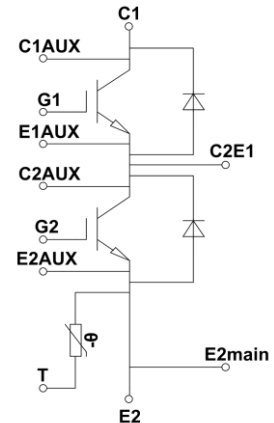


# MBM450FS33F

Silicon N-channel IGBT 3300V F version

## FEATURES

- \* High current density package
- \* Low stray inductance & low Rth(j-c)
- \* Half-bridge (2in1)
- \* Built in temperature sensor
- \* Scalable large current easily handled by paralleling
- \* Equipped with current sensing terminals



## ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub>=25°C)

Item	Symbol	Unit	MBM450FS33F
Collector Emitter Voltage	V <sub>CES</sub>	V	3,300
Gate Emitter Voltage	V <sub>GES</sub>	V	±20
Collector Current	DC	I <sub>C</sub>	450
	1ms	I <sub>CM</sub>	900
Forward Current	DC	I <sub>F</sub>	450
	1ms	I <sub>FM</sub>	900
Junction Temperature	T <sub>vj op</sub>	°C	-50 ~ +150
Storage Temperature	T <sub>stg</sub>	°C	-55 ~ +150
Isolation Voltage	V <sub>ISO</sub>	V <sub>RMS</sub>	6,000(AC 1 minute)
Screw Torque	Terminals (M3/M8)	M	0.8/15
	Mounting (M6)	M	6.0 (1)

Notes: (1) Recommended Value 5.5±0.5N·m

## ELECTRICAL CHARACTERISTICS

Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions	
Collector Emitter Cut-Off Current	I <sub>CES</sub>	mA	-	-	0.30	V <sub>CE</sub> =3,300V, V <sub>GE</sub> =0V, T <sub>vj</sub> =25°C	
			-	15	50	V <sub>CE</sub> =3,300V, V <sub>GE</sub> =0V, T <sub>vj</sub> =150°C	
Gate Emitter Leakage Current	I <sub>GES</sub>	nA	-500	-	+500	V <sub>GE</sub> =±20V, V <sub>CE</sub> =0V, T <sub>vj</sub> =25°C	
Collector Emitter Saturation Voltage	V <sub>CESat</sub>	V	-	2.25	-	I <sub>C</sub> =450A, V <sub>GE</sub> =15V, T <sub>vj</sub> =25°C	
			2.50	3.05	3.50	I <sub>C</sub> =450A, V <sub>GE</sub> =15V, T <sub>vj</sub> =150°C	
Gate Emitter Threshold Voltage	V <sub>GE(th)</sub>	V	5.5	6.5	7.5	V <sub>CE</sub> =10V, I <sub>C</sub> =450mA, T <sub>vj</sub> =25°C	
Input Capacitance	C <sub>ies</sub>	nF	-	24	-	V <sub>CE</sub> =10V, V <sub>GE</sub> =0V, f=100kHz, T <sub>vj</sub> =25°C	
Internal Gate Resistance	R <sub>G(int)</sub>	Ω	-	6.2	-	V <sub>CE</sub> =10V, V <sub>GE</sub> =0V, f=100kHz, T <sub>vj</sub> =25°C	
Turn On Delay Time	t <sub>d(on)</sub>	μs	-	0.48	-	V <sub>CC</sub> =1800V, I <sub>C</sub> =450A	
Rise Time	t <sub>r</sub>		-	0.12	-	L <sub>s</sub> =40nH	
Turn Off Delay Time	t <sub>d(off)</sub>		-	1.10	-	R <sub>G(on/off)</sub> =6.8Ω/12Ω (2)	
Fall Time	t <sub>f</sub>		-	1.30	-	V <sub>GE</sub> =±15V, T <sub>vj</sub> =150°C	
Forward Voltage Drop	V <sub>F</sub>	V	-	2.25	-	I <sub>F</sub> =450A, V <sub>GE</sub> =0V, T <sub>vj</sub> =25°C	
			2.10	2.45	2.80	I <sub>F</sub> =450A, V <sub>GE</sub> =0V, T <sub>vj</sub> =150°C	
Reverse Recovery Time	t <sub>rr</sub>	μs	-	1.10	-	V <sub>CC</sub> =1800V, I <sub>F</sub> =450A, L <sub>s</sub> =40nH T <sub>vj</sub> =150°C	
Turn-on Loss per Pulse	E <sub>on</sub>	J/P	-	0.73	-	V <sub>CC</sub> =1800V, I <sub>C</sub> =450A, L <sub>s</sub> =40nH	
Turn-off Loss per Pulse	E <sub>off</sub>	J/P	-	0.63	-	R <sub>G(on/off)</sub> =6.8Ω/12Ω (2)	
Reverse Recovery Loss per Pulse	E <sub>rr</sub>	J/P	-	0.68	-	V <sub>GE</sub> =±15V, T <sub>vj</sub> =150°C	
Short Circuit Pulse Width	t <sub>sc</sub>	μs	10	-	-	V <sub>CC</sub> =2200V, L <sub>s</sub> =40nH R <sub>G(on/off)</sub> =6.8/68Ω, V <sub>GE</sub> =±15V, T <sub>vj</sub> =150°C	
Stray Inductance Module	L <sub>SCE</sub>	nH	-	9	-	Between C1(main) and E2(main)	
NTC-Thermistor	Resistance	R <sub>25</sub>	kΩ	-	5	-	T <sub>C</sub> =25°C
	Deviation	ΔR/R	%	-5	-	5	T <sub>C</sub> =25°C
	B-constant	B(25/50)	K	-	3375	-	Between 25°C and 50°C
Thermal Impedance	IGBT	Rth(j-c)	K/W	-	-	0.035	Junction to case
	FWD	Rth(j-c)	K/W	-	-	0.055	
Contact Thermal Impedance	Rth(c-f)	K/W	-	0.02	-	Case to fin (per 1 arm)	

Notes: (2) R<sub>G</sub> value is a test condition value for evaluation, not recommended value.

