

HA13421A, HA13421AMP

Dual Bridge Drivers

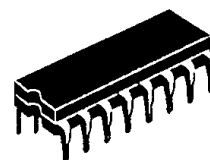
Description

The HA13421A and HA13421AMP monolithic power ICs are dual bridge drivers. The maximum driving current and voltage are $0.33\text{ A} \times 12\text{ V}$ per bridge. Therefore, the best use for these parts is in a two-phase bipolar stepping motor driving the head actuator of a 3, to 5.25-inch FDD (Floppy Disk Drive).

Features

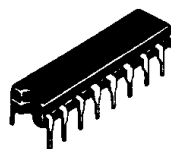
- 330 mA output current capability
- Dual bridge included
- Power save
- Single input direction control
- Low output saturation voltage
- Low supply current
- Low input current
- Compatible with TTL, LSTTL, and 5 V CMOS
- Thermal shutdown

HA13421A



(DP-16C)

HA13421AMP



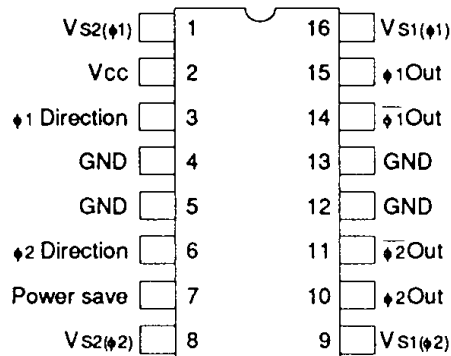
(DP-18)

Ordering Information

Type No.	Package
HA13421A	DP-16C
HA13421AMP	DP-18

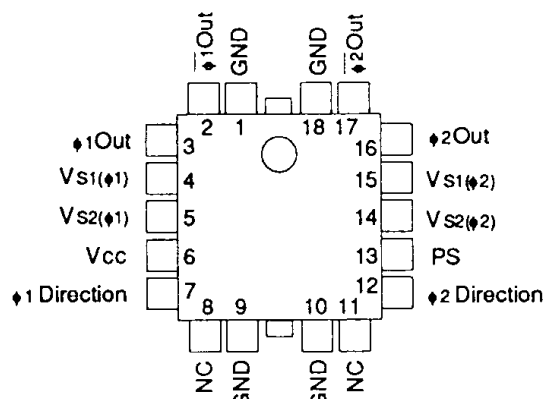
Pin Arrangement

HA13421A



(Top view)

HA13421AMP



(Top view)



