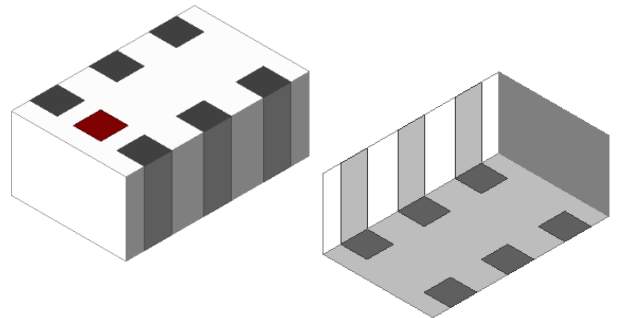


## Impedance-matched Integrated Passive Device (IPD) Balun + Filter for Texas Instruments (TI) +20dBm Transmit Mode

- Designed for the following Texas Instruments chipsets in +20dBm transmit mode:
  - CC1352P, CC1352P7, CC1354P10, CC1311P3, CC1312P
- Replaces 9 L/C components in the original reference design.
- Improves RF performance stability & variability.
- Performance verified by Texas Instruments.
- SMD, EIA 0805, small PCB footprint.



### General Specifications<sup>1</sup>

Passband Frequency (GHz)	2.4 – 2.5
Balanced Impedance ( $\Omega$ )	Impedance-matched to TI CC1352P, CC1352P7, CC1354P10, CC1311P3, and CC1312P
Unbalanced Impedance ( $\Omega$ )	50
Insertion Loss (dB)	1.4 Typ. (1.8 Max.)
Return Loss (dB)	9.5 Min.
Phase Difference (degree)	180 $\pm$ 10 Typ. (180 $\pm$ 20 Max.)
Amplitude Difference (dB)	0.9 Typ. (2.0 Max.)
<b>Attenuation</b>	
Frequency Range (MHz)	4800 – 5000
Attenuation (dB)	47 Typ. (40 Min.)
Frequency Range (MHz)	7200 – 7500
Attenuation (dB)	38 Typ. (30 Min.)
Frequency Range (MHz)	9600 – 10000
Attenuation (dB)	39 Typ. (20 Min.)
Frequency Range (MHz)	1200 - 12500
Attenuation (dB)	17 Typ. (10 Min.)

<sup>1</sup> Typical value represents average measurement at 25°C. Min./Max. values represent measurements over specified operating temperature.

**Maximum Ratings**

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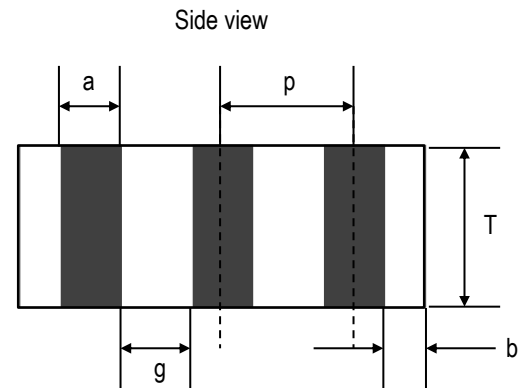
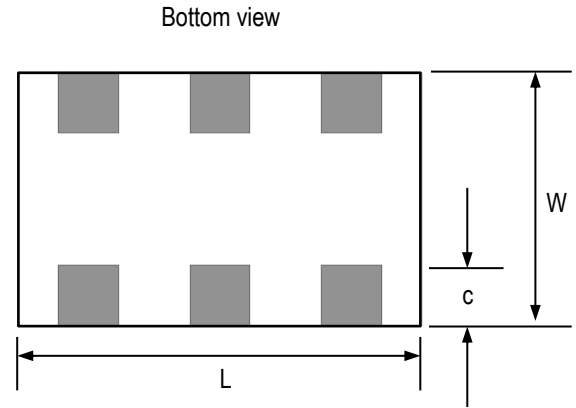
Power Capacity (W)	1 Max. (CW)
Operating Temperature (°C)	-40 to +85
Recommended Storage Conditions post-installation (°C)	-40 to +85
Recommended Storage Conditions and Period for Unused T&R Product <sup>2</sup>	45% - 60% RH +5 to +35°C 18 Months Max.

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<sup>2</sup> 18 months recommended shelf life on unused product on T&R.

