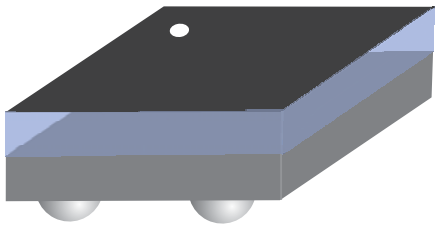
BAL-NRF02D3

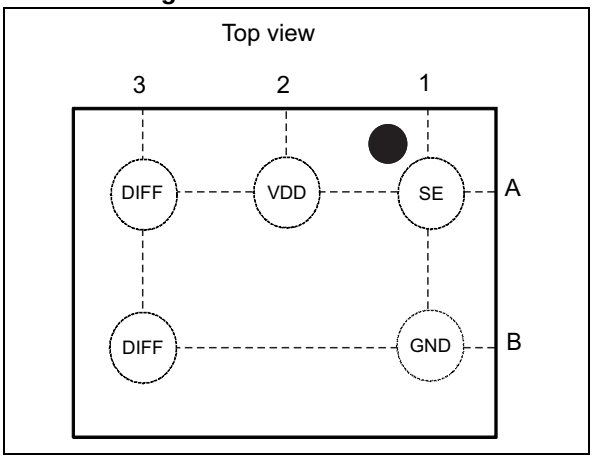
50 ohm nominal input / conjugate match balun to nRF51822-CEAA and nRF51422-CEAA

Datasheet – production data



Lead-free Flip-Chip package
5 bumps

Figure 1. Pin coordinates



Features

- 50 Ω nominal input / conjugate match to Nordic Semiconductor chips nRF51422-CEAA and nRF51822-CEAA.
- Low insertion loss
- Low amplitude imbalance
- Low phase imbalance
- Small footprint: < 1.2 mm^2

Benefits

- Very low profile: < 560 µm after reflow
- High RF performance
- RF BOM and area reduction

Applications

- 2.45 GHz impedance matched balun filter
- Optimized for Nordic's chip set nRF51422-CEAA, nRF51822-CEAA.

Description

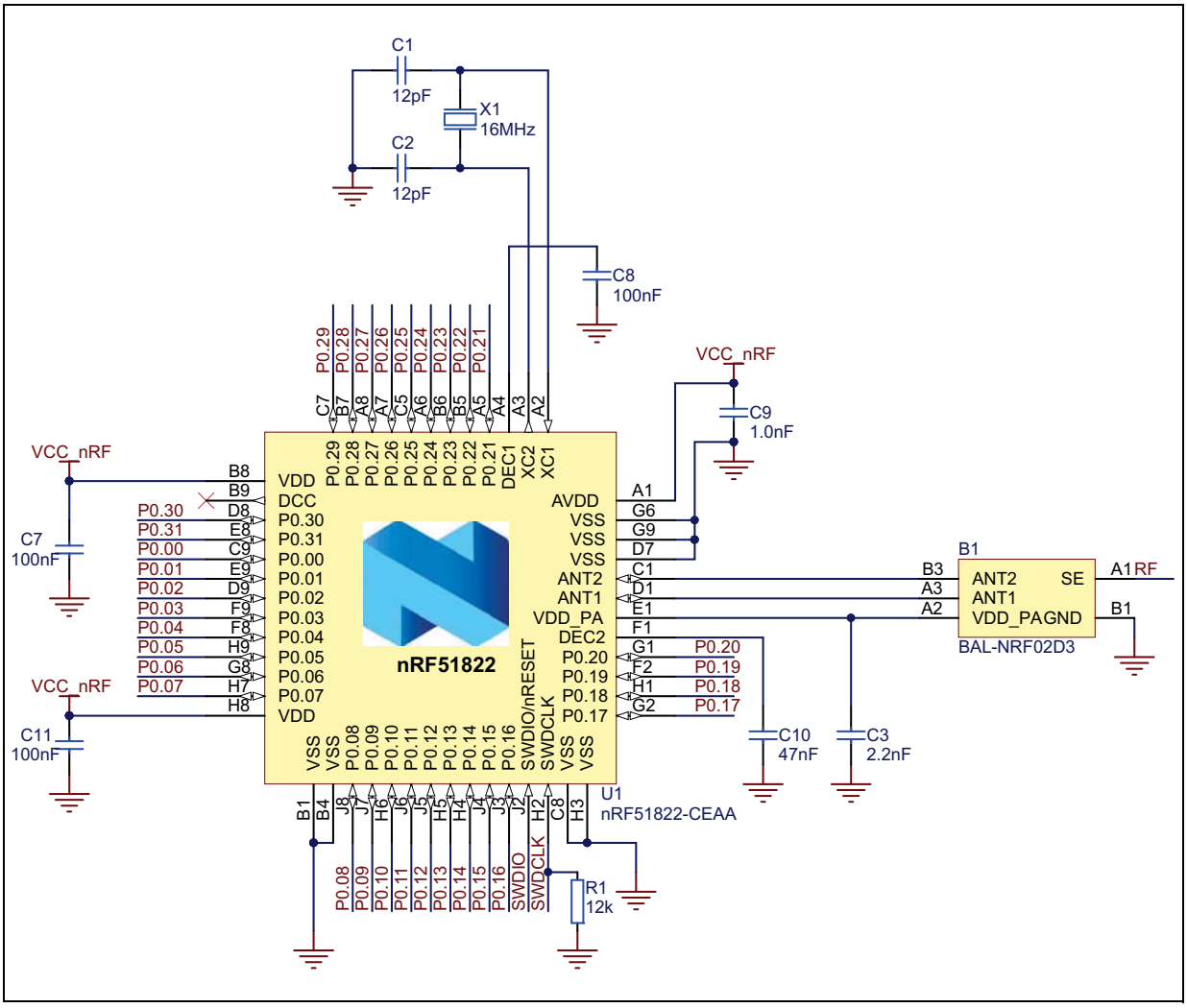
STMicroelectronics BAL-NRF02D3 is an ultraminiature balun. The BAL-NRF02D3 integrates matching network and harmonics filter. Matching impedance has been customized for the following Nordic Semiconductor circuits: nRF51422-CEAA and nRF51822-CEAA.

