

# HA13415

## Quad Solenoid Driver

### Description

The HA13415 monolithic power IC drives inductive loads. It is packaged in a 16-pin Dip containing four 0.6-A driving circuits.

Each driver has an OCS (over current shut down) circuit to protect the IC from the short-circuited loads. They are best suited for drivers of solenoids, relays, and stepping motors.

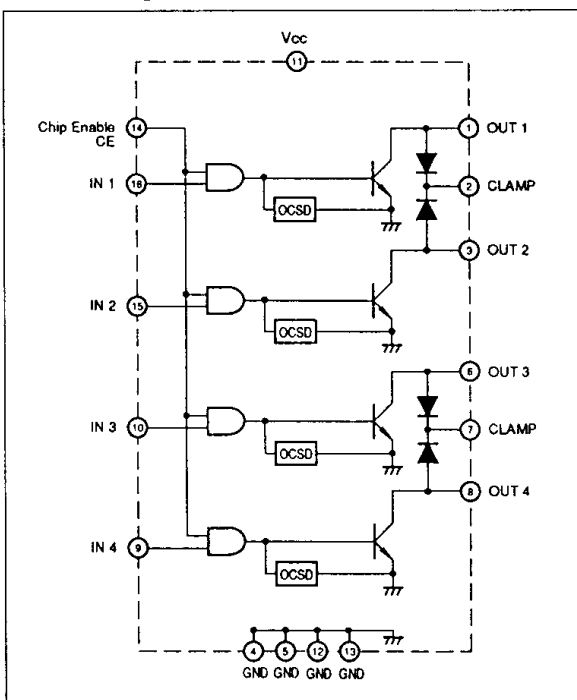
### Functions

- 0.6-A quad driver
- Clamp diode
- Chip enable
- OCS (over current shut down)
- Low voltage inhibit

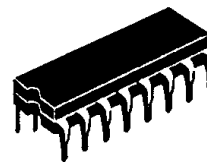
### Features

- High sustaining voltage (50 V)
- Low saturation voltage
- TTL compatible
- Low input current

### Block Diagram

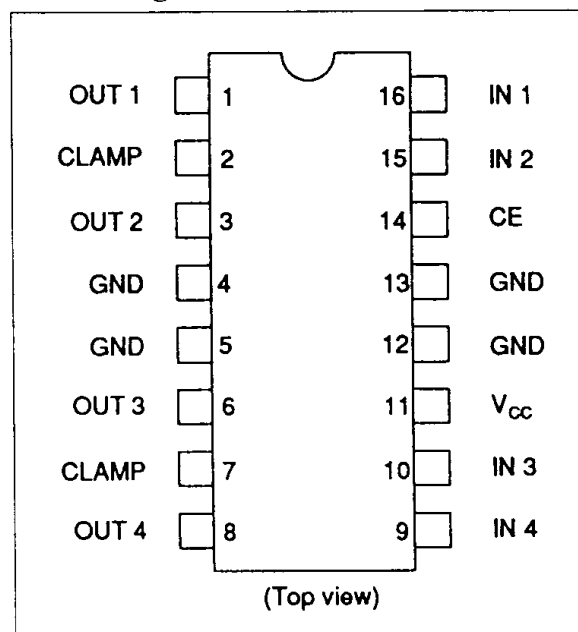


HA13415



(DP-16C)

### Pin Arrangement



### Ordering Information

Type No.	Package
HA13415	DP-16C



# HA13415

**Table 1 Absolute Maximum Ratings (Ta = 25 °C)**

Item	Symbol	Ratings	Unit	Note
Supply voltage	Vcc	-0.5 to 6	V	1
Input voltage	VIN	-0.5 to 6	V	
Output voltage	Vout	50	V	
Output current	Io	0.6	A	
Power dissipation	PT	2.0	W	2
Junction temperature	Tj	150	°C	
Operating junction temperature range	Tjop	-40 to +125	°C	
Storage temperature range	Tstg	-55 to +150	°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:  
Vcc = 5 V ± 10 % (4.5 to 5.5 V)
  2. Thermal resistances are follows.  
 $\theta_{j-a1} \leq 60$  °C/W (Soldered on a printed circuit board)  
 $\theta_{j-a2} \leq 35$  °C/W (Soldered on a printed circuit covered with copper sufficiently)  
 $\theta_{j-a3} \leq 15$  °C/W (Soldered on pins 4, 5, 12, and 13 with an infinite heat sink)