Please determine the suitable R<sub>G</sub> value by measuring switching behavior and checking results with the respective SOA.

\* Please contact our representatives at order. \* For improvement, specifications are subject to change without notice.

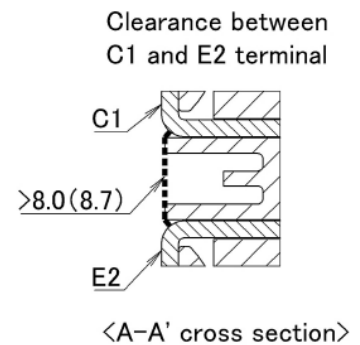
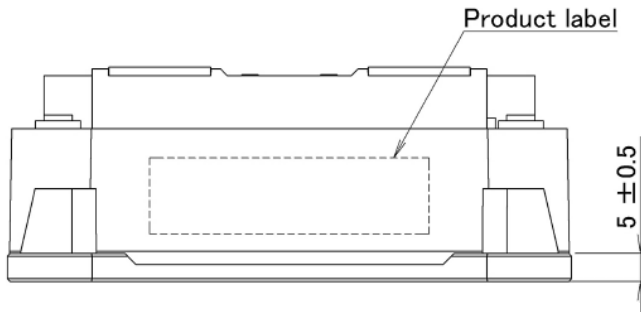
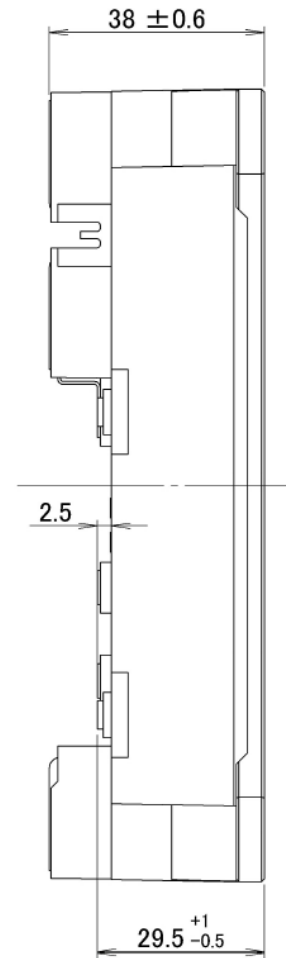
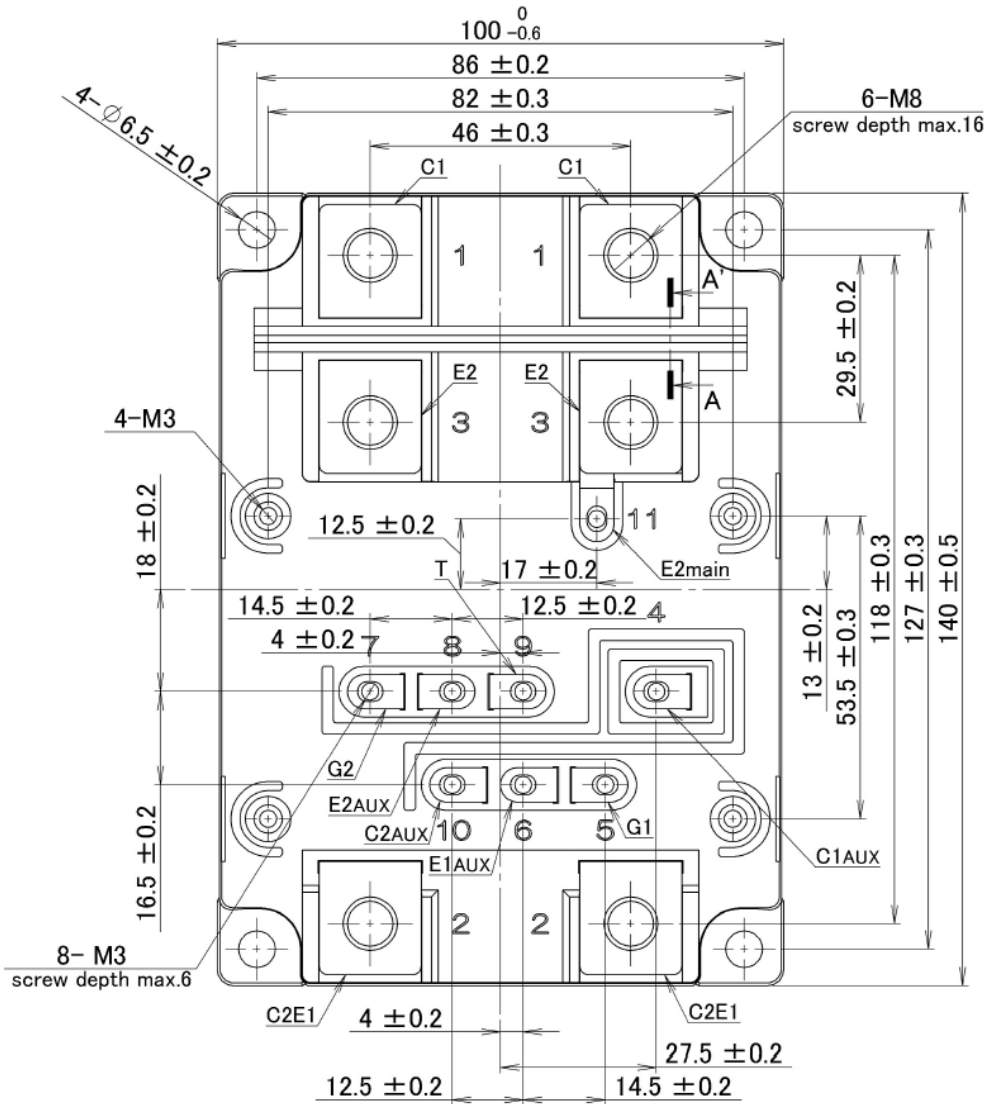
\* For actual application, please confirm this spec sheet is the newest revision.

