F9 Systems, Inc.

Standard Systems Testing Solutions

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Standard System Testing Solutions
AdvancedTCA and
& HM-zd based systems

F9 Systems, Inc.

- Incorporated in 2004 with a focus on AdvancedTCA
- Founders:
  - John Crossin (jcrossin@f9-systems.com)
  - Kathy Breda (kbreda@f9-systems.com)
  - Both founders have extensive backgrounds in product and business development.
- F9 Systems offers six products:
  - Thermal*Blade*
  - RTM Thermal*Blade*
  - Power/Thermal AMC Carrier and panel
  - Tx/Rx Signal*Blade*
  - Calibration Blade for use with Agilent Oscilloscopes Scopes
  - Tx/Rx Bench*Blade*

F9 Systems, Inc.

- Website is www.F9-Systems.com and includes products, prices, PayPal purchase ability and datasheets.
- Current products were engineered by John Crossin and North East Systems Associates, Inc. (NESA) a premier engineering design firm (www.nesa.com).
- F9 Systems products are offered worldwide through direct sales representation and OEM arrangements.

F9 Systems Customer Examples

- Motorola
- Nokia
- Schroff (US, Europe)
- Siemens (US, Central America, Europe)
- Sun
- Agilent Channels Partner (SignalBlade, BenchBlade, Calibration Blade)
- ASI-SIG Measurement Kit of Choice (SignalBlades)

What is AdvancedTCA?

- Advanced Telecom Computing Architecture, or AdvancedTCA or ATCA is a series of industry standard specifications for the next generation of carrier grade communications equipment.
- AdvancedTCA incorporates the latest trends in high speed interconnect technologies, next generation processors, and improved reliability, manageability and serviceability, resulting in a new blade (board) and chassis (shelf) form factor optimized for communications.
- AdvancedTCA provides standardized platform architecture for carrier-grade telecommunication applications, with support for carrier-grade features such as NEBS, ETSI, and 99.999% availability.

ATCA Adoption Potential

- Adoption of ATCA Products:
  - "Support in 2003 led by Intel Corp. and Motorola, Inc. was much greater than (we) originally viewed, and has reached a certain critical mass" (Source: Ernie Bergstrom, Cube Consulting & Metz International, Dec 2003)
  - Initial ATCA adoption will be driven by development cost savings: Smaller system vendors may find that an all-proprietary hardware solution is out their reach…large system vendors may prefer to shift their effort towards software, perceived as giving better return on investment.(Source: RHK, Inc., Oct 2003)
  - "Most engineers predicted the schedule for Advanced TCA will see the first products emerge this year, with ramp-up in 2005 and volume deployment in 2006." (Source: EE Times,"Advanced TCA Consensus Unravels at Fabric", Charles J. Murray, Jan 2004)
  - ATCA leverages years of CompactPCI Telecom learning and leverages IP networking concepts and IT software base (Source: NMS Communications, Jan 2003)

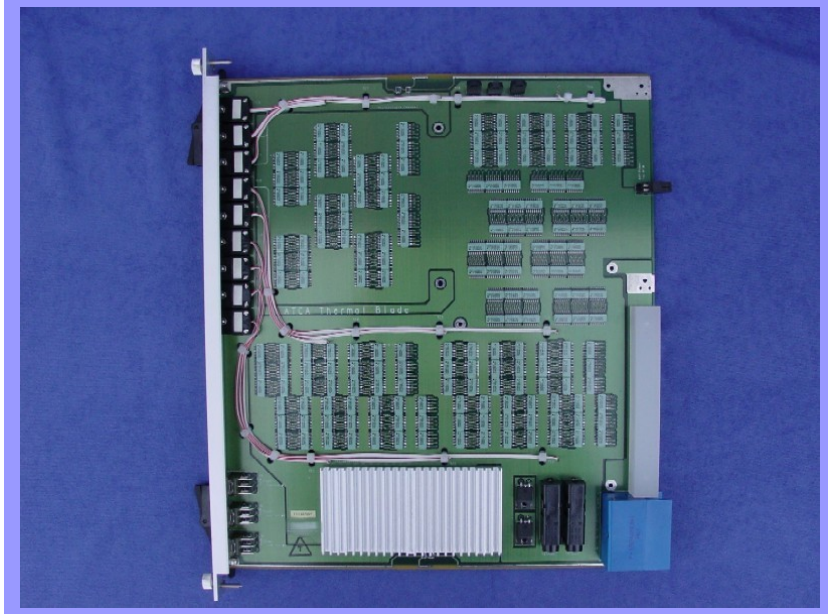
ATCA Resources

- The PICMG website is an excellent resource for all market, technical, specification and business involvement with AdvancedTCA.
  - www.picmg.org/newinitiative.stm
- The Open Systems Publishing website is another excellent resource for AdvancedTCA information.
  - www.compactpci-systems.com/
- See F9 Systems recent article published in the May 2005 Volume of CompactPCI and AdvancedTCA magazine.
  - www.compactpci-systems.com/articles/id/?373

