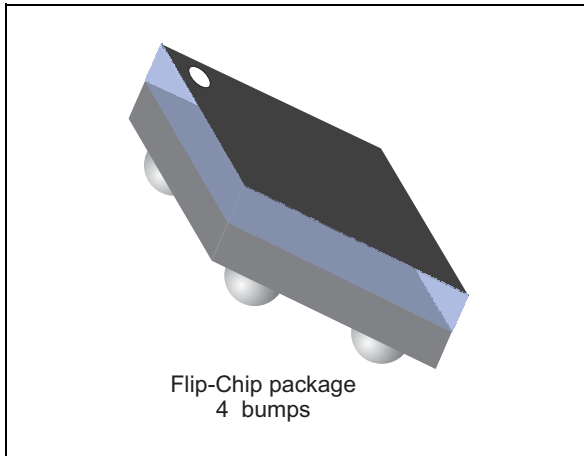


50 ohm nominal input / conjugate match balun to CC1101 / CC1150 (868-928 MHz), with integrated harmonic filter

Datasheet – production data



## Description

STMicroelectronics BAL-CC1101-01D3 is an ultra miniature balun which integrates a matching network in a monolithic glass substrate. This has been customized for the CC1101 / CC1150 TI transceiver.

It's a design using STMicroelectronics IPD (integrated passive device) technology on non-conductive glass substrate to optimize RF performance.

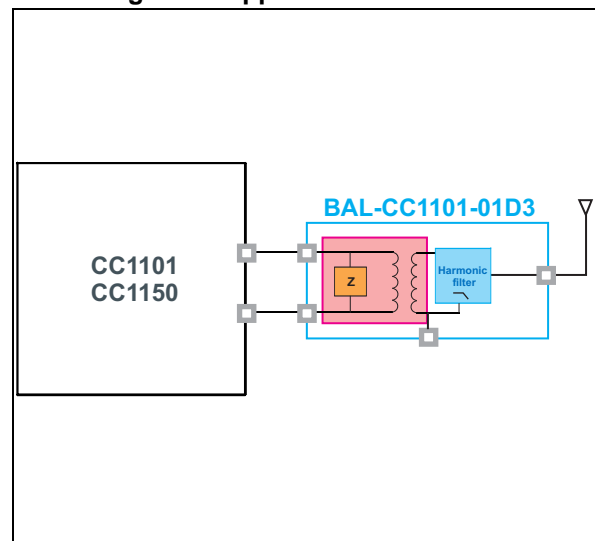
## Features

- 50  $\Omega$  nominal input / conjugate match to CC1101 / CC1150
- Low insertion loss
- Low amplitude imbalance
- Low phase imbalance
- Coated Flip-Chip on glass
- Small footprint: < 2.1 mm<sup>2</sup>

## Benefits

- Extremely low profile (< 550  $\mu$ m after reflow)
- High RF performance
- RF BOM and area reduction

