Not recommended for new designs –
Please use 25AA640A or 25LC640A.

25AA640/25LC640

64K SPI Bus Serial EEPROM

Device Selection Table

Part Number	Vcc Range	Max Clock Frequency	Temp Ranges
25AA640	1.8-5.5V	1 MHz	I
25LC640	2.5-5.5V	2 MHz	I
25LC640	4.5-5.5V	3/2.5 MHz	I, E

Features:

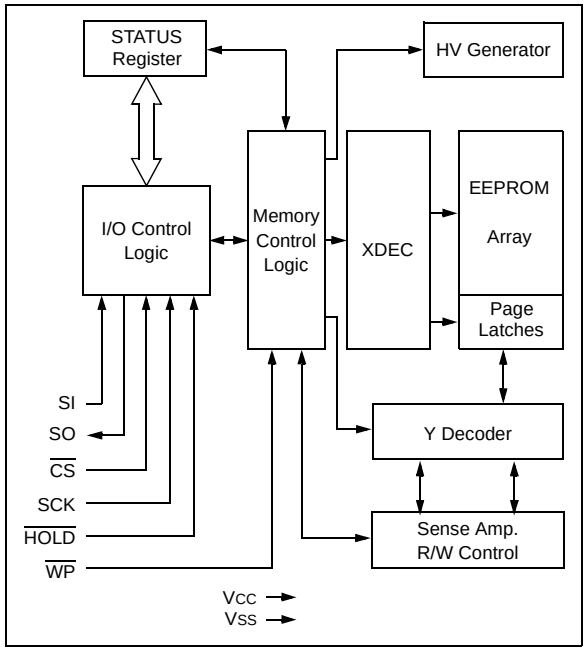
- Low-Power CMOS Technology
  - Write current: 3 mA, typical
  - Read current: 500 μA, typical
  - Standby current: 500 nA, typical
- 8192 x 8 Bit Organization
- 32 Byte Page
- Write Cycle Time: 5 ms max.
- Self-Timed Erase and Write Cycles
- Block Write Protection
  - Protect none, 1/4, 1/2 or all of array
- Built-in Write Protection
  - Power on/off data protection circuitry
  - Write enable latch
  - Write-protect pin
- Sequential Read
- High Reliability
  - Data retention: > 200 years
  - ESD protection: > 4000V
- 8-pin PDIP, SOIC and TSSOP Packages
- Temperature Ranges Supported:
  - Industrial (I): -40°C to +85°C
  - Automotive (E): -40°C to +125°C

Description:

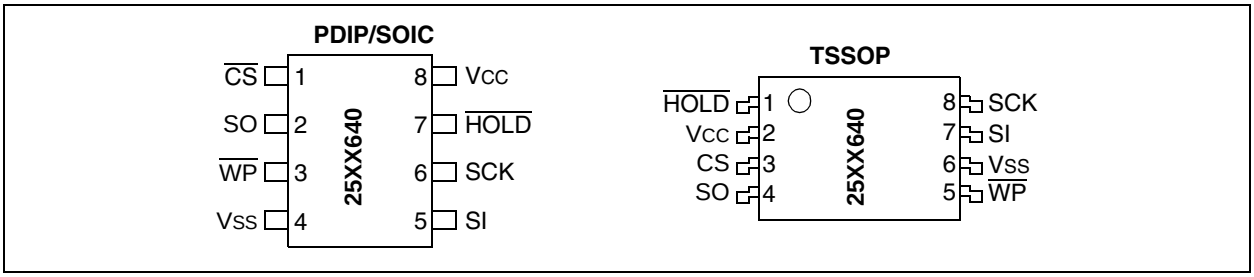
The Microchip Technology Inc. 25AA640/25LC640 (25XX640*) is a 64 Kbit Serial Electrically Erasable PROM [EEPROM]. The memory is accessed via a simple Serial Peripheral Interface (SPI) compatible serial bus. The bus signals required are a clock input (SCK) plus separate data in (SI) and data out (SO) lines. Access to the device is controlled through a Chip Select (CS) input.

Communication to the device can be paused via the hold pin (HOLD). While the device is paused, transitions on its inputs will be ignored, with the exception of Chip Select, allowing the host to service higher priority interrupts.

Block Diagram



Package Types



*25XX640 is used in this document as a generic part number for the 25AA640/25LC640 devices.

1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings(†)

VCC.....7.0V

All inputs and outputs w.r.t. VSS ..... -0.6V to VCC + 1.0V

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

Ambient temperature under bias.....-65°C to 125°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 an extended period of time may affect device reliability.

