

600V / 20A

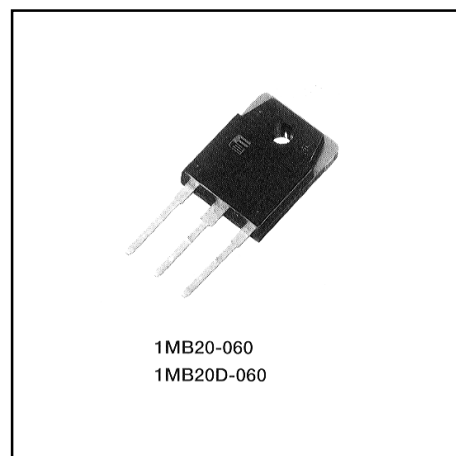
Molded Package

■ 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 (at $T_c=25^\circ\text{C}$ unless otherwise specified)

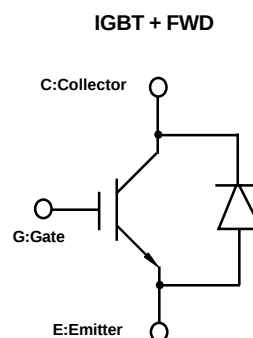
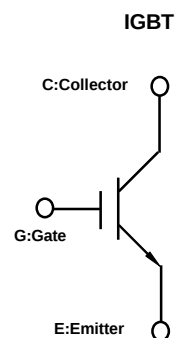
1MB20-060 / IGBT

Item			Symbol	Rating	Unit
Collector-Emitter voltage			V_{CES}	600	V
Gate-Emitter voltaga			V_{GES}	±20	V
Collector current	DC	Tc=25°C	Ic25	38	A
		Tc=100°C	Ic100	20	A
	1ms	Tc=25°C	Icp	152	A
Max. power dissipation(IGBT)			Pc	145	W
Operating temperature			Tj	+150	°C
Storage temperature			Tstg	-40 to +150	°C
Screw torque			-	50	N·m

1MB20D-060 / IGBT+FWD

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}	38	A
		T _C =100°C	I _{C100}	20	A
	1ms	T _C =25°C	I _{CP}	152	A
Max. power dissipation (IGBT)			P _C	145	W
Max. power dissipation (FWD)			P _C	75	W
Operating temperature			T _J	+150	°C
Storage temperature			T _{stg}	-40 to +150	°C
Screw torque			-	50	N·m

■ Equivalent Circuit Schematic



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

1MB20-060 / IGBT

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}	—	—	20	V _{CE} =0V, V _{GE} =±20V	μA
Gate-Emitter threshold voltage	V _{GE(th)}	5.5	—	8.5	V _{CE} =20V, I _C =20mA	V
Collector-Emitter saturation voltage	V _{CE(sat)}	—	—	3.0	V _{GE} =15V, I _C =20A	V
Input capacitance	C _{ies}	—	1300	—	V _{GE} =0V	pF
Output capacitance	C _{oes}	—	300	—	V _{CE} =10V	
Reverse transfer capacitance	C _{res}	—	70	—	f=1MHz	
Turn-on time	t _{on}	—	—	1.2	V _{CC} =300V I _C =20A	μs
	t _r	—	—	0.6	V _{GE} =±15V	
Turn-off time	t _{off}	—	—	1.0	R _G =120 ohm	
	t _f	—	—	0.35	(Half Bridge)	

1MB20D-060 / IGBT+FWD

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}	—	—	20	V _{CE} =0V, V _{GE} =±20V	μA
Gate-Emitter threshold voltage	V _{GE(th)}	5.5	—	8.5	V _{CE} =20V, I _C =20mA	V
Collector-Emitter saturation voltage	V _{CE(sat)}	—	—	3.0	V _{GE} =15V, I _C =20A	V
Input capacitance	C _{ies}	—	1300	—	V _{GE} =0V	pF
Output capacitance	C _{oes}	—	300	—	V _{CE} =10V	
Reverse transfer capacitance	C _{res}	—	70	—	f=1MHz	
Turn-on time	t _{on}	—	—	1.2	V _{CC} =300V, I _C =20A	μs
	t _r	—	—	0.6	V _{GE} =±15V	
Turn-off time	t _{off}	—	—	1.0	R _G =120 ohm	
	t _f	—	—	0.35	(Half Bridge)	
FWD forward on voltage	V _F	—	—	3.0	I _F =20A, V _{GE} =0V	V
Reverse recovery time	t _{rr}	—	—	0.3	I _F =20A, V _{GE} =-10V, di/dt=100A/μs	μs