The BAL-NRF02D3 uses STMicroelectronics IPD technology on non-conductive glass substrate which optimize RF performances.

The BAL-NRF02D3 has been tested and approved by Nordic Semiconductor in the nRFgo modules.

1 Application

Figure 2. Application schematic



2 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 human body model (JESD22-A114-C), all I/O one at a time while others connected to GND	2000			V
	ESD ratings charge device model (JESD22-C101-C)	500			
	ESD ratings machine model, all I/O	200			
T_{OP}	Operating temperature (JESD22-A115-C), all I/O	-40		+85	°C

Table 2. Impedances (T_{amb} = 25 °C)

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
Z_{OUT}	Nominal differential output impedance		matched		Ω
Z_{IN}	Nominal input impedance		50		Ω

Table 3. RF performance (T_{amb} = 25 °C)

Symbol	Parameter	Test condition	Value			Unit
			Min.	Typ.	Max.	
F	Frequency range (bandwidth)		2400		2540	MHz
I_L	Insertion loss in bandwidth			1.9		dB
R_L	Return loss in bandwidth			12		dB
ϕimb	Phase imbalance			6		°
Aimb	Amplitude imbalance			0.15		dB
2f0	2nd harmonic S21 attenuation	4880 MHz		10		dB
3f0	3rd harmonic S21 attenuation	7320 MHz		20		dB

2.1 On-board measurements

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

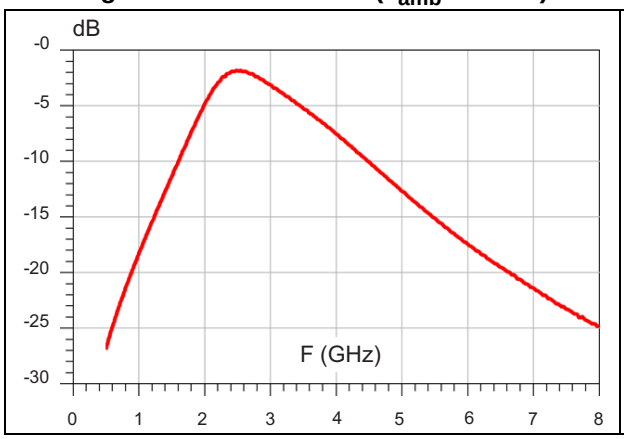


Figure 4. Insertion loss (T_{amb} = 25 °C)