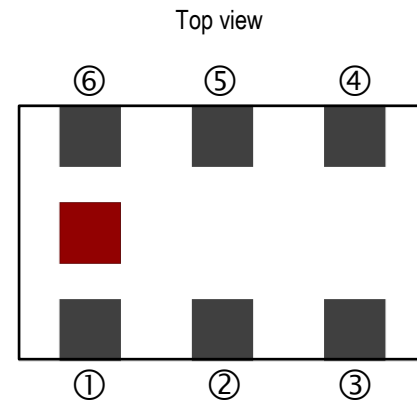
**Mechanical Dimensions**

	Inches			Millimeters		
<b>L</b>	0.079	±	0.004	2.00	±	0.10
<b>W</b>	0.049	±	0.004	1.25	±	0.10
<b>T</b>	0.031	±	0.004	0.80	±	0.10
<b>a</b>	0.012	±	0.004	0.30	±	0.10
<b>b</b>	0.008	±	0.004	0.20	±	0.10
<b>c</b>	0.012		+0.004/-0.008	0.30		+0.10/-0.20
<b>g</b>	0.014	±	0.004	0.35	±	0.10
<b>p</b>	0.026	±	0.002	0.65	±	0.05



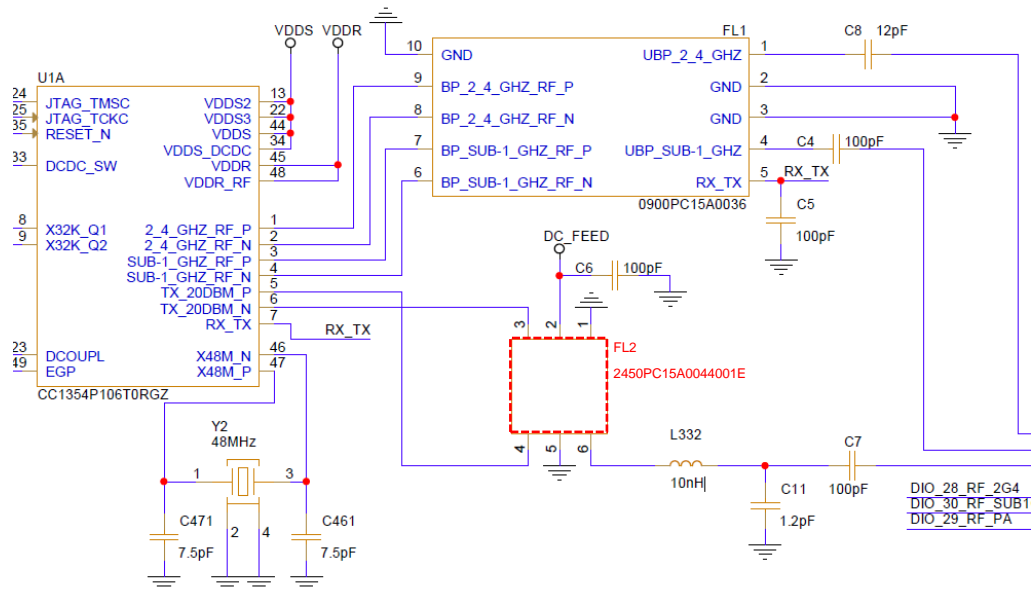
**Terminal Configuration<sup>3</sup>**

Pin Number	Function
1	GND
2	DC Feed
3	Balanced Port
4	Balanced Port
5	GND
6	Unbalanced Port



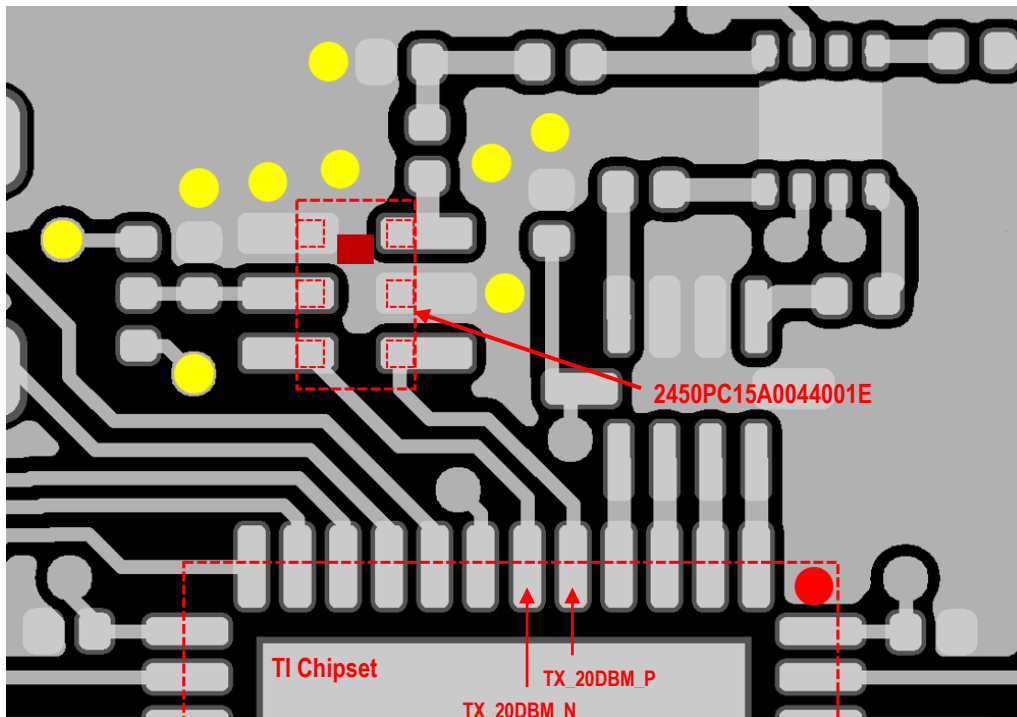
<sup>3</sup> The termination type is Nickel Tin. Go to: <https://www.johansontechnology.com/ipcsoldering-profile> for Typical Soldering Profile.

