

MITSUBISHI IGBT MODULES  
**CM600DU-24F**

HIGH POWER SWITCHING USE

**CM600DU-24F**



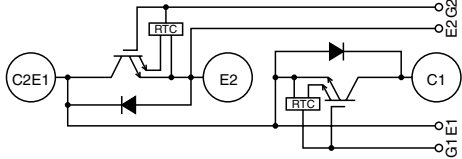
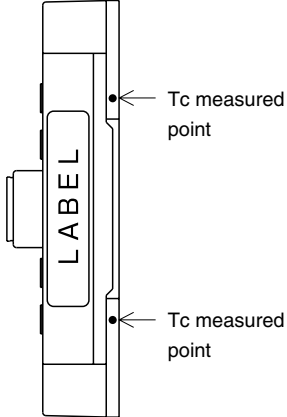
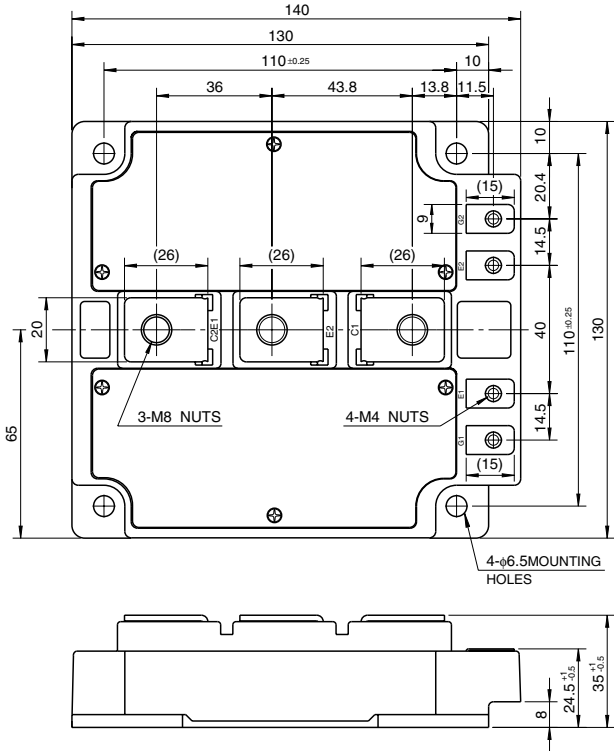
- IC ..... 600A
- VCES ..... 1200V
- Insulated Type
- 2-elements in a pack

**APPLICATION**

General purpose inverters & Servo controllers, etc

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm



CIRCUIT DIAGRAM

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MAXIMUM RATINGS (T<sub>j</sub> = 25°C, unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V <sub>CE</sub> S	Collector-emitter voltage	G-E short	1200	V
V <sub>GE</sub> S	Gate-emitter voltage	C-E short	±20	V
I <sub>C</sub>	Collector current	T <sub>c</sub> = 25°C	600	A
I <sub>CRM</sub>		Pulse (Note 2)	1200	A
I <sub>E</sub> (Note 1)	Emitter current	T <sub>c</sub> = 25°C	600	A
I <sub>ERM</sub> (Note 1)		Pulse (Note 2)	1200	A
P <sub>tot</sub> (Note 3)	Maximum collector dissipation	T <sub>c</sub> = 25°C	1540	W
T <sub>j</sub>	Junction temperature		-40 ~ +150	°C
T <sub>stg</sub>	Storage temperature		-40 ~ +125	°C
V <sub>isol</sub>	Isolation voltage	Terminals to base plate, f = 60Hz, AC 1 min, RMS	2500	V
—	Torque strength	Main terminals M8 screw	8.8 ~ 10.8	N • m
		Mounting M6 screw	3.5 ~ 4.5	
		G(E) Terminal M4 screw	1.3 ~ 1.7	
—	Weight	Typical value	1200	g

