



SETS

Shielding
Effectiveness
Test Set



Turn-key SE testing to 10 or 18 GHz

Scientific Applications & Research Associates

SHIELDING EFFECTIVENESS TESTING

Critical military, government and civilian assets, particularly critical communications, are often required to be High Altitude Electromagnetic Pulse (HEMP) survivable. Such assets may also be subject to emission security (EMSEC) requirements, dictating allowable electromagnetic radiation leakage.

SARA, Inc. offers the Shielding Effectiveness Test Set (SETS) for low-risk, high-confidence HEMP survivability and EMSEC assessment. SETS is a portable, turn-key testing system that quantifies the shielding effectiveness of enclosures, panels, racks, containers, etc. with Dynamic Range (DR) of at least 100 dB.

SETS is available in two models: SETS-10 and SETS-18, with operating frequencies of 1 GHz – 10 GHz and 1 GHz – 18 GHz, respectively. Both models work with the same SARA-developed software and antenna set. The SETS software produces report quality SE graphs, allowing the user to produce real-time documentation during testing.

SETS OVERVIEW

Theory of Operation

SETS is comprised of two main components: the transmit (TX) system and the receive (RX) system. When placed on either side of a shielded enclosure, the TX and RX systems combine to perform a radiative insertion loss measurement. The TX system produces a frequency stepped RF signal, the magnitude of which is monitored by the synchronized RX system. Received power corresponds to enclosure leakage at that frequency.

As delivered, the maximum TX power output is typically 100 mW (20 dBm) over the entire frequency range, with about 30 dB of RX gain. SETS can be augmented with an external power amplifier if the ambient environment noise is substantial.

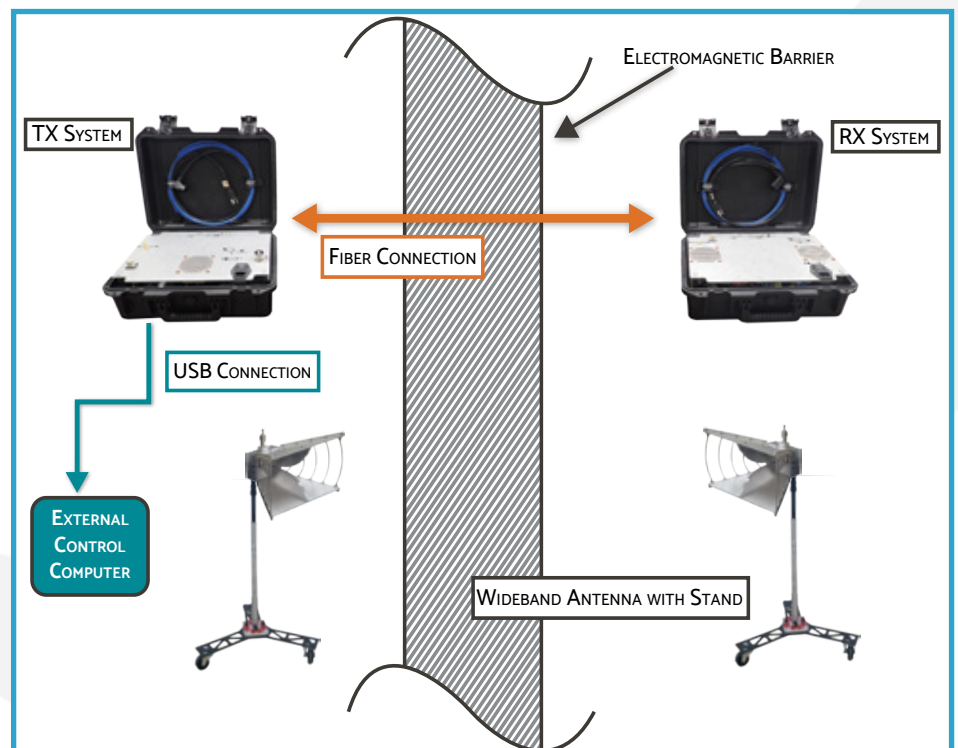


Figure 1: Typical Measurement Configuration

Included with Purchase

A SETS-10 or SETS-18 purchase comes with everything needed to begin SE testing, including a control laptop, wideband antenna pair, and cables. A full list of components is shown in the following:

