

### Features

- 4-line 15 kV ESD protection
- Ultralow line capacitance: 1.1 pF
- Ultralarge bandwidth
  - no influence on signal rise and fall times
  - maximized number of signal harmonics
- Flow-through layout with type C HDMI™ connector
- Low PCB space area: 1.76 mm<sup>2</sup> footprint
- Very low leakage current 70 nA
- 0.4 mm pitch Flip-Chip package (wafer level CSP) to minimize parasitic inductances
- RoHS compliant

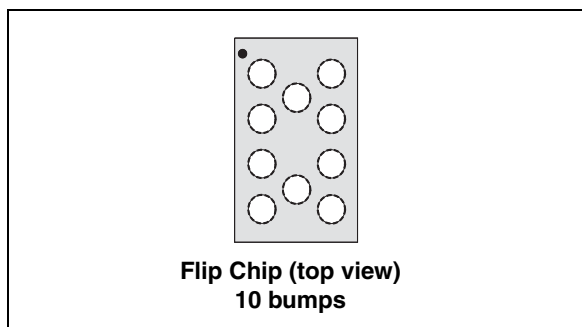
### Complies with the standards:

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

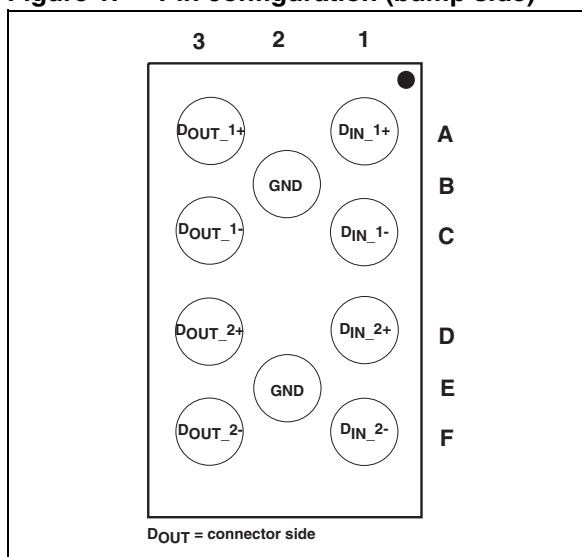
### Applications

- Mobile phones
- HDMI ports at 1.65 Gb/s and up to 3.2 Gb/s
- USB 2.0 ports up to 480 Mb/s (Hi-Speed)
- Video line protection

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**Figure 1. Pin configuration (bump side)**



### Description

The HDMIULC6-4F3 is a monolithic, application specific discrete device dedicated to ESD protection of the HDMI connection. It also offers the same high level of protection for IEEE 1394a and IEEE 1394b/c, USB 2.0, Ethernet links, and video lines.

Its ultrahigh cutoff frequency (7 GHz) secures a high level of signal integrity. The device topology provides this integrity without compromising the complete protection of ICs against the most stringent ESD strikes.

# 1 Characteristics

Figure 2. Internal circuit schematic (top view)

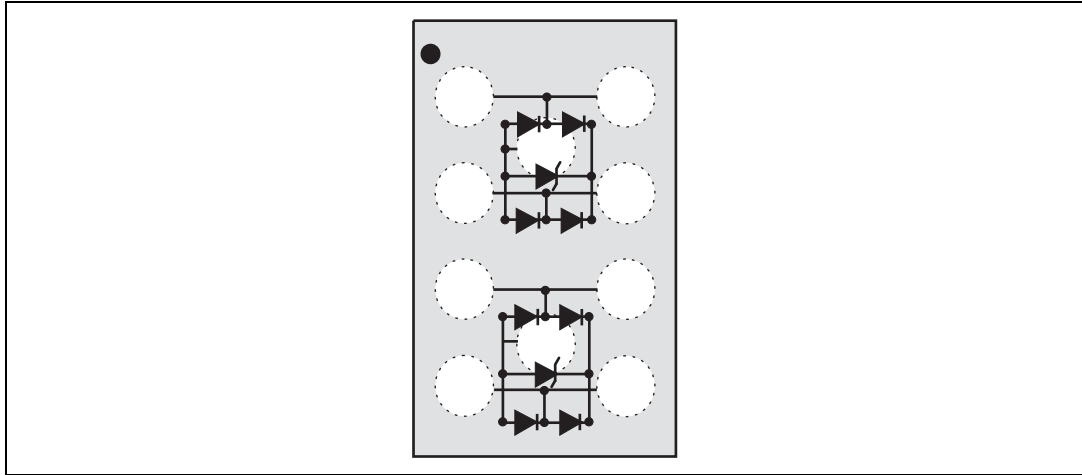


Table 1. Absolute maximum ratings ( $T_{amb} = 25\text{ °C}$ )

