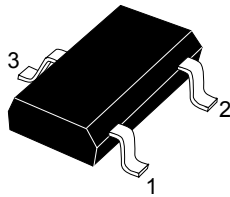
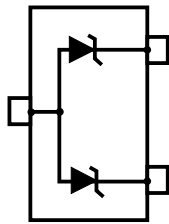


## Automotive 2-line ESD protection for high speed lines




**SOT323-3L**  
(Jedec TO-236)



Functional diagram

### 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 BroadReach
- 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.

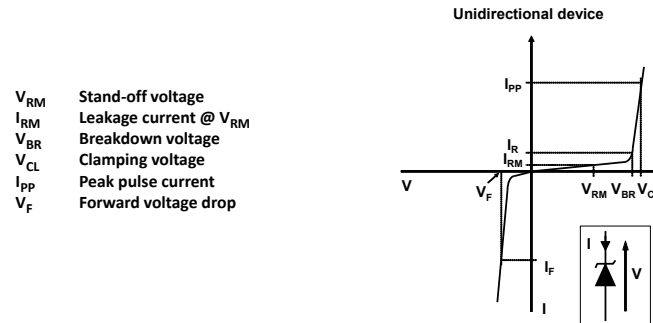
Product status link	
<a href="#">HSP051-2W3Y</a>	
Product summary	
<b>Order code</b>	HSP051-2W3Y
<b>Marking</b>	H5Y
<b>Package</b>	SOT323-3L
<b>Packing</b>	Tape and reel

# 1 Characteristics

**Table 1. Absolute maximum ratings (T<sub>amb</sub> = 25 °C)**

Symbol	Parameter	Value	Unit	
V <sub>PP</sub>	Peak pulse voltage	ISO10605 / IEC 61000-4-2 (C = 150 pF, R = 330 Ω):		
		Contact discharge	12	kV
		Air discharge	15	
		ISO10605 (C = 330 pF, R = 330 Ω)		
Contact discharge	8			
	Air discharge	12		
P <sub>PP</sub>	Peak pulse power dissipation (8/20 μs)	20	W	
I <sub>PP</sub>	Peak Pulse current (8/20 μs)	1.8	A	
T <sub>stg</sub>	Storage temperature range	-65 to +150	°C	
T <sub>j</sub>	Operating junction temperature range	-40 to +150	°C	
T <sub>L</sub>	Maximum lead temperature for soldering during 10 s	260	°C	

**Figure 1. Electrical characteristics - parameter definitions**



**Table 2. Electrical characteristics (values) (T<sub>amb</sub> = 25° C)**

Symbol	Test conditions	Min.	Typ.	Max.	Unit
V <sub>BR</sub>	I <sub>R</sub> = 1 mA	5.3			V
I <sub>R</sub>	V <sub>R</sub> = 3 V			100	nA
	V <sub>R</sub> = 5 V			150	
V <sub>CL</sub>	ISO 10605- C = 150 pF, R = 330 Ω +8 kV contact discharge, measured at 30 ns		18		V
C <sub>I/O-GND</sub>	V <sub>I/O</sub> = 0 V, f = 1 MHz, V <sub>OSC</sub> = 30 mV		0.7	1.0	pF
ΔC <sub>I/O-GND</sub>			0.03		
f <sub>C</sub>	S <sub>21</sub> = -3 dB		3		GHz

