



WaveFront

*The QuinStar Newsletter Spring 2013
Twentieth Anniversary Issue*

Message from the CEO/President

Welcome to this 20th Anniversary issue of **WaveFront**, the QuinStar Newsletter! Although it seems like yesterday, we started QuinStar Technology 20 years



Leo Fong

ago. Motivation from tough competitors drove us to create, adapt, and achieve. Today, QuinStar has expanded to multiple buildings and over 100 employees. We pledge to continue to provide exceptional service, quality and performance to empower your applications. This newsletter will inform you about some of our recent achievements and enhancements in our products, capabilities and facilities. QuinStar continues to advance state-of-the-art technology to benefit its customers and the microwave/millimeter wave application community at large.

I salute you—our customers, friends, fellow entrepreneurial competitors, suppliers and business partners, and dedicated employees—for your contributions to QuinStar's success and for keeping the microwave communication and sensor markets dynamic and alive.

Your feedback is always very important to us, so please keep us informed and apprised. Best wishes for success in your endeavors, and we sincerely look forward to working with you to our mutual benefit.

New Products Introduced

New Line of High Power Solid State Amplifiers for Ka through W bands (26 to 110 GHz)

QuinStar has created an enhanced product line (Model QPN and QBP) of high power millimeter wave amplifiers based on the most advanced device and circuit integration technology

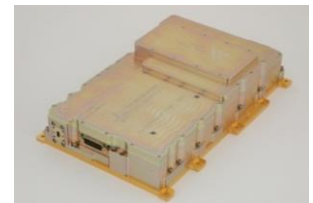
available. This line incorporates state of art GaAs and GaN MMIC devices with QuinStar's proprietary high efficiency power combiner networks to produce unprecedented high power levels with exceptionally high efficiency. However, application-specific power amplifiers can be readily manufactured to suit virtually any communications equipment, radars or scientific instruments, often replacing the expensive and bulky TWTs and their power supplies. These

products incorporate many useful features and optional accessories combined with excellent performance characteristics.

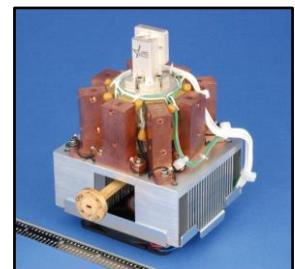
Standard products in this product line offer power levels in the range of 10 to 100 Watts at 29 to 37 GHz and 2 to 20 Watts in 70 to 96 GHz frequency range. These amplifiers are intended for use in airborne and ground applications as well as for satellites and space equipment for communication and radar equipment.



Ka-band (34-37 GHz) 10 Watt Power Amplifier



Ka-band (29-38 GHz) High Power (50 Watts) Amplifier for Airborne Radar Applications)



High Power E-band Power Amplifier Assembly

Instrumentation Solid State Power Amplifiers

QuinStar has created a new product line of standard and custom Instrumentation



**30-34 GHz 10 Watt
Instrumentation Amplifier**

Amplifiers (Model QAI) in the millimeter wave frequency range based on the most advanced device and circuit integration technology. This line also incorporates many useful features and offers excellent

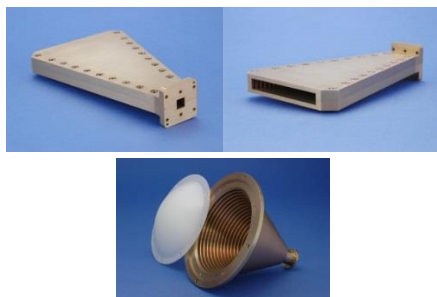
performance characteristics. These amplifiers can be designed to operate over a wide band (up to full waveguide band) or over relatively narrow band with an exceptionally high power level. Our customers have used them for applications as diverse as plasma diagnostic, medical research, communication and remote sensing.

Radar Signal Simulators and Radar Test Beds

QuinStar's Radar Signal Simulators and Radar Test Beds (Instrumentation Radars) have been developed for a variety of customer applications ranging from evaluation or characterization of various radars to conducting final inspection in production lines. These are designed to interface with standard or custom automated test equipment (ATE) and process control computers. The basic product can be customized to suit customer's specific test requirements and operational environment.

New Horn Antennas

QuinStar has developed new product lines of Lens-Corrected Scalar Horn Antennas and Corrugated Sectoral Horns for those applications that require exceptional performance including low sidelobes and precise prescribed beam patterns.



Examples of New Lines of Horn Antennas

High Performance Band Pass Filters

QuinStar now offers a complete new line of band-pass waveguide filters capable of handling high RF power with low insertion loss while producing sharp skirts (selectivity).

Contact QuinStar's Sales Department for details.

QuinStar's Recent Success Stories and Achievements

Major Milestone Attained in Defense Production Contract

QuinStar has received a go-ahead and is proceeding with manufacturing on the multi-year Full Rate Production contract for the Transceivers for a US Navy Program.



**Program Team for the Full-Rate
Production**

Small Business Innovation Research (SBIR) Contracts Announced (March 2013)

QuinStar has recently received a Phase II awards from the US Air Force for the development of W-band Power Amplifiers for SATCOM. QuinStar continues to move forward in defining the state of art in millimeter-wave power amplifiers in V, E and W-bands at all levels of their performance.

