XTM4118

H-Bridge Motor Driver

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2.4V-7.2V, 1.2A H-Bridge Brushed DC Motor Driver

GENERAL DESCRIPTION

XTM4118 provides a single H-bridge motor driver solution for battery-powered toys, toothbrushes and other low-voltage or battery-powered motion control applications. The device can drive one DC brush motor,solenoid, or other inductive load. The H-bridge consists P-channel and N-channel power MOSFET, its built-in four output mode: forward, reverse, coast, brake.

XTM4118 operates on a motor power supply voltage from 2.4V to 7.2V, which can supply an output current up to 1.2A continuously, 2.0A peak. The protection features include under-voltage lockout (UVLO), and thermal shutdown (TSD).

XTM4118 has a PWM (IN/IN) input interface.

FEATURES

- Power Supply Range: 2.4V-7.2V
- Output Current:
  1.2A continuously, 2.0A Peak
- Standby Current: 0.1uA typ.
- MOSFET On-resistance $R_{DS(ON)}$:
  0.59Ω（SOP8）
  0.53Ω（SOT23-6）
- Protection
  - Under-Voltage Lockout(UVLO)
  - Thermal Shutdown(TSD)
- Package: SOP8 and SOT23-6

APPLICATIONS

- Utility Meters
- Toothbrushes
- Cameras/IR-CUT
- Smart Lock
- Battery-Powered Toys

TYPICAL APPLICATION

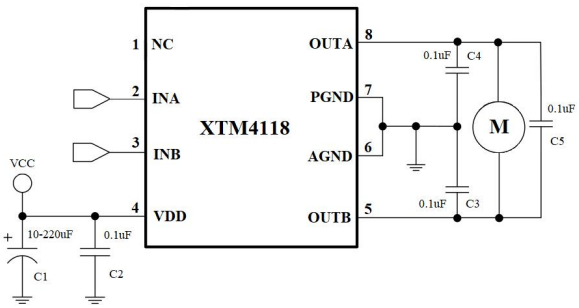

Figure 1. SOP8 application

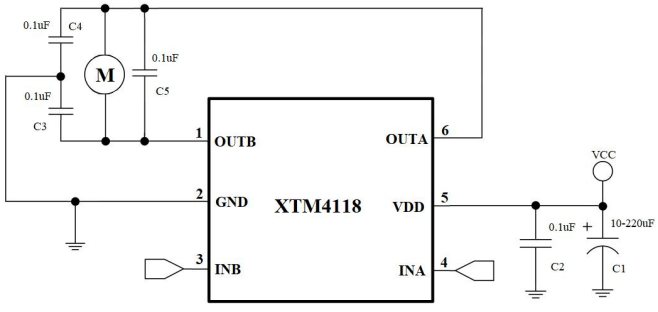

Figure 2. SOT23-6 application

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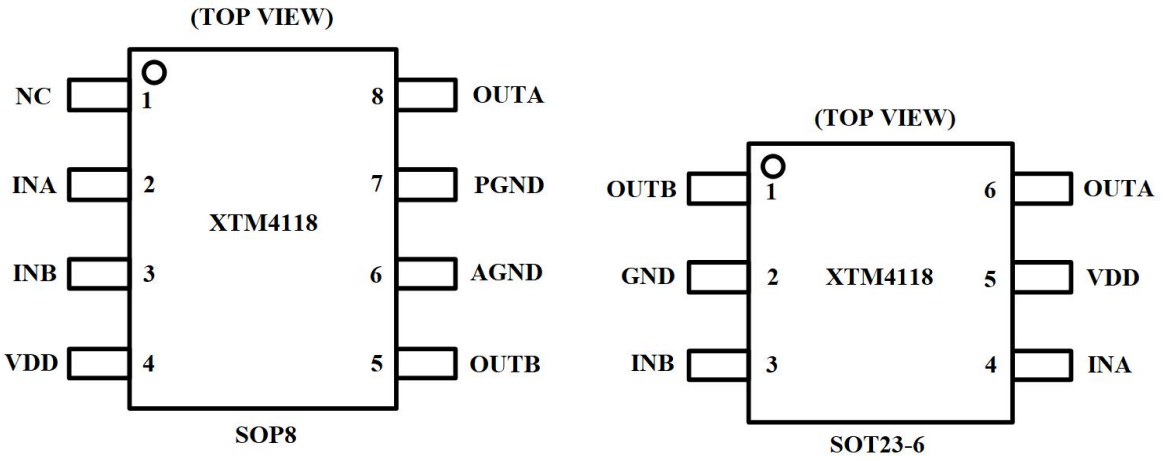
PIN CONFIGURATIONS



