



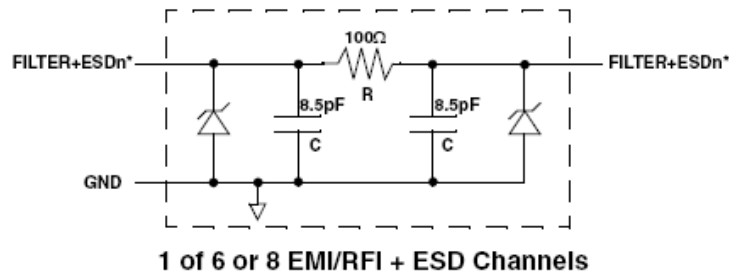
Features

- Six or 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 -25dB attenuation (typical) at 1GHz
- NuDFN package with 0.40mm lead pitch:
 - 12-lead: $2.5\text{mm} \times 1.20\text{mm} \times 0.50\text{mm}$
 - 16-lead: $3.5\text{mm} \times 1.20\text{mm} \times 0.50\text{mm}$
- Lead-free finishing

Applications

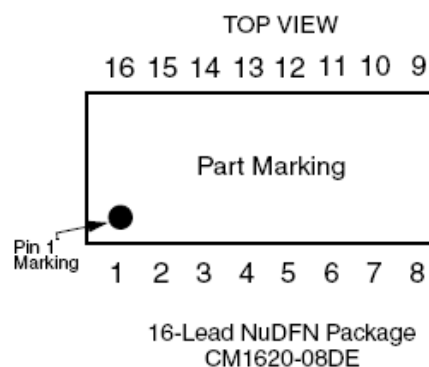
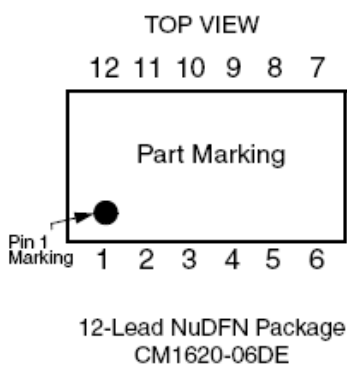
- Applications
- LCD and camera data lines in mobile handsets
- I/O port protection for mobile handsets, notebook computers, PDAs, etc.
- EMI filtering for data ports in cell phones, PDAs or notebook computers
- Wireless handsets
- Handheld PCs/PDAs

Electrical Schematic



* See Package/Pinout Diagram for expanded pin information.

PACKAGE / PINOUT DIAGRAMS



Note: These drawings are not to scale.

16-PIN DESCRIPTIONS

| DEVICE PIN(s) | | NAME | DESCRIPTION | DEVICE PIN(s) | | NAME | DESCRIPTION |
|---------------|---------|---------|------------------------|---------------|-----|---------|------------------------|
| -06 | -08 | | | -06 | -08 | | |
| 1 | 1 | FILTER1 | Filter + ESD Channel 1 | 12 | 16 | FILTER1 | Filter + ESD Channel 1 |
| 2 | 2 | FILTER2 | Filter + ESD Channel 2 | 11 | 15 | FILTER2 | Filter + ESD Channel 2 |
| 3 | 3 | FILTER3 | Filter + ESD Channel 3 | 10 | 14 | FILTER3 | Filter + ESD Channel 3 |
| 4 | 4 | FILTER4 | Filter + ESD Channel 4 | 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 | Lead-free Finish | |
| | | Ordering Part Number ¹ | Part Marking |
| 12 | NuDFN-12 | CM1620 -06DE | P20 |
| 16 | NuDFN-16 | CM1620 -08DE | P208 |

b

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 (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 C | At 2.5VDC Reverse Bias, 1MHz, 30mVAC | | 8.5 | | pF |
| V _{DIODE} | Standoff Voltage | I _{DIODE} = 10 μ A | | 6.0 | | V |
| I _{LEAK} | Diode Leakage Current (reverse bias) | V _{DIODE} = +3.3V | | 0.1 | 1.0 | μ A |
| V _{SIG} | Signal Clamp Voltage | I _{LOAD} = 10mA | 5.6 | 6.8 | 9.0 | 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 | See Note 2 | \pm 30 | | | kV kV |
| R _{DYN} | Dynamic Resistance Positive Negative | | | 2.3 0.9 | | Ω Ω |
| f _C | Cut-off Frequency Z _{SOURCE} = 50 Ω , Z _{LOAD} = 50 Ω | Channel R = 100 Ω , Channel C = 17pF | | 200 | | MHz |
| A _{1GHz} | Absolute Attenuation @ 1GHz from 0dB Level | Z _{SOURCE} = 50 Ω , Z _{LOAD} = 50 Ω , DC Bias = 0V; See Notes 1 and 3 | | -30 | | dB |
| A _{800MHz - 6GHz} | Absolute Attenuation @ 800MHz to 6GHz from 0dB Level | Z _{SOURCE} = 50 Ω , Z _{LOAD} = 50 Ω , DC Bias = 0V; See Notes 1 and 3 | | -25 | | dB |

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: Attenuation / RF curves characterized by a network analyzer using microprobes.

