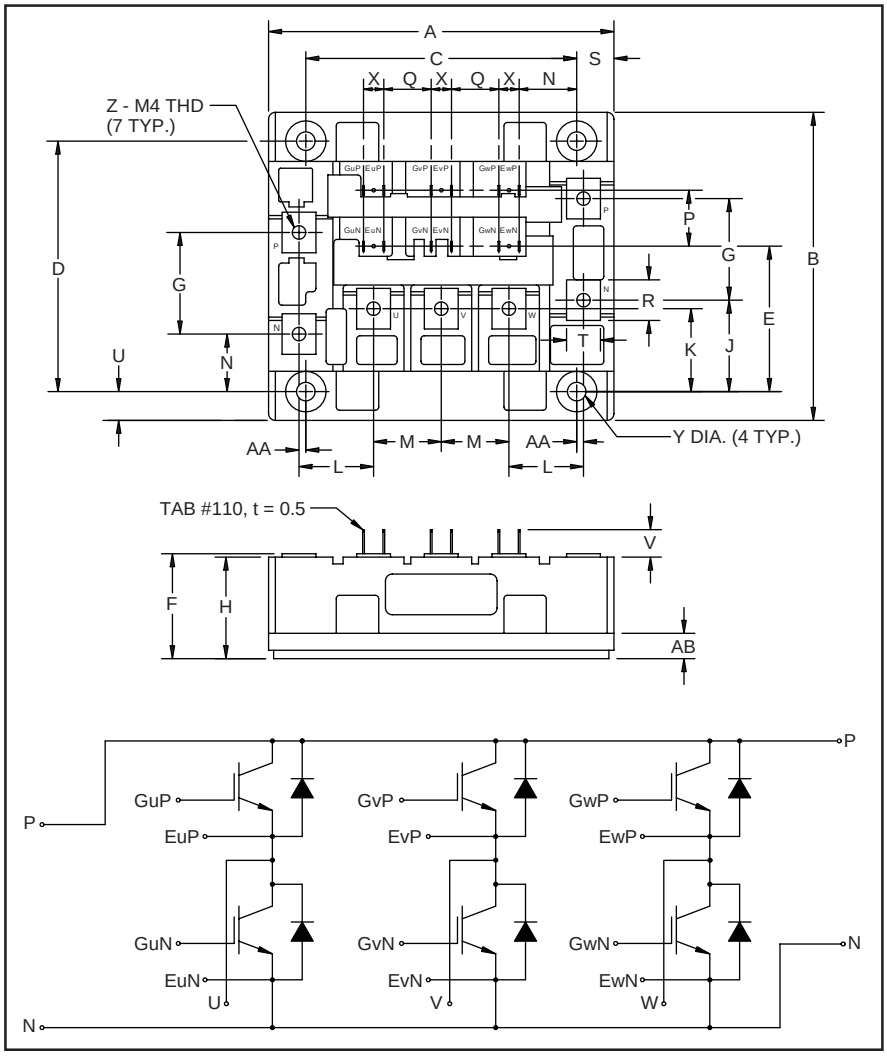
MITSUBISHI IGBT MODULES

CM100TF-12H

HIGH POWER SWITCHING USE
INSULATED TYPE



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	4.02±0.02	102±0.5
B	3.58±0.02	91.0±0.5
C	3.15±0.01	80.0±0.25
D	2.913±0.01	74.0±0.25
E	1.69	43.0
F	1.18+0.06/-0.02	30.0+1.5/-0.5
G	1.18	30.0
H	1.16	29.5
J	1.06	27.0
K	0.96	24.5
L	0.87	22.0
M	0.79	20.0
N	0.67	17.0

Dimensions	Inches	Millimeters
P	0.65	16.5
Q	0.55	14.0
R	0.47	12.0
S	0.43	11.0
T	0.39	10.0
U	0.33	8.5
V	0.32	8.1
X	0.24	6.0
Y	0.22 Dia.	Dia. 5.5
Z	M4 Metric	M4
AA	0.08	2.0
AB	0.28	7.0

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. CM100TF-12H is a 600V (V_{CES}), 100 Ampere Six-IGBT Module.

