

1MBH50D-060S

Molded IGBT

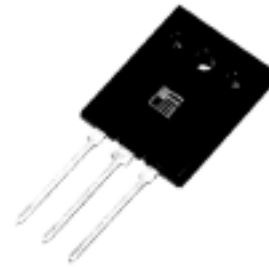
600V / 50A Molded Package

■ 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

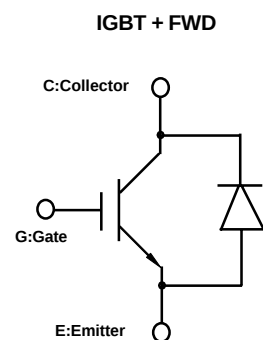


■ Maximum ratings and characteristics

● Absolute maximum ratings (Tc=25°C)

Item			Symbol	Rating	Unit
Collector-Emitter voltage			V _{CES}	600	V
Gate-Emitter voltage			V _{GES}	±20	V
Collector current	DC	Tc=25°C	I _{C25}	75	A
		Tc=100°C	I _{C100}	50	A
	1ms	Tc=25°C	I _{CP}	150	A
Max. power dissipation (IGBT)			P _C	230	W
Max. power dissipation (FWD)			P _C	150	W
Operating temperature			T _J	+150	°C
Storage temperature			T _{stg}	-40 to +150	°C
Screw torque			-	58.8 to 78.4	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 _{CES}	—	—	1.0	V _{GE} =0V, V _{CE} =600V	mA
Gate-Emitter leakage current	I _{GES}	—	—	10	V _{CE} =0V, V _{GE} =±20V	μA
Gate-Emitter threshold voltage	V _{GE(th)}	4.0	5.0	6.0	V _{CE} =20V, I _C =50mA	V
Collector-Emitter saturation voltage	V _{CE(sat)}	—	2.4	2.9	V _{GE} =15V, I _C =50A	V
Input capacitance	C _{ies}	—	2500	—	V _{GE} =0V	pF
Output capacitance	C _{oes}	—	240	—	V _{CE} =25V	μs
Reverse transfer capacitance	C _{res}	—	130	—	f=1MHz	
Switching Time	Turn-on time	t _{on} *	—	0.15	V _{CC} =300V, I _C =50A	μs
		t _r *	—	0.09	V _{GE} =±15V	
		t _{rr2}	—	0.03	R _G =33 ohm	
	Turn-off time	t _{off}	—	0.50	0.62	
		t _f	—	0.10	0.17	
					(Half Bridge)	
	Turn-on time	t _{on} *	—	0.15	—	μs
		t _r *	—	0.09	—	
		t _{rr2}	—	0.03	—	
	Turn-off time	t _{off}	—	0.50	0.62	
		t _f	—	0.10	0.17	
					(Half Bridge)	
FWD forward on voltage	V _F	—	2.0	2.5	I _F =50A, V _{GE} =0V	V
Reverse recovery time	t _{rr}	—	0.06	0.10	I _F =50A, V _{GE} =-10V, V _R =300V, di/dt=100A/μs	μs

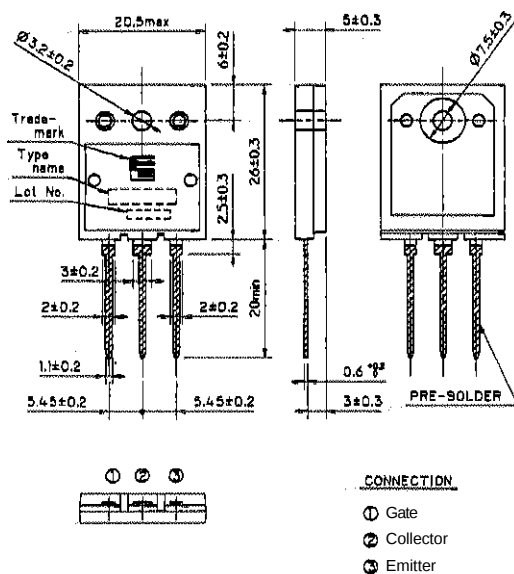
*Turn-on characteristics include t_{rr2}. See a figure in next page.

