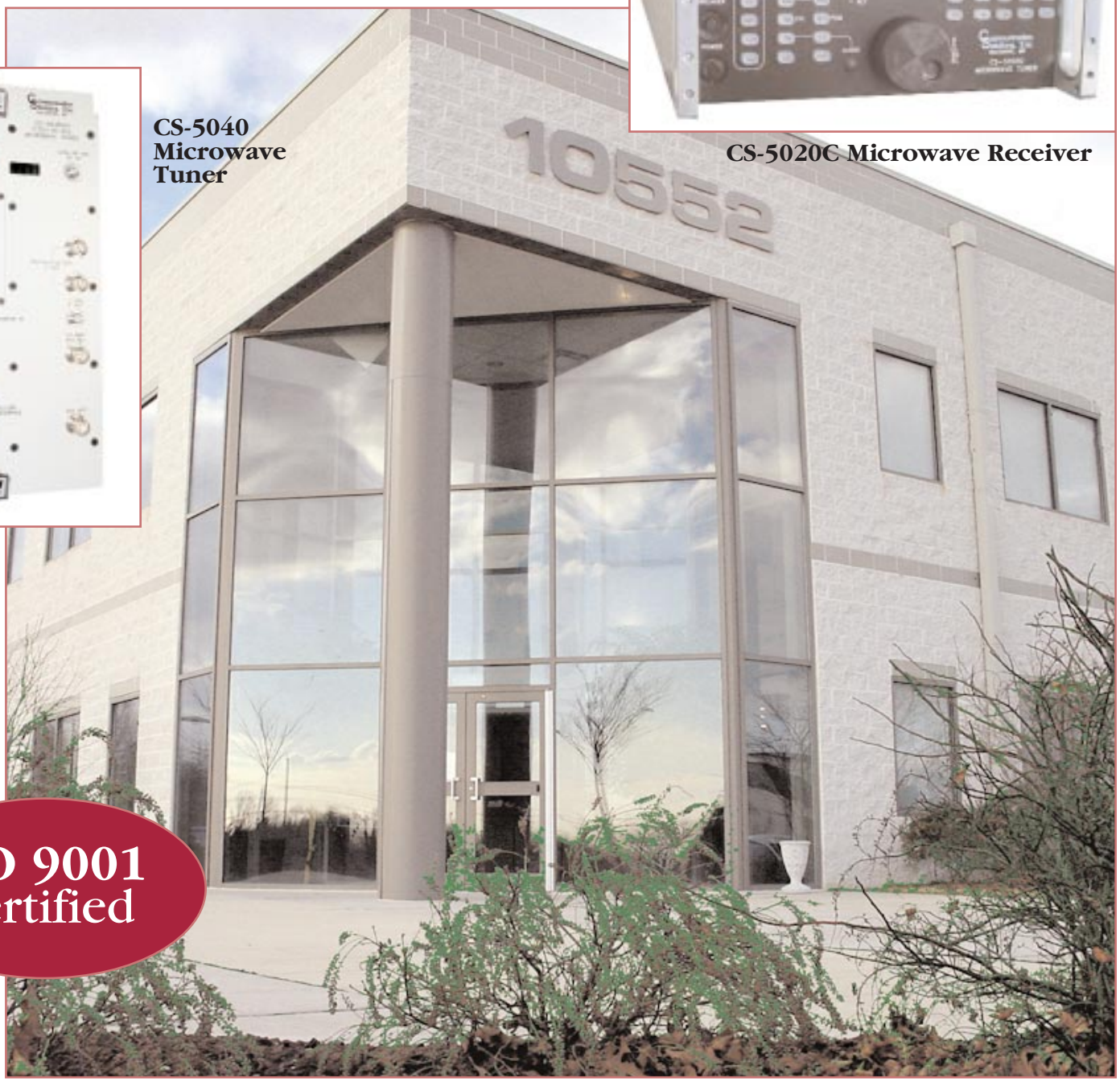
RF & MICROWAVE INSTRUMENTS

CS-5020C Microwave Receiver

CS-5040
Microwave
Tuner



ISO 9001
Certified

Communication
Solutions, Inc.

COMMUNICATION SOLUTIONS, INC.

Communication Solutions, Inc. known as COM-SOL, designs and manufactures high performance electronic instruments and sub-systems using microwave, RF and digital signal processing technologies. These instruments and sub-systems cover the frequency spectrum of DC to 110 GHz.

COM-SOL develops innovative solutions to meet COMINT and ELINT signal intercept and processing applications for military users, system designers and integrators, and the intelligence community. The company serves customers in the U.S. and allies abroad.

COM-SOL's product base includes:

- Microwave Receivers and Tuners
- Millimeter Wave Receivers and Downconverters
- Up/Down Frequency Translators
- ELINT/ESM Pulse Analyzers
- Demodulators
- Display Digitizers
- Signal Distribution Equipment
- IF-to-Baseband Converters
- Signal Sources and Other Measurement Instruments
- Rack Mount, VXI and VME Product Configurations

Celebrating 10 Years & Growing!

The **COM-SOL** team is comprised of highly skilled professionals dedicated to ethical business practices, a never ending pursuit of excellence, a "best value", high quality product and customer satisfaction!

For additional information about the company, products or employment opportunities, please visit our website at **www.comsol-inc.com**

CommEX, LLC a subsidiary of Communication Solutions, Inc.

For COMINT and DF applications, CommEX, LLC offers a complete line of high performance, cost effective HF, VHF/UHF Receivers, Tuners, N-Channel Subsystems and Spectrum Survey Tools. Please visit **www.commex-llc.com** *for the company profile and product descriptions.*

COMPANY COMMITMENT

Com-Sol strives to provide what you, the customer, want and deserve...

QUALITY

A continuous, never ending commitment to improvement

VALUE

Quality and Performance at minimum cost

CUSTOMER SATISFACTION

*You will find **Respect** and **Responsiveness** when you call Com-Sol*

Robert Biller
President
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bbiller@comsol-inc.com

Com-Sol can provide customized "Windows NT", "Windows 2000", "Visual C++" or "Visual Basic" based software to support our customer needs. Contact the factory for further details.

