

High Performance Stepper Motor Drive Circuit

FEATURES

- Full-Step, Half-Step and Micro-Step Capability.
- Bipolar Output Current up to 2A.
- Wide Range of Motor Supply Voltage: 10–50V
- Low Saturation Voltage
- Wide Range of Current Control: 5mA–2A.
- Current Levels Selected in Steps or Varied Continuously.
- Thermal Protection and Soft Intervention.

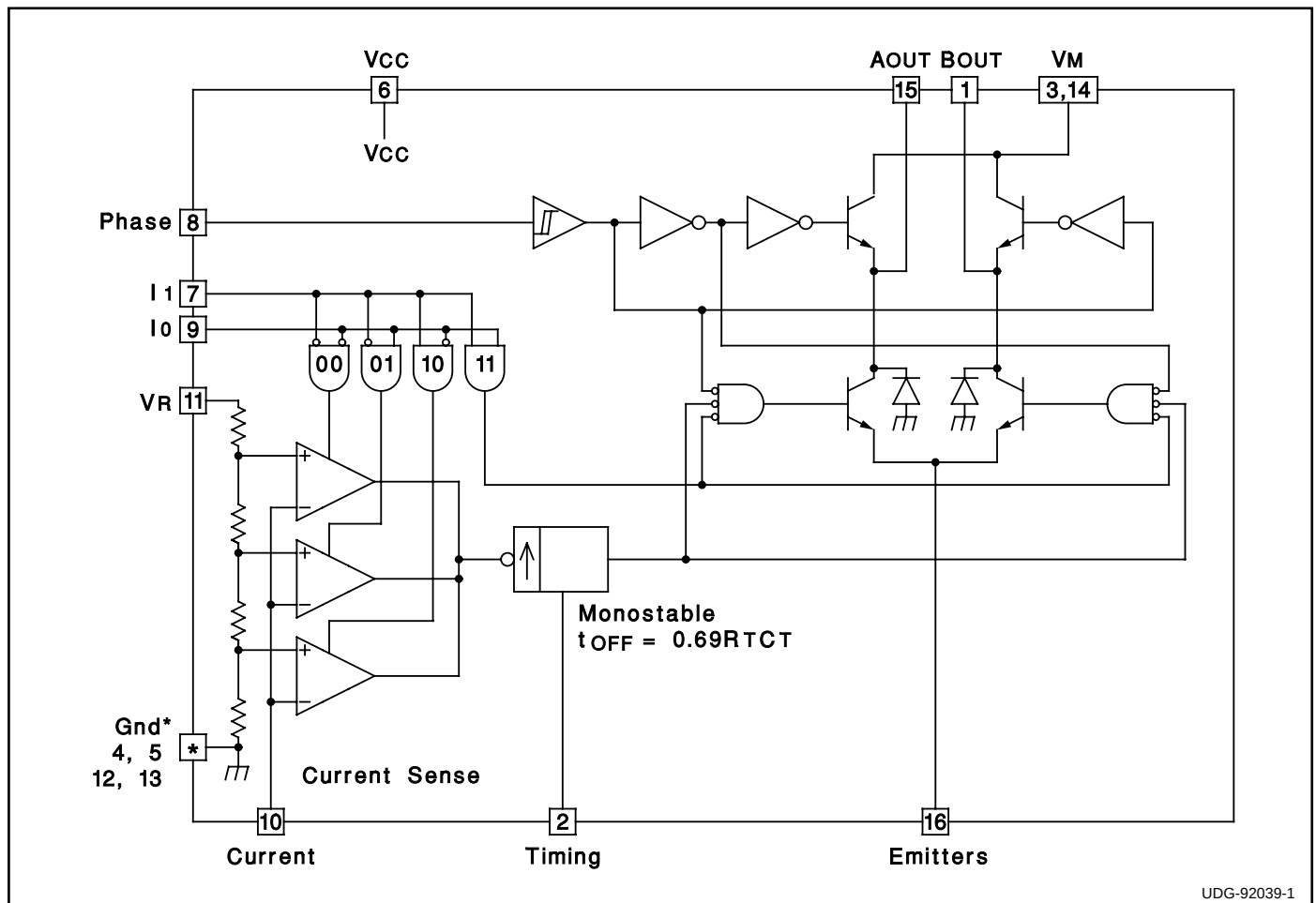
DESCRIPTION

The UC3770A and UC3770B are high-performance full bridge drivers that offer higher current and lower saturation voltage than the UC3717 and the UC3770. Included in these devices are LS-TTL compatible logic inputs, current sense, monostable, thermal shut-down, and a power H-bridge output stage. Two UC3770As or UC3770Bs and a few external components form a complete micro-processor-controllable stepper motor power system.

Unlike the UC3717, the UC3770A and the UC3770B require external high-side clamp diodes. The UC3770A and UC3770B are identical in all regards except for the current sense thresholds. Thresholds for the UC3770A are identical to those of the older UC3717 permitting drop-in replacement in applications where high-side diodes are not required. Thresholds for the UC3770B are tailored for half stepping applications where 50%, 71%, and 100% current levels are desirable.

