

Instruction manual for Evaluation Board of TB67S141FTG

Aug 9, 2019

Rev. 1.3

【Outline】

The TB67S141 is a two-phase unipolar stepping motor driver using a PWM chopper. PHASE control system and BiCD process are adopted. Rating of 45V and 3.0A is realized.

This evaluation board mounts necessary components to evaluate the IC. Each excitation drive of full step, half step, and quarter 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.

<https://toshiba.semicon-storage.com/us/product/linear/motordriver/detail.TB67S141FTG.html>

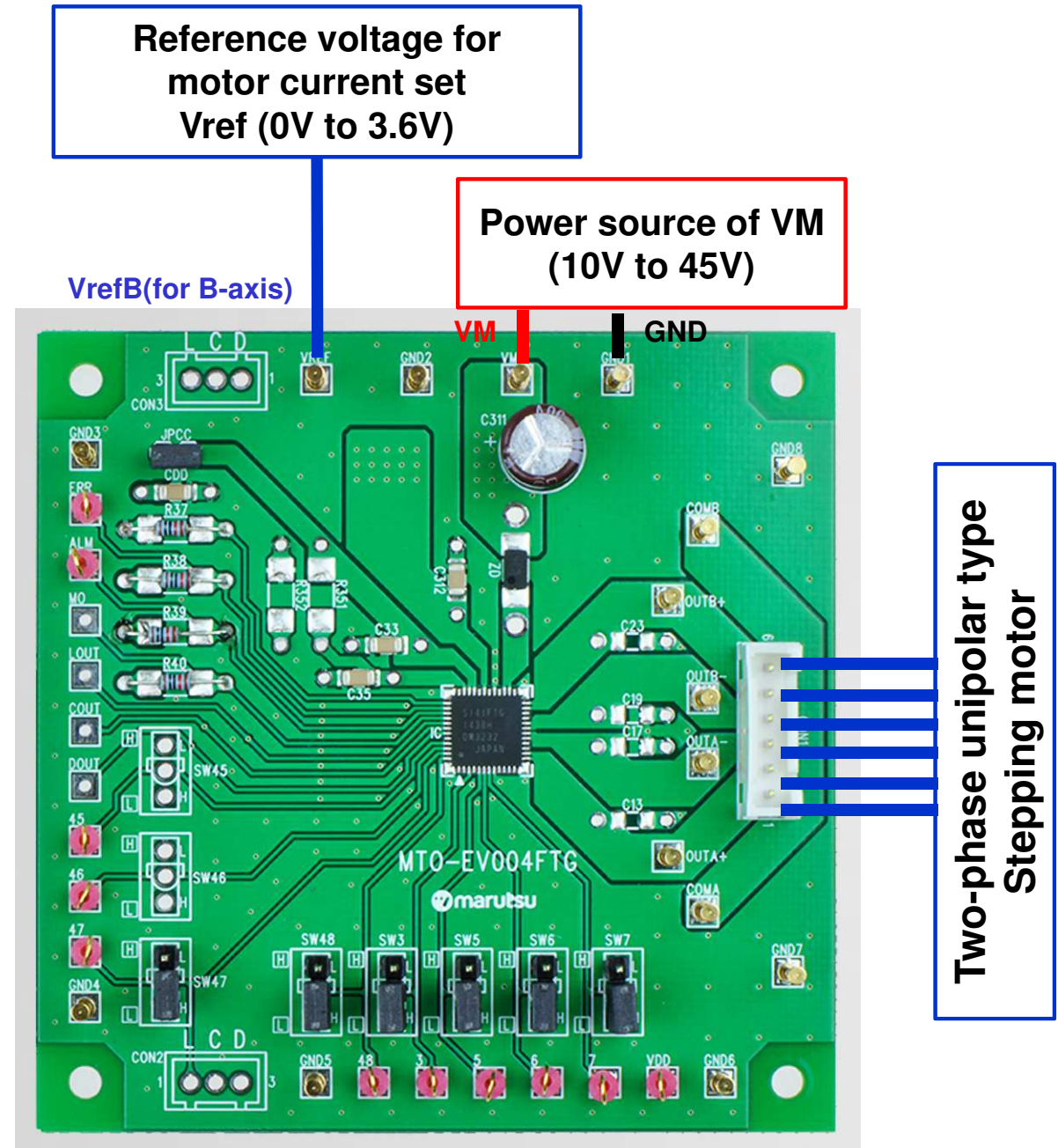
Further, the application of this evaluation board is limited to the purpose of evaluating and learning the motor control. Please do not ship them to a market.

