

# DSA800/DSA800E Series Spectrum Analyzer

## Frequency

Frequency				
	DSA815	DSA832E	DSA832	DSA875
Frequency range	9 kHz to 1.5 GHz	9 kHz to 3.2 GHz	9 kHz to 3.2 GHz	9 kHz to 7.5 GHz
Frequency resolution	1 Hz			

Internal Reference Frequency				
	DSA815	DSA832E	DSA832	DSA875
Reference frequency	10 MHz			
Accuracy	$\pm[(\text{time since last calibration} \times \text{aging rate}) + \text{temperature stability} + \text{calibration accuracy}]$			
Initial calibration accuracy	<1 ppm			
Temperature stability	0°C to 50°C, reference to 25°C			
	<2 ppm	<1 ppm	<0.5 ppm	
Aging rate	<2 ppm/year	<2 ppm/year	<1 ppm/year	

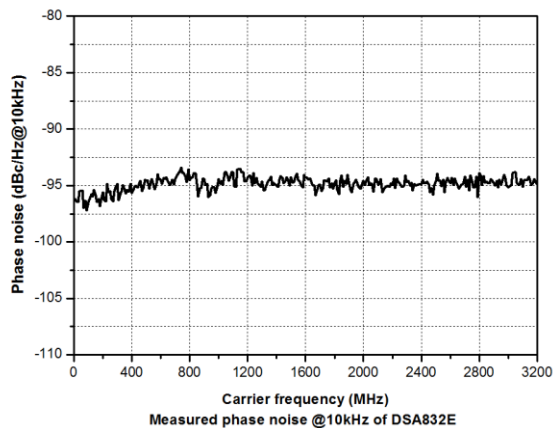
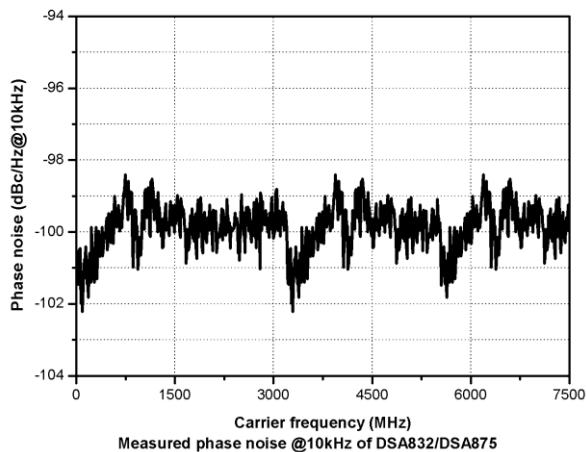
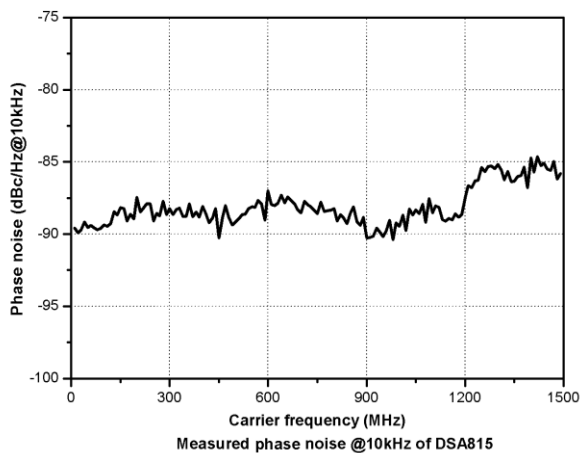
Frequency Readout Accuracy	
Marker resolution	$\text{span} / (\text{number of sweep points} - 1)$
Marker uncertainty	$\pm(\text{frequency indication} \times \text{reference frequency accuracy} + 1\% \times \text{span} + 10\% \times \text{resolution bandwidth} + \text{marker resolution})$

Frequency Counter	
Resolution	1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz
Uncertainty	$\pm(\text{frequency indication} \times \text{reference frequency accuracy} + \text{counter resolution})$

Frequency Span	
Range	0 Hz, 100 Hz to maximum frequency of instrument
Uncertainty	$\pm \text{span} / (\text{number of sweep points} - 1)$

SSB Phase Noise	
	20°C to 30°C, $f_c = 1 \text{ GHz}$

Carrier offset	DSA815	DSA832E	DSA832	DSA875
10 kHz	<-80 dBc/Hz	<-90 dBc/Hz	<-98 dBc/Hz	
100 kHz	<-100 dBc/Hz (typ.)	<-100 dBc/Hz (typ.)	<-100 dBc/Hz (typ.)	



