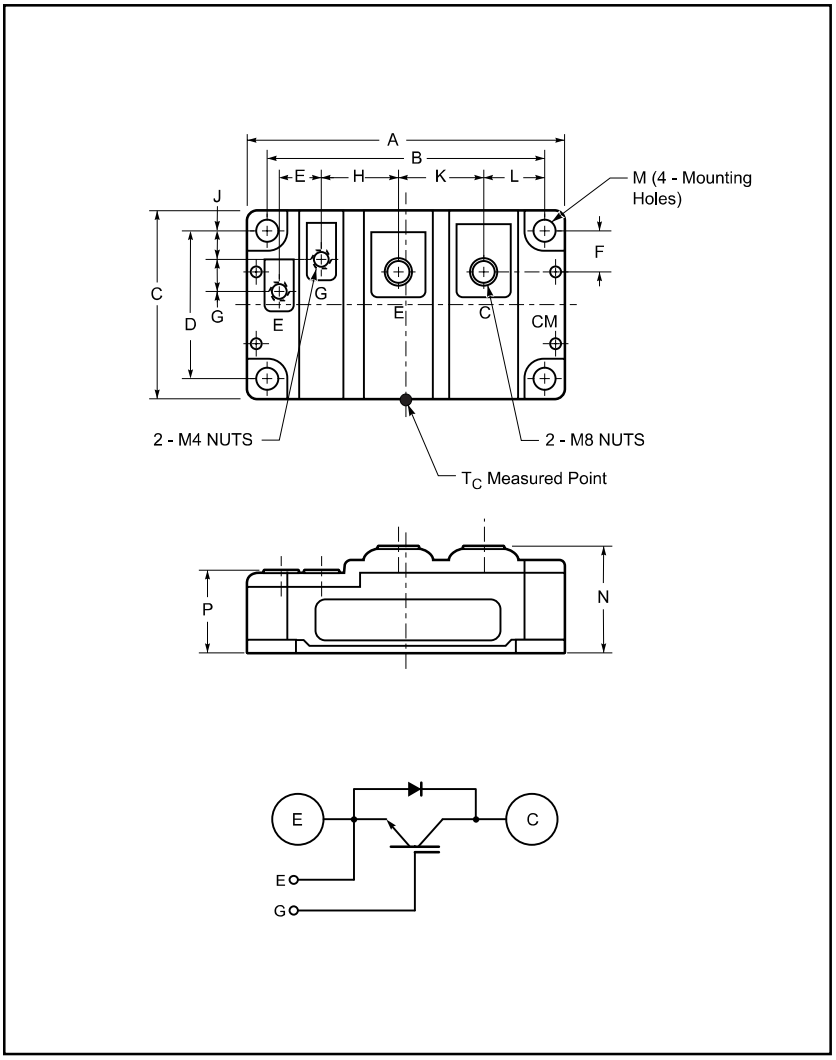
MITSUBISHI IGBT MODULES

CM600HU-12H

HIGH POWER SWITCHING USE INSULATED TYPE



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.21	107.0
B	3.66±0.01	93.0±0.25
C	2.44	62.0
D	1.89±0.01	48.0±0.25
E	0.53	13.5
F	0.49	12.55
G	0.39	10.0

Dimensions	Inches	Millimeters
H	1.02	26.0
J	0.37	9.5
K	1.14	29.0
L	0.81	20.5
M	0.26 Dia.	6.5 Dia.
N	1.34 +0.04/-0.02	34 +1.0/-0.5
P	1.02 +0.04/-0.02	26 +1.0/-0.5

Description:
Mitsubishi IGBT Modules are designed for use in switching applications. Each module consists of one IGBT in a single configuration with a reverse-connected super-fast recovery free-wheel diode. All components and interconnects are isolated from the heat sinking baseplate, offering simplified system assembly and thermal management.

Features:
- ☐ Low Drive Power
- ☐ Low $V_{CE(sat)}$
- ☐ Discrete Super-Fast Recovery Free-Wheel Diode
- ☐ High Frequency Operation
- ☐ Isolated Baseplate for Easy Heat Sinking

Applications:
- ☐ AC Motor Control
- ☐ Motion/Servo Control
- ☐ UPS
- ☐ Welding Power Supplies

Ordering Information:
Example: Select the complete module number you desire from the table - i.e. CM600HU-12H is a 600V (V_{CES}), 600 Ampere Single IGBT Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	600	12

