Agilent E6890A
General Purpose Application

For the E6601A Wireless Communications Test Set

Data Sheet

## The next generation of mobile phone manufacturing test.

The E6601A is the newest test set from Agilent Technologies, designed especially for high-volume, test-mode manufacturing. Combining industry-leading measurement speed, selectable formats, flexible licensing, and an integrated open Windows® XP PC, the E6601A helps you achieve the lowest cost of test in mobile phone manufacturing.

The E6601A and its available technology-specific software applications deliver industry leading measurement speed and accuracy for your mobile phone test needs.

The Agilent E6890A General Purpose Application is a software application program for the Agilent E6601A. It provides general measurement capability in the E6601A manufacturing test. The E6890A General Purpose Application is required to run tech-nology-specific calibration applications.

E6601A/E6890A Features and General Specifications

- CW, AM, FM, DSB-SC source modulation
- RF analyzer
- Spectrum monitor
- Transmitter power measurements
- Power versus time measurement
- Frequency error measurement
- QPSK EVM measurement
- Optional IQ capture waveform sampling
- Internal OCXO timebase
- Built-in open Windows XP PC
- Built-in help system
- Run test programs with internal or external PC
- GPIB, USB, and LAN connectivity and control
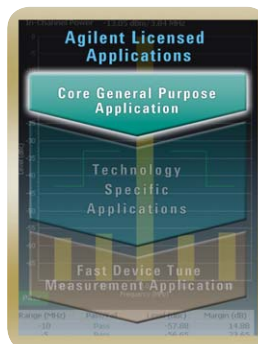
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Technical Specifications

These specifications apply to an E6601A mainframe and the E6890A General Purpose Application firmware revision A.04 or higher. Specifications describe the test set's warranted performance and are valid for the unit's operation within ±10 °C of the last self alignment. All specifications are valid after a 30-minute warm-up period of continuous operation with valid self-alignment unless otherwise noted. If the instrument has been off for longer than 48 hours, a 48-hour warm-up period followed by self-alignment is required.

Supplemental characteristics are intended to provide typical, but non-warranted, performance parameters that may be useful in applying the instrument. These characteristics are shown in italics and labeled as "typical." All units shipped from the factory meet these typical numbers at +25 °C ambient temperature without including measurement uncertainty.

CW RF Generator

Frequency

Frequency range	380 to 2700 MHz
Accuracy	Same as timebase accuracy

CW output level

Output level ranges	
RF IN/OUT	−130 to −13 dBm *typical over-range to −10 dBm*
RF OUT ONLY	−120 to −3 dBm *typical over-range to 0 dBm*

Absolute level accuracy
(≤ ±10 °C and ≤ 24 hours from last self alignment)

−108 to −13 dBm at RF IN/OUT	< ±1.0 dB, *typically < ±0.5 dBm*
−108 to −5 dBm at RF OUT ONLY	< ±1.0 dB, *typically < ±0.5 dBm*
Setting resolution	0.01 dB

Maximum applied reverse power

RF IN/OUT	< +37 dBm (5 W) peak
RF OUT ONLY	< +24 dBm (0.25 W) peak

Amplitude modulation

Modulation frequency range	100 Hz to 100 kHz
AM depth range	0 to 99.9%
AM accuracy	< ± 1.0% (20 kHz modulation frequency, 60% AM depth and −25 dBm output level)
Total harmonic distortion	< 0.5% (20 kHz modulation frequency, 60% AM depth and −25 dBm output level)

Frequency modulation

Modulation frequency range	10 Hz to 100 kHz
FM deviation range	0 to 100 kHz
FM deviation accuracy	< 3.5%
Total harmonic distortion	< 0.5%

Residual FM (0.3 - 3 kHz bandwith)

RF frequencies	< 1 GHz to 5 Hz rms
RF frequencies	2 to 2.2 GHz to 7 Hz rms
RF frequencies	> 2.2 GHz to 9 Hz rms

VSWR

RF IN/OUT

380 to 1000 MHz	< 1.15:1
1000 to 2000 MHz	< 1.2:1
2000 to 2200 MHz	< 1.3:1
2200 to 2700 MHz	< 1.35:1

RF OUT ONLY

380 to 1000 MHz	< 1.3:1
1000 to 2700 MHz	< 1.5:1

Spectral purity

Harmonics
RF IN/OUT

−130 to −15 dBm, 400 to 2200 MHz	< −30 dBc

RF OUT ONLY

−120 to −5 dBm, 400 to 2200 MHz	< −30 dBc

Non-harmonic spurious
(< ±10 °C from last self alignment, 400 to 2200 MHz)

