



## High Speed CMOS Bus Interface 9 & 10-bit Transceivers

QS54/74FCT861T  
QS54/74FCT862T  
QS54/74FCT863T  
QS54/74FCT864T

QS54/74FCT2861T  
QS54/74FCT2862T  
QS54/74FCT2863T  
QS54/74FCT2864T

### FEATURES/BENEFITS

- Pin and function compatible to the 74F861/2/3/4 74FCT861/2/3/4 and 74FCT861T/2T/3T/4T
- 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 861T/2T/3T/4T

- JEDEC-FCT spec compatible
- Fastest CMOS logic family available
- A and B speed grades with 6ns tPD for B
- I<sub>OL</sub> = 48 mA Com., 32 mA Mil.

### FCT-T 2861T/2T/3T/4T

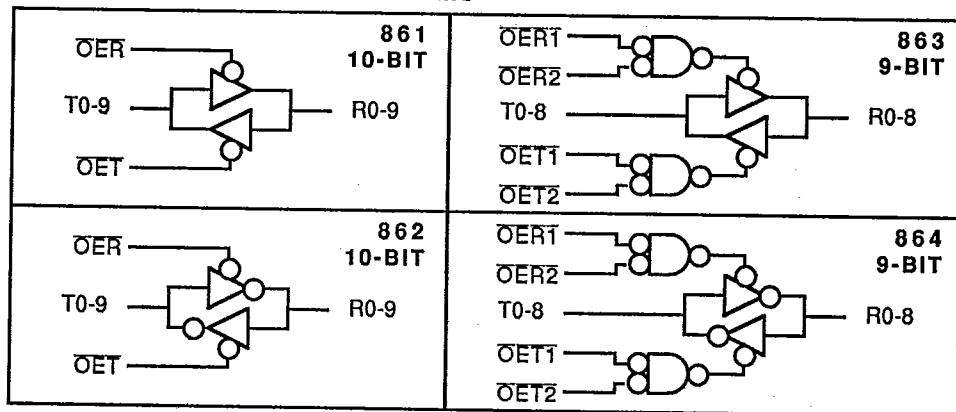
- Built-in 25Ω series resistor outputs reduce reflection and other system noise
- A and B speed grades with 6ns tPD for B
- I<sub>OL</sub> = 12mA Com.

4

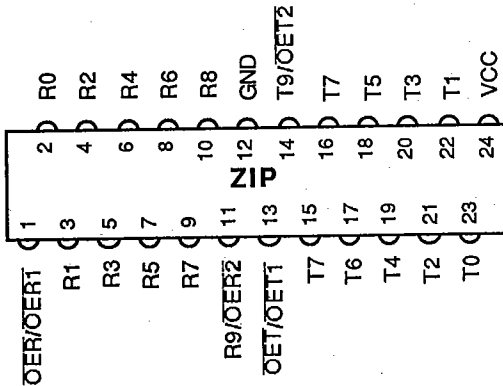
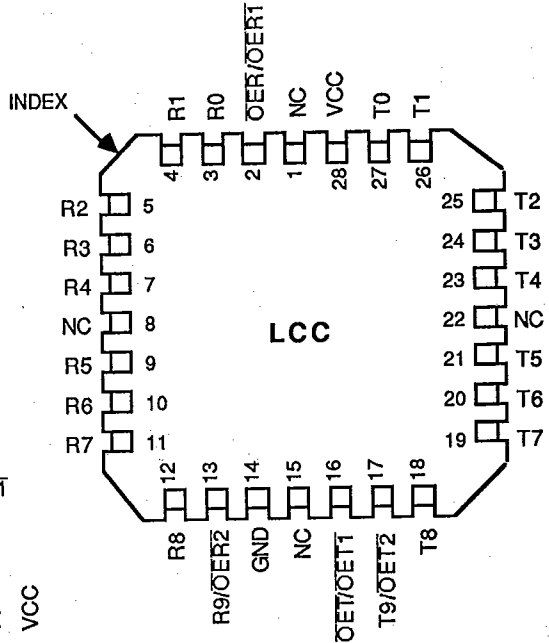
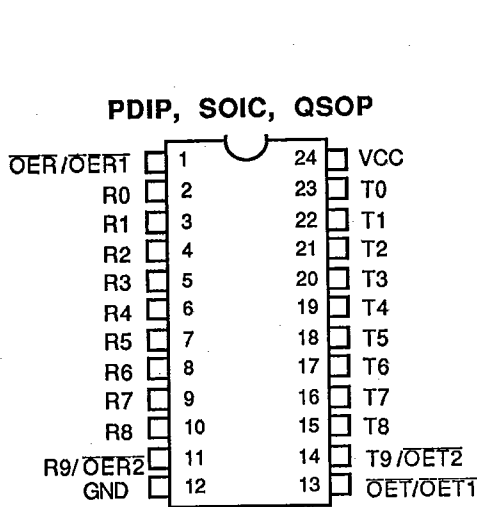
### DESCRIPTION

