Rochester Electronics

Datasheet

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
    - Class Q Military
    - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)

    - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

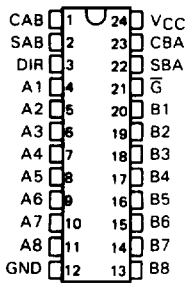
OCTAL BUS TRANSCEIVERS AND REGISTERS

D2661, DECEMBER 1983 – REVISED OCTOBER 1991

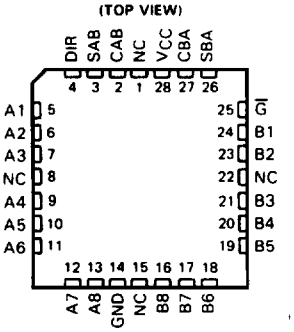
- **Independent Registers for A and B Buses**
- **Multiplexed Real-Time and Stored Data**
- **Choice of True or Inverting Data Paths**
- **3-State Outputs**
- **Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs**

DEVICE	OUTPUT	LOGIC
'ALS646, 'AS646	3-State	True
'ALS648, 'AS648	3-State	Inverting

SN54ALS', SN54AS' . . . JT PACKAGE
SN74ALS', SN74AS' . . . DW OR NT PACKAGE
(TOP VIEW)



SN54ALS', SN54AS' . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description

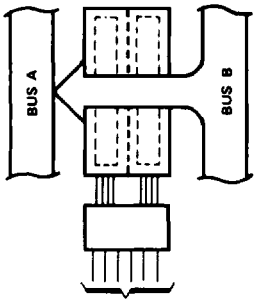
These devices consist of bus transceiver circuits, with 3-state outputs, D-type flip-flops, and control circuitry arranged for multiplexed transmission of data directly from the data bus or from the internal storage registers. Data on the A or B bus will be clocked into the registers on the low-to-high transition of the appropriate clock pin (CAB or CBA). The following examples demonstrate the four fundamental bus-management functions that can be performed with the octal bus transceivers and registers.

Enable ($\overline{G}$) and direction (DIR) pins are provided to control the transceiver functions. In the transceiver mode, data present at the high-impedance port may be stored in either register or in both. The select controls (SAB and SBA) can multiplex stored and real-time (transparent mode) data. The circuitry used for select control will eliminate the typical decoding glitch which occurs in a multiplexer during the transition between stored and real-time data. The direction control determines which bus will receive data when enable $\overline{G}$ is active (low). In the isolation mode (control $\overline{G}$ high), A data may be stored in one register and/or B data may be stored in the other register.

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.

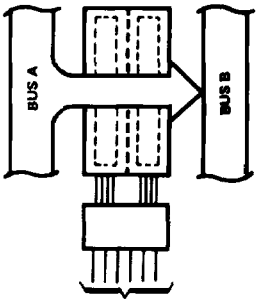
The -1 versions of the SN74ALS' parts are identical to the standard versions except that the recommended maximum I_{OL} is increased to 48 milliamperes.

The SN54' familiy is characterized for operation over the full military temperature range of -55°C to 125°C. The SN74' family is characterized for operation from 0°C to 70°C.



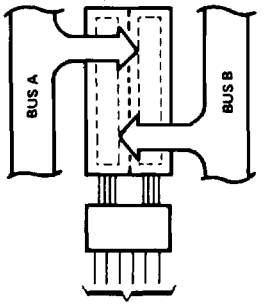
(21) $\overline{G}$	(3) DIR	(1) CAB	(23) CBA	(2) SAB	(22) SBA
L	L	X	X	X	L

REAL-TIME TRANSFER
BUS B TO BUS A



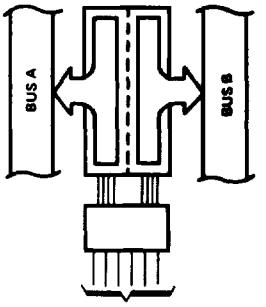
(21) $\overline{G}$	(3) DIR	(1) CAB	(23) CBA	(2) SAB	(22) SBA
L	H	X	X	L	X

REAL-TIME TRANSFER
BUS A TO BUS B



(21) $\overline{G}$	(3) DIR	(1) CAB	(23) CBA	(2) SAB	(22) SBA
X	X	↑	X	X	X
X	X	X	↑	X	X
H	X	↑	↑	X	X

