



# CL-SH4400

Advance Product Bulletin

## FEATURES

### General

- Digital core of a highly flexible, high-performance sampled-amplitude read/write channel
- High-performance channel data rates with support up to 96 MHz
- Support for single-, double-, and 8-bit NRZ interfaces

### Sequence Detection

- Rate 2/3 RLL (1, 7) ENDEC
- Programmable digital equalization
- SofTarget™ PRML sequence detection
- Digital timing recovery
- Digital gain control

### Error Tolerance

- Error-tolerant synchronization mark detection
- Channel quality circuitry for statistical performance-related feedback of the channel
- Erasure-pointer generation

### Head Support

- Supports monolithic, composite, thin-film, MIG, and MR heads

### Technology

- 100-pin Plastic Quad Flat Pack (PQFP); low-power CMOS technology

## Sampled-Amplitude Digital R/W Channel Device

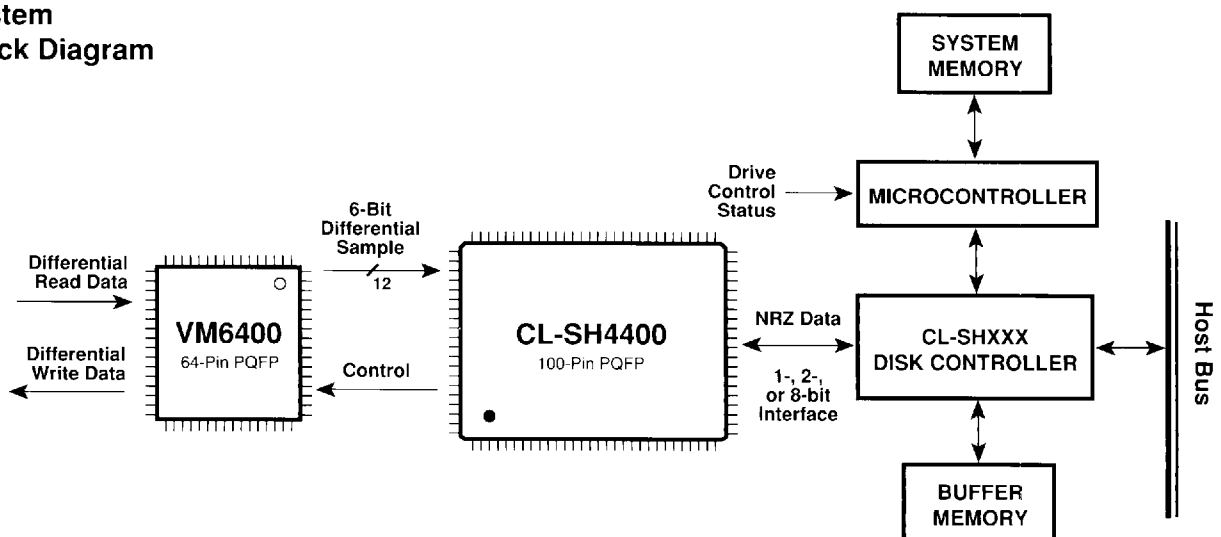
## OVERVIEW

The CL-SH4400 Sampled-Amplitude Digital Channel is a VLSI component designed to work with a companion analog device and a disk controller to provide the majority of drive and controller hardware necessary to build a state-of-the-art, high-density, magnetic disk drive. The CL-SH4400 implements the digital portion of a sampled-amplitude read/write channel employing advanced partial-response polynomials and SofTarget™ sequence-detection technology. It supports data rates up to 64 Mbps and channel rates up to 96 MHz.

The CL-SH4400 Sampled-Amplitude Digital Channel provides the digital core of a highly flexible, high-performance sampled-amplitude read/write channel that provides data rates up to 64 Mbps. A companion analog part — the VTC® VM6400 — implements the frequency synthesizer, variable gain amplifier, timing VFO, tunable analog filter, analog-to-digital converter, write precompensation, and servo

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## System Block Diagram





## CL-SH4400

*Sampled-Amplitude Digital R/W Channel Device*

### OVERVIEW (cont.)

demodulation functions. The CL-SH4400/VM6400 chip set supports magnetic disk drive applications employing embedded servo techniques and zone bit recording. The functional partition of the CL-SH4400/VM6400 chip set is shown in the diagram below.

