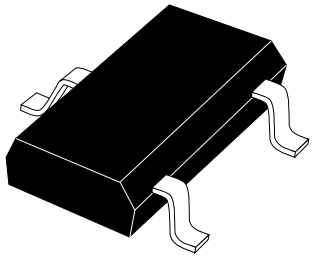
ESDCAN0x-2BWY

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

Datasheet - production data



SOT323-3L

Features

- Dual-line ESD and EOS protection
- Stand-off voltage
  - ESDCAN02-2BWY: 26.5 V
  - ESDCAN03-2BWY: 24 V
- Bidirectional device
- Max pulse power: 250 W (8/20 µs)
- Low clamping factor V_{CL} / V_{BR}
- Low leakage current
- ECOPACK®2 compliant component
- AEC-Q101 qualified

Complies with the following standards

- ISO 10605 - C = 150 pF, R = 330 Ω :
  - ±30 kV (air discharge)
  - ±30 kV (contact discharge)
- ISO 10605 - C = 330 pF, R = 330 Ω :
  - ±30 kV (air discharge)
  - ±30 kV (contact discharge)
- ISO 7637-3:
  - 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. This product is compliant with most of automotive interfaces.

Description

The ESDCAN02-2BWY and ESDCAN03-2BWY are a dual-line Transil specifically designed for the protection of the automotive CAN bus lines against electrostatic discharge (ESD).

Its improved parameters versus other solutions on the market make it compliant with all key interfaces in automotive: CAN-FD, LIN, FlexRay, MOST, SENT, etc.

Table 1. Device summary

Reference	Part number
ESDCAN0x-2BWY	ESDCAN02-2BWY
	ESDCAN03-2BWY

TM: Transil is a trademark of STMicroelectronics

1 Characteristics

Table 2. Absolute maximum ratings (T_{amb} = 25°C)

Symbol	Parameter		Value	Unit
V_{PP}	Electrostatic discharge capability	ISO 10605 - C = 150 pF, R = 330 Ω :		kV
		Contact discharge	30	
		Air discharge	30	
		ISO 10605 - C = 330 pF, R = 330 Ω :		
		Contact discharge	30	
		Air discharge	30	
		HBM MIL STD 883	30	
P_{PP}	Peak pulse power dissipation (8/20 µs)	T_j initial = T_{amb}	250	W
I_{PP}	Peak pulse current (8/20 µs)		3.7	A
T_j	Operating junction temperature range		-55 to +175	°C
T_{stg}	Storage temperature range		-55 to +175	°C

Figure 1. Electrical characteristics (definitions)

Symbol		Parameter
V_{BR}	=	Breakdown voltage
V_{RM}	=	Stand-of voltage
V_{CL}	=	Clamping voltage
I_{RM}	=	Leakage current at V_{RM}
I_{PP}	=	Peak pulse current
R_d	=	Dynamic impedance
C_{LINE}	=	Input capacitance per line

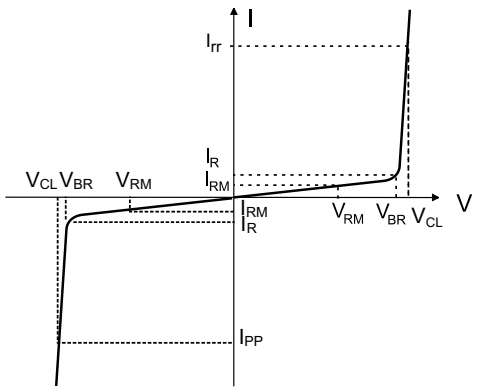


Table 3. Electrical characteristics (values, T_{amb} = 25 °C)

