RIGOL
Innovation or nothing

DSA800E Series Spectrum Analyzer

- All-Digital IF Technology
- Frequency Range from 9 kHz to 3.2 GHz
- Min. -161 dBm Displayed Average Noise Level (Typ.)
- Min. <-98 dBc/Hz @ 10 kHz Offset Phase Noise
- Level Measurement Uncertainty <1.0 dB
- 10 Hz Minimum Resolution Bandwidth
- Up to 3.2 GHz Tracking Generator (DSA832E-TG)
- Optional Preamplifier
- Advanced Measurement Functions (Opt.)
- EMI Filter & Quasi-Peak Detector Kit (Opt.)
- VSWR Measurement Kit (Opt.)
- PC Software (Opt.)
- Optional RF TX/RX Training Kit
- Optional RF Accessories (Cable, Adaptor, Attenuator, Bridge ...)
- Complete Connectivity: LAN (LXI), USB Host & Device, GPIB (Opt.)
- 8 Inch WVGA (800×480) Display
- Compact Size, Light Weight Design

DSA800E Series Spectrum Analyzer

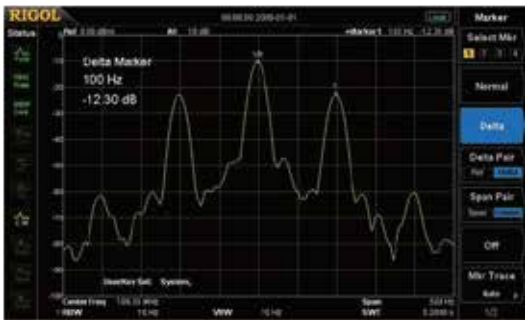
Product Dimensions: Width × Height × Depth = 361.6 mm × 178.8 mm × 128 mm

➤ Benefits of Rigol's all digital IF design

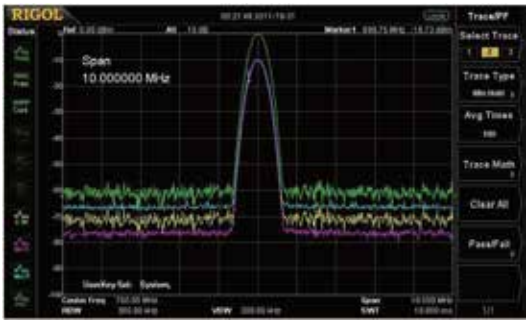
- The ability to measure smaller signals: on the basis of this technology, the IF filter enables smaller bandwidth settings, which greatly reduce the displayed average noise level.
- The ability to distinguish between small signals by frequency: using the IF filter with the smallest bandwidth setting, it is possible to make out signals with a frequency difference of only 10 Hz.
- High precision amplitude readings: this technology almost eliminates the errors generated by filter switching, reference level uncertainty, scale distortion, as well as errors produced in the process of switching between logarithmic and linear display of amplitude when using a traditional analog IF design.
- Higher reliability: compared with traditional analog designs, the digital IF greatly reduces the complexity of the hardware, the system instability caused by channel aging, and the temperature sensitivity that can contribute to parts failure.
- High measurement speed: the use of digital IF technology improves the bandwidth precision and selectivity of the filter, minimizing the scanning time and improving the speed of the measurement.