\* ELECTRICAL CHARACTERISTIC items shown in above table are according to IEC 60747-2 and IEC 60747-9.

# MBM450FS33F

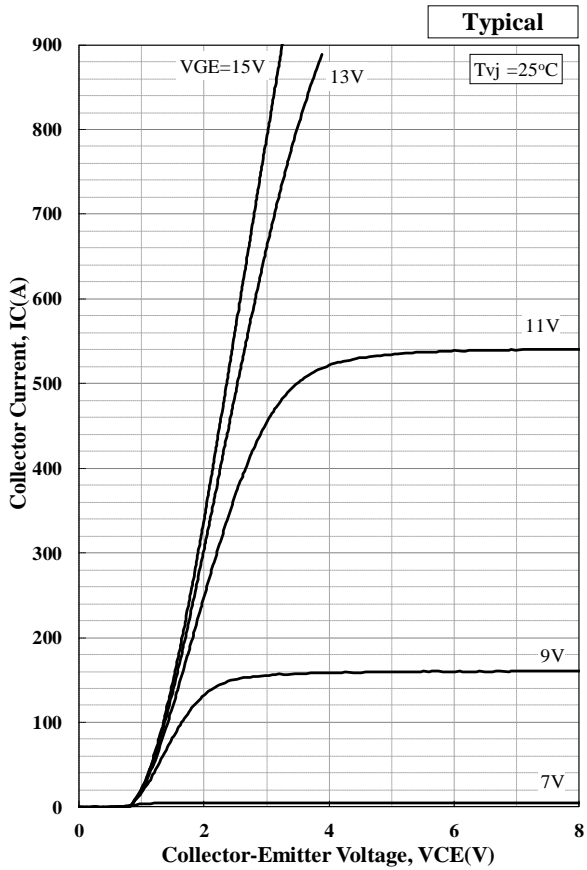
OUTLINE DRAWING

Unit in mm

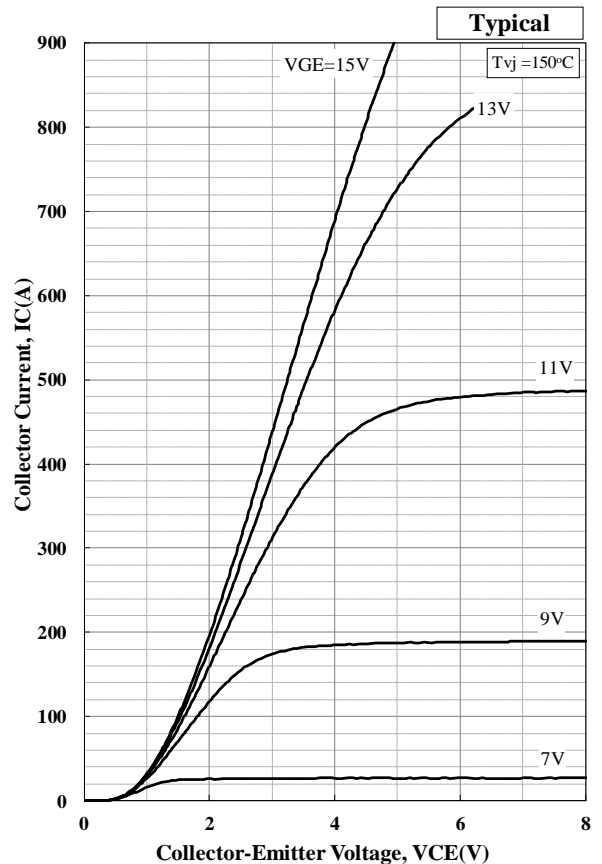


Weight: 770(g)

