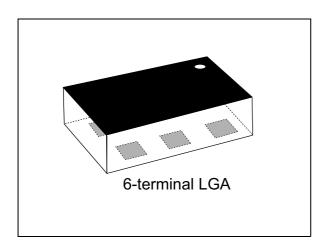
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BALF-NRF01E3

50 Ω nominal input / conjugate match balun to nRF51822-QFAAG0 nRF51422-QFAAE0 and nRF51822-QFABB0 with integrated filter

Datasheet - production data



Features

- Low insertion loss
- Low amplitude imbalance
- Low phase imbalance
- · Coated CSP on Glass
- Small footprint: < 1.5 mm²

Benefits

- · Very low profile
- · High RF performance
- · PCB space saving versus discrete solution
- BOM count reduction
- · Efficient manufacturability

Applications

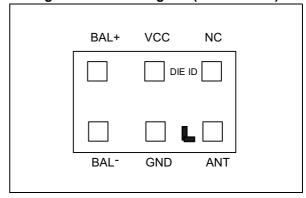
- 2.45 GHz balun with integrated matching network
- Matching optimized for following chipsets: nRF51822-QFAAG0, nRF51822-QFABB0 and nRF51422-QFAAE0

Description

STMicroelectronics BALF-NRF01E3 is an ultraminiature balun. The BALF-NRF01E3 integrates matching network in a monolithic glass substrate. Matching impedance has been customized for the nRF51822-QFAAG0, nRF51822-QFABB0 and nRF51422-QFAAE0 RF transceivers.

It is using STMicroelectronics IPD technology on non-conductive glass substrate which optimize RF performances.

Figure 1. Pinout diagram (bottom view)



Characteristics BALF-NRF01E3

1 Characteristics

Table 1. Absolute maximum ratings (limiting values)

Symbol	Parameter		Value		
			Тур.	Max.	Unit
P _{IN}	Input Power RF _{IN}			20	dBm
V _{ESD}	ESD ratings MIL STD883C (HBM: C = 100 pF, R = 1.5 k Ω , air discharge)	2000			
	ESD ratings charge device model (JESD22-C101-C)	500			V
	ESD ratings machine model (MM: C = 200 pF, R = 25 Ω , L = 500 nH)	500			
T _{OP}	Operating temperature	-40		+125	°C

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

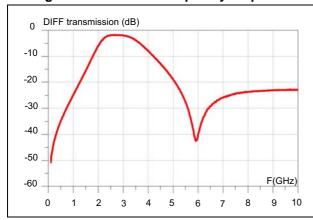
Symbol	Parameter		Unit		
Symbol	raiametei	Min.	Тур.	Max.	Oilit
Z _{OUT}	Nominal differential output impedance		conjugate match to: – nRF51822-QFAAG0 – nRF51822-QFABB0 – nRF51422-QFAAE0		Ω
Z _{IN}	Nominal input impedance		50		Ω
F	Frequency range (bandwidth)	2400		2540	
ΙL	Insertion loss in bandwidth		2.2	2.7	dB
R_L	Return loss in band	14	15		dB
фimb	Phase imbalance	-10	4	10	0
Aimb	Amplitude imbalance	-1	0.3	1	dB
2f0	(4800-5080 MHz)	15.8	16.3		dB
3f0	(7200-7620 MHz)	22.7	24.1		dB

BALF-NRF01E3 Characteristics

1.1 RF performances (T_{amb} = 25 °C)

Figure 2. Wide band frequency response

Figure 3. Insertion loss



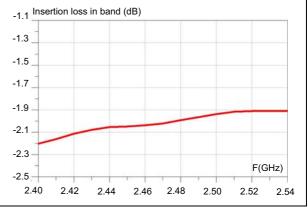
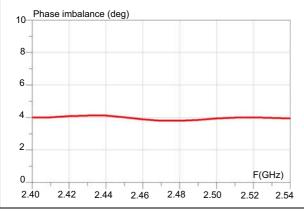


