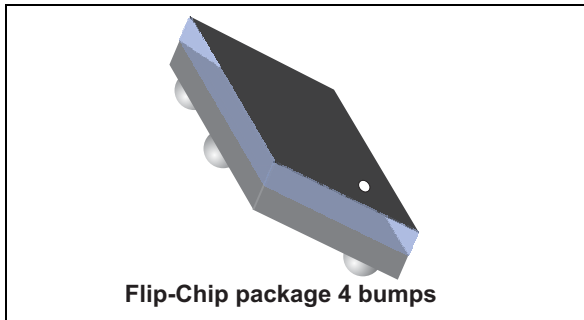


## 50 ohm nominal input / conjugate match balun for STLC2690, with integrated harmonic filter

Datasheet – production data



### Features

- 50  $\Omega$  nominal input / matched output differential impedance
- Integrated harmonic filter
- Low insertion loss
- Low amplitude imbalance
- Low phase imbalance
- Small footprint < 1.54 mm<sup>2</sup>

### Benefits

- Very low profile (< 560  $\mu$ m after reflow)
- High RF performance
- RF BOM and area reduction

### Applications

- Bluetooth STLC2690 application
- Mobile phone application

### Description

STMicroelectronics BALF-2690-02D3 is a balun design to transform single ended signal to differential signals in Bluetooth applications. This BALF-2690-02D3 has been customized for STLC2690 Bluetooth transceiver with less than 1.2 dB insertion losses in the bandwidth (2400 MHz-2500 MHz).

The BALF-2690-02D3 has been designed using STMicroelectronics IPD (integrated passive device) technology on non-conductive glass substrate which optimize RF performance.

Figure 1. Device configuration (top view)

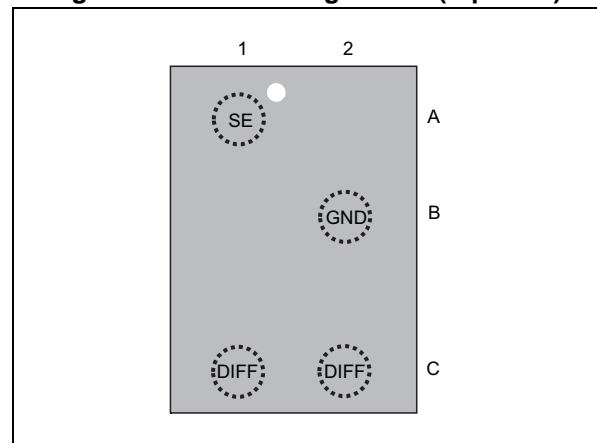
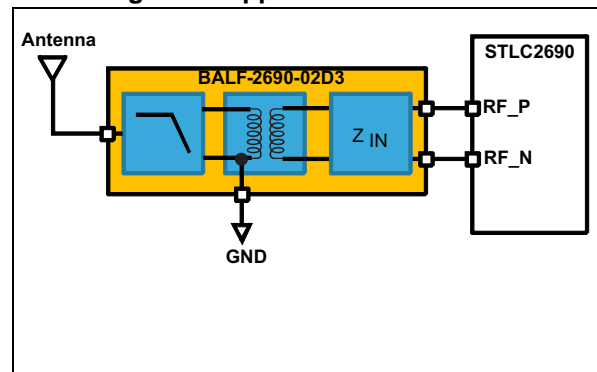


Figure 2. Application schematic



# 1 Characteristics

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

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$P_{IN}$	Input power RFIN		10	13	dBm
$V_{ESD}$	ESD rating, human body model (JESD22-A114-C) all I/O one at a time while others connected to GND	2000			V
	ESD rating, machine model, all I/O	200			
$T_{OP}$	Operating temperature range	-40		+85	°C

**Table 2. Impedances ( $T_{amb} = 25\text{ °C}$ )**

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$Z_{DIFF}$	Nominal differential impedance		matched to STLC2690		$\Omega$
$Z_{SE}$	Nominal single-ended impedance		50		

**Table 3. RF performance ( $T_{amb} = 25\text{ °C}$ )**

Symbol	Parameter	Test condition	Value			Unit
			Min.	Typ.	Max.	
f	Frequency range (bandwidth)		2400		2500	MHz
$I_L$	Insertion loss in bandwidth			+1.2		dB
$R_{L\_SE}$	Return loss in bandwidth		15	21		dB
$\Phi_{imb}$	Output phase imbalance (single ended)		-10		+10	°
$A_{imb}$	Output amplitude imbalance		-1	0.5	1	dB
CMRR	Common mode rejection ( $S_{SC12}$ )		20			dB
$Att_{2f_0}$	2nd harmonic S21 attenuation	4800-5000 MHz	31			dB
$Att_{3f_0}$	3rd harmonic S21 attenuation	7200-7500 MHz	36			

