

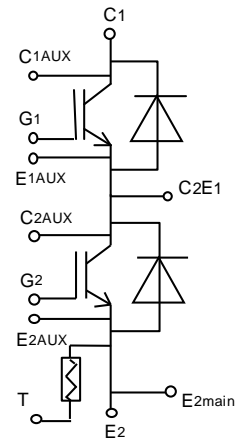
# MBM450FS33F

Preliminary Specification

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



Circuit diagram

## 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	-	-	0.15	V <sub>CE</sub> =3,300V, V <sub>GE</sub> =0V, T <sub>vj</sub> =25°C
Gate Emitter Leakage Current	I <sub>GES</sub>	nA	-500	-	+500	V <sub>CE</sub> =3,300V, V <sub>GE</sub> =0V, T <sub>vj</sub> =150°C
Collector Emitter Saturation Voltage	V <sub>CEsat</sub>	V	2.5	2.85	3.5	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	-	24.0	-	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
Switching Times	Rise Time	t <sub>r</sub>	-	0.1	-	V <sub>CC</sub> =1800V, I <sub>C</sub> =450A
	Turn On Time	t <sub>on</sub>	-	0.6	-	L <sub>s</sub> =40nH
	Fall Time	t <sub>f</sub>	-	1.9	-	R <sub>G(on/off)</sub> =6.8Ω/12Ω (2)
	Turn Off Time	t <sub>off</sub>	-	3.0	-	V <sub>GE</sub> =±15V, T <sub>vj</sub> =150°C
Forward Voltage Drop	V <sub>F</sub>	V	2.1	2.45	2.8	I <sub>F</sub> =450A, V <sub>GE</sub> =0V, T <sub>vj</sub> =150°C
Reverse Recovery Time	t <sub>rr</sub>	μs	-	1.2	-	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	-	0.75	-	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	-	0.77	-	R <sub>G(on/off)</sub> =6.8Ω/12Ω (2)
Reverse Recovery Loss per Pulse	E <sub>rr</sub>	J/P	-	0.74	-	V <sub>GE</sub> =±15V, T <sub>vj</sub> =150°C
Stray Inductance Module	L <sub>SCE</sub>	nH	-	10	-	Between C1(main) and E2(main)
NTC-Thermistor	Resistance	R <sub>25</sub>	-	5	-	T <sub>C</sub> =25°C
	Deviation	ΔR/R	%	-5	5	T <sub>C</sub> =25°C
Thermal Impedance	IGBT	Rth(j-c)	-	-	0.035	Junction to case
	FWD	Rth(j-c)	-	-	0.055	
Contact Thermal Impedance	Rth(c-f)	K/W	-	0.02	-	Case to fin (per 1 arm)

