Spotlight on Industry’s Latest Products

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Hot Products

Product Highlights

Page 21: Design of a K-Band MMIC PA for SATCOM Applications
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Including These Connector Series

<table>
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<tr>
<th>Connector Series</th>
<th>Frequency Range</th>
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<td>1.85mm</td>
<td>DC-65 GHz</td>
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<tr>
<td>2.92mm</td>
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<td>2.4mm</td>
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<td>SSMA</td>
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Pulse Profiling Power Sensor

LadyBug Technologies’ 20 GHz thermally stable LB680A USB pulse profiling power sensor is in stock for immediate shipment. The sensor is available with optional connectors so that the user can place it directly on the DUT to achieve the best match and accuracy.

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6: Editorial

Ligado Networks vs. GPS; Big Change for IMS 2020
By Tom Perkins

Increasing demand for spectrum by both military and commercial interests puts high demand on how to prevent unintended interference. Traditionally there have been “guard bands” between military and commercial bands. Increasing demands on limited spectrum and its high auction value have imposed the desire to let no frequency bands go unused and some are shared. In May 2020 the House Armed Services Committee (HASC) said that the Federal Communications Commission’s (FCC) approval of a 5G network in a portion of L-Band could interfere with the Global Positioning System (GPS). Officials at the Pentagon are warning about potential disruption of GPS technology which consists of a thirty-one satellite constellation in Medium Earth Orbit (MEO) at 20,200 km (12,550 miles) altitude. Each satellite circles the earth twice a day. The latest version is the Lockheed Martin Space Systems GPS III Space Vehicle (SV)-02, also known as “Magellan.”

22: Feature Article

Design of a K-Band MMIC PA for Satcom Applications
By David Vye and Thomas Young

In this article, some of the requirements of power amplifiers (PA) used for massive multiple-input, multiple-output (mMIMO) applications will be discussed. These requirements are gathered from our experiences in this application. Some of the requirements are related to the PA design and some are lineup requirements. The importance of Amplitude-to-Phase modulation (AM/PM) of an amplifier and the impact of its behavior on linearizability will be presented. Likewise, the impact of the measurement setup configuration on the wideband PA linearizability problems and solutions will be discussed. The focus will be on the design of PAs using Gallium Nitride (GaN) power transistors. We will demonstrate high power 50 Ohm asymmetrical Doherty amplifier lineups with excellent wideband digital predistortion (DPD) correction up to 200 MHz.

16: Featured Products

Qorvo’s QPA2610 is a packaged, high performance power amplifier fabricated on Qorvo’s production 0.15 um GaN on SiC process (QGaN15). Covering 8.5 - 10.5 GHz, the QPA2610 provides > 2 W of saturated output power and 23 dB of large-signal gain while achieving an impressive 47% power-added efficiency. Packaged in a small 5 x 5 mm plastic overmold QFN, tight lattice spacing requirements for phased array radar applications is easily supported. RF input and output ports are matched to 50Ω and include integrated DC blocking capacitors. QPA2610 is part of a three-amplifier family and is pin compatible to QPA2612 and QPA2611 for IoT, satellite, radar, Bluetooth, and defense applications.

ModalAI released VOXL Flight, the first open-development platform for autonomous drone navigation that fuses a companion computer with a PX4 flight controller on one printed circuit board (PCB). VOXL Flight reduces cabling, cost, size and weight compared to using two independent boards, creating a plug-and-play solution drone manufacturers and makers can implement to get to market sooner and increase profitability.

31 Product Highlights  □  48 Advertiser Index
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Frequency (GHz)

Magnitude (dB)

0 dB
1 dB
2 dB
3 dB
4 dB
5 dB
6 dB
7 dB
8 dB
9 dB
10 dB

0 5 10 15 20 25 30

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Increasing demand for spectrum by both military and commercial interests puts high demand on how to prevent unintended interference. Traditionally there have been “guard bands” between military and commercial bands. Increasing demands on limited spectrum and its high auction value have imposed the desire to let no frequency bands go unused and some are shared.

In May 2020 the House Armed Services Committee (HASC) said that the Federal Communications Commission’s (FCC) approval of a 5G network in a portion of L-Band could interfere with the Global Positioning System (GPS). Officials at the Pentagon are warning about potential disruption of GPS technology which consists of a thirty-one satellite constellation in Medium Earth Orbit (MEO) at 20,200 km (12,550 miles) altitude. Each satellite circles the earth twice a day. The latest version is the Lockheed Martin Space Systems GPS III Space Vehicle (SV)-02, also known as “Magellan.”

Ligado Networks, formerly known as LightSquared, is an American satellite communications company founded in 2010. After restructuring and emerging from bankruptcy and modifying its network plan, the new company was launched in 2016. It operates the SkyTerra 1 satellite. A bipartisan group of 22 members of the HASC have called on the FCC to reverse its support for Ligado’s plan, saying it could harm the GPS system. Besides DoD, numerous commercial companies, like airlines, FedEx, and UPS back the Pentagon. It seems to be a “double-edged sword,” as there is both a strong dependency on GPS, as well as a concern that 5G is a global technology race that the United States must lead.

A letter, signed by 13 Democrats and nine Republicans, was sent to the five FCC commissioners. It expresses “deep concern” about Ligado’s business plan. It comes a day after a three-hour hearing of the Senate Armed Services Committee that enabled Pentagon officials a public platform to air concerns about the plan, approved unanimously by the FCC in April. The struggle between Ligado and the Pentagon rests on credible test data. The DoD and allies argue that Ligado’s L-Band (in the 1 - 2 GHz range) plan would create interference with GPS capabilities, harming military use and the economic benefits from the system. Ligado argues that DoD’s testing does not accurately capture the mitigation plan the company has developed over the years, and that there is no proof that interference will be an issue. Notably,
the committee has no real authority over the FCC, which falls under the Commerce Committees in the Senate and the House. A spokesman for the FCC said the commission had received the letter but declined to comment on whether it would respond.

GPS, and other international navigation systems, rely on L-band because it can easily penetrate clouds, fog, rain, and vegetation. Ligado owns a license to operate the spectrum near GPS to build what the firm describes as a 5G network that would boost connectivity for the industrial “Internet of Things” (IoT) market. “The technological advances and economic opportunities of 5G technologies are exciting. However, we note that no other country is pursuing the use of this portion of the spectrum for 5G, and there are substantial doubts about the technical feasibility of doing so,” the HASC members wrote. “Our committee is actively seeking solutions that will facilitate and direct DoD to share as much spectrum as possible for commercial use, but the nation faces threats that will require DoD to continue to use parts of the spectrum needed for 5G.” Specifically, Ligado is seeking terrestrial use of the 1526 - 1536 MHz, 1627.5 - 1637.5, and 1646.5 and 1656.5 MHz bands. Published GPS frequencies are L1 Band: 1575.42 MHz with bandwidth of 15.345 MHz, L2 Band: 1227.6 MHz with bandwidth of 11 MHz, and L5 Band: 1176.45 MHz with bandwidth of 12.5 MHz. Conflict is not obvious to this author.

Meanwhile there are backup strategies for GPS including portable, deployable LORAN antennas that could be used to activate a system used for decades before GPS. eLoran is the latest in the long-standing and proven series of low frequency, Long Range Navigation (LORAN) systems. It takes full advantage of 21st century technology.

**IMS 2020**

The IEEE MTT-S IMS2020 and Microwave Week have transitioned to a virtual event, set for August. The program will contain the following activities and will feature both pre-recorded and live events:

- IMS, RFIC and ARFTG Technical Sessions
- IMS, RFIC and ARFTG Plenary Sessions
- Technical Lectures
- 5G Summit
- Panel Sessions
- Three Minute Thesis
- MicroApps
- Industry Workshops
- Virtual Exhibition

Look for more information in *HFE's* July issue.

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21 - 26 June 2020 | Los Angeles, California, USA
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2020 45th International Conference on Infrared, Millimeter and Terahertz Waves (IRMMW-THz)
13 - 18 September 2020 | Buffalo, New York, USA
Field of Interest: Aerospace; Bioengineering; Communication, Networking and Broadcast Technologies; Components, Circuits, Devices and Systems; Engineered Materials, Dielectrics and Plasmas; Fields, Waves and Electromagnetics; Photonics and Electrooptics; Signal Processing and Analysis

2020 50th European Microwave Conference (EuMC)
15 - 17 September 2020 | Utrecht, Netherlands
Field of Interest: Communication, Networking and Broadcast Technologies; Components, Circuits, Devices and Systems; Fields, Waves and Electromagnetics; Photonics and Electrooptics

2020 17th European Radar Conference (EuRAD)
16 - 18 September 2020 | Utrecht, Netherlands
Field of Interest: Aerospace; Communication, Networking and Broadcast Technologies; Components, Circuits, Devices and Systems; Fields, Waves and Electromagnetics; Signal Processing and Analysis; Transportation

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Private Network Operators and Private Spectrum for Enterprises Put Telco’s Enterprise Ambitions at Risk

With the popularity of private cellular networks growing among enterprises, there are currently initiatives in 15 countries for enterprises to deploy private networks, finds global tech market advisory firm, ABI Research. This includes both arrangements for enterprises to acquire spectrum directly from the regulator, as well as spectrum assets held by mobile network operators, that focus entirely on providing private cellular networks for enterprises. Either way, private cellular network operators are a growing threat to traditional Telcos.

“The rising number of these spectrum initiatives underpin the strong momentum for private cellular networks that we see within enterprises around the globe,” says Leo Gergs, Research Analyst for 5G Markets at ABI Research. “With the very economic pricing, we will see even more enterprises expressing interest, as the ecosystem for 5G connectivity matures.”

Just as the question remains of who will operate private cellular networks for enterprises, we see more and more new network operators entering the stage that are focusing on providing private cellular networks for enterprises. “Specialist operators like Anterix, Ambra, Citymesh, Edzcom and Tampnet will disrupt the market by offering business models to enterprises that follow an “Everything-as-a-Service” (XaaS) approach. Since all these specialist network operators have a system integrator background, they have the vertical-specific knowledge about requirements, pain points, and deployment complexity. These specialist network operators, therefore, enjoy an incumbent advantage over traditional Telcos in bringing connectivity to enterprises,” explains Gergs.

