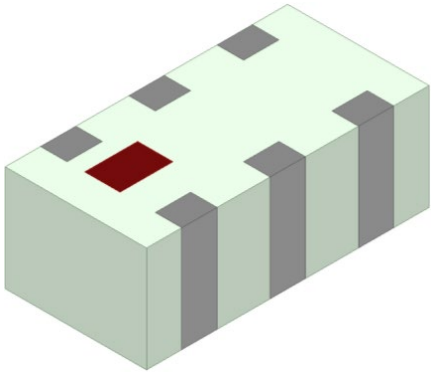
# 770 – 928 MHz Impedance-matched Balun-filter for Texas Instruments CC1310 and 1312R Wireless MCUs

- 783, 868, and 915MHz ISM bands
- SMD, EIA 0603
- Complete front-end solution
  - Integrated impedance-matching balun
  - Integrated harmonic filter for regulatory compliance
- Designed for use with Texas Instruments MCU part numbers:
  - CC1310
  - CC1312R



## General Specifications[1]

| **Passband Frequency (MHz)** | **770 - 928** | |
|---|---|---|
| Unbalanced Impedance, Antenna-side (Ω) | 50 | |
| Balanced Impedance, Transceiver-side (Ω) | Impedance match to Texas Instruments CC1310, CC1312R | |
| **Frequency Bands (MHz)** | **770 – 860** | **860 – 928** |
| Insertion Loss (dB) | 1.3 Typ. (1.6 Max.) | 1.8 Typ. (2.2 Max.) |
| Return Loss (dB) | 9.5 Min. | 9.5 Min. |
| Phase Difference (Degree) | 180 ± 17 | 180 ± 15 |
| Amplitude Difference (dB) | 3.5 Max. | 2.0 Max. |
| Attenuation | | |
| Frequency Range (MHz)<br>Attenuation (dB) | 1540 – 1720<br>8 Min. | |
| Frequency Range (MHz)<br>Attenuation (dB) | 1720 – 1736<br>15 Min. | |
| Frequency Range (MHz)<br>Attenuation (dB) | 1736 – 1856<br>15 Min. | |
| Frequency Range (MHz)<br>Attenuation (dB) | 2310 – 2580<br>30 Min. | |
| Frequency Range (MHz)<br>Attenuation (dB) | 2580 – 2784<br>30 Min. | |

[1] Typical value represents average measurement at 25°C. Min./Max. values represent measurements within the operating temperature specification unless stated otherwise.



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## General Specifications (continued)

| | |
|---|---|
| Frequency Range (MHz) | 3080 – 3440 |
| Attenuation (dB) | 33 Min. |
| Frequency Range (MHz) | 3440 – 3712 |
| Attenuation (dB) | 35 Min. |

## Maximum Ratings

| | |
|---|---|
| Power Capacity (W) | 2 Max. (CW) |
| Operating Temperature (°C) | -40 to +85 |
| Recommended Storage Conditions post-installation (°C) | -40 to +85 |
| Recommended Storage Conditions and Period for Unused T&R Product | 45% - 75% RH<br>+5 to +35 °C<br>18 Months Max. |



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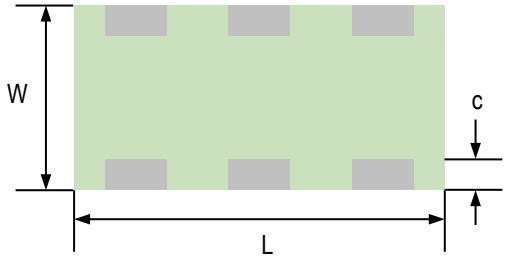
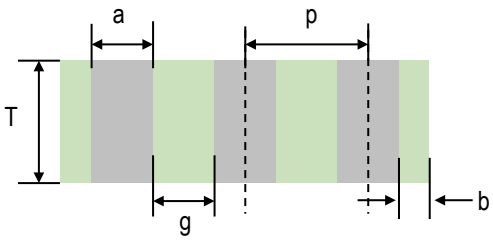
## Mechanical Dimensions

| | Inches | | | Millimeters | | |
|---|---|---|---|---|---|---|
| **L** | 0.079 | ± | 0.006 | 2.00 | ± | 0.15 |
| **W** | 0.049 | ± | 0.004 | 1.25 | ± | 0.10 |
| **T** | 0.031 | ± | 0.004 | 0.80 | ± | 0.10 |
| **a** | 0.010 | ± | 0.004 | 0.25 | ± | 0.10 |
| **b** | 0.012 | ± | 0.006 | 0.30 | ± | 0.15 |
| **c** | 0.008 | +0.004/-0.006 | | 0.20 | +0.10/-0.15 | |
| **p** | 0.020 | ± | 0.004 | 0.50 | ± | 0.10 |

