MBN1500FH45F-H

Silicon N-channel IGBT 4500V F version

FEATURES

- Soft switching behavior, low switching loss & low conduction loss :
  - Soft low-injection punch-through
  - Advanced Trench High conductivity IGBT.
- Low driving power due to low input capacitance with trench MOS gate.
- Low noise recovery: Ultra soft fast recovery diode.
- High Current rate Package.
- Low $R_{th(j-c)}$ & low stray inductance.
- RoHS

ABSOLUTE MAXIMUM RATINGS (T_C=25°C)

Item		Symbol	Unit	MBN1500FH45F-H
Collector Emitter Voltage		V_{CES}	V	4,500
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	1,500
	1ms	I_{CRM}		3,000
Forward Current	DC	I_F	A	1,500
	1ms	I_{FRM}		3,000
Junction Temperature		$T_{vj\ op}$	°C	-50 ~ +150
Storage Temperature		T_{stg}	°C	-50 ~ +150
Isolation Voltage		V_{ISO}	V_{RMS}	10,200(AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	N·m	2/10 (1)
	Mounting (M6)	-		6 (2)

Notes: (1) Recommended Value 1.8±0.2/9±1N·m (2) 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	-	-	6	V_{CE}=4,500V, V_{GE}=0V, T_{vj}=25°C
				-	-	180	V_{CE}=4,500V, V_{GE}=0V, T_{vj}=150°C
Gate Emitter Leakage Current		I_{GES}	nA	-500	-	+500	V_{GE}=±20V, V_{CE}=0V, T_{vj}=25°C
Collector Emitter Saturation Voltage		V_{CEsat}	V	-	4.35	5.0	I_C=1500A, V_{GE}=15V, T_{vj}=150°C
Gate Emitter Threshold Voltage		$V_{GE(th)}$	V	6.0	6.5	7.0	V_{CE}=10V, I_C=1500mA, T_{vj}=25°C
Input Capacitance		C_{ies}	nF	-	83	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, T_{vj}=25°C
Internal Gate Resistance		$R_{G(int)}$	Ω	-	2.6	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, T_{vj}=25°C
Turn On Delay Time		$t_{d(on)}$	µs	-	0.5	-	V_{CC}=2,800V, I_C=1500A
Rise Time		t_r		-	0.3	-	L_S=165nH
Turn Off Delay Time		$t_{d(off)}$		-	2.6	-	R_G=3.3Ω (3)
Fall Time		t_f		-	0.7	-	V_{GE}=±15V, T_{vj}=150°C
Peak Forward Voltage Drop		V_F	V	-	2.8	3.2	I_F=1500A, V_{GE}=0V, T_{vj}=150°C
Reverse Recovery Time		t_{rr}	µs	-	1.3	-	V_{CC}=2,800V, I_F=1500A, L_S=165nH T_{vj}=150°C
Turn On Loss		E_{on}	J/P	-	5.1	-	V_{CC}=2,800V, I_C=1500A, L_S=165nH
Turn Off Loss		E_{off}	J/P	-	5.0	-	R_G=3.3Ω (3)
Reverse Recovery Loss		E_{rr}	J/P	-	5.6	-	V_{GE}=±15V, T_{vj}=150°C
Short Circuit Pulse Width		t_{sc}	µs	10	-	-	V_{CC}=3000V,Ls=165nH R_G(on/off)=3.3/33Ω,V_{GE}=±15V, T_{vj}=150°C
Partial discharge extinction voltage		V_e	V_{RMS}	3,500	-	-	f=50Hz, Q_{PD}≤10pC(acc. to IEC 61287)
Stray inductance module		L_{SCE}	nH	-	10	-	
Thermal Impedance	IGBT	$R_{th(j-c)}$	K/W	-	-	0.0085	Junction to case
	FWD	$R_{th(j-c)}$		-	-	0.0115	
Contact Thermal Impedance		$R_{th(c-f)}$	K/W	-	0.005	-	Case to fin

Notes: (3) R_G value is a test condition value for evaluation, not recommended value.
Please, determine the suitable R_G value by measuring switching behaviors.

