QUALITY SEMICONDUCTOR, INC.

High-Speed CMOS Bus Interface 8-Bit Registers

QS54/74FCT374T
QS54/74FCT2374T

FEATURES/BENEFITS

- Pin and function compatible to the 74F374 74FCT374 and 74ABT374
- Industrial temperature –40°C to 85°C
- CMOS power levels: <7.5mW static
- Available in DIP, SOIC, QSOP, ZIP, HQSOP
- Undershoot clamp diodes on all inputs
- TTL-compatible input and output levels
- Ground bounce controlled outputs
- Reduced output swing of 0-3.5V
- Military product compliant to MIL-STD-883, Class B

FCT-T 374T

- JEDEC-FCT spec compatible
- Std., A, C, and D speed grades with 4.5ns t_{PD} for D
- I_{OL} = 48mA Ind., 32mA Mil.

FCT-T 2374T

- Built-in 25Ω series resistor outputs reduce reflection and other system noise
- Std., A and C speed grades with 5.2ns t_{PD} for C
- I_{OL} = 12mA Ind.

DESCRIPTION

The QSFCT374T is a high-speed CMOS TTL-compatible 8-bit buffered registers with a buffered common clock and a buffered output enable control. The QSFCT2374T is a 25Ω resistor output version useful for driving transmission lines and reducing system noise. Data is stored in the register on the rising edge of the clock. The FCT374 is a non-inverting device. The high output current I_{OL} and I_{OH} drive high capacitance loads. All inputs have clamp diodes for undershoot noise suppression. All outputs have ground bounce suppression (see QSI Application Note AN-001), and outputs will not load an active bus when V_{CC} is removed from the device.

Figure 1. Functional Block Diagram

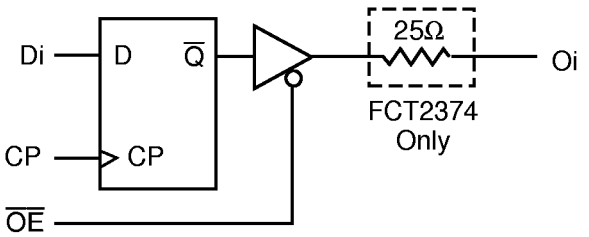
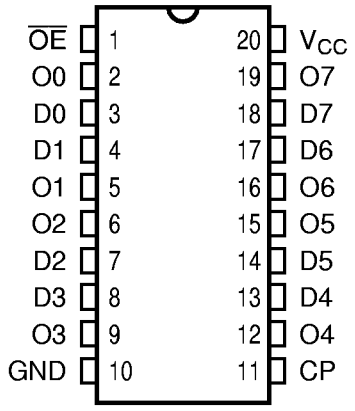


Figure 2. Pin Configurations (All Pins Top View)

PDIP, SOIC, QSOP, HQSOP



ZIP

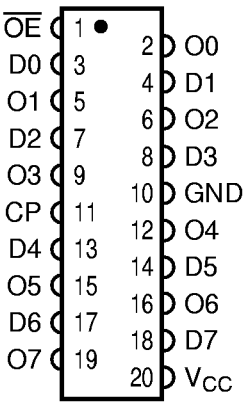


Table 1. Pin Description

Name	I/O	Description
Di	I	Data Inputs
Oi	O	Data Outputs
CP	I	Clock Input
$\overline{OE}$	I	Output Enable

Table 2. Function Table

Inputs $\overline{OE}$	Inputs CP	Inputs Di	Internal Q Value	Outputs Oi	Function
H	X	X	X	Hi-Z	Disable Outputs
L	↑	L	L	L	Load Input Data
L	↑	H	H	H	Enable Outputs
H	↑	L	L	Hi-Z	Load Input Data
H	↑	H	H	Hi-Z	Disable Outputs

Table 3. Absolute Maximum Ratings

Supply Voltage to Ground	–0.5V to 7.0V
DC Output Voltage V_{OUT}	–0.5V to 7.0V
DC Input Voltage V_{IN}	–0.5V to 7.0V
AC Input Voltage (for a pulse width ≤ 20ns)	–3.0V
DC Input Diode Current with $V_{IN} < 0$	–20mA
DC Output Diode Current with $V_{OUT} < 0$	–50mA
DC Output Current Max. Sink Current/Pin	120mA
Maximum Power Dissipation	0.5 watts
T_{STG} Storage Temperature	–65° to 150°C

Note: Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to QSI devices that result in functional or reliability type failures.

Table 4. Capacitance(1)

T_A = 25°C, f = 1MHz, V_{IN} = 0V, V_{OUT} = 0V

Pins(2)	SOIC	QSOP	PDIP	ZIP	Unit
1, 3, 4, 7, 8, 11, 13, 14, 17, 18	4	4	5	7	pF
2, 5, 6, 9, 12, 15, 16, 19	8	8	9	10	pF

Notes:
1. Capacitance is characterized but not tested.
2. Pin reference for 20-pin package.

Table 5. Power Supply Characteristics

Symbol	Parameter	Test Conditions(1)	Min	Max	Unit
I_{CC}	Quiescent Power Supply Current	V_{CC} = Max., freq = 0 0V ≤ V_{IN} ≤ 0.2V or V_{CC}-0.2V ≤ V_{IN} ≤ V_{CC}	—	1.5	mA
ΔI_{CC}	Supply Current per Input @ TTL HIGH	V_{CC} = Max., V_{IN} = 3.4V, freq = 0(2)	—	2.0	mA
Q_{CCD}	Supply Current per Input per MHz	V_{CC} = Max., Outputs open and enabled One bit toggling @ 50% duty cycle Other inputs at GND or V_{CC}(3,4)	—	0.25	mA/ MHz

Notes:
1. For conditions shown as Min. or Max., use the appropriate values specified under DC specifications.
2. Per TTL driven input (V_{IN} = 3.4V).
3. For flip-flops, Q_{CCD} is measured by switching one of the data input pins so that the output changes every clock cycle. This is a measurement of device power consumption only and does not include power to drive load capacitance or tester capacitance. This parameter is guaranteed by design but not tested.
4. I_C can be computed using the above parameters as explained in the Technical Overview section.