While large enterprises might have the manpower and the necessary financial resources to manage the network on their own, Gergs notes, “Globally, there are only around 10 million enterprises with more than 500 employees, while there are more than 700 million small & medium-sized enterprises with up to 500 members of staff, which will look for third parties to manage a private cellular network.”

“To realize this immense revenue opportunity with SMEs, network operators need to leave their comfort zone and offer appealing solutions to them, which are fundamentally different from the offerings in the consumer domain,” Gergs suggests. These should center around monetizing services such as the provision of a particularly high bandwidth, certain low latency, or the provision of additional capabilities like network slicing.

—ABI Research
abiresearch.com

5G Will Enable Over US$69 Billion in Revenues to Cloud Gaming and Cloud Video by 2024

While 2019 has seen the first deployments of 5G in the consumer domain, 2020 will be the year of large scale commercial 5G rollouts across the globe. In line with this, 5G generated revenues for cloud-based entertainment services are forecasted to rise sharply until at least 2024. As newly forecasted data by global tech advisory firm ABI Research reveals, by 2024, 5G alone will contribute revenues of almost US$1.9 billion to cloud gaming (accounting for 42% of overall cloud gaming revenues) as well as US$67.5 billion in cloud video (accounting for 31% of cloud video revenues).

“These numbers underline the growing demand for cloud-based entertainment services,” says Leo Gergs, Research Analyst for 5G Markets at ABI Research. “As an important enabler for these new entertainment services, 5G will be critical for the telco industry to unlock these immense revenue opportunities and turn them into commercial reality.”

The current situation around countries imposing social distancing in order to fight and delay the outbreak of Covid-19 is exacerbating the demand for cloud-based entertainment as well as remote video applications, such as remote education services or video calling platforms. Network operators across the globe are faced with a surge of network traffic by an average of 15% (up to 30% in countries like Spain and Italy). Measures like school closings are giving a bump to video gaming and over-the-top streaming markets, with platforms like YouTube and Netflix reporting an increase in network traffic of 15% and 16%, respectively.

“While due to current social distancing measures, most of these services will be consumed at home, using either mobile/fixed broadband or fixed wireless access. 5G will be an important enabler to transport these immersive media user experiences outside,” Gergs explains.

In order to truly succeed in the media and entertainment domain, however, it is vitally important for network operators and infrastructure vendors to target enterprise use cases within media and entertainment. Gergs states, “If there is one lesson to learn from South Korean operators LGU+ or SK Telecom, it is the fact that revenues from the consumer domain alone will not be enough to pay off capital investment for 5G network deployment. That is why it is highly important for the telco industry to leave their comfort zone and advance to target media enterprise use cases.”

—ABI Research
abiresearch.com
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Blackjack Focuses on Risk Reduction Flights and Simulations to Prepare for Full Demonstration

In partnership with the U.S. Space Force and Space Development Agency, DARPA’s Blackjack program is targeting flights to low-Earth orbit (LEO) later this year and 2021. Using a series of small risk reduction satellites, the program aims to demonstrate advanced technology for satellite constellation autonomy and space mesh networks. Blackjack seeks to develop and validate critical elements of global high-speed autonomous networks in LEO, proving a capability that could provide the Department of Defense with highly connected, resilient, and persistent overhead coverage.

The upcoming demonstration flights are all planned as rideshares, catching a ride to LEO on a launch with other missions. The first demonstration, Mandrake 1, is a cubesat that will carry supercomputer processing chips. Mandrake 2 is a pair of small satellites that will carry optical inter-satellite links for broadband data. These could form the basis of future optically meshed computer networks in LEO.

The program also is targeting a risk reduction payload called Wildcard, a software-defined radio that will experiment with links from LEO to tactical radios. A data fusion experiment with the ability to host advanced third party algorithms, known as massless payloads, is intended for an upcoming Loft Orbital mission.

“It’s important that we get the design right,” says Paul “Rusty” Thomas, the program manager for Blackjack. “We focused first on buses and payloads, then the autonomous mission management system, which we call Pit Boss. We anticipate we’ll begin integrating the first two military payloads next summer with launch via rideshare in late 2021, followed by the remainder of the Blackjack demonstration sub-constellation in 2022.”

Blackjack aims to demonstrate sensors that are low in size, weight, and power, and that can be mass produced to fit on many different buses from many different providers, for less than $2 million per payload.

The agency is evaluating buses from Airbus, Blue Canyon Technologies, and Telesat, all of which have progressed through preliminary design review. The final selection of buses will happen in 2020. The program recently completed preliminary design review for Pit Boss, selecting SEAKR as the primary performer for the on-orbit autonomy system. The agency also awarded a contract to Lockheed Martin as the satellite integrator.

Several sensor payloads are under consideration for the Blackjack demonstration sub-constellation, including overhead persistent infrared (OPIR) from Collins Aerospace and Raytheon; radio frequency systems from Northrop Grumman Mission Systems, Trident, and Systems & Technology Research; position, navigation, and timing from Northrop Grumman; optical inter-satellite links from SA Photonics; and electro-optical/infrared from L3Harris. The program also recently completed a Small Business Innovation Research contract with Augustus Aerospace to work on an Army Space and Missile Defense Command-related payload.

—DARPA

DARPA Selects Teams to Increase Security of Semiconductor Supply Chain

As Internet of Things (IoT) devices rapidly increase in popularity and deployment, economic attackers and nation-states alike are shifting their attention to the vulnerabilities of digital integrated circuit (IC) chips. Threats to IC chips are well known, and despite various measures designed to mitigate them, hardware developers have largely been slow to implement security solutions due to limited expertise, high cost and complexity, and lack of security-oriented design tools integrated with supporting semiconductor intellectual property (IP).
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Further, when unsecure circuits are used in critical systems, the lack of embedded countermeasures exposes them to exploitation. To address the growing threat this poses from an economic and national security perspective, DARPA developed the Automatic Implementation of Secure Silicon (AISS) program. AISS aims to automate the process of incorporating scalable defense mechanisms into chip designs, while allowing designers to explore chip economics versus security trade-offs based on the expected application and intent while maximizing designer productivity.

Today, DARPA is announcing the research teams selected to take on AISS’ technical challenges. Two teams of academic, commercial, and defense industry researchers and engineers will explore the development of a novel design tool and IP ecosystem – which includes tool vendors, chip developers, and IP licensors – allowing, eventually, defenses to be incorporated efficiently into chip designs. The expected AISS technologies could enable hardware developers to not only integrate the appropriate level of state-of-the-art security based on the target application, but also balance security with economic considerations like power consumption, die area, and performance.

“The ultimate goal of the AISS program is to accelerate the timeline from architecture to security-hardened RTL from one year, to one week – and to do so at a substantially reduced cost,” said the DARPA program manager leading AISS, Mr. Serge Leef.

The two AISS research teams are:

Synopsys and Northrop Grumman will each be developing Arm®-based architectures that include security engines offering different approaches and demonstrating the modularity of the new AISS-based flows to accept other security engines, potentially including highly specialized engines developed for future Department of Defense (DoD) applications.

In addition, Northrop Grumman, along with IBM, will seek to further enhance technologies first developed under the DARPA Supply Chain Hardware Integrity for Electronics Defense (SHIELD) program.

They will use these technologies as a starting point for the development of an Asset Management Infrastructure (AMI) to protect chips throughout their lifecycle.

―DARPA
Recent DOD Contracts

NAVY

General Electric Co. GE Aviation, Lynn, Massachusetts, is awarded a $180,599,648 firm-fixed-price, indefinite-delivery/indefinite-quantity contract. This contract procures commercial depot level services for the repair and overhaul of T700-GE-401/401C turbo shaft engines, cold section modules and power turbine modules for the Navy H-60 Seahawk helicopter as well as the Marine Corps H-1 Cobra and Bell UH-1 Huey aircraft. Work will be performed in Wingsfield, Kansas, and is expected to be complete by June 2025. No funds will be obligated at the time of award. Funds will be obligated on individual orders as they are issued. This contract was not competitively procured pursuant to 10 U.S. Code 2304 (c)(1). The Naval Air Warfare Center Aircraft Division, Patuxent River, Maryland, is the contracting activity (N00421-20-D-0115).

Northrop Grumman Systems Corp., Apopka, Florida, is awarded a $7,289,968 modification to firm-fixed-price, supply job order N00164-17-F-J272 under basic ordering agreement N00164-17-G-JQ08 for the procurement of 56 single-color diode-pumped laser designators. Work will be performed in Apopka, Florida. This procurement of 56 laser designators will support the Common Sensor Payload Program's Multi-spectral Targeting System (MTS) Family of Electro-optic Infrared (EO/IR) Sensors. Work is expected be complete by June 2022. Fiscal 2020 operations and maintenance (Army) funding in the amount of $7,289,968 will be obligated at the time of award and will expire at the end of the current fiscal year. The Naval Air Warfare Center Aircraft Division, Patuxent River, Maryland, is the contracting activity (N00421-20-D-0115).

Northrop Grumman Systems Corp., Herndon, Virginia, is awarded a $29,939,440 firm-fixed-price modification to previously awarded contract N00024-20-C-5605 to exercise an option and purchase additional consoles, displays, and peripherals (CDP) technical insertion (TI) 16, modification (MOD) 1 production equipment and spares to support the Navy's future surface ship combat systems. Work will be performed in Johnstown, Pennsylvania. The CDP program consists of a suite of TI 16 MOD 1 common display system (CDS) consoles, thin client displays, multi-mission displays and peripheral equipment. The CDS consoles are a set of open-architecture watch station three-eyed horizontal display consoles comprised of three different console variants: water cooled CDS (14-35 Hz), air cooled CDS (14-35 Hz), and air cooled CDS (8Hz). The CDP hardware provides the human machine interface between the sailor and the ships combat systems. Work is expected to be complete by December 2021.

(Continued on p. 25)
Isolators, Circulators
Cernexwave’s CSC and CSI series SMT isolators and circulators are offered to cover the frequency range of UHF to 18 GHz. These isolators and circulators are designed and manufactured to provide low insertion loss and high isolation for SMT component and module integrations. The 50Ω input and output SMT line configuration is immediately ready for circuit insertion. While the isolator is an important device where port isolation or VSWR is concerned, the circulator offers duplexing functions in many radar and communication systems.

