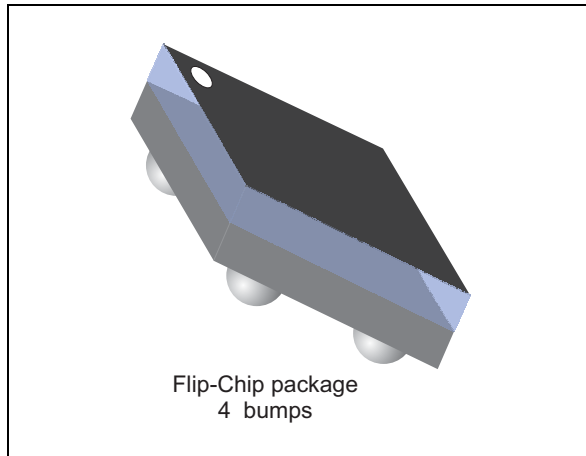


50 ohm nominal input / conjugate match balun to CC1101 / CC1150 (868-928 MHz), with integrated harmonic filter

Datasheet — production data

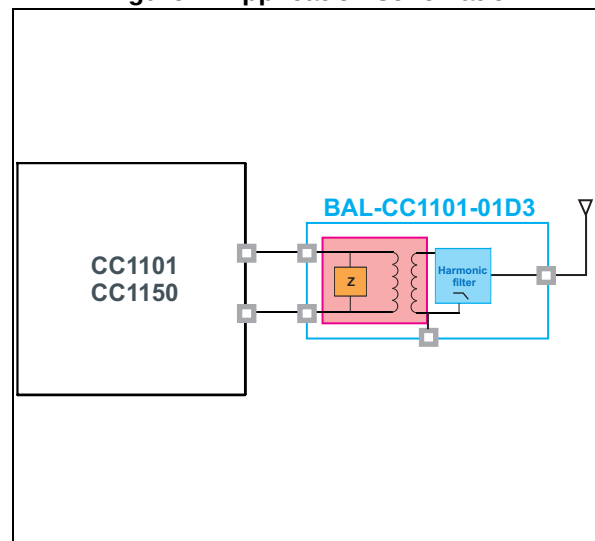


Description

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.

