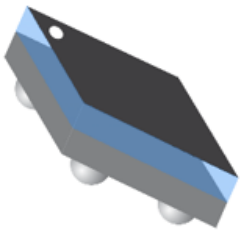
BALF-NRG-02D3

50 ohm nominal input / conjugate match to BlueNRG tranceiver, with integrated harmonic filter

Datasheet - production data



Chip Scale package on glass
4 bumps - 1.4 x 0.85 mm²

Features

- 50 Ω nominal input / conjugate match to BlueNRG device
- Low insertion loss
- Low amplitude imbalance
- Low phase imbalance

Benefits

- Small footprint
- RF BOM reduction
- High RF performance

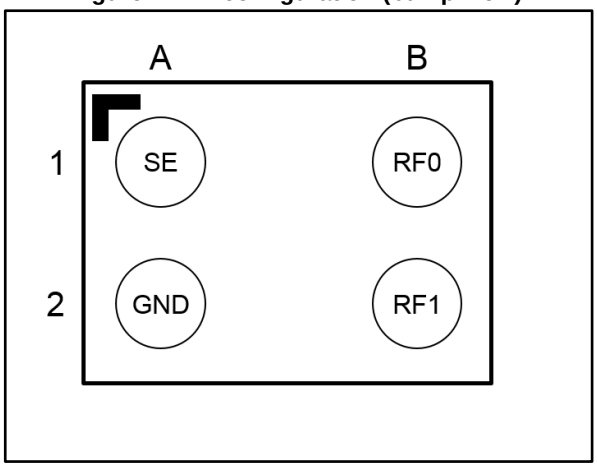
Applications

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

Description

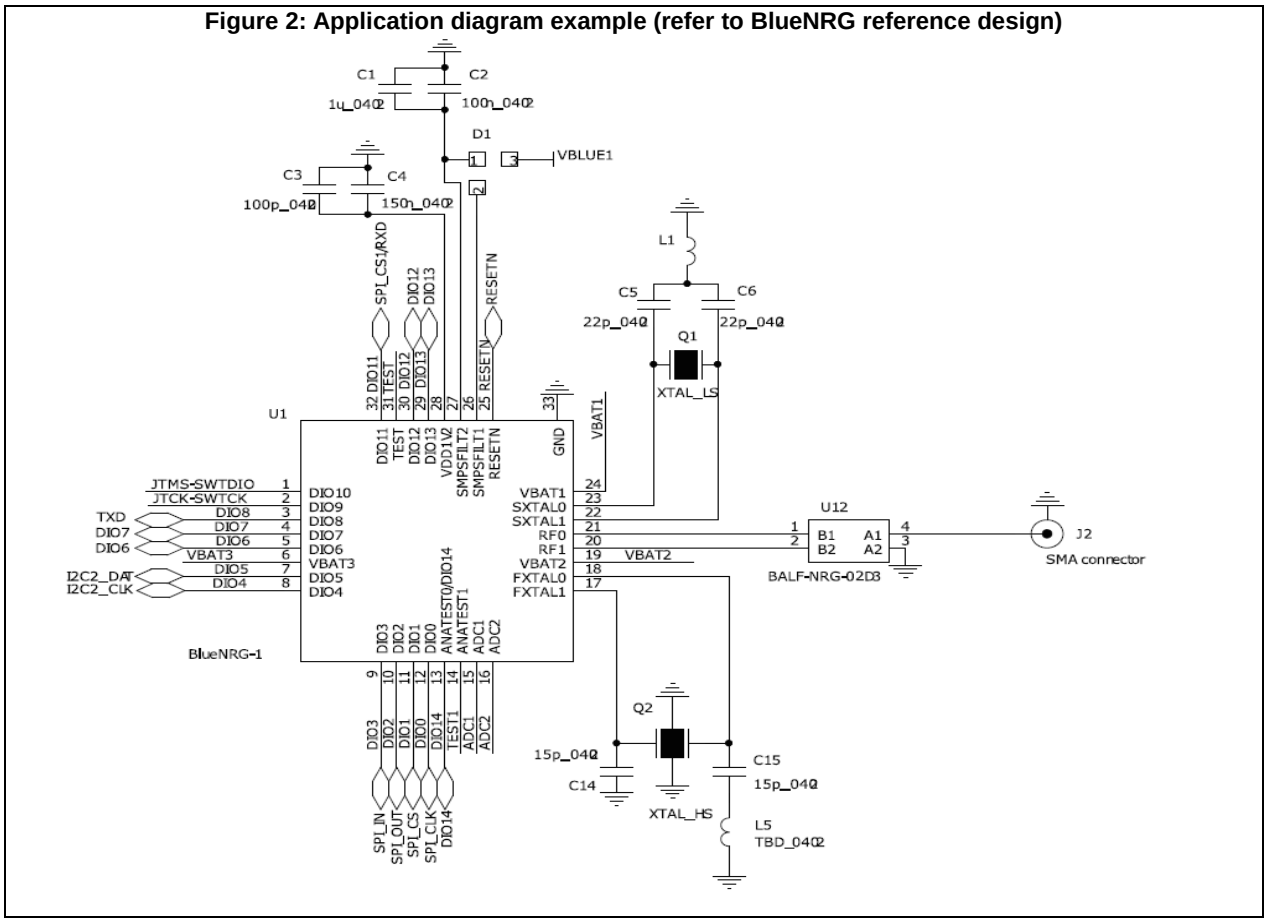
This device is an ultra-miniature balun which integrates matching network and harmonics filter. Matching impedance has been customized for the BlueNRG ST transceiver.
The BALF-NRG-02D3 uses STMicroelectronics IPD technology on non-conductive glass substrate which optimizes RF performance.

