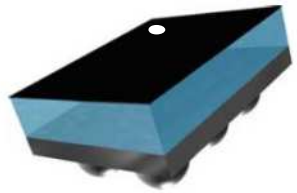
BALF-112X-01D3

50 ohm nominal input / conjugate match balun CC1120, CC1125 (868-928 MHz), with integrated harmonic filter

Datasheet - production data



Flip-Chip (8 bumps) package

Features

- 50 Ω nominal input / conjugate match to CC1120, CC1125
- Low insertion loss
- Low amplitude imbalance
- Low phase imbalance
- Small footprint

Benefits

- Very low profile (< 670 µm thickness)
- High RF performance
- RF BOM and size reduction

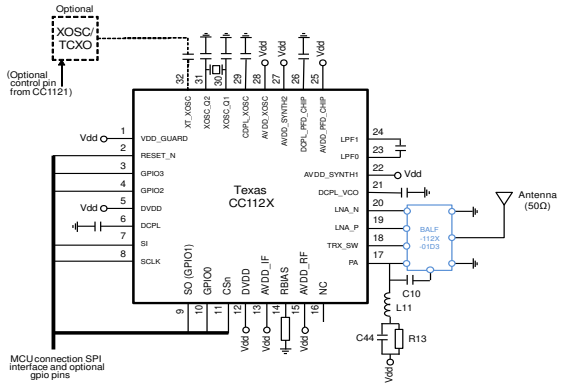
Applications

- 868 MHz and 928 MHz impedance-matched balun filter optimized for Texas Instruments® CC1120, CC1125, CC1175, CC1200 sub-GHz RFICs.

Description

STMicroelectronics' BALF-112X-01D3 is an ultra-miniature balun, integrating both matching network and harmonics filter.
Matching impedance has been customized for the CC1120, CC1125, CC1175 and CC1200 transceivers from Texas Instruments. The device uses STMicroelectronics' IPD technology on a non-conductive glass substrate, which optimizes RF performance.

Figure 1: Application schematic



C10 is a DC block capacitor: 0402/100 pF/50 V

This is information on a product in full production.

1 Characteristics

Table 1: Absolute maximum ratings (limiting values)

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
P_{IN}	Input power RFIN		-	20	dBm
V_{ESD}	ESD ratings MIL STD883C (HBM: C = 100 pF, R = 1.5 Ω, air discharge)	500	-		V
	ESD ratings machine model (MM: C = 200 pF, R = 25 W, L = 500 nH)	250	-		
T_{OP}	Operating temperature	-40	-	+85	°C

Table 2: Electrical characteristics and RF performance (T_{amb} = 25 °C) RX balun

Symbol	Parameter	Test condition	Value			Unit
			Min.	Typ.	Max.	
Z_{RX}	Nominal differential impedance			Match to CC112X		Ω
Z_{ANT}	Antenna impedance			50		Ω
f	Frequency range (bandwidth)		866		928	MHz
$S21_{RX-ANT}$	Insertion loss in bandwidth	at 868 MHz	-2.3	-1.9		dB
		at 928 MHz	-2.8	-2.4		
$S11_{ANT}$	Input return loss in bandwidth	at 868 MHz		-22	-20	dB
		at 928 MHz		-11	-9	
Phase_imbal	Output phase imbalance		-10	-2.9	10	°
Ampl_imbal	Output amplitude imbalance		-1	-0.3	1	dB

Table 3: Electrical characteristics and RF performance (T_{amb} = 25 °C) TX filter

Symbol	Parameter	Test condition	Value			Unit
			Min.	Typ.	Max.	
Z_{TX}	Nominal TX impedance			Match to CC112X		Ω
Z_{ANT}	Antenna impedance			50		Ω
f	Frequency range (bandwidth)		866		928	MHz
$S21_{TX-ANT}$	Insertion loss in bandwidth	at 868 MHz	-2.3	-1.9		dB
		at 928 MHz	-2.7	-2.3		
$S11_{ANT}$	Input return loss in bandwidth	at 868 MHz		-8	-6	dB
		at 928 MHz		-7	-5	
Att	Harmonic levels	Attenuation at 2 fo		-43	-41	dBm
		Attenuation at 3 fo		-50	-46	
		Attenuation at 4 fo		-43	-40	
		Attenuation at 5 fo		-39	-37	
		Attenuation at 6 fo		-35	-33	
		Attenuation at 7 fo		-19	-17	

1.1 RF measurement

Figure 2: Insertion loss (RX balun)

