

Dual Line CAN Bus Protector

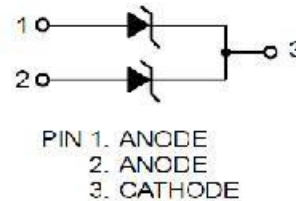
The NUP1105 has been designed to protect the CAN transceiver in high-speed and fault tolerant networks from ESD and other harmful transient voltage events. This device provides bidirectional protection for each data line with a single compact SOT-23 package, giving the system designer a low cost option for improving system reliability and meeting stringent EMI requirements.

Features

- 350 W Peak Power Dissipation per Line (8 x 20 μ sec Waveform)
- Low Reverse Leakage Current (< 100 nA)
- Low Capacitance High-Speed CAN Data Rates
- 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 2, 9.5 A (1 x 50 μ s)
- ISO 7637-3, Repetitive Electrical Fast Transient (EFT) EMI Surge Pulses, 50 A (5 x 50 ns)
- Flammability Rating UL 94 V-0
- Pb-Free Packages are Available

Applications

- Industrial Control Networks
 - Smart Distribution Systems (SDS™)
 - DeviceNet™
- Automotive Networks
 - Low and High-Speed CAN
 - Fault Tolerant CAN



MARKING DIAGRAM



SOT-23
CASE 318
STYLE 27



27 = Device Code
XX = Date Code

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

Symbol	Rating	Value	Unit
PPK	Peak Power Dissipation 8 x 20 μ s Double Exponential Waveform (Note 1)	350	W
T _J	Operating Junction Temperature Range	-40 to 125	°C
T _J	Storage Temperature Range	-55 to 150	°C
T _L	Lead Solder Temperature (10 s)	260	°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. Non-repetitive current pulse per Figure 1.

ELECTRICAL CHARACTERISTICS

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)	26.2		32	V
I_R	Reverse Leakage Current	$V_{RWM} = 24 \text{ V}$		15	100	nA
V_C	Clamping Voltage	$I_{PP} = 5 \text{ A}$ ($8 \times 20 \mu\text{s}$ Waveform) (Note 4)			40	V
V_C	Clamping Voltage	$I_{PP} = 8 \text{ A}$ ($8 \times 20 \mu\text{s}$ Waveform) (Note 4)			44	V
I_{PP}	Maximum Peak Pulse Current	$8 \times 20 \mu\text{s}$ Waveform (Note 4)			8.0	A
CJ	Capacitance	$V_R = 0 \text{ V}$, $f = 1 \text{ MHz}$ (Line to GND)			30	pF

- 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.
- V_{BR} is measured at pulse test current I_T .
- Pulse waveform per Figure 1.