Symbol	Test conditions		Min.	Typ.	Max.	Unit
V_{RM}	ESDCAN02-2BWY				26.5	V
	ESDCAN03-2BWY				24	
V_{BR}	I_R = 1 mA, ESDCAN02-2BWY		28.5			V
	I_R = 1 mA, ESDCAN03-2BWY		26.5			
I_{RM}	V_{RM} = 24 V	T_j = 25 °C			10	nA
	V_{RM} = 5V				1	
	V_{RM} = 24 V	T_j = 125 °C			50	
	V_{RM} = 5V				10	
V_{CL}(1)	ISO 7637-3 Pulse 3a (U_s = -150 V)		-39			V
	ISO 7637-3 Pulse 3b (U_s = +100 V)				39	
	IEC 61000-4-5 (8/20 µs), I_{PP} = 1 A				37	
	IEC 61000-4-5 (8/20 µs), I_{PP} = 3A				44	
V_{CL}(2)	ISO 7637-3 Pulse 3a (U_s = -150 V)		-37			V
	ISO 7637-3 Pulse 3b (U_s = +100 V)				37	
	IEC 61000-4-5 (8/20 µs), I_{PP} = 1 A				35	
	IEC 61000-4-5 (8/20 µs), I_{PP} = 3A				41	
C	V_R = 0 V DC, F = 1 MHz			3	3.5	pF
ΔC	Capacitance difference between both line versus ground			0.01	0.08	pF
αT(3)	Voltage temperature coefficient				9	10^{-4}/°C

1. ESDCAN02-2BWY
2. ESDCAN03-2BWY
3. V_{BR} at T_j = V_{BR} at 25°C x (1 + αT x (T_j – 25))

Figure 2. Peak pulse current versus initial junction temperature (maximum values)

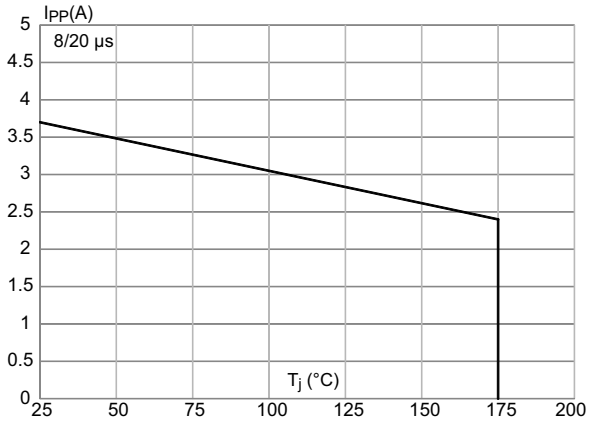


Figure 3. Junction capacitance versus reverse voltage applied (typical values)

