

SPECIFICATION

(TENTATIVE)

Device Name : IGBT

Type Name : 1MBH500-060S

Spec. No. : MSSF 4622

Date : June-21-1999

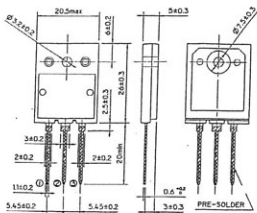
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Fuji Electric Co., Ltd.
Matsumoto Factory

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DRAWN	Jun-21-99	X. Sasaki		DWG. NO.	MSSF 4622
CHECKED	Jun-21-99	T. HOZEN	T. HOZEN		

1MBH50D-060S

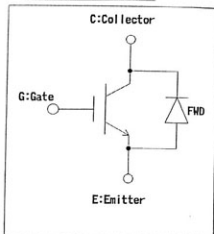
1. Outline Drawing



CONNECTION

- ① GATE
② COLLECTOR
③ EMITTER

2. Equivalent circuit



3. Absolute maximum ratings (Tc=25°C)

Items		Symbols	Ratings	Units	
Collector-Emitter Voltage		V_{CEs}	600	V	
Gate-Emitter Voltage		V_{GEs}	± 30	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
IGBT Max. Power Dissipation		P_c	230	W	
FWD Max. Power Dissipation		P_c	150	W	
Operating Temperature		T_j	+ 150	°C	
Storage Temperature		T_{stg}	-40 ~ +150	°C	
Mounting Screw Torque		—	70	N • cm	

4. Electrical Characteristics (at $T_c=25^\circ\text{C}$ unless otherwise specified)

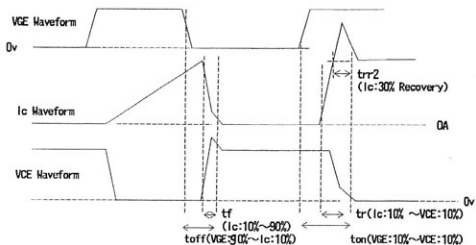
Items		Symbols	Characteristics			Conditions	Unit	
			min.	typ.	max.			
Zero gate voltage Collector Current		I_{CES}	—	—	1.0	$V_{GE} = 0\text{V}$ $V_{CE} = 600\text{V}$	mA	
Gate-Emitter leakage Current		I_{GES}	—	—	10	$V_{CE} = 0\text{V}$ $V_{GE} = \pm 30\text{V}$	μA	
Gate-Emitter Threshold Voltage		$V_{GE(th)}$	4.0	5.0	6.0	$V_{CE} = 20\text{V}$ $I_C = 50\text{mA}$	V	
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	—	2.4	2.9	$V_{GE} = 15\text{V}$ $I_C = 50\text{A}$	V	
Input capacitance		C_{ies}	—	2500	—	$V_{GE} = 0\text{V}$	pF	
Output capacitance		C_{oes}	—	240	—	$V_{CE} = 25\text{V}$		
Reverse transfer capacitance		C_{res}	—	130	—	$f = 1\text{MHz}$		
Switching Time	Turn-on time	$t_{on} \times$	—	0.15	—	$V_{CC} = 300\text{V}$ $I_C = 50\text{A}$ $V_{GE} = \pm 15\text{V}$ $R_a = 33 \Omega$ (Half Bridge)	μs	
		$t_r \times$	—	0.09	—			
		t_{rr2}	—	0.03	—			
	Turn-off time	t_{off}	—	0.50	0.62			Inductance Load
		t_f	—	0.10	0.17			
	Turn-on time	$t_{on} \times$	—	0.15	—			$V_{CC} = 300\text{V}$ $I_C = 50\text{A}$ $V_{GE} = +15\text{V}$ $R_a = 8.0 \Omega$ (Half Bridge)
		$t_r \times$	—	0.09	—			
		t_{rr2}	—	0.03	—			
	Turn-off time	t_{off}	—	0.50	0.62	Inductance Load		
		t_f	—	0.10	0.17			
	FWD forward voltage		V_F	—	2.0	2.5	$I_F=50\text{A}, V_{GE}=0\text{V}$	
	Reverse recovery time		t_{rr}	—	0.60	0.10	$I_F=50\text{A}, V_{GE}=-10\text{V}$ $V_R=300\text{V},$ $dv/dt=100\text{A}/\mu\text{s}$	μs

※ Turn-on characteristics include t_{rr2} . See figure, A in next page.

