

Tiny Serial Digital Thermal Sensor

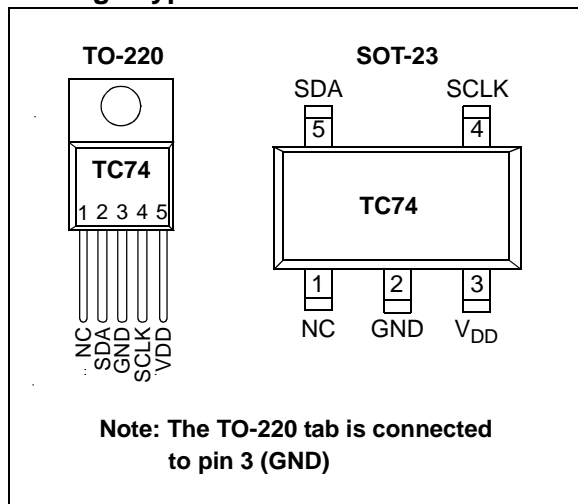
Features

- Digital Temperature Sensing in SOT-23-5 or TO-220 Packages
- Outputs Temperature as an 8-Bit Digital Word
- Simple SMBus/I²C™ Serial Port Interface
- Solid-State Temperature Sensing:
 - ±2°C (max.) Accuracy from +25°C to +85°C
 - ±3°C (max.) Accuracy from 0°C to +125°C
- Supply Voltage of 2.7V to 5.5V
- Low Power:
 - 200 µA (typ.) Operating Current
 - 5 µA (typ.) Standby Mode Current

Applications

- Thermal Protection for Hard Disk Drives and other PC Peripherals
- PC Card Devices for Notebook Computers
- Low Cost Thermostat Controls
- Power Supplies
- Thermistor Replacement

Package Types



General Description

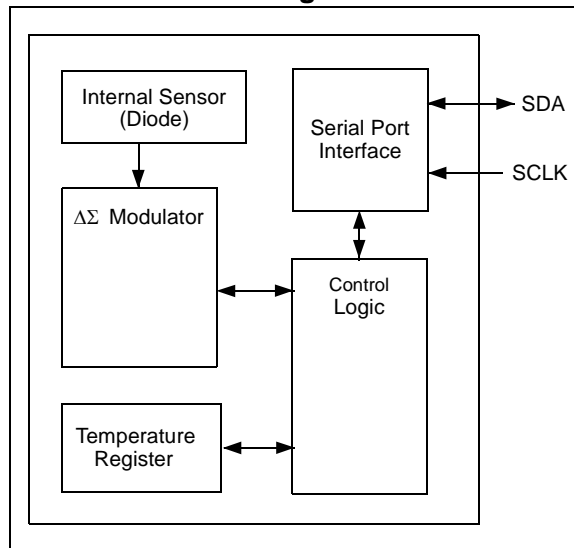
The TC74 is a serially accessible, digital temperature sensor particularly suited for low cost and small form-factor applications. Temperature data is converted from the onboard thermal sensing element and made available as an 8-bit digital word.

Communication with the TC74 is accomplished via a 2-wire SMBus/I²C compatible serial port. This bus also can be used to implement multi-drop/multi-zone monitoring. The SHDN bit in the CONFIG register can be used to activate the low power Standby mode.

Temperature resolution is 1°C. Conversion rate is a nominal 8 samples/sec. During normal operation, the quiescent current is 200 µA (typ). During standby operation, the quiescent current is 5 µA (typ).

Small size, low installed cost and ease of use make the TC74 an ideal choice for implementing thermal management in a variety of systems.

Functional Block Diagram



TC74

1.0 ELECTRICAL CHARACTERISTICS

1.1 Absolute Maximum Ratings†

| | |
|---|------------------------------------|
| Supply Voltage (V_{DD}) | +6V |
| Voltage On Any Pin | (GND – 0.3V) to (V_{DD} + 0.3V) |
| Current On Any Pin | ±50 mA |
| Operating Temperature (T_A) | -40°C ≤ T_A ≤ +125°C |
| Storage Temperature (T_{STG}) | -65°C to +150°C |
| Junction Temperature (T_J) | +150°C |

† **Notice:** Stresses above those listed under "Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operation listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

