MTD2029J

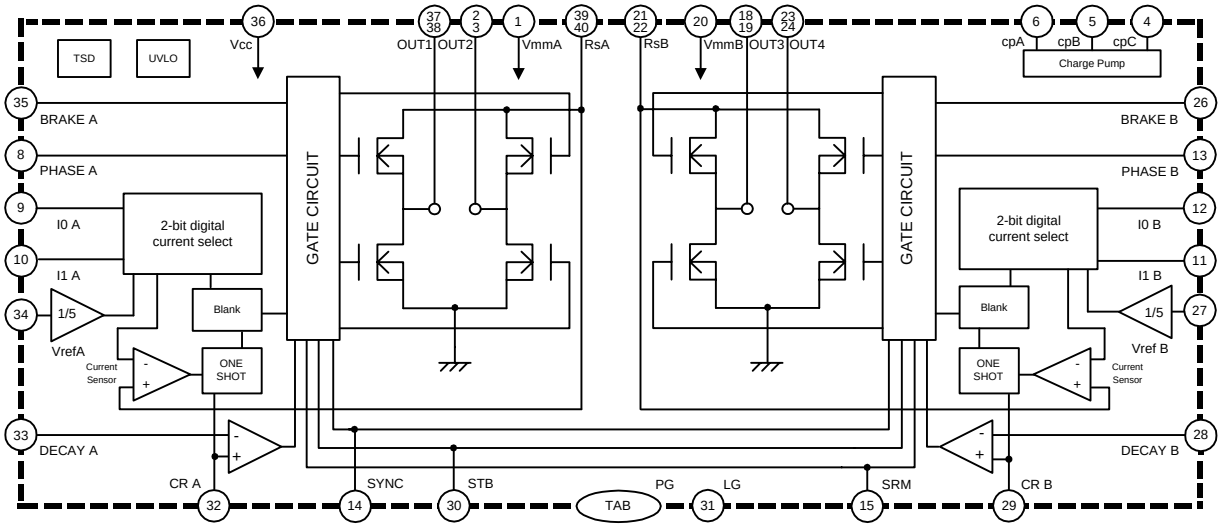
DMOS DUAL FULL BRIDGE PWM MOTOR DRIVER ICs

■Features

1) Built-in dual full-bridge
2) For a 2-phase bipolar stepper motor or two DC motors
3) Constant current control function (fixed OFF time PWM current control)
4) 2-bit digital current selection (It can respond to W1-2 phase excitation)
5) Selectable current decay mode (Slow/Fast/Mix Decay Mode)
6) Stand-by function
7) Noise cancellation function (An external filter is unnecessary)
8) Phase Synchronous function
9) Over heating shutdown function with thermal hysteresis
10) Under Voltage Lock Out function
11) Output current 1.5A, Output voltage 50V
12) Surface mount type package with heat dissipation tab (HSOP40)

