Dual Non-Inverting Power Driver

FEATURES

- 3.0A Peak Current Totem Pole Output

- 5 to 35V Operation

- 25ns Rise and Fall Times

- 25ns Propagation Delays

- Thermal Shutdown and Under-Voltage Protection

- High-Speed, Power MOSFET Compatible

- Efficient High Frequency Operation

- Low Cross-Conduction Current Spike

- Enable and Shutdown Functions

- Wide Input Voltage Range

- ESD Protection to 2kV

DESCRIPTION

The UC1708 family of power drivers is made with a high-speed, high-voltage, Schottky process to interface control functions and high-power switching devices – particularly power MOSFETs. Operating over a 5 to 35 volt supply range, these devices contain two independent channels. The A and B inputs are compatible with TTL and CMOS logic families, but can withstand input voltages as high as V_{IN}. Each output can source or sink up to 3A as long as power dissipation limits are not exceeded.

Although each output can be activated independently with its own inputs, they can be forced low in common through the action of either a digital high signal at the Shutdown terminal or by forcing the Enable terminal low. The Shutdown terminal will only force the outputs low, it will not effect the behavior of the rest of the device. The Enable terminal effectively places the device in under-voltage lockout, reducing power consumption by as much as 90%. During under-voltage and disable (Enable terminal forced low) conditions, the outputs are held in a self-biasing, low-voltage, state.