DC CHARACTERISTICS

| Electrical Specifications: Unless otherwise noted, V_{DD} = 3.3V for TC74AX-3.3VXX and V_{DD} = 5.0V for TC74AX-5.0VXX, -40°C ≤ T_A ≤ 125°C. Note 5 | | | | | | |
|--|------------------|-------------------|----------------|-------------------|-------|--|
| Parameters | Sym | Min | Typ | Max | Units | Conditions |
| Power Supply | | | | | | |
| Power-on Reset Threshold | V_{POR} | 1.2 | — | 2.2 | V | V_{DD} Falling Edge or Rising Edge |
| Supply Voltage | V_{DD} | 2.7 | — | 5.5 | V | Note 5 |
| Operating Current | I_{DD} | — | 200 | 350 | μA | V_{DD} = 5.5V, Note 1 |
| Standby Supply Current | $I_{DD-STANDBY}$ | — | 5.0 | 10 | μA | V_{DD} = 3.3V Serial Port Inactive, Note 4 |
| Temperature-to-Bits Converter | | | | | | |
| Temperature Accuracy | T_{ERR} | -2.0 -3.0 — | — — ±2.0 | +2.0 +3.0 — | °C | +25°C < T_A < +85°C 0°C < T_A < +125°C -40°C < T_A < 0°C |
| Conversion Rate | CR | 4 | 8 | — | SPS | Note 2 |
| Serial Port Interface | | | | | | |
| Logic Input High | V_{IH} | 0.8 x V_{DD} | — | — | V | |
| Logic Input Low | V_{IL} | — | — | 0.2 x V_{DD} | V | |
| SDA Output Low | V_{OL} | — | — | 0.4 0.6 | V | I_{OL} = 3 mA I_{OL} = 6 mA, Note 3 |
| Input Capacitance SDA, SCLK | C_{IN} | — | 5.0 | — | pF | |
| I/O Leakage | I_{LEAK} | -1.0 | 0.1 | 1.0 | μA | |
| Serial Port AC Timing (C_{LOAD} = 80 pF) | | | | | | |
| SMBus/I ² C Clock Frequency | f_{SMB} | 10 | — | 100 | kHz | |
| Low Clock Period | t_{LOW} | 4.7 | — | — | μsec | 10% to 10% |
| High Clock Period | t_{HIGH} | 4.0 | — | — | μsec | 90% to 90% |
| SMBus/I ² C Rise Time | t_R | — | — | 1000 | nsec | 10% to 90% |
| SMBus/I ² C Fall Time | t_F | — | — | 300 | nsec | 90% to 10% |

- Note 1:** Operating current is an average value integrated over multiple conversion cycles. Transient current may exceed this specification.
- 2:** Maximum ensured conversion time after Power-on Reset (POR to DATA_RDY) is 250 msec.
- 3:** Output current should be minimized for best temperature accuracy. Power dissipation within the TC74 will cause self-heating and temperature drift error.
- 4:** SDA and SCLK must be connected to V_{DD} or GND.
- 5:** V_{DD} = 3.3V for TC74AX -3.3 VXX. V_{DD} = 5.0V for TC74AX -5.0 VXX. All part types of the TC74 will operate properly over the wider power supply range of 2.7V to 5.5V. 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°C/V of V_{DD} change.

DC CHARACTERISTICS (CONTINUED)

| Electrical Specifications: Unless otherwise noted, $V_{DD} = 3.3V$ for TC74AX-3.3VXX and $V_{DD} = 5.0V$ for TC74AX-5.0VXX, $-40^{\circ}C \leq T_A \leq 125^{\circ}C$. Note 5 | | | | | | |
|--|-----------------|------|-----|-----|-----------------|-------------------------------------|
| Parameters | Sym | Min | Typ | Max | Units | Conditions |
| START Condition Setup Time (for repeated START Condition) | $t_{SU(START)}$ | 4.0 | — | — | μsec | 90% SCLK to 10% SDA |
| START Condition Hold Time | $t_{H(START)}$ | 4.0 | — | — | μsec | |
| Data In Setup Time | $t_{SU-DATA}$ | 1000 | — | — | nsec | |
| Data In Hold Time | t_{H-DAT} | 1250 | — | — | nsec | |
| STOP Condition Setup Time | $t_{SU(STOP)}$ | 4.0 | — | — | μsec | |
| Bus Free Time Prior to New Transition | t_{IDLE} | 4.7 | — | — | μsec | |
| Power-on Reset Delay | t_{POR} | — | 500 | — | μsec | $V_{DD} \geq V_{POR}$ (Rising Edge) |

- Note 1:** Operating current is an average value integrated over multiple conversion cycles. Transient current may exceed this specification.
- 2:** Maximum ensured conversion time after Power-on Reset (POR to DATA_RDY) is 250 msec.
- 3:** Output current should be minimized for best temperature accuracy. Power dissipation within the TC74 will cause self-heating and temperature drift error.
- 4:** SDA and SCLK must be connected to V_{DD} or GND.
- 5:** $V_{DD} = 3.3V$ for TC74AX -3.3 VXX. $V_{DD} = 5.0V$ for TC74AX -5.0 VXX. All part types of the TC74 will operate properly over the wider power supply range of 2.7V to 5.5V. 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 $1^{\circ}C/V$ of V_{DD} change.

