

FEATURES/BENEFITS

- Pin and function compatible to the 74F827/8 74FCT827/8 and 74FCT827T/8T
- Industrial temperature -40°C to 85°C
- CMOS power levels: $<7.5\text{mW}$ static
- Available in DIP, SOIC, QSOP, ZIP, HQSOP
- Undershoot clamp diodes on all inputs
- TTL-compatible input and output levels
- Ground bounce controlled outputs
- Reduced output swing of 0-3.5V
- Military product compliant to MIL-STD-883, Class B

FCT-T 827T, 828T

- JEDEC-FCT spec compatible
- A, B, and C speed grades with 4.4ns t_{PD} for C
- $I_{OL} = 48\text{mA}$ Ind., 32mA Mil.

FCT-T 2827T, 2828T

- Built-in 25Ω series resistor outputs reduce reflection and other system noise
- A, B, and C speed grades with 4.4ns t_{PD} for C
- $I_{OL} = 12\text{mA}$ Ind.

DESCRIPTION

The QSFCT827T/828T and QSFCT2827T/2828T are 10-bit buffers with three-state outputs that are ideal for driving high-capacitance loads as in memory address and data buses. The 2827/8 are 25Ω resistor output versions useful for driving transmission lines and reducing system noise. The 2827/8 series parts can replace the 827/8 series to reduce noise in an existing design. All inputs have clamp diodes for undershoot noise suppression. All outputs have ground bounce suppression (see QSI Application Note AN-001), and outputs will not load an active bus when V_{CC} is removed from the device.

Figure 1. Functional Block Diagram

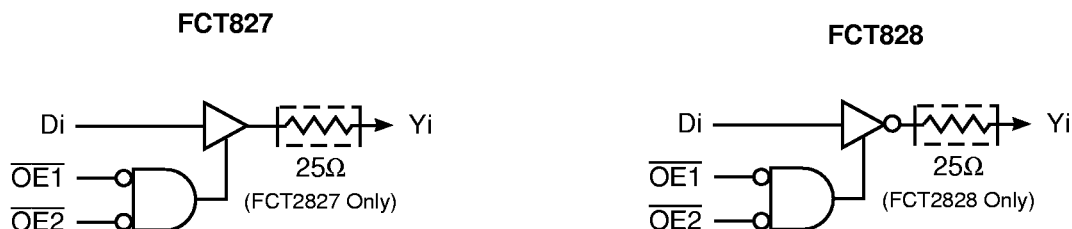


Figure 2. Pin Configurations (All Pins Top View)

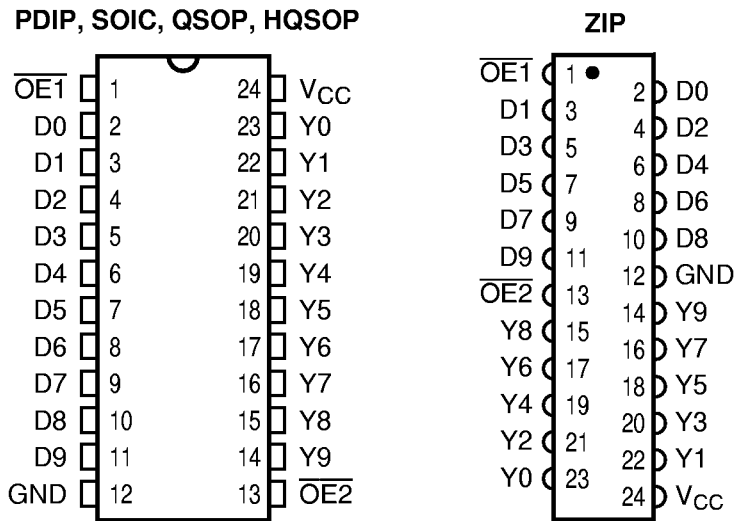


Table 1. Pin Description

| Name | I/O | Description |
|------------------|-----|----------------|
| D9-D0 | I | Data Inputs |
| Y9-Y0 | O | Data Outputs |
| \overline{OEi} | I | Output Enables |

Table 2. Function Table

| $\overline{OE1}$ | Inputs | | Outputs | | Function |
|------------------|------------------|-------|--------------------|-------------------------------|----------------|
| | $\overline{OE2}$ | D_i | 827, 2827 Y_i | 828, 2828 \overline{Y}_i | |
| L | L | L | L | H | Enabled |
| L | L | H | H | L | Enabled |
| H | — | — | Hi-Z | Hi-Z | High Impedance |
| — | H | — | Hi-Z | Hi-Z | High Impedance |

Table 3. Absolute Maximum Ratings

| | |
|---|---------------|
| Supply Voltage to Ground | -0.5V to 7.0V |
| DC Output Voltage V_{OUT} | -0.5V to 7.0V |
| DC Input Voltage V_{IN} | -0.5V to 7.0V |
| AC Input Voltage (for a pulse width ≤ 20 ns) | -3.0V |
| DC Input Diode Current with $V_{IN} < 0$ | -20mA |
| DC Output Diode Current with $V_{OUT} < 0$ | -50mA |
| DC Output Current Max. Sink Current/Pin | 120mA |
| Maximum Power Dissipation | 0.5 watts |
| T_{STG} Storage Temperature | -65° to 150°C |

Note: Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to QSI devices that result in functional or reliability type failures.

