

600V / 20A

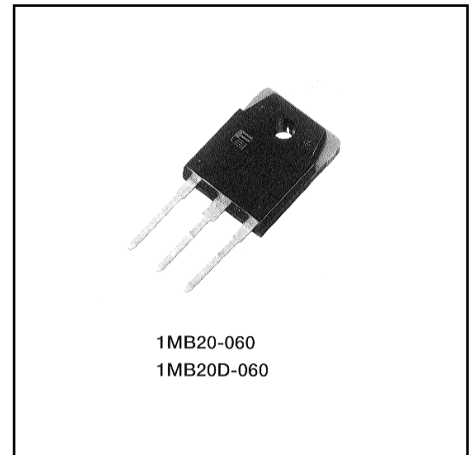
Molded Package

■ 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 Tc=25°C unless otherwise specified)

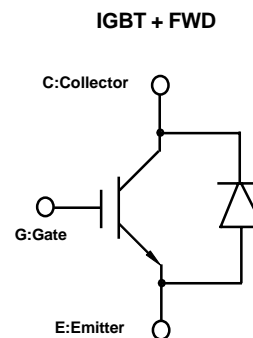
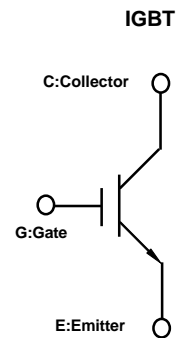
1MB20-060 / IGBT

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		
Operating temperature	T _J	+150	°C		
Storage temperature	T _{stg}	-40 to +150	°C		
Screw torque	-	50	N·cm		

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·cm		

■ Equivalent Circuit Schematic



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

1MB20-060 / IGBT

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Zero gate voltage collector current	ICES	–	–	1.0	VGE=0V, VCE=600V	mA
Gate-Emitter leakage current	IGES	–	–	20	VCE=0V, VGE=±20V	µA
Gate-Emitter threshold voltage	VGE(th)	5.5	–	8.5	VCE=20V, IC=20mA	V
Collector-Emitter saturation voltage	VCE(sat)	–	–	3.0	VGE=15V, IC=20A	V
Input capacitance	Cies	–	1300	–	VGE=0V	pF
Output capacitance	Coes	–	300	–	VCE=10V	
Reverse transfer capacitance	Cres	–	70	–	f=1MHz	
Turn-on time	ton	–	–	1.2	VCC=300V IC=20A	µs
	tr	–	–	0.6	VGE=±15V	
Turn-off time	toff	–	–	1.0	RG=120 ohm	(Half Bridge)
	tf	–	–	0.35		

1MB20D-060 / IGBT+FWD

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Zero gate voltage collector current	ICES	–	–	1.0	VGE=0V, VCE=600V	mA
Gate-Emitter leakage current	IGES	–	–	20	VCE=0V, VGE=±20V	µA
Gate-Emitter threshold voltage	VGE(th)	5.5	–	8.5	VCE=20V, IC=20mA	V
Collector-Emitter saturation voltage	VCE(sat)	–	–	3.0	VGE=15V, IC=20A	V
Input capacitance	Cies	–	1300	–	VGE=0V	pF
Output capacitance	Coes	–	300	–	VCE=10V	
Reverse transfer capacitance	Cres	–	70	–	f=1MHz	
Turn-on time	ton	–	–	1.2	VCC=300V, IC=20A	µs
	tr	–	–	0.6	VGE=±15V	
Turn-off time	toff	–	–	1.0	RG=120 ohm	(Half Bridge)
	tf	–	–	0.35		
FWD forward on voltage	VF	–	–	3.0	IF=20A, VGE=0V	V
Reverse recovery time	trr	–	–	0.3	IF=20A, VGE=-10V, di/dt=100A/µs	µs

● Thermal resistance characteristics

1MB20-060 / IGBT

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	Rth(j-c)	–	–	0.86	IGBT	°C/W

