12V单通道全桥驱动器

Chip description

GC8838 is a 12V DC motor driver chip that provides an integrated motor drive solution for cameras, consumer products, toys, and other low-voltage or battery-powered motion control applications. The chip is typically used to drive a single DC motor or two motors to drive a stepper motor.

GC8838 It can work on the power supply voltage of 0~ 12V, and can provide up to 1.5A continuous output current or 2.5A peak current, and the power consumption is less than 1uA in sleep mode.

GC8838 Has a PWM (IN/IN) input interface, compatible with industry standard devices, and has overtemperature protection function.

The chip also integrates undervoltage protection, output short circuit protection, overcurrent protection and other functions.

Chip features

H Bridge motor driver-load power supply voltage 0~ 12V-low conduction impedance (HS+LS) 350m Ω

1.5A continuous drive output current

PWM (PH/EN) input mode

Compatible with 3.3V and 5V logic inputs

Built-in overtemperature protection

Built-in H-bridge power short circuit protection, short ground protection

Low current sleep mode (nA class, when nSleep=0)

Chip application

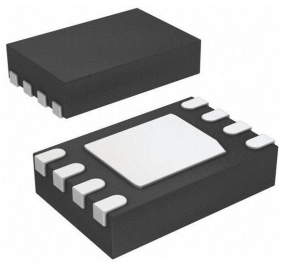
camera

Digital single-lens reflex (DSLR) lens Toy robot technology

Shared bike locks

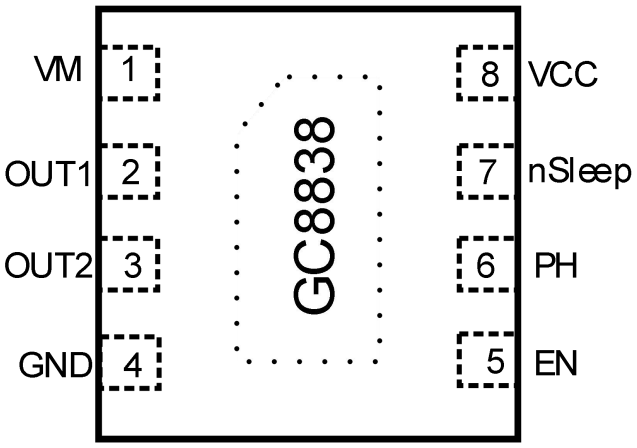
Water meter switch

armamentarium



Product name	Package	Description
GC8838	DFN8	2*2mm e=0.5

Pin distribution diagram



Pin description

Pin number	Name of the tube	I/O	Description of the tubes and feet
DFN8			
1	VM	Power	Power supply
2	OUT1	O	Output 1
3	OUT2	O	Output 2
4	GND	ground	The earth
5	EN	I	Enable input (see logic table for details)
6	PH	I	Phase input (see logic table for details)
7	nSleep	I	Power saving mode input, low effective
8	VCC	Power	3.3V or 5V logic power supply