Type	Current Rating Amperes	V_{CES} Volts (x 50)
CM	100	12

MITSUBISHI ELECTRIC

CM100TF-12H

HIGH POWER SWITCHING USE
INSULATED TYPE

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

	Symbol	Ratings	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	100	Amperes
Peak Collector Current	I_{CM}	200*	Amperes
Emitter Current** (T_C = 25°C)	I_E	100	Amperes
Peak Emitter Current**	I_{EM}	200*	Amperes
Maximum Collector Dissipation (T_C = 25°C, $T_j \leq$ 150°C)	P_c	400	Watts
Mounting Torque, M4 Main Terminal	–	0.98 ~ 1.47	N · m
Mounting Torque, M5 Mounting	–	1.47 ~ 1.96	N · m
Weight	–	540	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	–	–	1.0	mA
Gate Leakage Current	I_{GES}	$V_{GE} = V_{GES}$, V_{CE} = 0V	–	–	0.5	µA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C = 10mA, V_{CE} = 10V	4.5	6.0	7.5	Volts
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 100A, V_{GE} = 15V	–	2.1	2.8**	Volts
		I_C = 100A, V_{GE} = 15V, T_j = 150°C	–	2.15	–	Volts
Total Gate Charge	Q_G	V_{CC} = 300V, I_C = 100A, V_{GE} = 15V	–	300	–	nC
Emitter-Collector Voltage	V_{EC}	I_E = 100A, V_{GE} = 0V	–	–	2.8	Volts

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

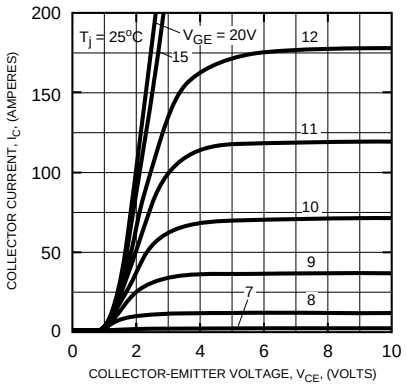
Dynamic Electrical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics		Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Capacitance		C_{ies}	V_{GE} = 0V, V_{CE} = 10V	–	–	10	nF
Output Capacitance		C_{oes}		–	–	3.5	nF
Reverse Transfer Capacitance		C_{res}		–	–	2	nF
Resistive	Turn-on Delay Time	$t_{d(on)}$	V_{CC} = 300V, I_C = 100A, $V_{GE1} = V_{GE2}$ = 15V, R_G = 6.3Ω	–	–	120	ns
Load	Rise Time	t_r		–	–	300	ns
Switching	Turn-off Delay Time	$t_{d(off)}$		–	–	200	ns
Times	Fall Time	t_f		–	–	300	ns
Diode Reverse Recovery Time		t_{rr}	I_E = 100A, di_E/dt = –200A/µs	–	–	110	ns
Diode Reverse Recovery Charge		Q_{rr}	I_E = 100A, di_E/dt = –200A/µs	–	0.27	–	µC

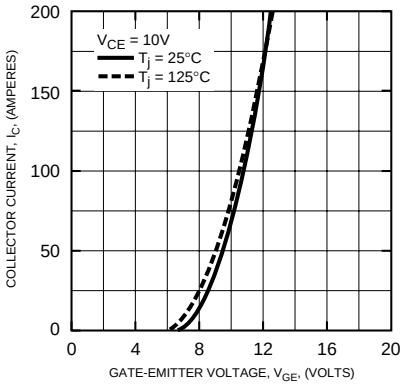
Thermal and Mechanical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per IGBT	–	–	0.31	°C/W
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	Per FWDi	–	–	0.70	°C/W
Contact Thermal Resistance	$R_{th(c-f)}$	Per Module, Thermal Grease Applied	–	–	0.033	°C/W

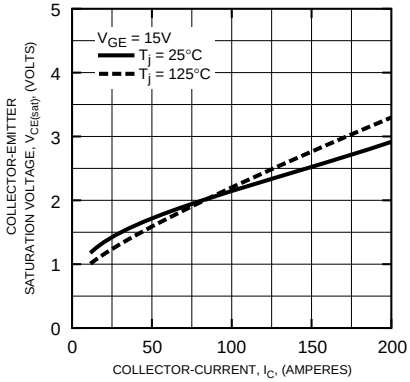
OUTPUT CHARACTERISTICS (TYPICAL)



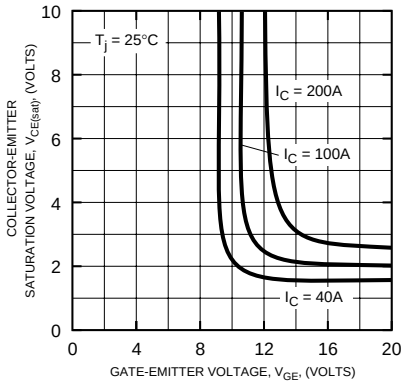
TRANSFER CHARACTERISTICS (TYPICAL)



