

# MC74

## Serial Digital Temperature Sensor

The MC74 is a serial digital temperature sensor suited for low cost applications. Temperature data is converted from the integrated thermal sensing element and made available as an 8-bit serial digital word. Communication with the MC74 is accomplished via 2-wire SMBus/I<sup>2</sup>C-compatible serial port. Temperature resolution is 1°C. Conversion rate is a nominal 8 samples/sec. Power consumption is only 200  $\mu$ A (5.0  $\mu$ A Standby).

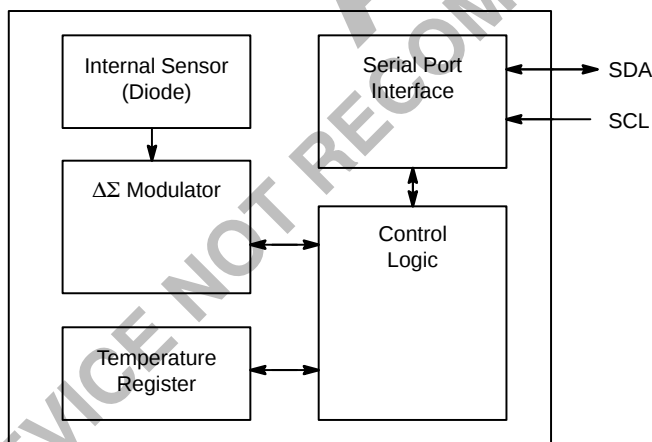
### Features

- Temperature Range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Outputs Temperature as an 8-Bit Digital Word
- Simple Serial Port Interface
- Solid State Temperature Sensing:
  - $\pm 2^{\circ}\text{C}$  Accuracy from  $+25^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
  - $\pm 3^{\circ}\text{C}$  Accuracy from  $0^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- 3.3 V and 5.5 V Operating Range
- Low Power
  - 200  $\mu$ A Operations
  - 5.0  $\mu$ A Standby Mode

### Typical Applications

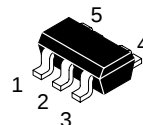
- Thermal Protection for Hard Disk Drives and Other PC Peripherals
- Low-Cost Thermostat Controls
- Power Supplies

### FUNCTIONAL BLOCK DIAGRAM

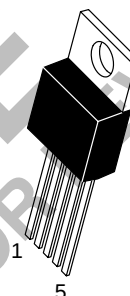


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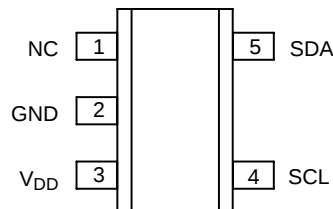


SOT-23  
SN SUFFIX  
CASE 1212



TO-220  
T SUFFIX  
CASE 314D

### PIN CONNECTIONS



(Top View)

SOT-23A\*

NOTE: \*SOT-23A is equivalent to EIAJ-SC74A

### ORDERING INFORMATION

See detailed ordering and shipping information on page 9 of this data sheet.

### DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 9 of this data sheet.

# MC74

## PIN DESCRIPTION FOR TO-220-5

| Pin No. | Symbol          | Type           | Description        |
|---------|-----------------|----------------|--------------------|
| 1       | NC              | None           | Not Connected      |
| 2       | SDA             | Bi-directional | SMBus Serial Data  |
| 3       | GND             | Power          | System Ground      |
| 4       | SCL             | Input          | SMBus Serial Clock |
| 5       | V <sub>DD</sub> | Power          | Power Supply Input |

## PIN DESCRIPTION FOR SOT-23-5

| Pin No. | Symbol          | Type           | Description        |
|---------|-----------------|----------------|--------------------|
| 1       | NC              | None           | Not Connected      |
| 2       | GND             | Power          | System Ground      |
| 3       | V <sub>DD</sub> | Power          | Power Supply Input |
| 4       | SCL             | Input          | SMBus Serial Clock |
| 5       | SDA             | Bi-directional | SMBus Serial Data  |

## PIN DESCRIPTION

### SCL

SMBus Serial Clock Input. Clocks data into and out of the MC74. See System Management Bus Specification, rev. 1.0, for timing diagrams.

### V<sub>DD</sub>

Power Supply Input. See electrical specifications.

### GND

Ground return for all MC74 functions.