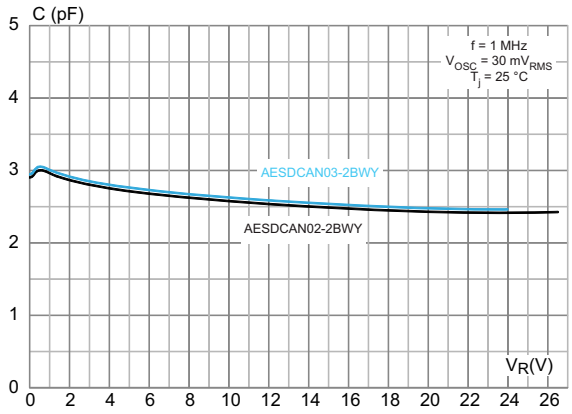


Figure 4. Peak pulse current versus clamping voltage (typical values) ESDCAN02

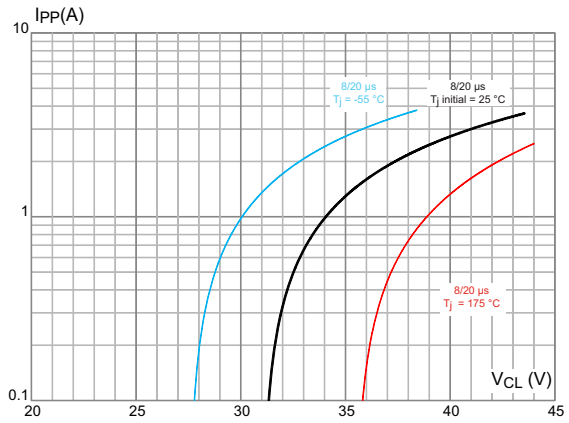


Figure 5. Peak pulse current versus clamping voltage (typical values) ESDCAN03

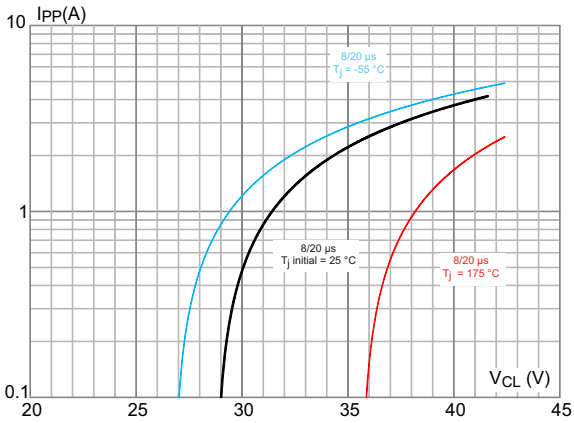


Figure 6. ESD response to ISO 10605 - C = 150 pF, R = 330 Ω (+8 kV contact)

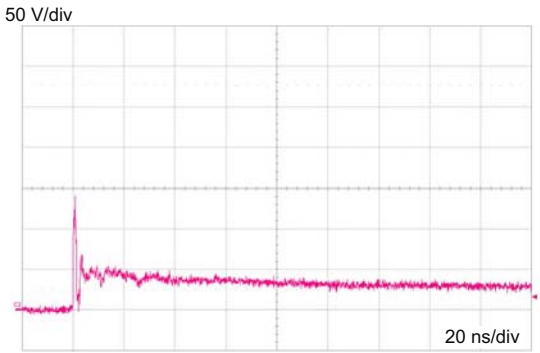


