

# Agilent E6833A cdma2000/1xEV-DO Calibration Application

## For the E6601A Wireless Communications Test Set

Data Sheet



### The next generation of mobile phone manufacturing test.

The **Agilent E6601A** is the new, one-box test set that expedites mobile phone calibration. 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 E6833A cdma2000/1xEV-DO Calibration Application** is a non-signaling application optimized for cdma2000®/1xEV-DO mobile phone calibration. The E6833A also provides a choice of perpetual, transportable, or term licenses for maximizing asset utilization and your cost per test.

The test set and its applications use emerging advancements such as fast device tune features to deliver fast, high-quality calibration. Because it's Agilent, you can be confident—it operates using trusted, proven measurement methodology that ensures measurement integrity that is never compromised.

### E6601A/E6890A Features and General Specifications

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

### E6833A Features

#### Source modulation

- CW, amplitude, frequency, IS-95, cdma2000, and 1xEV-DO

#### Power measurements

- Mean power
- Root-raised cosine power

#### Power measurements

- Channel power
- Dynamic power
- Fast device tune

#### Spectral measurements

- Tx spurious emissions
- Occupied bandwidth
- Spectrum monitor

#### Modulation quality measurements

- IS-95, cdma2000 RC1 rho

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## Technical Specifications

These specifications apply to an E6601A mainframe and the E6833A cdma2000/1xEVDO Calibration Application firmware revision A.03 or higher. Only feature additions beyond the E6890A General Purpose Application are included in this document. Specifications describe the test set's warranted performance and are valid for the unit's operation within  $\pm 10$  °C of the last self alignment. All specifications are valid after a 30-minute warm-up period of continuous operation with valid self alignment. If the instrument has been off for longer than 48 hours, a 48-hour warm-up period followed by a 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.

## RF Generator

### Frequency

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#### W-CDMA cellular bands

US cellular band	1-799, 991-1023, 1024-1323 (860.04-893.97 MHz)
US PCS band	0-1199 (1930-1990 MHz)
Korean PCS band	0-599 (1840-1870 MHz)
Japan CDMA band	1-799, 801-1039, 1041-1199, 1201-1600 (832.0125-869.9875 MHz)
IMT-2000 band	0-1199 (2110-2169.950 MHz)
NMT-450 band	1-400, 472-871, 1039-1473, 1792-2016 (approx 420-494 MHz)
Secondary 800 band	0-719, 720-919 (851-869, 935-940 MHz)
US PCS 1900 band	0-1299 (1930-1995 MHz)
AWS band	0-899 (2110-2155 MHz)

### Amplitude

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<b>Output port control</b>	User control of RF source routing to either the RF in/out port or the RF out only port
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<b>Output level range</b>	
RF in/out port	-115 dBm/1.23 MHz to -15 dBm/1.23 MHz
RF out only port	-115 dBm/1.23 MHz to -5 dBm/1.23 MHz

#### Composite absolute output level accuracy

(<  $\pm 10$  °C and < 24 hours from the last alignment, -108 to -15 dBm/1.23 MHz)

RF in/out port	< $\pm 1.0$ dB, <i>typically <math>\pm 0.65</math> dB</i>
RF out only port	< $\pm 1.0$ dB, <i>typically <math>\pm 0.65</math> dB</i>

### Modulation

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<b>Waveforms</b>	Spectrally correct IS-95, cdma2000 RC3, 1xEV-DO waveforms
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#### Modulation quality

Residual rho	<i>Typically &gt; 0.99</i>
Residual EVM	<i>Typically &lt; 3%</i>

## RF Analyzer

### Frequency

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#### Frequency range in channel numbers

US cellular band	1-799, 991-1023, 1024-1323 (815.04-848.97 MHz)
US PCS band	0-1199 (1850-1910 MHz)
Korean PCS band	0-599 (1750-1780 MHz)
Japan CDMA band	1-799, 801-1039, 1041-1199, 1201-1600 (887.0125-924.9875 MHz)
IMT-2000 band	0-1199 (1920-1979.950 MHz)
NMT-450 band	1-400, 472-871, 1039-1473, 1792-2016 (approx 410-484 MHz)
Secondary 800 band	0-719, 720-919 (806-824, 896-901 MHz)
US PCS 1900 band	0-1299 (1850-1915 MHz)
AWS band	0-899 (1710-1755 MHz)

