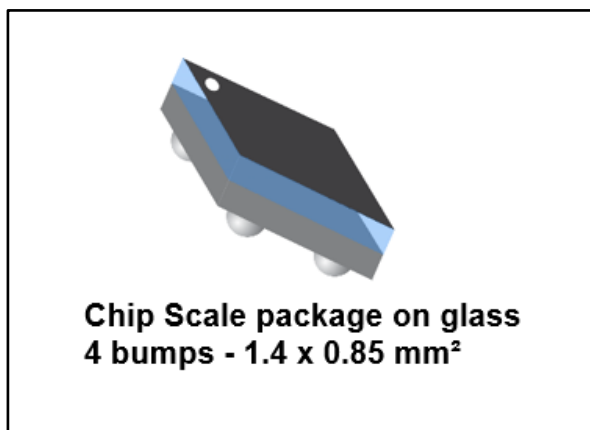


50 ohm nominal input / conjugate match to BlueNRG tranceiver,
with integrated harmonic filter

Datasheet - production data



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

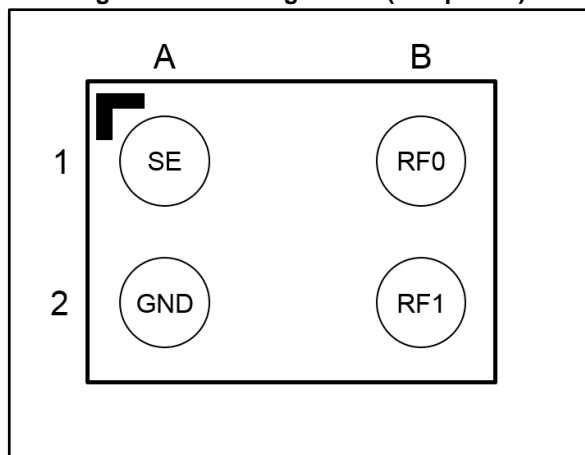
Applications

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

Description

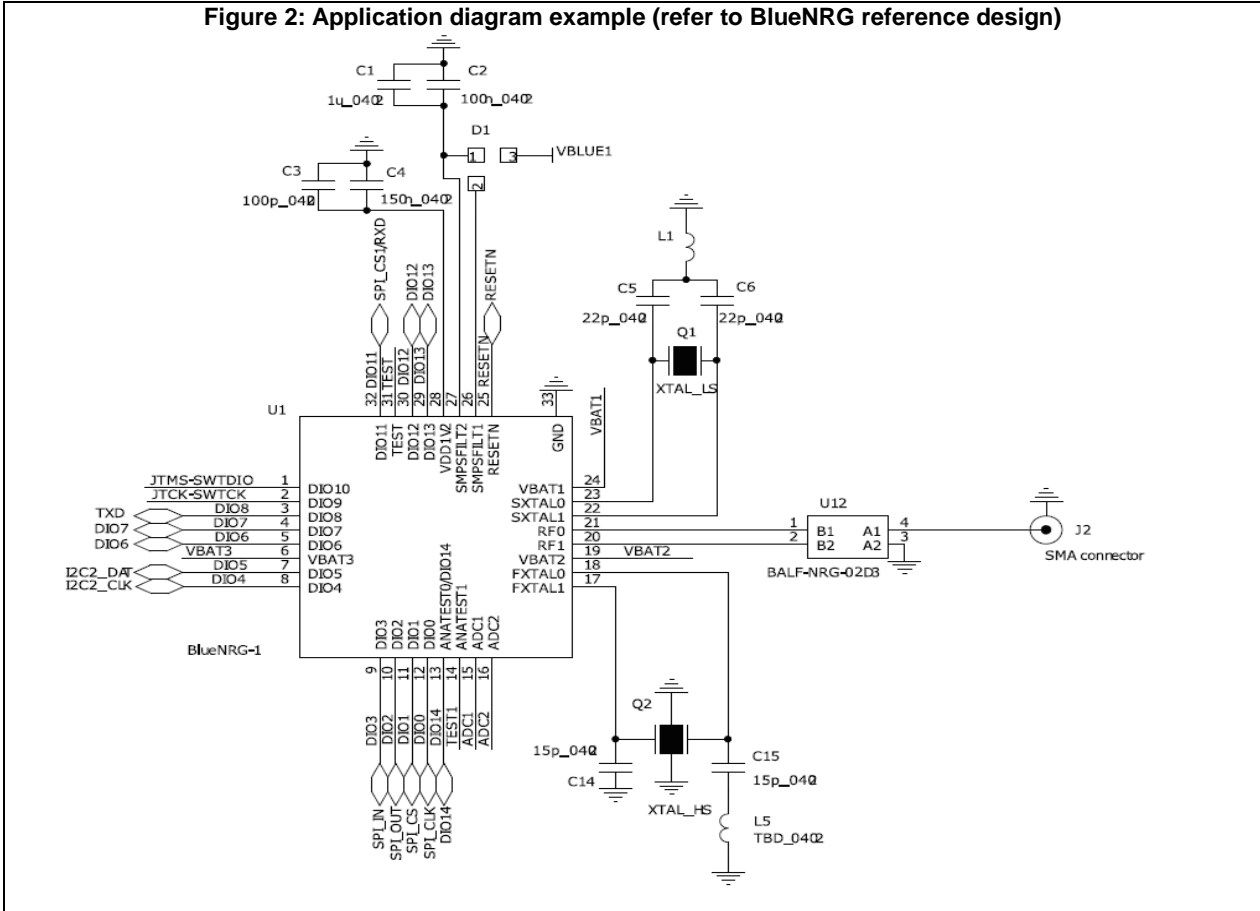
This device is an ultra-miniature balun which integrates matching network and harmonics filter. Matching impedance has been customized for the BlueNRG ST tranceiver. The BALF-NRG-02D3 uses STMicroelectronics IPD technology on non-conductive glass substrate which optimizes RF performance.