* 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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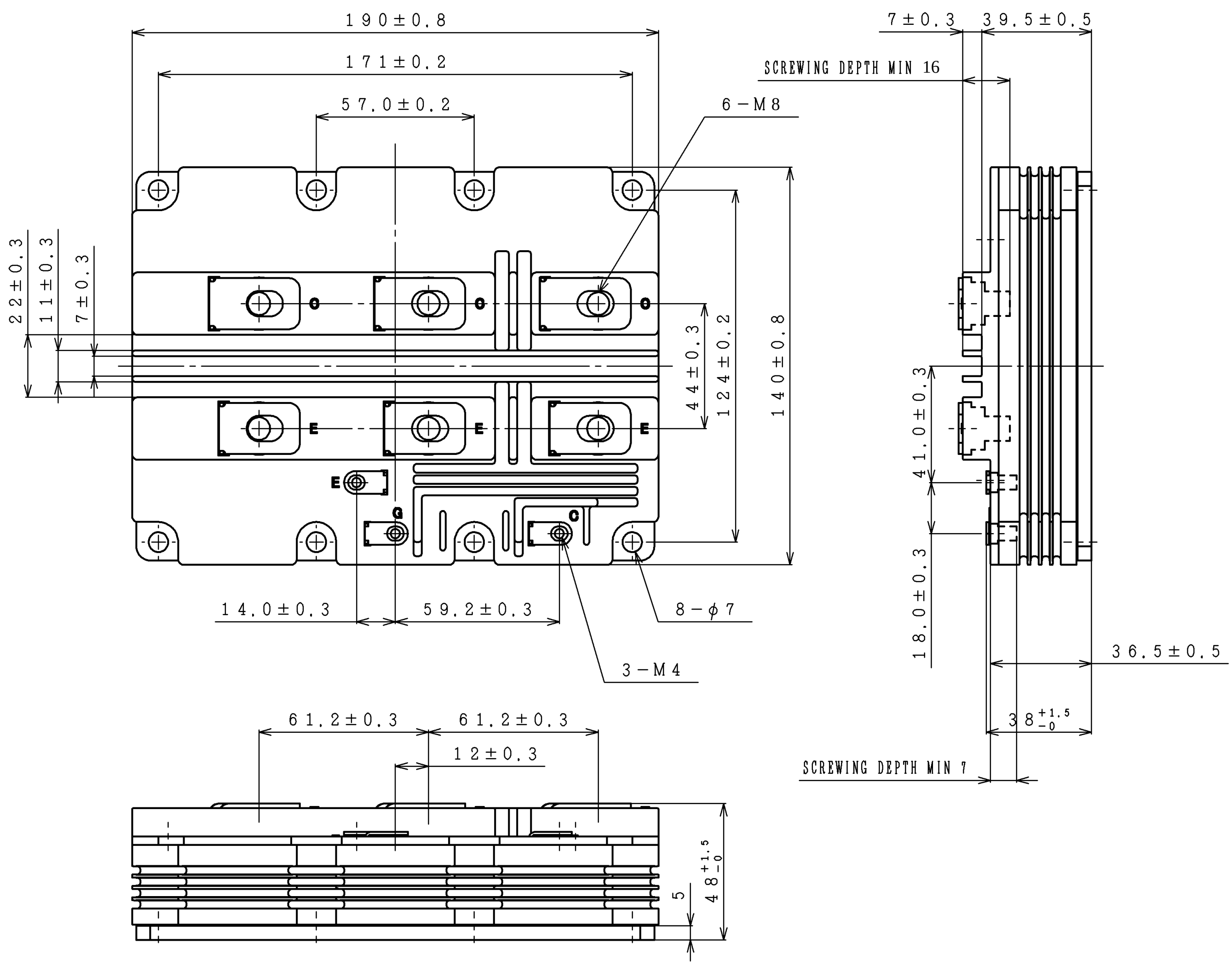
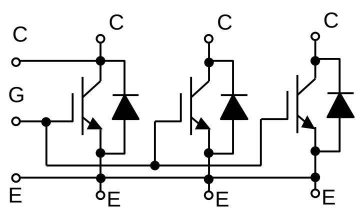
OUTLINE DRAWING

