

Automotive dual-line Transil™, transient voltage suppressor (TVS) for CAN bus

Datasheet – production data

Features

- Dual line ESD and EOS protection
- Bidirectional device
- Max pulse power: 230 W (8/20 μs)
- Stand-off voltage 24 V
- Low clamping factor V_{CL}/V_{BR}
- Fast response time
- Low leakage current
- Small plastic package

Benefits

- ESD and EOS protection for CAN transceiver
- SOT23 package for space saving on high density printed circuit board
- Transil diodes providing high overvoltage protection by clamping action and instantaneous response to transient overvoltages

Complies with the following standards

- ISO10605 - C = 150 pF, R = 330 Ω:
 - 30 kV (air discharge)
 - 30 kV (contact discharge)
- ISO10605 - C = 330 pF, R = 330 Ω:
 - 30 kV (air discharge)
 - 30 kV (contact discharge)
- ISO7637-2:
 - Pulse 3a: $V_s = -150$ V
 - Pulse 3b: $V_s = +100$ V

Application

Automotive controller area network (CAN) bus lines where electrostatic discharge and other transients must be suppressed.

TM: Transil is a trademark of STMicroelectronics

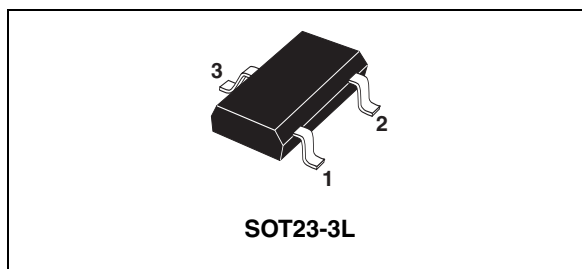
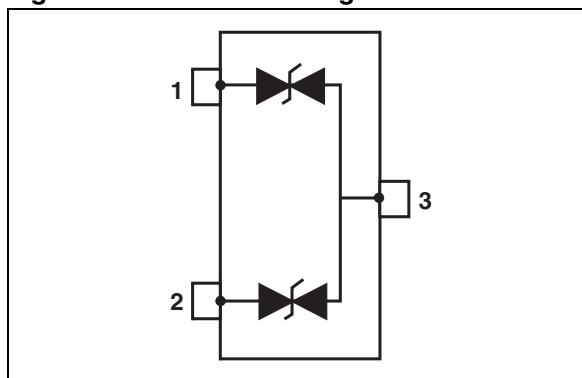


Figure 1. Functional diagram



Description

The ESDCAN24-2BLY is a dual-line Transil specifically designed for the protection of the automotive CAN bus lines against electrostatic discharge (ESD).

1 Characteristics

Table 1. Absolute maximum ratings (T_{amb} = 25°C)

Symbol	Parameter		Value	Unit
V _{PP}	Electrostatic discharge capability	ISO10605 - C = 150 pF, R = 330 Ω: Contact discharge	30	kV
		Air discharge	30	
		ISO10605 - C = 330 pF, R = 330 Ω: Contact discharge	30	
		Air discharge	30	
		HBM MIL STD 883	8	
P _{PP}	Peak pulse power dissipation 8/20 μs ⁽¹⁾	T _j initial = T _{amb}	230	W
I _{PP}	Peak pulse current typical value (8/20 μs)		5.5	A
T _j	Maximum junction temperature		150	°C
T _{op}	Operating junction temperature range		-40 to +125	°C
T _{stg}	Storage temperature range		-55 to +150	°C

1. For a surge greater than the maximum values, the diode will fail in short-circuit.

Figure 2. Electrical characteristics (definitions)

