Spectrum Analyzers

3250 Series 1 kHz to 26.5 GHz Spectrum Analyzers

AEROFLEX
A passion for performance.

The NEW 3250 Series compact, digital spectrum analyzers...

- High accuracy and reliability
- Powerful RF performance, phase noise - 115 dBc/Hz, DANL -145 dBm/Hz
- Standard 30 MHz I/Q demodulation bandwidth
- Remote control via LAN, GPIB, RS-232C
- S/W extension based on Windows® XP OS
- 7" wide touch panel display
- Portability based on light and compact design
- Removable hard disk
- Optional battery

The NEW 3250 Series has been developed to provide market leading performance at a low cost. The innovative compact design 3250 spectrum analyzer employs the latest digital processing and RF technology, providing accomplished accuracy, stability and measurement speed.

To support the constantly evolving wireless communication market, the 3250 incorporates a standard 30 MHz bandwidth digitizer and basic digital modulation analysis S/W. The instrument has been optimized for various mobile and wireless communication measurements such as GSM/EDGE, UMTS, WiMAX and WiBRO.

With its powerful RF performance and advanced applications the 3250 Series is ideally suited for RF development, design analysis and testing. All models have a Windows® XP operating system, remote control capabilities via LAN, GPIB and RS-232C as well as a 7" touch panel screen, ensuring ease of operation and exceptional connectivity.

Innovational Spectrum Analyzer with Fully Digital Processing

Optimize your measurement through the accuracy, stability, measurement speed, and portability based on the high RF performance and digital technology of the 3250 Series.

Various Applications

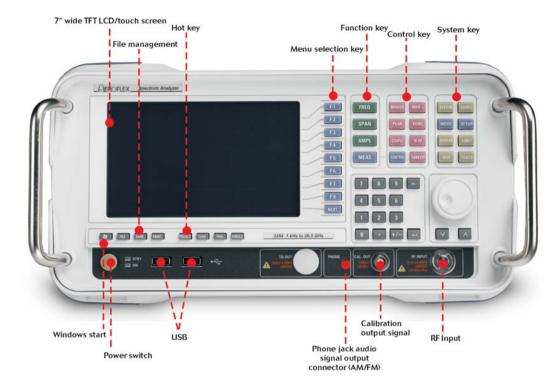Various applications optimized for the wireless and mobile communication development and RF measurement.

Customized Standard Functions

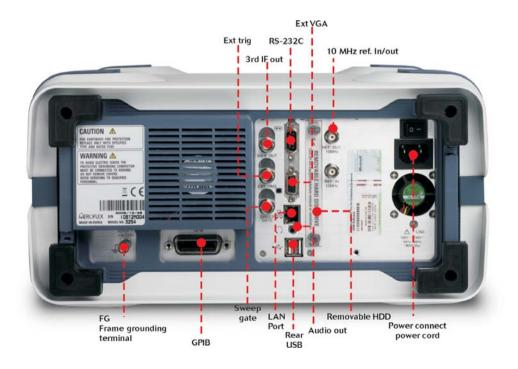Useful customized measurement functions and tools for various customer needs.

Interface and Control

Various interfaces such as LAN, GPIB, RS-232C based on Windows® XP. Its powerful Web-server functions enable the users to remotely access and control the equipment anytime anywhere.

3251	1 kHz to 3 GHz
3252	1 kHz to 8 GHz
3253	1 kHz to 13.2 GHz
3254	1 kHz to 26.5 GHz

For the very latest specifications visit www.aeroflex.com

Innovative Ergonomic Design

7" wide TFT LCD/touch screen · File management · Hot key · Menu selection key · Function key · Control key · System key

Windows start · Power switch · USB · Phone jack audio signal output connector (AM/FM) · Calibration output signal · RF Input

Front of 3250 Series

Ext trig · RS-232C · Ext VGA · 3rd IF out · 10 MHz ref. In/out

FG Frame grounding terminal · GPIB · Sweep gate · LAN Port · Rear USB · Audio out · Removable HDD · Power connect power cord
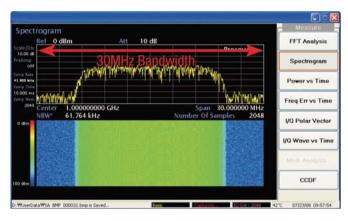
Back of 3250 Series