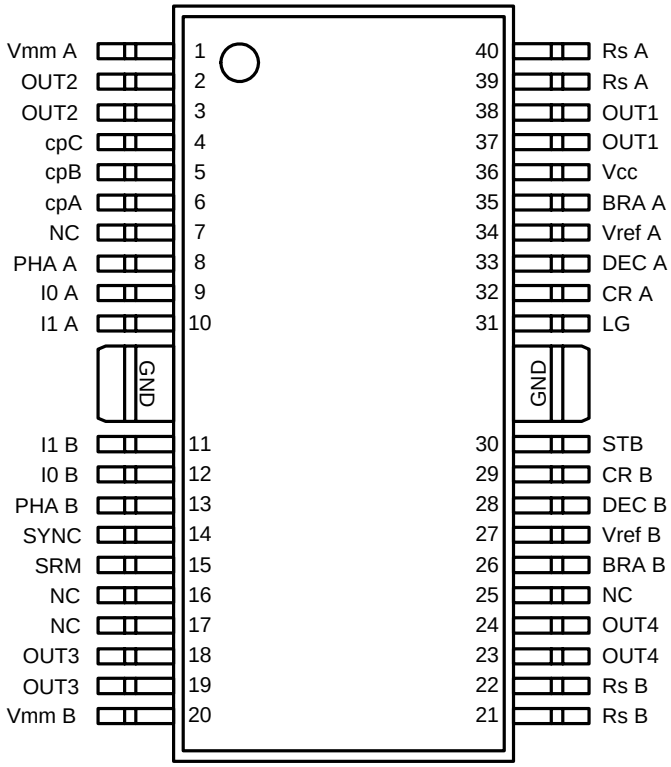
HSOP40

■Block Diagram



■Pin Assignment

<TOP VIEW>



[OUT,Rs are prepared each two terminals.
Be sure to use, short-circuiting]

■Absolute Maximum Ratings

Ta=25ºC unless otherwise specified

Parameter		Symbol	Ratings	Units
Logic input	Logic supply voltage	Vcc	0~7	V
	Input voltage	$V_{PHA/I0/I1/DEC/BRA/SYNC/SRM/STB}$	0~Vcc	V
Output	Output voltage	V_{OUT}	50	V
	Output current	Ic	1.5	A
	Output current (Peak) ∗1	Ip ∗1	2.5	A
	Flywheel diode voltage	VF	50	V
	Flywheel diode current	IF	1.5	A
Temperature	Allowable power dissipation ∗2	Pt ∗2	2.9	W
	Storage temperature range	Tstg	-40~150	ºC
	Maximum junction temperature	Tj(max)	150	ºC

∗1 Condition : tw < 20μs

∗2 2inches grass epoxy board (FR4) and a heat dissipation Cu pattern area of 250mm²

■Electrical Characteristics

(Ta=25ºC, Vcc=5.0V unless otherwise specified)

