

Using a Johanson 2450BM14E0007 Impedance-Matched, Integrated Filter Balun with the ADF7241 and ADF7242

by Mary O’Keefe

INTRODUCTION

This application note describes the use and performance achieved using the Johanson Technology, Inc., 2450BM14E0007 impedance-matched (complex differential impedance value) filter balun with the ADF7241 or ADF7242 2.4 GHz RF transceivers. The filter balun from Johanson Technology effectively reduces the RF front-end component count and layout space. This balun is 100% RF tested by Johanson Technology. The Additional Information from Johanson Technology section provides more insight about how harmonic emissions are attenuated, as well as further details about the balun component.

Table 1. Key Parameters of the Filter Balun

Parameter	Description
Part Number	2450BM14E0007
Frequency	2400 MHz to 2500 MHz
Unbalanced Port Impedance	50 Ω
Balanced Port Impedance	Matched to ADF7241/ADF7242 RF port impedance

TYPICAL PERFORMANCE DATA

Table 2 shows typical performance data obtained from the ADF7241 and ADF7242 using the 2450BM14E0007 impedance-matched filter balun.

Table 2. Typical Performance of the ADF7241 and ADF7242 Using the 2450BM14E0007 Filter Balun

Parameter	Value
Tx Output Power	3 dBm
Harmonics	
4.9 GHz	–50 dBm
7.35 GHz	–47 dBm

EVALUATION BOARD LAYOUT

An outline of the RF board layout is shown in Figure 1. Gerber files of the board layout are available on the Analog Devices, Inc., ADF7242 evaluation board product website. Because the impedance seen by the balun is inherently dependent on the layout, it is recommended to follow the EVAL-ADF724xDB3Z layout as shown in the Gerber files as closely as possible for optimum performance.

The board schematic is shown in Figure 2. Note that the C7 and C8 capacitors are required for power amplifier stability, and the specified 10 nF value should be used.

