CDR-3580 VHF/UHF HALF-RACK RECEIVER

The VHF/UHF Receiver is a high performance computer-controlled 20 to 1200 MHz DSP receiver

FEATURES

- *17 synthesized digital IF filters*
- *10 Hz tuning resolution*
- *Wide tuning range: 20 - 1200 MHz*
- *High dynamic range:*
  IP3 +13 dBm, typical
  NF 13 dB nominal
- *250 programmable channels*
- *Quadrature digital IF output (I & Q)*
- *Easy-to-read vacuum fluorescent display*
- *Sweep and scan functions up to 100 channels per second*
- *Continuous self-test, BITE and BIT*
- *Low LO phase noise*
- *Available in full or half-rack configurations*
- *Rugged construction using surface mount technology*
- *High MTBF: >11,000 hrs*
- *User-friendly menu-driven control*

CDR-3580 VHF/UHF RECEIVER SPECIFICATION

FREQUENCY

Frequency Range: 20 to 1200 MHz
Tuning Resolution: 10 Hz
Synthesizer Tuning Speed (from synthesizer command byte until within 1 kHz of the final frequency): AM, FM, LSB, USB
Δf <100 kHz: 0.7 msec, typical
Δf <50 MHz: 1.2 msec, typical
Δf <500 MHz: 2.4 msec, typical
20 to 100 MHz: 1.8 msec, max.
100 to 599 MHz: 2.4 msec, max.
600 to 1200 MHz: 4.0 msec, max.
(switching across 600 MHz: 4.0 msec max.)
Receiver Tuning Time: 10 ms max.
Command Processing: 2 ms
Synthesizer Tuning Time: 4 ms
IF Settling Time: 4 ms
Tuning Accuracy:
Internal Standard OCXO: 0.1 ppm of tuned frequency
Internal/External Frequency Standard: 10 MHz

DETECTION MODES

AM, FM - all bandwidths
USB, LSB, CW - bandwidths <15 kHz

SCAN AND SWEEP

Channels: 250 programmable channels
Scan: up to 250 channels
Sweep: f1 and f2 at selected steps. Up to 125 sweep bands
Sweep and Scan Rate: 1 to 100 channels per second
Adjustable Threshold: 1 dB increments

RF SECTION

Input Impedance: 50 ohms, nominal
Input VSWR: 2:1 typical, 3:1 maximum at the tuned frequency
Sensitivity:
AM (50% modulation, 6 kHz BW): -101 dBm for 10 dB SINAD
FM (15 kHz deviation, 50 kHz BW, 1 kHz modulation): -102 dBm for 20 dB SINAD, de-emphasis on.
SSB (3 kHz BW): -111 dBm for 10 dB SINAD
Noise Figure:
13 dB typical, 20 - 1000 MHz;
16 dB typical, 1000 - 1200 MHz
RF Input Protection: 50 dB reflective attenuation. Activates at signal levels between +15 dBm and +30 dBm. Protects from input signals up to 10 watts
RF Filters: a six-band preselector set consisting of the following bands:

Band	Frequency MHz
1	20 - 93
2	93 - 156
3	156 - 260
4	260 - 430
5	430 - 720
6	720 - 1200

Automatic Gain Control (AGC):
SSB, CW : Fast attack selectable decay
Attack Time: automatically selected
Fast: <2 ms (6 kHz or greater BW) for 50 dB change. Sweep & scan only
Normal: <10 ms for 50 dB change. Product detector modes
AM, FM: average attack and decay times 50 ms nominal for 50 dB change
Decay Time: selectable 20 ms to 4 sec nominal for 50 dB change.
Dynamic Range: output level held to ±1 dB over a 110 dB range.
Threshold: -110 dBm nominal
AGC Dump: bus-controllable, time <2 ms
Manual Gain Control (MGC)
Dynamic Range: 127.5 dB in 0.5 dB steps
Automatic Frequency Control (AFC):
Tracking Range: ±5 times IF bandwidth
Acquisition Range: ±50% of IF bandwidth
Squelch: operates on selected carrier-to-noise ratios of 0 dB to 99 dB

