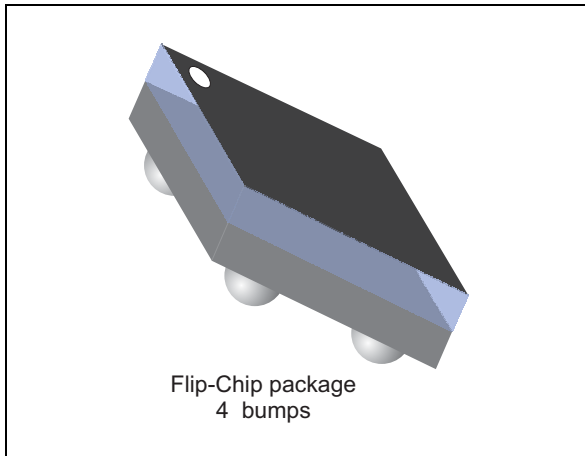


50 ohm nominal input / conjugate match balun to CC1101 / CC1150 (868-928 MHz), with integrated harmonic filter

Datasheet – production data



Description

STMicroelectronics BAL-CC1101-01D3 is an ultra miniature balun which integrates a matching network in a monolithic glass substrate. This has been customized for the CC1101 / CC1150 TI transceiver.

It's a design using STMicroelectronics IPD (integrated passive device) technology on non-conductive glass substrate to optimize RF performance.

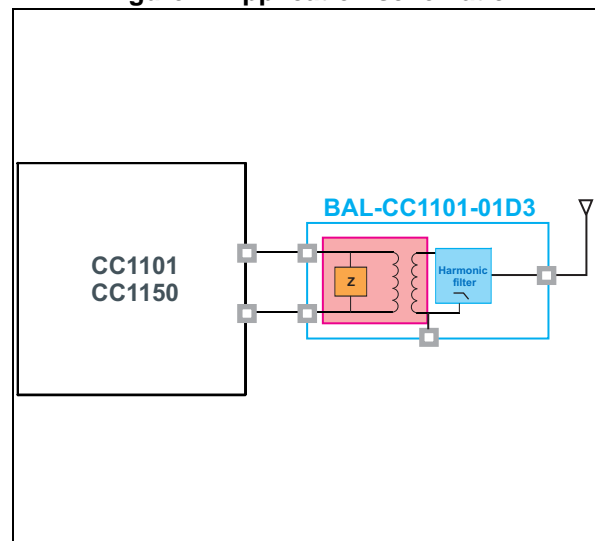
Features

- 50 Ω nominal input / conjugate match to CC1101 / CC1150
- Low insertion loss
- Low amplitude imbalance
- Low phase imbalance
- Coated Flip-Chip on glass
- Small footprint: < 2.1 mm²

Benefits

- Extremely low profile (< 550 μ m after reflow)
- High RF performance
- RF BOM and area reduction

