CY54/74FCT827T

10-Bit Buffers

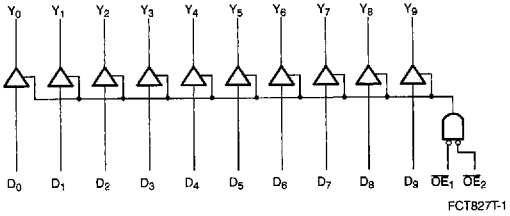
Features

- **Function, pinout and drive compatible with FCT, F, and AM29827 logic**
- **FCT-C speed at 4.4ns max. (Com'l) FCT-A speed at 5.0ns max. (Com'l)**
- **Reduced V_{OH} (typically = 3.3V) versions of equivalent FCT functions**
- **Edge-rate control circuitry for significantly improved noise characteristics**
- **Power-off disable feature**
- **ESD > 2000V**
- **Matched rise and fall times**
- **Fully compatible with TTL input and output logic levels**
- **Sink current** 64 mA (Com'l), 32 mA (Mil)
- **Source current** 32 mA (Com'l), 12 mA (Mil)

Functional Description

The FCT827T 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. The FCT827T is designed for high-capacitance load drive capability, while providing low-capacitance bus loading at both inputs and outputs. All outputs are designed for low-capacitance bus loading in the high-impedance state and are designed with a power-off disable feature to allow for live insertion of boards.

Logic Block Diagram



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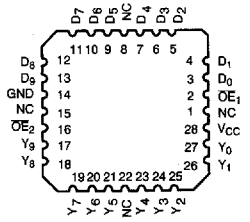
Pin Configurations

LCC/PLCC
Top View



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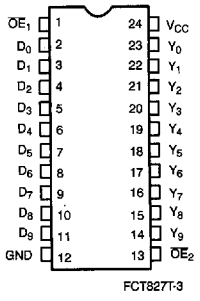
DIP
Top View



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Function Table[1]

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

Note:
1. H = HIGH Voltage Level. L = LOW Voltage Level. X = Don't Care.

Maximum Ratings[2, 3]

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature ..... −65°C to +150°C

Ambient Temperature with Power Applied ..... −65°C to +135°C

Supply Voltage to Ground Potential ..... −0.5V to +7.0V

DC Input Voltage ..... −0.5V to +7.0V

DC Output Voltage ..... −0.5V to +7.0V

DC Output Current (Maximum Sink Current/Pin) .... 120 mA

Power Dissipation 0.5W

Static Discharge Voltage ..... >2001V (per MIL-STD-883, Method 3015)

Operating Range

Range	Range	Ambient Temperature	V_{CC}
Commercial	CT	0°C to +70°C	5V ± 5%
Commercial	AT, BT	−40°C to +85°C	5V ± 5%
Military[4]	All	−55°C to +125°C	5V ± 10%

Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions		Min.	Typ.[5]	Max.	Unit
V_{OH}	Output HIGH Voltage	V_{CC}=Min., I_{OH}=−32 mA	Com'l	2.0			V
		V_{CC}=Min., I_{OH}=−15 mA	Com'l	2.4	3.3		V
		V_{CC}=Min., I_{OH}=−12 mA	Mil	2.4	3.3		V
V_{OL}	Output LOW Voltage	V_{CC}=Min., I_{OL}=64 mA	Com'l		0.3	0.55	V
		V_{CC}=Min., I_{OL}=32 mA	Mil		0.3	0.55	V
V_{IH}	Input HIGH Voltage			2.0			V
V_{IL}	Input LOW Voltage					0.8	V
V_H	Hysteresis[6]	All inputs			0.2		V
V_{IK}	Input Clamp Diode Voltage	V_{CC}=Min., I_{IN}=−18 mA			−0.7	−1.2	V
I_I	Input HIGH Current	V_{CC}=Max., V_{IN}=V_{CC}				5	µA
I_{IH}	Input HIGH Current	V_{CC}=Max., V_{IN}=2.7V				±1	µA
I_{IL}	Input LOW Current	V_{CC}=Max., V_{IN}=0.5V				±1	µA
I_{OZH}	Off State HIGH-Level Output Current	V_{CC} = Max., V_{OUT} = 2.7V				10	µA
I_{OZL}	Off State LOW-Level Output Current	V_{CC} = Max., V_{OUT} = 0.5V				−10	µA
I_{OS}	Output Short Circuit Current[7]	V_{CC}=Max., V_{OUT}=0.0V		−60	−120	−225	mA
I_{OFF}	Power-Off Disable	V_{CC}=0V, V_{OUT}=4.5V				±1	µA

