

MITSUBISHI IGBT MODULES
CM100RL-12NF

HIGH POWER SWITCHING USE

CM100RL-12NF



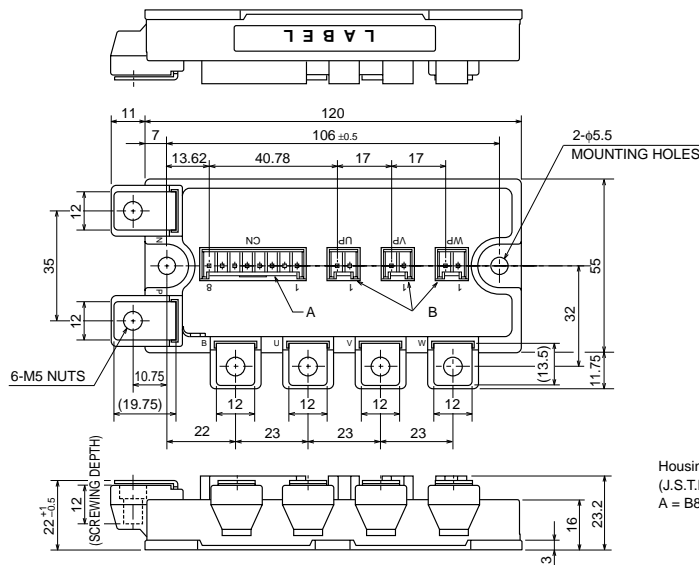
- IC 100A
- VCES 600V
- Insulated Type
- 7-elements in a pack

APPLICATION

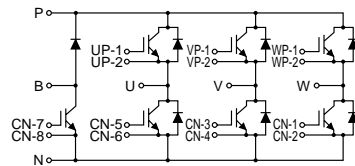
AC drive inverters & Servo controls, etc

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

Jun. 2004



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ABSOLUTE MAXIMUM RATINGS ($T_j = 25^\circ\text{C}$)

INVERTER PART

Symbol	Parameter	Conditions	Ratings	Unit
VCES	Collector-emitter voltage	G-E Short	600	V
VGES	Gate-emitter voltage	C-E Short	± 20	V
IC	Collector current	DC, $T_c = 99^\circ\text{C}^{*1}$	100	A
ICM		Pulse (Note 2)	200	A
IE (Note 1)	Emitter current		100	A
IEM (Note 1)		Pulse (Note 2)	200	A
PC (Note 3)	Maximum collector dissipation	$T_c = 25^\circ\text{C}$	540	W

BRAKE PART

Symbol	Parameter	Conditions	Ratings	Unit
VCES	Collector-emitter voltage	G-E Short	600	V
VGES	Gate-emitter voltage	C-E Short	± 20	V
IC	Collector current	DC, $T_c = 107^\circ\text{C}^{*1}$	50	A
ICM		Pulse (Note 2)	100	A
PC (Note 3)	Maximum collector dissipation	$T_c = 25^\circ\text{C}$	320	W
VRRM	Repetitive peak reverse voltage	Clamp diode part	600	V
IFM	Forward current	Clamp diode part	50	A

(COMMON RATING)

Symbol	Parameter	Conditions	Ratings	Unit
T_j	Junction temperature		$-40 \sim +150$	$^\circ\text{C}$
T_{stg}	Storage temperature		$-40 \sim +125$	$^\circ\text{C}$
V_{iso}	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

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ELECTRICAL CHARACTERISTICS (Tj = 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 = 10mA, VCE = 10V	6	7	8	V	
IGES	Gate leakage current	VGE = VGES, VCE = 0V	—	—	0.5	μA	
VCE(sat)	Collector-emitter saturation voltage	IC = 100A, VGE = 15V	Tj = 25°C	—	1.7	2.2	V
			Tj = 125°C	—	1.7	—	
Cies	Input capacitance	VCE = 10V VGE = 0V	—	—	15	nF	
Coes	Output capacitance		—	—	1.9	nF	
Cres	Reverse transfer capacitance		—	—	0.6	nF	
QG	Total gate charge	VCC = 300V, IC = 100A, VGE = 15V	—	400	—	nC	
td(on)	Turn-on delay time	VCC = 300V, IC = 100A VGE1 = VGE2 = 15V RG = 6.3Ω, Inductive load switching operation IE = 100A	—	—	120	ns	
tr	Turn-on rise time		—	—	100	ns	
td(off)	Turn-off delay time		—	—	300	ns	
tf	Turn-off fall time		—	—	300	ns	
t _{rr} (Note 1)	Reverse recovery time		—	—	120	ns	
Q _{rr} (Note 1)	Reverse recovery charge	—	2.1	—	μC		
VEC(Note 1)	Emitter-collector voltage	IE = 100A, VGE = 0V	—	—	2.8	V	
Rth(j-c)Q	Thermal resistance	IGBT part (1/6 module) ^{*1}	—	—	0.23	°C/W	
Rth(j-c)R		FWDi part (1/6 module) ^{*1}	—	—	0.41	°C/W	
Rth(c-f)	Contact thermal resistance	Case to fin, Thermal compound Applied (1/6 module) ^{*2}	—	0.085	—	°C/W	
RG	External gate resistance		6.3	—	63	Ω	

