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NUP3105L, SZNUP3105L

ESD Protection Diode

Dual Line CAN Bus Protector

The SZ/NUP3105L has been designed to protect the CAN transceiver in 24 V systems 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 (8/20 μsec 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): 50 A – 5/50 ns
  – IEC 61000−4−5 (Lighting) 8.0 A (8/20 μs)
- 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, Halogen Free/BFR Free and are RoHS Compliant

Applications

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

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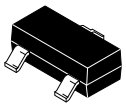
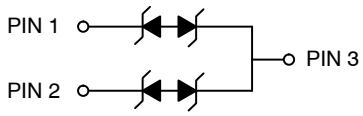
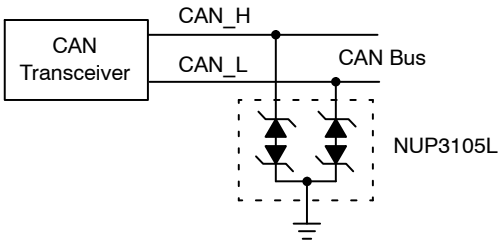
SOT−23
DUAL BIDIRECTIONAL
VOLTAGE SUPPRESSOR
350 W PEAK POWER

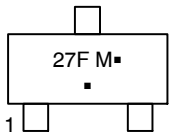


SOT−23
CASE 318
STYLE 27





MARKING DIAGRAM



27F = Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

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)	8.0 400 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)	–	–	32	V
V_{BR}	Breakdown Voltage	I_T = 1 mA (Note 3)	35.6	–	–	V
I_R	Reverse Leakage Current	V_{RWM} = 32 V	–	–	100	nA
V_C	Clamping Voltage	I_{PP} = 5 A (8/20 μs Waveform) (Note 4)	–	–	59	V
V_C	Clamping Voltage	I_{PP} = 8 A (8/20 μs Waveform) (Note 4)	–	–	66	V
I_{PP}	Maximum Peak Pulse Current	8/20 μs Waveform (Note 4)	–	–	8.0	A
CJ	Capacitance	V_R = 0 V, f = 1 MHz (Line to GND)	–	–	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.

TYPICAL PERFORMANCE CURVES

(T_J = 25°C unless otherwise noted)

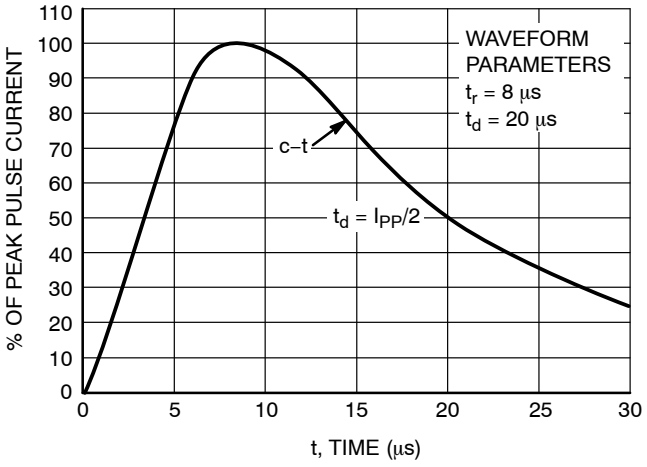


Figure 1. Pulse Waveform, 8/20 μs

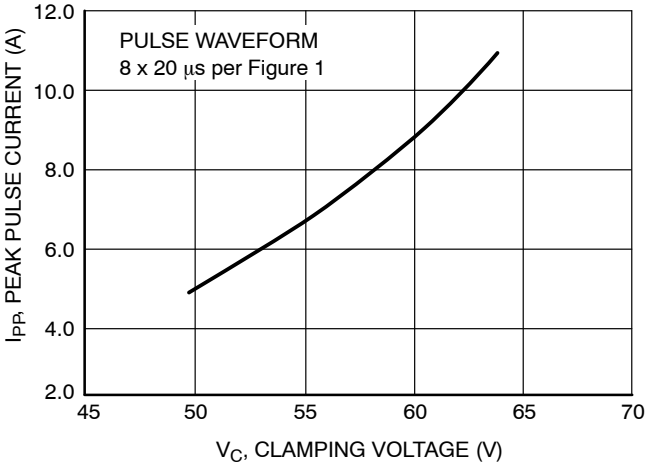


Figure 2. Clamping Voltage vs Peak Pulse Current

Surge Protection Diode Protection Circuit

Surge protection diodes provide protection to a transceiver by clamping a surge voltage to a safe level. surge protection diodes have high impedance below and low impedance above their breakdown voltage. A surge protection Zener diode has its junction optimized to absorb the high peak energy of a transient event, while a standard Zener diode is designed and specified to clamp a steady state voltage.

