

# ON Semiconductor

## Is Now

# onsemi™

To learn more about onsemi™, please visit our website at  
[www.onsemi.com](http://www.onsemi.com)

---

**onsemi** and **onsemi** and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi** product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner. Other names and brands may be claimed as the property of others.

# NMF3000, NMF3010

## Dual-Stage, Differential Lines Filter with ESD Protection

The NMF3000 and the NMF3010 are a dual-stage, differential line ESD and filtering protection scheme for input signals into portable devices. The NMF3000 is the first stage and is located at or very near to the interface to the outside world. It provides the high-level ESD protection as well as the initial filtering of incoming audio signals. The NMF3010 is the second stage and provides additional signal filtering. This second stage can be placed some distance away from the first stage to allow for effective filtering across extended distances.

### Features

- Dual Filtering Lines for 2-Channels or Differential Transmission
- Separate Power and Analog Grounds for ESD Protection and Filtering Circuitry
- V<sub>CC</sub> Input Pin on First Stage to Set Microphone DC Bias
- IEC 61000-4-2 Grade ±15 kV Contact ESD Protection on the Inputs, V<sub>CC</sub>, and Between Power and Analog Grounds
- IEC 61000-4-2 Level 1 ESD protection on All Other Pin-to-Pin Combinations
- These are Pb-Free Devices\*



ON Semiconductor®

<http://onsemi.com>

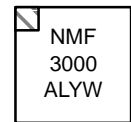
### MARKING DIAGRAMS



A1

9 Bump Flip-Chip  
CASE 499AE

A1



A1

6 Bump Flip-Chip  
CASE 499AF

A1



A = Assembly Location  
L = Wafer Lot  
Y = Year  
W = Work Week

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 8 of this data sheet.

