

### Applications

- Edge QAM Gain Stage
- MDU Output
- RF Distribution Amplifiers
- Low Noise Optical TIA

### Product Features

- 75  $\Omega$ , 50 MHz to 1200 MHz Bandwidth
- RF Low Noise Figure: 3.2 dB to 1000 MHz
- Configurable as an Optical low noise TIA
  - EIN typ 3.5 pA/ $\sqrt{\text{Hz}}$
  - Optical S21Typ 20dB Z/75 dB
- Adjustable Low Power Consumption
- pHEMT device technology
- SOIC-8 package

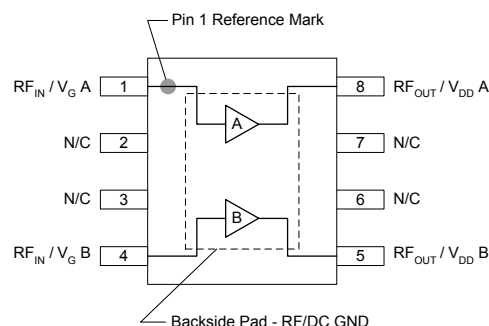
### General Description

The TAT7469 is a 75  $\Omega$  RF Amplifier designed for CATV use, but capable of operation up to 1200 MHz. The TAT7469 contains two separate amplifiers for push pull applications. It is fabricated using 6-inch GaAs pHEMT technology to optimize performance and cost. Each amplifier contains on-chip active biasing. The bias current set point of each amplifier is adjustable with a single resistor from the input to ground.



SOIC-8 Package

### Functional Block Diagram



### Pin Configuration

| Pin No.      | Label                                 |
|--------------|---------------------------------------|
| 1            | RF <sub>IN</sub> / V <sub>G</sub> A   |
| 2, 3, 6, 7   | N/C                                   |
| 4            | RF <sub>IN</sub> / V <sub>G</sub> B   |
| 5            | RF <sub>OUT</sub> / V <sub>DD</sub> B |
| 8            | RF <sub>OUT</sub> / V <sub>DD</sub> A |
| Backside Pad | RF/DC GND                             |

### Ordering Information

| Part No.       | Description                      |
|----------------|----------------------------------|
| TAT7469        | 75 $\Omega$ Dual pHEMT Amplifier |
| TAT7469-SC8-EB | 50-1200 MHz Evaluation Board     |

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

### Absolute Maximum Ratings

| Parameter                   | Rating                |
|-----------------------------|-----------------------|
| Storage Temperature         | -55 to 150°C          |
| Device Voltage ( $V_{DD}$ ) | +10 V                 |
| Device Current ( $I_{DD}$ ) | 400 mA <sup>(†)</sup> |

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

<sup>†</sup> Total current of both amplifiers, individual side cannot exceed half this value as an independent amplifier

### Recommended Operating Conditions

| Parameter                          | Min | Typ | Max  | Units |
|------------------------------------|-----|-----|------|-------|
| Device Voltage ( $V_{DD}$ )        |     | 5.0 |      | V     |
| Device Voltage ( $I_{DD}$ )        |     | 250 |      | mA    |
| Case Temperature                   | -40 |     | +85  | °C    |
| Tj for >10 <sup>6</sup> hours MTTF |     |     | +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:

