USB Filter with ESD Protection

NUF2101M

This device is designed for applications requiring **Line Termination**, **EMI Filtering** and **ESD Protection**. It is intended for use in downstream USB 1.1 ports, Cellular phones, Wireless equipment and computer applications. This device offers an integrated solution in a small package (TSOP−6, Case 318G) reducing PCB space and cost.

Features:

- Provides USB Line Termination, Filtering and ESD Protection
- Single IC Offers Cost Savings by Replacing 4 Resistors, 2 Capacitors, and 5 TVs diodes
- EMI Filtering Prevents Noise from Entering/Leaving the System
- IEC61000−4−2 (Level 4)
  8 kV (Contact)
  15 kV (Air)
- ESD Ratings: Machine Model = C
  Human Body Model = 3B
- Pb−Free Package is Available

Benefits:

- TSOP−6 Package Minimizes PCB Space
- Integrated Circuit Increases System Reliability versus Discrete Component Implementation
- TVs Devices Provide ESD Protection That is Better than a Discrete Implementation because the Small IC minimizes Parasitic Inductances

Typical Applications:

- USB Hubs
- Computer Motherboards

MAXIMUM RATINGS (T_A = 25°C)

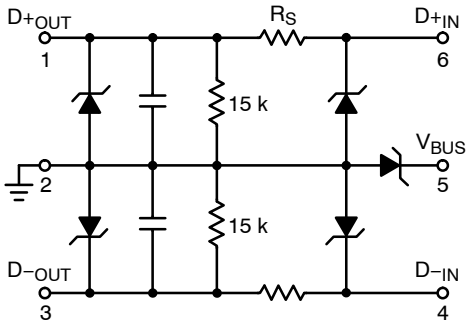
Symbol	Rating	Value	Unit
P_D	Steady State Power	225	mW
$T_{J(max)}$	Maximum Junction Temperature	125	°C
T_J	Operating Temperature Range	−55 to +125	°C
T_{stg}	Storage Temperature Range	−55 to +125	°C
T_L	Lead Solder Temperature (10 second duration)	260	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

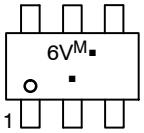


TSOP−6
CASE 318G
STYLE 10

SCHEMATIC



MARKING DIAGRAM



6V = Specific Device Code
M = Date Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
NUF2101MT1G	TSOP−6 (Pb−Free)	3,000/Tape & Reel

DISCONTINUED (Note 1)

NUF2101MT1	TSOP−6	3,000/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.

1. **DISCONTINUED:** This device is not recommended for new design. Please contact your **onsemi** representative for information. The most current information on this device may be available on www.onsemi.com.

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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Device	Device Marking	V_{RWM} (Volts)	V_{BR} @ 1 mA (Volts)		Max I_R @ V_{RWM} = 5.25 V V_{BUS} to GND (μA)	Max I_R @ V_{RWM} = 3.3 V V_{BUS} Pin (μA)	Typical Line Capacitance (pF) (Notes 2, 3)	Series Resistor R_S (Ω) (Note 1)			Pulldown Resistor R_{pd} (kΩ)		
			Min	Max				Min	Nom	Max	Min	Nom	Max
NUF2101MT1	6V	5.25	6.0	8.0	1.0	0.1	55	26.3	30	33.7	13	15	17
NUF2101MT1G	6V	5.25	6.0	8.0	1.0	0.1	55	26.3	30	33.7	13	15	17

1. For other R_S values (i.e. R_S = 30 Ω) contact your local **onsemi** sales representative.
2. Measured at 25°C, V_R = 0 V, f = 1 MHz, Pins 2, 3, 4 or 5 to GND with Pin 1 also grounded.
3. For other capacitance values contact your local **onsemi** sales representative.

