93AA46, 93LC46, 93C46
93AA46A/B, 93LC46A/B, 93C46A/B

1K Microwire® Serial EEPROM

Device Selection Table

Part Number	VCC Range	Org Pin	Word Size	Temp Ranges
93AA46	1.8-5.5	Yes	8 or 16-bit	I
93LC46	2.5-5.5	Yes	8 or 16-bit	I, E
93C46	4.5-5.5	Yes	8 or 16-bit	I, E
93AA46A	1.8-5.5	No	8-bit	I
93AA46B	1.8-5-5	No	16-bit	I
93LC46A	2.5-5.5	No	8-bit	I, E
93LC46B	2.5-5.5	No	16-bit	I, E
93C46A	4.5-5.5	No	8-bit	I, E
93C46B	4.5-5.5	No	16-bit	I, E

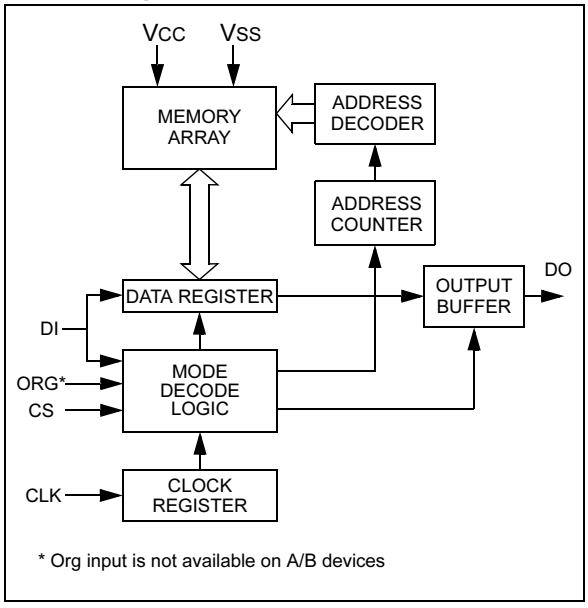
Features

- Low power CMOS technology
- ORG pin for selectable memory configuration
- No org pin for dedicated word sizes
  - 128 x 8-bit organization 'A' version devices
  - 64 x 16-bit organization 'B' version devices
- Self-timed ERASE and WRITE cycles (including auto-erase)
- Automatic ERAL before WRAL
- Power on/off data protection circuitry
- Industry standard 3-wire serial I/O
- Device status signal during ERASE/WRITE cycles
- Sequential READ function
- 1,000,000 E/W cycles
- Data retention > 200 years
- 8-pin MSOP and 6-pin SOT
- Temperature ranges supported:
  - Industrial (I): -40°C to +85°C
  - Automotive (E) -40°C to +125°C

Description

The Microchip Technology Inc. 93AA46, 93LC46, 93C46, 93AA46A/B, 93LC46A/B & 93C46A/B are 1K low voltage serial Electrically Erasable PROMs (EEPROM). Generic memory devices such as the 93AA46, 93LC46 or 93C46 are dependent upon external logic levels driving the ORG pin to set word size. For dedicated 8-bit communication, the 93AA46A, 93LC46A or 93C46A devices are selected, while the 93AA46B, 93LC46B and 93C46B devices are selected for 16 bits. Advanced CMOS technology makes these devices ideal for low power, non-volatile memory applications. This 93XX Series is available in standard 8-lead MSOP and 6-lead SOT-23 packages.

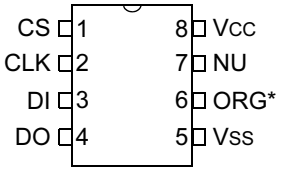
Block Diagram



* Org input is not available on A/B devices

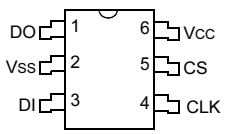
Package Types

MSOP



* Org pin is not available on A/B devices

SOT-23**



** SOT-23 device only offered in A/B versions

1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings†

V_{CC}.....6.5V

All inputs and outputs w.r.t. V_{SS} ..... -0.6V to V_{CC} +1.0V

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

Ambient temp. with power applied .....-40°C to +125°C

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

† 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 operational listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

DC CHARACTERISTICS

DC CHARACTERISTICS			V_{CC} = +1.8V to +5.5V Industrial (I): T_{AMB} = -40°C to +85°C Automotive (E): T_{AMB} = -40°C to +125°C				
Param. No.	**Sym**	**Characteristic**	**Min**	**Typ**	**Max**	**Units**	**Conditions**
D1	$V_{IH}1$	High level input voltage	2.0	—	V_{CC} +1	V	$V_{CC} \geq 2.7V$
	$V_{IH}2$		0.7 V_{CC}	—	V_{CC} +1	V	$V_{CC} < 2.7V$
D2	$V_{IL}1$	Low level input voltage	-0.3	—	0.8	V	$V_{CC} \geq 2.7V$
	$V_{IL}2$		-0.3	—	0.2 V_{CC}	V	$V_{CC} < 2.7V$
D3	$V_{OL}1$	Low level output voltage	—	—	0.4	V	I_{OL} = 2.1 mA, V_{CC} = 4.5V
	$V_{OL}2$		—	—	0.3	V	I_{OL} = 100 μA, V_{CC} = 2.5V
D4	$V_{OH}1$	High level output voltage	2.4	—	—	V	I_{OH} = -400 μA, V_{CC} = 4.5V
	$V_{OH}2$		V_{CC}-0.2	—	—	V	I_{OH} = -100 μA, V_{CC} = 2.5V
D5	I_{LI}	Input leakage current	—	—	±10	μA	V_{IN} = 0.1V to V_{CC}
D6	I_{LO}	Output leakage current	—	—	±10	μA	V_{OUT} = 0.1V to V_{CC}
D7	C_{IN}, C_{OUT}	Pin capacitance (all inputs/outputs)	—	—	7	pF	V_{IN}/V_{OUT} = 0V **(Note 1 & 2)** T_{AMB} = 25°C, F_{CLK} = 1 MHz
D8	I_{CC} write	Operating current	—	—	3	mA	F_{CLK} = 2 MHz, V_{CC} = 5.5V
D9	I_{CC} read		—	—	1	mA	F_{CLK} = 2 MHz, V_{CC} = 5.5V
			—	—	500	μA	F_{CLK} = 1 MHz, V_{CC} = 3.0V
			—	100	—	μA	F_{CLK} = 1 MHz, V_{CC} = 2.5V
D10	$I_{CCS}2$	Standby current	—	—	1	μA	I-Temp
			—	—	5	μA	E-Temp CLK = CS = 0V ORG = DI = V_{SS} or V_{CC} **(Note 3)**

Note 1: This parameter is tested at T_{AMB} = 25°C and F_{CLK} = 1 MHz.

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

3: Org pin not available on ‘A’ or ‘B’ versions.

