

P54/74FCT640/A (P54/74PCT640/A) P54/74FCT643/A (P54/74PCT643/A) OCTAL BIDIRECTIONAL TRANSCEIVERS WITH 3-STATE OUTPUTS

★ FEATURES

- Function, Pinout, and Drive Compatible with the FCT and F Logic
- FCT-A speed at 5.0ns max. (Com'I)
FCT speed at 7.0ns max. (Com'I)
- CMOS V_{OH} Levels for Low Power Consumption
— Typically 1/3 of FAST Bipolar Logic
- Edge-rate Control Circuitry for Significantly Improved Noise Characteristics
- ESD protection exceeds 2000V
- Inputs and Outputs Interface Directly with TTL, NMOS, and CMOS Devices
- Outputs Meet Levels Required for CMOS Static RAM Low Power Standby Mode
- 64 mA Sink Current (Com'I), 48 mA (Mil)
15 mA Source Current (Com'I), 12 mA (Mil)
- 3-State Outputs
- Manufactured in 0.8 micron PACE Technology™

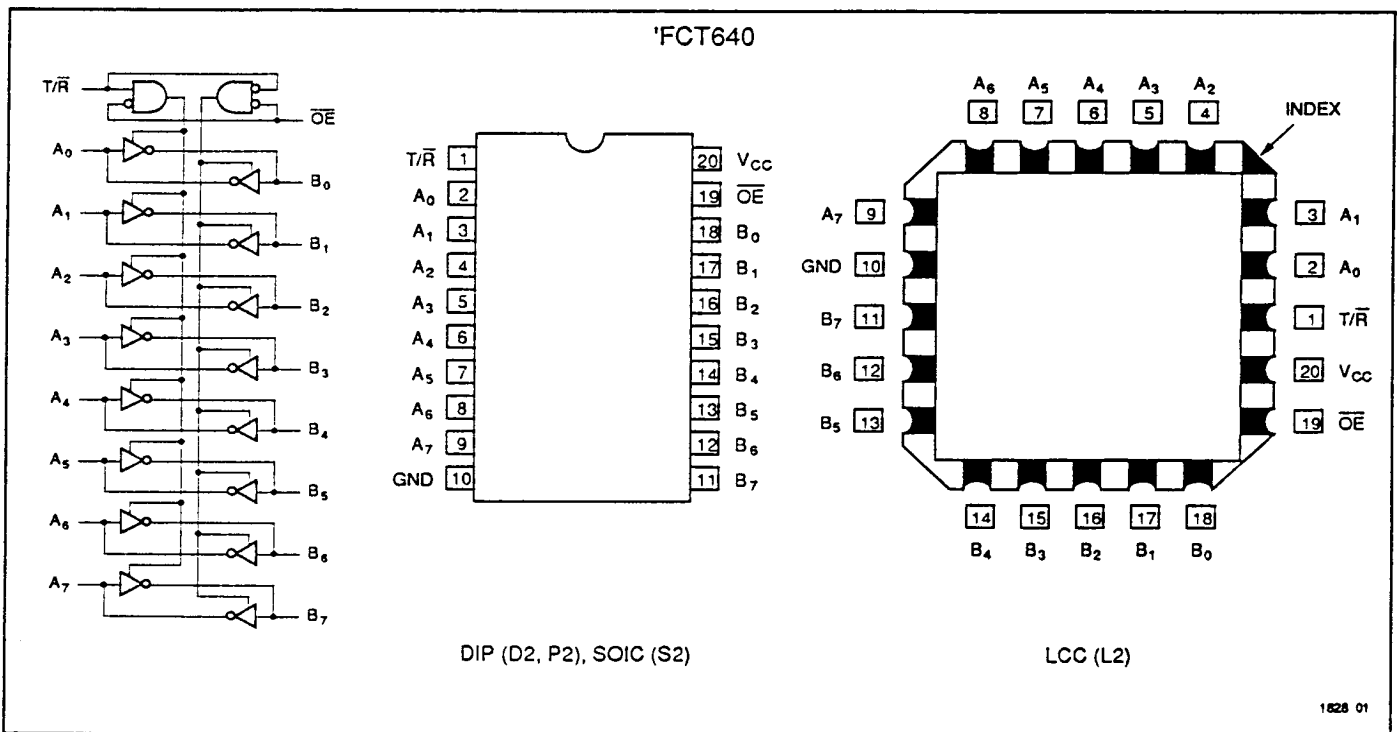
★ DESCRIPTION

The 'FCT640, 'FCT643 contain eight bidirectional buffers with 3-state outputs and is intended for bus oriented applications. Current sinking capability is 64 mA at the A & B ports. The 'FCT640 and 'FCT643 are identical except for the non-inversion on the B port for the 'FCT643.

