

# Dual J-K Master-Slave Flip-Flop

The MC10H135 is a dual J-K master-slave flip-flop. The device is provided with an asynchronous set(s) and reset(R). These set and reset inputs override the clock.

A common clock is provided with separate J-K inputs. When the clock is static, the JK inputs do not effect the output. The output states of the flip flop change on the positive transition of the clock.

- Propagation delay, 1.5 ns Typical
- Power Dissipation, 280 mW Typical/Pkg. (No Load)
- $f_{tog}$  250 MHz Max
- Improved Noise Margin 150 mV (Over Operating Voltage and Temperature Range) Voltage Compensated
- MECL 10K-Compatible

## MAXIMUM RATINGS

Characteristic	Symbol	Rating	Unit
Power Supply ( $V_{CC} = 0$ )	$V_{EE}$	-8.0 to 0	Vdc
Input Voltage ( $V_{CC} = 0$ )	$V_I$	0 to $V_{EE}$	Vdc
Output Current— Continuous	$I_{out}$	50	mA
— Surge		100	
Operating Temperature Range	$T_A$	0 to +75	°C
Storage Temperature Range— Plastic	$T_{stg}$	-55 to +150	°C
— Ceramic		-55 to +165	°C

## ELECTRICAL CHARACTERISTICS ( $V_{EE} = -5.2 V \pm 5\%$ ) (See Note)

Characteristic	Symbol	0°		25°		75°		Unit
		Min	Max	Min	Max	Min	Max	
Power Supply Current	$I_E$	—	75	—	68	—	75	mA
Input Current High Pins 6, 7, 10, 11 Pins 4, 5, 12, 13 Pin 9	$I_{inH}$	—	460	—	285	—	285	$\mu A$
Input Current Low	$I_{inL}$	0.5	—	0.5	—	0.3	—	$\mu A$
High Output Voltage	$V_{OH}$	-1.02	-0.84	-0.98	-0.81	-0.92	-0.735	Vdc
Low Output Voltage	$V_{OL}$	-1.95	-1.63	-1.95	-1.63	-1.95	-1.60	Vdc
High Input Voltage	$V_{IH}$	-1.17	-0.84	-1.13	-0.81	-1.07	-0.735	Vdc
Low Input Voltage	$V_{IL}$	-1.95	-1.48	-1.95	-1.48	-1.95	-1.45	Vdc

## AC PARAMETERS

Propagation Delay Set, Reset, Clock	$t_{pd}$	0.7	2.6	0.7	2.6	0.7	2.6	ns
Rise Time	$t_r$	0.7	2.2	0.7	2.2	0.7	2.2	ns
Fall Time	$t_f$	0.7	2.2	0.7	2.2	0.7	2.2	ns
Set-up Time	$t_{set}$	1.5	—	1.5	—	1.5	—	ns
Hold Time	$t_{hold}$	1.0	—	1.0	—	1.0	—	ns
Toggle Frequency	$f_{tog}$	250	—	250	—	250	—	MHz

### NOTE:

Each MECL 10H 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 lpm is maintained. Outputs are terminated through a 50-ohm resistor to -2.0 volts.

