NUP1105L

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 μsec 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 μs)
- 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

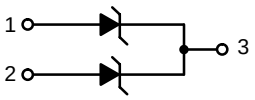
Applications

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

ON Semiconductor®

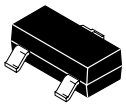
http://onsemi.com

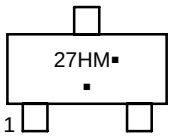
SOT−23 BIDIRECTIONAL VOLTAGE SUPPRESSOR 350 W PEAK POWER



PIN 1. ANODE
2. ANODE
3. CATHODE

MARKING DIAGRAM





SOT−23
CASE 318
STYLE 27

27H = Device Code
M = Date Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

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.

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

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°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
CJ	Capacitance	V_R = 0 V, f = 1 MHz (Anode to GND) V_R = 0 V, f = 1 MHz (Anode to Anode)			60 30	pF

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.

TYPICAL PERFORMANCE CURVES

(T_J = 25°C unless otherwise noted)

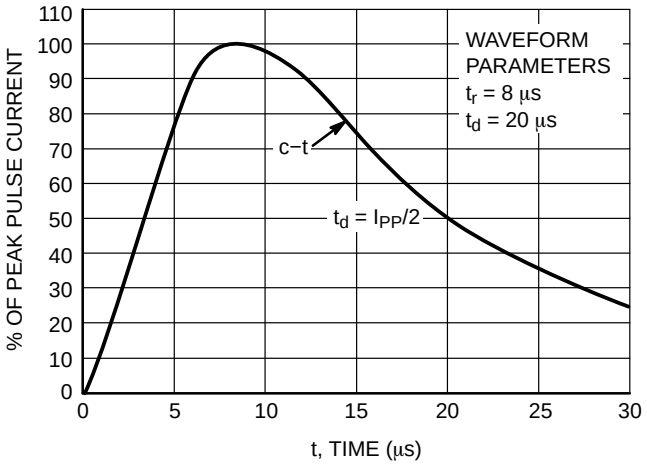


Figure 1. Pulse Waveform, 8 × 20 μs

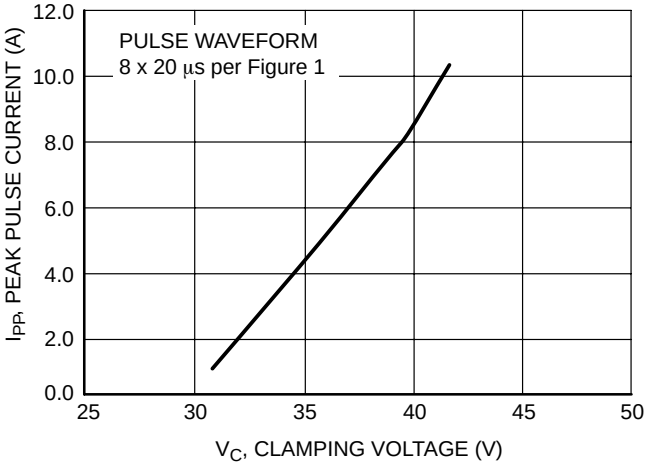


Figure 2. Clamping Voltage vs Peak Pulse Current

