

# MPMD200B120RH

## NPT & Rugged Type 1200V IGBT Module

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### General Description

MagnaChip's IGBT Module 7DM-3 package devices are optimized to reduce losses and switching noise in high frequency power conditioning electrical systems. These IGBT Module series are ideally suited for IH, High Power inverters, Motors drives and other applications where switching losses are significant portion of the total losses.

### Features

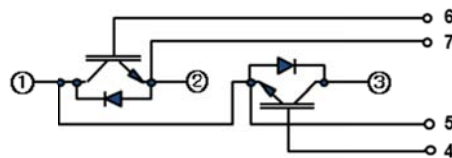
- $BV_{CES} = 1200V$
- Low Conduction Loss :  $V_{CE(sat)} = 2.7V$  (typ.)
- Fast & Soft Anti-Parallel FWD
- Short circuit rated : Min. 10us at  $T_C = 100^\circ C$
- Isolation Type Package

### Applications

- Induction Heating, Motor Drives, High Power Inverters
- Welding Machine, UPS



7DM-3



Equivalent Circuit

### Absolute Maximum Ratings @ $T_c = 25^\circ C$ (Per Leg)

Characteristics	Symbol	Rating	Unit	
Collector-Emitter Voltage	$V_{CES}$	1200	V	
Gate- Voltage	$V_{GES}$	$\pm 20$	V	
Continuous Collector Current	$I_C$	$T_c = 25^\circ C$	275	A
		$T_c = 80^\circ C$	200	A
Pulsed Collector Current <sup>(1)</sup>	$I_{CM}$	200	A	
Diode Continuous Forward Current	$I_F$	200	A	
Diode Maximum Forward Current	$I_{FM}$	400	A	
Power Dissipation	$P_D$	1136	W	
Short Circuit Withstand Time	$T_{SC}$	10	us	
Operating Junction Temperature	$T_j$	-55~150	$^\circ C$	
Storage Temperature Range	$T_{stg}$	-55~125	$^\circ C$	
Isolation Voltage	$V_{iso}$	2500	V	
Mounting screw Torque : M6	-	4	N.m	

Note : (1) Repetitive rating : Pulse width limited by max. junction temperature

**Electrical Characteristics of IGBT @ $T_C = 25^\circ\text{C}$ (unless otherwise specified)**

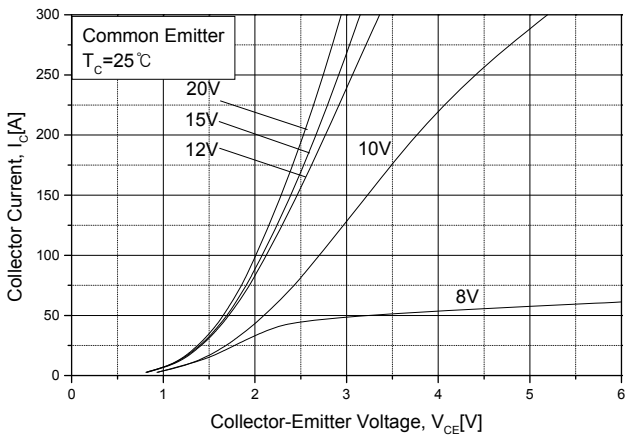
Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit	
<b>Static Characteristics</b>							
Collector-Emitter Breakdown Voltage	$BV_{CES}$	$I_C = 1\text{mA}, V_{GE} = 0\text{V}$	1200	-	-	V	
Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 2\text{mA}$	4.5	-	7.5		
Collector Cut-Off Current	$I_{CES}$	$V_{CE} = 1200\text{V}, V_{GE} = 0\text{V}$	-	-	2	mA	
Gate Leakage Current	$I_{GES}$	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}$	-	-	$\pm 300$	nA	
Collector-Emitter saturation voltage	$V_{CE(sat)}$	$V_{GE} = 15\text{V}, I_C = 200\text{A}$	$T_C = 25^\circ\text{C}$	-	2.7	3.3	V
			$T_C = 100^\circ\text{C}$	-	3.3	-	V
<b>Dynamic Characteristics</b>							
Total Gate Charge	$Q_g$	$V_{CC} = 600\text{V}, I_C = 200\text{A}, V_{GE} = \pm 15\text{V}$	-	790	-	nC	
Gate-Emitter Charge	$Q_{ge}$		-	100	-		
Gate-Collector Charge	$Q_{gc}$		-	470	-		
Input Capacitance	$C_{ies}$	$V_{CE} = 30\text{V}, V_{GE} = 0\text{V}, f = 1.0\text{MHz}$	-	8876	-	pF	
Output Capacitance	$C_{oes}$		-	977	-		
Reverse Transfer Capacitance	$C_{res}$		-	330	--		
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 600\text{V}, I_C = 200\text{A}, V_{GE} = \pm 15\text{V}, R_G = 2.4\Omega, \text{Inductive Load}$	-	170	-	ns	
Rise Time	$t_r$		-	90	-		
Turn-Off Delay Time	$t_{d(off)}$		-	450	-		
Fall Time	$t_f$		-	90	-		
Turn on Switching Loss	$E_{on}$		-	12	-		mJ
Turn off Switching Loss	$E_{off}$		-	16	-		mJ
Total Switching Loss	$E_{ts}$		-	28	-		mJ
Short Circuit Withstand Time	$T_{sc}$	$V_{CC} = 600\text{V}, V_{GE} = \pm 15\text{V}, R_G = 4.7\Omega @ T_C = 100^\circ\text{C}$	10	-	-	us	