STORAGE FROM
A, B, OR A AND B



(21) $\overline{G}$	(3) DIR	(1) CAB	(23) CBA	(2) SAB	(22) SBA
L	L	X	HorL	X	H
L	H	HorL	X	H	X

TRANSFER
STORED DATA
TO A OR B

TEXAS INSTRUMENTS

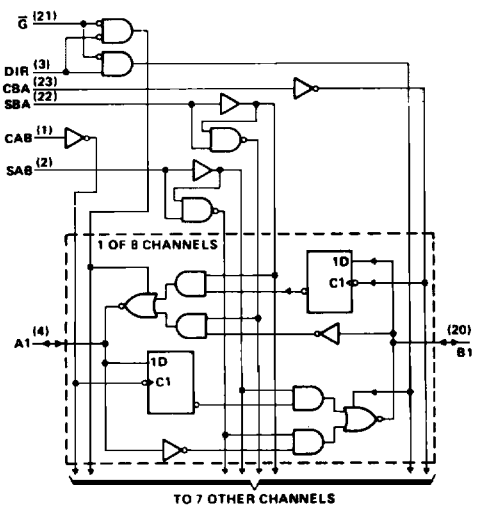
FUNCTION TABLE

INPUTS						DATA I/O		OPERATION OR FUNCTION	
$\overline{G}$	DIR	CAB	CBA	SAB	SBA	A1 THRU A8	B1 THRU B8	'ALS646, 'AS646	'ALS648, 'AS648
X	X	↑	X	X	X	Input	Unspecified†	Store A, B unspecified†	Store A, B unspecified†
X	X	X	↑	X	X	Unspecified†	Input	Store B, A unspecified†	Store B, A unspecified†
H	X	↑	↑	X	X	Input	Input	Store A and B Data	Store A and B Data
H	X	H or L	H or L	X	X			Isolation, hold storage	Isolation, hold storage
L	L	X	X	X	L	Output	Input	Real-Time B Data to A Bus	Real-Time $\overline{B}$ Data to A Bus
L	L	X	H or L	X	H			Stored B Data to A Bus	Stored $\overline{B}$ Data to A Bus
L	H	X	X	L	X	Input	Output	Real-Time A Data to B Bus	Real-Time $\overline{A}$ Data to B Bus
L	H	H or L	X	H	X			Stored A Data to B Bus	Store $\overline{A}$ Data to B Bus

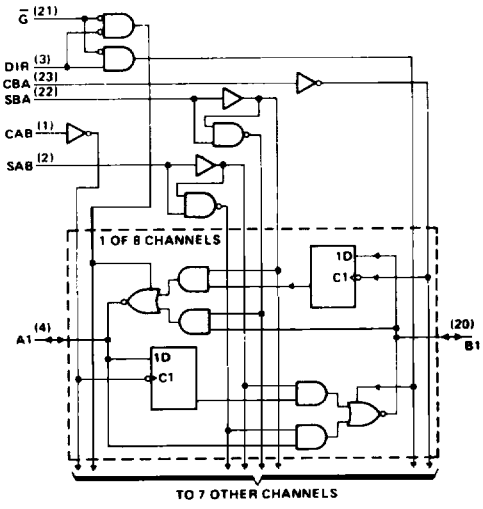
†The data output functions may be enabled or disabled by various signals at the $\overline{G}$ and DIR inputs. Data input functions are always enabled, i.e., data at the bus pins will be stored on every low-to-high transition on the clock inputs.

functional block diagrams (positive logic)

