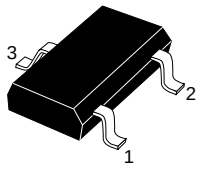
ESDCAN0x-2BWY

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) and ±30 kV (contact discharge)
  - ISO 10605 - C = 330 pF, R = 330 Ω: ±30 kV (air discharge) and ±30 kV (contact discharge)
  - ISO 7637-3: Pulse 3a: Vs = -150 V and Pulse 3b: Vs = +100 V

Applications

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

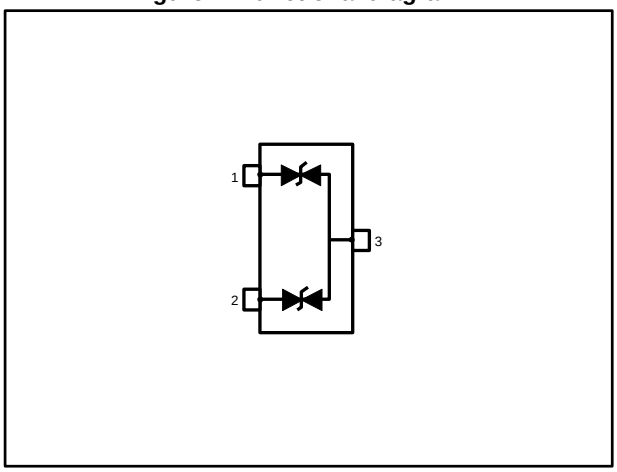
The ESDCAN02-2BWY and ESDCAN03-2BWY are a dual-line Transil specifically designed for the protection of the automotive CAN bus lines against electrostatic discharge (ESD).

the market make it compliant with all key interfaces in automotive: CAN-FD, LIN, FlexRay, MOST, SENT, etc.

Table 1: Device summary

Order code	V_{RM}	Package
ESDCAN02-2BWY	26.5 V	SOT323-3L
ESDCAN03-2BWY	24 V	

Figure 1: Functional diagram



1 Characteristics

Table 2: Absolute ratings (Tamb = 25 °C)

Symbol	Parameter		Value	Unit
V_{PP}	Electrostatic discharge capability	ISO 10605 - C = 150 pF, R = 330 Ω: Contact discharge Air discharge	 30 30	kV
		ISO 10605 - C = 330 pF, R = 330 Ω: Contact discharge Air discharge	 30 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 2: Electrical characteristics (definitions)

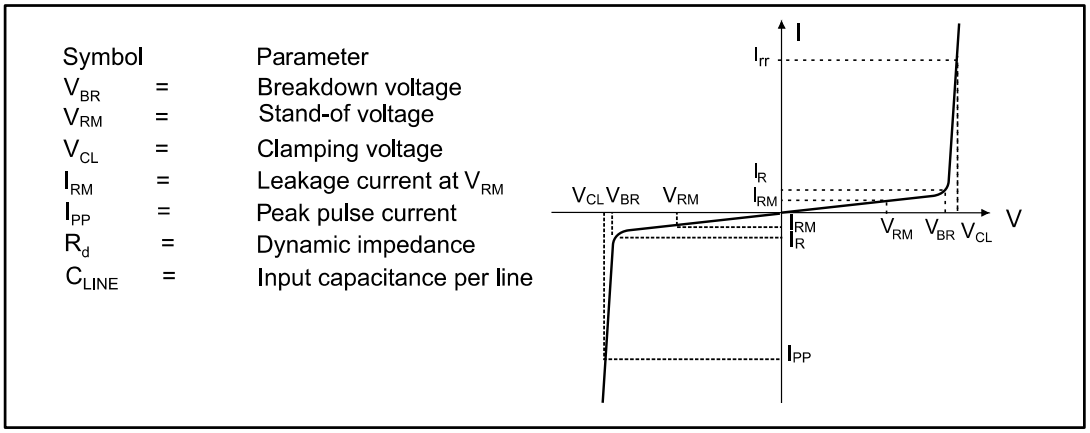


Table 3: Electrical characteristics (Tamb = 25 °C)