● Thermal resistance characteristics

1MB20-060 / IGBT

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	R _{th(j-c)}	—	—	0.86	IGBT	°C/W

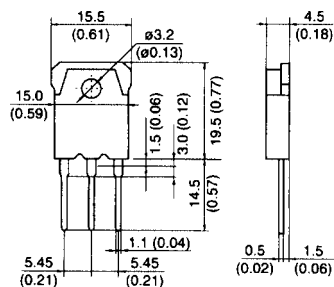
1MB20D-060 / IGBT+FWD

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	R _{th(j-c)}	—	—	0.86	IGBT	°C/W
	R _{th(j-c)}	—	—	1.66	FWD	°C/W

■ Outline drawings, mm

1MB20-060, 1MB20D-060

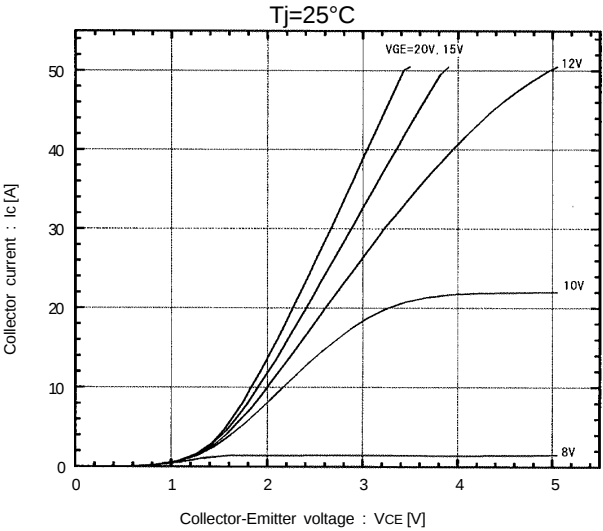
TO-3P



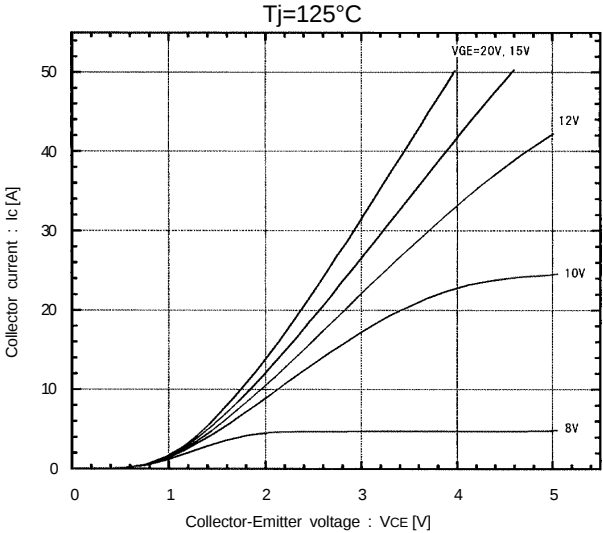
■ Characteristics

1MB20-060,1MB20D-060

