



Integrated Device Technology, Inc.

FAST CMOS 8-BIT IDENTITY COMPARATOR

IDT54/74FCT521T
IDT54/74FCT521AT
IDT54/74FCT521BT
IDT54/74FCT521CT

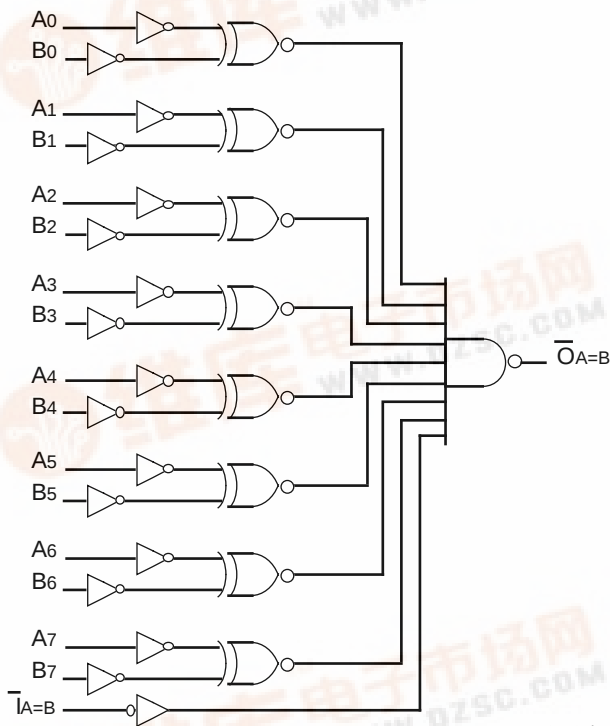
FEATURES:

- Std., A, B and C speed grades
- Low input and output leakage $\leq 1\mu\text{A}$ (max.)
- CMOS power levels
- True TTL input and output compatibility
 - $V_{OH} = 3.3\text{V}$ (typ.)
 - $V_{OL} = 0.3\text{V}$ (typ.)
- High drive outputs (-15mA I_{OH} , 48mA I_{OL})
- Meets or exceeds JEDEC standard 18 specifications
- Product available in Radiation Tolerant and Radiation Enhanced versions
- Military product compliant to MIL-STD-883, Class B and DESC listed (dual marked)
- Available in DIP, SOIC, SSOP, QSOP, CERPACK and LCC packages

DESCRIPTION:

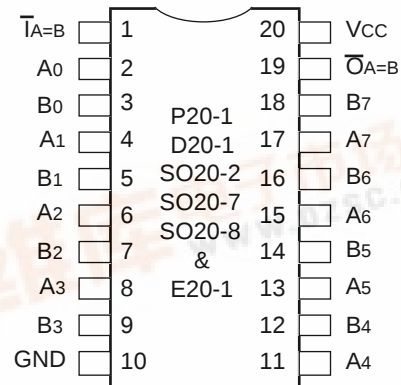
The IDT54/74FCT521T/AT/BT/CT are 8-bit identity comparators built using an advanced dual metal CMOS technology. These devices compare two words of up to eight bits each and provide a LOW output when the two words match bit for bit. The expansion input $\bar{I}_A = B$ also serves as an active LOW enable input.

FUNCTIONAL BLOCK DIAGRAM



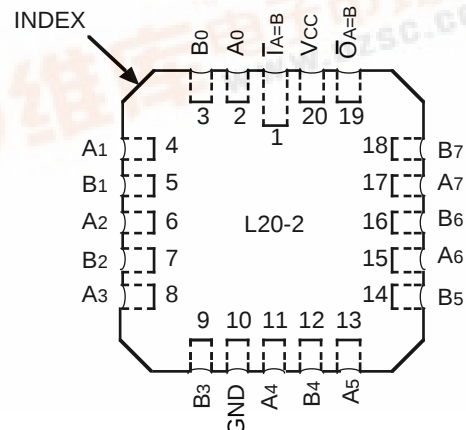
2572 drw 01

PIN CONFIGURATIONS



**DIP/SOIC/SSOP/QSOP/CERPACK
TOP VIEW**

2572 drw 02



**LCC
TOP VIEW**

2572 drw 03

PIN DESCRIPTION

Pin Names	Description
A0 - A7	Word A Inputs
B0 - B7	Word B Inputs
$\bar{I}_A = B$	Expansion or Enable Input (Active LOW)
$\bar{O}_A = B$	Identity Output (Active LOW)