## 1.1 Characteristics (curves)

Figure 2. Leakage current versus junction temperature

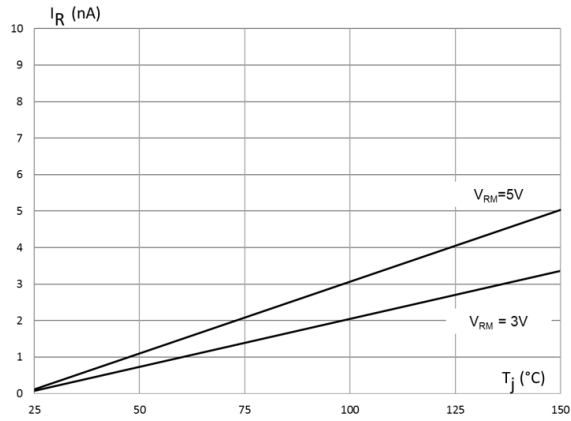


Figure 3. Junction capacitance versus reverse applied voltage

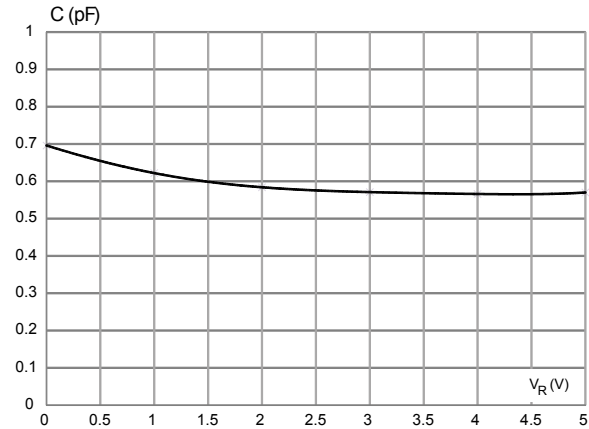


Figure 4. ESD response to ISO 10605 - C = 150 pF, R = 330  $\Omega$  (+8 kV contact discharge)



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



Figure 6. TLP

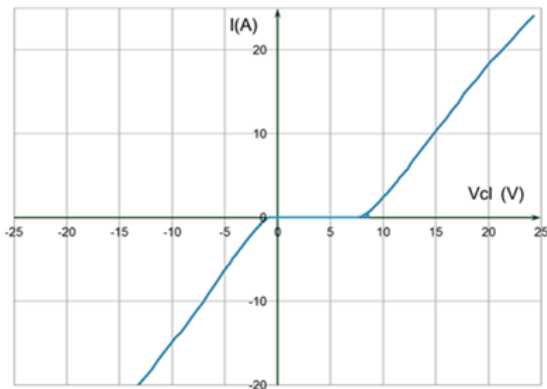
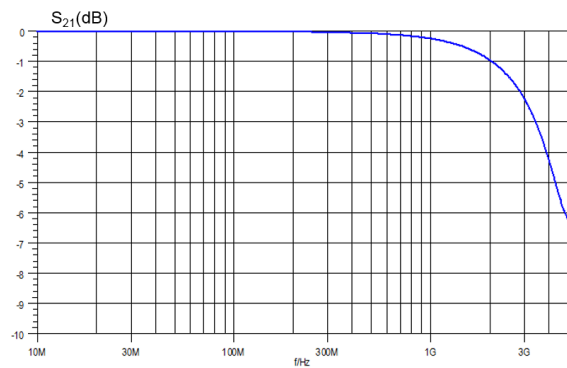
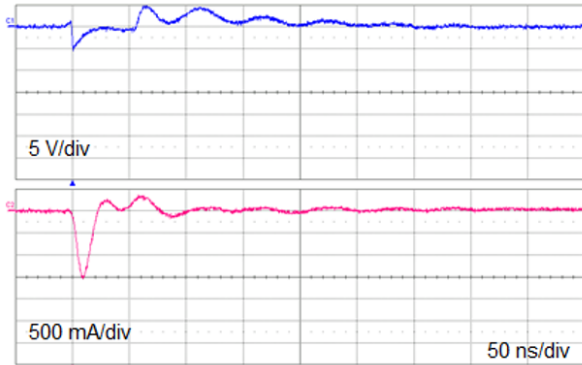


