

NUP1105L

Advance Information 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
- Pb-Free Packages are Available

Applications

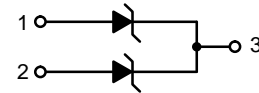
- Automotive Electronics
 - ◆ LIN Bus
 - ◆ Single Line CAN
- Industrial Control Networks
 - ◆ Smart Distribution Systems (SDS™)
 - ◆ DeviceNet™



ON Semiconductor®

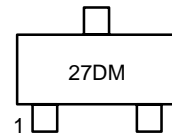
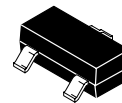
<http://onsemi.com>

SOT-23 BIDIRECTIONAL VOLTAGE SUPPRESSOR 350 W PEAK POWER



PIN 1. ANODE
2. ANODE
3. CATHODE

MARKING DIAGRAM



SOT-23
CASE 318
STYLE 27

27D = Device Code
M = Date Code

ORDERING INFORMATION

| Device | Package | Shipping† |
|-------------|---------------------|-------------------|
| NUP1105LT1 | SOT-23 | 3000/Tape & Reel |
| NUP1105LT1G | SOT-23 (Pb-Free) | 3000/Tape & Reel |
| NUP1105LT3 | SOT-23 | 10000/Tape & Reel |
| NUP1105LT3G | SOT-23 (Pb-Free) | 10000/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.

This document contains information on a new product. Specifications and information herein are subject to change without notice.

NUP1105L

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$, 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 | -40 to 125 | $^\circ\text{C}$ |
| T_J | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| T_L | Lead Solder Temperature (10 s) | 260 | $^\circ\text{C}$ |
| ESD | Human Body model (HBM) | 16 | kV |
| | Machine Model (MM) | 400 | V |
| | IEC 61000-4-2 Specification (Contact) | 30 | kV |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. Nonrepetitive current pulse per Figure 1.

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|-----------|----------------------------|---|------|-----|------|------|
| V_{RWM} | Reverse Working Voltage | (Note 2) | 24 | | | V |
| V_{BR} | Breakdown Voltage | $I_T = 1 \text{ mA}$ (Note 3) | 25.7 | | 28.4 | V |
| I_R | Reverse Leakage Current | $V_{RWM} = 24 \text{ V}$ | | 15 | 100 | nA |
| V_C | Clamping Voltage | $I_{PP} = 5 \text{ A}$ (8 x 20 μs Waveform) (Note 4) | | | 40 | V |
| V_C | Clamping Voltage | $I_{PP} = 8 \text{ A}$ (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 |
| CJ | Capacitance | $V_R = 0 \text{ V}$, $f = 1 \text{ MHz}$ (Anode to GND) | | | 60 | pF |
| | | $V_R = 0 \text{ V}$, $f = 1 \text{ MHz}$ (Anode to Anode) | | | 30 | |

