FAST CMOS QUAD 2-INPUT MULTIPLEXER

IDT74FCT2257T/AT/CT

FEATURES:

- Low input and output leakage ≤1µA (max.)
- CMOS power levels
- True TTL input and output compatibility
  - V_{OH} = 3.3V (typ.)
  - V_{OL} = 0.3V (typ.)
- Meets or exceeds JEDEC standard 18 specifications
- Std., A, and C speed grades
- Resistor output (-15mA I_{OH}, 12mA I_{OL})
- Reduced system switching noise
- Available in SOIC and QSOP packages

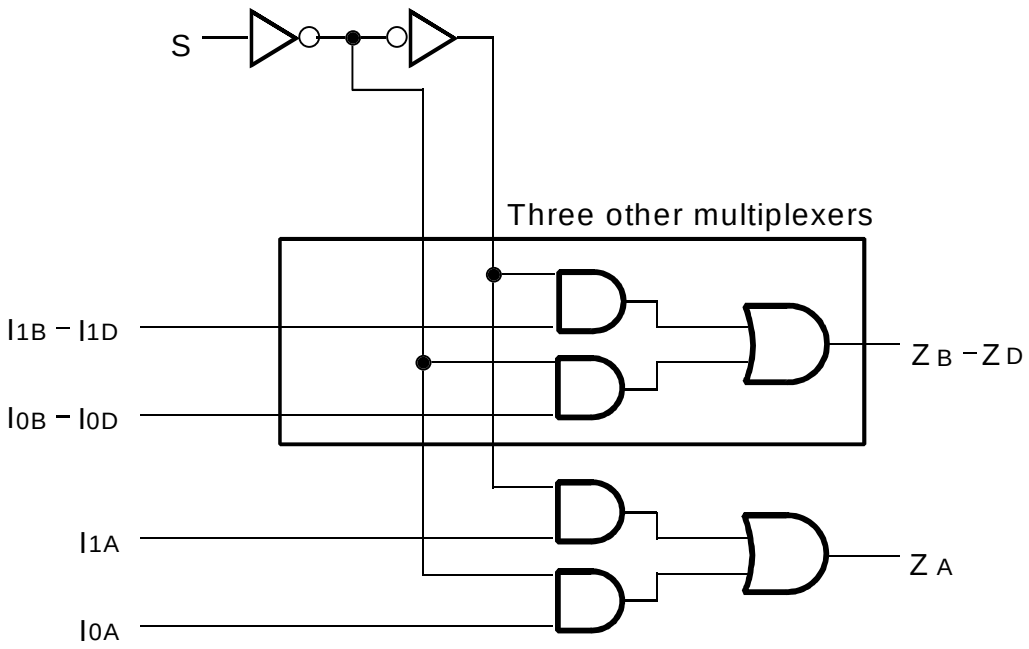
DESCRIPTION:

The FCT2257T is a high-speed quad 2-input multiplexer built using an advanced dual metal CMOS technology. Four bits of data from two sources can be selected using the common select input. The four buffered outputs present the selected data in the true (non-inverting) form.

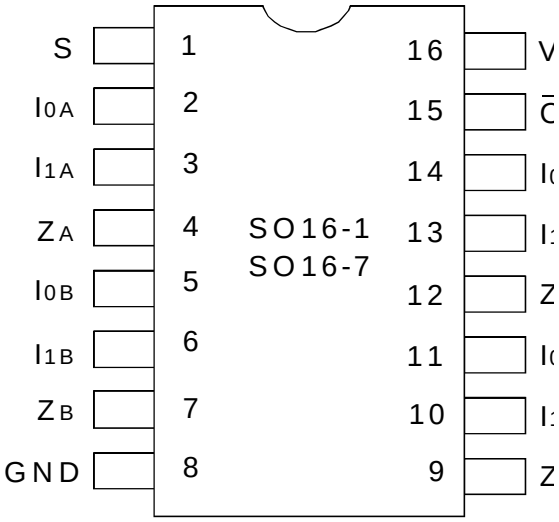
The 2257T has a common Output Enable ($\overline{OE}$) input. When $\overline{OE}$ is high, all outputs are switched to a high-impedance state allowing the outputs to interface directly with bus-oriented systems.

