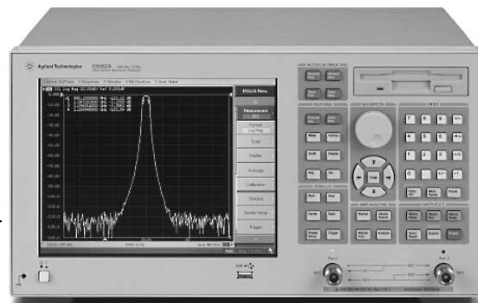
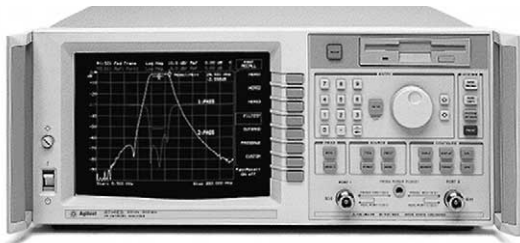


Agilent Migration from 8712/8714 Series to ENA-L Network Analyzers

Technical Overview

The Standard Just Got Better!



Enhanced usability and performance

- Affordably priced
- Minimal software migration



Agilent Technologies

A new standard for low-cost basic RF network analysis

In the fast paced world of RF network analysis, we know how important it is to stay current and competitive...

Agilent is proud to introduce the ENA-L RF network analyzers (E5061, E5062A) to our 8712/8714 series customers. Based on the latest in modern technology, the ENA-L offers enhanced performance and powerful productivity features to improve your test and measurement efficiency, all at a price comparable to the 8712/8714 series.

This document provides key product feature comparisons of the ENA-L and 8712/8714 series followed by a discussion on utilizing your existing software.

Contents

Product Feature Comparison

- Measurement performance comparisons
- Enhanced usability and user interface not included in the ENA-L
- 8712/8714 series features

Utilizing Existing Software

- State file utilization
- Control program code utilization

Appendix 1. Product comparison chart

Appendix 2. Order configuration chart

Product Feature Comparison

The ENA-L supports most of 8712/8714 series product features with added enhancements as shown in the summary chart below.

ENA-L not only enhances fundamental performance such as sweep speed, dynamic range, trace noise, etc., but also provides many easy-to-use new features such as a large color LCD display, multi-channel, ECal support and more. Please refer to Appendix 1 for more detailed feature comparisons.

Feature comparison summary

	Features and compatibility		E5061A	E5062A	8714ES ¹	
Fundamental measurement performance	System impedance	○	50/75 ohm	50/75 ohm	50 ohm	75 ohm
	Frequency range	,	300 kHz to 1.5 GHz	300 kHz to 3 GHz	300 kHz to 3 GHz	
	Maximum power > 1GHz	,	10 dBm		7 dBm ¹	4 dBm ¹
	Minimum power (with attenuator option)	○	-5 dBm (-45 dBm)		-60 dBm ¹	-60 dBm ¹
	System dynamic range	,	115 dB		101 dB ¹	96 dB ¹
	Sweep type	,	Liner, Power, Log, Segment		Liner, Power	
	Trace noise	,	0.005 dB rms @ 3 kHz IFBW		0.01 dB rms @250 Hz IFBW	
	85075C (Multi-port test set) support	○	Yes		Yes	
	Broadband receiver	○	No		Yes	
Absolute power measurement	○	No		Yes		
Usability	Number of channel	,	4		2	
	Number of traces per channel	,	4		1	
	Display	,	10.4-inch color LCD		9-inch black and white	
	Touch screen display?	,	Yes (Option 016)		No	
	ECal support	,	Yes		No	

Features enhanced in ENA-L

Features not supported in ENA-L

Same features in ENA-L

¹ The 871X series' analog performance specification varies according to the models. Please refer to Appendix 1 for more details and additional models.

Measurement performance comparison

Wider dynamic range expands your measurement possibilities

ENA-L provides wide dynamic range of 115 dB in all models across their entire frequency range. In the 8712/8714 series, this level of performance is only available with T/R test set models at frequencies up to 1.3 GHz. Compared to the 8714ES, the ENA-L has additional 14 dB of dynamic range. Higher dynamic range makes a significant difference for the precise evaluation of devices such as high rejection filters.

