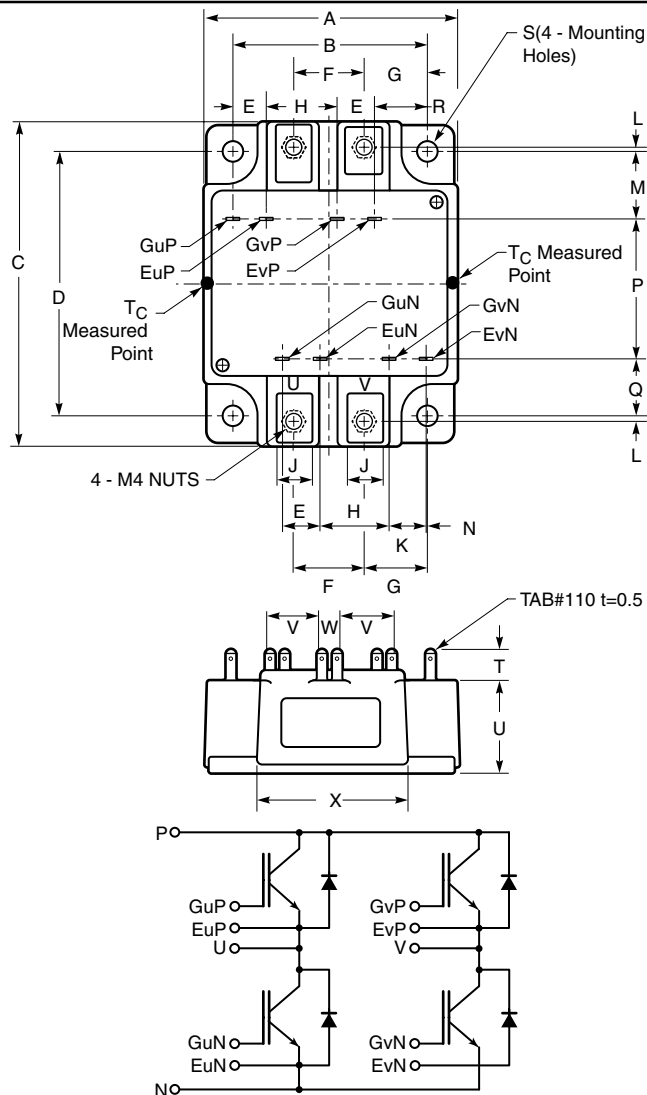


MITSUBISHI IGBT MODULES
CM50BU-24H
 HIGH POWER SWITCHING USE
 INSULATED TYPE



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	2.83	72.0
B	2.17±0.01	55±0.25
C	3.58	91.0
D	2.91±0.01	74.0±0.25
E	0.43	11.0
F	0.79	20.0
G	0.69	17.5
H	0.75	19.1
J	0.39	10.0
K	0.41	10.5
L	0.05	1.25

Dimensions	Inches	Millimeters
M	0.74	18.7
N	0.02	0.5
P	1.55	39.3
Q	0.63	16.0
R	0.57	14.4
S	0.22 Dia.	5.5 Dia.
T	0.32	8.1
U	1.02	26.0
V	0.59	15.0
W	0.20	5.0
X	1.61	41.0



Description:

Mitsubishi IGBT Modules are designed for use in switching applications. Each module consists of four IGBTs in an H-Bridge configuration, with each transistor having 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. CM50BU-24H is a 1200V (V_{CES}), 50 Ampere Four-IGBT Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	50	24

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Absolute Maximum Ratings, $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

	Symbol	Ratings	Units
Junction Temperature	T_j	-40 to 150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-40 to 125	$^{\circ}\text{C}$
Collector-Emitter Voltage (G-E SHORT)	V_{CES}	1200	Volts
Gate-Emitter Voltage (C-E SHORT)	V_{GES}	± 20	Volts
Collector Current ($T_c = 25^{\circ}\text{C}$)	I_C	50	Amperes
Peak Collector Current ($T_j \leq 150^{\circ}\text{C}$)	I_{CM}	100*	Amperes
Emitter Current** ($T_c = 25^{\circ}\text{C}$)	I_E	50	Amperes
Peak Emitter Current**	I_{EM}	100*	Amperes
Maximum Collector Dissipation ($T_c = 25^{\circ}\text{C}$)	P_c	400	Watts
Mounting Torque, M4 Main Terminal	—	1.3 ~ 1.7	N · m
Mounting Torque, M5 Mounting	—	2.5 ~ 3.5	N · m
Weight	—	390	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 $T_{j(\text{max})}$ rating.

**Represents characteristics of the anti-parallel, emitter-to-collector free-wheel diode (FWDi).

Static Electrical Characteristics, $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	I_{CES}	$V_{\text{CE}} = V_{\text{CES}}, V_{\text{GE}} = 0\text{V}$	—	—	1	mA
Gate Leakage Voltage	I_{GES}	$V_{\text{GE}} = V_{\text{GES}}, V_{\text{CE}} = 0\text{V}$	—	—	0.5	μA
Gate-Emitter Threshold Voltage	$V_{\text{GE(th)}}$	$I_C = 5\text{mA}, V_{\text{CE}} = 10\text{V}$	4.5	6	7.5	Volts
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$I_C = 50\text{A}, V_{\text{GE}} = 15\text{V}, T_j = 25^{\circ}\text{C}$	—	2.9	3.7	Volts
		$I_C = 50\text{A}, V_{\text{GE}} = 15\text{V}, T_j = 125^{\circ}\text{C}$	—	2.85	—	Volts
Total Gate Charge	Q_G	$V_{\text{CC}} = 600\text{V}, I_C = 50\text{A}, V_{\text{GE}} = 15\text{V}$	—	187	—	nC
Emitter-Collector Voltage*	V_{EC}	$I_E = 50\text{A}, V_{\text{GE}} = 0\text{V}$	—	—	3.2	Volts

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

Dynamic Electrical Characteristics, $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	C_{ies}	$V_{\text{CE}} = 10\text{V}, V_{\text{GE}} = 0\text{V}$	—	—	7.5	nF
Output Capacitance	C_{oes}		—	—	2.6	nF
Reverse Transfer Capacitance	C_{res}		—	—	1.5	nF
Resistive	Turn-on Delay Time	$V_{\text{CC}} = 600\text{V}, I_C = 50\text{A},$ $V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V},$ $R_G = 6.3\Omega, \text{Resistive}$	—	—	80	ns
Load	Rise Time		—	—	200	ns
Switch	Turn-off Delay Time	Load Switching Operation	—	—	150	ns
Times	Fall Time		—	—	350	ns
Diode Reverse Recovery Time	t_{rr}	$I_E = 50\text{A}, di_E/dt = -100\text{A}/\mu\text{s}$	—	—	300	ns
Diode Reverse Recovery Charge	Q_{rr}	$I_E = 50\text{A}, di_E/dt = -100\text{A}/\mu\text{s}$	—	0.28	—	μC

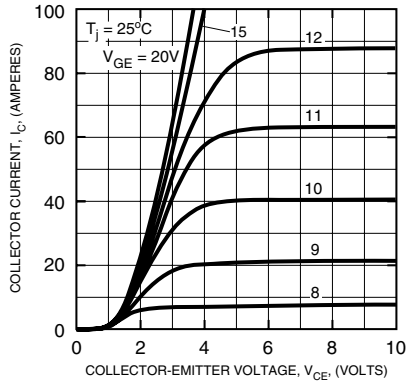
Thermal and Mechanical Characteristics, $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)Q}}$	Per IGBT 1/4 Module	—	—	0.31	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)D}}$	Per FWDi 1/4 Module	—	—	0.7	$^{\circ}\text{C}/\text{W}$
Contact Thermal Resistance	$R_{\text{th(c-f)}}$	Per Module, Thermal Grease Applied	—	0.025	—	$^{\circ}\text{C}/\text{W}$

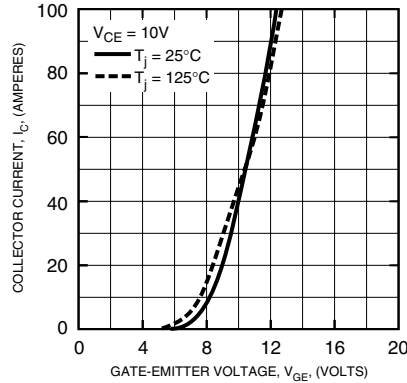
CM50BU-24H

HIGH POWER SWITCHING USE
INSULATED TYPE

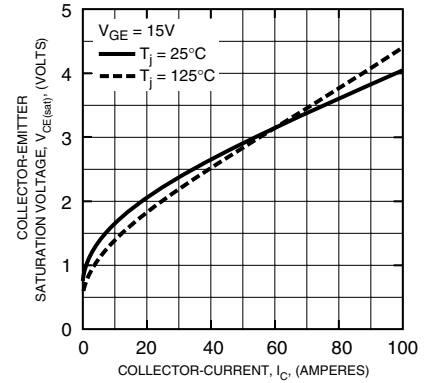
OUTPUT CHARACTERISTICS
(TYPICAL)



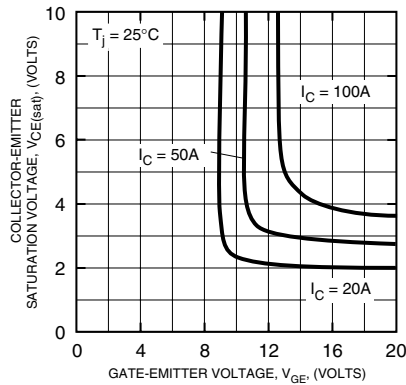
TRANSFER CHARACTERISTICS
(TYPICAL)



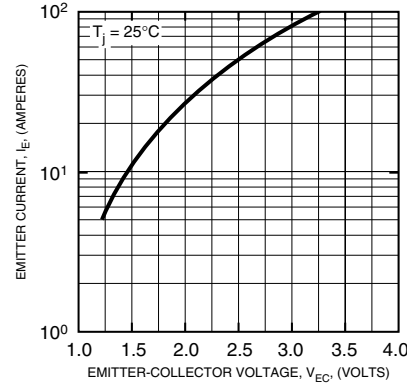
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



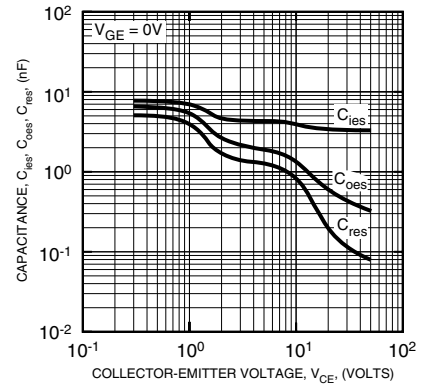
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



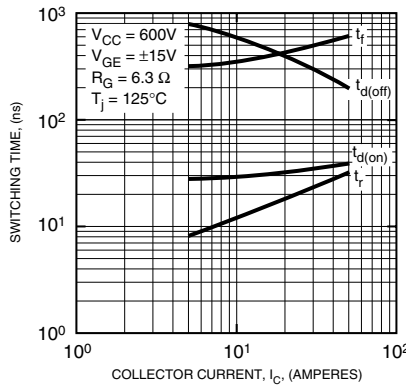
FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



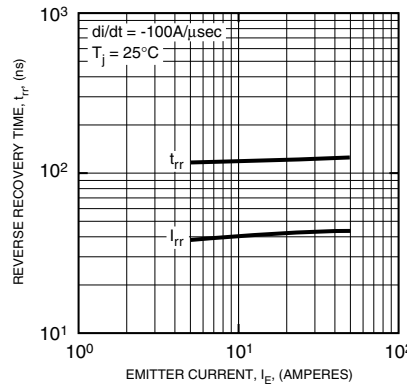
CAPACITANCE VS. V_{CE}
(TYPICAL)



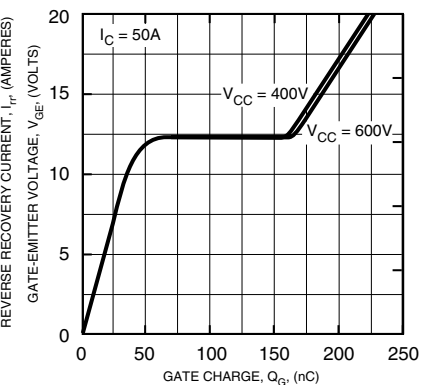
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)



GATE CHARGE, V_{GE}



CM50BU-24H

HIGH POWER SWITCHING USE
INSULATED TYPE

