



## High Speed CMOS 16-Bit Buffers

QS74FCT16244T  
 QS74FCT162244T

### FEATURES/BENEFITS

- 16-bit Function compatible to the 74F244 74FCT244 and 74FCT244T
- CMOS power levels: <7.5 mW static
- Available in VSOP
- 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 16244T

- JEDEC-FCT spec compatible
- Fastest CMOS logic family available
- Std., A, and C speed grades; 4.1 ns tPD for C
- I<sub>ol</sub> = 64 mA Com., 48 mA Mil.

#### FCT-T 162244T

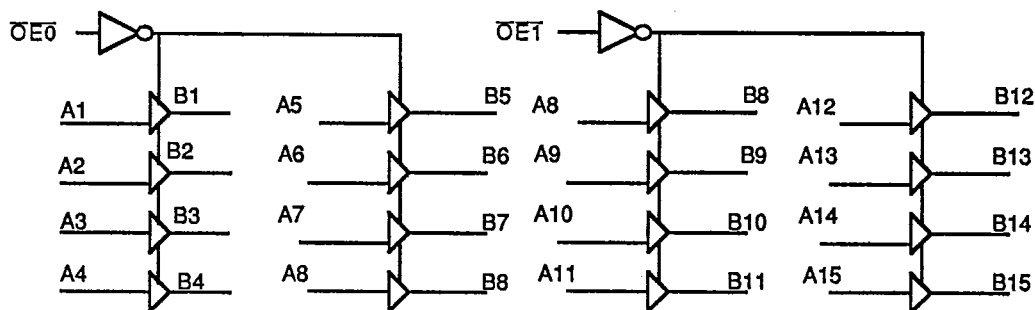
- Built-in 25Ω series resistor outputs reduce reflection and other system noise
- Std., A, and C speed grades; 4.1 ns tPD for C
- I<sub>ol</sub> = 12mA Com.

### DESCRIPTION

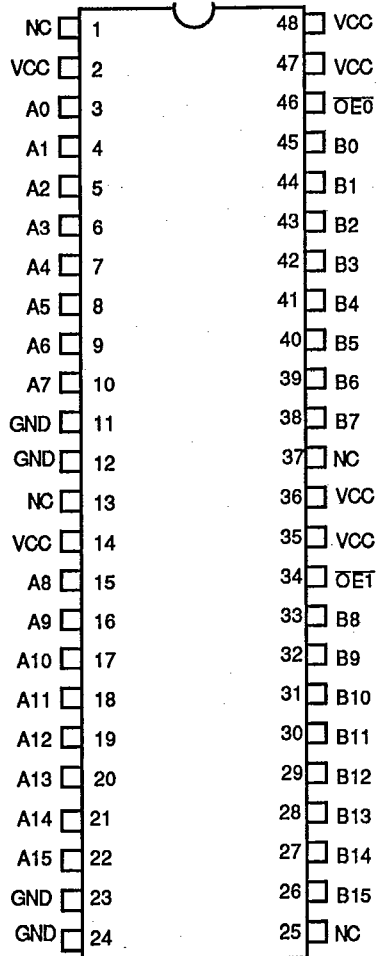
The FCT16244T are 16-bit buffers/line drivers with three-state outputs that are ideal for driving high-capacitance loads as in memory address and data buses. The FCT162244T are 25Ω resistor output versions useful for driving transmission lines and reducing system noise. The 16244 series parts can replace the 244 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<sub>cc</sub> is removed from the device.

### FUNCTIONAL BLOCK DIAGRAM

FCT244



### PINOUTS



### FUNCTION TABLE

$\overline{OE0}$	$\overline{OE1}$	Input A	Output Y
H	X	X	Z
X	H	X	Z
L	L	L	L
L	L	H	H

H=High, L=Low, Hi-Z=High Impedance, X = Don't care

### 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

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

Pins	VSOP	Unit
2,14,34,46	4	pF
-----	6	pF
3-10,15-22, 26-33, 38-45	8	pF

Note: Capacitance is characterized but not tested

**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	Vtlh - Vthl for All Inputs		-	0.2	-	
lih	Input Current Input HIGH or	Vcc = MAX	$0 \leq V_{in} < V_{cc}$	-	-	5	$\mu\text{A}$
loz	Off State Output Current (Hi-Z)	$V_{cc} = \text{MAX}, 0 \leq V_{in} \leq V_{cc}$		-	-	5	
los	Short Circuit Current FCTXXX	$V_{cc} = \text{MAX}, V_o = \text{GND} (2,3)$		-60	-	225	mA
lor	Current Drive FCT2XXX	$V_{cc} = \text{Min}, V_o = 2.0\text{V}$		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 &	Vcc = MIN	loh = 12 mA (MIL)	2.4	-	-	Volts
			loh = 15 mA (COM)	2.4	-	-	
Vol	Output LOW Voltage FCTXXX	Vcc = MIN	lol = 48 mA (MIL)	-	-	0.55	
			lol = 64 mA (COM)	-	-	0.55	
	Output LOW Voltage FCT2XXX (25 $\Omega$ )	Vcc = MIN	lol = 12 mA (MIL)	-	-	0.50	
			lol = 12 mA (COM)	-	-	0.50	
Rout	Output Resistance FCT2XXX (25 $\Omega$ )	Vcc = 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>	-	3.0	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

**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.

**FCT244, FCT2244**

Symbol	Description	Note (1)	16244A 162244A		16244C 162244C		Unit
			Min	Max	Min	Max	
t PHL t PLH	Propagation Delay Ai to Yi, FCT241/4	COM	1.5	6.5	1.5	4.1	ns
		MIL	1.5	7.5			
	Propagation Delay Ai to Yi, FCT2244	COM	1.5	6.5	1.5	4.1	
		MIL	1.5	7.5			
t PZH t PZL	Output Enable Time OE to Yi, FCT241/4	COM	1.5		1.5	5.8	
		MIL	1.5	8.5			
	Output Enable Time OE to Yi, FCT2244	COM	1.5		1.5	5.8	
		MIL	1.5	8.5			
t PHZ t PLZ	Output Disable Time OE to Yi	COM	2	1.5	1.5	5.2	
		MIL	2	1.5	7.5		

Notes:

1. Minimum propagation delay values are guaranteed but not tested.
2. This parameter is guaranteed but not tested.