Figure 1. Application schematic



# 1 Characteristics

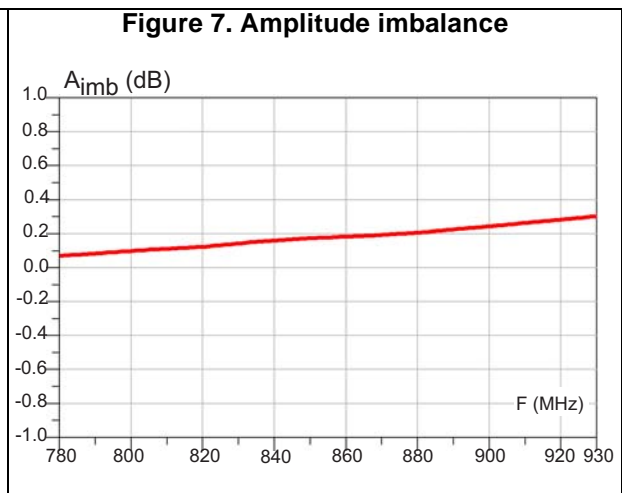
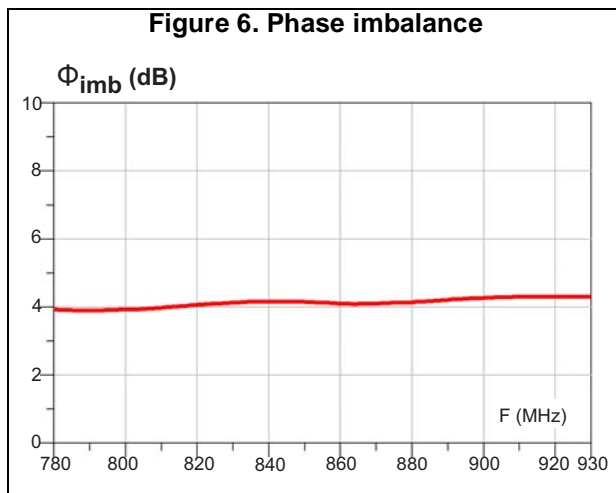
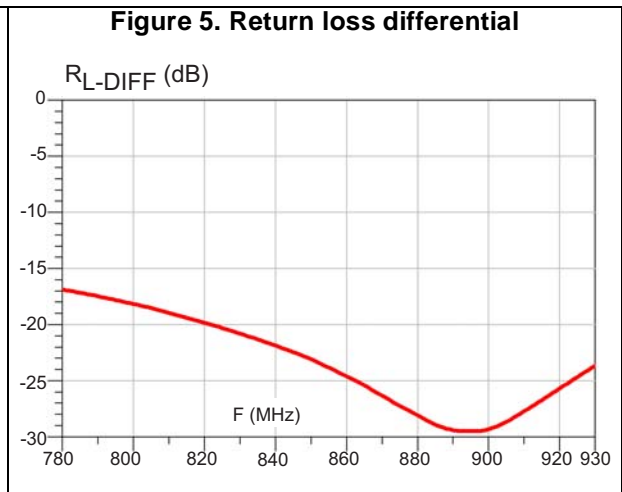
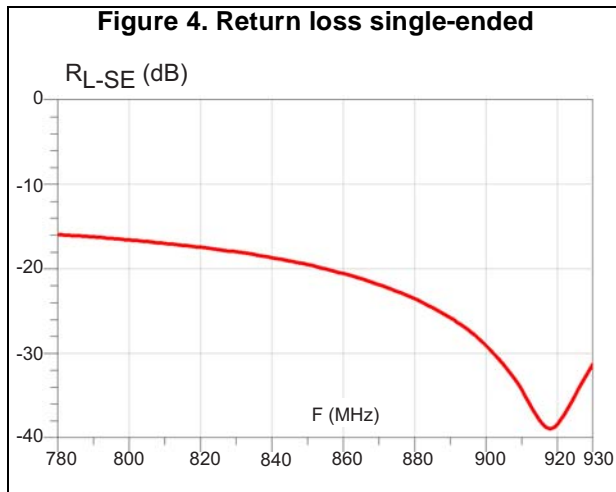
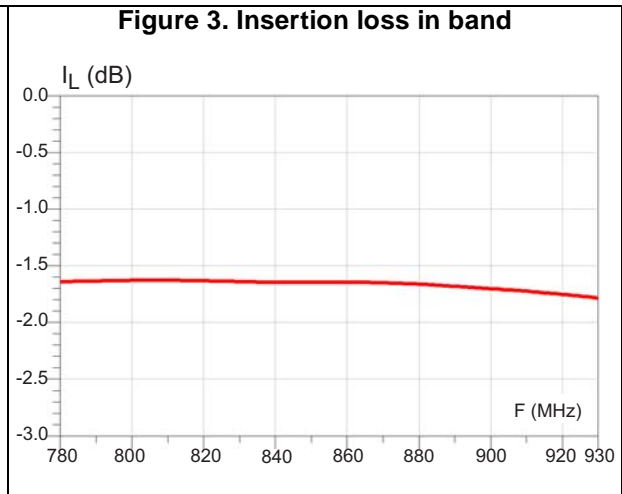
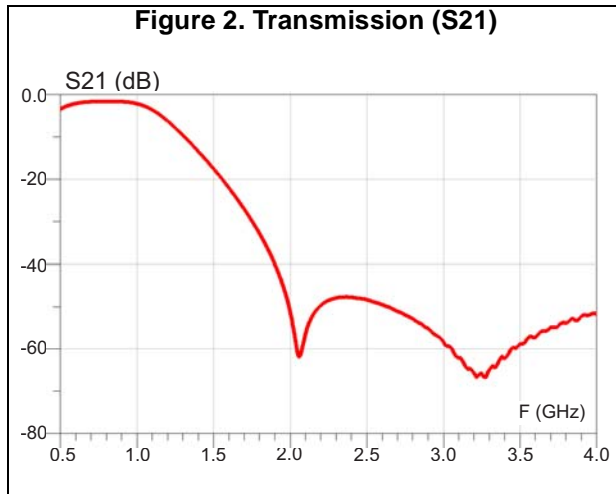
**Table 1. Absolute maximum rating (limiting values)**