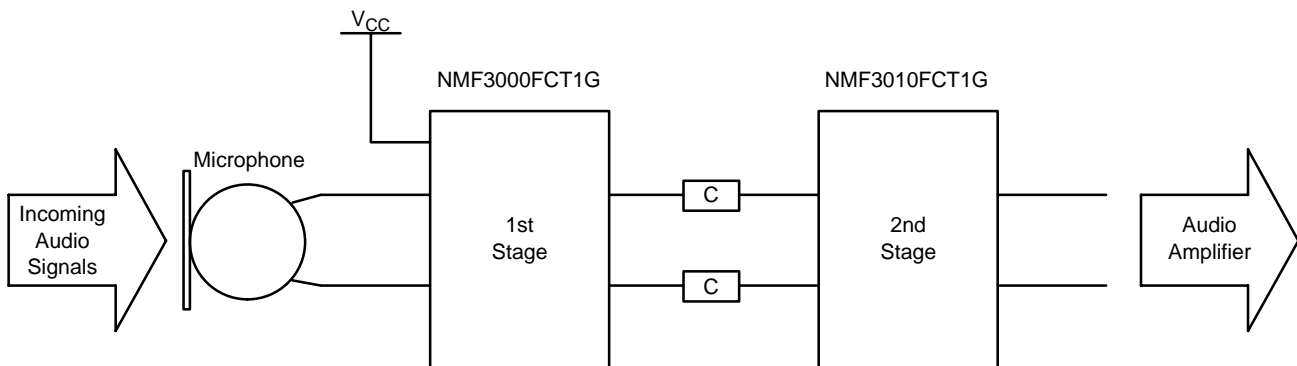


Figure 1. System Diagram

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

# NMF3000, NMF3010

## FUNCTIONAL BLOCK DIAGRAMS

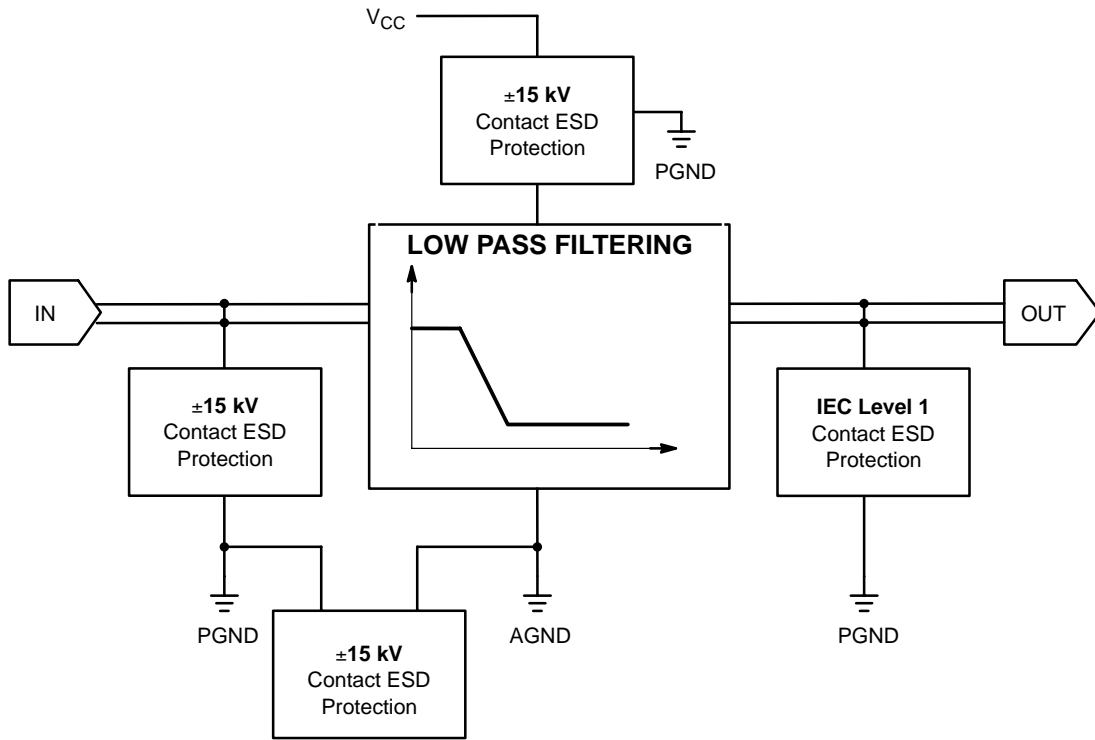


Figure 2. First Stage: NMF3000FCT1G

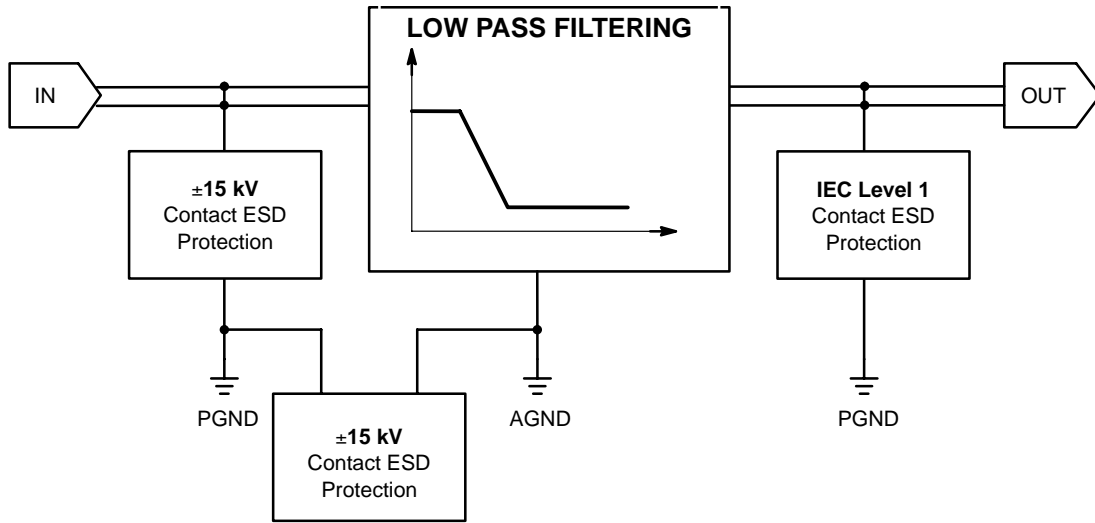


Figure 3. Second Stage: NMF3010FCT1G

# NMF3000, NMF3010

## PINOOTS AND PIN DESCRIPTIONS

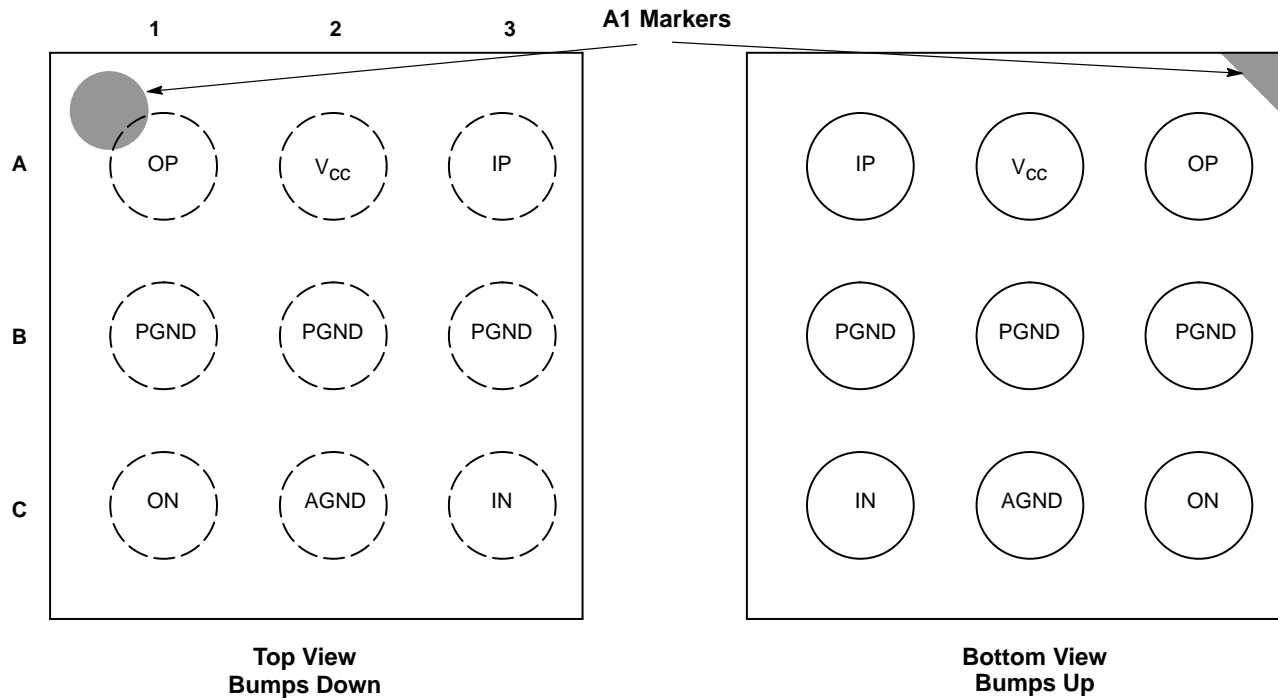


Figure 4. Pinout Diagrams for First Stage: NMF3000FCT1G

### PINOUT FUNCTIONS FOR FIRST STAGE

Pin	Type	Description
A1	Output P	Positive Side Signal Output
A2	VCC	DC Power Connection
A3	Input P	Positive Side Signal Input
B1, B2, B3	PGND	Power Ground
C1	Output N	Negative Side Signal Output
C2	AGND	Analog Ground
C3	Input N	Negative Side Signal Input

