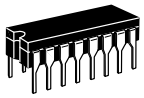
Four-Bit Universal Shift Register

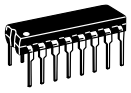
MC10H141

The MC10H141 is a four–bit universal shift register. This device is a functional/pinout duplication of the standard MECL 10K part with 100% improvement in propagation delay and operation frequency and no increase in power supply current.

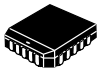
- Shift frequency, 250 MHz Min
- Power Dissipation, 425 mW Typical
- Improved Noise Margin 150 mV (over operating voltage and temperature range)
- Voltage Compensated
- MECL 10K–Compatible



L SUFFIX
CERAMIC PACKAGE
CASE 620–10



P SUFFIX
PLASTIC PACKAGE
CASE 648–08



FN SUFFIX
PLCC
CASE 775–02

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 — Surge	I_{out}	50 100	mA
Operating Temperature Range	T_A	0 to +75	°C
Storage Temperature Range — Plastic — Ceramic	T_{stg}	–55 to +150 –55 to +165	°C °C

ELECTRICAL CHARACTERISTICS (V_{EE} = –5.2 V ±5%)

Characteristic	Symbol	0°		25°		75°		Unit
		Min	Max	Min	Max	Min	Max	
Power Supply Current	I_E	—	112	—	102	—	112	mA
Input Current High Pins 5,6,9,11,12,13 Pins 7,10 Pin 4	I_{inH}	 — — —	 405 416 510	 — — —	 255 260 320	 — — —	 255 260 320	µA
Input Current Low	I_{inL}	0.5	—	0.5	—	0.3	—	µA
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	t_{pd}	1.0	2.0	1.0	2.0	1.1	2.1	ns
Hold Time — Data, Select	t_{hold}	1.0	—	1.0	—	1.0	—	ns
Set–up Time Data Select	t_{set}	 1.5 3.0	 — —	 1.5 3.0	 — —	 1.5 3.0	 — —	ns
Rise Time	t_r	0.5	2.4	0.5	2.4	0.5	2.4	ns
Fall Time	t_f	0.5	2.4	0.5	2.4	0.5	2.4	ns
Shift Frequency	f_{shift}	250	—	250	—	250	—	MHz

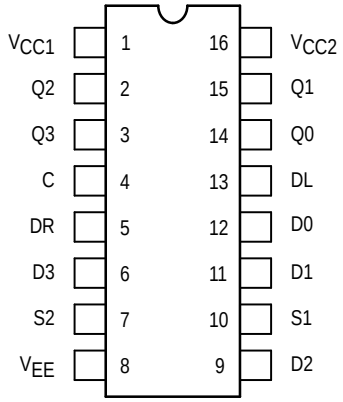
NOTE:
Each MECL 10H series circuit has been designed to meet the dc specifications shown in the test table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 linear fpm is maintained. Outputs are terminated through a 50 ohm resistor to –2.0 volts.

TRUTH TABLE

SELECT		OPERATING MODE	OUTPUTS			
S1	S2		$Q0_{n+1}$	$Q1_{n+1}$	$Q2_{n+1}$	$Q3_{n+1}$
L	L	Parallel Entry	D0	D1	D2	D3
L	H	Shift Right*	$Q1_n$	$Q2_n$	$Q3_n$	DR
H	L	Shift Left*	DL	$Q0_n$	$Q1_n$	$Q2_n$
H	H	Stop Shift	$Q0_n$	$Q1_n$	$Q2_n$	32_n

