Avantek Products

Thin-Film Cascadable Amplifier 10 to 1000 MHz

Technical Data

UTO/UTC/PPA 1043 Series

Features

- **Frequency Range: 10 to 1000MHz**
- **High Dynamic Range**
- **Low Noise Figure: 2.5 dB (Typ)**
- **Medium Power Output: +8.0 dBm (Typ)**
- **Temperature Compensated**
- **Surface Mount Option**

Applications

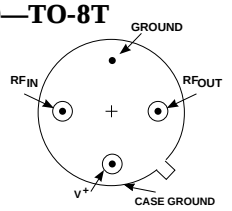
- **Wideband RF System Front End**
- **Surface Mount Assembly**

Description

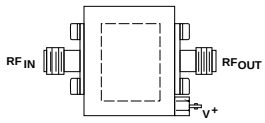
The 1043 Series is a thin-film bipolar RF amplifier using lossless feedback for low noise, high dynamic range and efficient operation; and active bias circuits to assure good temperature compensation and increased immunity to bias voltage variations. The 1043 Series amplifiers are available in three packages: the surface mount PlanarPak PP-38 (.375 in. x .375in.) case, the TO-8 hermetic case and the connectorized TC-1 case.

Pin Configuration

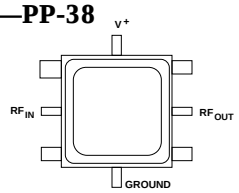
UTO—TO-8T



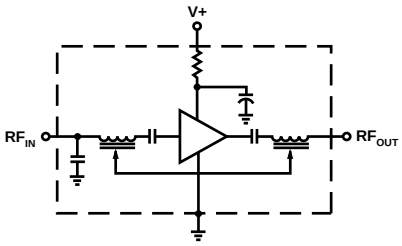
UTC—TC-1



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	176 mW
Junction Temperature Above Case Temperature	19°C
MTBF (MIL-HDBK-217E, A_{UF} @ 90°C)	767,000 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

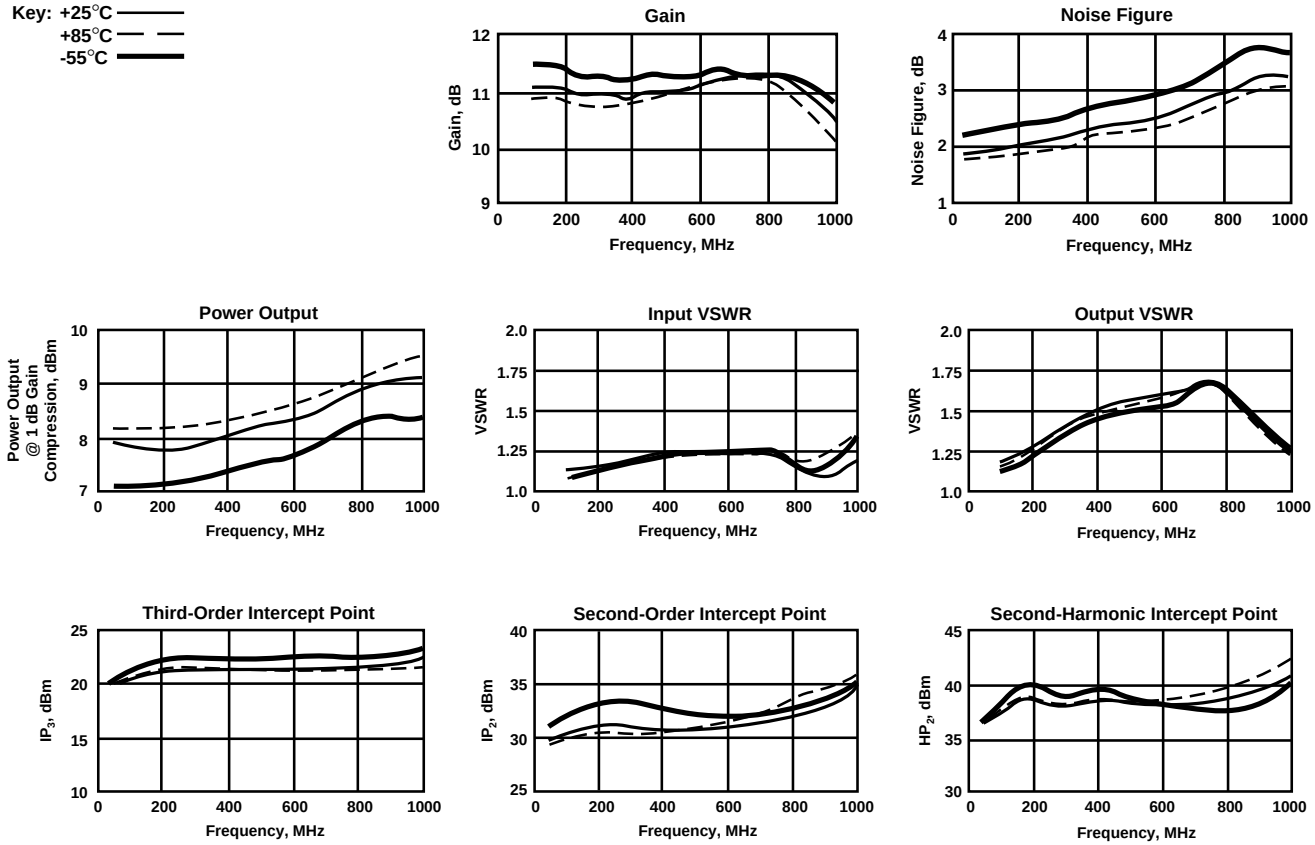
Electrical Specifications[1]