Figure 1. Application schematic



Features

- 50 Ω 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 mm²

Benefits

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

1 Characteristics

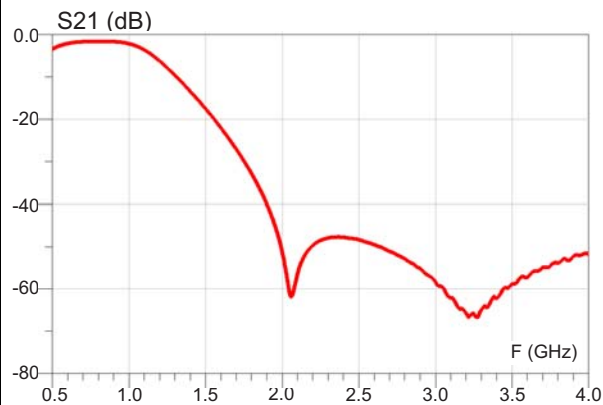
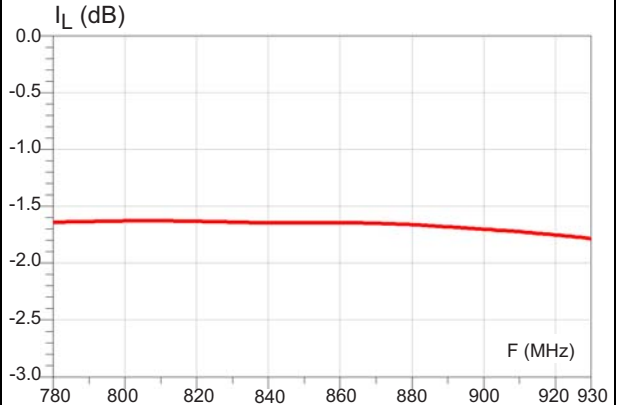
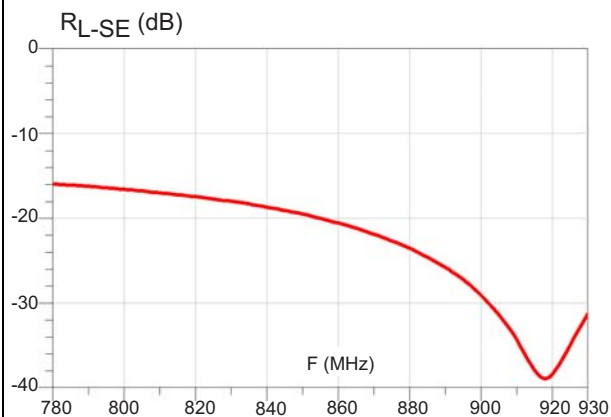
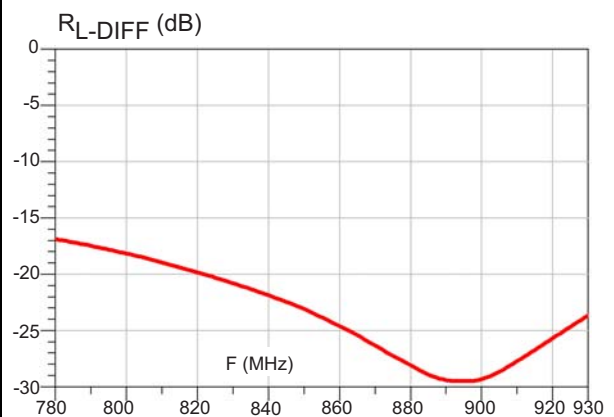
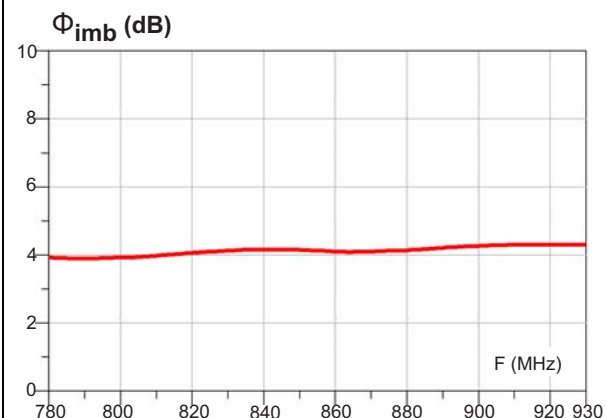
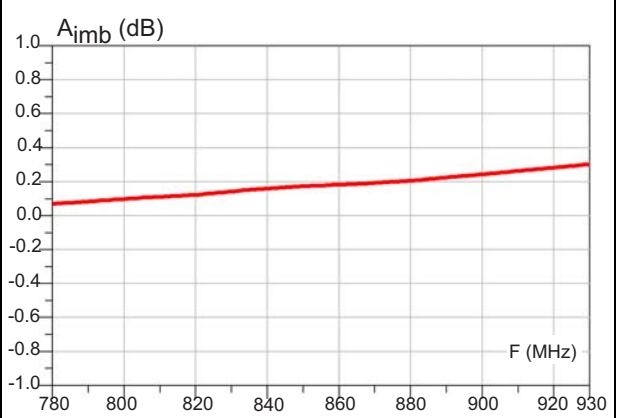
Table 1. Absolute maximum rating (limiting values)

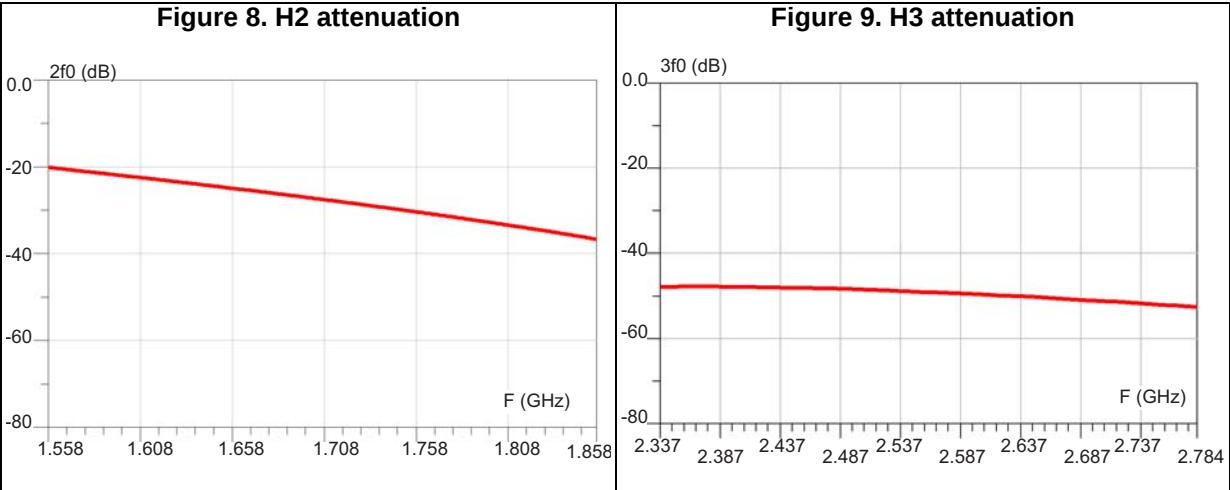
Symbol	Parameter	Value	Unit
P_{IN}	Input power RF_{IN}	20	dBm
V_{ESD}	ESD ratings human body model (JESD22-A114C), all I/O one at a time while others connected to GND	2000	V
	ESD ratings machine model, all I/O	500	
	ESD ratings charged device model (JESD22-C101D)	500	
T_{OP}	Operating temperature	-40 to +125	°C