IF SECTION

First IF: 1621.4 MHz
Second IF: 21.4 MHz
Third IF: 1.4 MHz
Fourth IF (DSP): 17 standard bandwidths (kHz); 1, 2, 3, 5, 6, 10, 15, 20, 25, 30, 35, 50, 60, 100, 150, 180, & 240. (20 - 240 kHz are available in AM or FM only)
Shape Factor: better than 1.5:1, 6 dB to 80 dB

INTERFERENCE IMMUNITY

IF Rejection: 90 dB minimum
Image Rejection: 55 dBm minimum
Blocking: attenuation of a wanted RF signal of -60 dBm and caused by an unmodulated unwanted signal of -10 dBm, spaced 20 MHz away, is less than 3 dB
Reciprocal Mixing: with an input at a rated sensitivity level in 50 kHz bandwidth, an out-of-band signal 500 kHz removed, and 52 dB higher in level will not degrade the (S+N)/N of the desired signal by more than 3 dB
Oscillator Reradiation: <-65 dBm
Generated Spurious: no more than 10 at >-100 dBm equivalent input level. No spur ≥-70 dBm
Intermodulation Distortion:
2nd Order Intercept:
20 - 100 MHz: +28 dBm min.
100 - 1200 MHz: +60 dBm min.
3rd Order Intercept:
< 100 MHz +9 dBm typical
>100 MHz +13 dBm typical
(two equal -20 dBm tones with greater than 10 MHz spacing)
Inband: -45 dBc minimum (two equal tones separated by 1 kHz or more, input level up to -20 dBm)
Synthesizer Phase Noise:

Frequency Offset	Phase Noise (dBc/Hz)
1 kHz	-73
10 kHz	-77
100 kHz	-91

ANALOG-TO-DIGITAL CONVERTER

A/D Bits: 14
A/D Sampling Rate: 2 Ms/s
A/D Dynamic Range: 80 dB

OUTPUTS

WBIF: centered at 21.4 MHz, 15 MHz min BW
NBIF: centered at 21.4 MHz, 0.4 MHz min, -6 dB BW ,
Digital I&Q: TTL (0 to +5V, 12.5 MHz)
Audio Line Output: (Normal)
AM, CW, LSB, USB: 0 ±3 dBm over AGC dynamic range, THD <3%
FM: 0 ± 3dBm for deviation equal to ±1/3 of selected bandwidth, THD <3% (de-emphasis on)

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Audio Frequency Response: 100 Hz to 15 kHz within 3 dB, 600 ohms balanced pair, short circuit protected

Audio Line Output (Alternate, optional) 600 ohms balanced pair, short circuit protected, <3% distortion at rated output (FM mode only with de-emphasis on) 0 dBm ±3dB

Video: 2V peak-to-peak into 75 ohms (deviation equivalent to 30% of selected bandwidth in FM or 50% modulation in AM)

Video Frequency Response: DC to 1/2 the IF bandwidth, -10 dB

FM De-emphasis: flat, 75 µs (60 - 240 kHz BW) or 750 µs (6 - 50 kHz BW)

Phones: 0-2Vp-p, 8 0hm load impedance to front panel phone jack. Short circuit protected. Speaker output in parallel to rear panel audio connector.

C.O.R.: NORM Carrier Operated Relay signals

Reference: 10 MHz external standard, 0dBm, 50 ohms.

INPUTS

Synthesizer Reference: 10 MHz external standard, 0dBm, 50 ohms

Antenna: 50 ohms nominal

REMOTE CONTROL

IEEE-488, RS-232 and RS-422 available. All receiver operational parameters are remotely controllable

BITE

Probability of detection is 90%. Entire receiver chain is tested. In addition, fault detectors continuously monitor voltage levels and phase lock

RELIABILITY

MTBF: 11,000 hours. Calculated based on “Naval Sheltered” (NS) as defined in MIL-HDBK-217F

MAINTAINABILITY

Mean-time-to-repair (MTTR) of not more than 30 minutes at the module replacement level.