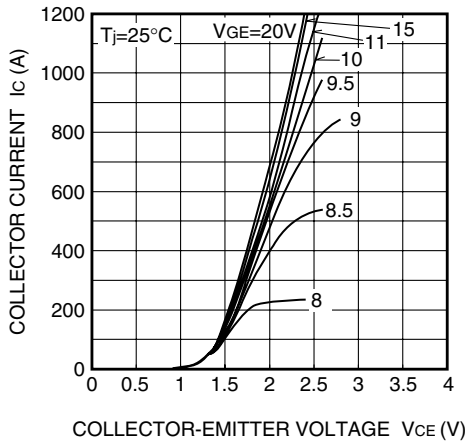
ELECTRICAL CHARACTERISTICS (T<sub>j</sub> = 25°C, unless otherwise specified)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I <sub>CE</sub> S	Collector cutoff current	V <sub>CE</sub> = V <sub>CE</sub> S, G-E short	—	—	2	mA
V <sub>GE(th)</sub>	Gate-emitter threshold voltage	I <sub>C</sub> = 60mA, V <sub>CE</sub> = 10V	5	6	7	V
I <sub>GES</sub>	Gate leakage current	V <sub>GE</sub> = V <sub>GE</sub> S, C-E short	—	—	80	μA
V <sub>CE(sat)</sub>	Collector-emitter saturation voltage	I <sub>C</sub> = 600A, V <sub>GE</sub> = 15V	T <sub>j</sub> = 25°C		2.55	V
			T <sub>j</sub> = 125°C		—	
C <sub>ies</sub>	Input capacitance	V <sub>CE</sub> = 10V G-E short	—	—	230	nF
C <sub>oes</sub>	Output capacitance		—	—	10	nF
C <sub>res</sub>	Reverse transfer capacitance		—	—	6	nF
Q <sub>G</sub>	Total gate charge	V <sub>CC</sub> = 600V, I <sub>C</sub> = 600A, V <sub>GE</sub> = 15V	—	6600	—	nC
t <sub>d(on)</sub>	Turn-on delay time	V <sub>CC</sub> = 600V, I <sub>C</sub> = 600A V <sub>GE</sub> = ±15V R <sub>G</sub> = 1.0Ω, Inductive load I <sub>E</sub> = 600A	—	—	450	ns
t <sub>r</sub>	Turn-on rise time		—	—	200	ns
t <sub>d(off)</sub>	Turn-off delay time		—	—	800	ns
t <sub>f</sub>	Turn-off fall time		—	—	300	ns
t <sub>rr</sub> (Note 1)	Reverse recovery time		—	—	500	ns
Q <sub>rr</sub> (Note 1)	Reverse recovery charge	—	43.2	—	μC	
V <sub>EC</sub> (Note 1)	Emitter-collector voltage	I <sub>E</sub> = 600A, G-E short	—	—	3.35	V
R <sub>th(j-c)Q</sub>	Thermal resistance*1	IGBT part (1/2 module)	—	—	0.081	K/W
R <sub>th(j-c)R</sub>		FWDi part (1/2 module)	—	—	0.11	K/W
R <sub>th(c-s)</sub>	Contact thermal resistance	Case to heat sink, Thermal compound applied*2 (1/2 module)	—	0.010	—	K/W
R <sub>th(j-c')Q</sub>	Thermal resistance*3	Case temperature measured point is just under the chips	—	—	0.032	K/W
R <sub>G</sub>	External gate resistance		1.0	—	5.2	Ω

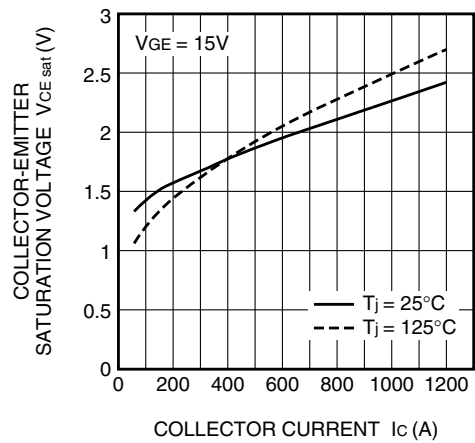
Note 1. I<sub>E</sub>, V<sub>EC</sub>, t<sub>rr</sub>, Q<sub>rr</sub> & die/dt represent characteristics of the anti-parallel, emitter-collector free-wheel diode (FWDi).  
 2. Pulse width and repetition rate should be such that the device junction temperature (T<sub>j</sub>) does not exceed T<sub>jmax</sub> rating.  
 3. Junction temperature (T<sub>j</sub>) should not increase beyond 150°C.  
 4. Pulse width and repetition rate should be such as to cause negligible temperature rise.  
 \*1 : Case temperature (T<sub>c</sub>) measured point is indicated in OUTLINE DRAWING.  
 \*2 : Typical value is measured by using thermally conductive grease of λ = 0.9[W/(m • K)].  
 \*3 : If you use this value, R<sub>th(s-a)</sub> should be measured just under the chips.

