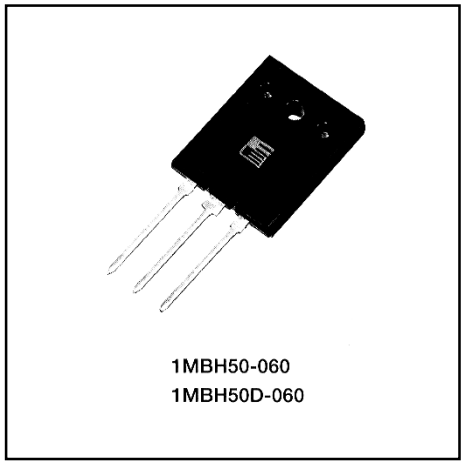
1MBH50-060,1MBH50D-060, Molded IGBT

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 (at Tc=25°C unless otherwise specified)**

1MBH50-060 / IGBT

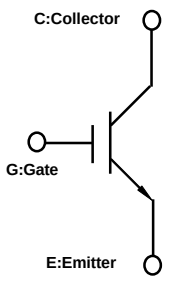
Item			Symbol	Rating	Unit
Collector-Emitter voltage			V_{CES}	600	V
Gate-Emitter voltaga			V_{GES}	±20	V
Collector current	DC	Tc=25°C	I_{C25}	82	A
		Tc=100°C	I_{C100}	50	A
	1ms	Tc=25°C	Icp	328	A
Max. power dissipation(IGBT)			P_C	310	W
Operating temperature			T_j	+150	℃
Storage temperature			T_{stg}	-40 to +150	℃
Screw torque			-	70	N·m

1MBH50D-060 / IGBT+FWD

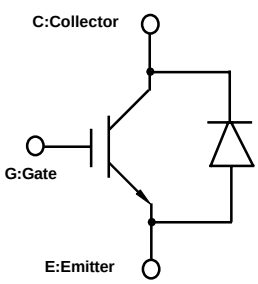
Item			Symbol	Rating	Unit
Collector-Emitter voltage			V_{CES}	600	V
Gate-Emitter voltaga			V_{GES}	±20	V
Collector current	DC	Tc=25°C	I_{C25}	82	A
		Tc=100°C	I_{C100}	50	A
	1ms	Tc=25°C	Icp	328	A
Max. power dissipation (IGBT)			P_C	310	W
Max. power dissipation (FWD)			P_C	140	W
Operating temperature			T_j	+150	℃
Storage temperature			T_{stg}	-40 to +150	℃
Screw torque			-	70	N·m

■ Equivalent Circuit Schematic

IGBT



IGBT + FWD



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

1MBH50-060 / 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=50mA	V
Collector-Emitter saturation voltage	$V_{CE(sat)}$	–	–	3.0	V_{GE}=15V, I_C=50A	V
Input capacitance	C_{ies}	–	3000	–	V_{GE}=0V	pF
Output capacitance	C_{oes}	–	650	–	V_{CE}=10V	
Reverse transfer capacitance	C_{res}	–	150	–	f=1MHz	
Turn-on time	t_{on}	–	–	1.2	V_{CC}=300V, I_C=50A	µs
	t_r	–	–	0.6	V_{GE}=±15V	
Turn-off time	t_{off}	–	–	1.0	R_G=62 ohm	
	t_f	–	–	0.35	(Half Bridge)	

1MBH50D-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=50mA	V
Collector-Emitter saturation voltage	$V_{CE(sat)}$	–	–	3.0	V_{GE}=15V, I_C=50A	V
Input capacitance	C_{ies}	–	3000	–	V_{GE}=0V	pF
Output capacitance	C_{oes}	–	650	–	V_{CE}=10V	
Reverse transfer capacitance	C_{res}	–	150	–	f=1MHz	
Turn-on time	t_{on}	–	–	1.2	V_{CC}=300V, I_C=50A	µs
	t_r	–	–	0.6	V_{GE}=±15V	
Turn-off time	t_{off}	–	–	1.0	R_G=62 ohm	
	t_f	–	–	0.35	(Half Bridge)	
FWD forward on voltage	V_F	–	–	3.0	I_F=50A, V_{GE}=0V	V
Reverse recovery time	t_{rr}	–	–	0.3	I_F=50A, V_{GE}=-10V, di/dt=100A/µs	µs