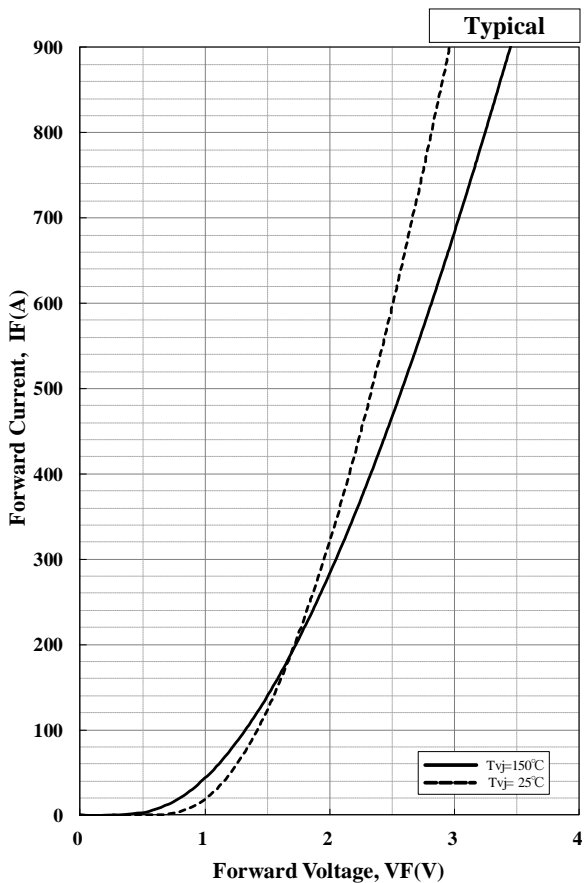
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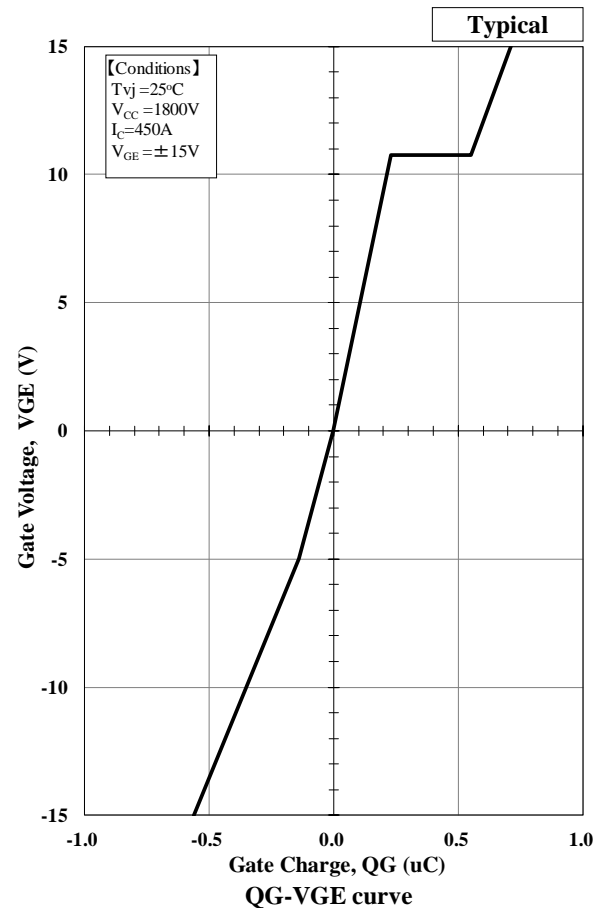
Collector Current vs. Collector to Emitter Voltage