The FCT2257T has balanced output drive with current limiting resistors. This offers low ground bounce, minimal undershoot and controlled output fall times-reducing the need for external series terminating resistors. FCT2257T parts are plug-in replacements for FCT257T parts.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



SOIC/ QSOP
TOP VIEW

ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Rating	Max.	Unit
V_{TERM}(2)	Terminal Voltage with Respect to GND	–0.5 to +7	V
V_{TERM}(3)	Terminal Voltage with Respect to GND	–0.5 to V_{CC}+0.5	V
T_{STG}	Storage Temperature	–65 to +150	°C
I_{OUT}	DC Output Current	–60 to +120	mA

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NOTES:
1. 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.
2. Inputs and Vcc terminals only.
3. Outputs and I/O terminals only.

CAPACITANCE (T_A = +25°C, f = 1.0MHz)

Symbol	Parameter(1)	Conditions	Typ.	Max.	Unit
C_{IN}	Input Capacitance	V_{IN} = 0V	6	10	pF
C_{OUT}	Output Capacitance	V_{OUT} = 0V	8	12	pF

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NOTE:
1. This parameter is measured at characterization but not tested.

PIN DESCRIPTION

Pin Names	Description
I_{0A}–I_{0D}	Source 0 Data Inputs
I_{1A}–I_{1D}	Source 1 Data Inputs
$\overline{OE}$	Output Enable (Active LOW)
S	Select Input
Z_A–Z_D	Outputs

FUNCTION TABLE(1)

Inputs				Outputs
$\overline{OE}$	S	I_0	I_1	
H	X	X	X	Z
L	H	X	L	L
L	H	X	H	H
L	L	L	X	L
L	L	H	X	H

NOTE:
1. H = HIGH Voltage Level
   L = LOW Voltage Level
   X = Don't Care
   Z = High-Impedance

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:
Industrial: T_A = –40°C to +85°C, V_{CC} = 5.0V ± 5%

Symbol	Parameter	Test Conditions[1]		Min.	Typ.[2]	Max.	Unit
V_{IH}	Input HIGH Level	Guaranteed Logic HIGH Level		2	—	—	V
V_{IL}	Input LOW Level	Guaranteed Logic LOW Level		—	—	0.8	V
I_{IH}	Input HIGH Current[4]	V_{CC} = Max.	V_I = 2.7V	—	—	±1	µA
I_{IL}	Input LOW Current[4]		V_I = 0.5V	—	—	±1	
I_{OZH}	High Impedance Output Current	V_{CC} = Max.	V_O = 2.7V	—	—	±1	
I_{OZL}	(3-State Output pins)[4]		V_O = 0.5V	—	—	±1	
I_I	Input HIGH Current[4]	V_{CC} = Max., V_I = V_{CC} (Max.)		—	—	±1	µA
V_{IK}	Clamp Diode Voltage	V_{CC} = Min., I_{IN} = –18mA		—	–0.7	–1.2	V
V_H	Input Hysteresis	—		—	200	—	mV
I_{CC}	Quiescent Power Supply Current	V_{CC} = Max., V_{IN} = GND or V_{CC}		—	0.01	1	mA

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OUTPUT DRIVE CHARACTERISTICS

Symbol	Parameter	Test Conditions[1]		Min.	Typ.[2]	Max.	Unit
I_{ODL}	Output LOW Current	V_{CC} = 5V, V_{IN} = V_{IH} or V_{IL}, V_{OUT} = 1.5V[3]		16	48	—	mA
I_{ODH}	Output HIGH Current	V_{CC} = 5V, V_{IN} = V_{IH} or V_{IL}, V_{OUT} = 1.5V[3]		–16	–48	—	mA
V_{OH}	Output HIGH Voltage	V_{CC} = Min. V_{IN} = V_{IH} or V_{IL}	I_{OH} = –15mA	2.4	3.3	—	V
V_{OL}	Output LOW Voltage	V_{CC} = Min. V_{IN} = V_{IH} or V_{IL}	I_{OH} = 12mA	—	0.3	0.5	V

NOTES:
1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at Vcc = 5.0V, +25°C ambient.
3. Not more than one output should be shorted at one time. Duration of the short circuit test should not exceed one second.
4. The test limit for this parameter is ±5µA at T_A = –55°C.
5. This parameter is guaranteed but not tested.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions[1]		Min.	Typ.[2]	Max.	Unit
ΔI_{CC}	Quiescent Power Supply Current TTL Inputs HIGH	V_{CC} = Max. V_{IN} = 3.4[3]		—	0.5	2	mA
I_{CCD}	Dynamic Power Supply Current[4]	V_{CC} = Max. Outputs Open $\overline{OE}$ = GND One Bit Toggling 50% Duty Cycle	V_{IN} = V_{CC} V_{IN} = GND	—	0.06	0.12	mA/ MHz
I_C	Total Power Supply Current[6]	V_{CC} = Max. Outputs Open fo = 10MHz 50% Duty Cycle $\overline{OE}$ = GND One Bit Toggling	V_{IN} = V_{CC} V_{IN} = GND	—	0.6	2.2	mA
			V_{IN} = 3.4 V_{IN} = GND	—	0.9	3.2	
		V_{CC} = Max. Outputs Open fo = 2.5MHz 50% Duty Cycle $\overline{OE}$ = GND Four Bits Toggling	V_{IN} = V_{CC} V_{IN} = GND	—	0.6	2.2[5]	
			V_{IN} = 3.4 V_{IN} = GND	—	1.6	6.2[5]	

