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We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

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Instruction manual
for Evaluation Board of
TB67S109AFNG

May 10, 2015

Re v.1.0

【Outline】
The TB67S109A is a two-phase bipolar stepping motor driver using a PWM chopper. CLK-IN control system and BiCD process are adopted. Rating of 50V and 4.0A is realized.
This evaluation board mounts necessary components to evaluate the IC. Each excitation drive of full step, half step, quarter step 1/8 step, 1/16 step, and 1/32 step can be run with PWM constant current drive. Please sense low noise and low vibration of the stepping motor.

【Note】
 In using, please be careful about thermal condition sufficiently.
As for each control signal, please refer to the IC specification by accessing to the below URL.
http://toshiba.semicon-storage.com/info/lookup.jsp?pid=TB67S109AFNG&region=apc&lang=en
Further, the application of this evaluation board is limited to the purpose of evaluating and learning the motor control. Please do not ship them to a market.
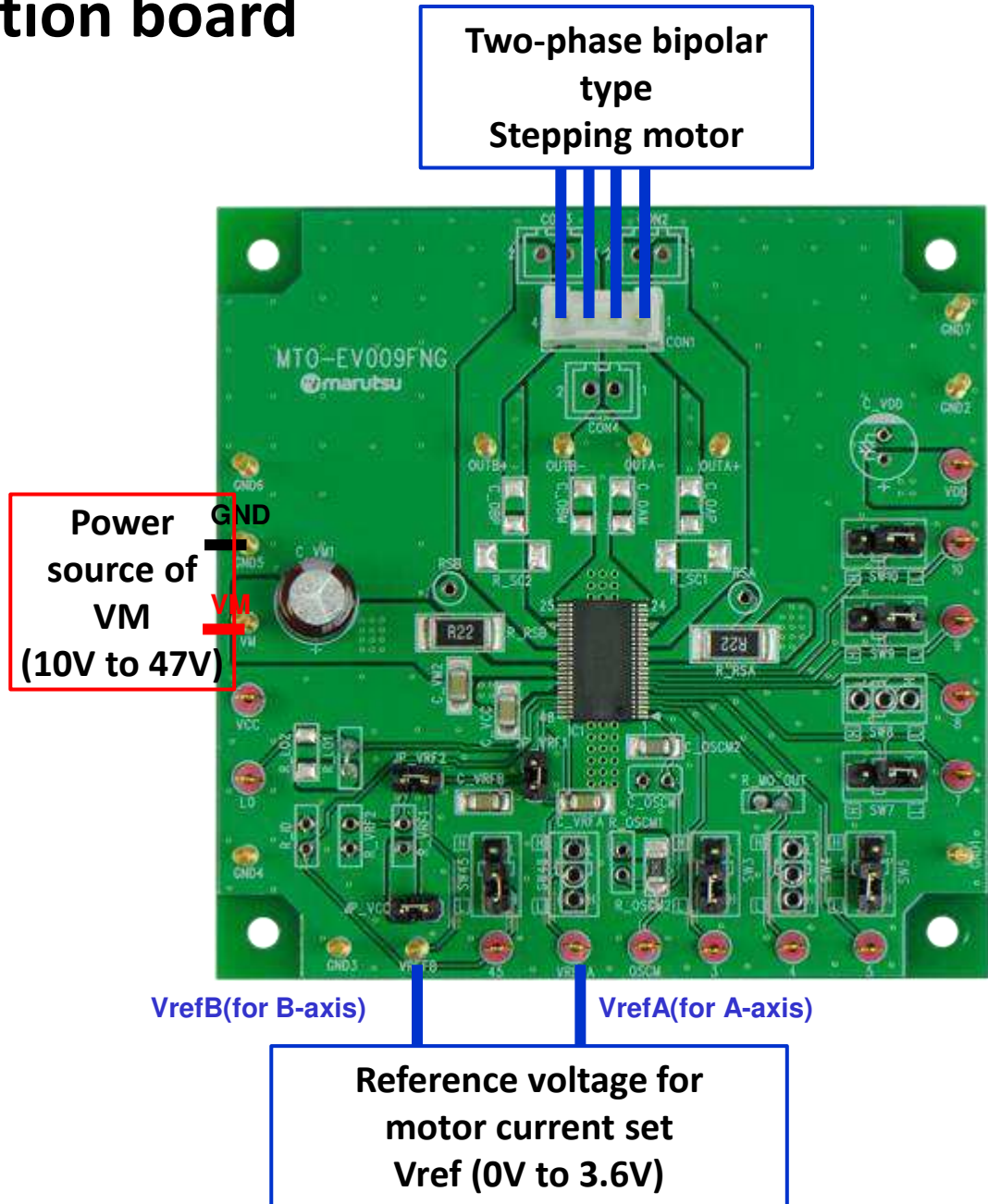
Connection to Evaluation board
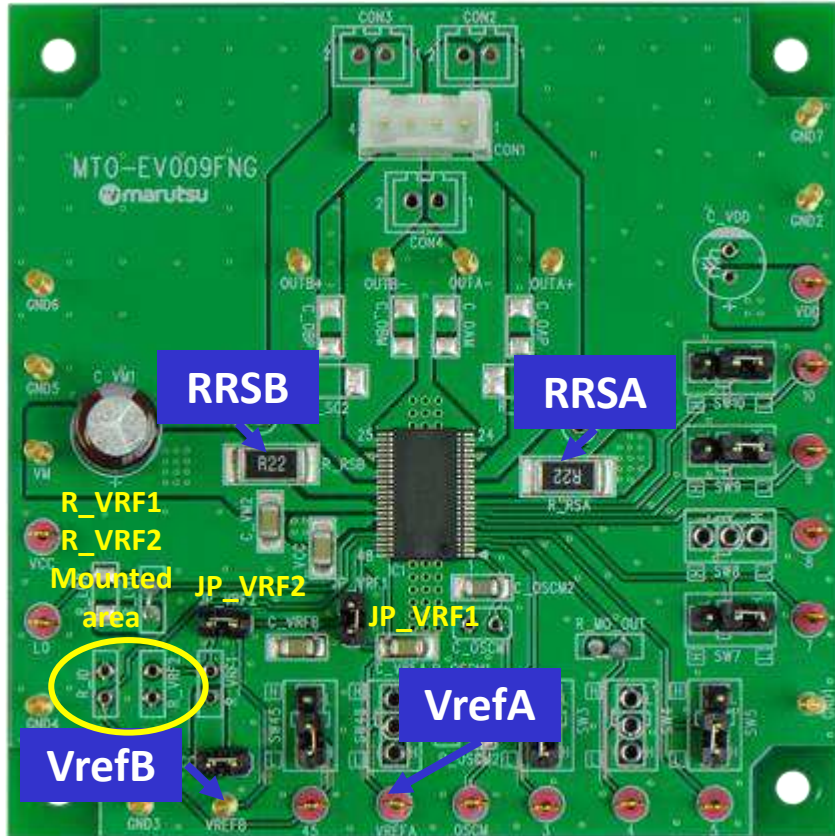
Corresponding table
(Silk name vs. Signal name)

