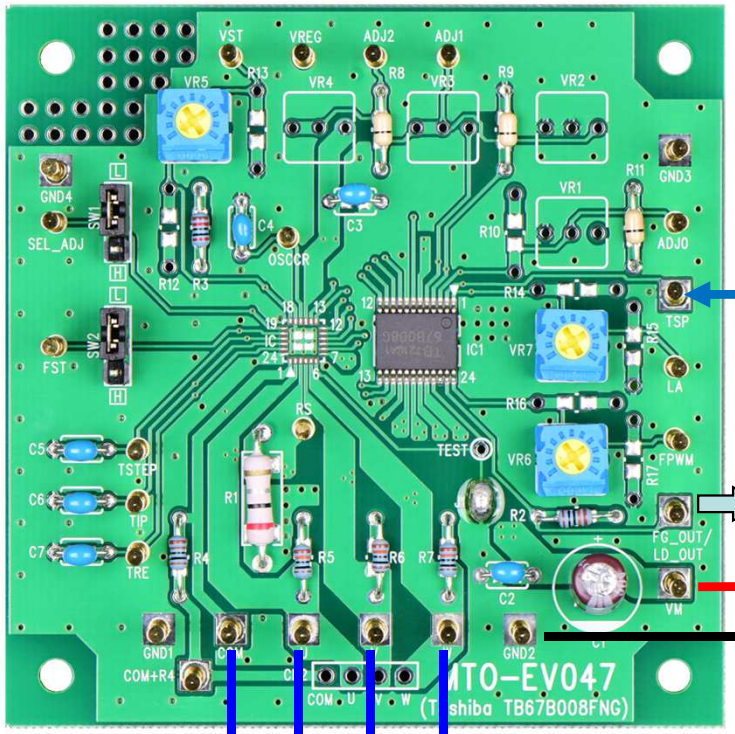
Instruction manual for Evaluation Board of TB67B008FNG

July 2nd, 2019
Rev.1.1

【Outline】
The TB67B008FNG is a three-phase PWM chopper driver for sensorless brushless motors. It controls motor rotation speed by changing the PWM duty cycle, based on the speed control input.
BiCD process are adopted, and Rating of 40V and 3.0A is realized.
Necessary external parts are mounted on this board. So, it is possible to control the motor by connecting a motor.
Please sense the controllability of 3 phase brushless DC motor using TB67B008FNG.

【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.TB67B008FNG.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



PWM signal inputs to TSP pin.

Motor rotation speed is controlled by PWM signal.

FG_OUT output
(Rotation speed output)

VM

Power source of VM: 4 to 22V

GND

COM
(Center tap of the motor)

U

V

W

Motor

Operation sequence

【Startup sequence】
1. Connect a motor to evaluation board
2. Confirm the each conditions. And perform reconfiguration according to usage conditions.
3. Turn on VM power supply: VM = 4 to 22V
   →When used in initial settings, a motor rotates at full speed.

【Stop sequence】
1. When stopping a motor rotation, set VR9 (TSP / VSP) voltage to 0V.
2. Turn off VM power supply.

