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April 1988  
Revised October 2000

## 74F378 Parallel D-Type Register with Enable

### General Description

The 74F378 is a 6-bit register with a buffered common Enable. This device is similar to the 74F174, but with common Enable rather than common Master Reset.

### Features

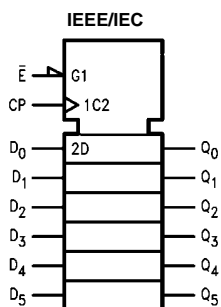
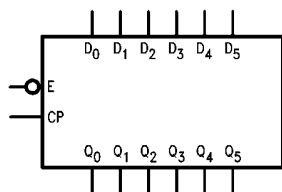
- 6-bit high-speed parallel register
- Positive edge-triggered D-type inputs
- Fully buffered common clock and enable inputs
- Input clamp diodes limit high-speed termination effects
- Full TTL and CMOS compatible

### Ordering Code:

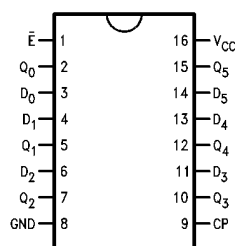
Order Number	Package Number	Package Description
74F378SC	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow
74F378SJ	M16D	16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74F378PC	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

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

### Logic Symbols



### Connection Diagram



74F378

### Unit Loading/Fan Out

Pin Names	Description	U.L. HIGH/LOW	Input I <sub>IH</sub> /I <sub>IL</sub> Output I <sub>OH</sub> /I <sub>OL</sub>
$\bar{E}$	Enable Input (Active LOW)	1.0/1.0	20 $\mu$ A/-0.6 mA
D <sub>0</sub> -D <sub>5</sub>	Data Inputs	1.0/1.0	20 $\mu$ A/-0.6 mA
CP	Clock Pulse Input (Active Rising Edge)	1.0/1.0	20 $\mu$ A/-0.6 mA
Q <sub>0</sub> -Q <sub>5</sub>	Outputs	50/33.3	-1 mA/20 mA

### Functional Description

The 74F378 consists of six edge-triggered D-type flip-flops with individual D inputs and Q outputs. The Clock (CP) and Enable ( $\bar{E}$ ) inputs are common to all flip-flops.

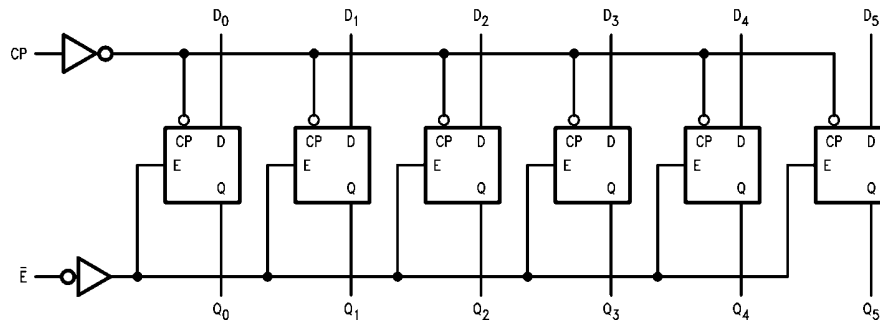
When the  $\bar{E}$  input is LOW, new data is entered into the register on the LOW-to-HIGH transition of the CP input. When the  $\bar{E}$  input is HIGH the register will retain the present data independent of the CP input.