AC CHARACTERISTICS

AC CHARACTERISTICS			VCC = +1.8V to +5.5V Industrial (I): TAMB = -40°C to +85°C Automotive (E): TAMB = -40°C to +125°C				
Param. No.	**Sym**	**Characteristic**	**Min**	**Typ**	**Max**	**Units**	**Conditions**
1	FCLK	Clock frequency	— —	— —	2 1	MHz MHz	VCC ≥ 4.5V VCC < 4.5V
2	TCKH	Clock high time	250	—	—	ns	
3	TCKL	Clock low time	250	—	—	ns	
4	TCSS	Chip select setup time	50	—	—	ns	Relative to CLK
5	TCSH	Chip select hold time	0	—	—	ns	Relative to CLK
6	TCSL	Chip select low time	250	—	—	ns	
7	TDIS	Data input setup time	100	—	—	ns	Relative to CLK
8	TDIH	Data input hold time	100	—	—	ns	Relative to CLK
9	TPD	Data output delay time	—	—	400	ns	CL = 100 pF
10	TCZ	Data output disable time	—	—	100	ns	CL = 100 pf **(Note 2)**
11	TSV	Status valid time	—	—	500	ns	CL = 100 pF
12	TWC	Program cycle time	—	4	10	ms	ERASE/WRITE mode
				1.5	2	ms	93CXX devices only
13	TEC		—	8	15	ms	ERAL mode (VCC=5V ±10%)
14	TWL		—	16	30	ms	WRAL mode (VCC=5V ±10%)
15	—	Endurance	1M	—	1M	cycles	25°C, VCC = 5.0V, ERAL/ WRAL **(Note 3)**

Note 1: This parameter is tested at TAMB = 25°C and FCLK = 1 MHz.

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

3: 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 on Microchip's website: www.microchip.com.

FIGURE 1-1: SYNCHRONOUS DATA TIMING

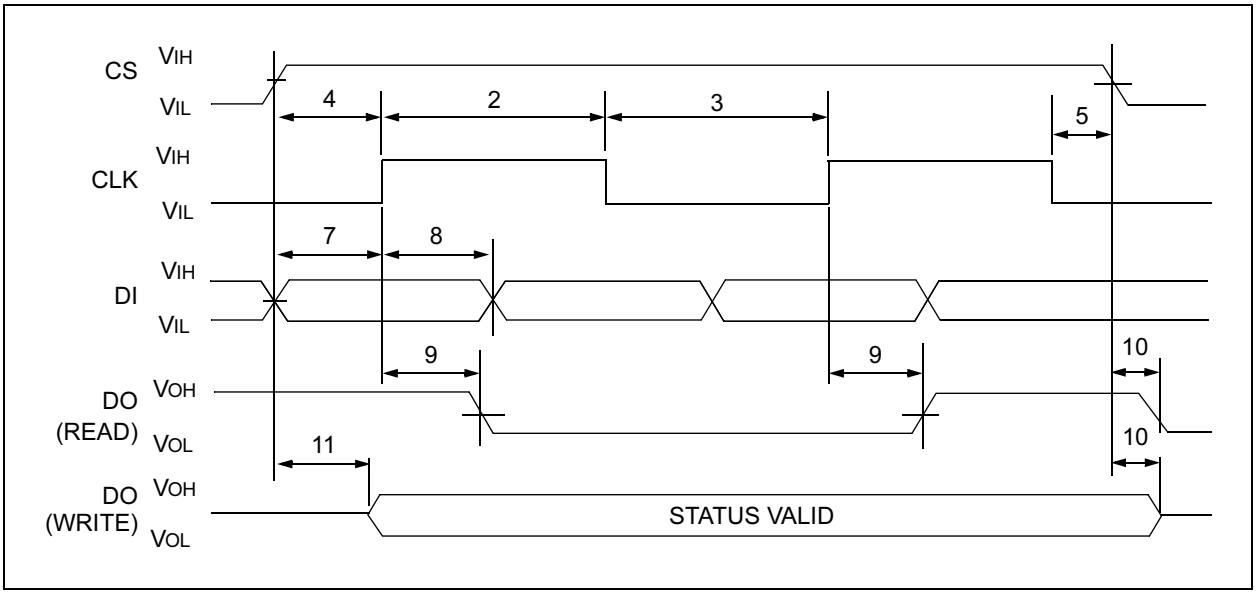


TABLE 1-1: INSTRUCTION SET FOR X 16 ORGANIZATION (B - VERSION DEVICES OR ORG = 1)

Instruction	SB	Opcode	Address						Data In	Data Out	Req. CLK Cycles
ERASE	1	11	A5	A4	A3	A2	A1	A0	—	(RDY/$\overline{\text{BSY}}$)	9
ERAL	1	00	1	0	X	X	X	X	—	(RDY/$\overline{\text{BSY}}$)	9
EWDS	1	00	0	0	X	X	X	X	—	HIGH-Z	9
EWEN	1	00	1	1	X	X	X	X	—	HIGH-Z	9
READ	1	10	A5	A4	A3	A2	A1	A0	—	D15 - D0	25
WRITE	1	01	A5	A4	A3	A2	A1	A0	D15 - D0	(RDY/$\overline{\text{BSY}}$)	25
WRAL	1	00	0	1	X	X	X	X	D15 - D0	(RDY/$\overline{\text{BSY}}$)	25

TABLE 1-2: INSTRUCTION SET FOR X 8 ORGANIZATION (A - VERSION DEVICES OR ORG = 0)

Instruction	SB	Opcode	Address							Data In	Data Out	Req. CLK Cycles
ERASE	1	11	A6	A5	A4	A3	A2	A1	A0	—	(RDY/$\overline{\text{BSY}}$)	10
ERAL	1	00	1	0	X	X	X	X	X	—	(RDY/$\overline{\text{BSY}}$)	10
EWDS	1	00	0	0	X	X	X	X	X	—	HIGH-Z	10
EWEN	1	00	1	1	X	X	X	X	X	—	HIGH-Z	10
READ	1	10	A6	A5	A4	A3	A2	A1	A0	—	D7 - D0	18
WRITE	1	01	A6	A5	A4	A3	A2	A1	A0	D7 - D0	(RDY/$\overline{\text{BSY}}$)	18
WRAL	1	00	0	1	X	X	X	X	X	D7 - D0	(RDY/$\overline{\text{BSY}}$)	18

2.0 FUNCTIONAL DESCRIPTION

When the ORG* pin is connected to VCC, the (x16) organization is selected. When it is connected to ground, the (x8) organization is selected. Instructions, addresses and write data are clocked into the DI pin on the rising edge of the clock (CLK). The DO pin is normally held in a high-Z state except when reading data from the device, or when checking the READY/BUSY status during a programming operation. The ready/busy status can be verified during an Erase/Write operation by polling the DO pin; DO low indicates that programming is still in progress, while DO high indicates the device is ready. The DO will enter the high-Z state on the falling edge of the CS.

2.1 START Condition

The START bit is detected by the device if CS and DI are both HIGH with respect to the positive edge of CLK for the first time.

Before a START condition is detected, CS, CLK, and DI may change in any combination (except to that of a START condition), without resulting in any device operation (READ, WRITE, ERASE, EWEN, EWDS, ERAL, and WRAL). As soon as CS is HIGH, the device is no longer in the Standby mode.

An instruction following a START condition will only be executed if the required amount of opcode, address and data bits for any particular instruction is clocked in.

After execution of an instruction (i.e., clock in or out of the last required address or data bit) CLK and DI become don't care bits until a new START condition is detected.

2.2 Data In/Data Out (DI/DO)

It is possible to connect the Data In and Data Out pins together. However, with this configuration it is possible for a “bus conflict” to occur during the “dummy zero” that precedes the READ operation, if A0 is a logic HIGH level. Under such a condition the voltage level seen at Data Out is undefined and will depend upon the relative impedances of Data Out and the signal source driving A0. The higher the current sourcing capability of A0, the higher the voltage at the Data Out pin.

