

Q

High Speed CMOS 8-Bit Identity Comparator

QS54/74FCT521T

QS54/74FCT2521T

FEATURES/BENEFITS

- Pin and function compatible to the 74F521, 74FCT521, and 74ALS521
- CMOS power levels: <7.5 mW 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

FCT-T 521T

- JEDEC-FCT spec compatible
- Fastest CMOS logic family available
- Standard thru D speed grades; 3.9 ns t_{PD} for D
- I_{OL} = 48 mA Com., 32 mA Mil.

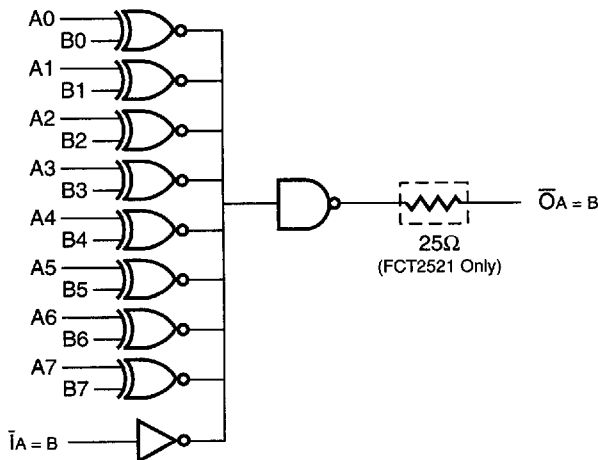
FCT-T 2521T

- Built-in 25Ω series resistor outputs reduce reflection and other system noise
- Standard thru D speed grades; 3.9 ns t_{PD} for D
- I_{OL} = 12 mA Com.

DESCRIPTION

The QSFCT521 and QSFCT2521 are high-speed CMOS TTL-compatible 8-bit identity comparators. Two words of up to eight bits are compared and a low output is provided when the words match. An expansion input allows the comparison to be extended over multiple words. All inputs have clamp diodes for undershoot noise suppression. All outputs have ground bounce suppression (see QSI Application Note AN-001).

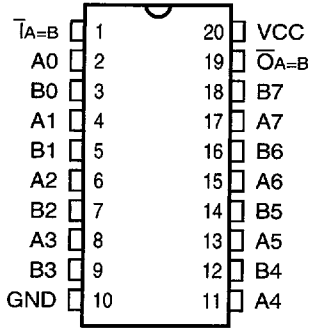
FUNCTIONAL BLOCK DIAGRAM



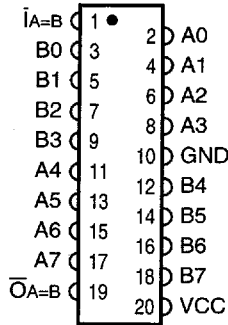
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PIN CONFIGURATIONS (All Pins Top View)

PDIP, SOIC, QSOP, HQSOP



ZIP



PIN DESCRIPTION

Name	I/O	Description
A7-A0	I	Word A
B7-B0	I	Word B
$\bar{I}_A = B$	I	Expansion or Enable Input
$\bar{O}_A = B$	O	Compare Output

FUNCTION TABLE

Inputs		Outputs		Function
A7-A0, B7-B0	$\bar{I}_A = B$	$\bar{O}_A = B$		
A7-A0 = B7-B0	L	L		Compare Equal
A7-A0 \neq B7-B0	L	H		Compare Not Equal
X	H	H		Expand Input Not Valid

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 ≤ 20 ns)	-3.0V
DC Input Diode Current with $V_{IN} < 0$	-20 mA
DC Output Diode Current with $V_{OUT} < 0$	-50 mA
DC Output Current Max. Sink Current/Pin	120 mA
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.

CAPACITANCE

$T_A = 25^\circ\text{C}$, $f = 1$ MHz, $V_{IN} = 0\text{V}$, $V_{OUT} = 0\text{V}$

Pins	SOIC	QSOP	PDIP	ZIP	Unit
1-9, 11-18	4	4	5	7	pF
19	6	6	7	9	pF
—	8	8	9	10	pF

Note: Capacitance is characterized but not tested.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾	Min	Max	Unit
I_{CC}	Quiescent Power Supply Current	$V_{CC} = \text{Max.}$, $\text{freq} = 0$ $0\text{V} \leq V_{IN} \leq 0.2\text{V}$ or $V_{CC}-0.2\text{V} \leq V_{IN} \leq V_{CC}$	—	1.5	mA
ΔI_{CC}	Supply Current per Input @ TTL HIGH	$V_{CC} = \text{Max.}$, $V_{IN} = 3.4\text{V}$, $\text{freq} = 0$ ⁽²⁾	—	2.0	mA
Q_{CCD}	Supply Current per Input per MHz	$V_{CC} = \text{Max.}$, 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 ($V_{IN} = 3.4\text{V}$).
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.

