



APPLICATION NOTE	Prepared by	Miyazaki, Hiramoto	R E V	A Miyazaki, T. Hiramoto S. Hiramoto 21 Aug. '06	
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POWER IGBT MODULE TARGET SPECIFICATION(TENTATIVE)

1. Type CM150DC-24NFM ☒ A
2. Structure Flat Base type (Insulated Package)
3. Application High frequency switching use
Resonant inverter power supply
4. Outline drawing Fig.1

5. Maximum ratings ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

Item	Symbol	Units	Ratings	Conditions
Collector-emitter voltage	V_{CES}	V	1200	G—E Short
Gate-emitter voltage	V_{GES}	V	± 20	C—E Short
Collector current	I_C	A	150	DC, $T_C=25^{\circ}\text{C}$
	I_{CM}		300	Pulse ②
Emitter current	I_E ①	A	150	DC, $T_C=25^{\circ}\text{C}$
	I_{EM} ①		300	Pulse ②
Maximum power dissipation	P_C ③	W	960	$T_C=25^{\circ}\text{C}$
Isolation voltage	V_{iso}	V	2500	Charged part to base plate, AC 1 minute
Junction temperature	T_J	$^{\circ}\text{C}$	-40 ~ +150	
Storage temperature	T_{stg}	$^{\circ}\text{C}$	-40 ~ +125	

6. Mechanical characteristics

Item	Symbol	Units	Min.	Typ.	Max.	Conditions
Torque strength	—	N·m	3.5	—	4.5	Main terminals, M6 screw
Torque strength	—	N·m	3.5	—	4.5	Mounting holes, M6 screw
Weight	—	g	—	400	—	

7. Electrical characteristics ($T_j=25^{\circ}\text{C}$, unless otherwise specified)

Item	Symbol	Units	MIN.	TYP.	MAX.	Conditions
Collector cutoff current	I_{CES}	mA	—	—	1	$V_{CE}=V_{CES}$, $V_{GE}=0\text{V}$
Gate-emitter threshold voltage	$V_{GE(th)}$	V	4.5	6	7.5	$I_C=15\text{mA}$, $V_{CE}=10\text{V}$
Gate leakage current	I_{GES}	μA	—	—	0.5	$\pm V_{GE}=V_{GES}$, $V_{CE}=0\text{V}$
Collector-to-emitter saturation voltage	$V_{CE(sat)}$	V	—	3.0	4.5	$T_j=25^{\circ}\text{C}$ $I_C=150\text{A}$ ④
			—	3.0	—	$T_j=125^{\circ}\text{C}$ $V_{GE}=15\text{V}$
Input capacitance	C_{ies}	nF	—	—	24	$V_{GE}=0\text{V}$, $V_{CE}=10\text{V}$
Output capacitance	C_{oes}		—	—	2	
Reverse transfer capacitance	C_{res}		—	—	0.45	
Total gate charge	Q_G	nC	—	680	—	$V_{CC}=600\text{V}$, $I_C=150\text{A}$ $V_{GE}=15\text{V}$
Turn-on delay time	$t_{d(on)}$	ns	—	—	150	$V_{CC}=600\text{V}$, $I_C=150\text{A}$
Turn-on rise time	t_r		—	—	80	$V_{GE1}=V_{GE2}=15\text{V}$, $R_G=2.1\Omega$
Turn-off delay time	$t_{d(off)}$		—	—	400	Inductive load switching
Turn-off fall time	t_f		—	60	200	Operation See Fig.3
Reverse recovery time	t_{rr} ①		—	80	130	$I_E=150\text{A}$
Reverse recovery charge	Q_{rr} ①	μC	—	7	—	See Fig.4
Emitter-collector voltage	V_{EC} ①	V	—	2.3	3.3	$I_E=150\text{A}$, $V_{GE}=0\text{V}$
External gate resistance	R_G	Ω	2.1	—	21	

① I_E , I_{EM} , V_{EC} , t_{rr} & Q_{rr} represent characteristics of the anti-parallel, emitter to collector free-wheel diode.

② Pulse width and repetition rate should be such that the device junction temperature (T_j) does not exceed T_{jmax} rating.

③ Junction temperature (T_j) should not increase beyond 150°C .

④ Pulse width and repetition rate should be such as to cause negligible temperature rise.