New products are being added as an on-going process at Com-Sol. Please call if you have a question regarding the availability of products not shown in this brochure.

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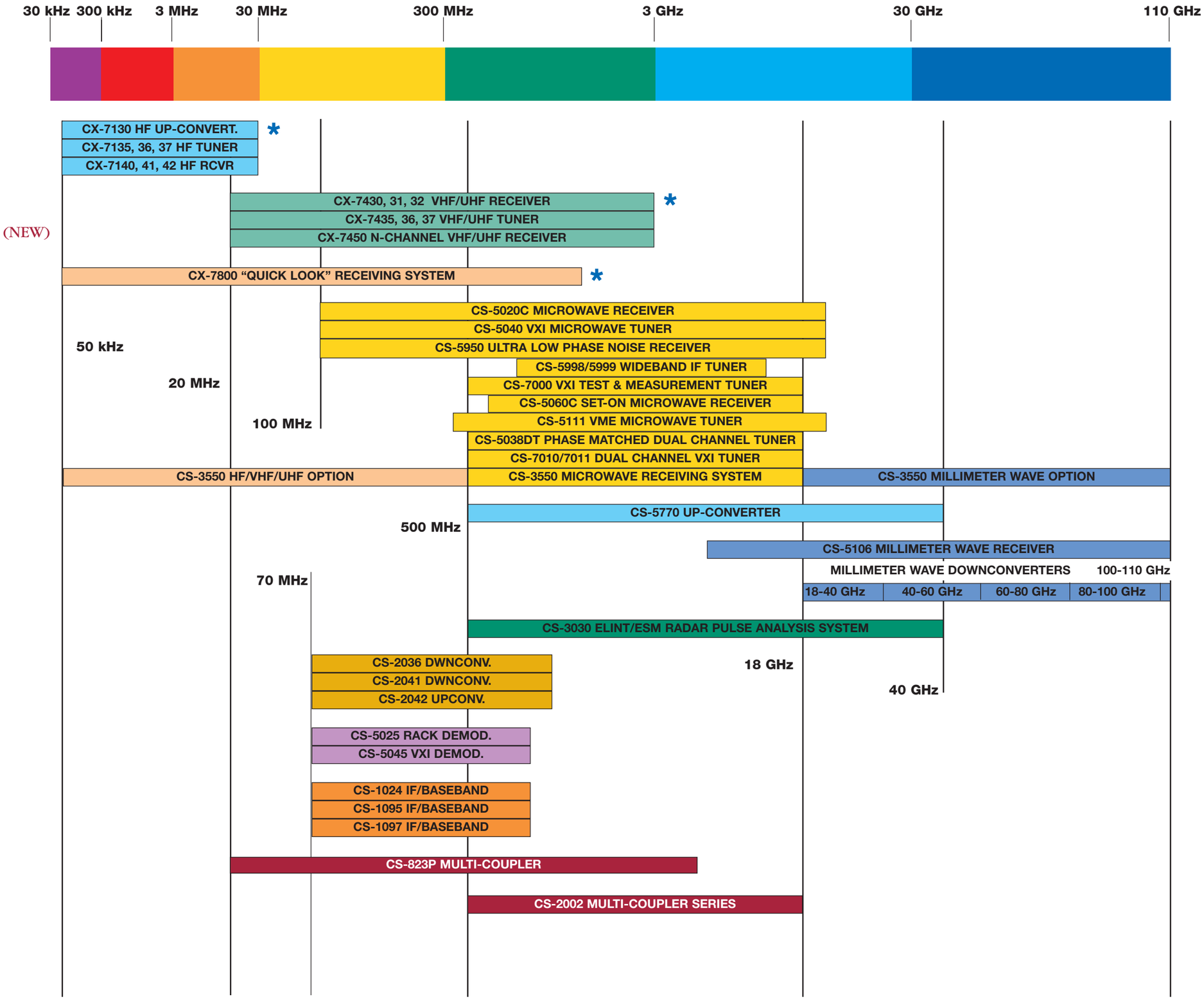


MICROWAVE RECEIVERS and TUNERS

microwave receivers and tuners

CS-5020C Microwave Receiver

- 0.5-18 GHz Standard Frequency Range
- Extension Option Down to 100 MHz and up to 22 GHz
- Low Phase Noise, < 0.5 Degrees RMS
- COMINT/ELINT Applications (SEI Certified)
- Search/Set-On Modes
- AM/FM/LOG Audio/Video and 8 IF BW's
- 70/140/160 MHz and 1 GHz/500 MHz BW IF Outputs
- Available Millimeter Wave Extenders to 110 GHz
- 2U, Half-Rack Chassis
- Front Panel and RS-232/Ethernet Remote Control
- I/A Outputs

CS-5950 Ultra-Low Phase Noise Microwave Receiver (NEW)

- Very Low Phase Noise, < 0.25 Degrees RMS
- Specifically Tailored for High Data Rate, Complex, Digital Format Signals
- Very Low RF-to-IF Group Delay and Bandpass ripple
- 0.5-18 GHz Frequency Range, Options to 0.1 and 22 GH
- Same package as CS-5020C
- Can be Configured as Receiver or Tuner
- 70/140/160 MHz and 1 GHz/500 MHz BW IF Outputs
- Millimeter Wave Downconverters for 18-110 GHz

CS-5040 VXI Microwave Tuner

- Three (3) Slot-Wide VXI Module
- Low Phase Noise, < 0.5 degrees RMS
- Search/Set-On Modes with Auto-Stop
- COMINT/ELINT Applications
- 70/140/160 MHz and 1 GHz/500 MHz BW IF Outputs
- Available Millimeter Wave Extenders to 110 GHz
- Front Panel LED Status Display

CS-5998/CS-5999 Ultra-Broadband Tuner (NEW)