CernexWave designs, develops and produces high quality, reliable products up to 1000GHz for both active and passive components, waveguides products, ferrite products, antenna products, sub-systems for the commercial markets to the requirements of the ISO9001:2015 international standards with no exclusions taken.

The markets that CernexWave participate include wireless telecommunications, aerospace, defense and the fiber optic communications industry.

CernexWave
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Power Amp
Qorvo’s QPA2610 is a packaged, high performance power amplifier fabricated on Qorvo’s production 0.15 um GaN on SiC process (QGaN15). Covering 8.5 - 10.5 GHz, the QPA2610 provides > 2 W of saturated output power and 23 dB of large-signal gain while achieving an impressive 47% power-added efficiency.

Packaged in a small 5 x 5 mm plastic overmold QFN, tight lattice spacing requirements for phased array radar applications is easily supported. RF input and output ports are matched to 50Ω and include integrated DC blocking capacitors. QPA2610 is part of a three-amplifier family and is pin compatible to QPA2612 and QPA2611.

Regardless of the route to becoming Qorvo, the mission has always remained the same: to drive connectivity, no matter the technology. From the start of RF Micro Devices (RFMD) in 1991, TriQuint in 1985, and dating back to roots in Tektronix, Texas Instruments, Raytheon, and Watkins-Johnson, we’ve helped send rockets to Mars, connected you with your family and friends through cell phones, and brought satellite radio to your car.

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Power Sensor with Direct TTL Connectivity
LadyBug Technologies’ LB5944A new self-contained thermally stabilized power sensor delivers accurate first tier NIST traceability directly to a microcontroller, FPGA or other device. The sensor utilizes the company’s patented No-Zero No-Cal before use technology which allows it to make accurate measurements from its -60 dBm noise floor up to +26 dBm with no drift or measurement interruption. All this with no computer or power meter attached.

The multi-path square-law diode based sensor is designed using the latest available technology and is fully self-contained. Measurements can be made on a trigger and measure basis, or the sensor can free-run and measurements can be collected when requested. The sophisticated system can provide pre-trigger data.

Measurements can also be stored internally and recalled using the Optional UOP (Unattended Operation) feature. Optional Analog Recorder Output is also available. The sensor’s detection system makes average power measurements and is not affected by the signal’s modulation. For example, signals with 400MHz modulation bandwidth will be measured accurately. Sensors in the line offer coverage from 9 kHz to 50 GHz.

Download data sheet, programming guide and direct connectivity (Option SPI) guide for further information. Contact LadyBug for a direct connectivity demonstration kit. The kit includes a microprocessor with display, working firmware, and all necessary adaptors required to evaluate the direct connectivity option.

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ladybug-tech.com
The Right RF Parts.
Right Away.

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Limiter
PMI Model No. LM-10M14G-100W-1KWP-SFF-OPT17 is a limiter that operates over the 1.0 to 7.0 GHz frequency range. It has a maximum insertion loss of 2 dB; a maximum VSWR of 2.0:1 (at -10 dBm input); Input Power: 100 W CW Max. (1.0 to 7.0 GHz), 1 kW Peak (1% Duty Cycle, 1 us Pulse Width), 100 W Peak (10% Duty Cycle, 10 us Pulse Width); Maximum Flat Leakage: 17 dBm Typ @ 100 W CW - Measured 16.62 dBm; P1dB: 5 dBm Min; and Recovery Time: 100 ns Typ. - Measured 16.22 ns. This model is outfitted with a SMA male and a SMA female connector in a housing measuring 0.90” x 0.38” x 0.38”.

Planar Monolithics Industries
pmi-rf.com

VNA Cal Kits
Pasternack’s expanded line of VNA calibration kits are available in 12 versions including short circuit, open circuit and load kits (SOL) as well as short circuit, open circuit, load and thru kits (SOLT) with 2.4mm, 2.92mm, 3.5mm, 7/16 DIN, 7mm, BNC and N-Type interface options.

Each of these new VNA calibration kits from Pasternack include all of the necessary short circuit, open circuit, loads and thru (model dependent) components required for VNA calibration. The kits are suitable for many vector network analyzers from the industry’s leading providers such as Agilent, Rohde & Schwarz, Anritsu and Copper Mountain. These RF test and measurement kits come packaged in protective wooden boxes.

Pasternack
pasternack.com

Test Adapters
Withwave’s precision test adapters are designed based on precision microwave interconnection technologies. These new 2.92 mm to 3.5 mm types are manufactured to precise microwave specifications and constructed with male and female gender on both sides.
The precision microwave connector interfaces ensure an excellent microwave performance up to 34 GHz.

Withwave
with-wave.com

Type N Female 4-hole Flange Precision Adapters
- Frequency Range: DC to 18 GHz (Mode FREE)
- Electrical: 50 Ohm, Low VSWR & Low Insertion Loss
- VSWR: 1.15:1 Max @ 18 GHz (Typical VSWR 1.05:1 through 18 GHz)
- Materials: Passivated 303 Stainless Steel or Nickel Plated Brass available
- Dielectric Fluorocarbon (PTFE)
- PN: 111-21-21-000 N Female to N Female (4) Hole Flange (In-Series Adapter)
- Available for immediate delivery – Same day shipping for all stock items

SGMC Microwave
sgmcmicrowave.com

Mixers: Handheld Analyzers
OML’s mixer series, MxxHxDC, is specifically designed for handheld spectrum analyzers as a portable solution for millimeter wave spectrum analysis measurement. Utilizing the handheld spectrum analyzer tracking generator as an LO source and the built-in DC supply; this harmonic mixer provides you the ease of portable field measurement in a one box solution.

Available in waveguide bands WR-12 (60-90 GHz), WR-15 (50-75 GHz) WR-10 (75-110 GHz). OML’s innovative millimeter wave frequency extension products can help you with your testing in the emerging application areas such as WiGig, 5G, collision avoidance radar systems, E-Band backhaul and military & defense.

OML
omlin.com

1.00 mm Connectors
Built to Southwest Microwave’s rigorous performance and quality standards, the 1.0mm connectors are rugged and durable, featuring a 360° raised grounding ring and operational temperature rating of -55°C to +165°C. 1.0mm connectors provide mode-free operation through 110 GHz, offering well-matched impedance, excellent repeatability, and the industry’s lowest VSWR (1.2:1), insertion loss (0.6 dB), and RF leakage (≤ -100 dB).

Southwest Microwave
southwestmicrowave.com

008004 MLCC with 0.1µF Capacitance
Available now, Murata’s GRM-011R60J104M, the world’s first multi-layer ceramic capacitor (MLCC) featuring a maximum capacitance of 0.1µF in a 008004 (0.25×0.125mm) package. The design features a capacitance tolerance of ±20 percent, usage...
temperature range of -55°C to 85°C, and rated voltage of 6.3Vdc.

By using proprietary ceramic and electrode material atomization and homogenization technology, Murata achieved a mounting surface area approximately half the size and a volume approximately 80 percent smaller than conventional products in a 01005 package. The GRM011R-60J104M has nearly 10 times the capacity of similarly sized products.

Murata
murata.com

Cooling System
Cernex’s Thermoelectric Refrigeration Cooling System is the perfect solution to keep your components at optimal temperature. It features an adjustable temperature control with digital readout and a universal mounting plate that is compatible with any amplifier module as well as many other devices. It is an ideal solution for systems where heat dissipation is critical.

Cernex
cernex.com

Reflective Switch
PMI Model No. P2T-6G18G-40-R-570-TFF-1D5KW-120W is a Single Pole, Two Throw, Reflective Switch that operates over the 6.0 to 18.0 GHz frequency range. Specifications include power handling of 120 W CW (1.5 kW Peak), Duty Cycle: 8%; Switching Speed 1.25 µs Max, 1.1 µs Typ. (50% TTL to 90% RF & 50% TTL to 10% RF; Insertion Loss: 2.3 dB Max. - Measured 2.27 dB; Isolation: 35 dB Typ. - Measured 35.49 dB; VSWR In/Out: 2:1 Max. - Measured 1.81:1/1.9:1; and Load VSWR: Better than 1.5:1. This model is outfitted with TNC female connectors and a 9-Pin Micro-D female connector in a housing measuring 2.00” x 2.00” x 0.75”.

Planar Monolithics Industries
pmi-rf.com

Frequency Converters
Norden Millimeter has extensive experience in design and manufacturing of frequency converter and custom

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**Featured Products**

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<tr>
<th>Power Division</th>
<th>Freq. Range (GHz)</th>
<th>Insertion Loss (dB)</th>
<th>Isolation (dB)</th>
<th>Amplitude Balance</th>
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<td>0.5 dB</td>
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<tr>
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</tr>
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<td>2.2</td>
<td>15</td>
<td>0.6 dB</td>
<td>PS8-13</td>
</tr>
</tbody>
</table>

10 to 30 watts power handling, visit website for complete specifications. SMA and Type N connectors available to 18 GHz.
assemblies products for both the military and commercial markets. Norden understands that the vast majority of requirements for these types of products involve custom design and packaging per individual customer specifications.

Norden military converters and custom assemblies are used in Airborne (fixed and rotary wing), Shipboard, and Ground Mobile platforms. Military applications include Avionics, Electronic Warfare including (ECM, ESM, ELINT, SIGINT), RadAR applications, radar environment simulation systems, and intelligence, surveillance and reconnaissance (ISR) systems. Norden’s commercial converters and custom assemblies are used in Microwave Communications, Astronomy, and Test Equipment. Whatever the customer requirement, Norden can design and deliver a product that will fulfill the customer’s specifications.

Norden Millimeter
nordengroup.com

Herotek offers Detectors, Comb Generators, Limiters, Switches, GaAsFet Amplifiers (Broadband, Low Noise, and Power) and integrated subsystems of many types, including up and down converters, multipliers, harmonic mixers, and transceivers.

**Herotek**
herotek.com

**RF Coax Cables**

ShowMeCables is now selling Pasternack’s line of RF coax cables, connectors and assemblies for use in wireless telecom, military/defense and commercial wireless products.

This line of Pasternack brand RF cable assemblies and interconnects consists of 30 base models and 150 total SKUs. These models operate to 6 GHz and contain various sizes of coax for different applications. They are constructed with authentic Times Microwave low-loss coax and most orders can be built and shipped same day. These high-quality, Pasternack products are outdoor-rated and designed to deliver low-insertion-loss per foot.