### SDA

Bi-directional Input/Output. Serial data is transferred on the SMBus in both directions using this pin. See System Management Bus Specification rev. 1.0 for timing diagrams.

## ABSOLUTE MAXIMUM RATINGS\*

| Rating                      | Symbol           | Value                                    | Unit |
|-----------------------------|------------------|------------------------------------------|------|
| Power Supply Voltage        | V <sub>DD</sub>  | 6.0                                      | V    |
| Voltage on Any Pin          | —                | (GND –0.3 V) to (V <sub>DD</sub> +0.3 V) | V    |
| Operating Temperature Range | T <sub>A</sub>   | –40 to +125                              | °C   |
| Storage Temperature Range   | T <sub>stg</sub> | –65 to +150                              | °C   |
| Current on Any Pin          | —                | ±50                                      | mA   |
| Package Thermal Resistance  | R <sub>θJA</sub> | 330                                      | °C/W |

\*Maximum Ratings are those values beyond which damage to the device may occur.

\*Static-sensitive device. Unused devices must be stored in conductive material. Protect devices from static discharge and static fields. 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 above those indicated in the operational sections of the specifications is not implied. Exposure to Absolute Maximum Rating Conditions for extended periods may affect device reliability.

# MC74

## DC ELECTRICAL CHARACTERISTICS ( $V_{DD} = 3.3 \text{ V}$ or $5.0 \text{ V}$ (Note 5.), $-40^{\circ}\text{C} \leq T_A \leq 125^{\circ}\text{C}$ , unless otherwise noted.)

| Characteristic                                                                         | Symbol                  | Min | Typ | Max | Unit          |
|----------------------------------------------------------------------------------------|-------------------------|-----|-----|-----|---------------|
| <b>Power Supply</b>                                                                    |                         |     |     |     |               |
| Power-On Reset Threshold<br>( $V_{DD}$ Falling Edge or Rising Edge)                    | $V_{POR}$               | 1.2 | –   | 2.2 | V             |
| Operating Current<br>( $V_{DD} = 5.5 \text{ V}$ , Serial Port Inactive) (Note 1.)      | $I_{DD}$                | –   | 200 | 350 | $\mu\text{A}$ |
| Standby Supply Current<br>( $V_{DD} = 3.3 \text{ V}$ , Serial Port Inactive) (Note 4.) | $I_{DD\text{-}STANDBY}$ | –   | 5.0 | 10  | $\mu\text{A}$ |

## Temperature-to-Bits Converter

|                                                                                                                                                                                                          |           |                   |                     |                   |                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------------|---------------------|-------------------|--------------------|
| Temperature Accuracy MC74A<br>$+25^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$<br>$0^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$<br>$-40^{\circ}\text{C} \leq T_A \leq 0^{\circ}\text{C}$ | $T_{ERR}$ | –2.0<br>–3.0<br>– | –<br>–<br>$\pm 2.0$ | +2.0<br>+3.0<br>– | $^{\circ}\text{C}$ |
| Conversion Rate (Note 2.)                                                                                                                                                                                | CR        | 4.0               | 8.0                 | –                 | sa/sec             |

## Serial Port Interface

|                                                                                          |            |                     |        |                     |               |
|------------------------------------------------------------------------------------------|------------|---------------------|--------|---------------------|---------------|
| Logic Input High                                                                         | $V_{IH}$   | $0.8 \times V_{DD}$ | –      | –                   | V             |
| Logic Input Low                                                                          | $V_{IL}$   | –                   | –      | $0.2 \times V_{DD}$ | V             |
| SDA Output Low<br>$I_{OL} = 3 \text{ mA}$ (Note 3.)<br>$I_{OL} = 6 \text{ mA}$ (Note 3.) | $V_{OL}$   | –<br>–              | –<br>– | 0.4<br>0.6          | V             |
| Input Capacitance SDA, SCL                                                               | $C_{IN}$   | –                   | 5.0    | –                   | pF            |
| I/O Leakage                                                                              | $I_{LEAK}$ | –1.0                | 0.1    | 1.0                 | $\mu\text{A}$ |

## SERIAL PORT AC TIMING ( $V_{DD} = 3.3 \text{ V}$ or $5.0 \text{ V}$ (Note 5.), $-40^{\circ}\text{C} \leq (T_A = T_J) \leq 125^{\circ}\text{C}$ ; $C_L = 80 \text{ pF}$ unless otherwise noted.)

