



**High Speed CMOS  
Bus Interface  
10-bit Buffers**

QS54/74FCT827T  
QS54/74FCT828T

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QS54/74FCT2828T

**FEATURES/BENEFITS**

- Pin and function compatible to the 74F827/8 74FCT827/8 and 74FCT827T/8T
- CMOS power levels: <7.5 mW static
- Available in DIP, ZIP, SOIC, QSOP, LCC
- 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

**FCT-T 827T/8T**

- JEDEC-FCT spec compatible
- Fastest CMOS logic family available
- A B, and C speed grades with 4.4ns tPD for C
- Iol = 48mA Com., 32 mA Mil.

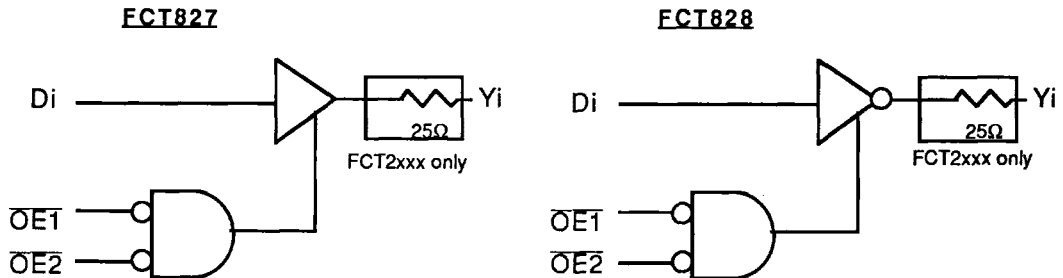
**FCT-T 2827T/8T**

- Built-in 25Ω series resistor outputs reduce reflection and other system noise
- A and B speed grades with 5.0ns tPD for B
- Iol = 12mA Com.

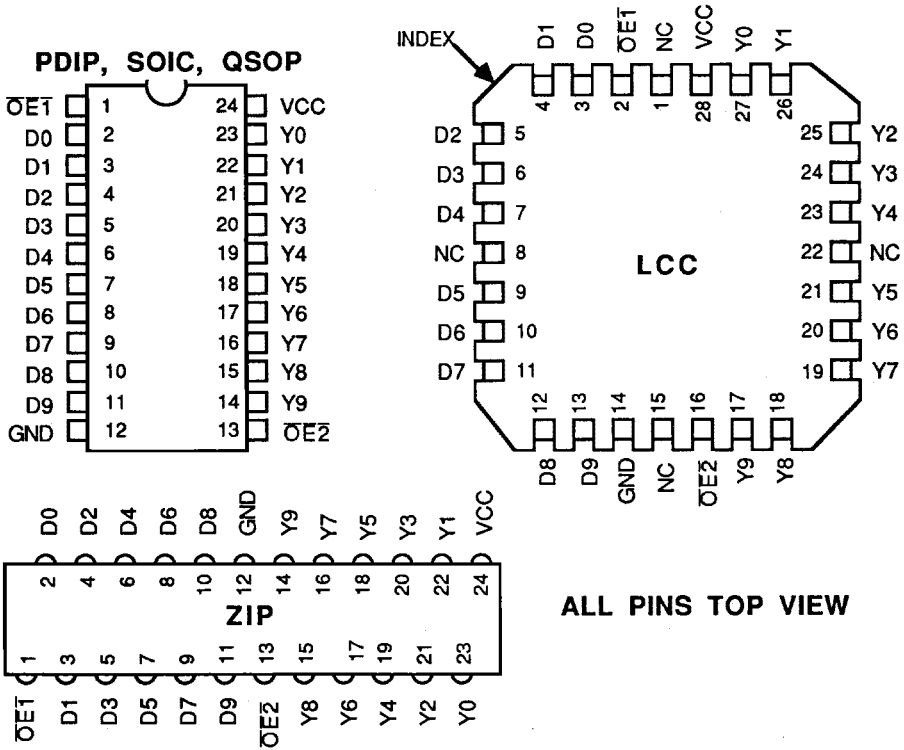
**DESCRIPTION**

The QSFCT827T/828T and QSFCT827T/828T are 10-bit buffers/line drivers 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 series parts can replace the 827 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 Vcc is removed from the device.