F9 Systems Products

- Power and Thermal Analysis for ATCA Systems
  - Thermal*Blade*
  - RTM Thermal*Blade*
  - AMC Thermal*Blade* Panel and Carrier
- Signal Integrity Analysis of HM-zd Backplanes and Line Cards
  - Tx/Rx Signal*Blade*
  - Tx/Rx Bench*Blade*

F9 Systems Thermal*Blade*

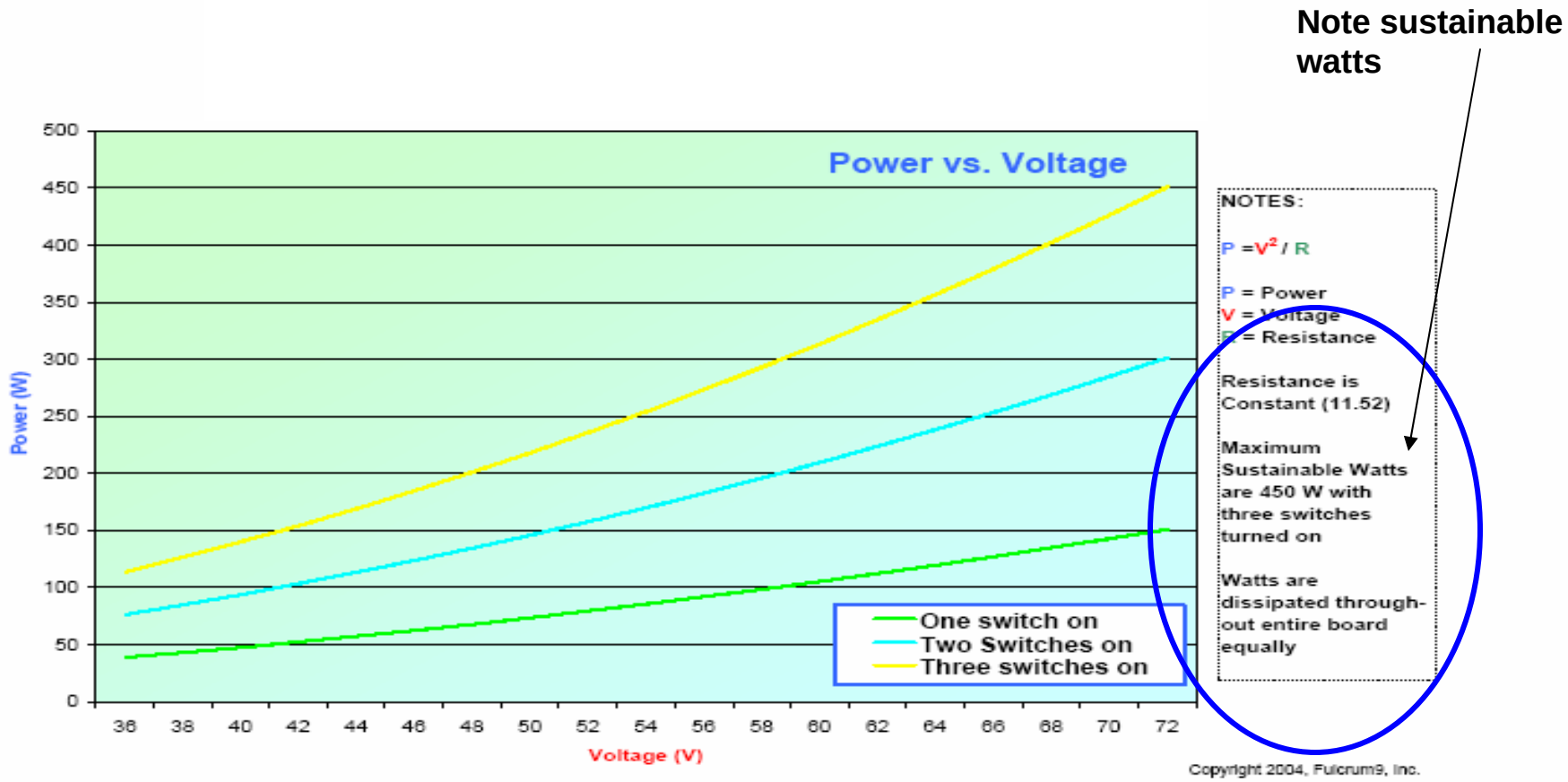


- Verify thermal and power dissipation of your ATCA chassis, logic cards and backplane.
- Use in the lab to test airflow, power load and thermal performance and perform “what-if” design experiments.
- Use during manufacturing system test to analyze power and thermal loads

