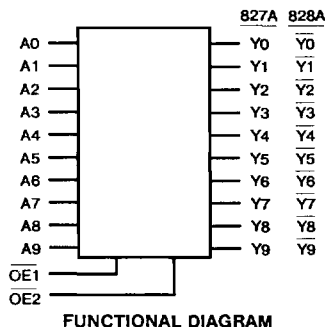


CD54/74FCT827A, CD54/74FCT827BT CD54/74FCT828A, CD54/74FCT828BT

July 1990



10-Bit Buffers/Line Drivers, 3-State

CD54/74FCT827A, CD54/74FCT827BT - Non-Inverting
CD54/74FCT828A, CD54/74FCT828BT - Inverting

Type Features:

- Buffered inputs
- Typical propagation delay:
6.8ns @ VCC = 5V, TA = +25°C, CL = 50pF (FCT827A, FCT828A)

Family Features:

- SCR-latchup-resistant BiCMOS process and circuit design
- FCTXXXA - Speed of bipolar FAST*/AS/S;
FCTXXXBT - 30% faster than FAST/AS/S with significantly reduced power consumption
- 48/32-mA output sink current (commercial/extended industrial)
- Output voltage swing limited to 3.7V @ VCC = 5V
- Controlled output-edge rates
- Input/output isolation to VCC
- BiCMOS technology with low quiescent power

* FAST is a registered trademark of Fairchild Semiconductor Corp.

The CD54/74FCT827A, 827BT, 828A and 828BT 10-bit, 3-state, bus drivers use small-geometry BiCMOS technology. The output stage is a combination of bipolar and CMOS transistors that limits the output-HIGH level to two diode drops below VCC. This resultant lowering of output swing (0V to 3.7V) reduces power bus ringing (a source of EMI) and minimizes VCC bounce and ground bounce and their effects during simultaneous output switching. The output configuration also enhances switching speed and is capable of sinking 32 to 48 milliamperes. These drivers provide high-performance bus interface buffering for wide data paths or buses carrying parity.

The CD54/74FCT827A, 827BT, 828A and 828BT are supplied in 24-lead dual-in-line narrow-body plastic packages (EN suffix) and in 24-lead dual-in-line small-outline plastic packages (M suffix). Both package types are operable over two temperature ranges: Commercial (0°C to +70°C) and Extended Industrial (-55°C to +125°C).

The CD54FCT827A and 828A are also available in chip form (H suffix). These unpackaged devices are operable over the -55°C to +125°C temperature range.

TRUTH TABLE

INPUTS			OUTPUTS	
			FCT827A/BT	FCT828A/BT
OE1	OE2	An	Yn	Yn
L	L	L	L	H
L	L	H	H	L
H	X	X	Z	Z
X	H	X	Z	Z

H = HIGH Voltage Level (steady state)
L = LOW Voltage Level (steady state)
X = Immaterial
Z = HIGH Impedance

MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE (VCC)	-0.5V to 6V
DC INPUT DIODE CURRENT, I _{IK} (for V _I < -0.5V)	-20mA
DC OUTPUT DIODE CURRENT, I _{OK} (for V _O < -0.5V)	-50mA
DC OUTPUT SINK CURRENT per Output Pin, I _O	+70mA
DC OUTPUT SOURCE CURRENT per Output Pin, I _O	-30mA
DC VCC CURRENT (I _{CC})	264mA
DC GROUND CURRENT (I _{GD})	500mA
POWER DISSIPATION PER PACKAGE (PD):	
For TA = -55°C to +100°C (PACKAGE TYPE E)	500mW
For TA = +100°C to +125°C (PACKAGE TYPE E)	Derate Linearly at 8mW/°C to 300mW
For TA = -55°C to +70°C (PACKAGE TYPE M)	400mW
For TA = +70°C to +125°C (PACKAGE TYPE M)	Derate Linearly at 6mW/°C to 70mW
OPERATING-TEMPERATURE RANGE (TA):	
PACKAGE TYPE E, M	-55°C to +125°C
STORAGE TEMPERATURE (T_{stg})	-65°C to +150°C
LEAD TEMPERATURE (DURING SOLDERING):	
At distance 1/16 in. ± 1/32 in. (1.59mm ± 0.79mm) from case for 10s maximum	+265°C
Unit inserted into PC board min. thickness 1/16 in. (1.59mm) with solder contacting lead tips only	+300°C

RECOMMENDED OPERATING CONDITIONS:

The following are normal operating ranges for these devices. For maximum reliability, devices should always be operated within these ranges.