| Characteristic                                                                    | Symbol               | Min   | Typ | Max   | Unit            |
|-----------------------------------------------------------------------------------|----------------------|-------|-----|-------|-----------------|
| SMBus Clock Frequency                                                             | $f_{SMB}$            | 10    | –   | 100   | kHz             |
| Low Clock Period (10% to 10%)                                                     | $t_{LOW}$            | 4.7   | –   | –     | $\mu\text{sec}$ |
| High Clock Period (90% to 90%)                                                    | $t_{HIGH}$           | 4.0   | –   | –     | $\mu\text{sec}$ |
| SMBus Rise Time (10% to 90%)                                                      | $t_R$                | –     | –   | 1,000 | nsec            |
| SMBus Fall Time (90% to 10%)                                                      | $t_F$                | –     | –   | 300   | nsec            |
| Start Condition Setup Time (90% SCL to 10% SDA)<br>(for Repeated Start Condition) | $t_{SU(START)}$      | 4.0   | –   | –     | $\mu\text{sec}$ |
| Start Condition Hold Time                                                         | $t_{H(START)}$       | 4.0   | –   | –     | $\mu\text{sec}$ |
| Data in Setup Time                                                                | $t_{SU\text{-}DATA}$ | 1,000 | –   | –     | nsec            |
| Data in Hold Time                                                                 | $t_{H\text{-}DATA}$  | 1,250 | –   | –     | nsec            |
| Stop Condition Setup Time                                                         | $t_{SU(STOP)}$       | 4.0   | –   | –     | $\mu\text{sec}$ |
| Bus Free Time Prior to New Transition                                             | $t_{IDLE}$           | 4.7   | –   | –     | $\mu\text{sec}$ |
| Power-On Reset Delay ( $V_{DD} \geq V_{POR}$ (Rising Edge))                       | $t_{POR}$            | –     | 500 | –     | $\mu\text{sec}$ |

- Operating current is an average value integrated over multiple conversion cycles. Transient current may exceed this specification.
- Maximum guaranteed conversion time after Power-On RESET (POR to DATA\_RDY) is 250 msec.
- Output current should be minimized for best temperature accuracy. Power dissipation within the MC74 will cause self-heating and temperature drift error.
- SDA and SCL must be connected to  $V_{DD}$  or GND.
- $V_{DD} = 3.3 \text{ V}$  for MC74–33SNTR.  $V_{DD} = 5.0 \text{ V}$  for MC74–50T. All part types of the MC74 will operate properly over the wider power supply range of 2.7 V to 5.5 V. Each part type is tested and specified for rated accuracy at its nominal supply voltage. As  $V_{DD}$  varies from the nominal value, accuracy will degrade  $1^{\circ}\text{C/V}$  of  $V_{DD}$  change.

## DETAILED OPERATING DESCRIPTION

The MC74 acquires and converts temperature information from its integrated solid state sensor with a basic accuracy of  $\pm 1^{\circ}\text{C}$ . It stores the data in an internal register which is read through the serial port. The system interface is a slave SMBus. The temperature data can be read at any time through the SMBus port. Eight SMBus addresses are programmable for the MC74, which allows for a multi-sensor configuration. Also, there is low-power Standby mode where temperature acquisition is suspended.

**Standby Mode**

The MC74 allows the host to put it into a low power ( $I_{DD} = 5.0 \mu\text{A}$ , typical) Standby mode. In this mode, the A/D converter is halted and the temperature data registers are frozen. The SMBus port operates normally. Standby mode is enabled by setting the SHDN bit in the CONFIG register. The table below summarizes this operation.

**Standby Mode Operation**

| SHDN Bit | Operating Mode |
|----------|----------------|
| 0        | Normal         |
| 1        | Standby        |

**SMBus Slave Address**

The MC74 is internally programmed to have a default SMBus address value of 1001 101b. Seven other addresses are available by custom order (contact factory).