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FUNCTION TABLE⁽¹⁾

Inputs		Output
$\bar{I}_A = B$	A, B	$\bar{O}_A = B$
L	A = B*	L
L	A ≠ B	H
H	A = B*	H
H	A ≠ B	H

2572 tbl 02

NOTE:

- H = HIGH Voltage Level
L = LOW Voltage Level
*A0 = B0, A1 = B1, A2 = B2, etc.

CAPACITANCE (TA = +25°C, f = 1.0MHz)

Symbol	Parameter ⁽¹⁾	Conditions	Typ.	Max.	Unit
CIN	Input Capacitance	VIN = 0V	6	10	pF
COUT	Output Capacitance	VOUT = 0V	8	12	pF

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NOTE:

- This parameter is measured at characterization but not tested.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Rating	Commercial	Military	Unit
VTERM ⁽²⁾	Terminal Voltage with Respect to GND	−0.5 to +7.0	−0.5 to +7.0	V
VTERM ⁽³⁾	Terminal Voltage with Respect to GND	−0.5 to VCC +0.5	−0.5 to VCC +0.5	V
TA	Operating Temperature	0 to +70	−55 to +125	°C
TBIAS	Temperature Under Bias	−55 to +125	−65 to +135	°C
TSTG	Storage Temperature	−55 to +125	−65 to +150	°C
PT	Power Dissipation	0.5	0.5	W
IOUT	DC Output Current	−60 to +120	−60 to +120	mA

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NOTES:

- Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability. No terminal voltage may exceed VCC by +0.5V unless otherwise noted.
- Input and VCC terminals only.
- Outputs and I/O terminals only.

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Commercial: TA = 0°C to +70°C, VCC = 5.0V ± 5%; Military: TA = −55°C to +125°C, VCC = 5.0V ± 10%

Symbol	Parameter	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Unit
V _{IH}	Input HIGH Level	Guaranteed Logic HIGH Level		2.0	—	—	V
V _{IL}	Input LOW Level	Guaranteed Logic LOW Level		—	—	0.8	V
I _{IH}	Input HIGH Current ⁽⁴⁾	VCC = Max.	V _I = 2.7V	—	—	±1	μA
I _{IL}	Input LOW Current ⁽⁴⁾	VCC = Max.	V _I = 0.5V	—	—	±1	μA
I _I	Input HIGH Current ⁽⁴⁾	VCC = Max., V _I = VCC (Max.)		—	—	±1	μA
V _{IK}	Clamp Diode Voltage	VCC = Min., I _N = −18mA		—	−0.7	−1.2	V
I _{OS}	Short Circuit Current	VCC = Max. ⁽³⁾ , V _O = GND		−60	−120	−225	mA
V _{OH}	Output HIGH Voltage	VCC = Min. V _{IN} = V _{IH} or V _{IL}	I _{OH} = −6mA MIL. I _{OH} = −8mA COM'L.	2.4	3.3	—	V
			I _{OH} = −12mA MIL. I _{OH} = −15mA COM'L.	2.0	3.0	—	V
V _{OL}	Output LOW Voltage	VCC = Min. V _{IN} = V _{IH} or V _{IL}	I _{OL} = 32mA MIL. I _{OL} = 48mA COM'L.	—	0.3	0.5	V
V _H	Input Hysteresis	—		—	200	—	mV
I _{CC}	Quiescent Power Supply Current	VCC = Max. V _{IN} = GND or VCC		—	0.01	1	mA