### 1.1 Measurements

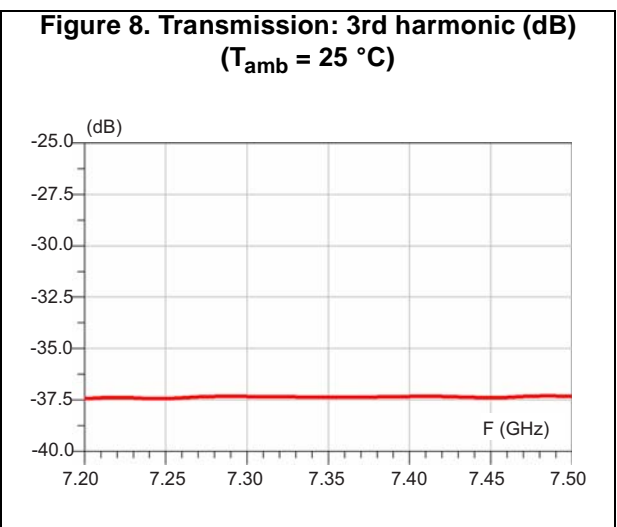
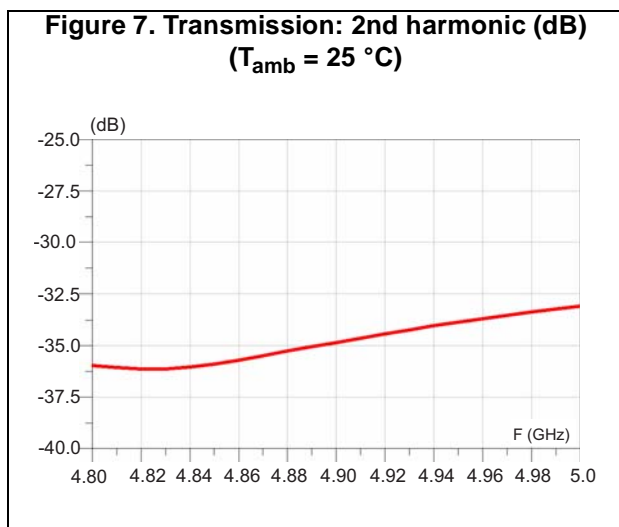
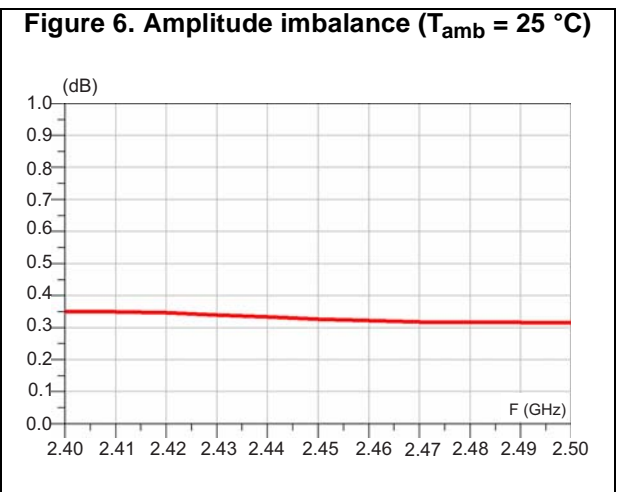
