SHINDENGEN

Stepping Motor Driver ICs

MTD Series

MTD2005F

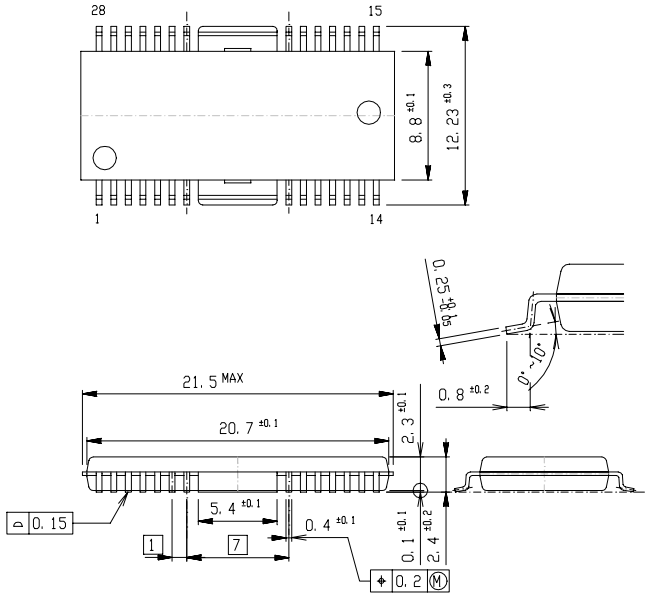
FEATURES

- Constant-current chopping function (Frequency fixed, separate-oscillation)
- 2-phase input (ENA input is useful for half step drive)
- Selectable slow/fast current decay for improved micro stepping
- A noise cancel function is provided (No externally attached filter needed)
- Protection for penetration current
- Built-in thermal alarm
- Built-in flywheel diodes

OUTLINE DIMENSIONS

Case : HSOP-28

(Unit : mm)



RATINGS

●Absolute Maximum Ratings (Ta=25℃)

Item	Symbol	Ratings	Unit
Output Voltage	$V_{CEO(SUS)}$	60	V
Output Current	I_O	1.0	A
Logic Supply Voltage	V_{CC}	0 to 6	V
Logic Input Voltage	V_{IN}	0 to V_{CC}	V
Total Power Dissipation	P_T	3	W
Junction Temperature	Tj	150	℃
Storage Temperature	Tstg	-40 to 150	℃

●Electrical Characteristics (Ta=25℃)

Item	Symbol	Test Conditions	min.	typ.	max.	Unit
Output Saturation Voltage(Upper side)	V_{CE}(sat)H	Io=0.8A		1.0	1.4	V
Output Saturation Voltage(Lower side)	V_{CE}(sat)L	Io=0.8A		1.0	1.4	V
Output Leakage Current(Upper side)	Ir_H	Vmm=60V,Vout=0V			10	μA
Output Leakage Current(Lower side)	I_{rL}	Vout=60V,V_{RS}=0V			10	μA
Logic Supply Current(Standby)	I_{CC}(OFF)	Vcc=5V,V_{ENA}="H"		19	26	mA
Logic Supply Current(All Circuit ON)	I_{CC}(ON)	Vcc=5V,V_{ENA}="L"		25	33	mA
Phase"H"Input Voltage	VphaH	V_{CC} = 5V	2.3		Vcc	V
Phase"L"Input Voltage	VphaL	V_{CC} = 5V	GND		0.8	V
Phase"H"Input Current	IphaH	V_{CC} = 5V,Vpha=5V			10	μA
Phase"L"Input Current	IphaL	V_{CC} = 5V,Vpha=0V		-100	-150	μA
Enable"H"Input Voltage	V_{ENAH}	V_{CC}=5V	2.3		Vcc	V
Enable"L"Input Voltage	V_{ENAL}	V_{CC}=5V	GND		0.8	V
Enable"H"Input Current	I_{ENAH}	V_{CC}=5V,V_{ENA}=5V			10	μA
Enable"L"Input Current	I_{ENAL}	V_{CC}=5V,V_{ENA}=0V		-100	-150	μA
DECAY"H"Input Voltage	V_{DECH}	V_{CC}=5V	2.3		Vcc	V
DECAY"L"Input Voltage	V_{DECL}	V_{CC}=5V	GND		0.8	V
DECAY"H"Input Current	I_{DECH}	V_{CC}=5V,V_{DEC}=5V			10	μA
DECAY"L"Input Current	I_{DECL}	V_{CC}=5V,V_{DEC}=0V		-200	-300	μA
Reference Input Current	Iref	V_{CC}=5V,Vref=0V		-1	-10	μA
Input Current(Current Sensor)	Isense	V_{CC}=5V,V_S=0V		-1	-10	μA
Maximum Sensing Voltage	V_S(max.)	V_{CC}=5V			1.0	V
Pulse Blanking Time	tb	V_{CC}=5V,Ct=3300pF		1.35		μs
Thermal Alarm Cutoff Current	Iralm	V_{CC}=5V,Valm=5V			10	μA
Thermal Alarm Output Current	Ialm	V_{CC}=5V,Valm=0.5V			2	mA
Thermal Alarm Temperature	Talm			140		℃

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●Setting of Output Current and Chopping Frequency

Fig.1 shows constant current chopping wave form.