**Electrical Characteristics of FRD @ $T_a = 25^\circ\text{C}$ (unless otherwise specified)**

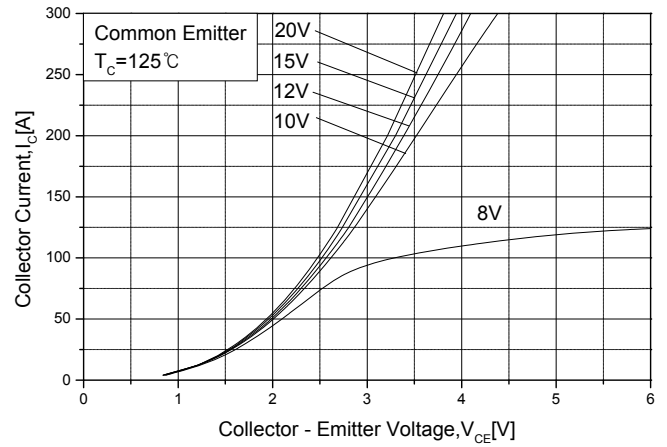
Diode Forward Voltage	$V_{FM}$	$I_F = 200\text{A}$	$T_C = 25^\circ\text{C}$	-	2.9	3.5	V
			$T_C = 100^\circ\text{C}$	-	2.3	-	
Diode Reverse Recovery Time	$t_{rr}$		$T_C = 25^\circ\text{C}$	-	130	-	ns
			$T_C = 100^\circ\text{C}$	-	250	-	
Diode Peak Reverse Recovery Current	$I_{rr}$	$I_F = 20\text{A}, V_R = 600\text{V}, di/dt = -400\text{A/us}$	$T_C = 25^\circ\text{C}$	-	8	-	A
			$T_C = 100^\circ\text{C}$	-	18	-	
Diode Reverse Recovery Charge	$Q_{rr}$		$T_C = 25^\circ\text{C}$	-	520	-	nC
			$T_C = 100^\circ\text{C}$	-	2250	-	

