

# Giga-tronics Newsletter

Issue: September 2011

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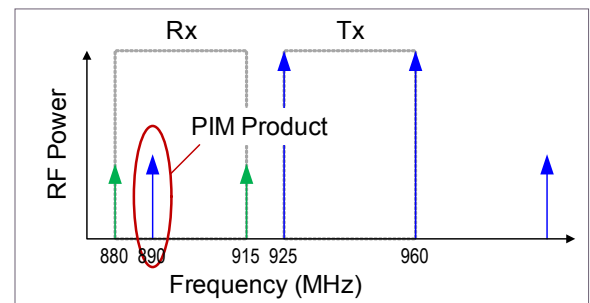
## White Paper

### Low Passive Intermodulation (PIM) Switching Systems and RF Interface Units (RFUI)



With the growing number of radio signals needed to be presented to wireless devices, managing interaction between these signals is increasingly important. For example, in a cell site today, a base station may be required to transmit and receive GSM, EDGE, W-CDMA, and LTE signals while in the presence of professional mobile radio, WiMAX, microwave links, and other RF/microwave signals. Historically, a great deal of attention was paid to minimizing intermodulation products resulting from non-linearities of active components within an RF system. The growing demands on wireless devices require that now even passive intermodulation (PIM) needs to be carefully considered. Correspondingly, test engineers must ensure that the test systems they utilize have sufficiently low PIM to not corrupt measurements on their devices under test (DUTs).

PIM occurs in passive devices (which may include RF relays and cables) that are subjected to two or more high power tones. The PIM product is the result of the two (or more) high power tones mixing at device nonlinearities such as junctions of dissimilar metals, metal-oxide junctions ("rusty bolts") and even loose connectors.



#### When is PIM a Concern?

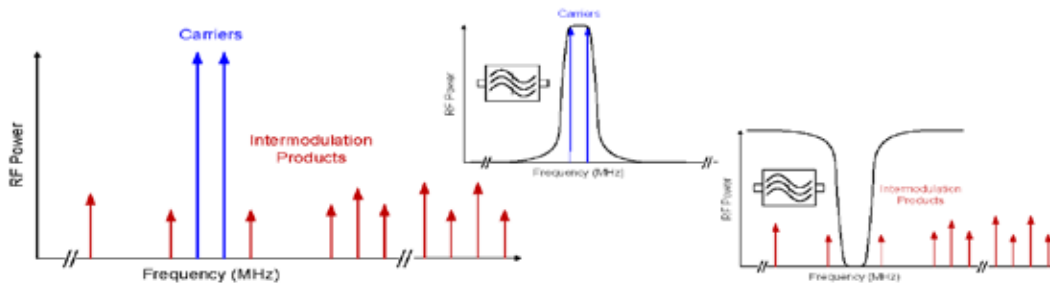
PIM is of particular concern whenever:

- Two or more base station transceivers are at a single site.
- Two or more transmitter channels share a common antenna.
- Transmitters and receivers share a common antenna.
- Transmitter signal levels are high.
- Receiver sensitivity is high.

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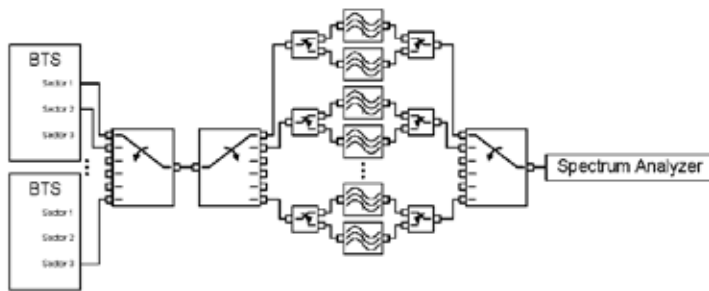
## Emissions Monitoring Test System

Giga-tronics/ASCOR helps test engineers automate their emission monitoring test systems. A typical test setup includes presenting at least two carriers at high power (relative to the RF system component specifications) and measuring the intermodulation products. Band-pass and stopband filters are used to separate out the carriers from the intermodulation products.



## Low Passive Intermodulation (PIM) Switching Systems and RF Interface Units (RFIU)

Giga-tronics/ASCOR can offer complete RFIUs which integrate filters and relays or a bank of relays (see Series 8000 microwave configurable switching system) giving users the flexibility to utilize external filters to adapt to changing or emerging requirements. LEDS help users keep track of relay positions and built-in closure counting enables manufacturing engineers to monitor usage for periodic maintenance.