Parameter	Symbol	Condition	MIN	TYP	MAX	Unit
Logic supply current (2 circuit ON)	Icc(ON)	V_{I0}="L",V_{I1}="L"	-	12.0	17.0	mA
Logic supply current (2 circuit OFF)	Icc(OFF)	V_{I0}="H",V_{I1}="H"	-	11.0	16.0	mA
Load supply current (2 circuit ON)	IMM(ON)	VMM=24V,V_{I0}="L",V_{I1}="L"	-	9.0	12.0	mA
Logic supply current (STB)	Icc(STB)	V_{STB}="L"	-	5.0	8.0	mA
Load supply current (STB)	IMM(STB)	VMM=24V,V_{STB}="L"	-	-	100	μA
Logic "H" input voltage	V_{IN}H	Operating	2.0	-	Vcc	V
Logic "L" input voltage	V_{IN}L	Operating	GND	-	0.8	V
PHASE "H" input current	I_{PHA}H	V_{PHA}=5.0V	-	-	10.0	μA
PHASE "L" input current	I_{PHA}L	V_{PHA}=0V	-	-1.0	-10.0	μA
I0 "H" input current	I_{I0}H	V_{I0}=5.0V	-	-	10.0	μA
I0 "L" input current	I_{I0}L	V_{I0}=0V	-	-1.0	-10.0	μA
I1 "H" input current	I_{I1}H	V_{I1}=5.0V	-	-	10.0	μA
I1 "L" input current	I_{I1}L	V_{I1}=0V	-	-1.0	-10.0	μA
DECAY "H" input current	I_{DEC}H	V_{DEC}=5.0V	-	-	10.0	μA
DECAY "L" input current	I_{DEC}L	V_{DEC}=0V	-	-5.0	-15.0	μA
BRAKE "H" input current	I_{BRA}H	V_{BRA}=5.0V	-	-	10.0	μA
BRAKE "L" input current	I_{BRA}L	V_{BRA}=0V	-42.0	-62.5	-125.0	μA
SRM "H" input current	I_{SRM}H	V_{SRM}=5.0V	-	-	10.0	μA
SRM "L" input current	I_{SRM}L	V_{SRM}=0V	-42.0	-62.5	-125.0	μA
SYNC "H" input current	I_{SYNC}H	V_{SYNC}=5.0V	42.0	62.5	125	μA
SYNC "L" input current	I_{SYNC}L	V_{SYNC}=0V	-	-1.0	-10.0	μA
STB "H" input current	I_{STB}H	V_{STB}=5.0V	-	-	10.0	μA
STB "L" input current	I_{STB}L	V_{STB}=0V	-42.0	-62.5	-125.0	μA
Reference voltage range	Vref	Vref=Vcc-2.0V	-	-	3.0	V
Vref "H" input current	IrefH	Vref=3.0V	-	-	10.0	μA
Vref "L" input current	IrefL	Vref=0V	-	-5.0	-15.0	mA
Comparator Threshold (100%)	Vs1	V_{I0}="L",V_{I1}="L"	95	100	105	%
Comparator Threshold (70%)	Vs2	V_{I0}="H",V_{I1}="L"	64.4	70	75.6	%
Comparator Threshold (40%)	Vs3	V_{I0}="L",V_{I1}="H"	36	40	44	%
Upper MOSFET ON resistance	RonH	I_{OUT}=-1.0A	-	0.5	0.7	Ω
Lower MOSFET ON resistance	RonL	I_{OUT}=1.0A	-	0.5	0.7	Ω
Upper MOSFET leak current	IleakH	Vmm=50V,V_{OUT}=0V	-	-	50.0	μA
Lower MOSFET leak current	IleakL	V_{OUT}=50V,V_{TAB}=0V	-	-	50.0	μA
Upper diode foward drop	VFH	I_{OUT}=-1.0A	-	1.3	1.5	V
Lower diode foward drop	VFL	I_{OUT}=1.0A	-	1.3	1.5	V
One shot off time	Toff	Ct=470pF,Rt=56kΩ	-	26.3	-	μs
Blanking time	tb	Ct=470pF,Rt=56kΩ	-	2.03	-	μs
Charge pump setting time	Tchg	Vmm=24.0V,Cp1=0.47μF,Cp2=0.022μF	-	-	2.0	ms
Under voltage lock out threshold	V_{UVLO}	Operating	-	4.0	-	V
Thermal shutdown temperature	T_{TSD}	Operating	-	165	-	ºC

■Recommended operation conditions

Parameter	Symbol	Recommendation	Unit
Junction temperature range	Tj	-25～120	℃
Logic supply	Vcc	4.75～5.50	V
Load supply	Vmm	15～45	V

■Thermal resistance

Symbol	Rating	Unit
θja *1	43	℃/W

*1 2inches grass epoxy board (FR4) and a heat dissipation Cu pattern area of 250mm²

■Truth Table

BRAKE A or B	I0 A or B	I1 A or B	PHASE A or B	OUT 1 or 4	OUT 2 or 3	Output current ratio (%)
H	L	L	L	L	H	100
H	H	L	L	L	H	70
H	L	H	L	L	H	40
H	H	H	×	×	×	0 (Output OFF)
H	L	L	H	H	L	100
H	H	L	H	H	L	70
H	L	H	H	H	L	40
L	×	×	×	L	L	-