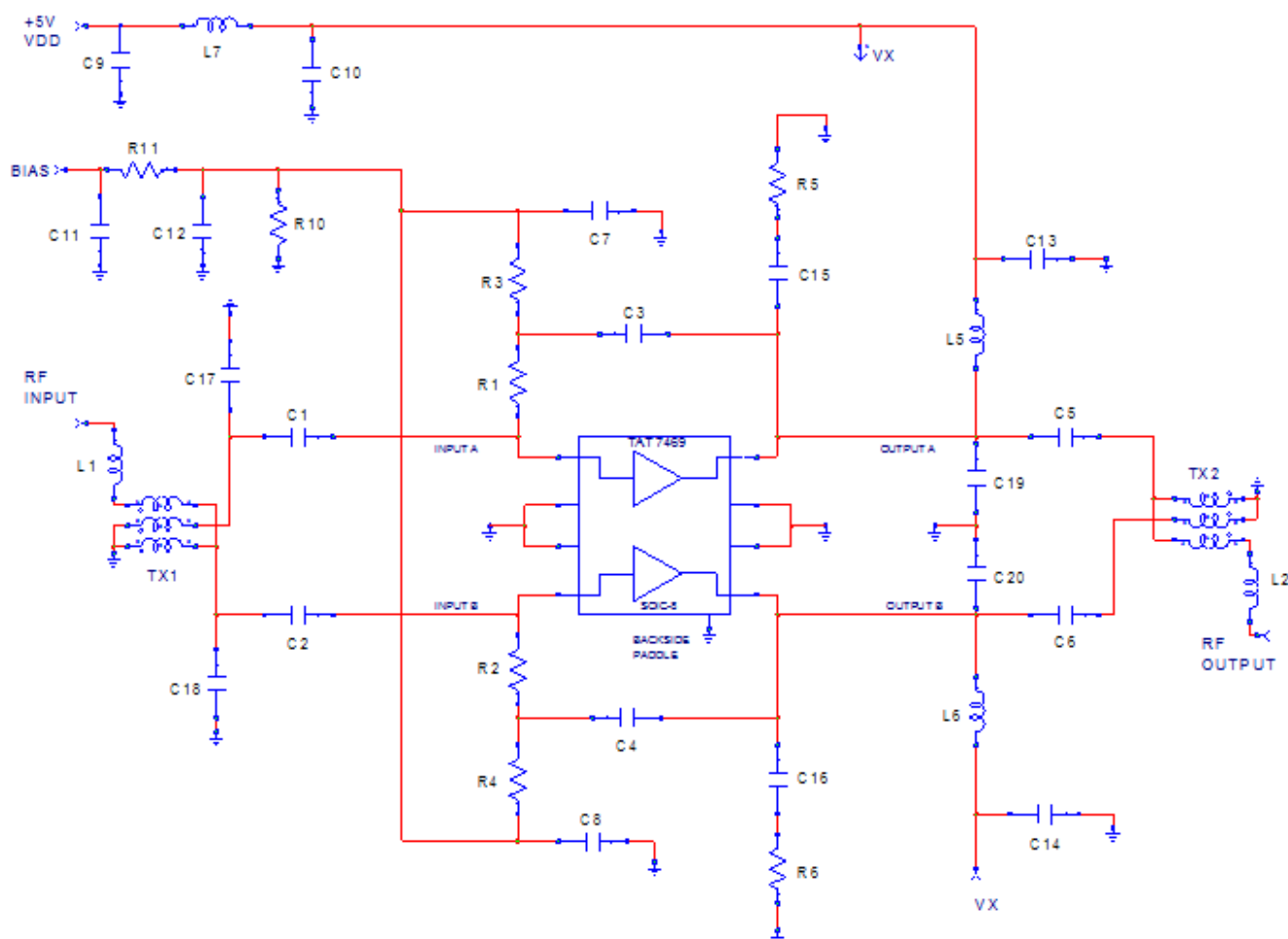
TAT7469-SC8-EB Evaluation board,  $V_{DD}$ =+5 V, Heatsink Temp= +25°C,  $Z_o$  = 75 $\Omega$ , BIAS (J2) pin to GND

| Parameter                                  | Conditions                                    | Min  | Typ   | Max  | Units |
|--------------------------------------------|-----------------------------------------------|------|-------|------|-------|
| Operational Frequency Range                |                                               | 50   |       | 1200 | MHz   |
| Gain                                       | 50 To 1200 MHz                                | 17.0 | 17.5  |      | dB    |
| Gain Flatness <sup>(1)</sup>               | 50 To 1000 MHz                                |      | ±0.75 |      | dB    |
| Input Return Loss                          | 50 To 1000 MHz                                |      | 18    |      | dB    |
|                                            | >1000 To 1200 MHz                             |      | 17    |      |       |
| Output Return Loss                         | 50 To 1000 MHz                                |      | 23    |      | dB    |
|                                            | >1000 To 1200 MHz                             |      | 17    |      |       |
| Output IP2 <sup>(3)</sup>                  | Pout = +10 dBm/tone<br>f1=225 MHz, f2=325 MHz | +70  | +77   |      | dBm   |
| Output IP3                                 | 184 mA < $I_{DD}$ < 315 mA                    | +37  | +38   |      | dBm   |
| Noise Figure                               | Freq.=1000 MHz                                |      | 3.2   |      | dB    |
| Device Current ( $I_{DD}$ ) <sup>(2)</sup> |                                               | 184  | 250   | 315  | mA    |
| Thermal Resistance, $\theta_{jb}$          | Junction to base                              |      | 13    |      | °C/W  |

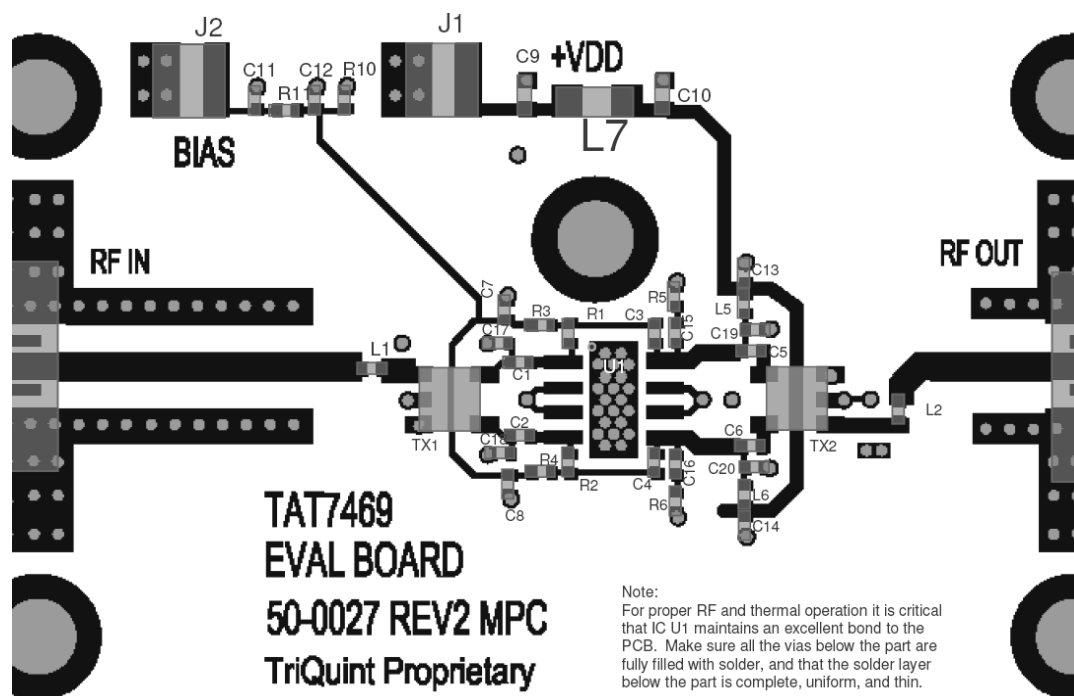
Notes:

1. Flatness determined by deviation from a straight-line curve fit.
2. R3 and R4 are used to set the bias current, 10 k $\Omega$ .
3. Low side intermod at 200 MHz.

**TAT7469-SC8-EB Evaluation Board Schematic**



### TAT7469-SC8-EB Evaluation Board



### Bill of Material – TAT7469-SC8-EB

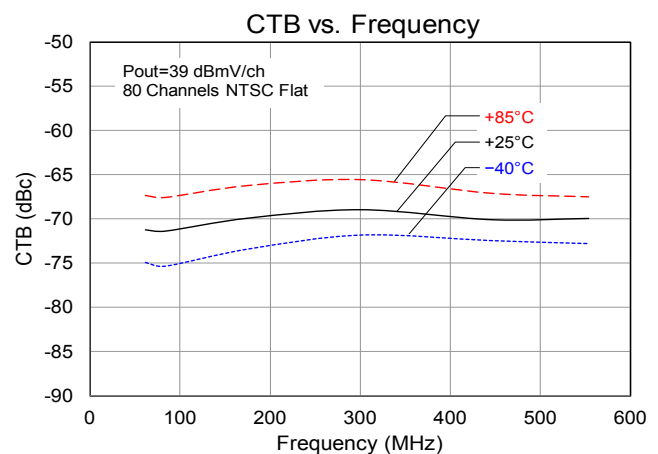
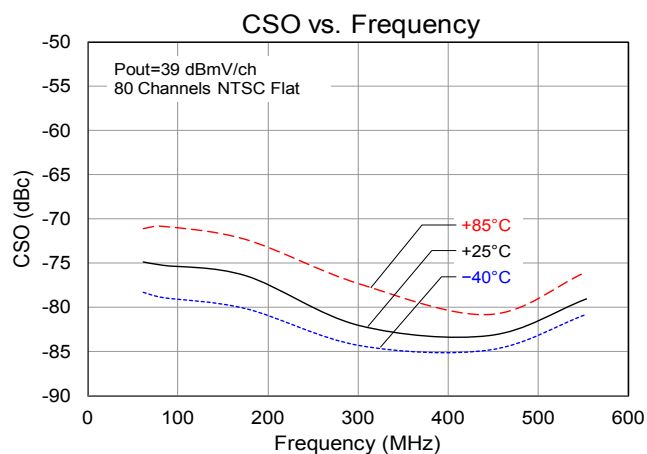
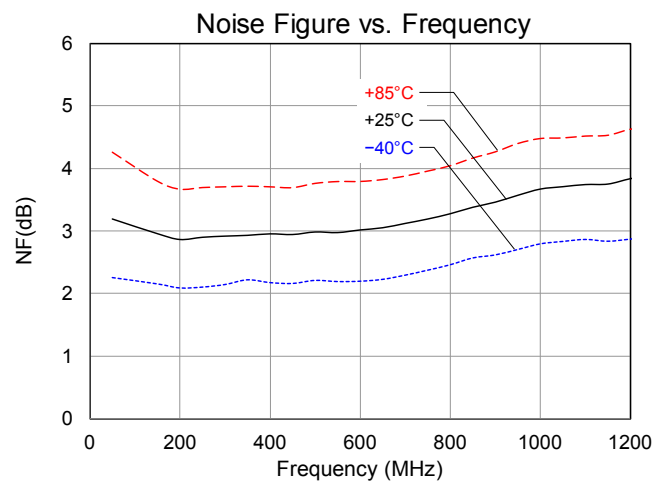
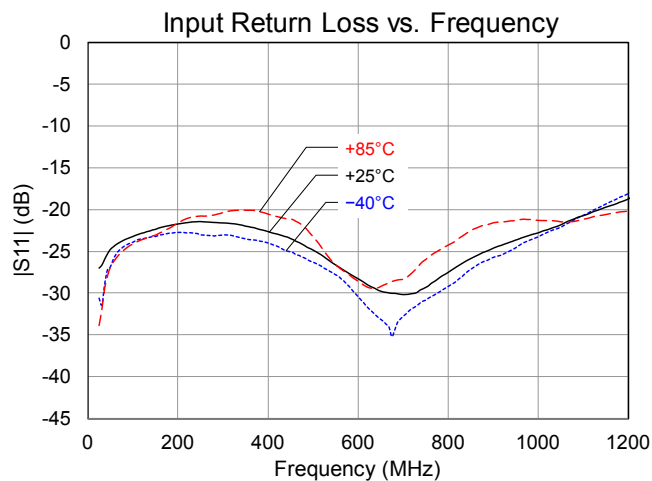
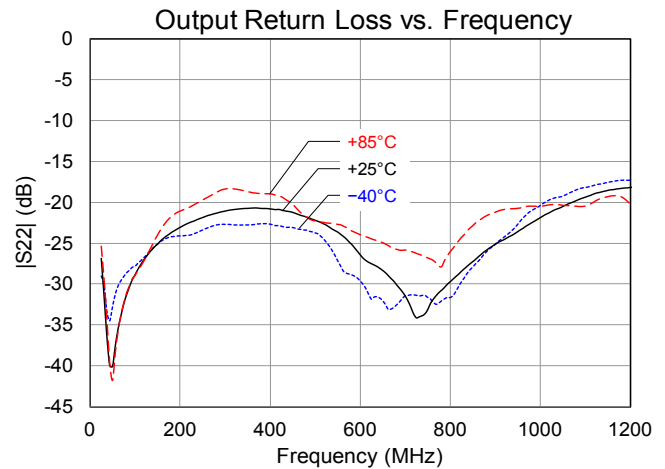
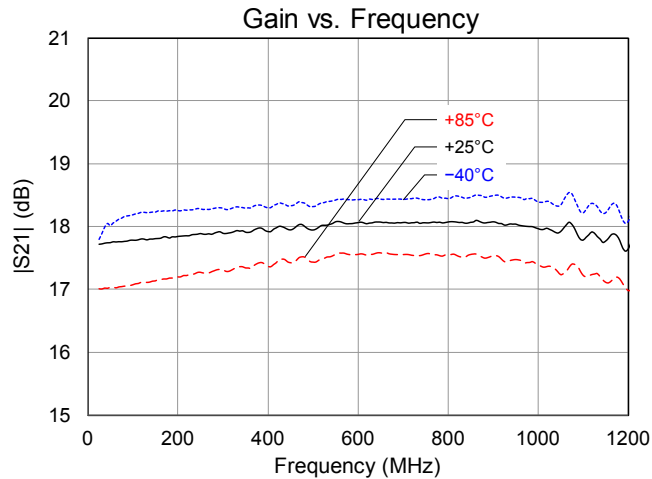
| Reference Des.                             | Value         | Description                            | Manuf.       | Part Number    |
|--------------------------------------------|---------------|----------------------------------------|--------------|----------------|
| U1                                         | n/a           | 75 $\Omega$ Dual pHEMT Amplifier       | TriQuint     | TAT7469        |
| L1                                         | 3.6 nH        | Chip Coil, 0402, 5%                    | CoilCraft    | 0402CS-3N6XJLW |
| L2                                         | 2.2 nH        | Chip Coil, 0402, 5%                    | CoilCraft    | 0402CS-2N2XJLW |
| L5, L6                                     | 560 nH        | Chip Coil, 0402, 5%                    | CoilCraft    | 0402AF-561XJLW |
| L7                                         | 0.9 uH        | Chip Coil, 1008, 10%                   | various      |                |
| TX1, TX2 <sup>(1)</sup>                    | 1:1           | 1:1 Balun, 5 – 3000 MHz                | MiniCircuits | TC1-33-75G2+   |