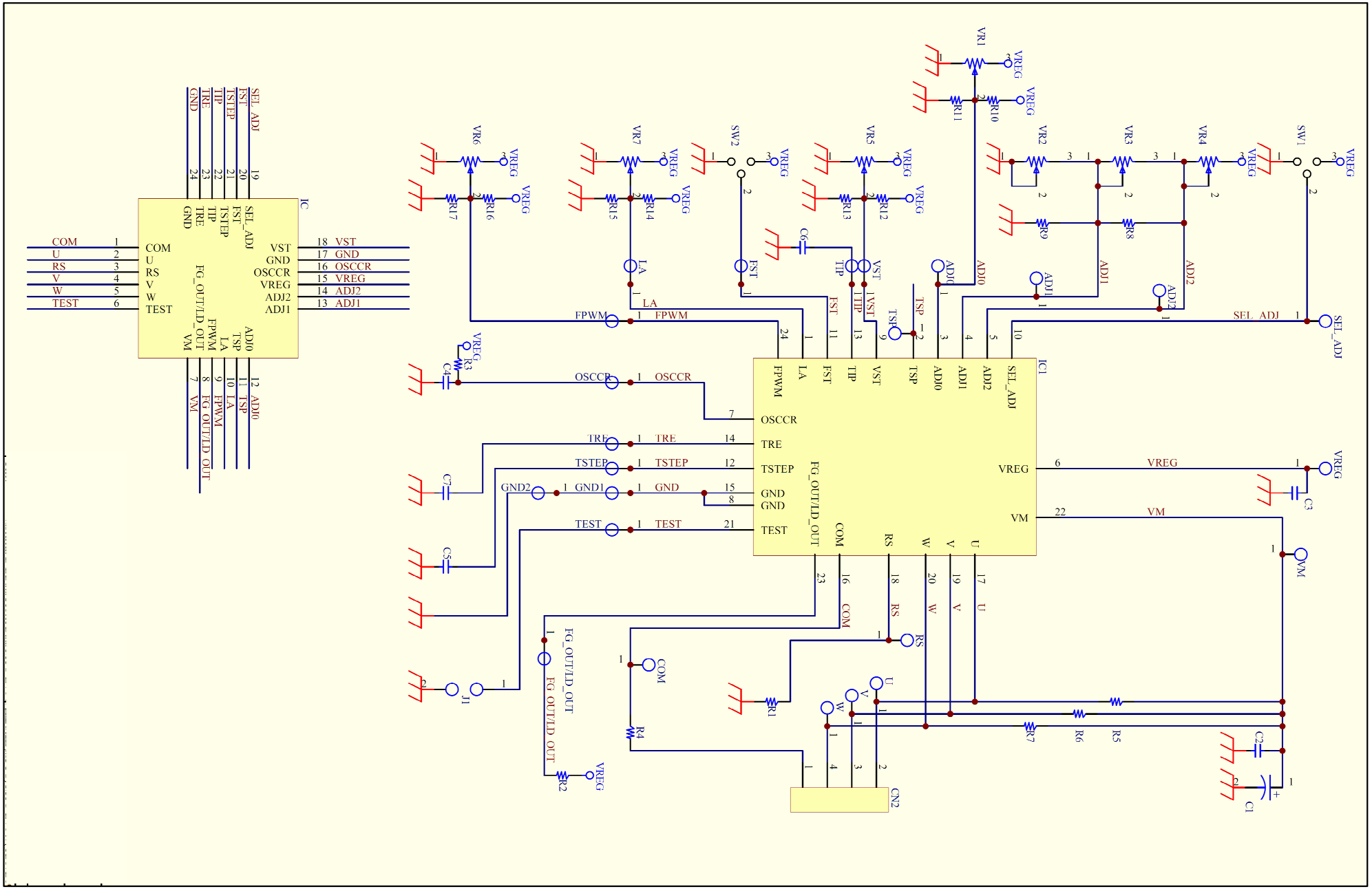
【Notes】
・Note 1：When does not rotate correctly at startup, please adjust SW2, VR5, and C6 (FST, VST, TIP terminals).

Settings

Parts name	Pin name	H/L	Initial settings	Description
SW1	SEL_ADJ	H	-	Input duty and output duty are set to same settings. When uses ADJ terminal, please set it.
		M	-	
		L	レ	
SW2	FST	H	-	Forced commutation frequency 1.6 Hz Please change when adjusting forced commutation frequency setting at startup.
		M	-	
		L	レ	

Parts name	Pin name	Initial settings	Description
VR5	VST	Short to VREG	Startup with full duty mode. Please change this value when adjusting start setting.
VR6	FPWM	Short to VREG	8 steps is set. When adjusts output PWM frequency, please change by VR6.
VR7	LA	Short to VREG	Lead angle is set to 30˚ When sets lead angle, please adjust by VR7.
C5	TSTEP	1nF	Approximately, 0.01s is set. When adjusts acceleration time, please change this value.
C6	TIP	0.1μF	Approximately, 1s is set. When adjusts DC resolution term at startup, please change this value.
C7	TRE	0.1μF	Approximately, 1s is set. When adjusts recovery time at abnormal detection, please change this value.
R1	RS	0.2Ω	Limit value of output current＝0.25V/0.2Ω＝1.25A
R8/9/11	ADJ0/1/2	Shorts to GND	Input duty and output duty are same settings. When uses ADJ terminals, please set this value.