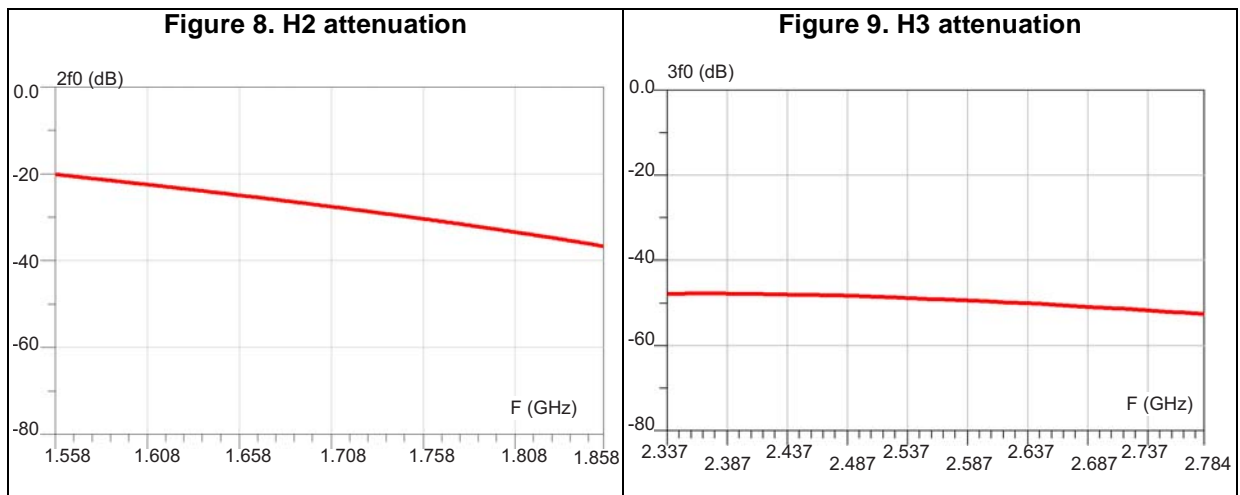
Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
P <sub>IN</sub>	Input power RF <sub>IN</sub>		20		dBm
V <sub>ESD</sub>	ESD ratings human body model (JESD22-A114C), all I/O one at a time while others connected to GND	2000			V
	ESD ratings machine model, all I/O	500			
	ESD ratings charged device model (JESD22-C101D)	500			
T <sub>OP</sub>	Operating temperature	-40		+125	°C

