

Excellent Integrated System Limited

Stocking Distributor

Click to view price, real time Inventory, Delivery & Lifecycle Information:

[STMicroelectronics](#)

[BAL-NRF01D3](#)

For any questions, you can email us directly:

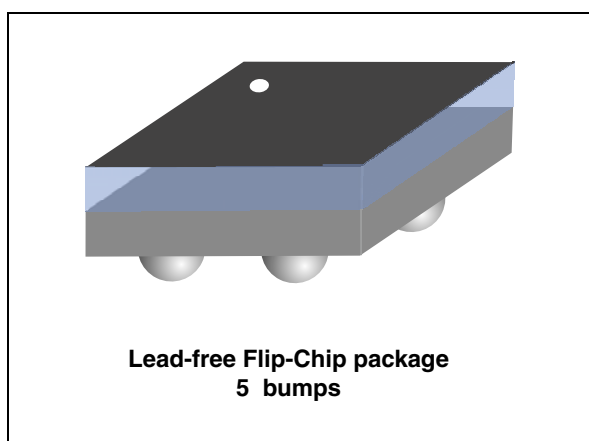
sales@integrated-circuit.com



BAL-NRF01D3

50 Ω nominal input / conjugate match balun to nRF51422-QFAA, nRF24LE1, nRF51822-QFAA/AB, with integrated harmonic filter

Datasheet – production data



Description

STMicroelectronics BAL-NRF01D3 is an ultraminiature balun. The BAL-NRF01D3 integrates matching network and harmonics filter. Matching impedance has been customized for the following Nordic Semiconductor circuits: nRF24LE1 QFN-32 pins, nRF24AP2-1CH, nRF24AP2-8CH, nRF51422-QFAA (build code CA/C0), nRF51822-QFAA (build code CA/C0) and nRF51822-QFAB (build code AA/A0).

The BAL-NRF01D3 uses STMicroelectronics IPD technology on non-conductive glass substrate which optimize RF performance.

The BAL-NRF01D3 has been tested and approved by Nordic Semiconductor in their nRF2723 and nRF2752 nRFgo modules.

Features

- 50 Ω nominal input / conjugate match to Nordic Semiconductor chips nRF24LE1 QFN32, nRF24AP2-1CH, nRF24AP2-8CH, nRF51422-QFAA (build code CA/C0), nRF51822-QFAA (build code CA/C0) and nRF51822-QFAB (build code AA/A0)
- Low insertion loss
- Low amplitude imbalance
- Low phase imbalance
- Small footprint: < 1.5 mm²

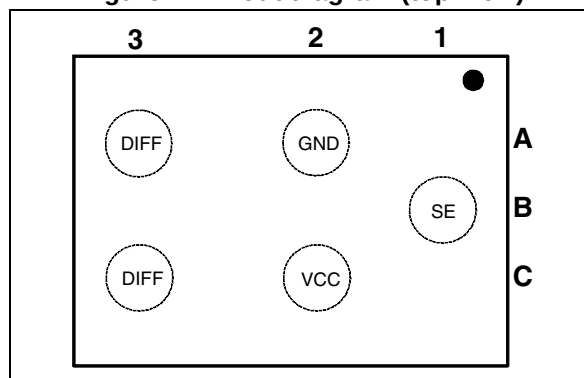
Benefits

- Very low profile: < 595 μ m after reflow
- High RF performance
- RF BOM and area reduction

Applications

- 2.45 GHz impedance matched balun filter
- Optimized for Nordic's chip set nRF24LE1/AP2, nRF51422-QFAA (build code CA/C0), nRF51822-QFAA (build code CA/C0) and nRF51822-QFAB (build code AA/A0).

