



**THE DATASHEET OF  
TC1-1-13M-22+**





SURFACE MOUNT

# RF Transformer

## TC1-1-13M-22+

50Ω 47 to 1000 MHz

### FEATURES

- Wideband, 47 to 1000 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



Generic photo used for illustration purposes only

CASE STYLE: AT224-1

**+RoHS Compliant**

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

### APPLICATIONS

- Balanced to unbalanced transformation
- Push-pull amplifiers
- PCS/DCS
- MMDS

### ELECTRICAL SPECIFICATIONS AT +25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Impedance Ratio			1		
Frequency Range		47		1000	MHz
Insertion Loss	47 -1000		1		dB
Phase Unbalance	47-1000		2	-	Deg.
Amplitude Unbalance	47-1000	-	0.5	-	dB

\*Insertion Loss is referenced to mid-band loss, 0.5 dB typ. DC current imbalance less than 3% between windings.

\*\*At 30mA max.

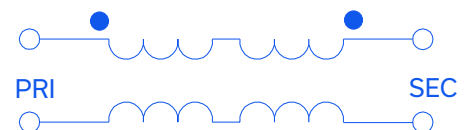
### MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	0.25W
DC Current	100mA***

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

\*\*\*Equal current must be applied in opposite directions to individual windings.

### CONFIG. G



REV. D  
ECO-022020  
TC1-1-13M-22+  
MCL NY  
240606



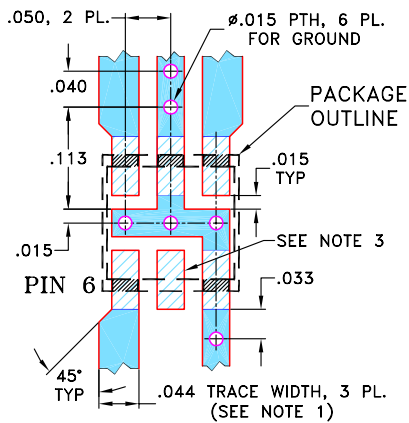


### PIN CONNECTIONS

Function	Pin Number
PRIMARY DOT	6
PRIMARY	4
SECONDARY DOT	1
SECONDARY	3
NOT USED	2

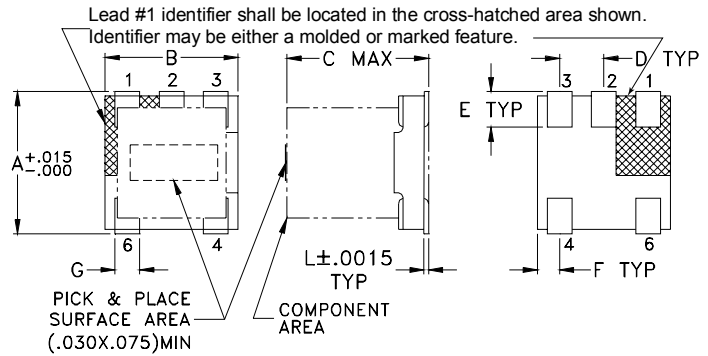
PRODUCT MARKING: N/A

### DEMO BOARD MCL P/N: TB-145 SUGGESTED PCB LAYOUT (PL-244)

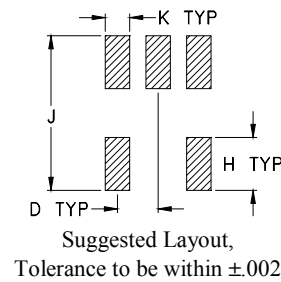


- TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020" ± .0015"; COPPER: 1/2 OZ. ON EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
  - THIS PAD IS NOT REQUIRED FOR AT224 CASE STYLE.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)  
 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

### OUTLINE DRAWING



### PCB Land Pattern



### OUTLINE DIMENSIONS (Inch mm)

A	B	C	D	E	F	G	H	J	K	L
.150	.150	.160	.050	.040	.025	.028	.065	.190	.030	.007
3.81	3.81	4.06	1.27	1.02	0.64	0.71	1.65	4.83	0.76	0.18

Weight: 0.15 grams

### TAPE & REEL INFORMATION: F17



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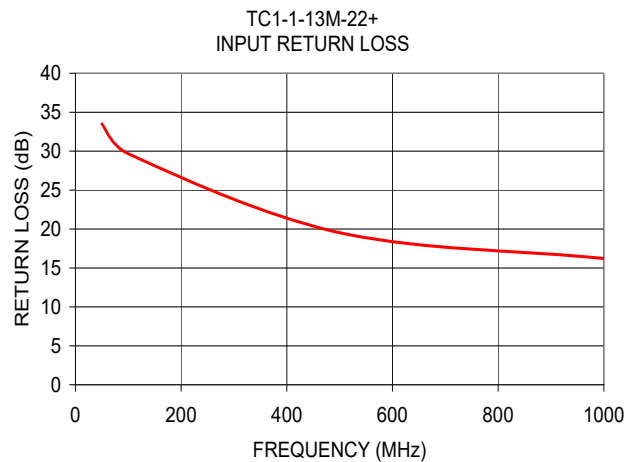
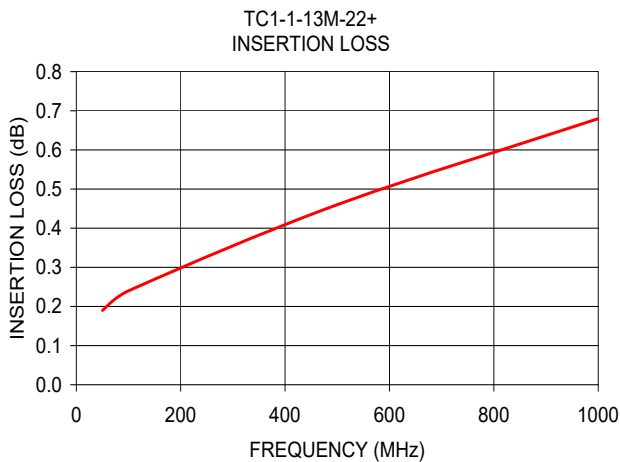
## TC1-1-13M-22+

Mini-Circuits

50Ω 47 to 1000 MHz

### TYPICAL PERFORMANCE DATA

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT R. LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (Deg.)
50.0	0.19	33.50	0.56	0.11
100.0	0.24	29.68	0.55	0.19
500.0	0.46	19.52	0.45	0.81
1000.0	0.68	16.22	0.14	1.59



#### 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/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)



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