

MTD2003B

Dual Full-bridge PWM Stepper Motor Driver

Features

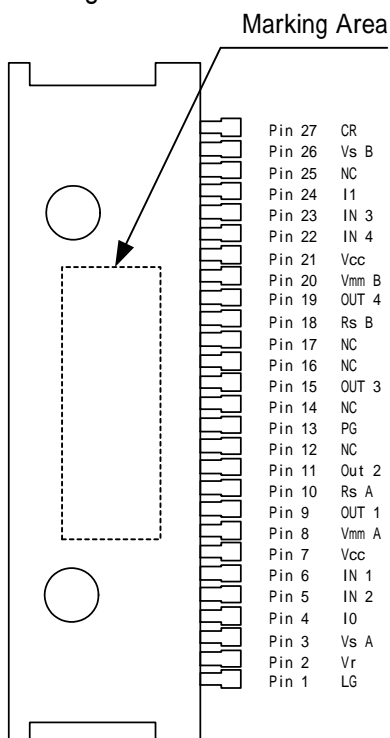
- Output current 1.2A , Output voltage 35V
- Constant current control(fixed frequency PWM control)
- 2-bit digital current selection
- Noise cancellation function
- Built-in flywheel and flyback diodes
- Cross conduction protection
- Low thermal resistance ZIP package(ZIP27)



Absolute maximum ratings / Ta=25

| Parameter | Symbol | Rating | Unit |
|------------------------------|--------------------|---------------------|------|
| Output voltage | V _{mm} | 35 | V |
| Output current | I _{OUT} | 1.2 | A |
| Logic supply | V _{CC} | 0 ~ 6 | V |
| Logic input | V _{LOGIC} | 0 ~ V _{CC} | V |
| Allowable power dissipation | P _D | 5 | W |
| Storage temperature range | T _{stg} | -40 ~ 150 | |
| Maximum Junction temperature | T _j | 150 | |

Pin Assignment



Truth 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 |

| I0 | I1 | Output current ratio[%] | Vref[V] (at Vr=5V) |
|----|----|-------------------------|-----------------------|
| L | L | 100 | 0.50 ± 5% |
| H | L | 70 | 0.35 ± 8% |
| L | H | 33 | 0.17 ± 10% |
| H | H | 0 | - |

Stepper Motor Driver IC

MTD2003B

Electrical Characteristics

 $V_{CC}=5V$, $T_a=25$ unless otherwise specified

| Parameter | Symbol | Condition | MIN | TYP | MAX | Unit |
|-------------------------------------|----------------|--|-------|------|----------|---------|
| Output stage | | | | | | |
| Upper transistor saturation voltage | $V_{CE(sat)H}$ | $I_C=1.0A$ | - | 1.2 | 1.4 | V |
| Lower transistor saturation voltage | $V_{CE(sat)L}$ | $I_C=1.0A$ | - | 0.7 | 1.0 | V |
| Upper transistor leak current | I_{rH} | $V_{mm}=35V, V_{OUT}=0V$ | - | - | 10 | μA |
| Lower transistor leak current | I_{rL} | $V_{OUT}=35V, V_{RS}=0V$ | - | - | 10 | μA |
| Upper diode forward drop | V_{FH} | $I_F=1.0A$ | - | 1.4 | 1.6 | V |
| Lower diode forward drop | V_{FL} | $I_F=1.0A$ | - | 1.3 | 1.5 | V |
| Logic stage | | | | | | |
| Logic supply current (2circuit ON) | $I_{CC(ON)}$ | | - | 50 | 65 | mA |
| Logic supply current (2circuit OFF) | $I_{CC(OFF)}$ | $V_{IN}=\text{all } 0V \text{ or all } 5V$ | - | 15 | 25 | mA |
| IN "H" input voltage | V_{INH} | | 2.3 | - | V_{CC} | V |
| IN "L" input voltage | V_{INL} | | GND | - | 0.6 | V |
| IN "H" input current | I_{INH} | $V_{IN}=3.3 \text{ or } 5V$ | - | - | 10 | μA |
| IN "L" input current | I_{INL} | $V_{IN}=0V$ | - | -3 | -20 | μA |
| I0,11 "H" input voltage | $V_{I0/11H}$ | | 2.3 | - | V_{CC} | V |
| I0,11 "L" input voltage | $V_{I0/11L}$ | | GND | - | 0.6 | V |
| I0,11 "H" input current | $I_{I0/11H}$ | $V_{I0/11}=3.3 \text{ or } 5V$ | - | - | 10 | μA |
| I0,11 "L" input current | $I_{I0/11L}$ | $V_{I0/11}=0V$ | - | -75 | -100 | μA |
| Vr input current | I_{ref} | $V_r=5V$ | - | 500 | 650 | μA |
| Vs input current | I_s | $V_s=0V$ | - | -1 | -10 | μA |
| Comparator threshold (100%) | V_{s1} | $V_r=5V, V_{I0}=0V, V_{I1}=0V$ | 0.475 | 0.5 | 0.525 | V |
| Comparator threshold (70%) | V_{s2} | $V_r=5V, V_{I0}=5V, V_{I1}=0V$ | 0.322 | 0.35 | 0.378 | V |
| Comparator threshold (33%) | V_{s3} | $V_r=5V, V_{I0}=0V, V_{I1}=5V$ | 0.153 | 0.17 | 0.187 | V |
| Chopping frequency | f_{CHOP} | | - | 20 | - | kHz |
| Blanking time | t_b | $C_t=3300pF$ | - | 1.55 | - | μs |
| Vs maximum voltage | $V_{s(max)}$ | | - | - | 1.5 | V |

