

# NUF4107FC

## Four Channel EMI Pi-Filter Array with Full USB Filter

This device is a four-channel EMI filter array for data lines. Greater than -35 dB attenuation is obtained at frequencies from 800 MHz to 2.2 GHz. It also offers USB filtering circuitry with speed detection. This includes the inline resistors for impedance matching and EMI filtering. ESD protection is provided across all capacitors.

### Features

- EMI Filtering and ESD Protection for Data Lines
- USB 1.1 Filtering Provided with Speed Detection
- Integration of 27 Discretes Offers Cost and Space Savings
- 350  $\mu\text{m}$  Solder Spheres
- All TVS Protected Inputs Comply with IEC61000-4-2 (Level 4)
  - 30 kV (Contact)
  - 30 kV (Air)
- Low Profile Flip-Chip Packaging
- MSL 1
- All Pins Exceed 2000 V Human Body Model (Note 1)
- Pb-Free Package is Available\*

### Typical Applications

- EMI and USB Filtering and ESD Protection for Data Lines
- Cell Phones
- Handheld Portables
- Notebook Computers
- MP3 Players

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

Rating	Symbol	Value	Unit
ESD Discharge IEC61000-4-2 (Note 1) – Air Discharge, Contact Discharge	$V_{PP}$	30	kV
Human Body Model		16	
Machine Model		0.4	
DC Power per Resistor	$P_R$	100	mW
DC Power per Package	$P_T$	600	mW
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Operating Temperature Range	$T_{Op}$	-40 to +85	$^\circ\text{C}$
Storage Temperature Range	$T_{Stg}$	-55 to +150	$^\circ\text{C}$

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.

1. This does not include Pins B1, C1 and C2

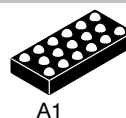
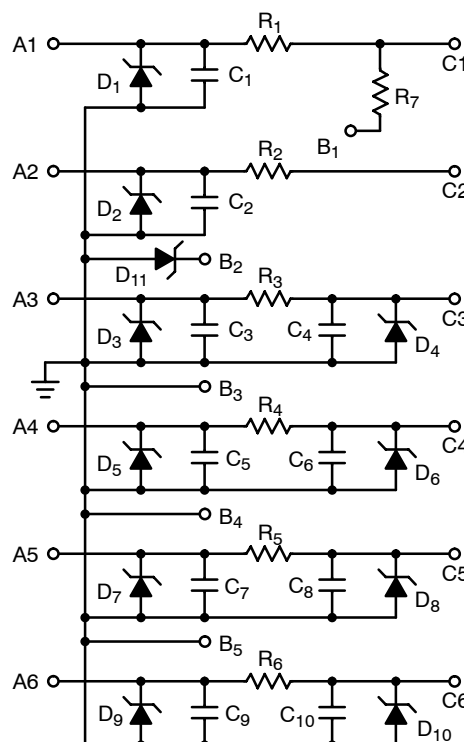
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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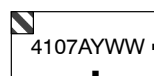
<http://onsemi.com>

### CIRCUIT DESCRIPTION



FLIP-CHIP-17  
CASE 499AD

### MARKING DIAGRAM



4107 = Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

Device	Package	Shipping†
NUF4107FCT1	Flip-Chip	3000 Tape & Reel
NUF4107FCT1G	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.

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

Symbol	Characteristic	Min	Typ	Max	Unit
$V_{BR}$	$I_R = 1.0 \text{ mA}$	6.0	6.8	8.0	V
$I_R$	$V_{RM} = 3.3 \text{ V per line}$	-	-	0.1	$\mu\text{A}$
$R_3 - R_6$	EMI Filter Resistors	80	100	120	$\Omega$
$R_1, R_2$	USB Resistors; Impedance Matching	18	22	26	$\Omega$
$R_7$	USB Pull-up; Speed Detection Resistor	1250	1500	1750	$\Omega$
$C_{line}$	At 2.5 V Bias	48	60	72	pF
C1, C2	At Pins A1 and A2; At 2.5 V Bias	29	36	43	pF
$C_{power}$	At Pins B2; At 2.5 V Bias	54	68	82	pF