5. Thermal resistance characteristics

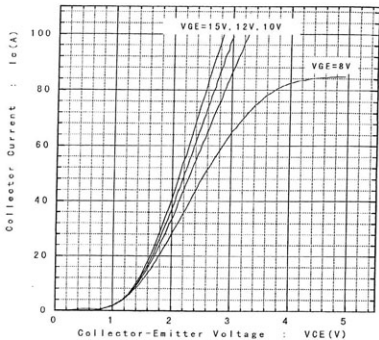
Items	Symbols	Characteristics			Conditions	Unit
		min.	typ.	max.		
Thermal resistance	Rth(J-c)	—	—	0.54	IGBT	°C/W
	Rth(J-c)	—	—	0.83	FWD	

6. Switching waveform

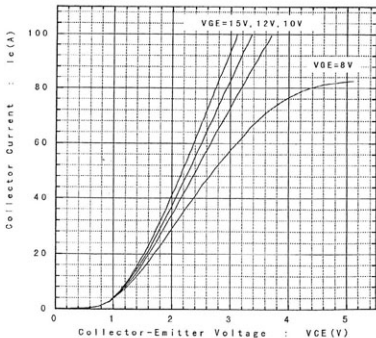


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Collector Current vs. Collector-Emitter Voltage
 $T_j = 25^\circ\text{C}$

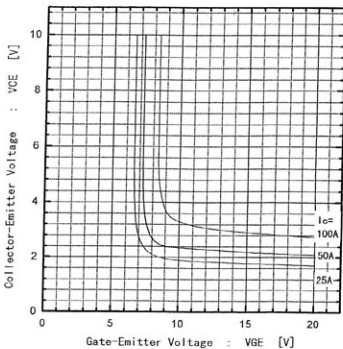


Collector Current vs. Collector-Emitter Voltage
 $T_j = 125^\circ\text{C}$

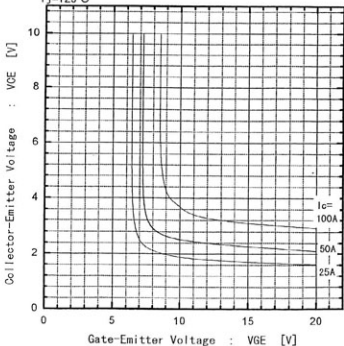


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Collector-Emitter Voltage vs Gate-Emitter Voltage
 $T_j=25^\circ\text{C}$



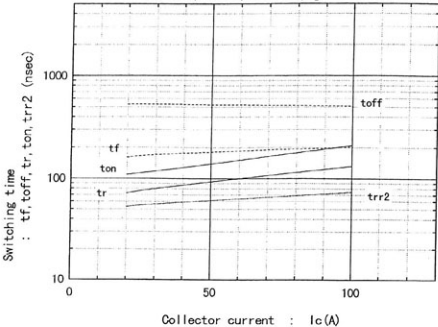
Collector-Emitter Voltage vs Gate-Emitter Voltage
 $T_j=125^\circ\text{C}$



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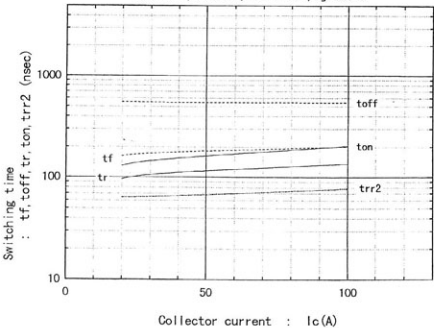
Switching time vs Collector current

$V_{CC}=300V, R_G=8\Omega, V_{GE}=\pm 15V, T_J=125^\circ C$



Switching time vs Collector current

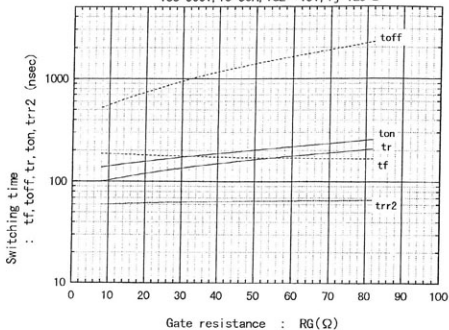
$V_{CC}=300V, R_G=33\Omega, V_{GE}=\pm 15V, T_J=125^\circ C$



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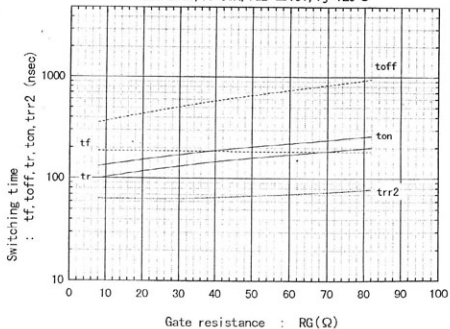
Switching time vs RG

