

# NUF9002FC

## Low Capacitance 10 Line EMI Filter with ESD Protection

This device is a ten-line EMI filter array for wireless applications. Greater than -25 dB attenuation is obtained at frequencies from 900 MHz to 3.0 GHz. ESD protection is provided across all capacitors.

### Features

- EMI Filtering and ESD Protection
- Integration of 50 Discretes
- Provides Protection for IEC61000-4-2 (Level 4)
  - ♦ 8.0 kV (Contact)
- Flip-Chip Package
- Moisture Sensitivity Level 1
- ESD Rating: Machine Model = C; Human Body Model = 3B
- Pb-Free Package is Available\*

### Benefits

- Reduces EMI/RFI Emissions on a Data Line
- Integrated Solution Offers Cost and Space Savings
- Reduces Parasitic Inductances Which Offer a More “Ideal” Low Pass Filter Response
- Integrated Solution Improves System Reliability

### Applications

- LCD for Cell Phones and PDAs
- Computers and Printers
- Communication Systems
- MP3 Players

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Rating                          |                   | Symbol    | Value       | Unit             |
|---------------------------------|-------------------|-----------|-------------|------------------|
| ESD Discharge<br>IEC61000-4-2   | Contact Discharge | $V_{PP}$  | 8.0         | kV               |
| Steady-State Power per Resistor |                   | $P_R$     | 100         | mW               |
| Steady-State Power per Package  |                   | $P_T$     | 200         | mW               |
| Operating Temperature Range     |                   | $T_{OP}$  | -40 to +85  | $^\circ\text{C}$ |
| Storage Temperature Range       |                   | $T_{STG}$ | -55 to +150 | $^\circ\text{C}$ |
| Junction Temperature            |                   | $T_J$     | +125        | $^\circ\text{C}$ |

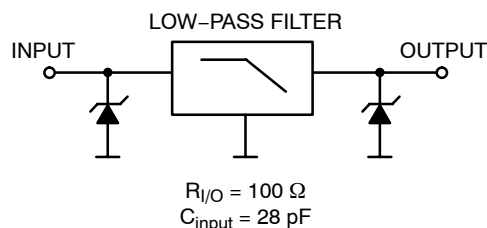
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

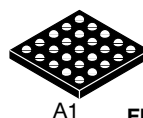


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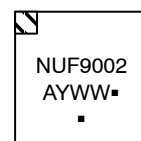
<http://onsemi.com>



### MARKING DIAGRAM



Flip-Chip  
CASE 499G

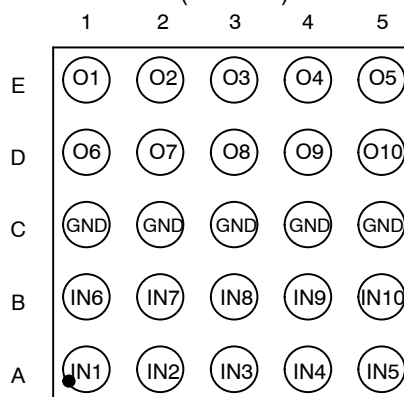


NUF9002 = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### PIN CONFIGURATION

(Ball Side)



### ORDERING INFORMATION

| Device       | Package             | Shipping†        |
|--------------|---------------------|------------------|
| NUF9002FCT1  | Flip-Chip           | 3000 Tape & Reel |
| NUF9002FCT1G | Flip-Chip (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 Specifications Brochure, BRD8011/D.

# NUF9002FC

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic                  | Symbol        | Test Conditions                                        | Min | Typ | Max | Unit          |
|---------------------------------|---------------|--------------------------------------------------------|-----|-----|-----|---------------|
| Maximum Reverse Working Voltage | $V_{RWM}$     | –                                                      | –   | –   | 5.0 | V             |
| Breakdown Voltage               | $V_{BR}$      | $I_R = 1.0\text{ mA}$                                  | 6.0 | 7.0 | 8.0 | V             |
| Leakage Current                 | $I_R$         | $V_{RM} = 3.0\text{ V}$                                | –   | –   | 0.1 | $\mu\text{A}$ |
| Series Resistance               | $R_A$         | –                                                      | 85  | 100 | 115 | $\Omega$      |
| Capacitance                     | $C_{LINE\ 1}$ | $f = 1.0\text{ MHz}, 0\text{ Vdc}$                     | –   | 28  | 35  | pF            |
| Cut-Off Frequency               | $f_{3dB}$     | (Above this frequency, appreciable attenuation occurs) | –   | 110 | –   | MHz           |

