

SN54ALS620A THRU SN54ALS623A, SN54AS620 THRU SN54AS623 SN74ALS620A THRU SN74ALS623A, SN74AS620 THRU SN74AS623 OCTAL BUS TRANSCEIVERS

D2661, DECEMBER 1982 - REVISED MAY 1986

- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Local Bus-Latch Capability
- Choice of True or Inverting Logic
- Choice of 3-State or Open-Collector Outputs
- Dependable Texas Instruments Quality and Reliability

DEVICE	OUTPUT	LOGIC
'ALS620A, 'AS620	3-State	Inverting
'ALS621A, 'AS621	Open-Collector	True
'ALS622A, 'AS622	Open-Collector	Inverting
'ALS623A, 'AS623	3-State	True

description

These octal bus transceivers are designed for asynchronous two-way communication between data buses. The control function implementation allows for maximum flexibility in timing.

These devices allow data transmission from A bus to the B bus or from the B bus to the A bus depending upon the logic levels at the enable inputs ($\bar{G}BA$ and GAB).

The enable inputs can be used to disable the device so that the buses are effectively isolated.

The dual-enable configuration gives the octal bus transceivers the capability to store data by simultaneous enabling of $\bar{G}BA$ and GAB . Each output reinforces its input in this transceiver configuration. Thus, when both control inputs are enabled and all other data sources to the two sets of bus lines are at high impedance, both sets of bus lines (16 in all) will remain at their last states. The 8-bit codes appearing on the two sets of buses will be identical for the 'ALS621A, 'AS621 and 'ALS623A, 'AS623 or complementary for the 'ALS620A, 'AS620 and 'ALS622A, 'AS622.

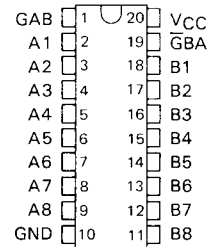
The -1 versions of the SN74ALS' parts are identical to their standard versions except that the recommended maximum I_{OL} is increased to 48 mA. There are no -1 versions of the SN54ALS' parts.

The SN54' family 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 .

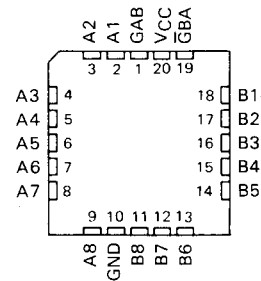
FUNCTION TABLE

ENABLE INPUTS		OPERATION	
$\bar{G}BA$	GAB	'ALS620A, 'ALS622A 'AS620, 'AS622	'ALS621A, 'ALS623A 'AS621, 'AS623
L	L	\bar{B} data to A bus	B data to A bus
H	H	A data to B bus	A data to B bus
H	L	Isolation	Isolation
L	H	\bar{B} data to A bus, \bar{A} data to B bus	B data to A bus, A data to B bus

SN54ALS', SN54AS' ... J PACKAGE
SN74ALS', SN74AS' ... DW OR N PACKAGE
(TOP VIEW)



