24AA02E48

2K I²C™ Serial EEPROM with EUI-48™ Node Identity

Device Selection Table

Part Number	Vcc Range	Max. Clock Frequency	Temp. Ranges
24AA02E48	1.7-5.5V	400 kHz(1)	I

Note 1: 100 kHz for Vcc <2.5V

Features:

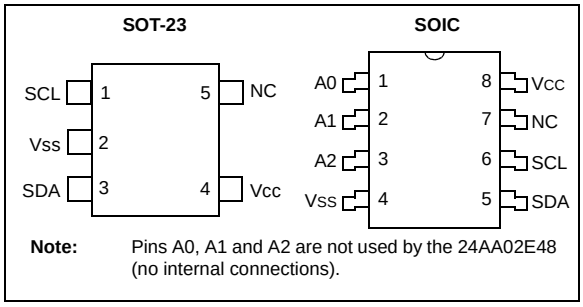
- Pre-programmed Globally Unique, 48-bit Node Address
- Compatible with EUI-48™ and EUI-64™
- Single Supply with Operation Down to 1.7V
- Low-Power CMOS Technology:
  - Read current 1 mA, max.
  - Standby current 1 μA, max.
- 2-Wire Serial Interface, I²C™ Compatible
- Schmitt Trigger Inputs for Noise Suppression
- Output Slope Control to Eliminate Ground Bounce
- 100 kHz and 400 kHz Clock Compatibility
- Page Write Time 3 ms, typical
- Self-Timed Erase/Write Cycle
- 8-Byte Page Write Buffer
- ESD Protection >4,000V
- More than 1 Million Erase/Write Cycles
- Data Retention >200 Years
- Factory Programming Available
- Packages include 8-lead SOIC and 5-lead SOT-23
- Pb-free and RoHS Compliant
- Temperature Ranges:
  - Industrial (I): -40°C to +85°C

Note: This document is supplemented by the "*24AA02 Data Sheet*" (DS21709). See **Section 2.0 "Functional Description"**.

Description:

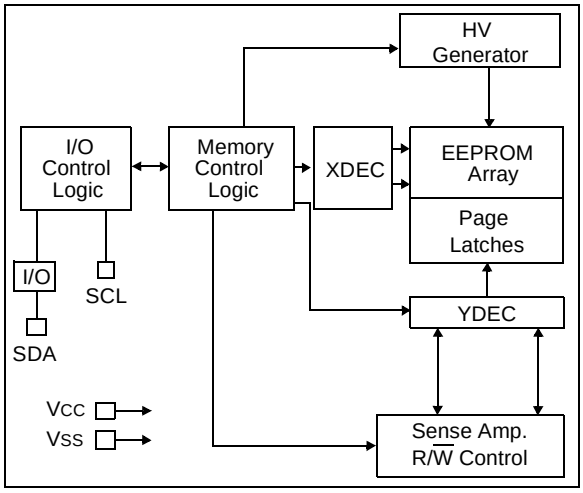
The Microchip Technology Inc. 24AA02E48 is a 2 Kbit Electrically Erasable PROM. The device is organized as two blocks of 128 x 8-bit memory with a 2-wire serial interface. Low-voltage design permits operation down to 1.7V, with maximum standby and active currents of only 1 μA and 1 mA, respectively. The 24AA02E48 also has a page write capability for up to 8 bytes of data. The 24AA02E48 is available in the standard 8-pin SOIC and 5-lead SOT-23 packages.

Package Types



Note: Pins A0, A1 and A2 are not used by the 24AA02E48 (no internal connections).

Block Diagram



© 2009 Microchip Technology Inc.

