



SCCS045 - May 1994 - Revised March 2000

CY74FCT2827T

10-Bit Buffer

Features

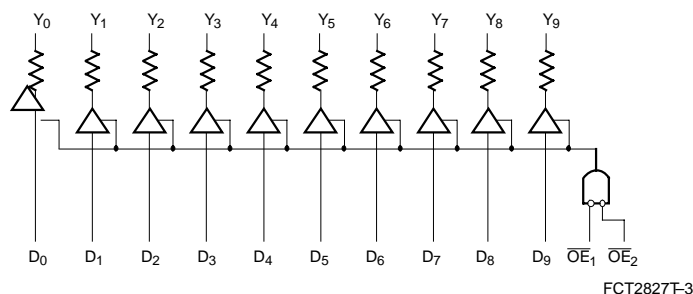
- Function and pinout compatible with FCT, F, and AM29827 logic
- FCT-C speed at 5.0 ns max. (Com'l), FCT-A speed at 8.0 ns max. (Com'l)
- 25Ω output series resistors to reduce transmission line reflection noise
- Reduced V_{OH} (typically = 3.3V) versions of equivalent FCT functions
- Edge-rate control 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
- Extended commercial temp. range of -40°C to $+85^{\circ}\text{C}$
- Sink current 12 mA
- Source current 15 mA

Functional Description

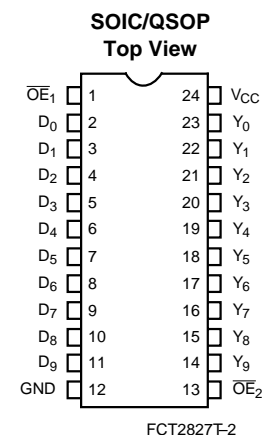
The FCT2827T 10-bit bus driver provides high-performance bus interface buffering for wide data/address paths or buses carrying parity. This 10-bit buffer has NAND-ed output enables for maximum control flexibility. The FCT2827T is designed for high-capacitance load drive capability, while providing low-capacitance bus loading at both inputs and outputs. All inputs have clamp diodes and all outputs are designed for low-capacitance bus loading in the high impedance state. On-chip termination resistors have been added to the outputs to reduce system noise caused by reflections. The FCT2827T can be used to replace the FCT827T to reduce noise in an existing design.

The outputs are designed with a power-off disable feature to allow for live insertion of boards.

Logic Block Diagram



Pin Configurations



Function Table^[1]

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

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	Ambient Temperature	V _{CC}
Commercial	–40°C to +85°C	5V ± 5%

Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions	Min.	Typ. ^[4]	Max.	Unit
V _{OH}	Output HIGH Voltage	V _{CC} = Min., I _{OH} = –15 mA	2.4	3.3		V
V _{OL}	Output LOW Voltage	V _{CC} = Min., I _{OL} = 12 mA		0.3	0.55	V
R _{OUT}	Output Resistance	V _{CC} = Min., I _{OL} = 12 mA	20	25	40	Ω
V _{IH}	Input HIGH Voltage		2.0			V
V _{IL}	Input LOW Voltage				0.8	V
V _H	Hysteresis ^[5]	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 ^[6]	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^[5]

Parameter	Description	Typ. ^[4]	Max.	Unit
C _{IN}	Input Capacitance	5	10	pF
C _{OUT}	Output Capacitance	9	12	pF

Notes:

- Unless otherwise noted, these limits are over the operating free-air temperature range.
- Unused inputs must always be connected to an appropriate logic voltage level, preferably either V_{CC} or ground.
- Typical values are at V_{CC}=5.0V, T_A=+25°C ambient.
- This parameter is specified but not tested.
- 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. ^[4]	Max.	Unit
I_{CC}	Quiescent Power Supply Current	$V_{CC}=\text{Max.}, V_{IN} \leq 0.2V,$ $V_{IN} \geq V_{CC}-0.2V$	0.1	0.2	mA
ΔI_{CC}	Quiescent Power Supply Current (TTL inputs HIGH)	$V_{CC}=\text{Max.}, V_{IN}=3.4V,$ ^[7] $f_1=0$, Outputs Open	0.5	2.0	mA
I_{CCD}	Dynamic Power Supply Current ^[8]	$V_{CC}=\text{Max.}$, One Input Toggling, 50% Duty Cycle, Outputs Open, \overline{OE}_1 or $\overline{OE}_2=\text{GND}$, $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC}-0.2V$	0.06	0.12	mA/ MHz
I_C	Total Power Supply Current ^[9]	$V_{CC}=\text{Max.}$, 50% Duty Cycle, Outputs Open, One Bit Toggling at $f_1=10$ MHz, \overline{OE}_1 or $\overline{OE}_2=\text{GND}$, $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC}-0.2V$	0.7	1.4	mA
		$V_{CC}=\text{Max.}$, 50% Duty Cycle, Outputs Open, One Bit Toggling at $f_1=10$ MHz, \overline{OE}_1 or $\overline{OE}_2=\text{GND}$, $V_{IN}=3.4V$ or $V_{IN}=\text{GND}$	1.0	2.4	mA
		$V_{CC}=\text{Max.}$, 50% Duty Cycle, Outputs Open, Ten Bits Toggling at $f_1=2.5$ MHz, \overline{OE}_1 or $\overline{OE}_2=\text{GND}$, $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC}-0.2V$	1.6	3.2 ^[10]	mA
		$V_{CC}=\text{Max.}$, 50% Duty Cycle, Outputs Open, Ten Bits Toggling at $f_1=2.5$ MHz, \overline{OE}_1 or $\overline{OE}_2=\text{GND}$, $V_{IN}=3.4V$ or $V_{IN}=\text{GND}$	4.1	13.2 ^[10]	mA