HA13421A, HA13421AMP

Block Diagram

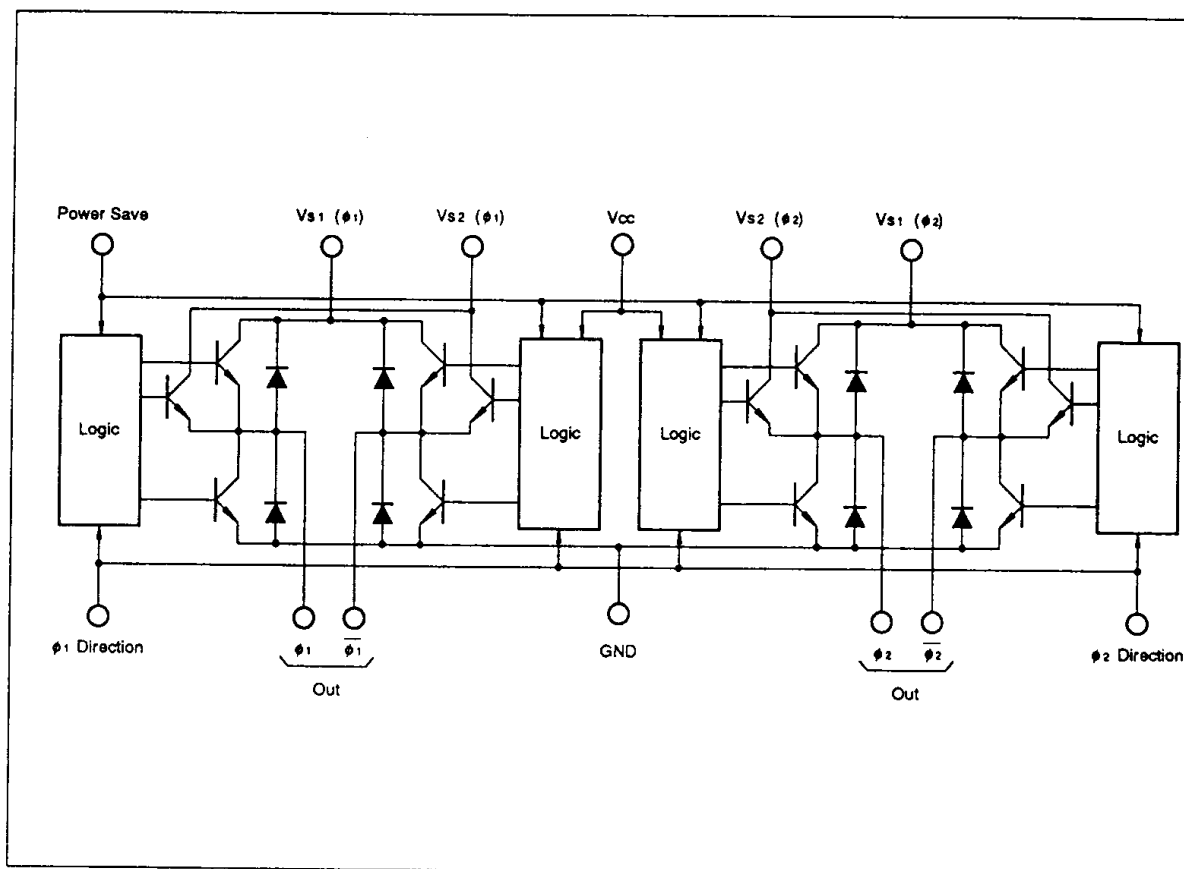


Table 1 Truth Table (For each bridge)

Power Save	Direction	ϕ Out	$\bar{\phi}$ Out
L	L	L	H ⁺
L	H	H ⁺	L
H	L	L	H ⁻
H	H	H ⁻	L

Note: L = Low voltage state
H⁺ = High voltage state
(Seeking transistors On)
H⁻ = High voltage state
(Holding transistors On)

Table 2 Absolute Maximum Ratings (Ta = 25 °C)

Item	Symbol	HA13421A	HA13421AMP	Unit	Note
Logic stage supply voltage	Vcc	7	7	V	1
Seeking supply voltage	Vs1	15	15	V	1
Holding supply voltage	Vs2	7	7	V	1
Input voltage	Vi	0 to Vcc	0 to Vcc	V	
Peak seeking current	Io (peak)	500	500	mA	2
Seeking current (DC)	Ios	330	330	mA	
Holding current (DC)	Ioh	200	200	mA	
Power dissipation	PT	2.0	1.0	W	3
Junction temperature	Tj	150	150	°C	
Operating junction temperature range	Tjop	−20 to +125	−20 to +125	°C	
Storage temperature range	Tstg	−55 to +125	−55 to +125	°C	

The absolute maximum ratings are limiting values, to be applied individually, beyond which the device may be permanently damaged. Functional operation under any of these conditions is not guaranteed. Exposing a circuit to its absolute maximum rating for extended periods of time may affect the device's reliability.

Notes: 1. Recommended operating voltage

	Min	Typ	Max	Unit
Vcc	4.5	5.0	5.5	V
Vs1	10.2	12.0	13.8	V
Vs2	4.5	5.0	5.5	V

2. $t \leq 5$ ms

3. Thermal resistances are as follows:

a. HA13421A

$\theta_{j-a1} \leq 60$ °C/W (Soldered on a print circuit board)

$\theta_{j-a2} \leq 35$ °C/W (Soldered on a print circuit covered with copper sufficiently)

$\theta_{j-a3} \leq 15$ °C/W (Soldered on pin 4, 5, 12, and 13 with an infinite heat sink)

b. HA13421AMP

$\theta_{j-a1} \leq 120$ °C/W (Soldered on a glass epoxy circuit board with 10 % printing)

