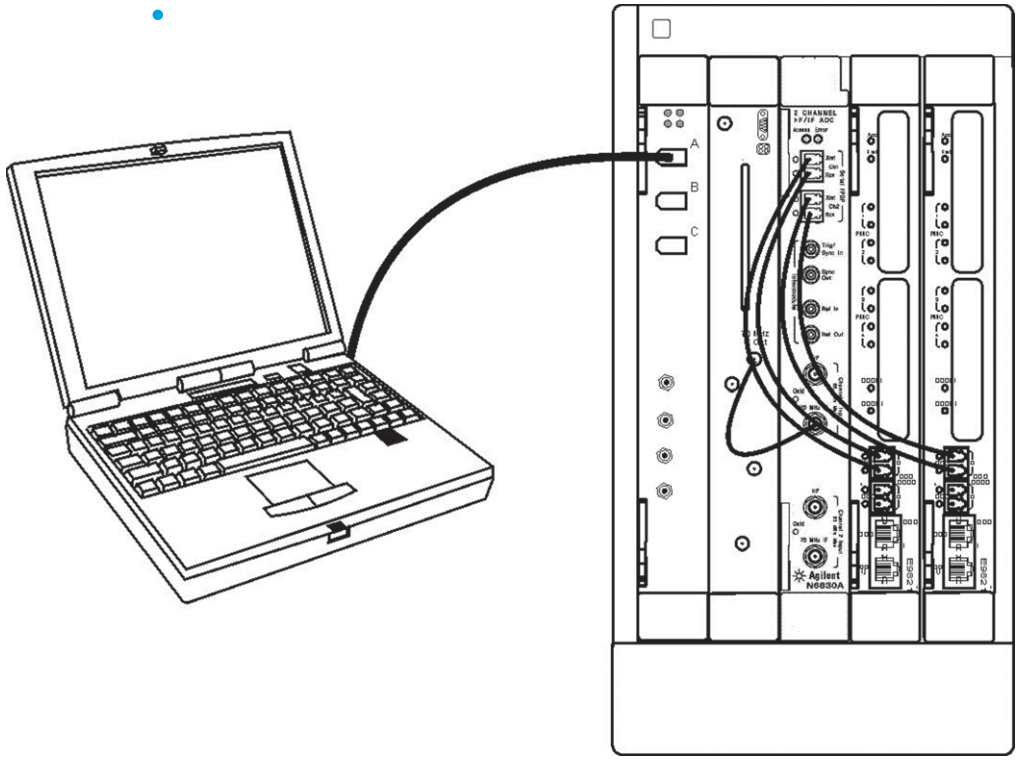
Agilent E3238S/N6820E Signal Survey System

Configuration and Performance Reference



Introduction

The E3238S/N6820E signal monitoring systems include the hardware components and system configurations for a complete signal monitoring solution. Microwave frequency monitoring uses Agilent's PSA series of spectrum analyzers as the tuner in the system. The N6820E is software specifically designed for global signal survey tasks.

This configuration and performance reference guide will describe:

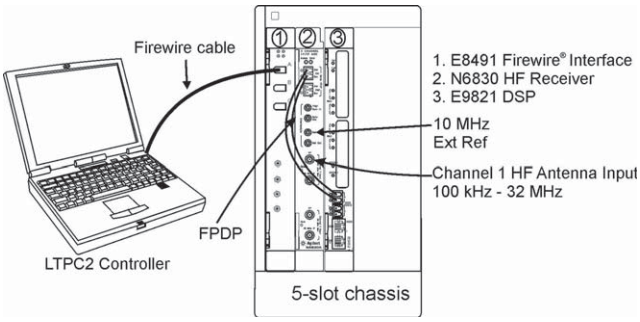
- Typical search and collection subsystems
- Foundation components for building a system
- Application software for an E3238S/N6820E system
- Acquisition and processing performance attributes of the system
- Standard characteristics for systems including size, weight, power and cooling requirements

Agilent Technologies

1 Typical Search and Collection Systems

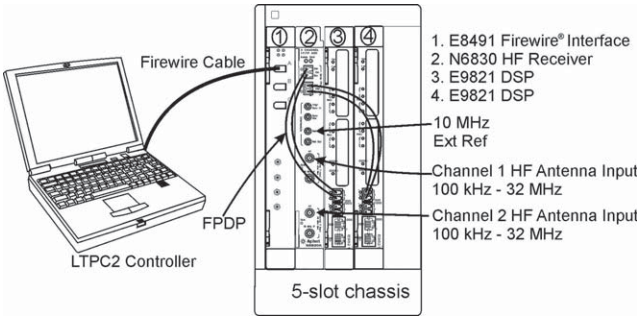
The following are examples of E3238S/N6820E systems based on the Agilent N6830A HF Receiver and 70 MHz IF ADC. The Agilent N6830A is a dual channel HF receiver and 70 MHz IF ADC used exclusively in Agilent's E3238 systems. This module is configured for monitoring HF signals from 100 kHz to 32 MHz and for monitoring V/UHF signals using the 70 MHz IF ADC input.

The N6830A increases system flexibility with dual channels for HF or 70 MHz IF for V/UHF. Both channels can be used for HF, 70 MHz IF for V/UHF, or a combination of HF and 70 MHz IF for V/UHF. When used as an HF Receiver, the N6830A does not require an additional HF Tuner since that capability is already built into the N6830A.