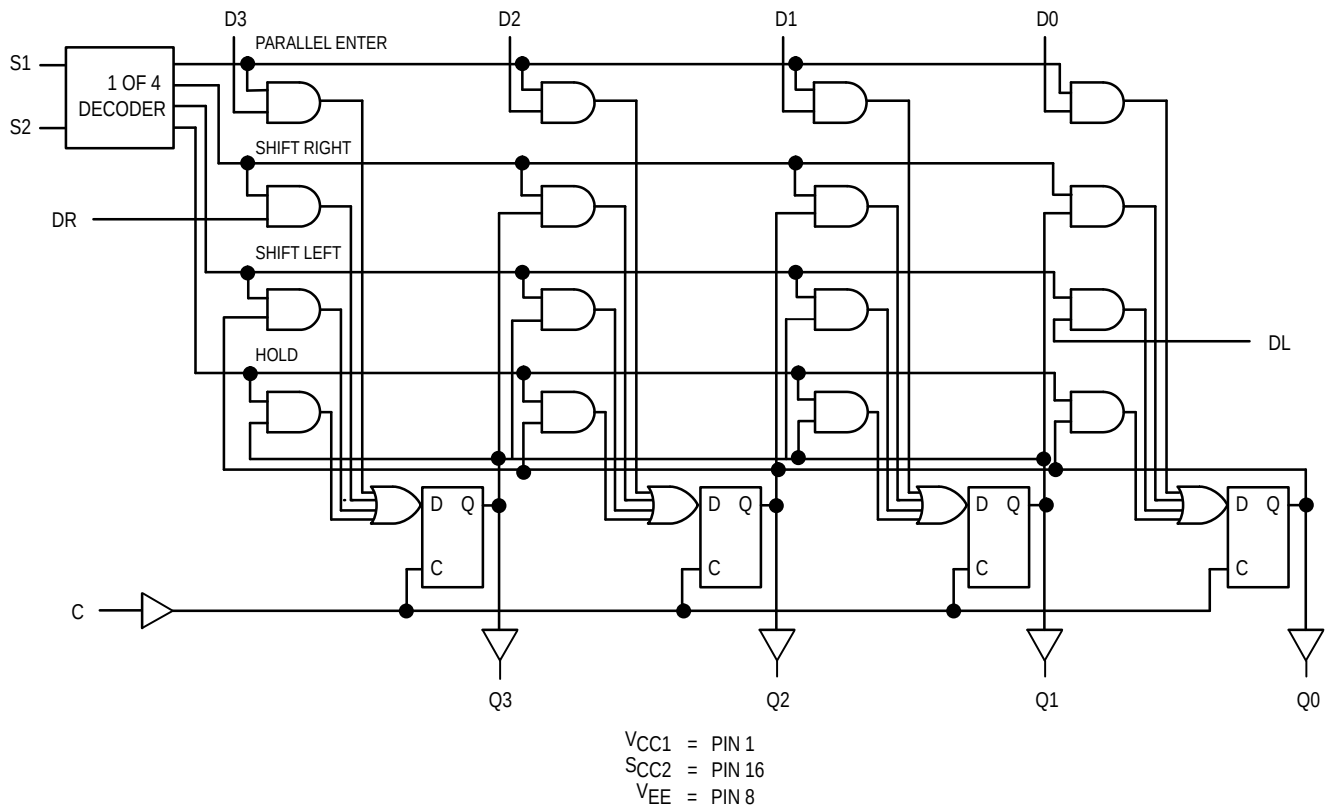
* Outputs as exist after pulse appears at “C” input with input conditions as shown (Pulse Positive transition of clock input).

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).