× : don't care

STB	Mode
L	Stand-by
H or Open (*1)	Active

*1 pull-up resistance built-in

SYNC	Mode
L or Open (*2)	Disabled
H	Synchronous

*2 pull-down resistance built-in

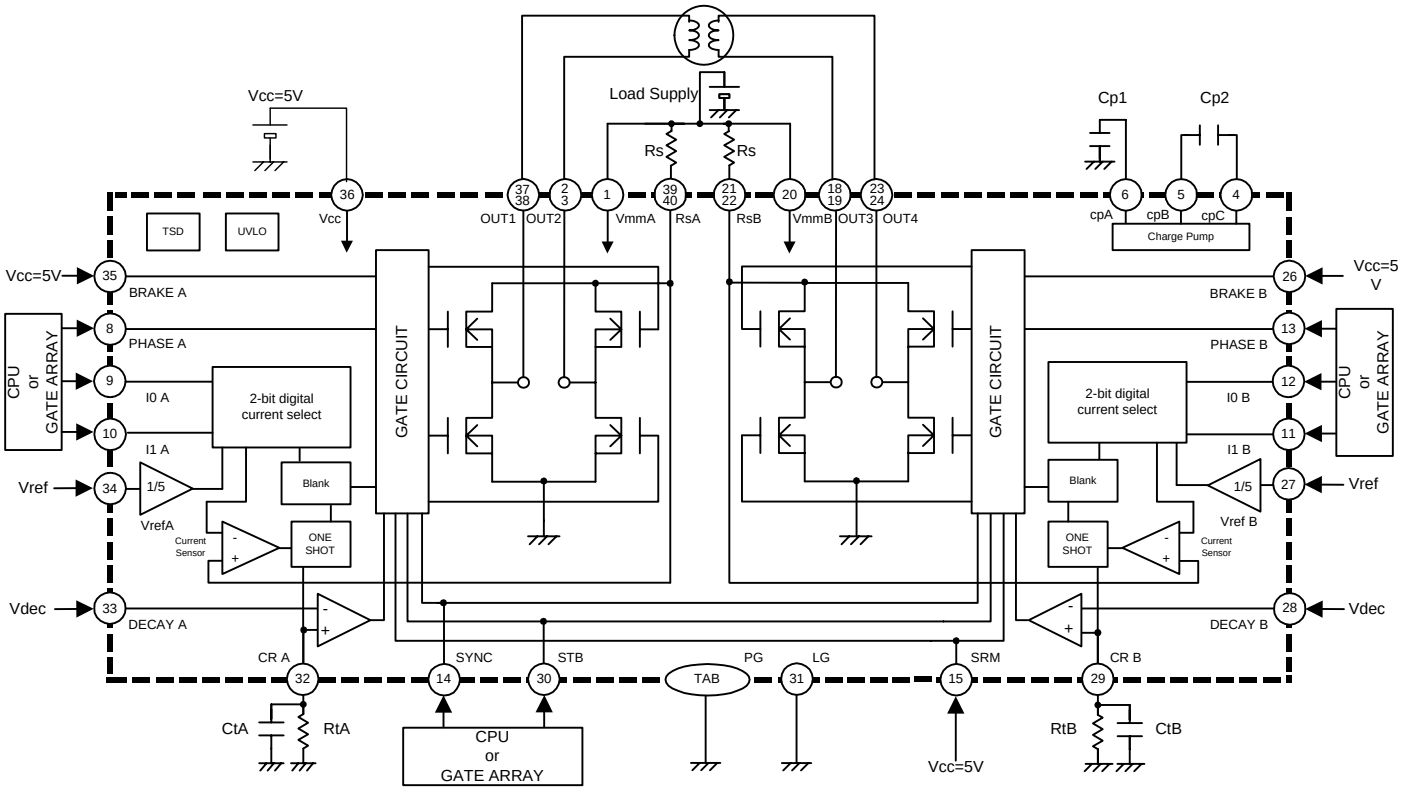
DECAY	DECAY Mode
$V_{DEC} < V_{CR}$	FAST
$V_{DEC} > V_{CR}$	SLOW

[1.0V < V_{CR} < 3.0V
All Fast Decay Mode V_{DEC} < 0.6V
All Slow Decay Mode V_{DEC} > 3.4V]

