



WaveFront

The QuinStar Newsletter Spring 2014
Twenty First Anniversary Issue

Message from the CEO/President



Leo Fong

Greetings and thanks from the QuinStar family on the occasion of our 21st Anniversary celebration! This special issue of *WaveFront* commemorates this milestone with feature stories reflecting the past two decades of tremendous growth within

the millimeter wave industry and QuinStar, in particular. Many projections made since the 1980s have finally come to fruition because of major technical advancements and economically viable supporting technologies. Millimeter wave based systems and applications are experiencing explosive growth and widespread deployment in communications, remote sensing, defense and science. QuinStar has continually kept pace with these developments by enhancing our capabilities and offering new and improved products. We recently completed our five-year strategic planning and are implementing many initiatives and programs, as well as organizational enhancements, to best serve our customers and affiliates. We sincerely appreciate your past support and value our on-going relationships. Let us achieve great successes and meet our loftiest goals together!

New Products Introduced

New Family of Advanced High Power Solid State Power Amplifiers for Ka through W Bands (26 to 110 GHz)

QuinStar has created a full range of advanced millimeter wave amplifier products which offer **exceptionally high RF power output** with unprecedented efficiency in very compact packages by utilizing the most advanced devices and novel circuit integration techniques. These products incorporate state of the art GaAs and GaN MMIC devices with QuinStar's proprietary high efficiency power combiner networks to produce optimal solutions for virtually any application at an **affordable cost**.

Application-specific power amplifiers can be readily manufactured to suit any communications equipment, radar or scientific instrument, often replacing the expensive and bulky TWTs and their power supplies.

Standard features of these amplifiers include power supplies or conditioners, sampled power detectors and telemetry/telecommands. **Pulsed operation** is offered for applications requiring direct ON/OFF modulation of the power output thereby reducing power consumption and heat dissipation while eliminating amplifier noise during pulse OFF period.

Products in this family offer power levels in the range of **50 to 200 Watts in the 29 to 38 GHz** frequency range and **5 to 20 Watts in the 70 to 96 GHz** frequency range. These amplifiers are intended for use in airborne and ground-based applications as well as satellite and space equipment used for communication and radar systems.



30 Watt 94 GHz Solid State Power Amplifier (SSPA)



5-Watt 94 GHz Power Amplifier Module Used in SSPA

For Technical Data Sheets and additional information about this family of amplifiers, please contact sales@quinstar.com

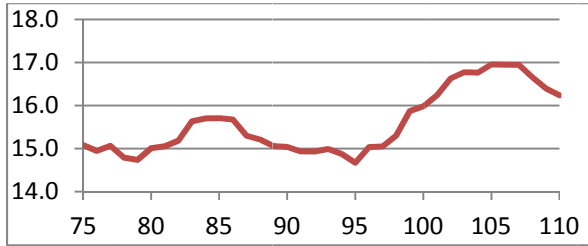
Improved Noise Source Product Line Covering 50-110 GHz in Three Waveguide Bands

QuinStar has significantly improved the performance of its traditional line of noise sources operating over full waveguide bands. Exceptional flatness of the ENR is achieved together with very stable, drift-free operation over temperature and time, while still generating the highest ENR level available. Versions with amplified excess noise power are also offered.



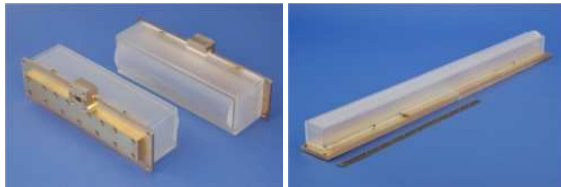
New Version of W-band Noise Source

Excess Noise Ratio (ENR) Data for New W-band Noise Source



Next Generation of Slot Array Antennas

QuinStar has created a new line of conformal or low-profile antennas for special applications, including airborne radars with integral radome. These antennas offer a fairly wide range of beamwidths in the azimuth and elevations planes with reasonable sidelobe levels. They are available from below 18 GHz to 110 GHz as custom products.