- Available in 2U, Half-Rack Chassis and Three (3) Slot-Wide VXI Module
- Standard Frequency Range of 1.1-17 GHz, Option Down to 100 MHz (Restricted BW) and up to 22 GHz
- 100 Hz Tuning Resolution
- 3 GHz Center Frequency IF Output/2 GHz Bandwidth
- Search/Set-On Modes with Auto-Stop
- COMINT/ELINT Applications
- Low Phase Noise, <0.5 Degrees RMS

MICROWAVE RECEIVERS and TUNERS

CS-7000 VXI Low-Cost Microwave Tuner

- 2-18 GHz Frequency Range, Options to 0.1 & 22 GHz
- Test & Measurement Applications
- Low Group Delay, <3 ns over 40 MHz BW
- 25-31.5 GHz LMDS Option
- Three (3) Slot-Wide VXI Module
- Low-Phase Noise, <0.5 degrees RMS
- 125 kHz Standard Tuning Resolution, 10 kHz Tuning Step Size Option
- 70/140 MHz and 1 GHz IF Outputs

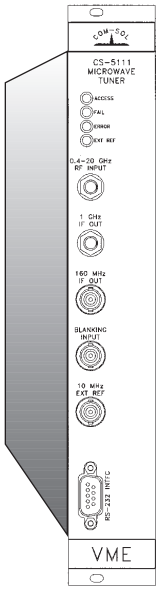
CS-7010/CS-7011 VXI Dual Channel Microwave Tuner (NEW)

- Separate Synthesizer and RF/IF Converter Modules (2-Slot Wide Synthesizer and 3-Slot Wide Tuner)
- Amplitude and Phase Matched Channels
- High Dynamic Range
- 1 GHz/500 MHz BW or 480 MHz/250 MHz BW IF's
- 2-18 GHz Frequency Range, Option Down to 0.5 GHz
- Chebychev or Gaussian IF Filter Selection for COMINT or ELINT Applications
- Designed for Airborne and Shipboard Installations
- "N" Channel Configuration Available

CS-5060 Set-On Microwave Receiver

- 0.8-6 GHz or 0.8-18 GHz Frequency Range
- Frequency Extension Options to 20 GHz, 26.5 GHz or 40 GHz
- Configure as Complete Receiver or Tuner
- Specifically Designed for FDM and PCM Applications
- Housed in 1U, Full-Rack Chassis
- Full Front Panel control with Rotary Shaft Encoder
- 4 IF Filters, AM/FM Demodulator, Audio/Video Outputs
- Less Than 0.5 degrees RMS Phase Noise
- Very Low Group Delay and Bandpass Ripple

CS-5111 VME Elint Microwave Tuner (NEW)



Call for Availability

- 0.4-20 GHz Frequency Range
- 10 kHz Tuning Resolution
- Fast Synthesizer Switch Speed, <1 Millisecond
- 1 GHz/500 MHz BW and 160 MHz/80 MHz BW IF's
- ELINT Applications, Use with CS-3001 Pulse Analyzer
- Built-In Blanking and attenuator Options
- CS-5110 COMINT version available

millimeter wave receivers and downconverters

MICROWAVE RECEIVERS and TUNERS

CS-5038 Dual Channel Matched Tuner

- 0.5-18 GHz Frequency Range
- Amplitude and Phase Matched channels
- Housed in 2U, Full-Rack Chassis
- Front Panel and RS-232 or Ethernet Remote Control
- 1 GHz and 160 MHz IF Outputs
- I&Q Outputs with 100 MHz BW
- High Dynamic Range
- LOG Video Outputs
- AGC/MGC with 50 dB Gain Control

CS-3550 Microwave Signal Collection System

- 0.5 to 40 GHz Frequency Range
- Can be extended down to 50 kHz using CommEX HF/VHF/UHF receivers and up to 110 GHz
- Automatic and Manual Search Routines
- Windows NT Operator Screens
- VXI Plug'N Play Format and RS-232 or Ethernet I/O
- Signal Hand-Off and Monitoring
- RF and IF Spectral Displays
- Analog and Digital Baseband Outputs

MILLIMETER WAVE RECEIVERS and DOWNCONVERTERS

CS-5106C Low Cost Millimeter Wave Receiver

- Frequency range from 4 to 110 GHz
- Select Plug-In Heads to Cover 3 or 6 GHz Wide Bands
- Remote Tuning Head Option
- Very Low Phase Noise and 1 kHz Tuning Resolution
- Windows NT, GUI and Device Driver Software provided
- Configure as Tuner or Complete Receiver
- 70 MHz /50 MHz BW or 140 MHz/80 MHz BW IF's
- FM Video Output
- 1U, Half-Rack Chassis

Millimeter Wave Downconverters

- Extends Range of CS-5020C, CS-5040, CS-5950, CS-7000, CS-5111, and CS-5038 Receivers/Tuners
- Standard Bands of 18-40 GHz, 40-60 GHz, 60-80 GHz, 80-100 GHz and 100-110 GHz
- Small Size, Suitable for Mounting at Antenna
- Waveguide "K" or "V" RF Input Connector Options
- Low Noise Figure and High Dynamic Range
- +20 dBm Input Protection
- Optional Low Noise Preamplifier

FREQUENCY CONVERTERS

CS-2036 VXI Dual Downconverter

- 750-1250 MHz Input Frequency
- 70 MHz, 140 MHz or 160 MHz IF Output
- Dual Channels in a 1-Slot Wide VXI Module
- Independently Tuned Channels
- Synthesized 100 Hz Step Size
- Low Phase Noise and Excellent Group Delay
- VXI Bus or Front Panel RS-232 Control
- High Dynamic Range, +9 dBm Third Order IP
- Low Noise Figure, Less than 9 dB

CS-2041 Downconverter

- 750-1250 MHz Input Frequency
- 100 Hz Tuning Resolution
- 70 MHz, 140 MHz or 160 MHz IF Output
- 1U, Full-Rack Chassis
- Front Panel and RS-232 Control
- Second Independently Tuned Channel Option
- Low Phase Noise and Excellent Group Delay
- High Dynamic range and Low Noise figure
- External and Internal 10 MHz Reference

