MTD2038G DMOS Microstepping PWM Motor Driver

Features

- Dual full bridge for a bipolar stepper motor driver
- Load supply voltage 40V , Output current 1.0A
- Constant current control (Fixed frequency PWM control)
- 2-bit selectable current level (Full step/Half step/Quarter step)
- Stand-by function
- Thermal shutdown with hysteresis
- Under voltage lock out function
- Surface mount package with heat sink(HSOP24)

HSOP24

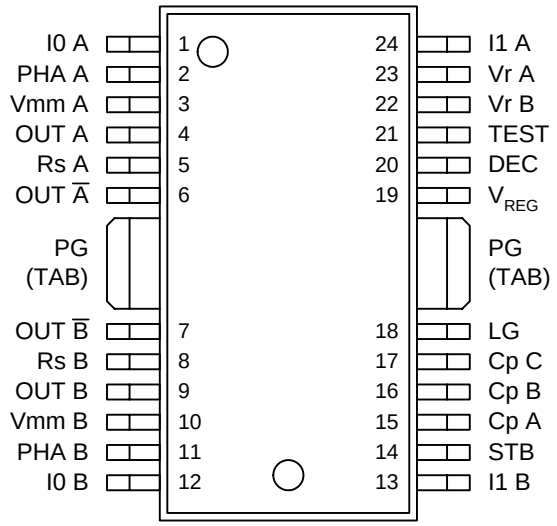
■Absolute maxmum ratings / Ta=25°C

Parameter	Symbol	Rating	Unit
V_{REG}Output current	I_{REG}	12	mA
Logic input	V_{LOGIC}	0～6	V
Reference input	Vr	0～7	V
Load supply	Vmm	40	V
Output current	I_{OUT}	1.0	A
Power dissipation	P_D *1	2.1	W
Storage temperature range	Tstg	-40～150	°C
Maximum Junction temperature	Tj	150	°C

*1 : 50.8×50.8×1mm³ Glass Epoxy Board(FR4),200mm² Cupper Pattern

■Pin Assignment

MTD2038G TOP VIEW



■Electrical Characteristics

Vmm=24V,Ta=25°C unless otherwise specified

Parameter	Symbol	Condition	MIN	TYP	MAX	Unit
●Output stage						
Load supply current (All circuit OFF)	Imm(OFF)	$V_{I0A}=V_{I1A}=V_{I0B}=V_{I1B}=5V$	-	13	22	mA
Load supply current (All circuit ON)	Imm(ON)	$V_{I0A}=V_{I1A}=V_{I0B}=V_{I1B}=0V$	-	13	22	mA
Load supply current (Stand-by)	Imm(STB)	$V_{STB}=5V$	-	-	200	μA
Upper MOSFET ON resistance	$R_{ON}H$	Iout=-0.8A	-	1.8	2.0	Ω
Lower MOSFET ON resistance	$R_{ON}L$	Iout=0.8A	-	0.8	1.0	Ω
Upper MOSFET leakage current	IrH	Vmm=35V, $V_{OUT}=0V$	-	-	100	μA
Lower MOSFET leakage current	IrL	$V_{OUT}=35V$, $V_{RS}=0V$	-	-	100	μA
Upper MOSFET reverse voltage	$V_F H$	$I_F=0.8A$	-	1.4	1.6	V
Lower MOSFET reverse voltage	$V_F L$	$I_F=0.8A$	-	1.1	1.3	V
VcpA under voltage lock out threshold	VcpAUVLO	-	Vmm+3	Vmm+4	Vmm+6	V
●Logic stage						
V_{REG}output voltage	V_{REG}	I_{REG}=500μA	4.85	5.00	5.15	V
		I_{REG}=12mA	4.75	-	5.25	V
PHA/I0/I1/DEC "H" input voltage	$V_{LOGIC}H$	-	2.0	-	V_{REG}	V
PHA/I0/I1/DEC "L" input voltage	$V_{LOGIC}L$	-	GND	-	0.8	V
STB "H" input voltage	$V_{STB}H$	-	2.3	-	V_{REG}	V
STB "L" input voltage	$V_{STB}L$	-	GND	-	0.8	V
PHA/I0/I1 "H" input current	$I_{PHA/I0/I1}H$	$V_{PHA/I0/I1}=5V$	-	-	10	μA
PHA/I0/I1 "L" input current	$I_{PHA/I0/I1}L$	$V_{PHA/I0/I1}=0V$	-	-20	-50	μA
STB "H" input current	$I_{STB}H$	$V_{STB}=5V$	-	45	90	μA
STB "L" input current	$I_{STB}L$	$V_{STB}=0V$	-	-	-10	μA
DEC "H" input current	$I_{DEC}H$	$V_{DEC}=5V$	-	75	150	μA
DEC "L" input current	$I_{DEC}L$	$V_{DEC}=0V$	-	-	-10	μA
Vr "H" input current	IrefH	Vr=4V	-	1	10	μA
Vr "L" input current	IrefL	Vr=0V	-	-1	-10	μA
Comparator threshold voltage (100%)	Vs1	$V_{I0(AorB)}$="L", $V_{I1(AorB)}$="L"	95	100	105	%
Comparator threshold voltage (70%)	Vs2	$V_{I0(AorB)}$="H", $V_{I1(AorB)}$="L"	64	70	76	%
Comparator threshold voltage (40%)	Vs3	$V_{I0(AorB)}$="L", $V_{I1(AorB)}$="H"	36	40	44	%
Oscillator frequency	f_{OSC}	-	20	30	40	kHz
Comparator blanking time	tb	-	-	0.65	-	μs
CpA charging time *1	Tchg	Cp1=0.22μF,Cp2=0.01μF,V_{STB}=5V→0V	-	-	1.5	ms
Thermal shutdown temperature *2	T_{TSD}	-	150	170	190	°C

