UNITRODE

UC1710
UC2710
UC3710

High Current FET Driver

FEATURES

- Totem Pole Output with 6A Source/Sink Drive
- 3ns Delay
- 20ns Rise and Fall Time into 2.2nF
- 8ns Rise and Fall Time into 30nF
- 4.7V to 18V Operation
- Inverting and Non-Inverting Outputs
- Under-Voltage Lockout with Hysteresis
- Thermal Shutdown Protection
- MINIDIP and Power Packages

DESCRIPTION

The UC1710 family of FET drivers is made with a high-speed Schottky process to interface between low-level control functions and very high-power switching devices-particularly power MOSFET's. These devices accept low-current digital inputs to activate a high-current, totem pole output which can source or sink a minimum of 6A.

Supply voltages for both V_{IN} and V_C can independently range from 4.7V to 18V. These devices also feature under-voltage lockout with hysteresis.

The UC1710 is packaged in an 8-pin hermetically sealed dual in-line package for –55°C to +125°C operation. The UC2710 and UC3710 are specified for a temperature range of –40°C to +85°C and 0°C to +70°C respectively and are available in either an 8-pin plastic dual in-line or a 5-pin, TO-220 package. Surface mount devices are also available.

TRUTH TABLE

INV	N.I.	Out
H	H	L
L	H	H
H	L	L
L	L	L

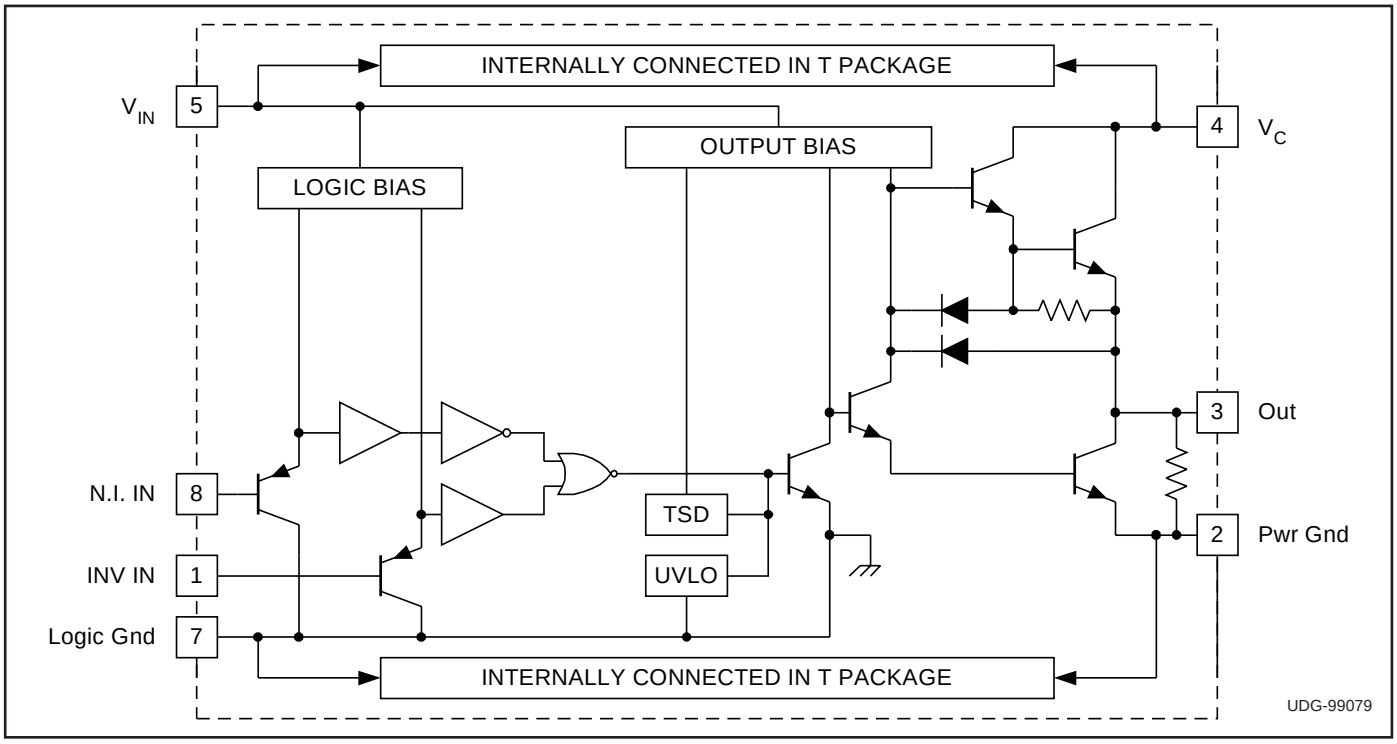
OUT= $\overline{\text{INV}}$ and N.I.

