# NUP4301MR6, SZNUP4301MR6

## Low Capacitance Diode Array for ESD Protection in Four Data Lines

SZ/NUP4301MR6T1G is a micro−integrated device designed to provide protection for sensitive components from possible harmful electrical transients; for example, ESD (electrostatic discharge).

### Features

- Low Capacitance (1.5 pf Maximum Between I/O Lines)
- Single Package Integration Design
- Provides ESD Protection for JEDEC Standards JESD22
  Machine Model = Class C
  Human Body Model = Class 3B
- Protection for IEC61000−4−2 (Level 4)
  8.0 kV (Contact)
  15 kV (Air)
- Ensures Data Line Speed and Integrity
- Fewer Components and Less Board Space
- Direct the Transient to Either Positive Side or to the Ground
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- This is a Pb−Free Device*

### Applications

- USB 1.1 and 2.0 Data Line Protection
- T1/E1 Secondary IC Protection
- T3/E3 Secondary IC Protection
- HDSL, IDSL Secondary IC Protection
- Video Line Protection
- Microcontroller Input Protection
- Base Stations
- I$^2$C Bus Protection

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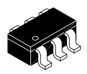
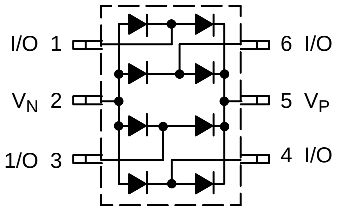
**http://onsemi.com**

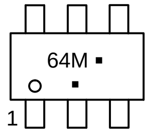


**SC−74**
**CASE 318F**

### PIN CONFIGURATION AND SCHEMATIC



### MARKING DIAGRAM



64 = Device Code
M = Date Code*
▪ = Pb−Free Package
(Note: Microdot may be in either location.

*Date Code orientation may vary depending upon manufacturing location.

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| NUP4301MR6T1G | SC−74<br>(Pb−Free) | 3,000 /<br>Tape & Reel |
| SZNUP4301MR6T1G | SC−74<br>(Pb−Free) | 3,000 /<br>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.

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

September, 2014 − Rev. 7

**MAXIMUM RATINGS** (Each Diode) ($T_J$ = 25°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Reverse Voltage | $V_R$ | 70 | Vdc |
| Forward Current | $I_F$ | 200 | mAdc |
| Peak Forward Surge Current | $I_{FM(surge)}$ | 500 | mAdc |
| Repetitive Peak Reverse Voltage | $V_{RRM}$ | 70 | V |
| Average Rectified Forward Current (Note 1) (averaged over any 20 ms period) | $I_{F(AV)}$ | 715 | mA |
| Repetitive Peak Forward Current | $I_{FRM}$ | 450 | mA |
| Non−Repetitive Peak Forward Current<br>t = 1.0 μs<br>t = 1.0 ms<br>t = 1.0 S | $I_{FSM}$ | 2.0<br>1.0<br>0.5 | A |

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.

1. FR−5 = 1.0 × 0.75 × 0.062 in.

**THERMAL CHARACTERISTICS**

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction−to−Ambient | $R_{\theta JA}$ | 556 | °C/W |
| Lead Solder Temperature, Maximum 10 Seconds Duration | $T_L$ | 260 | °C |
| Junction Temperature | $T_J$ | −40 to +150 | °C |
| Storage Temperature | $T_{stg}$ | −55 to +150 | °C |