Table 4. Capacitance⁽¹⁾

$T_A = 25^\circ\text{C}$, $f = 1\text{MHz}$, $V_{IN} = 0\text{V}$, $V_{OUT} = 0\text{V}$

| Pins ⁽²⁾ | SOIC | QSOP | PDIP | ZIP | Unit |
|---------------------|------|------|------|-----|------|
| 1-11, 13-23 | 8 | 8 | 9 | 10 | pF |

Notes:

1. Capacitance is characterized but not tested.
2. Pin reference for 24-pin package.

Table 5. Power Supply Characteristics

| Symbol | Parameter | Test Conditions ⁽¹⁾ | Min | Max | Unit |
|-----------------|-------------------------------------|--|-----|------|------------|
| I_{CC} | Quiescent Power Supply Current | $V_{CC} = \text{Max.}$, freq = 0 $0\text{V} \leq V_{IN} \leq 0.2\text{V}$ or $V_{CC}-0.2\text{V} \leq V_{IN} \leq V_{CC}$ | — | 1.5 | mA |
| ΔI_{CC} | Supply Current per Input @ TTL HIGH | $V_{CC} = \text{Max.}$, $V_{IN} = 3.4\text{V}$, freq = 0 ⁽²⁾ | — | 2.0 | mA |
| Q_{CCD} | Supply Current per Input per MHz | $V_{CC} = \text{Max.}$, Outputs open and enabled One bit toggling @ 50% duty cycle Other inputs at GND or V_{CC} ^(3,4) | — | 0.25 | mA/ MHz |

Notes:

1. For conditions shown as Min. or Max., use the appropriate values specified under DC specifications.
2. Per TTL driven input ($V_{IN} = 3.4\text{V}$).
3. For flip-flops, Q_{CCD} is measured by switching one of the data input pins so that the output changes every clock cycle. This is a measurement of device power consumption only and does not include power to drive load capacitance or tester capacitance. This parameter is guaranteed by design but not tested.
4. I_C can be computed using the above parameters as explained in the Technical Overview section.

Table 6. DC Electrical Characteristics Over Operating Range

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

Military $T_A = -55^\circ\text{C}$ to 125°C , $V_{CC} = 5.0\text{V} \pm 10\%$

| Symbol | Parameter | Test Conditions | Min | Typ ⁽¹⁾ | Max | Unit |
|--------------------------|--|--|------------|--------------------|--------------|---------------|
| V_{IH} | Input HIGH Voltage | Logic HIGH for All Inputs | 2.0 | — | — | V |
| V_{IL} | Input LOW Voltage | Logic LOW for All Inputs | — | — | 0.8 | V |
| ΔV_T | Input Hysteresis | $V_{TLH} - V_{THL}$ for All Inputs | — | 0.2 | — | V |
| $ I_{IH} $ $ I_{IL} $ | Input Current Input HIGH or LOW | $V_{CC} = \text{Max.}, 0 \leq V_{IN} < V_{CC}$ | — | — | 5 | μA |
| $ I_{OZ} $ | Off-State Output Current (Hi-Z) | $V_{CC} = \text{Max.}, 0 \leq V_{IN} \leq V_{CC}$ | — | — | 5 | μA |
| I_{OS} | Short Circuit Current (FCTXXX) | $V_{CC} = \text{Max.}, V_{OUT} = \text{GND}^{(2,3)}$ | -60 | — | — | mA |
| I_{OR} | Current Drive (FCT2XXX) | $V_{CC} = \text{Max.}, V_{OUT} = 2.0\text{V}^{(3)}$ | 50 | — | — | mA |
| V_{IC} | Input Clamp Voltage | $V_{CC} = \text{Min.}, I_{IN} = -18\text{mA}, T_A = 25^\circ\text{C}^{(3)}$ | — | -0.7 | -1.2 | V |
| V_{OH} | Output HIGH Voltage | $V_{CC} = \text{Min.}$ $I_{OH} = -12\text{mA}$ (MIL) $I_{OH} = -15\text{mA}$ (IND) | 2.4 2.4 | — — | — — | V |
| V_{OL} | Output LOW Voltage (FCTXXX) | $V_{CC} = \text{Min.}$ $I_{OL} = 32\text{mA}$ (MIL) $I_{OL} = 48\text{mA}$ (IND) | — — | — — | 0.50 0.50 | V |
| V_{OL} | Output LOW Voltage (FCT2XXX- 25 Ω) | $V_{CC} = \text{Min.}$ $I_{OL} = 12\text{mA}$ (MIL) $I_{OL} = 12\text{mA}$ (IND) | — — | — — | 0.50 0.50 | V |
| R_{OUT} | Output Resistance (FCT2XXX- 25 Ω) | $V_{CC} = \text{Min.}$ $I_{OL} = 12\text{mA}$ (MIL) $I_{OL} = 12\text{mA}$ (IND) | — 20 | 25 28 | — 40 | Ω |

