Prepared by	S.Iura	Revision: C
Date	I.Umezaki 5-Sep.-2011	

CM2400HC-34N

HIGH POWER SWITCHING USE
INSULATED TYPE

4th-Version HVIGBT (High Voltage Insulated Gate Bipolar Transistor) MODULES

COMPANY PROPRIETARY
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CM2400HC-34N

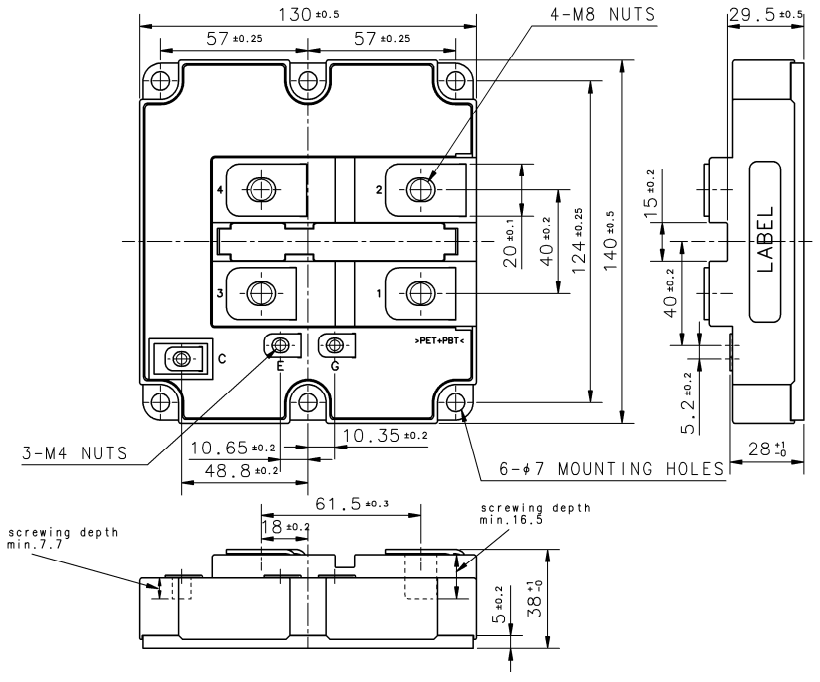
- I_C ..... 2400 A
- V_{CES} ..... 1700 V
- Insulated Type
- 1-element in a Pack
- AlSiC Baseplate
- Trench Gate IGBT : CSTBT™
- Soft Reverse Recovery Diode

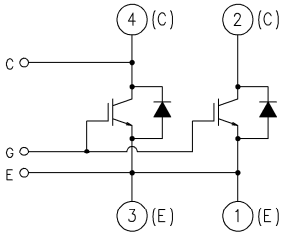
APPLICATION

Traction drives, High Reliability Converters / Inverters, DC choppers

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm





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CIRCUIT DIAGRAM

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MAXIMUM RATINGS

Symbol	Item	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	V_{GE} = 0V, T_j = 25 °C	1700	V
V_{GES}	Gate-emitter voltage	V_{CE} = 0V, T_j = 25 °C	± 20	V
I_C	Collector current	DC, T_c = 75 °C	2400	A
I_{CM}		Pulse (Note 1)	4800	A
I_E	Emitter current (Note 2)	DC	2400	A
I_{EM}		Pulse (Note 1)	4800	A
P_c	Maximum power dissipation (Note 3)	T_c = 25 °C, IGBT part	13100	W
V_{iso}	Isolation voltage	RMS, sinusoidal, f = 60Hz, t = 1min.	4000	V
T_j	Junction temperature		−40 ~ +150	°C
T_{op}	Operating temperature		−40 ~ +125	°C
T_{stg}	Storage temperature		−40 ~ +125	°C
T_{psc}	Maximum short circuit pulse width	V_{CC} =1200V, V_{CE} ≤ V_{CES}, V_{GE} =15V, T_j =125°C	10	μs