CS-2042 Upconverter

- 750-1250 MHz Output Frequency
- 100 Hz Tuning Resolution
- 70 MHz, 140 MHz or 160 MHz Input Frequencies
- 1U, Full-Rack Chassis
- Front Panel and RS-232 Control
- Second Independently Tuned Channel Option
- Low Phase Noise and Excellent Group Delay
- High dynamic Range and Low Noise figure
- External and Internal 10 MHz Reference

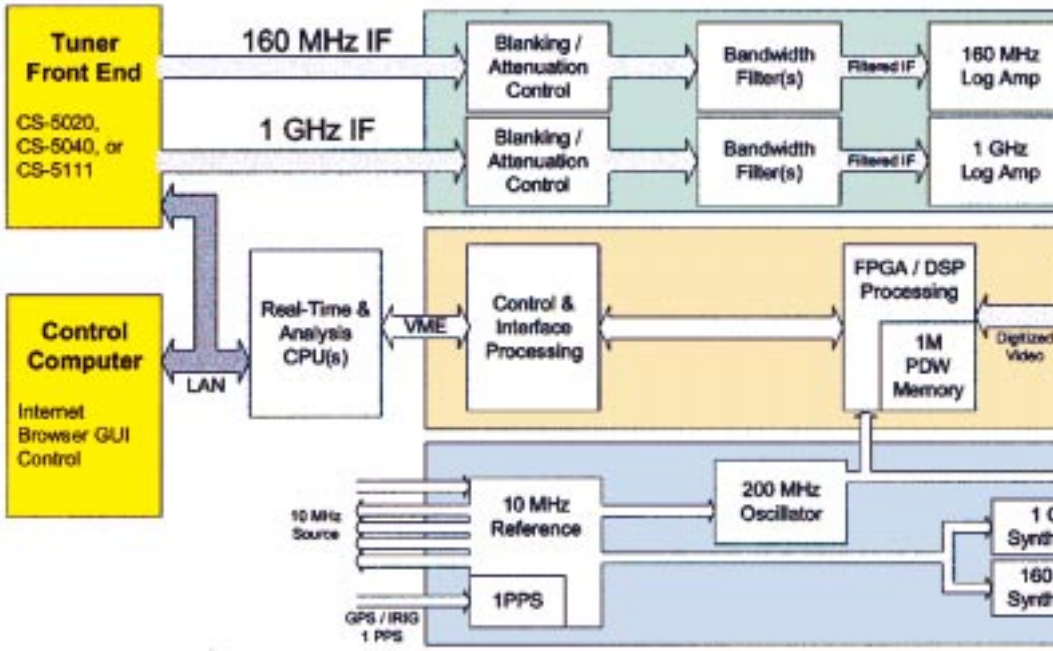
CS-5770 Microwave Upconverter

- Converts 70/140/160 MHz or 1 GHz Input up to any frequency in the 0.5 to 20 GHz Range
- 100 Hz Tuning Resolution
- Up to +10 dBm Output Level
- Low Phase Noise, <0.5 Degrees RMS
- >100 dB Output Level Control
- Millimeter-Wave Frequency Extension Options to 40 and 60 GHz
- Excellent Group Delay
- 2U, Half-Rack Chassis

CS-3001 pulse analyzer (new)

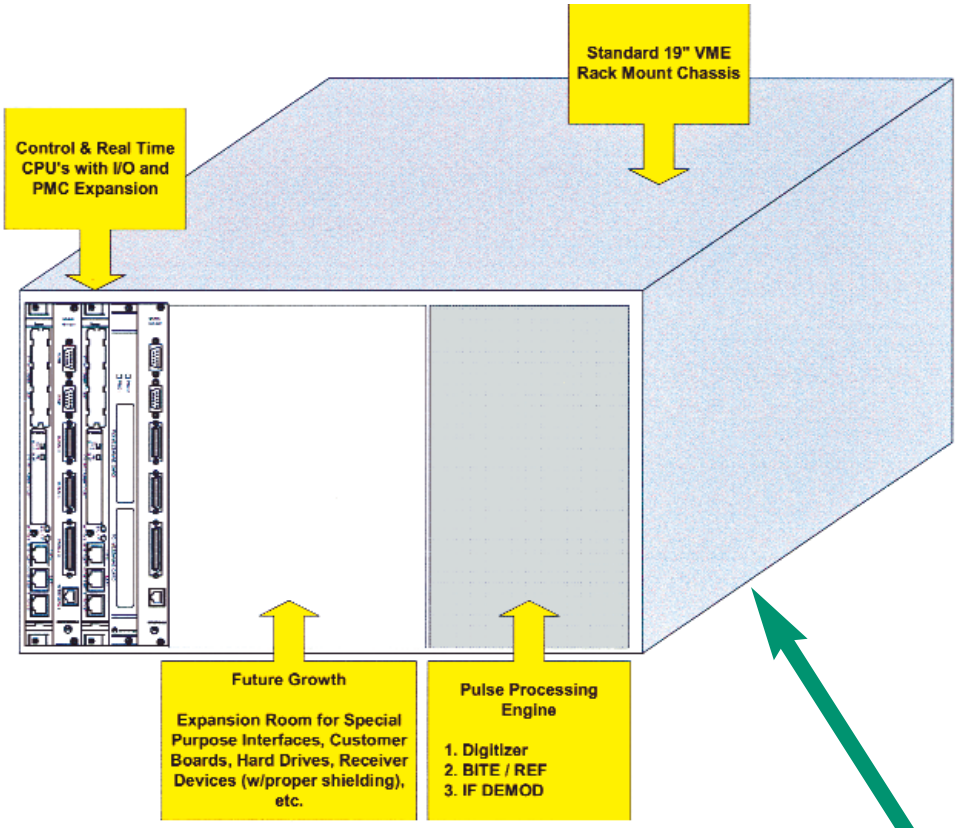
CS-3001
PULSE ANALYZER (NEW)

