

**FEATURES**

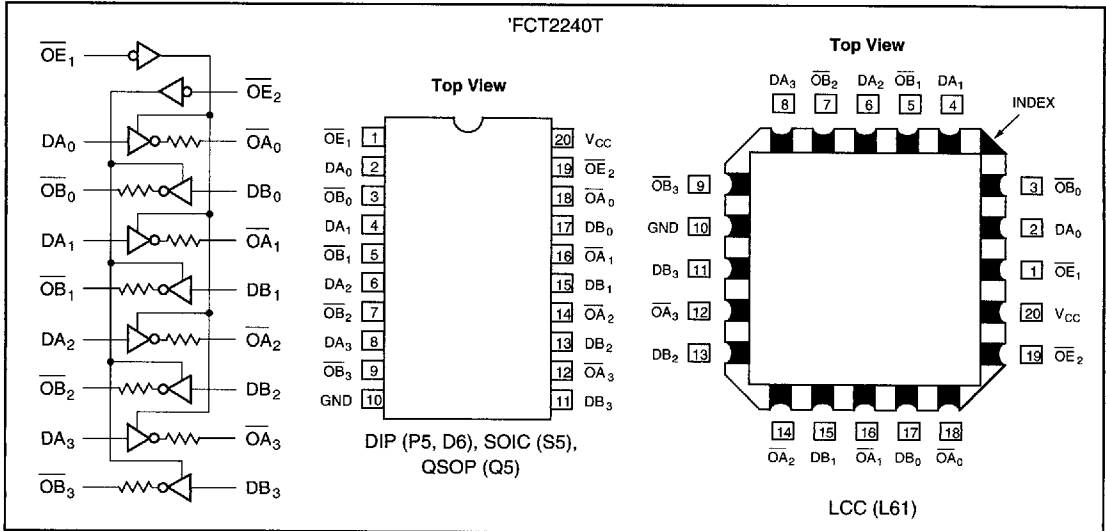
- Function and pinout compatible with the FCT and F Logic
- 25Ω Output series resistors to reduce transmission line reflection noise
- FCT-C speed at 4.1ns max. (Com'I), FCT2244T FCT-A speed at 4.8ns max. (Com'I)
- TTL output level versions of equivalent FCT functions
- Edge-rate control circuitry for significantly improved noise characteristics
- Power-off disable feature
- Fully compatible with TTL input and output logic levels
- 12mA Sink Current (Commercial), 12mA (Mil) 15mA Source Current (Commercial), 12mA (Mil)
- 3-State Outputs

**DESCRIPTION**

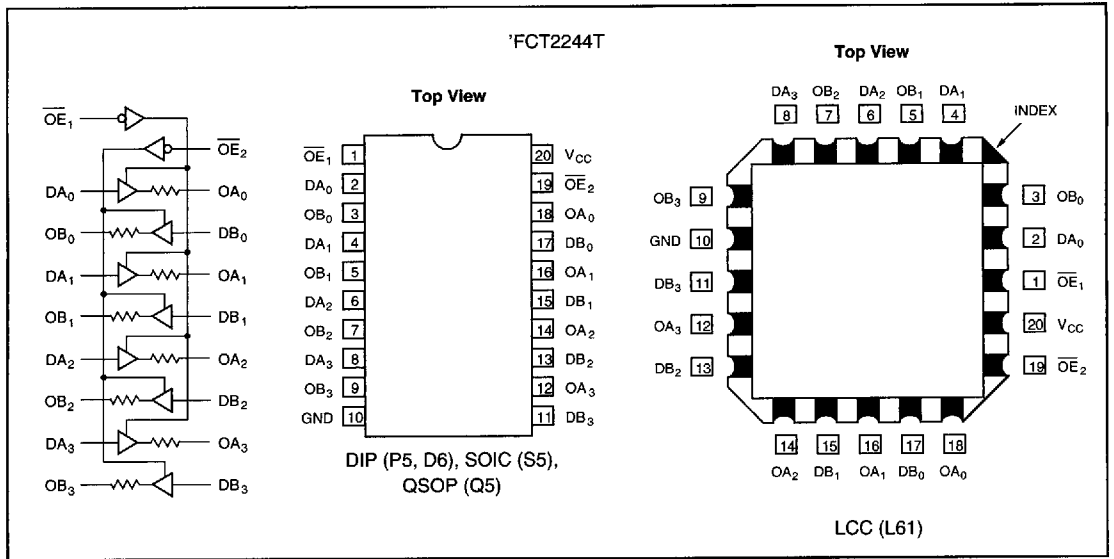
'FCT2240T and 'FCT2244T are octal buffers and line drivers that include on-chip 25Ω terminating resistors at each of the outputs, to minimize noise resulting from reflections or standing waves in high-performance applications. The on-chip resistors reduce overall board space and component count.