The 3250 Series includes the widest 30 MHz bandwidth digitizer in its product range as well as basic digital modulation analysis S/W. Its 30 MHz standard 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.
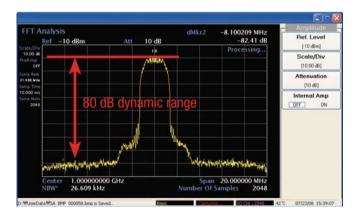
Spectrogram Measurement

Display the change of the frequency in time domain, analyze the wide bandwidth digital modulation signal in 30 MHz bandwidth.
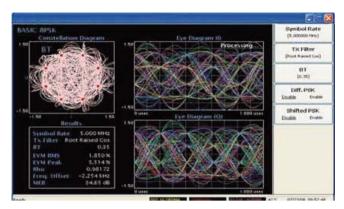
- FFT
- Spectrogram
- Power vs time
- I/Q wave vs time
- Digital modulation analysis
- CCDF

FFT Measurement

Measure and display the FFT signal analysis and dynamic range of the digital modulation signal input.
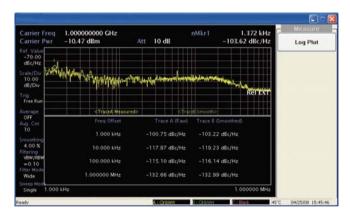
Modulation analysis

Measure and display the value of I/Q polar vector, I/Q eye diagram graph and EVM, Rho, MER, frequency offset.

- PSK (8, 16, 64)
- QAM ((4, 8, 16, 32, 64, 128, 256)
- BPSK, QPSK.

Various Customized Measurement Functions

The 3250 Series has various customized measurement functions for RF and Wireless communication analysis. Its powerful measurement functions help the users analyze the measured data, and find the optimized solutions for the detected problems.
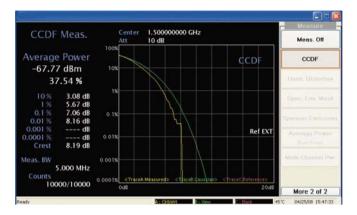
Phase Noise Measurement

The phase noise is one of the important factors to evaluate short-term stability of signals. The Frequency offset values are automatically set by the start frequency, and an accurate phase noise value can be obtained through the smoothed value. This function can be used as a basic tool to enable development and optimization in a production environment (in-line testing) that is required for design verification and trouble shooting.
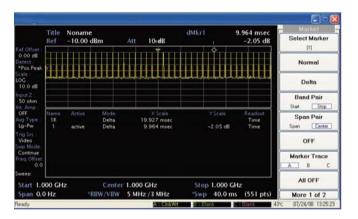
- One-button measurement
- Continuous phase noise plot- offset range: 10 Hz – 1 GHz
- Display method: Log plot/numerical results table
- Narrow/Wide sweep mode
- Average and smoothing curve
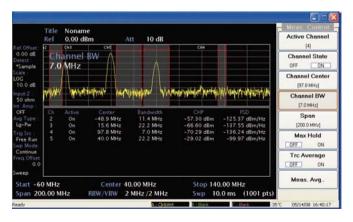- Automatic carrier search

CCDF

Power CCDF (Complementary Cumulative Distribution Function) is a function to remove unclear power characteristics of constructively amplified and decoded signals to gain clear signal status in the communication system, this is especially important for digital communication.
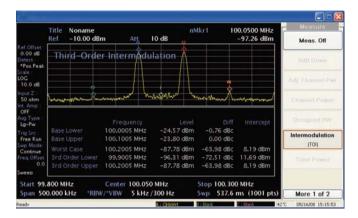
Pulse Measurement

Pulse measurement including the functions for the Video Trigger or RF burst trigger based on high performance digital IF signal processing, enabling the user to precisely measure the pulse signals of PRF for Radar.
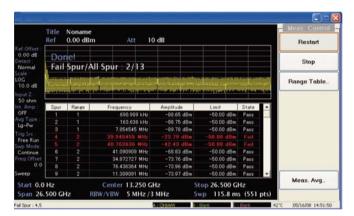
Multi Channel Power

This function enables the users to measure the channel powers in various signals at one time and be displayed on the screen. The users can select several different frequency ranges.

