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# 12-Bit + Sign Temperature Sensor with **SPI-Compatible Serial Interface**

### **General Description**

The MAX6662 is a 12-bit + sign temperature sensor combined with a programmable overtemperature alarm and a 3-wire (SPITM-compatible) serial interface in a single package. It converts its die temperature into digital values using an internal analog-to-digital converter (ADC). The temperature data is stored in a temperature register as a 13-bit word, which allows 0.0625°C resolution. The temperature data is readable at any time through the serial interface. The operating temperature range is -55°C to +150°C.

The MAX6662 provides two programmable watchdog interrupt outputs. ALERT is used for lower temperature warning functions, while OT is used for higher temperature-critical functions, such as power-supply shutdown. The MAX6662 features a shutdown mode that saves power by disabling everything except the serial interface. The temperature sensor is available in an 8-pin SO package.

#### **Features**

- ♦ 12-Bit + Sign, 0.0625°C Resolution
- **♦** Accuracy
  - ±1°C max (+30°C to +50°C) ±1.6°C max (0°C to +70°C)
  - ±2.5°C max (-20°C to +85°C)
  - ±2.5 typ (+150°C)
- **♦** Extended Temperature Measurement Range -55°C to +150°C
- **♦** Low Average Supply Current, 125µA (typ)
- **♦** Shutdown Mode to Minimize Power Consumption in Portable Applications
- **♦** Two Programmable Temperature Fault Outputs
- **♦** Switchable Fault Queue to Eliminate False **Tripping in Noisy Environments**

## **Applications**

**HVAC** 

Refrigeration

Automotive

Test Equipment

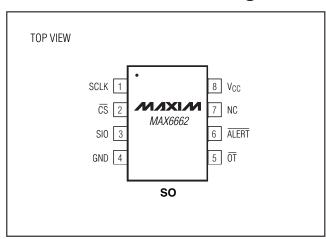
### **Ordering Information**

| PART       | TEMP. RANGE     | PIN-PACKAGE |
|------------|-----------------|-------------|
| MAX6662MSA | -55°C to +150°C | 8 SO        |

# Typical Operating Circuit

# $V_{CC} = +3V TO +5.5V$ 0.1µF $10k\Omega$ 10kΩ ŌΤ ALERT MIXIM SOURCES SIO MAX6662 **SCLK** CS

### **Pin Configuration**



SPI is a trademark of Motorola, Inc.

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#### **ABSOLUTE MAXIMUM RATINGS**

| All Voltages Are Referenced to GND         VCC       -0.3V to +6V         ALERT, OT       -0.3V to +6V         SIO, SCLK, CS       -0.3V to (V <sub>CC</sub> + 0.3V)         SIO Current       -10mA to +50mA | Continuous Power Dissipation (T <sub>A</sub> = +70°C)  8-Pin SO (derate 5.9mW/°C above +70°C) |
|---|---|
| Continuous Current into Any Pin (except NC)10mA   | Lead Temperature (soldering, 10s)+300°C   |

Note 1: The MAX6662 is not recommended to operate above +125°C for an extended period of time.

Stresses beyond 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 beyond 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.

#### **ELECTRICAL CHARACTERISTICS**

 $(V_{CC} = +3V \text{ to } +5.5V, T_A = -55^{\circ}\text{C} \text{ to } +125^{\circ}\text{C}, \text{ unless otherwise noted.}$  Typical values are at  $T_A = +25^{\circ}\text{C}$  and  $V_{CC} = +3.3V.$ )

