*Surface Mount*

# RF Transformer

## 50Ω 4.5 to 3000 MHz

TC1-1-13MX+ Upgraded Version*

## TC1-1-13M+

CASE STYLE: AT224-1A

*Addition of Top hat™ feature
**Benefits**
- Allows faster pick-and-place
- Enables visual identification marking

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

### Maximum Ratings

| | |
|---|---|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature | -55°C to 100°C |
| RF Power | 0.25W |
| DC Current | 30mA |

Permanent damage may occur if any of these limits are exceeded.

### Pin Connections

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

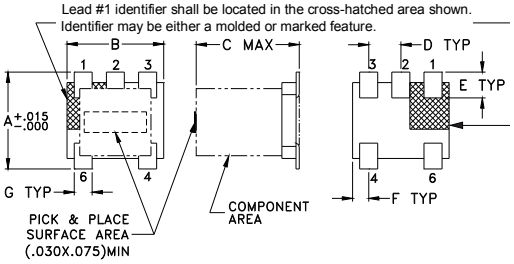
### Features

- wideband, 4.5 to 3000 MHz
- balanced transmission line
- good return loss
- excellent amplitude unbalance, 0.5 dB typ. and phase unbalance, 2 deg typ. in 1 dB bandwidth
- plastic base with leads
- aqueous washable

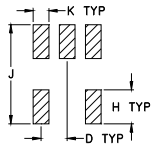
### Applications

- balanced to unbalanced transformation
- push-pull amplifiers
- PCS/DCS
- MMDS

### Outline Drawing AT224-1A




### PCB Land Pattern



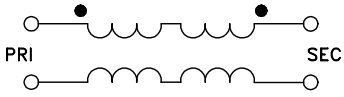

Suggested Layout,
Tolerance to be within ±.002

### Outline Dimensions (inch / mm)

| A | B | C | D | E | F |
|---|---|---|---|---|---|
| .150 | .150 | .160 | .050 | .040 | .025 |
| 3.81 | 3.81 | 4.06 | 1.27 | 1.02 | 0.64 |

| G | H | J | K | wt |
|---|---|---|---|---|
| .028 | .065 | .190 | .030 | grams |
| 0.71 | 1.65 | 4.83 | 0.76 | 0.15 |

### Config. G




### Electrical Specifications ($T_{AMB}$=25°C)

| Ω RATIO | FREQUENCY (MHz) | INSERTION LOSS* | | | PHASE UNBALANCE (Deg.) Typ. | | AMPLITUDE UNBALANCE (dB) Typ. | |
|---|---|---|---|---|---|---|---|---|
| | | 3 dB MHz | 2 dB MHz | 1 dB MHz | 1 dB bandwidth | 2 dB bandwidth | 1 dB bandwidth | 2 dB bandwidth |
| 1 | 4.5-3000 | 2000-3000 | 1000-2000 | 4.5-1000 | 2 | 3 | 0.5 | 0.5 |

*Insertion Loss is referenced to mid-band loss, 0.5 dB typ.

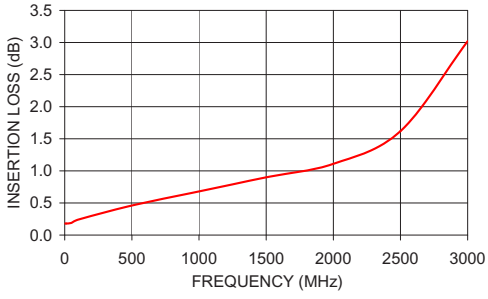
*Available Tape and Reel at no extra cost*

| Reel Size | Devices/Reel |
|---|---|
| 7" | 20, 50, 100, 200, 500 |
| 13" | 1000, 2000 |

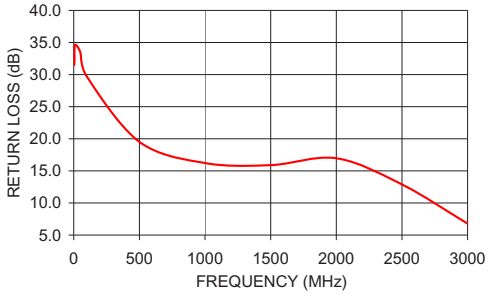
### Typical Performance Data

| FREQUENCY (MHz) | INSERTION LOSS (dB) | INPUT R. LOSS (dB) | AMPLITUDE UNBALANCE (dB) | PHASE UNBALANCE (Deg.) |
|---|---|---|---|---|
| 4.50 | 0.18 | 31.52 | 0.69 | 3.81 |
| 10.00 | 0.18 | 34.60 | 0.56 | 1.78 |
| 50.00 | 0.19 | 33.50 | 0.56 | 0.11 |
| 100.00 | 0.24 | 29.68 | 0.55 | 0.19 |
| 500.00 | 0.46 | 19.52 | 0.45 | 0.81 |
| 1000.00 | 0.68 | 16.22 | 0.14 | 1.59 |
| 1500.00 | 0.90 | 15.89 | 0.29 | 0.89 |
| 2000.00 | 1.11 | 16.97 | 0.71 | 1.28 |
| 2500.00 | 1.62 | 12.88 | 0.78 | 5.79 |
| 3000.00 | 3.02 | 6.79 | 0.49 | 12.32 |

INSERTION LOSS




INPUT RETURN LOSS




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