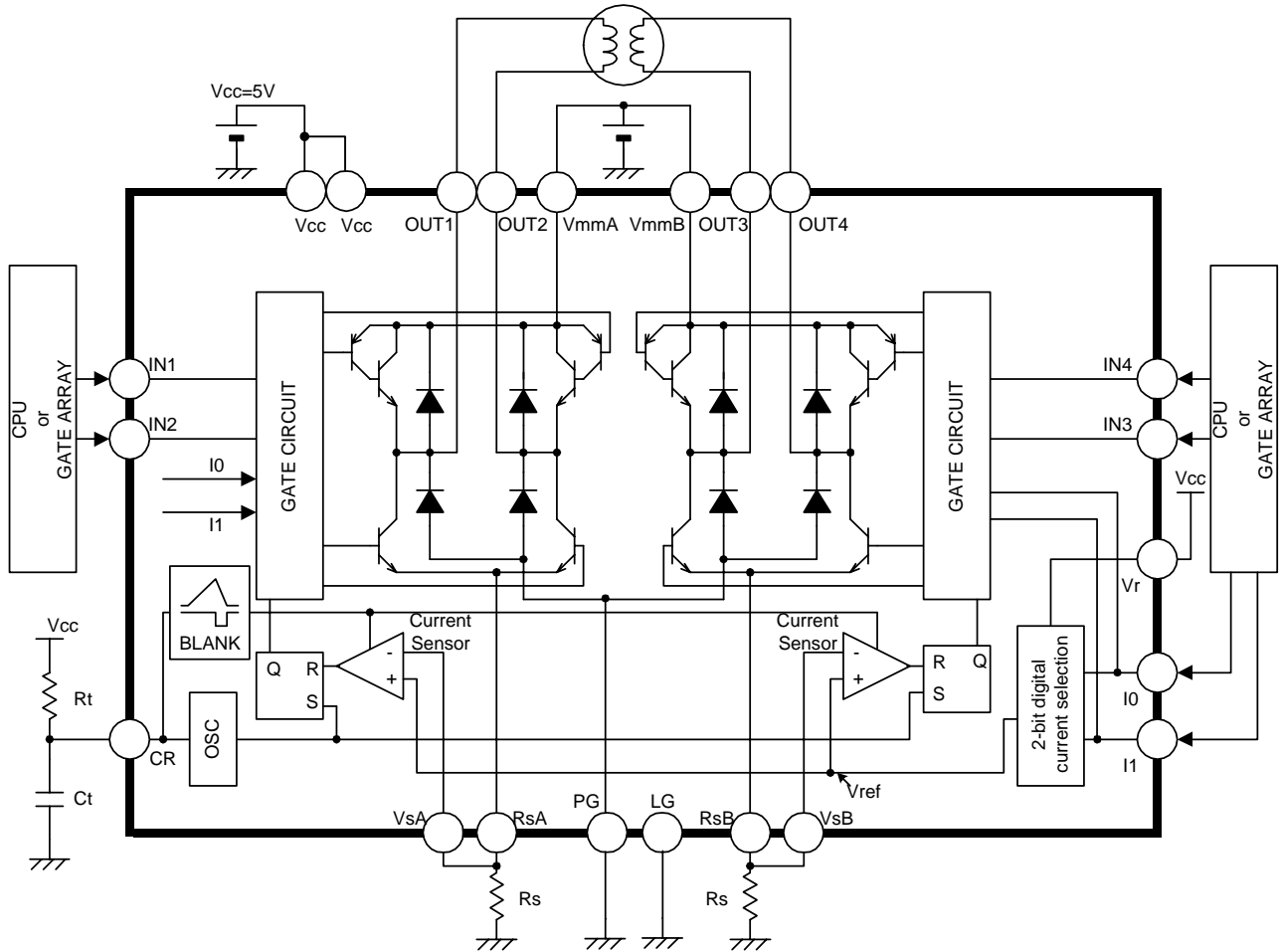
Recommended operation conditions

| Parameter | Symbol | Recommendation | Unit |
|----------------------|----------|----------------|------|
| Junction temperature | T_j | -25 ~ 120 | |
| Logic supply | V_{CC} | 4.75 ~ 5.25 | V |
| Load supply | V_{mm} | 5 ~ 31 | V |

