

# LUMISTAR

## LS-44-QBS Rack Mount Quad Bit Synchronizer

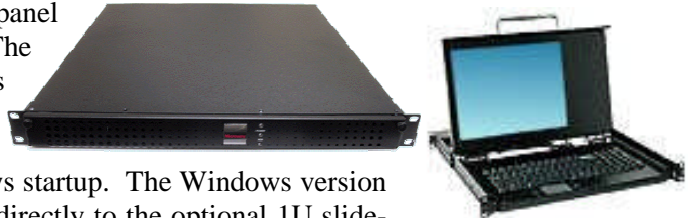
### Data Sheet

#### Key Features:

- **Up to 4 Bit Synchronizers in a 1U Rack Mount Chassis**
- **Optional 1U Keyboard/Display for setup**
- **Data rates to 25 Mbps for NRZ-L (12.5 Mbps for BI $\phi$  Codes)**
- **Performance within 1 dB of theoretical to 10 Mbps (1.5 dB to 25 Mbps)**
- **All Digital Design ensures high reliability and long term performance**
- **Built-in-Test allows internal BER measurement or frame sync pattern indication**
- **Available in DOS version for quick boot or Windows version for networking**

#### Description:

The LS-44-QBS contains up to 4 Lumistar LS-40-DB25 Bit Synchronizer Daughterboards in a 1U Rack-Mount chassis with status lights on the front panel and all interconnections through the rear. The design contains an internal computer which runs off DOS or Windows depending on the version selected. The DOS version boots quickly without the delays required for Windows startup. The Windows version offers networking. The unit can be connected directly to the optional 1U slide-out keyboard/display, for setup resulting in only 2U of total rack height. For applications that require many bit synchronizers, a 1U keyboard/Display with KVM switch allows 32 bit synchronizers in 9U of rack height. When power is applied, the computer will operate with the last configuration unless the operator wishes to change the setup. For setup, the keyboard/display is pulled out and the display is flipped up to monitor the process. When the bit synchronizer setup is completed, the keyboard/display can be closed up since the status can be monitored on the front panel without an external display.



The Lumistar LS-40-DB25 Bit Synchronizer Daughterboards are used to provide optimal reconstruction of serial PCM data streams that have been corrupted by noise, phase jitter, amplitude modulation, or base line variations. The all-digital design assures a consistent product with high reliability and long-term stability. Please refer to the Lumistar LS-40-DB

Data Sheet for a description of the daughterboard bit synchronizer used in the LS-44-QBS.

#### PCM Data Rate and Input Codes:

The LS-40-DB25 Bit Synchronizers can operate over a range of 100 bits per second to 20 Mbps for all NRZ codes or from 100 bits per second to 10 Mbps for the Bi-Phase and Miller codes. The user can select any of the following IRIG PCM input codes:

NRZ codes:	NRZ-L, NRZ-M, NRZ-S
RZ codes	RZ
Split phase codes	BI $\phi$ -L, BI $\phi$ -M, BI $\phi$ -S
Miller codes	DM-M, DM-S, M <sup>2</sup> -M, M <sup>2</sup> -S
Randomized codes	RNRZ-L, RNRZ-M, RNRZ-S
Randomization sequence:	2 <sup>11</sup> -1, 2 <sup>15</sup> -1, 2 <sup>17</sup> -1, 2 <sup>23</sup> -1

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*Specifications are subject to change. Please verify the latest specifications at time of order.*

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### Data Sheet

#### Input and Signal Characteristics:

Inputs signals:	Single-ended or differential
Input Impedance:	Configured with 75Ω, Jumper selectable for 50Ω, 1KΩ
Input Polarity:	Auto-detect (normal or inverted)
Input Signal Amplitude:	0.4 V pp to 10 V pp
Maximum Voltage Input:	5V RMS for 50Ω and 75Ω Inputs 25V RMS for 1KΩ Impedance
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)

#### Phase-Locked Loop Performance:

Loop-Bandwidth:	Programmable from 0.01% to 2% depending on the Bit Rate of the input signal.
Acquisition Range:	0.04% to 8% depending on the Loop-Bandwidth selected
Tracking Range:	0.1% to 20% depending on the Loop-Bandwidth selected

#### Bit Error Rate Performance:

The LS-40 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.

<u>Codes:</u>	<u>Bit Rate:</u>	<u>Degradation from Theory:</u>
NRZ	<10 Mbps	< 1 dB max (0.5 dB typical)
NRZ	10 to 20 Mbps	< 1.5 dB max (1 dB typical)
BIφ, RZ	<5 Mbps	< 1 dB max (0.5 dB typical)
BIφ, RZ	5 to 10 Mbps	< 1.5 dB max (1 dB typical)
DM, M <sup>2</sup>	up to 10 Mbps	< 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:

<u>Codes:</u>	<u>Capture Threshold:</u>
NRZ	-1 dB (-3 dB typical)
BIφ	+1 dB (+0 dB typical)

#### Synchronization Hold:

The LS-40 Bit Synchronizer is capable of maintaining synchronization during periods of signal loss or during continuous periods of 1s or 0s lasting up to 245 bits in every 1024 bits, for NRZ coded signals up to 5 Mbps or BIφ coded signals up to 2.5 Mbps, providing:

- S/N ratio is greater than 12 dB
- PLL bandwidth is equal to 0.1%
- 50% Transition Density when the signal is present
- Input signal has no jitter or base line variations
- Signal has a constant amplitude

#### Acquisition Time:

The mean acquisition time is a function of the Loop Bandwidth and will be less than 100 bits with a Loop Bandwidth of 1% and less than 150 bits with a Loop Bandwidth of 0.1% for NRZ signals up to 5 Mbps or BIφ signals up to 2.5 Mbps, providing:

- Gaussian white noise in a band up to three times the bit rate
- Transition Density is greater than 2% of the bit rate
- Signal has no jitter or baseline variations on the input signal

#### Output Signals:

Data	TTL and RS-422 Driven
Zero Degree Clock	TTL and RS-422 Driven
Tape Outputs	1 V pp into 50 Ω (code programmable) TTL and RS-422

#### Environmental:

Temperature (Operating)	0 to 50 °C
Temperature (Non-Op)	-25 to +70 °C
Humidity (Operating)	10% to 90% Non-Condensing

#### Physical:

Form Factor	1U High Rack Mount With Optional 1U High Keyboard/Display
Power required (typical)	115/230 VAC 60/50 Hz 70 W Max

#### I/O Connectors:

Inputs and Outputs	BNC Connectors for TTL, High Density Connector for RS-422 Signals
Power	115/240 VAC, 50-60 Hz