Figure 1. Pinout diagram (top view)



Characteristics

BAL-NRF01D3

1 Characteristics

Table 1. Absolute maximum ratings (limiting values)

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
P_{IN}	Input Power RFIN			20	dBm
V_{ESD}	ESD ratings MIL STD883C (HBM: C = 100 pF, R = 1.5 k Ω , air discharge)	2000			V
	ESD ratings charge device model (JEDEC22-C101-C)	500			
	ESD ratings machine model (MM: C = 200 pF, R = 25 Ω , L = 500 nH)	200			
T_{OP}	Operating temperature	-40		+105	$^{\circ}\text{C}$

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

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
Z_{OUT}	Nominal differential output impedance		conjugate match to: – nRF24LE1/AP2 – nRF51422-QFAA (build code CA/C0) – nRF51822-QFAA (build code CA/C0) – nRF51822-QFAB (build code AA/A0)		Ω
Z_{IN}	Nominal input impedance		50		Ω

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

Symbol	Parameter	Test condition	Value			Unit
			Min.	Typ.	Max.	
F	Frequency range (bandwidth)		2400		2540	MHz
I_L	Insertion loss in bandwidth			2.25		dB
R_L	Return loss in bandwidth			10		dB
ϕ_{imb}	Phase imbalance			3		$^{\circ}$
Aimb	Amplitude imbalance			0.1		dB
2f0	2nd harmonic filtering	4880 MHz		10		dB
3f0	3rd harmonic filtering	7320 MHz		20		dB

BAL-NRF01D3

Characteristics

1.1 On-board simulations

Figure 2. Transmission ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

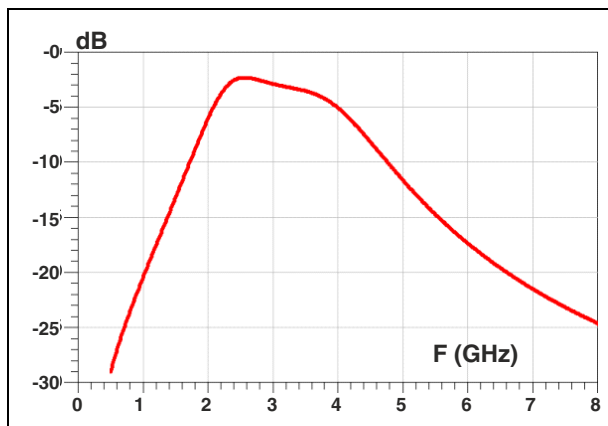


Figure 3. Return loss on SE port ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

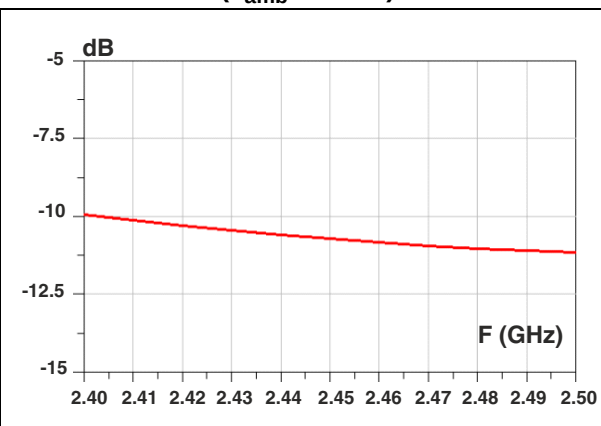


Figure 4. Return loss on DIFF port ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

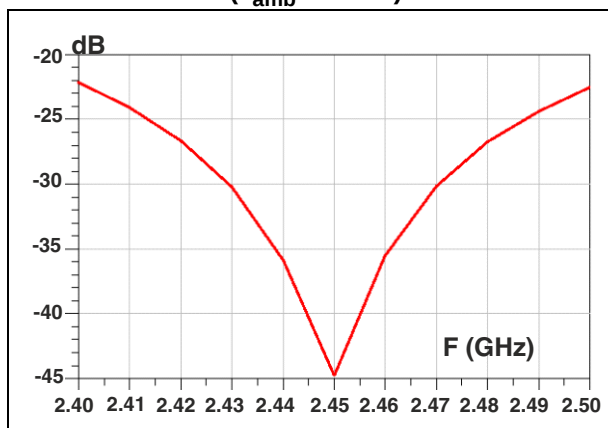


Figure 5. Amplitude imbalance ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

