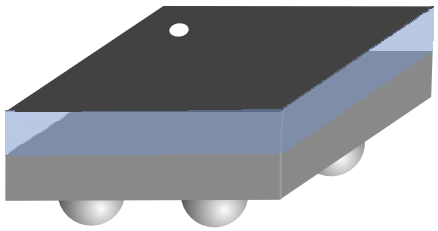
BALF-NRF01D3

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

Datasheet – production data



Lead-free Flip-Chip package
5 bumps

Features

- Low insertion loss
- Low amplitude imbalance
- Low phase imbalance
- Coated Flip-Chip on Glass
- Small footprint: < 1.5 mm^2

Benefits

- Very low profile: < 560 µm after reflow
- High RF performance
- PCB space saving versus discrete solution
- BOM count reduction
- Efficient manufacturability

Applications

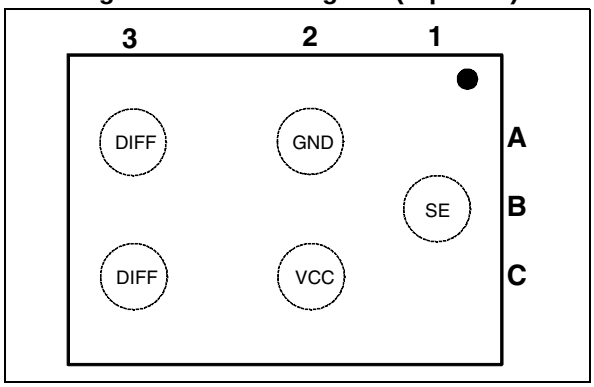
- 2.45 GHz balun with integrated matching network
- Matching optimized for following chipsets: nRF51822-QFAAG0/GC/FA, nRF51822-QFABB0 and nRF51422-QFAAE0

Description

STMicroelectronics BALF-NRF01D3 is an ultraminiature balun. The BALF-NRF01D3 integrates matching network in a monolithic glass substrate. Matching impedance has been customized for the nRF51822-QFAAG0/GC/FA, nRF51822-QFABB0 and nRF51422-QFAAE0 RF transceivers.

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

Figure 1. Pinout diagram (top view)



1 Characteristics

Table 1. Absolute maximum ratings (limiting values)

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
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			V
	ESD ratings charge device model (JESD22-C101-C)	500			
	ESD ratings machine model (MM: C = 200 pF, R = 25 Ω , L = 500 nH)	500			
T_{OP}	Operating temperature	-40		+85	°C

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

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
Z_{OUT}	Nominal differential output impedance		conjugate match to: – nRF51822-QFAAG0/GC/FA – nRF51822-QFABB0 – nRF51422-QFAAE0		Ω
Z_{IN}	Nominal input impedance		50		Ω
F	Frequency range (bandwidth)	2400		2540	
I_L	Insertion loss in bandwidth		1.35	1.46	dB
R_L	Return loss in bandwidth	16.5	17	17.5	dB
ϕimb	Phase imbalance	4.5	5	5.5	°
Aimb	Amplitude imbalance	0.15	0.2	0.25	dB
2f0	2nd harmonic filtering		-15	-14	dB
3f0	3rd harmonic filtering		-42	-41	dB

