

APPLICATION NOTE

MITSUBISHI (IGBT MODULE)

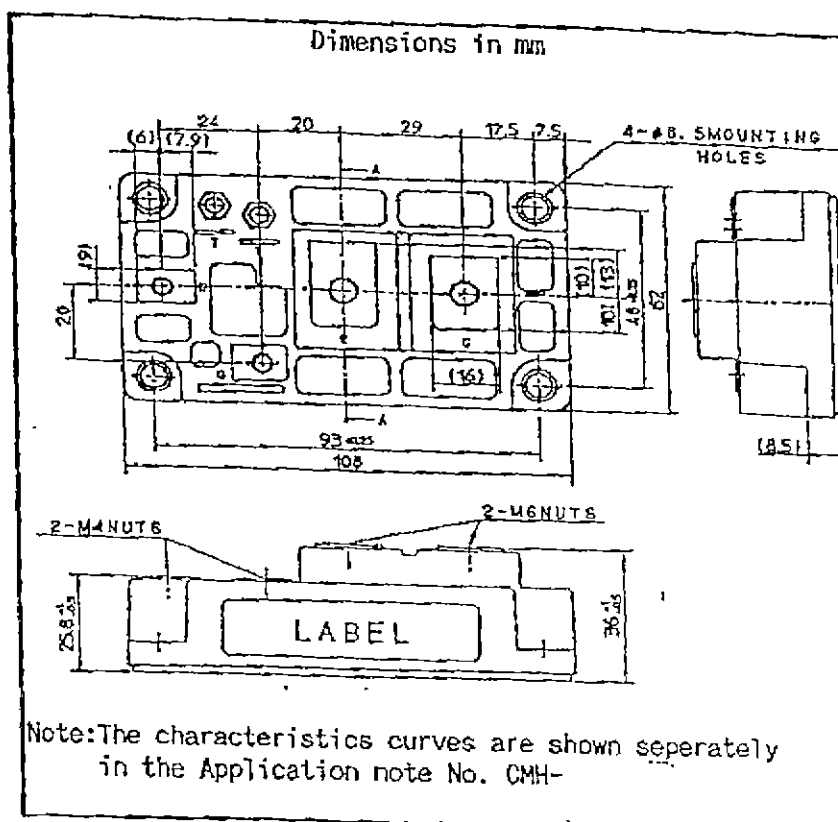
TENTATIVE

CM600HN-5F

Pre.	M. Kouza	Rev	
Apr.	A. Iju Nov 7, '86		

HIGH POWER SWITCHING USE

CM600HN-5F	
● I_c	600 A
● V_{CES}	250 V
● Insulated Type	
● 1 - element in a pack	



APPLICATION

DC chopper

Inverters for battery power source

ABSOLUTE MAXIMUM RATINGS ($T_j = 25^\circ\text{C}$)

Symbol	Item	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	G - E Short	250	V
V_{GES}	Gate-emitter voltage	C - E Short	± 20	V
I_c	Collector current	$T_c = 25^\circ\text{C}$	600	A
I_{CM}		Pulse	1200	
I_E ①	Emitter current	$T_c = 25^\circ\text{C}$	600	A
I_{EM} ①		Pulse	1200	
P_c ③	Maximum collector dissipation	$T_c = 25^\circ\text{C}$	1780	W
T_j	Junction temperature		$-40 \sim +150$	$^\circ\text{C}$
T_{stg}	Storage temperature		$-40 \sim +125$	$^\circ\text{C}$
V_{iso}	Isolation voltage	Main terminal to base plate, AC 1 min.	2500	V
—	Mounting torque	Main Terminal M 6	1.96 ~ 2.94	N·m
			20 ~ 30	kg·cm
		Mounting M 6	1.96 ~ 2.94	N·m
			20 ~ 30	kg·cm
—	Weight	G(E) Terminal M 4	0.98 ~ 1.47	N·m
		Typical value	10 ~ 15	kg·cm
			400	g

TSM-1228

1-2

ELECTRICAL CHARACTERISTICS ($T_j = 25^\circ\text{C}$)

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cutoff current	$V_{CE} = V_{CEB}, V_{GE} = 0V$	—	—	1	mA
$V_{GE(th)}$	Gate-emitter threshold voltage	$I_C = 60\text{ mA}, V_{OE} = 10V$	3.0	4.0	5.0	V
I_{GEB}	Gate leakage voltage	$V_{GE} = V_{CES}, V_{CE} = 0V$	—	—	0.5	μA
$V_{CE(sat)}$	Collector to emitter saturation voltage	$T_j = 25^\circ\text{C}$ $I_C = 600\text{A}$	—	1.2	1.7	V
		$T_j = 150^\circ\text{C}$ $V_{GE} = 10V$	—	1.10	—	
C_{ies}	Input capacitance	$V_{CE} = 10V$	—	—	165	nF
C_{oes}	Output capacitance	$V_{GE} = 0V$	—	—	7.5	
C_{res}	Reverse transfer capacitance		—	—	5.6	
Q_g	Total gate charge	$V_{CC} = 100V, I_C = 600\text{A}$ $V_{GE} = 10V$	—	2200	—	nC
$t_{d(on)}$	Turn-on delay time	$V_{CC} = 100V, I_C = 600\text{A}$	—	—	1000	ns
t_r	Turn-on rise time	$V_{GE1} = V_{GE2} = 10V$	—	—	4000	
$t_{d(off)}$	Turn-off delay time	$R_G = 4.2\Omega$, Resistive load	—	—	1000	
t_f	Turn-off fall time	switching operation	—	—	500	
V_{EC} ①	Emitter-collector voltage	$I_E = 600\text{ A}, V_{GE} = 0V$	—	—	2.0	V
t_{rr} ①	Reverse recovery time	$I_E = 600\text{ A}$	—	—	300	ns
Q_{rr} ①	Reverse recovery charge	$di/dt = -1200\text{ A}/\mu\text{s}$	—	9.5	—	μC
$R_{th(j-c)Q}$	Thermal resistance	IGBT part	—	—	0.07	$^\circ\text{C}/\text{W}$
$R_{th(j-c)R}$		FWDi part	—	—	0.11	
$R_{th(c-f)}$	Contact thermal resistance	Case to fin Conductive grease applied	—	—	0.04	

① $I_E, V_{EC}, t_{rr}, Q_{rr}$ & di/dt represent characteristics of the anti-parallel, emitter to collector free-wheel diode (FWDi).

② Pulse width and repetition rate should be such that the device junction temp. (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.