National Semiconductor

PRELIMINARY INFORMATION

DP7310/DP8310/DP7311/DP8311 Octal Latched Peripheral Drivers

General Description

The DP7310/8310, DP7311/8311 Octal Latched Peripheral Drivers provide the function of latching eight bits of data with open collector outputs, each driving up to 100 mA DC with an operating voltage range of 30 volts. Both devices are designed for low input currents, high input/output voltages, and feature a power up clear (outputs off) function.

The DP7310/8310 are positive edge latching. Two active low write/enable inputs are available for convenient data bussing without external gating.

The DP7311/8311 are fall through latches. The active low strobe input latches data or allows fall through operation when held at logic "0". The latches are cleared (outputs off) with a logic "0" on the clear pin.

Features

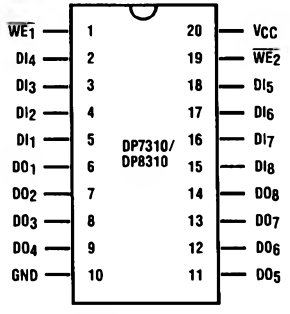
- High current, high voltage open collector outputs
- Low current, high voltage inputs
- All outputs simultaneously sink rated current "DC" with no thermal derating at maximum rated temperature.
- Parallel latching or buffering
- Separate active low enables for easy data bussing
- Internal "glitch free" power up clear
- 10% V_{CC} tolerance

Applications

- High current high voltage drivers
- Relay drivers
- Lamp drivers
- LED drivers
- TRIAC drivers
- Solenoid drivers
- Stepper motor drivers
- Level translators
- Fiber optic LED drivers

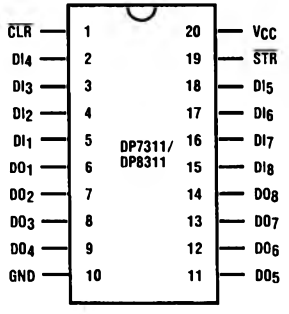
Connection Diagrams

Dual-In-Line Package



Order Number DP7310J, DP8310J
DP8310N

Dual-In-Line Package



Order Number DP7311J, DP8311J
DP8311N

Absolute Maximum Ratings (Note 1)

Supply Voltage	7.0V
Input Voltage	35V
Output Voltage	35V
Storage Temperature Range	−65°C to +150°C
N Package Power Dissipation @ 70°C	1.3 watts
Lead Temperature (soldering, 10 seconds)	300°C

Operating Conditions

	Min.	Max.	Units
Supply Voltage (V_{CC})	4.5	5.5	V
Temperature			
DP7310/DP7311	−55	+125	°C
DP8310/DP8311	0	+70	°C
Input Voltage		30	V
Output Voltage		30	V

DC Electrical Characteristics DP7310/DP8310, DP7311/DP8311 (Notes 2 and 3)

Parameter		Conditions	Min.	Typ.	Max.	Units
V_{IH}	Logical "1" Input Voltage		2.0			V
V_{IL}	Logical "0" Input Voltage				0.8	V
V_{OL}	Logical "0" Output Voltage	Data outputs latched to logical "0", V_{CC} = min.				
	DP7310/DP7311	I_{OL} = 75 ma			0.4	V
	DP8310/DP8311	I_{OL} = 100 mA		0.35	0.5	V
I_{OH}	Logical "1" Output Current	Data outputs latched to logical "1", V_{CC} = min.				
	DP7310/DP7311	V_{OH} = 25V			500	μA
	DP8310/DP8311	V_{OH} = 30V		2.5	250	μA
I_{IH}	Logical "1" Input Current	V_{IH} = 2.7V, V_{CC} = max.		0.1	25	μA
I_I	Input Current at Maximum Input Voltage	V_{IN} = 30V, V_{CC} = max.		1	250	μA
I_{IL}	Logical "0" Input Current	V_{IN} = 0.4V, V_{CC} = max.		−215	−300	μA
V_{clamp}	Input Clamp Voltage	I_{IN} = −12 mA		−0.8	−1.5	V
I_{CC0}	Supply Current, Outputs On	Data outputs latched to a logical "0". All inputs are at logical "1", V_{CC} = max.				
	DP7310			100	125	mA
	DP8310			100	152	mA
	DP7311			88	117	mA
	DP8311			88	125	mA
I_{CC1}	Supply Current, Outputs Off	Data outputs latched to a logic "1". Other conditions same as I_{CC0}.				
	DP7310			40	47	mA
	DP8310			40	57	mA
	DP7311			25	34	mA
	DP8311			25	36	mA

