MOS Memory Interface Circuits

National Semiconductor

DS3625, DS7802/DS8802, DS7806/DS8806 Dual High Speed TRI-STATE® MOS to TTL Level Converters

General Description

The DS3625, DS7802/DS8802, DS7806/DS8806 are high speed MOS to TTL level converters. These circuits act as an interface level converter between MOS and TTL logic devices. It consists of two 1-input converters with common strobe input to inhibit "0" entry when strobe is high. It allows parallel entry when strobe is low and the internal latch is preset by the common preset input. TRI-STATE output logic is implemented in this circuit to facilitate high speed time sharing of decoder-drivers, fast random-access (or sequential) memory arrays, etc.

Features

- Very low output impedance — high drive ability

- High impedance output state which allows many outputs to be connected to a common bus line

- Average power dissipation 110 mW per converter

- DS3625 is pin-for-pin replacement for the Signetics 8T25

Logic and Connection Diagrams

DS7802/DS8802, DS7806/DS8806

DS3625

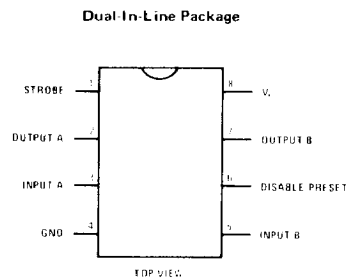Dual-In-Line Package
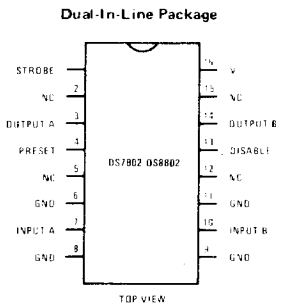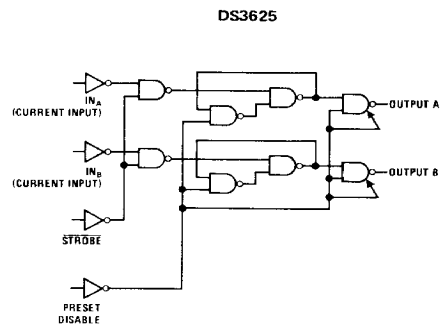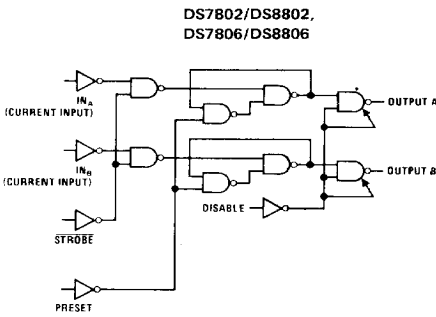
Order Number DS7802J, DS8802J or DS8802N
See NS Package J16A or N16A
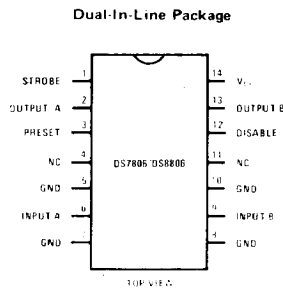
Order Number DS7806J, DS8806J, DS8806N or DS7806W
See NS Package J14A, N14A or W14A

Order Number DS3625N
See NS Package N08A

Absolute Maximum Ratings (Note 1)

Supply Voltage	7.0V
Input Voltage	5.5V
Output Voltage	5.5V
Storage Temperature Range	-65 C to 150 C
Lead Temperature (Soldering, 10 seconds)	300 C

Operating Conditions

	MIN	MAX	UNITS
Supply Voltage (V_{CC})			
DS7802, DS7806	4.5	5.5	V
DS8802, DS8806, DS3625	4.75	5.25	V
Temperature (T_A)			
DS7802, DS7806	-55	+125	C
DS8802, DS8806, DS3625	0	+70	C

Electrical Characteristics (Notes 2 and 3)

PARAMETER		CONDITIONS			MIN	TYP	MAX	UNITS
I_{INA}, I_{INB}	Logical "1" Input Current	V_{CC} = Min		DS7802, DS7806	500			μA
				DS3625	400			μA
I_{INA}, I_{INB}	Logical "0" Input Current	V_{CC} = Min					200	μA
V_{IH}	Logical "1" Input Voltage	Strobe, Preset, Disable, V_{CC} = Min			2.0			V
V_{IL}	Logical "0" Input Voltage	Strobe, Preset, Disable, V_{CC} = Min					0.8	V
V_{OH}	Logical "1" Output Voltage	V_{CC} = Min, I_{OUT} = -1.5 mA		DS7802, DS7806	2.4			V
				DS3625	2.8			V
V_{OL}	Logical "0" Output Voltage	V_{CC} = Min, I_{OUT} = 16 mA					0.4	V
I_O	TRI-STATE Output Current	V_{CC} = Max	DS7802, DS7806	V_O = 2.4V			40	μA
				V_O = 0.4V			-40	μA
			DS3625	V_O = 3.9V			100	μA
				V_O = 0V			-100	μA
I_{IH}	Logical "1" Input Current	V_{CC} = Max	V_{IN} = 2.4V				40	μA
			V_{IN} = 5.5V				1.0	mA
I_{IL}	Logical "0" Input Current	V_{CC} = Max, V_{IN} = 0.4V					-1.5	mA
I_{CC}	Supply Current	V_{CC} = Max, $V_{IN(DISABLE)}$ = 2V, $V_{IN(STROBE)}$ and $V_{IN(PRESET)}$ = 0V					40	mA
V_{CD}	Input Clamp Voltage	V_{CC} = Min, I_{IN} = -12 mA					-1.6	V
I_{SC}	Output Short Circuit Current	V_{CC} = Max, V_O = 0V, (Note 4)		DS7802, DS7806	-20		-70	mA
				DS8802, DS8806	-18		-70	mA
				DS3625	-20		-70	mA