Major Research and Development Contracts Awarded

QuinStar has partnered with defense prime contractors on two major new research and development contracts for US Air Force and DARPA for the next generation of military communications.

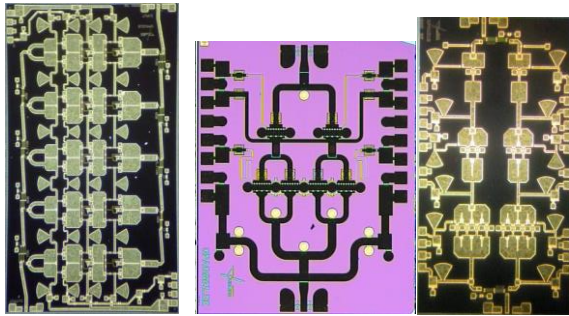
Small Business Innovation Research (SBIR) Contracts update during 2012-2013

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, LNA 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 commercially available products. Several new and emerging millimeter-wave communications and radar systems operating in the 29 to 96 GHz range derive their superior performance, enhanced capability and economic viability from these new semiconductor devices.



Q- and W-band MMICs developed by QuinStar

QuinStar's Space-Qualified Q-band SSPAs Integrated and Ready for Space Flight in European Satellite based Communication Experiment

A set of high power Q-band power amplifiers (10 Watt) operating in the 38 to 40 GHz range has been integrated in the Technology Demonstration Payload for Q-band space communications experimental study and is ready for launch in **mid-July 2013 On Alphasat-I**



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

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 (SSPA), Transmitter Upconverters, Receivers, Antennas and other associated components. These subsystems have been integrated in various instruments and equipment for ongoing and new programs, some of which are:

- Surface Water Ocean Topography-Airborne version-Ka-band Phenomenology Airborne Radar (AirSWOT- KaSPAR) [1]

- Dual-frequency Dual-polarized Doppler Radar (D3R) of Global Precipitation Measurement Mission (GPM) [2]

- High-Altitude Imaging Wind and Rain Airborne Profiler (HIWRAP) [3]

- Airborne Glacier/Land Ice Surface Topography Interferometer (GLISTIN-A) [4]

- HIAPER Cloud Radar (HCR) operated by National Center for Atmospheric Research- Earth Observing Laboratory [5]

References for additional information:

[1] <https://swot.jpl.nasa.gov/Airswot/>

[2] <http://pmm.nasa.gov/science/ground-validation/D3R>

[3] <https://directory.eoportal.org/web/eoportal/airborne-sensors/hiwrap>

[4] <http://airbornescience.jpl.nasa.gov/instruments/glistin/>

[5] <http://www.hiaper.ucar.edu/>



High Power Ka-band Amplifier for D3R and the Radar at CHILL facility in Greeley, Colorado, USA

Announcements and News

QuinStar Celebrates 20th Birthday!



On April 1, 2013, QuinStar celebrated its 20th Birthday. As Mr. Fong, QuinStar's CEO remarked, "QuinStar has survived the many ups and downs of the industry during this entire period, and stands strong and more versatile today to enable our customers' applications."

New Web Site Coming Soon! – Introducing the New QuinStar Catalog

QuinStar Continues to Expand its facilities in New and Original Building

QuinStar has added additional manufacturing and product development and testing areas in both buildings during the last four months. Several significant upgrades have also been made to the existing facilities and manufacturing equipment. Please visit us for a first-hand look.



New additional facility at 3425 Lomita Blvd., Torrance

Additional Machining Capability and Capacity-

QuinStar has added one more CNC High Speed Vertical Machining Center to its machine shop to further enhance the capacity of the manufacturing facility. This added machine will

allow even more rapid development and delivery of millimeter wave components and their parts with high precision and finish. This addition and other upgrades to the machine shop will further improve our delivery times and on-time performance.



QuinStar Participates in Professional- Industry Events

QuinStar Presents at Technical Sessions of the 2013 International Microwave Symposium

QuinStar employees will present two technical papers at the upcoming IMS 2013 in Seattle, Washington, USA.

**(See additional details about this event in
"Upcoming Industry Events" on page 6)**

QuinStar to Exhibit at International Microwave Symposium and Exhibition, June 2-9, 2013 in Seattle, Washington, USA. Booth No. 813.

**(See additional details on this event in
"Upcoming Industry Events" on page 6)**

QuinStar to Attend European Microwave Conference and European Microwave Week

**Oct. 6-11, 2013 in Nuremberg, Germany
(See additional details about this event in
"Upcoming Industry Events" on Page6)**

QuinStar to participate in IEEE COMCAS- International Conference on Microwaves, Communications, Antennas and Electronic Systems, October 21-23, 2013, Tel Aviv, Israel. (See additional details about this event in "Upcoming Industry Events" on page 6)

QuinStar to Host Millimeter Wave Webinar

Dates, topics and times to be announced.

