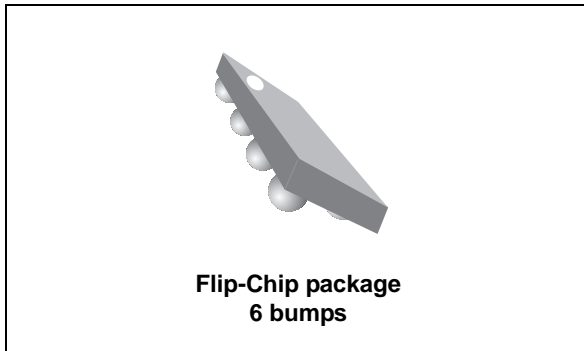


4-line ESD protection for high speed lines

Datasheet - production data



Description

The HSP061-4F4 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 device is available in a Flip-Chip package with a 300 μm pitch, which minimizes the PCB area.

Features

- Flow-through routing to keep signal integrity
- Ultralarge bandwidth: 13 GHz
- Ultralow capacitance: 0.5 pF
- Low leakage current: 70 nA at 25 °C
- Extended operating junction temperature range: -40 °C to 125 °C
- Small package size: 0.72 mm²
- Very thin package: 0.380 mm typical
- RoHS compliant

Complies with following standards

- IEC 61000-4-2 level 4:
 - 8 kV (contact discharge)
 - 15 kV (air discharge)

Applications

The HSP061-4F4 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. Pinout (bottom view)

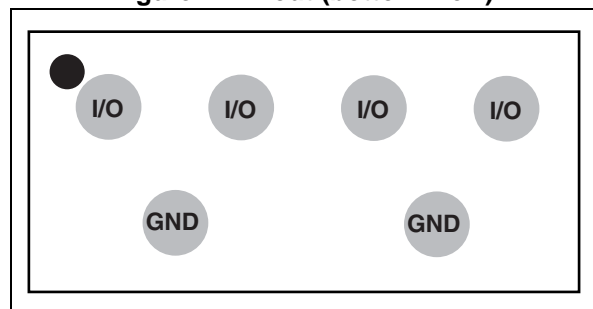
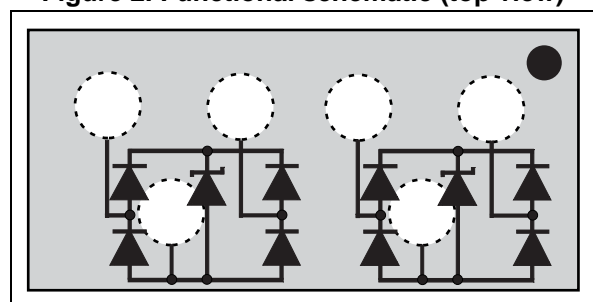


Figure 2. Functional schematic (top view)



1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage	IEC 61000-4-2 contact discharge	8	kV
		IEC 61000-4-2 air discharge	15	
I_{pp}	Repetitive peak pulse current (8/20 μ s)		3.5	A
T_j	Operating junction temperature range		-40 to +125	$^{\circ}$ C
T_{stg}	Storage temperature range		-65 to +150	$^{\circ}$ C
T_L	Maximum lead temperature for soldering during 10 s		260	$^{\circ}$ C

Table 2. Electrical characteristics $T_{amb} = 25\text{ °C}$

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{BR}	Breakdown voltage	$I_R = 1\text{ mA}$	6			V
I_{RM}	Leakage current	$V_{RM} = 3\text{ V}$			70	nA
V_{CL}	Clamping voltage	IEC 61000-4-2, +8 kV contact ($I_{PP} = 30\text{ A}$), measured at 30 ns		18		V
$C_{I/O - GND}$	Capacitance (input/output to ground)	$V_{I/O} = 0\text{ V}$, $F = 200\text{ MHz to }3000\text{ MHz}$, $V_{OSC} = 30\text{ mV}$		0.5	0.55	pF
$\Delta C_{I/O - GND}$	Capacitance variation (input/output to ground)	$V_{I/O} = 0\text{ V}$, $F = 200\text{ MHz to }3000\text{ MHz}$, $V_{OSC} = 30\text{ mV}$		0.03	0.05	pF
f_C	Cut-off frequency	-3dB		13		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.