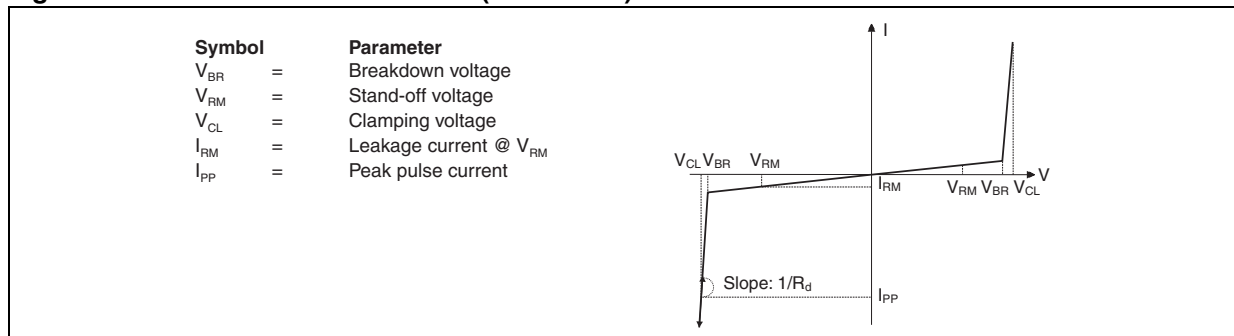


Table 2. Electrical characteristics (values, T_{amb} = 25 °C)

Symbol	Test conditions	Min.	Typ.	Max.	Unit
V _{RM}	Stand-off voltage			24	V
V _{BR}	I _R = 1 mA	27		32	V
I _{RM}	V _{RM} = 24 V			100	nA
V _{CL}	Pulse ISO7637-2 Pulse 3b			40	V
V _{CL}	Pulse ISO7637-2 Pulse 3a	-40			V
V _{CL}	I _{PP} = 5 A, 8/20μs			43	V
αT ⁽¹⁾	Voltage temperature coefficient			9	10 ⁻⁴ /°C
C	V _R = 0 V DC, F = 1 MHz			30	pF

1. ΔV_{BR} = αT x (T_{amb} -25) x V_{BR}(25 °C)

Figure 3. Response to ISO 7637-2 Pulse 3a on each channel

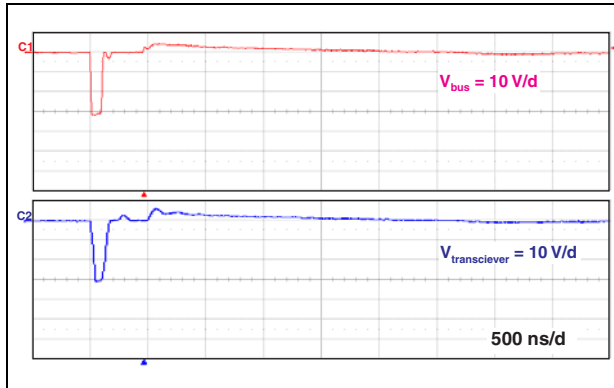


Figure 4. Response to ISO 7637-2 Pulse 3b on each channel

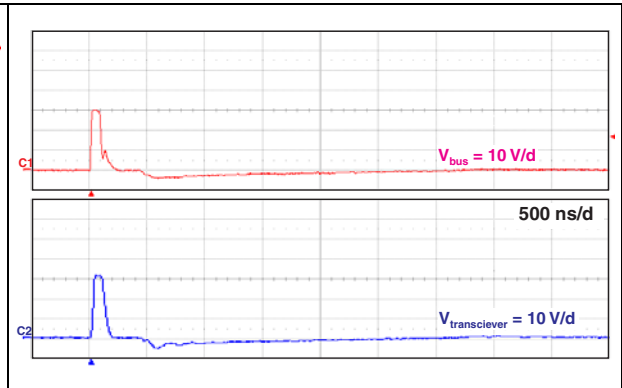


Figure 5. ESD response to ISO10605 - C = 150 pF, R = 330 Ω (+25 kV air discharge) on each channel

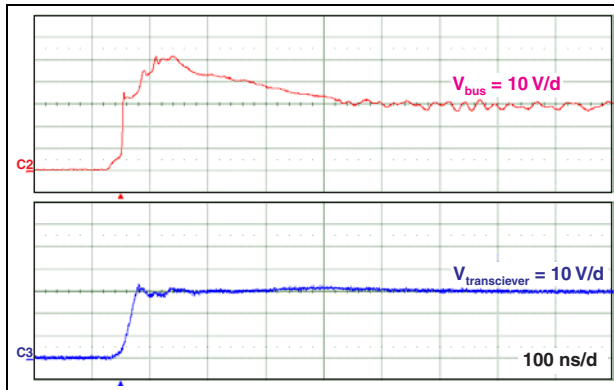


Figure 6. ESD response to ISO10605 - C = 150 pF, R = 330 Ω (-25 kV air discharge) on each channel

