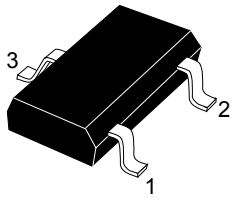
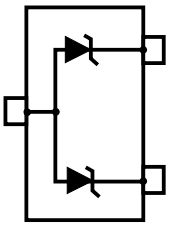
HSP051-2W3Y

Datasheet

Automotive 2-line ESD protection for high speed lines



SOT323-3L
(Jedec TO-236)



Functional diagram

Product status link	
HSP051-2W3Y	
Product summary	
Order code	HSP051-2W3Y
Marking	H5Y
Package	SOT323-3L
Packing	Tape and reel

Features

- AEC-Q101 qualified
- Flow-through routing to keep signal integrity
- Ultra large bandwidth: 3 GHz
- Ultra low capacitance: 0.7 pF
- Extended operating junction temperature range: -40 °C to 150 °C
- RoHS compliant
- Complies with ISO 10605 - C = 150 pF, R = 330 Ω exceeds level 4
  - ±12 kV (contact discharge)
  - ±15 kV (air discharge)
- Complies with ISO 10605 - C = 330 pF, R = 330 Ω
  - ±8 kV (contact discharge)
  - ±12 kV (air discharge)

Application

The HSP051-2W3Y is designed to protect against electrostatic discharge on automotive circuits such as:

- APIX
- LVDS & digital video interface
- Ethernet and BroadrReach
- USB 2.0 and USB 3.0
- High speed communication buses

Description

The HSP051-2W3Y is an ESD array designed for high-speed differential lines protection.

The ultralow capacitance variation ensures negligible influence on signal-skew.

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage	ISO10605 / IEC 61000-4-2 (C = 150 pF, R = 330 Ω): Contact discharge Air discharge	 12 15	kV
		ISO10605 (C = 330 pF, R = 330 Ω) Contact discharge Air discharge	 8 12	
P_{PP}	Peak pulse power dissipation (8/20 µs)		20	W
I_{PP}	Peak Pulse current (8/20 µs)		1.8	A
T_{stg}	Storage temperature range		-65 to +150	°C
T_j	Operating junction temperature range		-40 to +150	°C
T_L	Maximum lead temperature for soldering during 10 s		260	°C

Figure 1. Electrical characteristics - parameter definitions

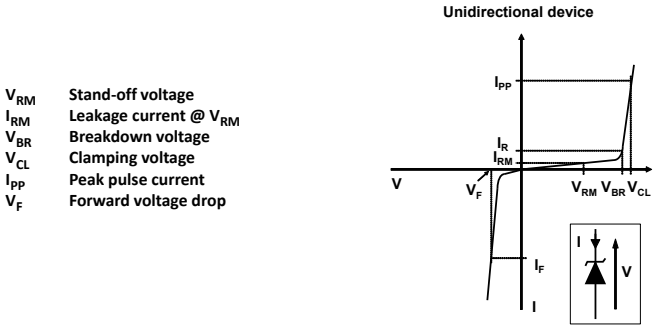


Table 2. Electrical characteristics (values) (T_{amb} = 25° C)

Symbol	Test conditions	Min.	Typ.	Max.	Unit
V_{BR}	I_R = 1 mA	5.3			V
I_R	V_R = 3 V			100	nA
	V_R = 5 V			150	
V_{CL}	ISO 10605- C = 150 pF, R = 330 Ω +8 kV contact discharge, measured at 30 ns		18		V
$C_{I/O-GND}$	$V_{I/O}$ = 0 V, f = 1 MHz, V_{OSC} = 30 mV		0.7	1.0	pF
$\Delta C_{I/O-GND}$			0.03		
f_C	S_{21} = -3 dB		3		GHz

