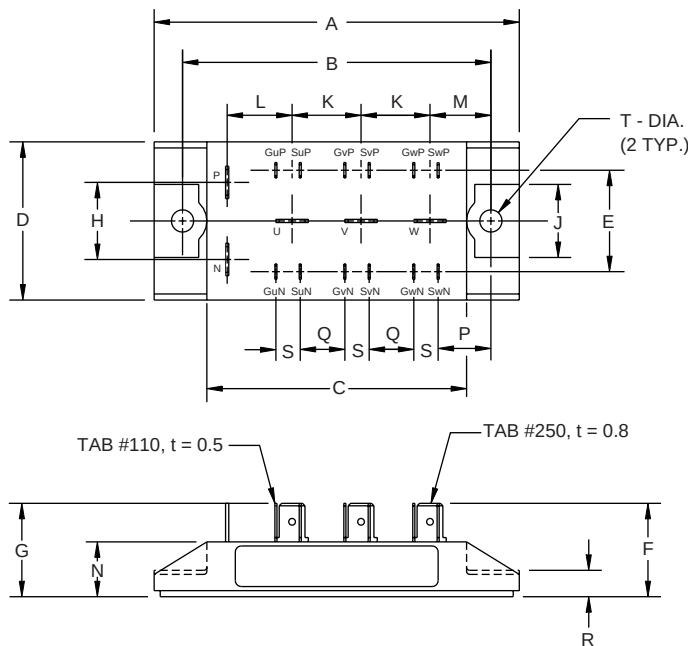


CM20TF-12HMEDIUM POWER SWITCHING USE
INSULATED TYPE**Description:**

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. CM20TF-12H is a 600V (V_{CES}), 20 Ampere Six-IGBT Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	20	12

Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	3.54	90.0
B	2.99±0.01	76.0±0.2
C	2.52	64.0
D	1.54	39.0
E	0.98	25.0
F	0.90	23.0
G	0.87	22.0
H	0.75	19.0
J	0.71	18.0

Dimensions	Inches	Millimeters
K	0.67	17.0
L	0.63	16.0
M	0.59	15.0
N	0.56	14.1
P	0.51	13.0
Q	0.43	11.0
R	0.26	6.5
S	0.24	6.0
T	0.22 Dia.	Dia. 5.5

CM20TF-12H**MEDIUM POWER SWITCHING USE
INSULATED TYPE****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}	600	Volts
Gate-Emitter Voltage (C-E SHORT)	V_{GES}	± 20	Volts
Collector Current ($T_C = 25^{\circ}\text{C}$)	I_C	20	Amperes
Peak Collector Current	I_{CM}	40*	Amperes
Emitter Current** ($T_C = 25^{\circ}\text{C}$)	I_E	20	Amperes
Peak Emitter Current**	I_{EM}	40*	Amperes
Maximum Collector Dissipation ($T_C = 25^{\circ}\text{C}$, $T_j \leq 150^{\circ}\text{C}$)	P_c	125	Watts
Mounting Torque, M5 Mounting	—	1.47 ~ 1.96	N · m
Weight	—	150	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}	$V_{\text{CE}} = V_{\text{CES}}$, $V_{\text{GE}} = 0\text{V}$	—	—	1.0	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	$V_{\text{GE(th)}}$	$I_C = 2\text{mA}$, $V_{\text{CE}} = 10\text{V}$	4.5	6.0	7.5	Volts
Collector-Emitter Saturation Voltage	$V_{\text{CE(sat)}}$	$I_C = 20\text{A}$, $V_{\text{GE}} = 15\text{V}$	—	2.1	2.8**	Volts
		$I_C = 20\text{A}$, $V_{\text{GE}} = 15\text{V}$, $T_j = 150^{\circ}\text{C}$	—	2.15	—	Volts
Total Gate Charge	Q_G	$V_{\text{CC}} = 300\text{V}$, $I_C = 20\text{A}$, $V_{\text{GE}} = 15\text{V}$	—	60	—	nC
Emitter-Collector Voltage	V_{EC}	$I_E = 20\text{A}$, $V_{\text{GE}} = 0\text{V}$	—	—	2.8	Volts

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

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

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance	C_{ies}	$V_{\text{GE}} = 0\text{V}$, $V_{\text{CE}} = 10\text{V}$	—	—	2.0	nF
Output Capacitance	C_{oes}		—	—	0.7	nF
Reverse Transfer Capacitance	C_{res}		—	—	0.4	nF
Resistive	Turn-on Delay Time	$V_{\text{CC}} = 300\text{V}$, $I_C = 20\text{A}$, $V_{\text{GE1}} = V_{\text{GE2}} = 15\text{V}$, $R_G = 31\Omega$	—	—	120	ns
Load	Rise Time		—	—	300	ns
Switching	Turn-off Delay Time		—	—	200	ns
Times	Fall Time		—	—	300	ns
Diode Reverse Recovery Time	t_{rr}	$I_E = 20\text{A}$, $di_E/dt = -40\text{A}/\mu\text{s}$	—	—	110	ns
Diode Reverse Recovery Charge	Q_{rr}	$I_E = 20\text{A}$, $di_E/dt = -40\text{A}/\mu\text{s}$	—	0.05	—	μC

