

Spectrum Analyzers

3280A Series 3 Hz to 26.5 GHz Spectrum Analyzers

AEROFLEX
A passion for performance.



The NEW 3280A Series Spectrum Analyzers...
...performance far beyond the price tag.

3281A	3 Hz to 3 GHz
3282A	3 Hz to 13.2 GHz
3283A	3 Hz to 26.5 GHz

- 3 Hz to 26.5 GHz Frequency Range
- High Level Accuracy ± 0.15 dB up to 3 GHz
- Digital IF offers resolution bandwidths from 5 MHz to 1 Hz
- Low DANL of < -150 dBm/Hz
- + 18 dBm Third Order Intermodulation performance
- Excellent LO phase noise < -115 dBc/Hz, 1 GHz/10 kHz offset
- Digital demodulation with 30 MHz analysis bandwidth
- Large TFT, 10.4" color display
- Marker readout via up to 9 selectable markers
- Windows XP™ operating system
- Comprehensive data interfaces - CD ROM, USB, LAN
- Optional 3 GHz Tracking Generator - all models

The NEW 3280A Series has been designed to achieve the best performance whilst keeping the cost to an affordable level. Ideally suited to design and production applications the 3280 series uses a Windows XP™ operating system and a large color TFT LCD, making the 3280A very easy to operate with exceptional connectivity. RF and microwave performance that employs the very latest digital signal processing technology enables superb level accuracy and a wide choice of resolution bandwidths.

Very Wide Signal Measurement Range

The combination of a DANL of < -150 dBm/Hz and a 1 dB compression point of -5 dBm at 26.5 GHz provides for a large signal measurement range over a wide range of frequencies.

Low LO Phase Noise

The Local Oscillator (LO) is fully synthesized and provides 1 Hz resolution. The LO phase noise is specified as < -115 dBc/Hz at 10 kHz offset for an input frequency of 1 GHz. This low level allows evaluation of the phase noise of oscillators and systems and sub-systems.

Large Color Display

The 10.4 inch TFT LCD display provides a comfortably large viewing area even with more than one window open. The display may be viewed as either full screen or dual window and up to 3 traces can be displayed in each display window. Up to 9 markers can be selected and a marker table can be displayed in the alternative window.

Information Storage

The internal hard drive provides internal data storage and retrieval while external data storage is accomplished by use of either the built-in CD ROM drive or via the USB interface.

Interfaces

The use of a Windows XP™ operating system allows for a wide range of interfaces. Included in the unit are: USB, LAN, Centronics parallel printer port, RS-232, IEEE 488 (GPIB) and VGA output. A wide range of printers can be installed and updated by the installation of drivers from the CD ROM supplied with the printer.

Signal Demodulation

In addition to the standard demodulation feature of AM and FM the 3280A Series also includes as standard a 30 MHz bandwidth digitizer in its product range as well as basic digital modulation analysis S/W. Its digitizer provides the optimized H/W conditions for various mobile and wireless communication measurements such as WiMAX/WiBRO, etc.

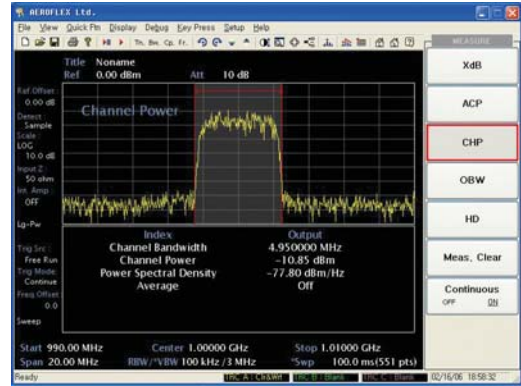
- 14 bit ADC with 85.6 MHz sampling frequency
- Dynamic range over 80 dB
- 32 M samples data with 128 MB memory
- Standard FFT, spectrogram, digital modulation analysis
- Save I/Q data file
- Digital modulation analysis like PSK (8, 16, 64), QAM (4, 8, 16, 32, 64, 128, 256), BPSK, QPSK.

