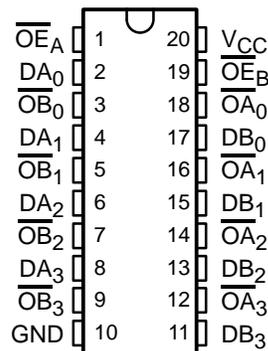


CY54FCT240T, CY74FCT240T 8-BIT BUFFERS/LINE DRIVERS WITH 3-STATE OUTPUTS

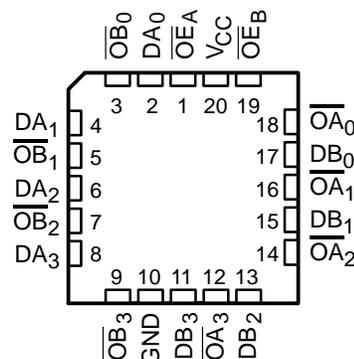
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- Function, Pinout, and Drive Compatible With FCT and F Logic
- Reduced V_{OH} (Typically = 3.3 V) Versions of Equivalent FCT Functions
- Edge-Rate Control Circuitry for Significantly Improved Noise Characteristics
- I_{off} Supports Partial-Power-Down Mode Operation
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)
- Matched Rise and Fall Times
- Fully Compatible With TTL Input and Output Logic Levels
- CY54FCT240T
 - 48-mA Output Sink Current
 - 12-mA Output Source Current
- CY74FCT240T
 - 64-mA Output Sink Current
 - 32-mA Output Source Current
- 3-State Outputs

CY54FCT240T . . . D PACKAGE
CY74FCT240T . . . Q OR SO PACKAGE
(TOP VIEW)



CY54FCT240T . . . L PACKAGE
(TOP VIEW)



description

The 'FCT240T devices are octal buffers and line drivers designed to be employed as memory address drivers, clock drivers, and bus-oriented transmitters/receivers. These devices provide speed and drive capabilities equivalent to their fastest bipolar logic counterparts, while reducing power consumption. The input and output voltage levels allow direct interface with TTL, NMOS, and CMOS devices without external components.

These devices are fully specified for partial-power-down applications using I_{off} . The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.



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 **TEXAS
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CY54FCT240T, CY74FCT240T
8-BIT BUFFERS/LINE DRIVERS
WITH 3-STATE OUTPUTS

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ORDERING INFORMATION

T _A	PACKAGE†		SPEED (ns)	ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	SOIC – SO	Tube	4.3	CY74FCT240CTSOC	FCT240C
		Tape and reel	4.3	CY74FCT240CTSUCT	
	QSOP – Q	Tape and reel	4.3	CY74FCT240CTQCT	FCT240C
	SOIC – SO	Tube	4.8	CY74FCT240ATSOC	FCT240A
		Tape and reel	4.8	CY74FCT240ATSUCT	
	QSOP – Q	Tape and reel	4.8	CY74FCT240ATQCT	FCT240A
	SOIC – SO	Tube	8	CY74FCT240TSOC	FCT240
Tape and reel		8	CY74FCT240TSUCT		
QSOP – Q	Tape and reel	8	CY74FCT240TQCT	FCT240	
-55°C to 125°C	CDIP – D	Tube	4.7	CY54FCT240CTDMB	
	CDIP – D	Tube	5.1	CY54FCT240ATDMB	
	LCC – L	Tube	5.1	CY54FCT240ATLMB	
	CDIP – D	Tube	9	CY54FCT240TDMB	

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

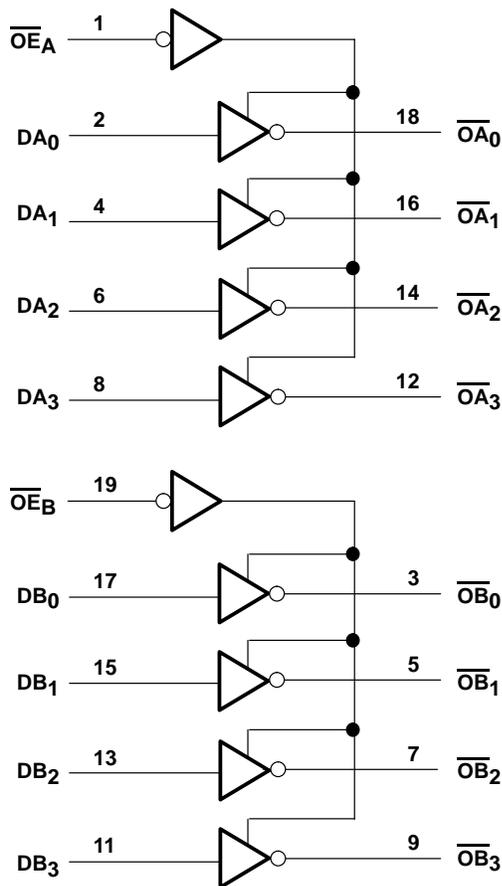
FUNCTION TABLE

INPUTS			OUTPUT O
\overline{OE}_A	\overline{OE}_B	D	
L	L	L	H
L	L	H	L
H	H	X	Z

H = High logic level, L = Low logic level,
X = Don't care, Z = High-impedance state