8. Thermal resistance

Item	Symbol	Units	Min.	Typ.	Max.	Conditions
Thermal resistance	$R_{th(j-c)}$	$^{\circ}\text{C/W}$	—	—	0.13	IGBT part *2
Thermal resistance	$R_{th(j-c)}$		—	—	0.28	Free-wheel diode part *2
Contact thermal resistance	$R_{th(c-f)}$		—	0.02	—	Thermal grease *1,2 applied

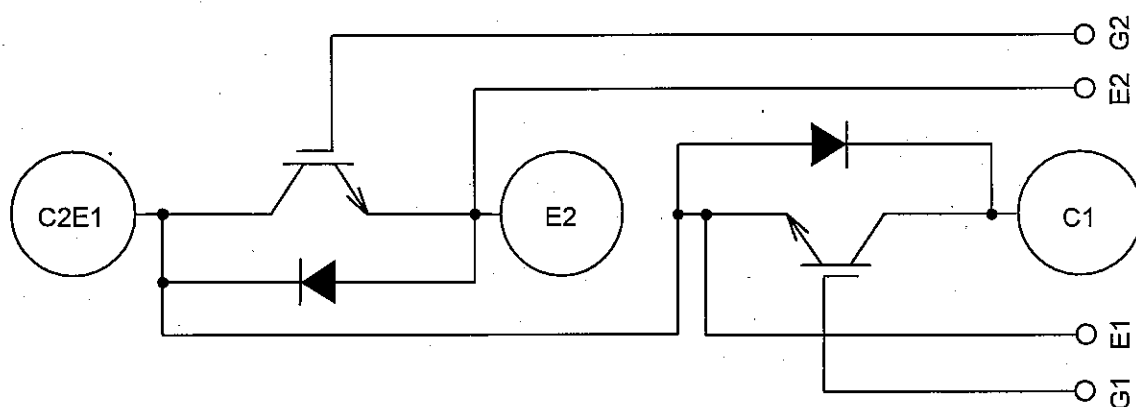
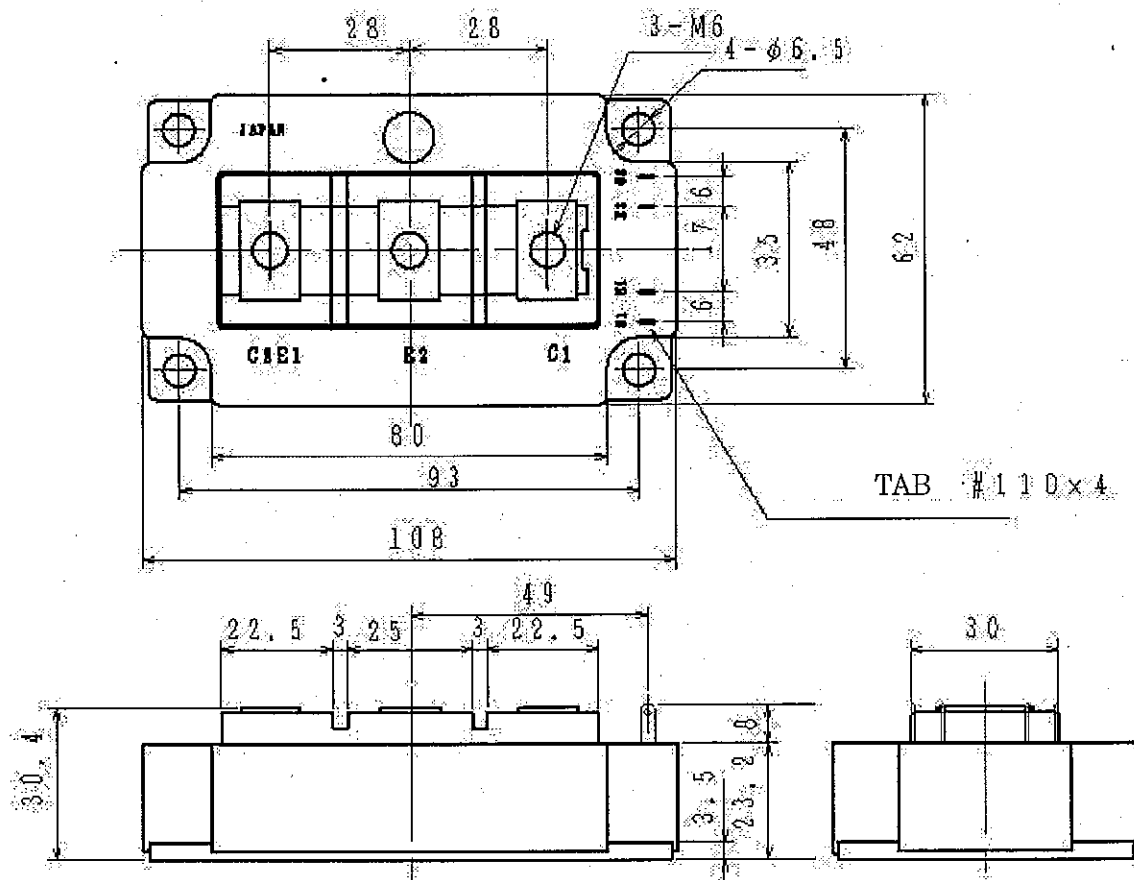
All thermal resistance value above is for 1/2 module.

