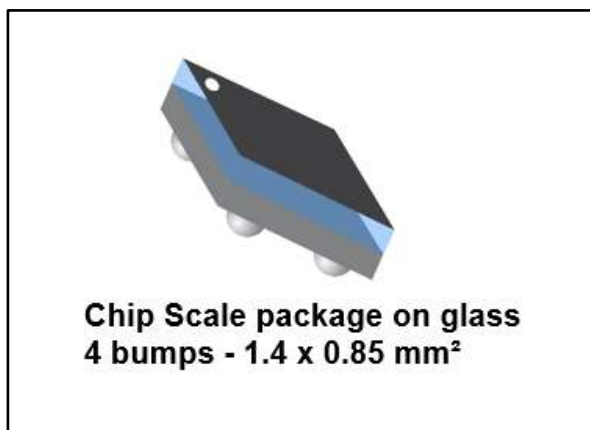


50 ohm nominal input / conjugate match to BlueNRG tranceiver,  
with integrated harmonic filter

Datasheet - production data



### Features

- 50  $\Omega$  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

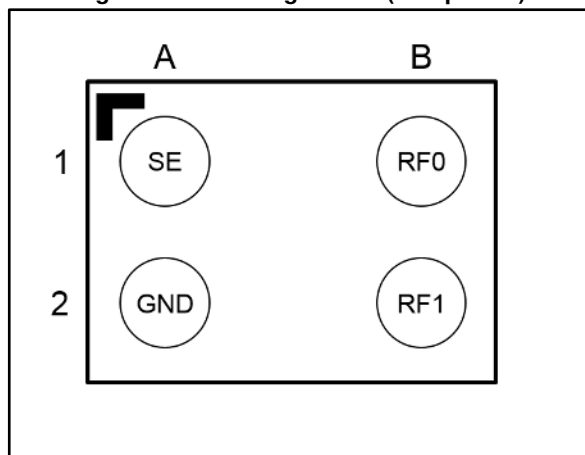
### Applications

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

### Description

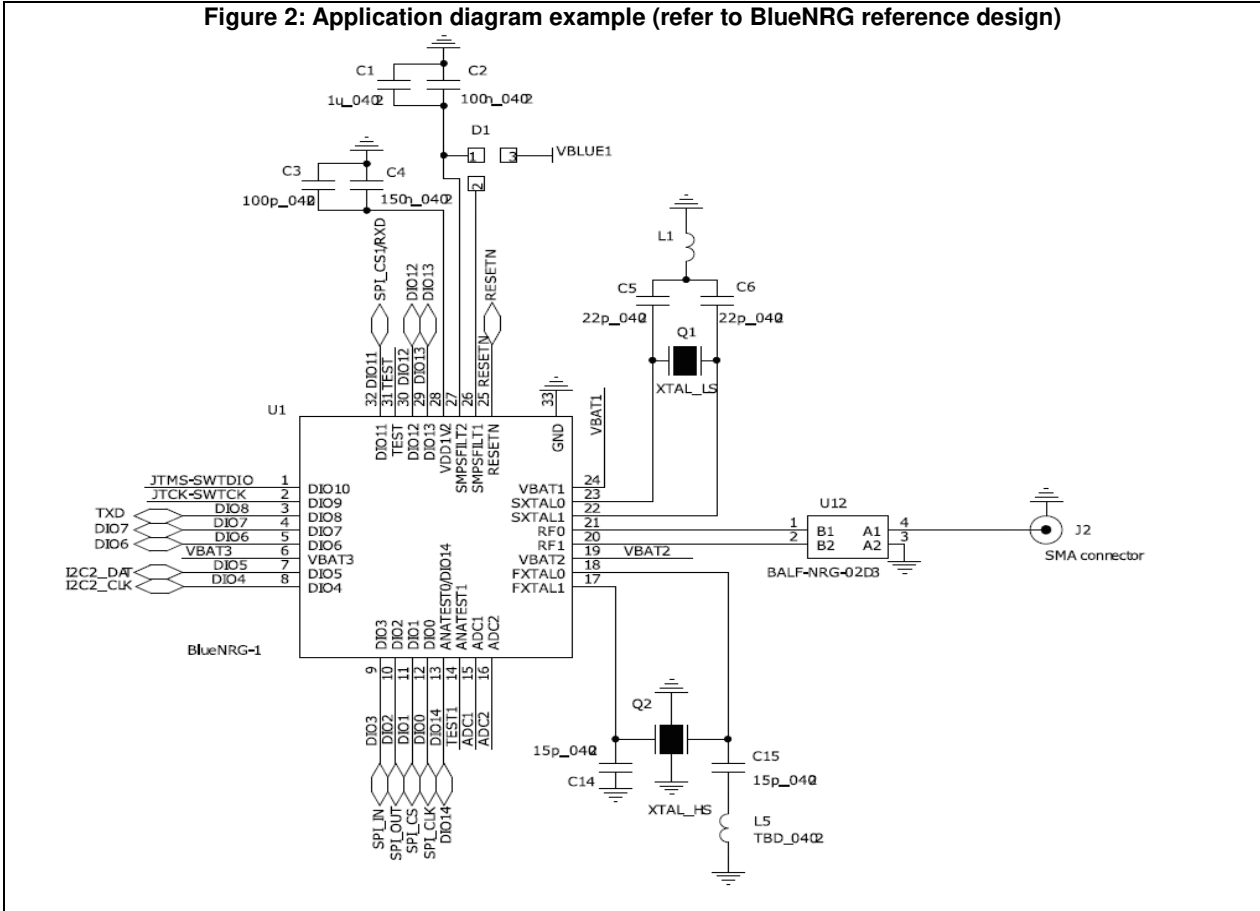
This device is an ultra-miniature balun which integrates matching network and harmonics filter. Matching impedance has been customized for the BlueNRG ST tranceiver. The BALF-NRG-02D3 uses STMicroelectronics IPD technology on non-conductive glass substrate which optimizes RF performance.