# NMF3000, NMF3010

## PINOUTS AND PIN DESCRIPTIONS

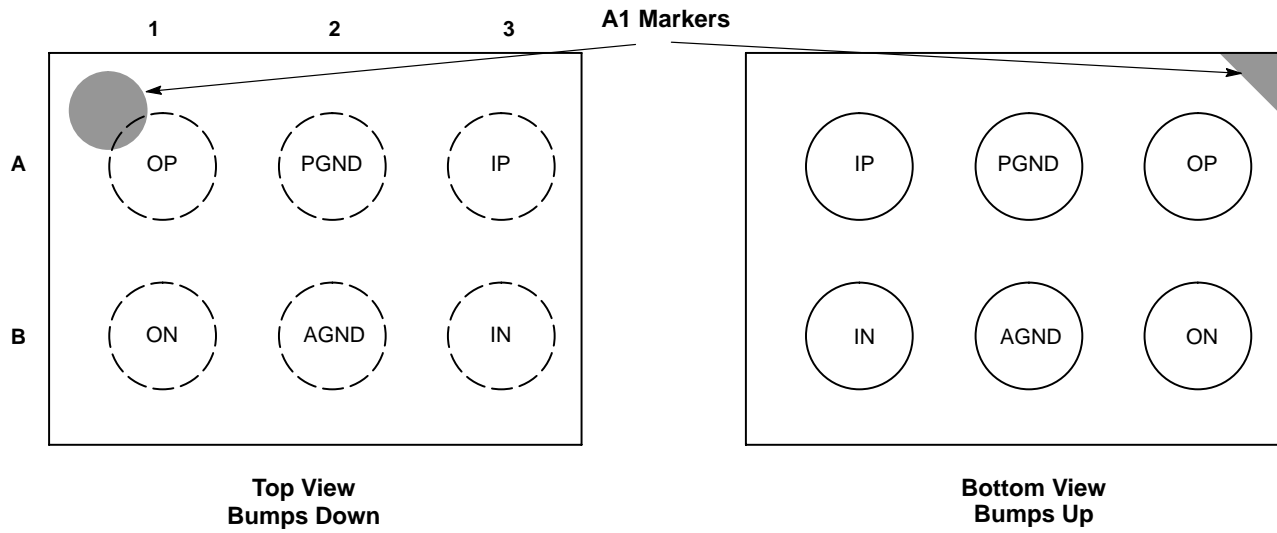


Figure 5. Pinout Diagrams for Second Stage: NMF3010FCT1G

### PINOUT FUNCTIONS FOR SECOND STAGE

Pin	Type	Description
A1	Output P	Positive Side Signal Output
A2	PGND	Power Ground
A3	Input P	Positive Side Signal Input
B1	Output N	Negative Side Signal Output
B2	AGND	Analog Ground
B3	Input N	Negative Side Signal Input

# NMF3000, NMF3010

## MAXIMUM RATINGS

Rating	Symbol	Value	Units
Operating Ambient Temperature Range	$T_A$	-40 to 85	°C
Moisture Sensitivity	MSL	Level 1	
Storage Temperature Range	$T_{stg}$	-55 to 150	°C
Supply Voltage	$V_{CC}$	0 to 11	V

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

## ELECTRICAL CHARACTERISTICS ( $V_{CC} = 0\text{ V to }10\text{ V}$ , $T_A = -40^\circ\text{C to }85^\circ\text{C}$ , All Typical Values Measured at $25^\circ\text{C}$ )

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Supply Voltage	First stage only	$V_{CC}$	0		10	V
Attenuation	@ 800 MHz, 50 $\Omega$ Environment		52	95		dB
Attenuation	@ 1.9 GHz, 50 $\Omega$ Environment		52	70		dB
B2B Diode Breakdown Voltage	IR = 1.0 mA, Pin to PGND, AGND to PGND	B2B BV	$\pm 12$			V
Standoff Voltage		VRM		10		V
Leakage Current	V = VRM, for each stage	IRM			500	nA
Power Dissipation					100	mW
NMF3000FCT1G DC Series Resistance	Input to output on first stage	RI/O	997	1050	1103	$\Omega$
NMF3010FCT1G DC Series Resistance	Input to output on second stage	RI/O	950	1000	1050	$\Omega$
Input Capacitance per Line	f = 1.0 MHz, for each stage when capacitor has 2.0 V across its terminals.	$C_{LINE}$	900	1000	1100	pF
Bias Resistance per Line	First Stage Only	$R_{BIAS1}$	950	1000	1050	$\Omega$
Crosstalk	50 $\Omega$ Source and Load	CT	-25			dB
Noise	Idle-channel or Self-noise of the Network				6.0	nV/ $\sqrt{\text{Hz}}$
Distortion	Anywhere in the Bandwidth 20 Hz to 20 kHz				0.01	%

1. Specifications apply to devices as a pair, as shown in the system diagram, unless otherwise noted as 'for each stage'.