'ALS646, 'AS646



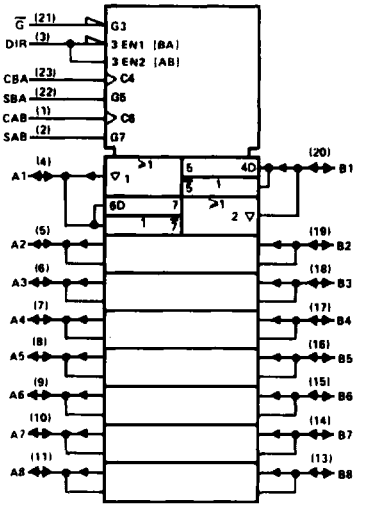
'ALS648, 'AS648



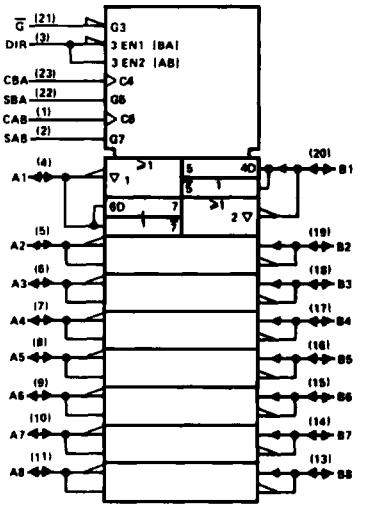
Pin numbers shown are for DW, JT, and NT packages.

logic symbols†

'ALS646, 'AS646



'ALS648, 'AS648



†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for DW, JT, and NT packages.

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage: Control inputs . . . . . 7 V
I/O ports . . . . . 5.5 V
Operating free-air temperature range: SN54ALS646 . . . . . −55°C to 125°C
SN74ALS646 . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

recommended operating conditions

		SN54ALS646			SN74ALS646			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.7			0.8	V
I_{OH}	High-level output current			−12			−15	mA
I_{OL}	Low-level output current			12			24	mA
							48†	
f_{clock}	Clock frequency	0		35	0		40	MHz
t_w	Pulse duration, clocks high or low	14.5			12.5			ns
t_{su}	Setup time, A before CAB↑ or B before CBA↑	15			10			ns
t_h	Hold time, A after CAB↑ or B after CBA↑	1			0			ns
T_A	Operating free-air temperature	−55		125	0		70	°C

†The extended condition applies if V_{CC} is maintained between 4.75 V and 5.25 V.
The 48-mA limit applies for the SN74ALS646-1 only.

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

PARAMETER		TEST CONDITIONS		SN54ALS646			SN74ALS646			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = −18 mA			−1.2			−1.2	V
V_{OH}		V_{CC} = 4.5 V to 5.5 V,	I_{OH} = −0.4 mA	V_{CC} −2			V_{CC} −2			V
		V_{CC} = 4.5 V,	I_{OH} = −3 mA	2.4	3.2		2.4	3.2		
		V_{CC} = 4.5 V,	I_{OH} = −12 mA	2						
		V_{CC} = 4.5 V,	I_{OH} = −15 mA				2			
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 12 mA		0.25	0.4		0.25	0.4	V
		V_{CC} = 4.5 V, (I_{OL} = 48 mA for −1 version)	I_{OL} = 24 mA					0.35	0.5	
I_I	Control inputs	V_{CC} = 5.5 V,	V_I = 7 V			0.1			0.1	mA
	A or B ports	V_{CC} = 5.5 V,	V_I = 5.5 V			0.1			0.1	
I_{IH}	Control inputs	V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	μA
	A or B ports§					20			20	
I_{IL}	Control inputs	V_{CC} = 5.5 V,	V_I = 0.4 V			−0.2			−0.2	mA
	A or B ports§					−0.2			−0.2	
I_O¶		V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	−30		−112	mA
I_{CC}		V_{CC} = 5.5 V	Outputs high		47	76		47	76	mA
			Outputs low		55	88		55	88	
			Outputs disabled		55	88		55	88	

‡All typical values are at V_{CC} = 5 V, T_A = 25°C
§For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.
¶The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

'ALS646 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX				UNIT
			SN54ALS646		SN74ALS646		
			MIN	MAX	MIN	MAX	
f_{max}			35		40		MHz
t_{PLH}	CBA or CAB	A or B	10	35	10	30	ns
t_{PHL}			5	20	5	17	
t_{PLH}	A or B	B or A	5	22	5	20	ns
t_{PHL}			3	15	3	12	
t_{PLH}	SBA or SAB† (with A or B low)	A or B	10	40	15	35	ns
t_{PHL}			5	23	5	20	
t_{PLH}	SBA or SAB† (with A or B high)	A or B	8	30	8	25	ns
t_{PHL}			5	24	5	20	
t_{PZH}	$\overline{G}$	A or B	3	20	3	17	ns
t_{PZL}			5	22	5	20	
t_{PHZ}	$\overline{G}$	A or B	1	12	1	10	ns
t_{PLZ}			1	20	2	16	
t_{PZH}	DIR	A or B	5	38	8	30	ns
t_{PZL}			5	30	5	25	
t_{PHZ}	DIR	A or B	1	12	1	10	ns
t_{PLZ}			2	21	2	16	

†These parameters are measured with the internal output state of the storage register opposite to that of the bus input.
NOTE 1: Load circuit and voltage waveforms are shown in Figure 1.

