

MITSUBISHI IGBT MODULES  
**CM150TL-12NF**

HIGH POWER SWITCHING USE

**CM150TL-12NF**



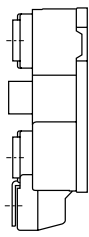
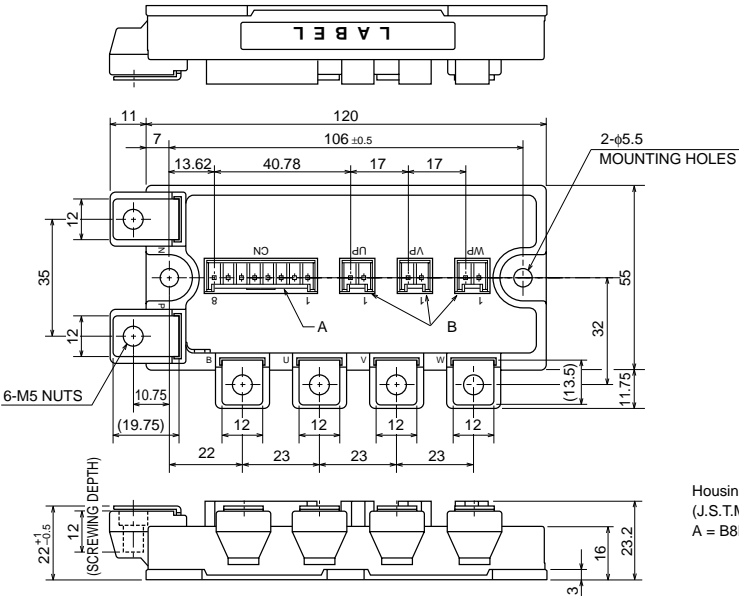
- IC ..... 150A
- VCES ..... 600V
- Insulated Type
- 6-elements in a pack

**APPLICATION**

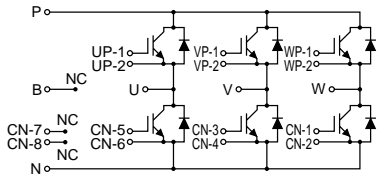
AC drive inverters & Servo controls, etc

**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**

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**ABSOLUTE MAXIMUM RATINGS (T<sub>j</sub> = 25°C)**

Symbol	Parameter	Conditions	Ratings	Unit
V <sub>CE</sub>	Collector-emitter voltage	G-E Short	600	V
V <sub>GE</sub>	Gate-emitter voltage	C-E Short	±20	V
I <sub>C</sub>	Collector current	DC, T <sub>c</sub> = 93°C* <sup>1</sup>	150	A
I <sub>CM</sub>		Pulse (Note 2)	300	A
I <sub>E</sub> (Note 1)	Emitter current		150	A
I <sub>EM</sub> (Note 1)		Pulse (Note 2)	300	A
P <sub>C</sub> (Note 3)	Maximum collector dissipation	T <sub>c</sub> = 25°C	730	W
T <sub>j</sub>	Junction temperature		-40 ~ +150	°C
T <sub>stg</sub>	Storage temperature		-40 ~ +125	°C
V <sub>iso</sub>	Isolation voltage	Main Terminal to base plate, AC 1 min.	2500	V
—	Torque strength	Main Terminal M5	2.5 ~ 3.5	N • m
—		Mounting holes M5	2.5 ~ 3.5	N • m
—	Weight	Typical value	350	g