Performance Information

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

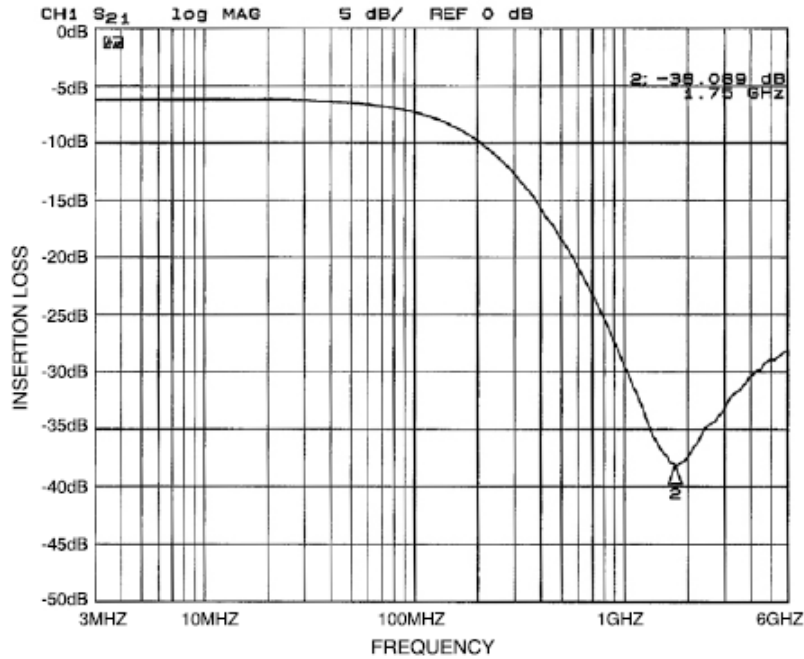


Figure 1. Insertion Loss vs. Frequency (FILTER1 Input to GND, CM1620-06DE)

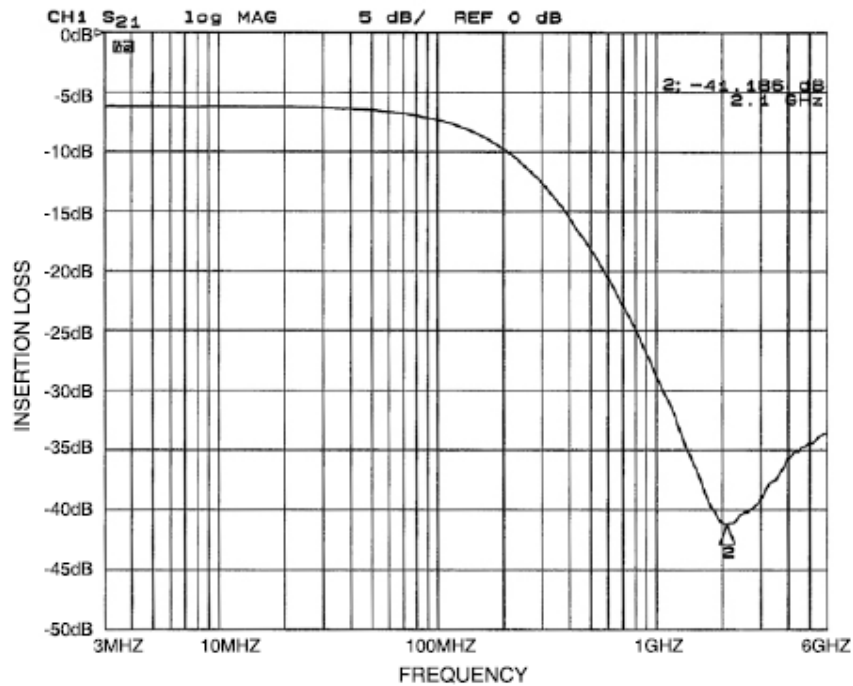


Figure 2. Insertion Loss vs. Frequency (FILTER2 Input to GND, CM1620-06DE)

Performance Information (cont'd)

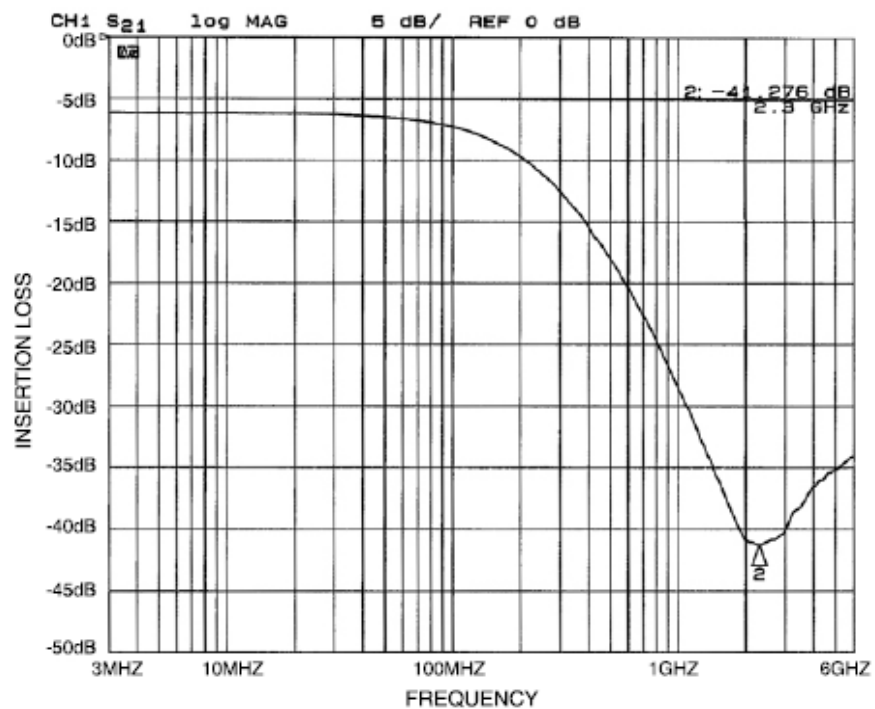


Figure 3. Insertion Loss vs. Frequency (FILTER3 Input to GND, CM1620-06DE)

