BAL-2690D3U

50 / 30+j25 balun transformer for 2.45 GHz ISM band

Features

- 50 Ω nominal input / 30+j25 output differential impedance
- Low insertion loss
- Low amplitude imbalance
- Low phase imbalance
- Small footprint: BAL-2690D3U < 1 mm²

Benefits

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

Applications

Balun transformer for applications such as:

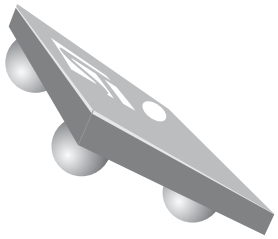
- Bluetooth STLC2690
- Mobile phone

Description

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

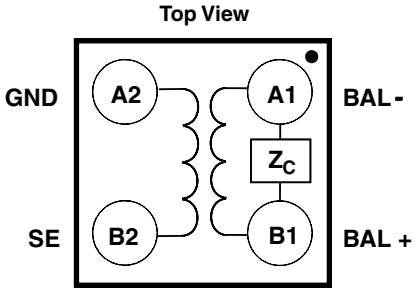
The BAL-2690D3U has been customized for the STLC2690 Bluetooth transceiver with 0.8 dB insertion losses in the bandwidth (2400 MHz - 2500 MHz) and with a specific requirement for the S_{CC22} parameter.

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



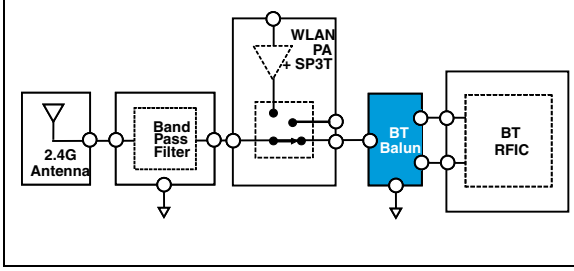
Flip-Chip
4 bumps

Figure 1. Top view



Bump	Name	Description
A1	BAL-	RF balanced ouput
A2	GND	Ground
B1	BAL+	RF balanced ouput
B2	SE	RF input

Figure 2. Application schematic



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1 Electrical characteristics

Table 1. Absolute maximum ratings (limiting values)

Symbol	Test condition	Min.	Typ.	Max.	Unit
P_{IN}	Input power R_{FIN}	-	-	20	dBm
V_{ESD}	ESD ratings MIL STD883G (HBM: C = 100 pF, R = 1.5k , air discharge) ESD ratings, machine model (MM: C = 200 pF, R = 25 Ω L = 500 nH) ESD ratings, charged device model (CDM) (JESD22-C101D)	2000 500 500	-	-	V
T_{OP}	Operating temperature	-40	-	+85	°C

Table 2. Electrical characteristics (T_{amb} = 25 °C) impedances

Symbol	Test condition	Min.	Typ.	Max.	Unit
Z_{OUT}	Nominal differential output impedance	-	30 + j25	-	Ω
Z_{IN}	Nominal input impedance	-	50	-	Ω

Table 3. RF performance

Symbol	Test condition		Min.	Typ.	Max.	Unit
F	Frequency range (bandwidth)		2402	2441	2480	MHz
I_L	Insertion loss in bandwidth		-	0.8	1.1	dB
ripple	Ripple in bandwidth		-	-	0.6	dB
R_L	Return loss in bandwidth		14	-	-	dB
Φ_{imb}	Phase imbalance		-10	-	10	°
A_{imb}	Amplitude imbalance		-1	-	1	dB
R_{CMRR}	Common mode rejection ratio (S_{SC12})		20	-	-	dB
S_{CC22}	Magnitude for common mode harmonic rejection coefficient @ $2f_O$	From 4804 MHz to 4960 MHz, 25 Ω is considered as reference for CM	0.7	-	1	°
	Phase for common mode harmonic rejection coefficient @ $2f_O$		-45	-	0	

Figure 3. Insertion loss (T_{amb}= 25 °C)

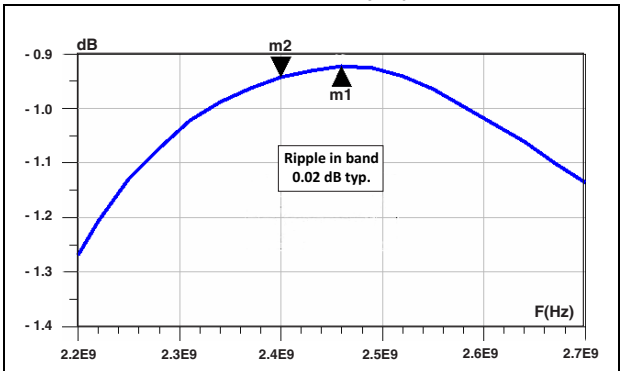


Figure 4. Return loss (T_{amb}= 25 °C)