Figure 3. Leakage current versus junction temperature (typical values)

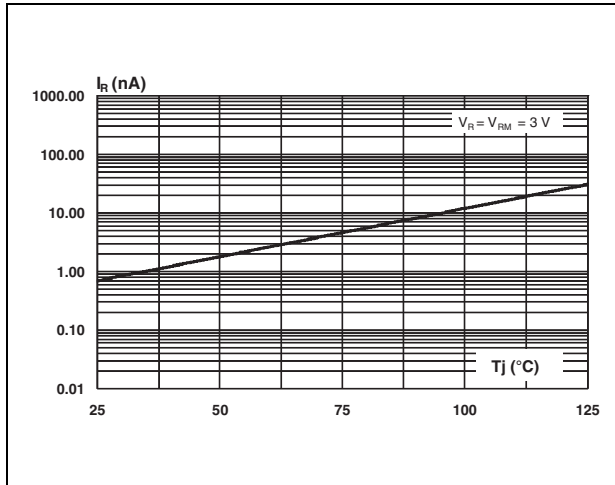


Figure 4. Attenuation versus frequency

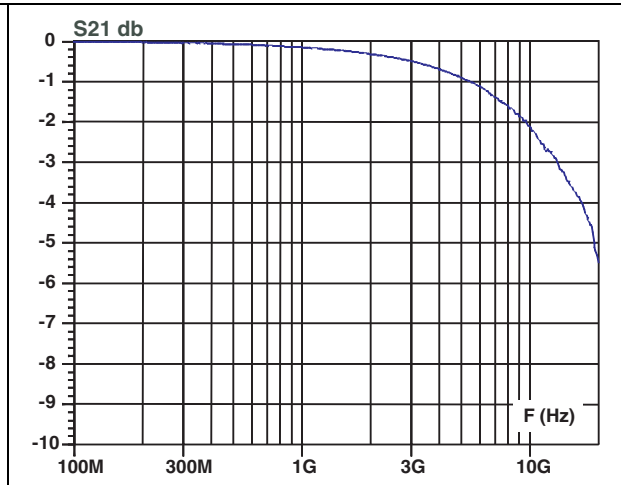


Figure 5. Differential impedance (Z_{diff})⁽¹⁾

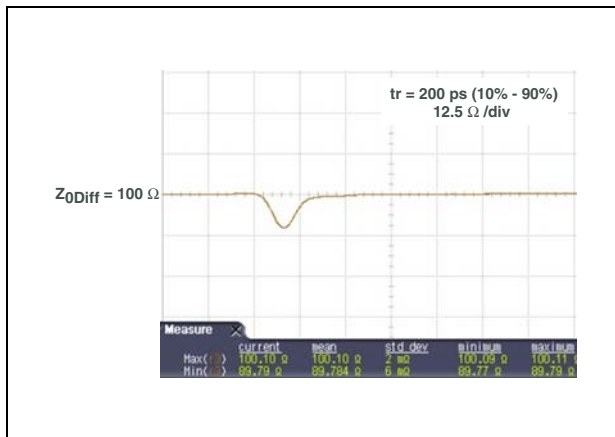
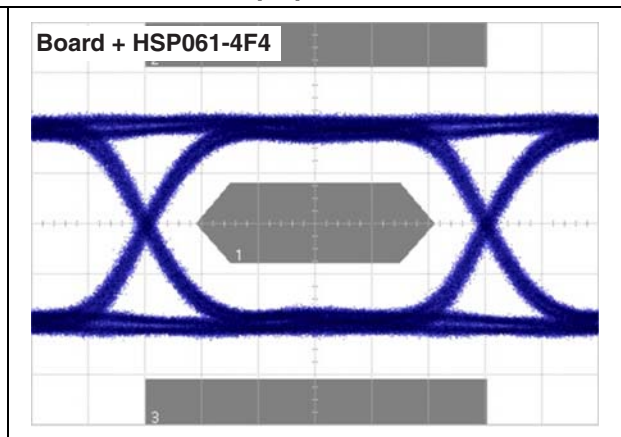