2.3 Data Protection

During power-up, all programming modes of operation are inhibited until VCC exceeds a typical voltage level of 1.5V for 'AA' and 'LC' devices or 3.8V for 'C' devices.

During power-down, the source data protection circuitry acts to inhibit all programming modes when VCC falls below 1.4V for 'AA' and 'LC' devices or 3.5V for 'C' devices.

The EWEN and EWDS commands give additional protection against accidentally programming during normal operation.

After power-up, the device is automatically in the EWDS mode. Therefore, an `EWEN` instruction must be performed before any `ERASE` or `WRITE` instruction can be executed.

*Org pin is not available on A/B devices

2.4 ERASE

The ERASE instruction forces all data bits of the specified address to the logical “1” state. CS is brought low following the loading of the last address bit. This falling edge of the CS pin initiates the self-timed programming cycle, except on ‘C’ devices where the rising edge of CLK before the last address bit initiates the write cycle.

The DO pin indicates the READY/$\overline{\text{BUSY}}$ status of the device if CS is brought high after a minimum of 250 ns low (TCSL). DO at logical “0” indicates that programming is still in progress. DO at logical “1” indicates that the register at the specified address has been erased and the device is ready for another instruction.

FIGURE 2-1: ERASE TIMING FOR 93AA AND 93LC DEVICES

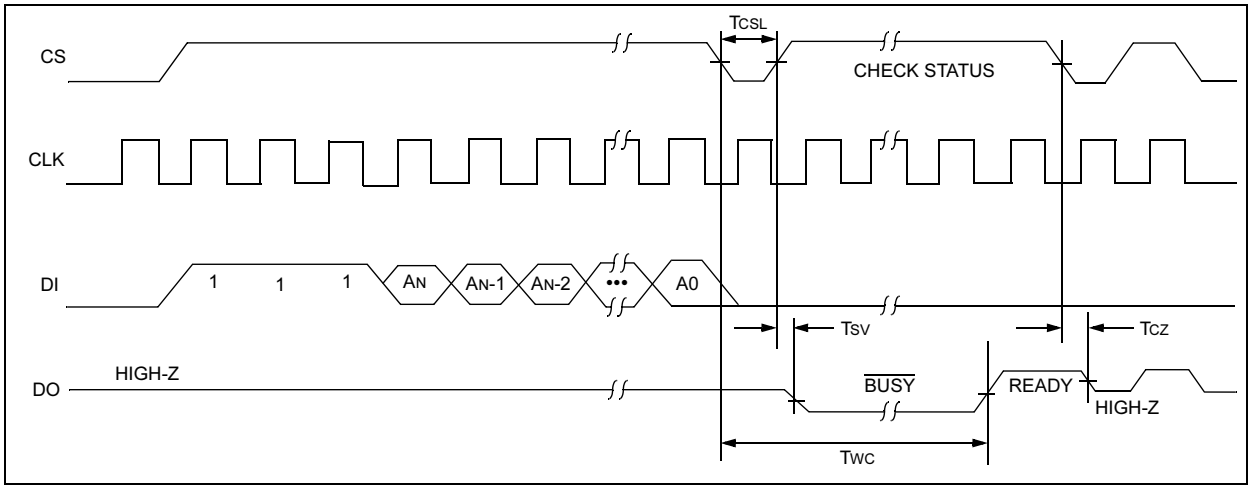
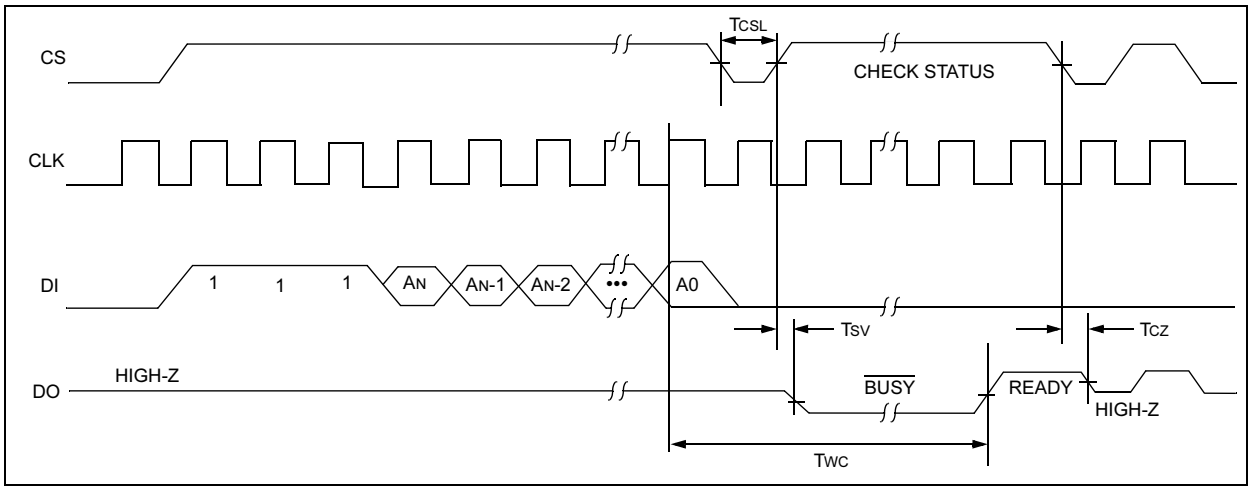


FIGURE 2-2: ERASE TIMING FOR 93C DEVICES



2.5 ERASE ALL (ERAL)

The Erase All (ERAL) instruction will erase the entire memory array to the logical “1” state. The ERAL cycle is identical to the ERASE cycle, except for the different opcode. The ERAL cycle is completely self-timed and commences at the falling edge of the CS, except on ‘C’ devices where the rising edge of CLK before the last data bit initiates the write cycle. Clocking of the CLK pin is not necessary after the device has entered the ERAL cycle.

The DO pin indicates the READY/$\overline{\text{BUSY}}$ status of the device, if CS is brought high after a minimum of 250 ns low (TCSL).