The UC3708 and UC2708 are available in plastic 8-pin MINI DIP and 16-pin "bat-wing" DIP packages for commercial operation over a $0^{o}C$ to $+70^{o}C$ temperature range and industrial temperature range of $-25^{o}C$ to $+85^{o}C$ respectively. For operation over a $-55^{o}C$ to $+125^{o}C$ temperature range, the UC1708 is available in hermetically sealed 8-pin MINI CDIP, 16 pin CDIP and 20 pin CLCC packages. Surface mount devices are also available.
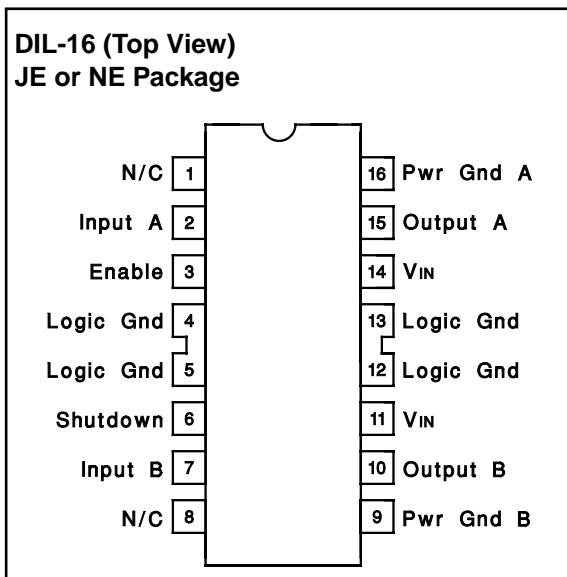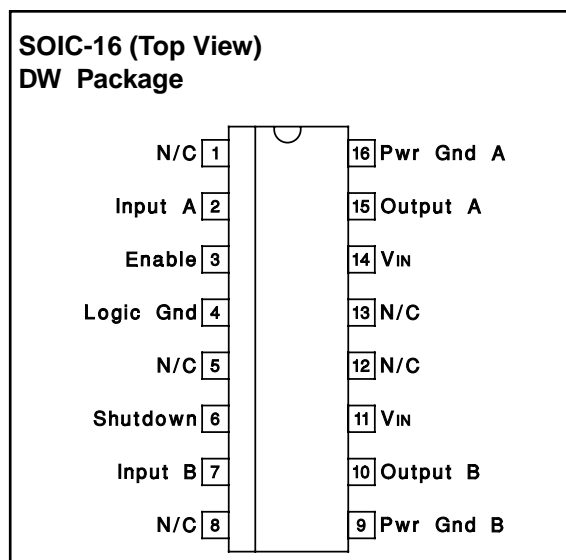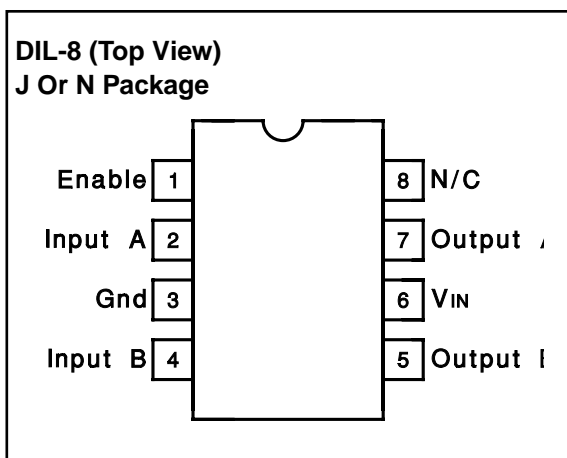
BLOCK DIAGRAM
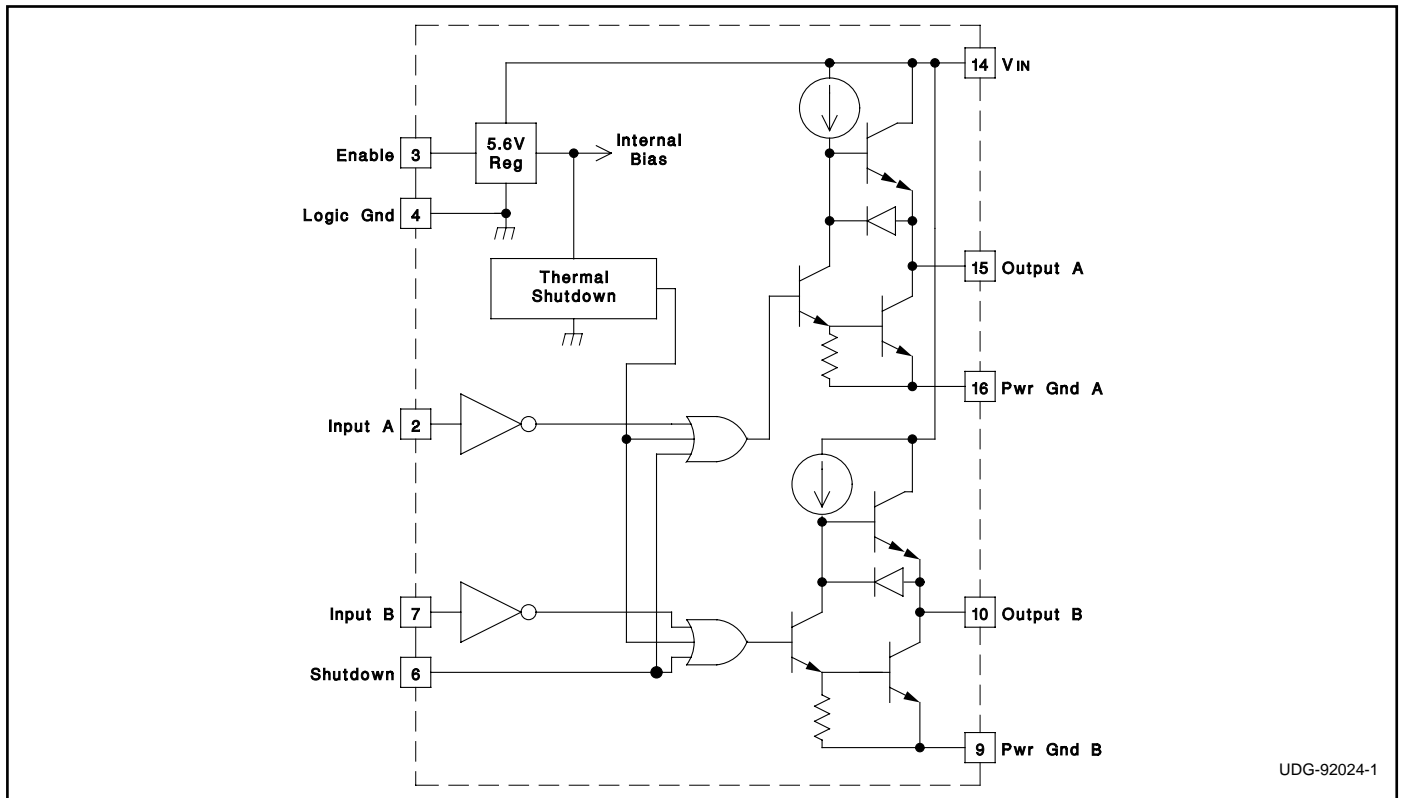
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Note: Shutdown feature available only in JE , NE or DW packages.

ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply Voltage V_{IN} 35V
Output Current (Each Output, Source or Sink)
   Steady-State 0.5A
   Peak Transient 3A
Ouput Voltage . . . . -0.3 to (V_{IN} + 0.3)V
Enable and Shutdown Inputs . . . . -0.3 to 6.2V
A and B Inputs . . . . -0.3 to (V_{IN} + 0.3)V
Operating Junction Temperature (Note 2) . . . . 150°C
Storage Temperature Range. . . . . -65° to 150°C
Lead Temperature (Soldering, 10 Seconds). . . . . 300°C

NOTE 1: All voltages are with respect to Logic Gnd pin. All currents are positive into, negative out of, device terminals.
NOTE 2: Consult Unitrode Integrated Circuits databook for information regarding thermal specifications and limitations of packages.

CONNECTION DIAGRAMS

DIL-8 (Top View)
J Or N Package

Enable	1	8	N/C
Input A	2	7	Output A
Gnd	3	6	V_{IN}
Input B	4	5	Output B

SOIC-16 (Top View)
DW Package

N/C	1	16	Pwr Gnd A
Input A	2	15	Output A
Enable	3	14	V_{IN}
Logic Gnd	4	13	N/C
N/C	5	12	N/C
Shutdown	6	11	V_{IN}
Input B	7	10	Output B
N/C	8	9	Pwr Gnd B

DIL-16 (Top View)
JE or NE Package

N/C	1	16	Pwr Gnd A
Input A	2	15	Output A
Enable	3	14	V_{IN}
Logic Gnd	4	13	Logic Gnd
Logic Gnd	5	12	Logic Gnd
Shutdown	6	11	V_{IN}
Input B	7	10	Output B
N/C	8	9	Pwr Gnd B

Note: In JE package Pin 4 is logic ground. Pins 5, 12, and 13 are N/C.

CLCC-20 (Top View)
L Package
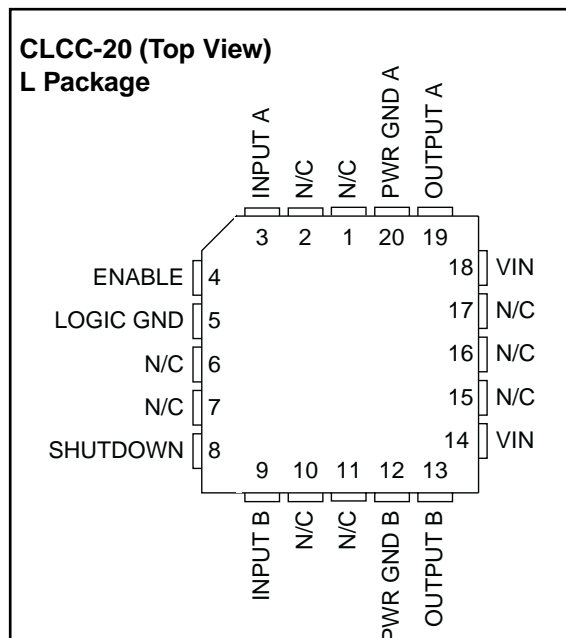
ELECTRICAL CHARACTERISTICS: Unless otherwise stated, V_{IN}=10V to 35V, and these specifications apply for: $-55^oC<T_A<125^oC$ for the UC1708, $-25^oC<T_A<+85^oC$ for the UC2708, and $0^oC<T_A<70^oC$ for the UC3708. $T_A = T_J$.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN} Supply Current	OutputsLow		18	26	mA
	Outputs High		14	18	mA
	Enable = 0V		1	4	mA
A, B and Shutdown Inputs Low Level				0.8	V
A, B and Shutdown Inputs High Level		2.0			V
A, B Input Current Low	$V_{A,B} = 0.4V$	-1	-0.6		mA
A, B Input Current High	$V_{A,B} = 2.4V$	-200		50	µA
A, B Input Leakage Current High	$V_{A,B} = 35.3V$			200	µA
Shutdown Input Current Low	$V_{SHUTDOWN} = 0.4V$		20	100	µA
Shutdown Input Current High	$V_{SHUTDOWN} = 2.4V$		170	500	µA
	$V_{SHUTDOWN} = 6.2V$		0.6	1.5	mA
Enable Input Current Low	$V_{ENABLE} = 0V$	-600	-460	200	µA
Enable Input Current High	$V_{ENABLE} = 6.2V$			200	µA
Enable Threshold Rising			2.8	3.6	V
Enable Threshold Falling		1.0	2.4	3.4	V
Output High Sat., V_{IN} - V_{OUT}	$I_{OUT} = -50mA$			2.0	V
	$I_{OUT} = -500mA$			2.5	V
Output Low Sat., V_{OUT}	$I_{OUT} = 50mA$			0.5	V
	$I_{OUT} = 500mA$			2.5	V
Thermal Shutdown			155		°C