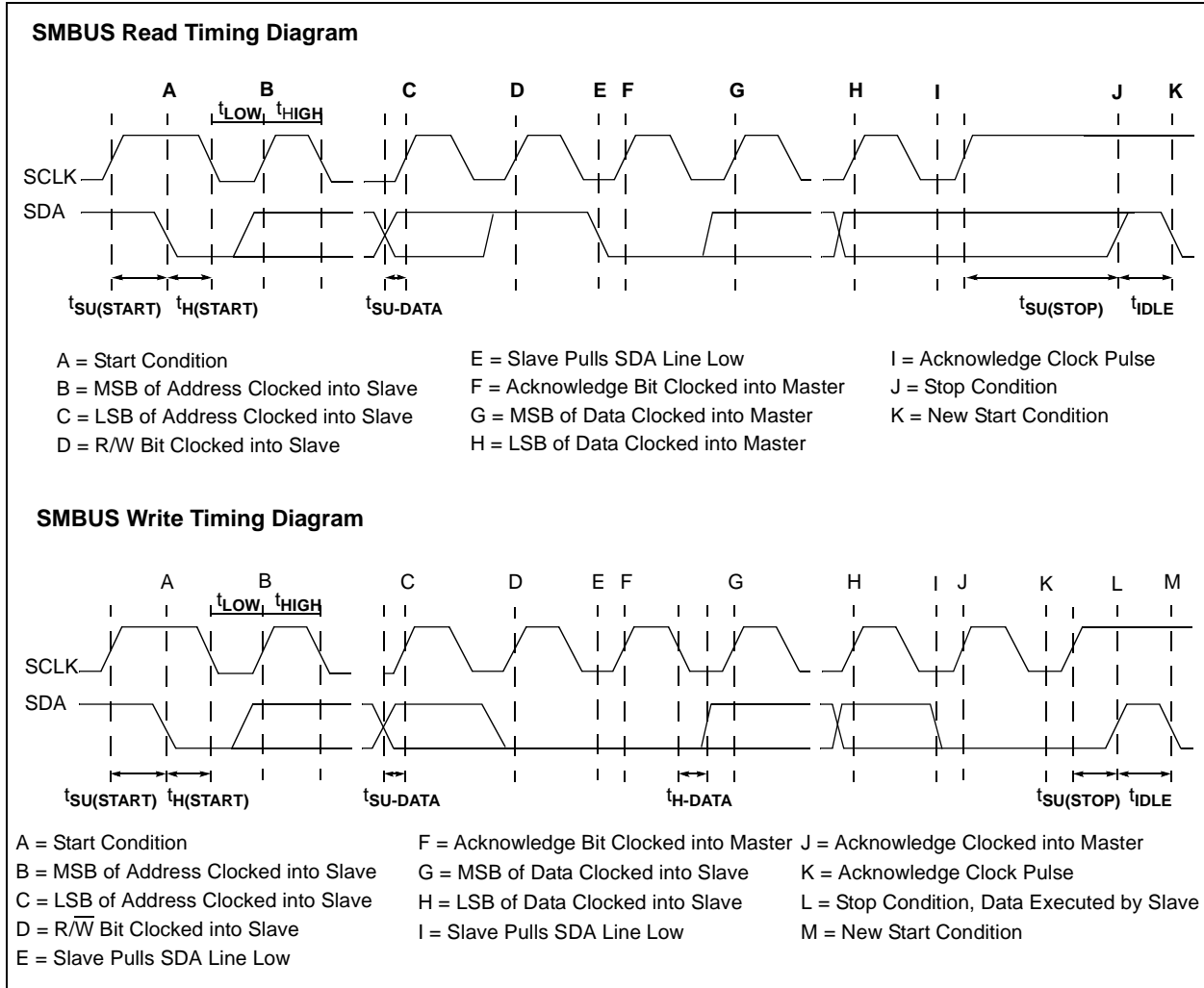


FIGURE 1-1: Timing Diagrams.

2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 2-1.

TABLE 2-1: PIN FUNCTION TABLE

| Pin No. (5-Pin SOT-23) | Pin No. (5-Pin TO-220) | Symbol | Type | Description |
|------------------------------|---------------------------|-----------------|---------------|-------------------------------------|
| 1 | 1 | NC | None | No Internal Connection |
| 2 | 3 | GND | Power | System Ground |
| 3 | 5 | V _{DD} | Power | Power Supply Input |
| 4 | 4 | SCLK | Input | SMBus/I ² C Serial Clock |
| 5 | 2 | SDA | Bidirectional | SMBus/I ² C Serial Data |

2.1 Ground (GND)

Input. Ground return for all TC74 functions.

2.2 Power Supply Input (V_{DD})

Power supply input. See Electrical Specifications.