Figure 4. Phase imbalance

Figure 5. Amplitude imbalance



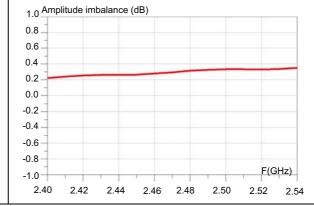
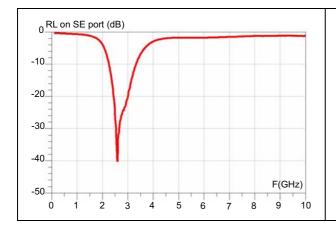
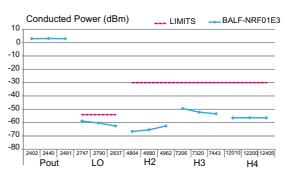


Figure 6. Return loss on SE port

Figure 7. Conducted measurement with nRF51822-QFAAG0 (at 4 dBm mode)





2 Application information

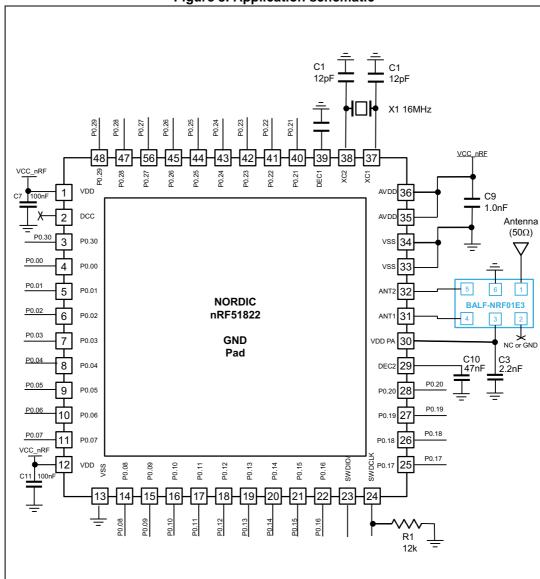


Figure 8. Application schematic

3 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.

Top view

Top view

Top view

Top view

Top view

Top view

Bottom view

Bottom view

Figure 9. Package dimensions (top, profile and bottom view)

Table 3. Package dimensions

Dim.	mm			
Dilli.	Min.	Тур.	Max.	
L	1.40	1.50	1.60	
W	0.90	1.00	1.10	
Т	0.42	0.45	0.48	
а	0.18	0.20	0.20	
b	0.18	0.20	0.20	
С	0.38	0.40	0.42	
d	0.28	0.30	0.32	