| PARAMETER SYMBOL                                 |                   | CONDITIONS   | MIN                    | TYP    | MAX  | UNITS |  |  |  |  |
|--|-------------------|--|------------------------|--------|------|-------|--|--|--|--|
| TEMPERATURE TO DIGITAL-CONVERTER CHARACTERISTICS |                   |  |                        |        |      |       |  |  |  |  |
|  |                   | +30°C ≤ T <sub>A</sub> ≤ +50°C, V <sub>CC</sub> = +3.3V  | -1.0                   | ±0.4   | +1.0 |       |  |  |  |  |
|  |                   | 0°C ≤ T <sub>A</sub> ≤ +70°C, V <sub>CC</sub> = +3.3V  | -1.6                   | ±0.7   | +1.6 |       |  |  |  |  |
| A a a  |                   | -20°C ≤ T <sub>A</sub> ≤ +85°C, V <sub>CC</sub> = +3.3V  | -2.5                   | ±1.0   | +2.5 | °C    |  |  |  |  |
| Accuracy   |                   | $-40^{\circ}\text{C} \le \text{T}_{A} \le +100^{\circ}\text{C}, \text{ V}_{CC} = +3.3\text{V}$ | -3.0                   | ±1.2   | +3.0 |       |  |  |  |  |
|  |                   | $-55^{\circ}\text{C} \le \text{T}_{A} \le +125^{\circ}\text{C}, \text{V}_{CC} = +3.3\text{V}$  | -4.0                   | ±1.5   | +4.0 |       |  |  |  |  |
|  |                   | $T_A \le +150^{\circ}C$ , $V_{CC} = +3.3V$   |                        | ±2.5   |      |       |  |  |  |  |
| Power-Supply Rejection Ratio                     | PSRR              |  |                        | 0.2    | 0.5  | °C/V  |  |  |  |  |
| Resolution                                       |                   |  |                        | 0.0625 |      | °C    |  |  |  |  |
| Supply Voltage Range                             | Vcc               |  | 3.0                    |        | 5.5  | V     |  |  |  |  |
| Average Operating Current                        |                   | $V_{CC} = +5.5V$   |                        | 150    |      |       |  |  |  |  |
| Average Operating Current                        |                   | $V_{CC} = +3.0V$   |                        | 125    |      | μA    |  |  |  |  |
|  |                   | V <sub>CC</sub> = +5.5V  |                        | 300    | 600  |       |  |  |  |  |
| Peak Operating Current (Note 2)                  |                   | V <sub>CC</sub> = +3.0V  |                        | 300    | 500  | μA    |  |  |  |  |
|  |                   | V <sub>CC</sub> = +5.5V  |                        | 8      | 22   |       |  |  |  |  |
| Shutdown Supply Current                          |                   | V <sub>CC</sub> = +3.0V  |                        | 4      | 15   | μA    |  |  |  |  |
| Power-On-Reset Threshold                         | V <sub>POR</sub>  |  |                        | 2.0    | 2.5  | V     |  |  |  |  |
| Power-On-Reset Threshold<br>Hysteresis           |                   |  |                        | 90     |      | mV    |  |  |  |  |
| Conversion Time                                  | tconv             |  |                        | 0.25   |      | S     |  |  |  |  |
| Temperature Update Frequency                     |                   |  |                        | 2      |      | Hz    |  |  |  |  |
| SERIAL INTERFACE (SIO, SCLK                      | CS, ALER          | <u>r, ot</u> )   | •                      |        |      |       |  |  |  |  |
| Input Low Voltage                                | VIL               |  |                        |        | 0.8  | V     |  |  |  |  |
| Input High Voltage                               | VIH               |  | 0.7 V <sub>CC</sub>    |        |      | V     |  |  |  |  |
| Input/Output Leakage Current                     | I <sub>LEAK</sub> | V <sub>IN</sub> = GND or V <sub>CC</sub>   | -5                     |        | +5   | μΑ    |  |  |  |  |
| Input Capacitance                                | Cin               |  |                        | 5      |      | рF    |  |  |  |  |
| Output Low Sink Current                          | loL               | ALERT, OT, V <sub>OL</sub> = 0.6V  | 3                      |        |      | mA    |  |  |  |  |
| Output High Voltage                              | VoH               | I <sub>SIO</sub> = 1.6mA source  | V <sub>C</sub> C - 0.4 |        |      | V     |  |  |  |  |
| Output Low Voltage                               | V <sub>OL</sub>   | I <sub>SIO</sub> = 1.6mA sink  |                        |        | 0.4  | V     |  |  |  |  |

## **ELECTRICAL CHARACTERISTICS (continued)**

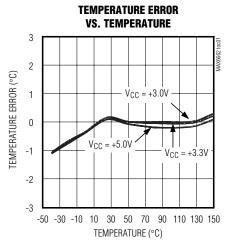
 $(V_{CC} = +3V \text{ to } +5.5V, T_A = -55^{\circ}C \text{ to } +125^{\circ}C, \text{ unless otherwise noted.}$  Typical values are at  $T_A = +25^{\circ}C$  and  $V_{CC} = +3.3V$ .)