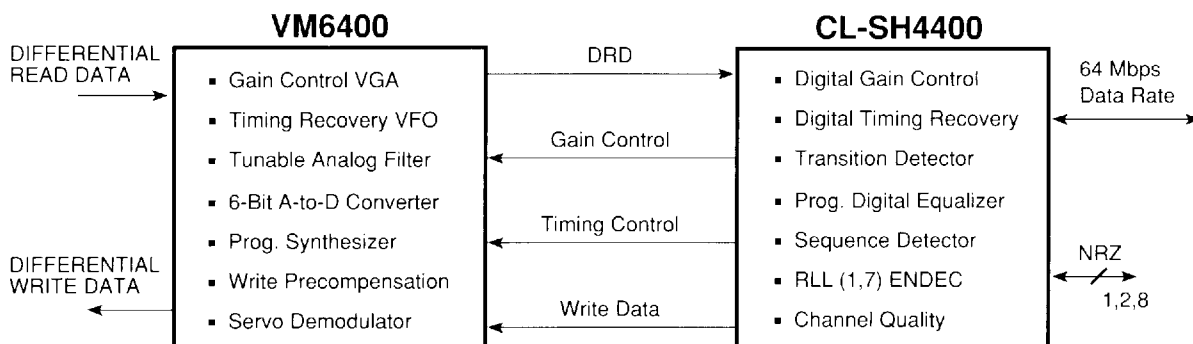
The CL-SH4400 provides digital gain control, timing recovery, equalization, sequence detection, RLL (1,7) encoding and decoding, error-tolerant synchronization, and channel quality measurement.

The degree of flexibility in the CL-SH4400 architecture allows for more precise matching of HDA and channel electronics. The gain and timing loops can be configured with control coefficients for both acquisition and tracking; the loops will reconfigure with the correct coefficients under control of the acquisition and tracking modes.

The CL-SH4400/VM6400 also includes an analog servo gain stage to provide demodulation of recovered servo burst information.

The CL-SH4400 is a CMOS integrated circuit that implements a highly flexible synchronous channel. Partial response schemes such as PR4 and EPR4 may be implemented, and the SofTarget Sequence detector provides a user-specific partial response scheme that allows the detection strategy to be customized for a specific pulse shape.

The SofTarget technology, together with an on-chip filter specifically designed to minimize pole-tip effects or secondary gap effects, make the CL-SH4400 compatible with monolithic, composite, thin film, MIG and magneto-resistive heads.



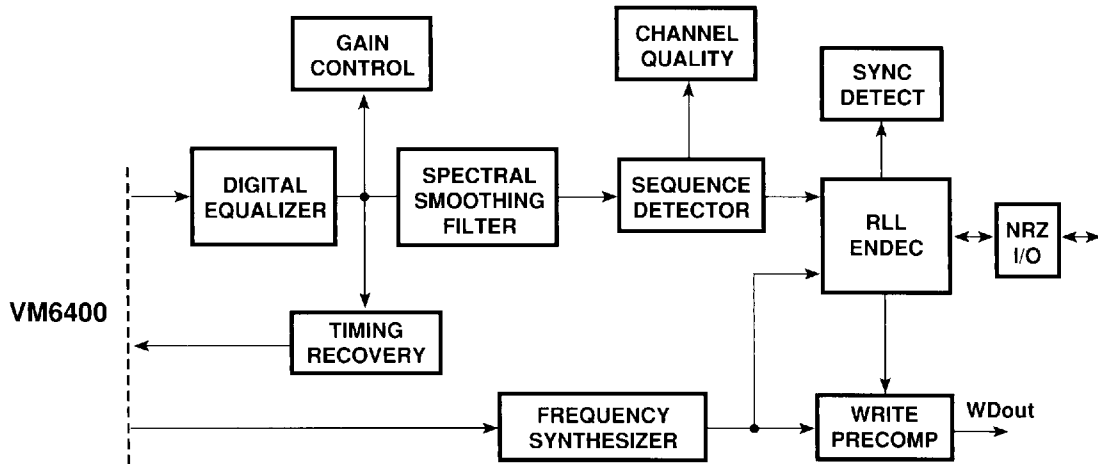
**CL-SH4400/VM6400 Functional Partition**

## CL-SH4400

Sampled-Amplitude Digital R/W Channel Device



### FUNCTIONAL BLOCK DIAGRAM



### ADVANTAGES

#### Key Features

- **SofTarget™ Sequence Detector**
- **Error-tolerant synchronization**
- **Programmable gain, timing, equalization, sampling and detection alternatives**
- **Rate 2/3 RLL (1,7) ENDEC**
- **Intelligent power management**

#### Benefits

Flexible architecture supporting a broad range of partial-response polynomials. SofTarget allows the disk drive designer to tailor the behavior of the channel to a particular head/disk characteristic, thereby optimizing areal density.

Supports the higher soft error rates and higher defect densities encountered at higher recording densities.

Provide optimum match to channel characteristics and permit channel optimization.

Reduces nonlinear effects associated with closely-spaced transitions.

Minimizes operational and idle power consumption.