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Modular Microwave Receivers

- Up to 26.5GHz maximum input frequency
- Bandwidth up to 2GHz as standard
- Up to 8 RF channels as standard
- More RF channels optional, enclosure dependent.
- Main IF output(s): up to 1GHz
- Selectable secondary IF outputs on some models
- Optional demodulator – AM/Log AM/FM etc.
- Ethernet & RS422/RS485 connectivity.
- Real-time FFT / waterfall display.
- Internal precision reference with external ref. in/out.
- SWaP-C optimised.
- Rugged enclosures – 19” or VPX as standard.

Avalon AE33160820 Microwave Receiver (example front view).

TECHNICAL OVERVIEW

The new Avalon AE3-series modular microwave receivers are designed to accept a microwave input up to 26.5GHz; to provide fixed and user-controlled conditioning and conversion as desired; then to provide IF or, optionally, demodulated outputs.

In base models, the system settings are controlled by an external controller, via RS485/422.
Optionally, a controller can be built in to provide front panel local control. This controller is supplied with an Ethernet interface for external connectivity.

The receivers have an internal precision frequency reference with external 10MHz in/out (auto changeover).
They also feature a powerful, real-time FFT function that can be used to visualise the incoming signal.

The AE3-series receivers are supplied with a full-featured, graphical user interface (GUI), accessible from a remote laptop/PC via Ethernet. The GUI can be compiled to run under most popular operating systems, including Debian, Windows, etc.). The fundamental settings can also be viewed or altered from the front panel if this option has been specified.

In common with other Avalon systems and modules, our receivers are designed for a wide range of ‘platform’ applications including, laboratory, mobile, field-portable, surface ships, submarines, and jet/turboprop ‘passenger’ aircraft.

Several other options are available, including a demodulator function and several chassis form-factors.

We also offer a customisation consultancy.

