



ON Semiconductor

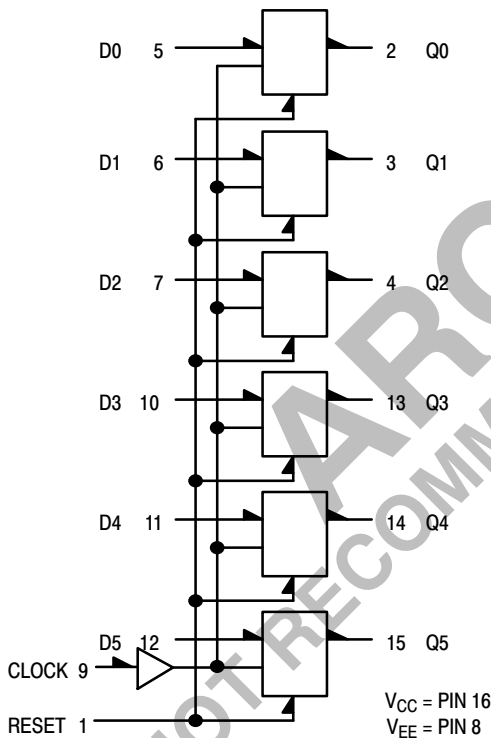
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Hex D Master-Slave Flip-Flop with Reset

The MC10186 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. **A COMMON RESET IS INCLUDED IN THIS CIRCUIT. RESET ONLY FUNCTIONS WHEN CLOCK IS LOW.**

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

LOGIC DIAGRAM

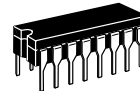


CLOCKED TRUTH TABLE

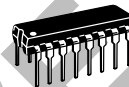
R	C	D	$Q_n + 1$
L	L	X	Q_n
L	H*	L	L
L	H*	H	H
H	L	X	L

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

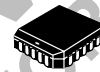
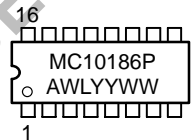
MARKING DIAGRAMS



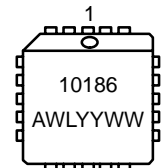
CDIP-16
L SUFFIX
CASE 620



PDIP-16
P SUFFIX
CASE 648

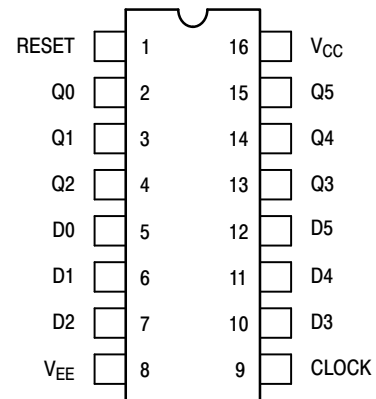


PLCC-20
FN SUFFIX
CASE 775



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
MC10186L	CDIP-16	25 Units / Rail
MC10186P	PDIP-16	25 Units / Rail
MC10186FN	PLCC-20	46 Units / Rail

MC10186

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	μ Adc	
		9		495			310		310		
1			920			575		575			
	I_{inL}	5	0.5		0.5			0.3		μ Adc	
Output Voltage Logic 1	V_{OH}	2 [†]	-1.060	-0.890	-0.960		-0.810	-0.890	-0.700	Vdc	
		15 [†]	-1.060	-0.890	-0.960		-0.810	-0.890	-0.700		
Output Voltage Logic 0	V_{OL}	2 [†]	-1.890	-1.675	-1.850		-1.650	-1.825	-1.615	Vdc	
		15 [†]	-1.890	-1.675	-1.850		-1.650	-1.825	-1.615		
Threshold Voltage Logic 1	V_{OHA}	2 [†]	-1.080		-0.980			-0.910		Vdc	
		15 [†]	-1.080		-0.980			-0.910			
Threshold Voltage Logic 0	V_{OLA}	2 [†]		-1.655			-1.630		-1.595	Vdc	
		15 [†]		-1.655			-1.630		-1.595		
Switching Times (50 Ω Load)										ns	
Propagation Delay	t_{1+3-}	3	1.6	4.6	1.6	2.5	4.5	1.6	5.0		
		4	1.6	4.6	1.6	2.5	4.5	1.6	5.0		
		t_{9+2+}	2	1.6	4.6	1.6	3.5	4.5	1.6		5.0
		t_{9+2-}	2	1.6	4.6	1.6	3.5	4.5	1.6		5.0
Rise Time (20 to 80%)	t_{2+}	2	1.0	4.1	1.1	1.8	4.0	1.1	4.4		
Fall Time (20 to 80%)	t_{2-}	2	1.0	4.1	1.1	1.8	4.0	1.1	4.4		
Setup Time	t_{setup}	2	2.5		2.5	2.5		2.5		ns	
Hold Time	t_{hold}	2	1.5		1.5	-1.5		1.5		ns	
Toggle Frequency (Max)	f_{tog}	2	125		125	150		125		MHz	

[†] Output level to be measured after clock pulse. V_{IL} appears at clock input (Pin 9).