MITSUBISHI ELECTRIC

CM600HU-12H

HIGH POWER SWITCHING USE
INSULATED TYPE

Absolute Maximum Ratings, T_j = 25 °C unless otherwise specified

Ratings	Symbol	CM600HU-12H	Units
Junction Temperature	T_j	-40 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°C
Collector-Emitter Voltage (G-E SHORT)	V_{CES}	600	Volts
Gate-Emitter Voltage (C-E SHORT)	V_{GES}	±20	Volts
Collector Current (T_c = 25°C)	I_C	600	Amperes
Peak Collector Current ($T_j \leq$ 150°C)	I_{CM}	1200*	Amperes
Emitter Current** (T_c = 25°C)	I_E	600	Amperes
Peak Emitter Current**	I_{EM}	1200*	Amperes
Maximum Collector Dissipation (T_c = 25°C)	P_c	1560	Watts
Mounting Torque, M8 Main Terminal	–	8.8~10.8	N · m
Mounting Torque, M6 Mounting	–	3.5~4.5	N · m
Mounting Torque, M4 Terminal	–	1.3~1.7	N · m
Weight	–	450	Grams
Isolation Voltage (Main Terminal to Baseplate, AC 1 min.)	V_{iso}	2500	Vrms

* Pulse width and repetition rate should be such that the device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.
**Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

Static Electrical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	I_{CES}	$V_{CE} = V_{CES}$, V_{GE} = 0V	–	–	1	mA
Gate Leakage Voltage	I_{GES}	$V_{GE} = V_{GES}$, V_{CE} = 0V	–	–	0.5	µA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 60mA, V_{CE} = 10V	4.5	6	7.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 600A, V_{GE} = 15V, T_j = 25°C	–	2.4	3.0	Volts
		I_C = 600A, V_{GE} = 15V, T_j = 125°C	–	2.6	–	Volts
Total Gate Charge	Q_G	V_{CC} = 300V, I_C = 600A, V_{GE} = 15V	–	1200	–	nC
Emitter-Collector Voltage*	V_{EC}	I_E = 600A, V_{GE} = 0V	–	–	2.6	Volts

* Pulse width and repetition rate should be such that the device junction temperature (T_j) does not exceed $T_{j(max)}$ rating.

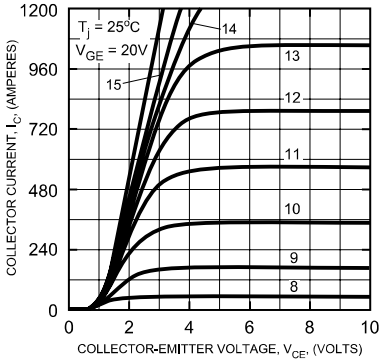
Dynamic Electrical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics		Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance		C_{ies}	V_{CE} = 10V, V_{GE} = 0V	–	–	52.8	nF
Output Capacitance		C_{oes}		–	–	28.8	nF
Reverse Transfer Capacitance		C_{res}		–	–	7.8	nF
Resistive	Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 300V, I_C = 600A,	–	–	300	ns
Load	Rise Time	t_r	$V_{GE1} = V_{GE2}$ = 15V,	–	–	600	ns
Switch	Turn-off Delay Time	$t_{d(off)}$	R_G = 1.0Ω, Resistive	–	–	350	ns
Times	Fall Time	t_f	Load Switching Operation	–	–	300	ns
Diode Reverse Recovery Time		t_{rr}	I_E = 600A, di_E/dt = -1200A/µs	–	–	160	ns
Diode Reverse Recovery Charge		Q_{rr}	I_E = 600A, di_E/dt = -1200A/µs	–	1.44	–	µC

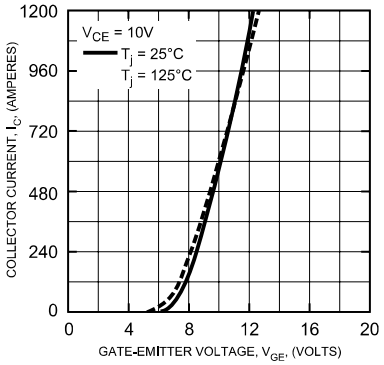
Thermal and Mechanical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)}Q$	Per IGBT Module	–	–	0.08	°C/ W
Thermal Resistance, Junction to Case	$R_{th(j-c)}D$	Per FWDi Module	–	–	0.12	°C/W
Contact Thermal Resistance	$R_{th(c-f)}$	Per Module, Thermal Grease Applied	–	0.02	–	°C/W

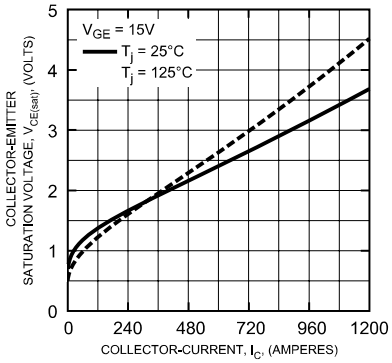
OUTPUT CHARACTERISTICS
(TYPICAL)



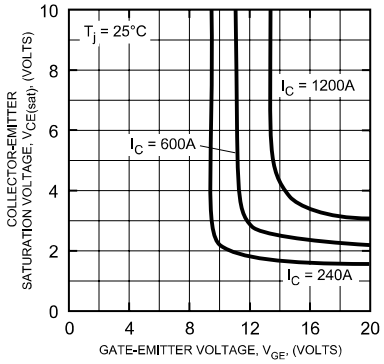
TRANSFER CHARACTERISTICS
(TYPICAL)