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



PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

TEXAS
INSTRUMENTS

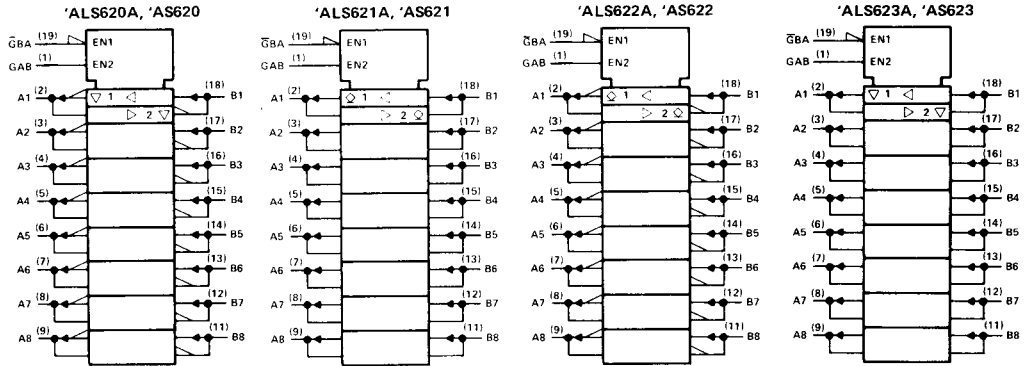
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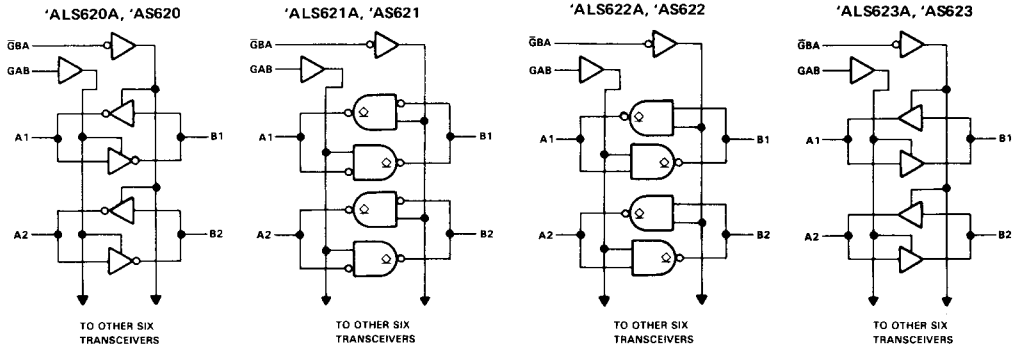
SN54ALS620A THRU SN54ALS623A, SN54AS620 THRU SN54AS623 SN74ALS620A THRU SN74ALS623A, SN74AS620 THRU SN74AS623 OCTAL BUS TRANSCEIVERS

logic symbols†



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

logic diagrams (positive logic)



SN54ALS620A, SN54ALS623A, SN74ALS620A, SN74ALS623A
OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

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ALS and AS Circuits

'ALS620A switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = MIN to MAX				UNIT
			SN54ALS620A		SN74ALS620A		
			MIN	MAX	MIN	MAX	
t _{PLH}	A	B	2	12	2	10	ns
t _{PHL}			2	12	2	10	
t _{PLH}	B	A	2	12	2	10	ns
t _{PHL}			2	12	2	10	
t _{PZH}	\bar{G} BA	A	3	23	3	17	ns
t _{PZL}			5	31	5	25	
t _{PHZ}	\bar{G} BA	A	2	14	2	12	ns
t _{PLZ}			3	22	3	18	
t _{PZH}	GAB	B	3	23	3	18	ns
t _{PZL}			5	31	5	25	
t _{PHZ}	GAB	B	2	14	2	12	ns
t _{PLZ}			3	22	3	18	

'ALS623A switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = MIN to MAX				UNIT
			SN54ALS623A		SN74ALS623A		
			MIN	MAX	MIN	MAX	
t _{PLH}	A	B	2	15	2	13	ns
t _{PHL}			3	13	3	11	
t _{PLH}	B	A	2	15	2	13	ns
t _{PHL}			3	13	3	11	
t _{PZH}	\bar{G} BA	A	5	25	5	22	ns
t _{PZL}			5	25	5	22	
t _{PHZ}	\bar{G} BA	A	2	19	2	16	ns
t _{PLZ}			2	23	2	19	
t _{PZH}	GAB	B	5	25	5	22	ns
t _{PZL}			5	25	5	22	
t _{PHZ}	GAB	B	2	19	2	16	ns
t _{PLZ}			2	23	2	19	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

SN54ALS621A, SN54ALS622A, SN74ALS621A, SN74ALS622A OCTAL BUS TRANSCEIVERS WITH OPEN-COLLECTOR OUTPUTS

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

Supply voltage, V_{CC}	7 V
Input voltage: All inputs and I/O ports	7 V
Operating free-air temperature range: SN54ALS621A, SN54ALS622A	-55°C to 125°C
SN74ALS621A, SN74ALS622A	0°C to 70°C
Storage temperature range	-65°C to 150°C

recommended operating conditions

		SN54ALS621A SN54ALS622A			SN74ALS621A SN74ALS622A			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
V_{OH}	High-level output voltage			5.5			5.5	V
I_{OL}	Low-level output current			12			24	mA
							48†	
T_A	Operating free-air temperature	-55		125	0		70	°C

† The extended limits apply only if V_{CC} is maintained between 4.75 V and 5.25 V.
The 48-mA limit applies for the SN74ALS621A-1 and SN74ALS622A-1 only.