The Transmit/Receive (T/\bar{R}) input determines the direction of data flow through the bidirectional transceiver. Transmit (Active HIGH) enables data from A ports to B ports; receive (Active LOW) enables data from B ports to A ports. The output enable input, when HIGH, disables both the A and B ports by putting them in a high Z condition.

★ LOGIC BLOCK DIAGRAM

PIN CONFIGURATIONS



Means Quality, Service and Speed

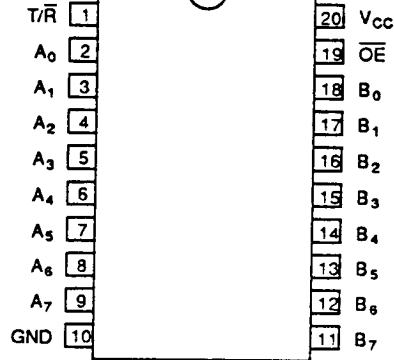
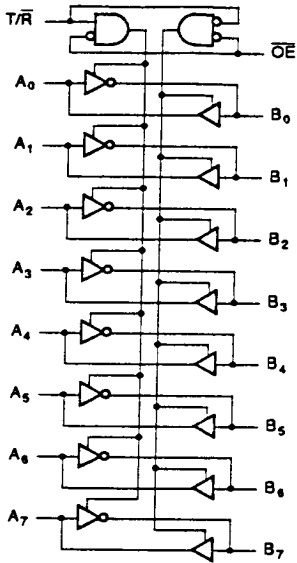
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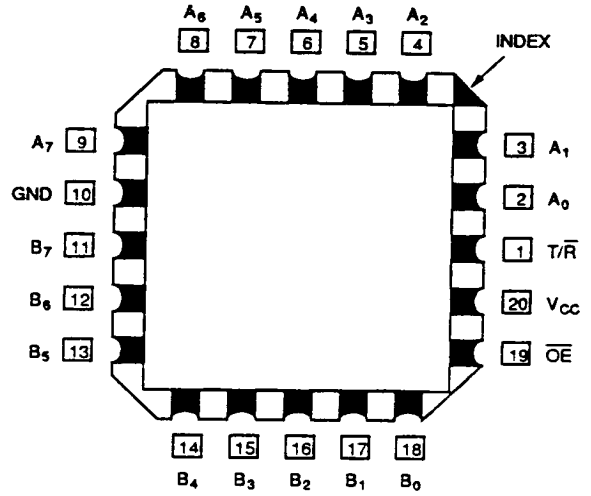
LOGIC BLOCK DIAGRAM

PIN CONFIGURATIONS

'FCT643



DIP (D2, P2), SOIC (S2)



LCC (L2)

1828 02

ABSOLUTE MAXIMUM RATINGS^{1,2}

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
I _{IN}	Input Current	-30 to +5.0	mA

Notes:

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1. 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.

RECOMMENDED OPERATING CONDITIONS

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

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Symbol	Parameter	Value	Unit
I _{OUTPUT}	Current Applied to Output	120	mA
V _{IN}	Input Voltage	-0.5 to V _{CC} + 0.5	V
V _{OUT}	Voltage Applied to Output	-0.5 to V _{CC} + 0.5	V

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2. Unused inputs must always be connected to an appropriate logic voltage level, preferably either V_{CC} or ground.

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

1828 Tbl 04

DC ELECTRICAL CHARACTERISTICS (Over recommended operating conditions)

