

# NUC2401MN

## Integrated Common Mode Choke with Integrated ESD Protection

### Description

The NUC2401MN is an Integrated Common Mode Filter for the elimination of common mode noise in high speed data line applications such as IEEE1394, USB2.0 and other LVDS type applications. ESD protection is integrated into the Common mode filter for superior protection and significant part count reduction.

### Features

- Common mode EMI Filtering and ESD Protection
- Integration of 5 Discrete components
- $\pm 12$  kV ESD Protection per IEC61000-4-2 (Contact Discharge)
- DFN: 2.0 x 2.2 mm Package
- Moisture Sensitivity Level 1
- ESD Rating: Machine Model (MM) = 1.6 kV;  
Human Body Model (HBM) = 16 kV
- This is a Pb-Free Device

### Benefits

- Reduces EMI/RFI Emissions on a Data Line
- Integrated Solution offers Cost and Space Savings
- Reduces Parasitic Inductances Which Offer a More “Ideal” Common Mode Filtering
- Integrated Solution Improves System Reliability

### Applications

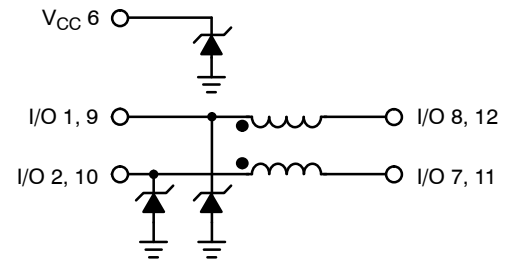
- High Speed Differential Data Lines
- USB2.0
- IEEE1394
- LVDS
- MIPI
- MDDI



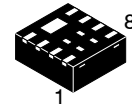
ON Semiconductor®

<http://onsemi.com>

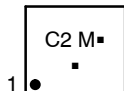
### SIMPLIFIED SCHEMATIC



### MARKING DIAGRAM



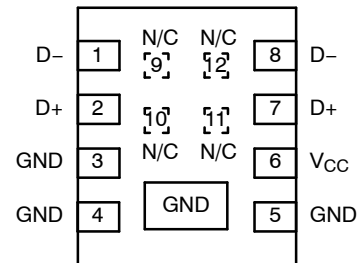
DFN8  
CASE 506BL



C2 = Specific Device Code  
M = Date Code  
▪ = Pb-Free Device

(Note: Microdot may be in either location)

### PIN CONNECTIONS\*



(Top View)

\*NOTE: Pins 1 and 9, Pins 2 and 10, Pins 7 and 11, Pins 8 and 12 are internally connected in pairs. It is recommended not to solder to Pins 9, 10, 11, 12.

### ORDERING INFORMATION

Device	Package	Shipping†
NUC2401MNTAG	DFN8 (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.

# NUC2401MN

## MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise stated)

Parameter	Symbol	Value	Units
ESD Discharge IEC61000-4-2 Contact Discharge	V <sub>PP</sub>	±12	kV
Operating Temperature Range	T <sub>OP</sub>	-40 to 85	°C
Storage Temperature Range	T <sub>STG</sub>	-55 to 125	°C
Maximum Lead Temperature for Soldering Purposes (1/8" from Case for 10 Seconds)	T <sub>L</sub>	260	°C
DC Current per Line	I <sub>LINE</sub>	100	mA

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.

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Maximum Reverse Working Voltage	V <sub>RWM</sub>				5.0	V
Breakdown Voltage	V <sub>BR</sub>	I <sub>R</sub> = 1 mA	6.0	7.6	8.6	V
Leakage Current	I <sub>R</sub>	V <sub>RWM</sub> = 5.5 V			2.0	μA
Maximum Peak Pulse Current	I <sub>PP</sub>	8x20 μs Waveform			12	A
Clamping Voltage	V <sub>C</sub>	I <sub>PP</sub> = 5 A			10	V
Resistance Pin 1 to Pin 8	R <sub>A</sub>			2.2	5.0	Ω
Resistance Pin 2 to Pin 7	R <sub>B</sub>			2.2	5.0	Ω
Capacitance (Note 1)	C <sub>LINE 1</sub>			0.8	1.0	pF
Capacitance (Note 2)	C <sub>LINE 2</sub>			0.8	1.0	pF
Common Mode Cut-Off Frequency (Note 3)	f <sub>3dB</sub>	(Above this Frequency, Appreciable Common Mode Attenuation Occurs)		40		MHz
Common Mode Impedance	Z <sub>C</sub>	@ 100 MHz		90		Ω

1. Measured at 25°C, V<sub>R</sub> = 0 V, f = 1 MHz, Pins 1 or 4 to GND.
2. Measured at 25°C, V<sub>R</sub> = 0 V, f = 1 MHz, Pins 8 or 5 to GND.
3. 50 Ω source and 50 Ω load termination.

