

Surface Mount

RF Transformer

ADT2-162T+

50Ω 20 to 1600 MHz

The Big Deal

- 1W RF power handling
- Low unbalance, 0.4 dB, 3°
- Small size, 0.27 x 0.31 x 0.22"



CASE STYLE: CD636

Product Overview

Mini-Circuits' ADT2-162T+ is a surface-mount balanced-to-balanced transformer with a secondary/primary impedance ratio of 2:1. This model covers the 20 to 1600 MHz band with low insertion loss (1.2 dB typ.) as well as low phase unbalance (3°) and amplitude unbalance (0.4 dB). The unit comes enclosed in a miniature, leadless plastic package measuring just 0.27 x 0.31 x 0.22", ideal for dense circuit board layouts.

Key Features

| Feature | Advantages |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Wideband, 20 to 1600 MHz | Supports a wide range of applications including VHF/UHF, cellular, PCS and more. |
| Low insertion loss, 1.2 dB typ. | Good transmission of signal power from input to output. |
| 1W RF power handling | Supports a wide range of power requirements. |
| Low phase and amplitude unbalance, 3°, 0.4 dB | Low phase and amplitude unbalance can improve a system's electromagnetic compatibility by rejecting unwanted common-mode noise |
| Small footprint, 0.27 x 0.31 x 0.22" | Accommodates tight space requirements for dense PCB layouts. |

Notes

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp



Surface Mount RF Transformer

50Ω 20 to 1600 MHz

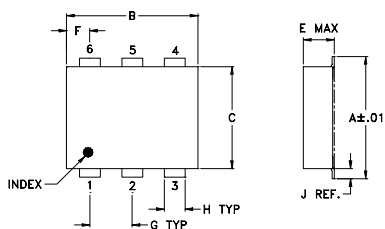
Maximum Ratings

| | |
|-----------------------------------------------------------------|----------------|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature | -55°C to 100°C |
| RF Power | 1.0W |
| Permanent damage may occur if any of these limits are exceeded. | |

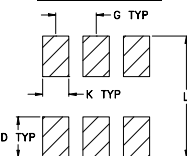
Pin Connections

| | |
|---------------|---|
| PRIMARY DOT | 3 |
| PRIMARY | 1 |
| SECONDARY DOT | 6 |
| SECONDARY | 4 |
| SECONDARY CT | 5 |
| NOT USED | 2 |

Outline Drawing



PCB Land Pattern



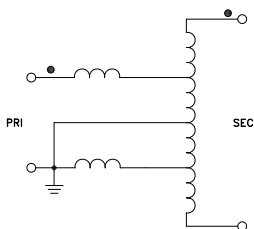
Outline Dimensions (inch/mm)

| A | B | C | D | E | F | G |
|------|------|------|------|------|------|------|
| .272 | .310 | .220 | .100 | .162 | .055 | .100 |
| 6.91 | 7.87 | 5.59 | 2.54 | 4.11 | 1.40 | 2.54 |
| H | J | K | L | | | |
| .030 | .026 | .065 | .300 | | | |
| 0.76 | 0.66 | 1.65 | 7.62 | | | |

wt
grams
0.25

Demo Board MCL P/N: TB-430+

Config. P1



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Features

- leaded surface mount
- wideband frequency 20-1600 MHz
- excellent amplitude balance, 0.4 dB typ. and phase unbalance, 3 deg. typ.

