

# SMR-5800

Extended Tuning Range Microwave Receiver

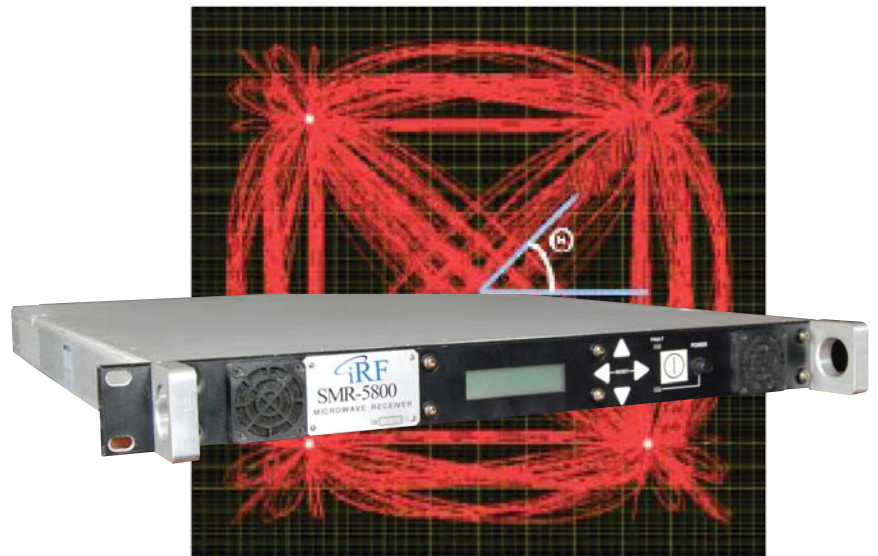


Data Sheet

intelligentRF solutions

## FEATURES

- **0.5 to 40 GHz tuning range**
- **Synthesized tuning in 1 kHz Steps**
- **Excellent phase noise performance**
- **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 10/100BaseT & RS-232, (RS-422 option)**



## DESCRIPTION

The SMR-5800 meets the need for a high performance microwave receiver with extended tuning range. The receiver offers all the necessary features for high data rate PCM/TDM reception while maintaining high pulse fidelity for RADAR interception. The SMR-5800 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-5800 sets a new standard for performance-to-cost value in microwave/mm wave signal reception.

The SMR-5800 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 output IF frequency may be set by the user to 70 MHz, 140 MHz or 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.

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.

## SMR-5800

The converted IF signal is split into three separate outputs: (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 an 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 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, the center frequency of the NB IF filter set must be specified at 70 MHz, 140 MHz or 160 MHz. Custom bandwidth sets may be configured for special requirements.

The NB IF signal path is also used to derive the post-filtered signal

## SMR-5800 RECEIVER SPECIFICATIONS

<b>Frequency Coverage</b>	0.5 to 40 GHz
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<b>RF Input Connector</b>	
0.5-26.49 GHz	SMA type
18-40 GHz	2.9 mm type

<b>Maximum Input without Damage</b>	
0.5-17.99 GHz	+20 dBm, max.
18-40 GHz	0 dBm, max.

<b>Frequency Resolution</b>	1 kHz
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<b>External Reference Input</b>	10 MHz, 0 dBm to +7 dBm
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<b>Internal Reference Output</b>	10 MHz, +3 dBm ±1 dB
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<b>Internal Reference Accuracy and Aging</b>	3 x 10 <sup>-7</sup> after 1 hr. warmup Aging less than 1 x 10 <sup>-6</sup> per year
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<b>Phase Noise (100 Hz to 25 MHz)</b>	
0.5-17.99 GHz	0.2° rms, typ., 0.4° rms, max.
18-26.49 GHz	0.3° rms, typ., 0.5° rms, max.
26.5-40 GHz	0.5° rms, typ., 0.6° rms, max.

<b>Input VSWR</b>	2.5:1, max. Into the connector that is active at the tuning frequency selected
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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 or Ethernet interface. 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, and receiver I.D. 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-5800 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-5800 is designed to minimize life-cycle costs and for ease of maintenance. All major assemblies are connectorized to facilitate field repair and module replacement.

<b>Out-of-Band Rejection (-40 dBm applied)</b>	
0.5-17.99 GHz	60 dB, min., 70 dB, typ
18-26.49 GHz	50 dB, min., 60 dB, typ
26.5-40 GHz	40 dB, min., 50 dB, typ

<b>Preselection</b>	
0.5-20 GHz	Suboctave filters

<b>LO Radiation</b>	
Below 18 GHz	-90 dBm, max.
18-26.49 GHz	-80 dBm, max.
≥26.5 GHz	-70 dBm, max.

<b>LO Spurious</b>	
0.5-17.99 GHz	-55 dBc, max.
18-40 GHz	-50 dBc, typ.

<b>Tuning Speed</b>	150 ms, max.
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<b>P1dB linear dynamic range in 50 MHz BW</b>	
0.5-18 GHz	≥58 dB
18-26.5 GHz	≥50 dB

<b>Single tone SFDR in 50 MHz BW</b>	
0.5-18 GHz	≥53 dB
18-26.5 GHz	≥45 dB

<b>Dual tone SFDR in 50 MHz BW</b>	
0.5-18 GHz	≥48 dB
18-26.5 GHz	≥42 dB

## SMR-5800

<b>1 GHz IF Output</b>	
<b>IF Bandwidth (3 dB)</b>	100 MHz, min.

