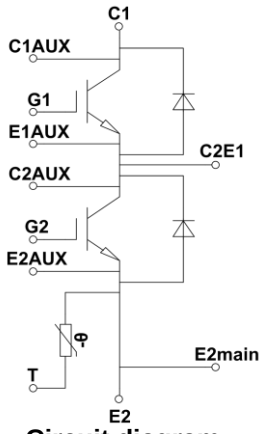
MBM450FS33F

Silicon N-channel IGBT 3300V F version



Circuit diagram

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 (Tc=25ºC)

Item		Symbol	Unit	MBM450FS33F
Collector Emitter Voltage		V_{CES}	V	3,300
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	450
	1ms	I_{CM}		900
Forward Current	DC	I_F	A	450
	1ms	I_{FM}		900
Junction Temperature		$T_{vj\ op}$	ºC	-50 ~ +150
Storage Temperature		T_{stg}	ºC	-55 ~ +150
Isolation Voltage		V_{ISO}	V_{RMS}	6,000(AC 1 minute)
Screw Torque	Terminals (M3/M8)	M	N·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_{CES}	mA	-	-	0.30	V_{CE}=3,300V, V_{GE}=0V, T_{vj}=25ºC
				-	15	50	V_{CE}=3,300V, V_{GE}=0V, T_{vj}=150ºC
Gate Emitter Leakage Current		I_{GES}	nA	-500	-	+500	V_{GE}=±20V, V_{CE}=0V, T_{vj}=25ºC
Collector Emitter Saturation Voltage		V_{CEsat}	V	-	2.25	-	I_C=450A, V_{GE}=15V, T_{vj}=25ºC
				2.50	3.05	3.50	I_C=450A, V_{GE}=15V, T_{vj}=150ºC
Gate Emitter Threshold Voltage		$V_{GE(th)}$	V	5.5	6.5	7.5	V_{CE}=10V, I_C=450mA, T_{vj}=25ºC
Input Capacitance		C_{ies}	nF	-	24	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, T_{vj}=25ºC
Internal Gate Resistance		$R_{G(int)}$	Ω	-	6.2	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, T_{vj}=25ºC
Turn On Delay Time		$t_{d(on)}$	μs	-	0.48	-	V_{CC}=1800V, I_C=450A
Rise Time		t_r		-	0.12	-	Ls=40nH
Turn Off Delay Time		$t_{d(off)}$		-	1.10	-	R_G(on/off)=6.8Ω/12Ω (2)
Fall Time		t_f		-	1.30	-	V_{GE}=±15V, T_{vj}=150ºC
Forward Voltage Drop		V_F	V	-	2.25	-	I_F=450A, V_{GE}=0V, T_{vj}=25ºC
				2.10	2.45	2.80	I_F=450A, V_{GE}=0V, T_{vj}=150ºC
Reverse Recovery Time		t_{rr}	μs	-	1.10	-	V_{CC}=1800V, I_F=450A, Ls =40nH T_{vj}=150ºC
Turn-on Loss per Pulse		E_{on}	J/P	-	0.73	-	V_{CC}=1800V, Ic=450A, Ls =40nH
Turn-off Loss per Pulse		E_{off}	J/P	-	0.63	-	R_G(on/off)=6.8Ω/12Ω (2)
Reverse Recovery Loss per Pulse		E_{rr}	J/P	-	0.68	-	V_{GE}=±15V, T_{vj}=150ºC
Short Circuit Pulse Width		t_{sc}	μs	10	-	-	Vcc=2200V,Ls=40nH R_G(on/off)=6.8/68Ω,V_{GE}=±15V,Tvj=150℃
Stray Inductance Module		L_{SCE}	nH	-	9	-	Between C1(main) and E2(main)
NTC-Thermistor	Resistance	R_{25}	kΩ	-	5	-	Tc=25 ºC
	Deviation	△R/R	%	-5		5	Tc=25 ºC
	B-constant	$B_{(25/50)}$	K	-	3375	-	Between 25℃ and 50℃
Thermal Impedance	IGBT	Rth(j-c)	K/W	-	-	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_G value is a test condition value for evaluation, not recommended value.
Please determine the suitable R_G 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.