Downloaded from Elcodis.com electronic components distributor

1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (†)

VCC.....6.5V

All inputs and outputs w.r.t. VSS ..... -0.3V to VCC +1.0V

Storage temperature .....-65°C to +150°C

Ambient temperature with power applied.....-40°C to +85°C

ESD protection on all pins .....≥ 4 kV

† NOTICE: Stresses above those listed under “Absolute 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 operational listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

TABLE 1-1: DC CHARACTERISTICS

DC CHARACTERISTICS			Industrial (I): TA = -40°C to +85°C, VCC = +1.7V to +5.5V				
Param. No.	**Sym.**	**Characteristic**	**Min.**	**Typ.**	**Max.**	**Units**	**Conditions**
D1	VIH	**WP, SCL and SDA pins**	—	—	—	—	—
D2	—	High-level Input Voltage	0.7 VCC	—	—	V	—
D3	VIL	Low-level Input Voltage	—	—	0.3 VCC	V	—
D4	VHYS	Hysteresis of Schmitt Trigger inputs	0.05 VCC	—	—	V	**(Note)**
D5	VOL	Low-level Output Voltage	—	—	0.40	V	IOL = 3.0 mA, VCC = 2.5V
D6	ILI	**Input Leakage Current**	—	—	±1	µA	VIN = VSS or VCC
D7	ILO	**Output Leakage Current**	—	—	±1	µA	VOUT = VSS or VCC
D8	CIN, COUT	Pin Capacitance (all inputs/outputs)	—	—	10	pF	VCC = 5.0V **(Note)** TA = 25°C, FCLK = 1 MHz
D9	ICC write	**Operating Current**	—	0.1	3	mA	VCC = 5.5V, SCL = 400 kHz
D10	ICC read		—	0.05	1	mA	—
D11	ICCS	**Standby Current**	—	0.01	1	µA	Industrial SDA = SCL = VCC WP = VSS

Note: This parameter is periodically sampled and not 100% tested.

© 2009 Microchip Technology Inc.

Downloaded from Elcodis.com electronic components distributor

TABLE 1-2: AC CHARACTERISTICS

AC CHARACTERISTICS			Industrial (I): T_A = -40°C to +85°C, V_{CC} = +1.7V to +5.5V				
Param. No.	**Sym.**	**Characteristic**	**Min.**	**Typ.**	**Max.**	**Units**	**Conditions**
1	F_{CLK}	Clock frequency	— —	— —	400 100	kHz	2.5V ≤ V_{CC} ≤ 5.5V 1.7V ≤ V_{CC} < 2.5V
2	T_{HIGH}	Clock high time	600 4000	— —	— —	ns	2.5V ≤ V_{CC} ≤ 5.5V 1.7V ≤ V_{CC} < 2.5V
3	T_{LOW}	Clock low time	1300 4700	— —	— —	ns	2.5V ≤ V_{CC} ≤ 5.5V 1.7V ≤ V_{CC} < 2.5V
4	T_R	SDA and SCL rise time **(Note 1)**	— —	— —	300 1000	ns	2.5V ≤ V_{CC} ≤ 5.5V **(Note 1)** 1.7V ≤ V_{CC} < 2.5V **(Note 1)**
5	T_F	SDA and SCL fall time	—	— —	300	ns	**(Note 1)**
6	$T_{HD:STA}$	Start condition hold time	600 4000	— —	— —	ns	2.5V ≤ V_{CC} ≤ 5.5V 1.7V ≤ V_{CC} < 2.5V
7	$T_{SU:STA}$	Start condition setup time	600 4700	— —	— —	ns	2.5V ≤ V_{CC} ≤ 5.5V 1.7V ≤ V_{CC} < 2.5V
8	$T_{HD:DAT}$	Data input hold time	0	— —	—	ns	**(Note 2)**
9	$T_{SU:DAT}$	Data input setup time	100 250	— —	— —	ns	2.5V ≤ V_{CC} ≤ 5.5V 1.7V ≤ V_{CC} < 2.5V
10	$T_{SU:STO}$	Stop condition setup time	600 4000	— —	— —	ns	2.5V ≤ V_{CC} ≤ 5.5V 1.7V ≤ V_{CC} < 2.5V
11	T_{AA}	Output valid from clock **(Note 2)**	— —	— —	900 3500	ns	2.5V ≤ V_{CC} ≤ 5.5V 1.7V ≤ V_{CC} < 2.5V
12	T_{BUF}	Bus free time: Time the bus must be free before a new transmission can start	1300 4700	— —	— —	ns	2.5V ≤ V_{CC} ≤ 5.5V 1.7V ≤ V_{CC} < 2.5V
13	T_{OF}	Output fall time from V_{IH} minimum to V_{IL} maximum	— —	— —	250 250	ns	2.5V ≤ V_{CC} ≤ 5.5V 1.7V ≤ V_{CC} < 2.5V
14	T_{SP}	Input filter spike suppression (SDA and SCL pins)	—	—	50	ns	**(Notes 1 and 3)**
15	T_{WC}	Write cycle time (byte or page)	—	—	5	ms	—
16	—	Endurance	1M	—	—	cycles	25°C **(Note 4)**

