

1MBK50D-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

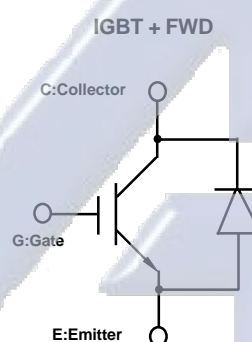
- Inverter for Motor drive
- AC and DC Servo drive amplifier
- Uninterruptible power supply

■ 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} 65	A
		Tc=100°C	I _{C100} 50	A
	1ms	Tc=25°C	I _{cp} 150	A
Max. power dissipation (IGBT)	P _c	200	W	
Max. power dissipation (FWD)	P _c	130	W	
Operating temperature	T _j	+150	°C	
Storage temperature	T _{stg}	-40 to +150	°C	
Screw torque	-	39.2 to 58.8	N·m	

■ 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		
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 _{on} *	-	0.15	-	V _{CC} =300V, I _c =50A	
	Turn-off time	t _r *	-	0.09	-	V _{GE} =+15V	μs
		t _{rr2}	-	0.03	-	R _G =8 ohm	
t _{off}		-	0.50	0.62	(Half Bridge)		
Turn-off time	t _f	-	0.10	0.17	Inductance Load	μs	
	t _{off}	-	0.50	0.62	(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

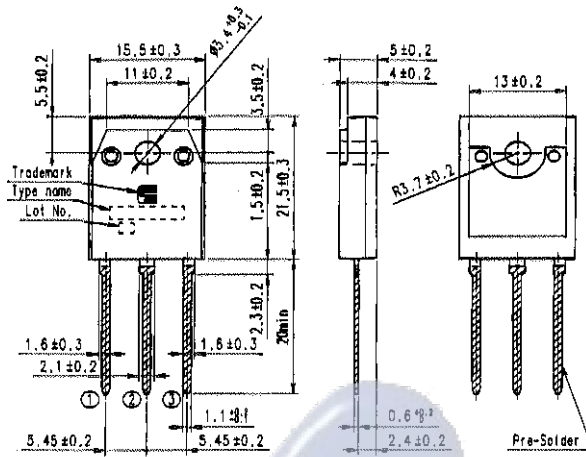
Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	R _{th(j-c)}	-	-	0.63	IGBT	°C/W
	R _{th(j-c)}	-	-	0.96	FWD	°C/W

