MITSUBISHI IGBT MODULES

CM600HN-5F

HIGH POWER SWITCHING USE
INSULATED TYPE

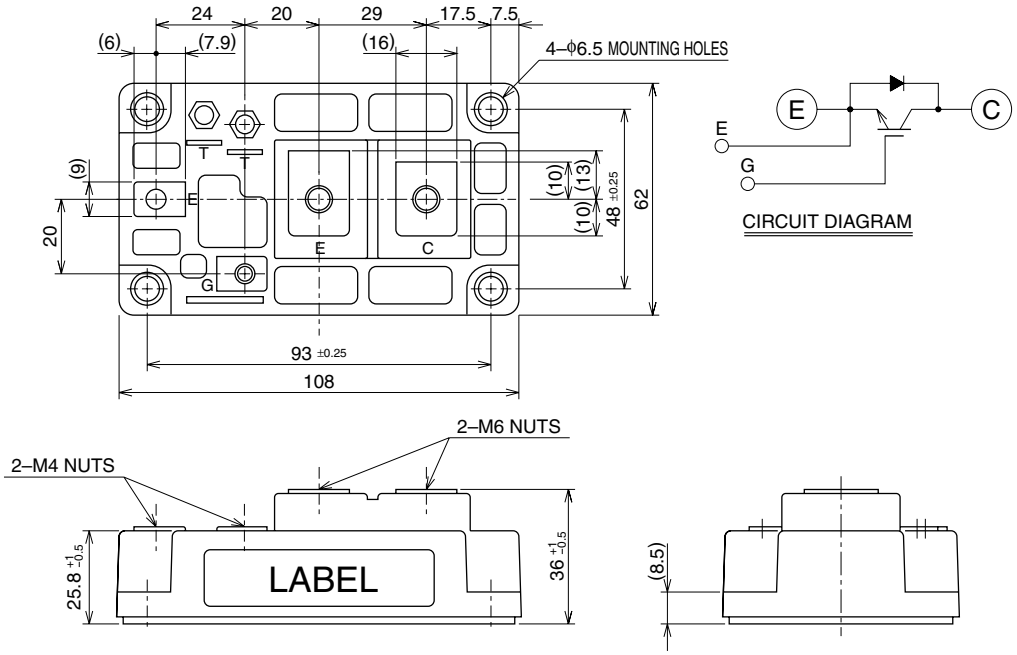
CM600HN-5F

- I_C 600A
- V_{CES} 250V
- Insulated Type
- 1-element in a pack
- UL Recognized
  Yellow Card No. E80276
  File No. E80271

APPLICATION

UPS, Forklift

OUTLINE DRAWING & CIRCUIT DIAGRAM **Dimensions in mm**



Mar. 2009

MITSUBISHI ELECTRIC

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

Symbol	Item	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	G-E Short	250	V
V_{GES}	Gate-emitter voltage	C-E Short	±20	V
I_C	Collector current	T_C = 25°C	600	A
I_{CM}		Pulse (Note 2)	1200	A
I_E (Note 1)	Emitter current	T_C = 25°C	600	A
I_{EM} (Note 1)		Pulse (Note 2)	1200	A
P_C (Note 3)	Maximum collector dissipation	T_C = 25°C	1780	W
T_j	Junction temperature	—	–40 ~ +150	°C
T_{stg}	Storage temperature	—	–40 ~ +125	°C
V_{iso}	Isolation voltage	Charged part to base plate, sinusoidal, AC 60Hz 1min.	2500	Vrms
—	Mounting torque	Main terminals M6 screw	1.96 ~ 2.94	N·m
		Mounting M6 screw	1.96 ~ 2.94	N·m
		G(E) auxiliary terminal M4 screw	0.98 ~ 1.47	N·m
—	Weight	Typical value	400	g

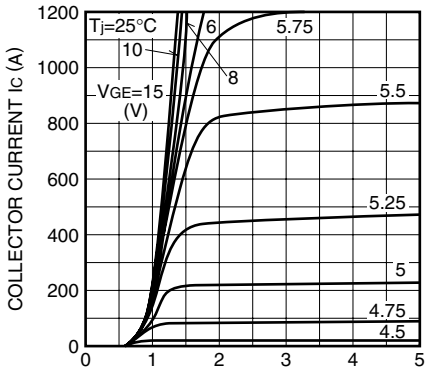
ELECTRICAL CHARACTERISTICS (Tj = 25°C, unless otherwise specified)

