

MITSUBISHI IGBT MODULES  
**CM150DY-24A**

HIGH POWER SWITCHING USE

**CM150DY-24A**



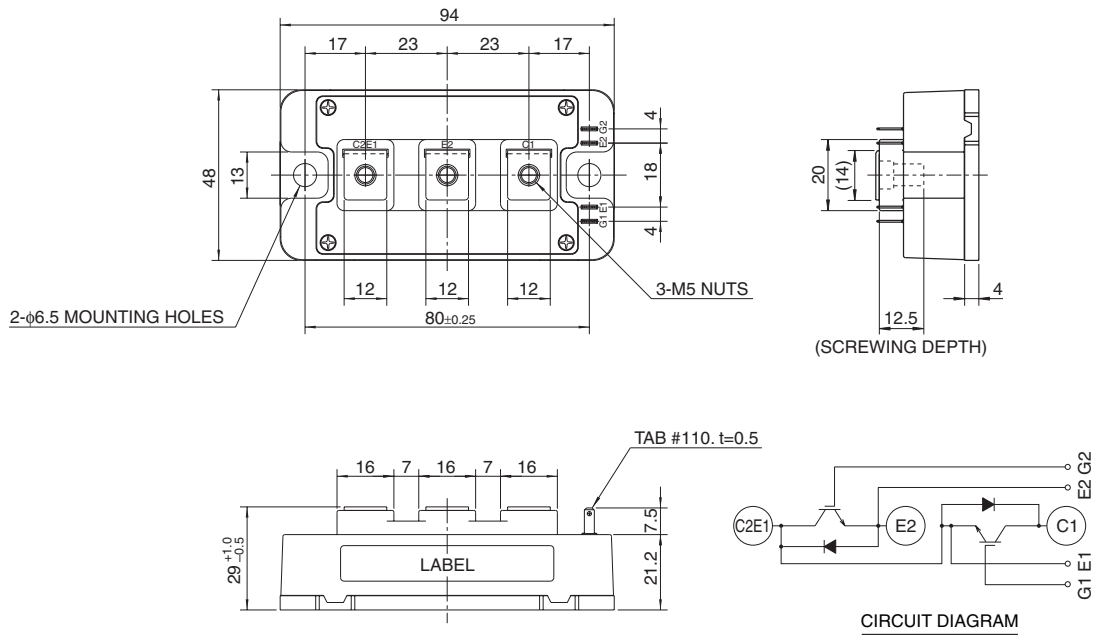
- IC ..... 150A
- VCES ..... 1200V
- Insulated Type
- 2-elements in a pack

**APPLICATION**

AC drive inverters & Servo controls, etc

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm



# CM150DY-24A

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### ABSOLUTE MAXIMUM RATINGS (T<sub>j</sub> = 25°C, unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V <sub>CE</sub> S	Collector-emitter voltage	G-E Short	1200	V
V <sub>GE</sub> S	Gate-emitter voltage	C-E Short	±20	V
I <sub>C</sub>	Collector current	DC, T <sub>C</sub> = 81°C* <sup>1</sup>	150	A
I <sub>CM</sub>		Pulse (Note 2)	300	
I <sub>E</sub> (Note 1)	Emitter current		150	A
I <sub>EM</sub> (Note 1)		Pulse (Note 2)	300	
P <sub>C</sub> (Note 3)	Maximum collector dissipation	T <sub>C</sub> = 25°C* <sup>1</sup>	960	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	Terminals to base plate, f = 60Hz, AC 1 minute	2500	V <sub>rms</sub>
—	Torque strength	Main terminals M5 screw	2.5 ~ 3.5	N • m
—		Mounting M6 screw	3.5 ~ 4.5	
—	Weight	Typical value	310	g

### ELECTRICAL CHARACTERISTICS (T<sub>j</sub> = 25°C, unless otherwise specified)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I <sub>CES</sub>	Collector cutoff current	V <sub>CE</sub> = V <sub>CE</sub> S, 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				V
		T <sub>j</sub> = 25°C	—	2.1	3.0	
		T <sub>j</sub> = 125°C	—	2.4	—	
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	
C <sub>res</sub>	Reverse transfer capacitance		—	—	0.45	
Q <sub>G</sub>	Total gate charge	V <sub>CC</sub> = 600V, I <sub>C</sub> = 150A, V <sub>GE</sub> = 15V	—	675	—	nC
t <sub>d(on)</sub>	Turn-on delay time	V <sub>CC</sub> = 600V, I <sub>C</sub> = 150A V <sub>GE</sub> = ±15V R <sub>G</sub> = 2.1Ω, Inductive load I <sub>E</sub> = 150A	—	—	130	ns
t <sub>r</sub>	Turn-on rise time		—	—	100	
t <sub>d(off)</sub>	Turn-off delay time		—	—	450	
t <sub>f</sub>	Turn-off fall time		—	—	350	
t <sub>rr</sub> (Note 1)	Reverse recovery time		—	—	150	
Q <sub>rr</sub> (Note 1)	Reverse recovery charge		—	6.0	—	μC
V <sub>EC</sub> (Note 1)	Emitter-collector voltage	I <sub>E</sub> = 150A, V <sub>GE</sub> = 0V	—	—	3.8	V
R <sub>th(j-c)Q</sub>	Thermal resistance	IGBT part (1/2 module)* <sup>1</sup>	—	—	0.13	K/W
R <sub>th(j-c)R</sub>		FWDi part (1/2 module)* <sup>1</sup>	—	—	0.23	
R <sub>th(c-f)</sub>	Contact thermal resistance	Case to heat sink, Thermal compound Applied (1/2 module)* <sup>1,2</sup>	—	0.022	—	
R <sub>G</sub>	External gate resistance		2.1	—	31	Ω