**Reference Schematic**



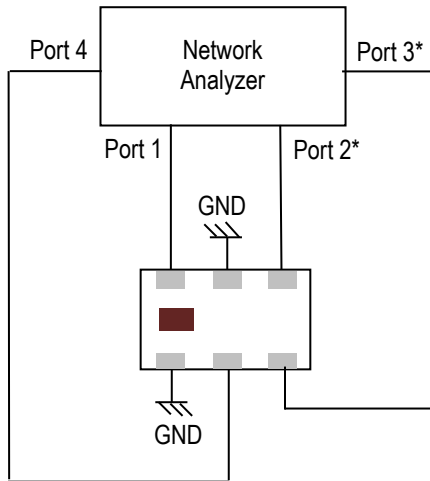
For the 900MHz IPD, go to: [0900PC15D0043001E](#) and [0900PC15A0036001E](#)

**Reference Design PCB Layout**



Please contact us for the full reference design files:  
<https://www.johansontechnology.com/ask-a-question>

**Measuring Diagram**



Port 1: Unbalanced Port

Ports 2 and 3: Balanced Port

Port 4 :100pF matching

$$IL = S_{ds21}$$

$$RL = S_{ss11}$$

$$\text{Amplitude balance} = \text{dB}(S(2,1)/S(3,1))$$

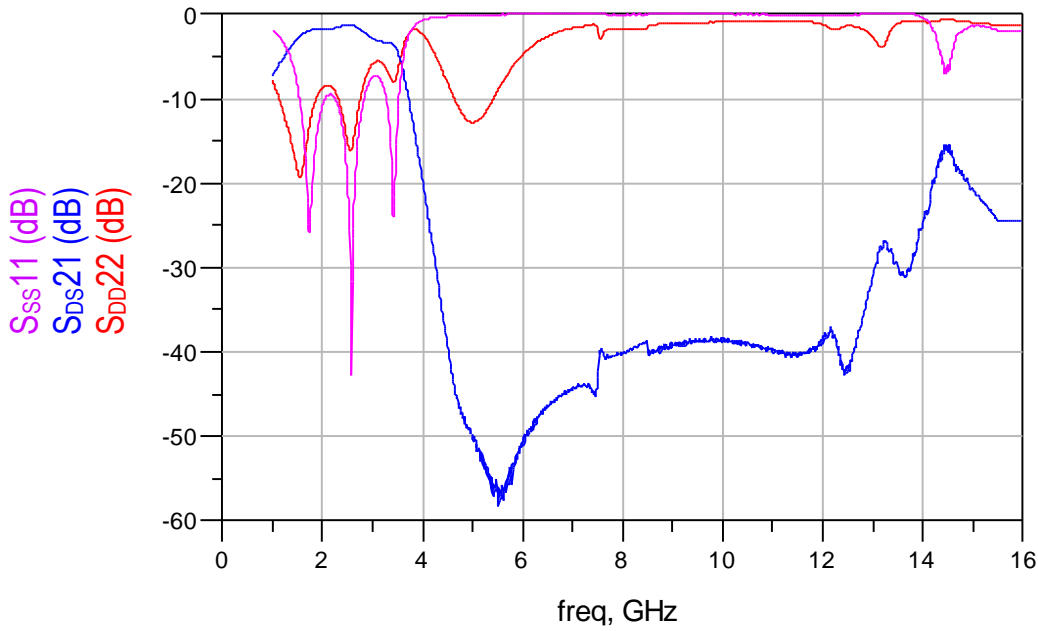
$$\text{Phase balance} = \text{Phase}(S(2,1)/S(3,1))$$