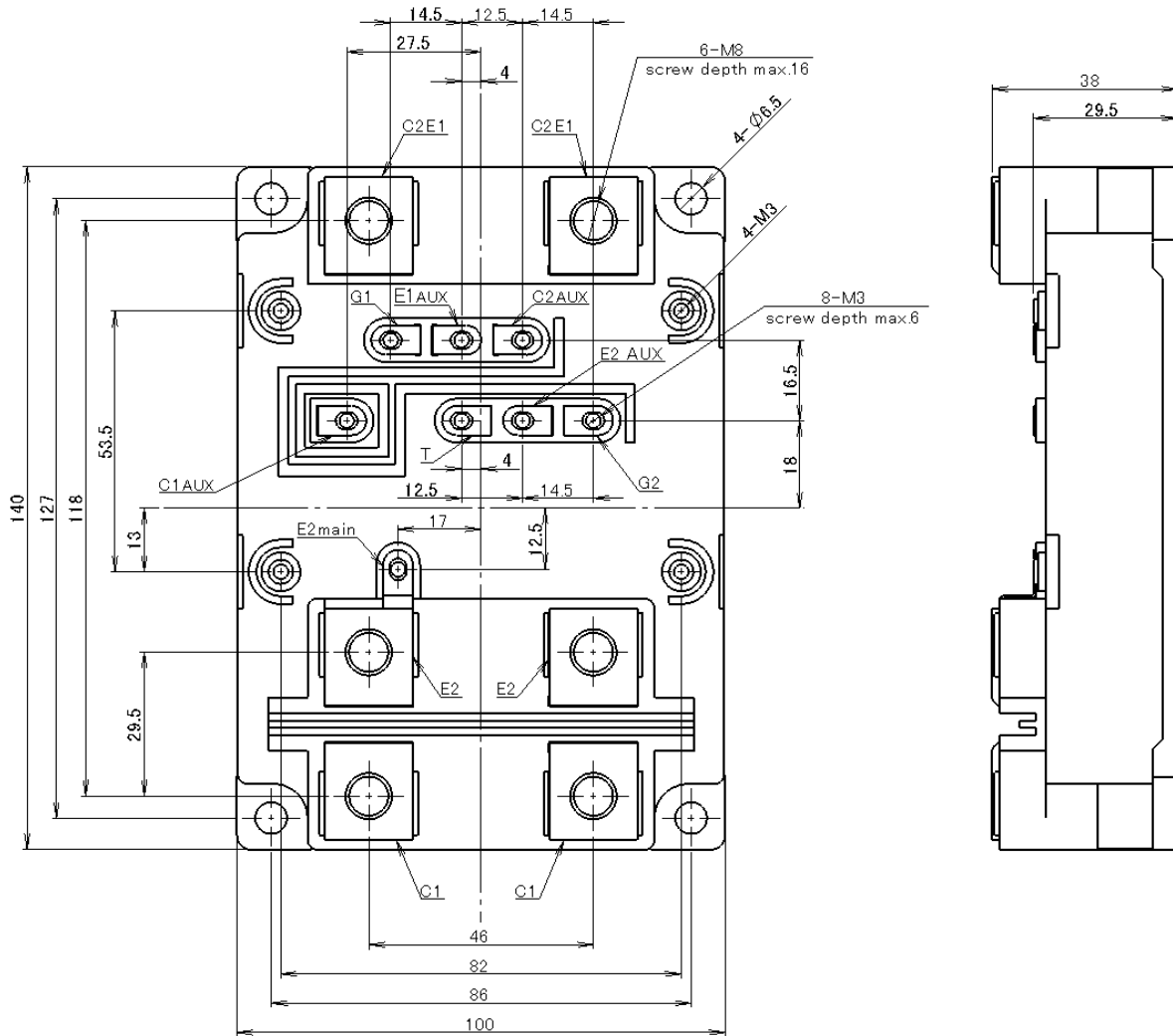
Notes: (2) R<sub>G</sub> value is a test condition value for evaluation, not recommended value.Please determine the suitable R<sub>G</sub> value by measuring switching behavior and checking results with the respective SOA.

- \* 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 values according to IEC 60747-2 IEC 60747-9

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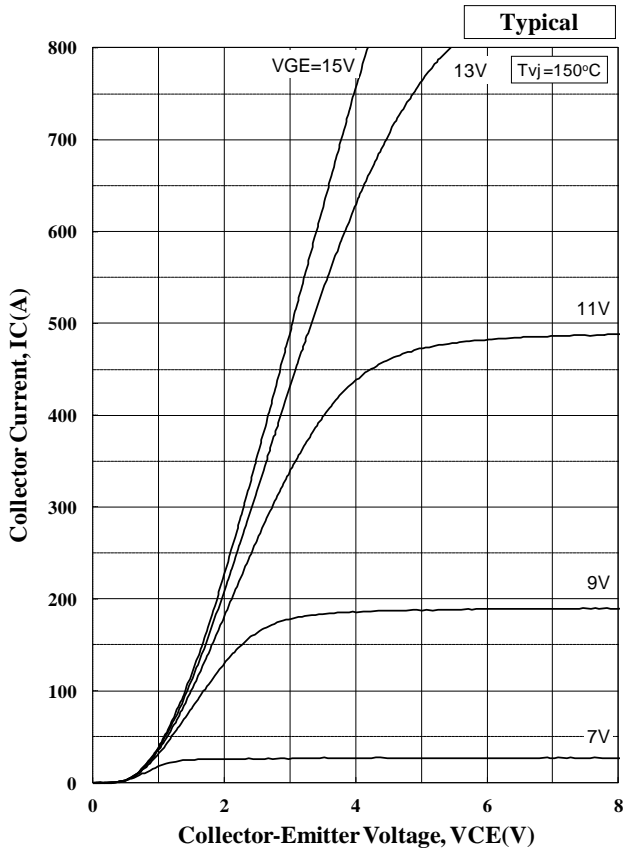
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## OUTLINE DRAWING