Connection to Evaluation board

Corresponding table (Silk name vs. Signal name)

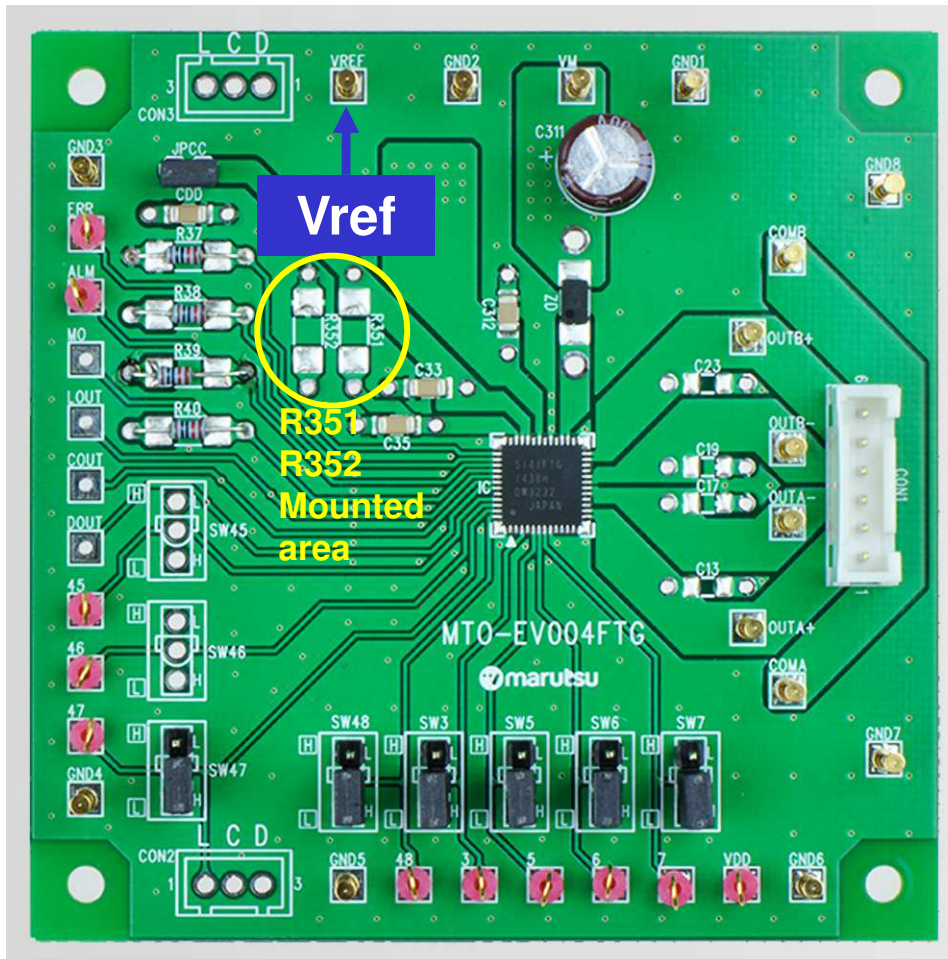
(Note) Silk name and signal name on the board are different because the series products have the common board.