logic diagram (positive logic)



absolute maximum rating over operating free-air temperature range (unless otherwise noted)†

Supply voltage range to ground potential	-0.5 V to 7 V
DC input voltage range	-0.5 V to 7 V
DC output voltage range	-0.5 V to 7 V
DC output current (maximum sink current/pin)	120 mA
Package thermal impedance, θ_{JA} (see Note 1): Q package	68°C/W
SO package	58°C/W
Ambient temperature range with power applied, T_A	-65°C to 135°C
Storage temperature range, T_{Stg}	-65°C to 150°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: The package thermal impedance is calculated in accordance with JESD 51-7.

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recommended operating conditions (see Note 2)

	CY54FCT240T			CY74FCT240T			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC} Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V _{IH} High-level input voltage	2			2			V
V _{IL} Low-level input voltage			0.8			0.8	V
I _{OH} High-level output current			-12			-32	mA
I _{OL} Low-level output current			48			64	mA
T _A Operating free-air temperature	-55		125	-40		85	°C

NOTE 2: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.



CY54FCT240T, CY74FCT240T
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electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	CY54FCT240T		CY74FCT240T		UNIT
		MIN	TYP†	MAX	MIN	
V _{IK}	V _{CC} = 4.5 V, I _{IN} = -18 mA	-0.7	-1.2			V
	V _{CC} = 4.75 V, I _{IN} = -18 mA			-0.7	-1.2	
V _{OH}	V _{CC} = 4.5 V, I _{OH} = -12 mA	2.4	3.3			V
	V _{CC} = 4.75 V	I _{OH} = -32 mA		2		
		I _{OH} = -15 mA		2.4	3.3	
V _{OL}	V _{CC} = 4.5 V, I _{OL} = 48 mA	0.3	0.55			V
	V _{CC} = 4.75 V, I _{OL} = 64 mA			0.3	0.55	
V _{hys}	All inputs	0.2		0.2		V
I _I	V _{CC} = 5.5 V, V _{IN} = V _{CC}			5		μA
	V _{CC} = 5.25 V, V _{IN} = V _{CC}				5	
I _{IH}	V _{CC} = 5.5 V, V _{IN} = 2.7 V			±1		μA
	V _{CC} = 5.25 V, V _{IN} = 2.7 V				±1	
I _{IL}	V _{CC} = 5.5 V, V _{IN} = 0.5 V			±1		μA
	V _{CC} = 5.25 V, V _{IN} = 0.5 V				±1	
I _{OZH}	V _{CC} = 5.5 V, V _{OUT} = 2.7 V			10		μA
	V _{CC} = 5.25 V, V _{OUT} = 2.7 V				10	
I _{OZL}	V _{CC} = 5.5 V, V _{OUT} = 0.5 V			-10		μA
	V _{CC} = 5.25 V, V _{OUT} = 0.5 V				-10	
I _{OS} ‡	V _{CC} = 5.5 V, V _{OUT} = 0 V	-60	-120	-225		mA
	V _{CC} = 5.25 V, V _{OUT} = 0 V				-60 -120 -225	
I _{off}	V _{CC} = 0 V, V _{OUT} = 4.5 V			±1		μA
I _{CC}	V _{CC} = 5.5 V, V _{IN} ≤ 0.2 V, V _{IN} ≥ V _{CC} - 0.2 V	0.1	0.2			mA
	V _{CC} = 5.25 V, V _{IN} ≤ 0.2 V, V _{IN} ≥ V _{CC} - 0.2 V				0.1 0.2	
ΔI _{CC}	V _{CC} = 5.5 V, V _{IN} = 3.4 V§, f ₁ = 0, Outputs open	0.5	2			mA
	V _{CC} = 5.25 V, V _{IN} = 3.4 V§, f ₁ = 0, Outputs open				0.5 2	
I _{CCD} ¶	V _{CC} = 5.5 V, One input switching at 50% duty cycle, Outputs open, $\overline{OE}_A = \overline{OE}_B = \text{GND}$, V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} - 0.2 V	0.06	0.12			mA/ MHz
	V _{CC} = 5.25 V, One input switching at 50% duty cycle, Outputs open, $\overline{OE}_A = \overline{OE}_B = \text{GND}$, V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} - 0.2 V				0.06 0.12	

† Typical values are at V_{CC} = 5 V, T_A = 25°C.