Figure 6. Eye diagram - HDMI mask at 3.35 Gbps per channel⁽¹⁾



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

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

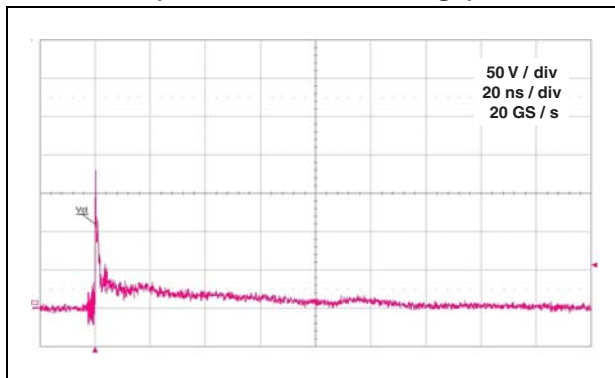
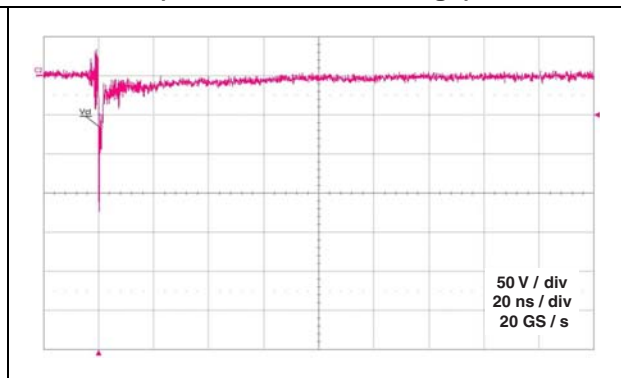


Figure 8. ESD response to IEC 61000-4-2 (-8 kV contact discharge)



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.

Figure 9. Flip Chip dimensions

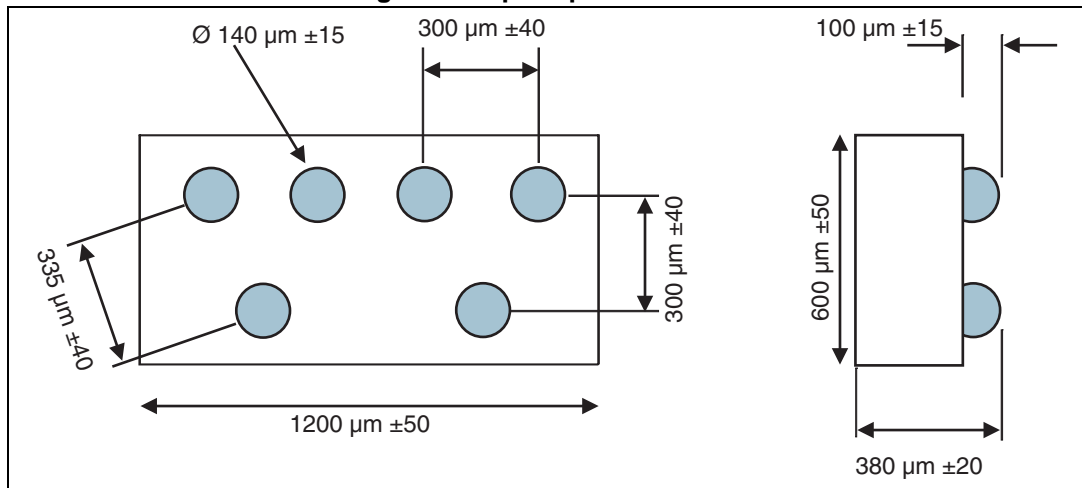


Figure 10. Footprint recommendations (dimensions in mm)

