

TAT7467H

CATV 75 Ω pHEMT Dual RF Amplifier



Applications

- Replacement for 5 V SOIC-8 Amplifiers
- Edge QAM Output Stage
- MDU Output
- Distribution Amplifiers
- Transmitter Driver Amplifier

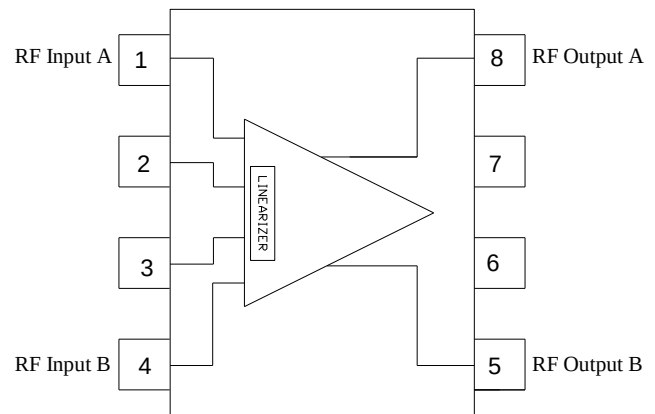


SOIC-8 package

Product Features

- 75 Ω , 40-1002 MHz Bandwidth
- pHEMT device technology
- Meets DOCSIS 3.0 Output Requirements
- 5 V supply voltage
- 380 mA typical current consumption
- On-chip Linearization
- SOIC-8 package

Functional Block Diagram



General Description

The TAT7467H is a 75 Ω fully integrated single-die differential RF Amplifier covering medium power applications in the CATV band. The TAT7467H includes on-chip linearization to improve 3rd order distortion performance while maintaining low power consumption on a 5 V supply. It is fabricated using 6 inch GaAs pHEMT technology to optimize performance and cost.

Pin Configuration

Pin #	Symbol
1	RF Input A
2	Linearizer A
3	Linearizer B
4	RF Input B
5	RF Output B
6	Biasing 2
7	Biasing 1
8	RF Output A
9	Ground Slug

Ordering Information

Part No.	Description
TAT7467H	75 Ω Dual pHEMT Amplifier (lead-free/RoHS compliant SOIC-8 Pkg)
TAT7467H-EB	Amplifier Evaluation Board

Standard T/R size = 1000 pieces on a 7" reel.

Specifications

Absolute Maximum Ratings¹

Parameter	Rating
Device Voltage	+10 V
Storage Temperature	-60 to +150 °C
Operating Temperature	-40 to +85 °C

Notes:

1. Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
V _{DD}		5		V
I _{DD}		380		mA
T _J (for > 10 ⁶ hours MTF)			145	°C

