

## 74F377 Octal D-Type Flip-Flop with Clock Enable

### General Description

The 74F377 has eight edge-triggered, D-type flip-flops with individual D inputs and Q outputs. The common buffered Clock (CP) input loads all flip-flops simultaneously, when the Clock Enable (CE) is LOW.

The register is fully edge-triggered. The state of each D input, one setup time before the LOW-to-HIGH clock transition, is transferred to the corresponding flip-flop's Q output. The CE input must be stable only one setup time prior to the LOW-to-HIGH clock transition for predictable operation.

### Features

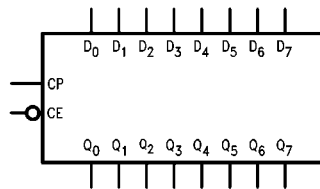
- Ideal for addressable register applications
- Clock enable for address and data synchronization applications
- Eight edge-triggered D-type flip-flops
- Buffered common clock
- See 74F273 for master reset version
- See 74F373 for transparent latch version
- See 74F374 for 3-STATE version

### Ordering Code:

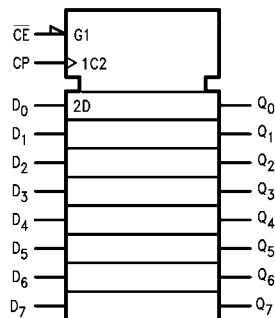
Order Number	Package Number	Package Description
74F377SC	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
74F377SJ	M20D	20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74F377PC	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

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

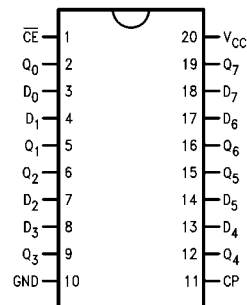
### Logic Symbols



IEEE/IEC



### Connection Diagram



### Unit Loading/Fan Out

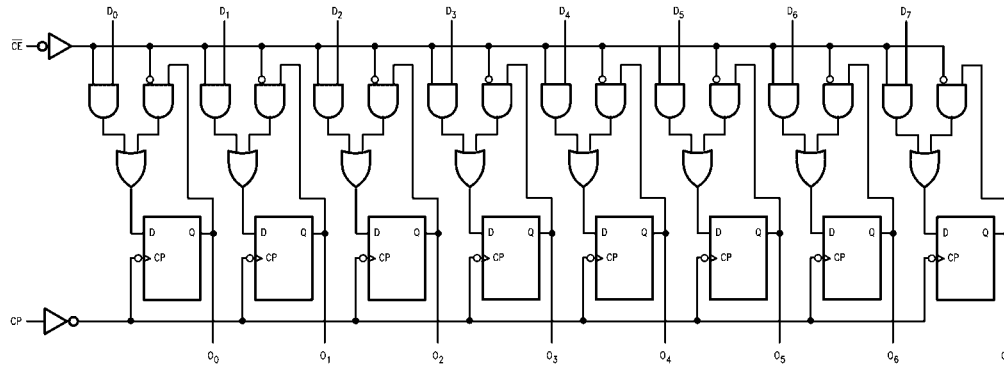
Pin Names	Description	U.L. HIGH/LOW	Input $I_{IH}/I_{IL}$ Output $I_{OH}/I_{OL}$
$D_0-D_7$	Data Inputs	1.0/1.0	20 $\mu$ A/-0.6 mA
$\overline{CE}$	Clock Enable (Active LOW)	1.0/1.0	20 $\mu$ A/-0.6 mA
CP	Clock Pulse Input	1.0/1.0	20 $\mu$ A/-0.6 mA
$Q_0-Q_7$	Data Outputs	50/33.3	-1 mA/20 mA

### Mode Select-Function Table

Operating Mode	Inputs			Output
	CP	$\overline{CE}$	$D_n$	$Q_n$
Load "1"	↗	l	h	H
Load "0"	↗	l	l	L
Hold	↗	h	X	No Change
(Do Nothing)	X	H	X	No Change

