

# 93AA46/56/66

## 1K/2K/4K 1.8V Microwire Serial EEPROM

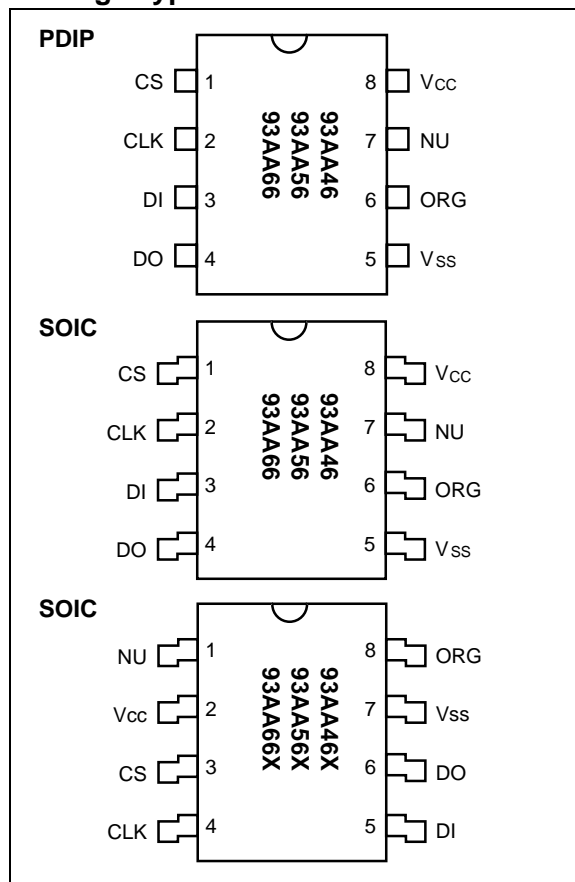
### Features:

- Single supply with programming operation down to 1.8V
- Low-power CMOS technology:
  - 70  $\mu$ A typical active read current at 1.8V
  - 2  $\mu$ A typical standby current at 1.8V
- ORG pin selectable memory configuration:
  - 128 x 8- or 64 x 16-bit organization (93AA46)
  - 256 x 8- or 128 x 16-bit organization (93AA56)
  - 512 x 8 or 256 x 16-bit organization (93AA66)
- 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 ensured
- Data retention > 200 years
- 8-pin PDIP/SOIC (SOIC in JEDEC and EIAJ standards)
- Temperature ranges supported:
  - Commercial (C): 0°C to +70°C
  - Industrial (I): -40°C to +85°C

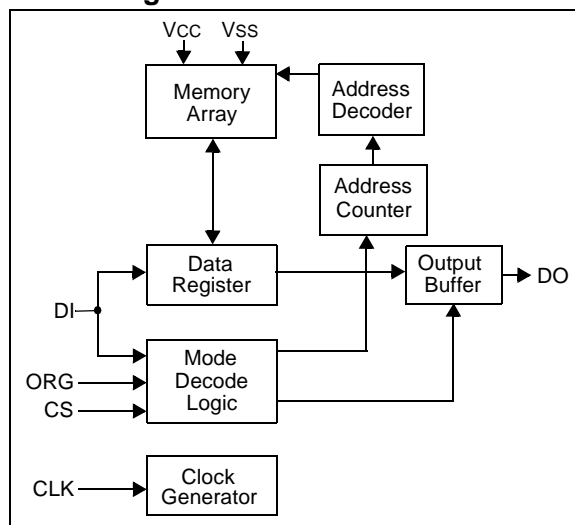
### Description:

The Microchip Technology Inc. 93AA46/56/66 are 1K, 2K and 4K low voltage serial Electrically Erasable PROMs. The device memory is configured as x8 or x16 bits depending on the ORG pin setup. Advanced CMOS technology makes these devices ideal for low power nonvolatile memory applications. The 93AA Series is available in standard 8-pin PDIP and surface mount SOIC packages. The rotated pin-out 93AA46X/56X/66X are offered in the "SN" package only.