The QSFCT861-4T and QSFCT2861-4T are 9-bit and 10-bit inverting and non-inverting bus transceivers. Separate enables for each bus control the direction of data flow. The 2861-4A/B are 25Ω resistor output versions useful for driving transmission lines and reducing system noise. The 2861 parts can replace the 861 series to reduce noise in an in existing design. All inputs have clamp diode 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<sub>CC</sub> is removed from the device.

### FUNCTIONAL BLOCK DIAGRAMS



**PINOUTS**



**ALL PINS TOP VIEW**

**PIN DESCRIPTION**

Pin Name	I/O	Description
Ti	I/O	T Bus
Ri	I/O	R Bus
OER, OET	I	R, T Enable

**FUNCTION TABLE**

Enables		861/3		862/4		Function
OER	OET	TI	RI	TI	RI	
H	H	Z	Z	Z	Z	Disable, Hi Z
L	H	L	L	L	H	T->R
L	H	H	H	H	L	T->R
H	L	L	L	H	L	R->T
H	L	H	H	L	H	R->T

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

QSFCT861/2/3/4T, 2861/2/3/4T

**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<sub>STG</sub>Storage Temperature..... -65° to +165°C

**CAPACITANCE**

TA = 25 °C, f = 1 MHz, Vin = 0V, Vout = 0 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

4

**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	$V_{ih} - V_{th}$ 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>c</sub> can be computed using the above parameters as explained in the Technical Overview section.

QSFCT861/2/3/4T, 2861/2/3/4T

**SWITCHING CHARACTERISTICS OVER OPERATING RANGE**

Commercial: Ta = 0 °C to 70 °C, Vcc = 5.0V ±5% Military: Ta = -55 °C to +125 °C, Vcc = 5.0V ±10%  
 Cload = 50 pF, Rload = 500Ω unless otherwise noted.

Symbol	Description	Notes (1)	861-4A, 2861-4A				861-4B, 2861-4B				Unit
			Com		MII		Com		MII		
			Min	Max	Min	Max	Min	Max	Min	Max	
t PHL t PLH	Propagation Delay Ti to/fm Ri, FCT861/3		-	8	-	9	-	6	-	6.5	ns
		2,3	-	15	-	17	-	13	-	14	
	Propagation Delay Ti to/fm Ri, FCT2861/3		-	8	-	9	-	6	-	6.5	
		2,3	-	17	-	18	-	-	-	-	
	Propagation Delay Ti to/fm Ri, FCT862/4		-	7.5	-	9	-	5.5	-	6.5	
		2,3	-	14	-	16	-	13	-	14	
	Propagation Delay Ti to/fm Ri, FCT2862/4		-	9	-	10	-	5.5	-	6.5	
		2,3	-	17	-	18	-	-	-	-	
t PZH t PZL	Output Enable Time OE to Ti or Ri, FCT861-4		-	12	-	13	-	8	-	9	
		2,3	-	20	-	22	-	15	-	16	
	Output Enable Time OE to Ti or Ri, FCT2861-4		-	12	-	13	-	8	-	9	
		2,3	-	20	-	22	-	-	-	-	
t PHZ t PLZ	Output Disable Time OE to Ti or Ri	2,4	-	9	-	9	-	6	-	7	
		2	-	10	-	10	-	7	-	8	

Notes

1. Minimum are guaranteed but not tested on propagation delays.
2. These parameters are guaranteed but not tested in final production.
3. Cload = 300 pF
4. Cload = 5 pF