



XTM5847

Dual H-Bridge Motor Driver

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Product Overview

The XTM5847 device is a dual H-bridge motor driver for industrial applications, home appliances, ePOS printers, and other mechatronic applications. This device can be used for driving two DC motors, a bipolar stepper motor, or other loads such as relays. A simple PWM interface allows an easy interface with the controller. The XTM5847 device operates off a single power supply and supports a wide input supply range from 1.65 to 18 V.

The output stage of the driver consists of N-channel power MOSFETs configured as two full H-bridges to drive motor windings or four independent half bridges (in an independent bridge interface). A fixed off time controls the peak current in the bridge which can drive a 1.2A load (2.5A in parallel mode with proper heat sinking, at 25°C T_A).

A low-power sleep mode is provided to achieve a low quiescent current draw by shutting down much of the internal circuitry. Additionally, a torque scalar is provided which dynamically scales the output current through a digital input pin. This feature lets the controller decrease the current required for lower power consumption.

Internal protection functions are provided for undervoltage-lockout, overcurrent protection on each FET, short circuit protection, and overtemperature. Fault conditions are indicated by the nFAULT pin.

Features

- Operating Voltage Range: 1.65V to 18V
- Continuous Current: 1.2A, Peak Current: 2.5A
- R_{DS(ON)} (per bridge): 0.59Ω
- Drives two DC brushed motors or one bipolar stepper motor
- Low-power sleep mode
- Parallel output capability (2.5A total)
- Multiple control interface options
 - 4-Pin interface
 - 2-Pin interface
 - Parallel bridge interface
 - Independent bridge interface
- Integrated UVLO, thermal shutdown, overcurrent, and short-circuit protection
- Package Options: ETSSOP16, QFN16-3×3

Applications

- Cameras
- Printers and office automation equipment
- Toys, robots
- Refrigerator damper and ice maker
- Washers, dryers and dishwashers
- Stage lighting equipment

Typical Applications

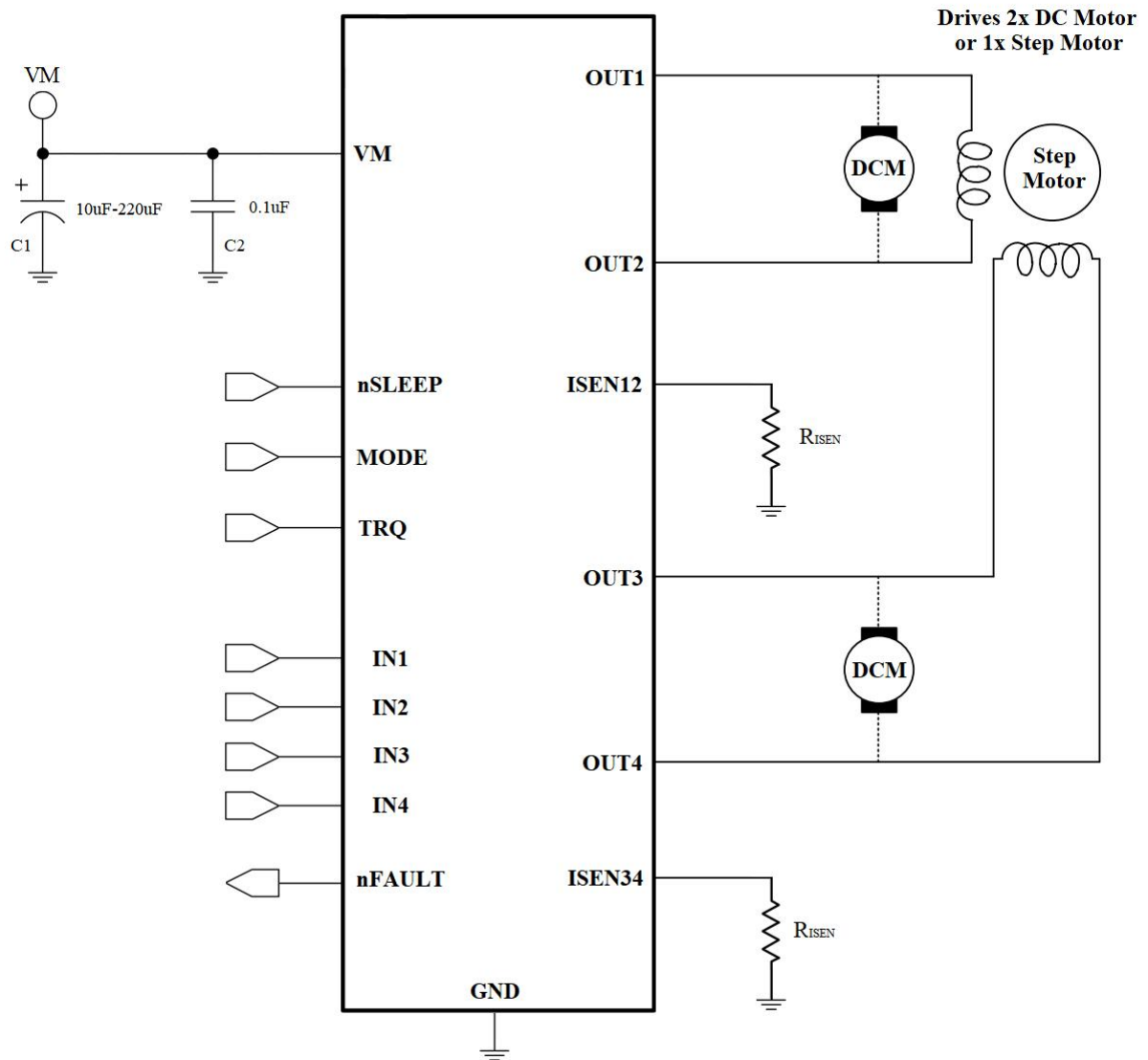
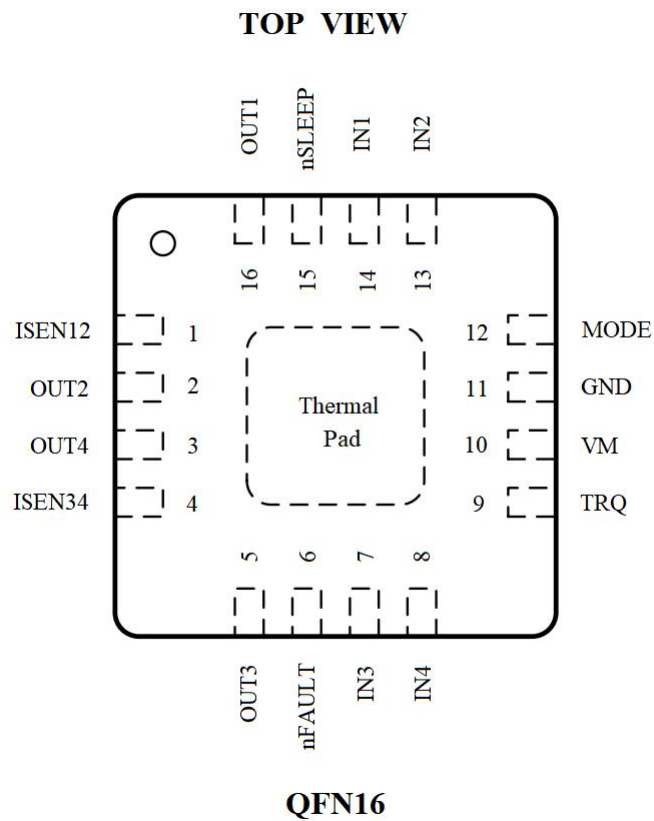
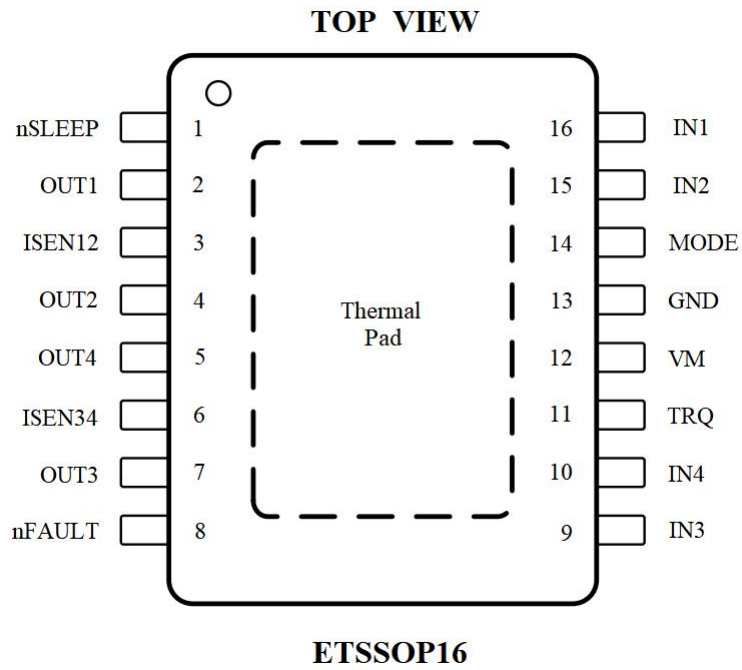