**SERIAL PORT OPERATION**

The Serial Clock input (SCL) and bi-directional data port (SDA) form a 2-wire bi-directional serial port for programming and interrogating the MC74. The following conventions are used in this bus architecture:

**MC74 Serial Bus Conventions**

| Term        | Explanation                                                                                                                                                                                                             |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transmitter | The device sending data to the bus.                                                                                                                                                                                     |
| Receiver    | The device receiving data from the bus.                                                                                                                                                                                 |
| Master      | The device which controls the bus: initiating transfers (START), generating the clock, and terminating transfers (STOP).                                                                                                |
| Slave       | The device addressed by the master.                                                                                                                                                                                     |
| Start       | A unique condition signaling the beginning of a transfer indicated by SDA falling (High-Low) while SCL is high.                                                                                                         |
| Stop        | A unique condition signaling the end of a transfer indicated by SDA rising (Low-High) while SCL is high.                                                                                                                |
| ACK         | A receiver acknowledges the receipt of each byte with this unique condition. The receiver drives SDA low during SCL high of the ACK clock-pulse. The Master provides the clock pulse for the ACK cycle.                 |
| Busy        | Communication is not possible because the bus is in use.                                                                                                                                                                |
| NOT Busy    | When the bus is idle, both SDA and SCL will remain high.                                                                                                                                                                |
| Data Valid  | The state of SDA must remain stable during the High period of SCL in order for a data bit to be considered valid. SDA only changes state while SCL is low during normal data transfers (see Start and Stop conditions). |

All transfers take place under control of a host, usually a CPU or microcontroller, acting as the Master which provides the clock signal for all transfers. The MC74 *always* operates as a Slave. The serial protocol is illustrated in Figure 1. All data transfers have two phases; all bytes are transferred MSB first. Accesses are initiated by a start condition (START), followed by a device address byte and one or more data bytes. The device address byte includes a Read/Write selection bit. Each access must be terminated by a Stop Condition (STOP). A convention called *Acknowledge* (ACK) confirms receipt of each byte. Note that SDA can change only during periods when SCL is LOW (SDA changes while SCL is HIGH are reserved for Start and Stop Conditions).

## MC74

### Write Byte Format

| S             | ADDRESS | WR | ACK | COMMAND                                                  | ACK | DATA                                                            | ACK | P |
|---------------|---------|----|-----|----------------------------------------------------------|-----|-----------------------------------------------------------------|-----|---|
|               | 7 Bits  |    |     | 8 Bits                                                   |     | 8 Bits                                                          |     |   |
| Slave Address |         |    |     | Command Byte: selects which register you are writing to. |     | Data Byte: data goes into the register set by the command byte. |     |   |

### Read Byte Format

| S             | ADDRESS | WR | ACK | COMMAND                                                    | ACK | S                                                             | ADDRESS | RD | ACK | DATA                                                        | NACK | P |
|---------------|---------|----|-----|------------------------------------------------------------|-----|---------------------------------------------------------------|---------|----|-----|-------------------------------------------------------------|------|---|
|               | 7 Bits  |    |     | 8 Bits                                                     |     |                                                               | 7 Bits  |    |     | 8 Bits                                                      |      |   |
| Slave Address |         |    |     | Command Byte: selects which register you are reading from. |     | Slave Address: repeated due to change in data-flow direction. |         |    |     | Data Byte: reads from the register set by the command byte. |      |   |

### Receive Byte Format

| S                                                                                                   | ADDRESS | RD | ACK | DATA   | NACK | P |
|-----------------------------------------------------------------------------------------------------|---------|----|-----|--------|------|---|
|                                                                                                     | 7 Bits  |    |     | 8 Bits |      |   |
| Data Byte: reads data from the register commanded by the last Read Byte or Write Byte transmission. |         |    |     |        |      |   |

S = Start Condition  
P = Stop Condition  
Shaded = Slave Transmission

Figure 1. SMBus Protocols

### Start Condition (START)

The MC74 continuously monitors the SDA and SCL lines for a start condition (a HIGH to LOW transition of SDA while SCL is HIGH) and will not respond until this condition is met.

### Address Byte

Immediately following the Start Condition, the host must transmit the address byte to the MC74. The states of A1 and A0 determine the 7-bit SMBus address for the MC74. The 7-bit address transmitted in the serial bit stream must match for the MC74 to respond with an Acknowledge (indicating the MC74 is on the bus and ready to accept data). The eighth bit in the Address Byte is a Read-Write Bit. This bit is a 1 for a read operation or 0 for a write operation. During the first phase of any transfer this bit will be set = 0 to indicate that the command byte is being written.

