

# JD7105A – Base Station Analyzer

## CDMA Networks

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### CDMA Performance

The JD7105A is a Base Station Analyzer for installation and maintenance of modern wireless communication systems. It combines the functionality of spectrum analysis, cable and antenna analysis, power meter, and modulation analysis. CDMA performance testing in cell sites performed during installation and maintenance include the following:

- In-channel. The basic cell site transmission tests are done on the signal sent to the cell site's antenna, these are called the in-channel measurements, and they verify performance within the 1.23MHz channel bandwidth.
- In-band / Out-of-channel. In-band/out-of-channel measurements verify performance within the system band, but outside of the actual transmitting channel bandwidth, and these tests verify how the transmitting channel is affecting adjacent channels.
- Over the Air (OTA) measurements. OTA measurements in CDMA networks provide measurements for a quick performance characterization of the base station on specific locations, including multi-path profiles and waveform quality.

### In-channel measurements

The main types of in-channel tests performed in design and manufacturing are:

- Channel power
- Occupied bandwidth
- Modulation quality (rho)
- Code-domain analysis

### Channel Power

The Channel Power measurement is a common test used in the wireless industry to measure the total transmitted power of a radio within a defined frequency channel.

The Channel Power measurement indicates the total transmitted power within the channel bandwidth (1.23 MHz for cdmaOne).

The measurement acquires a number of points representing the input signal in the time domain.



**Occupied Bandwidth**

Occupied bandwidth measurements express the percentage (typically 99%) of the transmitted power that consisted in a specified bandwidth.

In principle, any distortion (for example, harmonics or inter-modulation) produces power outside the specified bandwidth.



**Waveform Quality (rho)**

Waveform quality (rho) measures the correlated power to total power. It indicates the overall modulation performance level of a CDMA transmitter.

The correlated power is computed by removing frequency, phase and time offsets, and performing a cross correlation between the corrected measured signal and the ideal reference.

The rho limit for CDMA base stations as specified in the TIA IS-97 document is 0.912, indicating that 91.2% of the correlated pilot power is contained in the total transmission power.



**Code Domain Analysis**

Code-domain power measures the fraction of total power transmitted in each Walsh channel. The contribution of each Walsh channel to the total signal is measured and displayed as a bar indicating the relative power in the channel.

This measurement allows you to verify that each Walsh channel is operating at its proper level, and quantify the inactive traffic noise level. Also give a quick look at all the channel elements' contributions for a given frequency assignment and PN offset.



**In-band/out-of-channel measurements**

The in-band/out-of-channel measurements characterize the distortion and interference within the system band, but outside of the transmitting channel. The following are the primary measurements:

- In-band spurious emissions
- Adjacent Channel Power Ratio (ACPR, also called spectral re-growth)

The standards specify the amount of interference allowed by the system. This is the in-band spurious emissions measurement.

**In-band spurious emissions**

The IS-95-based standards specify the following spurious emissions values relative to the channel output power.

For offset frequencies greater than 750kHz from the CDMA channel center frequency, spurious emissions must be at least 45dB below the channel power ( $\leq -45$  dBc).

For offset frequencies greater than 1.98MHz from the CDMA channel center frequency, spurious emissions must be less than -60dBc.



**Adjacent Channel Power Ratio (ACPR)**

ACPR is the ratio of adjacent-channel power to the average power level of the channel. The specification for measuring ACPR compares the power in the RF channel to the power at several offsets.

An increased induced power of adjacent channels will degrade the ACPR characteristics increasing the in-band noise of the adjacent channel, which results in a call quality degradation and reduction of call capacity.



**Over the Air (OTA) Measurements**

OTA measurements characterize the CDMA signal performance on specific locations, providing the following metrics.

- PN Scanner
- Multi-path Profile
- Code Domain
- Channel Power
- Pilot Power
- Waveform Quality
- PN Offset
- Frequency Offset
- Time Offset



**Conclusion**

The JD7105A performs all the transmission measurements required for CDMA networks for installation and maintenance services.

This capability together with the functions of Spectrum Analysis, Cable and Antenna Analysis, Interference Analysis, Insertion Gain/Loss Analysis, and T1/E1 Analysis, makes the JD7105A a complete and optimal test solution for CDMA networks.

**Test & Measurement Regional Sales**

<b>NORTH AMERICA</b> TEL: 1 866 228 3762 FAX: +1 301 353 9216	<b>LATIN AMERICA</b> TEL:+55 11 5503 3800 FAX:+55 11 5505 1598	<b>ASIA PACIFIC</b> TEL:+852 2892 0990 FAX:+852 2892 0770	<b>EMEA</b> TEL:+49 7121 86 2222 FAX:+49 7121 86 1222	<b><a href="http://www.jdsu.com/test">www.jdsu.com/test</a></b>
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