**Table 2 Electrical Characteristics (Ta = 25 °C, Vcc = 5 V)**

Item	Symbol	Min	Typ	Max	Unit	Test Conditions	Note
Supply current	Icc	—	6	—	mA	CE=0.8 V	
		—	60	80	mA	CE=IN=2.0 V	
Low level input voltage	VIL	0	—	0.8	V		
High level input voltage	VH	2.0	—	—	V		
Low level input current	IIL	-10	—	10	µA	VI=0.8 V	
High level input current	IIH	-10	—	10	µA	VI=2.0 to 5 V	
Input clamp voltage	VIK	—	-1.0	-1.5	V	IK=-12 mA	1
Low level output voltage	VOL	—	0.20	0.4	V	Ic=0.3 A	
		—	0.40	0.7		Ic=0.6 A	
Output leakage current	ICEX	—	—	100	µA	VCE=50 V	



**Electrical Characteristics (Ta = 25 °C, Vcc = 5 V) (cont)**

Clamp diode forward voltage	VF	—	1.1	—	V	IF=0.4 A
		—	1.3	—		IF=0.8 A
Clamp diode reverse current	IR	—	—	100	μA	VR=50 V
Turn on and turn off delay	tPHL	—	0.2	—	μs	VL=17 V, for IN RL=56 Ω
		—	0.4	—		for CE
	tPHL	—	1.0	—	μs	VL=17 V, for IN RL=56 Ω
		—	1.5	—		for CE
Negative output current test						Io=-100 mA      2
Output short test						VL=5.5 V, RL=3.5 Ω      3
Capacitive load test						VL=17 V, RL=2 Ω, CL=0.01 μF      4
Solenoid survival test						VL=32 V, RL=56 Ω, LL=250 mH      5

- Notes:
1. See Figure 1.
  2. Test procedures are
    - a. Vcc = 5.5 V
    - b. Set all outputs on with Ic = 250 mA per output, then set Ic = -100 mA for one output. All remaining outputs shall remain on.
    - c. Set all outputs off then set Ic = -100 mA for one output. Each remaining output shall not conduct more than 30 mA.
    - d. Perform test for each output.
  3. See Figure 2.
  4. See Figure 3.
  5. See Figure 4.

