

# **Instruction Manual for Evaluation Board of The TB6605FTG**

August, 21<sup>st</sup> , 2018

Re v.1.0

## 【Outline】

The TB6605FTG is a pre-driver for 3 phase brushless DC motor. BiCD process is adopted. Maximum ratings of motor drive voltage is 30V and operating range is up to 28V.

This evaluation board mounts necessary components to evaluate the motor. And uses 8A and 30V ratings Nch type MOS FET as output.

Connecting external hall elements and motor to this board, it's possible to control motor. Please try the controllability of a brushless DC motor by applying the TB6605FTG.

## 【Note】

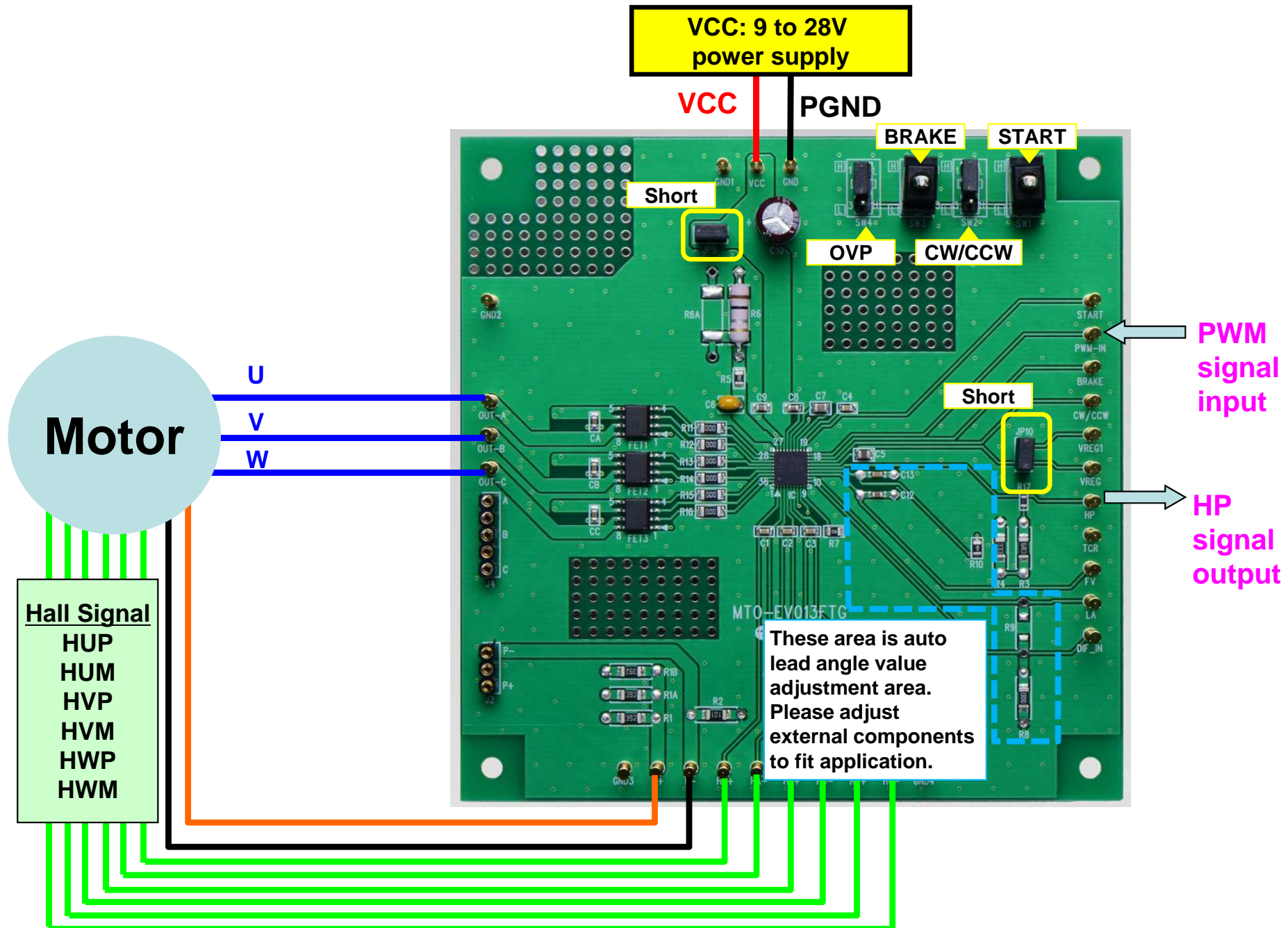
In using, please be careful about the thermal condition sufficiently.