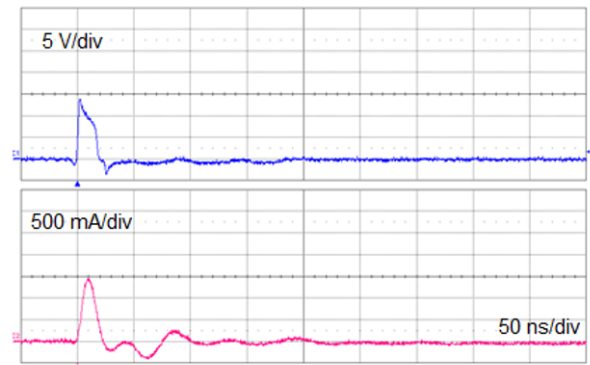
Figure 7. S<sub>21</sub> attenuation



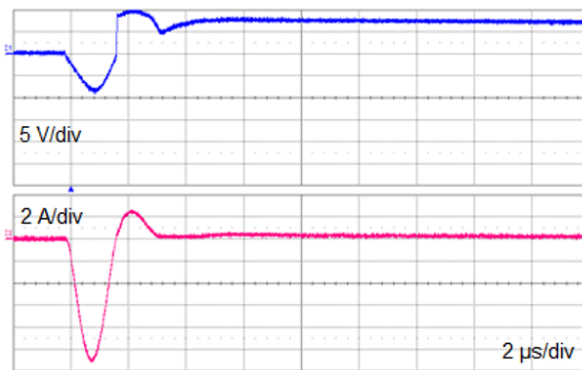
**Figure 8. Fast transient pulse 3a ( $U_s = -150\text{ V}$ )**



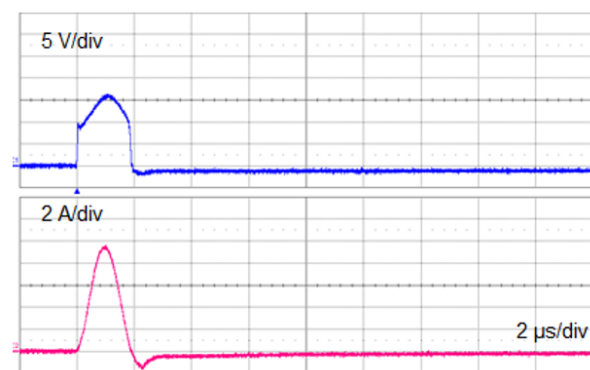
**Figure 9. Fast transient pulse 3b ( $U_s = +150\text{ V}$ )**