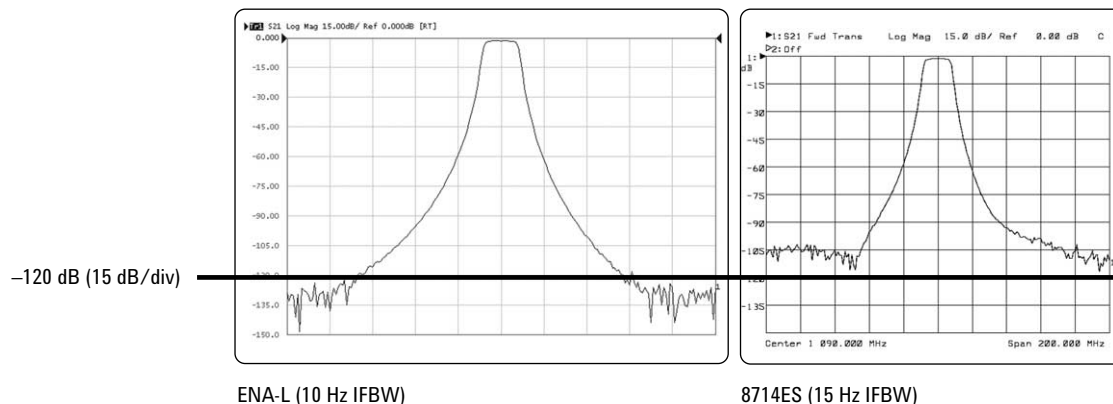


Figure 1. Dynamic range comparison

Lower trace noise increases measurement reliability

With enhanced synthesized source purity, the ENA-L provides much lower trace noise than 8712/8714. For example, when both analyzers are set to get 90 dB dynamic range, trace noise is three times lower in the ENA-L. This trace noise enhancement allows you more stable measurements for increased reliability and product quality.

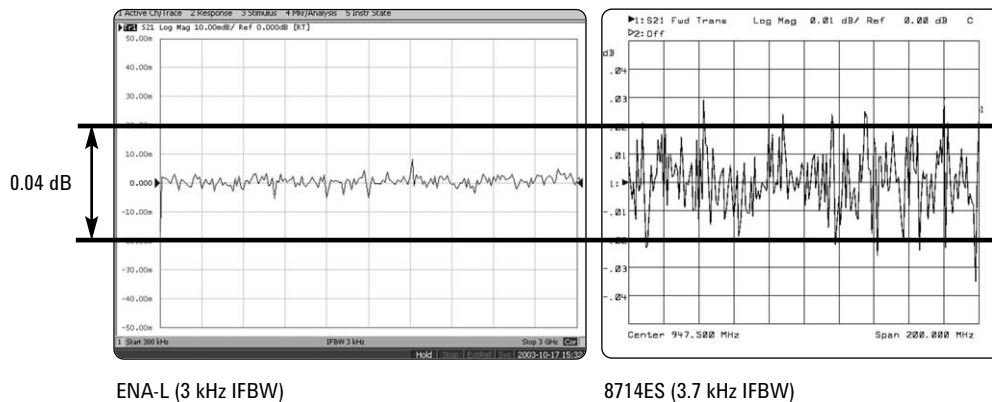


Figure 2. Trace noise comparison at 90 dB dynamic range

Faster sweep speed decreases your cost of test

Due to a powerful digital processing and enhanced circuit's performance, ENA-L provides faster sweep speed than the 8712/14 series. For example, with a typical setting for high volume filter production (201 points, full 2-port cal., 90 dB dynamic range), ENA-L is approximately 6 times faster than 8712/14. For automated production lines the additional speed increases through-put and cuts down measurement cost per component.



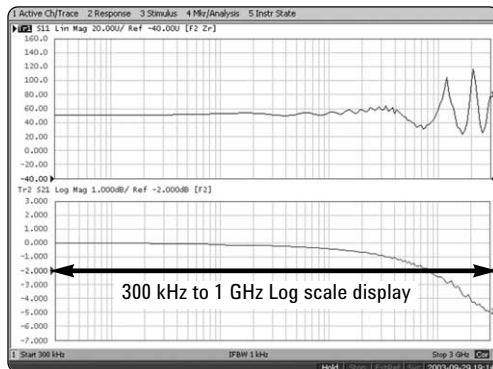
Agilent E5061A verses Agilent 8712ES sweep speed comparison with typical data (201 points, full 2-port cal., 90 dB dynamic range).