AC Electrical Characteristics DP7310/DP8310: $V_{CC} = 5V$, $T_A = 25°C$

Parameter		Conditions	Min.	Typ.	Max.	Units
t_{pd0}	High to Low Propagation Delay Write Enable Input to Output	Figure 1		40		ns
t_{pd1}	Low to High Propagation Delay Write Enable Input to Output	Figure 1		70		ns
t_{SETUP}	Minimum Set-Up Time Data In to Write Enable Input	$t_{HOLD} = 0$ ns Figure 1		12		ns
t_{pWH}, t_{pWL}	Minimum Write Enable Pulse Width	Figure 1		20		ns
t_{THL}	High to Low Output Transition Time	Figure 1		16		ns
t_{TLH}	Low to High Output Transition Time	Figure 1		38		ns
C_{IN}	"N" Package Note 4			5	15	pF

AC Electrical Characteristics DP7311/DP8311: $V_{CC} = 5V$, $T_A = 25°C$

Parameter		Conditions	Min.	Typ.	Max.	Units
t_{pd0}	High to Low Propagation Delay Data In to Output	Figure 2		30		ns
t_{pd1}	Low to High Propagation Delay Data In to Output	Figure 2		70		ns
t_{SETUP}	Minimum Set-Up Time Data In to Strobe Input	$t_{HOLD} = 0$ ns Figure 2		−25		ns
t_{pWL}	Minimum Strobe Enable Pulse Width	Figure 2		45		ns
t_{pdC}	Propagation Delay Clear to Data Output	Figure 2		70		ns
t_{pWC}	Minimum Clear Input Pulse Width	Figure 2		10		ns
t_{THL}	High to Low Output Transition Time	Figure 2		16		ns
t_{TLH}	Low to High Output Transition Time	Figure 2		38		ns
C_{IN}	Input Capacitance — Any Input	Note 4		5	15	pF

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 DP7310/DP7311 and across the 0°C to +70°C for the DP8310/DP8311. All typical values are for $T_A = 25°C$, $V_{CC} = 5V$.

Note 3: All currents into device pins shown as positive, out of device pins as negative, all voltages referenced to ground unless otherwise noted.

Note 4: Input capacitance is guaranteed by periodic testing. $f_{TEST} = 10$ KHz at 300 mV, $T_A = 25°C$

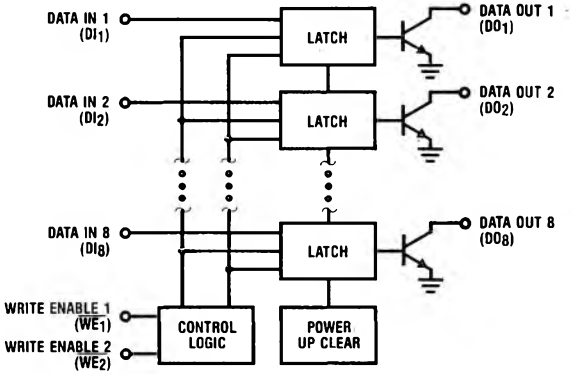
Logic Table

DP7310/DP8310			
Write Enable 1 $\overline{WE_1}$	Write Enable 2 $\overline{WE_2}$	Data Input DI_{1-8}	Data Output DO_{1-8}
0	0	X	Q
0	↓	0	1
0	↓	1	0
↓	0	0	1
↓	0	1	0
0	1	X	Q
1	0	X	Q
1	1	X	Q

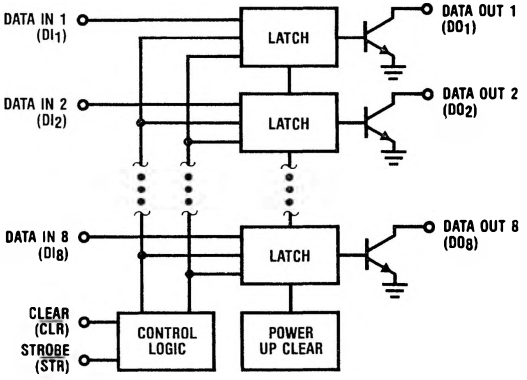
DP7311/DP8311			
Clear $\overline{CLR}$	Strobe $\overline{STR}$	Data Input DI_{1-8}	Data Output DO_{1-8}
1	1	X	Q
1	0	0	1
1	0	1	0
0	X	X	1