## MC10H135



**L SUFFIX**  
CERAMIC PACKAGE  
CASE 620-10

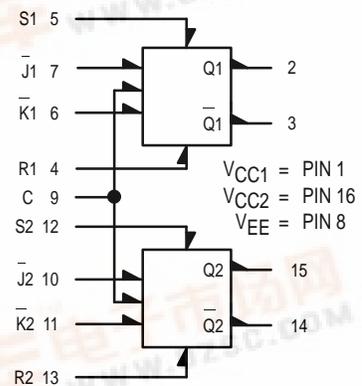


**P SUFFIX**  
PLASTIC PACKAGE  
CASE 648-08



**FN SUFFIX**  
PLCC  
CASE 775-02

## LOGIC DIAGRAM



### RS TRUTH TABLE

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

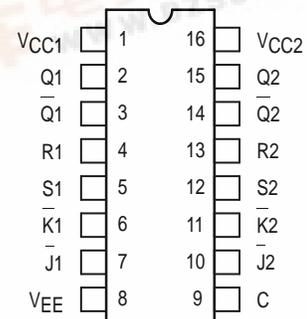
### CLOCK J-K TRUTH TABLE\*

J	K	$Q_{n+1}$
L	L	$Q_n$
H	L	L
L	H	H
H	H	$Q_n$

N.D. = Not Defined

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

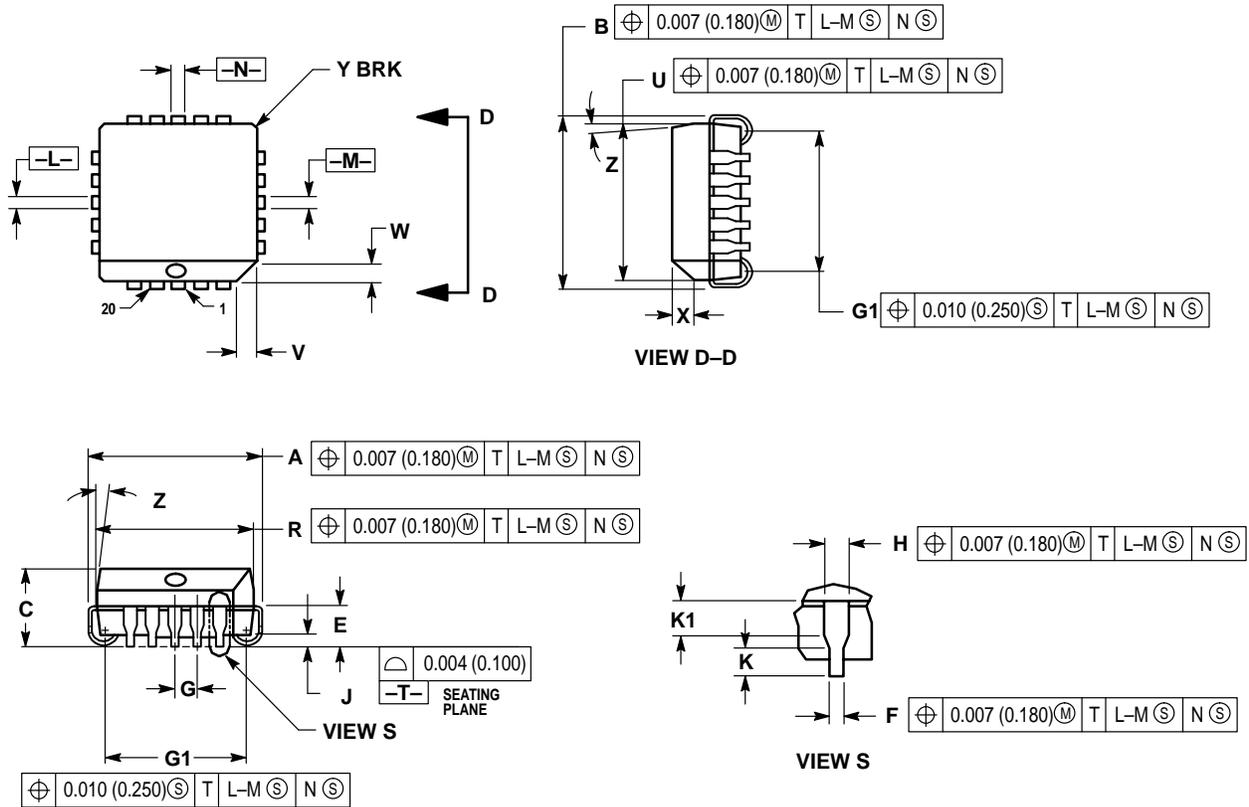
## DIP PIN ASSIGNMENT



Pin assignment is for Dual-in-Line Package. For PLCC pin assignment, see the Pin Conversion Tables on page 6-11 of the Motorola MECL Data Book (DL122/D).

OUTLINE DIMENSIONS

FN SUFFIX  
 PLASTIC PLCC PACKAGE  
 CASE 775-02  
 ISSUE C



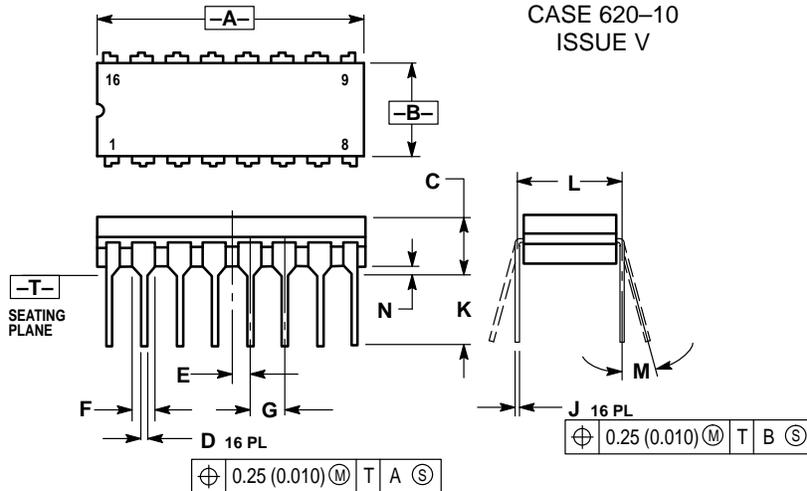
NOTES:

- 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	—

OUTLINE DIMENSIONS

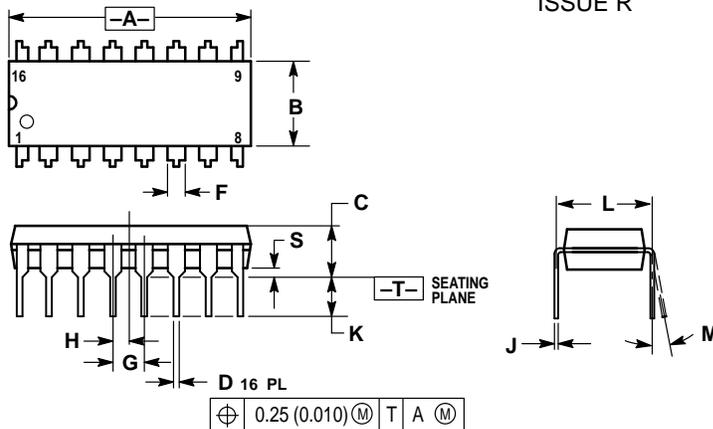
L SUFFIX  
CERAMIC DIP PACKAGE  
CASE 620-10  
ISSUE V



- 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

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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