**Show Me Cables**
showmecables.com

**Benchtop YIG Synthesizers**

We’re pleased to announce that we’ve increased the offerings for our high-performance, low phase noise benchtop frequency synthesizers. In sync with our evolving catalog of YIG synthesizer components, our custom-tuned benchtop YIG synthesizer line now offers RF and microwave designers working at frequencies up to 20 GHz the chance to upgrade their test benches with the best technology at their specific bands.

Offering up to -125 dBc/Hz @ 10 kHz offset phase noise at a carrier frequency of 10 GHz, these frequency synthesizers set the standard for phase noise performance. They are also capable of tuning speeds up to 50 uS over wide bands, and offer output power levels of +15 dBm, with power leveling in frequency bands up to 10 GHz.

**Micro Lambda Wireless**
microlambdawireless.com

**VCO**

Z-Communications, Inc. announces the RoHS compliant VCO (Voltage Controlled Oscillator) model USSP2400-LF. The USSP2400-LF operates from 2400 to 2485 MHz within the tuning voltage range of 0.5 to 2.5 Vdc. This high performance VCO is available in an ultra-compact USSP package measuring only 0.2 in. x 0.2 in. x 0.04 in. and conserves precious energy by typically consuming less than 18mW. The USSP2400-LF is designed to operate off a 2.7 Vdc supply and drawing only 6 mA of current.

The USSP2400-LF features phase noise performance of -83 dBc/Hz @ 10 kHz offset and delivers typically -1.5 dBm of output power into a 50 ohm load. This unequalled VCO provides exceptional linearity across the frequency range and is guaranteed to operate over the industrial temperature range of -40 to 85°C making it suitable for the harshest of conditions. This low powered USSP2400-LF suppresses the second harmonic to better than -15 dBc, and is available in tape and reel packaging for production requirements making it ideal for automated surface mount assembly and reflow.

**Z-Communications**
zeomm.com
Design of a K-Band MMIC PA for Satcom Applications

By David Vye and Thomas Young

K/Ka-band (26.5-40 GHz) satellite communications (satcom) systems are popular for global broadband services, offering universal access to faster data rates due to the higher bandwidths available in this frequency spectrum. These systems are enabled through high-power amplifiers (HPAs) in next-generation, satellite-based, RF front-end components. Originally part of the European Space Agency (ESA) Advanced Research in Telecommunications Systems (ARTESS) program, Arralis Ltd. in Limerick, Ireland, has developed the Leonis chipset to meet the growing demand for lower cost K/Ka-band satellite communications (satcom) equipment.

This article describes the design of the Leonis chipset using the Cadence® AWR Design Environment® platform. The chipset includes in-phase quadrature (I/Q) and subharmonic mixers, upconverter and downconverter core chips, switches, phase shifters, low-noise amplifiers (LNAs), and PAs. Within this chipset is the company’s LE-Ka1330308, a high-power monolithic microwave integrated circuit (MMIC) amplifier. Arralis has successfully demonstrated transceiver architectures for both uplink and downlink communications.

The MMIC HPA Design
The transmitter gain versus output power for the LE-Ka1330308, configured in a typical low-band transmitter architecture, is shown in Figure 1. This integrated HPA operates from 17.5-20 GHz and typically delivers 10 W saturated output power, with a power added efficiency (PAE) of...
25% and large-signal gain of 20 dB in a compact die size of 3.7 x 3.0 mm.

The three-stage MMIC amplifier was fabricated on the United Monolithic Semiconductors (UMS) GH25-10 process. The 0.25 µm, gallium nitride (GaN) on silicon carbide (SiC) technology is space qualified and International Traffic in Arms Regulations (ITAR)-free. It is matched to 50 Ω with integrated DC blocking capacitors on RF ports and incorporates an output power detector to assist with system integration.

Arralis designers used simulation software to ensure the design met its performance targets based on active and passive MMIC component models developed by the foundry and organized into process design kits (PDKs) developed through collaboration between the AWR® and UMS modeling teams. Circuit design and simulation was performed using AWR Microwave Office® circuit design software. The AWR AXIEM® planar electromagnetic (EM) simulator was used to model the MMIC manifold feed network, on-chip passives, and evaluation board, and the AWR Analyst™ 3D finite element method (FEM) EM simulator was used for the analysis of the package.

The characterization and modeling methods implemented by the UMS foundry have been validated through a well-established process/model qualification procedure.

![Figure 2 • Simulated data including yield analysis vs. modeled small-signal frequency response for the LE-Ka1330308 reference board shown in Figure 3.](image)

![Figure 3 • LE-Ka1330308 reference board.](image)
developed over years, that has been proven to yield reliable device models for the foundry’s family of semiconductor processes. The extracted nonlinear models account for trapping phenomena and transistor self-heating. In addition to electrical characterization, the UMS modeling team performed a comprehensive study of the thermal device behavior and other non-stationary effects to improve the quality of its nonlinear device modeling.

The MMIC die was analyzed using these foundry-verified, schematic-based models and EM analysis, allowing the designers to reliably predict and optimize key performance metrics. Figure 2 shows the correlation between measured and modeled S-parameters. The graph also shows the simulated gain variation due to process tolerances. Measured gain performance falls on the high side of the variation, however it is within the predicted limits of the simulation.

EM analysis and design optimization were carried out at the component and subcircuit level to ensure that parasitics and inadvertent EM coupling between structures was incorporated into the simulation. Towards the end of the design phase, the AXIEM simulator was used for EM analysis of the entire MMIC for final verification and RF signoff, ensuring that all interactions were captured in simulation.

Packaged Device Development

Following the success of the bare die MMIC, the Analyst EM simulator was used to model the package shown in Figure 4, and to minimize return loss due to impedance mismatches between the MMIC, the package, and the evaluation board. The simulation results showed a well-matched transition with insertion loss of 0.25 dB. This translated to an overall gain reduction of 0.5 dB and power reduction of 0.25 dB for the packaged part compared to bare die option.

**Conclusion**

This article has described the successful design of a K/Ka-band chipset and 10 W saturated output power HPA for satellite communications applications. The three-stage MMIC amplifier, fabricated with space-qualified, 0.25 µm GaN on SiC, was developed using state-of-the-art semiconductor technology, foundry-qualified device models, and AWR software circuit and EM simulation technology. Transceiver architectures for both uplink and downlink communications were demonstrated with this chipset and the integrated HPA.

**About the Authors**

David Vye is senior product marketing manager for the AWR portfolio at Cadence Design Systems. He formerly served as an editor for a microwave publication and has held a number of technical and marketing positions at ANSYS, Ansoft Corp., Raytheon, and M/A-COM. David holds a BS from the University of Massachusetts.

Thomas Young is senior MMIC design engineer at Arralis Ltd. Previously he has worked for TDK Electronics as a design engineer, and MACOM in Belfast as a senior design engineer, and Queens University as a research assistant. Thomas holds an MEng from Queen’s University in Belfast.
Recent DOD Contracts

NAVY

Trandes Corp., Linthicum, Maryland, is awarded a $24,388,698 for an indefinite-delivery/indefinite-quantity, cost-plus-fixed-fee contract (N66001-20-D-0336) to provide engineering services to support **electronic tactical air navigation, air traffic and command control, landing systems and joint tactical systems.** Work will be performed in San Diego, California (75%); and potential air traffic control sites, ships, and Department of Defense facilities worldwide (25%). The period of performance of the base award is from June 2, 2020, to June 1, 2022. If all options are exercised, the period of performance will extend through June 1, 2025. This two-year contract includes three one-year options, which if exercised will bring the potential value of this contract to an estimated $63,833,003. No funds will be obligated at the time of award. Funds will be obligated as task orders are issued using operations and maintenance (Navy); other procurement (Navy); research, development, test and evaluation (Navy); and potential funding from other government agencies to include the Army, Air Force, Coast Guard and the Department of Homeland Security. This contract was competitively procured as a small business set-aside via request for proposal which was published on the contract opportunities section of the System for Award Management website and the Naval Information Warfare Systems Command e-Commerce Central website. Two proposals were received and one was selected for award. The Naval Information Warfare Center Pacific, San Diego, California, is the contracting activity.

**AIR FORCE**

Trident Systems Inc., Fairfax, Virginia, has been awarded a $35,000,000 maximum ordering amount, indefinite-delivery/indefinite-quantity, cost-plus-fixed-fee and firm-fixed-price orders for **Secure Collaborative Technology (SCTECH) software and hardware.** This contract provides for the research, adaptation, enhancement and transition of critical Small Business Innovative Research (SBIR) technologies to provide new capabilities which are secure and provide access between multiple levels of security domains and bridge between different chat protocols. This effort will result in the delivery of several software releases to the SCTECH user community, to include computer software, technical documentation, hardware, installation and maintenance of the current systems located at existing customer sites. Work will be performed in Fairfax, Virginia; and Morrisville, North Carolina, and is expected to be completed June 5, 2025. This award is the result of a sole-source acquisition under the SBIR program. Air Force Research Laboratory, Rome, New York, is the contracting activity (FA8750-20-D-0600).

Northrop Grumman Systems Corp., Clearfield, Utah, has awarded a ceiling $11,345,659 firm-fixed-price modification (P00022) to contract SPE4AX-19-D-9404 for left-hand and right-hand wing tips for the **T-38 weapon system.** Work will be performed in Stockton, California, and is expected to be completed July 2027. Fiscal 2020 working capital funds in the amount of $2,624,384 are being obligated at the time of award. Air Force Sustainment Center, Hill Air Force Base, Utah, is the contracting activity.

Range Generation Next LLC, Sterling, Virginia, has been awarded a $13,941,843 cost-plus-fixed-fee modifi-
cation (P000297) to contract FA8806-15-C-0001 for cyber hardened infrastructure support. This modification supports an increase in launch and test range requirements. The primary locations of performance are the Eastern Range, Patrick Air Force Base, Florida; and the Western Range, Vandenberg AFB, California. Work is expected to be completed Feb. 14, 2022. Fiscal 2020 operations and maintenance funds in the amount of $13,941,843 are being obligated at the time of award. The total cumulative face value is $1,210,861,882. Space and Missile Systems Center, Peterson AFB, Colorado, is the contracting activity.