**ELECTRICAL CHARACTERISTICS (T<sub>j</sub> = 25°C)**

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I <sub>CES</sub>	Collector cutoff current	V <sub>CE</sub> = V <sub>CE</sub> , V <sub>GE</sub> = 0V	—	—	1	mA
V <sub>GE(th)</sub>	Gate-emitter threshold voltage	I <sub>C</sub> = 15mA, V <sub>CE</sub> = 10V	6	7	8	V
I <sub>GES</sub>	Gate leakage current	V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0V	—	—	0.5	μA
V <sub>CE(sat)</sub>	Collector-emitter saturation voltage	I <sub>C</sub> = 150A, V <sub>GE</sub> = 15V	—	T <sub>j</sub> = 25°C 1.7	2.2	V
		T <sub>j</sub> = 125°C —		—		
C <sub>ies</sub>	Input capacitance	V <sub>CE</sub> = 10V V <sub>GE</sub> = 0V	—	—	23	nF
C <sub>oes</sub>	Output capacitance		—	—	2.8	nF
C <sub>res</sub>	Reverse transfer capacitance		—	—	0.9	nF
Q <sub>G</sub>	Total gate charge	V <sub>CC</sub> = 300V, I <sub>C</sub> = 150A, V <sub>GE</sub> = 15V	—	600	—	nC
t <sub>d(on)</sub>	Turn-on delay time	V <sub>CC</sub> = 300V, I <sub>C</sub> = 150A V <sub>GE1</sub> = V <sub>GE2</sub> = 15V R <sub>G</sub> = 4.2Ω, Inductive load switching operation I <sub>E</sub> = 150A	—	—	120	ns
t <sub>r</sub>	Turn-on rise time		—	—	100	ns
t <sub>d(off)</sub>	Turn-off delay time		—	—	300	ns
t <sub>f</sub>	Turn-off fall time		—	—	300	ns
t <sub>rr</sub> (Note 1)	Reverse recovery time		—	—	150	ns
Q <sub>rr</sub> (Note 1)	Reverse recovery charge		—	2.5	—	μC
V <sub>EC</sub> (Note 1)	Emitter-collector voltage	I <sub>E</sub> = 150A, V <sub>GE</sub> = 0V	—	—	2.8	V
R <sub>th(j-c)Q</sub>	Thermal resistance	IGBT part (1/6 module)* <sup>1</sup>	—	—	0.17	°C/W
R <sub>th(j-c)R</sub>		FWDi part (1/6 module)* <sup>1</sup>	—	—	0.31	°C/W
R <sub>th(c-f)</sub>	Contact thermal resistance	Case to fin, Thermal compound Applied (1/6 module)* <sup>2</sup>	—	0.085	—	°C/W
R <sub>G</sub>	External gate resistance		4.2	—	42	Ω

\*1 : T<sub>c</sub> measured point is just under the chips.

If you use this value, R<sub>th(f-a)</sub> should be measured just under the chips.

\*2 : Typical value is measured by using Shin-etsu Silicone "G-746".

Note 1. I<sub>E</sub>, V<sub>EC</sub>, t<sub>rr</sub> & Q<sub>rr</sub> represent characteristics of the anti-parallel, emitter to collector free-wheel diode (FWDi).

2. Pulse width and repetition rate should be such that the device junction temp. (T<sub>j</sub>) does not exceed T<sub>jmax</sub> rating.

3. Junction temperature (T<sub>j</sub>) should not increase beyond 150°C.

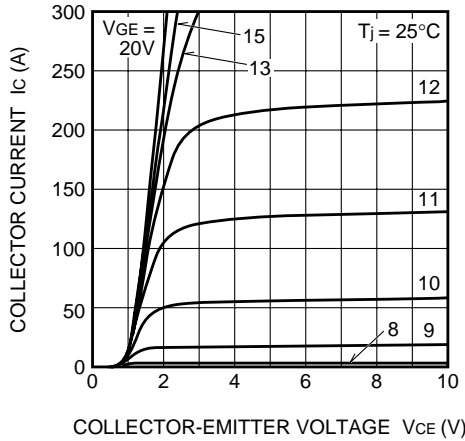
4. Pulse width and repetition rate should be such as to cause negligible temperature rise.

