

APPLICATION NOTE

MTSUBISHI<IGBT MODULE>

Tentative

CM50RL-24NF

Pre.	M.Koura	Rev	B	H.Hanada, H.Kuroda
Apr.	M.Furue 27-Nov.-'03			T.Furue 20-May-'04

HIGH POWER SWITCHING USE

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

CM50RL-24NF	
●I _c	50A
●V _{CES}	1200V
●Insulated Type	
●7-elements in a pack	

APPLICATION

AC drive inverters & Servo controls, etc

ABSOLUTE MAXIMUM RATINGS (T_j = 25 °C)

Inverter part

Symbol	Item	Conditions	Ratings	Units
V _{CES}	Collector-emitter voltage	G-E Short	1200	V
V _{GES}	Gate-emitter voltage	C-E Short	±20	
I _c	Collector current	DC, T _c =94°C *1	50	A
I _{CM}		Pulse (2)	100	
I _E (1)	Emitter current		50	
I _{EM} (1)		Pulse (2)	100	
P _c (3)	Maximum collector dissipation	T _c = 25 °C	390	W

Brake part

Symbol	Item	Conditions	Ratings	Units
V _{CES}	Collector-emitter voltage	G-E Short	1200	V
V _{GES}	Gate-emitter voltage	C-E Short	±20	
I _c	Collector current	DC, T _c =104°C *1	30	A
I _{CM}		Pulse (2)	60	
P _c (3)	Maximum collector dissipation	T _c = 25 °C	290	W
V _{RRM}	Repetitive peak reverse voltage	Clamp diode part	1200	V
I _{FM}	Forward current	Clamp diode part	30	A

(Common rating)

Symbol	Item	Conditions	Ratings	Units
T _j	Junction temperature		-40~+150	°C
T _{stg}	Storage temperature		-40~+125	
Viso	Isolation voltage	Main terminal to base plate, AC 1 min.	2500	V
-	Torque strength	Main terminal M5	2.5~3.5	N·m
-	Torque strength	Mounting holes M5	2.5~3.5	
-	Weight	Typical value	350	g

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CM50RL-24NF

HIGH POWER SWITCHING USE

ELECTRICAL CHARACTERISTICS (T_j = 25 °C)

Inverter part

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 =5.0mA, V _{CE} = 10V	6	7	8	V	
I _{GES}	Gate leakage current	V _{GE} =V _{GES} , V _{CE} = 0V	—	—	0.5	μA	
V _{CE(sat)}	Collector to emitter saturation voltage	T _j = 25 °C I _C = 50A	—	2.1	3.0	V	
		T _j = 125 °C V _{GE} = 15V	—	2.4	—		
C _{ies}	Input capacitance	V _{CE} = 10V V _{GE} = 0V	—	—	8.5	nF	
C _{oes}	Output capacitance		—	—	0.75		
C _{res}	Reverse transfer capacitance		—	—	0.17		
Q _G	Total gate charge	V _{CC} =600V, I _C =50A, V _{GE} =15V	—	250	—	nC	
td(on)	Turn-on delay time	V _{CC} =600V, I _C =50A V _{GE1} =V _{GE2} =15V R _G =6.3Ω, Inductive load switching operation I _E =50A	—	—	100	ns	A
t _r	Turn-on rise time		—	—	50		
td(off)	Turn-off delay time		—	—	300		
t _f	Turn-off fall time		—	—	350		
t _{rr} ①	Reverse recovery time		—	—	100		
Q _{rr} ①	Reverse recovery charge	—	2	—	μC	A	
V _{EC} ①	Emitter-collector voltage	I _E =50A, V _{GE} = 0V	—	—	3.8	V	
R _{th(j-c)Q}	Thermal resistance	IGBT part (1/6 module) *1	—	—	0.32	°C/W	
R _{th(j-c)R}	Thermal resistance	FWDi part (1/6 module) *1			0.43		
R _{th(c-f)}	Contact thermal resistance	Case to fin, Thermal compound Applied (1/6 module) *2	—	0.085	—		
R _G	External gate resistance		6.3	—	96	Ω	B

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MITSUBISHI <IGBT MODULE> CM50RL-24NF HIGH POWER SWITCHING USE

Brake Part

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	$I_C=3.0mA$	6	7	8	V
I_{GES}	Gate leakage current	$V_{GE}=V_{GES}, V_{CE}=0V$	—	—	0.5	μA
$V_{CE(sat)}$	Collector to emitter saturation voltage	$T_j=25^\circ C$ $I_C=30A$	—	2.1	3.0	V
		$T_j=125^\circ C$ $V_{GE}=15V$	—	2.4	—	
C_{ies}	Input capacitance	$V_{CE}=10V$ $V_{GE}=0V$	—	—	5.1	nF
C_{oes}	Output capacitance		—	—	0.45	
C_{res}	Reverse transfer capacitance		—	—	0.10	
Q_G	Total gate charge	$V_{CC}=600V, I_C=30A, V_{GE}=15V$	—	150	—	nC
V_{FM}	Forward voltage drop	$I_F=30A$	—	—	3.8	V
$R_{th(j-c)Q}$	Thermal resistance	IGBT part ^{*1}	—	—	0.43	$^\circ C/W$
$R_{th(j-c)R}$		Clamp diode part ^{*1}	—	—	0.65	

*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".

