



# CAT5110, CAT5118, CAT5119

32-Tap MiniPot™ Digitally Programmable Potentiometers  
with 2-Wire Interface

## FEATURES

- 0.3μA Ultra-low supply current
- Single-supply operation: 2.7 V to 5.5 V
- Glitchless switching between resistor taps
- Power-on reset to midscale
- 2-Wire up/down serial interface
- Resistance values: 10kΩ, 50kΩ and 100kΩ
- Available in SC70 and SOT-23 packages

## APPLICATIONS

- LCD screen adjustment
- Volume control
- Mechanical potentiometer replacement
- Gain adjustment
- Line impedance matching

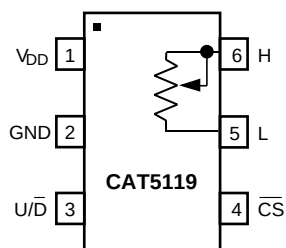
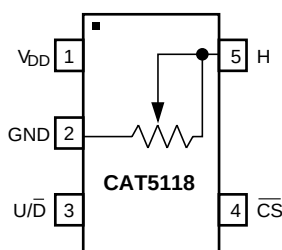
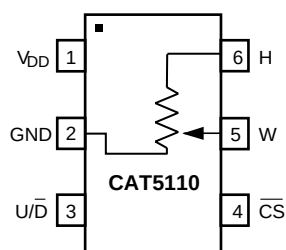
## DESCRIPTION

CAT5110/5118/5119 linear-taper digitally programmable potentiometers perform the same function as a mechanical potentiometer or a variable resistor. These devices consist of a fixed resistor and a wiper contact with 32-tap points that are digitally controlled through a 2-wire up/down serial interface.

The CAT5110 is configured as a potentiometer. The CAT5118 and CAT5119 are configured as variable resistors. See *Pin Configurations* for part functionality.

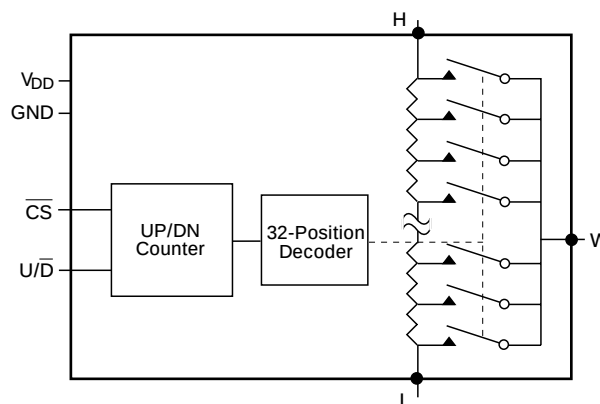
Three resistance values are available: 10kΩ, 50kΩ and 100kΩ. These are available in space-saving 5-pin and 6-pin SC70 and SOT-23 packages.

## PIN CONFIGURE



Top View

## FUNCTIONAL DIAGRAM



## PIN DESCRIPTION

| Pin Number |         |         | Pin Name          | Pin Function                                                                                                                                                       |
|------------|---------|---------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CAT5110    | CAT5118 | CAT5119 |                   |                                                                                                                                                                    |
| 1          | 1       | 1       | V <sub>DD</sub>   | Power Supply                                                                                                                                                       |
| 2          | 2       | 2       | GND               | Ground                                                                                                                                                             |
| 3          | 3       | 3       | U/ $\overline{D}$ | Up/ $\overline{\text{Down}}$ Control Input. With $\overline{CS}$ low, a low-to-high transition increments or decrements the wiper position.                        |
| 4          | 4       | 4       | $\overline{CS}$   | Chip Select Input. A high-to-low $\overline{CS}$ transition determines the mode: increment if U/ $\overline{D}$ is high, or decrement if U/ $\overline{D}$ is low. |
| -          | -       | 5       | L                 | Low Terminal of Resistor                                                                                                                                           |
| 5          | -       | -       | W                 | Wiper Terminal of Resistor                                                                                                                                         |
| 6          | 5       | 6       | H                 | High Terminal of Resistor                                                                                                                                          |