Figure 7. ESD response to ISO 10605 - C = 150 pF, R = 330 Ω (-8 kV contact)

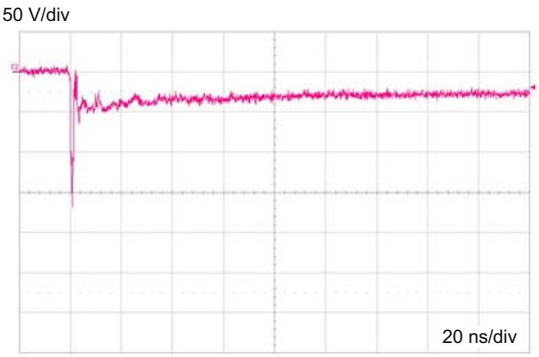


Figure 8. Response to ISO 7637-3 Pulse 3a (Us = -150 V)

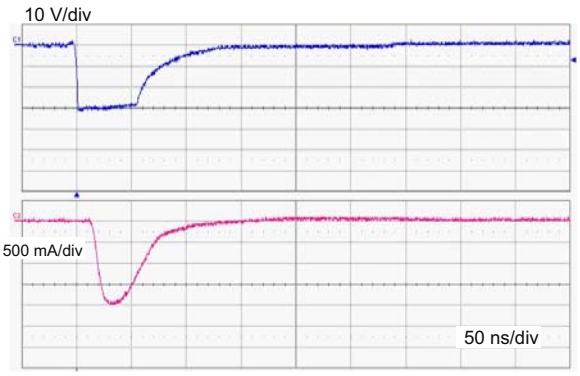


Figure 9. Response to ISO 7637-3 Pulse 3b (Us = +100 V)

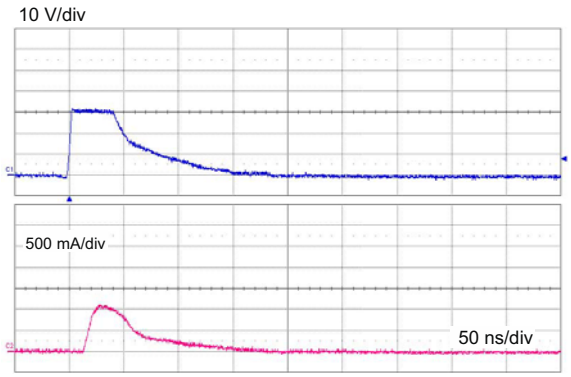
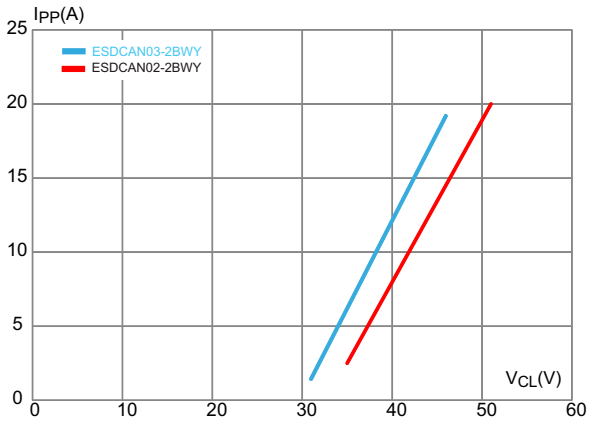


Figure 10. TLP measurements



2 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.

