



FAST CMOS 10-BIT BUFFER

IDT74FCT2827AT/BT/CT

FEATURES:

- Low input and output leakage $\leq 1\mu\text{A}$ (max.)
- Extended commercial range of -40°C to $+85^\circ\text{C}$
- CMOS power levels
- True TTL input and output compatibility
 - $V_{OH} = 3.3\text{V}$ (typ.)
 - $V_{OL} = 0.3\text{V}$ (typ.)
- Meets or exceeds JEDEC standard 18 specifications
- Product available in Radiation Tolerant and Radiation Enhanced versions
- Available in PDIP, SOIC, SSOP, QSOP, and TSSOP packages
- A, B and C speed grades
- Resistor outputs (-15mA IOH, 12mA IOL)
- Reduced system switching noise

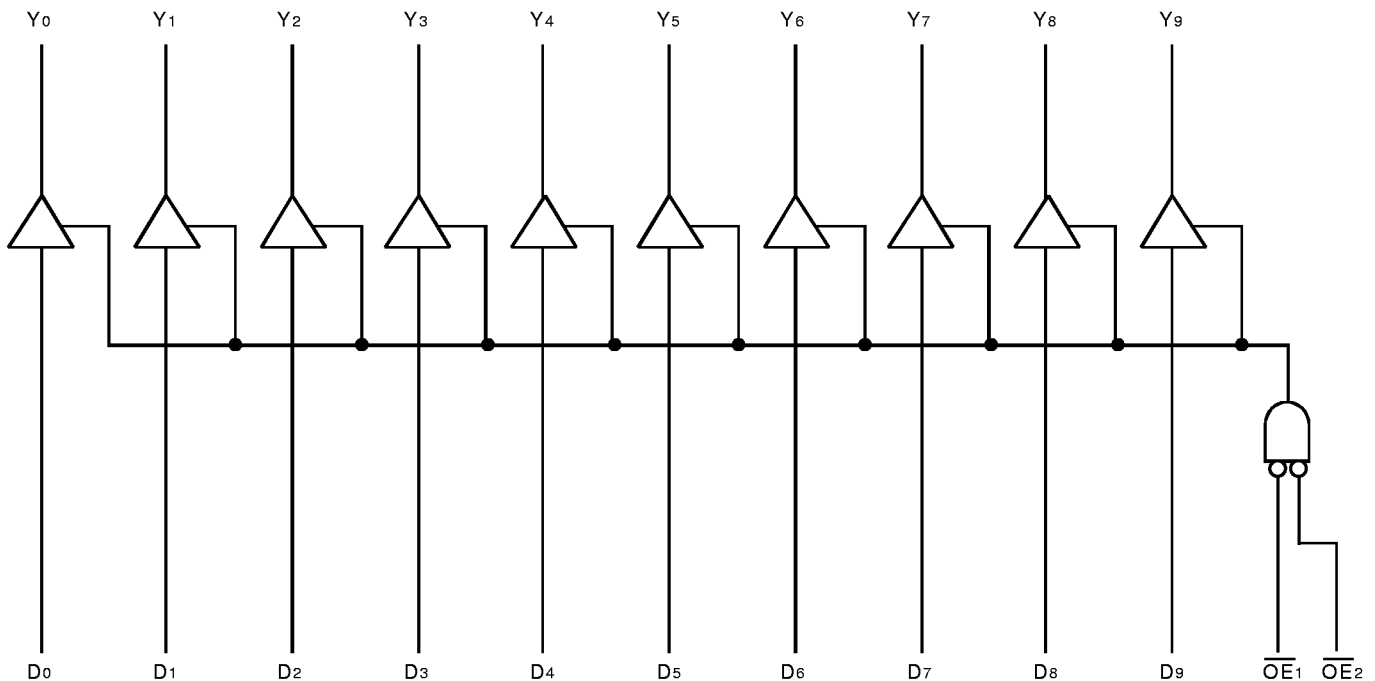
DESCRIPTION:

The FCT2827T 10-bit bus driver provides high-performance bus interface buffering for wide data/address paths or buses carrying parity. The 10-bit buffers have NAND-ed output enables for maximum control flexibility.