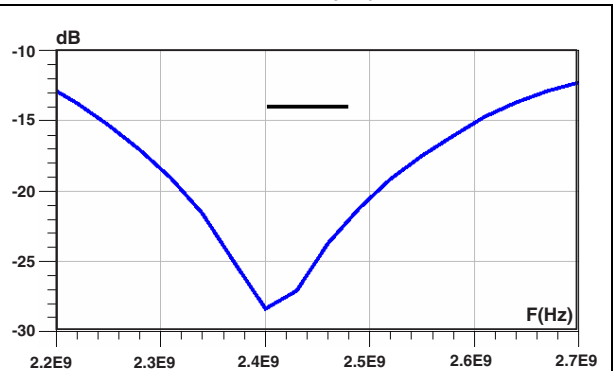


Figure 5. Amplitude imbalance (T_{amb}= 25 °C)

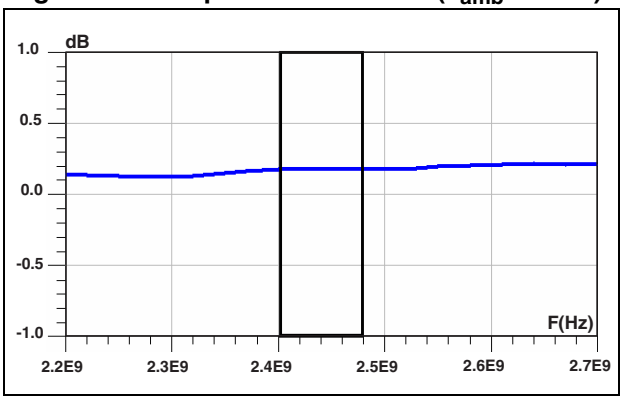


Figure 6. Phase imbalance (T_{amb}= 25 °C)

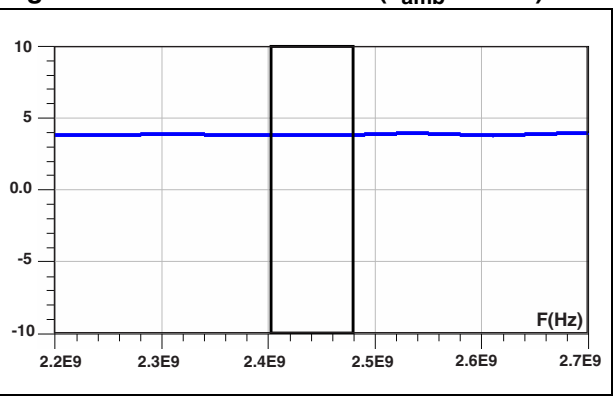


Figure 7. S_{cc22} magnitude @ 2f0 (T_{amb} = 25 °C)

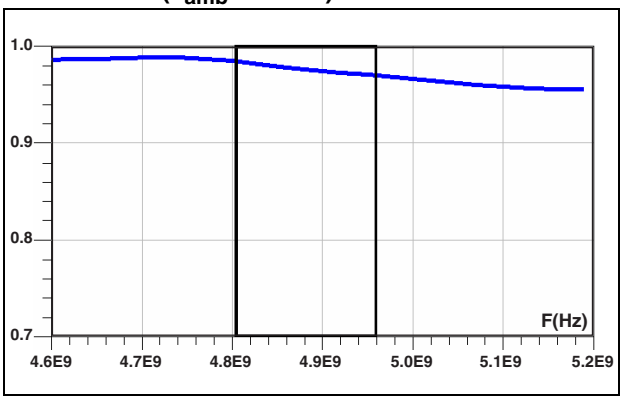


Figure 8. S_{cc22} phase @2f0 (T_{amb} = 25 °C)

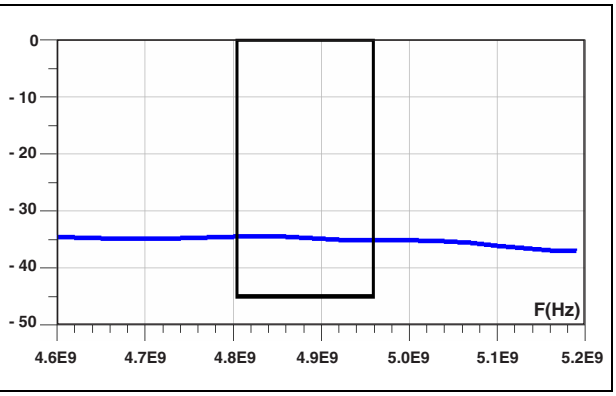


Figure 9. Recommend land pattern (used for balun characterization)

