

MITSUBISHI HVIGBT MODULES
CM1200HC-50H

3rd-Version HVIGBT (High Voltage Insulated Gate Bipolar Transistor) Modules

HIGH POWER SWITCHING USE
INSULATED TYPE

CM1200HC-50H



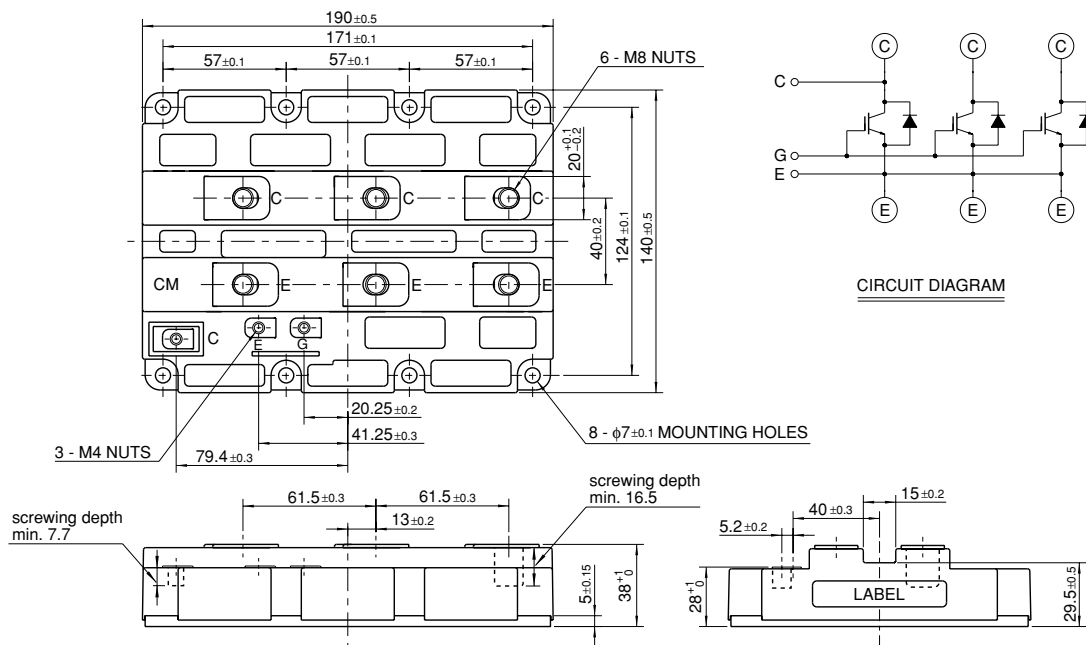
- Ic 1200A
- VCES 2500V
- Insulated Type
- 1-element in a Pack
- AISiC Baseplate

APPLICATION

Traction drives, High Reliability Converters / Inverters, DC choppers

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



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Jul. 2005



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MAXIMUM RATINGS

Symbol	Item	Conditions	Ratings	Unit
VCES	Collector-emitter voltage	VGE = 0V, Tj = 25°C	2500	V
VGES	Gate-emitter voltage	VCE = 0V, Tj = 25°C	±20	V
IC	Collector current	TC = 105°C	1200	A
ICM		Pulse (Note 1)	2400	A
IE (Note 2)	Emitter current		1200	A
IEM (Note 2)		Pulse (Note 1)	2400	A
PC (Note 3)	Maximum power dissipation	TC = 25°C, IGBT part	14700	W
Tj	Junction temperature		-40 ~ +150	°C
Top	Operating temperature		-40 ~ +125	°C
Tstg	Storage temperature		-40 ~ +125	°C
Viso	Isolation voltage	RMS, sinusoidal, f = 60Hz, t = 1min.	6000	V
tpsc	Maximum short circuit pulse width	VCC = 1700V, VCES ≤ 2500V, VGE = 15V Tj = 125°C	10	μs