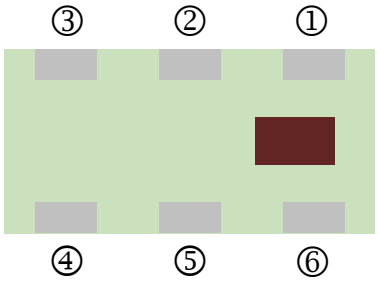
Bottom view




Side view




Top view




## Terminal Configuration

| Pin Number | Function |
|---|---|
| 1 | Unbalanced |
| 2 | RX/TX |
| 3 | Balanced RF_N |
| 4 | Balanced RF_P |
| 5 | GND |
| 6 | GND |



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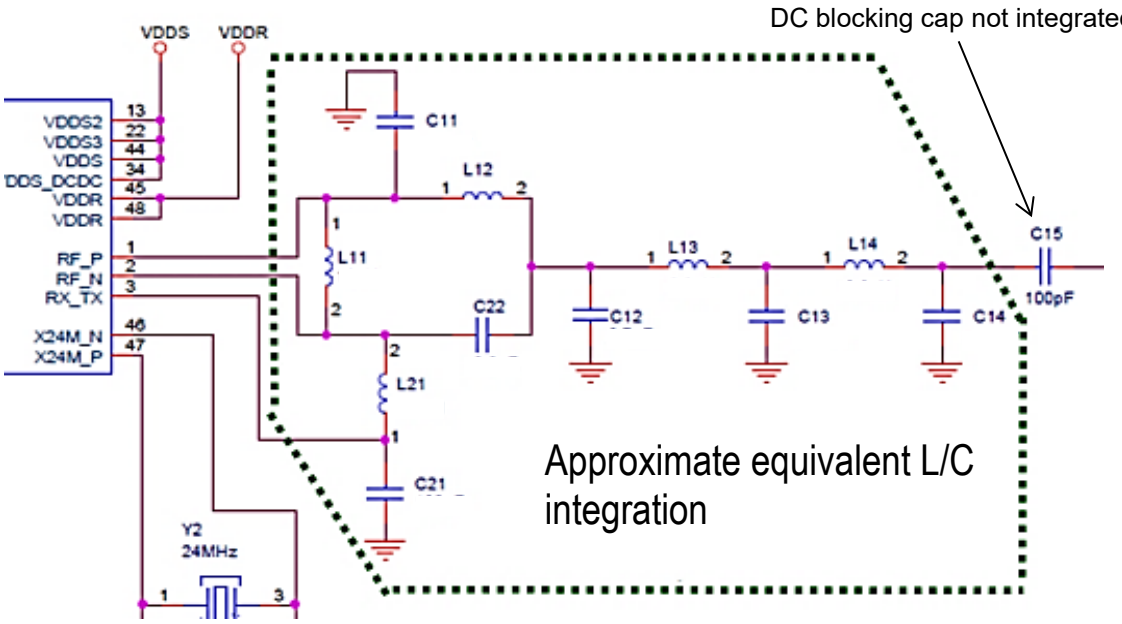
## 0850BM14E0016001T Internal Equivalent Circuit




*We recommend the designer place a DC blocking cap (68-100pF) in series after Pin 1 (between 0850BM14E0016001T and antenna).