NOTES:

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- For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at VCC = 5.0V, +25°C ambient.
- Not more than one output should be shorted at one time. Duration of the short circuit test should not exceed one second.
- The test limit for this parameter is ±5μA at TA = −55°C.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Unit
ΔI_{CC}	Quiescent Power Supply Current TTL Inputs HIGH	$V_{CC} = \text{Max.}$ $V_{IN} = 3.4V^{(3)}$		—	0.5	2.0	mA
I_{CCD}	Dynamic Power Supply Current ⁽⁴⁾	$V_{CC} = \text{Max.}$ Outputs Open One Input Toggling 50% Duty Cycle	$V_{IN} = V_{CC}$ $V_{IN} = GND$	—	0.15	0.25	mA/ MHz
I_C	Total Power Supply Current ⁽⁵⁾	$V_{CC} = \text{Max.}$ Outputs Open $f_i = 10\text{MHz}$ One Bit Toggling 50% Duty Cycle	$V_{IN} = V_{CC}$ $V_{IN} = GND$	—	1.5	3.5	mA
			$V_{IN} = 3.4V$ $V_{IN} = GND$	—	1.8	4.5	

NOTES:

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- For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
- Typical values are at $V_{CC} = 5.0V$, $+25^\circ\text{C}$ ambient.
- Per TTL driven input ($V_{IN} = 3.4V$). All other inputs at V_{CC} or GND .
- This parameter is not directly testable, but is derived for use in Total Power Supply Calculations.
- Values for these conditions are examples of the I_{CC} formula. These limits are guaranteed but not tested.
- $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
 $I_C = I_{CC} + \Delta I_{CC} D_{HNT} + I_{CCD} (f_{CP}/2 + f_i N_i)$
 $I_{CC} = \text{Quiescent Current}$
 $\Delta I_{CC} = \text{Power Supply Current for a TTL High Input } (V_{IN} = 3.4V)$
 $D_H = \text{Duty Cycle for TTL Inputs High}$
 $N_T = \text{Number of TTL Inputs at } D_H$
 $I_{CCD} = \text{Dynamic Current Caused by an Input Transition Pair (HLH or LHL)}$
 $f_{CP} = \text{Clock Frequency for Register Devices (Zero for Non-Register Devices)}$
 $f_i = \text{Input Frequency}$
 $N_i = \text{Number of Inputs at } f_i$
All currents are in milliamperes and all frequencies are in megahertz.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

Symbol	Parameter	Condition ⁽¹⁾	IDT54/74FCT521T				IDT54/74FCT521AT				IDT54/74FCT521BT				IDT54/74FCT521CT				Unit
			Com'l.		Mil.		Com'l.		Mil.		Com'l.		Mil.		Com'l.		Mil.		
			Min. ⁽²⁾	Max.	Min. ⁽²⁾	Max.	Min. ⁽²⁾	Max.	Min. ⁽²⁾	Max.	Min. ⁽²⁾	Max.	Min. ⁽²⁾	Max.	Min. ⁽²⁾	Max.	Min. ⁽²⁾	Max.	
tPLH tPHL	Propagation Delay An or Bn to $\overline{O_A} = B$	CL = 50pF RL = 500Ω	1.5	11.0	1.5	15.0	1.5	7.2	1.5	9.5	1.5	5.5	1.5	7.3	1.5	4.5	1.5	5.1	ns
tPLH tPHL	Propagation Delay $\overline{I_A} = B$ to $\overline{O_A} = B$		1.5	10.0	1.5	9.0	1.5	6.0	1.5	7.8	1.5	4.6	1.5	6.0	1.5	4.1	1.5	4.5	ns

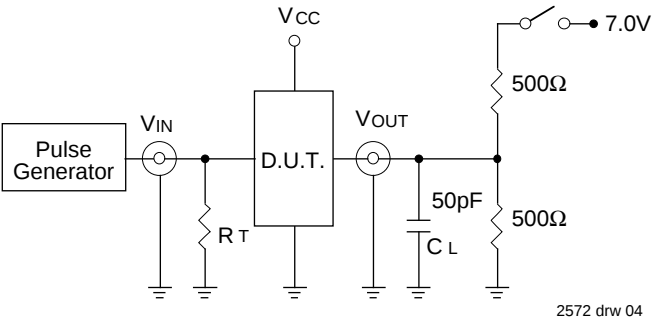
NOTES:

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- See test circuit and waveforms.
- Minimum limits are guaranteed but not tested on Propagation Delays.