ELECTRICAL CHARACTERISTICS

Symbol	Item	Conditions	Limits			Unit
			Min	Typ	Max	
ICES	Collector cut-off current	VCE = VCES, VGE = 0V, Tj = 25°C	—	—	15	mA
VGE(th)	Gate-emitter threshold voltage	IC = 120mA, VCE = 10V, Tj = 25°C	5.0	6.0	7.0	V
IGES	Gate leakage current	VGE = VGES, VCE = 0V, Tj = 25°C	—	—	0.5	μA
VCE(sat)	Collector-emitter saturation voltage	IC = 1200A, VGE = 15V, Tj = 25°C (Note 4)	—	2.80	3.60	V
		IC = 1200A, VGE = 15V, Tj = 125°C (Note 4)	—	3.15	—	
Cies	Input capacitance	VCE = 10V, f = 100kHz	—	180	—	nF
Coes	Output capacitance	VGE = 0V, Tj = 25°C	—	19.8	—	nF
Cres	Reverse transfer capacitance		—	6.0	—	nF
Qg	Total gate charge	VCC = 1250V, IC = 1200A, VGE = 15V, Tj = 25°C	—	8.1	—	μC
VEC (Note 2)	Emitter-collector voltage	IE = 1200A, VGE = 0V, Tj = 25°C (Note 4)	—	2.50	3.25	V
		IE = 1200A, VGE = 0V, Tj = 125°C (Note 4)	—	2.30	—	
td(on)	Turn-on delay time	VCC = 1250V, IC = 1200A, VGE = ±15V	—	—	1.60	μs
tr	Turn-on rise time	RG(on) = 1.6Ω, Tj = 125°C, Ls = 100nH	—	—	1.00	μs
Eon	Turn-on switching energy	Inductive load	—	1.30	—	J/pulse
td(off)	Turn-off delay time	VCC = 1250V, IC = 1200A, VGE = ±15V	—	—	2.50	μs
tf	Turn-off fall time	RG(off) = 1.6Ω, Tj = 125°C, Ls = 100nH	—	—	1.00	μs
Eoff	Turn-off switching energy	Inductive load	—	1.20	—	J/pulse
trr (Note 2)	Reverse recovery time	VCC = 1250V, IC = 1200A, VGE = ±15V	—	—	1.20	μs
Qrr (Note 2)	Reverse recovery charge	RG(on) = 1.6Ω, Tj = 125°C, Ls = 100nH	—	700	—	μC
Erec (Note 2)	Reverse recovery energy	Inductive load	—	0.45	—	J/pulse

Note 1. Pulse width and repetition rate should be such that junction temperature (Tj) does not exceed Topmax rating (125°C).

2. The symbols represent characteristics of the anti-parallel, emitter to collector free-wheel diode (FWDI).

3. Junction temperature (Tj) should not exceed Tjmax rating (150°C).

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

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THERMAL CHARACTERISTICS

Symbol	Item	Conditions	Limits			Unit
			Min	Typ	Max	
R _{th(j-c)Q}	Thermal resistance	Junction to Case, IGBT part	—	—	8.5	K/kW
R _{th(j-c)R}		Junction to Case, FWDi part	—	—	17.0	K/kW
R _{th(c-f)}	Contact thermal resistance	Case to Fin, $\lambda_{grease} = 1W/m\cdot K$	—	6.0	—	K/kW