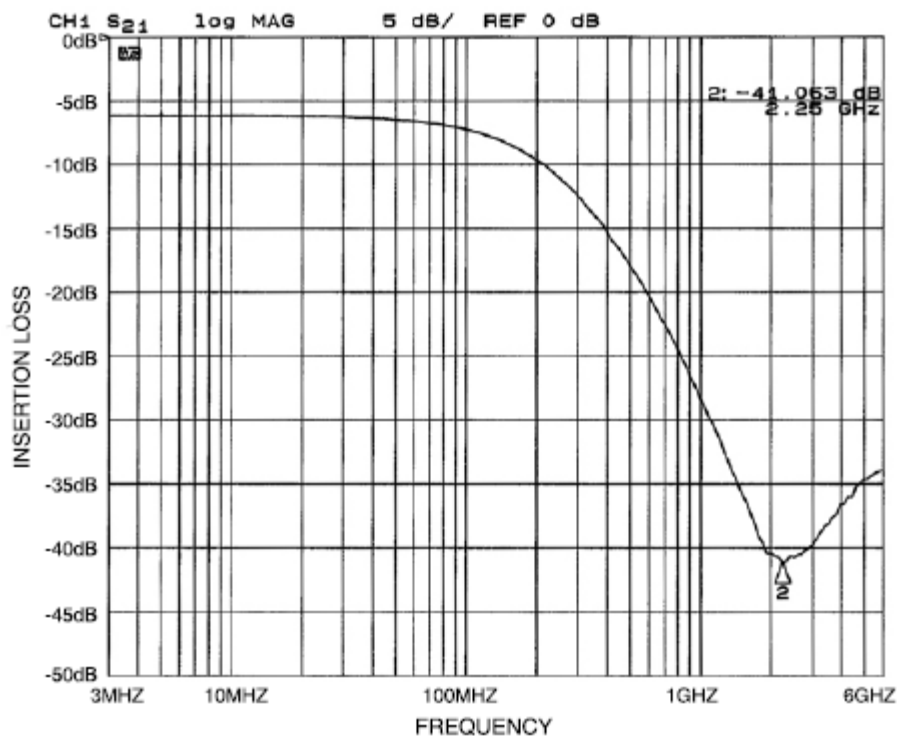


Figure 4. Insertion Loss vs. Frequency (FILTER4 Input to GND, CM1620-06DE)

Performance Information (cont'd)

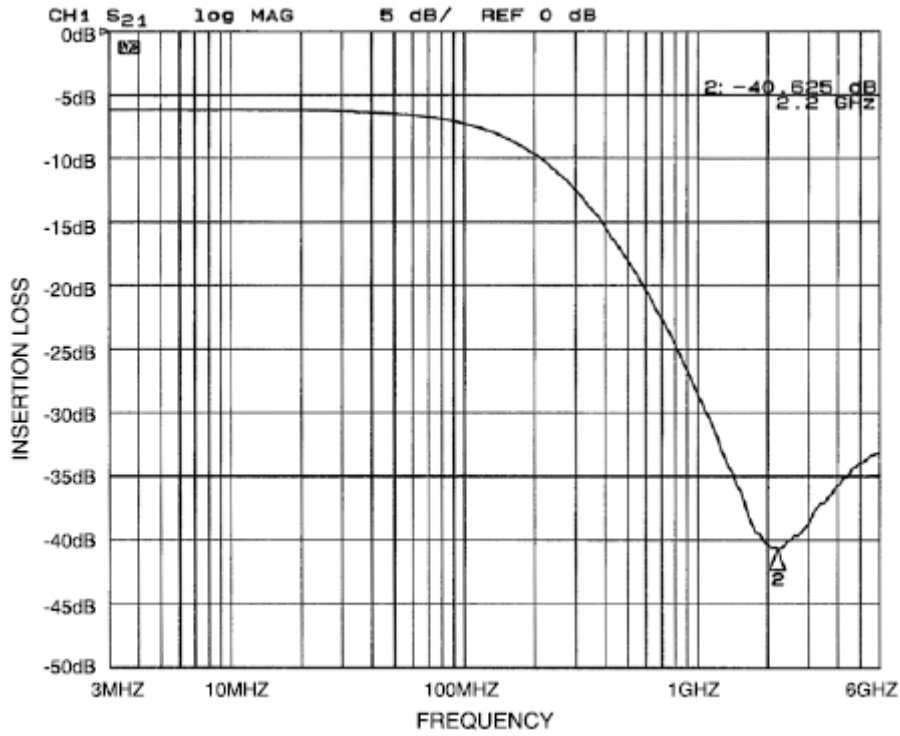


Figure 5. Insertion Loss vs. Frequency (FILTER5 Input to GND, CM1620-06DE)

