



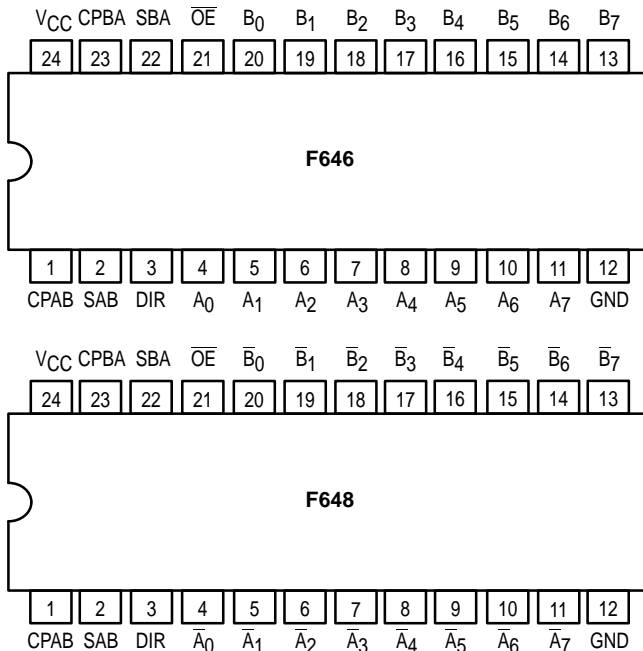
## Product Preview

# OCTAL TRANSCEIVER/REGISTER WITH 3-STATE OUTPUTS

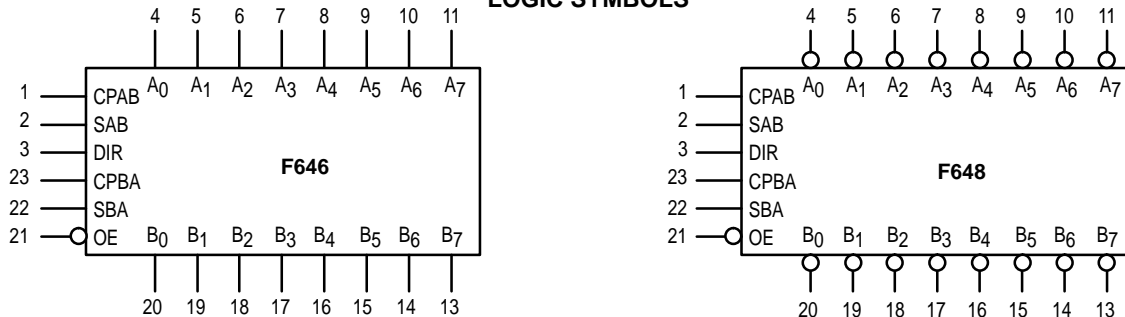
These devices consist of bus transceiver circuits with 3-state D-type flip-flops, and control circuitry arranged for multiplexed transmission of data directly from the input bus or from the internal registers. Data on the A or B bus will be clocked into the registers as the appropriate clock pin goes to a high logic level. Output Enable ( $\overline{OE}$ ) and DIR pins are provided to control the transceiver function. In the transceiver mode, data present at the high impedance port may be stored in either the A or the B register or in both. The select controls can multiplex stored and real-time (transparent mode) data. The direction control determines which bus will receive data when the enable  $\overline{OE}$  is Active LOW. In the isolation mode ( $\overline{OE}$  HIGH), A data may be stored in the B register and/or B data may be stored in the A register.

- Independent Registers for A and B
- Multiplexed Real-Time and Stored Data
- Choice of True (F646) and Inverting (F648) Data Paths
- 3-State Outputs