Residual FM				
	20°C to 30°C, RBW = VBW = 1 kHz			
	DSA815	DSA832E	DSA832	DSA875
Residual FM	<50 Hz (nom.)	<20 Hz (nom.)		

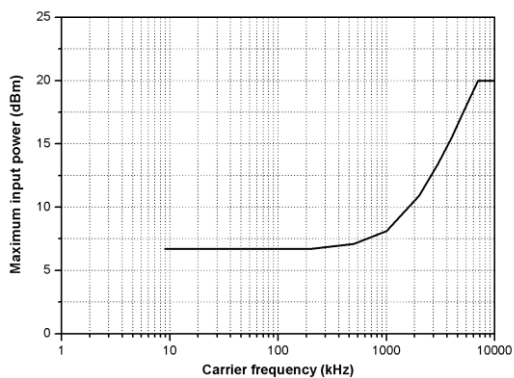
Bandwidths				
	Set "Auto SWT" to "Accy"			
	DSA815	DSA832E	DSA832	DSA875
Resolution bandwidth (-3 dB)	10 Hz to 1 MHz, in 1-3-10 sequence			
RBW uncertainty	<5% (nom.)			
Resolution filter shape factor (60 dB : 3 dB)	<5 (nom.)			
Video bandwidth (-3 dB)	1 Hz to 3 MHz, in 1-3-10 sequence			

Resolution bandwidth (-6 dB) (EMI-DSA800 option)	200 Hz, 9 kHz, 120 kHz
---	------------------------

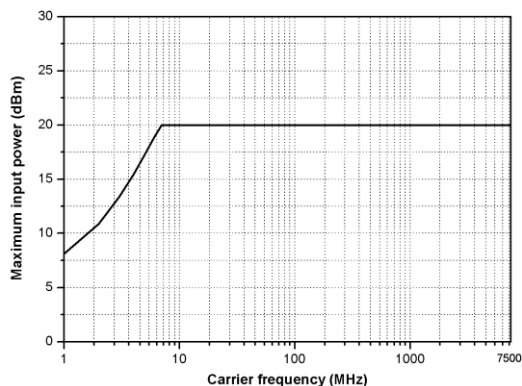
## Amplitude

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

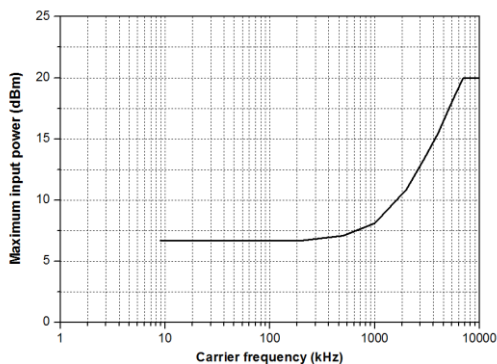
Maximum Input Level	
DC voltage	50 V
CW RF power	attenuation = 30 dB +20 dBm (100 mW)
Max. damage level <sup>[1]</sup>	+30 dBm (1 W)



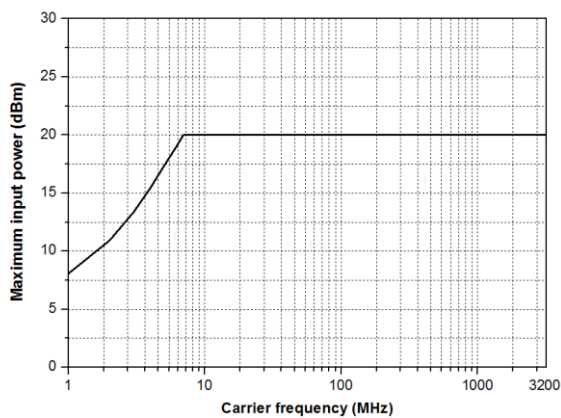
Measured frequency VS maximum input power of DSA815/DSA832/DSA875