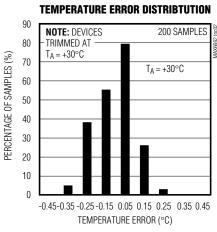
| PARAMETER                      | SYMBOL | CONDITIONS                | MIN | TYP | MAX | UNITS |
|--------------------------------|--------|---------------------------|-----|-----|-----|-------|
| SERIAL INTERFACE TIMING        |        |                           |     |     |     |       |
| Serial Clock Frequency         | fsclk  |                           |     |     | 2.5 | MHz   |
| SCLK High Pulse Width          | tCH    |                           | 200 |     |     | ns    |
| SCLK Low Pulse Width           | tCL    |                           | 200 |     |     | ns    |
| CS High Pulse Width            | tcsw   |                           | 200 |     |     | ns    |
| SCLK Fall to Output Data Valid | tDO    | C <sub>LOAD</sub> = 100pF |     |     | 100 | ns    |
| CS Fall to SCLK Rise           | tcss   |                           | 100 |     |     | ns    |
| CS Rise to Output Disable      | tTR    | C <sub>LOAD</sub> = 100pF |     |     | 100 | ns    |
| CS to SCLK Hold Time           | tcsh   |                           | 0   |     |     | ns    |
| SIO to SCLK Setup Time         | tDS    |                           | 100 |     |     | ns    |
| SIO to SCLK Hold Time          | tDH    |                           | 0   |     |     | ns    |
| Output Fall Time               | tF     |                           |     | 10  |     | ns    |

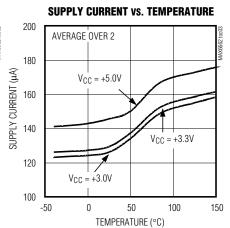
Note 2: Peak operating current measured during conversion.

# Typical Operating Characteristics

( $V_{CC} = +3V$ ,  $T_A = +25$ °C, unless otherwise noted.)

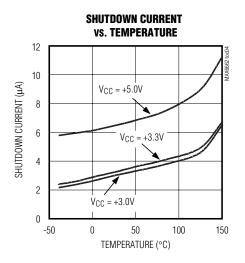






### Typical Operating Characteristics (continued)

 $(V_{CC} = +3V, T_A = +25^{\circ}C, \text{ unless otherwise noted.})$ 



## **Pin Description**

| PIN | NAME  | FUNCTION  |  |  |  |
|-----|-------|---|--|--|--|
| 1   | SCLK  | Serial-Clock Input  |  |  |  |
| 2   | CS    | Chip Select Input. Set low to enable the serial interface for data input/output.                    |  |  |  |
| 3   | SIO   | Serial-Data Input/Output. Bidirectional data input and output for serial interface.                 |  |  |  |
| 4   | GND   | Ground  |  |  |  |
| 5   | ŌT    | Overtemperature Output. Open-drain output requires a pullup resistor to VCC.                        |  |  |  |
| 6   | ALERT | Alert Output. Open-drain output requires a pullup resistor to VCC.                                  |  |  |  |
| 7   | NC    | No Connection. Do not make a connection to this pin.  |  |  |  |
| 8   | Vcc   | Supply Voltage Input. Bypass to GND with a 0.1µF capacitor as close to V <sub>CC</sub> as possible. |  |  |  |
|     |       |   |  |  |  |

# **Detailed Description**

The MAX6662 continuously converts its die temperature into a digital value using its integrated ADC. Temperature data is updated twice a second. The resulting data is readable at any time through the SPI-compatible serial interface.

Figure 1 shows the simplified functional diagram of the MAX6662. Its internal current sources force  $100\mu A$  and  $10\mu A$  currents through a diode (diode-connected transistor), while the integrating ADC measures the voltage difference. The difference in voltage corresponds to the die temperature. The result is stored in the Temperature register. The control logic unit compares the temperature and the temperature limit settings stored in the registers to determine whether a fault condition has occurred.

#### **Temperature Fault Alert**

The ALERT is an open-drain active-low (default, also programmable active-high) output used to alert the system to temperature faults. ALERT can be programmed to operate in either one of two modes: comparator or interrupt mode.