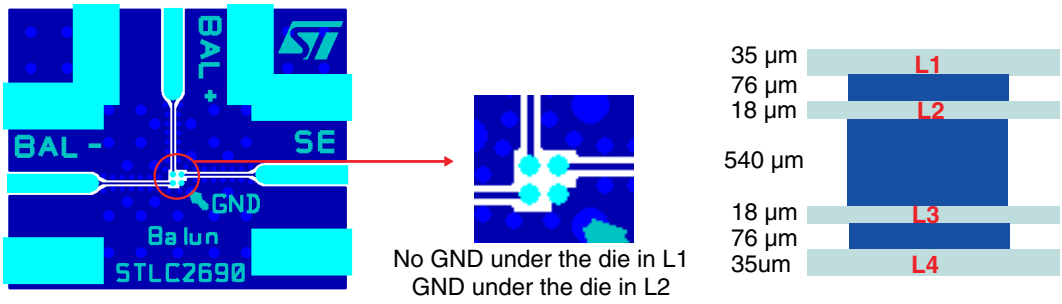
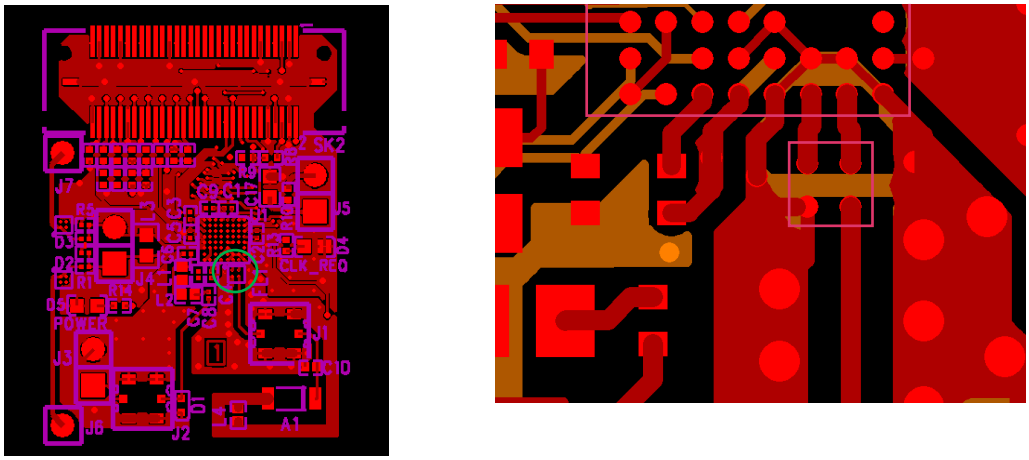


Figure 10. Example of transceiver application board land pattern



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.

Table 4. Package dimensions (values)

Ref.	Dimensions					
	Millimetres			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.565	0.63	0.695	0.022	0.025	0.027
A1	0.17	0.205	0.24	0.007	0.008	0.009
A2	-	0.4	-	-	0.016	-
b	0.215	0.255	0.295	0.008	0.010	0.012
D	0.86	0.91	0.96	0.034	0.036	0.038
D1	-	0.474	-	-	0.019	-
E	0.86	0.91	0.96	0.034	0.036	0.038
E1	-	0.474	-	-	0.019	-
SE	-	0.237	-	-	0.009	-
$	-	0.025	-	-	0.001	-

Figure 11. Package dimensions (definitions)