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

PARAMETER	TEST CONDITIONS	SN54ALS621A SN54ALS622A		SN74ALS621A SN74ALS622A		UNIT		
		MIN	TYP‡	MAX	MIN		TYP‡	MAX
V_{IK}	$V_{CC} = 4.5\text{ V}$, $I_I = -18\text{ mA}$			-1.5		-1.5	V	
I_{OH}	$V_{CC} = 4.5\text{ V}$, $V_{OH} = 5.5\text{ V}$			0.1		0.1	mA	
V_{OL}	$V_{CC} = 4.5\text{ V}$, $I_{OL} = 12\text{ mA}$		0.25	0.4		0.25	0.4	V
	$V_{CC} = 4.5\text{ V}$, $I_{OL} = 24\text{ mA}$ ($I_{OL} = 48\text{ mA}$ for -1 versions)					0.35	0.5	
I_I	Control inputs			0.1		0.1	mA	
	A or B ports	$V_{CC} = 5.5\text{ V}$, $V_I = 7\text{ V}$		0.1		0.1		
I_{IH}	Control inputs			20		20	µA	
	A or B ports‡	$V_{CC} = 5.5\text{ V}$, $V_I = 2.7\text{ V}$		20		20		
I_{IL}	Control inputs			-0.1		-0.1	mA	
	A or B ports‡	$V_{CC} = 5.5\text{ V}$, $V_I = 0.4\text{ V}$		-0.1		-0.1		
I_{CC}	'ALS621A	$V_{CC} = 5.5\text{ V}$	Outputs high	29	45	29	40	mA
			Outputs low	35	53	35	48	
	'ALS622A	$V_{CC} = 5.5\text{ V}$	Outputs high	11	20	11	15	
			Outputs low	20	33	20	28	

‡ All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

§ For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.

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ALS and AS Circuits

SN54ALS621A, SN54ALS622A, SN74ALS621A, SN74ALS622A
OCTAL BUS TRANSCEIVERS WITH OPEN-COLLECTOR OUTPUTS

'ALS621A switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 680 Ω, T _A = MIN to MAX				UNIT
			SN54ALS621A		SN74ALS621A		
			MIN	MAX	MIN	MAX	
t _{PLH}	A	B	10	45	10	33	ns
t _{PHL}			5	24	5	20	
t _{PLH}	B	A	10	45	10	33	ns
t _{PHL}			5	24	5	20	
t _{PLH}	$\overline{\text{G}}\text{BA}$	A	10	47	10	39	ns
t _{PHL}			12	40	12	35	
t _{PLH}	GAB	B	10	47	10	39	ns
t _{PHL}			12	40	12	35	

'ALS622A switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 680 Ω, T _A = MIN to MAX				UNIT
			SN54ALS622A		SN74ALS622A		
			MIN	MAX	MIN	MAX	
t _{PLH}	A	B	8	42	8	35	ns
t _{PHL}			5	23	5	19	
t _{PLH}	B	A	8	42	8	35	ns
t _{PHL}			5	23	5	19	
t _{PLH}	$\overline{\text{G}}\text{BA}$	A	8	45	8	38	ns
t _{PHL}			10	40	10	35	
t _{PLH}	GAB	B	8	45	8	38	ns
t _{PHL}			10	40	10	35	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

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ALS and AS Circuits

SN54AS620, SN54AS623, SN74AS620, SN74AS623 OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