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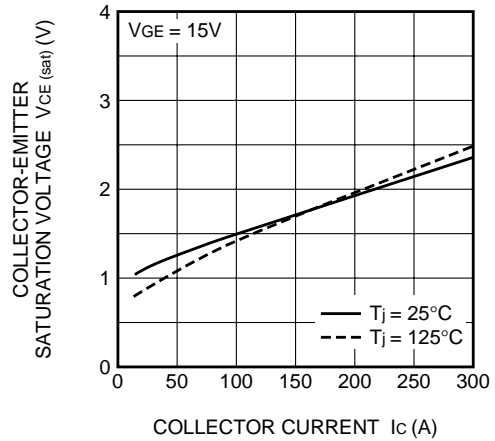
HIGH POWER SWITCHING USE

## PERFORMANCE CURVES

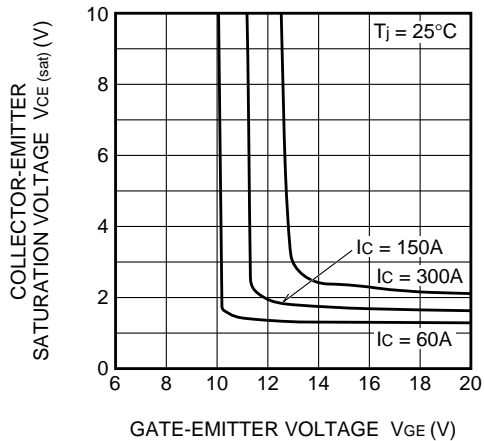
**OUTPUT CHARACTERISTICS (TYPICAL)**



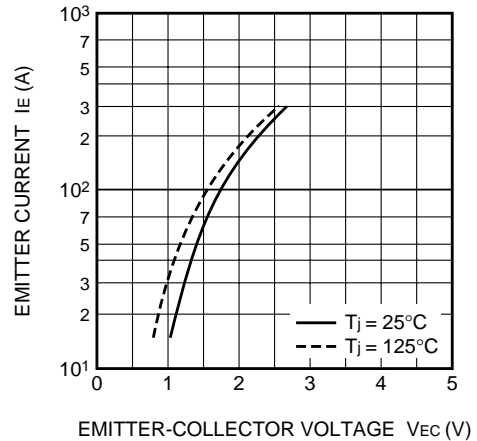
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



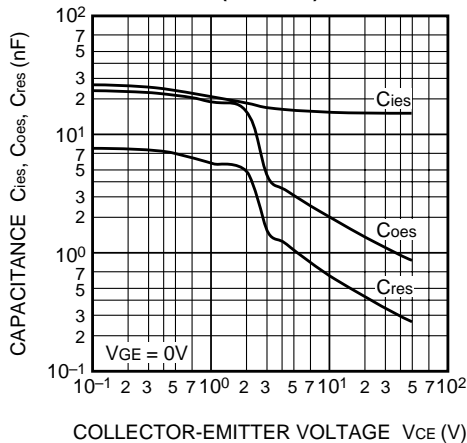
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



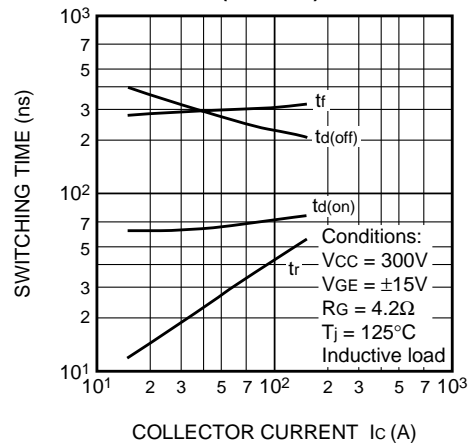
**FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)**



**CAPACITANCE-VCE CHARACTERISTICS (TYPICAL)**



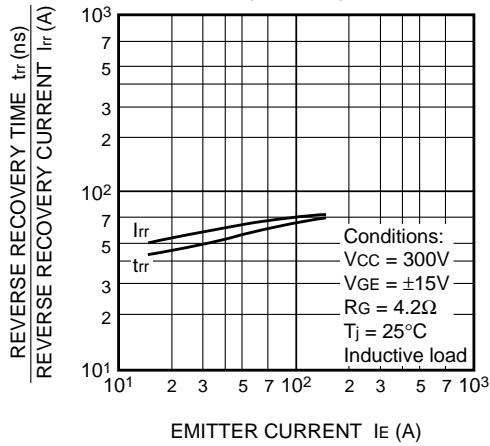
**HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)**