\*1 : Case temperature (T<sub>C</sub>), heat sink temperature (T<sub>t</sub>) measured point is just under the chips.

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

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-collector free-wheel diode (FWDi).

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

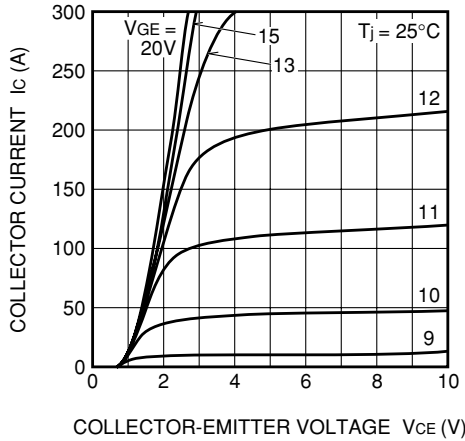
3. Junction temperature (T<sub>j</sub>) should not increase beyond 150°C.

# CM150DY-24A

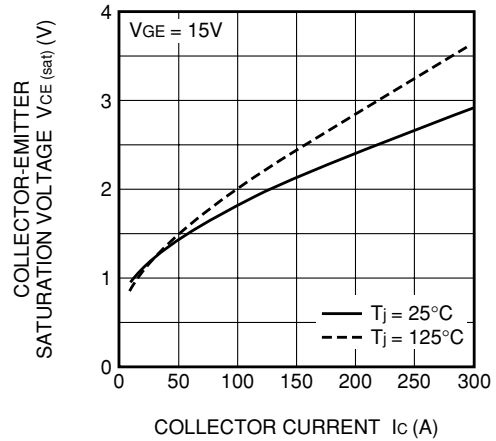
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## PERFORMANCE CURVES

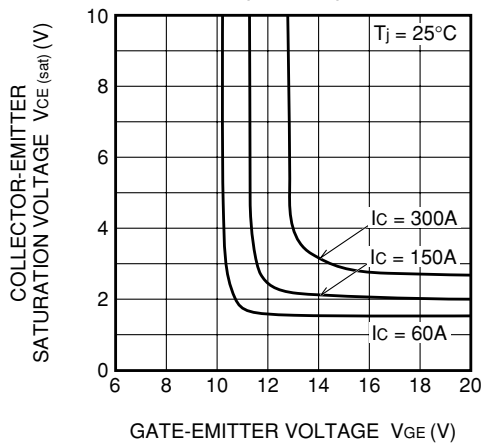
**OUTPUT CHARACTERISTICS (TYPICAL)**



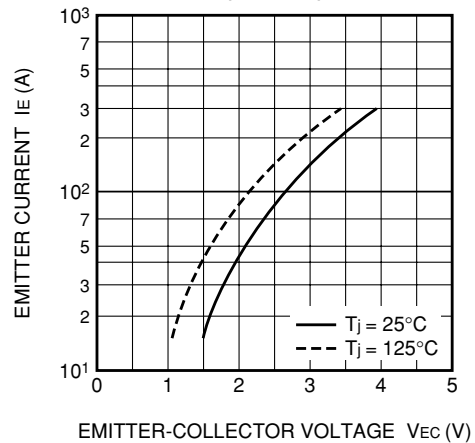
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



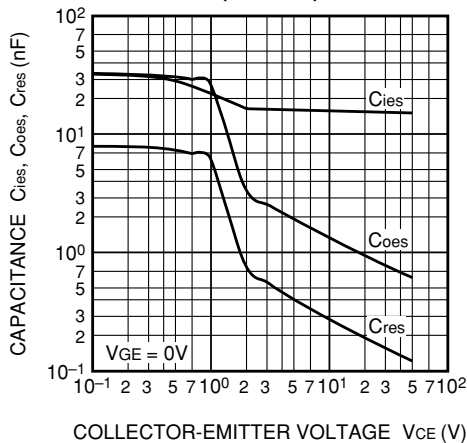
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



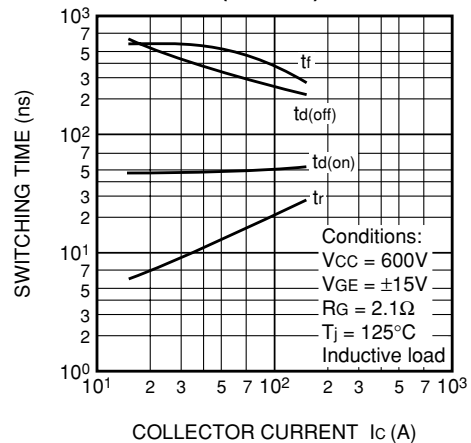
**FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)**



