

# 1MBH05D-120

**Molded IGBT**

## 1200V / 5A Molded Package

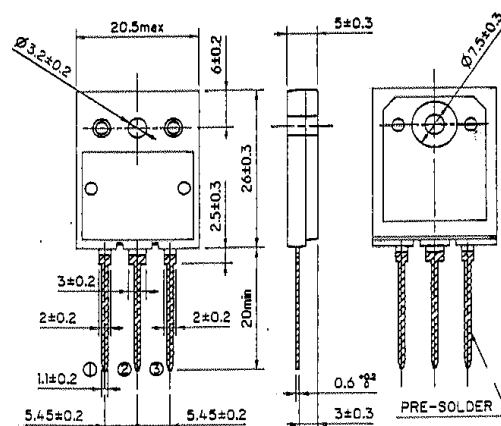
**Outline drawings, mm TO-3PL**

### Features

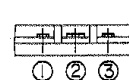
- Small molded package
- Low power loss
- Soft switching with low switching surge and noise
- High reliability, high ruggedness (RBSOA, SCSOA etc.)
- Comprehensive line-up

### Applications

- Inverter for Motor drive
- AC and DC Servo drive amplifier
- Uninterruptible power supply



#### CONNECTION



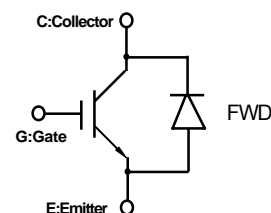
- ① GATE
- ② COLLECTOR
- ③ EMITTER

### Maximum ratings and characteristics

#### Absolute maximum ratings (Tc=25°C)

Item	Symbol	Rating	Unit		
Collector-Emitter voltage	V <sub>CEs</sub>	1200	V		
Gate-Emitter voltage	V <sub>GES</sub>	±20	V		
Collector current	DC	T <sub>c</sub> =25°C	I <sub>c25</sub>	10	A
		T <sub>c</sub> =105°C	I <sub>c105</sub>	5	A
	1ms	T <sub>c</sub> =25°C	I <sub>cp</sub>	27	A
Max. power dissipation (IGBT)	P <sub>c</sub>	115	W		
Max. power dissipation (FWD)	P <sub>c</sub>	75	W		
Operating temperature	T <sub>j</sub>	+150	°C		
Storage temperature	T <sub>stg</sub>	-40 to +150	°C		
Screw torque	-	70	N·cm		

### Equivalent Circuit Schematic



#### Electrical characteristics (at Tc=25°C unless otherwise specified)

Item	Symbol	Characteristics			Conditions	Unit		
		Min.	Typ.	Max.				
Zero gate voltage collector current	I <sub>CEs</sub>	-	-	1.0	V <sub>GE</sub> =0V, V <sub>CE</sub> =1200V	mA		
Gate-Emitter leakage current	I <sub>GES</sub>	-	-	20	V <sub>CE</sub> =0V, V <sub>GE</sub> =±20V	µA		
Gate-Emitter threshold voltage	V <sub>GE(th)</sub>	5.5	-	8.5	V <sub>CE</sub> =20V, I <sub>c</sub> =5mA	V		
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub>	-	-	3.5	V <sub>GE</sub> =15V, I <sub>c</sub> =5A	V		
Input capacitance	C <sub>ies</sub>	-	650	-	V <sub>GE</sub> =0V	pF		
Output capacitance	C <sub>oes</sub>	-	150	-	V <sub>CE</sub> =10V			
Reverse transfer capacitance	C <sub>res</sub>	-	40	-	f=1MHz			
Switching Time	Turn-on time	t <sub>on</sub>	-	-	1.2	V <sub>CC</sub> =600V, I <sub>c</sub> =5A	µs	
		t <sub>r</sub>	-	-	0.6	V <sub>GE</sub> =±15V		
	Turn-off time	t <sub>off</sub>	-	-	1.5	R <sub>G</sub> =330 ohm		
		t <sub>f</sub>	-	-	0.5	(Half Bridge)		
	Turn-on time	t <sub>on</sub>	-	0.16	-	V <sub>CC</sub> =600V, I <sub>c</sub> =5A		µs
		t <sub>r</sub>	-	0.11	-	V <sub>GE</sub> =+15V		
Turn-off time	t <sub>off</sub>	-	0.30	-	R <sub>G</sub> =33 ohm			
	t <sub>f</sub>	-	-	0.50	(Half Bridge)			
FWD forward on voltage	V <sub>F</sub>	-	-	3.0	I <sub>F</sub> =5A	V		
Reverse recovery time	t <sub>rr</sub>	-	-	0.35	I <sub>F</sub> =5A, V <sub>GE</sub> =-10V, V <sub>R</sub> =200V, di/dt=100A/µs	µs		