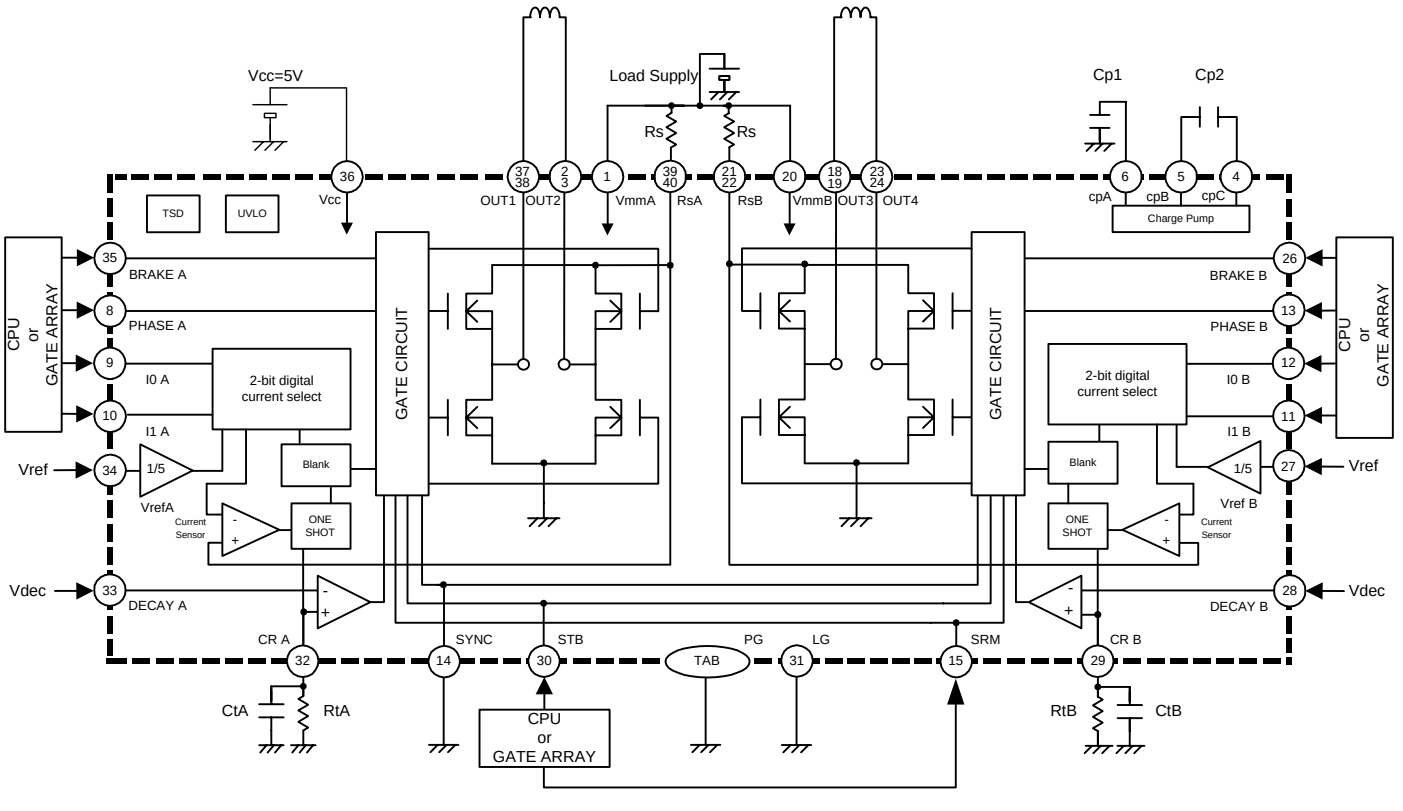
SRM (*3)	Mode
L	Disabled
H or Open (*4)	Synchronous Rectification