Figure 3. Sweep speed comparison

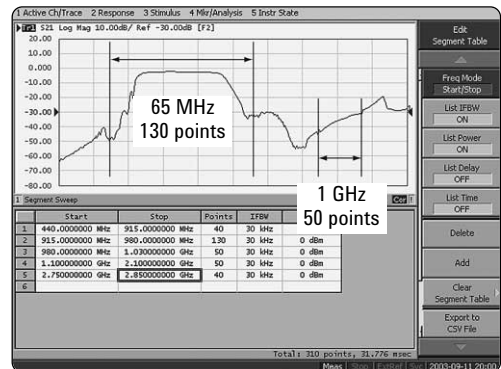
Log and segment sweeps provide measurement convenience

In addition to linear frequency and power sweep types (which are available in the 8712/8714), the ENA-L supports log and segment frequency.

- For the users who want to evaluate broadband devices such as cables or connectors, log frequency sweep helps you to recognize wide frequency characteristics at a glance.
- For the users with analyzers in a production line, segment sweep allows sweeps only at the frequencies you need for higher throughput.



Log sweep effectively shows characteristics



Segment sweep allows you to measure various intervals, ONLY the necessary frequencies.

Figure 4. Log and segment sweep

Built-in VBA makes it easy to develop automated test programs

ENA-L adopts one of the most widely used programming languages, Visual Basic® for Application (VBA) as the built-in programming language instead of IBASIC used in the 8712/8714 series.

The ENA-L's VBA editor provides powerful and useful debug and edit functions. For example, as shown in Figure 8, the programming commands are automatically listed after the first character of the command is typed. Additionally, the editor indicates a typo by changing text color. And sentence structures are very simple to write. Thus users can code a program easily and decrease program development time dramatically compared to the 8712/8714 series.

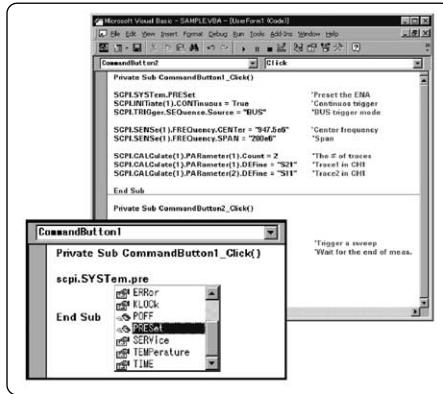


Figure 8. Powerful VBA editor example

VBA is also very useful for creating interactive test programs with a graphical user interface (GUI). As shown in Figure 9, users can create a GUI tailored to meet your specific measurement needs, which facilitates analyzer operation and reduces operator errors.

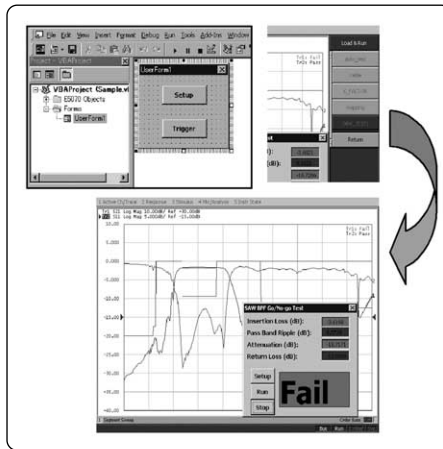


Figure 9. Custom graphical user interface created using VBA program

VBA also offers module level programming to help reduce development time. With the ENA-L, if you find convenient sample programs, you can utilize them in your own program by simply importing the necessary module.

The following features are not supported in the ENA-L:

- Broadband receiver capability
- Absolute power measurement capability

8712/8714 series'
measurement capability
not included in ENA-L

Utilizing Existing Software

Software resources, namely state files and control programs, are precious and it is costly to develop them from scratch for a new analyzer. Agilent provides two tools to minimize the cost of software migration: the State File Converter and Program Code Conversion Kit.