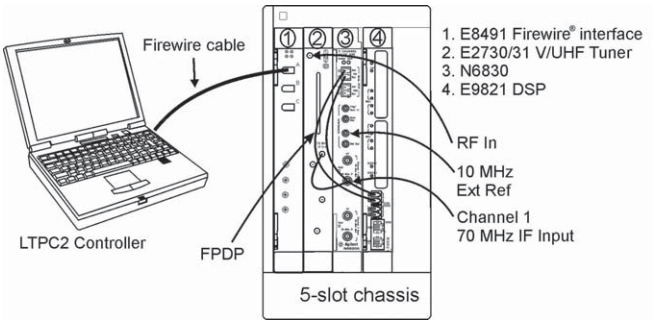
HF search and collection

The N6830A allows you to have an HF search and 32 channel narrowband collection system using only three slots of a VXI mainframe. Additional narrowband channels can be added to the system by adding E9821 DSP modules. Each additional E9821 DSP module can add 32 to 96 narrowband channels. An HF system in a five slot VXI mainframe can have up to 224 narrowband channels for collection.



Dual channel HF search and collection

The N6830A allows you to have two independent HF search and 32 channel collection systems that only use four VXI mainframe slots. The fifth slot could be used for 32 to 96 additional narrowband channels, or an E2730/31B tuner can be added to create a dual channel HF and V/UHF Interceptor system. These two HF systems are totally independent of each other and run different instances of the N6820E software. Since both instances are run from the same computer, only one software license is required.

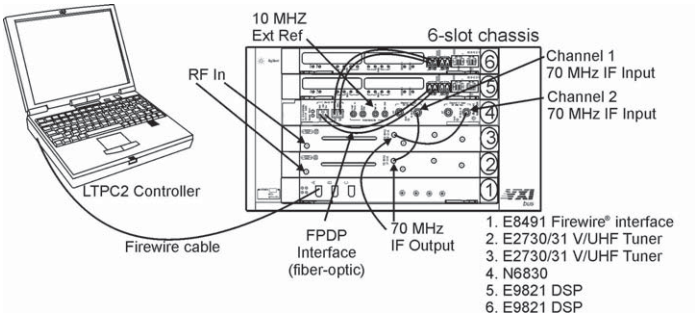


V/UHF search and collection

A V/UHF search and 32 channel narrowband collection system uses only four slots of a VXI mainframe. Additional narrowband channels can be added to the system by adding E9821 DSP modules. Each additional E9821 DSP module can add 32 to 96 narrowband channels. The typical DSP configuration for most signal types is one dual G4 processor (Option 101) for each 32 channel digital downconverter (DDC, Option 200). With this configuration, each additional E9821 DSP adds 64 digital downconverters for narrowband channelization.

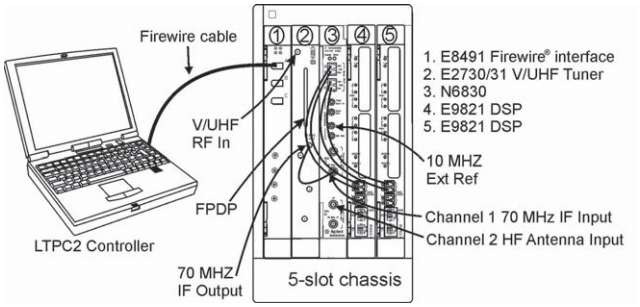
Dual channel V/UHF search and collection

The N6830A allows you to have two independent V/UHF search and 32 channel collection systems that only use six VXI mainframe slots. These two V/UHF systems are totally independent of each other and run different instances of the N6820E software. Since both instances are run from the same computer, only one software license is required.



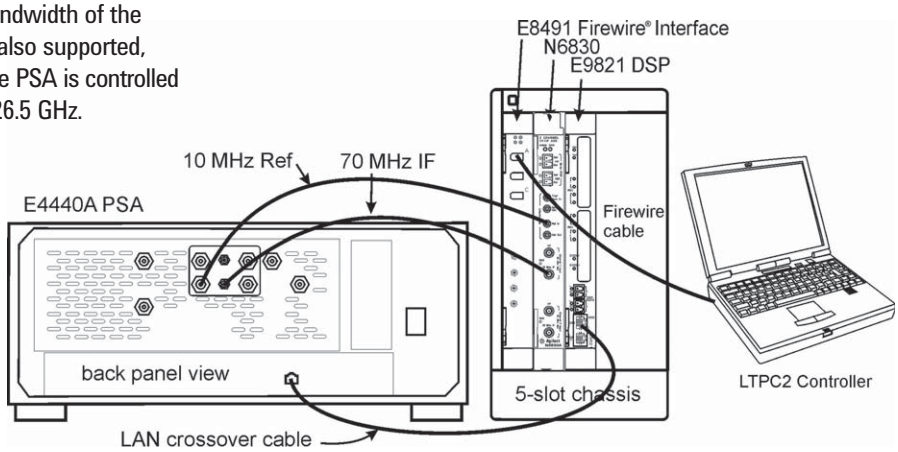
Simultaneous HF/V/UHF search and collection

The N6830A allows you to have an HF search and 32 channel collection system and a V/UHF search and 32 channel collection system in a five slot VXI mainframe. These two systems are totally independent of each other and run different instances of the N6820E software. Since both instances are run from the same computer, only one software license is required.



Microwave search and collection

The Agilent E4440A PSA can be used as a tuner for a very broad search of the RF spectrum to include microwave frequencies. The N6830A 70 MHz IF input bandwidth of 36 MHz matches the 70 MHz IF output bandwidth of the PSA with Option HY7. PSA Option H70 is also supported, but Option HY7 has better performance. The PSA is controlled via LAN to allow search from 100 kHz to 26.5 GHz.