1.1 Characteristics (curves)

Figure 2. Leakage current versus junction temperature

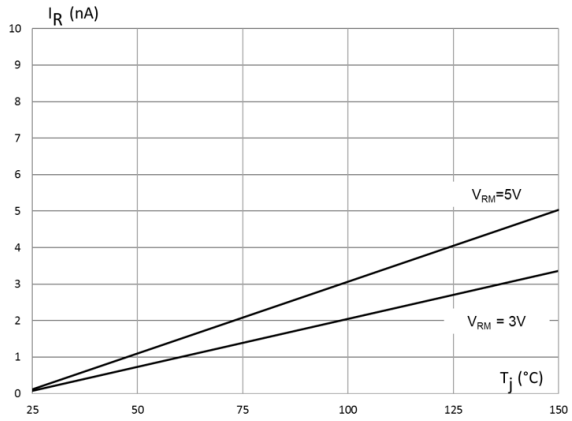


Figure 3. Junction capacitance versus reverse applied voltage

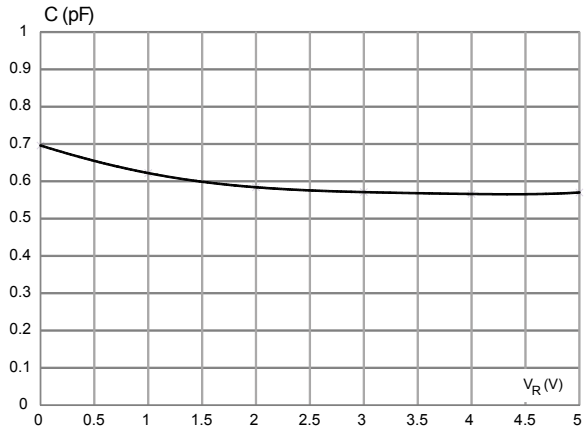


Figure 4. ESD response to ISO 10605 - C = 150 pF, R = 330 Ω (+8 kV contact discharge)

Figure 5. ESD response to ISO 10605 - C = 150 pF, R = 330 Ω (-8 kV contact discharge)

