

## Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

## Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
  - Class Q Military
  - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
  - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

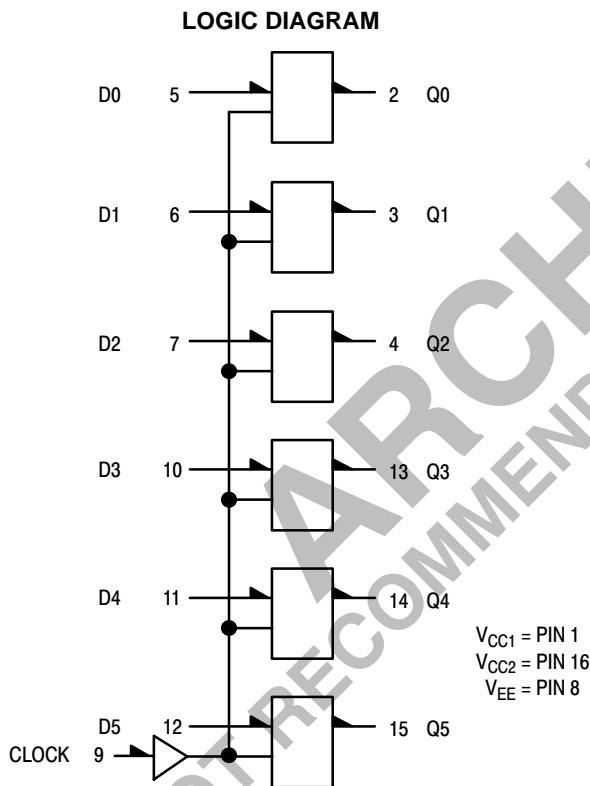
The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

# MC10176

## Hex D Master/Slave Flip-Flop

The MC10176 contains six high-speed, master slave type “D” flip-flops. Clocking is common to all six flip-flops. Data is entered into the master when the clock is low. Master to slave data transfer takes place on the positive-going Clock transition. Thus, outputs may change only on a positive-going Clock transition. A change in the information present at the data (D) input will not affect the output information any other time due to the master-slave construction of this device.

- $P_D = 460$  mW typ/pkg (No Load)
- $f_{toggle} = 150$  MHz (typ)
- $t_r, t_f = 2.0$  ns typ (20%–80%)



**CLOCKED TRUTH TABLE**

C	D	$Q_{n+1}$
L	X	$Q_n$
H*	L	L
H*	H	H

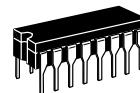
\*A clock H is a clock transition from a low to a high state.



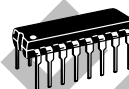
**ON Semiconductor**

<http://onsemi.com>

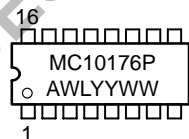
**MARKING DIAGRAMS**



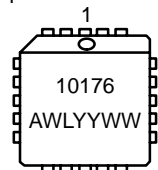
**CDIP-16**  
**L SUFFIX**  
**CASE 620**



**PDIP-16**  
**P SUFFIX**  
**CASE 648**

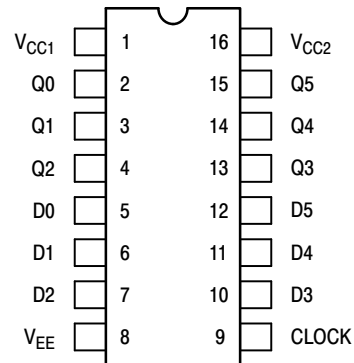


**PLCC-20**  
**FN SUFFIX**  
**CASE 775**



A = Assembly Location  
 WL = Wafer Lot  
 YY = Year  
 WW = Work Week

**DIP PIN ASSIGNMENT**



Pin assignment is for Dual-in-Line Package.  
 For PLCC pin assignment, see the Pin Conversion Tables on page 18 of the ON Semiconductor MECL Data Book (DL122/D).

