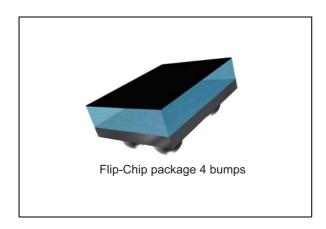
life.augmented

BALF-NRG-01D3

50 Ω nominal input / conjugate match balun to BlueNRG transceiver, with integrated harmonic filter

Datasheet - production data



Features

- 50 Ω nominal input / conjugate match to BlueNRG device
- · Low insertion loss
- Low amplitude imbalance
- Low phase imbalance
- Wafer level chip scale package (WLCSP)

Benefits

- Very low profile: < 670 μm
- · High RF performance
- RF BOM reduction
- Small footprint

Applications

- Bluetooth low energy impedance matched balun filter
- Optimized for ST BlueNRG RFIC

Description

STMicroelectronics BALF-NRG-01D3 is an ultra miniature balun. The BALF-NRG-01D3 integrates matching network and harmonics filter. Matching impedance has been customized for the BlueNRG ST transceiver (both QFN and WLCSP versions). It is using STMicroelectronics IPD technology on non conductive glass substrate which optimizes RF performance.

Figure 1. Application schematic with QFN type BlueNRG

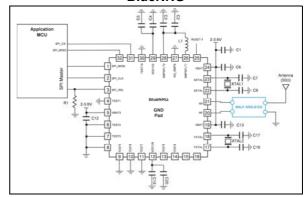
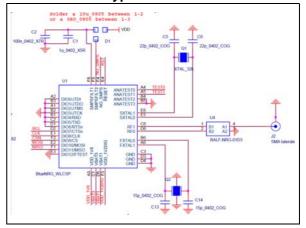


Figure 2. Application schematic with WLCSP type BlueNRG



Characteristics BALF-NRG-01D3

1 Characteristics

Table 1. Absolute maximum ratings (limiting values)

Symbol	Parameter		Value		
			Тур.	Max.	- Unit
P _{IN}	Input Power RFIN		=	10	dBm
V _{ESD}	ESD ratings human body model (JESD22-A114-C), all I/O one at a time while others connected to GND	2000	-		V
	ESD ratings machine model (MM: C = 200 pF, R = 25 Ω , L = 500 nH)	200	-		
T _{OP}	Operating temperature	-40	=	+105	°C

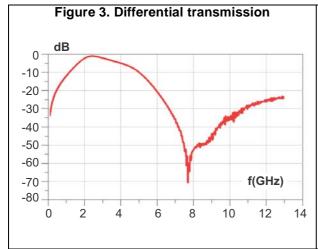
Table 2. Impedances ($T_{amb} = 25 \text{ °C}$)

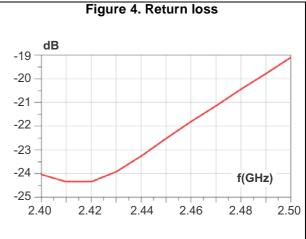
Symbol	Parameter	Value			
Symbol	raiametei	Min.	Тур.	Max.	
Z _{diff}	Z _{diff} Nominal differential impedance		Match to BlueNRG	-	Ω
Z _{ANT}	Antenna impedance	-	50	-	Ω

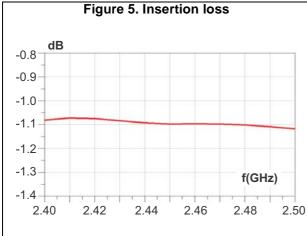
Table 3. RF performance ($T_{amb} = 25 \, ^{\circ}C$)

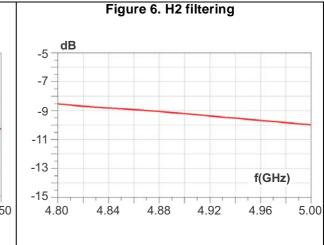
Symbol	Parameter	Test condition	Value			Unit	
Symbol	Farameter	rest condition	Min.	Тур.	Max.	Oille	
f	Frequency range (bandwidth)		2400		2500	MHz	
S11	Input return loss bandwidth			-20		dB	
S21	Insertion loss			-1.1		dB	
	Harmonic rejection (differential mode)	H2		-8		dB	
S21		H3		-38			
321		H4		-31			
		H5		-23			
Phase_imbal	Output phase imbalance			7		0	
Ampl_imbal	Output amplitude imbalance			0.5		dB	