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions

Electrical Specifications

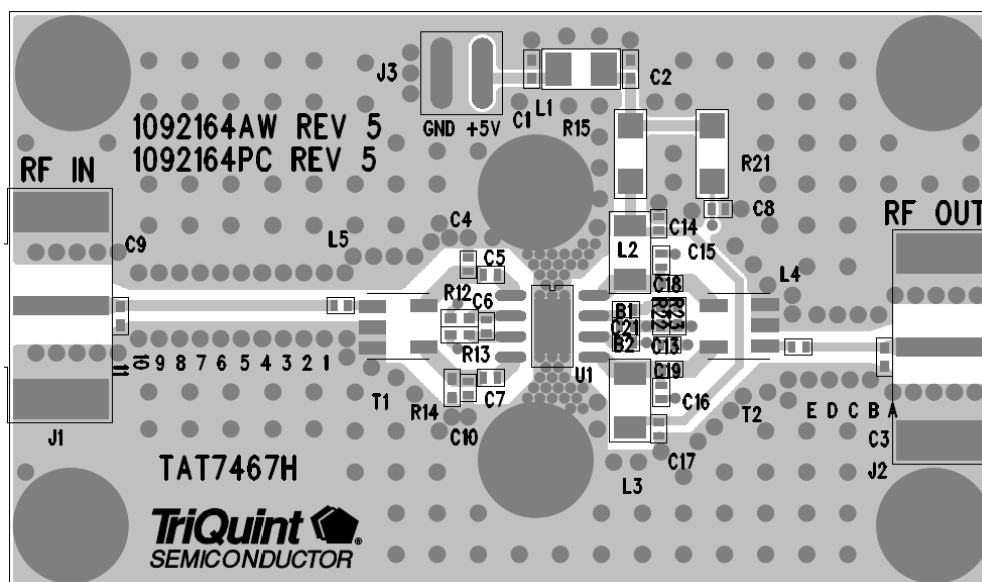
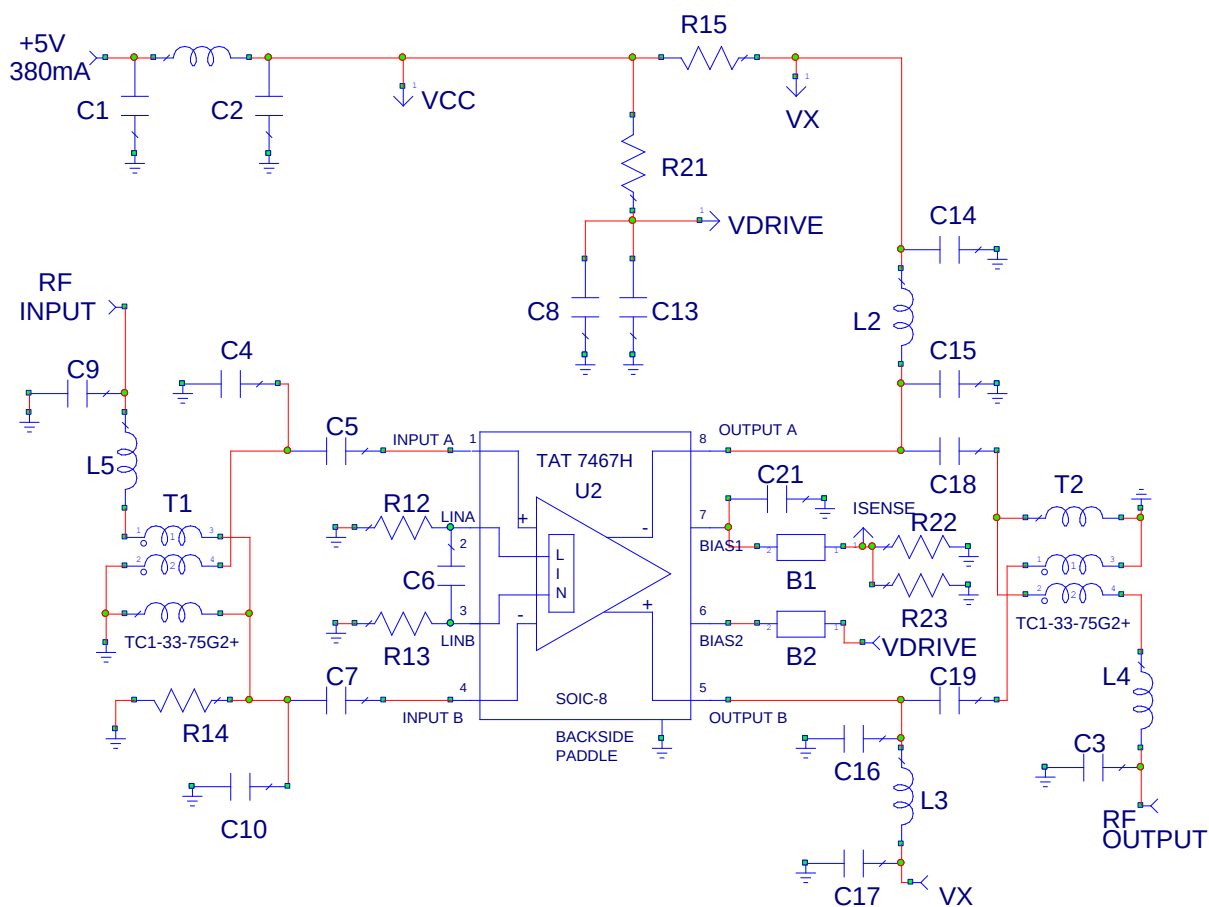
Test conditions unless otherwise noted: 25 °C case temperature, +5 V V_{DD}

Parameter	Conditions	Min	Typical	Max	Units
Operational Frequency Range		50		1002	MHz
Gain			16.5		dB
Gain Flatness	See Note 1		+/- 0.75		dB
Noise Figure			4.7		dB
Input Return Loss			18		dB
Output Return Loss			23		dB
EQAM Output Out-of-band Spurious and Noise for single channel on a single port	Adjacent, See Note 2 and Note 3			-62	dBc
V _{out} = 62 dBmV/ch					
P1dB			24		dBm
OIP3	See Note 4		43		dBm
Equivalent Harmonics	See Note 5			-63	dBc
V _{SUPPLY}			+5		V
I _{DD}			380		mA
Thermal Resistance (jnc. To case) θ_{jc}			14.5		°C/W