Symbol	Parameter	Value	Unit
$V_{PP}$	ESD discharge IEC 61000-4-2 Air discharge Contact discharge	$\pm 15$ $\pm 8$	kV
$P_{PP}$	Peak pulse power dissipation (8/20 $\mu s$ )	35	W
$T_j$	Maximum junction temperature	125	$^{\circ}C$
$T_{stg}$	Storage temperature range	-55 to + 150	$^{\circ}C$

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

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
$V_{BR}$	Breakdown voltage between VBUS and GND	$I_R = 1\text{ mA}$	6			V
$I_{RM}$	Leakage current	$V_{RM} = 3\text{ V}$			70	nA
$C_{I/O-GND}^{(1)}$	Capacitance between I/O and GND	$V_{line} = 0\text{ V}$ , $V_{osc} = 30\text{ mV}$ , $F = 1\text{ MHz}$		1.1	1.4	pF
$\Delta C_{I/O-GND}^{(1)}$	Capacitance variation between I/O and GND	$V_{line} = 0\text{ V}$ , $V_{osc} = 30\text{ mV}$ , $F = 1\text{ MHz}$ between two lines of the same lane		0.06		pF
BW	Bandwidth	- 3 dB		5.3		GHz

1.  $C_{I/O-GND}$  values are given per line and relative to one GND.

Figure 3. Attenuation measurements

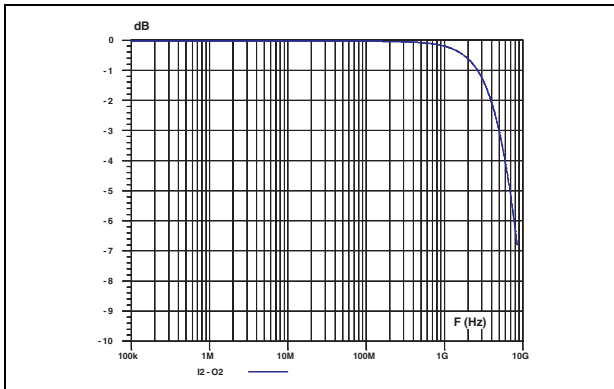


Figure 4. Analog crosstalk measurements

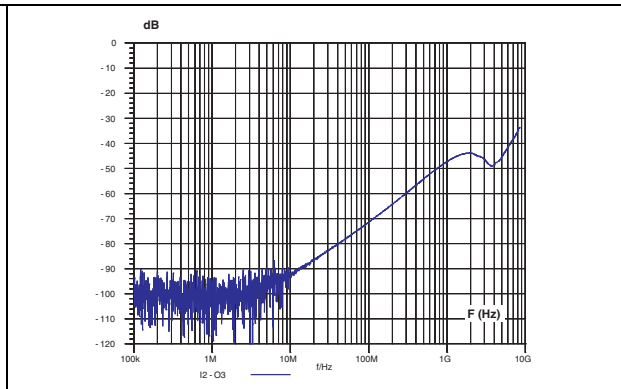


Figure 5. +8 kV ESD response (typical value)

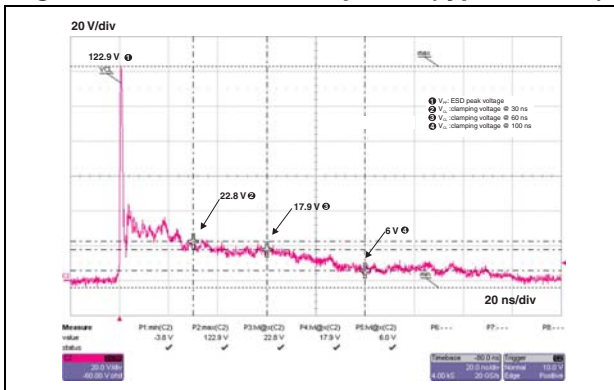


Figure 6. -8 kV ESD response (typical value)

