Jameco Part Number 45137FSC

FAIRCHILD

SEMICONDUCTOR ™

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MM74HCT74
Dual D-Type Flip-Flop with Preset and Clear

General Description

The MM74HCT74 utilizes advanced silicon-gate CMOS technology to achieve operation speeds similar to the equivalent LS-TTL part. It possesses the high noise immunity and low power consumption of standard CMOS integrated circuits, along with the ability to drive 10 LS-TTL loads.

This flip-flop has independent data, preset, clear, and clock inputs and Q and $\overline{Q}$ outputs. The logic level present at the data input is transferred to the output during the positive-going transition of the clock pulse. Preset and clear are independent of the clock and accomplished by a low level at the appropriate input.

The 74HCT logic family is functionally and pin-out compatible with the standard 74LS logic family. All inputs are pro-tected from damage due to static discharge by internal diode clamps to V_{CC} and ground.

MM74HCT devices are intended to interface between TTL and NMOS components and standard CMOS devices. These parts are also plug-in replacements for LS-TTL devices and can be used to reduce power consumption in existing designs.

Features

■ Typical propagation delay: 20 ns
■ Low quiescent current: 40 µA maximum (74HCT Series)
■ Low input current: 1 µA maximum
■ Fanout of 10 LS-TTL loads
■ Meta-stable hardened

Ordering Code:

Order Number	Package Number	Package Description
MM74HCT74M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow
MM74HCT74SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
M74HCT74MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
MM74HCT74N	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Connection Diagram

Pin Assignments for DIP, SOIC, SOP and TSSOP

TOP VIEW
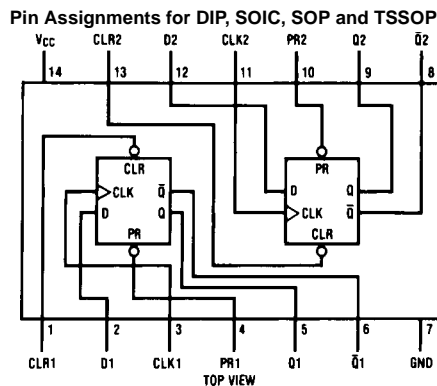
Truth Table

Inputs				Outputs	
PR	CLR	CLK	D	Q	$\overline{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H (Note 1)	H (Note 1)
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q0	$\overline{Q0}$

Q0 = the level of Q before the indicated input conditions were established.

Note 1: This configuration is nonstable; that is, it will not persist when pre-set and clear inputs return to their inactive (HIGH) level.

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Logic Diagram
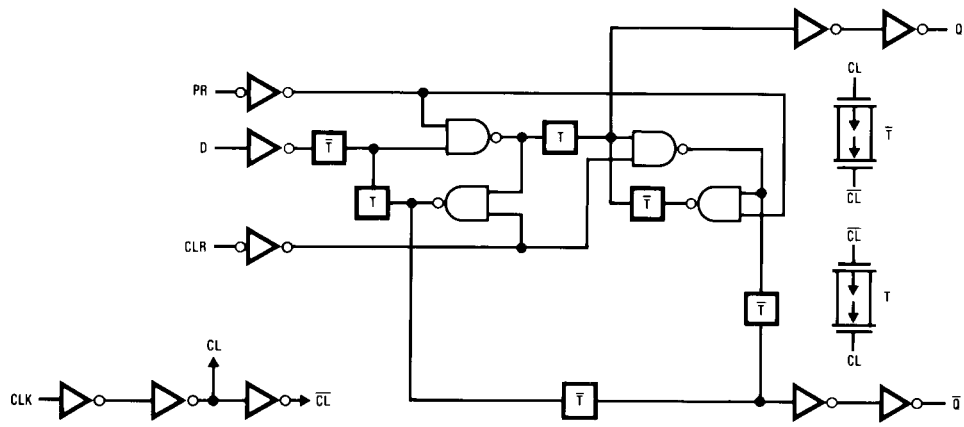
Absolute Maximum Ratings(Note 2)

(Note 3)

Supply Voltage (V_{CC})	−0.5 to +7.0V
DC Input Voltage (V_{IN})	−1.5 to V_{CC} +1.5V
DC Output Voltage (V_{OUT})	−0.5 to V_{CC} +0.5V
Clamp Diode Current (I_{IK}, I_{OK})	±20 mA
DC Output Current, per pin (I_{OUT})	±25 mA
DC V_{CC} or GND Current, per pin (I_{CC})	±50 mA
Storage Temperature Range (T_{STG})	−65°C to +150°C
Power Dissipation (P_D)	
(Note 4)	600 mW
S.O. Package only	500 mW
Lead Temperature (T_L)	
(Soldering 10 seconds)	260°C