ELECTRICAL CHARACTERISTICS

Symbol	Item	Conditions		Limits			Unit
				Min	Typ	Max	
I_{CES}	Collector cutoff current	V_{CE} = V_{CES}, V_{GE} = 0V	T_j = 25 °C	—	—	8.0	mA
			T_j = 125 °C	—	6.0	16.0	
$V_{GE(th)}$	Gate-emitter threshold voltage	V_{CE} = 10 V, I_C = 240 mA, T_j = 25 °C		6.0	7.0	8.0	V
I_{GES}	Gate leakage current	V_{GE} = V_{GES}, V_{CE} = 0V, T_j = 25°C		—	—	0.5	μA
C_{ies}	Input capacitance	V_{CE} = 10 V, V_{GE} = 0 V, f = 100 kHz T_j = 25 °C		—	352	—	nF
C_{oes}	Output capacitance			—	19.2	—	nF
C_{res}	Reverse transfer capacitance			—	5.6	—	nF
Q_g	Total gate charge	V_{CC} = 850 V, I_C = 2400 A V_{GE} = ±15V, T_j = 25 °C		—	24.5	—	μC
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_C = 2400 A (Note 4) V_{GE} = 15 V	T_j = 25 °C	—	2.15	2.80	V
			T_j = 125 °C	—	2.40	—	
$t_{d(on)}$	Turn-on delay time	V_{CC} = 850 V, I_C = 2400 A V_{GE} = ±15 V, $R_{G(on)}$ = 0.7 Ω T_j = 125 °C, L_s = 100 nH Inductive load		—	—	1.50	μs
t_r	Turn-on rise time			—	—	0.70	μs
$E_{on(10\%)}$	Turn-on switching energy (Note 5)			—	0.64	—	J/P
$t_{d(off)}$	Turn-off delay time	V_{CC} = 850 V, I_C = 2400 A V_{GE} = ±15 V, $R_{G(off)}$ = 1.6 Ω T_j = 125 °C, L_s = 100 nH Inductive load		—	—	3.00	μs
t_f	Turn-off fall time			—	—	0.60	μs
$E_{off(10\%)}$	Turn-off switching energy (Note 5)			—	0.84	—	J/P
V_{EC}	Emitter-collector voltage (Note 2)	I_E = 2400 A (Note 4) V_{GE} = 0 V	T_j = 25 °C	—	2.60	3.30	V
			T_j = 125 °C	—	2.30	—	
t_{rr}	Reverse recovery time (Note 2)	V_{CC} = 850 V, I_E = 2400 A V_{GE} = ±15 V, $R_{G(on)}$ = 0.7 Ω T_j = 125 °C, L_s = 100 nH Inductive load		—	—	1.50	μs
Q_{rr}	Reverse recovery charge (Note 2)			—	620	—	μC
$E_{rec\ (10\%)}$	Reverse recovery energy (Note 2),(Note 5)			—	0.38	—	J/P

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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	—	—	9.5	K/kW
$R_{th(j-c)R}$	Thermal resistance	Junction to Case, FWDi part	—	—	21.0	K/kW
$R_{th(c-f)}$	Contact thermal resistance	Case to Fin, λ_{grease} = 1W/m·K, $D_{(c-f)}$ = 100 µm	—	8.0	—	K/kW

MECHANICAL CHARACTERISTICS

Symbol	Item	Conditions	Limits			Unit
			Min	Typ	Max	
M_t	Mounting torque	M8: Main terminals screw	7.0	—	20.0	N·m
M_s		M6: Mounting screw	3.0	—	6.0	N·m
M_t		M4: Auxiliary terminals screw	1.0	—	3.0	N·m
m	Mass		—	0.8	—	kg
CTI	Comparative tracking index		600	—	—	—
d_a	Clearance		19.5	—	—	mm
d_S	Creepage distance		32.0	—	—	mm
$L_{P\ CE}$	Parasitic stray inductance		—	16	—	nH
$R_{CC'+EE'}$	Internal lead resistance	T_c = 25 °C	—	0.14	—	mΩ

