

Publisher

Scott Spencer
scott@highfrequencyelectronics.com
Tel: 603-472-8261
Fax: 603-471-0716

Associate Publisher/Managing Editor

Tim Burkhard
tim@highfrequencyelectronics.com
Tel: 707-544-9977
Fax: 707-544-9375

Senior Technical Editor

Tom Perkins
tom@highfrequencyelectronics.com
Tel: 603-472-8261
Fax: 603-471-0716

Vice President, Sales

Gary Rhodes
grhodes@highfrequencyelectronics.com
Tel: 631-274-9530
Fax: 631-667-2871

Business Office

Summit Technical Media, LLC
One Hardy Road, Ste. 203
PO Box 10621
Bedford, NH 03110

Also Published Online at

www.highfrequencyelectronics.com

Subscription Services

Sue Ackerman
Tel: 651-292-0629
Fax: 651-292-1517
circulation@highfrequencyelectronics.com

Send subscription inquiries and address changes to the above contact person. You may send them by mail to the Business Office address above.



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Consumer Electronics, the F-35, and a Record Setting Transmitter



Scott L. Spencer
Publisher

The 2012 International Consumer Electronics Show (CES) was held last month in Las Vegas. Estimates are that a mind-boggling 20,000 new products were introduced over the three day event.

Ubiquitous among the products introduced is the incorporation of MEMS inertial sensors in almost every new mobile device. Once impractical for small form factor applications, these devices not only determine the orientation of a mobile device but also can be used to determine the device's location in three dimensional space.

Home Health Hubs are poised to become commonplace. These systems will integrate Bluetooth, Wi-Fi, USB, and ZigBee technologies to a router that is capable of sending information like glucose levels, blood pressure, body temperature, heart rate, and blood-oxygen levels to a web-based platform or mobile device. This enables users to collect, store, and share their health information. Diagnostic software on a mobile device can even trigger a personal emergency response system (PERS) in the event of a life-threatening situation.

F-35 Cuts Likely?

Last month I reported on a statement made by the Secretary of Defense where he indicated that cutting \$1 trillion from the defense budget over the next ten years would essentially gut many major programs including the F-35 Joint Strike Fighter. Last week's news from Washington signaled that the Pentagon is indeed planning to curtail production of some F-35 variants in an effort to reduce the overall defense budget. Many companies in the RF and microwave field have investments in this vital program and have major revenue projections in their sales forecasts tied to the F-35.

Lockheed Martin alone estimates that the F-35 program will provide more than 260,000 jobs when the aircraft reaches full-scale production. Already the company contracts with more than 1,300 small businesses and manufacturers around the country, producing more than 127,000 jobs in 47 states. Because of this broad geographic distribution there is formidable pressure on Members of Congress, particularly the F-35 Caucus, to keep the program fully funded.

Initially the United States planned to build 2,443 F-35s at a cost of \$325 billion. Current cost estimates have increased to over \$380 billion. In light of this the Pentagon has proposed spending about \$9.2 billion to buy 29 F-35 jets in its fiscal 2013 budget, 13 fewer than previously planned. The

Pentagon's previous plan to purchase 62 F-35s in fiscal 2014 is being reduced to 29 and the request for 2015 is dropping to 44 from 81. The planned purchase for 2016 will drop from 108 to 61. The reduction is part of a decision to delay purchasing 179 of the Joint Strike Fighters beyond 2017 and could spell trouble for the program in the long term.

Most people who have been involved with the manufacturing process will agree that pushing production into the future is a recipe for higher overall lifecycle costs and project overruns which have already plagued the F-35 in the ten or more years since the project was awarded.

T-rays

High Frequency Electronics Senior Technical Editor Tom Perkins stopped by my office a while ago with a copy of *IEEE Transactions on Terahertz Science and Technology*, a digest aimed at the frequency range between 300 GHz and 10 THz. Increasingly there is a renewed interest in this area because terahertz radiation penetrates most materials without the damage normally associated with ionizing radiation. As such there are numerous applications in medical and dental diagnostics. In security situations time-domain spectroscopy, used to determine the chemical composition of materials, benefits from T-ray technology and is useful for identifying the chemical signatures of specific explosives and detection of weapons and contraband.

I never paid too much attention to this area of the spectrum which straddles the region where electromagnetic physics can best be described by its wave-like characteristics (microwave) and its particle-like characteristics (infrared). There didn't seem to be any commercially available devices (optical or microwave) to make a large scale market introduction a reality.

This week I saw an article posted on the Technical University at Darmstadt's website titled "*Tiny Transmitter Sets Frequency Record.*" Researchers at the University's Institute for Microwave Technology and Photonics say they have developed a resonance tunnel diode (RTD) for generating terahertz electromagnetic radiation that takes up

less than a square millimeter and may be produced using quasi-conventional semiconductor device-fabrication technologies. Their transmitter reportedly set a new frequency record of 1.111 THz with output power of 0.1 microwatts at room temperature.

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