Semi-Automated Measurements

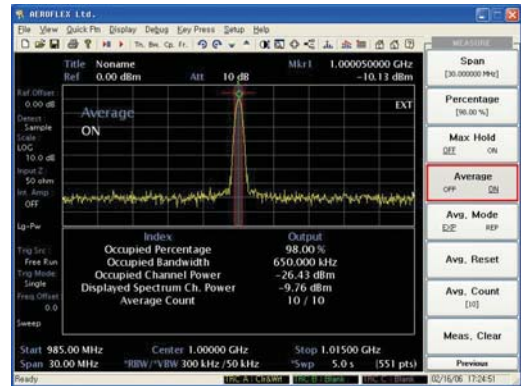
The evaluation of many of the common measurements can be simplified by the use of built-in measurement functions. These include: channel power, adjacent channel power, occupied bandwidth, spectrum emission mask, TOI measurement, harmonic distortion, X dB down and phase noise measurement.

Optional Tracking Generator

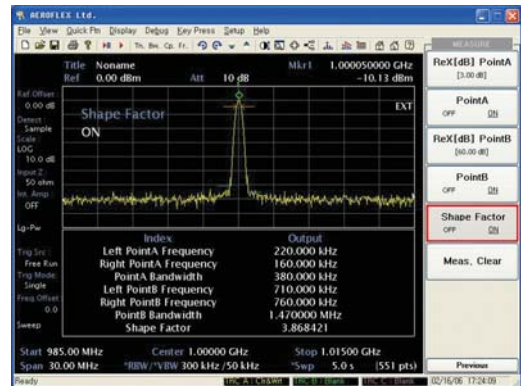
A tracking generator option is available for all three frequency models. The tracking generator has a specified frequency range of 9 kHz to 3 GHz and a level range from 0 dBm down to -70 dBm with 0.1 dB resolution. The tracking generator can be used to make high dynamic range measurements on components and devices, particularly filters. A normalize function is available to allow the markers to display relative flatness/frequency response.



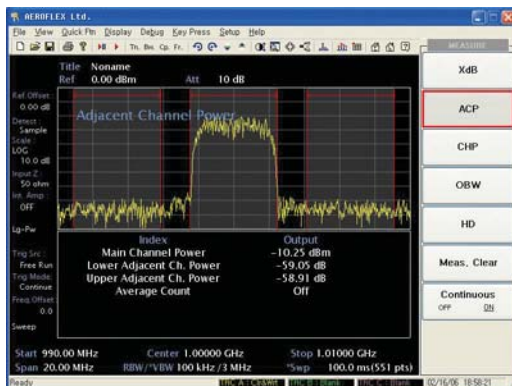
Channel Power



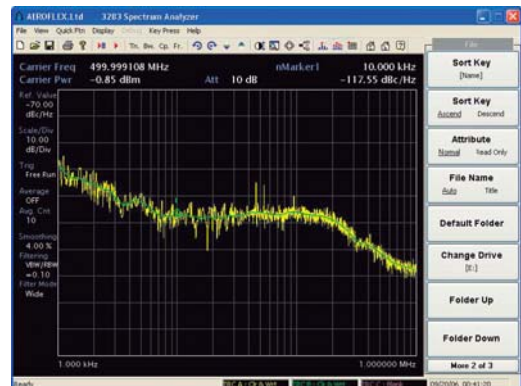
Occupied Bandwidth



X dB down



Adjacent Channel Power



Phase noise

SPECIFICATION

FREQUENCY

Frequency Range

DC coupled 3 Hz ~ 3 GHz / 13.2 GHz / 26.5 GHz
AC coupled 10 MHz ~ 3 GHz / 13.2 GHz / 26.5 GHz

Resolution

1 Hz

Frequency Reference

Temperature Drift 0°C ~ 50°C ± 0.1 ppm
Aging per year ± 0.3 ppm*

Frequency Readout

Marker resolution depending on span and measurement points (1 Hz minimum)

Accuracy

± (marker frequency * reference error + 0.5% span + 5% RBW + 0.5 * horizontal resolution)

