

# BAL-2690D3U

## 50 $\Omega$ nominal input / conjugate match balun to STLC2690





### Features

- 50 Ω nominal input / 30+j25 output differential impedance
- Low insertion loss
- Low amplitude imbalance
- Low phase imbalance
- Small footprint: BAL-2690D3U < 1 mm<sup>2</sup>

#### **Benefits**

- Very low profile (<700 μm)</li>
- High RF performances
- RF BOM and area reduction

## Applications

Balun transformer for applications such as:

- Bluetooth STLC2690
- Mobile phone

### Description

The BAL-2690D3U is a balun designed to transform single ended signals to differential signals in Bluetooth applications.

The BAL-2690D3U has been customized for the STLC2690 Bluetooth transceiver with 0.8 dB insertion losses in the bandwidth (2400 MHz - 2500 MHz) and with a specific requirement for the SCC22 parameter.

The BAL-2690D3U has been designed using STMicroelectronics IPD (integrated passive device) technology on non conductive glass substrate to optimize RF performance.



#### Figure 2. Application schematic



TM: IPAD is a trademark of STMicroelectronics

September 2015

DocID16056 Rev 3

www.st.com

This is information on a product in full production.

## 1 Characteristics

Symbol	Parameter		Value		Unit		
Symbol	Falameter		Тур.	Max.			
P <sub>IN</sub>	Input power RF <sub>IN</sub>			20	dBm		
V <sub>ESD</sub>	ESD ratings MIL STD883G (HBM: C = 100 pF, R = 1.5 k $\Omega$ , air discharge)	2000					
	ESD ratings machine model, (MM: C = 200 pF, R = 25 $\Omega$ , L = 500 nH)	500			V		
	ESD ratings charged device model (JESD22-C101D)	500					
T <sub>OP</sub>	Operating temperature	-40		+125	°C		

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

			Value				
Symbol	Parameter			Тур.	Ma x.	Unit	
Z <sub>OUT</sub>	Nominal differential output impedance			30 + j25		Ω	
Z <sub>IN</sub>	Nominal input impedance			50			
F	Frequency range (bandwidth)	2402	2441	248 0	MHz		
١ <sub>L</sub>	Insertion loss in bandwidth			0.8	1.1	dB	
Ripple	Ripple in bandwidth			0.6	dB		
RL	Return loss in bandwidth	14			dB		
$\Phi_{imb}$	Phase imbalance	-10		10	0		
A <sub>imb</sub>	Amplitude imbalance				1	dB	
R <sub>CMRR</sub>	Common mode rejection ratio (Ssc12)					dB	
S <sub>CC22</sub>	Magnitude for common mode harmonic rejection coefficient at 2fo	From 4804 MHz to 4960 MHz, 25 Ω is	0.7		1	dB	
	Phase for common mode harmonic rejection coefficient at 2fo	considered as reference for CM	-45		0	o	

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



### 1.1 Measurements









DocID16056 Rev 3

## 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: *www.st.com*. ECOPACK<sup>®</sup> is an ST trademark.

### 2.1 Flip-Chip package information



#### Figure 9. Flip-Chip package outline

Table 0. The one package meenanear data	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	0.860	0.910	0.960	mm
D1	Y pitch		0.474		mm
Е	X dimension of the die	0.860	0.910	0.960	mm
E1	X pitch		0.474		mm
SE			0.237		mm
fD	Distance from bump to edge of die on Y axis		0.213		mm
fE	Distance from bump to edge of die on X axis		0.213		mm
CCC				0.05	mm
\$			0.025		mm







DocID16056 Rev 3



Figure 15. Recommend land pattern (used for balun characterization)







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-2690D3U	RP	Flip-Chip	1.02 mg	5000	Tape and reel

## 4 Revision history

Table 5. Document revision his
--------------------------------

Date	Revision	Changes
25-Jan-2010	1	First issue.
08-Feb-2010	2	Updated Table 1 and Figure 16.
21-Sep-2015	3	Updated <i>Figure 9</i> and <i>Figure 9</i> . Added <i>Figure 11</i> , <i>Figure 12</i> , <i>Figure 13</i> , <i>Figure 14</i> and <i>Table 3</i> .



#### 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



DocID16056 Rev 3