Figure 1: Pin configuration (bump view)



1 Application schematic

Figure 2: Application diagram example (refer to BlueNRG reference design)



2 Characteristics

Table 1: Absolute maximum ratings (limiting values)

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
P_{IN}	Input power RFIN		-	10	dBm
V_{ESD}	ESD ratings human body model, 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: Electrical characteristics (T_{amb} = 25 °C)

Symbol	Definition	Value			Unit
		Min.	Typ.	Max.	
Z_{diff}	Nominal differential impedance	Match to BlueNRG			Ω
Z_{ANT}	Nominal antenna impedance		50		Ω
f	Frequency range (bandwidth)	2400		2500	MHz
I_L	Insertion loss in bandwidth		1.33	1.85	dB
RL_{SE}	Single ended return loss in bandwidth	21	30		
RL_{DIFF}	Differential return loss in bandwidth	17	19		
H2	Second harmonic attenuation (differential mode)	40	49		
H3	Third harmonic attenuation (differential mode)	46	55		
H4	Fourth harmonic attenuation (differential mode)	42	50		
H5	Fifth harmonic attenuation (differential mode)	31	56		
H6	Fifth harmonic attenuation (differential mode)	29	45		
H7	Fifth harmonic attenuation (differential mode)	30	42		
Φ_{imb}	Output phase imbalance	-3.5	0	3.5	°
A_{imb}	Output amplitude imbalance	-1	0	1	dB

2.1 RF measurement

Figure 3: Differential transmission (dB)

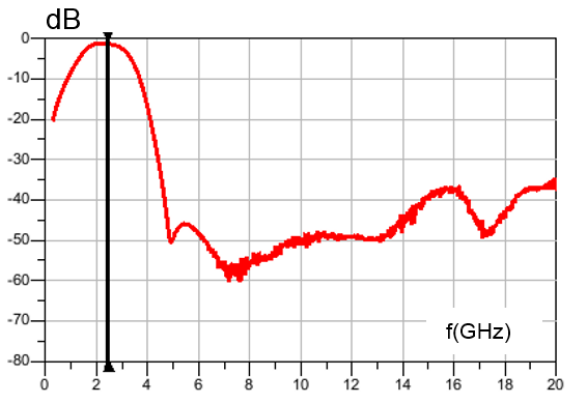


Figure 4: Insertion loss (dB)

