

SMR-5550i

Low Cost Microwave Receiver

Data Sheet



intelligentRF solutions

FEATURES

- **0.5 to 20 GHz tuning range**
- **Compatible with 40 GHz Frequency Extender**
- **Synthesized tuning in 1 kHz steps**
- **Excellent phase noise performance 0.2 degrees RMS typical**
- **1.0 GHz IF output, 100 MHz bandwidth**
- **Selectable 70/140/160 MHz IF outputs:**
 - Fixed gain wideband output
 - Variable gain wideband output
 - Variable gain, post filtered IF output
- **AM, FM and LOG video, and audio outputs**
- **Four selectable IF bandwidths**
- **Ethernet 100BaseT, RS-232, RS-422**



160 MHz. Additionally, unlike the 1 GHz IF output, the spectrum sense of the 70/140/160 IF may be selected to be either upright or inverted. From this converted IF signal, three separate signal outputs are derived: (1) PAN IF OUT, (2) WB IF OUT and (3) NB IF OUT. The PAN IF signal is a fixed gain IF output which provides the maximum available bandwidth for any selection of IF frequency. In a typical application, this signal is applied to an IF panoramic display processor for signal activity monitoring purposes. A sample of the fixed gain signal is filtered and applied to a Logarithmic Amplitude Detector to generate the Log Video Output signal. The user may select the Log Detector Filter Bandwidth of 5 MHz, 10 MHz, 20 MHz, 50 MHz or 95 MHz (Bypass) at and IF of 160 MHz. Additionally, if an IF frequency of either 70 MHz or 140 MHz is selected; the bypass bandwidth is automatically selected to be 50 MHz at 70 MHz, or 95 MHz at 140 MHz. Note that these bandwidths are separate from the NB IF bandwidths described below, and are only offered in the values described above.

The WB IF and NB IF signals share a common variable-gain signal path that allows the gain to be adjusted, either manually (MGC) or automatically (AGC), over a 70 dB control range. Additionally, the “rated output level” of each of these two variable gain IF outputs may be independently set to -5 dBm, -10 dBm, -15 dBm, or -20 dBm to optimize interface with a variety of off-board equipment. The WB IF (wideband) provides “bypass” IF bandwidths of 50 MHz at 70 MHz IF, 95 MHz at 140 MHz IF, and 95 MHz at 160 MHz IF.

The NB IF signal path provides all the bypass bandwidths as the WB IF signal path, but also includes a set of four additional, selectable narrowband filters. This NB IF filter set may include IF bandwidths ranging from a minimum of 500 kHz to a maximum of 50 MHz. In addition to the specific bandwidths,

DESCRIPTION

The SMR-5550i meets the need for a low cost, high performance microwave receiver. The receiver offers all the necessary features for high data rate PCM/TDM reception while maintaining high pulse fidelity for RADAR interception. The SMR-5550i electrical design features the low group delay distortion, low phase noise characteristics and high dynamic range necessary in today’s demanding signal environments. Through the use of “state of the art” commercial components coupled with a high volume production line, the SMR-5550i sets a new standard for performance-to-cost value in microwave signal reception.

The SMR-5550i receiver provides a full complement of rear panel signal outputs to support a variety of system processing and monitoring requirements. A fixed gain, IF signal at 1 GHz IF provides 100 MHz of signal bandwidth.

The “final” IF frequency may be set by the user to 70 MHz, 140 MHz or

This equipment does not contain provisions for the installation of an intelligence database (i.e. threat signal parametric data).

This equipment may be subject to U.S. Government export controls. Consult factory for details.

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the center frequency of the NB IF filter set must be specified at 70 MHz, 140 MHz or 160 MHz. Standard bandwidth sets are listed in the specification section, and custom sets may be configured for special requirements.