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

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

1.1 Measurements

Figure 2. Transmission (S21)**Figure 3. Insertion loss in band****Figure 4. Return loss single-ended****Figure 5. Return loss differential****Figure 6. Phase imbalance****Figure 7. Amplitude imbalance**



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. ECOPACK[®] is an ST trademark.

2.1 Flip-Chip package information

Figure 10. Flip-Chip package outline

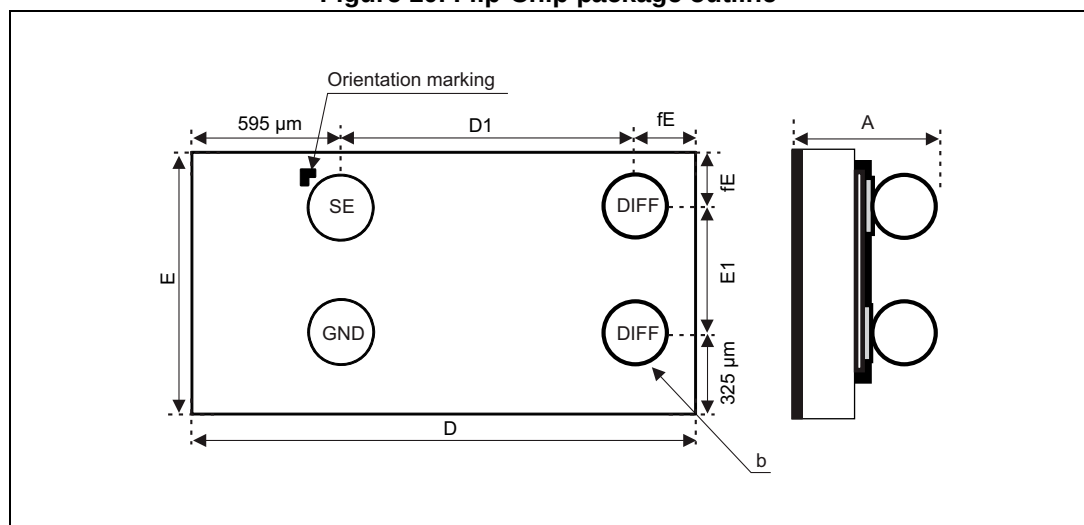


Table 3. Flip-Chip package mechanical data

Parameter	Description	Min.	Typ.	Max.	Unit
A	Bump height + substrate thickness	0.570	0.630	0.690	mm
b	Bump diameter	0.215	0.255	0.295	mm
D	Y dimension of the die	1.970	2.020	2.070	mm
D1	Y pitch		1.200		mm
E	X dimension of the die	1.000	1.050	1.100	mm
E1	X pitch		0.500		mm
fE	Distance from bump to edge of die on X axis			0.225	mm