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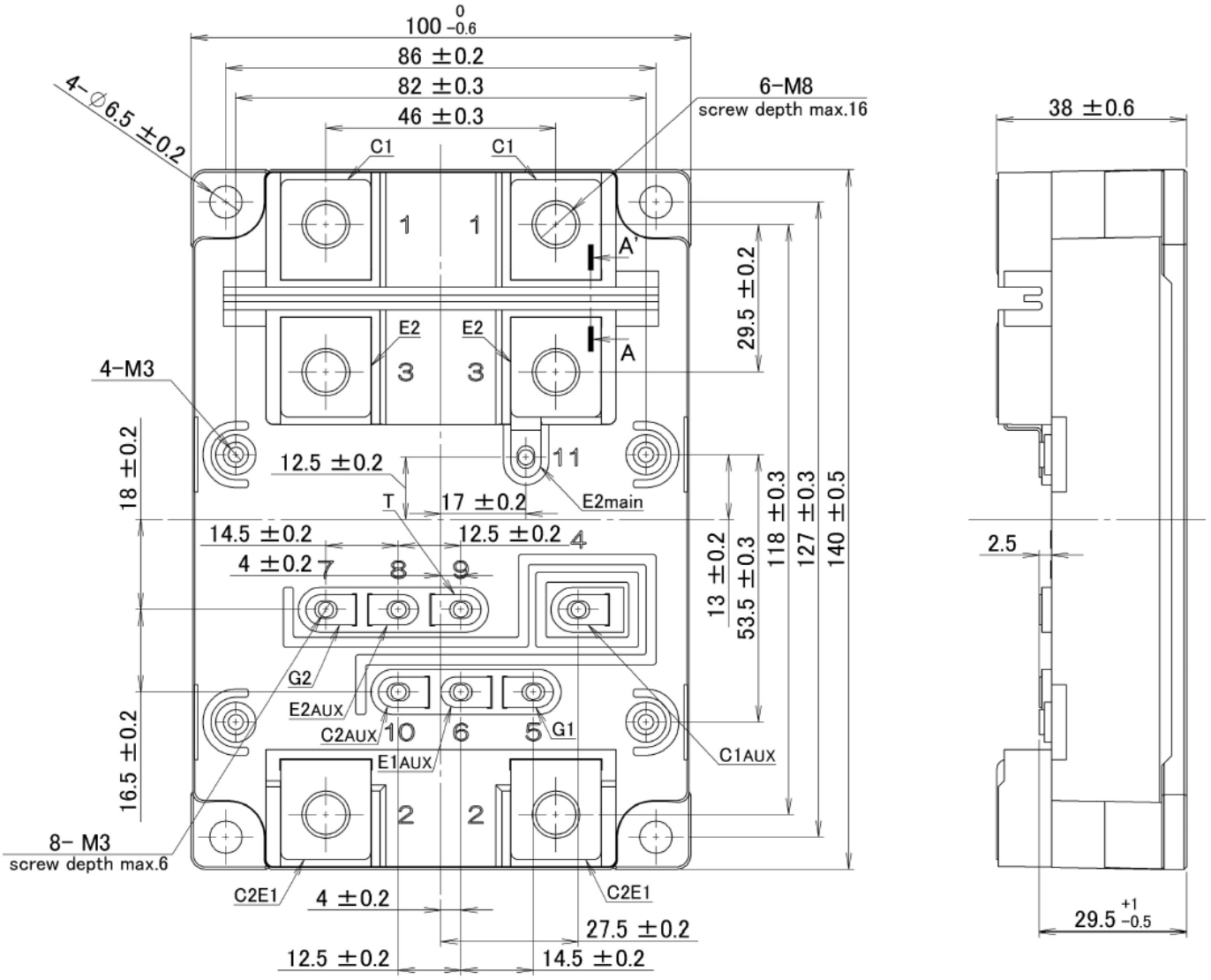
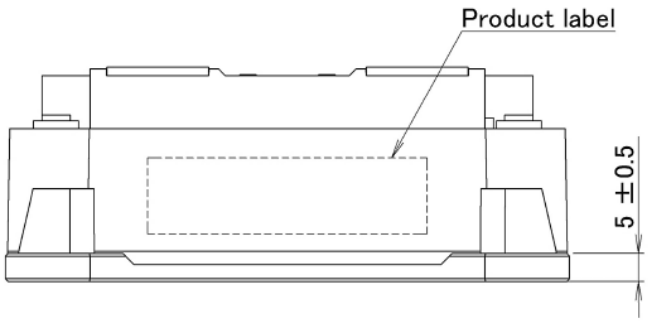
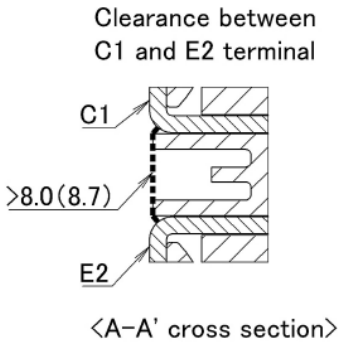
OUTLINE DRAWING

Unit in mm







Weight: 770(g)