Figure 1. Application Schematic

Pin Definitions



NAME	NO.		TYPE	DESCRIPTION
	ETSSOP16	QFN16		
nSLEEP	1	15	I	Sleep mode logic input
OUT1	2	16	O	Half-bridge output 1
ISEN12	3	1	I/O	Full-bridge 12 current sense resistor
OUT2	4	2	O	Half-bridge output 2
OUT4	5	3	O	Half-bridge output 4
ISEN34	6	4	I/O	Full-bridge 34 current sense resistor
OUT3	7	5	O	Half-bridge output 3
nFAULT	8	6	O	Fault output (open-drain)
IN3	9	7	I	Half-bridge input 3
IN4	10	8	I	Half-bridge input 4
TRQ	11	9	I	Torque current scalar
VM	12	10	Power	Power supply
GND	13	11	GND	Ground
MODE	14	12	I	Tri-state pin for selection of driver operating mode
IN2	15	13	I	Half-bridge input 2
IN1	16	14	I	Half-bridge input 1
Thermal Pad	-	-	GND	Exposed pad (connect to ground)

Ordering Information

Part Number	Package	Quantity	Operating Temperature Range
XTM5847AT2CT	ETSSOP16	3000	-40°C~85°C
XTM5847AQ3CT	QFN16-3*3	3000	-40°C~85°C

Absolute Maximum Ratings

Parameter		Min	Max	Unit
Power Supply	V_M	-0.3	25	V
Peak Output Current	I_{PEAK}	0	2.5	A
Logic Input Voltage	V_{INx}	-0.3	5.5	V
ESD Protection (HBM)	ESD	2000	-	V
Operating Temperature	T_{OPR}	-40	85	°C
Storage Temperature	T_{stg}	-65	150	°C
Junction Temperature	T_j	-	150	°C
Soldering Temperature (10s)		-	260	°C

Recommended Operating Conditions (Unless otherwise noted, $T_A=25^{\circ}\text{C}$)

Parameter		Min	Max	Unit
Power Supply	V_M	1.65	18	V
Input Logic Voltage	V_{INx}	0	5	V
Output Current (continuously)	I_{OUT}	0	1.2	A

Electrical Characteristics (Unless otherwise noted, $V_M=12V$, $T_A=25^{\circ}C$)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
POWER SUPPLY (VM)						
V_M	Operating Supply Voltage		1.65	-	18	V
I_{VM}	Operating Supply Current	nSLEEP = 1; $I_{NX} = 0$	-	1	3	mA
I_{VMQ}	Sleep Mode Supply Current	nSLEEP = 0	-	-	1	uA
t_{SLEEP}	Sleep time	nSLEEP = 0 to sleep mode	-	5	-	us
t_{WAKE}	Wake-up Time	nSLEEP = 1 to output transition	-	0.8	1.5	ms
LOGIC-LEVEL INPUTS (IN1、IN2、IN3、IN4、nSLEEP、TRQ)						
V_{IL}	Input logic low voltage		-	-	0.6	V
V_{IH}	Input logic high voltage		1.5	-	5.5	V
V_{HYS}	Input logic hysteresis		-	50	-	mV
I_{IL}	Input logic low current	$V_{INx} = 0V$	-1	-	1	uA
I_{IH}	Input logic high current	$V_{INx} = 5V$	-	-	25	uA
R_{PD}	Input pulldown resistance		-	100	-	K Ω
$t_{DEGLITCH}$	Input deglitch time		-	50	-	ns
OPEN-DRAIN OUTPUTS (nFAULT)						
V_{OL}	Output logic low voltage	$I_{OD} = 5mA$	-	-	0.5	V
I_{OH}	Output logic high current	$V_{OD} = 3.3V$	-1	-	1	uA
TRI-LEVEL INPUTS (MODE)						
V_{IL}	Tri-level input logic low voltage		0	-	0.6	V
V_{IZ}	Tri-level input hi-Z voltage		-	1.2	-	V
V_{IH}	Tri-level input logic high voltage		1.6	-	5.5	V
I_{IL}	Tri-level input logic low current	$V_{IN} = 0V$	-	0	-	uA
I_{IH}	Tri-level input logic high current	$V_{IN} = 5V$	8	-	25	uA

Electrical Characteristics (Unless otherwise noted, $V_M=12V$, $T_A=25^{\circ}C$)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
DRIVER OUTPUTS (OUT1、OUT2、OUT3、OUT4)						
$R_{HS_DS(ON)}$	High-side MOSFET on resistance	$I_{OUTx} = 0.2A$	-	310	-	mΩ
$R_{LS_DS(ON)}$	Low-side MOSFET on resistance	$I_{OUTx} = 0.2A$	-	280	-	mΩ
V_{SD}	Body diode forward voltage	$I_{OUTx} = 0.5A$	-	1.1	-	V
t_{RISE}	Output rise time	$V_M = 12 V$, $I_{OUT} = 0.5 A$	-	150	-	ns
t_{FALL}	Output fall time	$V_M = 12 V$, $I_{OUT} = 0.5 A$	-	150	-	ns
t_{PD}	Propagation Delay INx to OUTx		-	400	-	ns
t_{DEAD}	Output dead time	Internal dead time	-	300	-	ns
PWM CURRENT CONTROL (ISEN12、ISEN34)						
V_{TRIP}	ISENx trip voltage	Torque at 100% ($TRQ = 0$)	193	200	205	mV
		Torque at 50% ($TRQ = 1$)	96	100	103	mV
t_{BLANK}	Current sense blanking time		-	3	-	us
t_{OFF}	Current control constant off time		-	20	-	us
PROTECTION CIRCUITS						
V_{UVLO}	Supply undervoltage lockout	Supply rising	-	-	1.5	V
		Supply falling	1.4	-	-	V
V_{UVLO_HYS}	Supply undervoltage hysteresis	Rising to falling threshold	-	100	-	mV
I_{OCP}	Overcurrent protection trip point		2.5	-	-	A
t_{OCP}	Overcurrent protection deglitch time		-	2	-	us
t_{RETRY}	Overcurrent protection retry time		-	1.4	-	ms
T_{TSD}	Thermal shutdown temperature		-	165	-	°C
T_{HYS}	Thermal shutdown hysteresis		-	40	-	°C

