



HDMI05-CL01F3

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

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.



Figure 1. Pin configuration (bump side)

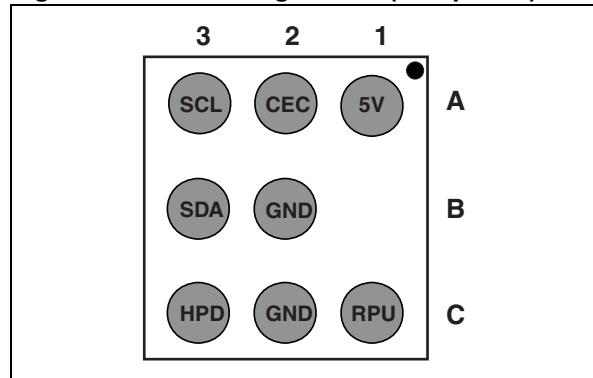
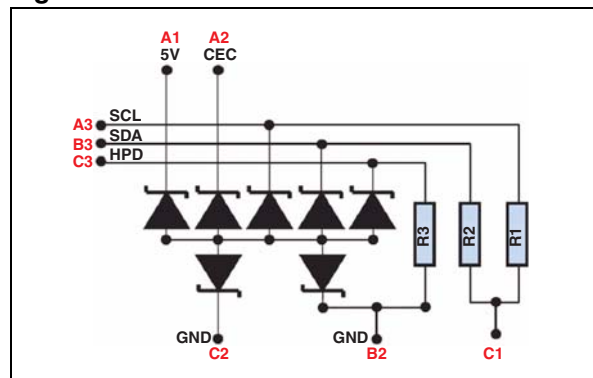


Figure 2. Schematic



1. B2 and C2 bumps must be connected together in the PCB

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1 Characteristics

Table 1. Absolute maximum ratings ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

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

Figure 3. Electrical characteristics - definitions

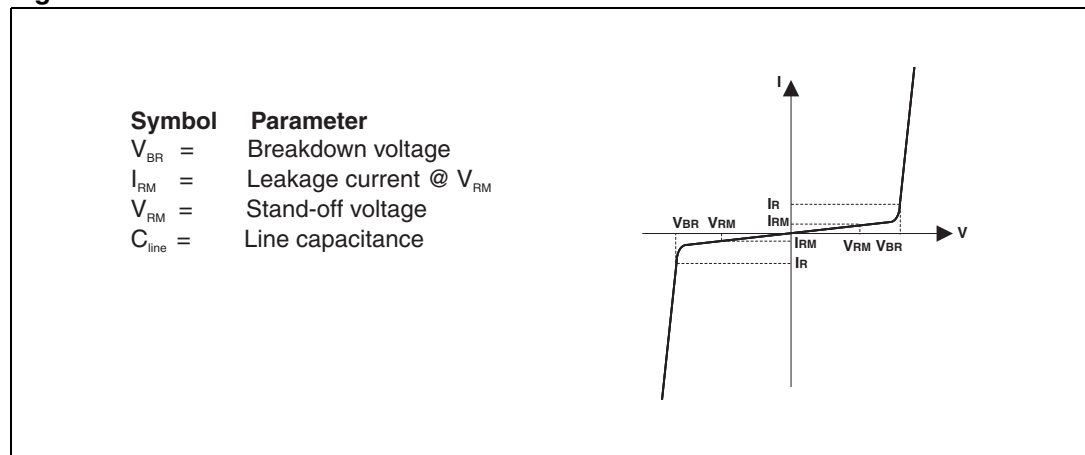


Table 2. Electrical characteristics ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