Figure 1. Application schematic



1 Characteristics

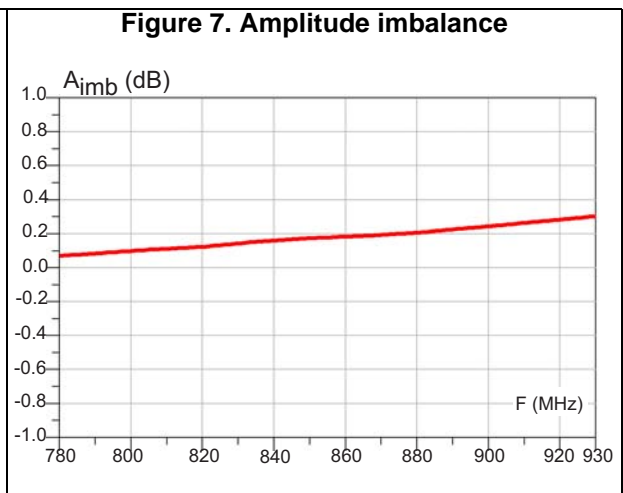
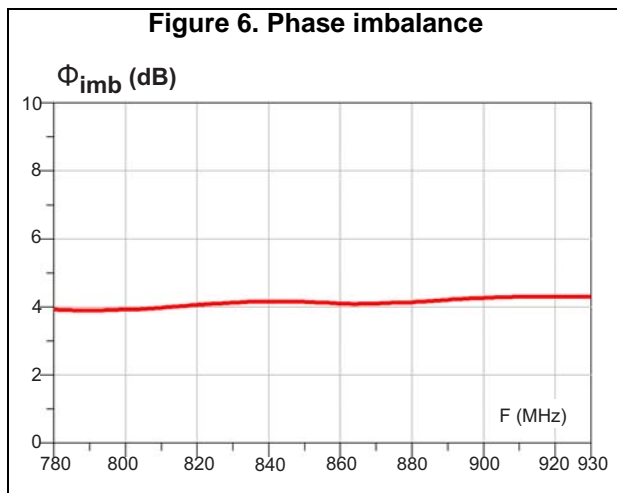
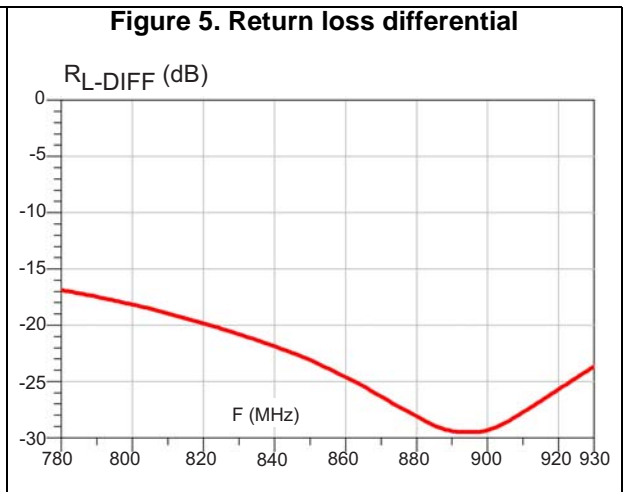
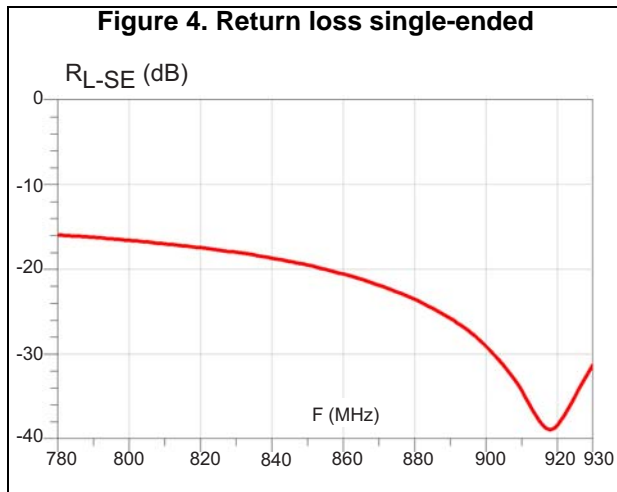
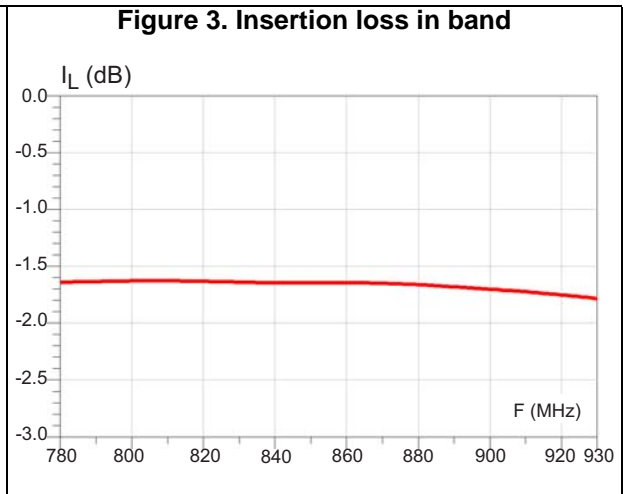
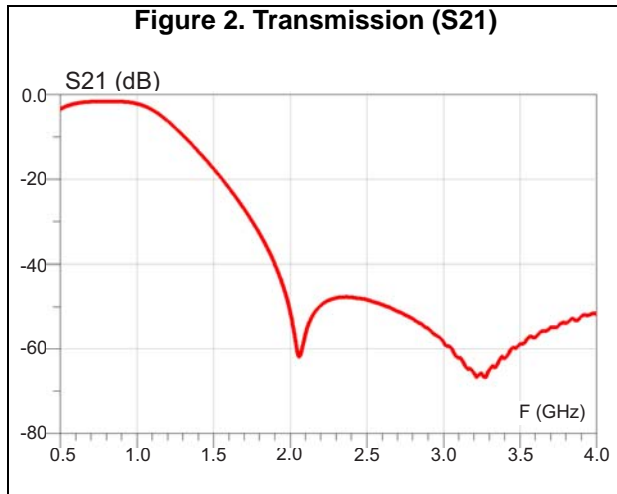
Table 1. Absolute maximum rating (limiting values)