## ORDERING INFORMATION

| Ordering Part Number | Resistor K | Top Mark | Pin Package   | Parts Per Reel |
|----------------------|------------|----------|---------------|----------------|
| CAT5110SBI-10-T      | 10         | HW_      | 6 Lead SC70   | 3k             |
| CAT5110SBI-10-T10    | 10         | HW_      | 6 Lead SC70   | 10k            |
| CAT5110TPI-10-T      | 10         | HWYM     | 6 Lead SOT-23 | 3k             |
| CAT5110TPI-10-T10    | 10         | HWYM     | 6 Lead SOT-23 | 10k            |
| CAT5110SBI-50-T      | 50         | HX_      | 6 Lead SC70   | 3k             |
| CAT5110SBI-50-T10    | 50         | HX_      | 6 Lead SC70   | 10k            |
| CAT5110TPI-50-T      | 50         | HXYM     | 6 Lead SOT-23 | 3k             |
| CAT5110TPI-50-T10    | 50         | HXYM     | 6 Lead SOT-23 | 10k            |
| CAT5110SBI-00-T      | 100        | HY_      | 6 Lead SC70   | 3k             |
| CAT5110SBI-00-T10    | 100        | HY_      | 6 Lead SC70   | 10k            |
| CAT5110TPI-00-T      | 100        | HYYM     | 6 Lead SOT-23 | 3k             |
| CAT5110TPI-00-T10    | 100        | HYYM     | 6 Lead SOT-23 | 10k            |
| CAT5118SBI-10-T      | 10         | HN_      | 5 Lead SC70   | 3k             |
| CAT5118SBI-10-T10    | 10         | HN_      | 5 Lead SC70   | 10k            |
| CAT5118TPI-10-T      | 10         | HNYM     | 5 Lead SOT-23 | 3k             |
| CAT5118TPI-10-T10    | 10         | HNYM     | 5 Lead SOT-23 | 10k            |
| CAT5118SBI-50-T      | 50         | HP_      | 5 Lead SC70   | 3k             |
| CAT5118SBI-50-T10    | 50         | HP_      | 5 Lead SC70   | 10k            |
| CAT5118TPI-50-T      | 50         | HPYM     | 5 Lead SOT-23 | 3k             |
| CAT5118TPI-50-T10    | 50         | HPYM     | 5 Lead SOT-23 | 10k            |
| CAT5118SBI-00-T      | 100        | HR_      | 5 Lead SC70   | 3k             |
| CAT5118SBI-00-T10    | 100        | HR_      | 5 Lead SC70   | 10k            |
| CAT5118TPI-00-T      | 100        | HRYM     | 5 Lead SOT-23 | 3k             |
| CAT5118TPI-00-T10    | 100        | HRYM     | 5 Lead SOT-23 | 10k            |
| CAT5119SBI-10-T      | 10         | HT_      | 6 Lead SC70   | 3k             |
| CAT5119SBI-10-T10    | 10         | HT_      | 6 Lead SC70   | 10k            |
| CAT5119TPI-10-T      | 10         | HTYM     | 6 Lead SOT-23 | 3k             |
| CAT5119TPI-10-T10    | 10         | HTYM     | 6 Lead SOT-23 | 10k            |
| CAT5119SBI-50-T      | 50         | HU_      | 6 Lead SC70   | 3k             |
| CAT5119SBI-50-T10    | 50         | HU_      | 6 Lead SC70   | 10k            |
| CAT5119TPI-50-T      | 50         | HUYM     | 6 Lead SOT-23 | 3k             |
| CAT5119TPI-50-T10    | 50         | HUYM     | 6 Lead SOT-23 | 10k            |
| CAT5119SBI-00-T      | 100        | HV_      | 6 Lead SC70   | 3k             |
| CAT5119SBI-00-T10    | 100        | HV_      | 6 Lead SC70   | 10k            |
| CAT5119TPI-00-T      | 100        | HVYM     | 6 Lead SOT-23 | 3k             |
| CAT5119TPI-00-T10    | 100        | HVYM     | 6 Lead SOT-23 | 10k            |