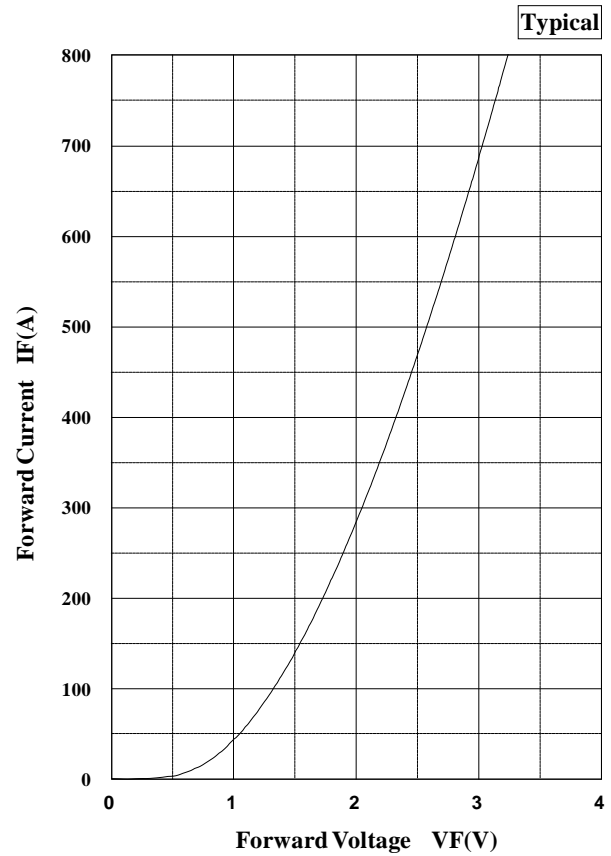


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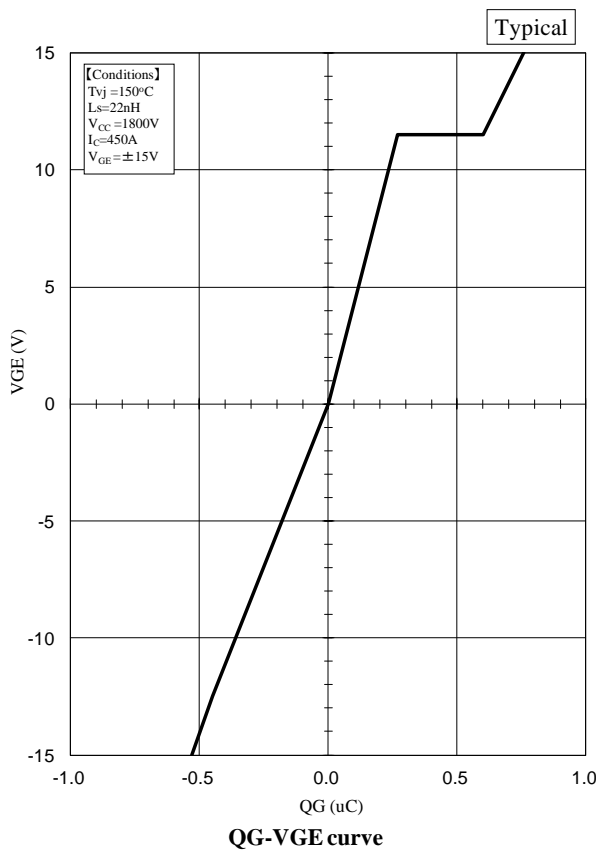
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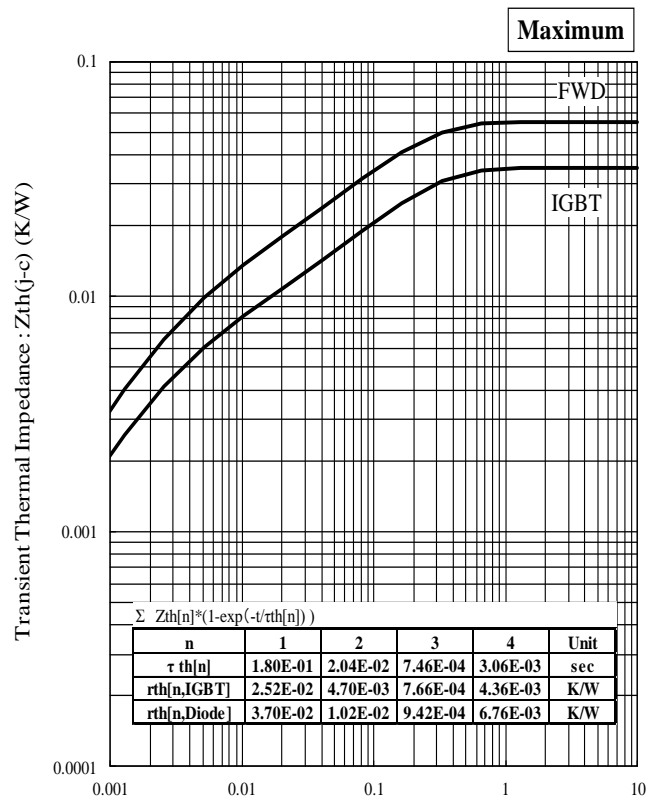
Collector Current vs. Collector to Emitter Voltage



