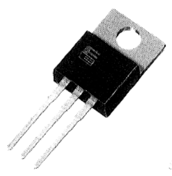
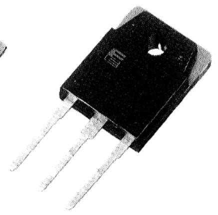
1MBC03-120,1MB03D-120,

1200V / 3A

Molded Package



1MBC03-120



1MB03D-120

■ 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)

1MBC03-120 / IGBT

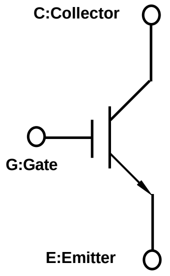
Item			Symbol	Rating	Unit
Collector-Emitter voltage			V_{CES}	1200	V
Gate-Emitter voltaga			V_{GES}	±20	V
Collector current	DC	Tc=25°C	I_{C25}	5	A
		Tc=100°C	I_{C100}	2.5	A
	1ms	Tc=25°C	Icp	15	A
Max. power dissipation(IGBT)			P_C	70	W
Operating temperature			T_j	+150	℃
Storage temperature			T_{stg}	-40 to +150	℃
Screw torque			-	40	N·m

1MB03D-120 / IGBT+FWD

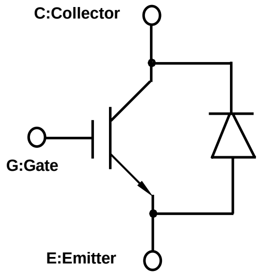
Item			Symbol	Rating	Unit
Collector-Emitter voltage			V_{CES}	1200	V
Gate-Emitter voltaga			V_{GES}	±20	V
Collector current	DC	Tc=25°C	I_{C25}	5	A
		Tc=100°C	I_{C100}	2.5	A
	1ms	Tc=25°C	Icp	15	A
Max. power dissipation (IGBT)			P_C	70	W
Max. power dissipation (FWD)			P_C	40	W
Operating temperature			T_j	+150	℃
Storage temperature			T_{stg}	-40 to +150	℃
Screw torque			-	40	N·m

■ Equivalent Circuit Schematic

IGBT



IGBT + FWD



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

1MBC03-120 / IGBT

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Zero gate voltage collector current	I_{CES}	–	–	1.0	V_{GE}=0V, V_{CE}=1200V	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=2.5mA	V
Collector-Emitter saturation voltage	$V_{CE(sat)}$	–	–	3.5	V_{GE}=15V, I_C=2.5A	V
Input capacitance	C_{ies}	–	400	–	V_{GE}=0V	pF
Output capacitance	C_{oes}	–	70	–	V_{CE}=10V	
Reverse transfer capacitance	C_{res}	–	20	–	f=1MHz	
Turn-on time	t_{on}	–	–	1.2	V_{CC}=600V I_C=2.5A	µs
	t_r	–	–	0.6	V_{GE}=±15V	
Turn-off time	t_{off}	–	–	1.5	R_G=430 ohm	
	t_f	–	–	0.5	(Half Bridge)	

1MB03D-120 / IGBT+FWD

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Zero gate voltage collector current	I_{CES}	–	–	1.0	V_{GE}=0V, V_{CE}=1200V	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=2.5mA	V
Collector-Emitter saturation voltage	$V_{CE(sat)}$	–	–	3.5	V_{GE}=15V, I_C=2.5A	V
Input capacitance	C_{ies}	–	400	–	V_{GE}=0V	pF
Output capacitance	C_{oes}	–	70	–	V_{CE}=10V	
Reverse transfer capacitance	C_{res}	–	20	–	f=1MHz	
Turn-on time	t_{on}	–	–	1.2	V_{CC}=600V, I_C=2.5A	µs
	t_r	–	–	0.6	V_{GE}=±15V	
Turn-off time	t_{off}	–	–	1.5	R_G=430 ohm	
	t_f	–	–	0.5	(Half Bridge)	
FWD forward on voltage	V_F	–	–	3.0	I_F=2.5A, V_{GE}=0V	V
Reverse recovery time	t_{rr}	–	–	0.35	I_F=2.5A, V_{GE}=-10V, di/dt=100A/µs	µs