## TYPICAL PERFORMANCE CURVE

( $T_A = 25^\circ\text{C}$  unless otherwise specified)

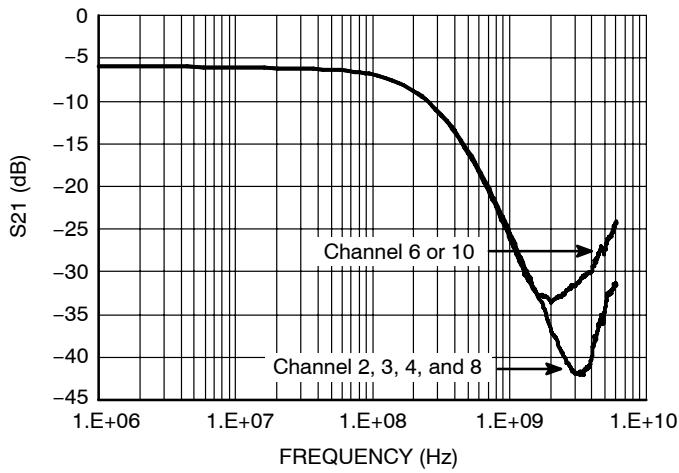


Figure 1. Insertion Loss Characteristics (S21 Measurement)

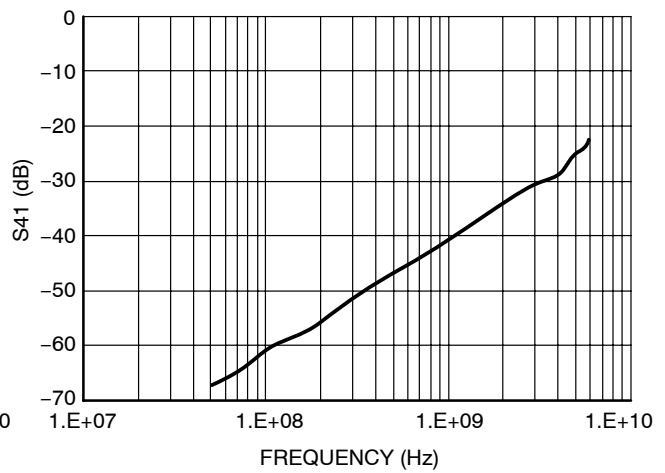


Figure 2. Analog Crosstalk Curve (S41 Measurement)

