MITSUBISHI IGBT MODULES

CM1000DU-34NF

HIGH POWER SWITCHING USE

CM1000DU-34NF

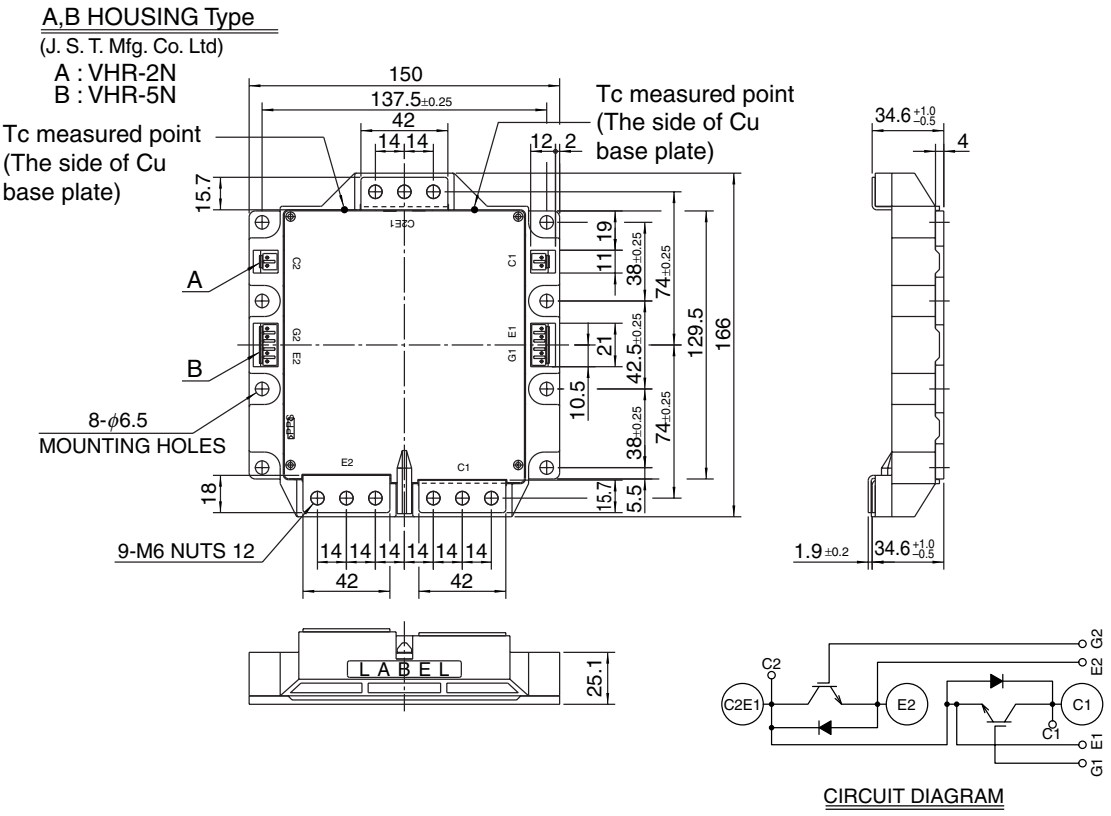
- I_C 1000A
- V_{CES} 1700V
- Insulated Type
- 2-elements in a pack

APPLICATION

General purpose inverters Servo controls, etc

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



Feb. 2009

MITSUBISHI ELECTRIC

MAXIMUM RATINGS (Tj = 25°C, unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	G-E Short	1700	V
V_{GES}	Gate-emitter voltage	C-E Short	±20	V
I_C	Collector current	T_C = 104°C	1000	A
I_{CM}		Pulse (Note 2)	2000	
I_E (Note 1)	Emitter current	T_C = 25°C	1000	A
I_{EM} (Note 1)		Pulse (Note 2)	2000	
P_C (Note 3)	Maximum collector dissipation	T_C = 25°C	8900	W
T_j	Junction temperature		–40 ~ +150	°C
T_{stg}	Storage temperature*3		–40 ~ +125	°C
V_{iso}	Isolation voltage	Terminals to base plate, f = 60Hz, AC 1 minute	3500	Vrms
—	Torque strength	Main terminals M6 screw	3.5 ~ 4.5	N • m
		Mounting M6 screw	3.5 ~ 4.5	N • m
—	Weight	Typical value	1400	g