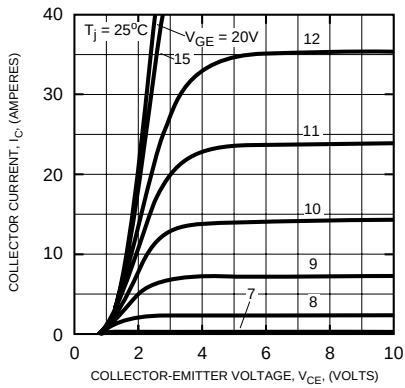
Thermal and Mechanical Characteristics, $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	Per IGBT	—	—	1.00	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\text{th(j-c)}}$	Per FWDi	—	—	3.50	$^{\circ}\text{C}/\text{W}$
Contact Thermal Resistance	$R_{\text{th(c-f)}}$	Per Module, Thermal Grease Applied	—	—	0.092	$^{\circ}\text{C}/\text{W}$

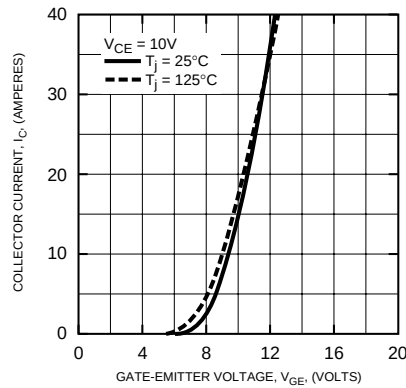
CM20TF-12H

MEDIUM POWER SWITCHING USE
INSULATED TYPE

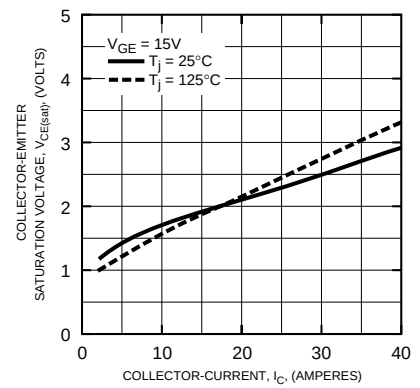
OUTPUT CHARACTERISTICS
(TYPICAL)



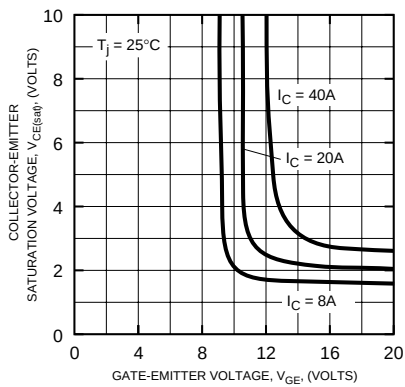
TRANSFER CHARACTERISTICS
(TYPICAL)



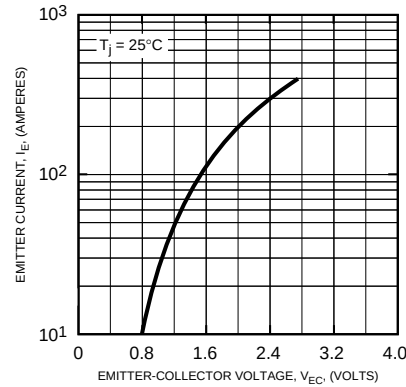
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



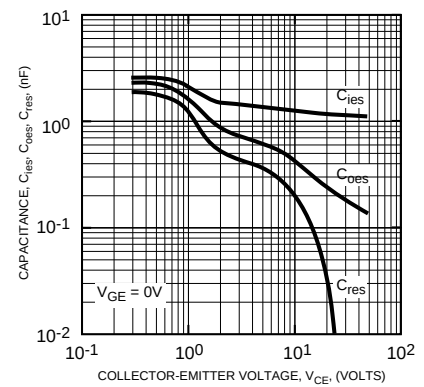
COLLECTOR-EMITTER
SATURATION VOLTAGE CHARACTERISTICS
(TYPICAL)



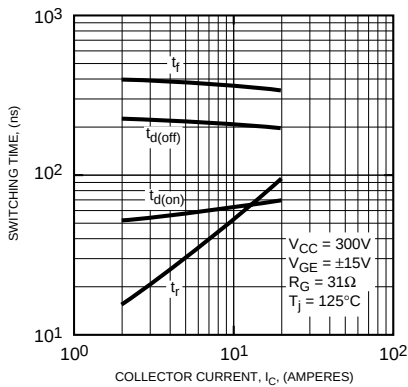
FREE-WHEEL DIODE
FORWARD CHARACTERISTICS
(TYPICAL)



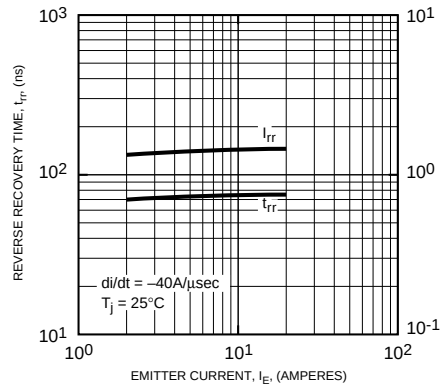
CAPACITANCE VS. Vce
(TYPICAL)



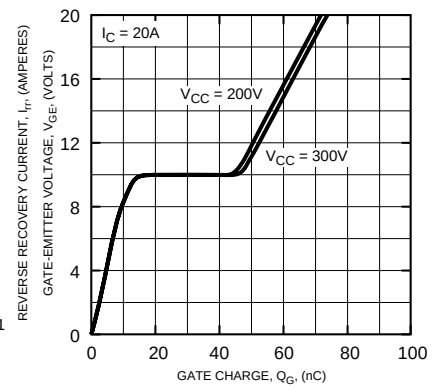
HALF-BRIDGE
SWITCHING CHARACTERISTICS
(TYPICAL)



REVERSE RECOVERY CHARACTERISTICS
(TYPICAL)



GATE CHARGE, Vge



CM20TF-12H

MEDIUM POWER SWITCHING USE
INSULATED TYPE