Thermal resistance

| Symbol | Rating | Unit |
|--------|--------|------|
| j_a | 25 | /W |

Block diagram / Typical application



Constant chopping current level

$$I_{chop} = \frac{V_r}{10 \times R_s} - 0.015$$

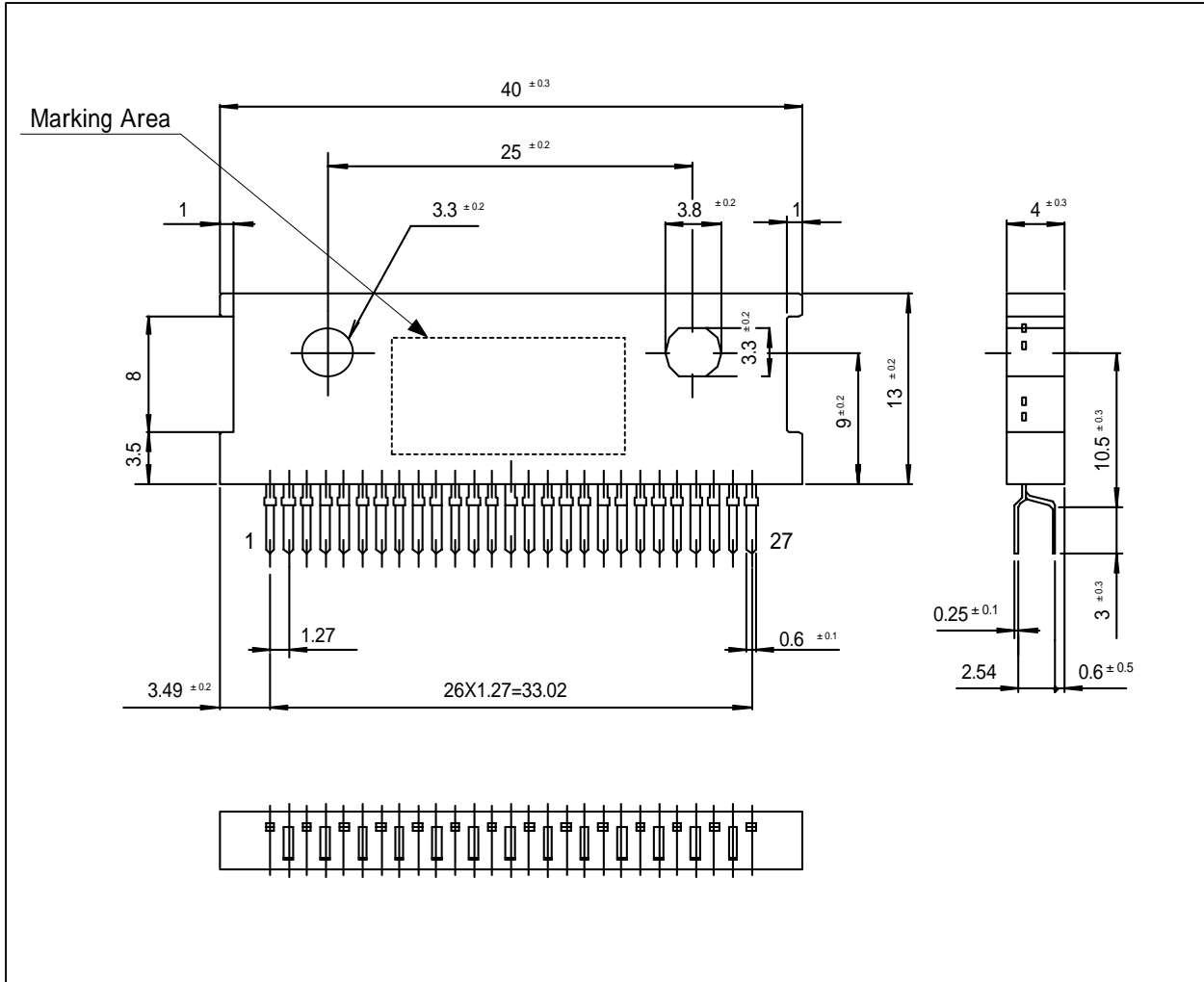
Recommended component values

| Symbol | Recommended component values | Unit |
|--------|------------------------------|------|
| Rt | 18 | k |
| Ct | 3300 | pF |
| Vr | Vcc | V |


ONE SHOT OFF TIME


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

Outline Drawing



(Unit : mm)

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