FEELING TECHNOLOGY

FD1295H

Smart motor driver with embedded Hall sensor

FEATURES

Pb Free

- Motor driver with integrated Hall sensor
- High current driving capability
- Lock-shutdown protection & auto-restart function
- Precise magnetic switching thresholds
- Available in both TO-92(SIP-4) packages

GENERAL DESCRIPTION

FD1295H is a Motor driver with on-chip Hall sensor. It integrates the motor driver with the Hall sensor, which simplifies the PCB(printed circuit board) design and make the fabrication of small-size motors possible.

BLOCK DIAGRAM

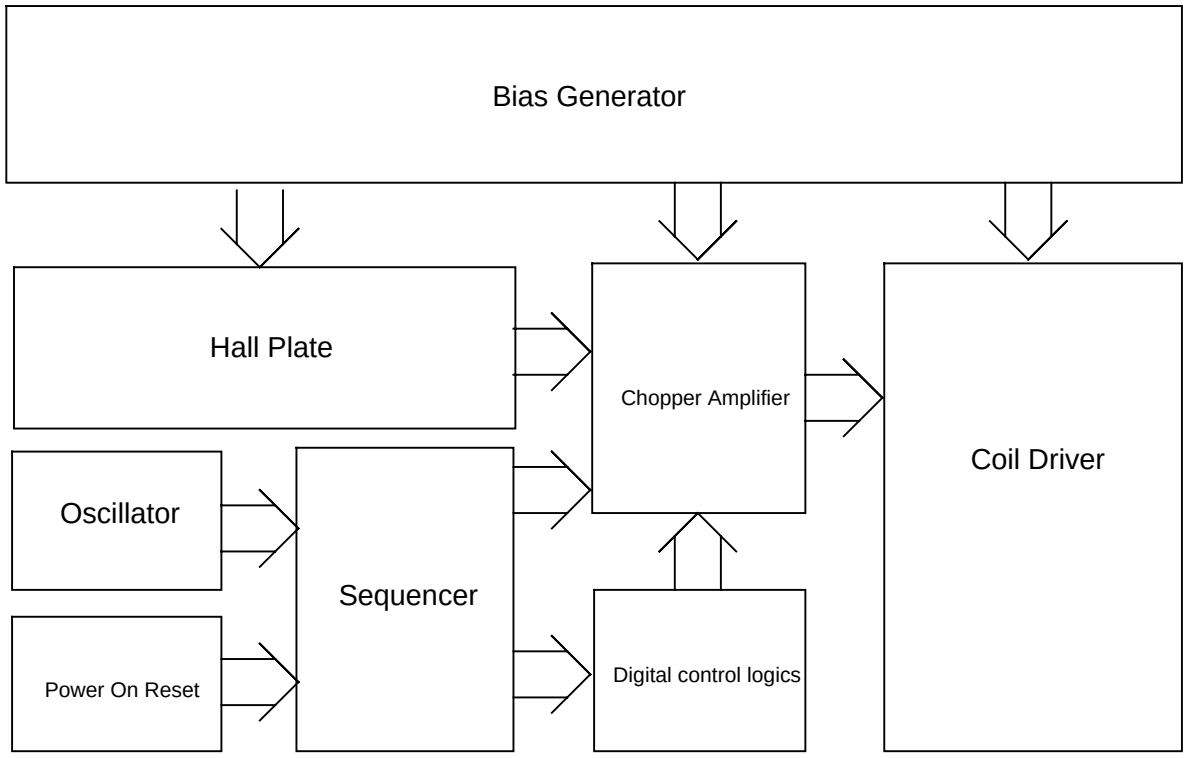


Figure.1

PIN CONNECTION

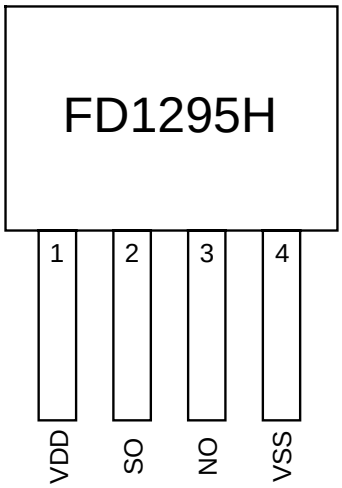


Figure.2

PIN DESCRIPTIONS

	I/O	FD1295H	Description
VDD	P	1	Power supply
SO	O	2	Driver output
NO	O	3	Driver output
VSS	G	4	Ground

Legend: I=input, O=output, I/O=input/output, P=power supply, G=ground

FUNCTIONAL DESCRIPTIONS

Refer to the block diagram (Figure.1), FD1295H is composed of the following building blocks:

- Bias generator

The bias generator provides precise, temperature- and process-insensitive bias references for the analog blocks. These references guarantee proper operation of the chip under all conditions specified in this specification.