For each control signal, please refer to the IC specifications by accessing to the following URL:

<http://toshiba.semicon-storage.com/ap-en/product/linear/motordriver/detail.TB6605FTG.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



# Power ON and power OFF sequence and notes



## Power ON sequence

1. In general, please set BRAKE switch to high level.
2. During start operation, please hold inputting PWM signal as low level.
3. On next step, please set to START switch to high level.
4. In case of motor drive voltage is 24V, please set to OVP pin to high level. In case of motor drive voltage is 12V, please set to OVP pin to low level.
5. Please supply VCC voltage (VCC voltage range is 9 to 28V.)
6. Please set to START switch as low level. (Motor starts operation.)
7. When PWM signal(speed control signal) inputs to PWM-in pin, a motor speed changes based on PWM signal.

## Power OFF sequence

1. Down PWM duty slowly, and stop the motor rotation.
2. Set START switch to high level position.
3. Fixed PWM signal to low level.
4. Power OFF of VCC power supply.

**(Note 1): Please adjust R6 resistor value to fit current limiter target value.**

**(Current limit value) :  $0.1\Omega$  is mounted on this board.  $I_{out} (max) = 0.25V / R6 = 2.5A$**

**(Note 2): Please adjust lock protection setting used R3 and R4 resistor value.**

**In this board,  $68k\Omega$  is mounted as R3, and  $33k\Omega$  is mounted as R4. It becomes automatic recovery mode, and lock detection time is 1s.**

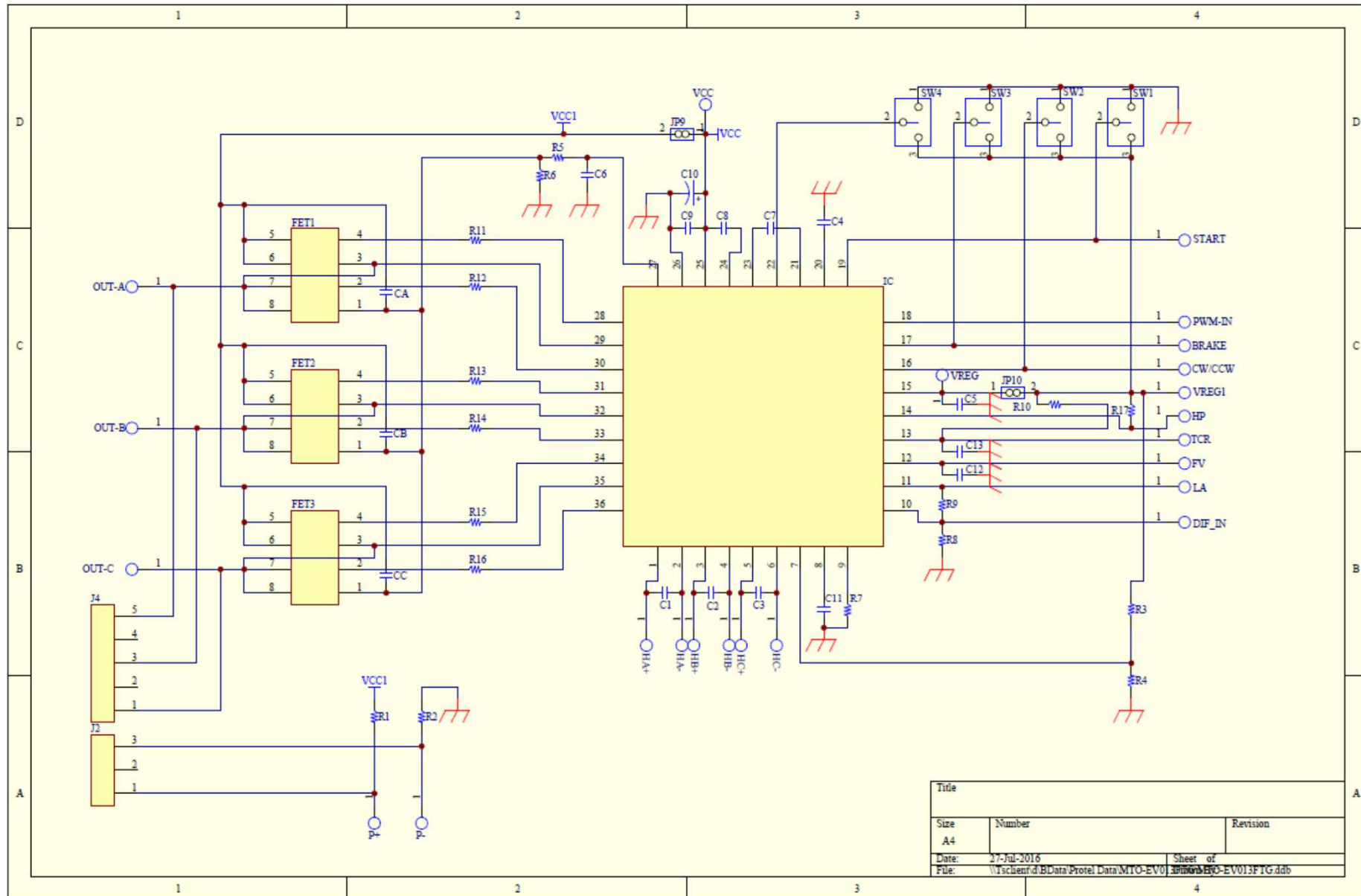
**(Note 3): Switches are used for OVP pin, BRAKE pin, CW/CCW pin and START pin settings.**

