

MC10135

Dual J-K Master-Slave Flip-Flop

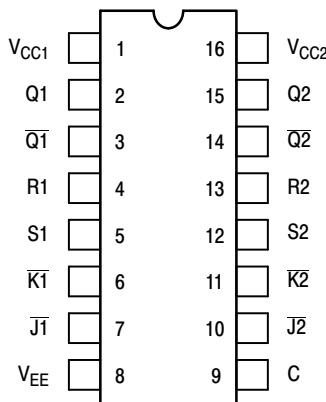
The MC10135 is a dual master-slave dc coupled J-K flip-flop. Asynchronous set (S) and reset (R) are provided. The set and reset inputs override the clock.

A common clock is provided with separate $\bar{J}$ - $\bar{K}$ inputs. When the clock is static, the $\bar{J}$ - $\bar{K}$ inputs do not effect the output.

The output states of the flip-flop change on the positive transition of the clock.

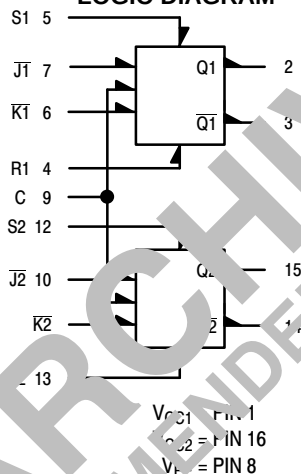
- $P_D = 280$ mW typ/pkg (No Load)
- $f_{Tog} = 140$ MHz typ
- $t_{pd} = 3.0$ ns typ
- $t_r, t_f = 2.5$ ns typ (20%–80%)

DIP PIN ASSIGNMENT



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

LOGIC DIAGRAM



R-S TRUTH TABLE

R	S	Q_{n+1}
L	L	Q_n
L	H	H
H	L	L
H	H	N.D.

N.D. = Not Defined

CLOCK J-K TRUTH TABLE*

$\bar{J}$	$\bar{K}$	Q_{n+1}
L	L	$\bar{Q}_n$
H	L	L
L	H	H
H	H	Q_n

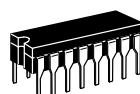
*Output states change on positive transition of clock for $\bar{J}$ - $\bar{K}$ input condition present.



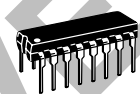
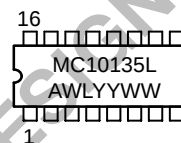
ON Semiconductor

<http://onsemi.com>

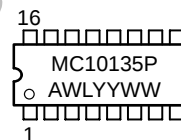
MARKING DIAGRAMS



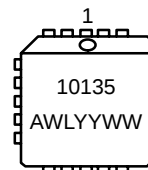
CDIP-16
L SUFFIX
CASE 620



PDIP-16
P SUFFIX
CASE 648



PLCC-20
FN SUFFIX
CASE 775



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

ORDERING INFORMATION

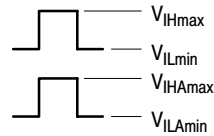
Device	Package	Shipping
MC10135L	CDIP-16	25 Units / Rail
MC10135P	PDIP-16	25 Units / Rail
MC10135FN	PLCC-20	46 Units / Rail