Silk name	Signal name
ERR	ERR
ALM	ALM
MO	NC
LOUT	NC
COUT	NC
DOUT	NC
45	PHASEA
46	PHASEB
47	INA1
48	INA2
3	INB1
5	INB2
6	STANDBY
7	BRAKE



Setting evaluation board1

Setting motor current



Setting motor current

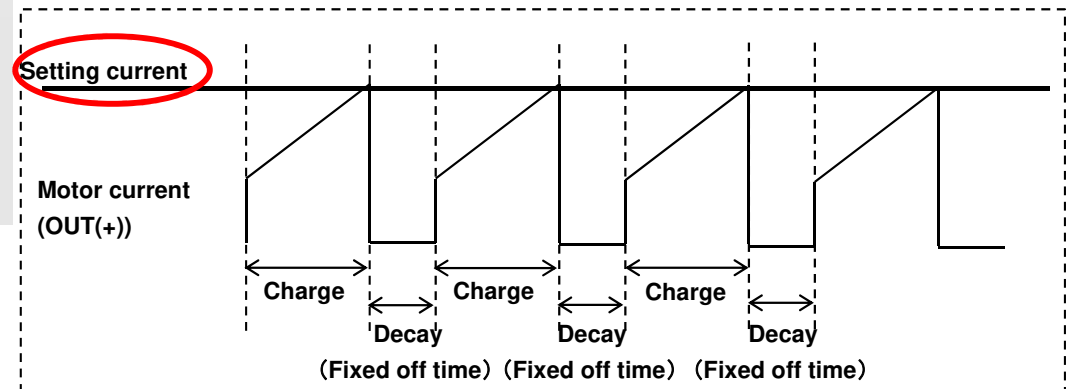
$$I_{out(max)} = V_{ref}(V) \times 3/4$$

Vref can be generated from the internal regulator (VCC) by mounting the divider resistance to R351 and R352.

Please mount the divider resistance in generating Vref from the internal regulator (VCC).