Industry and Profession News

The Wireless Gigabit (WiGig) Alliance

has reached a “memorandum of understanding” of unification with Wi-Fi Alliance®. WiGig Alliance was established by technology leaders within the communication, computing, semiconductor and handheld devices industries to address the need for faster, wireless connectivity between computing, communications and entertainment devices. The organization has developed a unified specification that allows devices to communicate at multi-gigabit speeds never before experienced with wireless technology. The primary objective is to establish a global system of high-speed and easy-to-use wireless devices that work together seamlessly to connect them. WiGig technology enables multi-gigabit wireless communications among consumer electronics, handheld devices and PCs, and drives industry convergence to a single radio using the readily available, unlicensed 60 GHz spectrum.

Cellular Backhaul using millimeter wave links and communication equipment is experiencing an explosive growth in direct correlation with the rise in rich internet media services. As media like video via mobile phones and devices becomes common, the need for higher data bandwidth across our cellular networks becomes essential. As the mobile devices’ industry creates new services that bring us more internet media and data, our global wireless infrastructure will have to update their capacity to carry the significantly increased bandwidth. While new millimeter wave bands (such as 42 GHz in Europe) are being proposed and utilized, the existing unlicensed V-band (57-64 GHz) and E-band (71-76 GHz and 81-86 GHz) are being targeted for this traffic, giving new life to this industry and millimeter wave business in general.

Factoids & Technical Information

Did You Know?

- The global market for millimeter wave Compound Semiconductor MMIC (between 26 and 100 GHz) will exceed \$ 0.75 Billion by year 2017 starting at around \$ 50 million in year 2012. This includes GaAs, GaN, SiC, SiGe, CMOS and InP devices. This growth is largely due to commercial automotive sensors and millimeter-wave radios (links), though Ku- and Ka-band VSAT, and ISM applications also contribute heavily to this growth. The market size for the actual products is several billion dollars by 2017.

- The international standard for defining and measure a **Volt** (unit of voltage) is based on millimeter-wave signal and a physical constant (Josephson constant*) rather than any standard cell or battery as in the past.

United States adopted the new standard in 1972 followed by all other Standards Organizations. The Volt standard uses the exact frequency-to-voltage conversion with an array of tens of thousands of Josephson junctions, excited by millimeter-wave signals around 76 GHz. The method of measurement is independent of device design, material, measurement setup, etc., and no correction terms are required. QuinStar personnel have been involved with the development of the associated millimeter-wave instruments for this standard.

- Millimeter wave radiometers can remotely measure the concentration of many gases and chemicals in our atmosphere and in space (such as ozone, water vapor, sulfur dioxide, etc.) with high accuracy as a profile. These instruments operate between 20 and 1400 GHz.

The ALMA Project

The Atacama Large Millimeter/Submillimeter Array (ALMA), an international partnership of Europe, North America and East Asia in cooperation with the Republic of Chile, is the largest astronomical project in existence. ALMA will be a single telescope of revolutionary design, composed initially of 66 high precision antennas located on the Chajnantor plateau, 5000 meters altitude in northern Chilean Andes.

ALMA was **inaugurated on March 13, 2013** at an official ceremony

which marks the completion of all the major systems of the giant telescope and the formal transition from a construction project to a full-fledged observatory. QuinStar has supplied critical components for receivers in various frequency bands in the Array.

For more information-
<http://www.almaobservatory.org>



Aerial view of the array of ALMA antennas- taken December 2012, four months prior to the ALMA inauguration.

Human Resources Corner

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

Quality Systems Updates/News

QuinStar has significantly upgraded its Quality Management System by adding several software tools, processes and personnel. This has resulted in improved customer service, higher product reliability and faster, on-time delivery of products and services. QuinStar is constantly looking to its customers for suggestions, feedback and participation in achieving the highest standards of quality and product assurance and integrity.

Upcoming Industry Event

April 7, 2013 IEEE Wireless and Microwave Technology Conference, Orlando, Florida, USA



April 10-11, 2013 Microwave & RF 2013 Paris, France



April 22-26 SPACOMM- International Conference on Advances in Satellite and Space Communications Venice, Italy
SPACOMM 2013

April 29-May 3, 2013 IEEE RadarCon 2013 Ottawa, Canada

June 2-4, 2013 RFIC 2013- IEEE Radio Frequency Integrated Circuits Symposium Seattle, Washington, USA

June 2-7, 2013 IMS- IEEE MTT-S International Microwave Symposium and Exhibition

Seattle, Washington, USA



June 7, 2013- ARFTG Microwave Measurement Symposium Seattle, Washington, USA

October 6-11, 2013- European Microwave Week- consisting of three conferences:

- European Microwave Conference (EuMC) ,
 - European Microwave Integrated Circuits Conference (EuMIC), and
 - European Radar Conference (EuRAD)
- Nuremberg, Germany**



October 6-11, 2013- AMTA 2013- Antenna Measurement Techniques Association Columbus, Ohio, USA



October 21-23, 2013 IEEE COMCAS- International Conference on Microwaves, Communications, Antennas and Electronic Systems Tel Aviv, Israel



Your Comments and Contributions welcome.
Please share this newsletter with others and introduce them to us.

Contact Us sales@quinstar.com
Or (310) 320-1111