Horizontal resolution is span / (sweep points - 1)

Frequency Counter

Resolution 1 Hz / 10 Hz / 100 Hz / 1 kHz

Accuracy

± (reference frequency accuracy * marker frequency) ± (counter resolution + 1 LSB)

Sensitivity (for spans < 3 MHz)

< -60 dBm for frequencies > 2 MHz and < 3 GHz
< -55 dBm for frequencies > 3 GHz and < 13.2 GHz
< -50 dBm for frequencies > 13.2 GHz and < 26.5 GHz

FREQUENCY SPAN

Range

0 Hz (Zero Span), 10 Hz ~ 3 GHz, 13.2 GHz, 26.5 GHz

Resolution

1 Hz

Accuracy

±1%

Sweep

Zero span 1 µs to 2000 sec, ± 0.5 %
Span ≥ 10 Hz, 10 ms to 2000 sec, ± 0.5 % nominal

Sweep Points

Number of points

3 to 8192 (Span = 0 Hz)
101 to 8192 (Span ≥ 10 Hz)

Span Trigger

≥ 10 Hz
Source external, line, video, free run, RF burst
Offset 1 µs to 500 ms
Span = 0 Hz
Source external, line, video, free run, RF burst
Offset -150 ms to +500 ms

Gated FFT Function

Span	101 Hz to 30 MHz
Trigger Source	Burst and external
Gate Length	2.51/RBW
RBW	1 MHz, 10% Step
Delay Range	0 - 400 sec (Resolution: 100 ns)

Spectral Purity

SSB phase noise, dBc/Hz at offset (typical)

CW Freq	Frequency Offset				
	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz
10 MHz	<-78	<-102	<-113	<-113	<-135
100 MHz	<-76	<-110	<-113	<-113	<-135
1 GHz	<-87	<-96	<-115	<-115	<-136
3 GHz	<-68	<-98	<-110	<-111	<-135
6 GHz	<-60	<-83	<-107	<-110	<-135

	20-30°C	0-55°C
At 1 GHz: 100 Hz offset	< -83 < (-87 typ)	< -81
1 kHz offset	< -92 < (-96 typ)	< -90
10 kHz offset	< -112 < (-115 typ)	< -110
100 kHz offset	< -112 < (-115 typ)	< -110
1 MHz offset	< -136	< -134
10 MHz offset	< -144	< -142

Residual FM

Accuracy, < 20 * N Hz p-p in 1 sec**

Resolution Bandwidth (RBW)

3 dB bandwidths 30 Hz to 5 MHz in a 1-2-3-5 sequence
Bandwidth accuracy:

	20-30°C	0-55°C
500 Hz to 300 kHz filters	±3 %	±5%
500 kHz to 5 MHz filters	±10 %	±12%

Shape factor - 60 dB / - 3 dB < 5 (500 Hz to 5 MHz filters)

Bandwidth switching uncertainty at 100 MHz CF reference to 5 kHz
RBW ± 0.05 dB nominal at 20-30°C, ± 0.1 dB nominal at 0-55°C

FFT Filters

3 dB bandwidths 1 Hz to 300 Hz, in 1-2-3-5 sequence
Bandwidth accuracy < 1 %, nominal
Shape factor: - 60 dB / - 3 dB < 4.5, nominal

Video Bandwidth (VBW)

1 Hz to 3 MHz and none in a 1-2-3-5 sequence

AMPLITUDE

Display range

DANL to + 30 dBm

Maximum Input Level

DC (AC coupled) ±50 V DC (Option)
DC (DC coupled) 0 V

CW RF power +30 dBm
Preamp on +20 dBm

1 dB Compression Point

0 dB RF attenuation
0 dBm 100 MHz to 3 GHz
-5 dBm up to 26.5 GHz
Preamp on - 22 dBm at 1 GHz

Third-Order Intermodulation Distortion (IP3)

For two tones of -30 dBm at the input mixer with a tone separation of >100 kHz

+13 dBm below 100 MHz
+15 dBm from 100 MHz to 26.5 GHz, +18 dBm (Typical)

Second Harmonic Intercept (IP2)

with -30 dBm at the input

+30 dBm for frequencies <100 MHz
+40 dBm for frequencies 100 MHz to 1.5 GHz
+80 dBm for frequencies 1.5 GHz to 26.5 GHz

Displayed Average Noise Level (DANL)

dBm/Hz, 0 dB RF attenuation, RBW 1 Hz, average detector, 50 Ω termination.

