GD54/74LS646

OCTAL BUS TRANSCEIVERS AND REGISTERS

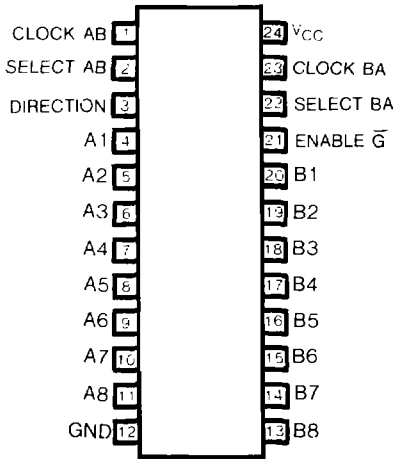
Features

- Independent Registers for A and B Buses
- Multiplexed Real-Time and Stored Data
- True Data Paths
- 3-State Outputs

Description

These devices consist of bus transceiver circuits with 3-state 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. Control $\overline{G}$ and direction 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 control $\overline{G}$ is active (low). In the isolation mode (control $\overline{G}$ high), A data may be stored in the B register and/or B data may be stored in the A register.

Pin Configuration



Suffix-Blank. Plastic Dual In Line Package
Suffix-J Ceramic Dual In Line Package

When an output function is disabled, the input function is still enabled, and may be used to store and transmit data. Only one of the two buses, A or B may be driven at a time.

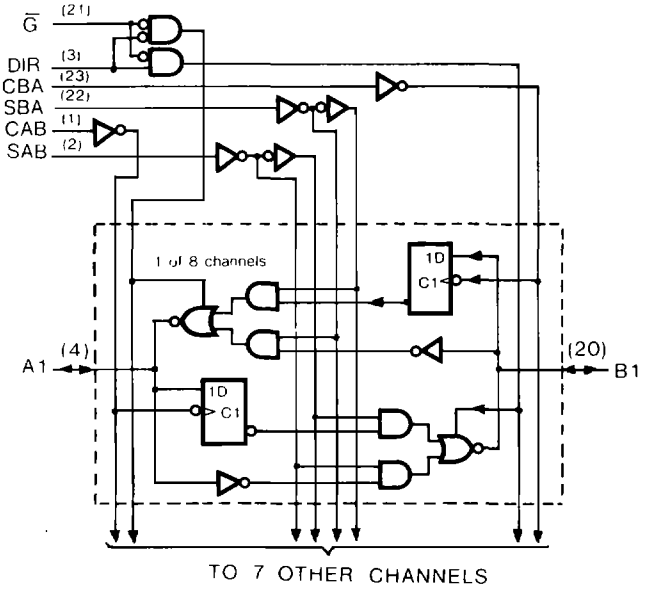
Function Table

INPUTS						DATA I O		OPERATION OR FUNCTION
$\overline{G}$	DIR	CAB	CBA	SAB	SBA	A1 THRU A8	B1 THRU B8	'LS646
H	X	H or L	H or L	X	X	Input	Input	Isolation
H	X	↑	↑	X	X			Store A and B Data
L	L	X	X	X	L	Output	Input	Real Time B Data to A Bus
L	L	X	X	X	H			Stored B Data to A Bus
L	H	X	X	L	X	Input	Output	Real Time A Data to B Bus
L	H	H or L	X	H	X			Stored A Data to B Bus

H=high level L=low level X=Irrelevant ↑=low-to-high-level transition

- The date output function may be enabled or disabled by various signals at the $\overline{G}$ and DIR Inputs. Data input function are always enabled, i.e , data at the bus pins will be stored on every low-to-high transition on the clock inputs.

Function Block Diagram



Absolute Maximum Ratings at 25°C Free-air Temperature (Unless Otherwise Noted)

- Supply voltage, V_{CC} (see Note 1) 7V
- Input voltage (Control Inputs) 7V
- Off-state Output Voltage (A and B Ports) 5.5V
- Operating free-air temperature range 54LS ..... −55°C to 125°C
  74LS ..... 0°C to 70°C
- Storage temperature range ..... −65°C to 150°C

Recommended Operating Conditions

SYMBOL	PARAMETER			MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage		54	4.5	5	5.5	V
			74	4.75	5	5.25	
I_{OH}	High-level output current		54			−12	mA
			74			−15	
I_{OL}	Low-level output current		54			12	mA
			74			24	
t_w	Width of any input pulse			20			ns
t_{su}	Clear inactive-state set up time	Bus to clock		20			ns
t_{th}	Data hold time	Bus from clock		0			ns
T_A	Operating free-air temperature		54	−55		125	°C
			74	0		70	

Electrical Characteristics over recommended operating free-air temperature range (unless otherwise noted)

SYMBOL	PARAMETER		TEST CONDITIONS			MIN	TYP (Note 1)	MAX	UNIT
V_{IH}	High-level input voltage					2			V
V_{IL}	Low-level input voltage				54			0.5	V
					74			0.6	
V_{IK}	Input clamp voltage		V_{CC}=Min, I_I=−18 mA					−1.5	V
$V_{T+}-V_{T-}$	Hysteresis		V_{CC}=Min,		54	0.1	0.4		V
					74	0.2	0.4		
V_{OH}	High-level output voltage		V_{CC}=Min, V_{IH}=Min	I_{OH}=−3mA	54,74	2.4	3 4		V
			V_{IL}=Max	I_{OH}=Max	54,74	2			
V_{OL}	Low-level output voltage		V_{CC}=Min V_{IL}=Max V_{IH}=Min	I_{OL}=12mA	54,74		0 25	0.4	V
				I_{OL}=24mA	74		0.35	0.5	
I_{OZH}	Off-state output current high-level voltage applied		V_{CC}=Max, V_O=2 7V					−20	μA
I_{OZL}	Off-state output current low-level voltage applied		V_{CC}=Max, V_O=0 4V					−400	μA
I_I	Input current at maximum input voltage	A or B	V_{CC}=Max, V_I=5 5V	V_I=5.5V				0.1	mA
		All others		V_I=7V				0 1	
I_{IH}	High-level input current		V_{CC}=Max, V_I=2.7V					20	μA
I_{IL}	Low-level input current		V_{CC}=Max, V_I=0.4V					−0 4	mA
I_{OS}	Short-circuit output current		V_{CC}=Max (Note 2)			−40		−255	mA
I_{CC}	Supply Current	Output high	V_{CC}=5 25V Outputs open				91	145	mA
		Outputs low					103	165	
		Outputs at Hi-z					103	165	

Note 1 All typical values are at V_{CC}=5V T_A=25 °C

Note 2. Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second

Switching Characteristics, V_{CC} = 5V, T_A = 25°C

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	'LS646 MIN	TYP	MAX	UNIT
t_{PLH}	Clock	Bus	R_L=667Ω C_L=45pF,		15	25	ns
t_{PHL}					23	35	ns
t_{PLH}	Bus	Bus			12	18	ns
t_{PHL}					13	20	ns
t_{PLH}	Select, with bus input high†	Bus			26	40	ns
t_{PHL}					21	35	ns
t_{PLH}	Select, with bus input low†				33	50	ns
t_{PHL}					14	25	ns
t_{PZH}	Enable	Bus			33	55	ns
t_{PZL}					42	65	ns
t_{PZH}	Direction				28	45	ns
t_{PZL}					39	60	ns
t_{PHZ}	Enable	Bus	R_L=667Ω, C_L=5pF,		23	35	ns
t_{PLZ}					22	35	ns
t_{PHZ}	Direction				20	30	ns
t_{PLZ}					19	30	ns

† These parameters are messured with the internal output state of the storage register opposite to that of the bus input