

2MBI150VA-060-50

IGBT Modules

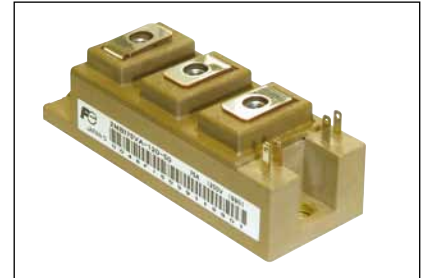
IGBT MODULE (V series) 600V / 150A / 2 in one package

■ Features

- High speed switching
- Voltage drive
- Low Inductance module structure

■ Applications

- Inverter for Motor Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply
- Industrial machines, such as Welding machines



■ Maximum Ratings and Characteristics

● Absolute Maximum Ratings (at $T_c=25^\circ\text{C}$ unless otherwise specified)

Items	Symbols	Conditions	Maximum ratings	Units
Collector-Emitter voltage	V_{CES}		600	V
Gate-Emitter voltage	V_{GES}		± 20	V
Collector current	I_C	Continuous $T_c=100^\circ\text{C}$	150	A
	$I_{C\text{ pulse}}$	1ms	300	
	$-I_C$		150	
	$-I_{C\text{ pulse}}$	1ms	300	
Collector power dissipation	P_C	1 device	650	W
Junction temperature	T_J		175	$^\circ\text{C}$
Operating junction temperature (under switching conditions)	T_{Jop}		150	
Case temperature	T_c		125	
Storage temperature	T_{stg}		-40 ~ 125	
Isolation voltage	between terminal and copper base (*1) V_{iso}	AC : 1min.	2500	VAC
Screw torque	Mounting (*2)		5.0	N m
	Terminals (*3)		5.0	

Note *1: All terminals should be connected together when isolation test will be done.

Note *2: Recommendable Value : 3.0-5.0 Nm (M5 or M6)

Note *3: Recommendable Value : 2.5-3.5 Nm (M5)

● Electrical characteristics (at $T_J=25^\circ\text{C}$ unless otherwise specified)

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Zero gate voltage collector current	I_{CES}	$V_{GE} = 0V, V_{CE} = 600V$	-	-	1.0	mA
Gate-Emitter leakage current	I_{GES}	$V_{CE} = 0V, V_{GE} = \pm 20V$	-	-	200	nA
Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V, I_C = 150mA$	6.2	6.7	7.2	V
Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_C = 150A$	$T_J=25^\circ\text{C}$	1.75	2.20	V
			$T_J=125^\circ\text{C}$	2.05	-	
			$T_J=150^\circ\text{C}$	2.25	-	
	$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_C = 150A$	$T_J=25^\circ\text{C}$	1.60	2.05	
			$T_J=125^\circ\text{C}$	1.90	-	
			$T_J=150^\circ\text{C}$	2.10	-	
Internal gate resistance	$R_{G(int)}$	-	-	6	-	Ω
Input capacitance	C_{ies}	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	-	9.7	-	nF
Turn-on time	t_{on}	$V_{CC} = 300V$ $L_S = 30nH$ $I_C = 150A$	-	650	-	nsec
	t_r		-	300	-	
	$t_{(f)}$		-	100	-	
Turn-off time	t_{off}	$V_{GE} = \pm 15V$ $R_G = 9\Omega$ $T_J = 150^\circ\text{C}$	-	600	-	
	t_r		-	40	-	
	t_{tr}		-	-	-	
Forward on voltage	V_F (terminal)	$V_{GE} = 0V$ $I_F = 150A$	$T_J=25^\circ\text{C}$	1.70	2.15	V
			$T_J=125^\circ\text{C}$	1.60	-	
			$T_J=150^\circ\text{C}$	1.57	-	
	V_F (chip)	$V_{GE} = 0V$ $I_F = 150A$	$T_J=25^\circ\text{C}$	1.60	2.05	
			$T_J=125^\circ\text{C}$	1.50	-	
			$T_J=150^\circ\text{C}$	1.47	-	
Reverse recovery time	t_{rr}	$I_F = 150A$	-	200	-	nsec