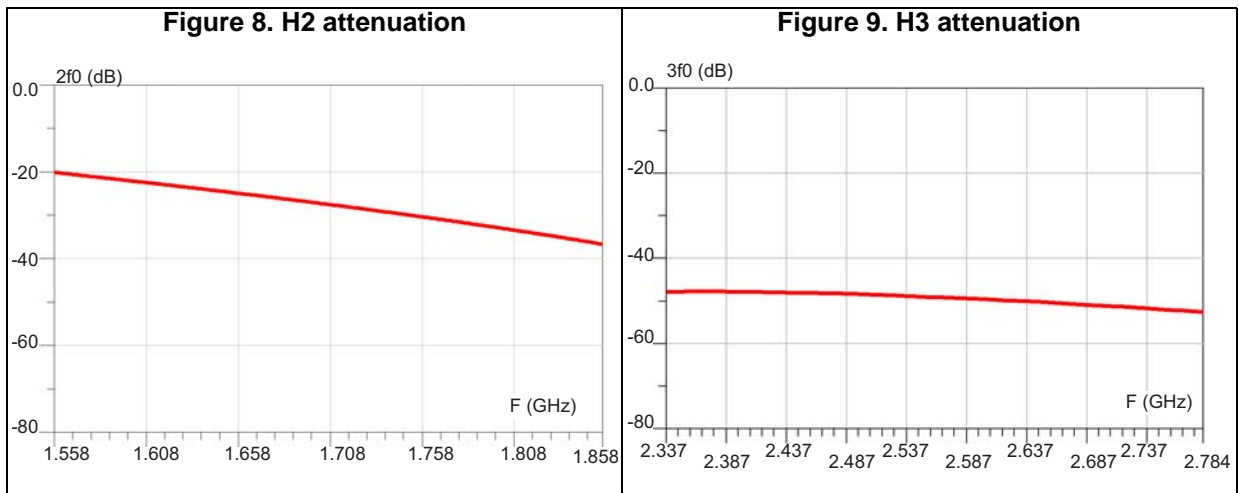
| Symbol | Parameter | Value | Unit |
|-----------|--|-------------|------|
| P_{IN} | Input power RF_{IN} | 20 | dBm |
| V_{ESD} | ESD ratings human body model (JESD22-A114C), all I/O one at a time while others connected to GND | 2000 | V |
| | ESD ratings machine model, all I/O | 500 | |
| | ESD ratings charged device model (JESD22-C101D) | 500 | |
| T_{OP} | Operating temperature | -40 to +125 | °C |

Table 2. Electrical characteristics - RF performance ($T_{amb} = 25\text{ °C}$)

| Symbol | Parameter | Value | | | Unit |
|---------------|---|-------|------------------------------------|------|----------|
| | | Min. | Typ. | Max. | |
| Z_{OUT} | Nominal differential output impedance | | Conjugate match to CC1101 / CC1150 | | Ω |
| Z_{IN} | Nominal input impedance | | 50 | | |
| F | Frequency range (bandwidth) | 779 | | 928 | MHz |
| I_L | Insertion loss in bandwidth | | 1.7 | 1.9 | dB |
| R_{L_SE} | Single ended return loss in bandwidth | | 15 | | dB |
| R_{L_DIFF} | Differential ended return loss in bandwidth | | 15 | | dB |
| Φ_{imb} | Phase imbalance | -10 | | 10 | ° |
| A_{imb} | Amplitude imbalance | -1 | | 1 | dB |
| Att | Harmonic levels (TX filter) | | | | dB |
| | Attenuation at 2fo | | -25 | | |
| | Attenuation at 3fo | | -50 | | |

1.1 Measurements





2 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.