Collector Current vs. Collector to Emitter Voltage

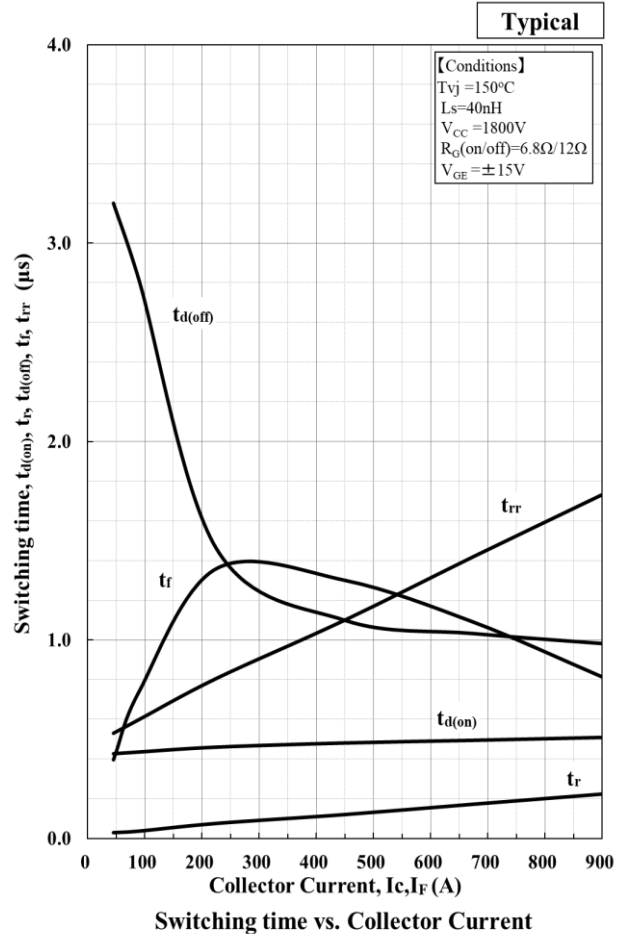
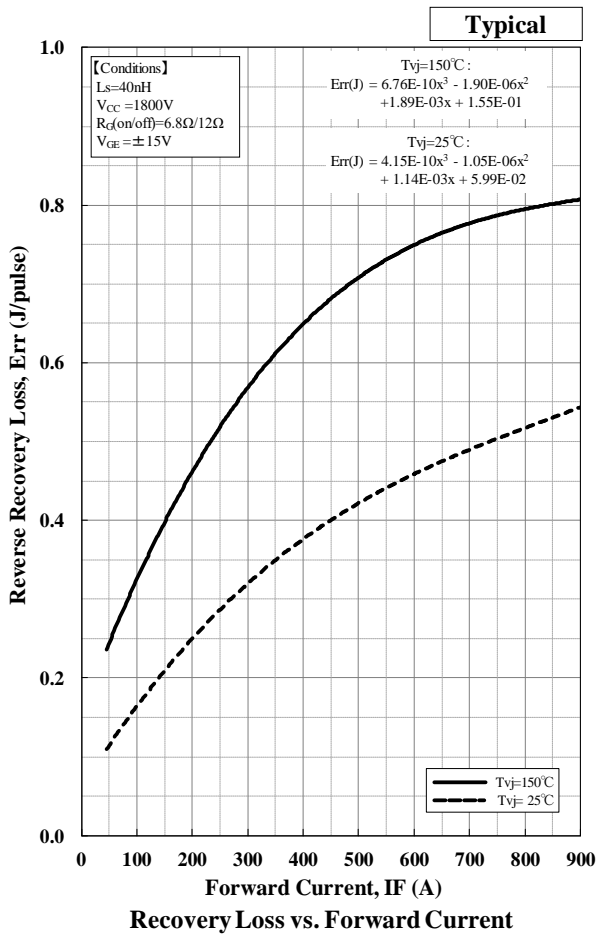
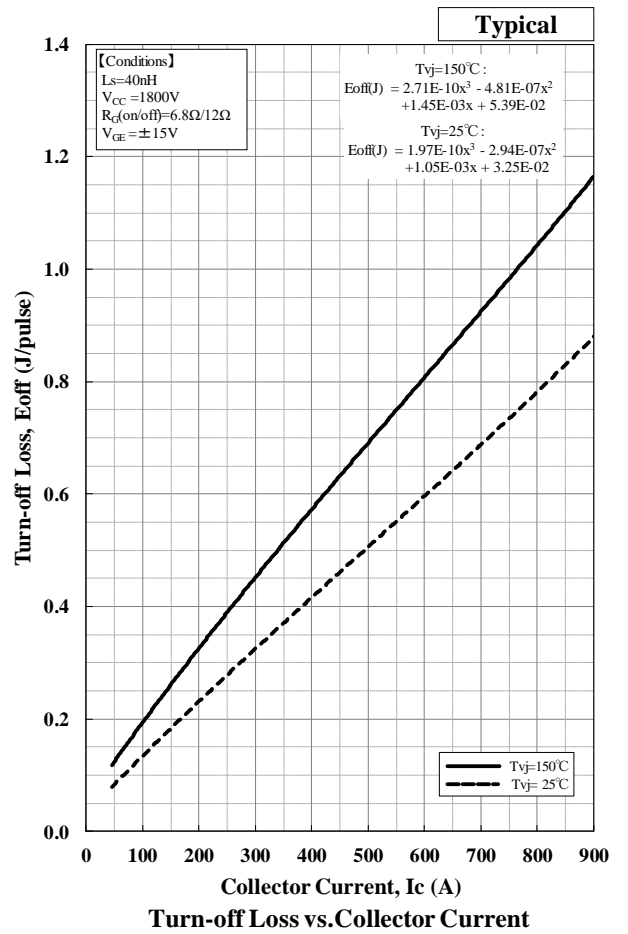
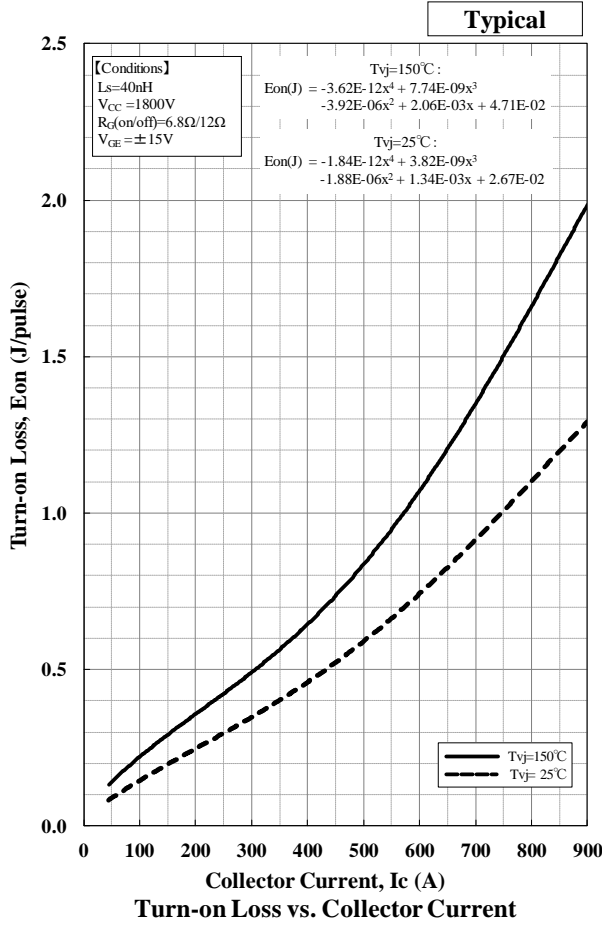