**ELECTRICAL CHARACTERISTICS** ($T_J$ = 25°C unless otherwise noted) (Each Diode)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Reverse Breakdown Voltage<br>($I_{(BR)}$ = 100 μA) | $V_{(BR)}$ | 70 | – | – | Vdc |
| Reverse Voltage Leakage Current<br>($V_R$ = 70 Vdc)<br>($V_R$ = 25 Vdc, $T_J$ = 150°C)<br>($V_R$ = 70 Vdc, $T_J$ = 150°C) | $I_R$ | –<br>–<br>– | –<br>–<br>– | 2.5<br>30<br>50 | μAdc |
| Capacitance (between I/O pins)<br>($V_R$ = 0 V, f = 1.0 MHz) | $C_D$ | – | 0.8 | 1.5 | pF |
| Capacitance (between I/O pin and ground)<br>($V_R$ = 0 V, f = 1.0 MHz) | $C_D$ | – | 1.6 | 3 | pF |
| Forward Voltage<br>($I_F$ = 1.0 mAdc)<br>($I_F$ = 10 mAdc)<br>($I_F$ = 50 mAdc)<br>($I_F$ = 150 mAdc) | $V_F$ | –<br>–<br>–<br>– | –<br>–<br>–<br>– | 715<br>855<br>1000<br>1250 | $mV_{dc}$ |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Alumina = 0.4 × 0.3 × 0.024 in. 99.5% alumina.
3. Include SZ-prefix devices where applicable.

## Curves Applicable to Each Cathode

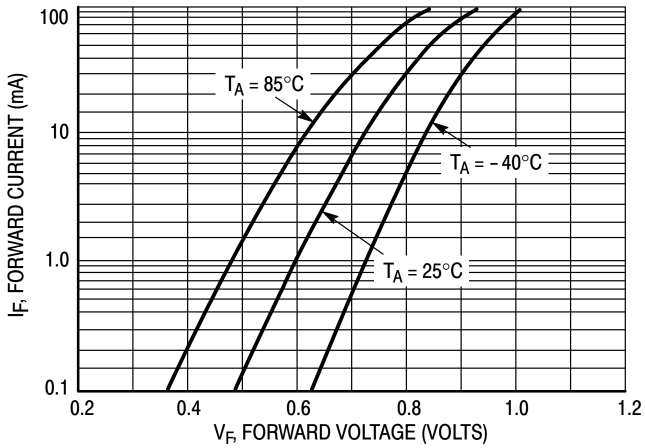


Figure 1. Forward Voltage

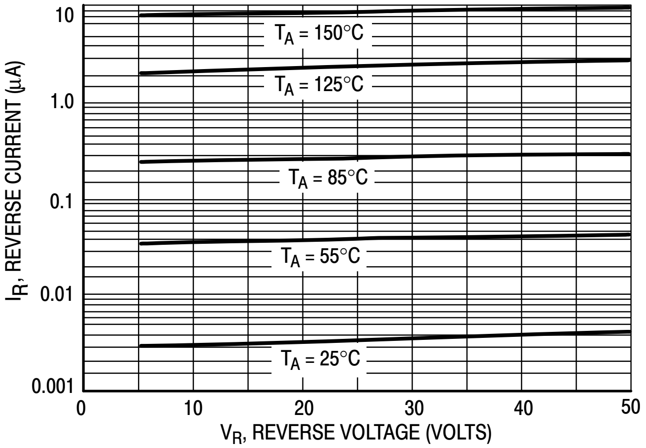


Figure 2. Leakage Current

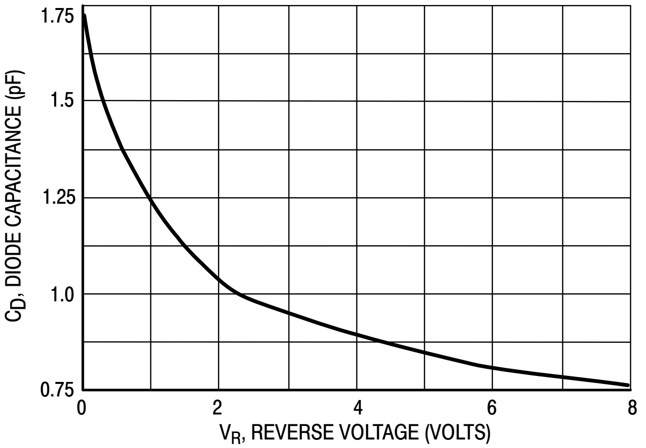
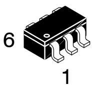