H = HIGH Voltage Level  
h = HIGH Voltage Level one setup time prior to the LOW-to-HIGH Clock Transition  
L = LOW Voltage Level  
l = LOW Voltage Level one setup time prior to the LOW-to-HIGH Clock Transition  
X = Immaterial  
↗ = LOW-to-HIGH Clock Transition

### Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

**Absolute Maximum Ratings** (Note 1)

Storage Temperature	-65°C to +150°C
Ambient Temperature under Bias	-55°C to +125°C
Junction Temperature under Bias	-55°C to +150°C
V <sub>CC</sub> Pin Potential to Ground Pin	-0.5V to +7.0V
Input Voltage (Note 2)	-0.5V to +7.0V
Input Current (Note 2)	-30 mA to +5.0 mA
Voltage Applied to Output in HIGH State (with V <sub>CC</sub> = 0V)	
Standard Output	-0.5V to V <sub>CC</sub>
3-STATE Output	-0.5V to +5.5V
Current Applied to Output in LOW State (Max)	twice the rated I <sub>OL</sub> (mA)
ESD Last Passing Voltage (Min)	4000V


**Recommended Operating Conditions**

Free Air Ambient Temperature	0°C to +70°C
Supply Voltage	+4.5V to +5.5V

**Note 1:** Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

**Note 2:** Either voltage limit or current limit is sufficient to protect inputs.

**DC Electrical Characteristics**

Symbol	Parameter	Min	Typ	Max	Units	V <sub>CC</sub>	Conditions
V <sub>IH</sub>	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V <sub>IL</sub>	Input LOW Voltage			0.8	V		Recognized as a LOW Signal
V <sub>CD</sub>	Input Clamp Diode Voltage			-1.2	V	Min	I <sub>IN</sub> = -18 mA
V <sub>OH</sub>	Output HIGH Voltage	10% V <sub>CC</sub>	2.5		V	Min	I <sub>OH</sub> = -1 mA
		5% V <sub>CC</sub>	2.7				I <sub>OH</sub> = -1 mA
V <sub>OL</sub>	Output LOW Voltage	10% V <sub>CC</sub>		0.5	V	Min	I <sub>OL</sub> = 20 mA
I <sub>IH</sub>	Input HIGH Current			5.0	μA	Max	V <sub>IN</sub> = 2.7V
I <sub>BVI</sub>	Input HIGH Current Breakdown Test			7.0	μA	Max	V <sub>IN</sub> = 7.0V
I <sub>IL</sub>	Input LOW Current			-0.6	mA	Max	V <sub>IN</sub> = 0.5V
I <sub>OS</sub>	Output Short-Circuit Current	-60		-150	mA	Max	V <sub>OUT</sub> = 0V
I <sub>CEX</sub>	Output HIGH Leakage Current			50	μA	Max	V <sub>OUT</sub> = V <sub>CC</sub>
V <sub>ID</sub>	Input Leakage Test	4.75			V	0.0	I <sub>ID</sub> = 1.9 μA All Other Pins Grounded
I <sub>OD</sub>	Output Leakage Circuit Current			3.75	μA	0.0	V <sub>ID</sub> = 150 mV All Other Pins Grounded
I <sub>CCH</sub>	Power Supply Current		35	46	mA	Max	CP =  D <sub>n</sub> = $\overline{MR}$ = HIGH
I <sub>CCL</sub>			44	56			