● Thermal resistance characteristics

1MBC03-120 / IGBT

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	Rth(j-c)	–	–	1.78	IGBT	°C/W

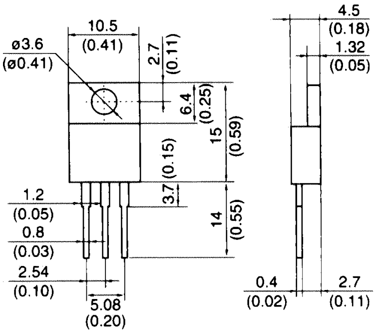
1MB03D-120 / IGBT+FWD

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	Rth(j-c)	–	–	1.78	IGBT	°C/W
	Rth(j-c)	–	–	3.12	FWD	°C/W

■ Outline drawings, mm

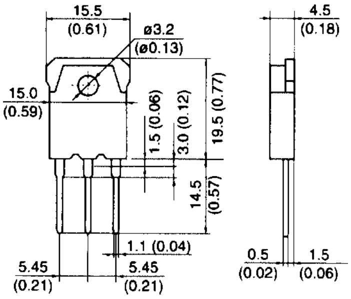
1MBC03-120

TO-110AB



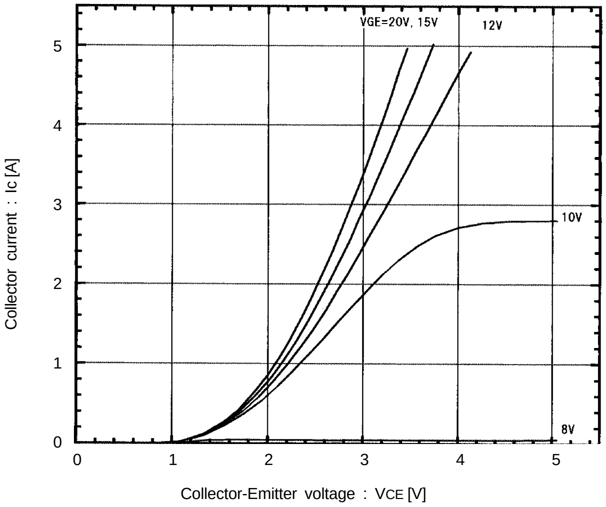
1MB03D-120

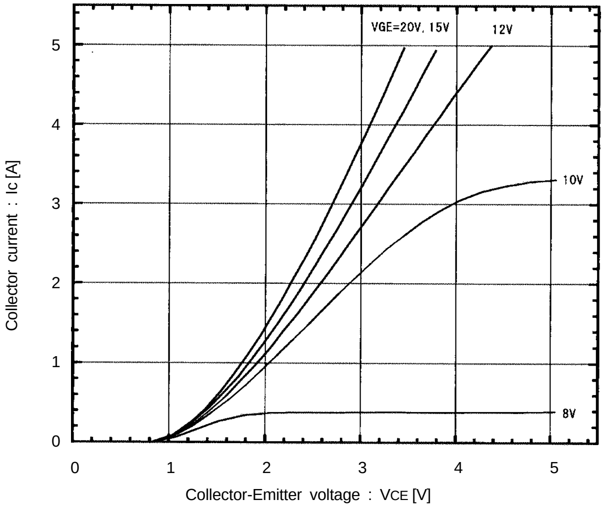
TO-3P

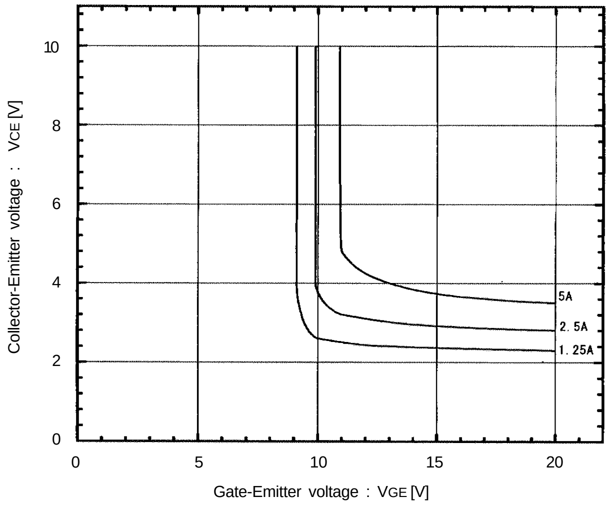


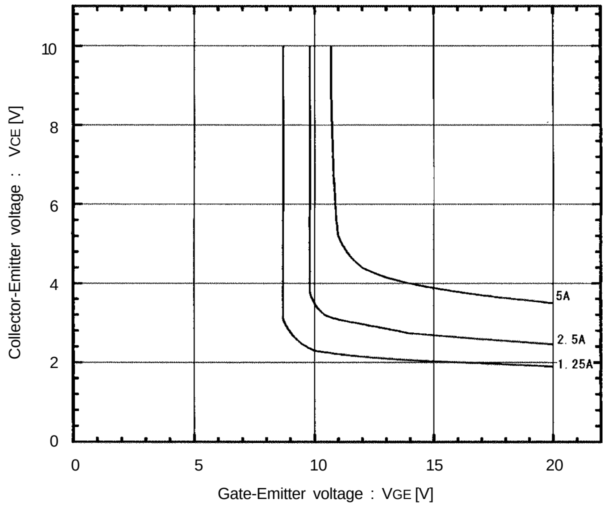
