



APPLICATION NOTE	Prepared by	miyazaki, nakanishi	R		
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POWER IGBT MODULE TARGET SPECIFICATION(TENTATIVE)

- Type: CM600HC-24NFM
- Structure: Flat Base type ( Insulated Package )
- Application: High frequency switching use  
Resonant inverter power supply
- Outline drawing: Fig.1
- 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	$\pm 20$	C-E Short
Collector current	$I_C$	A	600	DC, $T_C=25^{\circ}\text{C}$
	$I_{CM}$		1200	Pulse ②
Emitter current	$I_E$ ①	A	600	DC, $T_C=25^{\circ}\text{C}$
	$I_{EM}$ ①		1200	Pulse ②
Maximum power dissipation	$P_C$ ③	W	3670	$T_C=25^{\circ}\text{C}$
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	$I_C=60\text{mA}$ , $V_{CE}=10\text{V}$
Gate leakage current	$I_{GES}$	$\mu\text{A}$	—	—	2.0	$\pm V_{GE}=V_{GES}$ , $V_{CE}=0\text{V}$
Collector-to-emitter saturation voltage	$V_{CE(sat)}$	V	—	3.0	4.5	$T_j=25^\circ\text{C}$ $I_C=600\text{A}$ ④
			—	3.0	—	$T_j=125^\circ\text{C}$ $V_{GE}=15\text{V}$
Input capacitance	$C_{ies}$	nF	—	—	95	$V_{GE}=0\text{V}$ , $V_{CE}=10\text{V}$
Output capacitance	$C_{oes}$		—	—	8	
Reverse transfer capacitance	$C_{res}$		—	—	1.8	
Total gate charge	$Q_G$	nC	—	2700	—	$V_{CC}=600\text{V}$ , $I_C=600\text{A}$ $V_{GE}=15\text{V}$
Turn-on delay time	$t_{d(on)}$	ns	—	—	400	$V_{CC}=600\text{V}$ , $I_C=600\text{A}$
Turn-on rise time	$t_r$		—	—	120	$V_{GE1}=V_{GE2}=15\text{V}$ , $R_G=0.52\Omega$
Turn-off delay time	$t_{d(off)}$		—	—	700	Inductive load switching
Turn-off fall time	$t_f$		—	60	200	Operation See Fig.3
Reverse recovery time	$t_{rr}$ ①		—	130	210	$I_E=600\text{A}$
Reverse recovery charge	$Q_{rr}$ ①		$\mu\text{C}$	—	28	—
Emitter-collector voltage	$V_{EC}$ ①	V	—	2.3	3.3	$I_E=600\text{A}$ , $V_{GE}=0\text{V}$
External gate resistance	$R_G$	$\Omega$	0.52	—	5.2	

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  $150^\circ\text{C}$ .

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	$R_{th(j-e)}$	$^\circ\text{C/W}$	—	—	0.034	IGBT part <sup>*2</sup>
Thermal resistance	$R_{th(j-c)}$		—	—	0.07	Free-wheel diode part <sup>*2</sup>
Contact thermal resistance	$R_{th(c-f)}$		—	0.02	—	Thermal grease <sup>*1,2</sup> applied

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

\*2: Tc Tf measured point is just under the chips.