NOTES:
1. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at V_{CC} = 5.0V, +25°C ambient.
3. Per TTL driven input (V_{IN} = 3.4V); all other inputs at V_{CC} or GND.
4. This parameter is not directly testable, but is derived for use in Total Power Supply calculations.
5. Values for these conditions are examples of the I_{CC} formula. These limits are guaranteed but not tested.
6. $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
   $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_o N_o)$
   I_{CC} = Quiescent Current
   ΔI_{CC} = Power Supply Current for a TTL High Input (V_{IN} = 3.4V)
   D_H = Duty Cycle for TTL Inputs High
   N_T = Number of TTL Inputs at D_H
   I_{CCD} = Dynamic Current Caused by an Output Transition Pair (HLH or LHL)
   f_o = Output Frequency
   N_o = Number of Outputs at f_o
   All currents are in milliamps and all frequencies are in megahertz.

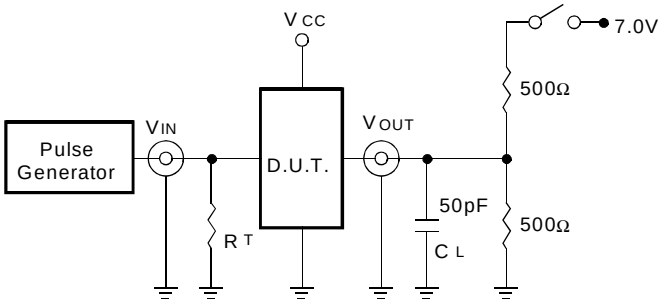
SWITCHING CHARACTERISTICS OVER OPERATING RANGE

Symbol	Parameter	Condition[1]	FCT2257T		FCT2257AT		FCT2257CT		Unit
			Min.[2]	Max.	Min.[2]	Max.	Min.[2]	Max.	
t_{PLH} t_{PHL}	Propagation Delay IN to ZN	C_L = 50pF R_L = 500Ω	1.5	6	1.5	5	1.5	4.3	ns
t_{PLH} t_{PHL}	Propagation Delay S to ZN		1.5	10.5	1.5	7	1.5	5.2	ns
t_{PZH} t_{PZL}	Output Enable Time		1.5	8.5	1.5	7	1.5	6	ns
t_{PHZ} t_{PLZ}	Output Disable Time		1.5	6	1.5	5.5	1.5	5	ns

NOTES:
1. See test circuits and waveforms.
2. Minimum limits are guaranteed but not tested on Propagation Delay.

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

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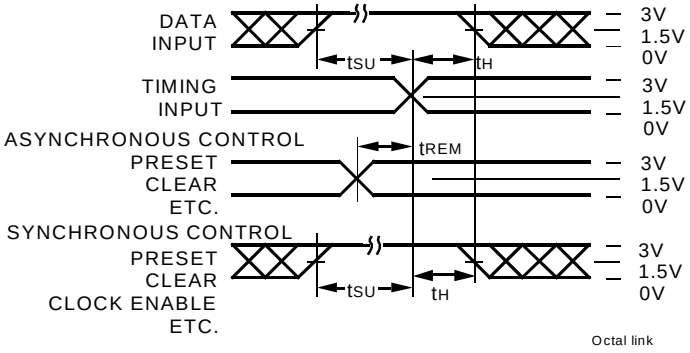
DEFINITIONS:

C_L = Load capacitance: includes jig and probe capacitance.

R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.