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ELECTRICAL CHARACTERISTICS (continued)

			TEST VOLTAGE VALUES (Volts)						
			V _{IHmax}	V _{ILmin}	V _{IHAmin}	V _{ILAmax}	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 _{CC}) Gnd	
			V _{IHmax}	V _{ILmin}	V _{IHAmin}	V _{ILAmax}	V _{EE}		
Power Supply Drain Current	I _E	8					8	16	
Input Current	I _{inH}	5	5				8	16	
		9	9				8	16	
1		1				8	16		
	I _{inL}	5		5			8	16	
Output Voltage Logic 1	V _{OH}	2 [†]	5				8	16	
		15 [†]					8	16	
Output Voltage Logic 0	V _{OL}	2 [†]	5	12			8	16	
		15 [†]					8	16	
Threshold Voltage Logic 1	V _{OHA}	2 [†]			5	12	8	16	
		15 [†]					8	16	
Threshold Voltage Logic 0	V _{OLA}	2 [†]			5	12	8	16	
		15 [†]					8	16	
Switching Times (50Ω Load)			+1.11Vdc	+0.31V	Pulse In	Pulse Out	-3.2 V	+2.0 V	
Propagation Delay	t ₁₊₃₋ t ₁₊₄₋ t ₉₊₂₊ t ₉₊₂₋	3	6		1, 9	3	8	16	
		4	7		1, 9	4	8	16	
		2			5, 9	2	8	16	
		2			5, 9	2	8	16	
Rise Time (20 to 80%)	t ₂₊	2			5, 9	2	8	16	
Fall Time (20 to 80%)	t ₂₋	2			5, 9	2	8	16	
Setup Time	t _{setup}	2			5, 9	2	8	16	
Hold Time	t _{hold}	2			5, 9	2	8	16	
Toggle Frequency (Max)	f _{tog}	2					8	16	

† Output level to be measured after clock pulse.  V_{IH} appears at clock input (Pin 9).

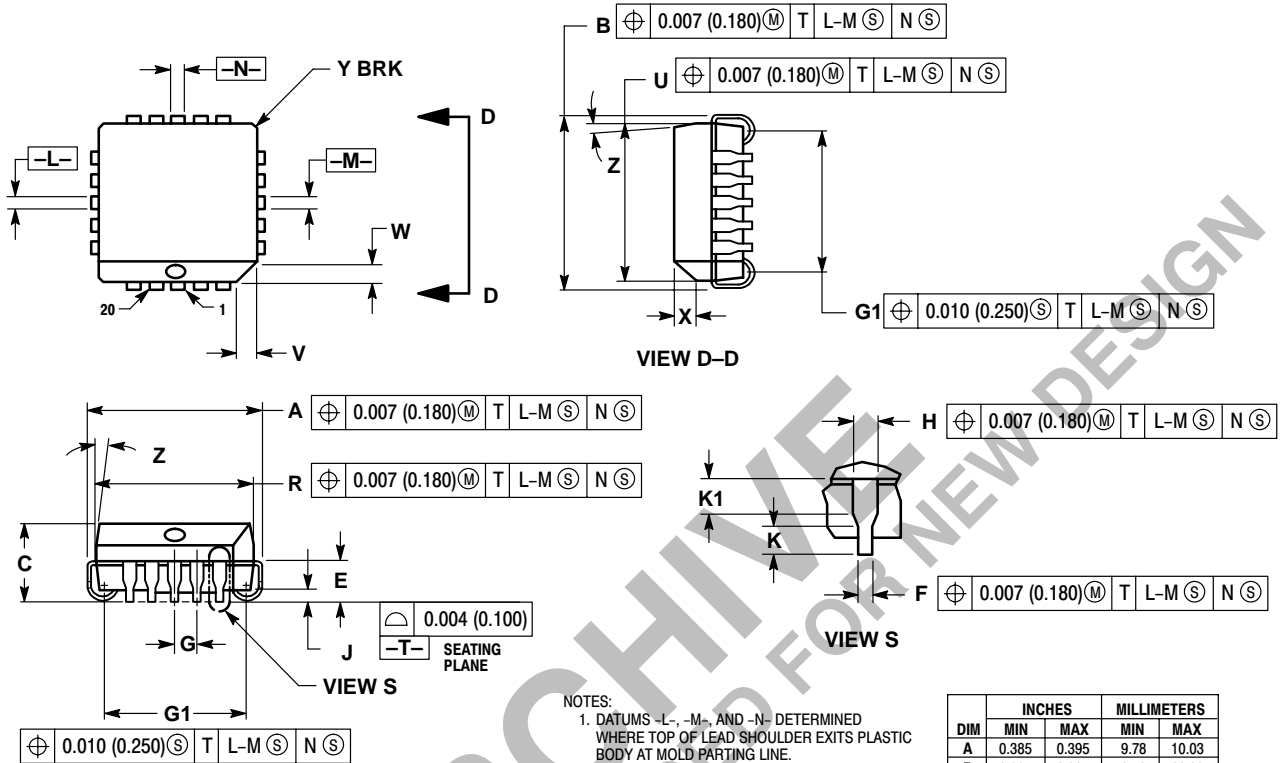
Each MECL 10,000 series circuit has been designed to meet the dc specifications shown in the test table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 linear fpm is maintained. Outputs are 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.

