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

MITSUBISHI IGBT MODULES

CM10AD05-24H

MEDIUM POWER SWITCHING USE
FLAT BASE, INSULATED TYPE

CM10AD05-24H

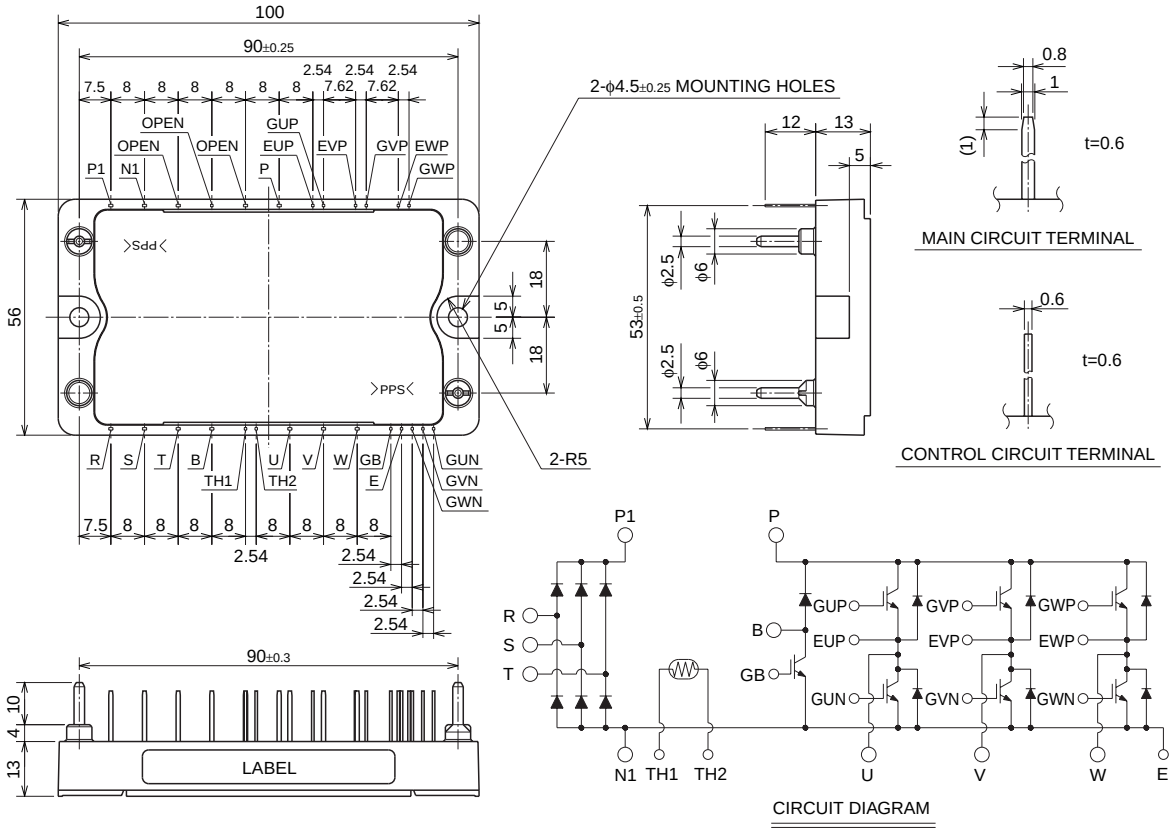
- I_C 10A
- V_{CES} 1200V
- Insulated Type
- 3φ Inverter + 3φ Converter + Brake + Thermistor

APPLICATION

AC & DC motor controls, General purpose inverters

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



MITSUBISHI ELECTRIC

CM10AD05-24H

MEDIUM POWER SWITCHING USE
FLAT BASE, INSULATED TYPE

MAXIMUM RATINGS (Tj = 25°C)

INVERTER PART

Symbol	Parameter	Conditions	Rating	Unit
V_{CES}	Collector-emitter voltage	G-E Short	1200	V
V_{GES}	Gate-emitter voltage	C-E Short	±20	V
I_C	Collector Current	Tc = 25°C	10	A
I_{CM}		PULSE (Note. 2)	20	
I_E (Note.1)	Emitter Current	Tc = 25°C	10	A
I_{EM} (Note.1)		PULSE (Note. 2)	20	
P_C (Note.3)	Maximum collector dissipation	Tc = 25°C	62	W

BRAKE PART

Symbol	Parameter	Conditions	Rating	Unit
V_{CES}	Collector-emitter voltage	G-E Short	1200	V
V_{GES}	Gate-emitter voltage	C-E Short	±20	V
I_C	Collector Current	Tc = 25°C	10	A
I_{CM}		PULSE (Note. 2)	20	
P_C (Note.3)	Maximum collector dissipation	Tc = 25°C	62	W
V_{RRM}	Repetitive peak reverse voltage	Clamp diode part	1200	V
I_{FM} (Note.3)	Forward current	Clamp diode part	10	A