Note 1. Pulse width and repetition rate should be such that junction temperature (T_j) does not exceed T_{opmax} rating (125°C).
Note 2. The symbols represent characteristics of the anti-parallel, emitter to collector free-wheel diode (FWDi).
Note 3. Junction temperature (T_j) should not exceed T_{jmax} rating (150°C).
Note 4. Pulse width and repetition rate should be such as to cause negligible temperature rise.
Note 5. $E_{on(10\%)}$ / $E_{off(10\%)}$ / $E_{rec(10\%)}$ are the integral of $0.1V_{CE} \times 0.1I_C \times dt$.

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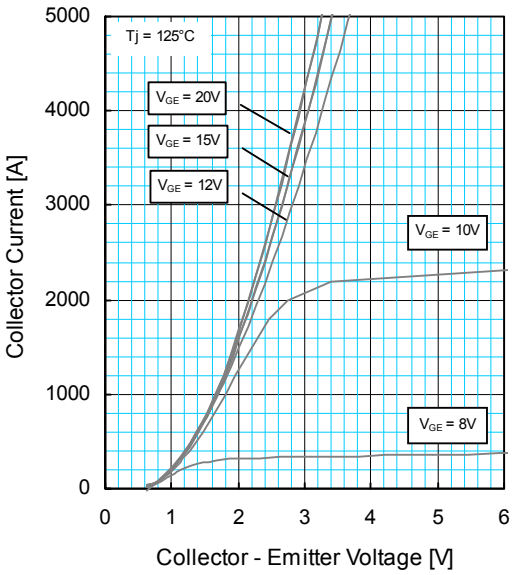
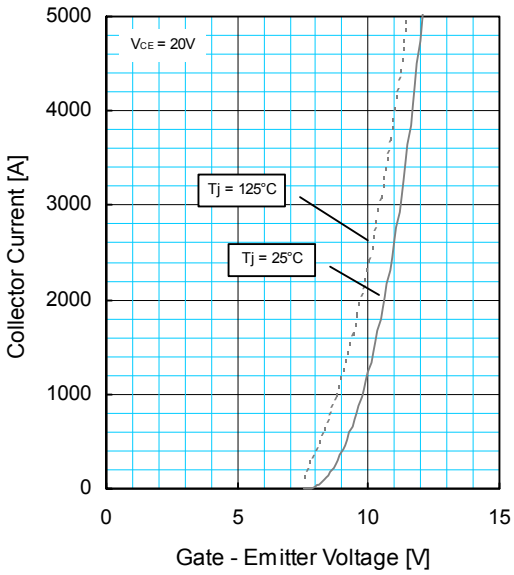
PERFORMANCE CURVES

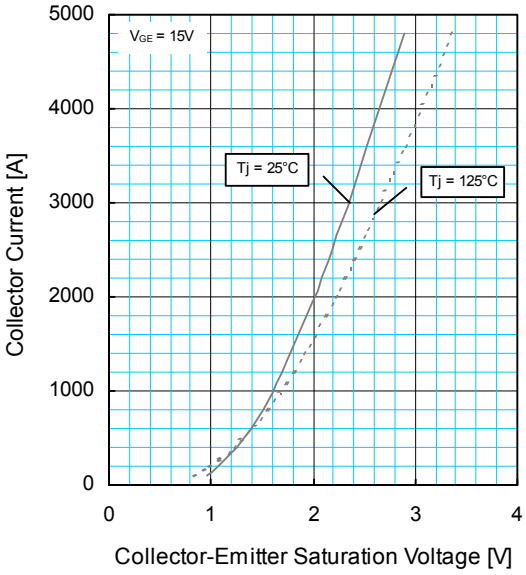
OUTPUT CHARACTERISTICS (TYPICAL)