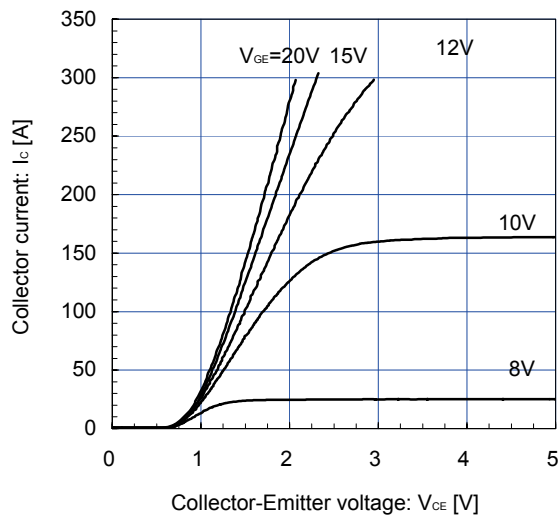
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	IGBT	-	-	0.31	$^\circ\text{C/W}$
		FWD	-	-	0.60	
Contact thermal resistance (1device) (*4)	$R_{th(c-f)}$	with Thermal Compound	-	0.050	-	

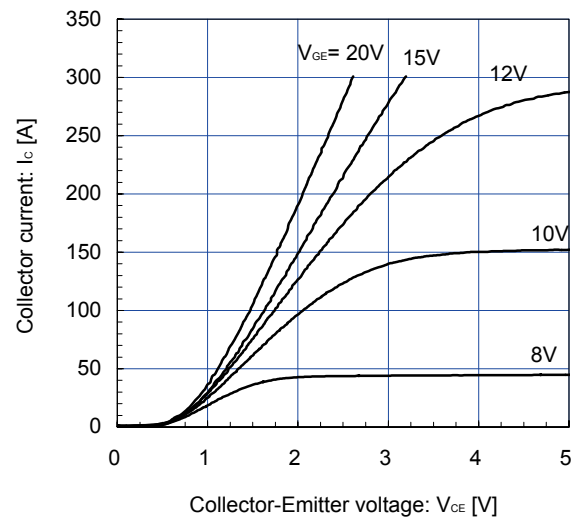
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

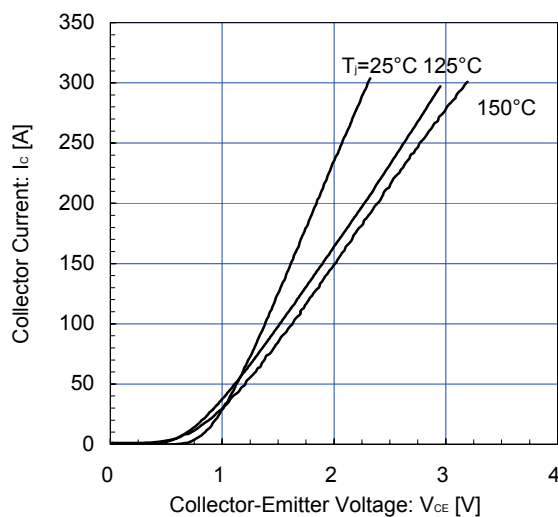
Collector current vs. Collector-Emitter voltage (typ.)
 $T_J = 25^\circ\text{C}$ / chip