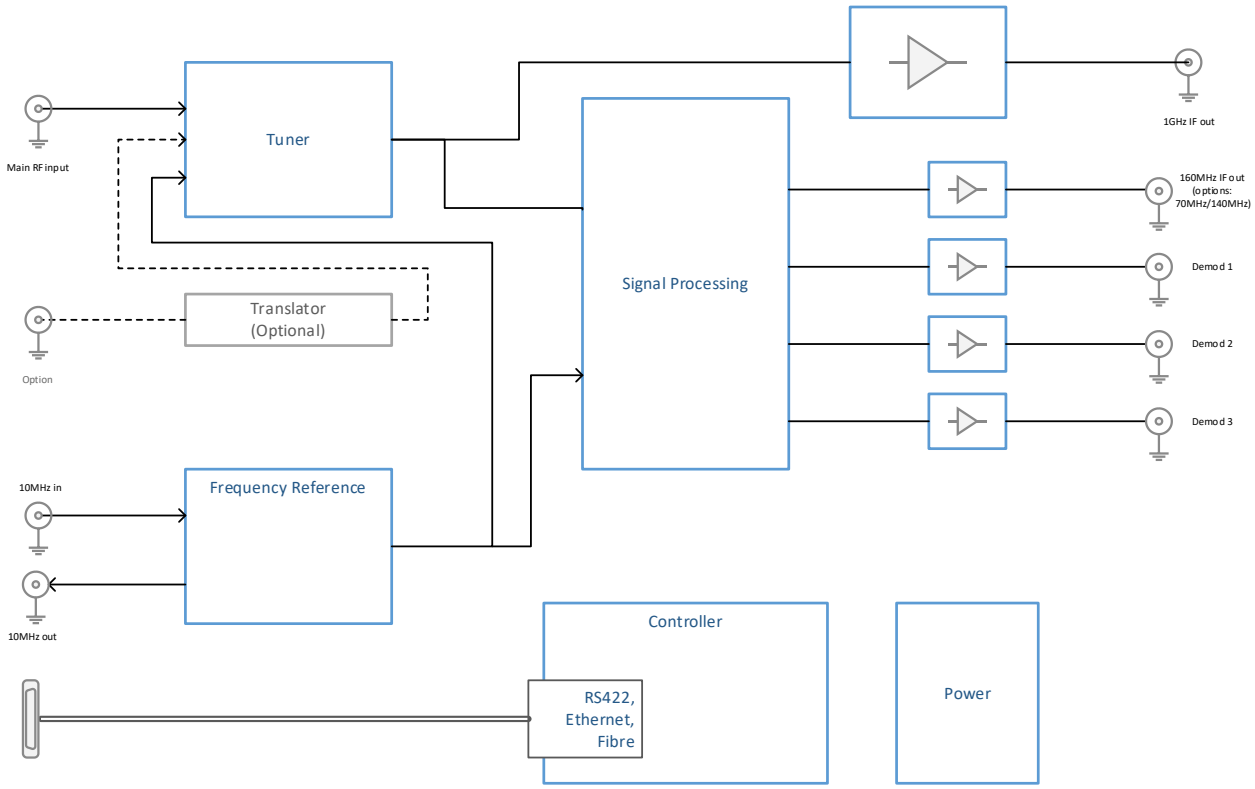


Figure 1 - example system block diagram, single channel versions

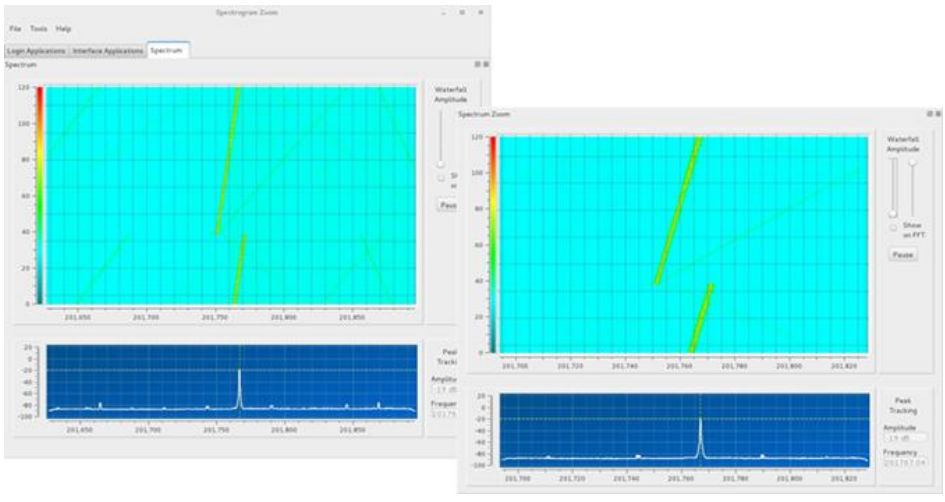
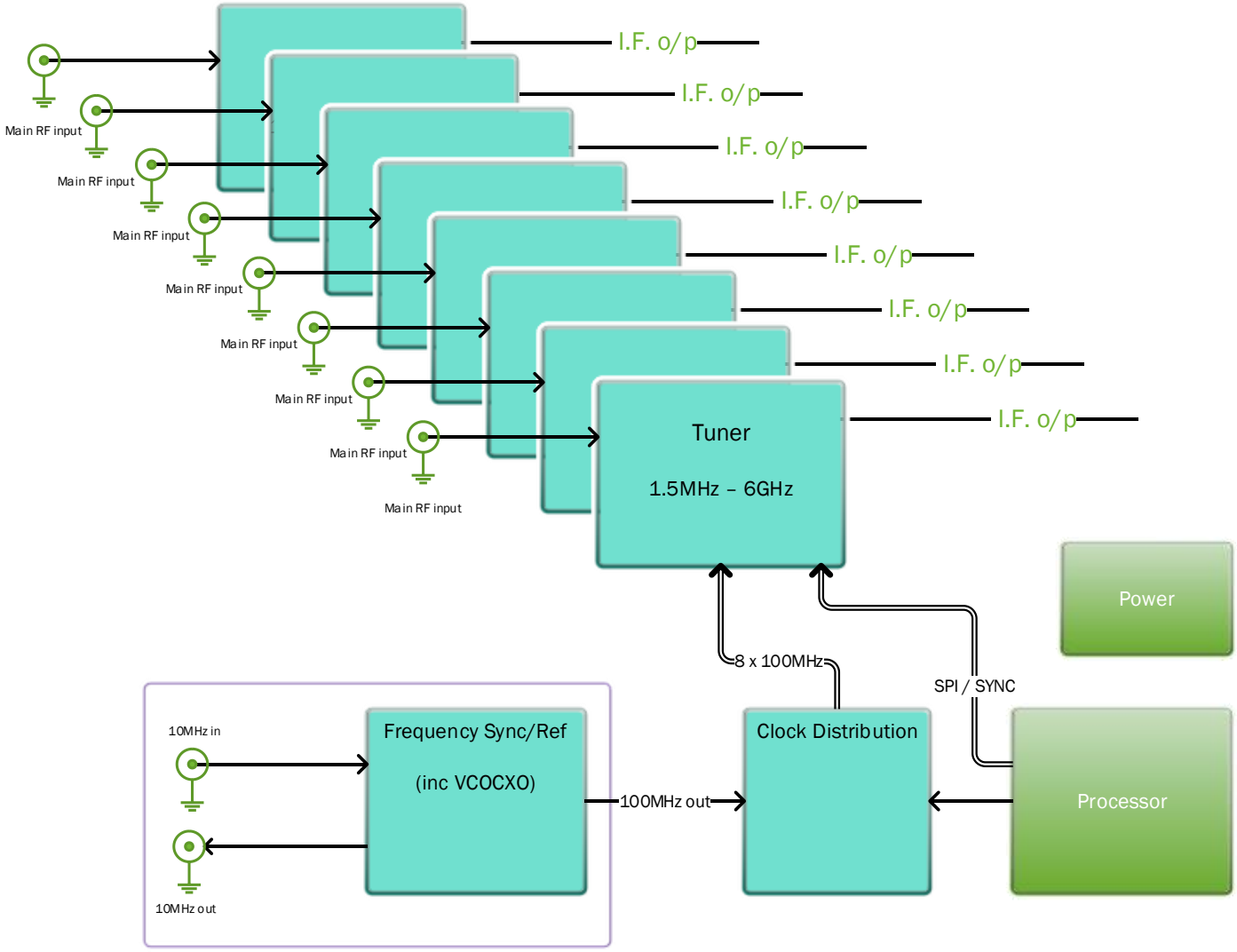