| C1, C2, C3, C4, C7, C8, C11, C12, C13, C14 | 0.01 uF       | Ceramic Cap, 0402, 16 V, NPO, 10%      | various      |                |
| C5, C6                                     | 470 pF        | Ceramic Cap, 0402, 50 V, NPO, 10%      | various      |                |
| C15, C16                                   | 1.0 pF        | Ceramic Cap, 0402, 50 V, $\pm 0.10$ pF | AVX          | 04025A010BAT9A |
| C17, C18                                   | 0.5 pF        | Ceramic Cap, 0402, 50 V, $\pm 0.10$ pF | AVX          | 04025A005BAT9A |
| C9, C10                                    | 0.1 uF        | Ceramic Cap, 0603, 16 V, NPO, 10%      | various      |                |
| R1, R2                                     | 820 $\Omega$  | Thick Film Res, 0402, 1%               | various      |                |
| R3, R4                                     | 10 k $\Omega$ | Thick Film Res, 0402, 1%               | various      |                |
| R5, R6                                     | 30 $\Omega$   | Thick Film Res, 0402, 1%               | various      |                |
| R10                                        | 100 $\Omega$  | Thick Film Res, 0402, 1%               | various      |                |
| R11                                        | 0 $\Omega$    | Thick Film Res, 0402                   | various      |                |
| C19, C20                                   | N/L           | Do Not Load                            |              |                |
| J3, J4                                     | n/a           | 75 $\Omega$ Female connector           | Amphenol     | 531-40039      |