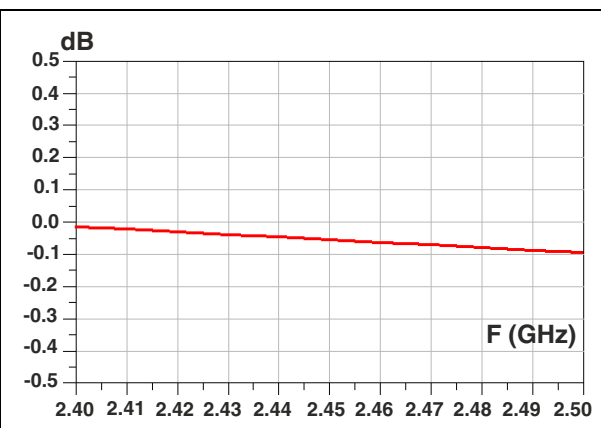
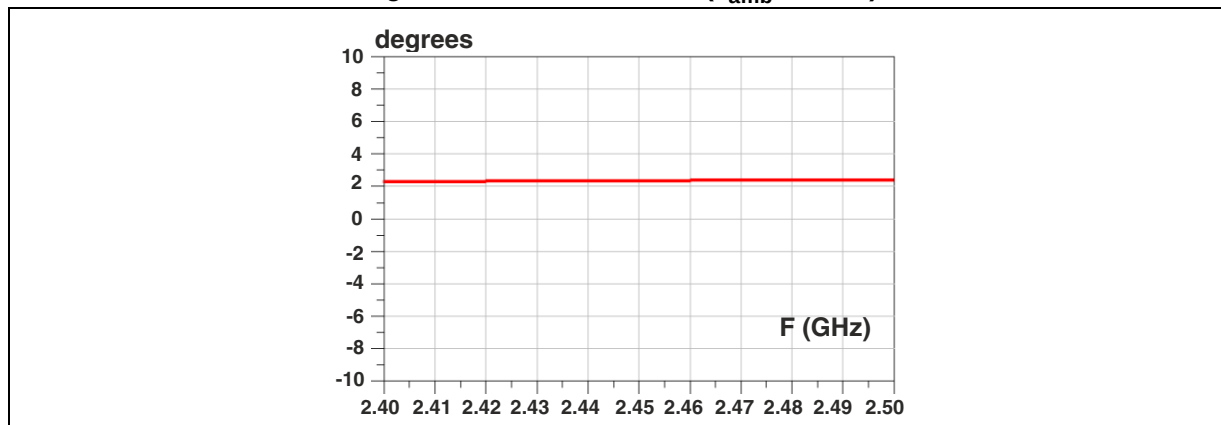


Figure 6. Phase imbalance ($T_{amb} = 25\text{ }^{\circ}\text{C}$)



Application information

BAL-NRF01D3

2 Application information

Figure 7. Application schematic (courtesy of Nordic Semiconductor)