Note 1: Not 100% tested. C_B = total capacitance of one bus line in pF.

2: As a transmitter, the device must provide an internal minimum delay time to bridge the undefined region (minimum 300 ns) of the falling edge of SCL to avoid unintended generation of Start or Stop conditions.

3: The combined T_{SP} and V_{HYS} specifications are due to new Schmitt Trigger inputs which provide improved noise spike suppression. This eliminates the need for a T_I specification for standard operation.

4: This parameter is not tested but ensured by characterization. For endurance estimates in a specific application, please consult the Total Endurance™ Model which can be obtained from Microchip's web site at www.microchip.com.

Downloaded from Elcodis.com electronic components distributor

FIGURE 1-1: BUS TIMING DATA

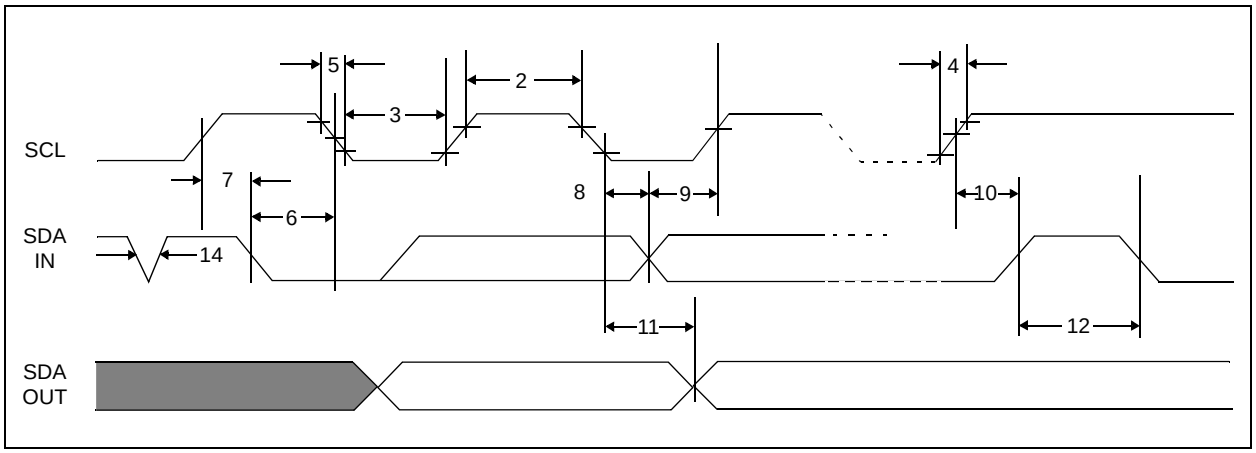
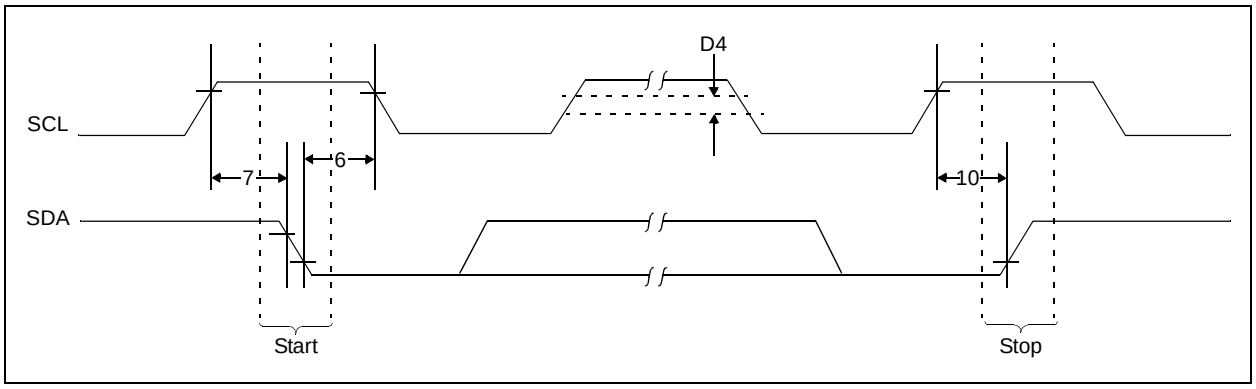