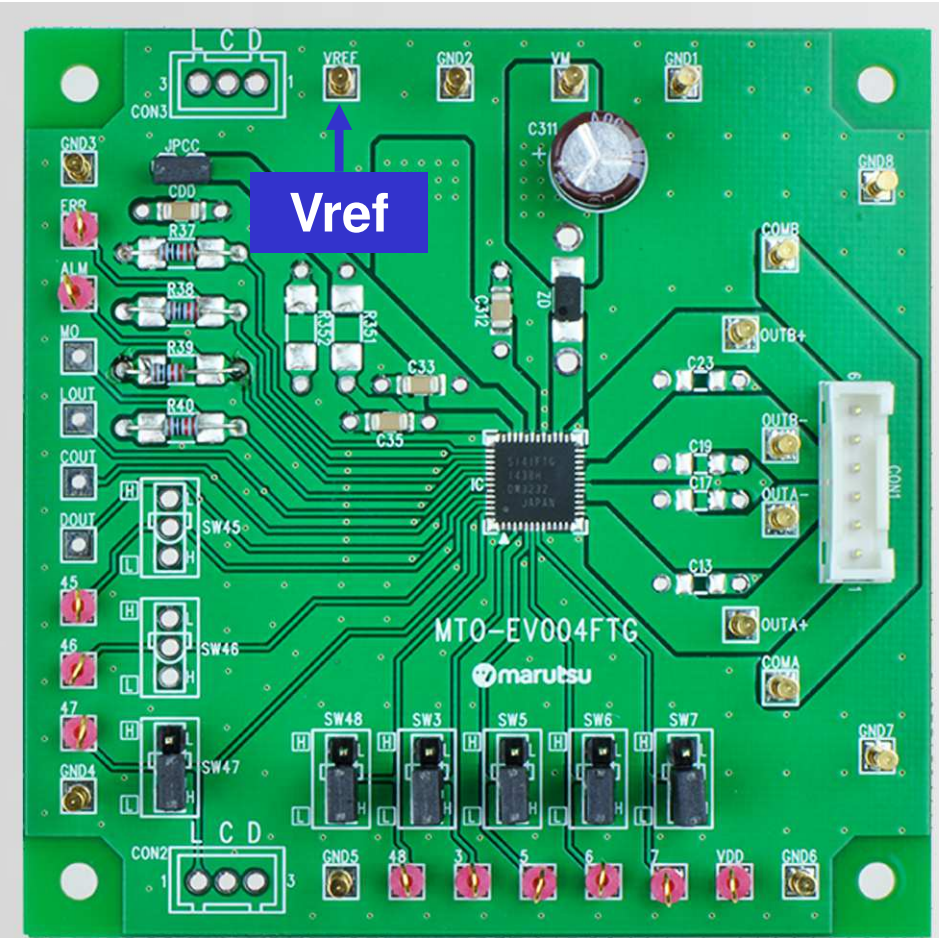
R351: VCC side, R352: GND side

Relation between setting current and waveform of motor drive current



Setting evaluation board2

Setting constant current PWM control



Setting fixed off time

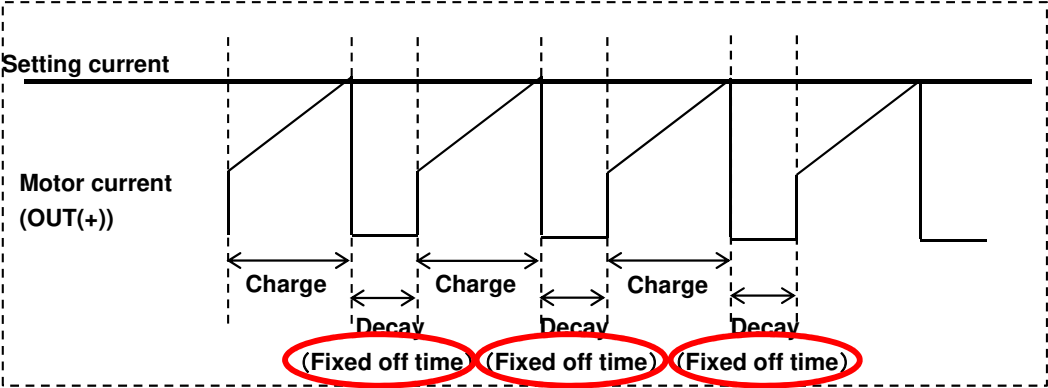


The TB67S141 drives with constant current PWM control. Fixed off time can be configured with pull-down resistance which is connected to OSCM pin. The relation between the pull-down resistance and the fixed off time is shown in the below table. Please adjust by referring to it.

- *The values in the table do not include variations in precision of the IC and external parts. They are reference data.
- *Please connect the standard resistance (10kΩ) even in the constant voltage mode.

