# GaAs Components Boost CATV Systems Performance, Lower Power Consumption

*by TriQuint Semiconductor*

While wireless devices garner most of the media attention, cable applications nevertheless consume vast quantities of RF components every year and remain the primary means most people in North America employ to entertain themselves, access the internet, and channel broadband content. CATV RF components range from simple gain block amplifiers to laser modulator driver amplifiers, and they will all play an increasingly important role as cable MSOs increase the performance of their networks to accommodate the needs of very-high-speed broadband data, HD video, and other bandwidth intensive applications. TriQuint Semiconductor recently added three amplifiers to its TriAccess family, each one designed to provide better performance at lower cost with lower power consumption compared to other market solutions.

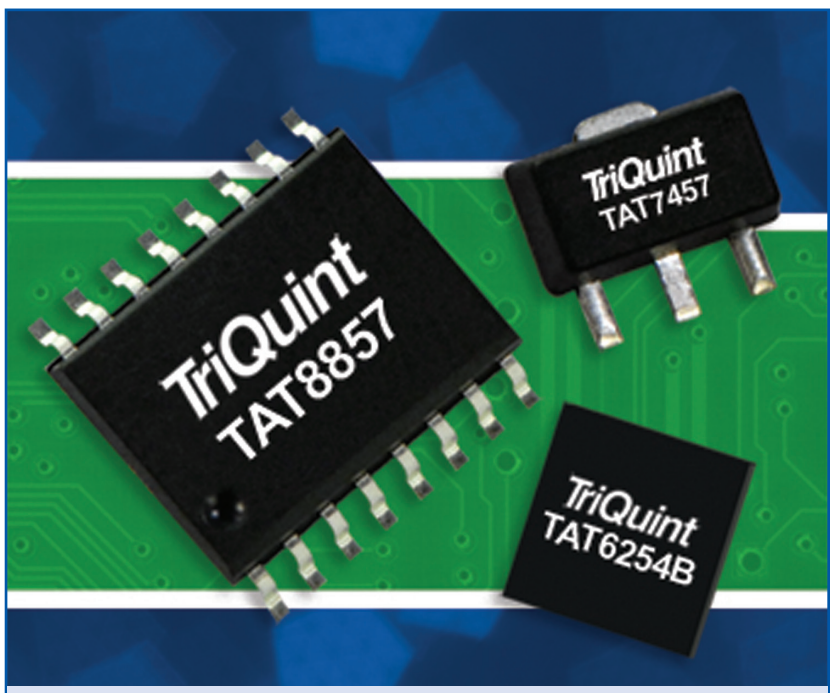


*Figure 1: TriQuint's three new amplifiers provide high gain, high linearity, and low-power consumption and a variety of cable applications.*

The performance of the company's TriAccess portfolio of GaAs pHEMT amplifiers is tailored to the unique needs of the cable industry. They consume small amounts of power, are highly linear, deliver power-added efficiency up to 50%, and can reduce the amount of required PC board "real estate" by up to 80%. They also meet the demanding requirements of DOCSIS® 3.0 and have a variety of features that make them appealing for use in headend, CATV infrastructure, subscriber, Fiber to the Home (FTTH), and emerging RF over Glass (RFoG) applications. TriAccess RFICs for fiber to Multi-Dwelling Unit (MDU) applications satisfy the difficult gain, noise, and distortion requirements of Gigabit Passive Optical Network (PON) systems as well. These architectures must achieve broad optical dynamic range with high RF output power, and new multimedia distribution approaches such as MoCa (Multimedia over Coax) require higher levels of RF output to cover a large number of terminal devices. The new devices are designed to meet these challenges. Key specifications are shown in Table 1.

*TriQuint, Con't on pg 58*

**Table 1: TriQuint Amplifiers at a Glance**

| | TAT7457 | TAT6254B | TAT8857 |
|---|---|---|---|
| Frequency Range (MHz) | DC to 2000 | 50 to 1000 | – |
| Power-Added Efficiency (%) | 50 | 50 | 50 |
| Gain (dB) | 19 | 38 | 22 to 27 |
| Power Supply (VDC/mA) | 5/100 | 5 or 12/200 or 100 | ???? |
| CTB (dBc) | -78 | -62 | -70 |
| On-Chip Linearization | Yes | Yes | Yes |
| On-Chip Active Bias | Yes | Yes | Yes |
| Applications | • Single-ended and push-pull optical receivers<br>• Drop amplifiers<br>• Distribution amplifiers<br>• Single-ended gain block | • FTTH<br>•RFoG<br>• Mini-node receivers<br>• GPON RF overlay | • Line amplifiers<br>• Distribution nodes |

*TriQuint, Con't on pg 27*

### A Flexible Amplifier for All-QAM Content and Digital Cable

The TAT7457 is a single-ended amplifier fabricated using 6-in. GaAs pHEMT technology to optimize performance and minimize costs while operating from DC to 2 GHz. It has low noise and distortion that make it well suited for broadband amplifiers used in optical receivers and low noise front ends. It draws very low current and makes it possible for a single device to be used in many applications such as Ethernet over Coax (EoC) and optical network unit (ONU) systems, as well as a variety of existing and emerging home amplifier designs. The TAT7457 consumes just 120 mA at 5 VDC and delivers up to 19 dB of gain. Gain and return loss are adjustable with an external feedback resistor to optimize distortion or noise performance, and an internal bias circuit mitigates the effect of temperature and process variation. There are no on-chip capacitors to limit low-frequency response, allowing performance to extend to DC. The device provides higher gain, lower noise, and better return loss compared to generations of amplifiers that are currently employed for 16 dB of gain typically found in home network applications.

### RFICs for FTTH and RFoG Applications

RFoG is becoming increasingly popular for new construction and network upgrades as it leverages the current cable infrastructure and offers a smooth transitional path to higher bandwidth services. To help designers cost-effectively meet the challenge of satisfying RF requirements at the Residential-Optical Network Unit (R-ONU), the TriAccess portfolio includes a family of RFICs that satisfy the difficult gain, noise and distortion requirements of PONs (Passive Optical Networks). The new TAT6254B is an excellent choice for QAM-dominated content networks and those that can benefit from an extended optical link budget. It is designed to support current GPON and emerging RFoG specifications and its very low noise, dual single die, and single package convenience make it a cost-effective upgrade solution.

The TAT6254B integrates two trans-impedance amplifiers in a differential configuration followed by an output amplifier It offers excellent EIN (3.0 pA/rtHz) – currently the best performance available – and it delivers 38 dB gain and 18 dB return loss, making it an excellent choice or single system amplifier/receiver FTTH and RFoG networks in which noise optimization is a critical requirement. It consumes only 200 to from a 5-VDC supply (100 mA from a 12-VDC supply) and has sensitivity of -12 dBm.

### Integrated Solution for CATV Infrastructure

The TAT8857 amplifier is designed for use as a doubler in 75-ohm cable infrastructure including line amplifiers and distribution nodes from 40 to 1002 MHz where low current consumption and high performance are highly desirable. The device offers better third-order modulation distortion performance than legacy solutions and can reduce power consumption by 20% when compared with existing 24-VDC MMIC solutions. It can also be operated at 12 VDC for optimum efficiency. The TAT8857 utilizes on-chip linearized, integrated pHEMT and MESFET technology to provide low distortion and user-configurable gain from 21 to 27 dB. Samples and evaluation boards are available for the TAT6254B and TAT7457, which are in full production. The TAT8857 will enter production in mid-year. More information is available at www.triquint.com/xxxx

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