



4-line ESD protection for high speed lines

Features

■ flow-through routing to keep signal integrity

ultra-large bandwidth: 6 GHz
ultra low capacitance: 0.6 pF
low time domain reflection

low leakage current: 100 nA at 25 °C
extended operating junction temperature range: -40 °C to 150 °C

■ package size in mm: 2 x 1 x 0.5

RoHS compliant

Benefits

■ high ESD robustness of the equipment

■ suitable for high density boards

Complies with following standards

■ MIL-STD 883G Method 3015-7 Class 3B:

- 8 kV

■ IEC 61000-4-2 level 4:

- 8 kV (contact discharge)

Applications

The HSP061-4NY8 is designed to protect against electrostatic discharge on sub micron technology circuits driving:

■ HDMI 1.3 and 1.4

Digital Video Interface

Display Port

■ USB 3.0

Serial ATA

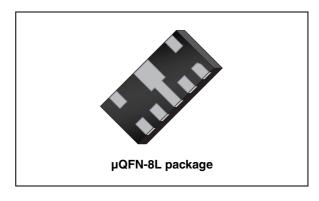
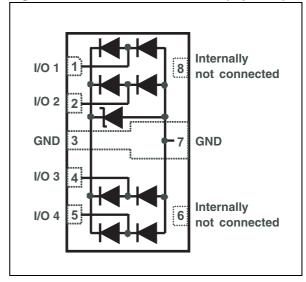


Figure 1. Functional schematic (top view)



Description

The HSP061-4NY8 is a 4-channel ESD array with a rail to rail architecture designed specifically for the protection of high speed differential lines.

The ultra-low variation of the capacitance ensures very low influence on signal-skew. The large bandwidth and the low reflection make it compatible with 5 Gbps.

The device is packaged in μ QFN-8L with a 400 μ m pitch, which minimizes the PCB area.

Characteristics HSP061-4NY8

1 Characteristics

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

Symbol	F	Value	Unit	
V_{PP}	Peak pulse voltage IEC 61000-4-2 contact discharge		8	kV
I _{pp}	Repetitive peak pulse current (8/20	3	Α	
T _j	Operating junction temperature rang	-40 to +150	°C	
T _{stg}	Storage temperature range	-65 to +150	°C	
T _L	Maximum lead temperature for sold	260	°C	

Table 2. Electrical characteristics $T_{amb} = 25 \, ^{\circ}C$

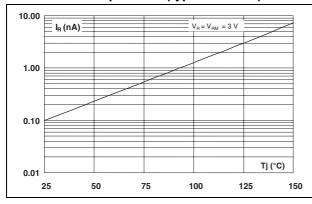
Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
V_{BR}	Breakdown voltage	I _R = 1 mA	6			V
I _{RM}	Leakage current	V _{RM} = 3 V			100	nA
V _{CL}	Clamping voltage	IEC 61000-4-2, +8 kV contact (I _{PP} = 30 A), measured at 30 ns		18		V
C _{I/O - GND}	Capacitance (input/output to ground)	$V_{I/O} = 0 \text{ V F} = 1 \text{ MHz},$ $V_{OSC} = 30 \text{ mV}$		0.6	0.8	pF
ΔC _{I/O - GND}			0.03	0.05	pF	
f _C	Cut-off frequency	-3dB		6		GHz
Z _{Diff}	Differential impedance	$t_r = 200 \text{ ps } (10 - 90\%)^{(1)}$ $Z_{0 \text{ Diff}} = 100 \Omega$	85	100	115	Ω

^{1.} HDMI specification conditions. This information can be provided for other applications. Please contact your local ST office.