Features and Benefits

Distinguish the two nearby signals clearly with the 10 Hz RBW

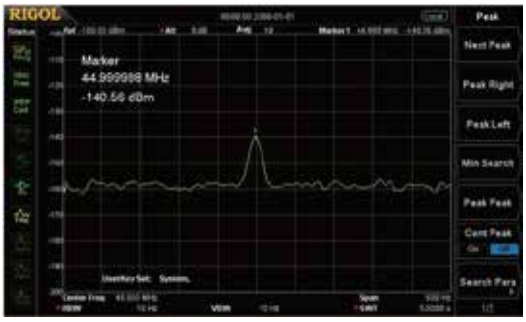


Compare the spectrums with different color trace

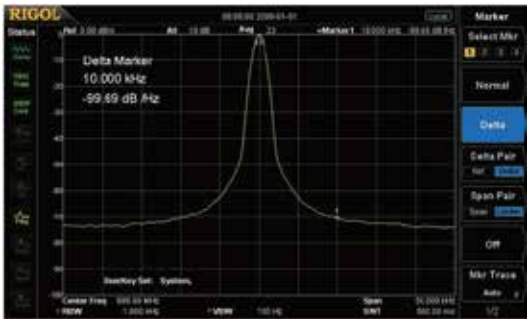


Readout the spectrum peak values with the peak table function

Measure lower level signal with the preamplifier turn on

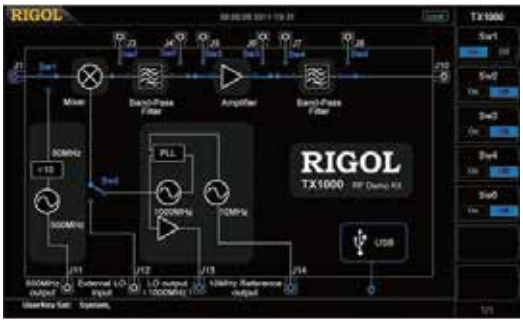


Phase noise < -98 dBc/Hz @10 kHz offset

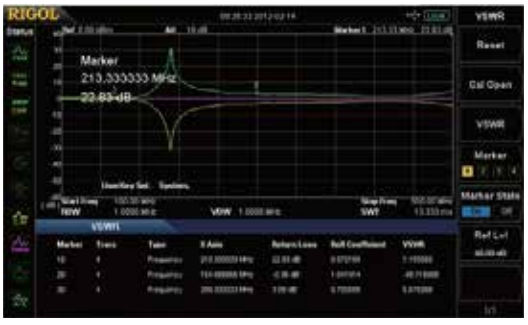


EMI kit (EMI filter & Quasi-peak & Pass/Fail)

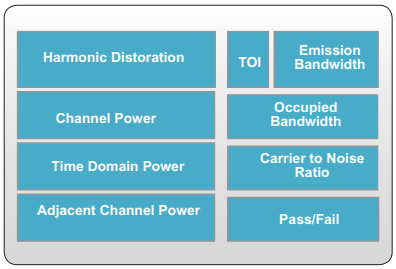
The GUI to control the RF demo kit (Transmitter) directly



VSWR measurement



► RIGOL Spectrum Analyzer Option and Accessory



Advanced Measurement Kit
(AMK-DSA800)

Rack Mount Kit
(RM-DSA800)

VSWR Bridge
(VB1020/VB1032/VB1040/VB1080)

RF Demo Kit
(TX1000)

RF Demo Kit
(RX1000)

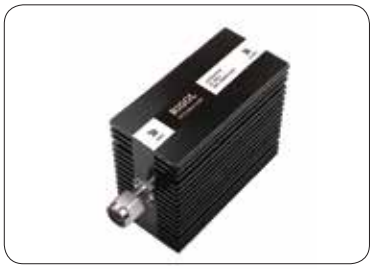
RF CATV Kit

DSA Utility Kit

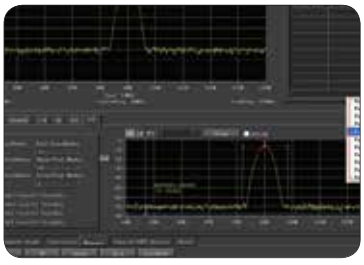
RF Adaptor Kit

RF Attenuator Kit

RF Cable Kit
(CB-NM-NM-75-L-12G)
(CB-NM-SMAM-75-L-12G)

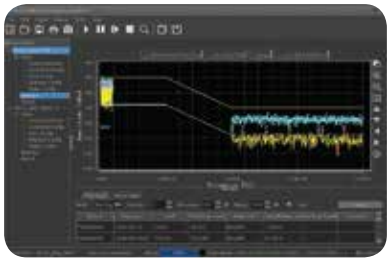


High Power Attenuator
(ATT03301H)



DSA PC Software
(Ultra Spectrum)

USB to GPIB Converter
(USB-GPIB)



EMI Pre-compliance Test Software
(S1210 EMI Pre-compliance Software)

Near Field Probe
(NFP-3)

▶ Specifications

Specifications are valid under the following conditions: the instrument is within the calibration period, is stored for at least two hours at 0 ℃ to 50 ℃ temperature, and is warmed up for 40 minutes. Unless otherwise noted, the specifications in this manual include the measurement uncertainty.