Measured frequency VS maximum input power of DSA815/DSA832/DSA875



Measured frequency VS maximum input power of DSA832E



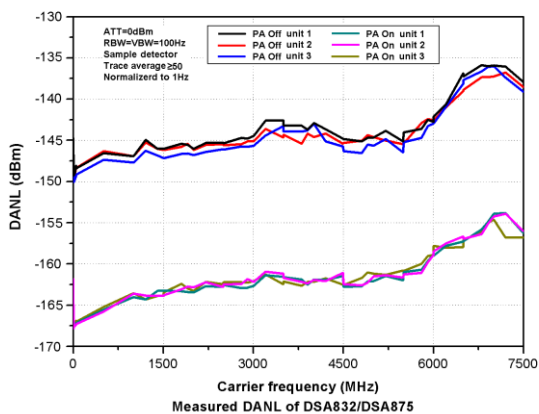
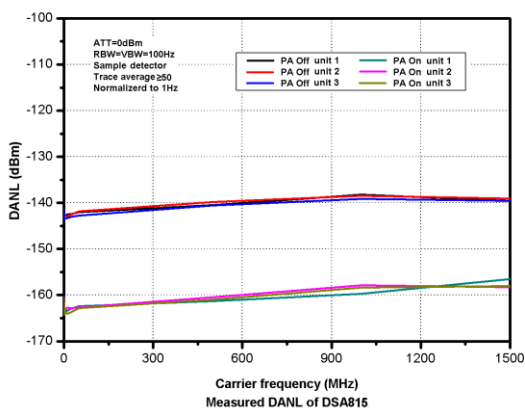
Measured frequency VS maximum input power of DSA832E

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

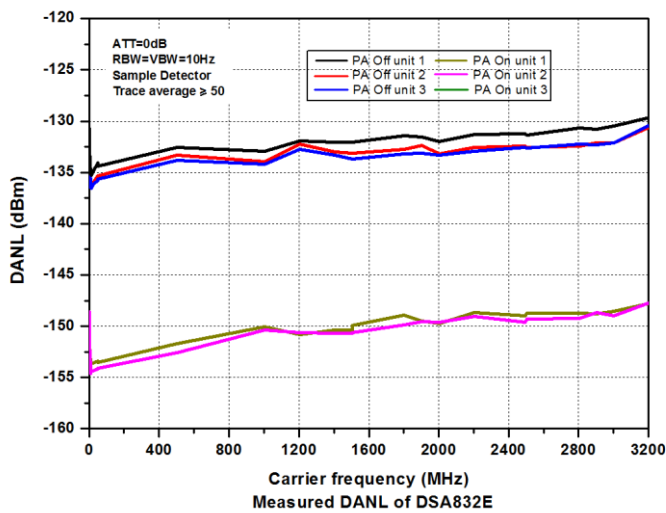
Displayed Average Noise Level (DANL)		
		DSA815
Frequency		attenuation = 0 dB, RBW = VBW = 100 Hz, sample detector, trace average $\geq 50$ , tracking generator off, 20°C to 30°C, input impedance = 50 $\Omega$
PA off	100 kHz to 1 MHz	<-90 dBm, <-110 dBm (typ.)
	1 MHz to 1.5 GHz	<-110 dBm + 6 $\times$ (f/1 GHz) dB, <-115 dBm (typ.)
PA on	100 kHz to 1 MHz	<-110 dBm, <-130 dBm (typ.)
	1 MHz to 1.5 GHz	<-130 dBm + 6 $\times$ (f/1 GHz) dB, <-135 dBm (typ.)

Displayed Average Noise Level (DANL)			
		DSA832	DSA875
Frequency		attenuation = 0 dB, RBW = VBW = 10 Hz, sample detector, trace average $\geq 50$ , tracking generator off, 20°C to 30°C, input impedance = 50 $\Omega$	
PA off	9 kHz to 100 kHz	<-110 dBm (typ.)	<-110 dBm (typ.)
	100 kHz to 5 MHz	<-125 dBm, <-128 dBm (typ.)	<-125 dBm, <-128 dBm (typ.)
	5 MHz to 3.2 GHz	<-130 dBm, <-134 dBm (typ.)	<-130 dBm, <-134 dBm (typ.)
	3.2 GHz to 6 GHz		<-126 dBm, <-130 dBm (typ.)
	6 GHz to 7.5 GHz		<-121 dBm, <-125 dBm (typ.)
PA on	100 kHz to 1 MHz	<-142 dBm (typ.)	<-142 dBm (typ.)
	1 MHz to 5 MHz	<-142 dBm, <-145 dBm (typ.)	<-142 dBm, <-145 dBm (typ.)
	5 MHz to 3.2 GHz	<-147 dBm, <-151 dBm (typ.)	<-147 dBm, <-151 dBm (typ.)
	3.2 GHz to 6 GHz		<-143 dBm, <-147 dBm (typ.)
	6 GHz to 7.5 GHz		<-138 dBm, <-142 dBm (typ.)

