

# 8800SX Series P25 Phase II Test Option 05



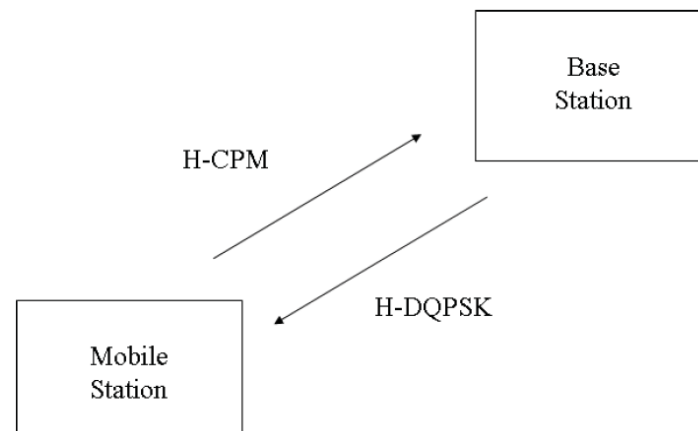
# 8800SX P25 Phase 2 Operation

## Introduction

- The P25 Phase 2 **Option 05** allows transmitter and receiver testing of both subscriber portable and mobile radios as well as base stations.
- Testing is generally performed using OEM software to put the radio into a “Test Mode” to control the radio or base station for various transmit patterns and receiver BER measurements.

**Note:** The 8800SX does not support Phase II Trunking.

- Phase II Trunking uses a Phase 1 Control Channel
  - Maintains compatibility
- Phase II Voice channels use HCPM and HDQPSK modulation for uplink and downlink
- Phase II Subscriber TX/RX
  - Transmits HCPM Modulation
  - Receives HDQPSK
- Phase II Base Station TX/RX
  - Transmits HDQPSK
  - Receives HCPM



# 8800SX P25 Phase 2 Operation

## Switching Systems to P25 Phase 2



To access this system –

1. Press the Home Button
2. Select Configuration by pressing LMR
3. Select Advanced Digital

Note: The 8800SX will reboot and come up into the Phase II system after making this selection. Repeat this process choosing LMR to return to the LMR system after Phase II testing is complete.

# 8800SX P25 Phase 2 Operation


## Summary of Capabilities

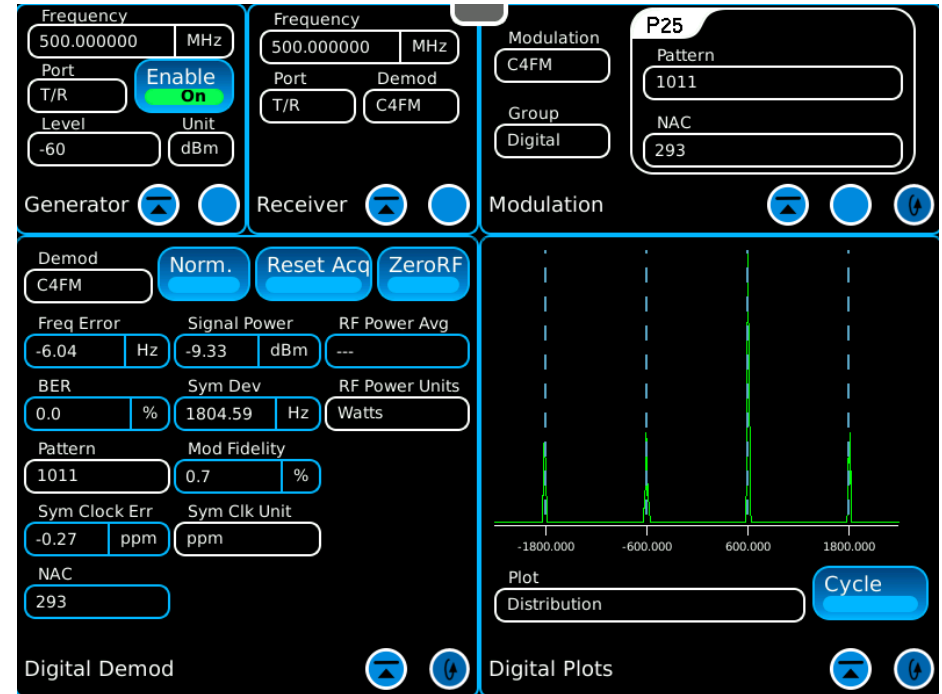
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- 3 Modulation/Demodulation Types
  - C4FM
  - HDQPSK
  - HCPM
- Measurements
  - Symbol Deviation and Modulation Fidelity
  - Symbol Clock Error
  - Frequency Error
  - Signal Power
  - Bit Error Rate
  - FM Deviation Meter
- Graphics
  - Digital Plots: Constellation, Eye Diagram, and Distribution
  - Power Profile: HCPM Timeslot Burst