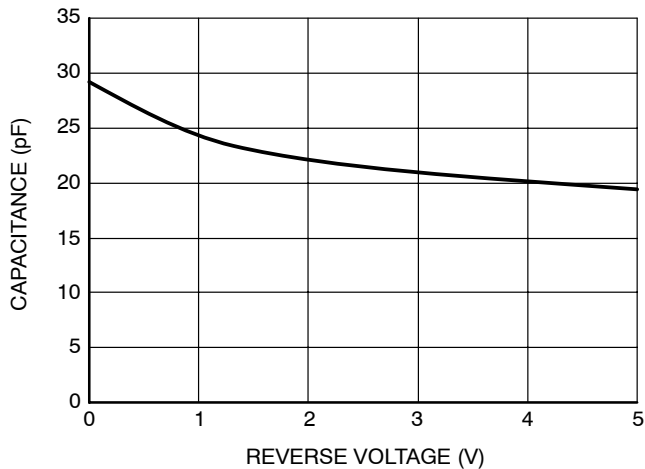


Figure 3. Typical Line Capacitance vs. Reverse Bias Voltage

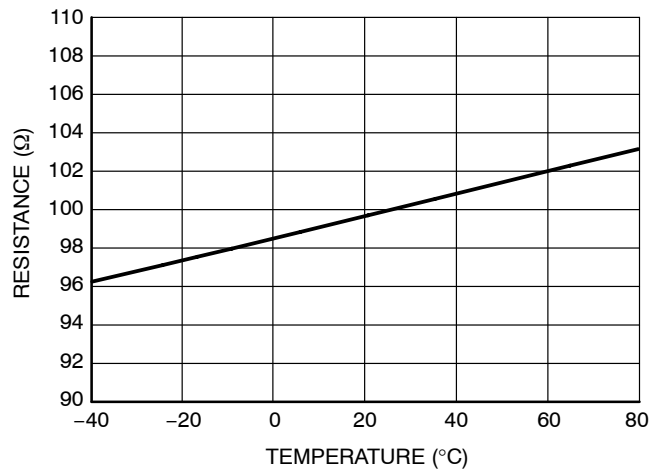


Figure 4. Typical Resistance Over Temperature

PRINTED CIRCUIT BOARD RECOMMENDATIONS

| Parameter                | 500 $\mu\text{m}$ Pitch<br>300 or 350 $\mu\text{m}$ Solder Ball |
|--------------------------|-----------------------------------------------------------------|
| PCB Pad Size             | 250 $\mu\text{m}$ +25<br>-0                                     |
| Pad Shape                | Round                                                           |
| Pad Type                 | NSMD                                                            |
| Solder Mask Opening      | 350 $\mu\text{m}$ $\pm$ 25                                      |
| Solder Stencil Thickness | 125 $\mu\text{m}$                                               |
| Stencil Aperture         | 250 x 250 $\mu\text{m}$ sq.                                     |
| Solder Flux Ratio        | 50/50                                                           |
| Solder Paste Type        | No Clean Type 3 or Finer                                        |
| Trace Finish             | OSP Cu                                                          |
| Trace Width              | 150 $\mu\text{m}$ Max                                           |

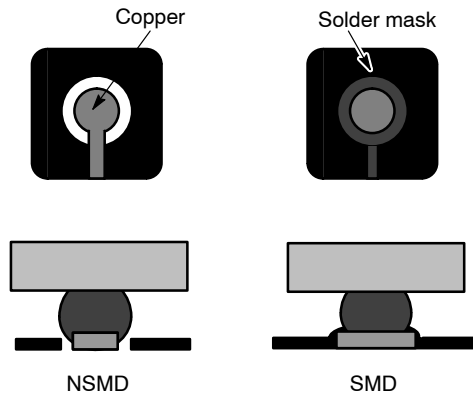
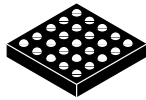


Figure 5. NSMD vs. SMD

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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A1

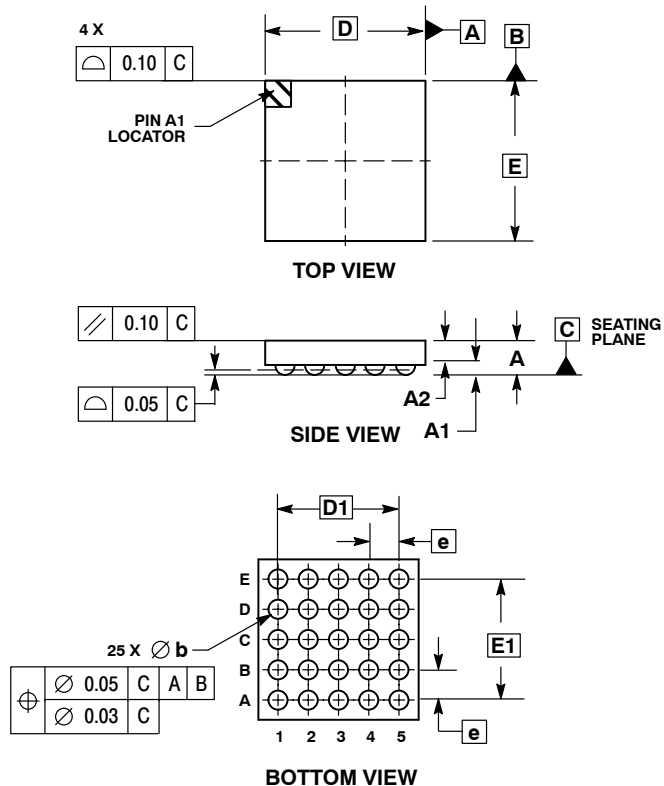
SCALE 4:1

### FLIP-CHIP-25 CSP

#### CASE 499G-01

#### ISSUE B

DATE 03 MAY 2005

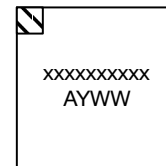


#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. COPLANARITY APPLIES TO SPHERICAL CROWNS OF SOLDER BALLS.

| DIM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | ---         | 0.700 |
| A1  | 0.210       | 0.270 |
| A2  | 0.380       | 0.430 |
| D   | 2.650 BSC   |       |
| E   | 2.650 BSC   |       |
| b   | 0.290       | 0.340 |
| e   | 0.500 BSC   |       |
| D1  | 2.000 BSC   |       |
| E1  | 2.000 BSC   |       |

#### GENERIC MARKING DIAGRAM\*



xxxxxx = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

|                  |                                                |                                                                                                                                                                                  |
|------------------|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| DESCRIPTION:     | FLIP-CHIP-25 CSP, 0.265 *0.265 MM, 0.500 PITCH | PAGE 1 OF 1                                                                                                                                                                      |

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