Displayed Average Noise Level (DANL) (Normalized to 1Hz)				
		DSA815	DSA832	DSA875
Frequency		attenuation = 0 dB, RBW = VBW = 100 Hz, sample detector, trace average ≥ 50, tracking generator off, normalized to 1Hz, 20°C to 30°C, input impedance = 50 Ω		
PA off	9 kHz to 100 kHz		<-120 dBm (typ.)	<-120 dBm (typ.)
	100 kHz to 1 MHz	<-110 dBm, <-130 dBm (typ.)	<-135 dBm, <-138 dBm (typ.)	<-135 dBm, <-138 dBm (typ.)
	1 MHz to 5 MHz	<-130 dBm + 6 × (f/1 GHz) dB, <-135 dBm (typ.)	<-140 dBm, <-144 dBm (typ.)	<-140 dBm, <-144 dBm (typ.)
	5 MHz to 1.5 GHz			
	1.5 GHz to 3.2 GHz			
	3.2 GHz to 6 GHz			<-136 dBm, <-140 dBm (typ.)
6 GHz to 7.5 GHz			<-131 dBm, <-135 dBm (typ.)	
PA on	100 kHz to 1 MHz	<-130 dBm, <-150 dBm (typ.)	<-152 dBm (typ.)	<-152 dBm (typ.)
	1 MHz to 5 MHz	<-150 dBm + 6 × (f/1 GHz) dB, <-155 dBm (typ.)	<-152 dBm, <-155 dBm (typ.)	<-152 dBm, <-155 dBm (typ.)
	5 MHz to 1.5 GHz			
	1.5 GHz to 3.2 GHz		<-157 dBm, <-161 dBm (typ.)	<-157 dBm, <-161 dBm (typ.)
	3.2 GHz to 6 GHz			<-153 dBm, <-157 dBm (typ.)
	6 GHz to 7.5 GHz			<-148 dBm, <-152 dBm (typ.)

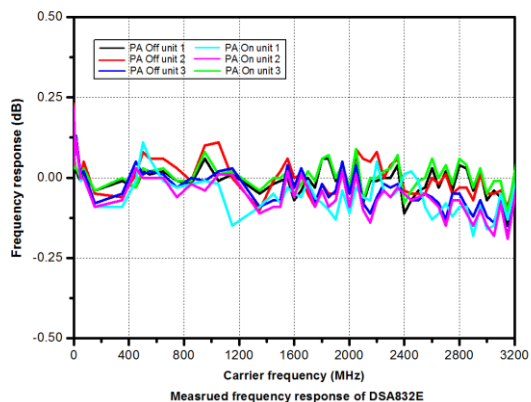
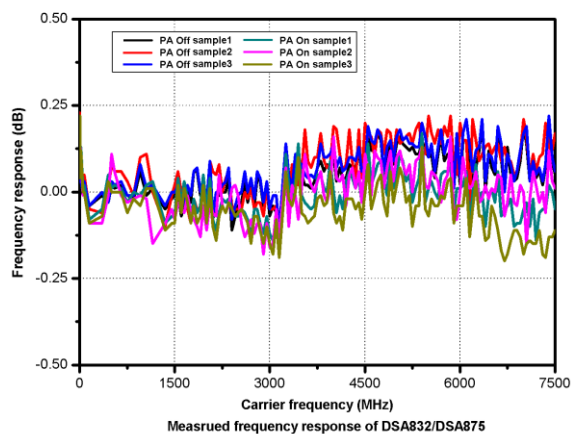
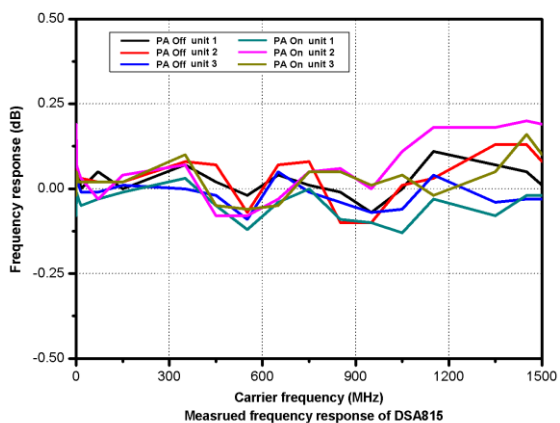


Displayed Average Noise Level (DANL)		
	DSA832E	
	attenuation = 0 dB, RBW = VBW = 10 Hz, sample detector, trace average ≥ 50, tracking generator off, 20°C to 30°C, input impedance = 50 Ω	
PA off	9 kHz to 100 kHz	<-110 dBm (typ.)
	100 kHz to 5 MHz	<-122 dBm, <-125 dBm (typ.)
	5 MHz to 3.2 GHz	<-127 dBm, <-130 dBm (typ.)
PA on	100 kHz to 1 MHz	<-142 dBm (typ.)
	1 MHz to 5 MHz	<-140 dBm, <-143 dBm (typ.)
	5 MHz to 3.2 GHz	<-145 dBm, <-148 dBm (typ.)