TOI

TOI Measurement is a function to measure the linearity of the measured elements. TOI automatically calculates IP3 values and displays them on the screen. When the two signals are entered and suitable spans are set, a base point and a third order harmonic level are automtically displayed and IP3 value is accurately calculated.

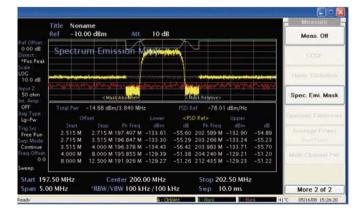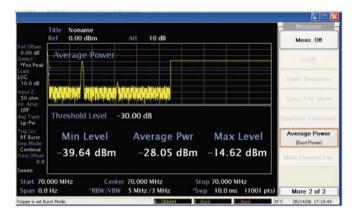## Spurious Emissions

Spurious Emissions function are used to specify the spurious of the DUT (Device Under Test). The User first sets the frequency bands using a range table, and sets a maximum of 200 different conditions corresponding to each frequency by adjusting RBW/VBW/Sweep time and limit. The spurious for each range is automatically displayed as 20 Peak values.
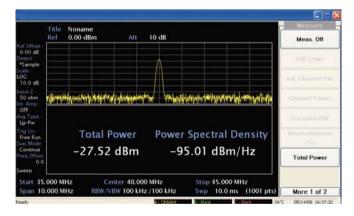
Spectrum Emission Mask

This function can automatically analyze Pass/Fail using the limit line, set in the 3250 in advance to the communication standards such as the frequency bands, and level values. The 3250 Series provides standard mask functions for WLAN (802.11a/b/g), W-CDMA (3GPP, base and mobile) as a basic function. The users can manually set the limit lines required by each communication standard at their own discretion and easily modify limit lines.
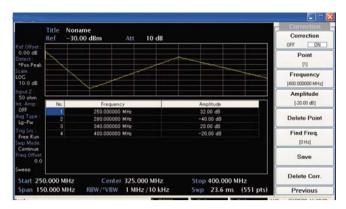
Average Power

As a measurement function to analyze the burst signals that occur spontaneously, average power is used to analyze the power characteristics of signals on the time axis. This function automatically calculates burst lengths, average power, and min/max power in a zero span condition and displays them on the screen.

Total Power

All the power values and power spectral densities within the frequency span selected by users are displayed. Total power indicates the channel power in the span region displayed on the screen, and power spectral density is used for the same purposes as the auto spectral density indicating the rate of spectrum changes in relation to the frequency.

Amplitude Correction Factors

Using the amplitude-correction factor, it is possible to set compensation values for levels appropriate to the measurement environment. It is possible to individually set and control antennas, cables, other factors of users, and to load and save using file dialog.

SPECIFICATION

FREQUENCY

FREQUENCY RANGE

DC coupled -

AC coupled 1 kHz ~ 3 GHz/ 8 GHz/13.2 GHz/ 26.5 GHz

Resolution

1 Hz

FREQUENCY REFERENCE PPM

Temperature Drift ±1/ ±0.01(option)
Aging per year*   ±1/ ±0.01(option)

FREQUENCY READOUT

Marker resolution

depending on span (1 Hz minimum)

Accuracy

±(maker frequency x reference error+ 3% span + 50% RBW)

FREQUENCY COUNTER

Resolution

1 Hz/10 Hz/100 Hz /1 kHz

Accuracy

±(reference frequency accuracy x marker frequency accuracy)
±(counter resolution x 1LSB)

Sensitivity

-45 dBm @ 13.2 GHz > f > 2 MHz, span < 3 MHz
-40 dBm @ 26.5 GHz > f > 13.2 GHz, span < 3 MHz

FREQUENCY SPAN

Range

0 Hz, 10 Hz~3 GHz /6.2 GHz/13.2 GHz/26.5 GHz

Resolution

1 Hz

Accuracy

±1%

SWEEP

Zero span

1 us to 2000 sec, ±0.5%

Span ≥ 10 Hz

10 ms to 2000 sec, ±0.5% nominal

Sweep points

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

TRIGGER

Span ≥10 Hz

Source	External, video, free run, burst
Offset	1 us to 500 ms

Span = 0 Hz

Source	External, video, free run, burst
Offset	-150 ms to +500 ms

Spectral purity [dB c/Hz]

