



UH255

CMOS IC

SMART MOTOR DRIVER WITH INTEGRATED HALL SENSOR

DESCRIPTION

The **UH255** is a single coil motor driver with integrated Hall sensor. Lock-shutdown and auto-restart function protects the motor from being over-heated and restarts the motor after being locked.

The rotation speed function is also integrated in the **UH255**, the system could detect the rotation speed of motor when using **UH255** by the 'FG' pin.

The **UH255** also uses Soft-switch phase-switching technique to reduce the vibration and acoustic noise.

PWM is used for the speed control for **UH255**. Two types of PWM input signals could be used: voltage mode PWM & pulse mode PWM.

FEATURES

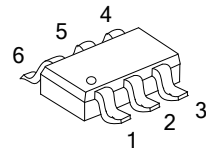
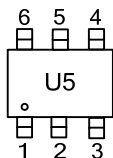
- * Soft switching output driver.
- * Built-in Hall sensor motor driver.
- * Motor lock protection and automatic restart.
- * Thermal shutdown protection.
- * PWM speed control.

ORDERING INFORMATION

Ordering Number	Package	Packing
UH255G-AG6-R	SOT-26	Tape Reel

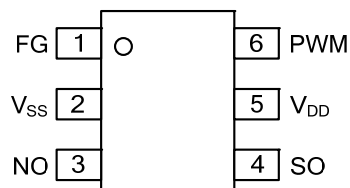
<p>UH255G-AG6-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) AG6: SOT-26</p> <p>(3) G : Halogen Free and Lead Free</p>
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MARKING



SOT-26

■ PIN CONFIGURATIONS

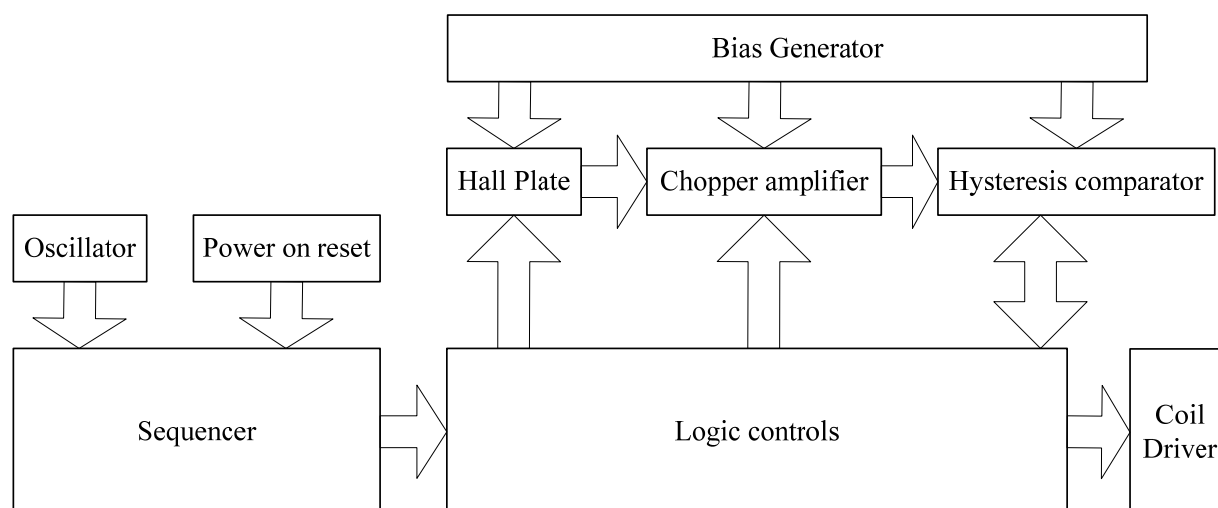


■ PIN DESCRIPTIONS

PIN NAME	PIN TYPE	PIN DESCRIPTION
FG	O	Frequency generation
V _{SS}	G	Ground
NO	O	Driver output
SO	O	Driver output
V _{DD}	P	Power supply
PWM	I	Pulse width modulation speed control

Note: I=Input, O=Output, I/O=Input/Output, P=Power Supply, G=Ground.

