

# 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  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  operation. The UC2710 and UC3710 are specified for a temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  and  $0^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  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

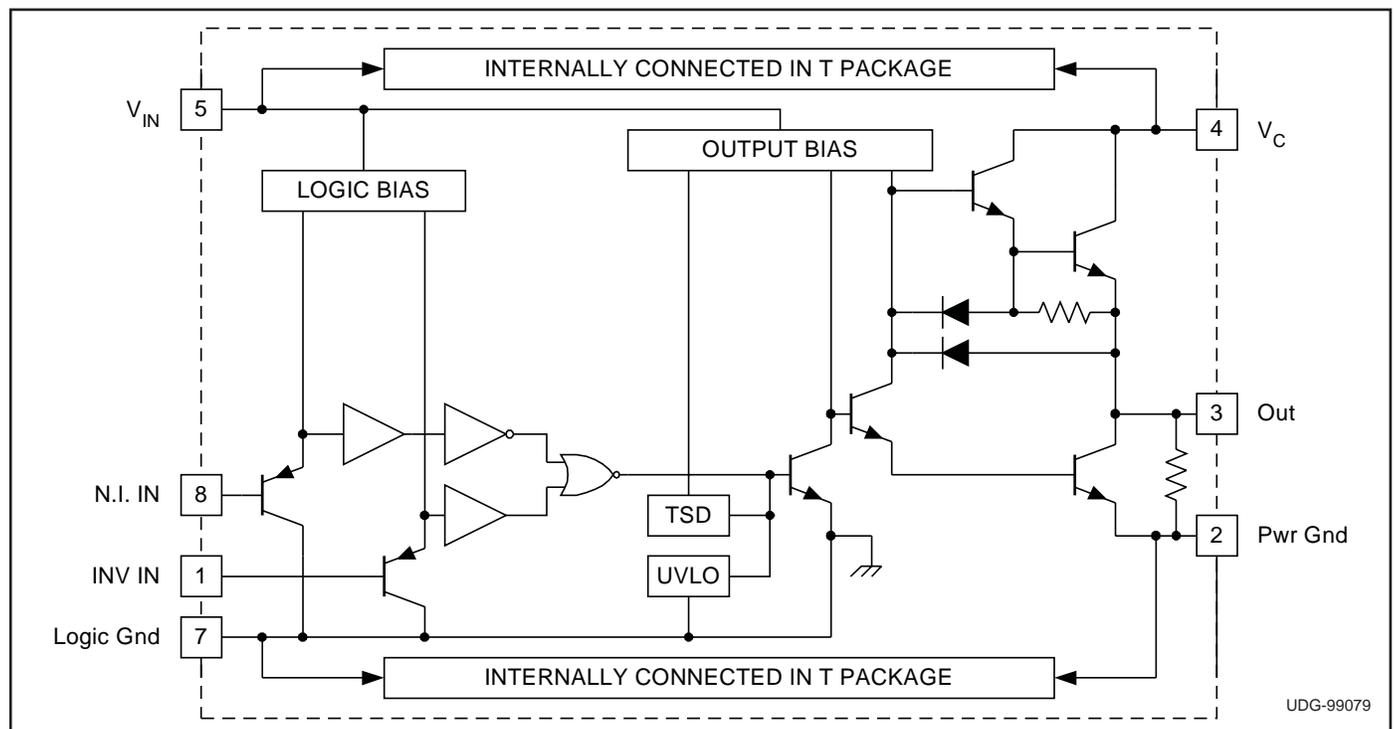
INV	N.I.	Out
H	H	L
L	H	H
H	L	L
L	L	L

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

## ORDERING INFORMATION

	TEMPERATURE RANGE	PACKAGE
UC1710J	$-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$	8 pin CDIP
UC2710DW	$-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	16 pin SOIC-wide
UC2710J		8 pin CDIP
UC2710N		8 pin PDIP
UC2710T		5 pin TO220
UC3710DW	$0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$	16 pin SOIC-wide
UC3710N		8 pin PDIP
UC3710T		5 pin TO220

