

# SHINDENGEN

## Stepping Motor Driver ICs

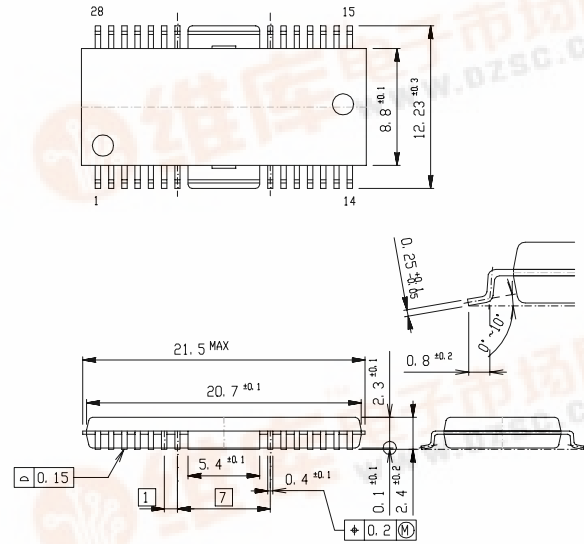
MTD Series

# MTD2005F

## OUTLINE DIMENSIONS

Case : HSOP-28

(Unit : mm)



### 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

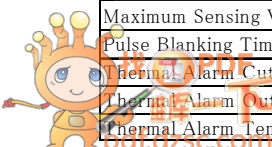
### RATINGS

● Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Unit
Output Voltage	$V_{CEO(SUS)}$	60	V
Output Current	$I_O$	1.0	A
Logic Supply Voltage	$V_{CC}$	0~6	V
Logic Input Voltage	$V_{IN}$	0~ $V_{CC}$	V
Total Power Dissipation	$P_T$	3	W
Junction Temperature	$T_j$	150	°C
Storage Temperature	$T_{stg}$	-40~150	°C

● Electrical Characteristics (Ta=25°C)

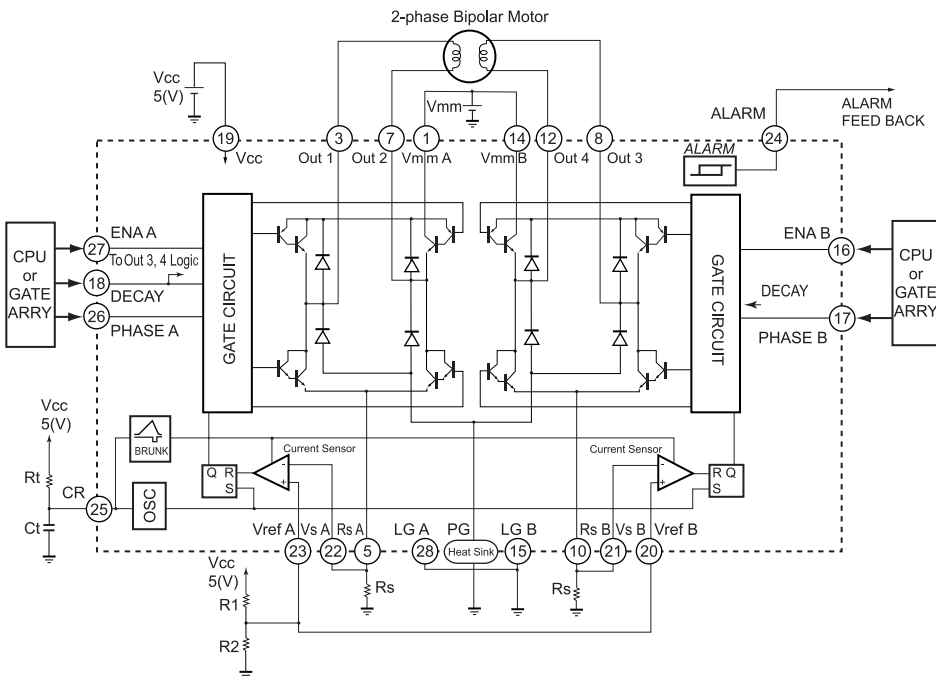
Item	Symbol	Test Conditions	min.	typ.	max.	Unit
Output Saturation Voltage(Upper side)	$V_{CE(sat)H}$	$I_o=0.8A$		1.0	1.4	V
Output Saturation Voltage(Lower side)	$V_{CE(sat)L}$	$I_o=0.8A$		1.0	1.4	V
Output Leakage Current(Upper side)	$I_{rH}$	$V_{mm}=60V, V_{out}=0V$			10	$\mu A$
Output Leakage Current(Lower side)	$I_{rL}$	$V_{out}=60V, V_{RS}=0V$			10	$\mu A$
Logic Supply Current(Standby)	$I_{CC(OFF)}$	$V_{cc}=5V, V_{ENA}="H"$		19	26	mA
Logic Supply Current(All Circuit ON)	$I_{CC(ON)}$	$V_{cc}=5V, V_{ENA}="L"$		25	33	mA
Phase"H"Input Voltage	$V_{phaH}$	$V_{CC} = 5V$	2.7		$V_{cc}$	V
Phase"L"Input Voltage	$V_{phaL}$	$V_{CC} = 5V$	GND		0.8	V
Phase"H"Input Current	$I_{phaH}$	$V_{CC} = 5V, V_{pha}=5V$			10	$\mu A$
Phase"L"Input Current	$I_{phaL}$	$V_{CC} = 5V, V_{pha}=0V$			-100	$\mu A$
Enable"H"Input Voltage	$V_{ENAH}$	$V_{CC}=5V$	2.7		$V_{cc}$	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	$\mu A$
Enable"L"Input Current	$I_{ENAL}$	$V_{CC}=5V, V_{ENA}=0V$			-100	$\mu A$
DECAY"H"Input Voltage	$V_{DECH}$	$V_{CC}=5V$	2.7		$V_{cc}$	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	$\mu A$
DECAY"L"Input Current	$I_{DECL}$	$V_{CC}=5V, V_{DEC}=0V$			-200	$\mu A$
Reference Input Current	$I_{ref}$	$V_{CC}=5V, V_{ref}=0V$			-1	$\mu A$
Input Current(Current Sensor)	$I_{sense}$	$V_{CC}=5V, V_S=0V$			-1	$\mu A$
Maximum Sensing Voltage	$V_S(max.)$	$V_{CC}=5V$			1.0	V
Pulse Blanking Time	$t_b$	$V_{CC}=5V, C_t=3300pF$		1.35		$\mu s$
Thermal Alarm Cutoff Current	$I_{ralm}$	$V_{CC}=5V, V_{alm}=5V$			10	$\mu A$
Thermal Alarm Output Current	$I_{alm}$	$V_{CC}=5V, V_{alm}=0.5V$			2	mA
Thermal Alarm Temperature	$T_{alm}$			140		°C