Characteristics

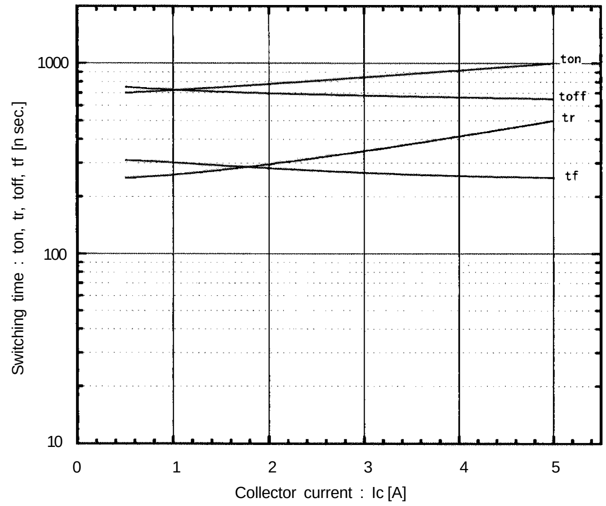
1MBC03-120,1MB03D-120

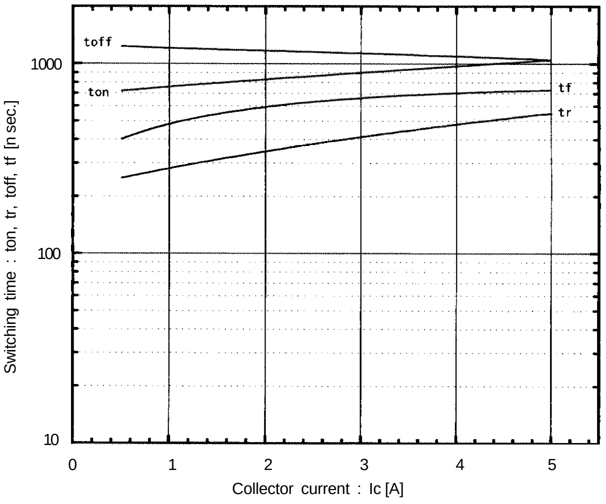

Collector current vs. Collector-Emitter voltage
Tj=25°C


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


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


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


Switching time vs. Collector current
Vcc=600V, R_G=430 ohm, V_{GE}=±15V, Tj=25°C

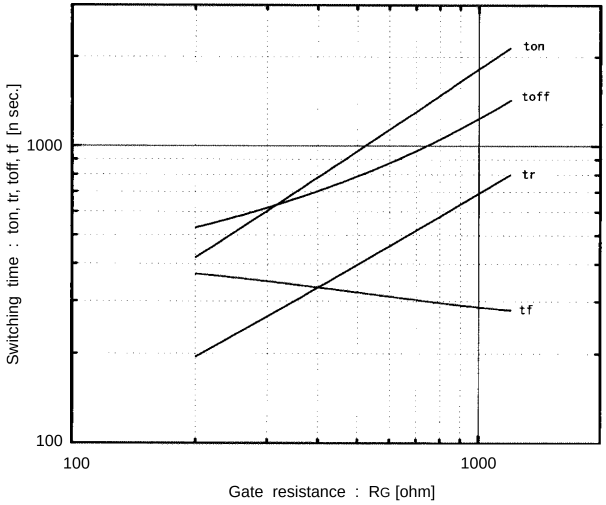

Switching time vs. Collector current
Vcc=600V, R_G=430 ohm, V_{GE}=±15V, Tj=125°C

