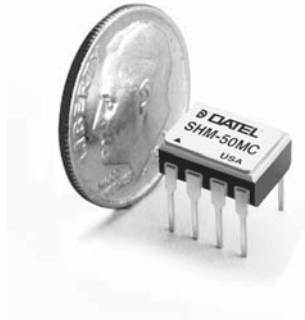


NEW **SMT Package**

FEATURES

- Small 8-pin DIP or SMT package
- 30ns typical acquisition time to $\pm 0.01\%$, 40ns typical acquisition time to 0.005%
- 15ns typical sample-to-hold settling time to $\pm 0.01\%$
- 100MHz small signal bandwidth
- -78dB feedthrough attenuation
- ± 2 picoseconds aperture uncertainty
- 85mW typical, 135mW maximum power dissipation



| INPUT/OUTPUT CONNECTIONS | |
|--------------------------|--------------------|
| Pin | Function |
| 1 | +5v Digital Supply |
| 2 | S/H Control |
| 3 | Analog Input |
| 4 | Analog Return |
| 5 | -5v Supply |
| 6 | Analog Output |
| 7 | +5v Analog Supply |
| 8 | Power Ground |

GENERAL DESCRIPTION

DATEL's SHM-50 is a high-speed, highly accurate sample/hold designed for precision, high-speed analog signal processing applications. The SHM-50 features excellent dynamic specifications including a maximum acquisition time of only 40 nanoseconds for a 2V step to $\pm 0.01\%$.

Sample-to-hold settling time, to $\pm 0.01\%$ accuracy, is 20 nanoseconds maximum with an aperture uncertainty of ± 2 picoseconds.

The SHM-50 is a complete sample/hold circuit, containing a precision MOS hold capacitor and a MOSFET switching configuration which results in faster switching and better feedthrough attenuation. Additionally, a FET input amplifier design allows faster acquisition and settling times while maintaining a considerably lower droop rate.

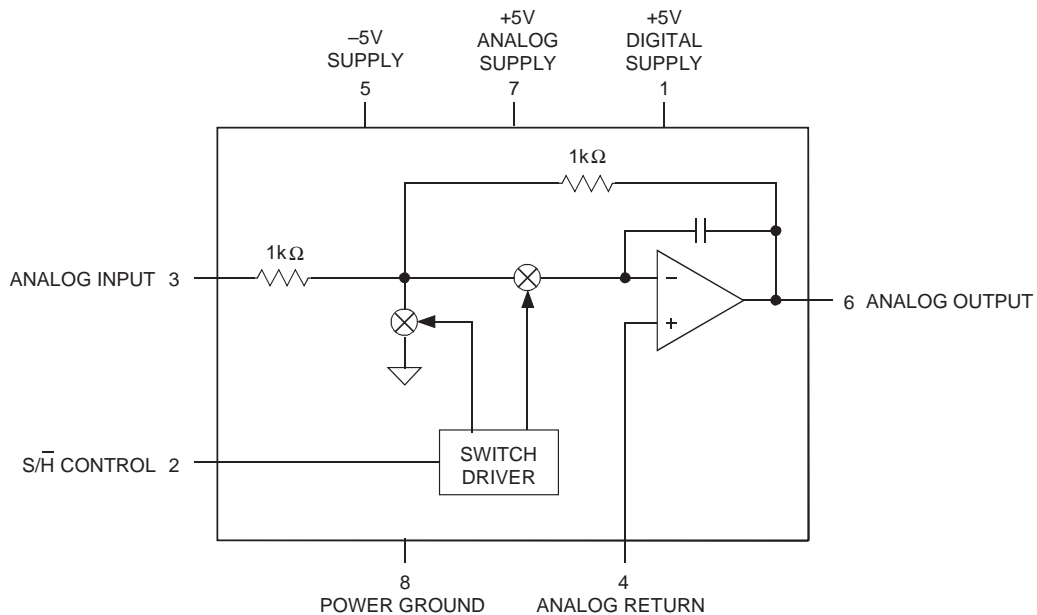


Figure 1. Functional Block Diagram

| ABSOLUTE MAXIMUM RATINGS | |
|--------------------------|--------------------|
| $\pm 5V$ Supply Voltages | $\pm 6.6V$ |
| Analog Input | $\pm 4V$ |
| Digital Input | $-0.5V$ to $+5.5V$ |
| Output Current | ± 65 mA |

Functional Specifications

Apply over the operating temperature range with $\pm 5Vdc$ unless otherwise specified.