SOP8

NO.	NAME	TYPE	DESCRIPTION
1	NC	NC	Floating
2	INA	I	Control Logic Input A
3	INB	I	Control Logic Input B
4	VDD	P	Power Supply
5	OUTB	O	Full-Bridge Output B
6	AGND	G	GND
7	PGND	G	GND
8	OUTA	O	Full-Bridge Output A

SOT23-6

NO.	NAME	TYPE	DESCRIPTION
1	OUTB	O	Full-Bridge Output B
2	GND	G	GND
3	INB	I	Control Logic Input B
4	INA	I	Control Logic Input A
5	VDD	P	Power Supply
6	OUTA	O	Full-Bridge Output A

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PACKAGE/ORDERING INFORMATION

Part Number	Package	Quantity/Reel	Operating Temperature Range
XTM4118AS8CT	SOP8	3000	-40°C~85°C
XTM4118AS3CT	SOT23-6	3000	-40°C~85°C

ABSOLUTE MAXIMUM RATINGS

Parameter		Min	Max	Unit
Power Supply	V_{DD}	-0.3	8.0	V
Output Current (Peak)	I_{PEAK}	0	2.0	A
Input Logic Voltage	$V_{INA/INB}$	-0.3	5.5	V
ESD (HBM)	ESD		4000	V
Operating Temperature	T_{OPR}	-40	85	°C
Storage Temperature	T_{stg}	-65	150	°C
Junction Temperature	T_j		150	°C
Package Thermal Resistance (SOP8)	θ_{JA}		130	°C/W
Package Thermal Resistance (SOT23-6)	θ_{JA}		220	°C/W
Lead Temperature (Soldering 10s)			260	°C

RECOMMENDED OPERATING CONDITIONS （Unless otherwise noted, Ta=25°C）

Parameter		Min	Max	Unit
Power Supply	V_{DD}	2.4	7.2	V
Input Logic Voltage	$V_{INA/INB}$	0	5	V
Output Current (continuously)	I_{OUT}	0	1.2	A

2.4V-7.2V, 1.2A H-Bridge Brushed DC Motor Driver

ELECTRICAL CHARACTERISTICS

Unless otherwise noted, V_{DD}=5V, Ta=25°C

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
POWER SUPPLY						
V_{DD}	Power Supply Voltage		2.4		7.2	V
I_{DDST}	Standby Current	INA=INB=L, no load			1	uA
I_{DD}	Operating Current	INA=INB=H, or INA=H & INB=L, or INA=L & INB=H, no load		80	200	uA
INPUT LOGIC						
V_{INH}	Input High Voltage		2.0			V
V_{INL}	Input Low Voltage				0.6	V
I_{INH}	Input High Current	VDD=5V, VIN=5V		3	20	uA
I_{INL}	Input Low Current	VDD=5V, VIN=0V		0		μA
R_{IN}	Pulldown resistance			1.7		MΩ
H-Bridge FETs						
$R_{ds(on)}$	HS+LS FETs on-resistance (SOP8)	I_{LOAD}=0.5A, HS_PMOS+LS_NMOS		0.59	0.75	Ω
	HS+LS FETs on-resistance (SOT23-6)	I_{LOAD}=0.5A, HS_PMOS+LS_NMOS		0.53	0.7	Ω