2. TVS 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.

NUP1105L

TYPICAL PERFORMANCE CURVES

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

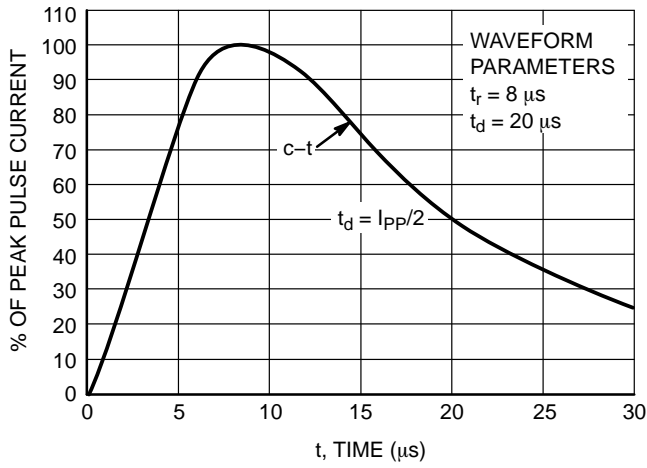


Figure 1. Pulse Waveform, $8 \times 20 \mu\text{s}$

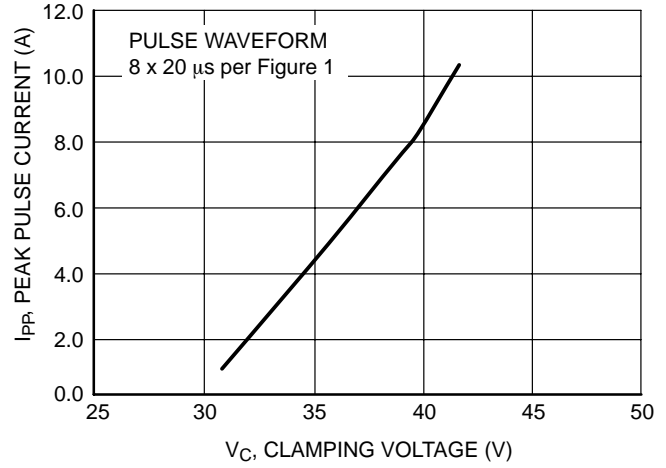


Figure 2. Clamping Voltage vs Peak Pulse Current

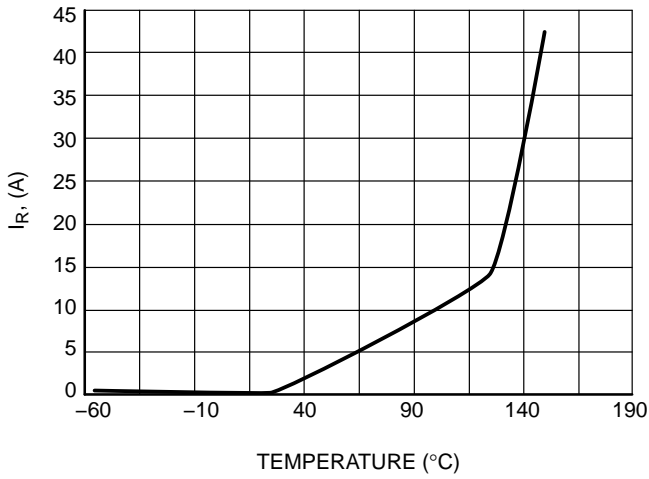


Figure 3. Typical Leakage vs. Temperature

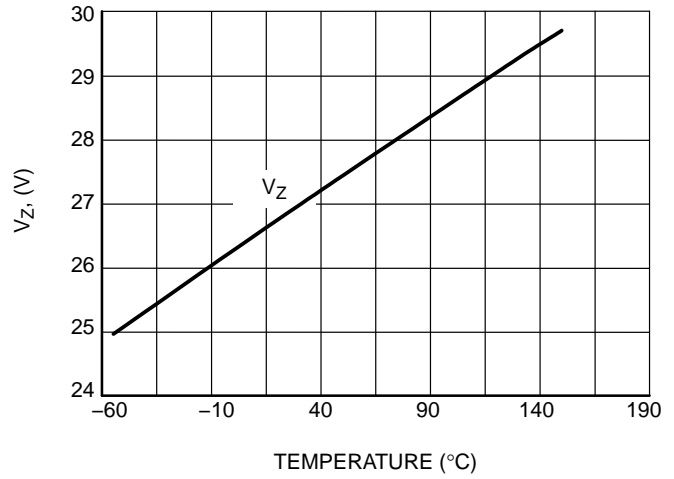


Figure 4. Typical V_z @ 1.0 mA vs. Temperature

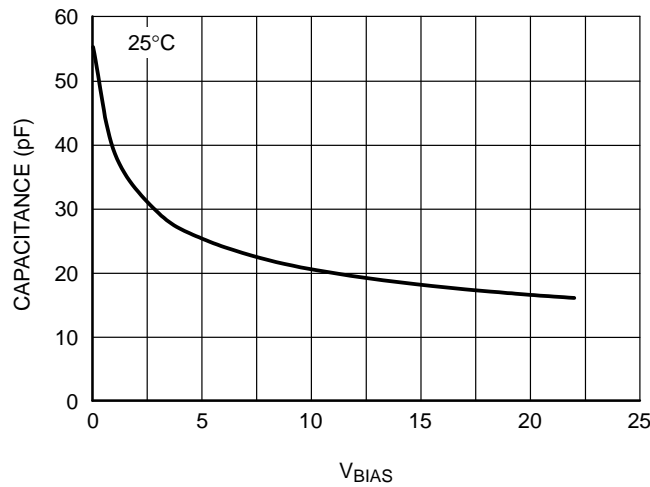


Figure 5. Capacitance vs. V_{BIAS}

NUP1105L

APPLICATIONS SECTION

The NUP1105L provides a transient voltage suppression solution for the LIN data communication bus. The NUP1105L is a dual bidirectional TVS 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.