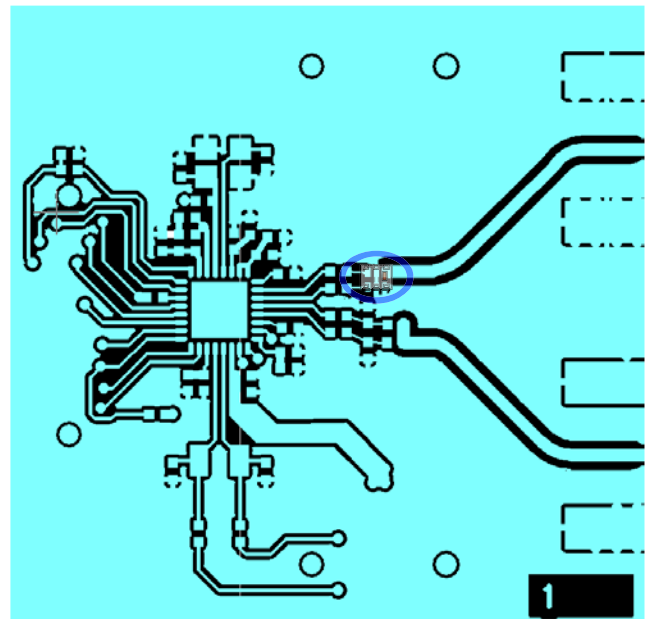


Figure 1. EVAL-ADF724xDB3Z Board Layout Highlighting Balun Location

10634-001

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REVISION HISTORY

5/12—Revision 0: Initial Version

EVALUATION BOARD SCHEMATIC

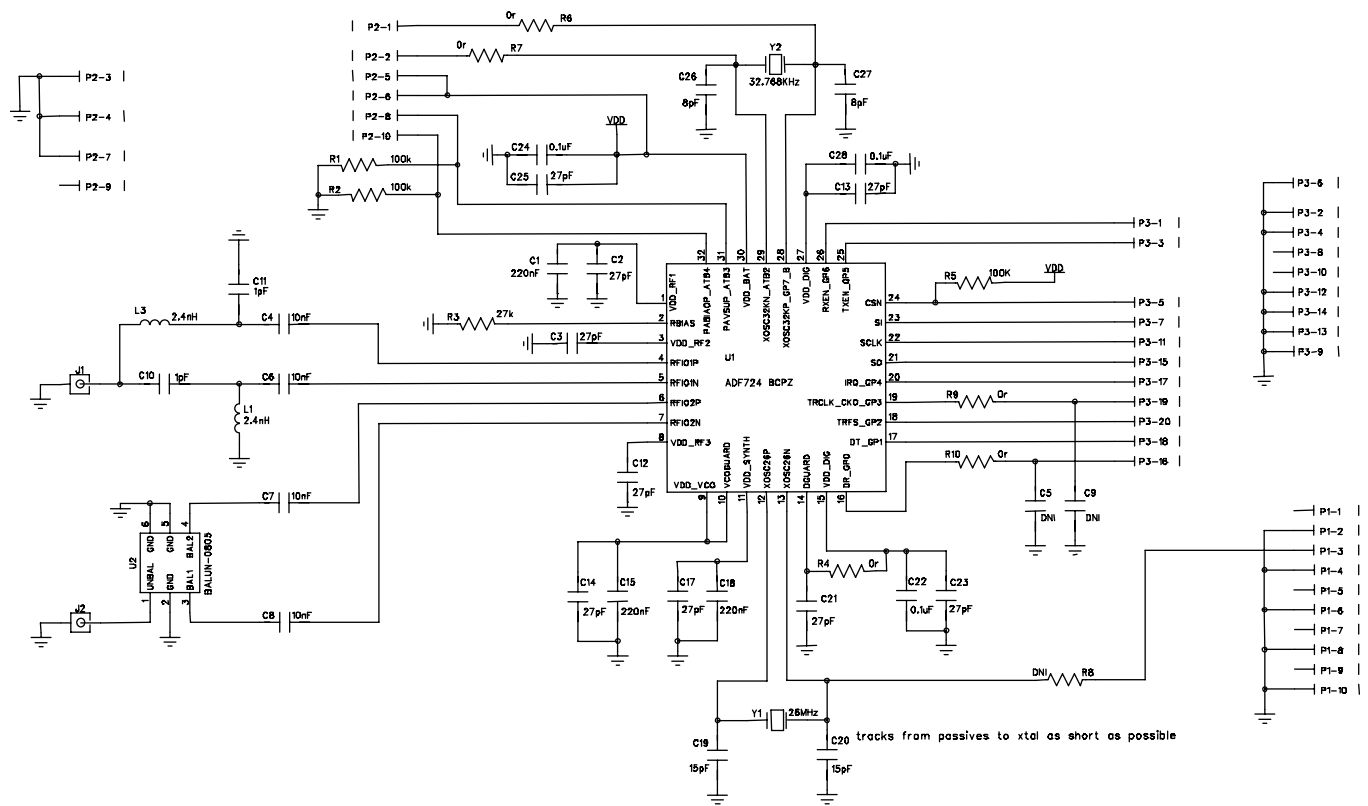


Figure 2. EVAL-ADF724xDB3Z Schematic

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ADDITIONAL INFORMATION FROM JOHANSON TECHNOLOGY

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High Frequency Ceramic Solutions

2.4 GHz Impedance-Matched Balun-Filter Integrated Passive for ADF7241 and AADF7242	P/N 2450BM14E0007
Detail Specification: 5/15/2012	Page 1 of 3

General Specifications

Part Number	2450BM14E0007
Frequency (MHz)	2400 - 2500
Unbalanced Impedance (Antenna Out)	50 Ω
Balanced Differential Impedance	Conjugate match to ADI ADF7241 and ADF7242
Attenuation (dB)	25min. @4800-5000MHz 25min. @7200-7500MHz
Power Capacity	2W max.

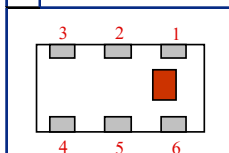
Insertion Loss	1.5 dB max.
Return Loss	9.5 dB min.
Phase Difference	180° \pm 10°
Amplitude Difference	2.0 dB max.
Reel Quantity	4,000
Operating Temperature	-40 to +85°C
Recommended Storage Temperature	+5 to +35°C, Humidity: 45-75%RH, 18 mos. Max *

*18 months in vacuum sealed bag and 1 week cumulative after opened. For more info go to www.johansontechnology.com/silverleads.html

P/N Suffix	Packaging Style	Bulk	Suffix = S	Eg. 2450BM14E0007S
		T & R (Paper)	Suffix = E	Eg. 2450BM14E0007T
	Termination Style	AgPt	Suffix = None	Eg. 2450BM14E0007(S or T)