Applications

- VHF/UHF
- balanced amplifiers
- info structure
- A/D and D/A converter
- cellular

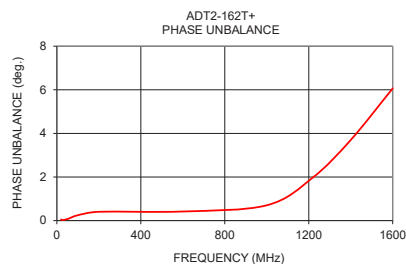
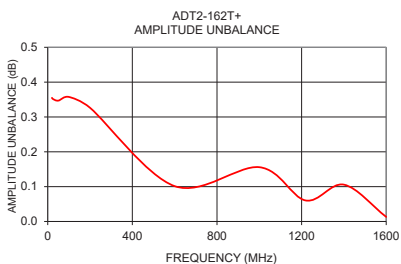
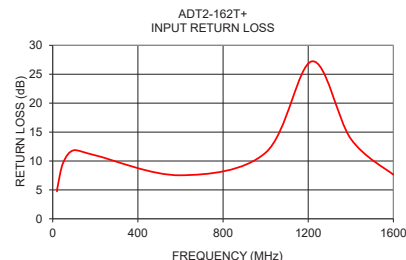
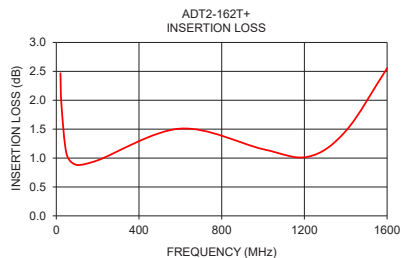
Transformer Electrical Specifications@25°C

| Parameter | Frequency (MHz) | Min. | Typ. | Max. | Unit |
|---------------------------------------|-------------------------------------|-------------|-------------------|----------------------|--------|
| Impedance Ratio (secondary / primary) | | | 2 | | |
| Frequency Range | | 20 | | 1600 | MHz |
| Insertion Loss* (average) | 50 - 1250 25 - 1400 20 - 1600 | — — — | 0.5 1.2 2.0 | 1.0 2.0 3.0 | dB |
| Amplitude Unbalance ± | 50 - 1250 25 - 1400 20 - 1600 | — — — | 0.4 0.5 0.6 | 0.75 0.85 0.95 | dB |
| Phase Unbalance ± | 50 - 1250 25 - 1400 20 - 1600 | — — — | 2 2.5 3.0 | 4 5 7 | Degree |
| Input Return Loss | 20-1600 | — | 12 | — | dB |
| Common mode rejection | 20-1250 1250-1600 | 20 18 | 25 22 | — — | dB |

* Insertion Loss is referenced to mid-band loss, 1.0 dB typ.

Typical Performance Data

| FREQUENCY (MHz) | INSERTION LOSS (dB) | INPUT R. LOSS (dB) | AMPLITUDE UNBALANCE (dB) | PHASE UNBALANCE (Deg.) |
|-----------------|---------------------|--------------------|--------------------------|------------------------|
| 20 | 2.47 | 4.74 | 0.35 | 0.06 |
| 25 | 1.92 | 5.94 | 0.35 | 0.03 |
| 50 | 1.07 | 9.79 | 0.35 | 0.07 |
| 100 | 0.88 | 11.86 | 0.36 | 0.25 |
| 200 | 0.96 | 10.98 | 0.33 | 0.41 |
| 600 | 1.51 | 7.53 | 0.10 | 0.42 |
| 1000 | 1.15 | 11.44 | 0.16 | 0.70 |
| 1218 | 1.02 | 27.23 | 0.06 | 1.96 |
| 1400 | 1.47 | 13.83 | 0.11 | 3.70 |
| 1600 | 2.55 | 7.63 | 0.01 | 6.06 |



Generic photo used for illustration purposes only

CASE STYLE: CD636

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications



Available Tape and Reel
at no extra cost

| Reel Size | Devices/Reel |
|-----------|------------------|
| 7" | 20, 50, 100, 200 |
| 13" | 500, 1000 |