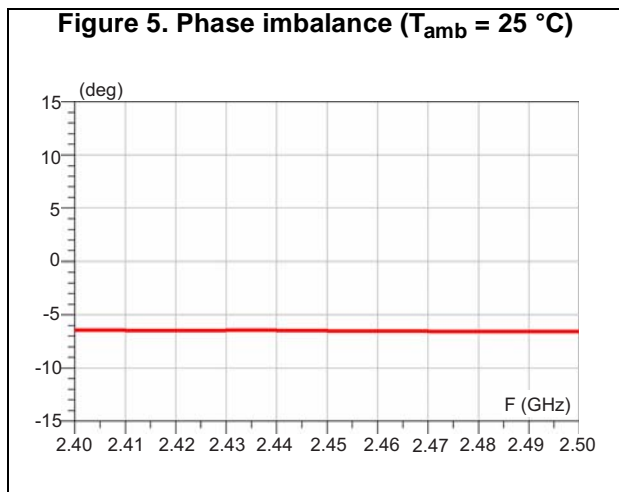
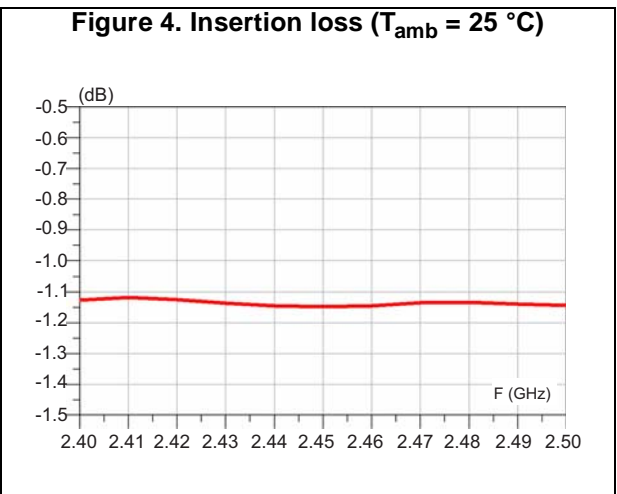
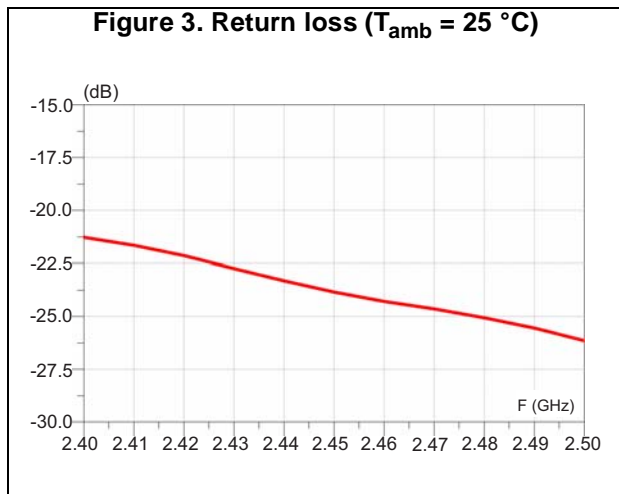
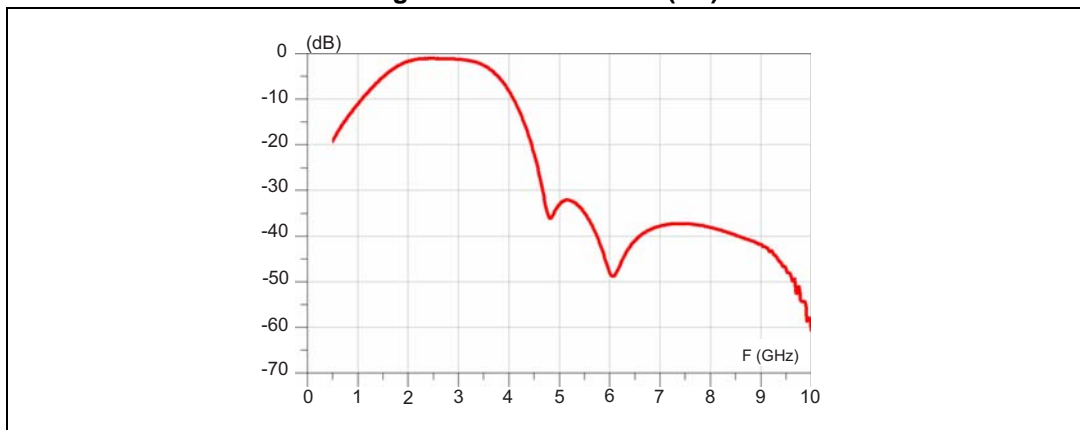