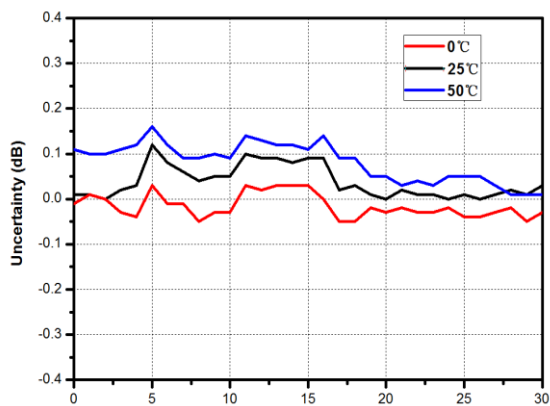
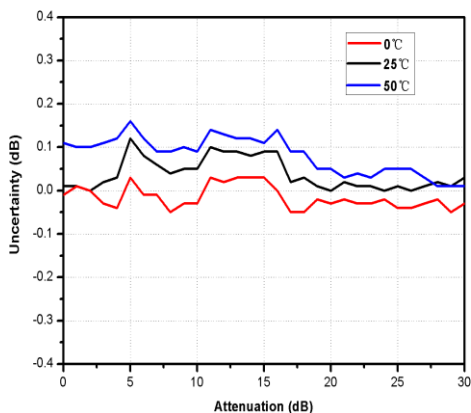


Level Display	
Logarithmic level axis	1 dB to 200 dB
Linear level axis	0 to reference level
Number of display points	601
Number of traces	3 + math trace
Trace detectors	normal, positive-peak, negative-peak, sample, RMS, voltage average
	quasi-peak (with EMI-DSA800 option)
Trace functions	clear write,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

Frequency Response					
		DSA815	DSA832E	DSA832	DSA875
Frequency response		$f_c \geq 100$ kHz, attenuation = 10 dB, relative to 50 MHz, 20°C to 30°C			
PA off	100 kHz to 1.5 GHz	<0.7 dB	<0.7 dB,	<0.5 dB, <0.3 dB (typ.)	<0.5 dB, <0.3 dB (typ.)
	1.5 GHz to 3.2 GHz				
	3.2 GHz to 7.5 GHz				<0.7 dB, <0.3 dB (typ.)
		$f_c \geq 1$ MHz, attenuation = 10 dB, relative to 50 MHz, 20°C to 30°C			
PA on	100 kHz to 1.5 GHz	<1.0 dB	<1.0 dB,	<0.7 dB, <0.3 dB (typ.)	<0.7 dB, <0.3 dB (typ.)
	1.5 GHz to 3.2 GHz				
	3.2 GHz to 7.5 GHz				<0.9 dB, <0.3 dB (typ.)



Input Attenuation Switching Uncertainty				
	DSA815	DSA832E	DSA832	DSA875
Setting range	0 to 30 dB, in 1 dB step			
Switching uncertainty	$f_c = 50 \text{ MHz}$ , relative to 10 dB, 20°C to 30°C			
	< 0.5 dB	< 0.3 dB		



Absolute Amplitude Uncertainty				
	DSA815	DSA832E	DSA832	DSA875
Uncertainty	$f_c = 50 \text{ MHz}$ , peak detector, preamplifier off, attenuation = 10 dB, input signal level = -10 dBm, 20°C to 30°C			
	<0.4 dB	<0.3 dB		

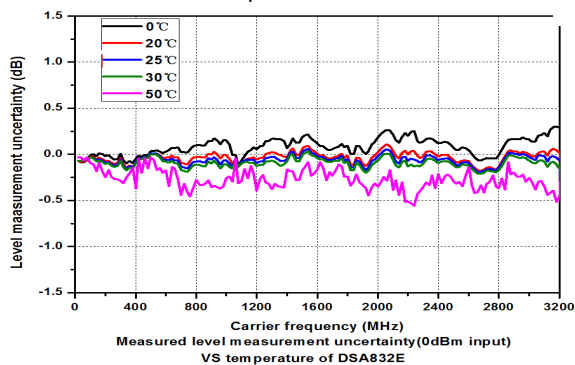
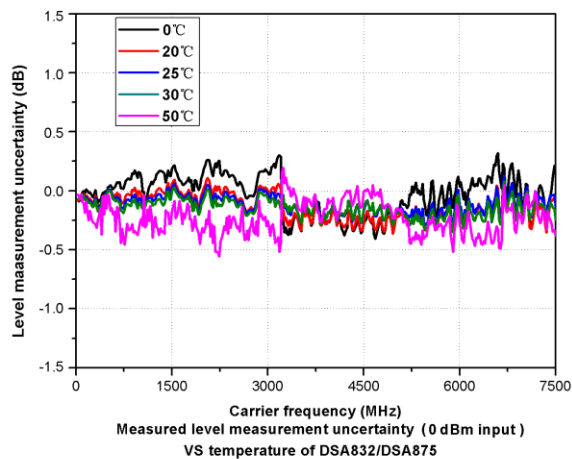
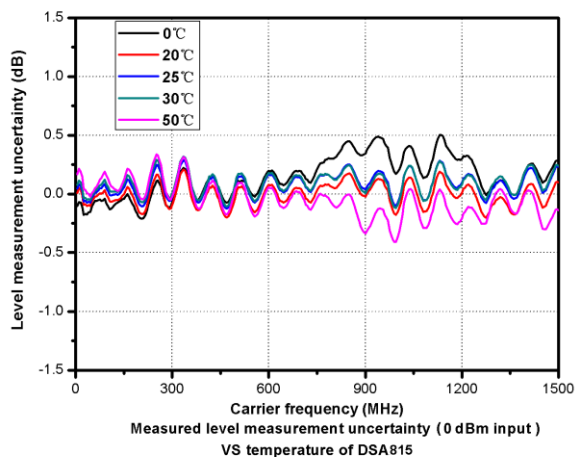
RBW Switching Uncertainty	
Uncertainty	relative to 1 kHz RBW
	<0.1 dB