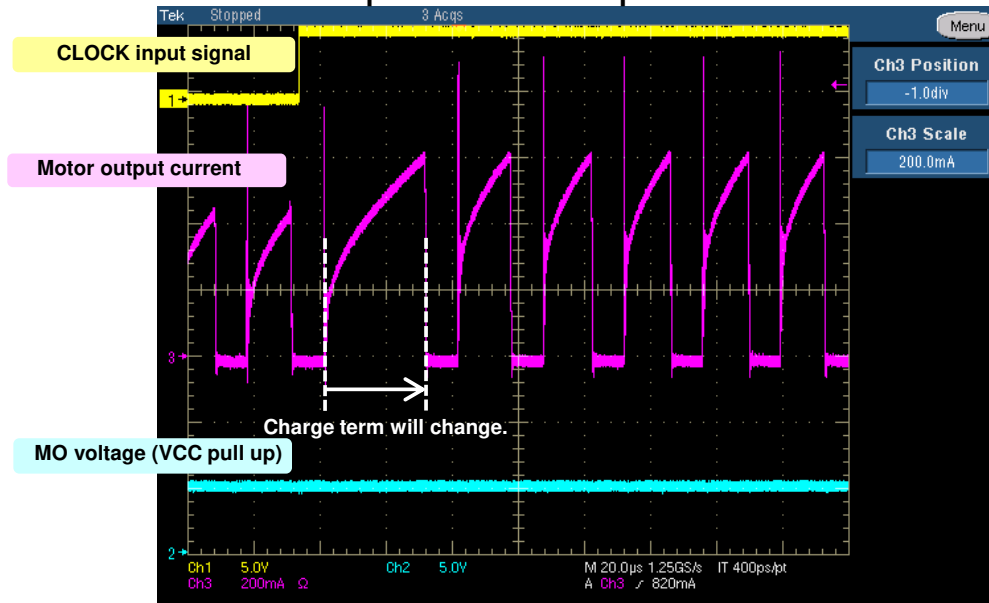
External resistance(ROSCM)	Fixed off time (toff)
3.9kΩ	4.1μs
4.7kΩ	4.9μs
5.6kΩ	5.8μs
6.8kΩ	7.0μs
8.2kΩ	8.3μs
10kΩ	10μs
15kΩ	15μs
18kΩ	18μs
22kΩ	21μs
27kΩ	26μs
39kΩ	37μs

Relation between fixed off time and waveform of motor drive current



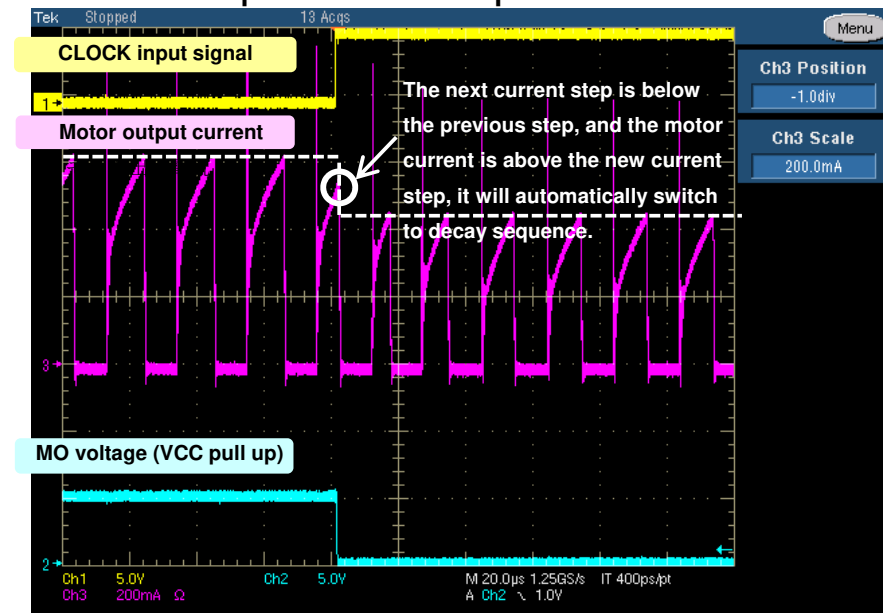
(Reference) Waveform of motor drive

【When the next current step is higher than the previous step



When the current threshold (current step) is shifted to the next threshold (step), the 'Charge' time may change, but the 'Decay (=off time)' time will not. (The off time depends on the OSCM resistance.)