Figure 9. Transmission (dB)



## 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

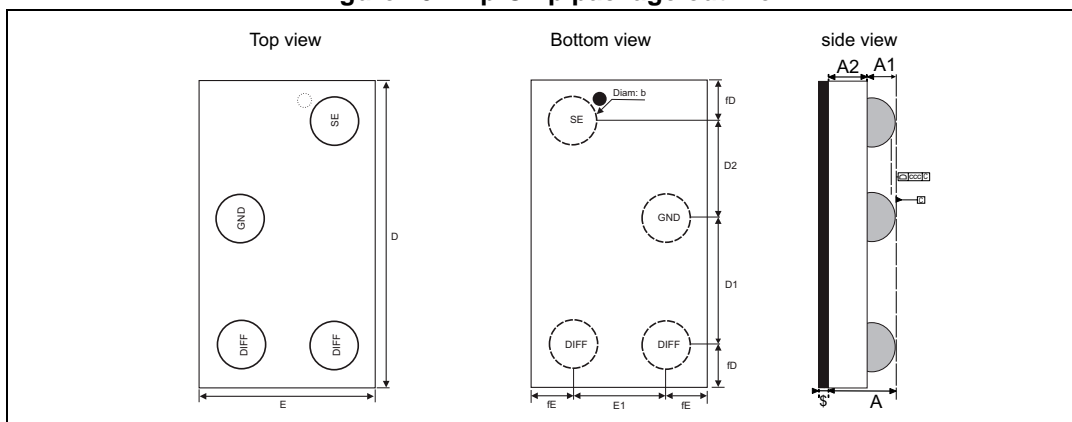


Table 4. Flip-Chip package mechanical data

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	1.590	1.640	1.690	mm
D1	Y pitch		0.660		mm
D2	Y pitch2		0.540		mm
E	X dimension of the die	0.890	0.940	0.990	mm
E1	X pitch		0.500		mm
fD	Distance from bump to edge of die on Y axis		0.225		mm
fE	Distance from bump to edge of die on X axis		0.215		mm
ccc				0.05	mm
\$			0.025		mm