MC10186

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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).

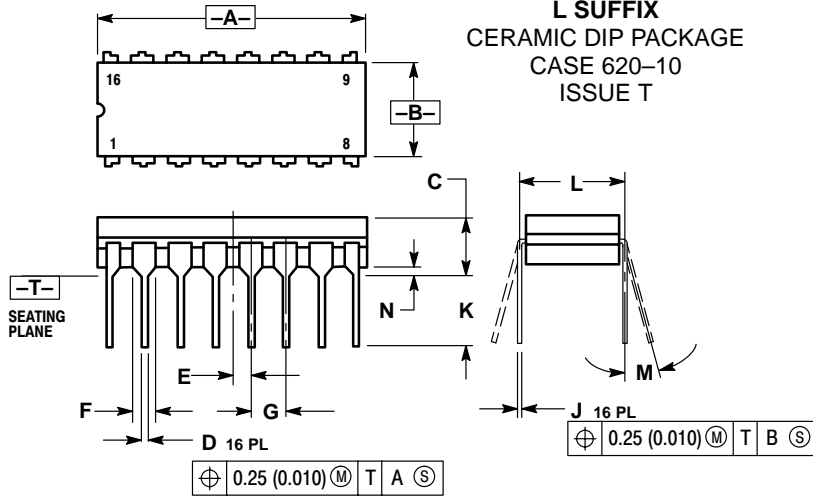
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.385	0.395	9.78	10.03
B	0.385	0.395	9.78	10.03
C	0.165	0.180	4.20	4.57
E	0.090	0.110	2.29	2.79
F	0.013	0.019	0.33	0.48
G	0.050 BSC		1.27 BSC	
H	0.026	0.032	0.66	0.81
J	0.020	---	0.51	---
K	0.025	---	0.64	---
R	0.350	0.356	8.89	9.04
U	0.350	0.356	8.89	9.04
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	---

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PACKAGE DIMENSIONS

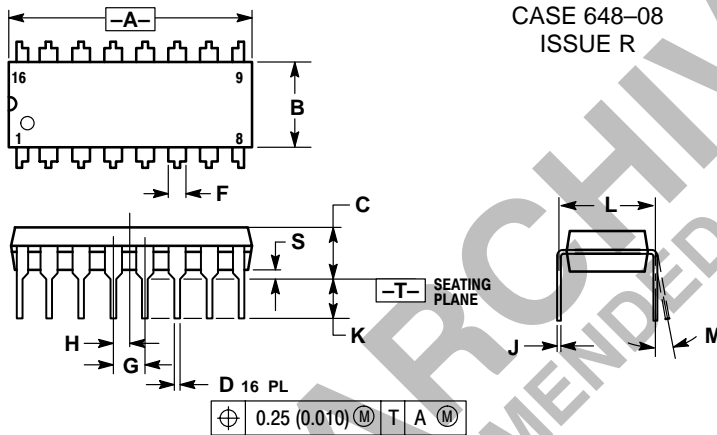
CDIP-16 L SUFFIX CERAMIC DIP PACKAGE CASE 620-10 ISSUE T



- 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

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