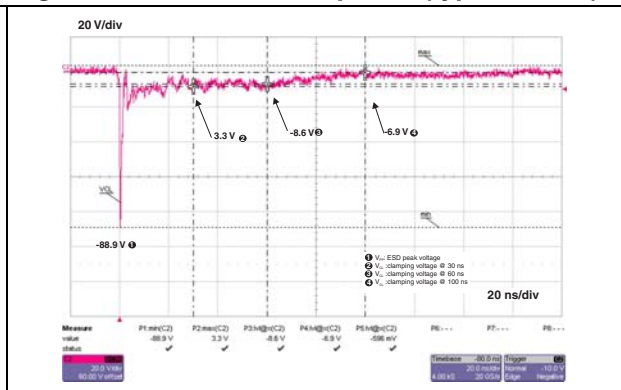
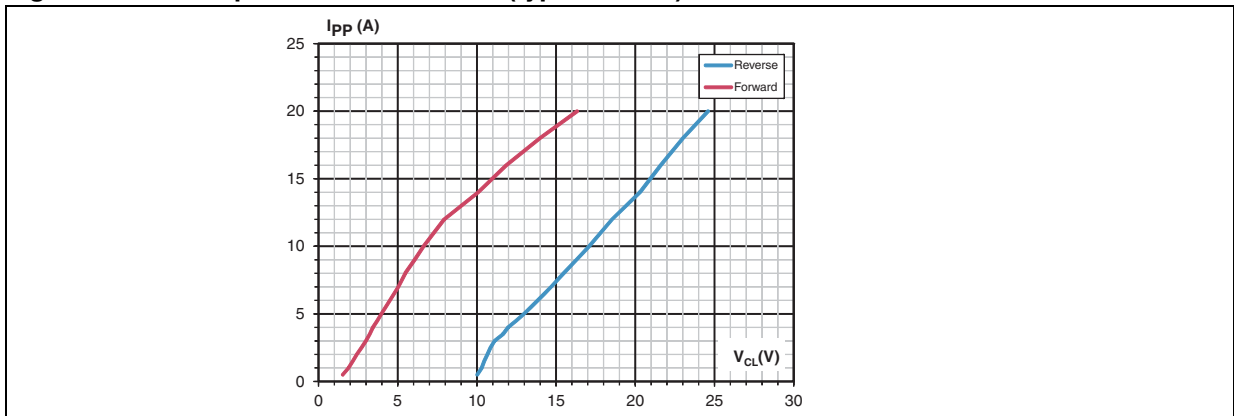
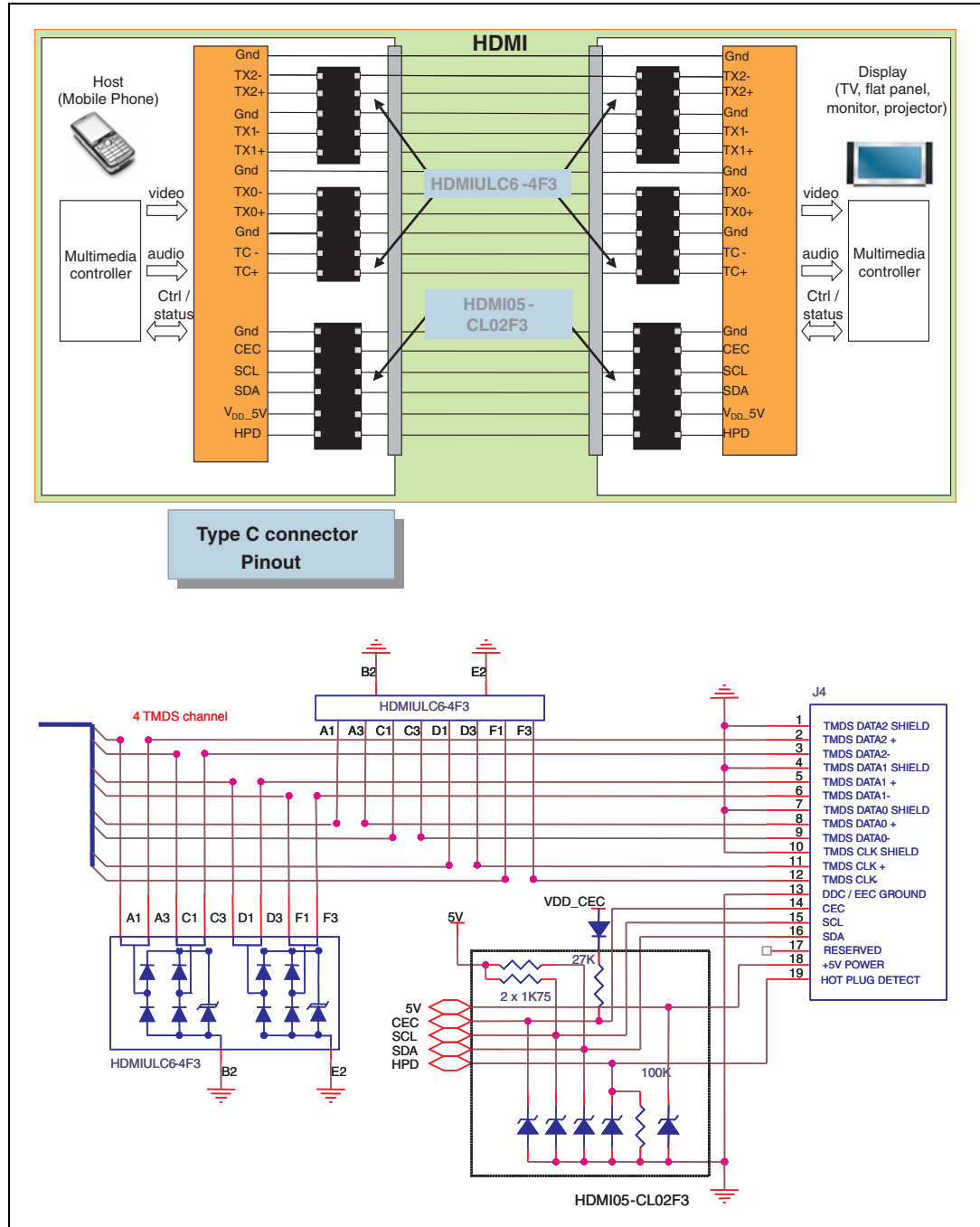


