

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

MITSUBISHI IGBT MODULES

CM50AD05-12H

MEDIUM POWER SWITCHING USE
 FLAT BASE, INSULATED TYPE

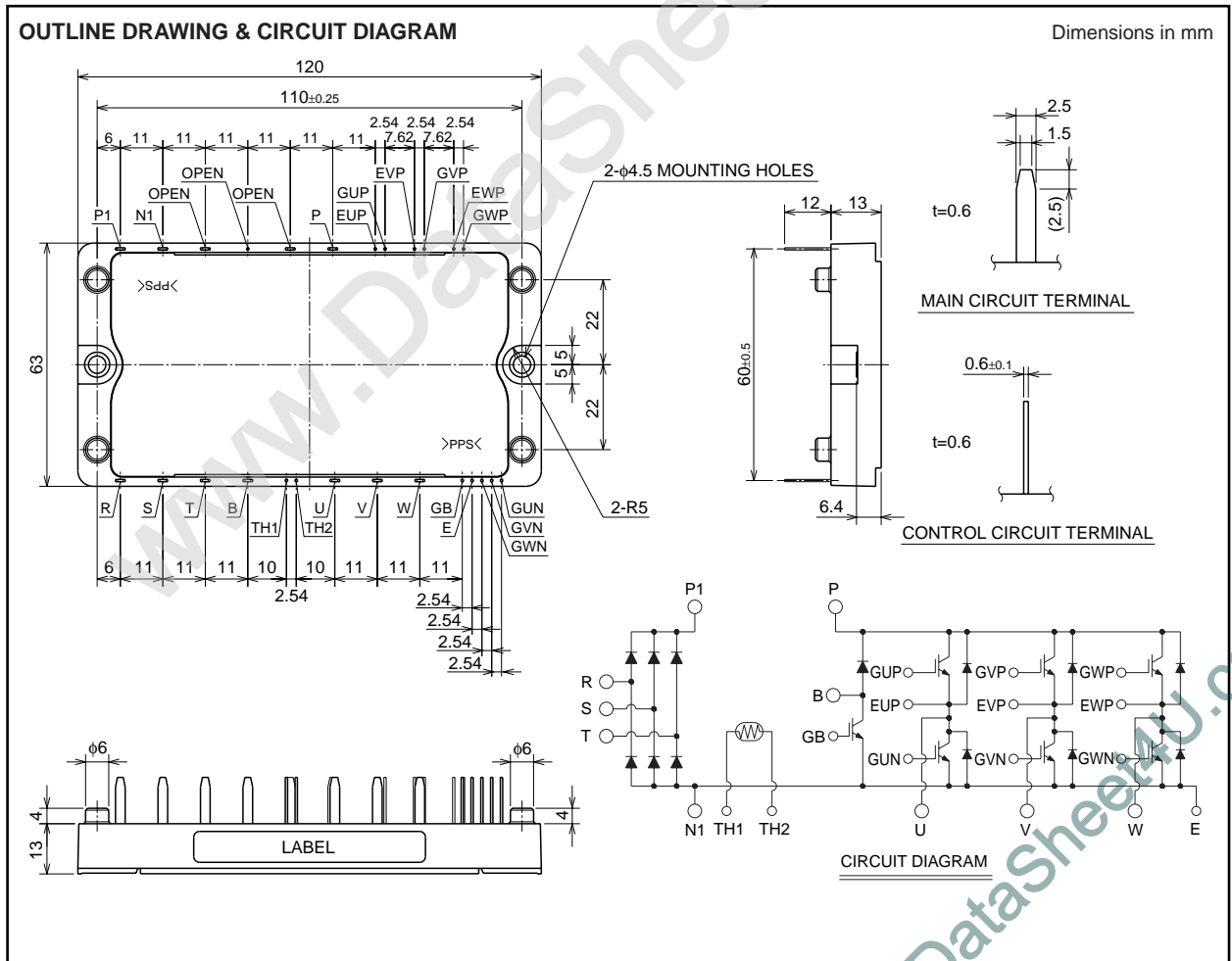
CM50AD05-12H



- IC 50A
- VCES 600V
- Insulated Type
- 3φ Inverter + 3φ Converter + Brake + Thermistor

APPLICATION

AC & DC motor controls, General purpose inverters



Aug. 1999

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**MAXIMUM RATINGS (T_J = 25°C)
 INVERTER PART**

Symbol	Parameter	Conditions	Rating	Unit
V _{CE} S	Collector-emitter voltage	G-E Short	600	V
V _{GE} S	Gate-emitter voltage	C-E Short	±20	V
I _C	Collector Current	T _C = 25°C	50	A
I _{CM}		PULSE (Note. 2)	100	
I _E (Note.1)	Emitter Current	T _C = 25°C	50	A
I _{EM} (Note.1)		PULSE (Note. 2)	100	
P _C (Note.3)	Maximum collector dissipation	T _C = 25°C	—	W

BRAKE PART

Symbol	Parameter	Conditions	Rating	Unit
V _{CE} S	Collector-emitter voltage	G-E Short	600	V
V _{GE} S	Gate-emitter voltage	C-E Short	±20	V
I _C	Collector Current	T _C = 25°C	50	A
I _{CM}		PULSE (Note. 2)	100	
P _C (Note.3)	Maximum collector dissipation	T _C = 25°C	—	W
V _{RRM}	Repetitive peak reverse voltage	Clamp diode part	600	V
I _{FM} (Note.3)	Forward current	Clamp diode part	50	A