Capacitance[6]

Parameter	Description	Typ.[5]	Max.	Unit
C_{IN}	Input Capacitance	5	10	pF
C_{OUT}	Output Capacitance	9	12	pF

Notes:

2. Unless otherwise noted, these limits are over the operating free-air temperature range.
3. Unused inputs must always be connected to an appropriate logic voltage level, preferably either V_{CC} or ground.
4. T_A is the "instant on" case temperature.
5. Typical values are at V_{CC}=5.0V, T_A=+25°C ambient.
6. This parameter is guaranteed but not tested.
7. Not more than one output should be shorted at a time. Duration of short should not exceed one second. The use of high-speed test apparatus and/or sample and hold techniques are preferable in order to minimize internal chip heating and more accurately reflect operational values. Otherwise prolonged shorting of a high output may raise the chip temperature well above normal and thereby cause invalid readings in other parametric tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

Power Supply Characteristics

Parameter	Description	Test Conditions	Typ.[5]	Max.	Unit
I_{CC}	Quiescent Power Supply Current	V_{CC}=Max., $V_{IN} \le 0.2V$, $V_{IN} \ge V_{CC}-0.2V$	0.1	0.2	mA
ΔI_{CC}	Quiescent Power Supply Current (TTL inputs HIGH)	V_{CC}=Max., V_{IN}=3.4V,[8] f_1=0, Outputs Open	0.5	2.0	mA
I_{CCD}	Dynamic Power Supply Current[9]	V_{CC}=Max., One Input Toggling, 50% Duty Cycle, Outputs Open, $\overline{OE}_1$ or $\overline{OE}_2$=GND, $V_{IN} \le 0.2V$ or $V_{IN} \ge V_{CC}-0.2V$	0.06	0.12	mA/ MHz
I_C	Total Power Supply Current[10]	V_{CC}=Max., 50% Duty Cycle, Outputs Open, One Bit Toggling at f_1=10 MHz, $\overline{OE}_1$ or $\overline{OE}_2$=GND, $V_{IN} \le 0.2V$ or $V_{IN} \ge V_{CC}-0.2V$	0.7	1.4	mA
		V_{CC}=Max., 50% Duty Cycle, Outputs Open, One Bit Toggling at f_1=10 MHz, $\overline{OE}_1$ or $\overline{OE}_2$=GND, V_{IN}=3.4V or V_{IN}=GND	1.0	2.4	mA
		V_{CC}=Max., 50% Duty Cycle, Outputs Open, Ten Bits Toggling at f_1=2.5 MHz, $\overline{OE}_1$ or $\overline{OE}_2$=GND, $V_{IN} \le 0.2V$ or $V_{IN} \ge V_{CC}-0.2V$	1.6	3.2[11]	mA
		V_{CC}=Max., 50% Duty Cycle, Outputs Open, Ten Bits Toggling at f_1=2.5 MHz, $\overline{OE}_1$ or $\overline{OE}_2$=GND, V_{IN}=3.4V or V_{IN}=GND	4.1	13.2[11]	mA

Notes:

8. Per TTL driven input (V_{IN}=3.4V); all other inputs at V_{CC} or GND.
9. This parameter is not directly testable, but is derived for use in Total Power Supply calculations.
10. I_C = $I_{QUIESCENT}$ + I_{INPUTS} + $I_{DYNAMIC}$
    I_C = $I_{CC}+\Delta I_{CC}D_HN_T+I_{CCD}(f_0/2 + f_1N_1)$
    I_{CC} = Quiescent Current with CMOS input levels
    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_0 = Clock frequency for registered devices, otherwise zero
    f_1 = Input signal frequency
    N_1 = Number of inputs changing at f_1
    All currents are in milliamps and all frequencies are in megahertz.
11. Values for these conditions are examples of the I_{CC} formula. These limits are guaranteed but not tested.

