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Avantek Products

Thin-Film Cascadable Amplifier 20 to 1000 MHz

Technical Data

UTO/UTC/PPA 1044 Series

Features

- **Frequency Range: 20 to 1000MHz**
- **High Dynamic Range**
- **Low Noise Figure: 2.5 dB (Typ)**
- **Medium Power Output: +13.0 dBm (Typ)**
- **Temperature Compensated**
- **Surface Mount Option**

Applications

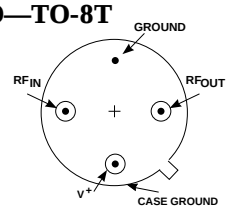
- **Wideband RF System Front End**

Description

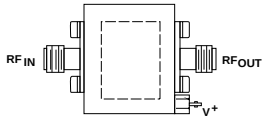
The 1044 Series is a high power thin-film bipolar RF amplifier using lossless feedback for low noise, high dynamic range and efficient operation; and active bias circuits to assure good temperature compensation and increased immunity to bias voltage variations. The 1044 Series amplifiers are available in three packages: the surface mount PlanarPak PP-38 (.375 in. x .375 in.) case, the TO-8 hermetic case and the connectorized TC-1 case.

Pin Configuration

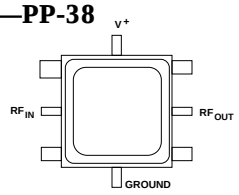
UTO—TO-8T



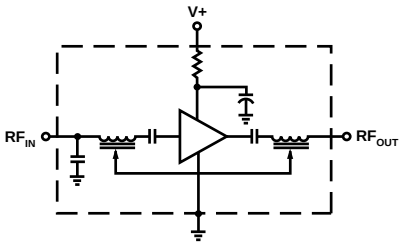
UTC—TC-1



PPA—PP-38



Schematic



Maximum Ratings

Parameter	Maximum
DC Voltage	+17 Volts
Continuous RF Input Power	+13 dBm
Operating Case Temperature	–55 to +125°C
Storage Temperature	–62 to +150°C
"R" Series Burn-In Temperature	+125°C

Thermal Characteristics[1]

θ_{JC}	105°C/W
Active Transistor Power Dissipation	256 mW
Junction Temperature Above Case Temperature	27°C
MTBF (MIL-HDBK-217E, A_{UF} @ 90°C)	955,100 Hrs.

Note 1: For further information, see Reliability Screening, Pub. 5963-3240E.