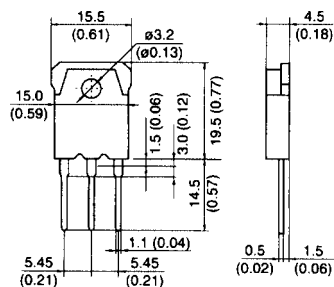
1MB20D-060 / IGBT+FWD

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	Rth(j-c)	–	–	0.86	IGBT	°C/W
	Rth(j-c)	–	–	1.66	FWD	°C/W

■ Outline drawings, mm

1MB20-060, 1MB20D-060

TO-3P

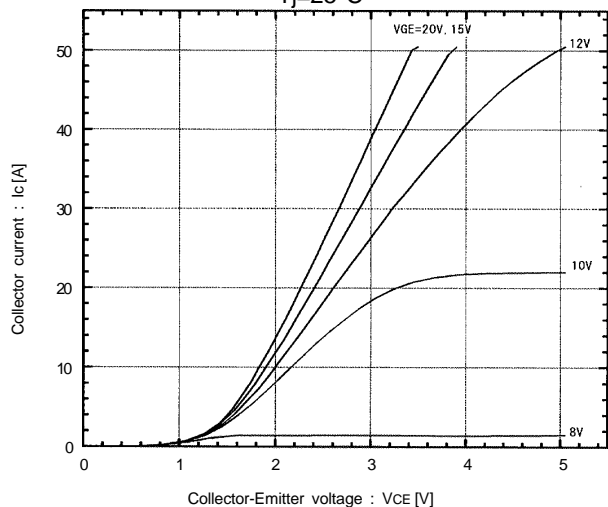


Characteristics

1MB20-060, 1MB20D-060

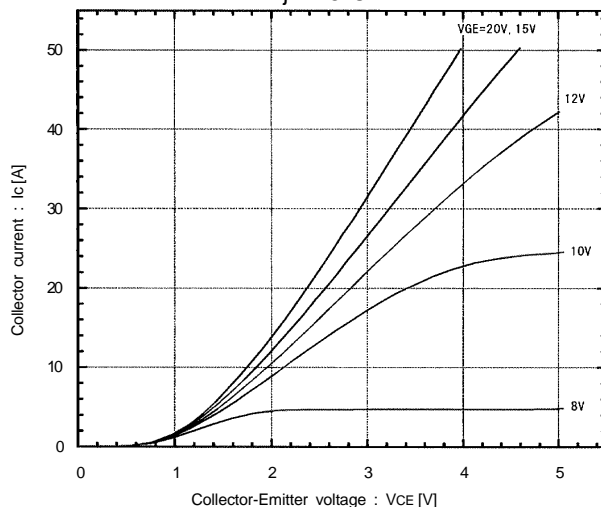
Collector current vs. Collector-Emittor voltage

$T_j=25^{\circ}\text{C}$



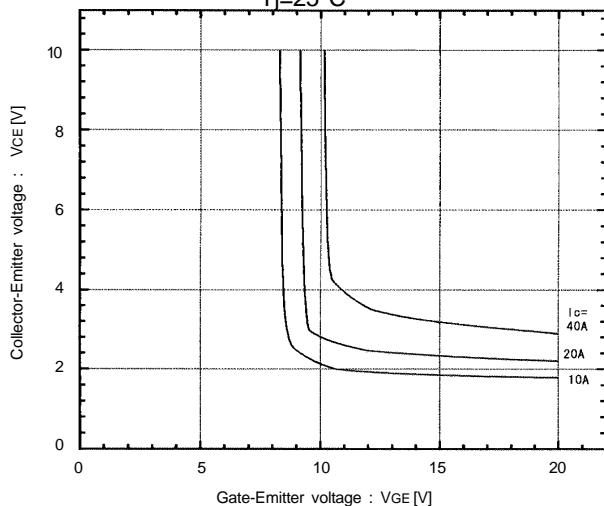
Collector current vs. Collector-Emittor voltage

