National Semiconductor

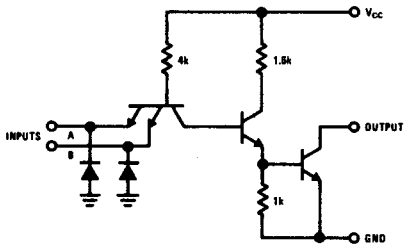
DS7810/DS8810 Quad 2-Input TTL-MOS Interface Gate
DS7811/DS8811 Quad 2-Input TTL-MOS Interface Gate
DS7812/DS8812 Hex TTL-MOS Inverter

General Description

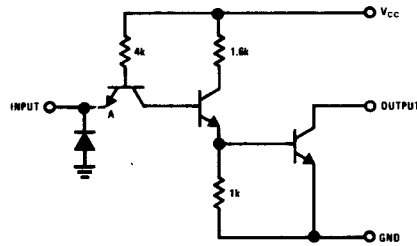
These Series 54/74 compatible gates are high output voltage versions of the DM5401/DM7401 (SN5401/SN7401), DM5403/DM7403 (SN5403/SN7403), and DM5405/DM7405 (SN5405/SN7405). Their open-collector outputs may be "pulled-up" to +14 volts in the logical "1" state thus providing guaranteed interface between TTL and MOS logic levels.

In addition the devices may be used in applications where it is desirable to drive low current relays or lamps that require up to 14 volts.

Schematic and Connection Diagrams

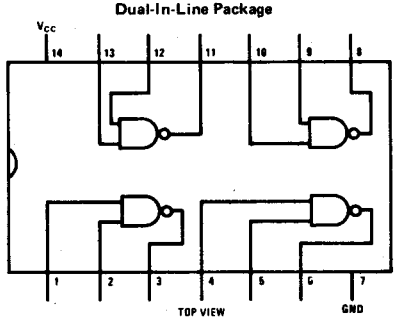


DS7810/DS8810, DS7811/DS8811



DS7812/DS8812

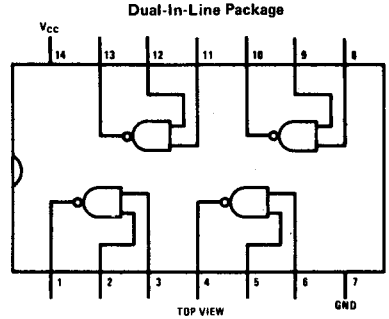
Dual-In-Line Package



TOP VIEW

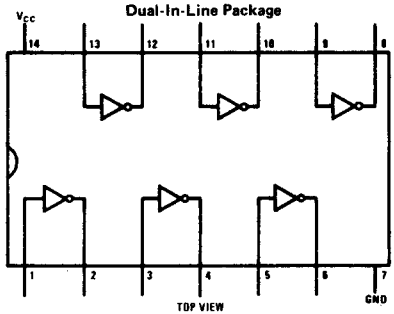
Order Number DS7810J, DS8810J, or DS8810N
See NS Package J14A or N14A

Dual-In-Line Package



TOP VIEW

Order Number DS7811J, DS8811J, DS7811W or DS8811N
See NS Package J14A, N14A or W14A



TOP VIEW

Order Number DS7812J, DS8812J, DS7812W or DS8812N
See NS Package J14A, N14A or W14A

Absolute Maximum Ratings (Note 1)

V_{CC}	7V
Input Voltage	5.5V
Output Voltage	14V
Storage Temperature Range	−65°C to +150°C
Maximum Power Dissipation* at 25°C	
Cavity Package	1254 mW
Molded Package	1106 mW
Lead Temperature (Soldering, 10 seconds)	300°C

*Derate cavity package 8.36 mW/°C above 25°C; derate molded package 8.85 mW/°C above 25°C.