Internal block diagram

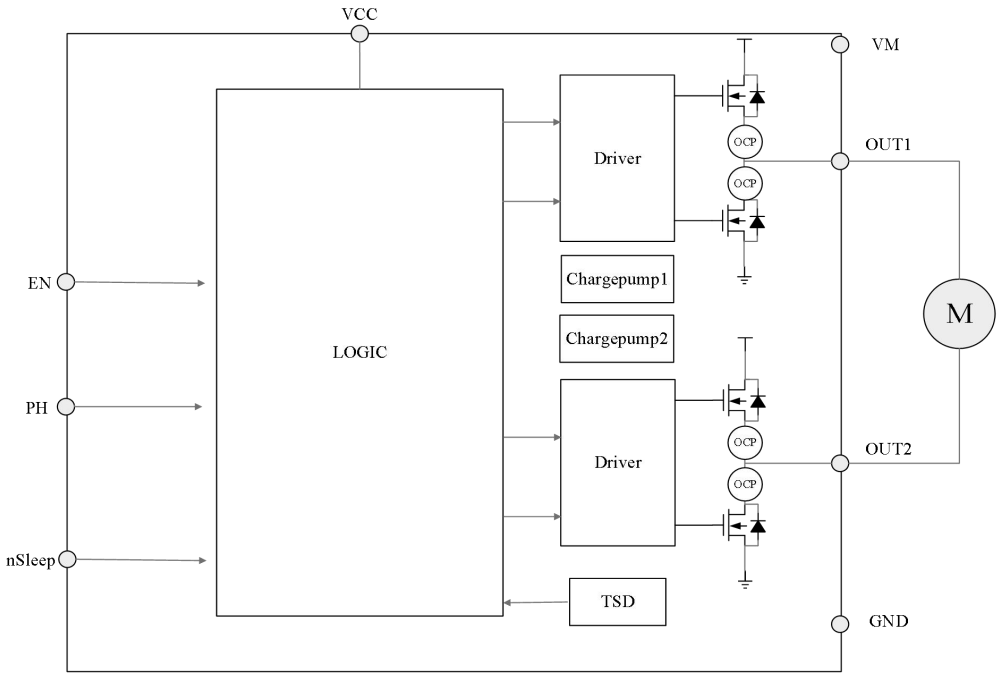


Figure 1 GC8838 Internal block diagram

Extreme parameters (T = 25 unless otherwise specified)

Parameter	Symbol	Parameter range	Unit
Logic voltage range	VCC	-0.3~7	V
Load voltage	VM	0~16	V
Control the input voltage range	EN, PH	-0.5~7	V
A constant current for a long time	Ion	±1.5	A
Drive peak current	Imax	±2.5	A
Junction temperature	Tjmax	-40~150	℃
Storage temperature	Tstg	-60~150	℃
Electrostatic protection (human body mode)	ESD	±5000	V

Electrical parameters (T=25 , VCC=3V, VM=12V in general without special note)

Recommended working environment:(no other description, T=25)

Parameter	Symbol	Test condition	Least value	Representative value	Crest value	Unit
Logic power supply	VCC		2.0		7	V
Power supply for the load	VM		0		12	V
Output	I_{OUT}		0		1.5	A
External PWM frequency	f_{PWM}		0		400	kHZ
Working temperature	T_a		-40		85	℃

Electrical characteristics:(no other description, T=25 , VCC=3V, VM=12V)

Parameter	Symbol	Test condition	Least value	Representative value	Crest value	Unit
VCC operating current 1	I_{VCC1}	Not have PWM		368	450	uA
The operating current of VCC is 2	I_{VCC2}	PWM 50 kHz		0.68	1.0	mA
VCC standby current	I_{VCCQ}	nSleep=0 power saving mode		40	80	nA
VM working current 1	I_{VM1}	Not have PWM		214	550	uA
VM working current 2	I_{VM2}	50 KHz PWM		0.58	0.90	mA
VM working current 2	I_{VMQ}	nSleep=0 power saving mode		1.3	20	nA
Output H, bridge parameters						
Bridge conduction resistance of upper arm + lower arm	R_{dsON1}	I_o=500mA; T=25°		350	450	mΩ
	R_{dsON2}	I_o=500mA;T=125°		530	700	mΩ
Off-state leakage current	I_{OFF}	vout=0v	-10		10	uA
Logical input feet (PH, EN, nSleep)						
The logic is reversed from high to low at the voltage point	V_{IL}	PH,EN		1.28		V
		nSleep		1.28		V
The logic is reversed from low to high at the voltage point	V_{IH}	PH,EN		1.58		V
		n				V