Designed to be employed as memory address drivers,

clock drivers, and bus-oriented transmitters/receivers, the devices provide speed and drive capabilities commensurate with their fastest bipolar logic counterparts while reducing overall power dissipation. The input and output voltage levels allow direct interface with TTL, NMOS and CMOS devices without the need for external components.

**3**
**FUNCTIONAL BLOCK DIAGRAM and PIN CONFIGURATIONS**


# FUNCTIONAL BLOCK DIAGRAM and PIN CONFIGURATIONS



## ABSOLUTE MAXIMUM RATINGS<sup>1,2</sup>

Symbol	Parameter	Value	Unit
$T_{STG}$	Storage Temperature	-65 to +150	°C
$T_A$	Ambient Temperature Under Bias	-65 to +135	°C
$V_{CC}$	$V_{CC}$ Potential to Ground	-0.5 to +7.0	V
$P_T$	Power Dissipation	0.5	W

Symbol	Parameter	Value	Unit
$I_{OUTPUT}$	Current Applied to Output	120	mA
$V_{IN}$	Input Voltage	-0.5 to +7.0	V
$V_{OUT}$	Voltage Applied to Output	-0.5 to +7.0	V

## RECOMMENDED OPERATING CONDITIONS

Free Air Ambient Temperature	Min	Max
Military	-55°C	+125°C
Commercial	0°C	+70°C

Supply Voltage ( $V_{CC}$ )	Min	Max
Military	+4.5V	+5.5V
Commercial	+4.75V	+5.25V

## DC ELECTRICAL CHARACTERISTICS (Over recommended operating conditions)

Symbol	Parameter		Min	Typ <sup>3</sup>	Max	Units	$V_{CC}$	Conditions
$V_{IH}$	Input HIGH Voltage		2.0			V		
$V_{IL}$	Input LOW Voltage				0.8	V		
$V_H$	Hysteresis <sup>5</sup>			0.2		V		All inputs
$V_{IK}$	Input Clamp Diode Voltage			-0.7	-1.2	V	MIN	$I_{IN} = -18mA$
$V_{OH}$	Output HIGH Voltage	Military	2.4	3.3		V	MIN	$I_{OH} = -12mA$
		Commercial	2.4	3.3		V	MIN	$I_{OH} = -15mA$
$V_{OL}$	Output LOW Voltage	Military		0.3	0.55	V	MIN	$I_{OL} = 12mA$
		Commercial		0.3	0.55	V	MIN	$I_{OL} = 12mA$
$R_{OUT}$	Output Resistance	Military		25		$\Omega$	MIN	$I_{OL} = 12mA$
		Commercial	20	25	40	$\Omega$	MIN	$I_{OL} = 12mA$
$I_I$	Input HIGH Current				20	$\mu A$	MAX	$V_{IN} = V_{CC}$
$I_{IH}$	Input HIGH Current				5	$\mu A$	MAX	$V_{IN} = 2.7V$
$I_{IL}$	Input LOW Current				-5	$\mu A$	MAX	$V_{IN} = 0.5V$
$I_{OZH}$	Off State $I_{OUT}$ HIGH-Level Output Current				10	$\mu A$	MAX	$V_{OUT} = 2.7V$
$I_{OZL}$	Off State $I_{OUT}$ LOW-Level Output Current				-10	$\mu A$	MAX	$V_{OUT} = 0.5V$
$I_{OS}$	Output Short Circuit Current <sup>4</sup>		-60	-120	-225	mA	MAX	$V_{OUT} = 0.0V$
$I_{OFF}$	Power-off Disable				100	$\mu A$	0V	$V_{OUT} = 4.5V$
$C_{IN}$	Input Capacitance <sup>5</sup>			5	10	pF	MAX	All inputs
$C_{OUT}$	Output Capacitance <sup>5</sup>			9	12	pF	MAX	All outputs
$I_{CC}$	Quiescent Power Supply Current			0.2	1.5	mA	MAX	$V_{IN} \leq 0.2V$ , $V_{IN} \geq V_{CC} - 0.2V$