FIGURE 1-2: BUS TIMING START/STOP



© 2009 Microchip Technology Inc.

Downloaded from Elcodis.com electronic components distributor

2.0 FUNCTIONAL DESCRIPTION

The 24AA02E48 supports a bidirectional, 2-wire bus and data transmission protocol. A device that sends data onto the bus is defined as transmitter, while a device receiving data is defined as a receiver. The bus has to be controlled by a master device which generates the Serial Clock (SCL), controls the bus access and generates the Start and Stop conditions, while the 24AA02E48 works as slave. Both master and slave can operate as transmitter or receiver, but the master device determines which mode is activated.

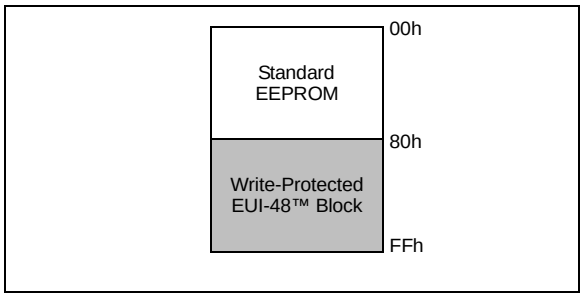
Note:	This data sheet documents only the device's features and specifications that are in addition to the features and specifications of the 24AA02 device. For information on the features and specifications shared by the 24AA02E48 and 24AA02 devices, see the "*24AA02 Data Sheet*" (DS21709).

Downloaded from Elcodis.com electronic components distributor

3.0 PRE-PROGRAMMED EUI-48™ NODE ADDRESS

The 24AA02E48 is programmed at the factory with a globally unique, EUI-48™ and EUI-64™ compatible node address stored in the upper half of the array and permanently write-protected. The remaining 1,024 bits are available for application use.

FIGURE 3-1: MEMORY ORGANIZATION



The 6-byte EUI-48 node address value is stored in array locations 0xFA through 0xFF, as shown in Figure 3-2. The first 3 bytes are the Organizationally Unique Identifier (OUI) assigned to Microchip by the IEEE Registration Authority. The remaining 3 bytes are the Extension Identifier, and are generated by Microchip to ensure a globally-unique, 48-bit value.

3.1 EUI-64™ Support

The pre-programmed EUI-48 node address can easily be encapsulated at the application level to form a globally unique, 64-bit node address for systems utilizing the EUI-64 standard. This is done by adding 0xFFFE between the OUI and the Extension Identifier, as shown below.