Timing Diagram

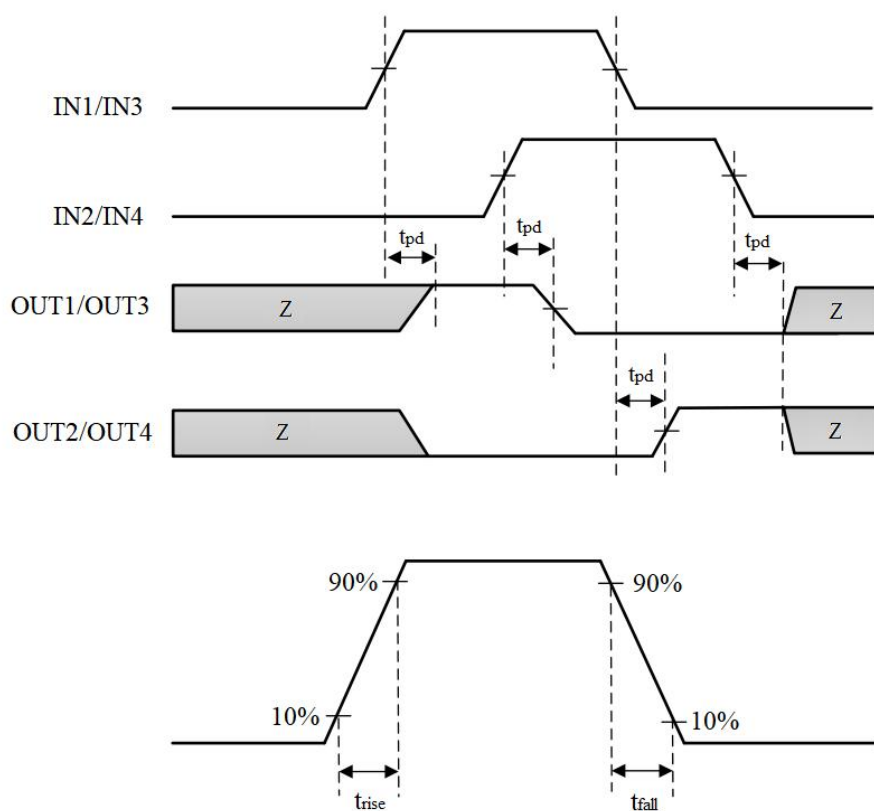


Figure 2. Timing Diagram

Functional Block Diagram

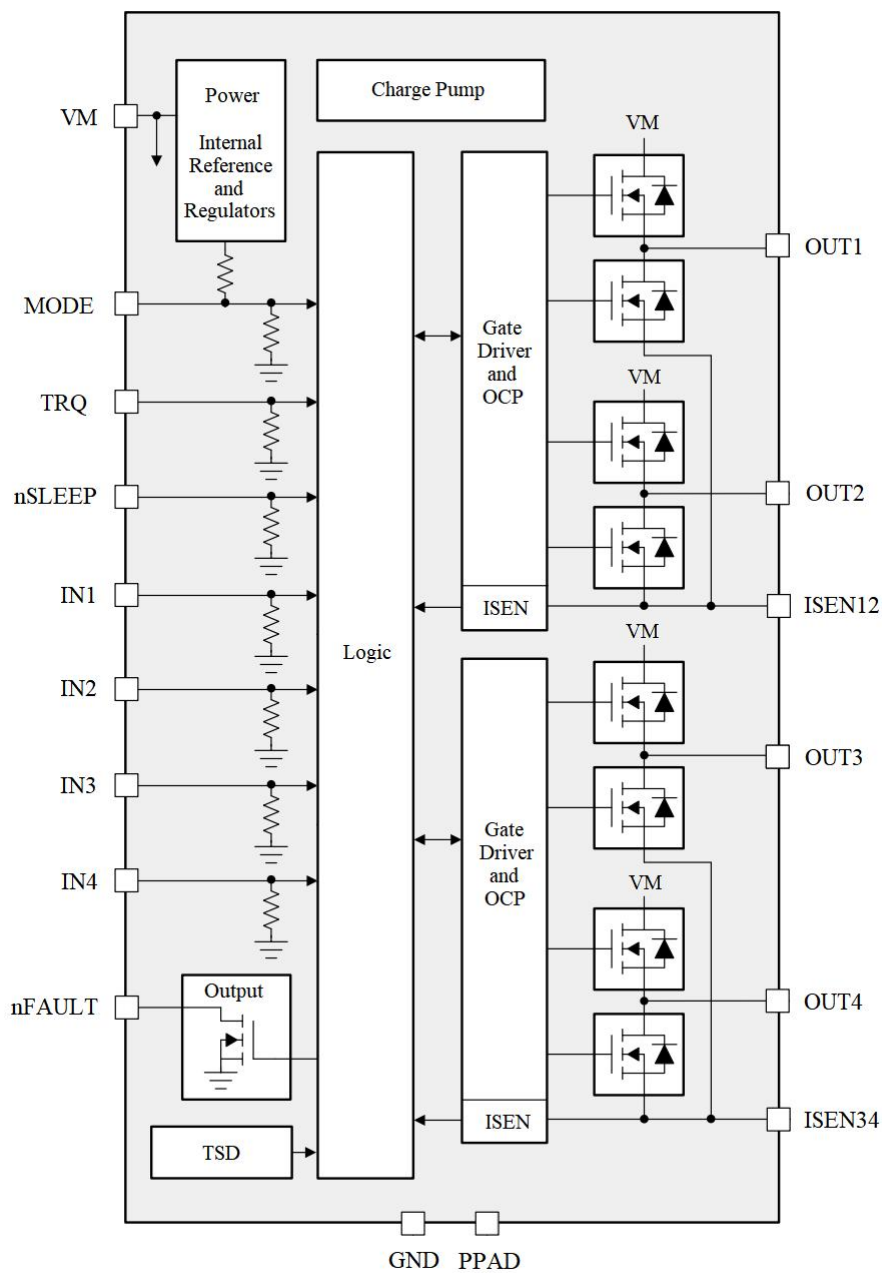


Figure 3. Block Diagram

Detailed Description

Overview

The XTM5847 device is an integrated 1.65V to 18V dual motor driver for industrial brushed and stepper motor applications. This driver can drive two DC motors, a bipolar stepper motor, or the solenoid loads. The device integrates two H-bridges that use NMOS low-side and high-side drivers and current-sense regulation circuitry. The XTM5847 device supports a high output current of 1.2A RMS per H-bridge using low- $R_{DS(ON)}$ integrated MOSFETs. A simple PWM interface option allows easy interfacing with the H-bridge outputs. The interface options can be configured using the MODE and IN3 pins in the XTM5847 device.

The current regulation uses a fixed off-time (t_{OFF}) PWM scheme. The trip point for current regulation is controlled by the value of the sense resistor and fixed internal V_{TRIP} value.

A low-power sleep mode is included which lets the system save power when not driving the motor.

The XTM5847 device has a broad range of integrated protection features. These features include power supply undervoltage lockout, overcurrent faults, and thermal shutdown.

PWM Current Control

The XTM5847 device has two identical H-bridge motor drivers with current-control PWM circuitry. Figure 4 shows a block diagram of the circuitry.

The two H-bridges can also be used as four independent half-bridges depending upon the interface option. The ISENx pin can be only used together with two half-bridges.