Ka-band (35 GHz) Slot Array Antennas with Radomes. Beamwidths of 4° X 20° and 1° X 17°, respectively.

QuinStar's Recent Success Stories and Achievements

QuinStar Hardware for X-band Radar System

QuinStar's Systems and Equipment Department has designed, built and integrated all associated hardware for a high performance X-band instrumentation radar.



X-band High Resolution Multi-Purpose Radar

QuinStar Receives Group Achievement Award from NASA (National Aeronautics and Space Administration)

QuinStar Technology, as a member of the GLISTIN-A Team, received the Group Achievement Award for excellence in contributing to the developing of the Airborne Glacier and Ice Surface Topography Interferometer as a state of the art cryospheric mapping sensor. The instrument maps sheet ice and its dynamics to better understand changes in glaciers and surface ice potentially linked to global warming. QuinStar supplied the Ka-band (35 GHz) transmitter amplifier (SSPA) and receiver components.

NASA W-band Cloud Radar Mission

QuinStar has recently supplied a pulsed 30 Watt Solid State transmitter amplifier for airborne 94 GHz Cloud Radar System (CRS). This amplifier replaces the tubes previously used for this type of radar. CRS measurements support the Global Precipitation Mission (GPM) satellite validation. CRS measures the vertical structure of clouds from aircraft altitude (20 km) to the surface. CRS is also providing data for developing science algorithms for the Aerosol Chemistry Ecology (ACE) space mission planning. ACE will carry a Ka- and a W-band radar which might incorporate a solid-state power amplifier in place of TWT as in the past missions (CloudSAT, EarthCARE, etc.).

Small Business Innovation Research (SBIR)

Contract Awards Announced

QuinStar has recently received three Phase I and two Phase II SBIR awards from the US Air Force and NASA. The Air Force research award is for the development of W-band Power Amplifiers and transceivers for SATCOM applications, while the NASA award is for F-band power amplifiers. QuinStar continues to move forward in defining the state of the art in millimeter wave power amplifiers and transceivers in V, E, W and F-bands in all aspects of their performance.

Small Business Technology Transfer Program

Small Business Technology Transfer (STTR) is another program in the federal innovation research and development arena. QuinStar has received a Phase I STTR contract from US Defense Advanced Research Programs Agency (DARPA) for the development of multi-ferroic devices in partnership with a University affiliate. Central to the program is the expansion of the public/private sector partnership to include joint venture opportunities for small businesses and nonprofit research institutions. The unique feature of the STTR program is the requirement for the small business to formally collaborate with a research institution in Phase I and Phase II. STTR's most important role is to bridge the gap between performance of basic science and commercialization of resulting innovations.

Small Business Innovation Research (SBIR)

Contracts update during 2013-2014

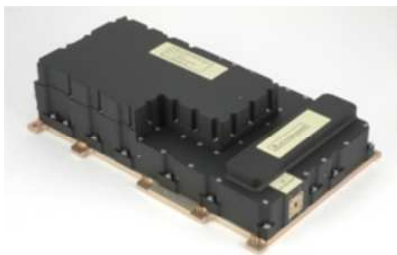
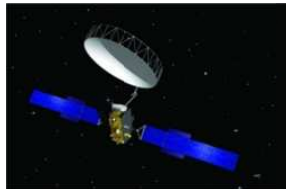
QuinStar has delivered on several SBIR contracts for novel concepts in millimeter wave technology and products. Our program teams have also made significant progress toward completing several other ongoing Phase I and Phase II contracts during this period. These efforts have resulted in the development of a range of low-noise and high-power amplifier MMIC devices, circuit integration and power combining techniques, which have been productized for a wide range of applications.

QuinStar's Own MMIC Development

QuinStar has successfully completed the design, development, fabrication and testing of three foundry runs of MMICs. These include power amplifiers, driver amplifiers, LNAs and other significant functions or devices. Many strategic products now utilize QuinStar's own MMIC chips, giving QuinStar and its customers a competitive edge over other commercially available products.