Forward Voltage of free-wheeling diode



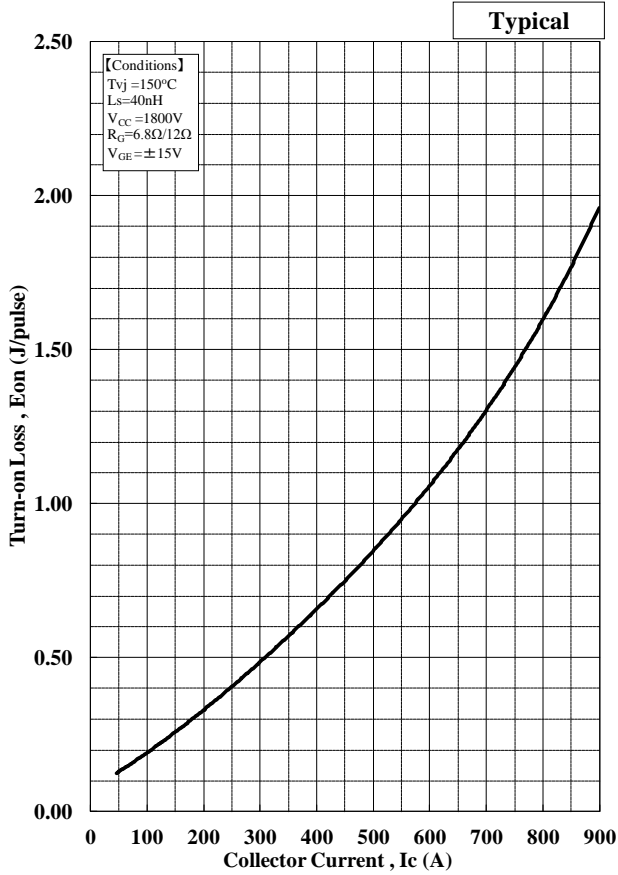
QG-VGE curve



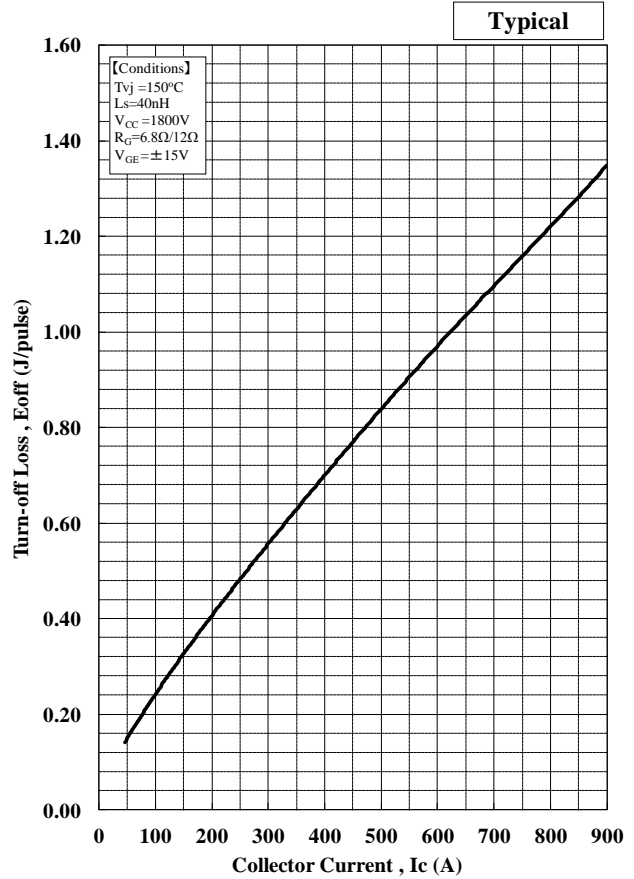
Transient Thermal Impedance Curve

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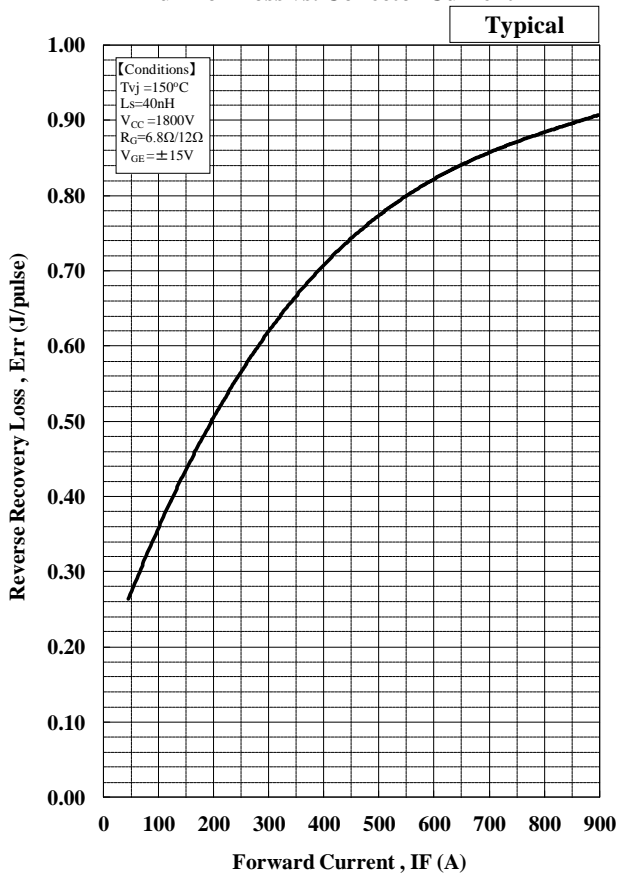