2.3 SMBus/I²C Serial Clock (SCLK)

Input. SMBus/I²C serial clock. Clocks data into and out of the TC74. See System Management Bus Specification, Rev. 1.0, for timing diagrams.

2.4 Serial Data (SDA)

Bidirectional. Serial data is transferred on the SMBus/I²C in both directions using this pin. See System Management Bus Specification, Rev. 1.0 for timing diagrams.

3.0 DETAILED DESCRIPTION

3.1 Functional Description

The TC74 acquires and converts temperature information from its onboard solid-state sensor with a resolution of $\pm 1^{\circ}\text{C}$. It stores the data in an internal register which is then read through the serial port. The system interface is a slave SMBus/I²C port, through which temperature data can be read at any time. Eight SMBus/I²C addresses are programmable for the TC74, which allows for a multi-sensor configuration. Also, there is low power Standby mode when temperature acquisition is suspended.

3.1.1 STANDBY MODE

The host is allowed, by the TC74, to put it into a low power ($I_{DD} = 5 \mu\text{A}$, typical) Standby mode. In this mode, the A/D converter is halted and the temperature data registers are frozen. The SMBus/I²C port, though, operates normally. Standby mode is enabled by setting the SHDN bit in the CONFIG register. Table 3-1 summarizes this operation.

TABLE 3-1: STANDBY MODE OPERATION

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

3.1.2 SMBUS/I²C SLAVE ADDRESS

The TC74 is internally programmed to have a default SMBus/I²C address value of 1001 101b. Seven other addresses are available by custom order (contact Microchip Technology Inc).

3.2 Serial Port Operation

The Serial Clock input (SCLK) and bidirectional data port (SDA) form a 2-wire bidirectional serial port for programming and interrogating the TC74. The conventions used in this bus architecture are listed in Table 3-2.

TABLE 3-2: 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 SCLK is high. |
| STOP | A unique condition signaling the end of a transfer indicated by SDA rising (low-high) while SCLK is high. |
| ACK | A Receiver acknowledges the receipt of each byte with this unique condition. The Receiver drives SDA low during SCLK 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 SCLK will remain high. |
| Data Valid | The state of SDA must remain stable during the high period of SCLK in order for a data bit to be considered valid. SDA only changes state while SCLK is low during normal data transfers (see START and STOP conditions). |

All transfers take place under the control of a host, usually a CPU or microcontroller, acting as the Master. This host provides the clock signal for all transfers. The TC74 always operates as a Slave. The serial protocol is illustrated in Figure 3-1. All data transfers have two phases and all bytes are transferred MSB first. Accesses are initiated by a START condition, 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. A convention called "Acknowledge" (ACK) confirms receipt of each byte. Note that SDA can change only during periods when SCLK is low (SDA changes while SCLK is high are reserved for START and STOP conditions).

4.0 REGISTER SET AND PROGRAMMER'S MODEL

TABLE 4-1: COMMAND BYTE DESCRIPTION (SMBUS/I²C READ_BYTE AND WRITE_BYTE)

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

TABLE 4-2: CONFIGURATION REGISTER (CONFIG); 8 BITS, READ/WRITE)

| Bit | POR | Function | Type | Operation |
|-----------|-----|--|------------|--------------------------|
| D[7] | 0 | STANDBY Switch | Read/Write | 1 = standby, 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 |

Note 1: *DATA_RDY bit RESET at power-up and SHDN enable.

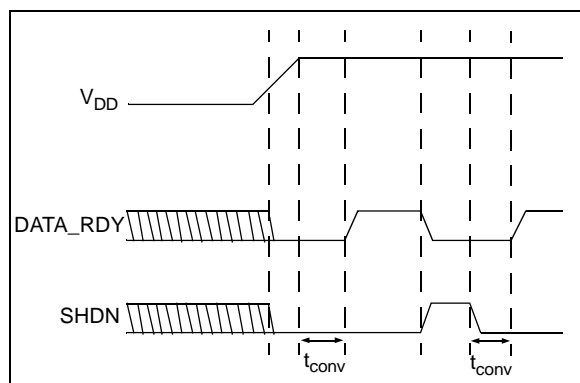


FIGURE 4-1: DATA_RDY, SHDN Operation Logic Diagram.

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

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

TABLE 4-3: 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 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 Table 4-4.

TABLE 4-4: 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 | +126°C | 0111 1110 |
| +25.25°C | +25°C | 0001 1001 |
| +0.50°C | 0°C | 0000 0000 |
| +0.25°C | 0°C | 0000 0000 |
| 0.00°C | 0°C | 0000 0000 |
| -0.25°C | -1°C | 1111 1111 |
| -0.50°C | -1°C | 1111 1111 |
| -0.75°C | -1°C | 1111 1111 |
| -1.00°C | -1°C | 1111 1111 |
| -25.00°C | -25°C | 1110 0111 |
| -25.25°C | -26°C | 1110 0110 |
| -54.75°C | -55°C | 1100 1001 |
| -55.00°C | -55°C | 1100 1001 |
| -65.00°C | -65°C | 1011 1111 |

4.2 Register Set Summary

The TC74 register set is summarized in Table 4-5. All registers are 8 bits wide.