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage: Control inputs . . . . . 7 V
I/O ports . . . . . 5.5 V
Operating free-air temperature range: SN54ALS648 . . . . . −55°C to 125°C
SN74ALS648 . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

recommended operating conditions

		SN54ALS648			SN74ALS648			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.7			0.8	V
I_{OH}	High-level output current			−12			−15	mA
I_{OL}	Low-level output current			12			24	mA
f_{clock}	Clock frequency	0		35	0		40	MHz
t_w	Pulse duration, clocks high or low	14.5			12.5			ns
t_{su}	Setup time, A before CAB↑ or B before CBA↑	15			10			ns
t_h	Hold time, A after CAB↑ or B after CBA↑	0			0			ns
T_A	Operating free-air temperature	−55		125	0		70	°C

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

PARAMETER		TEST CONDITIONS		SN54ALS648			SN74ALS648			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = −18 mA			−1.2			−1.2	V
V_{OH}		V_{CC} = 4.5 V to 5.5 V,	I_{OH} = −0.4 mA	V_{CC} − 2			V_{CC} − 2			V
		V_{CC} = 4.5 V,	I_{OH} = −3 mA	2.4	3.2		2.4	3.2		
		V_{CC} = 4.5 V,	I_{OH} = −12 mA	2						
		V_{CC} = 4.5 V,	I_{OH} = −15 mA				2			
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 12 mA		0.25	0.4		0.25	0.4	V
		V_{CC} = 4.5 V, (I_{OL} = 48 mA for −1 version)	I_{OL} = 24 mA					0.35	0.5	
I_I	Control inputs	V_{CC} = 5.5 V,	V_I = 7 V			0.1			0.1	mA
	A or B ports	V_{CC} = 5.5 V,	V_I = 5.5 V			0.1			0.1	
I_{IH}	Control inputs	V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	μA
	A or B ports§					20			20	
I_{IL}	Control inputs	V_{CC} = 5.5 V,	V_I = 0.4 V			−0.2			−0.2	mA
	A or B ports§					−0.2			−0.2	
I_O¶		V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	−30		−112	mA
I_{CC}		V_{CC} = 5.5 V	Outputs high		47	76		47	76	mA
			Outputs low		57	88		57	88	
			Outputs disabled		57	88		57	88	

‡All typical values are at V_{CC} = 5 V, T_A = 25°C
§For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.
¶The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

'ALS648 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX				UNIT
			SN54ALS648		SN74ALS648		
			MIN	MAX	MIN	MAX	
f_{max}			35		40		MHz
t_{PLH}	CBA or CAB	A or B	8	39	8	33	ns
t_{PHL}			5	23	5	20	
t_{PLH}	A or B	B or A	3	20	3	17	ns
t_{PHL}			2	12	2	10	
t_{PLH}	SBA or SAB† (with A or B low)	A or B	5	44	5	39	ns
t_{PHL}			4	26	4	22	
t_{PLH}	SBA or SAB† (with A or B high)	A or B	6	30	6	25	ns
t_{PHL}			6	25	6	21	
t_{PZH}	$\overline{G}$	A or B	4	25	4	22	ns
t_{PZL}			4	25	4	22	
t_{PHZ}	$\overline{G}$	A or B	1	12	1	10	ns
t_{PLZ}			2	21	2	15	
t_{PZH}	DIR	A or B	4	35	4	27	ns
t_{PZL}			3	25	3	19	
t_{PHZ}	DIR	A or B	1	17	1	14	ns
t_{PLZ}			2	22	2	15	

†These parameters are measured with the internal output state of the storage register opposite to that of the bus input.
NOTE 1: Load circuit and voltage waveforms are shown in Figure 1.