FIGURE 3-2: EUI-48 NODE ADDRESS PHYSICAL MEMORY MAP EXAMPLE

Description	24-bit Organizationally Unique Identifier			24-bit Extension Identifier		
Data	00h	04h	A3h	12h	34h	56h
Array Address	FAh					FFh

Corresponding EUI-48™ Node Address: 00-04-A3-12-34-56

Corresponding EUI-64™ Node Address: 00-04-A3-FF-FE-12-34-56

4.0 WRITE PROTECTION

The upper half of the array (80h-FFh) is permanently write-protected. Write operations to this address range are inhibited. Read operations are not affected.

The remaining half of the array (00h-7Fh) can be written to and read from normally.

© 2009 Microchip Technology Inc.

Downloaded from Elcodis.com electronic components distributor

5.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 5-1.

TABLE 5-1: PIN FUNCTION TABLE

Name	SOIC	SOT23	Description
A0	1	—	Not Connected
A1	2	—	Not Connected
A2	3	—	Not Connected
VSS	4	2	Ground
SDA	5	3	Serial Address/Data I/O
SCL	6	1	Serial Clock
NC	7	5	Not Connected
VCC	8	4	+1.7V to 5.5V Power Supply

5.1 Serial Address/Data Input/Output (SDA)

SDA is a bidirectional pin used to transfer addresses and data into and out of the device. Since it is an open-drain terminal, the SDA bus requires a pull-up resistor to VCC (typical 10 kΩ for 100 kHz, 2 kΩ for 400 kHz).

For normal data transfer, SDA is allowed to change only during SCL low. Changes during SCL high are reserved for indicating Start and Stop conditions.

5.2 Serial Clock (SCL)

The SCL input is used to synchronize the data transfer to and from the device.

5.3 A0, A1, A2

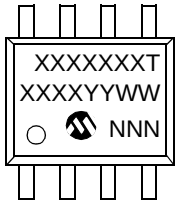
These A0, A1 and A2 pins are not used by the 24AA02E48. They may be left floating or tied to either VSS or VCC.

Downloaded from Elcodis.com electronic components distributor

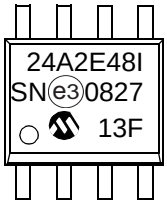
6.0 PACKAGING INFORMATION

6.1 Package Marking Information

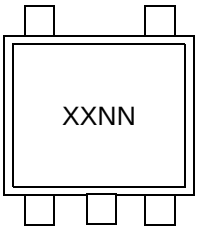
8-Lead SOIC (3.90 mm)



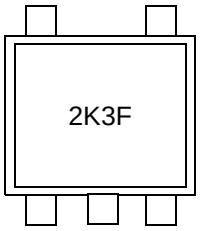
Example:



5-Lead SOT-23



Example:



Part Number	1st Line Marking Code
	SOT-23
	I Temp.
24AA02E48	2KNN

Note: NN = Alphanumeric traceability code

Legend:	XX...X	Part number or part number code
	T	Temperature (I, E)
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code (2 characters for small packages)
	e3	Pb-free JEDEC designator for Matte Tin (Sn)

Note: For very small packages with no room for the Pb-free JEDEC designator e3 , the marking will only appear on the outer carton or reel label.

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information.

Note: Please visit www.microchip.com/Pbfree for the latest information on Pb-free conversion.