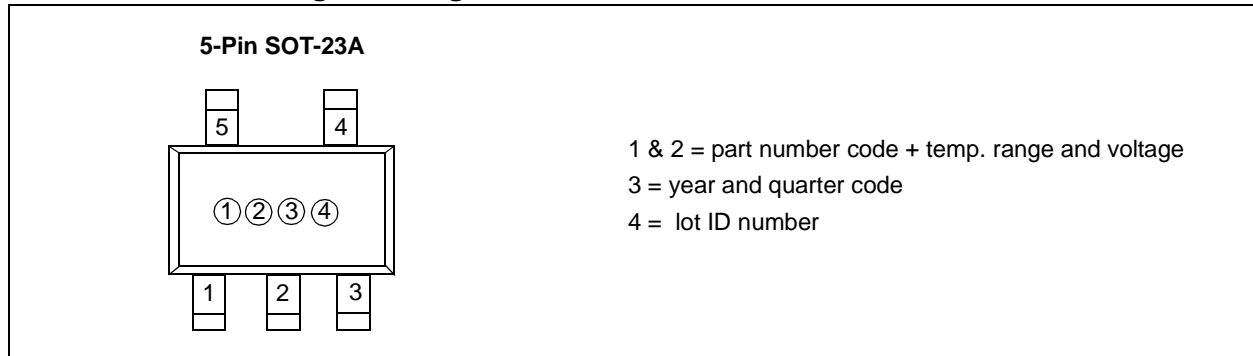
TABLE 4-5: TC74 REGISTER SET SUMMARY

| Name | Description | POR State | Read | Write |
|--------|--|---------------------------|------|-------|
| TEMP | Internal Sensor Temperature (2's Complement) | 0000 0000b ⁽¹⁾ | √ | N/A |
| CONFIG | CONFIG Register | 0000 0000b | √ | √ |

Note 1: The TEMP register will be immediately updated by the A/D converter after the DATA_RDY Bit goes high.

