

MTD2029J

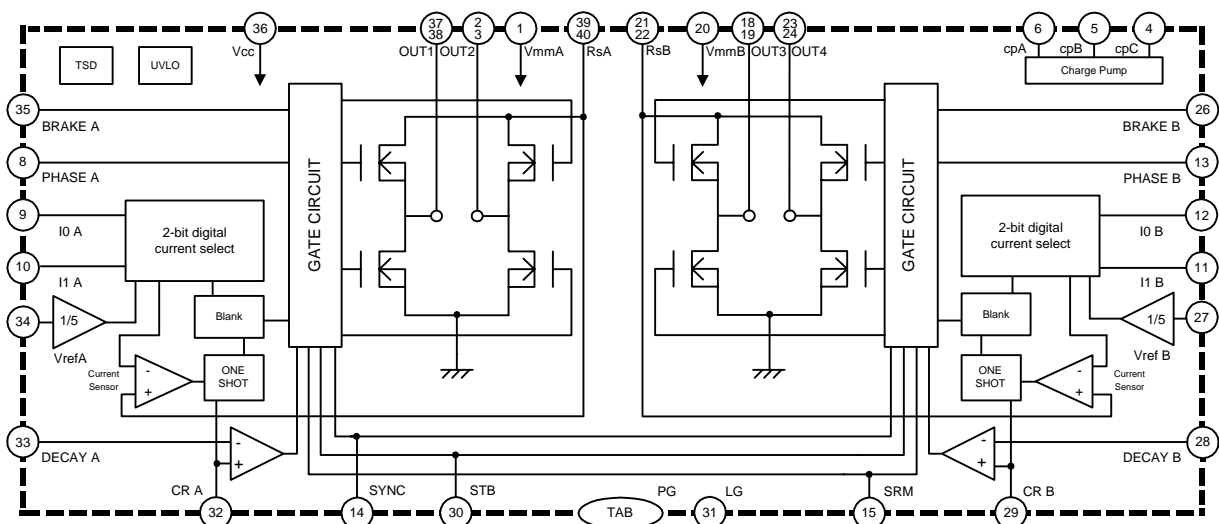
DMOS DUAL FULL BRIDGE PWM MOTOR DRIVER ICs

Features

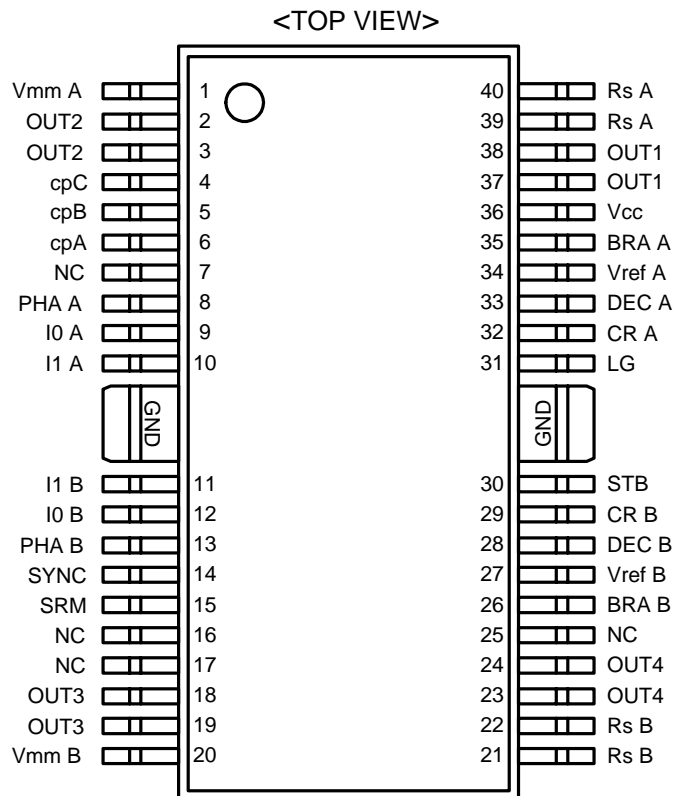
- 1) Built-in dual full-bridge
- 2) For a 2-phase bipolar stepper motor or two DC motors
- 3) Constant current control function (fixed OFF time PWM current control)
- 4) 2-bit digital current selection (It can respond to W1-2 phase excitation)
- 5) Selectable current decay mode (Slow/Fast/Mix Decay Mode)
- 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)



Block Diagram



Pin Assignment



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

Absolute Maximum Ratings

Ta=25°C unless otherwise specified

Parameter	Symbol	Ratings	Units	
Logic input	Logic supply voltage	Vcc	0-7	V
	Input voltage	V _{PHA/IO/11/DEC/BRA/} V _{SYNC/SRM/STB}	0-Vcc	V
Output	Output voltage	V _{OUT}	50	V
	Output current	I _c	1.5	A
	Output current (Peak) *1	I _p *1	2.5	A
	Flywheel diode voltage	V _F	50	V
	Flywheel diode current	I _F	1.5	A
Temperature	Allowable power dissipation *2	P _t *2	2.9	W
	Storage temperature range	T _{stg}	-40-150	°C
	Maximum junction temperature	T _{j(max)}	150	°C

*1 Condition : tw < 20μs

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

Electrical Characteristics

(Ta=25°C, 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)	V _{MM} =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)	V _{MM} =24V, V _{STB} ="L"	-	-	100	μA
Logic "H" input voltage	V _{INH}	Operating	2.0	-	V _{CC}	V
Logic "L" input voltage	V _{INL}	Operating	GND	-	0.8	V
PHASE "H" input current	I _{PHAH}	V _{PHA} =5.0V	-	-	10.0	μA
PHASE "L" input current	I _{PHAL}	V _{PHA} =0V	-	-1.0	-10.0	μA
I0 "H" input current	I _{I0H}	V _{I0} =5.0V	-	-	10.0	μA
I0 "L" input current	I _{I0L}	V _{I0} =0V	-	-1.0	-10.0	μA
I1 "H" input current	I _{I1H}	V _{I1} =5.0V	-	-	10.0	μA
I1 "L" input current	I _{I1L}	V _{I1} =0V	-	-1.0	-10.0	μA
DECAY "H" input current	I _{DECH}	V _{DEC} =5.0V	-	-	10.0	μA
DECAY "L" input current	I _{DECL}	V _{DEC} =0V	-	-5.0	-15.0	μA
BRAKE "H" input current	I _{BRAH}	V _{BRA} =5.0V	-	-	10.0	μA
BRAKE "L" input current	I _{BRAL}	V _{BRA} =0V	-42.0	-62.5	-125.0	μA
SRM "H" input current	I _{SRMH}	V _{SRM} =5.0V	-	-	10.0	μA
SRM "L" input current	I _{SRML}	V _{SRM} =0V	-42.0	-62.5	-125.0	μA
SYNC "H" input current	I _{SYNCH}	V _{SYNC} =5.0V	42.0	62.5	125	μA
SYNC "L" input current	I _{SYNCL}	V _{SYNC} =0V	-	-1.0	-10.0	μA
STB "H" input current	I _{STBH}	V _{STB} =5.0V	-	-	10.0	μA
STB "L" input current	I _{STBL}	V _{STB} =0V	-42.0	-62.5	-125.0	μA
Reference voltage range	V _{ref}	V _{ref} =V _{CC} -2.0V	-	-	3.0	V
Vref "H" input current	I _{refH}	V _{ref} =3.0V	-	-	10.0	μA
Vref "L" input current	I _{refL}	V _{ref} =0V	-	-5.0	-15.0	mA
Comparator Threshold (100%)	V _{s1}	V _{I0} ="L", V _{I1} ="L"	95	100	105	%
Comparator Threshold (70%)	V _{s2}	V _{I0} ="H", V _{I1} ="L"	64.4	70	75.6	%
Comparator Threshold (40%)	V _{s3}	V _{I0} ="L", V _{I1} ="H"	36	40	44	%
Upper MOSFET ON resistance	R _{onH}	I _{OUT} =-1.0A	-	0.5	0.7	Ω
Lower MOSFET ON resistance	R _{onL}	I _{OUT} =1.0A	-	0.5	0.7	Ω
Upper MOSFET leak current	I _{leakH}	V _{mm} =50V, V _{OUT} =0V	-	-	50.0	μA
Lower MOSFET leak current	I _{leakL}	V _{OUT} =50V, V _{TAB} =0V	-	-	50.0	μA
Upper diode forward drop	V _{FH}	I _{OUT} =-1.0A	-	1.3	1.5	V
Lower diode forward drop	V _{FL}	I _{OUT} =1.0A	-	1.3	1.5	V
One shot off time	T _{off}	C _t =470pF, R _t =56kΩ	-	26.3	-	μs
Blanking time	t _b	C _t =470pF, R _t =56kΩ	-	2.03	-	μs
Charge pump setting time	T _{chg}	V _{mm} =24.0V, C _{p1} =0.47μF, C _{p2} =0.022μF	-	-	2.0	ms
Under voltage lock out threshold	V _{UVLO}	Operating	-	4.0	-	V
Thermal shutdown temperature	T _{TSD}	Operating	-	165	-	°C

Recommended operation conditions

Parameter	Symbol	Recommendation	Unit
Junction temperature range	T _j	-25 ~ 120	
Logic supply	V _{CC}	4.75 ~ 5.50	V
Load supply	V _{mm}	15 ~ 45	V

Thermal resistance

Symbol	Rating	Unit
ja *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	X	X	X	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	X	X	X	L	L	-

X : 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

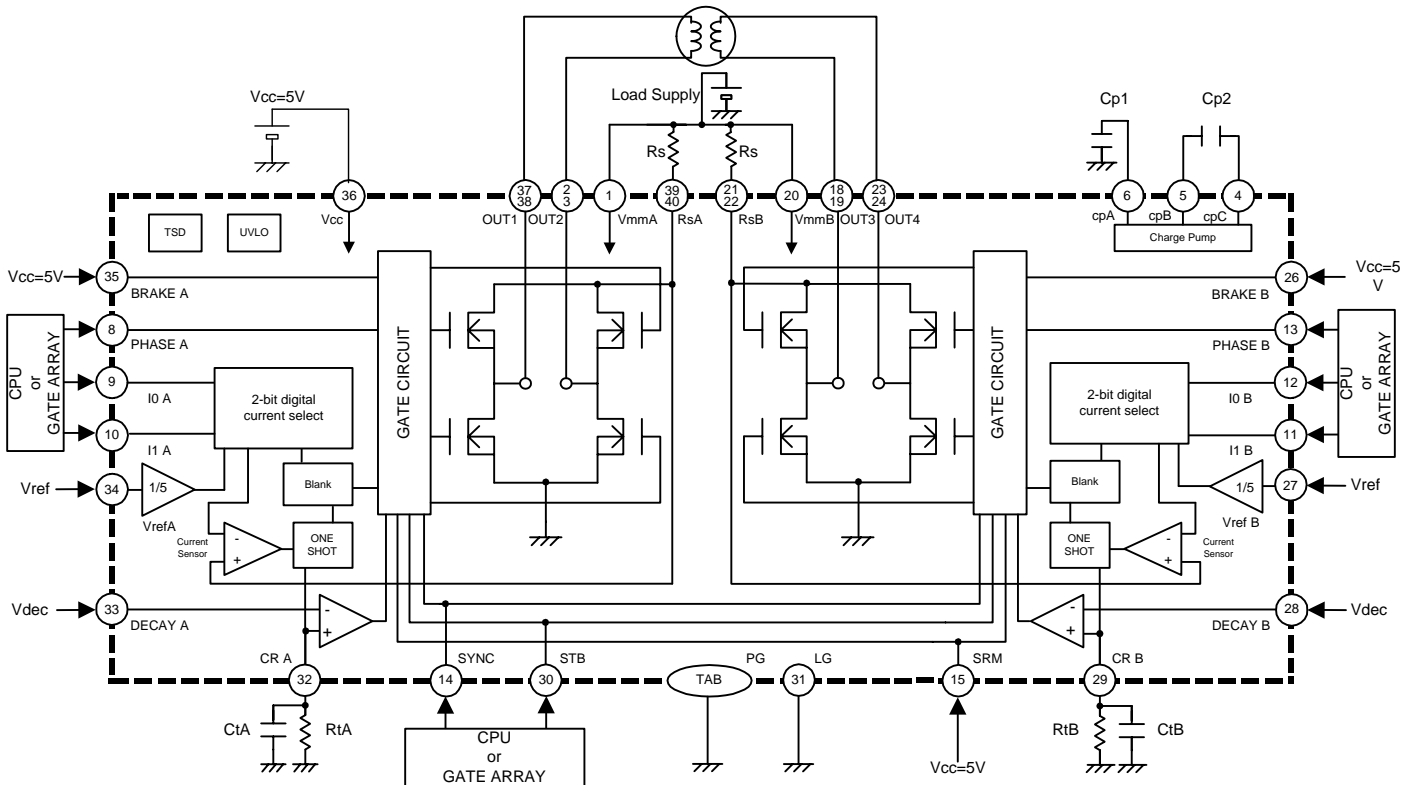
SRM (*3)	Mode
L	Disabled
H or Open (*4)	Synchronous Rectification

*3 SRM:Synchronous Rectification Mode

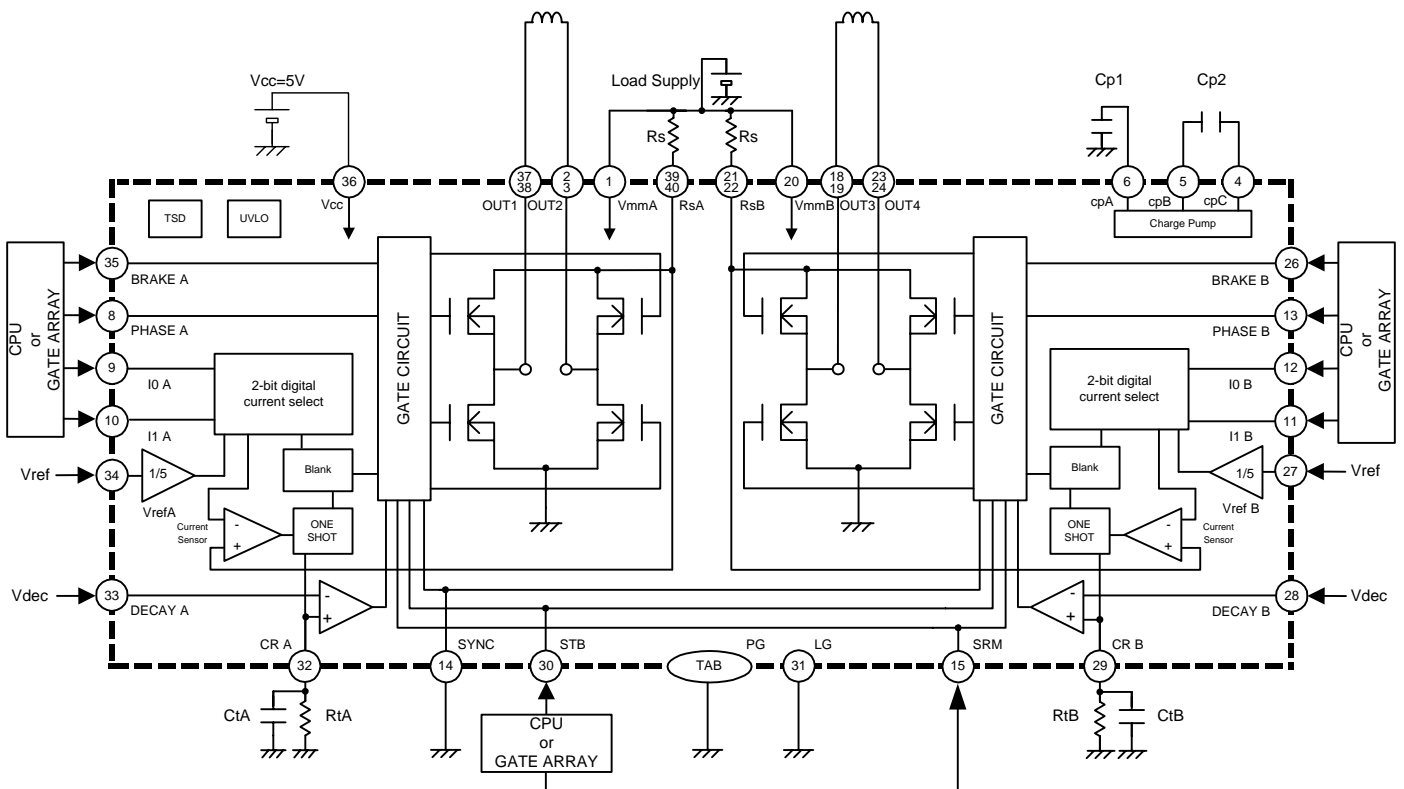
*4 pull-up resistance built-in

$1.0V < V_{CR} < 3.0V$ All Fast Decay Mode $V_{DEC} < 0.6V$ All Slow Decay Mode $V_{DEC} > 3.4V$
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The example of a 2-phase stepper motor drive circuit



