

High Speed Power Driver

FEATURES

- 1.5A Source/Sink Drive
- 100 nsec Delay
- 40 nsec Rise and Fall into 1000pF
- Inverting and Non-Inverting Inputs
- Low Cross-Conduction Current Spike
- Low Quiescent Current
- 5V to 40V Operation
- Thermal Shutdown Protection
- MINIDIP and Power Packages

DESCRIPTION

The UC1705 family of power drivers is made with a high speed Schottky process to interface between low-level control functions and high-power switching devices - particularly power MOSFETs. These devices are also an optimum choice for capacitive line drivers where up to 1.5 amps may be switched in either direction. With both Inverting and Non-Inverting inputs available, logic signals of either polarity may be accepted, or one input can be used to gate or strobe the other.

Supply voltages for both V_s and V_c can independently range from 5V to 40V. For additional application details, see the UC1707/3707 data sheet.

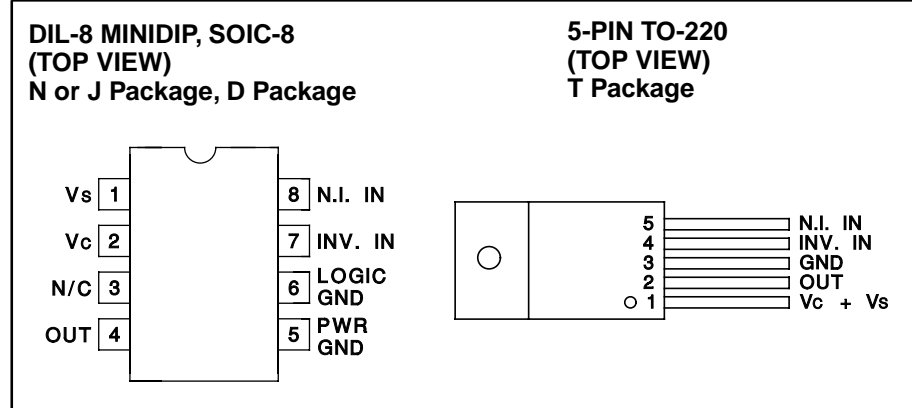
The UC1705 is packaged in an 8-pin hermetically sealed CERDIP for -55°C to +125°C operation. The UC3705 is specified for a temperature range of 0°C to +70°C and is available in either a plastic minidip or a 5-pin, power TO-220 package.

TRUTH TABLE

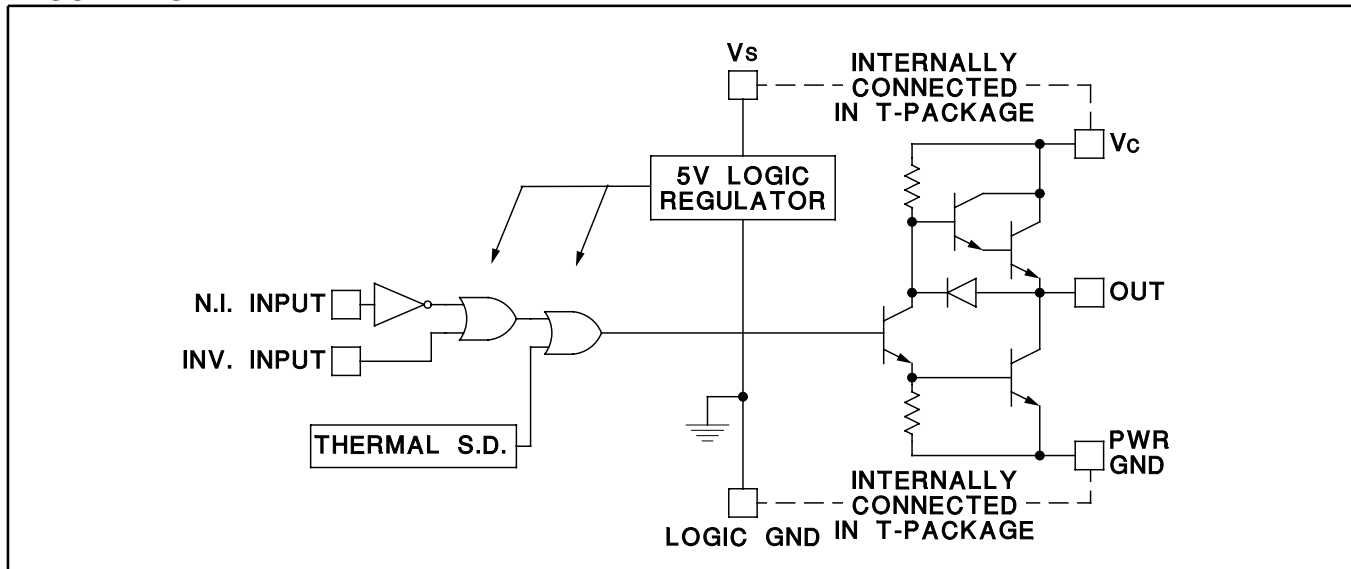
| INV | N.I | OUT |
|-----|-----|-----|
| H | H | L |
| L | H | H |
| H | L | L |
| L | L | L |