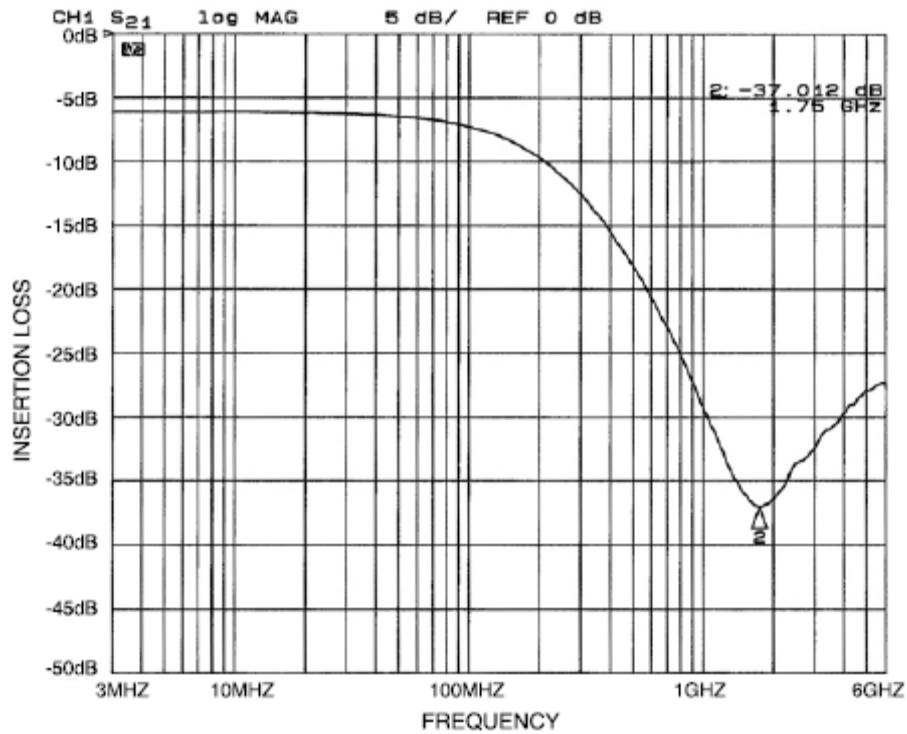


Figure 6. Insertion Loss vs. Frequency (FILTER6 Input to GND, CM1620-06DE)

Performance Information (cont'd)

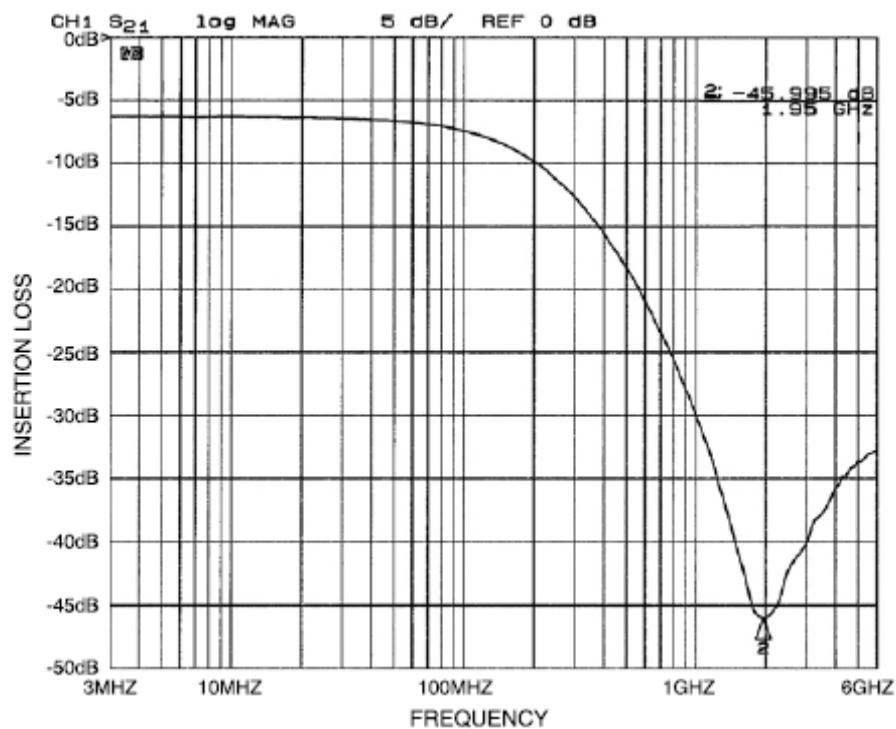


Figure 7. Insertion Loss vs. Frequency (FILTER1 Input to GND, CM1620-08DE)

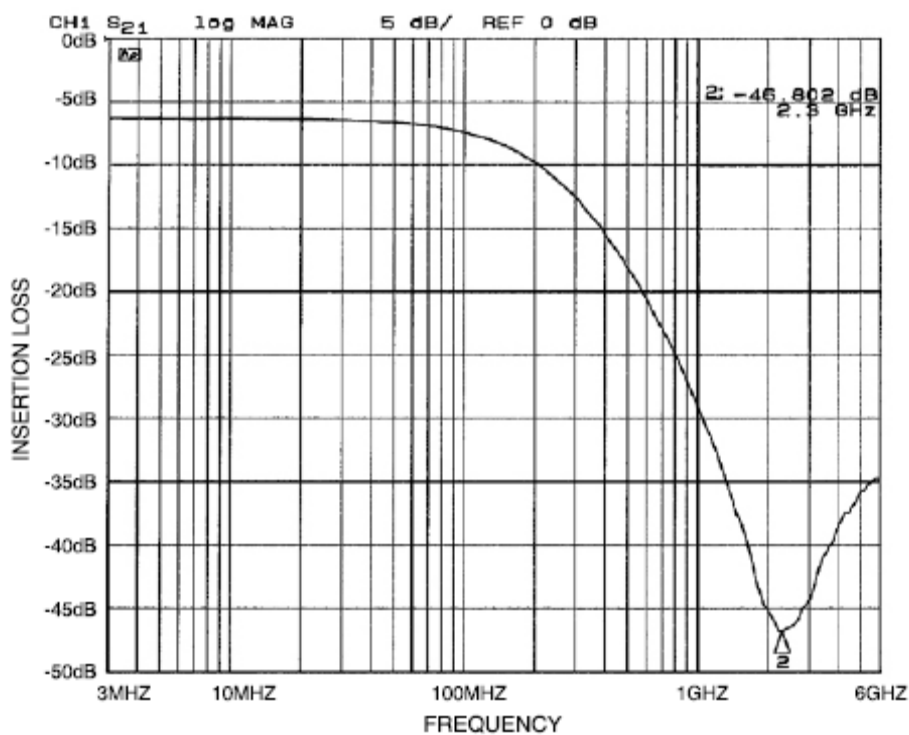


Figure 8. Insertion Loss vs. Frequency (FILTER2 Input to GND, CM1620-08DE)

Performance Information (cont'd)

