



CY54/74FCT2240T CY54/74FCT2244T

8-Bit Buffers/Line Drivers

Features

- Function and pinout compatible with FCT and F logic
- 25Ω output series resistors to reduce transmission line reflection noise
- FCT-C speed at 4.1 ns max. (Com'1)
FCT-A speed at 4.8 ns max. (Com'1)
- TTL output level versions of equivalent FCT functions
- Edge-rate control circuitry for significantly improved noise characteristics
- Power-off disable feature
- ESD > 2000V

- Fully compatible with TTL input and output logic levels
- Sink current 12 mA (Com'1),
12 mA (Mil)
- Source current 15 mA (Com'1),
12 mA (Mil)
- Three-state outputs

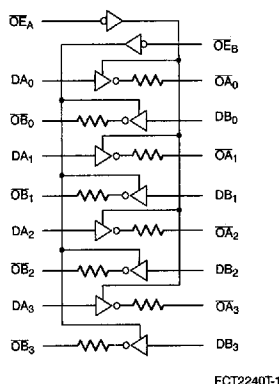
Functional Description

The 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

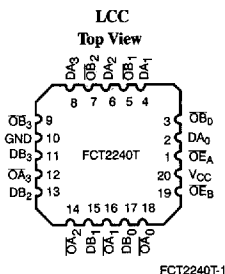
on-chip resistors reduce overall board space and component count. Designed to be employed as memory address drivers, clock drivers, and bus-oriented transmitters/receivers, these devices provide speed and drive capabilities commensurate with their fastest bipolar logic counterparts while reducing power dissipation. The input and output voltage levels allow direct interface with TTL, NMOS, and CMOS devices without the need for external components.

The outputs are designed with a power-off disable feature to allow for live insertion of boards.

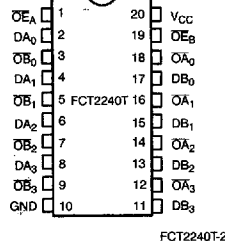
Logic Block Diagram FCT2240T



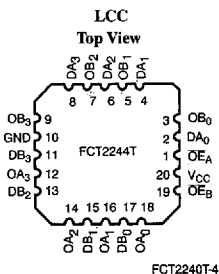
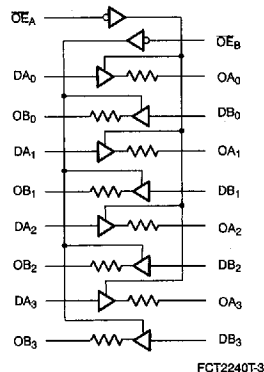
Pin Configurations



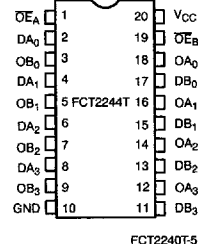
DIP/SOIC/QSOP Top View



Logic Block Diagram FCT2244T



DIP/SOIC/QSOP Top View



Function Table FCT2240T^[1]

Inputs			Output
\overline{OE}_A	\overline{OE}_B	D	
L	L	L	H
L	L	H	L
H	H	X	Z

Function Table FCT2244T^[1]

Inputs			Output
\overline{OE}_A	\overline{OE}_B	D	
L	L	L	L
L	L	H	H
H	H	X	Z

Maximum Ratings^[2, 3]

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature	-65°C to +150°C
Ambient Temperature with Power Applied	-65°C to +135°C
Supply Voltage to Ground Potential	-0.5V to +7.0V
DC Input Voltage	-0.5V to +7.0V
DC Output Voltage	-0.5V to +7.0V
DC Output Current (Maximum Sink Current/Pin)	120 mA
Power Dissipation	0.5W

Static Discharge Voltage >2001V
(per MIL-STD-883, Method 3015)

Operating Range

Range	Range	Ambient Temperature	V _{CC}
Commercial	CT, DT	0°C to +70°C	5V ± 5%
Commercial	T, AT	-40°C to +85°C	5V ± 5%
Military ^[4]	All	-55°C to +125°C	5V ± 10%