Symbol	Parameter	Min	Typ ¹	Max	Units	V _{CC}	Conditions	
V _{IH}	Input HIGH Voltage	2.0			V			
V _{IL}	Input LOW Voltage			0.8	V			
V _H	Hysteresis		0.35		V		All inputs	
V _{CD}	Input clamp diode voltage		-0.7	-1.2	V	MIN	I _{IN} = -18mA	
V _{OH}	Output HIGH voltage	V _{CC} = 3V, V _{IN} = 0.2V, or V _{CC} - 0.2V		V _{CC} - 0.2	V _{CC}	V	I _{OH} = -32μA	
		Military/Commercial (CMOS)	V _{CC} - 0.2	V _{CC}	V	MIN	I _{OH} = -300μA	
		Military (TTL)	2.4	4.3	V	MIN	I _{OH} = -12mA	
		Commercial (TTL)	2.4	4.3	V	MIN	I _{OH} = -15mA	
V _{OL}	Output LOW voltage	V _{CC} = 3V, V _{IN} = 0.2V, or V _{CC} - 0.2V			GND	0.2	V	I _{OL} = 300μA
		Military/Commercial (CMOS)		GND	0.2	V	MIN	I _{OL} = 300μA
		Military (TTL)		0.3	0.55	V	MIN	I _{OL} = 48mA
		Commercial (TTL)		0.3	0.55	V	MIN	I _{OL} = 64mA
I _{IH}	Input HIGH Current (Except I/O Pins)			5	μA	MAX	V _{IN} = V _{CC}	
I _{IL}	Input LOW Current (Except I/O Pins)			-5	μA	MAX	V _{IN} = GND	
I _{IH}	Input HIGH Current ³ (Except I/O Pins)			5	μA	MAX	V _{IN} = 2.7V	
I _{IL}	Input LOW Current ³ (Except I/O Pins)			-5	μA	MAX	V _{IN} = 0.5V	
I _{IH}	Input HIGH Current (I/O Pins only)			15	μA	MAX	V _{IN} = V _{CC}	
I _{IL}	Input LOW Current (I/O Pins only)			-15	μA	MAX	V _{IN} = GND	
I _{IH}	Input HIGH Current ³ (I/O Pins only)			15	μA	MAX	V _{IN} = 2.7V	
I _{IL}	Input LOW Current ³ (I/O Pins only)			-15	μA	MAX	V _{IN} = 0.5V	
I _{OS}	Output short circuit ²	-60	-120		mA	MAX	V _{OUT} = 0.0V	
C _{IN}	Input capacitance ³		5	10	pF		All inputs	
C _{OUT}	Output capacitance ³		9	12	pF		All outputs	

Notes:

1828 Tbl 05

1. Typical limits are at V_{CC} = 5.0V, T_A = +25°C ambient.
 2. 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 parameter tests. In any sequence of parameter tests, I_{OS} tests should be performed last.

3. This parameter is guaranteed but not tested.

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

Symbol	Parameter	Typ ¹	Max	Units	Conditions
I_{CC}	Quiescent Power Supply Current (CMOS inputs)	0.003	0.5	mA	$V_{CC} = \text{MAX}$, $f_1 = 0$, Outputs Open, $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC} - 0.2V$
ΔI_{CC}	Quiescent Power Supply Current (TTL inputs)	0.5	2.0	mA	$V_{CC} = \text{MAX}$, $V_{IN} = 3.4V^2$, $f_1 = 0$, Outputs Open
I_{CCD}	Dynamic Power Supply Current ³	0.15	0.25	mA/ mHz	$V_{CC} = \text{MAX}$, One Input Toggling, 50% Duty Cycle, Outputs Open, $T/\bar{R} = \overline{OE} = \text{GND}$ and $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC} - 0.2V$,
I_C	Total Power Supply Current ⁵	2.0	4.0	mA	$V_{CC} = \text{MAX}$, 50% Duty Cycle, Outputs Open, One Bit Toggling at $f_1 = 10\text{MHz}$, $T/\bar{R} = \overline{OE} = \text{GND}$ and $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC} - 0.2V$
		2.3	5.0	mA	$V_{CC} = \text{MAX}$, 50% Duty Cycle, Outputs Open, One Bit Toggling at $f_1 = 10\text{MHz}$, $T/\bar{R} = \overline{OE} = \text{GND}$ and $V_{IN} = 3.4V$ or $V_{IN} = \text{GND}$
		3.5	6.5 ⁴	mA	$V_{CC} = \text{MAX}$, 50% Duty Cycle, Outputs Open, Eight Bits Toggling at $f_1 = 2.5\text{MHz}$, $T/\bar{R} = \overline{OE} = \text{GND}$ and $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC} - 0.2V$
		5.5	14.5 ⁴	mA	$V_{CC} = \text{MAX}$, 50% Duty Cycle, Outputs Open, Eight Bits Toggling at $f_1 = 2.5\text{MHz}$, $T/\bar{R} = \overline{OE} = \text{GND}$ and $V_{IN} = 3.4V$ or $V_{IN} = \text{GND}$

Notes:

- Typical values are at $V_{CC} = 5.0V$, $+25^\circ\text{C}$ ambient.
- 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.
- $I_C = I_{\text{QUIESCENT}} + I_{\text{INPUTS}} + I_{\text{DYNAMIC}}$
 $I_C = I_{CC} + \Delta I_{CC} D_H N_T + I_{CCD} (f_c/2 + f_1 N_1)$
 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)
 - f_c = Clock Frequency for Register Devices (Zero for Non-Register Devices)
 - f_1 = Input Frequency
 - N_1 = Number of Inputs at f_1
- All currents are in milliamperes and all frequencies are in megahertz.