*1: Charge of a charge pump takes time. Therefore, please take the time more than Tchg from aftre Vcc input or Stand-by release to even before a motor drive start.

*2: T_{TSD} is design value.

■Thermal resistance

Symbol	Rating	Unit
θja *3	58	°C/W

*3: 50.8×50.8×1mm³ Glass Epoxy Board(FR4),200mm² Cupper Pattern

■Recommended operation conditions

Parameter	Symbol	Recommendation	Unit
Junction temperature	Tj	-25～120	℃
Load supply	Vmm	15～35	V
Reference voltage	Vr	0～6	V

■Truth table

I0 A(B) and I1 A(B)	PHA A or B	OUT A or B	OUT $\overline{A}$ or $\overline{B}$
L	H	H	L
L	L	L	H
H	×	OFF	OFF

×：don't care

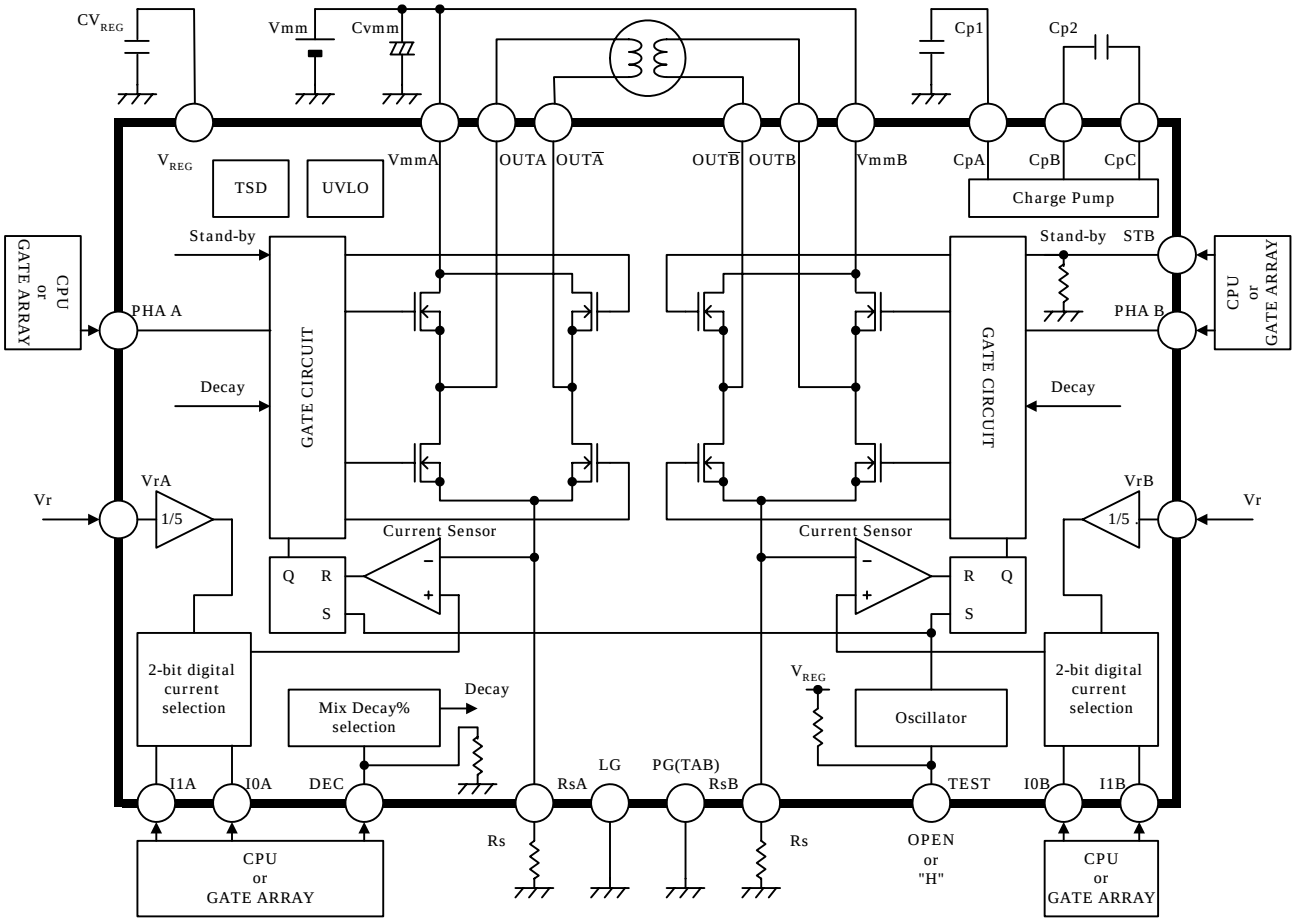
I0 A(B)	I1 A(B)	Current Level(%)
L	L	100
H	L	70
L	H	40
H	H	0