\*Impedance for ports 2 and 3 = Conjugate to Balanced Impedance/2

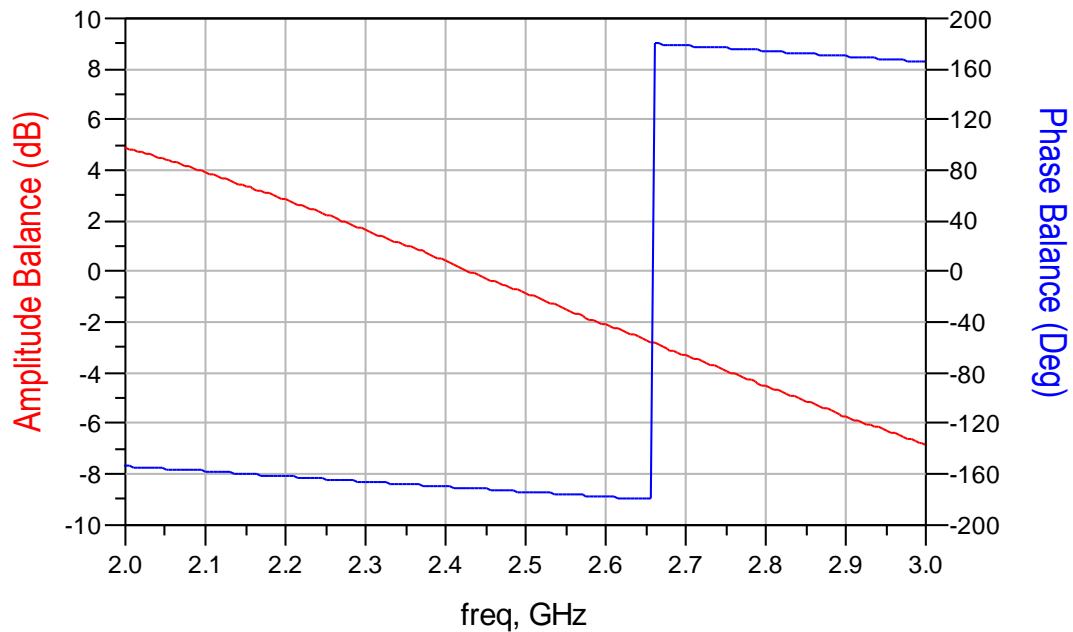


**RF Measurement (T = 25°C)**

**Insertion Loss, Return Loss, Attenuation**



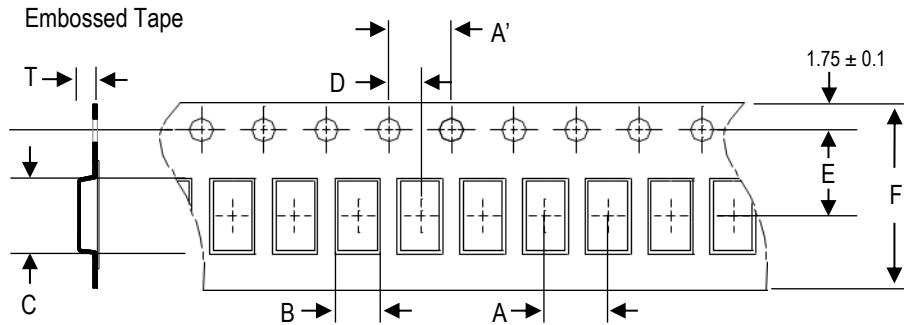
**Amplitude and Phase Balance**



S-parameters and layout files available upon request. Please contact us at <https://www.johansontechnology.com/ask-a-question>