5.0 PACKAGING INFORMATION

5.1 SOT23A Package Marking Information

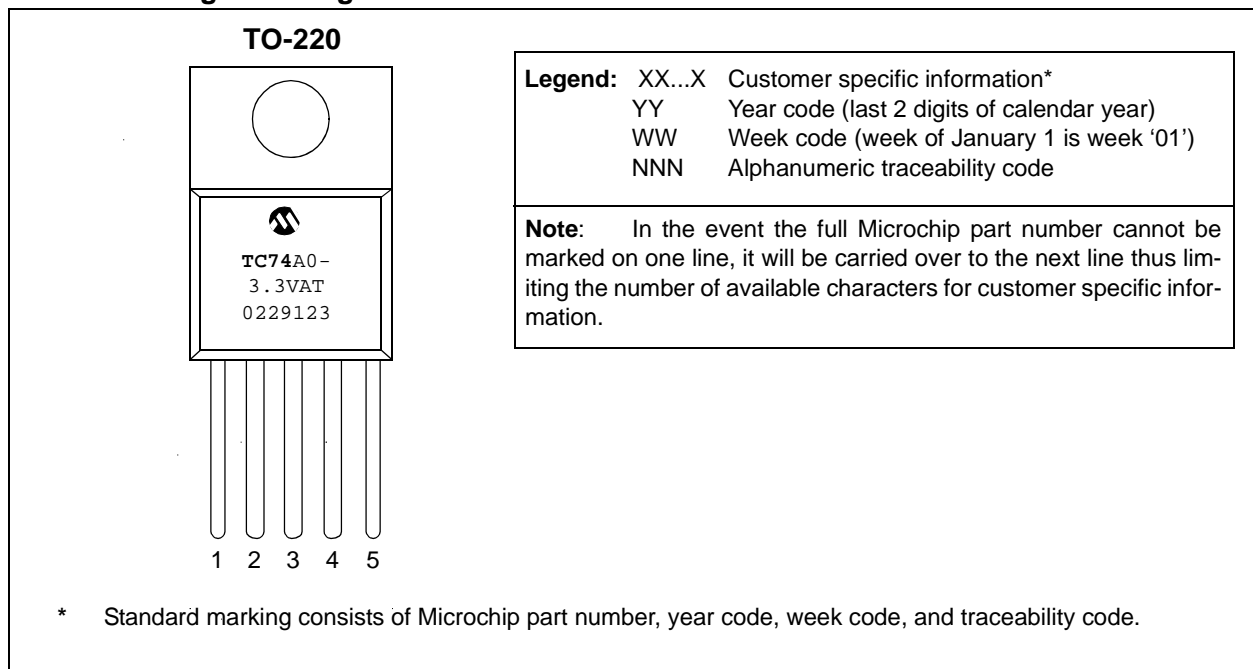


SOT-23 Package Marking Codes

| SOT-23 (V) | Address | Code | SOT-23 (V) | Address | Code |
|---------------|-----------|------|---------------|-----------|------|
| TC74A0-3.3VCT | 1001 000 | V0 | TC74A0-5.0VCT | 1001 000 | U0 |
| TC74A1-3.3VCT | 1001 001 | V1 | TC74A1-5.0VCT | 1001 001 | U1 |
| TC74A2-3.3VCT | 1001 010 | V2 | TC74A2-5.0VCT | 1001 010 | U2 |
| TC74A3-3.3VCT | 1001 011 | V3 | TC74A3-5.0VCT | 1001 011 | U3 |
| TC74A4-3.3VCT | 1001 100 | V4 | TC74A4-5.0VCT | 1001 100 | U4 |
| TC74A5-3.3VCT | 1001 101* | V5 | TC74A5-5.0VCT | 1001 101* | U5 |
| TC74A6-3.3VCT | 1001 110 | V6 | TC74A6-5.0VCT | 1001 110 | U6 |
| TC74A7-3.3VCT | 1001 111 | V7 | TC74A7-5.0VCT | 1001 111 | U7 |

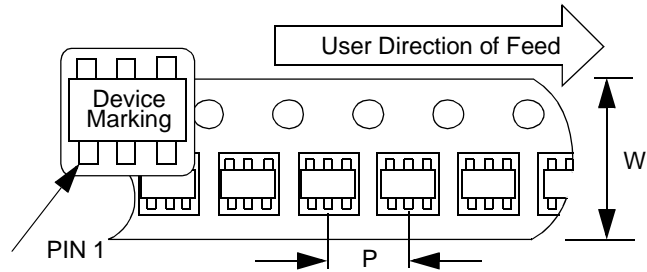
Note: * Default Address

TO-220 Package Marking Information



5.2 Taping Forms

Component Taping Orientation for 5-Pin SOT-23A (EIAJ SC-74A) Devices



Standard Reel Component Orientation
for TR Suffix Device
(Mark Right Side Up)

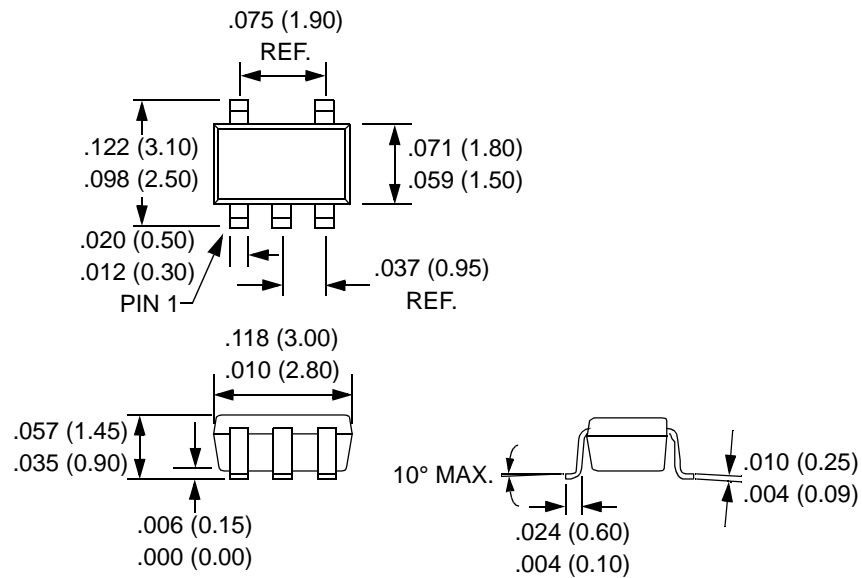
Carrier Tape, Number of Components Per Reel and Reel Size:

| Package | Carrier Width (W) | Pitch (P) | Part Per Full Reel | Reel Size |
|---------------|-------------------|-----------|--------------------|-----------|
| 5-Pin SOT-23A | 8 mm | 4 mm | 3000 | 7 in. |