PERFORMANCE CURVES

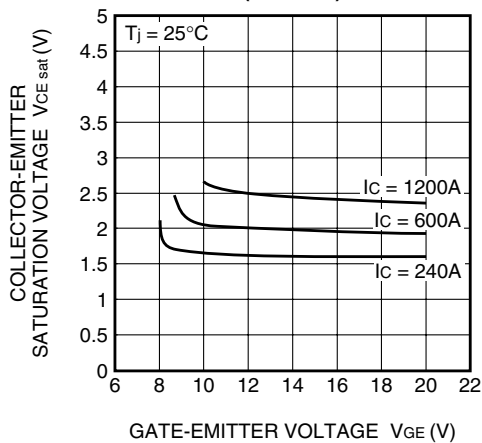
OUTPUT CHARACTERISTICS (TYPICAL)



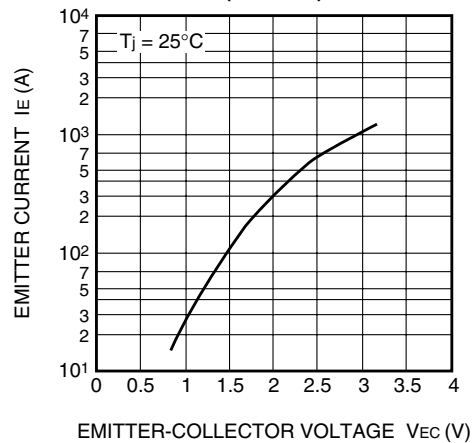
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



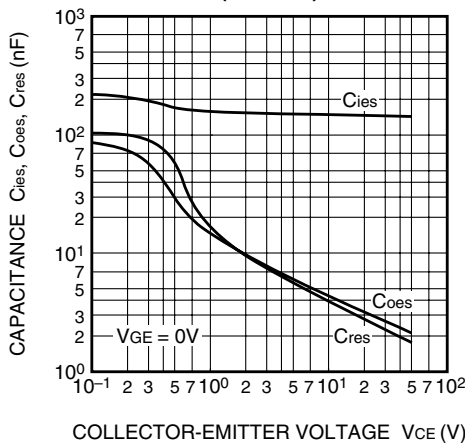
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



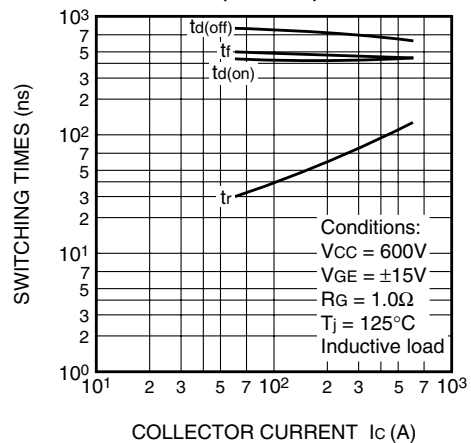
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



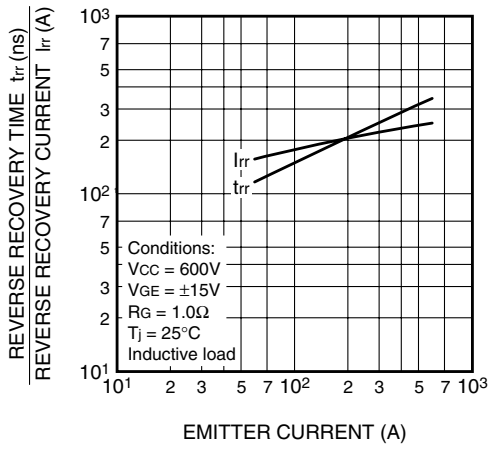
CAPACITANCE- $V_{ce}$  CHARACTERISTICS (TYPICAL)



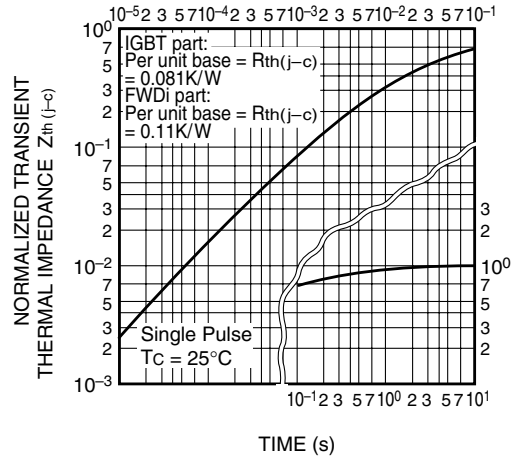
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