Figure 1: Pin configuration (bump view)



# 1 Application schematic

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



## 2 Characteristics

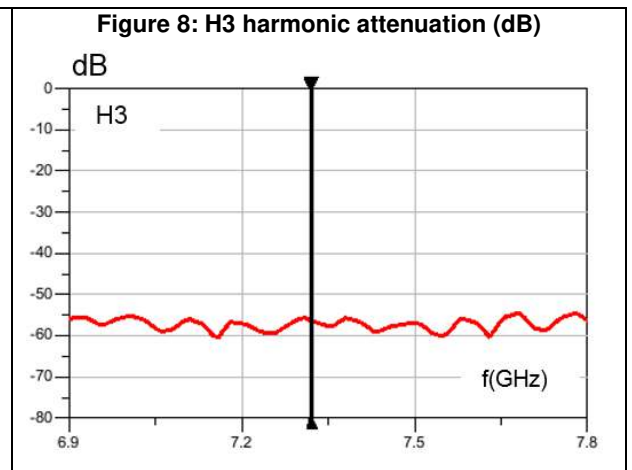
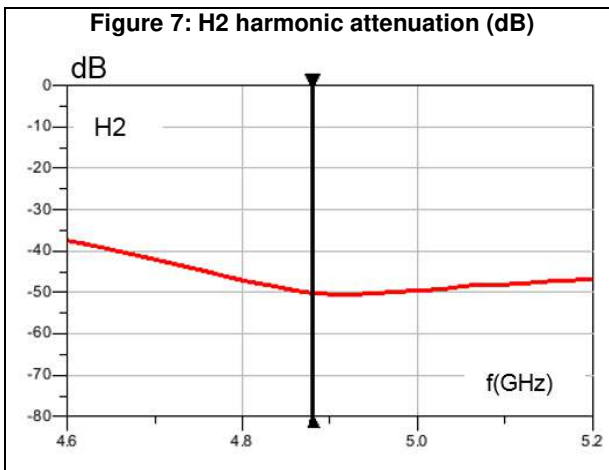
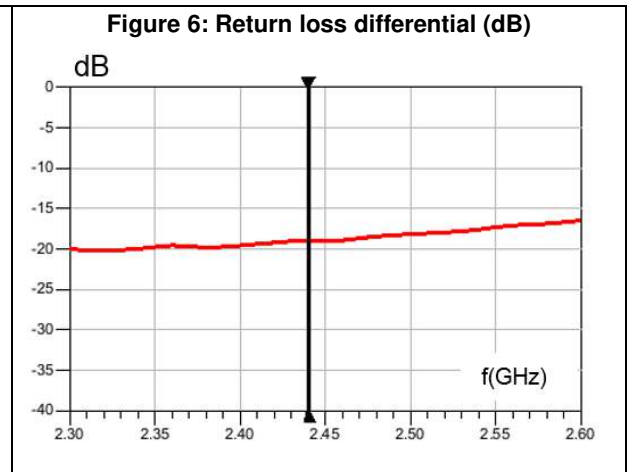
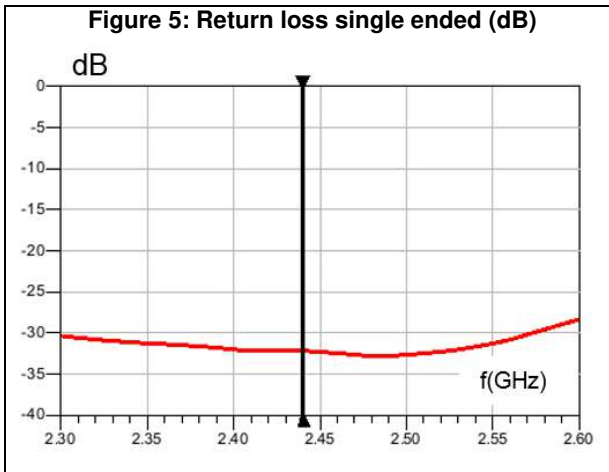
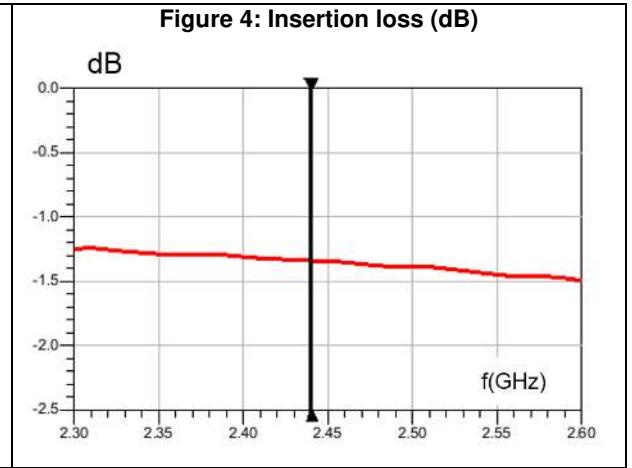
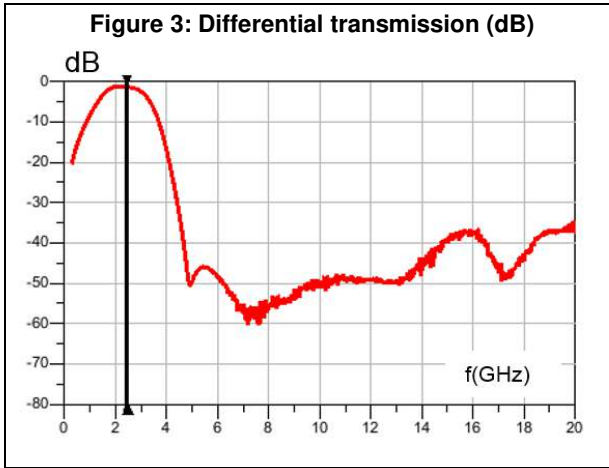
**Table 1: Absolute maximum ratings (limiting values)**