TYPICAL CHARACTERISTICS

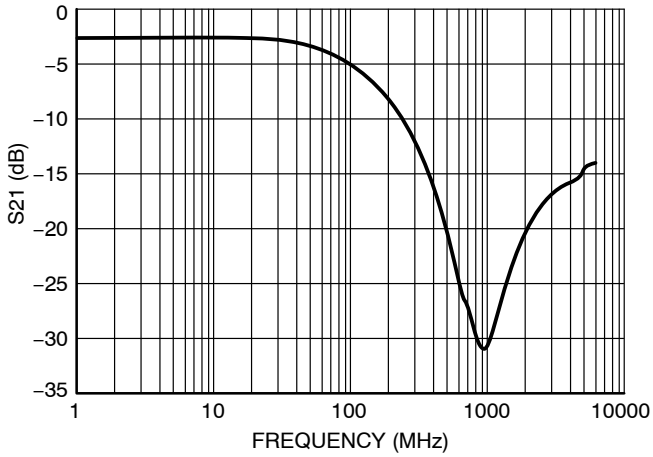


Figure 1. Insertion Loss Characteristics

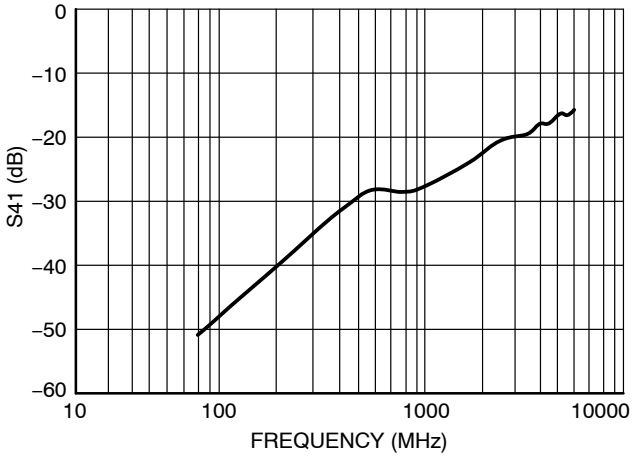


Figure 2. Analog Cross−Talk

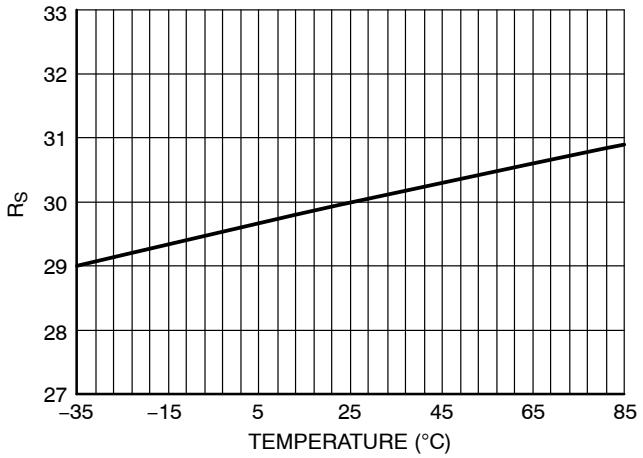


Figure 3. R_S vs. Temperature

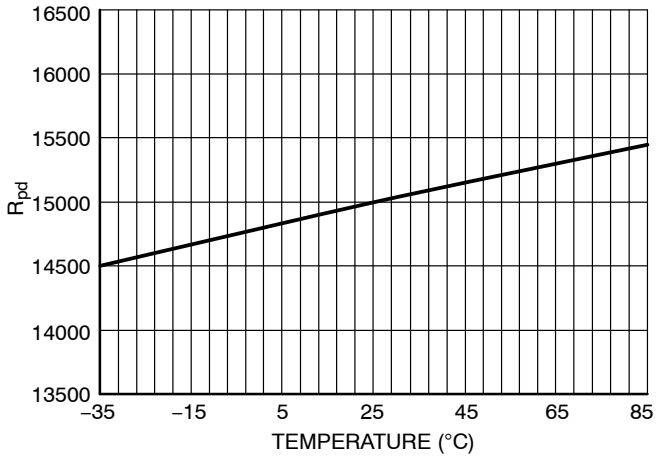


Figure 4. R_{pd} vs. Temperature

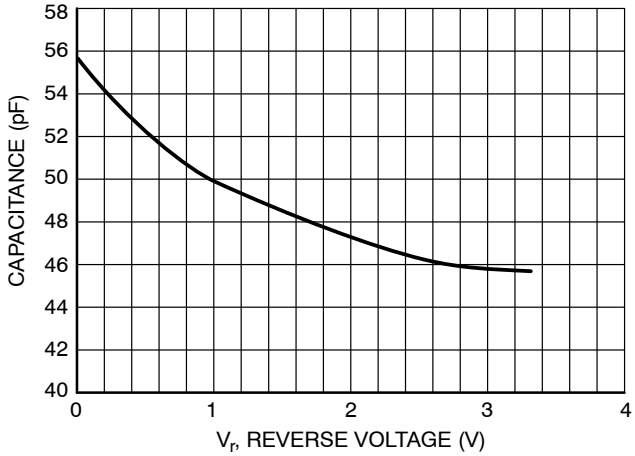
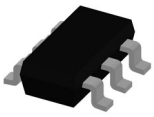
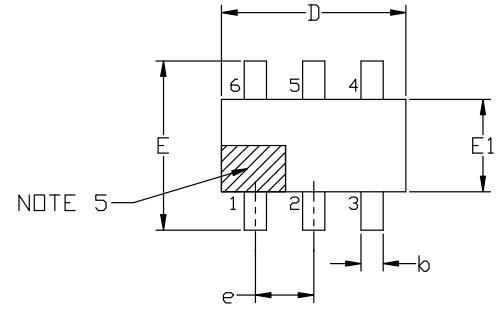