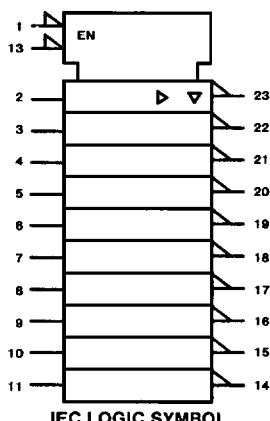
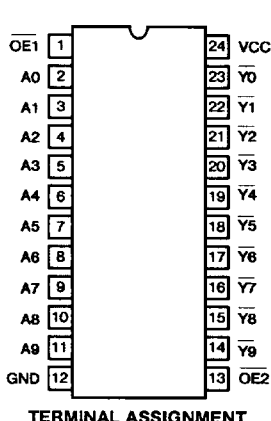
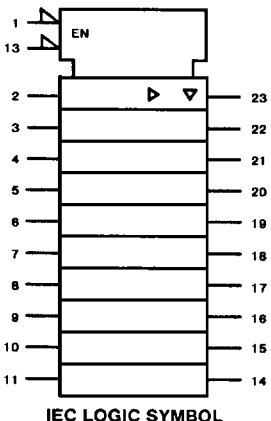
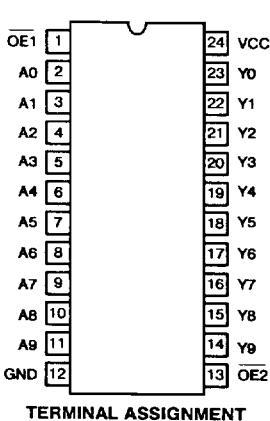
CHARACTERISTIC	LIMITS		UNITS
	MIN	MAX	
Supply-Voltage Range, VCC*: CD74 Series, TA = 0°C to 70°C	4.75	5.25	V
	CD54 Series, TA = -55°C to +125°C	4.5	5.5
DC Input Voltage, V _I	0	VCC	V
DC Output Voltage, V _O	0	≤ VCC	V
Operating Temperature, TA	-55	+125	°C
Input Rise and Fall Slew Rate, dt/dv	0	10	ns/V

* Unless otherwise specified, all voltages are referenced to ground.

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TECHNICAL DATA

CD54/74FCT827A, CD54/74FCT827BT TYPES

CD54/74FCT828A, CD54/74FCT828BT TYPES



STATIC ELECTRICAL CHARACTERISTICS

FCT Series: 74FCT Commercial Temperature Range, 0°C to +70°C; VCC max = 5.25V, VCC min = 4.75V

54FCT Extended Industrial Temperature Range, -55°C to +125°C; VCC max = 5.5V, VCC min = 4.5V

CHARACTERISTICS		TEST CONDITIONS		VCC (V)	AMBIENT TEMPERATURE (TA)						UNITS
					+25°C		0°C to +70°C		-55°C to +125°C		
					MIN	MAX	MIN	MAX	MIN	MAX	
High-Level Input Voltage	V _{IH}			4.5 to 5.5	2	-	2	-	2	-	V
Low-Level Input Voltage	V _{IL}			4.5 to 5.5	-	0.8	-	0.8	-	0.8	V
High-Level Output Voltage	V _{OH}	V _{IH} or V _{IL}	-24	MIN	2.4	-	2.4	-	-	-	V
			-20	MIN	2.4	-	-	-	2.4	-	V
Low-Level Output Voltage	V _{OL}	V _{IH} or V _{IL}	48	MIN	-	0.55	-	0.55	-	-	V
			32	MIN	-	0.55	-	-	-	0.55	V
High-Level Input Current	I _{IH}	VCC		MAX	-	0.1	-	1	-	1	μA
Low-Level Input Current	I _{IL}	GND		MAX	-	-0.1	-	-1	-	-1	μA
3-State Leakage Current	IOZH	VCC		MAX	-	0.5	-	10	-	10	μA
	IOZL	GND		MAX	-	-0.5	-	-10	-	-10	μA
Short-Circuit Output Current *	I _{OS}	VCC or GND V _O = 0		MAX	-75	-	-75	-	-75	-	mA
Input Clamp Voltage	V _{IK}	VCC or GND	-18	MIN	-	-1.2	-	-1.2	-	-1.2	V
Quiescent Supply Current, MSI	I _{CC}	VCC or GND	0	MAX	-	8	-	80	-	500	μA
Additional Quiescent Supply Current per Input Pin TTL Inputs High, 1 Unit Load	ΔI _{CC}	3.4V†		MAX	-	1.6	-	1.6	-	2	mA

* Not more than one output should be shorted at one time. Test duration should not exceed 100ms.

† Inputs that are not measured are at VCC or GND.

FCT Input Loading: All inputs are 1 unit load. Unit load is ΔI_{CC} limit specified in Static Characteristics Chart, e.g., 1.6mA max. @ +70°C.

