

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.

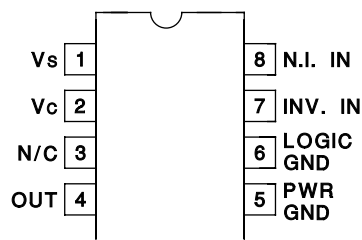
TRUTH TABLE

INV	N.I	OUT
H	H	L
L	H	H
H	L	L
L	L	L

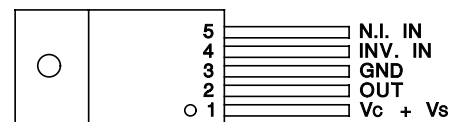
$\overline{OUT} = \overline{INV} \text{ and } \overline{N.I.}$
 $\overline{OUT} = INV \text{ or } N.I.$

CONNECTION DIAGRAMS

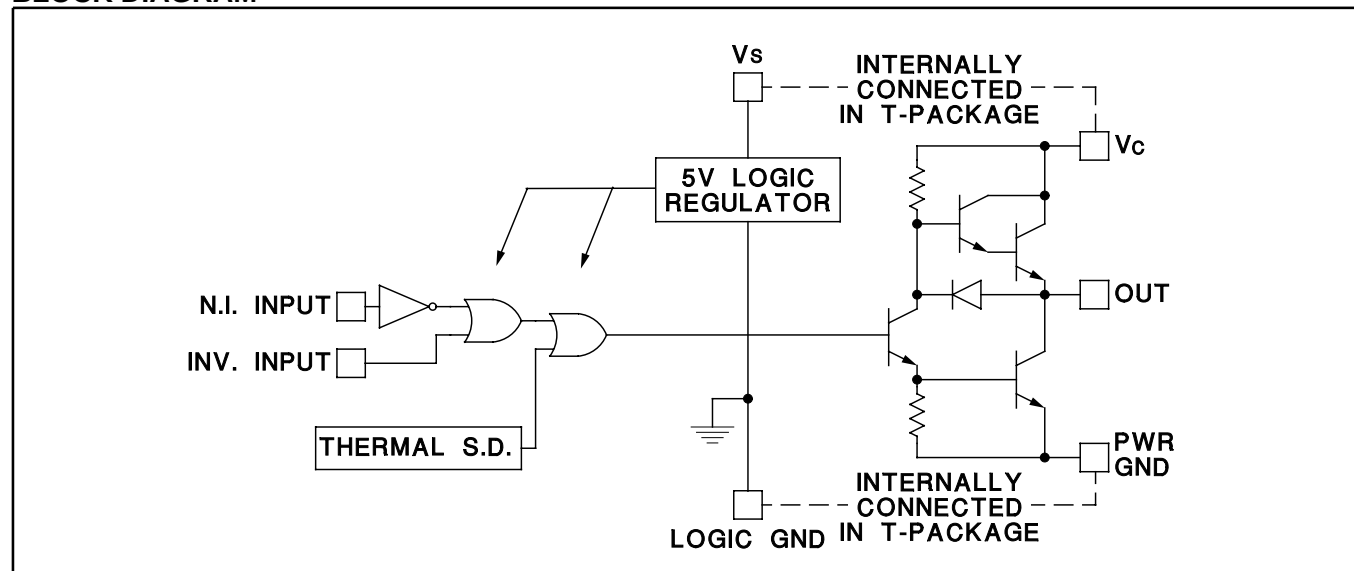
DIL-8 MINIDIP, SOIC-8
(TOP VIEW)
N or J Package, D Package



5-PIN TO-220
(TOP VIEW)
T Package



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	$\pm 500\text{mA}$	$\pm 500\text{mA}$	$\pm 1.0\text{A}$
Peak Transient	$\pm 1.5\text{A}$	$\pm 1.0\text{A}$	$\pm 2.0\text{A}$
Capacitive Discharge Energy	20 μJ	15 μJ	50 μJ
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; $V_S = V_C = 20\text{V}$, $T_A = T_J$.