- Oscillator + Sequencer

The built-in oscillator provides the clock signal, which is taken by the sequencer to generate the sequential signals necessary for both the Hall sensor and the digital control logics

- Power on Reset

Used to detect the power-up ramp and reset the digital circuits to attain correct operation as soon as the power is ready.

- Chopper Amplifier

To achieve a higher magnetic sensitivity the chopper amplifier structure is adopted in this design. Use of this structure dynamically removes both the offset and flicker noise at the same time.

- Digital control logics
  - Hall sensor part – generates controlling signals for the Hall sensor.
  - Coil driver part – generates controlling signals for the Coil driver.

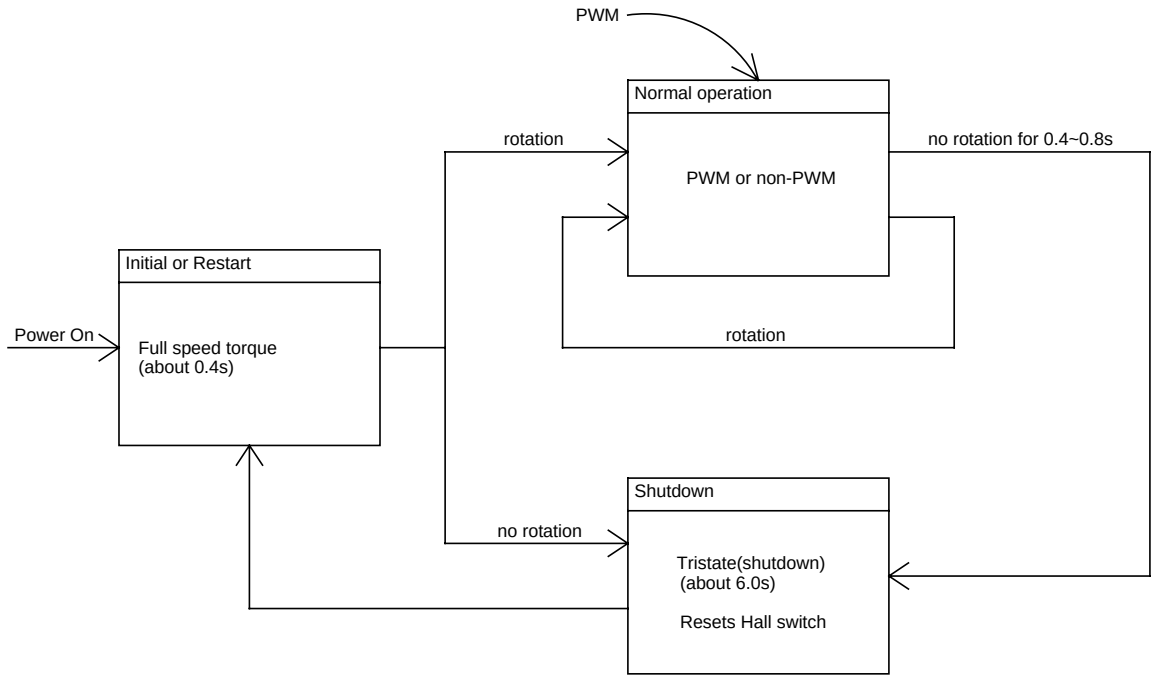


Figure.3

Refer to the figure above(Figure.3), the driver will enter the “Initial or Restart” state after power-on.
FD1295H will apply full speed torque to the motor for about 0.4s and monitor the status of the motor at the same time.
If the motor rotation is detected, FD1295H will enter “Normal operation” state; otherwise, it will enter the “Shutdown” state.
FD1295H will stay in the “Normal operation” state as long as the motor keeps rotating. If the motor is locked for more than 0.4 to 0.8s, FD1295H will enter the “Shutdown” state. Once entering the “Shutdown” state, FD1295H will stop providing driving current to the motor for about 6.0s and then enter the “Initial or Restart” state.
Alternating state changes between the “Initial or Restart” state and the “Shutdown” state will remain until the motor starts rotating. This will restart the motor and on the other hand prevent the motor (coil) from damages caused by over-heating.