1.1 Simulations results (T_{amb} = 25 °C)

Figure 2. Insertion loss in band

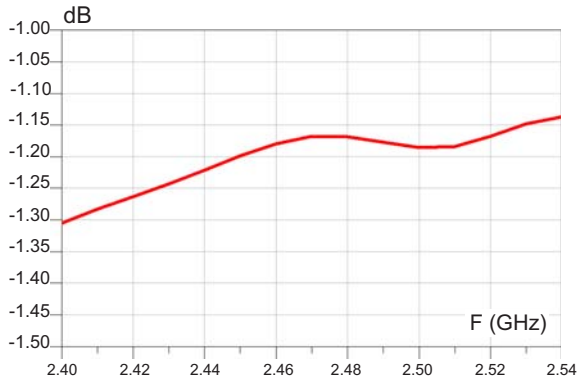


Figure 3. Differential transmission

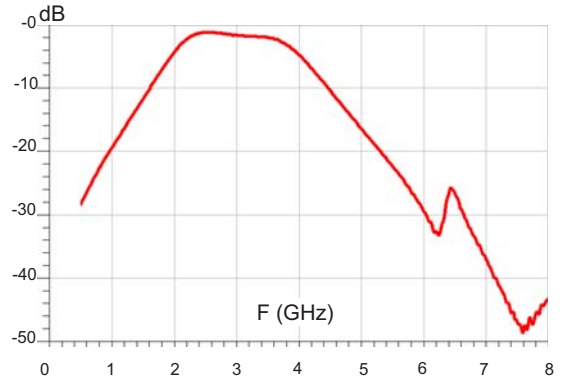


Figure 4. Return loss on SE port

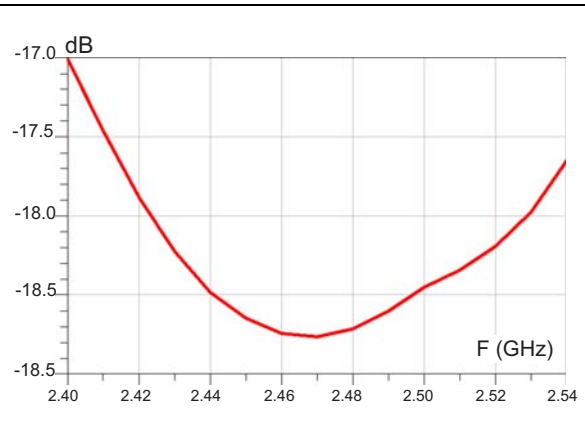