● Thermal resistance characteristics

1MBH50-060 / IGBT

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	Rth(j-c)	–	–	0.40	IGBT	°C/W

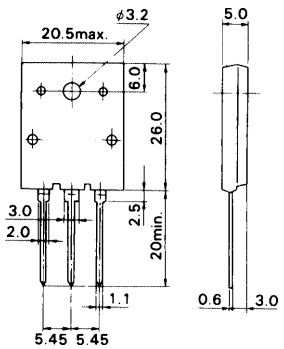
1MBH50D-060 / IGBT+FWD

Item	Symbol	Characteristics			Conditions	Unit
		Min.	Typ.	Max.		
Thermal resistance	Rth(j-c)	–	–	0.40	IGBT	°C/W
	Rth(j-c)	–	–	0.89	FWD	°C/W

■ Outline drawings, mm

1MBH50-060, 1MBH50D-060

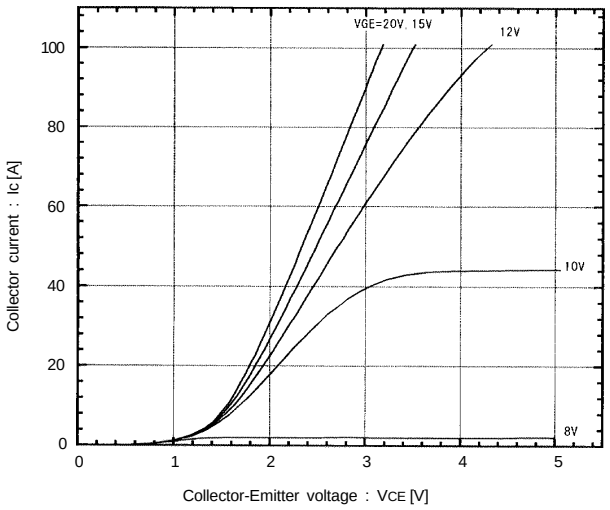
TO-3PL



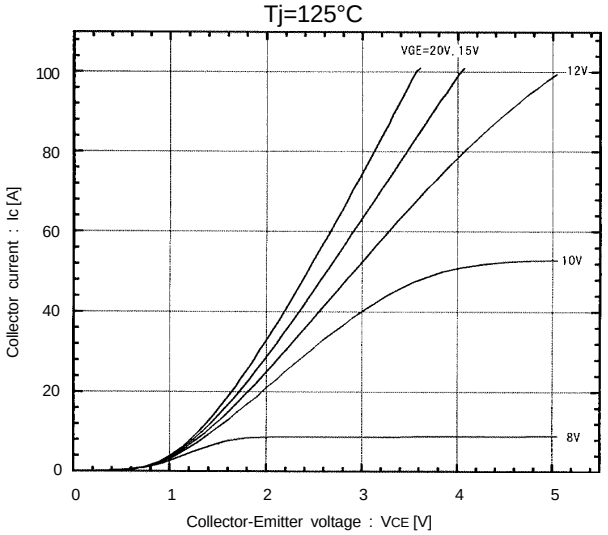
■ Characteristics

1MBH50-060,1MBH50D-060

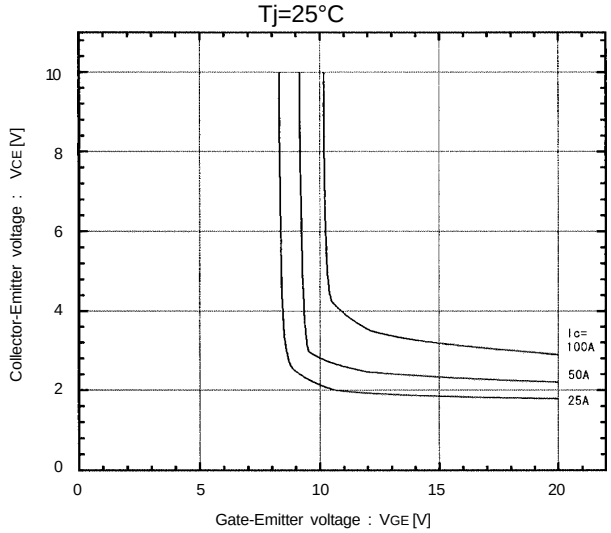
Collector current vs. Collector-Emitter voltage
Tj=25°C