Forward Voltage of free-wheeling diode

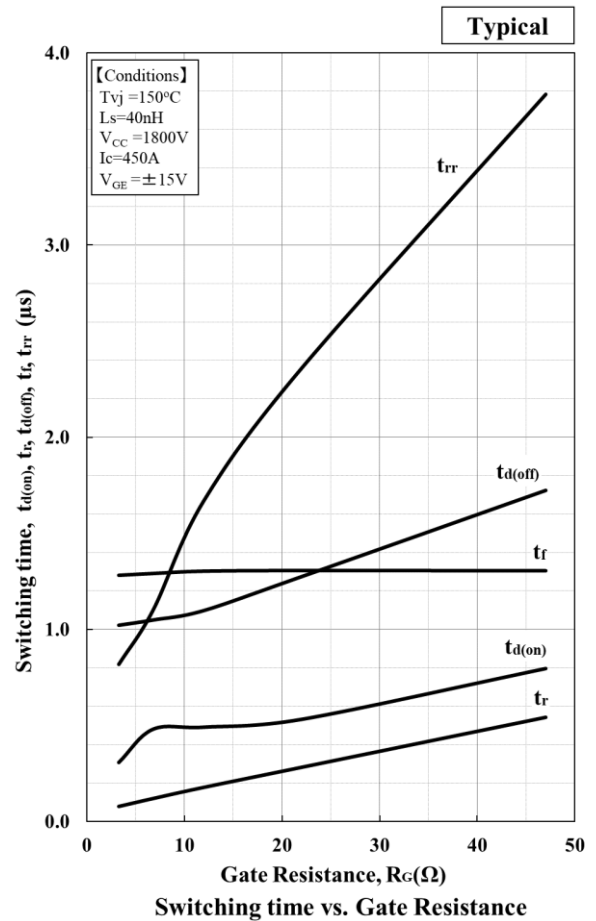
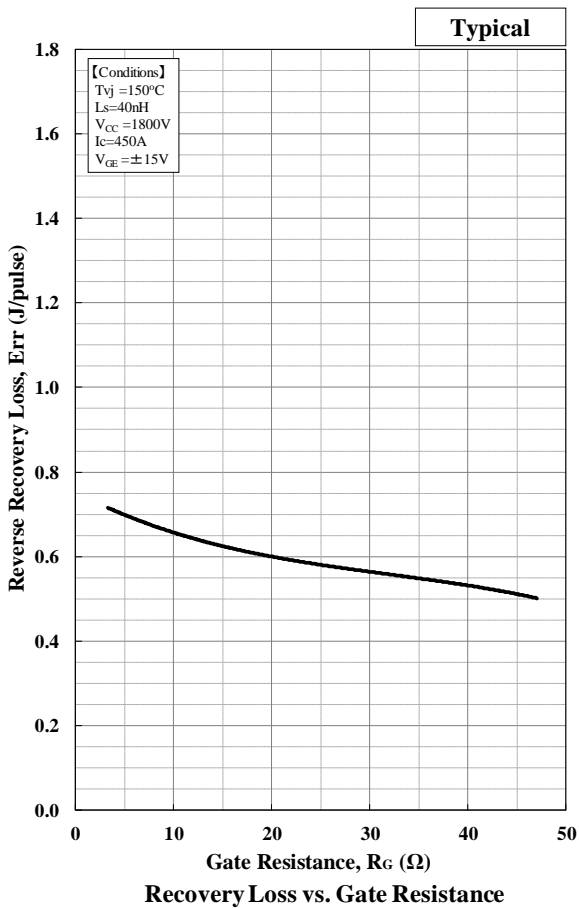
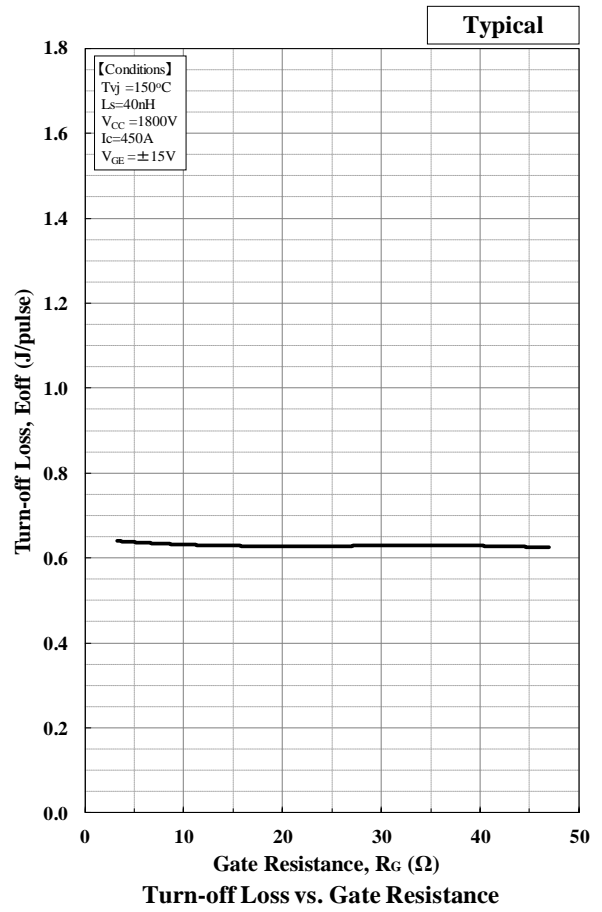
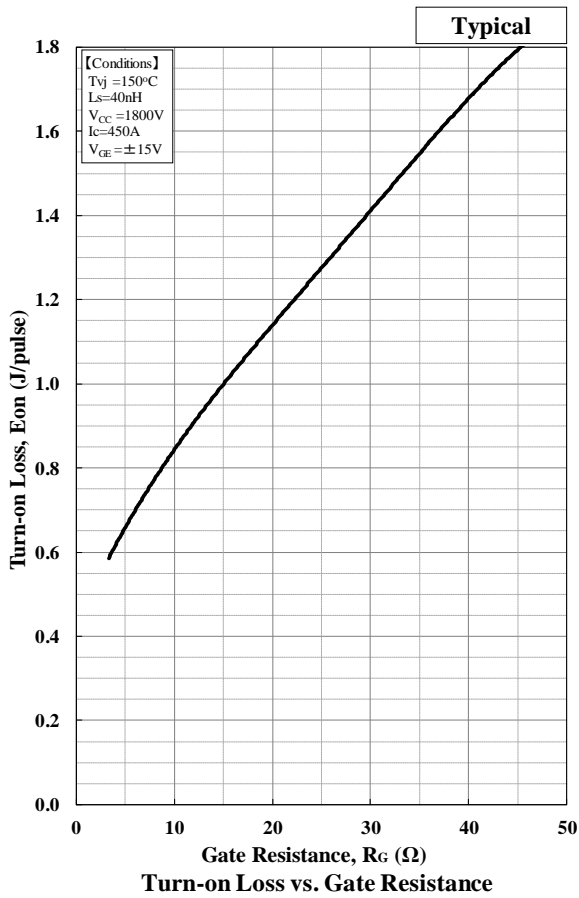