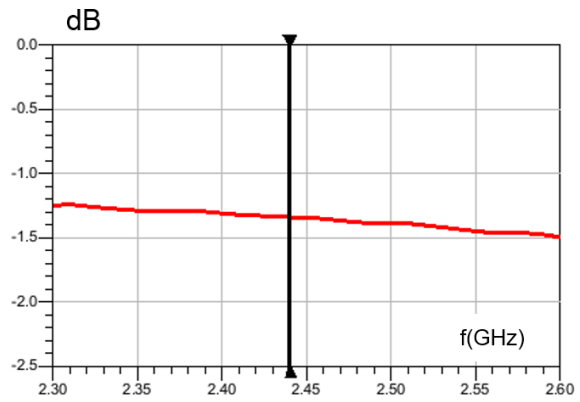


Figure 5: Return loss single ended (dB)

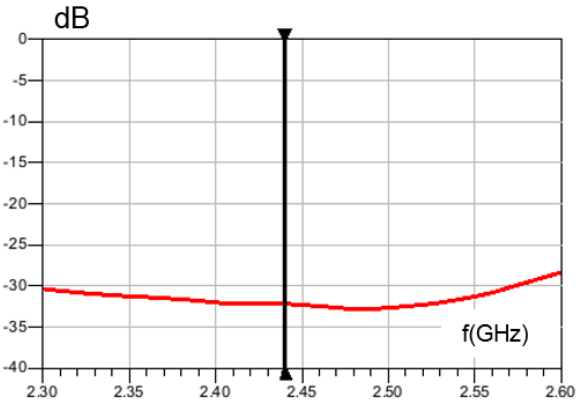


Figure 6: Return loss differential (dB)

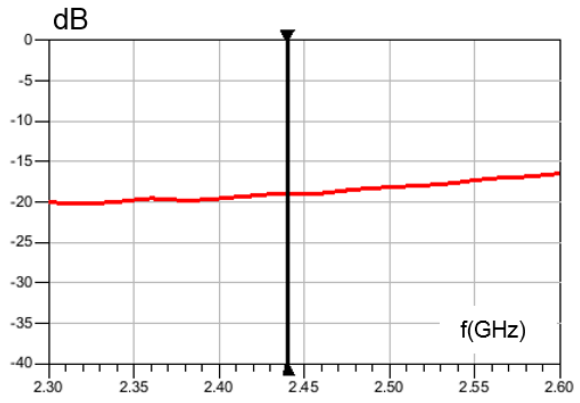


Figure 7: H2 harmonic attenuation (dB)

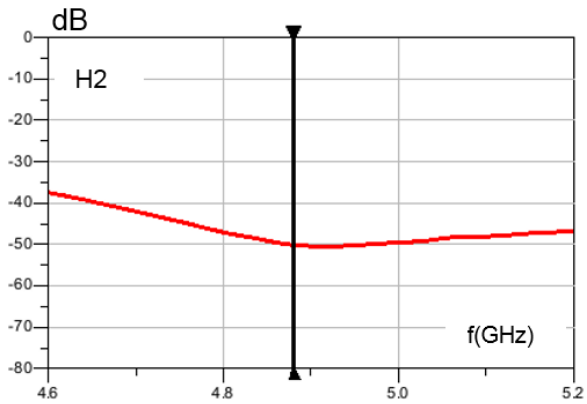


Figure 8: H3 harmonic attenuation (dB)

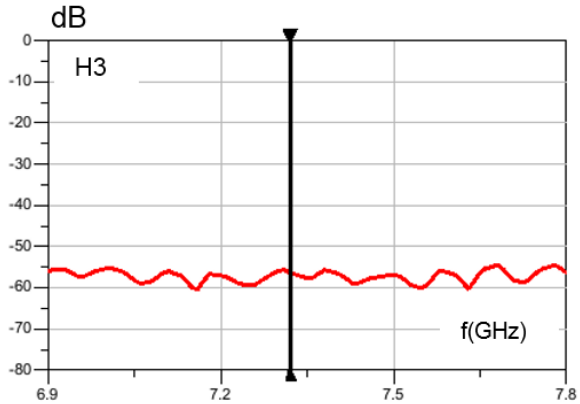


Figure 9: H4 harmonic attenuation (dB)