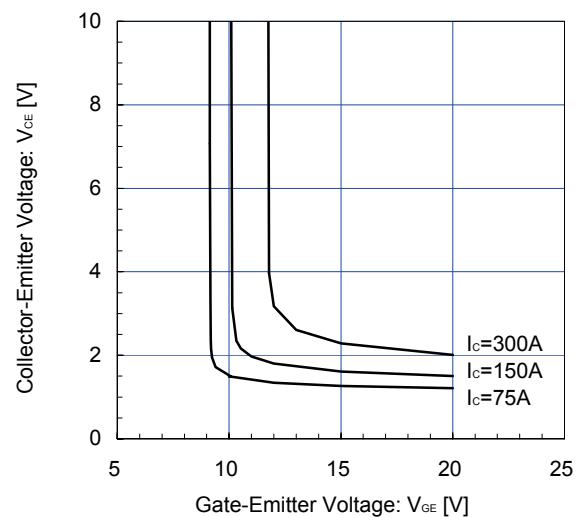
Collector current vs. Collector-Emitter voltage (typ.)
 $T_J = 150^\circ\text{C}$ / chip



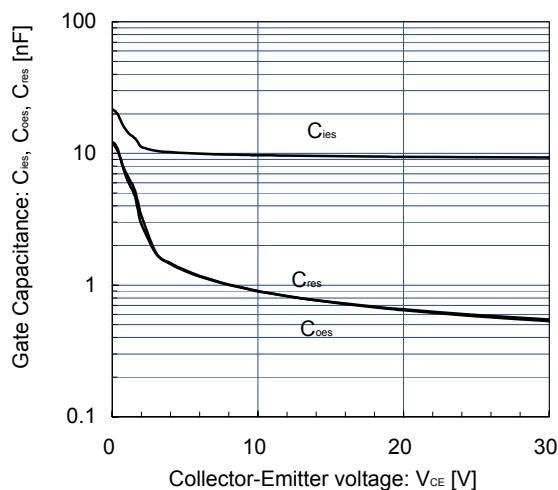
Collector current vs. Collector-Emitter voltage (typ.)
 $V_{GE} = 15\text{V}$ / chip



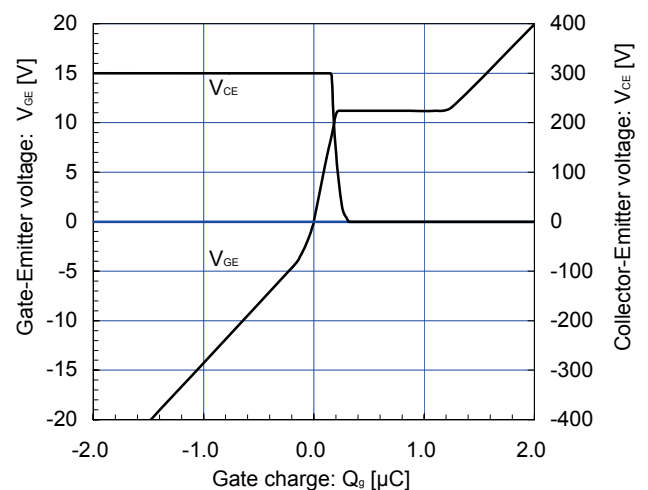
Collector-Emitter voltage vs. Gate-Emitter voltage
 $T_J = 25^\circ\text{C}$ / chip



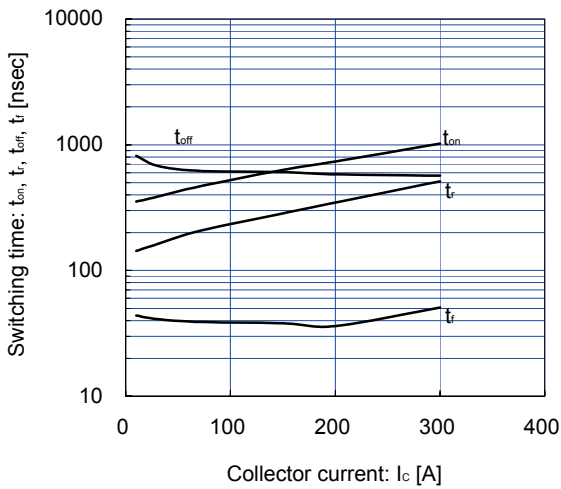
Gate Capacitance vs. Collector-Emitter Voltage
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$



