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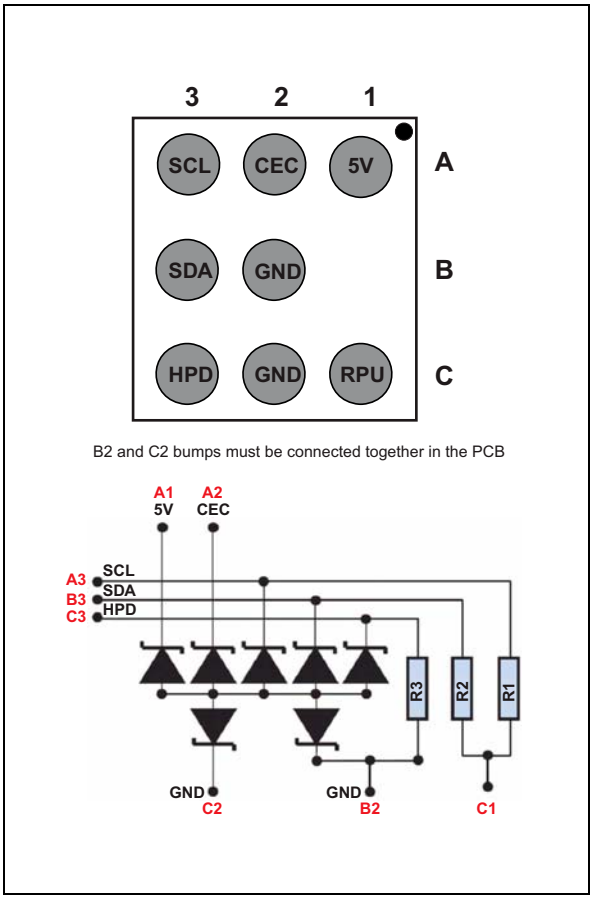
HDMI05-CL01F3

5-line IPAD™, HDMI™ control line ESD protection

Datasheet - production data

Leed-free Flip-Chip package
(8 bumps)

Figure 1. Pin configuration (bump side) and schematic



Features

- Low line capacitance
- High efficiency in ESD protection
- Lead-free package
- Very thin package
- High reliability offered by monolithic integration
- High reduction of parasitic elements through integration and wafer level packaging

Complies with the standards:

- IEC 61000-4-2 Level 4
  - ± 15 kV (air discharge)
  - ± 8 kV (contact discharge)
- IEC 61000-4-2 Level 1
  - ± 2 kV (air discharge)
  - ± 2 kV (contact discharge)

Application

Where ESD protection for HDMI control lines (CEC, HPD, SCL and SDA) is required:

- Mobile phones and communication systems
- Portable multimedia players
- Camcorder, digital still cameras

Description

The HDMI05-CL01F3 chip is a low capacitance ESD protection for HDMI control pins. It also integrates a pull-up resistor for I²C bus and a pull-down resistor for hot plug detect.

The ESD protection circuitry prevents damage to the protected device when subjected to ESD surges up to 15 kV.

TM: IPAD is a trademark of STMicroelectronics. HDMI, the HDMI logo and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing LLC.

1 Characteristics

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

Symbol	Parameter	Value	Unit
V_{PP}	External pins (A1, A2, A3, B3 and C3): ESD IEC 61000-4-2, level 4 - air discharge ESD IEC 61000-4-2, level 4 - contact discharge Internal pin (C1): ESD IEC 61000-4-2, level 1 - air discharge ESD IEC 61000-4-2, level 1 - contact discharge	 15 8 2 2	kV
P_d	Line resistance power dissipation at 70 °C	60	mW
T_{op}	Operating temperature range	-30 to + 85	°C
T_{stg}	Storage temperature range	-55 to + 150	°C

Figure 2. Electrical characteristics - definitions

Symbol **Parameter**
V_{BR} = Breakdown voltage
I_{RM} = Leakage current @ V_{RM}
V_{RM} = Stand-off voltage
C_{line} = Line capacitance

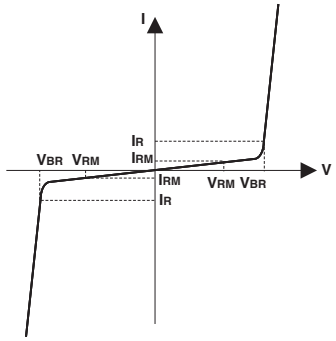


Table 2. Electrical characteristics (T_{amb} = 25 °C)

Symbol	Test condition	Min.	Typ.	Max.	Unit
V_{BR}	I_R = 1 mA	14			V
I_{RM}	V_{RM} = 3 V per line		50	200	nA
R_1, R_2		1575	1750	1925	Ω
R_3		80	100	120	kΩ
C_{line}	V_{line} = 0 V, V_{osc} = 30 mV, F = 1 MHz (measured under zero light conditions, B2 and C2 bumps connect together)	8	10	12	pF