FIGURE 2-3: ERAL TIMING FOR 93AA AND 93LC DEVICES

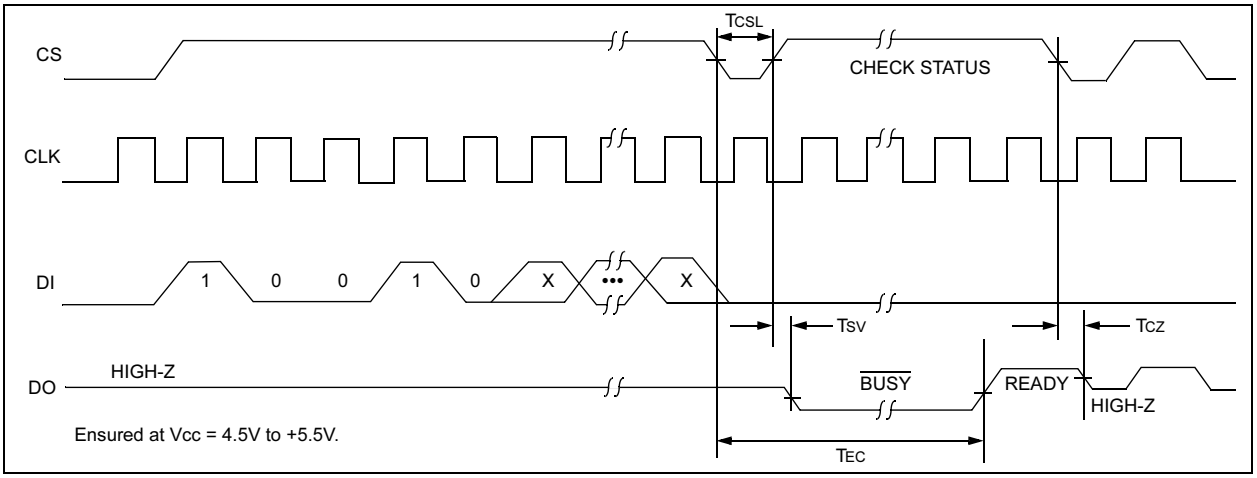
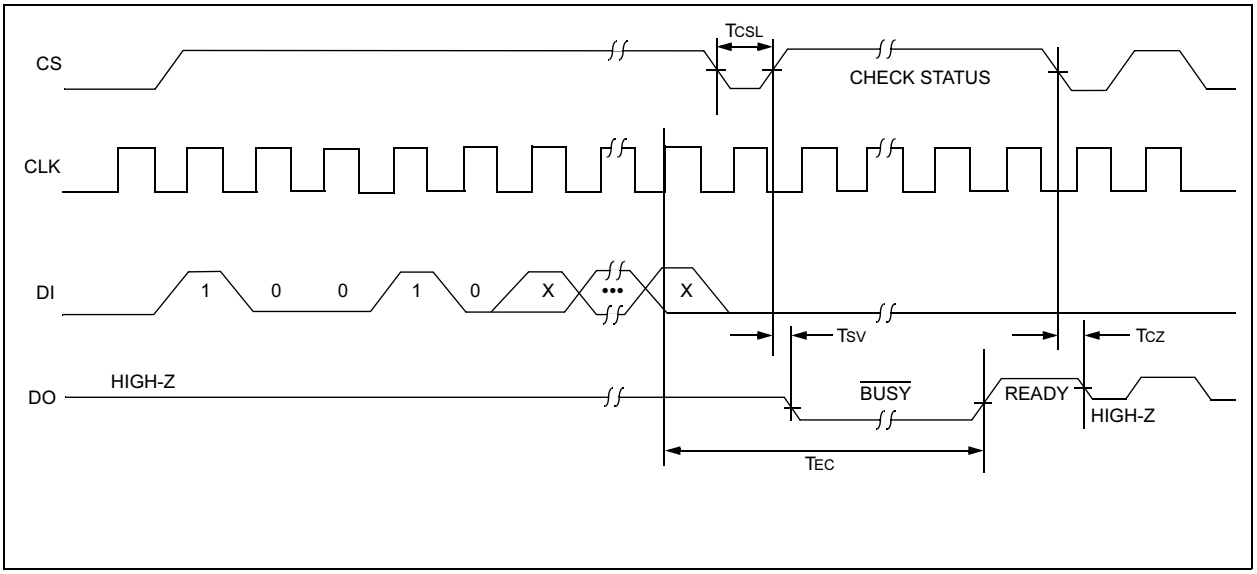


FIGURE 2-4: ERAL TIMING FOR 93C DEVICES



2.6 ERASE/WRITE DISABLE AND ENABLE (EWDS/EWEN)

The 93XX46, 93XX46A/B powers up in the ERASE/WRITE Disable (EWDS) state. All programming modes must be preceded by an ERASE/WRITE Enable (EWEN) instruction. Once the EWEN instruction is executed, programming remains enabled until an EWDS instruction is executed or Vcc is removed from the device. To protect against accidental data disturbance, the EWDS instruction can be used to disable all ERASE/WRITE functions and should follow all programming operations. Execution of a READ instruction is independent of both the EWEN and EWDS instructions.

FIGURE 2-5: EWDS TIMING

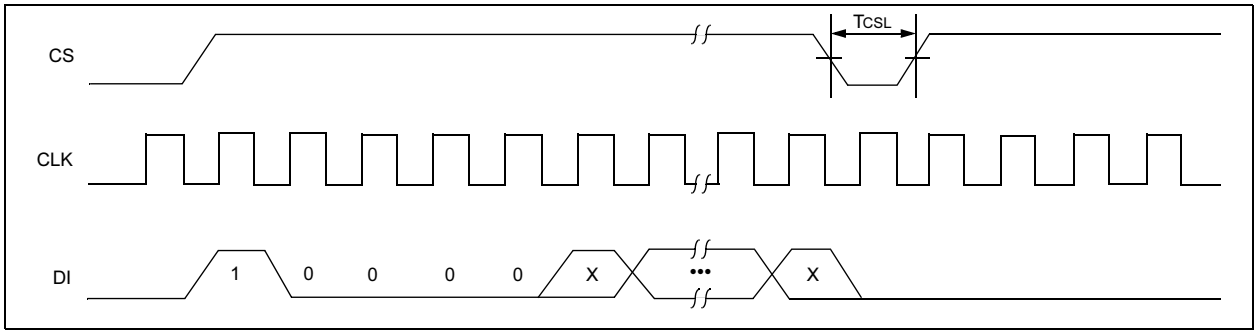
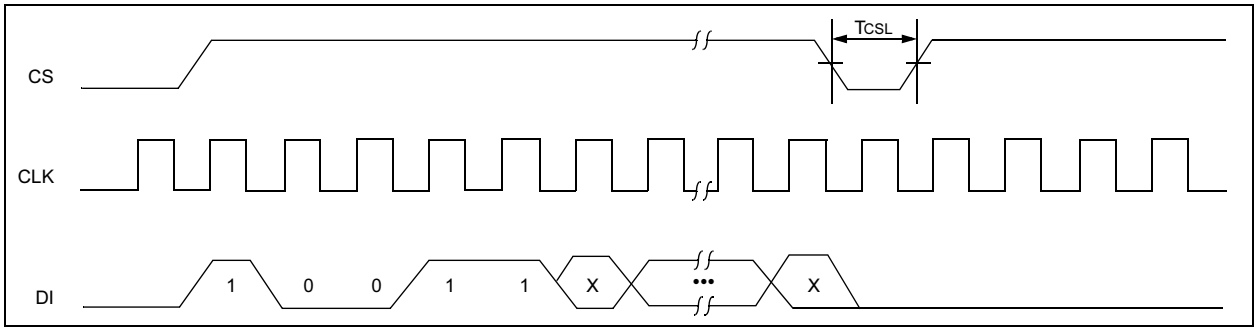