■ Characteristics

1MBC03-120,1MB03D-120

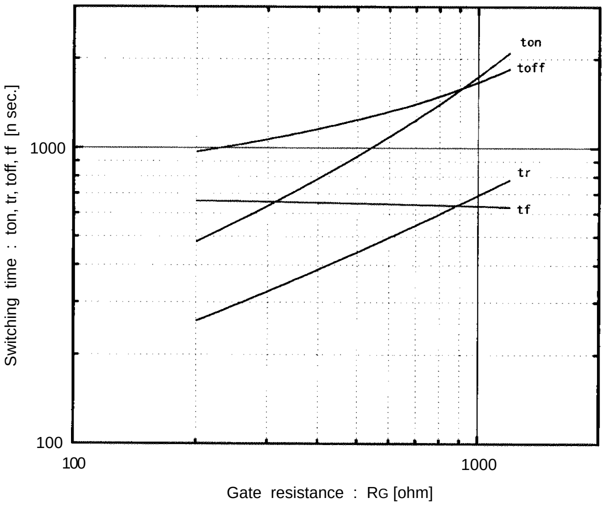
Switching time vs. RG

Vcc=600V, Ic=2.5A, VGE=±15V, Tj=25°C



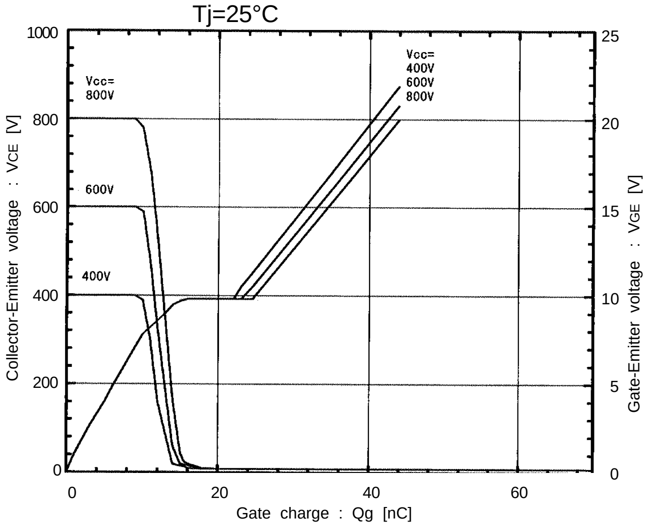
Switching time vs. RG

Vcc=600V, Ic=2.5A, VGE=±15V, Tj=125°C



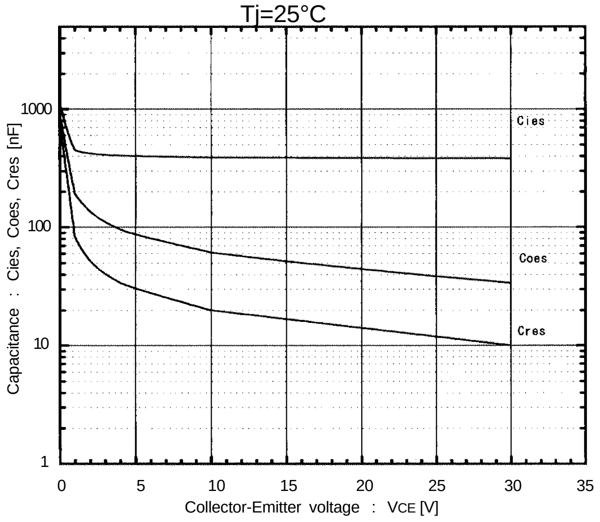
Dynamic input characteristics

Tj=25°C



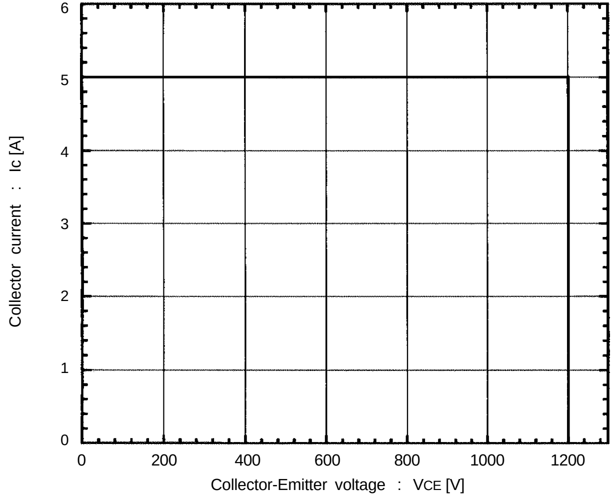
Capacitance vs. Collector-Emitter voltage