$T_j=125^{\circ}\text{C}$



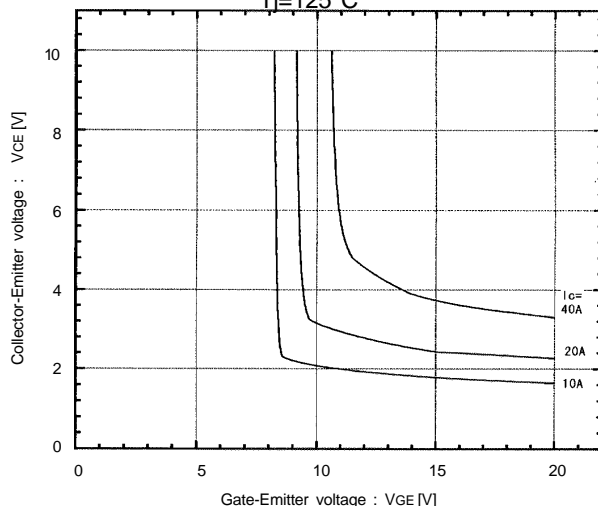
Collector-Emittor vs. Gate-Emittor voltage

$T_j=25^{\circ}\text{C}$



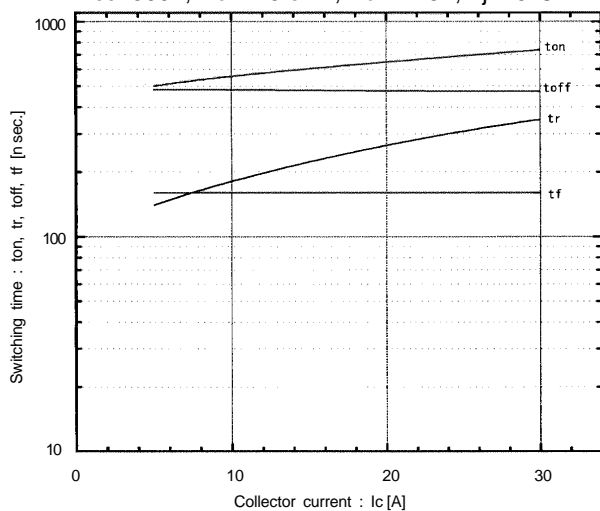
Collector-Emittor vs. Gate-Emittor voltage