2.1 Flip-Chip package information

Figure 10. Flip-Chip package outline

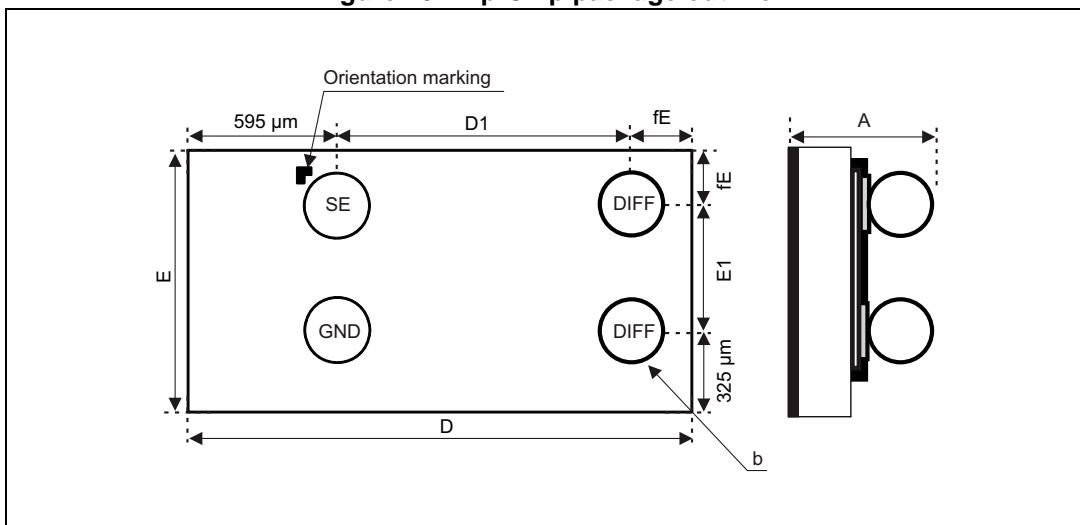


Table 3. Flip-Chip package mechanical data

| Parameter | Description | Min. | Typ. | Max. | Unit |
|-----------|---|-------|-------|-------|------|
| A | Bump height + substrate thickness | 0.570 | 0.630 | 0.690 | mm |
| b | Bump diameter | 0.215 | 0.255 | 0.295 | mm |
| D | Y dimension of the die | 1.970 | 2.020 | 2.070 | mm |
| D1 | Y pitch | | 1.200 | | mm |
| E | X dimension of the die | 1.000 | 1.050 | 1.100 | mm |
| E1 | X pitch | | 0.500 | | mm |
| fE | Distance from bump to edge of die on X axis | | | 0.225 | mm |