X = Don't Care
1 = Outputs Off
0 = Outputs On
Q = Pre-existing Output
↓ = Positive Edge Transition

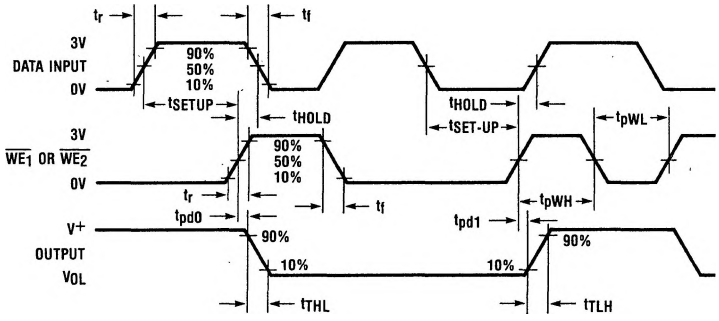
Block Diagram DP7310/DP8310



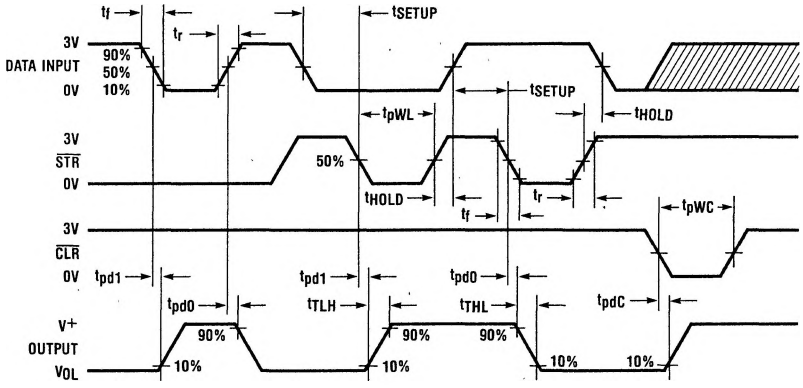
Block Diagram DP7311/DP8311



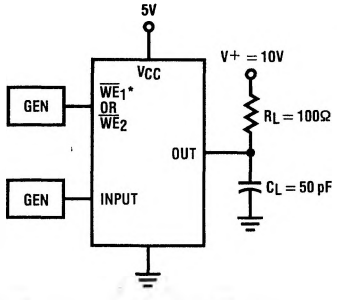
Switching Time Waveforms DP7310/DP8310



Switching Time Waveforms DP7311/DP8311

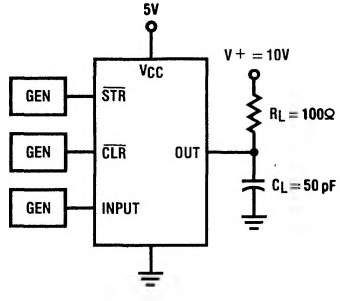


Switching Time Test Circuits DP7310/DP8310 DP7311/DP8311



*WE1 = 0V WHEN THE INPUT = WE2

Figure 1

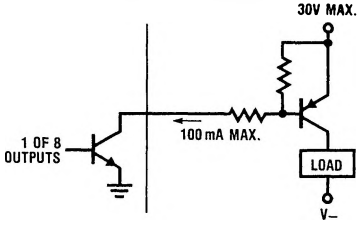


PULSE GENERATOR CHARACTERISTICS:
$Z_O = 50\Omega$, $t_r = t_f = 5$ ns

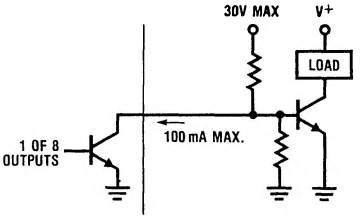
Figure 2

Typical Applications DP8310/11 Buffering High Current Device (Notes 5 and 6)