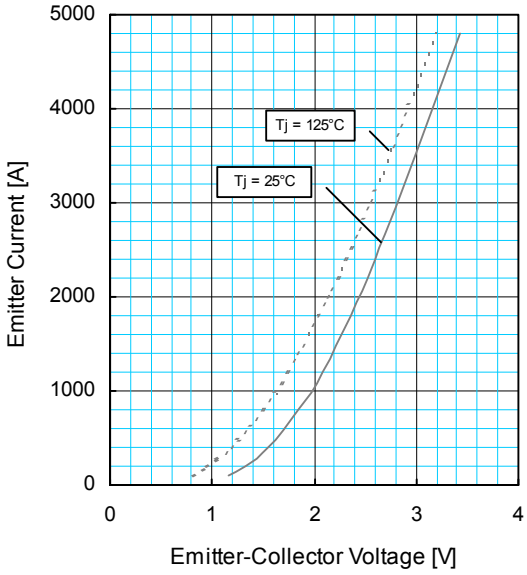
TRANSFER CHARACTERISTICS (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



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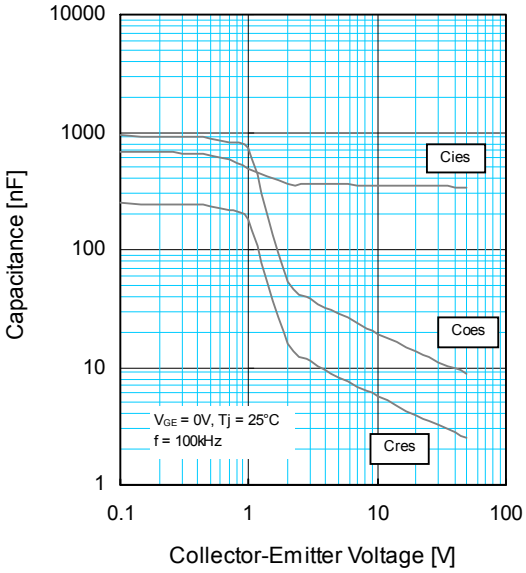
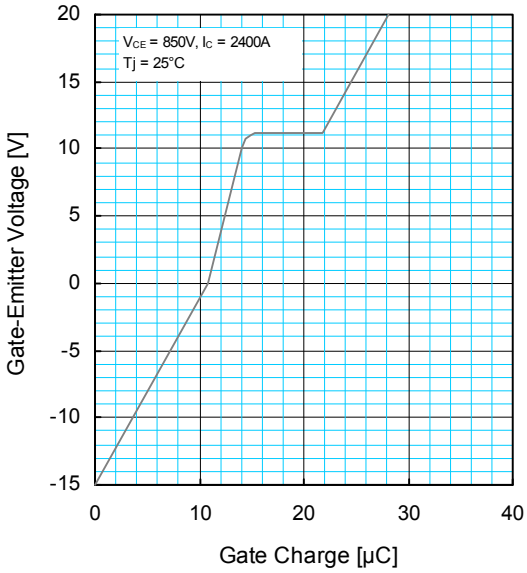
PERFORMANCE CURVES

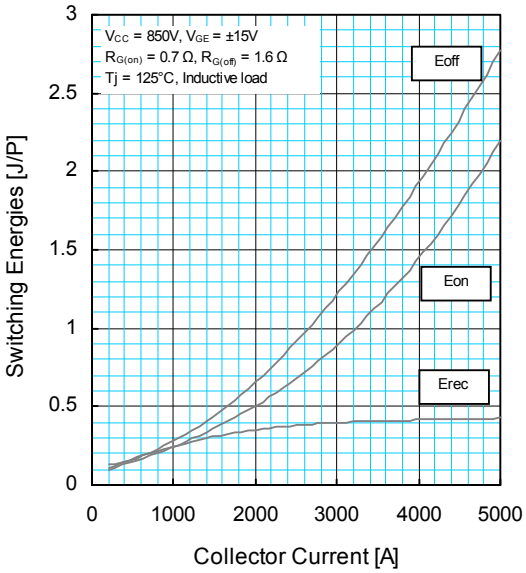
CAPACITANCE CHARACTERISTICS (TYPICAL)