2.1 SOT323-3L package information

Figure 11. SOT323-3L package outline

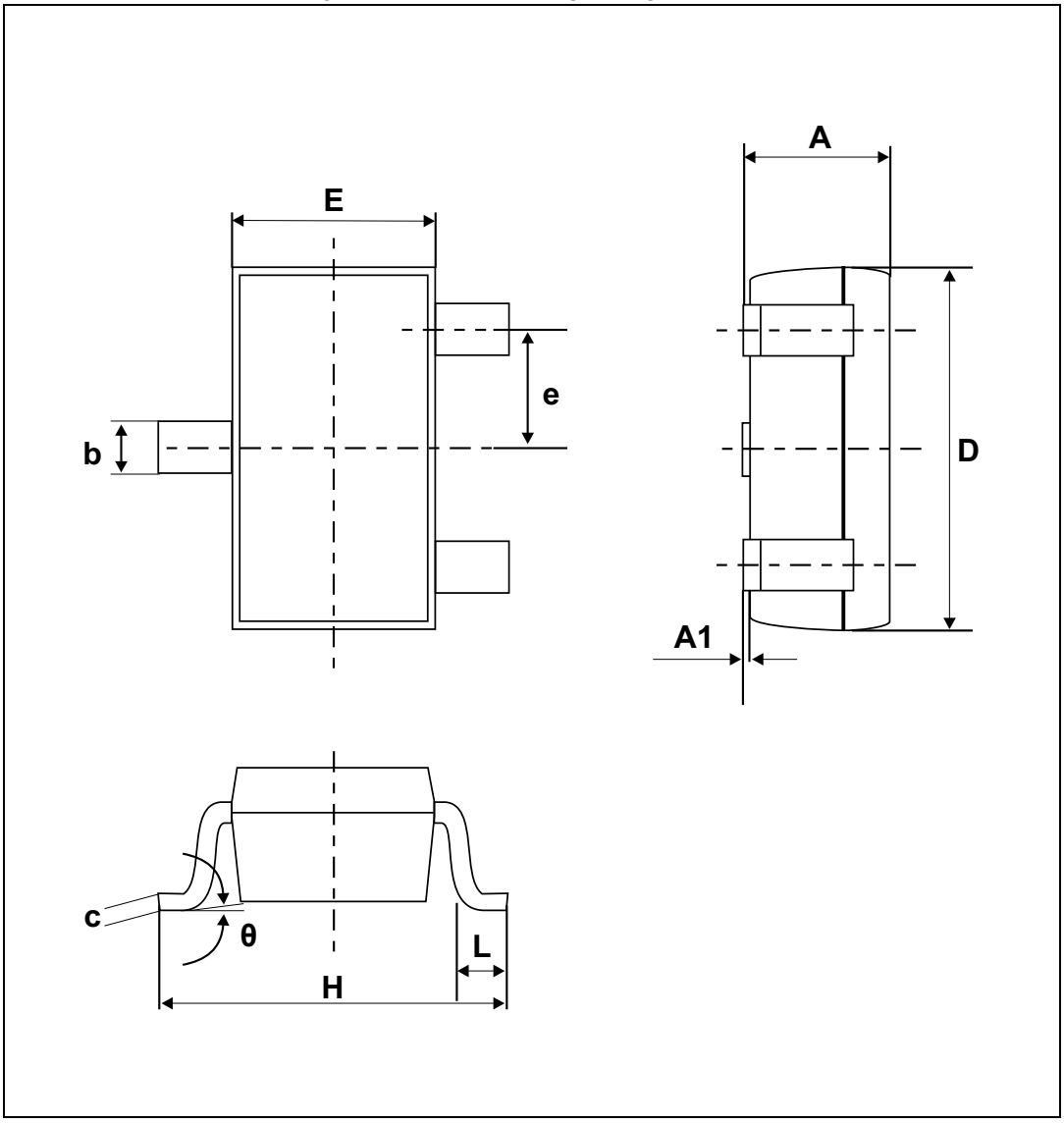
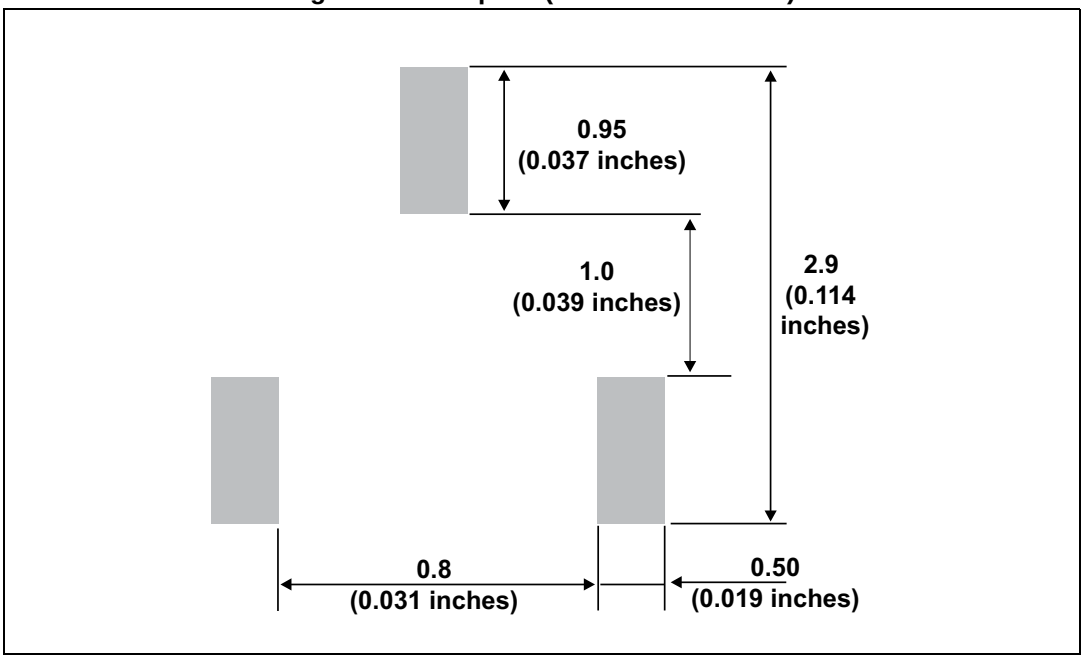