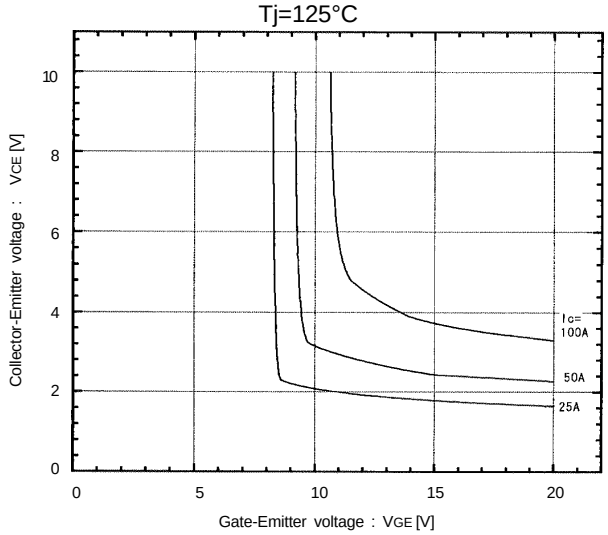
Collector current vs. Collector-Emitter voltage
Tj=125°C



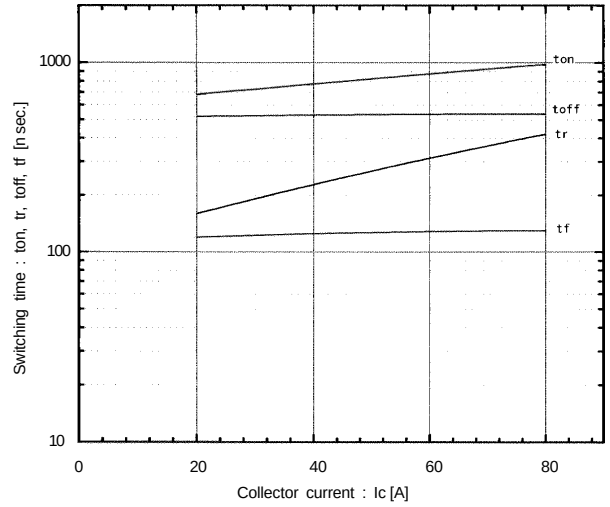
Collector-Emitter vs. Gate-Emitter voltage
Tj=25°C



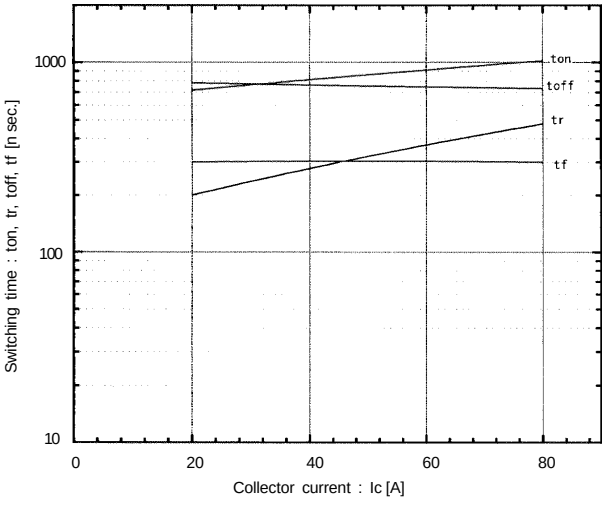
Collector-Emitter vs. Gate-Emitter voltage
Tj=125°C