● Thermal resistance characteristics

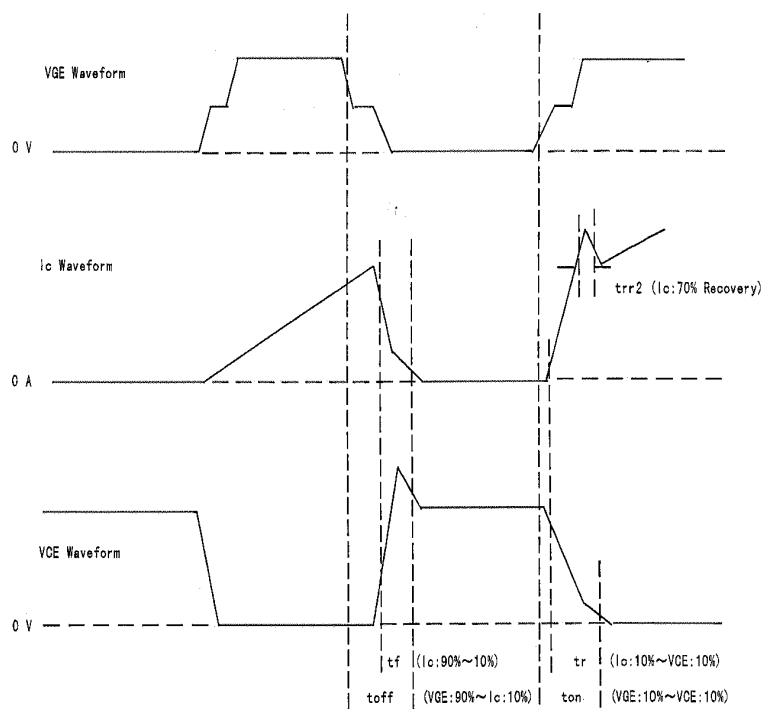
Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	R _{th(j-c)}	—	—	0.54	IGBT	°C/W
	R _{th(j-c)}	—	—	0.83	FWD	°C/W

Outline drawings, mm

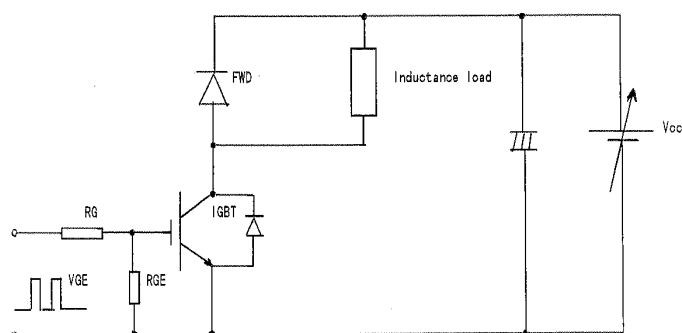
TO-3PL



Switching waveform (Inductance load)

