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
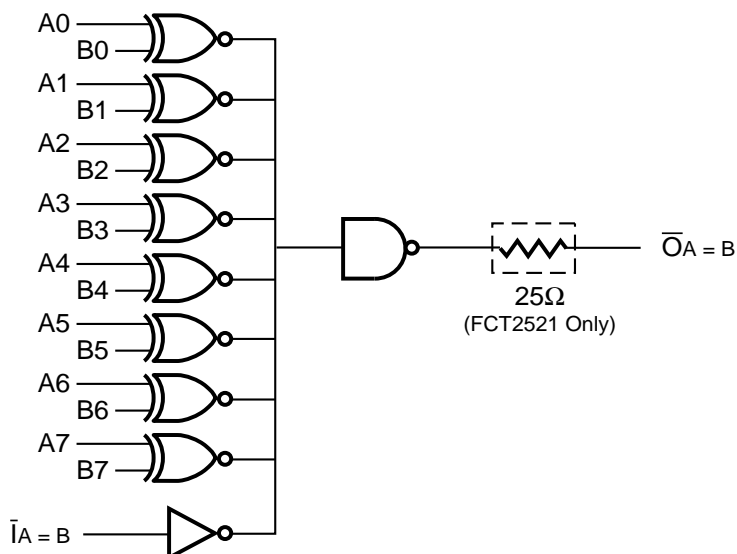- I_{OL} = 48 mA Com., 32 mA Mil.

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
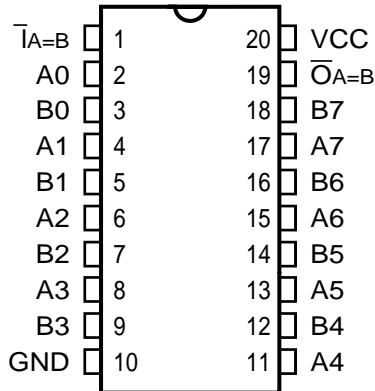- I_{OL} = 12 mA Com.

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).
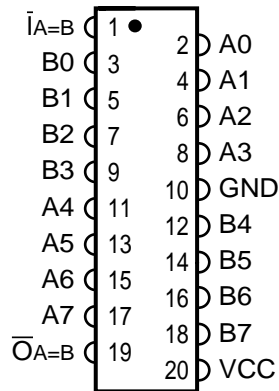
FUNCTIONAL BLOCK DIAGRAM

PIN CONFIGURATIONS (All Pins Top View)

PDIP, SOIC, QSOP, HQSOP

$\overline{I}_{A=B}$	1	20	VCC
A0	2	19	$\overline{O}_{A=B}$
B0	3	18	B7
A1	4	17	A7
B1	5	16	B6
A2	6	15	A6
B2	7	14	B5
A3	8	13	A5
B3	9	12	B4
GND	10	11	A4

ZIP

$\overline{I}_{A=B}$	1	2	A0
B0	3	4	A1
B1	5	6	A2
B2	7	8	A3
B3	9	10	GND
A4	11	12	B4
A5	13	14	B5
A6	15	16	B6
A7	17	18	B7
$\overline{O}_{A=B}$	19	20	VCC

PIN DESCRIPTION

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

FUNCTION TABLE

Inputs A7-A0, B7-B0	$\overline{I}_{A=B}$	Outputs $\overline{O}_{A=B}$	Function
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

QUALITY SEMICONDUCTOR, INC.

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°C, f = 1 MHz, V$_{IN}$ = 0V, V$_{OUT}$ = 0V

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
Icc	Quiescent Power Supply Current	Vcc = Max., freq = 0 0V ≤ V$_{IN}$ ≤ 0.2V or Vcc-0.2V ≤ V$_{IN}$ ≤ Vcc	—	1.5	mA
ΔIcc	Supply Current per Input @ TTL HIGH	Vcc = Max., V$_{IN}$ = 3.4V, freq = 0[2]	—	2.0	mA
Q$_{CCD}$	Supply Current per Input per MHz	Vcc = Max., Outputs open and enabled One bit toggling @ 50% duty cycle Other inputs at GND or Vcc[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. Ic can be computed using the above parameters as explained in the Technical Overview section.

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Commercial T_A = 0°C to 70°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
| I_{IH} | | I_{IL} |	Input Current Input HIGH or LOW	V_{CC} = Max., $0 \leq V_{IN} < V_{CC}$	—	—	5	μA
| I_{OZ} |	Off-State Output Current (Hi-Z)	V_{CC} = Max., $0 \leq V_{IN} \leq V_{CC}$	—	—	5	μA
I_{OS}	Short Circuit Current (FCTXXX)	V_{CC} = Max., V_{OUT} = GND[2,3]	−60	—	—	mA
I_{OR}	Current Drive (FCT2XXX − 25Ω)	V_{CC} = Min., V_{OUT} = 2.0V[3]	50	—	—	mA
V_{IC}	Input Clamp Voltage	V_{CC} = Min., I_{IN} = −18 mA, T_A = 25°C[3]	—	−0.7	−1.2	V
V_{OH}	Output HIGH Voltage	V_{CC} = Min. I_{OH} = −12 mA (MIL) I_{OH} = −15 mA (COM)	2.4 2.4	— —	— —	V
V_{OL}	Output LOW Voltage (FCTXXX)	V_{CC} = Min. I_{OL} = 32 mA (MIL) I_{OL} = 48 mA (COM)	— —	— —	0.50 0.50	V
V_{OL}	Output LOW Voltage (FCT2XXX − 25Ω)	V_{CC} = Min. I_{OL} = 12 mA (MIL) I_{OL} = 12 mA (COM)	— —	— —	0.50 0.50	V
R_{OUT}	Output Resistance (FCT2XXX − 25Ω)	V_{CC} = Min. I_{OL} = 12 mA (MIL) I_{OL} = 12 mA (COM)	— 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.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

Commercial T_A = 0°C to 70°C, V_{CC} = 5.0V ± 5%   Military T_A = −55°C to 125°C, V_{CC} = 5.0V ± 10%
C_{LOAD} = 50 pF, R_{LOAD} = 500Ω unless otherwise noted.

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

Notes:
1. Minimum guaranteed but not tested.