Figure 1: Pin configuration (bump view)



1 Application schematic

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



2 Characteristics

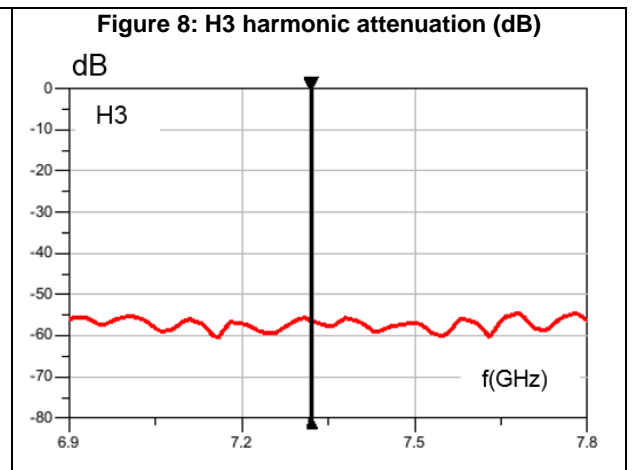
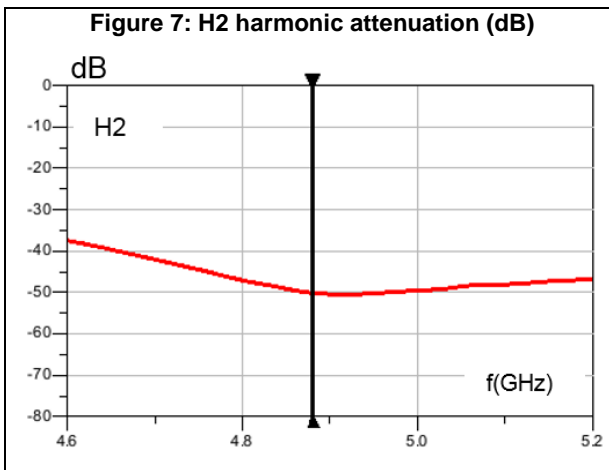