MECHANICAL CHARACTERISTICS

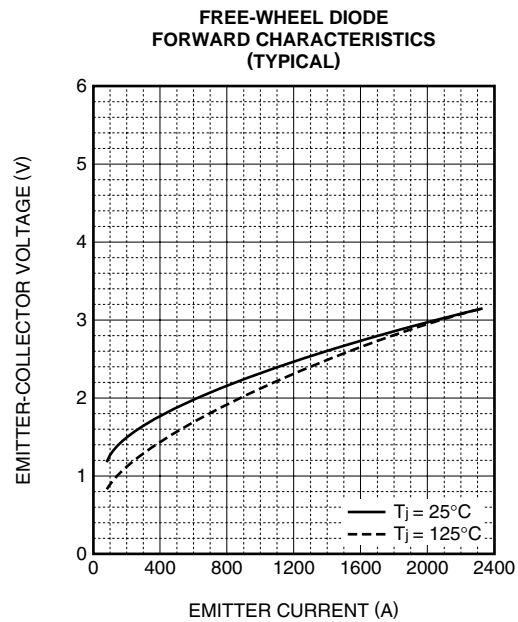
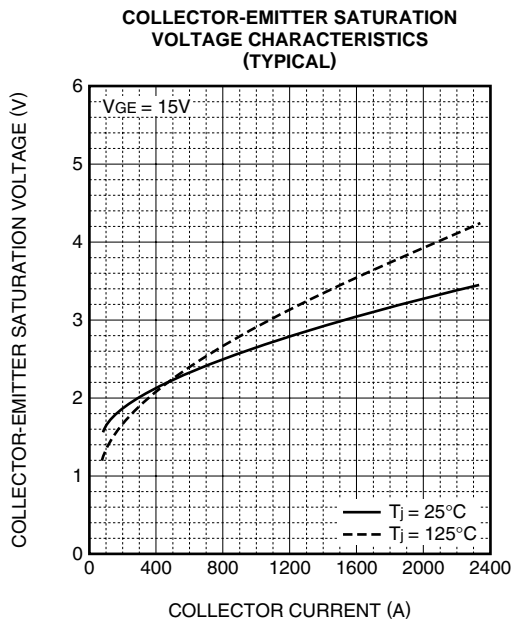
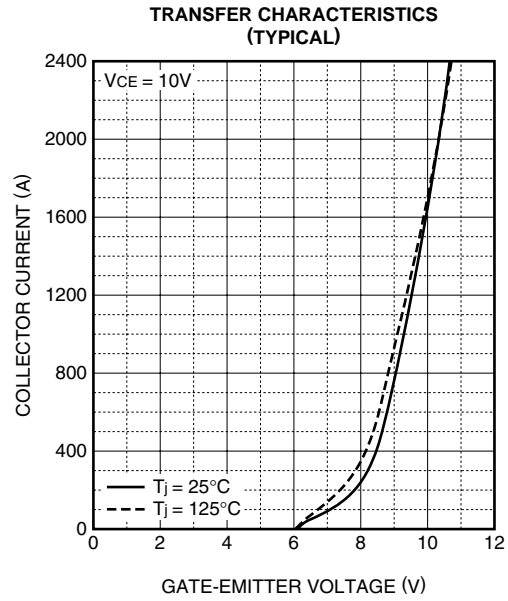
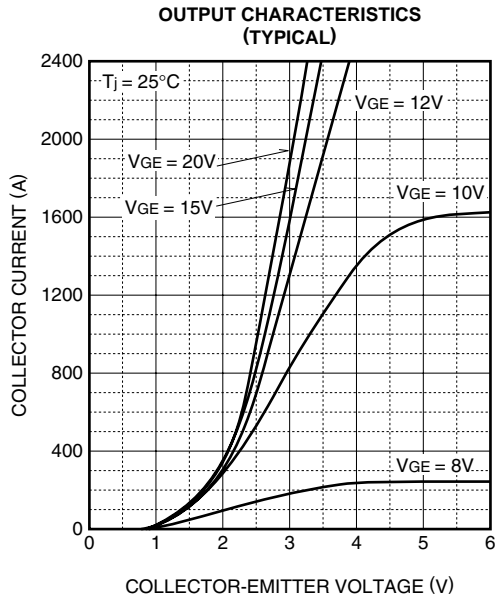
Symbol	Item	Conditions	Limits			Unit
			Min	Typ	Max	
M	Mounting torque	M8 : Main terminals screw	7.0	—	13.0	N·m
		M6 : Mounting screw	3.0	—	6.0	
		M4 : Auxiliary terminals screw	1.0	—	2.0	
—	Mass		—	1.5	—	kg
CTI	Comparative tracking index		600	—	—	—
d _a	Clearance distance in air		19.5	—	—	mm
d _s	Creepage distance along surface		32.0	—	—	mm
LC-E _(int)	Internal inductance	IGBT part	—	10	—	nH
RC-E _(int)	Internal lead resistance	T _C = 25°C	—	0.16	—	mΩ