$\theta_{j-a2} \leq 100$ °C/W (Soldered on a glass epoxy circuit board with 30 % printing)

$\theta_{j-a3} \leq 80$ °C/W (Soldered on a metal based circuit board)

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Table 3 Electrical Characteristics (Ta = 25 °C, Vcc = 5 V, Vs2 = 5 V, Vs1 = 12 V)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions	Note
Input low voltage	V _{IL}	—	—	0.8	V		
Input high voltage	V _{IH}	2.0	—	—	V		
Input low current	I _{IL}	—	—	±10	μA	V _I =0.8 V	
Input high current	I _{IH}	—	1.0	±10	μA	V _I =2 V	
		—	0.5	1.0	mA	V _I =5.5 V	
Supply current	—	25	33	mA	PS=0.8 V,	V _{CC}	
	—	10	20	mA	I _o =0 A	V _{s1}	1
	—	—	1.0	mA		V _{s2}	2
	—	25	33	mA	PS=2 V, I _o =0 A	V _{CC}	
	—	3	5	mA		V _{s1}	1
	—	5	10	mA		V _{s2}	2
Output transistors breakdown voltage	BV _{CER}	18	—	—	V	I _C = 10 mA	

Electrical Characteristics (Ta = 25 °C, Vcc = 5 V, Vs2 = 5 V, Vs1 = 12 V) (cont)

Vs1 saturation voltage	V _{CE(sat)1}	—	1.5	2.0	V	PS=0.8 V, I _o =330 mA	3
Vs2 saturation voltage	V _{CE(sat)2}	—	1.5	2.0	V	PS=2.0 V, I _o =130 mA	3
Clamp diode forward voltage	V _F	—	5	—	V	I _F =330 mA Upper	
		—	1.5	—	V	Lower	
Delay time	t _{PLH}	—	1.0	5	μs	I _o =330 mA	
Delay time	t _{PHL}	—	1.0	5	μs	I _o =330 mA	

- Notes: 1. Sum of Vs1(φ1) and Vs1(φ2) current
2. Sum of Vs2(φ1) and Vs2(φ2) current
3. Sum of upper and lower saturation voltages