**ARMY**

Northrop Grumman Systems Corp., Herndon, Virginia, was awarded a $21,703,157 modification (P00063) to contract W58RGZ-17-C-0014 for logistics support services for government-owned fixed wing fleet performing special electronic mission aircraft missions. Work will be performed in Herndon, Virginia, with an estimated completion date of Aug. 31, 2021. Fiscal 2020 operations and maintenance (Army) funds in the amount of $21,703,157 were obligated at the time of award. U.S. Army Contracting Command, Redstone Arsenal, Alabama, is the contracting activity.

Science Applications International Corp., Reston, Virginia, was awarded a $10,693,344 modification (000182) to contract W31P4Q-18-A-0011 for converged infrastructure engineering support; technical modeling support, containerized weapon system mission data analysis and engineering support; implementation support; and precision fires manager engineering and analysis. Work will be performed at Shaw Air Force Base, South Carolina, with an estimated completion date of June 4, 2021. Fiscal 2020 operations and maintenance (Army) funds in the amount of $10,693,344 were obligated at the time of award. U.S. Army Contracting Command, Redstone Arsenal, Alabama, is the contracting activity.

Raytheon Lockheed Martin Javelin JV, Tucson, Arizona, was awarded a $75,350,484 modification (P00019) to contract W31P4Q-19-C-0076 for Javelin weapon system full rate production primary deliverables. Work will be performed in Tucson, Arizona, with an estimated completion date of Aug. 31, 2023. Fiscal 2010, 2018 and 2020 missile procurement (Army) funds in the amount of $75,350,483 were obligated at the time of the award. U.S. Army Contracting Command, Redstone Arsenal, Alabama, is the contracting activity.

Raytheon Lockheed Martin Javelin JV, Tucson, Arizona, was awarded a $7,060,279 modification (P00048) to contract W31P4Q-19-C-0038 for engineering services for Lightweight Command Launch Unit system qualification build initiation. Bids were solicited via the internet with one received. Work will be performed in Tucson, Arizona, with an estimated completion date of Sept. 30, 2021. Fiscal 2020 research, development, tests and evaluation (Army) funds in the amount of $7,060,279 were obligated at the time of the award. U.S. Army Contracting Command, Redstone Arsenal, Alabama, is the contracting activity.

Harris, Rochester, New York, was awarded a $90,000,000 modification (P00019) to contract W91CRB-16-D-5006 to procure Harris family of radios, ancillaries, spare parts and services. Bids were solicited via the internet with one received. Work locations and funding will be determined with each order, with an estimated completion date of June 21, 2021. U.S. Army Contracting Command, Aberdeen Proving Ground, Maryland, is the contracting activity.

**DOD Names Seven Installations as Sites for Second Round of 5G Technology Testing, Experimentation**

The Department of Defense has named seven U.S. military installations as the latest sites where it will conduct fifth-generation (5G) communications technology experimentation and testing.
They are Naval Base Norfolk, Virginia; Joint Base Pearl Harbor-Hickam, Hawaii; Joint Base San Antonio, Texas; the National Training Center (NTC) at Fort Irwin, California; Fort Hood, Texas; Camp Pendleton, California; and Tinker Air Force Base, Oklahoma.

This second round, referred to as Tranche 2, brings the total number of installations selected to host 5G testing to 12. This tranche builds on DOD’s previously-announced 5G communications technology prototyping and experimentation and is part of a 5G development roadmap guided by the Department of Defense 5G Strategy.

5G technology is vital to maintaining America’s military and economic advantages. 5G is the fifth-generation of cellular network technology. It is the advent of ubiquitous connectivity – the connectivity of everything and everyone everywhere - through wireless communications. DOD’s efforts focus on large-scale experimentation and prototyping of dual-use (military and commercial) 5G technology that will provide high speeds, quicker response times and the ability to handle many more wireless devices than current wireless technology.

Last year, the department announced the selection of the Tranche 1 bases: Joint Base Lewis-McChord, Washington; Hill Air Force Base, Utah; Naval Base San Diego, California; and Marine Corps Logistics Base Albany, Georgia as the first U.S. military installations to host testing and experimentation for 5G technology. In May of 2020, DOD announced Nellis Air Force Base, Nevada had also been selected.

The bases were selected for their ability to provide streamlined access to site spectrum bands, mature fiber and wireless infrastructure, access to key facilities, support for new or improved infrastructure requirements and the ability to conduct controlled experimentation with dynamic spectrum sharing.

DOD recognizes industry will play a key role in the development of leap-ahead 5G technology for both military and civilian uses. In the coming weeks, the department will issue requests for prototype proposals from industry partners. The new round of opportunities will focus on the following areas:

- Ship-wide/Pier Connectivity at Naval Station Norfolk
- Enhancing Aircraft Mission Readiness at Joint Base Pearl Harbor-Hickam
- Augmented Reality Support of Maintenance and Training at Joint Base San Antonio
- Wireless Connectivity for Forward Operating Bases (FOB) and Tactical Operations Centers (TOC) at the NTC at Fort Irwin and Fort Hood, Texas
- Wireless Connectivity for FOBs and TOCs at Camp Pendleton
- DOD 5G Core Security Experimentation Network at Joint Base San Antonio and multiple remote locations
- Bi-directional Spectrum Sharing – DOD / Commercial at Tinker AFB

—DOD
3D Semiconductor Interconnect Technologies

Xperi Holding Corp. and Tower Semiconductor announced Tower’s license of Invensas ZiBond® and DBI® 3D semiconductor interconnect technologies. This technology complements Tower’s manufacturing of its state of the art stacked wafer BSI sensor platforms for time of flight (ToF), industrial global shutter and other CMOS image sensors on 300mm and 200mm wafers. In addition, Tower Semiconductor will explore the use of Invensas enabling 3D integration technologies for a broader range of applications, including memories and MEMS devices.

“With our fast portfolio expansion, Xperi’s leadership in direct and hybrid bonding technologies enables us to support the rapidly evolving requirements of our customer base as they develop next-generation applications,” said Dr. Avi Strum, Senior Vice President and General Manager of the Sensors Business Unit, Tower Semiconductor. “3D stacking architectures and integration are core to our strategy of providing the highest value, proven analog semiconductor solutions, including event-driven and time of flight sensors for mobile, automotive, industrial and high-end photography applications.”

With the recently released full design kit for hybrid bonding, Tower’s customers can now design their products on two different wafers, an imager wafer and a mixed-signal CMOS wafer, that are then stacked together with electrical connections on a pixel level, from 10um pitch for applications such as Direct ToF (dToF) and event-driven sensors, down to 2.5um and even below for applications such as mobile ToF for face recognition applications. This separation into two wafers allows very high speed circuitry on the CMOS side, with very high sensitivity pixels, due to backside illumination, and extremely low dark current, below 1 electron/sec per square micron at 60 degrees Celsius, on the imager side. Tower’s unique platform also allows the use of different Epi thicknesses for near infrared sensitivity enhancement.

“Tower Semiconductor continues to strengthen its position as a leading and trusted analog foundry partner of customers around the world,” said Craig Mitchell, President of Invensas, a wholly owned subsidiary of Xperi. “Our ZiBond and DBI technologies support the manufacturing of a wide range of devices. We are excited to partner with Tower Semiconductor to deploy our foundational 3D integration technologies into a range of new sensors, in particular time of flight sensors, which we anticipate will be increasingly utilized in automotive, mobile and industrial applications. This partnership continues the strong momentum Xperi has enjoyed as manufacturers worldwide position themselves to address an evolving range of industry needs.”

Industry momentum is building around 3D semiconductors that are smaller, thinner and higher performance to enable a new wave of applications for automotive, industrial, Internet of Things, edge computing and consumer device markets. Invensas has achieved fundamental advances in the semiconductor packaging and interconnect technologies required to create 3D stacked chips that satisfy demanding size and performance requirements. Invensas ZiBond direct bonding technology and DBI hybrid technology are ideal for high-throughput, low cost-of-ownership fabrication processes.

Tower Semiconductor
towersemi.com
Latest LPDDR5 Grypper Sockets

Ironwood Electronics, continues to design and manufacture new Grypper test sockets for the latest releases of memory devices - LPDDR5. Ironwood Grypper socket, part number GR1032-0001, allows testing of the newest generation LPDDR5 devices that have 315 Ball - 0.7 x 0.8mm pitch, with speeds up to 6400Mb/s.

The LPDDR5 Grypper socket fits to the same location/PCB footprint as the device allowing development and failure analysis. To connect a device, simply insert into the socket by pressing on top of the device, no lid is required. The unique geometry of the contact grips onto the solder balls of the device. To remove the device a simple extraction tool can be used to pop the device back out of the socket and it is ready to install another device. This Grypper socket has excellent electrical performance of -1dB insertion loss up to 40.0 GHz. Force required to insert a device is 45 grams / contact.

The socket is sold in three configurations; Sockets with a Rohs solder ball (SAC 305) replicates the device. The socket configured with SnPb solder ball allow easy reflow/attachment onto a PCB that already has components mounted. The lower melting temperature of the SnPb solder will not affect any adjacent components that might be close to the target area where the socket is to be placed. The socket can also be purchased with NO solder balls. No solder ball version requires the use of a 0.2mm thick stencil for the correct amount of solder paste allowing any type of solder paste the customer’s lab might use for attachment.

Ironwood Electronics
ironwoodelectronics.com

Webinar: Advanced Power Amplifier Design

Thursday, June 18, 2020
Time: 10:00 a.m. PT
Who: Christian Bean

This webinar will showcase the advanced load-pull based design flow for high power amplifiers (HPAs) within the Cadence® AWR Design Environment® platform. Load pull has become an integral tool for PA designers needing to meet aggressive performance targets in short design cycle windows.

The webinar, presented by Christian Bean, senior principal application engineer at Cadence, will highlight measurement techniques that involve not only fundamental load pull but also source pull, harmonic load pull, and baseband load pull will be discussed.

In addition, new features in the V15 release of AWR® software that directly support PA design will be highlighted, including data management enhancements and other ease-of-use improvements that simplify the handling of complex design projects. The webinar also examines automated matching network synthesis, which integrates seamlessly with load-pull measurements to ensure that the best possible PA performance is achieved across the frequency band of interest.

