








# HF/DF Sequencer Module

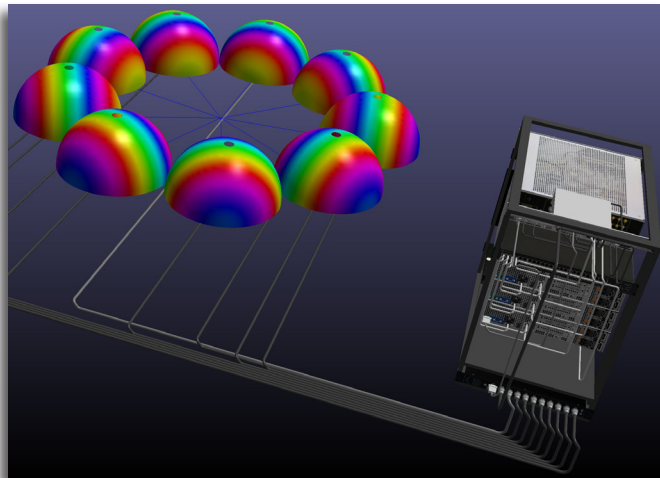
-  **Supports up to 9 HF antenna elements per 1U rackmount module**
-  **Multiple 1U modules can be used cascaded together to support greater than 9 antenna elements**
-  **Multiple modules can be software configured to operate in series or in parallel on multi-band antenna configurations**
-  **Dwell/Switch state control is software programmable with visit rates in excess of 200 Hz supported**
-  **Typical switch settle time of better than 10 usec**



**teamSENTINEL HF/DF Sequencer**

The modular nature of this design allows extreme flexibility in configuration. Simple HF/DF antenna arrays with nine elements or less can be controlled by a single module. Arrays with more than nine elements can utilize multiple modules to sequence additional elements.

Multi-band antenna arrays can be sequenced in parallel (each band of antenna elements sequenced independently from the other) or in series (all antenna elements processed sequentially across bands). Sequence patterns (circular, star, etc.) as well as dwell/switch rates are user programmable. Precise timing and synchronization between teamSENTINEL subsystems is provided by the baseband tuner module which is in turn locked to a GPS-disciplined time and frequency server.



Provisioning of a teamSENTINEL HF/DF Sensor is accomplished using Espy's visual configuration management tool, TSAdmin. In a matter of minutes, all aspects of the antenna array, including antenna type, antenna geometry and array manifolds can be modeled or input explicitly from TSAdmin. Three-dimensional antenna patterns representing position, frequency, phase and response are presented visually for each element configured into the array using TSAdmin.

For installations where the sequencer module is not installed in close proximity to the teamSENTINEL Sensor hardware, RS-485 control signals can be run over extended copper or fiber optical cabling. For distances less than 1,000 feet, copper cabling can be utilized. For distances up to 1 mile, Espy's optional FO Converters (fiber optic converters) can be utilized. For distances beyond 1 mile, additional multi-mode to single-mode fiber converters are required.

The image to the left shows the TSAdmin view of 9-element HF/DF array of omnidirectional antenna elements attached to a teamSENTINEL sequencer module and sensor.

## SPECIFICATIONS

### RF Specifications

Frequency Range: ~1.5 to 30 MHz  
 Channel Isolation: 90-100 dB typical  
 SFDR: 100 dB typical  
 RF Switch Time: 10 usec typical  
 Insertion Loss: 1 dBm  
 Coherent Phase Tolerance: +/- 0.5 degrees typical  
 Max Input RF without damage: +22 dBm (continuous)  
 1 dB compression point: +12 dBm

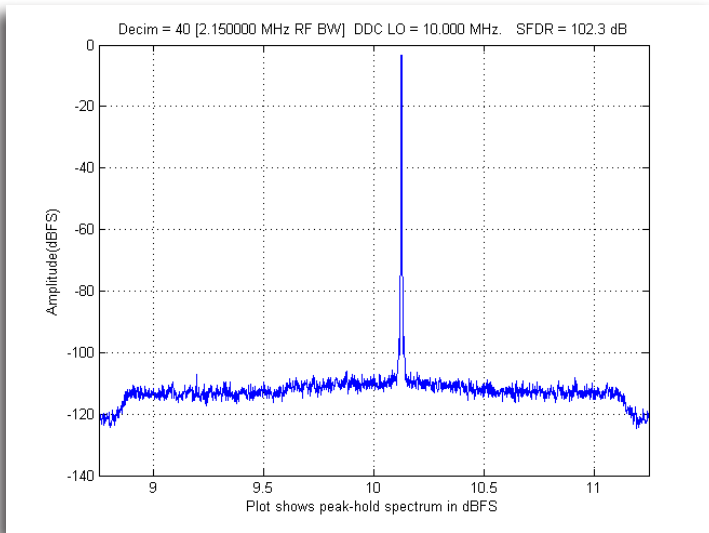
### Control Interface Specifications

Maximum Distance, Copper: 1,000 feet  
 Maximum Distance, Optional Optical: 1 miles  
 Sequencer Control: RS-485, 4-line Differential  
 Cable Type: Twisted pair, Differential