QG-VGE curve

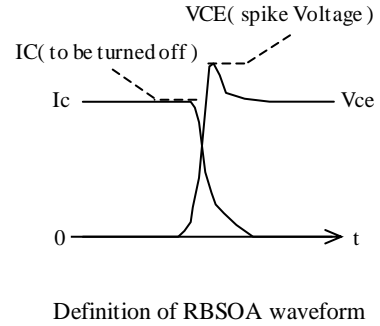
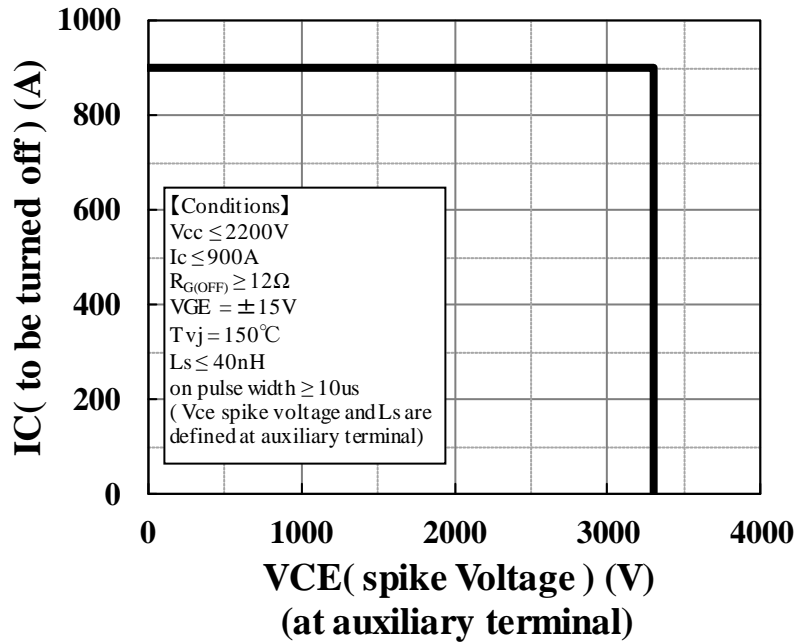
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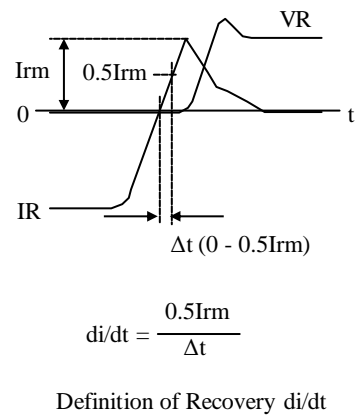
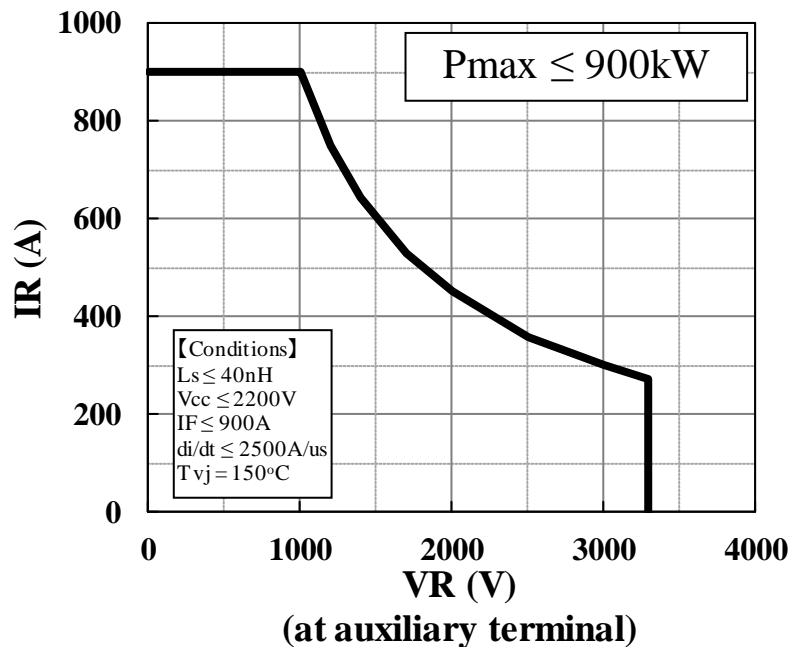
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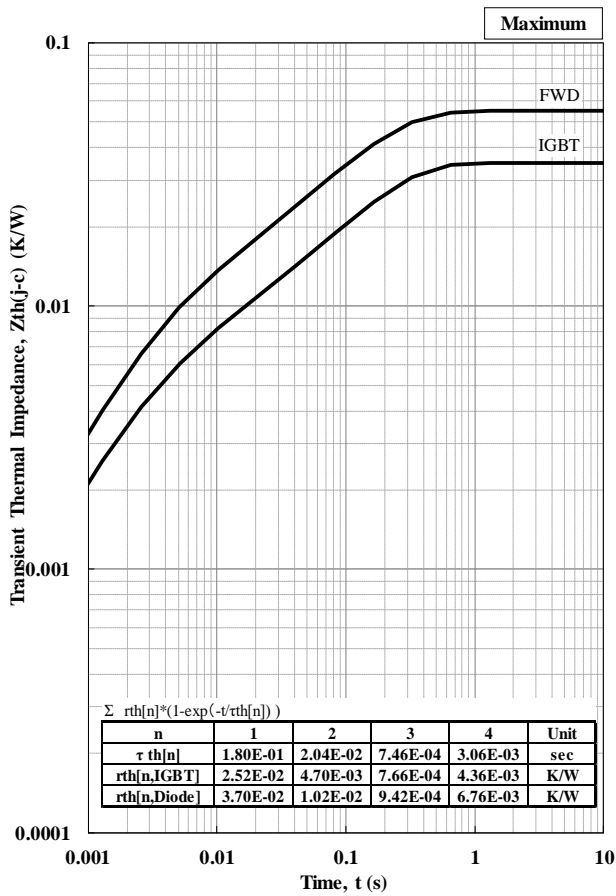


## Reverse bias safe operation area ( RBSOA )

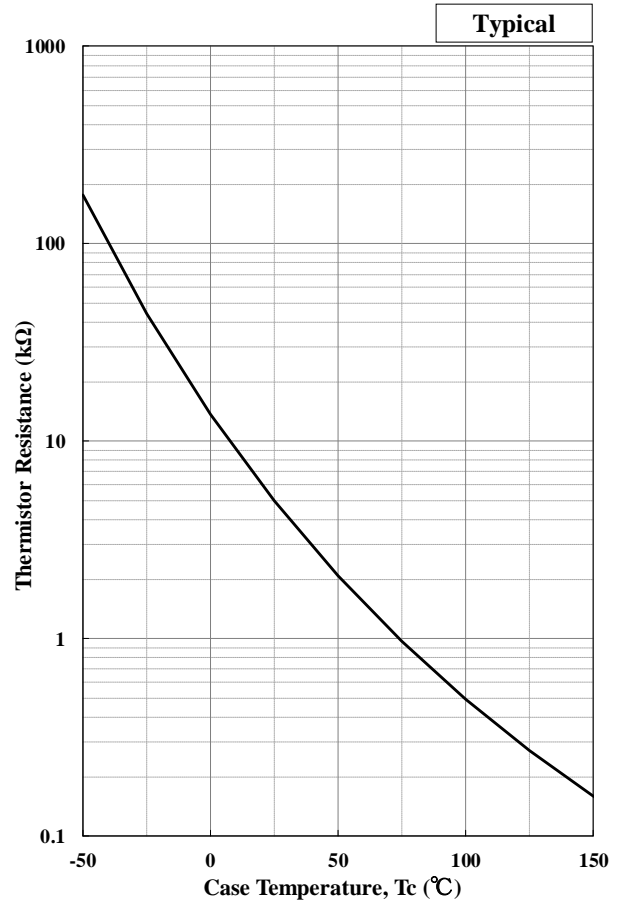


## Reverse Recovery SOA

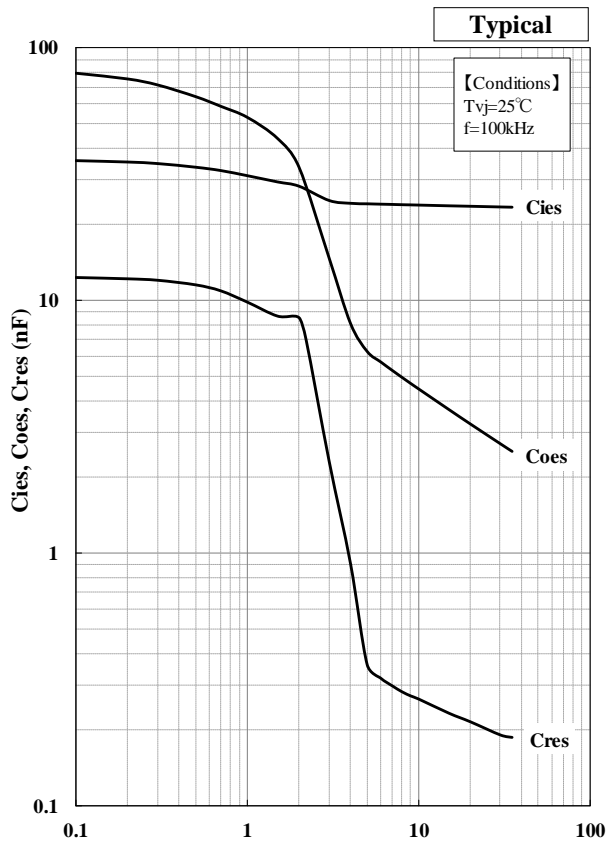
# MBM450FS33F



Transient Thermal Impedance Curve



Thermistor Resistance vs. Temperature



Capacitance vs. Collector to Emitter Voltage

# MBM450FS33F

## HITACHI POWER SEMICONDUCTORS

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# MBM450FS33F

## HITACHI POWER SEMICONDUCTORS

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