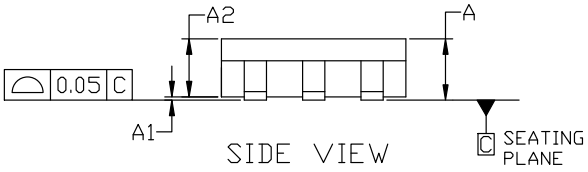
Figure 5. Typical Capacitance

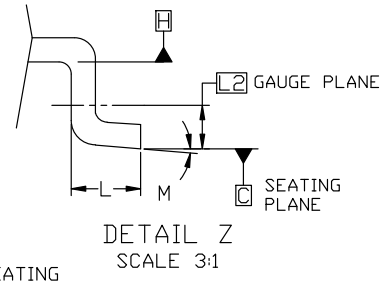


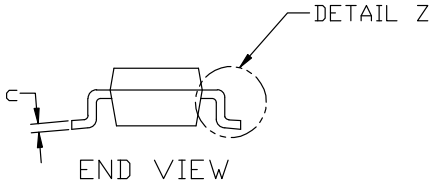
TSOP−6 3.00x1.50x0.90, 0.95P
CASE 318G
ISSUE W

DATE 26 FEB 2024



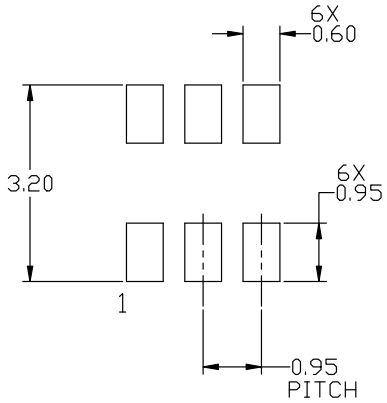






NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN 1 INDICATOR MUST BE LOCATED IN THE INDICATED ZONE

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.01	0.06	0.10
A2	0.80	0.90	1.00
b	0.25	0.38	0.50
c	0.10	0.18	0.26
D	2.90	3.00	3.10
E	2.50	2.75	3.00
E1	1.30	1.50	1.70
e	0.85	0.95	1.05
L	0.20	0.40	0.60
L2	0.25 BSC		
M	0°	---	10°



RECOMMENDED MOUNTING FOOTPRINT

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

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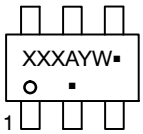
TSOP−6 3.00x1.50x0.90, 0.95P
CASE 318G
ISSUE W

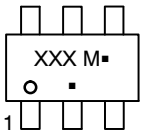
DATE 26 FEB 2024

GENERIC MARKING DIAGRAM*



IC

XXX = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb−Free Package



STANDARD

XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

*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. Some products may not follow the Generic Marking.

STYLE 1:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

STYLE 2:
PIN 1. EMITTER 2
2. BASE 1
3. COLLECTOR 1
4. EMITTER 1
5. BASE 2
6. COLLECTOR 2

STYLE 3:
PIN 1. ENABLE
2. N/C
3. R BOOST
4. Vz
5. V in
6. V out

STYLE 4:
PIN 1. N/C
2. V in
3. NOT USED
4. GROUND
5. ENABLE
6. LOAD

STYLE 5:
PIN 1. EMITTER 2
2. BASE 2
3. COLLECTOR 1
4. EMITTER 1
5. BASE 1
6. COLLECTOR 2

STYLE 6:
PIN 1. COLLECTOR
2. COLLECTOR
3. BASE
4. EMITTER
5. COLLECTOR
6. COLLECTOR

STYLE 7:
PIN 1. COLLECTOR
2. COLLECTOR
3. BASE
4. N/C
5. COLLECTOR
6. EMITTER

STYLE 8:
PIN 1. Vbus
2. D(in)
3. D(in)+
4. D(out)+
5. D(out)
6. GND

STYLE 9:
PIN 1. LOW VOLTAGE GATE
2. DRAIN
3. SOURCE
4. DRAIN
5. DRAIN
6. HIGH VOLTAGE GATE

STYLE 10:
PIN 1. D(OUT)+
2. GND
3. D(OUT)−
4. D(IN)−
5. VBUS
6. D(IN)+

STYLE 11:
PIN 1. SOURCE 1
2. DRAIN 2
3. DRAIN 2
4. SOURCE 2
5. GATE 1
6. DRAIN 1/GATE 2

STYLE 12:
PIN 1. I/O
2. GROUND
3. I/O
4. I/O
5. VCC
6. I/O

STYLE 13:
PIN 1. GATE 1
2. SOURCE 2
3. GATE 2
4. DRAIN 2
5. SOURCE 1
6. DRAIN 1

STYLE 14:
PIN 1. ANODE
2. SOURCE
3. GATE
4. CATHODE/DRAIN
5. CATHODE/DRAIN
6. CATHODE/DRAIN

STYLE 15:
PIN 1. ANODE
2. SOURCE
3. GATE
4. DRAIN
5. N/C
6. CATHODE

STYLE 16:
PIN 1. ANODE/CATHODE
2. BASE
3. EMITTER
4. COLLECTOR
5. ANODE
6. CATHODE

STYLE 17:
PIN 1. EMITTER
2. BASE
3. ANODE/CATHODE
4. ANODE
5. CATHODE
6. COLLECTOR

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