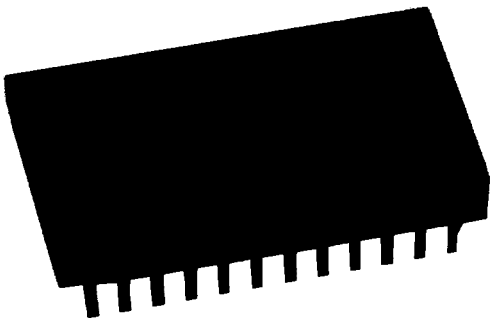
SHM-HU
Ultra-Fast, 0.1%
Micro-Electronic Sample-hold

FEATURES

- **25 Nanoseconds acquisition time**
- **50 MHz Bandwidth**
- **10 Picoseconds aperture uncertainty**
- **Up to 8-bit accuracy**
- **±2.5V Input range**



GENERAL DESCRIPTION

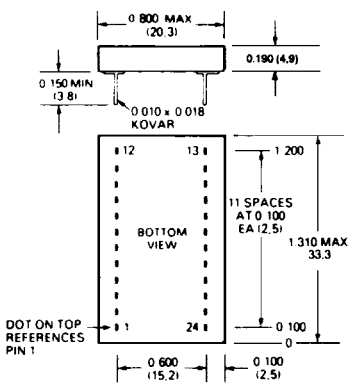
DATEL's SHM-HU is an ultra high-speed sample-hold capable of video speed signal processing. The SHM-HU acquires a full-scale 5V input change in just 25 nanoseconds and features a 10 picoseconds aperture uncertainty time. Bandwidth is 50 MHz and the slew rate is 200 V/microseconds.

Through the use of thin-film hybrid construction, this ultra high-speed circuit is contained in a miniature 24-pin ceramic package. A 53 picofarad MOS hold capacitor is incorporated inside the package and provision is made for externally added capacitance when necessary. The sample-hold requires four external resistors and an LH0033 fast buffer amplifier for completion. The circuit is zeroed by adjustment of the LH0033 amplifier.

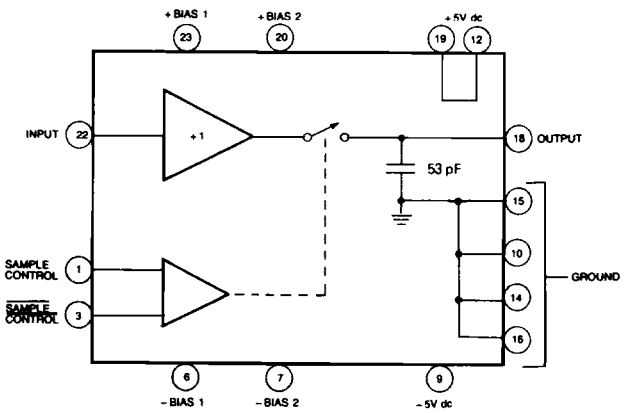
Other features of this unit include a ±2.5V input/output voltage range and a fixed gain of 0.0955. The sampling switch is controlled by a complementary series 10,000 ECL input. An ECL differential line driver can be conveniently used for the sample control inputs.

Power requirements are ±15V dc at 60 mA and ±5V dc at 70 mA. There are three basic models covering two operating temperature ranges, 0 to +70°C, and -55 to +100°C.

MECHANICAL DIMENSIONS
INCHES (MM)



NOTE: PINS HAVE 0.025 INCH STANDOFF FROM CASE. ±0.01"



INPUT/OUTPUT CONNECTIONS

PIN	FUNCTION
1	SAMPLE CONTROL
3	SAMPLE CONTROL
6	-BIAS 1
7	-BIAS 2
9	-5V POWER
10	GROUND
12	+5V POWER
14	GROUND
15	GROUND
16	GROUND
18	OUTPUT
19	+5V POWER
20	+BIAS 2
22	INPUT
23	+BIAS 1

NOTE: ALL OTHER PINS ARE NO CONNECTION

ABSOLUTE MAXIMUM RATINGS

Power Supplies, Pins 9-19	±6V
Analog Input Voltage, Pin 22	±5V
Sample Inputs, Pins 1 & 3	±5V Differential
Current, Pins 6, 7, 20, 23,	50 mA

FUNCTIONAL SPECIFICATIONS

Typical at 25°C, ±15V and ±5V supplies with external LH0033 Buffer Amplifier unless otherwise noted.

