

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

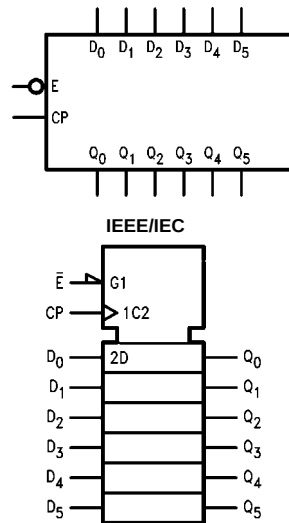
- 6-bit high-speed parallel register
- Positive edge-triggered D-type inputs
- Fully buffered common clock and enable inputs
- Input clamp diodes limit high-speed termination effects
- Full TTL and CMOS compatible

Ordering Code:

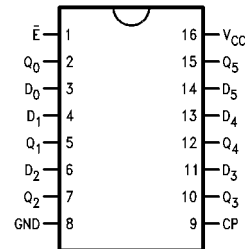
Order Number	Package Number	Package Description
74F378SC	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow
74F378SJ	M16D	16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74F378PC	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

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

Logic Symbols



Connection Diagram



Unit Loading/Fan Out

Pin Names	Description	U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
$\bar{E}$	Enable Input (Active LOW)	1.0/1.0	20 μA /–0.6 mA
D_0 – D_5	Data Inputs	1.0/1.0	20 μA /–0.6 mA
CP	Clock Pulse Input (Active Rising Edge)	1.0/1.0	20 μA /–0.6 mA
Q_0 – Q_5	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.

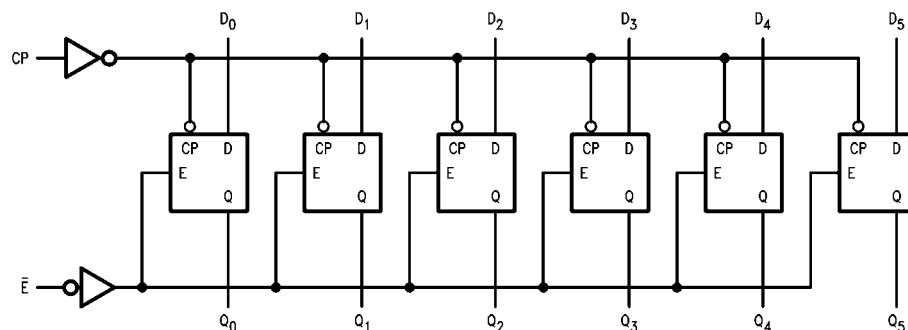
When the $\bar{E}$ input is LOW, new data is entered into the register on the LOW-to-HIGH transition of the CP input. When the $\bar{E}$ input is HIGH the register will retain the present data independent of the CP input.

Truth Table

Inputs			Output
$\bar{E}$	CP	D_n	Q_n
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 _{CC} 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_{CC} = 0V)Standard Output -0.5V to V_{CC}

3-STATE Output -0.5V to +5.5V

Current Applied to Output

in LOW State (Max) twice the rated I_{OL} (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 _{CC}	Conditions
V _{IH}	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V _{IL}	Input LOW Voltage			0.8	V		Recognized as a LOW Signal
V _{CD}	Input Clamp Diode Voltage			-1.2	V	Min	I _{IN} = -18 mA
V _{OH}	Output HIGH Voltage	10% V _{CC} 5% V _{CC}	2.5 2.7		V	Min	I _{OH} = -1 mA I _{OH} = -1 mA
V _{OL}	Output LOW Voltage	10% V _{CC}		0.5	V	Min	I _{OL} = 20 mA
I _{IH}	Input HIGH Current			5.0	μA	Max	V _{IN} = 2.7V
I _{BVI}	Input HIGH Current Breakdown Test			7.0	μA	Max	V _{IN} = 7.0V
I _{CEX}	Output HIGH Leakage Current			50	μA	Max	V _{OUT} = V _{CC}
V _{ID}	Input Leakage Test	4.75			V	0.0	I _{ID} = 1.9 μA All Other Pins Grounded
I _{OD}	Output Leakage Circuit Current			3.75	μA	0.0	V _{ID} = 150 mV All Other Pins Grounded
I _{IL}	Input LOW Current			-0.6	mA	Max	V _{IN} = 0.5V
I _{OS}	Output Short-Circuit Current	-60		-150	mA	Max	V _{OUT} = 0V
I _{CCL}	Power Supply Current		30	45	mA	Max	V _O = LOW