1kHz offset

-92 (-95 typical) @ f=1 GHz

10 kHz offset	-112 (-115 typical)
100 kHz offset	-112 (-115 typical)
1 MHz offset	-136
10 MHz offset	-144

RESIDUAL FM

<100 x N** Hzp-p in 1 sec

RBW

3 dB bandwidths

30 Hz to 5 MHz (1-2-3-5 Sequence)

Bandwidth accuracy

±3% (@ 500 Hz~500 kHz Filter)

±10% (@ 1 MHz~5 MHz Filter)

Shape factor -60 dB: -3 dB

<5 (@ 500 Hz~5 MHz)

Bandwidth switching uncertainty

±0.05 dB nominal @ 5 kHz RBW reference, CF=100 MHz

VBW

3 dB bandwidths

1 Hz to 3 MHz, none (1-2-3-5 sequence)

FFT FILTERS

3 dB bandwidths

1 Hz to 300 Hz (1-2-3-5 sequence)

Bandwidth accuracy

<1%, Nominal

Shape factor (-60 dB: -3 dB)

<4.5, Nominal

AMPLITUDE

DISPLAY RANGE

DANL to + 30 dBm

MAXIUM INPUT LEVEL

DC (AC coupled)

±50 VDC (Option)

DC (DC coupled)

CW RF power

+30 dBm

Peak Power

+50 dBm, 5 usec pulse width; 0.5% duty cycle

Preamp on

+20 dBm

RF input attenuator

Range

0 to 55 dB

Steps

5 dB

Switching accuracy

±0.5 dB @ 100 MHz
±0.5 dB @ < 13.2 GHz (
±0.8 dB @ 13.2 GHz ~ 26.5 GHz

1 DB CP [DBM]

0 dB RF attenuation

-10 @ ~ 3 GHz
0 @ 3 GHz to 26.5 GHz

Preamp on

-32 @ 1 GHz

THIRD-ORDER INTERMODULATION DISTORTION (TOI)

[dBm]

two −30 dBm tones at input mixer with tone separation > 100 kHz
+8 @ 10 MHz to 200 MHz+12, 15 typical @ 200 MHz to 26.5 GHz

SECOND HARMONIC INTERCEPT (SHI)

[dBm]

+40 typical @ ~ 1.5 GHz, -30 dBm input
+80 @ 1.5 GHz to 26.5 GHz, -30 dBm input

DISPLAYED AVERAGE NOISE LEVEL (DANL)

[dBm/Hz]

RBW 1Hz, VBW 1 Hz
50 Ω termination
-135 @ 100 kHz to 10 MHz
-143, 145 typical @ 10 MHz to 2 GHz
-141, -145 typical @ 2 GHz to 13.2 GHz
-138, -142 typical @ 13.2 GHz to 18 GHz
-133, -138 typical @ 18G GHz to 26.5 GHz

IMMUNITY TO INTERFERENCE

Residual responses (input termed, 0 dB attenuation) [dBm]

-90

Other Input related spurious [dBc]

-55 @ -30 dBm input

DISPLAY RANGE

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

Units of level axis

dBm, dBmV, dBµV, V, W (log level display)mV, µV, dBmV (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 dB

TRACES

Number

3 traces

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

10 dB input attenuation, preselector centering applied
±0.5 dB at 1 MHz to 3.0 GHz
±1.0 dB at 3.0 GHz to 8 GHz
±1.5 dB at 3 GHz to 13.2 GHz
±2.0 dB at 13.2 GHz to 22 GHz
±2.5 dB at 22 GHz to 26.5 GHz

Preamp on ±1.0 dB at 1 MHz to 3.0 GHz

DISPLAY LINEARITY [dB]

Linear and Log switching error

0

Log scale switching error

0

Linearity

±0.1 total @ input mixer level ≤-20 dBm
±0.13 total @ -20 dBm <mixer level ≤-10 dBm

DEMODULATION

AM demodulation depth

~ 100%

FM deviation range

~ 100 kHz

Audio output port

Loudspeaker, phone jack

INPUTS AND OUTPUTS

RF INPUT

Type

Front	N female, 50 Ω
	APC 2.92 mm, 50 Ω (26.5 GHz)

VSWR

≥10 dB input attenuation
<1.5 nominal @10 MHz to 3 GHz
<1.8 nominal @ 3 GHz to 13.2 GHz
<2.0 nominal @ 13.2 GHz to 26.5 GHz

