25LC1024

1 Mbit SPI Bus Serial EEPROM

Device Selection Table

Part Number	Vcc Range	Page Size	Temp. Ranges	Packages
25LC1024	2.5-5.5V	256 Byte	I,E	P, SM, MF

Features:

- 20 MHz max. Clock Speed
- Byte and Page-level Write Operations:
  - 256 byte page
  - 6 ms max. write cycle time
  - No page or sector erase required
- Low-Power CMOS Technology:
  - Max. Write current: 5 mA at 5.5V, 20 MHz
  - Read current: 7 mA at 5.5V, 20 MHz
  - Standby current: 1μA at 2.5V (Deep power-down)
- Electronic Signature for Device ID
- Self-Timed Erase and Write Cycles:
  - Page Erase (6 ms max.)
  - Sector Erase (10 ms max.)
  - Chip Erase (10 ms max.)
- Sector Write Protection (32K byte/sector):
  - 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
- High Reliability:
  - Endurance: 1M erase/write cycles
  - Data Retention: >200 years
  - ESD Protection: >4000V
- Temperature Ranges Supported:
  - Industrial (I): -40°C to +85°C
  - Automotive (E): -40°C to +125°C
- Pb-Free and RoHS Compliant

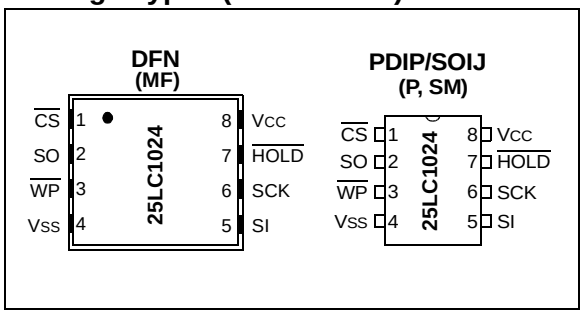
Description:

The Microchip Technology Inc. 25LC1024 is a 1024 Kbit serial EEPROM memory with byte-level and page-level serial EEPROM functions. It also features Page, Sector and Chip erase functions typically associated with Flash-based products. These functions are not required for byte or page write operations. 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 by a Chip Select ($\overline{CS}$) input.

Communication to the device can be paused via the hold pin ($\overline{HOLD}$). 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.

The 25LC1024 is available in standard packages including 8-lead PDIP and SOIJ, and advanced 8-lead DFN package. All devices are Pb-free.

Package Types (not to scale)



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (†)

VCC.....6.5V

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.....-40°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 = 2.5V to 5.5V Automotive (E): TA = -40°C to +125°C VCC = 2.5V to 5.5V			
Param. No.	**Sym.**	**Characteristic**	**Min.**	**Max.**	**Units**	**Test Conditions**
D001	VIH1	High-level input voltage	.7 VCC	VCC +1	V	
D002	VIL1	Low-level input voltage	-0.3	0.3 VCC	V	VCC ≥ 2.7V
D003	VIL2		-0.3	0.2 VCC	V	VCC < 2.7V
D004	VOL	Low-level output voltage	—	0.4	V	IOL = 2.1 mA
D005	VOH	High-level output voltage	VCC -0.2	—	V	IOH = -400 µA
D006	ILI	Input leakage current	—	±1	µA	$\overline{CS}$ = VCC, VIN = VSS or VCC
D007	ILO	Output leakage current	—	±1	µA	$\overline{CS}$ = VCC, VOUT = VSS or VCC
D008	CINT	Internal capacitance (all inputs and outputs)	—	7	pF	TA = 25°C, CLK = 1.0 MHz, VCC = 5.0V **(Note)**
D009	ICC Read	Operating current	— —	10 5	mA mA	VCC = 5.5V; FCLK = 20.0 MHz; SO = Open VCC = 2.5V; FCLK = 10.0 MHz; SO = Open
D010	ICC Write		— —	7 5	mA mA	VCC = 5.5V VCC = 2.5V
D011	ICCS	Standby current	— —	20 12	µA µA	$\overline{CS}$ = VCC = 5.5V, Inputs tied to VCC or VSS, 125°C $\overline{CS}$ = VCC = 5.5V, Inputs tied to VCC or VSS, 85°C
D012	ICCSPD	Deep power-down current	— —	1 2	µA µA	$\overline{CS}$ = VCC = 2.5V, Inputs tied to VCC or VSS, 85°C $\overline{CS}$ = VCC = 2.5V, Inputs tied to VCC or VSS, 125°C

