

CAN Bus Protector, Dual Line

NUP3125, SZNUP3125

The SZ/NUP3125 has been designed to protect the CAN transceiver in 24 V designs from ESD and other harmful surge protection events. This device provides bidirectional protection for each data line with a single compact SC-70 (SOT-323) package, giving the system designer a low cost option for improving system reliability and meeting stringent EMI requirements.

Features

- 120 W Peak Power Dissipation per Line (8/20 μ s Waveform)
- Diode Capacitance Matching
- Low Reverse Leakage Current (< 100 nA)
- IEC Compatibility:
 - IEC 61000-4-2 (ESD): Level 4
 - IEC 61000-4-4 (EFT): 50 A – 5/50 ns
 - IEC 61000-4-5 (Lighting) 2.0 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

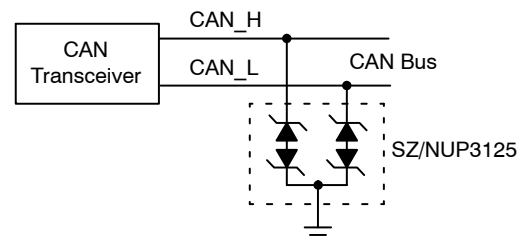
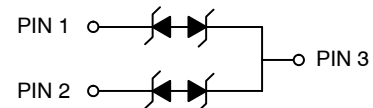
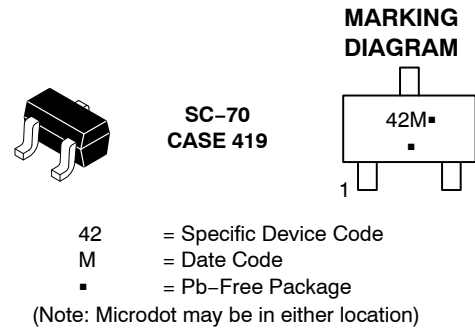
Applications

- Automotive Networks
 - ♦ CAN / CAN-FD
 - ♦ Low and High-Speed CAN
 - ♦ Fault Tolerant CAN
 - ♦ Trucks
- Industrial Control Networks
 - ♦ Smart Distribution Systems (SDS)
 - ♦ DeviceNet



ON Semiconductor®

www.onsemi.com



ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

NUP3125, SZNUP3125

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

Symbol	Rating	Value	Unit
P _{PK}	Peak Power Dissipation, 8/20 μs Double Exponential Waveform (Note 1)	120	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 (Contact) IEC 61000–4–2 (Air)	8.0 1.6 21 21	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	39	–	V
I _R	Reverse Leakage Current	V _{RWM} = 32 V	–	–	100	nA
V _C	Clamping Voltage	8/20 μs Waveform (Note 4) I _{PP} = 1 A I _{PP} = 2 A	– –	47 57	55 60	V
I _{PP}	Maximum Peak Pulse Current	8/20 μs Waveform (Note 4)	–	–	2.0	A
C _J	Capacitance	V _R = 0 V, f = 1 MHz (Line to GND)	–	5.7	10	pF
		V _R = 5 V, f = 1 MHz (Line to GND)	–	4.5	6.0	pF
		V _R = 5 V, f = 1 MHz (Line to GND), T _J = 150°C	–	5.0		pF
ΔC	Diode Capacitance Matching	V _R = 0 V, 5 MHz (Note 5)	–	0.26	2	%

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.
- ΔC is the percentage difference between C_J of lines 1 and 2 measured according to the test conditions given in the electrical characteristics table.

ORDERING INFORMATION

Device	Package	Shipping [†]
NUP3125WTT1G	SC-70 (Pb-Free)	3000 / Tape & Reel
SZNUP3125WTT1G	SC-70 (Pb-Free)	3000 / Tape & Reel
NUP3125WTT3G	SC-70 (Pb-Free)	10000 / Tape & Reel
SZNUP3125WTT3G	SC-70 (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 Specifications Brochure, BRD8011/D.