N6841A RF sensor search

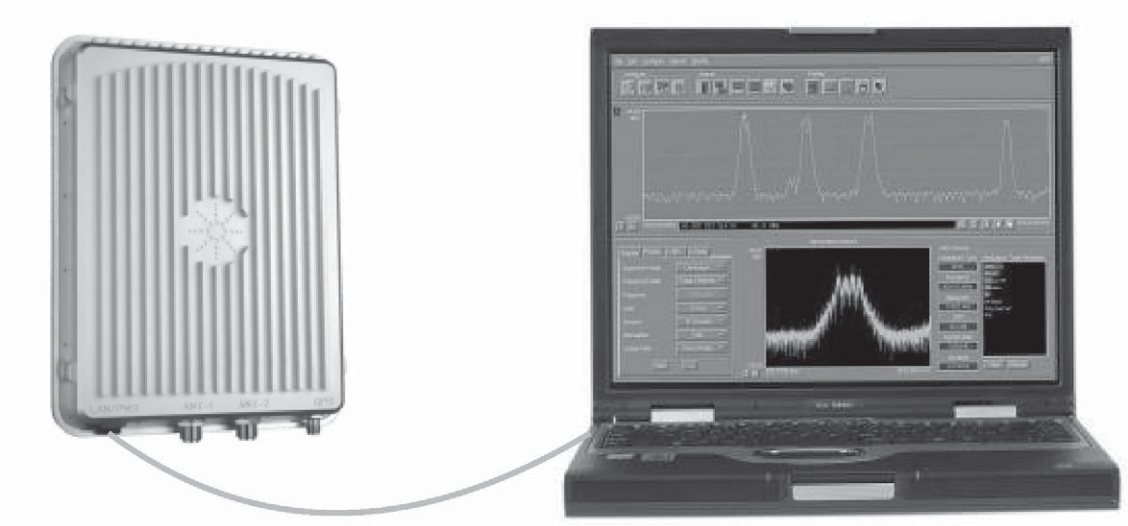
The Agilent N6841A is an outdoor deployable, low-cost, wideband digital RF receiver designed for high-density close-in deployment. A typical N6820E signal survey software setup is up to eight sensors connected per server PC via a LAN network running four instances of the N6820E software. Only one N6820E software license is required for this configuration.

The N6841A's weatherproof enclosure and wide operating temperature range allows it to withstand the harshest of environments. The small low-profile form factor offers many discreet mounting options.

The capabilities supported with the N6841A RF sensor are wideband capabilities. If you need narrowband capabilities, like multi-channel recording, you will need to use the VXI hardware that supports digital down convertors.

Key features of the N6841A interface to the N6820E software are:

- High speed and high resolution search receiver
  - General and directed sweeps
  - Energy detection
  - Alarms
- 20 MHz to 5.9 GHz frequency coverage
- 20 MHz of information BW
- Deep capture memory
- Modulation recognition (Opt MR1)
- Wideband universal signal detection (Opt USD)
- Integrated GPS for time and location (Opt GPS)
- Snapshot (IQ time block)
- Antenna switching



2 Typical Subsystem Configurations

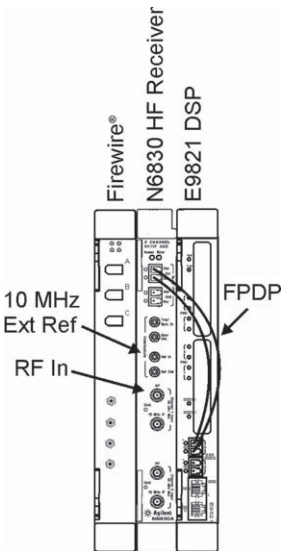
Search subsystems
Every E3238 system must have at least one search subsystem. The E9821A DSP module is used for all signal search subsystems, but the tuners and digitizer configurations are selected depending upon the frequency range of interest.

HF, VHF/UHF, and microwave coverage
Since the system is built using modular hardware, it is easy to reconfigure a system for different missions. To change the coverage of search frequencies, simply change the E3238's tuner and use the appropriate input of the N6830A HF Receiver and 70 MHz IF ADC. The other measurement hardware is the same for all systems. Several tuners are available, from HF to microwave. Some of the most common tuner and digitizer configurations are shown below.

Optimizing the ADC
The Agilent N6830A is a dual channel HF receiver and 70 MHz IF ADC used exclusively in Agilent's E3238 systems. This module is configured for monitoring HF signals from 100 kHz to 32 MHz and for monitoring V/UHF signals using the 70 MHz IF ADC input. The N6830A's HF input provides high dynamic range that is critical for the crowded HF spectrum. For VHF/UHF and uWave, the N6830A's 36 MHz stare bandwidth lets you continuously search wide frequency ranges or sweep at rates up to 10 GHz/sec. This minimizes revisit times and maximizes probability of intercept.

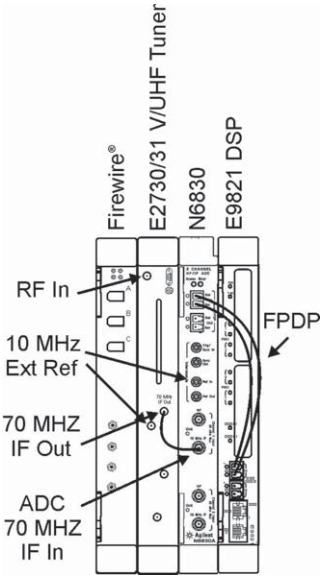
E9821A DSP performance
Search is performed by detecting new energy in the frequency domain, as new signals briefly appear and disappear. To do this at the extremely high sweep rates attainable with the E3238, extensive DSP capabilities are required.

The E9821A DSP module uses Motorola® G4 DSP's with altivec vector processing to provide new levels of performance, FFT'ing time-domain data, processing the results, and transferring results to the host computer. For maximum performance, six G4 processors are used to parallel-process the time-domain data.



100 kHz - 32 MHz HF VXI tuner with exceptional dynamic range

HF with exceptional dynamic range
When used as an HF receiver, the N6830A HF receiver and 70 MHz IF ADC does not require an additional HF tuner since that capability is already built into the N6830A. The N6830A provides exceptional dynamic range. It can find small signals hiding near large ones or pull signals out of the noise floor. The N6830A's selectable stare bandwidths of 4, 8, 16, and 32 MHz supports wideband search, maximizing probability of intercept.