Where:
Visit https://www.awr.com/events

Cadence AWR
awr.com
5G Infrastructure

StratEdge Corp. announced the expansion of its production line for building ceramic and molded ceramic packages to support 5G infrastructure demands. The packages, most often used to protect high-power laterally-diffused metal-oxide semiconductor (LDMOS), gallium arsenide (GaAs), silicon carbide (SiC), and gallium nitride (GaN) devices, match standard outlines developed to support cellular base stations. Run rates in excess of 100,000 packages are being accommodated.

“GaN-on-SiC devices are frequently used in 5G base stations, but these devices can have extremely high power densities, which generate a tremendous amount of localized heat. StratEdge packages use copper-molybdenum-copper (CMC) bases to dissipate this heat, increasing the power output the chip achieves and enabling the device to operate at cooler temperatures so it lasts longer, has higher reliability, and performs more efficiently,” said Casey Krawiec, vice president of global sales. “With our Leaded Laminate (LL) Series of high-power amplifier packages, the device is mounted directly onto a layer of thermally-conductive copper so the heat quickly spreads away from the transistor hot spots, while the matched coefficient of thermal expansion (CTE) minimizes the stress experienced by the device.”

StratEdge
stratedge.com

Webinar: Connector and Interposer Solutions for SATCOM

Radiation hardening (Rad-hard) is the process of making electronics resistant to issues that may be caused through intense radiation. This radiation could be either particle radiation or electromagnetic radiations, which are both types of radiation that occur in environments such as outer-space, around nuclear reactors, high-altitude flights, particle accelerators and more.

Electronics that are implemented within satellites are subject to this form of radiation and must be radiation hardened. Previously, these have been limited to one-time-programmable (OTP) solutions, but currently there are new FPGAs available that allow for the system to be manipulated and configured without hardware changes.

Amphenol Ardent Concepts
ardentconcepts.com
Packaging Products for the Electronics Industry

Equipto Electronics Corp. is a leading manufacturer of packaging products for the electronics industry. We design and manufacture a wide variety of standard equipment enclosures, from full-size cabinets to sub-racks, at our facility in Aurora, Illinois. Special customer needs are fulfilled by modifications to standard designs or by custom enclosures. As a diverse metal fabricator we have standard product lines, each consisting of multiple variations and accessories, based on the EIA RS-310 standard (often referred to as the 19 inch standard). Many of these products are covered by the company’s numerous patents.

Since the company’s founding in 1960, our electronic packaging products have been modular in design. This modularity extends well beyond the EIA RS-310 (19") standard for maximum user flexibility. For example, equipment can be moved from a vertical rack to a sloped front console, work station or instrument cabinet without modification. By adding shelves, drawers, turrets, casters, lift bolts, standard or special panels, outlet strips, fans, blowers, an almost endless list of accessories and other options, our customers can usually create the perfect electronic enclosure out of a catalog of standard products. This saves time and money over a custom packaging solution. Many projects can be manufactured and shipped by Equipto Electronics in just five working days.

In addition, our experienced engineering staff works directly with customers to specify and design enclosures for special situations. Because of the flexibility of our components and our wide variety of standard products, requirements that may seem very special can often be met with relatively minor modification of standard products providing meaningful savings.
Antennas: Point to Point Backhaul

KP Performance Antennas, an Infinite Electronics brand and a manufacturer of wireless network antennas, has just released new 2-foot and 3-foot antennas with Mimosa® B11 mounting kit options to its new series of ProLine 11 GHz parabolic antennas.

KP’s new high-performance ProLine parabolic antennas are ideal for high-density, point-to-point backhaul applications or client-premises and operate in the 10.7 GHz to 11.7 GHz frequency range. They are offered in 2-foot and 3-foot diameters and deliver gain performance of 34.4 dBi and 39 dBi respectively. These antennas are engineered to suppress side-lobes and back-lobes and are excellent at rejecting interference. They feature rugged construction with a patented 6-point mounting connection for set-and-forget installation.

These antennas deliver SISO or 2x2 MIMO for increased capacity and boast 155 mph survival wind speed. They are offered with dual-polarized N-type connector or direct connect options. The 2-foot model is a high-performance ETSI Class 2, FCC Cat B antenna and the 3-foot model is an ETSI Class 3, FCC Cat A antenna. Both models come with either a Mimosa® B11 or Ubiquiti airFiber® 11FX direct connect kit.

“Our new 11 GHz ProLine parabolic antennas combine durability, ease of installation and quality. They come pre-assembled from the factory for simple installation, ensuring factory tested quality and reducing deployment costs,” said Justin Pollock, Antenna Product Line Manager.

KP’s new 11 GHz ProLine parabolic antennas are in stock and can be ordered directly from any of KP’s authorized distributors or from the KP Performance Antennas website at www.kpperformance.com.

With decades of in-the-field expertise as former WISP operators and Ph.D. antenna engineers, KP Performance Antennas helps Wireless Internet Service Providers maximize ROI with products engineered to exceed industry expectations by delivering superior throughput, greater service coverage, dependable performance and reduced maintenance costs, while also providing responsive service, expert technical support and same-day shipping.

Founded in 2008 in Edmonton, Canada, as a manufacturer of broadband antennas and accessories for the fixed wireless internet provider market, KP got its start by developing a reflector dish antenna for the Motorola Canopy line that outperformed the existing models on the market in all key performance areas. This early success was followed up with the design of a new claw-mount on the reflector dish that allowed the Subscriber Module to clip in place for ease of installation. KP was then selected as the OEM reflector dish manufacturer for the Cambium Canopy line, which was our first step to making a variety of antennas that continue to exceed industry standards. Since then, we have focused on developing and perfecting our antennas to include industry-leading single and dual frequency sectors, omnis, yagis, and panels that operate from 200 MHz to 6 GHz.

We take pride in helping our customers every step of the way, from pre-sales questions, post-sales technical and application support, or simply a discussion on industry challenges and emerging trends, we’re here for you. Thank you for choosing KP to be a part of your team! Great Products, Great Support, 100% Performance Guaranteed, Same-Day Shipping.

KP Performance Antennas kpperformance.com
Absorptive Switch Module

PMI Model No. P8T-2G18G-60-T-SFF-NSI is a single pole, eight throw, absorptive switch module with low loss, high speed and with integral TTL driver, designed for broad band operation from 2.0 to 18.0 GHz.

Specifications include VSWR In/Out 2.0:1 max (On In/Out), 2.0:1 max (Absorptive Out/Off); Isolation 60 dB min; Insertion Loss: 2.5 dB max (2.0 to 6.0 GHz), 3.5 dB max (6.0 to 12.0 GHz), 4.5 dB max (12.0 to 18.0 GHz); Switching Speed: 100 ns max; Power Supply +5 V @ 300 mA max, -5 V @ 100 mA max; Insertion Loss Flatness/1 GHz: ±0.5 dB max; RF Input Power +20 dBm max; IP3 30 dBm typ. Size: ø1.5” Circle Point to Point x 0.400 (H); Finish: Painted Blue; Weight: 2.5 oz typ; Control 3 Bit TTL Logic.

50W Fixed Attenuator

Response Microwave announced the availability of its new DC-8.5GHz, 50W fixed attenuators for telecom specific product platform use.

The family includes 1 through 40dB attenuation values that operate between DC to 8.5GHz. Electrical performance offers typical insertion loss of 0.5dB and VSWR of 1.25:1 max. Impedance value is 50Ω. Power handling is 50W CW and package size is 0.45mm OD by 0.110mm length.

Connectors are ternary alloy plated brass N male to female and alternate interfaces are available upon request. Units accommodate environmental extremes from −55° to +125° C and are RoHS compliant.

Planar Monolithics Industries

Product Highlights

PMI
pmi-rf.com

Response Microwave
responsemicrowave.com
**Spectrum Analyzer Extension Modules**

OML can extend the frequency range of your existing spectrum analyzer to millimeter wave frequencies with our single diode unbalanced harmonic mixers. Harmonic mixers are available for the waveguide bands between 18 and 325 GHz.

These frequency extension modules are compatible with most spectrum analyzers that offer optional external mixer access. By substituting the harmonic mixer for the existing microwave input, you can expand your spectrum analyzer frequency coverage for millimeter wave measurements.

Our mission is to be on the innovative forefront of millimeter and sub-millimeter wave technology, while maintaining our role as a solutions partner in the test & measurement field. Our success is sought through collaborative efforts that optimize solutions for price and performance. Offering our customers quick access to service, we strive to build a prosperous millimeter wave ecosystem together.

OML
omline.com

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**Waveguide Shorts, Shims**

Fairview’s new line of waveguide shorts and shims includes 36 models offered in waveguide sizes ranging from WR-430 to WR-10. This new line is ideal for use in RF test and measurement applications and provides superior RF performance.

Waveguide shims and shorts, or shorting plates, are commonly included in calibration kits and they are used in calibration applications. Waveguide shims can also be used to bridge gaps between waveguide components.

These waveguide shims and shorts are compatible with square and round UG cover and CPR-style flanges and are available in both copper and aluminum versions.

Fairview Microwave is a leading provider of high-quality RF and microwave components including adapters, connectors, attenuators, coaxial cables, terminations, and much more. Specializing in immediate product needs, we offer same-day shipping on thousands of in-stock items with no minimum purchasing requirements.

Fairview Microwave
fairviewmicrowave.com
Front-End Module

Skyworks is pleased to introduce the SKY5®-5242-11 a dual 2.4 GHz, 802.11ax high-linearity, high-efficiency front-end module (FEM) designed for Wi-Fi 6 enabled devices including handsets, tablets and mobile devices supporting WLAN and Bluetooth® protocols.

This highly integrated FEM includes two transmit and receive chains, an extremely low EVM floor power amplifier, low noise amplifier with bypass, and a SP3T antenna switch.

The three transmit modes for high linearity, high efficiency and low gain provide optimal performance. The SKY55242-11 builds on Skyworks’ portfolio of revolutionary products for 5G applications.

We are deeply committed to providing our customers with the highest quality products keeping their satisfaction and success at the core of our business systems. Our comprehensive quality management organization is integrated across the entire company – from the product development cycle to manufacturing operations and post-sales services – emphasizing sustainable, continuous improvement at every level.