SWITCHING CHARACTERISTICS (Figure 1), (VIN = 20V, delays measured to 10% output change.)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
From A,B Input to Output:					
Rise Time Delay (TPLH)	CL = 0pF		25	40	ns
	CL = 1000pF (Note 3)		25	40	ns
	CL = 2200pF		30	45	ns
10% to 90% Rise (TTLH)	CL = 0pF		55	75	ns
	CL = 1000pF (Note 3)		25	50	ns
	CL = 2200pF		40	55	ns
Fall Time Delay (TPHL)	CL = 0pF		25	40	ns
	CL = 1000pF (Note 3)		25	45	ns
	CL = 2200pF		35	50	ns
90% to 10% Fall (TTHL)	CL = 0pF		15	20	ns
	CL = 1000pF (Note 3)		25	45	ns
	CL = 2200pF		40	55	ns

NOTE 3: These parameters, specified at 1000pF, although ensured over recommended operating conditions, are not tested in production.

SWITCHING CHARACTERISTICS (Figure 1), (VIN = 20V, delays measured to 10% output change.)

From Shutdown Input to Output					
Rise Time Delay (TPLH)	CL = 0pF			25	75	ns
	CL = 1000pF (Note 3)			30	75	ns
	CL = 2200pF			35	75	ns
10% to 90% Rise (TTLH)	CL = 0pf			50	75	ns
	CL = 1000pF (Note 3)			25	50	ns
	CL = 2200pF			40	55	ns
Fall Time Delay (TPHL)	CL = 0pF			25	45	ns
	CL = 1000pF (Note 3)			30	50	ns
	CL = 2200pF			35	55	ns
90% to 10% Fall (TTHL)	CL = 0pF			25	20	ns
	CL = 1000pF (Note 3)			25	45	ns
	CL = 2200pF			40	55	ns
Total Supply Current	F = 200kHz, 50% duty cycle, both channels; CL = 0pF			23	25	mA
	F = 200kHz, 50% duty cycle, both channels; CL = 2200pF			38	45	mA

NOTE 3: These parameters, specified at 1000pF, although ensured over recommended operating conditions, are not tested in production.