# 8800SX Screen Setup for P25 Phase 2

## Window Selections

- From the Generators Menu
  - Generator
  - Modulation
- From the Receivers Menu
  - Receiver
  - Digital
- From the Analyzers Menu
  - Digital Plots
  - Power Profile (for H-CPM only)
    - Power Profile can be stacked on top of the Digital Plots Tile.
  - Use the “Fast Stack”  icon to select the hidden tile.



Initial Settings

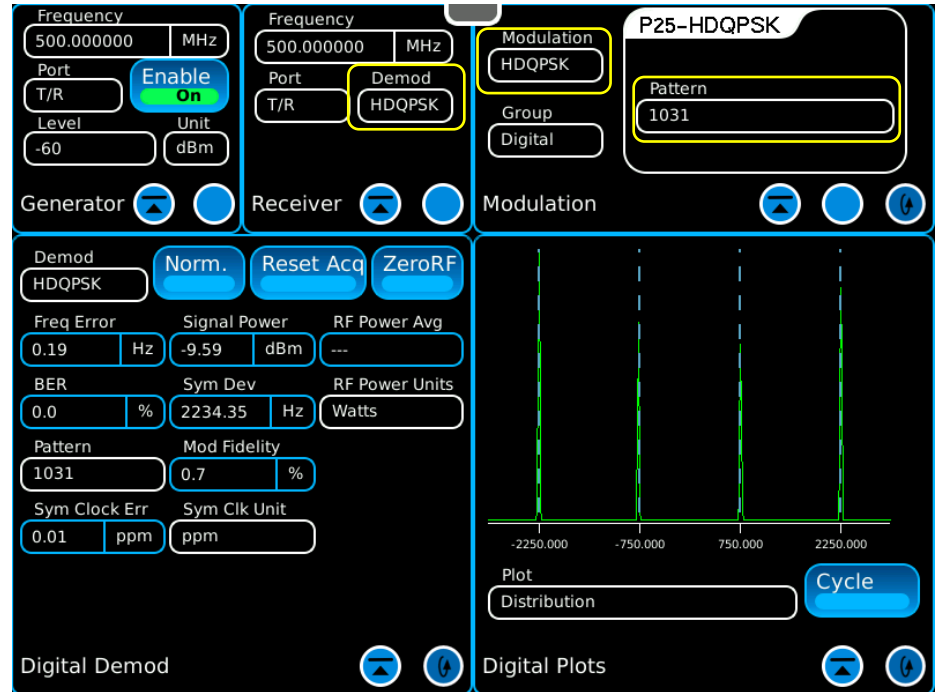
# 8800SX Screen Setup for P25 Phase 2

## HDQPSK Loopback - What you should see when testing a base station

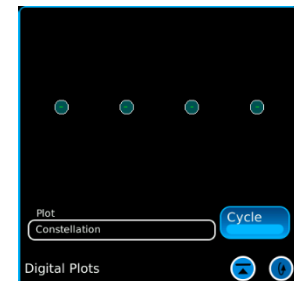
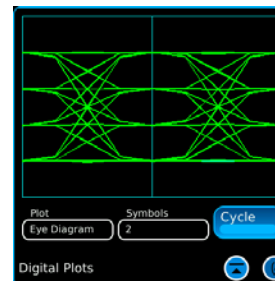
With the generator enabled, and the input and output ports routed to TR, it is possible to test or view the various modulation types prior to testing a radio or base station.