‡ 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 to minimize internal chip heating and more accurately reflect operational values. Otherwise, prolonged shorting of a high output can raise the chip temperature well above normal and cause invalid readings in other parametric tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

§ Per TTL-driven input (V_{IN} = 3.4 V); all other inputs at V_{CC} or GND

¶ This parameter is derived for use in total power-supply calculations.



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electrical characteristics over recommended operating free-air temperature range (unless otherwise noted) (continued)

PARAMETER	TEST CONDITIONS		CY54FCT240T		CY74FCT240T		UNIT		
			MIN	TYP†	MAX	MIN		TYP†	MAX
I _C #	V _{CC} = 5.5 V, Outputs open, OE _A = OE _B = GND	One bit switching at f ₁ = 10 MHz at 50% duty cycle	V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} - 0.2 V	0.7	1.4		mA		
			V _{IN} = 3.4 V or GND	1	2.4				
		Eight bits switching at f ₁ = 2.5 MHz at 50% duty cycle	V _{IN} = 0.2 V or V _{IN} ≥ V _{CC} - 0.2 V	1.3	2.6				
			V _{IN} = 3.4 V or GND	3.3	10.6				
	V _{CC} = 5.25 V, Outputs open, OE _A = OE _B = GND	One bit switching at f ₁ = 10 MHz at 50% duty cycle	V _{IN} ≤ 0.2 V or V _{IN} ≥ V _{CC} - 0.2 V			0.7		1.4	
			V _{IN} = 3.4 V or GND			1		2.4	
		Eight bits switching at f ₁ = 2.5 MHz at 50% duty cycle	V _{IN} = 0.2 V or V _{IN} ≥ V _{CC} - 0.2 V			1.3	2.6		
			V _{IN} = 3.4 V or GND			3.3	10.6		
C _i				5	10		5	10	pF
C _o				9	12		9	12	pF

† Typical values are at V_{CC} = 5 V, T_A = 25°C.

I_C = I_{CC} + ΔI_{CC} × D_H × N_T + I_{CCD} (f₀/2 + f₁ × N₁)

Where:

I_C = Total supply current

I_{CC} = Power-supply current with CMOS input levels

ΔI_{CC} = Power-supply current for a TTL high input (V_{IN} = 3.4 V)

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 milliamperes and all frequencies are in megahertz.

|| Values for these conditions are examples of the I_{CC} formula.



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switching characteristics over operating free-air temperature range (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	CY54FCT240T		CY54FCT240AT		CY54FCT240CT		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t _{PLH}	D	\bar{O}	1.5	9	1.5	5.1	1.5	4.7	ns
t _{PHL}			1.5	9	1.5	5.1	1.5	4.7	
t _{PZH}	\overline{OE}	\bar{O}	1.5	10.5	1.5	6.5	1.5	5.7	ns
t _{PZL}			1.5	10.5	1.5	6.5	1.5	5.7	
t _{PHZ}	\overline{OE}	\bar{O}	1.5	10	1.5	5.9	1.5	4.6	ns
t _{PLZ}			1.5	10	1.5	5.9	1.5	4.6	