- TX/RX Units
- Control Laptop
- Wideband Antenna Pair
- Articulating Antenna Stands
- RF Cables
- Fiber Optic Cables
- Power Cables
- 50 Ω Terminator
- 40 dB Attenuator

User Interface

Specialized SARA-developed software comes standard with both SETS models. The SETS software is designed specifically for SE testing. It walks users through the calibration (CAL), receive-terminated-noise (RTN), ambient (AMB), signal (SIG), and wire-through-waveguide (WTW) measurements. Users have control over pertinent sweep parameters, and can even import a range of frequencies through which to step via a CSV file. The software produces report-quality SE graphs instantly and comes with a user guide. A screenshot of the SETS software is shown in Figure 2



Figure 2: SETS Software Interface

PERFORMANCE

SETS-10 and SETS-18 provide Dynamic Range (DR) in excess of 100 dB across their entire band of operation. As delivered, power output is typically 20 dB, but the system can be augmented with an external power amplifier (not included) to increase Measurement Range (MR) in noisy environments. Figures 3 & 4 show SETS DR and MR in a relatively clean environment with a high-performance shield. Note that DR may vary with production units and MR is dependent upon the environment noise.

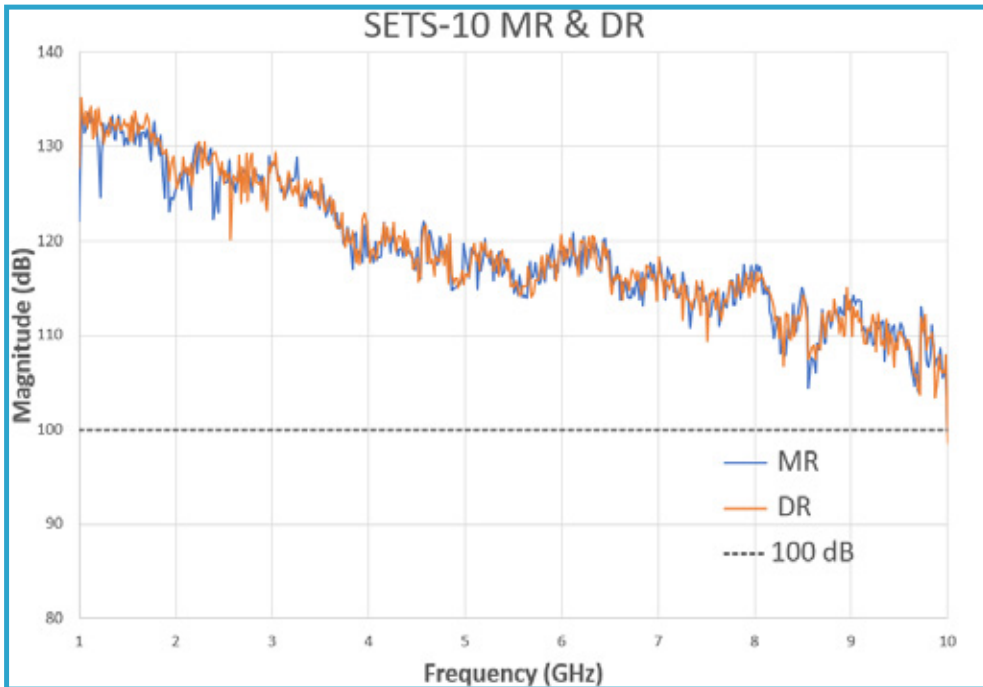


Figure 3: SETS-10 Typical MR & DR (MR taken in a low-noise environment)