**Table 2. Electrical characteristics - RF performance (T<sub>amb</sub> = 25 °C)**

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
Z <sub>OUT</sub>	Nominal differential output impedance		Conjugate match to CC1101 / CC1150		Ω
Z <sub>IN</sub>	Nominal input impedance		50		
F	Frequency range (bandwidth)	779		928	MHz
I <sub>L</sub>	Insertion loss in bandwidth		1.7	1.9	dB
R <sub>L_SE</sub>	Single ended return loss in bandwidth		15		dB
R <sub>L_DIFF</sub>	Differential ended return loss in bandwidth		15		dB
Φ <sub>imb</sub>	Phase imbalance	-10		10	°
A <sub>imb</sub>	Amplitude imbalance	-1		1	dB
Att	Harmonic levels (TX filter)				dB
	Attenuation at 2fo		-25		
	Attenuation at 3fo		-50		

### 1.1 Measurements





## 2 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](http://www.st.com). ECOPACK® is an ST trademark.

### 2.1 Flip-Chip package information

Figure 10. Flip-Chip package outline

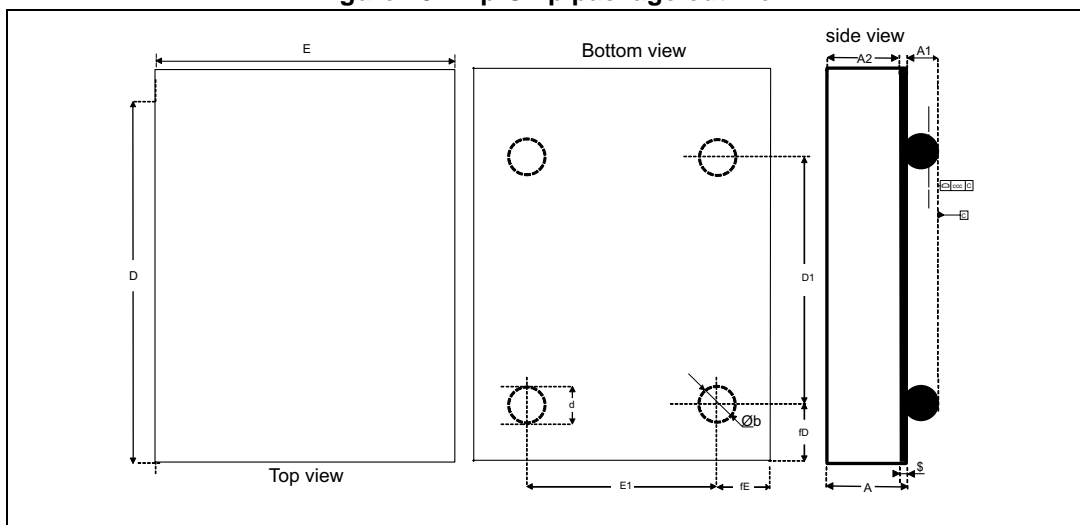


Table 3. Flip-Chip package mechanical data

Parameter	Description	Min.	Typ.	Max.	Unit
A	Bump height + substrate thickness	0.570	0.630	0.690	mm
A1	Bump height	0.155	0.205	0.255	mm
A2	Substrate thickness		0.400		mm
b	Bump diameter	0.215	0.255	0.295	mm
D	Y dimension of the die	1.960	2.010	2.060	mm
D1	Y pitch		1.200		mm
E	X dimension of the die	0.990	1.040	1.090	mm
E1	X pitch		0.500		mm
fD	Distance from bump to edge of die on Y axis		0.270		mm
fE	Distance from bump to edge of die on X axis		0.270		mm
ccc				0.05	mm
\$			0.025		mm