Notes:

1. Peak deviation from straight line across full band.
2. Production tested at 66 MHz, 330 MHz, and 990 MHz.
3. Adjacent channel (750 kHz from channel block edge to 6 MHz from channel block edge).
4. 100 MHz tone spacing at 0 dBm/tone.
5. Spurious and noise levels in channels coinciding with 2nd harmonic or 3rd harmonic.

Application Circuit 50-1002 MHz



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Bill of Material: TAT7467H-PCB

Reference Des.	Value	Description	Manuf.	Part Number
U1	--	75 Ohm RF Amplifier	TriQuint	TAT7467H
L5	2.7nH	Ind, wirewound, 0402, 640 mA, 5%	Various	
T1, T2	1:1	1:1 Balun	Minicircuits	TC1-33-75G2+
C3, C4, C10, C15, C16	0.5pF	Cap, ceramic, 0402, 50 V, +/- 0.25 pF	Various	
C5, C6, C7, C13, C14, C17	0.01uF	Cap, ceramic, 0402, 16 V, 10%	Various	
R12, R13	1.21k Ω	Res, thick film, 0402, 1/16 W, 1%	Various	
R14	750 Ω	Res, thick film, 0402, 1/16 W, 1%	Various	
R15	1 Ω	Res, thick film, 1206, 5%	Various	
R21	12 Ω	Res, thick film, 1206, 5%	Various	
R22, R23	1.5 Ω	Res, thick film, 0402, 1/16 W, 1%	Various	
C1, C2	0.1uF	Cap, ceramic, 0402, 16 V, 10%	Various	
L2, L3	500nH	Ind, bead, 1206, 260 mA, 10%	Murata	LQH31HNR50K03
L1	0.9uH	Ind, High Current, 1008, 10%	Coilcraft	1008AF-901XKL
C18, C19	270pF	Cap, ceramic, 0402, 50 V, 10%	Various	
L4	5.6nH	Ind, wirewound, 0402, 760 mA, 5%	Various	
B1, B2	600 Ω	Bead 600 Ω 0402 300 mA	Murata	BLM15HG601SN1
C8, C9, C21	DNP	Do Not Place		

Detailed Device Description

The TAT7467H is a flexible 5 V differential amplifier for medium power CATV applications. The amplifier of the TAT7467H was specially designed to work with on-chip linearization to provide 3rd order distortion improvement over a wide range of RF power levels and across the full CATV bandwidth. Operation of the linearizer will not affect overall gain by more than 0.7 dB.

For any amplifier bias current, output 3rd order distortion may be improved by adjusting a small bias current of the on-chip linearization circuit. The Application Schematic shows resistors setting the linearizer currents. Alternate linearizer drive circuitry is possible; consult TriQuint for discussion.

Bias current may be adjusted with changes to external components making the TAT7467H ideal for both input and output gain stages in an EdgeQAM amplifier line-up. For output stage applications, bias currents of between 300 mA to 400 mA are recommended. For input stage applications, bias currents of 230 mA to 280 mA are recommended.

The TAT7467H is built using a single die, which significantly improves its resulting circuit balance and corresponding 2nd order distortion performance. For best 2nd order performance, an input balun using a 3rd wire construction may be used to improve the input phase balance going into the TAT7467H.

The TAT7467H is packaged in an industry standard SOIC-8 package with a large exposed paddle to enable good heatflow to a backside heatsink. At the maximum recommended bias current of 400 mA the power consumption will be 2 W. The

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TAT7467H is fabricated using a mature pHEMT process that has demonstrated outstanding reliability performance on other TriQuint products. Please consult TriQuint for further information, sicapplication.engineering@tqs.com.

Package Information and Dimensions

Marking:

Product Number – TAT7467H

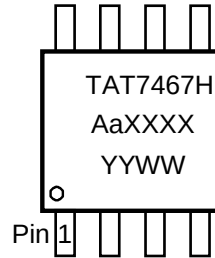
Assembly Code - AaXXXX

Year/Week Code – YYWW

This package is lead-free/RoHS-compliant.