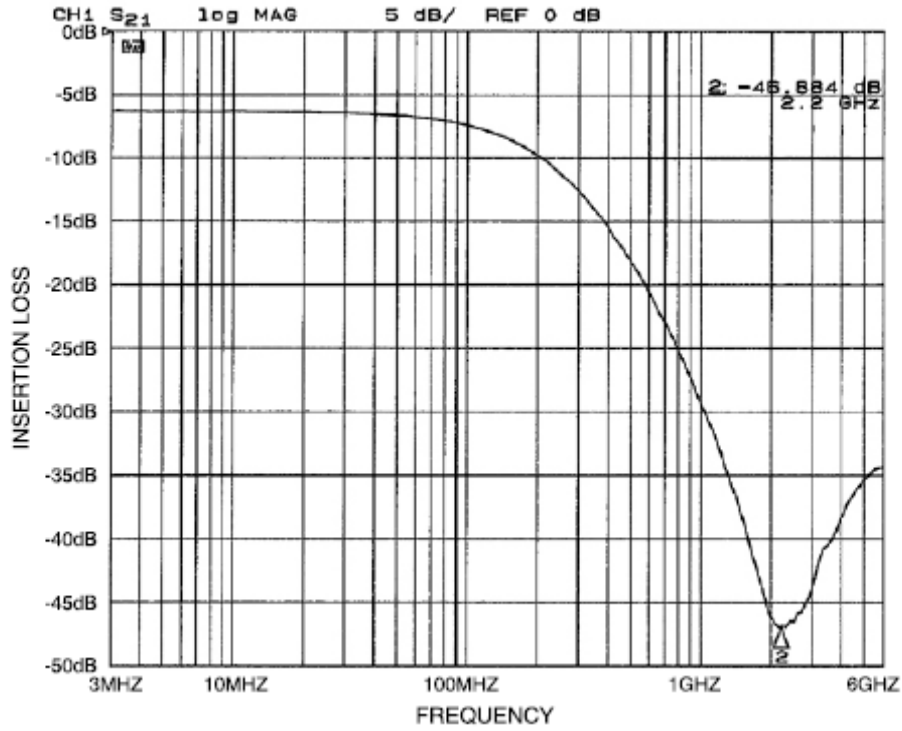


Figure 9. Insertion Loss vs. Frequency (FILTER3 Input to GND, CM1620-08DE)

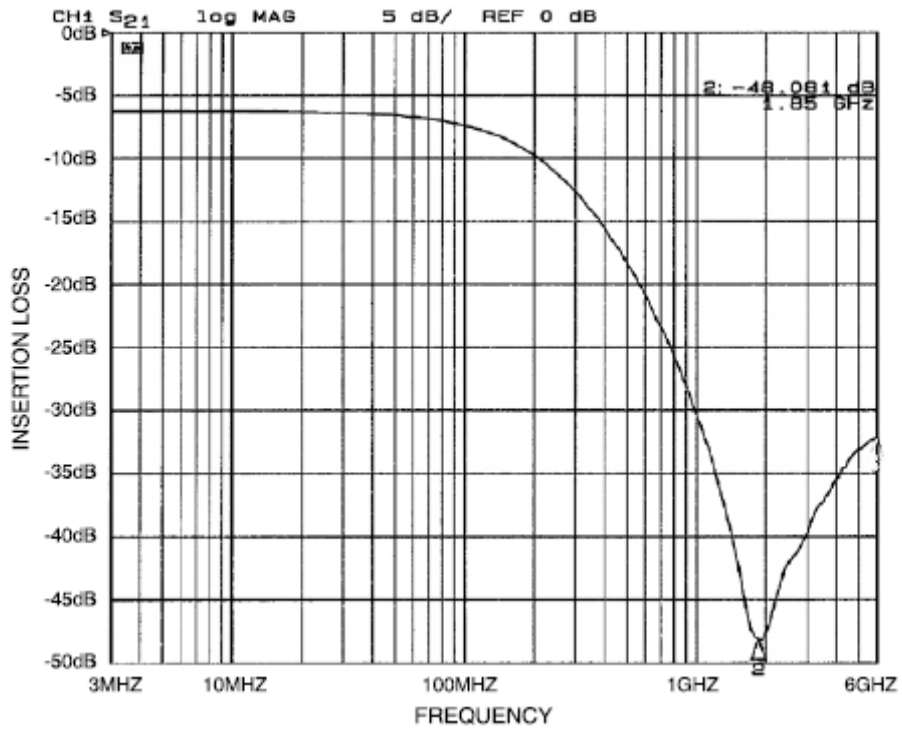


Figure 10. Insertion Loss vs. Frequency (FILTER4 Input to GND, CM1620-08DE)

Performance Information (cont'd)