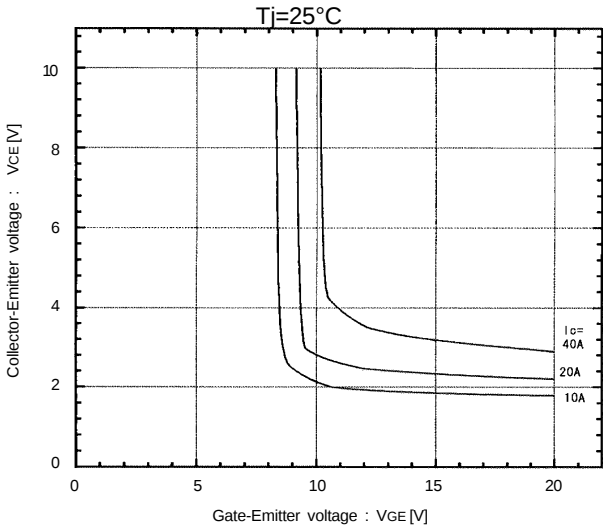
Collector current vs. Collector-Emitter voltage



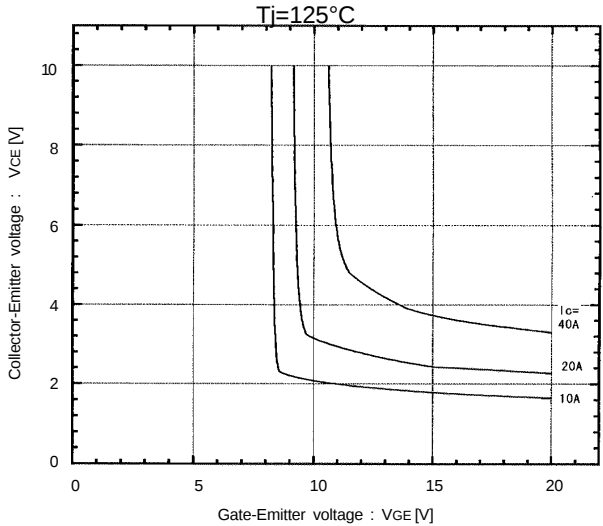
Collector current vs. Collector-Emitter voltage



Collector-Emitter vs. Gate-Emitter voltage

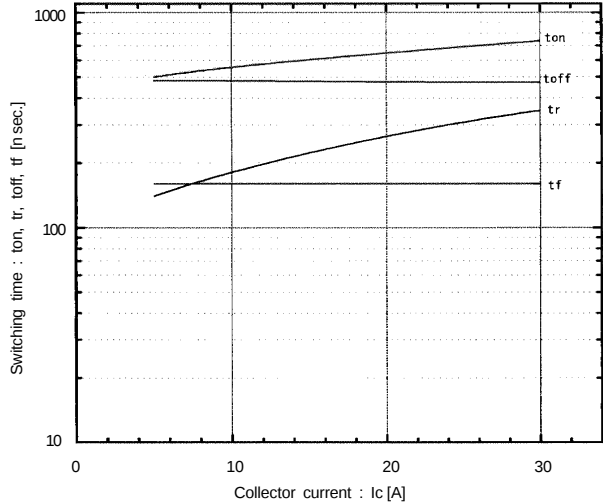


Collector-Emitter vs. Gate-Emitter voltage



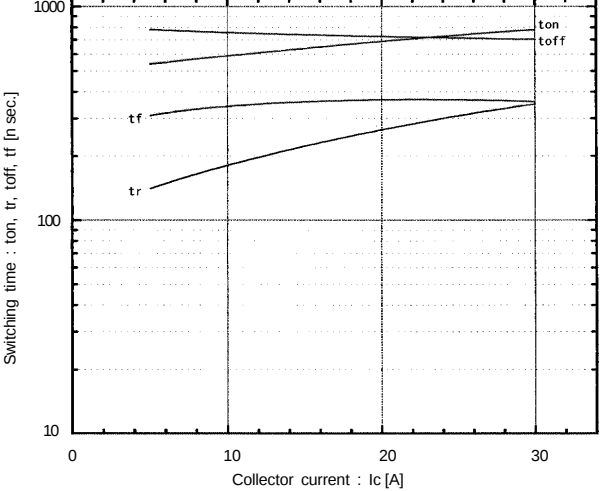
Switching time vs. Collector current

$V_{CC}=300\text{V}$, $R_G=120\text{ ohm}$, $V_{GE}=\pm 15\text{V}$, $T_j=25^{\circ}\text{C}$