#### Notes:

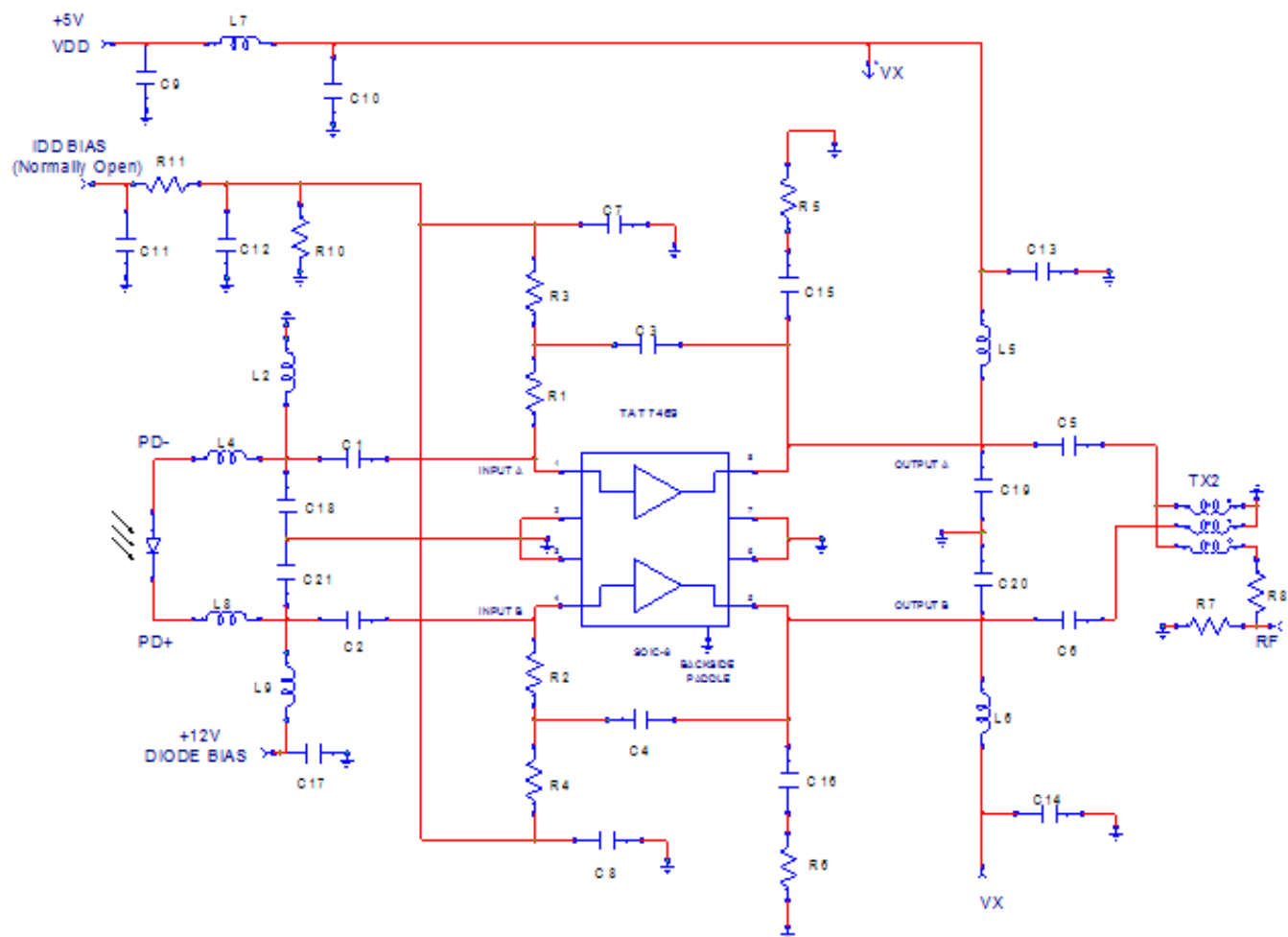
- 1:1 balun may also be constructed using a binocular core (Fair Rite 2843002302; Type 43 material) with 1.5 turns of bifilar wire (MWS T2341222-10).

### Performance Plots – TAT7469-SC8-EB

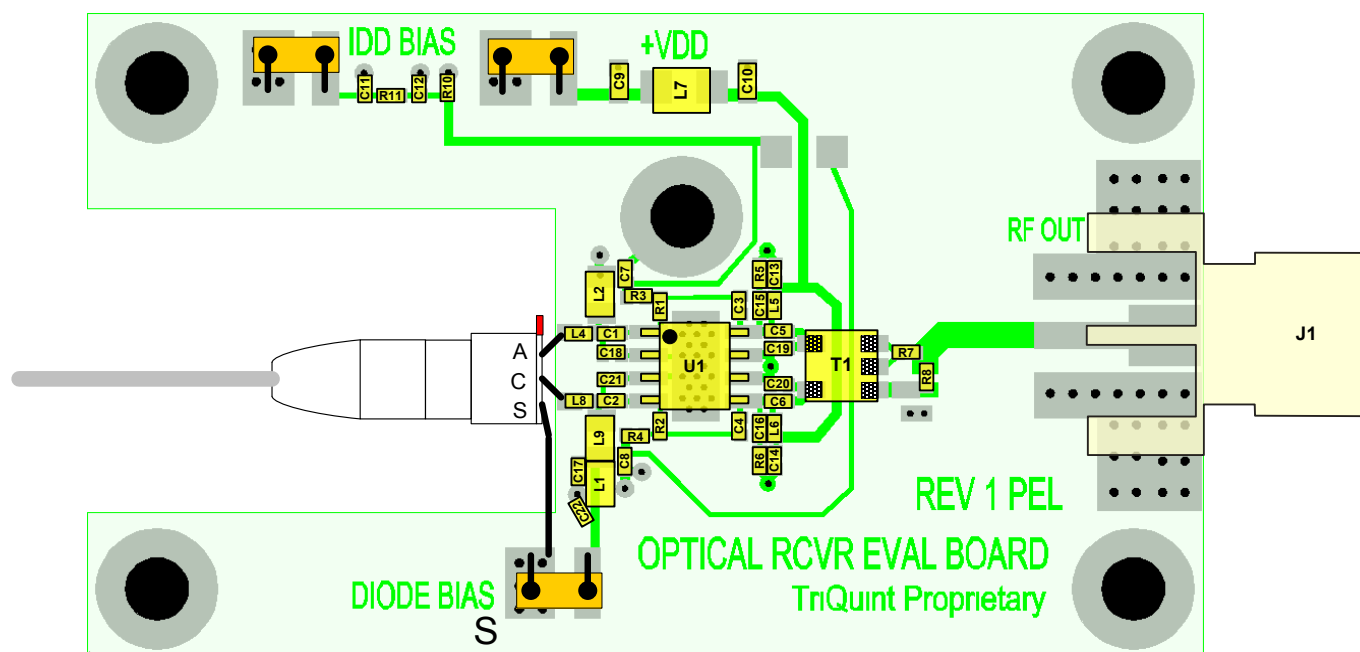
Test conditions unless otherwise noted:  $V_{DD}=+5$  V,  $I_{DD}=250$  mA (typ.), Temp=+25°C