Notes:

1. Typical values indicate $V_{CC} = 5.0\text{V}$ and $T_A = 25^\circ\text{C}$.
2. Not more than one output should be shorted and the duration is ≤ 1 second.
3. These parameters are guaranteed by design but not tested.

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Table 7. Switching Characteristics Over Operating Range

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

Military $T_A = -55^\circ\text{C}$ to 125°C , $V_{CC} = 5.0\text{V} \pm 10\%$

$C_{LOAD} = 50\text{pF}$, $R_{LOAD} = 500\Omega$ unless otherwise noted.

| Symbol | Description | | 827A 828A 2827A 2828A | | 827B 828B 2827B 2828B | | 827C 828C 2827C | | Unit |
|------------------------|--|------------|--------------------------------|------------|--------------------------------|------------|-----------------------|------------|------|
| | | | Min | Max | Min | Max | Min | Max | |
| t_{PHL} t_{PLH} | Propagation Delay Di to Yi, 827 | Ind Mil | — — | 8.0 9.0 | — — | 5.0 6.5 | — — | 4.4 5.0 | ns |
| t_{PHL} t_{PLH} | Propagation Delay ^(1,2) Di to Yi, 827 | Ind Mil | — — | 15 17 | — — | 13 14 | — — | 10 11 | ns |
| t_{PHL} t_{PLH} | Propagation Delay Di to Yi, 2827 | Ind Mil | — — | 8.0 9.0 | — — | 5.0 6.5 | — — | 4.4 5.0 | ns |
| t_{PHL} t_{PLH} | Propagation Delay ^(1,2) Di to Yi, 2827 | Ind Mil | — — | 17 18 | — — | — — | — — | — — | ns |
| t_{PHL} t_{PLH} | Propagation Delay Di to Yi, 828 | Ind Mil | — — | 7.5 9.5 | — — | 5.0 6.5 | — — | 4.4 5.0 | ns |
| t_{PHL} t_{PLH} | Propagation Delay ^(1,2) Di to Yi, 828 | Ind Mil | — — | 14 16 | — — | 13 14 | — — | 10 11 | ns |
| t_{PHL} t_{PLH} | Propagation Delay Di to Yi, 2828 | Ind Mil | — — | 7.5 9.5 | — — | 5.0 6.5 | — — | — — | ns |
| t_{PHL} t_{PLH} | Propagation Delay ^(1,2) Di to Yi, 2828 | Ind Mil | — — | 17 18 | — — | — — | — — | — — | ns |
| t_{PZH} t_{PZL} | Output Enable Time \overline{OE} to Yi, 827/8 | Ind Mil | — — | 12 13 | — — | 8.0 9.0 | — — | 7.0 8.0 | ns |
| t_{PZH} t_{PZL} | Output Enable Time \overline{OE} to Yi, 827/8 ^(1,2) | Ind Mil | — — | 23 25 | — — | 15 16 | — — | 14 15 | ns |
| t_{PZH} t_{PZL} | Output Enable Time \overline{OE} to Yi, 2827/8 | Ind Mil | — — | 12 13 | — — | 8.0 9.0 | — — | 7.0 8.0 | ns |
| t_{PZH} t_{PZL} | Output Enable Time \overline{OE} to Yi, 2827/8 ^(1,2) | Ind Mil | — — | 23 25 | — — | — — | — — | — — | ns |
| t_{PHZ} t_{PLZ} | Output Disable Time \overline{OE} to Yi ^(1,3) | Ind Mil | — — | 9.0 10 | — — | 6.0 7.0 | — — | 5.7 6.7 | ns |
| t_{PHZ} t_{PLZ} | Output Disable Time ⁽¹⁾ \overline{OE} to Yi | Ind Mil | — — | 10 10 | — — | 7.0 8.0 | — — | 6.0 7.0 | ns |

Notes:

1. This parameter is guaranteed by design but not tested.
2. $C_{LOAD} = 300\text{pF}$.
3. $C_{LOAD} = 5\text{pF}$.