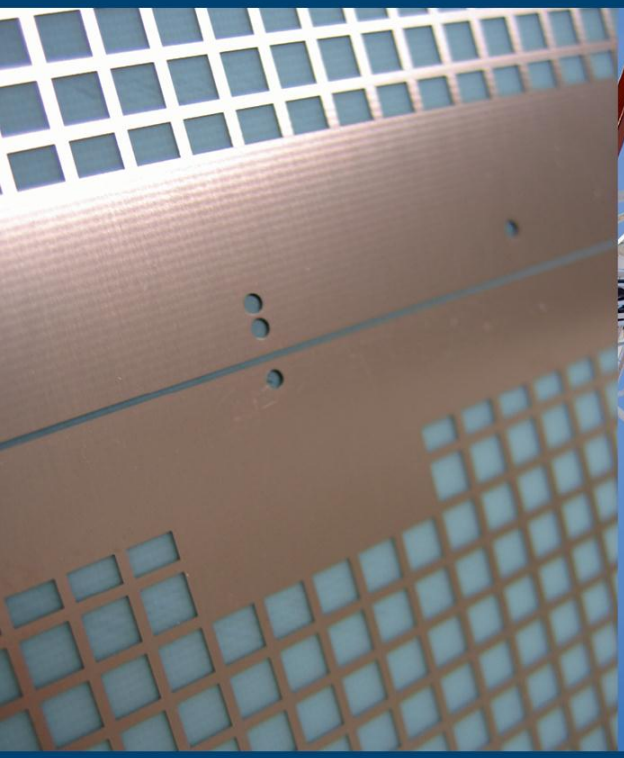
# Receive Systems Module (RSM)



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# What is the RSM?


Receive Systems Module - Rear View


Receive Systems Module – Fitted to ASM

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# The RSM and the ASM

The Receive Systems Module (RSM) is an option to the Antenna Systems Monitor (ASM). The RSM adds additional functionality to the ASM configuration, enhancing the ASM's own features.


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# What can it do?

The RSM may be used to;

- monitor two separate Rx paths of a Dual Diversity Receiver system (as is used in APCOP25 Phase 2, DMR, MotoTrbo™, TETRA, and other wireless technologies)
- monitor two separate Rx antennas on a site (i.e. a site's redundant receiver antennas or hot/standby antennas)
- provide enhanced 'off-air' monitoring of adjacent network sites' coverage performance
- Improve the receive sensitivity of the ASM
  (such as newer digital technologies are capable of operating)
- Measure, monitor and alarm all three Rx paths for the presence of any high level signals that can cause overloading of base station receivers (called 'blocking') that can result in degraded network performance
- Measure, monitor and alarm the ASM System Tests for any or all of the 3 Rx paths (Ant Isolation, Rx System Gain/Loss, Tx Rejection)

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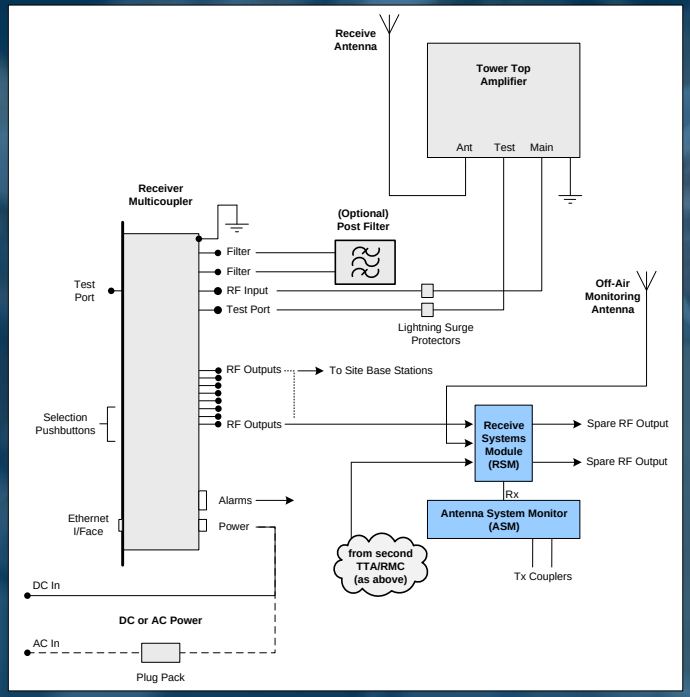
# What can it do?




## Rx Diversity or Dual Rx Monitoring

The RSM may be used to monitor Rx Diversity systems as are commonly used in APCOP25 P2 and DMR radio systems.

In this example, separate Tower Top Amplifiers and Receiver Multicouplers for each of the two Rx paths.

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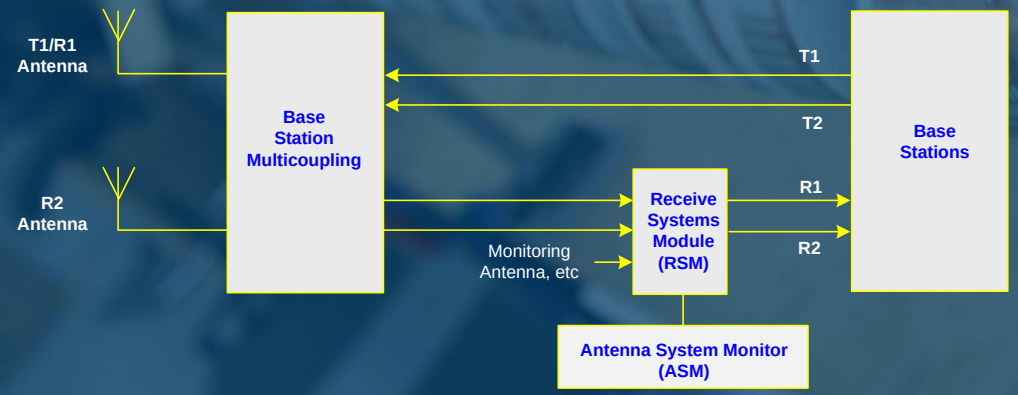
# What can it do?




## T1/R2 Diversity Monitoring

The RSM may be used to monitor 'T1/R2' Diversity systems as are commonly used in TETRA radio systems.

In this example, the Tx Combiner and Rx Multicoupler are integrated inside the radio equipment rack (shown here as the Base Station Multicoupling).

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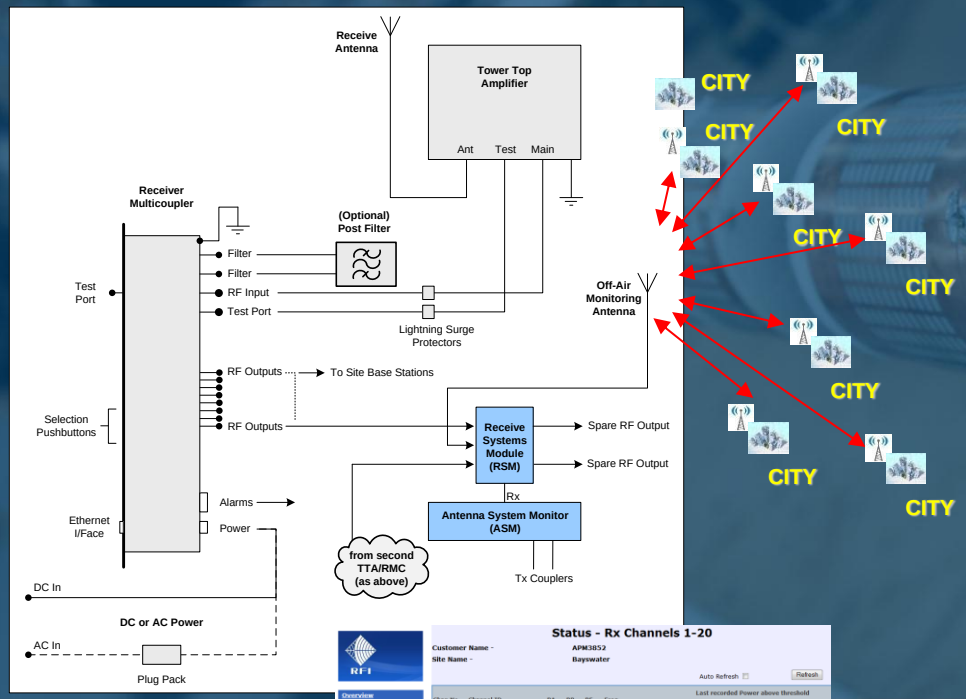
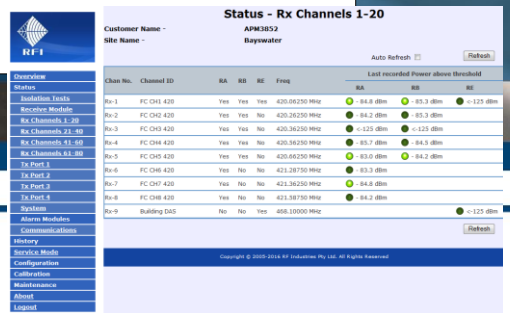
# What can it do?










## Monitoring other signals

A third monitoring path is also provided on the RSM, allowing other signals outside or separate to the network site's two Rx signal paths to also be monitored - i.e. the off-air monitoring of adjacent network sites' coverage propagation.

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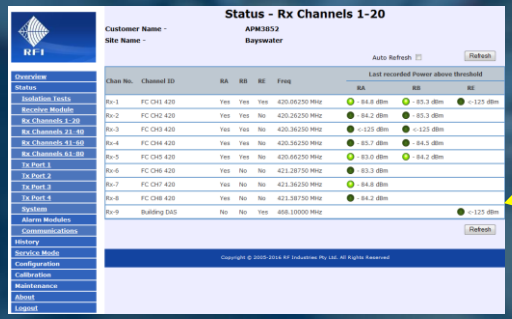
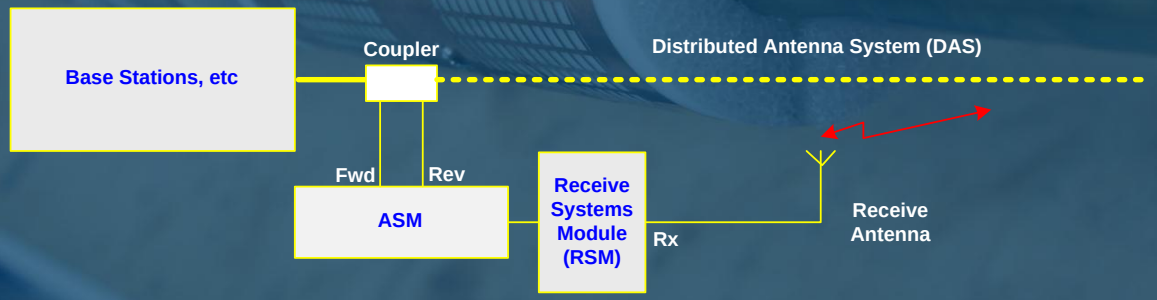
# What can it do?




## Monitoring other signals

The RSM can also be used with the ASM to monitor the coverage performance of a Distributed Antenna System (DAS), etc.

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# What can it do?


## Improving ASM Rx Level Sensitivity

The RSM incorporates an adjustable gain setting that can be set to increase the ASM's effective sensitivity capability – allowing the measurement of Rx signals from the ASM's own -110dBm, down to as low as -125dBm. Newer digital technologies (APCO P25, etc) are capable of operation down at such low signal levels.

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# What can it do?

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**Status**

| Item | Status |
|---|---|
| Alarm Status | OK |
| RxA Peak Level | - 53.4 dBm |
| RxA Current Level | - 57.7 dBm |
| RxB Peak Level | - 54.0 dBm |
| RxB Current Level | - 58.5 dBm |
| Antenna (RxE) Peak Level | - 50.0 dBm |
| Antenna (RxE) Current Level | < - 65.0 dBm |
| Power Supply | OK |

Reset Peak Levels | Refresh

## Peak Level Detector

The RSM also monitors all RF signal levels seen on each of its 3 inputs, across the range ~50-1000MHz, and detects the presence of any signals greater than base station receivers specifications (i.e. -35dBm for any momentary signal, or -50dBm for any continuous signal).

- Such high level signals can overload base station receivers, causing performance degradation. Yellow 'Warning' and Red 'Alarm' indicators in the ASM GUI and entries in the Alarm Event Log file indicate any presence of such signals within the configured alarm thresholds.

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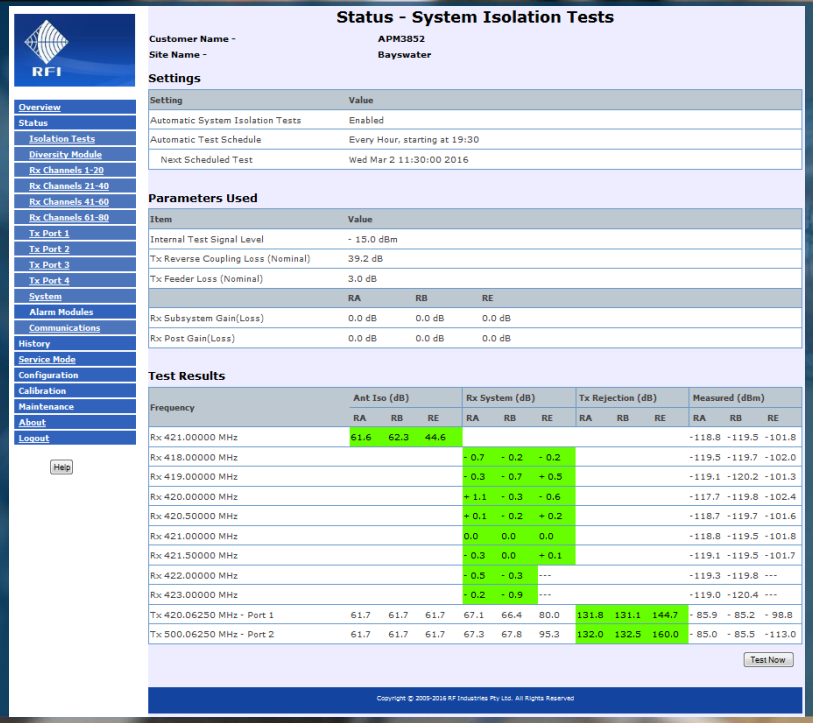
# What can it do?



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Overview
Status
Isolation Tests
Diversity Module
Rx Channels 1-20
Rx Channels 21-40
Rx Channels 41-60
Rx Channels 61-80
Tx Port 1
Tx Port 2
Tx Port 3
Tx Port 4
System
Alarm Modules
Communications
History
Service Mode
Configuration
Calibration
Maintenance
About
Logout

Help

**Status - System Isolation Tests**

**Customer Name -** APM3852
**Site Name -** Bayswater

**Settings**

| Setting | Value |
|---|---|
| Automatic System Isolation Tests | Enabled |
| Automatic Test Schedule | Every Hour, starting at 19:30 |
| Next Scheduled Test | Wed Mar 2 11:30:00 2016 |

**Parameters Used**

| Item | Value | | |
|---|---|---|---|
| Internal Test Signal Level | - 15.0 dBm | | |
| Tx Reverse Coupling Loss (Nominal) | 39.2 dB | | |
| Tx Feeder Loss (Nominal) | 3.0 dB | | |
| | RA | RB | RE |
| Rx Subsystem Gain(Loss) | 0.0 dB | 0.0 dB | 0.0 dB |
| Rx Post Gain(Loss) | 0.0 dB | 0.0 dB | 0.0 dB |

**Test Results**

| Frequency | Ant Iso (dB) | | | Rx System (dB) | | | Tx Rejection (dB) | | | Measured (dBm) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RA | RB | RE | RA | RB | RE | RA | RB | RE | RA | RB | RE |
| Rx 421.00000 MHz | 61.6 | 62.3 | 44.6 | | | | | | | -118.8 | -119.5 | -101.8 |
| Rx 418.00000 MHz | | | | - 0.7 | - 0.2 | - 0.2 | | | | -119.5 | -119.7 | -102.0 |
| Rx 419.00000 MHz | | | | - 0.3 | - 0.7 | + 0.5 | | | | -119.1 | -120.2 | -101.3 |
| Rx 420.00000 MHz | | | | + 1.1 | - 0.3 | - 0.6 | | | | -117.7 | -119.8 | -102.4 |
| Rx 420.50000 MHz | | | | + 0.1 | - 0.2 | + 0.2 | | | | -118.7 | -119.7 | -101.6 |
| Rx 421.00000 MHz | | | | 0.0 | 0.0 | 0.0 | | | | -118.8 | -119.5 | -101.8 |
| Rx 421.50000 MHz | | | | - 0.3 | 0.0 | + 0.1 | | | | -119.1 | -119.5 | -101.7 |
| Rx 422.00000 MHz | | | | - 0.5 | - 0.3 | --- | | | | -119.3 | -119.8 | --- |
| Rx 423.00000 MHz | | | | - 0.2 | - 0.9 | --- | | | | -119.0 | -120.4 | --- |
| Tx 420.06250 MHz - Port 1 | 61.7 | 61.7 | 61.7 | 67.1 | 66.4 | 80.0 | 131.8 | 131.1 | 144.7 | - 85.9 | - 85.2 | - 98.8 |
| Tx 500.06250 MHz - Port 2 | 61.7 | 61.7 | 61.7 | 67.3 | 67.8 | 95.3 | 132.0 | 132.5 | 160.0 | - 85.0 | - 85.5 | -113.0 |

Test Now



## System Isolation Tests

The RSM can perform the Antenna Isolation, Rx System and Tx Rejection tests across all three (3) Rx paths, testing the site's averaged Antenna Isolation, Rx Systems Gain, Selectivity and Ripple, and the Tx Carrier Rejection through both monitored Rx systems - and on the 3rd monitored Rx antenna.

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# Installation

The RSM is fitted to the rear of an ASM.  It can be added at any time, providing a technology upgrade path for customers who may move to a dual diversity, dual Rx antennas, or hot/standby Rx system at a future date (i.e. a future migration from APCOP25 Phase 1 to APCOP25 Phase 2).


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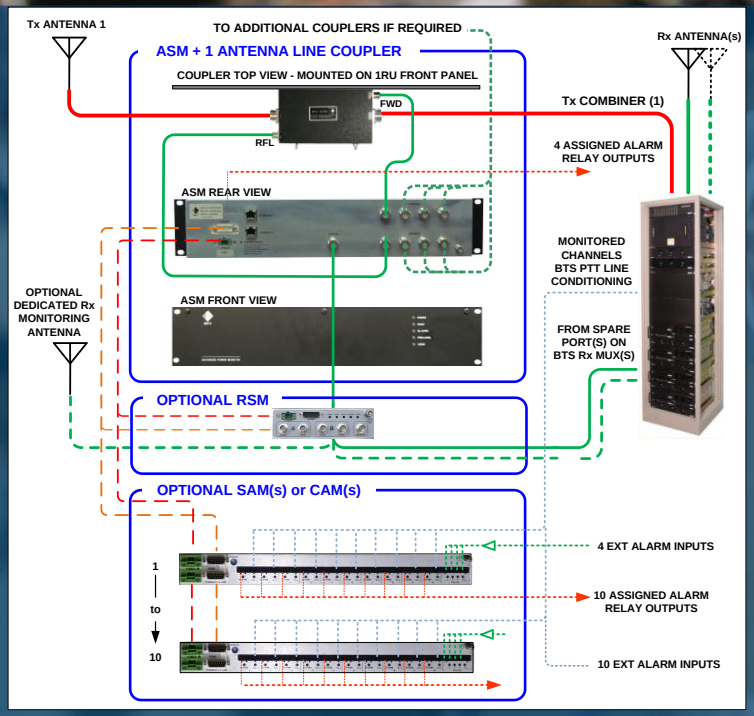
# Installation




The RSM conveniently connects into the Rx signal path(s) of the network site's base station equipment, prior to the ASM's Rx port.

It may be added to any existing ASM installation, quickly and conveniently.

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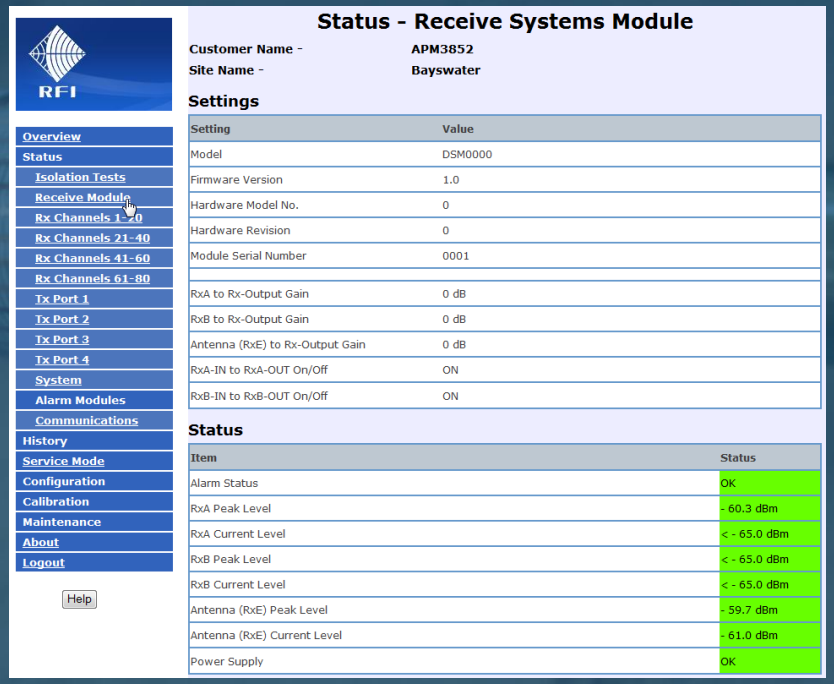
# Configuration

The RSM appears automatically in the Antenna Systems Monitor (ASM) Graphical User Interface (GUI) menu structure when they are connected.

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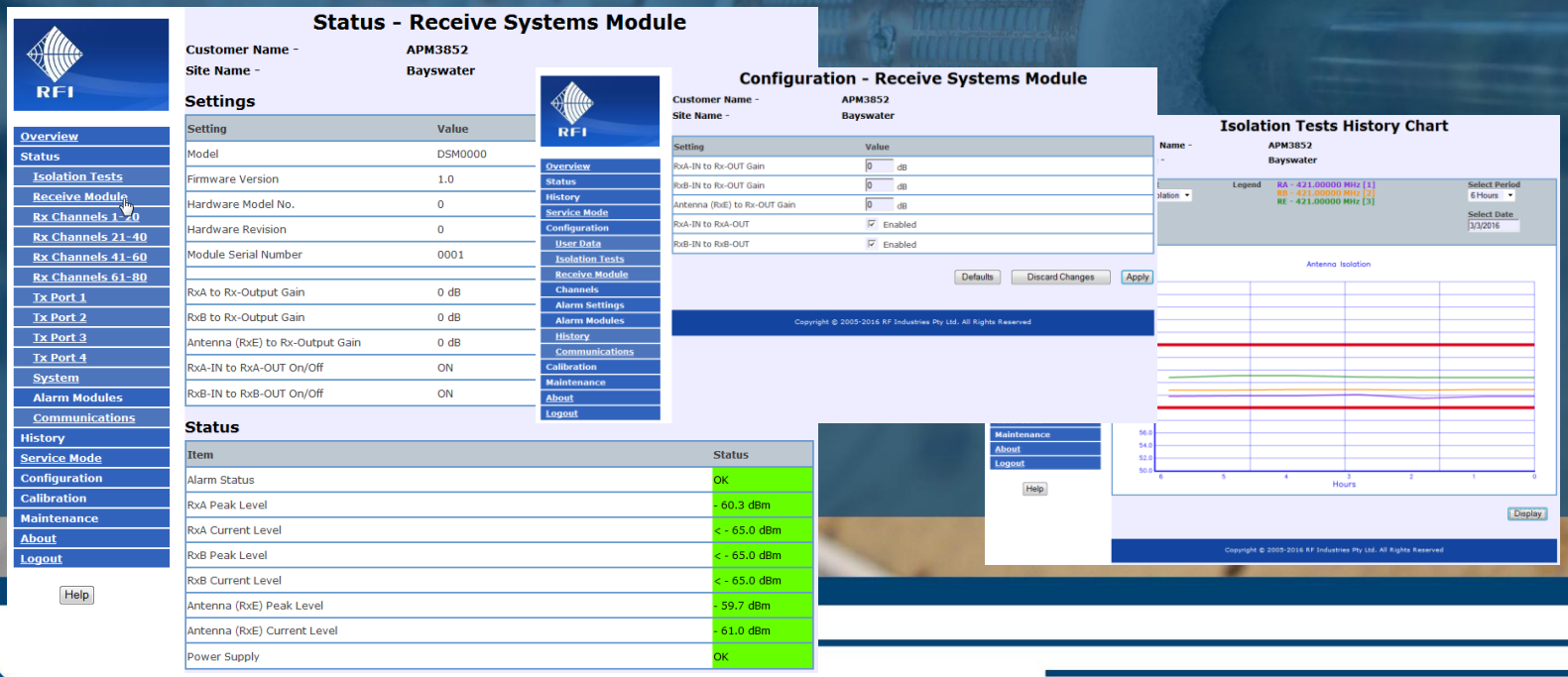
# Configuration