Series 8000 Microwave Configurable Switching System

## Technical Leadership



Giga-tronics/ASCOR pulls from the best technology in the industry to provide a standard, tailored or new solution that is optimized for the application.

For example, we provide relays with the **industry's lowest PIM rating**.

	Carrier Frequency 1	Carrier Frequency 2	PIM Frequency	PIM Level*
<b>800/900 Band</b>	869 MHz	891 MHz	847 MHz	<b>-130 dBc min</b>
<b>1800/1900 Band</b>	1930 MHz	1990 MHz	1870 MHz	<b>-160 dBc min</b>

In addition, other components can be integrated which have

- Wide signal bandwidth and frequency ranges: DC to 67 GHz
- Broad range of switch components including SPDT to SP12T, Transfer and Star switches
- Low-level through high-power signal handling capability
- Integration of a wide variety of signal conditioning components

When high reliability is critical, Giga-tronics ASCOR can incorporate relays with **10M cycle life** and an insertion loss with **0.03 dB repeatability**.

<http://www.gigatronics.com/uploads/document/AN-GT134A-ASCOR-Whitepaper-PIM-RFIU2.pdf>



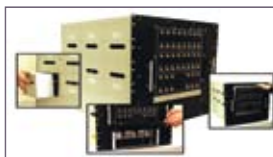
## Giga-tronics exhibiting at Autotestcon in Baltimore

Join Giga-tronics in **Booth 1045** to see the latest instruments and switching solutions for ATE systems.

### Show product highlights:



The GT-2303A Software Defined Vector Signal Generator enables the user to consolidate multiple conventional RF Signal Generators into one compact, cost effective RF test source. Generate up to 31 discrete signals in two independent 120 MHz wide blocks within the frequency range up to 3 GHz.



Giga-tronics ASCOR Common-Core based signal switching solutions, the Series 8800. This family of products provides a modular RF/LF/DC switching platform that is scalable and reconfigurable to meet existing and emerging test requirements, covering the DC to 67 GHz frequency range.



The Giga-tronics ASCOR The Series 8900 offers the ultimate flexibility with the choice of two 2 rack unit (2U - 3.5") high 19" or 9.5" wide chassis. Each chassis can be fitted with terminated or non-terminated SPDT and SPnT (n=3-6) relays or a transfer switch with frequency ranges up to 67 GHz.

Need to schedule individual time with one of our sales executives? Contact Daisy Kwok at [dkwok@gigatronics.com](mailto:dkwok@gigatronics.com)

Don't forget to get your Tech Trek Game card at our booth, we are a Sponsor of Tech Trek at Autotestcon 2011.

Hope to see you there!

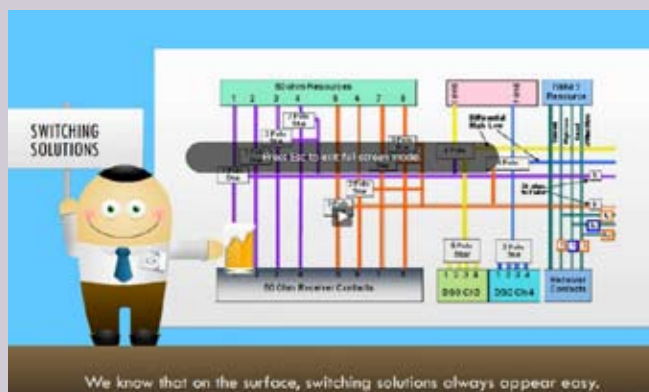
Not attending Autotestcon? Receive the Giga-tronics newsletter with articles, app notes, tech briefs and information on the latest products. Sign up at <http://www.gigatronics.com/index.php/form/Catalog-Request-Form>.

Explore more about Giga-tronics,  
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<http://youtu.be/l6g503B5td0>

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<http://www.youtube.com/GigatronicsInc>



We know that on the surface, switching solutions always appear easy.

## Giga-tronics ASCOR announces 50 GHz/67 GHz Switching Solutions for RF and Microwave ATE

Giga-tronics Incorporated (Nasdaq "GIGA") today announced the introduction of new 50 and 67 GHz switching solutions. This expands the capability of the well-accepted Series 8000 and 8800 families from Giga-tronics ASCOR. Offering a frequency range up to 67 GHz enables inclusion of switching in Automated Test Equipment (ATE) for a number of aerospace and defense applications, including test of inter-satellite and point-to-point communication systems. In addition, 67 GHz covers the frequency band intended for the wireless transmission of multimedia data (wireless HDMI).

