

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 OCSD (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.

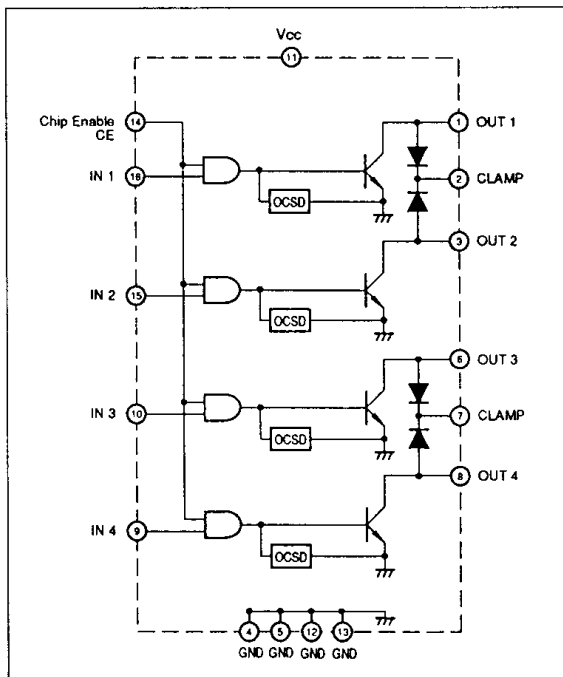
Functions

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

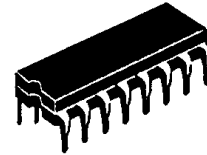
Features

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

Block Diagram

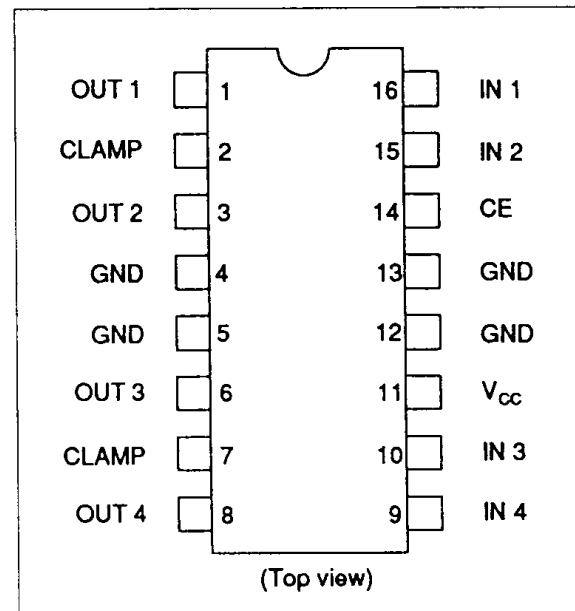


HA13415



(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	V _{CC}	-0.5 to 6	V	1
Input voltage	V _{IN}	-0.5 to 6	V	
Output voltage	V _{out}	50	V	
Output current	I _o	0.6	A	
Power dissipation	P _T	2.0	W	2
Junction temperature	T _j	150	°C	
Operating junction temperature range	T _{jop}	-40 to +125	°C	
Storage temperature range	T _{stg}	-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:
V_{CC} = 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, V_{CC} = 5 V)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions	Note
Supply current	I _{CC}	—	6	—	mA	CE=0.8 V	
		—	60	80	mA	CE=IN=2.0 V	
Low level input voltage	V _{IL}	0	—	0.8	V		
High level input voltage	V _{IH}	2.0	—	—	V		
Low level input current	I _{IL}	-10	—	10	μA	V _i =0.8 V	
High level input current	I _{IH}	-10	—	10	μA	V _i =2.0 to 5 V	
Input clamp voltage	V _{IK}	—	-1.0	-1.5	V	I _K =-12 mA	1
Low level output voltage	V _{OL}	—	0.20	0.4	V	I _C =0.3 A	
		—	0.40	0.7		I _C =0.6 A	
Output leakage current	I _{CEx}	—	—	100	μA	V _{CE} =50 V	



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

Clamp diode forward voltage	V _F	—	1.1	—	V	I _F =0.4 A	
		—	1.3	—		I _F =0.8 A	
Clamp diode reverse current	I _R	—	—	100	μA	V _R =50 V	
Turn on and turn off delay	t _{PHL}	—	0.2	—	μs	V _L =17 V, for IN	
		—	0.4	—		R _L =56 Ω	for CE
	t _{PHL}	—	1.0	—	μs	V _L =17 V, for IN	
		—	1.5	—		R _L =56 Ω	for CE
Negative output current test						I _O =-100 mA	2
Output short test						V _L =5.5 V, R _L =3.5 Ω	3
Capacitive load test						V _L =17 V, R _L =2 Ω, C _L =0.01 μF	4
Solenoid survival test						V _L =32 V, R _L =56 Ω, L _L =250 mH	5

- Notes:
1. See Figure 1.
 2. Test procedures are
 - a. V_{CC} = 5.5 V
 - b. Set all outputs on with I_C = 250 mA per output, then set I_C = -100 mA for one output. All remaining outputs shall remain on.
 - c. Set all outputs off then set I_C = -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.