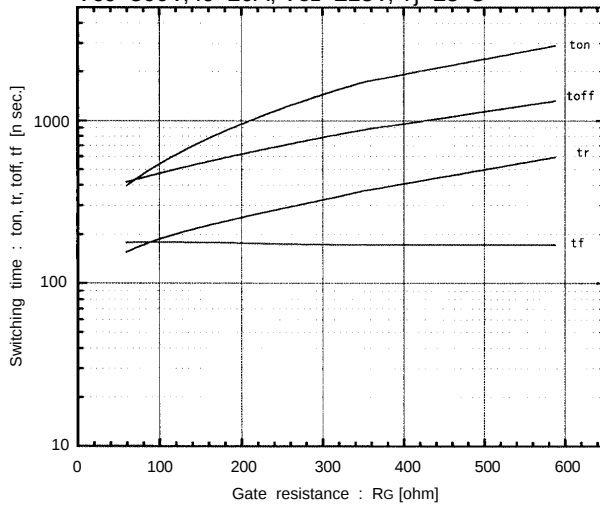
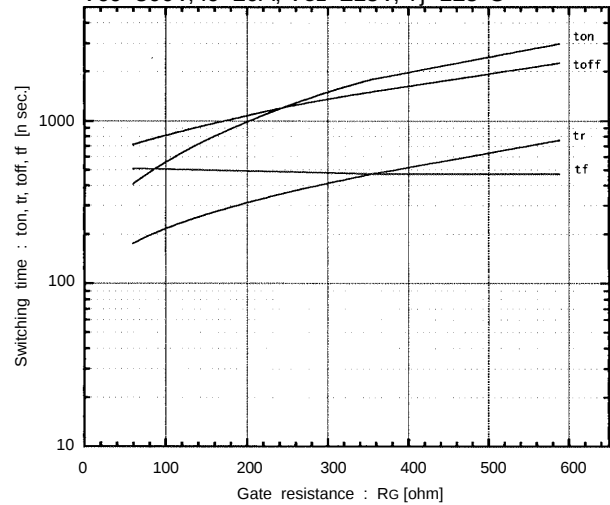
Switching time vs. Collector current

$V_{CC}=300\text{V}$, $R_G=160\text{ ohm}$, $V_{GE}=\pm 15\text{V}$, $T_j=125^{\circ}\text{C}$