Figure 11. Footprint

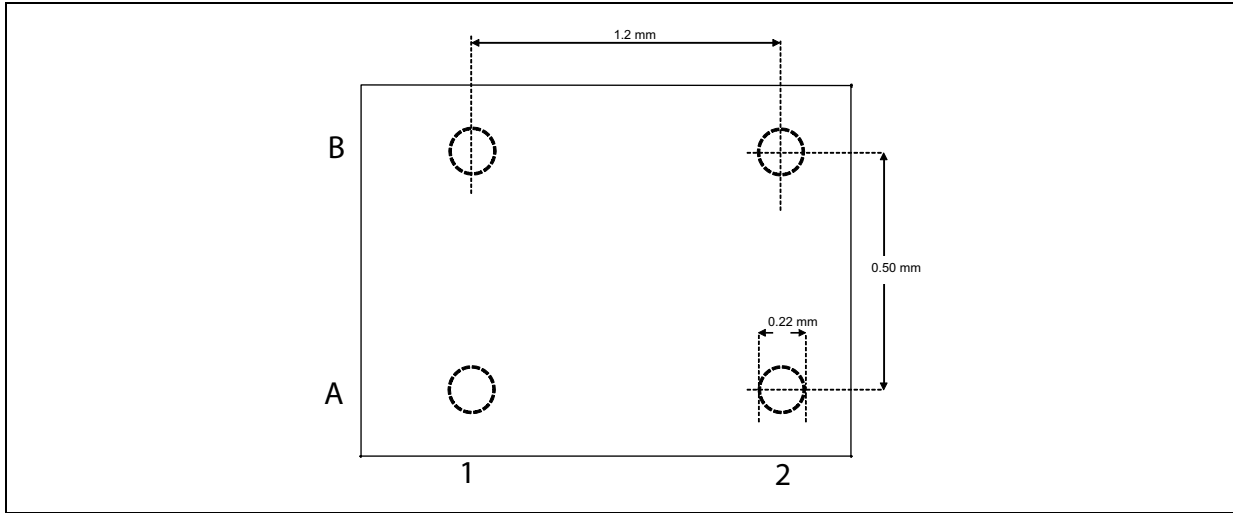


Figure 12. Footprint - 3 mils stencil - non solder mask defined

Copper pad diameter:  
220  $\mu\text{m}$  recommended  
180  $\mu\text{m}$  minimum  
260  $\mu\text{m}$  maximum

Solder mask opening:  
320  $\mu\text{m}$  recommended  
300  $\mu\text{m}$  minimum  
340  $\mu\text{m}$  maximum

Solder stencil opening:  
220  $\mu\text{m}$  recommended

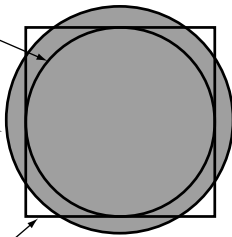


Figure 13. Footprint - 3 mils stencil - solder mask defined

Solder mask opening:  
220  $\mu\text{m}$  recommended  
180  $\mu\text{m}$  minimum  
260  $\mu\text{m}$  maximum

Copper pad diameter:  
320  $\mu\text{m}$  recommended  
300  $\mu\text{m}$  minimum

Solder stencil opening:  
220  $\mu\text{m}$  recommended

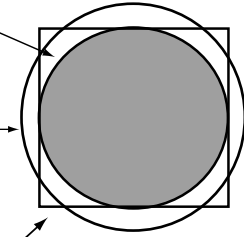


Figure 14. Footprint - 5 mils stencil - non solder mask defined

Copper pad diameter:  
220  $\mu\text{m}$  recommended  
180  $\mu\text{m}$  minimum  
260  $\mu\text{m}$  maximum

Solder mask opening:  
320  $\mu\text{m}$  recommended  
300  $\mu\text{m}$  minimum  
340  $\mu\text{m}$  maximum

Solder stencil opening:  
330  $\mu\text{m}$  recommended\*

\*depending on paste, it can go down to 270  $\mu\text{m}$

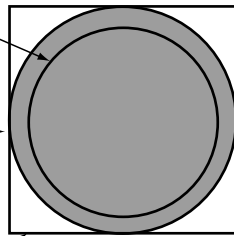


Figure 15. Footprint - 5 mils stencil - solder mask defined

Solder mask opening:  
220  $\mu\text{m}$  recommended  
180  $\mu\text{m}$  minimum  
260  $\mu\text{m}$  maximum

Copper pad diameter:  
320  $\mu\text{m}$  recommended  
300  $\mu\text{m}$  minimum