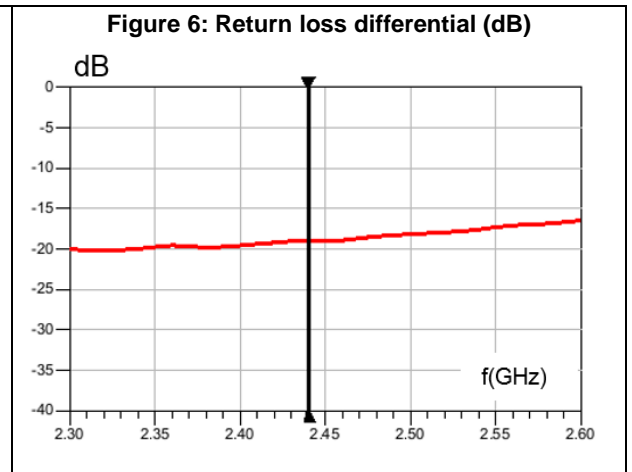
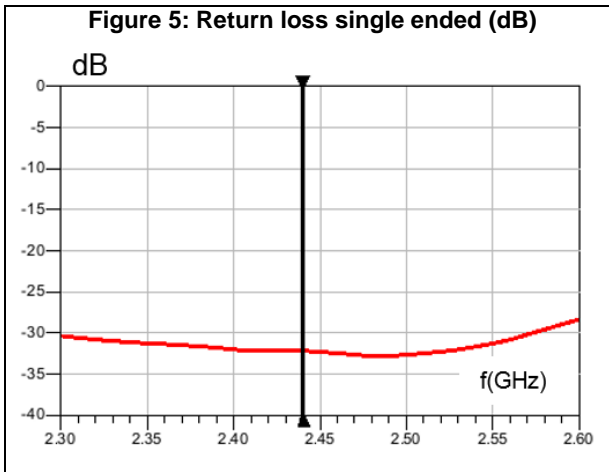
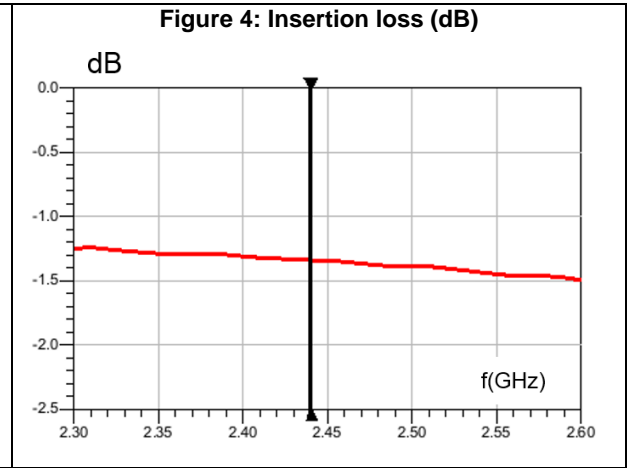
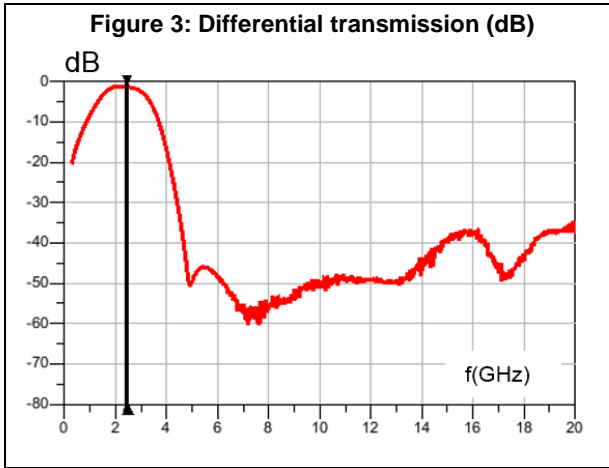
Table 1: Absolute maximum ratings (limiting values)