- Superior RF/Microwave Performance. Building on 30 years of experience and partnerships with leading relay manufacturers, Giga-tronics ASCOR selects the relays that offer the best performance for the application, including high isolation, low insertion loss and high reliability. Typical specifications for the 67 GHz relays include:

Frequency	DC - 3 GHz	3 - 12.4 GHz	12.4 - 18 GHz	18 - 26.5 GHz	26.5 - 50 GHz	50 - 67 GHz
Insertion Loss (dB)	0.4 max	0.5 max	0.7 max	0.8 max	1.0 max	1.1 max
VSWR (X:1)	1.15 max	1.25 max	1.3 max	1.7 max	1.9 max	1.9 max
Isolation (dB)	96 min	85 min	80 min	70 min	70 min	70 min

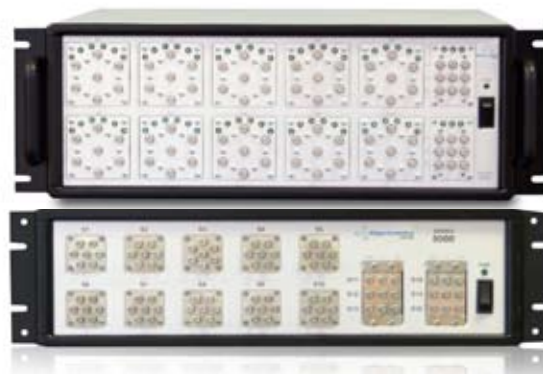
Repeatability: 0.08 dB, Life: 5M cycles, RF Power Handling: 1W avg

- Configuration Flexibility. The Giga-tronics ASCOR Series 8000 and 8800 are available in a wide variety of configurations from a collection of individual relays, multiplexers, matrices or combinations thereof. For 50 / 67 GHz switching solutions, configurations are comprised of SPDT, terminated SPDT, transfer, four- and five-port relays.
- Easy to Use. The Giga-tronics ASCOR 50/67 GHz switching solutions can be controlled over IEEE-488 (GPIB) or LAN using simple SCPI commands. Optional front panel LEDs provide test engineers instant status of all relay contacts to monitor system operation.

"With the extension of the Giga-tronics ASCOR switching system and RFIU product line to include 50 GHz and 67 GHz solutions, we have significantly increased the applications that can utilize tailored solutions at off-the-shelf prices" said Walt Strickler, VP of Business Development for Switching Solutions.



Series 8800 RF and Microwave ATE Common-Core Based Switching Solution



Series 8000 Configurable Microwave Switching Solution

[http://www.gigatronics.com/uploads/PR\\_50\\_67\\_GHz\\_Switching\\_Solutions\\_PR110823.pdf](http://www.gigatronics.com/uploads/PR_50_67_GHz_Switching_Solutions_PR110823.pdf)

## Announcement

### Giga-tronics Names New Vice President of Marketing

San Ramon - September 8, 2011 - Giga-tronics Incorporated (NASDAQ:GIGA), announced today that Mr. Mark Elo will join the Company as Vice President of Marketing effective August 29th 2011. Mr. Elo comes to Giga-tronics with more than 20 years of test and measurement experience in RF and microwave instrumentation. He has held various positions at Hewlett-Packard/Agilent Technologies and Keithley Instruments - including Product Marketing Manager, Marketing Director and Business Development Director - as well as number of R&D management roles.



Mr. Elo will be responsible for the marketing of all Giga-tronics products and for keeping new investment programs aligned with their target markets. John Regazzi, President and Chief Executive Officer stated, "New product programs that accurately address customer needs are critical to the financial success of the Company and I feel very fortunate to have someone with Mark's experience lead our efforts in this area."

Giga-tronics also announced that Mr. Malcolm Levy will retain his responsibilities for managing the Company's worldwide sales and business development activities and will continue as an Officer of the Company. He will assume the position of Executive Vice President of Sales. Mr. Regazzi added, "Giga-tronics is expanding its sales and marketing organization to provide more focus on both long term strategic planning and short term profitable growth."

Giga-tronics is a publicly held company, traded on the NASDAQ Capital Market under the symbol "GIGA". Giga-tronics produces instruments, subsystems and sophisticated microwave components that have broad applications in defense electronics, aeronautics and wireless telecommunications.

[http://www.gigatronics.com/uploads/PR\\_New\\_VP\\_Marketing\\_110909.pdf](http://www.gigatronics.com/uploads/PR_New_VP_Marketing_110909.pdf)

### New International Agent

Giga-tronics announced the appointment of Inala Technologies for the country of South Africa, to cover its growing business in RF/Microwave Instrumentation.

