

MITSUBISHI IGBT MODULES

CM200RL-12NF

HIGH POWER SWITCHING USE

CM200RL-12NF



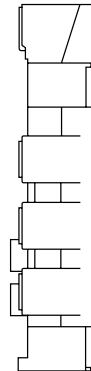
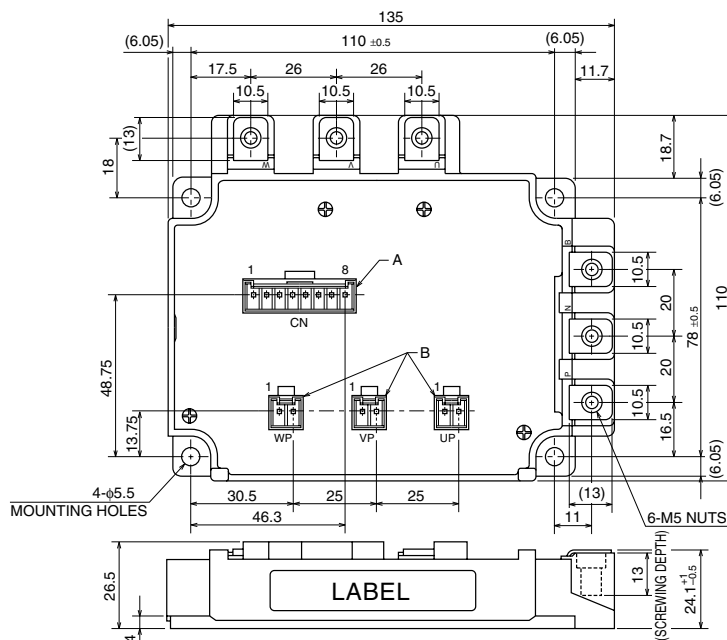
- Ic200A
- VCES600V
- Insulated Type
- 7-elements in a pack

APPLICATION

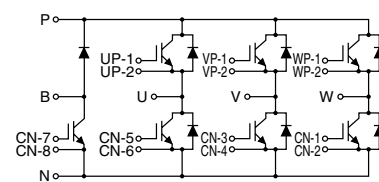
AC drive inverters & Servo controls, etc

OUTLINE DRAWING & CIRCUIT DIAGRAM

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

CM200RL-12NF

HIGH POWER SWITCHING USE

ABSOLUTE MAXIMUM RATINGS (Tj = 25°C, unless otherwise specified)

INVERTER PART

Symbol	Parameter	Conditions	Ratings	Unit
V _{CES}	Collector-emitter voltage	G-E Short	600	V
V _{GES}	Gate-emitter voltage	C-E Short	±20	V
I _C	Collector current	DC, T _C = 88°C ^{*1}	200	A
I _{CM}		Pulse (Note 2)	400	A
I _E (Note 1)	Emitter current		200	A
I _{EM} (Note 1)		Pulse (Note 2)	400	A
P _C (Note 3)	Maximum collector dissipation	T _C = 25°C	890	W

BRAKE PART

Symbol	Parameter	Conditions	Ratings	Unit
V _{CES}	Collector-emitter voltage	G-E Short	600	V
V _{GES}	Gate-emitter voltage	C-E Short	±20	V
I _C	Collector current	DC, T _C = 99°C ^{*1}	100	A
I _{CM}		Pulse (Note 2)	200	A
P _C (Note 3)	Maximum collector dissipation	T _C = 25°C	540	W
V _{RRM}	Repetitive peak reverse voltage	Clamp diode part	600	V
I _{FM}	Forward current	Clamp diode part	100	A

(COMMON RATING)

Symbol	Parameter	Conditions	Ratings	Unit
T _j	Junction temperature		−40 ~ +150	°C
T _{stg}	Storage temperature		−40 ~ +125	°C
V _{iso}	Isolation voltage	Terminals to base plate, f = 60Hz, AC 1 minute	2500	Vrms
—	Torque strength	Main terminals M5 screw	2.5 ~ 3.5	N • m
—		Mounting M5 screw	2.5 ~ 3.5	N • m
—	Weight	Typical value	750	g

CM200RL-12NF

HIGH POWER SWITCHING USE

ELECTRICAL CHARACTERISTICS (T_j = 25°C, unless otherwise specified)