CONVERTER PART

Symbol	Parameter	Conditions	Rating	Unit
V _{RRM}	Repetitive peak reverse voltage		800	V
E _a	Recommended AC input voltage		220	V
I _O	DC output current	3φ rectifying circuit	50	A
I _{FSM}	Surge (non-repetitive) forward current	1/2 cycle at 60Hz, peak value, Non-repetitive	500	A
I ² t	I ² t for fusing	Value for one cycle of surge current	1.0×10 ³	A ² s

COMMON RATING

Symbol	Parameter	Conditions	Rating	Unit
T _j	Junction temperature		-40 ~ +150	°C
T _{stg}	Storage temperature		-40 ~ +125	°C
V _{iso}	Isolation voltage	AC 1 min.	2500	V
—	Mounting torque	Mounting M4 screw	0.98 ~ 1.47	N·m
—	Weight	Typical value	140	g

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**ELECTRICAL CHARACTERISTICS (T_j = 25°C)
 INVERTER PART**

Symbol	Parameter	Test conditions	Limits			Unit		
			Min.	Typ.	Max.			
ICES	Collector cutoff current	VCE = VCES, VGE = 0V	—	—	1	mA		
VGE(th)	Gate-emitter threshold voltage	IC = 5.0mA, VCE = 10V	4.5	6	7.5	V		
IGES	Gate-emitter cutoff current	VGE = VGES, VCE = 0V	—	—	0.5	μA		
VCE(sat)	Collector-emitter saturation voltage	T _j = 25°C T _j = 150°C	IC = 50A, VGE = 15V	(Note.4)	—	2.2	2.8	V
					—	—	—	
Cies	Input capacitance	VCE = 10V VGE = 0V	—	—	5.0	nF		
Coes	Output capacitance		—	—	3.8			
Cres	Reverse transfer capacitance		—	—	1.0			
QG	Total gate charge	VCC = 300V, IC = 50A, VGE = 15V	—	150	—	nC		
td (on)	Turn-on delay time	VCC = 300V, IC = 50A VGE1 = VGE2 = 15V RG = 13Ω Resistive load	—	—	120	ns		
tr	Turn-on rise time		—	—	300			
td (off)	Turn-off delay time		—	—	200			
tf	Turn-off fall time		—	—	300			
VEC(Note.1)	Emitter-collector voltage	IE = 50A, VGE = 0V	—	—	2.8	V		
trr (Note.1)	Reverse recovery time	IE = 50A, VGE = 0V	—	—	110	ns		
Qrr (Note.1)	Reverse recovery charge	die / dt = - 100A / μs	—	0.14	—	μC		
Rth(j-c)Q	Thermal resistance	IGBT part, Per 1/6 module	—	—	—	°C/W		
Rth(j-c)R		FWDi part, Per 1/6 module	—	—	—			

BRAKE PART

Symbol	Parameter	Test conditions	Limits			Unit		
			Min.	Typ.	Max.			
ICES	Collector cutoff current	VCE = VCES, VGE = 0V	—	—	1	mA		
VGE(th)	Gate-emitter threshold voltage	IC = 5.0mA, VCE = 10V	4.5	6	7.5	V		
IGES	Gate-emitter cutoff current	VGE = VGES, VCE = 0V	—	—	0.5	μA		
VCE(sat)	Collector-emitter saturation voltage	T _j = 25°C T _j = 150°C	IC = 50A, VGE = 15V	(Note.4)	—	2.2	2.8	V
					—	—	—	
Cies	Input capacitance	VCE = 10V VGE = 0V	—	—	5.0	nF		
Coes	Output capacitance		—	—	3.8			
Cres	Reverse transfer capacitance		—	—	1.0			
QG	Total gate charge	VCC = 300V, IC = 50A, VGE = 15V	—	150	—	nC		
VFM	Forward voltage drop	IF = 50A, Clamp diode part	—	—	1.5	V		
Rth(j-c)Q	Thermal resistance	IGBT part	—	—	—	°C/W		
Rth(j-c)R		Clamp diode part	—	—	—			

CONVERTER PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
IRRM	Repetitive reverse current	VR = VRRM, T _j = 150°C	—	—	8	mA
VFM	Forward voltage drop	IF = 50A	—	—	1.5	V
Rth(j-c)	Thermal resistance	Per 1/6 module	—	—	—	°C/W

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THERMISTOR PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
RTH	Resistance	Tc = 25°C	—	(100)	—	kΩ
B	B Constant	Resistance at 25°C, 50°C (Note.5)	—	(4000)	—	K

() : These parametric limits are tentative.

COMMON RATING

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
Rth(c-f)	Contact thermal resistance	Case to fin, Thermal compound applied*1 (1 module)	—	—	—	°C/W

Note.1 IE, VEC, trr, Qrr, die/dt 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 temp. (Tj) does not exceed Tjmax rating.

3 Junction temperature (Tj) should not increase beyond 150°C.

4 Pulse width and repetition rate should be such as to cause negligible temperature rise.

5 $B = (\ln R_1 - \ln R_2) / (1/T_1 - 1/T_2)$ R1 : Resistance at T1(K)

R2 : Resistance at T2(K)

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