Tj=25°C



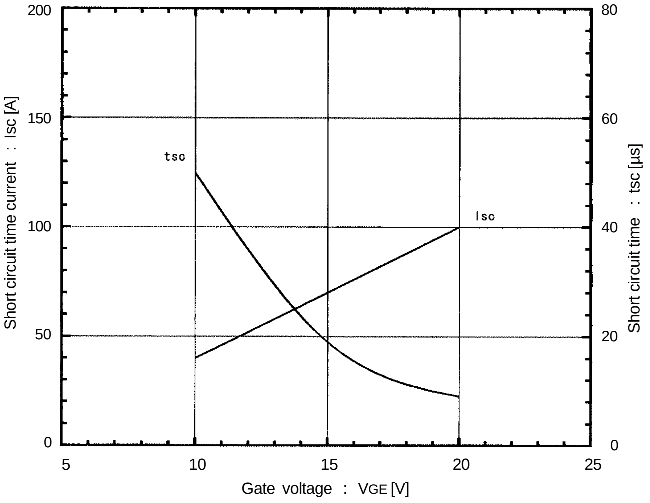
Reversed biased safe operating area

+VGE=15V, -VGE ≦ 15V, Tj ≦ 125°C, RG ≧ 430 ohm



Typical short circuit capability

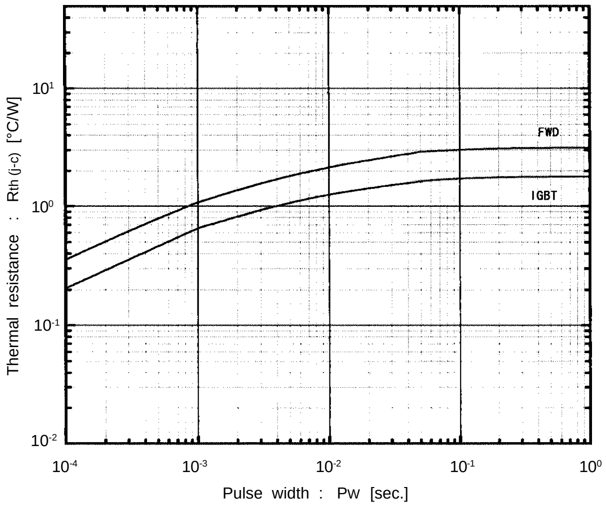
Vcc=800V, RG=430 ohm, Tj=125°C



Characteristics

1MBC03-120,1MB03D-120

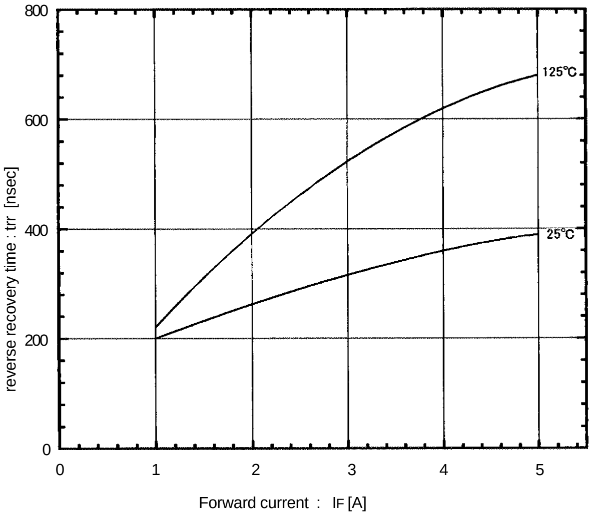
Transient thermal resistance