LOGIC DIAGRAM

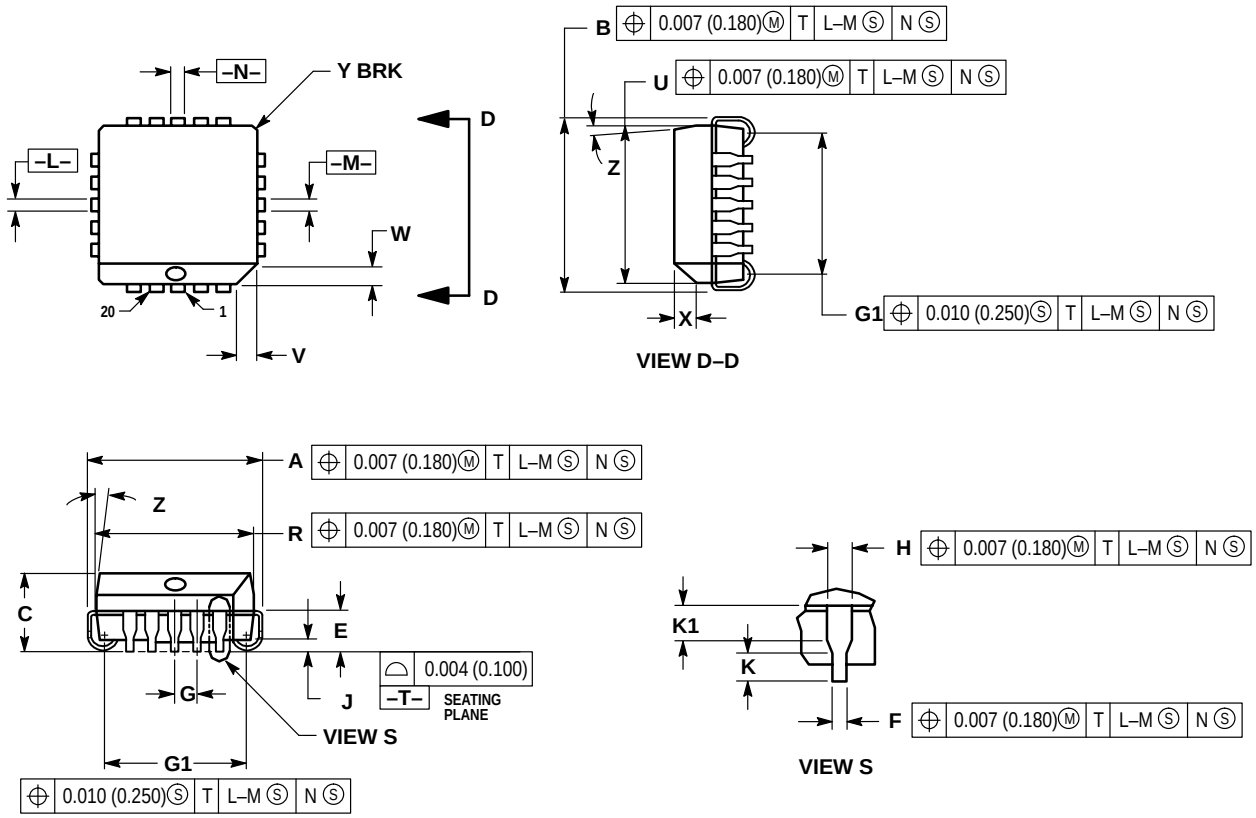


APPLICATION INFORMATION

The MC10H141 is a four–bit universal shift register which performs shift left, or shift right, serial/parallel in, and serial/parallel out operations with no external gating. Inputs S1 and S2 control the four possible operations of the register without external gating of the clock. The flip–flops shift information on the positive edge of the clock. The four operations are stop shift, shift left, shift right, and parallel entry of data. The other six inputs are all data type inputs; four for parallel entry data, and one for shifting in from the left (DL) and one for shifting in from the right (DR).

OUTLINE DIMENSIONS

FN SUFFIX
PLASTIC PLCC PACKAGE
CASE 775–02
ISSUE C

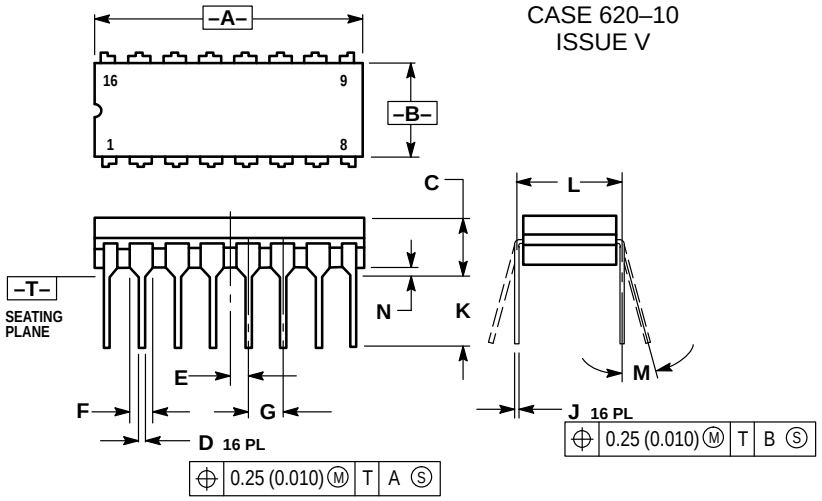


NOTES:
1. DATUMS –L–, –M–, AND –N– DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
2. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM –T–, SEATING PLANE.
3. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
5. CONTROLLING DIMENSION: INCH.
6. 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.
7. 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).

	INCHES		MILLIMETERS	
DIM	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

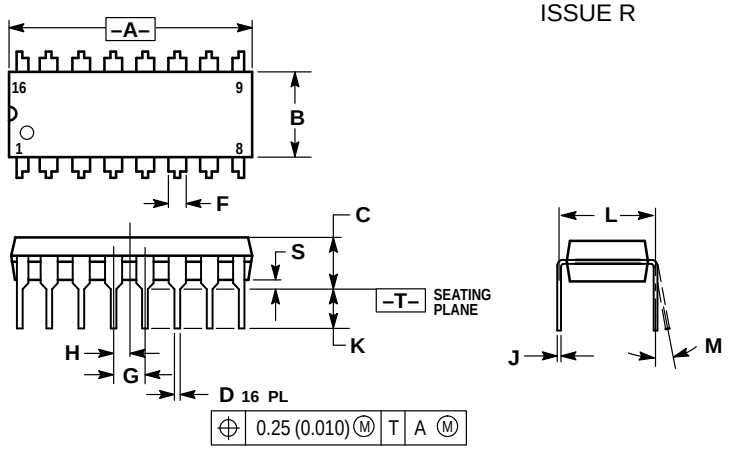
L SUFFIX
CERAMIC DIP PACKAGE
CASE 620–10
ISSUE V



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.

	INCHES		MILLIMETERS	
DIM	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.

	INCHES		MILLIMETERS	
DIM	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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