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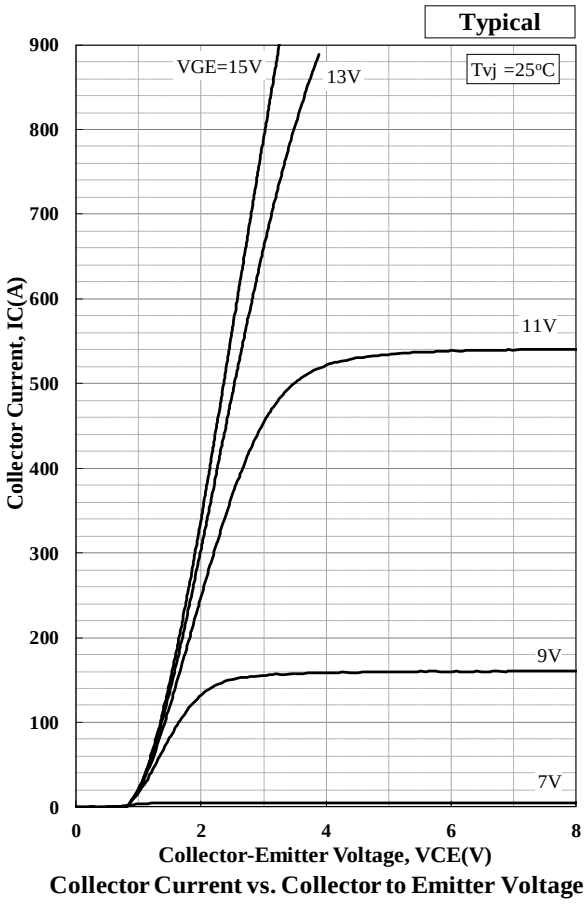
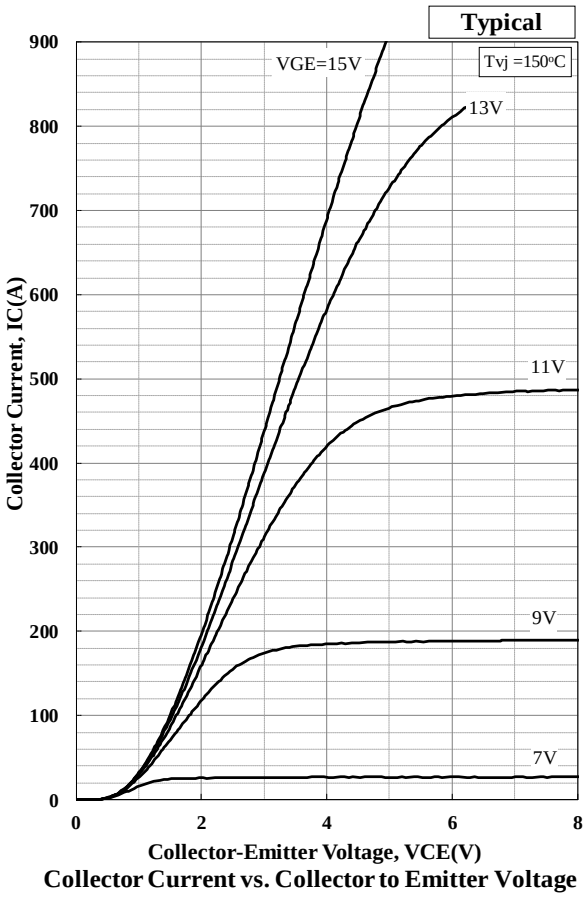


Collector Current vs. Collector to Emitter Voltage



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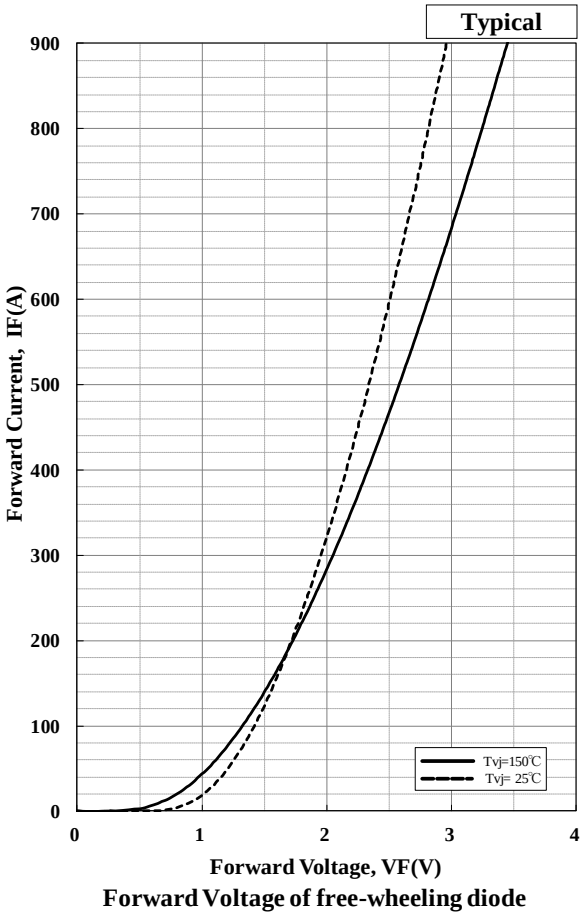
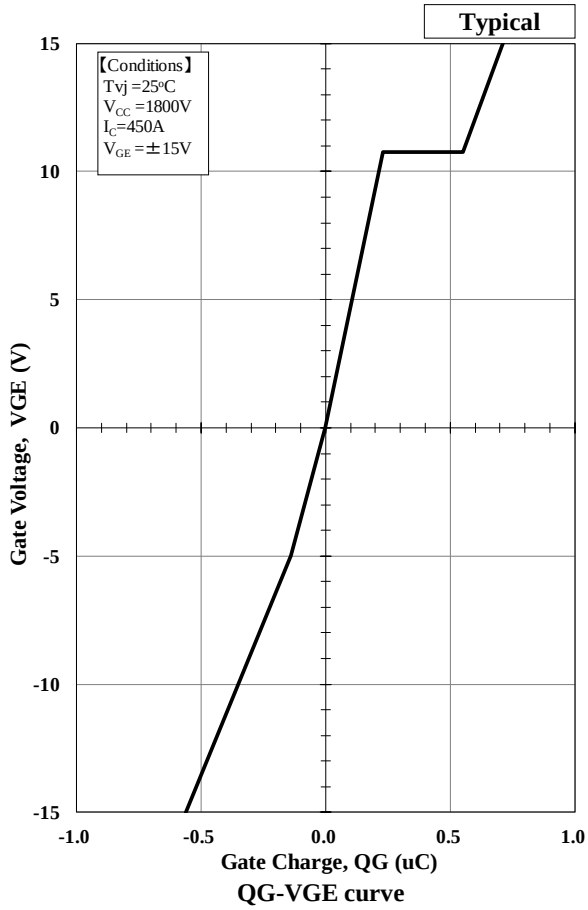


