HA13475MP/FP

Two-Phase Stepping Motor Driver

Description

The HA13475MP/FP driver IC for two-phase full-wave stepping motors can provide an output of 0.33 A × 12 V/phase.

Features

- Wide output current/voltage range (4.5–13.8 V)
- Single input forward/reverse select (D)
- Input compatible with TTL, LSTTL, and 5-V CMOS
- Compact thermally conductive surface-mount package

Functions

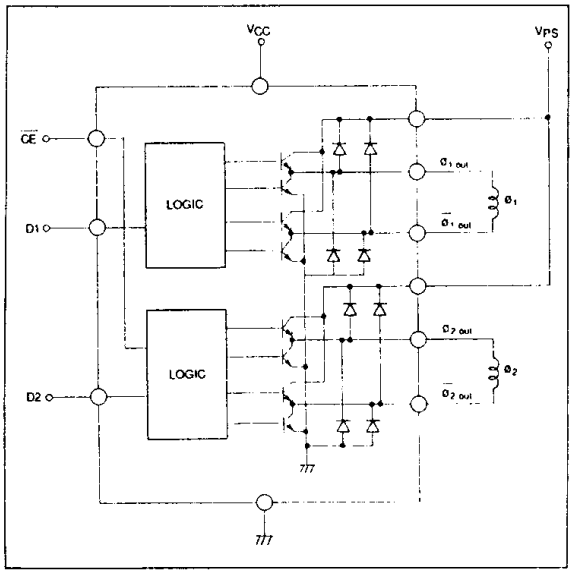
- 0.3-A dual full bridge
- Chip enable
- Diode clamp
- Overtemperature shutdown (OTSD)

Logic Table

Input		Output	
$\overline{CE}$	D	ϕ	$\overline{\phi}$
H	H	X	X
H	L	X	X
L	H	H	L
L	L	L	H

X: High impedance

Block Diagram



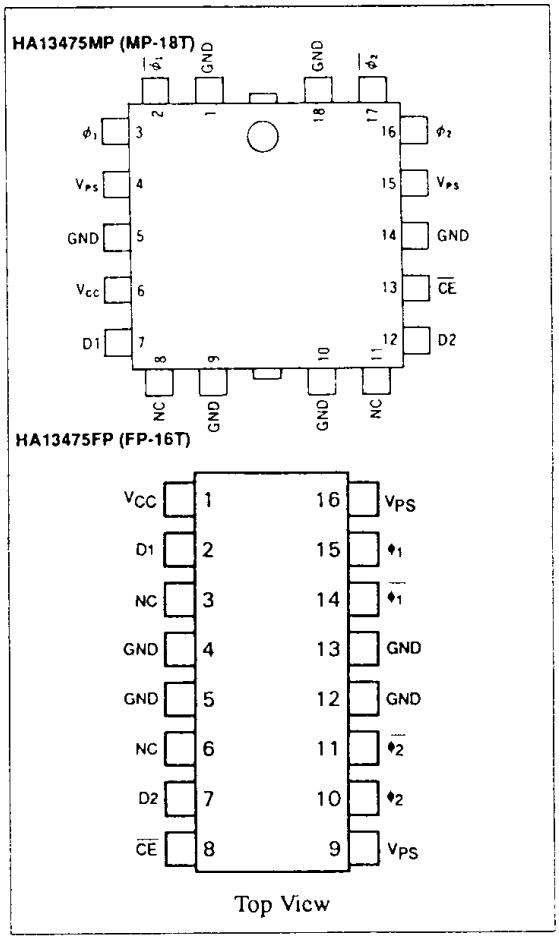
HA13475MP

(MP-18T)

Ordering Information

Type No.	Package
HA13475MP	MP-18T
HA13475FP	FP-16T

Pin Assignment



Absolute Maximum Ratings (Ta = 25°C)