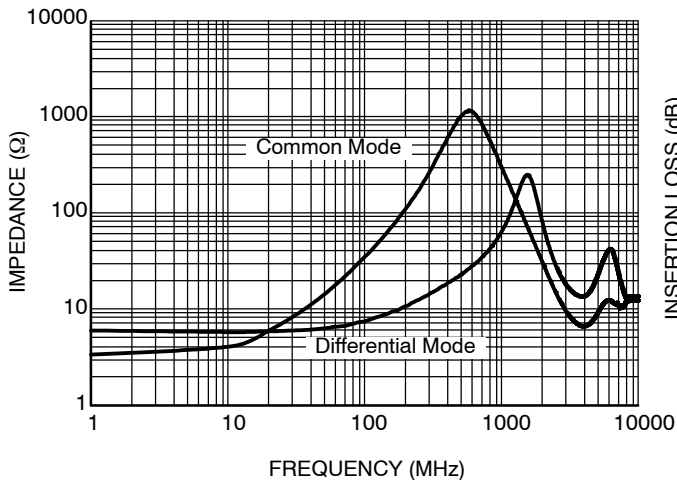


Figure 1. Impedance Characteristics vs. Frequency

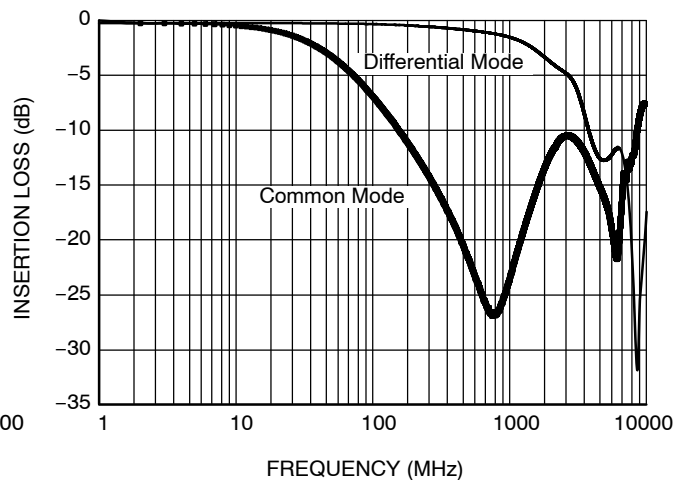
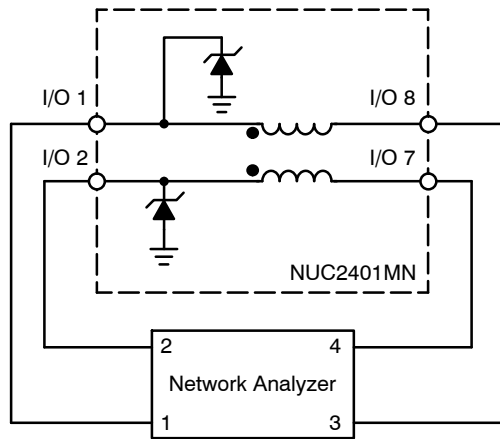


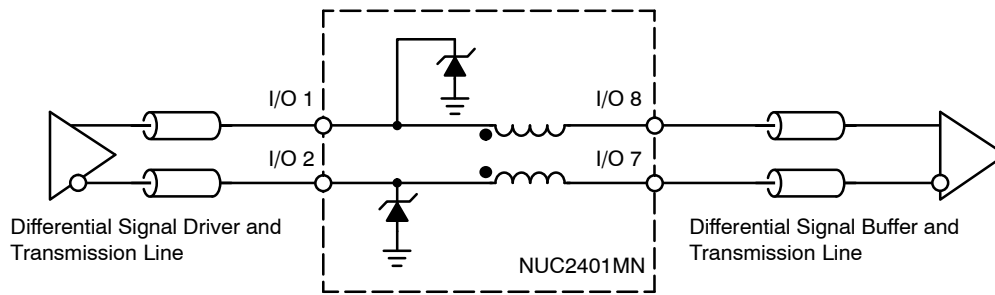
Figure 2. Insertion Loss Characteristics vs. Frequency