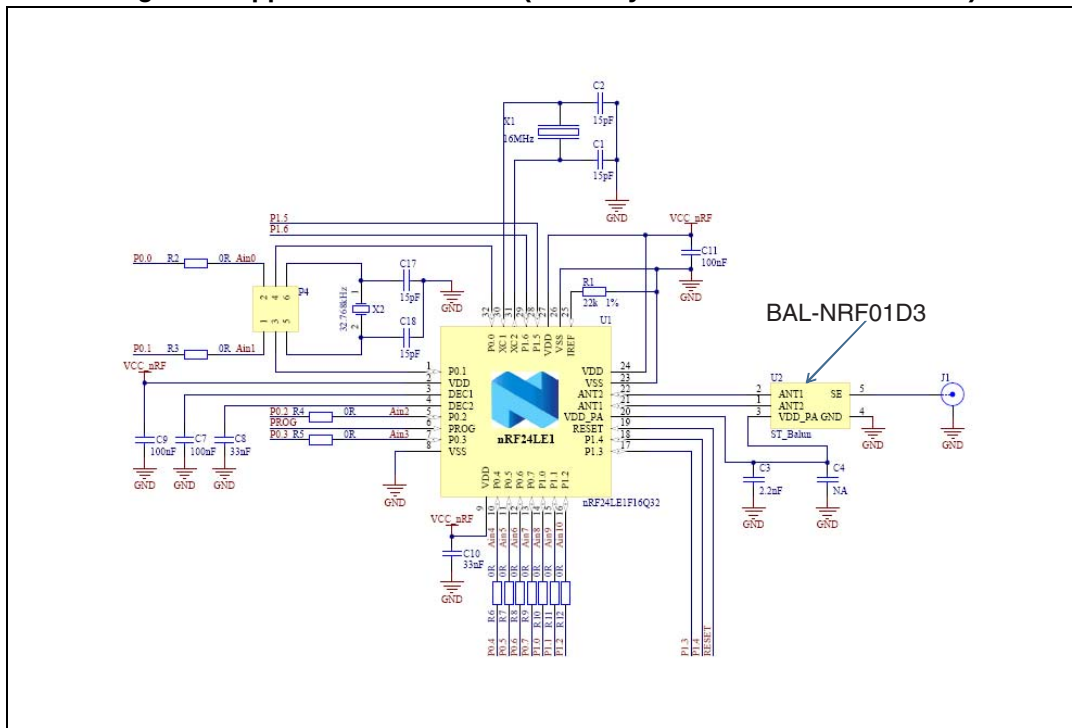
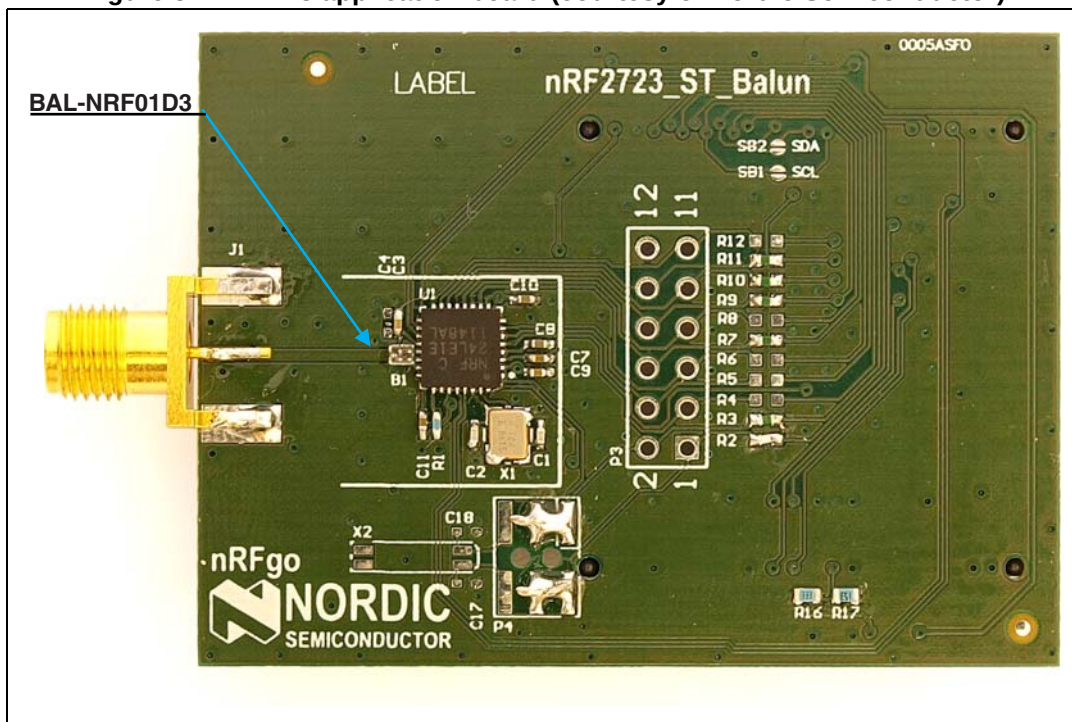


Figure 8. nRF2723 application board (courtesy of Nordic Semiconductor)



BAL-NRF01D3

Application information

Figure 9. nRF2752 application board (courtesy of Nordic Semiconductor)



Package information

BAL-NRF01D3

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.