Circuit diagram of evaluation board



BOM List

	Parts number	Parts type number	Supplier	Products type	Value	Mount /No mount
1	R1	MOSX1CR20J	KOA	Resistor	0.2Ω	実装
		CSR1206FKR200	Stackpole	Resistor (SMD type)	0.2Ω	未実装
2	R2	MFS1/4CC1003F	KOA	Resistor	100kΩ	実装
		RK73B2BTTD104J		Resistor (SMD type)	100kΩ	未実装
3	R3	MFS1/4CC2002F	KOA	Resistor	20kΩ	実装
		RK73B2BTTD203J		Resistor (SMD type)	20kΩ	未実装
4	R4	MFS1/4CC1001F	KOA	Resistor	1kΩ	実装
		RK73B2BTTD102J		Resistor (SMD type)	1kΩ	未実装
5	R5	MFS1/4CC1003F	KOA	Resistor	100kΩ	実装
		RK73B2BTTD104J		Resistor (SMD type)	100kΩ	未実装
6	R6	MFS1/4CC1003F	KOA	Resistor	100kΩ	実装
		RK73B2BTTD104J		Resistor (SMD type)	100kΩ	未実装
7	R7	MFS1/4CC1003F	KOA	Resistor	100kΩ	実装
		RK73B2BTTD104J		Resistor (SMD type)	100kΩ	未実装
8	R8	Z16C	KOA	Resistor	Short	実装
		RK73Z2ETTD	KOA	Resistor (SMD type)	Short	未実装
9	R9	Z16C	KOA	Resistor	Short	実装
		RK73Z2ETTD	KOA	Resistor (SMD type)	Short	未実装
10	R10			Resistor		未実装
				Resistor (SMD type)	-	未実装
11	R11	Z16C	KOA	Resistor	Short	実装
		RK73Z2ETTD	KOA	Resistor (SMD type)	Short	未実装
12	R12			Resistor		未実装
				Resistor (SMD type)	-	未実装
13	R13			Resistor		未実装
				Resistor (SMD type)	-	未実装
14	R14			Resistor		未実装
				Resistor (SMD type)	-	未実装
15	R15			Resistor		未実装
				Resistor (SMD type)	-	未実装
16	R16			Resistor		未実装
				Resistor (SMD type)	-	未実装
17	R17			Resistor		未実装
				Resistor (SMD type)	-	未実装
18	C1	KMG50VB10M		Capacitor	10μF	実装
				Capacitor (SMD type)	10μF	未実装
19	C2	RDER71H104K0K1H03B	murata	Capacitor	0.1μF	実装
		GRM319R72A104KA01D		Capacitor (SMD type)	0.1μF	未実装
20	C3	RDER71H104K0K1H03B	murata	Capacitor	0.1μF	実装
		GRM319R72A104KA01D		Capacitor (SMD type)	0.1μF	未実装
21	C4	RDE5C1H181J0K1H03B	murata	Capacitor	180pF	実装
		12061A181JAT2A	AVX	Capacitor (SMD type)	180pF	未実装
22	C5	RDE5C1H102J0K1H03B	murata	Capacitor	1ｎF	実装
		12065C102JAZ2A	AVX	Capacitor (SMD type)	1ｎF	未実装
23	C6	RDER71H104K0K1H03B	murata	Capacitor	0.1μF	実装
		GRM319R72A104KA01D		Capacitor (SMD type)	0.1μF	未実装
24	C7	RDER71H104K0K1H03B	murata	Capacitor	0.1μF	実装
		GRM319R72A104KA01D		Capacitor (SMD type)	0.1μF	未実装

	Parts number	Parts type number	Supplier	Products type	Value	Mount /No mount
25	SW1	2130S1*3GSE	Linkman	Jumper		実装
		2180BBA	Linkman	Short pin		実装
26	SW2	2130S1*3GSE	Linkman	Jumper		実装
		2180BBA	Linkman	Short pon		実装
27	VR1	PVG3A104C01R00		Potentiometer	100kΩ	未実装
28	VR2	PVG3A104C01R00		Potentiometer	100kΩ	未実装
29	VR3	PVG3A104C01R00		Potentiometer	100kΩ	未実装
30	VR4	PVG3A104C01R00		Potentiometer	100kΩ	未実装
31	VR5	PVG3A104C01R00		Potentiometer	100kΩ	実装
32	VR6	PVG3A104C01R00		Potentiometer	100kΩ	実装
33	VR7	PVG3A104C01R00		Potentiometer	100kΩ	実装
34	J1			Round for short	GND	実装
35	COM	型番:ST-1-3		Check pin	-	実装
36	U	型番:ST-1-3		Check pin	-	実装
37	V	型番:ST-1-3		Check pin	-	実装
38	W	型番:ST-1-3		Check pin	-	実装
39	GND	型番:ST-1-3		Check pin	-	実装
40	VM	型番:ST-1-3		Check pin	-	実装
41	FG_OUT/LD_OUT	型番:ST-1-3		Check pin	-	実装
42	TSP	型番:ST-1-3		Check pin	-	実装
43	VREG	型番:ST-1-3		Check pin	-	実装
44	SEL_ADJ	型番:ST-1-3		Check pin	-	実装
45	ADJ0	型番:ST-1-3		Check pin	-	実装
46	ADJ1	型番:ST-1-3		Check pin	-	実装
47	ADJ2	型番:ST-1-3		Check pin	-	実装
48	VST	型番:ST-1-3		Check pin	-	実装
49	TIP	型番:ST-1-3		Check pin	-	実装
50	LA	型番:ST-1-3		Check pin	-	実装
51	FPWM	型番:ST-1-3		Check pin	-	実装
52	OSCCR	型番:ST-1-3		Check pin	-	実装
53	TRE	型番:ST-1-3		Check pin	-	実装
54	TSTEP	型番:ST-1-3		Check pin	-	実装
55	TEST	型番:ST-1-3		Check pin	-	未実装
56	RS	型番:ST-1-3		Check pin	-	実装
57	FST	型番:ST-1-3		Check pin	-	実装
58	COM+R4	型番:ST-1-3		Check pin	-	実装
59	CN2					未実装
60	IC	TB67B008FNG		Motor Driver ｘIC	TB67B008FNG	実装

◆ 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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