Switching time vs. Collector current
Vcc=300V, RG=62 ohm, VGE=±15V, Tj=25°C



Switching time vs. Collector current
Vcc=300V, RG=62 ohm, VGE=±15V, Tj=125°C

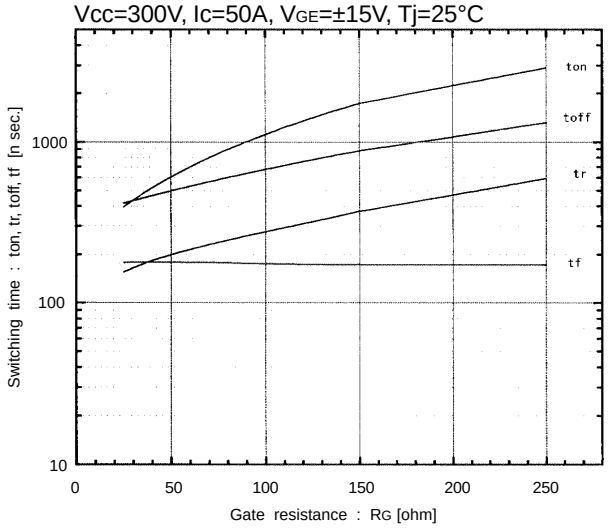


■ Characteristics

1MBH50-060,1MBH50D-060

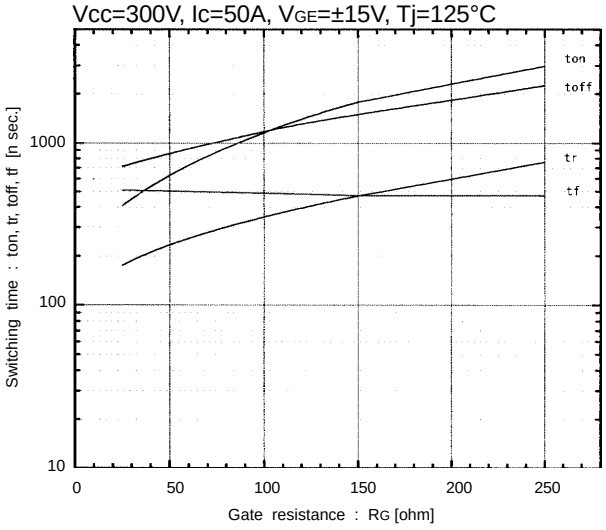
Switching time vs. R_G

Vcc=300V, Ic=50A, V_{GE}=±15V, Tj=25°C



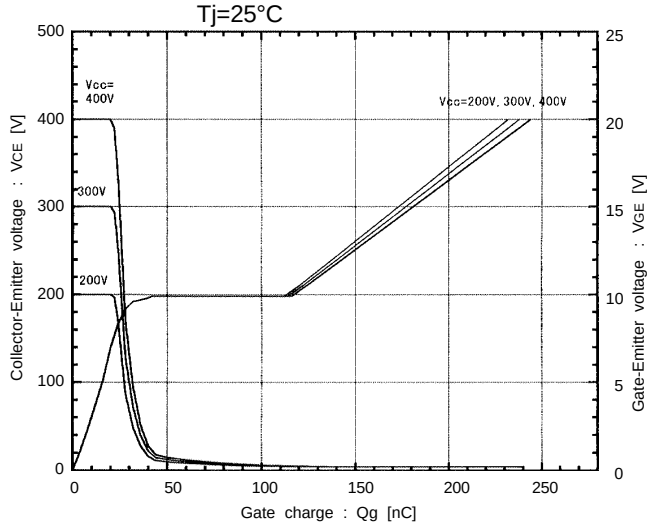
Switching time vs. R_G

Vcc=300V, Ic=50A, V_{GE}=±15V, Tj=125°C



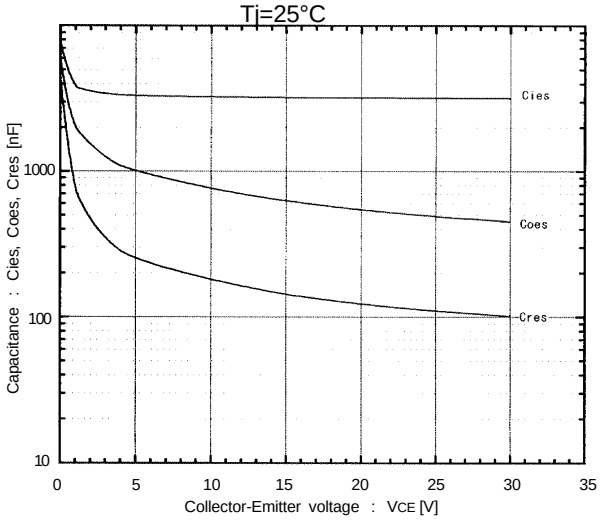
Dynamic input characteristics

Tj=25°C



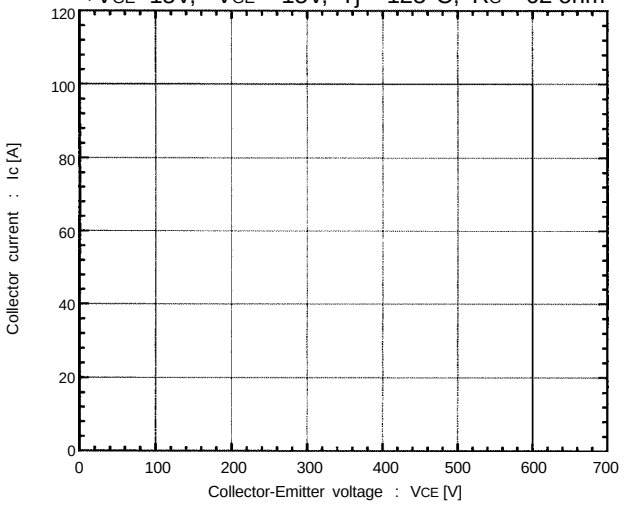
Capacitance vs. Collector-Emitter voltage