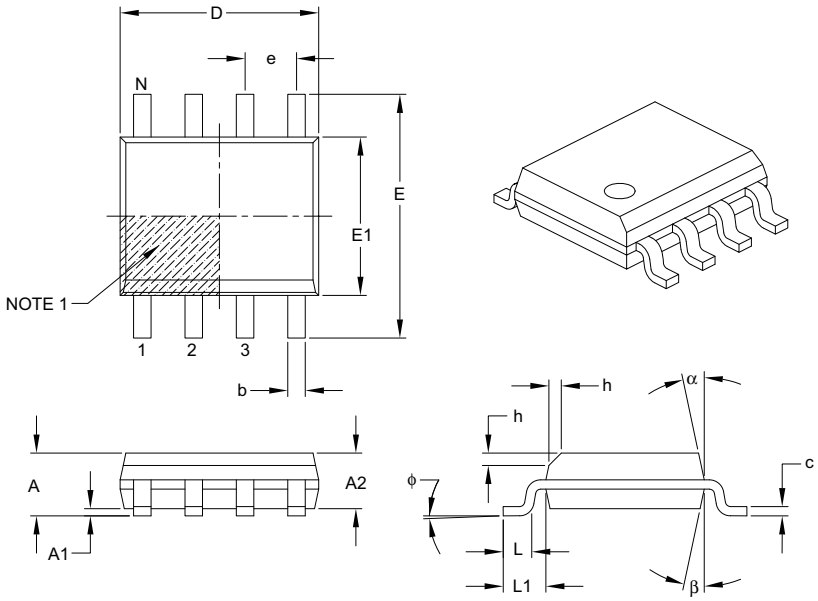
***Standard OTP marking consists of Microchip part number, year code, week code, and traceability code.

© 2009 Microchip Technology Inc.

Downloaded from Elcodis.com electronic components distributor

8-Lead Plastic Small Outline (SN) – Narrow, 3.90 mm Body [SOIC]

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



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		1.27 BSC	
Overall Height	A	–	–	1.75
Molded Package Thickness	A2	1.25	–	–
Standoff §	A1	0.10	–	0.25
Overall Width	E		6.00 BSC	
Molded Package Width	E1		3.90 BSC	
Overall Length	D		4.90 BSC	
Chamfer (optional)	h	0.25	–	0.50
Foot Length	L	0.40	–	1.27
Footprint	L1		1.04 REF	
Foot Angle	ϕ	0°	–	8°
Lead Thickness	c	0.17	–	0.25
Lead Width	b	0.31	–	0.51
Mold Draft Angle Top	α	5°	–	15°
Mold Draft Angle Bottom	β	5°	–	15°

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic.
3. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15 mm per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

   BSC: Basic Dimension. Theoretically exact value shown without tolerances.

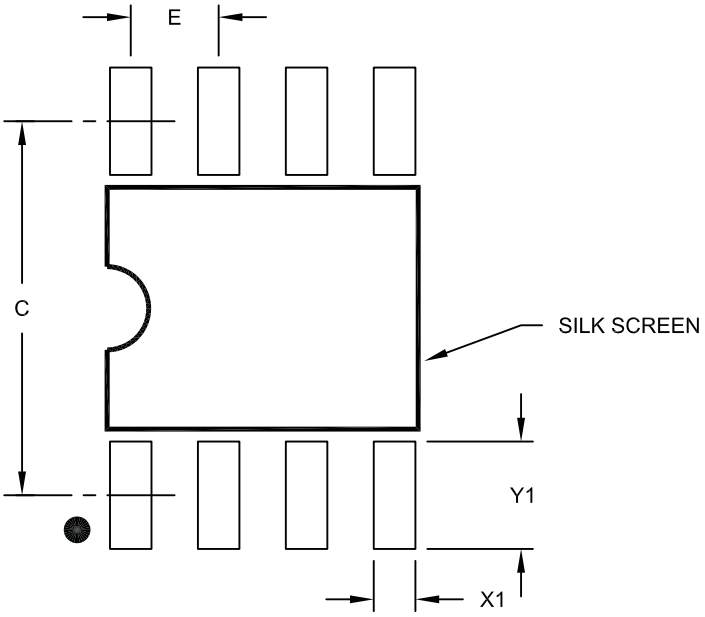
   REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-057B

Downloaded from Elcodis.com electronic components distributor

8-Lead Plastic Small Outline (SN) – Narrow, 3.90 mm Body [SOIC]

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



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E		1.27 BSC	
Contact Pad Spacing	C		5.40	
Contact Pad Width (X8)	X1			0.60
Contact Pad Length (X8)	Y1			1.55