QSFCT521T, 2521T

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Commercial $T_A = 0^\circ\text{C}$ to 70°C , $V_{CC} = 5.0\text{V} \pm 5\%$

Military $T_A = -55^\circ\text{C}$ to 125°C , $V_{CC} = 5.0\text{V} \pm 10\%$

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
I_{IH} I_{IL}	Input Current Input HIGH or LOW	$V_{CC} = \text{Max.}, 0 \leq V_{IN} < V_{CC}$	—	—	5	μA
I_{OZ}	Off-State Output Current (Hi-Z)	$V_{CC} = \text{Max.}, 0 \leq V_{IN} \leq V_{CC}$	—	—	5	μA
I_{OS}	Short Circuit Current (FCTXXX)	$V_{CC} = \text{Max.}, V_{OUT} = \text{GND}^{(2,3)}$	-60	—	—	mA
I_{OR}	Current Drive (FCT2XXX - 25 Ω)	$V_{CC} = \text{Min.}, V_{OUT} = 2.0\text{V}^{(3)}$	50	—	—	mA
V_{IC}	Input Clamp Voltage	$V_{CC} = \text{Min.}, I_{IN} = -18 \text{ mA}, T_A = 25^\circ\text{C}^{(3)}$	—	-0.7	-1.2	V
V_{OH}	Output HIGH Voltage	$V_{CC} = \text{Min.}$ $I_{OH} = -12 \text{ mA (MIL)}$ $I_{OH} = -15 \text{ mA (COM)}$	2.4 2.4	—	—	V
V_{OL}	Output LOW Voltage (FCTXXX)	$V_{CC} = \text{Min.}$ $I_{OL} = 32 \text{ mA (MIL)}$ $I_{OL} = 48 \text{ mA (COM)}$	— —	—	0.50 0.50	V
V_{OL}	Output LOW Voltage (FCT2XXX - 25 Ω)	$V_{CC} = \text{Min.}$ $I_{OL} = 12 \text{ mA (MIL)}$ $I_{OL} = 12 \text{ mA (COM)}$	— —	—	0.50 0.50	V
R_{OUT}	Output Resistance (FCT2XXX - 25 Ω)	$V_{CC} = \text{Min.}$ $I_{OL} = 12 \text{ mA (MIL)}$ $I_{OL} = 12 \text{ mA (COM)}$	— 20	25 28	— 40	Ω

Notes:

1. Typical values indicate $V_{CC} = 5.0\text{V}$ and $T_A = 25^\circ\text{C}$.
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.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

Commercial $T_A = 0^\circ\text{C}$ to 70°C , $V_{CC} = 5.0\text{V} \pm 5\%$

Military $T_A = -55^\circ\text{C}$ to 125°C , $V_{CC} = 5.0\text{V} \pm 10\%$

$C_{LOAD} = 50 \text{ pF}$, $R_{LOAD} = 500\Omega$ unless otherwise noted.

Symbol	Description ⁽¹⁾		521T		521AT		521BT		521CT		521DT		Unit
			2521T	2521AT	2521AT	2521BT	2521CT	2521DT					
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
t_{PHL}	Propagation Delay	COM	1.5	11	1.5	7.2	1.5	5.5	1.5	4.5	1.5	4.1	ns
t_{PLH}	$A_i = B_i$ to $\overline{O}_A = B$	MIL	1.5	15	1.5	9.5	1.5	7.3	1.5	5.1			
t_{PHLX}	Propagation Delay	COM	1.5	10	1.5	6	1.5	4.6	1.5	4.1	1.5	3.9	ns
t_{PLHX}	$\overline{I}_A = B$ to $\overline{O}_A = B$	MIL	1.5	9	1.5	7.8	1.5	6.0	1.5	4.5			

Notes:

1. Minimum guaranteed but not tested.