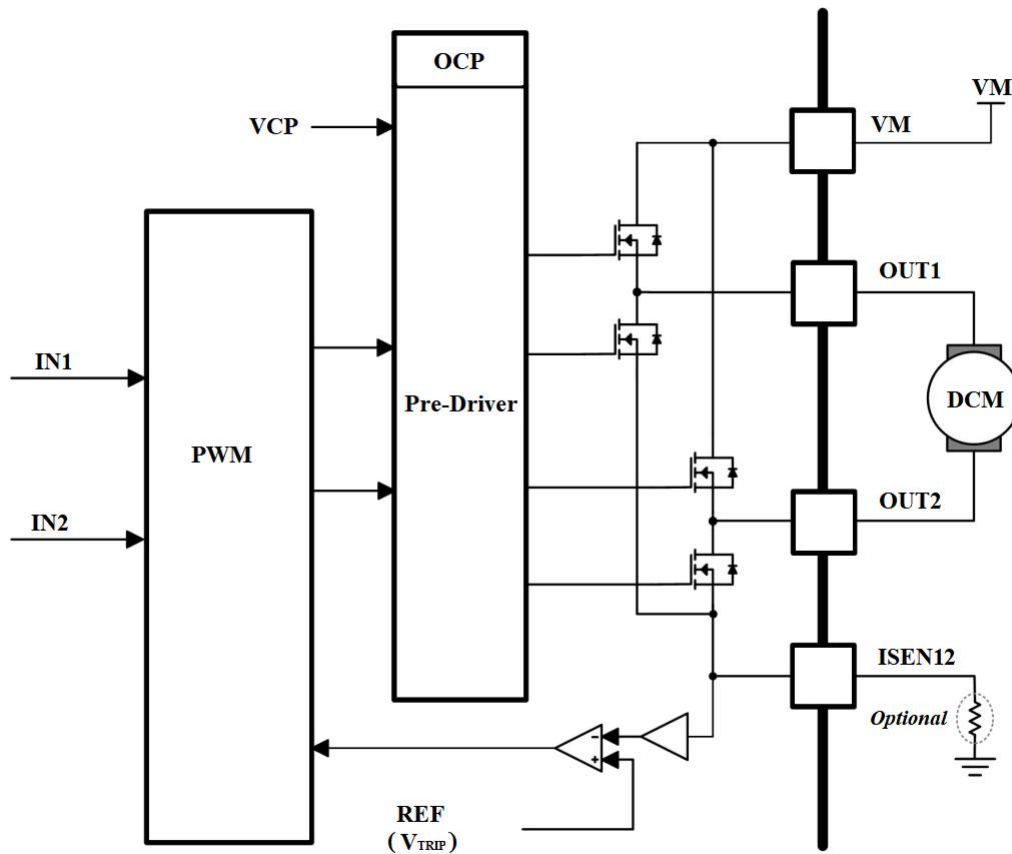


Figure 4. PWM Motor Driver Circuitry

Bridge Operation

The full-bridge can operate in four different operating modes: forward, reverse, coast (fast decay), and brake (slow decay) operation.

Forward Operation

This operating mode refers to the forward rotation of the motor such that the current flows from terminal A (OUT1 or OUT3) to terminal B (OUT2 or OUT4) as shown in Figure 5. In this mode, terminal A is connected to VM, and terminal B is connected to ground.

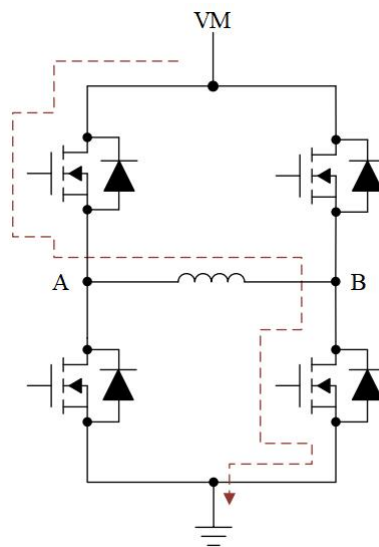


Figure 5. Forward Operation

Reverse Operation

This operating mode refers to the reverse rotation of the motor such that the current flows from terminal B (OUT2 or OUT4) to terminal A (OUT1 or OUT3) as shown in Figure 6. In this mode, terminal A is connected to ground, and terminal B is connected to VM.

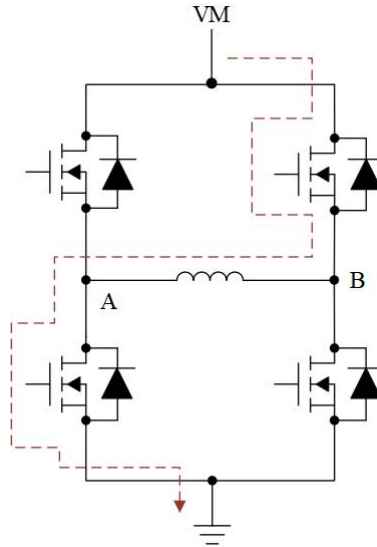


Figure 6. Reverse Operation

Coast Operation (Fast Decay)

In this operating mode, all the FETs of the full-bridges are in the high impedance (Hi-Z) state. The motor also goes to the Hi-Z state, and the motor starts coasting. This operating mode also helps to decay the motor current faster and is therefore also referred to as a fast decay mode. If the motor was initially connected in forward operation (current flows from terminal A to terminal B) and if the coast operation is applied, then, because of the inductive nature of the motor load, the current continues to flow in the same direction (A to B), and the anti-parallel diodes of the alternate FETs start conducting as shown in Figure 7. This flow of current through anti-parallel diodes lets the current decrease rapidly because of the higher negative potential created by the supply voltage, VM.

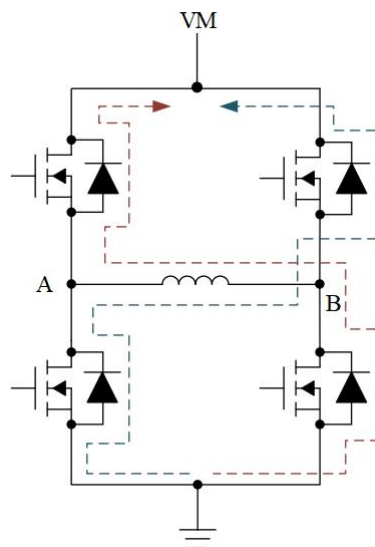


Figure 7. Coast Operation (Fast Decay)

Brake Operation (Slow Decay)

This operating mode is realized by switching on both of the low-side FETs of the full-bridge as shown in Figure 8. A current circulation path is provided when both low-side FETs are turned on. Due to this circulation path, the current decays to the ground using the resistance of the motor and of the low-side FET. Because this current decay is less when compared to the coast operation because of the low potential difference, this mode is also referred to as the slow decay mode.

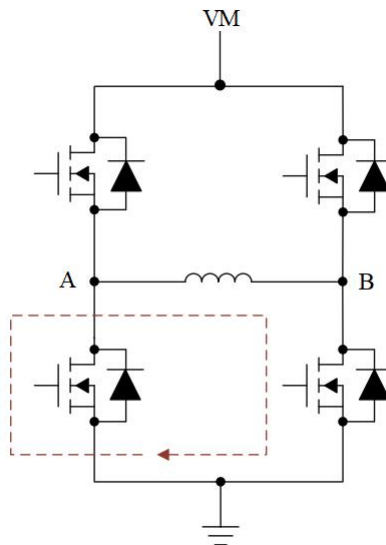


Figure 8. Brake Operation (Slow Decay)

Bridge Control

The XTM5847 device can be configured in four different operating modes depending on user requirements. The MODE and IN3 pins are used to configure the XTM5847 in one of the four different interfaces: a 4-pin interface, a 2-pin interface, a parallel bridge interface, and the independent bridge interface.

nSLEEP	MODE	IN3	INTERFACE
0	X	X	Sleep mode
1	0	X	4-pin interface
1	1	0	2-pin interface
1	1	1	Parallel bridge interface
1	Z	X	Independent bridge interface

4-Pin Interface

In the 4-pin interface, the XTM5847 device is configured to drive a stepper motor or two BDC motors with fully functional modes. To configure 4-pin interface operation, connect the MODE pin to ground and use the IN1, IN2, IN3, and IN4 pins to control the drivers. In this mode, the stepper or brushed DC motor can operate with all four modes (forward, reverse, coast, and brake mode) and the stepper motor can operate in either full-stepping mode or the non-circulating half-stepping mode. Sense resistors can be connected to the ISEN12 and ISEN34 pins for independent current regulation in bridge-12 and bridge-34 respectively.

