

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	$V_{CE}=V_{CES}, V_{GE}=0V$
Gate-emitter threshold voltage	$V_{GE(th)}$	V	4.5	6	7.5	$I_C=10mA, V_{CE}=10V$
Gate leakage current	I_{GES}	μA	—	—	0.5	$\pm V_{GE}=V_{GES}, V_{CE}=0V$
Collector-to-emitter saturation voltage	$V_{CE(sat)}$	V	—	3.0	4.5	$T_j=25^{\circ}\text{C}$
			—	3.0	—	$T_j=125^{\circ}\text{C}$
Input capacitance	C_{ies}	nF	—	—	16	$V_{GE}=0V, V_{CE}=10V$
Output capacitance	C_{oes}		—	—	1.3	
Reverse transfer capacitance	C_{res}		—	—	0.3	
Total gate charge	Q_G	nC	—	450	—	$V_{CC}=600V, I_C=100A$ $V_{GE}=15V$
Turn-on delay time	$t_{d(on)}$	ns	—	—	100	$V_{CC}=600V, I_C=100A$
Turn-on rise time	t_r		—	—	50	$V_{GE1}=V_{GE2}=15V, R_G=3.1\Omega$
Turn-off delay time	$t_{d(off)}$		—	—	250	Inductive load switching
Turn-off fall time	t_f		—	60	200	Operation See Fig.3
Reverse recovery time	t_{rr} ①		—	70	120	$I_E=100A$
Reverse recovery charge	Q_{rr} ①		μC	—	6	—
Emitter-collector voltage	V_{EC} ①	V	—	2.0	3.0	$I_E=100A, V_{GE}=0V$
External gate resistance	R_G	Ω	3.1	—	31	

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	$R_{th(j-c)}$	$^{\circ}\text{C/W}$	—	—	0.186	IGBT part *2
Thermal resistance	$R_{th(f-c)}$		—	—	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.

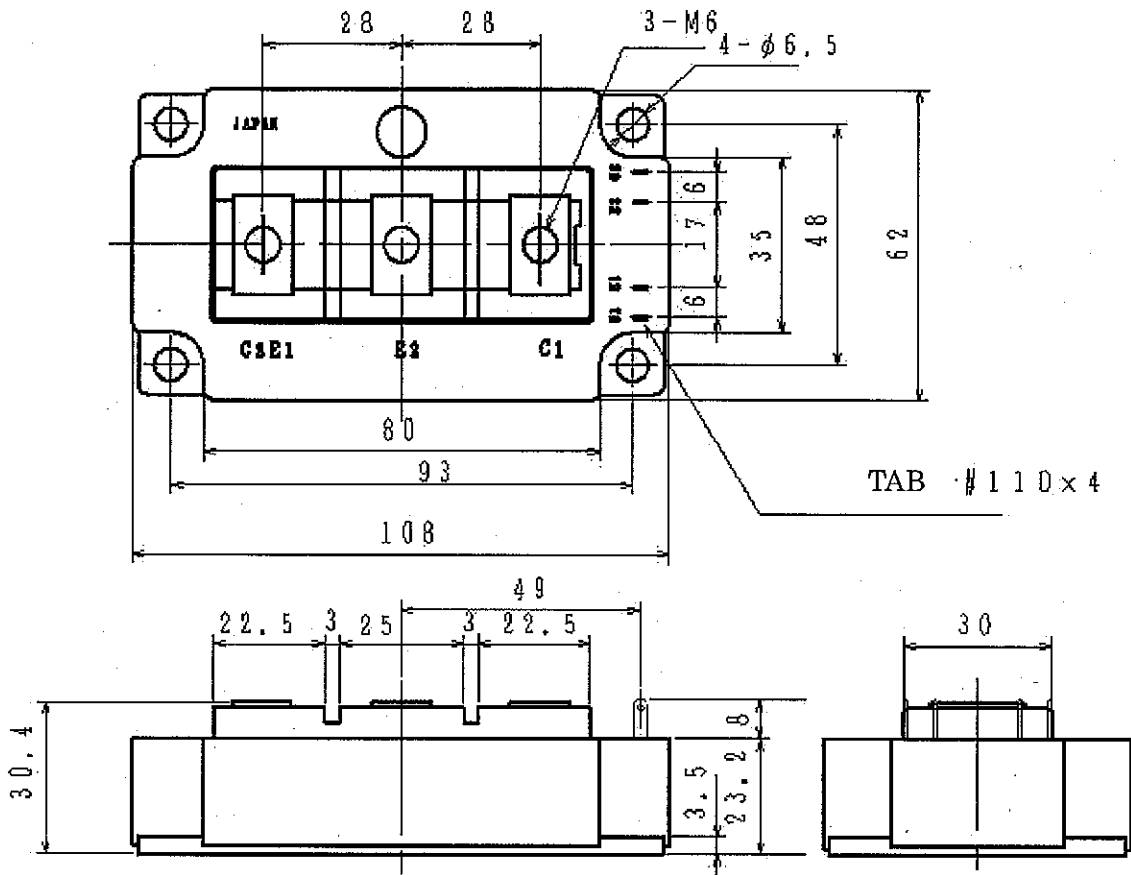


Fig.1 Outline drawing

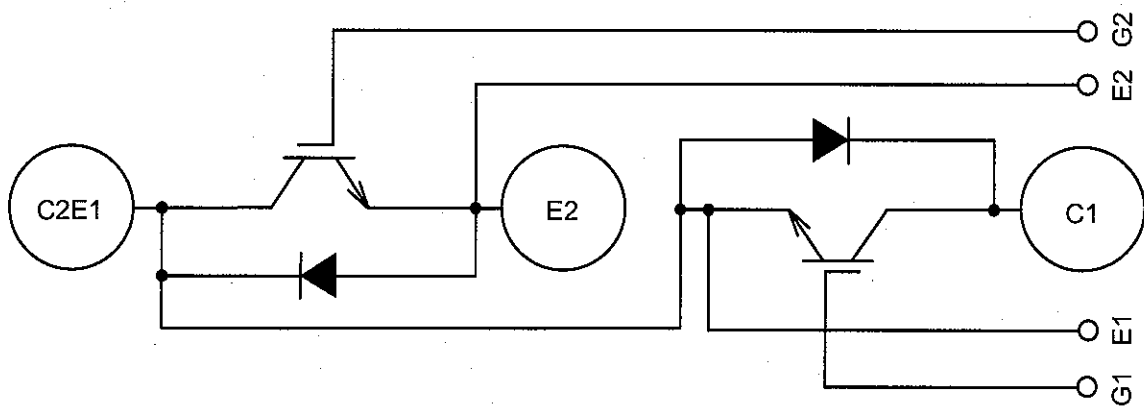


Fig.2 Circuit Diagram

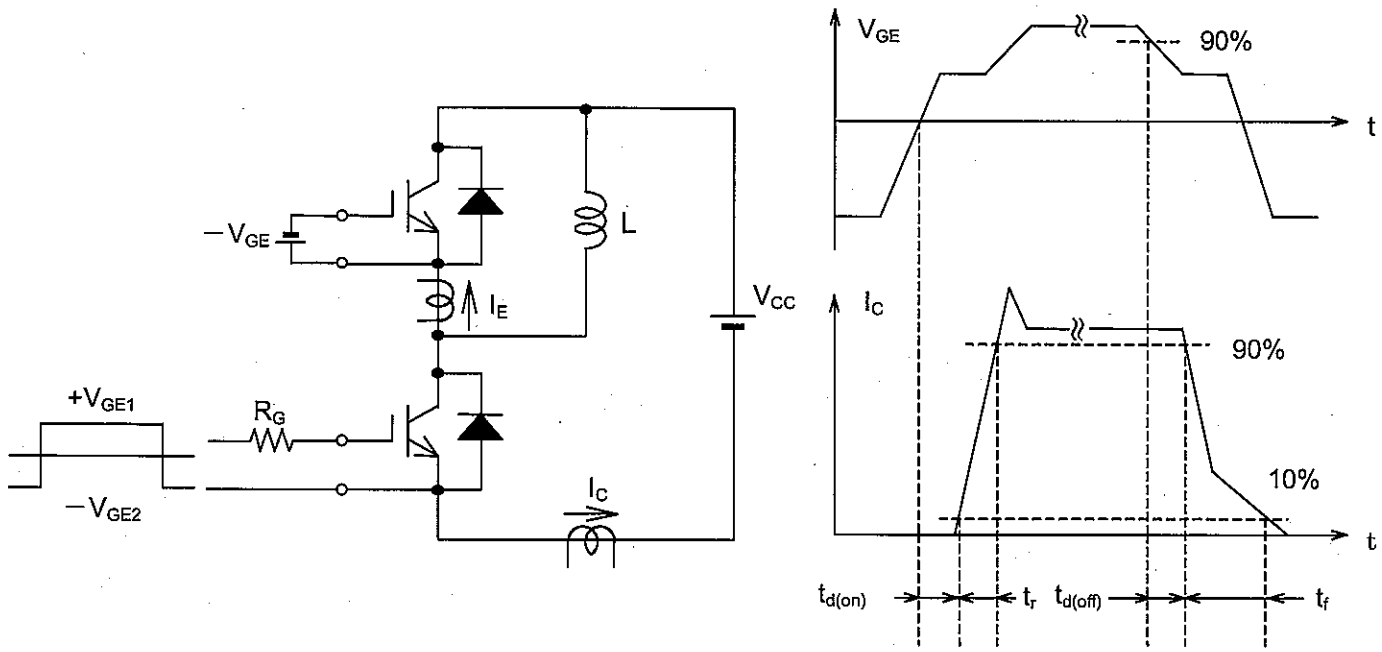


Fig.3 Switching time test circuit and waveforms

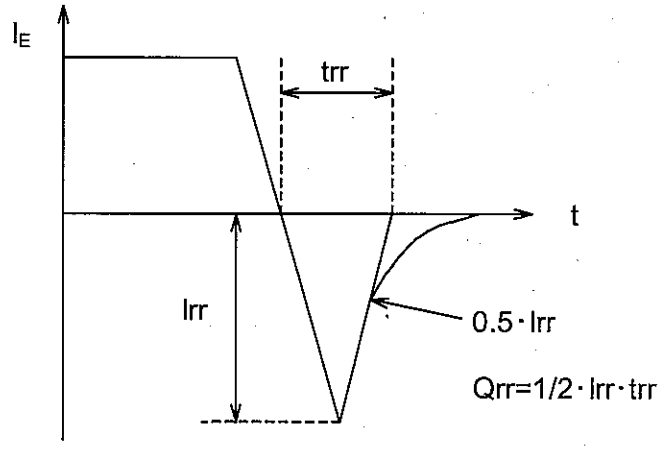


Fig.4 trr, Qrr waveforms

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