



**THE DATASHEET OF  
NUP4301MR6T1**



# NUP4301MR6T1

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

NUP4301MR6T1 is a MicroIntegration™ 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

### 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<sup>2</sup>C Bus Protection

### MAXIMUM RATINGS (Each Diode) (T<sub>J</sub> = 25°C unless otherwise noted)

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

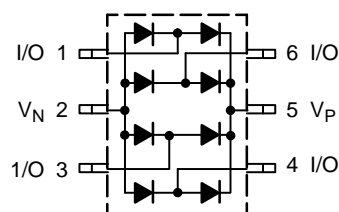
1. FR-5 = 1.0 × 0.75 × 0.062 in.



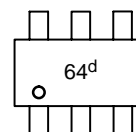
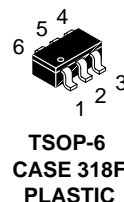
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### PIN CONFIGURATION AND SCHEMATIC



### MARKING DIAGRAM



64 = Specific Device Code  
d = Date Code

### ORDERING INFORMATION

| Device       | Package | Shipping         |
|--------------|---------|------------------|
| NUP4301MR6T1 | TSOP-6  | 3000/Tape & Reel |

# NUP4301MR6T1

## THERMAL CHARACTERISTICS

| Characteristic                                         | Symbol          | Max         | Unit |
|--------------------------------------------------------|-----------------|-------------|------|
| Thermal Resistance Junction-to-Ambient                 | $R_{\theta JA}$ | 556         | °C/W |
| Lead Solder Temperature<br>Maximum 10 Seconds Duration | $T_L$           | 260         | °C   |
| Junction Temperature                                   | $T_J$           | -40 to +85  | °C   |
| Storage Temperature                                    | $T_{stg}$       | -55 to +150 | °C   |

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|                                                                                                                                                                                   |            |    |     |                            |                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----|-----|----------------------------|------------------|
| Reverse Breakdown Voltage ( $I_{(BR)} = 100 \mu\text{A}$ )                                                                                                                        | $V_{(BR)}$ | 70 | -   | -                          | Vdc              |
| Reverse Voltage Leakage Current<br>( $V_R = 70 \text{ Vdc}$ )<br>( $V_R = 25 \text{ Vdc}$ , $T_J = 150^\circ\text{C}$ )<br>( $V_R = 70 \text{ Vdc}$ , $T_J = 150^\circ\text{C}$ ) | $I_R$      | -  | -   | 2.5<br>30<br>50            | $\mu\text{Adc}$  |
| Capacitance (between I/O pins)<br>( $V_R = 0 \text{ V}$ , $f = 1.0 \text{ MHz}$ )                                                                                                 | $C_D$      | -  | 0.8 | 1.5                        | pF               |
| Capacitance (between I/O pin and ground)<br>( $V_R = 0 \text{ V}$ , $f = 1.0 \text{ MHz}$ )                                                                                       | $C_D$      | -  | 1.6 | 3                          | pF               |
| Forward Voltage<br>( $I_F = 1.0 \text{ mAdc}$ )<br>( $I_F = 10 \text{ mAdc}$ )<br>( $I_F = 50 \text{ mAdc}$ )<br>( $I_F = 150 \text{ mAdc}$ )                                     | $V_F$      | -  | -   | 715<br>855<br>1000<br>1250 | $\text{mV}_{dc}$ |

- FR-5 =  $1.0 \times 0.75 \times 0.062 \text{ in.}$
- Alumina =  $0.4 \times 0.3 \times 0.024 \text{ in.}$  99.5% alumina.