### Thermal Characteristics and Weight

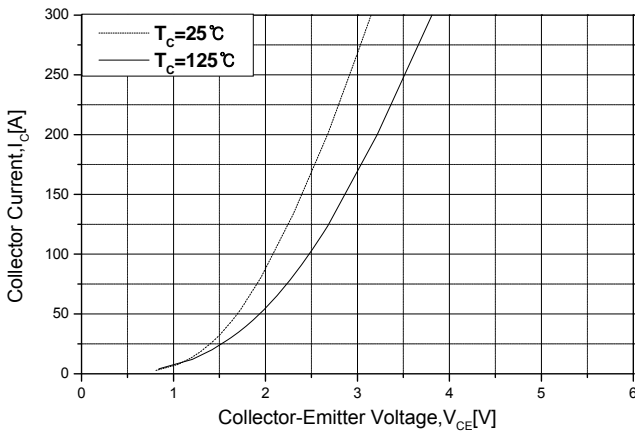
Characteristics	Symbol	Min.	Typ.	Max.	Unit
Junction-to-Case(IGBT Part)	$R_{\theta JC}$	-	-	0.11	$^{\circ}C/W$
Junction-to-Case(DIODE Part)	$R_{\theta JC}$	-	-	0.2	$^{\circ}C/W$
Case-to-Sink ( Conductive grease applied)	$R_{\theta CS}$	0.05	-	-	$^{\circ}C/W$
Weight of Module	Weight	-	-	360	g



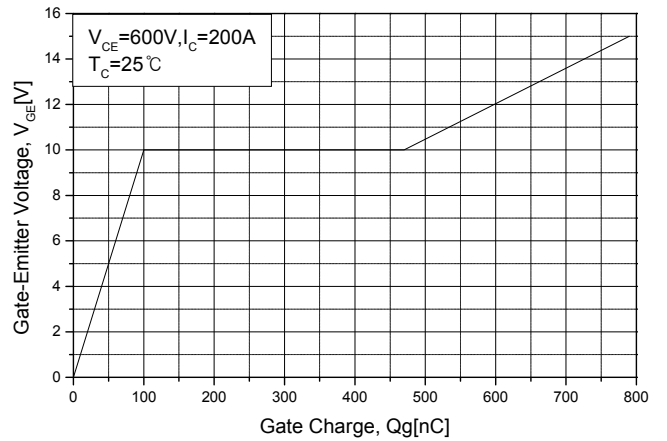
**Fig.1 Typical Output Characteristics**



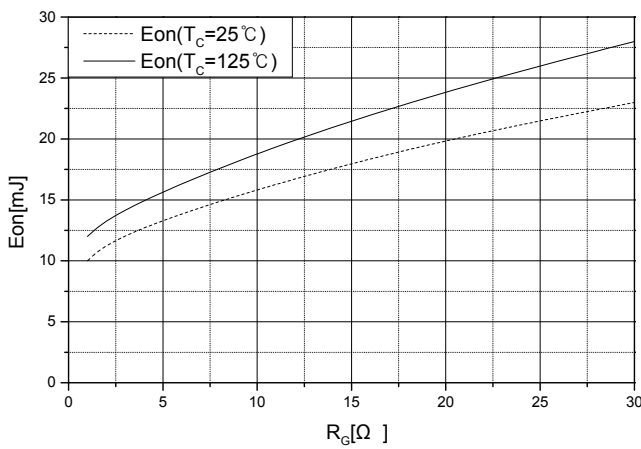
**Fig.2 Typical Output Characteristics**



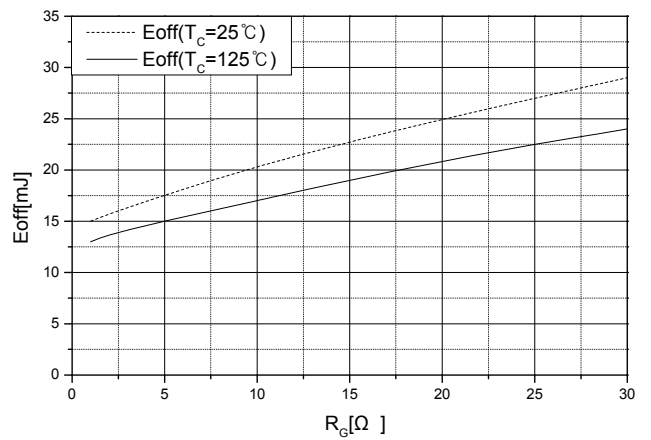
**Fig.3 Typical Saturation Voltage Characteristics**



