

## 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 30V. 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 positive edge 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

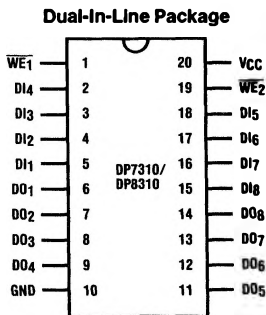
- High current, high voltage open collector outputs
- Low current, high voltage inputs

- 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

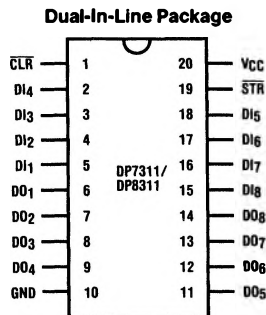
- High current high voltage drivers
- Relay drivers
- Lamp drivers
- LED drivers
- TRIAC drivers
- Solenoid drivers
- Stepper motor drivers
- Level translators
- Fiber-optic LED drivers

### Connection Diagrams



Top View

TL/F/5246-1



Top View

TL/F/5246-2

Order Number DP7310J, DP7311J,  
DP8310N or DP8311N  
See NS Package Number J20A or N20A

### Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	7.0V
Input Voltage	35V
Output Voltage	35V
Maximum Power Dissipation* at 25°C	
Cavity Package	1821 mW
DP8310/DP8311	2005 mW
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 4 sec.)	260°C

\*Derate cavity package 12.1 mW/°C above 25°C; derate molded package 16.0 mW/°C above 25°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)

Symbol	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", $V_{CC} = \text{Min}$ . $I_{OL} = 75 \text{ mA}$ $I_{OL} = 100 \text{ mA}$		0.35	0.4 0.5	V V
$I_{OH}$	Logical "1" Output Current	Data outputs latched to logical "1", $V_{CC} = \text{Min}$ . $V_{OH} = 25 \text{ V}$ $V_{OH} = 30 \text{ V}$		2.5	500 250	$\mu\text{A}$ $\mu\text{A}$
$I_{IH}$	Logical "1" Input Current	$V_{IH} = 2.7 \text{ V}$ , $V_{CC} = \text{Max}$		0.1	25	$\mu\text{A}$
$I_I$	Input Current at Maximum Input Voltage	$V_{IN} = 30 \text{ V}$ , $V_{CC} = \text{Max}$		1	250	$\mu\text{A}$
$I_{IL}$	Logical "0" Input Current	$V_{IN} = 0.4 \text{ V}$ , $V_{CC} = \text{Max}$		-215	-300	$\mu\text{A}$
$V_{clamp}$	Input Clamp Voltage	$I_{IN} = 12 \text{ mA}$		-0.8	-1.5	V
$I_{CC0}$	Supply Current, Outputs On	Data outputs latched to a logical "0". All Inputs are at logical "1", $V_{CC} = \text{Max}$ .		100 100 88 88	125 152 117 125	mA mA mA mA
$I_{CC1}$	Supply Current, Outputs Off	Data outputs latched to a logic "1". Other conditions same as $I_{CC0}$ .		40 40 25 25	47 57 34 36	mA mA mA mA

### AC Electrical Characteristics DP7310/DP8310: $V_{CC} = 4.5V$ , $T_A = -55^{\circ}C$ to $+125^{\circ}C$

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$t_{pd0}$	High to Low Propagation Delay Write Enable Input to Output	(Figure 1)		40	120	ns
$t_{pd1}$	Low to High Propagation Delay Write Enable Input to Output	(Figure 1)		70	150	ns
$t_{SETUP}$	Minimum Set-Up Time Data in to Write Enable Input	$t_{HOLD} = 0$ ns (Figure 1)	45	20		ns
$t_{pWH}$ , $t_{pWL}$	Minimum Write Enable Pulse Width	(Figure 1)	60	25		ns
$t_{THL}$	High to Low Output Transition Time	(Figure 1)		16	35	ns
$t_{TLH}$	Low to High Output Transition Time	(Figure 1)		38	70	ns
$C_{IN}$	"N" Package (Note 4)			5	15	pF