INVERTER PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
IC _{ES}	Collector cutoff current	V _{CE} = V _{CES} , V _{GE} = 0V	—	—	1	mA
V _{GE(th)}	Gate-emitter threshold voltage	I _C = 20mA, 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-emitter saturation voltage	I _C = 200A, V _{GE} = 15V	—	1.7	2.2	V
		T _j = 25°C T _j = 125°C	—	1.7	—	
C _{ies}	Input capacitance	V _{CE} = 10V	—	—	30	nF
C _{oes}	Output capacitance	V _{GE} = 0V	—	—	3.7	nF
C _{res}	Reverse transfer capacitance		—	—	1.2	nF
Q _G	Total gate charge	V _{CC} = 300V, I _C = 200A, V _{GE} = 15V	—	800	—	nC
t _{d(on)}	Turn-on delay time	V _{CC} = 300V, I _C = 200A V _{GE} = ±15V R _G = 3.1Ω, Inductive load I _E = 200A	—	—	120	ns
t _r	Turn-on rise time		—	—	100	ns
t _{d(off)}	Turn-off delay time		—	—	300	ns
t _f	Turn-off fall time		—	—	300	ns
t _{rr} (Note 1)	Reverse recovery time		—	—	150	ns
Q _{rr} (Note 1)	Reverse recovery charge		—	4.8	—	μC
V _{EC} (Note 1)	Emitter-collector voltage	I _E = 200A, V _{GE} = 0V	—	—	2.8	V
R _{th(j-c)Q}	Thermal resistance	IGBT part (1/6 module)*1	—	—	0.14	K/W
R _{th(j-c)R}		FWDi part (1/6 module)*1	—	—	0.22	K/W
R _{th(c-f)}	Contact thermal resistance	Case to heat sink, Thermal compound Applied (1/6 module)*2	—	0.051	—	K/W
R _G	External gate resistance		3.1	—	31	Ω

BRAKE PART

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
IC _{ES}	Collector cutoff current	V _{CE} = V _{CES} , V _{GE} = 0V	—	—	1	mA
V _{GE(th)}	Gate-emitter threshold voltage	I _C = 10mA	6	7	8	V
I _{GES}	Gate leakage current	±V _{GE} = V _{GES} , V _{CE} = 0V	—	—	0.5	μA
V _{CE(sat)}	Collector-emitter saturation voltage	I _C = 100A, V _{GE} = 15V	—	1.7	2.2	V
		T _j = 25°C T _j = 125°C	—	1.7	—	
C _{ies}	Input capacitance	V _{CE} = 10V	—	—	15	nF
C _{oes}	Output capacitance	V _{GE} = 0V	—	—	1.9	nF
C _{res}	Reverse transfer capacitance		—	—	0.6	nF
Q _G	Total gate charge	V _{CC} = 300V, I _C = 100A, V _{GE} = 15V	—	400	—	nC
V _{FM}	Forward voltage drop	I _F = 100A	—	—	2.8	V
R _{th(j-c)Q}	Thermal resistance	IGBT part*1	—	—	0.23	K/W
R _{th(j-c)R}		Clamp diode part*1	—	—	0.41	K/W
R _G	External gate resistance		6.3	—	63	Ω

*1 : Case temperature (T_c) measured point is just under the chips.

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

*2 : Typical value is measured by using thermally conductive grease of λ = 0.9[W/(m • K)].

Note 1. I_E, V_{EC}, t_{rr} & Q_{rr} represent characteristics of the anti-parallel, emitter-collector free-wheel diode (FWDi).

2. Pulse width and repetition rate should be such that the device junction temperature (T_j) does not exceed T_{jmax} rating.

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

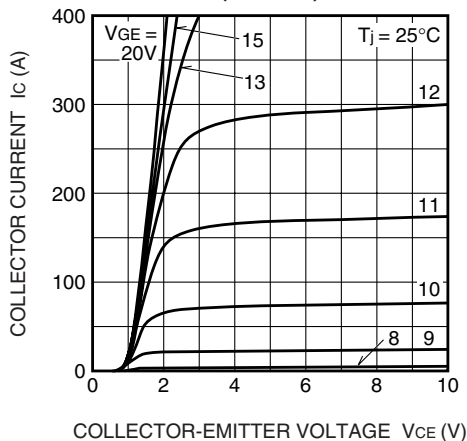
4. Pulse width and repetition rate should be such as to cause negligible temperature rise.