Figure 6. TLP

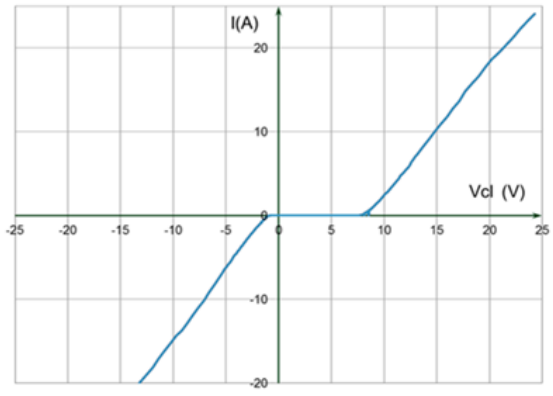


Figure 7. S21 attenuation

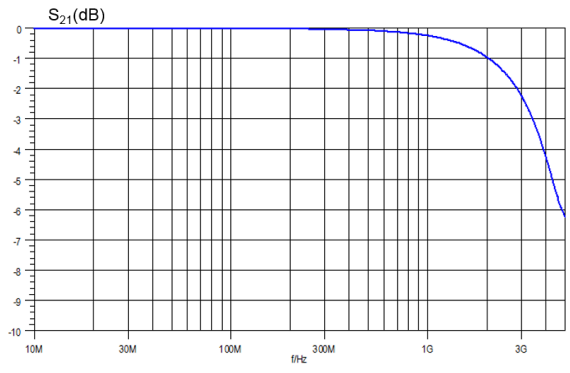


Figure 8. **Fast transient pulse 3a (Us = -150 V)**

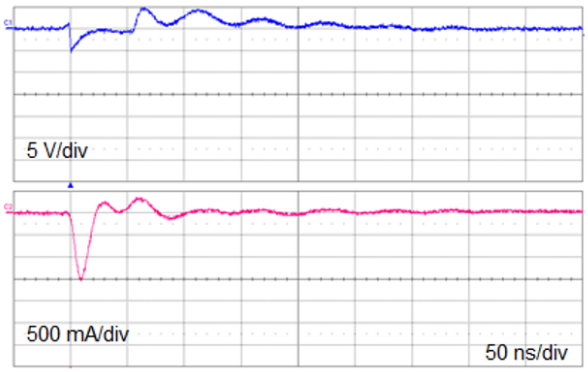


Figure 9. **Fast transient pulse 3b (Us = +150 V)**

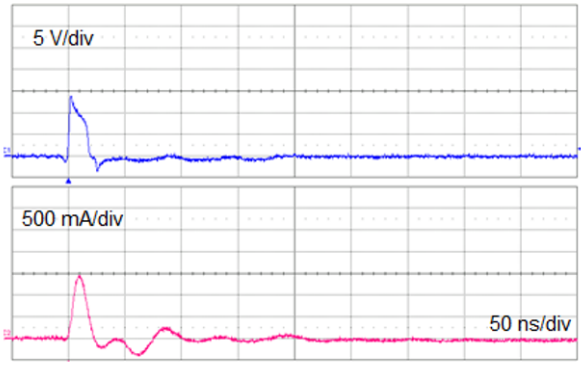


Figure 10. **Slow transient pulse - negative 2a (Us = -85 V)**

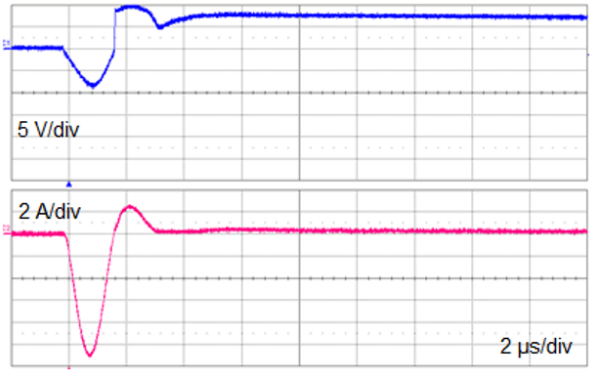
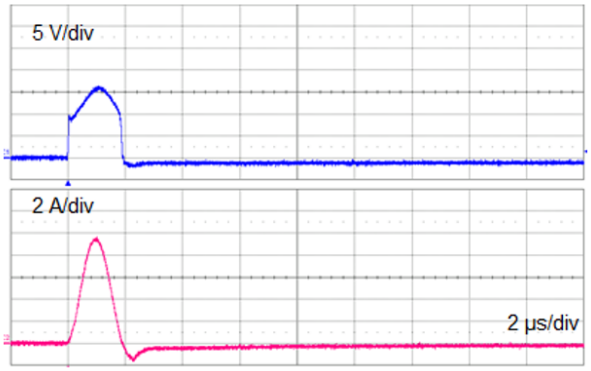


Figure 11. **Slow transient pulse - positive 2a (Us = +85 V)**



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.

