

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 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): 50 A – 5/50 ns
 - IEC 61000-4-5 (Lighting) 8.0 A (8/20 μ s)
- 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

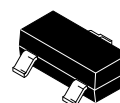
- Industrial Control Networks
 - ◆ Smart Distribution Systems (SDS[®])
 - ◆ DeviceNet[™]
- Automotive Networks
 - ◆ Low and High-Speed CAN
 - ◆ Fault Tolerant CAN
 - ◆ Trucks



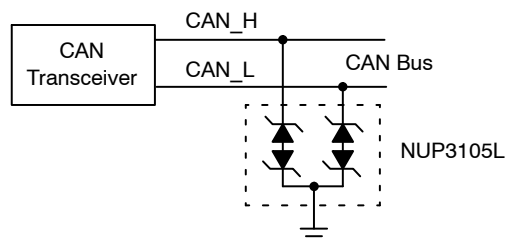
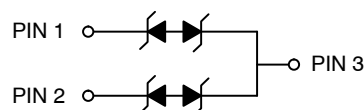
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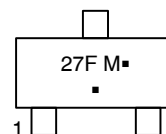
**SOT-23
DUAL BIDIRECTIONAL
VOLTAGE SUPPRESSOR
350 W PEAK POWER**



**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.

NUP3105L, SZNUP3105L

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 | -55 to 150 | $^\circ\text{C}$ |
| 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) 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 ($T_J = 25^\circ\text{C}$, unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|-----------|----------------------------|--|------|-----|-----|------|
| V_{RWM} | Reverse Working Voltage | (Note 2) | - | - | 32 | V |
| V_{BR} | Breakdown Voltage | $I_T = 1 \text{ mA}$ (Note 3) | 35.6 | - | - | V |
| I_R | Reverse Leakage Current | $V_{RWM} = 32 \text{ V}$ | - | - | 100 | nA |
| V_C | Clamping Voltage | $I_{PP} = 5 \text{ A}$ (8/20 μs Waveform) (Note 4) | - | - | 59 | V |
| V_C | Clamping Voltage | $I_{PP} = 8 \text{ A}$ (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 | $V_R = 0 \text{ V}$, $f = 1 \text{ MHz}$ (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

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

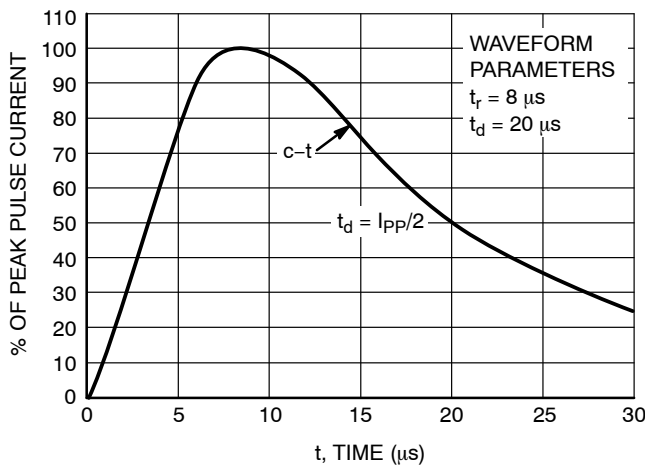


Figure 1. Pulse Waveform, 8/20 μs

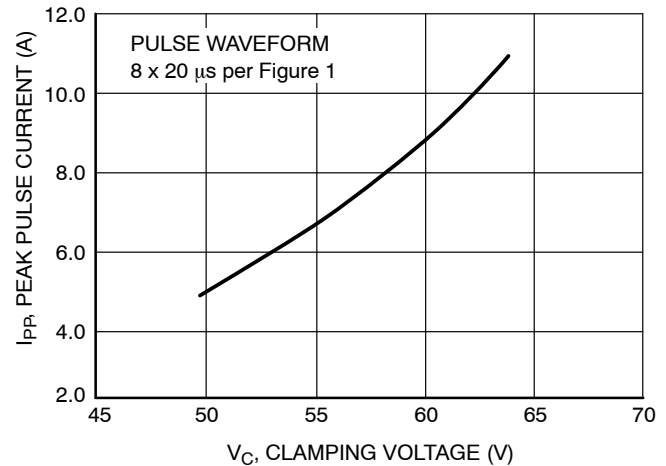


Figure 2. Clamping Voltage vs Peak Pulse Current

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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 forward biased.

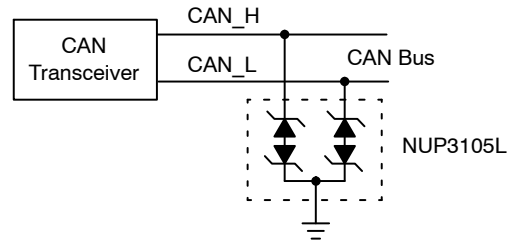


Figure 3. High-Speed and Fault Tolerant CAN Surge Protection Circuit

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.

| 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° |

RECOMMENDED SOLDERING FOOTPRINT



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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