**ORDERING INFORMATION**

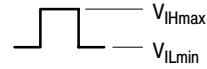
Device	Package	Shipping
MC10176L	CDIP-16	25 Units / Rail
MC10176P	PDIP-16	25 Units / Rail
MC10176FN	PLCC-20	46 Units / Rail

# MC10176

## ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Pin Under Test	Test Limits						Unit		
			-30°C		+25°C		+85°C				
			Min	Max	Min	Typ	Max	Min		Max	
Power Supply Drain Current	$I_E$	8		121		88	110		121	mAdc	
Input Current	$I_{inH}$	5		350			220		220	$\mu$ Adc	
		9		495			310		310		
	$I_{inL}$	5	0.5		0.5			0.3		$\mu$ Adc	
		9	0.5		0.5			0.3			
Output Voltage	Logic 1	$V_{OH}$	2 <sup>†</sup>	-1.060	-0.890	-0.960		-0.810	-0.890	-0.700	Vdc
			15 <sup>†</sup>	-1.060	-0.890	-0.960		-0.810	-0.890	-0.700	
Output Voltage	Logic 0	$V_{OL}$	2 <sup>†</sup>	-1.890	-1.675	-1.850		-1.650	-1.825	-1.615	Vdc
			15 <sup>†</sup>	-1.890	-1.675	-1.850		-1.650	-1.825	-1.615	
Threshold Voltage	Logic 1	$V_{OHA}$	2 <sup>†</sup>	-1.080		-0.980			-0.910		Vdc
			15 <sup>†</sup>	-1.080		-0.980			-0.910		
Threshold Voltage	Logic 0	$V_{OLA}$	2 <sup>†</sup>		-1.655			-1.630		-1.595	Vdc
			15 <sup>†</sup>		-1.655			-1.630		-1.595	
Switching Times (50 $\Omega$ Load)										ns	
Clock Input											
Propagation Delay	$t_{g+2+}$	2	1.6	4.6	1.6		4.5	1.6	5.0		
		2	1.6	4.6	1.6		4.5	1.6	5.0		
Rise Time (20 to 80%)	$t_{2+}$	2	1.0	4.1	1.1		4.0	1.1	4.4		
Fall Time (20 to 80%)	$t_{2-}$	2	1.0	4.1	1.1		4.0	1.1	4.4		
Setup Time	$t_{setup}$	2	2.5		2.5			2.5		ns	
Hold Time	$t_{hold}$	2	1.5		1.5			1.5		ns	
Toggle Frequency (Max)	$f_{tog}$	2	125		125	150		125		MHz	

<sup>†</sup> Output level to be measured after a clock pulse has been applied to the C Input (Pin 9)



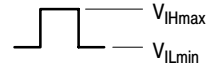
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DEVICE NOT RECOMMENDED FOR NEW DESIGN

# MC10176

## ELECTRICAL CHARACTERISTICS (continued)

			TEST VOLTAGE VALUES (Volts)						
			$V_{IHmax}$	$V_{ILmin}$	$V_{IHmin}$	$V_{ILmax}$	$V_{EE}$		
@ Test Temperature									
			-30°C	-0.890	-1.890	-1.205	-1.500	-5.2	
			+25°C	-0.810	-1.850	-1.105	-1.475	-5.2	
			+85°C	-0.700	-1.825	-1.035	-1.440	-5.2	
Characteristic	Symbol	Pin Under Test	TEST VOLTAGE APPLIED TO PINS LISTED BELOW					(V <sub>CC</sub> ) Gnd	
			$V_{IHmax}$	$V_{ILmin}$	$V_{IHmin}$	$V_{ILmax}$	$V_{EE}$		
Power Supply Drain Current	$I_E$	8					8	1, 16	
Input Current	$I_{inH}$	5	5				8	1, 16	
		9	9				8	1, 16	
Output Voltage	Logic 1	$V_{OH}$	2 <sup>†</sup>	5			8	1, 16	
			15 <sup>†</sup>						12
Output Voltage	Logic 0	$V_{OL}$	2 <sup>†</sup>	5			8	1, 16	
			15 <sup>†</sup>						12
Threshold Voltage	Logic 1	$V_{OHA}$	2 <sup>†</sup>		5		8	1, 16	
			15 <sup>†</sup>						12
Threshold Voltage	Logic 0	$V_{OLA}$	2 <sup>†</sup>			5	8	1, 16	
			15 <sup>†</sup>						12
Switching Times (50Ω Load)				+1.11Vdc	+0.31V	Pulse In	Pulse Out	-3.2 V	+2.0 V
Clock Input	Propagation Delay	$t_{g+2+}$	2			5, 9	2	8	1, 16
			2			5, 9	2	8	1, 16
Rise Time (20 to 80%)		$t_{2+}$	2			5, 9	2	8	1, 16
Fall Time (20 to 80%)		$t_{2-}$	2			5, 9	2	8	1, 16
Setup Time		$t_{setup}$	2			5, 9	2	8	1, 16
Hold Time		$t_{hold}$	2			5, 9	2	8	1, 16
Toggle Frequency (Max)		$f_{tog}$	2					8	1, 16