Electrical Characteristics Over the Operating Range

Parameter	Description	Test Conditions	Min.	Typ. ^[5]	Max.	Unit	
V _{OH}	Output HIGH Voltage	V _{CC} =Min., I _{OH} =-15 mA	Com ¹	2.4	3.3	V	
		V _{CC} =Min., I _{OH} =-12 mA	Mil	2.4	3.3	V	
V _{OL}	Output LOW Voltage	V _{CC} =Min., I _{OL} =12 mA	Com ¹		0.3	0.55	V
		V _{CC} =Min., I _{OL} =12 mA	Mil		0.3	0.55	V
R _{OUT}	Output Resistance	V _{CC} =Min., I _{OL} =12 mA	Com ¹	20	25	40	Ω
		V _{CC} =Min., I _{OL} =12 mA	Mil		25		Ω
V _{IH}	Input HIGH Voltage		2.0			V	
V _{IL}	Input LOW Voltage				0.8	V	
V _H	Hysteresis ^[6]	All inputs		0.2		V	
V _{IK}	Input Clamp Diode Voltage	V _{CC} =Min., I _{IN} =-18 mA		-0.7	-1.2	V	
I _I	Input HIGH Current	V _{CC} =Max., V _{IN} =V _{CC}			5	μA	
I _{IH}	Input HIGH Current	V _{CC} =Max., V _{IN} =2.7V			±1	μA	
I _{IL}	Input LOW Current	V _{CC} =Max., V _{IN} =0.5V			±1	μA	
I _{OZH}	Off State HIGH-Level Output Current	V _{CC} =Max., V _{OUT} =2.7V			10	μA	
I _{OZL}	Off State LOW-Level Output Current	V _{CC} =Max., V _{OUT} =0.5V			-10	μA	
I _{OS}	Output Short Circuit Current ^[7]	V _{CC} =Max., V _{OUT} =0.0V	-60	-120	-225	mA	
I _{OFF}	Power-Off Disable	V _{CC} =0V, V _{OUT} =4.5V			±1	μA	

Notes:

- H = HIGH Voltage Level. L = LOW Voltage Level. X = Don't Care.
- 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.
- T_A is the "instant on" case temperature.
- Typical values are at V_{CC}=5.0V, T_A=+25°C ambient.
- This parameter is guaranteed but not tested.
- Not more than one output should be shorted at a time. Duration of short should not exceed one second. The use of high-speed test apparatus and/or sample and hold techniques are preferable in order to minimize internal chip heating and more accurately reflect operational values. Otherwise prolonged shorting of a high output may raise the chip temperature well above normal and thereby cause invalid readings in other parametric tests. In any sequence of parameter tests, I_{OS} tests should be performed last.



Capacitance^[6]

Parameter	Description	Typ. ^[5]	Max.	Unit
C _{IN}	Input Capacitance	5	10	pF
C _{OUT}	Output Capacitance	9	12	pF

Power Supply Characteristics

Parameter	Description	Test Conditions	Typ. ^[5]	Max.	Unit
I _{CC}	Quiescent Power Supply Current	V _{CC} =Max., V _{IN} ≤0.2V, V _{IN} ≥V _{CC} -0.2V	0.1	0.2	mA
ΔI _{CC}	Quiescent Power Supply Current (TTL inputs)	V _{CC} =Max., V _{IN} =3.4V ^[8] f ₁ =0, Outputs Open	0.5	2.0	mA
I _{CCD}	Dynamic Power Supply Current ^[9]	V _{CC} =Max., One Input Toggling, 50% Duty Cycle, Outputs Open, OE ₁ =OE ₂ =GND, V _{IN} ≤0.2V or V _{IN} ≥V _{CC} -0.2V	0.06	0.12	mA/ MHz
I _C	Total Power Supply Current ^[10]	V _{CC} =Max., 50% Duty Cycle, Outputs Open, One Bit Toggling at f ₁ =10 MHz, OE ₁ =OE ₂ =GND, V _{IN} ≤0.2V or V _{IN} ≥V _{CC} -0.2V	0.7	1.4	mA
		V _{CC} =Max., 50% Duty Cycle, Outputs Open, One Bit Toggling at f ₁ =10 MHz, OE ₁ =OE ₂ =GND, V _{IN} =3.4V or V _{IN} =GND	1.0	2.4	mA
		V _{CC} =Max., 50% Duty Cycle, Outputs Open, Eight Bits Toggling at f ₁ =2.5 MHz, OE ₁ =OE ₂ =GND, V _{IN} ≤0.2V or V _{IN} ≥V _{CC} -0.2V	1.3	2.6 ^[11]	mA
		V _{CC} =Max., 50% Duty Cycle, Outputs Open, Eight Bits Toggling at f ₁ =2.5 MHz, OE ₁ =OE ₂ =GND, V _{IN} =3.4V or V _{IN} =GND	3.3	10.6 ^[11]	mA

Notes:

8. Per TTL driven input (V_{IN}=3.4V); all other inputs at V_{CC} or GND.
9. This parameter is not directly testable, but is derived for use in Total Power Supply calculations.
10. I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}
 I_C = I_{CC} + ΔI_{CCD_H}N_T + I_{CCD}(f₀/2 + f₁N₁)
 I_{CC} = Quiescent Current with CMOS input levels
 ΔI_{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)
 - f₀ = Clock frequency for registered devices, otherwise zero
 - f₁ = Input signal frequency
 - N₁ = Number of inputs changing at f₁
- All currents are in milliamps and all frequencies are in megahertz.
11. Values for these conditions are examples of the I_{CC} formula. These limits are guaranteed but not tested.