**Figure 10. Slow transient pulse - negative 2a ( $U_s = -85\text{ V}$ )**



**Figure 11. Slow transient pulse - positive 2a ( $U_s = +85\text{ V}$ )**



## 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](http://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

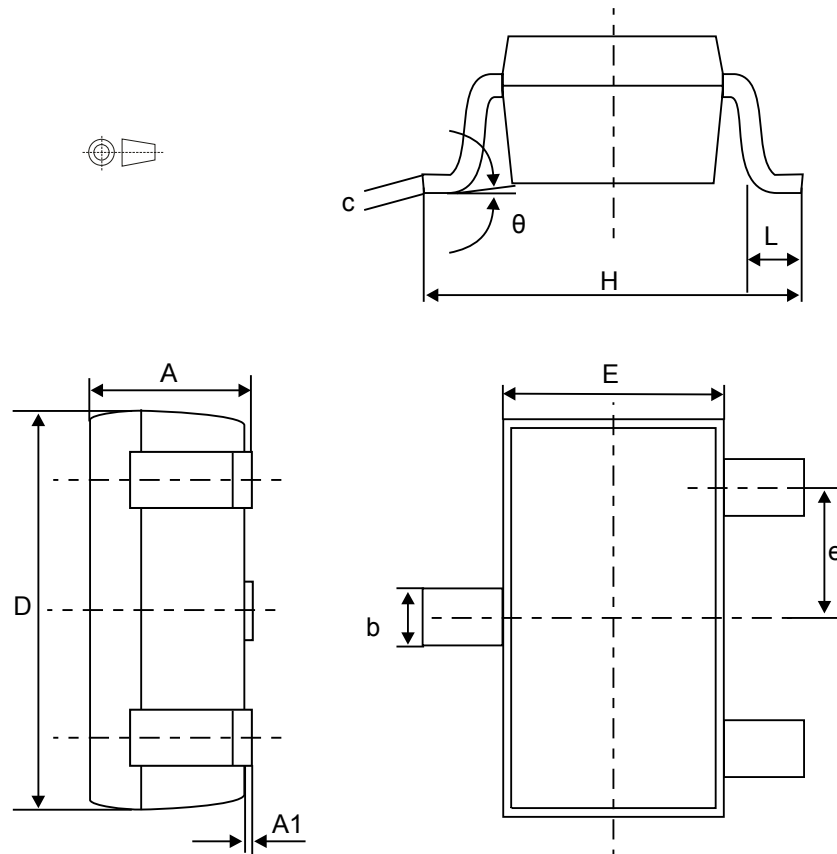


Table 3. SOT323-3L package mechanical data

Ref.	Dimensions					
	Millimeters			Inches <sup>(1)</sup>		
	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)

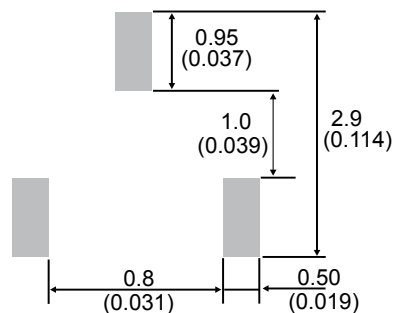
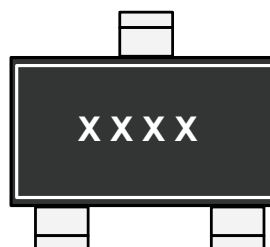
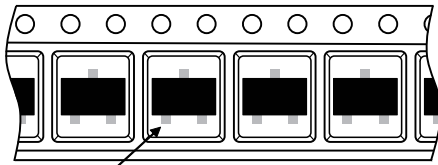


Figure 14. SOT323-3L marking



XXXX : Marking

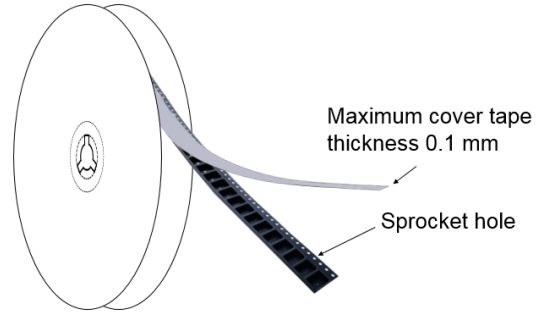
**Figure 15. Package orientation in reel**



Pin 1 located according to EIA-481

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

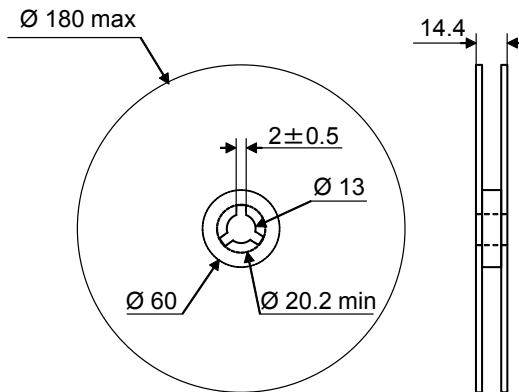
**Figure 16. Tape and reel orientation**