TEST CIRCUITS AND WAVEFORMS

TEST CIRCUITS FOR ALL OUTPUTS



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SWITCH POSITION

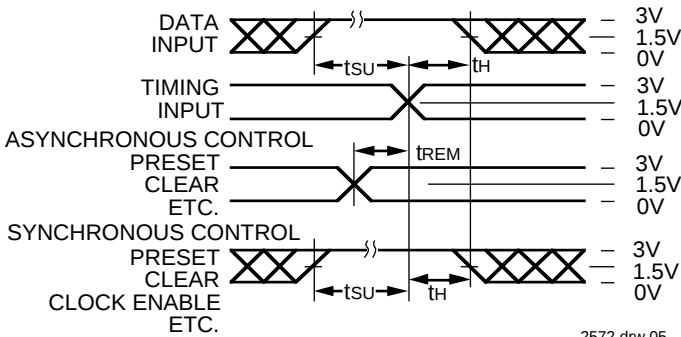
Test	Switch
Open Drain Disable Low Enable Low	Closed
All Other Tests	Open

2572 Ink 08

DEFINITIONS:

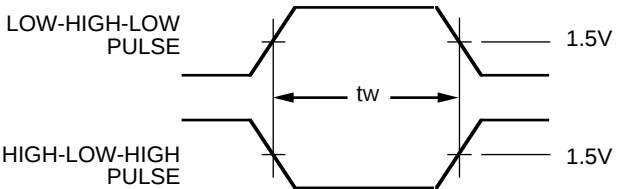
CL = Load capacitance: includes jig and probe capacitance.
RT = Termination resistance: should be equal to ZOUT of the Pulse Generator.

SET-UP, HOLD AND RELEASE TIMES



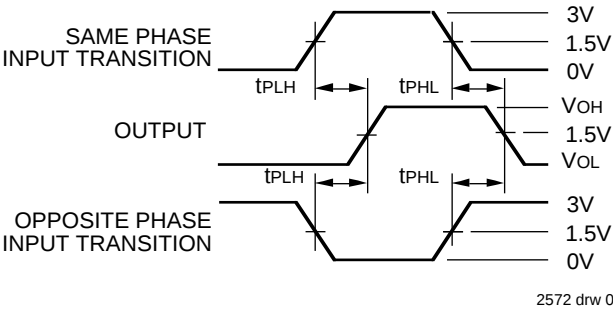
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PULSE WIDTH



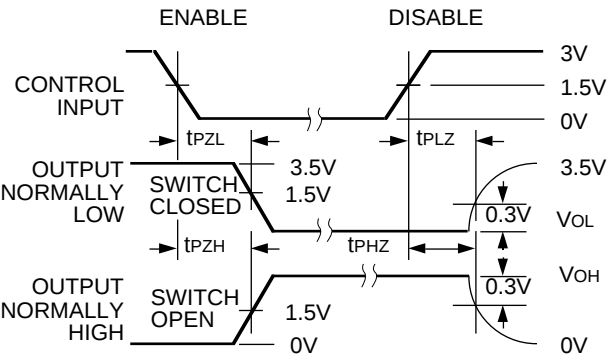
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PROPAGATION DELAY



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ENABLE AND DISABLE TIMES



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NOTES:

- 1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH
- 2. Pulse Generator for All Pulses: Rate ≤ 1.0MHz; tr ≤ 2.5ns; tr ≤ 2.5ns

ORDERING INFORMATION