| ANALOG INPUT/OUTPUT | MIN. | TYP. | MAX. | UNITS |
|----------------------------|------|------|----------|----------|
| Input/Output Voltage Range | -3.5 | — | +3.5 | Volts |
| Input Impedance | — | 1000 | — | Ω |
| Output Current | — | — | ± 65 | mA |
| Output Impedance | — | 0.1 | — | Ω |
| Capacitive Load | 100 | 250 | — | pF |

DIGITAL INPUT

Input Logic Levels

| | | | | |
|---------|------|---|------|-------|
| Logic 1 | +2.0 | — | +5.0 | Volts |
| Logic 0 | 0 | — | +0.8 | Volts |

Loading

| | | | | |
|---------|---|---|----|---------|
| Logic 1 | — | — | +5 | μA |
| Logic 0 | — | — | -5 | μA |

TRANSFER CHARACTERISTICS

| | | | | |
|---|---|--------------|-------------|---------------|
| Gain | — | -1.5 | — | V/V |
| Gain Error, +25°C | — | ± 0.05 | ± 0.25 | % |
| Linearity Error ① | — | ± 0.0035 | ± 0.005 | %FS |
| Sample Mode Offset, +25°C | — | ± 2 | ± 7 | mV |
| Sample-to-Hold Offset (Pedestal), +25°C ② | — | ± 30 | 60 | mV |
| Gain Drift | — | ± 1 | ± 15 | ppm/°C |
| Sample Mode Offset Drift ① | — | ± 3 | ± 15 | ppm of FSR/°C |
| Sample-to-Hold Off. (Pedestal) Drift | — | ± 5 | ± 20 | ppm of FSR/°C |

DYNAMIC CHARACTERISTICS

Acquisition Time

| | | | | |
|---|---|----|-----|----|
| 2V to $\pm 0.005\%$ FS ($\pm 100\mu V$) | | | | |
| +25°C | — | 40 | 50 | ns |
| -55 to +125°C | — | 70 | TBD | ns |
| 2V to $\pm 0.01\%$ FS ($\pm 200\mu V$) | | | | |
| +25°C | — | 30 | 40 | ns |
| -55 to +125°C | — | 40 | 50 | ns |
| 2V to $\pm 0.1\%$ FS ($\pm 2mV$) | — | 25 | 30 | ns |

Sample-to-Hold Settling Time

| | | | | |
|---|-----|-----------|---------|------------|
| 2V to $\pm 0.005\%$ FS ($\pm 100\mu V$) | — | 15 | 25 | ns |
| 2V to $\pm 0.01\%$ FS ($\pm 200\mu V$) | — | 10 | 20 | ns |
| Sample-to-Hold Transient | — | 100 | — | mVp-p |
| Aperture Delay Time | — | 2 | 4 | ns |
| Aperture Uncertainty (Jitter) | — | ± 2 | ± 4 | ps |
| Output Slew Rate | 600 | ± 650 | — | V/ μs |
| Small Signal BW (-3dB) | 90 | 100 | — | MHz |

Output Droop

| | | | | |
|---------------|---|-----------|------------|------------|
| +25°C | — | ± 0.2 | ± 1.0 | $\mu V/ns$ |
| 0 to +70°C | — | ± 0.3 | ± 1.0 | $\mu V/ns$ |
| -55 to +125°C | — | ± 5.0 | ± 12.0 | $\mu V/ns$ |

| | | | | |
|-----------------------|---|-----|---|----|
| Feedthrough Rejection | — | -78 | — | dB |
|-----------------------|---|-----|---|----|

| POWER REQUIREMENTS | MIN. | TYP. | MAX. | UNITS |
|------------------------------|--------------------------|-----------|---------|-------|
| Voltage Range | | | | |
| +5V Supply | +4.75 | +5.0 | +5.25 | Volts |
| -5V Supply | -4.75 | -5.0 | -5.25 | Volts |
| Power Supply Rejection Ratio | — | ± 0.5 | ± 1 | mV/V |
| Quiescent Current Drain | | | | |
| +5V Analog Supply | — | +7 | +12 | mA |
| -5V Supply | — | -10 | -15 | mA |
| Power Consumption | — | 85 | 135 | mW |
| PHYSICAL/ENVIRONMENTAL | | | | |
| Operating Temp. Range, Case | | | | |
| SHM-50MC, GC | 0 to +70°C | | | |
| SHM-50ME, GE | -40 to +100°C | | | |
| SHM-50MM, GM | -55 to +125°C | | | |
| Storage Temperature Range | -65 to +150°C | | | |
| Thermal Impedance | | | | |
| θ_{jc} | 15°C/W | | | |
| θ_{ca} | 35°C/W | | | |
| Package Type | 8-pin ceramic DIP or SMT | | | |

Footnotes:

- ① Full Scale (FS) = 2V. Full Scale Range (FSR) = 4V.
- ② Sample-to-hold offset error (pedestal) is constant regardless of input/output level.