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

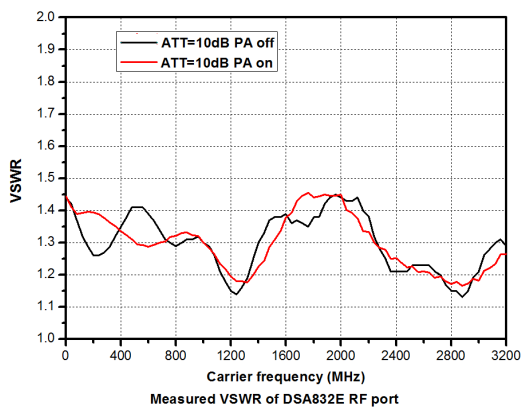
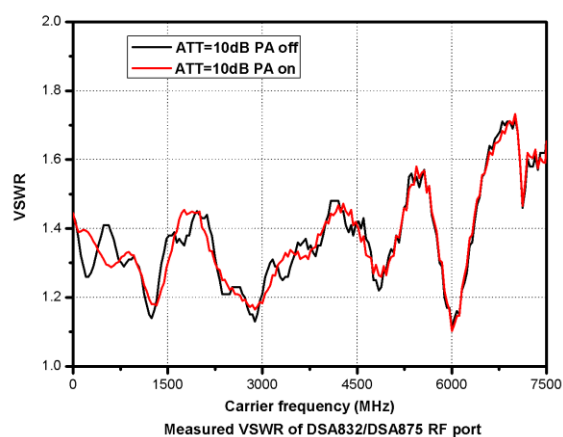
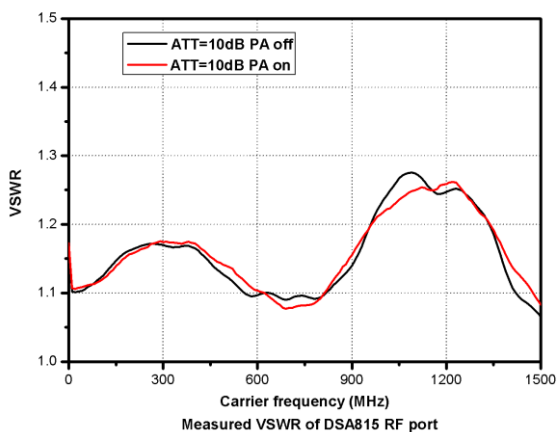
Preamplifier					
		DSA815 (standard)	PA-DSA832E (option)	PA-DSA832 (option)	PA-DSA875 (option)
Gain	100 kHz to 1.5 GHz	20 dB (nom.)	17 dB (nom.)	17 dB (nom.)	17 dB (nom.)
	1.5 GHz to 3.2 GHz				
	3.2 GHz to 7.5 GHz				



Level Measurement Uncertainty				
	DSA815	DSA832E	DSA832	DSA875
	95% confidence level, S/N > 20 dB, RBW = VBW = 1 kHz, preamplifier off, attenuation = 10 dB, -50 dBm < input level ≤ 0 dBm, f <sub>c</sub> > 10 MHz, 20°C to 30°C			
Level measurement uncertainty	<1.5 dB (nom.)	<1.0 dB (nom.)	<0.8 dB (nom.)	