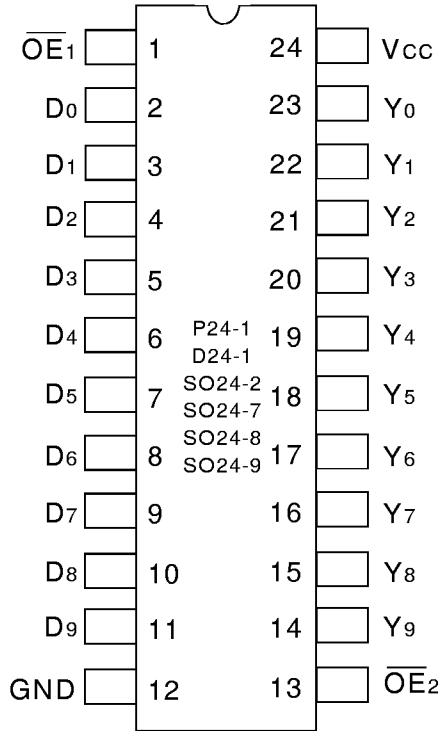
All of the FCT2827T high-performance interface family are designed for high-capacitance load drive capability, while providing low-capacitance bus loading at both inputs and outputs. All inputs have clamp diodes to ground and all outputs are designed for low-capacitance bus loading in high-impedance state.

The FCT2827T 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. FCT2827T parts are plug-in replacements for FCT827T parts.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



PDIP/ SOIC/ SSOP/ QSOP/ TSSOP
TOP VIEW

ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Rating	Max.	Unit
VTERM ⁽²⁾	Terminal Voltage with Respect to GND	-0.5 to +7	V
VTERM ⁽³⁾	Terminal Voltage with Respect to GND	-0.5 to V _{CC} +0.5	V
TSTG	Storage Temperature	-65 to +150	°C
I _{OUT}	DC Output Current	-65 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 V_{CC} by +0.5V unless otherwise noted.
- Inputs and V_{CC} terminals only.
- 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:

- This parameter is measured at characterization but not tested.

PIN DESCRIPTION

Name	I/O	Description
\overline{OE}_i	I	When both are LOW, the outputs are enabled. When either one or both are HIGH, the outputs are High Z.
D _i	I	10-bit data input.
Y _i	O	10-bit data output.

FUNCTION TABLE(1)

Inputs			Outputs	Function
\overline{OE}_1	\overline{OE}_2	D _i	Y _i	
L	L	L	L	Transparent
L	L	H	H	
H	X	X	Z	Three-State
X	H	X	Z	

NOTE:

- H = HIGH
L = LOW
X = Don't Care
Z = High-Impedance

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Commercial: $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$, $V_{CC} = 5.0\text{V} \pm 5\%$

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⁾	$V_{CC} = \text{Max.}$ $V_I = 2.7\text{V}$	—	—	± 1	μA
I_{IL}	Input LOW Current ⁽⁴⁾		$V_I = 0.5\text{V}$	—	—	± 1
I_{OZH}	High Impedance Output Current (3-State Output pins) ⁽⁴⁾	$V_{CC} = \text{Max.}$ $V_O = 2.7\text{V}$	—	—	± 1	μA
I_{OZL}			$V_O = 0.5\text{V}$	—	—	± 1
I_I	Input HIGH Current ⁽⁴⁾	$V_{CC} = \text{Max.}, V_I = V_{CC} (\text{Max.})$	—	—	± 1	μA
V_{IK}	Clamp Diode Voltage	$V_{CC} = \text{Min.}, I_{IN} = -18\text{mA}$	—	-0.7	-1.2	V
V_H	Input Hysteresis	—	—	200	—	mV
I_{CC}	Quiescent Power Supply Current	$V_{CC} = \text{Max.}, V_{IN} = \text{GND or } V_{CC}$	—	0.01	1	mA