TYPICAL PERFORMANCE CURVES

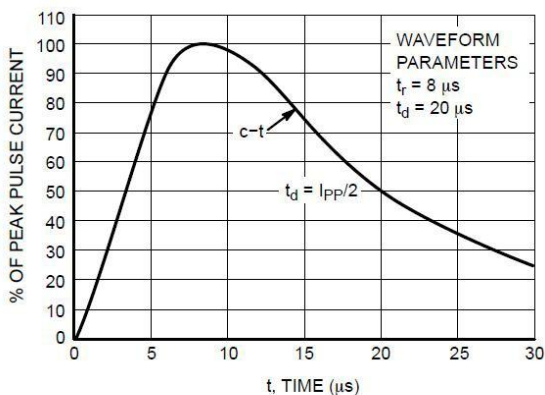


Figure 1. Pulse Waveform, $8 \times 20 \mu\text{s}$

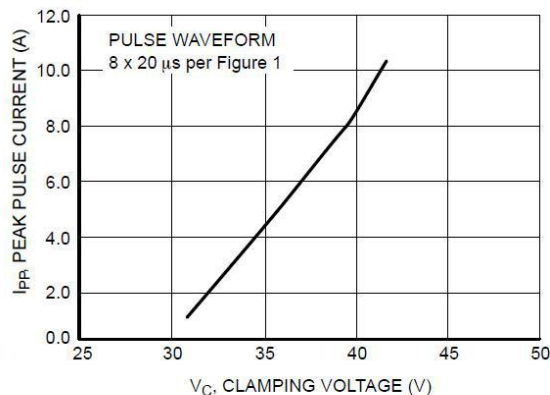


Figure 2. Clamping Voltage vs Peak Pulse Current

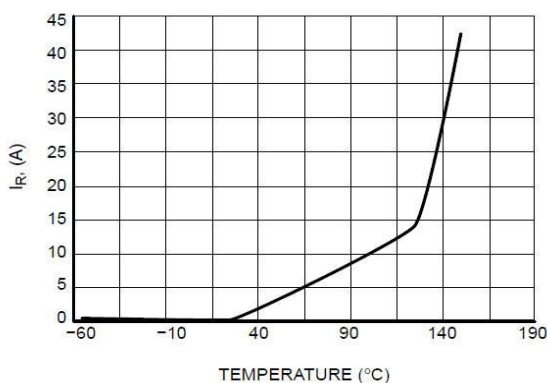


Figure 3. Typical Leakage vs. Temperature

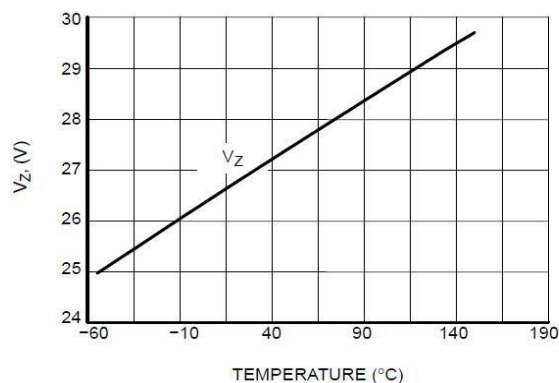


Figure 4. Typical V_Z @ 1.0 mA vs. Temperature

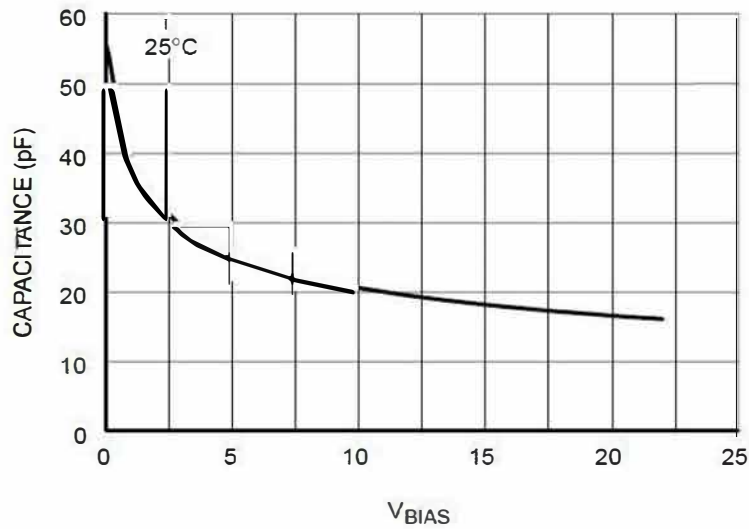


Figure 5. Capacitance vs. V_{BIAS}

TVS Diode Protection Circuit

The NUP1105 provides a transient voltage suppression solution for the LIN data communication bus. The NUP1105 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 NUP1105 has been tested to EMI and ESD levels that exceed the specifications of popular high speed LIN networks.

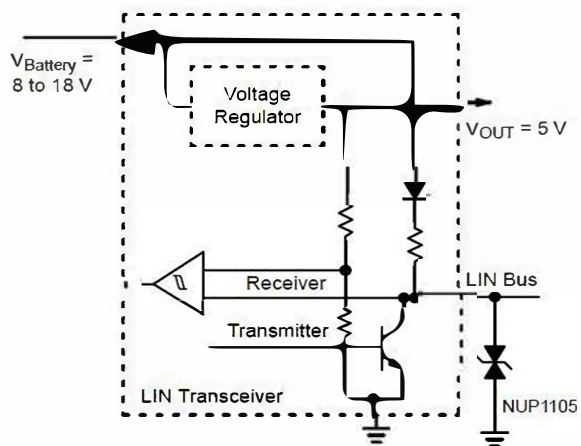


Figure 6. LIN Transceiver

The NUP1105 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.

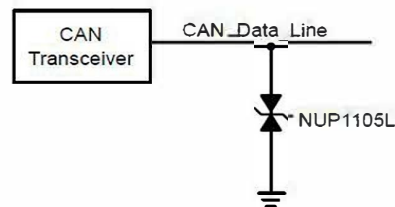
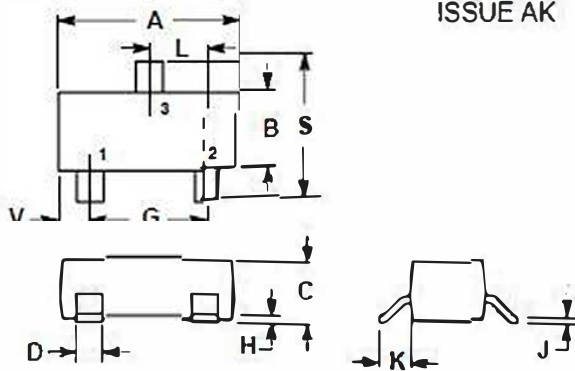


Figure 7. High-Speed and Fault Tolerant CAN TVS Protection Circuit

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 -08 OBSOLETE. NEW STANDARD 318-08.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1127	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	0.0225	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	0.0238	0.45	0.60

STYLE 27:

- PIN 1. CATHODE
2. CATHODE
3. CATHODE