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Outline drawings, mm

TO-247

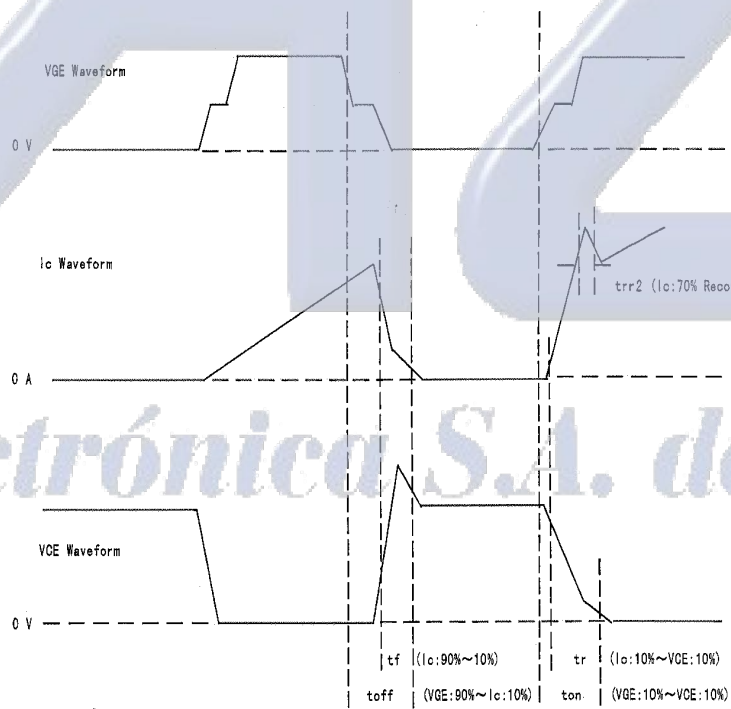


CONNECTION

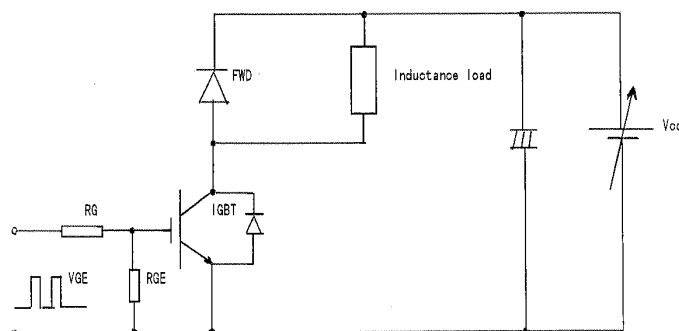
- ① Gate
- ② Collector
- ③ Emitter



Switching waveform (Inductance load)



Mesurement circuit

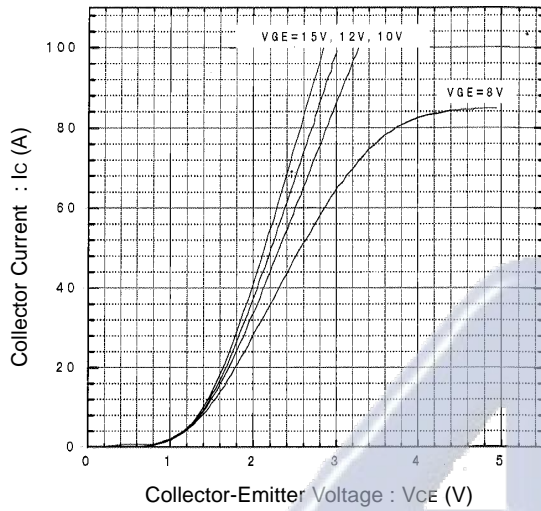


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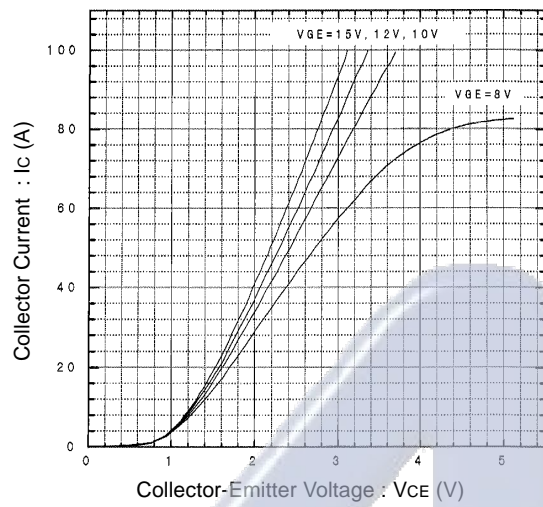
Molded IGBT

Characteristics

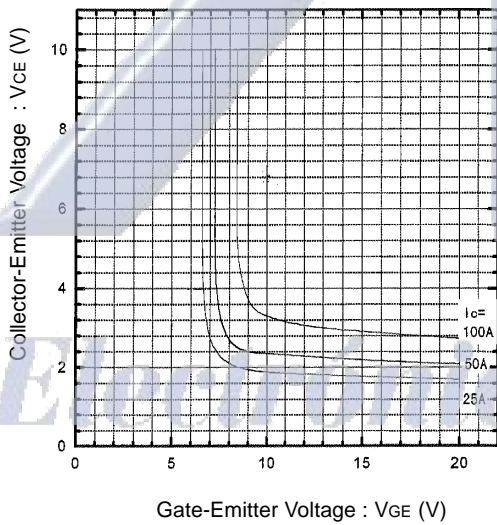
Collector current vs. Collector-Emitter voltage
T_j=25°C



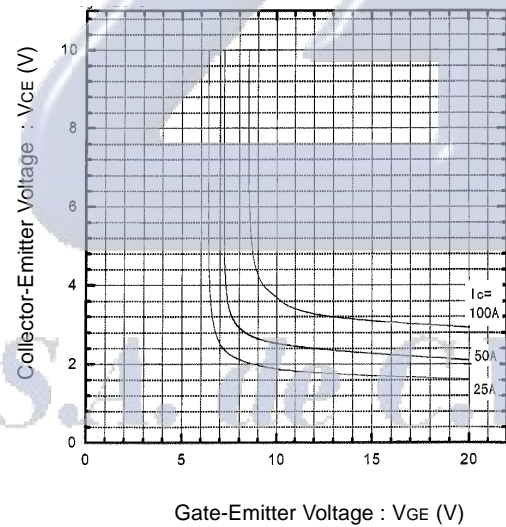
Collector current vs. Collector-Emitter voltage
T_j=125°C