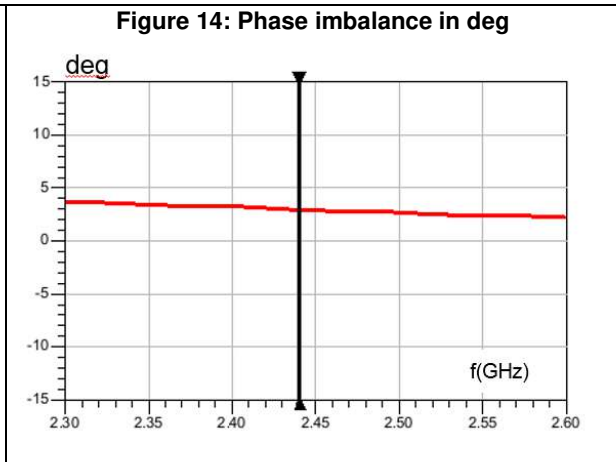
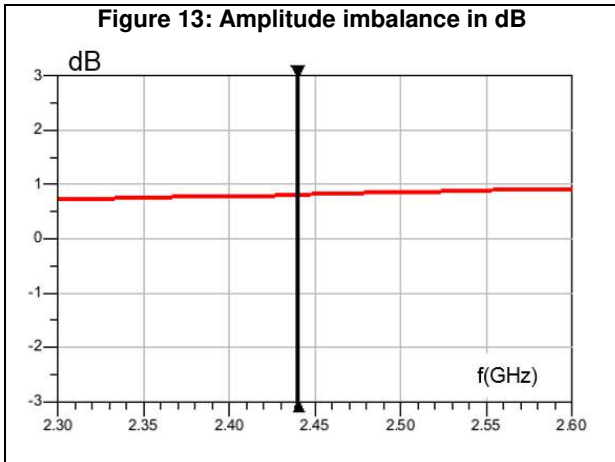
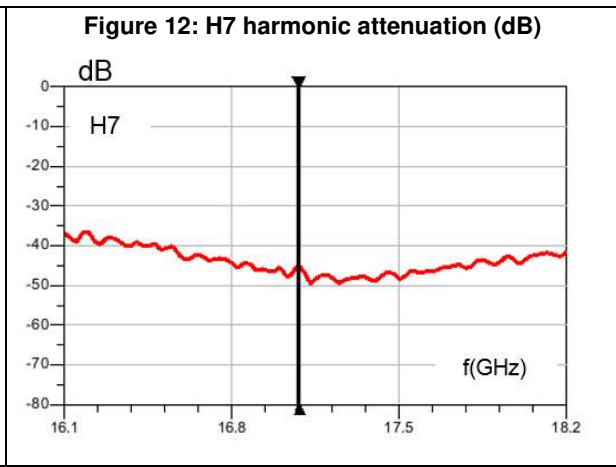
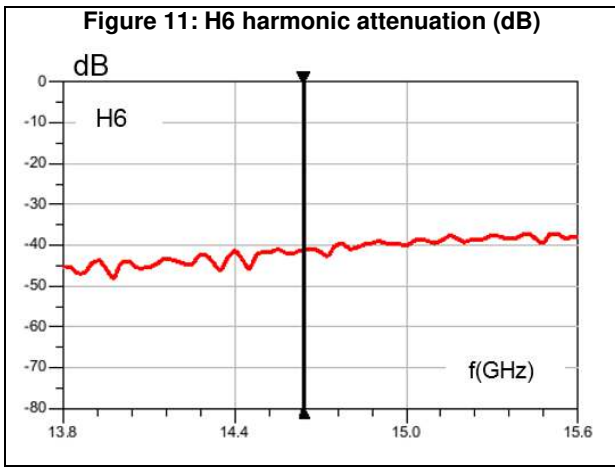
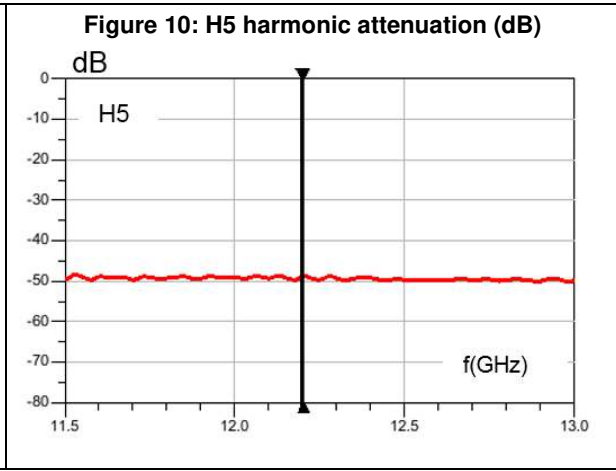
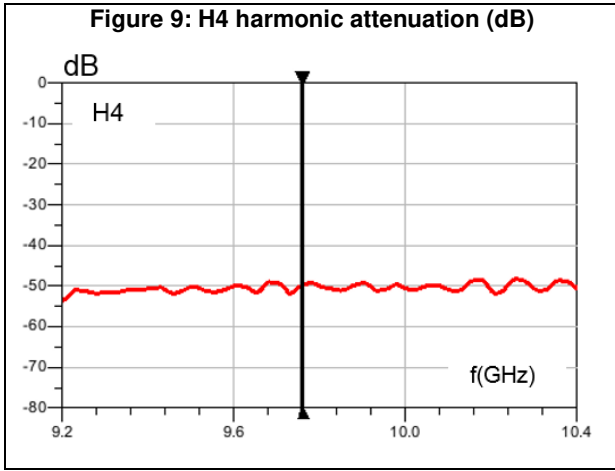
Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
P <sub>IN</sub>	Input power RFIN		-	10	dBm
V <sub>ESD</sub>	ESD ratings human body model, all I/O one at a time while others connected to GND	2000	-		V
	ESD ratings machine model (MM: C = 200 pF, R = 25 Ω, L = 500 nH)	200	-		
T <sub>OP</sub>	Operating temperature	-40	-	+105	°C