RF IN/OUT and RF OUT ONLY	< −40 dBc, *typically < −45 dBc*

RF Analyzer

Frequency ranges

Cellular bands	411 to 486 MHz
	776 to 960 MHz
	1574 to 1577 MHz
	1710 to 1980 MHz
General purpose	400 to 2000 MHz

Input level ranges

Average power	−65 to +33 dBm, *typical over-range to +35 dBm*
Peak power	−65 to +37 dBm (5 W)

Self alignment validity ≤ ±10 °C change and ≤ 30 days from last self alignment

VSWR
RF IN/OUT

400 to 1000 MHz	< 1.15:1
1000 to 2000 MHz	< 1.2:1
2000 to 2200 MHz	< 1.3:1
2200 to 2600 MHz	< 1.35:1

Filters	1 kHz
	30 kHz
	100 kHz
	300 kHz
	640 kHz
	1.23 MHz
	1.6 MHz
	3.84 MHz
	5.0 MHz
	GSM Tx power
	W-CDMA mean power

Trigger setup

Arm	Single, continuous
Delay (varies by filter and measurement)	−180 to 180 ms
Sources (varies by measurement)	External, fall, immediate, rise

Measurement setup

Averaging (multi-measurement count–not applicable to all measurements)	Off, 1 to 999
Timeout	Off, 0.1 to 999.9 s

RF Channel Suite

Includes channel power, frequency error, power versus time, and IQ capture measurements.

Input level range

Average power	−65 to +35 dBm

Measurement interval and filter ranges

1 kHz filter	1 to 5000 ms
30 kHz filter	0.4 to 4000 ms
100 kHz filter	0.1 to 4000 ms
300 kHz filter	0.01 to 1700 ms
640 kHz filter	0.01 to 810 ms
1.23 MHz filter	0.01 to 420 ms
1.6 MHz filter	0.01 to 320 ms
3.84 MHz filter	0.01 to 135 ms
5.0 MHz filter	0.01 to 100 ms
GSM Tx power filter	0.01 to 199 ms
W-CDMA mean power filter	0.1 to 3200 ms

Channel power measurement

Measurement accuracy[1]
Within cellular frequency bands

−59 to +35 dBm	< ±0.6 dB, *typically < ±0.3 dB*
−65 to < −59 dBm	< ±0.7 dB, *typically < ±0.4 dB*

Within cellular frequency bands with < 48 hours warm-up before self alignment initiated

−59 to +35 dBm	< ±0.7 dB, *typically < ±0.3 dB*
−65 to < −59 dBm	< ±0.8 dB, *typically < ±0.4 dB*

400 to 2000 MHz

−59 to +35 dBm	*Typically < ±0.4 dB*
−65 to < −59 dBm	*Typically < ±0.6 dB*

Measurement repeatability	*Typically < ±0.05 dB*

Returning to same level and frequency, no temperature change and insignificant time change

Frequency error measurement

Measurement accuracy
CW signals from 400 to 2000 MHz

−60 to +35 dBm with 1, 30, 100, 300, 640 kHz GSM Tx power filters	< ±(50 Hz + timebase accuracy)
−40 to +35 dBm with 1.23, 3.84, 5.0 MHz W-CDMA mean power filters	< ±(50 Hz + timebase accuracy)

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1. Additional accuracy error when using RF OUT ONLY port is < ±0.1 dB.

RF Channel Suite – continued

Power versus time measurement

This measurement is a graphical view of output power in the time domain. It is also useful as a zero-span spectrum analyzer.

Dynamic range (–15 dBm input signal)
With 1, 30, 100, 300, 640 kHz   *Typically > 64 d*B
GSM Tx power filters
With 1.23, 3.84, 5.0 MHz   Typically > 54 dB
W-CDMA mean power filters

IQ capture measurement

This measurement returns the IQ samples collected during the most recent RF channel suite measurements in either rectangular or polar format. The collected samples are provided as real/imaginary number pairs in rectangular format, or as magnitude/phase pairs in polar format.

Measurement results
IQ samples
Number of samples
Sample period

QPSK EVM measurement

This measurement calculates QPSK composite EVM and several other results relating to UE modulation quality.