RF Input VSWR		DSA815	DSA832E	DSA832	DSA875
		attenuation $\geq 10$ dB			
VSWR	300 kHz to 1.5 GHz	<1.5 (nom.)	<1.5 (nom.)	<1.5 (nom.)	<1.5 (nom.)
	1.5 GHz to 3.2 GHz				
	3.2 GHz to 7.5 GHz				<1.8 (nom.)

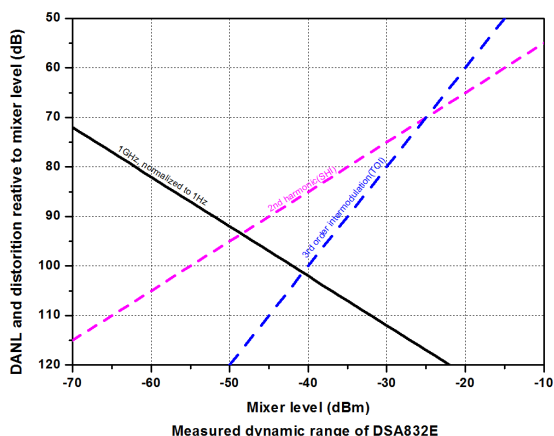
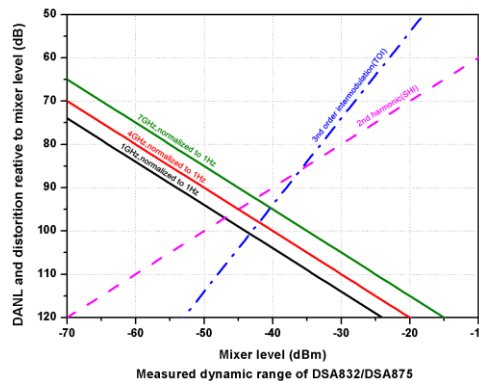
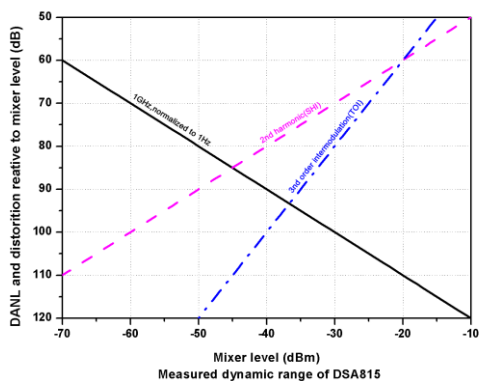


# Distortion

Second Harmonic Intercept				
	DSA815	DSA832E	DSA832	DSA875
Second harmonic intercept (SHI)	$f_c \geq 50$ MHz, input signal level = -20 dBm, attenuation = 10 dB			
	+40 dBm	+40 dBm	+45 dBm	

Third-order Intercept				
	DSA815	DSA832E	DSA832	DSA875
Third-order intercept (TOI)	$f_c \geq 50$ MHz, two -20 dBm tones at input mixer spaced by 200 kHz, attenuation = 10 dB			
	+10 dBm	+7 dBm	+11 dBm, +15 dBm (typ.)	

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



Spurious Response				
	DSA815	DSA832E	DSA832	DSA875
Spurious response	input terminated 50 Ω, attenuation = 0 dB, 20°C to 30°C			
	<-88 dBm (typ.)	<-90 dBm <sup>[1]</sup> , <-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 = -30 dBm			
	<-60 dBc			

