

SURFACE MOUNT

# RF Transformer

## TC1-33-75-7+

Mini-Circuits

75Ω 5 to 3000 MHz

### FEATURES

- Suitable for tin/lead and RoHS solder systems
- Wideband, 5 to 3000 MHz
- Balanced transmission line
- Good return loss, 20 dB typ. at 1 dB band
- Excellent amplitude unbalance, 0.3 dB typ. and
- Phase unbalance, 3 deg typ. in 1 dB bandwidth
- Aqueous washable



Generic photo used for illustration purposes only

CASE STYLE: AT224-1A

**+RoHS Compliant**

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

### APPLICATIONS

- Balanced to unbalanced transformation
- Push-pull amplifiers
- PCS/DCS
- Cable TV
- Cellular

Qorvo Part No.	Description
QPL8830	5-1280 MHz, 75Ω. 21 dB CATV Amplifier
QPL8831	5-1280 MHz, 75Ω. 17 dB CATV Amplifier
QPL8832	5-1280 MHz, 75Ω. 19 dB CATV Amplifier
QPL8833	5-1280 MHz, 75Ω. 15 dB CATV Amplifier
QPL8834	5-1280 MHz, 75Ω. 12 dB CATV Amplifier
QPA4425	1218 MHz MMIC, CATV Push Pull, 25 dB Amplifier
QPA4428	1219 MHz MMIC, CATV Push Pull, 28 dB Amplifier
QPB8857	47 - 1218 MHz, 28 dB CATV Doubler Amplifier
QPB8858	47-1218, 34 dB CATV Push Pull Amplifier
QPB8957	47-1000 MHz 28 dB CATV Doupler Amplifier

### ELECTRICAL SPECIFICATIONS (T<sub>AMB</sub>=25°C)

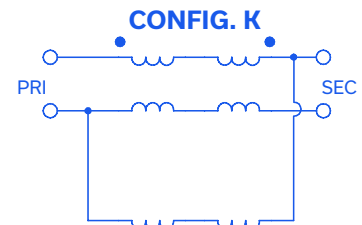
Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Impedance Ratio			1		
Frequency Range		5		3000	MHz
Insertion Loss*	2000-3000		3		dB
	1200-2000		2		
	5-1200		1		
Phase Unbalance	5 -1200		3		Deg.
	1200 - 2000		4		
Amplitude Unbalance	5 - 1200		0.3		dB
	1200 - 2000		1.0		

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

### MAXIMUM RATINGS

Parameter	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.



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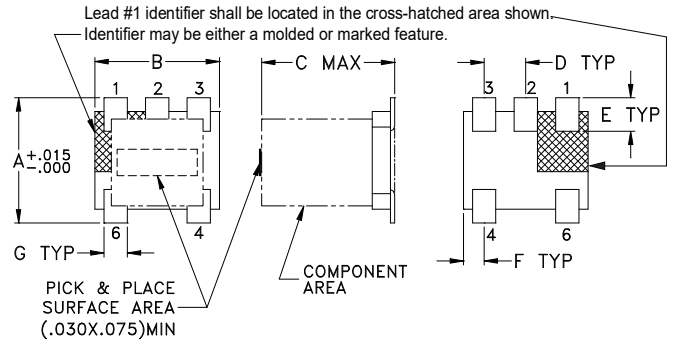
75Ω 5 to 3000 MHz

### PIN CONNECTIONS

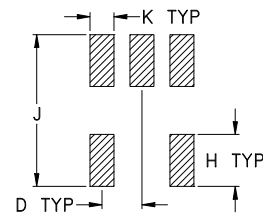
PRIMARY DOT	6
PRIMARY	4
SECONDARY DOT	1
SECONDARY	3
NOT USED	2

**PRODUCT MARKING:** N/A

### OUTLINE DRAWING



### 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	

### TAPE & REEL INFORMATION: F17



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## TC1-33-75-7+

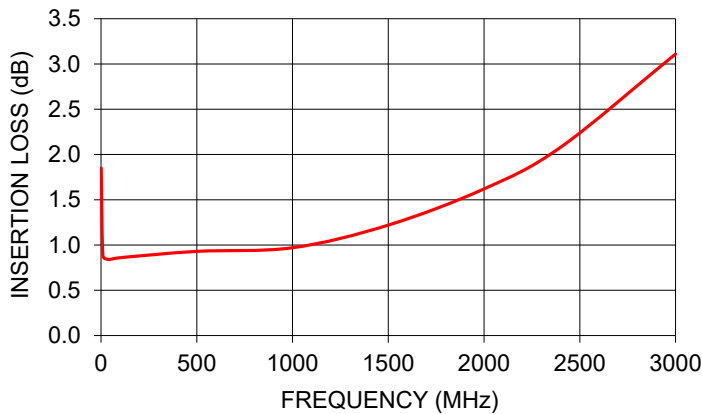
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75Ω 5 to 3000 MHz