Figure 7. Short pulse measurements (typical value)



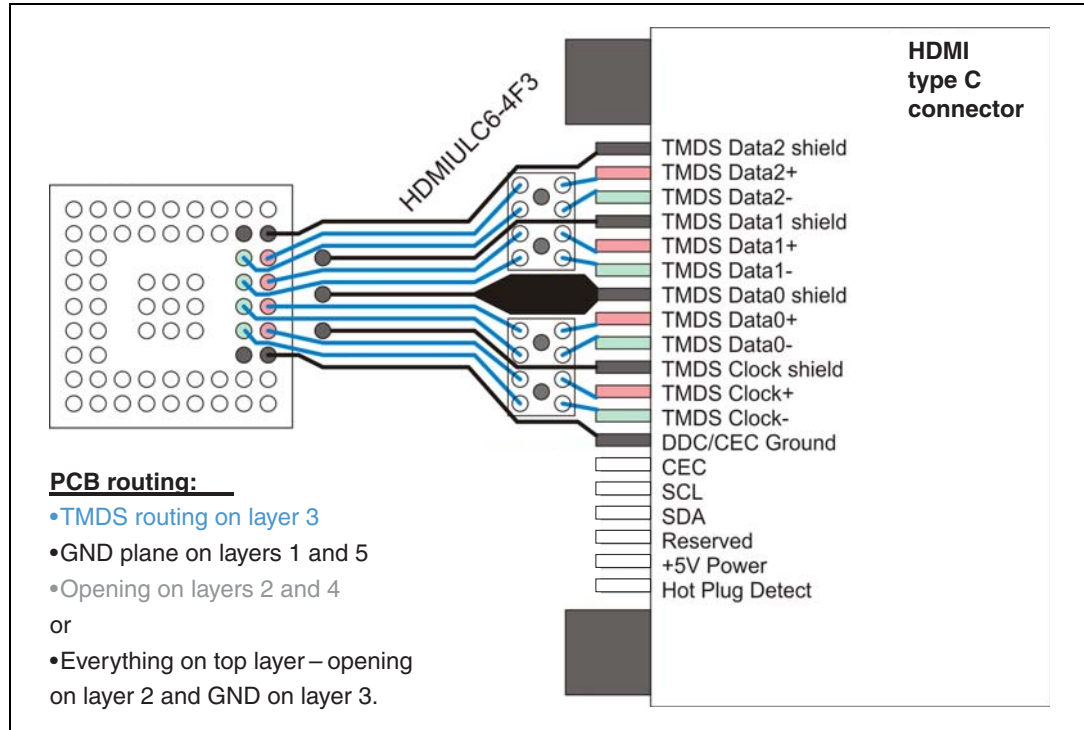
## 2 Typical application schematic

Figure 8. Implementation with HDMI type C connector



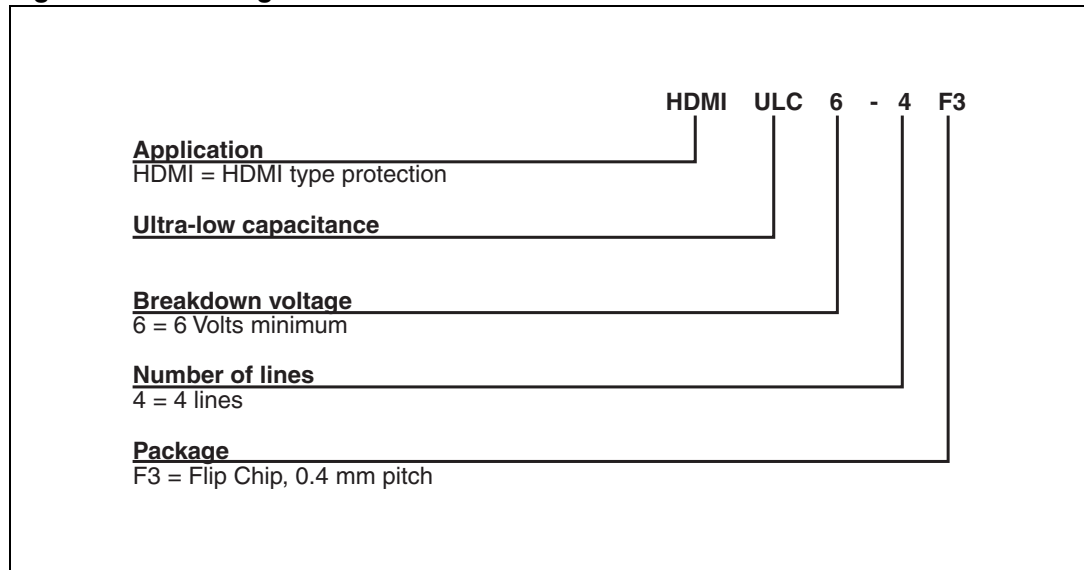
### 3 Layout recommendations

Figure 9. Layout recommendations



### 4 Ordering information scheme

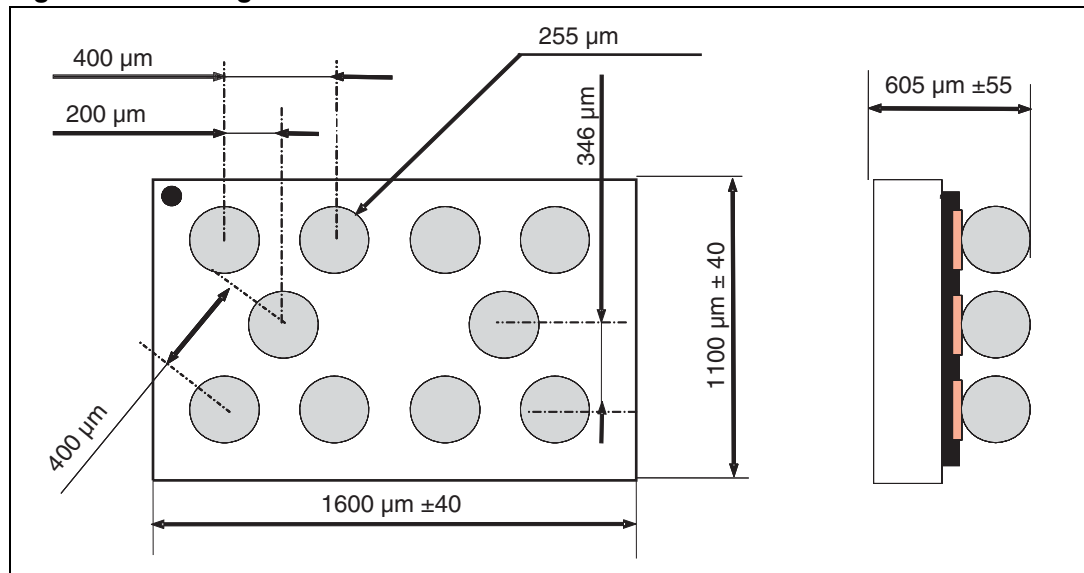
Figure 10. Ordering information scheme