Figure 2 - example waterfall/FFT displays.

Figure 3, below, shows a typical block diagram of the RF section of an 8-channel system. It includes a high stability, temperature-controlled oscillator, with the ability to accept - and synchronise with, an external 10MHz reference input. In addition to UHF or microwave frequencies, the front end can be specified to include other bands – i.e., 0 – 30MHz HF band.
For multi-channel receivers, coherent operation (DF) is provided. Each RF tuner is equipped with a 'Sync' pin, by which means the operator can invoke phase synchronisation manually or automatically, whenever the channel frequencies are changed or when the tuners are tied prior to initiating coherent mode. When not in coherent mode, the operator may tune each channel to any frequency within the tuner range.

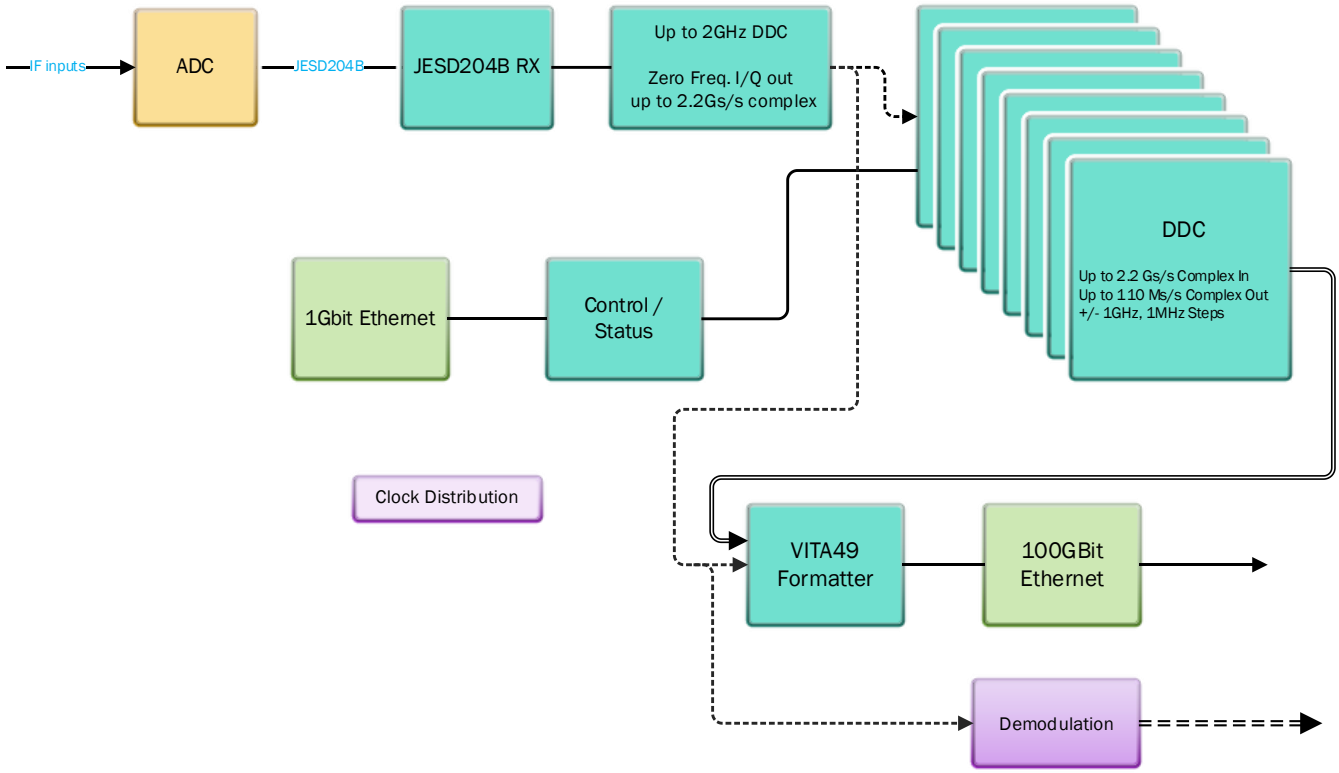
Figure 3 Typical RF section of an 8-channel variant