3RD IF OUTPUT

Type

Rear	BNC female, R i = 50 Ω

Frequency

21.4 MHz

Bandwidth

16 MHz Max, different as prefilter

Level

+2 dBm nominal, at top of screen

Audio output

Type	Front	Phone jack

Ext trigger input

Type	Rear	BNC female, 10 kΩ nominal
Trigger level		TTL nominal

Sweep gate output

Type	Rear	BNC female
Trigger level		TTL nominal

Reference frequency output

Type	Rear	BNC female, the same as reference input port
Frequency		10 MHz
Level		+5 dBm, nominal

Reference frequency input

Type	Rear	BNC female, the same as reference output port
Frequency		10 MHz
Required level		- 5 to +15 dBm nominal

GPIB

Type	Rear	IEEE 488.2, 24 - pin female
Command set		SCPI 1997.0
Interface functions		SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, E2, LE0, TE0

Serial interface

	Rear	RS - 232 - C (COM), 9 - pin D - SUB female

LAN interface

	Rear	10 / 100 / 1000 Base T, Connector RJ 45

USB

Front/Rear USB 2.0, Front: 2 EA, Rear: 2 EA

Printer interface

	Rear	-

Monitor output (VGA)

	Rear	15-pin mini D-SUB

Mouse connector

	Front	-

Keyboard connector

	Front	-

Cal. Out

Frequency	Front	40 MHz
Level		-20 dBm + 1.0

GENERAL SPECIFICATIONS

DISPLAY

Size

7" Wide color TFT LCD (Touch Screen)

Resolution

800 x 480 pixels

MASS MEMORY

Hard Disk, Removable, 80 G

ENVIRONMENTAL CONDITIONS

MIL - PRF - 28800 F, Class 3

Temperature operating

Operating	0°C to + 50°C
Permissible	0°C to + 55°C
Storage	-40°C to + 71°C

Humidity

5% to 95% (5 ~ 75% above 30°C, 5 ~ 45% above 40°C

Altitude

up to 4600 meters

MECHANICAL RESISTANCE

MIL-PRF-28800F, Class 3

Vibration, Random

5 Hz to 500 Hz

Vibration, Sinusoidal

5 Hz to 55 Hz

Shock

30 G, Half-sine shock

EMC

EN 61326-1 : 2006
EN 55022 : 2006
EN 55024 : 1998 + A1 + A2
EN 61000 - 3 - 2 : 2000 + A2
EN 61000 - 3 - 3 : 2000 + A1 + A2

SAFETY

EN 61010 - 1 : 2001 (2nd Edition)

POWER SUPPLY

Steady state voltage

100 VAC to 240 VAC, 50 / 60 Hz

Frequency

50/60 Hz

Power consumption

120 Watt max

DIMENSIONS

(WxHxD) [mm]

373 (W) x 194 (H) x 401 (D) without handles and down feet
384 (W) x 203 (H) x 437 (D) with handles and down feet

(WxHxD) [inches]

14.7 (W) x 7.6 (H) x 15.8 (D) without handles and down feet
15.1 (W) x 8 (H) x 17.2 (D) with handles and down feet

WEIGHT

Model

	3 G	8 G	13.2 G	26.5 G
[kg]	11.0	12.8	13.0	13.4

RECOMMENDED CALIBRATION INTERVAL

1 - year

STANDARD WARRANTY

2 - year

DIGITIZER SPECIFICATION

Maximum Analysis Bandwidth

30 MHz

ADC Resolution

14 bits

Dynamic Range

85 dB

Residual FM

<1% (nominal)

Capture Memory

128 Mbytes (32 Msamples)

OPTION

TRACKING GENERATOR

Frequency

9 KHz to 3 GHz

Frequency Resolution[dB]

1 Hz

Output Level[dBm]

−30 dBm to 0 dBm

Output Level Resolution

0.1 dB

Absolute Level Accuracy

±2.0 dB

Frequency Flatness [dB]

±4.0 @ -10 dBm (9 kHz ~ 100 KHz), Before Normalization
±2.5 @ -10 dBm (100 kHz ~ 3 GHz), Before Normalization
±1.0 @ -10 dBm (9 kHz ~ 3 GHz), After Normalization

Spurious

-15 dBc , Harmonic Level
-30 dBc , nonharmonic Level

Leakage[dBm]

-90

VSWR

1.5 @ 0 dBm Output Level

Connector

N female, 50 Ω

Note* Horizontal resolution is span/(sweep points-1)

** 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

*** Permissible temperature has slightly wider range as compared to the normal operating temperature. We garantee the specification of the equipment when operating within the Operating Temperature range. We garantee that the equipment is functional when operating within the Permissible Temperature.