Switch name	Pin name	High/Low	Explanation
SW1	OVP	High	Motor drive voltage : 24V
		Low	Motor drive voltage : 12V
SW2	BRAKE	High	Operation
		Low	Brake
SW3	CW/CCW	High	Reverse
		Low	Forward
SW4	START	High	Stop (Charge Pump circuit is stopped)
		Low	Operation (Charge Pump circuit is operation)

# The method of JP(Jumper) usage

JP name	Related pins	Initial status	Comments
JP2	P+, P-	Open	It used for power supply connector of hall elements.
JP4	OUT-A OUT-B OUT-C	Open	It uses for motor connector. OUT - A pin , OUT - B pin, OUT - C pin are connected based on silk indication.
JP9	VCC	Short	It must use with short condition. Supplies to power of FET and hall elements.
JP10	VREG,VREG1	Short	Please use it with short condition, basically. When JP10 is shorted, VREF supplies to the power for pull up.

# The circuit diagram of evaluation board



# BOM list of evaluation board

ID	Manufacture Part No.	Supplier	Description
IC	TB6605FTG	TOSHIBA	BLDC pre-driver IC
R1,R1A, R1B	RK73B2BTDD392J	KOA	3.9k $\Omega$
R2	RK73B2BTDD101J	KOA	100 $\Omega$
R3	RK73B2BTDD683J	KOA	68k $\Omega$
R4	RK73B2BTDD333J	KOA	33k $\Omega$
R5	RK73B2BTDD102J	KOA	1k $\Omega$
R6	MOSX1CR10J	KOA	0.1 $\Omega$ (1W)
R7	RK73B2BTDD103J	KOA	10k $\Omega$
R8	RK73Z2BTDD	KOA	0 $\Omega$ JUMPER
R9			Not Mounter
R10	RK73B2ATDD104J	KOA	100k $\Omega$
R11,R12,R13, R14, R15, R16	RK73Z2BTDD	KOA	0 $\Omega$ JUMPER
R17	RK73B1JTDD113J	KOA	11k
C1,C2,C3	GRM188B11H103KA01D	Murata	Ceramic capacitor 50V 0.01uF
C4	GRM188B11H153KA01D	Murata	Ceramic capacitor 50V 0.015uF
C5	GRM21BB31H105KA12L	Murata	Ceramic capacitor 50V 1uF
C6	C315C222K1R5TA	KEMET	Ceramic capacitor 100V 2200pF
C7	GRM21BR71H474KA88L	Murata	Ceramic capacitor 50V 0.47uF
C8	GRM188B31H104KA92D	Murata	Ceramic capacitor 50V 0.1uF
C9	GRM188B31H104KA92D	Murata	Ceramic capacitor 50V 0.1uF
C10	KMG50VB47M	Nippon chemi-con	Electrolytic capacitor 47uF
C11	GRM1882C1H470JA01D	Murata	Ceramic capacitor 50V 47pF
C12	GRM188B31H104KA92D	Murata	Ceramic capacitor 50V 0.1uF
C13	GRM188B11H332KA01D	Murata	Ceramic capacitor 50V 3300pF
CA, CB, CC	GRM188B31H104KA92D	Murata	Ceramic capacitor 50V 0.1uF
SW1	ATE1E-2J3-10-Z	Fujisoku	Toggle Switch
SW3	ATE1E-2J3-10-Z	Fujisoku	Toggle Switch
FET1, FET2, FET3	TPC8224-H,LQ(S	TOSHIBA	MOSFET