Figure 11. Footprint

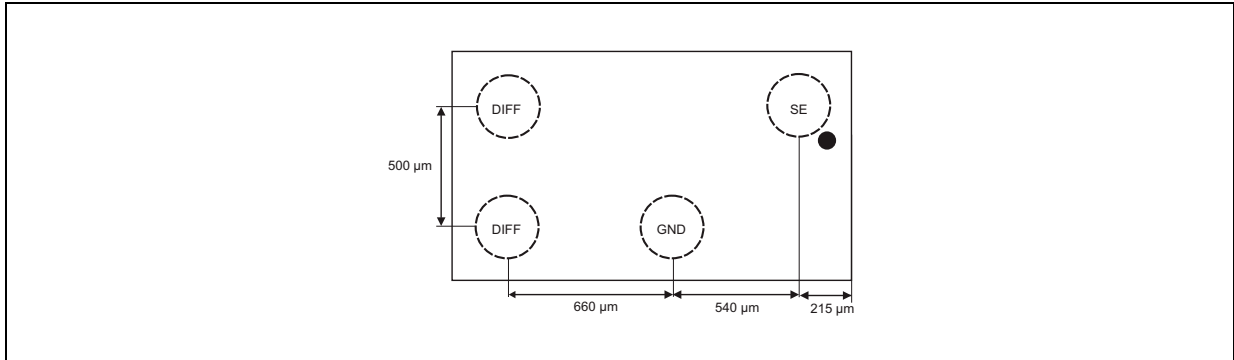


Figure 12. Footprint - 3 mils stencil - non solder mask defined

Copper pad diameter:  
220 μm recommended  
180 μm minimum  
260 μm maximum

Solder mask opening:  
320 μm recommended  
300 μm minimum  
340 μm maximum

Solder stencil opening:  
220 μm recommended

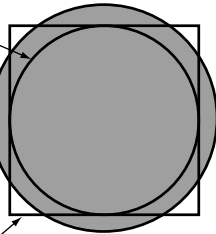


Figure 13. Footprint - 3 mils stencil - solder mask defined

Solder mask opening:  
220 μm recommended  
180 μm minimum  
260 μm maximum

Copper pad diameter:  
320 μm recommended  
300 μm minimum

Solder stencil opening:  
220 μm recommended

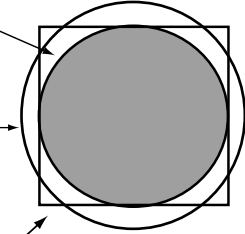


Figure 14. Footprint - 5 mils stencil - non solder mask defined

Copper pad diameter:  
220 μm recommended  
180 μm minimum  
260 μm maximum

Solder mask opening:  
320 μm recommended  
300 μm minimum  
340 μm maximum

Solder stencil opening:  
330 μm recommended\*

\*depending on paste, it can go down to 270 μm

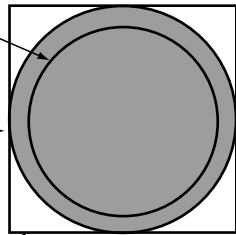


Figure 15. Footprint - 5 mils stencil - solder mask defined

Solder mask opening:  
220 μm recommended  
180 μm minimum  
260 μm maximum

Copper pad diameter:  
320 μm recommended  
300 μm minimum

Solder stencil opening:  
330 μm recommended\*

\*depending on paste, it can go down to 270 μm

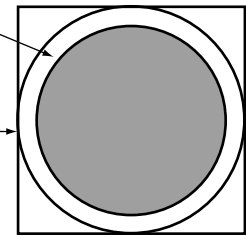


Figure 16. Marking

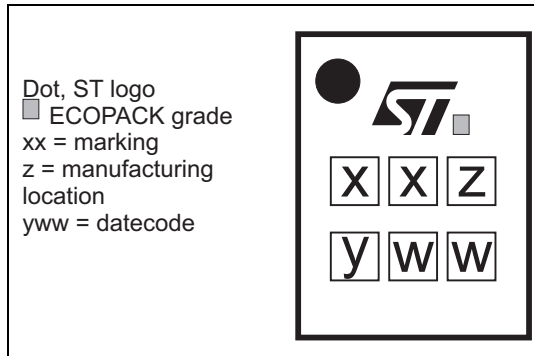


Figure 17. Recommended land pattern

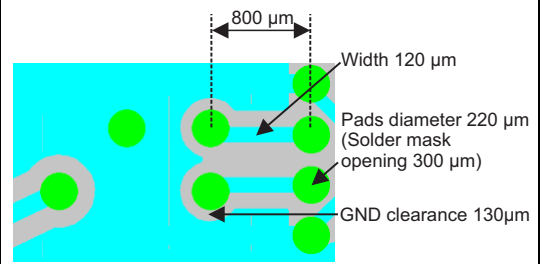
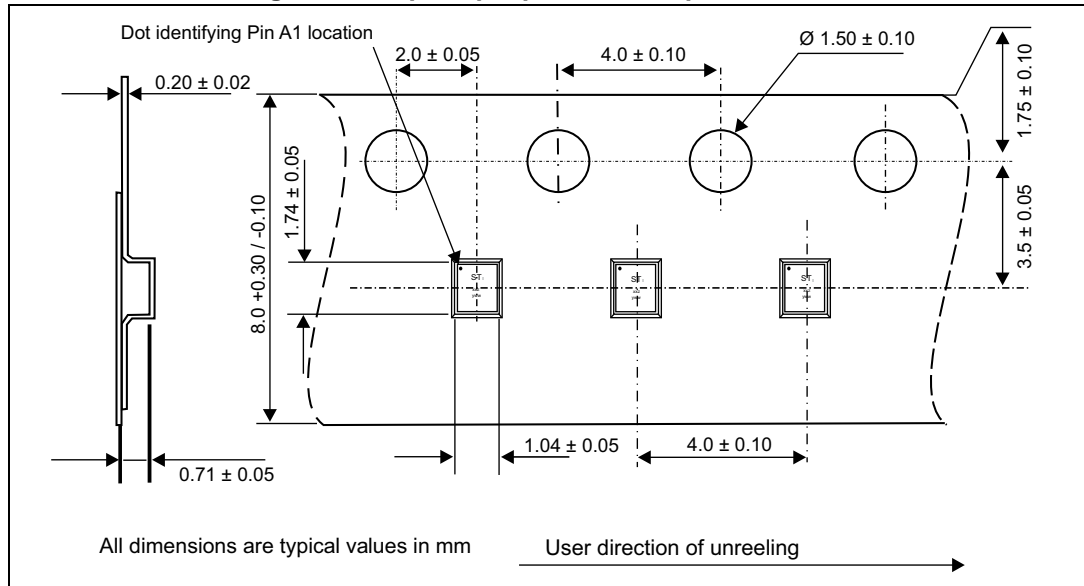


Figure 18. Flip Chip tape and reel specifications



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

### 3 Ordering information

**Table 5. Ordering information**

Order code	Marking	Weight	Base Qty	Delivery mode
BALF-2690-02D3	SP	1.81 mg	5000	Tape and Reel

### 4 Revision history

**Table 6. Document revision history**

Date	Revision	Changes
27-Sep-2013	1	Initial release
19-Dec-2013	2	Added product weight in <a href="#">Table 5</a> and updated <a href="#">Table 1</a> .
19-Nov-2014	3	Added tape and reel dimensions.
02-Sep-2015	4	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 4</a> .



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