### Acknowledge (ACK)

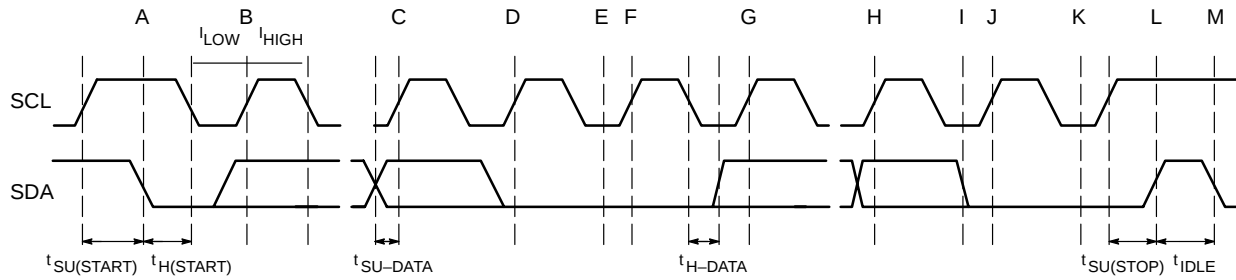
Acknowledge (ACK) provides a positive handshake between the host and the MC74. The host releases SDA after transmitting eight bits, then generates a ninth clock cycle to allow the MC74 to pull the SDA line LOW to acknowledge that it successfully received the previous eight bits of data or address.

### Data Byte

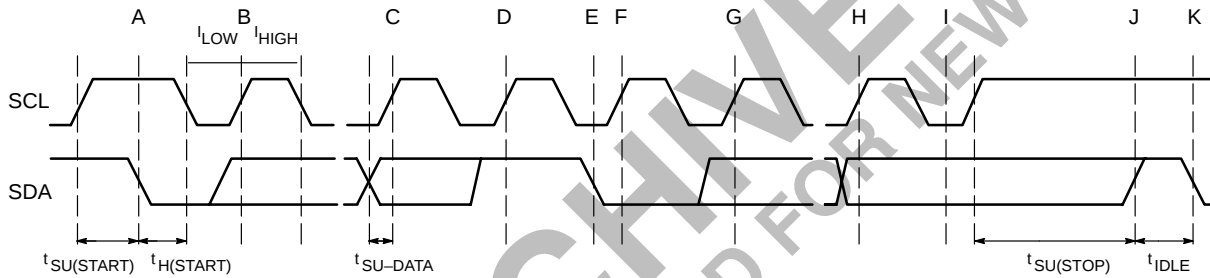
After a successful ACK of the address byte, the host must transmit the data byte to be written or clock out the data to be read. (See the appropriate timing diagrams. ) ACK will be generated after a successful write of a data byte into the MC74.

### Stop Condition (STOP)

Communications must be terminated by a stop condition (a LOW to HIGH transition of SDA while SCL is HIGH). The Stop Condition must be communicated by the transmitter to the MC74. NOTE: Refer to Timing Diagrams for serial bus timing (Figure 2).

**SMBUS Write Timing Diagram**

A = Start Condition  
 B = MSB of Address Clocked into Slave  
 C = LSB of Address Clocked into Slave  
 D = R/W Bit Clocked into Slave  
 E = Slave Pulls SDA Line Low  
 F = Acknowledge Bit Clocked into Master  
 G = MSB of Data Clocked into Slave  
 H = LSB of Data Clocked into Slave  
 I = Slave Pulls SDA Line Low  
 J = Acknowledge Clocked into Master  
 K = Acknowledge Clock Pulse  
 L = Stop Condition, Data Executed by Slave  
 M = New Start Condition

**SMBUS Read Timing Diagram**

A = Start Condition  
 B = MSB of Address Clocked into Slave  
 C = LSB of Address Clocked into Slave  
 D = R/W Bit Clocked into Slave  
 E = Slave Pulls SDA Line Low  
 F = Acknowledge Bit Clocked into Master  
 G = MSB of Data Clocked into Master  
 H = LSB of Data Clocked into Master  
 I = Acknowledge Clock Pulse  
 J = Stop Condition  
 K = New Start Condition

**Figure 2. Timing Diagrams**

## REGISTER SET and PROGRAMMER'S MODEL

MC74 Command Set  
(SMBus READ\_BYTE and WRITE\_BYTE)

## Command Byte Description

| Command | Code | Function                          |
|---------|------|-----------------------------------|
| RTR     | 00h  | Read Temperature (TEMP)           |
| RWCR    | 01h  | Read/Write Configuration (CONFIG) |

Configuration Register (CONFIG), 8-BITS,  
READ/WRITE

## Configuration Register (Config)

| D[7] | D[6]     | D[5]     | D[4] | D[3] | D[2] | D[1] | D[0] |
|------|----------|----------|------|------|------|------|------|
| SHDN | Data Rdy | Reserved |      |      |      |      |      |

| Bit       | POR | Function                                  | Type       | Operation                |
|-----------|-----|-------------------------------------------|------------|--------------------------|
| D[7]      | 0   | STANDBY switch                            | Read/Write | 1 = stand-by, 0 = normal |
| D[6]      | 0   | Data Ready*                               | Read Only  | 1 = ready, 0 = not ready |
| D[5]–D[0] | 0   | Reserved – Always returns zero when read. | N/A        | N/A                      |

\*DATA\_RDY bit reset at power-up and SHDN enable (see below).

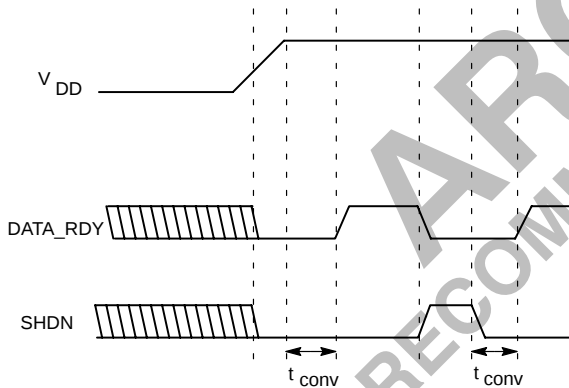


Figure 3. DATA\_RDY, SHDN Operation Logic Diagram

Temperature Register (TEMP), 8-Bits,  
READ-ONLY

The binary value (2's complement format) in this register represents temperature of the integrated sensor following a conversion cycle. The registers are automatically updated in an alternating manner.

## Temperature Register (TEMP)

| D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |
|------|------|------|------|------|------|------|------|
| MSB  | x    | x    | x    | x    | x    | x    | LSB  |

In the temperature data registers, each unit value represents one degree (Celsius). The value is in 2's-complement binary format such that a reading of 0000 0000b corresponds to 0°C. Examples of this temperature to binary value relationship are shown in the following table.

## Temperature-to-Digital Value Conversion (TEMP)

| ACTUAL TEMPERATURE | REGISTERED TEMPERATURE | BINARY HEX |
|--------------------|------------------------|------------|
| +130.00°C          | +127°C                 | 0111 1111  |
| +127.00°C          | +127°C                 | 0111 1111  |
| +126.50°C          | +127°C                 | 0111 1111  |
| +25.25°C           | +25°C                  | 0001 1001  |
| +0.50°C            | +1°C                   | 0000 0001  |
| +0.25°C            | 0°C                    | 0000 0000  |
| 0.00°C             | 0°C                    | 0000 0000  |
| -0.25°C            | 0°C                    | 0000 0000  |
| -0.50°C            | 0°C                    | 0000 0000  |
| -0.75°C            | -1°C                   | 1111 1111  |
| -1.00°C            | -1°C                   | 1111 1111  |
| -25.00°C           | -25°C                  | 1110 0111  |
| -25.25°C           | -25°C                  | 1110 0110  |
| -54.75°C           | -55°C                  | 1100 1001  |
| -55.00°C           | -55°C                  | 1100 1001  |
| -65.00°C           | -65°C                  | 1011 1111  |

## Register Set Summary

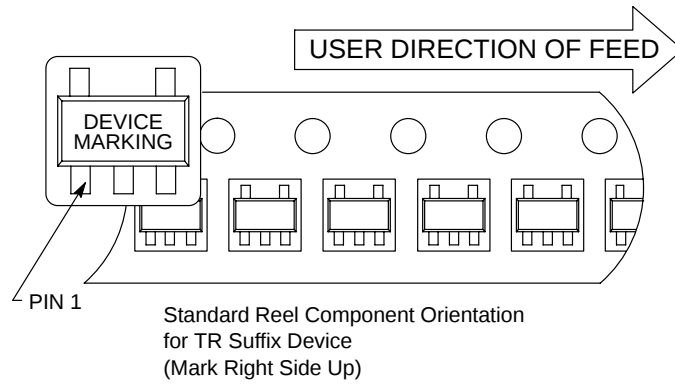
The MC74's register set is summarized below. All registers are 8-bits wide.

| Name   | Description                                  | POR State   | Read | Write |
|--------|----------------------------------------------|-------------|------|-------|
| TEMP   | Internal sensor temperature (2's complement) | 0000 0000b* | ✓    |       |
| CONFIG | CONFIG register                              | 0000 0000b  | ✓    | ✓     |

\*NOTE: The TEMP register immediately will be updated by the A/D converter after the DATA\_RDY bit goes high.

## TAPING FORM

## Component Taping Orientation for 5L SOT-23 Devices



Tape &amp; Reel Specifications Table

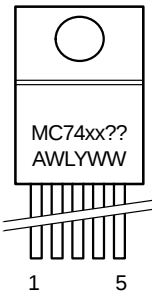
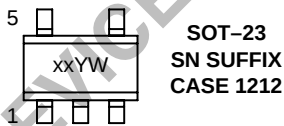
| Package    | Tape Width (W) | Pitch (P) | Part Per Full Reel | Diameter |
|------------|----------------|-----------|--------------------|----------|
| 5L SOT-23A | 8 mm           | 4 mm      | 3000               | 7 inches |

# MC74

## ORDERING INFORMATION AND DEVICE MARKINGS

| Device          | Marking (xx) | Package   | Voltage               | Address  | Shipping                 |
|-----------------|--------------|-----------|-----------------------|----------|--------------------------|
| MC74A0-3.3SNTR  | V0           | SOT-23A-5 | 3.3 V V <sub>DD</sub> | 1001 000 | 3000 Units / Tape & Reel |
| MC74A1-3.3SNTR  | V1           |           |                       | 1001 001 |                          |
| MC74A2-3.3SNTR  | V2           |           |                       | 1001 010 |                          |
| MC74A3-3.3SNTR  | V3           |           |                       | 1001 011 |                          |
| MC74A4-3.3SNTR  | V4           |           |                       | 1001 100 |                          |
| MC74A5-3.3SNTR* | V5           |           |                       | 1001 101 |                          |
| MC74A6-3.3SNTR  | V6           |           |                       | 1001 110 |                          |
| MC74A7-3.3SNTR  | V7           |           |                       | 1001 111 |                          |
| MC74A0-5.0SNTR  | U0           | SOT-23A-5 | 5.0 V V <sub>DD</sub> | 1001 000 | 3000 Units / Tape & Reel |
| MC74A1-5.0SNTR  | U1           |           |                       | 1001 001 |                          |
| MC74A2-5.0SNTR  | U2           |           |                       | 1001 010 |                          |
| MC74A3-5.0SNTR  | U3           |           |                       | 1001 011 |                          |
| MC74A4-5.0SNTR  | U4           |           |                       | 1001 100 |                          |
| MC74A5-5.0SNTR* | U5           |           |                       | 1001 101 |                          |
| MC74A6-5.0SNTR  | U6           |           |                       | 1001 110 |                          |
| MC74A7-5.0SNTR  | U7           |           |                       | 1001 111 |                          |
| MC74A0-3.3T     | V0           | TO-220-5  | 3.3 V V <sub>DD</sub> | 1001 000 | 3000 Units / Tape & Reel |
| MC74A1-3.3T     | V1           |           |                       | 1001 001 |                          |
| MC74A2-3.3T     | V2           |           |                       | 1001 010 |                          |
| MC74A3-3.3T     | V3           |           |                       | 1001 011 |                          |
| MC74A4-3.3T     | V4           |           |                       | 1001 100 |                          |
| MC74A5-3.3T     | V5           |           |                       | 1001 101 |                          |
| MC74A6-3.3T     | V6           |           |                       | 1001 110 |                          |
| MC74A7-3.3T     | V7           |           |                       | 1001 111 |                          |
| MC74A0-5.0T     | U0           | TO-220-5  | 5.0 V V <sub>DD</sub> | 1001 000 | 3000 Units / Tape & Reel |
| MC74A1-5.0T     | U1           |           |                       | 1001 001 |                          |
| MC74A2-5.0T     | U2           |           |                       | 1001 010 |                          |
| MC74A3-5.0T     | U3           |           |                       | 1001 011 |                          |
| MC74A4-5.0T     | U4           |           |                       | 1001 100 |                          |
| MC74A5-5.0T*    | U5           |           |                       | 1001 101 |                          |
| MC74A6-5.0T     | U6           |           |                       | 1001 110 |                          |
| MC74A7-5.0T     | U7           |           |                       | 1001 111 |                          |

\*Default voltages and addresses. Contact your ON Semiconductor sales representative for other voltage and address options.