1828 Ttl 06

FUNCTION TABLES

'FCT640		
Enable OE	Direction Control T/R	Operation
L	L	\bar{B} Data to Bus A
L	H	\bar{A} Data to Bus B
H	X	High Z State

1828 Ttl 07

'FCT643		
Enable OE	Direction Control T/R	Operation
L	L	B Data to Bus A
L	H	\bar{A} Data to Bus B
H	X	High Z State

1828 Ttl 06

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

AC CHARACTERISTICS

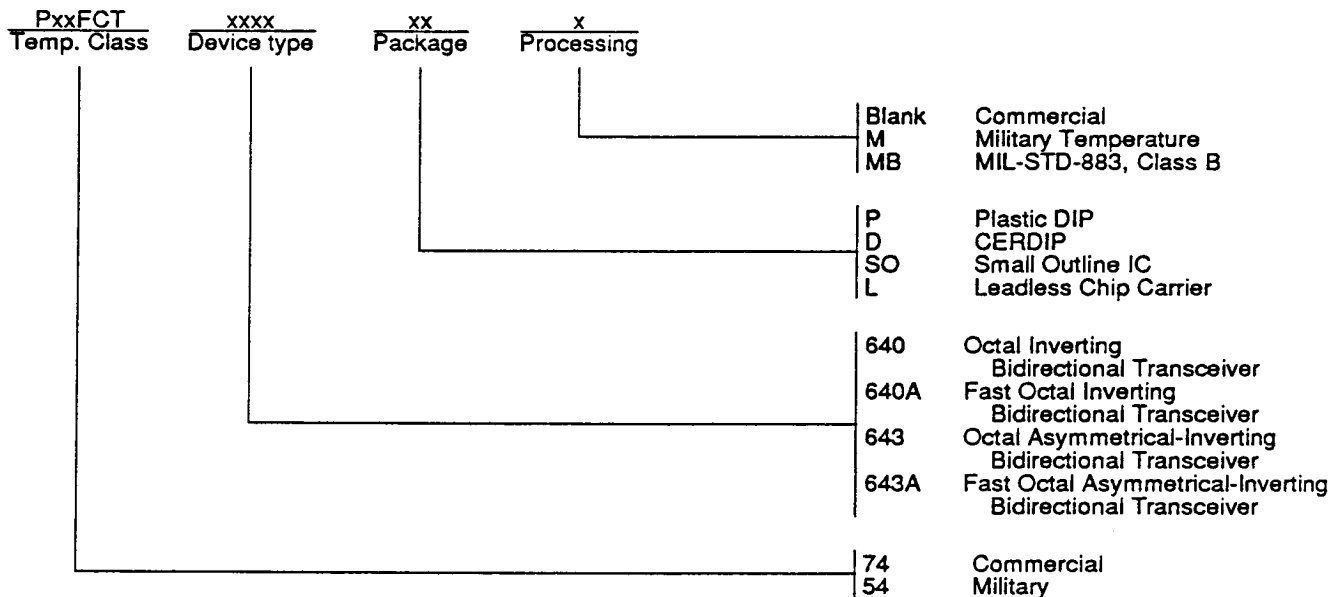
Symbol	Parameter	'FCT640 'FCT643				'FCT640A 'FCT643A				Units	Fig. No.
		MIL		COM'L		MIL		COM'L			
		Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.	Min. ¹	Max.		
t _{PLH} t _{PHL}	Propagation Delay A _n to B _n or B _n to A _n	1.5	8.0	1.5	7.0	1.5	5.3	1.5	5.0	ns	1 3
t _{PZH} t _{PZL}	Output Enable Time	1.5	9.5	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	9.0	1.5	7.5	1.5	5.3	1.5	5.0		

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Notes:

1. Minimum limits are guaranteed but not tested on Propagation Delays.
AC Characteristics guaranteed with C_L = 50pF as shown in Figure 1.

ORDERING INFORMATION



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