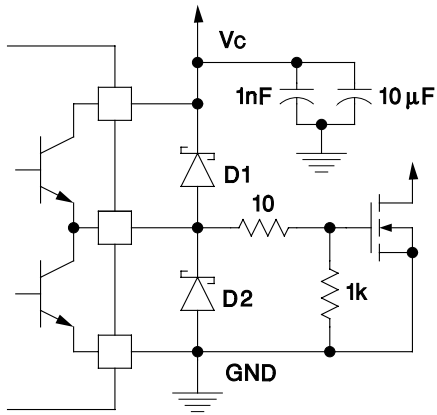
PARAMETERS	TEST CONDITIONS	MIN	TYP	MAX	UNITS
V_S Supply Current	$V_S = 40\text{V}$, (Outputs High, T Pkg)		6	8	mA
	$V_S = 40\text{V}$, (Outputs Low, T Pkg)		8	12	mA
V_C Supply Current (N, J Only)	$V_C = 40\text{V}$, Outputs Low		2	4	mA
V_C Leakage Current (N, J Only)	$V_S = 0$, $V_C = 30\text{V}$		0.05	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 - V_O	$I_O = -50\text{mA}$			2.0	V
	$I_O = -500\text{mA}$			2.5	V
Output Low Sat., V_O	$I_O = 50\text{mA}$			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	Output Rise	25			ns
Current Spike Duration	Output Fall	0			ns

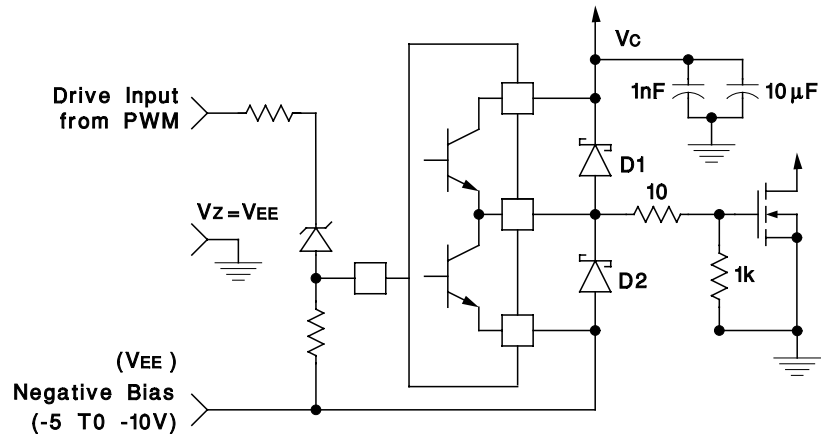
APPLICATIONS

Power MOSFET Drive Circuit



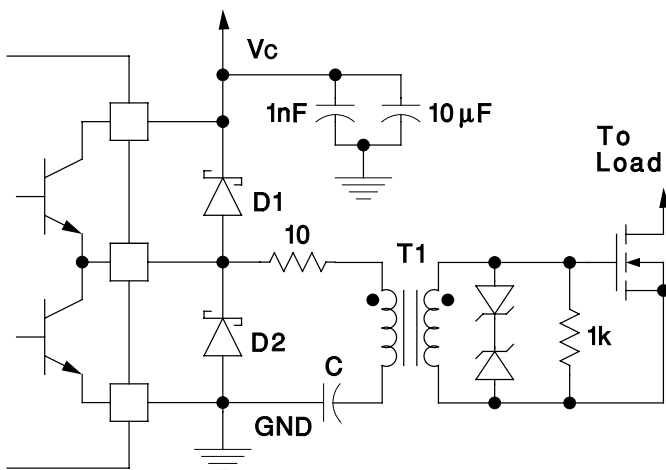
D1, D2: UC3611 Schottky Diodes

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



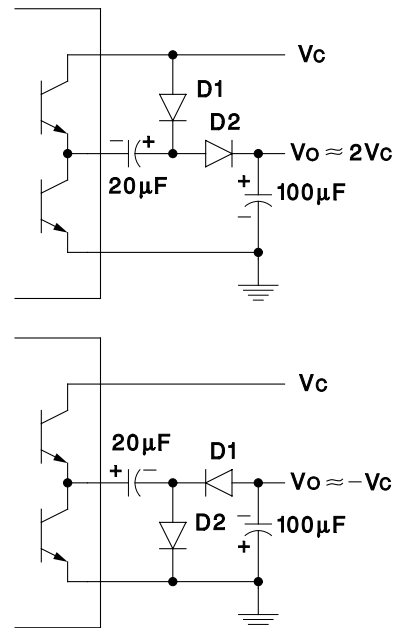
D1, D2: UC3611 Schottky Diodes

Transformer Coupled MOSFET Drive Circuit



D1, D2: UC3611 Schottky Diodes

Charge Pump Circuits



IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgment, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

Customers are responsible for their applications using TI components.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.