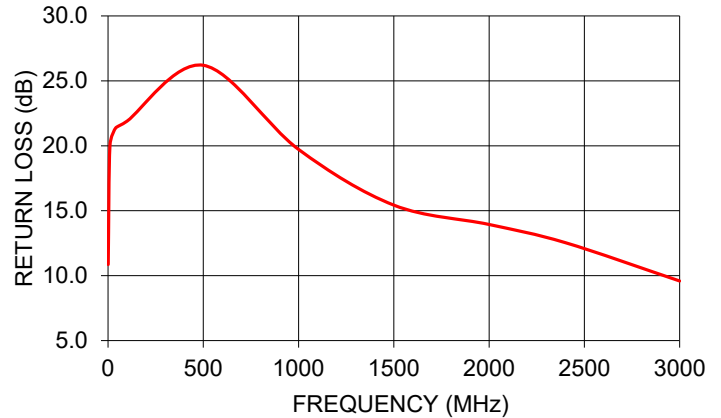
### TYPICAL PERFORMANCE DATA

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT R. LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (Deg.)
1.00	1.85	10.86	0.38	2.91
10.00	0.88	20.01	0.04	0.84
40.00	0.84	21.37	0.00	0.58
100.00	0.86	21.90	0.01	0.92
500.00	0.93	26.20	0.10	3.63
1000.00	0.97	19.72	0.18	4.76
1500.00	1.22	15.43	0.77	3.62
2000.00	1.62	13.94	1.40	0.56
2400.00	2.08	12.54	1.84	4.10
3000.00	3.11	9.59	2.06	12.70

TC1-33-75-7+  
INSERTION LOSS



TC1-33-75-7+  
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/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)



# RF Transformer

# TC1-33-75-7+

## Typical Performance Data

FREQUENCY (MHz)	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (deg.)
1	1.85	10.86	0.38	2.91
10	0.88	20.01	0.04	0.84
20	0.84	20.94	0.02	0.60
30	0.84	21.21	0.00	0.56
40	0.84	21.37	0.00	0.58
60	0.85	21.59	0.01	0.66
80	0.86	21.75	0.00	0.76
100	0.86	21.90	0.01	0.92
150	0.88	22.30	0.03	1.18
200	0.89	22.94	0.03	1.32
250	0.90	23.30	0.01	2.02
300	0.90	24.26	0.03	2.11
350	0.91	24.90	0.01	2.08
400	0.92	25.48	0.03	2.54
450	0.94	25.90	0.09	2.63
500	0.93	26.20	0.10	3.63
520	0.92	26.38	0.08	3.77
532	0.92	26.46	0.08	3.82
550	0.92	26.51	0.09	4.01
600	0.91	26.54	0.05	4.33
700	0.91	25.05	0.04	4.50
800	0.93	23.05	0.08	4.65
900	0.94	21.26	0.13	4.81
1000	0.97	19.72	0.18	4.76
1100	1.02	18.38	0.29	4.45
1200	1.06	17.38	0.42	4.38
1300	1.10	16.60	0.53	4.29
1400	1.16	15.96	0.64	3.99
1500	1.22	15.43	0.77	3.62
1600	1.29	14.99	0.91	3.17
1700	1.36	14.73	1.04	2.70
1800	1.44	14.48	1.16	2.09
1900	1.53	14.20	1.28	1.38
2000	1.62	13.94	1.40	0.56
2200	1.84	13.38	1.58	1.53
2400	2.08	12.54	1.84	4.10
2600	2.37	11.61	2.01	6.62
2800	2.71	10.58	2.09	9.52
3000	3.11	9.59	2.06	12.70



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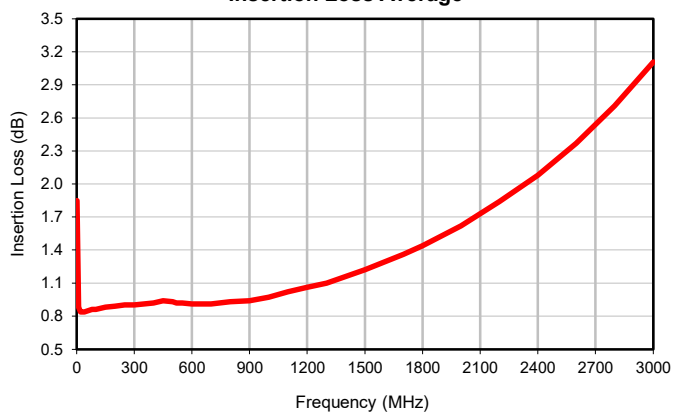


