

# Beginning of a new legend!

# AR5001D

## AR5001D 40kHz – 3.15GHz PROFESSIONAL GRADE Communications Receiver

The AR5001D from AOR is the most versatile Communications Receiver ever, since the release of a legendary AR5000 receiver! With ultra-wide frequency coverage and a host of operating features hatched by an advanced digital signal processing technology, you'll be on top of the monitoring action with the AR5001D

### Technical Highlights

#### Super Wide Range

Continuous frequency coverage: 40 kHz to 3.15 GHz in 1 Hz step with 1ppm frequency accuracy. (Frequency accuracy can be optimized to 0.01ppm with an optional GPS receiver.)

#### Multi-Mode reception

High performance digital signal processing circuitry offers variety of reception modes as well as decoding options. Receiving mode includes USB/LSB, CW, AM, SAM, FM, Wide FM and FM stereo. The decoding modes include CTCSS, DCS, DTMF and APCO P-25 by an optional P-25 decoder.

#### High-Performance analog front-end

The RF front-end is carefully designed by CAD to obtain optimum performance across the entire frequency range of 40kHz to 3.15GHz.

#### Direct Sampling Architecture (40 kHz . 25 MHz)

The AR5001D employs 14bit/65Ms/s direct sampling receiver architecture for VLF, LF and HF band. The direct sampling architecture assures high IMD and IP3 characteristics.

#### Digital Signal Processing

The 45.05MHz IF signal is processed by the independent signal processor for signal demodulation and recovery. No AGC circuitry is used in the analog stage to ensure accurate level reading as well as to offer IF output signal level linearity against RF input signal.

#### FFT Signal Analyzer

The AR5001D employs FFT(Fast Fourier Transform) signal analyzer that displays 400kHz to 10MHz in 100kHz increment of spectrum to monitor the band activity or detect unidentified signals instantaneously.

#### Wideband IF output (25MHz to 3.15GHz)

A 45.05MHz of IF analog output signal with 15MHz bandwidth is provided for external peripherals when using the AR5001D receiver for front-end. The optional I/Q output board with USB2.0 interface is available to access AR5001D's I/Q data for spectrum recording and playback by a PC.

#### High accuracy reference frequency

The AR5001D is capable of using GPS pulse signal for an accurate time base for the local oscillator circuit. 0.01ppm frequency accuracy for the 10MHz internal master oscillator is obtained when synchronized to a GPS signal.



Optional GPS Receiver . Third party product.  
(Connect to accessory jack.)



#### Simultaneous reception and monitoring

Simultaneous reception on HF (below 25MHz) and VHF-UHF (above 25MHz) frequencies are possible. For frequencies above 25MHz, absolute dual-channel reception within  $\pm 5$ MHz is possible. Thus, up to three channels can be monitored simultaneously.

#### Direct digital synthesizer (DDS) local oscillator

Direct digital synthesizer is employed for the 1st local oscillator that ensures fast frequency switching for memory channel scanning and limited band search operation.

#### SD Audio recorder

AR5001D is capable of recording demodulated audio signal directly to the built-in SD media recorder. Compact and readily available, SD memory cards are immune to Vibrations and produce no mechanical noise, unlike motor-driven media such as tapes or discs.

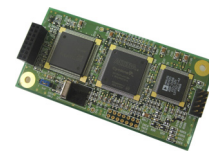
The AR5001D can accommodate up to 32GB SDHC card, allowing up to 240 hours of total recording time using PC compatible WAV format. The typical continuous recording time with 1GB SD card is about 8 hours. The recording time can be extended when squelch operation is employed.

#### Analogue VIDEO demodulation

Composite video output is provided to monitor FM modulated analogue type wireless security camera or frequency search operation for bug transmitters.

#### Optional APCO P-25 Digital Voice Decoder

APCO P-25 Digital Voice Decoder option is available for the demodulation of project 25 (P25) digital voice communication which are popular in North American for the government and public safety communications.



Plug-in to the AR5001D  
Approx. size 125 x 50mm

#### AF-IQ Output

A 12kHz IF output is provided for a PC sound card based SDR (software defined radio) for signal demodulation by the PC. Typical application includes the reception of DRM (Digital Radio Mondiale) broadcasts on HF frequencies.

#### Optional Digital I/Q board and PC software

When an optional I/Q interface board is installed, up to 1MHz of digital I/Q output can be recorded to the hard drive of computers operating under Windows environment for later playback and analysis without any loss of quality. This feature allows for unattended logging, signal classification and signal analysis. PC Control software for Windows XP, VISAT and 7 is supplied with the board.



Plug-in to the AR5001D  
Approx. size 100 x 50mm



# AR5001D SPECIFICATIONS

## GENERAL

Frequency range	40kHz to 3.15GHz
Frequency resolution	1Hz
Tuning steps - program	1Hz to 999.999kHz in 0.001kHz increments
Receiving mode	USB/LSB(J3E), CW(A1A), AM(A3E), SAM(A3E), FM(F3E), WFM(F3E), FM-Stereo(F8E), APCO P-25(D3E) Optional
Number of VFO	5 (A through E)
Memory channel	2,000 channels (50 channels x 40 Memory banks)
Memory bank	40 banks (each bank can be customized between 5 to 95 channels)
Pass frequencies	1,200 frequencies or 1,200 frequency ranges 30 frequencies(ranges) x 40 banks
Priority channel	1 (one)
Selected memory channel	100 channels through memory banks
Typical scanning speed	Approx. 100 channels/steps per second
Antenna impedance	50Ω
Operating temperature range	0°C to +50°C / 32°F to 122°F
Frequency stability	Less than ±1ppm after warm-up (5 minutes). Less than ±0.01ppm with optional GPS unit.
Power supply requirement	DC 10.7V to 16V, 2.0A @ 12V
Audio output	> 2W into 8Ω load
Power consumption*	Stand-by : 400mA, Max. Audio : 1.5A
Ground system	Negative ground
Dimensions*	304mm(D) x 220mm(W) x 97mm(H) 12" (D) x 8½" (W) x 3¾" (H)
Weight*	5kg. (1.1 lb.)