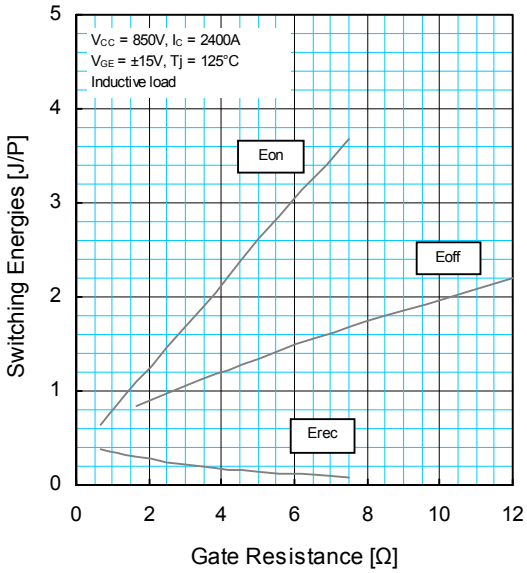
GATE CHARGE CHARACTERISTICS (TYPICAL)



HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)



HALF-BRIDGE SWITCHING ENERGY CHARACTERISTICS (TYPICAL)



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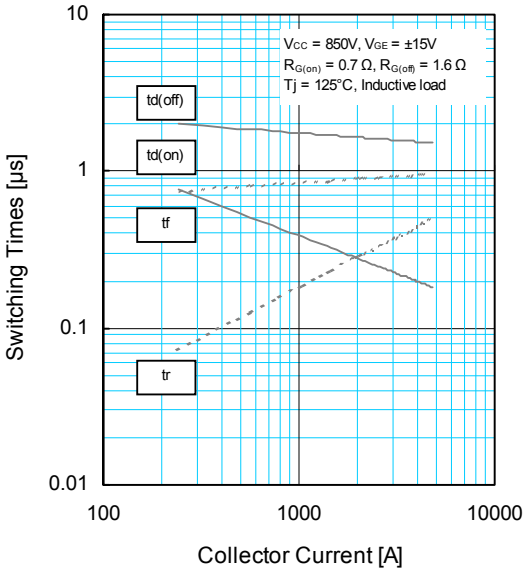
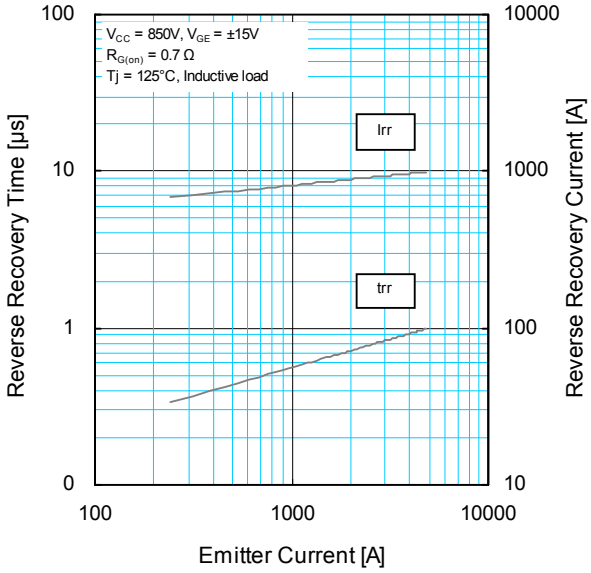
PERFORMANCE CURVES