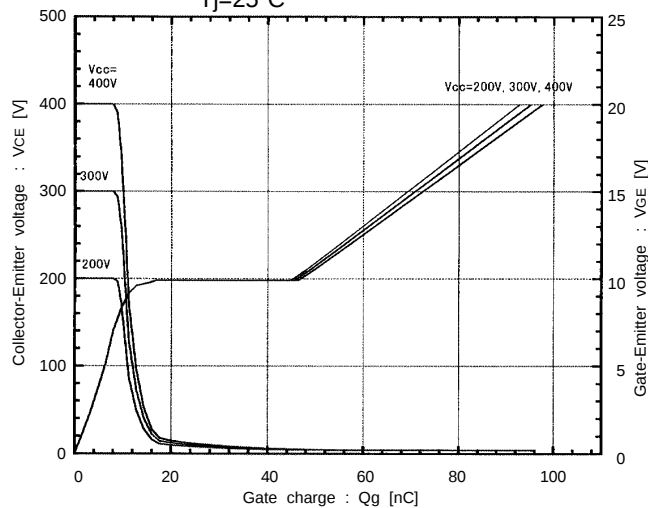


Characteristics

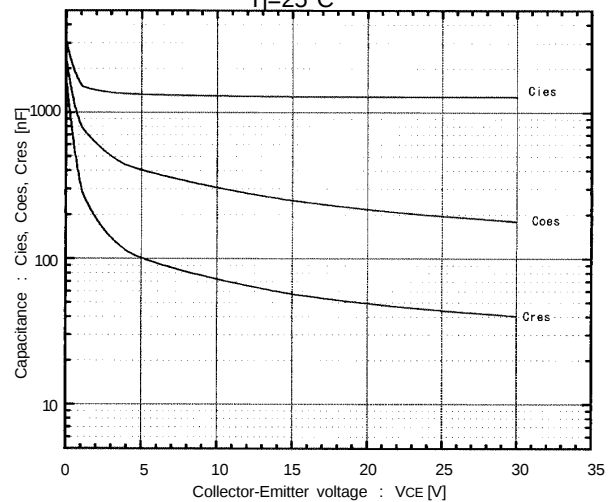
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Switching time vs. R_G $V_{CC}=300V, I_C=20A, V_{GE}=\pm 15V, T_J=25^\circ C$ Switching time vs. R_G $V_{CC}=300V, I_C=20A, V_{GE}=\pm 15V, T_J=125^\circ C$ 

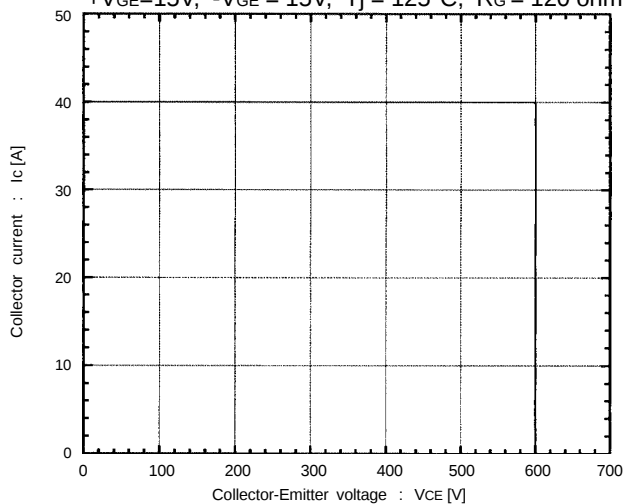
Dynamic input characteristics

 $T_J=25^\circ C$ 

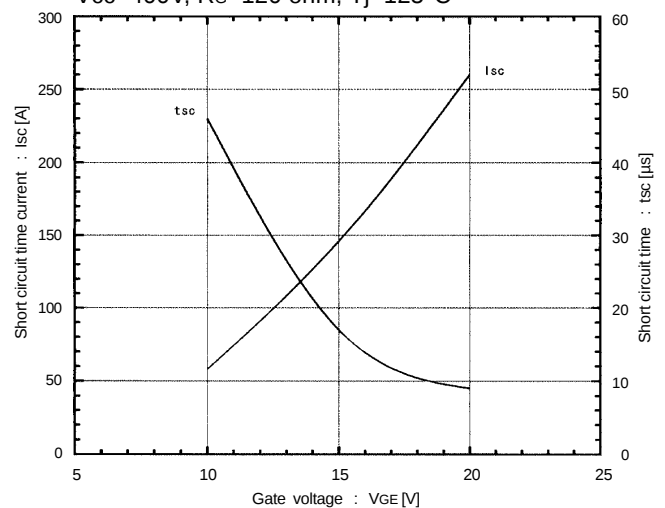
Capacitance vs. Collector-Emitter voltage

