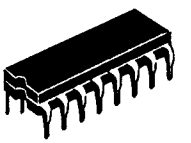
HA13415

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.

HA13415



(DP-16C)

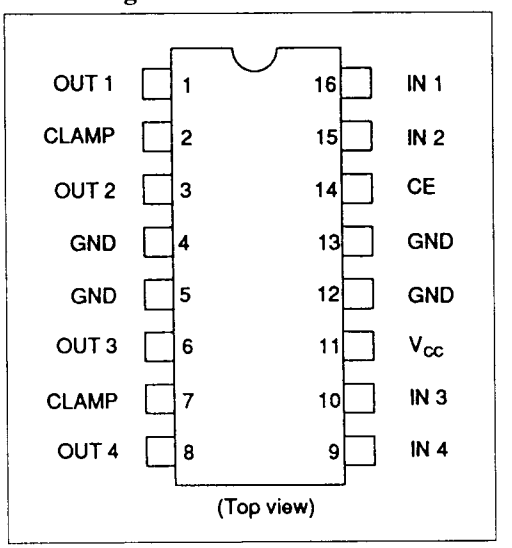
Functions

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

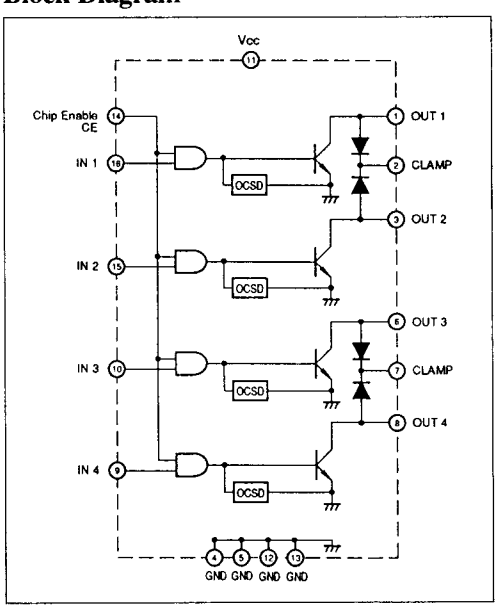
Features

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

Pin Arrangement



Block Diagram



Ordering Information

Type No.	Package
HA13415	DP-16C

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	Vout	50	V	
Output current	Io	0.6	A	
Power dissipation	P_T	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:
V_{CC} = 5 V±10 % (4.5 to 5.5 V)
2. Thermal resistances are follows.
$\theta_{j\text{-}a1} \leq 60$ °C/W(Soldered on a printed circuit board)
$\theta_{j\text{-}a2} \leq 35$ °C/W(Soldered on a printed circuit covered with copper sufficiently)
$\theta_{j\text{-}a3} \leq 15$ °C/W(Soldered on pins 4, 5, 12, and 13 with an infinite heat sink)

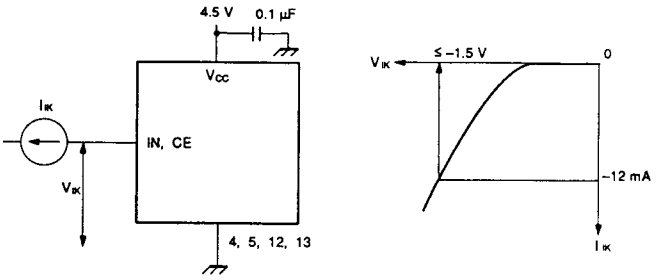
Table 2 Electrical Characteristics (Ta = 25 °C, V_{CC} = 5 V)

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_{IK}=–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)

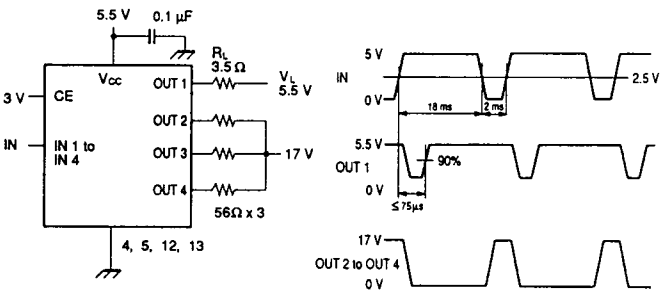
Clamp diodeforward voltage	V_F	—	1.1	—	V	I_F=0.4 A	
		—	1.3	—		I_F=0.8 A	
Clamp diode reverse current	I_R	—	—	100	µA	V_R=50 V	
Turn on and turn off delay	t_{PHL}	—	0.2	—	µs	V_L=17 V, R_L=56 Ω for IN	
		—	0.4	—		for CE	
	t_{PHL}	—	1.0	—	µs	V_L=17 V, R_L=56 Ω for IN	
		—	1.5	—		for CE	
Negative output current test						Io=−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. 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.



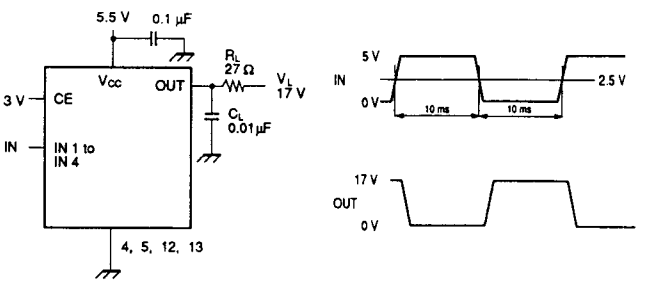
Measure at pins 9, 10, 14, 15, 16

Figure 1 Input Clamp Voltage



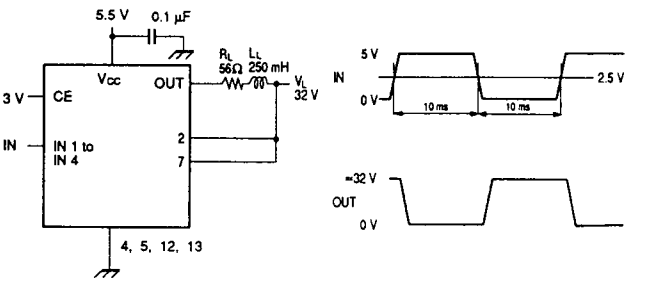
- Each unshorted output shall turn on with Ic = 300 mA per channel.
- Perform test for each output.

Figure 2 Output Short Test



- OCSD shall not become enabled and limit Ic 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