## ESD CHARACTERISTICS

Pin	Level	Type	Min	Units
NMF3000FCT1G: A2, C2, A3, C3 to PGND NMF3010FCT1G: B2, B3, A3 to PGND	4+ IEC 61000-4-2	Contact	15	kV
NMF3000FCT1G: A2, C2, A3, C3 to PGND NMF3010FCT1G: B2, B3, A3 to PGND	4 IEC 61000-4-2	Air	15	kV
NMF3000FCT1G: All Pins Pairwise NMF3010FCT1G: All Pins Pairwise	1 IEC 61000-4-2	Contact	2.0	kV
NMF3000FCT1G: All Pins Pairwise NMF3010FCT1G: All Pins Pairwise	1 IEC 61000-4-2	Air	2.0	kV

## COMPONENT MATCHING

Component	Description	Max	Unit
Resistors	Amount of Relative Variation between Symmetrical Resistors / Capacitors on the same Device	2.0	%
Capacitors		2.0	%

# NMF3000, NMF3010

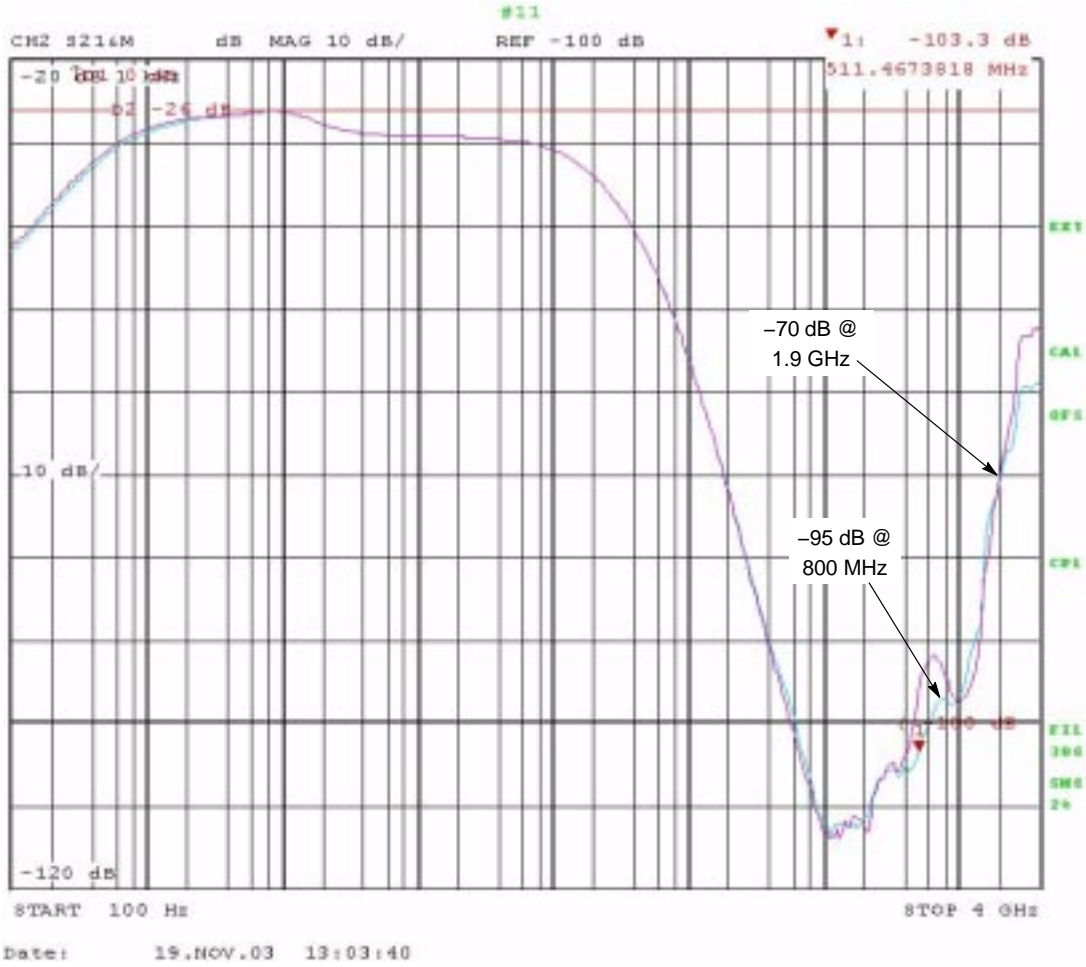


Figure 6. Typical S21 of NMF3000FCT1G & NMF3010FCT1G in a 50 Ω Environment  
2 Lines = Positive and Negative Sides