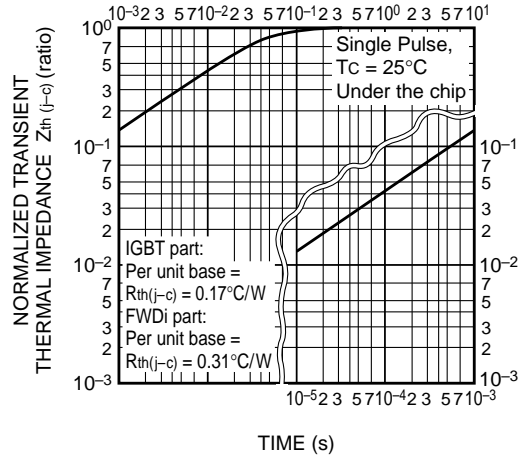
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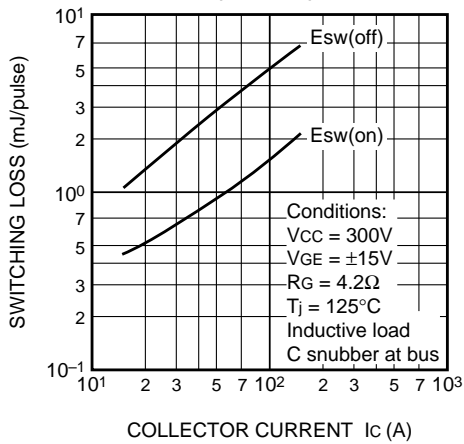
**REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)**



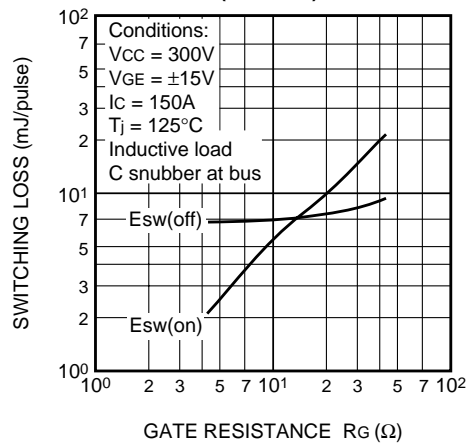
**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)**



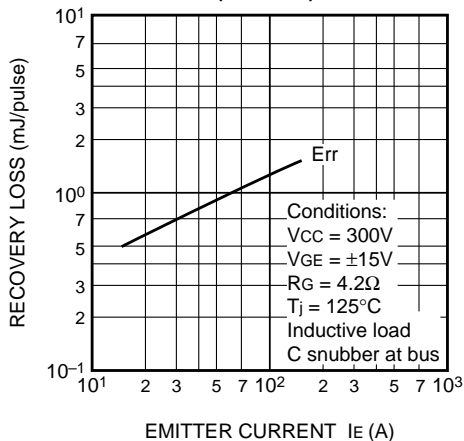
**SWITCHING LOSS vs. COLLECTOR CURRENT (TYPICAL)**



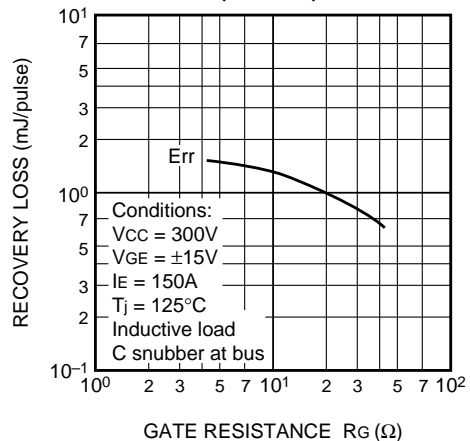
**SWITCHING LOSS vs. GATE RESISTANCE (TYPICAL)**



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



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



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