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

General Description

The DM74LS503 register has an active LOW Enable ($\overline{E}$) input that is used in cascading two or more packages for longer word lengths. A HIGH signal on $\overline{E}$, after a START operation, forces Q7 HIGH and prevents the device from accepting serial data. With the $\overline{E}$ input of an DM74LS503 connected to the $\overline{CC}$ output of a preceding (more significant) device, the DM74LS503 will be inhibited until the preceding device is filled, causing its $\overline{CC}$ 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
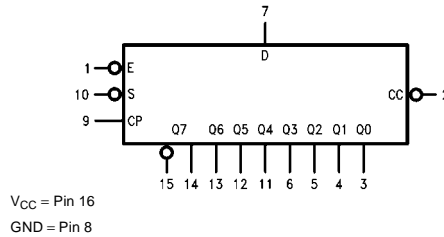■ Low power Schottky version of 2503

Ordering Code:

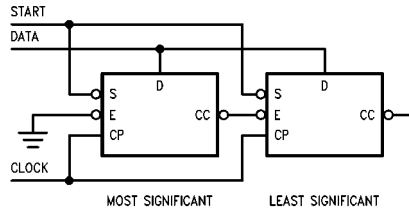| Order Number	Package Number	Package Description
DM74LS503N	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

Connection Diagram

Logic Symbol

V_{CC} = Pin 16
GND = Pin 8
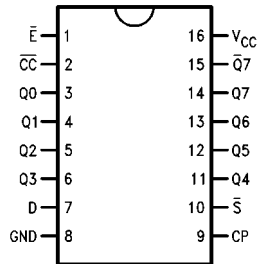
Pin Descriptions

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

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Logic Diagrams

Note: Cell logic is repeated for register stages Q5 to Q1.
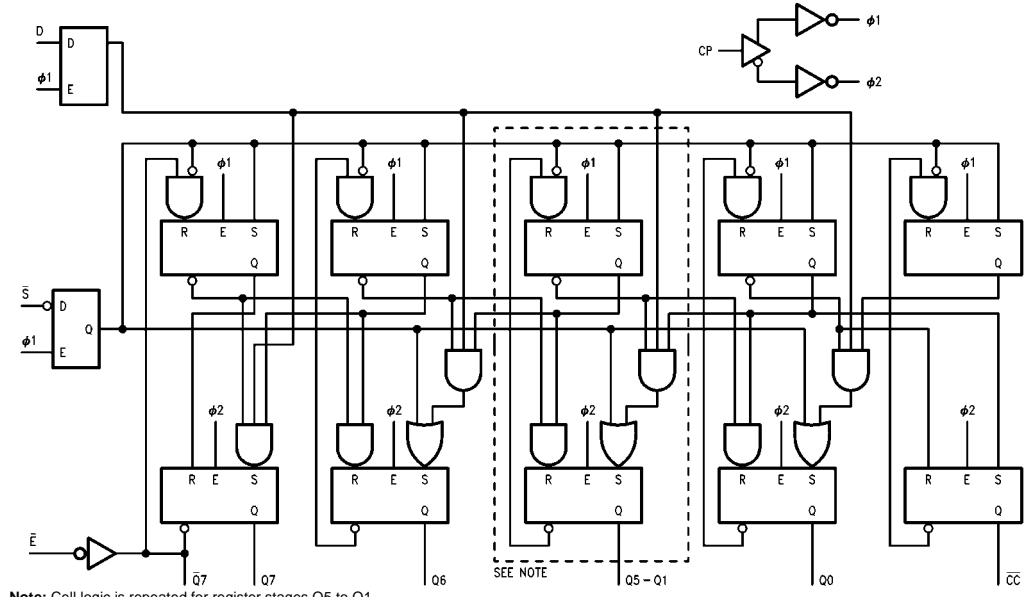
Connection for Longer Word Lengths

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_{CC}	Supply Voltage	4.75	5	5.25	V
V_{IH}	HIGH Level Input Voltage	2			V
V_{IL}	LOW Level Input Voltage			0.8	V
I_{OH}	HIGH Level Output Voltage			−0.4	mA
I_{OL}	LOW Level Output Current			8	mA
T_A	Free Air Operating Temperature	0		70	°C
t_S (H)	Setup Time HIGH or LOW	16			ns
t_S (L)	$\overline{S}$ to CP	16			
t_H (H)	Hold Time HIGH or LOW	0			ns
t_H (L)	$\overline{S}$ to CP	0			
t_S (H)	Setup Time HIGH or LOW	8			ns
t_S (L)	D to CP	8			
t_H (H)	Hold Time HIGH or LOW	10			ns
t_H (L)	D to CP	10			
t_W (H)	CP Pulse Width HIGH or LOW	46			ns
t_W (L)		46			