*3 SRM:Synchronous Rectification Mode
*4 pull-up resistance built-in

The example of a 2-phase stepper motor drive circuit



The example of a two DC motor drive circuit



●Constant chopping current level

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

●One shot off time

$$Toff = Ct \times Rt$$

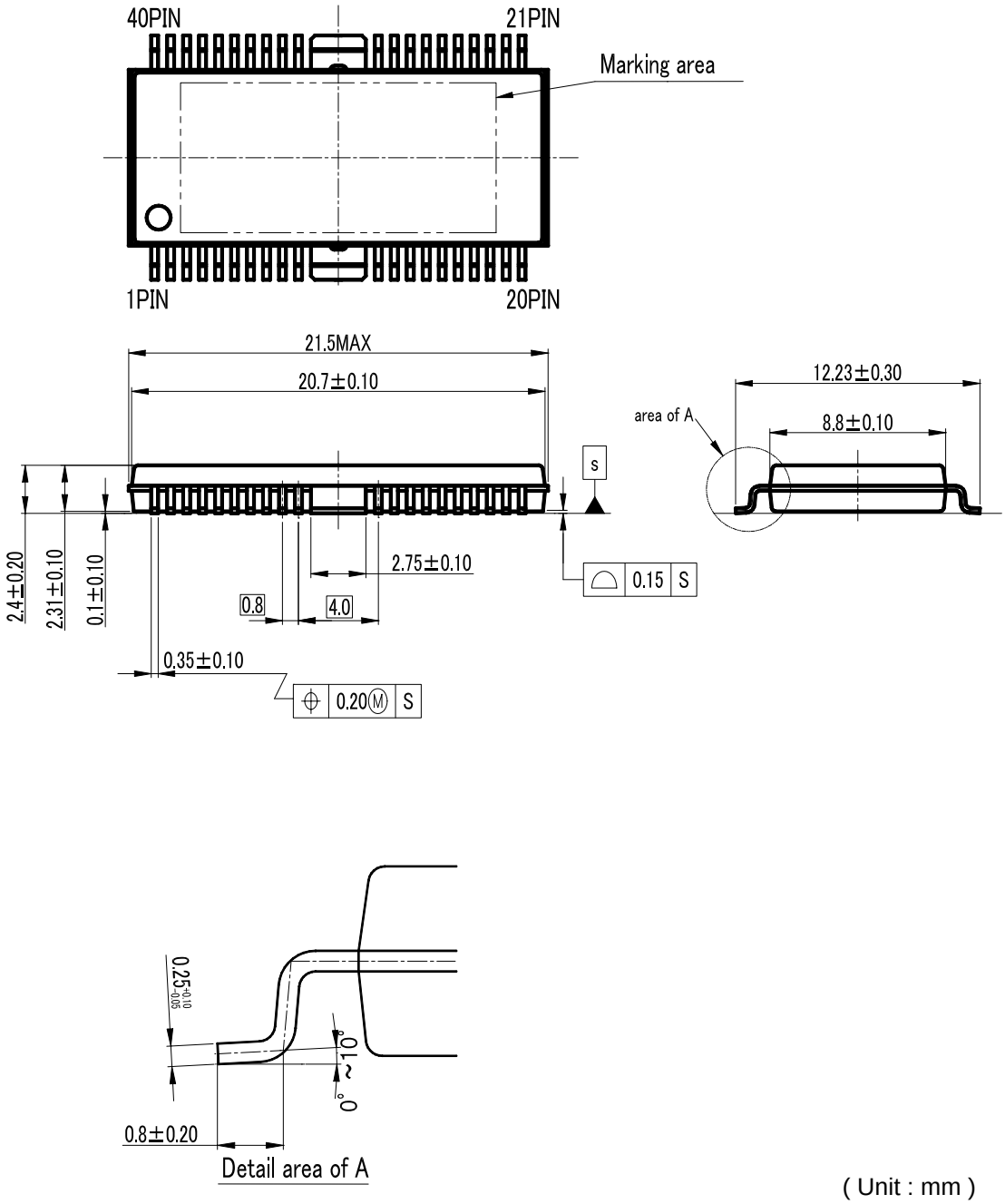
●Pulse Blanking Time

$$tb = Ct \times Rt \times ln \frac{1-0.5\times10^{-3}Rt}{3-0.5\times10^{-3}Rt}$$

●Recommended component valuesl

Symbol	Recommended value	Unit
Rs	0.39	Ω
Rt	56k	Ω
Ct	470p	F
Cp1	0.47μ	F
Cp2	0.022μ	F

■Outline Dimension



(Unit : mm)

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