Symbol	Test condition		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	$T_j$initial = 25 °C			10	nA
	V_{RM} = 5 V				1	
	V_{RM} = 24 V	$T_j$initial = 125 °C			50	
	V_{RM} = 5 V				10	
V_{CL}	ISO 7637-3 Pulse 3a (U_S = -150 V)	ESDCAN02-2BWY	-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}	ISO 7637-3 Pulse 3a (U_S = -150 V)	ESDCAN03-2BWY	-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	F = 1 MHz, V_R = 0 V DC			3	3.5	pF
ΔC	Capacitance difference between both line versus ground			0.01	0.08	pF
αT(1)	Voltage temperature coefficient				9	10^{-4}/°C

Notes:

(1)V_{BR} at T_j = V_{BR} at 25 °C x (1 + αT x (T_j – 25))

1.2 Characteristics (curves)

Figure 3: Peak pulse current versus initial junction temperature (maximum values)

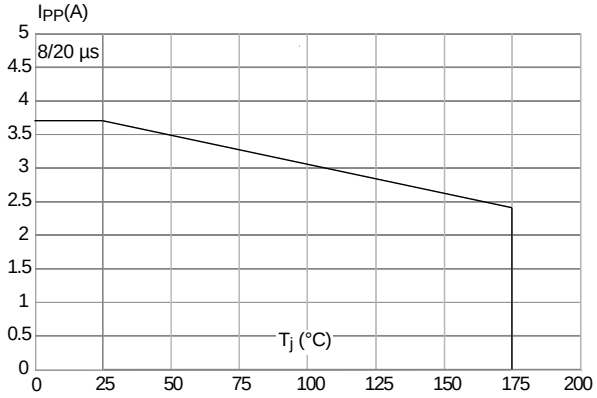


Figure 4: Junction capacitance versus reverse voltage applied

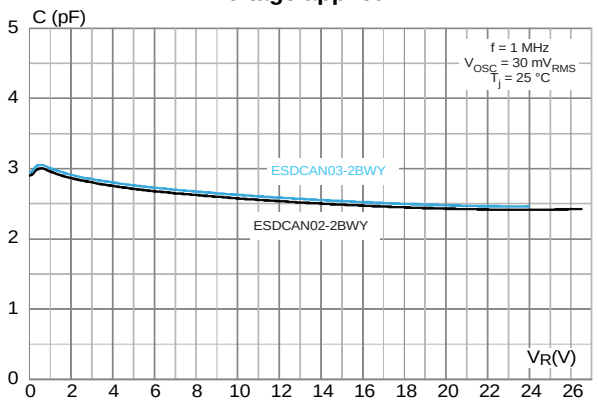


Figure 5: Peak pulse current versus clamping voltage ESDCAN02-2BWY

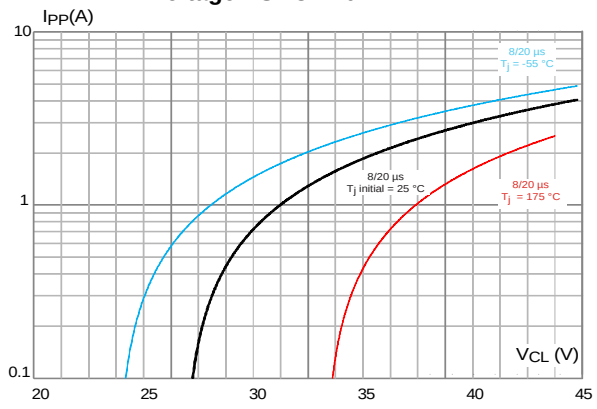


Figure 6: Peak pulse current versus clamping voltage ESDCAN03-2BWY

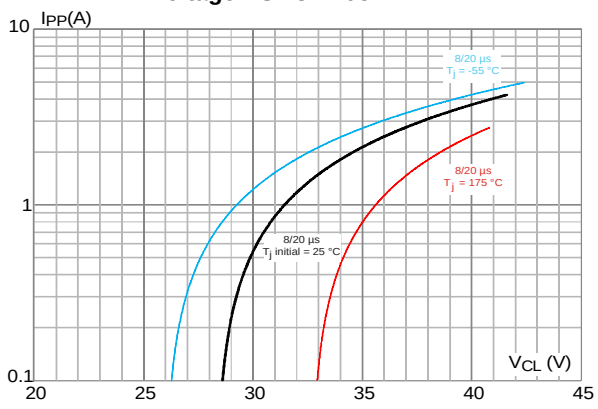


Figure 7: ESD response to ISO 10605 - C = 150 pF, R = 330 Ω (+8 kV contact) ESDCAN03-2BWY