The UC3770A and UC3770B are specified for operation from 0°C to 70°C ambient.

BLOCK DIAGRAM



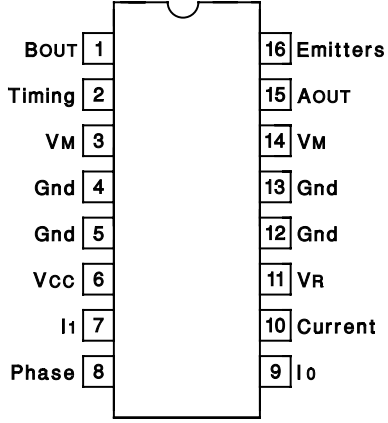
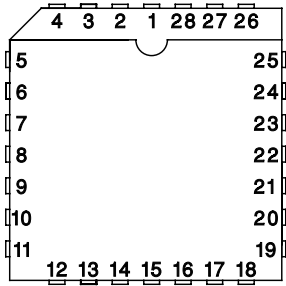
ABSOLUTE MAXIMUM RATINGS

Logic Supply Voltage, V_{CC}	7V
Output Supply Voltage, V_{MM}	50V
Logic Input Voltage (Pins 7, 8, 9)	6V
Analog Input Voltage (Pin 10)	V_{CC}
Reference Input Voltage (Pin 11)	15V
Logic Input Current (Pins 7, 8, 9)	-10mA
Analog Input Current (Pins 10, 11)	-10mA
Output Current (Pins 1, 15)	$\pm 2A$
Junction Temperature, T_J	+150°C

Note 1: All voltages are with respect to Gnd (DIL Pins 4, 5, 12, 13); all currents are positive into, negative out of the specified terminal.

Note 2: Consult Unitrode Integrated Circuits databook for thermal limitations and considerations of packages.

CONNECTION DIAGRAMS

DIL-16 (Top View) J Or N Package		PLCC-28 (Top View) Q Package		PACKAGE PIN FUNCTION	
				FUNCTION	PIN
				Gnd	1-3
				V_M	4
				N/C	5
				AOUT	6
				N/C	7
				Emitters	8
				Gnd	9
				BOUT	10
				Timing	11
				V_M	12
				Gnd	13-17
				V_{CC}	18
				I_1	19
				Phase	20
				I_0	21
				N/C	22
				Current	23
				V_R	24
				N/C	25-27
				Gnd	28

ELECTRICAL CHARACTERISTICS: (All tests apply with $V_M = 36V$, $V_{CC} = 5V$, $V_R = 5V$, No Load, and $0^\circ C < T_A < 70^\circ C$, unless otherwise stated, $T_A = T_J$.)