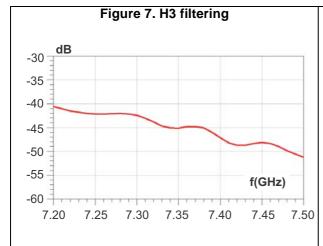
BALF-NRG-01D3 Characteristics

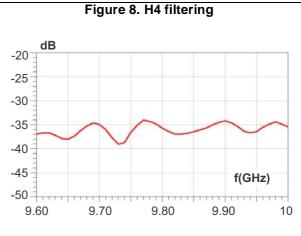




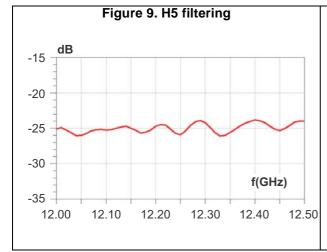








Characteristics BALF-NRG-01D3



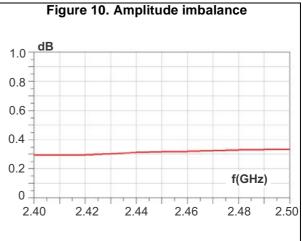
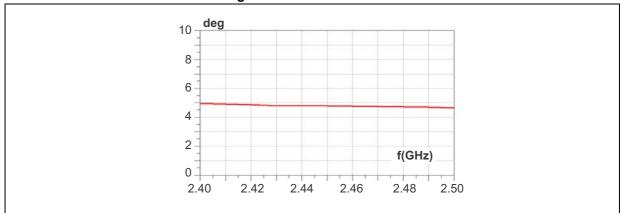


Figure 11. Phase imbalance



2 BALF-NRG-01D3 with QFN type BlueNRG

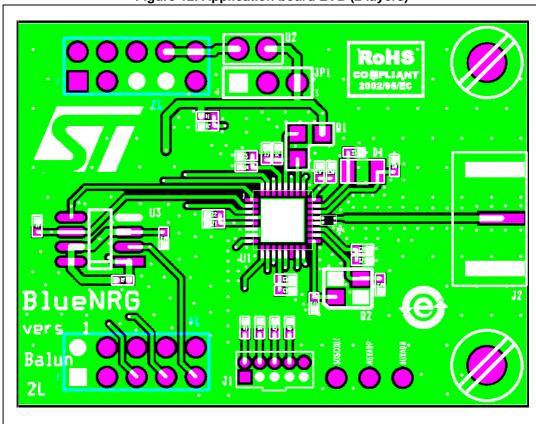
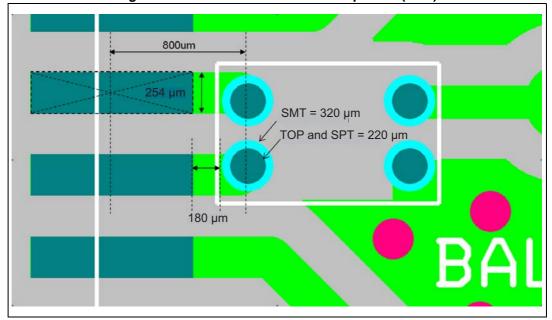


Figure 12. Application board EVB (2 layers)





2.1 BALF-NRG-01D3 measurements on QFN EVB

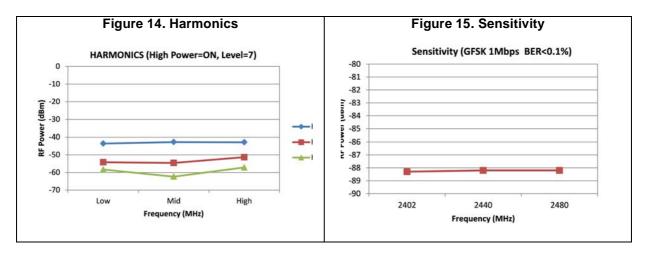
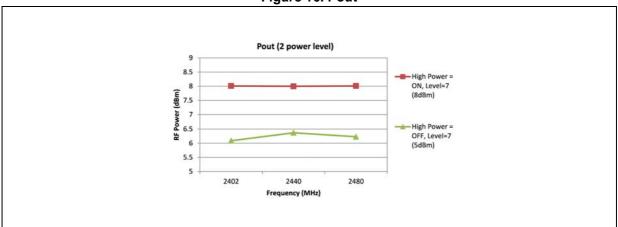


Figure 16. Pout



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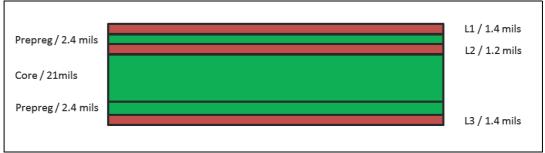
3 BALF-NRG-01D3 with WLCSP type BlueNRG

No GND in L1 under BlueNRG IC (position C4-C5, no bumps)

Pads diameter TOP 220µm, GND clearance 100µm SMT & SPT 320 µm

Figure 17. Recommended balun land pattern (WLCSP)