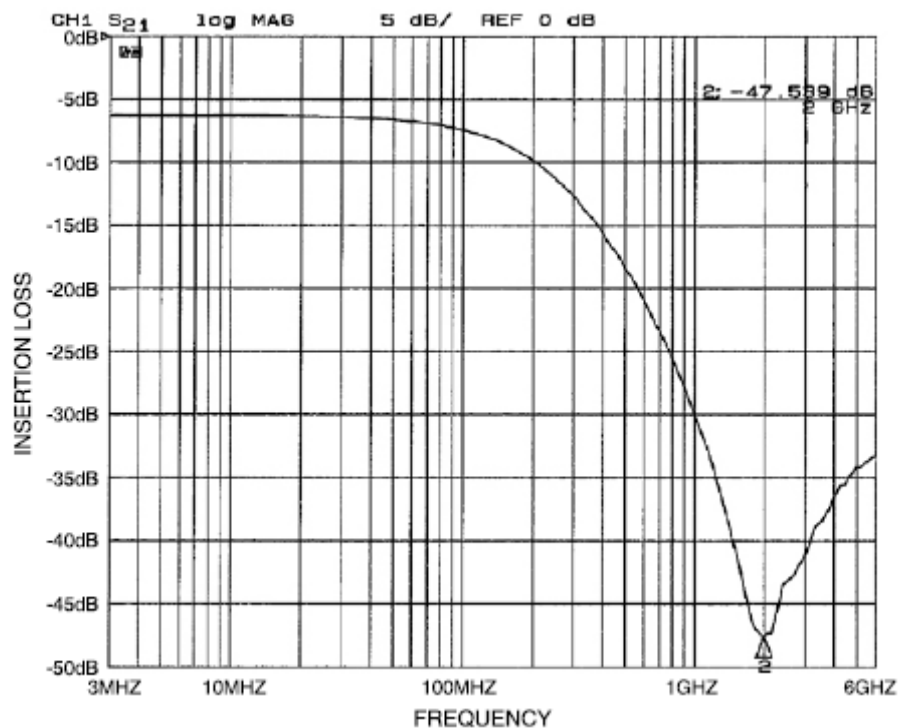


Figure 11. Insertion Loss vs. Frequency (FILTER5 Input to GND, CM1620-08DE)

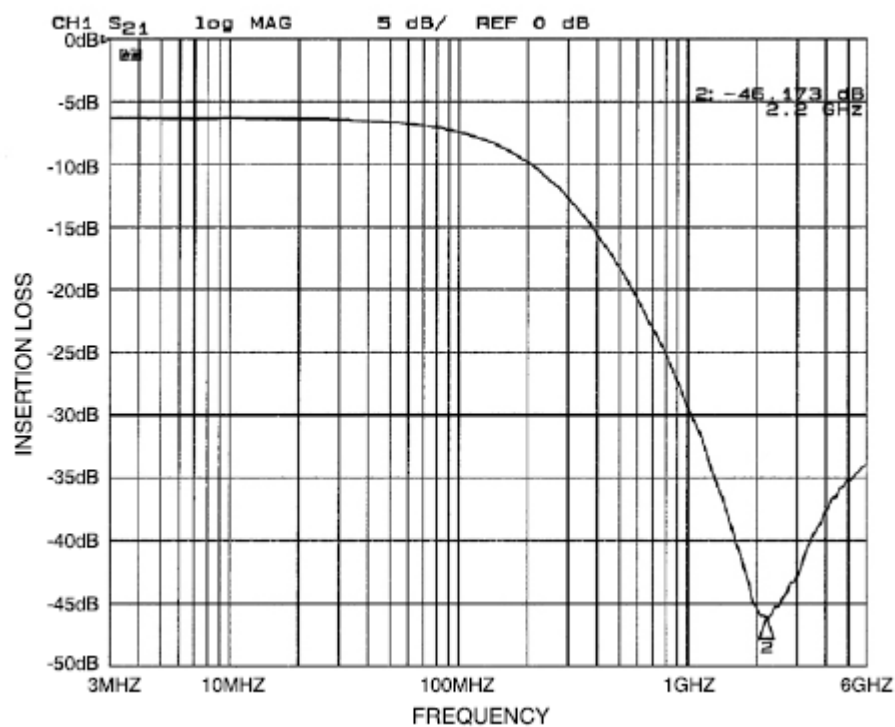


Figure 12. Insertion Loss vs. Frequency (FILTER6 Input to GND, CM1620-08DE)

Performance Information (cont'd)

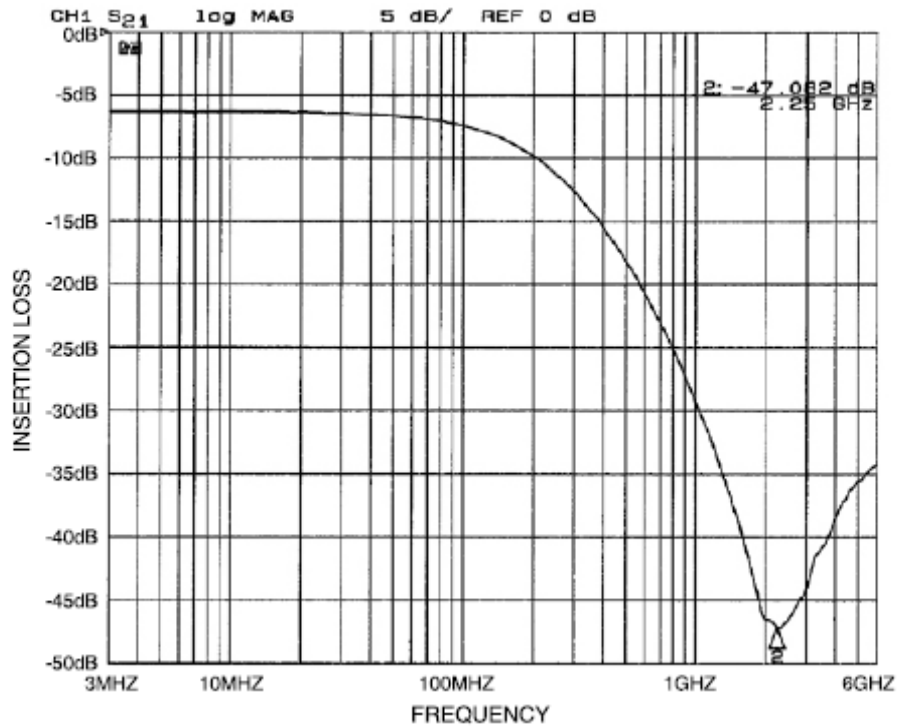


Figure 13. Insertion Loss vs. Frequency (FILTER7 Input to GND, CM1620-08DE)