Input level range
Average power   –25 to +28 dBm/3.48 MHz

UE ranges
EVM   ≤ 25% rms
Frequency error   < ±10 kHz

Measurement accuracy (Includes residual results, measured for one slot (0.66666667 ms) measurement interval)
UE EVM 0% rms   < 2.5% rms
UE EVM 17.5% rms   < 0.7% rms
UE 25% rms   < 0.5% rms
Frequency error   < (±10 Hz + timebase accuracy)

Filter   5 MHz

Measurement results   EVM, phase error, magnitude error, frequency error, origin offset

Spectrum Monitor

Input level range
Average power   –65 to +35 dBm

Absolute level accuracy[1]
Within cellular frequency bands at expected frequency and level

–59 to +35 dBm   < ±0.6 dB, *typically < ±0.3 dB*
–65 to < –59 dBm   < ±0.7 dB, *typically < ±0.4 dB*

Within cellular frequency bands at expected frequency and level with < 48 hours warm-up before self alignment initiated

–59 to +35 dBm   < ±0.7 dB, *typically < ±0.3 dB*
–65 to < –59 dBm   < ±0.8 dB, *typically < ±0.4 dB*

380 to 2000 MHz at expected frequency and level

–59 to +35 dBm   *Typically < ±0.4 dB*
–65 to < –59 dBm   *Typically < ±0.6 dB*

Absolute level flatness   *Typically < ±0.15 dB*

Spurious response   *Typically < –65 dBc*

Signals ≥ –10 dBm excluding spurs that change with input attenuation but not with input level

Resolution bandwidth (RBW)   3 kHz to 5 MHz

Span   RBW to 25 MHz

Amplitude scaling   0.1 to 20 dB/division

Markers
Number   0 to 5
Frequency   Absolute, relative
Amplitude   Absolute, relative

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1. Additional accuracy error when using RF OUT ONLY port is < ±0.1 dB.

Internal OCXO Timebase

Output level range	*Typically 0 to +10 dBm*
Aging rate	< ±0.1 ppm/year

Temperature stability (referenced to +25 °C)

–10 to +70 °C	< ±0.05 ppm

Accuracy

After 30-minute warm-up	*±[time since last calibration x aging rate + temperature stability + accuracy of calibration]*
Initial adjustment	±0.05 ppm
Locking range	*Typically ±0.2 ppm*
Output frequency	10 MHz + locking range
Output impedance	*Typically 50 ohms*

Synchronization Inputs/Outputs

External reference input

Locking range	*Typically ±0.2 ppm*
Input frequency	1, 2, 5, or 10 MHz ± locking range
Input level range	*Typically 0 to +10 dBm*
Input impedance	*Typically 50 ohms*

Baseband triggers

Rear-panel input and/or output connections for format-dependent synchronization with external equipment.

Bi-directional

DB9 connector	5 TTL triggers

Input

BNC connector	1 TTL trigger input

Output

BNC connector	1 TTL trigger output

General Specifications

Operating temperature range	+10 to +55 °C
Storage temperature range	–20 to +65 °C
Dimensions H x W x D	8.75 x 16.75 x 21 inches 222 x 426 x 533 mm
Weight	51 pounds 23.1 kg
AC power input	100 to 240 VAC, 50 to 60 Hz
AC power consumption	*Typically 260 W maximum*
Calibration interval	2 years

Self alignment conditions

User alerted that automatic self re-alignment is required and can choose to align then or to ignore until later	> ±10 °C from last self align-ment, or > 24 hours since last RF generator self alignment or > 30 days since last instrument self alignment

Self alignment times

RF generator	*Typically < 1 minute*
Instrument and RF generator	*Typically < 5 minutes*

EMC

Meets standards as listed	IEC 61326:2002 / EN 61326:1997 + A1:1998 + A2:2000 + A3:2003
Canada	ICES-001:2004
Australia and New Zealand	AS/NZS CISPR11:2002

Safety

Meets standards as listed	IEC 61010-1:2001 / EN 61010-1:2001
Canada	CSA C22.2 No. 61010-1:2004
USA	UL 61010-1:2004

Radiated source leakage

Within cellular frequency bands, at zero span with 10 Hz resolution bandwidth and one inch (2.54 cm) from instrument front panel and from front half of all sides of instrument surfaces	*Typically < 1 µV rms*

Remote programming

GPIB	IEEE standard 488.2
LAN	1 RJ45 rear-panel connector
USB-B	1 rear-panel connector

External device connections

USB-A	2 front-panel USB 1.1 4 rear-panel USB 2.0

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