TECHNICAL NOTES

1. All ground pins should be tied together and connected to system analog ground as close to the package as possible. It is recommended to use a ground plane under the device and solder ground pins directly to it. Take care to ensure that no ground potentials can exist between ground pins. A single +5V supply can be used for both +5V Digital Supply (pin 1) and +5V Analog Supply (pin 7).
2. External 0.1 μF to 4.7 μF tantalum bypass capacitors are required in critical applications.
3. A logic 1 on $\overline{S/H}$ puts the unit in the sample mode. A logic 0 puts the unit in hold mode.
4. Gain and offset adjusting can be accomplished using the external circuitry shown in Figure 2. Adjust offset with a 0V input. Adjust gain with a $\pm FS$ input. Adjust so that the output in the hold mode matches the input.

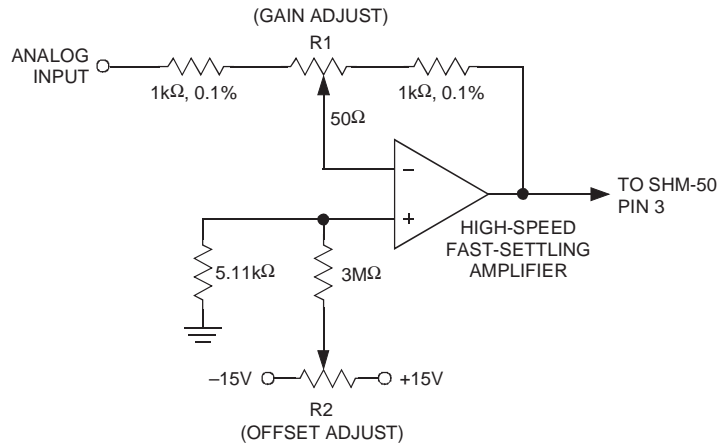


Figure 2. Offset and Gain Adjustments

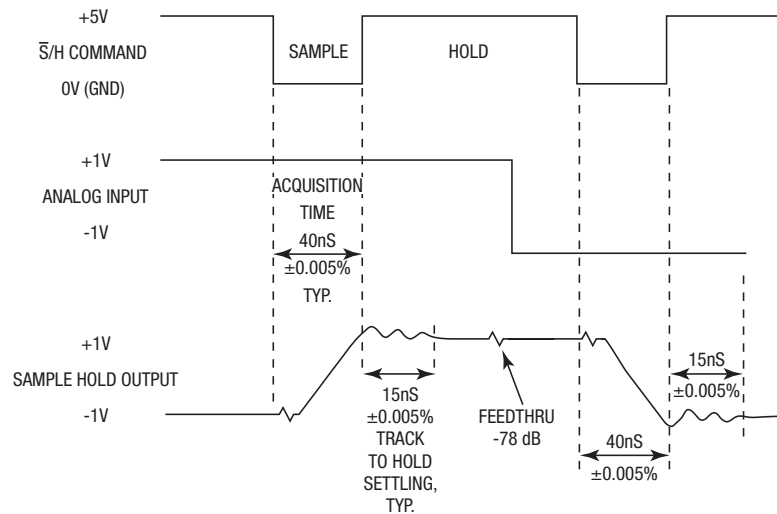


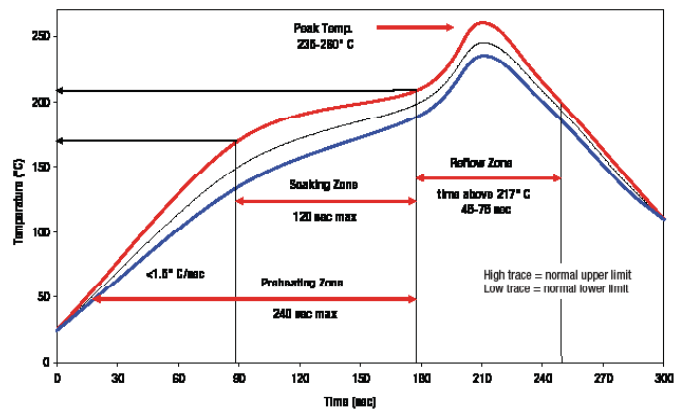
Figure 3. Timing Diagram

Soldering Guidelines

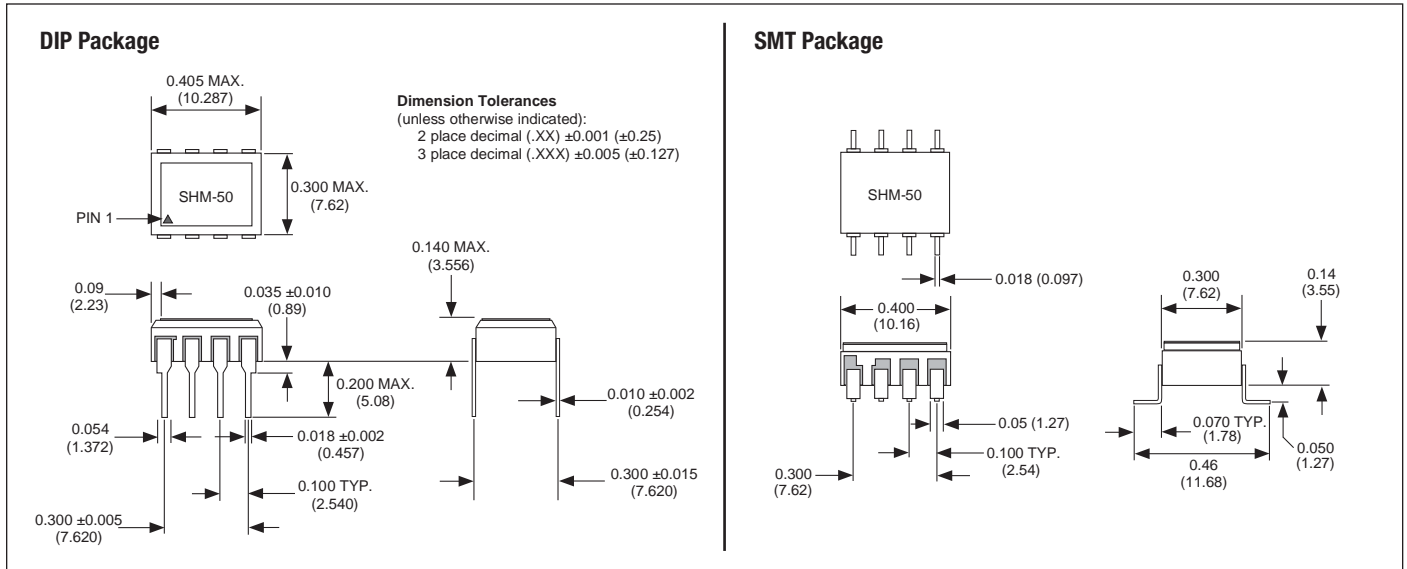
DATEL recommends the specifications below when installing these converters. These specifications vary depending on the solder type. Exceeding these specifications may cause damage to the product. Your production environment may differ therefore please thoroughly review these guidelines with your process engineers.