- Accepts 160 MHz and 1 GHz IF Inputs
- Provides De-Interleaved Mention 160 Bit Only 160 Bit Pulse Descriptor Words (PDW's)
- Uses a Mixture of Analog Hardware, High Speed Digitizers and Advanced DSP
- Available as a VME Card SET, or Complete Self-Contained Analyzer in VME Enclosure
- Windows NT/2000 Acquisition, Collection and Analysis Operator Screens
- Automated and Very Comprehensive Manual Operating Modes

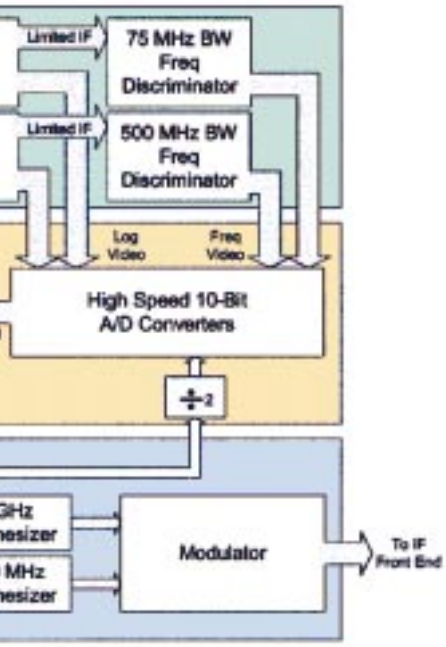


CS-3001 Block Diagram

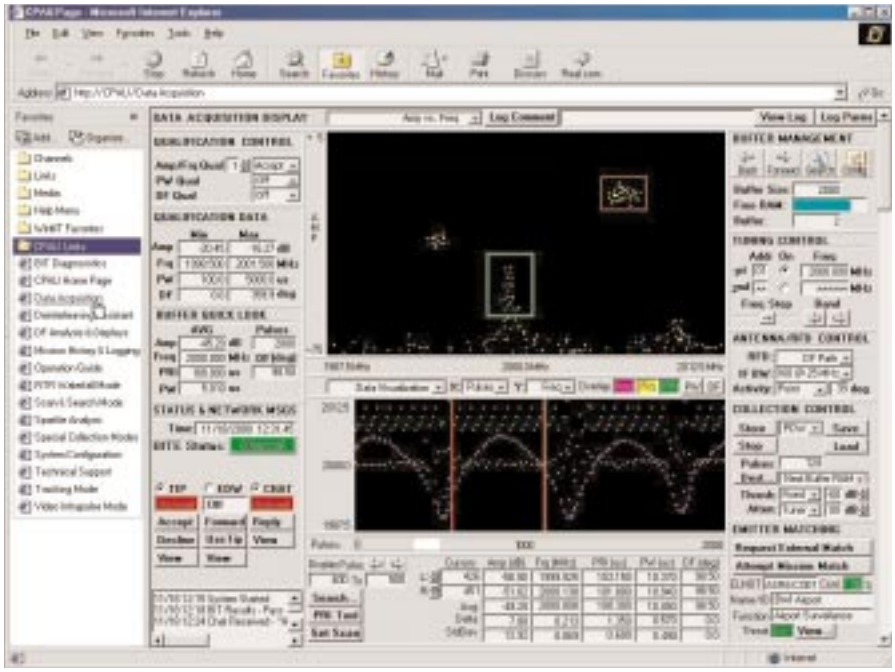
- Performs Intrapulse Measurements, Generates Intrapulse Descriptor Words (IDW's)
- Pulse Accuracy to +/- 20 nsec.
- 5 ns TOI Hardware Resolution
- 1 ns PW and PRI Display Resolution
- 1 Million On-Board PDW Storage
- Processes Up to 3 Million Pulses per Second
- AMOP, FMOP and PMOP Flags
- Continuous RTR (PRI vs. Time) Displays
- + 5 to -75 dBm Display Amplitude Range
- 24 kHz Frequency Resolution in 25 MHz BW
- DF Resolution (12-Bits/360 Degrees)
- Precision Graphic Analysis, Visualization, and Statisical Data Displays



CS-3001 VME Enclosure Layout

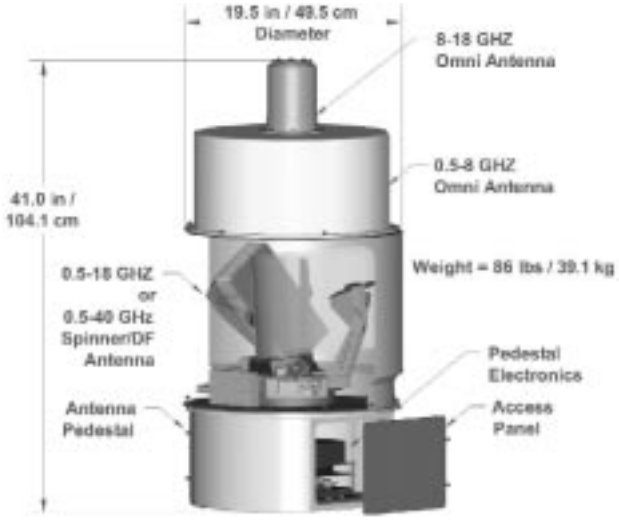


- Pulse Analysis Engine Comprised of:
- IF Demodulator for 160MHz/1GHz IF Inputs
- Proprietary High Speed Digitizer
- Dual High Performance CPU's for Control and Analysis Functions
- BITE and Timing Module
- Occupies 7 VME Slots
- Optional Interfaces for NAV/GPS Inputs
- 1, 10, 25, 75 and 500 MHz IF Bandwidths
- Measures Frequency, Amplitude, Pulse Width, PRI, TOI and Latched DF Angle