ABSOLUTE MAXIMUM RATINGS

Parameter	Conditions	Values			Unit
		min.	Typ.	max.	
Ambient Operating Temperature	-	-20		105	°C
Storage Temperature	-	-40		150	°C
DC Supply Voltage	-	2.4		16.0	V
Supply Current	-			5.5	mA
continous Current	-			400	mA
Hold current	-			700	mA
Thermal resistance	Vcc=12V		0.168		°C /mW
Junction temperature				150	°C

OPERATING CONDITIONS

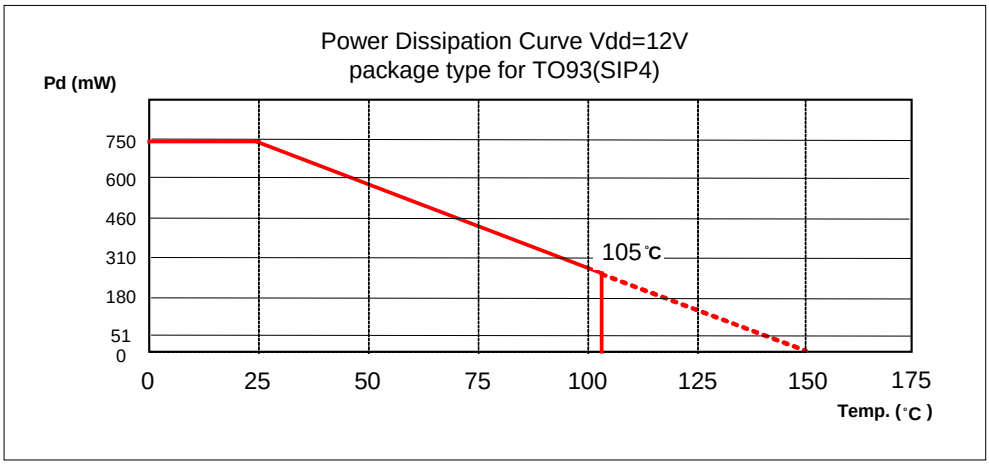
Parameter	Conditions	Values			Unit
		min.	typ.	max.	
Supply Voltage	-	2.4		16.0	V
Ambient Temperature	-	-20		105	°C

ELECTRICAL CHARACTERISTICS @ VDD=12.0V

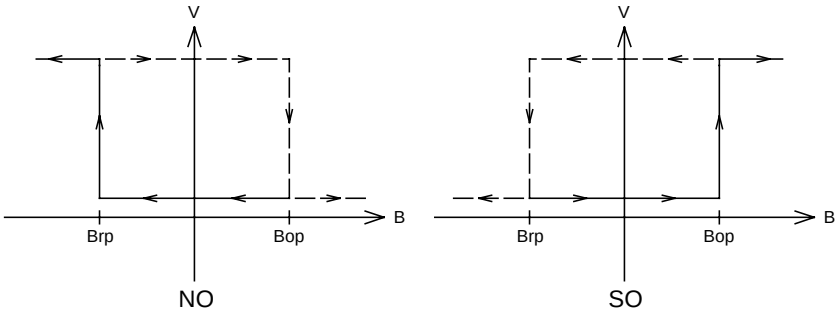
Parameter	Conditions	Values			Unit
		min.	typ.	max.	
Average Supply Current(no load)			4.5		mA
Output Saturation Voltage(FG/RD)	Iout= 10mA			0.5	V
Output leakage current(FG/RD)	Vout=12V			1	uA
On resistance(Rpmos+Rnmos)			2.1		Ohm

MAGNETIC CHARACTERISTICS

Parameter	Conditions	Values			Unit
		min.	typ.	max.	
Operate Points (B_{OP})			20		G
Release Points (B_{RP})			-20		G
Hysteresis			40		G