Use this interface option for the following loads:

- Stepper motor in full-stepping mode (with or without current regulation)
- Stepper motor in half-stepping mode (with or without current regulation)
- Single or dual BDC motor (with or without current regulation) with full functional BDC modes (forward, reverse, brake, and coast mode)

nSLEEP	IN1	IN2	IN3	IN4	OUT1	OUT2	OUT3	OUT4	FUNCTION (DC MOTOR)
0	X	X	X	X	Z	Z	Z	Z	Sleep mode
1	0	0			Z	Z			Motor coast (fast decay)
1	0	1			L	H			Reverse direction
1	1	0			H	L			Forward direction
1	1	1			L	L			Motor brake (slow decay)
1			0	0			Z	Z	Motor coast (fast decay)
1			0	1			L	H	Reverse direction
1			1	0			H	L	Forward direction
1			1	1			L	L	Motor brake (slow decay)

2-Pin Interface

In the 2-pin interface, the XTM5847 device is configured to drive a stepper motor or two BDC motors with a lower number of control inputs from the microcontroller. To configure the 2-pin interface operation, connect the MODE pin to the external supply (3.3 V or 5 V), connect the IN3 pin to the ground, and use the IN1 and IN2 pins to control the driver. In this mode, the stepper or brushed DC motor operates in only two modes (forward mode and reverse mode) i.e. only full-step operation is supported for the stepper motor. This 2-pin interface is very useful for low GPIO applications such as refrigerator dampers. Sense resistors can be connected to the ISEN12 and ISEN34 pins for current regulation.

Use this interface option for the following loads:

- Stepper motor in full stepping mode (with or without current regulation)
- Single or dual BDC motor (with or without current regulation) with reduced functional BDC modes (forward and reverse mode only)

nSLEEP	IN1	IN2	IN3	IN4	OUT1	OUT2	OUT3	OUT4	FUNCTION (DC MOTOR)
0	X	X	X	X	Z	Z	Z	Z	Sleep mode
1	0		0	X	L	H			Reverse direction
1	1		0	X	H	L			Forward direction
1		0	0	X			L	H	Reverse direction
1		1	0	X			H	L	Forward direction

Parallel Bridge Interface

In the parallel bridge interface, the XTM5847 device is configured to drive a higher current BDC motor by using the driver in parallel to deliver twice the motor current. To go to parallel bridge interface operation, connect the MODE and IN3 pins to the external supply (3.3 V or 5 V) and use the IN1 and IN2 pins to control the driver. This mode can deliver the full functionality of the BDC motor control with all four modes (forward, reverse, coast, and brake mode).

Use this interface option for the following loads:

- One high current BDC motor (without current regulation) with full functional BDC modes (forward, reverse, brake, and coast mode)
- Two independent BDC motors operating together (with or without current regulation) with full functional BDC modes (forward, reverse, brake, and coast mode)

nSLEEP	IN1	IN2	IN3	IN4	OUT1	OUT2	OUT3	OUT4	FUNCTION (DC MOTOR)
0	X	X	X	X	Z	Z	Z	Z	Sleep mode
1	0	0	1	X	Z	Z	Z	Z	Motor coast (fast decay)
1	0	1	1	X	L	H	L	H	Reverse direction
1	1	0	1	X	H	L	H	L	Forward direction
1	1	1	1	X	L	L	L	L	Motor brake (slow decay)

Independent Bridge Interface

In the independent bridge interface, the XTM5847 device is configured for independent half-bridge operation. To configure independent bridge interface operation, leave the MODE pin unconnected (Hi-Z state) and use the IN1, IN2, IN3, and IN4 pins to independently control the OUT1, OUT2, OUT3, and OUT4 pins respectively. Only two output states of the OUTx pin can be controlled (either connected to VM or connected to GND). This mode is used to drive independent loads such as relays and solenoids.

Use this interface option for the following loads:

- Relay or solenoid coils connected between OUTx and VM/ground pin without current regulation
- Single BDC motor (with or without current regulation) with three functional BDC modes (forward, reverse, and braking mode only)
- dual BDC motor (without current regulation) with three functional BDC modes (forward, reverse, and braking mode only)
- Stepper motor in full-stepping mode (with or without current regulation)
- Stepper motor in half-stepping mode (with or without current regulation) using brake mode

nSLEEP	IN1	IN2	IN3	IN4	OUT1	OUT2	OUT3	OUT4	FUNCTION (DC MOTOR)
0	X	X	X	X	Z	Z	Z	Z	Sleep mode
1	0				L				OUT1 connected to GND
1	1				H				OUT1 connected to VM
1		0				L			OUT2 connected to GND
1		1				H			OUT2 connected to VM
1			0				L		OUT3 connected to GND
1			1				H		OUT3 connected to VM
1				0				L	OUT4 connected to GND
1				1				H	OUT4 connected to VM

Current Control

The current through the motor windings is regulated by a fixed off-time PWM current regulation circuit. With brushed DC motors, current regulation can be used to limit the stall current (which is also the start-up current) of the motor. Current regulation works as follows: When an H-bridge is enabled, current rises through the winding at a rate dependent on the supply voltage and inductance of the winding. If the current reaches the current trip threshold, the bridge disables the current for a time t_{OFF} before starting the next PWM cycle.

Immediately after the current is enabled, the voltage on the ISENx pin is ignored for a while (t_{BLANK}) before enabling the current sense circuitry. This blanking time also sets the minimum on-time of the PWM cycle.

The PWM trip current is set by a comparator which compares the voltage across a current sense resistor connected to the ISENx pin with a reference voltage. This reference voltage (V_{TRIP}) is generated on-chip and decides the current trip level.

The full-scale trip current in a winding is calculated as shown:

$$I_{\text{TRIP}} = \text{Torque} * V_{\text{TRIP}} / R_{\text{ISENx}}$$

where

- I_{TRIP} is the regulated current.
- V_{TRIP} is the internally generated trip voltage.
- R_{ISENx} is the resistance of the sense resistor.
- Torque is the torque scalar, the value of which depends on the input on the TRQ pin. $\text{TRQ} = 100\%$ for TRQ pin connected to GND and $\text{TRQ} = 50\%$ connected to 5V.

For example, if the V_{TRIP} voltage is 150 mV and the value of the sense resistor is 150 mΩ, the full-scale trip current is $1 \text{ A} * (150 \text{ mV} / 150 \text{ m}\Omega) = 1 \text{ A}$.

If the current control is not needed, connect the ISENx pins directly to the ground.

Current Re-circulation and Decay Modes

During PWM current trip operation, the H-bridge is enabled to drive current through the motor winding until the trip threshold of the current regulation is reached. After the trip current threshold is reached, the drive current is interrupted, but, because of the inductive nature of the motor, the current must continue to flow for some time. This continuous flow of current is called re-circulation current. A mixed decay allows better current regulation by optimizing the current ripple by using fast and slow decay.

Mixed decay is a combination of fast and slow decay modes. In fast decay mode, the anti-parallel diodes of the opposite FETs are conducting on to let the current decay faster as shown in Figure 9 (see case 2). In slow decay mode, the winding current is recirculated by enabling both low-side FETs in the bridge (see case 3 in Figure 9). Mixed decay starts with fast decay, and then goes to slow decay. In the XTM5847 device, the mixed decay ratio is 25% fast decay and 75% slow decay as shown in Figure 10.