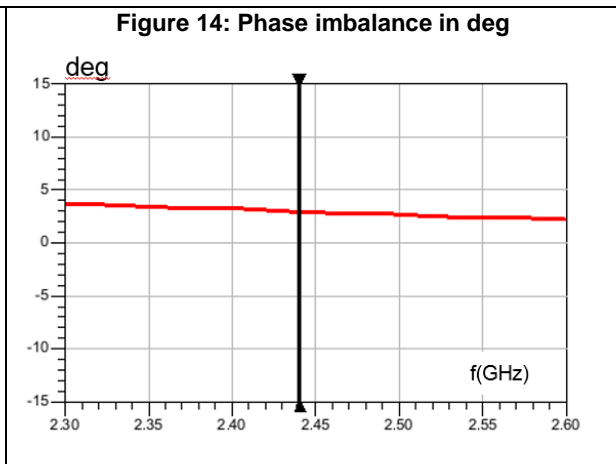
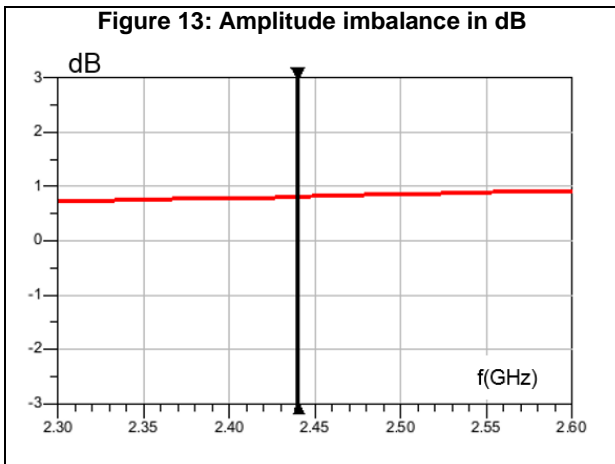
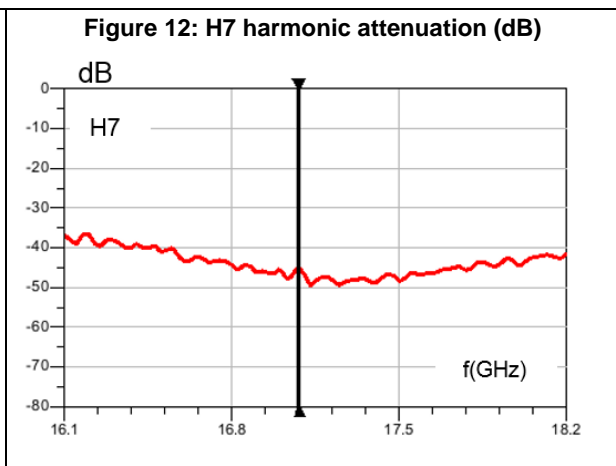
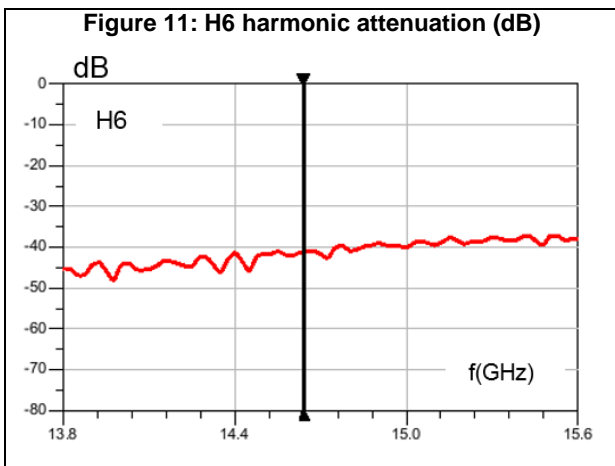
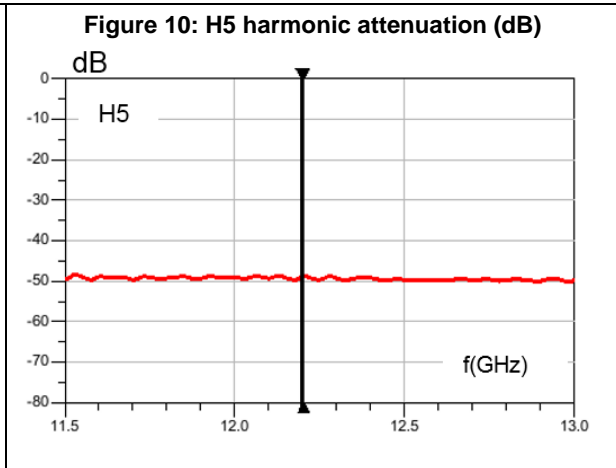
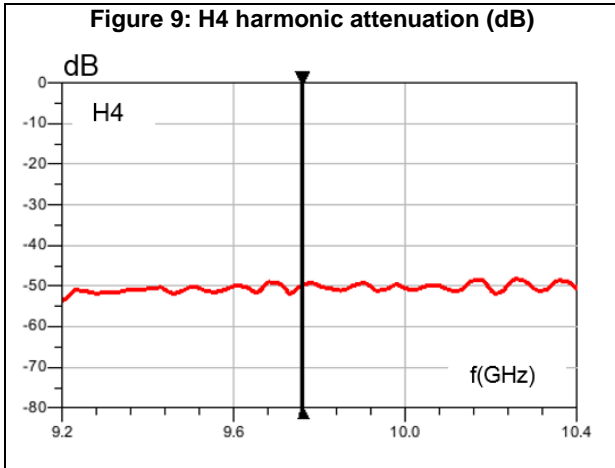
| Symbol | Parameter | Value | | | Unit |
|------------------|---|-------|------|------|------|
| | | Min. | Typ. | Max. | |
| P _{IN} | Input power RFIN | | - | 10 | dBm |
| V _{ESD} | ESD ratings human body model, all I/O one at a time while others connected to GND | 2000 | - | | V |
| | ESD ratings 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