Weight: (typical) PPA—0.5 grams; UTO—2.1 grams; UTC—21.5 grams

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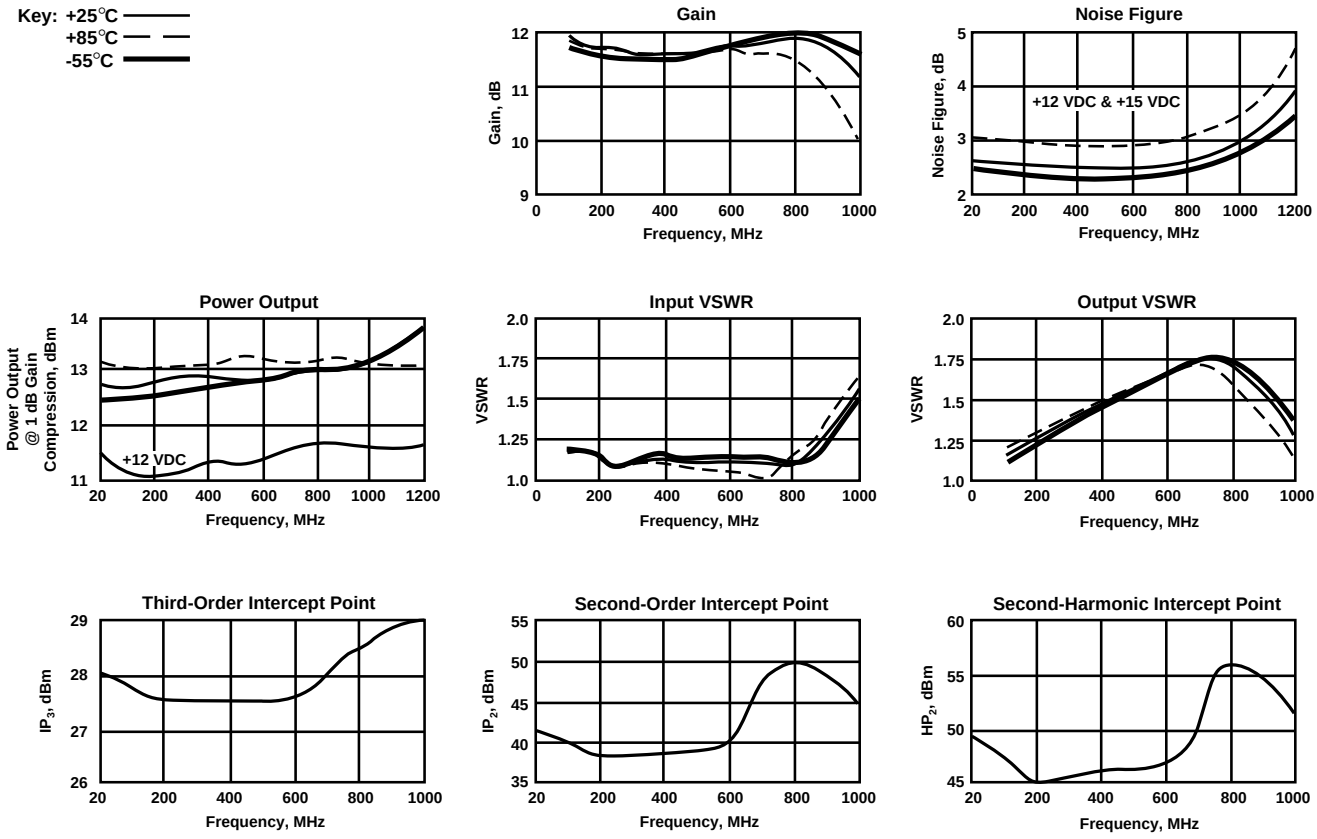
Electrical Specifications[1]

(Measured in 50 Ω system @ +15 VDC nominal unless otherwise noted)

Symbol	Characteristic	Typical T_C = 25°C	Guaranteed Specifications T_C = 0 to 50°C	Guaranteed Specifications T_C = –55 to +85°C	Unit
BW	Frequency Range	20-1000	20-1000	20-1000	MHz
GP	Small Signal Gain (Min.)	11.0	10.0	9.0	dB
—	Gain Flatness (Max.)	±0.5	±1.0	±1.0	dB
NF	Noise Figure (Max.)	2.5	4.5	5.0	dB
P_{1dB}	Power Output @ +1 dB Comp. (Min.)[2]	+13.0	+12.0	+11.0	dBm
—	Input VSWR (Max.)	<1.8:1	2.0:1	2.0:1	—
—	Output VSWR (Max.)	<1.8:1	2.0:1	2.0:1	—
IP_3	Two Tone 3rd Order Intercept Point	+25.0	+22.0	+21.0	dBm
IP_2	Two Tone 2nd Order Intercept Point	+35.0	—	—	dBm
HP_2	One Tone 2nd Harmonic Intercept Point	+46.0	—	—	dBm
I_D	DC Current	35	—	—	mA

Notes: 1. Both RF input and RF output pins are at DC ground — no blocking capacitor/PPA-1044 = Preliminary.
2. PPA-1044, Power Output = 12 dBm (typ) @ 25°C, 11.5 dBm from 0° to 50°C and 11.0 dBm from –55° to +85°C.