Typical (typ.): characteristic performance, which 80 percent of the measurement results will meet at room temperature (approximately 25℃). This data is not warranted and does not include the measurement uncertainty.

Nominal (nom.): the expected mean or average performance or a designed attribute (such as the 50Ω connector). This data is not warranted and is measured at room temperature (approximately 25℃).

Measured (meas.): an attribute measured during the design phase which can be compared to the expected performance, such as the amplitude drift variation with time. This data is not warranted and is measured at room temperature (approximately 25℃).

NOTE: All charts in this manual are the measurement results of multiple instruments at room temperature unless otherwise noted. The specifications (except the TG specifications) listed in this manual are those when the tracking generator is off.

Frequency

Frequency		
	DSA832E	
Frequency range	9 kHz to 3.2 GHz	
Frequency resolution	1 Hz	

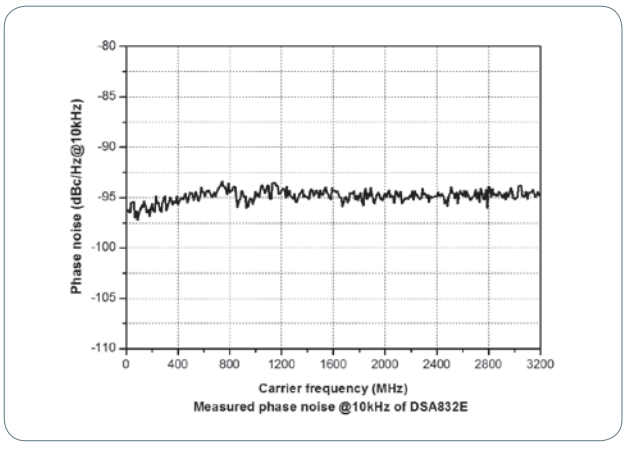
Internal Reference Frequency		
Reference frequency	10 MHz	
Accuracy	±[(time since last calibration × aging rate) + temperature stability + calibration accuracy]	
Initial calibration accuracy	<1 ppm	
Temperature stability	0℃ to 50℃ , reference to 25℃	
	<1 ppm	
Aging rate	<2 ppm/year	

Frequency Readout Accuracy		
Marker resolution	span/ (number of sweep points - 1)	
Marker uncertainty	±(frequency indication × reference frequency accuracy + 1% × span + 10% × resolution bandwidth + marker resolution)	

Frequency Counter		
Resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz	
Uncertainty	±(frequency indication × reference frequency accuracy + counter resolution)	

Frequency Span		
Range	0 Hz, 100 Hz to maximum frequency of instrument	
Uncertainty	±span/ (number of sweep points - 1)	

SSB Phase Noise		
	20℃ to 30℃ , f_c = 1 GHz	
Carrier offset	10 kHz offset	<-90 dBc/Hz, <-98 dBc/Hz (typ.)



Residual FM	
	20℃ to 30℃ , RBW = VBW = 1 kHz
Residual FM	<20 Hz (nom.)

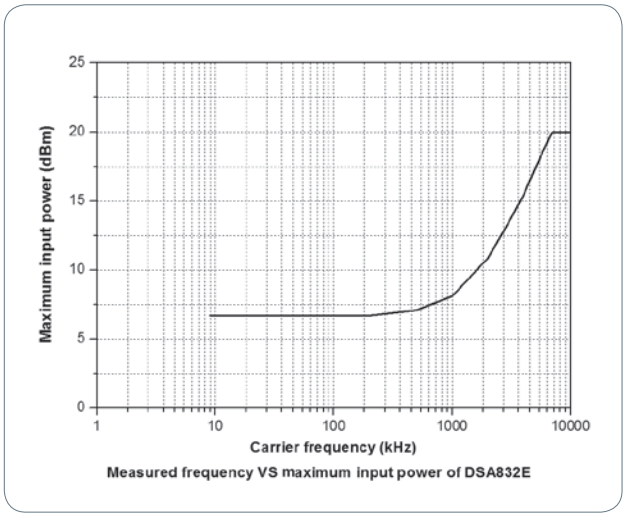
Bandwidths	
	Set "Auto SWT" to "Accy"
Resolution bandwidth (-3 dB)	10 Hz to 1 MHz, in 1-3-10 sequence
RBW uncertainty	<5% (nom.)
Resolution filter shape factor (60 dB : 3 dB)	<5 (nom.)
Video bandwidth (-3 dB)	1 Hz to 3 MHz, in 1-3-10 sequence
Resolution bandwidth (-6 dB) (EMI-DSA800 option)	200 Hz, 9 kHz, 120 kHz