STB *1	Mode
L or OPEN	ACTIVE
H	Stand-By

DEC *1	Current Decay Mode
L or OPEN	Slow Decay
H	Mix Decay(37.5% Fast)

*1 built-in pull-down resistance

■Block diagram / Typical application



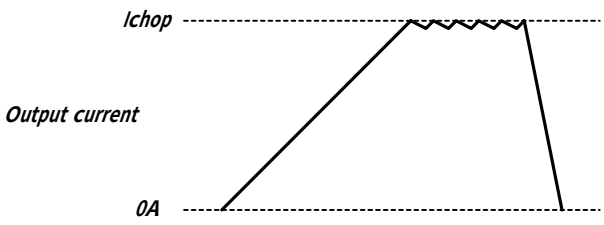
●Recommended component values

Symbol	Recommended component values	Unit
Cp1	0.22	μF
Cp2	0.01	μF
CV_{REG}	0.1	μF
Rs	0.68	Ω
Cvmm *1	47	μF

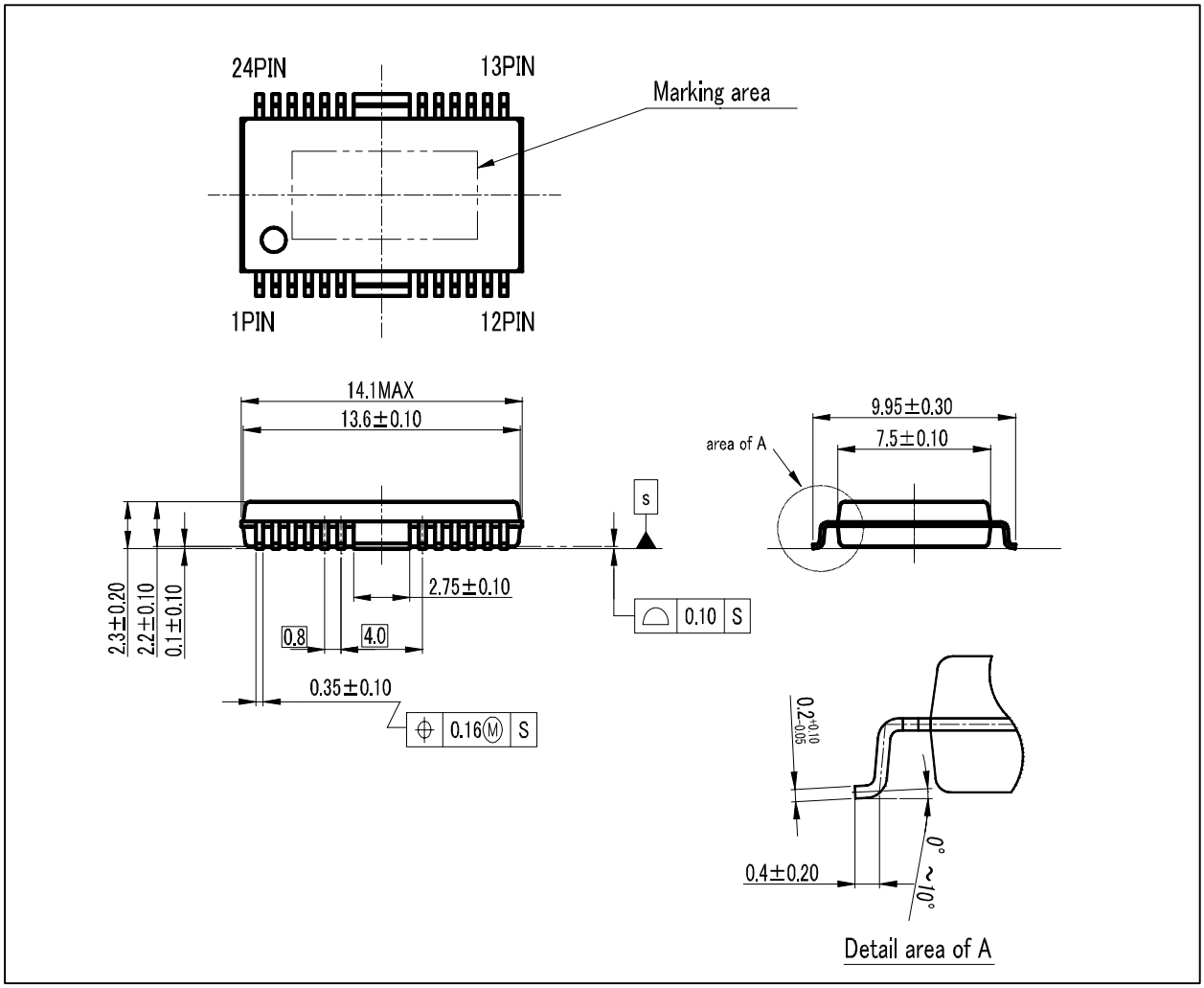
*1: It recommend the electrolytic capacitor for the noise absorption connect near IC to Load supply.

●Constant chopping current level

$$Ichop = \frac{Vr}{5 \times Rs}$$



■Outline Drawing



(Unit : mm)

⚠ Although we are constantly making every effort to improve the quality and reliability of our products, there nevertheless remains a certain probability that the semiconductor products may occasionally fail or malfunction. Please take careful precautions against product failures or malfunctions to avoid any injuries, fire accidents or social loss by implementing safety designs such as redundancy designs, designs for fire spread prevention, and designs for preventing malfunctions.

⚠ Our semiconductor products listed in this document are not designed or manufactured to be used in devices or systems requiring extremely high levels of quality and reliability, or the failure or malfunction of which may directly threaten human lives or cause injury. In the cases where the products are to be used in devices or systems for special applications or devices or systems for specialized applications shown below, always make sure to consult us in advance.

Special Applications
Transportation devices (automotive, marine, etc.), communication devices for core network, traffic signal devices, fire prevention/anticrime devices, various safety devices, medical devices, etc.

Specialized Applications
Nuclear power control systems, aircraft and aerospace devices, submarine relay devices, and systems for preserving life, etc.

Even if it is not for a special or specialized application, when IC products are to be used for devices or systems that are desired to last for a long period under continuous operation, please make sure to consult our sales representative in advance.

- We reserve the right to make any changes to the contents of this manual without prior notice in accordance with modifications to IC products.
- Details of specifications should be exchanged at the adoption of the IC products.
- All information included in this manual is believed to be accurate and reliable. However, our company takes no responsibility for any injury or damage incurred when using the IC products as described in this manual. Neither do we take any responsibility for issues arising from infringement of patent or other rights caused by using this manual.
- The provision of this manual does not guarantee the right to use any third party's patent or other rights, or grant permission to use the patent or other rights of our company.
- No part of this manual may be reproduced or copied without the specific written consent of Shindengen Electric Mfg. Co., Ltd.