

# **NUP1301ML3T1G, SZNUP1301ML3T1G**

## **Low Capacitance Diode Array for ESD Protection in a Single Data Line**

NUP1301ML3T1G is a MicroIntegration device designed to provide protection for sensitive components from possible harmful electrical transients; for example, ESD (electrostatic discharge).

### **Features**

- Low Capacitance (0.9 pF Maximum)
- 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
- Pb-Free Package is Available\*

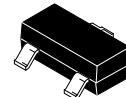
### **Applications**

- 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

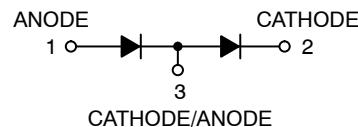


**ON Semiconductor®**

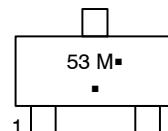
<http://onsemi.com>



**SOT-23  
CASE 318  
STYLE 11**



### **MARKING DIAGRAM**



53 = Device Code  
M = Date Code  
■ = Pb-Free Package

(Note: Microdot may be in either location)

### **ORDERING INFORMATION**

<b>Device</b>	<b>Package</b>	<b>Shipping<sup>†</sup></b>
NUP1301ML3T1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
SZNUP1301ML3T1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel

<sup>†</sup>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.

# NUP1301ML3T1G, SZNUP1301ML3T1G

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

Rating	Symbol	Value	Unit
Reverse Voltage	$V_R$	70	Vdc
Forward Current	$I_F$	215	mAdc
Peak Forward Surge Current	$I_{FM(\text{surge})}$	500	mAdc
Repetitive Peak Reverse Voltage	$V_{RRM}$	70	V
Average Rectified Forward Current (Note 1) (averaged over any 20 ms period)	$I_{F(\text{AV})}$	715	mA
Repetitive Peak Forward Current	$I_{FRM}$	450	mA
Non-Repetitive Peak Forward Current $t = 1.0 \mu\text{s}$ $t = 1.0 \text{ ms}$ $t = 1.0 \text{ S}$	$I_{FSM}$	2.0 1.0 0.5	A

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.

1. FR-5 =  $1.0 \times 0.75 \times 0.062$  in.

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	625	°C/W
Lead Solder Temperature Maximum 10 Seconds Duration	$T_L$	260	°C
Junction Temperature	$T_J$	-65 to 150	°C
Storage Temperature	$T_{\text{stg}}$	-65 to +150	°C

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

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

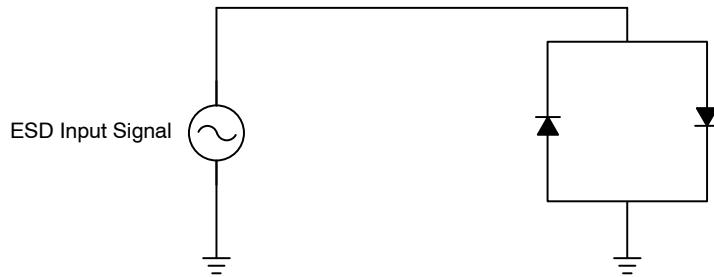
### OFF CHARACTERISTICS

Reverse Breakdown Voltage ( $I_{(BR)} = 100 \mu\text{A}$ )	$V_{(BR)}$	70	-	-	Vdc
Reverse Voltage Leakage Current ( $V_R = 70 \text{ Vdc}$ ) ( $V_R = 25 \text{ Vdc}, T_J = 150^\circ\text{C}$ ) ( $V_R = 70 \text{ Vdc}, T_J = 150^\circ\text{C}$ )	$I_R$	- - -	- - -	2.5 30 50	μAdc
Diode Capacitance (between I/O and ground) ( $V_R = 0, f = 1.0 \text{ MHz}$ )	$C_D$	-	-	0.9	pF
Forward Voltage ( $I_F = 1.0 \text{ mAdc}$ ) ( $I_F = 10 \text{ mAdc}$ ) ( $I_F = 50 \text{ mAdc}$ ) ( $I_F = 150 \text{ mAdc}$ )	$V_F$	- - - -	- - - -	715 855 1000 1250	mV <sub>dc</sub>

2. FR-5 =  $1.0 \times 0.75 \times 0.062$  in.

3. Alumina =  $0.4 \times 0.3 \times 0.024$  in, 99.5% alumina.

4. Include SZ-prefix devices where applicable.

**Figure 1. ESD Test Circuit****APPLICATION NOTE****Electrostatic Discharge**

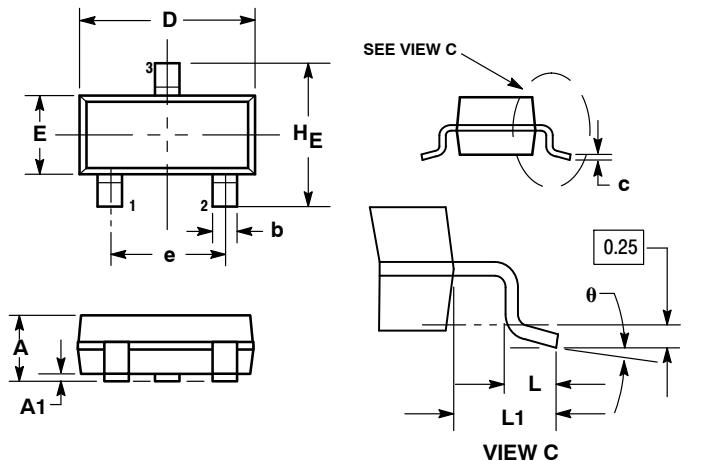
A common means of protecting high-speed data lines is to employ low-capacitance diode arrays in a rail-to-rail configuration. Two devices per line are connected between two fixed voltage references such as  $V_{CC}$  and ground. When the transient voltage exceeds the forward voltage ( $V_F$ ) drop of the diode plus the reference voltage, the diodes direct the

surge to the supply rail or ground. This method has several advantages including low loading capacitance, fast response time, and inherent bidirectionality (within the reference voltages). See Figure 1 for the test circuit used to verify the ESD rating for this device.

# NUP1301ML3T1G, SZNUP1301ML3T1G

## PACKAGE DIMENSIONS

### SOT-23 (TO-236) CASE 318-08 ISSUE AP



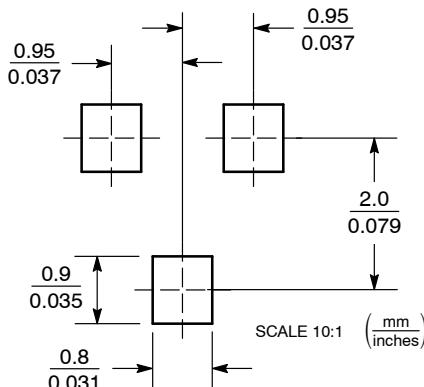
#### NOTES:

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. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
H_E	2.10	2.40	2.64	0.083	0.094	0.104
θ	0°	---	10°	0°	---	10°

STYLE 11:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE-ANODE

## SOLDERING FOOTPRINT



**ON Semiconductor** and **ON** 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

### Europe, Middle East and Africa Technical Support:

Phone: 421 33 790 2910

### Japan Customer Focus Center

Phone: 81-3-5817-1050

### ON Semiconductor Website: [www.onsemi.com](http://www.onsemi.com)

### Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative

**Данный компонент на территории Российской Федерации****Вы можете приобрести в компании MosChip.**

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибуторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ Р В 0015-002 и ЭС РД 009

**Офис по работе с юридическими лицами:**

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru  
moschip.ru\_4

moschip.ru\_6  
moschip.ru\_9