### Package Types



### Block Diagram



# 93AA46/56/66

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## 1.0 ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings<sup>(†)</sup>

V <sub>CC</sub> .....	7.0V
All inputs and outputs w.r.t. V <sub>SS</sub> .....	-0.6V to V <sub>CC</sub> +1.0V
Storage temperature .....	-65°C to +150°C
Ambient temperature with power applied.....	-40°C to +125°C
Soldering temperature of leads (10 seconds) .....	+300°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 these or any other conditions above those indicated in the operational listings of this specification is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

**TABLE 1-1: DC AND AC ELECTRICAL CHARACTERISTICS**

VCC = +1.8V to +5.5V    Commercial (C): TA = 0°C to +70°C Industrial (I):        TA = -40°C to +85°C						
Parameter	Symbol	Min	Typ	Max	Units	Conditions
High-level input voltage	V <sub>IH1</sub>	2.0	—	V <sub>CC</sub> +1	V	V <sub>CC</sub> ≥ 2.7V
	V <sub>IH2</sub>	0.7 V <sub>CC</sub>	—	V <sub>CC</sub> +1	V	V <sub>CC</sub> < 2.7V
Low-level input voltage	V <sub>IL1</sub>	-0.3	—	0.8	V	V <sub>CC</sub> ≥ 2.7V
	V <sub>IL2</sub>	-0.3	—	0.2 V <sub>CC</sub>	V	V <sub>CC</sub> < 2.7V
Low-level output voltage	V <sub>OL1</sub>	—	—	0.4	V	I <sub>OL</sub> = 2.1 mA; V <sub>CC</sub> = 4.5V
	V <sub>OL2</sub>	—	—	0.2	V	I <sub>OL</sub> = 100µA; V <sub>CC</sub> = 1.8V
High-level output voltage	V <sub>OH1</sub>	2.4	—	—	V	I <sub>OH</sub> = -400 µA; V <sub>CC</sub> = 4.5V
	V <sub>OH2</sub>	V <sub>CC</sub> -0.2	—	—	V	I <sub>OH</sub> = -100 µA; V <sub>CC</sub> = 1.8V
Input leakage current	I <sub>LI</sub>	-10	—	10	µA	V <sub>IN</sub> = 0.1V to V <sub>CC</sub>
Output leakage current	I <sub>LO</sub>	-10	—	10	µA	V <sub>OUT</sub> = 0.1V to V <sub>CC</sub>
Pin capacitance (all inputs/outputs)	C <sub>IN</sub> , C <sub>OUT</sub>	—	—	7	pF	V <sub>IN</sub> /V <sub>OUT</sub> = 0V ( <b>Note 1 &amp; 2</b> ) TA = +25°C, F <sub>CLK</sub> = 1 MHz
Operating current	I <sub>CC</sub> write	—	—	3	mA	F <sub>CLK</sub> = 2 MHz; V <sub>CC</sub> =5.5V ( <b>Note 2</b> )
	I <sub>CC</sub> read	—	—	1 500 µA	mA µA µA	F <sub>CLK</sub> = 2 MHz; V <sub>CC</sub> = 5.5V F <sub>CLK</sub> = 1 MHz; V <sub>CC</sub> = 3.0V F <sub>CLK</sub> = 1 MHz; V <sub>CC</sub> = 1.8V
Standby current	I <sub>CCS</sub>	—	2	100	µA	CLK = CS = 0V; V <sub>CC</sub> = 5.5V CLK = CS = 0V; V <sub>CC</sub> = 3.0V CLK = CS = 0V; V <sub>CC</sub> = 1.8V ORG, DI = V <sub>SS</sub> or V <sub>CC</sub>
				30	µA	
Clock frequency	F <sub>CLK</sub>	—	—	2	MHz	V <sub>CC</sub> ≥ 4.5V V <sub>CC</sub> < 4.5V
				1	MHz	
Clock high time	T <sub>CKH</sub>	250	—	—	ns	
Clock low time	T <sub>CKL</sub>	250	—	—	ns	
Chip select setup time	T <sub>CSS</sub>	50	—	—	ns	Relative to CLK
Chip select hold time	T <sub>CSH</sub>	0	—	—	ns	Relative to CLK
Chip select low time	T <sub>CSL</sub>	250	—	—	ns	
Data input setup time	T <sub>DIS</sub>	100	—	—	ns	Relative to CLK
Data input hold time	T <sub>DIH</sub>	100	—	—	ns	Relative to CLK
Data output delay time	T <sub>PD</sub>	—	—	400	ns	CL = 100 pF
Data output disable time	T <sub>CZ</sub>	—	—	100	ns	CL = 100 pF ( <b>Note 2</b> )
Status valid time	T <sub>SV</sub>	—	—	500	ns	CL = 100 pF
Program cycle time	T <sub>WC</sub>	—	4	10	ms	Erase/Write mode
	T <sub>EC</sub>	—	8	15	ms	ERAL mode (V <sub>CC</sub> = 5V ± 10%)
	T <sub>WL</sub>	—	16	30	ms	WRAL mode (V <sub>CC</sub> = 5V ± 10%)
Endurance	—	1M	—	1M	—	25°C, V <sub>CC</sub> = 5.0V, Block mode ( <b>Note 3</b> )