Electrical Characteristics

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

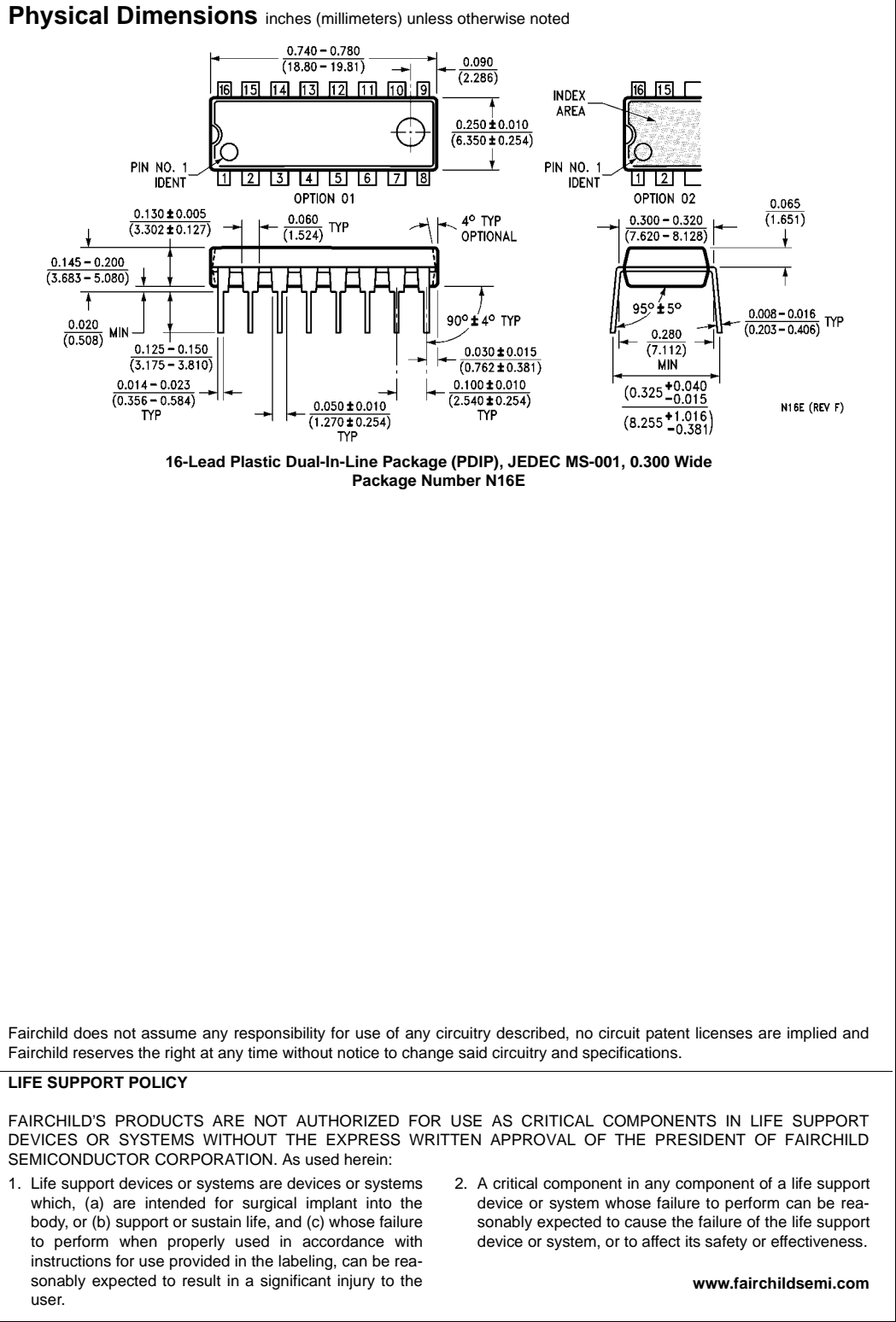| Symbol	Parameter	Conditions	Min	Typ (Note 2)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −18 mA			−1.5	V
V_{OH}	HIGH Level Output Voltage	V_{CC} = Min, I_{OH} = Max, V_{IL} = Max	2.7			V
V_{OL}	LOW Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IH} = Min			0.5	V
		I_{OL} = 4 mA, V_{CC} = Min			0.4	
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 7V, V_I = 10V			0.1	mA
I_{IH}	HIGH Level Input Current	V_{CC} = Max, V_I = 2.7V			20	μA
I_{IL}	LOW Level Input Current	V_{CC} = Max, V_I = 0.4V			−0.8	mA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 3)	−20		−100	mA
I_{CC}	Supply Current	V_{CC} = Max			65	mA

Note 2: All typicals are at V_{CC} = 5V, T_A = 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_{CC} = +5.0V, T_A = +25°C

Symbol	Parameter	R_L = 2 kΩ, C_L = 15 pF		Units
		Min	Max	
f_{MAX}	Maximum Count Frequency	15		MHz
t_{PLH}	Propagation Delay		35	ns
t_{PHL}	CP to Qn or $\overline{CC}$		25	
t_{PLH}	Propagation Delay		20	ns
t_{PHL}	$\overline{E}$ to Q7		24	

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Physical Dimensions inches (millimeters) unless otherwise noted

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

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