ELECTRICAL CHARACTERISTICS (Tj = 25°C, unless otherwise specified)

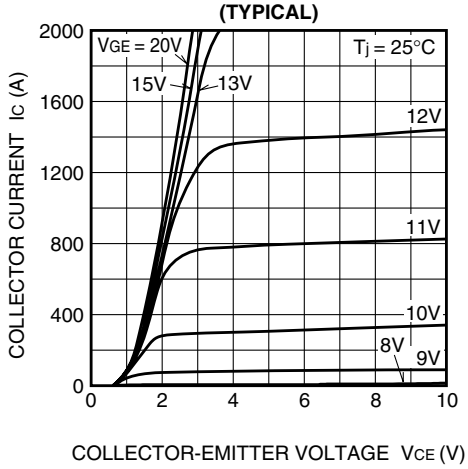
Symbol	Parameter	Test conditions		Limits Min.	Limits Typ.	Limits Max.	Unit
I_{CES}	Collector cutoff current	$V_{CE} = V_{CES}$, V_{GE} = 0V		—	—	1	mA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C = 100mA, V_{CE} = 10V		5.5	7	8.5	V
I_{GES}	Gate leakage current	$\pm V_{GE} = V_{GES}$, V_{CE} = 0V		—	—	5	μA
$V_{CE(sat)}$ (chip)	Collector-emitter saturation voltage (without lead resistance)	I_C = 1000A, V_{GE} = 15V (Note 4)	T_j = 25°C	—	2.2	2.8	V
			T_j = 125°C	—	2.45	—	
$R_{(lead)}$	Module lead resistance	Ic = 1000A, terminal-chip		—	0.286	—	mΩ
C_{ies}	Input capacitance	V_{CE} = 10V, V_{GE} = 0V		—	—	220	nF
C_{oes}	Output capacitance			—	—	25	
C_{res}	Reverse transfer capacitance			—	—	4.7	
Q_G	Total gate charge	V_{CC} = 1000V, I_C = 1000A, V_{GE} = 15V		—	6000	—	nC
$t_{d(on)}$	Turn-on delay time	V_{CC} = 1000V, I_C = 1000A, V_{GE} = ±15V, R_G = 0.47Ω, Inductive load, I_E = 1000A		—	—	600	ns
t_r	Turn-on rise time			—	—	150	
$t_{d(off)}$	Turn-off delay time			—	—	900	
t_f	Turn-off fall time			—	—	200	
t_{rr} (Note 1)	Reverse recovery time			—	—	450	ns
Q_{rr} (Note 1)	Reverse recovery charge			—	90	—	μC
V_{EC}(Note 1) (chip)	Emitter-collector voltage (without lead resistance)	I_E = 1000A, V_{GE} = 0V		—	2.3	3	V
$R_{th(j-c)Q}$	Thermal resistance*1	IGBT part (1/2 module)		—	—	0.014	K/W
$R_{th(j-c)R}$		FWDi part (1/2 module)		—	—	0.023	
$R_{th(c-f)}$	Contact thermal resistance*2	Case to heat sink, Thermal compound applied (1/2 module)		—	0.016	—	
R_G	External gate resistance			0.47	—	4.7	Ω

Note 1. I_E, V_{EC}, t_{rr} & Q_{rr} 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_j) does not exceed T_{jmax} rating.
3. Junction temperature (T_j) should not increase beyond 150°C.
4. Pulse width and repetition rate should be such as to cause negligible temperature rise.