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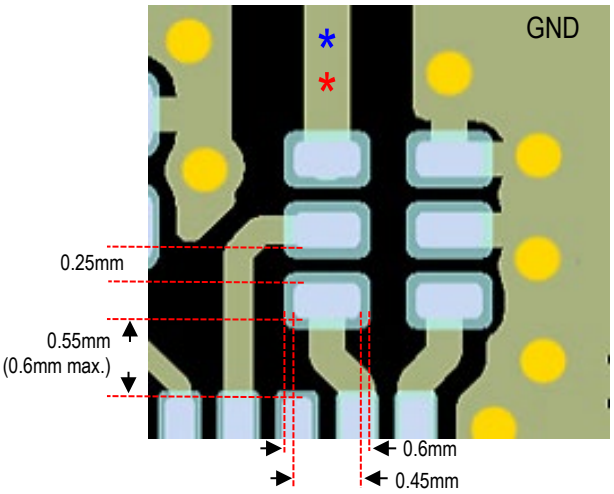
## PCB Reference Design Layout




Solder Resist

Solder Pads

GND Via (ø 0.35mm)

**NOTE: GND via placement is crucial to the harmonic attenuation capability of the filter.**

* We recommend the designer place a DC blocking cap (68-100pF) in series after Pin 1 (between 0850BM14E0016001T and antenna) per page 4 of the datasheet.

* Transmission line width should be designed to match 50Ω characteristic impedance, depending on PCB material and thickness.

If you would like the full reference design package or have any questions,
contact our application engineers at https://www.johansontechnology.com/ask-a-question



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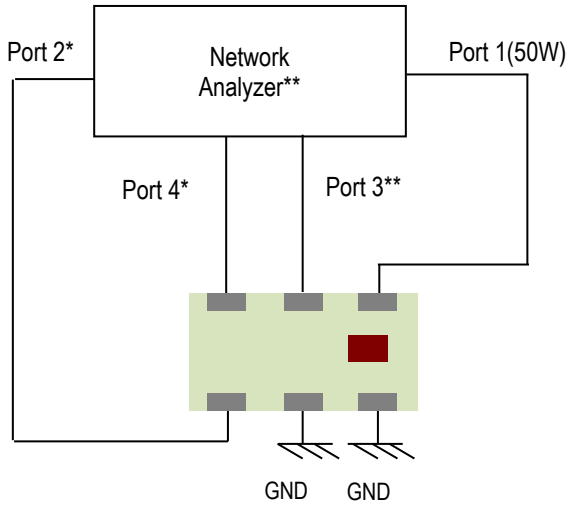
## Measuring Diagram




Port 1: Unbalanced

Ports 2 and 4: Balanced

Port 3: RX_TX

Insertion Loss=SDS21

Return Loss=SSS11

Amplitude Difference = dB(S(2,1)/S(4,1))

Phase Difference = Phase(S(2,1)/S(4,1))