**FUNCTIONAL BLOCK DIAGRAM**



**PINOOTS**



**FUNCTION TABLE**

Inputs			Outputs		Function
			827	828	
OE1	OE2	DI	Yi	Yi	
L	L	L	L	H	Enabled
L	L	H	H	L	Enabled
H	-	-	Z	Z	High Z
-	H	-	Z	Z	High Z

H=High, L=Low, Z=High Impedance

**ABSOLUTE MAXIMUM RATINGS**

Supply Voltage to Ground..... -0.5V to +7.0V  
 DC Output Voltage  $V_O$  ..... -0.5V to 7.0V  
 DC Input Voltage  $V_I$  ..... -0.5V to 7.0V  
 AC Input Voltage (for a pulse width  $\leq 20$  ns)..... -3.0V  
 DC Input Diode Current with  $V_I < 0$ ..... -20 mA  
 DC Output Diode Current with  $V_O < 0$ ..... -50 mA  
 DC Output Current Max. sink current/pin..... 120 mA  
 Maximum Power Dissipation..... 0.5 watts  
 $T_{STG}$ Storage Temperature..... -65° to +165°C

**CAPACITANCE**

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

Pins	SOIC	QSOP	PDIP,LCC	ZIP	Unit
-----	4	4	5	7	pF
-----	6	6	7	9	pF
1-11,13-23	8	8	9	10	pF

Note: Capacitance is characterized but not tested



**QSFCT827T, 828T, 2827T, 2828T**

**DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE**

Commercial  $T_A=0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ ,  $V_{CC}=5.0\text{V}\pm 5\%$

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

Symbol	Parameter	Test Conditions		Min	Typ (1)	Max	Unit	
Vih	Input High Voltage	Logic HIGH for All Inputs		2.0	-	-	Volts	
Vil	Input LOW Voltage	Logic LOW for All Inputs		-	-	0.8		
$\Delta V_t$	Input Hysteresis	$V_{Ith} - V_{tHl}$ for All Inputs		-	0.2	-		
$ i_{ih} $ $ i_{il} $	Input Current Input HIGH or LOW	$V_{CC} = \text{MAX}$	$0 \leq V_{in} < V_{CC}$	-	-	5	$\mu\text{A}$	
$ i_{oz} $	Off State Output Current (Hi-Z)	$V_{CC} = \text{MAX}, 0 \leq V_{in} \leq V_{CC}$		-	-	5		
Ios	Short Circuit Current FCTXXX	$V_{CC} = \text{MAX}, V_o = \text{GND} (2,3)$		-60	-	-225	mA	
Ior	Current Drive FCT2XXX	$V_{CC} = \text{Min}, V_o = 2.0\text{V} (3)$		50	-	-	mA	
Vic	Input Clamp Voltage	$V_{CC} = \text{MIN}, I_{in} = 18 \text{ mA} (3)$		-	-0.7	-1.2	Volts	
Voh	Output HIGH Voltage FCTXXX & FCT2XXX	$V_{CC} = \text{MIN}$	loh = 15 mA (MIL)	2.4	-	-	Volts	
			loh = 24 mA (COM)	2.4	-	-		
Vol	Output LOW Voltage FCTXXX	$V_{CC} = \text{MIN}$	lol = 32 mA (MIL)	-	-	0.50		
			lol = 48 mA (COM)	-	-	0.50		
	Output LOW Voltage FCT2XXX (25 $\Omega$ )	$V_{CC} = \text{MIN}$	lol = 12 mA (MIL)	-	-	0.50		
			lol = 12 mA (COM)	-	-	0.50		
Rout	Output Resistance FCT2XXX (25 $\Omega$ )	$V_{CC} = \text{MIN}$	lol = 12 mA (MIL)	-	25	-		$\Omega$
			lol = 12 mA (COM)	20	28	40		

**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  $\leq 1$  second.
3. These parameters are guaranteed by design but not tested.