The ADC block and data processing engine accepts the I.F. inputs from the RF section and provides such functions as:

- Feeding VITA49-formatted data streams (primary or DDC subdivision) to the 100Gb interface block for external use (i.e., recording or analysis).
- Waterfall/FFT waveform creation and output.
- Demodulation – if this option is selected.

Figure 4 Typical data processing block diagram



TECHNICAL SPECIFICATIONS

	Minimum	Typical	Maximum	Notes
Number of RF Channels	1,2 or 8 as standard		24	Contact Avalon for >8 channels. Channel number may be limited by bandwidth or enclosure requirements.
RF input frequency (version1)	1.5MHz		6GHz	
RF input frequency (version2)	2MHz		18GHz	
RF input frequency (version3)	400MHz		26.5GHz	
Maximum RF input level		+17.5dBm	+24dBm	Depends on tuner used.
Bandwidth		80MHz	2GHz	May be limited by choice of maximum RF frequency or number of channels.
IF outputs - frequencies	60MHz	307.2MHz	1GHz	307.2MHz is standard for 3/6GHz tuners
IF outputs - amplitude	TBD	TBD	TBD	
IF rejection		70dBm		
Gain control/attenuation range		60dB		(1dB steps)
SFDR	53dB			(with two -35dBm tones)
Group delay variation			5nS	
Tuning speed		200µS/step		
Tuning resolution		10KHz		
Phase noise (typical)		-90dBc/Hz		1KHz offset
		-100dBc/Hz		10KHz offset
		-100dBc/Hz		100KHz offset
		-118dBc/Hz		1MHz offset
		-132dBc/Hz		10MHz offset
Frequency reference	Internal Reference Oscillator 10 MHz/100MHz +/- 100ppb, or external 10 MHz source: +6 to +13dBm +/-0.5ppm to lock			
Demodulation	I/Q as standard			FM, AM, SSB: Optional
Spectrum Display Output	Optional. With full sweep waterfall display feature			
Control	10/100/1000BASE-T Ethernet with Avalon GUI (or user-furnished equivalent) running on remote laptop/PC. Most popular operating systems supported. Automation and control software also available from Avalon.			Fibre-optic control interface also available.
Local control	Local control via front panel available as an option, in addition to main control.			
Operating temperature range	-10°C to +85°C			Different limits available on request
Storage temperature range	-40°C to +140°C			

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Specifications, continued		
Environmental conformity	Designed to conform to the applicable sections of MIL-STD-461. Shock/Vibration: Designed to conform to the applicable sections of MIL-STD-810, and US Navy specifications. Similar construction approved for flight in USAF Rivet Joint and other military and civilian turbojet and propeller aircraft.	
RF external I/O socket type	SMA	
Time Stamping & GPS	1pps / IRIG / GPS	Optionally available
Size/Form-factor	Various standard configurations and form-factors available, including: • Rugged rackmount 19" full-width and half-width. • VPX	
Weight	TBA	
Power	90 to 264 Volts AC, 47 to 63 Hz, TBD Watts.	DC supply versions optionally available

Ordering Information and Options

Figure 5 shows the part numbering structure. E.g., for an 8-channel, 6GHz receiver, 80MHz BW, in a half-width 2U 19" chassis, the part number might be AE33160830.
Contact us for customisation and option details.
It is possible to specify a version of receiver with up to 24 channels, though it would have to be housed in an enclosure of suitable size, i.e., a full-width, 2U, 600mm deep, 19" chassis – or equivalent.

Figure 5 – part numbering schema