

APPLICATION NOTE

MITSUBISHI<IGBT MODULE>

Preliminary

CM1000DU-34NF

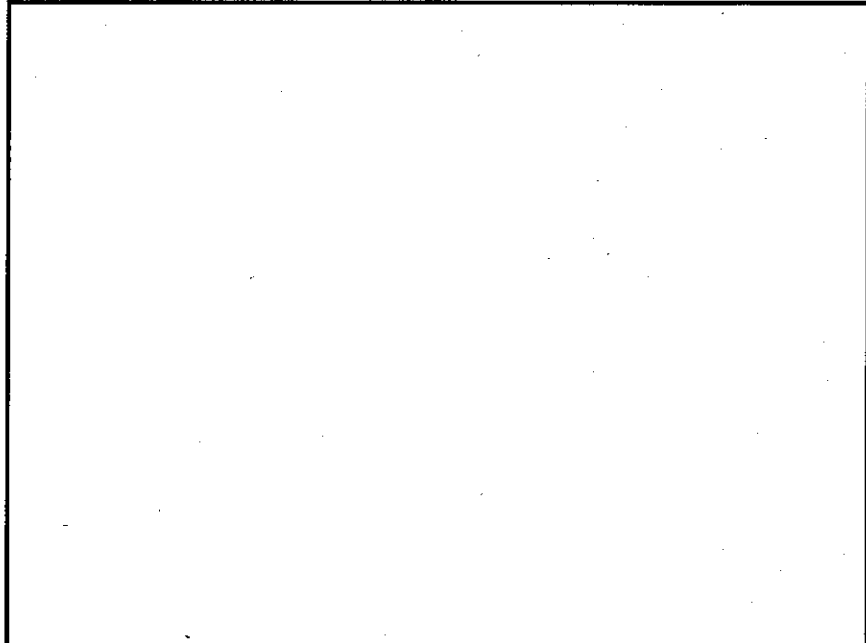
Pre.	J.Yamada	Rev	D	M. Kuroda
Apr.	M.Yamamoto Dec.14 '01			T. Furuta 20-Oct-'03

HIGH POWER SWITCHING USE

Notice : This is not a final specification. Some parametric limits are subject to change.

CM1000DU-34NF

- I_C1000A
- V_{CES}1700V
- Insulated Type
- 2-elements in a pack



APPLICATION

General purpose inverters & Servo controls, etc

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

Symbol	Item	Conditions	Ratings	Units
V_{CES}	Collector-emitter voltage	G-E Short	1700	V
V_{GES}	Gate-emitter voltage	C-E Short	± 20	V
I_C	Collector current	$T_c = 104^\circ\text{C}$	1000	A
I_{CM}		Pulse ②	2000	
I_E ①	Emitter current	$T_c = 25^\circ\text{C}$	1000	A
I_{EM} ①		Pulse ②	2000	
P_C ③	Maximum collector dissipation	$T_c = 25^\circ\text{C}$	3900	W
T_J	Junction temperature		$-40 \sim +150$	$^\circ\text{C}$
T_{stg}	Storage temperature ^{*3}		$-40 \sim +125$	$^\circ\text{C}$
Viso	Isolation voltage	Main terminal to base plate, AC 1 min.	3500	V
-	Torque strength	Main terminal M6	3.5 ~ 4.5	N·m
-	Torque strength	Mounting holes M6	3.5 ~ 4.5	N·m
-	Weight	Typical value	1400	g

ELECTRICAL CHARACTERISTICS (T_j = 25 °C)

Symbol	Item	Conditions	Min.	Typ.	Max.	Units	
I _{CEs}	Collector cutoff current	V _{CE} =V _{CEs} , V _{GE} = 0V	—	—	1	mA	
V _{GE(th)}	Gate-emitter threshold voltage	I _C =100mA, V _{CE} = 10V	6	7	8	V	B
I _{GES}	Gate leakage current	V _{GE} =V _{GES} , V _{CE} = 0V	—	—	5	μA	B
V _{CE(sat)} (chip)	Collector to emitter saturation voltage(without lead resistance)	T _j = 25 °C I _C = 1000A	—	2.2	2.8	V	B D
		T _j = 125 °C V _{GE} = 15V ④	—	2.45	—		
R(lead)	Module lead resistance	I _C = 1000A, terminal-chip	—	0.286	—	mΩ	A B
C _{ies}	Input capacitance	V _{CE} = 10V V _{GE} = 0V	—	—	220	nF	B
C _{oes}	Output capacitance		—	—	25		
C _{res}	Reverse transfer capacitance		—	—	4.7		
Q _G	Total gate charge	V _{CC} =1000V, I _C =1000A, V _{GE} =15V	—	6000	—	nC	B D
td(on)	Turn-on delay time	V _{CC} = 1000V, I _C = 1000A V _{GE1} = V _{GE2} = 15V R _G = 0.47 Ω, Inductive load switching operation I _E = 1000A	—	—	600	ns	B B B
tr	Turn-on rise time		—	—	150		
td(off)	Turn-off delay time		—	—	900		
tf	Turn-off fall time		—	—	200	ns	B B D
trr	Reverse recovery time		—	—	450		
Q _{rr}	Reverse recovery charge		—	90	—	μC	B D
V _{EC} ①	Emitter-collector voltage (without lead resistance)	I _E =1000A, V _{GE} = 0V	—	2.3	3	V	B
R _{th(j-c)Q}	Thermal resistance ^{*3}	IGBT part (1/2module)	—	—	0.032	°C/W	D
R _{th(j-c)R}		FWDi part (1/2module)	—	—	0.053		
R _{th(c-f)}	Contact thermal resistance ^{*2}	Case to fin, Thermal compound Applied (1/2module)	—	0.016	—		
R _{th(j-c')Q}	Thermal resistance ^{*1}	T _c measured point is just under the chips(IGBT part)	—	—	0.014	°C/W	
R _{th(j-c')R}		T _c measured point is just under the chips(FWDi part)	—	—	0.023		
R _G	External gate resistance		0.47	—	4.7	Ω	B

*1: T_c' measured point is just under the chips.

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

*2: Typical value is measured by using Shin-etsu Silicone "G-746".

*3: T_c measured point is shown in page "3-3".

*4: The operation temperature is restrained by the permission temperature of female connector.

- ① I_E, V_{EC}, trr & Q_{rr} 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) dose 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 neglible temperature rise.