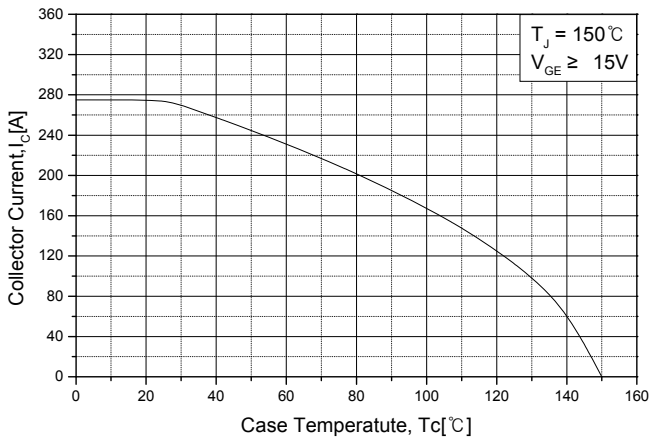
**Fig.4 Gate Charge Characteristics**



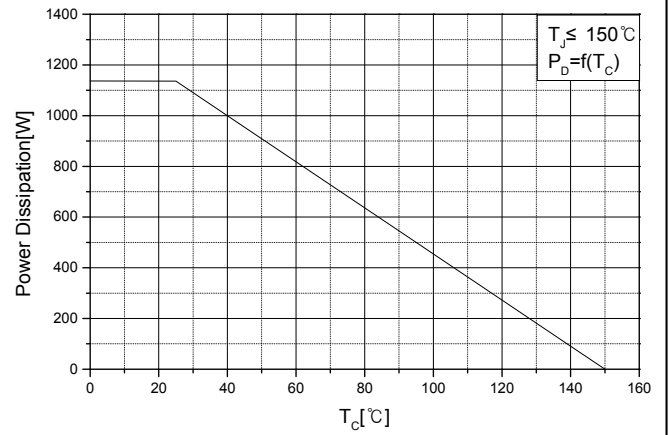
**Fig.5 Typical turn-on energy =  $f(R_G)$**   
 $V_{GE} = \pm 15\text{V}, I_C = 200\text{A}, V_{CE} = 600\text{V}$



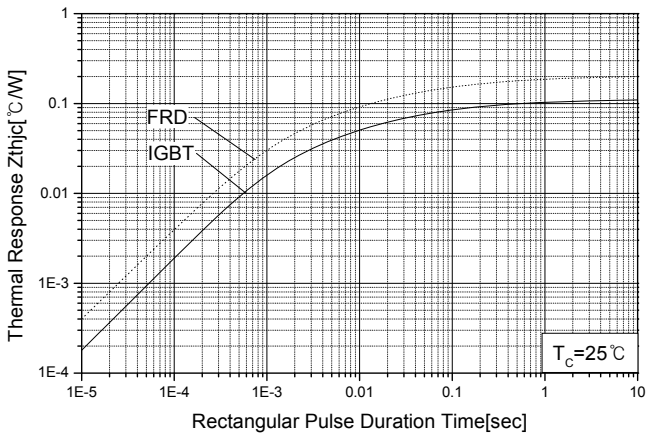
**Fig.6 Typical turn-off energy =  $f(R_G)$**   
 $V_{GE} = \pm 15\text{V}, I_C = 200\text{A}, V_{CE} = 600\text{V}$