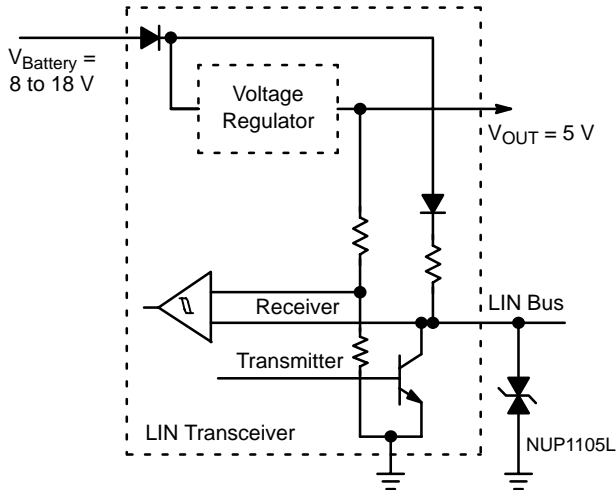


Figure 6. LIN Transceiver

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.

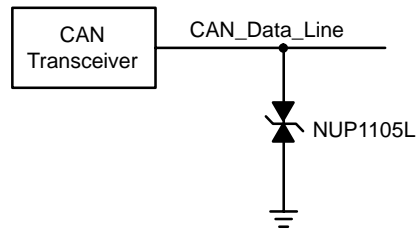
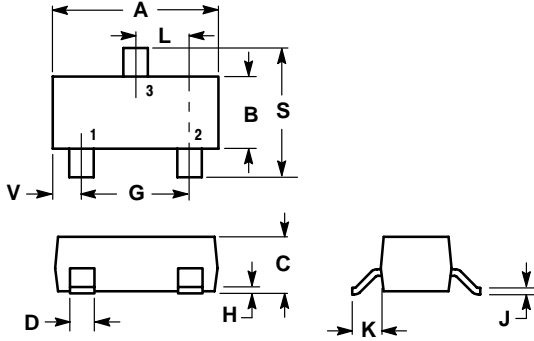


Figure 7. High-Speed and Fault Tolerant CAN TVS Protection Circuit

NUP1105L

PACKAGE DIMENSIONS

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

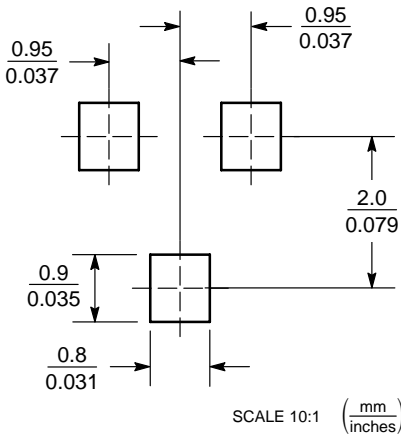


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
 4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|--------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.1102 | 0.1197 | 2.80 | 3.04 |
| B | 0.0472 | 0.0551 | 1.20 | 1.40 |
| C | 0.0350 | 0.0440 | 0.89 | 1.11 |
| D | 0.0150 | 0.0200 | 0.37 | 0.50 |
| G | 0.0701 | 0.0807 | 1.78 | 2.04 |
| H | 0.0005 | 0.0040 | 0.013 | 0.100 |
| J | 0.0034 | 0.0070 | 0.085 | 0.177 |
| K | 0.0140 | 0.0285 | 0.35 | 0.69 |
| L | 0.0350 | 0.0401 | 0.89 | 1.02 |
| S | 0.0830 | 0.1039 | 2.10 | 2.64 |
| V | 0.0177 | 0.0236 | 0.45 | 0.60 |

STYLE 27:
PIN 1. CATHODE
2. CATHODE
3. CATHODE


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.

NUP1105L

SDS is a registered trademark of Honeywell International Inc.
DeviceNet is a trademark of Rockwell Automation.

ON Semiconductor and  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 61312, Phoenix, Arizona 85082-1312 USA
Phone: 480-829-7710 or 800-344-3860 Toll Free USA/Canada
Fax: 480-829-7709 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

Order Literature: <http://www.onsemi.com/litorder>

For additional information, please contact your
local Sales Representative.