Recommended Operating Conditions

	Min	Max	Units
Supply Voltage (V_{CC})	4.5	5.5	V
DC Input or Output Voltage			
(V_{IN}, V_{OUT})	0	V_{CC}	V
Operating Temperature Range (T_A)	−40	+85	°C
Input Rise or Fall Times			
(t_r, t_f)		500	ns

Note 2: Absolute Maximum Ratings are those values beyond which damage to the device may occur.

Note 3: Unless otherwise specified all voltages are referenced to ground.

Note 4: Power Dissipation temperature derating — plastic "N" package: −12 mW/°C from 65°C to 85°C.

DC Electrical Characteristics

V_{CC} = 5V ±10% (unless otherwise specified)

| Symbol	Parameter	Conditions	T_A = 25°C		T_A = −40° to 85°C	T_A = −55 to 125°C	Units
			Typ	Guaranteed Limits			
V_{IH}	Minimum HIGH Level Input Voltage			2.0	2.0	2.0	V
V_{IL}	Maximum LOW Level Input Voltage			0.8	0.8	0.8	V
V_{OH}	Minimum HIGH Level Output Voltage	V_{IN} = V_{IH} or V_{IL}					
		$|I_{OUT}|$ = 20 µA	V_{CC}	V_{CC}− 0.1	V_{CC}− 0.1	V_{CC}− 0.1	V
		$|I_{OUT}|$ = 4.0 mA, V_{CC} = 4.5V	4.2	3.98	3.84	3.7	V
		$|I_{OUT}|$ = 4.8 mA, V_{CC} = 5.5V	5.2	4.98	4.84	4.7	V
V_{OL}	Maximum LOW Level Voltage	V_{IN} = V_{IH} or V_{IL}					
		$|I_{OUT}|$ = 20 µA	0	0.1	0.1	0.1	V
		$|I_{OUT}|$ = 4.0 mA, V_{CC} = 4.5V	0.2	0.26	0.33	0.4	V
		$|I_{OUT}|$ = 4.8 mA, V_{CC} = 5.5V	0.2	0.26	0.33	0.4	V
I_{IN}	Maximum Input Current	V_{IN} = V_{CC} or GND, V_{IH} or V_{IL}		±0.5	±0.5	±1.0	µA
I_{CC}	Maximum Quiescent Supply Current	V_{IN} = V_{CC} or GND I_{OUT} = 0 µA		2.0	20	80	µA
		V_{IN} = 2.4V or 0.5V (Note 5)		0.3	0.4	0.5	mA

Note 5: This is measured per pin. All other inputs are held at V_{CC} Ground.

AC Electrical Characteristics

$V_{CC} = 5V$, $T_A = 25°C$, $C_L = 15$ pF, $t_r = t_f = 6$ ns

Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Units
f_{MAX}	Maximum Operating Frequency from Clock to Q or $\overline{Q}$		50	30	MHz
t_{PHL}, t_{PLH}	Maximum Propagation Delay Clock to Q or $\overline{Q}$		18	30	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay from Preset or Clear to Q or $\overline{Q}$		18	30	ns
t_{REM}	Minimum Removal Time, Preset or Clear to Clock			20	ns
t_S	Minimum Setup Time Data to Clock			20	ns
t_H	Minimum Hold Time Clock to Data		−3	0	ns
t_W	Minimum Pulse Width Clock, Preset or Clear		8	16	ns

AC Electrical Characteristics

$V_{CC} = 5.0V \pm 10\%$, $C_L = 50$ pF, $t_r = t_f = 6$ ns unless otherwise specified

| Symbol	Parameter	Conditions	$T_A = 25°C$	$T_A = -40°$ to $+85°C$	Units
			Typ	Guaranteed Limits	
f_{MAX}	Maximum Operating Frequency		27	21	MHz
t_{PHL}, t_{PLH}	Maximum Propagation Delay from Clock to Q or $\overline{Q}$		21	35 / 44	ns
t_{PHL}, t_{PLH}	Maximum Propagation Delay from Preset or Clear to Q or $\overline{Q}$		21	35 / 44	ns
t_{REM}	Minimum Removal Time Preset or Clear to Clock			20 / 25	ns
t_S	Minimum Setup Time Data to Clock			20 / 25	ns
t_H	Minimum Hold Time Clock to Data		−3	0 / 0	ns
t_W	Minimum Pulse Width Clock, Preset or Clear		9	16 / 20	ns
t_r, t_f	Maximum Clock Input Rise and Fall Time			500 / 500	ns
t_{THL}, t_{TLH}	Maximum Output Rise and Fall Time			15 / 19	ns
C_{PD}	Power Dissipation Capacitance (Note 6)	(per flip-flop)	10		pF
C_{IN}	Maximum Input Capacitance		5	10 / 10	pF