# NUP4301MR6T1

## Curves Applicable to Each Cathode

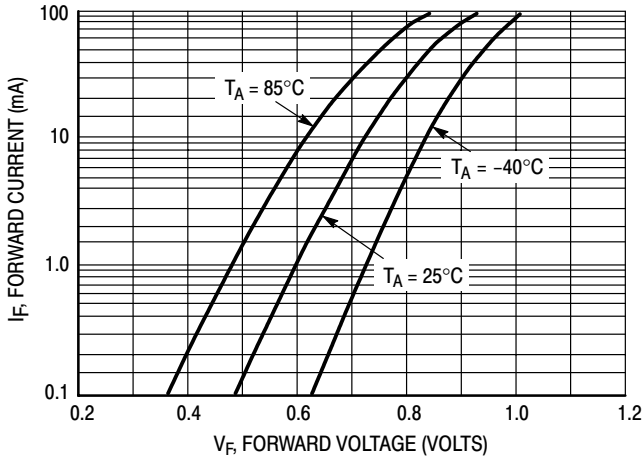


Figure 1. Forward Voltage

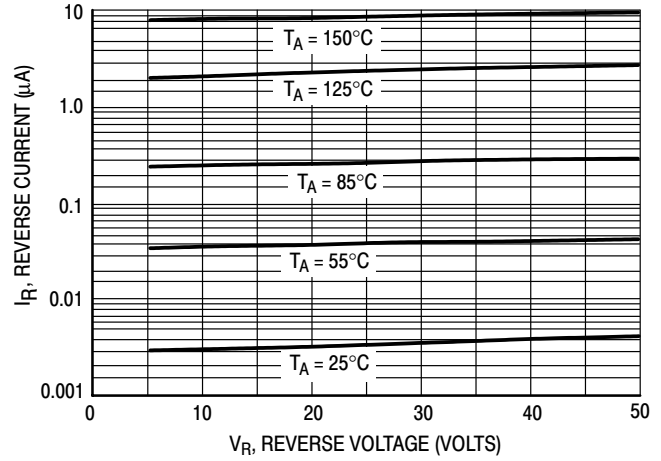


Figure 2. Leakage Current

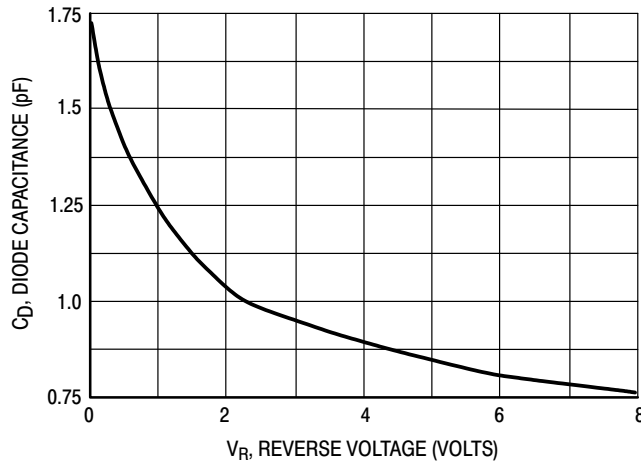
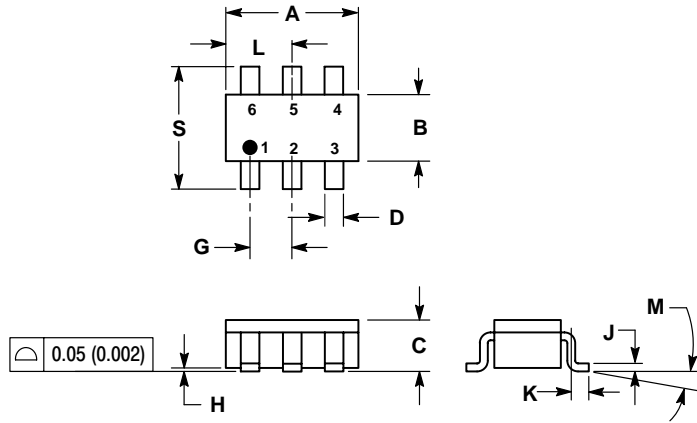


Figure 3. Capacitance

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## PACKAGE DIMENSIONS

TSOP-6  
CASE 318F-04  
ISSUE J




NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318F-01, -02, -03 OBSOLETE. NEW STANDARD 318F-04.

| DIM | INCHES |        | MILLIMETERS |       |
|-----|--------|--------|-------------|-------|
|     | MIN    | MAX    | MIN         | MAX   |
| A   | 0.1142 | 0.1220 | 2.90        | 3.10  |
| B   | 0.0512 | 0.0669 | 1.30        | 1.70  |
| C   | 0.0354 | 0.0433 | 0.90        | 1.10  |
| D   | 0.0098 | 0.0197 | 0.25        | 0.50  |
| G   | 0.0335 | 0.0413 | 0.85        | 1.05  |
| H   | 0.0005 | 0.0040 | 0.013       | 0.100 |
| J   | 0.0040 | 0.0102 | 0.10        | 0.26  |
| K   | 0.0079 | 0.0236 | 0.20        | 0.60  |
| L   | 0.0493 | 0.0649 | 1.25        | 1.65  |
| M   | 0°     | 10°    | 0°          | 10°   |
| S   | 0.0985 | 0.1181 | 2.50        | 3.00  |

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