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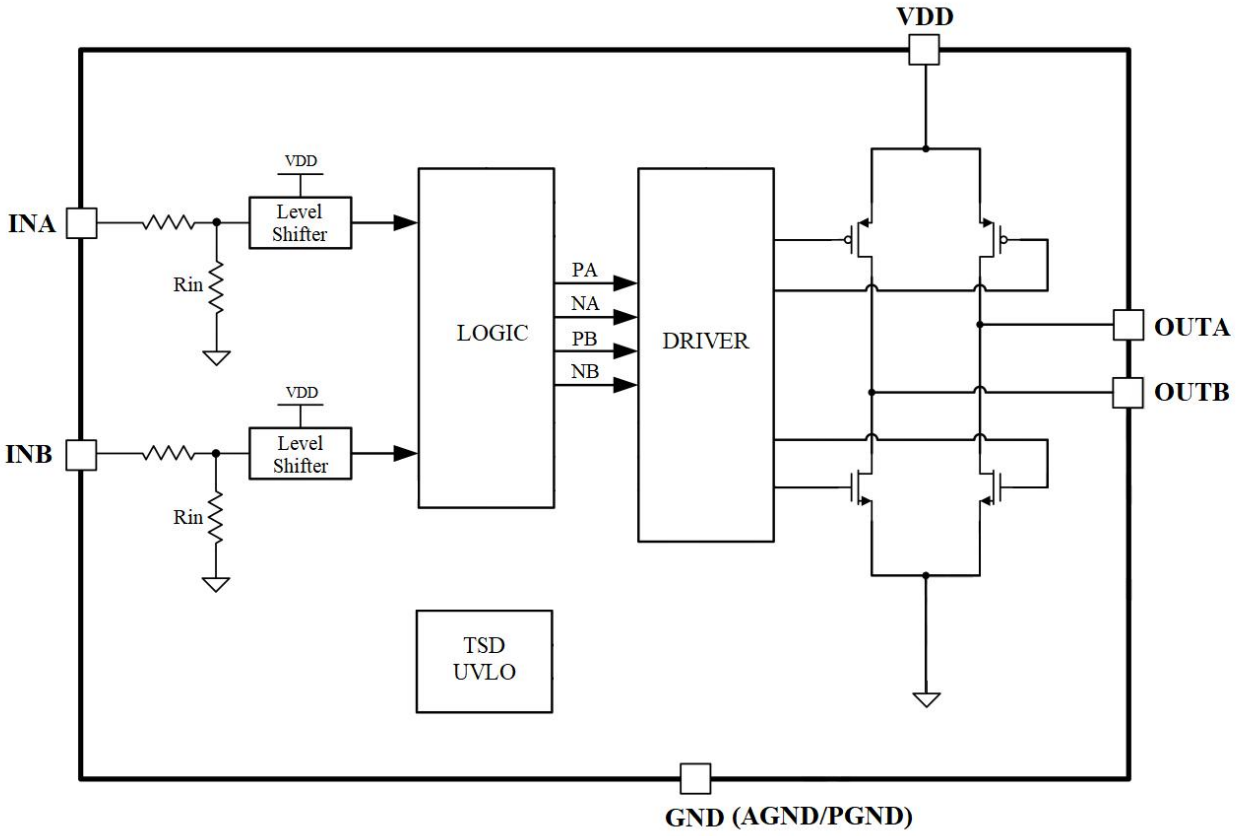
BLOCK DIAGRAM



INPUT/OUTPUT LOGIC

XTM4118 is controlled using a PWM input interface, also called an IN-IN interface. The two on/off inputs control the output mode: forward, reverse, coast, brake.

INA	INB	OUTA	OUTB	Function
L	L	High-Z	High-Z	Coast
H	L	H	L	Forward
L	H	L	H	Reverse
H	H	L	L	Brake