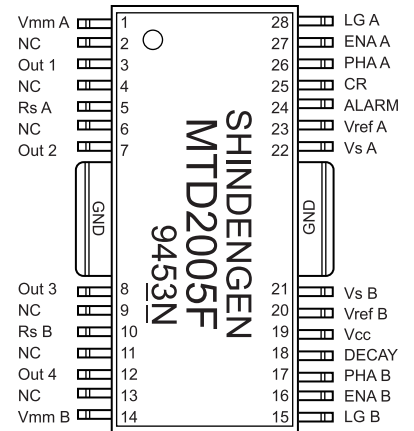
# Stepping Motor Driver ICs

# MTD2005F

## ● Equivalent Circuit · Basic Application Circuit



## ● Pin Assignment



Package  
HSOP-28

## ● True Table

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

x : don't care

## ● Recommended Parts Value

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

## ● True Table for Current Decay

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

## ● Setting of Output Current and Chopping Frequency

Fig.1 shows constant current chopping wave form.

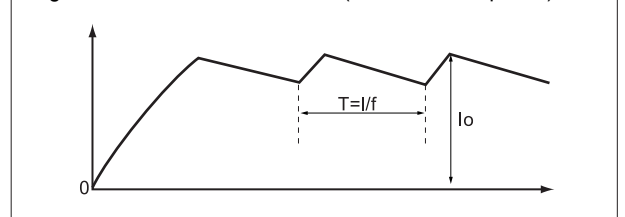
○ Output Current setting

$$I_o = \frac{R_2}{R_1 + R_2} \cdot \frac{V_{cc}}{R_s}$$

○ Chopping Frequency Setting

$$f = \frac{1}{0.72 \cdot C_t \cdot R_t}$$

Fig.1 Constant current wave form (Motor current / phase)



## ● Recommended Operating Conditions (Ta=25°C)

Item	Symbol	min.	typ.	max.	Unit
Motor Supply Voltage	Vmm			50	V
Output Current	I <sub>o</sub>			0.8	A
Output Emitter Voltage	V <sub>E</sub>			1	V
Logic Supply Voltage	V <sub>cc</sub>	4.75		5.25	V
Chopping Frequency	f <sub>chop</sub>		20		kHz
Operating Temperature	T <sub>op</sub>	-25		120	°C