The example of a two DC motor drive circuit



Constant chopping current level

$$I_{chop} = \frac{V_{ref}}{5 \times R_s}$$

One shot off time

$$T_{off} = C_t \times R_t$$

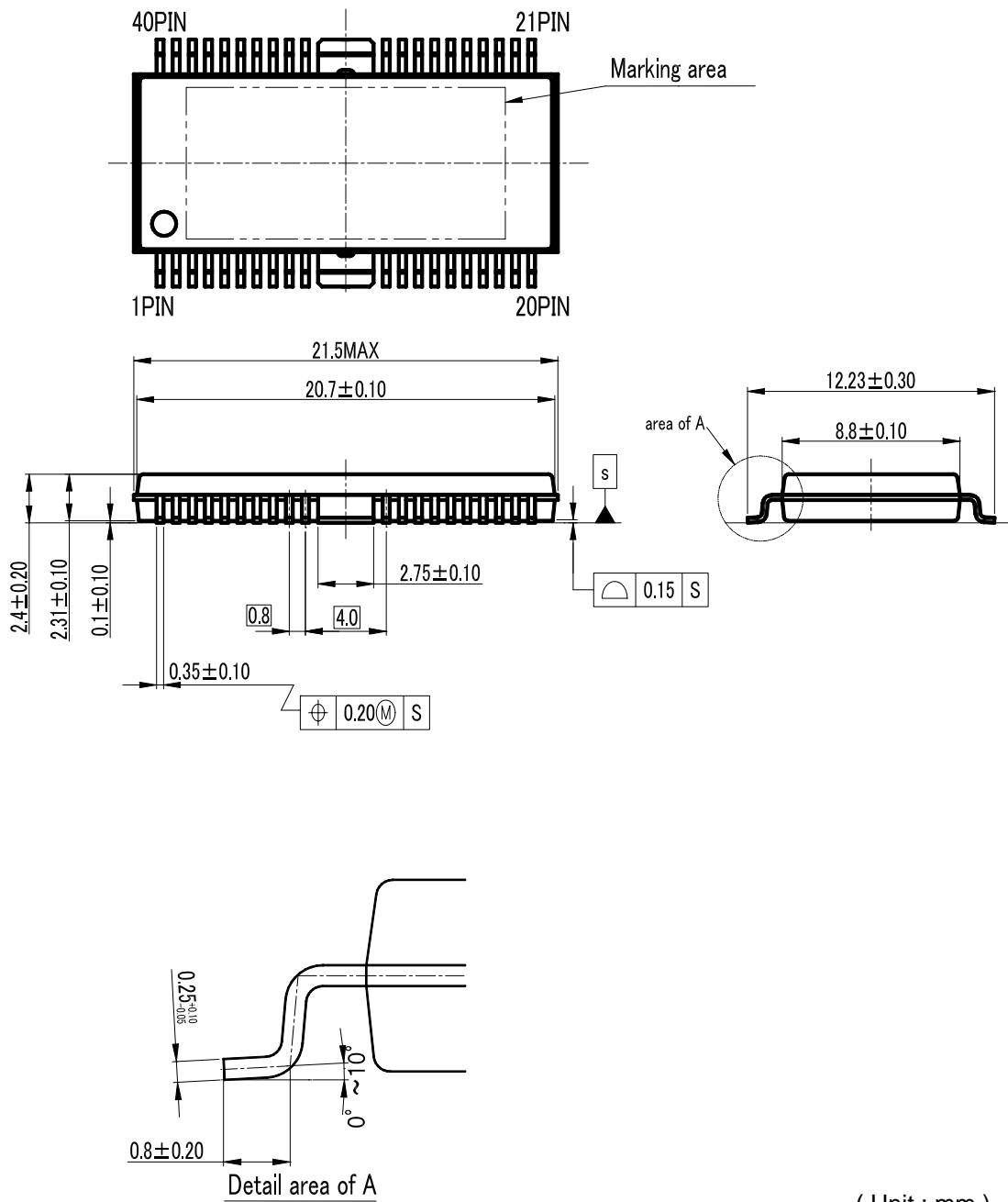
Pulse Blanking Time

$$t_b = C_t \times R_t \times \ln \frac{1 - 0.5 \times 10^{-3} R_t}{3 - 0.5 \times 10^{-3} R_t}$$


Recommended component values


Symbol	Recommended value	Unit
R _s	0.39	Ω
R _t	56k	Ω
C _t	470p	F
C _{p1}	0.47μ	F
C _{p2}	0.022μ	F

Outline Dimension



(Unit : mm)

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