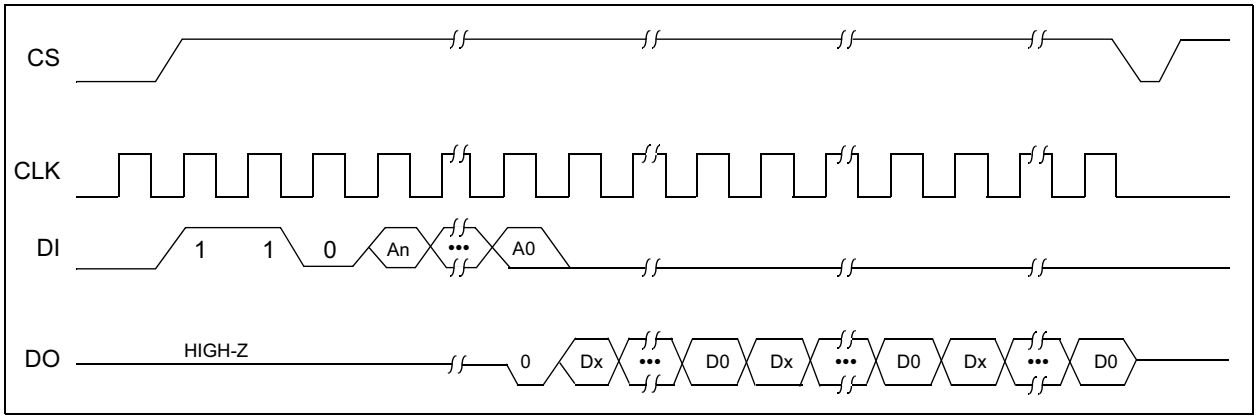
FIGURE 2-6: EWEN TIMING



2.7 READ

The READ instruction outputs the serial data of the addressed memory location on the DO pin. A dummy zero bit precedes the 8-bit (If ORG pin is low or A-Version devices) or 16-bit (If ORG pin is high or B-version devices) output string. The output data bits will toggle on the rising edge of the CLK and are stable after the specified time delay (TPD). Sequential read is possible when CS is held high. The memory data will automatically cycle to the next register and output sequentially.

FIGURE 2-7: READ TIMING



2.8 WRITE

The WRITE instruction is followed by 8 bits (If ORG is low or A-version parts) or 16 bits (If ORG pin is high or B-version devices) of data which are written into the specified address. After the last data bit is put on the DI pin, the falling edge of CS initiates the self-timed auto-erase and programming cycle, except on 'C' devices where the rising edge of CLK before the last data bit initiates the write cycle.

The DO pin indicates the READY/$\overline{\text{BUSY}}$ status of the device, if CS is brought high after a minimum of 250 ns low (TCSL). DO at logical "0" indicates that programming is still in progress. DO at logical "1" indicates that the register at the specified address has been written with the data specified and the device is ready for another instruction.

FIGURE 2-8: WRITE TIMING FOR 93AA AND 93LC DEVICES

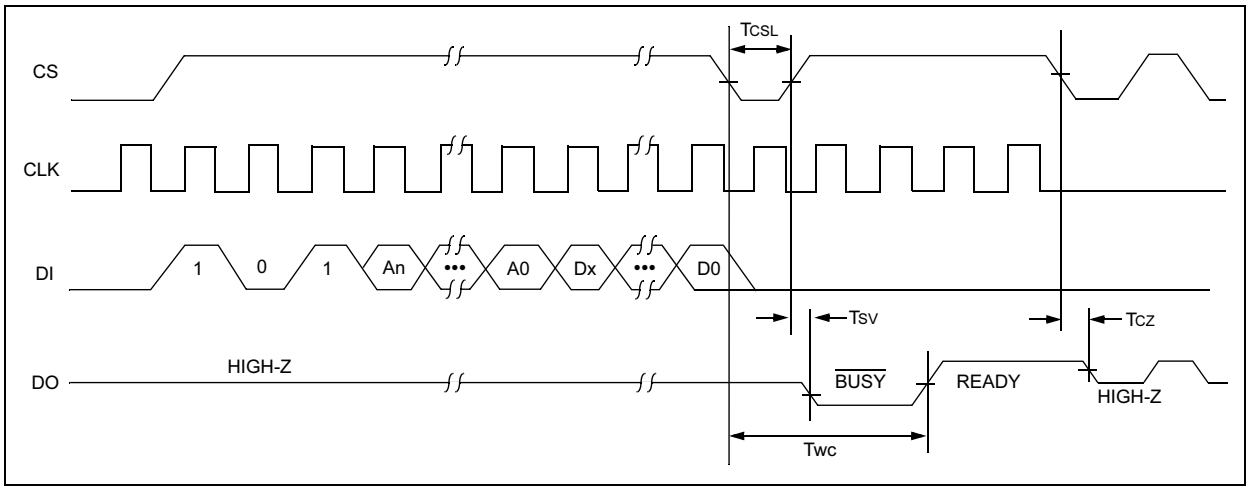
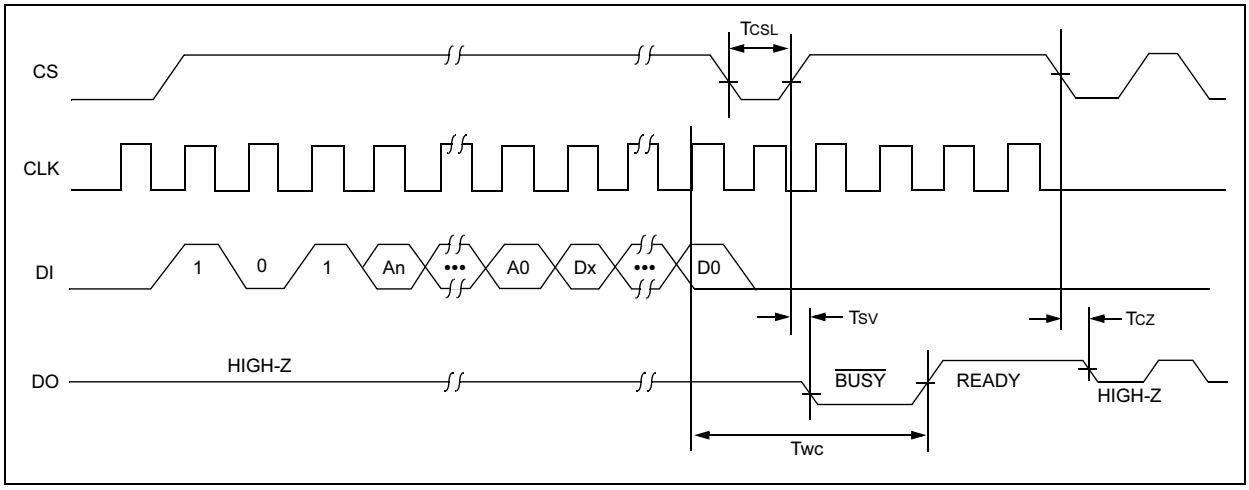


FIGURE 2-9: WRITE TIMING FOR 93C DEVICES



2.9 WRITE ALL (WRAL)

The Write All (WRAL) instruction will write the entire memory array with the data specified in the command. The WRAL cycle is completely self-timed and commences at the falling edge of the CS, except on 'C' devices where the rising edge of CLK before the last data bit initiates the write cycle. Clocking of the CLK pin is not necessary after the device has entered the WRAL cycle. The WRAL command does include an automatic ERAL cycle for the device. Therefore, the WRAL instruction does not require an ERAL instruction but the chip must be in the EWEN status.

The DO pin indicates the READY/$\overline{\text{BUSY}}$ status of the device if CS is brought high after a minimum of 250 ns low (T_{CSL}).