Forward Voltage of free-wheeling diode



QG-VGE curve

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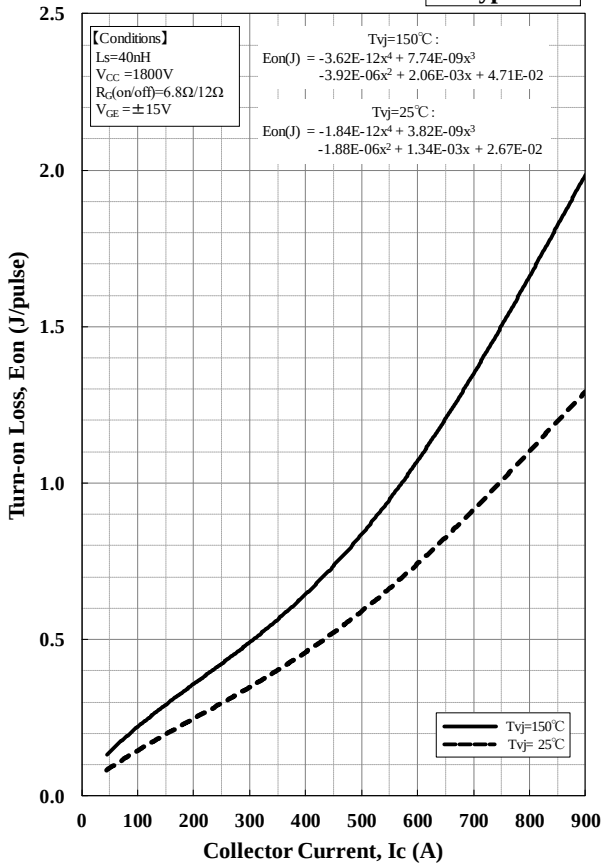
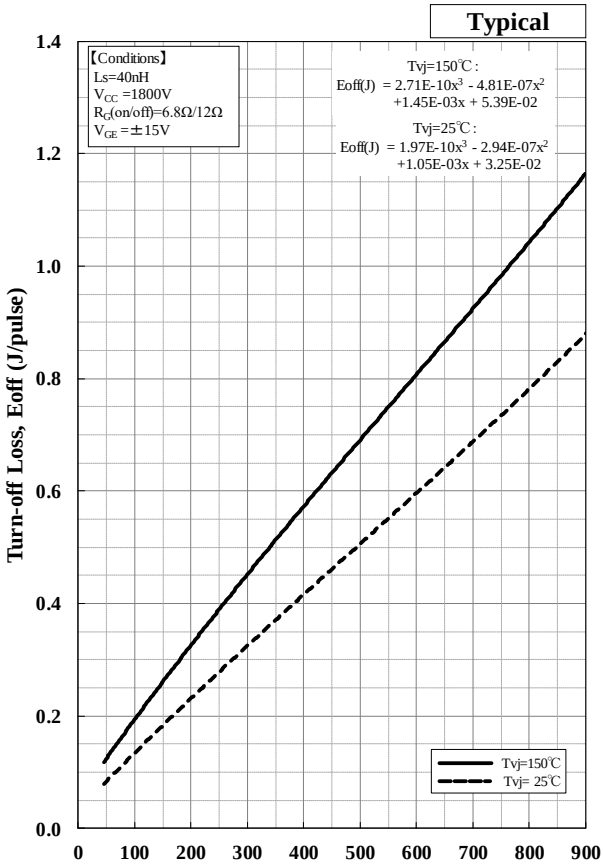
Typical