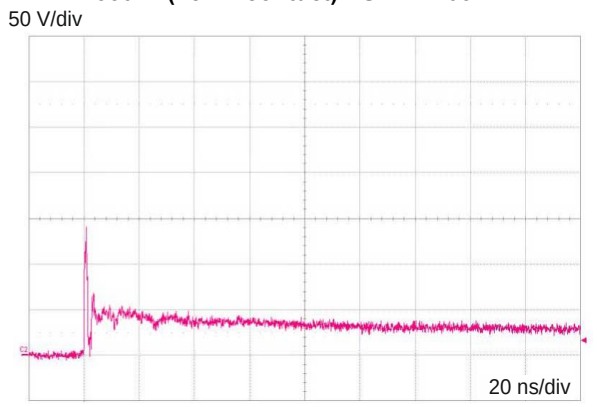


Figure 8: ESD response to ISO 10605 - C = 150 pF, R = 330 Ω (-8 kV contact) ESDCAN03-2BWY

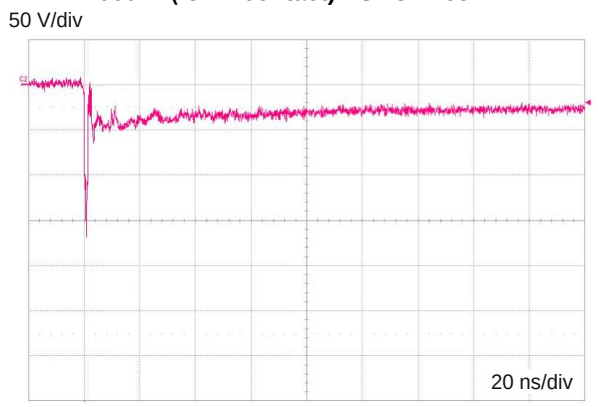


Figure 9: Response to ISO 7637-3 Pulse 3a (Us = -150 V) ESDCAN03-2BWY

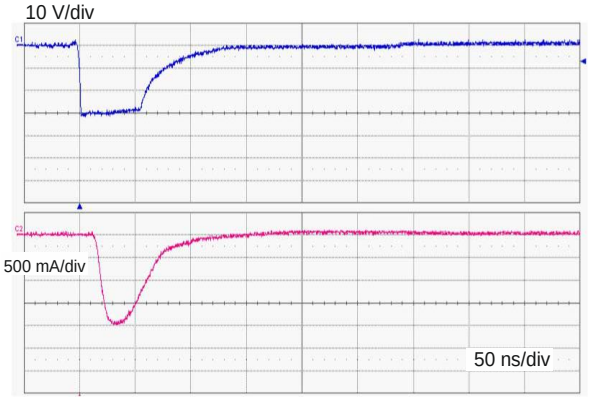


Figure 10: Response to ISO 7637-3 Pulse 3b (Us = +100 V) ESDCAN03-2BWY