### PIN ASSIGNMENTS



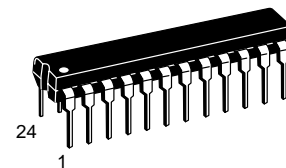
### LOGIC SYMBOLS



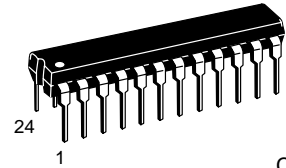
**MC54/74F646**  
**MC54/74F648**

**OCTAL TRANSCEIVER/REGISTER WITH 3-STATE OUTPUTS**

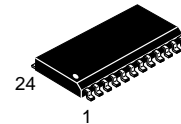
**FAST™ SCHOTTKY TTL**



**J SUFFIX**  
CERAMIC  
CASE 758-01



**N SUFFIX**  
PLASTIC  
CASE 724-03



**DW SUFFIX**  
SOIC  
CASE 751E-03

### ORDERING INFORMATION

MC54FXXXJ Ceramic  
MC74FXXXN Plastic  
MC74FXXXDW SOIC

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

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**FUNCTION TABLE**

Inputs						Data I/O*		Operation/Function
OE bar	DIR	CPAB	CPBA	SAB	SBA	A <sub>0</sub> -A <sub>7</sub>	B <sub>0</sub> -B <sub>7</sub>	
H	X	H or L	H or L	X	X	Input	Input	Isolation
H	X	↑	X	X	X	Input	Input	Store A <sub>n</sub> Data in A Register
H	X	X	↑	X	X	Input	Input	Store B <sub>n</sub> Data in B Register
H	X	↑	↑	X	X	Input	Input	Store A <sub>n</sub> /B <sub>n</sub> Data in A/B Register
L	H	X	X	L	X	Input	Output	A <sub>n</sub> to B <sub>n</sub> — Real Time (Transparent Mode)
L	H	↑	X	L	X	Input	Output	Store A <sub>n</sub> Data in A Register
L	H	H or L	X	H	X	Input	Output	A Register to B <sub>n</sub> (Stored Mode)
L	H	↑	X	H	X	Input	Output	Clock A <sub>n</sub> Data to B <sub>n</sub> and into A Register
L	L	X	X	X	L	Output	Input	B <sub>n</sub> to A <sub>n</sub> — Real Time (Transparent Mode)
L	L	X	↑	X	L	Output	Input	Store B <sub>n</sub> Data in B Register
L	L	X	H or L	X	H	Output	Input	B Register to A <sub>n</sub> (Stored Mode)
L	L	X	↑	X	H	Output	Input	Clock A <sub>n</sub> Data to B <sub>n</sub> and into B Register

\*The data output function may be enabled or disabled by various signals at the OE bar and DIR inputs. Data input functions are always enabled; i.e., data at the bus pins will be stored on every low-to-high transition of the appropriate clock inputs.

