

NUP1105LT1G, SZNUP1105LT1G

ESD Protection Diode

Single Line CAN/LIN Bus Protector

The NUP1105L has been designed to protect LIN and single line CAN transceivers from ESD and other harmful transient voltage events. This device provides bidirectional protection for the data line with a single SOT-23 package, giving the system designer a low cost option for improving system reliability and meeting stringent EMI requirements.

Features

- SOT-23 Package Allows One Separate Bidirectional Configuration
- 350 W Peak Power Dissipation per Line (8 x 20 μ sec Waveform)
- Low Reverse Leakage Current (< 100 nA)
- IEC Compatibility:
 - IEC 61000-4-2 (ESD): Level 4
 - IEC 61000-4-4 (EFT): 40 A – 5/50 ns
 - IEC 61000-4-5 (Lighting) 8.0 A (8/20 μ s)
- ISO 7637-1, Nonrepetitive EMI Surge Pulse TBD
- ISO 7637-3, Repetitive Electrical Fast Transient (EFT) TBD
- EMI Surge Pulses
- Flammability Rating UL 94 V-0
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

Applications

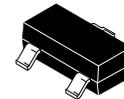
- Automotive Electronics
 - ◆ LIN Bus
 - ◆ Single Line CAN
- Industrial Control Networks
 - ◆ Smart Distribution Systems (SDS[®])
 - ◆ DeviceNet[™]



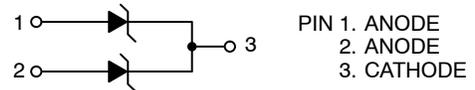
ON Semiconductor[®]

www.onsemi.com

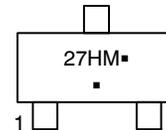
SOT-23 BIDIRECTIONAL VOLTAGE SUPPRESSOR 350 W PEAK POWER



SOT-23
CASE 318
STYLE 27



MARKING DIAGRAM



27H = Device Code
M = Date Code
■ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|---------------|---------------------|-------------------------|
| NUP1105LT1G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| SZNUP1105LT1G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| NUP1105LT3G | SOT-23 (Pb-Free) | 10,000 / 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.

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MAXIMUM RATINGS (T_J = 25°C, unless otherwise specified)

| Symbol | Rating | Value | Unit |
|----------------|---|-----------------|---------------|
| PPK | Peak Power Dissipation 8 x 20 μs Double Exponential Waveform (Note 1) | 350 | W |
| T _J | Operating Junction Temperature Range | -55 to 150 | °C |
| T _J | Storage Temperature Range | -55 to 150 | °C |
| T _L | Lead Solder Temperature (10 s) | 260 | °C |
| ESD | Human Body model (HBM) Machine Model (MM) IEC 61000-4-2 Specification (Contact) | 16 400 30 | kV V kV |

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. Non-repetitive current pulse per Figure 1.

ELECTRICAL CHARACTERISTICS (T_J = 25°C, unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|------------------|----------------------------|--|------|-----|----------|------|
| V _{RWM} | Reverse Working Voltage | (Note 2) | 24 | | | V |
| V _{BR} | Breakdown Voltage | I _T = 1 mA (Note 3) | 25.7 | | 28.4 | V |
| I _R | Reverse Leakage Current | V _{RWM} = 24 V | | 15 | 100 | nA |
| V _C | Clamping Voltage | I _{PP} = 5 A (8 x 20 μs Waveform) (Note 4) | | | 40 | V |
| V _C | Clamping Voltage | I _{PP} = 8 A (8 x 20 μs Waveform) (Note 4) | | | 44 | V |
| I _{PP} | Maximum Peak Pulse Current | 8 x 20 μs Waveform (Note 4) | | | 8.0 | A |
| C _J | Capacitance | V _R = 0 V, f = 1 MHz (Anode to GND) V _R = 0 V, f = 1 MHz (Anode to Anode) | | | 60 30 | pF |

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. Surge protection devices are normally selected according to the working peak reverse voltage (V_{RWM}), which should be equal or greater than the DC or continuous peak operating voltage level.
3. V_{BR} is measured at pulse test current I_T.
4. Pulse waveform per Figure 1.
5. Include SZ-prefix devices where applicable.