Figure 5. Amplitude imbalance

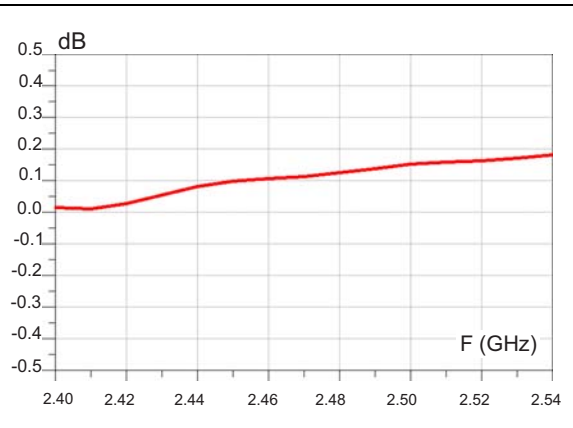


Figure 6. Phase imbalance

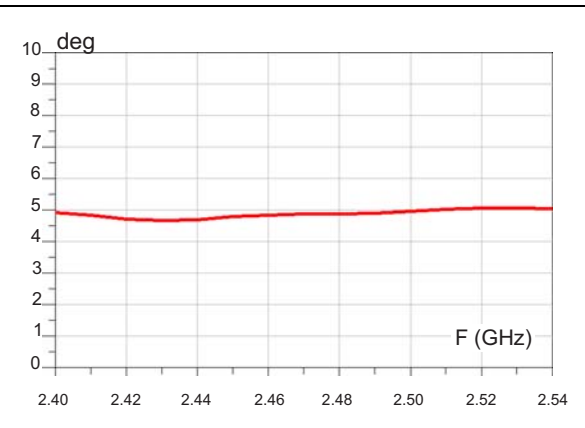


Figure 7. H2 attenuation

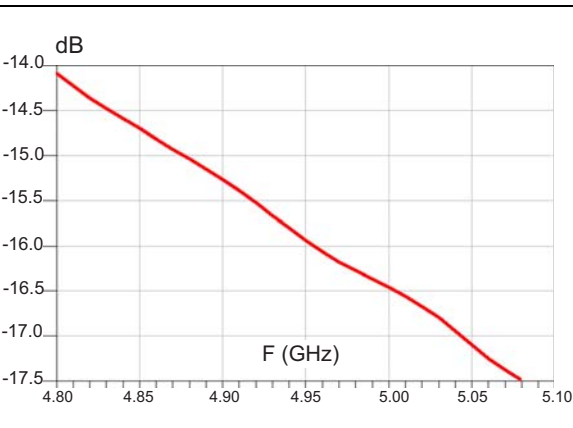
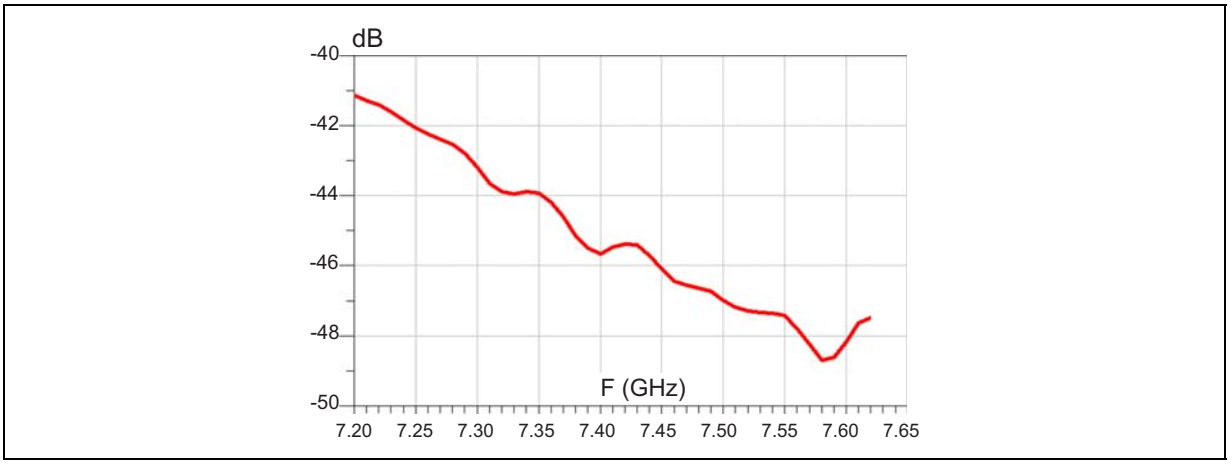
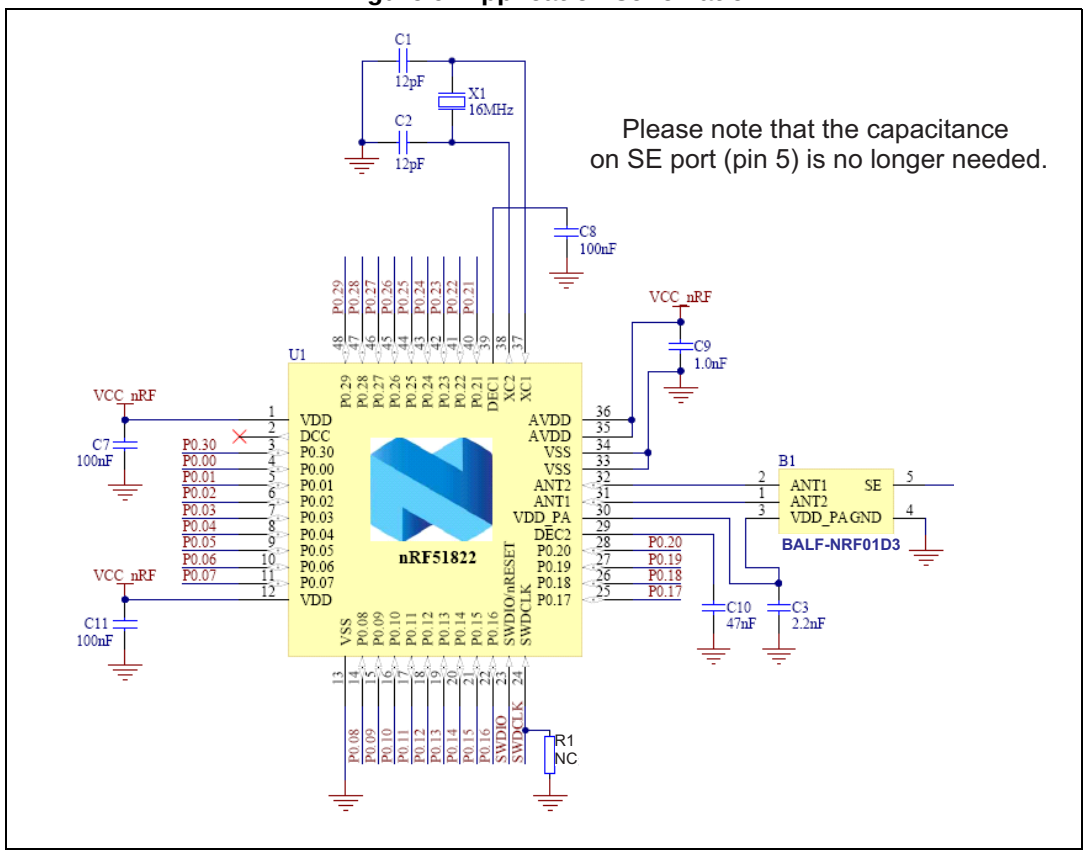