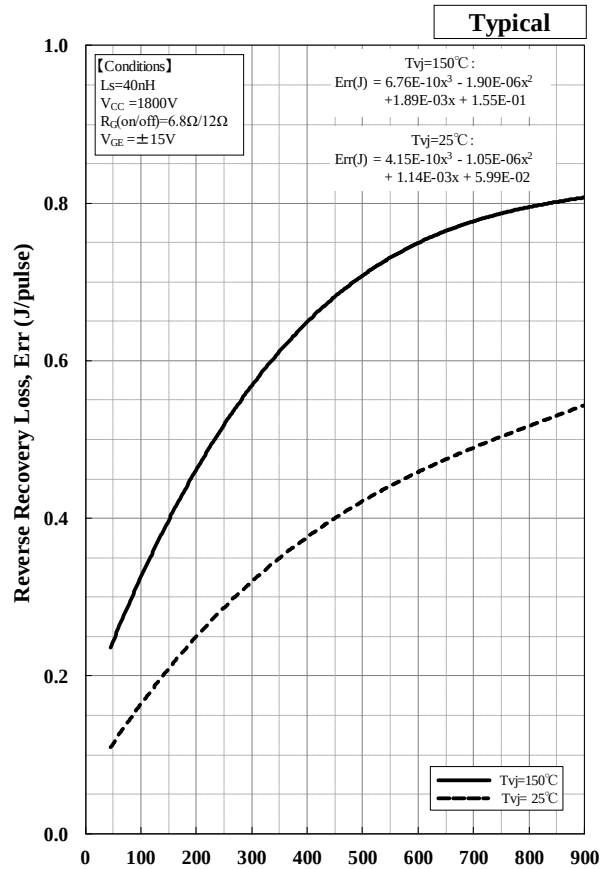
Turn-on Loss vs. Collector Current

Typical



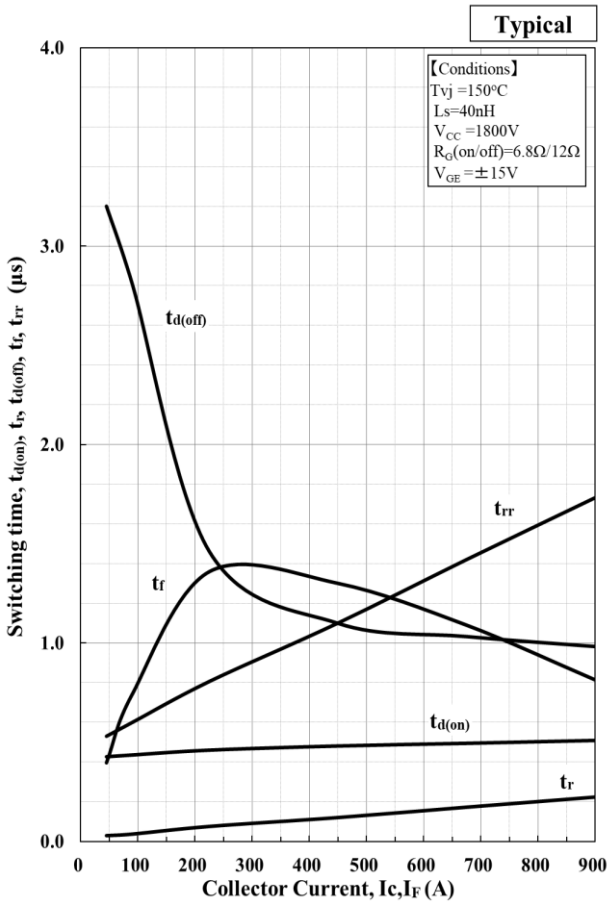
Turn-off Loss vs.Collector Current

Typical



Recovery Loss vs. Forward Current

Typical