OUTPUT DRIVE CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾	Min.	Typ. ⁽²⁾	Max.	Unit
I_{ODL}	Output LOW Current	$V_{CC} = 5\text{V}, V_{IN} = V_{IH} \text{ or } V_{IL}, V_{OUT} = 1.5\text{V}^{(3)}$	16	48	—	mA
I_{ODH}	Output HIGH Current	$V_{CC} = 5\text{V}, V_{IN} = V_{IH} \text{ or } V_{IL}, V_{OUT} = 1.5\text{V}^{(3)}$	-16	-48	—	mA
V_{OH}	Output HIGH Voltage	$V_{CC} = \text{Min.}$ $V_{IN} = V_{IH} \text{ or } V_{IL}$	2.4	3.3	—	V
V_{OL}	Output LOW Voltage	$V_{CC} = \text{Min.}$ $V_{IN} = V_{IH} \text{ or } V_{IL}$	—	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 $V_{CC} = 5.0\text{V}$, $+25^\circ\text{C}$ 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 $\pm 5\mu\text{A}$ at $T_A = -55^\circ\text{C}$.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾		Min.	Typ. ⁽²⁾	Max.	Unit
ΔI_{CC}	Quiescent Power Supply Current TTL Inputs HIGH	V _{CC} = Max. V _{IN} = 3.4V ⁽³⁾		—	0.5	2	mA
I _{CCD}	Dynamic Power Supply Current ⁽⁴⁾	V _{CC} = Max. Outputs Open $\overline{OE}_1 = \overline{OE}_2 = GND$ One Input 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 f _i = 10MHz 50% Duty Cycle $\overline{OE}_1 = \overline{OE}_2 = GND$ One Bit Toggling	V _{IN} = V _{CC} V _{IN} = GND	—	0.6	2.2	mA
			V _{IN} = 3.4V V _{IN} = GND	—	0.9	3.2	
		V _{CC} = Max. Outputs Open f _i = 2.5MHz 50% Duty Cycle $\overline{OE}_1 = \overline{OE}_2 = GND$ Eight Bits Toggling	V _{IN} = V _{CC} V _{IN} = GND	—	1.2	3.4 ⁽⁵⁾	
			V _{IN} = 3.4V V _{IN} = GND	—	3.2	11.4 ⁽⁵⁾	

NOTES:

- 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°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} = 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 Input Transition Pair (HLH or LHL)
 f_{CP} = Clock Frequency for Register Devices (Zero for Non-Register Devices)
 f_i = Input Frequency
 N_i = Number of Inputs at f_i
 All currents are in milliamps and all frequencies are in megahertz.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

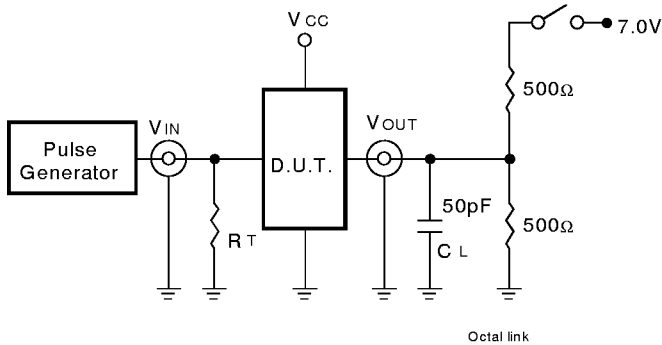
Symbol	Parameter	Condition ⁽¹⁾	FCT2827AT		FCT2827BT		FCT2827CT		Unit
			Min. ⁽²⁾	Max.	Min. ⁽²⁾	Max.	Min. ⁽²⁾	Max.	
tPLH tPHL	Propagation Delay Di to Yi	CL = 50pF RL = 500Ω	1.5	8	1.5	5	1.5	4.4	ns
		CL = 300pF ⁽³⁾ RL = 500Ω	1.5	15	1.5	13	1.5	10	ns
tPZH tPZL	Output Enable Time \overline{OE}_i to Yi	CL = 50pF RL = 500Ω	1.5	12	1.5	8	1.5	7	ns
		CL = 300pF ⁽³⁾ RL = 500Ω	1.5	23	1.5	15	1.5	14	ns
tPHZ tPLZ	Output Disable Time \overline{OE}_i to Yi	CL = 5pF ⁽³⁾ RL = 500Ω	1.5	9	1.5	6	1.5	5.7	ns
		CL = 50pF RL = 500Ω	1.5	10	1.5	7	1.5	6	ns