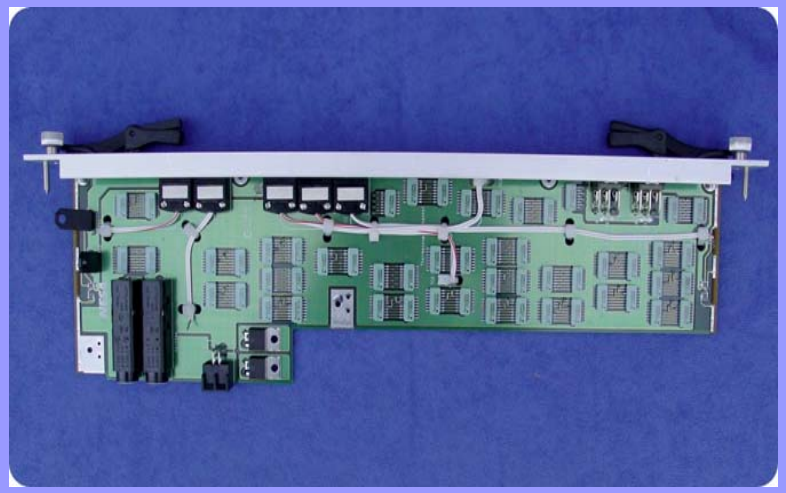
F9 Systems Thermal*Blade*

- Capabilities
  - Emulate typical component heights and air-flow resistance of high performance ATCA boards
  - Up to 200 Watts per slot over –36 to –72 VDC voltage range without damage to the Thermal*Blade*
  - User switchable thermal load choices of zero, 1/3, 2/3 and full load are provided to test the power and thermal system of an ATCA chassis
  - On-card thermal measurements at nine discrete points.
  - All UL and IEC safety design features are incorporated, including fusing, thermal shutdown, and adequate copper weight.
  - Designed with ATCA ESD and internationally mandated safety and thermal shutdown features.

F9 Thermal*Blade* Power vs. Voltage



F9 Systems RTM Thermal*Blade*



The RTM Thermal*Blade* is used in conjunction with the Thermal*Blade*. A RTM connector connects the two boards, with power being supplied by the Thermal*Blade*.

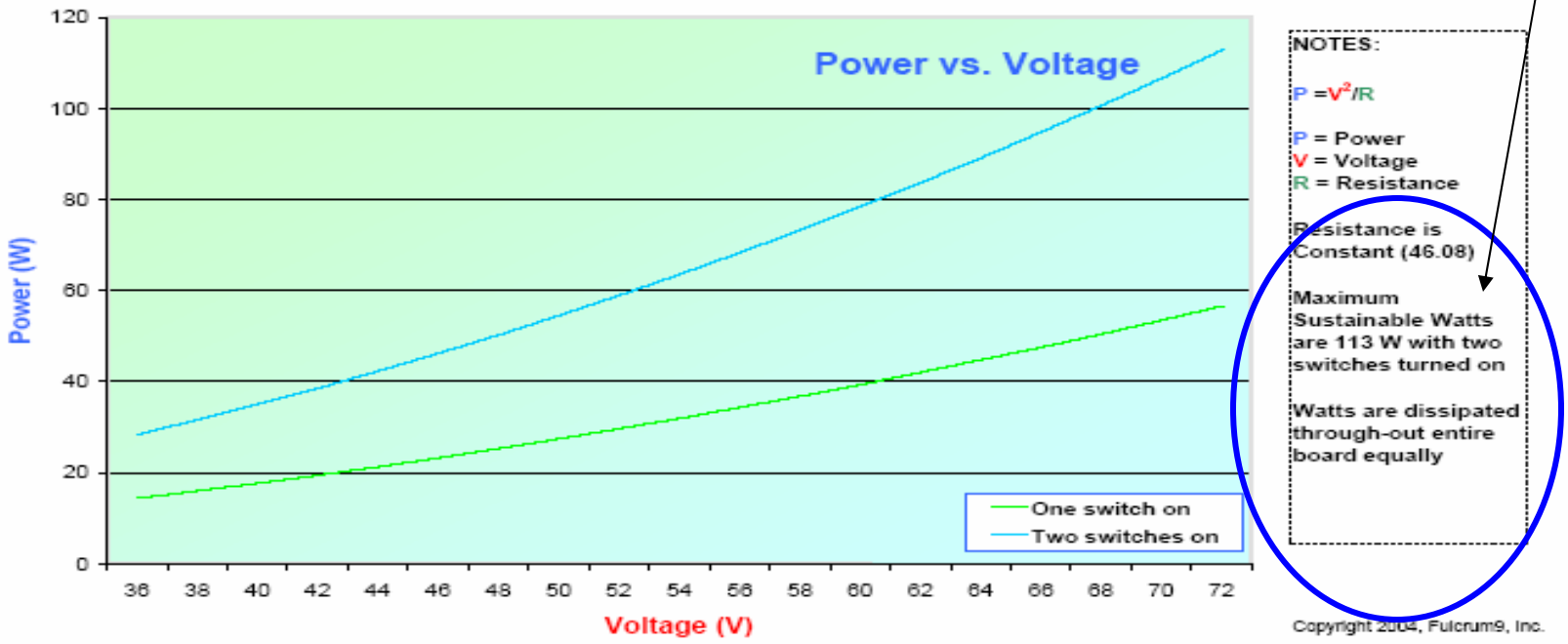
- Verify thermal and power dissipation of your ATCA chassis, logic cards and backplane.
- Use in the lab to test airflow, power load and thermal performance and perform “what-if” design experiments.
- Use during manufacturing system test to analyze power and thermal loads