Tj=25°C



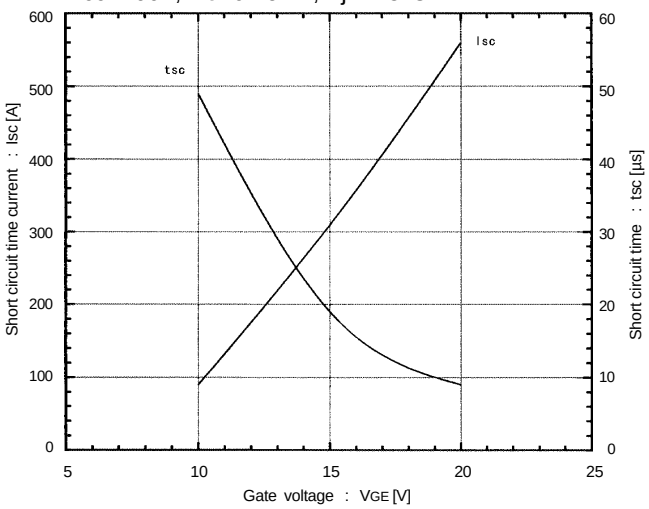
Reversed biased safe operating area

+V_{GE}=15V, -V_{GE} ≦ 15V, Tj ≦ 125°C, R_G ≧ 62 ohm



Typical short circuit capability

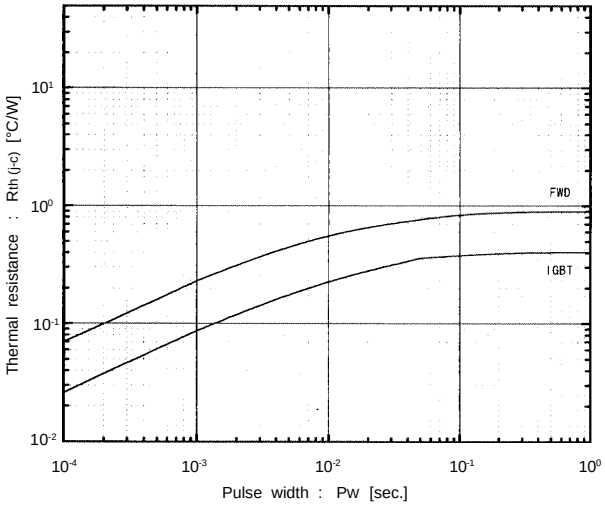
Vcc=400V, R_G=62 ohm, Tj=125°C



■ Characteristics

1MBH50-060,1MBH50D-060

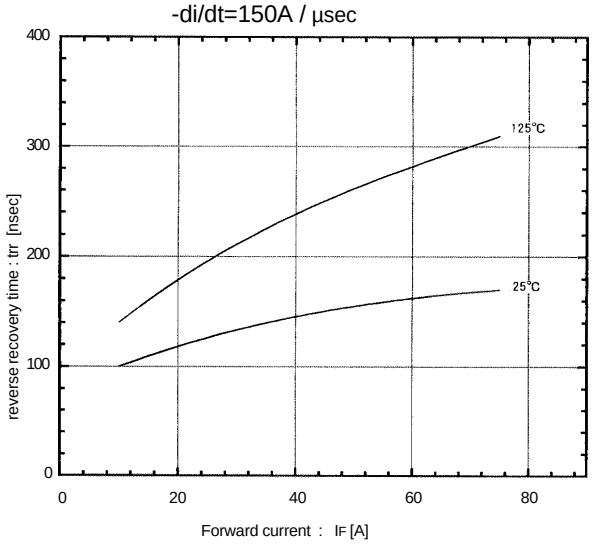