The NB IF signal path is also used to derive the post-filtered signal that feeds the integrated AM/FM demodulator. The AM/FM demodulator produces AM Video and FM Video output signals, as well as a selectable-mode audio output signal. All signals have output level control features. The audio modes include Linear FM, Linear AM, and Pulse Stretched AM. Note that the internal AM/FM Demodulator only operates at the IF frequency of the NB IF bandwidth set.

All receiver functions are controllable from the front panel or remotely using the standard RS-232 interface. As an option, an Ethernet interface can be added. Additionally, the RS-232 interface can be replaced by an RS-422 interface. Control and status functions include: tuned frequency, IF output frequency, IF bandwidth, IF gain mode (AGC/MGC), IF gain level, AM and FM video levels, audio level, signal strength, BIT status,

SMR-5550i RECEIVER SPECIFICATIONS

Frequency coverage	0.5 to 20 GHz
RF input connector	SMA Type
Frequency resolution	1 kHz
External reference input	10 MHz, 0 dBm to +7 dBm
Internal reference output	10 MHz, +3 dBm \pm 1 dB
Internal reference accuracy and aging	3×10^{-7} after 1 hr. warmup Aging less than 1×10^{-6} per year
Phase noise	0.2° rms, typ.
Input VSWR	2.5:1, max.
Preselection	Suboctave filters
LO radiation	-90 dBm, max. antenna conducted
Image rejection	60 dB, min.; 70 dB, typical
Single tone SFDR	53 dB, min., 50 MHz BW
1 dB compression (input level)	-15 dBm, typ. bypass bandwidth, 30 dB attenuation
Third order input intercept point	-5 dBm, min.; 0 dBm, typical

and receiver ID. Parameters can be quickly adjusted using the function keys. A system “kill” command is provided to reset all functions to a default condition and clear memory.

Other features include a 10 MHz reference output, external 10 MHz reference input with autoselect function, and built-in-test (BIT) of power supply voltages, internal temperature, and phase lock status. The unit is operational over the 0° to +50° Celsius temperature range. The SMR-5550i is housed in a 1U (1.75 inches high), full rack-width chassis. All connectors are located on the rear panel. Positive forced air cooling is provided through front panel cooling fans. Mechanical construction, shielding and filtering techniques assure EMI/RFI compliance with MIL-STD-461C.

The SMR-5550i is designed to minimize life-cycle costs and for ease of maintenance. All major assemblies are connectorized to facilitate field repair and module replacement.

LO spurious	-55 dBc, max.
Tuning speed	150 ms, max.
Group delay	3.6 ns p-p, typical. 80% of 95 MHz BW at 160 MHz IF output
1 GHz IF Output IF bandwidth (3 dB)	100 MHz, min.
Spectrum sense	Dependent upon tuned frequency
Gain	20 dB, nom.
Noise Figure	13 dB, max., 10 dB, typ.
IIP3	-3 dBm, min., +4 dBm, typ.
PAN IF Output (FIXED GAIN)	
Frequency	70 MHz, 140, or 160 MHz
Spectrum sense	Selectable: Upright/Inverted
IF bandwidth (3 dB)	50 MHz, min. at 70 MHz 95 MHz, min. at 140/160 MHz
Gain	25 dB, nom.