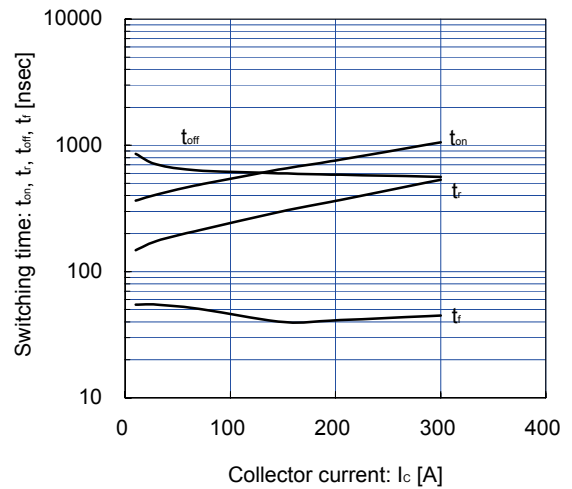
Dynamic Gate Charge (typ.)
 $V_{CC} = 300\text{V}$, $I_C = 150\text{A}$, $T_J = 25^\circ\text{C}$



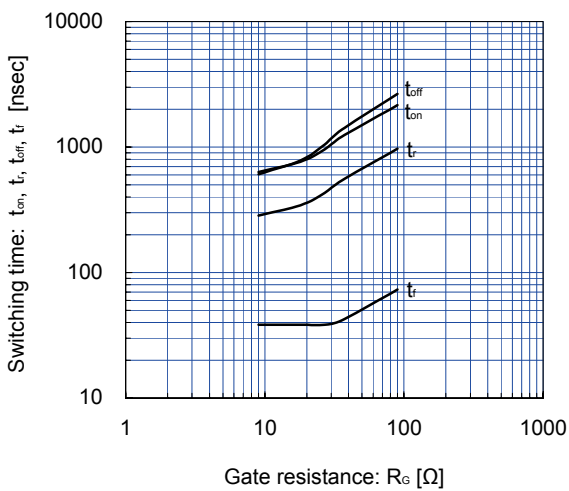
Switching time vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=9\Omega$, $T_J=125^\circ C$



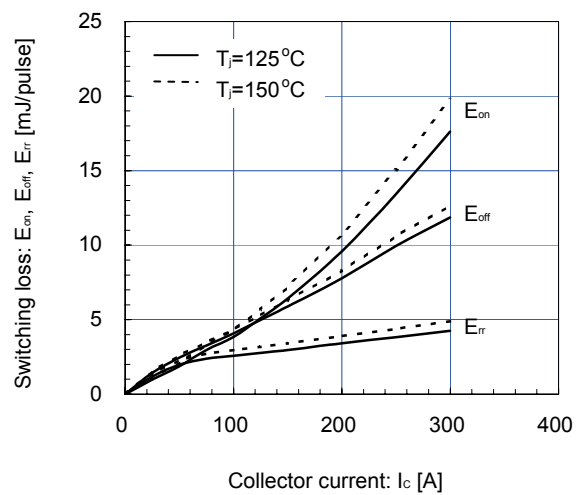
Switching time vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=9\Omega$, $T_J=150^\circ C$



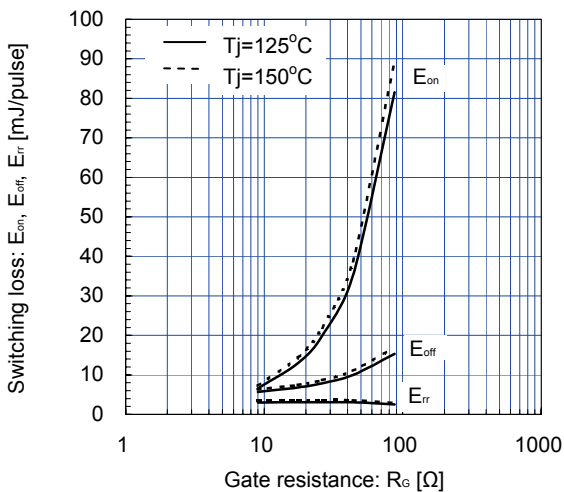
Switching time vs. Gate resistance (typ.)
 $V_{CC}=300V$, $I_C=150A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$