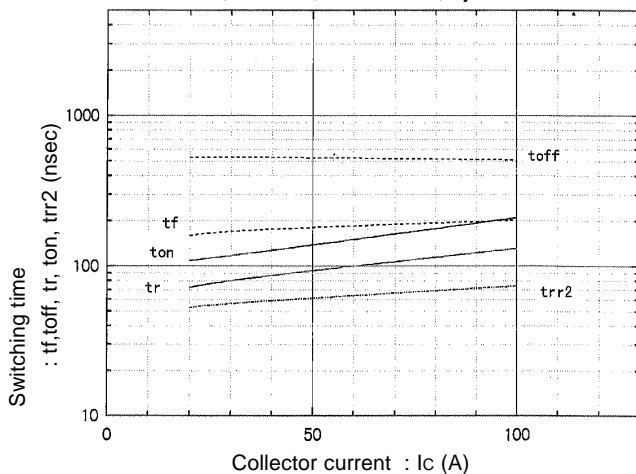
Collector-Emitter voltage vs. Gate-Emitter voltage
T_j=25°C



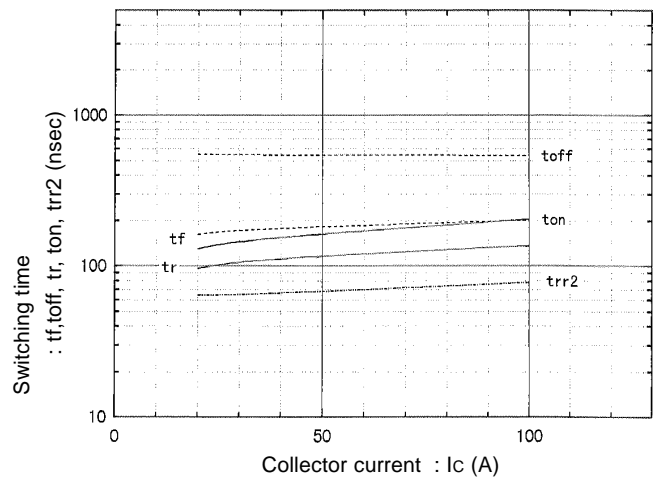
Collector-Emitter voltage vs. Gate-Emitter voltage
T_j=125°C



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



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



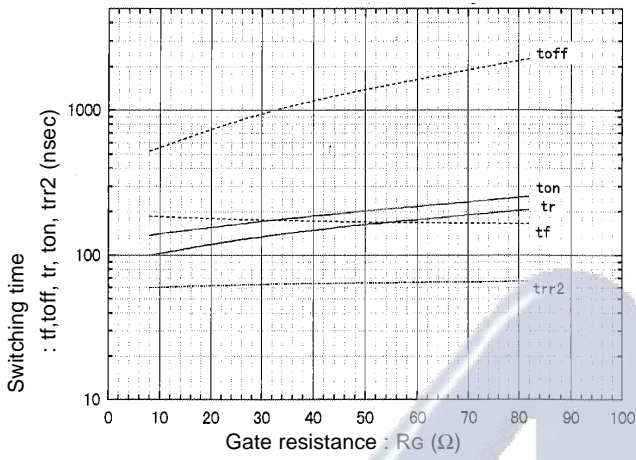
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IGBT Module