1. Set the Demod Type to HDQPSK
2. Set the Modulation Type to HDQPSK
3. Set the Modulation Pattern to 1031
4. Pressing the Cycle Button on the Digital Plots Tile will allow viewing of the Eye Diagram and Constellation Plots in addition to the Distribution Plot. Note: Power Profile Plots are not valid for HDQPSK Modulation.

HDQPSK Modulation has a Symbol Deviation of 2250 Hz and should be within 10% of that value or  $\pm 225$  Hz.



## HDQPSK Modulation



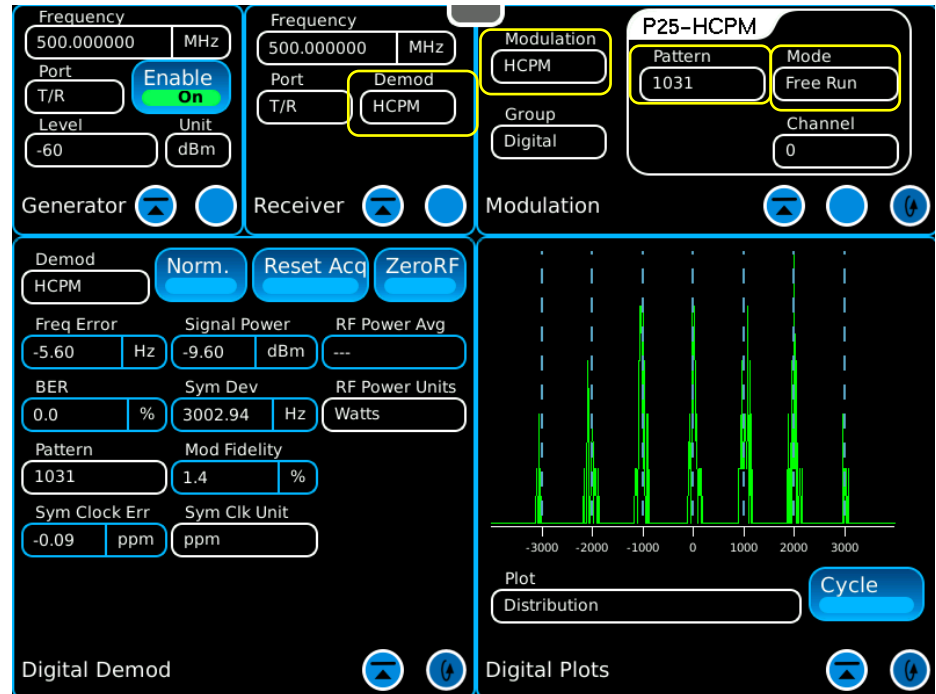
# 8800SX Screen Setup for P25 Phase 2

## HCPM Loopback – What you should see when testing a subscriber radio

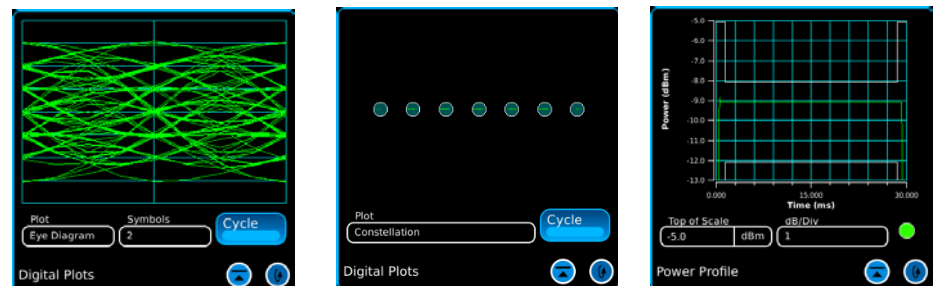
With the generator enabled, and the input and output ports routed to TR, it is possible to test or view the various modulation types prior to testing a radio or base station.