20 MHz - 6 GHz VHF/UHF VXI tuner with 36 MHz bandwidth

VHF/UHF with 36 MHz bandwidth
When used as a VHF/UHF ADC, the N6830A HF receiver and 70 MHz IF ADC's 36 MHz IF bandwidth matches the IF bandwidth of the E2730B 20 - 2700 MHz tuner and the E2731B 20 - 6000 MHz tuner. This allows you to stare at wide frequency regions. For covering the full frequency range of these tuners, the E3238 with the E9821A DSP can sweep at rates up to 10 GHz/sec, dramatically decreasing revisit times.

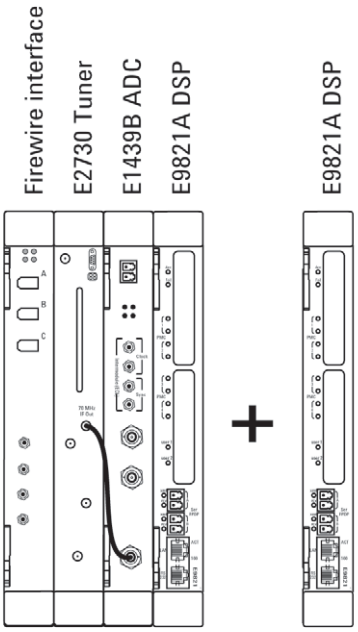
Collection added to search systems

In the simplest form of signal survey and collection system, a single E9821A serves as both the search signal processing controller and as the collection processing controller.

To add more collection signal processing into the system, additional E9821A DSP modules are added into the VXI mainframe.

Each of the E9821A modules has four internal mezzanine card slots for insertion of either dual G4 DSP modules or 32 channel DDC modules. A multi-channel narrowband processing hardware subsystem (software defined receiver) is created when a DDC module and dual G4 DSP module are combined inside the E9821A.

One example of a collection subsystem is the implementation of a bank of narrowband receivers. The receivers are normally controlled by the search subsystem, which tunes one of its many digital down converter (DDC) channels to the center frequency and bandwidth of the RF spectrum narrowband energy.



Search with collection + additional collection

The system can then record the signals to disk or perform further analysis of the energy to determine its internal signal characteristics. If the energy and signal characteristics match those in the search criteria, the system will pass information to other internal collection and processing components to demodulate and decode the signal.

One of the most powerful options for the E3238 system is universal signal detection (Option USD). Option USD allows you to rapidly reconfigure the search and collection system, without programming, when your mission changes. A universal signal detector automatically identifies signals of interest by operating on the characteristics of RF transmissions. Agilent's universal signal detection option includes bandwidth filters, frequency plans, wideband detectors, and narrowband confirmers. These wideband and narrowband technologies are combined to efficiently sift through the crowded spectrum and significantly increase the probability of intercept. As signals of interest are detected, simultaneous gap-free recordings are easily handled by the multiple DDCs and parallel DSPs in the E3238 system. When a new threat emerges you can quickly build a detector from a recording or from a live signal without programming.

3 Building an E3238S/N6820E Signal Survey Solution

The E3238S/N6820E is configured using two basic model numbers: E3238S and E3238SU

- E3238S/N6820E is a factory-integrated system of computer, hardware and software, with pre-defined configuration requirements
- E3238SU is used to order non-standard system configurations, upgrading existing systems or buying spare equipment as standalone components. The E3238SU requires the further selection of one of two options:
  - E3238SU-001 Integrated special or non-standard system, requires statement of work
  - E3238SU-002 Standalone items for system upgrade or spares

Since the E3238SU does not have pre-determined configuration requirements, purchase of an E3238SU system requires configuration advice from a factory expert.

The E3238S and E3238SU both contain the same system components. To minimize duplication only the E3238S components and configuration requirements are described in this configuration guide.

Step 1

Choose the frequency range for the signals of interest by selecting the combination of tuner, ADC, and/or receiver. With advice from an Agilent applications engineer, special configurations can be created to cover multiple frequency ranges.

The E3238S can monitor HF, VHF/UHF, or microwave signals. For HF, only the N6830A HF receiver needs to be selected. For VHF/UHF or microwave the N6830A's IF input and a tuner are configured as a combination.

Signal	Tuner	Receiver/ADC
HF	None	N6830A
U/VHF	E2730B or E2731B	N6830A
Microwave	E4440A with HY7	N6830A

One N6830A must be chosen for the E3238S system to operate. Multiple N6830A's can be used in one system.

HF frequency range receiver
The N6830A is a dual channel, single slot, C-size VXI module that plugs into the VXI mainframe. When used as an HF receiver, the N6830A does not require an additional HF tuner since that capability is already built into the N6830A. The N6830A monitors HF signals from 100 kHz to 32 MHz.

V/UHF frequency range tuner and IF digitizer
The E273xB V/UHF tuners require one VXI slot each.

E3238S-030	E2730B--20 MHz to 2.7 GHz RF Tuner, including cable kit
E3238S-031	E2731B--20 MHz to 6.0 GHz RF Tuner, including cable kit

Microwave Frequency Range Tuner and Digitizer
For survey of microwave frequencies, use the N6830A IF digitizer, the E3238S-040 cable kit, and the E4440A PSA configured with Option HY7. The E4440A PSA must be ordered separately from the E3238S system configuration.

E3238S-040	PSA as tuner cable kit

Step 2

Choose N6820E software (required)
Every E3238 system must have one copy of N6820E application software to run the hardware. N6820E-103 core software provides control of all the systems assets from antennas to digital receivers.

The software includes:
- a variety of signal visualization tools
- a powerful automatic energy detection and threshold detection system
- a database for logging energy and signals
- an automated alarm engine that makes it possible to run an unattended system and still get great results

N6820E	E3238S intercept and collection software
N6820E-1RU/2RU	One-year or two-year software update service
N6820E-103	Standard E3238 software on Windows

Software update service – N6820E-1RU or 2RU
Options 1RU and 2RU provide intermediate software updates and enhancements.