HSP061-4NY8 Characteristics

Figure 2. Leakage current versus junction temperature (typical values)

Figure 3. S21 attenuation measurement



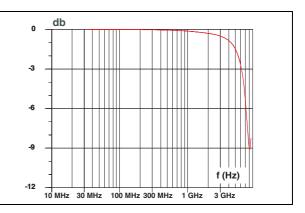
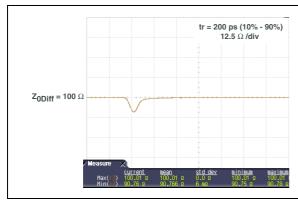
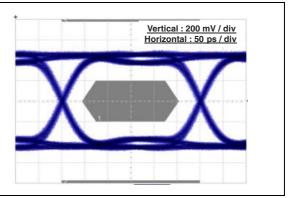


Figure 4. Differential impedance (Z_{diff})⁽¹⁾

Figure 5. Eye diagram - HDMI mask at 3.4 Gbps per channel⁽¹⁾



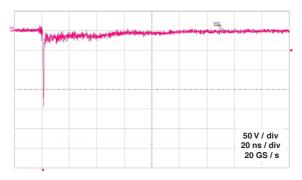


1. HDMI specification conditions. This information can be provided for other applications. Please contact your local ST office.

Figure 6. ESD response to IEC 61000-4-2 (+8 kV contact discharge)

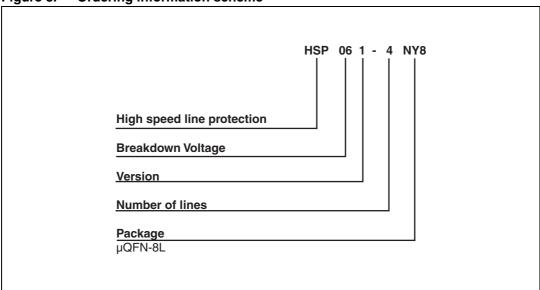
50 V / div 20 ns / div 20 GS / s

Figure 7. ESD response to IEC 61000-4-2 (-8 kV contact discharge)



2 Ordering information scheme

Figure 8. Ordering information scheme



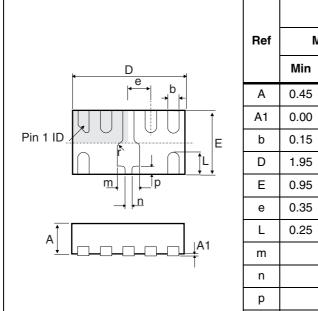
HSP061-4NY8 Package information

3 Package information

- Epoxy meets UL94, V0
- Lead-free package

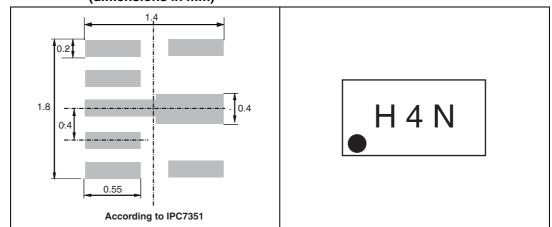
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Table 3. µQFN-8L dimensions



	Dimensions						
Ref	Millimeters			Inches			
	Min	Тур	Max	Min	Тур	Max	
Α	0.45	0.50	0.55	0.018	0.020	0.022	
A1	0.00	0.02	0.05	0.00	0.001	0.002	
b	0.15	0.20	0.25	0.006	0.008	0.010	
D	1.95	2.00	2.05	0.077	0.079	0.081	
Е	0.95	1.00	1.05	0.037	0.039	0.041	
е	0.35	0.40	0.45	0.014	0.016	0.018	
L	0.25	0.35	0.45	0.010	0.014	0.018	
m		0.40			0.016		
n		0.15			0.006		
р		0.11			0.004		
r		0.05			0.002		

Figure 9. Footprint recommendations Figure 10. Marking (dimensions in mm)