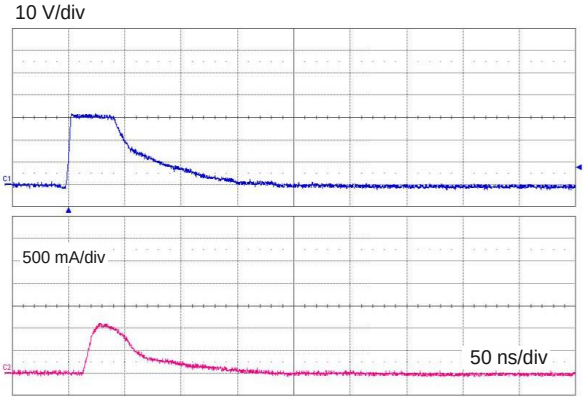


Figure 11: Leakage current versus junction temperature

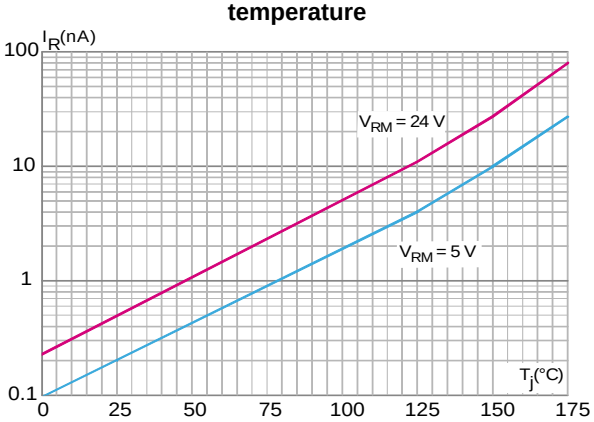


Figure 12: S21 attenuation

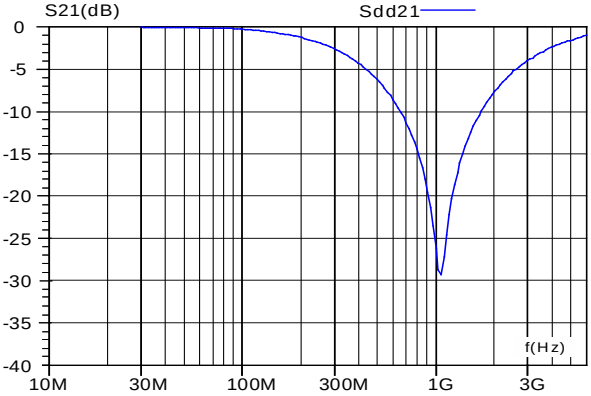
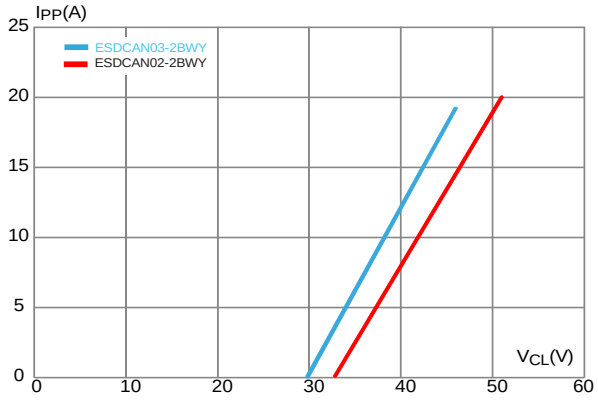


Figure 13: TLP



2 Package information

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.