N6820E-103 runtime and development features

Software	N6820E-103	N6820E - 103
Primary system application	Runtime system for signal survey and signal collection	Development seat enables user programming
Multiple search modes	■	■
Thresholds (level, noise following, environmental)	■	■
Frequency list function	■	■
Alarms function - (to trigger action)	■	■
Energy history database	■	■
Save/recall states	■	■
Hardware handoff receivers supported (18 models)	■	■
Signal specific marker functions	■	■
Time and Frequency snapshot functions	■	■
Data compatibility to Agilent 89600 VSA	■	■
Remote control and data export capability	■	■
DDC channels supported	■	■
Software subscription service available - 1RU or 2RU	●	●
Signal analysis and classification tools		
Narrowband recorder - NBR	●	●
Audio output - AU1	●	●
Universal signal detection - USD	●	●
Modulation recognition - MR1	●	●
Audio player software - N6829A	●	●
User programming capability		
User defined energy features - ASD	Runtime	●
User defined feature filters - ASD	Runtime	●
User defined alarm tasks - ASD	Runtime	●
User defined menus/panes & interface controls - ASD	Runtime	●
User Programming for new hardware handoff receivers - ASD	Runtime	●
User-defined handoff receiver drivers - ASD	Runtime	●
Multi-channel system	♦	♦
Multi system synchronization	♦	♦

KEY

■ Standard in this version ● Orderable as an option ♦ Special option upon request

3

Step 2.1

Signal options

The N6820E software provides the application modules for detecting and monitoring various signal types.

Signal detection and monitoring

N6820E-AU1	Real-time audio
N6820E-EDF	Enable direction finding applications
N6820E-MR1	Basic modulation recognition application
N6820E-NBR	Narrowband signal recorder
N6820E-USD	Universal signal detection

AU1* – Real-time audio

Real-time audio makes it possible to use the narrowband DDC assets in a system as a virtual realtime handoff receiver. It is of value for customers who are already buying other options such as NBR, VA1 or other backend processing signal options.

EDF – Enable direction finding systems

This option is required for an E3238 system that will be interconnected with a supported external direction-finding system.

These DF sub-systems are supported with a software driver:

- TechComm TC-5025
- Titan/L-3 Comm PRD-13
- Cubic VXI 4400 (uses cubic VXI-3570 handoff receiver)

MR1 – Modulation recognition software

N6820E-MR1 adds wideband modulation recognition capability or narrowband confirmation to an E3238 system. Many analog and digital modulation formats are supported. Wideband modulation recognition runs on the search system's host CPU, it does not require collection hardware; therefore systems are physically smaller and less expensive. Narrowband confirmation runs in conjunction with Option USD and requires narrowband collection hardware.

Key features:

- Modulation recognition user interface integrates into the E3238 interface
- Signals are tested for all modulation types, and the most likely are displayed graphically with additional pertinent information
- Integrates with universal signal detection
- A histogram shows the relative probability of the modulation types

Modulation types supported:

FSK
3-level FSK
4-level FSK
8-level FSK
Analog FM (includes multi-level FSK not shown above)
MSK (includes GMSK and Offset (aka staggered) QPSK)
BPSK
QPSK (includes DQPSK)
p/4 QPSK (incl. p/4 DQPSK)
8 PSK
16 PSK
16 QAM
32 QAM
64 QAM
256 QAM
AM
AM DSBSC
LSB
USB
OOK (aka ASK)
4PAM (aka 4-level ASK)
Manual Morse
Machine Morse
Unknown digital (reports symbol rate of other digital modulation formats)
Unknown
Pure carrier
Noise
V.29 modem

Modulation attributes displayed:

Modulation type
Frequency
Bandwidth
Signal to noise ratio (SNR)
Symbol rate
Frequency deviation

NBR* – Narrowband signal recorder
The E3238 narrowband recorder (NBR) extends the functionality of the E3238 system to include multi-channel recording of narrowband signals up to 350 kHz bandwidth per channel. It is a general-purpose recorder that is called as an alarm task. NBR does not perform any tests on the signal. It simply records the time data from the DDC's output to the system disk. The center frequency and bandwidth of the recording can be passed from the energy alarm, a signal alarm, or be selected by the operator. Option USD includes the functionality of NBR.

USD* - Universal signal detection

The universal signal detection option provides a foundational capability and structure upon which you can create E3238S signal detectors to find signals of interest (SOI) without the need to program and/or compile code. Option USD is a very flexible and powerful tool for signal detection and classification. Without programming, you can quickly change the USD settings and parameters to detect new signals.

Universal signal detection techniques include bandwidth filters, frequency plans, wideband detectors, and narrowband confirmers. These techniques can be used individually or combined for a powerful solution.

The USD bandwidth filter and frequency plan are used prior to wideband detection and narrowband confirmation to filter out all signals that don't meet the frequency and bandwidth criteria for the signal of interest.

USD wideband detection operates on the frequency-domain results of each sweep. When energy is detected in the frequency spectrum, that portion of the frequency spectrum is processed by one or more wideband detectors. The wideband detectors quickly determine if the energy is a potential signal of interest by comparing its magnitude spectrum to the wideband detectors you created.

USD narrowband confirmation operates on time-domain data collected from a narrow frequency band. Narrowband Confirmation involves assigning a narrowband processing channel to capture a potential signal of interest. Algorithms such as modulation recognition and demodulation (Option MR1) can then confirm if a signal is of interest.

Detected signal information is collected in the universal signal database. Detected signals can be automatically recorded, their frequencies can be added to a frequency list, and the detected signals can be used as criteria for energy and signal alarms.

A signals design environment is used to create and test signal detectors without programming. The detectors are stored in a signal detector library. There is no limit to the number of signal detectors stored in the library. Up to 23 signal detectors can be active at the same time. There is no limit to the number of wideband detectors or narrowband confirmers you can add to each signal detector.