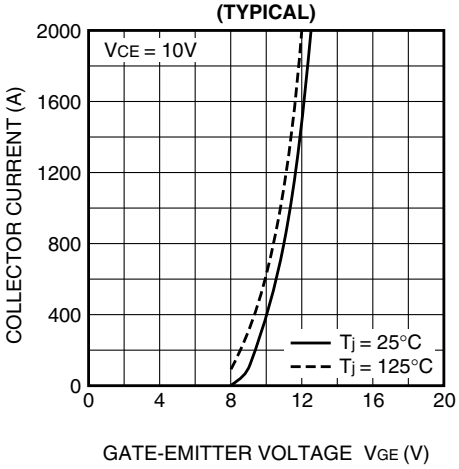
*1 : Case temperature (Tc) measured point is just under the chips.
If you use this value, $R_{th(f-a)}$ should be measured just under the chips.
*2 : Typical value is measured by using thermally conductive grease of λ = 0.9[W/(m • K)].
*3 : The operation temperature is restrained by the permission temperature of female connector.

PERFORMANCE CURVES

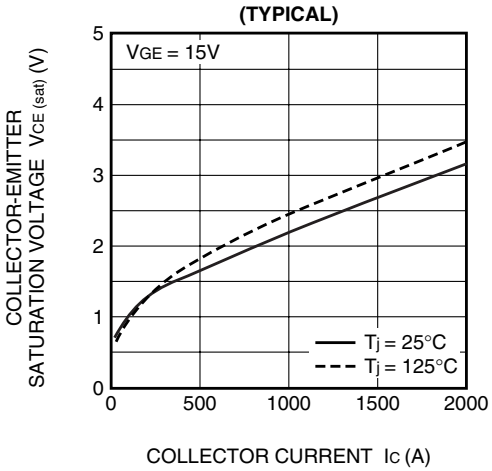
OUTPUT CHARACTERISTICS (TYPICAL)



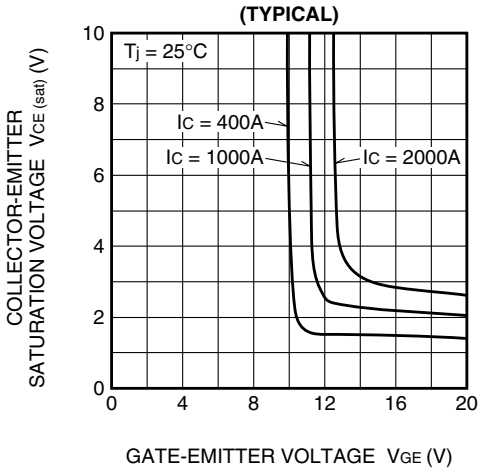
TRANSFER CHARACTERISTICS (TYPICAL)



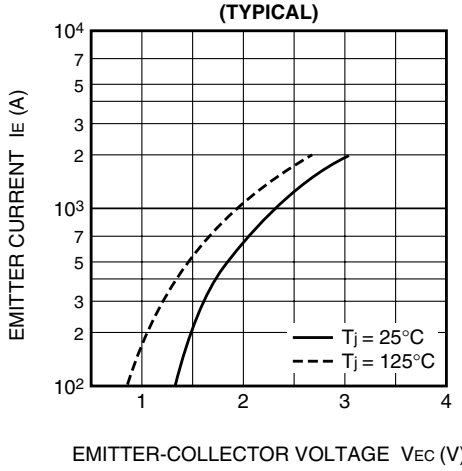
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



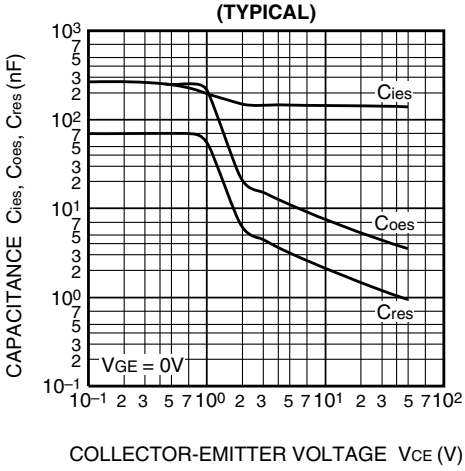
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



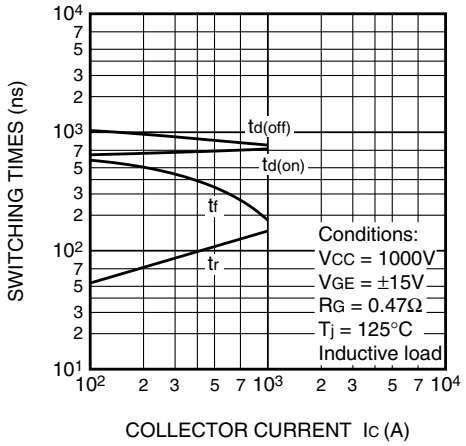
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