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Turn-on Loss vs. Collector Current



Turn-off Loss vs. Collector Current

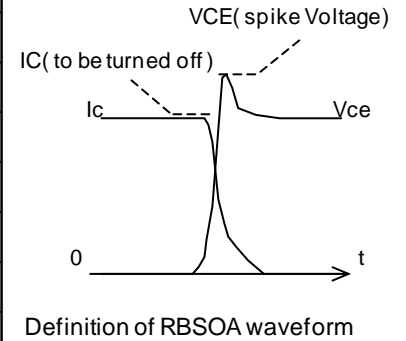
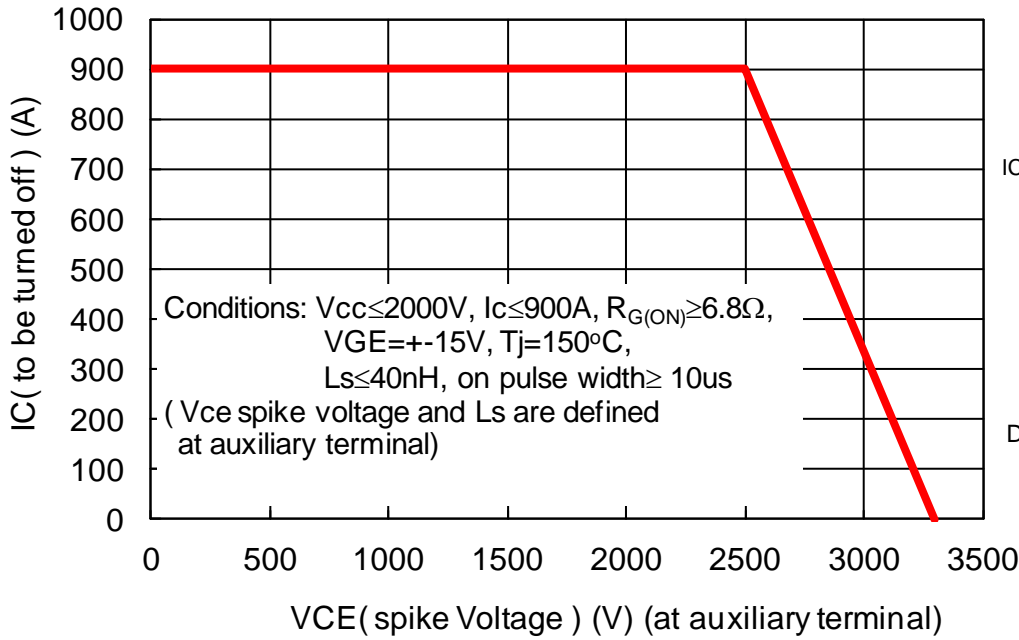