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Switching Characteristics Over the Operating Range[12]

Parameter	Description	Test Load	FCT827AT				FCT827BT				Unit	Fig. No.[13]
			Military		Commercial		Military		Commercial			
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
t_{PLH} t_{PHL}	Propagation Delay D to Y	C_L=50 pF R_L=500Ω	1.5	9.0	1.5	8.0	1.5	6.5	1.5	5.0	ns	1, 3
t_{PLH} t_{PHL}	Propagation Delay D to Y[6]	C_L=300 pF R_L=500Ω	1.5	17.0	1.5	15.0	1.5	14.0	1.5	13.0	ns	1, 3
t_{PZH} t_{PZL}	Output Enable Time $\overline{OE}$ to Y	C_L=50 pF R_L=500Ω	1.5	13.0	1.5	12.0	1.5	9.0	1.5	8.0	ns	1, 7, 8
t_{PZH} t_{PZL}	Output Enable Time $\overline{OE}$ to Y[6]	C_L=300 pF R_L=500Ω	1.5	25.0	1.5	23.0	1.5	16.0	1.5	15.0	ns	1, 7, 8
t_{PHZ} t_{PHL}	Output Disable Time- $\overline{OE}$ to Y[6]	C_L=5 pF R_L=500Ω	1.5	9.0	1.5	9.0	1.5	7.0	1.5	6.0	ns	1, 7, 8
t_{PHZ} t_{PHL}	Output Disable Time $\overline{OE}$ to Y	C_L=50 pF R_L=500Ω	1.5	10.0	1.5	10.0	1.5	8.0	1.5	7.0	ns	1, 7, 8

Parameter	Description	Test Load	FCT827CT				Unit	Fig. No.[13]
			Military		Commercial			
			Min.	Max.	Min.	Max.		
t_{PLH} t_{PHL}	Propagation Delay D to Y	C_L=50 pF R_L=500Ω	1.5	5.0	1.5	4.4	ns	1, 3
t_{PLH} t_{PHL}	Propagation Delay D to Y[6]	C_L=300 pF R_L=500Ω	1.5	11.0	1.5	10.0	ns	1, 3
t_{PZH} t_{PZL}	Output Enable Time $\overline{OE}$ to Y	C_L=50 pF R_L=500Ω	1.5	8.0	1.5	7.0	ns	1, 7, 8
t_{PZH} t_{PZL}	Output Enable Time $\overline{OE}$ to Y[6]	C_L=300 pF R_L=500Ω	1.5	15.0	1.5	14.0	ns	1, 7, 8
t_{PHZ} t_{PHL}	Output Disable Time $\overline{OE}$ to Y[6]	C_L=5 pF R_L=500Ω	1.5	6.7	1.5	5.7	ns	1, 7, 8
t_{PHZ} t_{PHL}	Output Disable Time $\overline{OE}$ to Y	C_L=50 pF R_L=500Ω	1.5	7.0	1.5	6.0	ns	1, 7, 8

Notes:
12. Minimum limits are guaranteed but not tested on Propagation Delays.
13. See "Parameter Measurement Information" in the General Information Section.

Ordering Information

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
4.4	CY74FCT827CTPC	P13/13A	24-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT827CTQC	Q13	24-Lead (150-Mil) QSOP	
	CY74FCT827CTSOC	S13	24-Lead (300-Mil) Molded SOIC	
5.0	CY74FCT827BTPC	P13/13A	24-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT827BTQC	Q13	24-Lead (150-Mil) QSOP	
	CY74FCT827BTSOC	S13	24-Lead (300-Mil) Molded SOIC	
5.0	CY54FCT827CTDMB	D14	24-Lead (300-Mil) CerDIP	Military
	CY54FCT827CTLMB	L64	28-Square Leadless Chip Carrier	
6.5	CY54FCT827BTDMB	D14	24-Lead (300-Mil) CerDIP	Military
	CY54FCT827BTLMB	L64	28-Square Leadless Chip Carrier	
8.0	CY74FCT827ATPC	P13/13A	24-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT827ATQC	Q13	24-Lead (150-Mil) QSOP	
	CY74FCT827ATSOC	S13	24-Lead (300-Mil) Molded SOIC	
9.0	CY54FCT827ATDMB	D14	24-Lead (300-Mil) CerDIP	Military
	CY54FCT827ATLMB	L64	28-Square Leadless Chip Carrier	

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