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

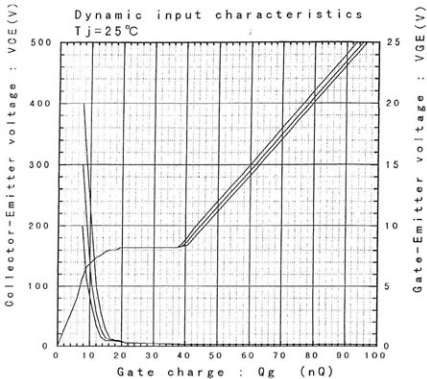


Switching time vs RG

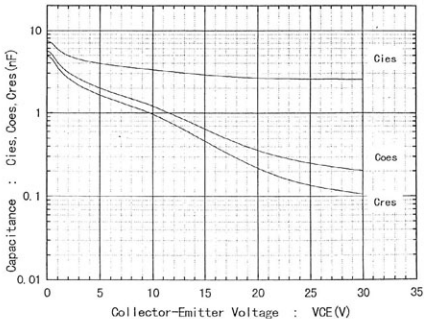
$V_{CC}=300V, I_c=50A, V_{GE}=\pm 15V, T_j=125^\circ C$



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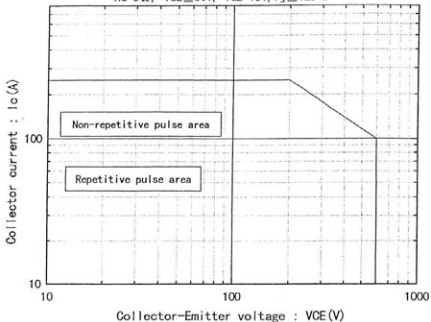


Capacitance vs. Collector-Emitter Voltage
 $T_j = 25^\circ\text{C}$

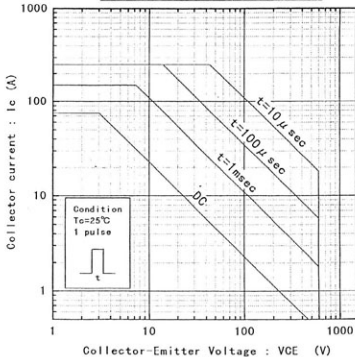


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1MBH500-060S
Reverse Biased Safe Operating Area
RG=8Ω, +VGE ≤ 30V, -VGE=15V, Tj ≤ 125°C

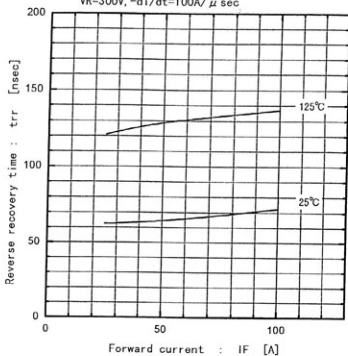


1MBH500-060S
Forward Bias Safe Operating Area

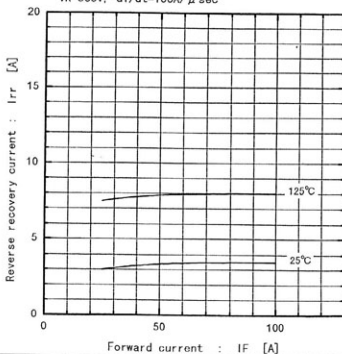


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Reverse recovery time vs. Forward current
 $VR=300V, -di/dt=100A/\mu sec$

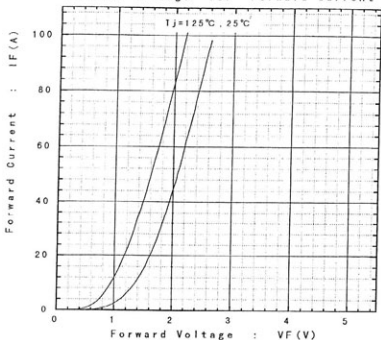


Reverse recovery current vs. Forward current
 $VR=300V, -di/dt=100A/\mu sec$

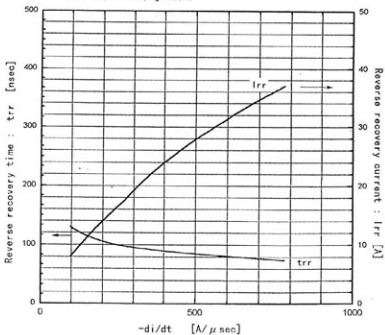


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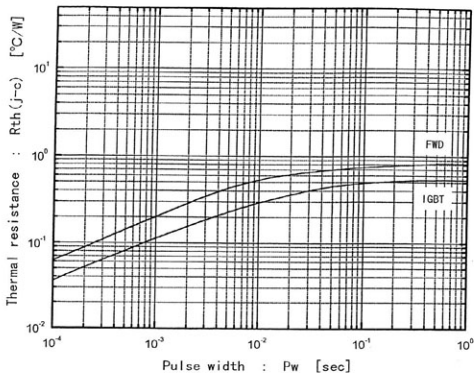
Forward Voltage vs. Forward current



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



Transient thermal resistance



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