The current regulation scheme uses a single sense resistor and hence always works for two-half bridges even when used in an "Independent Bridge Interface". It is recommended that current regulations not be used for loads using independent half bridges.

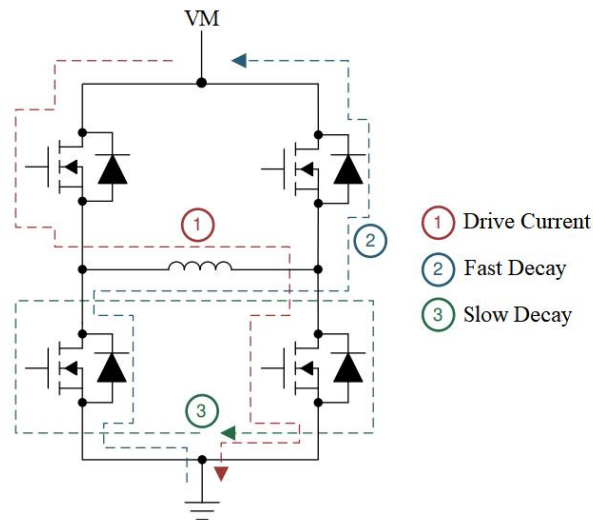


Figure 9. Decay Modes

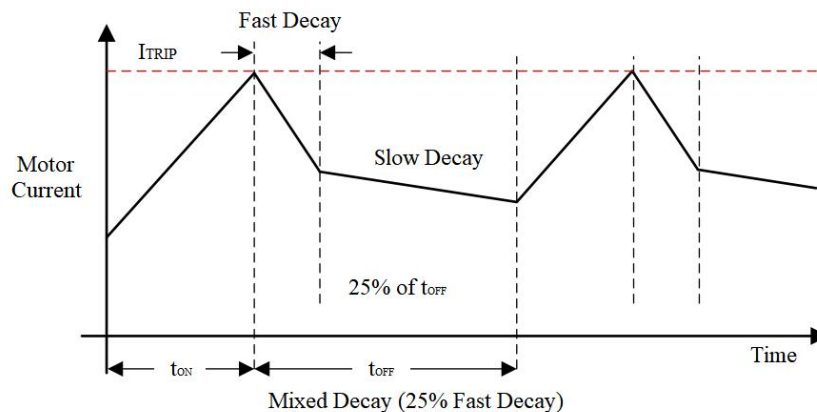


Figure 10. Mixed Decay

Torque Scalar

The torque scalar is used to dynamically adjust the output current through a digital input pin, TRQ. This torque scalar decreases the trip reference value of the output current to 50% (whenever the TRQ pin is pulled-high). A torque scalar can be used to scale the holding torque of the stepper motor.

When the TRQ pin is pulled-low, the trip current is calculated using Equation: $I_{TRIP} = \text{Torque} * V_{TRIP} / R_{ISEN_x}$

When the TRQ pin is pulled-high, the trip current is calculated using Equation: $I_{TRIP} = 0.5 * V_{TRIP} / R_{ISEN_x}$

Stepping Modes

The XTM5847 device is used to drive a stepper motor in full-stepping mode or non-circulating half-stepping mode using the following bridge configurations:

- Full-stepping mode (with or without current regulation)
 - Using 4-pin interface configuration
 - Using 2-pin interface configuration
- Half-stepping mode (with or without current regulation)
 - Using 4-pin interface configuration

Full-Stepping Mode (4-Pin Interface)

In full-stepping mode, the full-bridge operates in either of two modes (forward or reverse mode) with a phase shift of 90° between the two windings.

In 4-pin interface, the PWM input is applied to the IN1, IN2, IN3, and IN4 pins as shown in Figure 11 and the driver operates only in forward (FRW) and reverse (REV) mode.

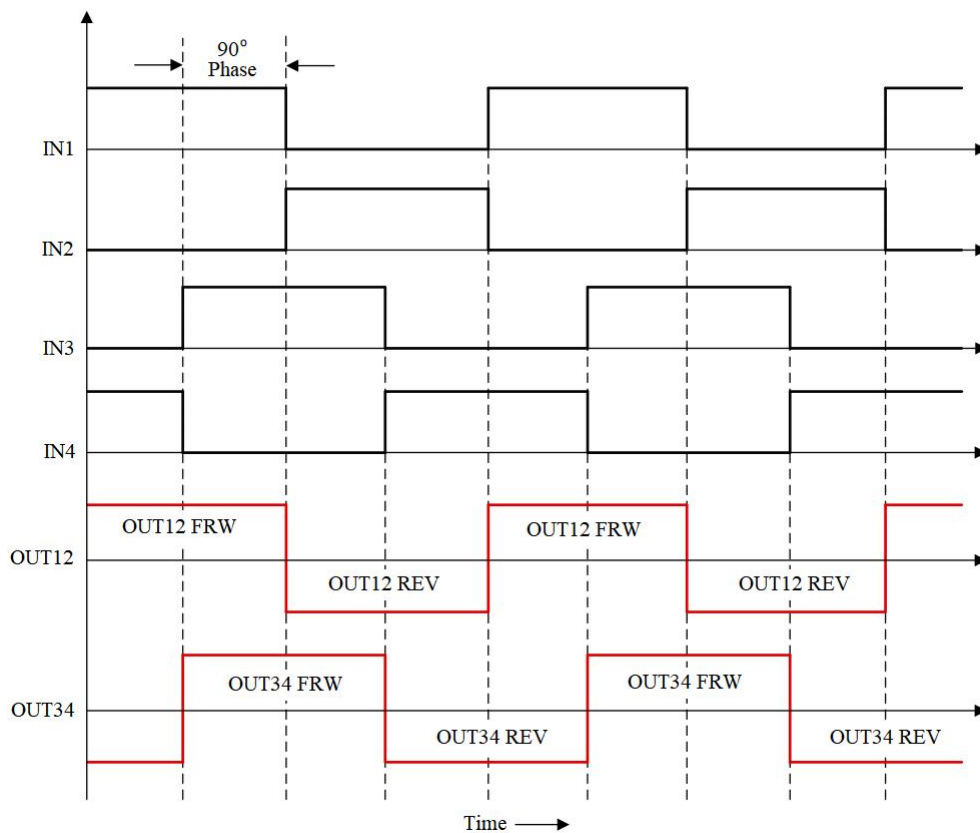


Figure 11. Full-Stepping Mode Using 4-Pin Interface

Full-Stepping Mode (2-Pin Interface)

In full-stepping using the 2-pin interface, the PWM input is only applied to the IN1 and IN2 pins, and the IN3 is connected to ground. Figure 12 shows the full-stepping mode of stepper motor using the 2-pin interface.