F9 Systems RTM Thermal*Blade*

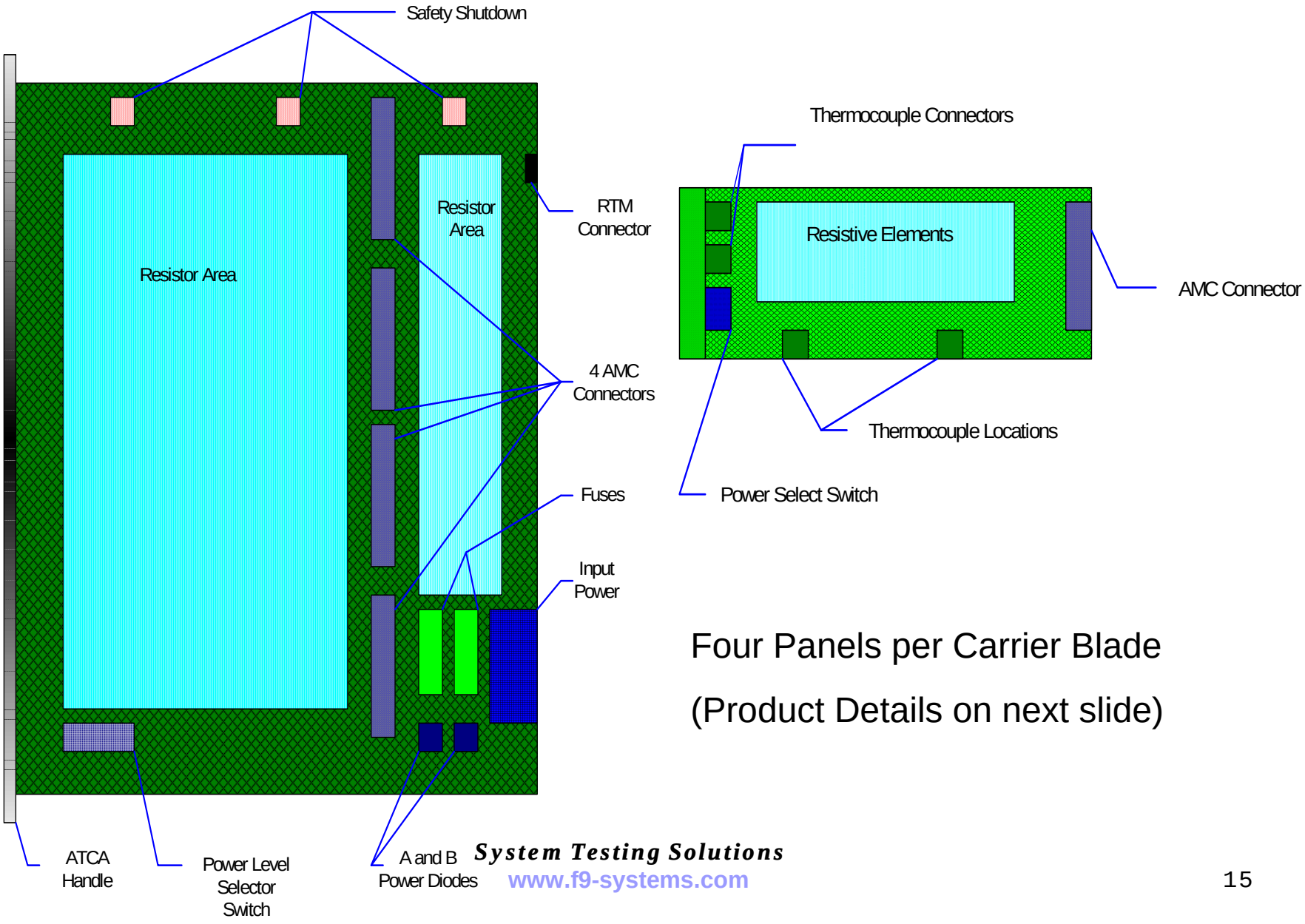
- Capabilities
  - Emulate typical component heights and air-flow resistance of high performance RTM ATCA boards
  - Up to 50 Watts per slot over –36 to –72 VDC voltage range without damage to the RTM Thermal*Blade* or Thermal*Blade*
  - User switchable thermal load choices of zero, 1/2 and full load are provided to test the power and thermal system of an ATCA chassis
  - On-card thermal measurements at five discrete points.
  - All UL and IEC safety design features are incorporated, including fusing, thermal shutdown, and adequate copper weight.
  - Designed with ATCA ESD and internationally mandated safety and thermal shutdown features.