TABLE 1-1: DC CHARACTERISTICS

DC CHARACTERISTICS			Industrial (I): TA = -40°C to +85°C VCC = 1.8V to 5.5V Automotive (E): TA = -40°C to +125°C VCC = 4.5V to 5.5V			
Param. No.	**Sym**	**Characteristics**	**Min**	**Max**	**Units**	**Conditions**
D1	VIH1	High-level input voltage	2.0	VCC + 1	V	VCC ≥ 2.7V **(Note 1)**
D2	VIH2		0.7 VCC	VCC + 1	V	VCC < 2.7V **(Note 1)**
D3	VIL1	Low-level input voltage	-0.3	0.8	V	VCC ≥ 2.7V **(Note 1)**
D4	VIL2		-0.3	0.2 VCC	V	VCC < 2.7V **(Note 1)**
D5	VOL	Low-level output voltage	—	0.4	V	IOL = 2.1 mA
			—	0.2	V	IOL = 1.0 mA, VCC = < 2.5V
D6	VOH	High-level output voltage	VCC - 0.5	—	V	IOH = -400 µA
D7	ILI	Input leakage current	—	±1	µA	$\overline{CS}$ = VCC, VIN = VSS TO VCC
D8	ILO	Output leakage current	—	±1	µA	$\overline{CS}$ = VCC, VOUT = VSS TO VCC
D9	CINT	Internal Capacitance (all inputs and outputs)	—	7	pF	TA = 25°C, CLK = 1.0 MHz, VCC = 5.0V **(Note 1)**
D10	ICC Read	Operating Current	— —	1 500	mA µA	VCC = 5.5V; FCLK = 3.0 MHz; SO = Open VCC = 2.5V; FCLK = 2.0 MHz; SO = Open
D11	ICC Write		— —	5 3	mA mA	VCC = 5.5V VCC = 2.5V
D12	ICCS	Standby Current	— —	5 1	µA µA	$\overline{CS}$ = VCC = 5.5V, Inputs tied to VCC or VSS $\overline{CS}$ = VCC = 2.5V, Inputs tied to VCC or VSS

Note 1: This parameter is periodically sampled and not 100% tested.

TABLE 1-2: AC CHARACTERISTICS

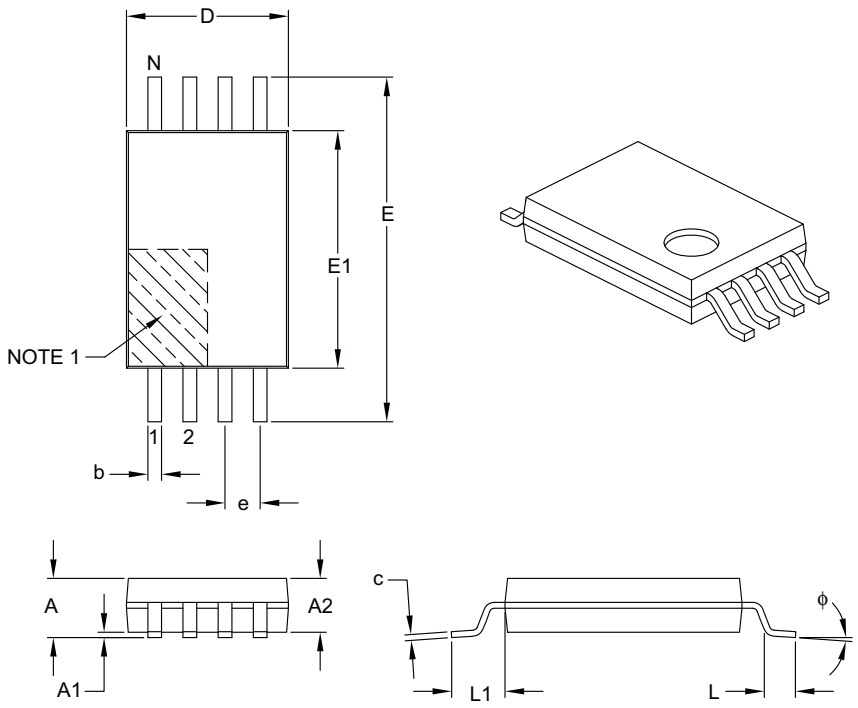
AC CHARACTERISTICS			Industrial (I): TA = -40°C to +85°C VCC = 1.8V to 5.5V Automotive (E): TA = -40°C to +125°C VCC = 4.5V to 5.5V			
Param. No.	**Sym**	**Characteristic**	**Min**	**Max**	**Units**	**Conditions**
1	FCLK	Clock Frequency	— — —	3 2 1	MHz MHz MHz	VCC = 4.5V to 5.5V **(Note 2)** VCC = 2.5V to 5.5V VCC = 1.8V to 5.5V
2	TCSS	$\overline{CS}$ Setup Time	100 250 500	— — —	ns ns ns	VCC = 4.5V to 5.5V VCC = 2.5V to 5.5V VCC = 1.8V to 5.5V
3	TCSH	$\overline{CS}$ Hold Time	150 250 475	— — —	ns ns ns	VCC = 4.5V to 5.5V VCC = 2.5V to 5.5V VCC = 1.8V to 5.5V
4	TCSD	$\overline{CS}$ Disable Time	500	—	ns	
5	TSU	Data Setup Time	30 50 50	— — —	ns ns ns	VCC = 4.5V to 5.5V VCC = 2.5V to 5.5V VCC = 1.8V to 5.5V
6	THD	Data Hold Time	50 100 100	— — —	ns ns ns	VCC = 4.5V to 5.5V VCC = 2.5V to 5.5V VCC = 1.8V to 5.5V
7	TR	CLK Rise Time	—	2	µs	**(Note 1)**
8	TF	CLK Fall Time	—	2	µs	**(Note 1)**
9	THI	Clock High Time	150 230 475	— — —	ns ns ns	VCC = 4.5V to 5.5V VCC = 2.5V to 5.5V VCC = 1.8V to 5.5V
10	TLO	Clock Low Time	150 230 475	— — —	ns ns ns	VCC = 4.5V to 5.5V VCC = 2.5V to 5.5V VCC = 1.8V to 5.5V
11	TCLD	Clock Delay Time	50	—	ns	
12	TCLE	Clock Enable Time	50	—	ns	
13	TV	Output Valid from Clock Low	— — —	150 230 475	ns ns ns	VCC = 4.5V to 5.5V VCC = 2.5V to 5.5V VCC = 1.8V to 5.5V
14	THO	Output Hold Time	0	—	ns	**(Note 1)**
15	TDIS	Output Disable Time	— — —	200 250 500	ns ns ns	VCC = 4.5V to 5.5V **(Note 1)** VCC = 2.5V to 5.5V **(Note 1)** VCC = 1.8V to 5.5V **(Note 1)**
16	THS	$\overline{HOLD}$ Setup Time	100 100 200	— — —	ns ns ns	VCC = 4.5V to 5.5V VCC = 2.5V to 5.5V VCC = 1.8V to 5.5V
17	THH	$\overline{HOLD}$ Hold Time	100 100 200	— — —	ns ns ns	VCC = 4.5V to 5.5V VCC = 2.5V to 5.5V VCC = 1.8V to 5.5V
18	THZ	$\overline{HOLD}$ Low to Output High-Z	100 150 200	— — —	ns ns ns	VCC = 4.5V to 5.5V **(Note 1)** VCC = 2.5V to 5.5V **(Note 1)** VCC = 1.8V to 5.5V **(Note 1)**
19	THV	$\overline{HOLD}$ High to Output Valid	100 150 200	— — —	ns ns ns	VCC = 4.5V to 5.5V VCC = 2.5V to 5.5V VCC = 1.8V to 5.5V
20	TWC	Internal Write Cycle Time	—	5	ms	
21	—	Endurance	1M	—	E/W Cycles	**(Note 3)**