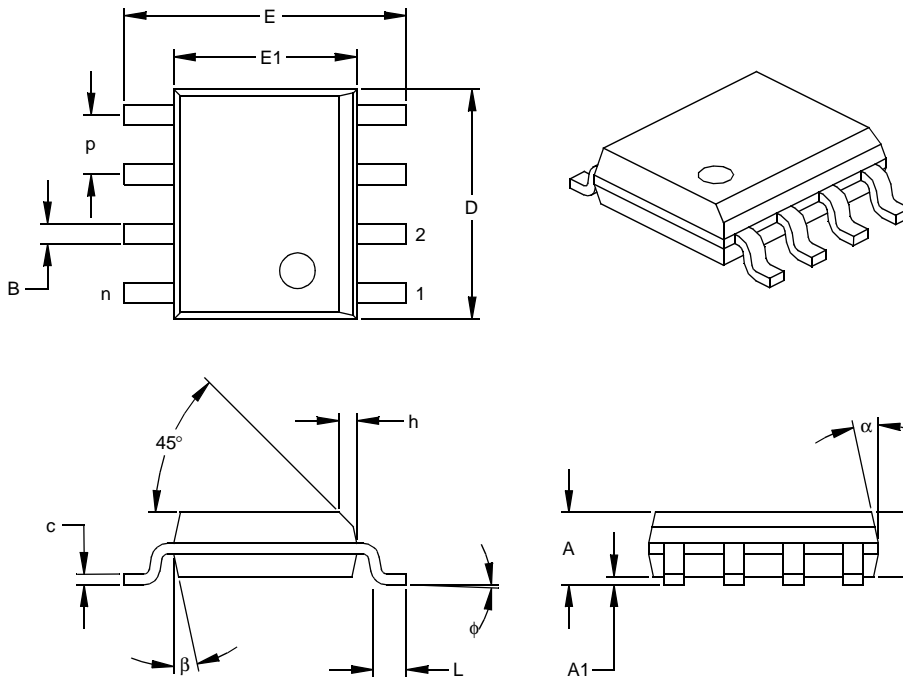
**Note 1:** This parameter is tested at TA = 25°C and F<sub>CLK</sub> = 1 MHz.

**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 from Microchip's web site.

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## 8-Lead Plastic Small Outline (SN) – Narrow, 150 mil Body (SOIC)



Units		INCHES*			MILLIMETERS		
Dimension	Limits	MIN	NOM	MAX	MIN	NOM	MAX
Number of Pins	n	8			8		
Pitch	p		.050			1.27	
Overall Height	A	.053	.061	.069	1.35	1.55	1.75
Molded Package Thickness	A2	.052	.056	.061	1.32	1.42	1.55
Standoff §	A1	.004	.007	.010	0.10	0.18	0.25
Overall Width	E	.228	.237	.244	5.79	6.02	6.20
Molded Package Width	E1	.146	.154	.157	3.71	3.91	3.99
Overall Length	D	.189	.193	.197	4.80	4.90	5.00
Chamfer Distance	h	.010	.015	.020	0.25	0.38	0.51
Foot Length	L	.019	.025	.030	0.48	0.62	0.76
Foot Angle	φ	0	4	8	0	4	8
Lead Thickness	c	.008	.009	.010	0.20	0.23	0.25
Lead Width	B	.013	.017	.020	0.33	0.42	0.51
Mold Draft Angle Top	α	0	12	15	0	12	15
Mold Draft Angle Bottom	β	0	12	15	0	12	15

\* 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.  
 JEDEC Equivalent: MS-012  
 Drawing No. C04-057

## 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>X</u>	<u>/XX</u>	<u>XXX</u>
Device	Temperature Range	Package	Pattern
Device	93AA46/56/66:	Microwire Serial EEPROM	
	93AA46/56/66X:	Microwire Serial EEPROM in alternate pinouts (SN package only)	
	93AA46T/56T/66T:	Microwire Serial EEPROM (Tape and Reel)	
	93AA46XT/56XT/66XT:	Microwire Serial EEPROM (Tape and Reel)	
Temperature Range	Blank =	0°C to +70°C	
Package	P =	Plastic PDIP (300 mil Body), 8-lead	
	SN =	Plastic SOIC (150 mil Body), 8-lead	
	SM =	Plastic SOIC (208 mil Body), 8-lead (93AA46/56/66)	