ELECTRICAL CHARACTERISTICS

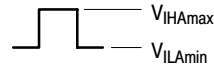
Characteristic	Symbol	Pin Under Test	Test Limits							Unit
			−30°C		+25°C			+85°C		
			Min	Max	Min	Typ	Max	Min	Max	
Power Supply Drain Current	I _E	8		75		54	68		75	mAdc
Input Current	I _{inH}	6,7,9,10,11 4,5,12,13		425 620			265 390		265 390	μAdc
	I _{inL}	4,5,6,7,9, 10,11,12,13	0.5 0.5		0.5 0.5			0.3 0.3		μAdc
Output Voltage Logic 1	V _{OH}	2 2 (3.)	−1.060 −1.060	−0.890 −0.890	−0.960 −0.960		−0.810 −0.810	−0.890 −0.890	−0.700 −0.700	Vdc
Output Voltage Logic 0	V _{OL}	3 3 (3.)	−1.890 −1.890	−1.675 −1.675	−1.850 −1.850		−1.650 −1.650	−1.825 −1.825	−1.615 −1.615	Vdc
Threshold Voltage Logic 1	V _{OHA}	2 2 (4.)	−1.080 −1.080		−0.980 −0.980			−0.910 −0.910		Vdc
Threshold Voltage Logic 0	V _{OLA}	3 3 (4.)		−1.655 −1.655			−1.630 −1.630		−1.595 −1.595	Vdc
Switching Times (50Ω Load) Clock Input										ns
Propagation Delay	t ₉₊₂₊	2	1.8	5.0	1.8	3.0	4.5	1.8	4.6	
	t _{9+2−}	2	1.8	5.0	1.8	3.0	4.5	1.8	4.6	
Rise Time (20 to 80%)	t ₂₊ , t ₃₊	2, 3	1.1	4.8	1.1	2.0	4.5	1.1	4.7	
Fall Time (20 to 80%)	t _{2−} , t _{3−}	2, 3	1.1	4.8	1.1	2.0	4.5	1.1	4.7	
Set Input										ns
Propagation Delay	t ₅₊₂₊	2	1.8	5.6	1.8	3.0	5.0	1.8	5.2	
	t ₁₂₊₁₅₊	15	1.8	5.6	1.8	3.0	5.0		5.2	
	t _{5+3−}	3	1.8	5.6	1.8	3.0	5.0		5.2	
	t _{12+14−}	14	1.8	5.6	1.8	3.0	5.0		5.2	
Reset Input										ns
Propagation Delay	t _{4+2−}	2	1.8	5.6	1.8	3.0	5.0	1.8	5.2	
	t _{4+3−}	3	1.8	5.6	1.8	3.0	5.0	1.8	5.2	
	t _{13+15−}	15	1.8	5.6	1.8	3.0	5.0	1.8	5.2	
	t ₁₃₊₁₄₊	14	1.8	5.6	1.8	3.0	5.0	1.8	5.2	
Setup Time	t _{setup}	7	2.5		2.5	1.0		2.5		ns
Hold Time	t _{hold}	7	1.5		1.5	1.0		2.5		ns
Toggle Frequency (Max)	f _{tog}	2	125		125	140		125		MHz

1. Individually test each input; apply V_{IHmax} to pin under test.
2. Individually test each input; apply V_{ILmin} to pin under test.

3. Output level to be measured after a clock pulse has been applied to the $\overline{C_E}$ Input (Pin 6)



4. Output level to be measured after a clock pulse has been applied to the $\overline{C_E}$ Input (Pin 6)



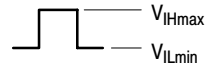
ELECTRICAL CHARACTERISTICS (continued)

@ Test Temperature			TEST VOLTAGE VALUES (Volts)					(V _{CC}) Gnd
			V _{IHmax}	V _{ILmin}	V _{IHAmin}	V _{ILAmx}	V _{EE}	
			–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 _{ILAmx}	V _{EE}	
Power Supply Drain Current	I _E	8					8	1, 16
Input Current	I _{inH}	6, 7, 9, 10, 11 4, 5, 12, 13	Note 1. Note 1.				8 8	1, 16 1, 16
	I _{inL}	4, 5, 6, 7, 9, 10, 11, 12, 13		Note 2. Note 2.			8 8	1, 16 1, 16
Output Voltage Logic 1	V _{OH}	2	5				8	1, 16
		2 (3.)	6				8	1, 16
Output Voltage Logic 0	V _{OL}	3	5				8	1, 16
		3 (3.)	6				8	1, 16
Threshold Voltage Logic 1	V _{OHA}	2			5		8	1, 16
		2 (4.)	6				8	1, 16
Threshold Voltage Logic 0	V _{OLA}	3			5		8	1, 16
		3 (4.)	6				8	1, 16
Switching Times (50Ω Load) Clock Input					Pulse In	Pulse Out	–3.2 V	+2.0 V
Propagation Delay	t ₉₊₂₊ t _{9+2–}	2			9	2	8	1, 16
		2			9	2	8	1, 16
Rise Time (20 to 80%)	t ₂₊ , t ₃₊	2, 3			9	2, 3	8	1, 16
Fall Time (20 to 80%)	t _{2–} , t _{3–}	2, 3			9	2, 3	8	1, 16
Set Input Propagation Delay	t ₅₊₂₊ t ₁₂₊₁₅₊ t _{5+3–} t _{12+14–}	2			5	2	8	1, 16
		15			12	15	8	1, 16
		3			5	3	8	1, 16
		14			12	14	8	1, 16
Reset Input Propagation Delay	t _{4+2–} t _{4+3–} t _{13+15–} t ₁₃₊₁₄₊	2			4	2	8	1, 16
		3			4	3	8	1, 16
		15			13	15	8	1, 16
		14			13	14	8	1, 16
Setup Time	t _{setup}	7			6, 9	2	8	1, 16
Hold Time	t _{hold}	7			6, 9	2	8	1, 16
Toggle Frequency (Max)	f _{tog}	2			9	2	8	1, 16

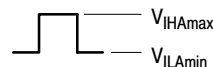
1. Individually test each input; apply V_{IHmax} to pin under test.