### Amplitude

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#### Input level range

Channel power	-61 dBm/1.23 MHz to +28 dBm/1.23 MHz
Peak input power	-61 dBm/1.23 MHz to +37 dBm/1.23 MHz

#### Self alignment validity

< ±10 °C change and < 30 days  
from last self alignment

## Reverse Traffic Channel Suite

Triggering this measurement suite results in the capture of one block of samples from which is derived the channel power, occupied bandwidth, and Tx spurious emissions parameters.

#### Trigger setup

Sources	External, immediate, RF generator ARB
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### Channel power measurement

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<b>Measurement method</b>	Measures the total power in a 1.23 MHz bandwidth centered on the reverse channel center frequency
<b>Measurement interval</b>	1.25 ms for cdma2000 or 1.67 ms for 1xEV-DO
<b>Measurement range</b>	-61 dBm/1.23 MHz to +28 dBm/1.23 MHz
<b>Measurement accuracy</b>	-61 to +28 dBm/1.23 MHz < ±0.7 dB, typically < ±0.2 dB
<b>Measurement repeatability</b>	Typically < ±0.05 dB

### Modulation quality measurement

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<b>Input frequency ranges</b>	Same as RF analyzer
<b>Measurement chip rate</b>	1.2288 Mcps
<b>Measurement method</b>	IS-95 or cdma2000 RC1: single code rho
<b>Input level range</b>	Average power -25 to +37 dBm/ 1.23 MHz
<b>Modulation quality measurement range</b> (for signals with < ±1 kHz frequency error)	
IS-95, RC1	0.40 to 1.00 rho
<b>Measurement interval</b>	1.042 ms (5 Walsh symbols)
<b>Modulation quality measurement accuracy</b>	
IS-95, RC1 rho	< ±0.003 + residual error for 0.8 < rho < 1.0
<b>Modulation quality measurement residuals</b>	
rho	> 0.999
<b>Frequency error</b>	±2 Hz plus timebase error
<b>Measurement results</b>	rho, frequency error, phase error, magnitude error, carrier feedthrough

## Occupied bandwidth

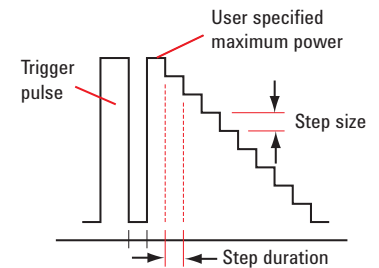
<b>Measurement method</b>	Measures the bandwidth that contains 99.0% of the total integrated power of the transmitted signal centered on the selected reverse channel
<b>Input level range</b>	+5 to +28 dBm/1.23 MHz
<b>Measurement accuracy</b>	±60 kHz for 99.0% total integrated power

## Tx spurious emissions

<b>Measurement method</b>	Measures the active carrier power in a 1.23 MHz bandwidth, then measures the power in a 30 kHz bandwidth at two offsets above and below the active carrier and displays the ratio of the offset powers to the active carrier power in dBc
<b>Input level range</b>	+0 to +30 dBm/1.23 MHz
<b>Measurement offsets</b>	
Frequencies < 1000 MHz	±885 kHz, ±1.98 MHz
Frequencies > 1000 MHz	±1.25 MHz, ±1.98 MHz
<b>Measurement bandwidth</b>	
Carrier	1.23 MHz flat channel filter
Offsets	30 kHz synchronously tuned, five-pole filter with approximately Gaussian shape
<b>Measurement accuracy</b>	
±885 kHz, ±1.25 MHz	< ±0.35 dB, typically < ±0.15 dB
±1.98 MHz	< ±0.6 dB, typically < ±0.25 dB
<b>Residual noise floor</b>	
±885 kHz, ±1.25 MHz	< -73 dBc/30 kHz BW
±1.98 MHz offsets	< -75 dBc/30 kHz BW
<b>Mobile pass/fail limits</b>	
<b>Auto mode</b>	
Frequencies < 1000 MHz	-42 dBc/30 kHz for ±885 kHz offsets
	-54 dBc/30 kHz for ±1.98 MHz offsets
Frequencies > 1000 MHz	-42 dBc/30 kHz for ±1.25 MHz offsets
	-50 dBc/30 kHz for ±1.98 MHz offsets
<b>Manual mode</b>	Settable from -10 to -65 dBc with 0.01 dB resolution