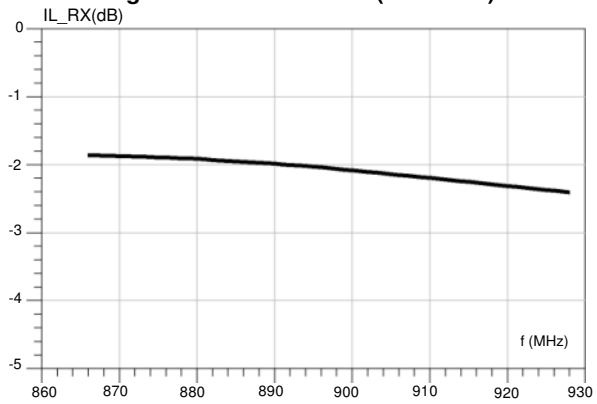


Figure 3: Return loss antenna (RX balun)

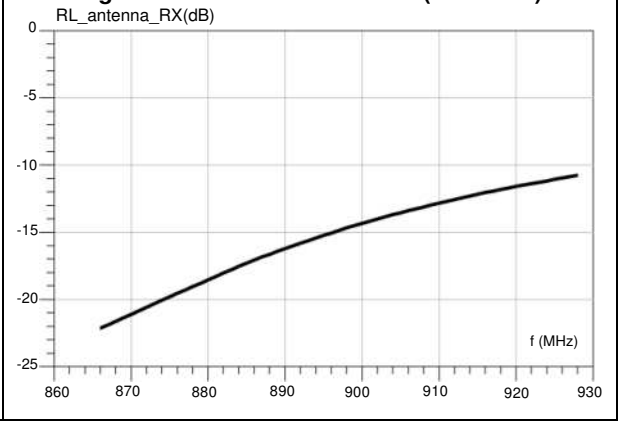


Figure 4: Amplitude imbalance (RX balun)

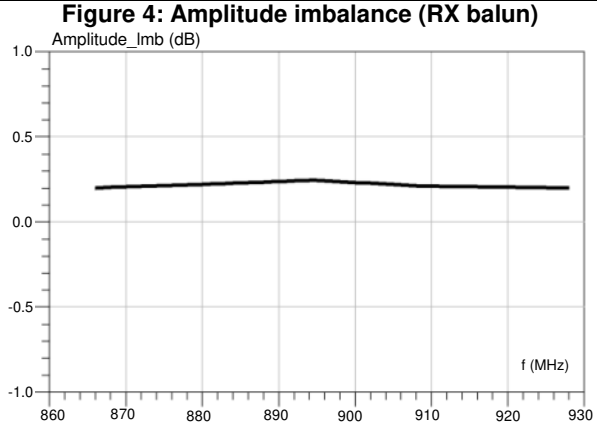


Figure 5: Phase imbalance (RX balun)

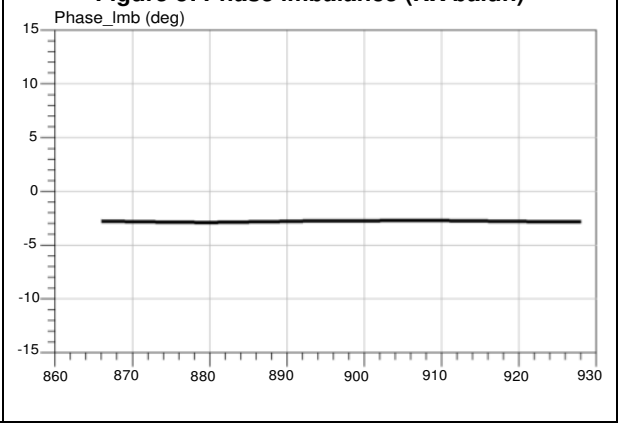


Figure 6: TX filter transmission

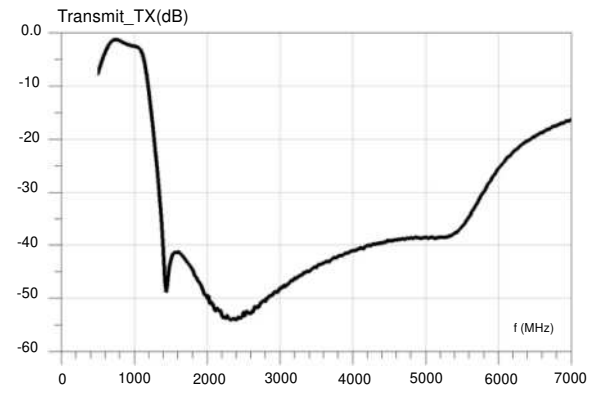


Figure 7: Insertion loss (TX filter)