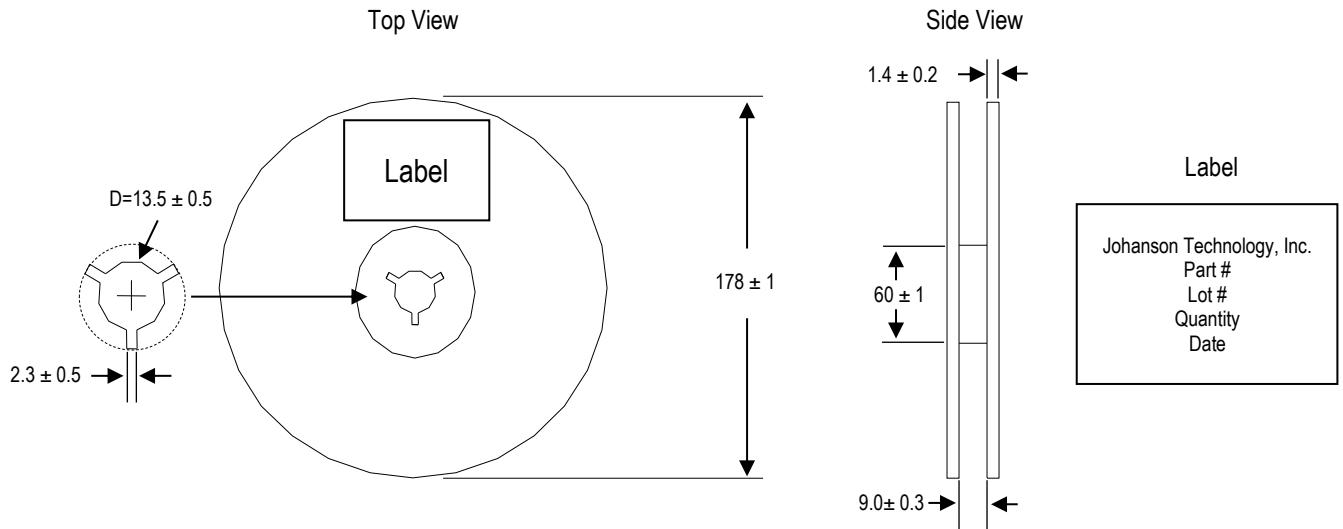
**Tape and Reel Specification (Units in mm)**

**Tape Dimensions**

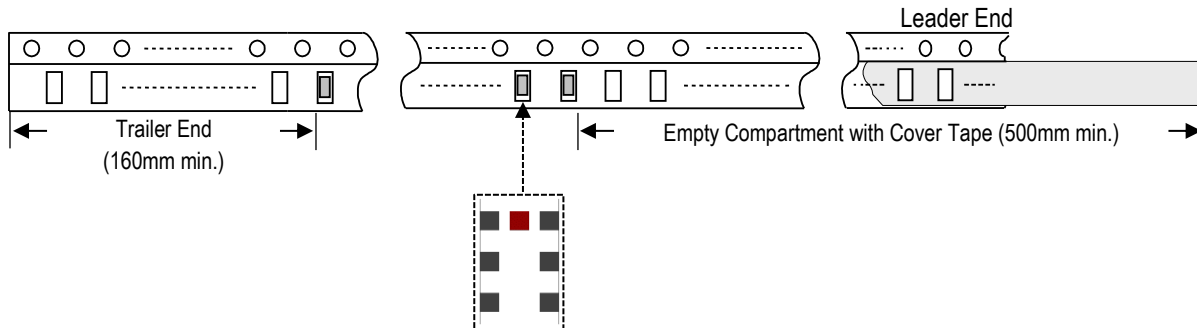


A	A'	B	C	D	E	F	T	Quantity/reel	Tape material
4.0±0.1	4.0±0.1	1.35±0.05	2.15±0.05	2.0±0.05	3.5±0.1	8.0±0.1	1.00±0.05	4,000pcs	Plastic (Embossed)

**Reel Dimensions**



**Leader and Trailer Dimensions**



### **IPD vs. Discrete Reference Design**

Johanson's impedance-matched balun + embedded FCC/ETSI band-pass filter is approved and qualified by Texas Instruments. This device replaces 9 L/C discrete components with one EIA 0805 (2x1.2mm) package, providing:

- Miniaturization of the overall RF front end, allowing for more compact end product form factor and antenna design freedom.
- Faster design time to market with a single component.
- Semiconductor-verified performance (FCC/ETSI).
- Improved RF performance variability, increasing system yield at the contract manufacturer.
- Cost-effective when considering total cost of components, assembly, and RF front-end yield.



**Orderable Part Number**

Packaging Style	Part Number	Termination
Bulk (loose pcs.)	2450PC15A0044001B	Ni/Sn
T & R (7" Reel Embossed Tape)	2450PC15A0044001E (Qty: 4,000 pcs./reel)	

**Important Links**

[2450PC15A0044001E Product Page](#)

[More Texas Instruments](#)

[Antenna Tuning, Optimization, and Validation Services](#)

[Soldering Information](#)

[MSL Information](#)

[Packaging Information](#)

[Recommended Storage Condition and Max Shelf Life](#)

[RoHS Compliance](#)

**Johanson Technology, Inc. reserves the right to make design changes without notice.**

**All sales are subject to Johanson Technology, Inc. terms and conditions.**