Figure 8. Attenuation in H3



2 Application information

Figure 9. 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.

Figure 10. Package dimensions (top and side view)

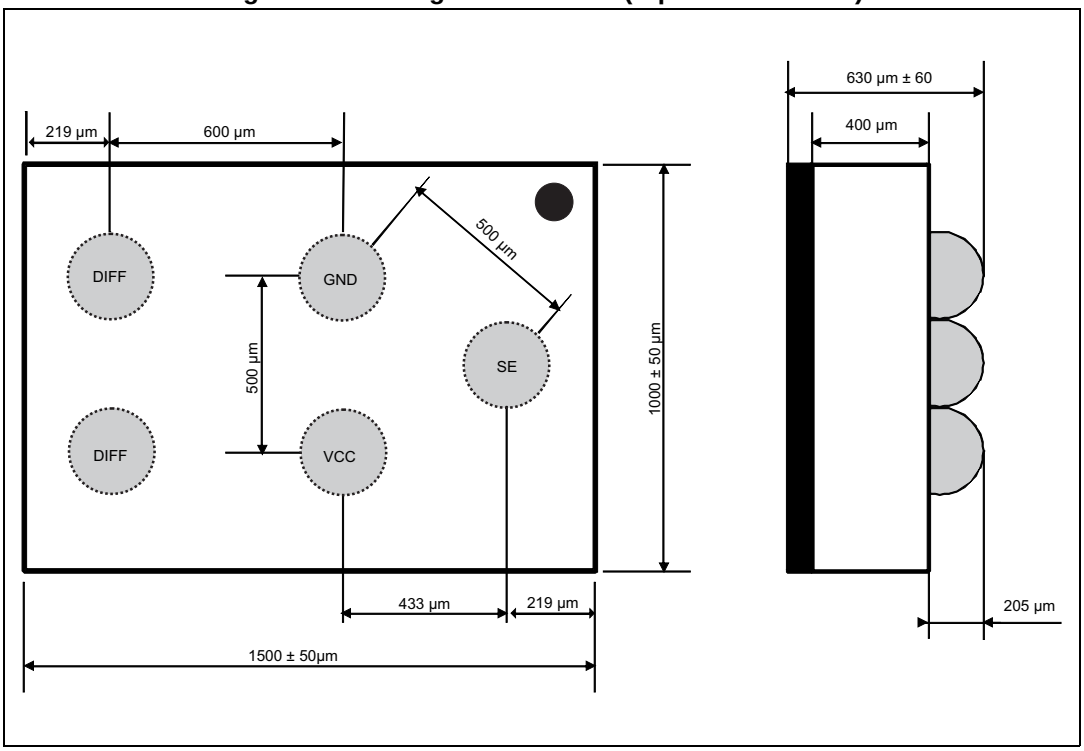


Figure 11. Footprint - non solder mask defined

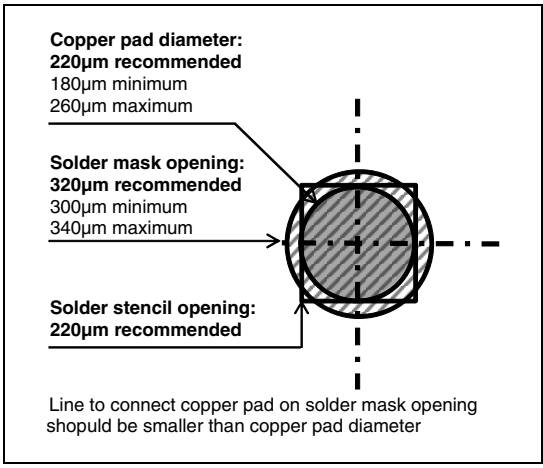


Figure 12. Footprint - solder mask defined

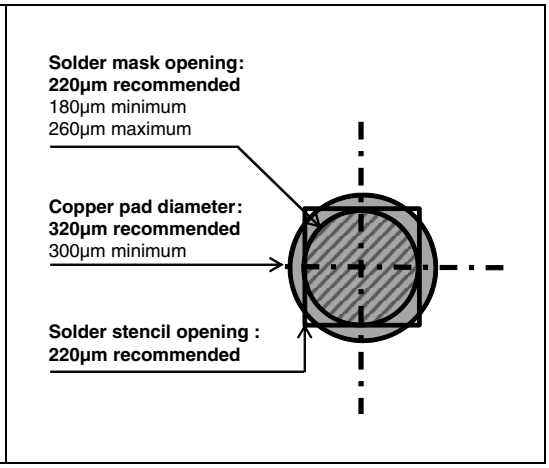


Figure 13. PCB layout recommendation

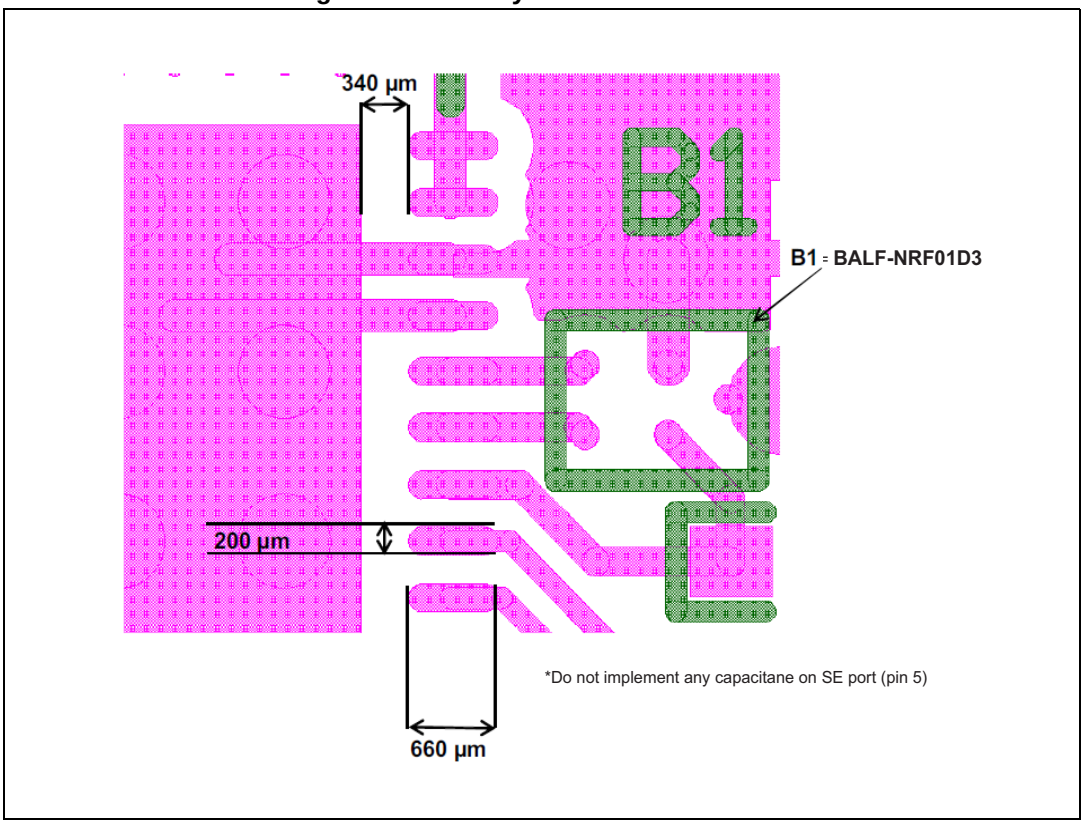