# NUC2401MN



Normal (Differential) Mode

**Figure 3. Normal (Differential) Mode Test Configuration**

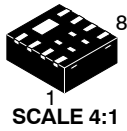


**Figure 4. Application Circuit**

# MECHANICAL CASE OUTLINE

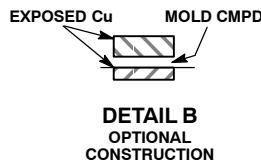
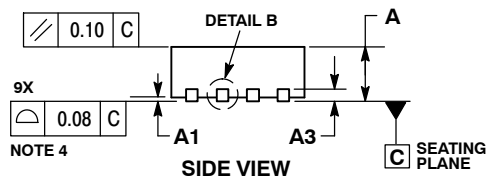
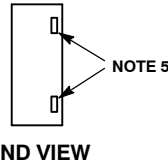
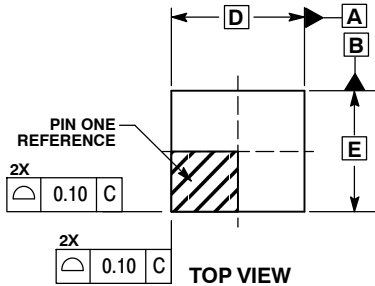
## PACKAGE DIMENSIONS

ON Semiconductor®



DFN8, 2.2x2, 0.5P  
CASE 506BL-01  
ISSUE O

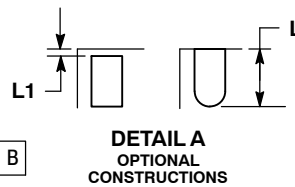
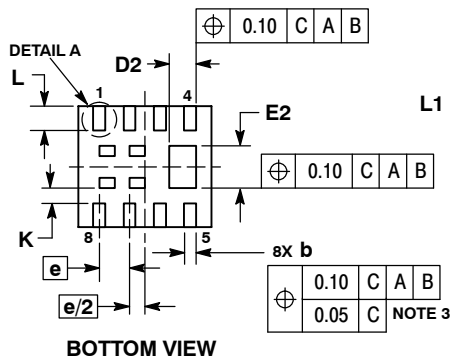
DATE 05 NOV 2008



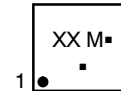
NOTES:

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.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
5. EXPOSED ENDS OF THE TERMINALS ARE ELECTRICALLY ACTIVE.

MILLIMETERS		
DIM	MIN	MAX
A	0.80	1.00
A1	0.00	0.05
A3	0.20 REF	
b	0.15	0.25
D	2.20 BSC	
D2	0.34	0.54
E	2.00 BSC	
E2	0.60	0.80
e	0.50 BSC	
K	0.20	---
L	0.30	0.50
L1	---	0.15

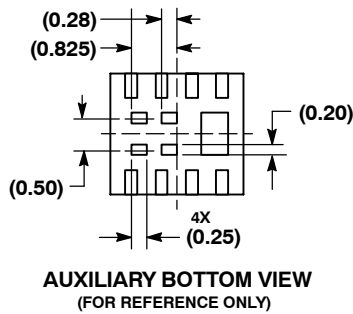


GENERIC MARKING DIAGRAM\*

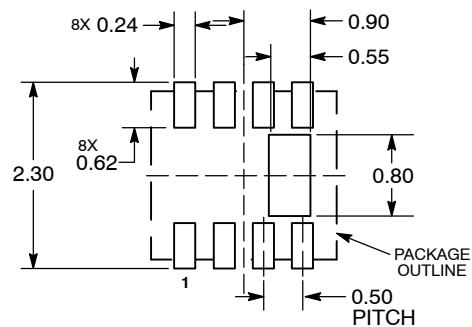


- XX = Specific Device Code
- M = Date Code
- = Pb-Free Device

\*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.



SOLDERING FOOTPRINT\*



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

DOCUMENT NUMBER:	98AON35711E	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
STATUS:	ON SEMICONDUCTOR STANDARD	
NEW STANDARD:		
DESCRIPTION:	DFN8, 2.2X2.0, 0.5P	PAGE 1 OF 2



**onsemi**, **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**'s 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.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at [www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)