Typical Performance Over Temperature (@ +15 VDC unless otherwise noted)



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Automatic Network Analyzer Measurements (Typical production unit @ +25°C ambient)

Numerical Readings **Bias = 15.00 Volts**

FREQUENCY MHz	VSWR IN	GAIN dB	PHASE DEGREES	PHASE DEV	GROUP DELAY ns	VSWR OUT	ISOLATION dB
100.0	1.13	11.12	168.56	–2.87	.00	1.17	16.40
200.0	1.20	11.02	152.79	–2.76	.43	1.28	16.39
300.0	1.27	11.01	137.45	–1.73	.41	1.41	16.56
400.0	1.31	11.04	123.61	–.21	.39	1.49	16.64
500.0	1.30	11.12	109.58	1.63	.39	1.54	16.66
600.0	1.24	11.19	95.25	3.19	.41	1.52	16.52
700.0	1.18	11.21	80.12	3.78	.43	1.45	16.47
800.0	1.02	11.24	63.73	3.42	.47	1.35	16.44
900.0	1.23	11.04	46.58	2.14	.50	1.30	16.33
1000.0	1.51	10.69	28.83	.28	.52	1.40	16.44

S-Parameters **Bias = 15.00 Volts**

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	Mag	Ang	dB	Ang	dB	Ang	Mag	Ang
100.00	.063	154.8	11.090	167.6	–16.592	169.3	.077	141.1
150.00	.075	120.6	11.053	159.7	–16.417	161.1	.096	114.7
200.00	.089	101.4	10.958	151.8	–16.537	152.8	.124	100.4
250.00	.108	85.3	10.930	143.9	–16.541	146.0	.145	88.3
300.00	.123	75.5	10.946	136.4	–16.639	139.5	.164	79.6
350.00	.130	65.9	10.980	129.0	–16.626	132.6	.182	71.7
400.00	.134	56.4	11.016	121.7	–16.607	126.4	.193	65.0
450.00	.132	46.7	11.073	114.7	–16.601	120.6	.201	58.7
500.00	.127	39.5	11.084	107.2	–16.583	114.3	.207	53.1
550.00	.114	32.6	11.157	100.1	–16.585	108.4	.204	48.6
600.00	.096	24.7	11.202	92.6	–16.565	102.1	.199	44.9
650.00	.075	18.2	11.221	84.7	–16.503	96.5	.189	41.8
700.00	.046	15.5	11.228	76.9	–16.470	90.3	.176	40.5
750.00	.011	28.3	11.254	68.7	–16.407	84.4	.160	41.8
800.00	.028	156.2	11.233	60.2	–16.406	77.7	.144	46.0
850.00	.072	153.9	11.183	51.5	–16.434	71.0	.135	53.9
900.00	.123	147.5	11.062	42.5	–16.370	64.7	.136	65.3
950.00	.173	140.7	10.896	33.2	–16.366	58.1	.148	75.0
1000.00	.220	133.4	10.691	24.3	–16.460	51.8	.174	82.9
1050.00	.269	123.8	10.378	14.5	–16.543	45.4	.212	85.8
1100.00	.316	116.2	10.038	5.5	–16.648	38.8	.251	86.3
1200.00	.390	101.4	9.272	–11.7	–17.028	26.0	.326	82.0
1300.00	.449	87.8	8.368	–27.1	–17.369	14.3	.393	74.7
1400.00	.486	75.0	7.393	–41.8	–17.792	3.8	.445	67.0
1500.00	.511	64.0	6.429	–55.2	–18.261	–6.5	.484	60.0