Solder stencil opening:  
330  $\mu\text{m}$  recommended\*

\*depending on paste, it can go down to 270  $\mu\text{m}$

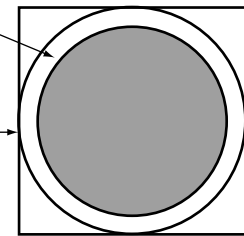


Figure 16. PCB view CC1101 with BAL-CC1101-01D3

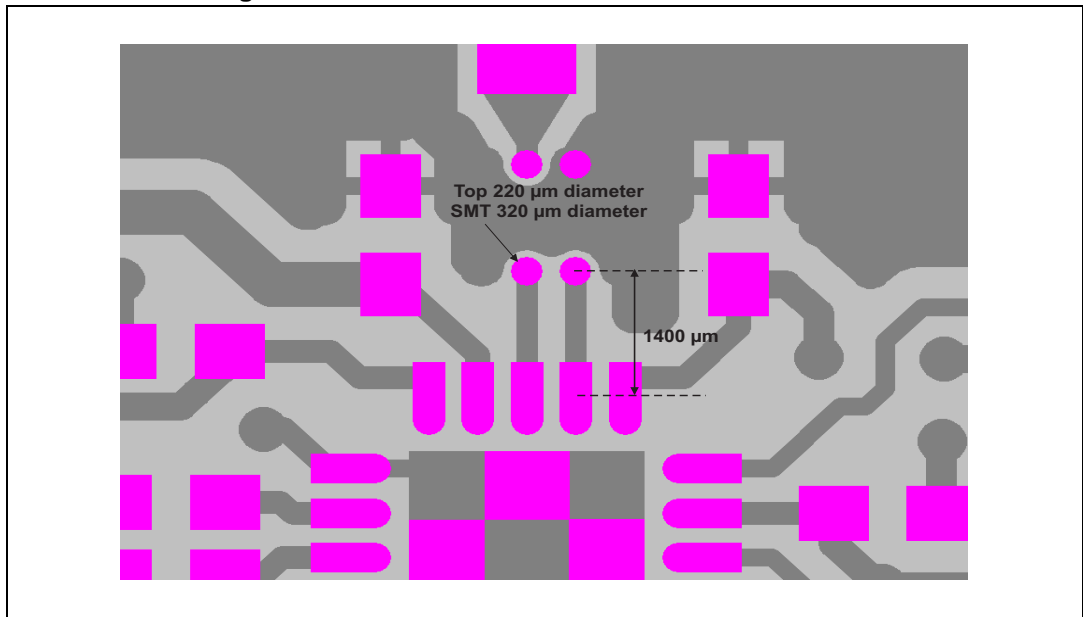


Figure 17. Marking

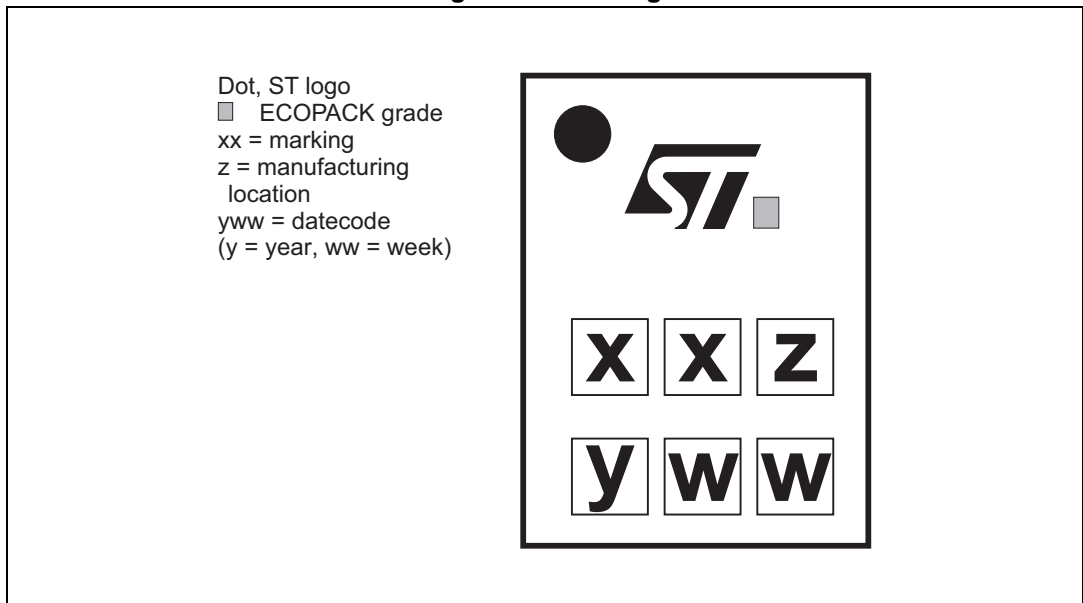
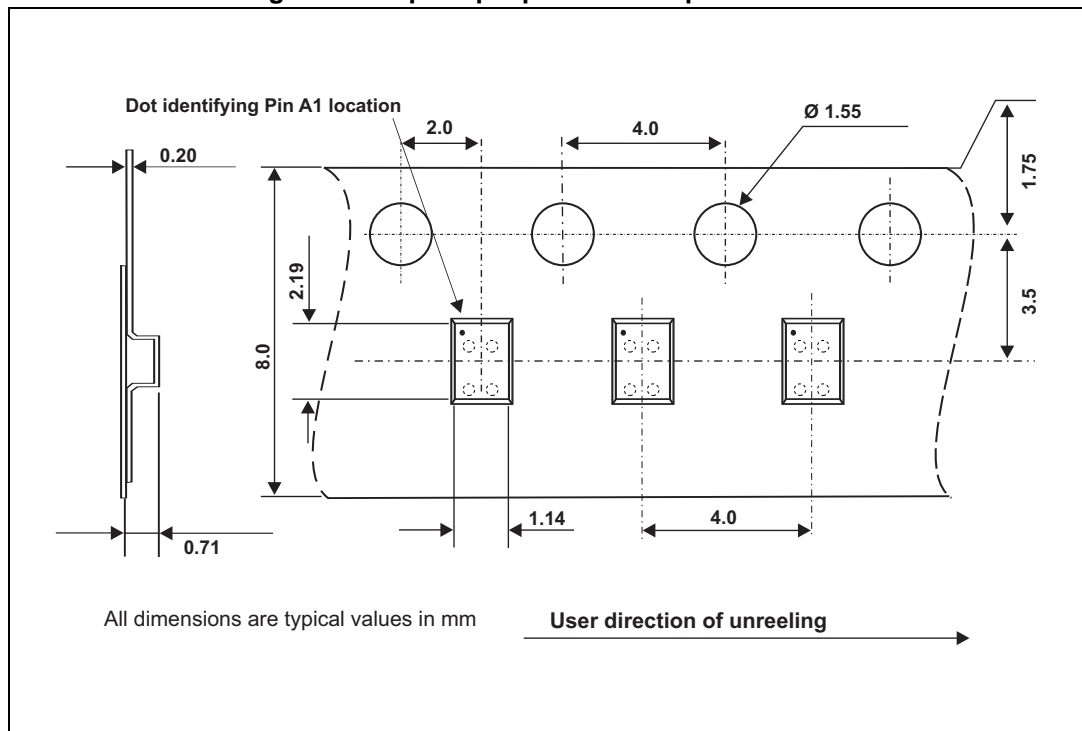


Figure 18. Flip Chip tape and reel specifications



Note: More information is available in the STMicroelectronics Application note: AN2348 Flip-Chip: "Package description and recommendations for use"



### 3 Ordering information

Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
BAL-CC1101-01D3	SS	Flip Chip	2.21 mg	5000	Tape and reel (7")

### 4 Revision history

Table 5. Document revision history

Date	Revision	Changes
23-Jan-2014	1	Initial release
18-Sep-2015	2	Updated <a href="#">Figure 10</a> . Added <a href="#">Figure 12</a> , <a href="#">Figure 13</a> , <a href="#">Figure 14</a> , <a href="#">Figure 15</a> and <a href="#">Table 3</a> .

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