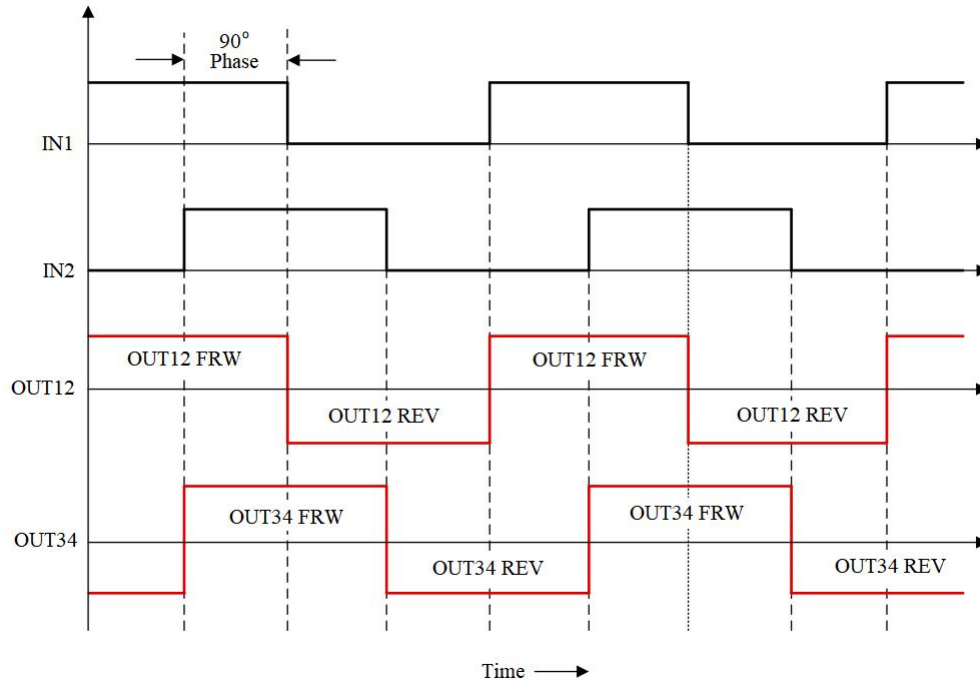


Figure 12. Full-Stepping Mode Using 2-Pin Interface

Half-Stepping Mode (With Non-Driving Fast Decay)

In half-stepping mode, the full-bridge operates in one of the three modes (forward, reverse, or coast mode) with a phase shift of 45° between the two windings.

In 4-pin interface, the PWM input is connected to the IN1, IN2, IN3, and IN4 pins as shown in Figure 13, and the driver operates in forward, reverse, and coast mode.

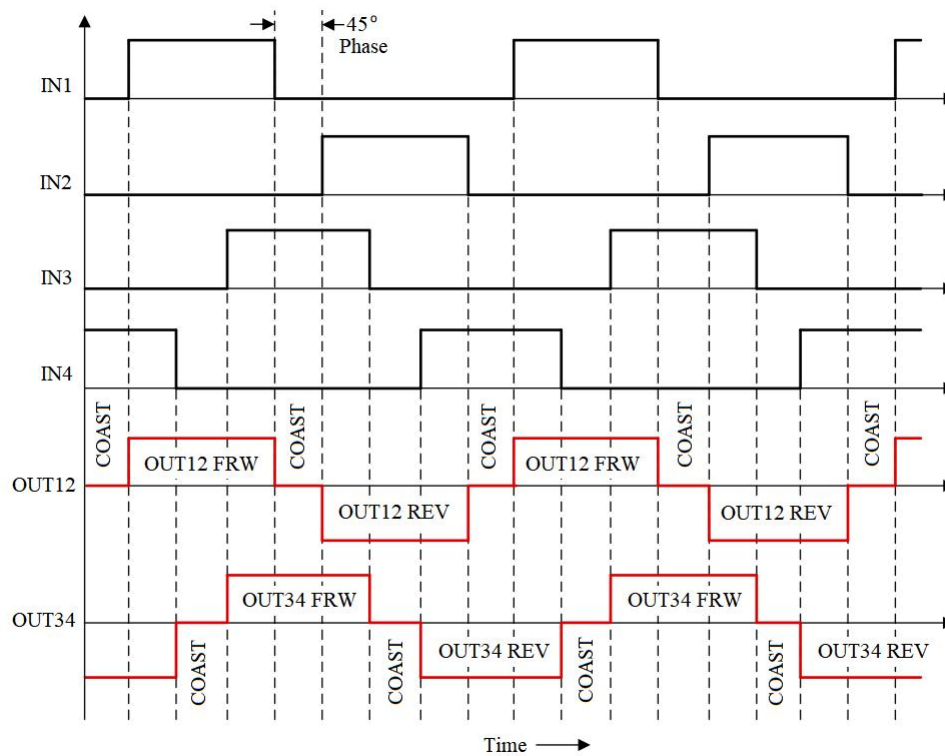


Figure 13. Half-Stepping Mode Using 4-Pin Interface (With Non-Driving Fast Decay)

Half-Stepping Mode (With Non-Driving Slow Decay)

In this half-stepping mode, the non-driving state is slow decay (braking mode). Therefore, the full-bridge operates in one of the three modes (forward, reverse, or brake mode) with a phase shift of 45° between the two windings.

In 4-pin interface, the PWM input is connected to the IN1, IN2, IN3, and IN4 pins as shown in Figure 14, and the driver operates in forward, reverse, and brake mode.

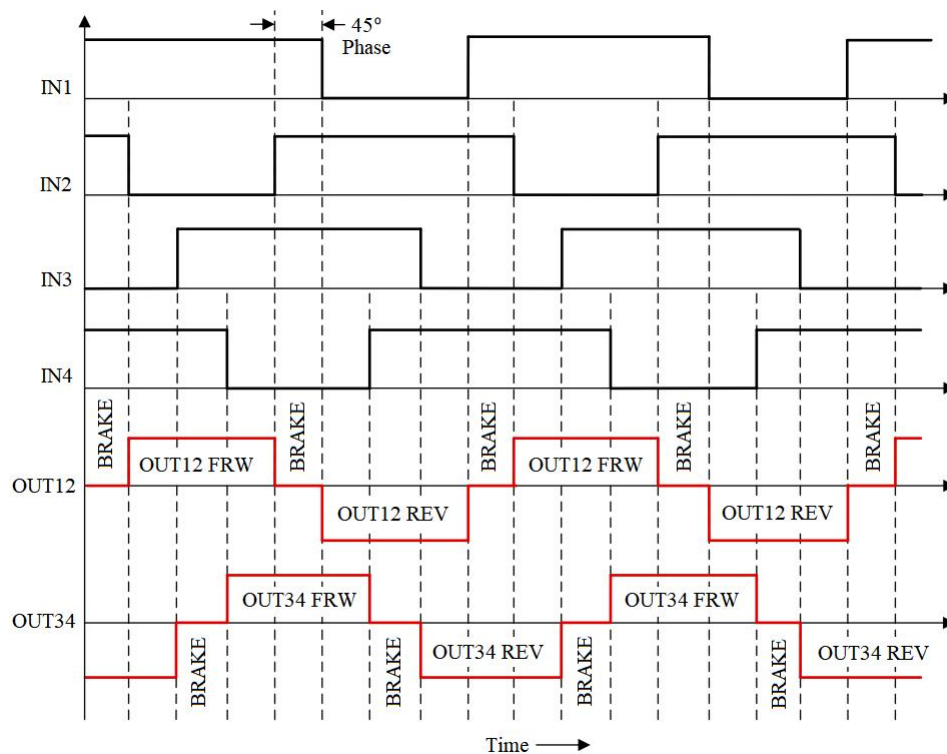


Figure 14. Half-Stepping Mode Using 4-Pin Interface (With Non-Driving Slow Decay)

nSLEEP Operation

Driving nSLEEP low will put the device into a low power sleep state. In this state, the H-bridges are disabled, the gate drive charge pump is stopped, all internal logic is reset, and all internal clocks are stopped. All inputs are ignored until nSLEEP returns inactive high. When returning from sleep mode, some time (up to 0.8ms) needs to pass before the motor driver becomes fully operational.

Blanking Time

There is usually a current spike during the switching transition due to the body diode's reverse-recovery current or the distributed inductance or capacitance. This current spike requires filtering to prevent it from erroneously shutting down the high-side MOSFET. An internal blanking time T_{BLANK} blanks the output of the current sense comparator when the outputs are switched, which is also the minimum on time for high-side MOSFET.