### Notes:

- Operation beyond the limits set forth in the above table may impair the useful life of the device. Unless otherwise noted, these limits are over the operating free-air temperature range.
- Unused inputs must always be connected to an appropriate logic voltage level, preferably either  $V_{CC}$  or ground.
- Typical values are at  $V_{CC} = 5.0V$ ,  $T_A = +25^\circ C$  ambient.
- Not more than one output should be shorted at a time. Short should not exceed one second. To minimize internal chip heating and more

accurately reflect operational values, use of high-speed test apparatus and/or sample and hold techniques are preferable. Otherwise prolonged shorting of a high output may raise chip temperature well above normal causing invalid readings in other parameter tests. In any sequence of parameter tests,  $I_{OS}$  tests should be performed last.

- This parameter is guaranteed but not tested.

## DC CHARACTERISTICS (Over recommended operating conditions unless otherwise specified.)

Symbol	Parameter	Typ <sup>9</sup>	Max	Units	Conditions
$\Delta I_{CC}$	Quiescent Power Supply Current (TTL inputs)	0.5	2.0	mA	$V_{CC} = \text{MAX}$ , $V_{IN} = 3.4V^6$ , $f_1 = 0$ , Outputs Open
$I_{CCD}$	Dynamic Power Supply Current <sup>7</sup>	0.15	0.25	mA/ MHz	$V_{CC} = \text{MAX}$ , One Input Toggling, 50% Duty Cycle, Outputs Open, $\overline{OE}_1 = \overline{OE}_2 = \text{GND}$ , $OE_2 = V_{CC}$ , $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC} - 0.2V$
$I_C$	Total Power Supply Current <sup>9</sup>	1.7	4.0	mA	$V_{CC} = \text{MAX}$ , 50% Duty Cycle, Outputs Open, One Bit Toggling at $f_1 = 10\text{MHz}$ , $\overline{OE}_1 = \overline{OE}_2 = \text{GND}$ , $OE_2 = V_{CC}$ , $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC} - 0.2V$
		2.0	5.0	mA	$V_{CC} = \text{MAX}$ , 50% Duty Cycle, Outputs Open, One Bit Toggling at $f_1 = 10\text{MHz}$ , $\overline{OE}_1 = \overline{OE}_2 = \text{GND}$ , $OE_2 = V_{CC}$ , $V_{IN} = 3.4V$ or $V_{IN} = \text{GND}$
		3.2	6.5 <sup>8</sup>	mA	$V_{CC} = \text{MAX}$ , 50% Duty Cycle, Outputs Open, Eight Bits Toggling at $f_1 = 2.5\text{MHz}$ , $\overline{OE}_1 = \overline{OE}_2 = \text{GND}$ , $OE_2 = V_{CC}$ , $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC} - 0.2V$
		5.2	14.5 <sup>8</sup>	mA	$V_{CC} = \text{MAX}$ , 50% Duty Cycle, Outputs Open, Eight Bits Toggling at $f_1 = 2.5\text{MHz}$ , $\overline{OE}_1 = \overline{OE}_2 = \text{GND}$ , $OE_2 = V_{CC}$ , $V_{IN} = 3.4V$ or $V_{IN} = \text{GND}$