Figure 10. Package dimensions (top and side view)

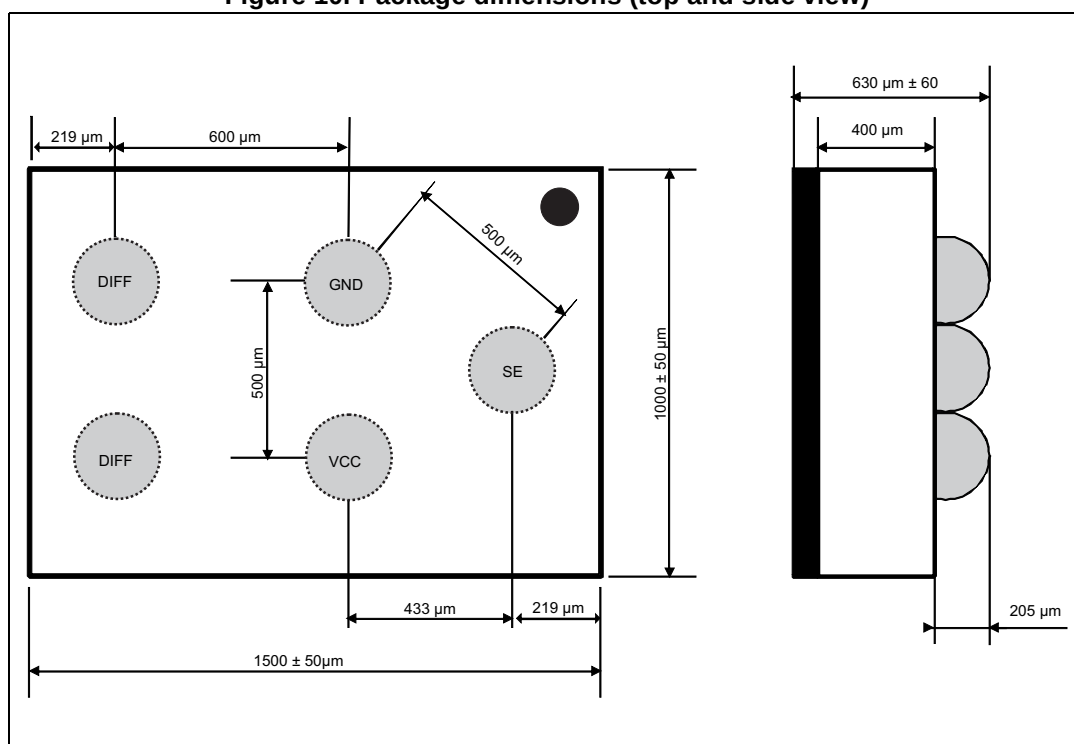
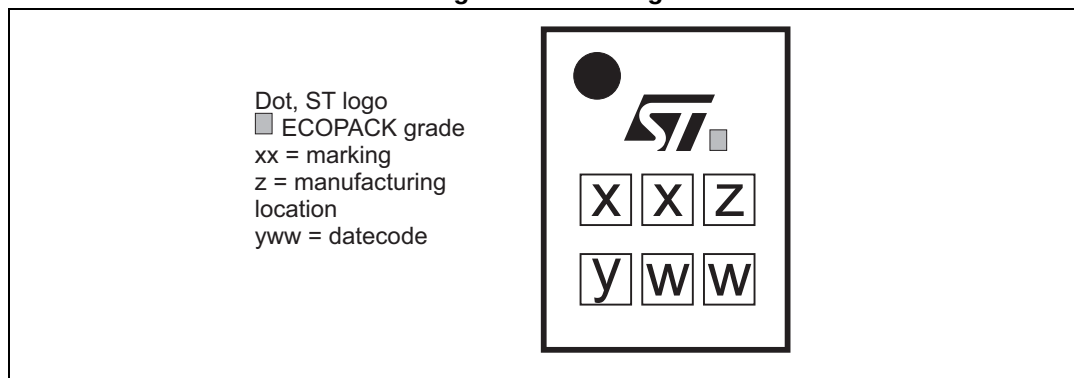