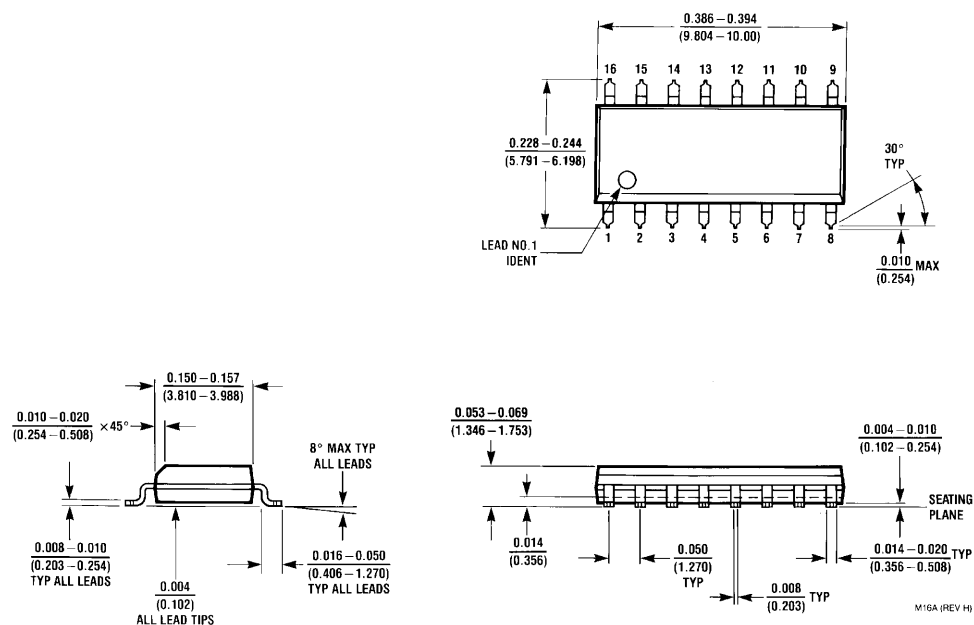
AC Electrical Characteristics

Symbol	Parameter	T _A = +25°C V _{CC} = +5.0V C _L = 50 pF			T _A = -55°C to +125°C V _{CC} = +5.0V C _L = 50 pF		T _A = 0°C to +70°C V _{CC} = +5.0V C _L = 50 pF		Units
		Min	Typ	Max	Min	Max	Min	Max	
f _{MAX}	Maximum Input Frequency	80	100		70		80		MHz
t _{PLH}	Propagation Delay	3.0	5.5	7.5	3.0	10.0	3.0	8.5	ns
t _{PHL}	CP to Q _n	3.5	6.0	8.5	3.5	10.5	3.5	9.5	

