FAIRCHILD™

Is Now Part of

ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at
www.onsemi.com

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

FAIRCHILD

SEMICONDUCTOR®

February 2008

74LVX74
Low Voltage Dual D-Type Positive Edge-Triggered Flip-Flop

Features

- Input voltage level translation from 5V to 3V
- Ideal for low power/low noise 3.3V applications
- Guaranteed simultaneous switching noise level and dynamic threshold performance

General Description

The LVX74 is a dual D-type flip-flop with Asynchronous Clear and Set inputs and complementary (Q, $\overline{Q}$) outputs. Information at the input is transferred to the outputs on the positive edge of the clock pulse. After the Clock Pulse input threshold voltage has been passed, the Data input is locked out and information present will not be transferred to the outputs until the next rising edge of the Clock Pulse input.

Asynchronous Inputs:

- LOW input to $\overline{S}_D$ (Set) sets Q to HIGH level
- LOW input to $\overline{C}_D$ (Clear) sets Q to LOW level
- Clear and Set are independent of clock
- Simultaneous LOW on $\overline{C}_D$ and $\overline{S}_D$ makes both Q and $\overline{Q}$ HIGH

Ordering Information

Order Number	Package Number	Package Description
74LVX74M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74LVX74SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74LVX74MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

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

All packages are lead free per JEDEC: J-STD-020B standard.

Connection Diagram

```
         ___
     C_D1 |1       14| V_CC
      D_1 |2       13| C_D2
     CP_1 |3       12| D_2
     S_D1 |4       11| CP_2
      Q_1 |5       10| S_D2
     Q_1  |6        9| Q_2
     GND  |7        8| Q_2
```

Inner labels: CP_1 D_1 / S_D1 C_D1 / Q_1 Q_1 (top flip-flop)
D_2 CP_2 / C_D2 S_D2 / Q_2 Q_2 (bottom flip-flop)
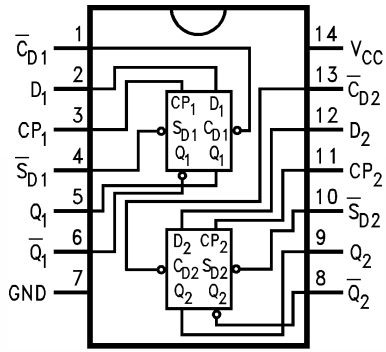
Pin Description

Pin Names	Description
D_1, D_2	Data Inputs
CP_1, CP_2	Clock Pulse Inputs
$\overline{C}_{D1}$, $\overline{C}_{D2}$	Direct Clear Inputs
$\overline{S}_{D1}$, $\overline{S}_{D2}$	Direct Set Inputs
Q_1, $\overline{Q}_1$, Q_2, $\overline{Q}_2$	Outputs

Logic Symbols

IEEE/IEC
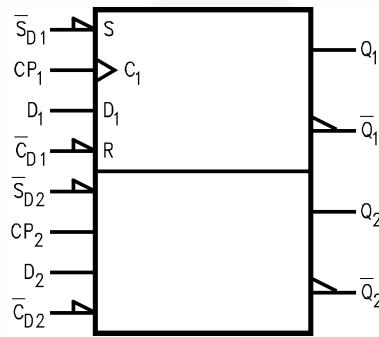
Truth Table
(Each Half)

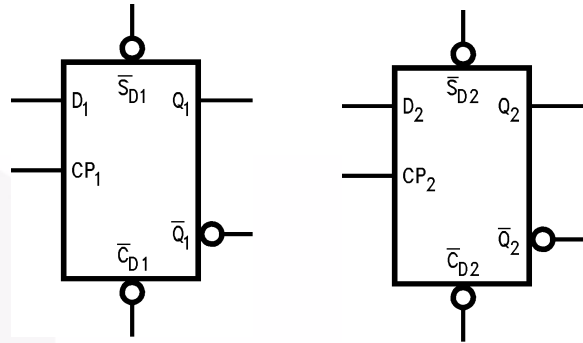| Inputs				Outputs	
$\overline{S}_D$	$\overline{C}_D$	CP	D	Q	$\overline{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H	H
H	H	⤒	H	H	L
H	H	⤒	L	L	H
H	H	L	X	Q_0	$\overline{Q}_0$

H = HIGH Voltage Level

L = LOW Voltage Level

X = Immaterial

⤒ = LOW-to-HIGH Clock Transition

$Q_0(\overline{Q}_0)$ = Previous $Q(\overline{Q})$ before LOW-to-HIGH Transition of Clock