Step 2.2
Additional software

N6829A audio player
Audio player is a separate software tool that allows linguists using independent PC's on a system LAN to manage files, demodulate, and listen to voice channels saved by the E3238 system or the 89600 vector signal analyzer. One copy of audio player is required for each PC.

N6829A	Audio player software
N6829B-103	Standard software on Windows®
N6829B-LKC	Computer-keyed software license
N6829B-LKI	Independent USB-keyed software license
N6829B-LKS	Shared USB-keyed software license

One of the license key options must be chosen. Option LKC ties the N6829B software to the hostID of the PC. Options LKI and LKS encoded the license file to a removable USB hostID device (USB Key). Option LKS lets you share the USB key device with the N6820E software licensing schemes.

Step 2.3
Development software

N6820E-ASD	User programming libraries and documentation

ASD* – User programming libraries and documentation
Option ASD makes it possible for users and other system integrators to dynamically link new functions and capabilities into the E3238 such as:
- Custom energy classification functions
- Database filtering functions
- Custom alarm functions
- Tuning the user interface
- Control for new or special receivers

** Note 3: To make and save programming changes with Option ASD, users must own and have installed a copy of Microsoft Visual Studio .NET*

3

Step 2.4

License key choices

The N6820E software can be tied to a USB key or the hostID of the PC. Your license file can be encoded specifically for a removable USB hostID device (USB Key) by selecting LK1 option. This is the best choice if you prefer to work on multiple computers. Alternatively, your license file can be keyed to a specific computer as option LK2. A unique hostID is derived from your computer's components. This is the best choice if you need operational simplicity on one machine.

You should have a failure recovery plan for the complete system hardware, including the computer. To recover from a computer failure, the software may need to be re-installed and properly configured on a back-up computer. To activate the license on the option LK1, simply move the USB key to the back-up computer and continue operation of the system. To operate a back-up computer with LK2, you must contact the Agilent E3238S software licensing administration team for a new computer-keyed license file. In emergency situations where these remedies are not possible, an option LKB is provided as a quick, fail-safe recovery of software operation. This single-use, emergency back-up key will enable the operation of the E3238S for a few days from when it is activated. The back-up key is only for temporary license recovery when you are unable to contact the Agilent E3238S license administration team.

N6820E-LK1	Standard USB license key
N6820E-LK2	License key tied to hostID
N6820E-LKB	Back-up license key

Step 3

Select a DSP module (required)

At least one E9821A DSP module must be included in the VXI mainframe. Up to four E9821A DSP modules may be chosen. Each DSP module has a total of four sites to attach a combination of 1 to 3 dual G4 processors and zero to three multi-channel digital down converters (DDC's) for narrowband channelization. Additional E9821A DSP modules can be added for more processing power and/or more narrowband channels. Delay memory can be created by using two E9821A modules.

E9821A	Signal processor module for E3238 system
E9821A-101	Add dual G4 processor card with extended RAM
E9821A-200	Multi-channel digital downconverter card
E9821A-0B2	Standard manuals included

Two 9045A fiber optic cables must be used to connect each E6830A to an E9821A. Multiple E9821A's require one fiber optic cable between each module. Spares of this cable are recommended.

E9045A	Fiber-optic 16-inch simplex cable

DSP processors will be positioned in the mainframe with the first DSP on the left and the second to the right of the first. The first DSP will always be the search DSP, and may also have 32 channels of collection. The second through fourth additional E9821A VXI signal processor main boards are added for collection use only.

In a "search only" system configuration, the E9821A should be configured with 3 each Option 101's to provide the most processing power. In a search and 32 channel collection system, the E9821A should be configured with 3 each Option 101 and one each Option 200. In system configurations with more than 32 channels, the configurations of the DSP's depend on the type of signals and the processing load factor. As an example, an ALE signal is simple to process, so it can be processed effectively in a 1 Dual G4 with 3 digital downconverter card configuration. A U/VHF VAD signal is more complex and requires a 2x2 configuration of 2 DSPs /2 digital downconverter cards. Use the DSP G4 processor and/or DDC channels load factor table in section 5 of this document to determine the configuration of the E9821A DSP for specific signals.

Step 4

Choose system controller (required)

The E3238S system requires a PC to control the instrumentation via the software.

LTPC2	Laptop PC with Windows
E3238S-500	No controller, controller supplied by user or outside this configuration

The LTPC2 is a laptop PC with features as good as or better than the "recommended" features in the following table.

The PC requirements for installing the N6820E software on a user-supplied PC are:

Features	Minimum required	Recommended
CPU		
Processor	1.5 GHz Pentium P4	2.4 GHz Intel® Core™ 2 Duo processor
Memory	1 GB	2 GB
Operating system:	Microsoft® Windows® XP with service pack 2 (also supports Windows 2000)	Microsoft Windows XP Professional with service pack 2
Drives		
Hard drive	20 GB	250 GB
CD / DVD drives	CD/DVD combo drive	DVD±RW SuperMulti with double layer
Graphics		
Display	15" Display	15.4" WSXGA+
Graphic card	True 1280x1040 (on-screen resolution) 16 bit true color on-board video memory (8 MB minimum)	ATI Mobility Radeon X2600 graphics
Communication (I/O)		
Sound card (audio)	Required only for AU1 and E9051A-430 Required for E3238S training classes	Required only for AU1 and E9051A-430 Required for E3238S training classes
Serial ports	Not required	Not required
USB	1-port required for license key	4 USB 2.0 ports
Firewire	1 port (must meet OHCI standard)	1 port (must meet OHCI standard)
GPIB	Not required, unless using GPIB handoff receiver	Not required, unless using GPIB handoff receiver
Networking	Not required, unless using multiple system synchronization, remote audio, or socket connection to other systems on the network)	10/100/1000 NIC
PCI expansion slots	May be required for the above items	1 type I/II PC card 1 secure digital

Optional PC accessories

The LTPC2 includes IEEE-1394-1995 connectivity. The E8491B IEEE-1394 PC link to VXI includes the cable and VXI card to connect to the VXI mainframe. If a customer-supplied desktop PC does not have IEEE-1394 interface, then include E8491A-001 with the configuration. Customer-supplied laptop PC must have a compatible IEEE-1394 interface. LTPC2 includes a mouse and carrying case.