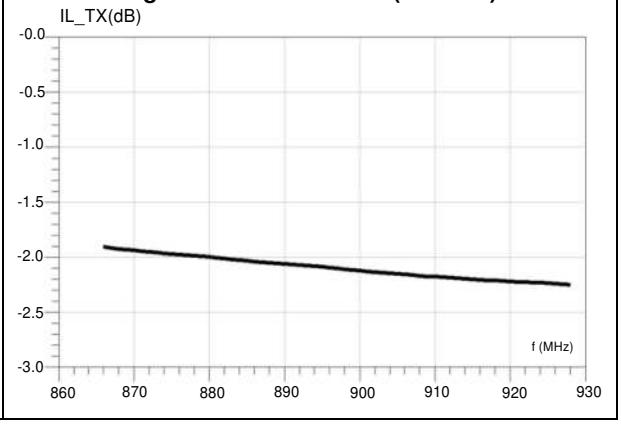


Figure 8: fo attenuation (TX filter)

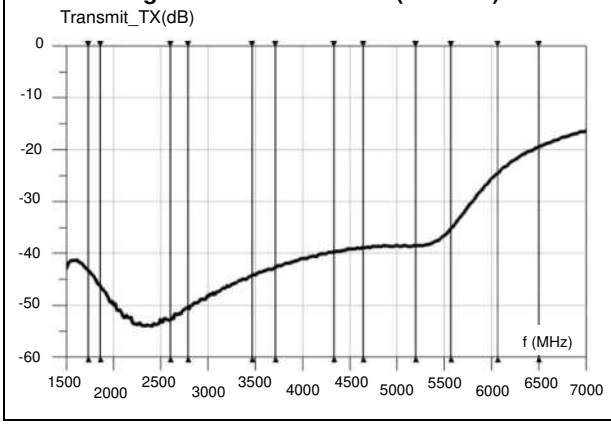
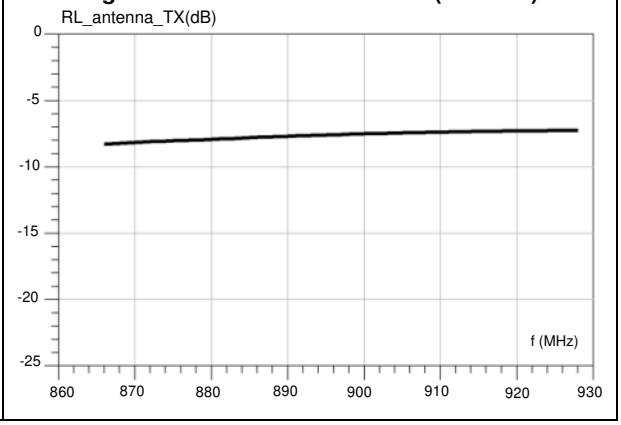


Figure 9: Return Loss antenna (TX filter)



2 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***. ECOPACK® is an ST trademark.