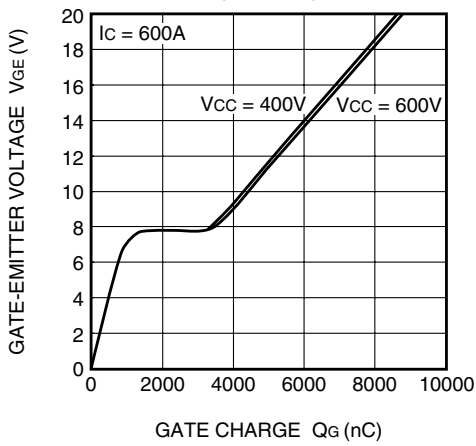
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



GATE CHARGE CHARACTERISTICS (TYPICAL)

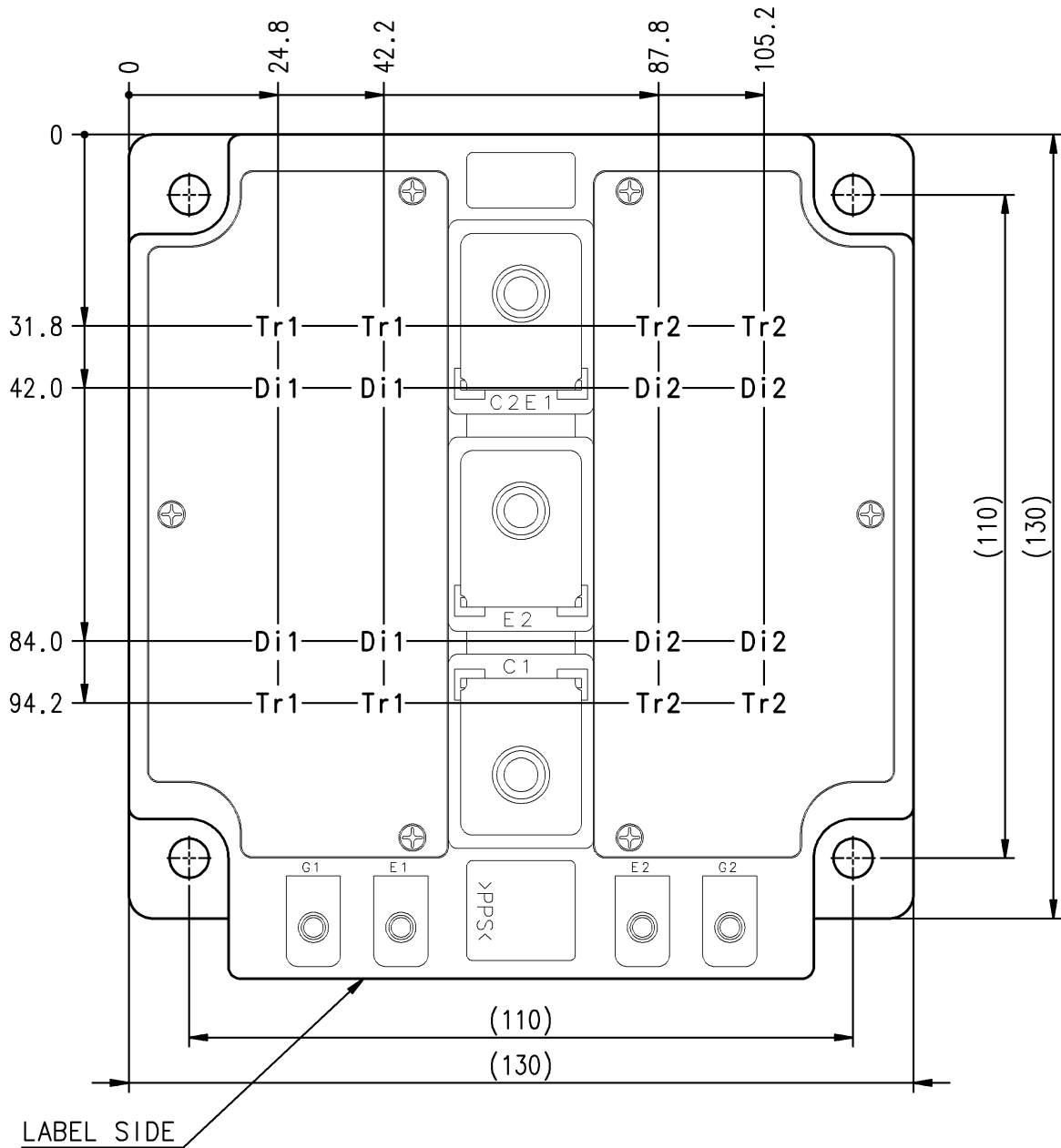


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HIGH POWER SWITCHING USE

Chip location (Top view)

Dimensions in mm, tolerance:  $\pm 1$  mm



Tr1/Tr2 : IGBT, Di1/Di2 : FWDi