### AC Electrical Characteristics DP7311/DP8311: $V_{CC} = 5V$ , $T_A = 25^{\circ}C$

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$t_{pd0}$	High to Low Propagation Delay Data In to Output	(Figure 2)		30	60	ns
$t_{pd1}$	Low to High Propagation Delay Data to Output	(Figure 2)		70	100	ns
$t_{SETUP}$	Minimum Set-Up Time Data in to Strobe Input	$t_{HOLD} = 0$ ns (Figure 2)	0	-25		ns
$t_{pWL}$	Minimum Strobe Enable Pulse Width	(Figure 2)	60	35		ns
$t_{pdC}$	Propagation Delay Clear to Data Output	(Figure 2)		70	135	ns
$t_{pWC}$	Minimum Clear Input Pulse Width	(Figure 2)	60	25		ns
$t_{THL}$	High to Low Output Transition Time	(Figure 2)		20	35	ns
$t_{TLH}$	Low to High Output Transition Time	(Figure 2)		38	60	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  $-55^{\circ}C$  to  $+125^{\circ}C$  temperature range for the DP7310/DP7311 and across the  $0^{\circ}C$  to  $+70^{\circ}C$  for the DP8310/DP8311. All typical values are for  $T_A = 25^{\circ}C$ ,  $V_{CC} = 5V$ .

**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,  $T_A = 25^{\circ}C$ .

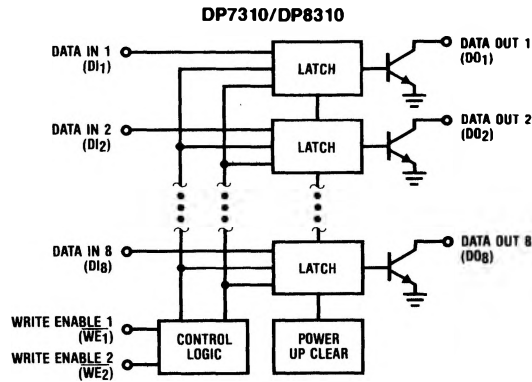
### Logic Table

DP7310/DP8310			
Write Enable 1 WE <sub>1</sub>	Write Enable 2 WE <sub>2</sub>	Data Input DI <sub>1-8</sub>	Data Output DO <sub>1-8</sub>
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

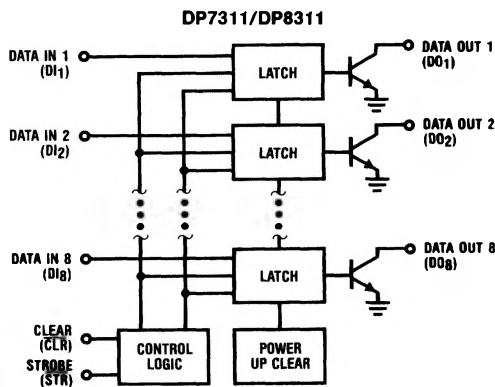
DP7311/DP8311			
Clear CLR	Strobe STR	Data Input DI <sub>1-8</sub>	Data Output DO <sub>1-8</sub>
1	1	X	Q
1	0	0	1
1	0	1	0
0	X	X	1