2. Individually test each input; apply V_{ILmin} to pin under test.

3. Output level to be measured after a clock pulse has been applied to the $\overline{C_E}$ Input (Pin 6)



4. Output level to be measured after a clock pulse has been applied to the $\overline{C_E}$ Input (Pin 6)

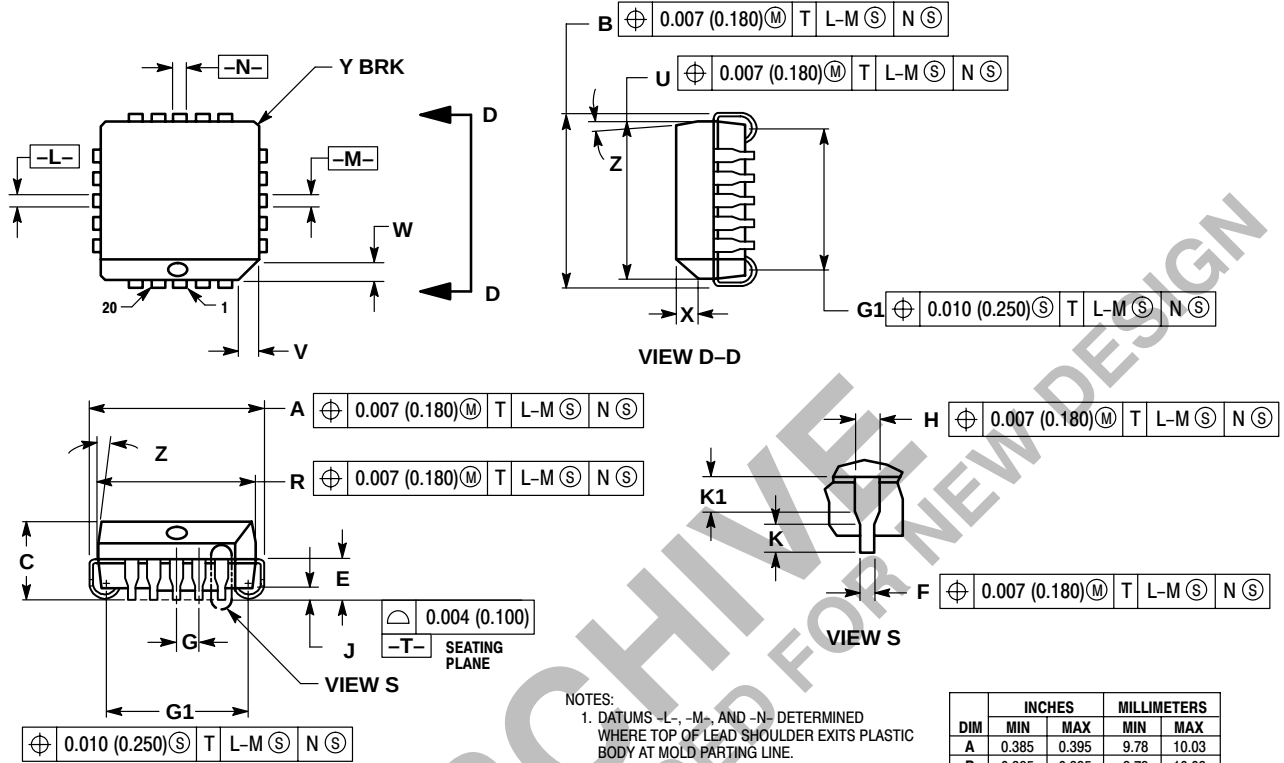


Each MECL 10,000 series circuit has been designed to meet the dc specifications shown in the test table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 linear fpm is maintained. Outputs are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

MC10135

PACKAGE DIMENSIONS

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



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	---

MC10135

PACKAGE DIMENSIONS



- 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



- 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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DEVICE NOT RECOMMENDED FOR NEW DESIGN

Notes

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DEVICE NOT RECOMMENDED FOR NEW DESIGN

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