Terminal Configuration

No.	Function
1	Unbalanced Port
2	GND
3	Balanced Port
4	Balanced Port
5	GND
6	GND



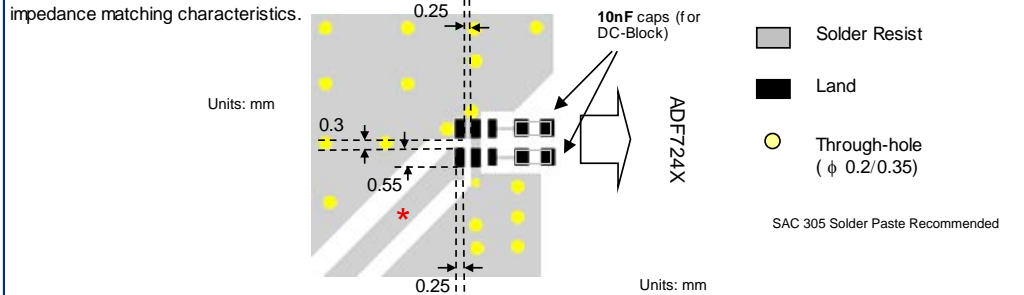
Mechanical Dimensions

	In	mm
L	0.063 \pm 0.004	1.60 \pm 0.10
W	0.031 \pm 0.004	0.80 \pm 0.10
T	0.024 \pm 0.004	0.60 \pm 0.10
a	0.008 \pm 0.004	0.20 \pm 0.10
b	0.008 +.004/-0.006	0.20 +0.1/-0.15
c	0.006 \pm 0.004	0.15 \pm 0.10
g	0.012 \pm 0.004	0.30 \pm 0.10
p	0.020 \pm 0.002	0.50 \pm 0.05

Mounting Considerations

Mount these devices with brown mark facing up.

* Line width should be designed to provide 50 Ω impedance matching characteristics.



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Preliminary

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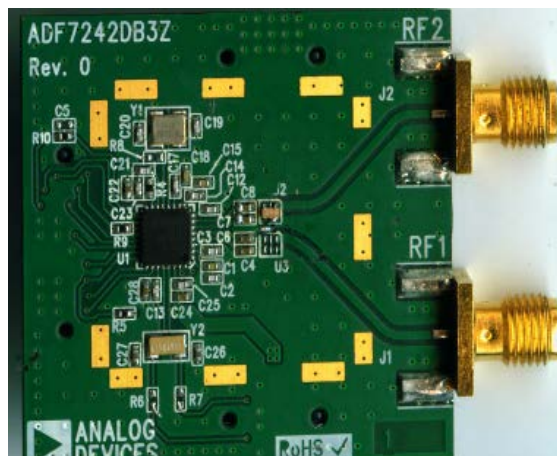
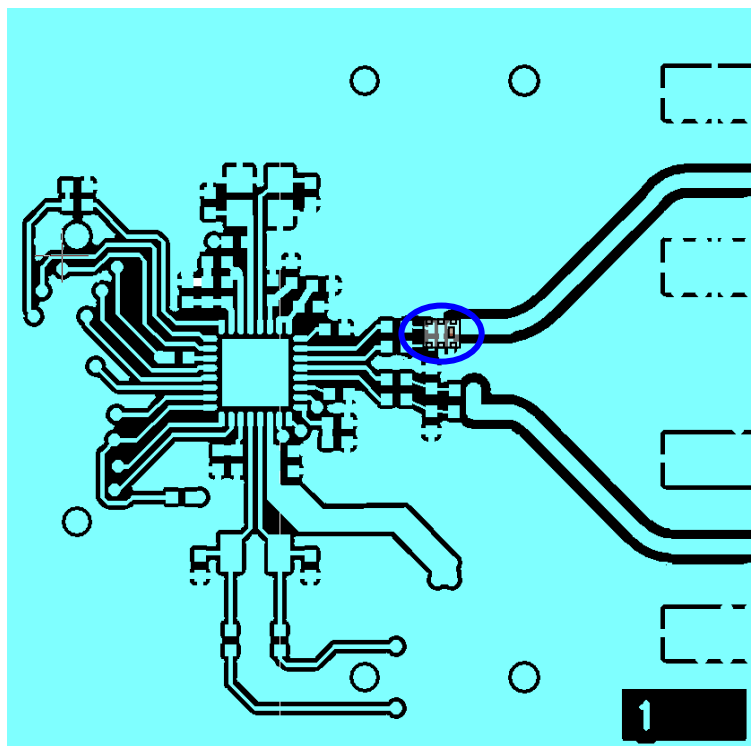
2.4 GHz Impedance-Matched Balun-Filter Integrated Passive for ADF7242