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Rating
V_{CC}	Supply Voltage	–0.5V to +7.0V
I_{IK}	DC Input Diode Current, V_I = –0.5V	–20mA
V_I	DC Input Voltage	–0.5V to 7V
I_{OK}	DC Output Diode Current	
	V_O = –0.5V	–20mA
	$V_O = V_{CC}$ + 0.5V	+20mA
V_O	DC Output Voltage	–0.5V to V_{CC} + 0.5V
I_O	DC Output Source or Sink Current	±25mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	±50mA
T_{STG}	Storage Temperature	–65°C to +150°C
P	Power Dissipation	180mW

Recommended Operating Conditions[1]

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to absolute maximum ratings.

Symbol	Parameter	Rating
V_{CC}	Supply Voltage	2.0V to 3.6V
V_I	Input Voltage	0V to 5.5V
V_O	Output Voltage	0V to V_{CC}
T_A	Operating Temperature	–40°C to +85°C
$\Delta t / \Delta V$	Input Rise and Fall Time	0ns/V to 100ns/V

Note:

1. Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol	Parameter	V$_{CC}$	Conditions	T$_A$ = +25°C			T$_A$ = –40°C to +85°C		Units
				Min.	Typ.	Max.	Min.	Max.	
V$_{IH}$	HIGH Level Input Voltage	2.0		1.5			1.5		V
		3.0		2.0			2.0		
		3.6		2.4			2.4		
V$_{IL}$	LOW Level Input Voltage	2.0				0.5		0.5	V
		3.0				0.8		0.8	
		3.6				0.8		0.8	
V$_{OH}$	HIGH Level Output Voltage	2.0	V$_{IN}$ = V$_{IL}$ or V$_{IH}$, I$_{OH}$ = –50µA	1.9	2.0		1.9		V
		3.0	V$_{IN}$ = V$_{IL}$ or V$_{IH}$, I$_{OH}$ = –50µA	2.9	3.0		2.9		
			V$_{IN}$ = V$_{IL}$ or V$_{IH}$, I$_{OH}$ = –4mA	2.58			2.48		
V$_{OL}$	LOW Level Output Voltage	2.0	V$_{IN}$ = V$_{IL}$ or V$_{IH}$, I$_{OL}$ = 50µA		0.0	0.1		0.1	V
		3.0	V$_{IN}$ = V$_{IL}$ or V$_{IH}$, I$_{OL}$ = 50µA		0.0	0.1		0.1	
			V$_{IN}$ = V$_{IL}$ or V$_{IH}$, I$_{OL}$ = 4mA			0.36		0.44	
I$_{IN}$	Input Leakage Current	3.6	V$_{IN}$ = 5.5V or GND			±0.1		±1.0	µA
I$_{CC}$	Quiescent Supply Current	3.6	V$_{IN}$ = V$_{CC}$ or GND			2.0		20.0	µA

Noise Characteristics[2]

Symbol	Parameter	V$_{CC}$ (V)	C$_L$ (pF)	T$_A$ = 25°C		Units
				Typ.	Limit	
V$_{OLP}$	Quiet Output Maximum Dynamic V$_{OL}$	3.3	50	0.3	0.5	V
V$_{OLV}$	Quiet Output Minimum Dynamic V$_{OL}$	3.3	50	–0.3	–0.5	V
V$_{IHD}$	Minimum HIGH Level Dynamic Input Voltage	3.3	50		2.0	V
V$_{ILD}$	Maximum LOW Level Dynamic Input Voltage	3.3	50		0.8	V