		Sleep		1.58		
Reverse hysteresis	V_{HY}	PH, EN		300		mV
		nSleep		300		mV
Low input current at the logic level	I_{IL}	Vin=0	-5		5	uA
High input current logic	I_{IH}	Vin = 3.3V, EN, PH pins		30		uA
		Vin = 3.3V, nSleep pin		30		uA
Pull-down resistor	R_{pd}	PH, EN, nSleep		100		kΩ
Guard circuit						
Over temperature protection	TSD	Temperature rise	155	169	180	℃
Overtemperature protection hysteresis	ΔTSD			26		℃
Undervoltage protection	V_{UVLO}	Source VCC		1.9		V
Undervoltage protection	ΔV_{UVLO}	Source VCC		1.8		V
Overcurrent protection	I_{OCP}	Arm bridge		3.0		A
		Lower arm bridge		3.0		A
Overcurrent protection lag	T_{DEG}	Overcurrent protection hysteresis time		1.5		us
Overcurrent protection recovery time	Tretry	Overcurrent protection recovery time		1.5		ms

Time series parameters and curves

TA = 25° C, VCC = 5 V, RL = 20 Ω

Parameter	Condition	Scope		Unit
		Minimum	Maximum	
t1	Delay time, PHASE high to OUT1 low		160	ns
t2	The delay time is PHASE high to OUT2 high		200	ns
t3	The delay time is PHASE low to OUT1 high		200	ns
t4	The delay time is PHASE low to OUT2 low		160	ns
t5	The delay time is high for ENBL and OUTx		200	ns
t6	The delay time is low for ENBL and OUTx		160	ns
t7	Increase the output rise time	30	188	ns
t8	Reduce the time of output de-cline	30	188	ns
	Wake up time, nSLEEP to output open		30	us

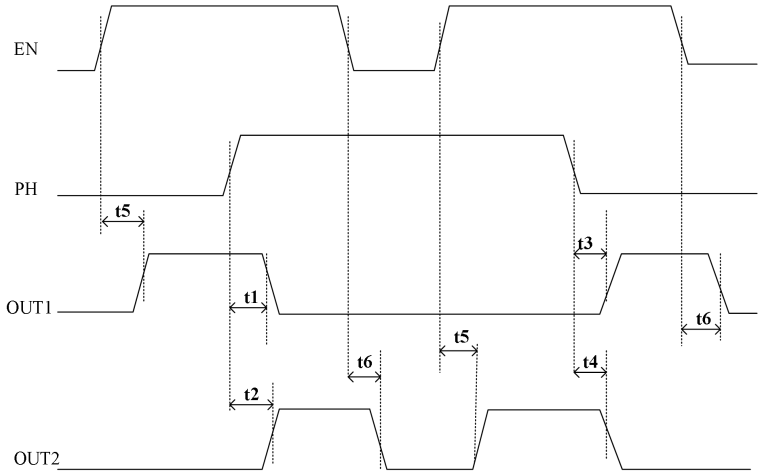


Figure 2 GC8838 Input and output time parameters 1

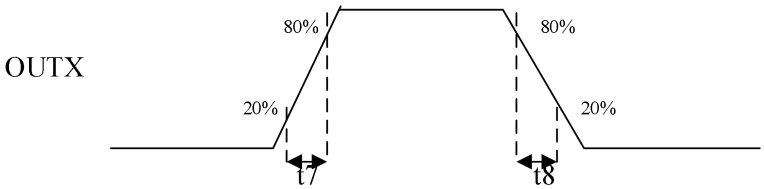


Figure 3 GC8838 Input and output time parameters 2

functional description

Bridge arm control

GC8838 Controlled by the PWM input interface, also known as IN/IN input mode, its control truth table is as follows:

nSleep	PH	EN	OUT1	OUT2	Function
0	X	X	Z	Z	Dormancy
1	X	0	L	L	Stop a vehicle by applying the brake
1	1	1	L	H	Opposite direction
1	0	1	H	L	Forward direction

Output drive

The output drive upper and lower tubes use NMOS power tubes, and the built-in charge pump circuit, the sum of the internal resistance of the upper and lower tubes is as low as 400m Ω

Sleep patterns

When the nSleep is high, the chip works normally.

When the nSleep is low, the chip enters a low-power sleep mode, which consumes power at the nA level and is suitable for low-power systems. The nSleep has a built-in 100k resistor that pulls down to ground, and the default sleep mode is when the external input is suspended.