$T_j=125^{\circ}\text{C}$



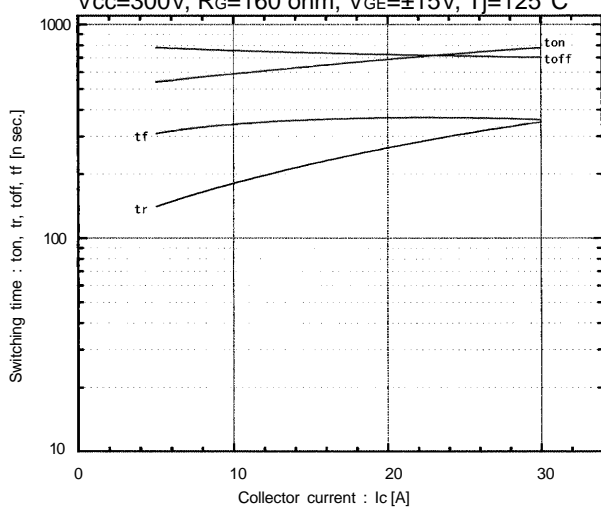
Switching time vs. Collector current

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



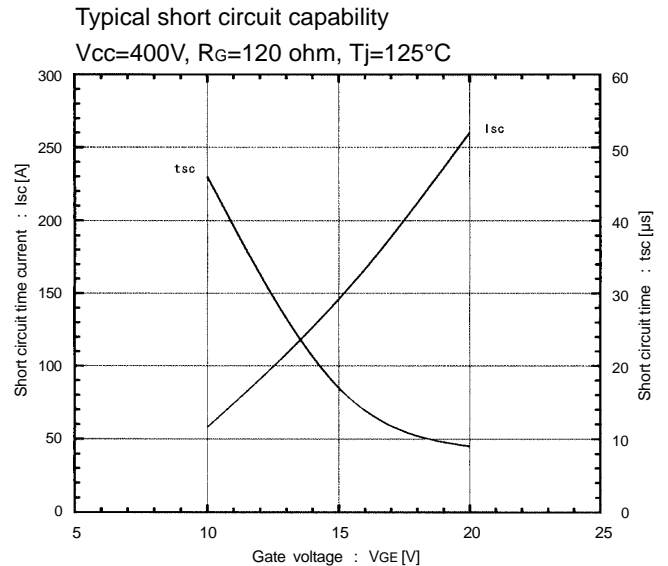
