T-52-01

National Semiconductor

74FCT827B
10-Bit Buffer/Line Driver with TRI-STATE® Outputs

General Description

The 'FCT827B 10-bit bus buffer provides high performance bus interface buffering for wide data/address paths or buses carrying parity. The 10-bit buffers have NOR output enables for maximum control flexibility.

FACT™ FCTB utilizes NSC Quiet Series™ technology to provide improved quiet output switching and dynamic threshold performance.

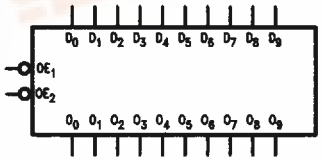
FACT FCTB features an undershoot corrector in addition to a split ground bus for superior performance.

Features

- NSC 74FCT827B is pin and functionally equivalent to IDT 74FCT827B
- High Speed parallel registers with positive edge-triggered D-type flip-flops
- Input clamp diodes to limit bus reflections
- TTL/CMOS input and output level compatible
- I_{OL} = 48 mA
- CMOS power levels
- 4 kV minimum ESD immunity

Ordering Code: See Section 8

Logic Symbols



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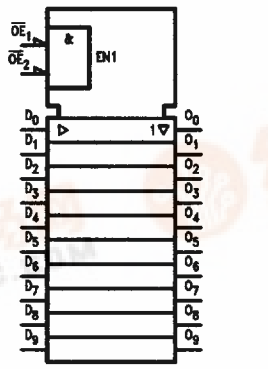
IEEE/IEC

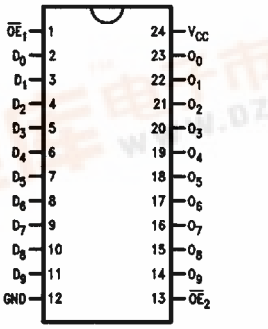


TL/F/10680–2

Pin Names	Description
$\overline{OE}_1$, $\overline{OE}_2$	Output Enable
D_0–D_9	Data Inputs
O_0–O_9	Data Outputs

Connection Diagram

Pin Assignment for DIP and SOIC



TL/F/10680–3

Absolute Maximum Ratings (Note 1)

Terminal Voltage with Respect to GND (V_{TERM})
74FCTB −0.5V to +7.0V

Temperature under Bias (T_{BIAS})
74FCTB −55°C to +125°C

Storage Temperature (T_{STG})
74FCTB −55°C to +125°C

Power Dissipation (P_T) 0.5W

DC Output Current (I_{OUT}) 120 mA

Note 1: Absolute maximum ratings are those values beyond which damage to the device may occur. Exposure to absolute maximum rating conditions for extended periods may affect reliability. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables.

Recommended Operating Conditions

Supply Voltage (V_{CC})
74FCTB 4.75V to 5.25V

Input Voltage 0V to V_{CC}

Output Voltage 0V to V_{CC}

Operating Temperature (T_A)
74FCTB 0°C to +70°C

Junction Temperature (T_J)
PDIP 140°C

Note: All commercial packaging is not recommended for applications requiring greater than 2000 temperature cycles from −40°C to +125°C.

DC Characteristics for 'FCTB Family Devices

Typical values are at V_{CC} = 5.0V, 25°C ambient and maximum loading. For test conditions shown as Max, use the value specified for the appropriate device type: V_{CC} = 5.0V ±5%, T_A = 0°C to +70°C; $V_{HC} = V_{CC} - 0.2V$

