Technical Data

WATKINS-JOHNSON

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VXI VHF/UHF Receiver
WJ-8634

The WJ-8634 is a fully synthesized, general-purpose VHF/UHF receiver for surveillance and monitoring of RF communications from 20 to 1000 MHz. The unit is packaged in a single-slot *C-size* VXI (VMEbus Extensions for Instrumentation) module measuring 9.2 x 13.4 x 1.2 inches (23.37 x 34.04 x 3.05 cm). The WJ-8634 is ideal for applications where high density and the highest degree of integration is required. By placing the receiver directly on a standard instrumentation and computing bus, the challenge of system integration is significantly reduced.

The standard configuration of the WJ-8634 supports frequency coverage from 20 to 1000 MHz with tuning to 2 MHz allowed with reduced performance. An HF- extended configuration of the WJ-8634 allows operation from 0.5 to 1000 MHz. The HF converter provides a +20 dBm third-order intercept point for signals spaced outside the 16-kHz first IF bandwidth. The HF converter mounts inside the WJ-8634 VXI module. A UHF frequency extended configuration of the WJ-8634 is also available and supports a frequency coverage from 20 to 2400 MHz. The 2400-MHz extender is housed in the WJ-8634 VXI module.

Features

- ❏ *Complete VHF/UHF receiver in a single-slot, C-size, VXI module*
- ❏ *Standard configuration frequency range: 20 to 1000 MHz*
- ❏ *HF extended configuration frequency range: 0.5 to 1000 MHz*
- ❏ *UHF extended configuration frequency range: 20 to 2400 MHz*
- ❏ *Narrowband configuration supports:*
  4 IFBWs between 6.4 & 100 kHz
  AM, FM, SSB, CW & IFT Detection Modes
  10-Hz Tuning Resolution in SSB mode
- ❏ *Wideband configuration supports:*
  IFBWs between 300 kHz & 12 MHz
  AM & FM Detection Modes
- ❏ *-5 dBm 3rd-order intercept, typical*
- ❏ *Tracking Preselector Filter*
- ❏ *Low Phase Noise*
- ❏ *VXI message-based control*

HEIGHT	9.2 in (23.37 cm)	**DEPTH**	13.4 in (34.04 cm)
WIDTH	1.2 in (3.05 cm)	**WEIGHT**	<6 lbs (2.73 kg)

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The WJ-8634 features low phase noise frequency synthesizers with 100-Hz tuning resolution, in a low-power VXI package. A high-performance tracking preselector filters incoming RF signals, and rejects undesired out-of-band signals. The narrowband configuration of the receiver supports installation of up to four 21.4-MHz selectable IF filters, ranging from 6.4 to 100 kHz. Two of the IF filters are included in the unit. A 3.2-kHz filter is also included in this configuration for narrowband SSB detection. An IF translation (IFT) mode is available in the narrowband configuration, which allows an operator to use the receiver as a narrowband down-converter. An available wideband configuration supports the installation of up to four 21.4-MHz selectable IF filters ranging from 300 kHz to 12 MHz. In the wideband configuration, two IF filters are included in the unit.

The mechanical packaging design of the WJ-8634 receiver uses modern surface-mount technology. RF isolation is provided using multilayer PC-boards fastened into a milled-aluminum chassis. All RF interconnections are available on the front panel of the unit. RF signals are passed in and out of the unit via SMA-type connectors.

The WJ-8634 is operated remotely via a VXI interface. Since there is no front panel control on the receiver, all functions except power-on/off are accessible over this interface. Data is passed to and from the receiver using the VXI-standard Word Serial Protocol.

The WJ-8634 Receiver supports three basic modes of operation:

- MANUAL (fixed-frequency operations)
- SWEEP (contiguous coverage from start to stop frequency)
- STEP (preprogrammed discrete frequencies)

The receiver is interactive in all of its modes of operation and is capable of alerting the controlling device of signal activity. While in SWEEP or STEP mode of operation, the receiver is capable of logging the COR status of the signals in the coverage area and only reporting changes to the controlling device. In the SWEEP mode of operation, bands or signals may be locked out of the coverage area. Non-volatile memory is included in the receiver for storage of up to 200 sweep or step setups, and up to 200 lockout bands.

WJ-8634 Configurations

Model Number	Frequency Range (MHz)	IFBW Range	Comments
WJ-8634	**20 to 1000**	**6.4 to 100 kHz**	**Narrowband**
WJ-8634-1	**20 to 2400**	**6.4 to 100 kHz**	**Narrowband/UHF Extender**
WJ-8634-2	**0.5 to 1000**	**6.4 to 100 kHz**	**Narrowband/HF Extender**
WJ-8634-3	**20 to 1000**	**0.3 to 12 MHz**	**Wideband**
WJ-8634-4	**20 to 2400**	**0.3 to 12 MHz**	**Wideband/UHF Extender**

Inputs/Outputs

- Antenna Input (SMA)
- SW IF Output (SMA)
- Video Output (SMA)
- Signal Monitor Output (SMA)
- 10-MHz Reference (SMA)
- Auxiliary Control Port (Subminiature *D*)

The following signals are available on the Auxiliary Control Connector:

- Line Audio
- Switched Audio
- Received Signal Strength Indicator
- COR output

Specifications

Frequency Range (standard)	20 to 1000 MHz (tuning to 2 MHz allowed)
HF Extender	0.5 to 1000 MHz
UHF Extender	20 to 2400 MHz (tuning to 2 MHz allowed)
Tuning Resolution	100 Hz (10-Hz SSB)
Internal Reference Accuracy	±2.5 ppm, max
Detection Modes	
Narrowband	AM, FM, CW, SSB, IFT
Wideband	AM, FM
RF Input	50 ohm, 2.5:1 VSWR, typical
Preselection	20% nominal bandwidth, tracking
Noise Figure (standard)	10 dB, max below 500 MHz 12 dB, max above 500 MHz
HF Extender without preamp	16 dB, max (0.5 to 30 MHz)
HF Extender with preamp	11 dB, max (0.5 to 30 MHz)
UHF Extender	15 dB, max (1000 to 2400 MHz)
3rd-order Intercept (20 to 1000 MHz)	-5 dBm, typical (-10 dBm, min)
HF Extender (0.5 to 30 MHz)	+20 dBm, min
UHF Extender (1000 to 2400 MHz)	-15 dBm, min
2nd-order Intercept (20 to 1000 MHz)	+45 dBm, typical (+25 dBm, min)
HF Extender (0.5 to 30 MHz)	+40 dBm, min
UHF Extender (1000 to 2400 MHz)	+20 dBm, min
Maximum RF Input without Damage	+20 dBm
HF Extender	+15 dBm
UHF Extender	+15 dBm
1st Image Rejection	80 dB, typical (70 dB, min)
2nd Image Rejection	65 dB, typical (60 dB, min)
IF Rejection	80 dB, typical (70 dB, min)
Phase Noise	-60 dBc/Hz @ 1 kHz -98 dBc/Hz @ 20 kHz, max (20 to 500 MHz) -96 dBc/Hz @ 20 kHz, max (500 to 1000 MHz)
HF Extender (at HF extender output)	-115 dBc/Hz @ 20 kHz, max (0.5 to 30 MHz)
UHF Extender	-90 dBc/Hz @ 20 kHz, max (1000 to 2400 MHz)
Tuning Time (SWEEP)	2 msec, typical to within 1 kHz of final frequency
Tuning Time (MANUAL 20 to 1000 MHz)	19 msec, max to within 1 kHz of final frequency
HF Extender (0.5 to 30 MHz)	24 msec, max to within 1 kHz of final frequency
UHF Extender (1000 to 2400 MHz)	24 msec, max to within 1 kHz of final frequency
LO Level at RF Input	-90 dBm, max
Internally Generated Spurious	-110 dBm equivalent RF input, max
Gain Control Modes	MGC/AGC, 90-dB typical range
AFC	Selectable
Signal Monitor Output	Nominally 10-dB gain above the RF input
Selected IF Output	Centered at 21.4 MHz, -40 dBm nominal output level
IF Bandwidths	4 selectable (2 supplied & 2 optional) plus 3.2-kHz BW SSB filter in narrowband configuration
Video Output Level	0.5 V peak-to-peak into 600 ohms (30% deviation in FM or 50% AM modulation)
Video Frequency Response	dc to 1/2 the IF bandwidth, -3 dB
Audio Output	ac-coupled multipin connector
Sensitivity	See Table for Standard Narrowband/Wideband IF Bandwidths
COR/ Squelch (TTL output)	50 dB range, min
RSSI Output	0 to 5 V into 10k ohms multipin connector
VXI Interface	
Protocol Supported	Word Serial Protocol, IEEE-488.2
Device Type	Message-based device, VXI servant
Card Size	VXIbus *C-size* module
Slots Used	1 slot
Data Transfer Handshake	Normal Transfer Mode
Data Transfer Capability	A24, D16 circuitry provided
EMI Shielding	Completely Enclosed Module

	+5V	+12V
Power Requirements		
Narrowband	4.5 W	6.0 W
Wideband	4.5 W	6.5 W
HF Extender (add to narrowband)		3.5 W
UHF Extended (add to narrowband or wideband)		2.5 W
Power Consumption (standard)	<11 W	

Environmental Specifications

Temperature	
Operating Temperature Range	-20 to +55°C Case
Non-Operating Temperature Range	-40 to +70°C Case
Shock	Meets the environmental conditions of MIL-E-5400T, paragraph 3.2.24.6.1 pertaining to equipment shock
Vibration	Meets the environmental conditions of MIL-STD-810D, method 514.3, section I-3.2.4, category 4, propeller aircraft. Figure 514.3-25(a) defines the power spectral density with Li = 0.3 (g^2/Hz), and Fi = 68 Hz.
Humidity	95% relative humidity, non-condensing

*IF Bandwidths***

	Bandwidth (kHz)	60:3 dB Bandwidth Shape Factor	Sensitivity (dBm)* 20 to 500 MHz	Sensitivity (dBm)* 500 to 1000 MHz
Standard Wideband	300	5:1	-90	-88
	500	5:1	-88	-86
	1000	4:1	-85	-83
	2000	4:1	-82	-80
	4000	4:1	-79	-77
	6000	4:1	-77	-75
	8000	4:1	-76	-74
	12000	4:1	-74	-72
Standard Narrowband	6.4	3:1	-107	-105
	10	3:1	-105	-103
	20	3:1	-102	-100
	30	3:1	-100	-98
	50	3:1	-98	-96
	100	3:1	-95	-93

***Sensitivity Conditions:**
AM - An input signal AM modulated 50% by a 1-kHz tone will produce a minimum video output S+N/N ratio of 10 dB
FM - An input signal FM modulated at a 1-kHz rate with a peak deviation equal to 30% of the selected IFBW will produce a minimum video output S+N/N ratio of 17 dB (Note: A 400-Hz modulation rate is required for IFBWs of 10 kHz or less.)
**** Consult the factory for other bandwidth sizes**