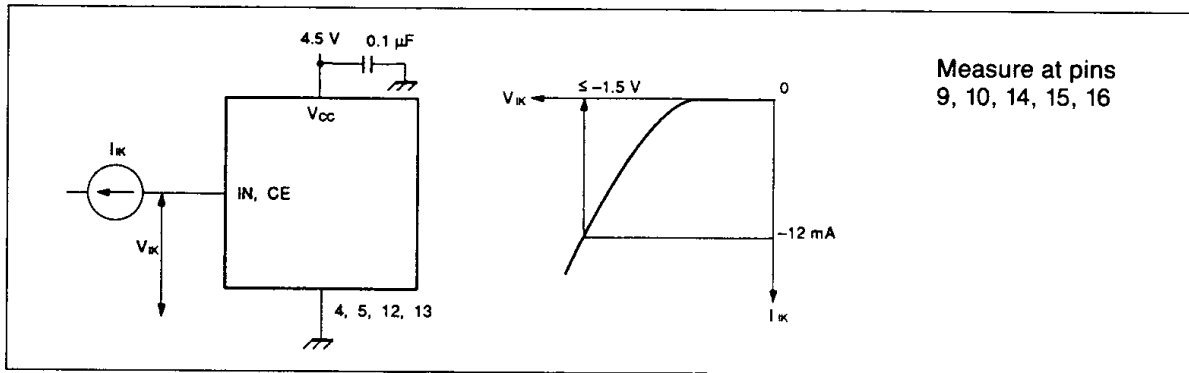


Figure 1 Input Clamp Voltage

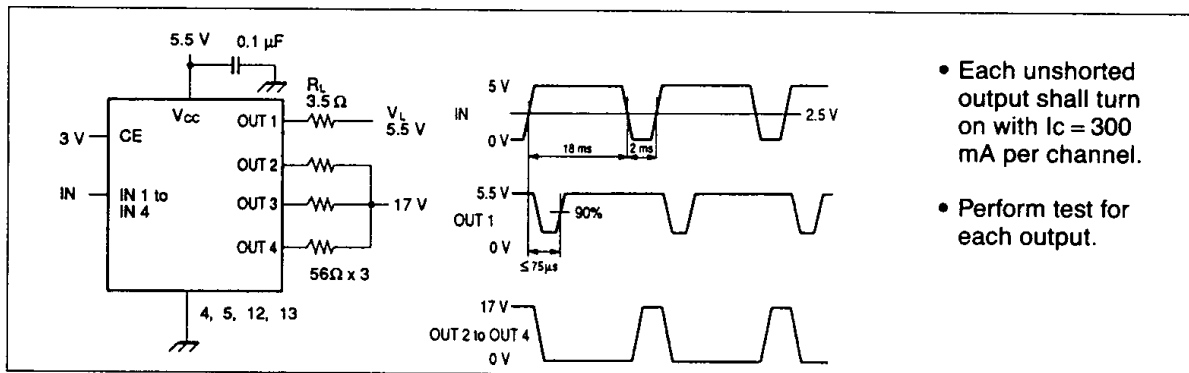


Figure 2 Output Short Test

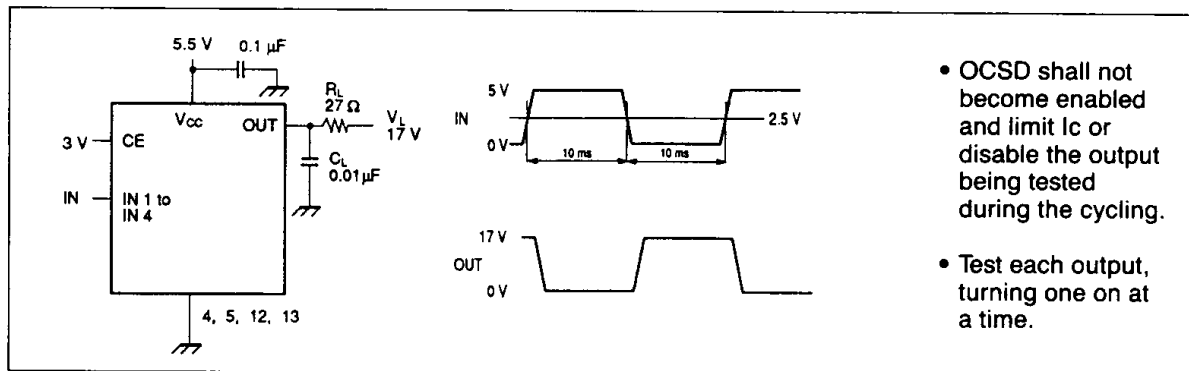


Figure 3 Capacitive Load Test

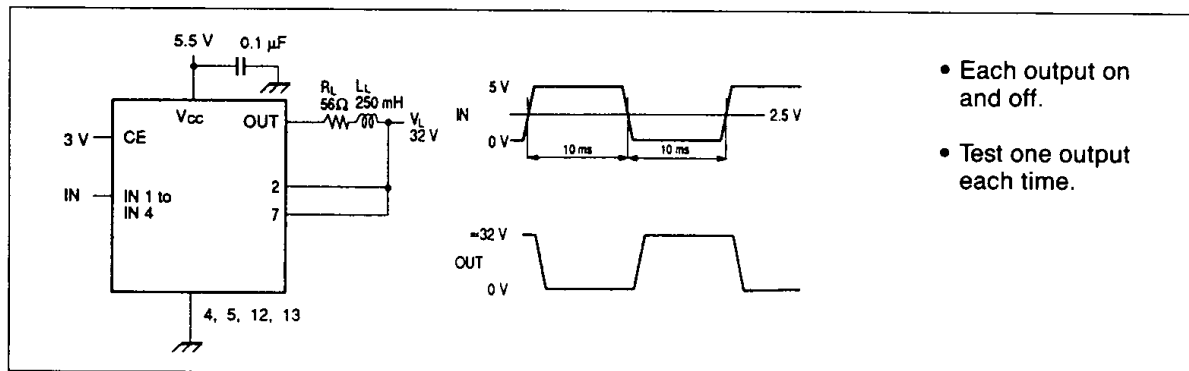


Figure 4 Solenoid Survival Test