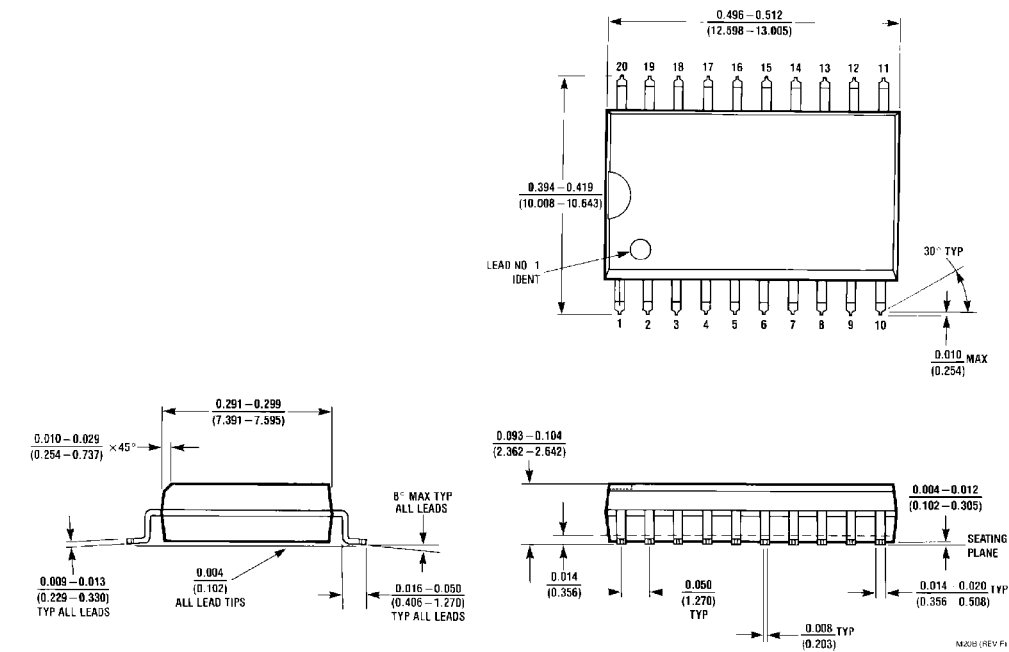
### AC Electrical Characteristics

Symbol	Parameter	T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50 pF			T <sub>A</sub> = -55°C to +125°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50 pF		T <sub>A</sub> = 0°C to +70°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50 pF		Units
		Min	Typ	Max	Min	Max	Min	Max	
t <sub>MAX</sub>	Maximum Clock Frequency	130			85		105		MHz
t <sub>PLH</sub>	Propagation Delay	3.0		7.0	2.0	8.5	2.5	7.5	ns
t <sub>PHL</sub>	CP to Q <sub>n</sub>	4.0		9.0	3.0	10.5	3.5	9.0	

