

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

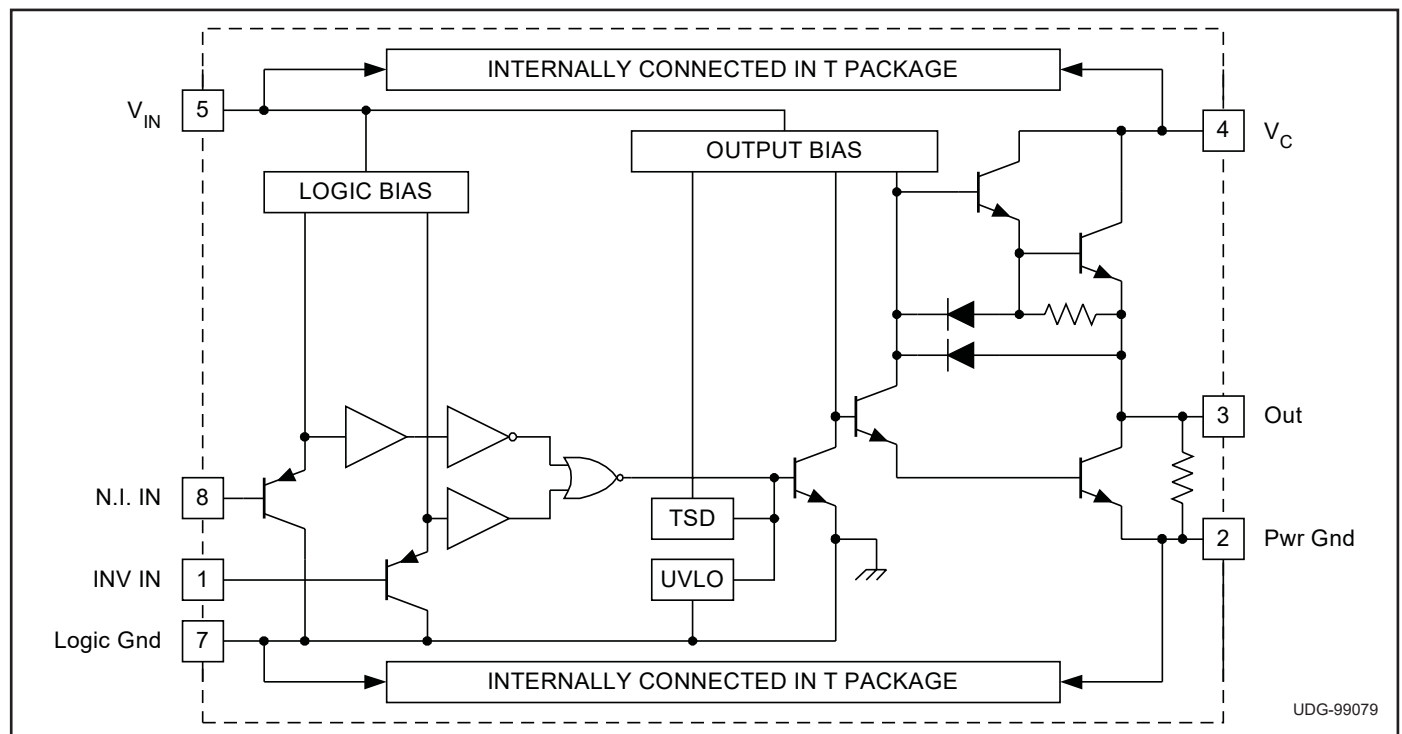
INV	N.I.	Out
H	H	L
L	H	H
H	L	L
L	L	L

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

ORDERING INFORMATION

	TEMPERATURE RANGE	PACKAGE
UC1710J	-55°C to $+125^{\circ}\text{C}$	8 pin CDIP
UC2710DW	-40°C to $+85^{\circ}\text{C}$	Not Available
UC2710J		Not Available
UC2710N		8 pin PDIP
UC2710T		5 pin TO220
UC3710DW	0°C to $+70^{\circ}\text{C}$	16 pin SOIC-wide
UC3710N		8 pin PDIP
UC3710T		5 pin TO220