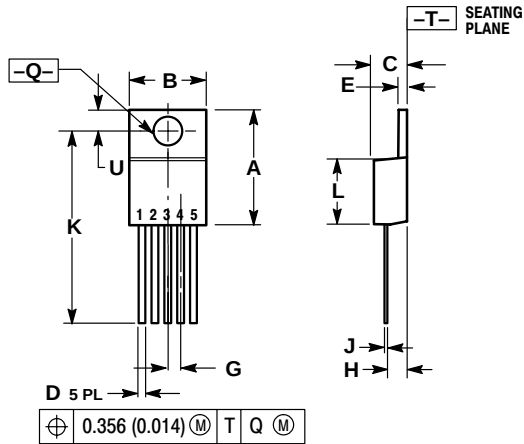


xx = Specific Device Code  
A = Assembly Location  
WL, L = Wafer Lot  
Y = Year  
WW = Work Week

# MC74

## PACKAGE DIMENSIONS

TO-220  
T SUFFIX  
CASE 314D-04  
ISSUE E

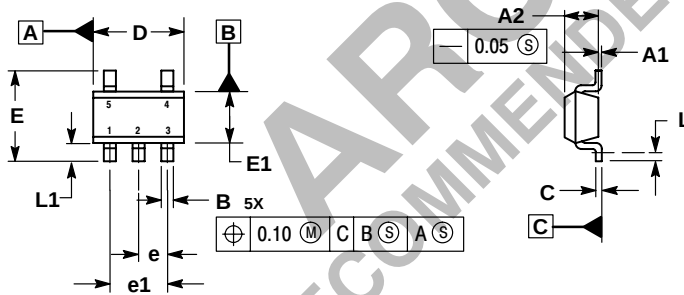


### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION D DOES NOT INCLUDE INTERCONNECT BAR (DAMBAR) PROTRUSION. DIMENSION D INCLUDING PROTRUSION SHALL NOT EXCEED 10.92 (0.043) MAXIMUM.

| DIM | INCHES    |       | MILLIMETERS |        |
|-----|-----------|-------|-------------|--------|
|     | MIN       | MAX   | MIN         | MAX    |
| A   | 0.572     | 0.613 | 14.529      | 15.570 |
| B   | 0.390     | 0.415 | 9.906       | 10.541 |
| C   | 0.170     | 0.180 | 4.318       | 4.572  |
| D   | 0.025     | 0.038 | 0.635       | 0.965  |
| E   | 0.048     | 0.055 | 1.219       | 1.397  |
| G   | 0.067 BSC |       | 1.702 BSC   |        |
| H   | 0.087     | 0.112 | 2.210       | 2.845  |
| J   | 0.015     | 0.025 | 0.381       | 0.635  |
| K   | 0.990     | 1.045 | 25.146      | 26.543 |
| L   | 0.320     | 0.365 | 8.128       | 9.271  |
| Q   | 0.140     | 0.153 | 3.556       | 3.886  |
| U   | 0.105     | 0.117 | 2.667       | 2.972  |

SOT-23  
SN SUFFIX  
CASE 1212-01  
ISSUE O



### NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DATUM C IS A SEATING PLANE.

| DIM | MILLIMETERS |      |
|-----|-------------|------|
|     | MIN         | MAX  |
| A1  | 0.00        | 0.10 |
| A2  | 1.00        | 1.30 |
| B   | 0.30        | 0.50 |
| C   | 0.10        | 0.25 |
| D   | 2.80        | 3.00 |
| E   | 2.50        | 3.10 |
| E1  | 1.50        | 1.80 |
| e   | 0.95 BSC    |      |
| e1  | 1.90 BSC    |      |
| L   | 0.20        | ---  |
| L1  | 0.45        | 0.75 |

## Notes

**ARCHIVE**  
DEVICE NOT RECOMMENDED FOR NEW DESIGN

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