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

Figure 4. S21(dB) versus frequency on A1

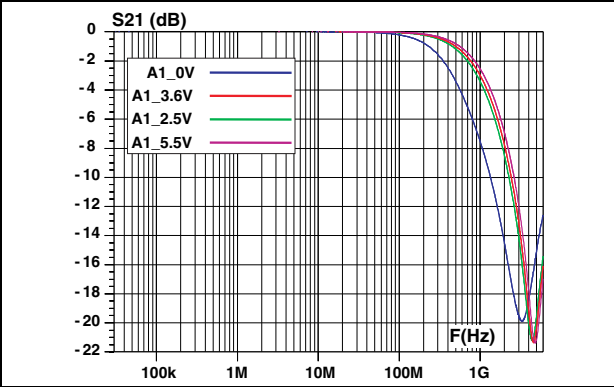


Figure 5. Analog crosstalk measurements B3-A3

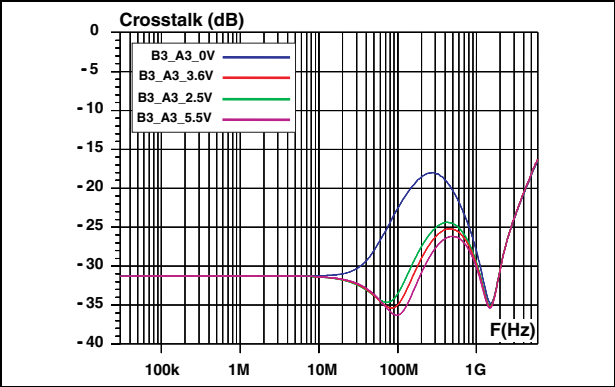


Figure 6. Digital crosstalk measurement A3-B3 with 5 V applied on C1

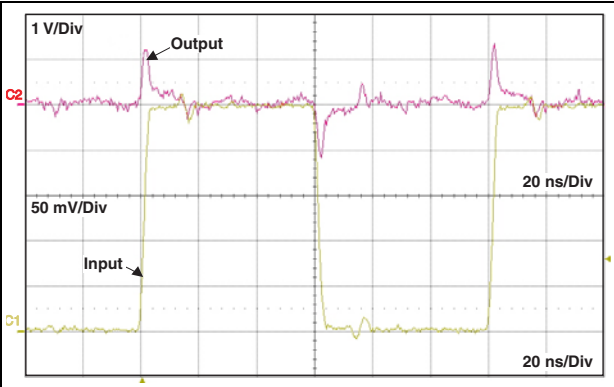


Figure 7. ESD response to IEC 61000-4-2 (+8 kV contact discharge) on CEC line (A2)

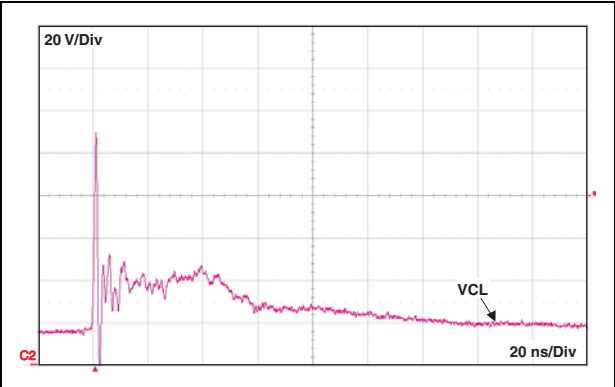


Figure 8. ESD response to IEC 61000-4-2 (-8 kV contact discharge) on CEC line (A2)