Amplitude

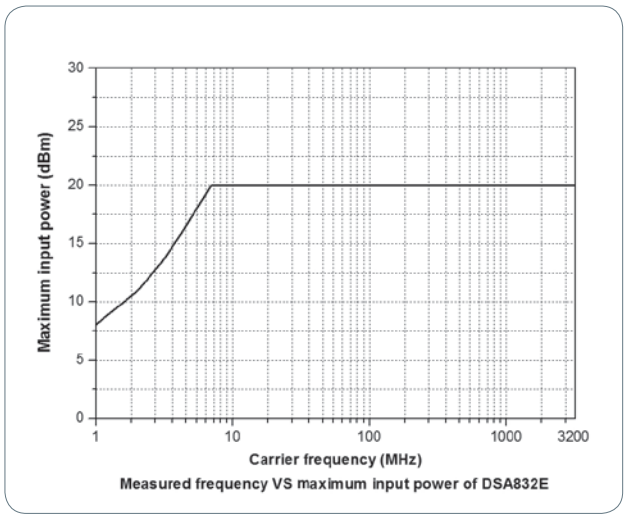
Measurement Range	
Range	$f_c \geqslant$ 10 MHz
	DANL to +20 dBm

Maximum Input Level	
DC voltage	50 V
CW RF power	attenuation = 30 dB
	+20 dBm (100 mW)
Max. damage level[1]	+30 dBm (1 W)

NOTE: [1] When $f_c \geqslant$ 10 MHz, input level > +25 dBm and PA is Off, the protection switch will be on.

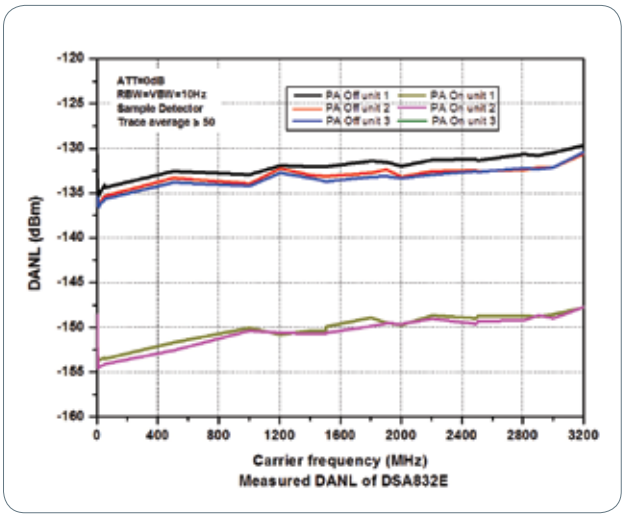


Measured frequency VS maximum input power of DSA832E



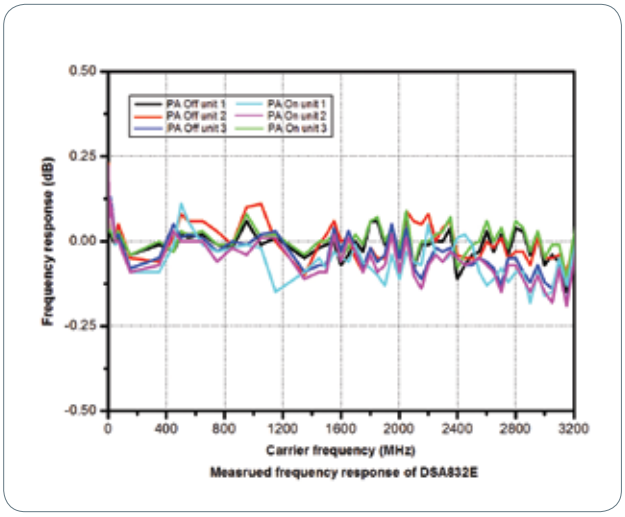
Measured frequency VS maximum input power of DSA832E