HYSTERESIS CHARACTERISTICS



Application Circuit Reference

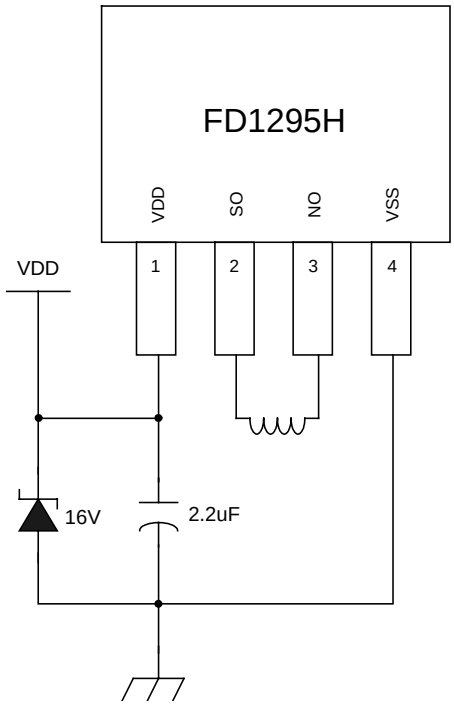
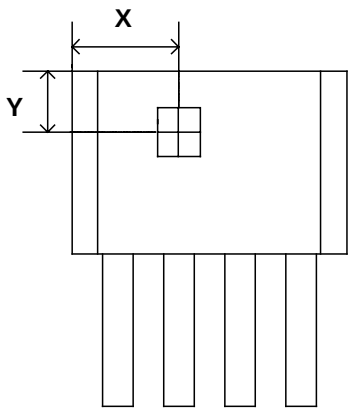


Figure.4

Note. Must use least 2.2uF(electrolytic) capacitor and 16V zener diode for the decoupling between VDD and VSS and place the capacitor as close to the IC as possible.

HALL SENSOR LOCATION

The Fig 5 is the hall sensor location, where marks the IC number. The best sensitivity, which can be intensified as much as possible, depends on the vertical distance and position between magnetic pole and the hall sensor (Fig 6). For the single-phase motor, this design is very important.