**Table 2: Electrical characteristics (T<sub>amb</sub> = 25 °C)**

Symbol	Definition	Value			Unit
		Min.	Typ.	Max.	
Z <sub>diff</sub>	Nominal differential impedance	Match to BlueNRG			Ω
Z <sub>ANT</sub>	Nominal antenna impedance		50		Ω
f	Frequency range (bandwidth)	2400		2500	MHz
I <sub>L</sub>	Insertion loss in bandwidth		1.33	1.85	dB
RL <sub>SE</sub>	Single ended return loss in bandwidth	21	30		
RL <sub>DIFF</sub>	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 <sub>imb</sub>	Output phase imbalance	-3.5	0	3.5	°
A <sub>imb</sub>	Output amplitude imbalance	-1	0	1	dB

## 2.1 RF measurement

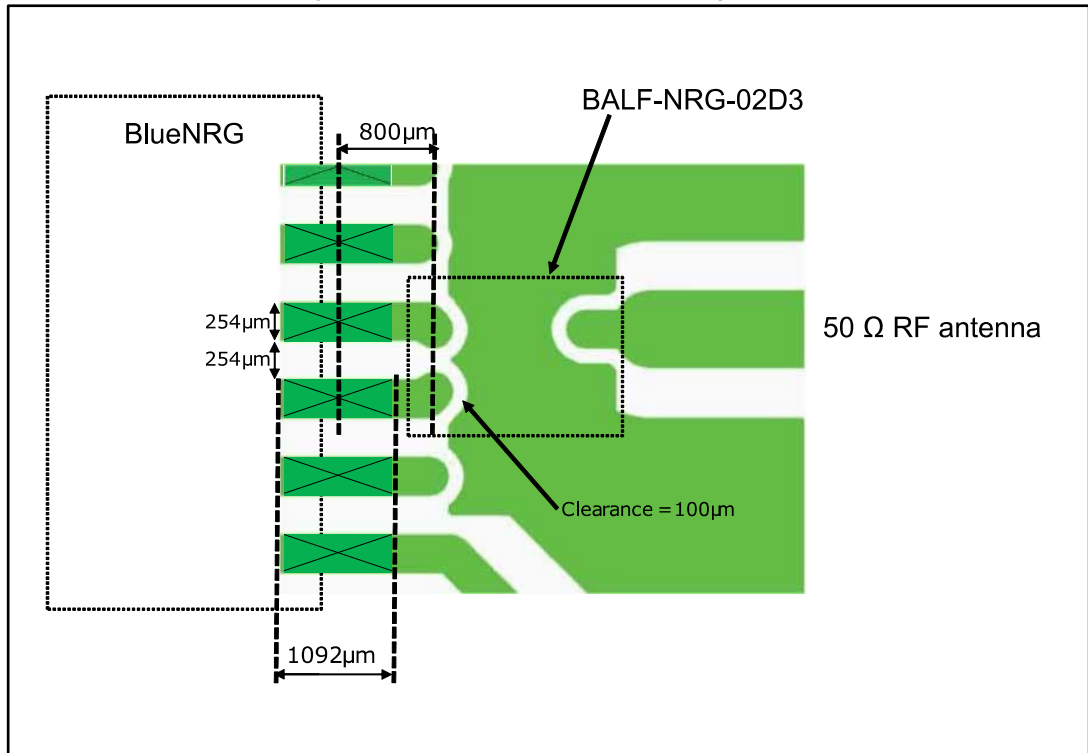




### 3 Application information

#### 3.1 BALF-NRG-02D3 with BlueNRG

Figure 15: Recommended balun land pattern

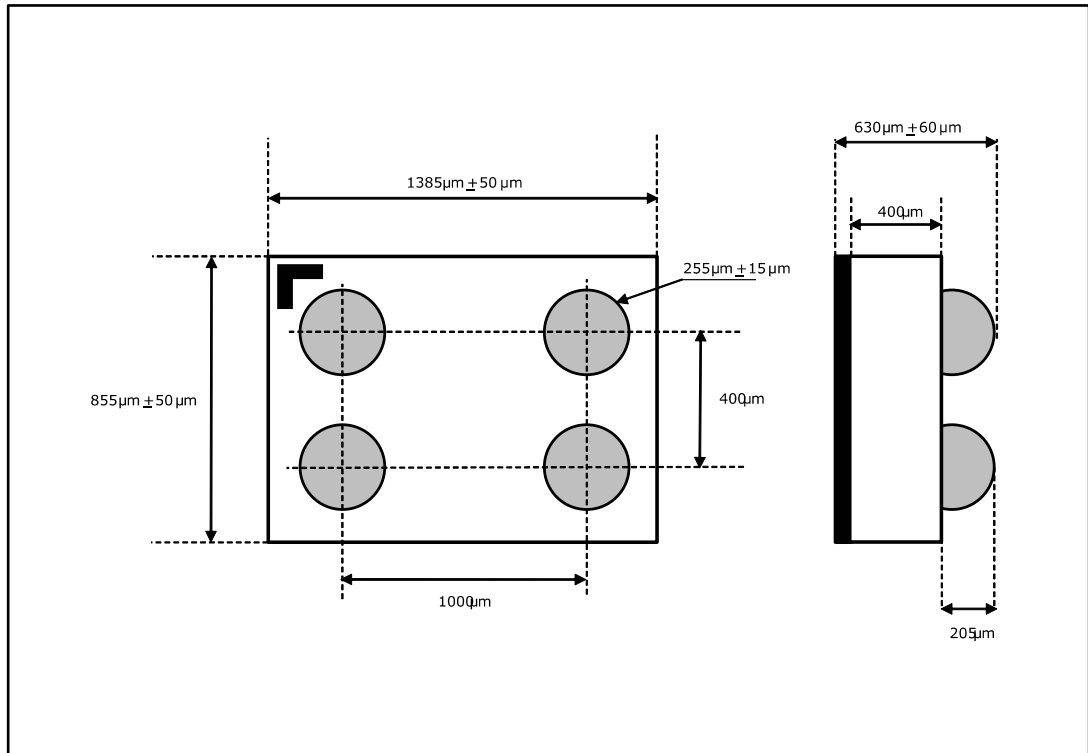


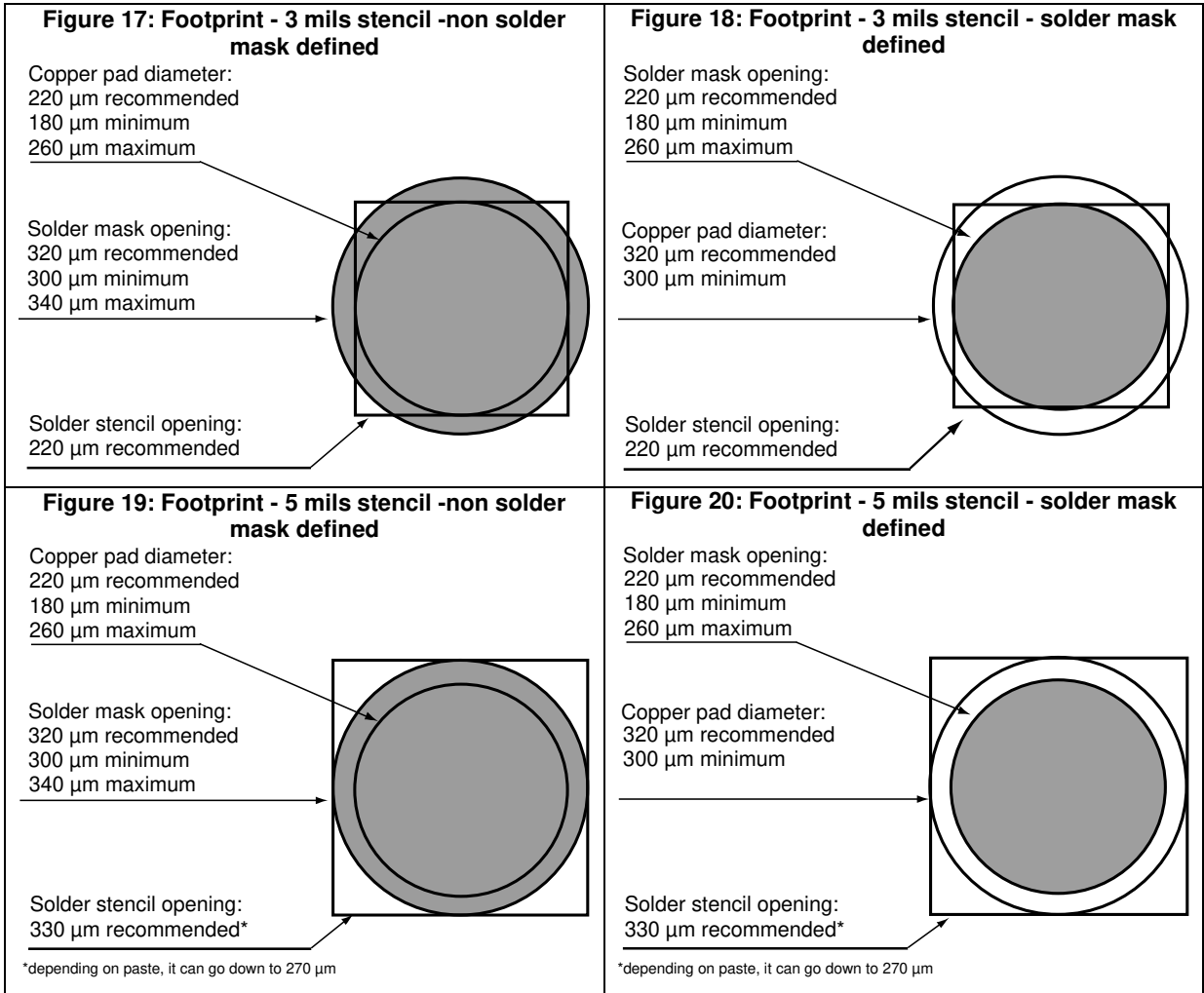
## 4 Package information

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](http://www.st.com). ECOPACK® is an ST trademark.

### 4.1 CSPG 0.4 package information

Figure 16: CSPG package outline (bump view)







