



▶ **Figure 3.** CDMA spectrum images. Which site is healthy?

### Spectrum Analyzers

A spectrum analyzer is a “frequency selective” power meter that displays power levels on the vertical axis versus frequency on the horizontal axis. While a power meter may yield a more accurate reading of absolute power level over a broad range of frequencies, a spectrum analyzer allows the user to more accurately determine power levels at each of the frequencies of interest. A spectrum analyzer can help troubleshoot problems such as interference and spurious signals being transmitted from a base station or by external sources.

Figure 3 shows two images from a spectrum analyzer. Neither image would seem to indicate a severe problem with the base station sector being analyzed. The base station on the left, however, could be missing a sync channel and therefore would not hold up a call. There is no way to detect this type of problem with either a power meter or a spectrum analyzer – this kind of modulation problem calls for the third major type of test equipment: the CDMA Waveform or “Code Domain” Analyzer.

### CDMA Waveform/Code Domain Analyzers

The CDMA waveform analyzer tunes to the transmission frequency of the base station sector and demodulates the signal. The demodulation process allows the waveform analyzer to display the performance of each of the individual Walsh code channels of the base station sector. The analyzer can also determine the timing and frequency error of the base station signals.

### Measurement Challenges

This section describes the key transmitter measurements for installing and maintaining a cdmaOne base station. The tests are specified in TIA Interim Standards IS-95 and IS-97. Similar tests are specified in ARIB/TTC standards in Japan and TTA standards in South Korea.

#### Complex characteristics in multiple domains

CDMA signals are far more complex than those found in analog systems. Sophisticated code domain modulation and spread-spectrum schemes, handoff control and power management functions are but a few of the new technology challenges. Overall power level and frequency versus time measurements alone cannot verify performance or isolate problems in these new systems. We now must measure parameters such as PN offsets, timing, power levels and code performance over time.

#### New sources of error and interference

New sources of interference and noise are resulting from the higher carrier frequencies and coexistence with competing mobile systems as well as exponential growth in other wireless and RF devices such as GPS systems and wireless LAN’s. Errors can become significant in any or all of the time, frequency and code domains – so all of them must be analyzed.