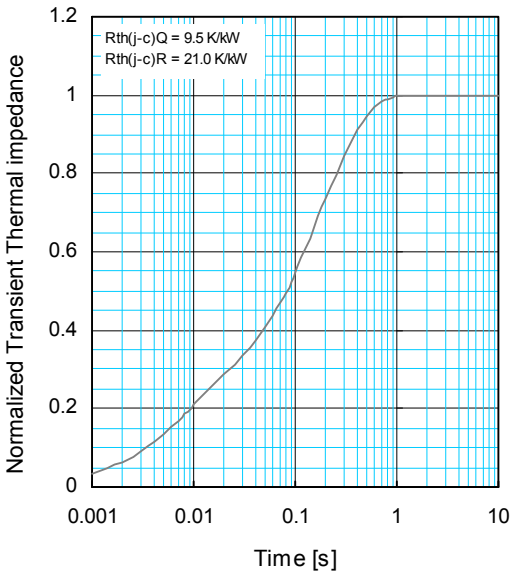
HALF-BRIDGE SWITCHING TIME CHARACTERISTICS (TYPICAL)



FREE-WHEEL DIODE REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS



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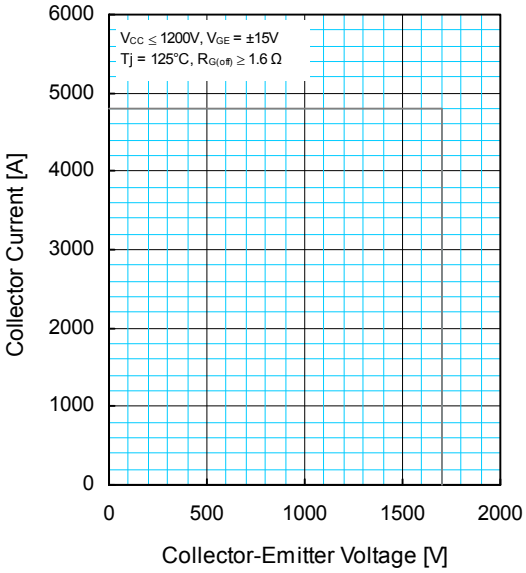
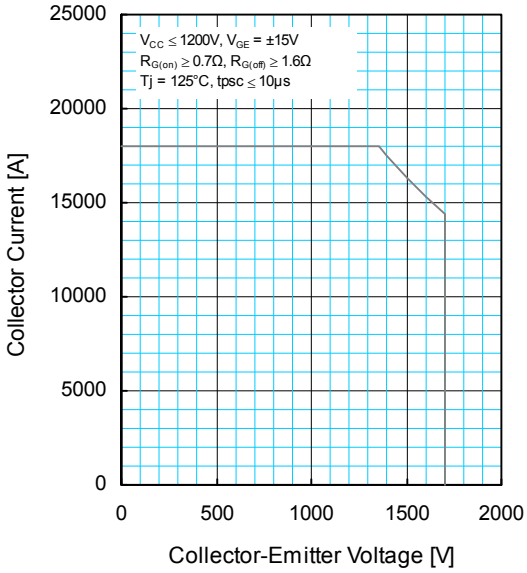
PERFORMANCE CURVES

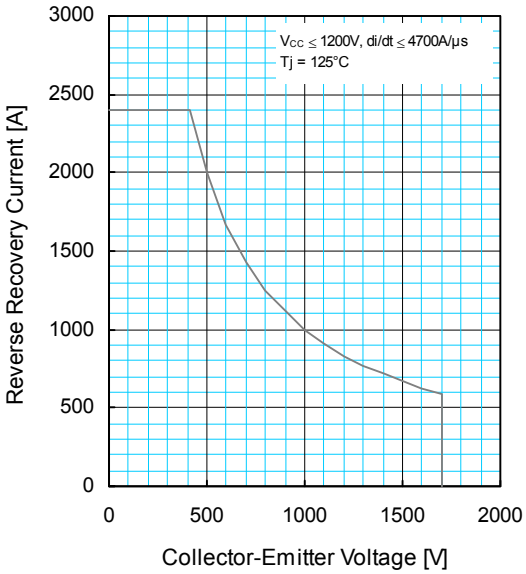
REVERSE BIAS SAFE OPERATING AREA (RBSOA)



SHORT CIRCUIT SAFE OPERATING AREA (SCSOA)



FREE-WHEEL DIODE REVERSE RECOVERY SAFE OPERATING AREA (RRSOA)



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