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

Supply voltage, V_{CC}	7 V
Input voltage: All inputs	7 V
I/O ports	5.5 V
Operating free-air temperature range: SN54AS620, SN54AS623	-55 °C to 125 °C
SN74AS620, SN74AS623	0 °C to 70 °C
Storage temperature range	-65 °C to 150 °C

recommended operating conditions

		SN54AS620 SN54AS623			SN74AS620 SN74AS623			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			48			64	mA
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	SN54AS620 SN54AS623			SN74AS620 SN74AS623			UNIT
		MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}	$V_{CC} = 4.5 \text{ V}$, $I_I = -18 \text{ mA}$			-1.2			-1.2	V
V_{OH}	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$, $I_{OH} = -2 \text{ mA}$	$V_{CC}-2$			$V_{CC}-2$			V
	$V_{CC} = 4.5 \text{ V}$, $I_{OH} = -3 \text{ mA}$	2.4	3.2		2.4	3.2		
	$V_{CC} = 4.5 \text{ V}$, $I_{OH} = -12 \text{ mA}$	2						
V_{OL}	$V_{CC} = 4.5 \text{ V}$, $I_{OH} = -15 \text{ mA}$				2			V
	$V_{CC} = 4.5 \text{ V}$, $I_{OL} = 48 \text{ mA}$		0.30	0.55				
I_I	$V_{CC} = 4.5 \text{ V}$, $I_{OL} = 64 \text{ mA}$				0.35	0.55		V
	$V_{CC} = 4.5 \text{ V}$, $I_{OL} = 64 \text{ mA}$							
I_I	Control inputs	$V_{CC} = 5.5 \text{ V}$	$V_I = 7 \text{ V}$		0.1		0.1	mA
	A or B ports	$V_{CC} = 5.5 \text{ V}$	$V_I = 5.5 \text{ V}$		0.1		0.1	
I_{IH}	Control inputs	$V_{CC} = 5.5 \text{ V}$	$V_I = 2.7 \text{ V}$		20		20	μA
	A or B ports‡	$V_{CC} = 5.5 \text{ V}$	$V_I = 2.7 \text{ V}$		70		70	
I_{IL}	Control inputs	$V_{CC} = 5.5 \text{ V}$	$V_I = 0.4 \text{ V}$		-0.5		-0.5	mA
	A or B ports‡	$V_{CC} = 5.5 \text{ V}$	$V_I = 0.4 \text{ V}$		-0.75		-0.75	
$I_{O\S}$	$V_{CC} = 5.5 \text{ V}$, $V_O = 2.25 \text{ V}$	-50		-150	-50		-150	mA
I_{CC}	'AS620	$V_{CC} = 5.5 \text{ V}$	Outputs high	35	57	35	57	mA
			Outputs low	74	122	74	122	
			Outputs disabled	48	77	48	77	
	'AS623		Outputs high	57	93	57	93	
			Outputs low	116	189	116	189	
			Outputs disabled	71	116	71	116	

† All typical values are at $V_{CC2} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

‡ 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, $I_{O\S}$.

SN54AS620, SN54AS623, SN74AS620, SN74AS623
OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

'AS620 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5\text{ V to }5.5\text{ V,}$ $C_L = 50\text{ pF,}$ $R_1 = 500\ \Omega,$ $R_2 = 500\ \Omega,$ $T_A = \text{MIN to MAX}$				UNIT
			SN54AS620		SN74AS620		
			MIN	MAX	MIN	MAX	
t_{PLH}	A	B	1	8	1	7	ns
t_{PHL}			2	7	2	6	
t_{PLH}	B	A	1	8	1	7	ns
t_{PHL}			2	7	2	6	
t_{PZH}	$\bar{G}BA$	A	2	8.5	2	8	ns
t_{PZL}			2	10	2	9	
t_{PHZ}	$\bar{G}BA$	A	1	7.5	1	6	ns
t_{PLZ}			2	15	2	12	
t_{PZH}	GAB	B	2	9	2	8	ns
t_{PZL}			2	10.5	2	9	
t_{PHZ}	GAB	B	1	6.5	1	6	ns
t_{PLZ}			2	16	2	13	

'AS623 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5\text{ V to }5.5\text{ V,}$ $C_L = 50\text{ pF,}$ $R_1 = 500\ \Omega,$ $R_2 = 500\ \Omega,$ $T_A = \text{MIN to MAX}$				UNIT
			SN54AS623		SN74AS623		
			MIN	MAX	MIN	MAX	
t_{PLH}	A	B	1	10	1	9	ns
t_{PHL}			1	9	1	8	
t_{PLH}	B	A	1	10	1	9	ns
t_{PHL}			1	9.5	1	8.5	
t_{PZH}	$\bar{G}BA$	A	2	11.5	2	11	ns
t_{PZL}			2	11	2	10	
t_{PHZ}	$\bar{G}BA$	A	1	8.5	1	7.5	ns
t_{PLZ}			1	13.5	1	11.5	
t_{PZH}	GAB	B	2	13	2	11.5	ns
t_{PZL}			2	12	2	11	
t_{PHZ}	GAB	B	1	8	1	7	ns
t_{PLZ}			1	10.5	1	9	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