Skyworks
skyworksinc.com

RF and Microwave Components Since 1982

Herotek offers a comprehensive line of Detectors, Comb Generators, Limiters, Switches, GaAsFet Amplifiers (Broadband, Low Noise, and Power) and integrated sub-systems of many types, including up and down converters, multipliers, harmonic mixers, and transceivers.

Herotek has been a quality supplier of RF and Microwave components since 1982. It is a broad-based, high technology company supplying parts for the Military, Industrial and Commercial markets with designs from DC to 75 GHz.

It offers standard products as well as thousands of custom designs, and is happy to match existing products.

Herotek
herotek.com
Product Highlights

VNA Extension Modules
OML offers three configurations of the VNA Frequency Extension Module to expand your existing Keysight or Anritsu vector network analyzer to millimeter frequencies: T/R, T, and S. Depending on your S-parameter needs, refer to the following block diagrams to configure our module(s) with your existing VNA test port(s). With flexible ordering configurations, we can satisfy your preferences for economical and high performance needs.

OML
omlin.com

mmWave Solution
Analog Devices introduced a solution for millimeter wave (mmWave) 5G with the highest available level of integration to reduce design requirements and complexity in the next generation of cellular network infrastructure. The new mmWave 5G chipset includes the 16-channel ADMV4821 dual/single polarization beamformer IC, 16-channel ADMV4801 single-polarization beamformer IC and the ADMV1017 mmWave UDC.

Analog Devices
analog.com

24 - 40 GHz sub-Harmonic Pumped Mixer
Ideal for testing and validating 5G solutions.

Innovation in Millimeter Wave Solutions
www.omlin.com
(408) 779-2698

Get info at www.HFeLink.com
Product Guides and YIG Resources

Micro Lambda Wireless has released a series of new Product Guides and other resources for its extensive line of YIG oscillators, filters, and synthesizers, including:

- 2020 Oscillator Product Guide
- 2020 Synthesizer Product Guide
- 2020 YIG Filter Product Guide
- MSLP Quick Start Guide
- MLBF Quick Start Guide
- And much more

The company’s YIG devices offer the biggest names in the EW, ISM, and aerospace industry the lowest phase noise and superior multi-octave tuning capability.

With this technology in-hand, they’re creating the next-generation of test instruments, signal generators, spectroscopy equipment, receivers, jammers, communication systems, and more.

Micro Lambda Wireless
https://www.microlambdawireless.com/support/

Peak and Pulse Power Sensor

LadyBug Technologies’ LB479A thermally stable peak and pulse sensor utilizes patented technology to deliver no-drift, high-accuracy statistical pulse information along with average power. No user zeroing is required. The USB sensor offers frequency coverage from 10 MHz to 8 GHz with an 80 dB dynamic range.

The product’s broad frequency range, combined with excellent sensitivity, makes it ideal for IoT, satellite, radar, Bluetooth, and defense applications.

The LB480A sensor is similar and includes triggered, time-domain trace based measurement features along with additional statistical information. These triggered measurements provide a visual time domain trace of the pulse power profile.

Both sensors are provided with a package of software that includes programmatic support for ATE builders. Triggering, recorder output and optional connectors are available.

LadyBug Technologies LLC
ladybug-tech.com
4-Beam 120 Degree Antenna System

A multibeam 120 degree antenna system with beam crossover, maximizing signal to noise ratio. This Antenna System can be employed with a single channel repeated four times thus quadrupling the data throughput. Available on all telecom bands.

Electromagnetic Technologies Industries, Inc. (ET Industries) is an engineering firm specializing in the design and manufacture state-of-the-art RF components, subsystems and systems. With the broadest frequency range in the industry (10 MHz to 67 GHz) coupled with low VSWR, high directivity and moderate insertion loss, ET Industries’ products are among the best in the industry and ET Industries is considered one of the leading engineering firms in its field.

Over several decades of experience, ETI has utilized its engineering skills to provide custom solutions and products to the U.S. Military and NASA and the world’s leading military contractors (e.g. Exelis, Lockheed Martin, Raytheon, L3 Communications, BAE, Cobham, Harris Corporation) as well as the Indian Space Agency and MITRE Corporation, to name a few.

ET Industries
etiworld.com

Frequency Divider

FBS-N-40 is a custom build 0.5 - 40GHz frequency divider with fixed divide ratio of 2 to 127 (N must be specified when ordering). It is running on single 5V DC power supply with 2.92mm female Input RF Connector and SMA female output RF connector. It is designed for PLL applications. Once a customer specifies the divide ratio, we can ship on the same day order is placed.

RF Bay provides online buying capability for customers requiring critical RF components immediately. Products include low-noise amplifiers, low- and medium-power RF amplifiers, high-power RF amplifiers, Waveguide Amplifiers, frequency mixer, power splitter/combiner, directional coupler, frequency doubler, frequency multiplier, frequency dividers, phase-locked oscillators, block converters, filters, RF detectors, RF switches and more.

RF Bay also works with customers to meet their special requirements and to develop new products delivering high-performance at low cost.

RF Bay
rfbayinc.com
Waveguide Switch

The LOGUS WR10 Ultra-Light Waveguide Switch operates across the 75.0 to 110.0 GHz band with a maximum VSWR of 1.20:1, Insertion Loss of 0.40 dB maximum, Isolation of 50 dB minimum, Switching Time of 50 ms maximum and is available with Indicators, TTL interface control and Port configurations.

Logus Manufacturing Corporation has been designing and manufacturing the finest Microwave and RF Switches in the world since 1961. Engineers and buyers of all Major Defense Contractors turn to Logus for their critical and most demanding switching requirements. Logus has supplied switches for Satellite Communications, Military Airborne, Ground and Shipboard Systems for 57 years.

Logus Microwave is the premier supplier for switches in Unmanned Aerial Vehicles. Our UAV ultra-light, high reliability switches are the cutting edge in design for our nation’s Defense, Homeland Security, Real Time Weather Data and Surveillance Programs.

Logus Microwave
logus.com

Mini Synthesizer

Luff Research’s line of high performance miniature synthesizers is ideal for broadband applications in communications and instrumentation. SLSM5-1225 covers the 12 to 25 GHz band and the SLSM5-2434 covers the 24 to 34 GHz band. The units have 1 kHz steps, good phase noise and spurious, operate on +5V, are housed in miniature rugged enclosures and are a great value.

Luff Research specializes in the design and manufacture of high performance, high reliability state-of-the-art RF/Microwave frequency synthesizers and phase-locked oscillators.

Our components are typically used in SATCOM, communication, medical and instrumentation equipment.

Luff Research
luffresearch.com
Precision Compression-Mount Microwave Test Connectors

Until now, traditional test methods have required timely soldering and a limited number of test ports per board. Molex Precision Compression-Mount Microwave Test Connectors offer a more streamlined solution with a vertical mount design for placement anywhere on the PCB, enabling more test connectors to be placed around parts being tested.

The compression-mount design also reduces installation time and costs by eliminating soldering from the process while achieving up to 65 GHz analog performance (supports data rates of 120 Gbps minimum).

The product is available in mating interfaces including 1.85mm, 2.4mm, 2.92mm and SMA.

Molex
molex.com

RF, Microwave Amps

We have developed a broad portfolio of cutting-edge RF and microwave amplifiers; from compact GaN SSPAs to low noise amplifiers. For custom designs, we have engineering teams ready with modular building blocks to rapidly support your program.

The core-competencies include designs through V-band, advanced non-linear modeling, compact power combining, state-of-the-art GaN amplifiers, and digital control hardware.

Mercury Systems is the leader in making trusted, secure mission-critical technologies profoundly more accessible to the aerospace and defense industries. Optimized for customer and mission success, our innovative solutions power more than 300 critical aerospace and defense programs.

Headquartered in Andover, MA, and with manufacturing and design facilities around the world, Mercury specializes in engineering, adapting and manufacturing new solutions purpose-built to meet the industry’s current and emerging high-tech needs. Our employees are committed to Innovation That Matters®.

Mercury Systems
mrcy.com
Continuing Education: Your Key to Success

Studies reveal that within each 3-5 year period, one-half of an engineer's technical knowledge becomes obsolete. New graduates soon discover that university education provides only the foundation of knowledge that is realistically needed to perform well in the industry. Continued education is a must for survival in today's competitive market. Application of modern computer-aided engineering to RF and microwave circuit and system design is vital to manufacturing products with high quality and yield. Modernization of the design laboratory and production floor is critical to maintaining a competitive edge.

A well-planned continuing education program will enable your company to meet these goals. As a recognized international leader in continuing education, Besser Associates is dedicated to serving the needs of RF and wireless professionals.

The Latest Tools and Techniques are Featured

Our instruction combines theory and practice into one complete and “user-friendly” package that attendees June apply on the job immediately. Whether it’s reviewing basics for the inexperienced, or the latest CAD techniques for more seasoned designers, Besser Associates’ courses offer meaningful education for every participant.

Our Instructors

Besser Associates instructors are recognized experts in their field. They are top-notch design engineers, skilled in both technology and the art of instructing. With an average of more than 20 years of education and practical first-hand experience, our instructors bring a wealth of training and information to the courses they present. Equally important, our trainers communicate effectively; they know how to reach both novice and veteran professionals.

Besser Associates
besserassociates.com
How to
BOOST SALES
Via a Cost-Effective
PR Campaign

Press Releases
Articles
White Papers
Online and in Print

Tim Burkhard has 30 years of proven experience promoting companies, technology, and products in the RF and Microwave space. Multiple studies show that increasing PR increases your bottom line, in good times and bad.

Cost-effective and targeted PR, promotion, and advertising experience.

Exposure equals leads equals sales opportunities. Call or email today for a free quote from a proven professional.

Tim Burkhard
tpburk@aol.com ☑ 707-696-2162

Product Highlights

Wirewound Chip Inductors

Coilcraft has introduced two new series of low-profile wirewound chip inductors: the 0402CT Series and the 0402FL Series. The 0402CT Series features a ceramic core and has a maximum height of just 0.45 mm — a 30% lower profile than competitive products. Offered in 23 inductance values from 1.2 to 56 nH (with, 5%, 3% or 2% tolerance), the 0402CT provides excellent Q Factor performance – up to 84 at 2.4 GHz. It also offers self-resonant frequencies as high as 27.5 GHz and current ratings up to 2.3 Amps (Irms).