### Interrupt Mode

In the interrupt mode, the MAX6662 ALERT pin asserts an alarm for an undertemperature (TLOW) fault, as well as for an overtemperature (THIGH) fault. Once either fault has occurred, it remains active indefinitely, regardless of condition. ALERT is unconditionally deasserted (even if Temperature is still out of limits) by reading the temperature register. ALERT only asserts again if the temperature crosses the hysteresis, thereby corresponding to the fault (TLOW or THIGH) that initially set the ALERT.

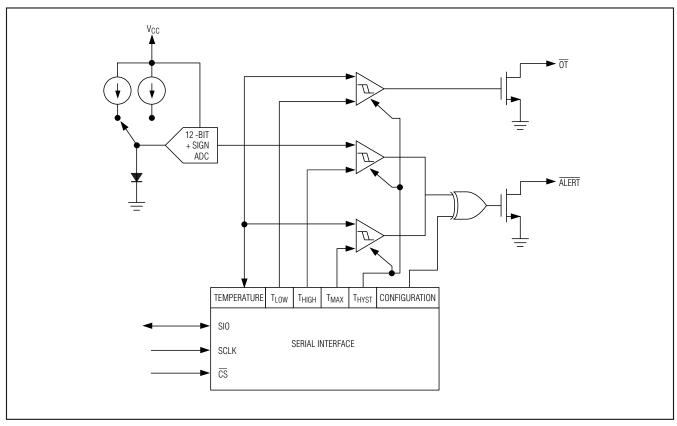


Figure 1. MAX6662 Simplified Functional Diagram

For example: If  $T_{HIGH}$  is set to 100°C and  $T_{HYST}$  is set to 20°C,  $\overline{ALERT}$  does not assert until temperature exceeds 100°C. If the temperature is then read through the serial interface,  $\overline{ALERT}$  deasserts.  $\overline{ALERT}$  asserts again when temperature is less than 80°C (Figure 2).

#### Comparator Mode

In the comparator mode,  $\overline{ALERT}$  is asserted when temperature exceeds the value in the T<sub>HIGH</sub> register, or is lower than the value in the T<sub>LOW</sub> register.  $\overline{ALERT}$  deasserts when temperature is less than T<sub>HIGH</sub> - T<sub>HYST</sub> or greater than T<sub>LOW</sub> + T<sub>HYST</sub>. Reading the registers does not deassert  $\overline{ALERT}$ .

For example: If Thigh is set to 100°C and Tlow is set to 80°C, ALERT does not assert until temperature exceeds 100°C, or is below 80°C. Then, ALERT only deasserts if temperature is less than Thigh - Thyst or greater than Tlow + Thyst.

#### **Overtemperature Alert**

 $\overline{\text{OT}}$  operates only in comparator mode. The  $\overline{\text{OT}}$  pin is asserted when the temperature exceeds  $T_{MAX}$ , and deasserted when the temperature drops below  $T_{MAX}$  -  $T_{HYST}$ . A read operation does not reset  $\overline{\text{OT}}$ .  $\overline{\text{OT}}$  is an open-drain active-low (default) output, but can be programmed to active-high.

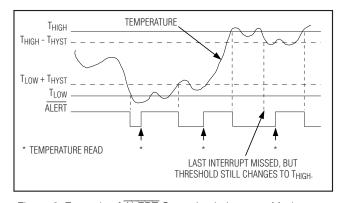


Figure 2. Example of ALERT Operation in Interrupt Mode

#### **Temperature Fault Queue**

The activation of ALERT and OT is subject to the depth of the fault queue. If the Fault Queue bit in the Configuration register is enabled, ALERT or OT does not assert until four consecutive temperature conversions are at fault.

For example: If THIGH is set to 100°C, THYST is set to 20°C, ALERT is set to interrupt mode, and fault queue is enabled, ALERT does not assert until four consecutive conversions exceed 100°C. If the temperature is then read through the serial interface, ALERT deasserts. ALERT asserts again when four consecutive conversions are less than 80°C.