BLOCK DIAGRAM



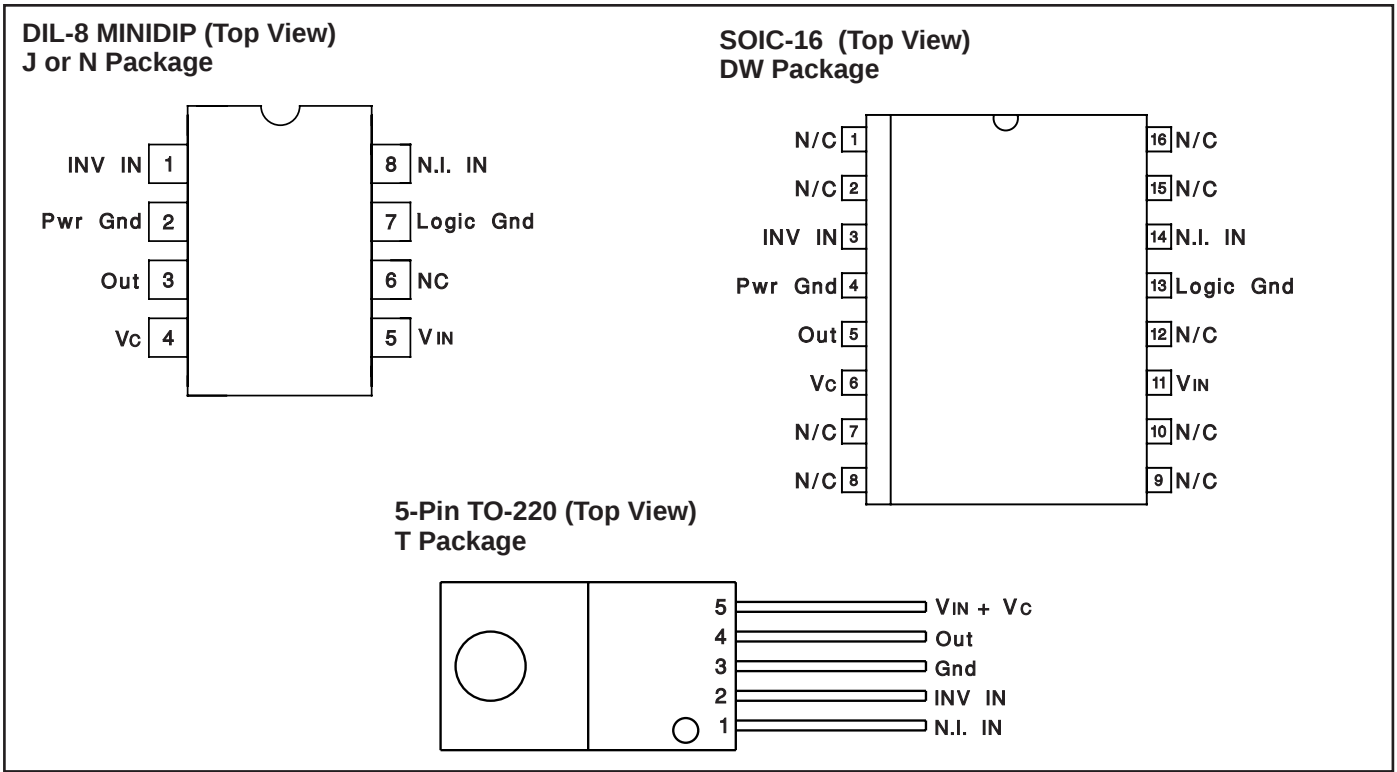
ABSOLUTE MAXIMUM RATINGS

	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	$-0.3V - V_{IN}$	$-0.3V - V_{IN}$	$-0.3V - V_{IN}$
Power Dissipation at $T_a=25^\circ\text{C}$	1W	1W	3W
Power Dissipation at T (Case) = 25°C	2W	2W	25W
Operating Junction Temperature	-55°C to $+150^\circ\text{C}$	-55°C to $+150^\circ\text{C}$	-55°C to $+150^\circ\text{C}$
Storage Temperature	-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 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



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		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		$^{\circ}C$
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	$T_A = 25^{\circ}C$ (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.