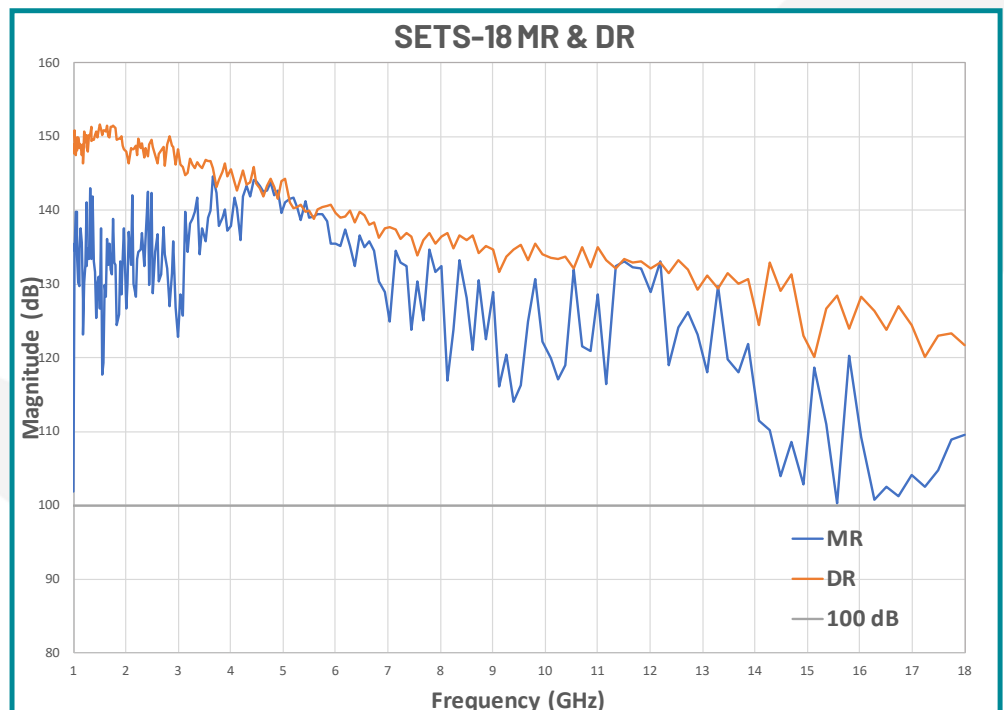


Figure 4: SETS-18 Typical MR & DR (MR taken in a low-noise environment)