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
DC Supply Voltage($V_{DD,FG}$)	V_{DD}	6.5	V
Supply Current	I_{DD}	3	mA
Continuous Current	I_{CONT}	500	mA
Hold Current	I_{HOLD}	800	mA
PG,RD sink current	I_{SINK}	25	mA
Magnetic Flux Density	B	Unlimited	Gauss
Allowable power dissipation	P_D	520	mW
Junction Temperature	T_J	170	°C
Operating Temperature	T_{OPR}	-20 ~ +105	°C
Storage Temperature	T_{STG}	-40 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ RECOMMENDED OPERATING COMDITIONS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Input Voltage	V_{DD}	1.8		5.5	V
Operating Temperature	T_A	-10		90	°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	278	°C/W

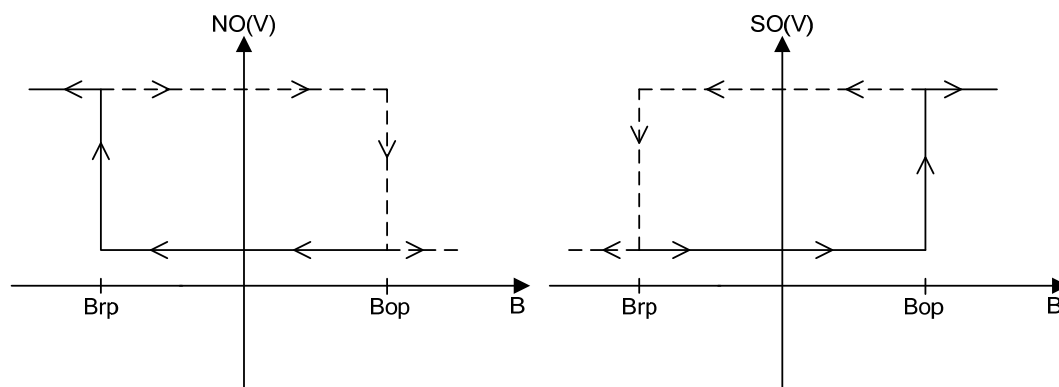
■ ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Average Supply Current(No load)	I_{DD}			1.8		mA
Output Saturation Voltage (FG)	V_{SAT}	$I_{OUT} = 10\text{mA}$			0.5	V
Output leakage current (FG)	I_{LEAK}	$V_{OUT} = 5\text{V}$			1	uA
On resistance ($R_{pmos} + R_{nmos}$)	R_{ON}			0.8		Ω
Thermal Shutdown Threshold	T_{SD}			165		°C

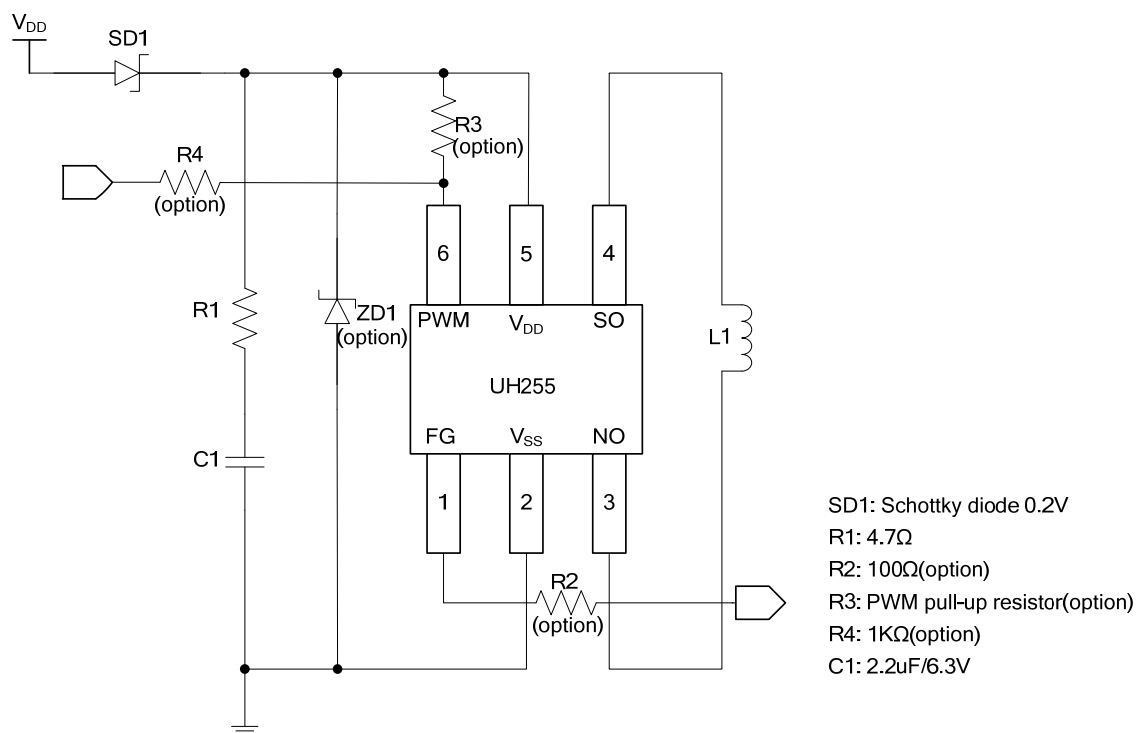
■ MAGNETIC CHARACTERISTICS

PARAMETR	SYMBOL	MIN	TYP	MAX	UNIT
Operate Point	B_{OP}		25		G
Release Point	B_{RP}		-25		G
Hysteresis	B_{HYS}		50		G

