

DP7310, DP8310, DP7311, DP8311

Octal Latched Peripheral Drivers

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.

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
 - Class Q Military
 - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
 - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

Rochester Electronics Notes

The values represented below are reflective of initial testing and final values will be determined during higher volume production. This document shall serve as a preliminary datasheet and its contents are subject to being updated and/or replaced at Rochester's discretion.

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

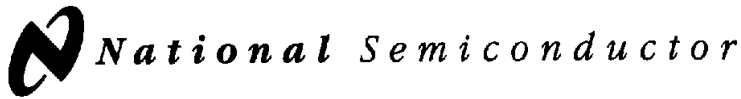
AC Electrical Characteristics DP7311/DP8311: $V_{CC} = 5V$, $T_A = 25^{\circ}C$						
Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{pd0}	High to Low Propagation Delay Data In to Output	(Figure 2)		35	60	ns
t_{pd1}	Low to High Propagation Delay Data to Output	(Figure 2)		140	165	ns
t_{SETUP}	Minimum Set-Up Time Data in to Strobe Input	$t_{HOLD} = 0$ ns (Figure 2)		25	35	ns
t_{pWL}	Minimum Strobe Enable Pulse Width	(Figure 2)	60	35		ns
t_{pdC}	Propagation Delay Clear to Data Output	(Figure 2)		125	150	ns
t_{pWC}	Minimum Clear Input Pulse Width	(Figure 2)	60	40		ns
t_{THL}	High to Low Output Transition Time	(Figure 2)		20	35	ns
t_{TLH}	Low to High Output Transition Time	(Figure 2)		55	65	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, $T_A = 25^{\circ}C$.



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

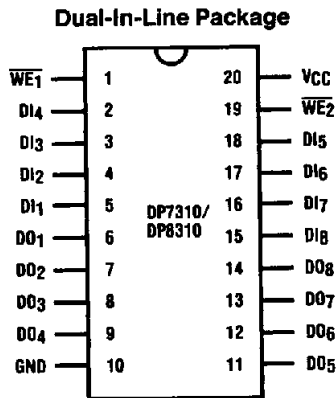
- High current, high voltage open collector outputs
- Low current, high voltage inputs

- 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

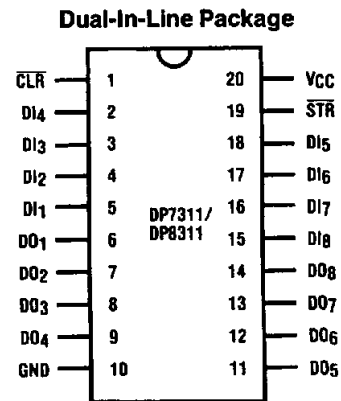
- High current high voltage drivers
- Relay drivers
- Lamp drivers
- LED drivers
- TRIAC drivers
- Solenoid drivers
- Stepper motor drivers
- Level translators
- Fiber-optic LED drivers

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", $V_{CC} = \text{Min.}$ $I_{OL} = 75 \text{ mA}$ $I_{OL} = 100 \text{ mA}$			0.4	V
				0.35	0.5	V
I_{OH}	Logical "1" Output Current	Data outputs latched to logical "1", $V_{CC} = \text{Min.}$ $V_{OH} = 25\text{V}$ $V_{OH} = 30\text{V}$			500	μA
				2.5	250	μA
I_{IH}	Logical "1" Input Current	$V_{IH} = 2.7\text{V}, V_{CC} = \text{Max}$		0.1	25	μA
I_I	Input Current at Maximum Input Voltage	$V_{IN} = 30\text{V}, V_{CC} = \text{Max}$		1	250	μA
I_{IL}	Logical "0" Input Current	$V_{IN} = 0.4\text{V}, V_{CC} = \text{Max}$		-215	-300	μA
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", $V_{CC} = \text{Max.}$				
			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: $V_{CC} = 4.5V$, $T_A = -55^{\circ}C$ 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

Please refer to the Notes page for Rochester's

AC Electrical Characteristics for this device**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, $T_A = 25^{\circ}C$.