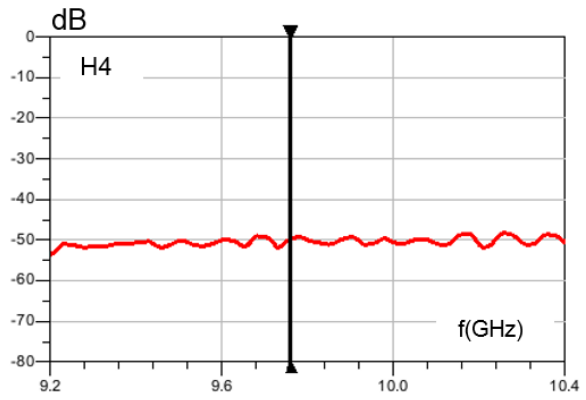


Figure 10: H5 harmonic attenuation (dB)

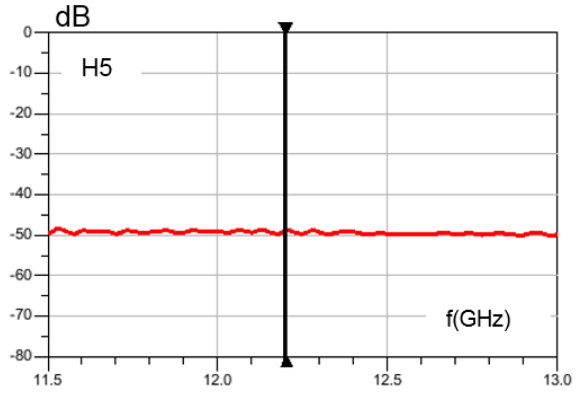


Figure 11: H6 harmonic attenuation (dB)

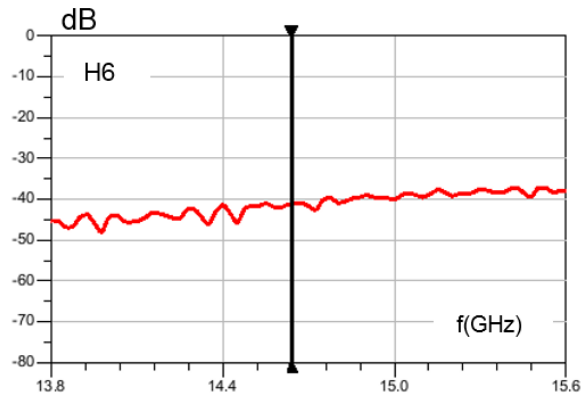


Figure 12: H7 harmonic attenuation (dB)

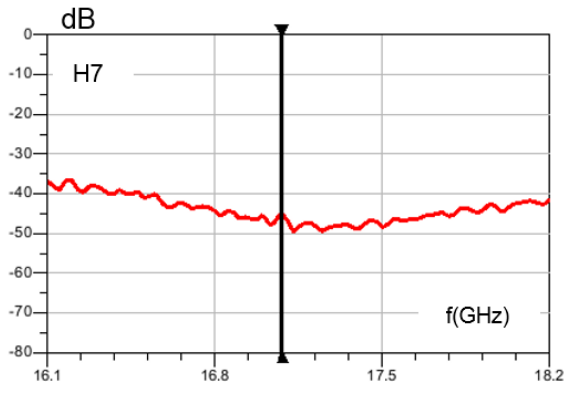


Figure 13: Amplitude imbalance in dB

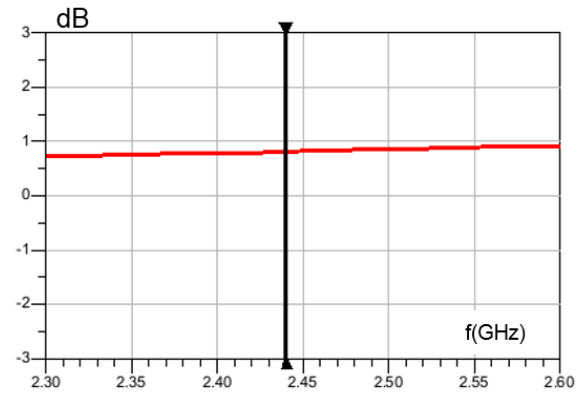
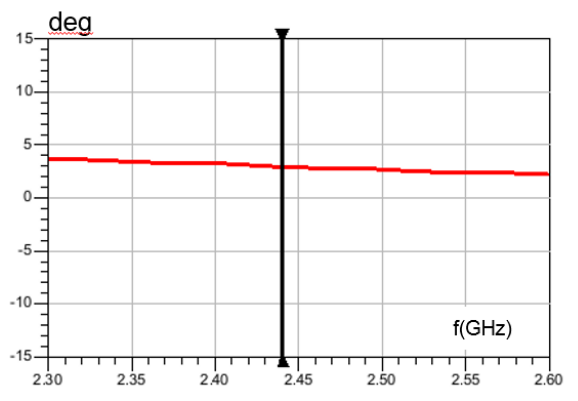