Note:
2. Input t$_r$ = t$_f$ = 3ns

AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	C_L (pF)	$T_A = +25°C$			$T_A = -40°C$ to $+85°C$		Units
				Min.	Typ.	Max.	Min.	Max.	
t_{PLH}, t_{PHL}	Propagation Delay, CP_n to Q_n or $\overline{Q}_n$	2.7	15		7.3	15	1.0	18.5	ns
			50		9.8	18.5	1.0	22	
		3.3 ± 0.3	15		5.7	9.7	1.0	11.5	
			50		8.2	13.2	1.0	15	
t_{PLH}, t_{PHL}	Propagation Delay, $\overline{C}_{Dn}$ to $\overline{S}_{Dn}$ to Q_n or $\overline{Q}_n$	2.7	15		8.4	15.6	1.0	18.5	ns
			50		10.9	19.1	1.0	22	
		3.3 ± 0.3	15		6.6	10.1	1.0	12	
			50		9.1	13.6	1.0	15.5	
t_W	CP_n or $\overline{C}_{Dn}$ or $\overline{S}_{Dn}$ Pulse Width	2.7		8.5			10		ns
		3.3 ± 0.3		6			7		
t_S	Setup Time, D_n to CP_n	2.7		8.0			9.5		ns
		3.3 ± 0.3		5.5			6.5		
t_H	Hold Time, D_n to CP_n	2.7		0.5			0.5		ns
		3.3 ± 0.3		0.5			0.5		
t_{REC}	Recovery Time, $\overline{CP}_n$ or $\overline{S}_{Dn}$ to CP_n	2.7		6.5			7.5		ns
		3.3 ± 0.3		5.0			5.0		
f_{MAX}	Maximum Clock Frequency	2.7	15	55	135		50		MHz
			50	45	60		40		
		3.3 ± 0.3	15	95	145		80		
			50	60	85		50		
t_{OSLH}, t_{OSHL}	Output to Output Skew[3]	2.7	50			1.5		1.5	ns
		3.3				1.5		1.5	

Note:

3. Parameter guaranteed by design $t_{OSLH} = |t_{PLHm} - t_{PLHn}|$, $t_{OSHL} = |t_{PHLm} - t_{PHLn}|$

Capacitance

Symbol	Parameter	$T_A = +25°C$			$T_A = -40°C$ to $+85°C$		Units
		Min.	Typ.	Max.	Min.	Max.	
C_{IN}	Input Capacitance		4	10		10	pF
C_{PD}	Power Dissipation Capacitance[4]		25				pF

Note:

4. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.
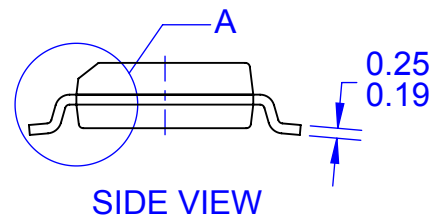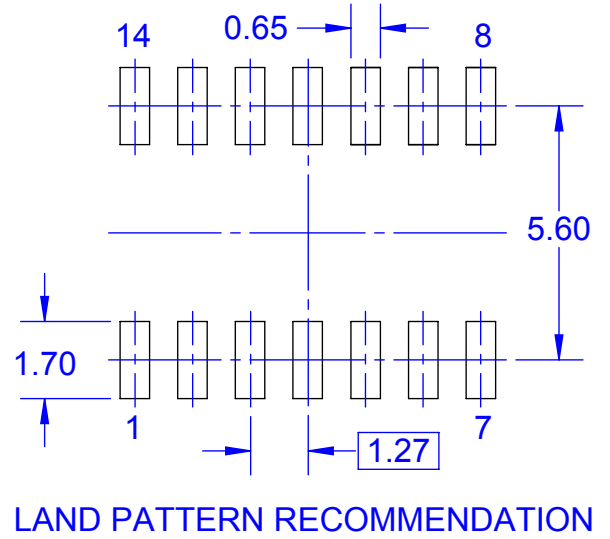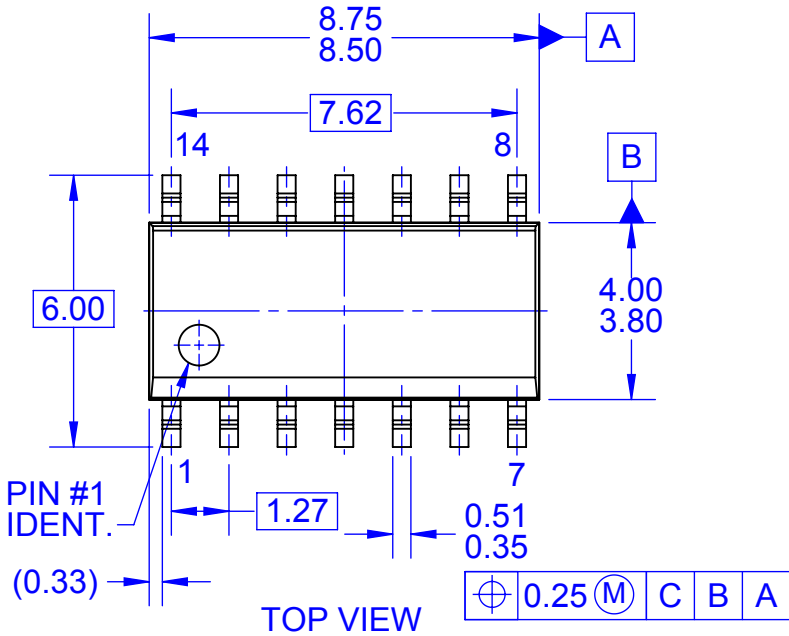
Average operating current can be obtained by the eqation: $I_{CC(opr.)} = \dfrac{C_{PD} \times V_{CC} \times f_{IN} \times I_{CC}}{2 \, (\text{per F}/\text{F})}$