Input foot

The input foot has a 100K Ω resistor pull-down and is set to low level input by default.

guard circuit

Over temperature protection

When the chip junction temperature exceeds 169 , the overtemperature protection circuit is activated, shutting off all output transistors. When the temperature drops by a hysteresis temperature of 26 and reaches 143 , all output transistors resume operation; since overtemperature protection only activates when the chip junction temperature exceeds the set value, it does not guarantee that the product will be protected from damage with this circuit alone, so the chip is equipped with short-circuit overcurrent protection.

Short circuit protection OCP

The chip includes overcurrent protection circuits in each drive transistor of the H bridge. When any drive transistor detects a current exceeding IOCP and lasting longer than the hysteresis time TDEG (1.4 us), all drive transistors will turn off. After Tretry time (1.5 ms), the drive transistors will automatically attempt to return to normal operation. If abnormal currents persist, the shutdown-recovery-shutdown process will be repeated.

Overcurrent protection is generally designed to protect against abnormal conditions that could cause the chip to burn out. For example, when the upper arm bridge of OUT1 is conducting, if OUT1 abnormally touches ground, or when the lower arm bridge of OUT1 is conducting, OUT1 abnormally shorts to the power supply. This type of protection is also known as short-to-ground and short-to-power protection.

work pattern

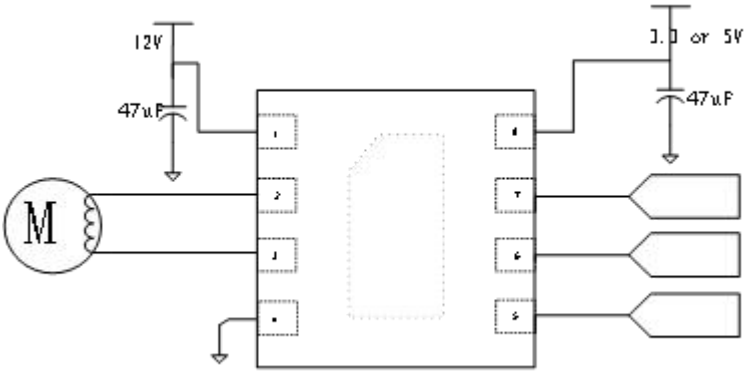
GC8838 Enter sleep mode when the nSleep is low, in sleep mode H, all bridges are turned off, output high resistance state, most of the chip circuit is turned off, and enter power saving mode.

Pattern	Condition	H bridge
Work		Work

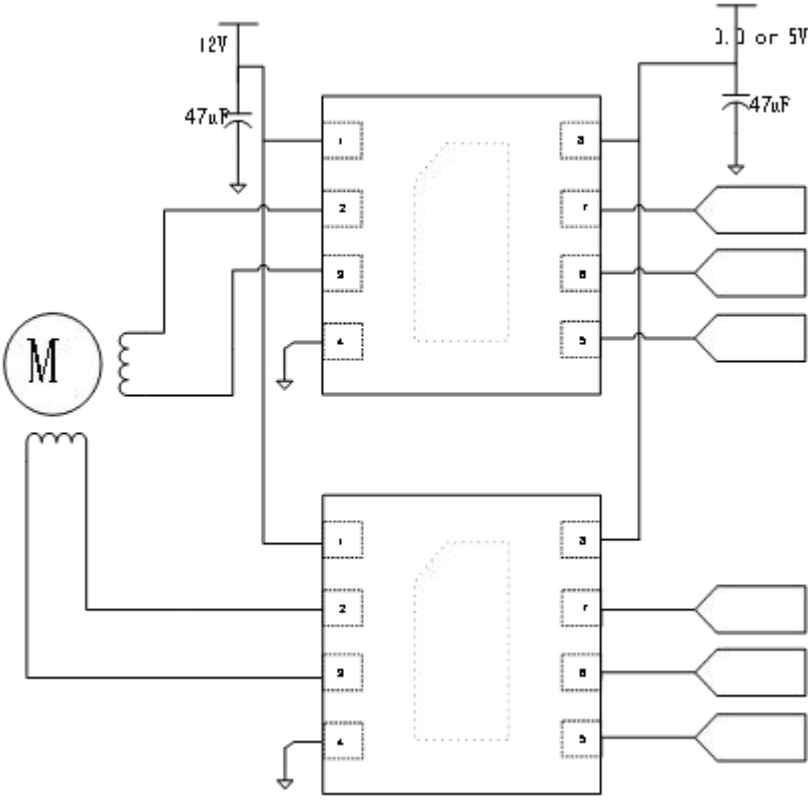
	nSleep=H	
Sleep patterns	nSleep=L	Turn-off
Failure detection	Over temperature, under pressure	Turn-off
	OCP	Shut down-restore-shut down mode