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

Symbol	Characteristic	Typical	Guaranteed Specifications		Unit
		T_C = 25°C	T_C = 0 to 50°C	T_C = –55 to +85°C	
BW	Frequency Range	10-1000	10-1000	10-1000	MHz
GP	Small Signal Gain (Min.)	10.5	10.0	9.0	dB
—	Gain Flatness (Max.)	±0.5	±1.0	±1.0	dB
NF	Noise Figure (Max.)	2.5	4.0	4.5	dB
P_{1dB}	Power Output @ +1 dB Comp. (Min.)	+8.0	+6.0	+6.0	dBm
—	Input VSWR (Max.)	<1.5:1	2.0:1	2.0:1	—
—	Output VSWR (Max.)	<1.7:1	2.0:1	2.0:1	—
IP_3	Two Tone 3rd Order Intercept Point	+19.0	—	—	dBm
IP_2	Two Tone 2nd Order Intercept Point	+28.0	—	—	dBm
HP_2	One Tone 2nd Harmonic Intercept Point	+35.0	—	—	dBm
I_D	DC Current	25	—	—	mA

Note: 1. Both RF input and RF output pins are at DC ground—no blocking capacitor.

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



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

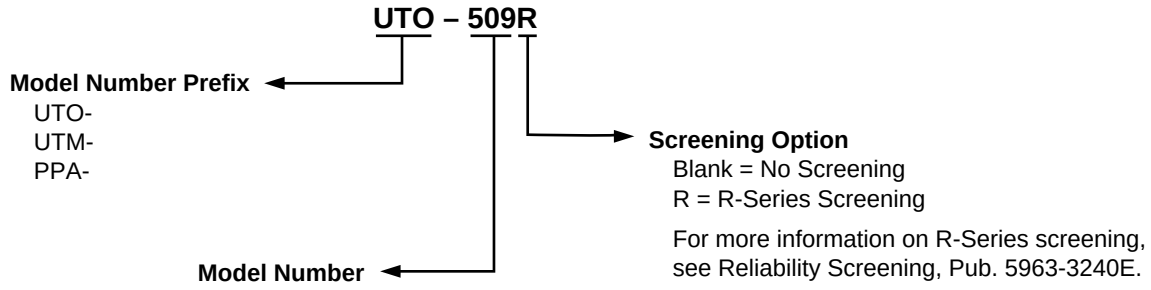
Numerical Readings **Bias = 15.00 Volts**