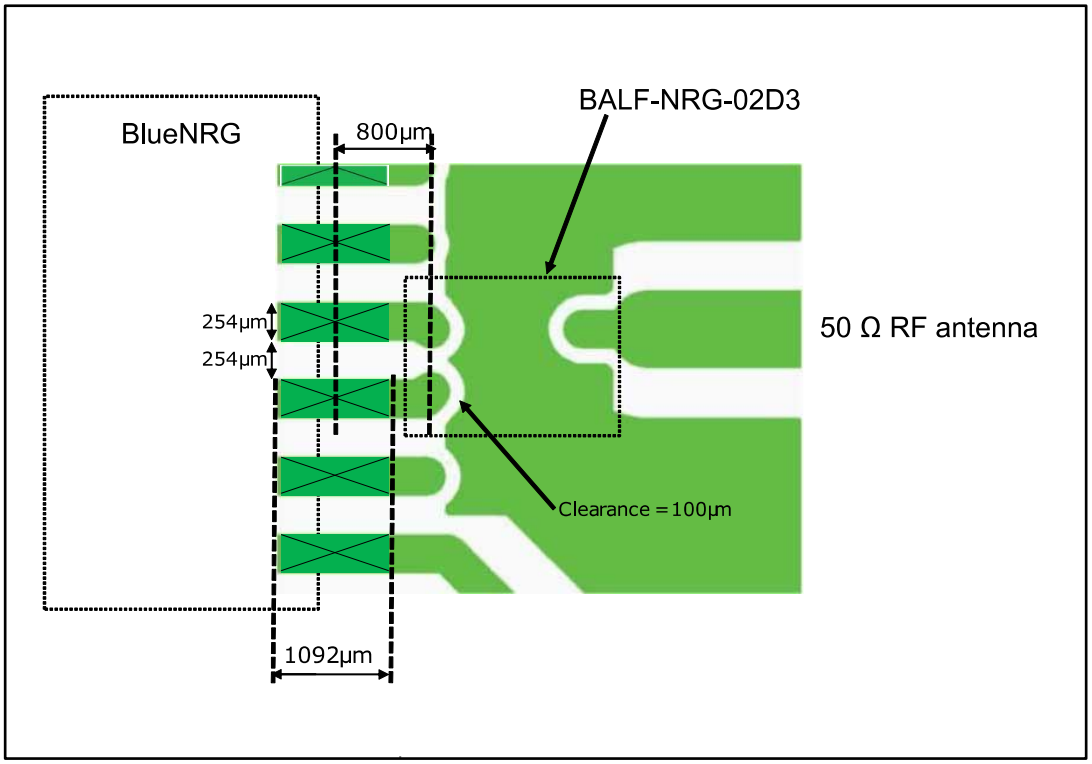
Figure 14: Phase imbalance in deg



3 Application information

3.1 BALF-NRG-02D3 with BlueNRG

Figure 15: Recommended balun land pattern



4 Package information

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 CSPG 0.4 package information

Figure 16: CSPG package outline (bump view)