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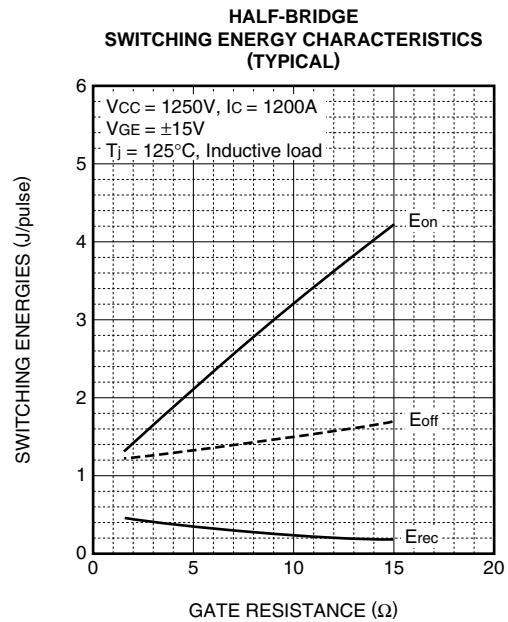
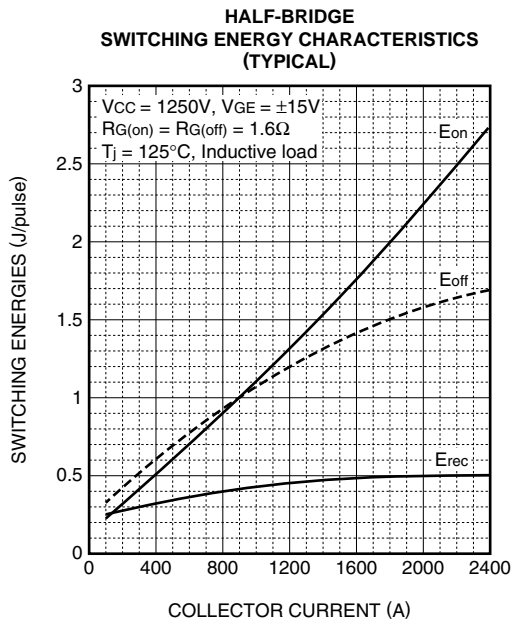
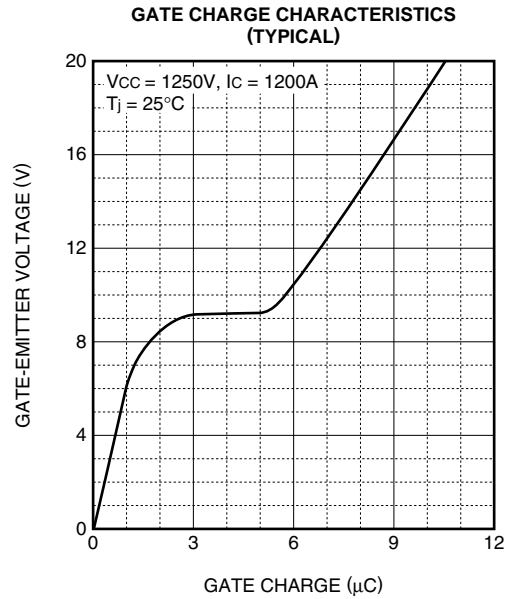
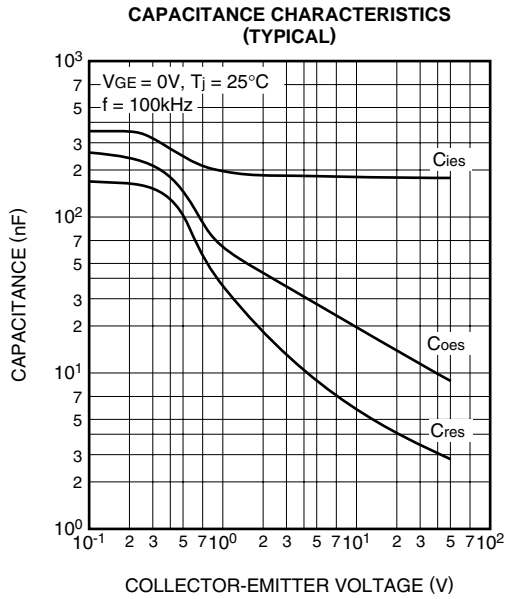
PERFORMANCE CURVES