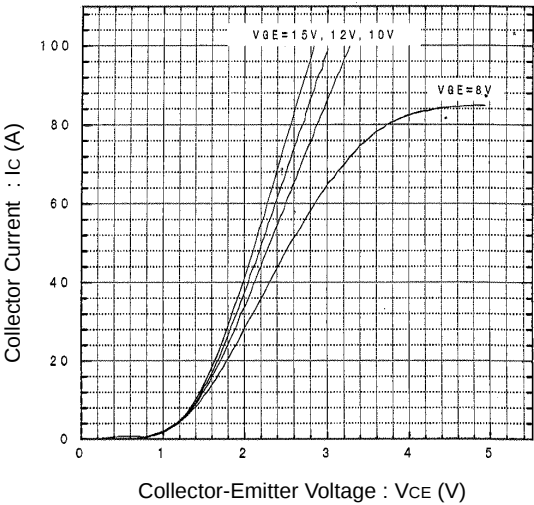


Mesurement circuit

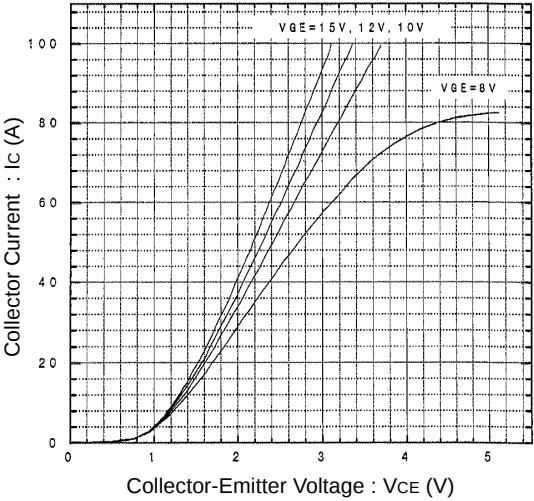


■ Characteristics

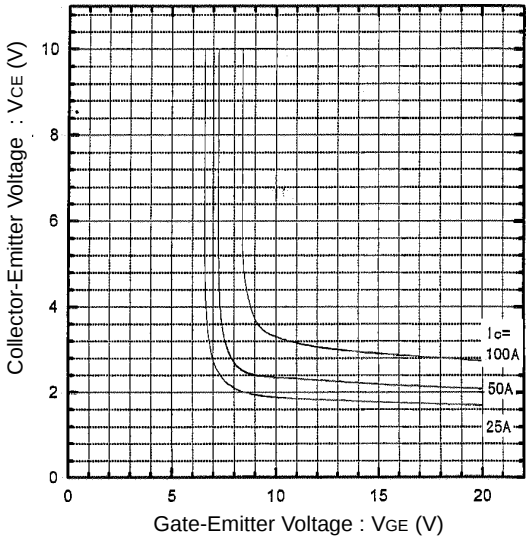
Collector current vs. Collector-Emitter voltage
 $T_j=25^{\circ}\text{C}$



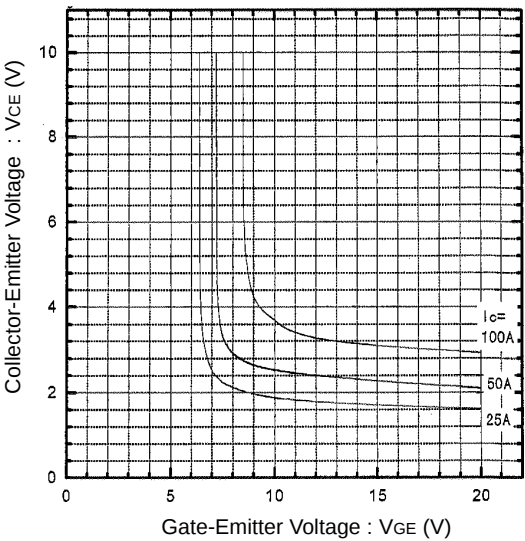
Collector current vs. Collector-Emitter voltage
 $T_j=125^{\circ}\text{C}$



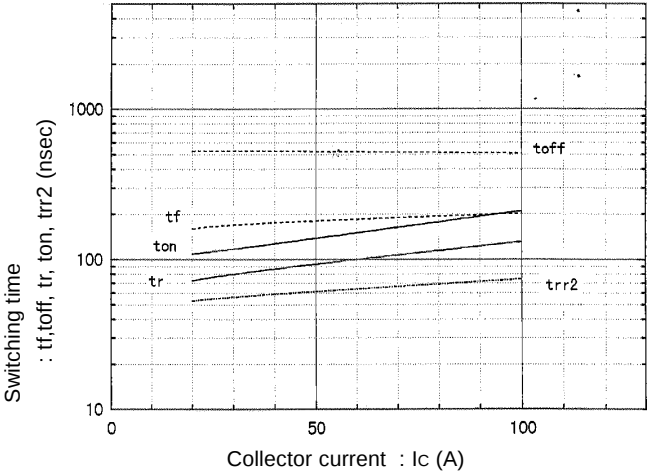
Collector-Emitter voltage vs. Gate-Emitter voltage
 $T_j=25^{\circ}\text{C}$