1MB03D-120

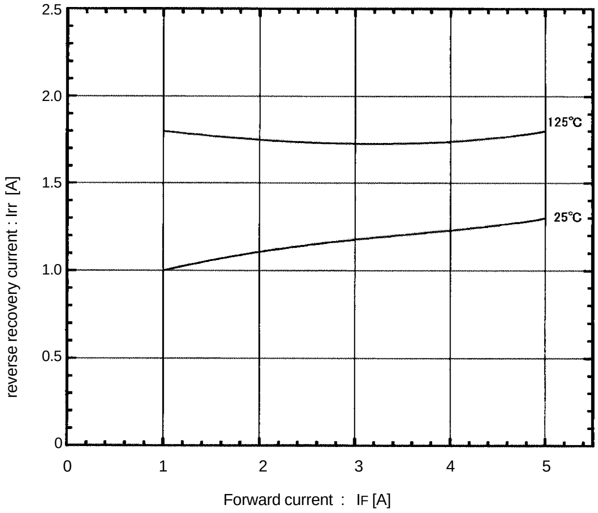
Reverse recovery time vs. Forward current

-di/dt=7.5A / µsec

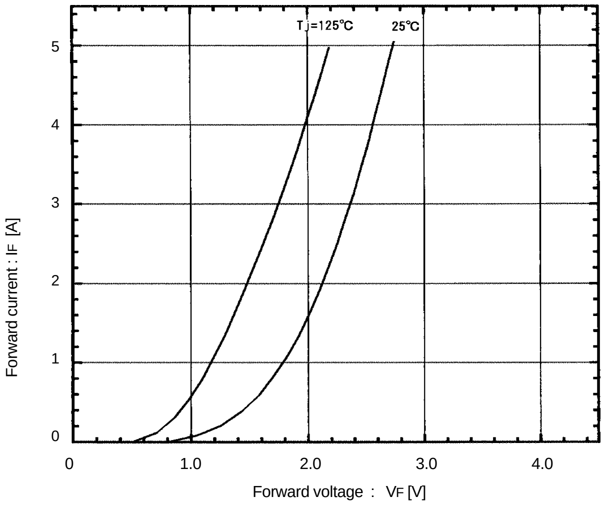


Reverse recovery current vs. Forward current

-di/dt=7.5A / µsec



Forward current vs. Foeward voltage



Reverse recovery time characteristics vs. -di/dt

IF=2.5A, Tj=125°C