Parameter	Symbol	Rating	Unit	Notes
Control stage supply voltage	V_{CC}	7	V	1
Output stage supply voltage	V_{PS}	15	V	1
Input voltage	V_I	0 to V_{CC}	V	2
Normal output current	I_O	330	mA	
Peak output current	I_{OP}	500	mA	3
Power dissipation	P_T	1.0	W	4
Junction temperature	T_j	150	°C	1
Storage temperature	T_{stg}	−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 range is as follows:
   V_{CC} = 4.5 to 5.5 V
   V_{PS} = 4.5 to 13.8 V
   T_{jop} = −20 to +125°C
2. Applies to direction and chip enable inputs.
3. t ≤ 5 ms.
4. HA13475MP:
   For T_{pin} = 125°C. Thermal resistance is as follows:
   $\theta_{j-c} \leq 25$°C/W
   $\theta_{j-a1} \leq 55$°C/W (when mounted on a metal base)
   $\theta_{j-a2} \leq 80$°C/W (when mounted on glass epoxy)
   HA13475FP:
   For T_{pin} = 110°C. Thermal resistance is as follows:
   $\theta_{j-c} \leq 40$°C/W
   $\theta_{j-a2} \leq 80$°C/W (when mounted on glass epoxy)

Electrical Characteristics (Ta = 25°C, V_{CC} = 5 V, V_{PS} = 12 V)

Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions	HA13475MP	HA13475F	Notes
Input low voltage	V_{IL}	—	—	0.8	V		7, 12, 13	2, 7, 8	
Input high voltage	V_{IH}	2.0	—	—	V				
Input low current	I_{IL}	−10	—	10	µA	V_I = 0.8 V			
Input high current	I_{IH1}	−10	1.0	10	µA	V_I = 2.0 V			
	I_{IH2}	—	0.5	1.0	mA	$V_{CC} = V_I$ = 5.5 V			
Quiescent current	I_{CC1}	—	25	33	mA	$\overline{CE}$ = 0.8 V, I_O = 0	6	1	
	I_{PS1}	—	10	20	mA		4, 15	9, 16	1
	I_{CC2}	—	1.8	2.6	mA	$\overline{CE}$ = 2.0 V, I_O = 0	6	1	
	I_{PS2}	—	—	1.0	mA		4, 15	9, 16	1
	I_{CC3}	—	2.8	—	mA	$\overline{CE}$ = 5.0 V, I_O = 0			
Output TRS leakage current	I_{CER}	—	—	100	µA	V_{CE} = 20 V	2, 3, 16, 17	10, 11, 14, 16	
Output saturation voltage	$V_{CE(sat)}$	—	1.5	2.0	V	I_O = 330 mA, $\overline{CE}$ = 0.8 V			2
Clamp voltage	V_{FU}	—	5.0	—	V	I_F = 330 mA, Upper diode			
	V_{FL}	—	1.5	—	V	I_F = 330 mA, Lower diode			
Delay time	t_{pLH1}	—	—	2	µs	R_L = 32 Ω to V_{PS}			3
	t_{pHL1}	—	—	2	µs				3
	t_{pLH2}	—	—	8	µs	R_L = 32 Ω to GND			3
	t_{pHL2}	—	—	2	µs				3

Electrical Characteristics (cont)

Parameter	Symbol	Min	Typ	Max	Unit	Test Conditions	HA13475MP	HA13475F	Notes
Through current	I_{thr}	—	0.2	0.4	A		2, 3, 16, 17	10, 11, 14, 15	4
Through current delay	t_{thr}	—	0.1	0.4	µs	I_{thr} = 0.1 A			
TSD operating temperature	T_{sd}	125	—	—	°C				
TSD hysteresis	ΔT_{sd}	—	25	—	°C				

Notes:

1. Sum of applicable pin currents.
2. Sum of upper and lower saturation voltages.
3. See figure 1.
4. See figure 2. Clock at either D1 or D2.