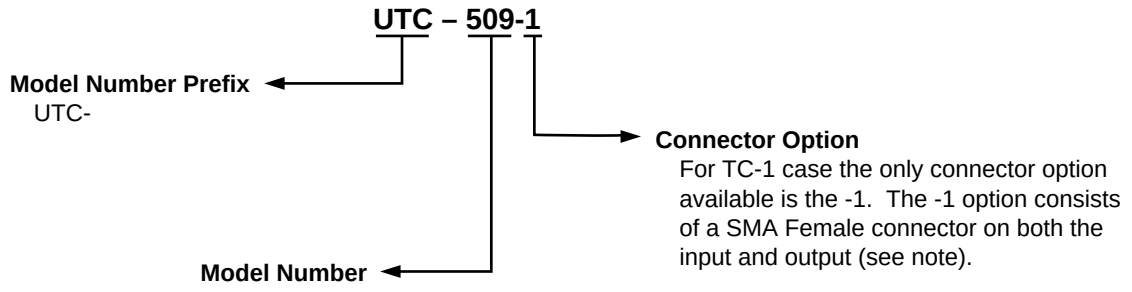
FREQUENCY MHz	VSWR IN	GAIN dB	PHASE DEGREES	PHASE DEV	GROUP DELAY ns	VSWR OUT	ISOLATION dB
100.0	1.09	10.77	160.26	–5.71	.00	1.17	16.80
200.0	1.19	10.67	152.36	–4.78	.43	1.35	16.72
300.0	1.29	10.67	137.24	–3.07	.42	1.53	17.08
400.0	1.36	10.72	122.72	–.75	.39	1.69	17.24
500.0	1.39	10.83	108.58	1.94	.40	1.79	17.32
600.0	1.38	10.95	94.02	4.22	.42	1.81	17.39
700.0	1.32	11.05	78.88	5.71	.44	1.74	17.40
800.0	1.22	11.19	61.92	5.79	.48	1.58	17.35
900.0	1.08	11.14	43.90	4.59	.52	1.35	17.29
1000.0	1.08	10.95	25.03	2.56	.54	1.10	17.20
1100.0	1.25	10.43	5.65	.02	.56	1.15	17.43
1200.0	1.44	9.69	–14.26	–3.04	.51	1.45	17.60
1300.0	1.61	8.73	–31.95	–3.90	.47	1.80	18.14
1400.0	1.73	7.63	–48.41	–3.53	.44	2.16	18.72
1500.0	1.80	6.46	–63.92	–2.20	.00	2.56	19.37

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	.043	132.7	10.733	167.3	–16.533	169.4	.074	114.0
150.00	.065	104.3	10.682	159.2	–16.771	161.0	.109	96.5
200.00	.088	87.0	10.607	151.1	–16.946	154.2	.149	83.7
250.00	.113	73.5	10.572	143.2	–16.949	147.6	.181	73.9
300.00	.131	65.9	10.599	135.6	–17.247	140.9	.207	65.2
350.00	.146	57.4	10.632	126.0	–17.155	134.5	.233	57.7
400.00	.154	49.2	10.685	120.6	–17.085	129.0	.252	50.8
450.00	.161	41.2	10.757	113.5	–17.273	123.3	.267	43.5
500.00	.163	34.0	10.784	105.9	–17.291	117.7	.277	36.7
550.00	.158	26.5	10.885	98.6	–17.319	112.0	.280	30.0
600.00	.151	20.2	10.865	91.0	–17.320	106.5	.281	23.6
650.00	.142	12.0	11.017	83.1	–17.373	100.9	.273	17.1
700.00	.125	4.5	11.080	75.0	–17.426	96.1	.259	9.9
750.00	.103	–4.6	11.173	66.5	–17.279	90.3	.239	3.0
800.00	.080	–14.7	11.216	57.7	–17.303	84.6	.211	–4.0
850.00	.052	–24.8	11.235	48.6	17.327	78.6	.176	–11.9
900.00	.017	–53.0	11.167	39.0	–17.281	72.6	.132	–18.4
950.00	.025	177.0	11.113	29.1	–17.233	66.6	.085	–25.8
1000.00	.057	153.7	10.971	19.4	–17.276	60.7	.032	–28.0
1100.00	.131	128.2	10.422	–.7	–17.405	47.6	.083	125.0
1200.00	.188	112.5	9.693	–21.0	–17.669	34.8	.193	112.1
1300.00	.236	88.9	8.713	–39.0	–18.138	22.0	.291	99.6
1400.00	.259	87.9	7.607	–56.0	–18.694	10.0	.368	86.4
1500.00	.279	80.0	6.496	–72.2	–19.401	–1.2	.433	78.7