Figure 14. BALF-NRF01D3 position

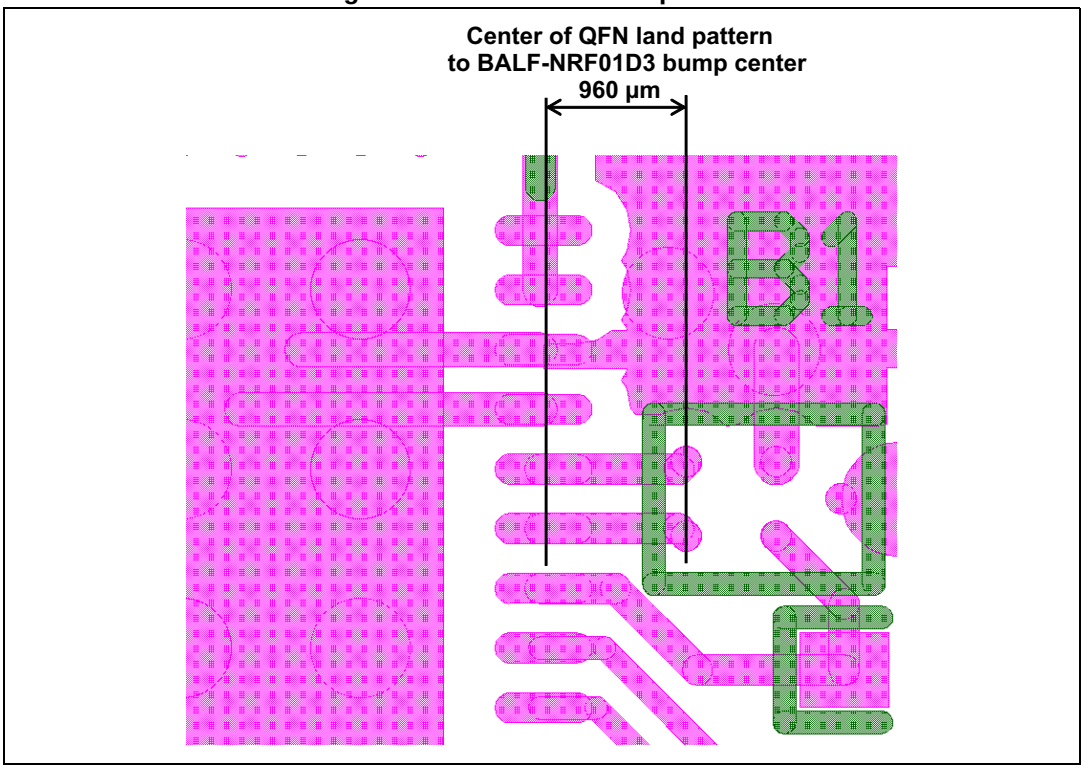


Figure 15. Marking

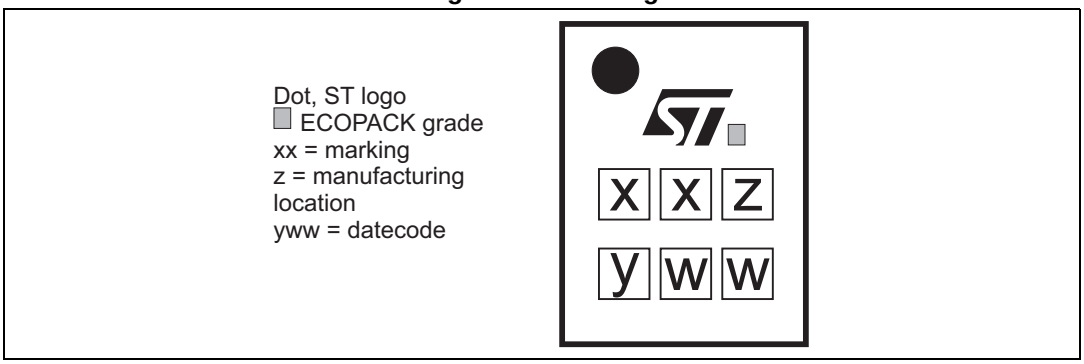
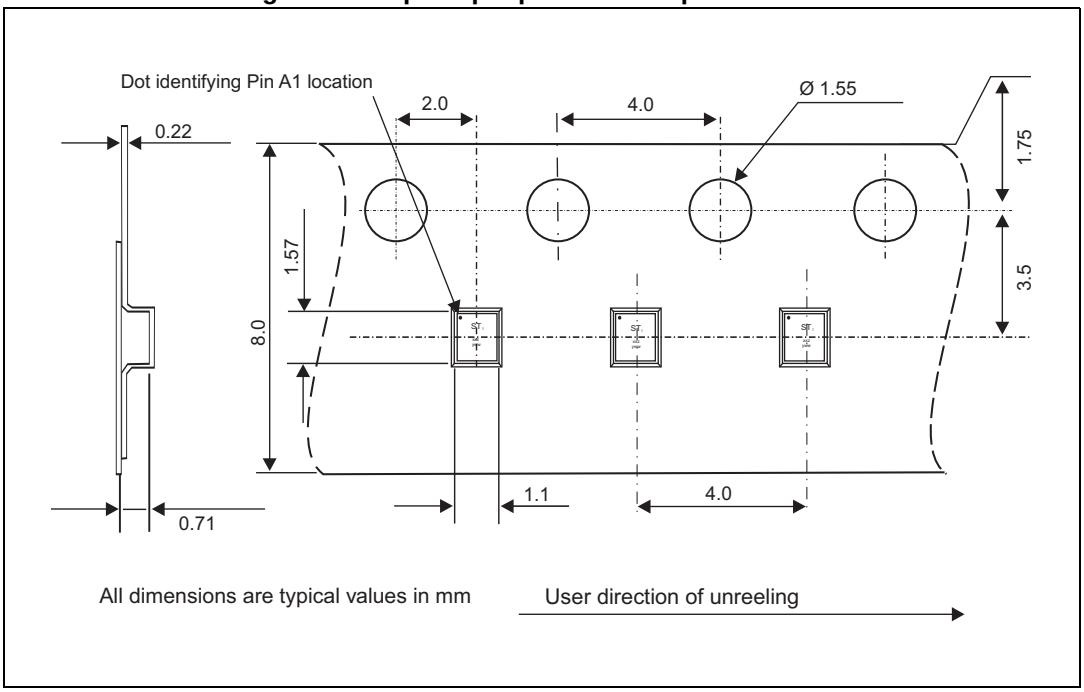


Figure 16. Flip-Chip tape and reel specifications



Note: More information is available in the STMicroelectronics Application note: AN2348 Flip-Chip: "Package description and recommendations for use"

Table 3. Compatibility matrix

Device marking		Balun variant and design files