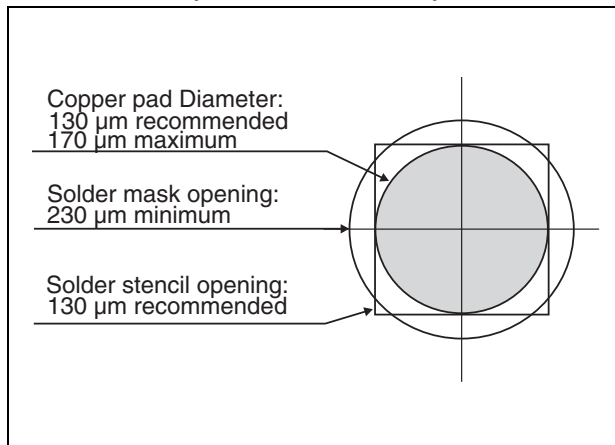


Figure 11. Marking

Dot,
xx = marking
z = manufacturing
location
yww = datecode
y = year,
ww = week

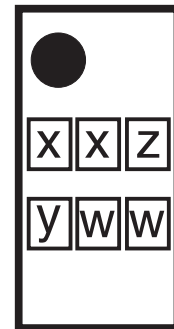
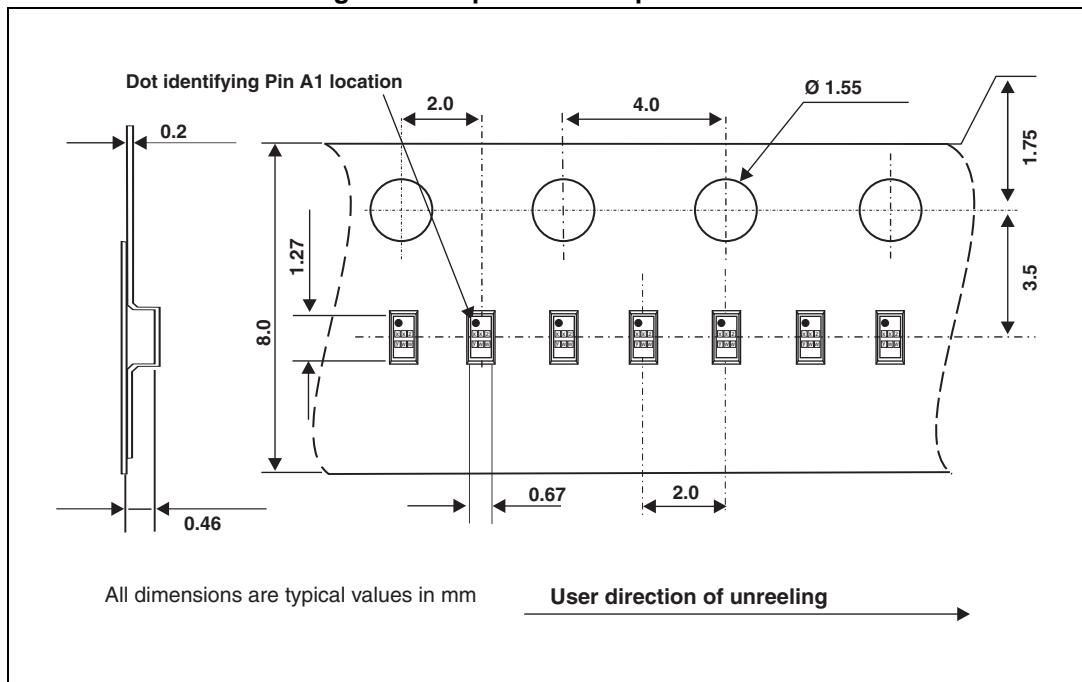


Figure 12. Tape and reel specification



3 Ordering information

Figure 13. Ordering information scheme

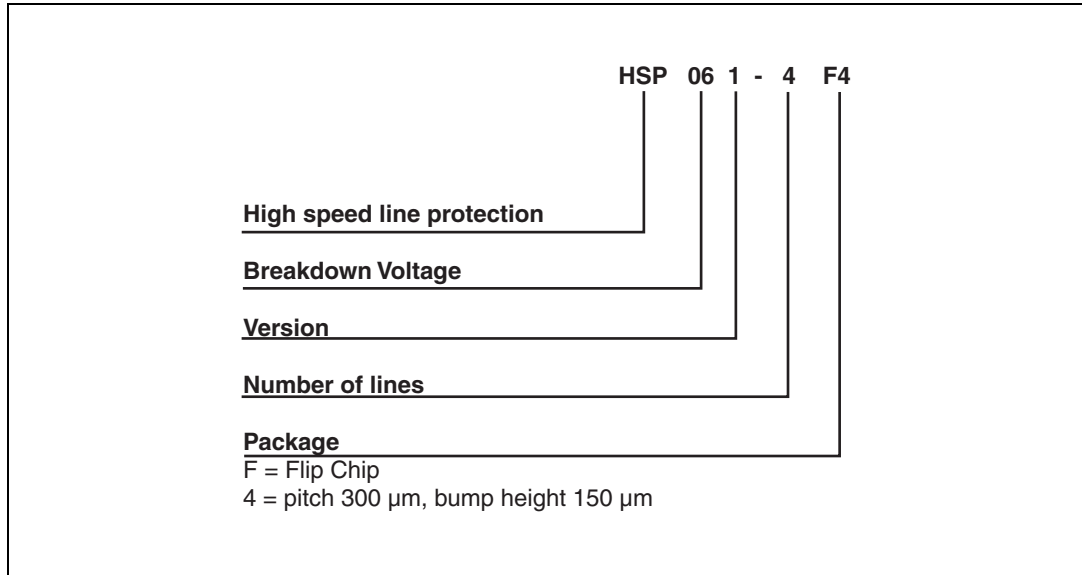


Table 3. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
HSP061-4F4	EW	Flip Chip	0.5 mg	1000	Tape and reel (7")

4 Revision history

Table 4. Document revision history

Date	Revision	Changes
08-Sep-2011	1	Initial release.
31-Oct-2013	2	Added package thickness information in <i>Features</i> and <i>Figure 9</i> .

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