Spectrum Analyzers

3280 Series 3 Hz to 26.5 GHz Spectrum Analyzers

AEROFLEX
A passion for performance.

The NEW 3280 series spectrum analyzers...
...performance far beyond the price tag.

- 3 Hz to 26.5 GHz frequency range

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

- 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 dBm/Hz, 1 GHz/10 kHz offset
- Large TFT, 26.4 cm (10.4 inch) color display
- Marker readout via up to 9 selectable markers
- Windows XP™ operating system
- Comprehensive data interfaces - CD ROM, USB, LAN
- Optional tracking generator - all models

The NEW 3280 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 3280 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

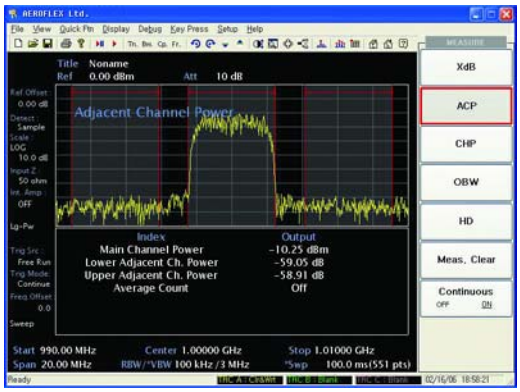
In addition to the standard demodulation feature of AM and FM the 3280 series also supports digital modulation standards through the use of an internal option module with appropriate software suites.

Semi-Automated Measurements

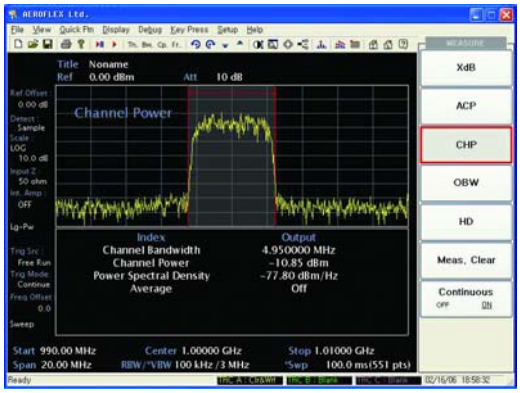
The evaluation of many of the common measurements can be simplified by the use of built-in measurement functions. These include: channel power, adjacent channel power, occupied bandwidth, spectrum emission mask, TOI measurement, harmonic distortion, X dB down and phase noise measurement.

Optional Tracking Generator

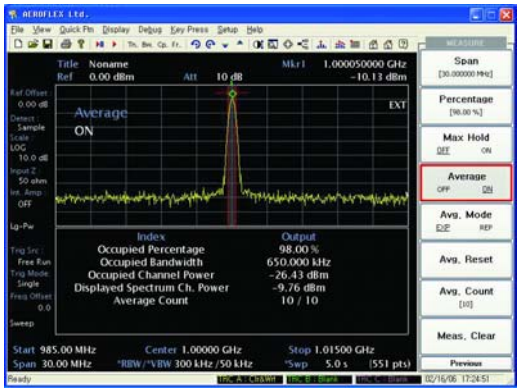
A tracking generator option is available for all three frequency models. The tracking generator has a specified frequency range of 9 kHz to 3 GHz and a level range from 0 dBm down to -70 dBm with 0.1 dB resolution. The tracking generator can be used to make high dynamic range measurements on components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



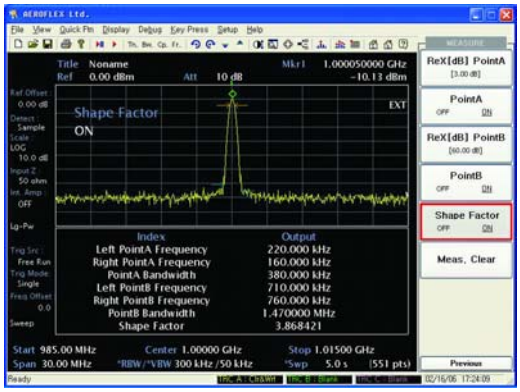
Adjacent Channel Power



Channel Power



Occupied Bandwidth



X dB down

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) + 0.5 * last digit*

Sensitivity <-70 dBm for frequencies >2 MHz

FREQUENCY SPAN

Range

0 Hz (Zero Span), 10 Hz ~ 3 GHz, 6.7 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, 5 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

Trigger Source

External, line, video, free run, RF burst
Offset 150 ms to + 500 ms

Gated Sweep

Source external
Delay 1 µs to 10 s
Length 1 ns to 10 s, resolution 100 ns

Accuracy

± (100 ns + (0.05 % x gate length)

Spectral Purity

SSB phase noise, dBc/Hz at offset:

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	<-76	<-100	<-113	<-113	<-136
3 GHz	<-68	<-98	<-110	<-111	<-135
6 GHz	<-60	<-83	<-107	<-110	<-135

At 1 GHz: 10 kHz offset <-115 dBc/Hz (Typical)

Residual FM

*Accuracy, <10 * 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 ± 5 %
Shape factor -60 dB/ -3 dB <5

FFT Filters

3 dB bandwidths 1 Hz to 300 Hz, in 1-2-3-5 sequence
Bandwidth accuracy <5 %, nominal
Shape factor -60 dB / -3 dB <4, nominal

Video Bandwidth (VBW)

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

Amplitude

Display range, DC coupled

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 up to 3 GHz
-5 dBm 3 GHz to 26.5 GHz
Preamp on - 22 dBm at 1 GHz

Third-Order Intermodulation Distortion (TOI)

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

+15 dBm from 100 MHz to 3 GHz, +18 dBm (Typical)
+15 dBm (Typical) above 3 GHz

Second Harmonic Intercept (SHI)