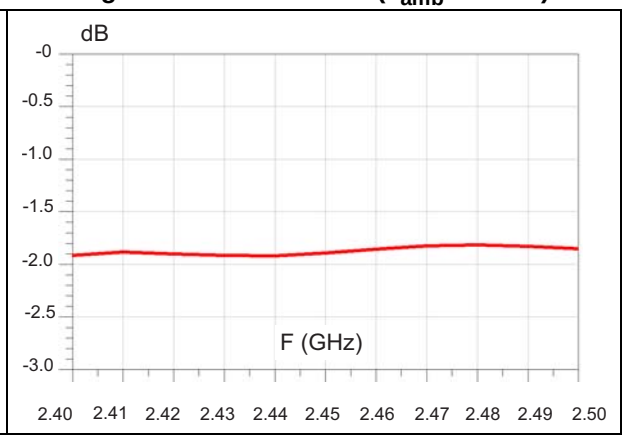


Figure 5. Return loss on SE port (T_{amb} = 25 °C)

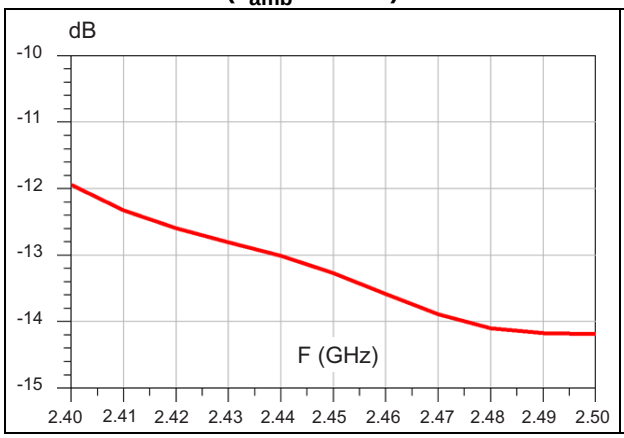


Figure 6. Return loss on DIFF port (T_{amb} = 25 °C)

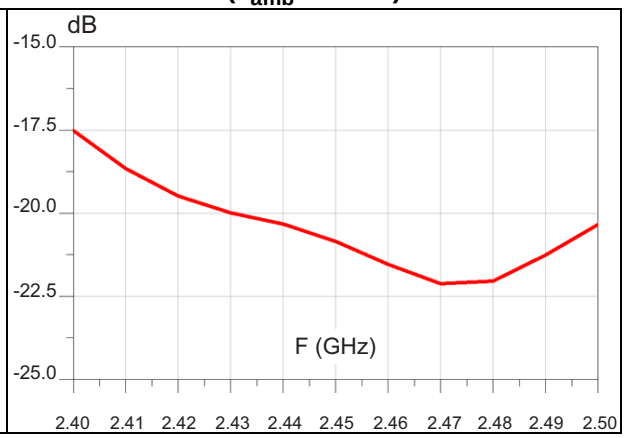


Figure 7. Amplitude imbalance (T_{amb} = 25 °C)