	20-30°C	0-55°C
from 3 Hz to 1 kHz	-90 nominal	-87 nominal
from 1 kHz to 10 kHz	-100 nominal	-97 nominal
from 10 kHz to 100 kHz	-120	-117
from 100 kHz to 300 kHz	-125	-122
from 300 kHz to 500 kHz	-132	-129
from 500 kHz to 700 kHz	-137	-134
from 700 kHz to 10 MHz	-142 (148 typ)	-139
from 10 MHz to 2 GHz	-147 (-150 typ)	-144
from 2 GHz to 6.4 GHz	-145 (-149 typ)	-143
from 6.4 GHz to 10 GHz	-143 (-146 typ)	-140
from 10 GHz to 22 GHz	-139 (-144 typ)	-135
from 22 GHz to 24 GHz	-137 (-142 typ)	-133
from 24 GHz to 26.5 GHz	-134 (-138 typ)	-130

Response to Unwanted Signals

Image frequency <-70 dBm with -10 dBm at the input
Intermediate frequency <-70 dBm with -10 dBm at the input

Residual responses (input terminated, 0 dB attenuation)
<-95 dBm from 1 MHz to 6.4 GHz
<-95 dBm typical from 6.4 GHz to 26.5 GHz

Other input related spurious <-60 dBc with -30 dBm at the input

Amplitude Scale

Log Scale

0.1 to 1 dB /div in 0.1 dB steps
1 to 20 dB / div in 1 dB steps
Linear scale 10 divisions

Level Units

dBm, dBμV, dBmV, dBpW (log level display)
μV, mV, pW, nW (linear level display)

Reference Level

Logarithmic range -170 dBm to +30 dBm, 0.1 dB steps

Linear range 7.07 nV to 7.07 V in 1 % steps

Accuracy ±0.15 dB

RF Input Attenuator

Range 0 dB to 55 dB in 5 dB steps

Switching Accuracy ± 0.5 dB at 100 MHz (3281A)
± 0.5 dB at <13.2 GHz (3282A, 3283A)
± 0.8 dB from 13.2 GHz to 26.5 GHz (3282A, 3283A)

Traces

Number of traces: 3

Trace detectors : Normal, peak, sample, negative peak, log power average, RMS, average and voltage average

Trace Functions : Clear / Write, Max Hold, Min Hold, View, Blank, Average

Frequency Response

With 10 dB input attenuation, preselector centering applied, preamp off

	20-30°C	0-55°C
from 1 MHz to 3.0 GHz	±0.5 dB	±1 dB
from 3.0 GHz to 6.4 GHz	±1.0 dB	±3 dB
from 6.4 GHz to 13.2 GHz	±1.5 dB	±4 dB
from 13.2 GHz to 22 GHz	±2.0 dB	±5 dB
from 22 GHz to 26.5 GHz	±2.5 dB	±5 dB
from 1 MHz to 3.0 GHz	Preamp on ±1.0 dB	±1.5 dB

Display Non-Linearity

Logarithmic level display

±0.1 dB total for an input mixer level of ≤-20 dBm
±0.13 dB total for mixer levels between -20 dBm and -10 dBm

Linear Level Display

5% of reference level

Demodulation Audio Output

AM & FM, loudspeaker, phone jack

AM demodulation range 0 to 100%

FM demodulation range 0 to 100 kHz

DIGITIZER

Maximum analysis Bandwidth

30 MHz

ADC Resolution

14 bits

Dynamic Range

85 dB

Residual FM

<1% (nominal)