Package information HSP061-4NY8

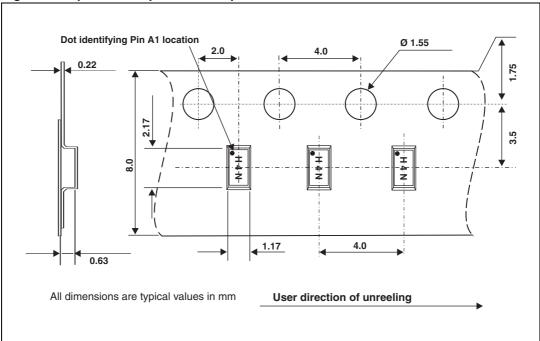


Figure 11. µQFN-8L tape and reel specification

4 Recommendation on PCB assembly

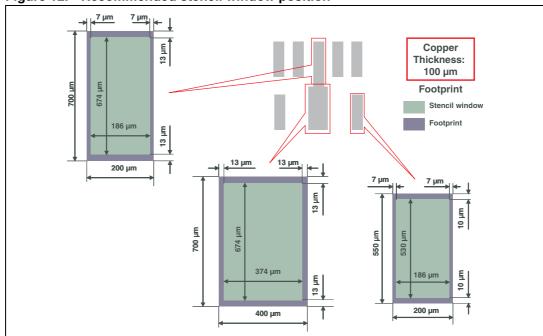


Figure 12. Recommended stencil window position

4.1 Solder paste

- 1. Use halide-free flux, qualification ROL0 according to ANSI/J-STD-004.
- 2. "No clean" solder paste recommended.
- 3. Offers a high tack force to resist component displacement during PCB movement.
- 4. Use solder paste with fine particles: powder particle size 20-45 μm.

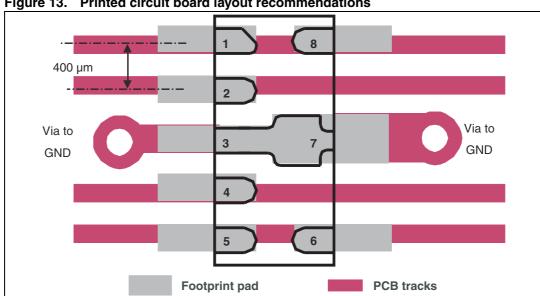
4.2 Placement

- 1. Manual positioning is not recommended.
- 2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering.
- 3. Standard tolerance of \pm 0.05 mm is recommended.
- 4. 3.5 N placement force is recommended. Too much placement force can lead to squeezed out solder paste and cause solder joints to short. Too low placement force can lead to insufficient contact between package and solder paste that could cause open solder joints or badly centered packages.
- 5. To improve the package placement accuracy, a bottom side optical control should be performed with a high resolution tool.
- 6. For assembly, a perfect supporting of the PCB (all the more on flexible PCB) is recommended during solder paste printing, pick and place and reflow soldering by using optimized tools.

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4.3 **PCB** design

- To control the solder paste amount, the closed via is recommended instead of open
- 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.



Printed circuit board layout recommendations

Reflow profile 4.4

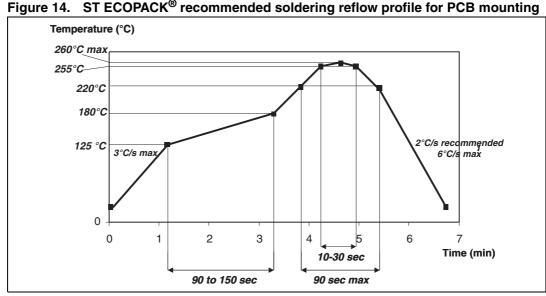


Figure 14. ST ECOPACK® recommended soldering reflow profile for PCB mounting

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

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5 Ordering information

Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
HSP061-4YN8	H4N	μQFN	9.55 mg	6000	Tape and reel (7")

6 Revision history

Table 5. Document revision history

Date	Revision	Changes
20-Apr-2010	1	Initial release.
15-Oct-2010 2		Updated values for $\Delta C_{I/O}$ - $_{GND}$ in <i>Table 2</i> . Updated <i>Figure 13</i> . Updated package name.

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