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 = 5.0mA	6	7	8	V	
IGES	Gate leakage current	VGE = VGES, VCE = 0V	—	—	0.5	μA	
VCE(sat)	Collector-emitter saturation voltage	IC = 50A, VGE = 15V	Tj = 25°C	—	1.7	2.2	V
			Tj = 125°C	—	1.7	—	
Cies	Input capacitance	VCE = 10V VGE = 0V	—	—	7.5	nF	
Coes	Output capacitance		—	—	1.0	nF	
Cres	Reverse transfer capacitance		—	—	0.3	nF	
QG	Total gate charge	VCC = 300V, IC = 50A, VGE = 15V	—	200	—	nC	
VFM	Forward voltage drop	IF = 50A	—	—	2.8	V	
Rth(j-c)Q	Thermal resistance	IGBT part ^{*1}	—	—	0.39	°C/W	
Rth(j-c)R		Clamp diode part ^{*1}	—	—	0.70	°C/W	
RG	External gate resistance		13	—	130	Ω	

*1 : Tc measured point is just under the chips.

If you use this value, Rth(f-a) should be measured just under the chips.

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

Note 1. IE, VEC, tr & Qrr 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. (Tj) does not exceed Tjmax rating.

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

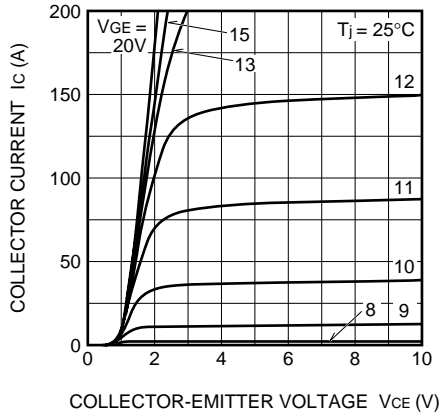
4. Pulse width and repetition rate should be such as to cause negligible temperature rise.

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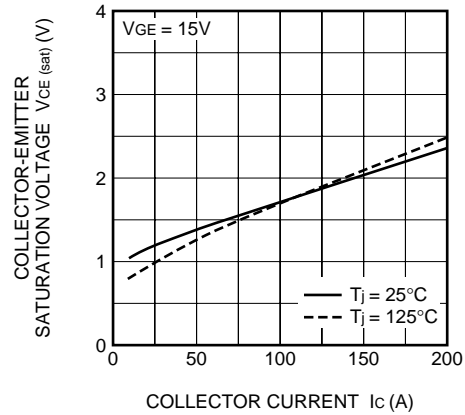
HIGH POWER SWITCHING USE

PERFORMANCE CURVES

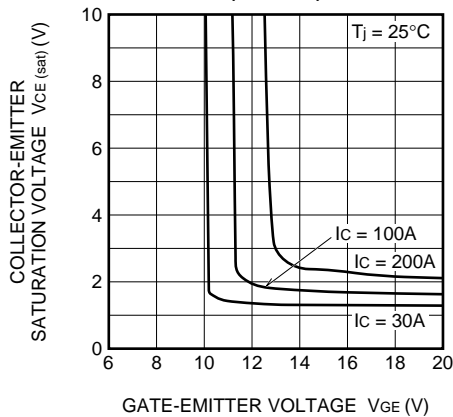
OUTPUT CHARACTERISTICS (TYPICAL)



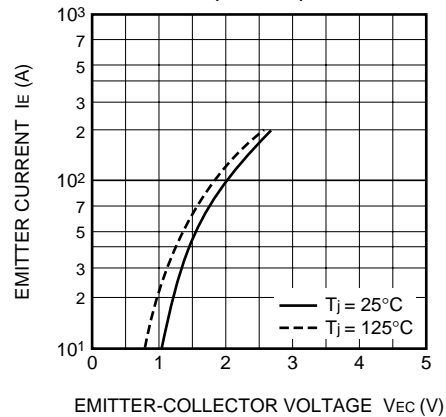
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



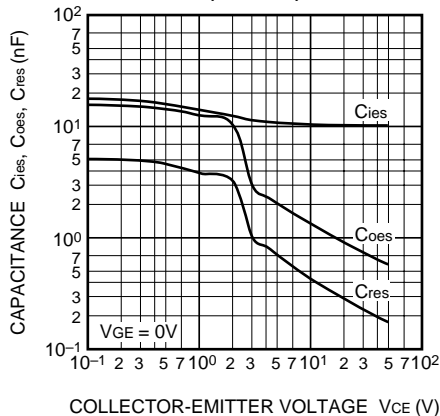
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