PARAMETER	TEST CONDITIONS	UC3770A			UC3770B			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
Supply Voltage V_M (Pins 3, 14)		10		45	10		45	V
Logic Supply Voltage V_{CC} (Pin 6)		4.75	5	5.3	4.75	5	5.3	V
Logic Supply Current I_{CC} (Pin 6)	$I_0 = I_1 = H, I_M = 0$		15	25		15	25	mA
	$I_0 = I_1 = L, I_M = 0$		18	28		18	28	mA
	$I_0 = I_1 = H, I_M = 1.3A$		33	40		33	40	mA
Thermal Shutdown Temperature			+170			+170		°C
Logic Threshold (Pins 7, 8, 9)		0.8		2.0	0.8		2.0	V
Input Current Low (Pin 8)	$V_I = 0.4V$			-100			-100	μA
Input Current Low (Pins 7, 9)	$V_I = 0.4V$			-400			-400	μA
Input Current High (Pins 7, 8, 9)	$V_I = 2.4V$			10			10	μA
Comparator Threshold (Pin 10)	$V_R = 5V, I_0 = L, I_1 = L$	400	415	430	400	415	430	mV
	$V_R = 5V, I_0 = H, I_1 = L$	240	255	265	290	300	315	mV
	$V_R = 5V, I_0 = L, I_1 = H$	70	80	90	195	210	225	mV
Comparator Input Current (Pin 10)				± 20			± 20	μA
Off Time	$R_T = 56k, C_T = 820pF$	25	30	35	25	30	35	ms

ELECTRICAL CHARACTERISTICS (cont.): (All tests apply with $V_M = 36V$, $V_{CC} = 5V$, $V_R = 5V$, No Load, and $0^\circ C < T_A < 70^\circ C$, unless otherwise stated, $T_A = T_J$.)

PARAMETER	TEST CONDITIONS	UC3770A			UC3770B			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
Turn Off Delay				2			2	ms
Sink Driver Saturation Voltage	$I_M = 1.0A$			0.8			0.8	V
	$I_M = 1.3A$			1.3			1.3	V
Source Driver Saturation Voltage	$I_M = 1.0A$			1.3			1.3	V
	$I_M = 1.3A$			1.6			1.6	V
Output Leakage Current	$V_M = 45V$			100			100	μA

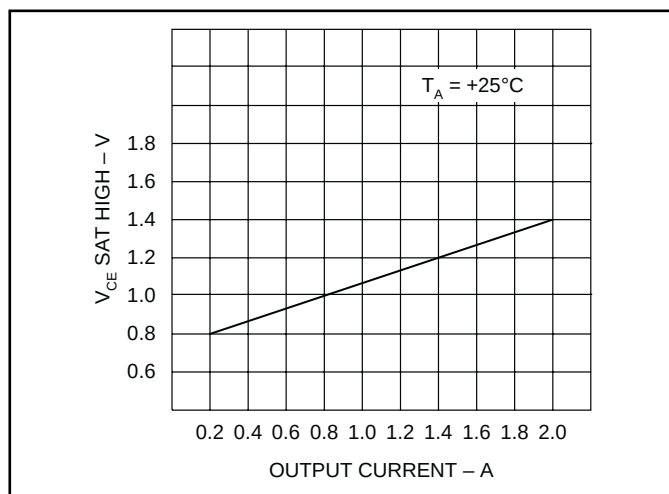


Figure 1. Typical source saturation voltages vs. load current

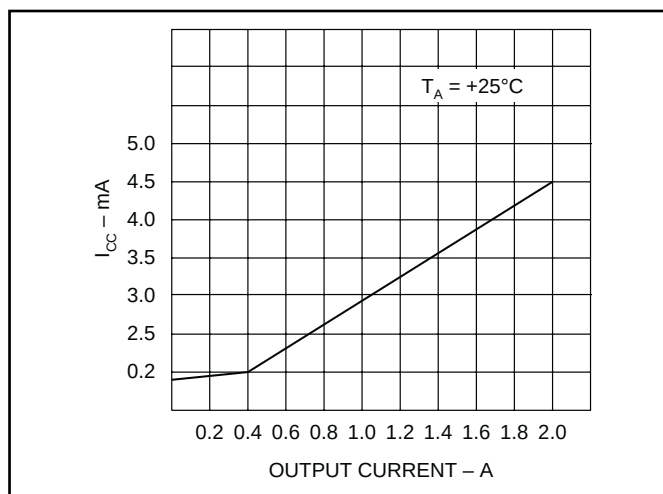


Figure 3. Typical supply current vs. load current.