Notes:

7. Per TTL driven input ($V_{IN}=3.4V$); all other inputs at V_{CC} or GND.
8. This parameter is not directly testable, but is derived for use in Total Power Supply calculations.
9. $I_C = I_{\text{QUIESCENT}} + I_{\text{INPUTS}} + I_{\text{DYNAMIC}}$
 $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_0/2 + f_1 N_1)$
 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.
10. Values for these conditions are examples of the I_{CC} formula. These limits are specified but not tested.

Switching Characteristics Over the Operating Range^[11]

Param.	Description	Test Load	CY74FCT2827AT		CY74FCT2827CT		Unit	Fig. No. ^[12]
			Min.	Max.	Min.	Max.		
t _{PLH} t _{PHL}	Propagation Delay D to Y	C _L =50 pF R _L =500Ω	1.5	8.0	1.5	4.4	ns	1, 3
t _{PLH} t _{PHL}	Propagation Delay D to Y ^[5]	C _L =300 pF R _L =500Ω	1.5	15.0	1.5	10.0	ns	1, 3
t _{PZH} t _{PZL}	Output Enable Time $\overline{\text{OE}}$ to Y	C _L =50 pF R _L =500Ω	1.5	12.0	1.5	7.0	ns	1, 7, 8
t _{PZH} t _{PZL}	Output Enable Time $\overline{\text{OE}}$ to Y ^[5]	C _L =300 pF R _L =500Ω	1.5	23.0	1.5	14.0	ns	1, 7, 8
t _{PHZ} t _{PHL}	Output Disable Time $\overline{\text{OE}}$ to Y ^[5]	C _L =5 pF R _L =500Ω	1.5	9.0	1.5	5.7	ns	1, 7, 8
t _{PHZ} t _{PHL}	Output Disable Time $\overline{\text{OE}}$ to Y	C _L =50 pF R _L =500Ω	1.5	9.0	1.5	6.0	ns	1, 7, 8

Ordering Information

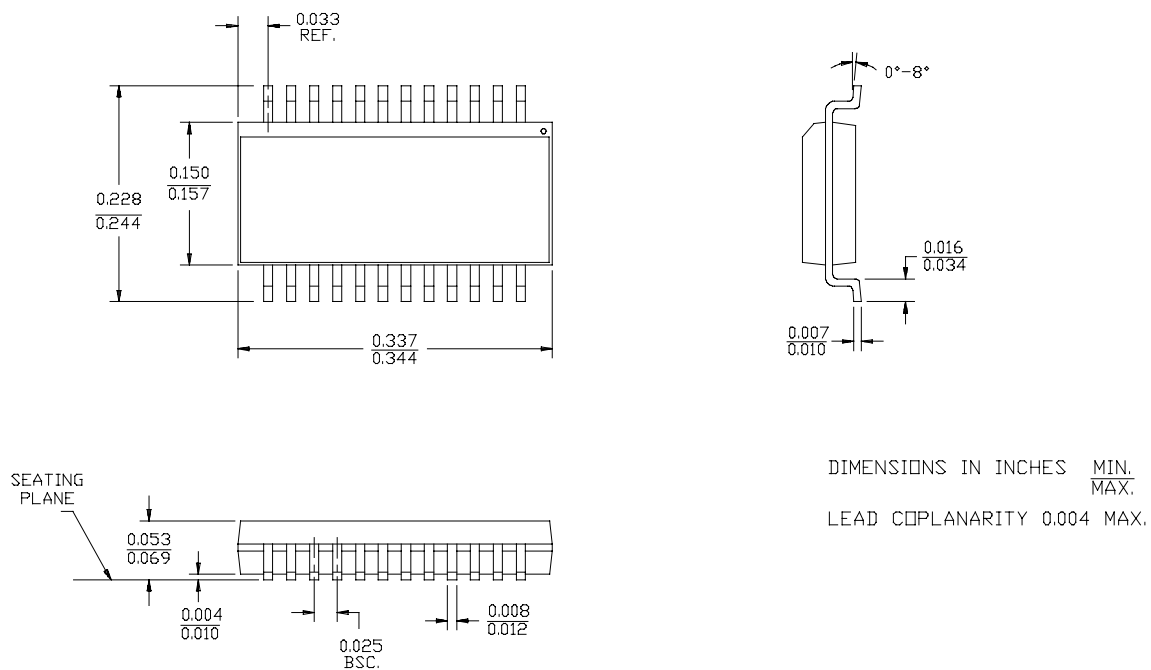
Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
4.4	CY74FCT2827CTQCT	Q13	24-Lead (150-Mil) QSOP	Commercial
8.0	CY74FCT2827ATQCT	Q13	24-Lead (150-Mil) QSOP	Commercial

Note:

11. Minimum limits are specified but not tested on Propagation Delays.

12. See "Parameter Measurement Information" in the General Information section.

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Package Diagram
24-Lead Quarter Size Outline Q13


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