F9 RTM Thermal*Blade* Power vs. Voltage

Note sustainable watts



F9 AMC Carrier & Panel Thermal*Blade*™



Four Panels per Carrier Blade

(Product Details on next slide)

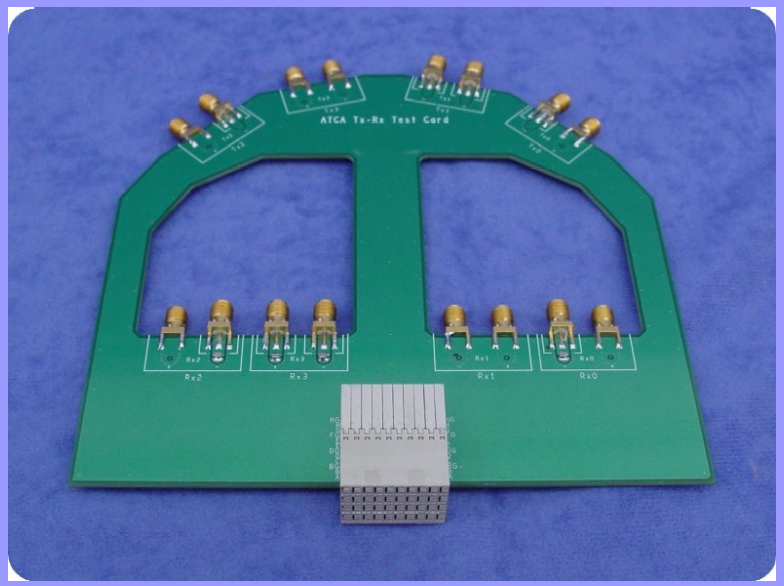
AMC Carrier & Panel Thermal*Blade*™

- AMC and ATCA compliant designs and form factors
- Test airflow, power load and thermal performance of your chassis, AMC cards and backplane
- Provides a thermal load of up to 200 watts per carrier from a -48 VDC backplane
- Up to Four AMC Thermal*Blades* per ATCA carrier card
- Two type J-Thermocouple per card for a total of 8 measurement points
- User switchable variable thermal load choices of zero, ½, full power to test power and thermal capabilities on the AMC Thermal*Blade* carrier card and AMC Thermal*Blade* Panels
- Operates over the entire -36 to 72 VDC voltage range without damage to the AMC Thermal*Blade*(s)
- Provision for up to 50 watts connection to RTM cards
- All UL and IEC safety design features are incorporated including fusing, thermal shutdown and adequate copper weight

Summary of Capabilities

- With the Thermal*Blade*, RTM Thermal*Blade* and AMC Products you can analyze:
  - the cooling fan design, component choices, temperature and flow through the chassis
  - the power distribution system including internal drops
  - the environmental control paradigm
  - the detection in any slot of on-card hot spots and thermal eddy points where component temperature limits might be exceeded