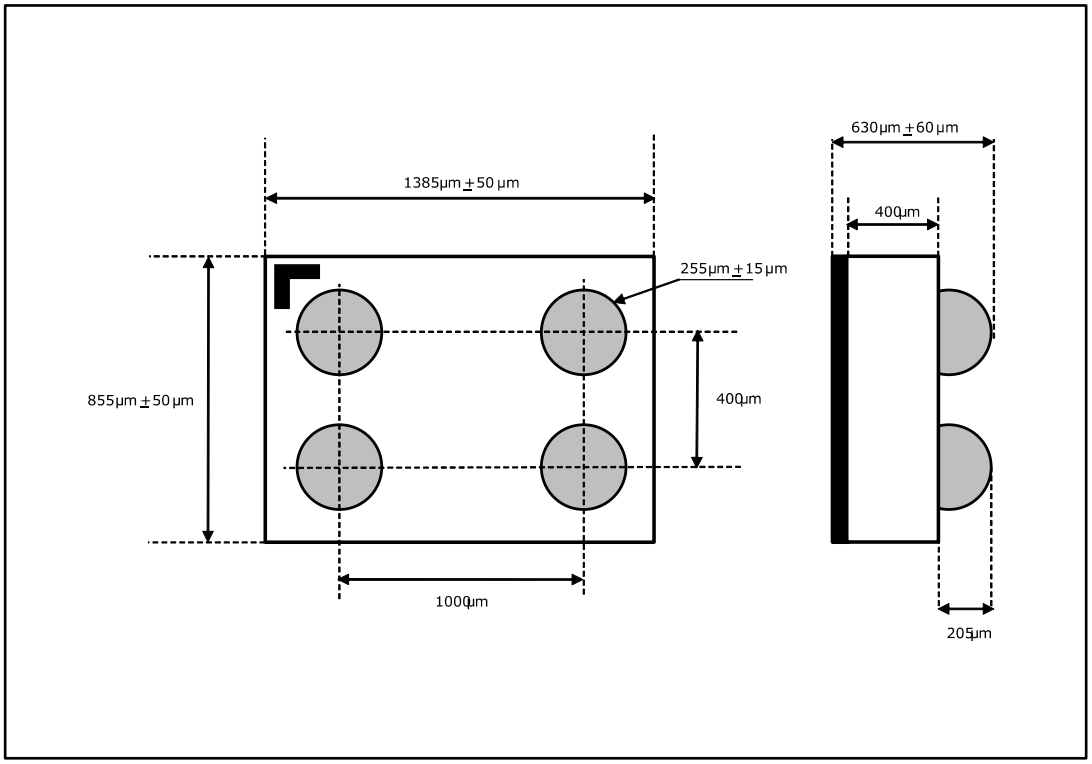


Figure 17: Footprint - 3 mils stencil -non solder mask defined

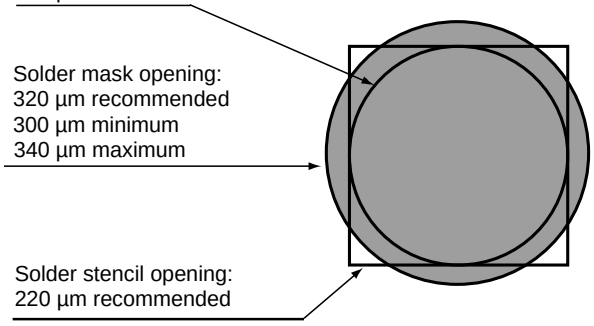


Figure 18: Footprint - 3 mils stencil - solder mask defined

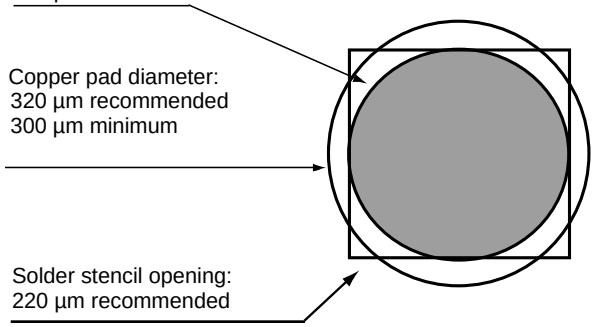
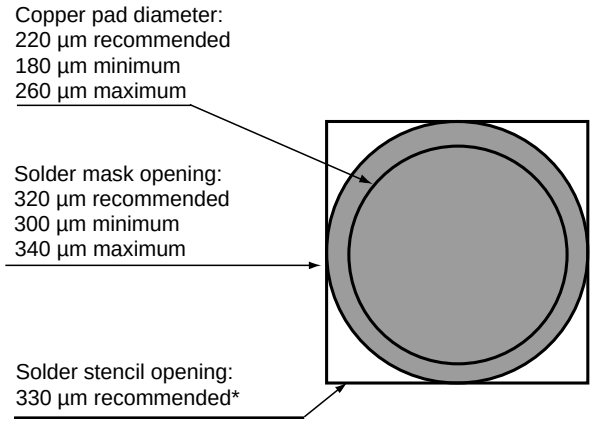
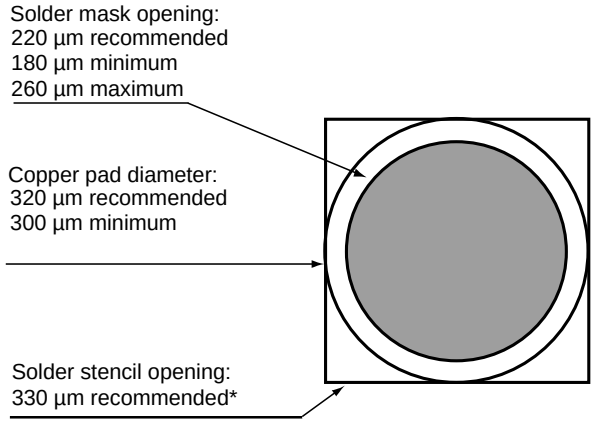