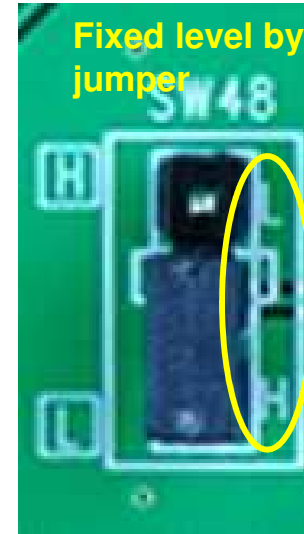
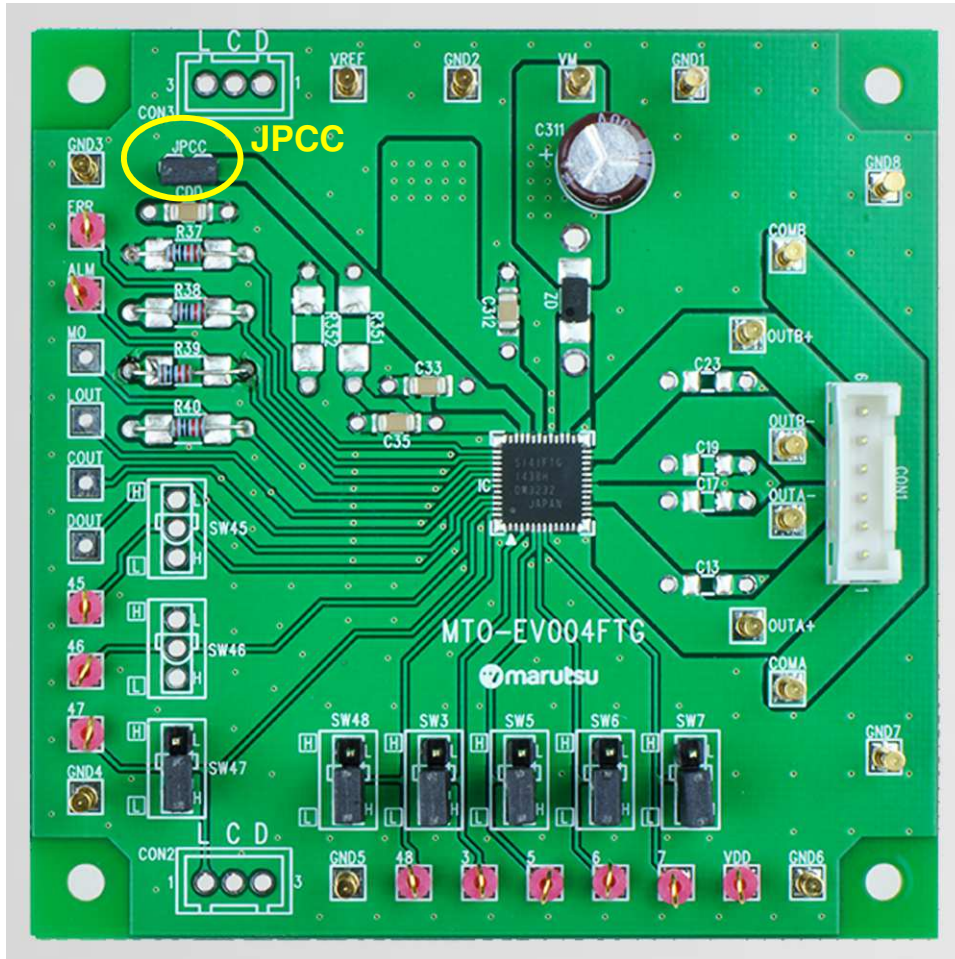
【When the next current step is lower than the previous step



When the current step is shifted to the next step: if the motor current is above the PWM threshold, it will then go onto the decay sequence. If the motor current is below the next current step, it will continue on to the constant current PWM.