TOP VIEW

5.00±0.10 [A]

0.43TYP

14   8

[B]

6.4

4.40±0.10

3.2

PIN#1 IDENT

1   TOP VIEW   7

△ 0.2 | C | B | A
ALL LEAD TIPS

RECOMMENDED LAND PATTERN

0.65

6.10

1.65

0.45

RECOMMENDED LAND PATTERN

FRONT VIEW

1.2 MAX

0.90 +0.15 -0.10

0.10±0.05

ALL LEAD TIPS

△ 0.1 | C

0.65

0.30
0.19

[C]

⊕ | 0.13Ⓜ | A | BⓈ | CⓈ

FRONT VIEW

DETAIL A

SEE DETAIL A

0.20
0.09

12.00° TOP & BOTTOM

0.09 MIN

GAGE PLANE

0.09 MIN

0.25

0°- 8°

0.6±0.1

1.00

SEATING PLANE

DETAIL A

NOTES:
A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB, REF NOTE 6
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS
D. DIMENSIONING AND TOLERANCES PER ANSI Y14.5M, 2009.
E. LANDPATTERN STANDARD: SOP65P640X110-14M.
F. DRAWING FILE NAME: MKT-MTC14rev7.

FAIRCHILD.

TOP VIEW

8.75
8.50

A

7.62

14

8

B

6.00

4.00
3.80

PIN #1
IDENT.

1

1.27

7

0.51
0.35

(0.33)

⊕ | 0.25 Ⓜ | C | B | A

LAND PATTERN RECOMMENDATION

14

0.65

8

5.60

1.70

1

1.27

7

FRONT VIEW

1.75 MAX

C

1.50
1.25

0.25
0.10

⌒ | 0.10 | C

SIDE VIEW

A

0.25
0.19

NOTES:

A. CONFORMS TO JEDEC MS-012,
   VARIATION AB, ISSUE C
B. ALL DIMENSIONS ARE IN MILLIMETERS
C. DIMENSIONS DO NOT INCLUDE MOLD
   FLASH OR BURRS
D. LAND PATTERN STANDARD:
   SOIC127P600X145-14M
E. CONFORMS TO ASME Y14.5M, 2009
D. DRAWING FILENAME: MKT-M14Arev14

FAIRCHILD ™

DETAIL A
SCALE 16 : 1

0.50
0.25 X 45°

R0.10

GAGE
PLANE

R0.10

0.36

8°
0°

0.90
0.50

(1.04)

SEATING PLANE

PUBLICATION ORDERING INFORMATION

© Semiconductor Components Industries, LLC

www.onsemi.com

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for ON Semiconductor *manufacturer:*

Other Similar products are found below :

1.5SMC82AT3G 74LCX574WM FST3126MX MC78L08ACP MMBTA42 FDD8424H_F085A NTZD3154NT1H KSA1015GRTA BAT42XV2 007851X 702607H MC33079DG MC34072DR2G MC34151P MC78L08ACDG 74VHC14MX 74VHC541MTCX FAN3111ESX FDMC86262P FDMD8530 FEBFL7733A_L53U021A FEBFOD8333 MM74HC138MX MMBZ5233B FOD3120SD FPAB30BH60B FQP2N80 1.5KE16AG MT9V115EBKSTCH-GEVB NB6L295MNGEVB NB7L1008MNGEVB NC7WZ126K8X NCL30000LED2GEVB NCN9252MUGEVB NCP1075PSRGEVB NCV4274CDT33RKG NCV887100D1R2G NDT2955 1N5339B NSIC2030JBT3G NV890231MWTXGEVB CAT4101AEVB KA7818ETU S3JB 2SC5569-TD-E FEBFL7734_L55L008A 1V5KE39CA FNB33060T AMIS30422DBGEVB AMIS3062XGEVK