E8491B	IEEE-1394 PC link to VXI
E8491B-001	OHCI based IEEE-1394/PCI card

3

Step 5

Additional capabilities (optional)

Switching
The E1472A 50 ohm single slot VXI RF multiplexer may be used in the E3238S system as an antenna switch. The E1472A is only appropriate for switching HF signals or the outputs of multiple tuners due to its 1.3 GHz maximum frequency.

Be sure to include the VXI slot required in the VXI mainframe in Step 6.

The E1368A18 GHz microwave switch is a single slot B-size VXI card and requires the E1403C C-size VXI carrier module. This microwave switch would be used to switch antenna inputs to the E2730B or E2731B tuners for VHF/UHF signals.

E1472A	Six 1x4 50 Ohm RF multiplexers
35688-88800	Cable kit

Analysis tools
IQ time data files can be recorded using E3238S capabilities such as time snapshots, narrowband recording (Option NBR), universal signal detection (Option USD), and more. A powerful analysis tool that complements the E3238S is the 89601A vector signal analysis software. The IQ time data files can be analyzed by the 89601A VSA software with no hardware required.

89601A	Vector signal analysis software
89601A-200	Basic vector signal analysis software
89601A-AYA	Flexible modulation analysis
89601A-B7N	3G modulation analysis bundle
89601A-B7T	cdma2000/1xEV-DV modulation analysis
89601A-B7U	W-CDMA modulation analysis
89601A-B7W	1xEV-DO modulation analysis
89601A-B7X	TD-SCDMA modulation analysis
89601A-B7R	WLAN modulation analysis
89601A-B7S	1EEE802.16-2004 OFDM modulation analysis
89601A-B7Y	1EEE802.16 OFDM modulation analysis
89601A-B7Z	1EEE802.11n modulation analysis
89601A-BHA	TETRA modulation analysis
89601A-BHB	MB-OFDM ultra-wideband modulation analysis
89601A-BHC	RFID modulation analysis
89601A-BHD	LTE modulation analysis
89601A-105	Dynamic link to EESof/ADS
89605B-106	Dynamic link to The MathWorks Simulink model-based design

Hand-off receivers
Handoff receiver hardware can be provided separately or included by special request. Some handoff receiver hardware is in VXI format, so additional slots will be needed in the VXI mainframe.

Supported handoff receivers

Handoff receiver	Frequency range	Interface type
AR5000A	VHF/UHF	RS232
WJ-8607	VHF/UHF	RS232
WJ-8611	VHF/UHF	RS232
WJ-8615P	VHF/UHF	GPIB
WJ-8621	VHF/UHF	VXI
WJ-8629	VHF/UHF	VXI
WJ-8629A	VHF/UHF	VXI
WJ-8634	VHF/UHF	VXI
WJ-8711	HF	RS232
WJ-8712A	HF	RS232
WJ-8712P	HF	RS232
WJ-8721	HF	VXI
WJ-8723	HF	RS232/GPIB
VXI-3250	HF	VXI
VXI-3550	VHF/UHF	VXI
VXI-3570	VHF/UHF	VXI
R-2411/U	MF/HF	GPIB
R-2412/U	VHF/UHF	GPIB
IC-R20	HF/VHF/UHF	RS232
IC-R8500	HF/VHF/UHF	RS232
IC-PCR1000	HF/VHF/UHF	RS232
EK-895	HF	RS232
RX-331	HF	RS232
Agilent 89400	VHF/UHF	GPIB
Agilent 89600	VHF/UHF	VXI

AR5000 provided by AOR (UK) Ltd
WJ-xxxx products provided by DRS Technologies
VXI-3xxx and R-24xx products provided by Cubic Communication
IC-xxxx products provided by ICOM
EK-895 provided by Rohde&Schwarz
RX-331 provided by Ten-Tech

Step 6

Choose VXI mainframe (required)

After selecting all the VXI Hardware in the system a total count of VXI modules is required before selecting the VXI mainframe. In addition, some combinations of VXI modules require higher VXI mainframe power.

One VXI mainframe is required for the installation of the VXI modules. Choices are 5- slot, 6-slot and 13 slot. The 13 slot VXI model numbers have a choice of VXI chassis monitoring. The E8404A with enhanced monitoring is recommended because the VXI modules in the E3238S system require significant cooling for optimum performance.

VXI backplane connector shields are required.

Model	Description
MFRAME1	5-slot, C-size VXI mainframe; includes backplane connector shields
E1421B	6-slot, C-size VXI mainframe
E1421-80921	Installed backplane connector shield
E8403A	13-slot, C-size, VXI mainframe with 1000W power supply and basic monitoring.
E8400-80918	26 backplane connector shields installed
E8404A	13-slot C-size VXI mainframe, 1000W power supply, enhanced monitor, color graphic display
E8400-80918	26 backplane connector shields installed

Step 7

Training, warranty, and support

For most new installations and all new users, E3238 training is recommended.

Field AE-delivered	Factory-delivered	Description
PS-T10-35688	E3238E-001	Basic operation class, 2 days at customer location in US, with customer-supplied equipment
PS-T11-35688	E3238E-002	User programming class, 3 days at customer location in US, with customer-supplied equipment
PS-X10	E3238E-003	Custom E3238S training

PS-T10_35688 or E3238E-001
This course covers the configuration and operation of the E3238S system. The class is a combination of lectures and labs that provide expert instruction and hands-on experience with the systems.