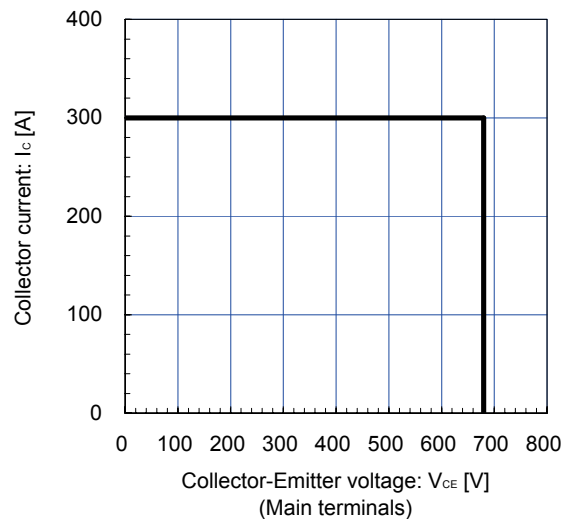
Switching loss vs. Collector current (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=9\Omega$, $T_J=125, 150^\circ C$



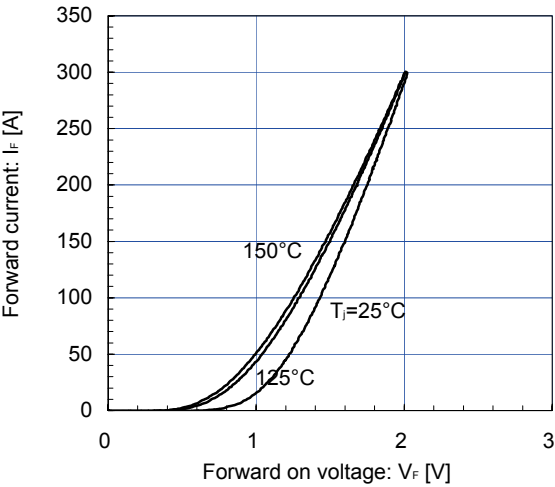
Switching loss vs. Gate resistance (typ.)
 $V_{CC}=300V$, $I_C=150A$, $V_{GE}=\pm 15V$, $T_J=125, 150^\circ C$



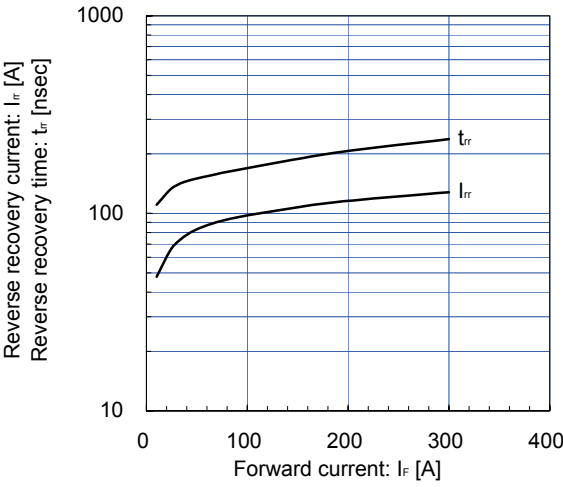
Reverse bias safe operating area (max.)
 $+V_{GE}=15V$, $-V_{GE}=15V$, $R_G=9\Omega$, $T_J=150^\circ C$