**Optical Application Reference Design Schematic**



### TAT7469-EVB Evaluation Board

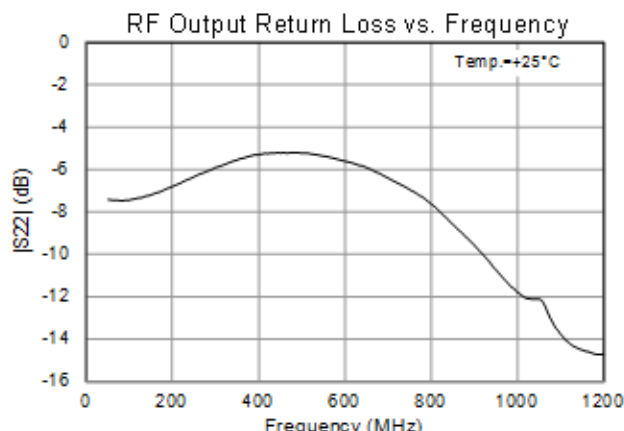
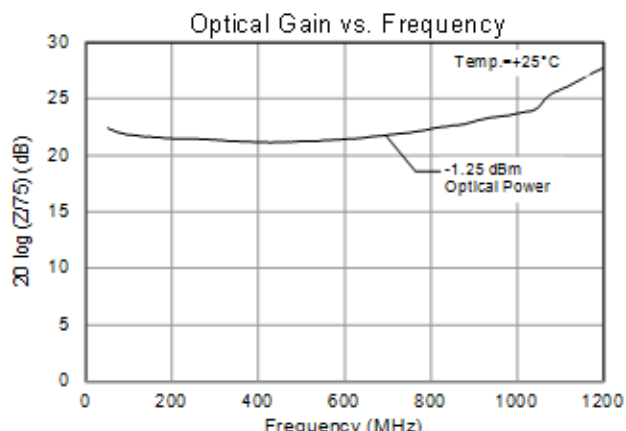


### Bill of Material – TAT7469-EVB

| Reference Des.                                  | Value           | Description                           | Manuf.       | Part Number            |
|-------------------------------------------------|-----------------|---------------------------------------|--------------|------------------------|
| U1                                              |                 | TAT7469 Amplifier, SOIC-8             | TriQuint     | TAT7469                |
| C1, C2                                          | 470 pF          | CAP, 0402, 10%, 50V, X7R              | TDK          | ECJ-0EB1H471K          |
| C3, C4, C5, C6, C7, C8, C11, C12, C13, C14, C17 | 0.01 uF         | CAP, 0402, 10%, 16V, X7R              | various      |                        |
| C9, C10                                         | 0.1 uF          | CAP, 0603, 10%, 16V, X7R              | various      |                        |
| C22                                             | 0.1 uF          | CAP, 0603, 10%, 50V, X7R              | various      |                        |
| R1, R2                                          | 2k              | RES, 0402, 5%, 1/16W. CHIP            | various      |                        |
| R3, R4                                          | 5.6 k $\Omega$  | RES, 0402, 5%, 1/16W. CHIP            | various      |                        |
| R8                                              | 22 $\Omega$     | RES, 0402, 5%, 1/16W. CHIP            | various      |                        |
| R10                                             | 100 $\Omega$    | RES, 0402, 1%, 1/16W. CHIP            | various      |                        |
| R11                                             | 0 $\Omega$      | Thick Film Res, 0402                  | various      |                        |
| L1                                              | 27uH            | IND, 0805, 5%, 120mA, 11MHz           | COILCRAFT    | 0805LS-273XJLB         |
| L2, L9                                          | 880 nH          | IND, 0805, $\pm 5\%$ , Gowanda        | GOWANDA      | CC0805-880J-2          |
| L4, L8                                          | 12 nH           | IND, 0402, 5%                         | COILCRAFT    | 0402CS-12NXJL          |
| L5, L6                                          | 560 nH          | IND, 0402, 5%                         | COILCRAFT    | 0402AF-561XJL          |
| L7                                              | 900 nH          | IND, 1008, 10% Ferrite Ind            | COILCRAFT    | 1008AF-901XKL          |
| J1                                              | N/A             | F-SIDE_GND Conn Precision edge launch | LIGHTHORSE   | LTI-FSF55MGT-P-10-A-X7 |
| C15, C16, C18, C19, C20, C21, R5, R6, R7        | no load         | 0402, DNP                             |              |                        |
| T1                                              | 1:1 75 $\Omega$ | SMT balun CD542                       | MINICIRCUITS | TC1-33-75G2+           |
| PD                                              | EPM705          | Photo Diode                           | JDSU         | X07051650-004R         |
| PCB                                             | Rev 1           | TAT7469 Optical EVB                   | TRIQUINT     | 1098793                |
| J2-3, J4-5, J6-7                                | n/a             | Conn, 1x2, 0.1 inch RA                | MOLEX        | 022-28-8021            |

