

1MBH50D-060S

Molded IGBT

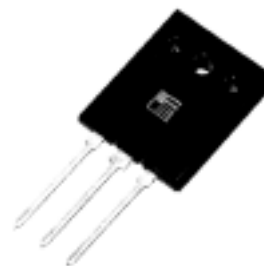
600V / 50A Molded Package

■ 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



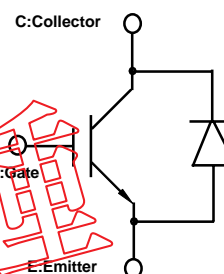
■ Maximum ratings and characteristics

● 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	T _c =25°C	I _{C25} 75 A
		T _c =100°C	I _{C100} 50 A
	1ms	T _c =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		53.8 to 78.4	N·cm

■ Equivalent Circuit Schematic

IGBT + FWD



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

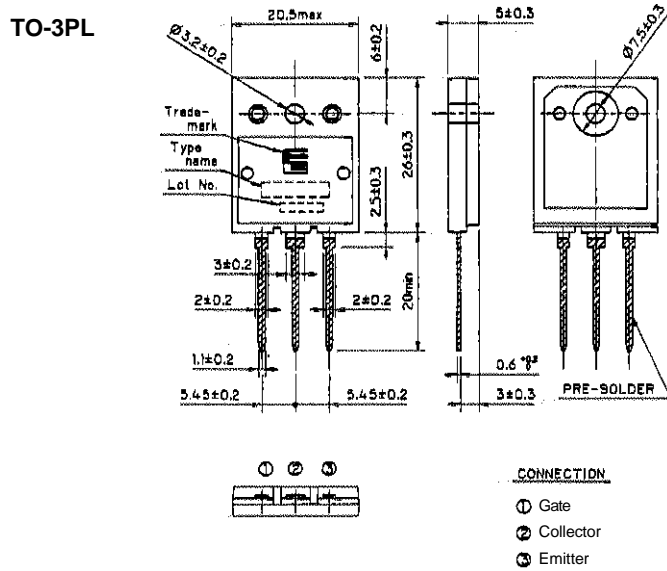
Item	Symbol	Characteristics			Conditions	Unit	
		Min.	Typ.	Max.			
Zero gate voltage collector current	I _{CEs}	–	–	1.0	V _{GE} =0V, V _{CE} =600V	mA	
Gate-Emitter leakage current	I _{GES}	–	–	10	V _{CE} =0V, V _{GE} =±20V	µA	
Gate-Emitter threshold voltage	V _{GE(th)}	4.0	5.0	6.0	V _{CE} =20V, I _c =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		
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	(Half Bridge)	µs
		t _f	–	0.10	0.17	Inductance Load	
		t _{rr}	–	0.10	0.17	Inductance Load	
	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 =8 ohm		
Turn-off time	t _{off}	–	0.50	0.62	(Half Bridge)	µs	
	t _f	–	0.10	0.17	Inductance Load		
	t _{rr}	–	0.10	0.17	Inductance Load		
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.