IF/RF MICROWAVE COMPONENTS

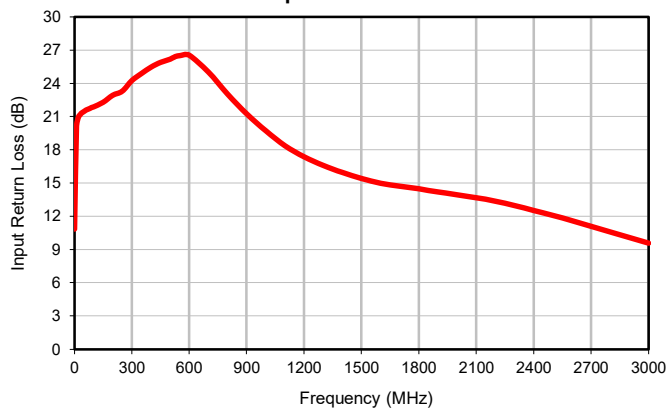
REV. OR  
TC1-33-75-7+  
6/21/2022  
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## Typical Performance Data

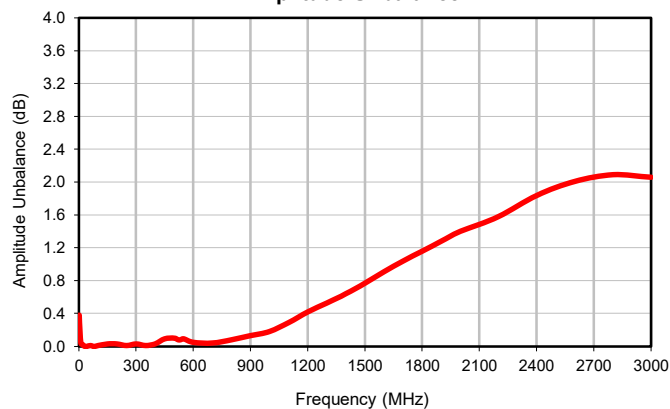
### Insertion Loss Average



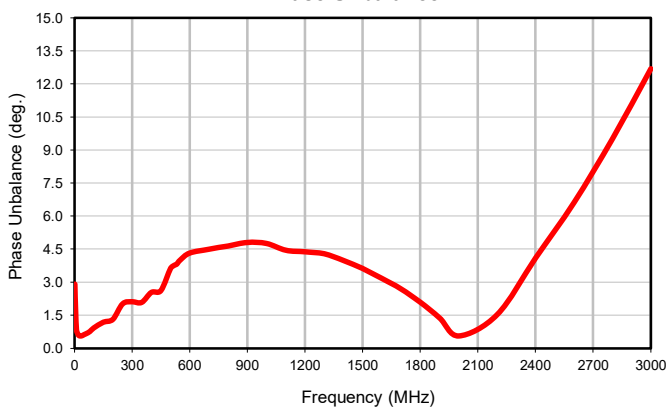
### Input Return Loss



### Amplitude Unbalance



### Phase Unbalance

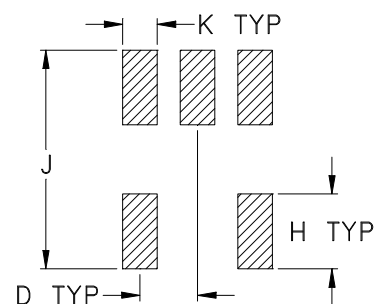


## Outline Dimensions

AT224-1A



## PCB Land Pattern



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

CASE #	A	B	C	D	E	F	G	H	J	K	WT. GRAMS
AT224-1A	.150 (3.81)	.150 (3.81)	.160 (4.06)	.050 (1.27)	.040 (1.02)	.025 (0.64)	.028 (0.71)	.065 (1.65)	.190 (4.83)	.030 (0.76)	.15

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

### Notes:

1. Case material: Plastic.
2. Termination finish:  
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
3. Lead #1 identifier shall be located in the cross-hatched area shown.  
Identifier may be either a molded or marked feature.



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RF/MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F17

## DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
12	8	7	Small quantity standards (see note)	20
				50
				100
				200
				500
		13	Standard	1000
			2000	

Note: Please Consult individual model data sheet to determine device per reel availability.

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](http://www.minicircuits.com/pages/pdfs/tape.pdf)



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RF/IF MICROWAVE COMPONENTS



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