**CAPACITANCE-VCE CHARACTERISTICS (TYPICAL)**



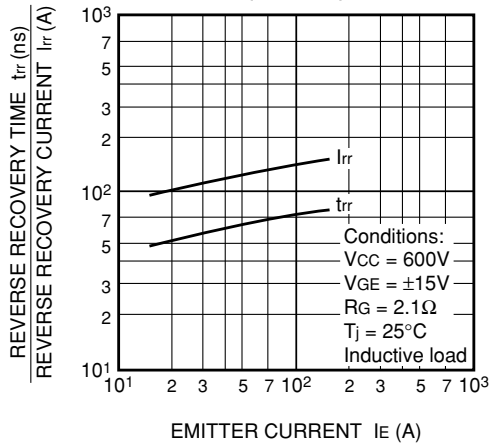
**HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)**



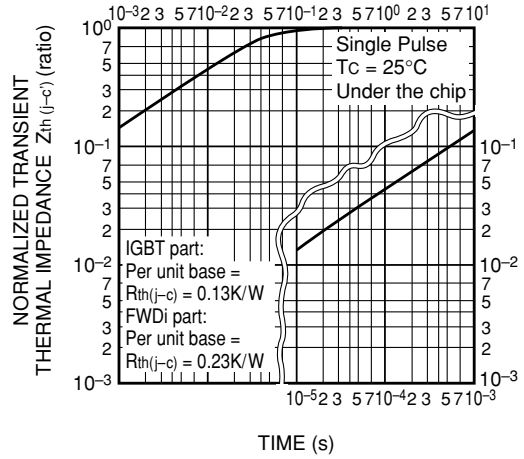
CM150DY-24A

HIGH POWER SWITCHING USE

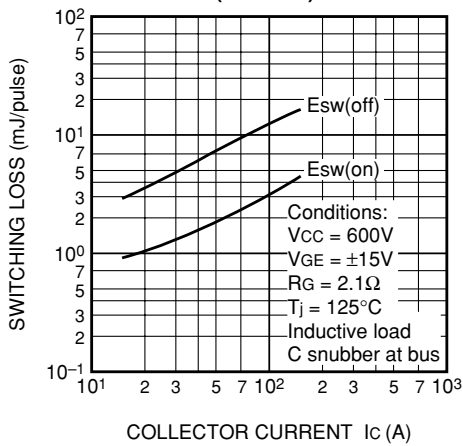
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



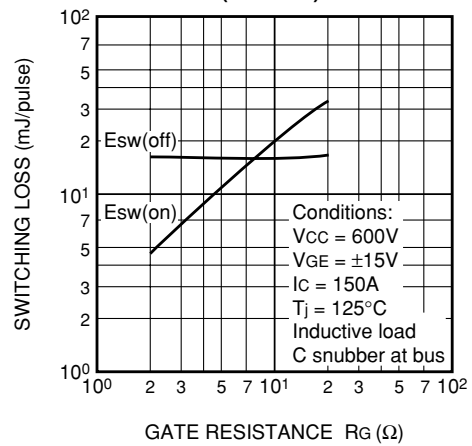
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



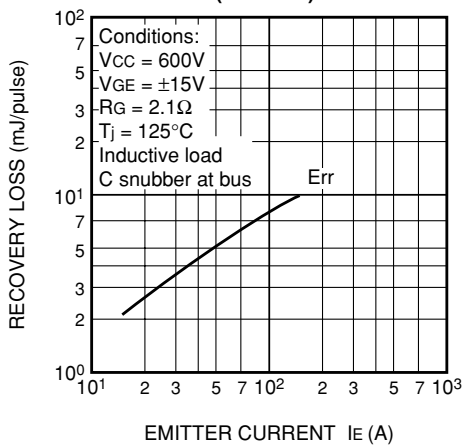
SWITCHING LOSS vs. COLLECTOR CURRENT (TYPICAL)



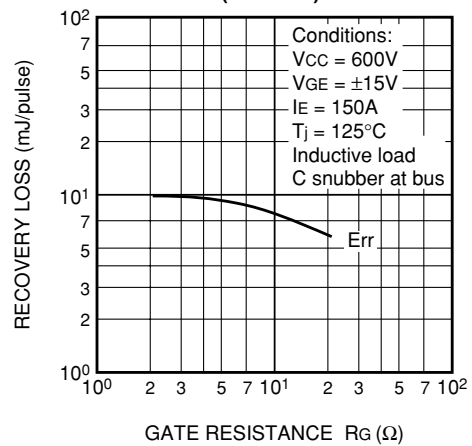
SWITCHING LOSS vs. GATE RESISTANCE (TYPICAL)



RECOVERY LOSS vs. IE (TYPICAL)



RECOVERY LOSS vs. GATE RESISTANCE (TYPICAL)



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