Note: 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 = 2.5V to 5.5V Automotive (E): TA = -40°C to +125°C VCC = 2.5V to 5.5V			
Param. No.	**Sym.**	**Characteristic**	**Min.**	**Max.**	**Units**	**Conditions**
1	FCLK	Clock frequency	— —	20 10	MHz MHz	4.5V ≤ VCC ≤ 5.5V (I) 2.5V ≤ VCC < 5.5V (I, E)
2	TCSS	$\overline{CS}$ setup time	25 50	— —	ns ns	4.5V ≤ VCC ≤ 5.5V (I) 2.5V ≤ VCC < 5.5V (I, E)
3	TCSH	$\overline{CS}$ hold time	50 100	— —	ns ns	4.5V ≤ VCC ≤ 5.5V (I) 2.5V ≤ VCC < 5.5V (I, E)
4	TCSD	$\overline{CS}$ disable time	50	—	ns	—
5	Tsu	Data setup time	5 10	— —	ns ns	4.5V ≤ VCC ≤ 5.5V (I) 2.5V ≤ VCC < 5.5V (I, E)
6	THD	Data hold time	10 20	— —	ns ns	4.5V ≤ VCC ≤ 5.5V (I) 2.5V ≤ VCC < 5.5V (I, E)
7	TR	CLK rise time	—	20	ns	**(Note 1)**
8	TF	CLK fall time	—	20	ns	**(Note 1)**
9	THI	Clock high time	25 50	— —	ns ns	4.5V ≤ VCC ≤ 5.5V (I) 2.5V ≤ VCC < 5.5V (I, E)
10	TLO	Clock low time	25 50	— —	ns ns	4.5V ≤ VCC ≤ 5.5V (I) 2.5V ≤ VCC < 5.5V (I, E)
11	TCLD	Clock delay time	50	—	ns	—
12	TCLE	Clock enable time	50	—	ns	—
13	TV	Output valid from clock low	— —	25 50	ns ns	4.5V ≤ VCC ≤ 5.5V (I) 2.5V ≤ VCC < 5.5V (I, E)
14	THO	Output hold time	0	—	ns	**(Note 1)**
15	TDIS	Output disable time	— —	25 50	ns ns	4.5V ≤ VCC ≤ 5.5V (I) 2.5V ≤ VCC < 5.5V (I, E)
16	THS	$\overline{HOLD}$ setup time	10 20	— —	ns ns	4.5V ≤ VCC ≤ 5.5V (I) 2.5V ≤ VCC < 5.5V (I, E)
17	THH	$\overline{HOLD}$ hold time	10 20	— —	ns ns	4.5V ≤ VCC ≤ 5.5V (I) 2.5V ≤ VCC < 5.5V (I, E)
18	THZ	$\overline{HOLD}$ low to output High-Z	15 30	— —	ns ns	4.5V ≤ VCC ≤ 5.5V (I) 2.5V ≤ VCC < 5.5V (I, E) **(Note 1)**
19	THV	$\overline{HOLD}$ high to output valid	15 30	— —	ns ns	4.5V ≤ VCC ≤ 5.5V (I) 2.5V ≤ VCC < 5.5V (I, E)
20	TREL	$\overline{CS}$ High to Standby mode	—	100	µs	—
21	TPD	$\overline{CS}$ High to Deep power-down	—	100	µs	—
22	TCE	Chip erase cycle time	—	10	ms	—
23	TSE	Sector erase cycle time	—	10	ms	—
24	TWC	Internal write cycle time	—	6	ms	Byte or Page mode and Page Erase

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

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

TABLE 1-2: AC CHARACTERISTICS (CONTINUED)

AC CHARACTERISTICS			Industrial (I): TA = -40°C to +85°C VCC = 2.5V to 5.5V Automotive (E): TA = -40°C to +125°C VCC = 2.5V to 5.5V			
Param. No.	**Sym.**	**Characteristic**	**Min.**	**Max.**	**Units**	**Conditions**
25	—	Endurance	1M	—	E/W Cycles	**(Note 2)** Per Page