† Output level to be measured after a clock pulse has been applied to the C Input (Pin 9)

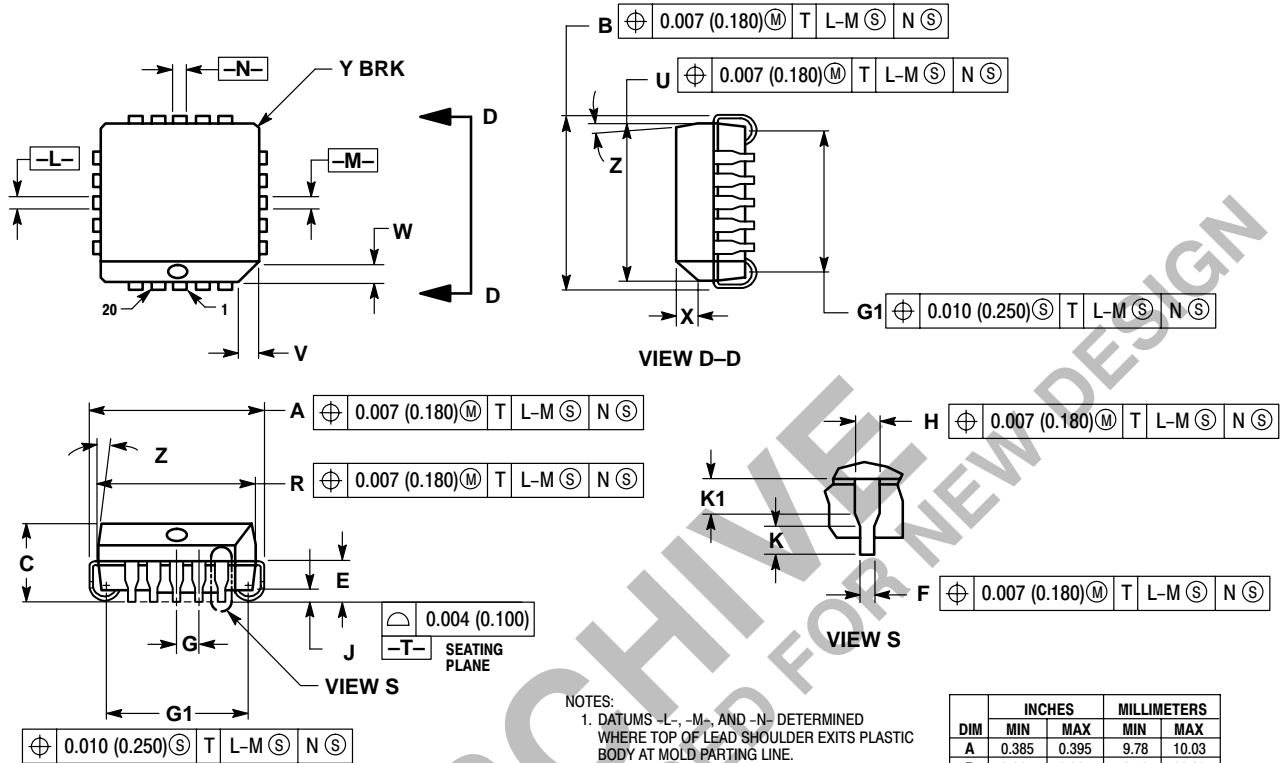


Each MECL 10,000 series circuit has been designed to meet the dc specifications shown in the test table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 linear fpm is maintained. Outputs are terminated through a 50-ohm resistor to -2.0 volts. Test procedures are shown for only one gate. The other gates are tested in the same manner.