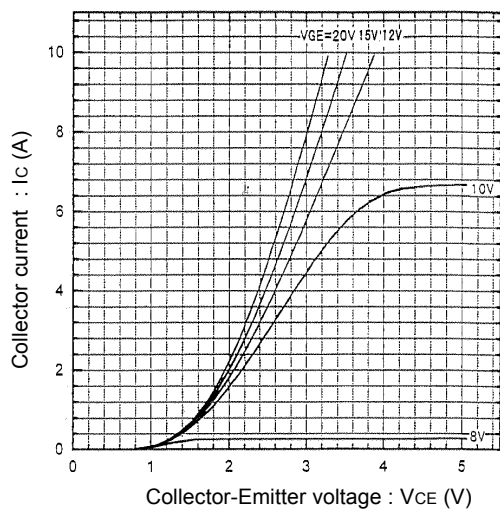
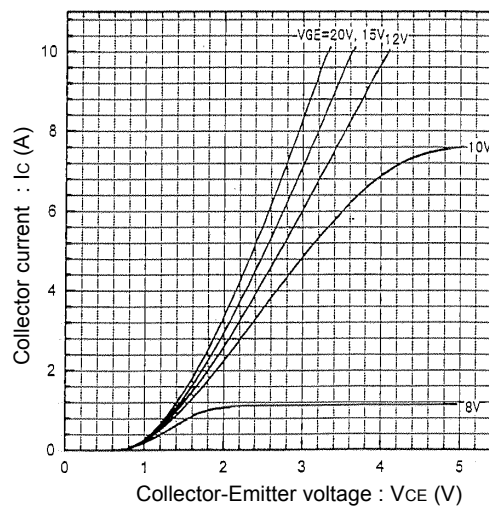
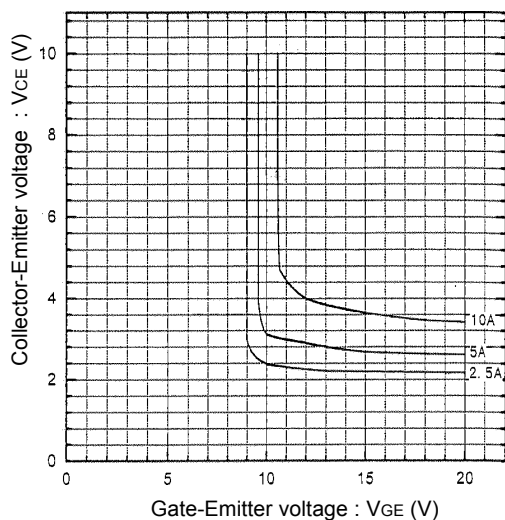
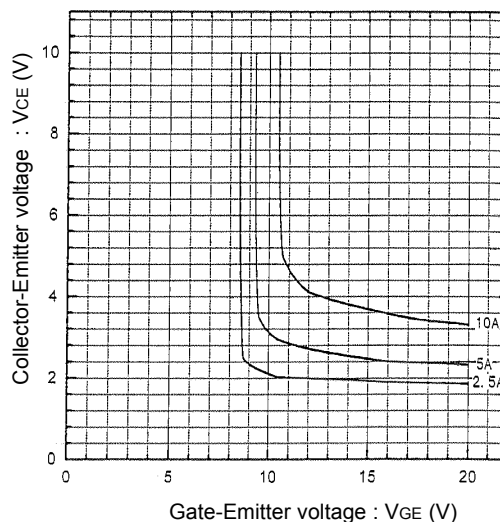
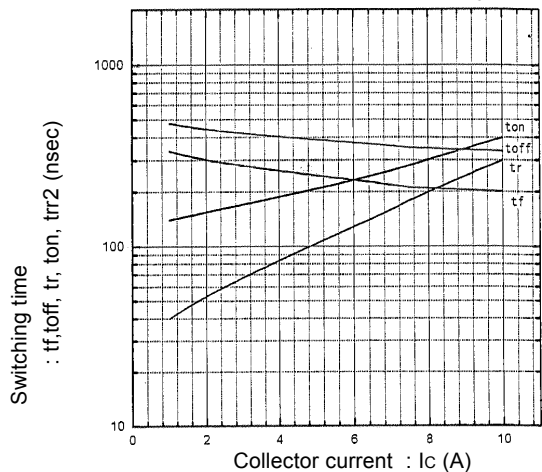
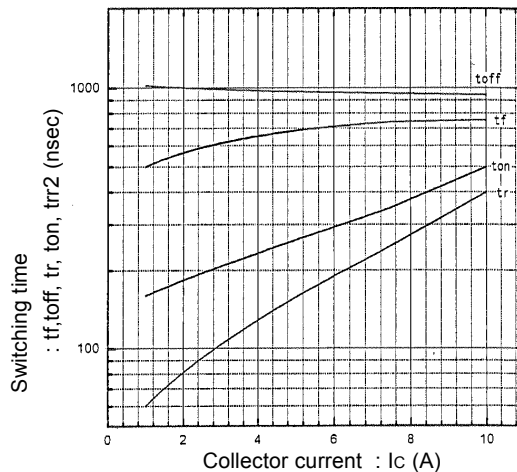
#### Thermal resistance characteristics