NUP3125, SZNUP3125

TYPICAL PERFORMANCE CURVES

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

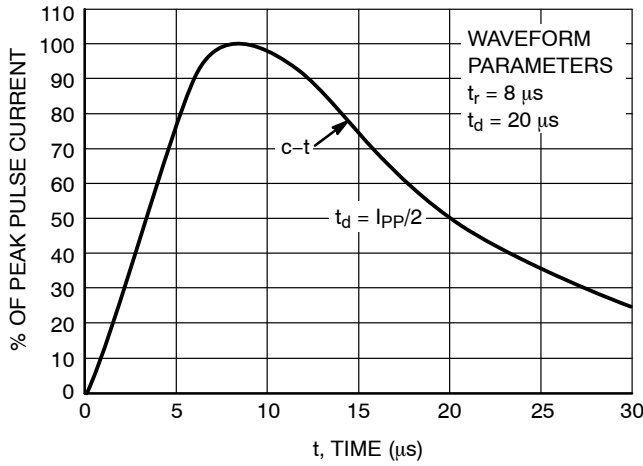


Figure 1. Pulse Waveform, 8/20 μs

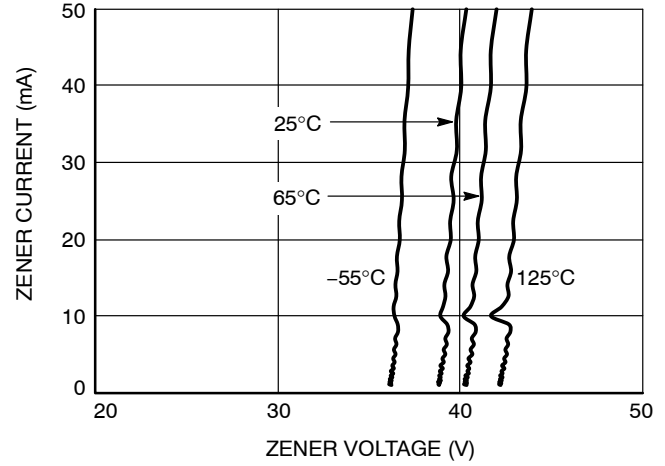


Figure 2. IV Characteristics

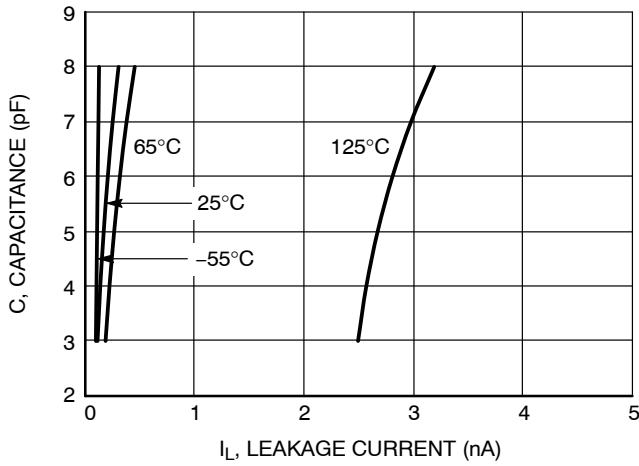


Figure 3. IR vs Temperature Characteristics

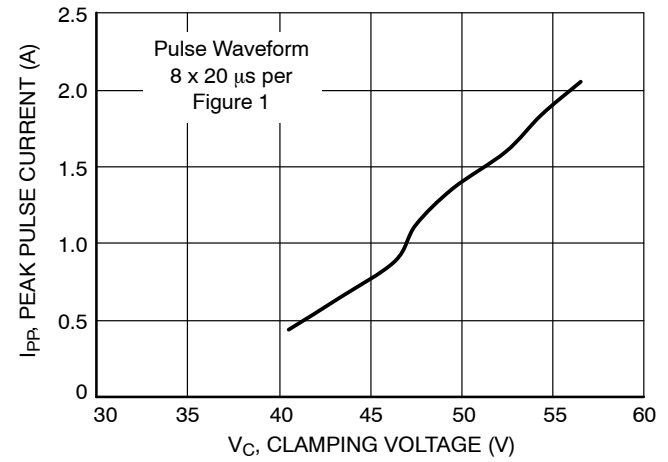


Figure 4. Clamping Voltage vs. Peak Pulse Current

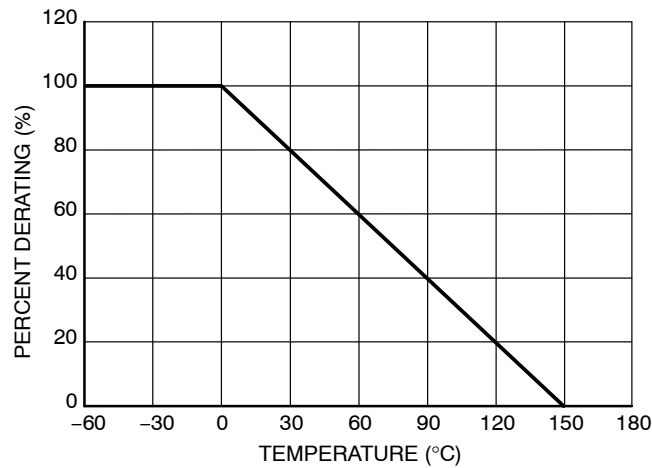


Figure 5. Temperature Power Dissipation Derating

Surge Protection Diode 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 6 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 TVS 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.

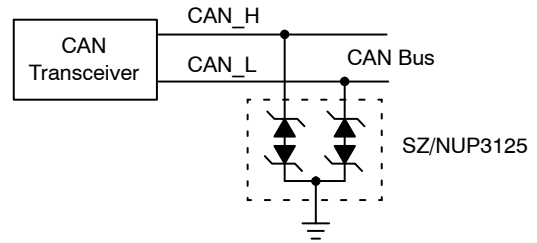
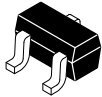


Figure 6. High-Speed and Fault Tolerant CAN Surge Protection Circuit



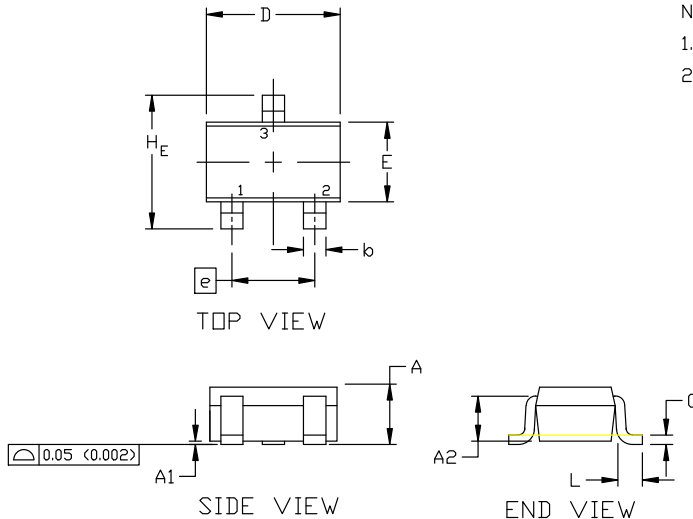
SCALE 4:1

SC-70 (SOT-323)
CASE 419
ISSUE R

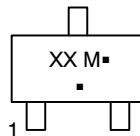
DATE 11 OCT 2022

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH

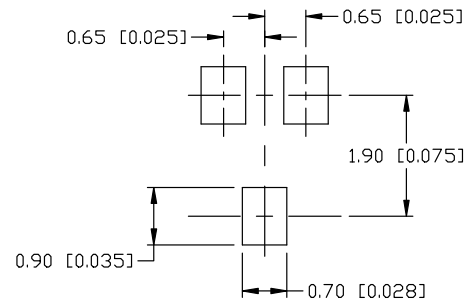


DIM	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.70 REF			0.028 BSC		
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.00	2.20	0.071	0.080	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	1.30	1.40	0.047	0.051	0.055
e1	0.65 BSC			0.026 BSC		
L	0.20	0.38	0.56	0.008	0.015	0.022
H _E	2.00	2.10	2.40	0.079	0.083	0.095

GENERIC
MARKING DIAGRAM


XX = 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.



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

SOLDERING FOOTPRINT

STYLE 1:
CANCELLED

STYLE 2:
PIN 1. ANODE
2. N.C.
3. CATHODE

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

STYLE 4:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 5:
PIN 1. ANODE
2. ANODE
3. CATHODE

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

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

STYLE 8:
PIN 1. GATE
2. SOURCE
3. DRAIN

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

STYLE 10:
PIN 1. CATHODE
2. ANODE
3. ANODE-CATHODE

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

DOCUMENT NUMBER:	98ASB42819B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SC-70 (SOT-323)	PAGE 1 OF 1

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales