

## Model SR-5210

# S/L-Band Multi-Mission Receive System

## Integrated Satellite and Range Receiver, Demod, & Bit-Sync

### Applications

- RF Reception of Satellite and Range Telemetry, Telecommand and Most Communications Links
- SatCom, Science, and Military Missions
- SGLS, USB, and STDN Ground Stations
- RF Link Testing and Monitoring
- Payload Integration, Simulation and Testing
- Supports ARTM PCM/FM and SOQPSK



### Key Features

- Single or Dual-Band Reception, Demodulation, Bit Synchronization and Decoding of Main and Subcarriers
- Multi-mode Analog and Digital FM and PM plus BPSK, QPSK, OQPSK and U/AQPSK
- Near theoretical performance for Data Rates from 50 bps to 25 MHz or 50 Mbps for mission flexibility
- Programmable Dual Bit Synchronizers supporting NRZ L/M/S and Bi-Phase L/M/S input formats
- Optional Pre-D Diversity Combiner
- IF, I/Q and Analog Outputs for Additional Uses
- Dual Viterbi and PCM Conversion and Descrambling
- Programmable Front Panel Ports for Setup and Monitoring
- Front-Panel Graphic Display with Spectrum, I/Q Plots
- Compact 1U chassis not requiring 3rd party Operating System or hard drive for increased reliability and security
- Also available as PCI PC-Cards for integration options

The **SR-5210** provides a complete communications receive system solution by incorporating radio frequency signal reception, phase/frequency/amplitude analog and digital waveform recovery, and optional configurable bit-synchronization and data decoding features. The unique mixture of state-of-the-art RF, analog, and digital circuitry provides an extremely compact package fully supporting low power and high reliability applications.

Starting with the downconverter, the design provides high performance signal recovery, supporting a wide dynamic range, narrow to wide signal bandwidths, and near theoretical data/clock recovery even for low  $E_b/N_0$  signals.

The soft-radio nature of the implementation allows the design to be tailored to unique end user requirements for acquisition bandwidth, sensitivity, and loop tracking characteristics to account for transmit source variations of Doppler, frequency stability, and other operating parameters. Using the latest generation digital signal processing techniques allows upgrades via firmware changes, even for previously fielded systems.

Simplified local operation is accomplished through menu-driven front panel graphical display allowing a wide selection of operating formats to meet user requirements. Key performance values including a Spectrum View and I/Q Plot are available. User selections are accessible locally or remotely via an included RS-232 serial or optional 100baseT Ethernet interface.

Up to 32 Configuration Profiles can be stored with user-defined link names and recalled with a single command, simplifying fast and accurate configuration changes.

For applications requiring diversity combined signals the SR-5210.C is available with an on-board high-performance Pre-Detection diversity combiner. This state-of-the-art combiner can increase link performance in space or range applications supporting dual downlinks.

The SR-5210 is available as a standard 1U 19 inch rack mountable chassis or as PCI cards and API for integration into other systems. The Chassis version is not based on a PC platform, avoiding the requirement for 3rd Party Operating Systems and hard drives and reducing the need for system patches and IT security concerns.



# Model SR-5210 Receive System Specifications

## RF Input

Frequency Range:  
2200 to 2297.5MHz  
1690 to 1850MHz  
Other Bands on Request  
Frequency Selectivity: 500KHz  
Dynamic Range: -10dBm to Noise Threshold  
Noise Figure: <8dB Typical  
Image Rejection: >60dB  
Interfering Signal Rejection: >60dB (+/- 8MHz from FC)  
AGC Modes: Automatic or Manual (Local or Remote)

## Supported Waveforms

Phase Modulation (PM) - Digital or Analog  
Phase Shift Keyed (PSK) - B, Q, OQ, AQ, UQ  
PM/PSK - Configurable subcarrier frequency  
Frequency Modulation (FM) - Digital or Analog  
Other Modes On Request

## Common Specifications

Data Rates: 50bps to 50Mbps  
Data Rate Selectivity: 0.001Kbps Steps  
Acquisition/Tracking Range:  
Programmable up to +/- 255KHz  
Locking Threshold: Programmable to  
-15dB C/N IN IF Bandwidth -or- 6dB Eb/No  
Performance:  
Within 1dB of Theory for Typical Waveform Modes

## PM Waveform Specifications

Modes: Digital or Analog  
Modulation: 0 to 2 Pi Radians  
Frequency Response: ~ 10KHz to 25MHz  
Loop Bandwidth: Programmable from 100Hz  
Static Phase Error: < 6°  
Residual Phase Error: < 3° RMS

## PSK Waveform Specifications

Modulation Options  
BPSK  
QPSK  
OFFSET-QPSK  
ASYNC-QPSK  
UNBALANCED-QPSK  
Loop Bandwidth: Programmable from 1Hz

## PM/PSK Waveform Specifications

Waveform: PSK Subcarrier Modulated via PM on Main Carrier  
PM Subcarrier Frequency: Programmable to 5MHz  
PM Modulation Index: 0 to 2 Pi Radians  
PM Static Phase Error: < 6°  
PM Residual Phase Error: < 3° RMS  
Subcarrier Tracking Range: Programmable  
PSK Modulation Options:  
BPSK, QPSK, OQPSK, AQPSK, UQPSK  
PSK Loop Bandwidth: Programmable from 1Hz  
PSK Selectivity:  
Operates with Multiple Subcarriers on Main Carrier

## FM Waveform Specifications

Modes: Analog or Digital  
Modulation: 50Hz to 5MHz Deviation  
Loop Bandwidth: Programmable from 100Hz  
Detection: Non-Coherent Discrimination

## ARTM Waveform Specifications

Modulation Types:  
ARTM Tier 0 (PCM/FM) to 25 M bit/s  
ARTM Tier I (SOQPSK) to 50 M bit/s, 25 M baud/s  
Modulation Characteristics:  
Premodulation Filtering per IRIG 106

## PCM Conversion Specifications

Input PCM Formats:  
Non-return-to-zero (NRZ): Mark, Space, Level  
Bi-phase (BIØ): Mark, Space, Level  
Output PCM Formats: NRZ-L AND BIØ-M

## Viterbi Decoder

Constraint Length: 7 (K=7)  
Rate: 1/2 or 3/4 (punctured)  
Convolutional Polynomials G1 = 171 Octal, G2 = 133 Octal  
Symbol Ordering: G1 followed by G2, G2 followed by G1  
Data Scrambling: Optional G2 Invert in any Mode  
Modes: Optional Dual Decoding for Independent I/Q data

## Data Descrambler

Algorithms: V.35 (CCITT), V.36 (Intelsat), RCC IRIG 106  
Shift Register Length: 20 Bits

## Remote Status/Control Specifications

Serial RS-232 @ 9600 bps (10/100baseT Option)  
Commands: Control Over All Configurable Parameters  
Status:  
Search/Lock Status  
Self-Test Status  
Detailed Operational Information

## Other Specifications

Chassis  
19 Inch Rack Mountable  
1.75 Inch Height (1U)  
20 Inch Depth (Excluding Connectors)  
Connectors  
1 N For RF Input  
1 BNC for IF Monitor Output (Front Panel)  
4 BNCs for Data/Clock Outputs  
2 BNCs for TTL1 and TTL2  
1 25 PIN D for Differential Data/Clock Outputs  
(NRZ-L, BIØM, and CLK)  
4 BNCs for Programmable DAC Monitors (2 Front, 2 Rear)  
1 9 PIN D for Remote Status/Control  
RJ-45 for 10/100baseT (Option)  
Standard 3 Prong Male Primary Power Input  
Primary Power: 85-264VAC 47-63Hz  
Temperature  
-25° TO 60°C Operational  
-45° TO +65°C Storage

\* All specifications subject to change without notice or obligation to retrofit. Consult factory for custom options and/or alternate specifications

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