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

### Block Diagrams

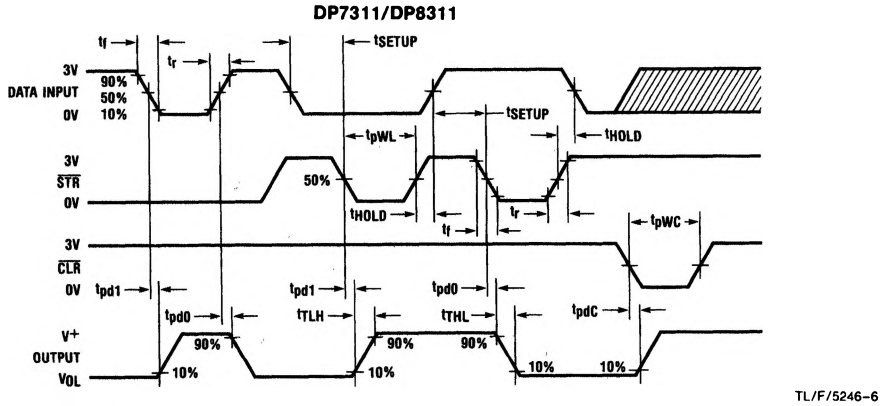
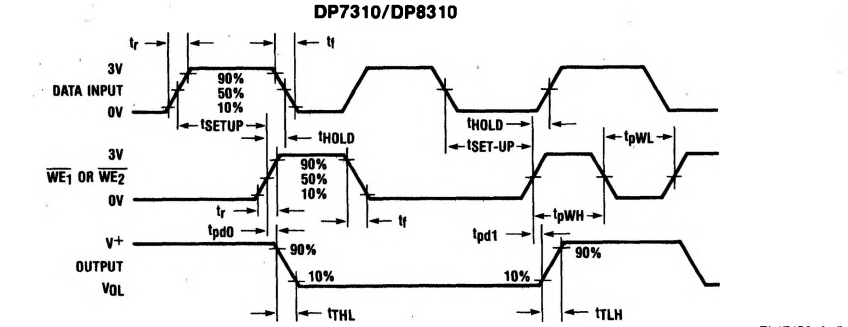


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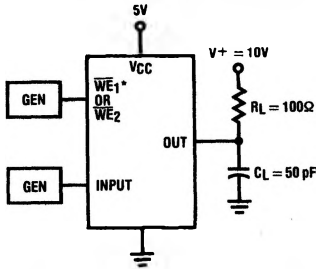


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## Switching Time Waveforms



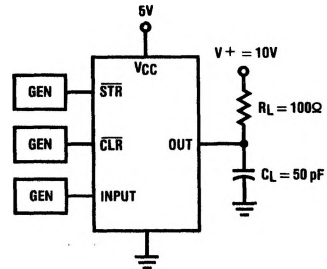
## Switching Time Test Circuits



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\* $\overline{WE}_1 = 0V$  when the Input =  $\overline{WE}_2$

**FIGURE 1. DP7310/DP8310**



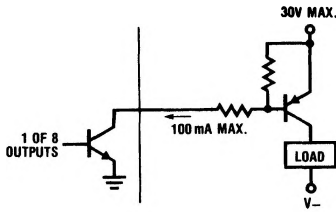
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Pulse Generator Characteristics:  
 $Z_0 = 50\Omega$ ,  $t_r = t_f = 5\text{ ns}$

**FIGURE 2. DP7311/DP8311**

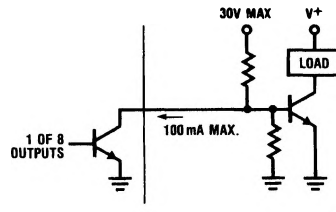
# Typical Applications DP8310/11 Buffering High Current Device (Notes 1 and 2)

## PNP High Current Driver



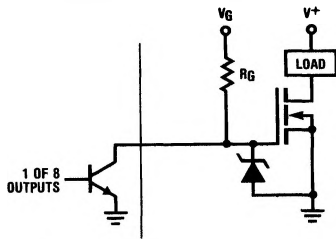
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## NPN High Current Driver



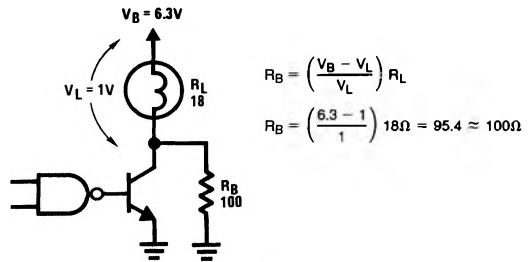
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## VMOS High Current Driver