Displayed Average Noise Level (DANL)		
	attenuation = 0 dB, RBW = VBW = 10 Hz, sample detector, trace average $\geqslant$ 50, tracking generator off, 20℃ to 30℃ , input impendence = 50 Ω	
PA off	9 kHz to 100 kHz	<-110 dBm (typ.)
	100 kHz to 5 MHz	<-122 dBm, <-128 dBm (typ.)
	5 MHz to 3.2 GHz	<-127 dBm, <-134 dBm (typ.)
PA on	100 kHz to 1 MHz	<-142 dBm (typ.)
	1 MHz to 5 MHz	<-140 dBm, <-145 dBm (typ.)
	5 MHz to 3.2 GHz	<-145 dBm, <-151 dBm (typ.)

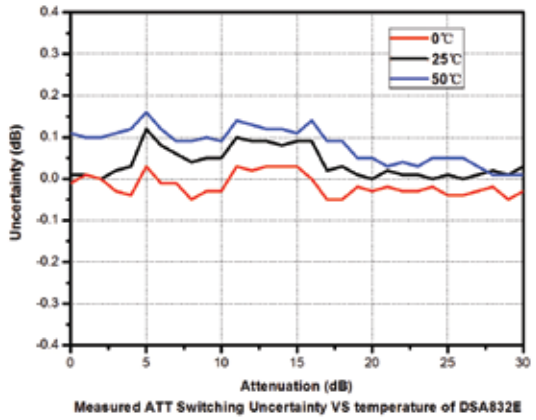


Level Display		
Logarithmic level axis	1 dB to 200 dB	
Linear level axis	0 to reference level	
Number of display points	601	
Number of traces	3 + math trace	
Trace detectors	normal, positive-peak, negative-peak, sample, RMS, voltage average	
	quasi-peak (with EMI-DSA800 option)	
Trace functions	clear write, max hold, min hold, average, view, blank	
Units of level axis	dBm, dBmV, dBμV, nV, μV, mV, V, nW, μW, mW, W	

Frequency Response		
	$f_c \geqslant$ 100 kHz, attenuation = 10 dB, relative to 50 MHz, 20℃ to 30℃	
PA off	100 kHz to 3.2 GHz	<0.7 dB
	$f_c \geqslant$ 1MHz, attenuation = 10 dB, relative to 50 MHz, 20℃ to 30℃	
PA on	100 kHz to 3.2 GHz	<1.0 dB



Input Attenuation Switching Uncertainty		
Setting range	0 dB to 30 dB, in 1 dB step	
Switching uncertainty	f_c = 50 MHz, relative to 10 dB, 20℃ to 30℃	
	<0.3 dB	



Measured ATT Switching Uncertainty VS temperature of DSA832E

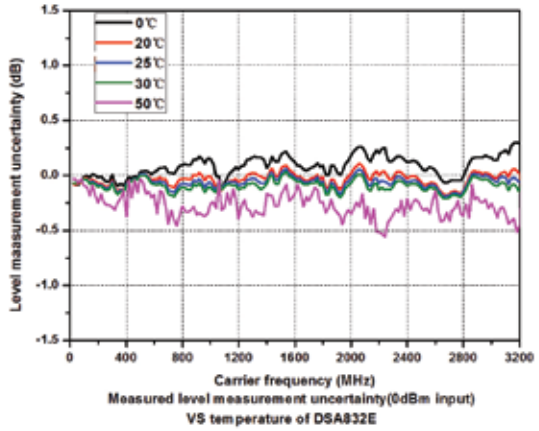
Absolute Amplitude Uncertainty		
Uncertainty	f_c = 50 MHz, peak detector, preamplifier off, attenuation = 10 dB, input signal level = -10dBm, 20℃ to 30℃	
	<0.3 dB	