		UNIT
X	1.75	mm
Y	1.35	mm

Fig 5. FD1295H Hall Sensor Location

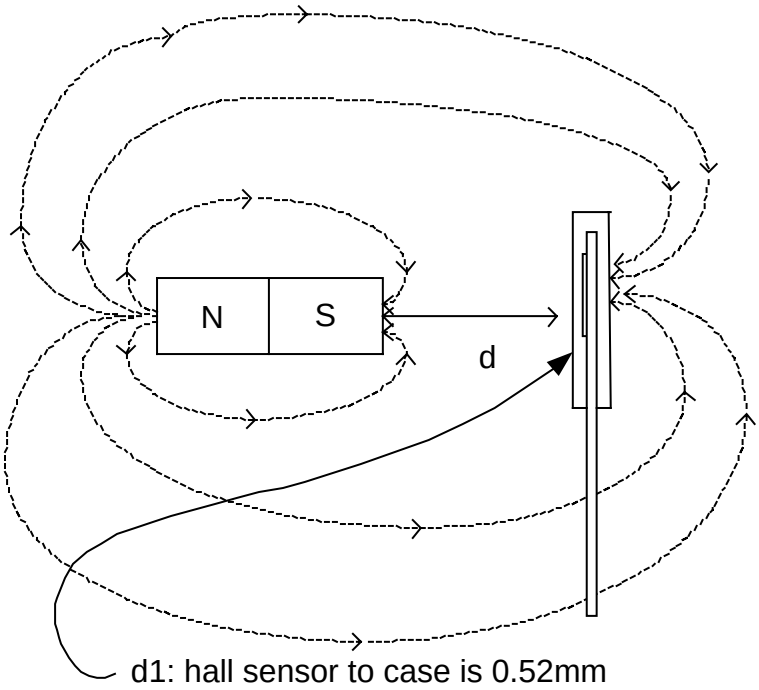
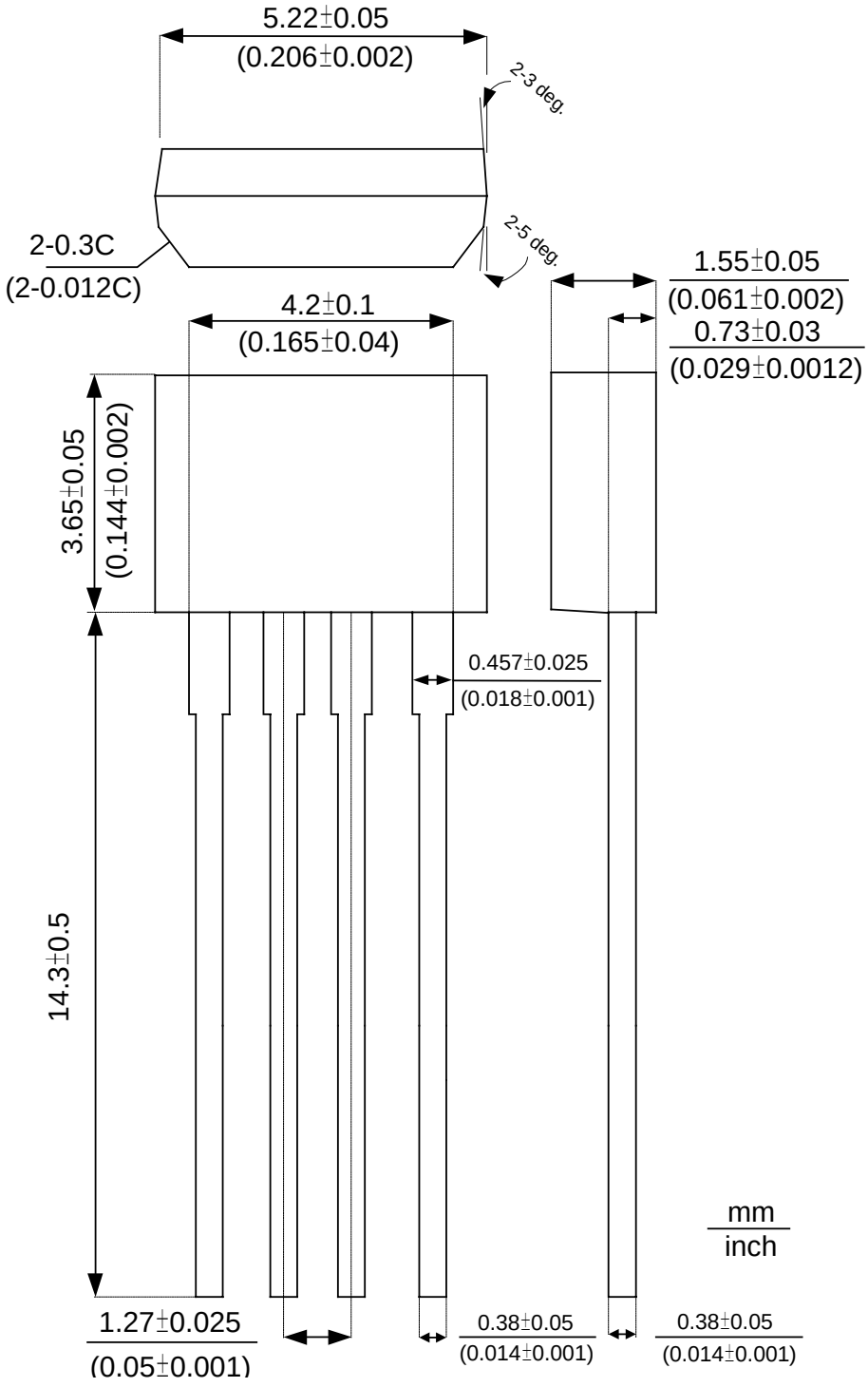


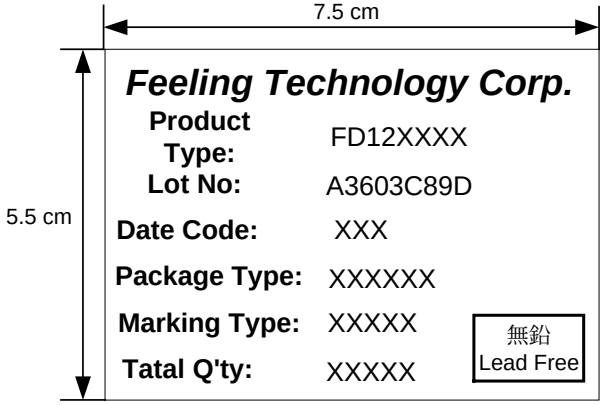
Fig 6. Magnetic Distribution and Z-axis position

PACKAGE OUTLINE (LEAD FREE)

PACKAGE TYPE:TO-92SP-4



LABEL SPECIFICATIONS



INSIDE BOX & CARTON LABEL

ORDER INFORMATION

Part Number	Operating Temperature	Package	Description
FD1295H-LF	-20 °C to +105 °C	TO-92SP-4	±20G (B)