

# MTD2003F

### FEATURES

- Constant-current chopping function  
(Frequency fixed, separate-oscillation)
- 4-phase input  
(with inhibit for simultaneously turn ON)
- Current levels can be selected in  
2 bit digital signal
- A noise cancel function is provided  
(No externally attached filter needed)
- Protection for penetration current
- Built-in overheating protection
- Built-in flywheel diodes

### RATINGS

#### ● Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Ratings	Unit
Output Voltage	$V_{CEO(SUS)}$	30	V
Output Current	$I_O$	1.2	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

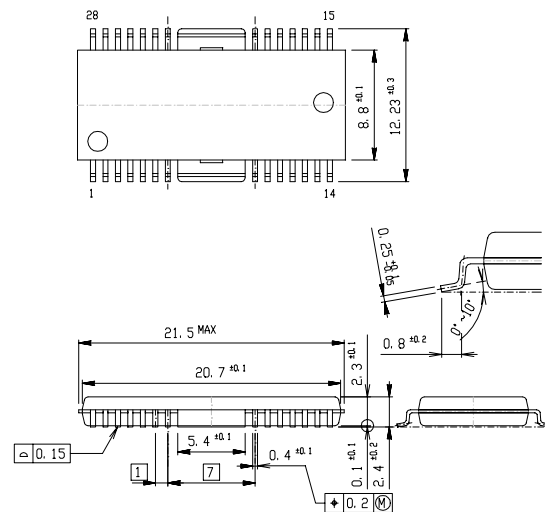
#### ● Electrical Characteristics (Ta=25°C)

Item	Symbol	Test Conditions	min.	typ.	max.	Unit
Output Saturation Voltage(Upper side)	$V_{CE(sat)H}$	$I_O=1.0A$		1.2	1.4	V
Output Saturation Voltage(Lower side)	$V_{CE(sat)L}$	$I_O=1.0A$		0.7	1.0	V
Output Leakage Current(Upper side)	$I_{rH}$	$V_{mm}=30V, V_{out}=0V$			10	$\mu A$
Output Leakage Current(Lower side)	$I_{rL}$	$V_{out}=30V, V_{RS}=0V$			10	$\mu A$
Logic Supply Current(Standby)	$I_{CC(OFF)}$	$V_{CC}=5V, I_N="H,H"$ or "L,L"		15	25	mA
Logic Supply Current(All Circuit ON)	$I_{CC(ON)}$	$V_{CC}=5V$		50	65	mA
Input High Voltage	$V_{INH}$	$V_{CC} = 5V$	2.7		$V_{CC}$	V
Input Low Voltage	$V_{INL}$	$V_{CC} = 5V$	GND		0.6	V
Logic High Input Current	$I_{INH}$	$V_{CC} = 5V, V_{IN}=5V$			10	$\mu A$
Logic Low Input Current	$I_{INL}$	$V_{CC} = 5V, V_{IN}=0V$		-3	-20	$\mu A$
$I_{O,H}$ "H" Input Voltage	$V(I_O, I_H)$	$V_{CC}=5V$	2.7		$V_{CC}$	V
$I_{O,L}$ "L" Input Voltage	$V(I_O, I_L)$	$V_{CC}=5V$	GND		0.6	V
$I_{O,H}$ "H" Input Current	$I(I_O, I_H)$	$V_{CC}=5V, V(I_O, I_H)=5V$			10	$\mu A$
$I_{O,L}$ "L" Input Current	$I(I_O, I_L)$	$V_{CC}=5V, V(I_O, I_L)=0V$		-75	-100	$\mu A$
Current Sensor Threshold(100%)	$V_{S1}$	$V_{CC}=V_r=5V, V(I_O)=0V, V(I_L)=0V$	0.475	0.5	0.525	V
Current Sensor Threshold(70%)	$V_{S2}$	$V_{CC}=V_r=5V, V(I_O)=5V, V(I_L)=0V$	0.322	0.35	0.378	V
Current Sensor Threshold(33%)	$V_{S3}$	$V_{CC}=V_r=5V, V(I_O)=0V, V(I_L)=5V$	0.153	0.17	0.187	V
Reference Input Current	$I_{ref}$	$V_{CC}=5V, V_r=5V$		500	650	$\mu A$
Input Current(Current Sensor)	$I_{sense}$	$V_{CC}=5V, V_S=0V$		-1	-10	$\mu A$
Pulse Blanking Time	$t_b$	$V_{CC}=5V, C_t=3300pF$		1.55		$\mu s$
Thermal Shutdown Temperature	$T_{TSD}$			150		°C