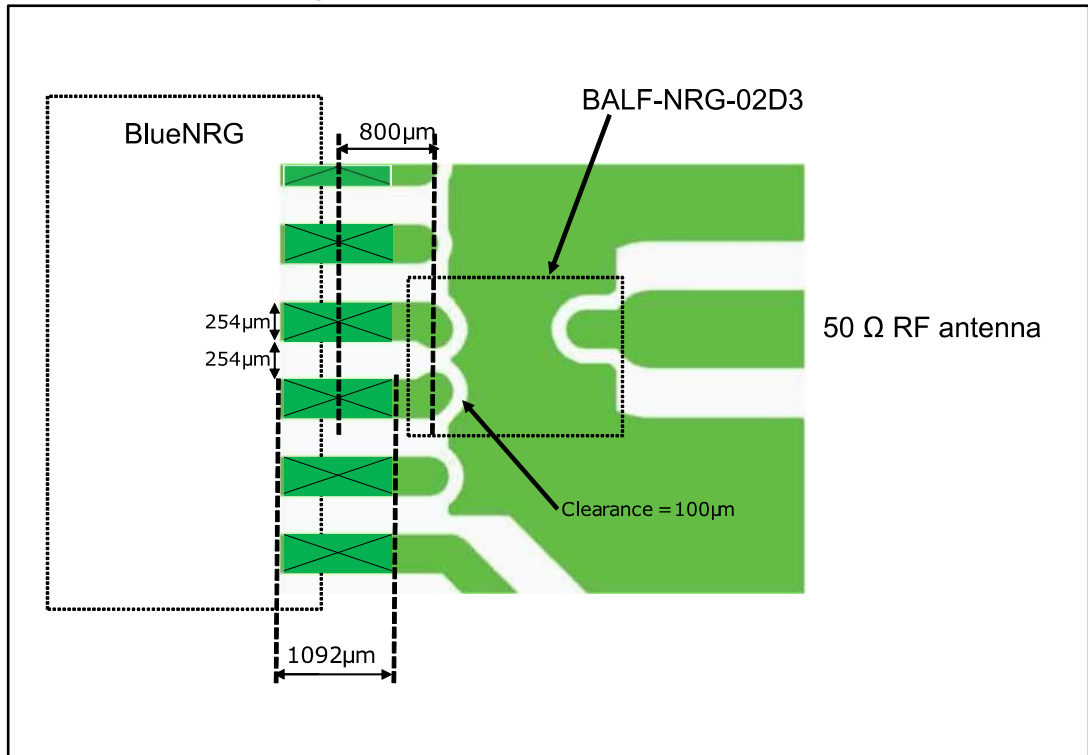




3 Application information

3.1 BALF-NRG-02D3 with BlueNRG

Figure 15: Recommended balun land pattern