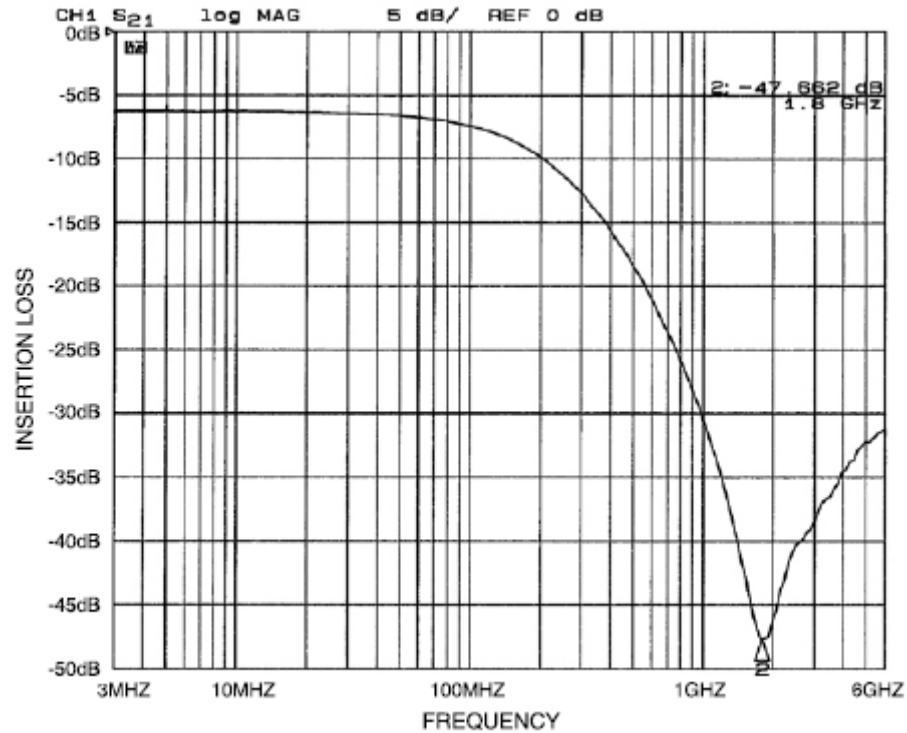
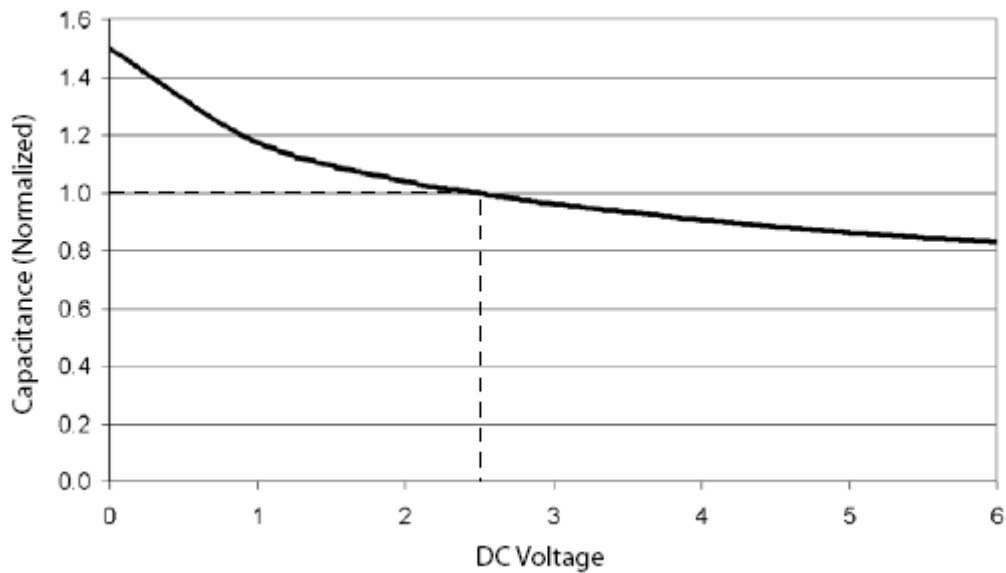


Figure 14. Insertion Loss vs. Frequency (FILTER8 Input to GND, CM1620-08DE)

Performance Information (cont'd)

