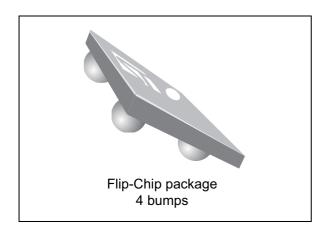


### **BALF-CC25-02D3**

# 50 ohm, conjugate match to CC2541 transformer balun

Datasheet - production data



#### **Features**

- 2.45 GHz balun with integrated matching network
- · Matching optimized for following CC2541
- Low insertion loss
- Low amplitude imbalance
- Low phase imbalance
- Coated Flip-Chip on glass
- Small footprint: < 0.88 mm²</li>

#### **Benefits**

- Very low profile
- High RF performance
- PCB space saving versus discrete solution
- BOM count reduction
- · Efficient manufacturability

#### **Description**

STMicroelectronics BAL-CC25-02D3 is an ultra miniature balun which integrates a matching network in a monolithic glass substrate. This has been customized for the CC2541 RF transceivers.

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

Figure 1. Pin configuration (top view)

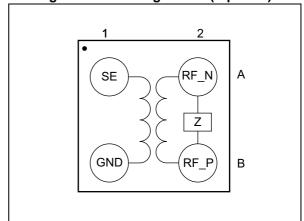
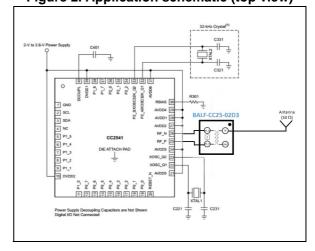


Figure 2. Application schematic (top view)



Characteristics BALF-CC25-02D3

### 1 Characteristics

Table 1. Absolute maximum rating (limiting values)

Symbol	Parameter	Value	Unit
P <sub>IN</sub>	Input power RF <sub>IN</sub>	20	dBm
	ESD ratings MIL STD883C (HBM: C = 100 pF, R = 1.5 $\Omega$ , air discharge)	2000	
V <sub>ESD</sub>	ESD ratings machine model (MM: C = 200 pF, R = 25 $\Omega$ , L = 500 nH)	500	V
	ESD ratings charged device model (CDM, JESD22-C101D)	500	
T <sub>OP</sub>	Operating temperature	-40 to + 105	°C

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

Symbol	Parameter	Value			Unit	
Symbol	raiametei	Min.	Тур.	Max.	, oilit	
Z <sub>OUT</sub>	Nominal differential output impedance	Conjugate match to CC2541		0		
Z <sub>IN</sub>	Nominal input impedance 50			Ω		
F	Frequency range (bandwidth)	2379		2507		
ΙL	Insertion loss in bandwidth		1.6	1.8	dB	
R <sub>L_SE</sub>	Single ended return loss in bandwidth	9	10		dB	
R <sub>L_DIFF</sub>	Differential ended return loss in bandwidth	9	17		dB	
$\Phi_{imb}$	Phase imbalance		7		0	
A <sub>imb</sub>	Amplitude imbalance		0.6		dB	

BALF-CC25-02D3 Characteristics

Figure 3. Balun transmission (T<sub>amb</sub> = 25 °C)

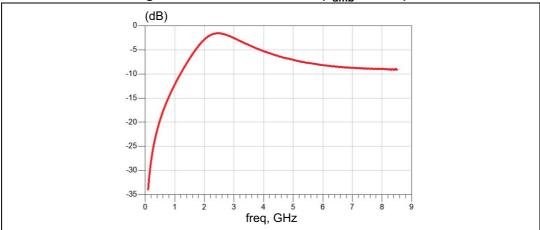


Figure 4. Insertion loss (T<sub>amb</sub> = 25 °C)