Typical application circuit diagram

Figure 4 GC8838 Typical application schematic



GC8838 Drive DC motor diagram

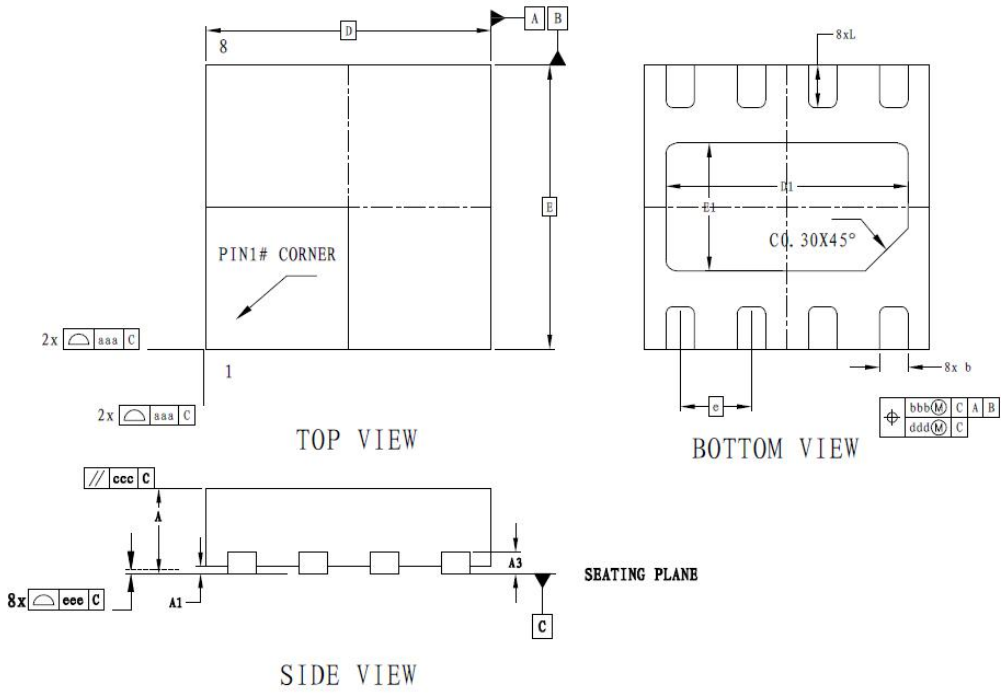


Two GC8838 drive stepper motor diagram

VCC, the bypass capacitor connection of VM should be as close as possible to the chip VCC, VM foot. When the load power supply exceeds 12V, it is recommended to increase the VM bypass capacitor greater than 56uF.

Encapsulate the shape diagram

DFN8L UNIT: mm



Symbol	Size (mm)		
	Minimum	Standard	Maximum
A	0.500	0.550	0.600
A1	0.000	0.02	0.050
A3	0.152REF		
D	1.924	2.000	2.076
E	1.924	2.000	2.076
D1	1.600	1.700	1.800
E1	0.800	0.900	1.000
b	0.150	0.200	0.250
e	0.500 TYP.		
L	0.250	0.300	0.350
aaa	0.150		
bbb	0.100		
ccc	0.100		
ddd	0.050		
eee	0.080		
fff	0.100		