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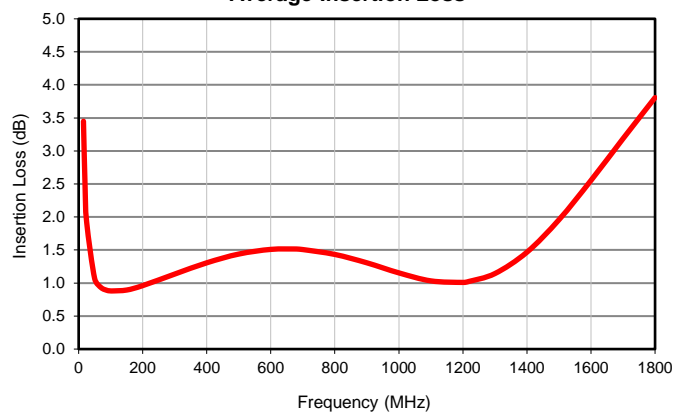
REV. OR
M169322
ADT2-162T+
WZ/CP/AM
190116

Typical Performance Data

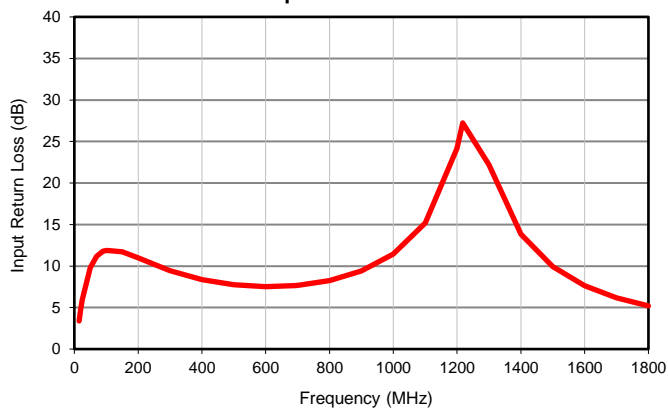
| FREQUENCY (MHz) | AVERAGE INSERTION LOSS (dB) | INPUT RETURN LOSS (dB) | AMPLITUDE UNBALANCE (dB) | PHASE UNBALANCE (deg.) |
|--------------------|-----------------------------------|------------------------------|--------------------------------|------------------------------|
| 15 | 3.45 | 3.39 | 0.36 | 0.16 |
| 20 | 2.47 | 4.74 | 0.35 | 0.12 |
| 25 | 1.92 | 5.94 | 0.35 | 0.06 |
| 50 | 1.07 | 9.79 | 0.35 | 0.14 |
| 70 | 0.93 | 11.17 | 0.35 | 0.22 |
| 90 | 0.89 | 11.77 | 0.34 | 0.39 |
| 95 | 0.88 | 11.83 | 0.35 | 0.44 |
| 100 | 0.88 | 11.86 | 0.36 | 0.50 |
| 105 | 0.88 | 11.89 | 0.36 | 0.54 |
| 150 | 0.89 | 11.72 | 0.33 | 0.66 |
| 200 | 0.96 | 10.98 | 0.33 | 0.81 |
| 300 | 1.14 | 9.44 | 0.30 | 1.09 |
| 400 | 1.31 | 8.37 | 0.26 | 1.13 |
| 500 | 1.44 | 7.75 | 0.19 | 1.10 |
| 600 | 1.51 | 7.53 | 0.10 | 0.84 |
| 680 | 1.52 | 7.61 | 0.03 | 0.65 |
| 684 | 1.51 | 7.63 | 0.03 | 0.63 |
| 700 | 1.51 | 7.67 | 0.01 | 0.56 |
| 800 | 1.43 | 8.25 | 0.06 | 0.06 |
| 900 | 1.31 | 9.40 | 0.13 | 0.60 |
| 1000 | 1.15 | 11.44 | 0.16 | 1.41 |
| 1100 | 1.03 | 15.18 | 0.14 | 2.39 |
| 1200 | 1.01 | 24.18 | 0.08 | 3.65 |
| 1218 | 1.02 | 27.23 | 0.06 | 3.93 |
| 1300 | 1.14 | 22.21 | 0.01 | 5.32 |
| 1400 | 1.47 | 13.83 | 0.11 | 7.40 |
| 1500 | 1.96 | 9.93 | 0.12 | 9.85 |
| 1600 | 2.55 | 7.63 | 0.01 | 12.13 |
| 1700 | 3.19 | 6.16 | 0.21 | 13.60 |
| 1800 | 3.81 | 5.20 | 0.47 | 13.84 |