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

ORDERING INFORMATION

	TEMPERATURE RANGE	PACKAGE
UC1710J	–55°C to +125°C	8 pin CDIP
UC2710DW	–40°C to +85°C	16 pin SOIC-wide
UC2710J		8 pin CDIP
UC2710N		8 pin PDIP
UC2710T		5 pin TO220
UC3710DW	0°C to +70°C	16 pin SOIC-wide
UC3710N		8 pin PDIP
UC3710T		5 pin TO220

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

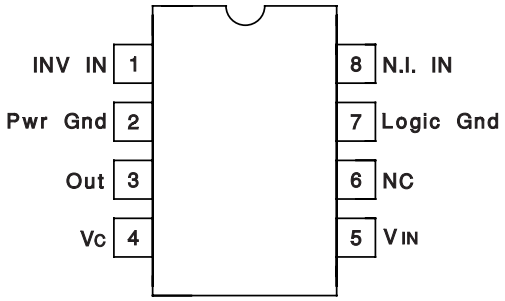
	N-Package	J-Package	T-Package
Supply Voltage, Vin	20V	20V	20V
Collector Supply Voltage, V_C	20V	20V	20V
Operating Voltage	18V	18V	18V
Output Current (Source or Sink)			
Steady-State	± 500mA	± 500mA	± 1A
Digital Inputs	–0.3V-V_{IN}	–0.3V – V_{IN}	–0.3V – V_{IN}
Power Dissipation at Ta=25°C	1W	1W	3W
Power Dissipation at T (Case) = 25°C	2W	2W	25W
Operating Junction Temperature	–55°C to +150°C	–55°C to +150°C	–55°C to +150°C
Storage Temperature	–65°C to +150°C	–65°C to +150°C	–65°C to +150°C
Lead Temperature (Soldering, 10 seconds)	300°C	300°C	300°C

Note 1: All currents are positive into, negative out of the specified terminal.

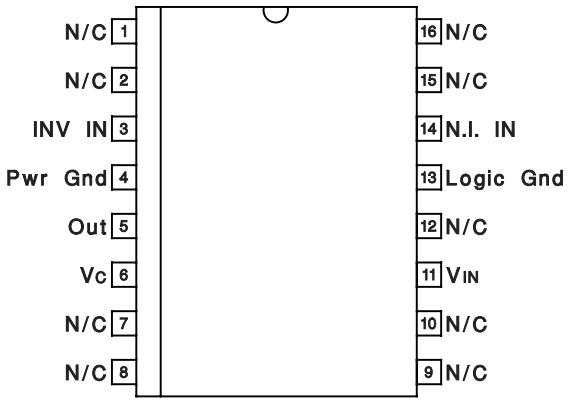
Note 2: Consult Unitrode Integrated Circuits databook for information regarding thermal specifications and limitations of packages.

CONNECTION DIAGRAMS

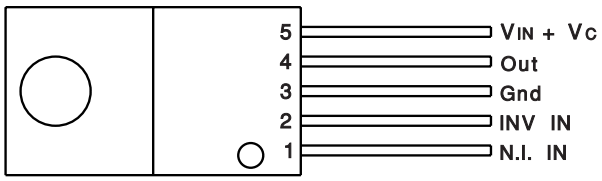
DIL-8 MINIDIP (Top View)
J or N Package



SOIC-16 (Top View)
DW Package



5-Pin TO-220 (Top View)
T Package



ELECTRICAL CHARACTERISTICS: Unless otherwise stated, these specifications apply for V_{IN} = V_C = 15V, No load, T_A = T_J.