TL/F/5246-11

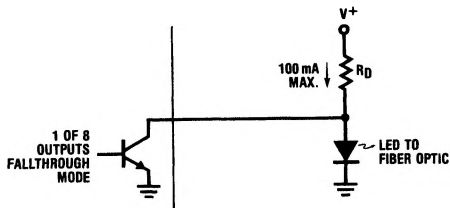
## Circuit Used to Reduce Peak Transient Lamp Current



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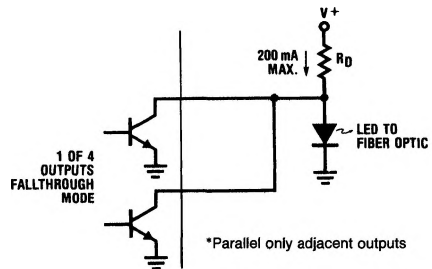
## Eight Output/Four Output Fiber Optic LED Driver

### DP8311 100 mA Drivers



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### DP8311 Parallel Outputs (200 mA) Drivers\*

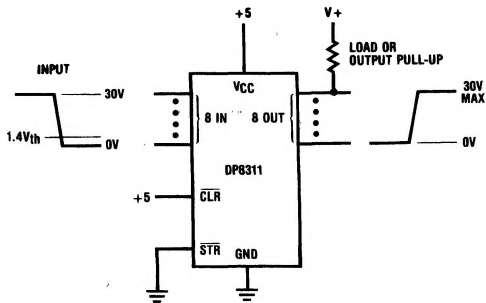


\*Parallel only adjacent outputs

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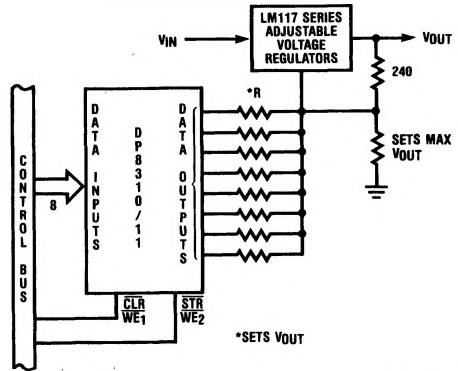
## Typical Applications (Continued)

### 8-Bit Level Translator-Driver



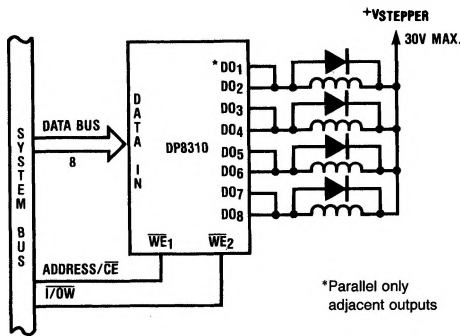
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### Digital Controlled 256 Level Power Supply from 1.2V to 30V



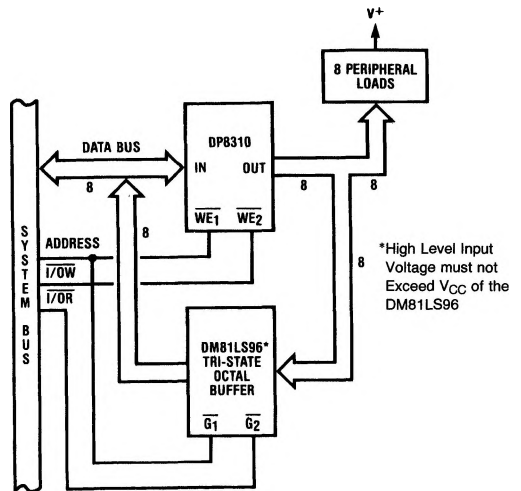
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### 200 mA Drive for a 4 Phase Bifilar Stepper Motor



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### Reading the State of the Latched Peripherals



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**Note 1:** Always use good  $V_{CC}$  bypass and ground techniques to suppress transients caused by peripheral loads.

**Note 2:** Printed circuit board mounting is required if these devices are operated at maximum rated temperature and current (all outputs on DC).