Figure 19: Footprint - 5 mils stencil -non solder mask defined



*depending on paste, it can go down to 270 µm

Figure 20: Footprint - 5 mils stencil - solder mask defined



*depending on paste, it can go down to 270 µm

4.2 CSPG 0.4 packing information

Figure 21: Marking

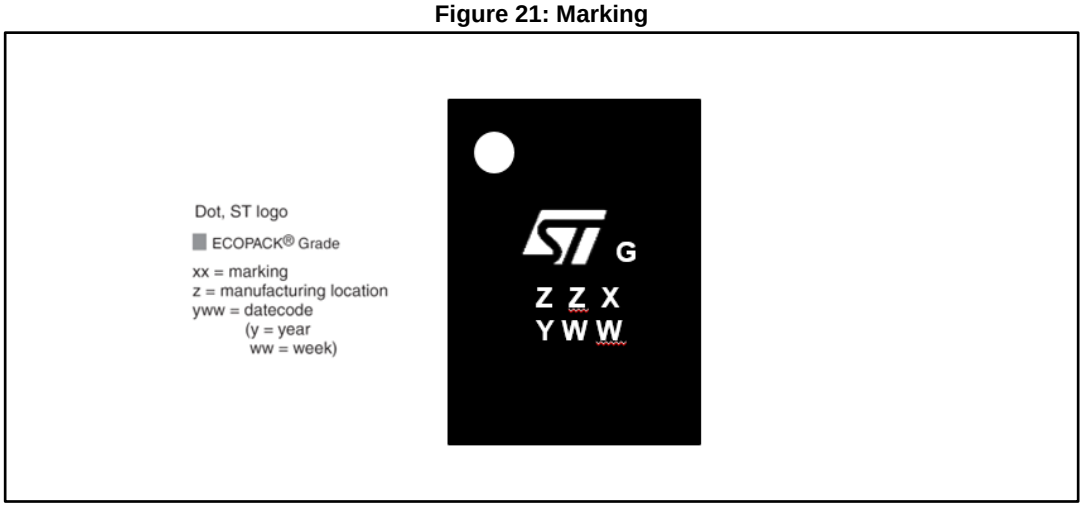
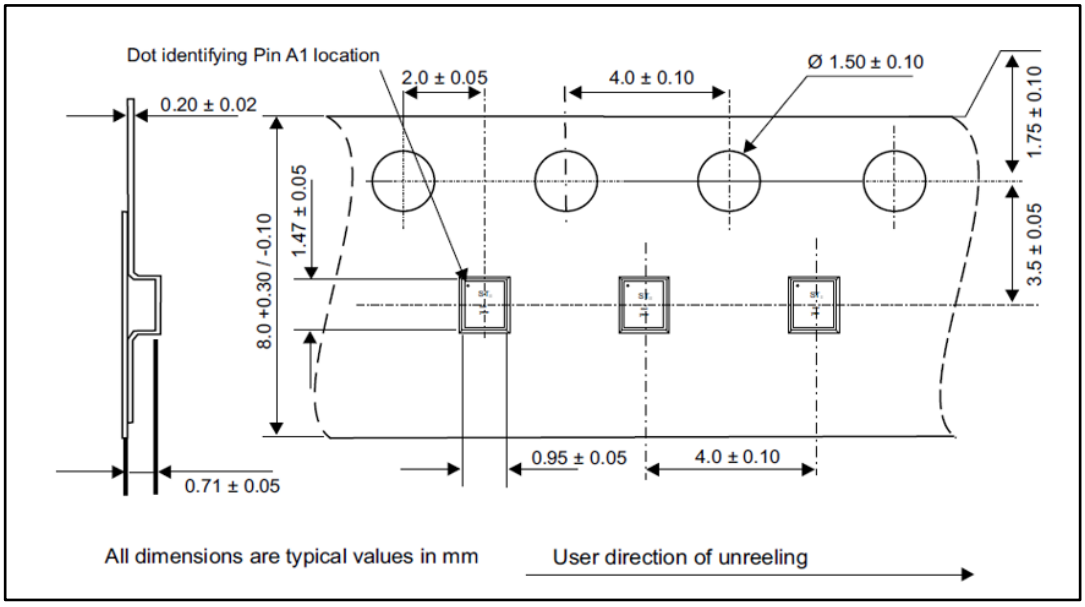