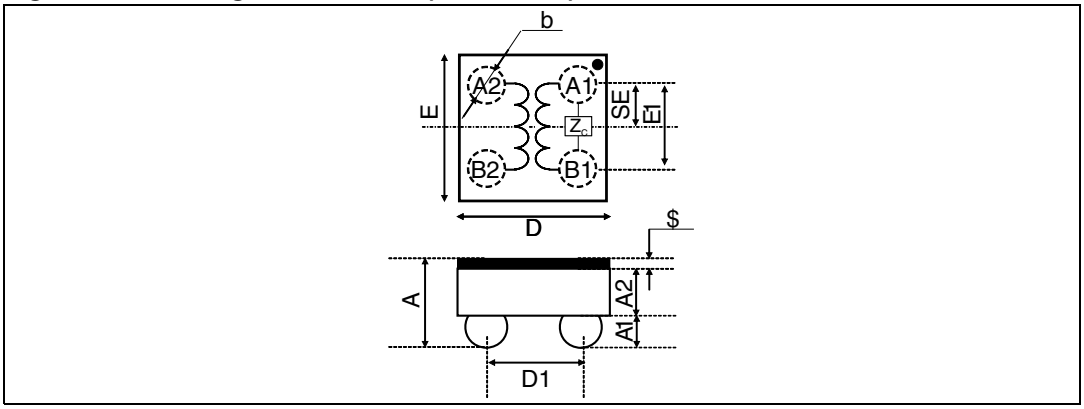


Figure 12. Footprint

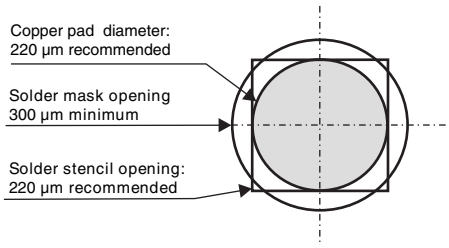


Figure 13. Marking

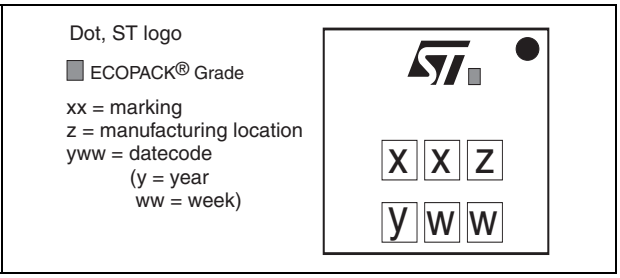
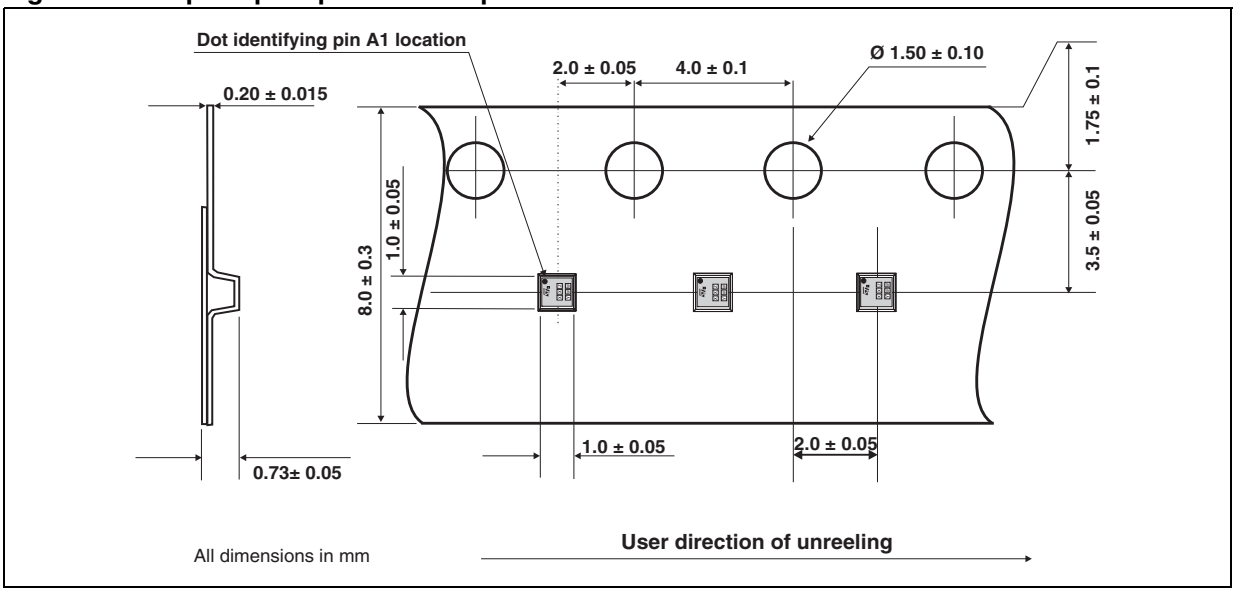


Figure 14. Flip-Chip - tape and reel specification



Note: More packing information is available in the applications note:
AN 2348: "Flip-Chip: package description and recommendations for use"

3 Ordering information

Table 5. 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 6. Document revision history

Date	Revision	Changes
25-Jan-2010	1	First issue.
08-Feb-2010	2	Updated *Table 1* and *Figure 10.*

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