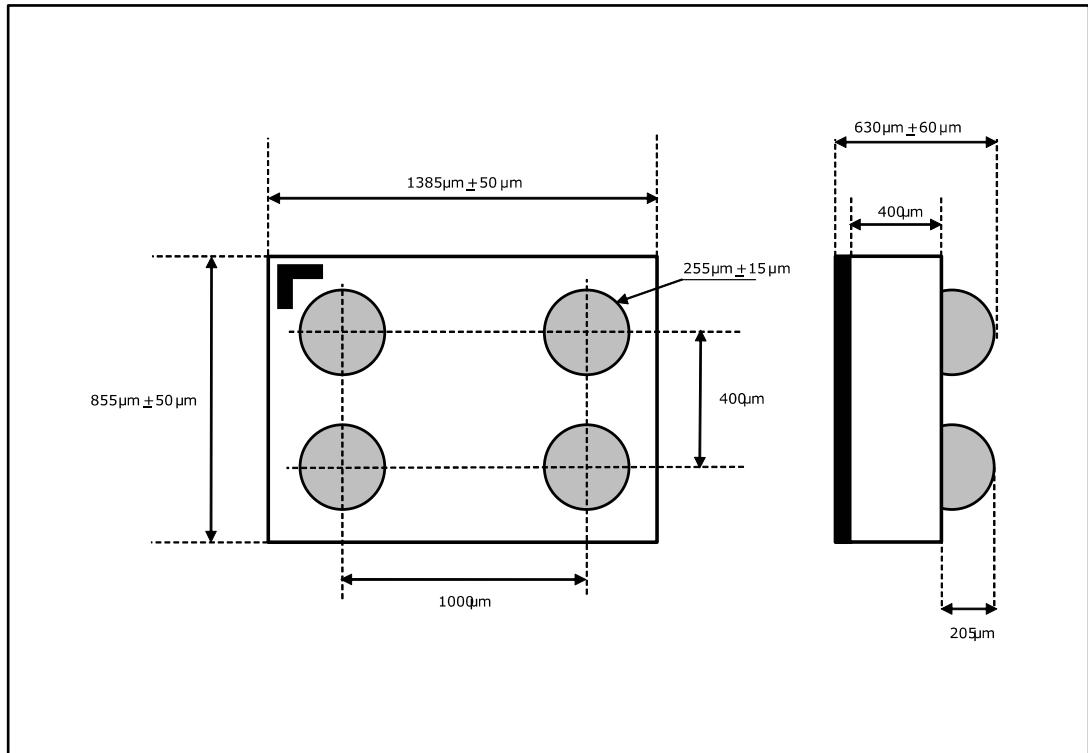


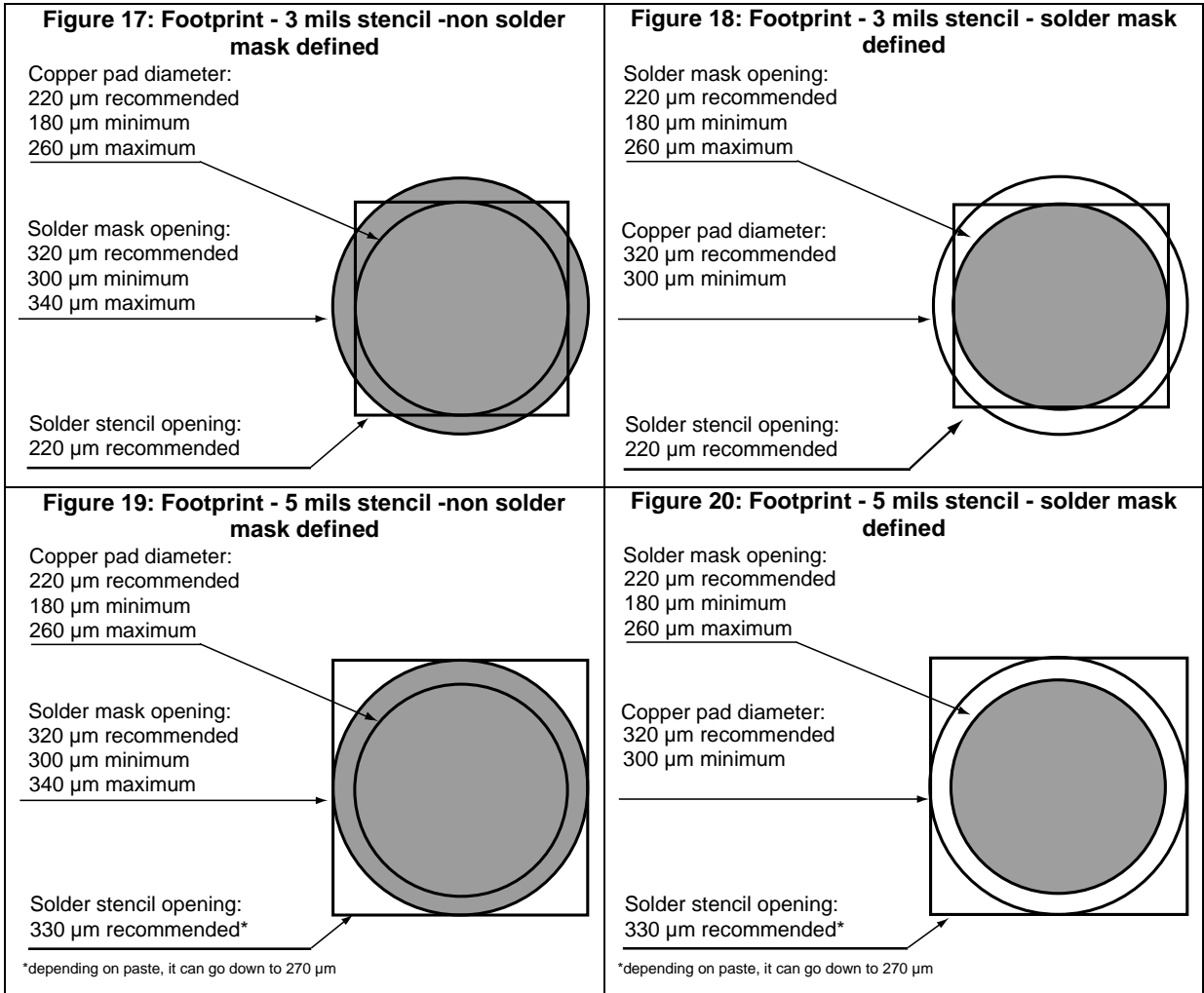
4 Package information

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)