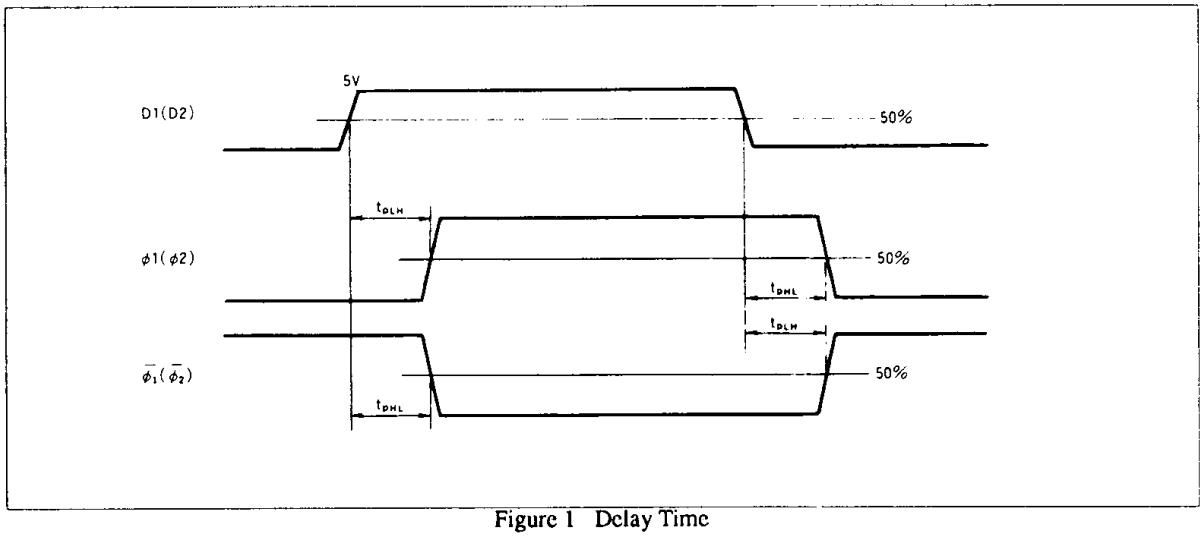


Figure 1 Delay Time

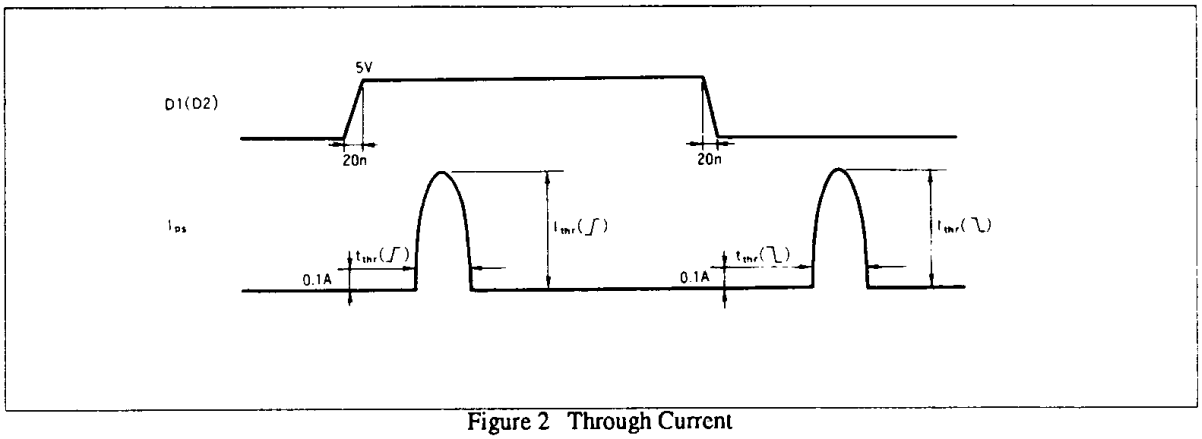


Figure 2 Through Current

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