Topics covered
- Search overview
- System processes
- Starting the system
- Graphical user interface
- Network socket connection to other systems

Special requirements
All E3238S systems scheduled to be used in the training must meet the following minimum requirements.
- E3238s E.02.00 or later

3

PS-T11_35688 or E3238E-002
This course covers how to create custom software libraries for the E3238 system. The class is a combination of lectures and labs that provide expert instruction and hands-on experience with the systems.

Topics covered
- Sockets interface
- Feature studio
- Basics of library programming
- Feature extraction libraries
- Basic motif programming
- Energy history filter libraries
- Custom alarm task libraries
- Custom menu and pane libraries
- Handoff receiver drivers
- User defined thresholds

Special requirements
All E3238S systems scheduled to be used in the training must meet the following minimum requirements.
- E3238s E.02.00 or later
- E3238s Option ASD
- E3238s Option ASM or USD

PS-X10 or E3238E-003
This course is quoted as special services, for situations involving a change in location, number of days, number of students, use of rented equipment or any modifications to the standard training materials and delivery. Training details are typically outlined in a statement of work.

Special requirements
All E3238S systems scheduled to be used in the training must meet the following minimum requirements.
- E3238s E.02.00 or later
- E3238s Option ASD
- E3238s Option ASM or USD
- Microsoft Visual Studio.NET
- E9051A-121 (ASX)
- Wind River Compiler (Diab)

Warranty

Standard warranty on the E3238S system is one year for the Agilent-labeled item numbers. Items with the OEM brand, e.g. PC and MFRAME1, have warranty of 90 days from Agilent. Software has a 90-day media replacement warranty. A warranty extension for the Agilent-labeled hardware is available. Agilent personnel can provide the system support.

4 Performance Reference and Specifications

The E3238S/N6820E system supports these tuner and ADC combinations.
Performance data is in the table below.

Tuner/ADC specifications	HF	VHF/UHF	VHF/UHF	HF to uWave
Tuner/Digitizer	N6830A Digitizer	E2730B/N6830A	E2731B/N6830A	E4440A with HY7/N6830A
Frequency range	0.1 to 32 MHz	20 to 2700 MHz	20 to 6000 MHz	100 kHz to 26.5 GHz
Useable IF bandwidth	4, 8, 16, and 32 MHz	36 MHz at 70 MHz IF	36 MHz at 70 MHz IF	36 MHz at 70 MHz IF
Noise figure	TBD	11 to 12 dB, typical	16 dB typical	N/A
Internally-generated spurious	TBD	-110 dBm, maximum	-110 dBm maximum	-100 dB maximum (option HY7)
RF input attenuation	-12 to 18 dB in 2 dB steps	0 to 56 dB, in 2 dB steps	0 to 56 dB, in 2 dB steps	0 to 50 dB in 2 dB steps
Pre-selection	Yes	No	No	No
Tuner form factor	N6830 does not require tuner	1 VXI C-1 module	1 VXI C- module	Stand-alone instrument
ADC residual spurious responses	- 105 dBfs	-105 dBfs	-105 dBfs	N/A
ADC harmonic distortion	- 85 dBc or - 105 dBfs	-70 dBc or -90 dBfs	-70 dBc or -90 dBfs	-70 dBc or -90 dBfs
ADC form factor	1 VXI C-1 module	1 VXI C-1 module	1 VXI C-1 module	1 VXI C-1 module

4

Physical characteristics

	MFRAME1 5-slot		Agilent E1421B 6-slot		E8403A/E8404A 13-slot	
Dimensions	in.	mm	in.	mm	in.	mm
Width	6.96	176.78	9.19	233.4	16.7	424.5
Height	15	381	17.63	447.8	13.9	352
Depth	21.3	540	22	558.8	24.9	631
Weights	lbs	kg	lbs	kg	lbs	kg
Mainframe weight	22	10	30.6	19.9	55	25
Component weights			lbs	kg		
E8491B Firewire interface			2	0.91		
E2731B tuner			7	3.18		
E9821A search DSP			4	1.82		
E9821A channelizer DSP			4	1.82		
N6830A dual channel HF receiver and 70 MHz IF ADC			4.1	1.86		
Laptop PC			7	3.18		

E9821A DSP loading factor tables

This table provides the number of G4 processors required for different signal processing software and increasing the number of DDC channels. Two G4 processors are provided with the Option E9821A-101. Thirty-two channels are provided with one Option E9821A-200. The first G4 processors configured as E9821A-101 are used for search, so these are additional G4 processors required for narrowband collection channels. Each E9821A may have a maximum of 6 G4's (or 3 each Option 101).

This table provides the maximum number of narrowband processing channels for different signal processing software and increasing number of G4 processors. Two G4 processors are provided with each Option E9821A-101. 32 channels are provided with one Option E9821A-200.

Number of G4 processors required

	Signal processing software		
	AU1	NBR	USD
(Loading Factor)	(16)	(48)	(8)
32 channels	2	1	4
64 channels	N/A	2	8
96 channels	N/A	2	N/A
128 channels	N/A	3	N/A

Maximum number of channels supported

	Signal processing software		
	AU1	NBR	USD
(Loading Factor)	(16)	(48)	(8)
Two G4 processors	32	96	16
Four G4 processors	N/A	192	32
Six G4 processors	N/A	288	48
Eight G4 processors (requires two E9821As)	N/A	384	N/A

System component operating temperature range

System components	Temperature range
E9821A	0 - 50 degrees C
N6830A	0 - 55 degrees C
LTPC2	5 - 35 degrees C
E2730B/E2731B	0 - 50 degrees C (20 - 30 degrees C guaranteed electrical specifications)
E1421B with E9821A	0 - 40 degrees C

Related literature

5989-2836EN	Agilent E3238S/N6820E Signal Survey System Product Overview
5989-2838EN	E3238S/N6820E Product Tour CD
5989-3081EN	N6820E-MR1 Modulation Recognition Brochure
5989-2839EN	N6829A Audio Player Brochure

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