Switching Characteristics

| PARAMETER		CONDITIONS	MIN	TYP	MAX	UNITS
t_{ds}	Propagation Delay to a Logical "0" From Strobe to Output	V_{CC} = 5.0V (See Waveforms), T_A = 25°C		17	25	ns
t_{dp}	Propagation Delay to a Logical "1" From Preset to Output (DS7802, DS7806)	V_{CC} = 5.0V (See Waveforms), T_A = 25°C		22	32	ns
t_{1H}	Delay From Disable Input to High Impedance State (From Logical "1" Level)	V_{CC} = 5.0V (See ac Test Circuit), T_A = 25°C		7.0	11	ns

6

Typical Input Circuit
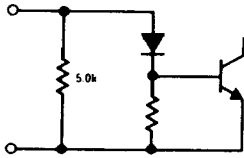
Truth Table

IN A OR B	ST	P	D	Q_A OR Q_B
0	1	1	0	1
1	1	1	0	1
0	0	1	0	0
1	0	1	0	1
X	X	X	1	Hi-Z

X = Don't care

AC Test Circuits

All diodes are 1N914
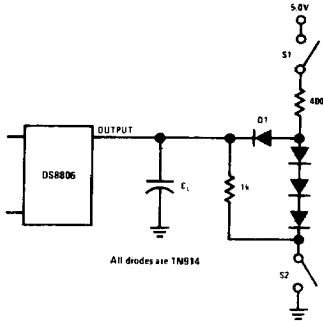
	SWITCH S_1	SWITCH S_2	C_L
t_{dp}	Closed	Closed	50 pF
t_{ds}	Closed	Closed	50 pF
t_{0H}	Closed	Closed	*5 pF
t_{1H}	Closed	Closed	*5 pF
t_{H0}	Closed	Open	50 pF
t_{H1}	Open	Closed	50 pF

* Jig capacitance

(a)

f = 1 MHz
$t_r = t_f$ 5 ns
R_O = 51 for PG 1 & 2
$t_{PW} = t_{SW}$ 20 ns max
t_S = 20 ns, max

(b)

f = 1 MHz
$t_r = t_f$ 5 ns
R_O = 51
t_{OW} = 200 ns, max

(c)

f = 1 MHz
$t_r = t_f$ 5 ns
R_O = 51
t_{OW} = 200 ns, max
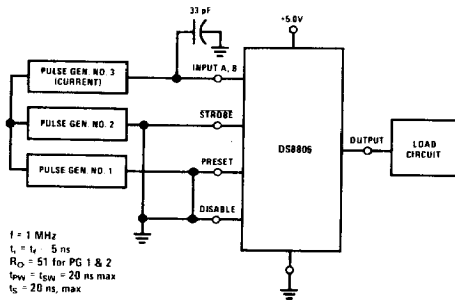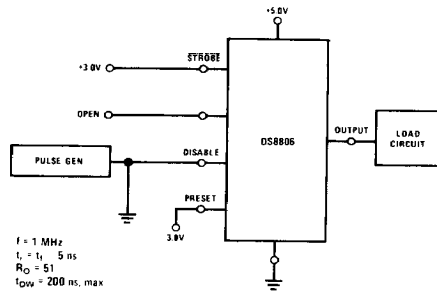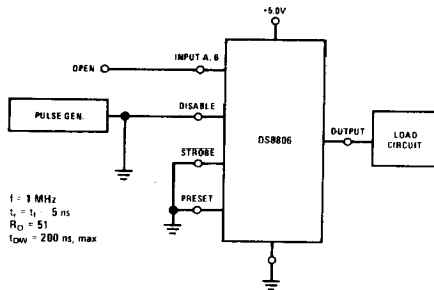
(d)

Test Circuit 20

Switching Time Waveforms

t_{OH}

(a)

t_{1H}

(b)

t_{H0}

(c)

t_{H1}

(d)

(e)

6