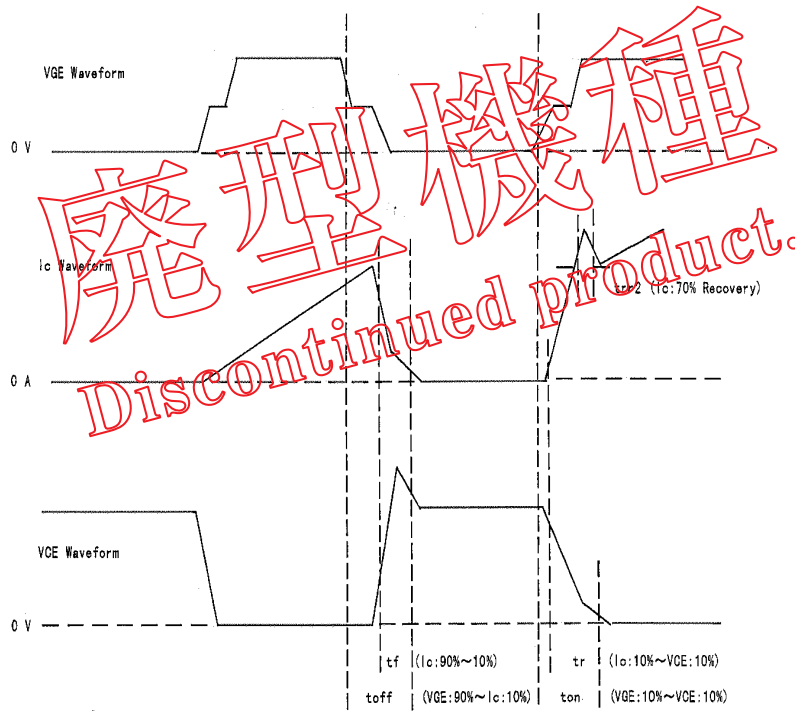
● Thermal resistance characteristics

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

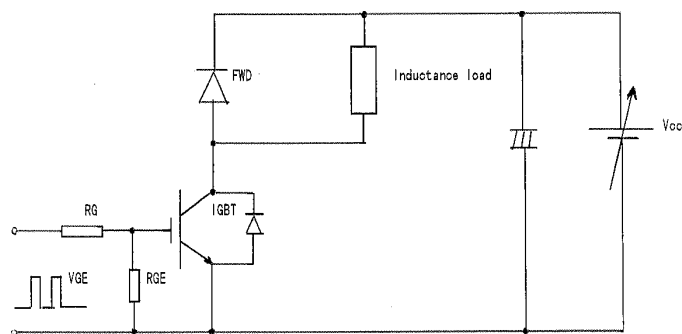
Outline drawings, mm



Switching waveform (Inductance load)

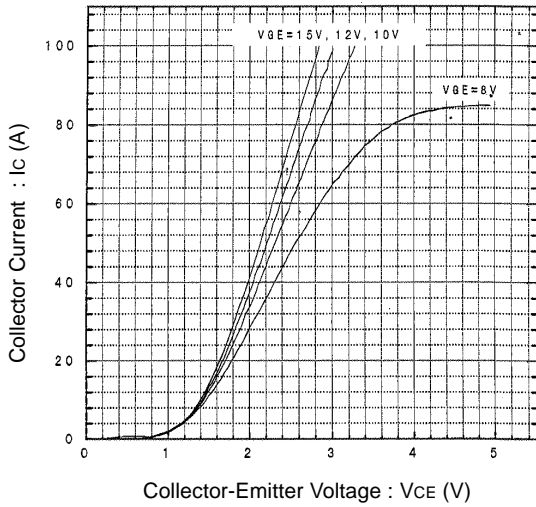


Measurement circuit

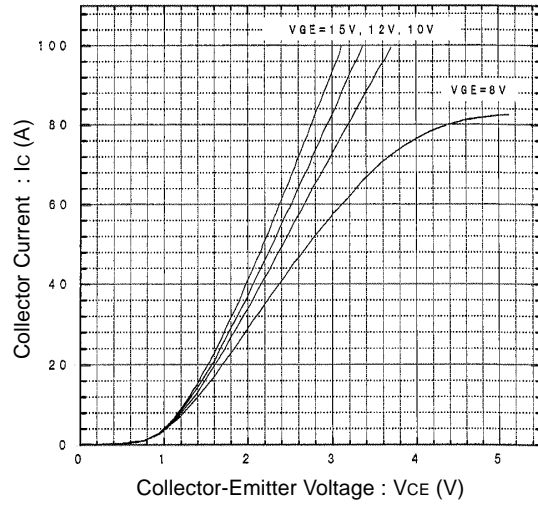


Characteristics

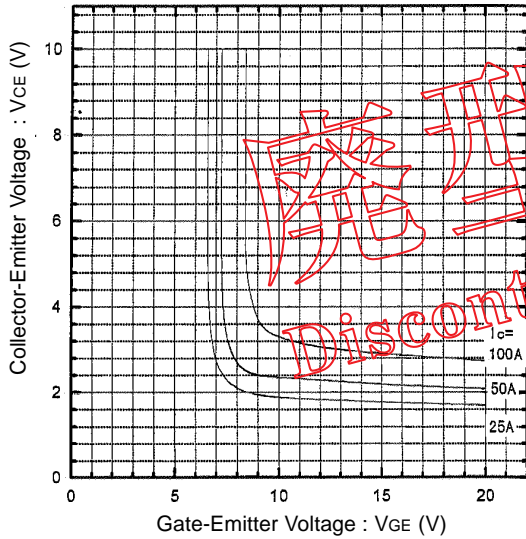
Collector current vs. Collector-Emitter voltage
Tj=25°C