QuinStar's Space-Qualified Q-band SSPAs Operating Flawlessly in Space Flight in European Satellite based Q/V-band Communications Experiment aboard Alphasat Technology Demonstration Payload (TDP5)

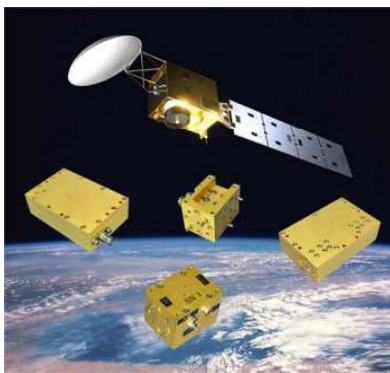
A set of high power Q-band power amplifiers (10 Watt) in the 38 to 40 GHz range has been operating as beacon and transmitters in the Technology Demonstration Payload for Q/V-band space communications experimental study since late 2013 On Alphasat-I.



Q-band SSPA for Space Communication (Alphasat TDP5 Q/V Space Communications Experiment)

QuinStar Delivers W-band Active Components for ESA's Living Planet Space Program EarthCARE Cloud Profiling Radar (CPR) Transmit Receive System

QuinStar has delivered the flight units for the front end of the W-band (94 GHz) satellite-borne radar planned to be launched in 2016.



QuinStar-produced Subsystems for Remote Sensing Instruments help Geophysics, Earth Sciences and Atmospheric Research

QuinStar has recently delivered a number of advanced subsystems to various customers for a wide range of environmental studies, geoscience measurements and remote sensing applications. These subsystems include High Power Solid-State Power Amplifiers (SSPAs), Transmitter Upconverters, Receivers, Antennas and other

associated components. These subsystems have been integrated in various instruments and equipment for ongoing and new programs.

Most recently, QuinStar has supplied a 30 Watt pulsed solid state power amplifier to NASA for Cloud Radar System (CRS) which is part of the Integrated Precipitation and Hydrology Experiment (IPHEX) in support of the Global Precipitation Mission (GPM) satellite validation. CRS measures the vertical structure of clouds from aircraft altitude (20 km) to the surface. CRS is also providing data for developing science algorithms for the Aerosol Chemistry Ecology (ACE) mission planning. ACE will carry a Ka- and W-band radar. In addition to the new QuinStar W-band SSPA, the HIWRAP instrument will be flying with a QuinStar Ka-band SSPA.

Space-based versions of these products for use in various transmitters for radars and communication equipment are anticipated in the coming years.

Announcements and News

 **New Website Coming Soon! – Introducing the New QuinStar Product Catalog**

QuinStar Participation in Professional Industry Events

QuinStar to Present at Technical Sessions of the 2014 International Microwave Symposium

QuinStar engineers will present a technical paper at the upcoming IMS 2014 in Tampa, Florida, USA. The paper is titled, "Power GaAs MMICs for E-Band Communications Applications".

QuinStar to Exhibit at International Microwave Symposium and Exhibition, June 2-9, 2014 in Tampa, Florida USA

QuinStar to Attend European Microwave Conference and European Microwave Week Oct. 6-11, 2014 in Rome, Italy

Industry News

Greater Than 95 GHz Petition to US FCC (Federal Communications Commission):

IEEE-USA Committee on Communication has filed a petition to permit the commercial use of spectrum above 95 GHz with the US FCC, the regulatory body for all US frequency allocations and licensing issues. The petition (ET Docket No. 13-259) requests FCC to consider making rules for the commercial and industrial exploitation of frequencies above 95 GHz for various applications.

To view this entire petition, make comments or view other millimeter wave related FCC dockets, go to:

<http://apps.fcc.gov/ecfs/comment/view?id=6017474704>
<http://apps.fcc.gov/ecfs/proceeding/view?name=13-259>

International Automotive Radar Frequency Harmonization Initiative is aimed at establishing 79 GHz as the "harmonized" or uniform frequency allocation world-wide. For more information: www.79ghz.eu

Factoids & Technical Information

Did You Know?