5.3 Package Dimensions

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

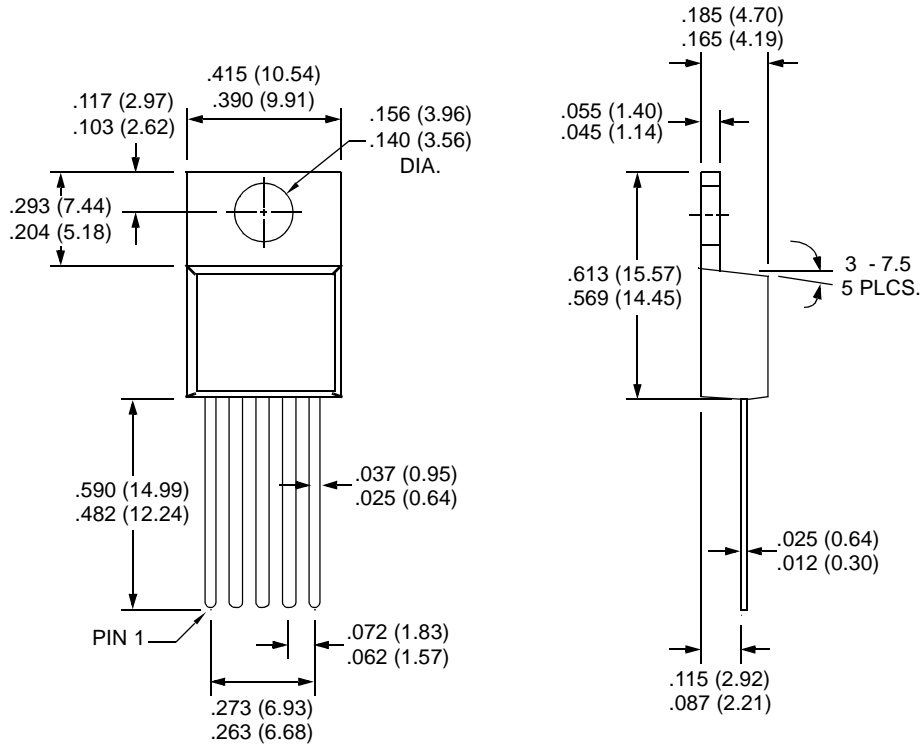
SOT-23A-5



Dimensions: inches (mm)

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

5-Pin TO-220



Dimensions: inches (mm)

6.0 REVISION HISTORY

Revision D (December 2012)

Added a note to each package outline drawing.

TC74

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

| <u>PART NO.</u> | <u>XX</u> | <u>-XX</u> | <u>X</u> | <u>XX</u> |
|--|-----------------|----------------|-----------------------|-----------|
| Device | Address Options | Supply Voltage | Operating Temperature | Package |
| Device: TC74: Serial Digital Thermal Sensor | | | | |
| Address Options: <ul style="list-style-type: none"> A0 = 1001 000 A1 = 1001 001 A2 = 1001 010 A3 = 1001 011 A4 = 1001 100 A5 = 1001 101 * A6 = 1001 110 A7 = 1001 111 * Default Address | | | | |
| Supply Voltage: <ul style="list-style-type: none"> 3.3 = Accuracy optimized for 3.3V 5.0 = Accuracy optimized for 5.0V | | | | |
| Operating Temperature: $V = -40^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ | | | | |
| Package: CTTR = SOT-23-5 (Tape and Reel only) | | | | |
| Examples: <ul style="list-style-type: none"> a) TC74A0-3.3VCTTR: SOT-23 Serial Digital Thermal Sensor b) TC74A1-3.3VCTTR: SOT-23 Serial Digital Thermal Sensor c) TC74A2-3.3VCTTR: SOT-23 Serial Digital Thermal Sensor d) TC74A3-3.3VCTTR: SOT-23 Serial Digital Thermal Sensor e) TC74A4-3.3VCTTR: SOT-23 Serial Digital Thermal Sensor f) TC74A5-3.3VCTTR: SOT-23 Serial Digital Thermal Sensor * g) TC74A6-3.3VCTTR: SOT-23 Serial Digital Thermal Sensor h) TC74A7-3.3VCTTR: SOT-23 Serial Digital Thermal Sensor <ul style="list-style-type: none"> a) TC74A0-5.0VCTTR: SOT-23 Serial Digital Thermal Sensor b) TC74A1-5.0VCTTR: SOT-23 Serial Digital Thermal Sensor c) TC74A2-5.0VCTTR: SOT-23 Serial Digital Thermal Sensor d) TC74A3-5.0VCTTR: SOT-23 Serial Digital Thermal Sensor e) TC74A4-5.0VCTTR: SOT-23 Serial Digital Thermal Sensor f) TC74A5-5.0VCTTR: SOT-23 Serial Digital Thermal Sensor * g) TC74A6-5.0VCTTR: SOT-23 Serial Digital Thermal Sensor h) TC74A7-5.0VCTTR: SOT-23 Serial Digital Thermal Sensor * Default Address | | | | |