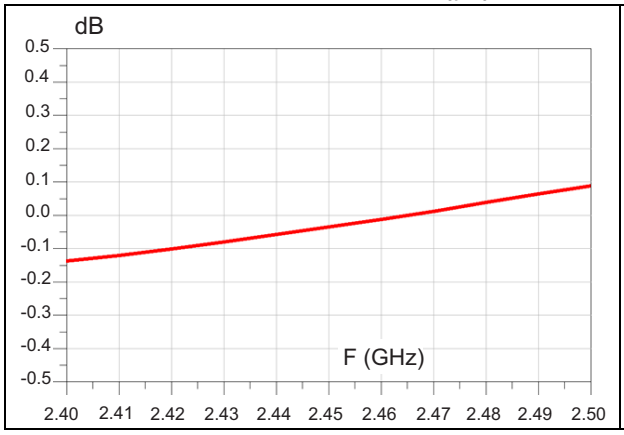
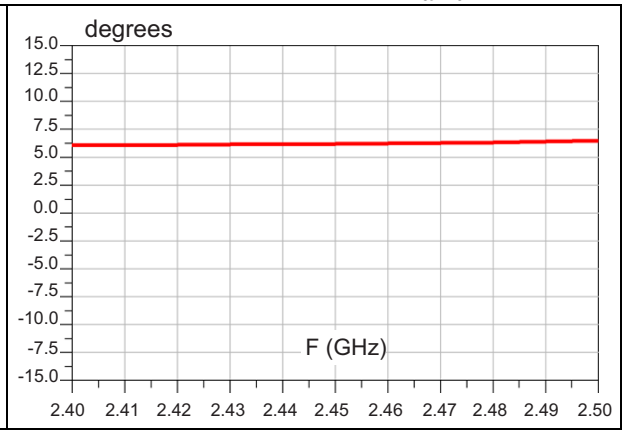


Figure 8. Phase imbalance (T_{amb} = 25 °C)