CONVERTER PART

Symbol	Parameter	Conditions	Rating	Unit
V_{RRM}	Repetitive peak reverse voltage		1600	V
E_a	Recommended AC input voltage		440	V
I_O	DC output current	3ϕ rectifying circuit	10	A
I_{FSM}	Surge (non-repetitive) forward current	1/2 cycle at 60Hz, peak value, Non-repetitive	100	A
I^2t	I^2t for fusing	Value for one cycle of surge current	42	A^2s

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	1.47 ~ 1.96	N·m
—	Weight	Typical value	120	g

CM10AD05-24H

MEDIUM POWER SWITCHING USE
FLAT BASE, INSULATED TYPE

ELECTRICAL CHARACTERISTICS (T_j = 25°C)

INVERTER PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I_{CES}	Collector cutoff current	V_{CE} = V_{CES}, V_{GE} = 0V	—	—	1	mA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C = 1.0mA, V_{CE} = 10V	4.5	6	7.5	V
I_{GES}	Gate-emitter cutoff current	V_{GE} = V_{GES}, V_{CE} = 0V	—	—	0.5	µA
$V_{CE(sat)}$	Collector-emitter saturation voltage	T_j = 25°C, I_C = 10A, V_{GE} = 15V (Note.4)	—	2.7	3.4	V
		T_j = 150°C, I_C = 10A, V_{GE} = 15V (Note.4)	—	2.45	—	
C_{ies}	Input capacitance	V_{CE} = 10V, V_{GE} = 0V	—	—	2.0	nF
C_{oes}	Output capacitance		—	—	1.5	
C_{res}	Reverse transfer capacitance		—	—	0.4	
Q_G	Total gate charge	V_{CC} = 600V, I_C = 10A, V_{GE} = 15V	—	50	—	nC
$t_{d(on)}$	Turn-on delay time	V_{CC} = 600V, I_C = 10A, V_{GE1} = V_{GE2} = 15V, R_G = 31Ω, Resistive load	—	—	100	ns
t_r	Turn-on rise time		—	—	200	
$t_{d(off)}$	Turn-off delay time		—	—	150	
t_f	Turn-off fall time		—	—	350	
V_{EC}(Note.1)	Emitter-collector voltage	I_E = 10A, V_{GE} = 0V	—	—	3.5	V
t_{rr} (Note.1)	Reverse recovery time	I_E = 10A, V_{GE} = 0V	—	—	250	ns
Q_{rr} (Note.1)	Reverse recovery charge	die / dt = – 20A / µs	—	0.08	—	µC
$R_{th(j-c)Q}$	Thermal resistance	IGBT part, Per 1/6 module	—	—	2.0	°C/W
$R_{th(j-c)R}$		FWDi part, Per 1/6 module	—	—	3.1	

BRAKE PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I_{CES}	Collector cutoff current	V_{CE} = V_{CES}, V_{GE} = 0V	—	—	1	mA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C = 1.0mA, V_{CE} = 10V	4.5	6	7.5	V
I_{GES}	Gate-emitter cutoff current	V_{GE} = V_{GES}, V_{CE} = 0V	—	—	0.5	µA
$V_{CE(sat)}$	Collector-emitter saturation voltage	T_j = 25°C, I_C = 10A, V_{GE} = 15V (Note.4)	—	2.7	3.4	V
		T_j = 150°C, I_C = 10A, V_{GE} = 15V (Note.4)	—	2.45	—	
C_{ies}	Input capacitance	V_{CE} = 10V, V_{GE} = 0V	—	—	2.0	nF
C_{oes}	Output capacitance		—	—	1.5	
C_{res}	Reverse transfer capacitance		—	—	0.4	
Q_G	Total gate charge	V_{CC} = 600V, I_C = 10A, V_{GE} = 15V	—	50	—	nC
V_{FM}	Forward voltage drop	I_F = 10A, Clamp diode part	—	—	1.7	V
$R_{th(j-c)Q}$	Thermal resistance	IGBT part	—	—	2.0	°C/W
$R_{th(j-c)R}$		Clamp diode part	—	—	3.1	

CONVERTER PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I_{RRM}	Repetitive reverse current	V_R = V_{RRM}, T_j = 150°C	—	—	8	mA
V_{FM}	Forward voltage drop	I_F = 10A	—	—	1.7	V
$R_{th(j-c)}$	Thermal resistance	Per 1/6 module	—	—	2.4	°C/W

CM10AD05-24H

MEDIUM POWER SWITCHING USE
FLAT BASE, INSULATED TYPE

THERMISTOR PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
R_{TH}	Resistance	T_C = 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.	
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, Thermal compound applied*1 (1 module)	—	0.05	—	°C/W

Note.1 I_E, V_{EC}, t_{rr}, Q_{rr}, di_e/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. (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.
5 $B = (\ln R_1 - \ln R_2)/(1/T_1 - 1/T_2)$ R_1 : Resistance at T_1(K)
R_2 : Resistance at T_2(K)

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