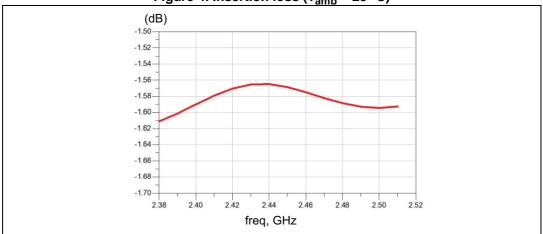
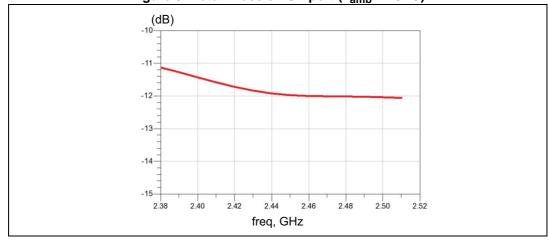


Figure 5. Return loss on SE port (T<sub>amb</sub> = 25 °C)



Characteristics BALF-CC25-02D3

Figure 6. Return loss on DIFF port (T<sub>amb</sub> = 25 °C)

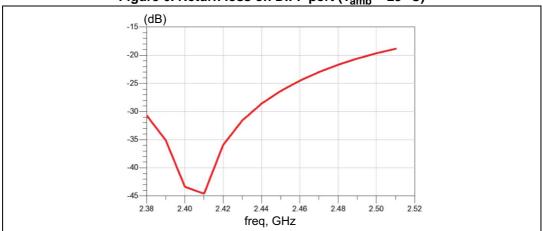


Figure 7. Amplitude imbalance ( $T_{amb} = 25$  °C)

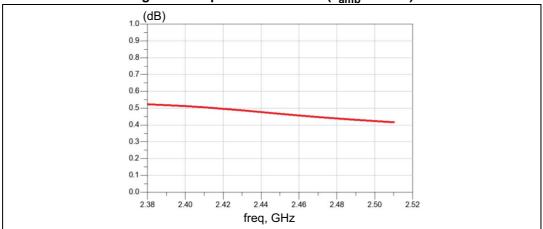
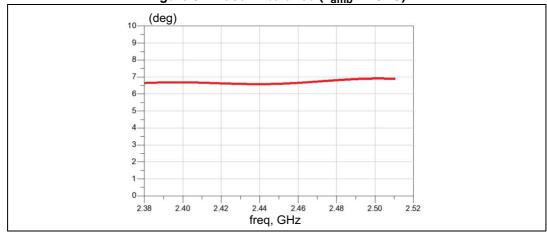


Figure 8. Phase imbalance ( $T_{amb} = 25$  °C)



### 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<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: <a href="https://www.st.com">www.st.com</a>. ECOPACK<sup>®</sup> is an ST trademark.

#### 2.1 Flip-Chip package information

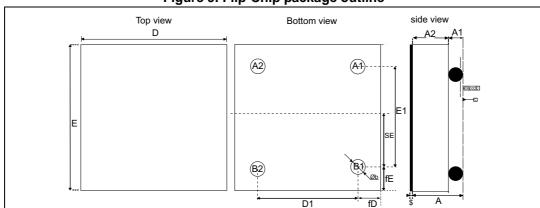


Figure 9. Flip-Chip package outline

Table 3. Flip-Chip package mechanical data

Parameter	Description	Min.	Тур.	Max.	Unit
А	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	0.890	0.940	0.990	mm
D1	Y pitch		0.500		mm
Е	X dimension of the die	0.890	0.940	0.990	mm
E1	X pitch		0.500		mm
SE			0.250		mm
fD	Distance from bump to edge of die on Y axis		0.220		mm
fE	Distance from bump to edge of die on X axis		0.220		mm
ccc				0.05	mm
\$			0.025		mm