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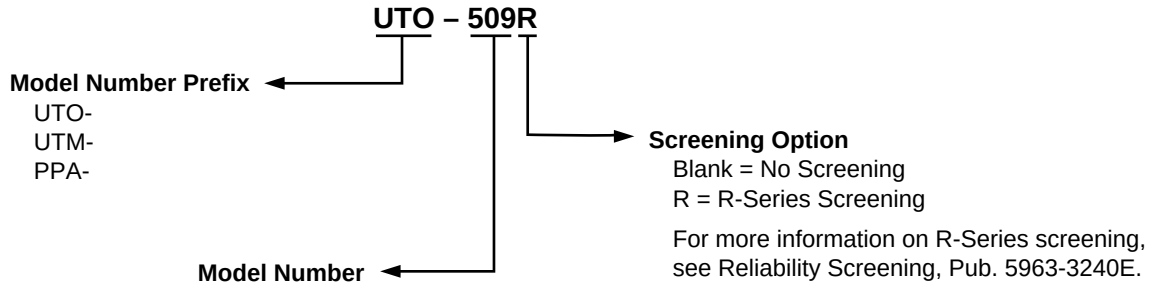
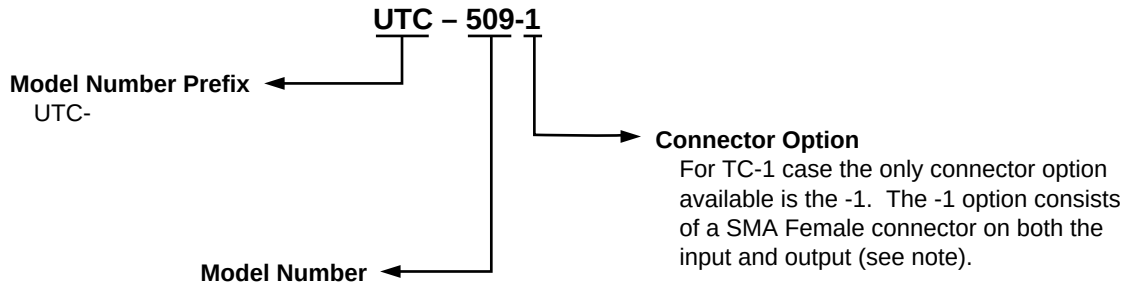
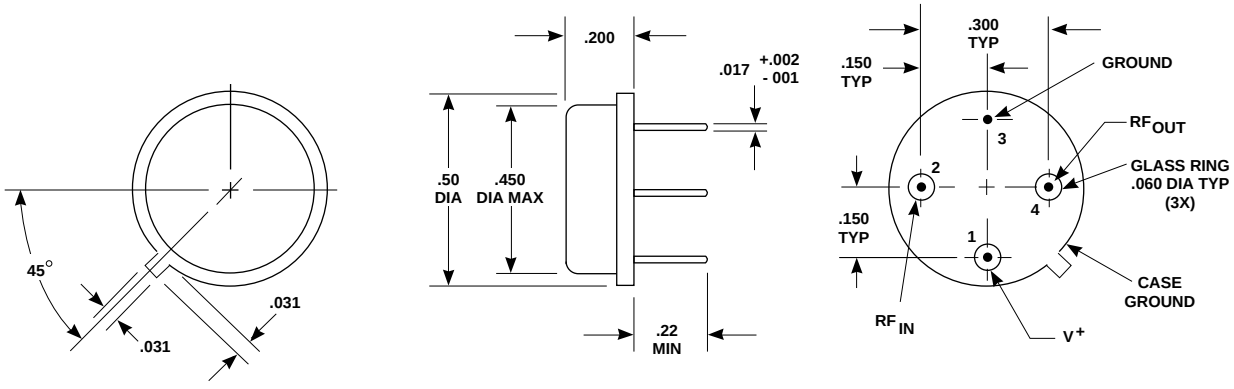
Product Options





Note: R-Series screening is not available in the TC-1 case as the case is non-hermetic.