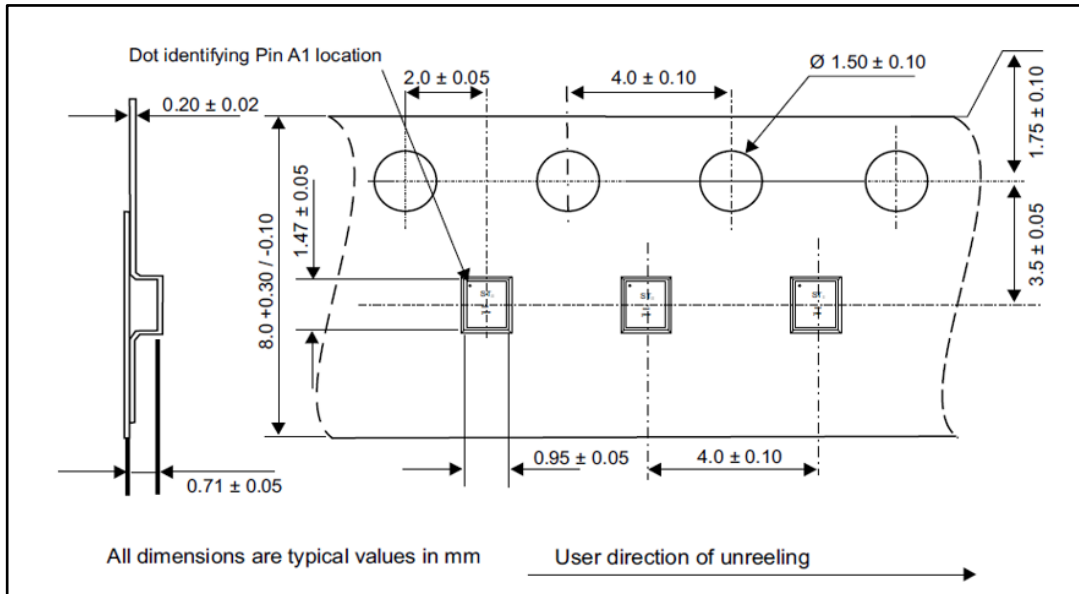


4.2 CSPG 0.4 packing information

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

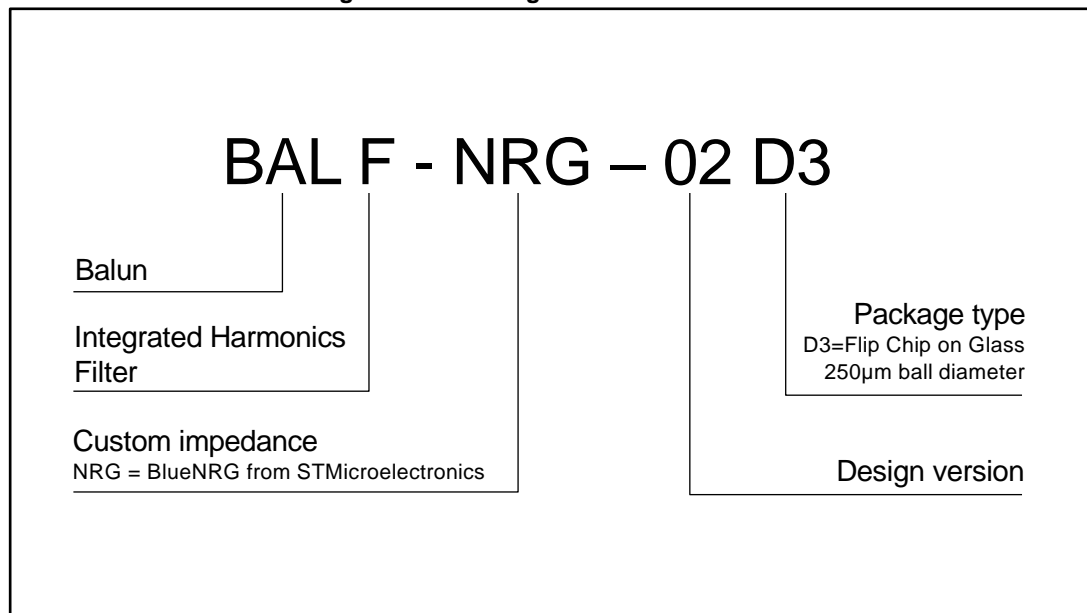


Table 4: Ordering information

| 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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