State file utilization - (State File Converter)

Agilent provides a State File Converter VBA program that can be run on the ENA-L. The program reads an 8712E/8714E series' state file, and sets up the ENA-L automatically. Because the ENA-L was designed for compatibility, the program supports most of the 8712/8714E settings. Supported and unsupported settings are described below:

Supported settings:

- Format¹
- Stimulus²
- channel and trace setting²
- Parameter¹
- Limit test
- Marker setting
- Self calibration
- Scale¹
- Trigger source
- Multi-port test set setting
- Display annotation¹

Un-supported settings:

- Calibration data
- Trace data
- Broadband measurement
- Absolute power measurement
- Marker limit
- Features that ENA-L does not have

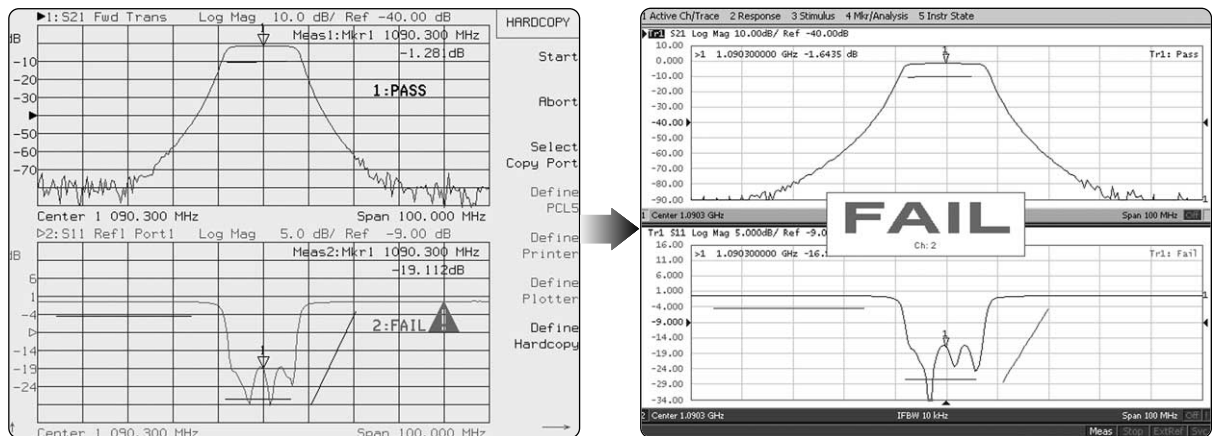


Figure 10. Conversion example with limit test and marker functions.

Note: Although the state file converter does not support 871xA, B, or C series state files, they can be converted to the 871xE series state files using an 871xE analyzer. Then they can be converted to the ENA-L state files with the converter.

¹ Except for the related features that ENA-L doesn't have

² Following setting values need to be confirmed, because values are changed to the nearest or most suitable ones when the same setting is not available for the ENA-L: IF bandwidth, Power level, Power range, Attenuator setting, Channel/trace setting

Control program code utilization - (Program Code Conversion Kit)

Because of the same SCPI compliance, 8712/8714 series' 51 commands are seamlessly compatible with the ENA-L's commands. These commands include most of the basic commands, such as measurement parameter and stimulus setting commands. Further 174 commands are basically re-writable with the ENA-L's corresponding commands. These 225 commands cover most of network analyzer's control. Therefore, users are able to reuse their 8712/8714 series control programs with ENA-L with some modifications. To help modifications, Agilent provides a Program Code Conversion Kit consisting of a command comparison table (Excel file) and tips for code conversion.

The comparison table lists all 8712/8714 series commands with the following code conversion information so users can easily find proper actions:

- Compatibility level (A+ to D coded in various colors for easy reference)
- Corresponding ENA-L commands
- Quick help for conversion

Table 1. Command classification summary

Compatibility Level	Description	Qty.	Typical 8712/8714E series scpi commands
A+	Completely compatible	51	Frequency & power stimulus set, Scale, Marker on/off, Trigger, Average, NOP, Sweep time, etc.
A	1 equivalent command	37	Ref marker, Cal on/off
B	Multiple candidate commands type 1 more than 1 command are necessary	79	Format, Data query, Limit test, Calibration setting, Marker function
C	Multiple candidate commands type 2 some features are not supported	58	Test cal, Marker function, Status byte handling, Format
D	No equivalent commands	202	LAN control, Key control, Plotter control, Absolute measurement, Marker limit, etc.