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

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

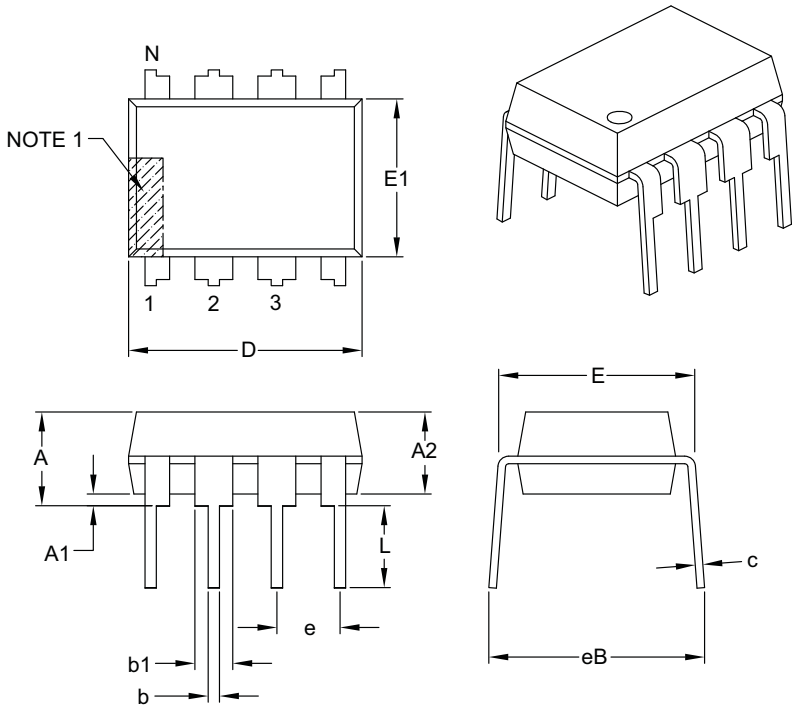
TABLE 1-3: AC TEST CONDITIONS

AC Waveform:	
VLO = 0.2V	—
VHI = VCC - 0.2V	**(Note 1)**
VHI = 4.0V	**(Note 2)**
CL = 30 pF	**—**
Timing Measurement Reference Level	
Input	0.5 VCC
Output	0.5 VCC

Note 1: For VCC ≤ 4.0V

2: For VCC > 4.0V

8-Lead Plastic Dual In-Line (P) – 300 mil Body [PDIP]



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N		8	
Pitch	e		.100 BSC	
Top to Seating Plane	A	–	–	.210
Molded Package Thickness	A2	.115	.130	.195
Base to Seating Plane	A1	.015	–	–
Shoulder to Shoulder Width	E	.290	.310	.325
Molded Package Width	E1	.240	.250	.280
Overall Length	D	.348	.365	.400
Tip to Seating Plane	L	.115	.130	.150
Lead Thickness	c	.008	.010	.015
Upper Lead Width	b1	.040	.060	.070
Lower Lead Width	b	.014	.018	.022
Overall Row Spacing §	eB	–	–	.430

Notes:

1. Pin 1 visual index feature may vary, but must be located with 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 .010" per side.
4. Dimensioning and tolerancing per ASME Y14.5M.

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

Microchip Technology Drawing C04-018B

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	/XX
Device	Tape & Reel		Temp Range	Package

Device:	25LC1024		1 Mbit, 2.5V, SPI Serial EEPROM
Tape & Reel:	Blank	=	Standard packaging (tube)
	T	=	Tape & Reel
Temperature Range:	I	=	-40°C to+85°C
	E	=	-40°C to+125°C
Package:	MF	=	Micro Lead Frame (6 x 5 mm body), 8-lead
	P	=	Plastic DIP (300 mil body), 8-lead
	SM	=	Plastic SOIJ (5.28 mm), 8-lead

Examples:

a) 25LC1024-I/P = 1 Mbit, 2.5V Serial EEPROM, Industrial temp., P-DIP package

b) 25LC1024T-E/MF = 1 Mbit, 2.5V Serial EEPROM, Extended temp., Tape & Reel, DFN package