PARAMETERS	TEST CONDITIONS	MIN	TYP	MAX	UNITS
V_{IN} Supply Current	V_{IN} =18V, V_C =18V, Output Low		26	35	mA
	V_{IN} =18V, V_C =18V, Output High		21	30	mA
V_C Supply Current	V_{IN} =18V, V_C =18V, Output Low		1.5	5.0	mA
	V_{IN} =18V, V_C =18V,Output High		5.0	8	mA
UVLO Threshold	V_{IN} High to Low	3.8	4.1	4.4	V
	V_{IN} Low to High	4.1	4.4	4.8	V

ELECTRICAL CHARACTERISTICS: Unless otherwise stated, these specifications apply for $V_{IN} = V_C = 15V$, No load, $T_A = T_J$.

PARAMETERS	TEST CONDITIONS	MIN	TYP	MAX	UNITS
UVLO Threshold Hysteresis		0.1	0.3	0.5	V
Digital Input Low Level				0.8	V
Digital Input High Level		2.0			V
Digital Input Current	Digital Input = 0.0V	–70	–4.0		µA
Output High Sat., $V_C – V_O$	I_O= –100mA		1.35	2.2	V
	I_O= –6A		3.2	4.5	V
Output Low Sat., V_O	I_O= 100mA		0.25	0.6	V
	I_O= 6A		3.4	4.5	V
Thermal Shutdown			165		°C
From Inv., Input to Output (Note 3, 4):					
Rise Time Delay	CL = 0		35	70	ns
	CL = 2.2nF		35	70	ns
	CL = 30nF		35	70	ns
10% to 90% Rise	CL = 0		20	40	ns
	CL = 2.2nF		25	40	ns
	CL = 30nF		85	150	ns
Fall Time Delay	CL = 0		35	70	ns
	CL = 2.2nF		35	70	ns
	CL = 30nF		35	80	ns
90% to 10% Fall	CL = 0		15	40	ns
	CL = 2.2nF		20	40	ns
	CL = 30nF		85	150	ns
From N.I. Input to Output (Note 3,4):					
Rise Time Delay	CL = 0		35	70	ns
	CL = 2.2nF		35	70	ns
	CL = 30nF		35	70	ns
10% to 90% Rise	CL = 0		20	40	ns
	CL = 2.2nF		25	40	ns
	CL = 30nF		85	150	ns
Fall Time Delay	CL = 0		35	70	ns
	CL = 2.2nF		35	70	ns
	CL = 30nF		35	80	ns
90% to 10% Fall	CL = 0		15	40	ns
	CL = 2.2nF		20	50	ns
	CL = 30nF		85	150	ns
Total Supply Current at 200kHz Input Switching Frequency	T_A = 25°C (Note 5) CL = 0		30	40	mA

Note: 3. Delay measured from 50% input change to 10% output change.

Note: 4. Those parameters with CL = 30nF are not tested in production.

Note: 5. Inv. Input pulsed at 50% duty cycle with N.I. Input = 3V. or N.I. Input pulsed at 50% duty cycle with Inv. Input = 0V.

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PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-0152001QPA	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg Type	-55 to 125	0152001QPA UC1710	Samples
5962-0152001VPA	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg Type	-55 to 125	0152001VPA UC1710	Samples
UC1710J	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg Type	-55 to 125	UC1710J	Samples
UC1710J883B	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg Type	-55 to 125	0152001QPA UC1710	Samples
UC2710N	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	-40 to 85	UC2710N	Samples
UC2710NG4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	-40 to 85	UC2710N	Samples
UC2710T	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type	-40 to 85	UC2710T	Samples
UC2710TG3	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type	-40 to 85	UC2710T	Samples
UC3710DW	ACTIVE	SOIC	DW	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	0 to 70	UC3710DW	Samples
UC3710DWG4	ACTIVE	SOIC	DW	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	0 to 70	UC3710DW	Samples
UC3710N	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	0 to 70	UC3710N	Samples
UC3710NG4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	0 to 70	UC3710N	Samples
UC3710T	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type	0 to 70	UC3710T	Samples
UC3710TG3	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type	0 to 70	UC3710T	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

OTHER QUALIFIED VERSIONS OF UC1710, UC1710-SP, UC3710 :

- Catalog: UC3710, UC1710
- Military: UC1710
- Space: UC1710-SP

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications
- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

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