RBW Switching Uncertainty		
Uncertainty	relative to 1 kHz RBW	
	<0.1 dB	

Reference Level		
Range	-100 dBm to +20 dBm, in 1 dB step	
Resolution	log scale	0.01 dB
	linear scale	4 digits

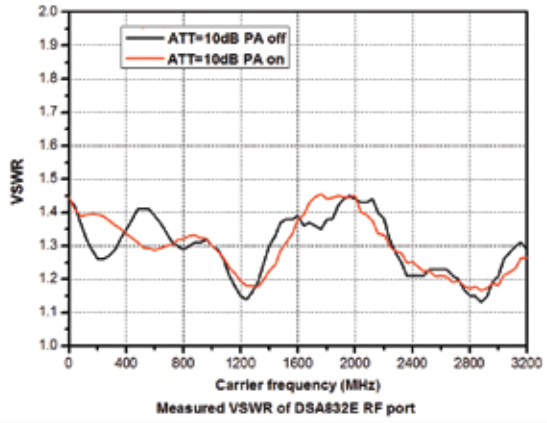
Preamplifier		
	PA-DSA832 (option)	
Gain	100 kHz to 3.2 GHz	17 dB (nom.)

Level Measurement Uncertainty	
	95% confidence level, S/N > 20 dB, RBW = VBW = 1 kHz, preamplifier off, attenuation = 10 dB, -50 dBm < input level ≤ 0 dBm, f_c > 10 MHz, 20℃ to 30℃
Level measurement uncertainty	<1.0 dB (nom.)



Measured level measurement uncertainty(0dBm input)
VS temperature of DSA832E

RF Input VSWR		
	attenuation ⩾ 10 dB	
VSWR	300 kHz to 3.2 GHz	<1.5 (nom.)



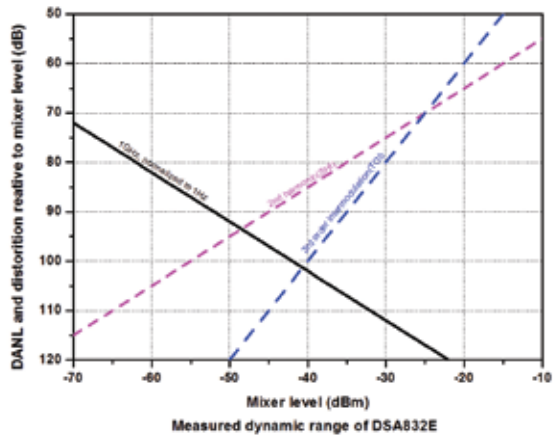
Measured VSWR of DSA832E RF port

Distortion

Second Harmonic Intercept	
Second harmonic intercept (SHI)	f_c ⩾ 50 MHz, input signal level = -20 dBm, attenuation = 10 dB
	+40 dBm

Third-order Intercept	
Third-order intercept (TOI)	f_c ⩾ 50 MHz, two -20 dBm tones at input mixer spaced by 200 kHz, attenuation = 10 dB
	+7 dBm

1dB Gain Compression	
1dB compression of input mixer (P_{1dB})	f_c ⩾ 50 MHz, attenuation = 0 dB
	>0 dBm



Measured dynamic range of DSA832E

Spurious Response		
Spurious response, inherent	input terminated 50 Ω, attenuation = 0 dB, 20℃ to 30℃	
	<-90 dBm[2], <-100 dBm (typ.)	
Intermediate frequency	<-60 dBc	
System related sidebands	referenced to local oscillators, referenced to A/D conversion, referenced to subharmonic of first LO, referenced to harmonic of first LO	
	<-60 dBc	
Input related spurious	mixer level = -30dBm	
	<-60 dBc	