F9 Systems Tx/Rx Signal*Blade*



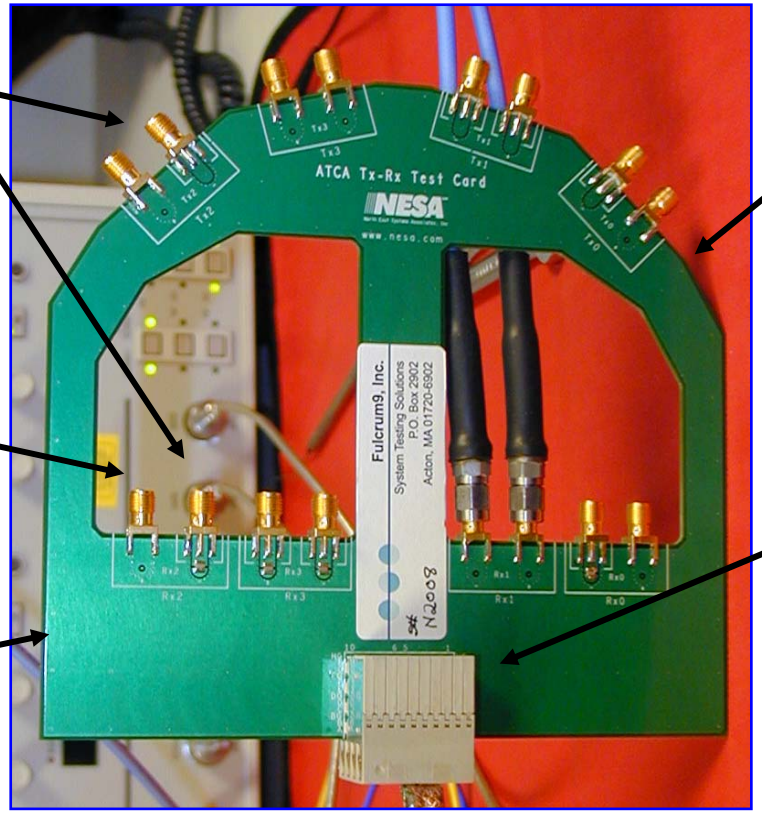
- Diagnostic and validation tool that eliminates dependency on backplane availability.
- Use two Signal*Blades* and cable to emulate a backplane.
- Analysis Options!
  - Sample SERDES signal from node and line cards
  - Perform clock verification
  - Access signals to change termination of a bus
  - Investigate “What if” possibilities before design is set – i.e. change in skew, worst case scenarios for optimized design
  - Probe, Observe, Measure eye-opening
  - Flexible connector alignment so all signals can be easily probed
- ATCA validation and evaluation
- HM-zd based design validation and evaluation

Signal*Blade* Features

Controlled Z_0 edge launch SMAs for ease of in-chassis cable management

Low-loss receiver channel SMAs

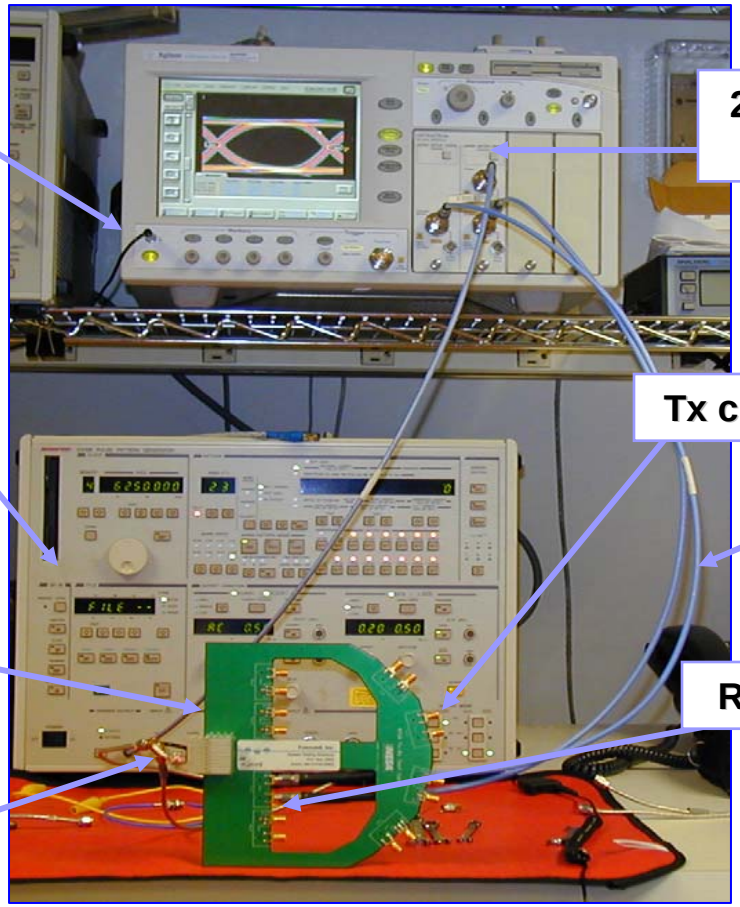
Card size fits all ATCA chassis locations