2.1 SOT323-3L package information

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

Figure 12. SOT323-3L package outline

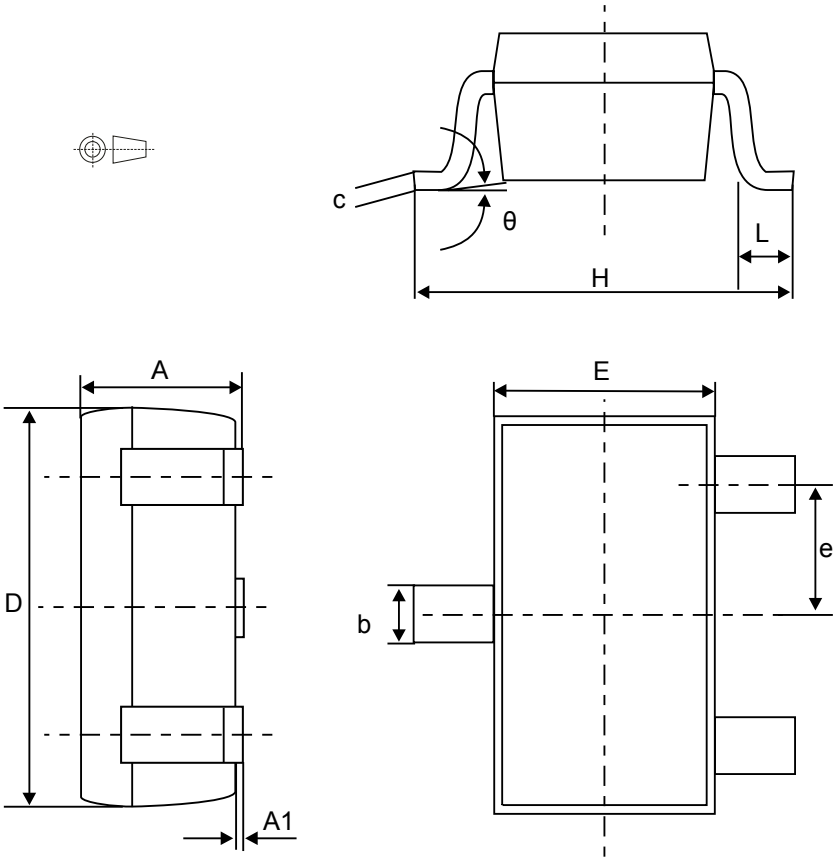


Table 3. SOT323-3L package mechanical data

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	1.8	2.0	2.2	0.070	0.078	0.086
E	1.15	1.25	1.35	0.0452	0.0492	0.0531
e	0.60	0.65	0.70	0.024	0.026	0.028
H	1.8	2.1	2.4	0.070	0.082	0.094
L	0.1	0.2	0.30	0.004	0.008	0.012
Θ		0	30°	0		30°

1. *Values in inches are converted from mm and rounded to 3 decimal digits*

Figure 13. SOT323-3L recommended footprint (dimensions in inches)

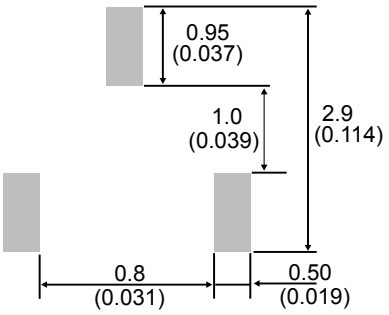
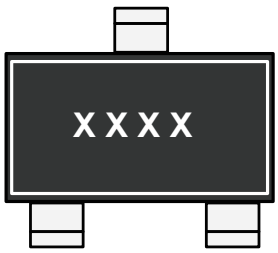
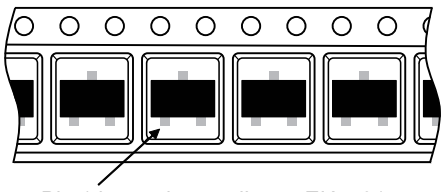


Figure 14. SOT323-3L marking



XXXX : Marking

Figure 15. Package orientation in reel



Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Figure 16. Tape and reel orientation