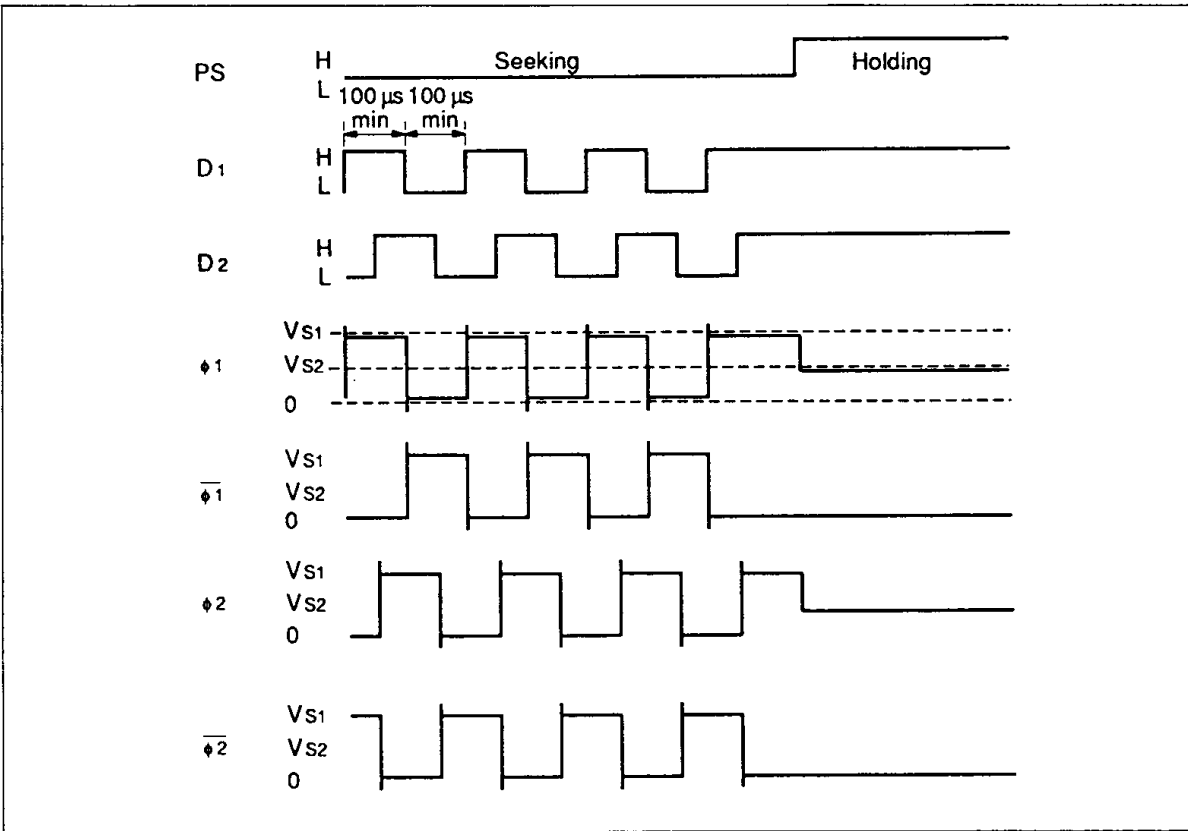


Figure 1 Timing Waveform

Application

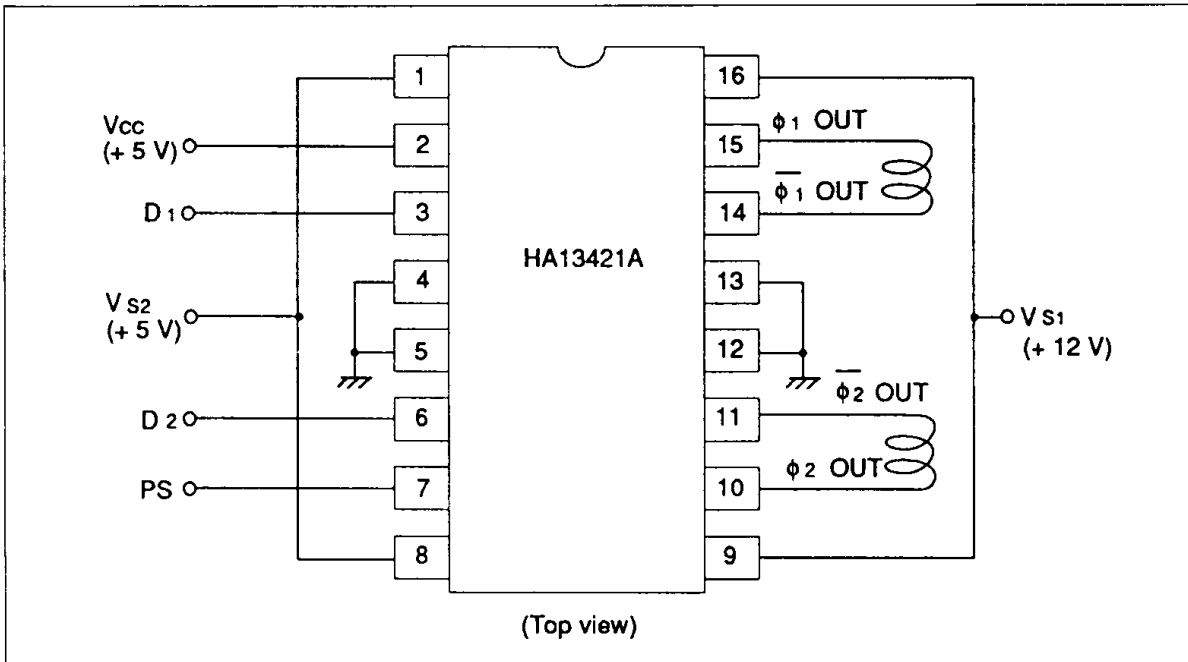


Figure 2 2-Phase Bipolar Stepping Motor Drive Circuit