Characteristics

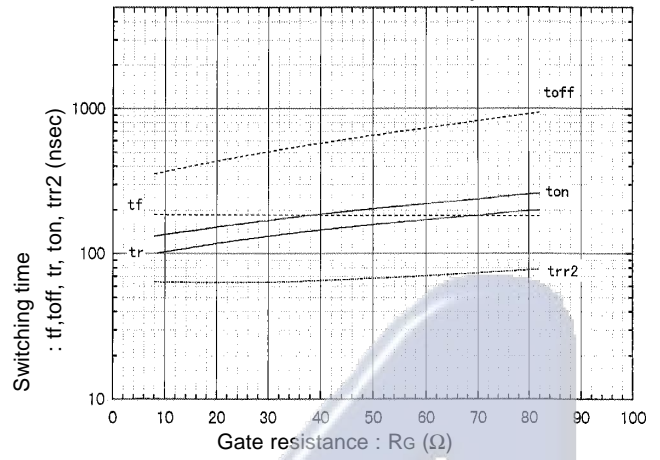
Switching time vs. R_G

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



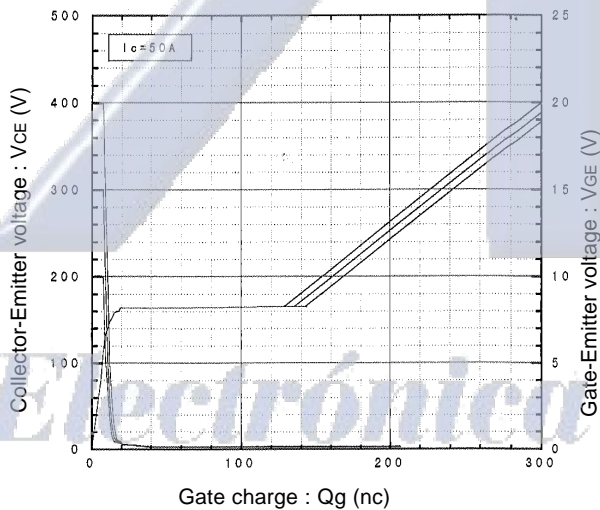
Switching time vs. R_G

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



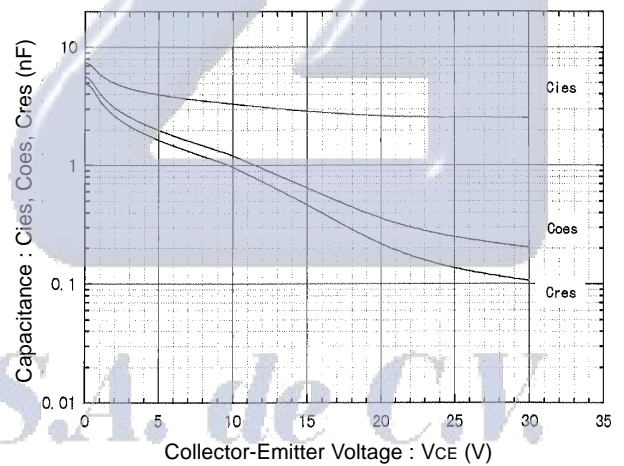
Dynamic input characteristics

$T_J=25^\circ C$



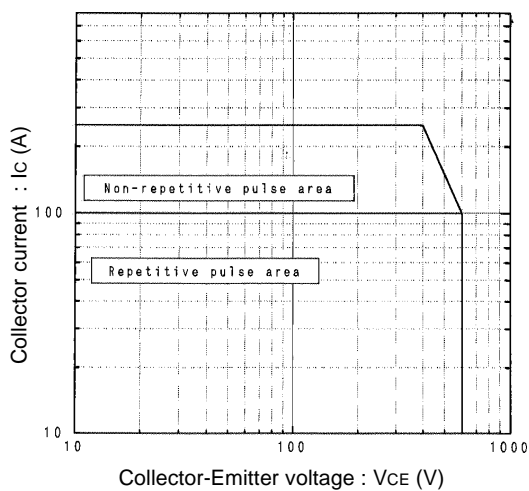
Capacitance vs. Collector-Emitter voltage