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WB & NB IF Outputs (Variable Gain)	
Frequency	70 MHz, 140 or 160 MHz, Selectable
Noise figure	15 dB, max. at 30 dB gain (at -20 dBm rated output level)
OIP3	+15 dBm, min. at 20 dB gain (at -20 dBm rated output level)
Rated output level	-20 dBm, -15 dBm, -10 dBm, or -5 dBm; user selectable
Absolute gain	+60 dB to -10 dB (at -20 dBm rated output level)
Gain control (MGC)	0 dB to 70 dB of attenuation control in 1 dB steps
Gain control range (AGC)	70 dB, min
Bypass/Wideband bandwidths	50 MHz at 70 MHz IF 95 MHz at 140/160 MHz IF
Standard NBIF/Demodulator filter bandwidths (other bandwidth sets available, consult factory)	70 MHz IF: 5, 10, 15, and 20 MHz 140 MHz IF: 4, 12, 24, and 48 MHz 160 MHz IF: 5, 10, 20, 50 MHz
Video outputs	AM and FM outputs available only when selected IF frequency is set to NBIF/ demodulator frequency.
Log Video Output	
Dynamic range	70 dB, min.
Output level	+2.0 Vdc at -20 dBm Input Level
Log slope	25 mV/dB
Linearity	±1.5 dB, max.
Rise time	25 ns, max.
Connector type	BNC, female
Impedance	75 Ω
Linear AM Video Output	
Level (100 %)	1.0 Vpk ±10% (for signal equal to the rated IF output level)
Video response (3 dB)	1/2 Selected IF bandwidth, min.
Coupling	DC
AM video gain range	5% to 100%, 5% steps
Connector type	BNC, female

Impedance	75 Ω
FM Video Output	
Level (100%)	±0.5 V for $\Delta f = \pm 1/3$ IF BW
Video Response (3 dB)	1/2 Selected IF bandwidth
Coupling	DC
FM Video Gain Range	5% to 100%, 5% steps
Connector Type	BNC, female
Impedance	75 Ω
Switched Audio Output	
Mode	Linear AM, Pulse Stretched AM, FM
Level	1.0 Vrms (at 0 dB attenuation)
Audio response (3 dB)	15 kHz, nominal
Attenuation range	0 dB to 80 dB, 1 dB steps
Impedance	600 Ω, nominal, unbalanced
Connector Type	BNC, female
ENVIRONMENTAL	
Shock	Meets or exceeds, MIL- STD-810E, method 516.4, Procedure VI
Vibration	Meets or exceeds MIL- STD-810E, method 514.4-1, Category 1
Temperature range, operating	0° to +50° C
Altitude	10,000 feet
AC power	Universal Input 100-240 Vac, 50-60 Hz, 100 watts
Built-In-Test (BIT)	Power supply voltages, temperature, phase lock status
EMI shielding	Built to Meet MIL-STD- 461C, CE03, and RE02. Tested to EN301 489- 01:(2002-08) & EN 301 489- 04: (Article 3.1(b) of R&TTE Directive)
Humidity	90% non-condensing at +40°C

Specifications guaranteed at 25°C.
Specifications are subject to change without notice.

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MECHANICAL

Size

1.75" H x 20.16" D x 17"
W 4.38 cm H x 51.2 cm D x
43.18 cm W
Mounts in Standard 19" rack
Note: D dimension is panel
to panel and does not include
connectors.

Weight

20 lbs. (9.07 kg)

Control interface

RS-232, standard
Front panel control, standard
RS-422, optional
Ethernet, optional

OPTIONS

- Custom demodulator/post filtered IF bandwidth sets
- Ethernet 100BaseT interface
- RS-422 interface (replaces RS-232)
- RF frequency range options.
- Tuner only option (no demodulator)
- Tuning range extension to 100 MHz
- CE certification available



SMR-5550i Rear Panel

Ordering Matrix

Bandwidth set at demodulator/ post-filtered IF center frequency	Unit part number with standard RS-232 interface	Unit part number with optional Ethernet and standard RS-232 interface
5, 10, 15, and 20 MHz BW at 70 MHz IF	SMR-5550i-09	SMR-5550i-08
5, 10, 20, and 50 MHz BW at 160 MHz IF	SMR-5550i-11	SMR-5550i-04
4, 12, 24, and 48 MHz BW at 140 MHz IF	SMR-5550i-06	SMR-5550i-10

WARRANTY

All [intelligentRFsolutions](http://www.intelligentRFsolutions.com) equipment is warranted for one year, except for damage caused by accident or misuse, provided the equipment is returned for repair to the plant in Sparks, Maryland U.S.A

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