# MC10176

## PACKAGE DIMENSIONS

PLCC-20  
FN SUFFIX  
PLASTIC PLCC PACKAGE  
CASE 775-02  
ISSUE C



### NOTES:

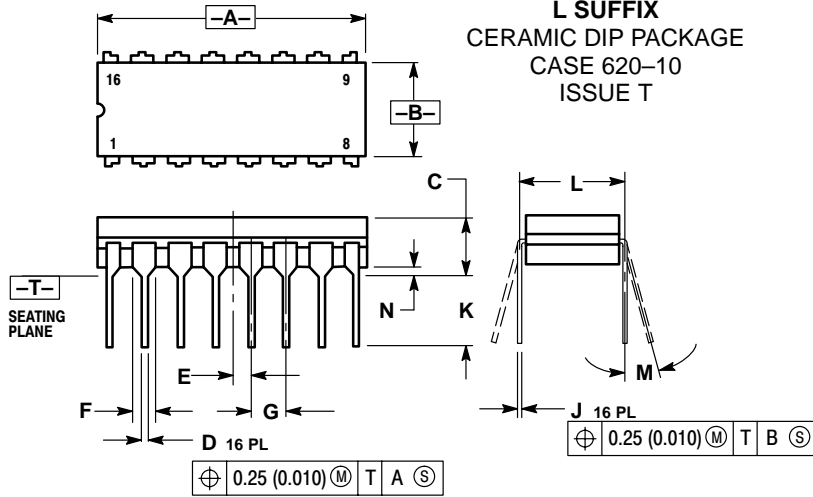
- DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
- DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
- DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.385	0.395	9.78	10.03
B	0.385	0.395	9.78	10.03
C	0.165	0.180	4.20	4.57
E	0.090	0.110	2.29	2.79
F	0.013	0.019	0.33	0.48
G	0.050 BSC		1.27 BSC	
H	0.026	0.032	0.66	0.81
J	0.020	---	0.51	---
K	0.025	---	0.64	---
R	0.350	0.356	8.89	9.04
U	0.350	0.356	8.89	9.04
V	0.042	0.048	1.07	1.21
W	0.042	0.048	1.07	1.21
X	0.042	0.056	1.07	1.42
Y	---	0.020	---	0.50
Z	2°	10°	2°	10°
G1	0.310	0.330	7.88	8.38
K1	0.040	---	1.02	---

# MC10176

## PACKAGE DIMENSIONS

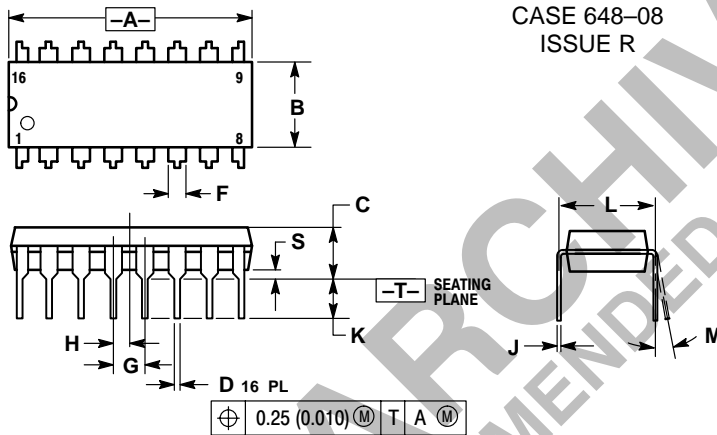
### CDIP-16 L SUFFIX CERAMIC DIP PACKAGE CASE 620-10 ISSUE T



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
  4. DIMENSION F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.750	0.785	19.05	19.93
B	0.240	0.295	6.10	7.49
C	---	0.200	---	5.08
D	0.015	0.020	0.39	0.50
E	0.050 BSC		1.27 BSC	
F	0.055	0.065	1.40	1.65
G	0.100 BSC		2.54 BSC	
H	0.008	0.015	0.21	0.38
K	0.125	0.170	3.18	4.31
L	0.300 BSC		7.62 BSC	
M	0°	15°	0°	15°
N	0.020	0.040	0.51	1.01

### PDIP-16 P SUFFIX PLASTIC DIP PACKAGE CASE 648-08 ISSUE R



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
  5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0°	10°	0°	10°
S	0.020	0.040	0.51	1.01

**Notes**


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