



SMR-5550i LOW COST MICROWAVE RECEIVER



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 10/100BaseT, RS-232, RS-422

DESCRIPTION

M/A-COM's new 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, M/A-COM's 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 1GHz IF provides 100MHz of signal bandwidth.

The "final" IF frequency may be set by the user to 70MHz, 140MHz or 160MHz. Additionally, unlike the 1GHz 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 5MHz, 10MHz, 20MHz, 50MHz or 95MHz (Bypass) at an IF of 160MHz. Additionally, if an IF frequency of either 70MHz or 140MHz is selected; the bypass bandwidth is automatically selected to be 50MHz at 70MHz, or 95MHz at 140MHz. 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

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that allows the gain to be adjusted, either manually (MGC) or automatically (AGC), over a 70dB control range. Additionally, the "rated output level" of each of these two variable gain IF outputs may be independently set to -5dBm, -10dBm, -15dBm, or -20dBm to optimize interface with a variety of off-board equipment. The WB IF (wideband) provides "bypass" IF bandwidths of 50MHz at 70MHz IF, 95MHz at 140MHz IF, and 95MHz at 160MHz 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 500kHz to a maximum of 50MHz. In addition to the specific bandwidths, the center frequency of the NB IF filter set must be specified at 70MHz, 140MHz or 160MHz. 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, and receiver I.D. Parameters can be quickly adjusted using the optional front panel knob and function keys as part of the Enhanced Front Panel option. 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° Celcius 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.

SMR-5550i RECEIVER SPECIFICATIONS

| | | | |
|--|--|--|--|
| Frequency Coverage | 0.5 to 20 GHz | Third Order Input Intercept Point | -5 dBm, min.; 0 dBm, typical |
| RF Input Connector | SMA Type | LO Spurious | -55 dBc, max. |
| Frequency Resolution | 1 kHz | Tuning Speed | 150 ms, max. |
| External Reference Input | 10 MHz, 0 dBm | Group Delay | 3.6 ns p-p, typical. 80% of 95 MHz BW at 160 MHz IF Output |
| Internal Reference Output | 10 MHz, +3 dBm ±1 dB | 1 GHz IF OUTPUT | |
| Internal Reference Accuracy and Aging | 3×10^{-7} after 1 hr. warmup Aging less than 1×10^{-6} per year | IF Bandwidth (3 dB) | 100 MHz, min. |
| Phase Noise | 0.2° rms, typ. | Spectrum Sense | Dependent upon tuned frequency |
| Input VSWR | 2.5:1, max. | Gain | 20 dB, nom. |
| Preselection | Suboctave filters | Noise Figure | 13 dB, max., 10 dB, typ. |
| LO Radiation | -90 dBm, max. antenna conducted | IIP3 | -3 dBm, min., +4 dBm, typ. |
| Image Rejection | 60 dB, min.; 70 dB, typical | PAN IF OUTPUT (FIXED GAIN) | |
| Dynamic Range | 60 dB | Frequency | 70 MHz, 140, or 160 MHz |
| 1 dB Compression (Input Level) | -15 dBm, bypass bandwidth, 30 dB attenuation | 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 |
| Absolute Gain | 60 dB at -20 dBm Rated Output Level |
| Gain Control Range (AGC) | 70 dB, min |
| Bypass/Wideband Bandwidths | 50 MHz at 70MHz 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, females |
| Impedance | 75 Ω |

LINEAR AM VIDEO OUTPUT

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|-----------------------|--|
| 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 ohms, nominal, unbalanced |
| Connector Type | BNC, female |

ENVIRONMENTAL

| | |
|------------------------------|---|
| Shock | Meets or exceeds, MIL-STD-810D, method 514.3-1 |
| Vibration | Meets or exceeds MIL-STD-810D, method 516.3 |
| Temperature Range, Operating | 0° to +50°C |
| AC Power | Universal Input - 95-265 Vac, 47-440 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 |
| Humidity | 90% non-condensing at +40°C |

MECHANICAL Size

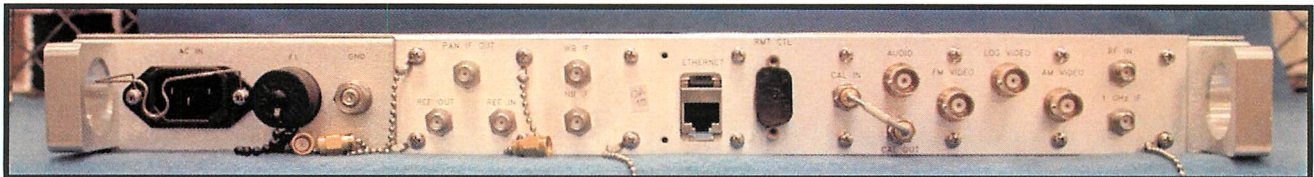
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|-------------------|---|
| Size | 1.75" H x 22" D x 17" W 4.38 cm H x 55.88 cm D x 43.18 cm W Mounts in Standard 19" rack |
| Weight | 20 lbs. (9.07 kg) |
| Control Interface | RS-232, standard Front panel control, standard RS-422, optional Ethernet, optional |

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

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OPTIONS

- Custom demodulator/post filtered IF bandwidth sets
- Ethernet 10/100BaseT interface
- RS-422 interface (replaces RS-232)
- RF frequency range options.
- Tuner only option (no demodulator).



SMR-5550i Rear Panel

Ordering Matrix

| Bandwidth Set at Demodulator/Post-Filtered IF 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 |



M/A-COM SIGINT PRODUCTS
10713 Gilroy Road, P.O. Box 868
Hunt Valley, MD 21030 U.S.A.
Phone 410-329-7900
FAX 410-329-7990
e-mail: sigintsales@tycoelectronics.com
www.macom.com/sigint

tyco / Electronics

EVHG