FIGURE 2-10: WRAL TIMING FOR 93AA AND 93LC DEVICES

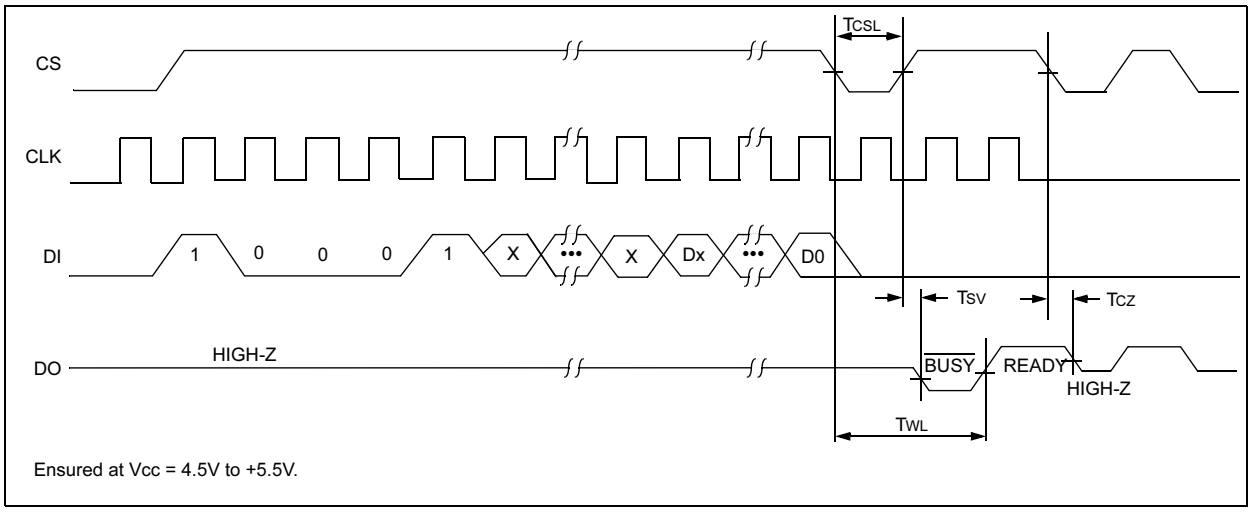
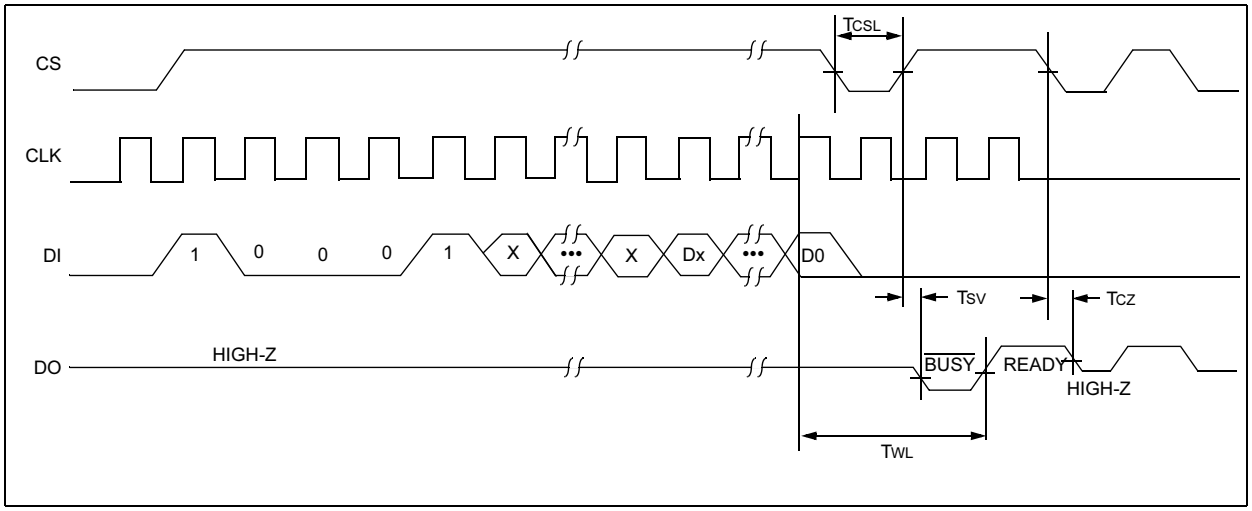


FIGURE 2-11: WRAL TIMING FOR 93C DEVICES



3.0 PIN DESCRIPTIONS

FIGURE 3-1: PIN DESCRIPTIONS

Name	MSOP	6-LEAD SOT-23	Function
CS	1	5	Chip Select
CLK	2	4	Serial Clock
DI	3	3	Data In
DO	4	1	Data Out
Vss	5	2	Ground
ORG/NC	6	N/A	Organization / No Connect (No internal connection for 93XX46A/B)
NC	7	N/A	No Connect (No Internal Connection)
Vcc	8	6	Power Supply

3.1 CHIP SELECT (CS)

A high level selects the device; a low level deselects the device and forces it into Standby mode. However, a programming cycle which is already in progress will be completed, regardless of the Chip Select (CS) input signal. If CS is brought low during a program cycle, the device will go into Standby mode as soon as the programming cycle is completed.

CS must be low for 250 ns minimum (TCSL) between consecutive instructions. If CS is low, the internal control logic is held in a RESET status.

Input filter spike suppression was added to reduce susceptibility to noise.

3.2 SERIAL CLOCK (CLK)

The Serial Clock is used to synchronize the communication between a master device and the 93XX series device. Opcodes, address and data bits are clocked in on the positive edge of CLK. Data bits are also clocked out on the positive edge of CLK.

CLK can be stopped anywhere in the transmission sequence (at high or low level) and can be continued anytime with respect to clock high time (TCKH) and clock low time (TCKL). This gives the controlling master freedom in preparing opcode, address and data.

CLK is a “Don't Care” if CS is low (device deselected). If CS is high, but the START condition has not been detected, any number of clock cycles can be received by the device without changing its status (i.e., waiting for a START condition).

CLK cycles are not required during the self-timed WRITE (i.e., auto ERASE/WRITE) cycle.

After detection of a START condition the specified number of clock cycles (respectively low to high transitions of CLK) must be provided. These clock cycles are required to clock in all required opcode, address and data bits before an instruction is executed. CLK and DI then become don't care inputs waiting for a new START condition to be detected.

Input filter spike suppression was added to reduce susceptibility to noise.

3.3 DATA IN (DI)

Data In (DI) is used to clock in a START bit, opcode, address and data synchronously with the CLK input.

Input filter spike suppression was added to reduce susceptibility to noise.

3.4 DATA OUT (DO)

Data Out (DO) is used in the READ mode to output data synchronously with the CLK input (TPD after the positive edge of CLK).

This pin also provides READY/$\overline{\text{BUSY}}$ status information during ERASE and WRITE cycles. READY/$\overline{\text{BUSY}}$ status information is available on the DO pin if CS is brought high after being low for minimum chip select low time (TCSL) and an ERASE or WRITE operation has been initiated.

The status signal is not available on DO, if CS is held low during the entire ERASE or WRITE cycle. In this case, DO is in the HIGH-Z mode. If status is checked after the ERASE/WRITE cycle, the data line will be high to indicate the device is ready.

3.5 ORGANIZATION (ORG)*

When the ORG pin is connected to VCC or Logic HI, the (x16) memory organization is selected. When the ORG pin is tied to VSS or Logic LO, the (x8) memory organization is selected. For proper operation, ORG must be tied to a valid logic level.

On the dedicated 'A' and 'B' devices the user selectable ORG function is not present. (No internal connection.)

