



High Power Microwave Sensor Suite



HPM SS Capability Summary

- Measures HPM fields in the vicinity of a ground target during an HPM test
- Supports lethality and vulnerability testing, HPM source characterization, and safety assessments
- Supports simultaneous acquisition of up to thirty test points at a test site
- Supports autonomous remote measurements at up to 10 locations
- Supports HPM testing during the daytime or nighttime
- Transportable between test sites
- Developed by EG&G Technical Services of Albuquerque, NM
- Available from White Sands Test Center

HPM SS System Specifications

- Frequency coverage: narrowband and wideband (50 MHz—10 GHz); millimeter band (91 GHz—98 GHz)
- Recorder channels: 30 configurable
- Oscilloscopes available: Six 2.5 GHz with four channels each
- Field strength measurement: 400 kV/m (narrowband and wideband) 100 W/cm² (millimeter band)
- Power density measurements: 100 W/cm²
- Dynamic range: 45 dB
- Autonomous channels: 10
- Accuracy: ±3 dB
- Timing: GPS/IRIG-B time-stamps to ±1 ns
- Pulse repetition frequency: Up to 10 kHz
- Test size: 1000 events; 4 events per hour

The High Power Microwave (HPM) Sensor Suite (SS) Capability was developed under the Directed Energy Test and Evaluation Capability (DETEC) project. The HPM SS measures time-dependent spatial representations of electric and magnetic field strength during an HPM test. This capability was developed in response to several high-priority shortfalls identified by the 2004 Tri-Service Study, which developed, scoped, and prioritized directed energy (DE) test and evaluation (T&E) infrastructure shortfalls. These shortfalls represented a need for a comprehensive and uniform capability to measure radio frequency field strength associated with an HPM test.

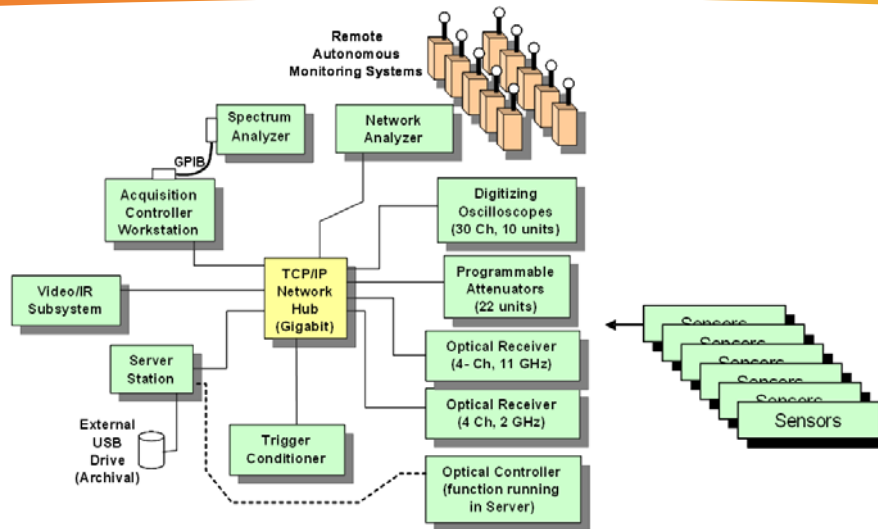
HPM SS Overview

The HPM SS Capability provides a suite of instruments that can be used together to measure HPM field strengths and intensities in the vicinity of a ground target during an HPM test. With thirty available sensors, the HPM SS is capable of simultaneous acquisition of real-time measurements. Additionally, the HPM SS has ten autonomous sensors that provide non-real-time measurements at remote locations, such as at selected test area boundary locations. The HPM SS is packaged in a transportable, shielded container that houses a data acquisition control and analysis (DAQCA) subsystem and provides workspace for the test crew. The DAQCA subsystem features high-speed digitizers that record sensor responses. The HPM SS software system automatically removes instrumentation effects and converts these data into formats suitable for user interpretation. The container is suitable for transportation by commercial as well as by military transport. The HPM SS also provides a transportable container to store field instrumentation and other equipment.