## TRUTH TABLES

'FCT2240T			
Inputs			Output
$\overline{OE}_1$	$\overline{OE}_2$	D	
L	L	L	H
L	L	H	L
H	H	X	Z

'FCT2244T			
Inputs			Output
$\overline{OE}_1$	$OE_2$	D	
L	L	L	L
L	L	H	H
H	H	X	Z

H = HIGH Voltage Level, L = LOW Voltage Level, X = Don't Care, Z = High Impedance

### Notes:

- Per TTL driven input ( $V_{IN} = 3.4V$ ); all other inputs at  $V_{CC}$  or GND.
- This parameter is not directly testable, but is derived for use in Total Power Supply calculations.
- Values for these conditions are examples of the  $I_{CC}$  formula. These limits are guaranteed but not tested.
- $I_C = I_{\text{QUIESCENT}} + I_{\text{INPUTS}} + I_{\text{DYNAMIC}}$   
 $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_0/2 + f_1 N_T)$   
 $I_{CC}$  = Quiescent Current with CMOS input levels  
 $\Delta I_{CC}$  = Power Supply Current for a TTL High Input ( $V_{IN} = 3.4V$ )

- $D_H$  = Duty Cycle for TTL Inputs High  
 $N_T$  = Number of TTL Inputs at  $D_H$   
 $I_{CCD}$  = Dynamic Current Caused by an Input Transition Pair (HLH or LHL)  
 $f_0$  = Clock Frequency for Register Devices (Zero for Non-Register Devices)  
 $f_1$  = Input Frequency  
 $N_T$  = Number of Inputs at  $f_1$   
 All currents are in milliamps and all frequencies are in megahertz.

## AC CHARACTERISTICS

Symbol	Parameter	'FCT2240T				'FCT2240AT				'FCT2240CT				Units	Fig. No.*
		MIL		COM'L		MIL		COM'L		MIL		COM'L			
		Min. <sup>10</sup>	Max.	Min. <sup>10</sup>	Max.	Min. <sup>10</sup>	Max.	Min. <sup>10</sup>	Max.	Min. <sup>10</sup>	Max.	Min. <sup>10</sup>	Max.		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Data to Output	1.5	9.0	1.5	8.0	1.5	5.1	1.5	4.8	-	-	1.5	4.1	ns	1, 2
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time	1.5	10.5	1.5	10.0	1.5	6.5	1.5	6.2	-	-	1.5	5.8	ns	1, 7, 8
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time	1.5	10.0	1.5	9.5	1.5	5.9	1.5	5.6	-	-	1.5	5.2	ns	8

## AC CHARACTERISTICS

Symbol	Parameter	'FCT2244T				'FCT2244AT				'FCT2244CT				Units	Fig. No.*
		MIL		COM'L		MIL		COM'L		MIL		COM'L			
		Min. <sup>10</sup>	Max.	Min. <sup>10</sup>	Max.	Min. <sup>10</sup>	Max.	Min. <sup>10</sup>	Max.	Min. <sup>10</sup>	Max.	Min. <sup>10</sup>	Max.		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Data to Output	1.5	7.0	1.5	6.5	1.5	5.1	1.5	4.8	-	-	1.5	4.3	ns	1, 3
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time	1.5	8.5	1.5	8.0	1.5	6.5	1.5	6.2	-	-	1.5	5.8	ns	1, 7, 8
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time	1.5	7.5	1.5	7.0	1.5	5.9	1.5	5.6	-	-	1.5	5.2	ns	8

10. Minimum limits are guaranteed but not tested on Propagation Delays.

\*Refer to the 'Parameter Measurement Information' section in this book.

AC Characteristics guaranteed with C<sub>L</sub> = 50pF.

## ORDERING INFORMATION