Figure 3. S21(dB) versus frequency on A1

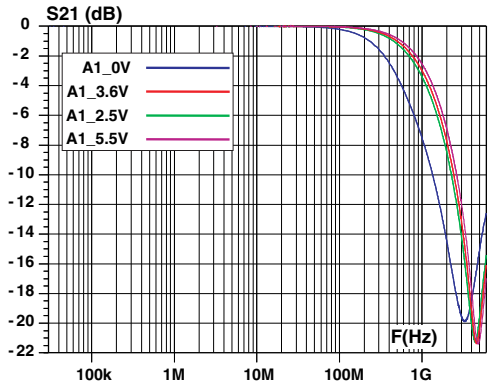


Figure 4. Analog crosstalk measurements B3-A3

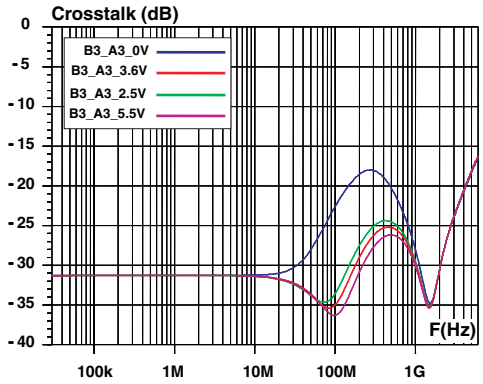


Figure 5. Digital crosstalk measurement A3-B3 with 5 V applied on C1

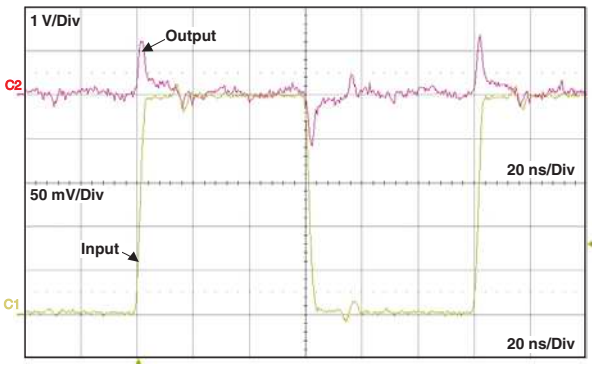


Figure 6. ESD response to IEC 61000-4-2 (+8 kV contact discharge) on CEC line (A2)

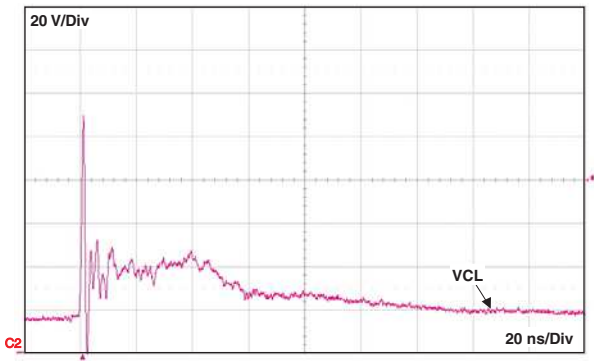


Figure 7. ESD response to IEC 61000-4-2 (-8 kV contact discharge) on CEC line (A2)