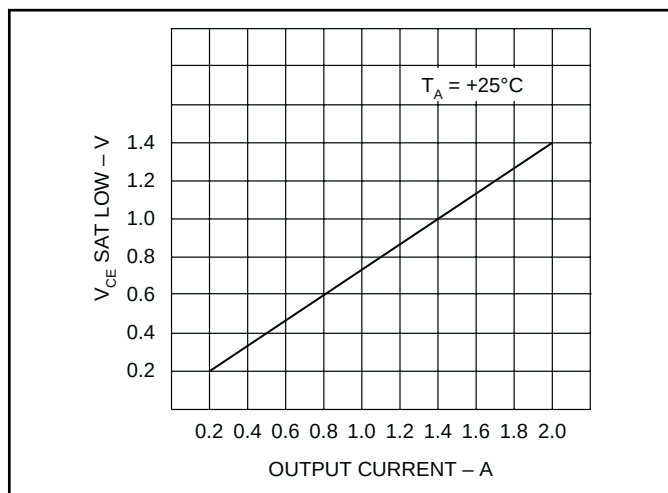


Figure 2. Typical sink saturation voltages vs. load current

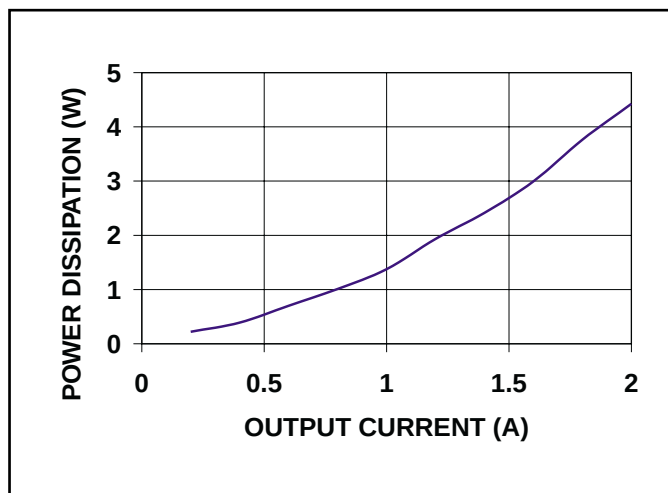


Figure 4. Typical power dissipation vs. output current.

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
UC3770AN	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	UC3770AN
UC3770AN.A	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	UC3770AN
UC3770ANG4	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	UC3770AN
UC3770AQ	Obsolete	Production	PLCC (FN) 28	-	-	Call TI	Call TI	-	UC3770AQ
UC3770BN	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	UC3770BN
UC3770BN.A	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	UC3770BN

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TUBE


*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
UC3770AN	N	PDIP	16	25	506	13.97	11230	4.32
UC3770AN.A	N	PDIP	16	25	506	13.97	11230	4.32
UC3770ANG4	N	PDIP	16	25	506	13.97	11230	4.32
UC3770BN	N	PDIP	16	25	506	13.97	11230	4.32
UC3770BN.A	N	PDIP	16	25	506	13.97	11230	4.32

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES "AS IS" AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI's products are provided subject to [TI's Terms of Sale](#), [TI's General Quality Guidelines](#), or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI's provision of these resources does not expand or otherwise alter TI's applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2026, Texas Instruments Incorporated

Last updated 10/2025