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	R <sub>th(j-c)</sub>	-	-	1.08	IGBT	°C/W
	R <sub>th(j-c)</sub>	-	-	1.66	FWD	°C/W

## 1MBH05D-120

## Molded IGBT

## ■ Characteristics

Collector current vs. Collector-Emitter voltage  
 $T_j=25^\circ\text{C}$ Collector current vs. Collector-Emitter voltage  
 $T_j=125^\circ\text{C}$ Collector-Emitter voltage vs. Gate-Emitter voltage  
 $T_j=25^\circ\text{C}$ Collector-Emitter voltage vs. Gate-Emitter voltage  
 $T_j=125^\circ\text{C}$ Switching time vs. Collector current  
 $V_{CC}=600\text{V}$ ,  $R_G=33\Omega$ ,  $V_{GE}=\pm 15\text{V}$ ,  $T_j=25^\circ\text{C}$ Switching time vs. Collector current  
 $V_{CC}=600\text{V}$ ,  $R_G=33\Omega$ ,  $V_{GE}=\pm 15\text{V}$ ,  $T_j=125^\circ\text{C}$ 

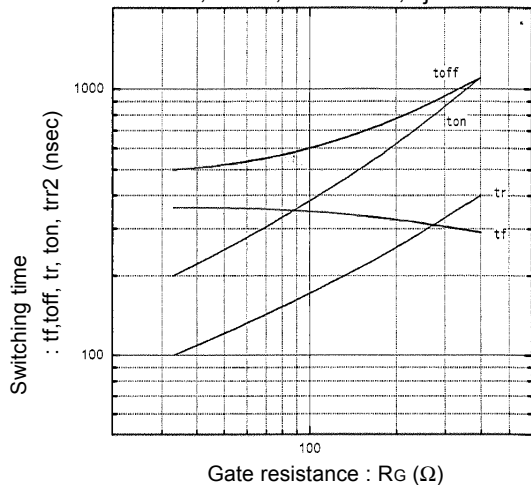
# 1MBH05D-120

# IGBT Module

## Characteristics

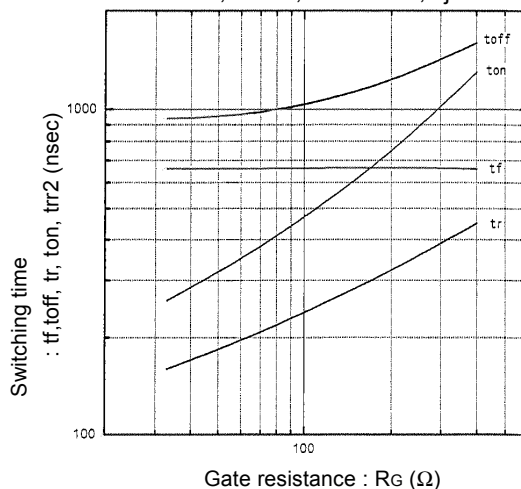
Switching time vs.  $R_G$

$V_{CC}=600V, I_C=5A, V_{GE}=\pm 15V, T_j=25^\circ C$



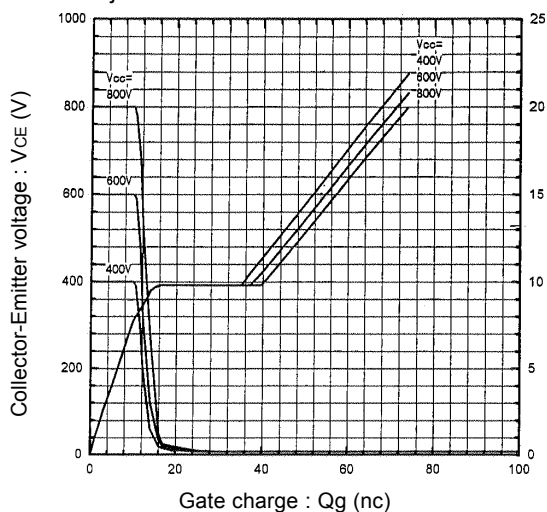
Switching time vs.  $R_G$

$V_{CC}=600V, I_C=5A, V_{GE}=\pm 15V, T_j=125^\circ C$



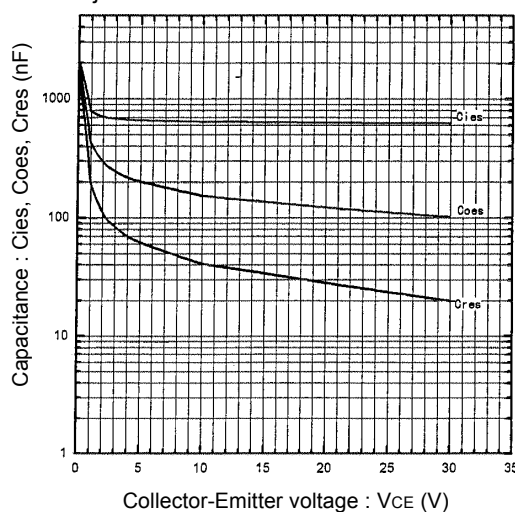
Dynamic input characteristics

$T_j=25^\circ C$



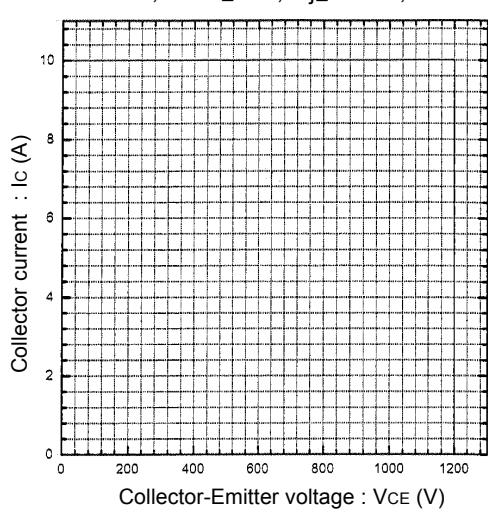
Capacitance vs. Collector-Emitter voltage