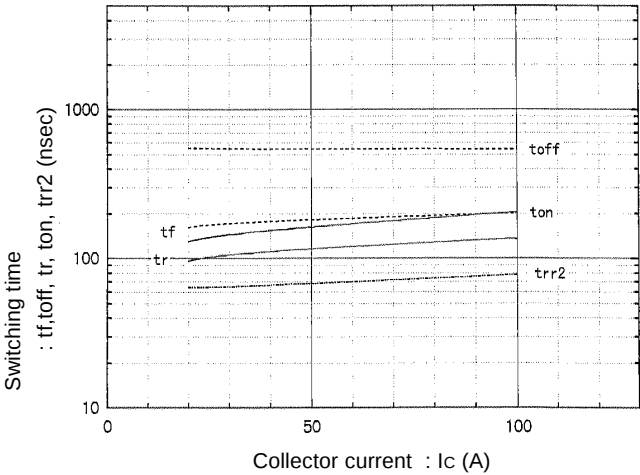
Collector-Emitter voltage vs. Gate-Emitter voltage
 $T_j=125^{\circ}\text{C}$



Switching time vs. Collector current
 $V_{CC}=300\text{V}$, $R_G=8\Omega$, $V_{GE}=+15\text{V}$, $T_j=125^{\circ}\text{C}$



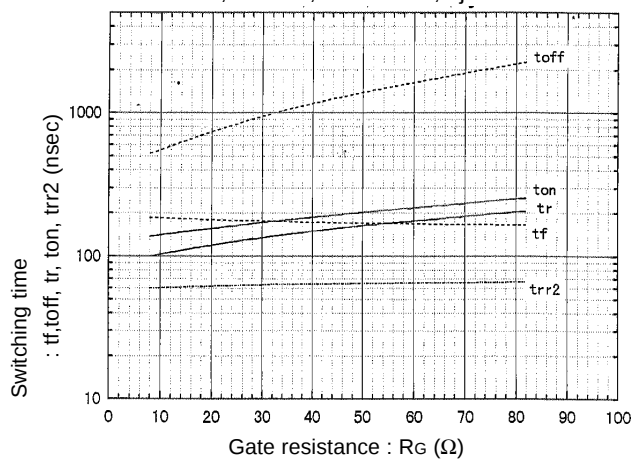
Switching time vs. Collector current
 $V_{CC}=300\text{V}$, $R_G=33\Omega$, $V_{GE}=+15\text{V}$, $T_j=125^{\circ}\text{C}$