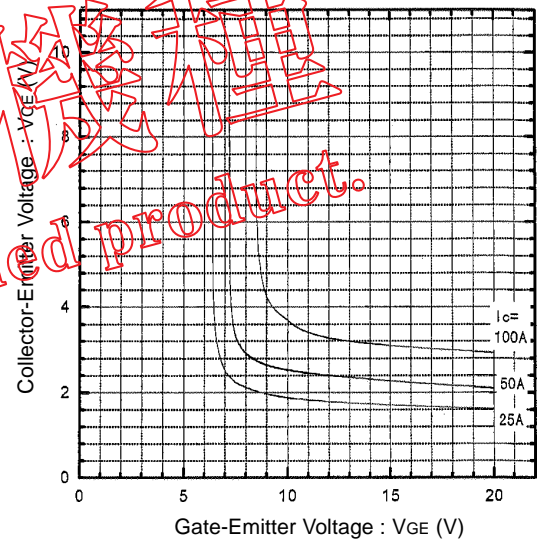
Collector current vs. Collector-Emitter voltage
Tj=125°C



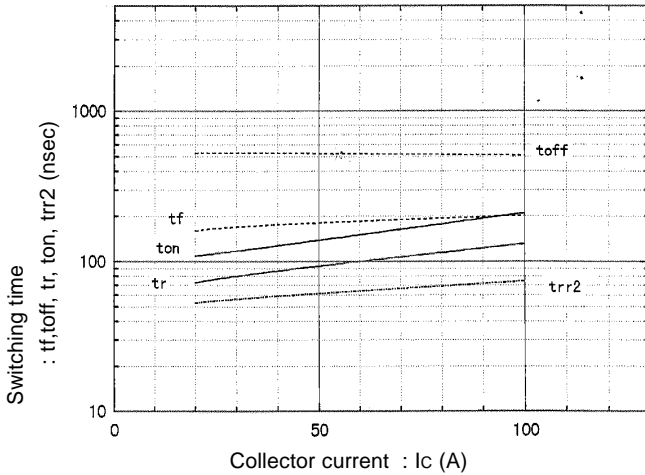
Collector-Emitter voltage vs. Gate-Emmitter voltage
Tj=25°C



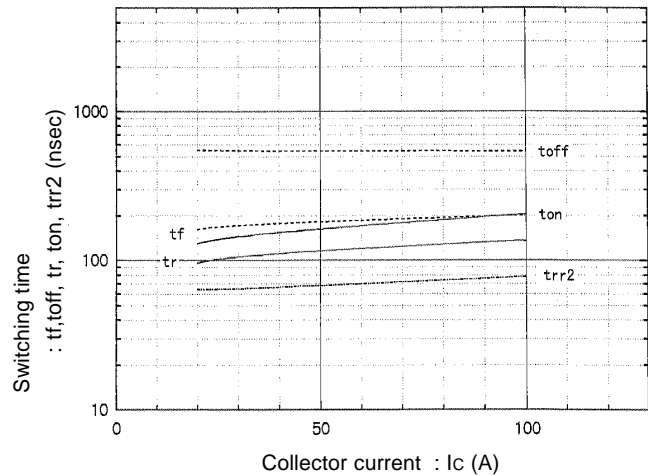
Collector-Emitter voltage vs. Gate-Emmitter voltage
Tj=125°C