Low Loss Nelco 4000-13SI PCB

ATCA ZD Backplane Connector Modified to fit all channel locations

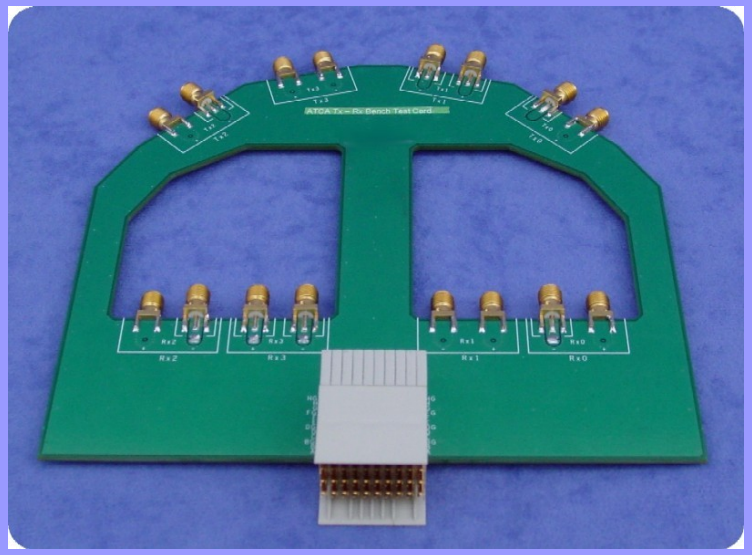
ATCA Signal*Blade* Scope and 10 Gbps Measurement Instrumentation



Signal*Blade* Capabilities

- The F9 Signal*Blade* can be used to monitor the active Tx and Rx signals across an ATCA backplane to insure signal quality.
- The F9 Signal*Blade* can be used to measure ATCA backplane Impedance and coupled Near End Crosstalk (NEXT) – (Open source Destination).
- A pair of F9 Signal*Blades* allows terminated ATCA backplane measurements of impedance, transmission, skew, propagation delay, coupled NEXT and Far End Crosstalk (FEXT).