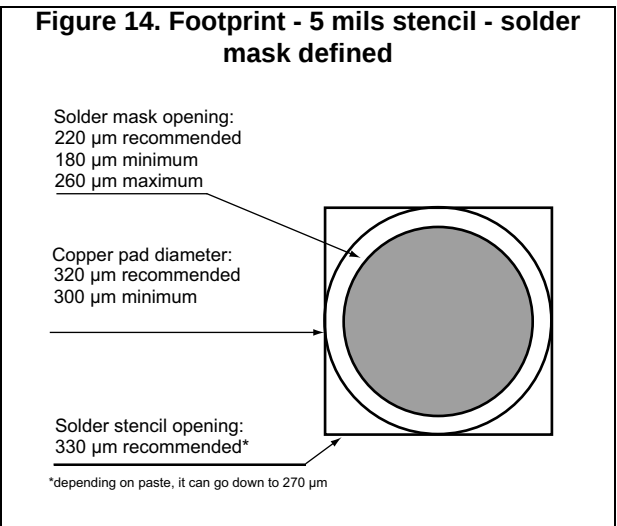
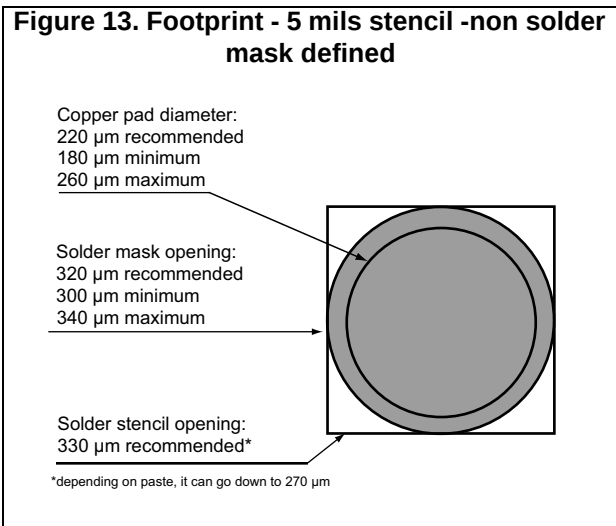
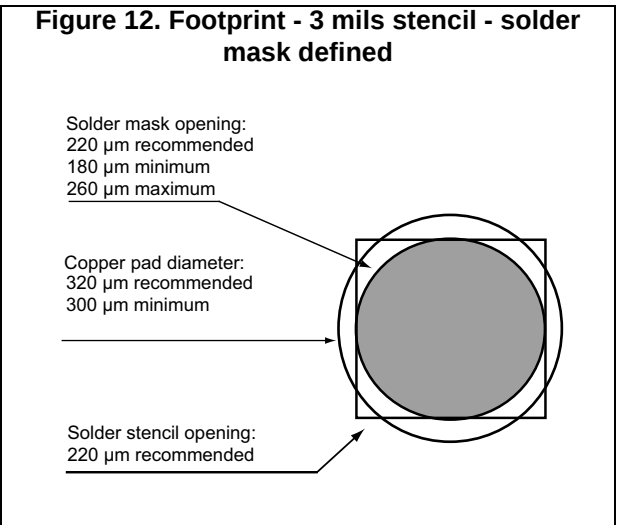
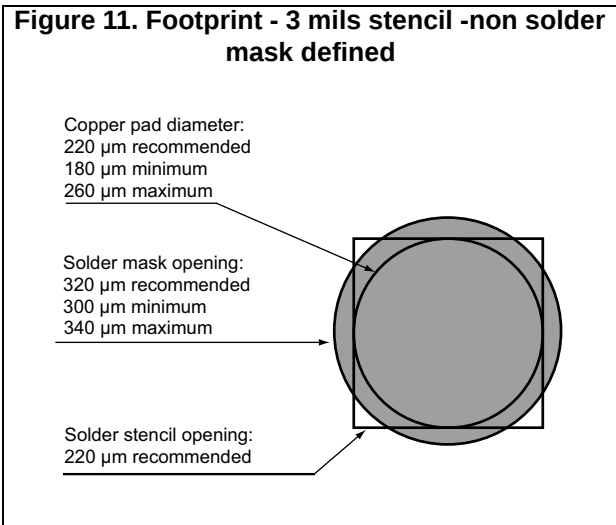


