

## DM74LS503 8-Bit Successive Approximation Register (with Expansion Control)

### General Description

The DM74LS503 register has an active LOW Enable ( $\bar{E}$ ) input that is used in cascading two or more packages for longer word lengths. A HIGH signal on  $\bar{E}$ , after a START operation, forces Q7 HIGH and prevents the device from accepting serial data. With the  $\bar{E}$  input of an DM74LS503 connected to the  $\bar{CC}$  output of a preceding (more significant) device, the DM74LS503 will be inhibited until the preceding device is filled, causing its  $\bar{CC}$  output to go LOW. This LOW signal then enables the DM74LS503 to accept the serial data on subsequent clocks.

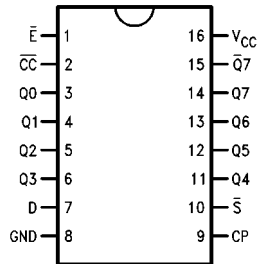
### Features

- Performs serial-to-parallel conversion
- Expansion control for longer words
- Storage and control for successive approximation A to D conversion
- Low power Schottky version of 2503

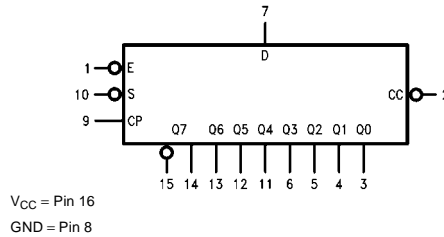
### Ordering Code:

Order Number	Package Number	Package Description
DM74LS503N	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

### Connection Diagram



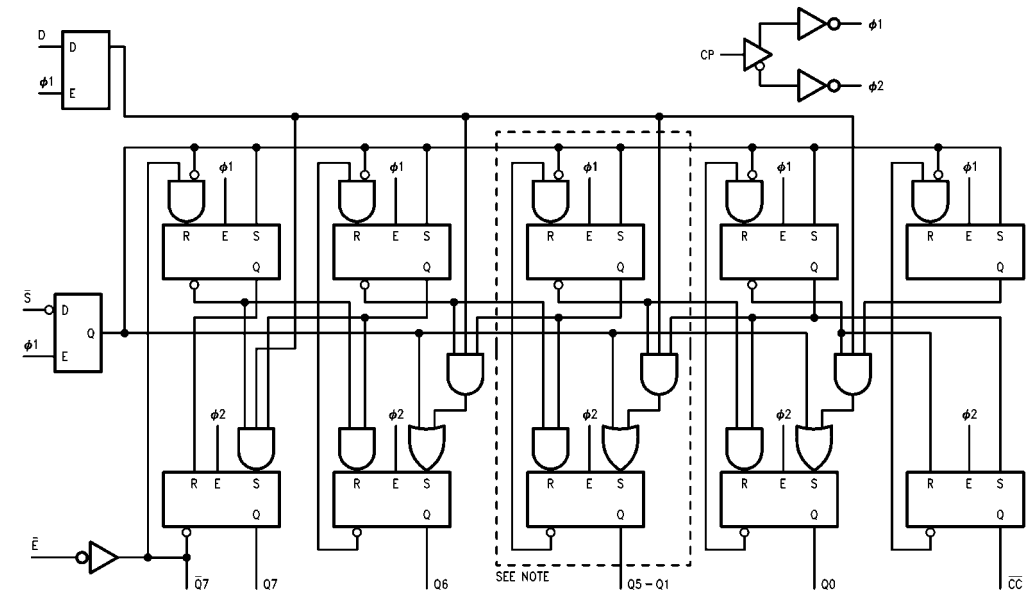
### Logic Symbol



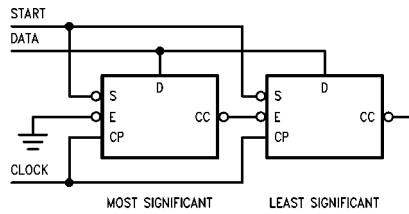
### Pin Descriptions

Pin Names	Description
D	Serial Data Input
$\bar{S}$	Start Input (Active LOW)
CP	Clock Pulse Input (Active Rising Edge)
$\bar{E}$	Conversion Enable Input (Active LOW)
$\bar{CC}$	Conversion Complete Output (Active LOW)
Q0–Q7	Parallel Register Outputs
$\bar{Q}7$	Complement of Q7 Output