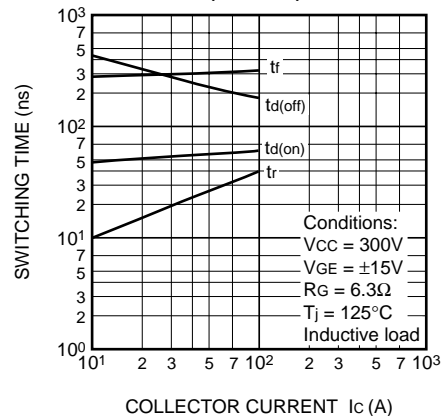
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



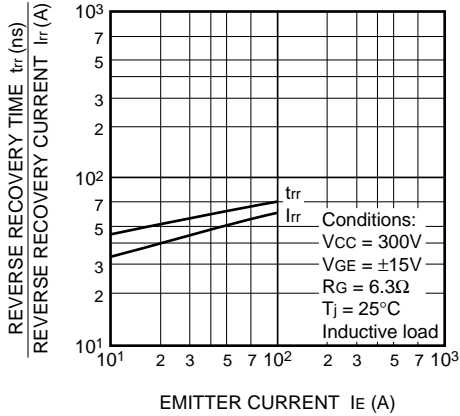
CAPACITANCE-Vce CHARACTERISTICS (TYPICAL)



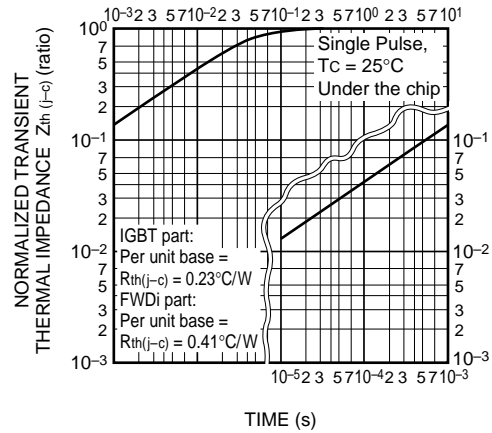
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



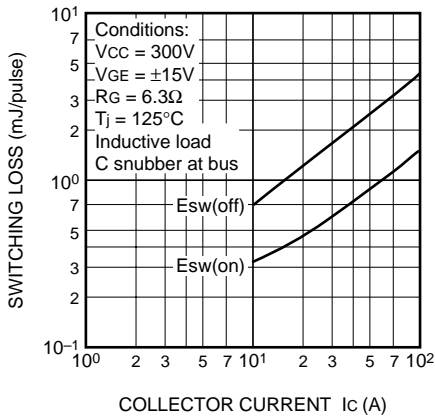
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



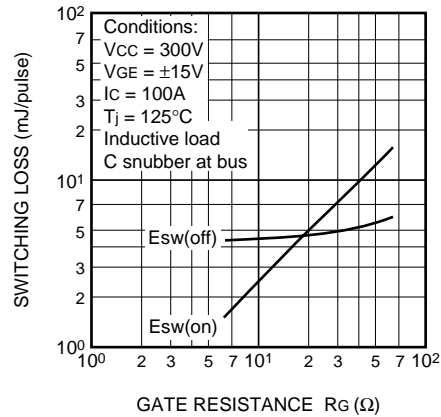
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



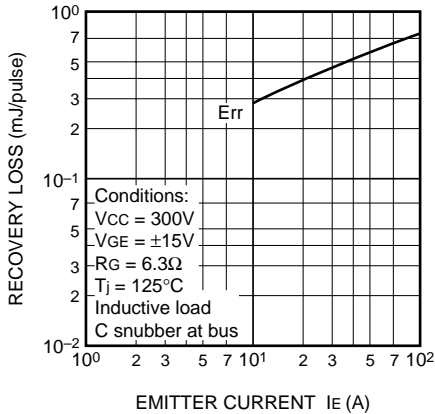
SWITCHING LOSS vs. COLLECTOR CURRENT (TYPICAL)



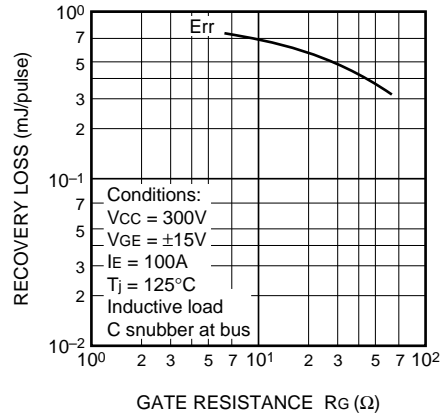
SWITCHING LOSS vs. GATE RESISTANCE (TYPICAL)



RECOVERY LOSS vs. Ie (TYPICAL)



RECOVERY LOSS vs. GATE RESISTANCE (TYPICAL)



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