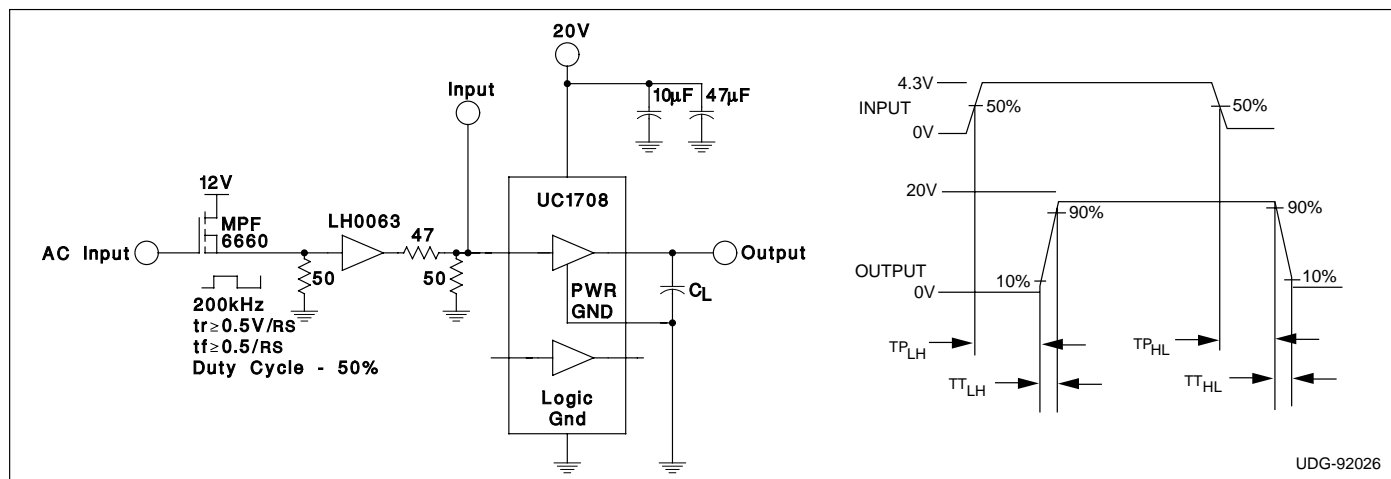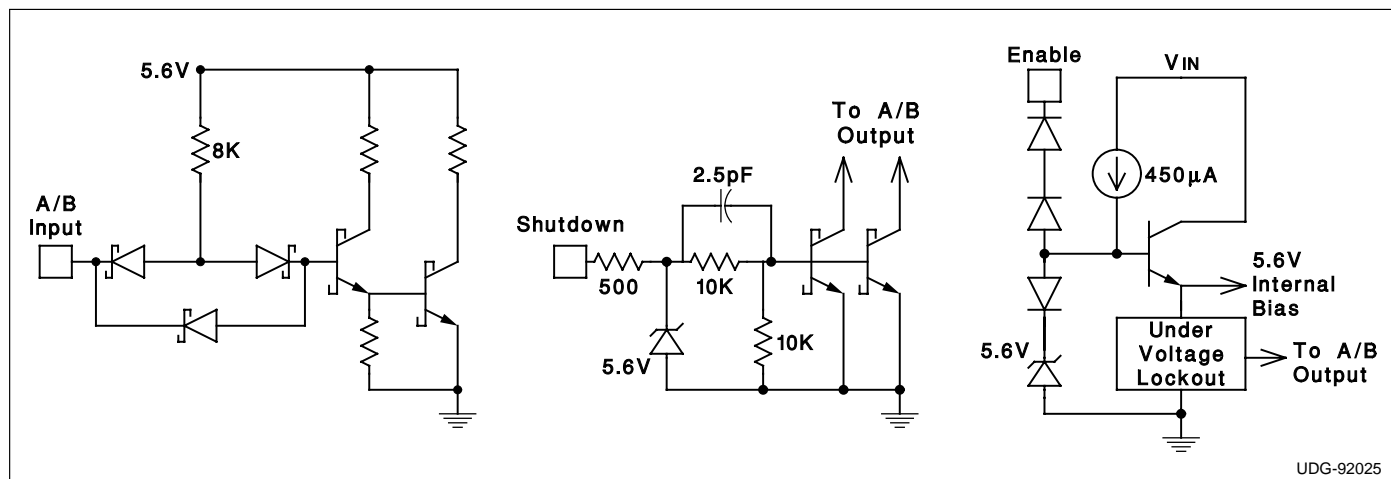Figure 1: AC Test Circuit and Switching Time Waveforms

Figure 2: Equivalent Input Circuits

Note: Shutdown feature available only in JE, NE or DW Packages.

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