Logic Diagrams



Connection for Longer Word Lengths



**Absolute Maximum Ratings**(Note 1)

Supply Voltage	7V
Input Voltage	7V
Operating Free Air Temperature Range	0°C to +70°C
Storage Temperature Range	-65°C to +150°C

**Note 1:** The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

**Recommended Operating Conditions**

Symbol	Parameter	Min	Nom	Max	Units
V <sub>CC</sub>	Supply Voltage	4.75	5	5.25	V
V <sub>IH</sub>	HIGH Level Input Voltage	2			V
V <sub>IL</sub>	LOW Level Input Voltage			0.8	V
I <sub>OH</sub>	HIGH Level Output Voltage			-0.4	mA
I <sub>OL</sub>	LOW Level Output Current			8	mA
T <sub>A</sub>	Free Air Operating Temperature	0		70	°C
t <sub>S</sub> (H)	Setup Time HIGH or LOW	16			ns
t <sub>S</sub> (L)	$\bar{S}$ to CP	16			ns
t <sub>H</sub> (H)	Hold Time HIGH or LOW	0			ns
t <sub>H</sub> (L)	$\bar{S}$ to CP	0			ns
t <sub>S</sub> (H)	Setup Time HIGH or LOW	8			ns
t <sub>S</sub> (L)	D to CP	8			ns
t <sub>H</sub> (H)	Hold Time HIGH or LOW	10			ns
t <sub>H</sub> (L)	D to CP	10			ns
t <sub>W</sub> (H)	CP Pulse Width HIGH or LOW	46			ns
t <sub>W</sub> (L)		46			ns

**Electrical Characteristics**

Over recommended operating free air temperature range (unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ (Note 2)	Max	Units
V <sub>I</sub>	Input Clamp Voltage	V <sub>CC</sub> = Min, I <sub>I</sub> = -18 mA			-1.5	V
V <sub>OH</sub>	HIGH Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OH</sub> = Max, V <sub>IL</sub> = Max	2.7			V
V <sub>OL</sub>	LOW Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OL</sub> = Max, V <sub>IH</sub> = Min			0.5	V
		I <sub>OL</sub> = 4 mA, V <sub>CC</sub> = Min			0.4	V
I <sub>I</sub>	Input Current @ Max Input Voltage	V <sub>CC</sub> = Max, V <sub>I</sub> = 7V V <sub>I</sub> = 10V			0.1	mA
I <sub>IH</sub>	HIGH Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 2.7V			20	μA
I <sub>IL</sub>	LOW Level Input Current	V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V			-0.8	mA
I <sub>OS</sub>	Short Circuit Output Current	V <sub>CC</sub> = Max (Note 3)	-20		-100	mA
I <sub>CC</sub>	Supply Current	V <sub>CC</sub> = Max			65	mA