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ALS and AS Circuits

SN54AS621, SN54AS622, SN74AS621, SN74AS622 OCTAL BUS TRANSCEIVERS WITH OPEN-COLLECTOR OUTPUTS

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

Supply voltage, V_{CC}	7 V
Input voltage: All inputs and I/O ports	7 V
Operating free-air temperature range: SN54AS621, SN54AS622	-55 °C to 125 °C
SN74AS621, SN74AS622	0 °C to 70 °C
Storage temperature range	-65 °C to 150 °C

recommended operating conditions

		SN54AS621 SN54AS622			SN74AS621 SN74AS622			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
V_{OH}	High-level output voltage			5.5			5.5	V
I_{OL}	Low-level output current			48			64	mA
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		SN54AS621 SN54AS622			SN74AS621 SN74AS622			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		$V_{CC} = 4.5 \text{ V}$,	$I_I = -18 \text{ mA}$			-1.2			-1.2	V
I_{OH}		$V_{CC} = 4.5 \text{ V}$,	$V_{OH} = 5.5 \text{ V}$			0.1			0.1	mA
V_{OL}		$V_{CC} = 4.5 \text{ V}$,	$I_{OL} = 48 \text{ mA}$		0.30	0.5				V
		$V_{CC} = 4.5 \text{ V}$,	$I_{OL} = 64 \text{ mA}$				0.35	0.5		
I_I	Control inputs	$V_{CC} = 5.5 \text{ V}$,	$V_I = 7 \text{ V}$			0.1			0.1	mA
	A or B ports	$V_{CC} = 5.5 \text{ V}$,	$V_I = 5.5 \text{ V}$			0.1			0.1	
I_{IH}	Control inputs	$V_{CC} = 5.5 \text{ V}$,	$V_I = 2.7 \text{ V}$			20			20	μA
	A or B ports†					70			70	
I_{IL}	Control inputs	$V_{CC} = 5.5 \text{ V}$,	$V_I = 0.4 \text{ V}$			-0.5			-0.5	mA
	A or B ports†					-0.75			-0.75	
I_{CC}	'AS621	$V_{CC} = 5.5 \text{ V}$	Outputs high		48	79		48	79	mA
			Outputs low		116	189		116	189	
	'AS622		Outputs high		24	39		24	39	
			Outputs low		63	103		63	103	

† All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25 \text{ °C}$.

‡ For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.

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ALS and AS Circuits

SN54AS621, SN54AS622, SN74AS621, SN74AS622
OCTAL BUS TRANSCEIVERS WITH OPEN-COLLECTOR OUTPUTS

'AS621 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX				UNIT
			SN54AS621		SN74AS621		
			MIN	MAX	MIN	MAX	
t _{PLH}	A	B	5	28.5	5	24	ns
t _{PHL}			1	8.5	1	7.5	
t _{PLH}	B	A	5	23	5	21	ns
t _{PHL}			1	8.5	1	7.5	
t _{PLH}	G̅BA	A	5	24	5	21	ns
t _{PHL}			1	10	1	9	
t _{PLH}	GAB	B	5	26	5	22	ns
t _{PHL}			1	11	1	10	

'AS622 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX				UNIT
			SN54AS622		SN74AS622		
			MIN	MAX	MIN	MAX	
t _{PLH}	A	B	5	28.5	5	24.5	ns
t _{PHL}			1	8.5	1	8	
t _{PLH}	B	A	5	30	5	25	ns
t _{PHL}			1	8.5	1	8	
t _{PLH}	G̅BA	A	5	26	5	22	ns
t _{PHL}			1	11.5	1	10	
t _{PLH}	GAB	B	5	26	5	23	ns
t _{PHL}			1	11.5	1	10.5	

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

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ALS and AS Circuits