○Output Current setting

$$Io = \frac{R2}{R1+R2} \cdot \frac{Vcc}{Rs}$$

○Chopping Frequency Setting

$$f = \frac{1}{0.72 \cdot Ct \cdot Rt}$$

●True Table

ENA A or B	PHA A or B	Out 1 or 4	Out 2 or 3
L	L	L	H
L	H	H	L
H	×	OFF	OFF

× : don't care

●True Table for Current Decay

DECAY	Current Decay Mode
L	FAST (Sink+Source Chopping)
H	SLOW (Source Chopping)

●Recommended Parts Value

Symbol	Recommended Value	Unit
Rs	0.68	Ω
Rt	13	kΩ
Ct	4700	pF
R1+R2	<10	kΩ

●Recommended Operating Conditions (Ta=25℃)

Item	Symbol	min.	typ.	max.	Unit
Motor Supply Voltage	Vmm			50	V
Output Current	Io			0.8	A
Output Emitter Voltage	V_E			1	V
Logic Supply Voltage	Vcc	4.75		5.25	V
Chopping Frequency	fchop		20		kHz
Operating Temperature	Top	-25		120	℃

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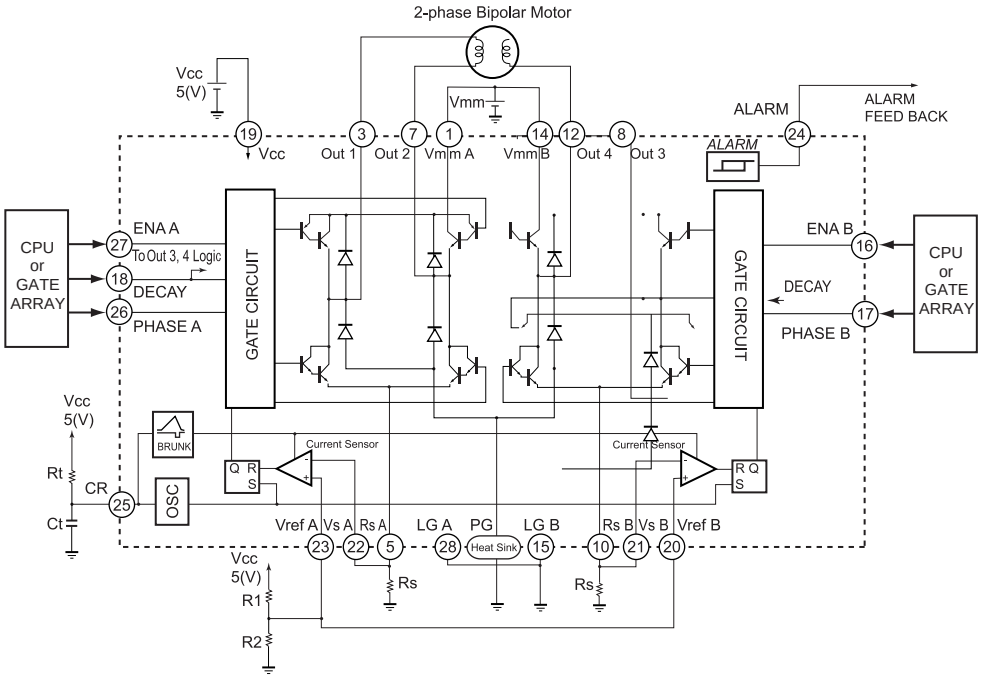
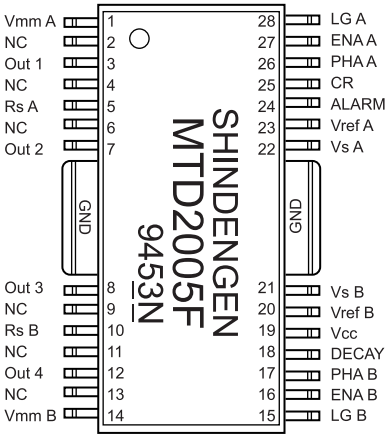
Equivalent Circuit / Basic Application Circuit



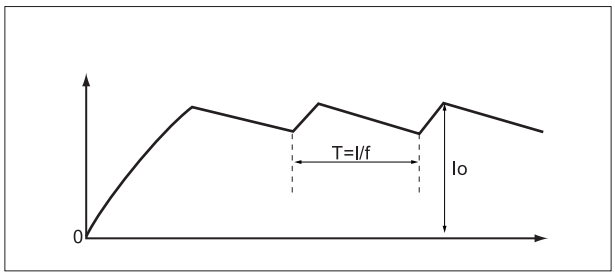
Pin Assignment



Package

HSOP-28

Fig.1 Constant current wave form (Motor current)



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