Case Drawings
TO-8T



APPROXIMATE WEIGHT 2.1 GRAMS

NOTES (UNLESS OTHERWISE SPECIFIED):
1. DIMENSIONS ARE SPECIFIED IN INCHES
2. TOLERANCES: xx ± .02
xxx ± .010

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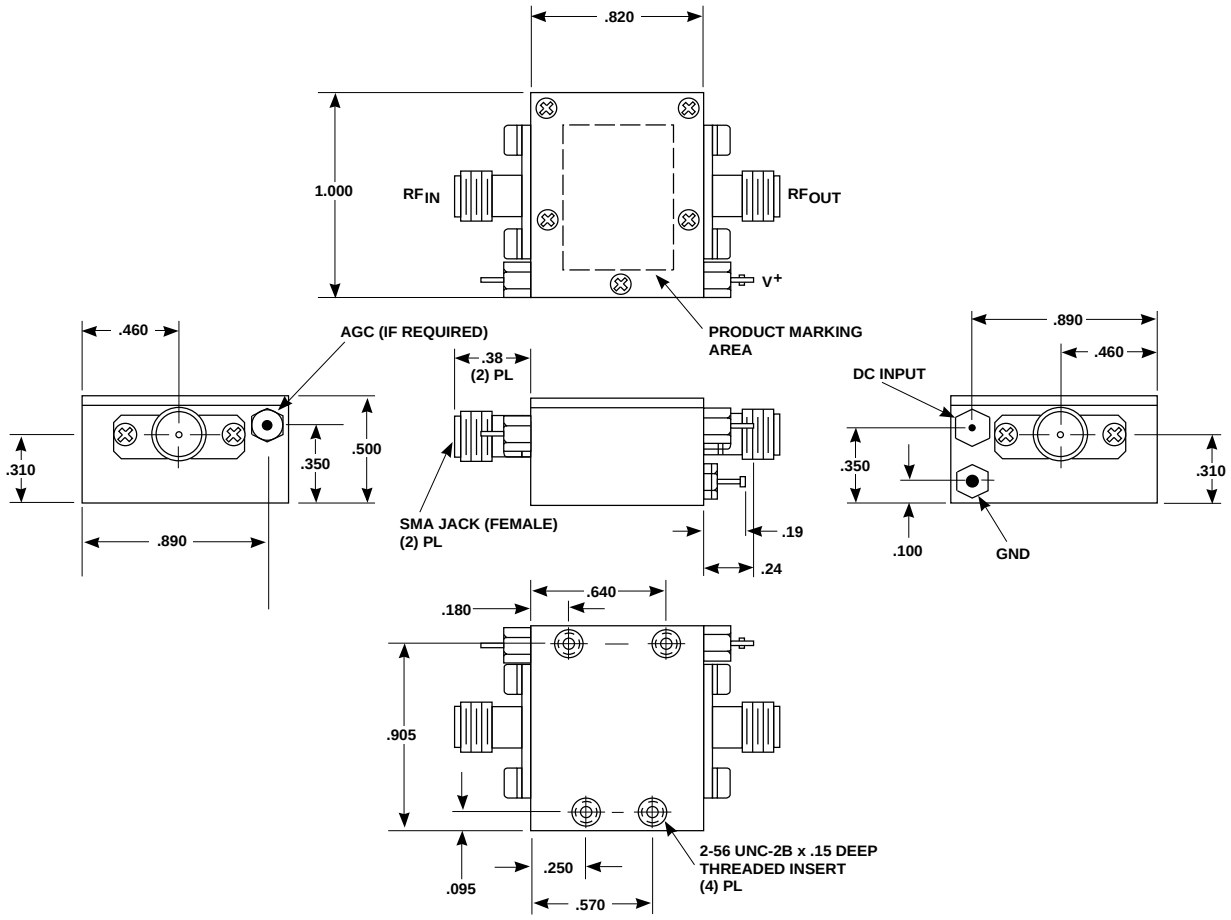
Case Drawings
TC-1



TYPICAL WEIGHT WITH CONNECTORS = 21.5 GRAMS

NOTES: 1. THE TC-1 CASE IS A NON-HERMETIC CASE.
2. THE ONLY CONNECTOR OPTION AVAILABLE FOR THE TC-1 CASE IS THE –1, SMA FEMALE CONNECTORS AT BOTH INPUT AND OUTPUT PORTS.