Symbol	Parameter	74FCTB			Units	Conditions	
		Min	Typ	Max			
V_{IH}	Minimum High Level Input Voltage	2.0			V		
V_{IL}	Maximum Low Level Input Voltage			0.8	V		
I_{IH}	Input High Current			5.0 5.0	μA	V_{CC} = Max	$V_I = V_{CC}$ V_I = 2.7V (Note 2)
I_{IL}	Input Low Current			−5.0 −5.0	μA	V_{CC} = Max	V_I = 0.5V (Note 2) V_I = GND
I_{OZ}	Maximum TRI-STATE Current			10.0 10.0 −10.0 −10.0	μA	V_{CC} = Max	$V_O = V_{CC}$ V_O = 2.7V (Note 2) V_O = 0.5V (Note 2) V_O = GND
V_{IK}	Clamp Diode Voltage		−0.7	−1.2	V	V_{CC} = Min; I_{IN} = −18 mA	
I_{OS}	Short Circuit Current	−75	−120		mA	V_{CC} = Max (Note 1); V_O = GND	
V_{OH}	Minimum High Level Output Voltage	2.9	3.0		V	V_{CC} = 3V; V_{IN} = 0.2V or V_{HC}; I_{OH} = −32 μA	
		V_{HC} 2.4	V_{CC} 4.3			V_{CC} = Min $V_{IN} = V_{IH}$ or V_{IL}	I_{OH} = −300 μA I_{OH} = −24 mA
V_{OL}	Maximum Low Level Output Voltage		GND	0.2	V	V_{CC} = 3V; V_{IN} = 0.2V or V_{HC}; I_{OL} = 300 μA	
			GND 0.3	0.2 0.5		V_{CC} = Min $V_{IN} = V_{IH}$ or V_{IL}	I_{OL} = 300 μA I_{OH} = 48 mA
I_{CC}	Maximum Quiescent Supply Current		0.2	1.5	mA	V_{CC} = Max; $V_{IN} \geq V_{HC}$; $V_{IN} \leq 0.2V$; $f_I = 0$	
ΔI_{CC}	Quiescent Supply Current TTL Input HIGH		0.5	2.0	mA	V_{CC} = Max V_{IN} = 3.4V (Note 3)	
I_{CCD}	Dynamic Power Supply Current (Note 4)		0.15	0.5	mA/MHz	V_{CC} = Max Outputs Open $\overline{OE}_1 = \overline{OE}_2$ = GND One Input Toggling 50% Duty Cycle	$V_{IN} \geq V_{HC}$ $V_{IN} \leq 0.2V$

DC Characteristics for 'FCTB Family Devices (Continued)

Typical values are at V_{CC} = 5.0V, 25°C ambient and maximum loading. For test conditions shown as Max, use the value specified for the appropriate device type: V_{CC} = 5.0V ±5%, T_A = 0°C to +70°C; V_{HC} = V_{CC} − 0.2V

Symbol	Parameter	74FCTB Min	74FCTB Typ	74FCTB Max	Units	Conditions	
I_C	Total Power Supply Current (Note 6)			5.5	mA	V_{CC} = Max Outputs Open $\overline{OE}_1$ = $\overline{OE}_2$ = GND f_i = 10 MHz One Bit Toggling 50% Duty Cycle	$V_{IN} \geq V_{HC}$ $V_{IN} \leq 0.2V$
				6.0			V_{IN} = 3.4V V_{IN} = GND
				9.5		(Note 5) V_{CC} = Max Outputs Open $\overline{OE}_1$ = $\overline{OE}_2$ = GND f_i = 2.5 MHz Eight Bits Toggling 50% Duty Cycle	$V_{IN} \geq V_{HC}$ $V_{IN} \leq 0.2V$
				14.5			V_{IN} = 3.4V V_{IN} = GND

Note 1: Maximum test duration not to exceed one second, not more than one output shorted at a time.

Note 2: This parameter is guaranteed but not tested.

Note 3: Per TTL driven input (V_{IN} = 3.4V); all other inputs at V_{CC} or GND.

Note 4: This parameter is not directly testable, but is derived for use in Total Power Consumption Supply calculations.

Note 5: Values for these conditions are examples of the I_{CC} formula. These limits are guaranteed but not tested.

Note 6: $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
$I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_{CP}/2 + f_i N_i)$
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 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 mA and all frequencies are in MHz.

AC Electrical Characteristics: See Section 2 for Waveforms

Symbol	Parameter	Conditions	74FCTB T_A, V_{CC} = Com Min	74FCTB T_A, V_{CC} = Com Max	Units	Fig. No.
t_{PLH} t_{PHL}	Propagation Delay D_n to O_n	C_L = 50 pF R_L = 500Ω		5.0	ns	2-9
		C_L = 300 pF(1) R_L = 500Ω		13.0	ns	2-9
t_{PZH} t_{PZL}	Output Enable Time $\overline{OE}$ to D_n	C_L = 50 pF R_L = 500Ω		8.0	ns	2-11
		C_L = 300 pF(1) R_L = 500Ω		15.0	ns	2-11
t_{PHZ} t_{PLZ}	Output Disable Time $\overline{OE}$ to D_n	C_L = 5 pF(1) R_L = 500Ω		6.0	ns	2-11
		C_L = 50 pF(1) R_L = 500Ω		7.0	ns	2-11

Note 1: This parameter is guaranteed but not tested.

Capacitance T_A = +25°C, f = 1.0 MHz

Symbol	Parameter (Note 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