1. Set the Demod Type to HCPM
2. Set the Modulation Type to HCPM
3. Set the Modulation Pattern to 1031
4. Set the Modulation Mode to Free Run for loopback operation. To test a transmitter this setting must be changed to SYNC.
5. Pressing the Cycle Button on the Digital Plots Tile will allow viewing of the Eye Diagram and Constellation Plots in addition to the Distribution Plot. Note: Power Profile Plots are not valid for HDQPSK Modulation.

HCPM Modulation has a Symbol Deviation of 3000 Hz and should be within 10% of that value or  $\pm 300$  Hz.



## HCPM Modulation

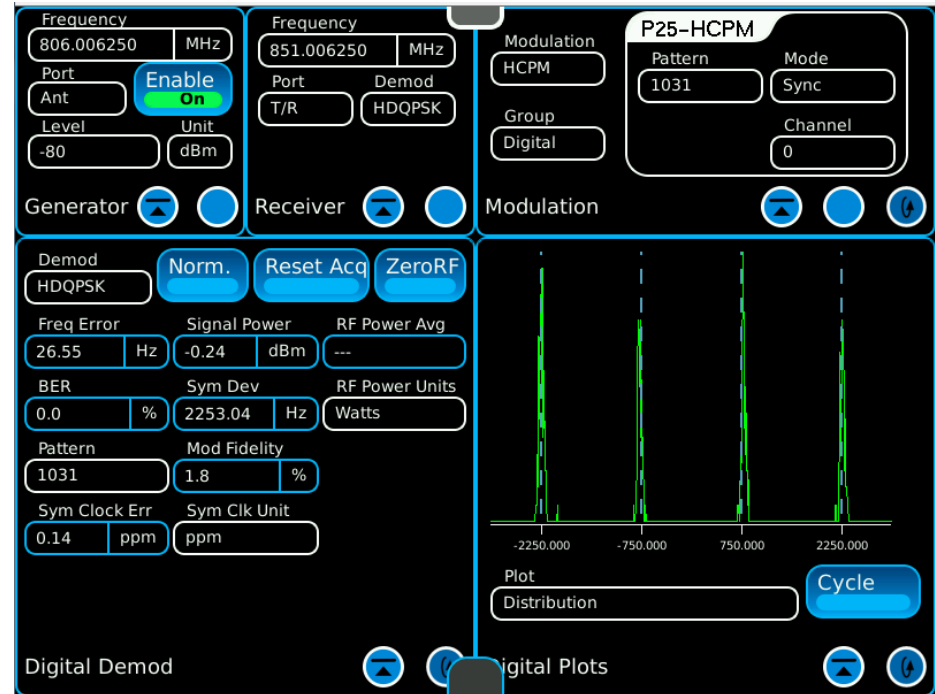


# 8800SX Screen Setup for P25 Phase 2

## Setup for testing a base station

To test a base station:

1. Enter the transmitter frequency on the 8800SX Receiver Tile.
2. Enter the receiver frequency on the Generator Tile.
3. Set the 8800SX Output Port to ANT.
4. Set the 8800SX Input Port to TR.
5. Connect the 8800SX ANT to the base station RX Input.
6. Connect the 8800SX TR Port to the base station TX Output.
7. Set the 8800SX receiver demod to HDQPSK.
8. Set the 8800SX modulation to HCPM.
9. Set the 8800SX modulation pattern to 1031 and change the mode from Free Run to SYNC and enable the RF Generator.
10. Power measurements for Phase II signals should be made with the Signal Power Meter after it has been calibrated with the Norm Button.



When testing base stations, the 8800SX is able to synchronize to the outbound signal and transmit in either logical channel 0 or 1.