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

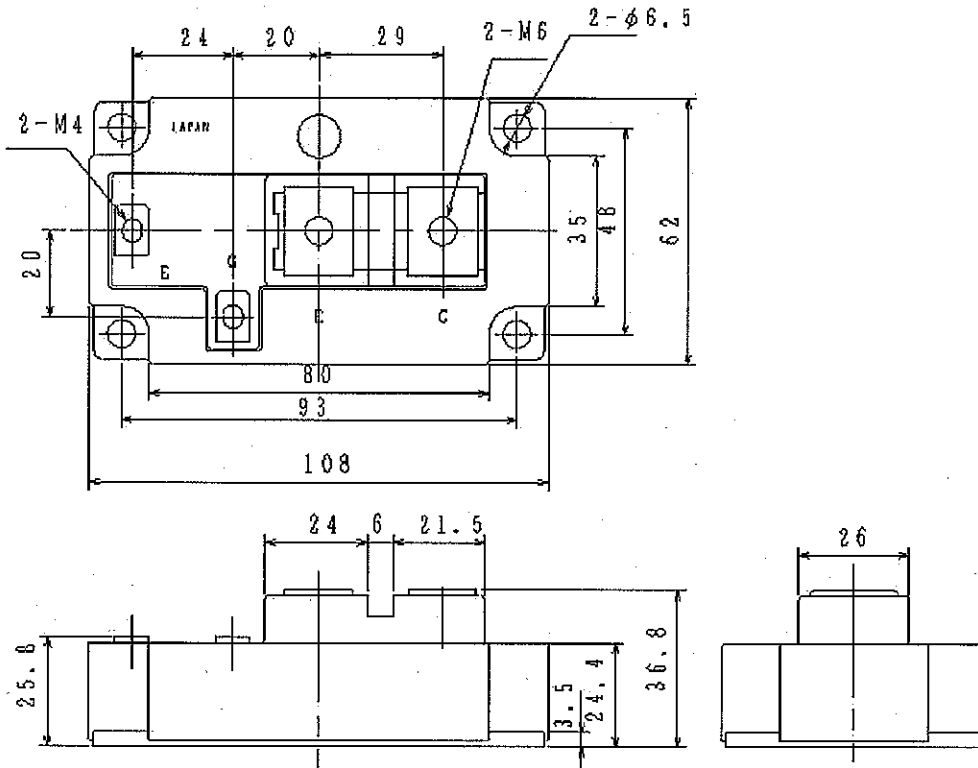


Fig.1 Outline drawing

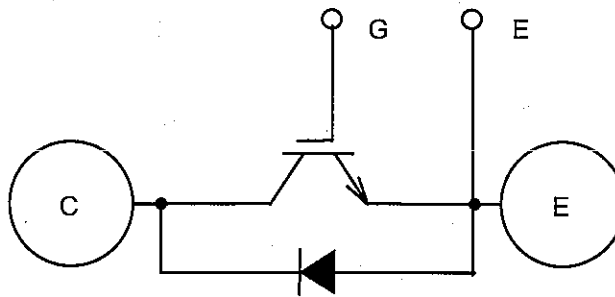


Fig.2 Circuit Diagram

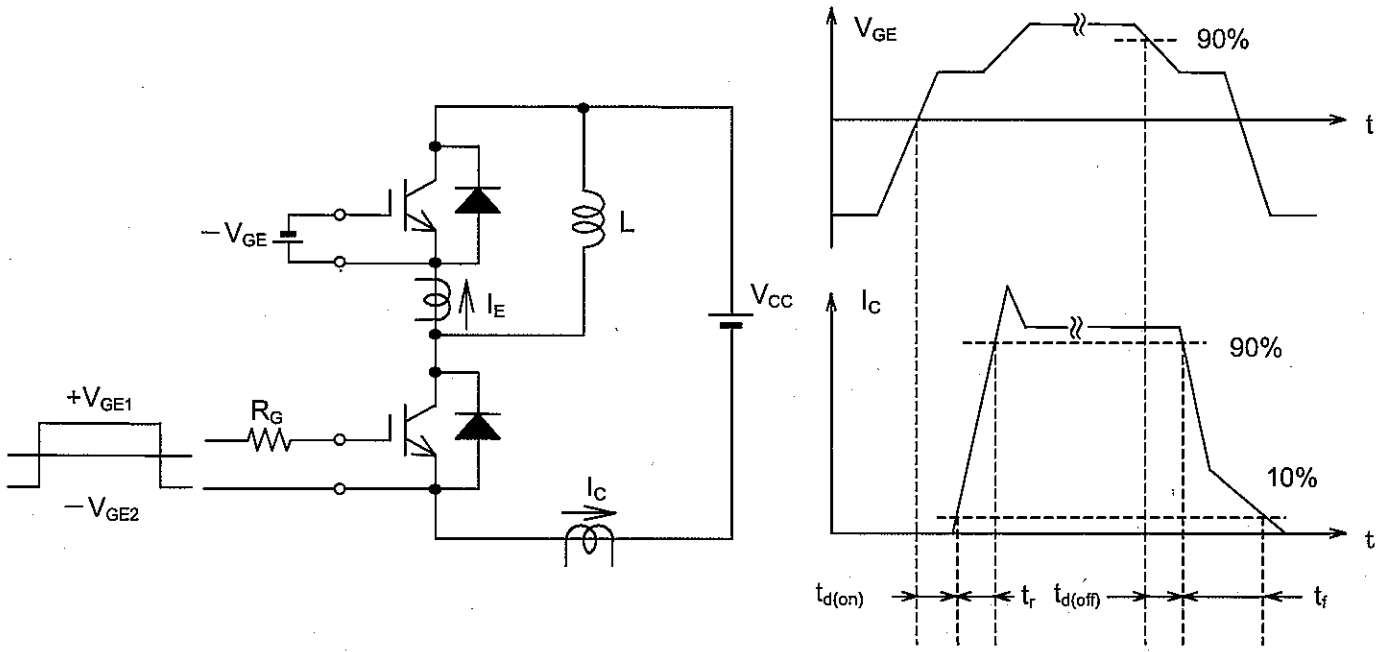


Fig.3 Switching time test circuit and waveforms

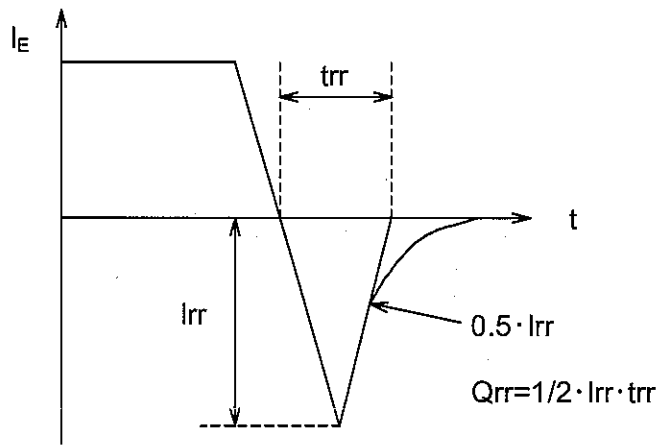


Fig.4 trr, Qrr waveforms

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Revision No.	Summary of Changes	Signature	Date