The ferrite-core 0402FL Series has a maximum height of 0.55 mm and is offered in 16 inductance values from 20 to 560 nH. It is ideal for use as a one-pole filter or RF choke in cellular bands, and can be used in both mobile and infrastructure equipment.

Coilcraft
coilcraft.com

Pocket Signal Source

Saelig Company features Triarchy Technologies’ VSG2G5C RF Vector Signal Generator - a cost-effective pocketable USB-connected RF signal source with capabilities that provide standalone and PC-controlled functions comparable to full-size analog RF signal generators.

Offering frequencies from 100Hz to 1MHz (low-band) and 100MHz to 2.5GHz (RF Band) with a frequency resolution of 1Hz, this handy unit’s features include frequency sweep, frequency hopping using I&Q modulation, and arbitrary signal generation.

Saelig Company, Inc. is a New York State corporation operating as a Sales and Marketing Agent and Distributor for more than 100 manufacturers from all over the world.

Saelig
saelig.com
**Product Highlights**

**Custom Capacitor Assemblies**

Passive Plus, Inc. (PPI) offers Custom Capacitor Assemblies for high power requirements. Typical assemblies are configured in series and/or parallel combinations, producing higher voltage/current handling capabilities, extended capacitance range and tighter tolerances.

PPI works with requesting engineers to determine best assembly for their applications.

Passive Plus, Inc. (PPI) is a manufacturer of high-performance RF/Microwave passive components for the Medical, Semiconductor, Military, Broadcast, and Telecommunications Industries.

Established in 2005 in New York by industry executives with over 30 years experience in Sales, Program Management and RF Engineering and Development, PPI strives to be the best RF/Microwave capacitor company in the industry.

PPI specializes in High-Q, Low ESR/ESL Capacitors, Broadband Capacitors, Single Layer Capacitors, Non-Magnetic Resistors (High Power and Thin Film) and Trimmer Capacitors.

Passive Plus passiveplus.com

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**Device Switching Time Testers from AVTECH**

Avtech offers pulsers for testing:

- Diode forward recovery time ($t_{frr}$)
- Diode reverse recovery time ($t_{rrr}$)
- Transistor switching times ($t_{on}$, $t_{off}$)
- Phototriac $dV/dt$ immunity
- Optocoupler / Isolator CMTI

**AVRQ-5-B:**
- CMTI tests, $dV/dt$ rates to 120 kV/us
- $t_{frr}$

**AVR-EB2A-B:**
- ±100 mA for switching diode $t_{rrr}$

**AVR-EB4-B:**
- +2A / -4A for ultra-fast rectifier $t_{rrr}$

**AVR-CD1-B:**
- 20 to 200 A/us for diode $dV/dt$, $t_{rrr}$

**AVR-EBFS-B:**
- ±50 mA to +1A for diode $t_{rrr}$

**AVR-D2-B:**
- MIL-95000 transistor switching time

**AVR-DV1-B:**
- ±1 kV for $dV/dt$ transient immunity

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**High Frequency Electronics, Inc.**

HighFrequencyElectronics.com
Aerospace, Defense, and More

Ducommun offers a diverse array of design, engineering and manufacturing capabilities that service the aerospace and defense market, oil & gas exploration, test and measurement, telecommunications, space and medical markets. With over 50 years of heritage in custom product solutions, the Ducommun team can support your Human Machine Interface, Motion Control Device, RF and custom electronics manufacturing needs.

Ducommun serves the avionics, communications, defense, industrial, intelligent traffic systems, medical, and test equipment markets with millimeter wave products. We design and manufacture products including amplifiers, antennas (horn and patch), mixers, oscillators, multipliers, radar sensors, industrial grade phase shifters, lab components, up/down-converters, along with sub-systems and integrated assemblies.

Ducommun
ducommun.com
SSPA

Teledyne Paradise Datacom announced availability of a leading edge L- and S-Dual Band solid state power amplifier (SSPA) for today’s evolving satellite command systems.

Both S- and L-band frequencies have been the industry’s bands of choice for positioning and tracking applications like global positioning systems (GPS) and Tracking, Telemetry, and Control (TTC) ground stations.

This dual band product offers customers a virtual “two for the price of one” SSPA solution that dramatically lowers the costs of command and control, leaves a much smaller footprint, but also delivers higher reliability compared to traditional klystron power amplifiers.

Teledyne Paradise
teledynedefenseelectronics.com

Avantek YIG-tuned RF/Microwave Oscillators

Micro Lambda Wireless offers a complete line of hard-to-find Avantek™ YIG Tuned Oscillators. Frequency coverage is 500 MHz to 40 GHz.

Micro Lambda Wireless has done extensive cross reference research and provides both catalog and special models.

For the RF and microwave designer, choices in components and instruments range from ordinary performance to the absolute best. And when it comes to oscillators, filters, and synthesizers, nothing beats Micro Lambda’s YIG-tuned technology.

Our YIG devices and equipment offer the biggest names in the EW, ISM, and aerospace industry the lowest phase noise and superior multi-octave tuning capability. With this technology in-hand, they’re creating the next-generation of test instruments, signal generators, spectroscopy equipment, receivers, jammers, communication systems, and more.

Micro Lambda Wireless
microlambdawireless.com
How to Break Into the C-Suite

Sherry Hess
Group Director for Product Marketing
Cadence

Women in Microwaves/Women in Engineering (WIM/WIE) networking events have blossomed over the years, growing from a handful of women meeting in a conference room during a local event to taking on its own full program of content that includes keynote, a panel session, and more.

To that end, I recently had the opportunity and pleasure to organize a WIE event for the 2019 International Conference on Microwaves, Communications, Antennas & Electronic Systems (COMCAS) in Tel Aviv, Israel. Having just read the book, “Alpha Girls: The Women Upstarts Who Took on Silicon Valley’s Male Culture and Made the Deals of a Lifetime,” I was inspired to do something around the themes within the book as a panel session. Consequently, the panel session titled “Alpha Girls: What does It Take to Break Into the C-Suite,” was born and came to fruition in a matter of a few short months.

Who Are the Alpha Girls?

Before I talk about the panel session, let’s recap the book itself. Alpha Girls details the stories of and lessons learned by four women who succeeded in Silicon Valley venture capital (VC) and helped build some of the biggest companies in the world. Although Mary Jane (MJ) Elmore, Magdalena Yesil, Sonja Perkins, and Theresia Gouw were all in the VC space, the experiences they relate throughout the book can just as readily apply to other women in science/technology/engineering/math (STEM) careers as we share the traits of making our careers in traditionally male-dominated industries.

COMCAS Panelists

With that said, the panel extracted from the book the five key lessons learned and asked of the panelists if indeed these applied equally as well in the world of microwave engineering and with a global perspective as well. The panel assembled for COMCAS included a diverse group of notable women and one man: Prof. Almundena Suarez Rodriguez of the Universidad de Cantabria in Spain, Dr. Natasha Antonyuk of Staal Technologies in The Netherlands, Dr. Vadim Issakov of Infineon Technologies in Germany, Prof. Zoya Popovic of the University of Colorado in the U.S., and Prof. Yonina Eldar of the Weizmann Institute of Science in Israel and me, Sherry Hess (now of Cadence), as the moderator.

Panel Discussion

Collectively we discussed and shared our own experiences in the context of the five takeaways of the book that follow.

Work/Life Balance: Your Family Doesn’t Need You Every Second

Alpha Girl Magdalena helped rescue Salesforce during the dotcom bust but was not there when the company went public because her son was sick.

How do you balance career and family? What guidelines do you have for striking the right balance? Tough choices made between the two? Regrets? What advice...
would you give young women engineers soon to be faced with these choices?

All panelists agreed that they probably do more than their fair share at home, even our male panelist as a new father. They also agreed that finding a balance is being pushed by millennials to the benefit of both genders as we all want to find the right work/life balance as doing so has great reward both at home and within our careers.

Awkward Situations: Humor Works Wonders

MJ was tasked with firing a male founder twice her age. When he reacted with, “I’m not going to be fired by a woman!” she looked to her right, then her left, and said, “I don’t see anyone else here, do you? You’re fired!”

In situations where your authority was challenged because you are a woman, how did you react?

One story that resonated with all is that as the female in the office, we are often the ones asked to make the coffee. One panelist mentioned responding: sure, let me teach you how to do it for yourself next time and another stating that she doesn’t drink coffee. The unexpected response put a different light on the subject that humor can also be used to diminish any perceived angst, whether conscious or subconscious.

Advocates: Find Out About the Locker Room Talk

A fellow partner shared with Theresa the Silicon Valley gossip surrounding her and how being a “female” helped her land deals. She understood that this was a way for men who felt threatened by her success to tell themselves she wasn’t earning it. At the end of the day, she was grateful to know what the gossip was but was determined not to let it influence how she worked or let it get in her way.

Do women need to know what the latest scuttlebutt is?

Interestingly, the majority of panelists said they would rather not know the “locker room talk” because even if they knew it, there was little or nothing they could do to change it.

Be Engaged: Don’t Sit on the Sidelines

Sonja was one of only a few women invited to a ski event for bankers in Sun Valley. The host signed her up for a downhill skiing race even though she had only skied about a dozen times in her life. Nevertheless, rather than bailing, she saw it through and made it to the bottom of the hill. Sonja says, “You can’t win if you don’t play the game.”

Have you been asked to participate in a business-related activity where your mettle against men was tested?

“Just do it,” to quote Nike, was the panelists’ remark in general, but certainly if you are being asked to do something completely out of your comfort zone, there is no shame in not doing so. Feeling comfortable with and owning your own choices in life is the key.

Gender Equality: Don’t Enable Underachievement

MJ’s husband was also a VC. She felt supported by him in her work but at home he never offered to help her with dinner, household chores, or the kids. MJ advises women to talk with their partners and establish expectations early on around division of labor.

Are you doing the lion’s share of the work at home as well as at work?

The panel consisted of single parents and single-person households, as well as more traditional family structures. The overall conclusion was that equal division of labor at home was not really an issue.

Conclusion

The final conclusion was that we must, as we face the gender and non-gender related challenges in our lives, be true to who we are and how we want to proceed in our careers and our personal lives. As Alpha Girl Mary Jane (MJ) Elmore asked herself, “Are you happy?”

Is it that simple of a question at the end of the day?
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