Overcurrent Protection (OCP)

The over-current protection circuit limits the current through the FET by disabling the gate driver. If the over-current limit threshold is reached and lasts for longer than the overcurrent deglitch time, all MOSFETs in the H-bridge will be disabled and the nFAULT pin will be driven low. The driver will remain disabled and is reset to enable state after 1.4ms(typ). Please note that only the H-bridge in which the OCP is detected will be disabled while the other bridge will operate normally.

Over-current conditions on both high and low side devices; i.e., a short to ground, supply, or across the motor winding will all result in an over current shutdown. Note that over-current protection does not use the current sense circuitry used for PWM current control, and is independent of the sense resistor value.

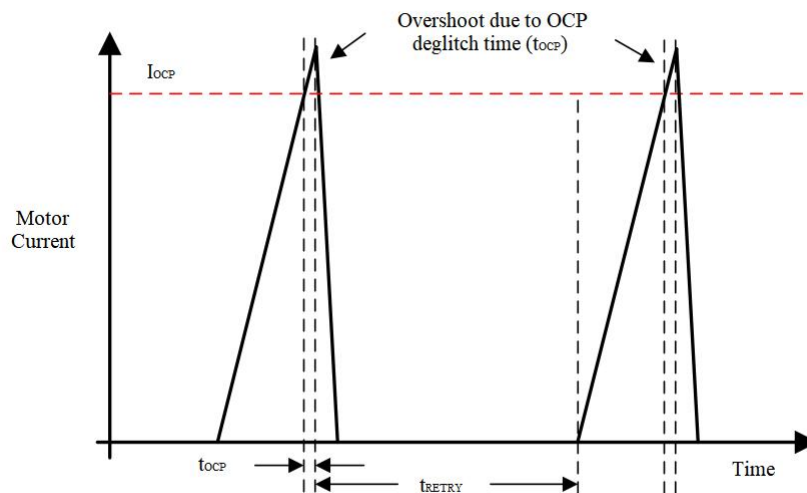


Figure 15. OCP Operation

Thermal Shutdown (TSD)

If the die temperature exceeds safe limits, all FETs in the H-bridge will be disabled and the nFAULT pin will be driven low. Once the die temperature has fallen to a safe level, operation will automatically resume.

Under-Voltage Lockout (UVLO)

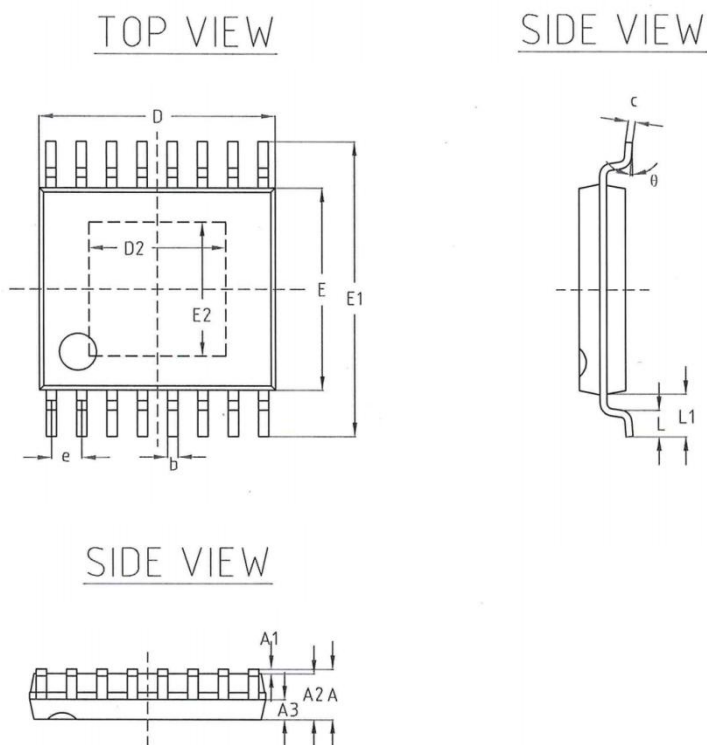
If at any time the voltage on the VM pin falls below the under-voltage lockout threshold voltage, all circuitry in the device will be disabled, and all internal logic will be reset. Operation will resume when VM rises above the UVLO threshold. nFAULT is driven low in the event of an under-voltage condition.

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 VM should be as close to the VM pin of the chip as possible
5. The ground wire connecting the motor needs to be isolated in the layout

Package Information

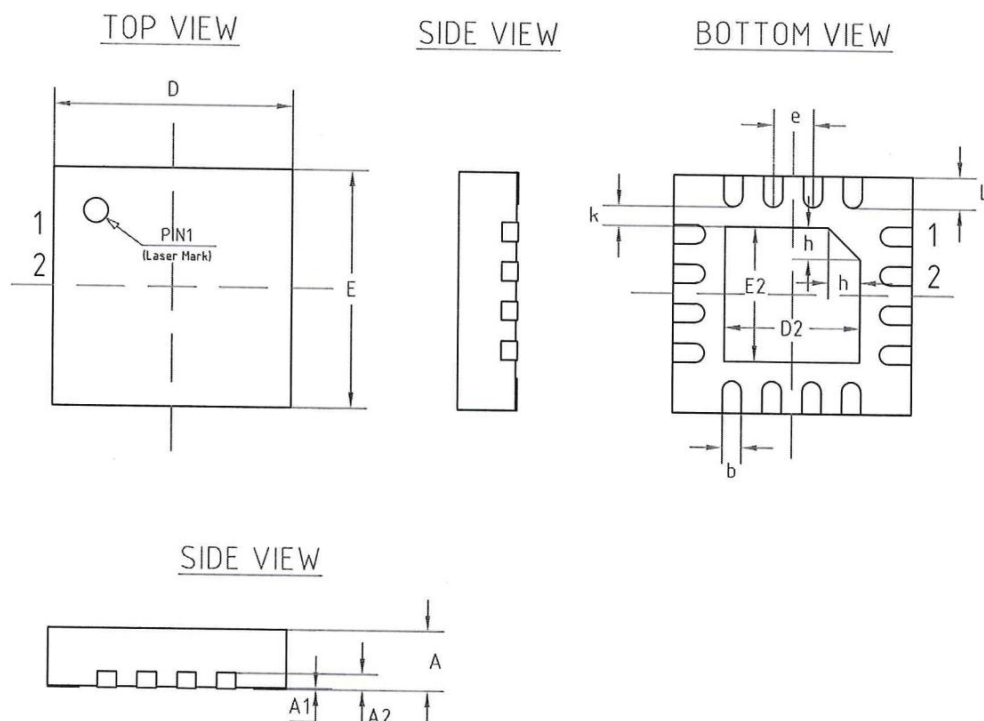
ETSSOP16



Symbol	Dimensions In Millimeters		
	Min	Nom	Max
A	-	-	1.20
A1	0.05	-	0.15
A2	0.90	1.00	1.05
A3	0.39	0.44	0.49
b	0.20	-	0.28
c	0.13	-	0.17
D	4.90	5.00	5.10
D2	2.80REF		
E	4.30	4.40	4.50
E1	6.20	6.40	6.60
E2	2.10REF		
e	0.65BSC		
L	0.45	0.60	0.75
L1	1.00REF		
θ	0°	-	8°

Package Information

QFN16-3*3



Symbol	Dimensions In Millimeters		
	Min	Nom	Max
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.203REF		
b	0.18	0.24	0.30
D	2.90	3.00	3.10
D2	1.60	1.70	1.80
E	2.90	3.00	3.10
E2	1.60	1.70	1.80
e	0.50BSC		
L	0.30	0.40	0.50
K	0.20	0.25	0.30
h	0.35	0.40	0.45

Revision History

Number	Description
Rev 1.0	XTM5847 datasheet release
Rev 1.1	update “Bridge Control function”
Rev 1.2	update “Electrical Characteristics”