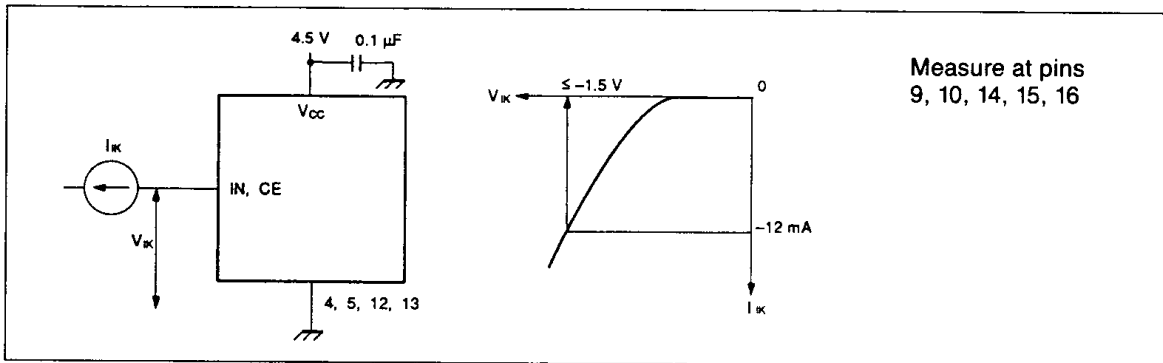
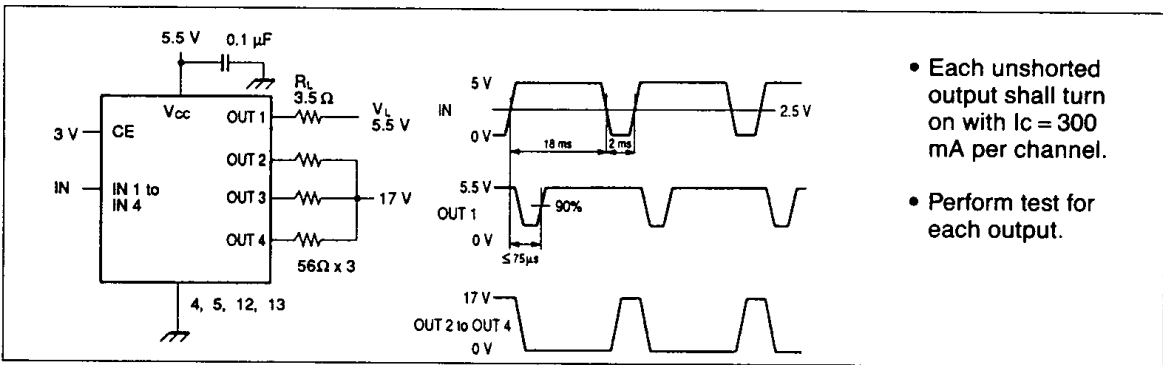
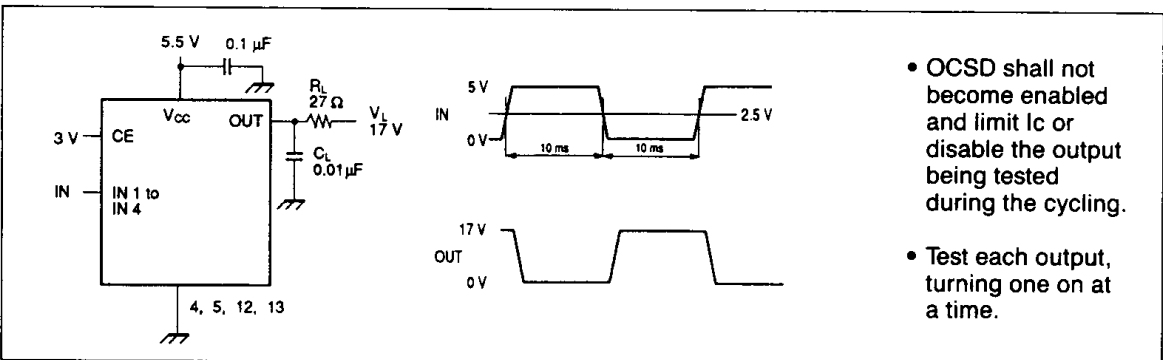


Figure 1 Input Clamp Voltage



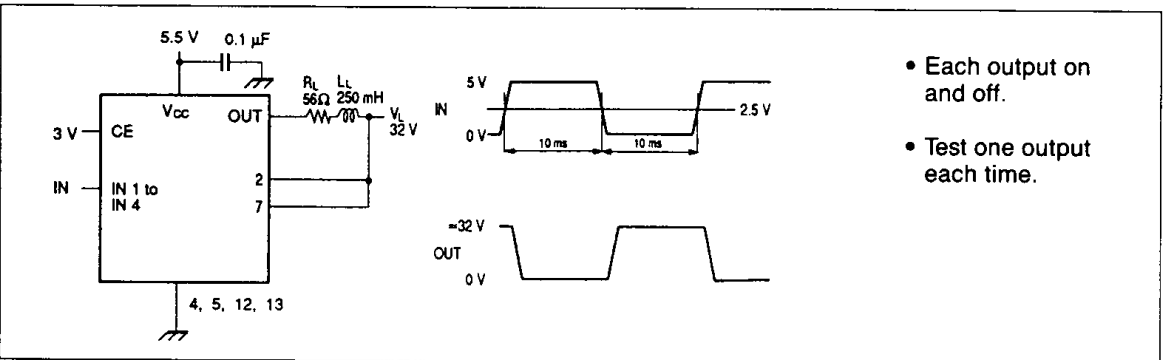
- Each unshorted output shall turn on with $I_c = 300$ mA per channel.
- Perform test for each output.

Figure 2 Output Short Test



- OCSD shall not become enabled and limit I_c or disable the output being tested during the cycling.
- Test each output, turning one on at a time.

Figure 3 Capacitive Load Test



- Each output on and off.
- Test one output each time.

Figure 4 Solenoid Survival Test