Package information BALF-CC25-02D3

Figure 10. Footprint

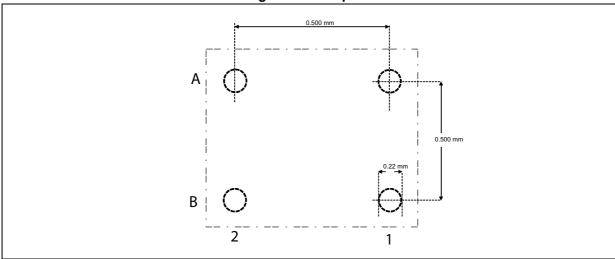
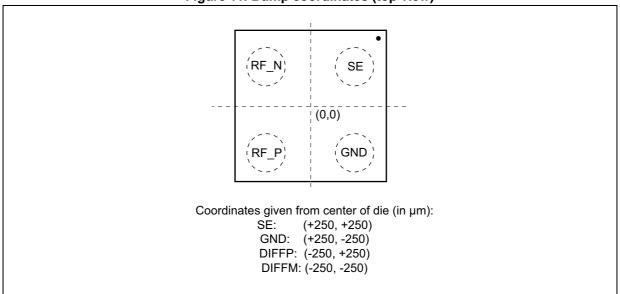
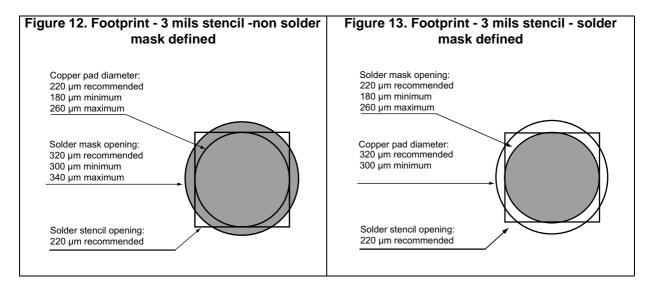
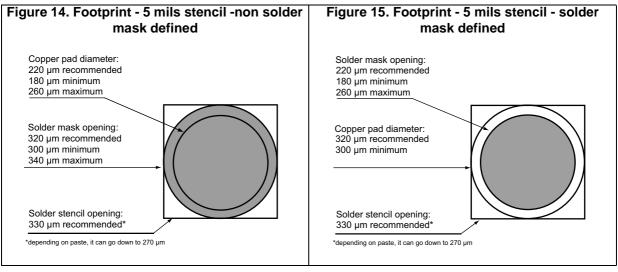


Figure 11. Bump coordinates (top view)



BALF-CC25-02D3 Package information





Package information BALF-CC25-02D3

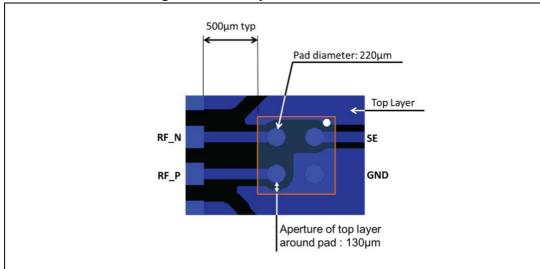
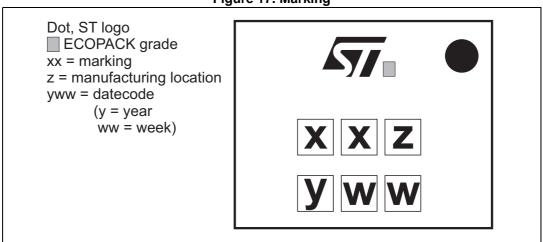


Figure 16. PCB layout recommendation

Figure 17. Marking



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

BALF-CC25-02D3 Package information

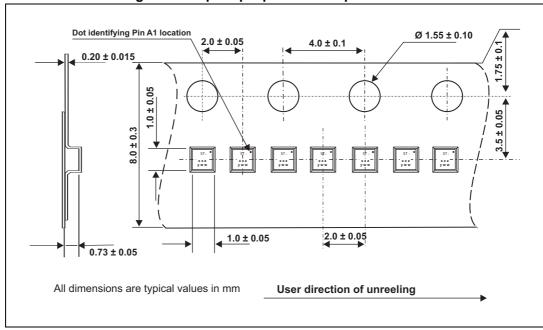


Figure 18. Flip Chip tape and reel specifications

Note:

More information is available in the application note:

AN2348: "Flip Chip: package description and recommendations for use"

Ordering information BALF-CC25-02D3

# 3 Ordering information

**Table 4. Ordering information** 

Order code	Marking	Package	Weight	Base qty	Delivery mode
BAL-CC25-02D3	TE	Flip Chip	1.07 mg	5000	Tape and reel (7")

## 4 Revision history

**Table 5. Document revision history** 

Date	Revision	Changes
17-Nov-2015	1	Initial release

#### **IMPORTANT NOTICE - PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2015 STMicroelectronics - All rights reserved