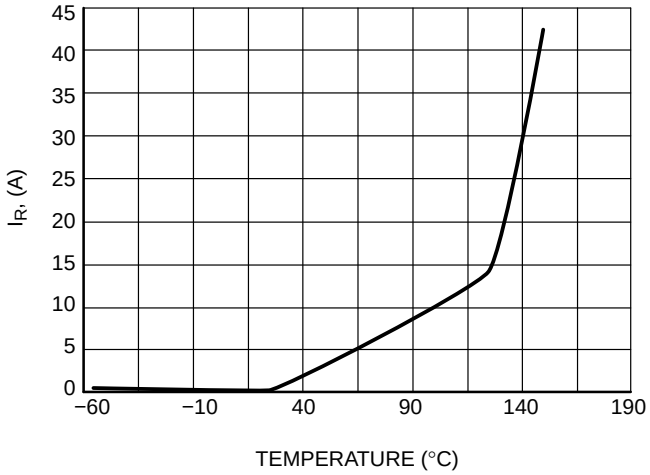


Figure 3. Typical Leakage vs. Temperature

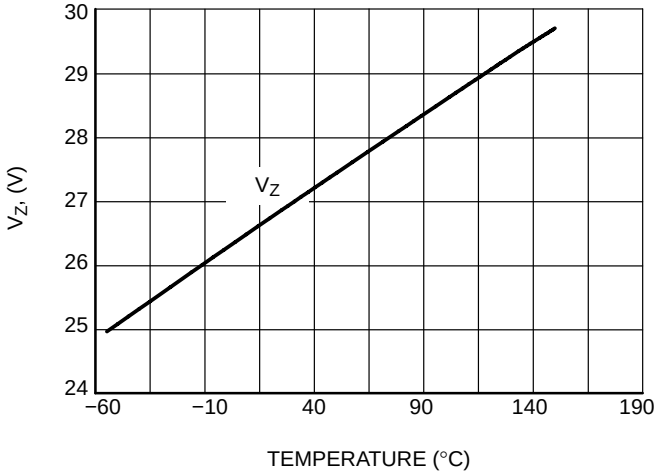


Figure 4. Typical V_Z @ 1.0 mA vs. Temperature

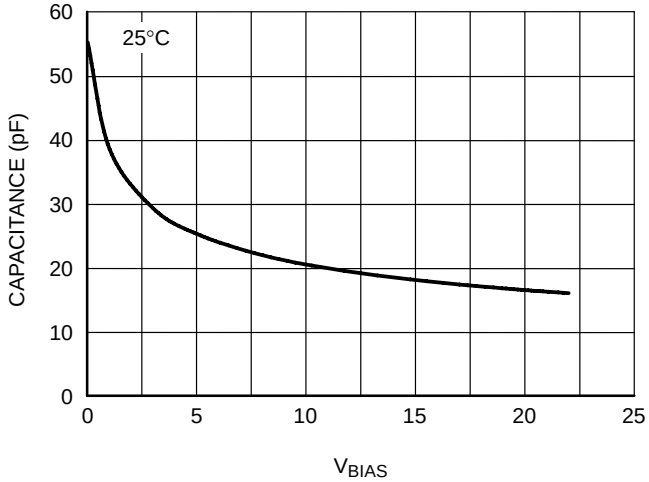


Figure 5. Capacitance vs. V_{BIAS}

APPLICATIONS SECTION

The NUP1105L provides a 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.

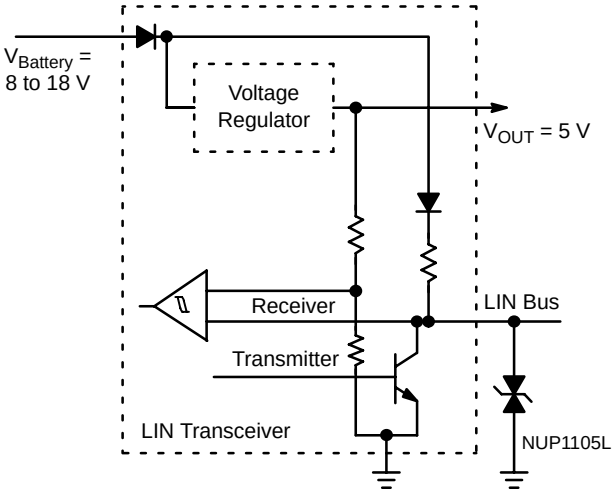


Figure 6. LIN Transceiver

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

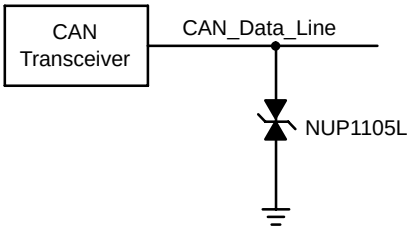
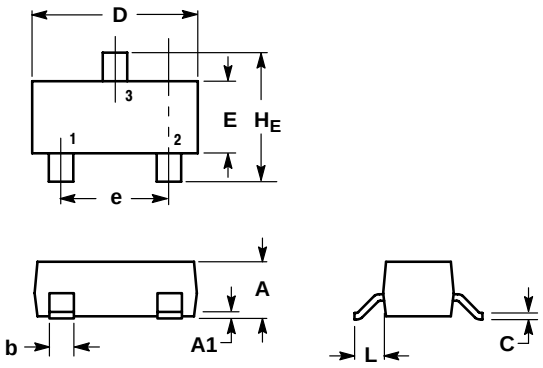


Figure 7. High−Speed and Fault Tolerant CAN TVS Protection Circuit

PACKAGE DIMENSIONS

SOT−23 (TO−236)
CASE 318−08
ISSUE AL

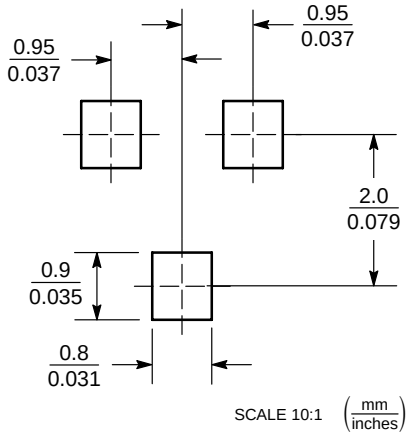


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318−01 THRU −07 AND −09 OBSOLETE, NEW STANDARD 318−08.

	MILLIMETERS			INCHES		
DIM	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	0.35	0.54	0.69	0.014	0.021	0.029
H_E	2.10	2.40	2.64	0.083	0.094	0.104

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.

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DeviceNet is a trademark of Rockwell Automation.

PUBLICATION ORDERING INFORMATION

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