Switching time vs. Collector Current

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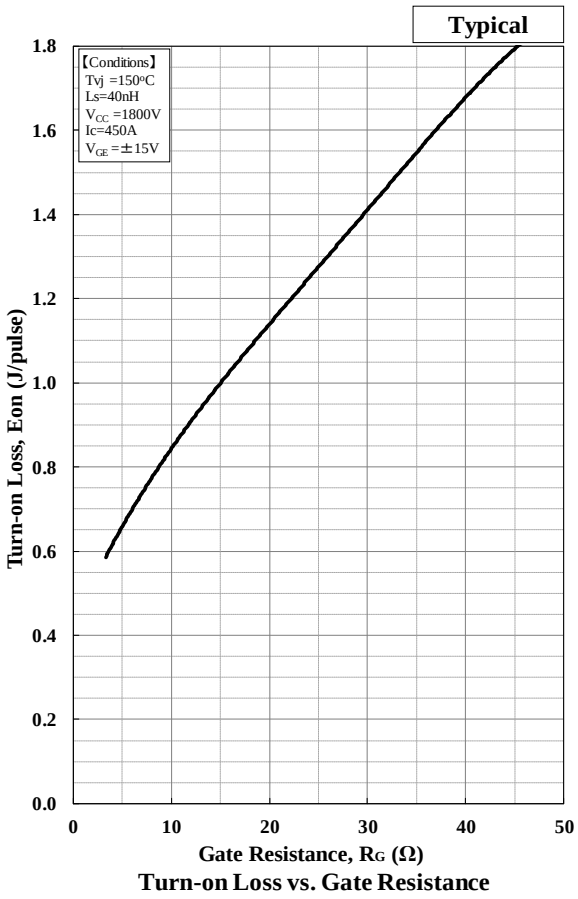
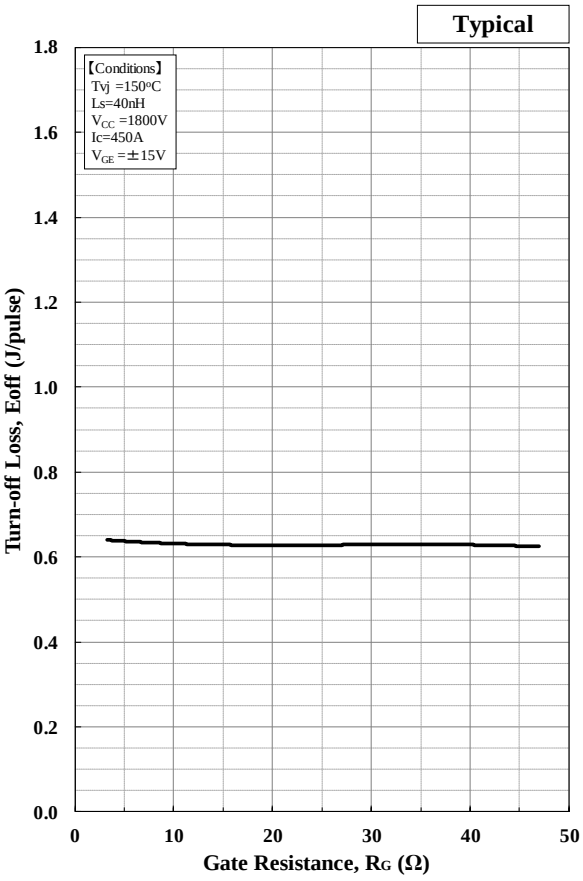
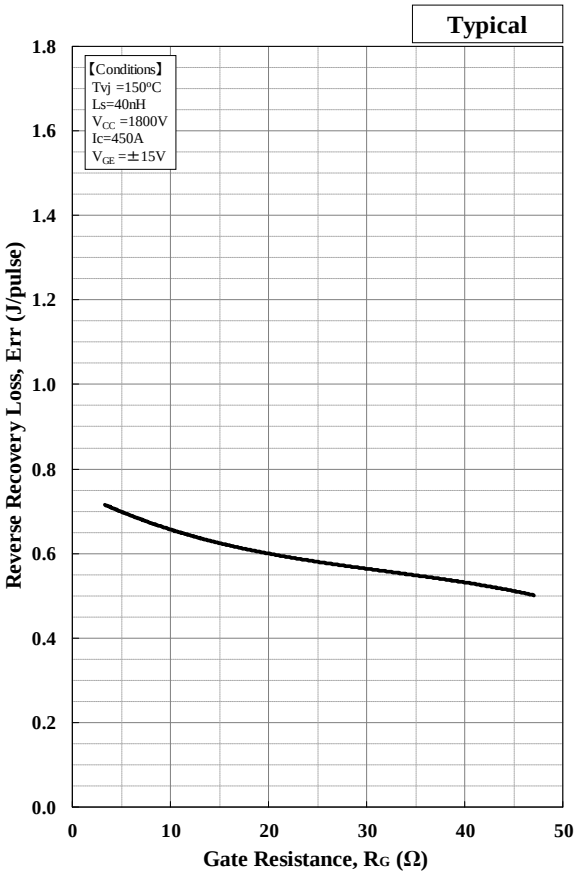