## ORDERING INFORMATION (CON'T)

| Ordering Part Number | Resistor K | Top Mark | Pin Package         | Parts Per Reel |
|----------------------|------------|----------|---------------------|----------------|
| CAT5110SDI-10-T      | 10         | JU_      | 6 Lead SC70 green   | 3k             |
| CAT5110SDI-10-T10    | 10         | JU_      | 6 Lead SC70 green   | 10k            |
| CAT5110TBI-10-T      | 10         | JUYM     | 6 Lead SOT-23 green | 3k             |
| CAT5110TBI-10-T10    | 10         | JUYM     | 6 Lead SOT-23 green | 10k            |
| CAT5110SDI-50-T      | 50         | JV_      | 6 Lead SC70 green   | 3k             |
| CAT5110SDI-50-T10    | 50         | JV_      | 6 Lead SC70 green   | 10k            |
| CAT5110TBI-50-T      | 50         | JVYM     | 6 Lead SOT-23 green | 3k             |
| CAT5110TBI-50-T10    | 50         | JVYM     | 6 Lead SOT-23 green | 10k            |
| CAT5110SDI-00-T      | 100        | JW_      | 6 Lead SC70 green   | 3k             |
| CAT5110SDI-00-T10    | 100        | JW_      | 6 Lead SC70 green   | 10k            |
| CAT5110TBI-00-T      | 100        | JWYM     | 6 Lead SOT-23 green | 3k             |
| CAT5110TBI-00-T10    | 100        | JWYM     | 6 Lead SOT-23 green | 10k            |
| CAT5118SDI-10-T      | 10         | JL_      | 5 Lead SC70 green   | 3k             |
| CAT5118SDI-10-T10    | 10         | JL_      | 5 Lead SC70 green   | 10k            |
| CAT5118TBI-10-T      | 10         | JLYM     | 5 Lead SOT-23 green | 3k             |
| CAT5118TBI-10-T10    | 10         | JLYM     | 5 Lead SOT-23 green | 10k            |
| CAT5118SDI-50-T      | 50         | JM_      | 5 Lead SC70 green   | 3k             |
| CAT5118SDI-50-T10    | 50         | JM_      | 5 Lead SC70 green   | 10k            |
| CAT5118TBI-50-T      | 50         | JMYM     | 5 Lead SOT-23 green | 3k             |
| CAT5118TBI-50-T10    | 50         | JMYM     | 5 Lead SOT-23 green | 10k            |
| CAT5118SDI-00-T      | 100        | JN_      | 5 Lead SC70 green   | 3k             |
| CAT5118SDI-00-T10    | 100        | JN_      | 5 Lead SC70 green   | 10k            |
| CAT5118TBI-00-T      | 100        | JNYM     | 5 Lead SOT-23 green | 3k             |
| CAT5118TBI-00-T10    | 100        | JNYM     | 5 Lead SOT-23 green | 10k            |
| CAT5119SDI-10-T      | 10         | JP_      | 6 Lead SC70 green   | 3k             |
| CAT5119SDI-10-T10    | 10         | JP_      | 6 Lead SC70 green   | 10k            |
| CAT5119TBI-10-T      | 10         | JPYM     | 6 Lead SOT-23 green | 3k             |
| CAT5119TBI-10-T10    | 10         | JPYM     | 6 Lead SOT-23 green | 10k            |
| CAT5119SDI-50-T      | 50         | JR_      | 6 Lead SC70 green   | 3k             |
| CAT5119SDI-50-T10    | 50         | JR_      | 6 Lead SC70 green   | 10k            |
| CAT5119TBI-50-T      | 50         | JRYM     | 6 Lead SOT-23 green | 3k             |
| CAT5119TBI-50-T10    | 50         | JRYM     | 6 Lead SOT-23 green | 10k            |
| CAT5119SDI-00-T      | 100        | JT_      | 6 Lead SC70 green   | 3k             |
| CAT5119SDI-00-T10    | 100        | JT_      | 6 Lead SC70 green   | 10k            |
| CAT5119TBI-00-T      | 100        | JTYM     | 6 Lead SOT-23 green | 3k             |
| CAT5119TBI-00-T10    | 100        | JTYM     | 6 Lead SOT-23 green | 10k            |

## ABSOLUTE MAXIMUM RATINGS

|                                                            |                                |
|------------------------------------------------------------|--------------------------------|
| $V_{DD}$ to GND.....                                       | -0.3 V to +6 V                 |
| All Other Pins to GND .....                                | -0.3 V to ( $V_{DD} + 0.3$ ) V |
| Input and Output Latch-Up Immunity.....                    | $\pm 200$ mA                   |
| Maximum Continuous Current into H, L and W                 |                                |
| 100k $\Omega$ .....                                        | $\pm 0.6$ mA                   |
| 50k $\Omega$ .....                                         | $\pm 1.3$ mA                   |
| 10k $\Omega$ .....                                         | $\pm 1.3$ mA                   |
| Continuous Power Dissipation ( $T_A = +70^\circ\text{C}$ ) |                                |
| 5-pin SC70* .....                                          | 247 mW                         |
| 6-pin SC70* .....                                          | 245 mW                         |

|                                                     |                 |
|-----------------------------------------------------|-----------------|
| Operating Temperature Range .....                   | -40°C to +85°C  |
| Junction Temperature .....                          | +150°C          |
| Storage Temperature Range .....                     | -65°C to +150°C |
| Soldering Temperature (soldering, 10s) .....        | +300°C          |
| *(derate 3.1mW/°C above $T_A = +70^\circ\text{C}$ ) |                 |

### COMMENT

Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions outside of those listed in the operational sections of this specification is not implied. Exposure to any absolute maximum rating for extended periods may affect device performance and reliability.

## ELECTRICAL CHARACTERISTICS

( $V_{DD} = 2.7$  V to 5.5 V,  $V_H = V_{DD}$ ,  $V_L = 0$ ,  $T_A = -40^\circ\text{C}$  to  $85^\circ\text{C}$ . Typical values are at  $V_{DD} = 2.7$  V,  $T_A = 25^\circ\text{C}$ , unless otherwise noted).