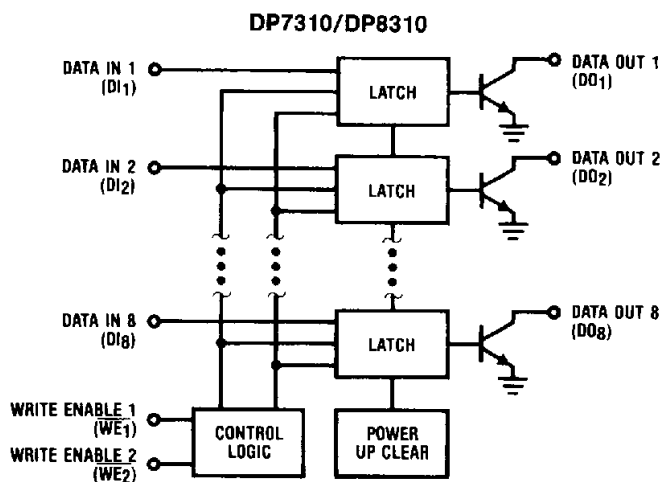
Logic Table

DP7310/DP8310			
Write Enable 1 \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

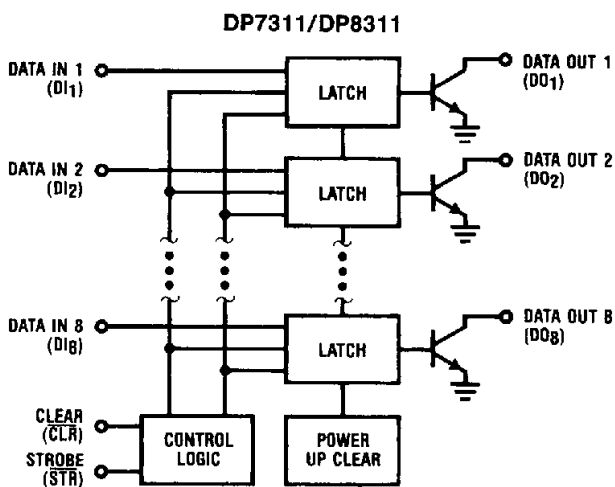
DP7311/DP8311			
Clear CLR	Strobe STR	Data Input DI_{1-8}	Data Output DO_{1-8}
1	1	X	Q
1	0	0	1
1	0	1	0
0	X	X	1