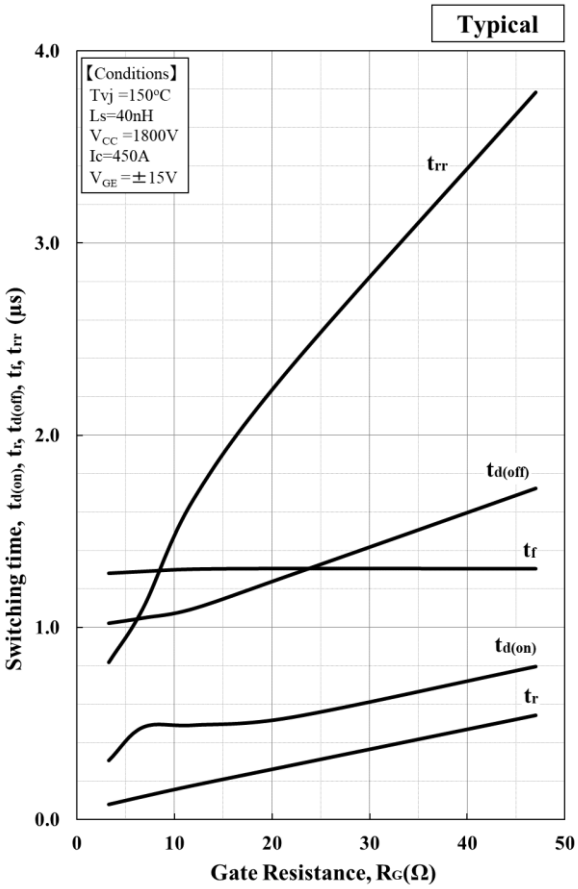
Turn-on Loss vs. Gate Resistance



Turn-off Loss vs. Gate Resistance



Recovery Loss vs. Gate Resistance



Switching time vs. Gate Resistance

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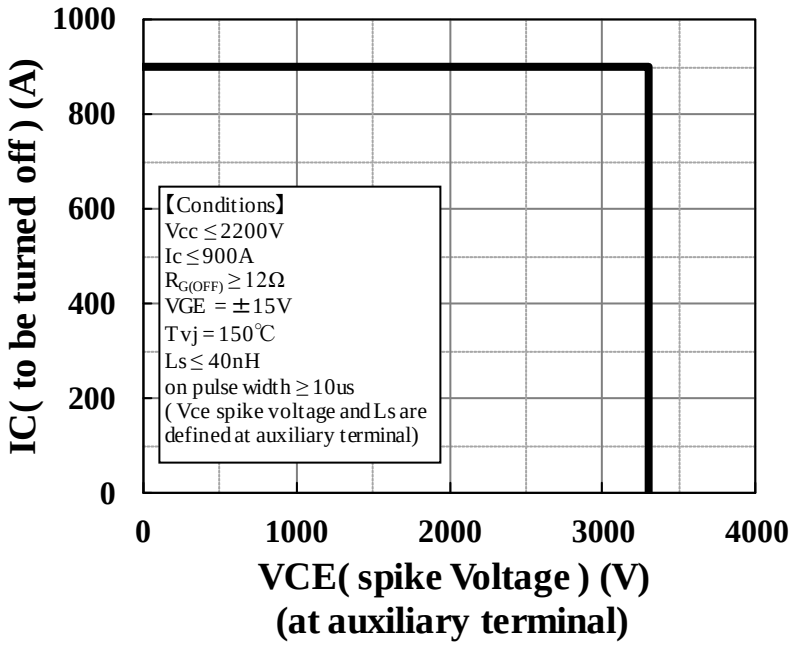
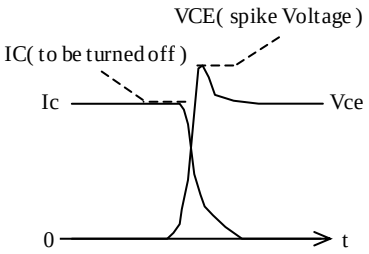
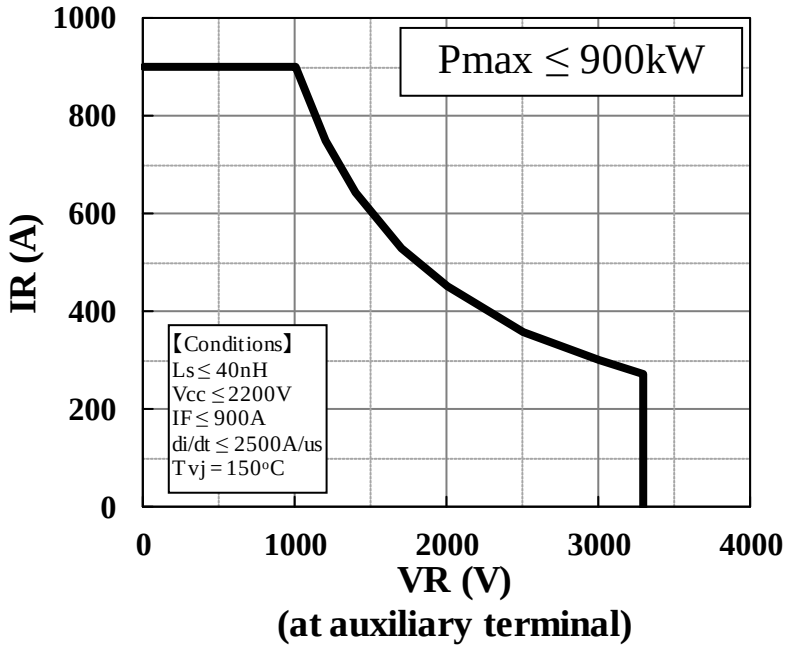
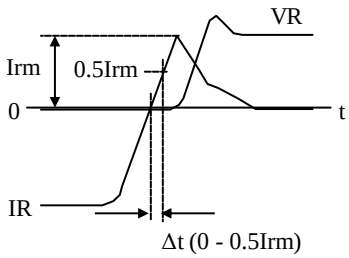




Definition of RBSOA waveform

Reverse bias safe operation area (RBSOA)