Switching time vs. Collector current
VCC=300V, RG=8Ω, VGE=+15V, Tj=125°C

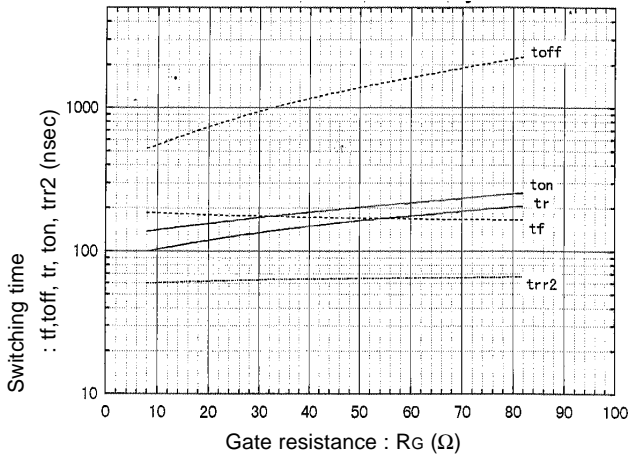


Switching time vs. Collector current
VCC=300V, RG=33Ω, VGE=±15V, Tj=125°C

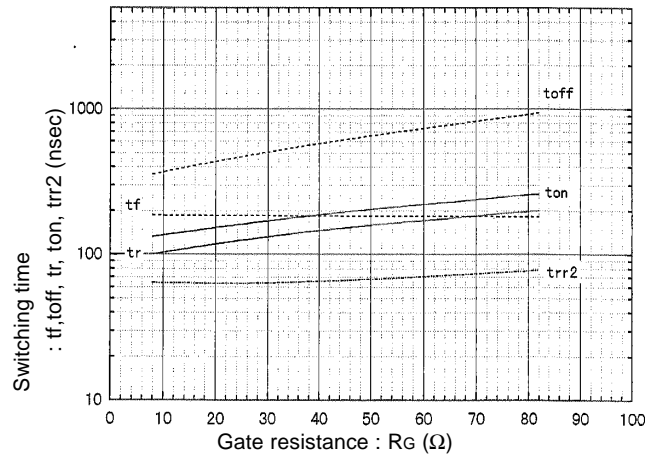


Characteristics

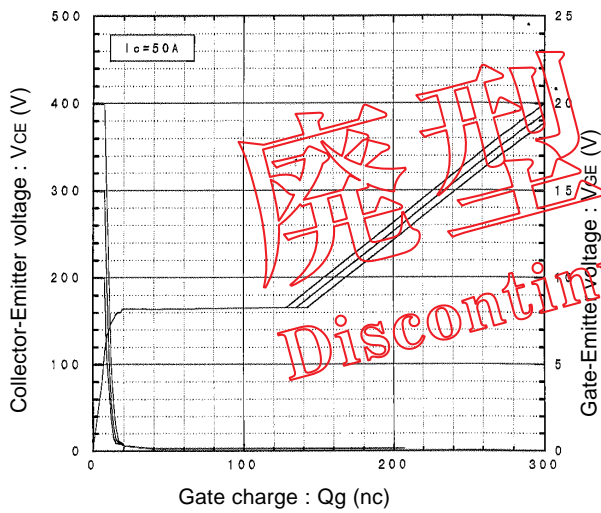
Switching time vs. R_G
 $V_{CC}=300V, I_C=50A, V_{GE}=+15V, T_J=125^\circ C$



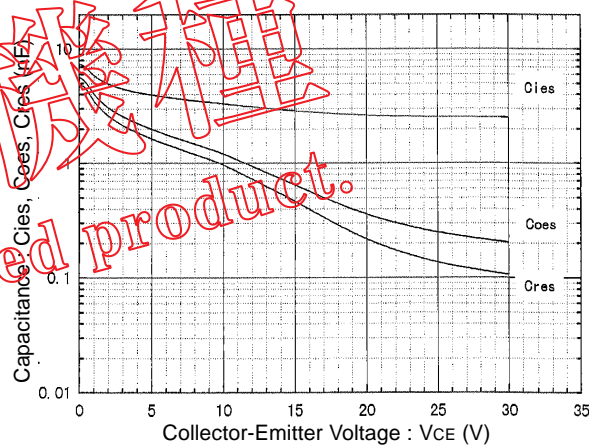
Switching time vs. R_G
 $V_{CC}=300V, I_C=50A, V_{GE}=\pm 15V, T_J=125^\circ C$



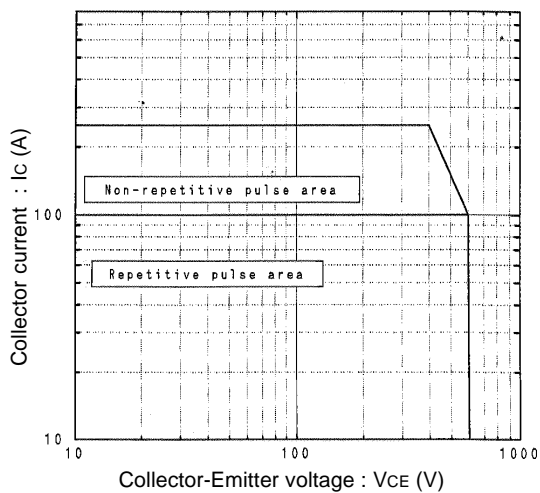
Dynamic input characteristics
 $T_J=25^\circ C$



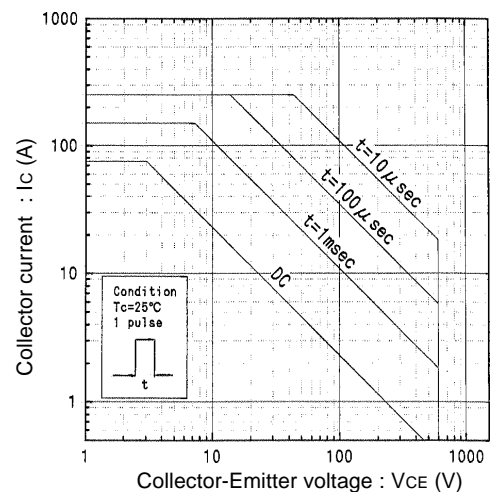
Capacitance vs. Collector-Emitter voltage
 $T_J=25^\circ C$