Typical Performance Data

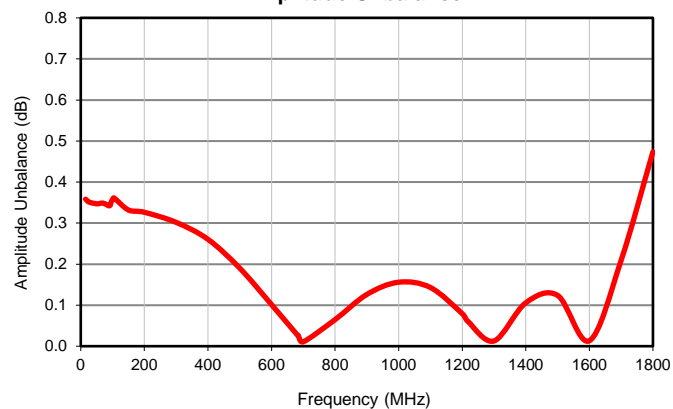
Average Insertion Loss



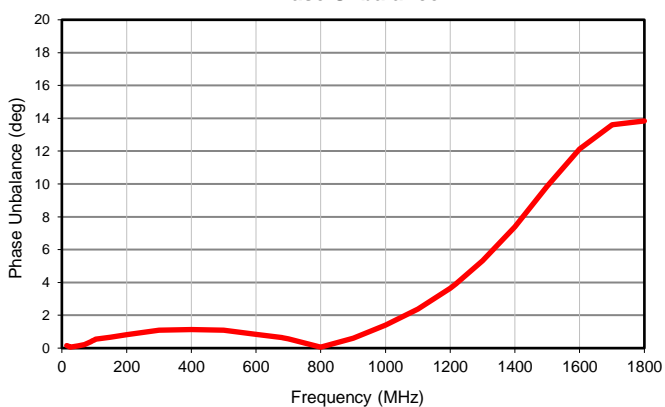
Input Return Loss



Amplitude Unbalance

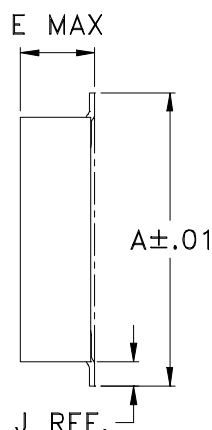
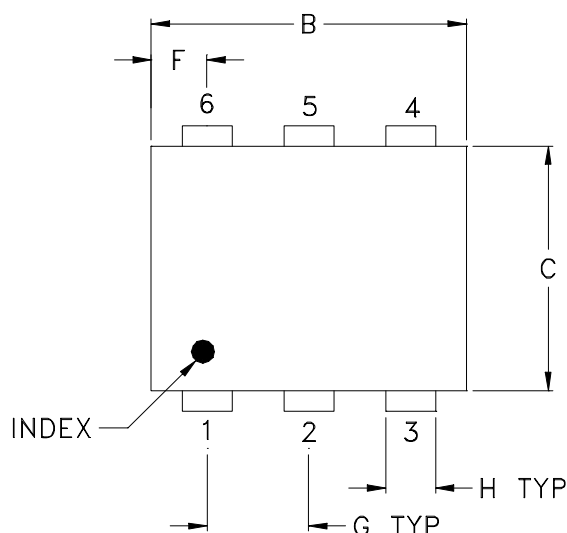