### Typical Optical S21 & RF S22

Test conditions unless otherwise noted:  $V_{DD}=+5$  V,  $I_{DD}=220$  mA (typ.),  $V_{PD}=+12$  V Temp= $+25^{\circ}\text{C}$



### Typical Optical Receiver Distortion

Test conditions unless otherwise noted:  $V_{DD}=+5$  V,  $I_{DD}=220$  mA (typ.),  $V_{PD}=+12$  V Temp= $+25^{\circ}\text{C}$   
3.5% OMI, 79 channels NTSC, Flat Loading

| Optical Power (dBm) | $I_{PD}$ (mA) | Frequency (MHz) | Noise Floor (dBm) | Fund (dBmV/ch) | CSO (dBc) | CTB <sup>1</sup> (dBc) |
|---------------------|---------------|-----------------|-------------------|----------------|-----------|------------------------|
| +1                  | 1.2           | 55.25           | -96.9             | 29.4           | -66.7     | -65.6                  |
|                     |               | 301.25          | -95.3             | 28.8           | -66.7     | -64.7                  |
|                     |               | 547.25          | -97.7             | 28.3           | -73.8     | -66.8                  |
| -6                  | 0.24          | 55.25           | -101.1            | 14.2           | -64.5     | -64.3                  |
|                     |               | 301.25          | -100.8            | 14.8           | -66.0     | -63.8                  |
|                     |               | 547.25          | -101.5            | 14.2           | -67.2     | -63.0                  |

Notes:

1. CTB was limited by the optical transmitter in the test set-up, actual receiver results are better than shown.

### Typical EIN Performance

Test conditions unless otherwise noted:  
 $V_{DD}=+5$  V,  $I_{DD}=220$  mA (typ.),  $V_{PD}=+12$  V Temp= $+25^{\circ}\text{C}$   
3.5% OMI, 79 channels NTSC, Flat Loading

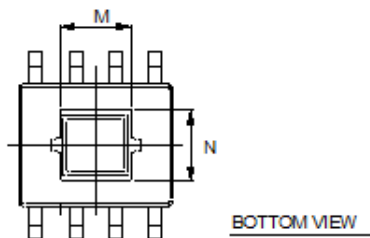
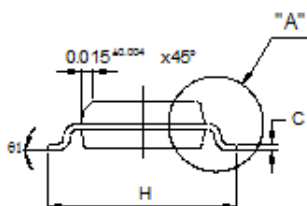
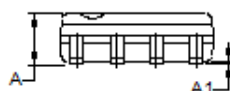
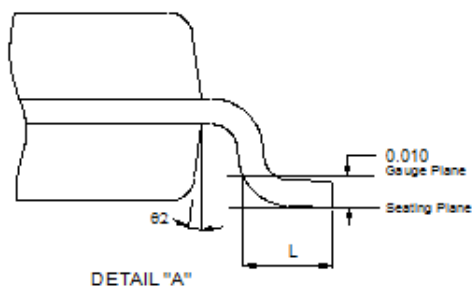
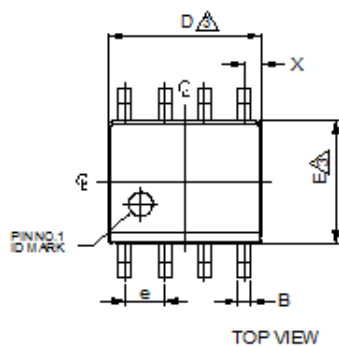
| Freq (MHz) | EIN (pA/rtHz) |
|------------|---------------|
| 55         | 4.0           |
| 547        | 3.8           |
| 1000       | 3.5           |