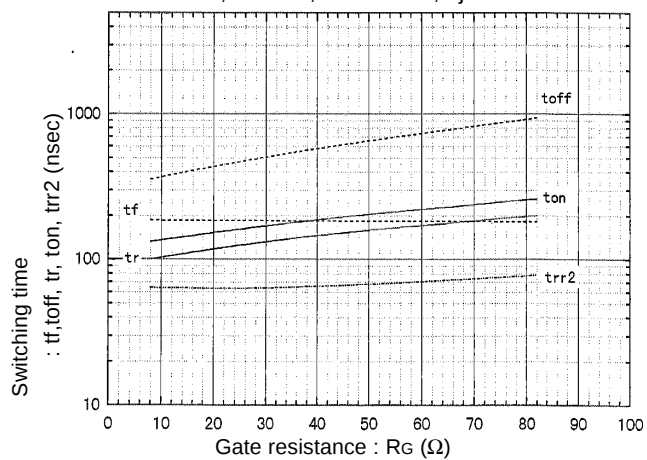
Characteristics

Switching time vs. R_G

$V_{CC}=300V$, $I_C=50A$, $V_{GE}=+15V$, $T_J=125^\circ C$

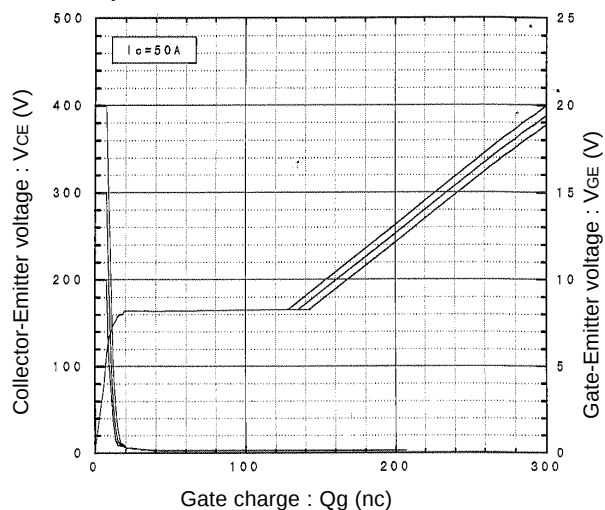
Switching time vs. R_G

$V_{CC}=300V$, $I_C=50A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$



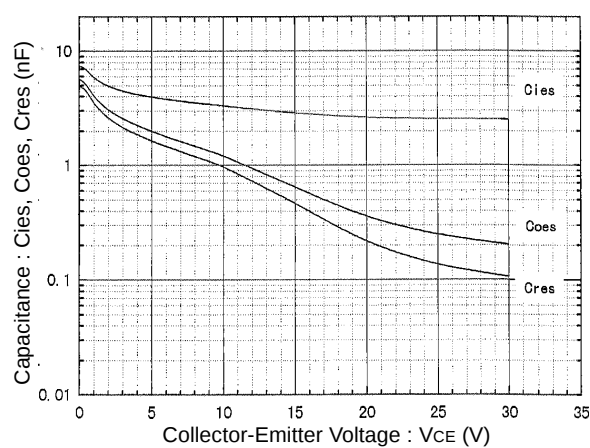
Dynamic input characteristics

$T_J=25^\circ C$



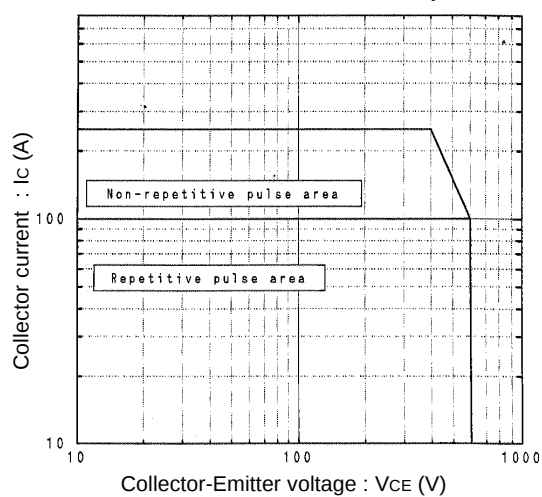
Capacitance vs. Collector-Emitter voltage

