

DCS-B

Basic Digital Communication Training System

SPECIFICATIONS

Clock and signal generation section

Sine wave

- Fixed frequency : 250Hz, 500Hz, 1 KHz, 2 KHz
- Variable frequency : 1Hz ~ 30Hz, 0 ~ 2 Vpp

Sampling clock

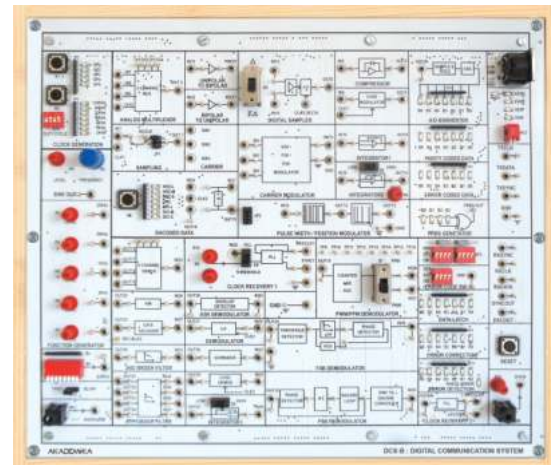
- Frequency : 2 KHz, 4 KHz, 8 KHz, 16 KHz, 32 KHz, 64 KHz, 128 KHz
- Duty cycle : 10 ~ 90% Selectable in steps of 10%
- DC signal : 0 ~ 5 V
- Transmitter clock frequency : 240 KHz fast modes
- Transmitter frame frequency : 8 KHz
- Carrier sine waves : 500 KHz (0°), 1MHz (0°), 1MHz (180°)
- Data pattern : 8-bit variable NRZ-L pattern
- PRBS generator : 14-bit

Transmitter section

- Analog signal sampling
Sample and hold, Natural sampling, Flat-top sampling
- 4 channel analog time division multiplexing
- Odd, even parity and hamming code generator
- Pulse code modulation • ASK, FSK, PSK modulation
- Data encoding NRZ (L), NRZ (M), NRZ(S), Bi-phase (Manchester), Bi-phase (Mark), Bi-phase (Space), URZ, alternate mark inversion (AMI), uni-polar to bipolar and bipolar to uni-polar
- Delta / adaptive delta / sigma delta / CVSD modulation
- Signal compression • PAM / PPM / PWM modulation
- Audio preamplifier with microphone interface

Receiver section

- 2nd order and 4th order low pass butterworth filters
- 4 channel time division de-multiplexing
- PLL clock recovery • Pulse code demodulation
- Odd, even parity and hamming code recovery
- Single bit error detection and correction
- Data decoding NRZ(L), NRZ(M), NRZ(S), Bi-phase (Manchester), Bi-phase (Mark), Bi-phase (Space), URZ, alternate mark inversion (AMI)
- ASK, FSK, PSK demodulation
- Delta / adaptive delta / sigma delta / CVSD demodulation



- Signal expander • PAM / PPM / PWM demodulation
- Audio amplifier with headphone / speaker interface

EXPERIMENTS

Study of sampling techniques

Natural sampling, Sample and hold, Flat top sampling

Effect of vareous sampling frequencies and duty cycles

Effect of sampling frequency, Effect of duty cycle

Effect of order of the low pass filter

Study of TDM with different receiver synchronization techniques

- Using the direct synchronization technique
- Clock recovery through PLL
- Clock recovery through threshold detector

Study of pulse code modulation and demodulation

- Direct synchronization technique
- Bit synchronization technique
- Frame synchronization technique

Effects of parities and hamming code on PCM data

- None parity, Even parity, Odd parity, Hamming code

Study of PRBS

Study of vareous data encoding and decoding techniques

- NRZ- L, NRZ- M, NRZ- S, BIO-L, BIO-M, BIO-S, URZ
- AMI encoding and decoding
- Unipolar to bipolar • Bipolar to unipolar

Study of vareous carrier modulation and demodulation techniques

- ASK, FSK, PSK modulation and demodulation
- Study of delta modulation and demodulation
- Study of slope overload and increased integrator gain
- Study of adaptive delta modulation and demodulation
- Study of sigma delta modulation and demodulation
- Study of continuously variable slope detector modulation and demodulation.
- Study of companding system • Voice communication
- Study of pulse width modulation and demodulation.
- Study of pulse position modulation and demodulation
- Switch faults