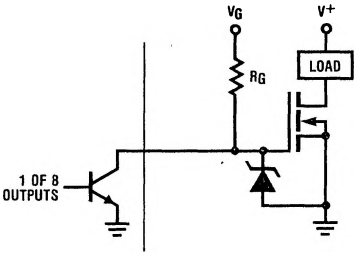
PNP High Current Driver



NPN High Current Driver

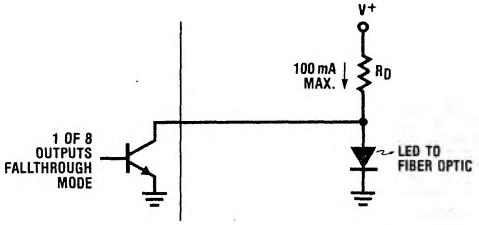


VMOS High Current Driver

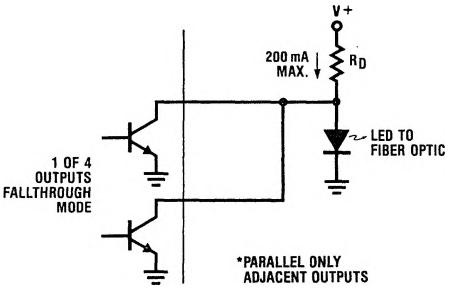


Eight Output/Four Output Fiber Optic LED Driver

DP8311 100 mA Drivers

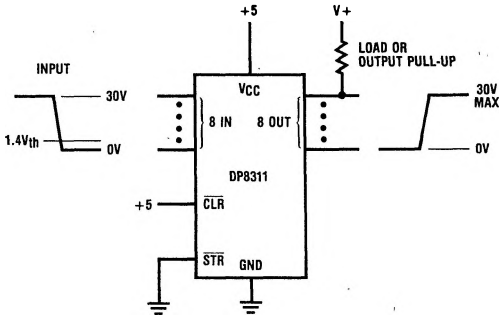


DP8311 Parallel Outputs (200 mA) Drivers*

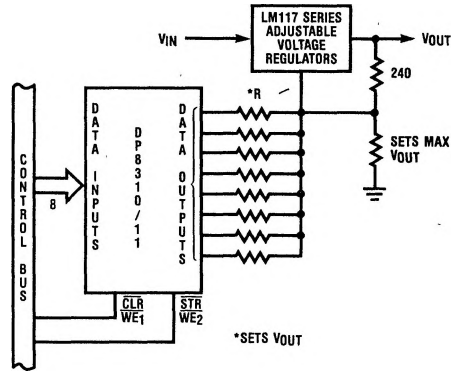


Typical Applications (cont'd)

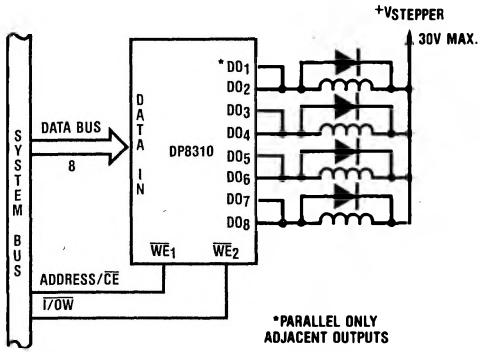
8-Bit Level Translator-Driver



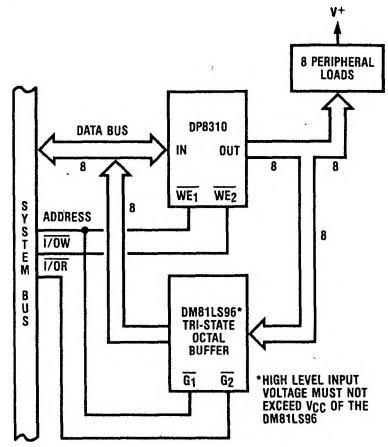
Digital Controlled 256 Level Power Supply from 1.2 Volts to 30 Volts



200 mA Drive for a 4 Phase Bifilar Stepper Motor



Reading the State of the Latched Peripherals



Note 5: Always use good V_{CC} bypass and ground techniques to suppress transients caused by peripheral loads.

Note 6: Printed circuit board mounting is required if these devices are operated at maximum rated temperature and current (all outputs on DC).