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## TYPICAL CHARACTERISTICS

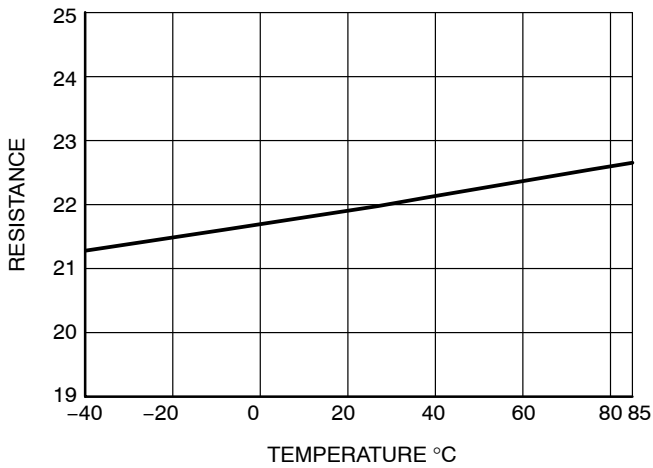


Figure 1. USB 1.1 Resistors (R1, R2) vs. Temperature

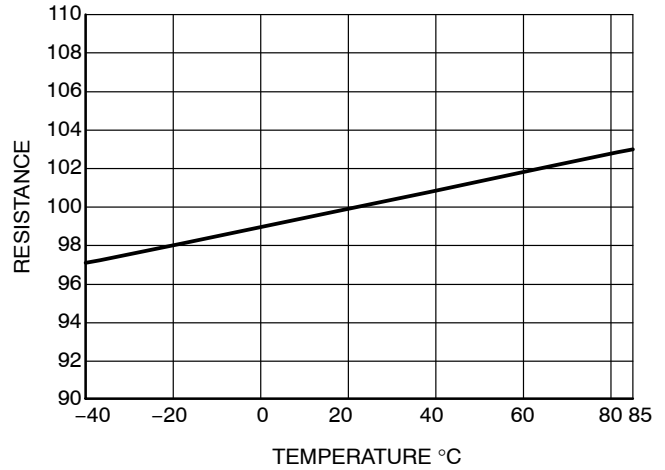


Figure 2. Data Resistors (R3, R4, R5, R6) vs. Temperature

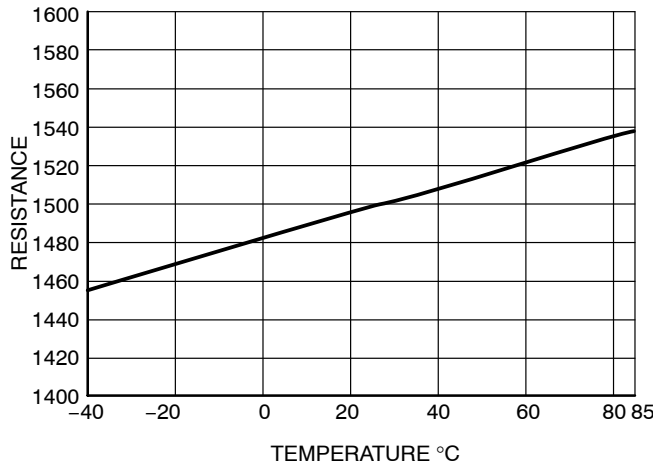


Figure 3. Pull-up Resistor (R7) vs. Temperature

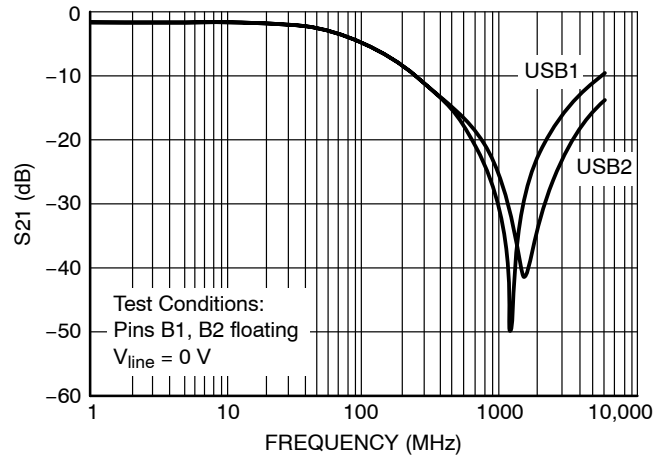


Figure 4. Insertion Loss Characteristic USB1, USB2

