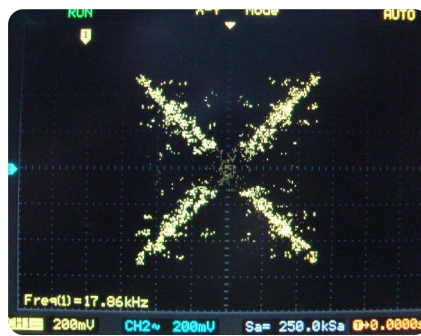


Features

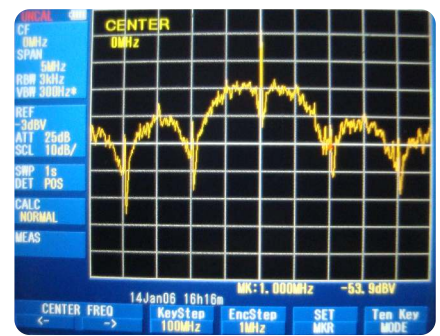
- A complete CDMA-Direct Sequence Spread-Spectrum (DSSS) system
- Customized real-time software
- Analysis in Digital time, Analog time, and Frequency domain
- Separate CDMA-DSSS Modulator and Demodulator for higher learning
- More than 25 nos. of test point
- On-board BNC connector for Analog I-Q signal analysis
- Software based variable Chip rate up to maximum 10Mchip/s
- User selectable different types of Gold code
- User selectable different types of Maximum Length Sequences
- User selectable different types of Barker code
- User can design his own Gold / MLS code.
- Time and Frequency domain analysis and measurement of baseband BPSK, QPSK and OQPSK Modulation with output spectral shaping I-Q filter.
- Built-in I & Q channel root-raised Cosine filter for spectral shaping.
- Built-in Digital Data Generator
- Built-in additive White gaussian noise (AWGN) Generator for analysis of noise gain effect on the Signal
- Built-in Frequency offset (Doppler) Generator for analysis of frequency offset effect on the Signal
- Measurement of BER with internal data which is being transmitted
- Measurement of BER with different SNR



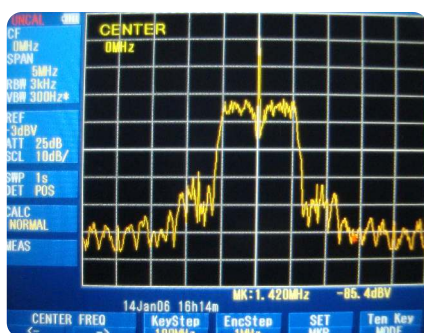
I-Q Spreaded Signals



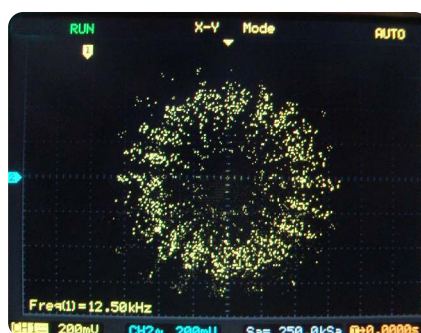
QPSK Constellation



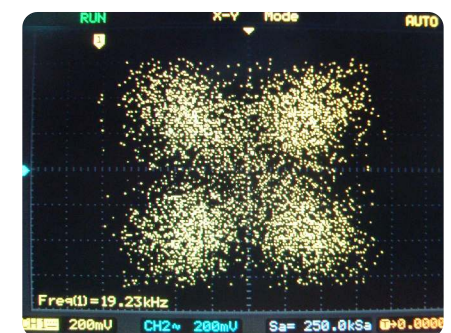
RF Spectrum of Spread Spectrum without Filter



RF Spectrum of Spread Spectrum with Filter



QPSK Constellation with Doppler



QPSK Constellation with Noise

Scope of Learning

- Analysis of relation between Bit rate, Symbol rate and Chip rate.
- Generation of different Barker codes and Gold codes with different length and study their characteristics.
- Generation of different types of maximum length sequence with different length and study their characteristics.
- Analysis of processing gain G_p with the ratio of transmitted bandwidth to the information bandwidth.
- Time and Frequency domain analysis of root raised Cosine filter with variable Chip rate
- Time and Frequency domain analysis of complete CDMA-Direct Sequence Spread Spectrum modulator with variable Chip rate, PN code, BPSK, QPSK, and OQPSK baseband modulation and with & without spectral shaping filter.
- Study and analysis of BPSK, QPSK, and OQPSK constellation with or without spectral shaping filter.
- Study of frequency offset i.e. Doppler effect as an impairment using QPSK baseband modulation.
- CDMA-Direct Sequence Spread Spectrum modulator and demodulator complete system study. Analysis and monitoring different signals at various test points of modulator and demodulator.
- Bit Error Rate (BER) measurement of CDMA-DSSS complete system using different signal gain and noise gain i.e. SNR and plotting graph between SNR and BER.

Technical Specifications

- CDMA-Direct Sequence Spread-Spectrum (DSSS) Modulator, Demodulator
- Software programmable chip rates up to maximum 10 Mchips/s
- Spreading codes :
 - Gold sequences (up to $2^{23} - 1$ chips)
 - Maximal length sequences (maximum length $2^{23} - 1$ chip)
 - Barker codes (length 11, 13)
- Baseband Modulation : BPSK / QPSK / OQPSK with output spectral shaping
- Spectral shaping filter : Root-raised Cosine square root filter
- Internal generation of pseudo-random bit stream and unmodulated carrier for test purposes
- I & Q Channel DAC-10 bit @ Sampling rate 125 MSPS max.
- Anti aliasing low pass filter with 3dB bandwidth of I & Q channel filter: Sallen Key 6-pole Butterworth with cut-off frequency 13MHz
- Built-in Additive White Gaussian Noise Generator
- Built-in Frequency offset (Doppler) Generator
- Sequential code search
- Extensive monitoring : Receiver lock, Carrier frequency error, code lock, synchronization etc.
- Mains Supply : 110-220 V AC $\pm 10\%$, 50/60Hz
- Operating Conditions : 0-40°C, 80% RH
- Weight : 2 Kgs. approximately
- Product Tutorial : Online (Theory, procedure, reference results, etc)

Included items

- | | | |
|----------------------------------|---|--------|
| • Sciencetech 2131B TechBook | : | 1 no. |
| • Sciencetech 2131B Power Supply | : | 1 no. |
| • Patch cord | : | 2 nos. |
| • Host to Device USB cable | : | 1 no. |
| • BNC to BNC | : | 2 nos. |
| • Power cord | : | 1 no. |