 $T_J=25^\circ C$ 

Reversed biased safe operating area

 $+V_{GE}=15V, -V_{GE} \leq 15V, T_J \leq 125^\circ C, R_G \geq 120 \text{ ohm}$ 

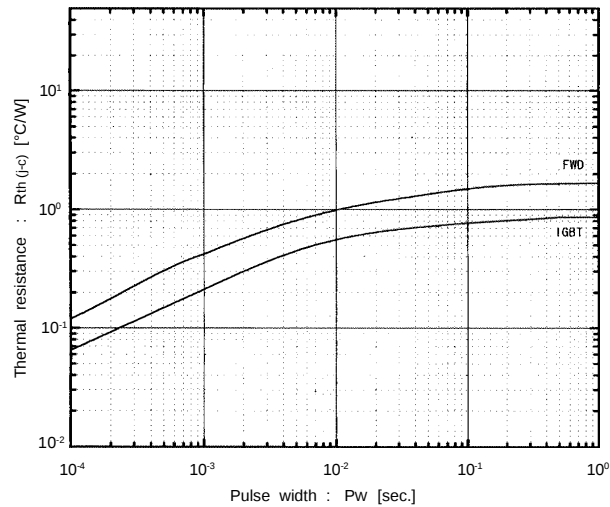
Typical short circuit capability

 $V_{CC}=400V, R_G=120 \text{ ohm}, T_J=125^\circ C$ 

■ Characteristics

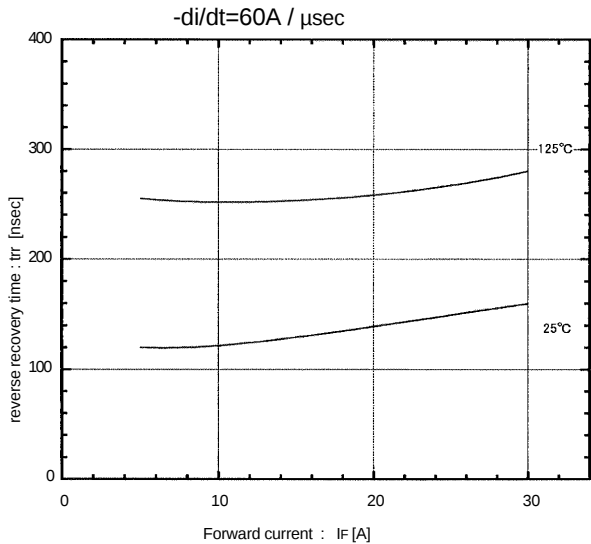
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Transient thermal resistance

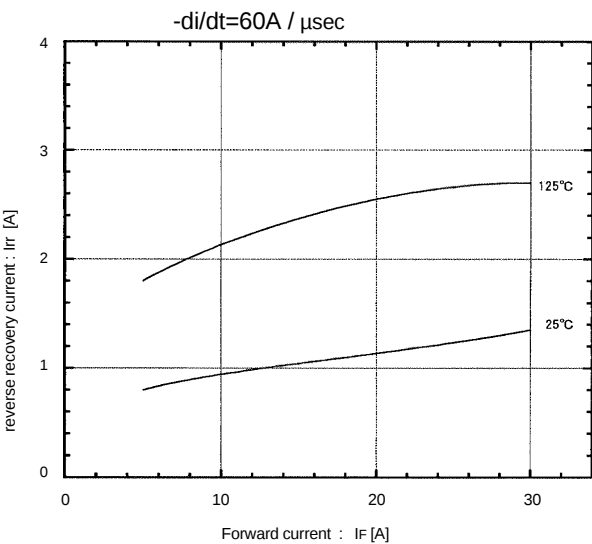


1MB20D-060

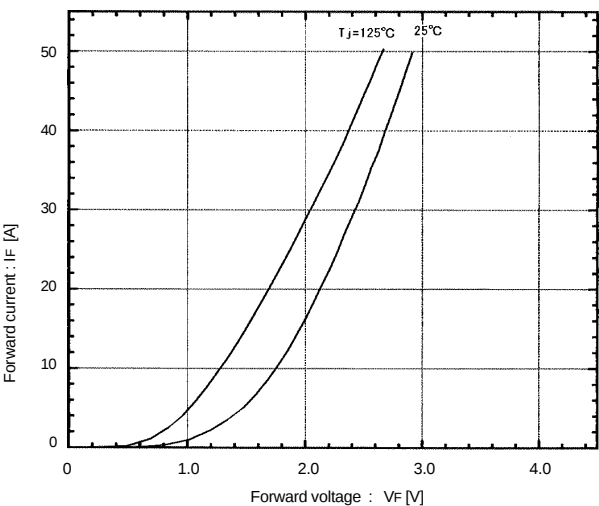
Reverse recovery time vs. Forward current



Reverse recovery current vs. Forward current



Forward current vs. Forward voltage



Reverse recovery time characteristics vs. $-di/dt$