## 5 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.

**Figure 11. Package dimensions**



**Figure 12. Footprint recommendations**      **Figure 13. Marking**

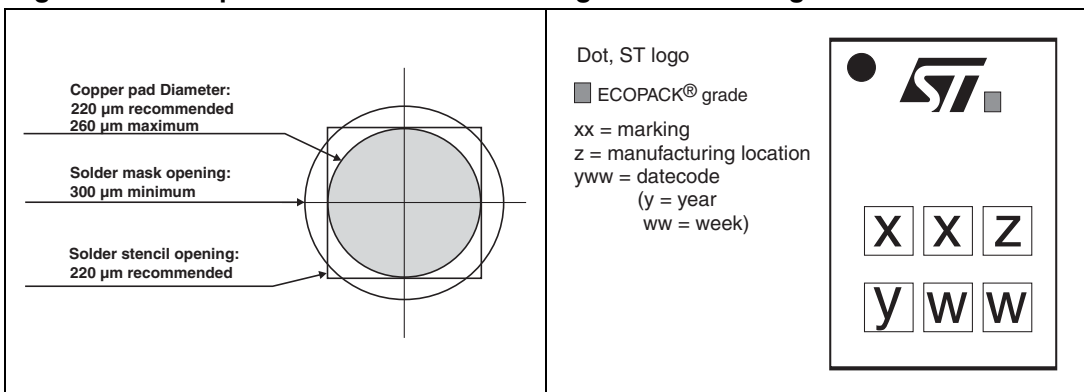
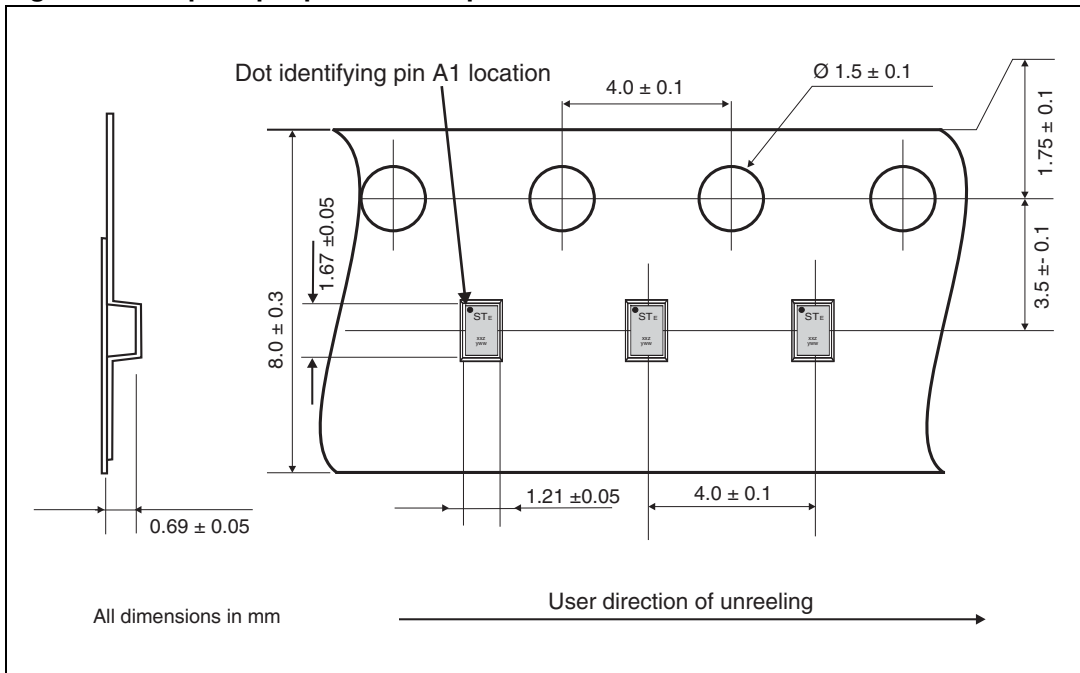


Figure 14. Flip-Chip tape and reel specifications



## 6 Ordering information

**Table 3. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
HDMIULC6-4F3	EP	Flip Chip	2.2 mg	10000	Tape and reel (7")

## 7 Revision history

**Table 4. Document revision history**

Date	Revision	Changes
24-Mar-2009	1	First issue.
10-Sept-2009	2	Removed "Electrical characteristics, parameters" table. Updated <a href="#">Table 2.</a> and <a href="#">Table 3.</a> Updated Figure 18. Added dimension in Figure 19.
15-Jan-2013	3	Updated features, <a href="#">Table 1.</a> , <a href="#">Table 2.</a> , and <a href="#">Table 3.</a> Updated ESD curves and added <a href="#">Figure 3.</a> , <a href="#">Figure 4.</a> and <a href="#">Figure 7.</a>



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