

ESD Protection Diode

Dual Line CAN Bus Protector

NUP3105L, SZNUP3105L

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

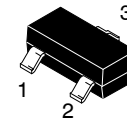
MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

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	-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

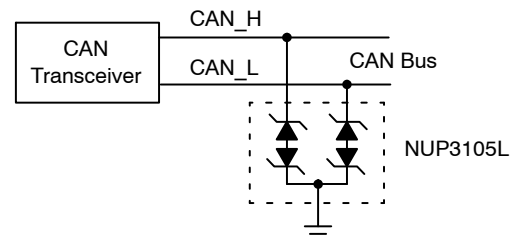
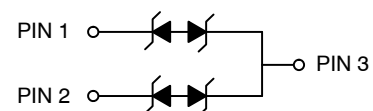
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Non-repetitive current pulse per Figure 1.

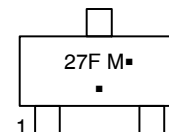
SOT-23 DUAL BIDIRECTIONAL VOLTAGE SUPPRESSOR 350 W PEAK POWER



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

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
C _J	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.

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

TYPICAL PERFORMANCE CURVES

(T_J = 25 °C UNLESS OTHERWISE NOTED)

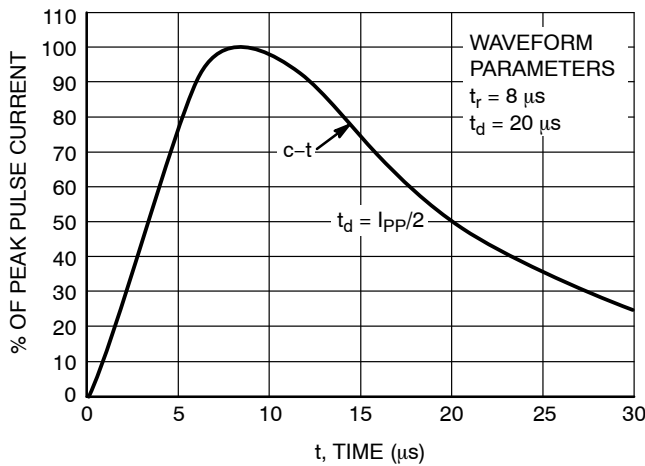


Figure 1. Pulse Waveform, 8/20 μs

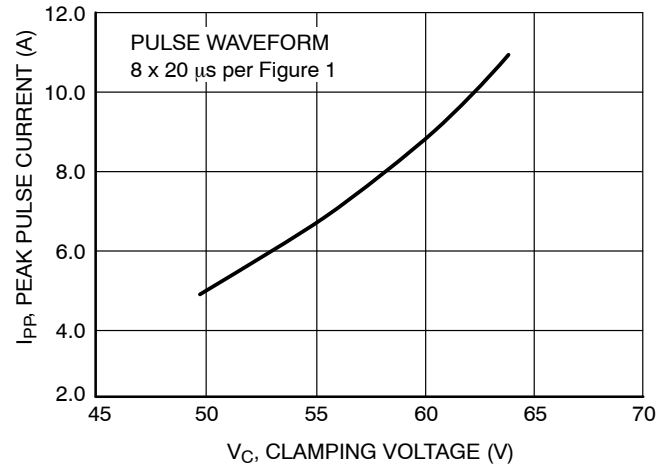


Figure 2. Clamping Voltage vs Peak Pulse Current

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 forward biased.

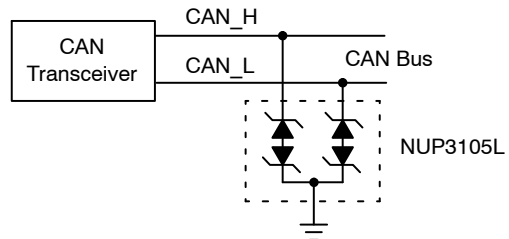


Figure 3. High-Speed and Fault Tolerant CAN Surge Protection Circuit

NUP3105L, SZNUP3105L

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](#).

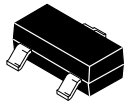
* SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

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REVISION HISTORY

Revision	Description of Changes	Date
5	Rebranded the Data Sheet to onsemi format.	10/15/2025

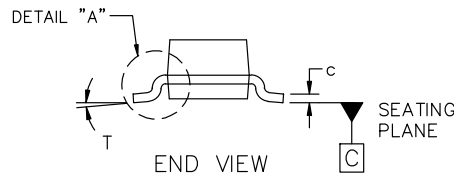
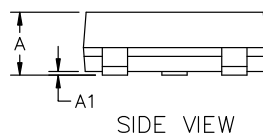
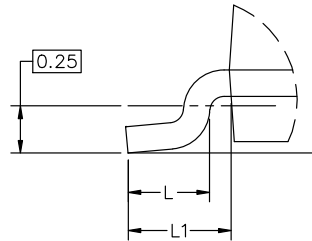
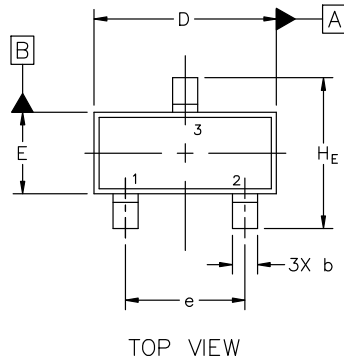
This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.



SCALE 4:1

SOT-23 (TO-236) 2.90x1.30x1.00 1.90P
CASE 318
ISSUE AU

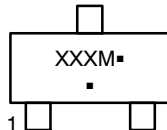
DATE 14 AUG 2024



MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.89	1.00	1.11
A1	0.01	0.06	0.10
b	0.37	0.44	0.50
c	0.08	0.14	0.20
D	2.80	2.90	3.04
E	1.20	1.30	1.40
e	1.78	1.90	2.04
L	0.30	0.43	0.55
L1	0.35	0.54	0.69
HE	2.10	2.40	2.64
T	0°	---	10°

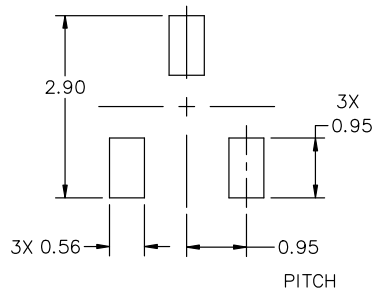
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: 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.

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. Some products may not follow the Generic Marking.


RECOMMENDED MOUNTING FOOTPRINT

* For additional information on our Pb-Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERM/D.

STYLES ON PAGE 2

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ISSUE AU

DATE 14 AUG 2024

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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