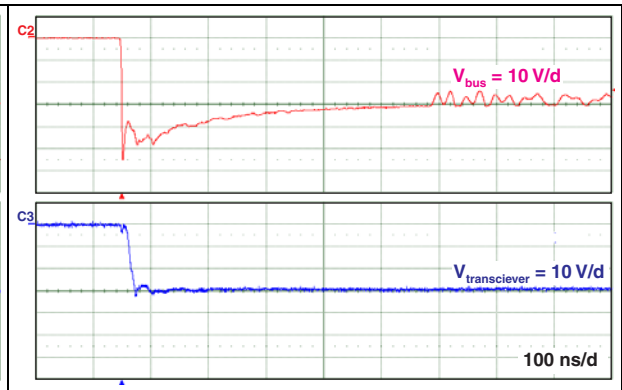


Figure 7. Peak pulse power dissipation versus initial junction temperature (maximum values)

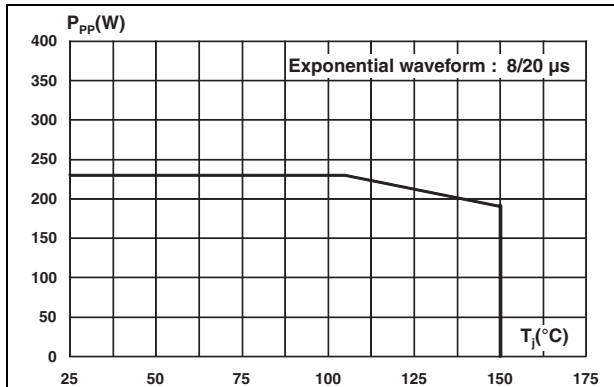


Figure 8. Peak pulse power dissipation versus pulse duration (maximum values)

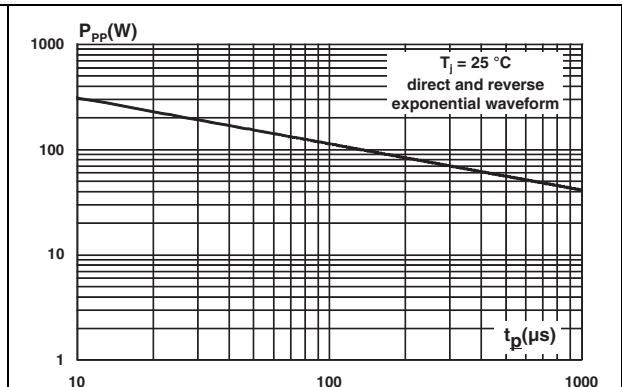


Figure 9. Clamping voltage versus peak pulse current (typical values, exponential waveform 8/20 μ s)

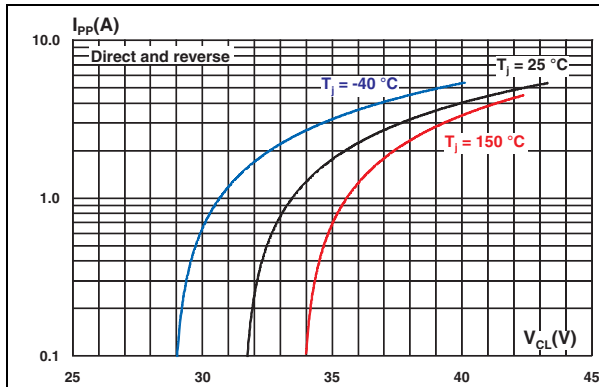


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

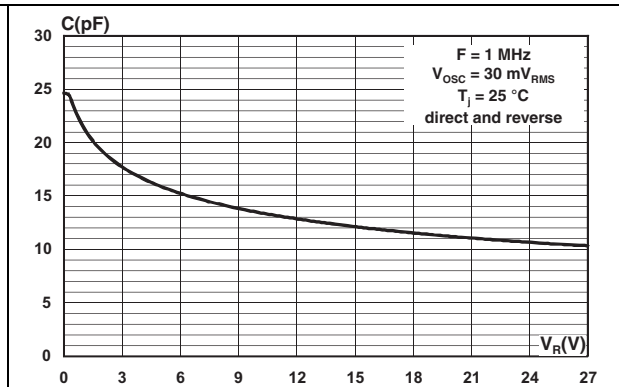


Figure 11. Leakage current versus junction temperature (typical values)