#### **Shutdown Mode**

The MAX6662 features a programmable shutdown mode. Set the Shutdown bit in the Configuration register to 1 to shut down. In the shutdown mode, everything is disabled except the power-on reset (POR) and the serial interface. In the shutdown mode, information stored in all registers is retained. The Temperature register retains the temperature from the last conversion result.

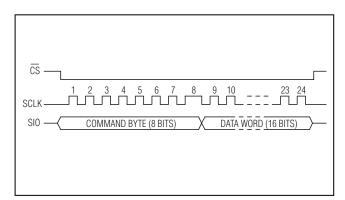


Figure 3. MAX6662 Serial Interface Operation

#### **Serial Interface Protocol**

The serial interface consists of three signal lines: chip select (CS), bidirectional data line (SIO), and serial clock (SCLK). Only the master (external) drives  $\overline{\text{CS}}$  and SCLK. Both the master and the MAX6662 drive SIO. When  $\overline{\text{CS}}$  is high, the MAX6662 does not respond to any activity on clock and data lines. When  $\overline{CS}$  goes low, a transaction begins. A valid transaction has 24 clock cycles provided from SCLK after CS goes low—no more and no fewer. Any communication with more or fewer than exactly 24 clocks is ignored. Data is clocked in to the MAX6662 at the rising edge of SCLK when the master is writing. Data is clocked out at the falling edge of SCLK when the master is reading. Both the command byte and data word are clocked in (or out) with the most-significant bit (MSB) bit first. The first eight clock cycles are dedicated to the command byte (1 bit per cycle). This command byte is input to the MAX6662 through the SIO. Sixteen cycles of data follow. The 16 cycles of data are either driven by the master or by the MAX6662, depending on the command byte. If the MAX6662 is driving the SIO, it starts driving at the falling edge of the eighth clock up until the rising edge of CS. Data is available on the falling edge of the eighth clock cycle. Figure 3 depicts a valid serial interface transaction and Figure 4 is the serial interface timing diagram.

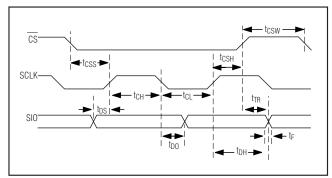


Figure 4. Detailed Serial Interface Timing Diagram

# Table 1. Bit Descriptions of the Configuration Register

| BIT      | POR | DESCRIPTION  |
|----------|-----|--|
| 15 to 13 | 0   | Reserved. Writing to these bits is ignored.  |
| 12       | 0   | Fault Queue bit. Set to 1 to enable queue.   |
| 11       | 0   | ALERT polarity bit. Set to 1 for active-high ALERT output. Default is 0 for the ALERT output active-low. |
| 10       | 0   | OT polarity bit. Set to 1 for active-high OT output. Default is 0 for the OT output active-low.          |
| 9        | 0   | Interrupt Mode bit. Set to 1 to enable the interrupt mode. Default is 0 for the comparator mode.         |
| 8        | 0   | Shutdown bit. Set to 1 to shut down the MAX6662.   |
| 7 to 0   | 0   | Reserved. Writing to these bits is ignored.  |

Table 2. Command Codes for the Temperature Limit Registers

| COMMAND | DESCRIPTION                      |  |  |  |  |  |  |
|---------|----------------------------------|--|--|--|--|--|--|
| C1h     | Temperature register read        |  |  |  |  |  |  |
| C3h     | Configuration register read      |  |  |  |  |  |  |
| C5h     | T <sub>HYST</sub> register read  |  |  |  |  |  |  |
| C7h     | T <sub>MAX</sub> register read   |  |  |  |  |  |  |
| C9h     | T <sub>LOW</sub> register read   |  |  |  |  |  |  |
| CBh     | T <sub>HIGH</sub> register read  |  |  |  |  |  |  |
| 83h     | Configuration register write     |  |  |  |  |  |  |
| 85h     | T <sub>HYST</sub> register write |  |  |  |  |  |  |
| 87h     | T <sub>MAX</sub> register write  |  |  |  |  |  |  |
| 89h     | T <sub>LOW</sub> register write  |  |  |  |  |  |  |
| 8Bh     | THIGH register write             |  |  |  |  |  |  |
|         |                                  |  |  |  |  |  |  |

The first bit of the command byte is always high to signify a Start, and the second bit is an R/W bit, high for read and low for write. There are a total of 11 valid commands. The temperature conversion runs continuously and asynchronously from the serial interface. When the Temperature register is read, any conversion in progress is aborted and the data output is from the previous conversion. A new conversion is started each time the serial interface is accessed.