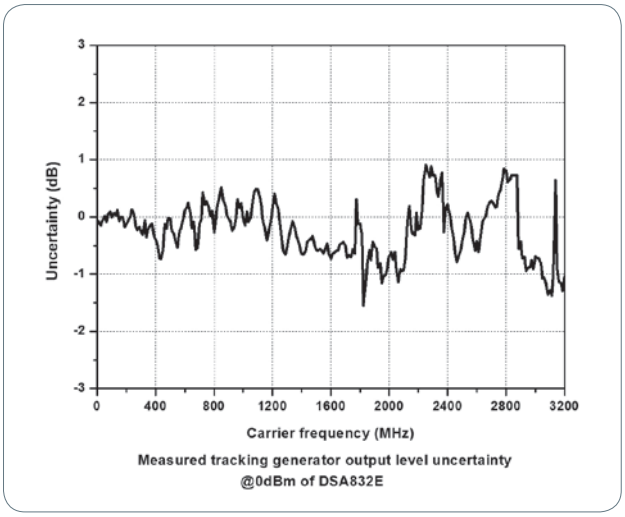
NOTE: [2] Except the internal local oscillator (1820 MHz) and its harmonics.

Sweep

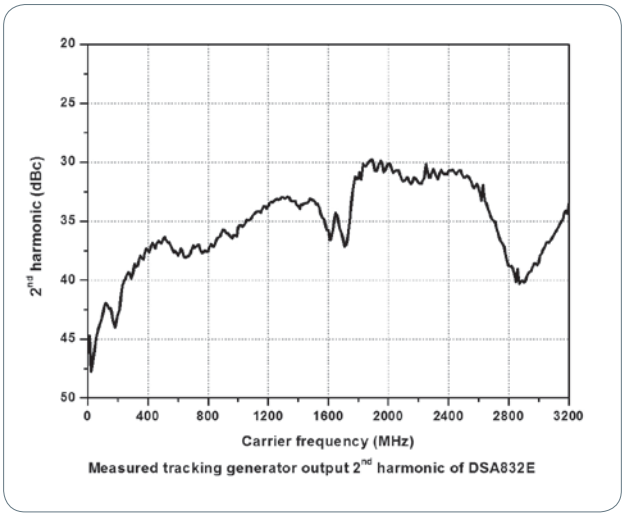
Sweep		
Sweep time	span ⩾ 100 Hz	1 ms to 3200 s
	zero span	20 μs to 3200 s
Sweep time uncertainty	span ⩾ 100 Hz	5% (nom.)
	zero span (sweep time setting value > 1 ms)	5% (nom.)
Sweep mode		continuous, single

Tracking Generator (Option)

TG Output	
Frequency range	100 kHz to 3.2 GHz
Output level range	-40 dBm to 0 dBm
Output level resolution	1 dB
Output flatness	relative to 50 MHz
	±3 dB (nom.)



Measured tracking generator output level uncertainty @0dBm of DSA832E



Measured tracking generator output 2nd harmonic of DSA832E

Trigger

Trigger	
Trigger source	Trigger source
External trigger level	External trigger level

Input /Output

Front Panel Connectors		
RF input	impedance	50 Ω (nom.)
	connector	N female
Tracking generator output	impedance	50 Ω (nom.)
	connector	N female

Internal/ External Reference		
Internal reference	frequency	10 MHz
	output level	+3 dBm to +10 dBm, +8 dBm (typ.)
	impedance	50 Ω (nom.)
	connector	BNC female
External reference	frequency	10 MHz ± 5 ppm
	input level	0 dBm to +10 dBm
	impedance	50 Ω (nom.)
	connector	BNC female

External Trigger Input		
External trigger input	impedance	1 kΩ (nom.)
	connector	BNC female

Communication Interface		
USB host	connector	A plug
	protocol	version2.0
USB device	connector	B plug
	protocol	version2.0
LAN	LXI core 2011 device	10/100Base, RJ-45
IEC/IEEE (GPIB) bus (USB-GPIB option)		IEEE488.2

General Specifications

Display	
Type	TFT LCD
Resolution	800 x 480 pixels
Size	8 inch
Colors	64k

Printer Supported	
Protocol	PictBridge

Mass Memory	
Mass memory	flash disk (internal), USB storage device (not supplied)

Power Supply	
Input voltage range, AC	100 V to 240 V (nom.)
AC supply frequency	45 Hz to 440 Hz
Power consumption	35 W (typ.), max. 50 W with all options