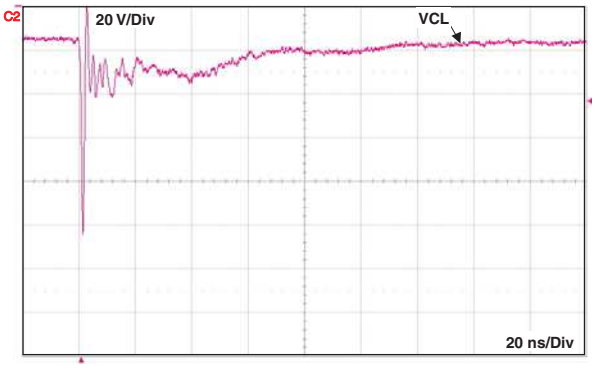
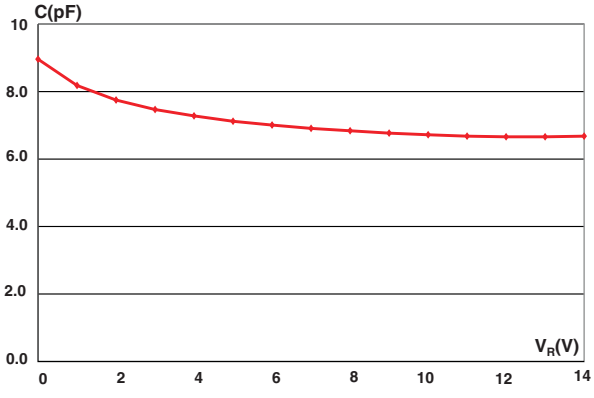
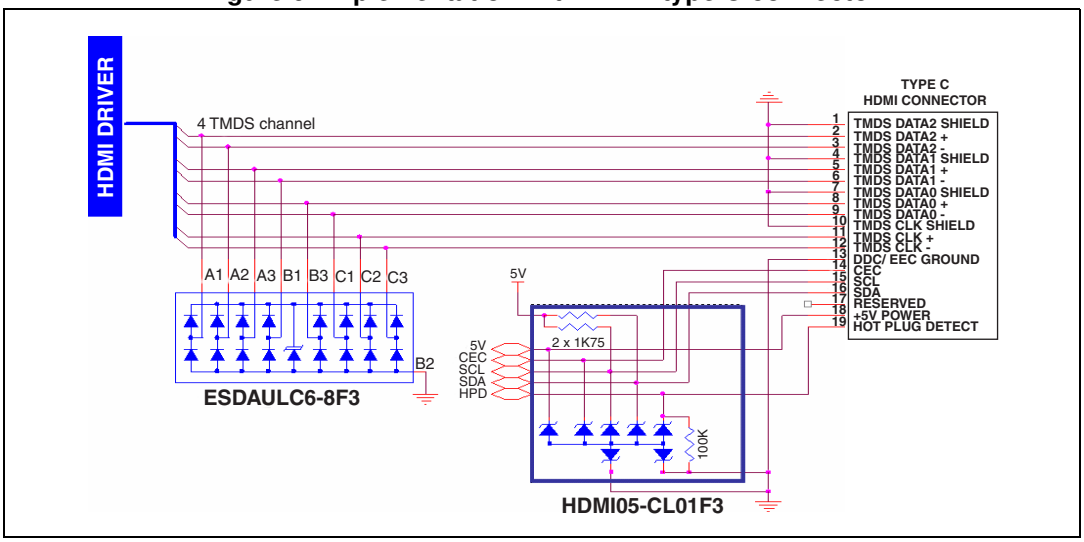


Figure 8. Line capacitance versus reverse applied voltage on A2-B2



2 Typical application schematic

Figure 9. Implementation with HDMI type C connector



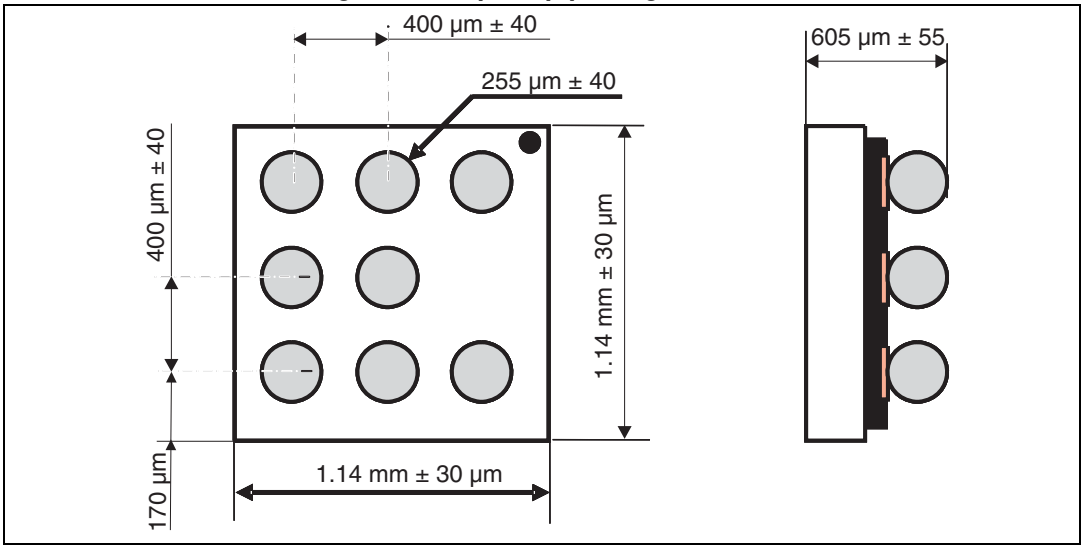
3 Package information

- Epoxy meets UL94, V0
- Lead-free package

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.