CM200RL-12NF

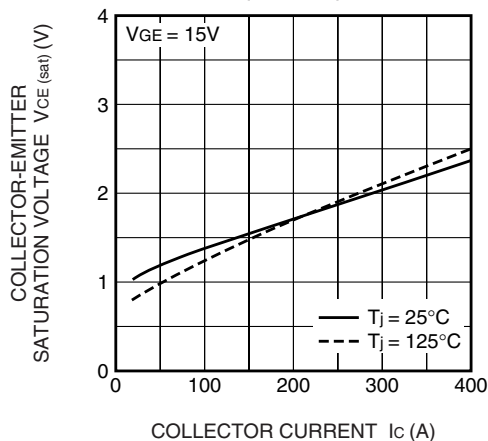
HIGH POWER SWITCHING USE

PERFORMANCE CURVES

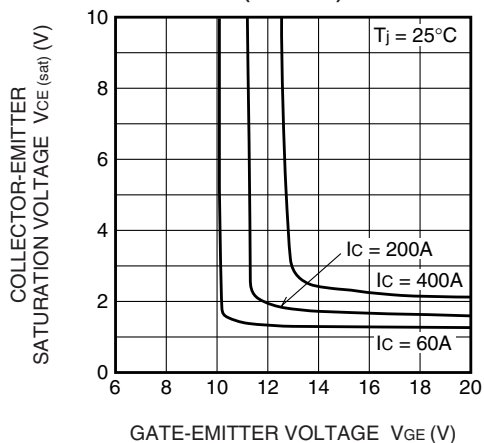
OUTPUT CHARACTERISTICS
(TYPICAL)



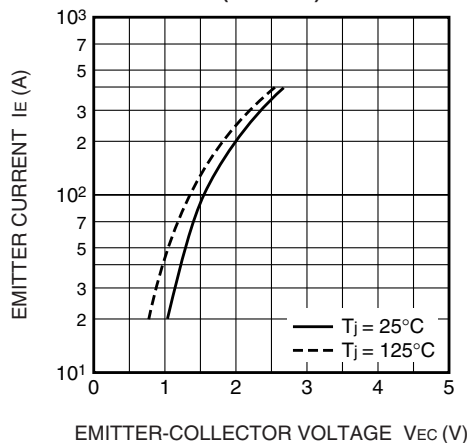
COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)



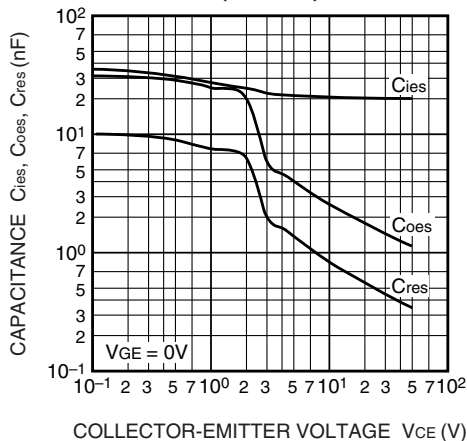
COLLECTOR-EMITTER SATURATION
VOLTAGE CHARACTERISTICS
(TYPICAL)



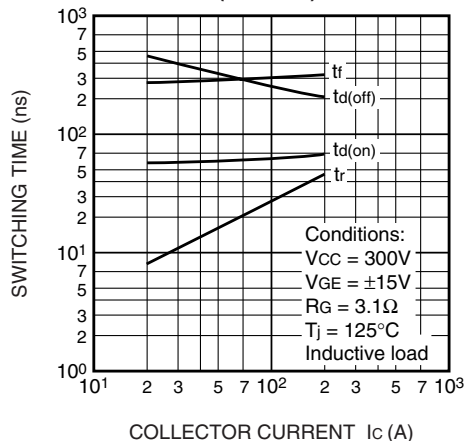
FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



CAPACITANCE- V_{CE}
CHARACTERISTICS
(TYPICAL)



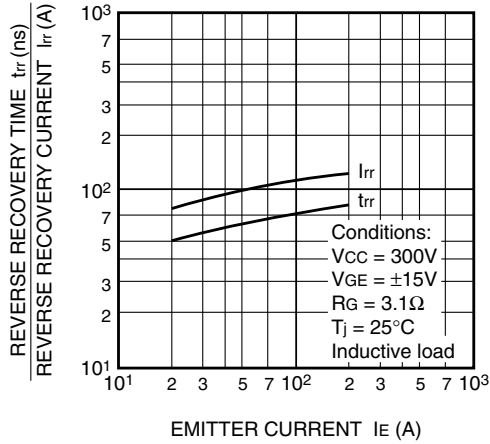
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)