H = HIGH voltage level

L = LOW voltage level

X = Don't Care

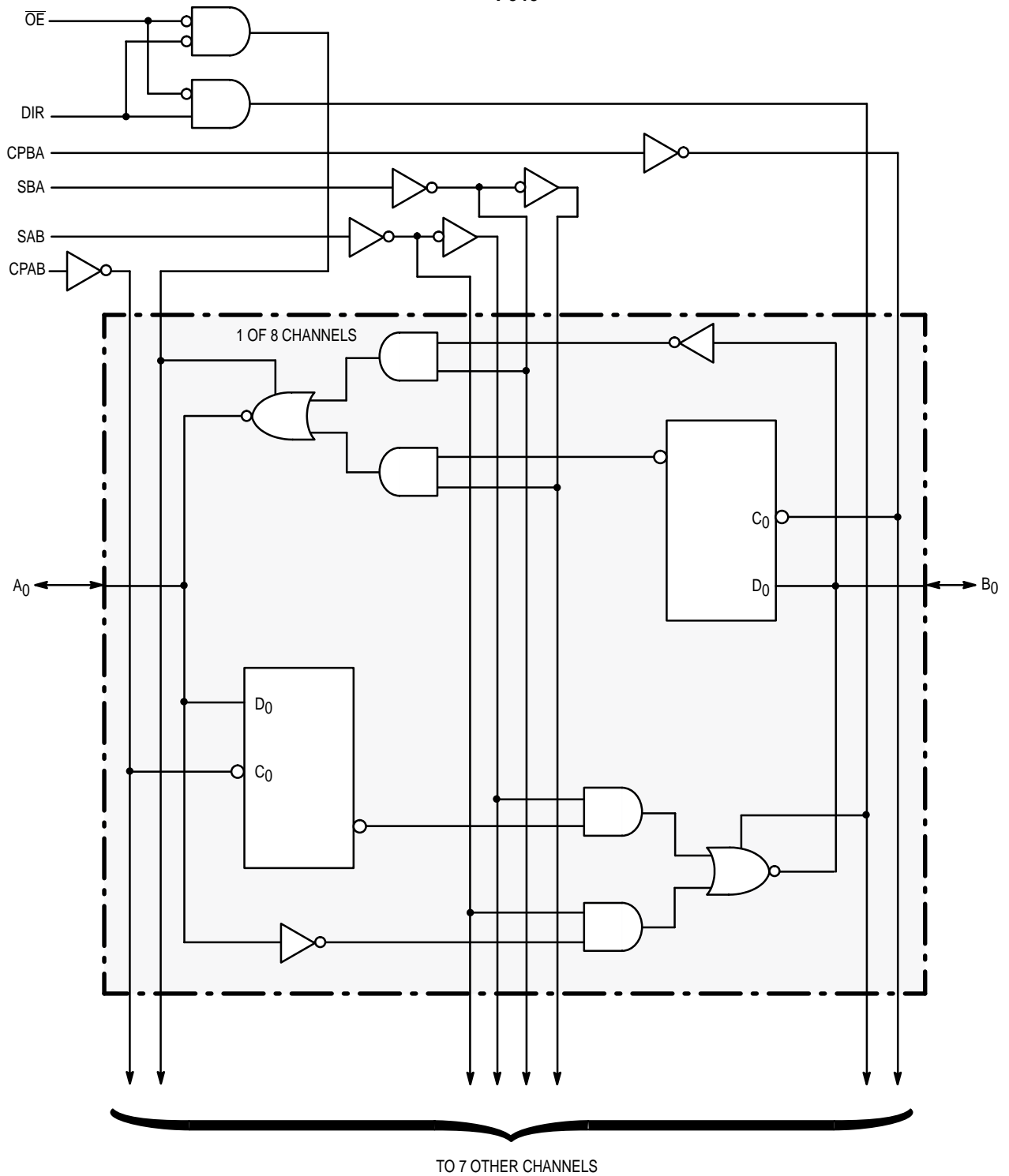
↑ = Low-to-High transition

**GUARANTEED OPERATING RANGES**

Symbol	Parameter		Min	Typ	Max	Unit
V <sub>CC</sub>	DC Supply Voltage	54, 74	4.5	5.0	5.5	V
T <sub>A</sub>	Operating Ambient Temperature Range	54 74	-55 0	25 25	125 70	°C
I <sub>OH</sub>	Output Current — High	54 74	— —	— —	-12 -15	mA
I <sub>OL</sub>	Output Current — Low	54 74	— —	— —	48 64	mA

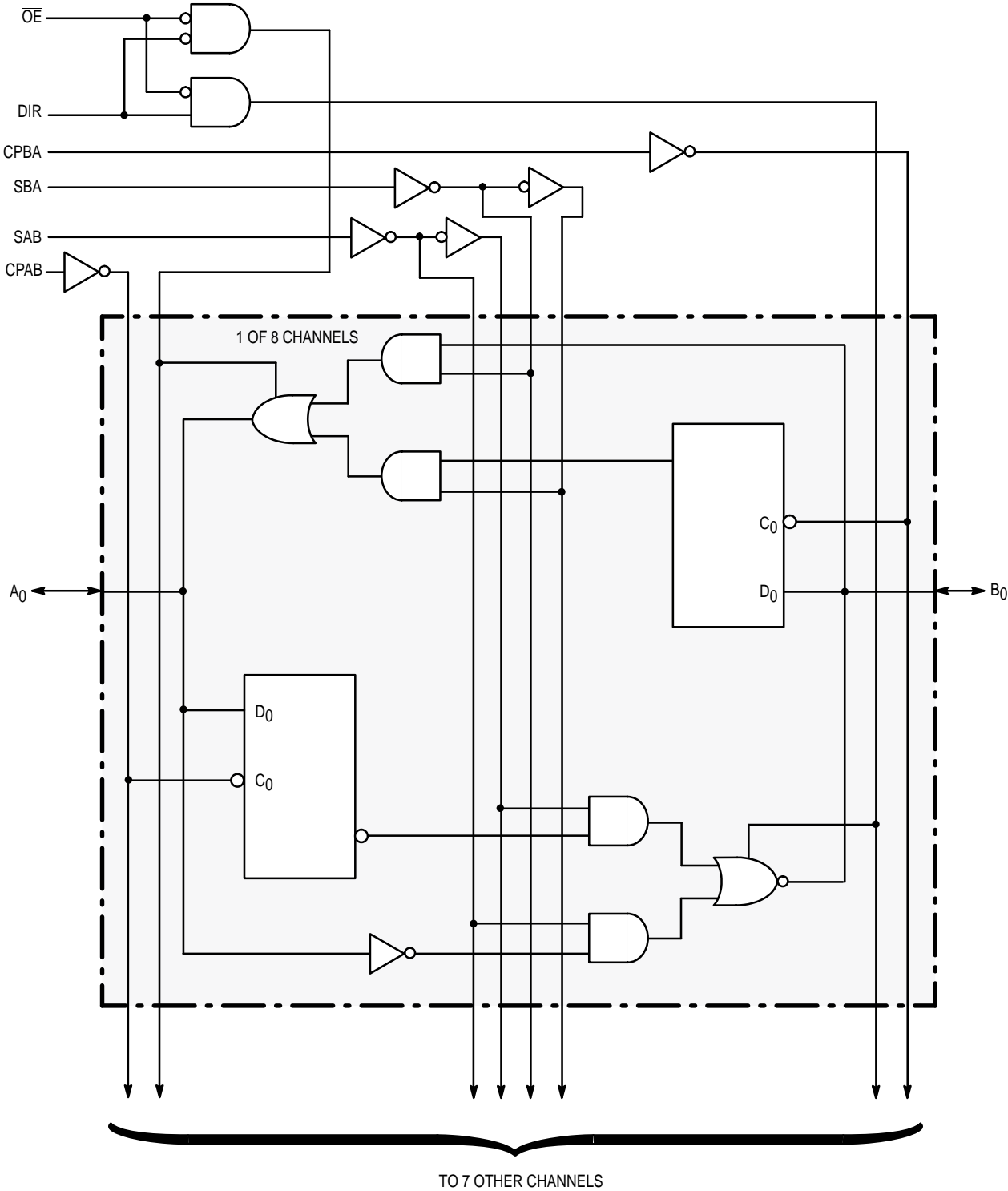
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LOGIC DIAGRAM  
F646