| Symbol                                       | Parameter                           | Conditions                                                   | Min                 | Typ       | Max                 | Units      |
|----------------------------------------------|-------------------------------------|--------------------------------------------------------------|---------------------|-----------|---------------------|------------|
| <b>DC Performance</b>                        |                                     |                                                              |                     |           |                     |            |
|                                              | Resolution                          |                                                              | 32                  |           |                     | Taps       |
|                                              | End-to-End Resistance               | CAT5110                                                      | 80                  | 100       | 120                 | k $\Omega$ |
|                                              |                                     | CAT5118                                                      | 40                  | 50        | 60                  |            |
|                                              |                                     | CAT5119                                                      | 8                   | 10        | 12                  |            |
| $TC_R$                                       | End-to-End Resistance Tempco        |                                                              |                     | 200       |                     | ppm/° C    |
|                                              | Ratiometric Resistance Tempco       |                                                              |                     | 5         |                     | ppm/° C    |
| INL                                          | Integral Nonlinearity               |                                                              |                     | $\pm 0.5$ | $\pm 1$             | LSB        |
| DNL                                          | Differential Nonlinearity           |                                                              |                     |           | $\pm 1$             | LSB        |
|                                              | Full-Scale Error                    |                                                              |                     | $\pm 0.1$ |                     | LSB        |
|                                              | Zero-Scale Error                    |                                                              |                     |           | 1                   | LSB        |
| $R_W$                                        | Wiper Resistance                    |                                                              |                     | 200       | 600                 | $\Omega$   |
| <b>Digital Inputs</b>                        |                                     |                                                              |                     |           |                     |            |
| $V_{IH}$                                     | Input High Voltage                  |                                                              | $0.7 \times V_{DD}$ |           |                     | V          |
| $V_{IL}$                                     | Input Low Voltage                   |                                                              |                     |           | $0.3 \times V_{DD}$ | V          |
| <b>Timing Characteristics (Figures 1, 2)</b> |                                     |                                                              |                     |           |                     |            |
| $t_{CU}$                                     | $U/\overline{D}$ Mode to CS Setup   |                                                              | 25                  |           |                     | ns         |
| $t_{CI}$                                     | CS to $U/\overline{D}$ Step Setup   |                                                              | 50                  |           |                     | ns         |
| $t_{IC}$                                     | CS to $U/\overline{D}$ Step Hold    |                                                              | 25                  |           |                     | ns         |
| $t_{IL}$                                     | $U/\overline{D}$ Step Low Period    |                                                              | 25                  |           |                     | ns         |
| $t_{IH}$                                     | $U/\overline{D}$ Step High Period   |                                                              | 25                  |           |                     | ns         |
| $f_{TOGGLE}$                                 | Up/Down Toggle Rate <sup>(1)</sup>  |                                                              |                     | 1         |                     | MHz        |
| $t_{SETTLE}$                                 | Output Settling Time <sup>(2)</sup> | 100k $\Omega$ variable resistor configuration, $C_L = 10$ pF |                     | 1         |                     | $\mu$ s    |
|                                              |                                     | 100k $\Omega$ potentiometer configuration, $C_L = 10$ pF     |                     | 0.25      |                     |            |

## ELECTRICAL CHARACTERISTICS

$V_{DD} = 2.7\text{ V to }5.5\text{ V}$ ,  $V_H = V_{DD}$ ,  $V_L = 0$ ,  $T_A = -40^\circ\text{C to }85^\circ\text{C}$ . Typical values are at  $V_{DD} = 2.7\text{ V}$ ,  $T_A = 25^\circ\text{C}$ , unless otherwise noted.

| Symbol                | Parameter                             | Conditions            | Min | Typ | Max | Units         |
|-----------------------|---------------------------------------|-----------------------|-----|-----|-----|---------------|
| <b>Power Supplies</b> |                                       |                       |     |     |     |               |
| $V_{DD}$              | Supply Voltage                        |                       | 2.7 |     | 5.5 | V             |
| $I_{DD}$              | Active Supply Current <sup>(3)</sup>  |                       |     |     | 25  | $\mu\text{A}$ |
| $I_{SD}$              | Standby Supply Current <sup>(4)</sup> | $V_{DD} = +5\text{V}$ |     | 0.3 | 1   | $\mu\text{A}$ |

Notes:

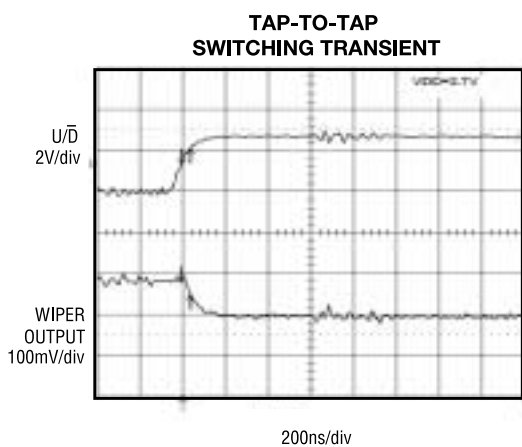
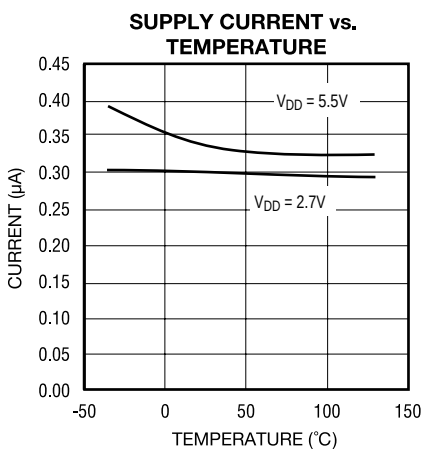
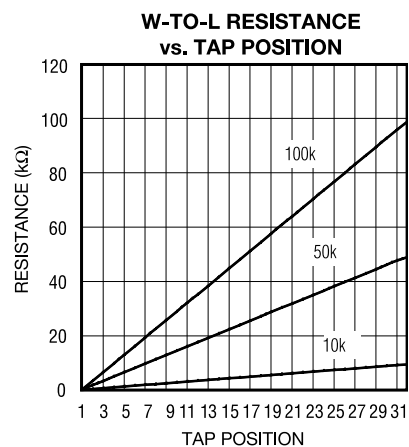
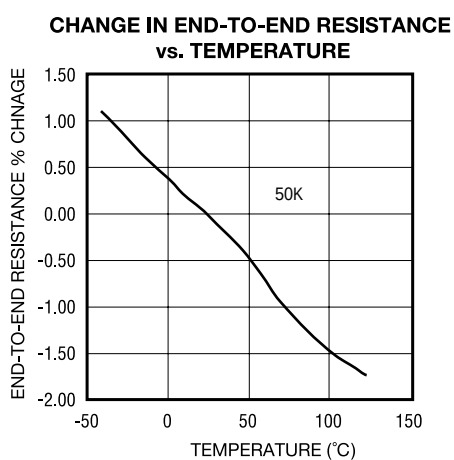
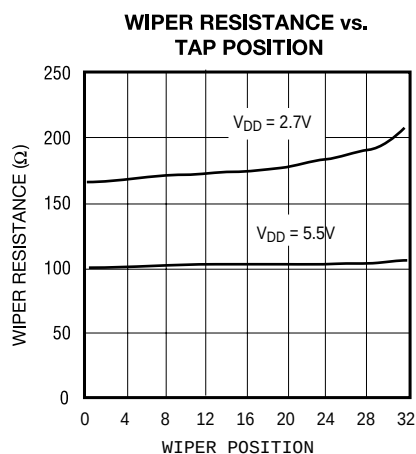
- Up/Down Toggle Rate:

$$f_{\text{TOGGLE}} = \frac{1}{t_{\text{SETTLE}}}$$

- Typical setting times are dependant on end-to-end resistance.
- Supply current taken while changing wiper tap,  $f_{\text{TOGGLE}} = 1\text{MHz}$ .
- Supply current taken while wiper position is fixed.

## TYPICAL OPERATING CHARACTERISTICS

$T_A = 25^\circ\text{C}$ , unless otherwise noted.



## FUNCTIONAL DESCRIPTION

The CAT5110/5118/5119 consist of a fixed resistor and a wiper contact with 32-tap points that are digitally controlled through a 2-wire up/down serial interface. Three end-to-end resistance values are available: 10k $\Omega$ , 50k $\Omega$  and 100k $\Omega$ .

The CAT5110 is designed to operate as a potentiometer. In this configuration, the low terminal of the resistor array is connected to ground (pin 2).

The CAT5118 performs as a variable resistor. In this device, the wiper terminal and high terminal of the resistor array is connected at pin 5. The CAT5119 is a similar variable resistor, except the low terminal is connected to pin 5.

### Digital Interface Operation

The Minipots have two modes of operation when the serial interface is active: increment and decrement mode. The serial interface is only active when  $\overline{CS}$  is low.

The  $\overline{CS}$  and  $U/\overline{D}$  inputs control the position of the wiper along the resistor array. When  $\overline{CS}$  transitions from high to low, the part will go into increment mode if  $U/\overline{D}$  input is high, and into decrement mode when  $U/\overline{D}$  input is low. Once the mode is set, the device will remain in that mode until  $\overline{CS}$  goes high again. A low-to-high transition at the  $U/\overline{D}$  pin will increment or decrement the wiper position depending on the current mode (Figures 1 and 2).

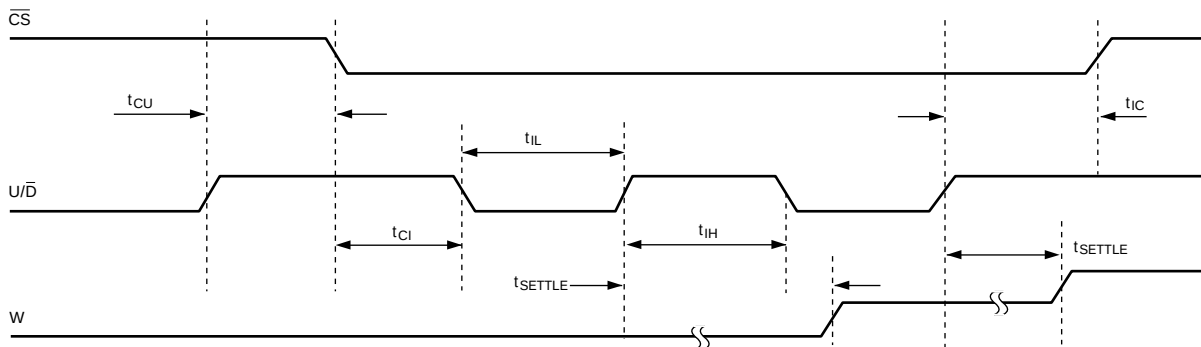
When the  $\overline{CS}$  input transitions to high (serial interface inactive), the value of the counter is stored and the wiper position is maintained.

Note that when the wiper reaches the maximum (or minimum) tap position, the wiper will not wrap around to the minimum (or maximum) position.