SET-UP, HOLD, AND RELEASE TIMES



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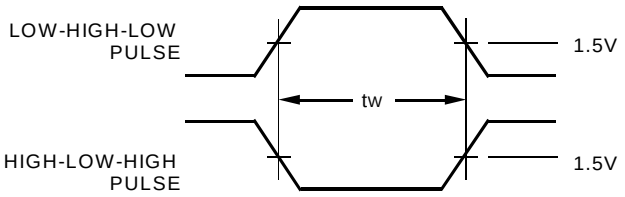
PULSE WIDTH



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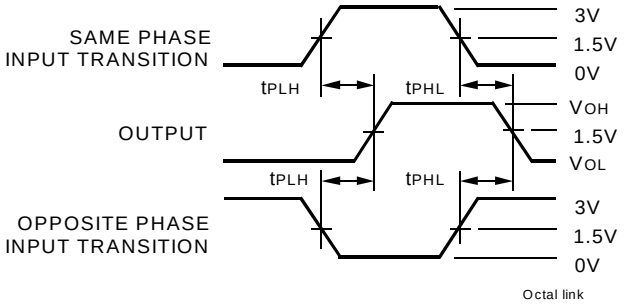
PROPAGATION DELAY



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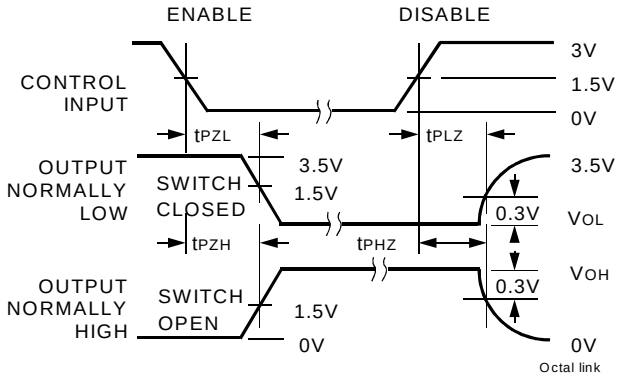
ENABLE AND DISABLE TIMES



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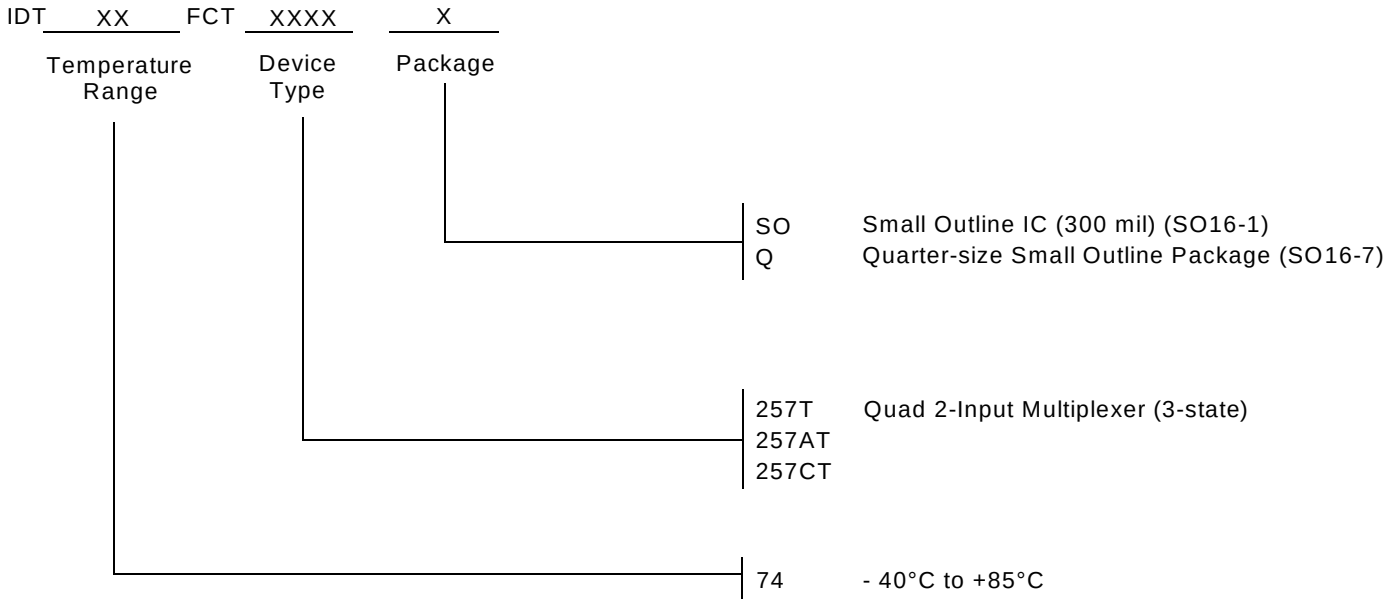
NOTES:

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

ORDERING INFORMATION



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