Note 1: This parameter is periodically sampled and not 100% tested.

2: FCLK max. = 2.5 MHz for TA > 85°C.

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

8-Lead Plastic Thin Shrink Small Outline (ST) – 4.4 mm Body [TSSOP]



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		0.65 BSC	
Overall Height	A	–	–	1.20
Molded Package Thickness	A2	0.80	1.00	1.05
Standoff	A1	0.05	–	0.15
Overall Width	E		6.40 BSC	
Molded Package Width	E1	4.30	4.40	4.50
Molded Package Length	D	2.90	3.00	3.10
Foot Length	L	0.45	0.60	0.75
Footprint	L1		1.00 REF	
Foot Angle	ϕ	0°	–	8°
Lead Thickness	c	0.09	–	0.20
Lead Width	b	0.19	–	0.30

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15 mm per side.
3. 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 C04-086B

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	XXX
Device	Temperature Range	Package	Pattern

Device	25AA640:	64K bit 1.8V SPI Serial EEPROM
	25AA640T:	64K bit 1.8V SPI Serial EEPROM (Tape and Reel)
	25AA640X:	64K bit 1.8V SPI Serial EEPROM in alternate pinout (ST only)
	25AA640XT:	64K bit 1.8V SPI Serial EEPROM in alternate pinout Tape and Reel (ST only)
	25LC640:	64K bit 2.5V SPI Serial EEPROM
	25LC640T:	64K bit 2.5V SPI Serial EEPROM (Tape and Reel)
	25LC640X:	64K bit 2.5V SPI Serial EEPROM in alternate pinout (ST only)
	25LC640XT:	64K bit 2.5V SPI Serial EEPROM in alternate pinout Tape and Reel (ST only)
Temperature Range	I =	-40°C to +85°C
	E =	-40°C to +125°C
Package	P =	Plastic DIP (300 mil Body), 8-lead
	SN =	Plastic SOIC (150 mil Body), 8-lead
	ST =	Plastic TSSOP (4.4 mm Body), 8-lead

Examples:

a) 25AA640-I/SN: Industrial Temp., SOIC package

b) 25AA640T-I/SN: Tape and Reel, Industrial Temp., SOIC package

c) 25AA640X-I/ST: Alternate Pinout Industrial Temp., TSSOP package

d) 25LC640-I/SN: Industrial Temp., SOIC package

e) 25LC640T-I/SN: Tape and Reel, Industrial Temp., SOIC package

f) 25LC640X-I/ST: Alternate Pinout, Industrial Temp., TSSOP package