$$di/dt = \frac{0.5Irm}{\Delta t}$$

Definition of Recovery di/dt

Reverse Recovery SOA

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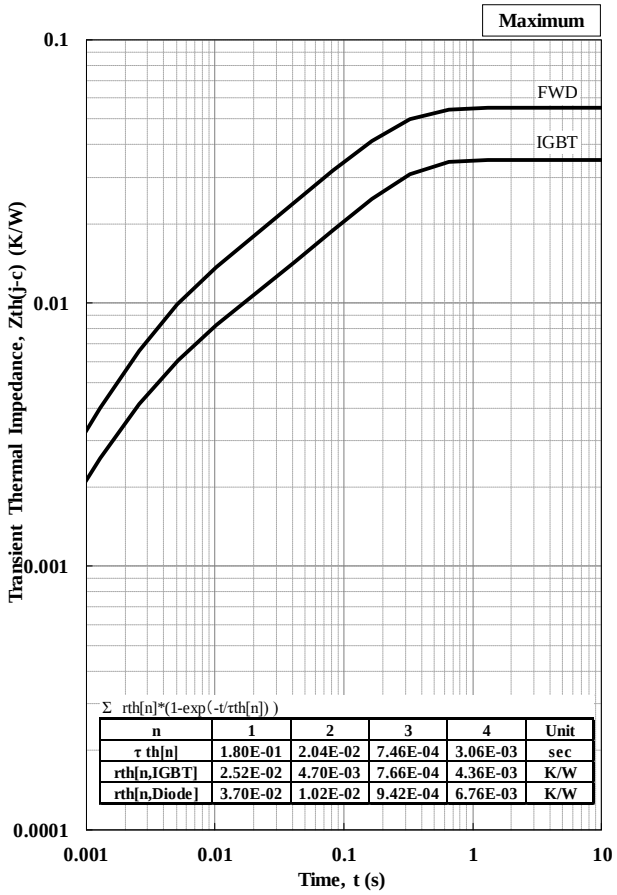
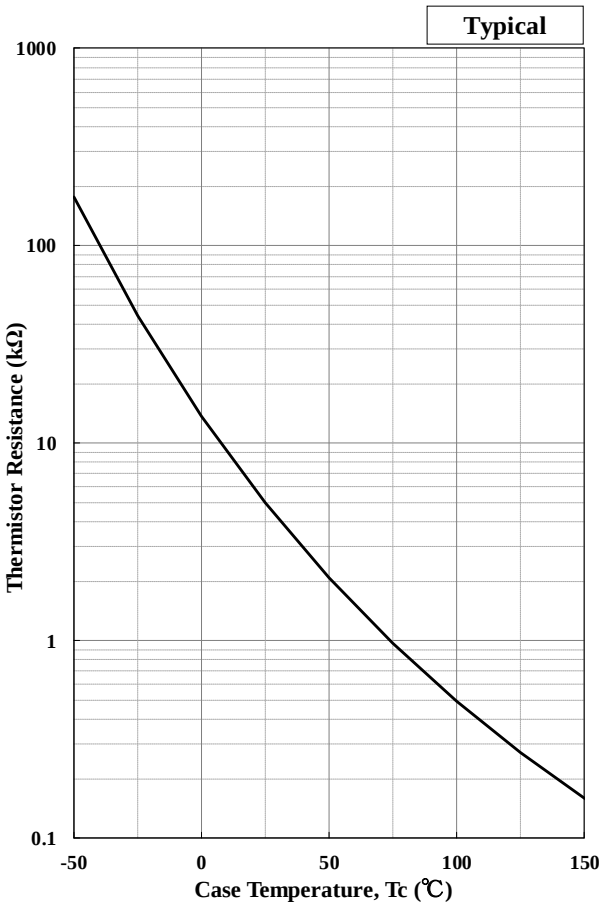


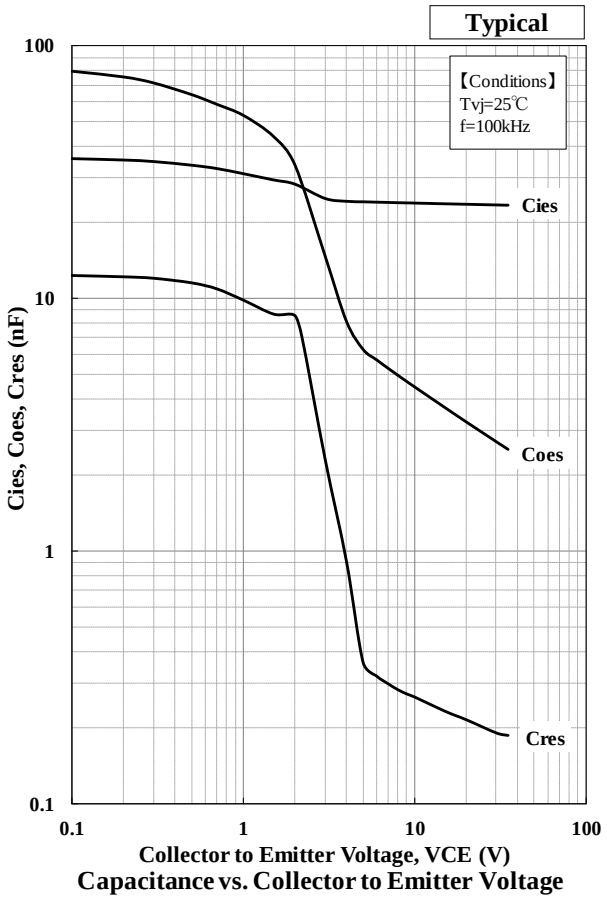
Σ rth[n]*(1-exp(-t/τth[n]))

n	1	2	3	4	Unit
τ th[n]	1.80E-01	2.04E-02	7.46E-04	3.06E-03	sec
rth[n,IGBT]	2.52E-02	4.70E-03	7.66E-04	4.36E-03	K/W
rth[n,Diode]	3.70E-02	1.02E-02	9.42E-04	6.76E-03	K/W

Transient Thermal Impedance Curve



Thermistor Resistance vs. Temperature



Capacitance vs. Collector to Emitter Voltage

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