## BLOCK DIAGRAM



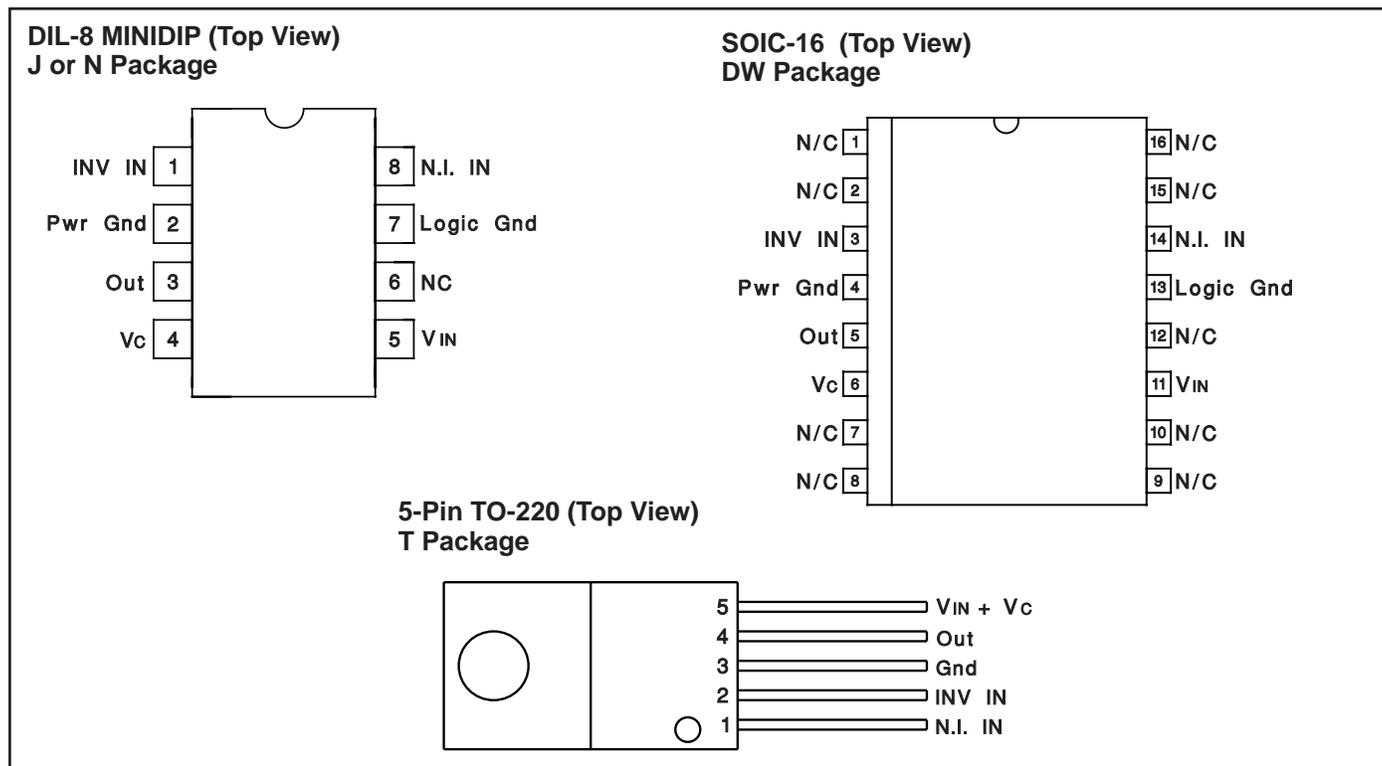
### ABSOLUTE MAXIMUM RATINGS

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

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

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

### CONNECTION DIAGRAMS



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

PARAMETERS	TEST CONDITIONS	MIN	TYP	MAX	UNITS
$V_{IN}$ Supply Current	$V_{IN}=18\text{V}$ , $V_C=18\text{V}$ , Output Low		26	35	mA
	$V_{IN}=18\text{V}$ , $V_C=18\text{V}$ , Output High		21	30	mA
$V_C$ Supply Current	$V_{IN}=18\text{V}$ , $V_C=18\text{V}$ , Output Low		1.5	5.0	mA
	$V_{IN}=18\text{V}$ , $V_C=18\text{V}$ , 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		$\mu A$
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		$^{\circ}C$
<b>From Inv., Input to Output (Note 3, 4):</b>					
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
<b>From N.I. Input to Output (Note 3,4):</b>					
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	$T_A = 25^{\circ}C$ (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 <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
5962-0152001QPA	ACTIVE	CDIP	JG	8	1	TBD	A42 SNPB	N / A for Pkg Type
5962-0152001VPA	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg Type
5962-0152001VXA	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg Type
UC1710J	ACTIVE	CDIP	JG	8	1	TBD	A42 SNPB	N / A for Pkg Type
UC1710J883B	ACTIVE	CDIP	JG	8	1	TBD	A42 SNPB	N / A for Pkg Type
UC1710L883B	OBSOLETE	TO/SOT	L	20		TBD	Call TI	Call TI
UC1710SP	OBSOLETE	CDIP	J	16		TBD	Call TI	Call TI
UC2710N	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type
UC2710NG4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type
UC2710T	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type
UC2710TG3	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type
UC3710DW	ACTIVE	SOIC	DW	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
UC3710DWG4	ACTIVE	SOIC	DW	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
UC3710DWTRG4	ACTIVE	SOIC	DW	16		TBD	Call TI	Call TI
UC3710N	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type
UC3710NG4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type
UC3710T	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type
UC3710TG3	ACTIVE	TO-220	KC	5	50	Green (RoHS & no Sb/Br)	CU SN	N / A for Pkg Type

<sup>(1)</sup> 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.

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**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> 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.

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**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)

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

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