# NMF3000, NMF3010

## DAISY CHAIN SPECIFICATIONS

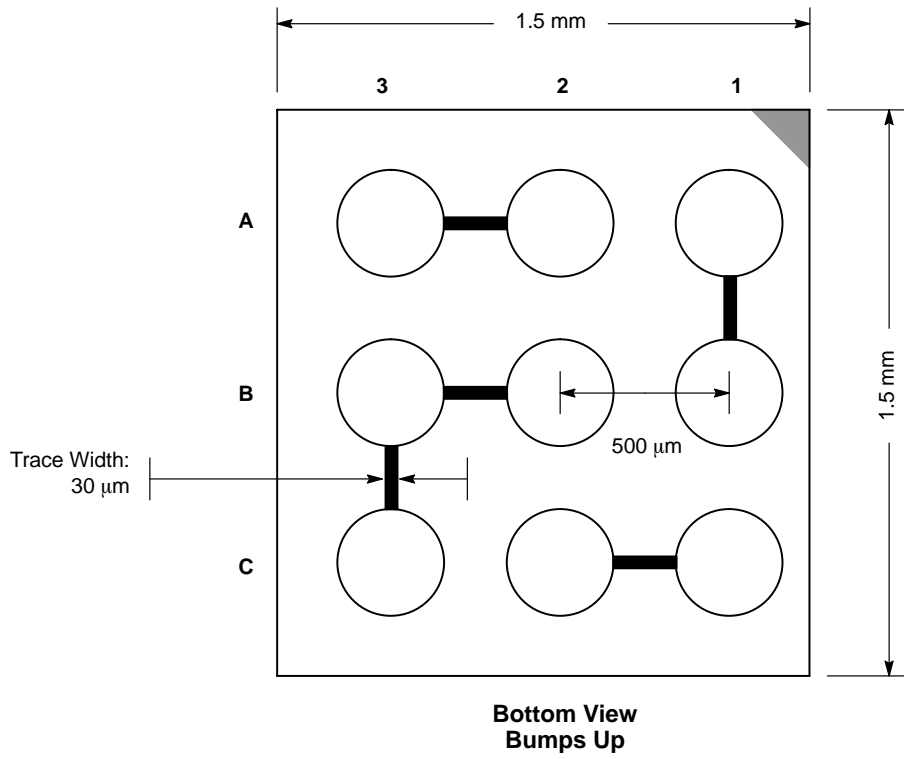


Figure 7. First Stage: NMF3000FCT1G

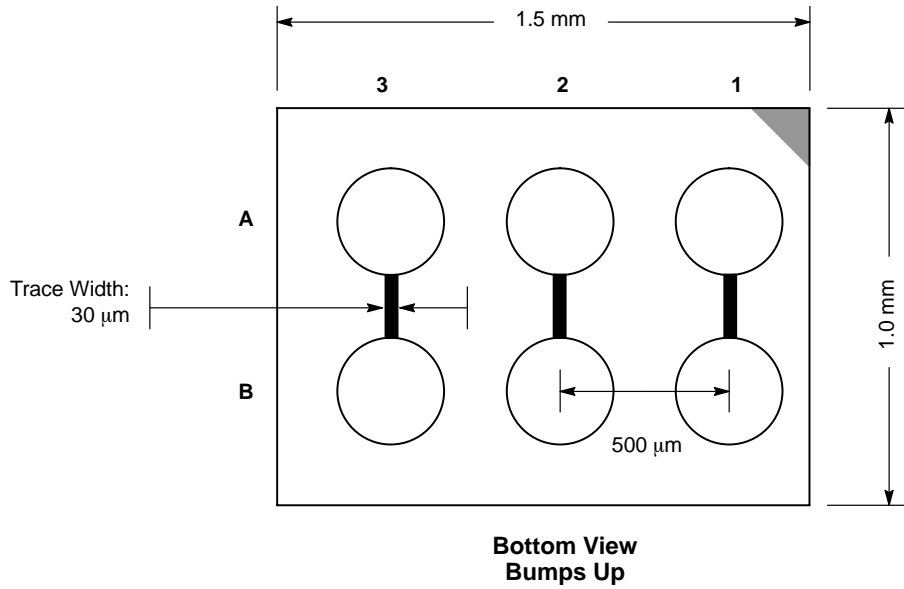


Figure 8. Second Stage: NMF3010FCT1G



## NMF3000, NMF3010

### DEVICE ORDERING INFORMATION

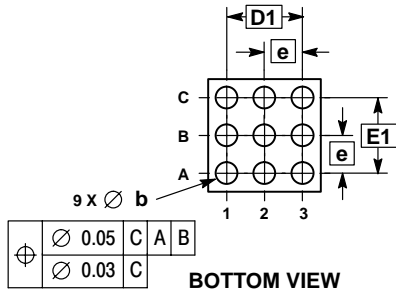
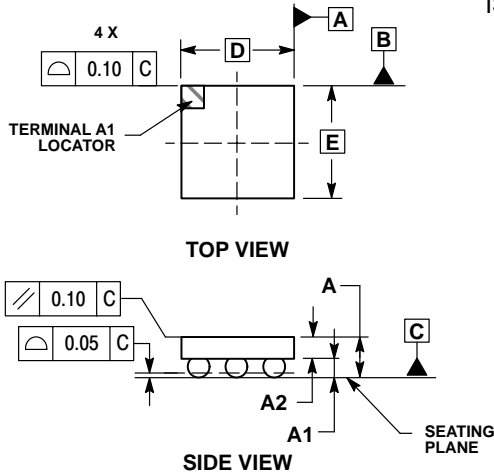
Device Order Number	Package Type	Shipping†
NMF3000FCT1G	9-Bump Flip-Chip	3000 / Tape and Reel
NMF3010FCT1G	6-Bump Flip-Chip	3000 / Tape and Reel
ENGTDSDY3x3FCT1G	9-Bump Flip-Chip	500 / Tape and Reel
ENGTDSDY2x3FCT1G	6-Bump Flip-Chip	500 / Tape and Reel

†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.

# NMF3000, NMF3010

## PACKAGE DIMENSIONS

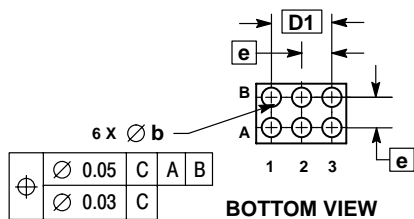
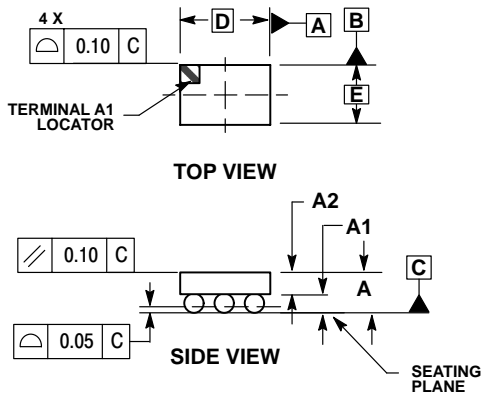
### FLIP-CHIP-9 CASE 499AE ISSUE A



- 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	1.489 BSC	
E	1.489 BSC	
b	0.290	0.340
e	0.500 BSC	
D1	1.000 BSC	
E1	1.000 BSC	

### FLIP-CHIP-6 CASE 499AF ISSUE A




- 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	1.489 BSC	
E	0.989 BSC	
b	0.290	0.340
e	0.500 BSC	
D1	1.000 BSC	

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

# NMF3000, NMF3010

**ON Semiconductor** and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA

**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada

**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada

**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada

**Japan:** ON Semiconductor, Japan Customer Focus Center

2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051

**Phone:** 81-3-5773-3850

**ON Semiconductor Website:** <http://onsemi.com>

**Order Literature:** <http://www.onsemi.com/litorder>

For additional information, please contact your  
local Sales Representative.