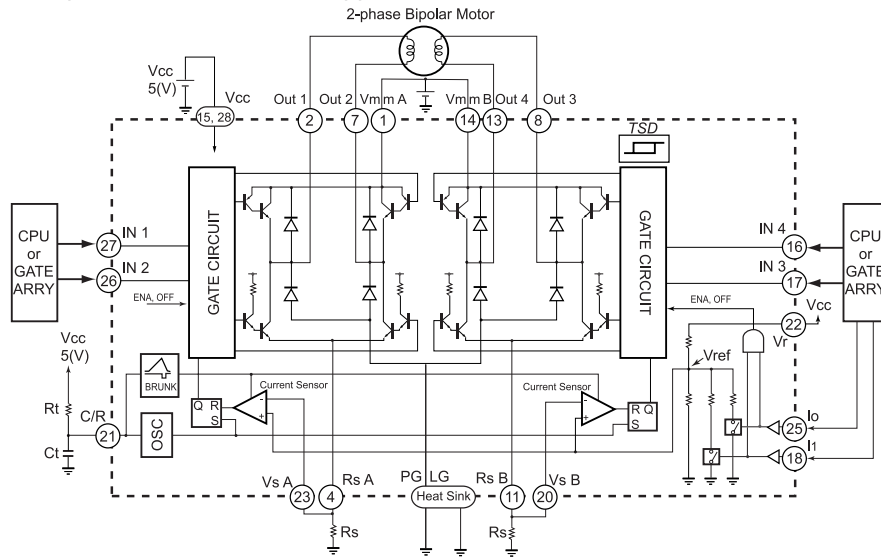
### OUTLINE DIMENSIONS

Case : HSOP-28

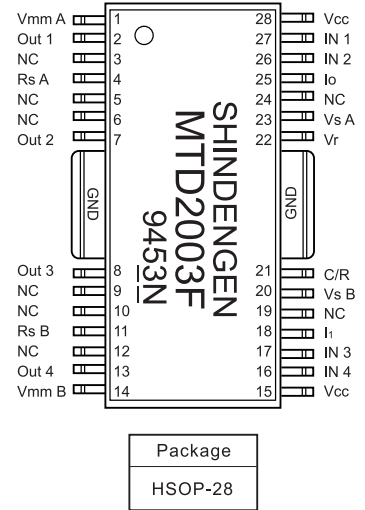
(Unit : mm)



## ● Equivalent Circuit · Basic Application Circuit



## ● Pin Assignment



## ● True Table

IN 1 or 4	IN 2 or 3	Out 1 or 4	Out 2 or 3
L	L	OFF	OFF
L	H	L	H
H	L	H	L
H	H	OFF	OFF

## ● Recommended Parts Value

Symbol	Recommended Value	Unit
Rs	0.68	Ω
Rt	18	kΩ
Ct	3300	pF
Vr	Vcc	V

## ● True Table for Current Chopping Level

Io	I1	Current Level(%)	Vref(V) (Vr=5V)
L	L	100	0.5 ± 5%
H	L	70	0.35 ± 8%
L	H	33	0.17 ± 10%
H	H	0	

## ● Setting of Output Current and Chopping Frequency

Fig.1 shows constant current chopping wave form.

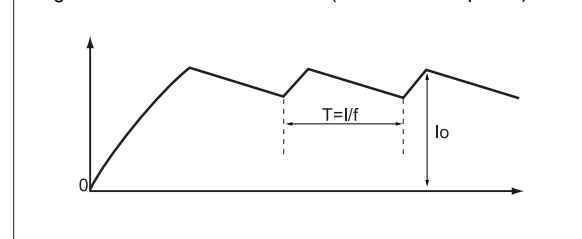
○ Output Current setting

$$Io(100\%) = \frac{Vr}{10 \cdot Rs} - 0.015$$

○ Chopping Frequency Setting

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

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			27	V
Output Current	Io			0.8	A
Logic Supply Voltage	Vcc	4.75		5.25	V
Chopping Frequency	fchop		20		kHz
Operating Temperature	Top	-25		120	°C