$\overline{OUT} = \overline{INV}$ and $\overline{N.I.}$
 $\overline{OUT} = INV$ or $\overline{N.I.}$

CONNECTION DIAGRAMS



BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| | N-Pkg | J-Pkg | T-Pkg |
|---|---|---|---|
| Supply Voltage, V_{IN} | 40V | 40V | 40V |
| Collector Supply Voltage, V_C | 40V | 40V | 40V |
| Output Current (Source or Sink) | | | |
| Steady-State | ±500mA | ±500mA | ±1.0A |
| Peak Transient | ±1.5A | ±1.0A | ±2.0A |
| Capacitive Discharge Energy | 20μJ | 15μJ | 50μJ |
| Digital Inputs (See Note) | 5.5V | 5.5V | 5.5V |
| Power Dissipation at $T_A = 25^\circ\text{C}$ (See Note) | 1W | 1W | 3W |
| Power Dissipation at T_A (Leads/Case) = 25°C (See Note) | 3W | 2W | 25W |
| Operating Temperature Range | 0°C to $+70^\circ\text{C}$ | -55°C to $+125^\circ\text{C}$ | 0°C to $+70^\circ\text{C}$ |
| Storage Temperature Range | -65°C to $+150^\circ\text{C}$ | -65°C to $+150^\circ\text{C}$ | -65°C to $+150^\circ\text{C}$ |
| Lead Temperature (Soldering, 10 seconds) | 300°C | 300°C | 300°C |

Note: All currents are positive into, negative out of the specified terminal.

Digital Drive can exceed 5.5V if input current is limited to 10mA

Consult Packaging Section of Databook for thermal limitations and considerations of package.

ELECTRICAL CHARACTERISTICS: Unless otherwise stated, these specifications apply for $T_A = -55^\circ\text{C}$ to $+125^\circ\text{C}$ for the UC1705, -25°C to $+85^\circ\text{C}$ for the UC2705, and 0°C to $+70^\circ\text{C}$ for the UC3705; $V_S = V_C = 20\text{V}$, $T_A = T_J$.

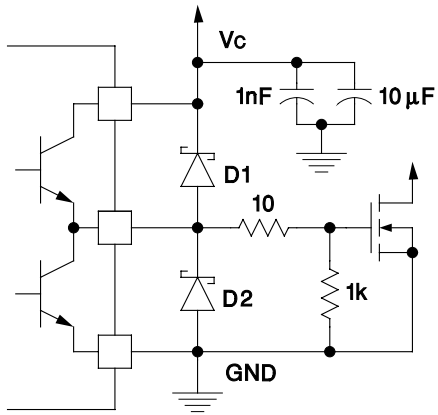
| PARAMETERS | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|-----------------------------------|--|-----|------|------|------------------|
| V_S Supply Current | $V_S = 40\text{V}$, (Outputs High, T Pkg) | | 6 | 8 | mA |
| | $V_S = 40\text{V}$, (Outputs Low, T Pkg) | | 8 | 12 | mA |
| V_C Supply Current (N, J Only) | $V_C = 40\text{V}$, Outputs Low | | 2 | 4 | mA |
| V_C Leakage Current (N, J Only) | $V_S = 0$, $V_C = 30\text{V}$ | | 0.05 | 0.1 | mA |
| Digital Input Low Level | | | | 0.8 | V |
| Digital Input High Level | | 2.2 | | | V |
| Input Current | $V_I = 0$ | | -0.6 | -1.0 | mA |
| Input Leakage | $V_I = 5\text{V}$ | | 0.05 | 0.1 | mA |
| Output High Sat., V_{C-H} | $I_O = -50\text{mA}$ | | | 2.0 | V |
| | $I_O = -500\text{mA}$ | | | 2.5 | V |
| Output Low Sat., V_{C-L} | $I_O = 50\text{mA}$ | | | 0.4 | V |
| | $I_O = 500\text{mA}$ | | | 2.5 | V |
| Thermal Shutdown | | | 155 | | $^\circ\text{C}$ |