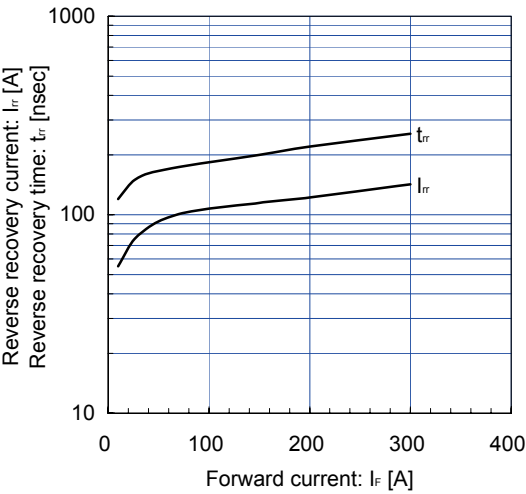
Forward Current vs. Forward Voltage (typ.)
chip



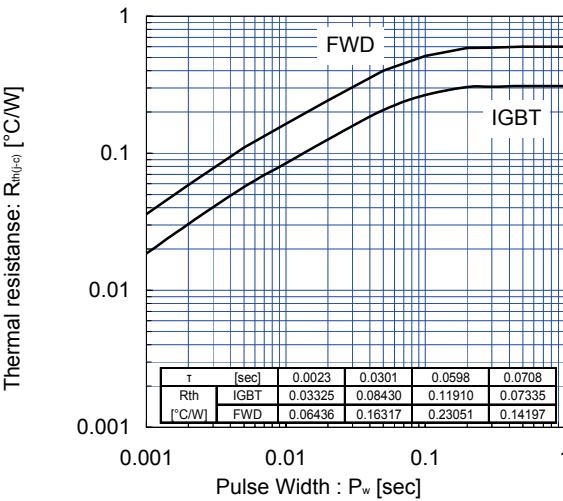
Reverse Recovery Characteristics (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=9\Omega$, $T_J=125^\circ C$



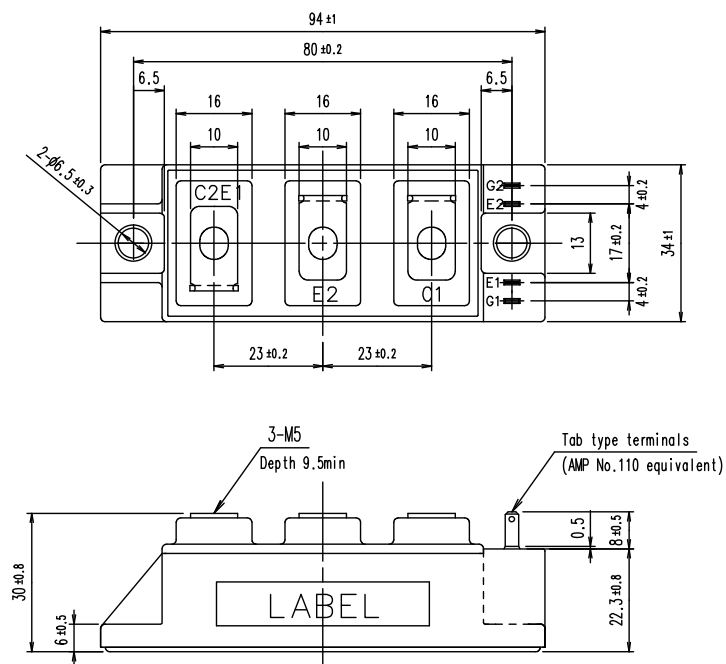
Reverse Recovery Characteristics (typ.)
 $V_{CC}=300V$, $V_{GE}=\pm 15V$, $R_G=9\Omega$, $T_J=150^\circ C$



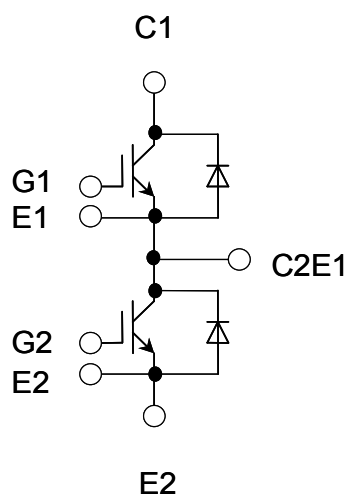
Transient Thermal Resistance (max.)



■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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