Note 6: C_{PD} determines the no load dynamic power consumption, $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$, and the no load dynamic current consumption, $I_S = C_{PD} V_{CC} f + I_{CC}$.

Physical Dimensions inches (millimeters) unless otherwise noted
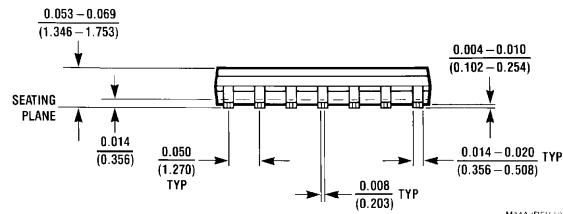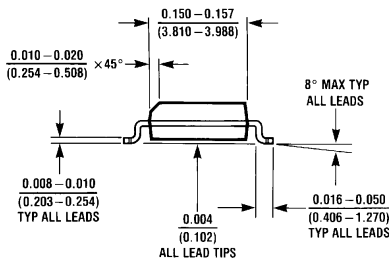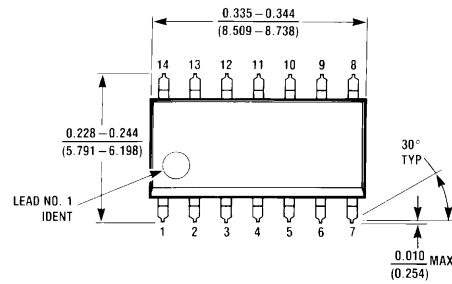
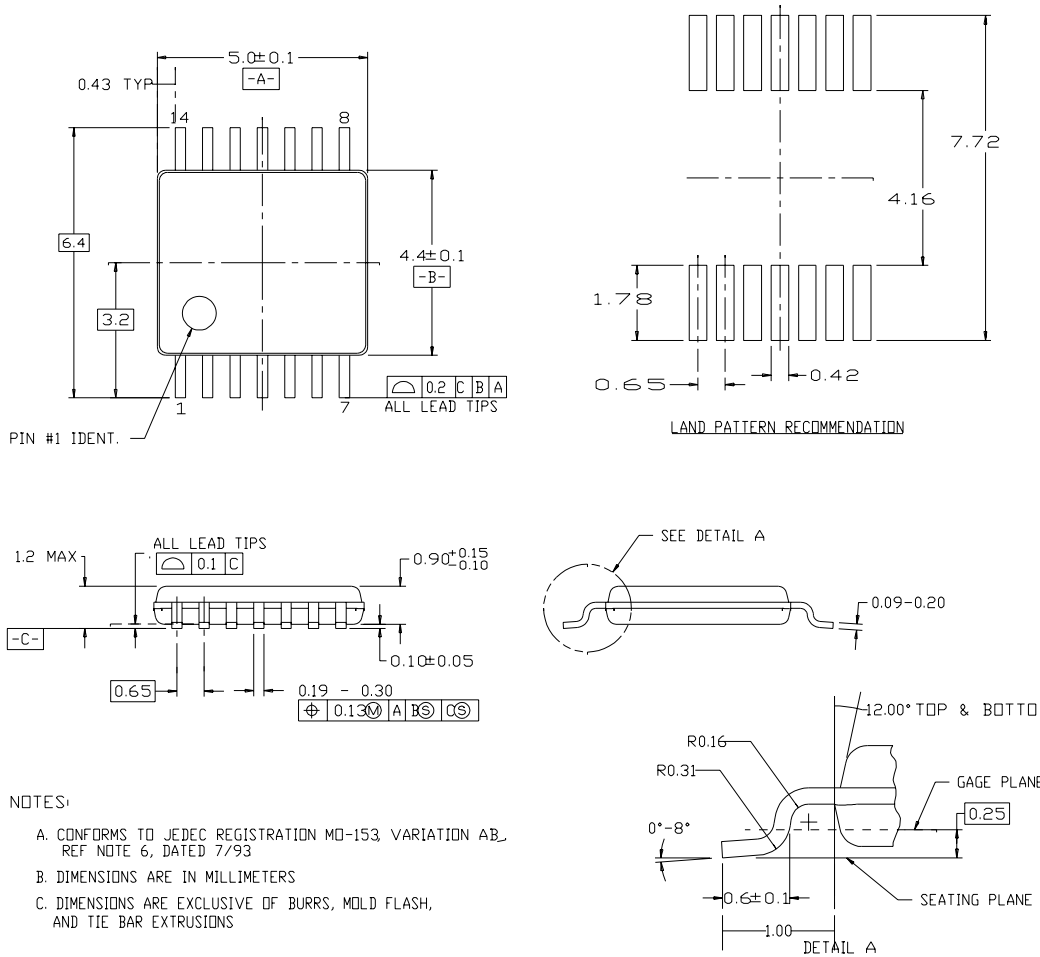14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow
Package Number M14A
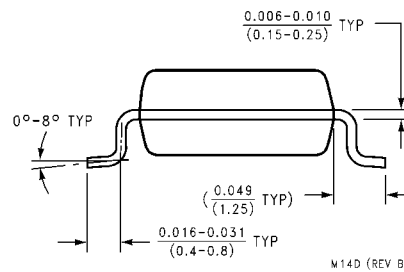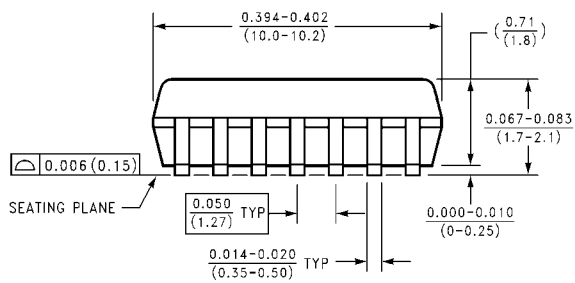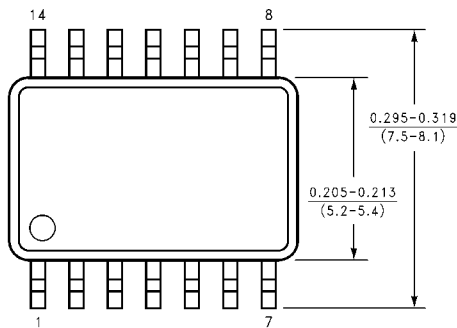
14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M14D