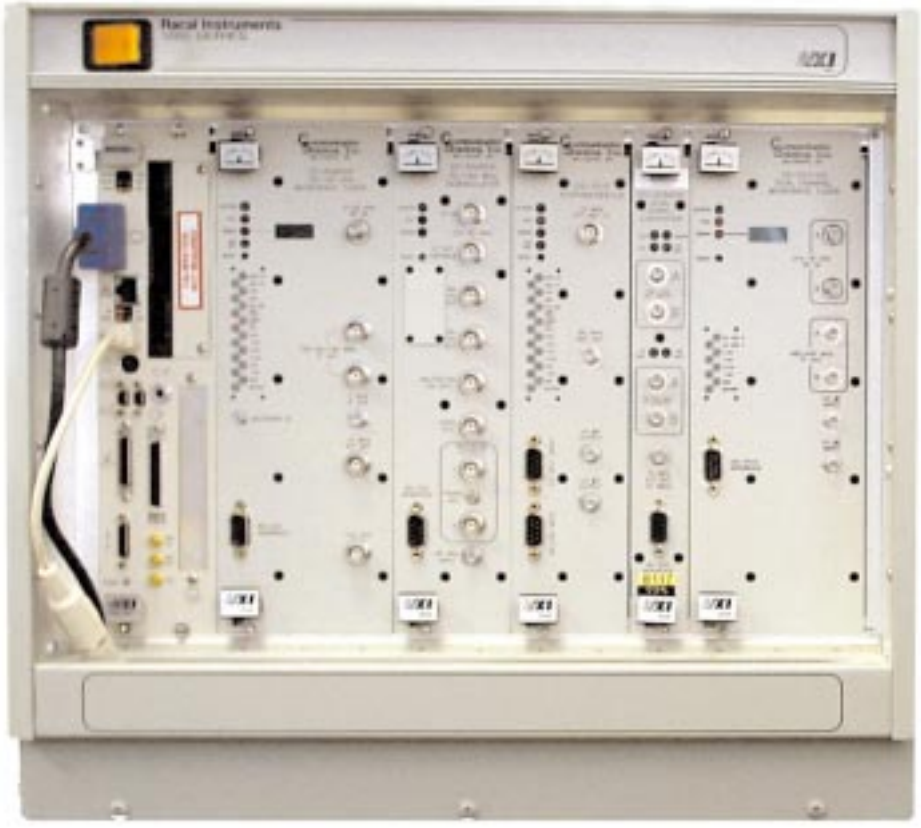


CS-3030 ELINT/ESM SYSTEM (NEW)

- 0.5-18 GHz Frequency Range, Options 0.1-0.5, 18-40GHz
- Mobile, Airborne and Shipboard Applications
- 360 Degree Azimuth Coverage, DF Spinner/Omni Antennas
- 3 Degrees RMS DF Accuracy
- Automated and Manual Operating Modes
- Precision ELINT Collection and Analysis Functions
- Algorithmic/Visual De-Interleaving Enhances Signal Separation in Dense Radar Environment
- 500 MHz BW for High Probability of Intercept
- Supports 32 Stagger Levels with 10% Jitter
- Real-Time Amplitude Vs. Frequency Displays
- Matches Local Mission with External Centralized Database
- 10,000 Emitter Entries/Modes for Local Database
- Video Intrapulse Collection Capability



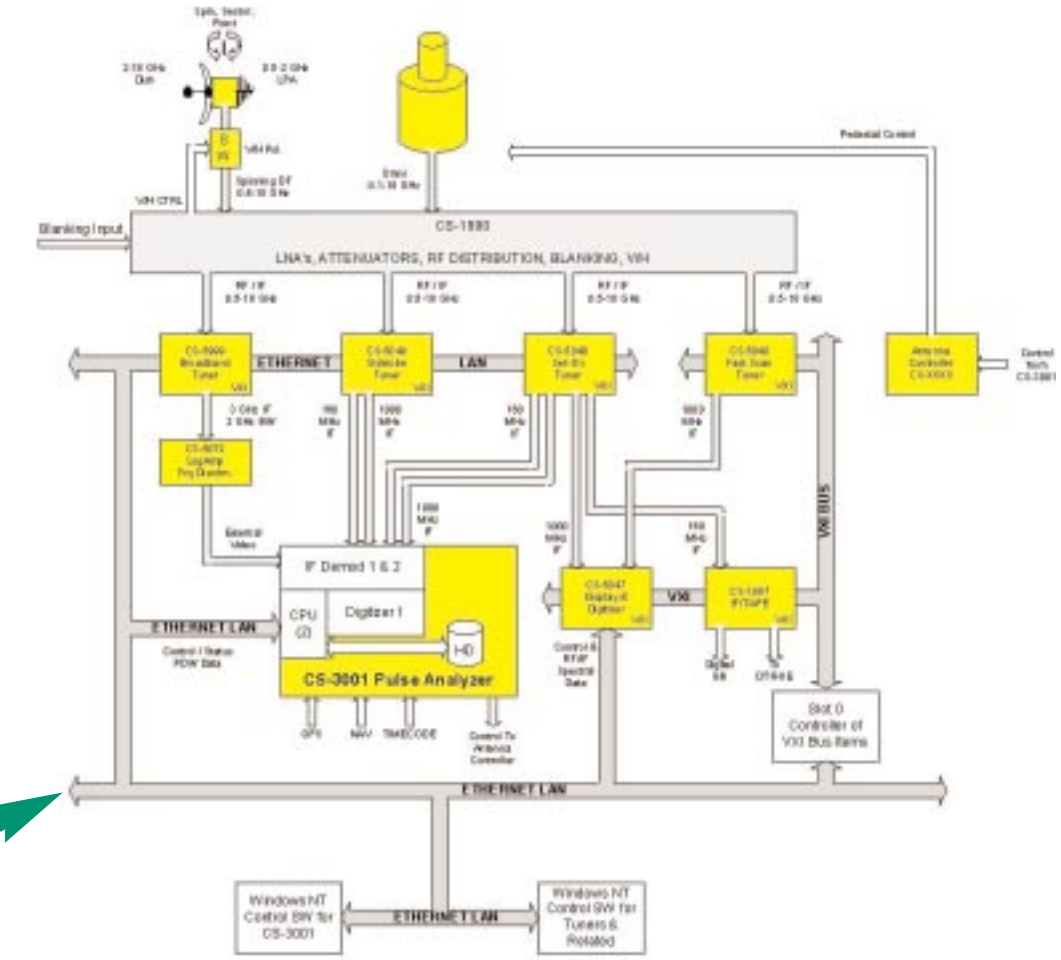
CS-1018 DF Antenna



VXI Enclosure Layout

- Compatible with CS-5020C, CS-5040 VXI and CS-5111 VME Microwave Tuners
- Additional Tuner Provides Sidelobe Suppression Capability
- Additional Tuner Performs Fast Scan Search Function With Comprehensive RF and IF Spectral Display (Allowing Simutaneous Search and Acquisition)
- CS-5999/CS-5072 Ultra-wide (2 GHz BW) Tuner Option
- CS-1097 IF/Tape Converter for Real-Time Record
- RFD Unit Accepts External Blanking
- Optional Step Attenuators and Limiters Available