Unit in mm



CIRCUIT DIAGRAM



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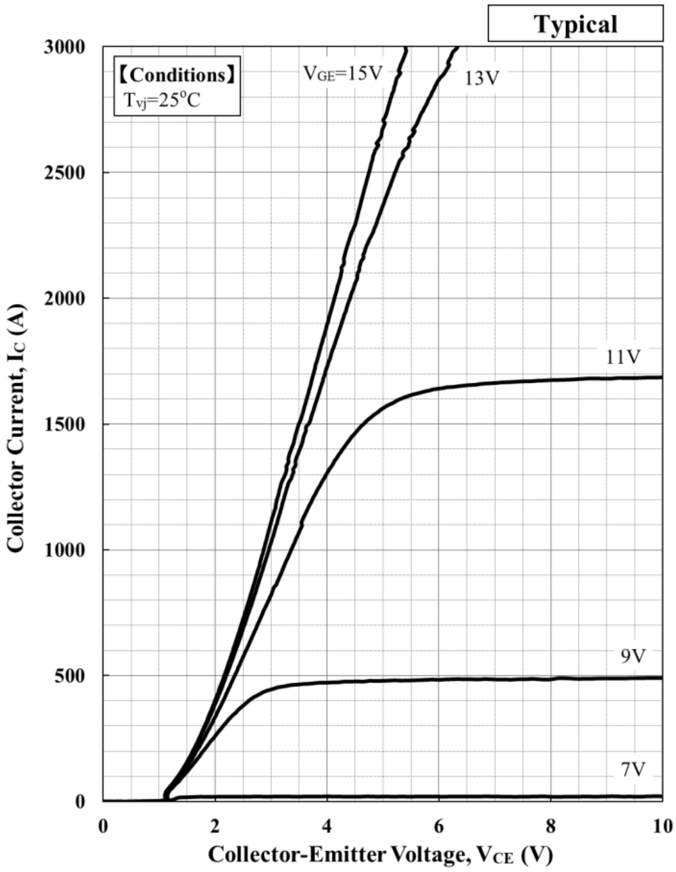
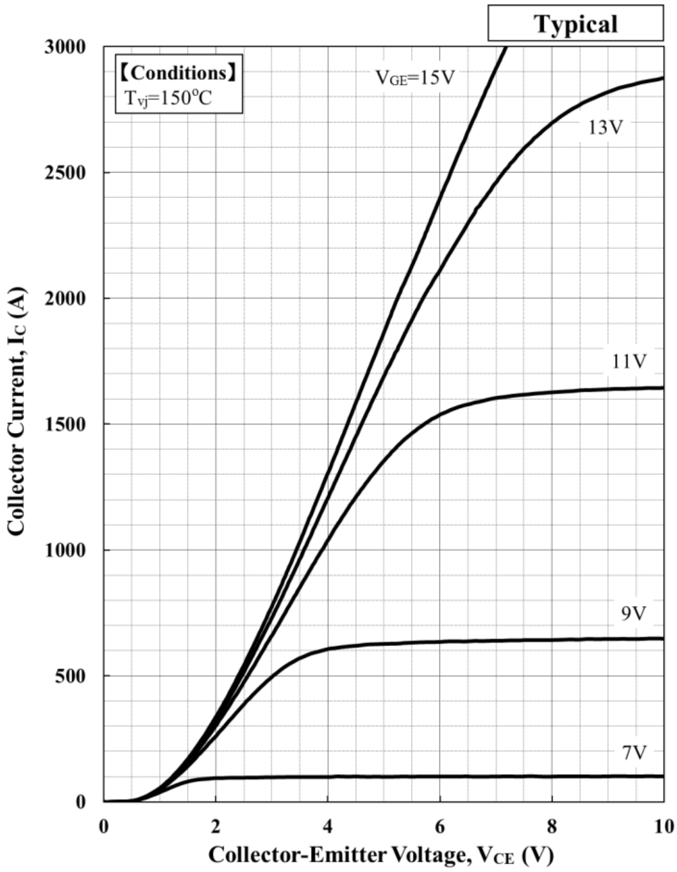
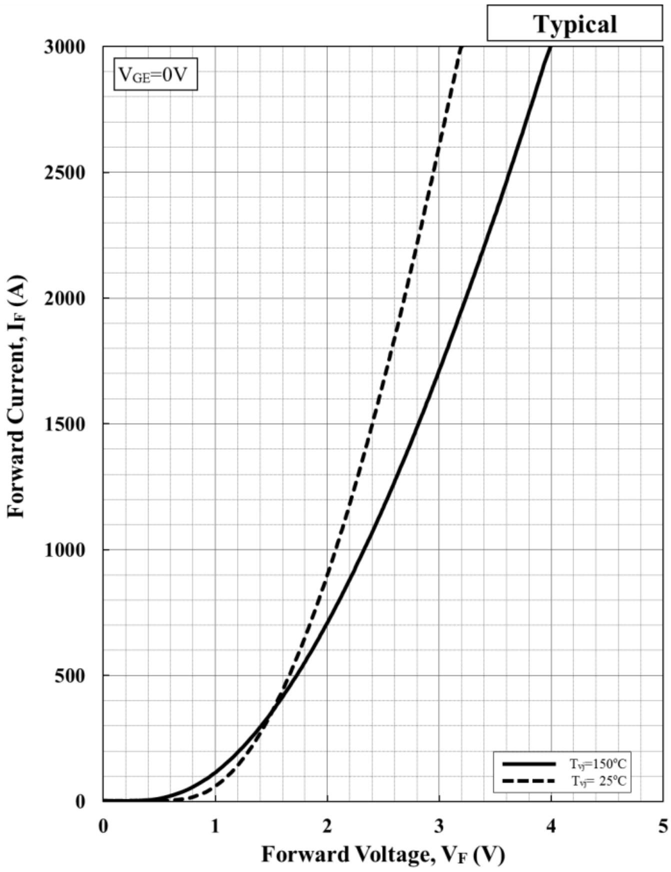