<b>Spectrum Sense</b>	Dependent upon tuned frequency
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<b>Gain</b>	20 dB, nom.
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<b>Noise Figure</b>	
0.5-17.99 GHz	14 dB, max.
18-26.49 GHz	18 dB, max.
26.5-40 GHz	19 dB, max.

<b>IIP3</b>	
0.5-17.99 GHz	-3 dBm, min.
18-40 GHz	-10 dBm, min.

### PAN IF Output (FIXED GAIN)

<b>Frequency</b>	70 MHz, 140, or 160 MHz
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<b>Spectrum Sense</b>	Selectable: Upright/Inverted
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<b>IF Bandwidth (3 dB)</b>	50 MHz, min. at 70 MHz 95 MHz, min. at 140/160 MHz
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<b>Gain</b>	23 dB, nom.
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### WB & NB IF Outputs (Variable Gain)

<b>Frequency</b>	70 MHz, 140 or 160 MHz, Selectable
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### Noise Figure at 30 dB Gain

0.5-17.99 GHz	17 dB, max.
18-26.49 GHz	19 dB, max.
26.5-40 GHz	20 dB, max.

<b>IIP3 at 20 dB Gain</b>	
0.5-17.99 GHz	-5 dBm, min.
18-40 GHz	-12 dBm, min.

<b>AGC Output Levels</b>	-20 dBm, -15 dBm, -10 dBm, or -5 dBm; user selectable
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<b>Absolute Gain</b>	+60 dB to -10 dB (at -20 dBm rated output level)
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<b>Gain Control (MGC)</b>	0 dB to 70 dB of attenuation control in 1 dB steps
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<b>Gain Control Range (AGC)</b>	70 dB, min.
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<b>Bypass/Wideband Bandwidths</b>	50 MHz at 70 MHz IF 95 MHz at 140/160 MHz IF
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<b>Standard NBIF/ Demodulator Filter Bandwidths (other bandwidth sets available, consult factory)</b>	70 MHz IF: 5, 10, 15, and 20 MHz
	140 MHz IF: 4, 10, 24, and 48 MHz
	160 MHz IF: 5, 10, 20, 50 MHz

<b>Video Outputs</b>	AM and FM outputs available only when selected IF frequency is set to NBIF/ demodulator frequency.
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<b>Log Video Output Dynamic Range</b>	70 dB, min.
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<b>Output Level</b>	+2.0 Vdc at -20 dBm Input Level
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<b>Log Slope</b>	25 mV/dB
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<b>Linearity</b>	±1.5 dB, max.
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<b>Rise Time</b>	25 ns, max. - 95 MHz IF BW
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<b>Connector Type</b>	BNC, females
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<b>Impedance</b>	75 Ω
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### Linear AM Video Output Level (100 %)

1.0 Vpk ±10% (for signal equal to the rated IF output level)

<b>Video Response (3 dB)</b>	1/2 Selected IF bandwidth, min.
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<b>Coupling</b>	DC
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<b>AM Video Gain Range</b>	5% to 100%, 5% steps
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<b>Connector Type</b>	BNC, female
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<b>Impedance</b>	75 Ω
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### FM Video Output Level (100%)

±0.5 V for  $\Delta f = \pm 1/3$  IF BW

<b>Video Response (3 dB)</b>	1/2 Selected IF bandwidth
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<b>Coupling</b>	DC
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<b>FM Video Gain Range</b>	5% to 100%, 5% steps
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<b>Connector Type</b>	BNC, female
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<b>Impedance</b>	75 Ω
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### Switched Audio Output Mode

Linear AM, Pulse Stretched AM, FM

<b>Level</b>	1.0 Vrms (at 0 dB attenuation)
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<b>Audio Response (3 dB)</b>	15 kHz, nominal
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<b>Attenuation Range</b>	0 dB to 80 dB, 1 dB steps
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<b>Impedance</b>	600 Ω, nom., unbalanced
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<b>Connector Type</b>	BNC, female
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<b>Control Interface</b>	RS-232, standard Front panel control, standard RS-422, optional Ethernet, standard
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## SMR-5800

### ENVIRONMENTAL

<b>Shock</b>	Meets or exceeds, MIL-STD-810E, method 516.4, Process VI
<b>Vibration</b>	Meets or exceeds MIL-STD-810E, method 514.4-1, Category 1

**Temperature Range, Operating** 0° to +50° C

**AC Power** Universal Input - 100-240 Vac, 50-60 Hz, 100 watts, 2.25 A fuse

**DC bias supply** +15 Vdc, 500 mA, output

**Built-In-Test (BIT)** Power supply voltages, temperature, phase lock status

**EMI Shielding** Built to Meet MIL-STD-461C, CE03, RE02

**Humidity** 90% non-condensing at +40°C

### MECHANICAL

**Size** 1.75" H x 23" D x 17" W 4.45 cm H x 58.42 cm D x 43.18 cm W  
Mounts in Standard 19" rack  
Note: The D dimension is the panel to panel distance and does not include connectors.

**Weight** 21 lbs. (9.5 kg)

Specifications subject to change without notice

### OPTIONS

- Type F RF input connector for 0.5-40 GHz input
- Custom IF filter bandwidth sets (consult factory)
- CE mark tested



**SMR-5800 REAR PANEL**

Optional 2.4 mm RF in adapter shown

### WARRANTY

All [intelligentRFsolutions](#) 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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