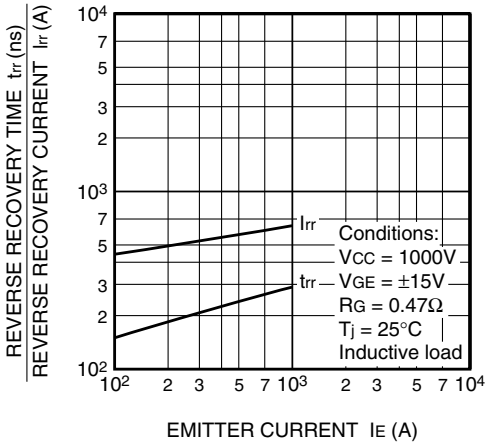
CAPACITANCE–VCE CHARACTERISTICS (TYPICAL)



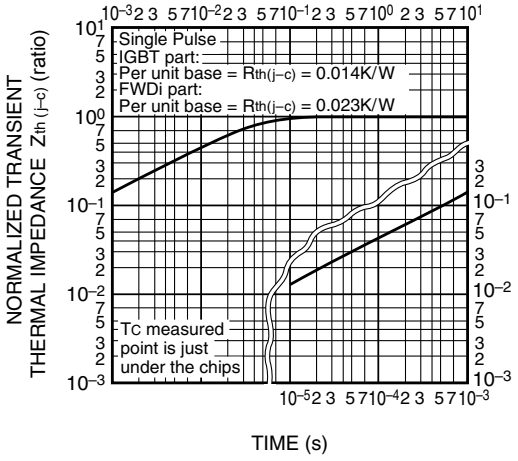
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



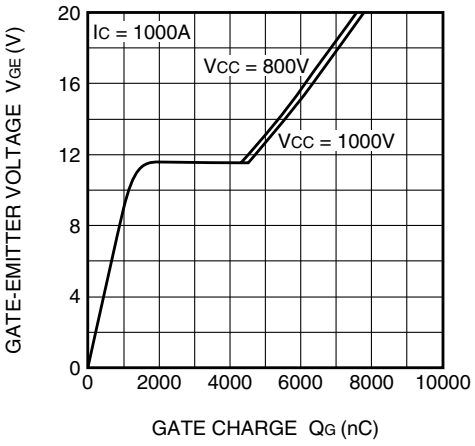
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



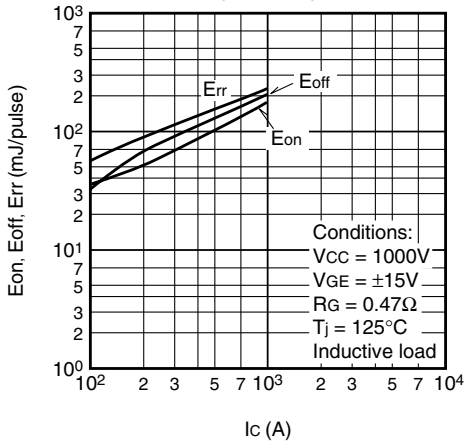
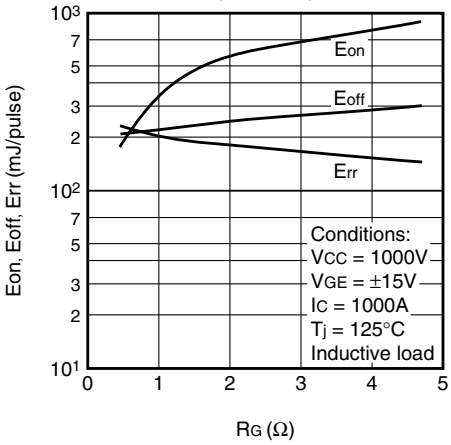
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



GATE CHARGE CHARACTERISTICS (TYPICAL)



IC-ESW (TYPICAL)



RG-ESW (TYPICAL)