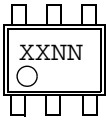
4.0 PACKAGING INFORMATION

4.1 Package Marking Information

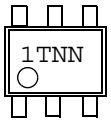
8-Lead MSOP (150 mil)

Example:

6-Lead SOT-23



Example:

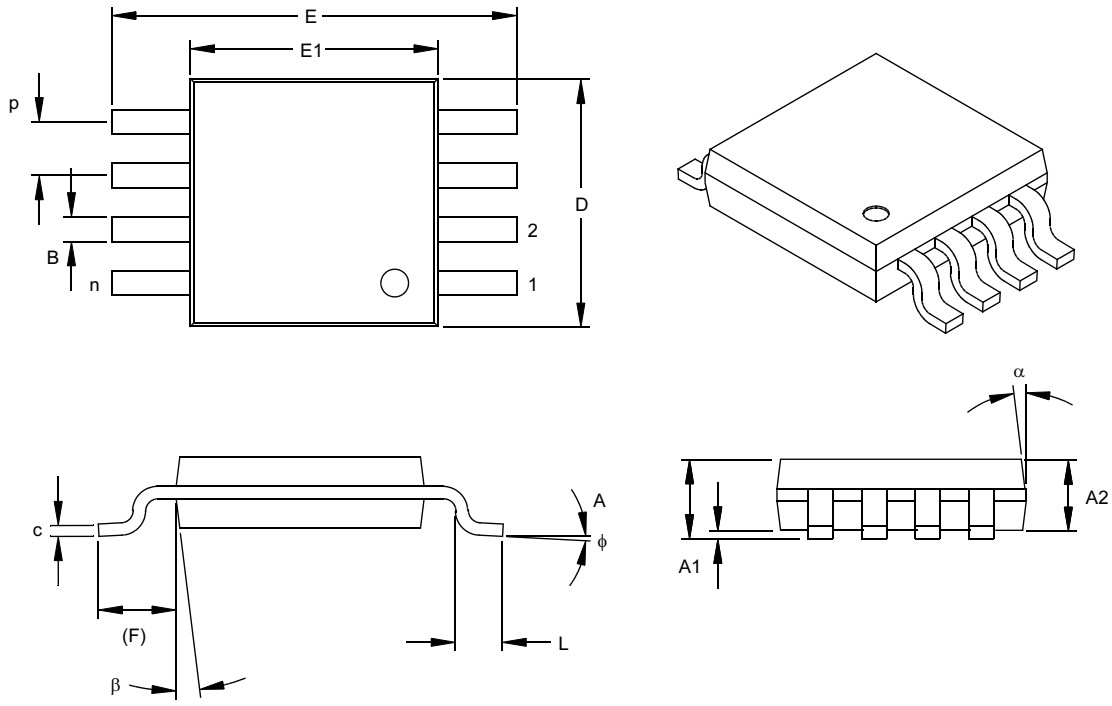


Legend:	XX...X	Customer specific information*
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code

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.

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

8-Lead Plastic Micro Small Outline Package (MS) (MSOP)



Units		INCHES			MILLIMETERS*		
Dimension Limits		MIN	NOM	MAX	MIN	NOM	MAX
Number of Pins	n		8				8
Pitch	p		.026			0.65	
Overall Height	A			.044			1.18
Molded Package Thickness	A2	.030	.034	.038	0.76	0.86	0.97
Standoff §	A1	.002		.006	0.05		0.15
Overall Width	E	.184	.193	.200	4.67	4.90	.5.08
Molded Package Width	E1	.114	.118	.122	2.90	3.00	3.10
Overall Length	D	.114	.118	.122	2.90	3.00	3.10
Foot Length	L	.016	.022	.028	0.40	0.55	0.70
Footprint (Reference)	F	.035	.037	.039	0.90	0.95	1.00
Foot Angle	φ	0		6	0		6
Lead Thickness	c	.004	.006	.008	0.10	0.15	0.20
Lead Width	B	.010	.012	.016	0.25	0.30	0.40
Mold Draft Angle Top	α		7			7	
Mold Draft Angle Bottom	β		7			7	

*Controlling Parameter
§ Significant Characteristic

Notes:

Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" (0.254mm) per side.

Drawing No. C04-111

NOTES:

ON-LINE SUPPORT

Microchip provides on-line support on the Microchip World Wide Web site.

The web site is used by Microchip as a means to make files and information easily available to customers. To view the site, the user must have access to the Internet and a web browser, such as Netscape® or Microsoft® Internet Explorer. Files are also available for FTP download from our FTP site.

Connecting to the Microchip Internet Web Site

The Microchip web site is available at the following URL:

www.microchip.com

The file transfer site is available by using an FTP service to connect to:

ftp://ftp.microchip.com

The web site and file transfer site provide a variety of services. Users may download files for the latest Development Tools, Data Sheets, Application Notes, User's Guides, Articles and Sample Programs. A variety of Microchip specific business information is also available, including listings of Microchip sales offices, distributors and factory representatives. Other data available for consideration is:

- Latest Microchip Press Releases
- Technical Support Section with Frequently Asked Questions
- Design Tips
- Device Errata
- Job Postings
- Microchip Consultant Program Member Listing
- Links to other useful web sites related to Microchip Products
- Conferences for products, Development Systems, technical information and more
- Listing of seminars and events

SYSTEMS INFORMATION AND UPGRADE HOT LINE

The Systems Information and Upgrade Line provides system users a listing of the latest versions of all of Microchip's development systems software products. Plus, this line provides information on how customers can receive the most current upgrade kits.The Hot Line Numbers are:

1-800-755-2345 for U.S. and most of Canada, and

1-480-792-7302 for the rest of the world.

092002

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: 93XX46, 93XX46A/B Literature Number: DS21749A

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?

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	X	X	/XX
Device	Pinout	Tape & Reel	Temperature Range	Package

Device:	93AA46:	1K 1.8V Microwire Serial EEPROM
	93AA46A:	1K 1.8V Microwire Serial EEPROM
	93AA46B:	1K 1.8V Microwire Serial EEPROM
	93LC46:	1K 2.5V Microwire Serial EEPROM
	93LC46A:	1K 2.5V Microwire Serial EEPROM
	93LC46B:	1K 2.5V Microwire Serial EEPROM
	93C46:	1K 5.0V Microwire Serial EEPROM
	93C46A:	1K 5.0V Microwire Serial EEPROM
	93C46B:	1K 5.0V Microwire Serial EEPROM
Pinout:	Blank=	Standard pinout
Tape & Reel:	Blank=	Standard packaging
	T =	Tape & Reel
Temperature Range:	I =	-40°C to +85°C
	E =	-40°C to +125°C
Package:	MS =	Plastic MSOP (Micro Small outline, 8-lead)
	OT =	SOT-23, 6-lead (Tape and Reel only)

Examples:

a) 93AA46-I/MS: 1K, 128x8 or 64x16 Serial EEPROM, MSOP package

b) 93AA46B-I/MS: 1K, 64x16 Serial EEPROM, MSOP package

c) 93AA46AT-I/OT: 1K, 128x8 Serial EEPROM, SOT-23 package, tape and reel

d) 93AA46T-I/MS: 1K, 128x8 or 64x16 Serial EEPROM, MSOP package, tape and reel

a) 93LC46A-I/MS: 1K, 128x8 Serial EEPROM, MSOP package

b) 93LC46BT-I/OT: 1K, 64x16 Serial EEPROM, SOT-23 package, tape and reel

c) 93LC46B-I/MS: 1K, 64x16 Serial EEPROM, MSOP package

a) 93C46B-I/MS: 1K, 64x16 Serial EEPROM, MSOP package

b) 93C46-I/MS: 1K, 128x8 or 64x16 Serial EEPROM, MSOP package

c) 93C46AT-I/OT: 1K, 128x8 Serial EEPROM, SOT-23 package, tape and reel

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 Corporate Literature Center U.S. FAX: (480) 792-7277
3. 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.