- **Satellite-based Weather and Environmental Monitoring Programs** which presently use Microwave and Millimeter-wave sensors in addition to other instruments have entered their 6th decade of operation and deployment. One of the most prominent programs is the Defense Meteorological Satellite Program (DMSP). Originally started in 1962, DMSP just launched its DMSP-Block 5-F19 satellite. The instruments include the Advanced Technology Microwave Sensor (ATMS), which consists of many microwave and millimeter wave sensitive radiometers. It will continuously send down imagery and space weather data, providing military forces with critical situational awareness information. This same data is used by weather forecasters to predict regional and global weather patterns, including severe thunderstorms, hurricanes and typhoons.

- **Bell Laboratory and the British Post Office** had planned a millimeter wave "pipe" for extremely broadband data and video transmission in the 1970s. On June 30, 1970, AT&T introduced Picturephone in Pittsburgh. The telephone monopoly planned to install millimeter waveguides to provide the needed extra capacity. In February 1975, Bell completed installation of 14 kilometers of millimeter waveguide in New Jersey. After tests, Bell declared success, but abandoned the technology. In October 1975, the British Post Office began tests of millimeter waveguide, like Bell it declared the tests successful but never installed any.

Human Resources Corner

Candidates Sought!

QuinStar is looking for experienced Microwave and Millimeter wave Engineers and Technicians for exciting careers in a stimulating and rewarding environment. Contact Human Resources at hr@quinstar.com or by calling 310-320-1111.

QuinStar Employees Support Disaster Relief and Recovery Efforts

QuinStar and its employees continued their support of Team Rubicon, a veteran-led disaster relief organization which responds to major natural disasters. Most recently, they donated \$17,892 toward Team Rubicon's response to the Philippines following Typhoon Haiyan.

QuinStar Launches Two New Programs

QuinStar is providing matching funds to employee selected charitable or public-service non-profit organizations by contributing up to \$250 per employee each year.

QuinStar has also started a program that rewards employees with a FIVE-STAR award for making noteworthy contributions to QuinStar or its customers. The nomination or citation is to be employee-initiated toward other QuinStar employees.

Quality and Management Systems Updates/News

QuinStar has significantly upgraded its Enterprise Resource Planning (ERP) software during the last quarter, thus automating and integrating every business process from quoting and planning through invoicing and point of sale (POS). The new system, "M1", is very flexible, easy to customize and able to handle our most valuable and unique business processes with ease and accuracy. We are already seeing the benefit of this change in terms of improved on-time delivery, shorter manufacturing cycles and better customer service. However, QuinStar is constantly looking to its customers for additional suggestions, feedback and participation to achieve the highest standards of product quality assurance and integrity.

Upcoming Industry Events

June 1-4, 2014 RFIC 2014- IEEE Radio Frequency Integrated Circuits Symposium

Tampa Convention Center, Tampa, FL, USA



IEEE Radio Frequency Integrated Circuits

June 1-6, 2014 IEEE International Microwave Symposium and Exhibition

Tampa Convention Center, Tampa, FL, USA



June 6, 2014- ARFTG Microwave Measurement Symposium- Microwave Measurements for Emerging Technologies, Tampa Marriott Waterside, Tampa, FL, USA

June 6, 2014- 15th annual IEEE Wireless and Microwave Technology Conference (WAMICON 2014) Tampa, FL, USA



IEEE Wireless and Microwave Technology Conference
WAMICON 2014
Co-located with the International Microwave Symposium & ARFTG
June 6, 2014
Marriott Waterside Hotel and Marina
Tampa, Florida

September 8, 2014 University of Arizona, Tucson, AZ, United States

IRMMW-Thz 2014- 39th International Conference on Infrared, Millimeter and Terahertz Waves



October 5-10, 2014 Fiera Roma, Rome, Italy

Please share this newsletter with others and introduce them to us. We welcome your comments and contributions and appreciate your support!

Please Contact Us at sales@quinstar.com

Or (310) 320-1111