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LOGIC DIAGRAM  
F648



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## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter		Limits			Unit	Test Conditions (Note 1)		
			Min	Typ	Max				
V <sub>IH</sub>	Input HIGH Voltage		2.0	—	—	V	Guaranteed as a HIGH Signal		
V <sub>IL</sub>	Input LOW Voltage		—	—	0.8	V	Guaranteed as a LOW Signal		
V <sub>IK</sub>	Input Clamp Diode Voltage		—	—	-1.2	V	V <sub>CC</sub> = MIN, I <sub>IN</sub> = -18 mA		
V <sub>OH</sub>	Output HIGH Voltage	A <sub>n</sub> , B <sub>n</sub>	54/74	2.4	—	—	V	I <sub>OH</sub> = -3.0 mA	V <sub>CC</sub> = 4.5 V
			74	2.7	—	—	V	I <sub>OH</sub> = -3.0 mA	V <sub>CC</sub> = 4.75 V
			54	2.0	—	—	V	I <sub>OH</sub> = -12.0 mA	V <sub>CC</sub> = 4.5 V
			74	2.0	—	—	V	I <sub>OH</sub> = -15.0 mA	V <sub>CC</sub> = 4.5 V
V <sub>OL</sub>	Output LOW Voltage	A <sub>n</sub> , B <sub>n</sub>	54	—	—	0.55	V	I <sub>OL</sub> = 48 mA	V <sub>CC</sub> = MIN
			74	—	—	0.55	V	I <sub>OL</sub> = 64 mA	V <sub>CC</sub> = MIN
I <sub>IH</sub>	Input HIGH Current		Non I/O Pins	—	—	20	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V	
			Non I/O Pins	—	—	100	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V	
			I/O (A <sub>a</sub> , B <sub>n</sub> )	—	—	1.0	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 5.5 V	
I <sub>IL</sub>	Input LOW Current		Non I/O Pins	—	—	-600	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.5 V	
I <sub>IH</sub> + I <sub>OZH</sub>	Output Leakage Current		I/O (A <sub>n</sub> , B <sub>n</sub> )	—	—	70	μA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 2.7 V	
I <sub>IL</sub> + I <sub>OZL</sub>	Output Leakage Current		I/O (A <sub>n</sub> , B <sub>n</sub> )	—	—	-650	μA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 0.5 V	
I <sub>OS</sub>	Output Short Circuit Current (Note 2)		-100	—	-225	mA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = GND		
I <sub>CC</sub>	Power Supply Current		I <sub>CC</sub> H	—	—	135	mA	V <sub>out</sub> = HIGH	V <sub>CC</sub> = MAX
			I <sub>CC</sub> L	—	—	150		V <sub>out</sub> = LOW	
			I <sub>CC</sub> Z	—	—	150		V <sub>out</sub> = HIGH Z	

**NOTES:**

1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.
2. Not more than one output should be shorted at a time, nor for more than 1 second.