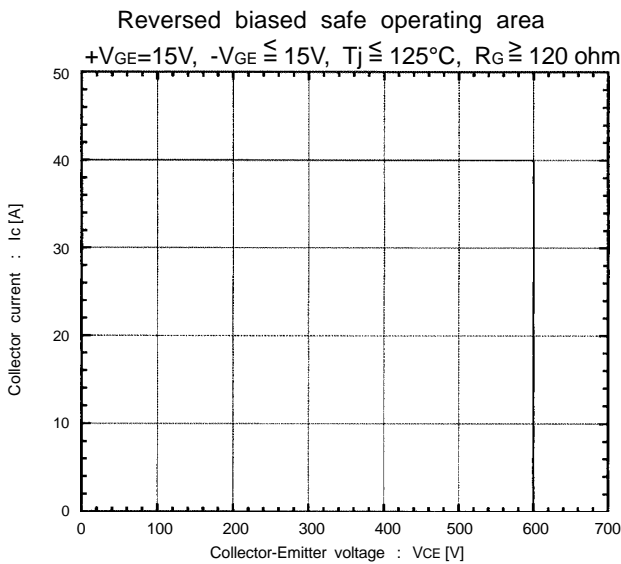
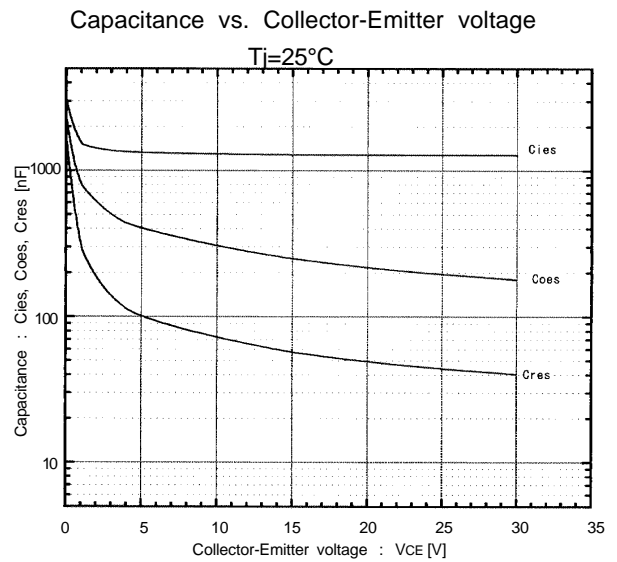
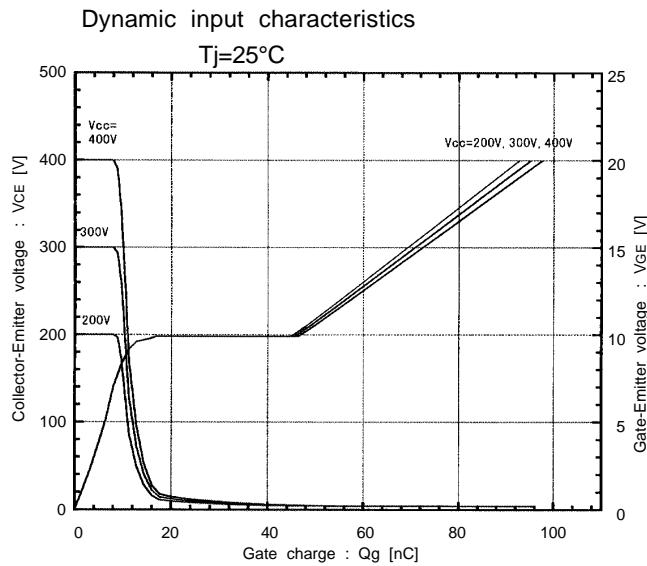
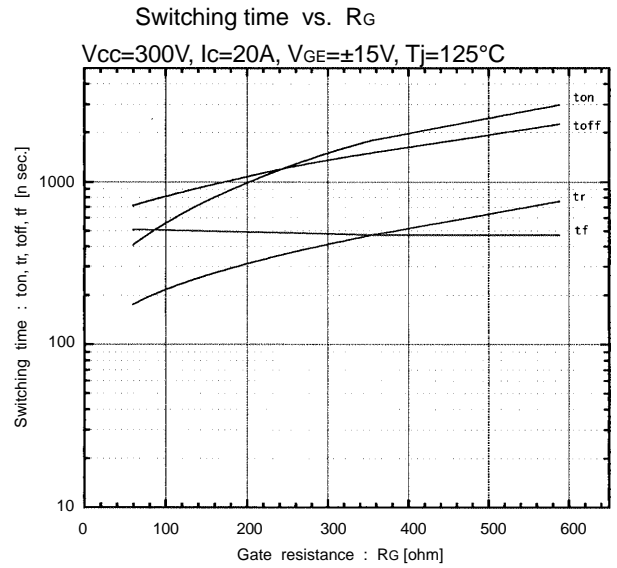
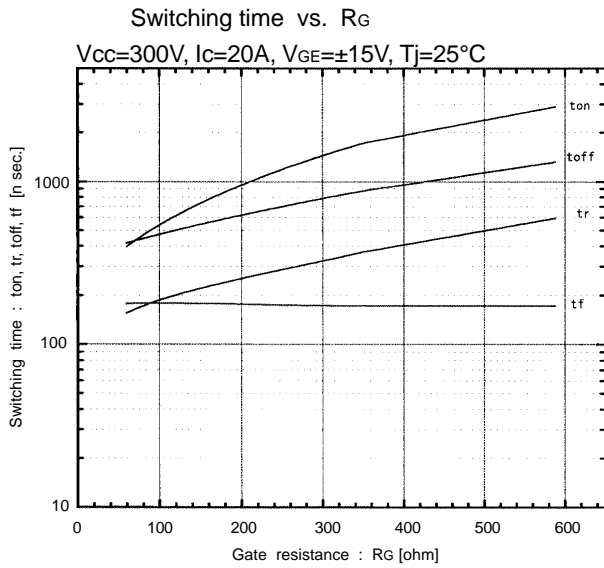
Switching time vs. Collector current