2.1 Flip-Chip CSPG 0.4 package information

Figure 10: Flip-Chip CSPG 0.4 package outline

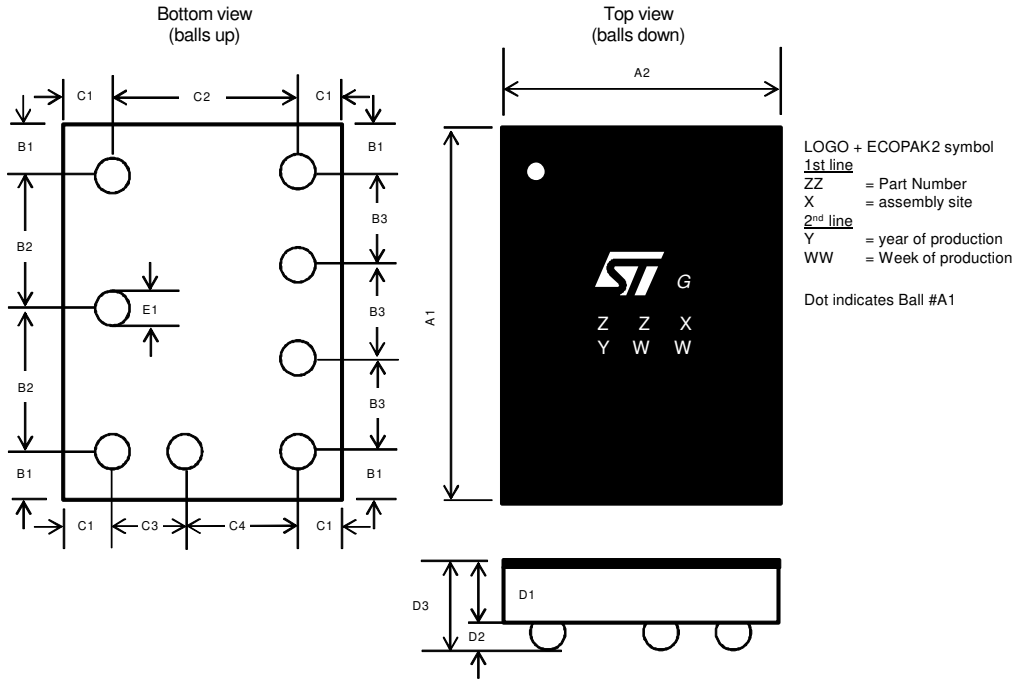


Table 4: Flip-Chip CSPG 0.4 mechanical data

Dimensions	Frequency	A1	A2	B1	B2	B3	C1	C2	C3	C4	D1	D2	D3	E1
BAL-112X-01D3	868 MHz	1950	1450	225	750	500	223	1004	400	604	425	205	630	255

