FAIRCHILD SEMICONDUCTOR™

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DM74LS377
Octal D-Type Flip-Flop with Common Enable and Clock

General Description

The DM74LS377 is an 8-bit register built using advanced low power Schottky technology. This register consists of eight D-type flip-flops with a buffered common clock and a buffered common input enable. The device is packaged in the space-saving (0.3 inch row spacing) 20-pin package.

Features

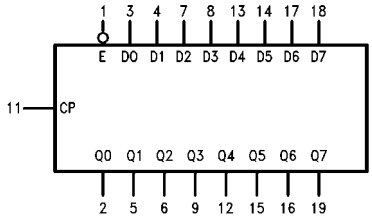
- 8-bit high speed parallel registers
- Positive edge-triggered D-type flip-flops
- Fully buffered common clock and enable inputs

Ordering Code:

Order Number	Package Number	Package Description
DM74LS377WM	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
DM74LS377N	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

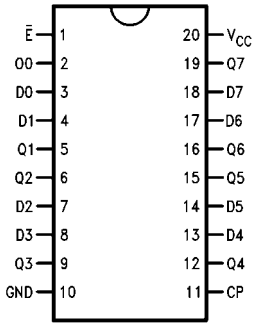
Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Logic Symbol



V_{CC} = Pin 20
GND = Pin 10

Connection Diagram



Pin Descriptions

Pin Names	Description
$\overline{E}$	Enable Input (Active LOW)
D0–D7	Data Inputs
CP	Clock Pulse Input (Active Rising Edge)
Q0–Q7	Flip-Flop Outputs

Truth Table

Inputs			Output
$\overline{E}$	CP	D_n	Q_n
H	X	X	No Change
L	↗	H	H
L	↗	L	L

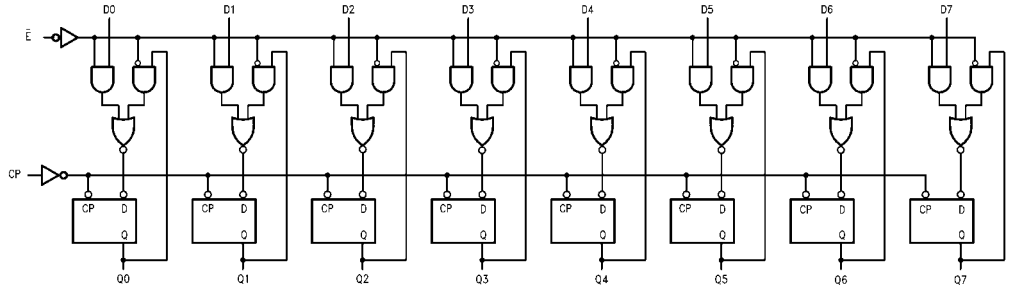
H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

Functional Description

The DM74LS377 consists of eight edge-triggered D flip-flops with individual D inputs and Q outputs. The Clock (CP) and Enable input ($\overline{E}$) are common to all flip-flops.

When $\overline{E}$ is LOW, new data is entered into the register on the next LOW-to-HIGH transition of CP. When $\overline{E}$ is HIGH, the register will retain the present data independent of the CP.

Logic Diagram



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 Current			−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	10			ns
t_S (L)	D_n to CP	10			
t_H (H)	Hold Time HIGH or LOW	5.0			ns
t_H (L)	D_n to CP	5.0			
t_S (H)	Setup Time HIGH or LOW	10			ns
t_S (L)	$\overline{E}$ to CP	20			
t_H (H)	Hold Time HIGH or LOW	5.0			ns
t_H (L)	$\overline{E}$ to CP	5.0			
t_W (H)	CP Pulse Width HIGH or LOW	20			ns
t_W (L)		20			

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	3.4		V
V_{OL}	LOW Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IH} = Min		0.35	0.5	V
		I_{OL} = 4 mA, V_{CC} = Min		0.25	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			20.0	µA
I_{IL}	LOW Level Input Current	V_{CC} = Max, V_I = 0.4V			−0.4	mA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 3)	−20		−100	mA
I_{CC}	Supply Current	V_{CC} = Max			28	mA