- Epoxy meets UL 94,V0
- Lead-free package

2.1 SOT323-3L package information

Figure 14: SOT323-3L package outline

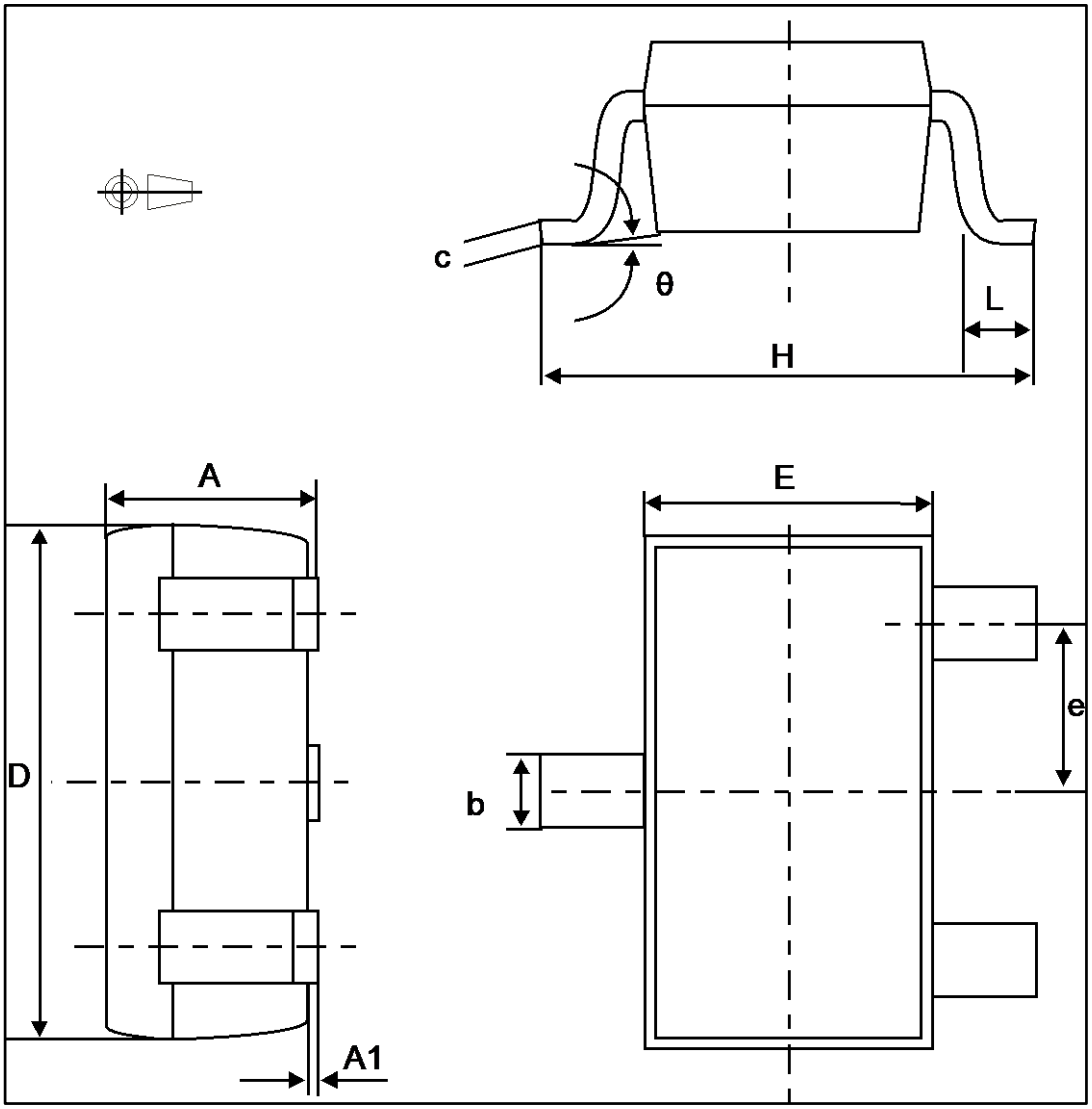


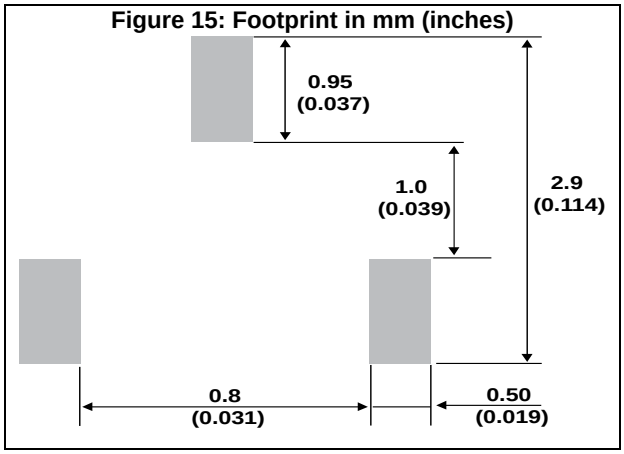
Table 4: SOT323-3L package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		0.8	1.1		0.031	0.043
A1		0.0	0.1		0.000	0.003
b		0.25	0.4		0.0098	0.0157
c		0.1	0.26		0.003	0.0102
D	2.0	1.8	2.2	0.078	0.070	0.086
E	1.25	1.15	1.35	0.0492	0.0452	0.0531
e	0.65			0.0255		
H	2.1	1.8	2.4	0.082	0.070	0.094
L	0.2	0.1	0.3	0.007	0.003	0.011
Θ		0	30°		0	30°

Notes:

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

Figure 15: Footprint in mm (inches)