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 9. Package dimensions

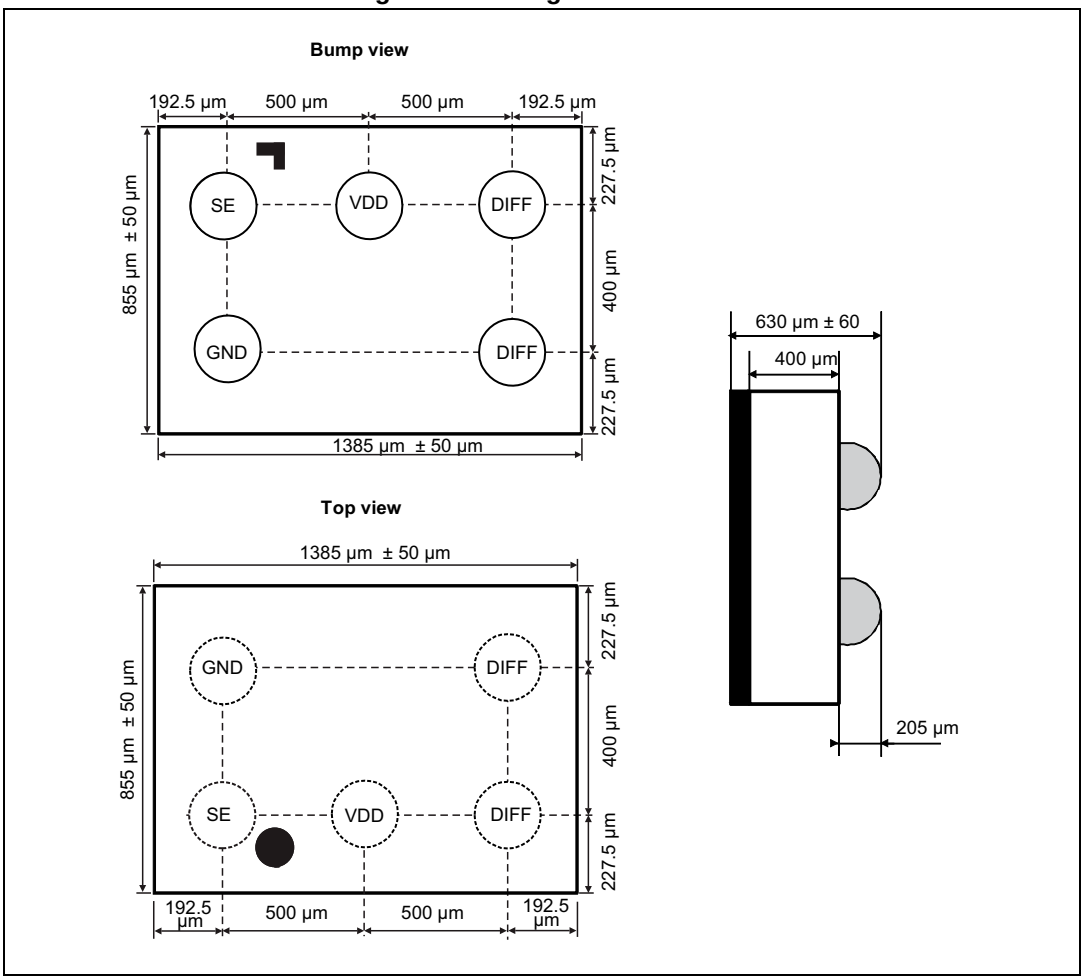


Figure 10. Recommended land pattern

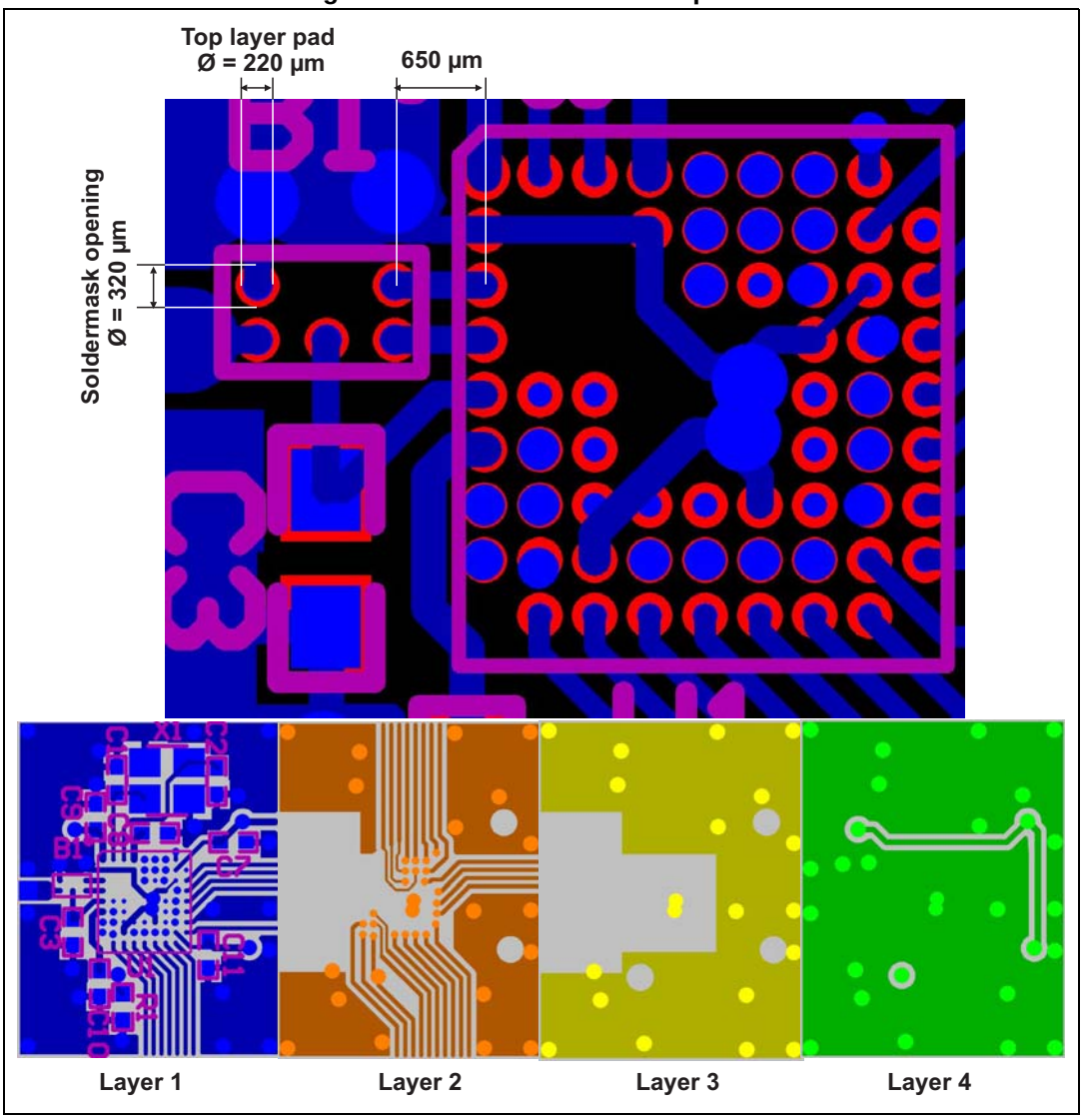


Figure 11. PCB stack-up recommendation

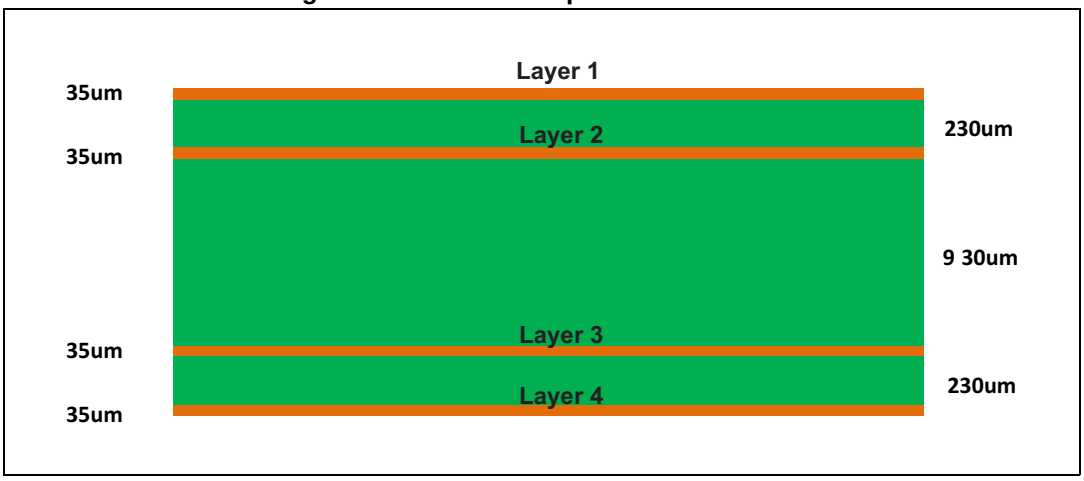


Figure 12. Footprint - non solder mask defined

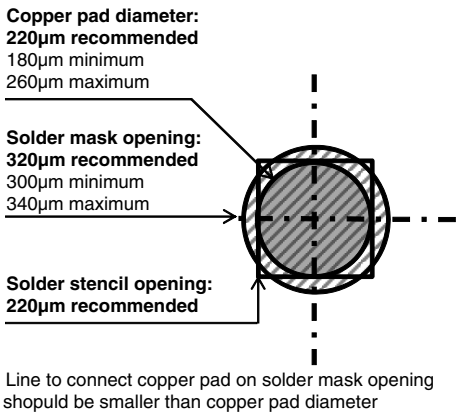


Figure 13. Footprint - solder mask defined