Recovery Loss vs. Forward Current

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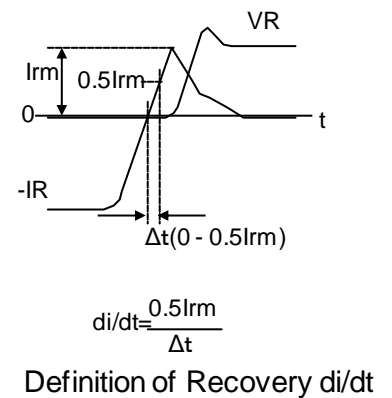
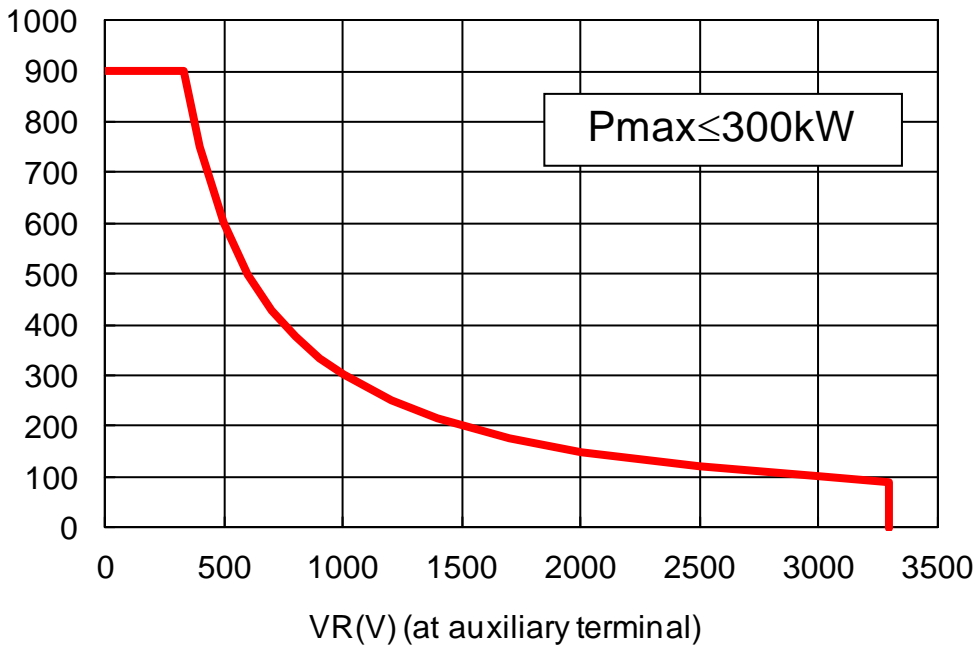
## RBSOA



## Reverse bias safe operation area ( RBSOA )

### Reverse Recovery SOA

Conditions:  
 $L_s \leq 40nH$ ,  $V_{cc} \leq 2000V$ ,  $I_F \leq 900A$ ,  $di/dt \leq 2500A/\mu s$ ,  $T_j = 150^\circ C$



## Reverse Recovery SOA

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Preliminary Specification

## HITACHI POWER SEMICONDUCTORS

### Notices

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