OPTION / FUNCTIONS

Frequency Reference (High stability)

standard

Preamplifier

standard

Phase Noise Measurement

standard

GPIB

standard

Soft Carrying Case

option

High Stability Oscillator

option

DC Power Supply

option

Battery Pack

option

Tracking Generator (9 kHz ~ 3 GHz)

option

EMC S/W (Pre-Compliance)

option

Digital CATV

option (Available from 2009)

Gated Sweep

standard

WiMAX / Wibro

option

VERSIONS, OPTIONS AND ACCESSORIES

When ordering please quote the full ordering number information.

Ordering Numbers	Versions
Standard units	
3251/0	Spectrum Analyzer (1 KHz ~ 3 GHz)
3251/1	Spectrum Analyzer (1 KHz ~ 3 GHz) incl. Tracking Gen
3252/0	Spectrum Analyzer (1 KHz ~ 8 GHz)
3252/1	Spectrum Analyzer (1 KHz ~ 8 GHz) incl. Tracking Gen
3253/0	Spectrum Analyzer (1 KHz ~ 13.2 GHz)
3253/1	Spectrum Analyzer (1 KHz ~ 13.2 GHz) incl. Tracking Gen
3254/0	Spectrum Analyzer (1 KHz ~ 26.5 GHz)
3254/1	Spectrum Analyzer (1 KHz ~ 26.5 GHz) incl. Tracking Gen
Hardware	
Opt.01 80028	3 GHz Tracking Generator
Opt.03 80029	High Stability Oscillator
Opt.05 80030	External Pre-Selector (A, B band)
Opt.06 80025	AC/DC Power Supply
Opt.08 80031	GSM/EDGE Measurement Suite
Opt.09 80032	UMTS UL Measurement Suite
Opt.10 80033	CDMA Measurement Suite
Opt.11 80034	WLAN Measurement Suite
Opt.12 80035	WiMAX Measurement Suite
Opt.13 80036	EMI Measurement Suite
Opt.14 80037	LTE Measurement Suite
Accessories	
80027	Soft Carrying Case
80026	DC Battery Pack
80038	RF Probe (3 GHz)
80039	Connector and Cable Assembly
80040	Hard Carrying Case

CHINA Beijing
Tel: [+86] (10) 6539 1166
Fax: [+86] (10) 6539 1778

CHINA Shanghai
Tel: [+86] (21) 5109 5128
Fax: [+86] (21) 5150 6112

FINLAND
Tel: [+358] (9) 2709 5541
Fax: [+358] (9) 804 2441

FRANCE
Tel: [+33] 1 60 79 96 00
Fax: [+33] 1 60 77 69 22

GERMANY
Tel: [+49] 8131 2926-0
Fax: [+49] 8131 2926-130

HONG KONG
Tel: [+852] 2832 7988
Fax: [+852] 2834 5364

INDIA
Tel: [+91] (0) 80 4115 4501
Fax: [+91] (0) 80 4115 4502

JAPAN
Tel: [+81] 3 3500 5591
Fax: [+81] 3 3500 5592

KOREA
Tel: [+82] (2) 3424 2719
Fax: [+82] (2) 3424 8620

SCANDINAVIA
Tel: [+45] 9614 0045
Fax: [+45] 9614 0047

SPAIN
Tel: [+34] (91) 640 11 34
Fax: [+34] (91) 640 06 40

UK Cambridge
Tel: [+44] (0) 1763 262277
Fax: [+44] (0) 1763 285353

UK Stevenage
Tel: [+44] (0) 1438 742200
Fax: [+44] (0) 1438 727601
Freephone: 0800 282388

USA
Tel: [+1] (316) 522 4981
Fax: [+1] (316) 522 1360
Toll Free: 800 835 2352

www.aeroflex.com

info-test@aeroflex.com

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

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