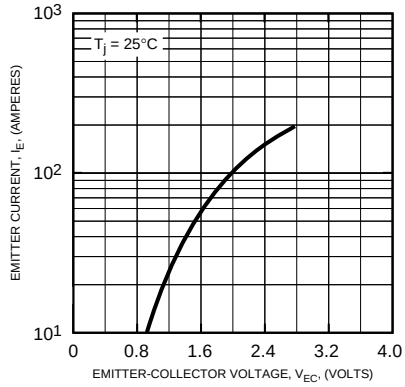
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



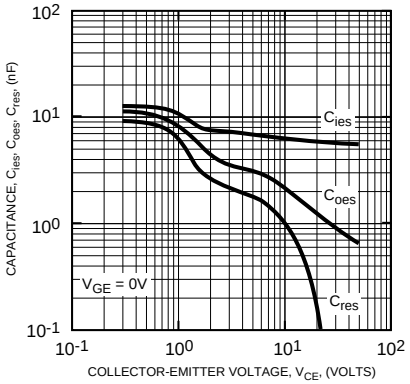
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



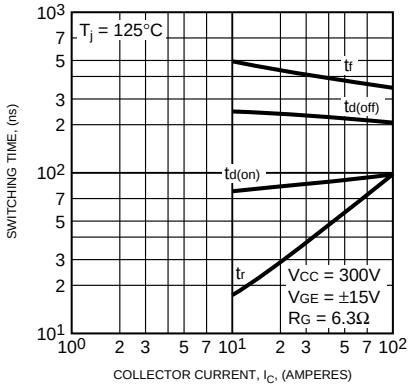
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



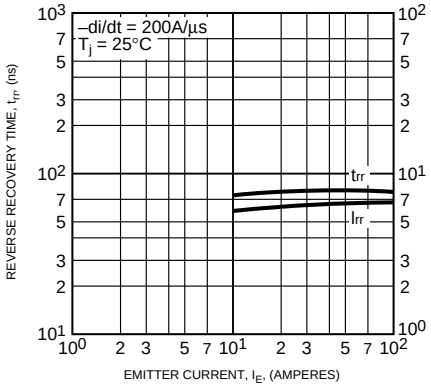
CAPACITANCE VS. V_{CE} (TYPICAL)



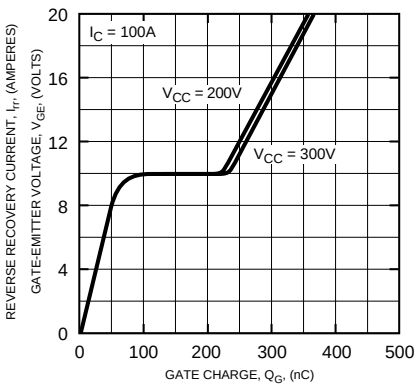
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)

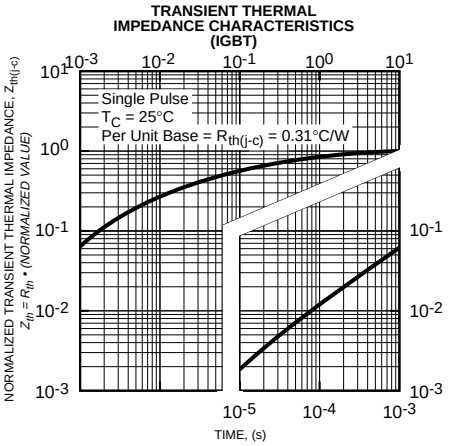


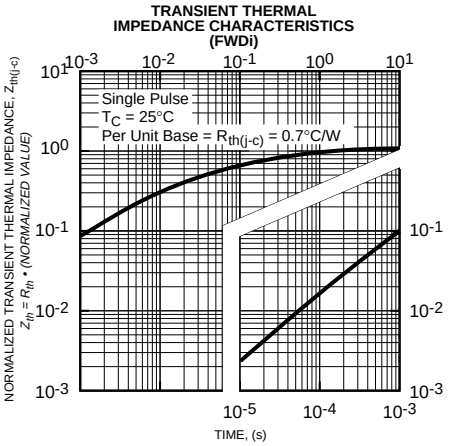
REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



GATE CHARGE, V_{GE}




TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(IGBT)
NORMALIZED TRANSIENT THERMAL IMPEDANCE, Zth(j-c)
Zth = Rth • (NORMALIZED VALUE)
Single Pulse
TC = 25°C
Per Unit Base = Rth(j-c) = 0.31°C/W
TIME, (s)


TRANSIENT THERMAL
IMPEDANCE CHARACTERISTICS
(FWDi)
NORMALIZED TRANSIENT THERMAL IMPEDANCE, Zth(j-c)
Zth = Rth • (NORMALIZED VALUE)
Single Pulse
TC = 25°C
Per Unit Base = Rth(j-c) = 0.7°C/W
TIME, (s)