DATA SHEET

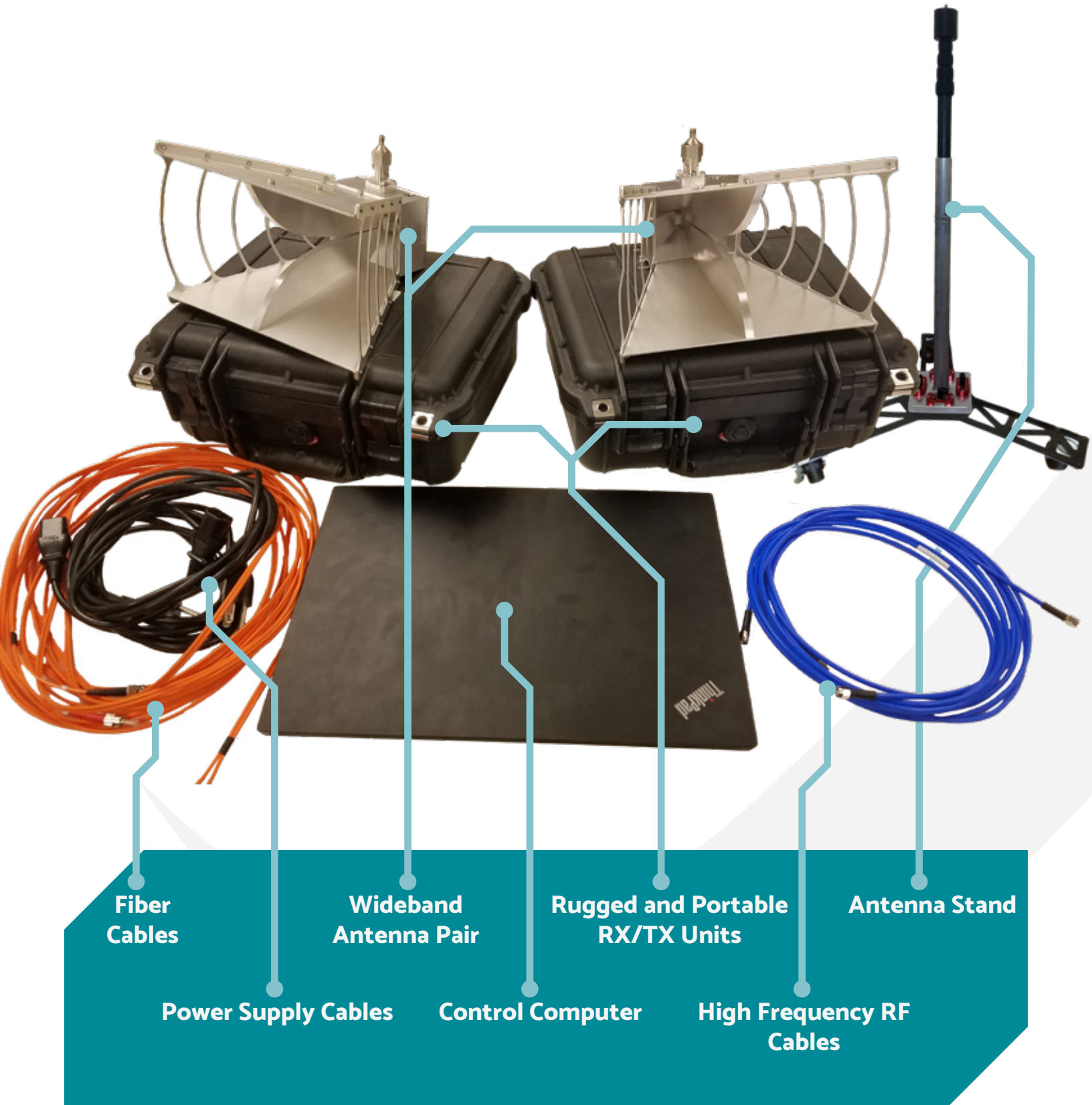
Tables 1 & 2 provide the most up-to-date technical information on the SETS system.

Table 1: SETS Physical Properties

Unit	Dimensions
SETS-10 Tx/Rx (L x W x H)	14" x 18.5" x 6.9"
SETS 18 Tx (L x W x H)	11.6" x 16.4" x 6"
SETS 18 Rx (L x W x H)	17.2" x 20.7" x 8.4"
Control Laptop (L x W x H)	10.8" x 15" x 1"
Antenna (L x W x H)	8" x 5.6" x 6.5"
Antenna Stand [min, max]	[39", 84"]

Table 2: SETS-10 (top) and SETS-18 (bottom) Technical Capabilities

Model	Parameter	Value
SETS-10	Frequency Range	1 GHz - 10 GHz
	Dynamic Range	100 dB - 130 dB
	Max RF Input Power	-10 dBm
	Output Power	+20 dBm
	Noise Floor	~ -98 dBm
SETS-18	Frequency Range	1 GHz - 18 GHz
	Dynamic Range	108 dB - 135 dB
	Max RF Input Power	-12 dBm
	Output Power	+20 dBm
	Noise Floor	~ -104 dBm



**Fiber
Cables**

Power Supply Cables

**Wideband
Antenna Pair**

Control Computer

**Rugged and Portable
RX/TX Units**

**High Frequency RF
Cables**

Antenna Stand

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