The HPM SS supports several operational scenarios, including effects and vulnerability testing, HPM source characterization, HPM chamber and open-air test, safety assessments, and classified test operations. The HPM SS Capability allows the T&E community to characterize the electromagnetic field spatially and temporally during HPM effects testing, to characterize sources, and to perform propagation studies.

Operational Description

Prior to an HPM test, HPM SS operators calibrate the selected instrumentation (i.e., sensors, data links, signal conditioners) using built-in calibration files and, if needed, built-in low-power continuous wave sources. The operators then set up the instrumentation in accordance with the test shot-matrix, which defines

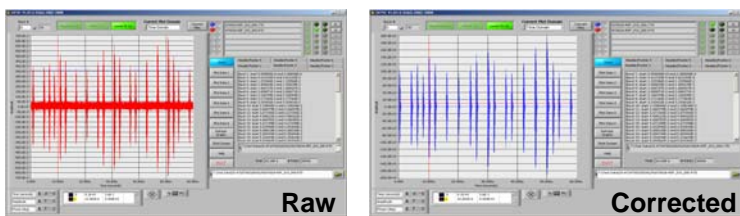


HPM SS System Components

each shot in the HPM test. Next, operators initialize the HPM SS database to correspond to the shot-matrix and then prepare the system for signal sensing and recording by arming the HPM SS system.

During the HPM test, the HPM SS system records the field strengths for each event in accordance with the test shot-matrix and setup. After the test and when the HPM SS system ceases recording, the system assesses the quality of the recorded signals and “corrects” the recorded signals to remove the effects of the data links on the signals and sensors. The HPM SS archives both the raw recorded signals and the processed signals.

The figure below shows the effect of “correcting” a typical recorded signal.



Program Status

The DETEC Systems Integration Contractor (SIC) managed the development and fielding of the HPM SS Capability. The DETEC SIC competitively awarded the HPM SS Capability development contract to EG&G Technical Services of Albuquerque, NM on 9 June 2006. EG&G completed the HPM SS Capability in June 2008 and upon satisfying the requirements of an acceptance test, delivered the capability to the Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI) in Orlando, FL. The HPM SS resides at its host site, White Sands Test Center (WSTC), and is available for the T&E community to use.

HPM SS Capability Integrated Product Team

To guide the development process, DETEC formed the HPM SS Capability Integrated Product Team (IPT) with representatives from the Major Range and Test Facility Base (MRTFB), military Services, and HPM community. The IPT represented the future users of the HPM SS Capability. The DETEC SIC structured the HPM SS development to engage the IPT members to actively participate in the development effort by providing guidance and expert advice. The HPM SS IPT members also participated in key reviews at significant points during design, manufacturing, testing, and fielding to verify the benefits and completeness of the capability for its intended users.

About DETEC

DETEC is funded by the Department of Defense Test Resource Management Center’s Central Test and Evaluation Investment Program (CTEIP) to address joint service DE weapon system T&E infrastructure needs and implement solutions to these identified needs. DETEC develops and fields capabilities to address high-priority shortfalls identified in the 2004 CTEIP-funded Tri-Service Study.

The DETEC SIC, Science Applications International Corporation (SAIC), implements the DETEC project by working with Government and industry teammates to develop functional specifications for certain DE T&E infrastructure capabilities. The SIC acquires these capabilities in competitive procurements and integrates the capabilities into the MRTFB to help meet the testing requirements for current and future high energy laser and high power microwave weapon systems. ■

For further information about the HPM SS Capability, please contact the DETEC team at detec@saic.com

To schedule time on the HPM SS Capability, please contact Mr. Russell Blundell, HPM SS Host Site Manager, 575-678-5584 · email: Russell.Blundell@us.army.mil