Typical Diode Capacitance vs. Input Voltage



**Figure 15. Filter Capacitance vs. Input Voltage
(Normalized to Capacitance at 2.5VDC and 25°C)**

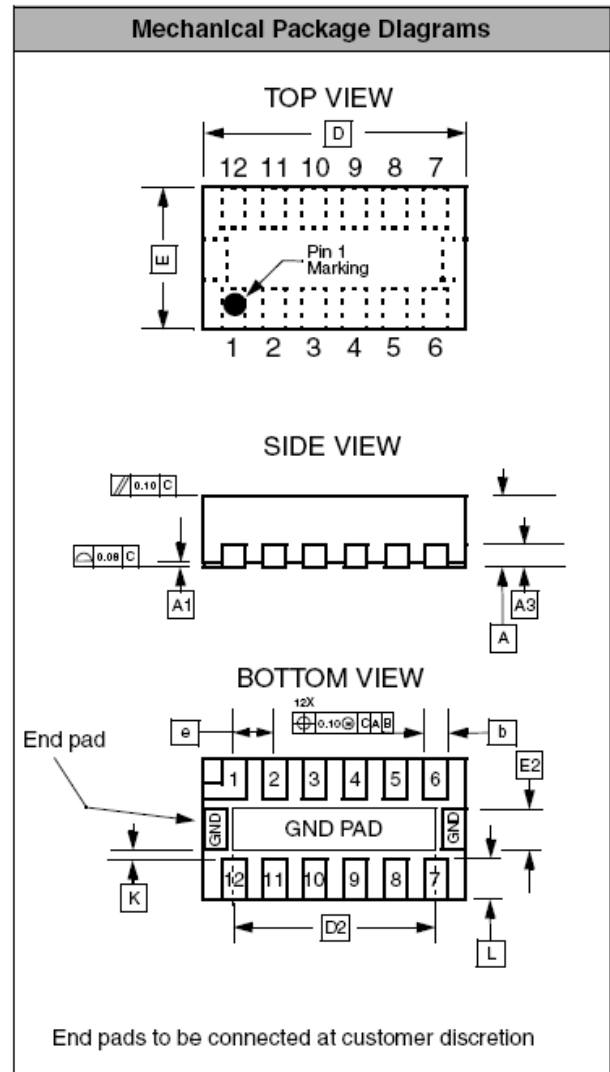
Mechanical Details

NuDFN-12 Mechanical Specifications

Dimensions for the 12-lead, 0.4mm pitch NuDFN package are presented below.

| PACKAGE DIMENSIONS | | | | | | |
|------------------------------------|-------------|------|------|-----------|-------|-------|
| Package | NuDFN | | | | | |
| JEDEC No. | MO-229C* | | | | | |
| Leads | 12 | | | | | |
| 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 | 0.15 | 0.20 | 0.25 | 0.006 | 0.008 | 0.010 |
| D | 2.40 | 2.50 | 2.60 | 0.094 | 0.098 | 0.102 |
| D2 | 1.70 | 1.80 | 1.90 | 0.067 | 0.071 | 0.075 |
| E | 1.10 | 1.20 | 1.30 | 0.043 | 0.047 | 0.051 |
| E2 | 0.20 | 0.30 | 0.40 | 0.008 | 0.012 | 0.016 |
| e | 0.40 BSC | | | 0.016 BSC | | |
| K | 0.20 | | | 0.008 | | |
| L | 0.20 | 0.25 | 0.30 | 0.008 | 0.010 | 0.012 |
| # 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.



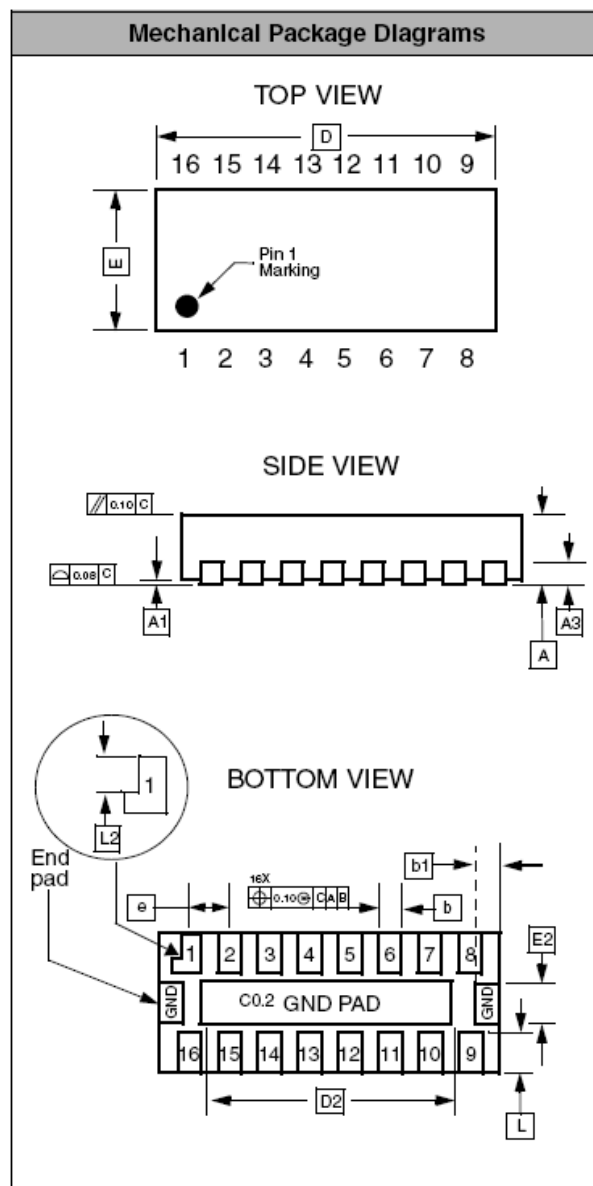
Dimensions for 12-Lead, 0.4mm pitch NuDFN package

Mechanical Details

NuDFN-16 Mechanical Specifications, 0.4mm


Dimensions for the 16-lead, 0.4mm pitch NuDFN package are presented below.

| PACKAGE DIMENSIONS | | | | | | |
|------------------------------------|-------------|------|------|-----------|-------|-------|
| Package | NuDFN | | | | | |
| JEDEC No. | MO-229C* | | | | | |
| Leads | 16 | | | | | |
| 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 | 0.15 | 0.20 | 0.25 | 0.006 | 0.008 | 0.010 |
| b1 | .20 BSC | | | 0.008 BSC | | |
| D | 3.40 | 3.50 | 3.60 | 0.134 | 0.138 | 0.142 |
| D2 | 2.70 | 2.80 | 2.90 | 0.106 | 0.110 | 0.114 |
| E | 1.10 | 1.20 | 1.30 | 0.043 | 0.047 | 0.051 |
| E2 | 0.20 | 0.30 | 0.40 | 0.008 | 0.012 | 0.016 |
| e | 0.400 BSC | | | 0.016 BSC | | |
| L | 0.20 | 0.25 | 0.30 | 0.008 | 0.010 | 0.012 |
| L2 | 0.15 REF | | | 0.006 REF | | |
| # per tape and reel | 3000 pieces | | | | | |
| Controlling dimension: millimeters | | | | | | |



**Dimensions for 16-Lead, 0.4mm pitch
NuDFN package**

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

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