■ HYSTERESIS CHARACTERISTICS

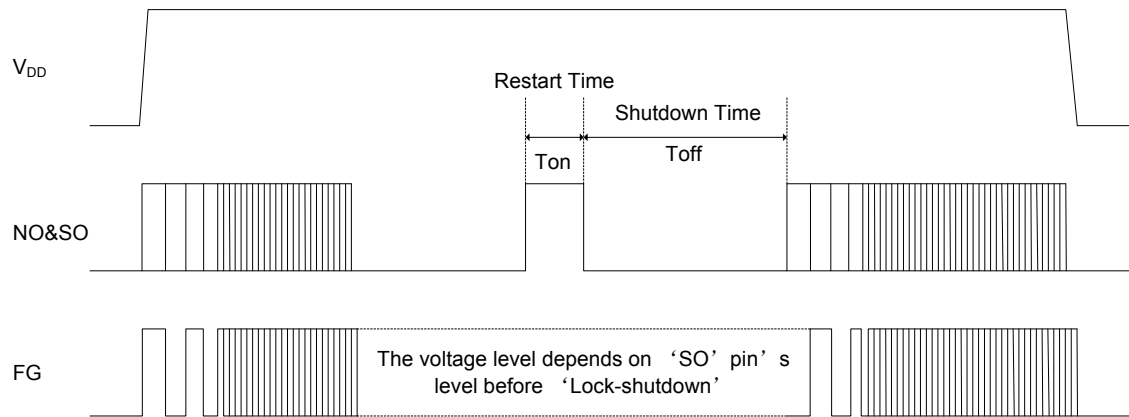


■ TYPICAL APPLICATIONS CIRCUIT



- Notes: 1. Capacitor C1 is necessary to use for the decoupling between V_{DD} and V_{SS} and should be placed as close to the IC as possible.
 2. The PWM pin contains an internal pull-up resistor so the **UH255** will rotate at full-speed(100% ON) when this pin is floating.

■ OUTPUT WAVEFORMS DESCRIPTION



- Notes: 1. FG is open drain, the high level of signal depends on the external supply voltage.
 2. The on torque time of motor is equal to the restart time.

■ FUNCTIONAL DESCRIPTIONS

Refer to the block diagram above, **UH255** is composed of the following blocks:

1. Bias generator

The bias generator provides bias references for the analog blocks.

2. Oscillator

The integrated oscillator provides the clock signal for the digital control logics.

3. Power-on Reset

The block of power-on reset is used to detect the power-up ramp and reset the digital circuits.

4. Chopper Amplifier

The chopper amplifier structure can achieve a higher magnetic sensitivity and dynamically removes both the offset and flicker noise at the same time.

5. Digital control logics

Generates controlling signals for the Hall sensor and Coil driver and a tachometer signal output(FG).

6. PWM speed control

Voltage mode PWM:

Applying a DC voltage to the PWM pin and the **UH255** will generate PWM pulses internally. The rotation speed will be higher if the voltage applied to the PWM pin is higher. The relation of the applying DC voltage and the 'ON' duty cycle of PWM pulse is as follows:

When the applying DC voltage is from $0.14 \times V_{DD}$ to $0.5 \times V_{DD}$, the 'ON' duty cycle of PWM pulse is linear with the DC voltage. Otherwise the 'ON' duty cycle is zero(DC voltage is lower than $0.14 \times V_{DD}$) and 100%(DC voltage is higher than $0.5 \times V_{DD}$).

Pulse mode PWM:

User can also apply PWM pulses directly to the PWM pin. The **UH255** will pass this pulse to the coil driver with the original duty-cycle ratio.

Notes: 1. While using pulse mode PWM, the 'High' value of the input pulse should be higher than $0.5 \times V_{DD}$ and the 'Low' value should be lower than $0.14 \times V_{DD}$.

2. The PWM pulse frequency should be higher than 200Hz, and the recommended frequency range is higher than 30KHz where there PWM input pulses will not generate acoustic noise.

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