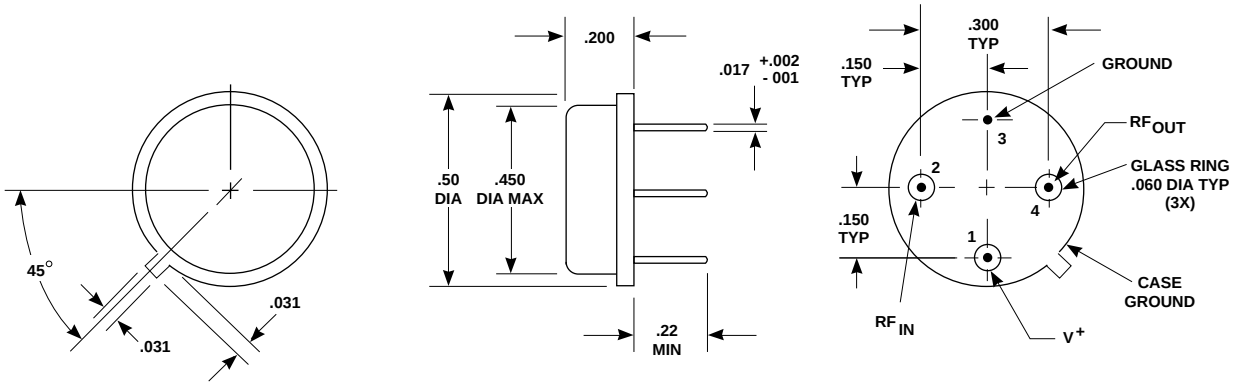
Product Options





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

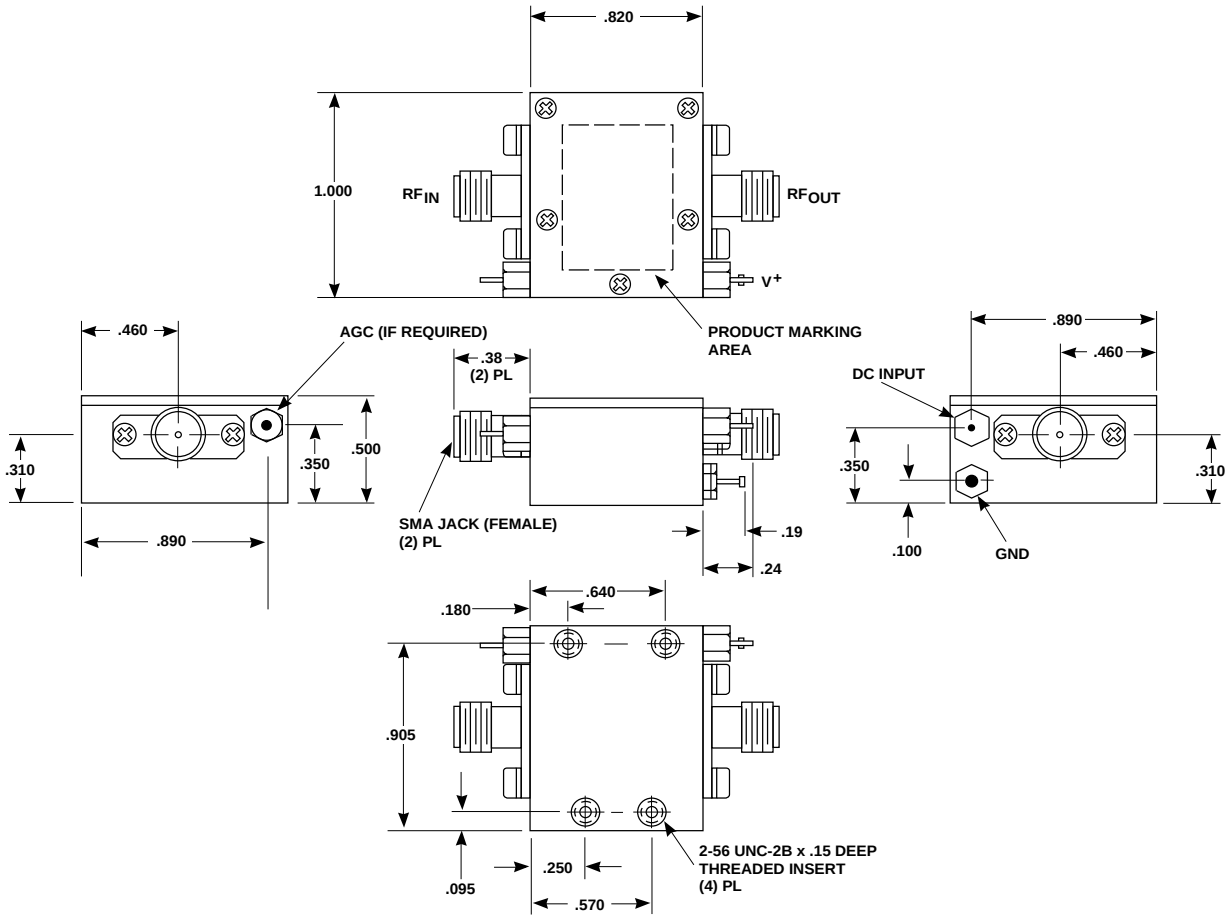
Case Drawings
TO-8T



APPROXIMATE WEIGHT 2.1 GRAMS

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

Case Drawings
TC-1



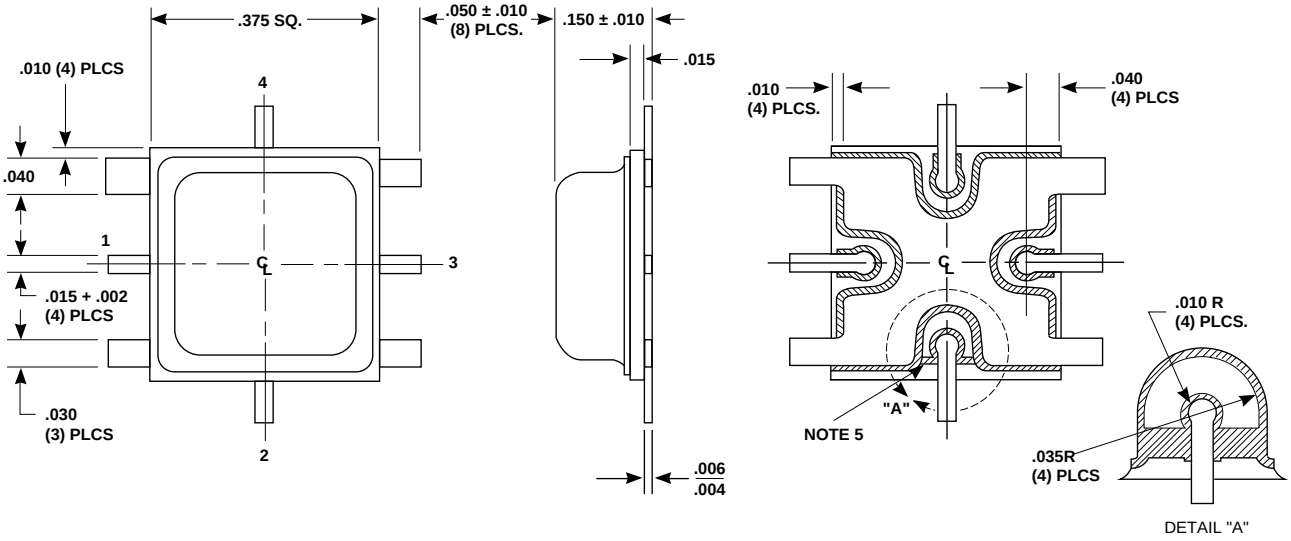
TYPICAL WEIGHT WITH CONNECTORS = 21.5 GRAMS

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

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:

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Japan: (81 3) 3331-6111

*Call your local HP sales office listed in your telephone directory. Ask for a Components representative.

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