### Truth Table

Inputs			Output
$\bar{E}$	CP	D <sub>n</sub>	Q <sub>n</sub>
H	↗	X	No Change
L	↗	H	H
L	↗	L	L

H = HIGH Voltage Level  
 L = LOW Voltage Level  
 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)

### 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.

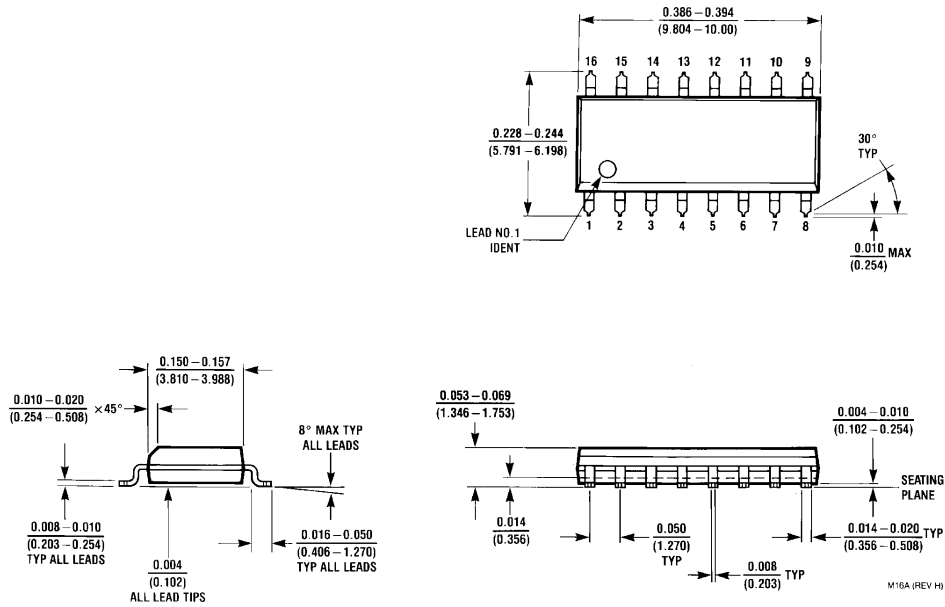
### DC Electrical Characteristics

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 5% V <sub>CC</sub> 2.7			V	Min	I <sub>OH</sub> = -1 mA 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>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>IOD</sub> = 150 mV All Other Pins Grounded
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>CCL</sub>	Power Supply Current		30	45	mA	Max	V <sub>O</sub> = LOW

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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 Input Frequency	80	100		70		80		MHz
t <sub>PLH</sub>	Propagation Delay	3.0	5.5	7.5	3.0	10.0	3.0	8.5	ns
t <sub>PHL</sub>	CP to Q <sub>n</sub>	3.5	6.0	8.5	3.5	10.5	3.5	9.5	
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	4.0		5.0		4.0		ns	
t <sub>S</sub> (L)	D <sub>n</sub> to CP	4.0		5.0		4.0			
t <sub>H</sub> (H)	Hold Time, HIGH or LOW	0		2.0		0		ns	
t <sub>H</sub> (L)	D <sub>n</sub> to CP	0		2.0		0			
t <sub>S</sub> (H)	Setup Time, HIGH or LOW	6.0		4.5		6.0		ns	
t <sub>S</sub> (L)	$\bar{E}$ to CP	10.0		13.0		10.0			
t <sub>H</sub> (H)	Hold Time, HIGH or LOW	0		0		0		ns	
t <sub>H</sub> (L)	$\bar{E}$ to CP	0		0		0			
t <sub>W</sub> (H)	CP Pulse Width	4.0		5.0		4.0		ns	
t <sub>W</sub> (L)	HIGH or LOW	6.0		7.5		6.0			