Figure 11: Footprint -non solder mask defined

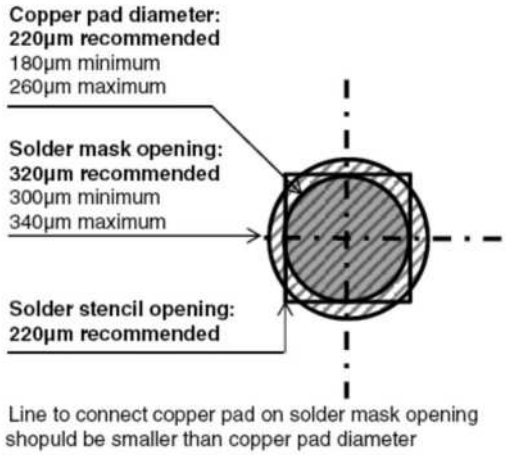


Figure 12: Footprint - solder mask defined

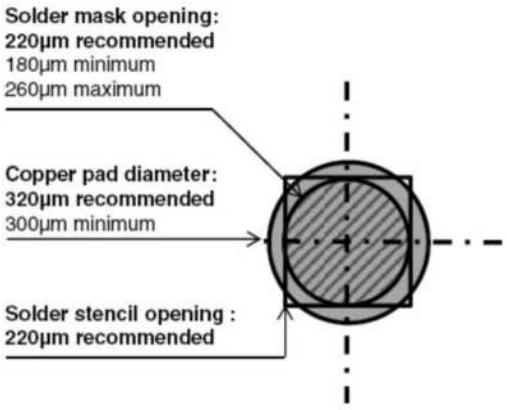


Figure 13: Ball assignment

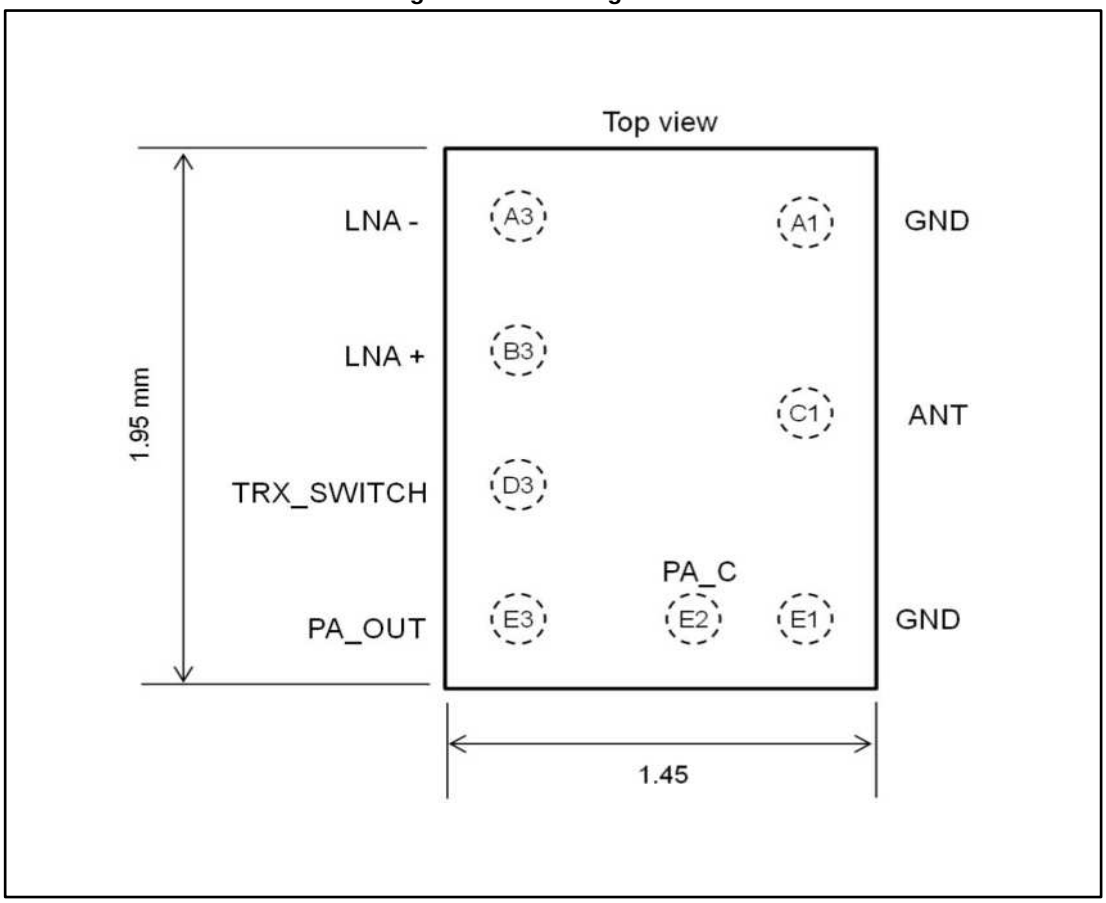
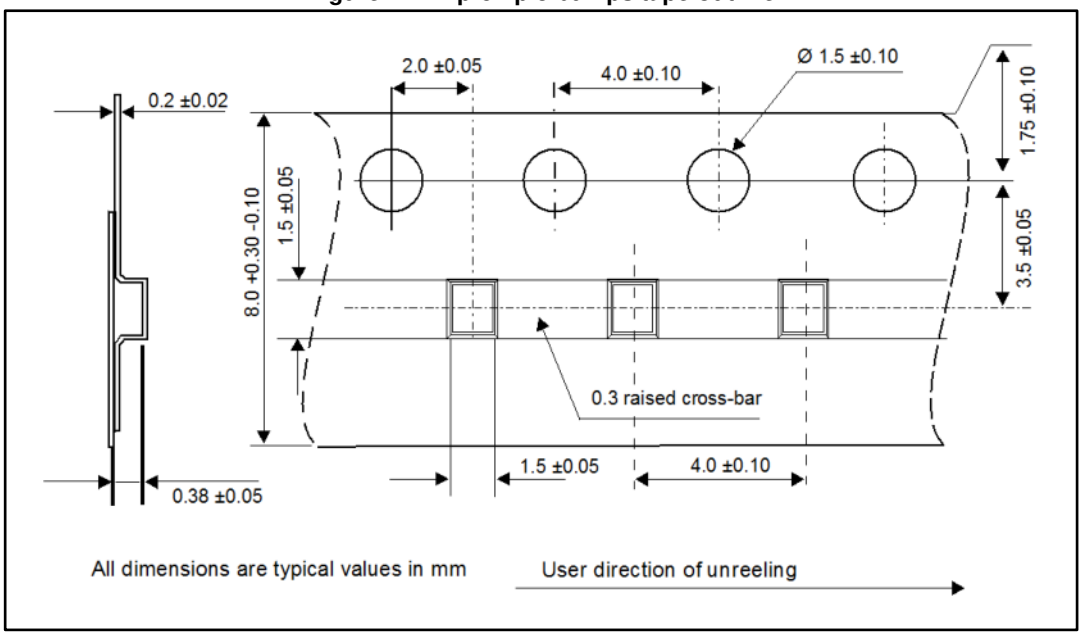


Table 5: Flip-Chip CSPG 0.4 ball description

Ball	Name	Designation
A1	GND	Ground
A3	LNA-	Connect to LNA_N
B3	LNA+	Connect to LNA_P
C1	ANT	Connect to antenna
D3	TRX_SW	Connect to TRX switch
E1	GND	Ground
E2	PA_C	Connect to PA output thru C10
E3	PA_OUT	Connect to PA

2.2 Flip-chip 8 bumps packing information

Figure 14: Flip-chip 8 bumps tape outline



3 Ordering information

Table 6: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
BALF-112X-01D3	TF	CSPG	3.02 mg	5000	Tape and reel

4 Revision history

Table 7: Document revision history

Date	Revision	Changes
04-Jul-2016	1	First issue.
20-Feb-2017	2	Updated Front page.

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