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TYPICAL PERFORMANCE CURVES

($T_J = 25^\circ\text{C}$ unless otherwise noted)

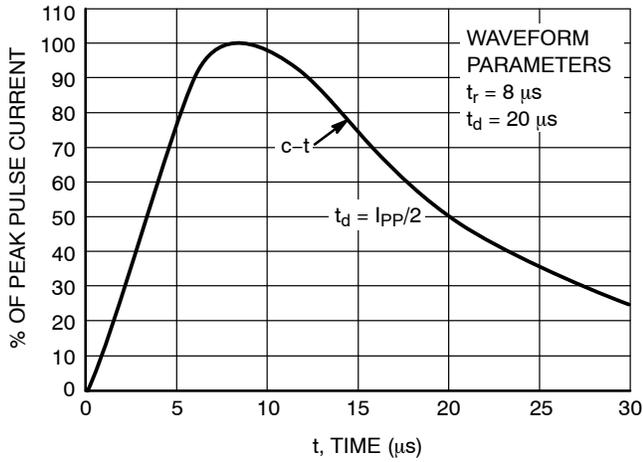


Figure 1. Pulse Waveform, $8 \times 20 \mu\text{s}$

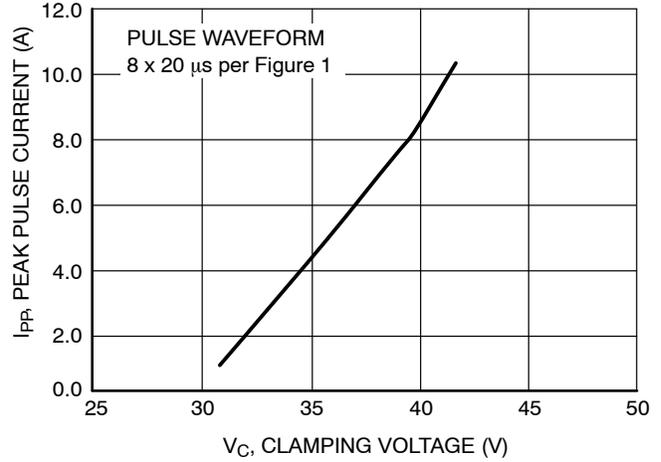


Figure 2. Clamping Voltage vs Peak Pulse Current

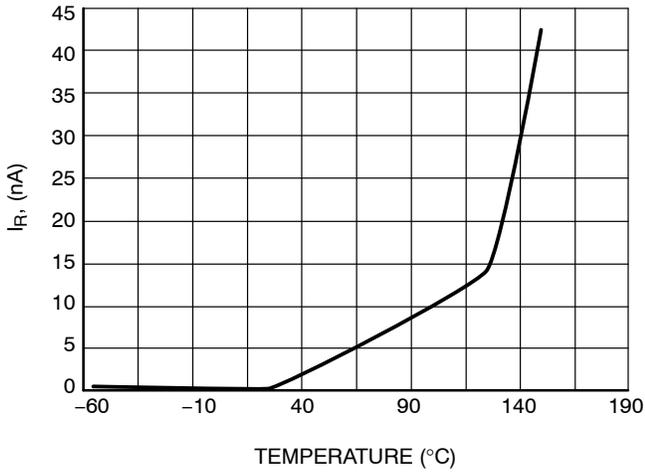


Figure 3. Typical Leakage vs. Temperature

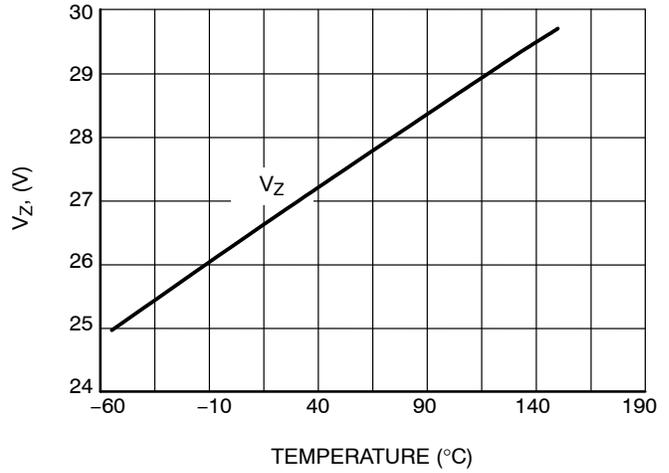


Figure 4. Typical V_Z @ 1.0 mA vs. Temperature

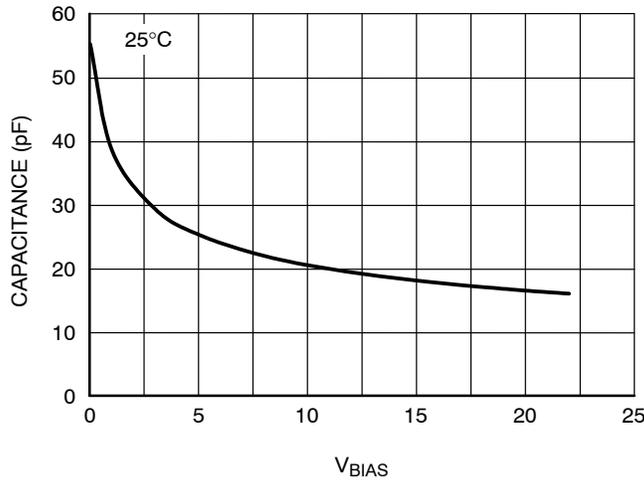


Figure 5. Capacitance vs. V_{BIAS}

APPLICATIONS SECTION

The NUP1105L provides a surge protection solution for the LIN data communication bus. The NUP1105L is a dual bidirectional surge protection device in a compact SOT-23 package. This device is based on Zener technology that optimizes the active area of a PN junction to provide robust protection against transient EMI surge voltage and ESD. The NUP1105L has been tested to EMI and ESD levels that exceed the specifications of popular high speed LIN networks.