POWER REQUIREMENTS

90 - 260 VAC, 47 - 440 Hz, 86 watts switching mode power supply.

CONTROLS AND CONNECTORS

Front Panel:

- Full alphanumeric display with full function keypad for entry of all parameters
- Control knob for selection of all parameters
- Volume ON/OFF knob
- 1/4 inch phone jack for headset

Rear Panel:

- Power Connector: IEC320
- Ref Input: BNC
- Antenna: TNC
- WBIF Out: BNC
- NBIF Out: BNC
- Digital Data: 15-pin Sub D
- Audio: 15-pin Sub D

Bus Control

- RS-232/RS-422: 25-pin Sub D
- IEEE-488: Stacking 24-pin

ENVIRONMENTAL DATA

Operating High Temperature: MIL-STD-810E, Method 501.3, Procedure II, Table 501.3-I (ambient air conditions), maximum test temperature 50°C, one cycle

Operating Low Temperature: MIL-STD-810E, Method 502.3, Procedure II, Temperature 0°C

Storage High Temperature: MIL-STD-810E, Method 501.3, Procedure I, 85°C, one cycle

Storage Low Temperature: MIL-STD-810E, Method 502.3, Procedure I, Temperature -40°C for 12 hours

Humidity: MIL-STD-810E, Method 507.3, Procedure I-Natural, Table 507.3-I, five cycles total

Shock: MIL-STD-810E, Method 516.4, Procedure VI

Vibration: MIL-STD-810E, Method 514.4 Procedure I, Category 9, Figure 514.4-15

EMI/EMC

Equipment designed to intent of the applicable requirements of MIL-STD 461/462 as a guide.

DESIGN AND CONSTRUCTION

MIL-STD-2036, Paragraph 5.1.4 as a guideline

Workmanship: MIL-HBK-454, Requirement 9 as a guideline

Interchangeability: All identical units, assemblies and replacement parts are physically, electrically and functionally interchangeable

DIMENSIONS AND WEIGHT

Standard half-rack: (CDR-3580)
8.45 inches (21.5 cm) wide
3.47 inches (8.8 cm) high
22.25 inches (56.5 cm) deep
Weight: 16 lbs (7.3 kg)

Optional full rack: (CDR-3550)
19 inches (48.3 cm) wide
3.47 inches (8.8 cm) high
22.25 inches (55.9 cm) deep
Weight: 32 lbs (14.6 kg)

OPTIONS

RCU-3100 Remote Controller: Serial bus option must be installed. Controls up to 10 receivers, expandable to 100 receivers. Line audio handling up to 10 receivers.

High Performance OCXO; 0.1ppm of tuned frequency after 10 minutes.

Data Bus: IEEE-4888, RS-232, or RS-422

Rack Mount Slides for installation of the CDR-3580 half rack.

Dual Rack Mount Kit: Hardware and slides to fasten two CDR-3580 receivers together for installation in a standard 19” rack.

Available a a single chassis 19” rack mount chassis (CDR-3550)

FINISH

Front Panel and Chassis Cover: FED-STD-595 chip 26307, semi-gloss grey enamel

Chassis: corrosion protected following guidelines established in MIL-HBK-454, Requirement 15