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

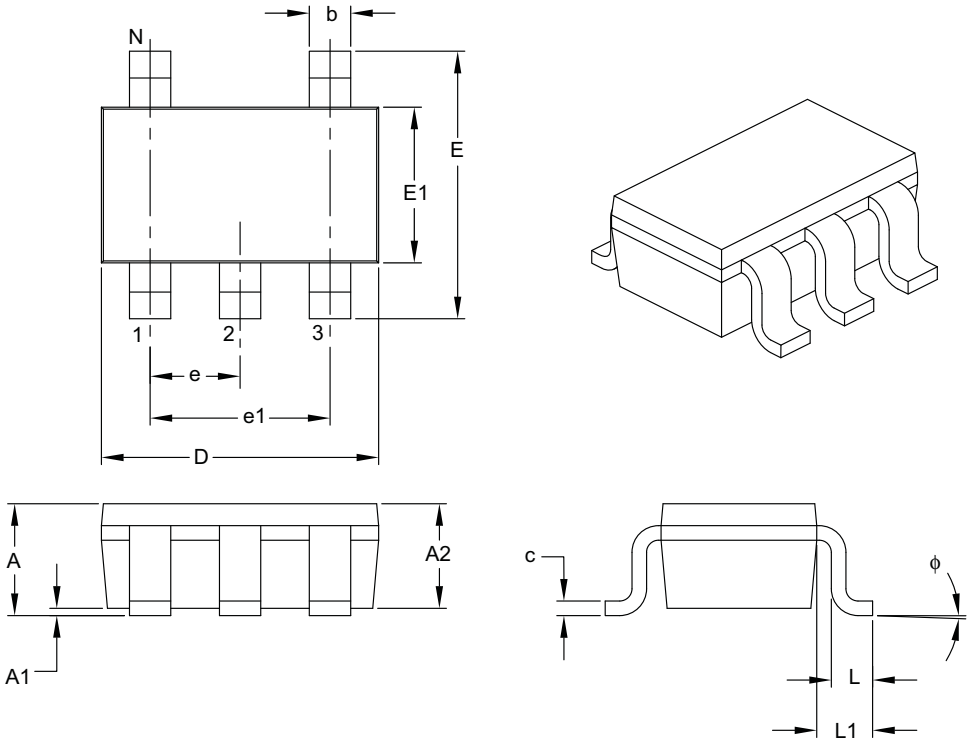
Microchip Technology Drawing No. C04-2057A

© 2009 Microchip Technology Inc.

Downloaded from Elcodis.com electronic components distributor

5-Lead Plastic Small Outline Transistor (OT) [SOT-23]

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



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		5	
Lead Pitch	e		0.95 BSC	
Outside Lead Pitch	e1		1.90 BSC	
Overall Height	A	0.90	–	1.45
Molded Package Thickness	A2	0.89	–	1.30
Standoff	A1	0.00	–	0.15
Overall Width	E	2.20	–	3.20
Molded Package Width	E1	1.30	–	1.80
Overall Length	D	2.70	–	3.10
Foot Length	L	0.10	–	0.60
Footprint	L1	0.35	–	0.80
Foot Angle	ϕ	0°	–	30°
Lead Thickness	c	0.08	–	0.26
Lead Width	b	0.20	–	0.51

Notes:

1. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
2. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-091B

Downloaded from Elcodis.com electronic components distributor

APPENDIX A: REVISION HISTORY

Revision A (12/08)

Original release of this document.

Revision B (01/09)

Removed preliminary status.

© 2009 Microchip Technology Inc.

Downloaded from Elcodis.com electronic components distributor

THE MICROCHIP WEB SITE

Microchip provides online support via our WWW site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQ), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

CUSTOMER CHANGE NOTIFICATION SERVICE

Microchip's customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, access the Microchip web site at www.microchip.com, click on Customer Change Notification and follow the registration instructions.