The NUP1105L device can be used to provide transient voltage suppression for a single data line CAN system. Figure 7 provides an example of a single data line CAN protection circuit.

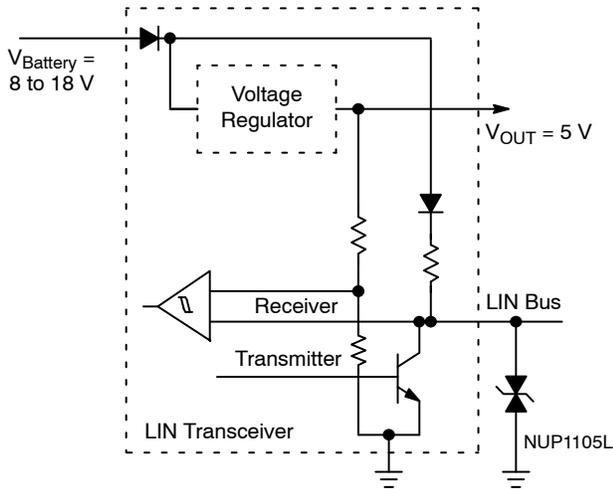


Figure 6. LIN Transceiver

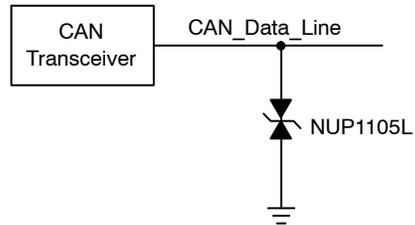
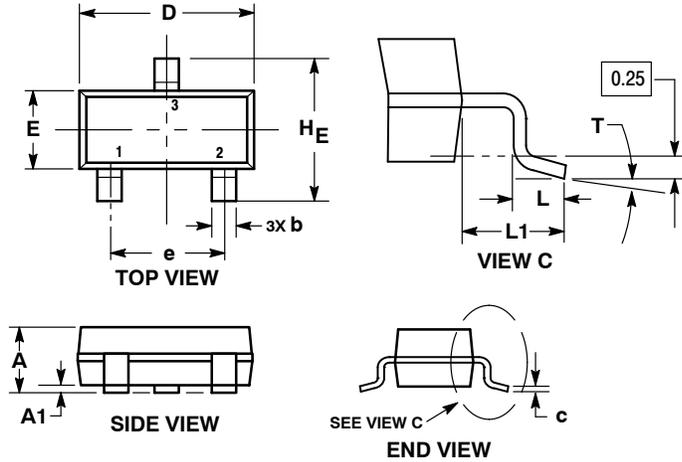


Figure 7. High-Speed and Fault Tolerant CAN Surge Protection Circuit

NUP1105LT1G, SZNUP1105LT1G

PACKAGE DIMENSIONS

SOT-23 (TO-236)
CASE 318-08
ISSUE AR



NOTES:

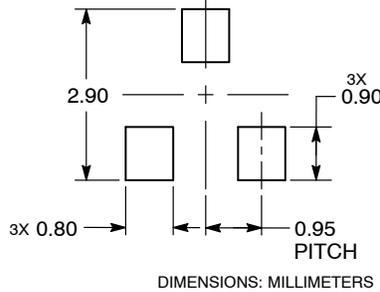
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.89 | 1.00 | 1.11 | 0.035 | 0.039 | 0.044 |
| A1 | 0.01 | 0.06 | 0.10 | 0.000 | 0.002 | 0.004 |
| b | 0.37 | 0.44 | 0.50 | 0.015 | 0.017 | 0.020 |
| c | 0.08 | 0.14 | 0.20 | 0.003 | 0.006 | 0.008 |
| 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 | 0.080 |
| L | 0.30 | 0.43 | 0.55 | 0.012 | 0.017 | 0.022 |
| L1 | 0.35 | 0.54 | 0.69 | 0.014 | 0.021 | 0.027 |
| HE | 2.10 | 2.40 | 2.64 | 0.083 | 0.094 | 0.104 |
| T | 0° | --- | 10° | 0° | --- | 10° |

STYLE 27:

1. CATHODE
2. CATHODE
3. CATHODE

RECOMMENDED 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.

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