## RECEIVER

Receiver system	40kHz - 25MHz	Direct conversion
	25MHz - 220MHz	Double super-heterodyne
	220MHz - 360MHz	Triple super-heterodyne
	360MHz - 3.15GHz	Double super-heterodyne
Intermediate frequencies	1st -	294.5MHz / 1.7045GHz
	2nd -	45.05MHz / 294.5MHz
	3rd -	45.05MHz
Third-order IMD	> +20 dBm at	14.1MHz
	> +9 dBm at	50MHz
	> +5 dBm at	620MHz
Spurious and image rejection	>70 dB :	40kHz - 25MHz
	>50 dB :	25MHz - 2GHz
	>40 dB :	2.0GHz - 3.15GHz
Digital IF filter bandwidth	200Hz, 500Hz, 1kHz, 3kHz, 6kHz, 15kHz, 30kHz, 100kHz, 200kHz - Receiving mode dependence	
Selectivity	CW - 500Hz	-3dB: > 380Hz -80dB: > 500Hz
	AM - 6kHz	-3dB: > 5.5kHz -80dB: > 6.9kHz
	SSB - 3kHz	-3dB: > 2.7kHz -80dB: > 3.1kHz
	NFM - 15kHz	-3dB: > 14.2kF -80dB: > 15.6kHz
	WFM - 200kHz	-3dB: > 200kH -80dB: > 250kHz

### Sensitivity

Mode	SSB, CW	AM	FM	WFM
Test Method	10dB S/N	10dB S/N	12dB SINAD	12dB SINAD
Filter B/W	3kHz	6kHz	15kHz	200kHz
40kHz to 100kHz	2.0μV	4.0μV	/	/
100kHz to 1.8MHz	1.2μV	2.0μV		
1.8MHz to 25MHz	1.0μV	2.0μV		
25MHz to 1GHz	0.25μV	1.0μV	0.5μV	1.5μV
1GHz to 2.4GHz	0.3μV	1.0μV	0.5μV	1.5μV
2.4GHz to 3GHz	0.5μV	1.7μV	0.5μV	2.5μV
3GHz to 3.15GHz	1.0μV	2.0μV	0.8μV	3.5μV

## AUXILIARY FUNCTIONS

Simultaneous reception	Two types of simultaneous reception (dual-watch) are possible.
2 band reception	One HF (40kHz-25MHz) frequency plus one VHF/UHF(25MHz and above) frequency.
Offset reception	Main frequency plus sub-frequency (within ±5MHz from the center frequency) Offset reception is possible only for VHF/UHF.
Triple reception	Triple receptions are possible by combining simultaneous reception mode. I.E. One HF frequency plus offset reception.
Squelch system	CTCSS, DCS
Demodulation Aid	Auto Notch Filter(NOTCH), De-Noise(NR), Noise Blanker, IF Shift, CW Pitch, AGC, AFC, DTMF APCO P-25 Digital voice decoder (option)

## AUDIO RECORDING

Type of recording	Record/Playback function through SD or SDHC
SD card type	SD or SDHC card per SD Card Association More than 256MB is required. Use card adapter for miniSD and microSD cards. FAT16 and 32 only.
File Format	Windows compatible WAV file format. RIFF (little-endian) data, WAVE audio, Microsoft PCM, 16-bit mono 17.578kHz
Recording time	Approximately 8 hours of continuous recording by 1GB SD Card. Squelch synchronization is possible to eliminate inactive time.

## INPUT & OUTPUT

Antenna Input	ANT 1: 25MHz - 3.15GHz, N-J connector ANT 2: 40kHz - 3.15GHz, N-J connector
10MHz reference input	SMA-J connector, Typical input: -2dBm±2dBm for 50Ω
45.05MHz Analog IF output	BNC-J connector, 45.05MHz±7.5MHz Typical output: Antenna input +10dBm for 50Ω Frequency range 25MHz - 3.15GHz only.
Digital I/Q output (Option)	USB2.0 compatible isochronous transfer Digital I/Q output through USB Type-A Jack. Frequency range 25MHz - 3.15GHz only.
12kHz offset output	12kHz offset analog I/Q through 3.5mmΦ stereo-phone jack.
Line output	3.5mmΦ stereo-phone jack. (3-wire)
Accessory	8-pin miniature DIN
DC Power Input	EIAJ MP-121C (5.5 x 2.1mm) plug. Positive center.
External speaker	3.5mmΦ miniature phone jack (2-wire)
RS-232C	9-pin D-subminiature type (Male) - Firmware update and remote control by PC.
USB	USB Type-A; USB 1.1/2.0 Jack for PC control.
VIDEO output (Rear Panel)	RCA Jack, 75Ω 1V p-p

Specifications subject to change without prior notice for product improvement or modification. \* Power consumptions, size and dimensions are only approximate value. Dimensions does not include projections. E. & O. E.



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