SPECIFICATION

Device Name : IGBT Module

Type Name : 2MBI400TB-060

Spec. No. : MS5F 5293

Fuji Electric Co.,Ltd.
Matsumoto Factory

	DATE	NAME	APPROVED
DRAWN	Oct.- 22 -'02	Y.Kobayashi	T.Fujihira
CHECKED	Oct.- 23 -'02	T.Miyasaka	
		K.Yamada	

Fuji Electric Co.,Ltd.

DWG.NO. MS5F 5293 1/14

a
b
c

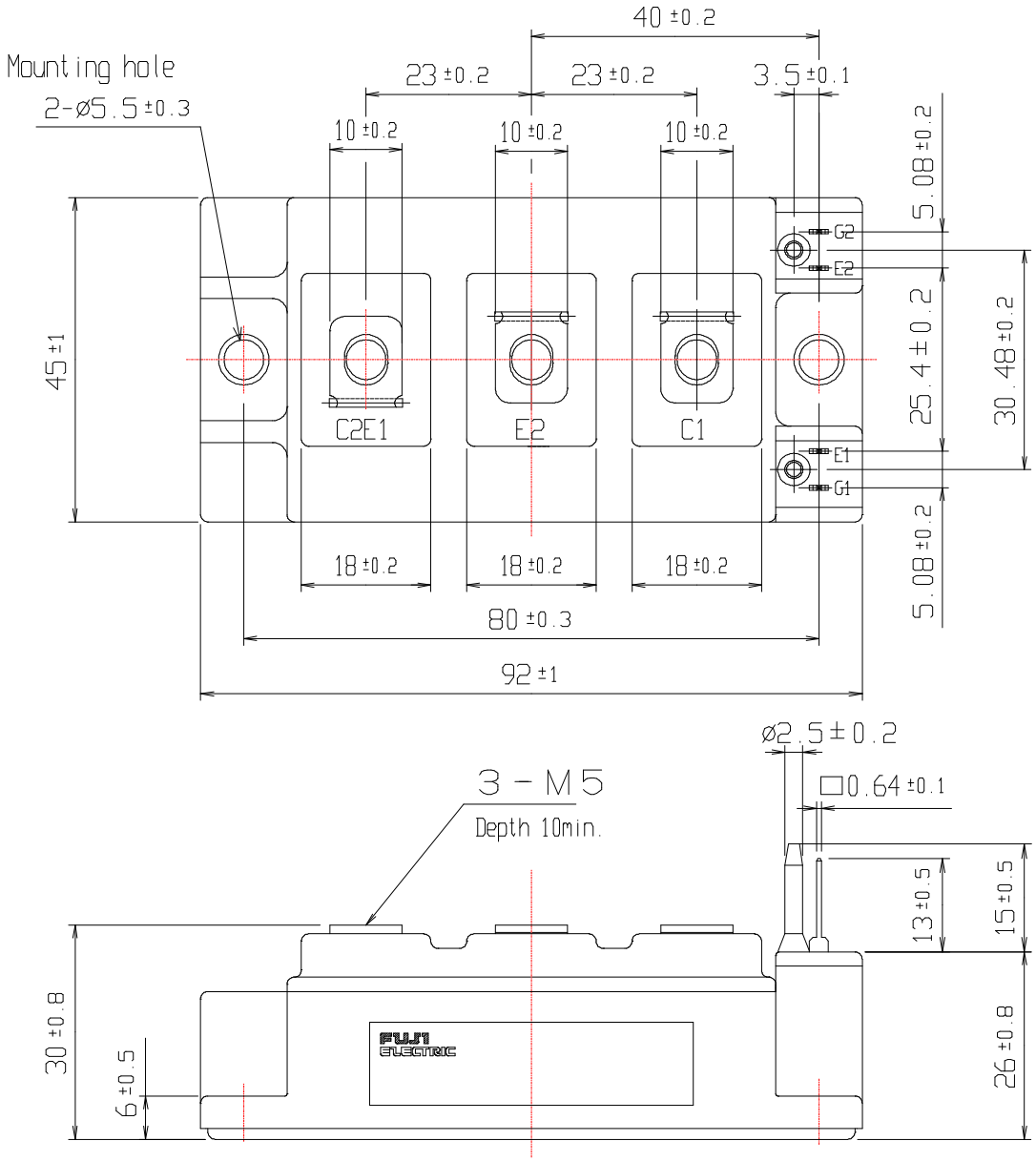
H04-004-07

Revised Records

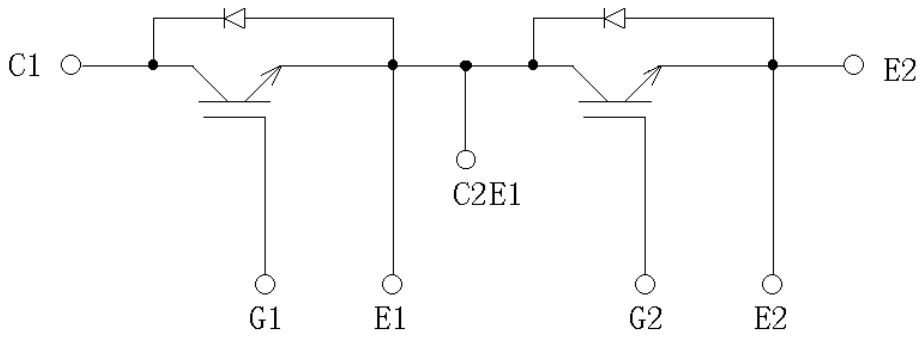
Date	Classi-fication	Ind.	Content	Applied date	Drawn	Checked	Approved
Oct.-23-'02	enactment	——	————————	Issued date	——	T.Miyasaka K.Yamada	T.Fujihira
Nov.-29-'02	Revision	a	Revised Reliability test condition (P7/14)		Y.Kobayashi	T.Miyasaka K.Yamada	T.Fujihira
Jan.-31-'03	Revision	b	Revised characteristics curve up to 800A (P11/14, 12/14)		Y.Kobayashi	T.Miyasaka K.Yamada	T.Fujihira
Apr.-07-'04	Revision	c	Revised ton,tr,toff,tf (P4/14) Revised Rth curve (P12/14)		Y.Kobayashi	T.Miyasaka K.Yamada	Y.Seki

2MBI400TB-060

1. Outline Drawing (Unit : mm)



2. Equivalent circuit



3. Absolute Maximum Ratings (at Tc= 25℃ unless otherwise specified)

Items	Symbols	Conditions	Maximum Ratings	Units
Collector-Emitter voltage	VCES	Ic=1mA	600	V
Gate-Emitter voltage	VGES		±20	V
Collector current	Ic	Duty=100 %	400	A
	Ic pulse	1ms	800	
	IF	Duty=56 %	400	
	IF pulse	1ms	800	
Collector Power Dissipation	Pc	1 device	1270	W
Junction temperature	Tj		150	℃
Storage temperature	Tstg		-40~ +125	℃
Isolation voltage(*1)	Viso	AC : 1min.	2500	V
Screw Torque	Mounting(*2)		3.5	N·m
	Terminals(*2)		3.5	