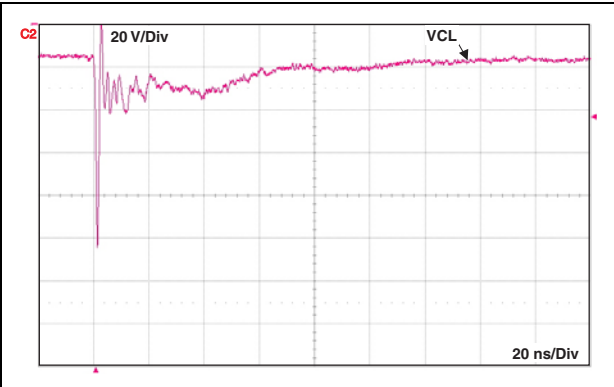
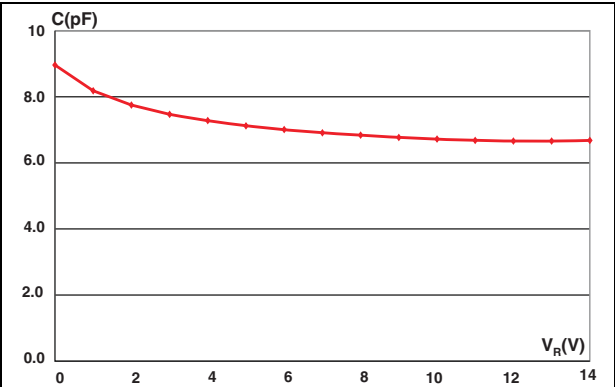
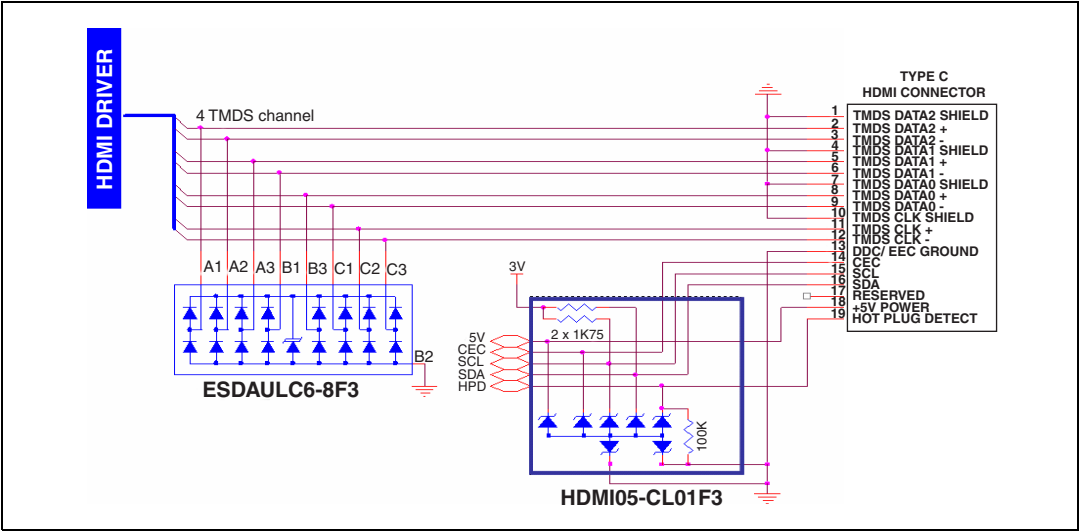


Figure 9. Line capacitance versus reverse applied voltage on A2-B2



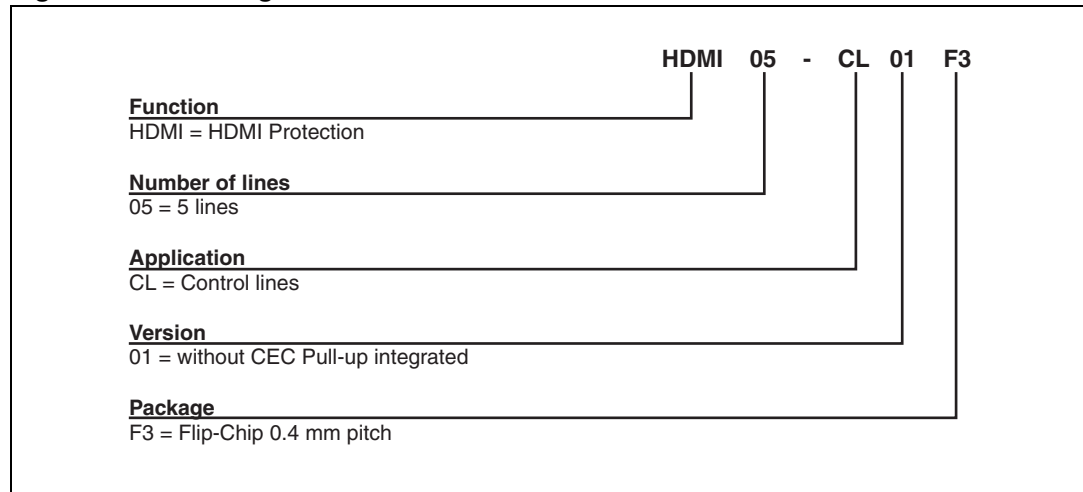
2 Typical application schematic

Figure 10. Implementation with HDMI type C connector



3 Ordering information scheme

Figure 11. Ordering information scheme



4 Package information

- Epoxy meets UL94, V0
- Lead-free package

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Figure 12. Flip-Chip dimensions