3.1 BALF-NRG-01D3 measurements on WLCSP EVB

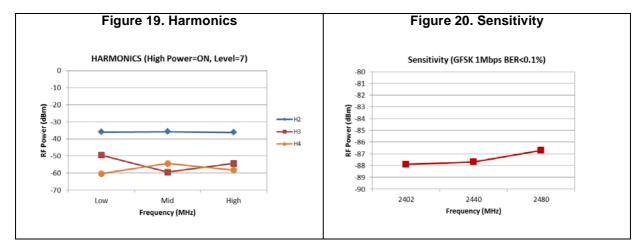
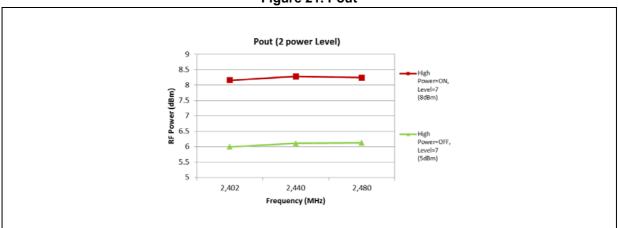


Figure 21. Pout



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4 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.

4.1 Flip-Chip package information

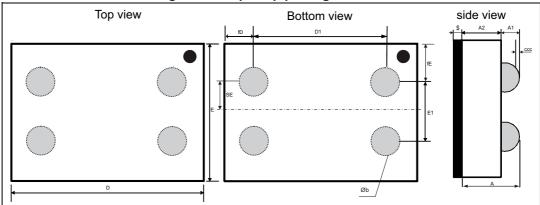
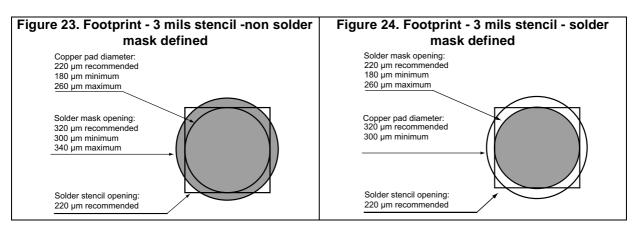
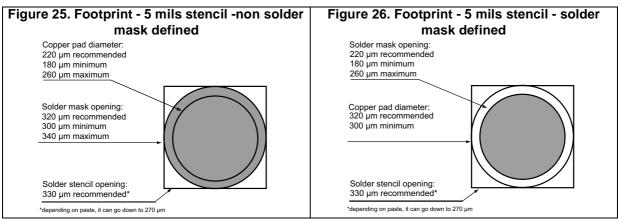


Figure 22. Flip-Chip package outline

Table 4. Flip-Chip package mechanical data

Dim	mm				
Dim.	Min.	Тур.	Max.		
A	0.580	0.630	0.680		
A1	0.180	0.205	0.230		
A2	0.380	0.40	0.420		
b	0.230	0.255	0.280		
D	1.375	1.40	1.425		
D1	0.99	1	1.01		
E	0.825	0.85	0.875		
E1	0.39	0.4	0.41		
SE		0.2			
fD	0.17	0.2	0.23		
fE	0.195	0.225	0.255		
ccc			0.05		
\$		0.025			





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4.2 Packing information

Figure 27. Ball assignment

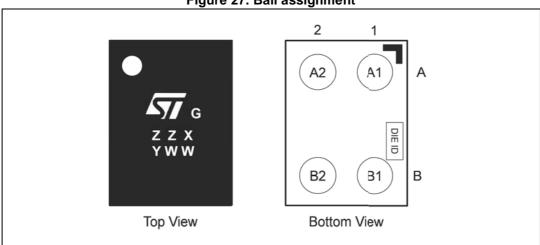
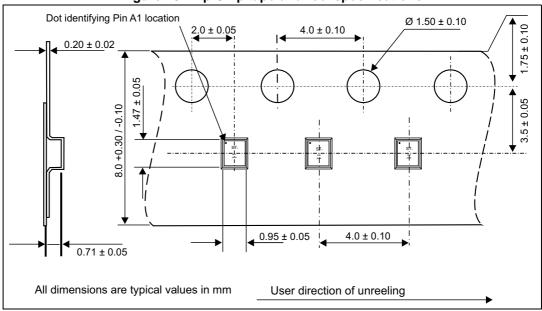


Table 5. Ball assignment details

Ball	Name	Description	
A1	ANT	Antenna connection	
A2	GND	Ground	
B1	Rx_P	Balun receive positive output	
B2	RX_N	Balun receive negative output	

Figure 28. 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" Ordering information BALF-NRG-01D3

5 Ordering information

Table 6. Ordering information

Order code	Marking	Weight	Base Qty	Delivery mode
BALF-NRG-01D3	SV	1.35 mg	5000	Tape and reel (7")

6 Revision history

Table 7. Document revision history

Date	Revision	Changes
17-Jun-2014	1	Initial release
17-Jul-2014	2	Updated Figure 13, Figure 17, Figure 22 and package view on cover page. Corrected typo error on Table 2.
18-Aug-2014	3	Updated title and description in cover page.
29-Sep-2015 4		Updated <i>Figure 22</i> . Added <i>Figure 25</i> and <i>Figure 26</i> . Reformatted to current standards.

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