SMR-5550i/FE EXTENDED TUNING RANGE MICROWAVE RECEIVER

FEATURES

- 0.5 to 20 GHz Tuning Range
- Internal Frequency Extender

  18-26.5 GHz
- 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

M/A-COM's new SMR-5550i/FE 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-5550i/FE 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/FE sets a new standard for performance-to-cost value in microwave/mm wave signal reception.

The SMR-5550i/FE 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 outputIF 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. 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 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 70dB 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 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. 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/FE 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/FE 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-5550*i*/FE RECEIVER SPECIFICATIONS

Frequency Coverage	0.5 to 20 GHz
Extended Coverage	18-26.5 GHz or
RF Input Connector	
0.5-20 GHz	SMA Type
18-26.5 GHz	SMA Type
Maximum Input without Damage	
0.5-18 GHz	+20 dBm, maximum
18-26.5 GHz	0 dBm, maximum
Frequency Resolution	1 kHz
External Reference Input	10 MHz, 0 dBm
Internal Reference Output	10 MHz, +3 dBm ±1 dB
Internal Reference Accuracy and Aging	3×10^{-7} after 1 hr. warmup Aging less than 1×10^{-6} per year
Phase Noise	
0.5-20 GHz	0.2° rms, typ.
18-26.5 GHz	0.6° rms, typ.
Input VSWR	2.5:1, max.

Preselection	
0.5-20 GHz	Suboctave filters
18-26.5 GHz	Bandpass filter
LO Radiation	-90 dBm, max. antenna conducted
Image Rejection	60 dB, min.; 70 dB, typical
1 dB Compression (Input Level)	-20 dBm, bypass bandwidth, 30 dB attenuation
Third Order Input Intercept Point	(See specific IF output)
0.5-20 GHz	-5 dBm, min.; 0 dBm, typical
18-26.5 GHz	-11 dBm, min
LO Spurious	
0.5-20 GHz	-55 dBc, max
18-26.5 GHz	-50 dBc, typ
Tuning Speed	150 ms, max.
Noise Figure	See specific IF output
0.5-20 GHz	15 dB, max
18-26.5 GHz	18 dB, max

1 GHz IF OUTPUT

IF Bandwidth (3 dB)	100 MHz, min.
Spectrum Sense	Dependent upon tuned frequency
Gain	20 dB, nom.
Noise Figure	
0.5-20 GHz	13 dB, max
18-26.5 GHz	17 dB, max
IIP3	
0.5-20 GHz	-3 dBm, min.
18-26.5 GHz	-10 dBm, min

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.

WB & NB IF OUTPUTS (VARIABLE GAIN)

Frequency	70 MHz, 140 or 160 MHz, Selectable
Noise Figure at 30 dB Gain	
0.5-20 GHz	15 dB, max.
18-26.5 GHz	18 dB, max
OIP3 at 20 dB Gain	
0.5-20 GHz	+15 dB, min
18-26.5 GHz	+9 dBm, min
AGC Output Levels	-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 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 - 95 MHz IF BW
Connector Type	BNC, females
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 Df = ±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

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

SMR-5550i/FE

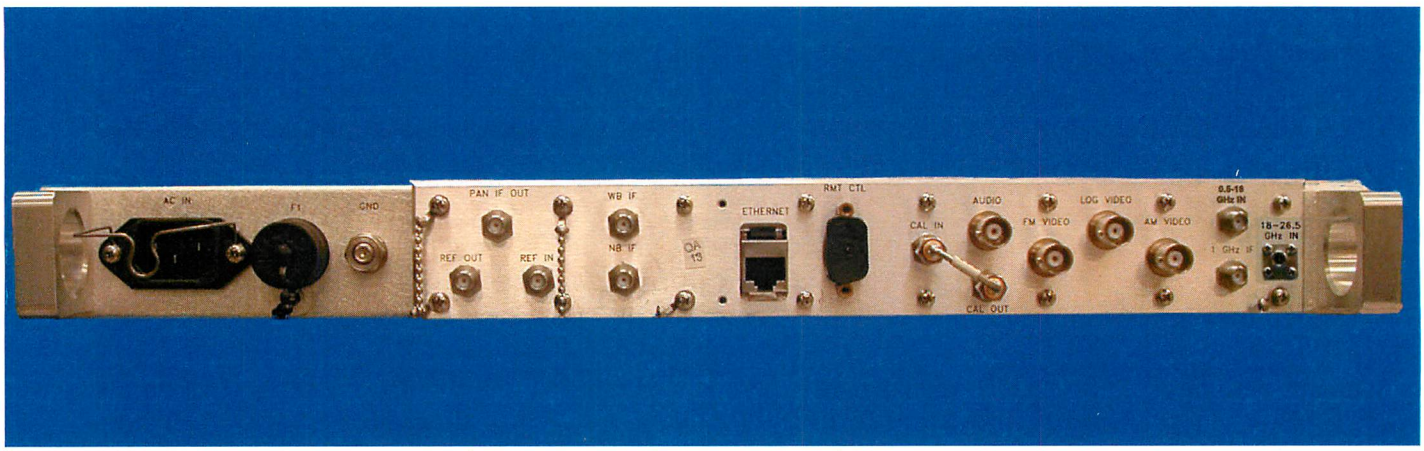
ENVIRONMENTAL

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^{o} to $+50^{o}$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	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)

Specifications subject to change without notice.



SMR-5550*i*/FE REAR PANEL

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