| REFLOW SOLDER OPERATIONS FOR SURFACE-MOUNT PRODUCTS (SMT) | |
|---|----------------------------|
| For Sn/Ag/Cu based solders: | |
| Preheat Temperature | Less than 1 °C. per second |
| Time over Liquidus | 45 to 75 seconds |
| Maximum Peak Temperature | 260 °C. |
| Cooling Rate | Less than 3 °C. per second |
| For Sn/Pb based solders: | |
| Preheat Temperature | Less than 1 °C. per second |
| Time over Liquidus | 60 to 75 seconds |
| Maximum Peak Temperature | 235 °C. |
| Cooling Rate | Less than 3 °C. per second |

Recommended Lead-free Solder Reflow Profile



MECHANICAL DIMENSIONS Inches (mm)



ISO 9001
REGISTERED

| ORDERING INFORMATION | | | |
|----------------------|-----------------------|---------|------|
| Model Number | Operating Temp. Range | Package | RoHS |
| SHM-50MC | 0 to +70°C | DIP | No |
| SHM-50ME | -40 to +100°C | DIP | No |
| SHM-50MM | -55 to +125°C | DIP | No |
| SHM-50GC | 0 to +70°C | SMT | No |
| SHM-50GE | -40 to +100°C | SMT | No |
| SHM-50GM | -55 to +125°C | SMT | No |
| SHM-50MC-C | 0 to +70°C | DIP | Yes |
| SHM-50ME-C | -40 to +100°C | DIP | Yes |
| SHM-50MM-C | -55 to +125°C | DIP | Yes |
| SHM-50GC-C | 0 to +70°C | SMT | Yes |
| SHM-50GE-C | -40 to +100°C | SMT | Yes |
| SHM-50GM-C | -55 to +125°C | SMT | Yes |

For availability of high-reliability versions of the SHM-50, contact DATEL.

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