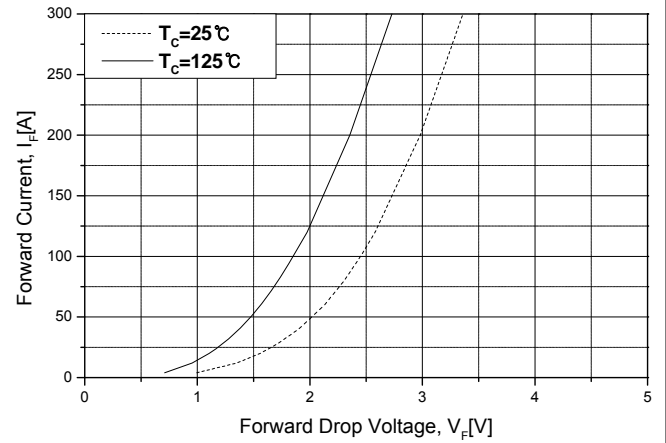
**Fig.7 Rated Current vs. Case Temperature**



**Fig.8 Power Dissipation vs. Case Temperature**



**Fig.9 Transient Thermal Impedance**

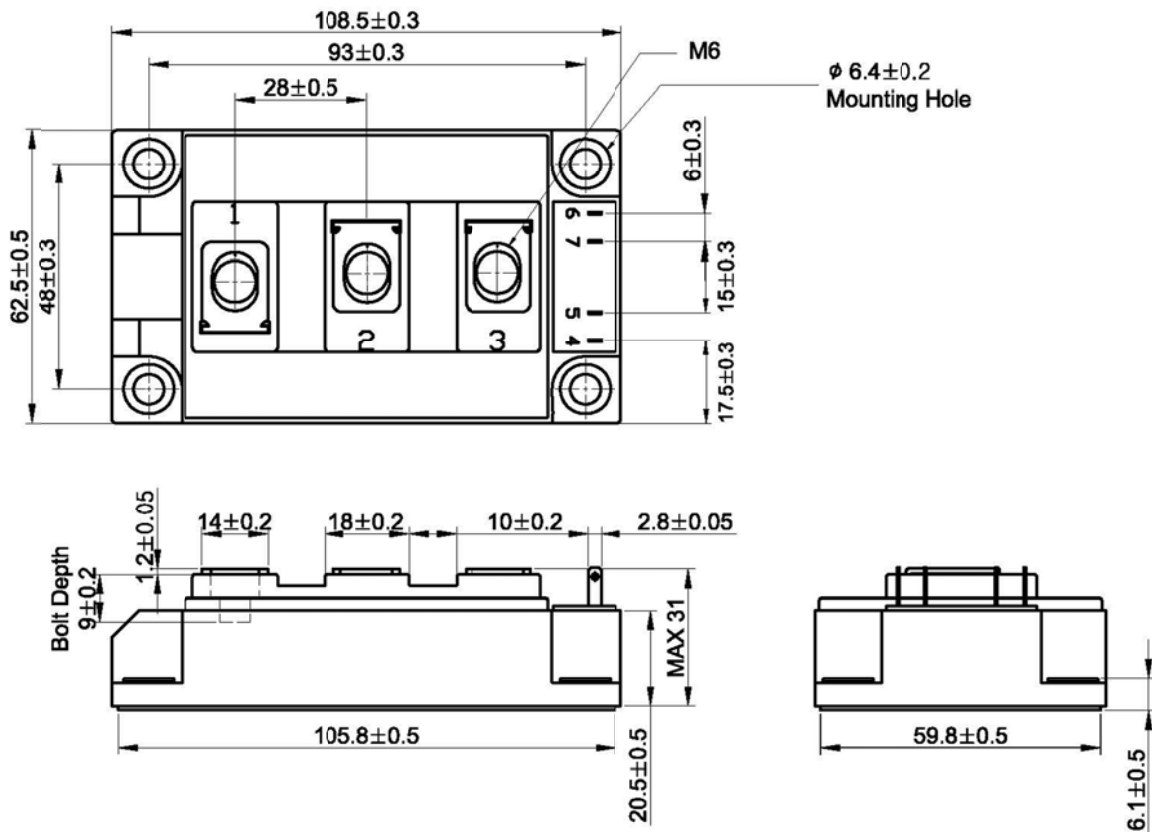


**Fig.10 Forward Characteristics**

## Package Dimension

### 7DM-3

Dimensions are in millimeters, unless otherwise specified



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