(Note) Silk name and signal name on the board are different because the series products have the common board.

Silk name	Signal name
GND7	NC
GND6	NC
LO	LO
VREFB	VREFB
45	DMODE0
VREFA	VREFA
OSCM	OSCM
3	CW/CCW
4	MO
5	DMODE1
7	DMODE2
8	CLK
9	ENABLE
10	RESET

Two-phase bipolar type Stepping motor

Power source of VM (10V to 47V)

GND

VM

VrefB(for B-axis)

VrefA(for A-axis)

Reference voltage for motor current set Vref (0V to 3.6V)

MTO-EV009FNG

Setting evaluation board 1

Setting motor current

MTO-EV009FNG
marutsu

RRSB | RRSA
R_VRF1
R_VRF2
Mounted area | JP_VRF2
JP_VRF1
VrefA
VrefB

Setting motor current

$$Iout(max) = VREF(gain) \times \frac{Vref(V)}{R_{RS}(\Omega)}$$

VREF(gain):Decay ratio of VREF: 1/5.0 (typ.)

RRS=0.22Ω

VREF of A-axis and B-axis are made common by short the jumper (JP_VRF1) and the both voltages are possible to input from VREFA pin. And Vref can be generated from the internal regulator (VCC) by mounting the divider resistance to R_VRF1 and R_VRF2 and short-circuiting JP_VRF2.
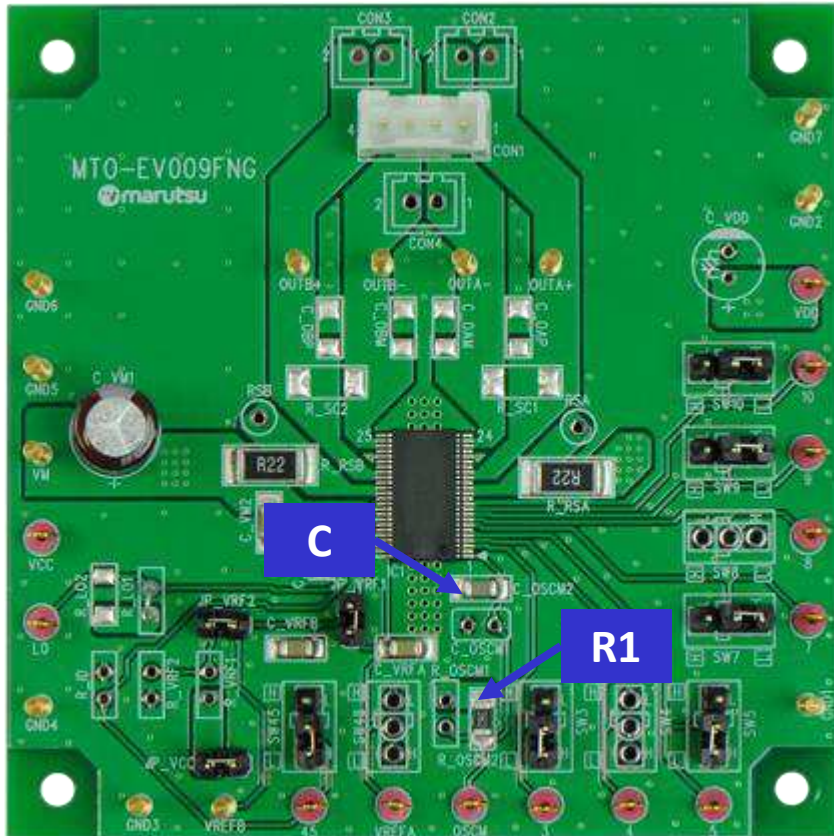
Waveform of motor current

Charge / Fast
Slow

Current value of setting motor
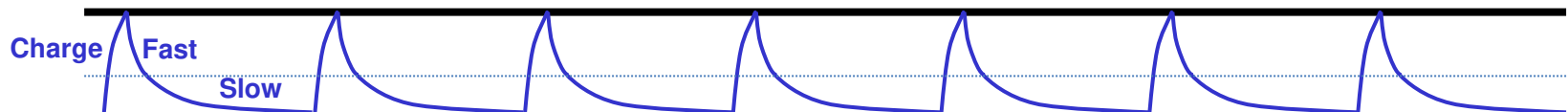
Setting evaluation board2
Setting chopping frequency of the constant current of the motor