Figure 11. Footprint - 3 mils stencil - non solder mask defined

Copper pad diameter:
220 μm recommended
180 μm minimum
260 μm maximum

Solder mask opening:
320 μm recommended
300 μm minimum
340 μm maximum

Solder stencil opening:
220 μm recommended

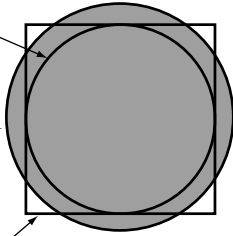


Figure 12. Footprint - 3 mils stencil - solder mask defined

Solder mask opening:
220 μm recommended
180 μm minimum
260 μm maximum

Copper pad diameter:
320 μm recommended
300 μm minimum

Solder stencil opening:
220 μm recommended

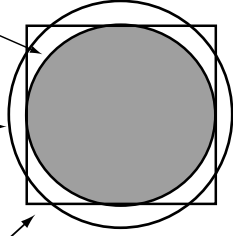


Figure 13. Footprint - 5 mils stencil - non solder mask defined

Copper pad diameter:
220 μm recommended
180 μm minimum
260 μm maximum

Solder mask opening:
320 μm recommended
300 μm minimum
340 μm maximum

Solder stencil opening:
330 μm recommended*

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

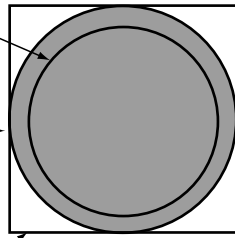


Figure 14. Footprint - 5 mils stencil - solder mask defined

Solder mask opening:
220 μm recommended
180 μm minimum
260 μm maximum

Copper pad diameter:
320 μm recommended