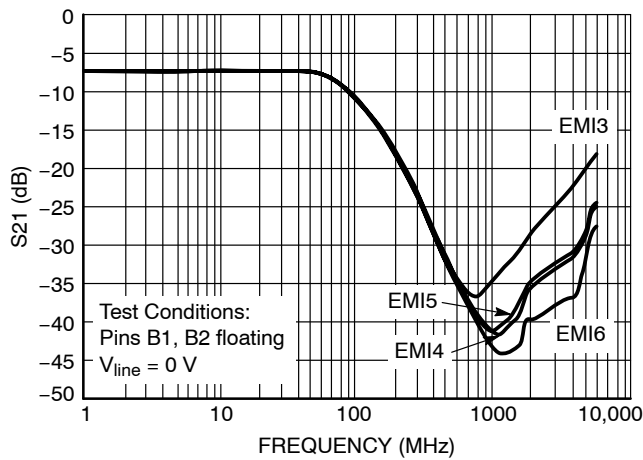


Figure 5. Insertion Loss Characteristic EMI3, EMI4, EMI5, EMI6

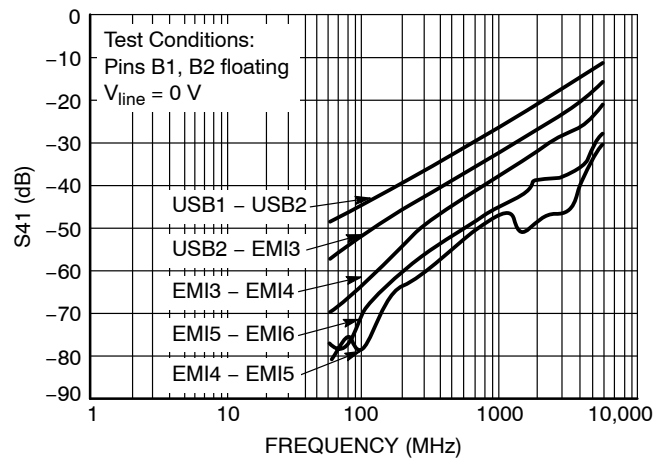


Figure 6. Analog Crosstalk Curve EMI Filter

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## Printed Circuit Board Recommendations

Parameter	500 $\mu\text{m}$ Pitch 300 $\mu\text{m}$ Solder Ball
PCB Pad Size	250 $\mu\text{m}$ +25 -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