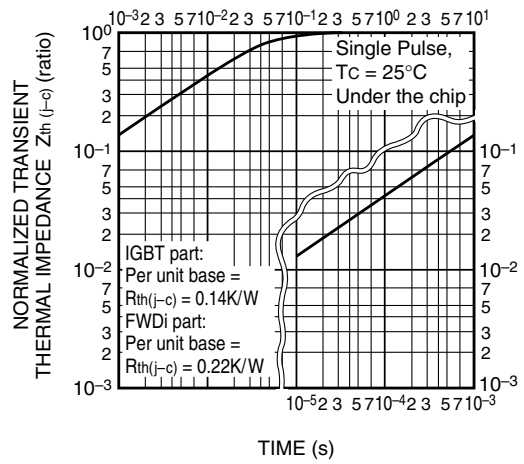
CM200RL-12NF

HIGH POWER SWITCHING USE

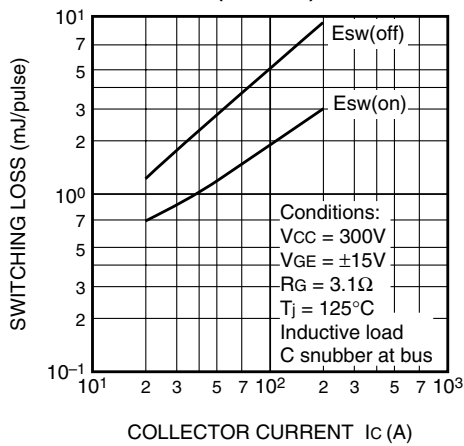
**REVERSE RECOVERY CHARACTERISTICS
OF FREE-WHEEL DIODE
(TYPICAL)**



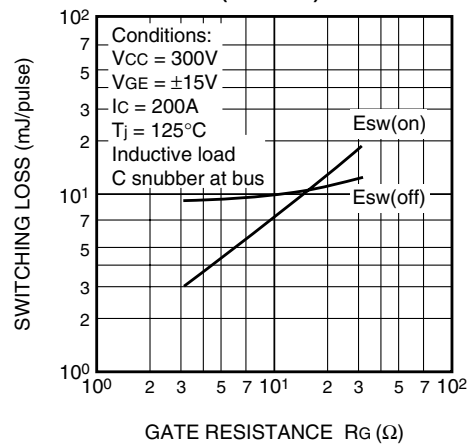
**TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT part & FWDi part)**



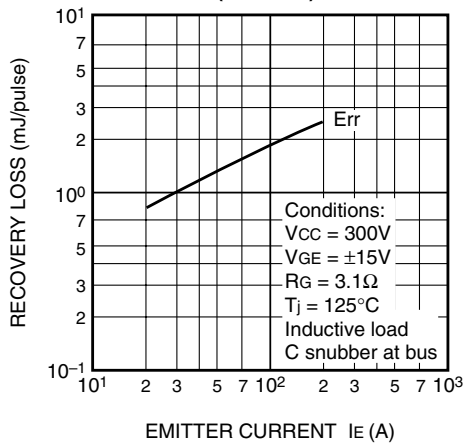
**SWITCHING LOSS vs.
COLLECTOR CURRENT
(TYPICAL)**



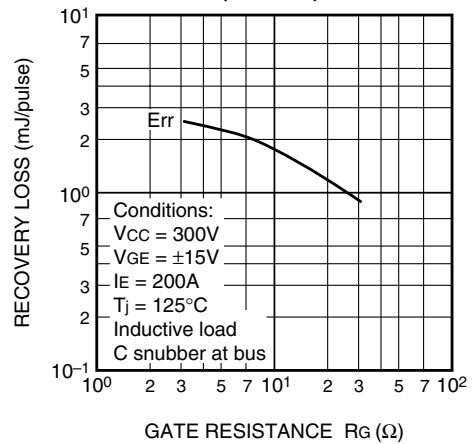
**SWITCHING LOSS vs.
GATE RESISTANCE
(TYPICAL)**



**RECOVERY LOSS vs. I_E
(TYPICAL)**



**RECOVERY LOSS vs.
GATE RESISTANCE
(TYPICAL)**



CM200RL-12NF

HIGH POWER SWITCHING USE