Symbol	Item	Test Conditions	Limits			Unit
			Min	Typ	Max	
I_{CES}	Collector cutoff current	V_{CE} = V_{CES}, V_{GE} = 0V	—	—	1	mA
$V_{GE(th)}$	Gate-emitter threshold voltage	I_C = 60mA, V_{CE} = 10V	3	4	5	V
I_{GES}	Gate-leakage current	V_{GE} = V_{GES}, V_{CE} = 0V	—	—	0.5	µA
$V_{CE(sat)}$	Collector-emitter saturation voltage	T_j = 25°C; I_C = 600A, V_{GE} = 10V (Note 4)	—	1.2	1.7	V
		T_j = 150°C; I_C = 600A, V_{GE} = 10V (Note 4)	—	1.1	—	
C_{ies}	Input capacitance	V_{CE} = 10V, V_{GE} = 0V	—	—	165	nF
C_{oes}	Output capacitance		—	—	7.5	nF
C_{res}	Reverse transfer capacitance		—	—	5.6	nF
Q_G	Total gate charge	V_{CC} = 100V, I_C = 600A, V_{GE} = 10V	—	2200	—	nC
$t_{d(on)}$	Turn-on delay time	V_{CC} = 100V, I_C = 600A, V_{GE1} = V_{GE2} = 10V, R_G = 4.2Ω, Resistive load	—	—	1000	ns
t_r	Turn-on rise time		—	—	4000	ns
$t_{d(off)}$	Turn-off delay time		—	—	1000	ns
t_f	Turn-off fall time		—	—	500	ns
V_{EC} (Note 1)	Emitter-collector voltage	I_E = 600A, V_{GE} = 0V	—	—	2.0	V
t_{rr} (Note 1)	Reverse recovery time	I_E = 600A, die / dt = –1200A / µs	—	—	300	ns
Q_{rr} (Note 1)	Reverse recovery charge		—	9.5	—	µC
$R_{th(j-c)Q}$	Thermal resistance	Junction to case, IGBT part	—	—	0.07	K/W
$R_{th(j-c)R}$		Junction to case, FWDi part	—	—	0.11	K/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, conductive grease applied	—	—	0.04	K/W

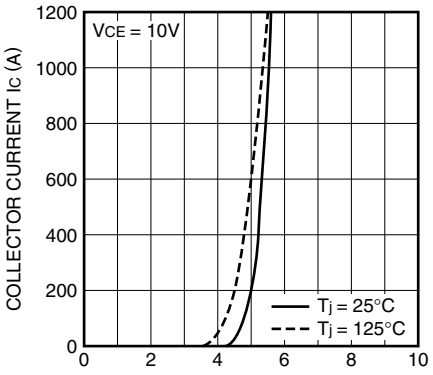
Note 1. I_E, V_{EC}, t_{rr}, Q_{rr} & die/dt represent characteristics of the anti-parallel, emitter-collector free-wheel diode.
2. Pulse width and repetition rate should be such that the device junction temperature (T_j) does not exceed T_{jmax} rating.
3. Junction temperature (T_j) should not increase beyond 150°C.
4. Pulse width and repetition rate should be such as to cause negligible temperature rise.

PERFORMANCE CURVES

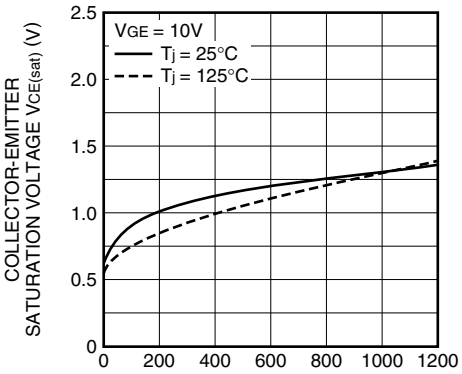
OUTPUT CHARACTERISTICS (TYPICAL)



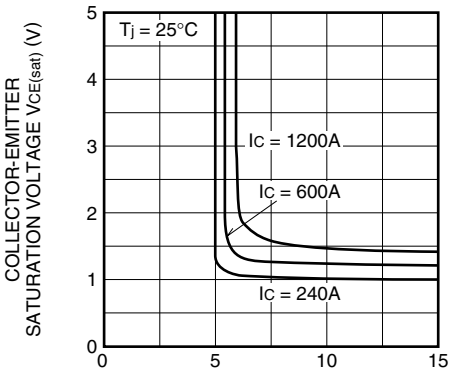
TRANSFER CHARACTERISTICS (TYPICAL)