(*1) All terminals should be connected together when isolation test will be done.

(*2) Recommendable Value : Mounting 2.5~3.5 N·m (M5)

Terminal 2.5~3.5Nm (M5)

4. Electrical characteristics (at Tj= 25℃ unless otherwise specified)

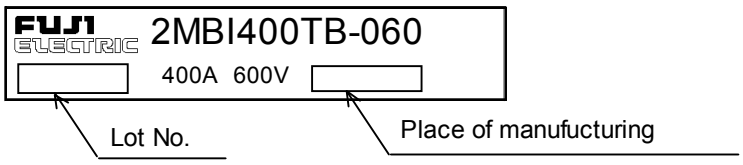
Items	Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics Max.	Units
Zero gate voltage Collector current	ICES	VGE = 0 V, VCE = 600 V		-	-	2.0	mA
Gate-Emitter leakage current	IGES	VCE = 0 V, VGE = ±20 V		-	-	400	nA
Gate-Emitter threshold voltage	VGE(th)	VCE = 20 V, Ic = 400 mA		6.2	6.7	7.7	V
Collector-Emitter saturation voltage	VCE(sat)	VGE = 15 V	Chip	-	1.9	-	V
		Ic = 400 A	Terminal	-	2.2	2.5	
Input capacitance	Cies	VGE = 0 V		-	30000	-	pF
Output capacitance	Coes	VCE = 10 V		-	5200	-	
Reverse transfer capacitance	Cres	f = 1 MHz		-	4500	-	
Turn-on time	ton	Vcc = 300 V		-	c 0.4	1.2	μs
	tr	Ic = 400 A		-	c 0.2	0.6	
	$tr_{(i)}$	VGE = ±15 V		-	0.1	-	
Turn-off time	toff	RG = 6.8 Ω		-	c 0.55	1.2	
	tf			-	c 0.05	0.45	
Forward on voltage	VF	IF = 400 A	Chip	-	1.75	-	V
			Terminal	-	1.9	2.5	
Reverse recovery time	trr	IF = 400 A		-	-	0.3	μs
Allowabe avalanche energy during short circuit cutting off (Non-repetitive)	PAV	Ic > 800A, Tj = 125℃		200	-	-	mJ

5. Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics Max.	Units
Thermal resistance (1 device)	Rth(j-c)	IGBT	-	-	0.098	℃/W
		FWD	-	-	0.19	
Contact Thermal resistance	Rth(c-f)	With thermal compound *	-	0.025	-	

* This is the value which is defined mounting on the additional cooling fin with thermal compound.