TYPICAL SWITCHING CHARACTERISTICS: $V_S = V_C = 20\text{V}$, $T_A = 25^\circ\text{C}$. Delays measured to 10% output change.

| PARAMETERS | TEST CONDITIONS | OUTPUT $C_L =$ | | | UNIT |
|---|-----------------|----------------|-----|-----|------|
| From Inv. Input to Output: | | open | 1.0 | 2.2 | nF |
| Rise Time Delay | | 60 | 60 | 60 | ns |
| 10% to 90% Rise | | 20 | 40 | 60 | ns |
| Fall Time Delay | | 60 | 60 | 60 | ns |
| 90% to 10% Fall | | 25 | 40 | 50 | ns |
| From N. I. Input to Output: | | | | | |
| Rise Time Delay | | 90 | 90 | 90 | ns |
| 10% to 90% Rise | | 20 | 40 | 60 | ns |
| Fall Time Delay | | 60 | 60 | 60 | ns |
| 90% to 10% Fall | | 25 | 40 | 50 | ns |
| V_C Cross-Conduction Current Spike Duration | Output Rise | 25 | | | ns |
| | Output Fall | 0 | | | ns |

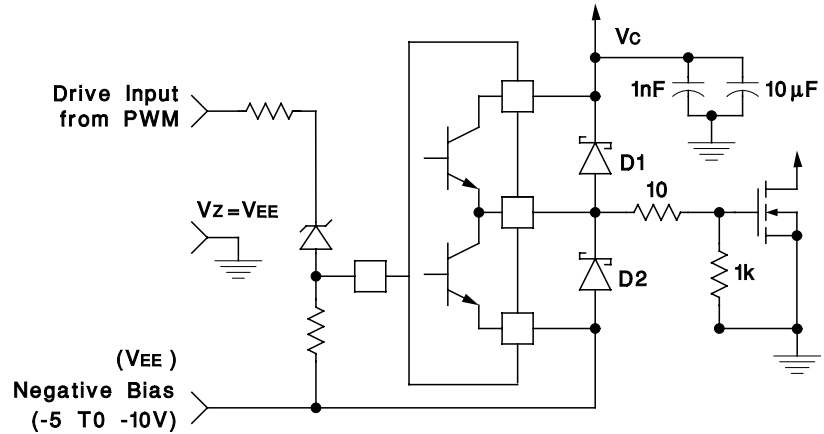
APPLICATIONS

Power MOSFET Drive Circuit



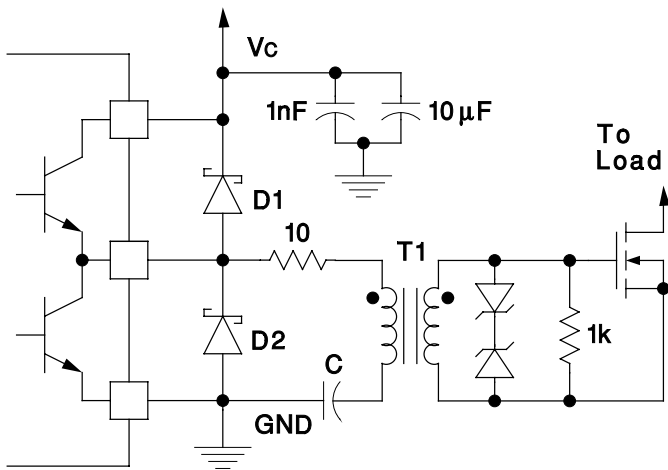
D1, D2: UC3611 Schottky Diodes

Power MOSFET Drive Circuit using Negative Bias Voltage and Level Shifting to Ground Referenced PWMs.



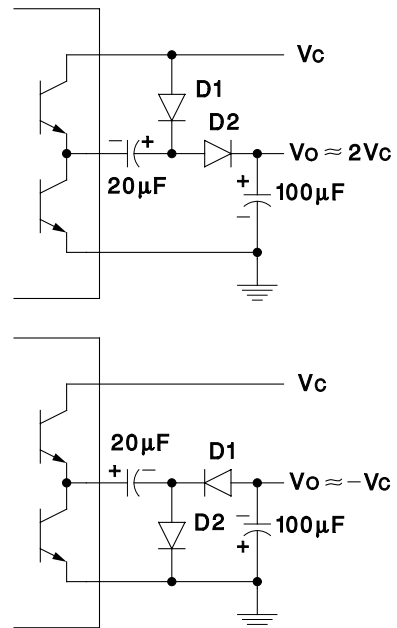
D1, D2: UC3611 Schottky Diodes

Transformer Coupled MOSFET Drive Circuit



D1, D2: UC3611 Schottky Diodes

Charge Pump Circuits



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