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage: Control inputs . . . . . 7 V
I/O ports . . . . . 5.5 V
Operating free-air temperature range: SN54AS646 . . . . . −55°C to 125°C
SN74AS646, SN74AS648 . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

recommended operating conditions

			SN54AS646			SN74AS646			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage		4.5	5	5.5	4.5	5	5.5	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			−15	mA
I_{OL}	Low-level output current				32			48	mA
f_{clock}	Clock frequency		0		75	0		90	MHz
t_w	Pulse duration	Clock high	6			5			ns
		Clock low	7			6			
t_{su}	Setup time, A before CAB↑ or B before CBA↑		7			6			ns
t_h	Hold time, A after CAB↑ or B after CBA↑		0			0			ns
T_A	Operating free-air temperature		−55		125	0		70	°C

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

PARAMETER		TEST CONDITIONS		SN54AS646			SN74AS646			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = −18 mA			−1.2			−1.2	V
V_{OH}		V_{CC} = 4.5 V to 5.5 V,	I_{OH} = −2 mA	V_{CC} −2			V_{CC} −2			V
		V_{CC} = 4.5 V,	I_{OH} = −3 mA	2.4	3.2		2.4	3.2		
		V_{CC} = 4.5 V,	I_{OH} = −12 mA	2						
		V_{CC} = 4.5 V,	I_{OH} = −15 mA				2			
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 32 mA		0.25	0.50				V
		V_{CC} = 4.5 V,	I_{OL} = 48 mA					0.35	0.50	
I_I	Control inputs	V_{CC} = 5.5 V,	V_I = 7 V			0.1			0.1	mA
	A or B ports	V_{CC} = 5.5 V,	V_I = 5.5 V			0.1			0.1	
I_{IH}	Control inputs	V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	μA
	A or B ports‡					70			70	
I_{IL}	Control inputs	V_{CC} = 5.5 V,	V_I = 0.4 V			−0.5			−0.5	mA
	A or B ports§					−0.75			−0.75	
I_O§		V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	−30		−112	mA
I_{CC}	'AS646	V_{CC} = 5.5 V	Outputs high		120	196		120	195	mA
			Outputs low		130	211		130	211	
			Outputs disabled		130	211		130	211	

†All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.
§The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

'AS646 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX				UNIT
			SN54AS646		SN74AS646		
			MIN	MAX	MIN	MAX	
f_{max}			75		90		MHz
t_{PLH}	CBA or CAB	A or B	2	9.5	2	8.5	ns
t_{PHL}			2	10	2	9	
t_{PLH}	A or B	B or A	2	11.5	2	9	ns
t_{PHL}			1	8	1	7	
t_{PLH}	SBA or SAB†	A or B	2	13.5	2	11	ns
t_{PHL}			2	11	2	9	
t_{PZH}	$\overline{G}$	A or B	2	11	2	9	ns
t_{PZL}			3	15	3	14	
t_{PHZ}	$\overline{G}$	A or B	2	11	2	9	ns
t_{PLZ}			2	11	2	9	
t_{PZH}	DIR	A or B	3	21	3	16	ns
t_{PZL}			3	24	3	18	
t_{PHZ}	DIR	A or B	2	12	2	10	ns
t_{PLZ}			2	12	2	10	

recommended operating conditions

			SN74AS648			UNIT
			MIN	NOM	MAX	
V_{CC}	Supply voltage		4.5	5	5.5	V
V_{IH}	High-level input voltage		2			V
V_{IL}	Low-level input voltage				0.8	V
I_{OH}	High-level output current				-15	mA
I_{OL}	Low-level output current				48	mA
f_{clock}	Clock frequency		0		90	MHz
t_w	Pulse duration	Clock high	5			ns
		Clock low	6			
t_{su}	Setup time, A before CABt or B before CBAt		6			ns
t_h	Hold time, A after CABt or B after CBAt		0			ns
T_A	Operating free-air temperature		0		70	°C