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 Call TI	N / A for Pkg Type	0 to 70	UC3710N	Samples
UC3710NG4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	Call TI	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⁾ **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of ≤ 1000 ppm threshold. Antimony trioxide based flame retardants must also meet the ≤ 1000 ppm threshold requirement.

⁽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.

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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
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- Space - Radiation tolerant, ceramic packaging and qualified for use in Space-based application

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5962-0152001VPA	ACTIVE	CDIP	JG	8	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	0152001VPA UC1710	Samples
UC1710J	ACTIVE	CDIP	JG	8	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	UC1710J	Samples
UC1710J883B	ACTIVE	CDIP	JG	8	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	0152001QPA UC1710	Samples
UC2710N	ACTIVE	PDIP	P	8	50	RoHS & Green	NIPDAU	N / A for Pkg Type	-40 to 85	UC2710N	Samples
UC3710DW	ACTIVE	SOIC	DW	16	40	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	0 to 70	UC3710DW	Samples
UC3710DWG4	ACTIVE	SOIC	DW	16	40	RoHS & Green	NIPDAU	Level-2-260C-1 YEAR	0 to 70	UC3710DW	Samples
UC3710N	ACTIVE	PDIP	P	8	50	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	UC3710N	Samples
UC3710NG4	ACTIVE	PDIP	P	8	50	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	UC3710N	Samples
UC3710T	ACTIVE	TO-220	KC	5	50	RoHS & Green	SN	N / A for Pkg Type	0 to 70	UC3710T	Samples
UC3710TG3	ACTIVE	TO-220	KC	5	50	RoHS & Green	SN	N / A for Pkg Type	0 to 70	UC3710T	Samples

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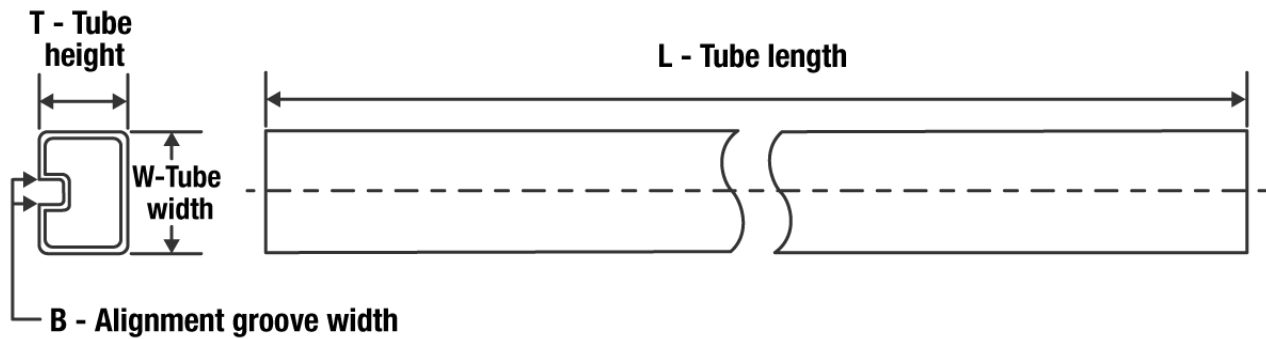
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TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
UC2710N	P	PDIP	8	50	506	13.97	11230	4.32
UC3710DW	DW	SOIC	16	40	507	12.83	5080	6.6
UC3710DWG4	DW	SOIC	16	40	507	12.83	5080	6.6
UC3710N	P	PDIP	8	50	506	13.97	11230	4.32
UC3710NG4	P	PDIP	8	50	506	13.97	11230	4.32
UC3710T	KC	TO-220	5	50	546	31	11930	3.17
UC3710TG3	KC	TO-220	5	50	546	31	11930	3.17

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