NOTES:

Information contained in this publication regarding device applications and the like is intended through suggestion only and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. No representation or warranty is given and no liability is assumed by Microchip Technology Incorporated with respect to the accuracy or use of such information, or infringement of patents or other intellectual property rights arising from such use or otherwise. Use of Microchip's products as critical components in life support systems is not authorized except with express written approval by Microchip. No licenses are conveyed, implicitly or otherwise, under any intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, KEELOQ, MPLAB, PIC, PICmicro, PICSTART and PRO MATE are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

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

dsPIC, dsPICDEM.net, ECONOMONITOR, FanSense, FlexROM, fuzzyLAB, In-Circuit Serial Programming, ICSP, ICEPIC, microPort, Migratable Memory, MPASM, MPLIB, MPLINK, MPSIM, PICC, PICDEM, PICDEM.net, rfPIC, Select Mode and Total Endurance are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

Serialized Quick Turn Programming (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.

Printed on recycled paper.

DNV Certification, Inc. USA

ANSI-RAB QMS ACCREDITED

DNV

DNV MSC The Netherlands Accredited by the RvA

ISO 9001 / QS-9000 REGISTERED FIRM

Microchip received QS-9000 quality system certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona in July 1999 and Mountain View, California in March 2002. The Company's quality system processes and procedures are QS-9000 compliant for its PICmicro® 8-bit MCUs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, non-volatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001 certified.

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: 480-792-7627
Web Address: http://www.microchip.com

Rocky Mountain
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7966 Fax: 480-792-4338

Atlanta
500 Sugar Mill Road, Suite 200B
Atlanta, GA 30350
Tel: 770-640-0034 Fax: 770-640-0307

Boston
2 Lan Drive, Suite 120
Westford, MA 01886
Tel: 978-692-3848 Fax: 978-692-3821

Chicago
333 Pierce Road, Suite 180
Itasca, IL 60143
Tel: 630-285-0071 Fax: 630-285-0075

Dallas
4570 Westgrove Drive, Suite 160
Addison, TX 75001
Tel: 972-818-7423 Fax: 972-818-2924

Detroit
Tri-Atria Office Building
32255 Northwestern Highway, Suite 190
Farmington Hills, MI 48334
Tel: 248-538-2250 Fax: 248-538-2260

Kokomo
2767 S. Albright Road
Kokomo, Indiana 46902
Tel: 765-864-8360 Fax: 765-864-8387

Los Angeles
18201 Von Karman, Suite 1090
Irvine, CA 92612
Tel: 949-263-1888 Fax: 949-263-1338

San Jose
Microchip Technology Inc.
2107 North First Street, Suite 590
San Jose, CA 95131
Tel: 408-436-7950 Fax: 408-436-7955

Toronto
6285 Northam Drive, Suite 108
Mississauga, Ontario L4V 1X5, Canada
Tel: 905-673-0699 Fax: 905-673-6509

ASIA/PACIFIC

Australia
Microchip Technology Australia Pty Ltd
Suite 22, 41 Rawson Street
Epping 2121, NSW
Australia
Tel: 61-2-9868-6733 Fax: 61-2-9868-6755

China - Beijing
Microchip Technology Consulting (Shanghai) Co., Ltd., Beijing Liaison Office
Unit 915
Bei Hai Wan Tai Bldg.
No. 6 Chaoyangmen Beidajie
Beijing, 100027, No. China
Tel: 86-10-85282100 Fax: 86-10-85282104

China - Chengdu
Microchip Technology Consulting (Shanghai) Co., Ltd., Chengdu Liaison Office
Rm. 2401, 24th Floor,
Ming Xing Financial Tower
No. 88 TIDU Street
Chengdu 610016, China
Tel: 86-28-86766200 Fax: 86-28-86766599

China - Fuzhou
Microchip Technology Consulting (Shanghai) Co., Ltd., Fuzhou Liaison Office
Unit 28F, World Trade Plaza
No. 71 Wusi Road
Fuzhou 350001, China
Tel: 86-591-7503506 Fax: 86-591-7503521

China - Shanghai
Microchip Technology Consulting (Shanghai) Co., Ltd.
Room 701, Bldg. B
Far East International Plaza
No. 317 Xian Xia Road
Shanghai, 200051
Tel: 86-21-6275-5700 Fax: 86-21-6275-5060

China - Shenzhen
Microchip Technology Consulting (Shanghai) Co., Ltd., Shenzhen Liaison Office
Rm. 1315, 13/F, Shenzhen Kerry Centre,
Renminnan Lu
Shenzhen 518001, China
Tel: 86-755-82350361 Fax: 86-755-82366086

China - Hong Kong SAR
Microchip Technology Hongkong Ltd.
Unit 901-6, Tower 2, Metroplaza
223 Hing Fong Road
Kwai Fong, N.T., Hong Kong
Tel: 852-2401-1200 Fax: 852-2401-3431

India
Microchip Technology Inc.
India Liaison Office
Divyasree Chambers
1 Floor, Wing A (A3/A4)
No. 11, O'Shaugnessey Road
Bangalore, 560 025, India
Tel: 91-80-2290061 Fax: 91-80-2290062

Japan
Microchip Technology Japan K.K.
Benex S-1 6F
3-18-20, Shinyokohama
Kohoku-Ku, Yokohama-shi
Kanagawa, 222-0033, Japan
Tel: 81-45-471- 6166 Fax: 81-45-471-6122

Korea
Microchip Technology Korea
168-1, Youngbo Bldg. 3 Floor
Samsung-Dong, Kangnam-Ku
Seoul, Korea 135-882
Tel: 82-2-554-7200 Fax: 82-2-558-5934

Singapore
Microchip Technology Singapore Pte Ltd.
200 Middle Road
#07-02 Prime Centre
Singapore, 188980
Tel: 65-6334-8870 Fax: 65-6334-8850

Taiwan
Microchip Technology (Barbados) Inc.,
Taiwan Branch
11F-3, No. 207
Tung Hua North Road
Taipei, 105, Taiwan
Tel: 886-2-2717-7175 Fax: 886-2-2545-0139

EUROPE

Austria
Microchip Technology Austria GmbH
Durisolstrasse 2
A-4600 Wels
Austria
Tel: 43-7242-2244-399
Fax: 43-7242-2244-393

Denmark
Microchip Technology Nordic ApS
Regus Business Centre
Lautrup hoj 1-3
Ballerup DK-2750 Denmark
Tel: 45 4420 9895 Fax: 45 4420 9910

France
Microchip Technology SARL
Parc d'Activite du Moulin de Massy
43 Rue du Saule Trapu
Batiment A - ler Etage
91300 Massy, France
Tel: 33-1-69-53-63-20 Fax: 33-1-69-30-90-79

Germany
Microchip Technology GmbH
Steinheilstrasse 10
D-85737 Ismaning, Germany
Tel: 49-89-627-144 0 Fax: 49-89-627-144-44

Italy
Microchip Technology SRL
Centro Direzionale Colleoni
Palazzo Taurus 1 V. Le Colleoni 1
20041 Agrate Brianza
Milan, Italy
Tel: 39-039-65791-1 Fax: 39-039-6899883

United Kingdom
Microchip Ltd.
505 Eskdale Road
Winnersh Triangle
Wokingham
Berkshire, England RG41 5TU
Tel: 44 118 921 5869 Fax: 44-118 921-5820

10/18/02