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

Block Diagrams

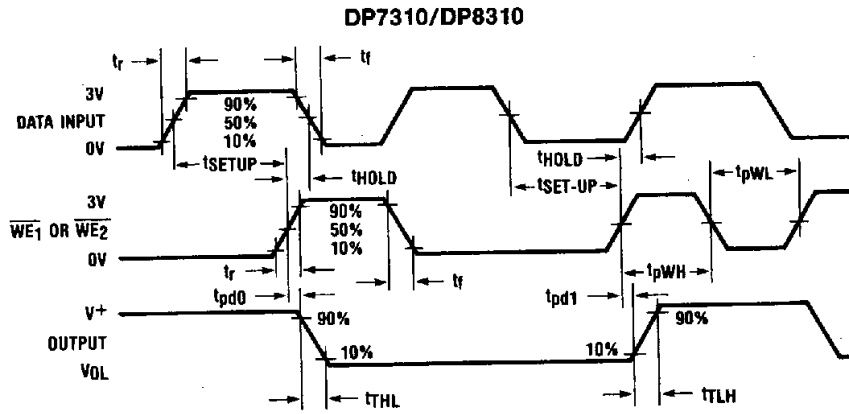


TL/F/5246-3

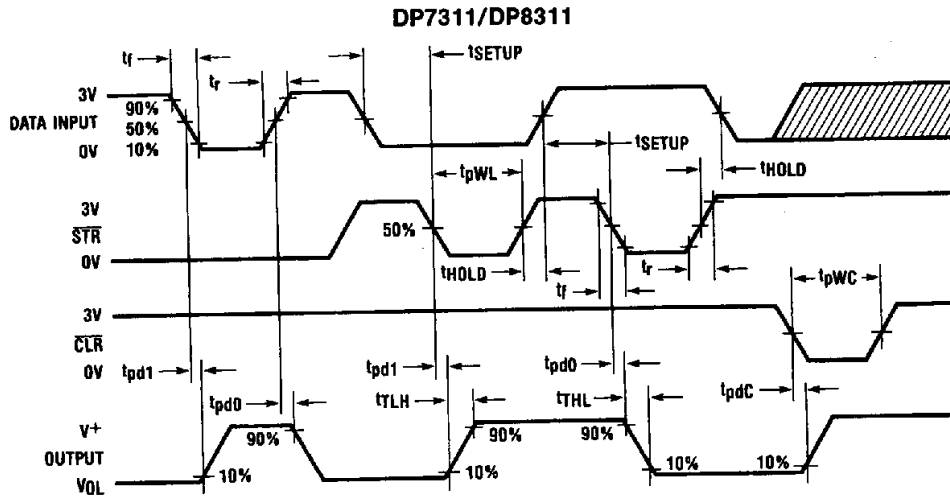


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Switching Time Waveforms

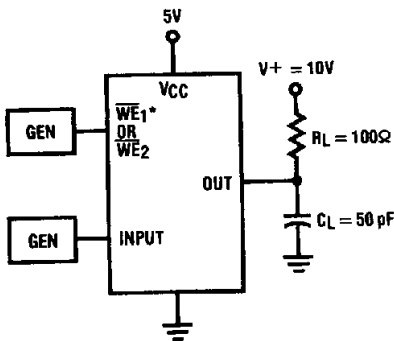


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TL/F/5246-6

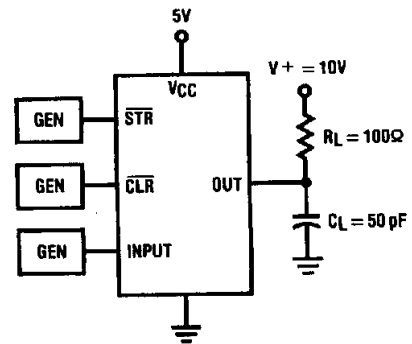
Switching Time Test Circuits



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

FIGURE 1. DP7310/DP8310



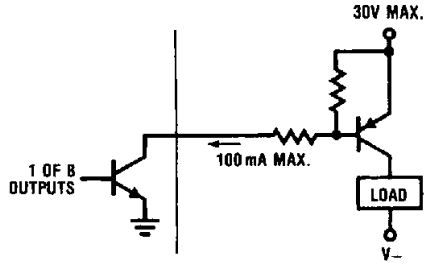
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Pulse Generator Characteristics:
 $Z_O = 50\Omega$, $t_r = t_f = 5\text{ ns}$

FIGURE 2. DP7311/DP8311

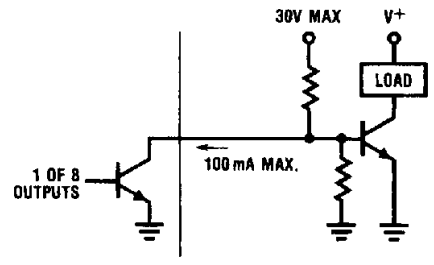
Typical Applications DP8310/11 Buffering High Current Device (Notes 1 and 2)

PNP High Current Driver



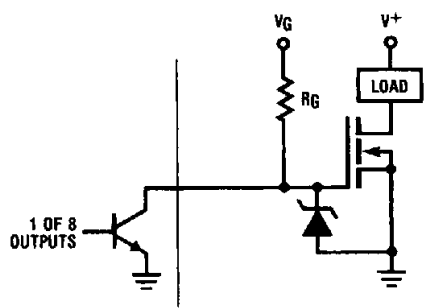
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NPN High Current Driver



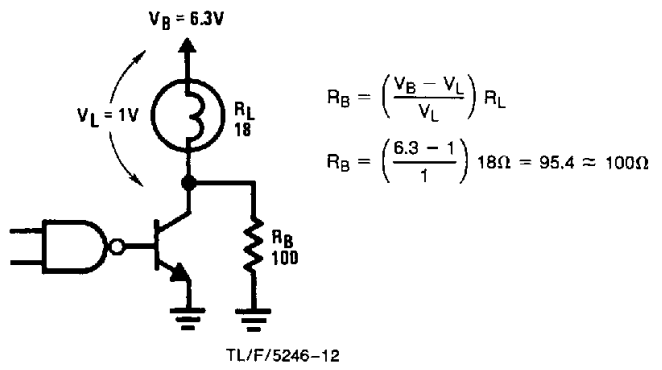
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VMOS High Current Driver



TL/F/5246-11

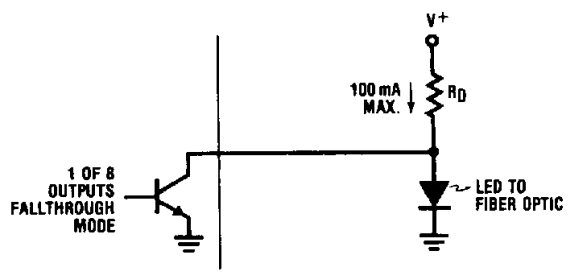
Circuit Used to Reduce Peak Transient Lamp Current



TL/F/5246-12

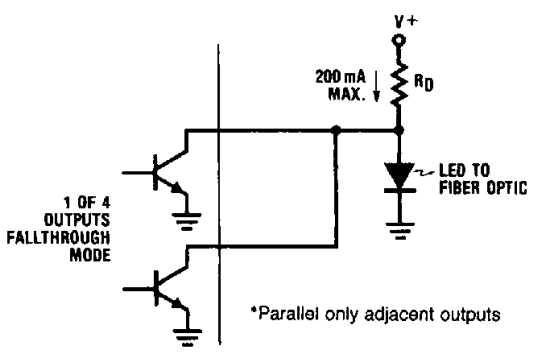
Eight Output/Four Output Fiber Optic LED Driver