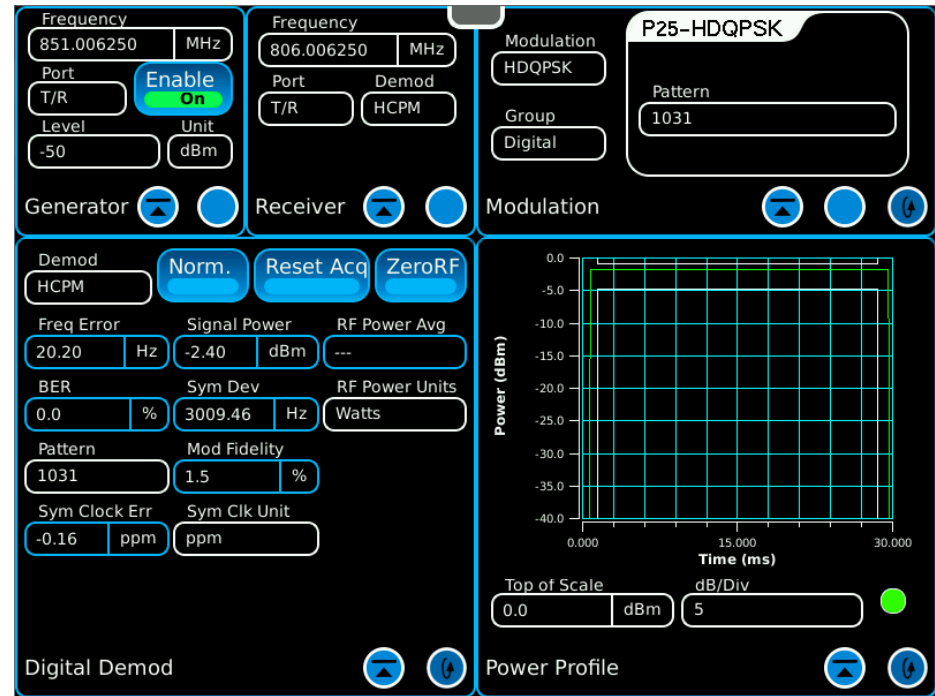


# 8800SX Screen Setup for P25 Phase 2

## Setup for testing a subscriber radio

To test a subscriber radio:

1. Enter the transmitter frequency on the 8800SX Receiver Tile.
2. Enter the radio receiver frequency on the 8800SX Generator Tile.
3. Set the 8800SX Output Port to TR.
4. Set the 8800SX Input Port to TR.
5. Connect the 8800SX TR Port to the subscriber radio antenna port.
6. Set the 8800SX receiver demod to HCPM.
7. Set the 8800SX modulation to HDQPSK.
8. Set the 8800SX modulation pattern to 1031.



When testing subscribers, the 8800SX can not only measure the important modulation parameters, but also display the profile of burst and verify that it is within the parameters specified in TIA-102-CCAB.

# 8800SX Screen Setup for P25 Phase 2

## Testing a subscriber transmitter

To test a subscriber radio:

1. With OEM software, configure the radio to transmit a Phase II 1031 pattern.
2. Set the 8800SX RF Generator Enable to Off.
3. Key the radio with the OEM software.
4. The Power Profile Ramp should be within the pre-defined mask. A green indicator light indicates that the signal is within the mask.

Note: Power measurements for Phase II signals should be made with the Signal Power Meter after it has been calibrated with the Norm Button.