The comparison table often provides enough information for code conversion for A level commands. However, in the case of the level B and C commands, you might also need to refer to the conversion tips or the analyzer's programmer's guide as suggested in the quick help.

In regards to level D commands, there is no equivalent ENA-L command. Although approximately 55% of these commands are covered by alternative methods such as the front panel menu or the VBA program. Another 25% are miscellaneous features, such as additional display annotation and maintenance commands. The last 20% are features that ENA-L does not have such as absolute power or broadband measurement capability. For these, to avoid unnecessary work, it is recommended to either use an alternative method or do not convert these commands.

The code conversion tips complement the comparison table by providing conversion information and programming examples for typical items that need additional explanation for efficient conversion. The conversion tool includes the following topics:

- Channel and trace settings
- Trigger system structure
- Data collection
- Limit test setting
- Status byte register handling

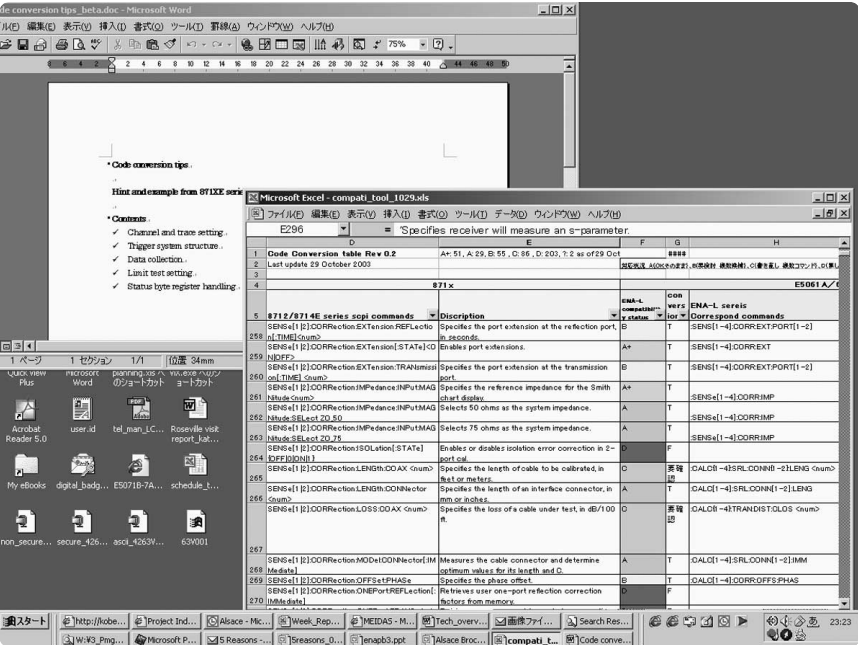


Figure 11. Comparison table and conversion tips

Take advantage of the ENA-L's performance

The enhanced usability and performance of the ENA-L network analyzer provides our 8712/8714 users with even greater value than ever before. Take advantage of Agilent's migration tools, to help you improve your overall efficiency and cost of test by upgrading to the most advanced RF general-purpose network analyzer.