Switching Characteristics FCT2240T Over the Operating Range^[12]

Parameter	Description	FCT2240T				FCT2240AT				Unit	Fig. No. ^[13]
		Military		Commercial		Military		Commercial			
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
t _{PLH} t _{PHL}	Propagation Delay Data to Input	1.5	9.0	1.5	8.0	1.5	5.1	1.5	4.8	ns	1, 2
t _{PZH} t _{PZL}	Output Enable Time	1.5	10.5	1.5	10.0	1.5	6.5	1.5	6.2	ns	1, 7, 8
t _{PHZ} t _{PLZ}	Output Disable Time	1.5	10.0	1.5	9.5	1.5	5.9	1.5	5.6	ns	1, 7, 8

Parameter	Description	FCT2240CT		Unit	Fig. No. ^[13]
		Commercial			
		Min.	Max.		
t _{PLH} t _{PHL}	Propagation Delay Data to Input	1.5	4.1	ns	1, 2
t _{PZH} t _{PZL}	Output Enable Time	1.5	5.8	ns	1, 7, 8
t _{PHZ} t _{PLZ}	Output Disable Time	1.5	5.2	ns	1, 7, 8

Switching Characteristics FCT2244T Over the Operating Range^[12]

Parameter	Description	FCT2244T				FCT2244A				Unit	Fig. No. ^[13]
		Military		Commercial		Military		Commercial			
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
t _{PLH} t _{PHL}	Propagation Delay Data to Input	1.5	7.0	1.5	6.5	1.5	5.1	1.5	4.6	ns	1, 3
t _{PZH} t _{PZL}	Output Enable Time	1.5	8.5	1.5	8.0	1.5	6.5	1.5	6.2	ns	1, 7, 8
t _{PHZ} t _{PLZ}	Output Disable Time	1.5	7.5	1.5	7.0	1.5	5.9	1.5	5.6	ns	1, 7, 8

Parameter	Description	FCT2244CT		FCT2244DT		Unit	Fig. No. ^[13]
		Commercial		Commercial			
		Min.	Max.	Min.	Max.		
t _{PLH} t _{PHL}	Propagation Delay Data to Input	1.5	4.1	1.5	3.6	ns	1, 3
t _{PZH} t _{PZL}	Output Enable Time	1.5	5.8	1.5	4.8	ns	1, 7, 8
t _{PHZ} t _{PLZ}	Output Disable Time	1.5	5.2	1.5	4.0	ns	1, 7, 8

Shaded areas contain preliminary information.

Notes:

- 12. Minimum limits are guaranteed but not tested on Propagation Delays.
- 13. See "Parameter Measurement Information" in the General Information section.



Ordering Information

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
4.1	CY74FCT2240CTPC	P5	20-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT2240CTQC	Q5	20-Lead (150-Mil) QSOP	
	CY74FCT2240CTSOC	S5	20-Lead (300-Mil) Molded SOIC	
4.8	CY74FCT2240ATPC	P5	20-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT2240ATQC	Q5	20-Lead (150-Mil) QSOP	
	CY74FCT2240ATSOC	S5	20-Lead (300-Mil) Molded SOIC	
5.1	CY54FCT2240ATDMB	D6	20-Lead (300-Mil) CerDIP	Military
	CY54FCT2240ATLMB	L61	20-Pin Square Leadless Chip Carrier	
8.0	CY74FCT2240TPC	P5	20-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT2240TQC	Q5	20-Lead (150-Mil) QSOP	
	CY74FCT2240TSOC	S5	20-Lead (300-Mil) Molded SOIC	
9.0	CY54FCT2240TDMB	D6	20-Lead (300-Mil) CerDIP	Military
	CY54FCT2240TLMB	L61	20-Pin Square Leadless Chip Carrier	

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
3.6	CY74FCT2244DTQC	Q5	20-Lead (150-Mil) QSOP	Commercial
	CY74FCT2244DTSOC	S5	20-Lead (300-Mil) Molded SOIC	
4.3	CY74FCT2244CTPC	P5	20-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT2244CTQC	Q5	20-Lead (150-Mil) QSOP	
	CY74FCT2244CTSOC	S5	20-Lead (300-Mil) Molded SOIC	
4.6	CY74FCT2244ATPC	P5	20-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT2244ATQC	Q5	20-Lead (150-Mil) QSOP	
	CY74FCT2244ATSOC	S5	20-Lead (300-Mil) Molded SOIC	
5.1	CY54FCT2244ATDMB	D6	20-Lead (300-Mil) CerDIP	Military
	CY54FCT2244ATLMB	L61	20-Pin Square Leadless Chip Carrier	
6.5	CY74FCT2244TPC	P5	20-Lead (300-Mil) Molded DIP	Commercial
	CY74FCT2244TQC	Q5	20-Lead (150-Mil) QSOP	
	CY74FCT2244TSOC	S5	20-Lead (300-Mil) Molded SOIC	
7.0	CY54FCT2244TDMB	D6	20-Lead (300-Mil) CerDIP	Military
	CY54FCT2244TLMB	L61	20-Pin Square Leadless Chip Carrier	

Shaded areas contain preliminary information.

Document #: 38-00341-A

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