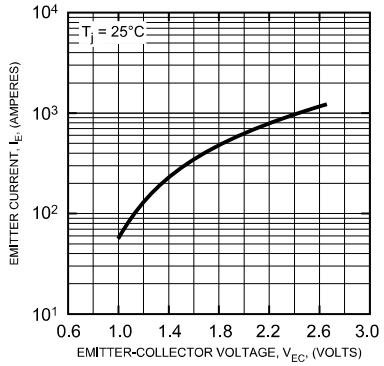
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



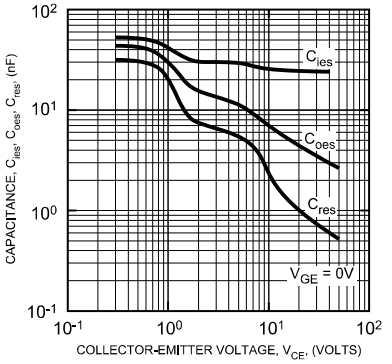
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



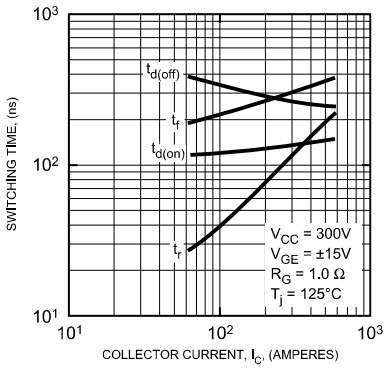
FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



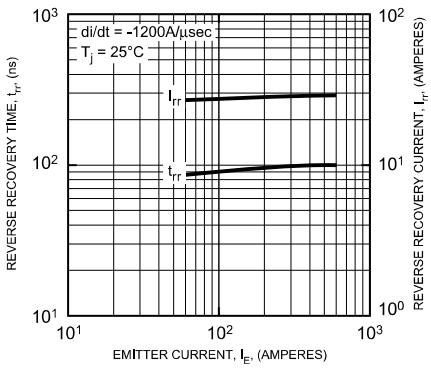
CAPACITANCE VS. V_{CE}
(TYPICAL)



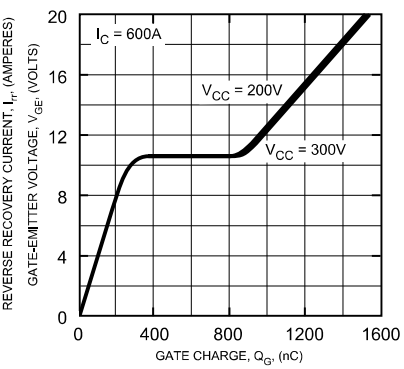
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)

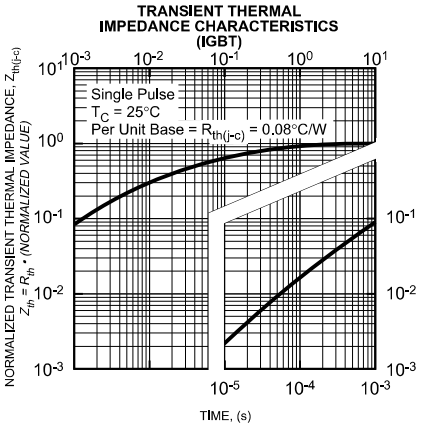


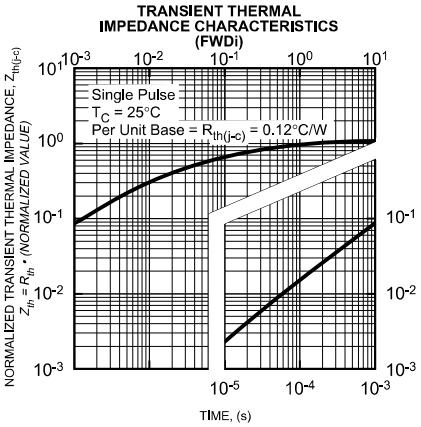
REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)



GATE CHARGE, V_{GE}




TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT)
Single Pulse
T_C = 25°C
Per Unit Base = $R_{th(j-c)}$ = 0.08°C/W
NORMALIZED TRANSIENT THERMAL IMPEDANCE, $Z_{th(j-c)}$
$Z_{th} = R_{th} \cdot$ (NORMALIZED VALUE)
TIME, (s)


TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(FWDi)
Single Pulse
T_C = 25°C
Per Unit Base = $R_{th(j-c)}$ = 0.12°C/W
NORMALIZED TRANSIENT THERMAL IMPEDANCE, $Z_{th(j-c)}$
$Z_{th} = R_{th} \cdot$ (NORMALIZED VALUE)
TIME, (s)