Operating Conditions

	MIN	MAX	UNITS
Supply Voltage (V_{CC})			
DS78XX	4.5	5.5	V
DS88XX	4.75	5.25	V
Temperature (T_A)			
DS78XX	−55	+125	°C
DS88XX	0	+70	°C

Electrical Characteristics (Notes 2 and 3)

PARAMETER		CONDITIONS		MIN	TYP	MAX	UNITS
V_{CLAMP}	Input Diode Clamp Voltage	V_{CC} = 5.0V, T_A = 25°C, I_{IN} = −12 mA				−1.5	V
V_{IH}	Logical "1" Input Voltage	V_{CC} = Min		2.0			V
V_{IL}	Logical "0" Input Voltage	V_{CC} = Min				0.8	V
I_{OH}	Logical "1" Output Current	V_{CC} = Min,	V_{IN} = 0.8V			250	μA
		V_{OUT} = 10V	V_{IN} = 0.0V			40	μA
I_{OL}	Logical "0" Output Current	V_{CC} = Min, V_{IN} = 2.0V, V_{OUT} = 0.4V		16			mA
V_{OH}	Logical "1" Output Breakdown Voltage	V_{CC} = Min, V_{IN} = 0V, I_{OUT} = 1 mA		14			V
V_{OL}	Logical "0" Output Voltage	V_{CC} = Min, V_{IN} = 2.0V, I_{OUT} = 16 mA				0.4	V
I_{IH}	Logical "1" Input Current	V_{CC} = Max	V_{IN} = 2.4V			40	μA
			V_{IN} = 5.5V			1	mA
I_{IL}	Logical "0" Input Current	V_{CC} = Max, V_{IN} = 0.4V				−1.6	mA
$I_{CC(MAX)}$	Logical "0" Supply Current (Each Gate)	V_{CC} = Max, V_{IN} = 5.0V			3.0	5.1	mA
$I_{CC(MIN)}$	Logical "1" Supply Current (Each Gate)	V_{CC} = Max, V_{IN} = 0V			1.0	1.8	mA

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

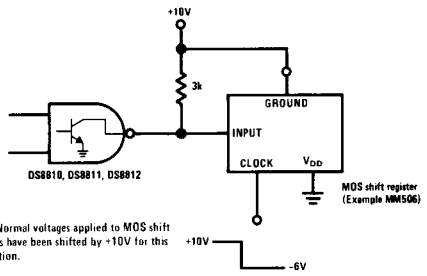
PARAMETER		CONDITIONS	MIN	TYP	MAX	UNITS
t_{pd0}	Propagation Delay Time to a Logical "0"	C_{OUT} = 15 pF, R_L = 1k	4	12	18	ns
t_{pd1}	Propagation Delay Time to a Logical "1"		18	29	45	ns

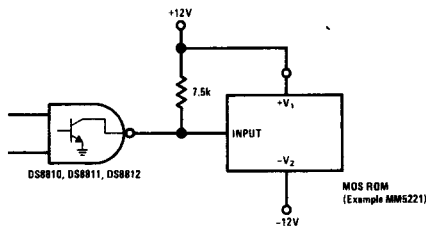
Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range " they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

Note 2: Unless otherwise specified min/max limits apply across the −55°C to +125°C temperature range for the DS7810, DS7811, and DS7812 and across the 0°C to +70°C range for the DS8810, DS8811, and DS8812.

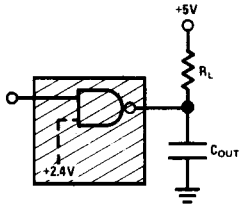
Note 3: All currents into device pins shown as positive, out of device pins as negative, all voltages referenced to ground unless otherwise noted. All values shown as max or min on absolute value basis.

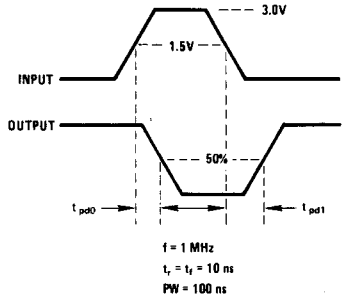
Typical Applications





AC Test Circuit and Switching Time Waveforms





f = 1 MHz
$t_r = t_f$ = 10 ns
PW = 100 ns