#### **MAX6662 Registers**

The MAX6662 has six registers: Temperature, Configuration,  $T_{HYST}$ ,  $T_{MAX}$ ,  $T_{LOW}$ , and  $T_{HIGH}$  registers. They are all 16 bits (Figure 5). The Temperature register is read only; all other registers can be read from or written to.

#### Temperature Register

The MSB of the Temperature register is the sign bit. The next 12 bits are temperature data. The digital temperature data for the most recent temperature conversion is

|              |                   |                   |       | T                    | EMPE        | RATU  | RE REGI              | STER               | (COM             | MAND =                | C1H)   |        |        |                  |                                |                   |     |                             |
|--------------|-------------------|-------------------|-------|----------------------|-------------|-------|----------------------|--------------------|------------------|-----------------------|--------|--------|--------|------------------|--------------------------------|-------------------|-----|-----------------------------|
| Label        | 15<br>Sign<br>Bit | 14<br>Data<br>MSB | 13    | 12                   | 11          | 10    | 9                    | 8                  | 7                | 6                     | 5      | 4      |        | 3<br>Data<br>LSB | 2<br>T <sub>OVER</sub><br>Flag | 1<br>THIG<br>Flag |     | 0<br>T <sub>LO</sub><br>Fla |
| POR<br>State | 0                 | 0                 | 0     | 0                    | 0           | 0     | 0                    | 0                  | 0                | 0                     | 0      | 0      |        | 0                | 0                              | 0                 |     | 0                           |
|              | CONI              | FIGUR             | ATION | REGIST               | ER (CC      | OMMAI | ND = C3              | H FOR              | READ             | DING; CO              | MMA    | ND =   | 83H    | FOR              | WRITI                          | NG)               |     |                             |
| Label        | 15<br>*           | 14                | 13    | 12<br>Fault<br>Queue | ALE<br>Pola | RT    | 10<br>OT<br>Polarity | Inter<br>Mo        | rupt S           | 8<br>Shutdown<br>Mode | 7      | 6      | 5<br>* | 4 *              | 3 *                            | 2 *               | 1 * | *                           |
| POR<br>State | 0                 | 0                 | 0     | 0                    | 0           |       | 0                    | C                  |                  | 0                     | 0      | 0      | 0      | 0                | 0                              | 0                 | 0   | C                           |
|              |                   |                   | TEMP  | ERATUR               | E LIMI      | T REG | ISTERS               | (T <sub>H</sub> YS | т, Тмд           | X, TLOW               | THIG   | H) (TA | BLI    | E 2)             |                                |                   |     |                             |
| Label        | 15<br>Sign        | 14<br>Data<br>MSB | 13    | 12                   | 11          | 10    | 9                    | 8                  | 7<br>Data<br>LSB | 6 *                   | 5<br>* | 4 *    |        | 3                | 2                              | 1 *               |     | 0                           |
| POR<br>State |                   |                   |       |                      |             | I     |                      | *                  | *                |                       |        | 1      |        |                  | 1                              | 1                 |     | -                           |

<sup>\*</sup> Reserved (not used). Writing to this bit is ignored.

Figure 5. Bit Assignment for the MAX6662 Registers

<sup>\*\*</sup> THYST register: 0000 0001 0000 0000b (2°C)

<sup>\*\*</sup> T<sub>MAX</sub> register: 0010 1000 0000 0000b (+80°C)

<sup>\*\*</sup> T<sub>LOW</sub> register: 0000 0101 0000 0000b (+10°C)

<sup>\*\*</sup> THIGH register: 0010 0000 0000 0000b (+64°C)

Table 3. Output Code vs. Temperature

| TEMPERATURE (°C) | BINARY CODE         |
|------------------|---------------------|
| +150.0000        | 0100 1011 0000 0xxx |
| +125.0000        | 0011 1110 1000 0xxx |
| +25.0000         | 0000 1100 1000 0xxx |
| +0.0625          | 0000 0000 0000 1xxx |
| 0.0000           | 0000 0000 0000 0xxx |
| -0.0625          | 1111 1111 1111 1xxx |
| -25.0000         | 1111 0011 0111 0xxx |
| -55.0000         | 1111 1100 0111 0xxx |

stored in the Temperature register and is in °C, using a two's-complement format with 1LSB corresponding to 0.0625°C (Table 3). The three least-significant bits (LSBs) are temperature status (flag) bits. The Temperature register is read only. Set the command byte to C1h for reading the Temperature register.