Figure 3 provides an example of a dual bidirectional surge protection diode array that can be used for protection with the high−speed CAN network. The bidirectional array is created from four identical Zener surge protection diodes. The clamping voltage of the composite device is equal to the breakdown voltage of the diode that is reversed biased, plus the diode drop of the second diode that is forwarded biased.

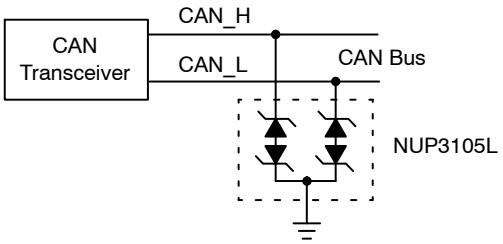


Figure 3. High−Speed and Fault Tolerant CAN Surge Protection Circuit

ORDERING INFORMATION

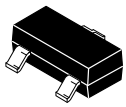
Device	Package	Shipping†
NUP3105LT1G	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SZNUP3105LT1G*	SOT−23 (Pb−Free)	3,000 / Tape & Reel
NUP3105LT3G	SOT−23 (Pb−Free)	10,000 / Tape & Reel
SZNUP3105LT3G*	SOT−23 (Pb−Free)	10,000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

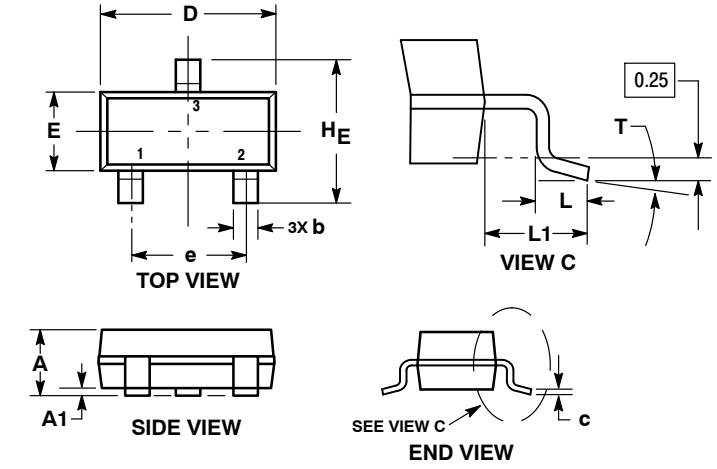
ON Semiconductor®



SOT−23 (TO−236)
CASE 318−08
ISSUE AS

DATE 30 JAN 2018

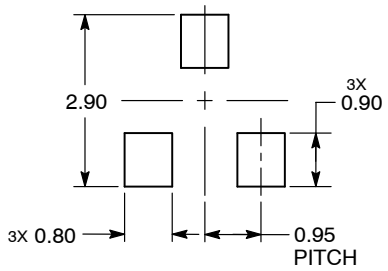
SCALE 4:1



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.

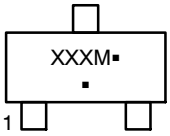
	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
L	0.30	0.43	0.55	0.012	0.017	0.022
L1	0.35	0.54	0.69	0.014	0.021	0.027
H_E	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	−−−	10°	0°	−−−	10°

RECOMMENDED SOLDERING FOOTPRINT



DIMENSIONS: MILLIMETERS

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present.

STYLE 1 THRU 5:
CANCELLED

STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 7:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 8:
PIN 1. ANODE
2. NO CONNECTION
3. CATHODE

STYLE 9:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 10:
PIN 1. DRAIN
2. SOURCE
3. GATE

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

STYLE 12:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 13:
PIN 1. SOURCE
2. DRAIN
3. GATE

STYLE 14:
PIN 1. CATHODE
2. GATE
3. ANODE

STYLE 15:
PIN 1. GATE
2. CATHODE
3. ANODE

STYLE 16:
PIN 1. ANODE
2. CATHODE
3. CATHODE

STYLE 17:
PIN 1. NO CONNECTION
2. ANODE
3. CATHODE

STYLE 18:
PIN 1. NO CONNECTION
2. CATHODE
3. ANODE

STYLE 19:
PIN 1. CATHODE
2. ANODE
3. CATHODE−ANODE

STYLE 20:
PIN 1. CATHODE
2. ANODE
3. GATE

STYLE 21:
PIN 1. GATE
2. SOURCE
3. DRAIN

STYLE 22:
PIN 1. RETURN
2. OUTPUT
3. INPUT

STYLE 23:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 24:
PIN 1. GATE
2. DRAIN
3. SOURCE

STYLE 25:
PIN 1. ANODE
2. CATHODE
3. GATE

STYLE 26:
PIN 1. CATHODE
2. ANODE
3. NO CONNECTION

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

STYLE 28:
PIN 1. ANODE
2. ANODE
3. ANODE

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DESCRIPTION:	SOT−23 (TO−236)	PAGE 1 OF 1

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