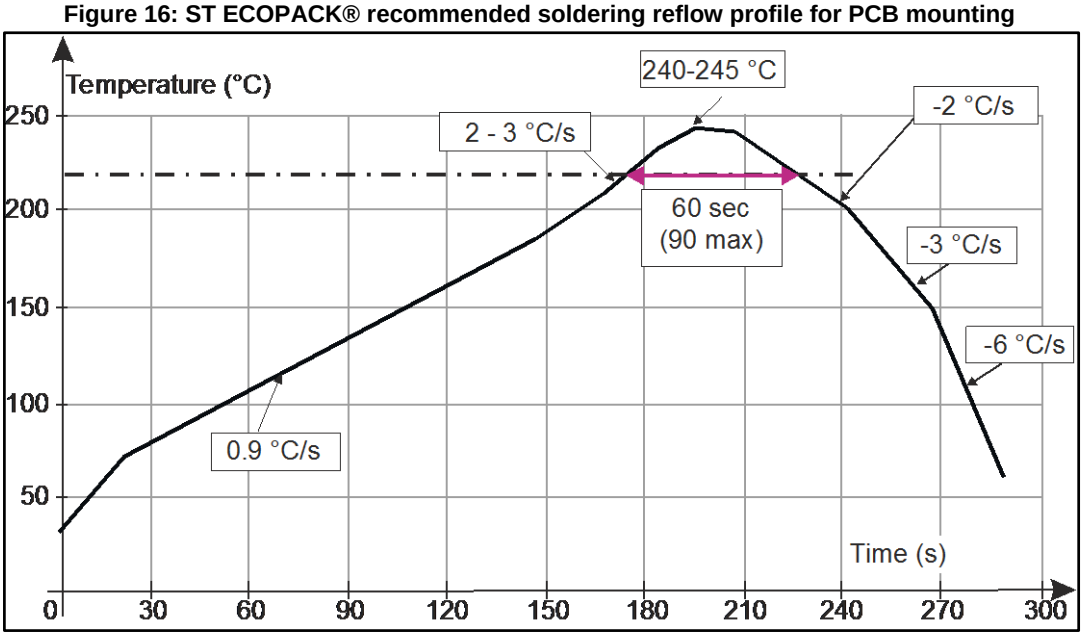
3 Recommendation on PCB assembly

3.1 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. A symmetrical layout is recommended, to avoid any tilt phenomena caused by asymmetrical solder paste due to solder flow away.

3.2 Reflow profile

Figure 16: 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.

4 Ordering information

Figure 17: Ordering information scheme

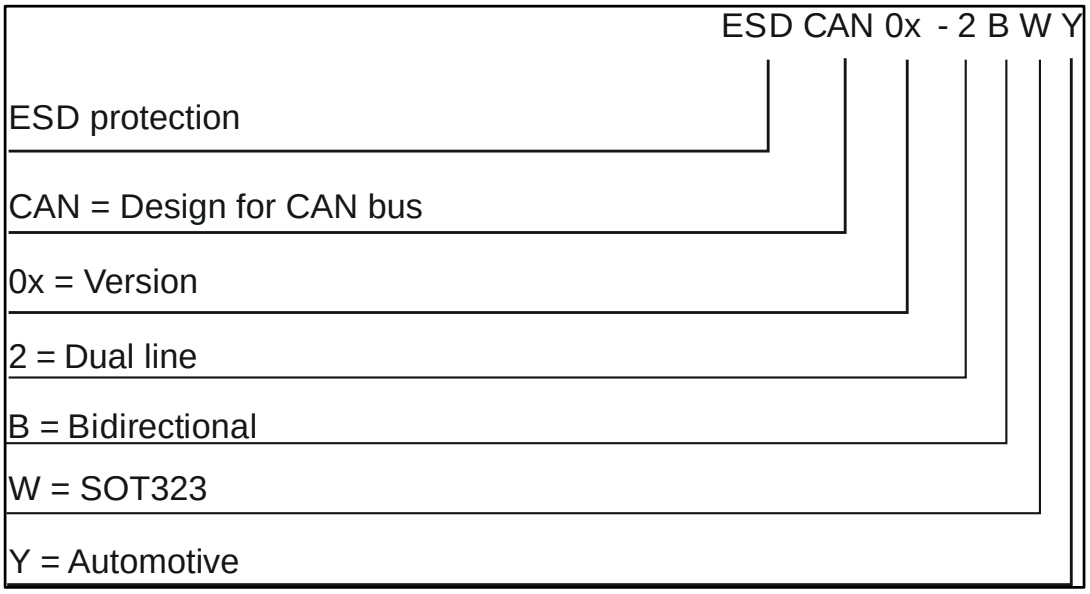


Table 5: Ordering information

Order code	Marking(1)	Package	Weight	Base qty.	Delivery mode
ESDCAN02-2BWY	C02	SOT323-3L	6.58 mg	3000	Tape and reel
ESDCAN03-2BWY	C03	SOT323-3L	6.58 mg	3000	Tape and reel

Notes:

(1)The marking can be rotated by multiples of 90° to differentiate assembly location

5 Revision history

Table 6: Document revision history

Date	Revision	Changes
11-Apr-2015	1	First issue.
30-Sep-2015	2	Updated *Figure 3: "Peak pulse current versus initial junction temperature (maximum values)"*.
16-Jun-2016	3	Updated *Figure 5: "Peak pulse current versus clamping voltage ESDCAN02-2BWY"* and *Figure 6: "Peak pulse current versus clamping voltage ESDCAN03-2BWY"*.

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