### Package Marking and Dimensions

Marking: Part Number – TAT7469

Lot code – AaXXXX

Year/Week –YYWW



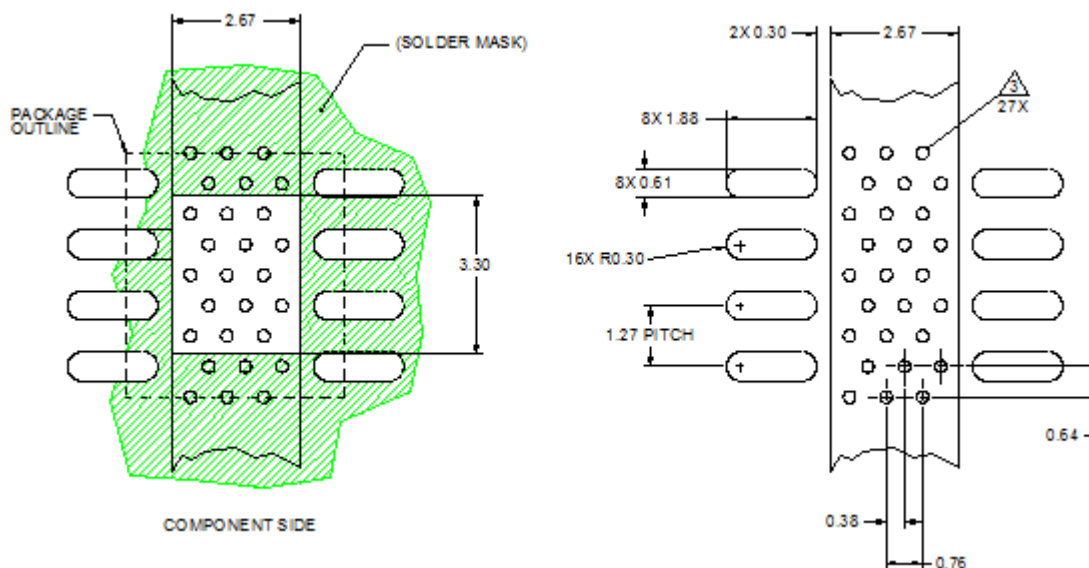
EXPOSED PADDLE

| SYMBOL | 8 SOIC     |        |
|--------|------------|--------|
|        | MIN        | MAX    |
| A      | 0.054      | 0.068  |
| A1     | 0.001      | 0.004  |
| B      | 0.014      | 0.019  |
| D      | 0.189      | 0.196  |
| E      | 0.150      | 0.157  |
| H      | 0.229      | 0.244  |
| M      | 0.087      | 0.097  |
| N      | 0.082      | 0.092  |
| e      | 0.050 BSC  |        |
| C      | 0.0075     | 0.0098 |
| L      | 0.020      | 0.040  |
| X      | 0.0215 REF |        |
| 61     | 0°         | 8°     |
| 62     | 7° BSC     |        |

#### NOTE:

1. TOP PACKAGE SURFACE TO BE Ni, Pd, Au PLATING
2. BOTTOM PACKAGE SURFACE TO BE Ni, Pd, Au PLATING
3. DIMENSIONS ARE EXCLUSIVE MOLD FLASH AND GATE BURR.
4. FOOT LENGTH MEASURING IS BASED ON THE GAUGE PLANE METHOD.

## PCB Mounting Pattern



### Notes:

1. All dimensions are in millimeters. Angles are in degrees.
2. Use 1 oz. copper minimum for top and bottom layer metal.
3. Vias are required under the backside paddle of this device for proper RF/DC grounding and thermal dissipation. We recommend a 0.35mm (#80/.0135") diameter bit for drilling via holes and a final plated thru diameter of 0.25mm (0.010").
4. Ensure good package backside paddle solder attach for reliable operation and best electrical performance.

## Product Compliance Information

### ESD Sensitivity Ratings



Caution! ESD-Sensitive Device

ESD Rating: Class 1B  
Value: Passes  $\geq 500$  V to  $<1000$  V  
Test: Human Body Model (HBM)  
Standard: JEDEC Standard JESD22-A114

ESD Rating: Class IV  
Value: Passes  $\geq 2000$  V  
Test: Charged Device Model (CDM)  
Standard: JEDEC Standard JESD22-C101

### MSL Rating

MSL Rating: Level 3  
Test:  $260^{\circ}\text{C}$  convection reflow  
Standard: JEDEC Standard IPC/JEDEC J-STD-020

### Solderability

Compatible with both lead-free ( $260^{\circ}\text{C}$  maximum reflow temperature) and tin/lead ( $245^{\circ}\text{C}$  maximum reflow temperature) soldering processes.

Contact plating: Ni, Pd, & Au

### RoHS Compliance

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

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ( $\text{C}_{15}\text{H}_{12}\text{Br}_4\text{O}_2$ ) Free
- PFOS Free
- SVHC Free

## Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about TriQuint:

Web: [www.triquint.com](http://www.triquint.com)  
Email: [info-sales@triquint.com](mailto:info-sales@triquint.com)

Tel: +1.707.526.4498  
Fax: +1.707.526.1485

For technical questions and application information:

Email: [sjcapapplications.engineering@triquint.com](mailto:sjcapapplications.engineering@triquint.com)

## Important Notice

The information contained herein is believed to be reliable. TriQuint makes no warranties regarding the information contained herein. TriQuint assumes no responsibility or liability whatsoever for any of the information contained herein. TriQuint assumes no responsibility or liability whatsoever for the use of the information contained herein. The information contained herein is provided "AS IS, WHERE IS" and with all faults, and the entire risk associated with such information is entirely with the user. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for TriQuint products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information.

TriQuint products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)

[www.lifeelectronics.ru](http://www.lifeelectronics.ru)