# 8800SX P25 Phase 2 Operation

## Transmitter Test Results

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- Transmitter test results should fall within the following range:
  - Modulation Fidelity:  $\leq 5\%$
  - Symbol Deviation HCPM:  $3000 \text{ Hz} \pm 10\%$
  - Symbol Deviation HDQPSK:  $2250 \text{ Hz} \pm 10\%$
  - Symbol Clock Error:  $\leq 10 \text{ ppm}$
  - TX BER: Undefined
  - Signal Power: Defined by User
  - Frequency Error: Defined by User

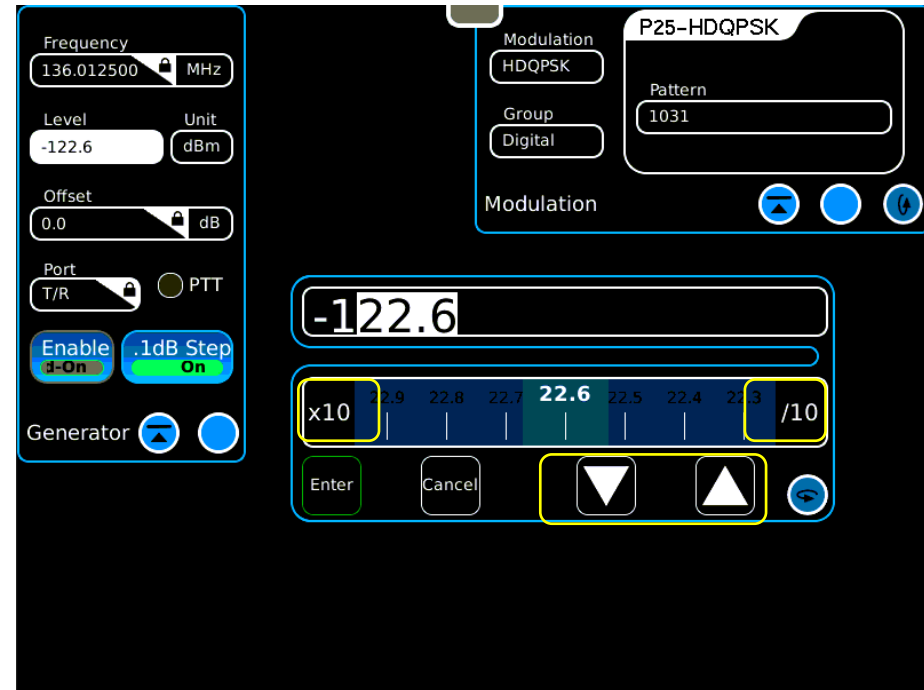
# 8800SX Screen Setup for P25 Phase 2

## Testing a subscriber receiver

To test a subscriber radio:

1. With OEM software, configure the radio for Bit Error Rate Test for Phase 2 H-DQPSK Digital 1031 Pattern.
2. Turn the 8800SX RF Generator Enable On.
3. Set the 8800SX generate modulation to HDQPSK and the pattern to 1031.
4. Set the 8800SX RF Generator Frequency to match the radio's receive frequency.
5. Start the BER test with the OEM software and adjust the 8800SX RF Generator Level to achieve a 5% BER indication.

**Note:** Set the 8800SX Generator Level to a level near the 5% indication then enter that value. For finer resolution, enable the 0.1 dB step function and use the generator dial to step the level in 0.1 dB steps.



Bit Error Rate	
Start/Stop	Sync Detected
Rx Frequency (MHz)	136.012500
Test Pattern	Phase 2 Digital - 1031 Hz Test Pattern
Modulation Type	H-DQPSK
Slot	First Logical Slot
Continuous Operation	Yes
BER Integration Time (sec)	1.44
Number Of Frames	1
Number Of Bit Errors	539
BER (%)	4.9540%

# 8800SX Options and Accessories

## 8800SX Options and Accessories

139942 8800SX Digital Radio Test Set

### Standard Accessories

Fuse, 5 A, 32 V, Mini Blade	Power Supply
AC Power Cord - USA	AC Power Cord - China
AC Power Cord - Europe	AC Power Cord - UK
Adapter, N(m) to BNC(f), Qty 3	Front Cover
Internal Battery	