Phase Unbalance

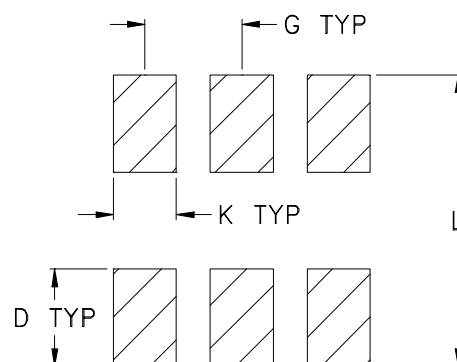


CD541
CD542
CD636
CD637

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm.002$

| CASE# | A | B | C | D | E | F | G | H | J | K | L | WT, GRAM |
|-------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-------------|
| CD541 | | | | | .082 (2.08) | | | | | | | .15 |
| CD542 | .272 (6.91) | .310 (7.87) | .220 (5.58) | .100 (2.54) | .112 (2.84) | .055 (1.40) | .100 (2.54) | .030 (0.76) | .026 (0.66) | .065 (1.65) | .300 (7.62) | .20 |
| CD636 | | | | | .162 (4.11) | | | | | | | .25 |
| CD637 | | | | | .206 (5.23) | | | | | | | .40 |

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .01$; 3 Pl. $\pm .005$

Notes:

- Case material: Plastic.
- Termination finish:
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



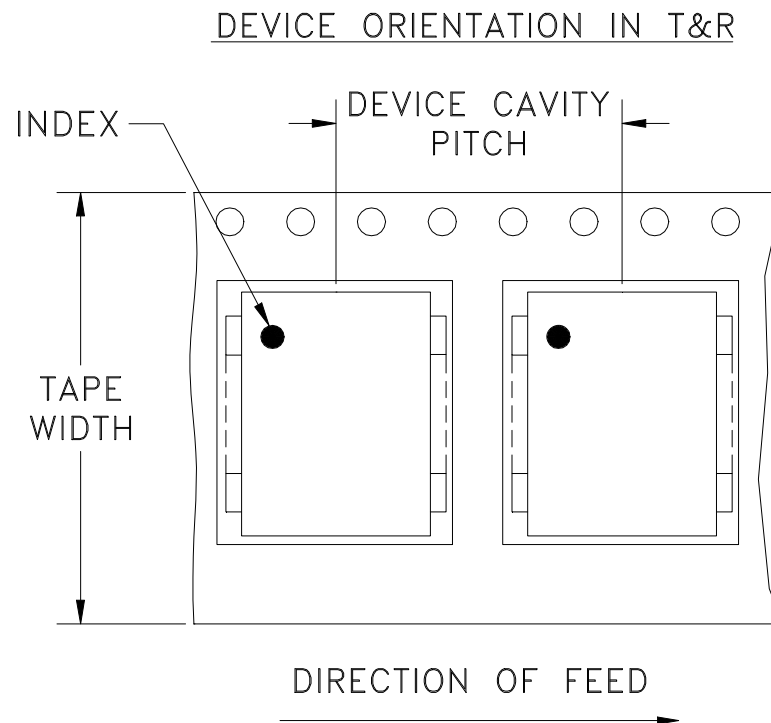
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Mini-Circuits ISO 9001 & ISO 14001 Certified

Tape & Reel Packaging TR-F34



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel see note | |
|-------------------|----------------------------|----------------------|---------------------------------------------|------|
| 16 | 12 | 7 | Small quantity standard (see note) | 20 |
| | | | | 50 |
| | | | | 100 |
| | | | | 200 |
| | | 13 | Standard | 500 |
| | | | | 1000 |

Note: Availability of small reel quantity varies by model.
Refer to pricing and availability on individual model dashboard.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf



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All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification | Test/Inspection Condition | Reference/Spec |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Operating Temperature | -40° to 85°C Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C Ambient Environment | Individual Model Data Sheet |
| Humidity | 90 to 95% RH, 240 hours, 50°C | MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours |
| Thermal Shock | -55° to 100°C, 100 cycles | MIL-STD-202, Method 107, Condition A-3, except +100°C |
| Solder Reflow Heat | Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak | J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1 |
| Solderability | 10X Magnification | J-STD-002, 95% Coverage |
| Vibration (High Frequency) | 20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36) | MIL-STD-202, Method 204, Condition D |
| Mechanical Shock | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes | MIL-STD-202, Method 213, Condition A |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215 |