CS-3030 elint/esm and block diagram system (new)



Typical Aplication Block Diagram

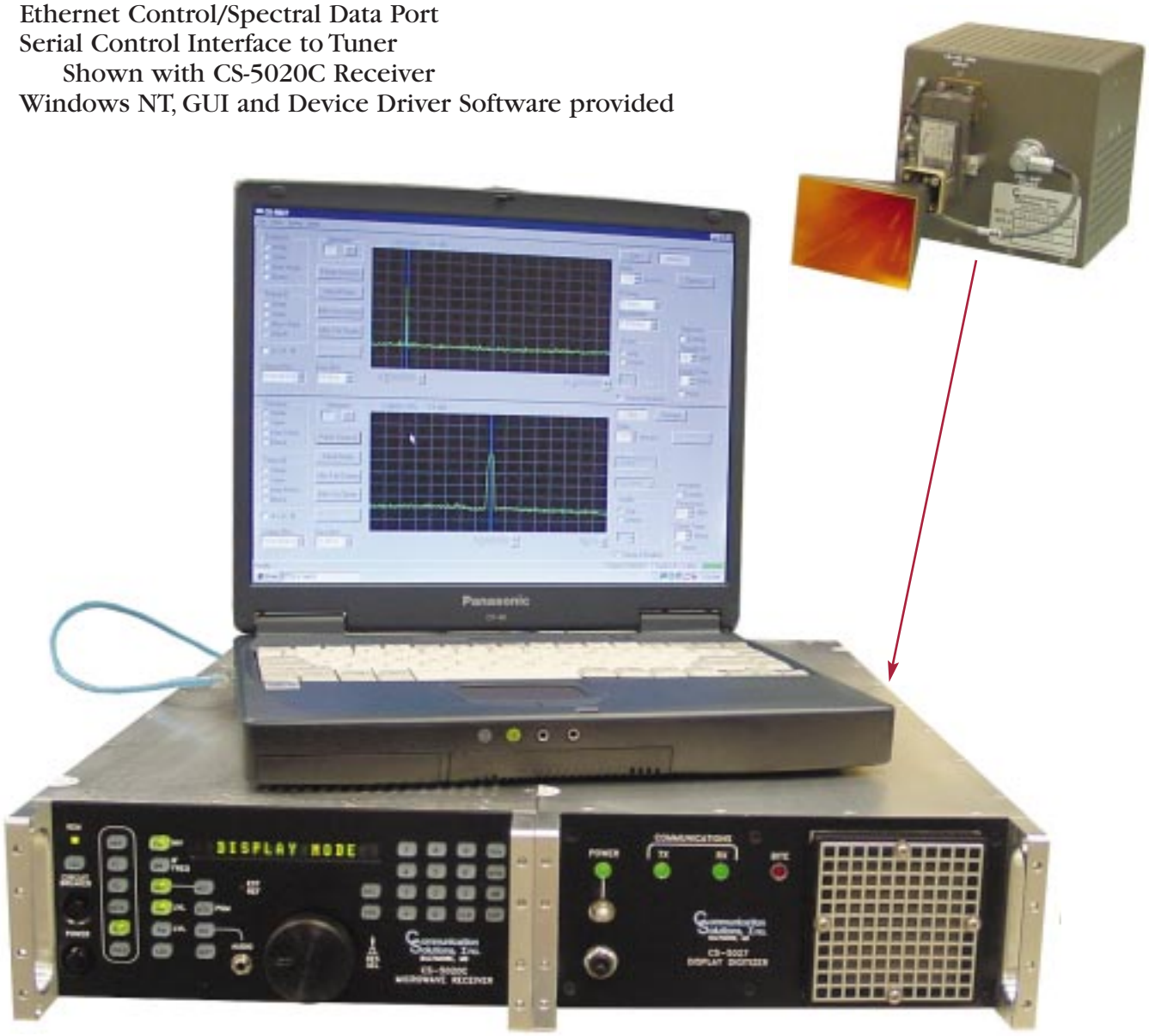
CS-5040 VXI Tuner

CS-5047 VXI Display Digitizer

DISPLAY DIGITIZERS and DEMODULATORS

CS-5027 Display Digitizer

- CS-5020C Receiver Compatible
- Sweep, Auto-Stop and SDU modes
- 21.4, 70, 140, 160 MHz and 1 GHz IF Inputs
- Full-Band RF and IF Pan Spectral Displays
- Single Sweep Channel and Six (6) IF input Channels
- Second Sweep channel Option Available
- Optional 1 kHz to 40 MHz Baseband Input
- Ethernet Control/Spectral Data Port
- Serial Control Interface to Tuner
  Shown with CS-5020C Receiver
- Windows NT, GUI and Device Driver Software provided



Shown with CS-5020C Receiver and CS-5020-K/Ka Downconverter

DISPLAY DIGITIZERS and DEMODULATORS

CS-5025 Demodulator

- 1U Half-Rack Chassis with Front Panel Controls
- RS-232 Remote Control
- 70, 140, 160 MHz and 1 GHz IF Inputs
- Up to Eight IF Bandwidths from 250 kHz to 50 MHz
- AM/FM/LOG Video Outputs
- AM/FM Audio Outputs
- Low Group Delay
- Pre-Detected Filtered IF Output
- RS-232/IEEE - 488/Ethernet Interfaces Available