Table 4. SOT323-3L package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	Typ.	Min.	Max.	Typ.	Min.	Max.
A	0.8		1.1	0.031		0.043
A1	0.0		0.1	0.0		0.004
B	0.25		0.4	0.01		0.016
C	0.1		0.26	0.004		0.01
D	1.8	2.0	2.2	0.071	0.079	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
E		0.65			0.026	
H	1.8	2.1	2.4	0.071	0.083	0.094
L	0.1	0.2	0.3	0.004	0.008	0.012
q	0		30°	0		30°

1. Values in inches are converted from mm and rounded to 4 decimal digits.

Figure 12. Footprint (dimensions in mm)

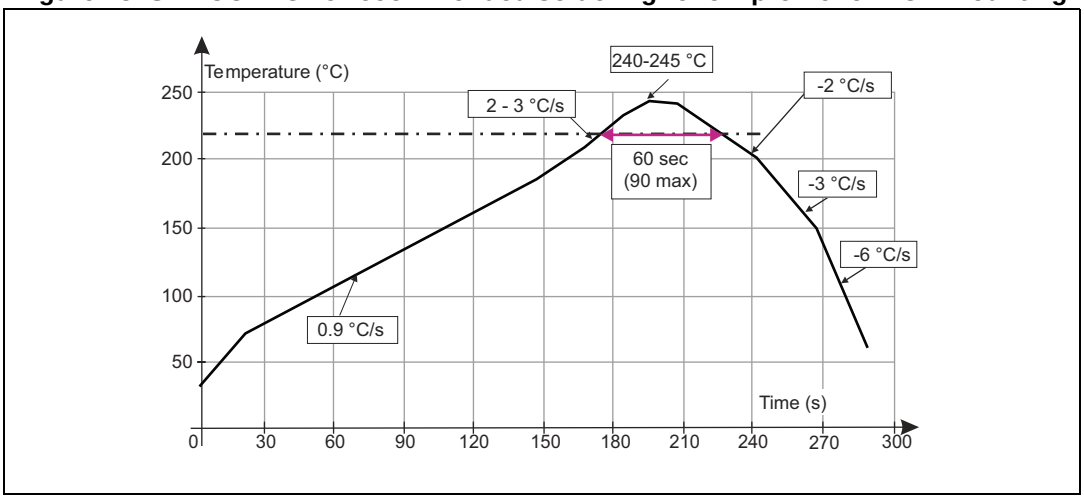


2.2 PCB design preference

1. To control the solder paste amount, the closed via is recommended instead of open vias.
2. The position of tracks and open vias in the solder area should be well balanced. The symmetrical layout is recommended, in case any tilt phenomena caused by asymmetrical solder paste amount due to the solder flow away.

2.3 Reflow profile

Figure 13. ST ECOPACK® recommended soldering reflow profile for PCB mounting



Minimize air convection currents in the reflow oven to avoid component movement.
Maximum soldering profile corresponds to the latest IPC/JEDEC J-STD-020.

3 Ordering information

Figure 14. Ordering information scheme

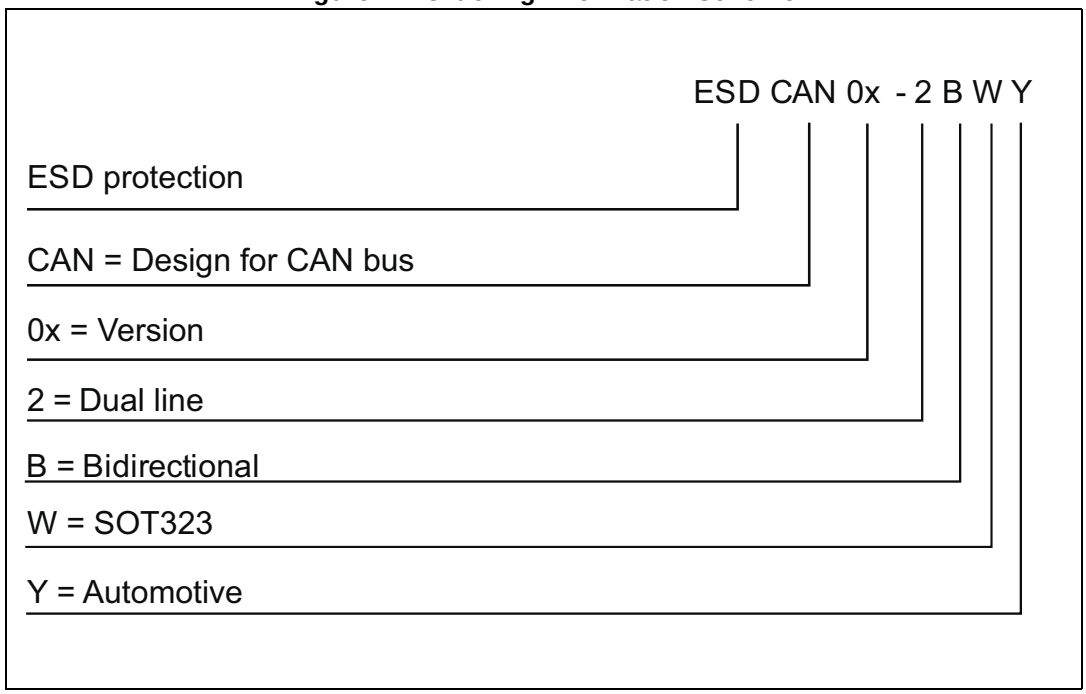


Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
ESDCAN02-2BWY	C03	SOT-323-3L	6.58 mg	3000	Tape and reel
ESDCAN03-2BWY	C02	SOT-323-3L	6.58 mg	3000	Tape and reel

4 Revision history

Table 6. Document revision history

Date	Revision	Changes
14-Apr-2015	1	First issue.