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

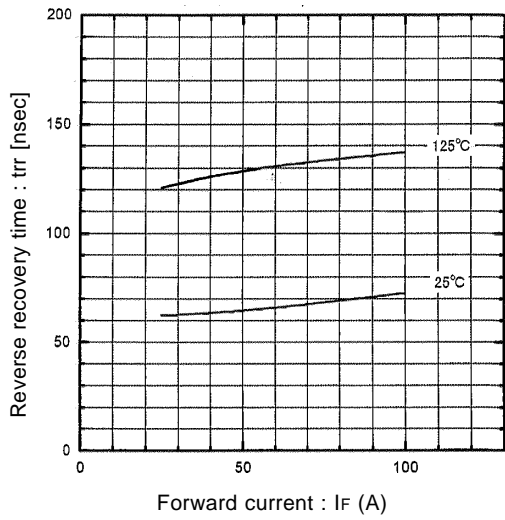


Forward Bias Safe Operating Area

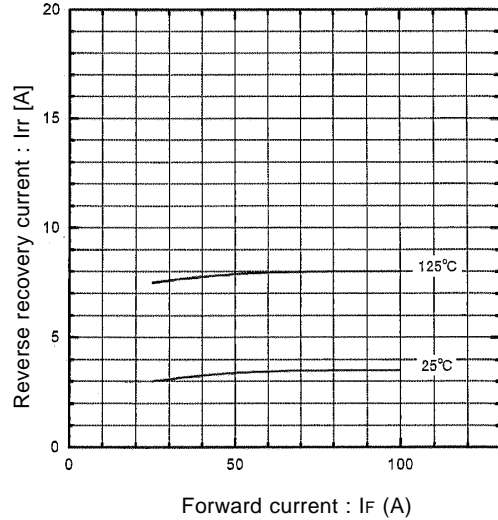


■ Characteristics

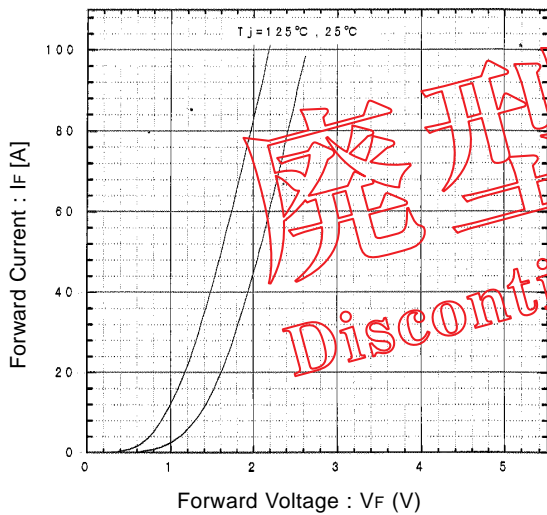
Reverse recovery time vs. Forward current
VR=300V, -di/dt=100A/μsec



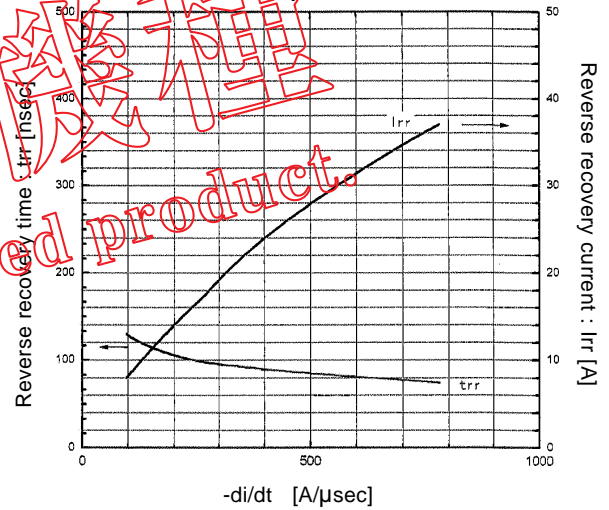
Reverse recovery current vs. Forward current
VR=300V, -di/dt=100A/μsec



Forward voltage vs. Forward current



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



Transient thermal resistance