About Inala Technologies:



Inala Technologies is a South African company founded in 1996 but its roots go back much further. Continuity of expertise and professionalism are two of the hallmarks of Inala with a core management and staff complement that has stayed loyal throughout the company's rapid evolution in the challenging world of high technology. This continuity of purpose has also led to supplier loyalty and an increasing degree of customer satisfaction (with a consequent increase in market share) over the years. Website: <http://www.inala.co.za>.

### New US Sales Representative

Giga-tronics announced the appointment of Tera Technologies, Inc for the upstate New York, to cover its growing business in RF/Microwave Instrumentation and ATE Signal Switching

About Tera Technologies, Inc:



Tera Technologies, Inc. has been in business since 2000 specializing in General Purpose Test & Measuring Instruments. We have a dedicated staff that includes Terry Owens, Ken Domonkos, Julian Filler, Connie O'Shea, and Ron Fiume. All are dedicated to supporting our customer base and

helping our Principals grow their business in our territory. We are very excited about representing your company and were brought on board to bring new relationships and opportunities to Gigatronics. Tera Technologies will work diligently to make Gigatronics one of our top product lines and look forward to a long and prosperous relationship together. Website: <http://www.ttechinc.com>.

## Product Highlight

**The Giga-tronics 2500B series high-performance microwave signal generators are now available with more options and new lower prices**



### Key Features:

- 100 kHz to 50 GHz
- Output Power +20 dBm at 20 GHz, +11 dBm at 50 GHz
- Fast-Switching, <500  $\mu$ s per point
- Ultra-Low Phase Noise (Phase Noise -109 dBc/Hz at 10 GHz, 10 kHz offset)
- Harmonics < -60 dBc, Spurious < -58 dBc
- AM, FM,  $\emptyset$ M, Pulse Modulation

Top-of-the-line signal generator performance at economy signal generator prices. Don't buy an "entry-level" signal generator and compromise your test, when you can get premium performance at cost-effective pricing. More value for your dollar without risk.

Don't compromise your test with a low performance microwave signal generator.

<http://www.gigatronics.com/category/c/-Model-2500B-Microwave-Signal-Generator-Performance-Line-100-kHz-to-50-GHz->

## Technical Article Highlight



Application Note - List Mode Operation of Microwave Signal Generator

Technical Brief - Precautions with High Power Amplifiers

Technical Brief - Replacing the Battery in the 8540C Power Meter

Technical Brief - Replacing the battery in the 58542 VXI Power Meter

Technical Brief - 2500B Save and Recall Functions

**Free Download - Giga-tronics Technical Articles**

**<http://www.gigatronics.com/Literature-Library>**

# Need Power at the DUT?

**New** Instrument-Grade  
Broadband Microwave Power Amplifiers covering  
100 MHz to 20 GHz and 10 MHz to 40 GHz



Test 20x Faster with  
Giga-tronics 2500B Series  
Microwave Signal Generators  
100 kHz to 50 GHz



GT-8550A Series  
USB Power Sensors  
CW, Modulation, Peak (Pulse)  
10 MHz to 26.5 GHz



[www.gigatronics.com](http://www.gigatronics.com) | [inquiries@gigatronics.com](mailto:inquiries@gigatronics.com)



designed and  
manufactured  
in the USA



## New Website

Giga-tronics (NASDAQ:GIGA) announced the launch of the new, updated Giga-tronics website, [www.gigatronics.com](http://www.gigatronics.com), which covers the Giga-tronics' Test and Measurement products include RF and Microwave instruments, Giga-tronics ASCOR ATE signal switching solutions, and our YIG-based components and assemblies.

Key improvements and features of the new website include:

- Ease of locating specific product data and resources for all product lines with more complete content and simpler navigation.
- Improved search features. The new search function using the Google™ search engine is fast and comprehensive.
- Improved technical support pages with easier access to all support material.



"Giga-tronics is increasing its focus on providing web based support for its customers and business partners. We recognize the increasing significance of a full service website in today's web centric world." said Malcolm Levy, VP of Sales and Marketing. "Our website is the first place many people go to for information on products and services, and continuous improvement is part of our commitment to provide the very best products and services".

## New Channel Partner

Giga-tronics (NASDAQ:GIGA) announced that Giga-tronics Incorporated and Trek Equipment Corporation partnered to offer lease and rental of Giga-tronics' high-end RF and Microwave Test and Measurement equipment.



About Trek Equipment Corporation:

Trek Equipment Corporation is an authorized lease and rental partner for Giga-Tronics RF and Microwave Equipment. Trek has provided lease and rental equipment financing to America's technology industry since 1982. Additional information on Trek Equipment can be found on Trek's web site, [www.trekequipment.com](http://www.trekequipment.com).

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NO, THANKS

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