## 4.2 CSPG 0.4 packing information

Figure 21: Marking

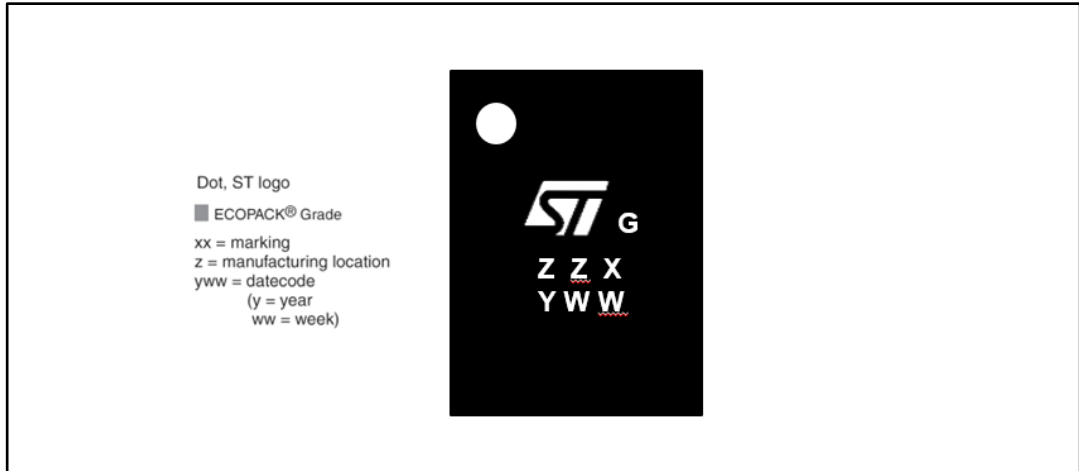
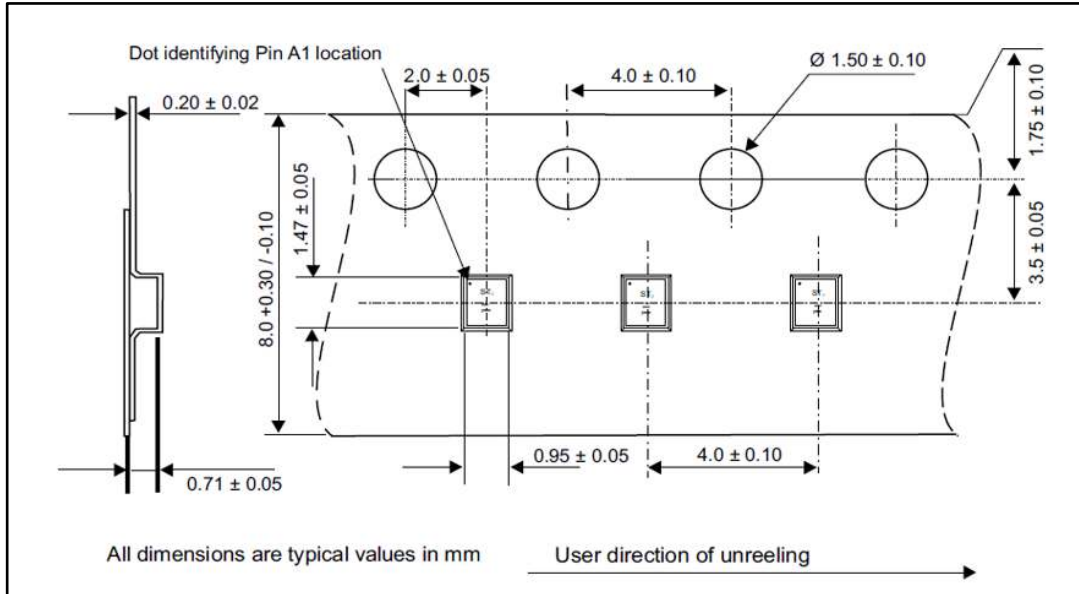


Figure 22: Flip Chip tape and reel specifications



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