#### Configuration Register

The Configuration register uses only 5 bits, bits 8 to 12. Table 1 describes its function. Bit 8 is the shutdown bit and should be set to 1 to shut down the entire MAX6662 except the serial interface and POR. Bit 12 is the fault queue bit. When the Fault Queue bit is 1, the ALERT and OT outputs are asserted if four consecutive temperature faults occurred. The Configuration register can be read or written to. Writing to unused bits is ignored. Set the command byte to C3h for reading from this register; set the command byte to 83h for writing to this register.

#### Temperature-Limit Registers

The High-Temperature (T<sub>HIGH</sub>), Low-Temperature (T<sub>LOW</sub>), and the Hysteresis (T<sub>HYST</sub>) registers set the temperature limit for triggering the ALERT (Figure 1). The Maximum-Temperature (T<sub>MAX</sub>) and Hysteresis registers set the temperature threshold for the OT output. These temperature-limit registers use the 9MSB bits (8 bits + sign) for setting temperature values in two's complement format with 1°C resolution. The 7LSBs are ignored. These registers can be read or written to. Table 2 shows the command bytes for reading and writing to these registers.

### \_Applications Information

The MAX6662 supply current is typically 125µA when the serial interface is active. When driving high-impedance loads, the devices dissipate negligible power; therefore, the die temperature is essentially the same as the package temperature. The key to accurate temperature monitoring is good thermal contact between the MAX6662 package and the monitored device or circuit. Heat flows in and out of plastic packages primarily through the leads. Short, wide copper traces leading to the temperature monitor ensure that heat transfers quickly and reliably. The rise in die temperature due to self-heating is given by the following formula:

#### $\Delta T_J = PDISSIPATION \times \theta_{JA}$

where PDISSIPATION is the power dissipated by the MAX6662, and  $\theta_{\text{JA}}$  is the package's thermal resistance.

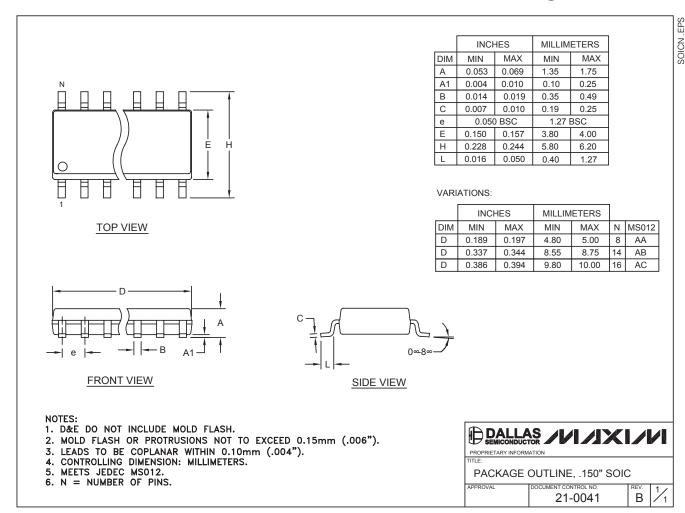
The typical thermal resistance is +170°C/W for the 8-pin SO package. To limit the effects of self-heating, minimize the output currents. For example, if the MAX6662 sinks 4mA with the maximum ALERT voltage specification of 0.8V, an additional 3.2mW of power is dissipated within the IC. This corresponds to a 0.54°C rise in the die temperature.

# **Chip Information**

TRANSISTOR COUNT: Bipolar: 182 MOS: 10177

PROCESS: BICMOS

# **Package Information**



Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.



OOO «ЛайфЭлектроникс" "LifeElectronics" LLC

ИНН 7805602321 КПП 780501001 P/C 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 3010181090000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

#### Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный) Email: org@lifeelectronics.ru