AC Operating Requirements

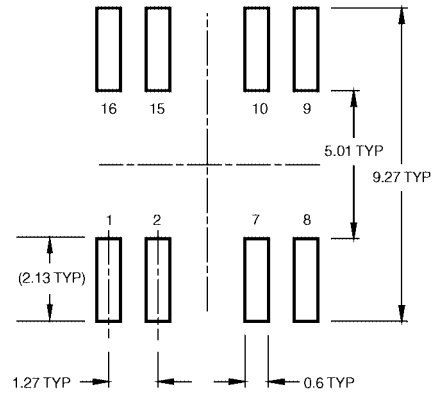
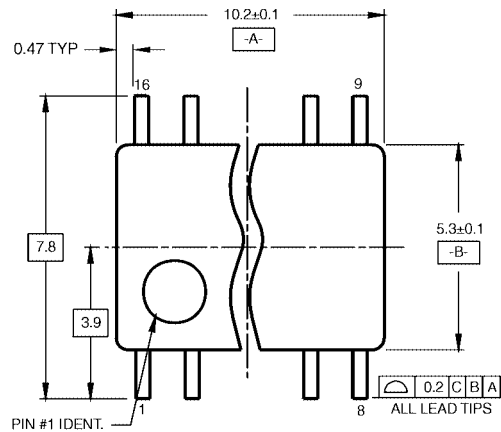
Symbol	Parameter	T _A = +25°C V _{CC} = +5.0V		T _A = -55°C to +125°C V _{CC} = +5.0V		T _A = 0°C to +70°C V _{CC} = +5.0V		Units
		Min	Max	Min	Max	Min	Max	
t _S (H)	Setup Time, HIGH or LOW	4.0		5.0		4.0		ns
t _S (L)	D _n to CP	4.0		5.0		4.0		
t _H (H)	Hold Time, HIGH or LOW	0		2.0		0		
t _H (L)	D _n to CP	0		2.0		0		ns
t _S (H)	Setup Time, HIGH or LOW	6.0		4.5		6.0		
t _S (L)	$\overline{E}$ to CP	10.0		13.0		10.0		
t _H (H)	Hold Time, HIGH or LOW	0		0		0		ns
t _H (L)	$\overline{E}$ to CP	0		0		0		
t _W (H)	CP Pulse Width	4.0		5.0		4.0		ns
t _W (L)	HIGH or LOW	6.0		7.5		6.0		

Physical Dimensions inches (millimeters) unless otherwise noted

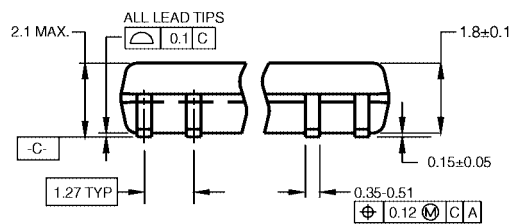


**16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow
Package Number M16A**

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



LAND PATTERN RECOMMENDATION

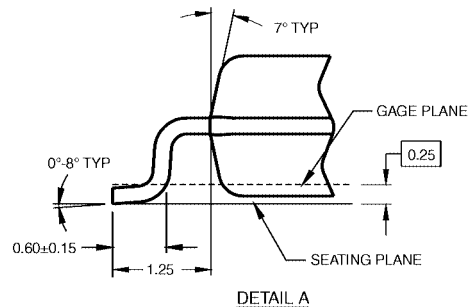
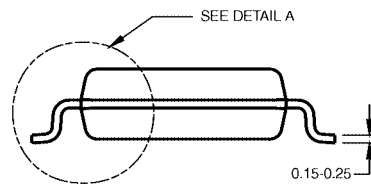


DIMENSIONS ARE IN MILLIMETERS

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.

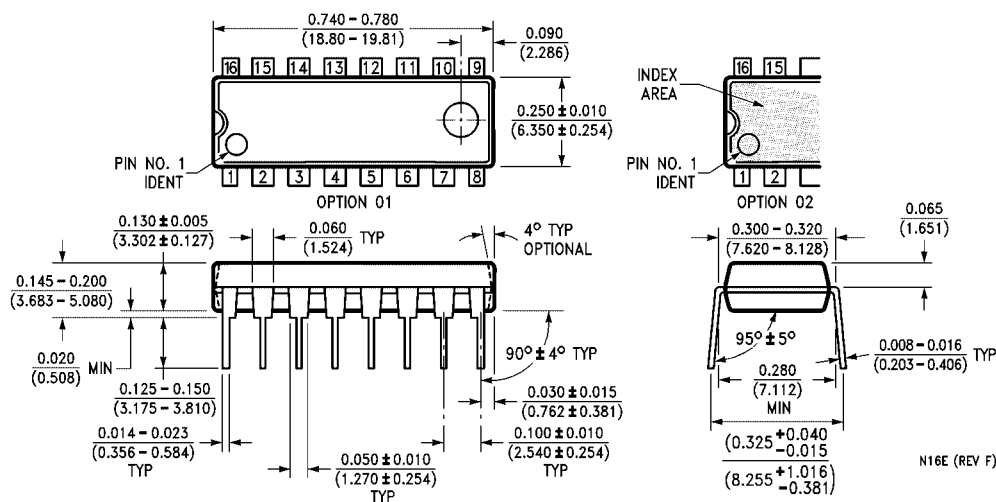
M16DRevB1



DETAIL A

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

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



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