Environmental		
Temperature	operating temperature range	0℃ to 50℃
	storage temperature range	-20℃ to 70℃
Humidity	0℃ to 30℃	≤ 95% rel. humidity
	30℃ to 40℃	≤ 75% rel. humidity
Altitude	operating height	up to 3,000m

Electromagnetic Compatibility and Safety		
EMC	in line with EN61326-1:2006	
	IEC 61000-4-2:2001	±4.0 kV (contact discharge), ±4.0 kV (air discharge)
	IEC 61000-4-3:2002	3 V/m (80 MHz to 1 GHz), 3 V/m (1.4 GHz to 2 GHz), 1 V/m (2.0 GHz to 2.7 GHz)
	IEC 61000-4-4:2004	1 kV power lines
	IEC 61000-4-5:2001	0.5 kV (phase to neutral), 0.5 kV (phase to PE), 1 kV (neutral to PE)
	IEC 61000-4-6:2003	3 V, 0.15 to 80 MHz
	IEC 61000-4-11:2004	voltage dip: 0% UT during half cycle, 0% UT during 1 cycle, 70% UT during 25 cycles short interruption: 0% UT during 250 cycles

Electrical safety	in line with UL 61010-1:2012, CAN/CSA-C22.2 No. 61010-1-12, EN 61010-1:2010

Dimensions	
(W x H x D)	361.6 mm × 178.8 mm × 128 mm (14.2 in × 7.0 in × 5.0 in)

Weight	
Standard	4.55 kg (10.0 lb)
With tracking generator	5.15 kg (11.4 lb)

Calibration Interval	
Recommended calibration interval	1 year

Ordering Information

	Description	Order Number
Model	spectrum analyzer, 9 kHz to 3.2 GHz	DSA832E
	spectrum analyzer, 9 kHz to 3.2 GHz (with tracking generator, factory installed)	DSA832E-TG
Standard accessories	quick guide (hard copy)	-
	power cable	-
Options	preamplifier, 100 kHz to 3.2 GHz	PA-DSA832
	EMI filter & quasi-peak detector	EMI-DSA800
	advanced measurement kit	AMK-DSA800
	VSWR measurement kit	VSWR-DSA800
	DSA PC software	Ultra Spectrum
Optional accessories	include: N-SMA cable, BNC-BNC cable, N-BNC adaptor, N-SMA adaptor, 75 Ω to 50 Ω adaptor, 900 MHz/1.8 GHz antenna (2pcs), 2.4 GHz antenna (2pcs)	DSA Utility Kit
	include: N(F)-N(F) adaptor (1pcs), N(M)-N(M) adaptor (1pcs), N(M)-SMA(F) adaptor (2pcs), N(M)-BNC(F) adaptor (2pcs), SMA(F)-SMA(F) adaptor (1pcs), SMA(M)-SMA(M) adaptor (1pcs), BNC T type adaptor (1pcs), 50 Ω SMA load (1pcs), 50 Ω BNC impedance adaptor (1pcs)	RF Adaptor Kit
	include: 50 Ω to 75 Ω adaptor (2pcs)	RF CATV Kit
	include: 6dB attenuator (1pcs), 10dB attenuator (2pcs)	RF Attenuator Kit
	30dB high power attenuator, max. power 100W	ATT03301H
	N(M)-N(M) RF cable	CB-NM-NM-75-L-12G
	N(M)-SMA(M) RF cable	CB-NM-SMAM-75-L-12G
	RF demo kit (transmitter)	TX1000
	RF demo kit (receiver)	RX1000
	VSWR bridge, 1 MHz to 2 GHz	VB1020
	VSWR bridge, 1 MHz to 3.2 GHz	VB1032
	VSWR bridge, 800 MHz to 4 GHz	VB1040
	VSWR bridge, 2 GHz to 8 GHz	VB1080
	near field probe	NFP-3
	EMI Pre-compliance test software	S1210 EMI Pre-compliance Software
	rack mount kit	RM-DSA800
	soft carrying bag	BAG-G1
	USB cable	CB-USBA-USBB-FF-150
	USB to GPIB interface converter for instrument	USB-GPIB

RIGOL

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