*Ports 2 and 4: Conjugate match to TI CC13XX chipset

**Port 3: Load impedance looking into RX_TX pin of TI CC1310/1312R chipset



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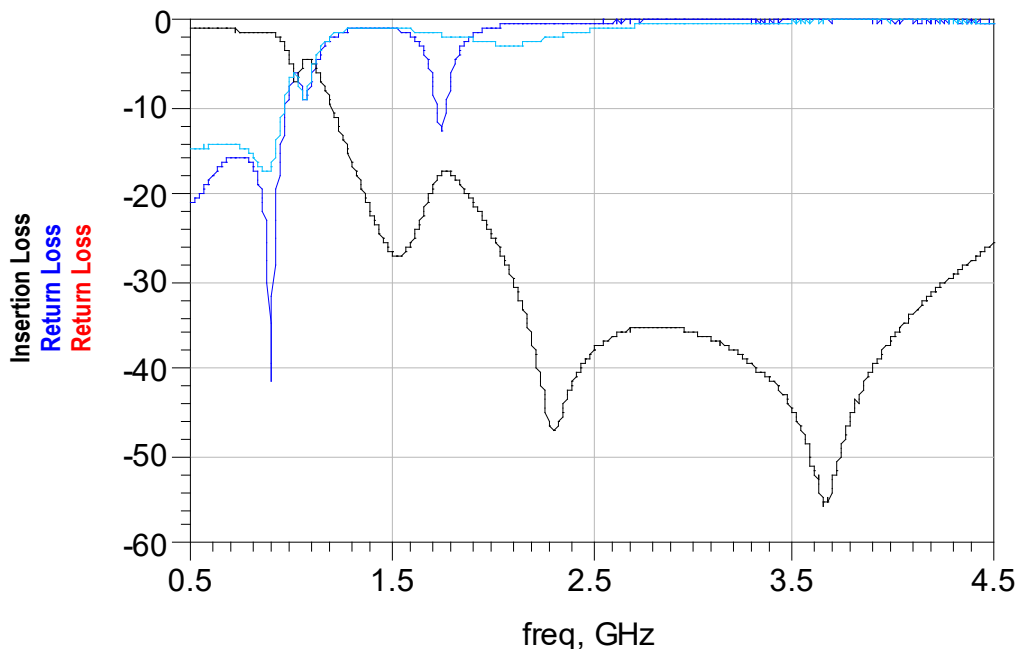
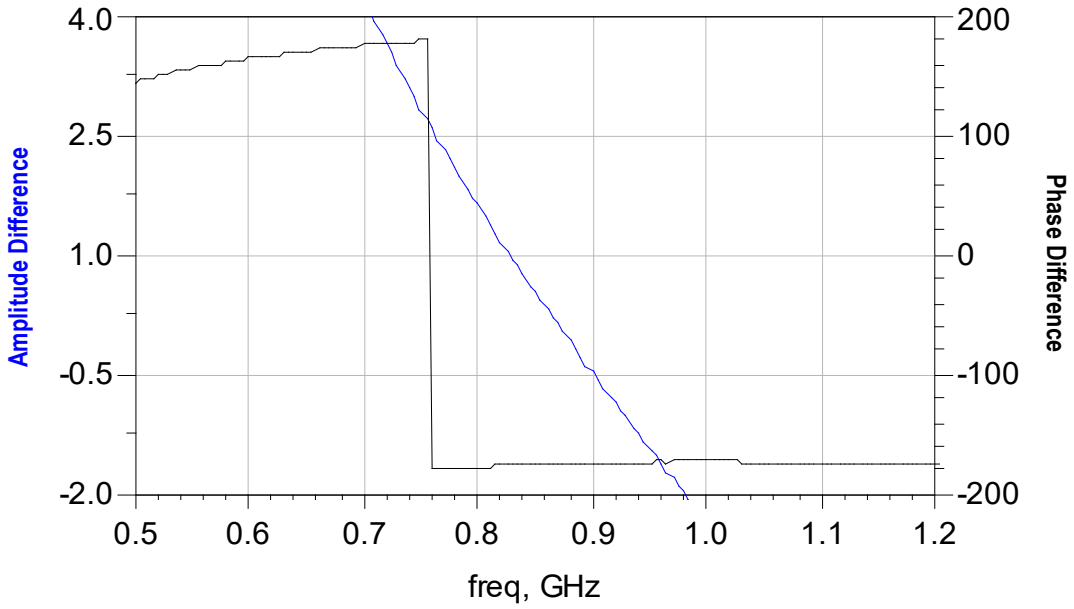
## RF Measurement

Insertion Loss, Return Loss




Phase Difference, Amplitude Difference




S-parameter and layout files available upon request. Please contact https://www.johansontechnology.com/ask-a-question



