LUMISTAR
LS-45-DB Dual Bit Synchronizer Daughterboard
Data Sheet

Description:

The Lumistar LS-45-DB Dual Channel Bit Synchronizer Daughterboard provides optimal reconstruction of a serial PCM data stream that has been corrupted by noise, phase jitter, amplitude modulation, or base line variations. The all-digital design assures a high performance, consistent product, with excellent reliability and long-term stability. Dual channel design can feed each channel of the LS-55-DD dual decom. The LS-45-DB also has a post D combiner that allows for optimal ratio combining of the two input signals.

A unique Built-in-Test feature allows performance verification for the Bit Synchronizer to ensure the highest level of operation. Auto-test BIT is performed for a short duration on the application of power and tests more than 90% of the Bit Synchronizer components. This test verifies that power is properly applied, verifies that there are no internal bit errors, and performs other tests to ensure that the bit synchronizer is fully operational with status indication of results. Command-test BIT performs the same functions and can be initiated by the user at any time through the Lumistar software when used on Lumistar PC products. The user has the ability to generate internal pseudo-random patterns and calculate internal bit error rates with or without the injection of forced errors. Various status indicators are also available through the software. The Bit Synchronizer also contains a BER reader as well as frame sync pattern indicator.

Key Features:

- PCM Data Rates up to 45 Mbps for NRZ-L (22 Mbps for Bi-Phase/Miller)
- Performance within 1 dB of theoretical to 20 Mbps (2 dB to 45 Mbps)
- All Digital Design ensures high reliability and long term performance
- 2 single ended and 1 differential input per channel along with RX BERT reader.
- Low power consumption less than 8 watts.
- Built-in-Test with internal BER measurement and FSP reader
- Viterbi decoding for rate ½ k=7 (Other available consult factory)


PCM Data Rate and Input Codes:
The LS-45-DB Bit Synchronizers can operate over a range of 100 bits per second to their maximum data rates for all NRZ codes, or from 100 bits per second to half their maximum data rate for the Bi-Phase and Miller codes.

| NRZ codes: | NRZ-L, NRZ-M, NRZ-S | RZ codes | RZ |
| Randomized codes | RNRZ-L, RNRZ-M, RNRZ-S | Randomization sequence: | 2¹⁷-1, 2¹⁵-1, 2¹⁷-1, 2²⁵-1 |
**Input and Signal Characteristics:**

- **Inputs signals:** Single-ended or differential
- **No. of inputs:** Up to 4 and internal simulator
- **Input Impedance:** Shipped with 75Ω, 50Ω, 1KΩ (Jumper Select)
- **Input Polarity:** Auto-detect (normal or inverted)
- **Input Signal Amplitude:** 0.1 V pp to 10 V pp (nominal)
- **Maximum Voltage Input:** 5V RMS for 50Ω and 75Ω Inputs
- **Maximum DC Offset:** ± 5V for 50Ω and 75Ω Inputs; ± 25 V for 1KΩ Impedance
- **Dynamic AC baseline:** Baseline variations up to 100% of the input signal at rates to 0.1% of the signal frequency for sinewave or sawtooth signals (100 Hz max)
- **De-randomizer** 9, 11, 15 bit both forward and reverse

**Phase-Locked Loop Performance:**

- **Loop-Bandwidth:** Programmable from 0.001% to 5% depending on the Bit Rate
- **Acquisition Range:** 0.04% to 8% depending on Loop-Bandwidth selected
- **Tracking Range:** 0.1% to 20% depending on Loop-Bandwidth selected

**Bit Error Rate Performance:**

The LS-45 Bit Synchronizer performance relative to theoretical is indicated below when the applied signal has a S/N ratio within 1dB of the specified synchronization threshold with a Gaussian white noise bandwidth up to three times the bit rate, and has no jitter or base line variations on the input signal.

**Codes:**

- **NRZ**
  - Bit Rate: <20 Mbps
  - Degradation from Theory: <1 dB max (0.5 dB typical)
- **NRZ**
  - Bit Rate: 20 to 30 Mbps
  - Degradation from Theory: <1.5 dB max (1 dB typical)
- **Blφ, RZ**
  - Bit Rate: <10 Mbps
  - Degradation from Theory: <1 dB max (0.5 dB typical)
- **Blφ, RZ**
  - Bit Rate: 10 to 15 Mbps
  - Degradation from Theory: <1.5 dB max (1 dB typical)
- **DM, M**
  - Bit Rate: up to 15 Mbps
  - Degradation from Theory: <2 dB max (1 dB typical)

**Capture Threshold:**

The Capture Threshold when the applied signal has a S/N ratio within 1 dB of the specified synchronization threshold, has a Gaussian white noise up to three times the bit rate, and has no jitter or base line variations on the input signal is defined below:

**Codes:**

- **NRZ**
  - Capture Threshold: -1 dB (<3 dB typical)
- **Blφ**
  - Capture Threshold: +1 dB (+0 dB typical)

The capture range of the bit sync is up to ±5% of the bit rate

**Environmental:**

- **Physical:** Daughterboard for LS-50 Series
  - 8 W total power 6.5” x 2.75”

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