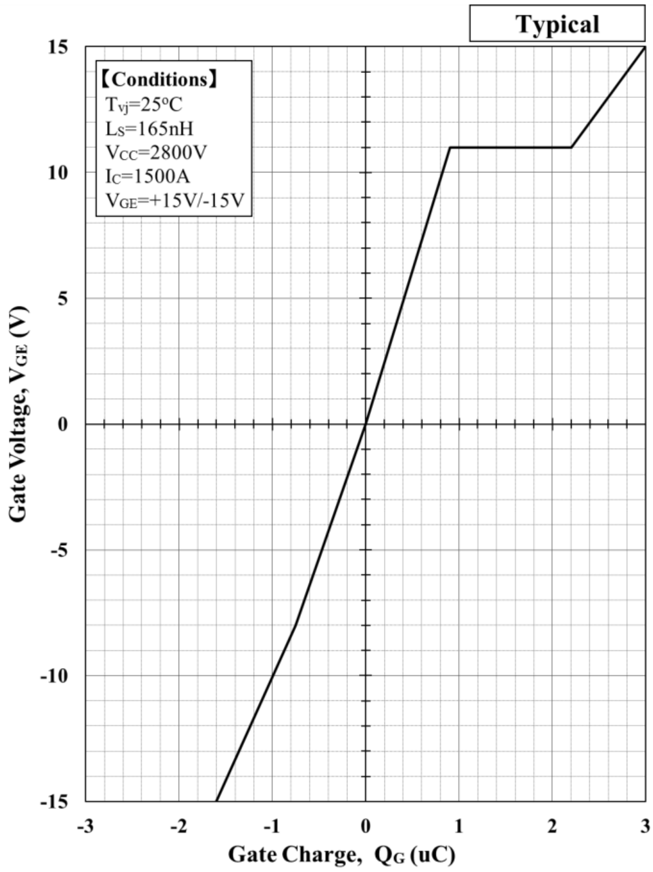
Collector Current vs. Collector Emitter Voltage