$T_j=25^\circ C$



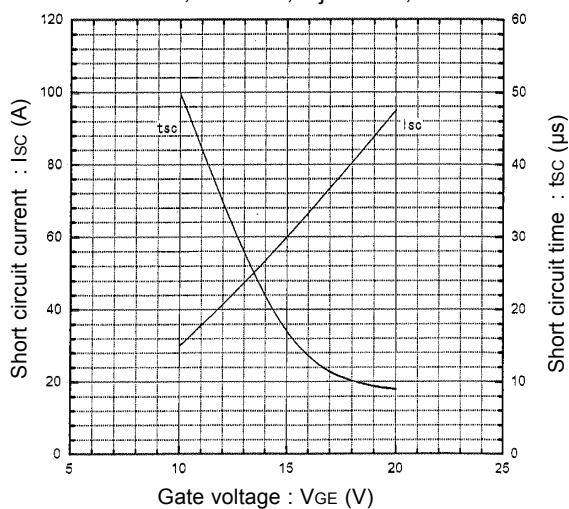
Reverse Biased Safe Operating Area

$+V_{GE}=15V, -V_{GE}\le 15V, T_j\le 125^\circ C, R_G\ge 33\Omega$



Typical short circuit capability

$V_{CC}=800V, R_G=33\Omega, T_j=125^\circ C,$

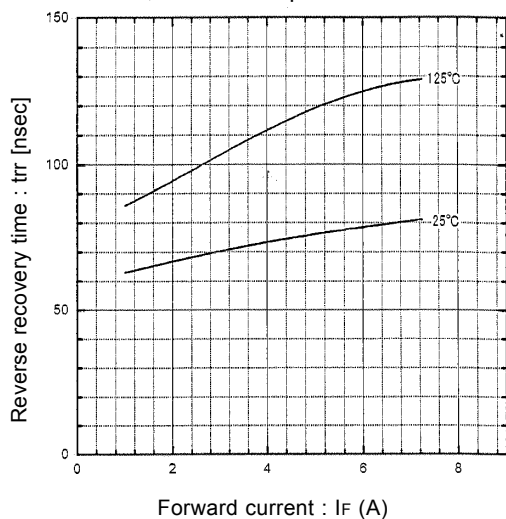


# 1MBH05D-120

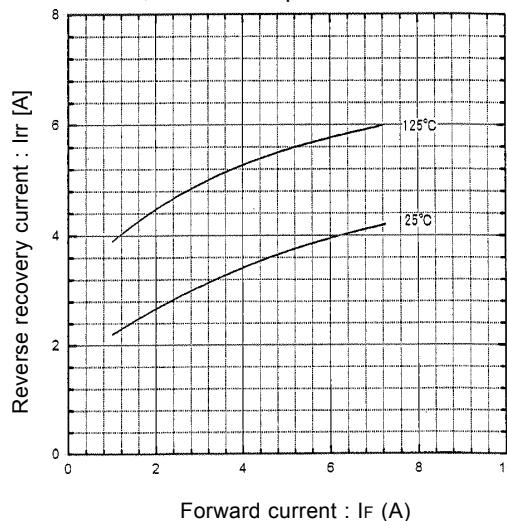
# IGBT Module

## Characteristics

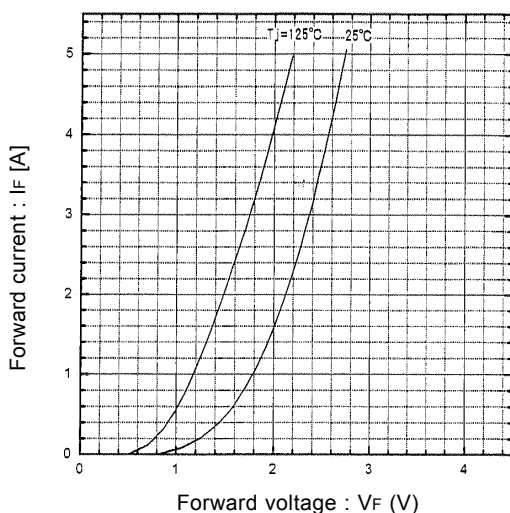
Reverse recovery time vs. Forward current  
VR=200V, -di/dt=100A/μsec



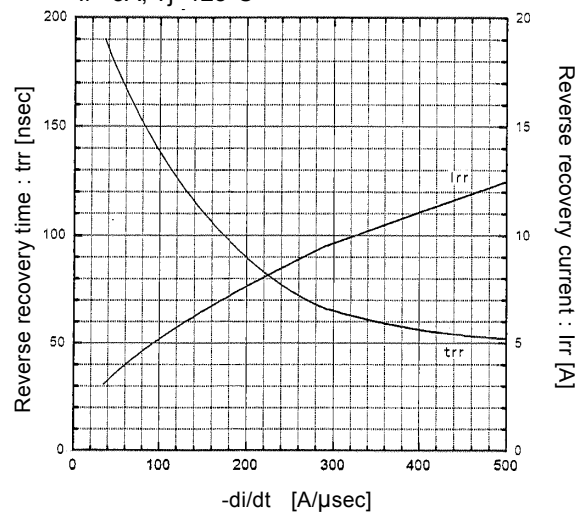
Reverse recovery current vs. Forward current  
VR=200V, -di/dt=100A/μsec



Forward Voltage vs. Forward Current



Reverse recovery characteristics vs. -di/dt  
IF=5A, Tj=125°C



Transient thermal resistance