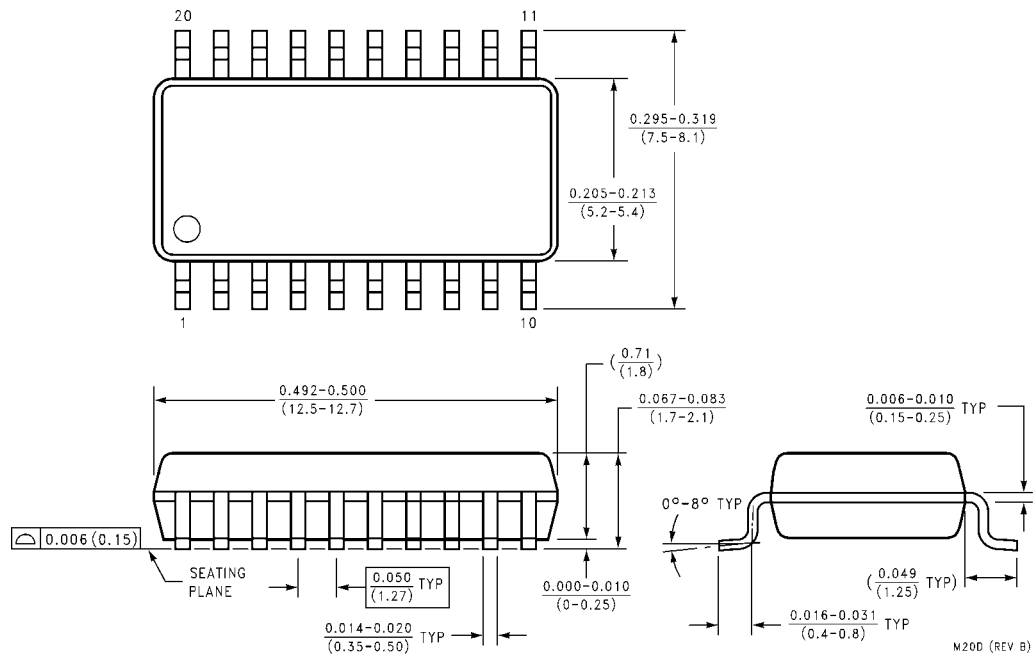
### AC Operating Requirements

Symbol	Parameter	T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0V		T <sub>A</sub> = -55°C to +125°C V <sub>CC</sub> = +5.0V		T <sub>A</sub> = 0°C to +70°C V <sub>CC</sub> = +5.0V		Units
		Min	Max	Min	Max	Min	Max	
t <sub>S</sub> (H)	Setup Time, HIGH or LOW	3.0		3.5		3.0		ns
t <sub>S</sub> (L)	D <sub>n</sub> to CP	3.5		4.0		3.5		
t <sub>H</sub> (H)	Hold Time, HIGH or LOW	0.5		1.0		0.5		ns
t <sub>H</sub> (L)	D <sub>n</sub> to CP	1.0		1.0		1.0		
t <sub>S</sub> (H)	Setup Time, HIGH or LOW	4.1		4.0		4.1		ns
t <sub>S</sub> (L)	$\overline{CE}$ to CP	3.5		5.0		4.0		
t <sub>H</sub> (H)	Hold Time, HIGH to LOW	0.5		1.5		0.5		ns
t <sub>H</sub> (L)	$\overline{CE}$ to CP	2.0		2.5		2.0		
t <sub>W</sub> (H)	Clock Pulse Width, HIGH or LOW	6.0		5.0		6.0		ns
t <sub>W</sub> (L)		6.0		5.0		6.0		

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

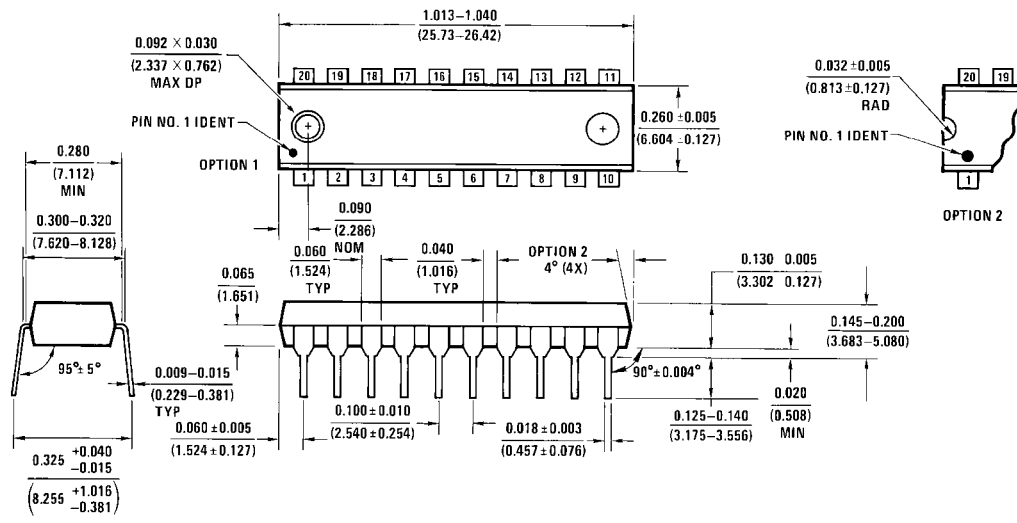


**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide Package Number M20B**



**20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide Package Number M20D**

**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**

N20A (REV G)

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