P/N 2450BM14E0007

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Layout Details



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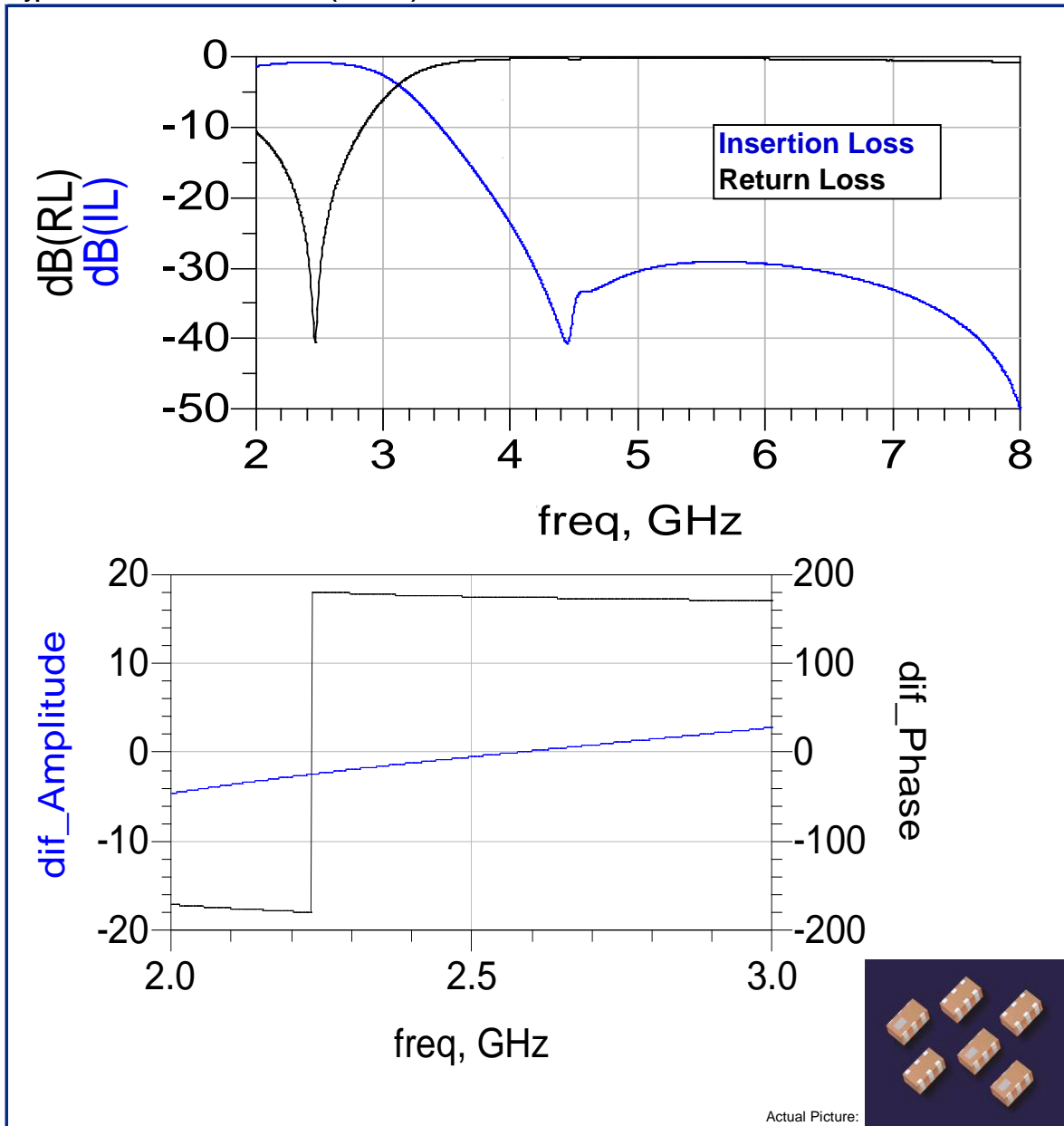
2.4 GHz Impedance-Matched Balun-Filter Integrated Passive for ADF7242

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Typical Electrical Performance (T=25°C)



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