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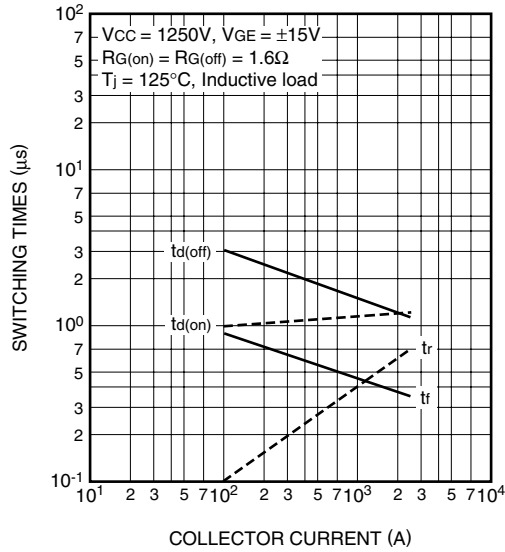


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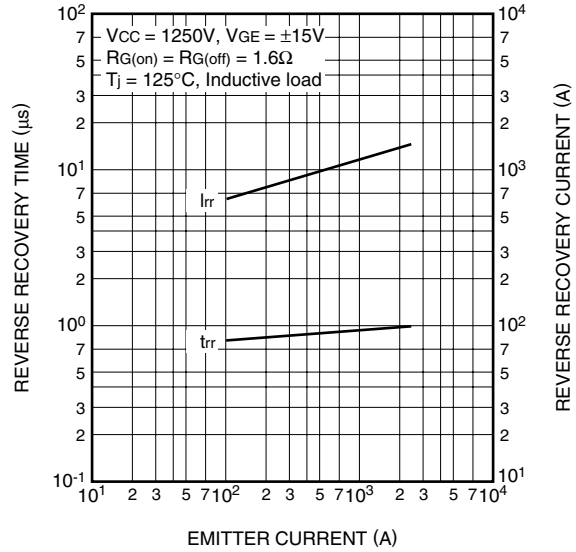
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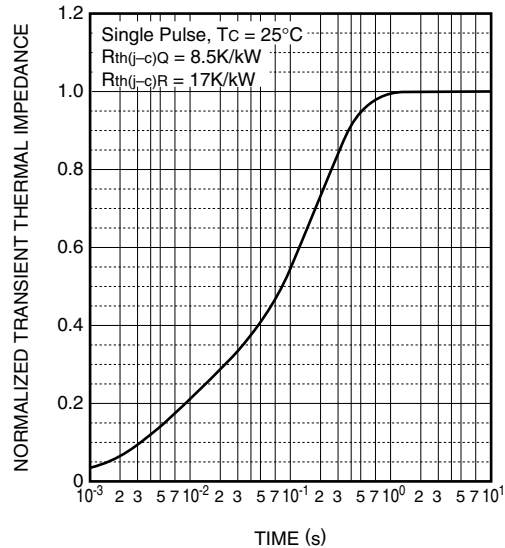
**HALF-BRIDGE
SWITCHING TIME CHARACTERISTICS
(TYPICAL)**



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



**TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS**



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