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



Characteristics

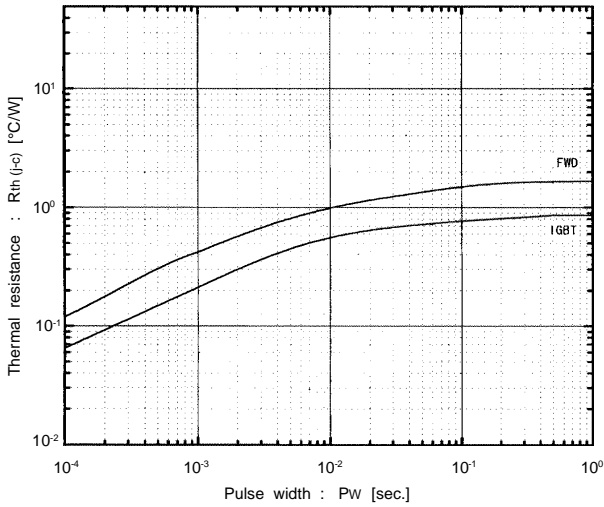
1MB20-060, 1MB20D-060



■ Characteristics

1MB20-060, 1MB20D-060

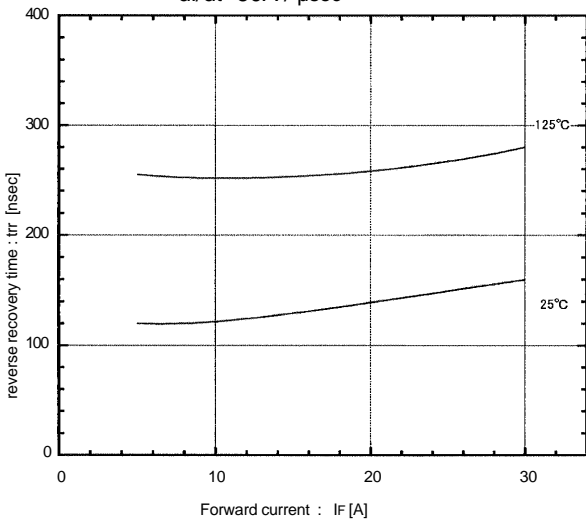
Transient thermal resistance



1MB20D-060

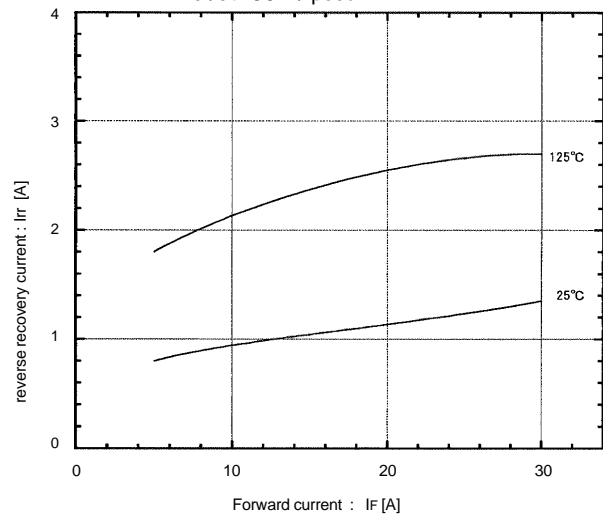
Reverse recovery time vs. Forward current

$-di/dt=60A/\mu sec$

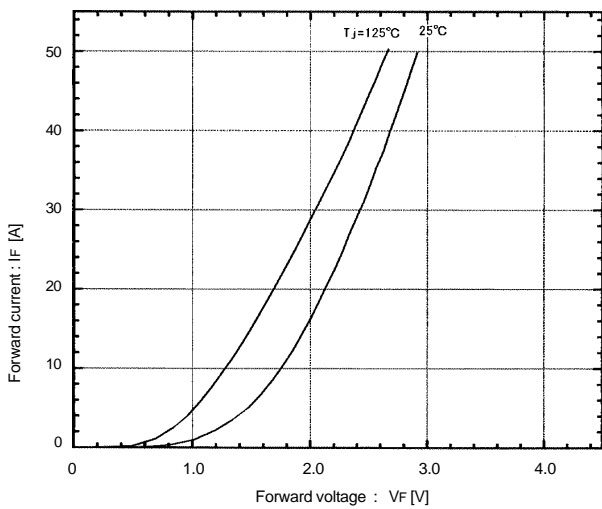


Reverse recovery current vs. Forward current

$-di/dt=60A/\mu sec$



Forward current vs. Forward voltage



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

$I_F=20A, T_j=125^{\circ}C$