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support
- Development Systems Information Line

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: http://support.microchip.com

Downloaded from Elcodis.com electronic components distributor

READER RESPONSE

It is our intention to provide you with the best documentation possible to ensure successful use of your Microchip product. If you wish to provide your comments on organization, clarity, subject matter, and ways in which our documentation can better serve you, please FAX your comments to the Technical Publications Manager at (480) 792-4150.

Please list the following information, and use this outline to provide us with your comments about this document.

To: Technical Publications Manager Total Pages Sent _____

RE: Reader Response

From: Name _____

Company _____

Address _____

City / State / ZIP / Country _____

Telephone: (_____) _____ - _____ FAX: (_____) _____ - _____

Application (optional):

Would you like a reply? ___Y ___N

Device: 24AA02E48 Literature Number: DS22124B

Questions:

1. What are the best features of this document?

2. How does this document meet your hardware and software development needs?

3. Do you find the organization of this document easy to follow? If not, why?

4. What additions to the document do you think would enhance the structure and subject?

5. What deletions from the document could be made without affecting the overall usefulness?

6. Is there any incorrect or misleading information (what and where)?

7. How would you improve this document?

© 2009 Microchip Technology Inc.

Downloaded from Elcodis.com electronic components distributor

PRODUCT IDENTIFICATION SYSTEM

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

PART NO.	X	/XX
Device	Temperature Range	Package

Device:	24AA02E48:	=	1.7V, 2 Kbit I^2C Serial EEPROM with EUI-48™ Node Identity
	24AA02E48T:	=	1.7V, 2 Kbit I^2C Serial EEPROM with EUI-48™ Node Identity (Tape and Reel)
Temperature Range:	I	=	-40°C to +85°C
Package:	SN	=	Plastic SOIC (3.90 mm body), 8-lead
	OT	=	SOT-23, 5-lead (Tape and Reel only)

Examples:

a) 24AA02E48-I/SN: Industrial Temperature, 1.7V, SOIC package

b) 24AA02E48T-I/OT: Industrial Temperature, 1.7V, SOT-23 package, tape and reel

Downloaded from Elcodis.com electronic components distributor

NOTES:

© 2009 Microchip Technology Inc.

Downloaded from Elcodis.com electronic components distributor

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, Accuron, dsPIC, KEELOQ, KEELOQ logo, MPLAB, PIC, PICmicro, PICSTART, rfPIC, SmartShunt and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

FilterLab, Linear Active Thermistor, MXDEV, MXLAB, SEEVAL, SmartSensor and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, Application Maestro, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, In-Circuit Serial Programming, ICSP, ICEPIC, Mindi, MiWi, MPASM, MPLAB Certified logo, MPLIB, MPLINK, mTouch, PICkit, PICDEM, PICDEM.net, PICtail, PIC^{32} logo, PowerCal, PowerInfo, PowerMate, PowerTool, REAL ICE, rfLAB, Select Mode, Total Endurance, WiperLock and ZENA 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.

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

© 2009, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

Printed on recycled paper.

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
ISO/TS 16949:2002

Microchip received ISO/TS-16949:2002 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.

Downloaded from Elcodis.com electronic components distributor

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://support.microchip.com
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

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

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

Kokomo
Kokomo, IN
Tel: 765-864-8360
Fax: 765-864-8387

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: 86-10-8528-2100
Fax: 86-10-8528-2104

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

China - Hong Kong SAR
Tel: 852-2401-1200
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: 86-755-8203-2660
Fax: 86-755-8203-1760

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

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

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

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

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4080

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 - Yokohama
Tel: 81-45-471- 6166
Fax: 81-45-471-6122

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: 886-3-572-9526
Fax: 886-3-572-6459

Taiwan - Kaohsiung
Tel: 886-7-536-4818
Fax: 886-7-536-4803

Taiwan - Taipei
Tel: 886-2-2500-6610
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

01/16/09

© 2009 Microchip Technology Inc.

Downloaded from Elcodis.com electronic components distributor