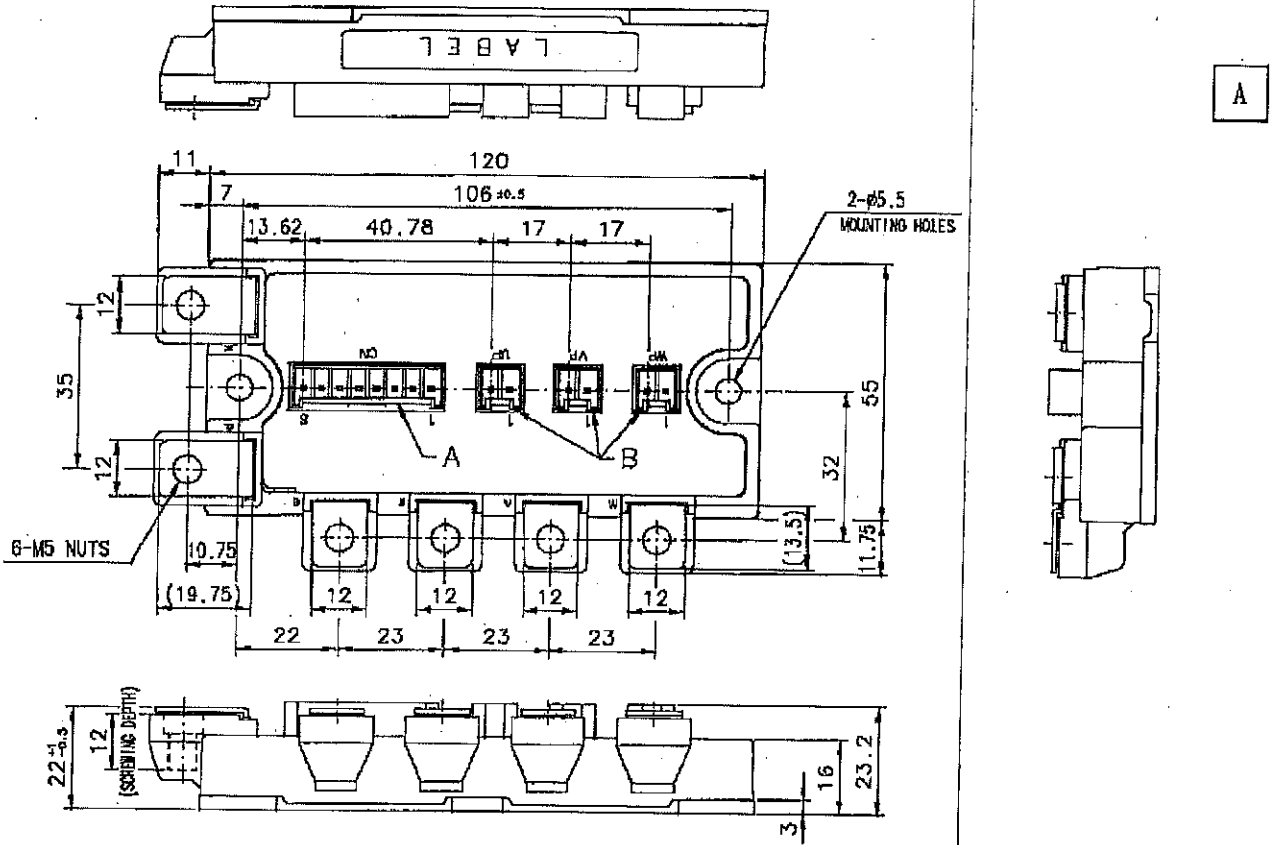
- ① $I_E, V_{EC}, t_{rr}, Q_{rr}$ represent characteristics of the anti-parallel, emitter to collector free-wheel diode (FWD).
- ② Pulse width and repetition rate should be such that the device junction temp. (T_j) does not exceed T_{jmax} rating.
- ③ Junction temperature (T_j) should not increase beyond $150^\circ C$.
- ④ Pulse width and repetition rate should be such as to cause negligible temperature rise.

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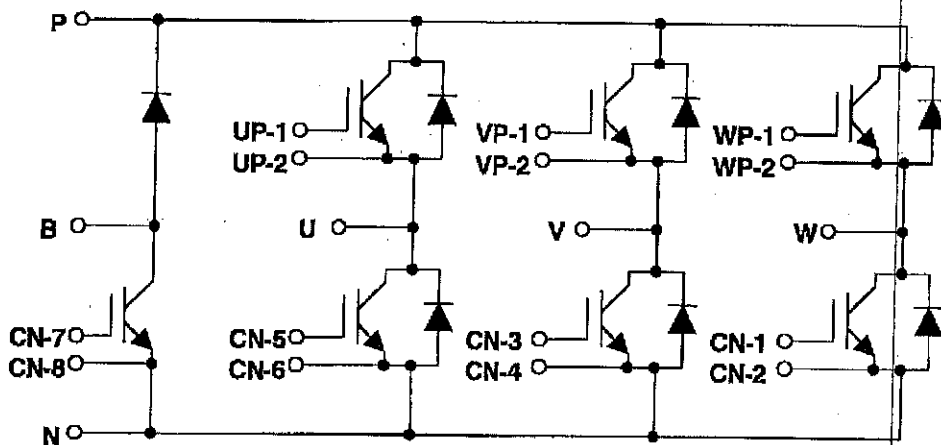
OUTLINE DRAWING

Dimensions in mm



Housing Type of A and B
 (J.S.T.Mfg.Co.Ltd)
 A= B8P-VH-FB-B, B= B2P-VH-FB-B

CIRCUIT DIAGRAM



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CHIP LAYOUT DRAWING

Dimensions in mm