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

PARAMETER		TEST CONDITIONS		SN74AS648			UNIT
				MIN	TYP†	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = -18 mA			-1.2	V
V_{OH}		V_{CC} = 4.5 V to 5.5 V,	I_{OH} = -2 mA	V_{CC}-2			V
		V_{CC} = 4.5 V,	I_{OH} = -3 mA	2.4	3.2		
		V_{CC} = 4.5 V,	I_{OH} = -12 mA				
		V_{CC} = 4.5 V,	I_{OH} = -15 mA	2			
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 32 mA				V
		V_{CC} = 4.5 V,	I_{OL} = 48 mA		0.35	0.50	
I_I	Control inputs	V_{CC} = 5.5 V,	V_I = 7 V			0.1	mA
	A or B ports	V_{CC} = 5.5 V,	V_I = 5.5 V			0.1	
I_{IH}	Control inputs	V_{CC} = 5.5 V,	V_I = 2.7 V			20	µA
	A or B ports ‡					70	
I_{IL}	Control inputs	V_{CC} = 5.5 V,	V_I = 0.4 V			-0.5	mA
	A or B ports ‡					-0.75	
I_O§		V_{CC} = 5.5 V,	V_O = 2.25 V	-30		-112	mA
I_{CC}		V_{CC} = 5.5 V	Outputs high		110	185	mA
			Outputs low		120	195	
			Outputs disabled		120	195	

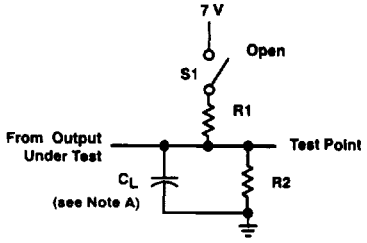
† All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡ For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.
§ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX		UNIT
			SN74AS648		
			MIN	MAX	
f_{max}			90		MHz
t_{PLH}	CBA or CAB	A or B	2	8.5	ns
t_{PHL}			2	9	
t_{PLH}	A or B	B or A	2	8	ns
t_{PHL}			1	7	
t_{PLH}	SBA or SAB†	A or B	2	11	ns
t_{PHL}			2	9	
t_{PZH}	$\overline{G}$	A or B	2	9	ns
t_{PZL}			3	15	
t_{PHZ}	$\overline{G}$	A or B	2	9	ns
t_{PLZ}			2	9	
t_{PZH}	DIR	A or B	3	16	ns
t_{PZL}			3	18	
t_{PHZ}	DIR	A or B	2	10	ns
t_{PLZ}			2	10	

†These parameters are measured with the internal output state of the storage register opposite of that of the bus input.
NOTE 1: Load circuit and voltage waveforms are shown in Figure 1.

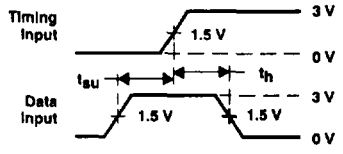
PARAMETER MEASUREMENT INFORMATION



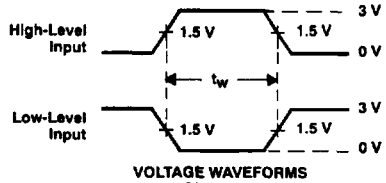
LOAD CIRCUIT FOR
3-STATE OUTPUTS

SWITCH POSITION TABLE

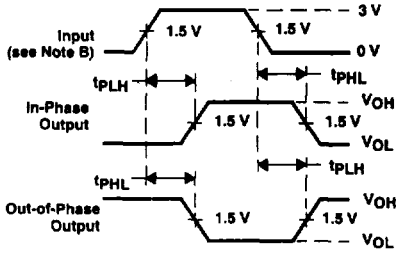
TEST	S1
t_{PLH}	Open
t_{PHL}	Open
t_{PZH}	Open
t_{PZL}	Closed
t_{PHZ}	Open
t_{PLZ}	Closed



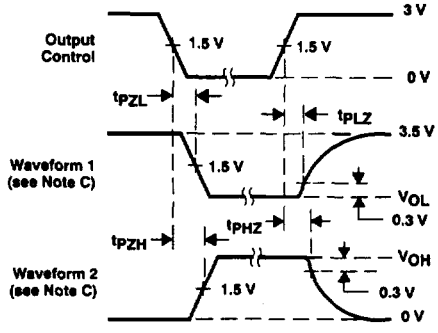
VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PULSE DURATION



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES, 3-STATE OUTPUTS

Notes: A. C_L includes probe and jig capacitance.
B. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r ≤ 2 ns, t_f ≤ 2 ns.
C. Waveform 1 is for an output with internal conditions such that the otuput 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.
D. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms