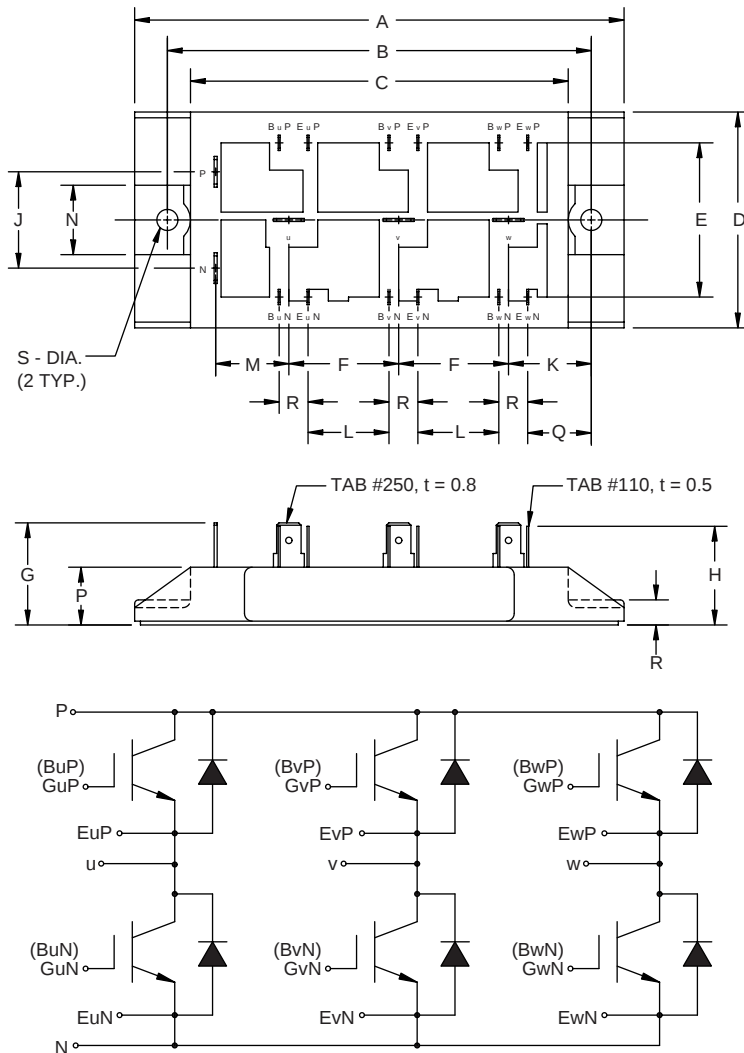


CM50TF-12H

MEDIUM POWER SWITCHING USE
INSULATED TYPE



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	5.00	127.0
B	4.33±0.01	110.0±0.2
C	3.86	98.0
D	2.20	56.0
E	1.57	40.0
F	1.12	28.5
G	1.04	26.5
H	1.01	25.6
J	0.98	25.0

Dimensions	Inches	Millimeters
K	0.85	21.5
L	0.83	21.0
M	0.75	19.0
N	0.71	18.0
P	0.69	17.5
Q	0.65	16.5
R	0.30	7.5
S	0.22 Dia.	Dia. 5.5



Description:

Mitsubishi IGBT Modules are designed for use in switching applications. Each module consists of six IGBTs in a three phase 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 part module number you desire from the table below -i.e. CM50TF-12H is a 600V (V_{CES}), 50 Ampere Six-IGBT Module.

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

CM50TF-12H**MEDIUM POWER SWITCHING USE
INSULATED TYPE****Absolute Maximum Ratings, $T_j = 25^\circ\text{C}$ 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}	600	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	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 ($T_C = 25^\circ\text{C}$, $T_j \leq 150^\circ\text{C}$)	P_C	250	Watts
Mounting Torque, M5 Mounting	—	1.47 ~ 1.96	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, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Collector-Cutoff Current	I_{CES}	$V_{\text{CE}} = V_{\text{CES}}$, $V_{\text{GE}} = 0\text{V}$	—	—	1.0	mA
Gate Leakage Current	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	6.0	7.5	Volts
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$I_C = 50\text{A}$, $V_{\text{GE}} = 15\text{V}$	—	2.1	2.8**	Volts
		$I_C = 50\text{A}$, $V_{\text{GE}} = 15\text{V}$, $T_j = 150^\circ\text{C}$	—	2.15	—	Volts
Total Gate Charge	Q_G	$V_{\text{CC}} = 300\text{V}$, $I_C = 50\text{A}$, $V_{\text{GE}} = 15\text{V}$	—	150	—	nC
Emitter-Collector Voltage	V_{EC}	$I_E = 50\text{A}$, $V_{\text{GE}} = 0\text{V}$	—	—	2.8	Volts

** Pulse width and repetition rate should be such that device junction temperature rise is negligible.

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	C_{ies}	$V_{\text{GE}} = 0\text{V}$, $V_{\text{CE}} = 10\text{V}$	—	—	5	nF
Output Capacitance	C_{oes}		—	—	1.8	nF
Reverse Transfer Capacitance	C_{res}		—	—	1	nF
Resistive	Turn-on Delay Time	$V_{\text{CC}} = 300\text{V}$, $I_C = 50\text{A}$, $V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V}$, $R_G = 13\Omega$	—	—	200	ns
Load	Rise Time		—	—	300	ns
Switching	Turn-off Delay Time		—	—	200	ns
Times	Fall Time		—	—	300	ns
Diode Reverse Recovery Time	t_{rr}	$I_E = 50\text{A}$, $di_E/dt = -100\text{A}/\mu\text{s}$	—	—	110	ns
Diode Reverse Recovery Charge	Q_{rr}	$I_E = 50\text{A}$, $di_E/dt = -100\text{A}/\mu\text{s}$	—	0.14	—	μC

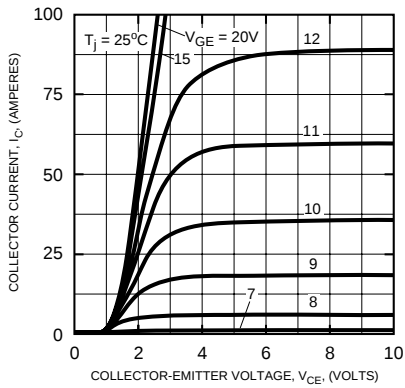
Thermal and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	Per IGBT	—	—	0.50	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	Per FWDi	—	—	1.00	$^\circ\text{C}/\text{W}$
Contact Thermal Resistance	$R_{\text{th(c-f)}}$	Per Module, Thermal Grease Applied	—	—	0.042	$^\circ\text{C}/\text{W}$

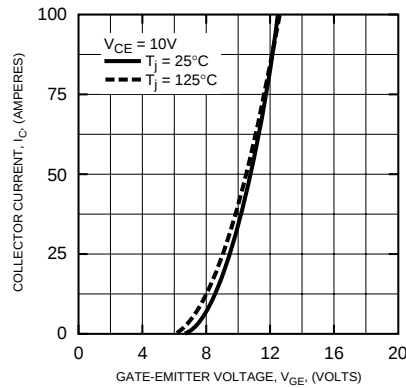
CM50TF-12H

MEDIUM POWER SWITCHING USE
INSULATED TYPE

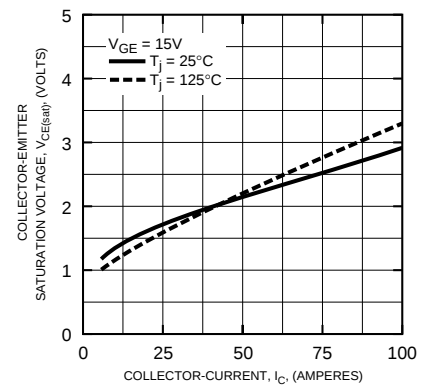
OUTPUT CHARACTERISTICS
(TYPICAL)



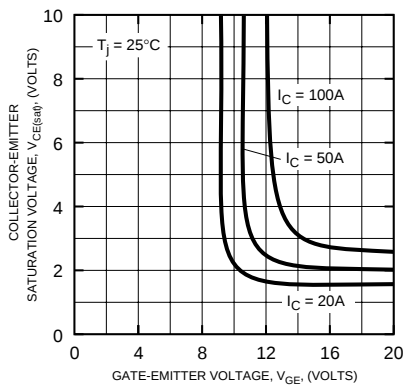
TRANSFER CHARACTERISTICS
(TYPICAL)



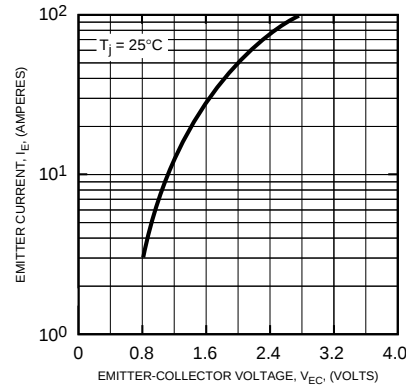
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



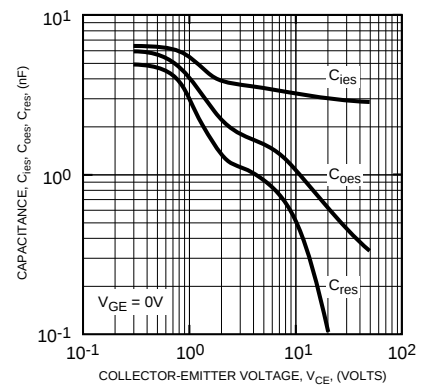
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



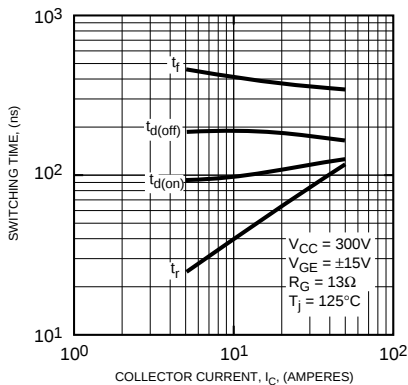
FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



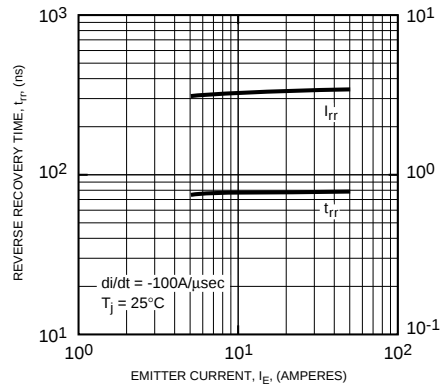
CAPACITANCE VS. Vce
(TYPICAL)



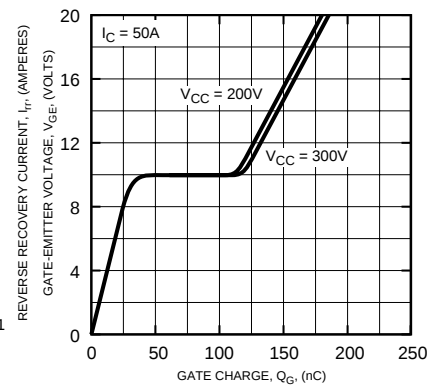
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)



GATE CHARGE, Vge



CM50TF-12H

MEDIUM POWER SWITCHING USE
INSULATED TYPE