Figure 15. PCB view CC1101 with BAL-CC1101-01D3

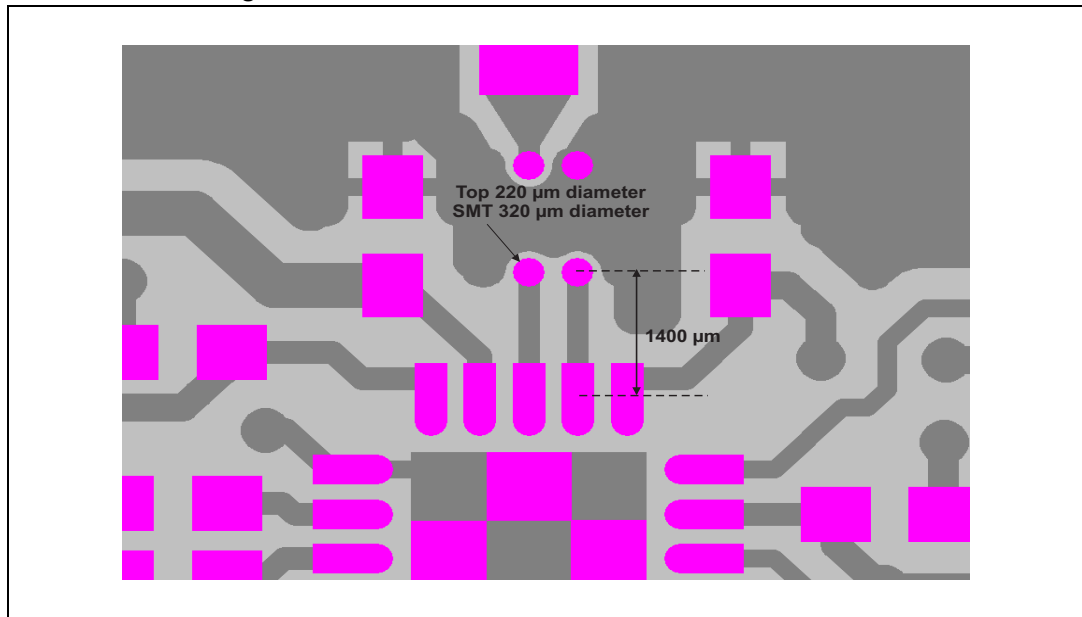
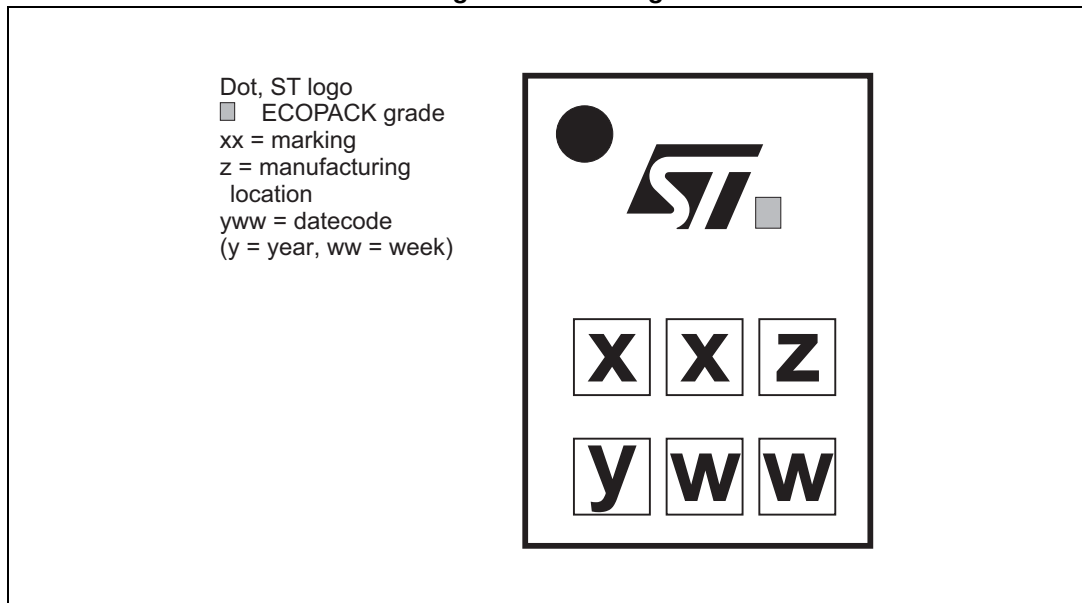


Figure 16. Marking



Dot identifying Pin A1 location

Ø 1.55

User direction of unreeling

All dimensions are typical values in mm

The diagram shows a side view of a cable reel with a width of 0.71 mm and a flange thickness of 0.20 mm. The main body has a height of 8.0 mm. Four circular holes with a diameter of Ø 1.55 mm are spaced 4.0 mm apart horizontally. Three rectangular components are mounted vertically, each containing six small circles arranged in two columns of three. A dimension of 2.19 mm indicates the distance from the top edge to the center of the first row of circles. A dashed line outlines the internal profile. An arrow at the bottom indicates the 'User direction of unreeling'.

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 Figure 10. Added Figure 11, Figure 12, Figure 13, Figure 14 and Table 3.
02-May-2016	3	Updated Figure 10 and Table 3 .

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