Table 6. DC Electrical Characteristics Over Operating Range

Commercial T_A = –40°C to 85°C, V_{CC} = 5.0V ±5% Military T_A = –55°C to 125°C, V_{CC} = 5.0V ±10%

Symbol	Parameter	Test Conditions	Min	Typ(1)	Max	Unit
V_{IH}	Input HIGH Voltage	Logic HIGH for All Inputs	2.0	—	—	V
V_{IL}	Input LOW Voltage	Logic LOW for All Inputs	—	—	0.8	V
ΔV_T	Input Hysteresis	$V_{TLH} - V_{THL}$ for All Inputs	—	0.2	—	V
$\lvert I_{IH} \rvert$ $\lvert I_{IL} \rvert$	Input Current Input HIGH or LOW	V_{CC} = Max., $0 \le V_{IN} < V_{CC}$	—	—	5	µA
$\lvert I_{OZ} \rvert$	Off-State Output Current (Hi-Z)	V_{CC} = Max., $0 \le V_{IN} \le V_{CC}$	—	—	5	µA
I_{OS}	Short Circuit Current (FCT374)	V_{CC} = Max., V_{OUT} = GND(2,3)	–60	—	—	mA
I_{OR}	Current Drive (FCT2374 – 25Ω)	V_{CC} = Min., V_{OUT} = 2.0V(3)	50	—	—	mA
V_{IC}	Input Clamp Voltage	V_{CC} = Min., I_{IN} = –18mA, T_A = 25°C(3)	—	–0.7	–1.2	V
V_{OH}	Output HIGH Voltage	V_{CC} = Min. I_{OH} = –12mA (MIL) I_{OH} = –15mA (IND)	2.4 2.4	— —	— —	V
V_{OL}	Output LOW Voltage (FCT374)	V_{CC} = Min. I_{OL} = 32mA (MIL) I_{OL} = 48mA (IND)	— —	— —	0.50 0.50	V
V_{OL}	Output LOW Voltage (FCT2374 – 25Ω)	V_{CC} = Min. I_{OL} = 12mA (MIL) I_{OL} = 12mA (IND)	— —	— —	0.50 0.50	V
R_{OUT}	Output Resistance (FCT2374 – 25Ω)	V_{CC} = Min. I_{OL} = 12mA (MIL) I_{OL} = 12mA (IND)	— 20	25 28	— 40	Ω

Notes:
1. Typical values indicate V_{CC} = 5.0V and T_A = 25°C.
2. Not more than one output should be shorted and the duration is ≤1 second.
3. These parameters are guaranteed by design but not tested.

Table 7. Switching Characteristics Over Operating Range

Industrial T_A = –40°C to 85°C, V_{CC} = 5.0V ±5% Military T_A = –55°C to 125°C, V_{CC} = 5.0V ±10%
C_{LOAD} = 50pF, R_{LOAD} = 500Ω unless otherwise noted.

Symbol	Description[1]		374 2374 Min	374 2374 Max	374A 2374A Min	374A 2374A Max	374C 2374C Min	374C 2374C Max	374D Min	374D Max	Unit
t_{PHL}	Propagation Delay	IND	2	10	2	6.5	2	5.2	1.5	4.5	ns
t_{PLH}	CP to Oi, 374	MIL	2	11	2	7.2	2	6			
t_{PHL}	Propagation Delay	IND	2	10	2	6.5	2	5.2	—	—	ns
t_{PLH}	CP to Oi, 2374	MIL	2	11	2	7.2	2	6	—	—	
t_{PZH}	Output Enable Time	IND	1.5	12.5	1.5	6.5	1.5	5.5	1.5	5.5	ns
t_{PZL}	$\overline{OE}$ to Yi, 374	MIL	1.5	14	1.5	7.5	1.5	6.2	—	—	
t_{PZH}	Output Enable Time	IND	1.5	12.5	1.5	6.5	1.5	6.2	—	—	ns
t_{PZL}	$\overline{OE}$ to Yi, 2374	MIL	1.5	14	1.5	7.5	1.5	6.9	—	—	
t_{PHZ}	Output Disable Time	IND[2]	1.5	8	1.5	5.5	1.5	5	1.5	5	ns
t_{PLZ}	$\overline{OE}$ to Yi	MIL[2]	1.5	8	1.5	6.5	1.5	6.5	—	—	
t_S	Data Setup Time	IND	2	—	2	—	1.5	—	1.5	—	ns
	Di to CP	MIL	2	—	2	—	2	—	—	—	
t_H	Data Hold Time	IND	1.5	—	1.5	—	1	—	1	—	ns
	Di to CP	MIL	1.5	—	1.5	—	1	—	—	—	
t_W	Clock Pulse Width	IND[2]	7	—	5	—	4	—	4	—	ns
	HIGH or LOW	MIL[2]	7	—	6	—	5	—	—	—	

Notes:
1. Minimums guaranteed but not tested for all parameters except t_S and t_H.
2. This parameter is guaranteed by design but not tested.
3. See Test Circuit and Waveforms.