## Dynamic Power Measurement

<b>Measurement method</b>	Captures a user-defined trace consisting of 5, 10, or 20 ms duration power steps with user-defined step size produced by a test mode in the device under test. Measures the total power in each step period in a 1.23 MHz bandwidth centered on the reverse channel center frequency
<b>Input level range</b>	-61 to +28 dBm/1.23 MHz
<b>Amplitude capture range</b>	With 4 dB crest < ±2 dB of expected power
<b>Measurement accuracy<sup>1</sup></b> (within +2 to -45 dB of expected power)	-61 to +28 dBm/1.23 MHz < ±0.7 dB, typically < ±0.2 dB
<b>Measurement accuracy<sup>1</sup></b> (within 45 dB of expected power with < 48 hours warm-up before self alignment initiation)	-59 to +28 dBm/1.23 MHz < ±0.7 dB, typically < ±0.3 dB
	-65 to < -59 dBm/1.23 MHz < ±0.8 dB, typically < ±0.5 dB
<b>Measurement repeatability</b>	Typically < ±0.05 dB for returning to the same level and frequency with no temperature change and insignificant time change
<b>Trigger setup</b>	Sources external, fall, rise



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

## Fast Device Tune Measurement

<b>Measurement method</b>	Allows simultaneous calibration of a device's transmitter output power and receiver input level across level and frequency in a single sweep (per frequency band). The device must operate in a test mode, which forces it to transmit a predefined series of power steps at various reverse link frequencies, and simultaneously tune its receiver to perform measurements (such as RSSI) of the test set's signal at various forward link frequencies and power levels
<b>Measurement range</b>	-65 dBm/1.23 MHz to +28 dBm/1.23 MHz
<b>Measurement interval</b>	1.25 ms
<b>Measurement filter</b>	1.23 MHz brick wall
<b>Step size range</b>	5 to 20 ms
<b>Trigger sources</b>	Immediate and RF rise
<b>Output level setting</b> (to be within 0.1 dB of the final power level)	
Amplitude switch	< 1 ms, <i>typically</i> < 250 $\mu$ s
Frequency switch within band	< 1 ms, <i>typically</i> < 500 $\mu$ s
<b>Measurement accuracy</b> <sup>1</sup> (within 45 dB of expected power with < 48 hours warm-up before self alignment initiation)	
-54 to +28 dBm/1.23 MHz	< $\pm 0.75$ dB, <i>typically</i> < $\pm 0.3$ dB
-61 to < -55 dBm/1.23 MHz	< $\pm 0.85$ dB, <i>typically</i> < $\pm 0.3$ dB
<b>RF source output level range</b>	
RF in/out port	-115 dBm/1.23 MHz to -15 dBm/1.23 MHz
RF out only port	-115 dBm/1.23 MHz to -5 dBm/1.23 MHz
<b>Composite absolute output level accuracy</b> (< $\pm 10$ °C and < 24 hours from the last alignment, -108 to -15 dBm/1.23 MHz)	
RF in/out port	< $\pm 1.0$ dB, <i>typically</i> $\pm 0.65$ dB
RF out only port	< $\pm 1.0$ dB, <i>typically</i> $\pm 0.65$ dB
RF output level settling	< 1 ms to be within 0.1 dB of the final value

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1. Additional accuracy error when using RF OUT ONLY port is <  $\pm 0.1$  dB.

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