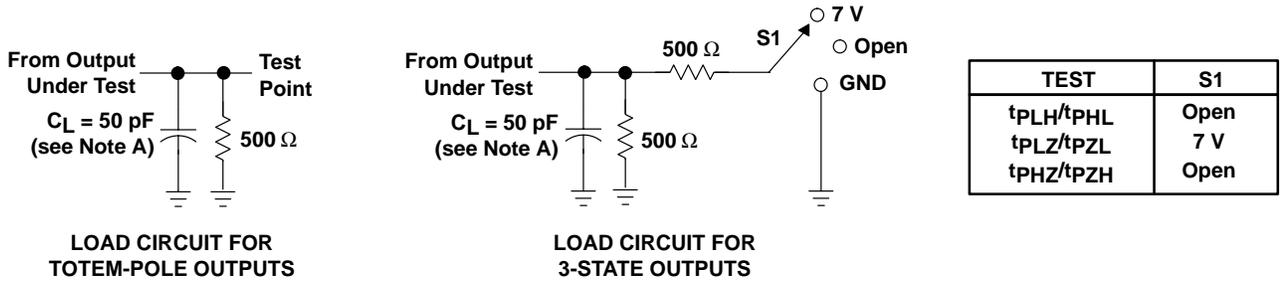
switching characteristics over operating free-air temperature range (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	CY74FCT240T		CY74FCT240AT		CY74FCT240CT		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t _{PLH}	D	\bar{O}	1.5	8	1.5	4.8	1.5	4.3	ns
t _{PHL}			1.5	8	1.5	4.8	1.5	4.3	
t _{PZH}	\overline{OE}	\bar{O}	1.5	10	1.5	6.2	1.5	5	ns
t _{PZL}			1.5	10	1.5	6.2	1.5	5	
t _{PHZ}	\overline{OE}	\bar{O}	1.5	9.5	1.5	5.6	1.5	4.5	ns
t _{PLZ}			1.5	9.5	1.5	5.6	1.5	4.5	

CY54FCT240T, CY74FCT240T
8-BIT BUFFERS/LINE DRIVERS
WITH 3-STATE OUTPUTS

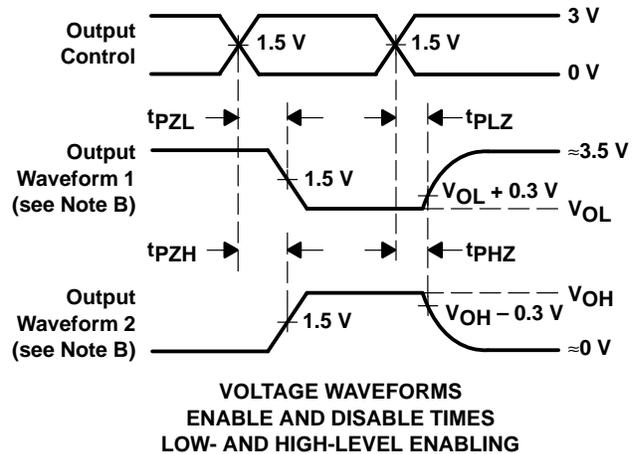
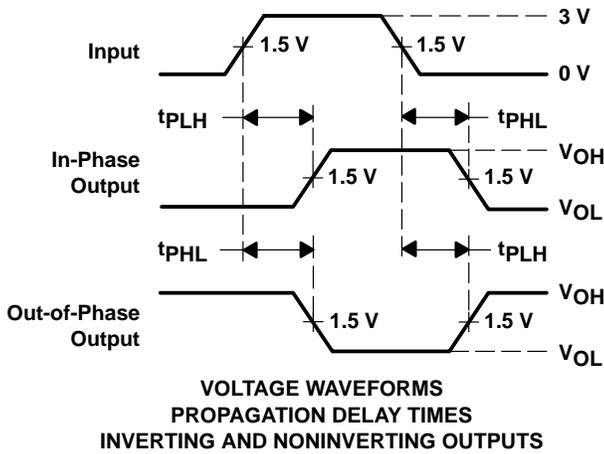
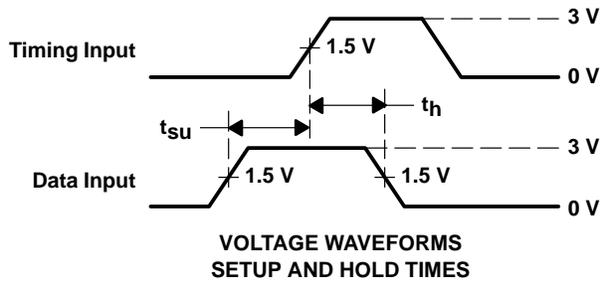
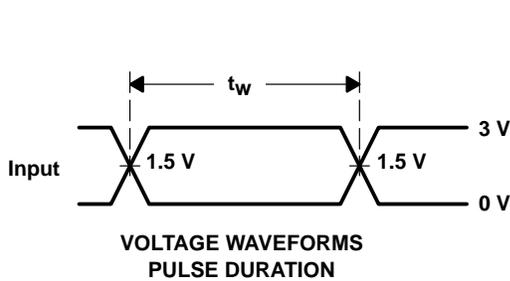
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PARAMETER MEASUREMENT INFORMATION



LOAD CIRCUIT FOR TOTEM-POLE OUTPUTS

LOAD CIRCUIT FOR 3-STATE OUTPUTS



- NOTES: A. C_L includes probe and jig capacitance.
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 C. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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