Handles and Silk screen Markings: matte black

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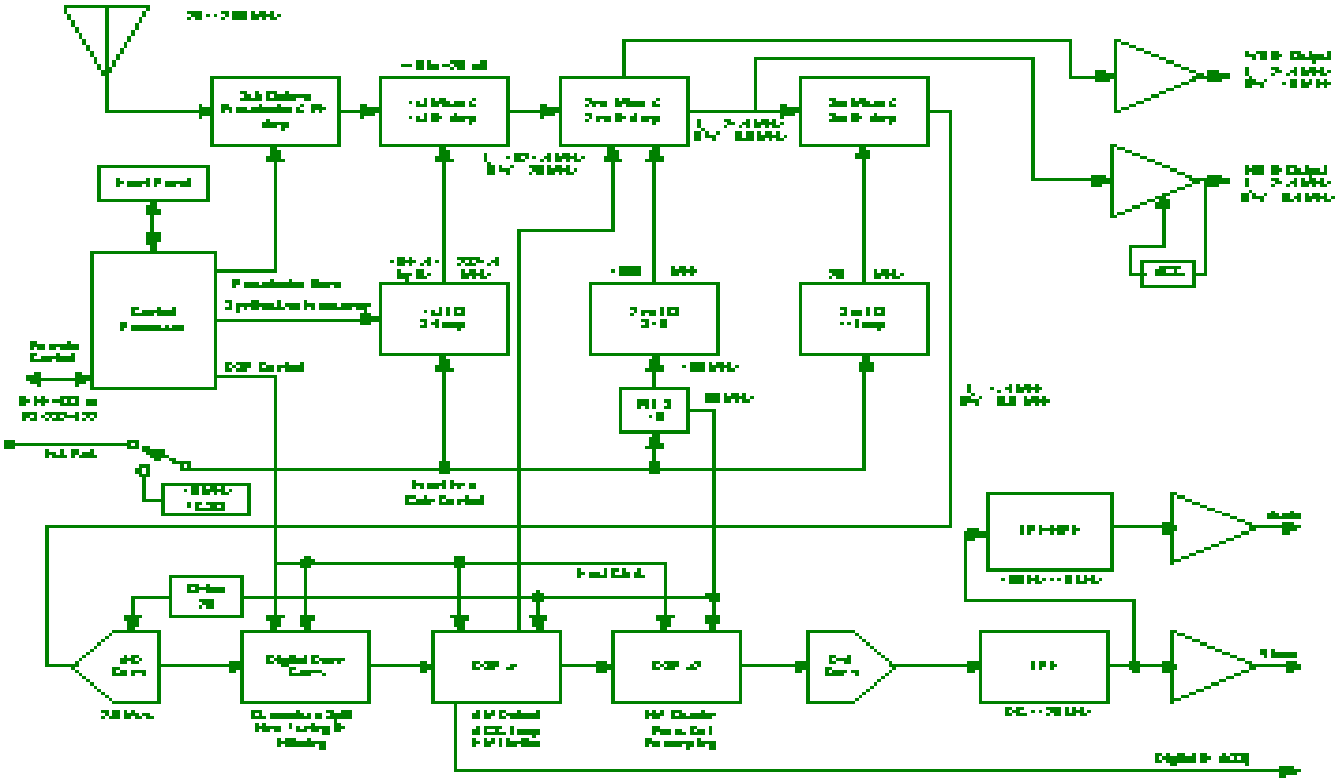

The 20 - 1200 MHz CDR-3580 receiver is a triple-conversion superheterodyne design in which the final IF filtering and demodulation are accomplished with digital signal processing (DSP) for superior accuracy and flexibility. The three intermediate frequencies (IFs) are 1621.4 MHz, 21.4 MHz and 1.4 MHz. Having the first IF above the entire tuning range assures spurious-free reception. At the third IF, the signal is converted to digital form. Digital signal processor chips then provide fine tuning, IF filtering to the selected bandwidth, and AM, FM or product detection according to the operating mode. Seventeen bandwidths are offered from 1 kHz to 240 kHz with video output up to 120 kHz. The demodulated signals are converted back to analog form for output to headphones or balanced lines.

Ordering Information

Model Number	Part Number	Description
CDR-3580	2606-1000-2	VHF/UHF Half-rack Communications Receiver, 20 - 1200 MHz
CHAS-KIT-01	2600-1000-1	Full Rack Chassis Kit, without rack slides
RKSLD-KIT-02	222-026/222-087	Rack Slides Kit
MNT-KIT-01	2600-1009-1	Dual Rack-mount Kit, Side-by-side
IEEE-KIT-01	2600-1010-1	IEEE Kit to Modify Receiver from RS-232 to IEEE
VIRTCONT-02	2800-3005-1	VHF Virtual Control Software (order with unit)

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