# Physical Dimensions inches (millimeters) unless otherwise noted (Continued)

14LD, TSSOP, JEDEC MO-153, 4.4MM WIDE

LAND PATTERN RECOMMENDATION

SEE DETAIL A

NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB, REF NOTE 6, DATED 7/93

B. DIMENSIONS ARE IN MILLIMETERS

C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS

DETAIL A

14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
Package Number MTC14

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)

OPTION 1

OPTION 02
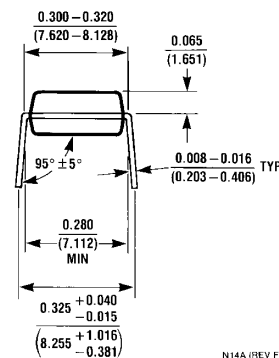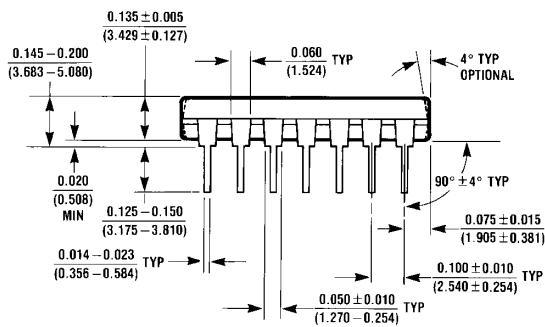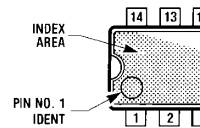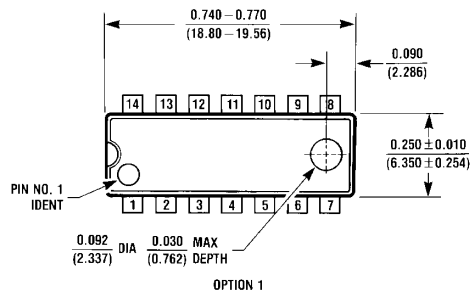
**14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
Package Number N14A**

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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