SWITCHING CHARACTERISTICS

FCT Series: $t_r, t_f = 2.5ns, C_L = 50pF, R_L$ - See Figure 3

CHARACTERISTICS	SYMBOL	V _{CC} (V)	CD54/74FCT827A, 828A						CD54/74FCT827BT, 828BT						UNITS						
			AMBIENT TEMPERATURE (T _A)																		
			+25°C			0°C to +70°C			-55°C to +125°C			+25°C				0°C to +70°C			-55°C to +125°C		
			TYP	MIN	MAX	MIN	MAX	TYP	MIN	MAX	MIN	MAX	TYP	MIN		MAX	MIN	MAX			
Propagation Delays:	FCT827A/BT	t _{PLH} , t _{PHL}	5†	6	1.5	8	1.5	9									ns				
Data to Outputs	FCT828A/BT	t _{PLH} , t _{PHL}	5	6.8	1.5	9	1.5	10									ns				
Output Disable to Output		t _{PLZ} , t _{PHZ}	5	7.5	1.5	10	1.5	10									ns				
Output Enable to Output		t _{PZH} , t _{PZL}	5	9	1.5	12	1.5	13									ns				
Power Dissipation Capacitance		C _{PD} §	-														pF				
Min. (Valley) V _{OHV} During Switching of Other Outputs (Output Under Test Not Switching)		V _{OHV} See Figure 1	5						0.5 Typical @ +25°C						V						
Max. (Peak) V _{OLP} During Switching of Other Outputs (Output Under Test Not Switching)		V _{OLP} See Figure 1	5						1 Typical @ +25°C						V						
Input Capacitance		C _I	-	-	-	10	-	10	-	-	10	-	10	-	10	-	pF				
3-State Output Capacitance		C _O	-	-	-	15	-	15	-	-	15	-	15	-	15	-	pF				

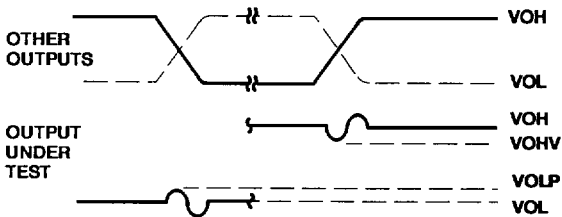
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†5V: min. is @ 5.5V
 max. is @ 4.5V
 5V: min. is @ 5.25V for 0°C to +70°C
 max. is @ 4.75V for 0°C to +70°C
 typ. is @ 5V

§C_{PD}, measured per function, is used to determine the dynamic power consumption.
 P_D (per package) = $V_{CC} I_{CC} + \sum (V_{CC}^2 t_i C_{PD} + V_O^2 t_o C_L + V_{CC} \Delta I_{CC} D)$ where:
 V_{CC} = supply voltage
 ΔI_{CC} = flow through current x unit load
 C_L = output load capacitance
 D = duty cycle of input high
 f_o = output frequency
 f_i = input frequency

4
 TECHNICAL DATA

PARAMETER MEASUREMENT INFORMATION



NOTES:

1. VOLP is measured with respect to a ground reference near the output under test. VOHV is measured with respect to VOH.
2. Input pulses have the following characteristics:
PRR \leq 1MHz, $t_r = 2.5ns$, $t_f = 2.5ns$, skew 1ns.
3. R.F. fixture with 700-MHz design rules required. IC should be soldered into test board and bypassed with 0.1 μ F capacitor. Scope and probes require 700-MHz bandwidth.

Figure 1 - Simultaneous switching transient waveforms.

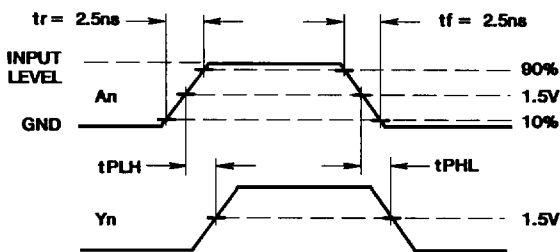
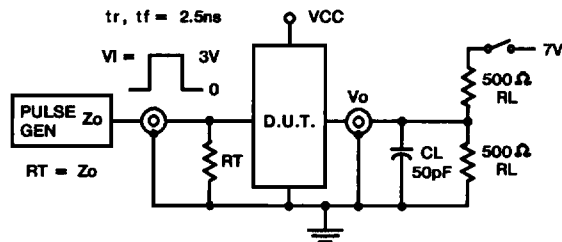
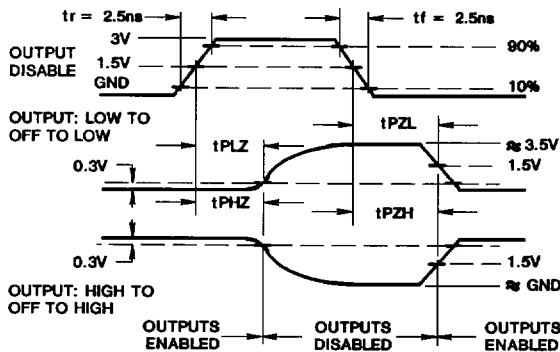


Figure 2 - Propagation delay times.



TEST	SWITCH POSITION
t_{PLZ}, t_{PZL} , OPEN DRAIN	CLOSED
$t_{PHZ}, t_{PZH}, t_{PLH}, t_{PHL}$	OPEN

Figure 3 - Three-state propagation delay times and test circuit.