Capture Memory

128 Mbytes (32Msamples)

INPUTS AND OUTPUTS - FRONT PANEL

RF INPUT

Type N female, 50 Ω (3.0 GHz, 13.2 GHz)

APC 2.92 mm, 50 Ω (26.5 GHz)

VSWR with ≥ 10 dB input attenuation

10 MHz to 3 GHz < 1.5:1

3 GHz to 13.2 GHz < 1.8:1

13.2 GHz to 26.5 GHz < 2.0:1

1st LO Output (for external mixer option)

SMA female, 50 Ω nominal
Frequency 3321.4 ~ 6821.4 MHz
Level +10 dBm, nominal

2nd IF Input (for external mixer option)

SMA female, 50 Ω nominal
Frequency 421.4 MHz
Level -20 dBm

Probe Power Supply

+15 V, -12 V, GND

Cal Output

BNC female, 50 Ω nominal
Frequency 100 MHz
Level -20 dBm \pm 1.0 dB

Audio Output

Front panel phone jack

USB Interface

Front panel connector
Type 1.1 or higher (2.0)

Mouse Connector

6-pin mini DIN connector
PS2 compatible

External Keyboard Connector

6-pin mini DIN connector
PS2 compatible

REAR PANEL

3rd IF Output

BNC female, 50 Ω nominal
Frequency 21.4 MHz
Bandwidth 16 MHz \pm Selected RBW
Level +3 dBm nominal, Top of screen

2nd IF Output

SMA female, 50 Ω nominal
Frequency 421.4 MHz
Bandwidth 40 MHz
Level 0 dBm nominal, Top of screen

Ext Trigger Input

BNC female, 10 k Ω nominal
Trigger level TTL nominal

Sweep Gate Output

BNC female
Trigger level TTL nominal

Reference Frequency Output

BNC female
Frequency 10 MHz
Level +5 dBm, nominal

Reference Frequency Input

BNC female
Frequency 10 MHz
Required level -5 to +15 dBm nominal

GPIB Interface

24 pin female connector
GPIB is IEEE 488 and 488.2 compatible
Command set SCPI 1997.0
Interface functions
SH1, AH1, T6, L4, SR1, RL1, PP0,
DC1, C0, LE0, TE0

RS-232 Serial Interface

9 way D-type connector, male

LAN Interface

10/100 Base T, Connector RJ45

USB 2.0 Interface

2 rear panel connectors

Printer Interface

Parallel interface, 25 way female D-type connector

External Monitor Output

Standard VGA, 800 x 600 color output
15 way high density D-type female connector

GENERAL SPECIFICATIONS

Display

Size 10.4" (26.4 cm) color TFT LCD
Resolution 800 x 600 pixels

Mass Memory

Hard disk drive 40 Gbyte

Power Supply

AC supply
88 V to 135V AC, 45 to 66 Hz
100 V to 135V AC, 360 to 440 Hz
193 V to 269V AC, 45 to 66 Hz
or 273 V to 381 V DC, automatically selected
240 W maximum (without options)
Warm up time 15 minutes

ENVIRONMENTAL CONDITIONS

Rated Range of Use (MIL-PRF-28800F, Class 3)

Temperature 0 $^{\circ}$ C to +50 $^{\circ}$ C
Altitude Up to 4,600 metres (15,000 feet)***

Conditions of Storage and Transportation

Temperature -40 $^{\circ}$ C to +71 $^{\circ}$ C
Altitude Up to 4,600 metres (15,000 feet)

Humidity

Meets MIL-PRF-28800F, Class 3

Vibration and Shock

Meets MIL-PRF-28800F, Class 3

Electromagnetic Compatibility

EN 61326, 1997 + Appendix 1, 1998
RFI suppression (EMC) EN 55011: 2001 Group 1 Class A,
Immunity table 1 and Performance Criterion B

Safety

IEC / EN61010-1, 2001

Dimensions (W x H x D)

430 mm x 222 mm x 451 mm (17 in x 8.7 in x 17.8 in)

Weight

3281A <18 kg (39.5 lb)
3282A, 3283A <19.5 kg (43 lb)

Recommended calibration interval

1 year

Standard Warranty

2 years

Specifications are subject to change without prior notice.