Transient thermal resistance



1MBH50D-060

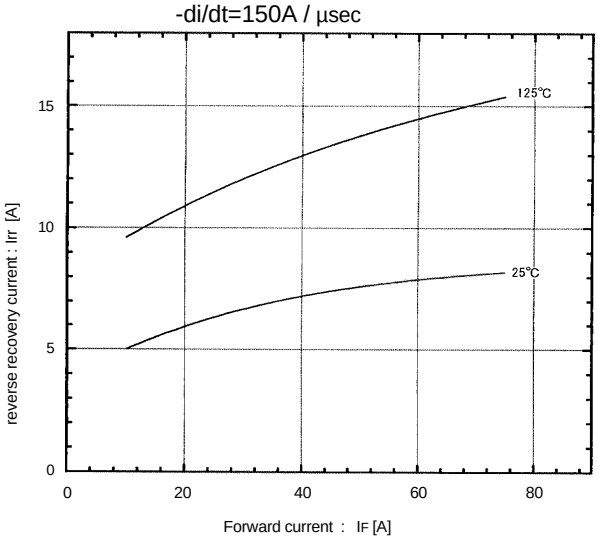
Reverse recovery time vs. Forward current

-di/dt=150A / µsec

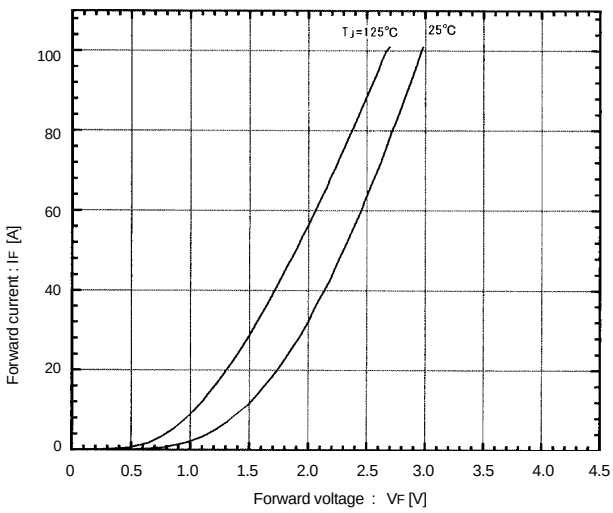


Reverse recovery current vs. Forward current

-di/dt=150A / µsec



Forward current vs. Foeward voltage



Reverse recovery time characteristics vs. -di/dt

IF=50A, Tj=125°C