300 μm minimum

Solder stencil opening:
330 μm recommended*

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

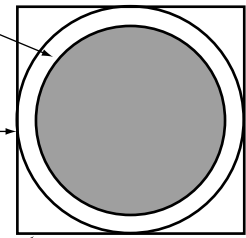


Figure 15. PCB view CC1101 with BAL-CC1101-01D3

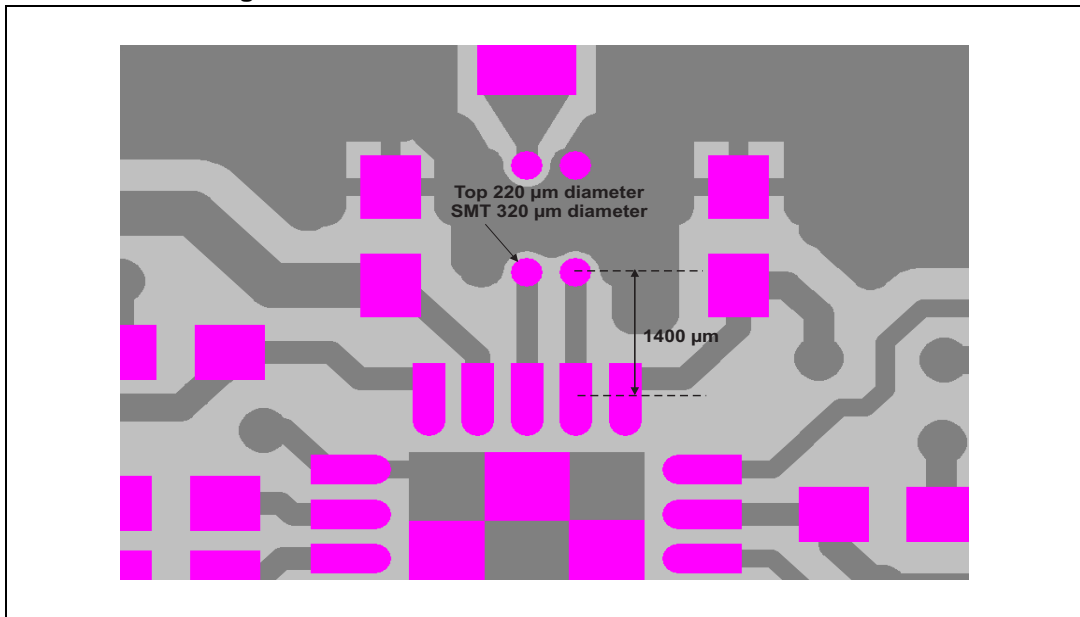


Figure 16. Marking

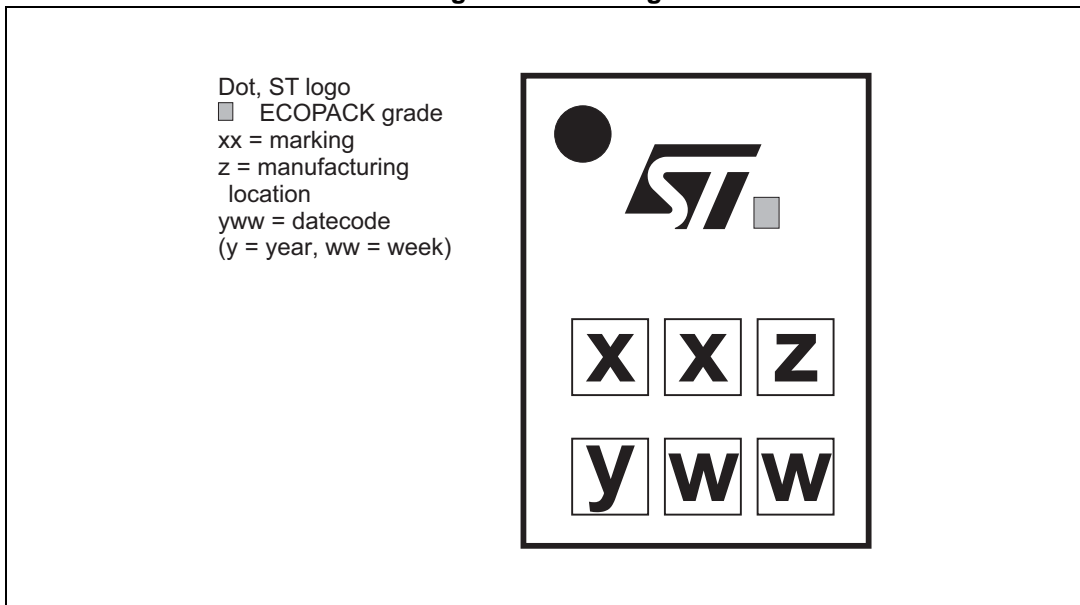
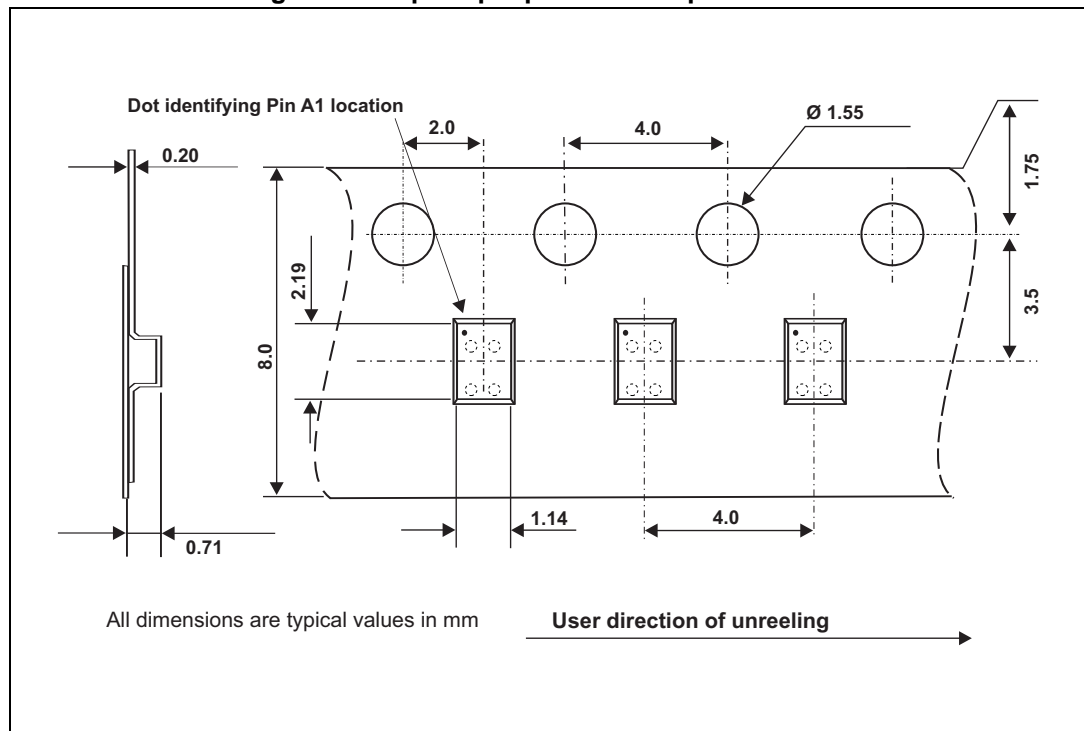


Figure 17. Flip Chip tape and reel specifications



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

3 Ordering information

Table 4. Ordering information

| Order code | Marking | Package | Weight | Base qty | Delivery mode |
|-----------------|---------|-----------|---------|----------|--------------------|
| BAL-CC1101-01D3 | SS | Flip-Chip | 2.21 mg | 5000 | Tape and reel (7") |

4 Revision history

Table 5. Document revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 23-Jan-2014 | 1 | Initial release |
| 18-Sep-2015 | 2 | Updated Figure 10. Added Figure 11, Figure 12, Figure 13, Figure 14 and Table 3. |
| 02-May-2016 | 3 | Updated Figure 10 and Table 3 . |

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