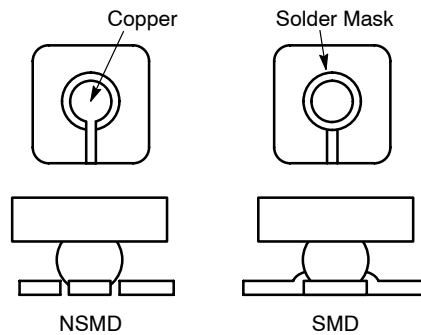


Figure 7. Solder Mask versus Non-Solder Mask Definition

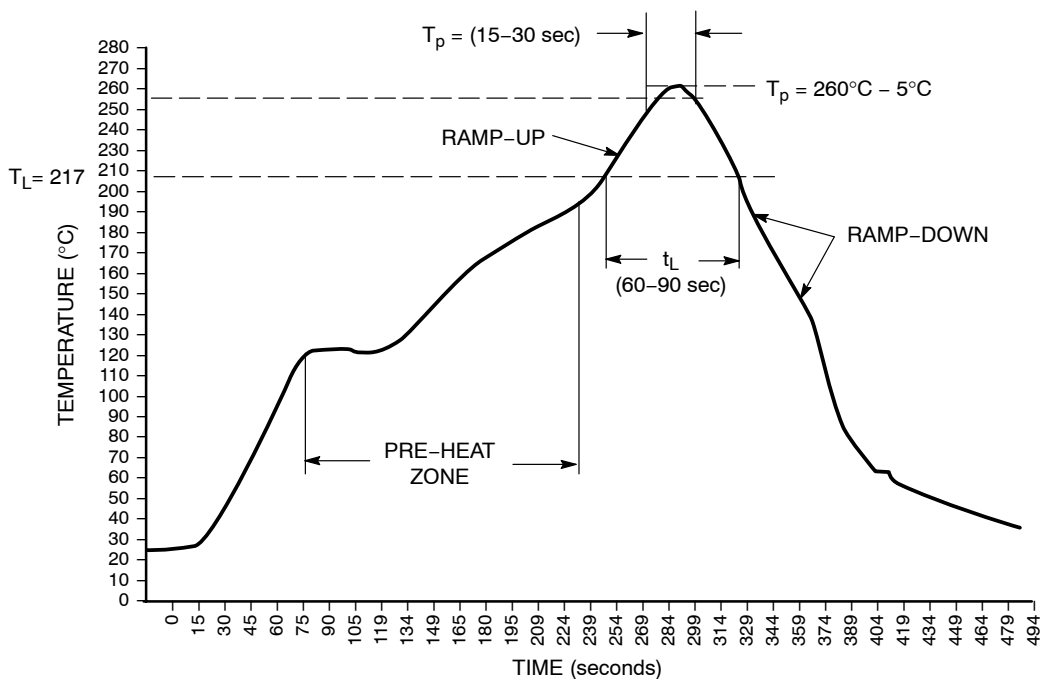
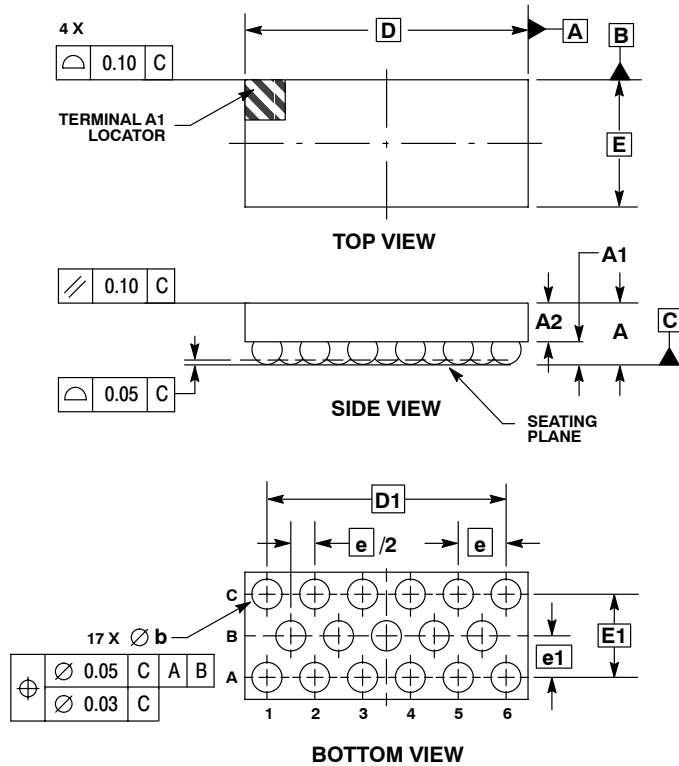


Figure 8. Typical Pb-Free Solder Heating Profile

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## PACKAGE DIMENSIONS

FLIP-CHIP-17 CSP  
CASE 499AD-01  
ISSUE A



**NOTES:**

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

DIM	MILLIMETERS	
	MIN	MAX
A	---	0.740
A1	0.250	0.310
A2	0.380	0.430
D	2.960 BSC	
E	1.330 BSC	
b	0.350	0.410
e	0.500 BSC	
e1	0.435 BSC	
D1	2.500 BSC	
E1	0.870 BSC	

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**NUF4107FC/D**