Setting evaluation board3

Setting motor operation

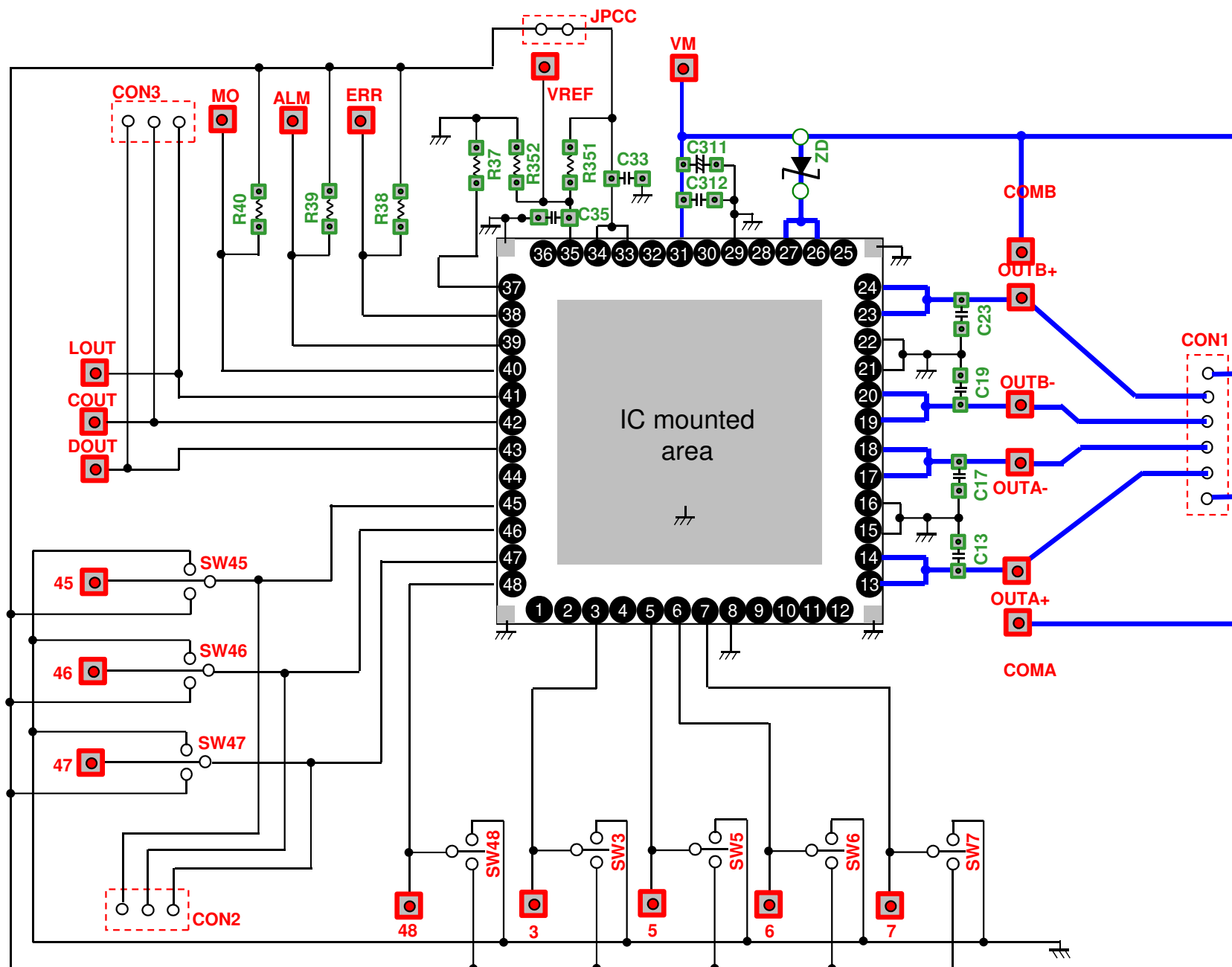


Jumper indicated in the left figure is adopted on this evaluation board to set operation of the TB67S141FTG.

To select the function by the jumper, short-circuit JPCC. 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



◆ Important Note ◆

● This product was not designed for use with devices which could cause personal injury in the event of failure or malfunction, including devices for use in areas including medical, military, aviation, aerospace, nuclear control, other types of safety mechanisms, etc., or for use in devices which require a high standard of safety. Do not use this product for such applications. This company assumes no liability for damages which may result from use of the product.

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