### Power-On Reset

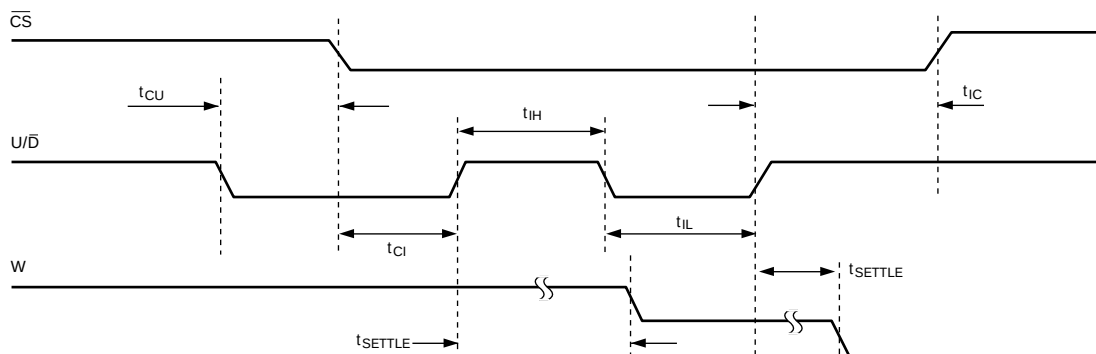
All parts in this family feature power-on reset (POR) circuitry that sets the wiper position to midscale at power-up. By default, the chip is in the increment mode.

**Figure 1. Serial Interface Timing Diagram, Increment Mode**



Note: "W" is not a digital signal. It represents wiper transitions.

**Figure 2. Serial Interface Timing Diagram, Decrement Mode**



Note: "W" is not a digital signal. It represents wiper transitions.

## APPLICATIONS INFORMATION

The Minipots are intended for circuits requiring digitally controlled adjustable resistance, such as LCD contrast control, where voltage biasing adjusts the display contrast.

### Alternative Positive LCD Bias Control

Use an op amp to provide buffering and gain on the output of the CAT5110. Connect the mechanical potentiometer to the positive input of a noninverting op amp (Figure 3) to select a portion of the input signal by digitally controlling the wiper terminal. Figure 4 shows a similar circuit for the CAT5119.

### Adjustable Gain

Figure 5 shows how to use the variable resistor to digitally adjust the gain of a noninverting op amp configuration. Connect the CAT5119 in series with a resistor to ground to form the adjustable gain control of a noninverting amplifier. The Minipots have a low 5ppm/°C ratiometric tempco that allows for a very stable adjustable gain configuration over temperature.

Figure 3. Positive LCD Bias Control

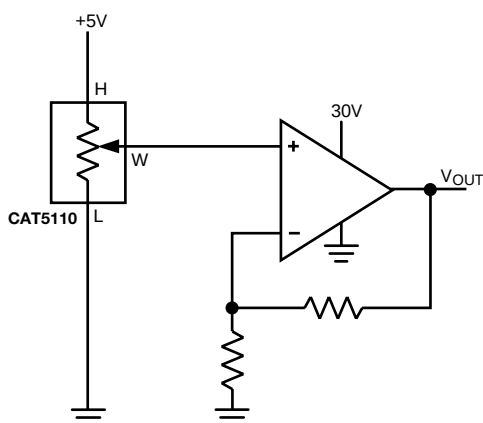


Figure 4. Positive LCD Bias Control

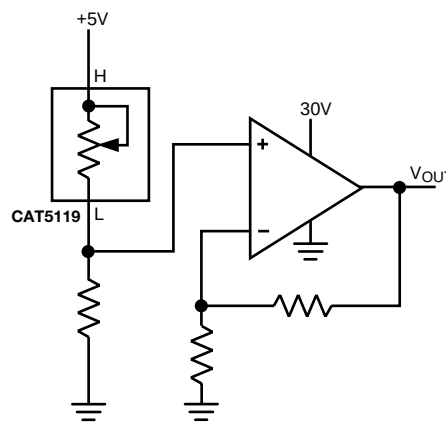


Figure 5a. Adjustable Gain Circuit

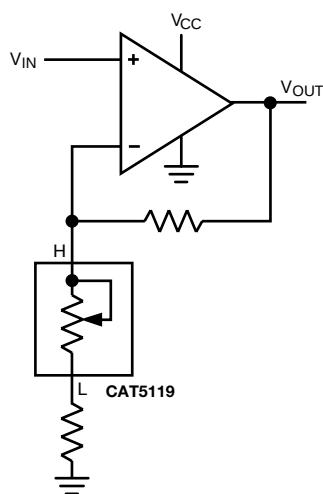
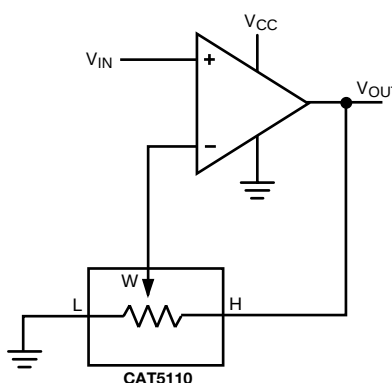
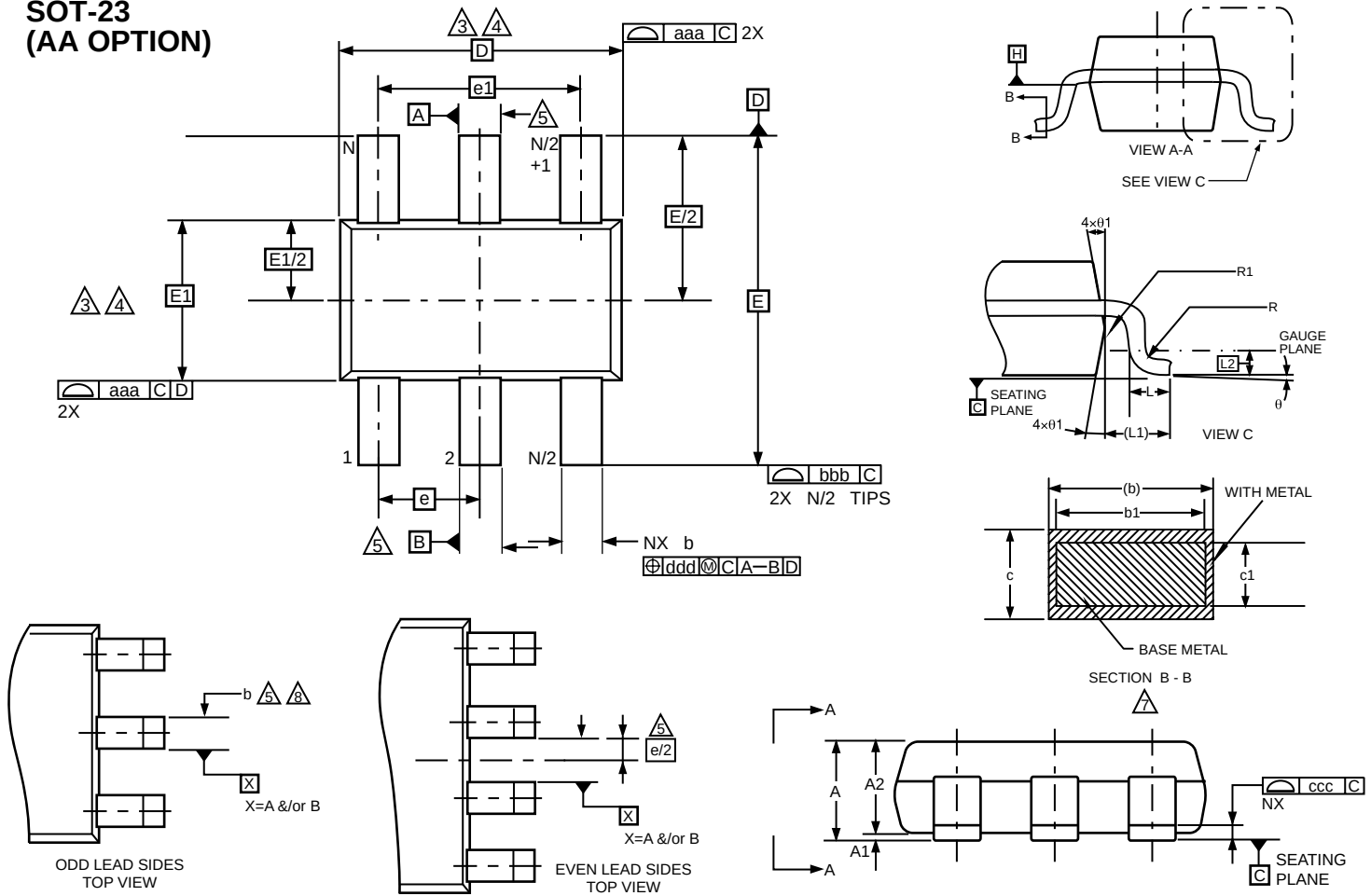


Figure 5b. Adjustable Gain Circuit







**SOT-23  
(AA OPTION)**


All Dimensions are in Millimeters

|    | Min     | Nom  | Max  | Notes |
|----|---------|------|------|-------|
| A  | —       | —    | 1.00 |       |
| A1 | 0.01    | 0.05 | 0.10 |       |
| A2 | 0.84    | 0.87 | 0.90 |       |
| c  | 0.12    | 0.15 | 0.20 | 7     |
| c1 | 0.08    | 0.13 | 0.16 | 7     |
| D  | 2.90BSC |      |      | 3,4   |
| E  | 2.80BSC |      |      | 3,4   |
| E1 | 1.60BSC |      |      | 3,4   |
| L  | 0.30    | 0.40 | 0.50 |       |
| L1 | 0.60REF |      |      |       |
| L2 | 0.25BSC |      |      |       |
| R  | 0.10    | —    | —    |       |
| R1 | 0.10    | —    | 0.25 |       |
| θ  | 0°      | 4°   | 8°   |       |
| θ1 | 4°      | 10°  | 12°  |       |