Appendix 1. Product comparison chart

	E5061A	E5062A	8712 ET		8712ES		8714ET		8714ES		
System impedance	50/75 ohm	50/75 ohm	50 ohm	75 ohm	50 ohm	75 ohm	50 ohm	75 ohm	50 ohm	75 ohm	
Fundamental measurement performance	Frequency range	300 kHz to 1.5 GHz	300 kHz to 3 GHz	300 kHz to 1.3 GHz			300 kHz to 3 GHz				
	Maximum power > 1GHz (without attenuator option)	10 dBm		12 dBm (13 dBm)	9 dBm (10 dBm)	10 dBm	7 dBm	9 dBm (10 dBm)	6 dBm (7 dBm)	7 dBm	4 dBm
	Minimum power (without attenuator option)	-45 dBm (-5 dBm)	-60 dBm (-0 dBm)	-60 dBm (-3 dBm)	-60 dBm	-60 dBm	-60 dBm	-60 dBm (-5 dBm)	-60 dBm (-8 dBm)	-60 dBm	-60 dBm
	System dynamic range (without attenuator option)	115 dB	115 dB	110 dB	104 dB	99 dB	112 dB (114 dB)	107 dB (110 dB)	101 dB	96 dB	
	Sweep type	Liner, Power, Log, Segment		Liner, Power							
	Speed¹	35 ms		240 ms							
	Trace noise	0.005 dB rms @ 3 kHz IFBW		0.06 dB p-p @ 4 kHz IFBW (typical)							
	Synthesized source	Yes (1Hz res.)		Yes (1Hz res.)							
	Fault location	Yes (Option 100)		Yes (Option 100)							
	SRL	Yes (Option 100)		Yes (Option 100)							
	85075C (Multi-port test set support)	Yes		Yes							
	◦ Broadband receiver	No		Yes							
	◦ Absolute power measurement	No		Yes							
Usability	No. of channels	4		2							
	No. of traces per channel	4		1							
	Display	10.4 inch color LCD		9 inch black and white monitor							
	Touch screen operational	Yes (Option 016)		No							
	Marker	Yes (max 10)		Yes (max 8)							
	ECal support	Yes		No							
	External VGA color monitor	Yes		Yes							
	Limit test	Yes		Yes							
	Marker - gain slope and flatness	Yes		Yes							
	Instrument state save/recall	Yes		Yes							
	Test set/self calibration for 87075C	Yes		Yes							
	◦ Code compatibility for 871x	No (Command comparison table for the 871xE series is available)		Yes							
	◦ Barcode-reading support	No		Yes							
	◦ Point trigger	No		Yes							
	◦ Marker limit test	No		Yes							
	◦ Keystroke recorder for IBASIC	No		Yes							
	Peripheral/Equipment	HDD	Yes (10 GB)		No						
LAN		Yes (100 base)		Yes (10 base)							
Handler I/O		Yes		No							
FDD		Yes		Yes							
◦ Probe power		No		Yes							
◦ Transport case (Opt 101)		No		Yes							
◦ USER TTL		No (Handler I/O can be used)		Yes							
◦ AUX IN		No		Yes							
◦ Serial I/O		No		Yes							

• Features enhanced in ENA-L

◦ Features not supported in ENA-L

¹ 201 points, full 2-port cal., 90 dB dynamic range.

Appendix 2. Order configuration chart: 8712/8714E series vs. ENA-L

Instrument and test set options

	Test set	Model number	System impedance	ENA-L Solution
8712 series 300 kHz to 1.3 GHz	Transmission reflection test set (T/R test set)	8712ET	50 ohm	E5061A-150
			75 ohm (Option 1EC)	E5061A-175
	S-parameter test set	8712ES	50 ohm	E5061A-250
			75 ohm (Option 1EC)	E5061A-275
8714 series 300 kHz to 3 GHz	Transmission Reflection test set (T/R test set)	8714ET	50 ohm	E5062A-150
			75 ohm (Option 1EC)	E5062A-175
	S-parameter test set	8714ES	50 ohm	E5062A-250
			75 ohm (Option 1EC)	E5062A-275

Additional feature options

8712/8714 series options	Descriptions	ENA-L Options	Descriptions
871xET-1E1	Add step attenuator for extended power range	E506xA-1E1 ¹	Extended power range
871xxx-100	Add Fault location / SRL	E506xA-100	Add Fault location analysis
871xxx-101	Add Fault location/SRL plus transport case	N/A	N/A
N/A	–	E506xA-016	Touch screen color LCD

871xxx=8712ET/8712ES/8714ET/8714ES
E506xA=E5061A/E5062A

¹ Extended power range is standard for E506xA-2xx S-parameter test set.

Web Resources

For additional ENA-L product information and literature visit our Web site:

www.agilent.com/find/ena

For additional electronic calibration (ECal) information and literature visit:

www.agilent.com/find/ecal

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