CS-5045 Demodulator

- VXI Version of CS-5025
- 2-Slot Wide VXI Module
- Control via VXI Bus or Front Panel RS-232 Port
- Use with CS-5040 VXI Microwave Tuner
- 70, 140, 160 MHz and 1 GHz IF Inputs
- Up to Eight IF Bandwidths from 250 kHz to 50 MHz
- Low Group Delay
- AM/FM/LOG Video Audio Outputs
- I/Q Outputs

CS-5047 Display Digitizer

- VXI version of CS-5027
- 2-Slot wide VXI Module
- CS-5040 Tuner Compatible
- Front Panel Ethernet Port
- Front Panel Tuner Control Serial Port
- Graphical User Interface in Windows NT
- Designed for PC Workstation/ Notebook Computer
- On Screen Alphanumerics/Symbols for Signal Level, Frequency and Markers
- Log and Linear Displays

IF-to-BASEBAND CONVERTERS

CS-1024 IF-to-Baseband Converter

- Accepts 70, 140, 160 MHz IF Inputs
- Option for 1 GHz or Tunable 21.4-160 MHz Input
- Very Low Differential Group Delay
- Up to 5 Standard Bandwidths from 2 to 40 MHz
- Optional BW's down to 250 kHz and up to 80 MHz
- 75 dB AGC/MGC Gain Control Range
- 1 U Full Rack Chassis
- Front Panel and RS-232 Remote Control
- Perfect Match for New Wideband Analog Recorders

CS-1095 IF-to-Baseband Converter

- Accepts 70, 140, 160 MHz IF Inputs
- Option for 1 GHz or Tunable 21.4-160 MHz Input
- Up to 7 Standard DSP Bandwidths from 2 to 20 MHz
- "Brick Wall" Filter Shape factor with Excellent Repeatability Over Time and Temperature
- Extremely Low Group Delay (< 10 ns)
- Optional Narrowband DSP Filters from 3 to 375 kHz
- 1U Full Rack Chassis
- Optional "Snapshot" Digitizer and Playback Feature

CS-1097 IF-to-Baseband Converter

- VXI Version of CS-1095
- Housed in 2-Slot wide VXI Module
- High Dynamic Range
- High Signal-to-Noise Ratio, > 50 dB
- Low Noise Figure,< 15 dB
- Group Delay < 10 ns Over 85% of the Bandwidth
- Standard DSP Bandwidths Between 2 and 20 MHz
- Real Digital or I&Q Digital Outputs
- 0.2-1.2 Vrms Analog Output
- Control via VXI Bus and Front Panel RS-232 Port
- CS-1098 Low Cost Analog IF-to-Baseband Converter Available in Single-Slot VXI Package. Contact Factory for More Information.

PERIPHERAL PRODUCTS

CS-801 Broadband Linearizer-Amplifier

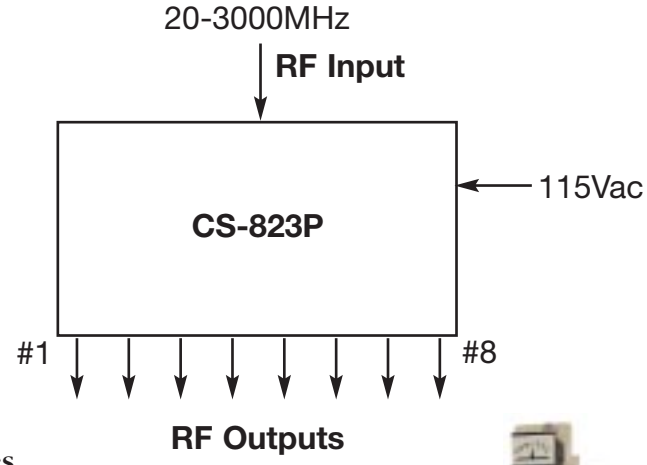
- 2-18 GHz Broadband or Band segments
- Matched Cable (up to 50') and Amplifier
- Corrects for the Negative Gain Slope of Long Coaxial Cable Runs
- Low Noise figure, 6 dB Typical
- 0 dBm Third Order IP
- Increases System Dynamic Range
- Small Size, 2"H x 3"W x 0.5"D
- 0-50 Degree C Operating Temperature

CS-2002 Series Microwave Multi-Coupler

- Models C through I for Different Band Segments from .01 to 18 GHz
- 70 dB Typical Output to Output Isolation
- 90 dB Typical Output to Input Isolation
- 10 dB Maximum Noise Figure
- 0 dBm 1 dB Compression Point
- +7 dBm Typical Third Order IP
- 0 dB, +/- 3 dB Gain
- 1U Half Rack Chassis

CS-823P RF Multi-Coupler

- Wide 20-3000 MHz Frequency Coverage
- High Dynamic range
- Low Noise figure
- 0 dB, +/- 3 dB Gain
- Better Than 6 dB Gain Flatness Over Entire Range
- 1 Input and 8 Outputs
- High Output to Input/Output to Output Isolation
- Choice of Type N or SMA Connectors
- 1 U Full Rack Chassis or Custom Enclosures



CS-824 VXI RF Multi-Coupler

- 1 Input and 16 Outputs
- Single-Slot VXI Package
- 50kHz to 1GHz Frequency Range
- SMA RF Connectors
- 10 dB Noise Figure
- High Dynamic Range
- Optional units available for coverage up to 3 GHz

EXPORT REGULATIONS

All exports of the hardware and/or software referenced in this catalog may require a United States Department of State Export License, or exemption as regulated by the International Traffic in Arms Regulation (ITAR).

WARRANTY

Communication Solutions, Inc. is an ISO-9001 certified Engineering and Manufacturing facility serving the Signal Intelligence Community and the Test & Measurement Industry.

All units are warranted for a period of one year against manufacturing defects in materials or workmanship, provided that the unit is returned to the manufacturer's designated facility. This warranty is specifically limited to the repair or replacement of the unit, and does not include liability for consequential damages or physical damage caused by other parties.

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