**POWER SUPPLY CHARACTERISTICS**

Symbol	Parameter	Test Conditions (1)	Min	Max	Unit
I <sub>cc</sub>	Quiescent Power Supply Current	V <sub>cc</sub> = MAX, freq = 0 0V ≤ V <sub>in</sub> ≤ 0.2V or V <sub>cc</sub> - 0.2V ≤ V <sub>in</sub> ≤ V <sub>cc</sub>	-	1.5	mA
ΔI <sub>cc</sub>	Supply Current per Input @ TTL HIGH	V <sub>cc</sub> = MAX, V <sub>in</sub> = 3.4 V, freq = 0 (2)	-	2.0	
Q <sub>ccd</sub>	Supply Current per input per mHz	V <sub>cc</sub> = MAX, Outputs open and enabled One bit toggling @ 50% duty cycle Other inputs at GND or V <sub>cc</sub> (3,4)	-	0.25	mA/ MHz

1. For conditions shown as MIN or MAX use the appropriate values specified under DC specifications.
2. Per TTL driven input (V<sub>i</sub>=3.4V)
3. For flipflops Q<sub>ccd</sub> is measured by switching one of the data in 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<sub>cc</sub> can be computed using the above parameters as explained in the Technical Overview section.

**QSFCT827T, 828T, 2827T, 2828T**

**SWITCHING CHARACTERISTICS OVER OPERATING RANGE**

Commercial  $T_A=0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ ,  $V_{CC}=5.0\text{V}\pm 5\%$       Military  $T_A=-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ ,  $V_{CC}=5.0\text{V}\pm 10\%$   
 Load = 50 pF,  $R_{load} = 500\Omega$  unless otherwise noted

Symbol	Description	Notes (1)	827/8A, 2827/8A		827/8B, 2827/8B		827/8C 2827/8C		Unit	
			Min	Max	Min	Max	Min	Max		
t PHL t PLH	Propagation Delay Di to Yi, FCT827	Com	-	8	-	5	-	4.4	ns	
		MII	-	9	-	6.5	-	5.0		
		Com	2,3	-	15	-	13	-		10
		MII	2,3	-	17	-	14	-		11
	Propagation Delay Di to Yi, FCT2827	Com	-	8	-	5	-	-		
		MII	-	9	-	6.5	-	-		
		Com	2,3	-	17	-	-	-		
		MII	2,3	-	18	-	-	-		
	Propagation Delay Di to Yi, FCT828	Com	-	7.5	-	5	-	4.4		
		MII	-	9.5	-	6.5	-	5.0		
		Com	2,3	-	14	-	13	-		10
		MII	2,3	-	16	-	14	-		11
	Propagation Delay Di to Yi, FCT2828	Com	-	7.5	-	5	-	-		
		MII	-	9.5	-	6.5	-	-		
		Com	2,3	-	17	-	-	-		
		MII	2,3	-	18	-	-	-		
t PZH t PZL	Output Enable Time OE to Yi, FCT827/8	Com	-	12	-	8	-	7		
		MII	-	13	-	9	-	8		
		Com	2,3	-	23	-	15	-	14	
		MII	2,3	-	25	-	16	-	15	
	Output Enable Time OE to Yi, FCT2827/8	Com	-	12	-	8	-	-		
		MII	-	13	-	9	-	-		
		Com	2,3	-	23	-	-	-		
		MII	2,3	-	25	-	-	-		
t PHZ t PLZ	Output Disable Time OE to Yi	Com	2	-	9	-	6	-	5.7	
		MII	2	-	10	-	7	-	6.7	
		Com	2	-	10	-	7	-	6	
		MII	2	-	10	-	8	-	7	

- Notes: 1. Minimum propagation delay values guaranteed but not tested.  
 2. This parameter is guaranteed but not tested.  
 3. Load = 300 pF