NOTES (UNLESS OTHERWISE SPECIFIED):
1. DIMENSIONS ARE SPECIFIED IN INCHES
2. TOLERANCES: xx ± .02
xxx ± .010

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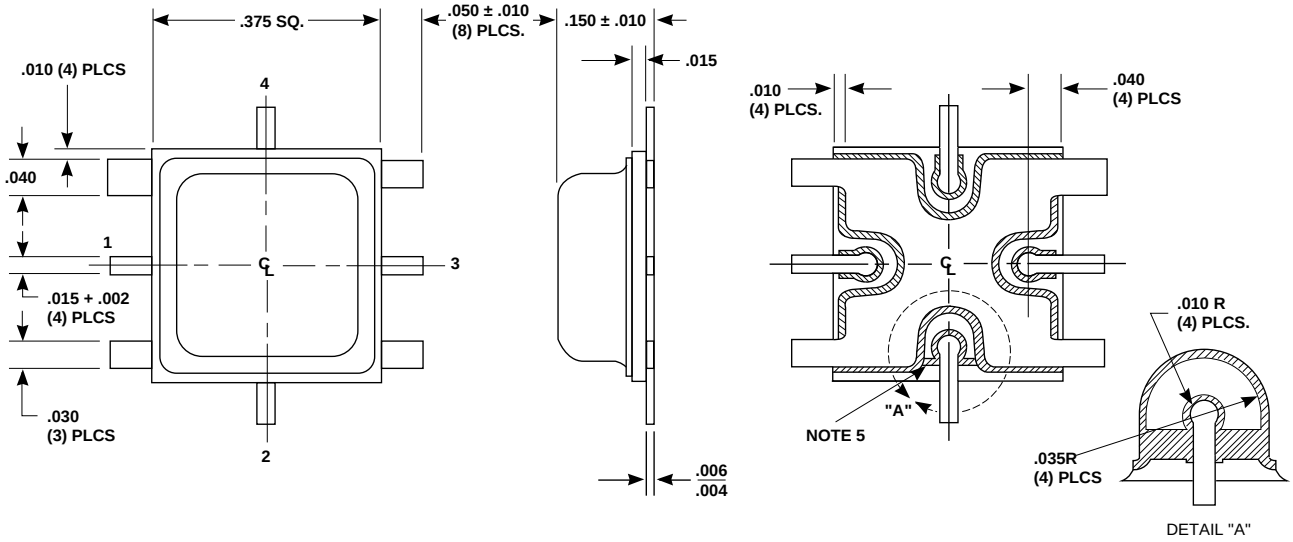
Case Drawings
PP-38

.375 x .375 PLANARPAK SURFACE MOUNTED COMPONENTS



TYPICAL WEIGHT 0.5 GRAMS

CASE	PIN DESIGNATION 1	2	3	4
PP-38	RF_{IN}	GROUND	RF_{OUT}	V^+
PP-38M	RF	LO	IF	N/C
PP-38F	RF_{IN}	GROUND	RF_{OUT}	GROUND

NOTES (UNLESS OTHERWISE SPECIFIED):
1. **DIMENSIONS ARE SPECIFIED IN INCHES**
2. **TOLERANCES: xxx ± .005**
3. **LEADS ARE FOR TESTING ONLY AND MAY BE TRIMMED FLUSH AT TIME OF INSTALLATION.**
4. **N/C = NOT CONNECTED**
5. **PIN 2 IS NOT AT GROUND POTENTIAL FOR PP-38M. IT LOOKS THE SAME AS PINS 1, 3, AND 4.**

Recommended Assembly Procedure

1. Chemically clean the PC board and the unit to be mounted using a vapor degreaser or acetone followed by an isopropol alcohol wash. Do not use ultrasonic cleaning.
2. Mask the backside of the PC board to prevent solder from reflowing through the plated thru-holes causing a rough ground plane surface. A suggested masking material is 2 mil thick Kapton® film with silicone adhesive back (Permacel part #P-222).
3. Apply solder cream (suggest Multicore SN62PRMAB3 or equivalent) using screen printing techniques or careful hand application. A layer 4 to 6 mils thick is adequate.
4. Reflow of the unit to the board may be done in many ways. Using a hot plate is one of the most simple. During reflow, pressure (with a clamping arrangement) on the unit is recommended, but not absolutely necessary. Absolute maximum reflow temperature is 260°C for not more than 10 seconds.
5. Chemically reclean the unit using the procedures given in step one. Make sure that a flux remover is used which is appropriate for the type of solder cream used (Multicore PC81 is the recommended flux remover for the above mentioned cream).

It should be noted that there are many alternatives for component attachment. This procedure has been found to be simple and effective. For more detailed instructions on how to use PlanarPak Products, please see the application note "*PlanarPak* Users Information," Pub.□5963-3232E.

For more information:

United States*

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Far East/Australasia: (65) 290-6305

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Japan: (81 3) 3331-6111

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Printed in U.S.A. 5963-2514E (10/94)

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