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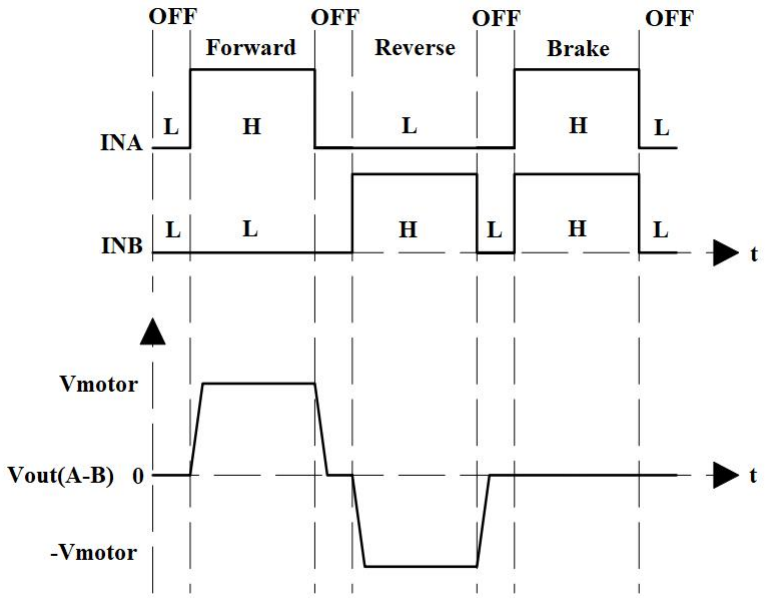
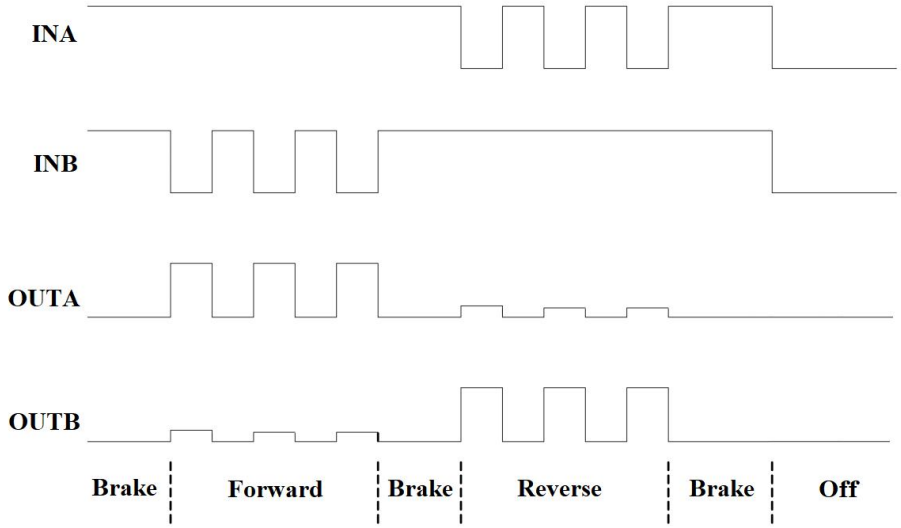
INPUT/OUTPUT FUNTIONAL WAVE



APPLICATION INFORMATION

The recommended PWM is shown in the figure below:



When the input signal INA=H, INB is PWM, or INA is PWM, INB=H, the rotation speed of the motor will be controlled by the PWM signal duty cycle. In this mode, the output of the driver circuit is between the conduction and brake mode, and the energy stored in the motor is rapidly released through the low side NMOS in the brake mode.

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NTOE: Due to the brake state, the motor energy can be released quickly, and the motor speed can be accurately controlled by the duty cycle of the PWM signal. However, it must be noted that if the PWM signal frequency is too low, the motor will not be able to rotate continuously and smoothly due to entering the brake mode. To reduce the motor noise, it is recommended that the PWM signal frequency be greater than 10KHz and less than 50KHz.

APPLICATION CIRCUIT NOTE

1.The operating condition over the absolute parameters of the chip is not allowed

2.Don’t short the two outputs or the power supply and ground. If the peak current is too high, the IC will be burned

3.If the motor exceeds the peak current designed by the IC when locked, the IC will also be damaged

4.The bypass capacitor of VDD should be as close to the VDD pin of the chip as possible