*1: Typical value is measured by using Shin-Etsu Chemical Co., Ltd "G-746".

*2: T_c T_f measured point is just under the chips.

If use this value, $R_{th(f-a)}$ should be measured just under the chips.

IGBT MODULE	I2AP-05021-A	APPLICATION NOTE
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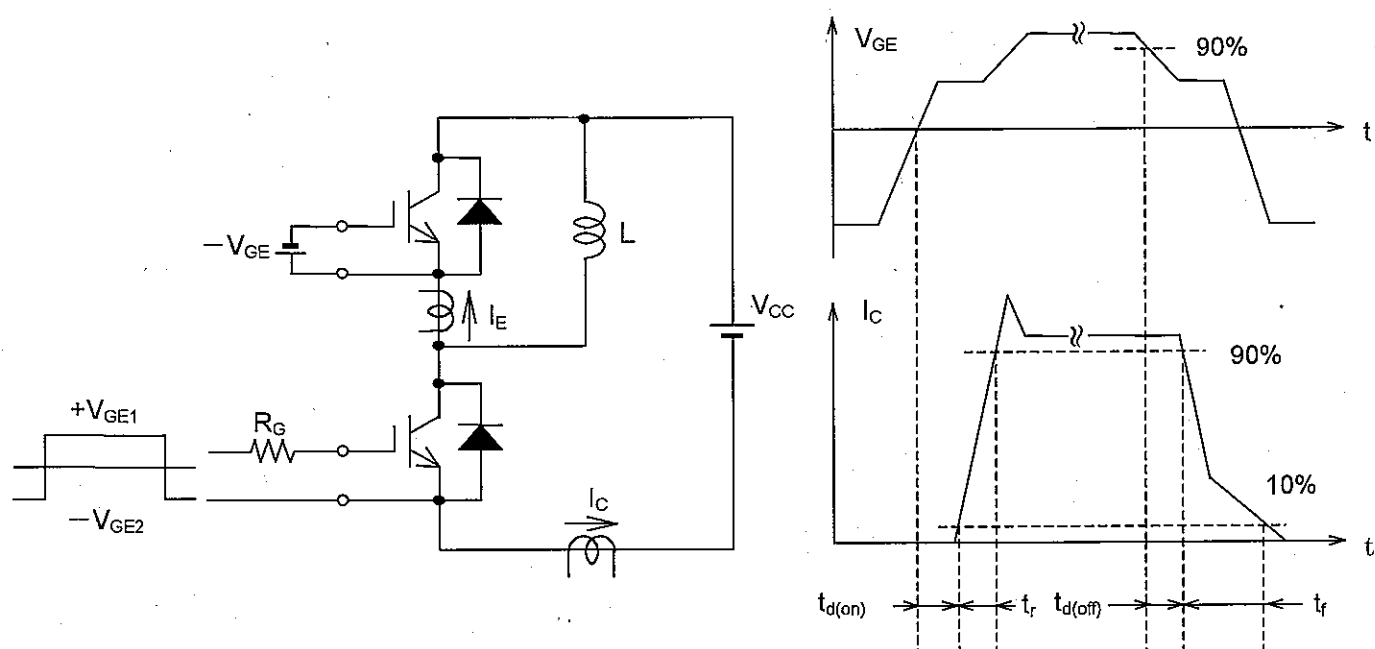


Fig.3 Switching time test circuit and waveforms

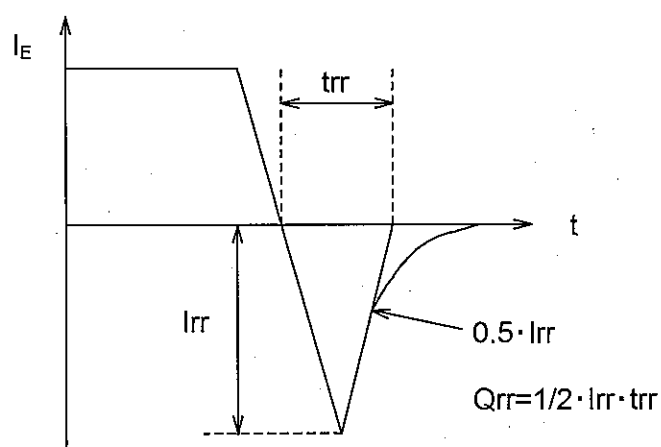


Fig.4 t_{rr} , Q_{rr} waveforms

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Revision No.	Summary of Changes	Signature	Date
<input type="checkbox"/> A	Modification of Type Name		