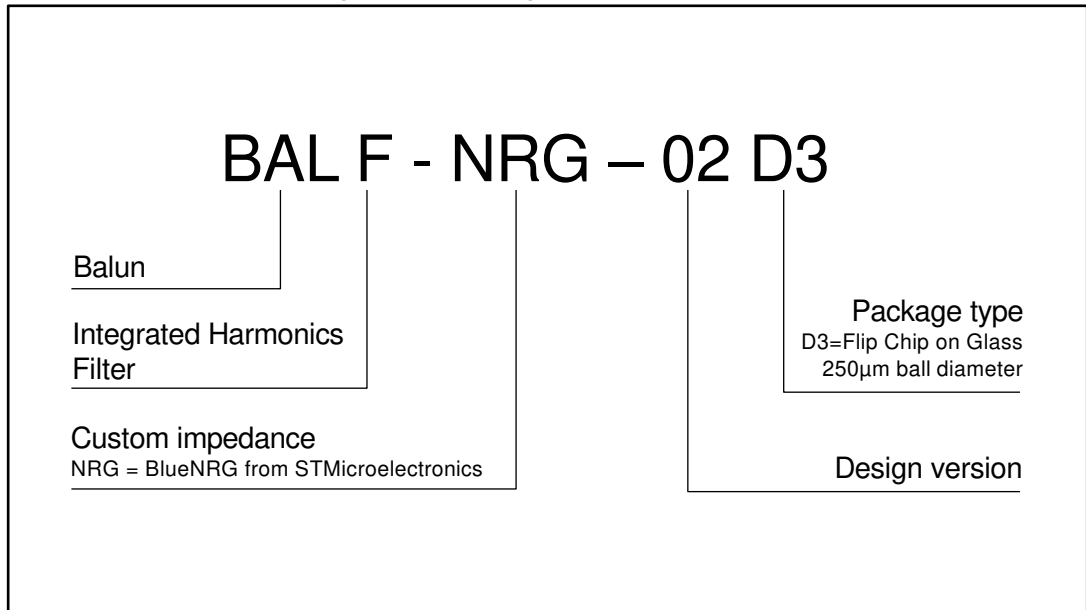


Table 4: Ordering information

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.

**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.

© 2017 STMicroelectronics – All rights reserved