5.The ground wire connecting the motor needs to be isolated in the layout

6.The C1,C3,C4,C5 can be adjusted according to the actual situation

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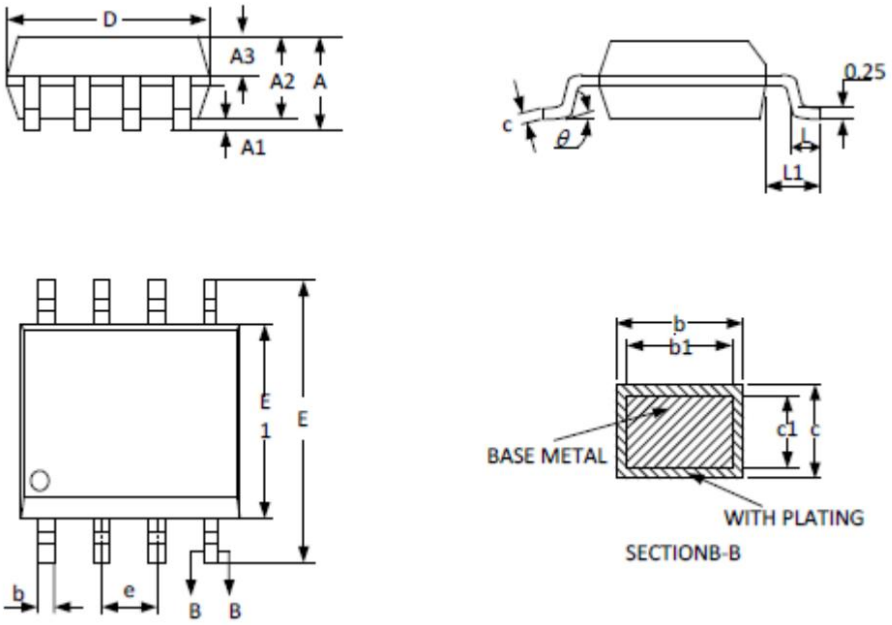
PACKAGE INFORMATION

SOP8



Symbol	Dimensions In Millimeters		
	Min	Nom	Max
A	-	-	1.77
A1	0.08	0.18	0.28
A2	1.20	1.40	1.60
A3	0.55	0.65	0.75
b	0.39	-	0.48
b1	0.38	0.41	0.43
c	0.21	-	0.26
c1	0.19	0.20	0.21
e	1.27BSC		
D	4.70	4.90	5.10
E	5.80	6.00	6.20
E1	3.70	3.90	4.10
L	0.50	0.65	0.80
L1	1.05BSC		
θ	0	-	8°

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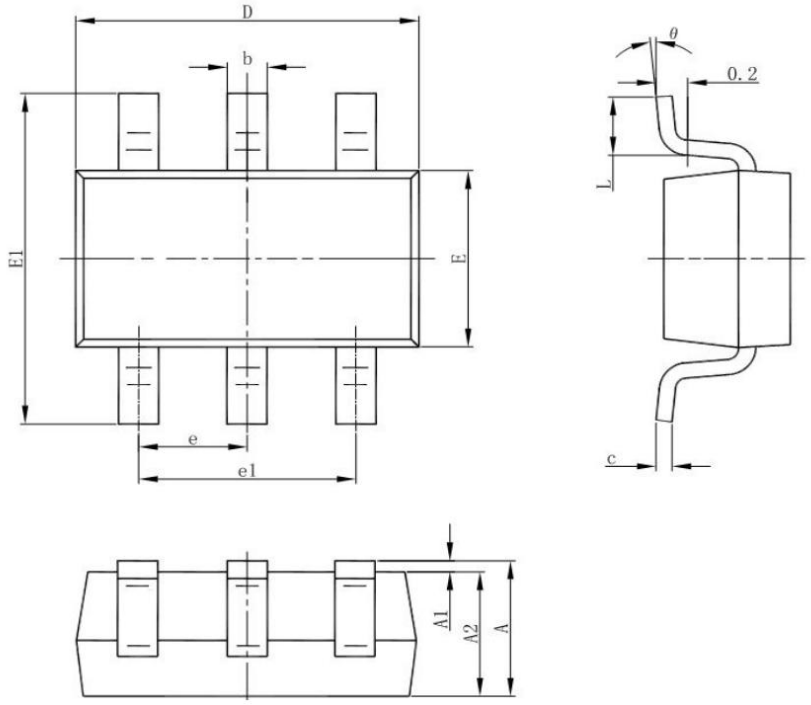
PACKAGE INFORMATION

SOT23-6



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.05	1.25
A1	0.00	0.10
A2	1.05	1.15
b	0.30	0.50
c	0.10	0.20
D	2.82	3.02
E	1.50	1.70
E1	2.65	2.95
e	0.95BSC	
e1	1.80	2.00
L	0.30	0.60
θ	0	8°

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REVISION HISTORY

Number	Date	Description
Rev 0.0	2022/11	XTM4118 datasheet release
Rev 0.1	2023/04	Update SOP8 Quantity