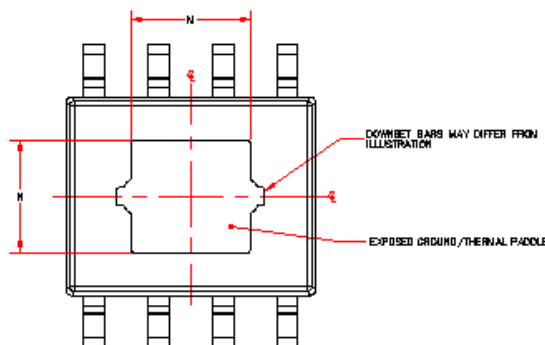
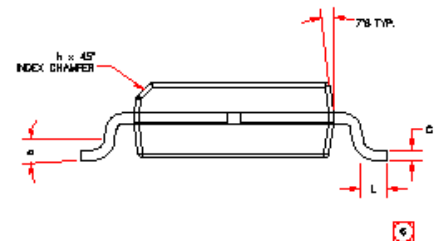
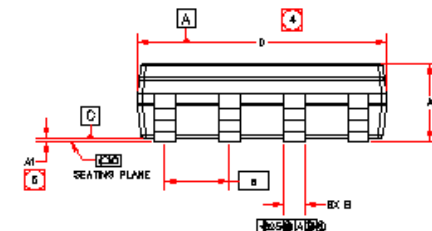
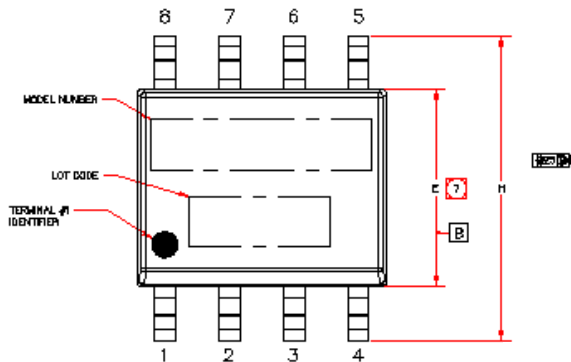
The plating material on the leads is 100% Matte Tin.

It is compatible with both lead-free (maximum 260 °C reflow temperature) and lead (maximum 245 °C reflow temperature) soldering processes



NOTES:

- EXCEPT WHERE NOTED, THIS PART OUTLINE CONFORMS TO JEDEC STANDARD MS-012, ISSUE C FOR SMALL OUTLINE (SO) PERIPHERAL TERMINALS 3.75mm BODY WIDTH (PLASTIC).
- DIMENSIONING & TOLERANCING CONFORM TO ANSI Y14.4M-1994.
- ALL DIMENSIONS ARE IN MILLIMETERS (INCHES). ANGLES ARE IN DEGREES.
- DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS, WHICH SHALL NOT EXCEED .15mm(.006in) PER SIDE.
- DEVIATION FROM JEDEC MS-012 STANDARD.
- LENGTH OF TERMINAL FOR SOLDERING TO A SUBSTRATE.
- DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSIONS, WHICH SHALL NOT EXCEED .25mm(.010in) PER SIDE.



SYMBOL	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.42	1.52	1.62	.056	.060	.064
A1	0	.05	.10	0	.002	.004
B	.38	.41	.43	.016	.016	.017
C	.10	.20	.25	.007	.008	.010
D	4.80	4.80	5.00	.188	.188	.197
E	3.80	3.80	4.00	.150	.154	.157
H	1.27 BSC			.050 BSC		
H	6.80	8.0	8.20	.268	.238	.244
h	.20	.33	.50	.01	.013	.02
L	.40	.64	1.27	.016	.025	.050
W	2.21	2.34	2.47	.087	.092	.097
M	2.09	2.21	2.34	.082	.087	.092
α	0	4°	8°	0	4°	8°

Product Compliance Information

ESD Information



Caution! ESD-Sensitive Device

ESD Rating: Class 1 B
Value: Passes ≥ 400 V min.
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD22-A114

ESD Rating: Class IV
Value: Passes ≥ 2000 V min.
Test: Charged Device Model (CDM)
Standard: JEDEC Standard JESD22-C101

Solderability

Compatible with the latest version of J-STD-020, Lead free solder, 260 °C.

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

MSL Rating

Level 3 at +260 °C convection reflow.
The part is rated Moisture Sensitivity Level 3 at 260 °C per JEDEC standard IPC/JEDEC J-STD-020.

Contact Information

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