Packet/variant	**Build code**	
QFAA	CA	BAL-NRF01D3 + 0.8pF DF-ST V1.0
	C0	BAL-NRF01D3 + 0.8pF DF-ST V1.0
	FA	BAL**F**-NRF01D3 DF-ST V1.x
	GC	BAL**F**-NRF01D3 DF-ST V1.x
	G0	BAL**F**-NRF01D3 DF-ST V1.x
QFAB	AA	BAL-NRF01D3 + 0.8pF DF-ST V1.0
	A0	BAL-NRF01D3 + 0.8pF DF-ST V1.0
	B0	BAL**F**-NRF01D3 DF-ST V1.x

DF-ST = nRF51822 Reference Layout files with STMicroelectronics balun.

Table 4. Compatibility matrix (nRF51422))

Device marking		Balun variant and design files
Packet/variant	**Build code**	
QFAA	C0	BAL-NRF01D3 + 0.8pF
	CA	BAL-NRF01D3 + 0.8pF
	E0	BALF-NRF01D3
QFAB	A0	BALF-NRF01D3

4 Ordering information

Table 5. Ordering information

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

5 Revision history

Table 6. Document revision history

Date	Revision	Changes
27-Mar-2014	1	Initial release
04-Jun-2014	2	Updated all curves and added *Table 4*.

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