|                                 | Tolerances of Form and Position |      |      |         |      |      | Notes   |      |      |       |
|---------------------------------|---------------------------------|------|------|---------|------|------|---------|------|------|-------|
| aaa                             | 0.15                            |      |      |         |      |      | 1,2     |      |      |       |
| bbb                             | 0.25                            |      |      |         |      |      | 1,2     |      |      |       |
| ccc                             | 0.10                            |      |      |         |      |      | 1,2     |      |      |       |
| Variations                      |                                 |      |      |         |      |      |         |      |      |       |
|                                 | AA                              |      |      | 6 AB    |      |      | BA      |      |      |       |
|                                 | Min                             | Nom  | Max  | Min     | Nom  | Max  | Min     | Nom  | Max  | Notes |
| b                               | 0.30                            | —    | 0.45 | 0.30    | —    | 0.45 | 0.22    | —    | 0.36 | 7,8   |
| b1                              | 0.31                            | 0.35 | 0.39 | 0.31    | 0.35 | 0.39 | 0.22    | 0.26 | 0.30 |       |
| e                               | 0.95BSC                         |      |      | 0.95BSC |      |      | 0.65BSC |      |      |       |
| e1                              | 1.90BSC                         |      |      | 1.90BSC |      |      | 1.95BSC |      |      |       |
| N                               | 6                               |      |      | 5       |      |      | 8       |      |      |       |
| Tolerances of Form and Position |                                 |      |      |         |      |      |         |      |      |       |
| ddd                             | 0.20                            |      |      | 0.20    |      |      | 0.13    |      |      | 1,2   |

**Notes:**

- Dimensions and tolerancing per ASME Y14.5M - 1994
- Dimension are in mm.
- Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.15mm per end. Dimension E1 does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.15mm per side. D and E1 dimensions are determined at Datum H.

- The package top may be smaller than the package bottom. Dimensions D and E1 are determined at the outermost extremes of the plastic body exclusive of mold flash, the bar burrs, gate burrs and interlead flash, but including any mismatch between the top and bottom of the plastic body. D and E1 dimensions are determined at Datum H.
- Datums A & B to be determined at Datum H.
- Package variation "AB" is a 5 lead version of the 6 lead variation "AA" where lead #5 has been removed from the 6 lead "AA" variation.
- These dimensions apply to the flat section of the lead between 0.08mm and 0.15mm from the lead tip.
- Dimension "b" does not include dambar protrusion. Allowable dambar protrusion shall be 0.08mm total in excess of the "b" dimension at maximum material condition. The dambar cannot be located on the lower radius of the foot. Minimum space between protrusion and an adjacent lead shall not be less than 0.07mm.

## REVISION HISTORY

| Date      | Rev. | Reason                                                                                                                                                                    |
|-----------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3/10/2004 | A    | Initial Issue                                                                                                                                                             |
| 3/18/2004 | B    | Updated Typical Operating Characteristics<br>Updated SC70 package outline                                                                                                 |
| 7/19/2004 | C    | Added SOT-23 package in all areas<br>Updated Description<br>Updated Electrical Characteristics<br>Updated Typ Operating Characteristics<br>Updated Functional Description |

### Copyrights, Trademarks and Patents

Trademarks and registered trademarks of Catalyst Semiconductor include each of the following:

DPP™ AE<sup>2</sup>™ MiniPot™

Catalyst Semiconductor has been issued U.S. and foreign patents and has patent applications pending that protect its products. For a complete list of patents issued to Catalyst Semiconductor contact the Company's corporate office at 408.542.1000.

*CATALYST SEMICONDUCTOR MAKES NO WARRANTY, REPRESENTATION OR GUARANTEE, EXPRESS OR IMPLIED, REGARDING THE SUITABILITY OF ITS PRODUCTS FOR ANY PARTICULAR PURPOSE, NOR THAT THE USE OF ITS PRODUCTS WILL NOT INFRINGE ITS INTELLECTUAL PROPERTY RIGHTS OR THE RIGHTS OF THIRD PARTIES WITH RESPECT TO ANY PARTICULAR USE OR APPLICATION AND SPECIFICALLY DISCLAIMS ANY AND ALL LIABILITY ARISING OUT OF ANY SUCH USE OR APPLICATION, INCLUDING BUT NOT LIMITED TO, CONSEQUENTIAL OR INCIDENTAL DAMAGES.*

Catalyst Semiconductor products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Catalyst Semiconductor product could create a situation where personal injury or death may occur.

Catalyst Semiconductor reserves the right to make changes to or discontinue any product or service described herein without notice. Products with data sheets labeled "Advance Information" or "Preliminary" and other products described herein may not be in production or offered for sale.

Catalyst Semiconductor advises customers to obtain the current version of the relevant product information before placing orders. Circuit diagrams illustrate typical semiconductor applications and may not be complete.



# CATALYST

Catalyst Semiconductor, Inc.  
Corporate Headquarters  
1250 Borregas Avenue  
Sunnyvale, CA 94089  
Phone: 408.542.1000  
Fax: 408.542.1200  
www.catsemi.com

Publication #: 2120  
Revision: C  
Issue date: 7/19/04  
Type: Advance