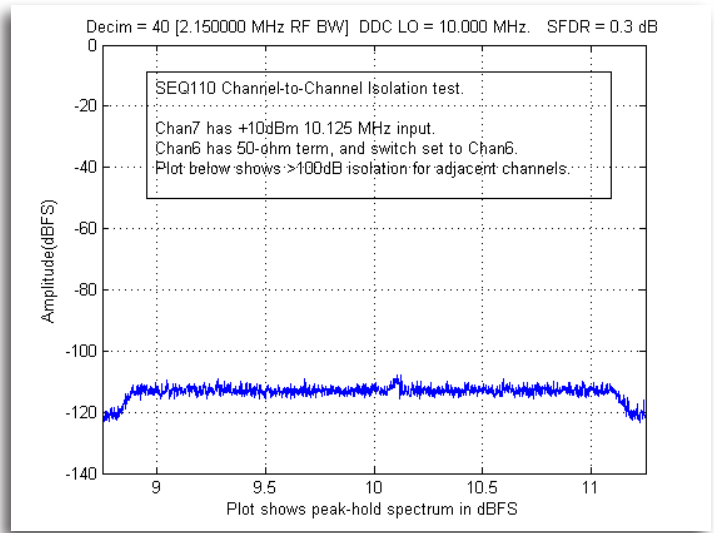
### Physical

Dimensions: 1.75" H (1U) x 9.0" D x 19.0" W  
 Weight: 10 Lbs  
 Power: 110/220V Autosensing  
 Power Dissipation: Less than 50 mAmps  
 RF Input Connectors: TNC, BNC, or N-Type  
 No. of Inputs: Up to 9 per module  
 RF Output Connectors: TNC, BNC, or N-Type  
 No. of Outputs: 1 per module  
 Control Input Connector: DB9, Male

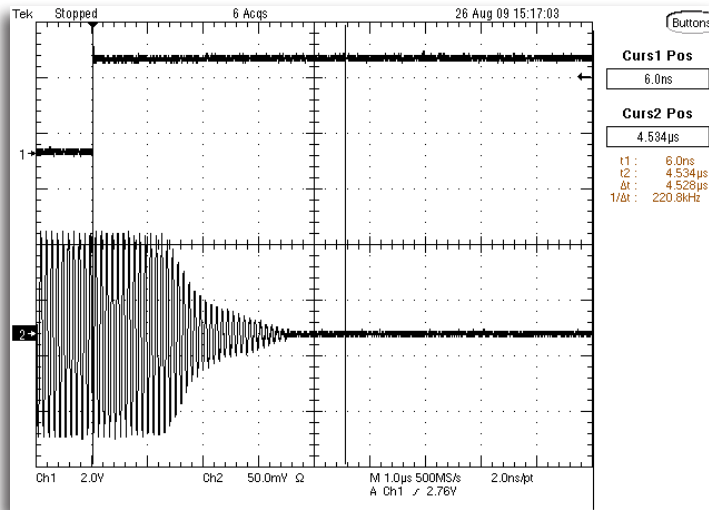




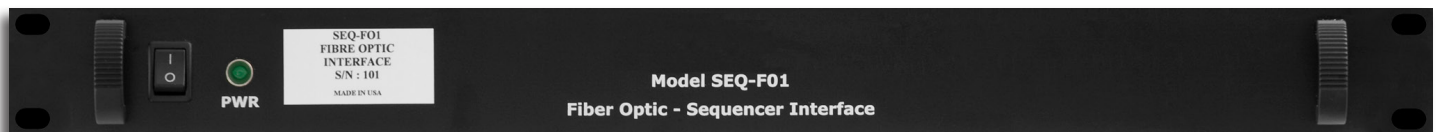
Graph above shows > 100 dB SFDR typical



Graph above shows >90 dBm isolation between antenna channels typical



Graph above shows better than 5-10 usec switch open settle time typical



### teamSENTINEL Sequencer FO-Converter Module

A unit-pair of teamSENTINEL Sequencer FO Converters allow up to four (4) Espy HF/DF Sequencer modules to be remotely controlled over a single fiber optic link up to 1 mile from the Sensor equipment rack. Each 1U FO-Converter module is switch selectable as either a transmitter or receiver. For distances beyond one mile, multi-mode to single-mode fiber converters are required (sold separately).

## SPECIFICATIONS

Copper Connections: Four DB9, RS-485, Differential  
 Optical Connectors: 1 ST  
 Optical Cable Type: 6.25/125 micron multi-mode

Dimensions: 1.75" H (1U) x 9.0" D x 19.0" W  
 Weight: 5 Lbs  
 Power: 110/220V Autosensing  
 Power Dissipation: Less than 50 mAmps

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