3.1 Flip-Chip package information

Figure 10. Flip-Chip package outline



3.2 Packing information

Figure 11. Footprint

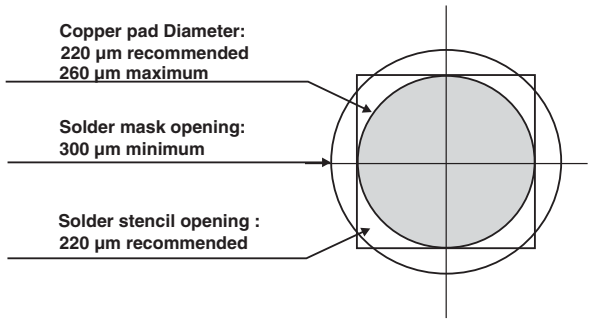


Figure 12. Marking

Dot, ST logo
ECOPACK status
xx = marking
z = manufacturing location
yww = datecode
(y = year

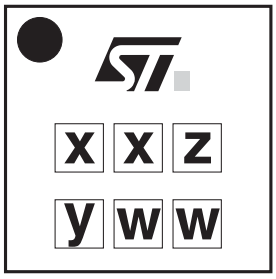
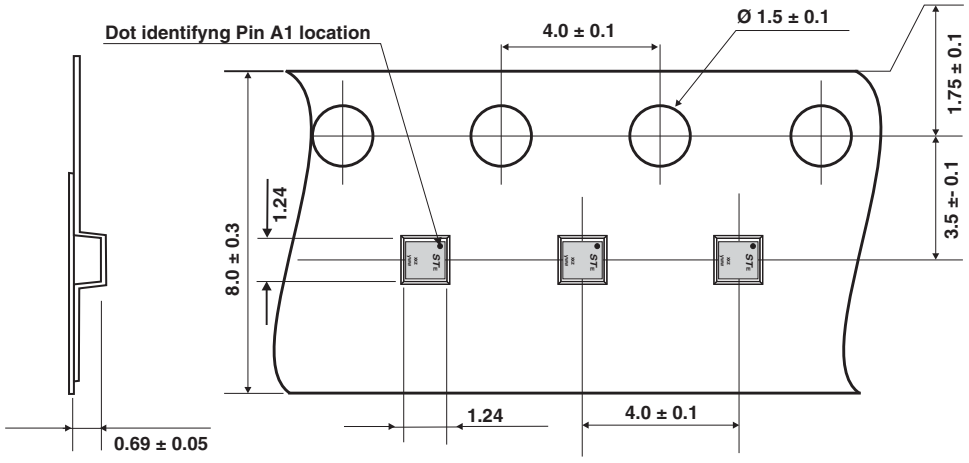


Figure 13. Tape and reel outline



4 Ordering information

Figure 14. Ordering information scheme

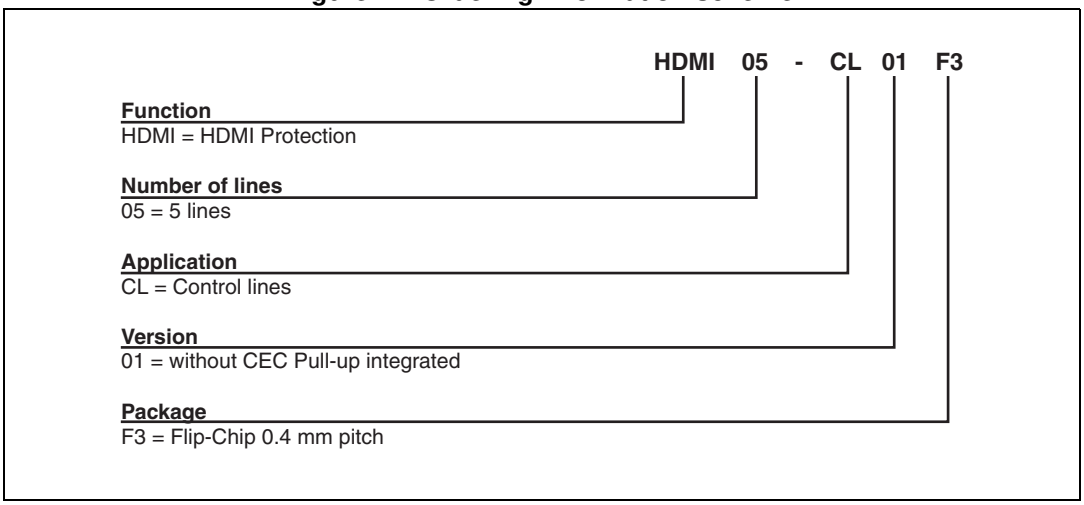


Table 3. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
HDMI05-CL01F3	JN	Flip-Chip	1.9 mg	5000	Tape and reel (7”)

5 Revision history

Table 4. Document revision history

Date	Revision	Changes
30-Apr-2010	1	Initial release.
14-Mar-2014	2	Updated *Figure 9*.
16-July-2015	3	Removed erroneous watermark from the document and reformatted to current standard.