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

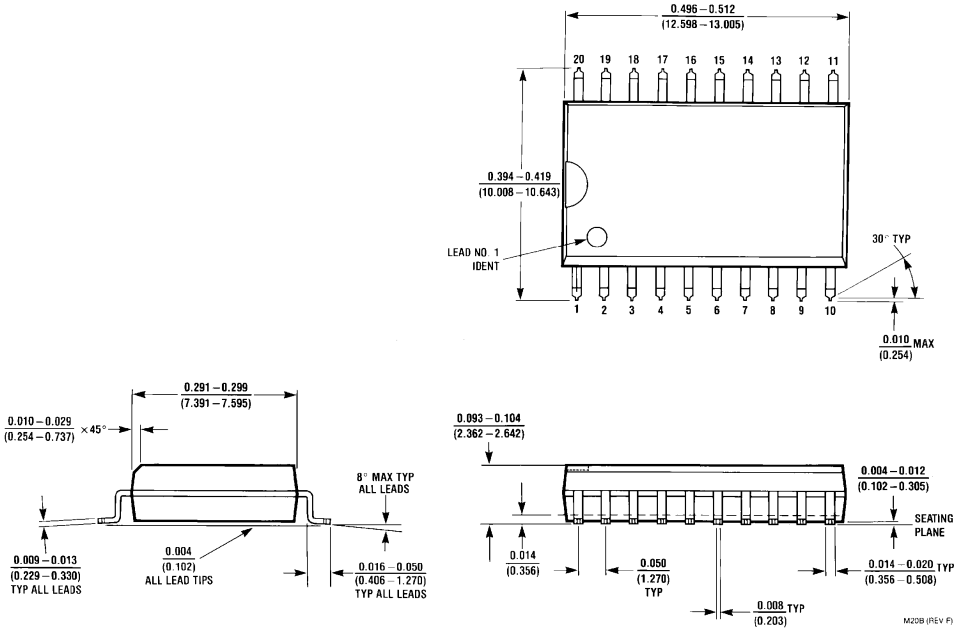
Note 3: Not more than one output should be shorted at a time, and the duration should not exceed one second.

Switching Characteristics

V_{CC} = +5.0V, T_A = +25°C

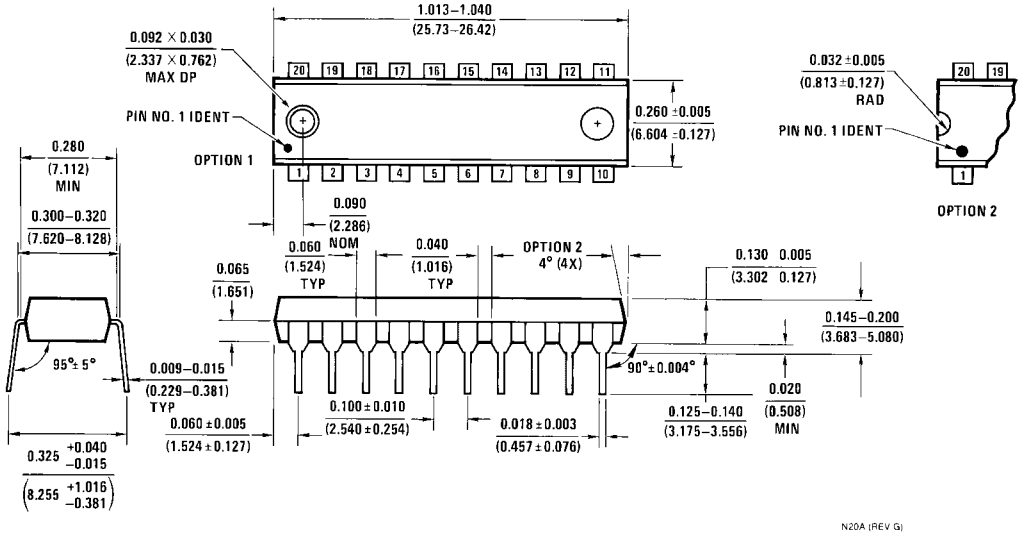
Symbol	Parameter	R_L = 2 kΩ, C_L = 15 pF		Units
		Min	Max	
f_{MAX}	Maximum Clock Frequency	30		MHz
t_{PLH}	Propagation Delay		25	ns
t_{PHL}	CP to Q_n		25	

Physical Dimensions inches (millimeters) unless otherwise noted



20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
Package Number M20B

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide
Package Number N20A