Figure 22: Flip Chip tape and reel specifications



More packing information is available in the application note:

- AN2348 Flip-Chip: “Package description and recommendations for use”

5 Ordering information

Figure 23: Ordering information scheme

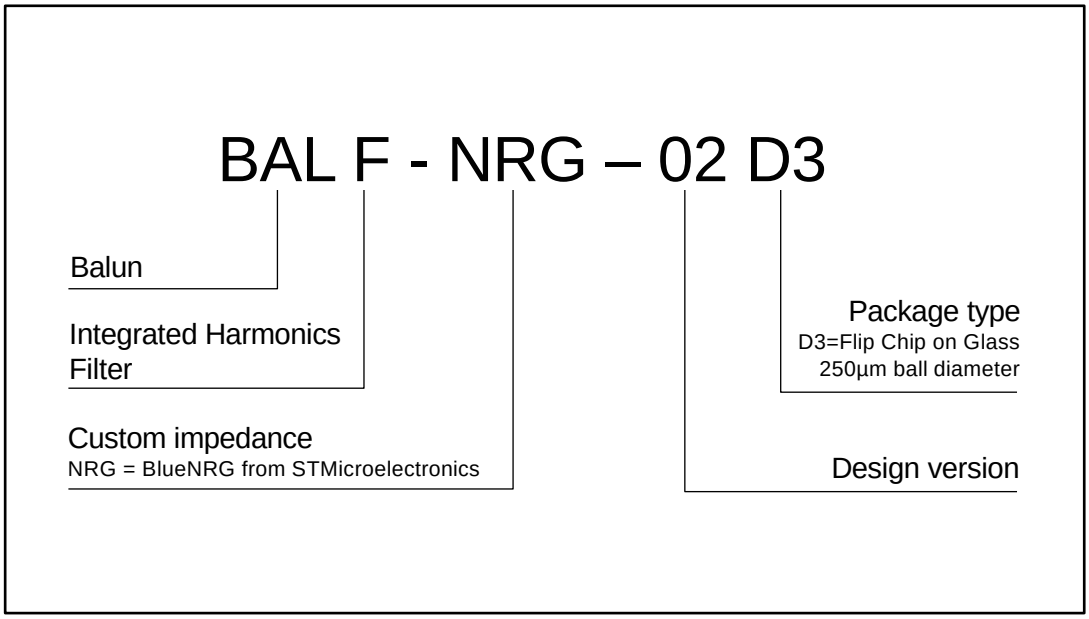


Table 4: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
BALF-NRG-02D3	TK	CSPG	1.37 mg	5000	Tape and reel

6 Revision history

Table 5: Document revision history

Date	Revision	Changes
23-Jun-2017	1	Initial release.

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