The ASM Graphic User Interface (GUI) allows each of the RSM's inputs and alarm thresholds to be configured, measured, monitored, alarmed, and viewed independently.

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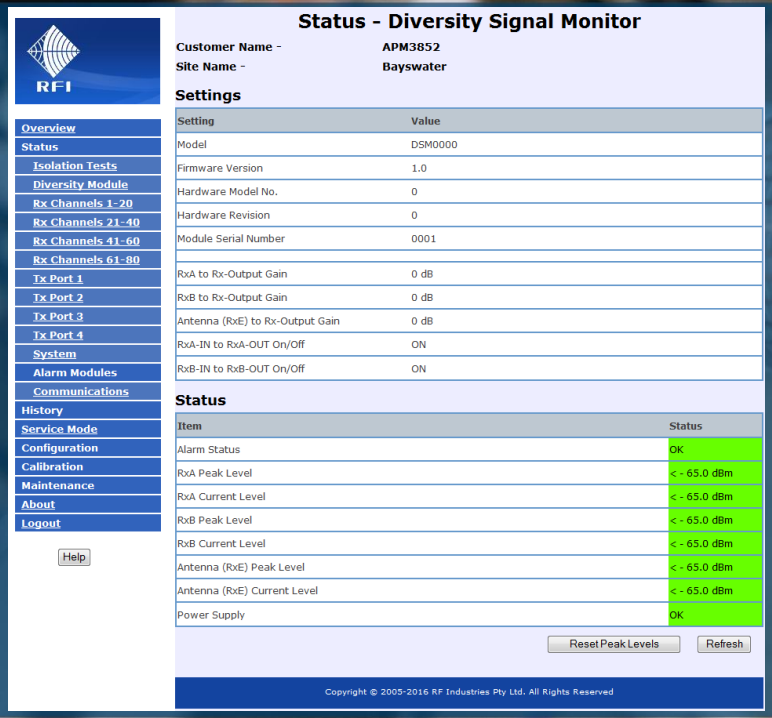
# Monitoring




The RSM's status is presented in the ASM's GUI, and any conditions outside the configured alarm thresholds are available as alarm relay outputs via the ASM/SAM/CAM, SNMP Traps, SNMP GET, SMTP (Email) messages, and as Manager Messages data packets.

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# Connectivity

To access and use the RSM (via the ASM), a web browser such as Internet Explorer, Mozilla, or Firefox is used. Connection to the ASM may be;

- "locally" via a computer using an Ethernet cable
- "locally" via a wireless router connected to the ASM and the computer's wireless modem (i.e. WiFi)
- "remotely" via a customer's Local Area Network (LAN)
- "remotely" via a site linking backbone (such as microwave links, fibre, or other link technologies)
- "remotely" via a cellular modem if the ASM site is within coverage of a cellular network
- "remotely" via a satellite link (ideal for *very* remote sites)

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# Summary


The Receive Systems Module (RSM) enhances the capabilities of the Antenna Systems Monitor (ASM), and provides a convenient way to measure, monitor and alarm multiple Rx signal paths on a network site.

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# More Information

For more information on the Receive Systems Module (RSM) and its use please refer to;

- Receive Systems Module Product Brief
- Antenna Systems Monitor Product Brief
- Antenna Systems Monitor Manual
- Antenna System Monitor Service Bulletins
- Antenna & Systems Monitoring Application Note

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