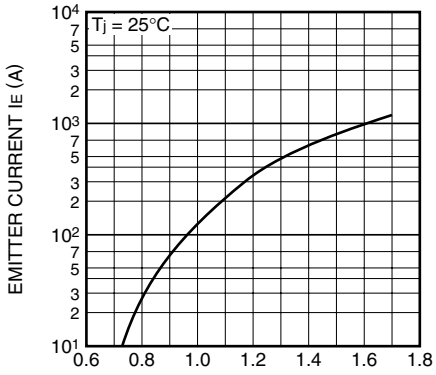
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



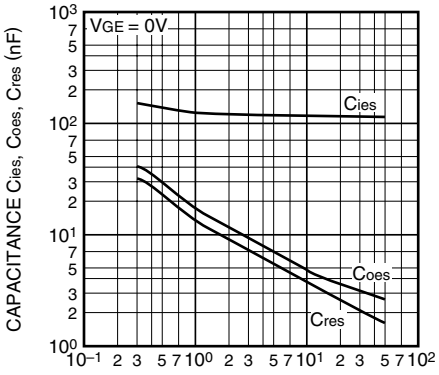
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



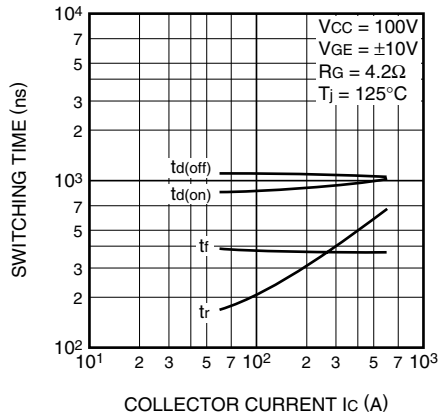
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



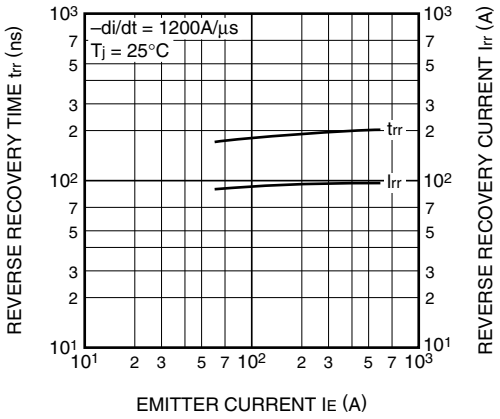
CAPACITANCE CHARACTERISTICS (TYPICAL)



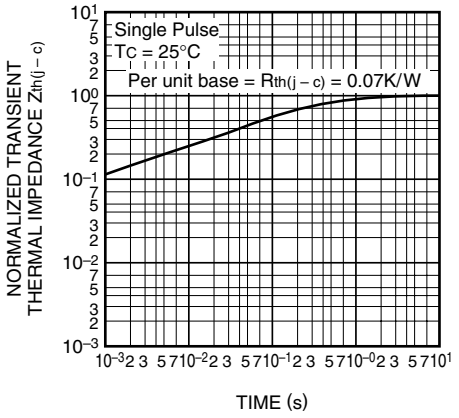
HALF-BRIDGE SWITCHING TIME CHARACTERISTICS (TYPICAL)



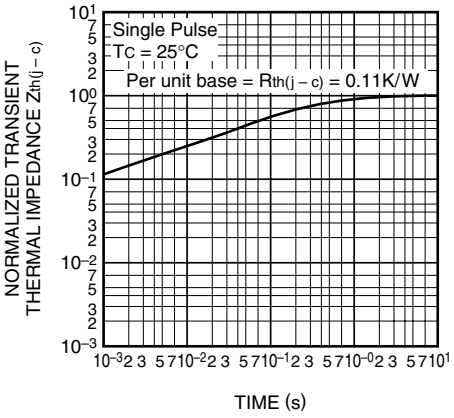
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi part)



GATE CHARGE CHARACTERISTICS (TYPICAL)