DP8311 100 mA Drivers



TL/F/5246-13

DP8311 Parallel Outputs (200 mA) Drivers*

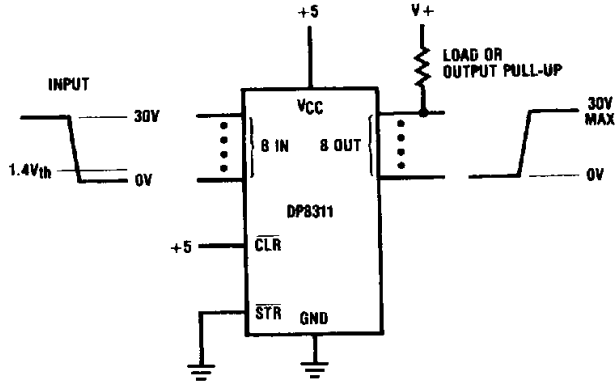


*Parallel only adjacent outputs

TL/F/5246-14

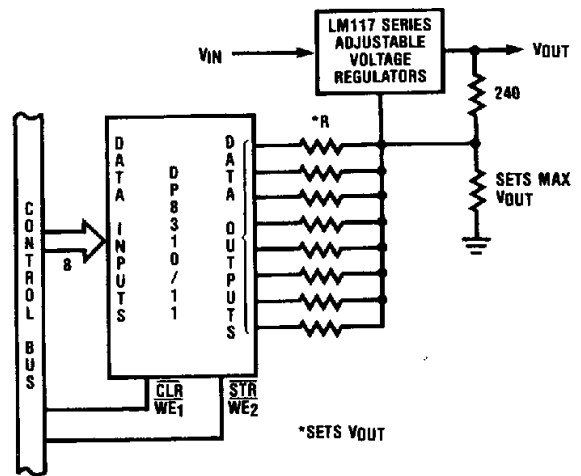
Typical Applications (Continued)

8-Bit Level Translator-Driver



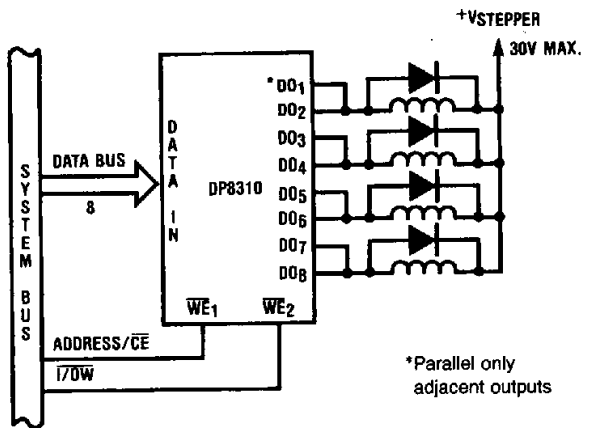
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Digital Controlled 256 Level Power Supply from 1.2V to 30V



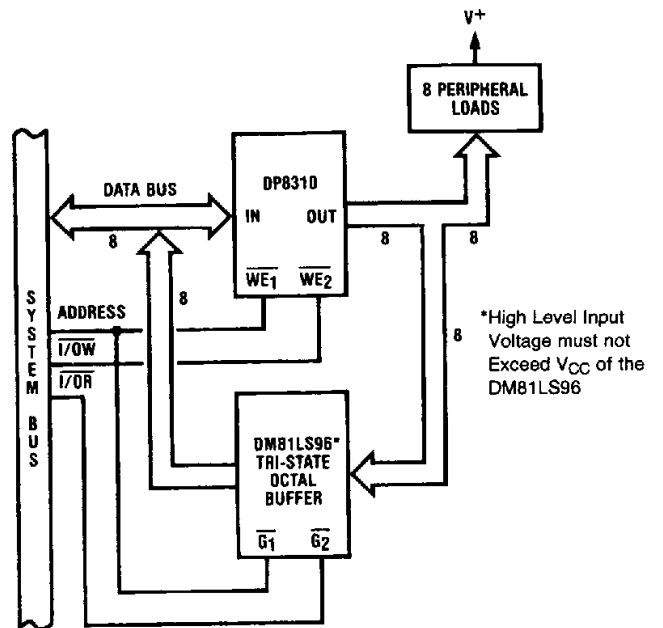
TL/F/5246-16

200 mA Drive for a 4 Phase Bifilar Stepper Motor



TL/F/5246-17

Reading the State of the Latched Peripherals



TL/F/5246-18

Note 1: Always use good VCC 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).