Tx/Rx Bench*Blade*

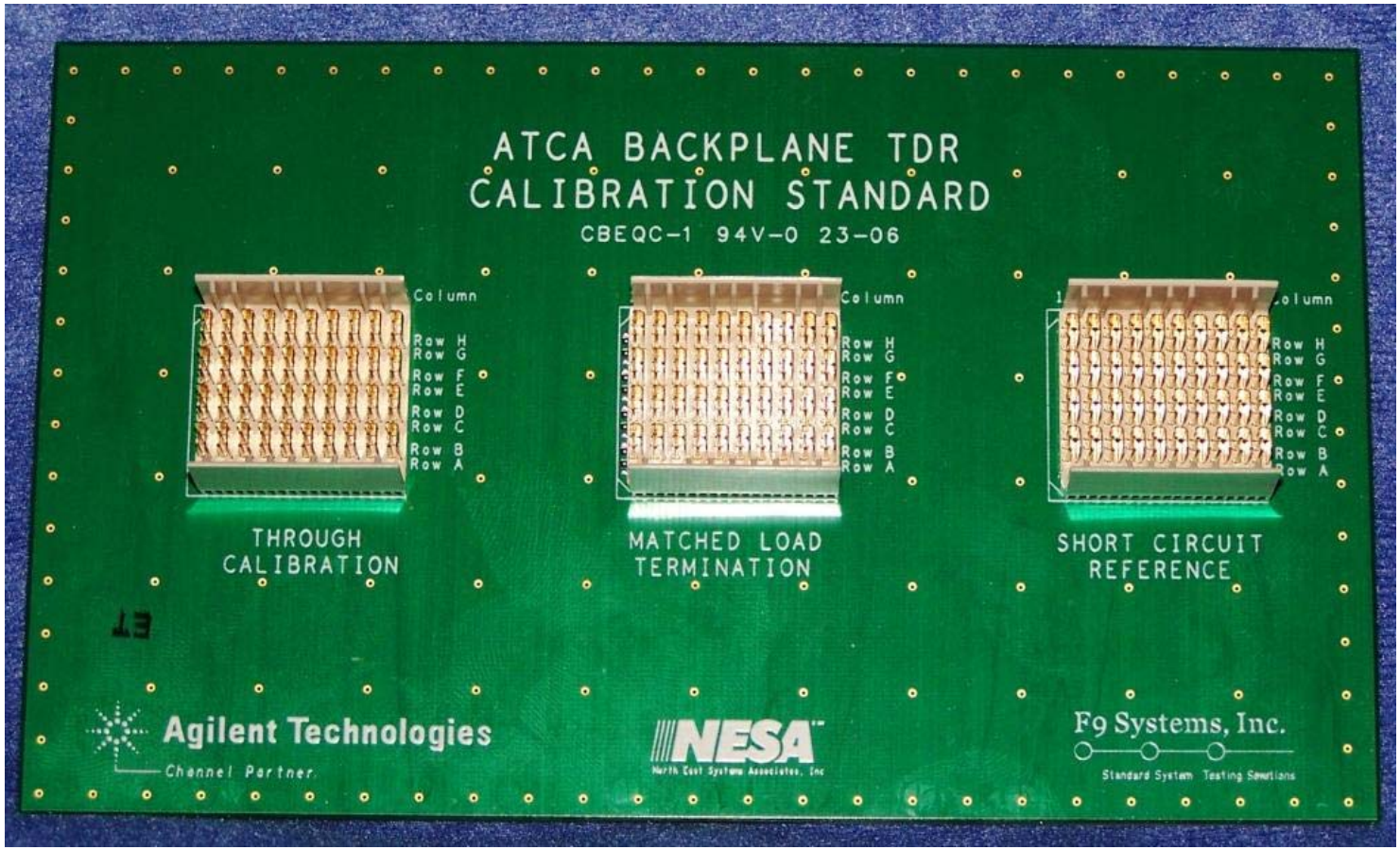


- Diagnostic and validation tool that eliminates dependency on logic card availability.
- Analysis Options!
  - Sample SERDES signal across backplane
  - Investigate “What if” possibilities before design is set – i.e. change in skew
  - Probe, Observe, Measure eye-opening
  - Flexible connector alignment so all signals can be easily probed
- ATCA validation and evaluation
- Use with any HM-zd based design for validation and evaluation

F9 Bench*Blade* Features

- Built on the same PCB platform as the Signal*Blade*
  - Nelco-4000-13SI low loss PCB material.
  - Designed with controlled impedance differential routing used for multi-Gigabit Gen1 and Gen2 performance.
  - Precision 50 Ω edge launch SMAs used for enhanced cable management and performance.
  - Uses a modified Tyco male (plug) ZD connector that can be installed in any channel location, which is used to mate with female (jack) ZD connectors used on ATCA active cards.

Calibration Blade



Calibration Blade

- Designed to permit accurate and convenient impedance and transmission measurements of a HM-zd based backplane.
- The fixture permits an Agilent 86100C with 54754 TDR/TDT plug-ins to be calibrated at the logic card connector interface to the backplane rather than at the end of coaxial measurement cables.
- Benefits:
  - Far more accurate impedance, skew and propagation delay measurements are possible since parasitic fixturing effects such as the scope cable and the F9-Systems Signal Blade propagation delay and losses can be removed from the backplane measurements.

Calibration Blade

- Uses the well-known Transmission, Reflection and Matched Load) (TRL calibration methodology.
- Details:
  - A differential transmission path is established that includes the losses and time delay of the entire measurement fixture from the generator source to the Device Under Test (DUT) and from the DUT to the measurement equipment.
  - This information is used by the 86100C to establish the losses in the through-path of the cables as well as the fixture propagation delay, and compensate the measurements accordingly.
  - The Calibration Blade through paths from the AB<->CD and EF<->GH paths are identical controlled impedance etch paths and only 170 mils (27 ps) long.
  - A differential short circuit, providing near perfect reflection coefficients for each channel, is established at the interface plane of the backplane connector. This helps the TDR to establish a time origin for impedance and transmission experiments.
  - Lastly, a matched 50 Ω impedance load (to ground) for each channel is also established which provides the TDR with additional information to remove the effect of fixture and cable losses.

Summary and Conclusions

- The F9 Systems products are excellent tools for diagnostic and validation of AdvancedTCA compliance and overall design integrity.
- F9 Products are costs savers - early design verification and analysis prevents costly design changes later.
- The Thermal*Blade*, RTM Thermal*Blade* and AMC Thermal*Blade* facilitate analyses of thermal and power performance of the entire ATCA system.
- The Signal*Blade* and Bench*Blade* facilitate detailed signal integrity analysis of HM-zd based backplanes and line cards.
- All products are available immediately for worldwide shipment.