

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

# MITSUBISHI IGBT MODULES

## CM15AD05-24H

MEDIUM POWER SWITCHING USE  
 FLAT BASE, INSULATED TYPE

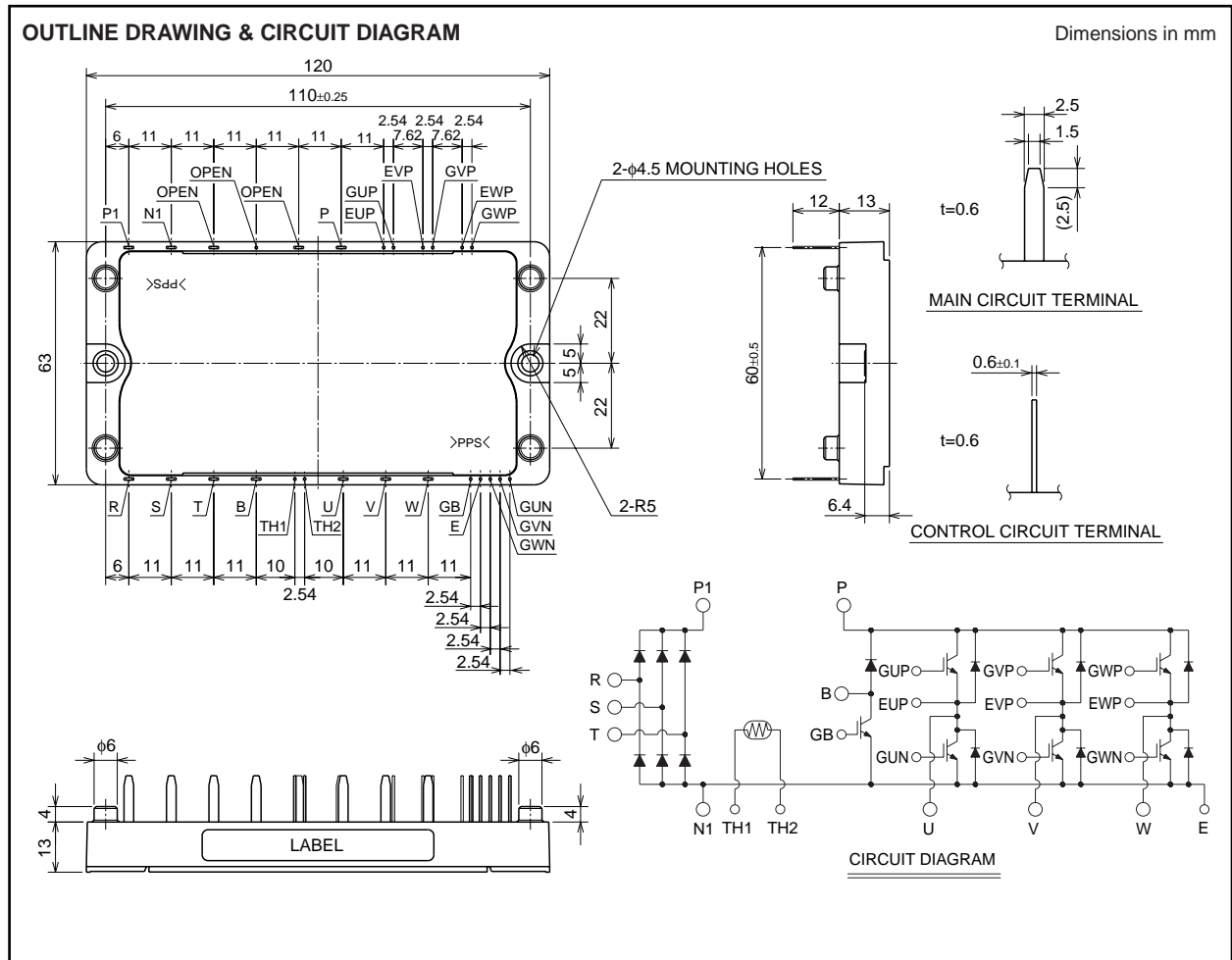
### CM15AD05-24H



- IC ..... 15A
- VCES ..... 1200V
- Insulated Type
- 3φ Inverter + 3φ Converter + Brake  
 + Thermistor