### Options

113334	8800OPT01	DMR
113335	8800OPT02	dPMR
113336	8800OPT03	NXDN
113337	8800OPT04	P25
138895	8800OPT05	P25 Phase 2
140215	8800OPT06	DMR Repeater Test
113338	8800OPT09	ARIB T98
113339	8800OPT10	Tracking Generator
113340	8800OPT11	Occupied Bandwidth
113309	8800OPT12	Internal Precision Power Meter (Meter + Sensor)
113342	8800OPT13	External Precision Thru-Line Meter (for use with Bird WPS Sensor)
113343	8800OPT14	PTC
113344	8800OPT15	AAR Channel Plan
139836	8800OPT20	R&S NRT-Z Power Sensor Support
139837	8800OPT21	Selectable Notch Filters
139838	8800OPT22	SNR Meter
138525	8800OPT101	Kenwood NXDN Auto-Test
138526	8800OPT102	Kenwood 5X20 P25 Series Auto-Test
138527	8800OPT103	Motorola APX Auto-Test
138528	8800OPT104	Motorola MOTOTRBO™ Auto-Test
139315	8800OPT105	Motorola ASTRO® 25 XTS®/XTL™ Auto-Test

### Languages

113350	8800OPT300	Simplified Chinese
113351	8800OPT301	Traditional Chinese

113352	8800OPT302	Spanish
113353	8800OPT303	Portuguese
113354	8800OPT304	Malay/Indonesian
113355	8800OPT305	Korean
113356	8800OPT306	Arabic
113357	8800OPT307	Polish
113358	8800OPT308	Russian
113359	8800OPT309	Japanese
113360	8800OPT310	German
113361	8800OPT311	French
139625	8800OPT312	Italian

### Accessories

138313	Calibration Certificate - 8800 Series
82560	AC27003 Attenuator - 20 dB/150 W
67076	Spare Internal Battery
114479	External Battery Charger
114477	Hard Transit Case
114478	Soft Carrying Case
114475	Antenna Kit
114348	Precision DTF/VSWR Accessory Kit for 8800
63927	AC25081 Site Survey Software
92793	5017D Bird Power Sensor
114312	Mounting Bracket
112861	Microphone
62404	DC Cord/Cigarette Adapter
63936	AC24009 DMM Test Leads
112277	10 AMP Current Shunt, 0.01 Ohm
67411	Scope Probe Kit

### Extended Warranties

114481	Extended Standard Warranty 36 Months
114482	Extended Standard Warranty 60 Months
114483	Extended Standard Warranty 36 Months with Scheduled Calibration
114484	Extended Standard Warranty 60 Months with Scheduled Calibration

## Select 8800SX Accessories Overview

*Soft Case* 114478

The soft case allows full operation of the 8800SX while inside the case. The laptop style design is lightweight and provides extra protection during field operation. Storage pockets provide extra space for spare batteries, test cables, etc.



*Hard Transit Case* 114477

The hard transit case features form-fitted slots for the 8800SX, protective cover, precision VSWR/DTF Kit, power supply, 150 W attenuators, spare battery, and more.



*Precision DTF/VSWR Accessory Kit* 114348

This accessory kit provides all items necessary for accurate and VSWR, Return Loss, and Distance-to-Fault measurement. The kit includes a case, return loss bridge, power divider, 50 Ω calibrator, and two N-type test cables specifically designed for the 8800SX.



*Bird 5017D Thru-Line Power Sensor* 92793

The 8800SX also supports the Bird 5017D Thru-Line Power Sensor as an external power meter for users that already have the 5017D. This capability requires 8800OPT13 and provides simultaneous forward and reverse power measurements up to 500 W and VSWR measurements that are displayed on the 8800SX screen.



# Questions or Comments?

## Contact Information

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For information about pricing for our products, contact the sales office by calling VIAVI Solutions at (800) 835-2352 or emailing [AvComm.Sales@viavisolutions.com](mailto:AvComm.Sales@viavisolutions.com).

For technical/product support, calibration, maintenance and general customer service inquiries, you can contact our help desk by [clicking here](#), calling (800) 835-2350, or emailing [Service.Americas@aeroflex.com](mailto:Service.Americas@aeroflex.com).

[Click here](#) for more information on the 8800SX and latest software versions and training materials.