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

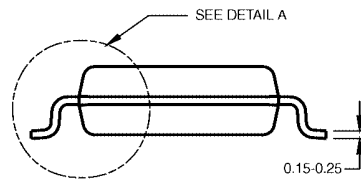
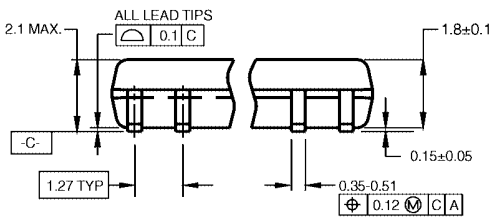
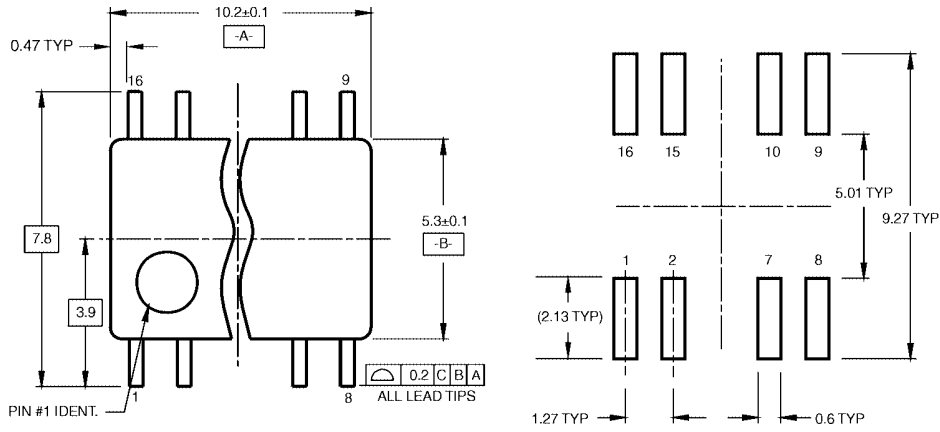


**16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow Package Number M16A**

M16A (REV H)

74F378

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

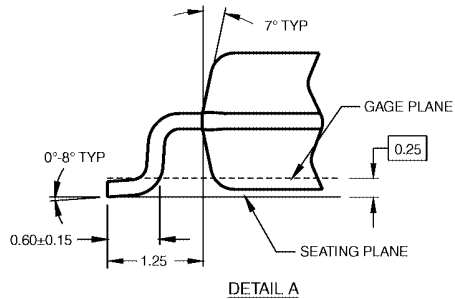


DIMENSIONS ARE IN MILLIMETERS

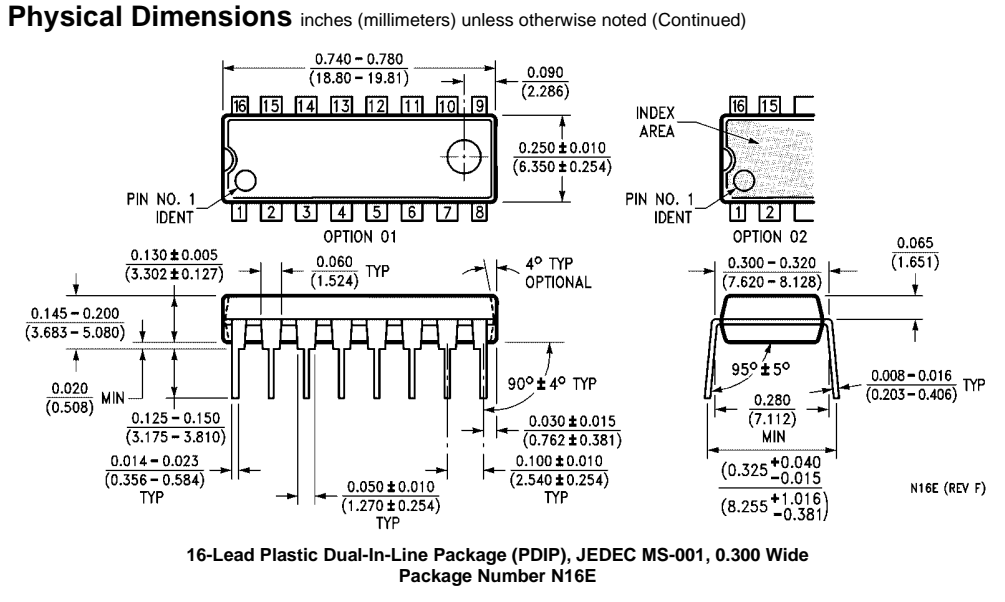
NOTES:

- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M16DRevB1



**16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide Package Number M16D**



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