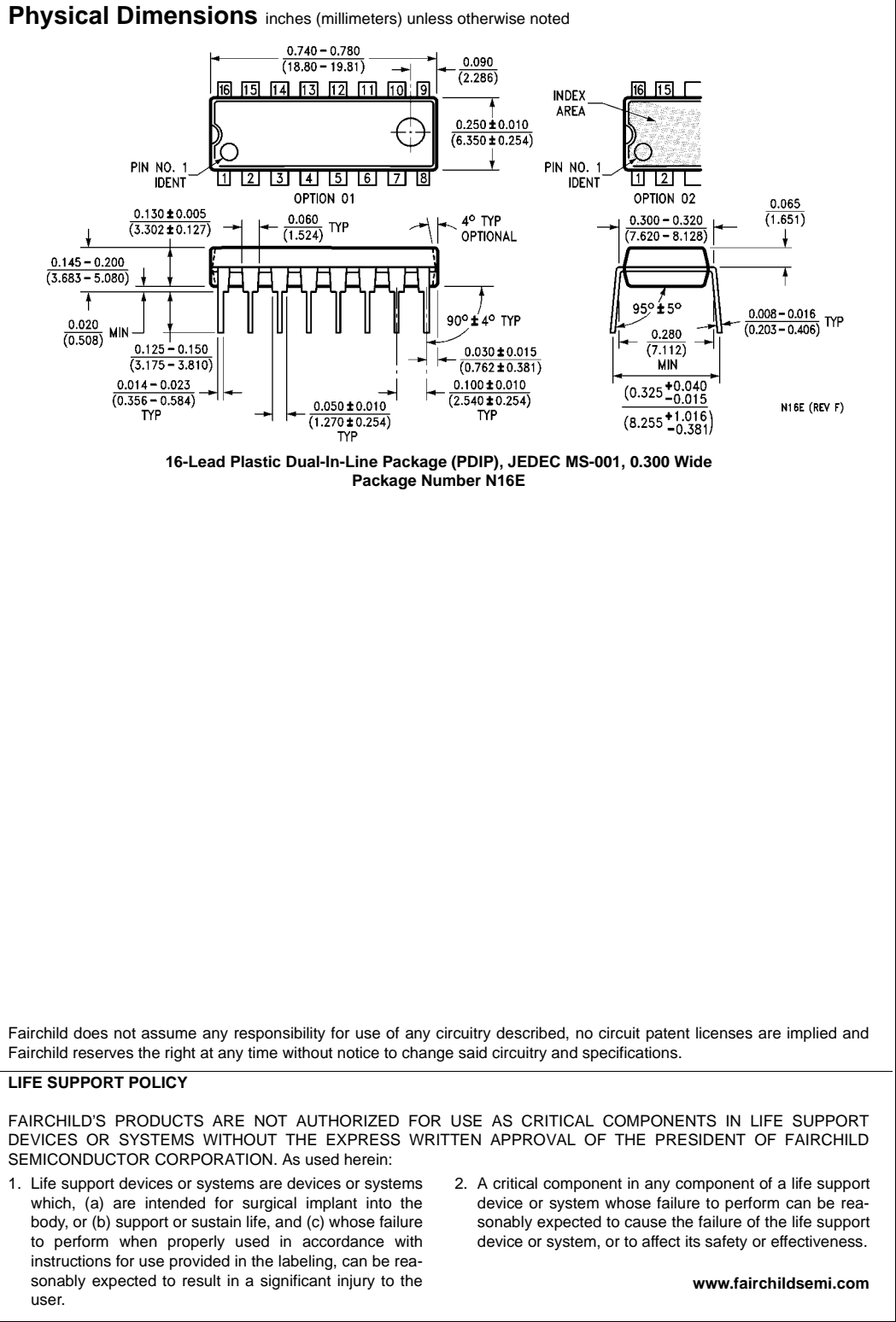
**Note 2:** All typicals are at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.

**Note 3:** Not more than one output should be shorted at a time, and the duration should not exceed one second.

**Switching Characteristics**

V<sub>CC</sub> = +5.0V, T<sub>A</sub> = +25°C

Symbol	Parameter	R <sub>L</sub> = 2 kΩ, C <sub>L</sub> = 15 pF		Units
		Min	Max	
f <sub>MAX</sub>	Maximum Count Frequency	15		MHz
t <sub>PLH</sub>	Propagation Delay		35	ns
t <sub>PHL</sub>	CP to Qn or CC		25	ns
t <sub>PLH</sub>	Propagation Delay		20	ns
t <sub>PHL</sub>	$\bar{E}$ to Q7		24	ns



Fairchild does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and Fairchild reserves the right at any time without notice to change said circuitry and specifications.

**LIFE SUPPORT POLICY**

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

[www.fairchildsemi.com](http://www.fairchildsemi.com)