Formula of setting chopping frequency

$fOSCM = 1 / [0.56 \times \{C \times (R1 + 500)\}]$
$fchop = fOSCM / 16$

Recommended frequency range:
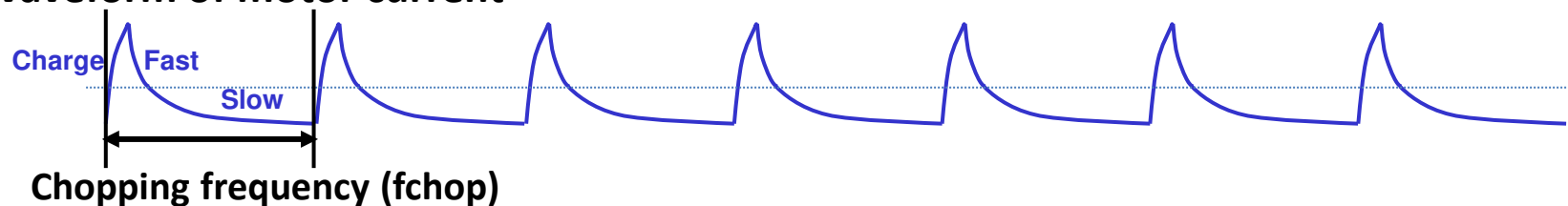fchop=40kHz to 150kHz
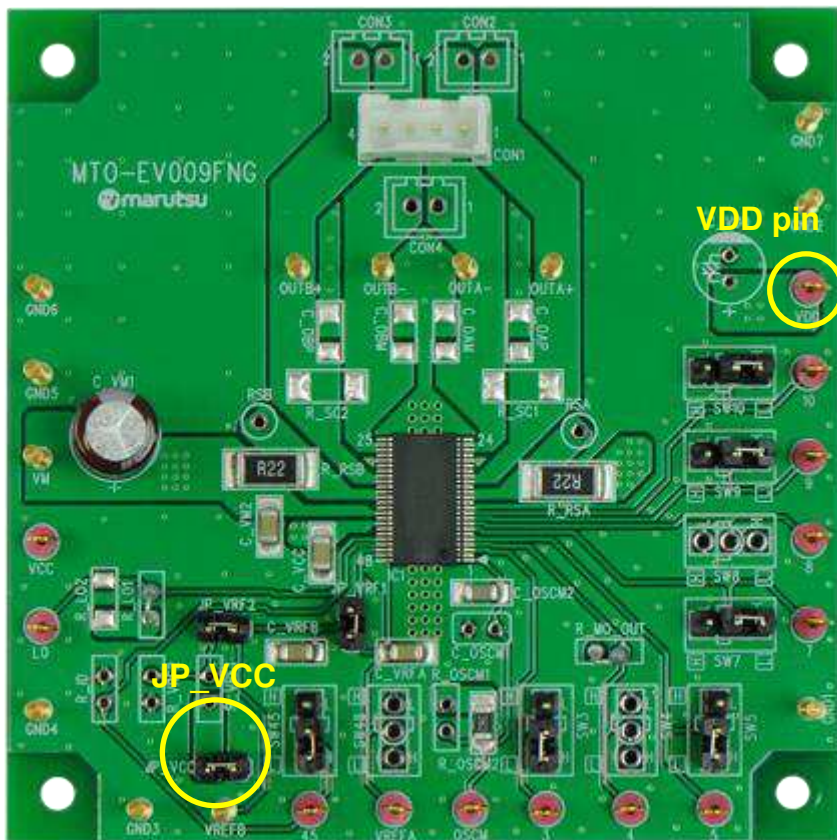100kHz configuration
Mounted parts are as follows;
Capacitor (C=270pF), Resistance
(R1=3.6kΩ)

Waveform of motor current

Charge Fast

Slow

Chopping frequency (fchop)

Setting evaluation board3

Setting motor operation

【**Enhanced figure of jumper part**】

Fixed level by jumper

Jumper indicated above is adopted on this evaluation board to set operation of the TB67S109AFNG.

To select the function by the jumper, short-circuit JP_VCC or supply the voltage of high level by VDD pin.

In above, fixed level of the silk near the jumper is indicated inside the white frame. Please change the short position according to the configuration of the usage function.

In case of inputting the signal externally, please remove the short pin.

Circuit of evaluation board