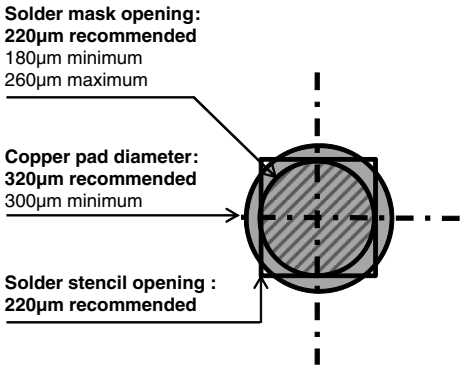


Figure 14. Marking

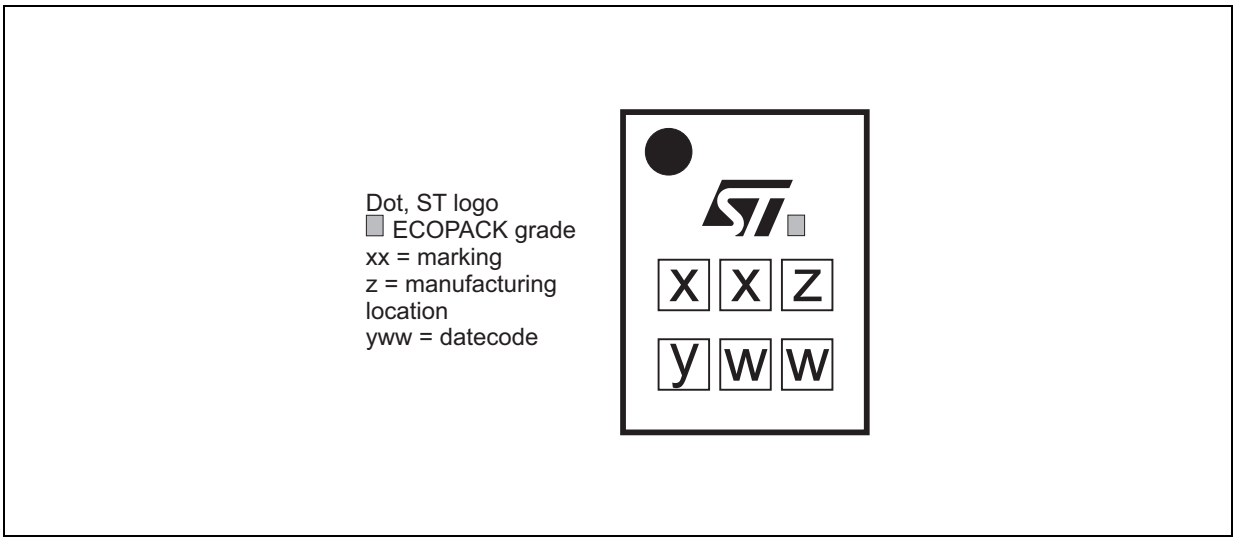
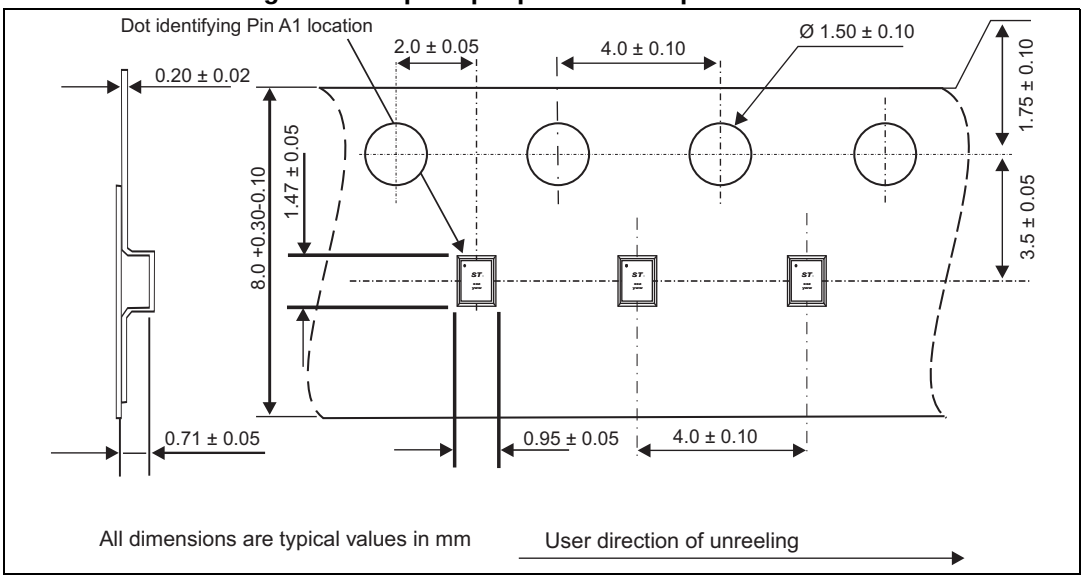


Figure 15. Flip Chip tape and reel specifications



Note: More information is available in the STMicroelectronics Application notes:
AN2348 Flip-Chip: "Package description and recommendations for use"
AN4315: "BAL-NRF02D3 matched balun with integrated harmonics filter for Nordic Semiconductor ultralow power transceivers"

4 Ordering information

Table 4. Ordering information

Order code	Marking	Weight	Base Qty	Delivery mode
BAL-NRF02D3	SK	1.58 mg	5000	Tape and Reel

5 Revision history

Table 5. Document revision history

Date	Revision	Changes
02-Jul-2013	1	Initial release
30-Aug-2013	2	Updated *Table 1*.
13-Oct-2014	3	Updated *Figure 9*.