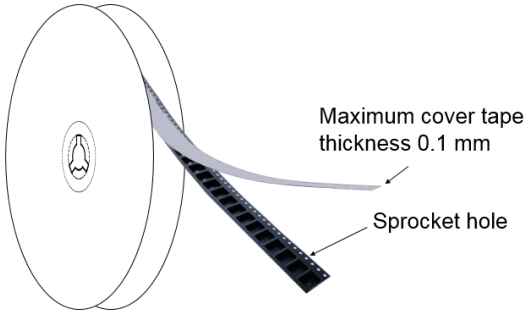


Figure 17. 7" reel dimension values

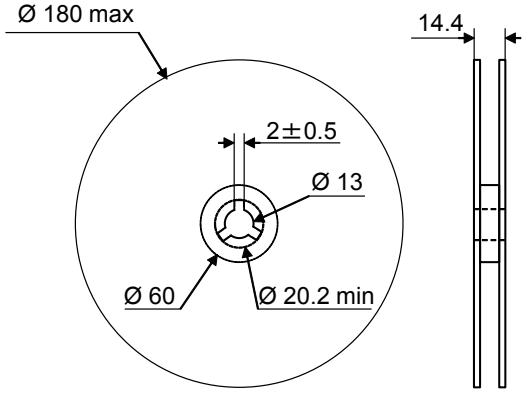


Figure 18. Inner box dimension values

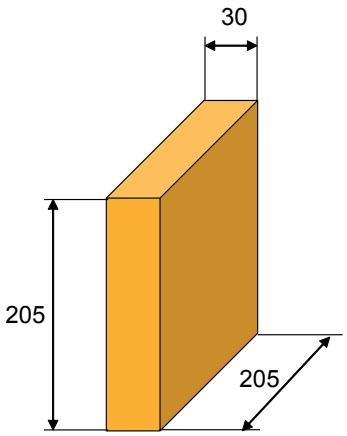
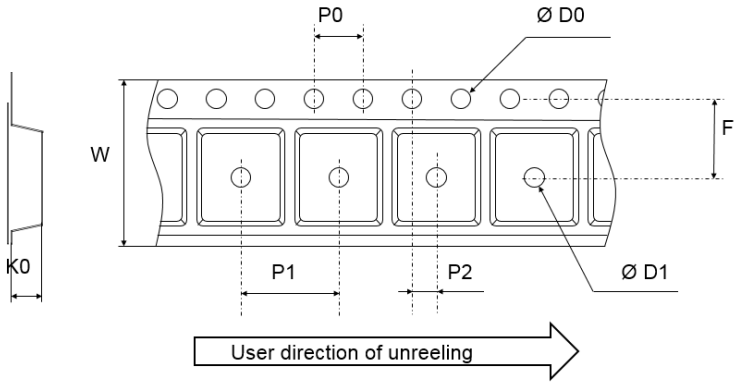


Figure 19. Tape outline



Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

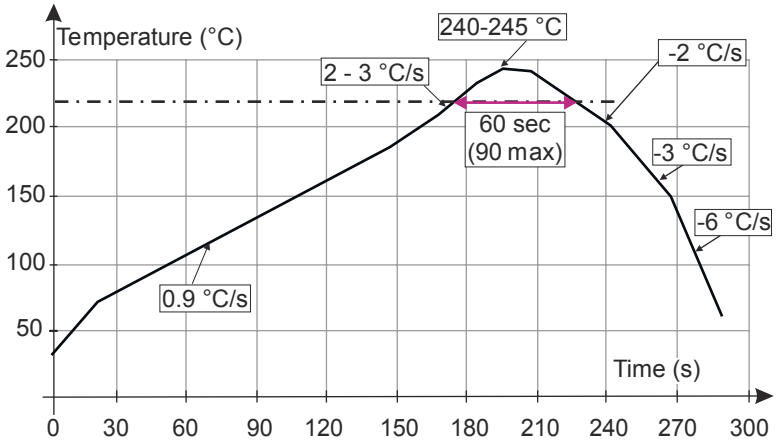
Table 4. Tape dimension values

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
D0	1.45	1.5	1.6
D1	1		
F	3.45	3.5	3.55
K0	1.3	1.4	1.5
P0	3.9	4.0	4.1
P1	3.9	4.0	4.1
P2	1.95	2.0	2.05
W	7.9	8	8.3

3 Recommendation on PCB assembly

3.1 Reflow profile

Figure 20. ST ECOPACK® recommended soldering reflow profile for PCB mounting



Note: Minimize air convection currents in the reflow oven to avoid component movement.

4 Ordering information

Figure 21. **Ordering information scheme**

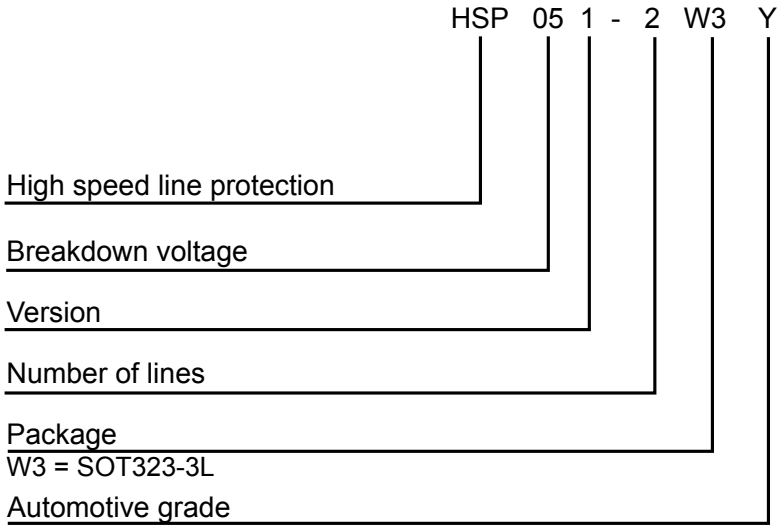


Table 5. **Ordering information**

Order code	Marking[1]	Package	Weight	Base qty.	Delivery mode
HSP051-2W3Y	H5Y	SOT323-3L	6 mg	3000	Tape and reel

1. *The marking can be rotated by multiples of 90° to differentiate assembly location*

Revision history

Table 6. **Document revision history**

Date	Version	Changes
10-Jul-2018	1	Initial release.

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