$T_J=25^\circ C$

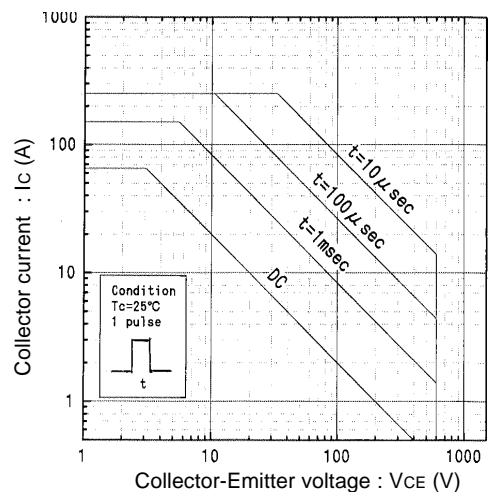


Reverse Biased Safe Operating Area

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



Forward Bias Safe Operating Area

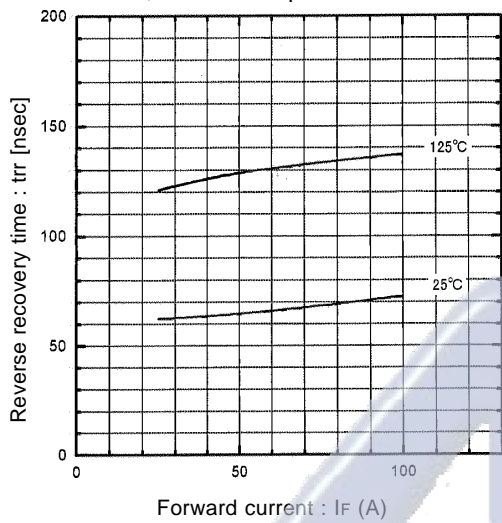


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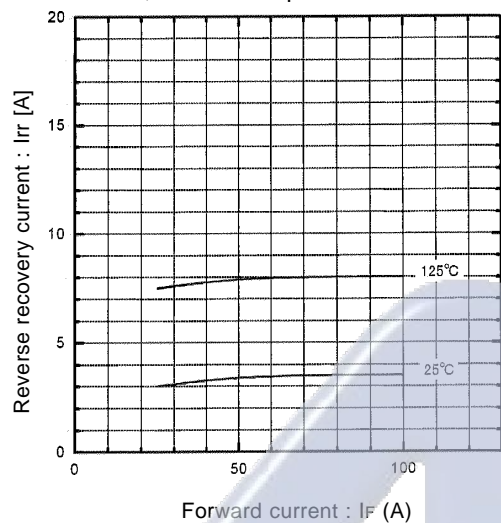
IGBT Module

■ Characteristics

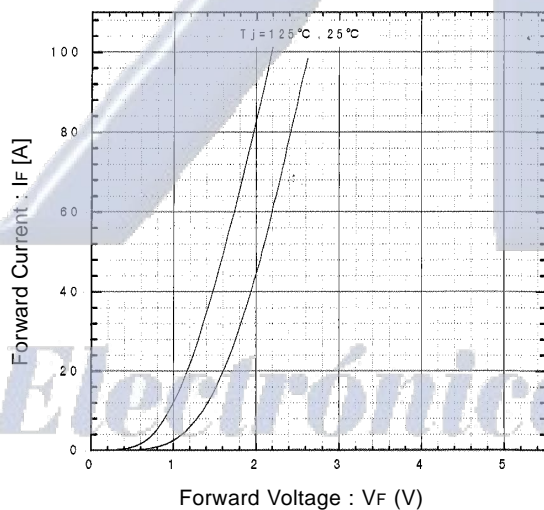
Reverse recovery time vs. Forward current
VR=300V, -di/dt=100A/μsec



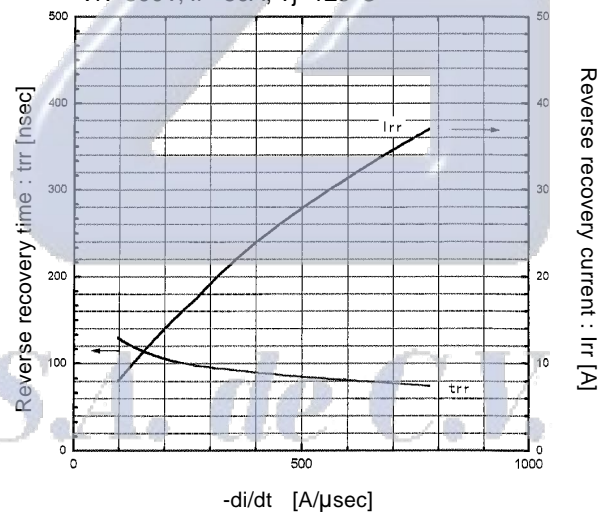
Reverse recovery current vs. Forward current
VR=300V, -di/dt=100A/μsec



Forward voltage vs. Forward current



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



Transient thermal resistance