NOTES:

1. See test circuit and waveforms.
2. Minimum limits are guaranteed but not tested on Propagation Delays.
3. These parameters are guaranteed but not tested.

TEST CIRCUITS AND WAVEFORMS

TEST CIRCUITS FOR ALL OUTPUTS



SWITCH POSITION

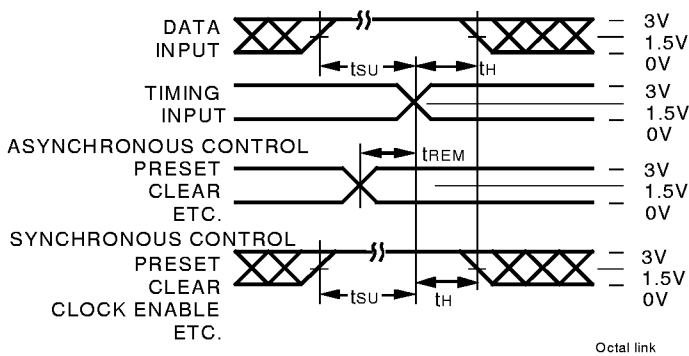
Test	Switch
Open Drain	Closed
Disable Low	
Enable Low	
All Other Tests	Open

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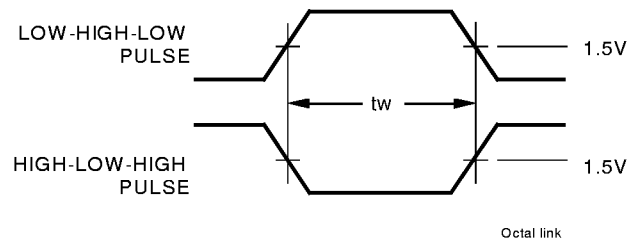
DEFINITIONS:

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

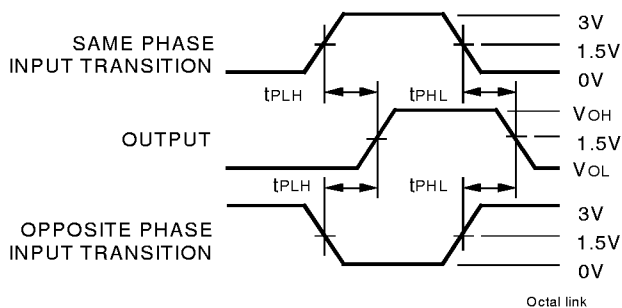
SET-UP, HOLD, AND RELEASE TIMES



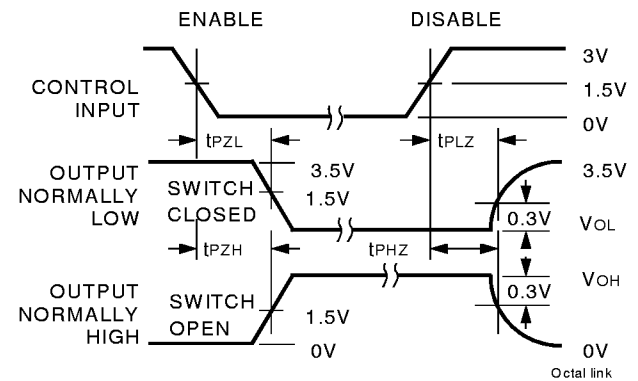
PULSE WIDTH



PROPAGATION DELAY



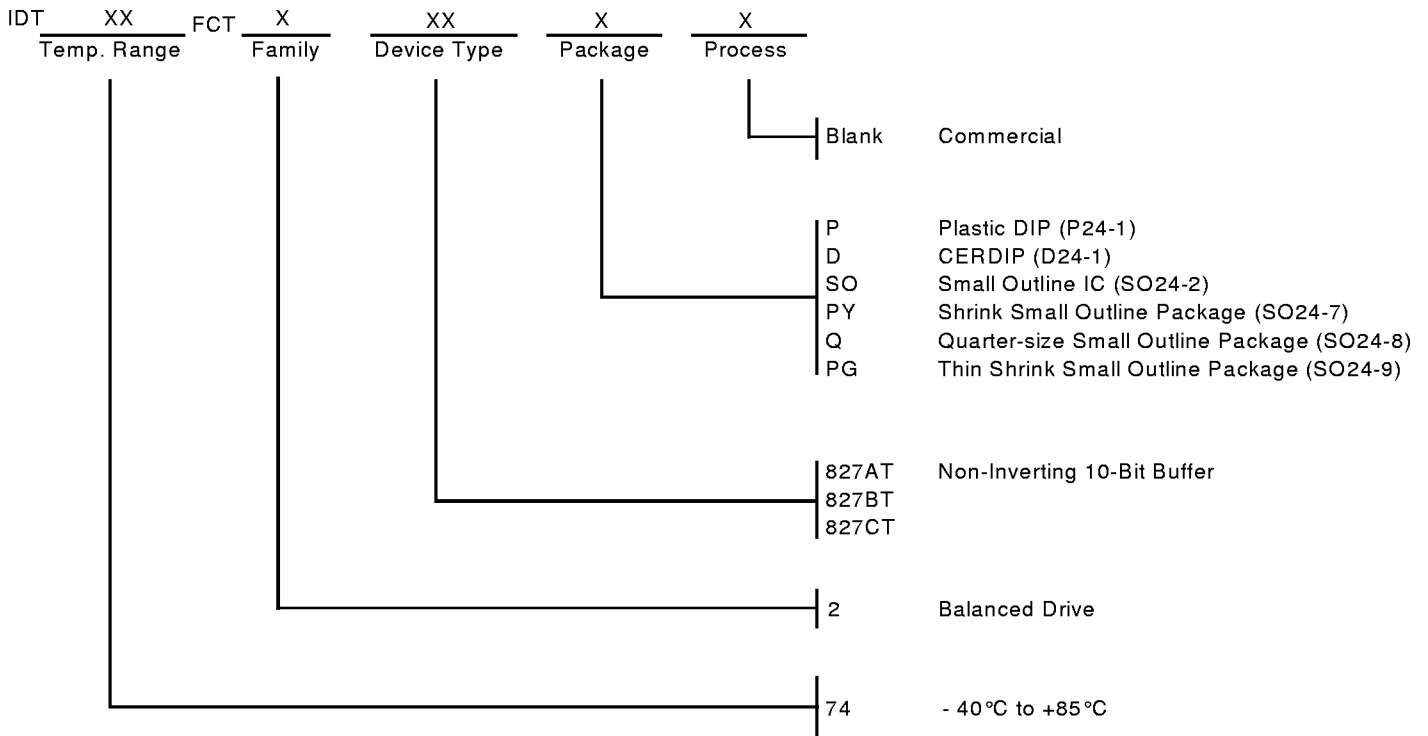
ENABLE AND DISABLE TIMES



NOTES:

- Diagram shown for input Control Enable-LOW and input Control Disable-HIGH
- Pulse Generator for All Pulses: Rate $\leq 1.0\text{MHz}$; $t_f \leq 2.5\text{ns}$; $t_r \leq 2.5\text{ns}$

ORDERING INFORMATION



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