6. Indication on module



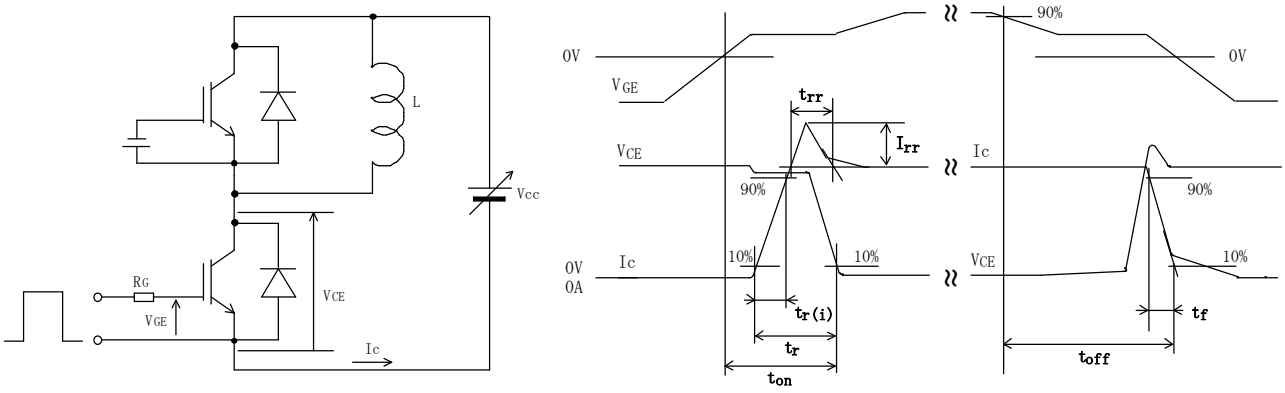
7. Applicable category

This specification is applied to IGBT Module named 2MBI400TB-060

8. Storage and transportation notes

- The module should be stored at a standard temperature of 5 to 35C and humidity of 45 to 75% .
- Store modules in a place with few temperature changes in order to avoid condensation on the module surface.
- Avoid exposure to corrosive gases and dust.
- Avoid excessive external force on the module.
- Store modules with unprocessed terminals.
- Do not drop or otherwise shock the modules when tranporting.

9. Definitions of switching time



13. Reliability test results

Reliability Test Items

Test categories		Test items	Test methods and conditions	Reference norms EIAJ ED-4701	Number of sample	Acceptance number
Mechanical Tests	1	Terminal Strength (Pull test)	Pull force : [a] 40N Test time : 10±1 sec.	A - 111 Method 1	5	(1 : 0)
	2	Mounting Strength	Screw torque : 2.5 ~ 3.5 N·m (M5) Test time : 10±1 sec.	A - 112 Method 2	5	(1 : 0)
	3	Vibration	Range of frequency : 10 ~ 500Hz Sweeping time : 15 min. Acceleration : [a] 10G Sweeping direction : Each X,Y,Z axis Test time : 6 hr. (2hr./direction)	A - 121	5	(1 : 0)
	4	Shock	Maximum acceleration : 1000G Pulse width : 0.5msec. Direction : Each X,Y,Z axis Test time : 3 times/direction	A - 122	5	(1 : 0)
Environment Tests	1	High Temperature Storage	Storage temp. : 125±5 ℃ Test duration : 1000hr.	B - 111	5	(1 : 0)
	2	Low Temperature Storage	Storage temp. : -40±5 ℃ Test duration : 1000hr.	B - 112	5	(1 : 0)
	3	Temperature Humidity Storage	Storage temp. : 85±3 ℃ Relative humidity : 85±5% Test duration : 1000hr.	B - 121	5	(1 : 0)
	4	Unsaturated Pressure Cooker	Test temp. : 121 ℃ Atmospheric pressure : 2.03×10^5 Pa (Reference value) Test duration : 20hr.	B - 123	5	(1 : 0)
	5	Temperature Cycle	Test temp. : Low temp. -40^{+3}_{-5} ℃; High temp. 125^{+5}_{-5} ℃; RT 5 ~ 35 ℃ Dwell time : High ~ RT ~ Low ~ RT 1hr. 0.5hr. 1hr. 0.5hr. Number of cycles : 100 cycles	B - 131	5	(1 : 0)
	6	Thermal Shock	Test temp. : High temp. 100^{+0}_{-5} ℃; Low temp. 0^{+5}_{-0} ℃ Used liquid : Water with ice and [a] boiling water Dipping time : 5 min. par each temp. Transfer time : 10 sec. Number of cycles : 10 cycles	B - 141	5	(1 : 0)