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## AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	54/74F		54F		74F		Unit
		$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 500\ \Omega$		$T_A = -55^\circ\text{C to } +125^\circ\text{C}$ $V_{CC} = +5.0\text{ V } \pm 10\%$ $C_L = 50\text{ pF}$ $R_L = 500\ \Omega$		$T_A = 0^\circ\text{C to } +70^\circ\text{C}$ $V_{CC} = +5.0\text{ V } \pm 10\%$ $C_L = 50\text{ pF}$ $R_L = 500\ \Omega$		
		Min	Max	Min	Max	Min	Max	
$f_{MAX}$	Maximum Clock Frequency	100	—	75	—	90	—	MHz
$t_{PLH}$ $t_{PHL}$	Propagation Delay Clock to Bus	2.0 2.0	7.0 8.0	2.0 2.0	8.5 9.5	2.0 2.0	8.0 9.0	ns
$t_{PLH}$ $t_{PHL}$	Propagation Delay Bus to Bus (F646)	1.0 1.0	7.0 6.5	1.0 1.0	8.0 8.0	1.0 1.0	7.5 7.0	ns
$t_{PLH}$ $t_{PHL}$	Propagation Delay Bus to Bus (F648)	1.0 1.0	7.0 6.5	1.0 1.0	10.0 9.0	1.0 1.0	7.5 7.0	ns
$t_{PLH}$ $t_{PHL}$	Propagation Delay SBA or SAB to $A_n$ or $B_n$	2.0 2.0	7.5 7.5	2.0 2.0	10.0 10.0	2.0 2.0	9.0 9.0	ns
$t_{PZH}$ $t_{PZL}$	Output Enable Time $\overline{OE}$ to $A_n$ or $B_n$	2.0 2.0	7.0 7.0	2.0 2.0	9.5 9.5	2.0 2.0	8.5 8.5	ns
$t_{PHZ}$ $t_{PLZ}$	Output Disable Time $\overline{OE}$ to $A_n$ or $B_n$	1.0 2.0	7.0 7.0	1.0 2.0	9.5 9.5	1.0 2.0	8.5 8.5	ns
$t_{PZH}$ $t_{PZL}$	Output Enable Time DIR to $A_n$ or $B_n$	2.0 2.0	7.0 7.0	2.0 2.0	9.5 9.5	2.0 2.0	8.5 8.5	ns
$t_{PHZ}$ $t_{PLZ}$	Output Disable Time DIR to $A_n$ or $B_n$	1.0 2.0	7.0 7.0	1.0 2.0	9.5 9.5	1.0 2.0	8.5 8.5	ns

## AC OPERATING REQUIREMENTS

Symbol	Parameter	54/74F		54F		74F		Unit
		$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{ V}$ $C_L = 50\text{ pF}$ $R_L = 500\ \Omega$		$T_A = -55^\circ\text{C to } +125^\circ\text{C}$ $V_{CC} = +5.0\text{ V } \pm 10\%$ $C_L = 50\text{ pF}$ $R_L = 500\ \Omega$		$T_A = 0^\circ\text{C to } +70^\circ\text{C}$ $V_{CC} = +5.0\text{ V } \pm 10\%$ $C_L = 50\text{ pF}$ $R_L = 500\ \Omega$		
		Min	Max	Min	Max	Min	Max	
$t_{s(H)}$ $t_{s(L)}$	Setup Time, HIGH or LOW Bus to Clock	4.0 4.0	— —	5.0 5.0	— —	5.0 5.0	— —	ns
$t_{h(H)}$ $t_{h(L)}$	Hold Time, HIGH or LOW Bus to Clock	0.0 0.0	— —	0.0 0.0	— —	0.0 0.0	— —	ns
$t_{w(H)}$ $t_{w(L)}$	Clock Pulse Width HIGH or LOW	4.0 5.0	— —	4.0 5.0	— —	4.0 5.0	— —	ns