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**

- 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 ±225 Hz.
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 ±300 Hz.
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

- 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.
8800SX Options and Accessories

8800SX Options and Accessories
139942
8800SX Digital Radio Test Set

Standard Accessories
Fuse, 5 A, 32 V, Mini Blade
AC Power Cord - USA
AC Power Cord - Europe
Adapter, N(m) to BNC(f), Qty 3
Internal Battery

Options
113334 8800OPT01 DMR
113335 8800OPT02 DPR
113336 8800OPT03 NDXN
113337 8800OPT04 P25
138895 8800OPT05 P25 Phase 2
140215 8800OPT06 DMR Repeater Test
113338 8800OPT09 ARB 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 NDXN Auto-Test
138526 8800OPT102 Kenwood SX20 P25 Series Auto-Test
138527 8800OPT103 Motorola APX Auto-Test
138528 8800OPT104 Motorola MOTOTRBO™ Auto-Test
139315 8800OPT105 Motorola ASTRO® 25 XTS5000™ 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

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/DITF 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 Ohm 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 8800OPT11 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

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.

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.

Click here for more information on the 8800SX and latest software versions and training materials.