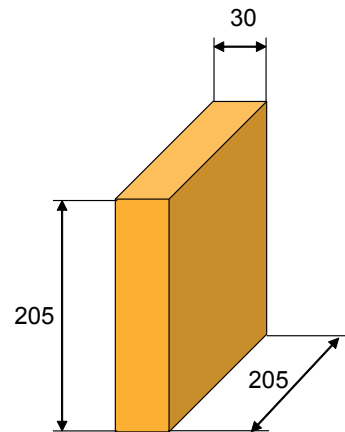
Maximum cover tape thickness 0.1 mm

Sprocket hole

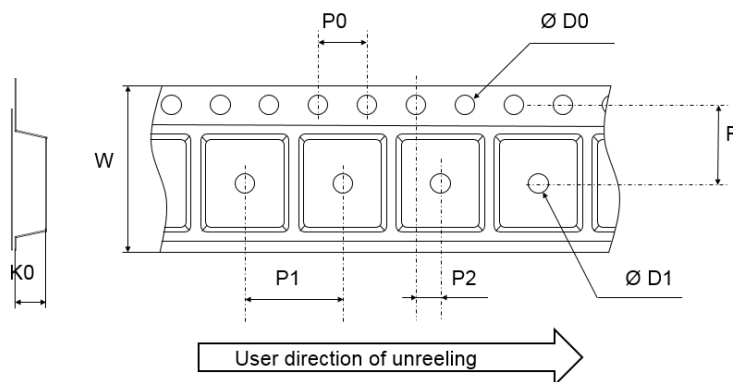
**Figure 17. 7" reel dimension values**



**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**

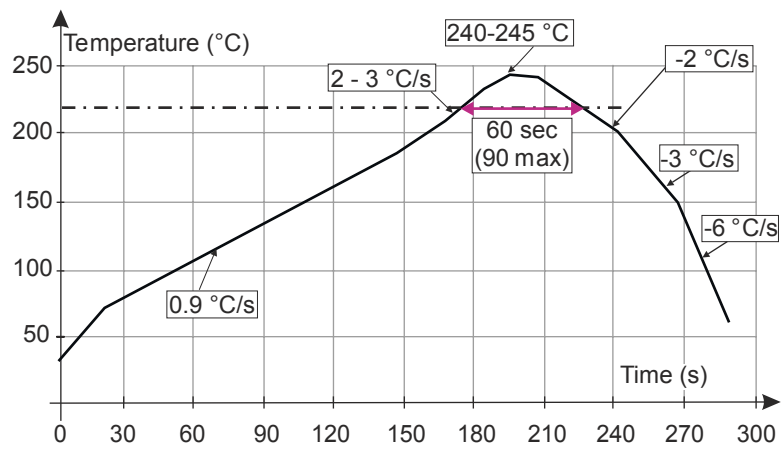
Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
D0	1.45	1.5	1.6
D1	1		
F	3.45	3.5	3.55
K0	1.3	1.4	1.5
P0	3.9	4.0	4.1
P1	3.9	4.0	4.1
P2	1.95	2.0	2.05
W	7.9	8	8.3



### 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

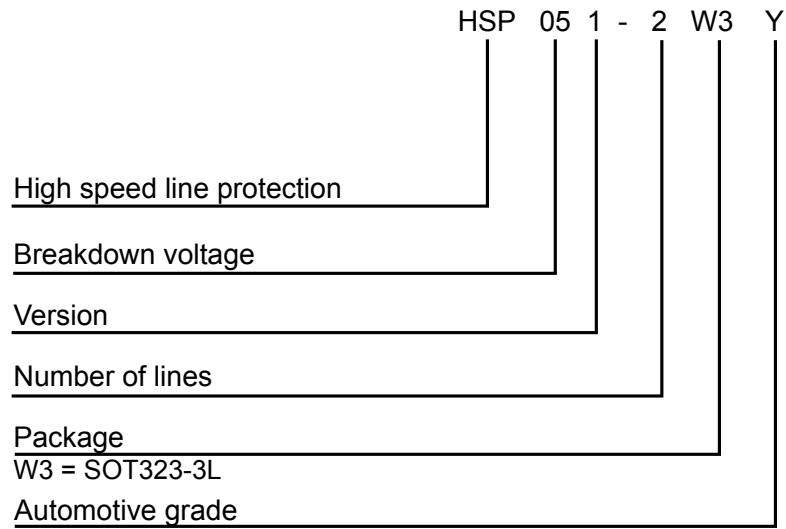


Table 5. Ordering information

Order code	Marking <sup>(1)</sup>	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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