INPUTS	
Input Voltage Range, Min.	±2.5V
Input Bias Current	25 µA
Maximum Source Impedance	51 Ohms
Input Impedance	10^6 Ohms
Sample Control Inputs[4]	Differential ECL 10,000 Positive Pulse on Pin 1 and Negative Pulse on Pin 3 gives Sample Mode
OUTPUT[1]	
Output Voltage Range, Min.	±2.5V
Output Current	±10 mA
Output Impedance	6 Ohms
PERFORMANCE	
Accuracy	0.1%
Gain	+0.995
Output Offset Voltage[2], Sample Mode	±100 mV max.
Output Offset Voltage Drift	±100 µV/°C max.
Sample to Hold Offset Error	±100 mV max.
Hold Mode Droop	50 µV/µsec.
Hold Mode Feedthrough	0.02%
DYNAMIC RESPONSE	
Acquisition Time, 5V Step to 0.2%	25 nsec.
Bandwidth, −3 dB, Sample Mode	50 MHz
Slew Rate	200V/µsec.
Aperture Delay Time	6 nsec.
Aperture Uncertainty Time	10 psec.
POWER REQUIREMENTS[3]	
Power Supply Voltage	±15V dc ±0.75V at 60 mA ±5V dc ±0.25V at 70 mA
PHYSICAL/ENVIRONMENTAL	
Operating Temperature Ranges	
SHM-HUMC	0 to +70°C
SHM-HUMM	−55 to +100°C
Storage Temperature Range	−65 to +150°C
Package Type	24 Pin Ceramic
Pins	0.010 x 0.018 inch Kovar
Weight	0.2 ounces (6 grams)

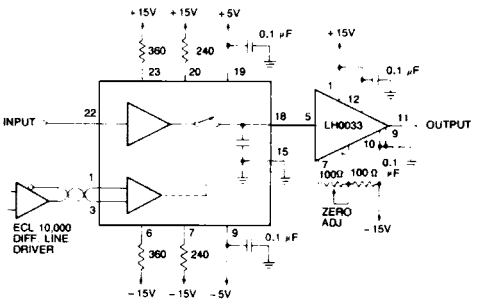
FOOTNOTES:

1. Output is from LH0033 amplifier and is not short circuit proof.
2. Output offset voltage adjustable to zero by LH0033 offset adjustment.
3. ±12V supplies can be used if the 360 ohm resistors at the Bias 1 pins are changed to 240 ohms and the 240 ohm resistors at the Bias 2 pins are changed to 160 ohms.
4. The SHM-HU can be driven by TTL logic input by biasing $\overline{\text{SAMPLE}}$ CONTROL input to +1.2V and driving the SAMPLE CONTROL with a positive pulse for sampling mode.

TECHNICAL NOTES

1. It is recommended that the ±5V supplies of the SHM-HU be bypassed with 0.1 µF ceramic capacitors as close as possible to pins 9 and 19. The ±15V supplies to the LH0033 should be bypassed with the same value capacitors.
2. It is essential that the output lead from pin 18 to pin 5 of the LH0033 be kept as short and direct as possible. Also, the complementary ECL driver should be as close as possible to pins 1 and 3 to minimize lead lengths to these pins.
3. With model SHM-HUMC the LH0033C should be used, and with model SHM-HUMM, model LH0033 should be used.
4. An external hold capacitor may be added from pin 18 to pin 15. This capacitor should be an MOS or polystyrene type. Hold mode Droop and sample-to-hold offset error will decrease proportionately with the size of this capacitor and acquisition time will increase proportionately.

CONNECTION DIAGRAM



ORDERING INFORMATION

MODEL NO.	OPERATING TEMP. RANGE
SHM-HUMC	0 to +70 °C
SHM-HUMM	-55 to +100 °C
SHM-HUMM-QL	-55 to +100 °C

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