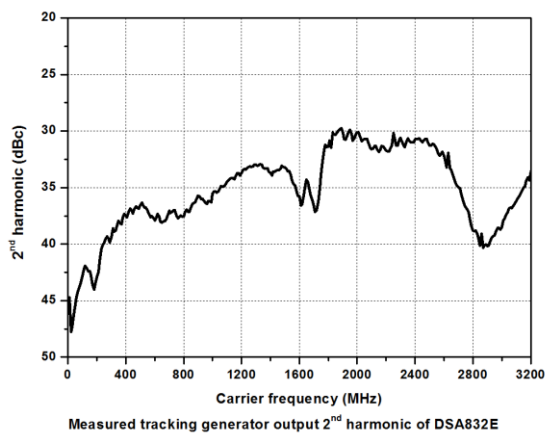
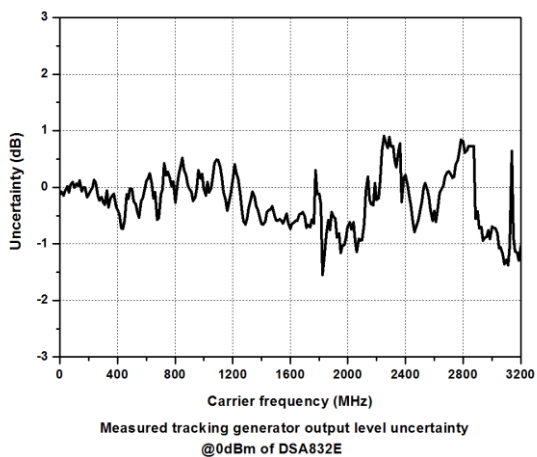
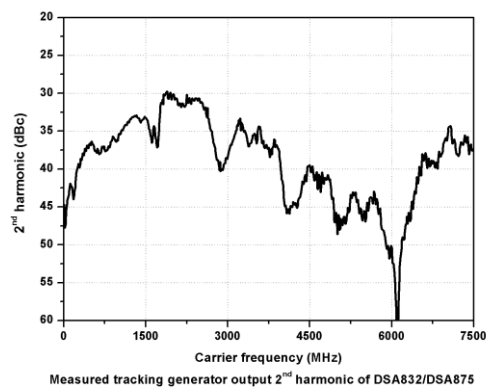
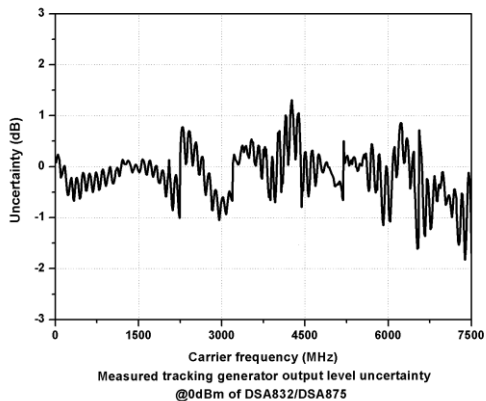
**NOTE:** [1] Except the internal local oscillator (1820 MHz) and its harmonics.

## Sweep

Sweep					
		DSA815	DSA832E	DSA832	DSA875
Sweep time	span ≥ 100 Hz	10 ms to 1500 s	1 ms to 3200 s		1 ms to 7500 s
	zero span	20 μs to 1500 s	20 μs to 3200 s		20 μs to 7500 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				
	DSA815	DSA832E	DSA832	DSA875
Frequency range	100 kHz to 1.5 GHz	100 kHz to 3.2 GHz		100 kHz to 7.5 GHz
Output level range	-20 dBm to 0 dBm	-40 dBm to 0 dBm		
Output level resolution	1 dB			
Output flatness	relative to 50 MHz			
	±3 dB (nom.)			



## Trigger

Trigger	
Trigger source	free run, video, external
External trigger level	5 V TTL level

## SSC-DSA (Option) (Only for DSA815)

Signal Seamless Capture (SSC)	
Measurement bandwidth	1.5 MHz

## Input / Output

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

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

External Trigger Input		
External trigger input	impedance	1 k $\Omega$ (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

<b>Mass Memory</b>	
Mass memory	flash disk (internal), USB storage device (not supplied)

<b>Power Supply</b>	
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

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

<b>Electromagnetic Compatibility and Safety</b>		
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	

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

<b>Weight</b>				
	DSA815	DSA832E	DSA832	DSA875
Standard	4.25 kg (9.4 lb)	4.55 kg (10.0 lb)		
With tracking generator		5.15 kg (11.4 lb)		

<b>Calibration Interval</b>	
Recommended calibration interval	1 year

## Ordering Information

	Description	Order Number
Model	spectrum analyzer, 9 kHz to 1.5 GHz (with preamplifier)	DSA815
	spectrum analyzer, 9 kHz to 3.2 GHz	DSA832E
	spectrum analyzer, 9 kHz to 3.2 GHz	DSA832
	spectrum analyzer, 9 kHz to 7.5 GHz	DSA875
	spectrum analyzer, 9 kHz to 1.5 GHz (with preamplifier, with tracking generator, factory installed)	DSA815-TG
	spectrum analyzer, 9 kHz to 3.2 GHz (with tracking generator, factory installed)	DSA832E-TG
	spectrum analyzer, 9 kHz to 3.2 GHz (with tracking generator, factory installed)	DSA832-TG
	spectrum analyzer, 9 kHz to 7.5 GHz (with tracking generator, factory installed)	DSA875-TG
Standard accessories	quick guide (hard copy)	-
	power cable	-
Options	preamplifier, 100 kHz to 3.2 GHz ( for DSA832, DSA832E)	PA-DSA832
	preamplifier, 100 kHz to 7.5 GHz (only for DSA875)	PA-DSA875
	EMI filter & quasi-peak detector	EMI-DSA800
	advanced measurement kit	AMK-DSA800
	VSWR measurement kit	VSWR-DSA800
	DSA PC software	Ultra Spectrum
	signal seamless capture (only for DSA815)	SSC-DSA
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