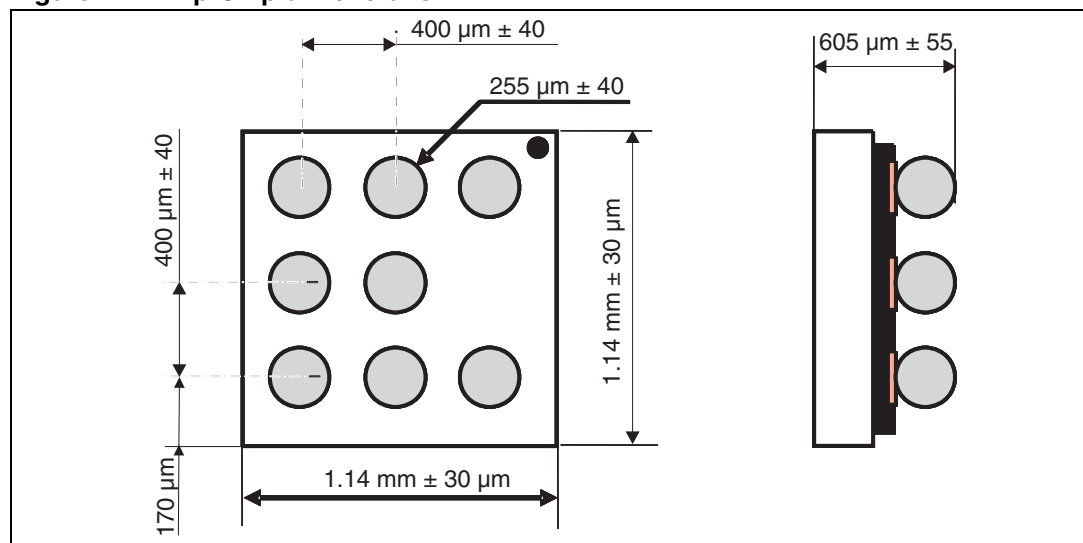
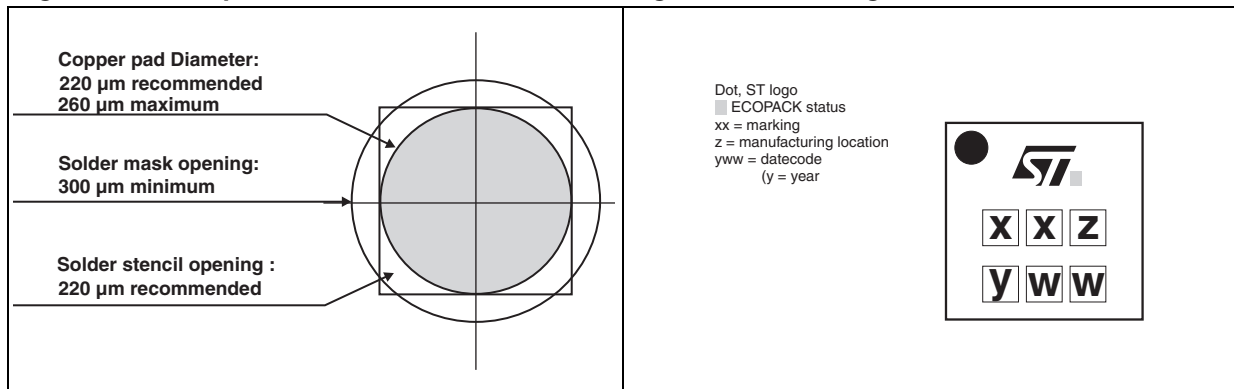


Figure 14. Marking



Technical drawing of a 1.5S tape reel. The drawing includes a top view and a side view. The top view shows a rectangular reel with four circular holes and three square holes. Dimensions are provided for the overall size, hole positions, and hole diameters. The side view shows the profile of the reel, including the flanges and the central hub. A note indicates the user direction of unreeling.

Top View Dimensions:

- Overall width: 8.0 ± 0.3
- Overall height: 3.5 ± 0.1
- Distance between outer holes: 4.0 ± 0.1
- Distance between inner holes: 4.0 ± 0.1
- Distance from left edge to first hole: 1.24
- Distance from right edge to last hole: 1.24
- Hole diameter: $\varnothing 1.5 \pm 0.1$
- Distance from top edge to hole center: 1.75 ± 0.1
- Distance from bottom edge to hole center: 1.75 ± 0.1

Side View Dimensions:

- Overall height: 0.69 ± 0.05

Notes:

- Dot identifying Pin A1 location
- User direction of unreeling

All dimensions in mm

5 Ordering information

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")

6 Revision history

Table 4. Document revision history

Date	Revision	Changes
30-Apr-2010	1	Initial release.

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