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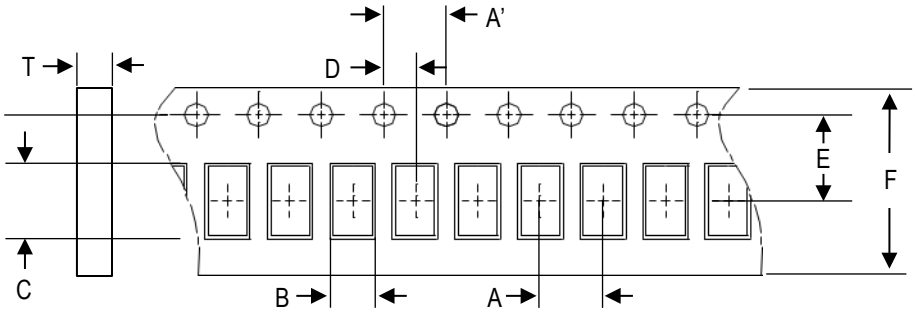
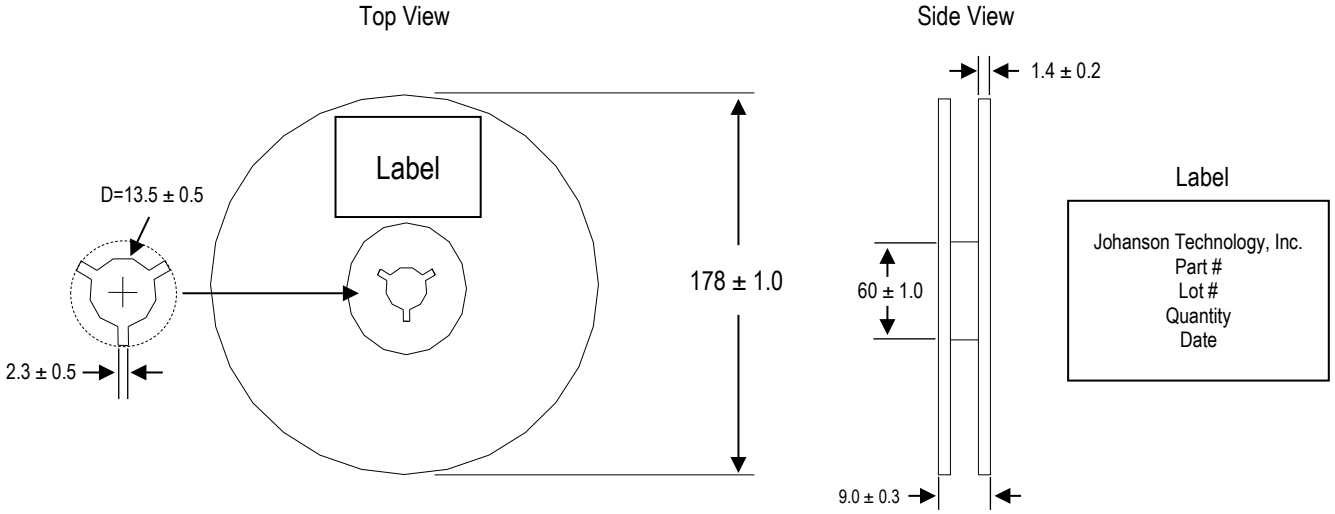
## Tape and Reel Specification (Units in mm)

Tape Dimensions

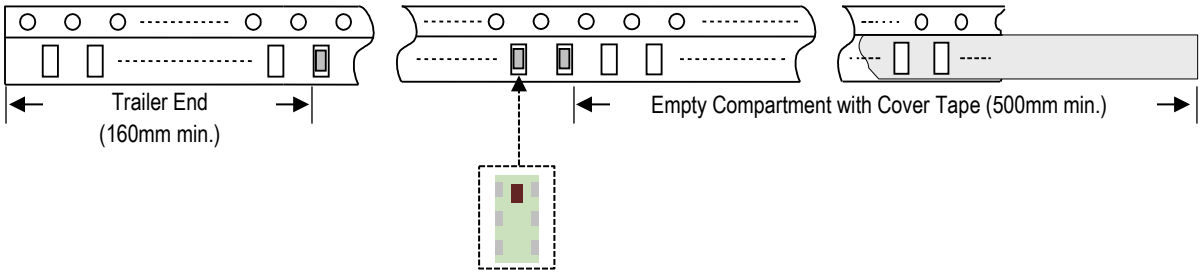



| A | A' | B | C | D | E | F | T | Quantity/reel | Tape material |
|---|---|---|---|---|---|---|---|---|---|
| 4.0±0.1 | 4.0±0.1 | 1.1±0.1 | 1.92±0.1 | 2.0±0.1 | 3.5±0.1 | 8.0±0.1 | 0.75±0.05 | 4,000pcs | Paper |

Reel Dimensions




Leader and Trailer Dimensions



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## Orderable Part Number

| Packaging Style | Part Number |
|---|---|
| Bulk (loose pcs.) | 0850BM14E0016001B |
| T & R (7" Reel Paper Tape) | 0850BM14E0016001T (Qty: 4,000 pcs./reel) |

## Important Links

0850BM14E0016001T Product Page

Texas Instruments Application Note SWRA524

Sub-GHz Chip Antennas

Antenna Tuning, Optimization, and Validation Services

Soldering Information

MSL Information

Packaging Information

Recommended Storage Condition and Max Shelf Life

RoHS Compliance



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