* After 30 days of continuous operation.

**N: LO Harmonic order

Frequency	Band	N
0 Hz ~ 3 GHz	0	1
2.9 GHz ~ 6.4 GHz	1	1
6.3 GHz ~ 13.2 GHz	2	2
13.1 GHz ~ 26.5 GHz	3	4

*** Altitude, operating not to MIL-PRF-28800F, Class 3

TRACKING GENERATOR OUTPUT (OPTIONAL VERSION, 328XA/1)

Connector

Type N female, 50 Ω

Frequency Range

9 kHz to 3.0 GHz

Output Level Range

0 dBm to -70 dBm

Output Level Resolution

0.1 dB

Level Accuracy

$\leq \pm 1.0$ dB

Level Flatness at -10 dBm - Before Normalization

9 kHz to 100 kHz ± 4.0 dB
 100 kHz to 3 GHz ± 2.0 dB

Level Flatness at -10 dBm - After Normalization

9 kHz to 3 GHz ± 1.0 dB

Spurious Output Levels

Harmonics < -15 dBc
 Non-Harmonics < -30 dBc
 Leakage Signal < -100 dBm

Output VSWR

$\leq 1.5:1$ at -10 dBm output level

SOFTWARE OPTIONS

Measurement Function	2G Cellular	3G Cellular		Wireless Data	
	GSM/EDGE	UMTS (ULS) HSUPA	cdma2000r 1xEV-DO	WLAN (802.11a,b,g)	WIMAX (802.16e OFDMA)
3280A option	8	9	10	11	12
Power	✓	✓	✓	✓	✓
Power Template				✓ (ramp time 802.11b)	✓
Occupied BW		✓		✓ (802.11a,g only)	✓
Code Domain Power		✓	✓		
Peak Code Domain Error		✓	✓ (RC3, 4)		
Magnitude Error		✓	✓		
Phase Error	✓ (GSM)	✓	✓		
IQ Skew		✓		✓	✓
Gain Imbalance		✓		✓	✓
EVM	✓ (EDGE)	✓ (QPSK & composite)	✓ (QPSK & composite)	✓ single/all carriers-data or pilot	✓ single/all carriers-data or pilot
Constellation Error				✓ (a only)	✓
Rho			✓ (composite)		
Symbol/Chip Timing				✓	✓
Carrier Suppression (Origin Offset)	✓ (EDGE)		✓ (QPSK)		
Frequency Error	✓	✓	✓	✓	✓
Spectral Emissions	✓ (ORFS)		✓ (Spectral Mask)	✓ (Spectral Mask)	✓ (Spectral mask)
Spectral Flatness				✓ (a, g only)	✓
Adjacent Channel Power		✓ (ACLR)	✓ (ACPR)	✓ (ACP)	
CCDF		✓	✓	✓	✓
BER	✓ (GSM)	✓			

VERSIONS, OPTIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering

Numbers Versions

3281A/0	3 Hz to 3 GHz Spectrum Analyzer
3281A/1	3 Hz to 3 GHz Spectrum Analyzer with tracking generator
3282A/0	3 Hz to 13.2 GHz Spectrum Analyzer
3282A/1	3 Hz to 13.2 GHz Spectrum Analyzer with tracking generator
3283A/0	3 Hz to 26.5 GHz Spectrum Analyzer
3283A/1	3 Hz to 26.5 GHz Spectrum Analyzer with tracking generator

Options

04	Removable Hard Drive
08	GSM/EDGE Measurement Suite
09	UMTS UL Measurement Suite
10	CDMA2000 Measurement Suite
11	WLAN Measurement Suite
12	WiMAX/WiBRO Measurement Suite
13	EMC Analyzer (Pre-Compliance)

Supplied Accessories

CD ROM Operating & Programming Manual	46886/075
Front Handles/Rackmount brackets	
USB Mouse	
Keyboard	
AC Supply Lead	
DC Block	
Connector kit	

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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.