### APPLICATION

AC & DC motor controls, General purpose inverters



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**MAXIMUM RATINGS (T<sub>J</sub> = 25°C)  
 INVERTER PART**

Symbol	Parameter	Conditions	Rating	Unit
V <sub>CES</sub>	Collector-emitter voltage	G-E Short	1200	V
V <sub>GES</sub>	Gate-emitter voltage	C-E Short	±20	V
I <sub>C</sub>	Collector Current	T <sub>C</sub> = 25°C	15	A
I <sub>CM</sub>		PULSE (Note. 2)	30	
I <sub>E</sub> (Note.1)	Emitter Current	T <sub>C</sub> = 25°C	15	A
I <sub>EM</sub> (Note.1)		PULSE (Note. 2)	30	
P <sub>C</sub> (Note.3)	Maximum collector dissipation	T <sub>C</sub> = 25°C	—	W

**BRAKE PART**

Symbol	Parameter	Conditions	Rating	Unit
V <sub>CES</sub>	Collector-emitter voltage	G-E Short	1200	V
V <sub>GES</sub>	Gate-emitter voltage	C-E Short	±20	V
I <sub>C</sub>	Collector Current	T <sub>C</sub> = 25°C	15	A
I <sub>CM</sub>		PULSE (Note. 2)	30	
P <sub>C</sub> (Note.3)	Maximum collector dissipation	T <sub>C</sub> = 25°C	—	W
V <sub>RRM</sub>	Repetitive peak reverse voltage	Clamp diode part	1200	V
I <sub>FM</sub> (Note.3)	Forward current	Clamp diode part	15	A

**CONVERTER PART**

Symbol	Parameter	Conditions	Rating	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage		1600	V
E <sub>a</sub>	Recommended AC input voltage		440	V
I <sub>O</sub>	DC output current	3φ rectifying circuit	15	A
I <sub>FSM</sub>	Surge (non-repetitive) forward current	1/2 cycle at 60Hz, peak value, Non-repetitive	250	A
I <sup>2</sup> t	I <sup>2</sup> t for fusing	Value for one cycle of surge current	260	A <sup>2</sup> s

**COMMON RATING**

Symbol	Parameter	Conditions	Rating	Unit
T <sub>j</sub>	Junction temperature		-40 ~ +150	°C
T <sub>stg</sub>	Storage temperature		-40 ~ +125	°C
V <sub>iso</sub>	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<sub>j</sub> = 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 = 1.5mA, 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 <sub>j</sub> = 25°C T <sub>j</sub> = 150°C	IC = 15A, VGE = 15V	(Note.4)	—	2.7	3.4	V
					—	2.45	—	
Cies	Input capacitance	VCE = 10V VGE = 0V	—	—	3.0	nF		
Coes	Output capacitance		—	—	2.4			
Cres	Reverse transfer capacitance		—	—	0.6			
QG	Total gate charge	VCC = 600V, IC = 15A, VGE = 15V	—	75	—	nC		
td (on)	Turn-on delay time	VCC = 600V, IC = 15A VGE1 = VGE2 = 15V RG = 21Ω Resistive load	—	—	100	ns		
tr	Turn-on rise time		—	—	200			
td (off)	Turn-off delay time		—	—	150			
tf	Turn-off fall time		—	—	350			
VEC(Note.1)	Emitter-collector voltage	IE = 15A, VGE = 0V	—	—	3.5	V		
trr (Note.1)	Reverse recovery time	IE = 15A, VGE = 0V	—	—	250	ns		
Qrr (Note.1)	Reverse recovery charge	die / dt = - 30A / μs	—	0.11	—	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 = 1.5mA, 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 <sub>j</sub> = 25°C T <sub>j</sub> = 150°C	IC = 15A, VGE = 15V	(Note.4)	—	2.7	3.4	V
					—	2.45	—	
Cies	Input capacitance	VCE = 10V VGE = 0V	—	—	3.0	nF		
Coes	Output capacitance		—	—	2.4			
Cres	Reverse transfer capacitance		—	—	0.6			
QG	Total gate charge	VCC = 600V, IC = 15A, VGE = 15V	—	75	—	nC		
VFM	Forward voltage drop	IF = 15A, 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 <sub>j</sub> = 150°C	—	—	8	mA
VFM	Forward voltage drop	IF = 15A	—	—	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".