Package information BALF-NRF01E3

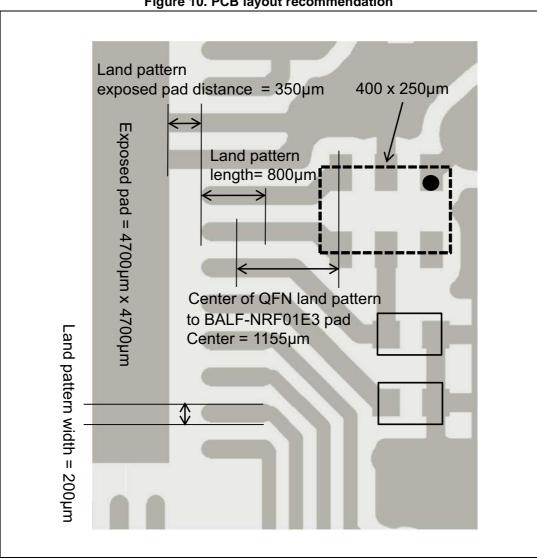


Figure 10. PCB layout recommendation

BALF-NRF01E3 Package information

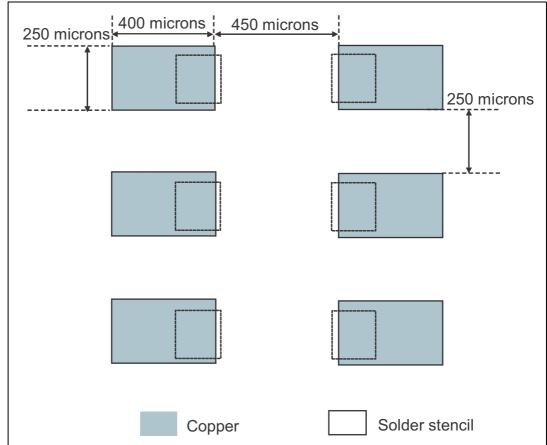


Figure 11. Solder-mask recommendation

Solder Paste

- 100 µm Solder stencil thickness is recommended.
- Halide-free flux qualification ROL0 according to ANSI/J-STD-004.
- "No Clean" solder paste is recommended.
- Offers a high tack force to resist component movement during high speed.
- Solder paste with fine particles: powder particle size is 20-45 μm.

Placement

- Manual positioning is not recommended.
- It is recommended to use the lead recognition capabilities of the placement system, not the outline centering.
- Standard tolerance of ±0.05 mm is recommended.
- 3.5 N placement force is recommended. Too much placement force can lead to squeeze out solder paste and cause solder joints to short. Too low placement force can lead to insufficient contact between package and solder paste that could cause open solder joints or badly centered packages.
- To improve the package placement accuracy, a bottom side optical control should be performed with high resolution.
- For assembly, a strong PCB support is recommended (especially on low thickness PCB) during solder paste printing, pick and place and reflow soldering by using optimized tools.

Package information BALF-NRF01E3

Figure 12. Marking

Figure 13. Pad bottom view

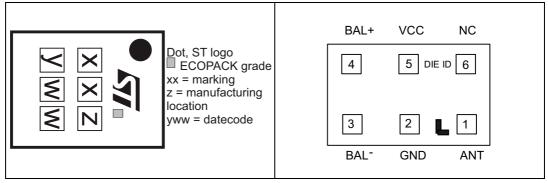
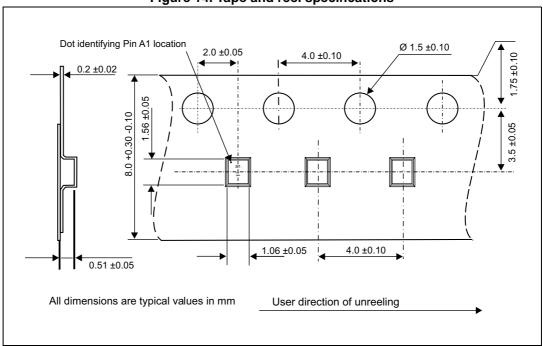


Table 4. Pad assignment details

LGA	Name	Description	
6	NC	Not connected	
5	VCC	Common collector voltage	
4	BAL+	Balun positive output	
3	BAL-	Balun negative output	
2	GND	Ground	
1	ANT	Antenna connection	

Figure 14. Tape and reel specifications



Note: More information is available in the STMicroelectronics Technical note:

TN1197: "IPAD™, CSPG w/o bump: package description and recommendations for use".

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BALF-NRF01E3 Ordering information

4 Ordering information

Figure 15. Ordering information scheme

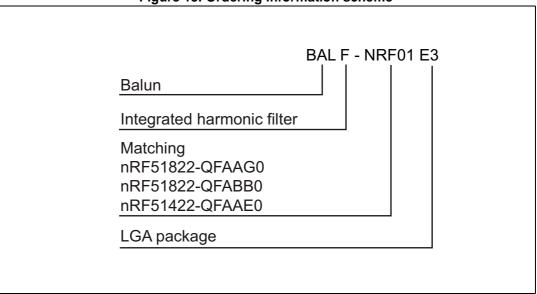


Table 5. Ordering information

Order code	Marking	Package	Weight	Base Qty	Delivery mode
BALF-NRF01E3	SYN	LGA	1.324 mg	5000	Tape and Reel(7")

5 Revision history

Table 6. Document revision history

Date	Revision	Changes
28-Nov-2014	1	Initial release

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