| <u>PART NO.</u> | <u>XX</u> | <u>-XX</u> | <u>X</u> | <u>XX</u> |
|--|-----------------|----------------|-----------------------|-----------|
| Device | Address Options | Supply Voltage | Operating Temperature | Package |
| Device: TC74: Serial Digital Thermal Sensor | | | | |
| Address Options: <ul style="list-style-type: none"> A0 = 1001 000 A1 = 1001 001 A2 = 1001 010 A3 = 1001 011 A4 = 1001 100 A5 = 1001 101 * A6 = 1001 110 A7 = 1001 111 * Default Address | | | | |
| Output Voltage: <ul style="list-style-type: none"> 3.3 = Accuracy optimized for 3.3V 5.0 = Accuracy optimized for 5.0V | | | | |
| Operating Temperature: $V = -40^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ | | | | |
| Package: AT = TO-220-5 | | | | |
| Examples: <ul style="list-style-type: none"> a) TC74A0-3.3VAT: TO-220 Serial Digital Thermal Sensor b) TC74A1-3.3VAT: TO-220 Serial Digital Thermal Sensor c) TC74A2-3.3VAT: TO-220 Serial Digital Thermal Sensor d) TC74A3-3.3VAT: TO-220 Serial Digital Thermal Sensor e) TC74A4-3.3VAT: TO-220 Serial Digital Thermal Sensor f) TC74A5-3.3VAT: TO-220 Serial Digital Thermal Sensor * g) TC74A6-3.3VAT: TO-220 Serial Digital Thermal Sensor h) TC74A7-3.3VAT: TO-220 Serial Digital Thermal Sensor <ul style="list-style-type: none"> a) TC74A0-5.0VAT: TO-220 Serial Digital Thermal Sensor b) TC74A1-5.0VAT: TO-220 Serial Digital Thermal Sensor c) TC74A2-5.0VAT: TO-220 Serial Digital Thermal Sensor d) TC74A3-5.0VAT: TO-220 Serial Digital Thermal Sensor e) TC74A4-5.0VAT: TO-220 Serial Digital Thermal Sensor f) TC74A5-5.0VAT: TO-220 Serial Digital Thermal Sensor * g) TC74A6-5.0VAT: TO-220 Serial Digital Thermal Sensor h) TC74A7-5.0VAT: TO-220 Serial Digital Thermal Sensor * Default Address | | | | |

Sales and Support

Data Sheets

Products supported by a preliminary Data Sheet may have an errata sheet describing minor operational differences and recommended workarounds. To determine if an errata sheet exists for a particular device, please contact one of the following:

1. Your local Microchip sales office
2. The Microchip Worldwide Site (www.microchip.com)

Please specify which device, revision of silicon and Data Sheet (include Literature #) you are using.

New Customer Notification System

Register on our web site (www.microchip.com/cn) to receive the most current information on our products.

TC74

NOTES:

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as “unbreakable.”

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, KEELOQ, KEELOQ logo, MPLAB, PIC, PICmicro, PICSTART, PIC³² logo, rPIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

FilterLab, Hampshire, HI-TECH C, Linear Active Thermistor, MTP, SEEVAL and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

Analog-for-the-Digital Age, Application Maestro, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, HI-TIDE, In-Circuit Serial Programming, ICSP, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, mTouch, Omniclient Code Generation, PICC, PICC-18, PICDEM, PICDEM.net, PICkit, PICtail, REAL ICE, rLAB, Select Mode, SQI, Serial Quad I/O, Total Endurance, TSHARC, UniWinDriver, WiperLock, ZENA and Z-Scale are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

GestIC and ULPP are registered trademarks of Microchip Technology Germany II GmbH & Co. & KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2001-2012, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

 Printed on recycled paper.

ISBN: 9781620768396

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
== ISO/TS 16949 ==

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC[®] MCUs and dsPIC[®] DSCs, KEELOQ[®] code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.



MICROCHIP

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
<http://www.microchip.com/support>
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Farmington Hills, MI
Tel: 248-538-2250
Fax: 248-538-2260

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

Santa Clara
Santa Clara, CA
Tel: 408-961-6444
Fax: 408-961-6445

Toronto
Mississauga, Ontario,
Canada
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2401-1200
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8569-7000
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Hangzhou
Tel: 86-571-2819-3187
Fax: 86-571-2819-3189

China - Hong Kong SAR
Tel: 852-2943-5100
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8864-2200
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-2566-1512
Fax: 91-20-2566-1513

Japan - Osaka
Tel: 81-6-6152-7160
Fax: 81-6-6152-9310

Japan - Tokyo
Tel: 81-3-6880-3770
Fax: 81-3-6880-3771

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

Taiwan - Kaohsiung
Tel: 886-7-213-7828
Fax: 886-7-330-9305

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

UK - Wokingham
Tel: 44-118-921-5869
Fax: 44-118-921-5820

11/29/12



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.