$T_J=25^\circ C$

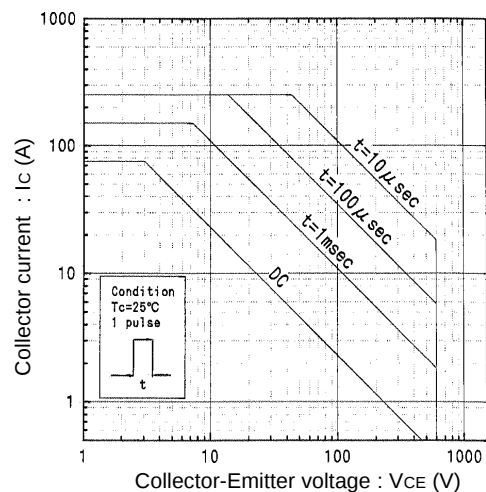


Reverse Biased Safe Operating Area

$R_G=8\Omega$, $+V_{GE} \leq 20V$, $-V_{GE}=15V$, $T_J \leq 125^\circ C$

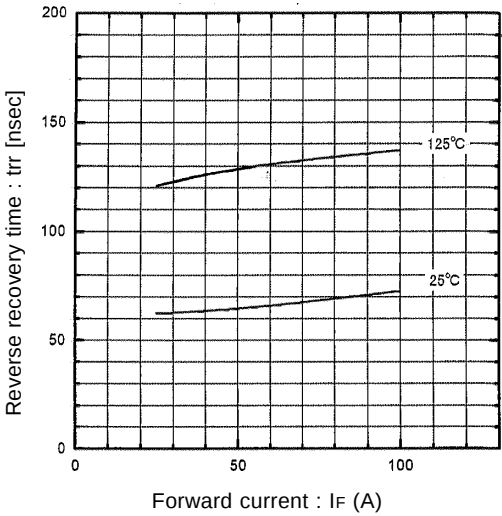


Forward Bias Safe Operating Area

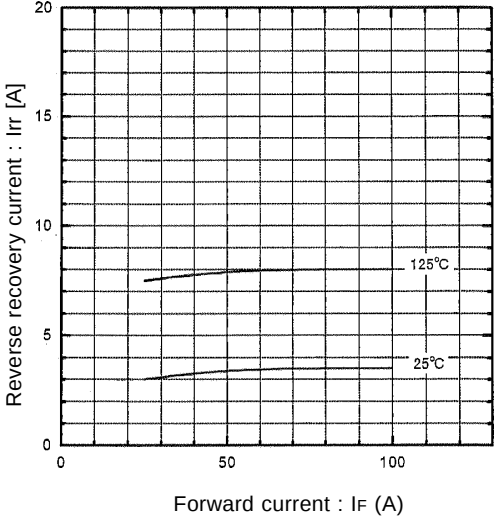


■ Characteristics

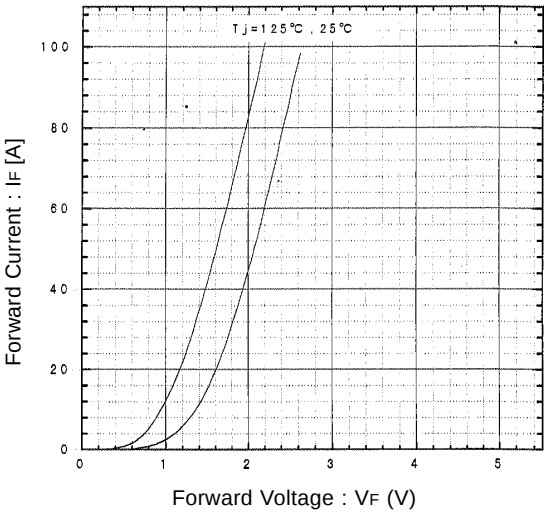
Reverse recovery time vs. Forward current
VR=300V, -di/dt=100A/μsec



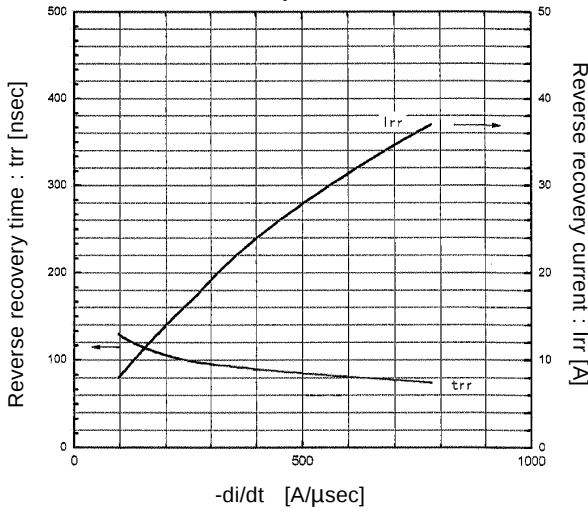
Reverse recovery current vs. Forward current
VR=300V, -di/dt=100A/μsec



Forward voltage vs. Forward current



Reverse recovery characteristics vs. -di/dt
VR=300V, IF=50A, Tj=125°C



Transient thermal resistance