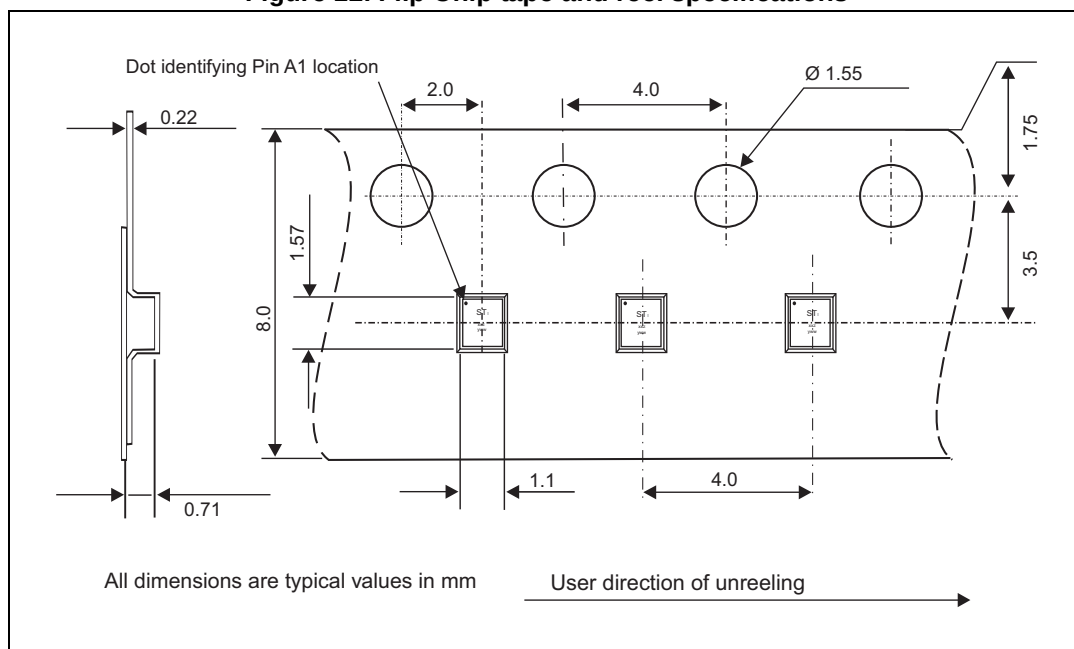
Figure 11. Marking



BAL-NRF01D3

Package information

Figure 12. 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”
AN4111: “BAL-NRF01D3 matched balun with integrated harmonics filter for
Nordic Semiconductor chips with ultralow power transceivers”*

Package information

BAL-NRF01D3

Figure 13. 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

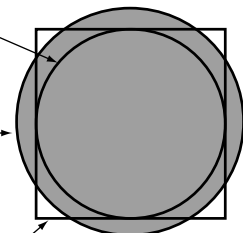


Figure 14. Footprint - 3 mils stencil - solder mask defined

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

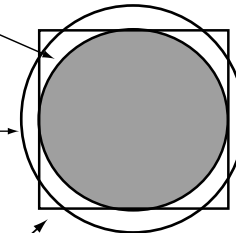


Figure 15. Footprint - 5 mils stencil -non solder mask defined

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

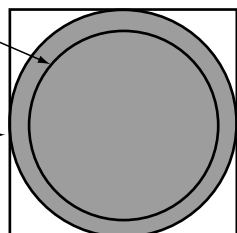


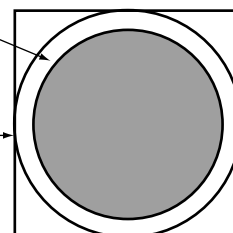
Figure 16. Footprint - 5 mils stencil - solder mask defined

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



BAL-NRF01D3

Ordering information

4 Ordering information

Table 4. Ordering information

Order code	Marking	Weight	Base Qty	Delivery mode
BAL-NRF01D3	SC	1.82 mg	5000	Tape and Reel

5 Revision history

Table 5. Document revision history

Date	Revision	Changes
15-Oct-2012	1	Initial release
13-Nov-2012	2	Added references to nRF51 series. Added Figure 9 . Updated y-axis labels in Figure 2 .
04-Mar-2013	3	Updated footprint illustrations in Figure 13 , and Figure 14 .
06-Aug-2013	4	Added dimensions in Figure 10 . Updated marking orientation in Figure 11 and Figure 12 .
13-Jan-2014	5	Updated document title and product references.
07-Jul-2015	6	Updated Table 1 .

BAL-NRF01D3

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2015 STMicroelectronics – All rights reserved