90
E	1.35 BSC	
E2	0.30	0.50
e	0.40 BSC	
K	0.22 REF	
L	0.15	0.35
L1	---	0.15



RECOMMENDED SOLDERING FOOTPRINT*



DIMENSION: MILLIMETERS

*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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WDFN12, 2.5x1.35, 0.4P
CASE 511BC
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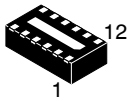
DATE 06 JUL 2010



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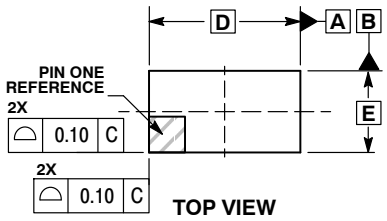
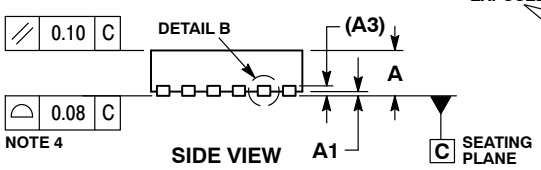
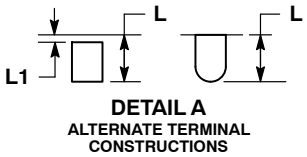


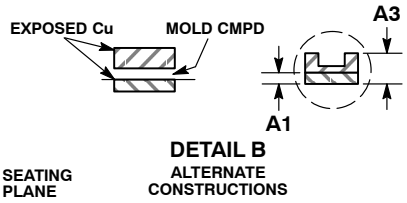
TOP VIEW



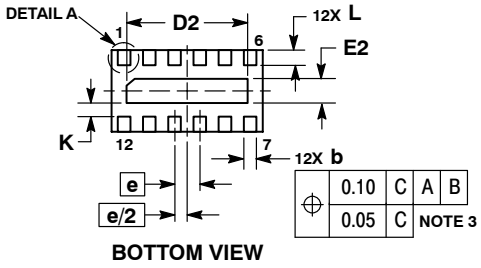
SIDE VIEW



DETAIL A
ALTERNATE TERMINAL CONSTRUCTIONS

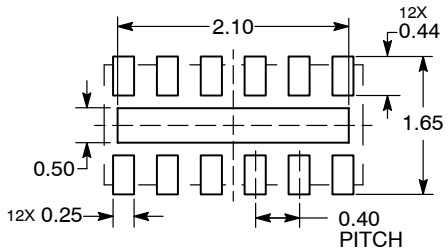


DETAIL B
ALTERNATE CONSTRUCTIONS



BOTTOM VIEW

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSION: MILLIMETERS

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D	2.50 BSC	
D2	1.90	2.10
E	1.35 BSC	
E2	0.30	0.50
e	0.40 BSC	
K	0.22 REF	
L	0.15	0.35
L1	---	0.15

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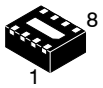

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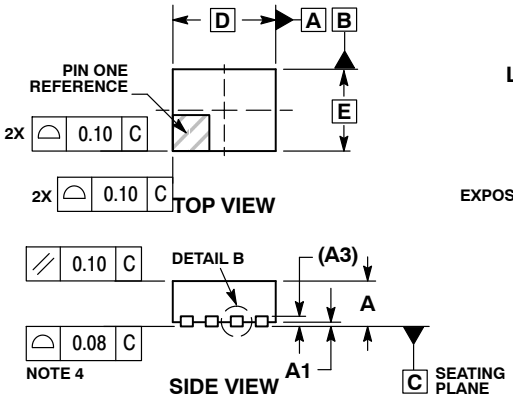

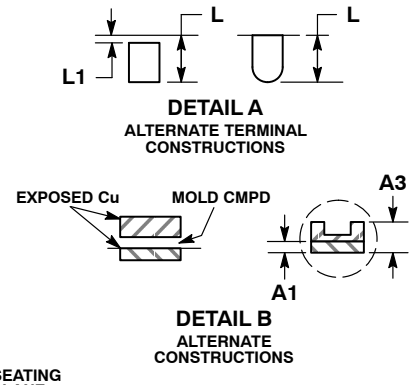

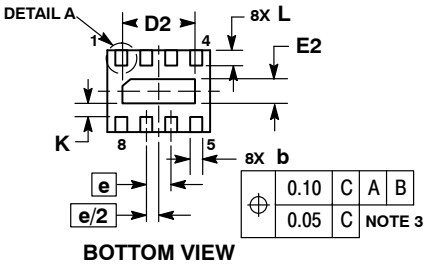

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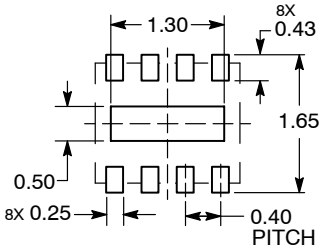
D2	1.10	1.30
E	1.35 BSC	
E2	0.30	0.50
e	0.40 BSC	
K	0.22 REF	
L	0.15	0.35
L1	---	0.15

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSION: MILLIMETERS

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