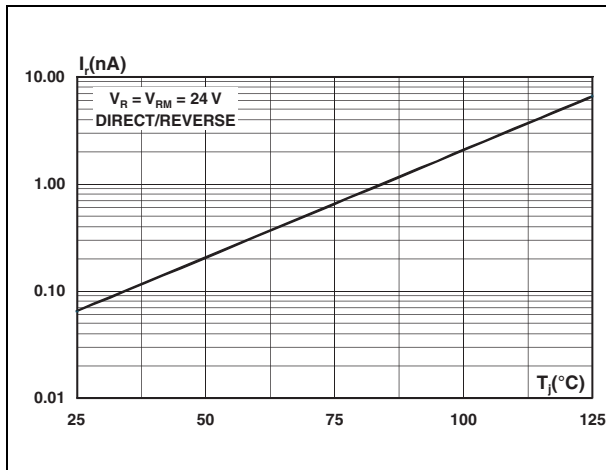
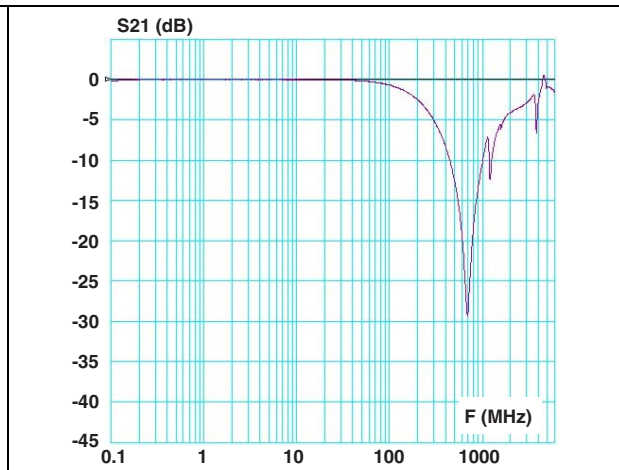


Figure 12. S21 attenuation measurement results of each channel

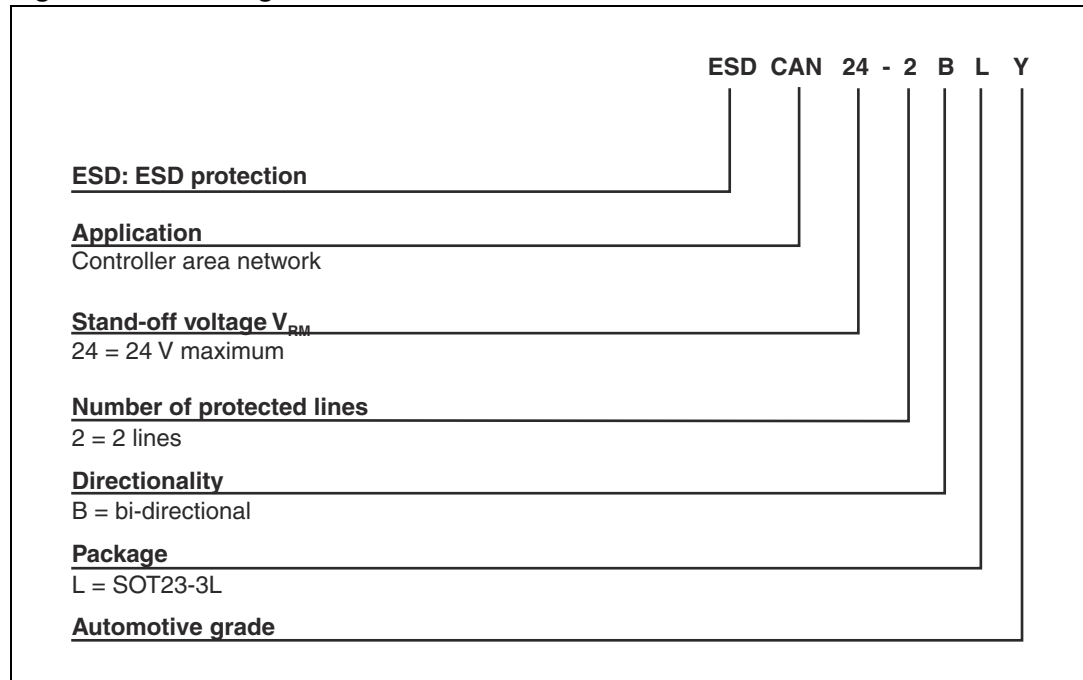


2 Application and design guidelines

More information is available in the ST Application note AN2689 "Protection of automotive electronics from electrical hazards, guidelines for design and component selection".