Figure 3. Capacitance

# MECHANICAL CASE OUTLINE
## PACKAGE DIMENSIONS



**SCALE 2:1**

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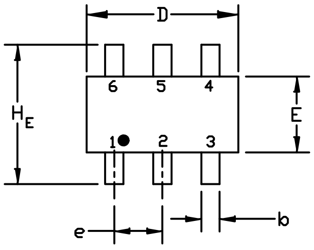
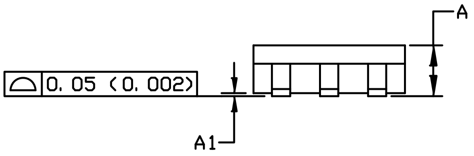
CASE 318F
ISSUE P

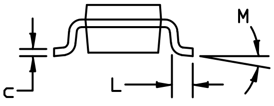
DATE 07 OCT 2021



TOP VIEW



SIDE VIEW

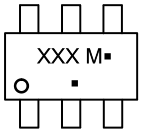


END VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994
2. CONTROLLING DIMENSION: INCHES
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.

| | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| DIM | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 0.90 | 1.00 | 1.10 | 0.035 | 0.039 | 0.043 |
| A1 | 0.01 | 0.06 | 0.10 | 0.001 | 0.002 | 0.004 |
| b | 0.25 | 0.37 | 0.50 | 0.010 | 0.015 | 0.020 |
| c | 0.10 | 0.18 | 0.26 | 0.004 | 0.007 | 0.010 |
| D | 2.90 | 3.00 | 3.10 | 0.114 | 0.118 | 0.122 |
| E | 1.30 | 1.50 | 1.70 | 0.051 | 0.059 | 0.067 |
| e | 0.85 | 0.95 | 1.05 | 0.034 | 0.037 | 0.041 |
| $H_E$ | 2.50 | 2.75 | 3.00 | 0.099 | 0.108 | 0.118 |
| L | 0.20 | 0.40 | 0.60 | 0.008 | 0.016 | 0.024 |
| M | 0° | --- | 10° | 0° | --- | 10° |

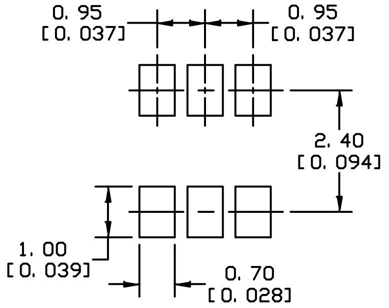
### GENERIC MARKING DIAGRAM*



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

(Note: Microdot may be in either location)

*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.



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

SOLDERING FOOTPRINT

STYLE 1:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. ANODE
6. CATHODE

STYLE 2:
PIN 1. NO CONNECTION
2. COLLECTOR
3. EMITTER
4. NO CONNECTION
5. COLLECTOR
6. BASE

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

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

STYLE 5:
PIN 1. CHANNEL 1
2. ANODE
3. CHANNEL 2
4. CHANNEL 3
5. CATHODE
6. CHANNEL 4

STYLE 6:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. CATHODE
6. CATHODE

STYLE 7:
PIN 1. SOURCE 1
2. GATE 1
3. DRAIN 2
4. SOURCE 2
5. GATE 2
6. DRAIN 1

STYLE 8:
PIN 1. EMITTER 1
2. BASE 2
3. COLLECTOR 2
4. EMITTER 2
5. BASE 1
6. COLLECTOR 1

STYLE 9:
PIN 1. EMITTER 2
2. BASE 2
3. COLLECTOR 1
4. EMITTER 1
5. BASE 1
6. COLLECTOR 2

STYLE 10:
PIN 1. ANODE/CATHODE
2. BASE
3. EMITTER
4. COLLECTOR
5. ANODE
6. CATHODE

STYLE 11:
PIN 1. EMITTER
2. BASE
3. ANODE/CATHODE
4. ANODE
5. CATHODE
6. COLLECTOR

| | | |
|---|---|---|
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