+40 dBm at 1.5 GHz with -30 dBm at the input
+80 dBm from 1.5 GHz to 26.5 GHz with -30 dBm at the input

Displayed Average Noise Level (DANL)

0 dB RF attenuation, RBW 10 Hz, trace average, span 0 Hz, 50 Ω termination

-105 dBm/Hz, nominal at 3 Hz to 10 kHz
-130 dBm/Hz, nominal at 10 KHz to 1 MHz
-145 dBm/Hz, nominal at 1 MHz to 10 MHz
-150 dBm/Hz, nominal at 10 KHz to 2 GHz
-148 dBm/Hz, nominal at 2 GHz to 3 GHz
-150 dBm/Hz, nominal at 3 GHz to 6.4 GHz
-146 dBm/Hz, nominal at 6.4 GHz to 13.2 GHz
-140 dBm/Hz, nominal at 13.2 GHz to 26.5 MHz

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) -100 dBm

Other spurious -70 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 at 0 dBm ref level

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, 20°C to 30°C, preselector centering applied

±0.5 dB at 1 MHz to 3.0 GHz
±1.0 dB at 3.0 GHz to 6.4 GHz
±1.5 dB at 6.4 GHz to 13.2 GHz
±2.2 dB at 13.2 GHz to 22 GHz
±3.0 dB at 22 GHz to 26.5 GHz
Preamp on ±1 dB at 1 MHz to 3.0 GHz

Display Non-Linearity

Logarithmic level display
(20°C to 30°C, mixer level ≤-10 dBm)
±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
Bandwidth switching uncertainty 10 kHz RBW reference ±0.05 dB

Demodulation Audio output

AM & FM, loudspeaker, phone jack

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
<1.5:1 at 10 MHz to 3 GHz
<1.8:1 at 3 GHz to 13.2 GHz
<2.0:1 at 13.2 GHz to 26.5 GHz

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

Connector

Type N female, 50 Ω (3.0 GHz & 13.2 GHz units)
APC 2.92 mm, 50 Ω (26.5 GHz unit)

Frequency Range

9 kHz to 3.0 GHz

Output Level Range

0 dBm to -70 dBm

Output Level Resolution

0.1 dB

Level Accuracy

≤± 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

≤1.5:1 at -10 dBm output level

ADDITIONAL INPUTS AND OUTPUTS

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
Bandwidth 20 MHz
Level -20 dBm (Max)

Probe Power Supply

+15 V, -12 V, GND

Cal Output

BNC female, 50 Ω nominal
Frequency 100 MHz
Level -20 dBm

Audio Output

Front panel phone jack

USB 2.0 Interface

Front panel connector

Mouse Connector

6-pin mini DIN connector
PS2 compatible

External Keyboard Connector

6-pin mini DIN connector
PS2 compatible

INPUTS AND OUTPUTS - REAR PANEL

3rd IF Output

BNC female, 50 Ω nominal
Frequency 21.4 MHz
Bandwidth 10 MHz ± Selected Pre-filter
Level +3 dBm (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 kΩ 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

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 × 600 pixels

Mass Memory

Hard disk

Power Supply

AC supply 110 VAC to 240 VAC, 50/60 Hz to 400 Hz

ENVIRONMENTAL CONDITIONS

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

Temperature 0°C to +50°C
Humidity 85% at +30°C
*Altitude Up 3,000 meters (10,000 feet)*****

Conditions of Storage and Transportation (MIL-PRF-28800F, Class 3)

Temperature -40°C to +71°C
Humidity 90% at +30°C
Altitude Up 12,000 meters (40,000 feet)

Vibration and Shock (MIL-PRF-28800F, Class 3)

Vibration, sinusoidal MIL-PRF-28800F, Class 3
Vibration, random 5 Hz to 500 Hz
Shock 30G, half-sine shock pulse

Electromagnetic Compatibility

RFI suppression (EMC) EN 55011: 2001 Group 1 Class A

Safety

DIMENSIONS AND WEIGHT

Dimensions (W x H x D)

430 mm × 222 mm × 467 mm (17 in x 8.7 in x 18.4 in)
Without handles and feet

485 mm x 240 mm x 489 mm (19.1 in x 9.5 in x 19.2 in)
With handles and feet in down position

Weight

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

Recommended calibration interval

1 year

Standard Warranty

2 years

VERSIONS, OPTIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering Numbers	Versions
3281/0	3 Hz to 3 GHz spectrum analyzer
3281/1	3 Hz to 3 GHz spectrum analyzer with tracking generator
3282/0	3 Hz to 13.2 GHz spectrum analyzer
3282/1	3 Hz to 13.2 GHz spectrum analyzer with tracking generator
3283/0	3 Hz to 26.5 GHz spectrum analyzer
3283/1	3 Hz to 26.5 GHz spectrum analyzer with tracking generator
	Supplied Accessories
	CD ROM operating manual
	Mains supply lead
	Accessories
43129/189	Standard GPIB cable
59999/170	RF bridge 5 MHz to 3 GHz
80011	Connector adapter kit with cable
AC4250	BNC to Type N adapter (75 Ω to 50 Ω)
AC5008	Type N DC block

Specifications are subject to change without prior notice.

** After 30 days of continuous operation.*

*** Valid for temperature range 20°C to 30°C, <0.6 dB for temperature range 5°C to 45°C.*

**** Valid for temperature range 20°C to 30°C and span <1 GHz; add <0.5 dB for temperature range 5°C to 45°C or span >1 GHz.*

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

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AEROFLEX
A passion for performance.

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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.

Part No. 46891/273, Issue 3, 07/06