3 Ordering information scheme

Figure 13. Ordering information scheme



4 Package information

- Epoxy meets UL94, V0
- Lead-free packages

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 3. SOT23-3L dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
a	0°	8°	0°	8°
A	0.89	1.4	0.035	0.055
A1	0	0.1	0	0.004
B	0.3	0.51	0.012	0.02
c	0.085	0.18	0.003	0.007
D	2.75	3.04	0.108	0.12
e	0.85	1.05	0.033	0.041
e1	1.7	2.1	0.067	0.083
E	1.2	1.6	0.047	0.063
H	2.1	2.75	0.083	0.108
L	0.6 typ.		0.024 typ.	
L1	0.25	0.55	0.010	0.022
S	0.35	0.65	0.014	0.026

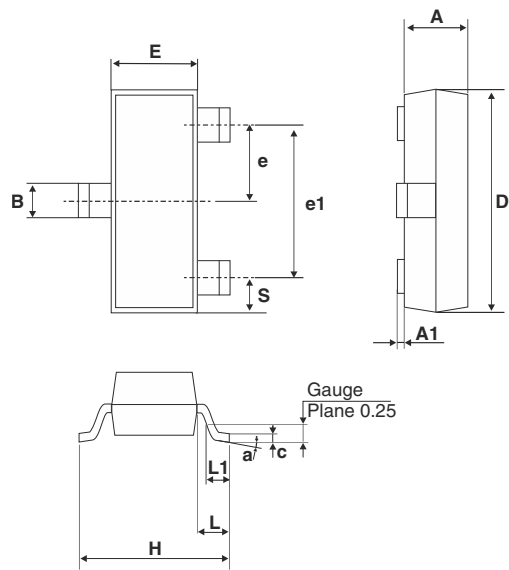
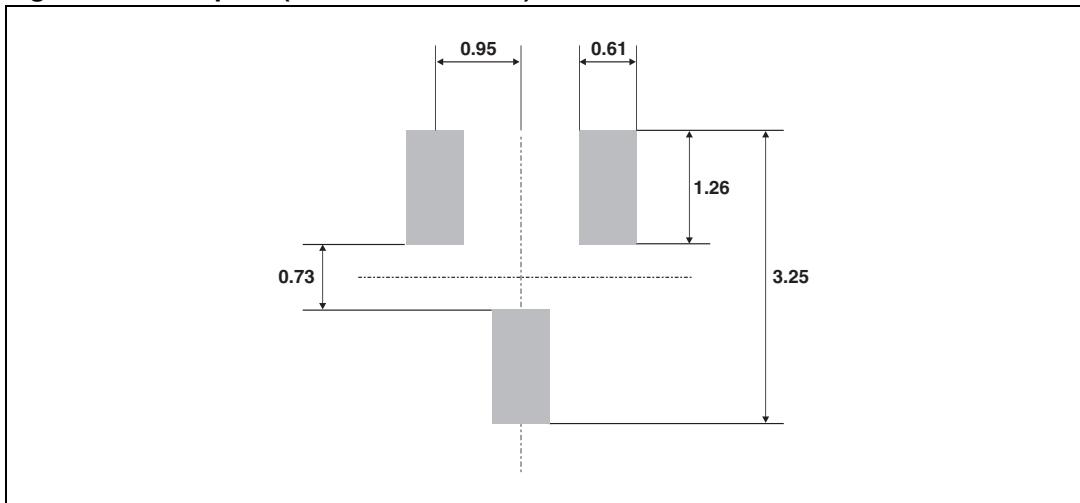


Figure 14. Footprint (dimensions in mm)



5 Ordering information

Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
ESDCAN24-2BLY	EL24	SOT-23	9.795 mg	3000	Tape and reel

6 Revision history

Table 5. Document revision history

Date	Revision	Changes
29-May-2012	1	First issue.
04-Sep-2012	2	Update values for V_{RM} in Table 2 . Updated Figure 10 , Figure 11 , and Figure 13 .
07-Nov-2012	3	Added dimensions a and L1 in Table 3 .

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