Collector Current vs. Collector Emitter Voltage



Forward Voltage of free-wheeling diode



V_{GE}-Q_G curve

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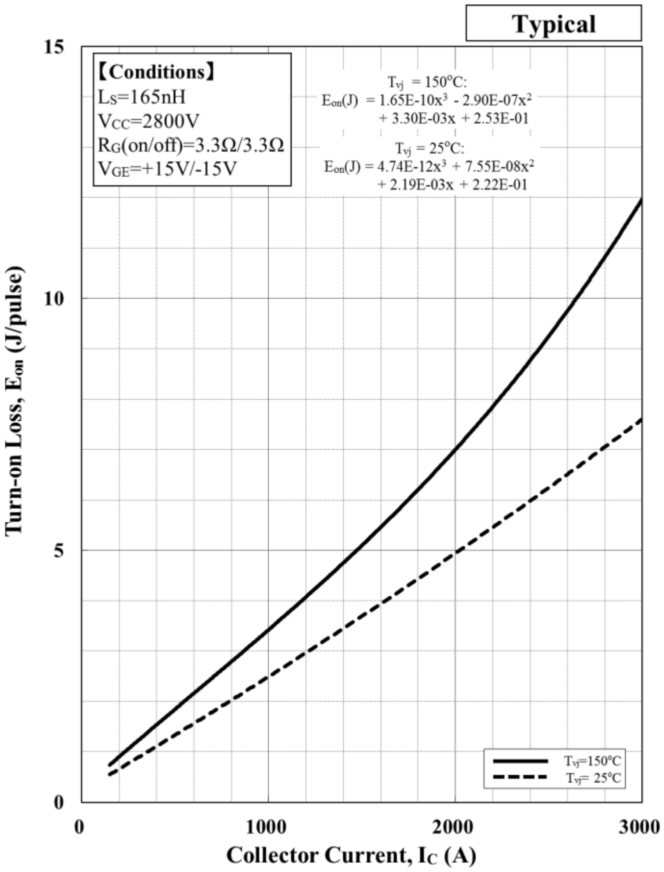
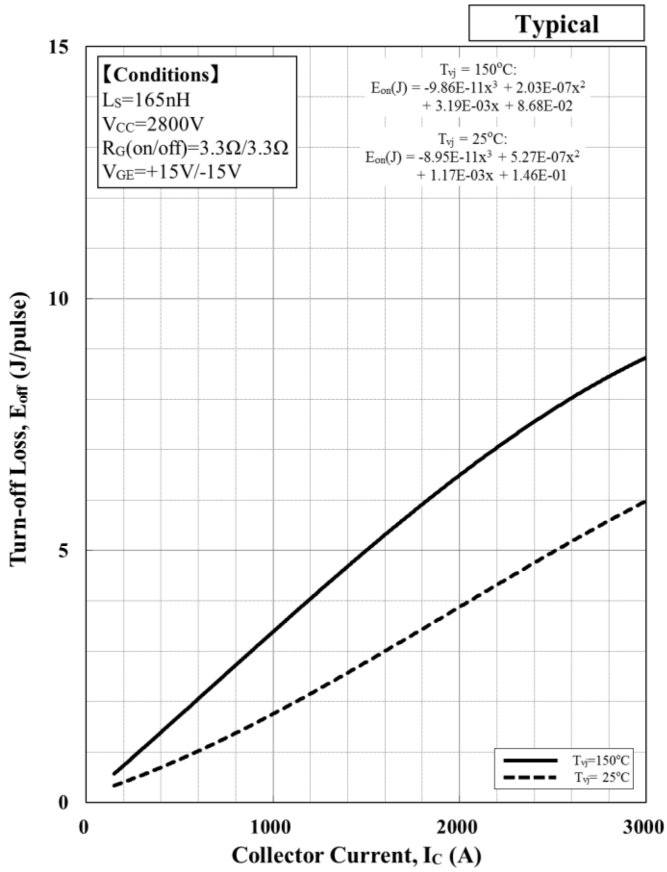
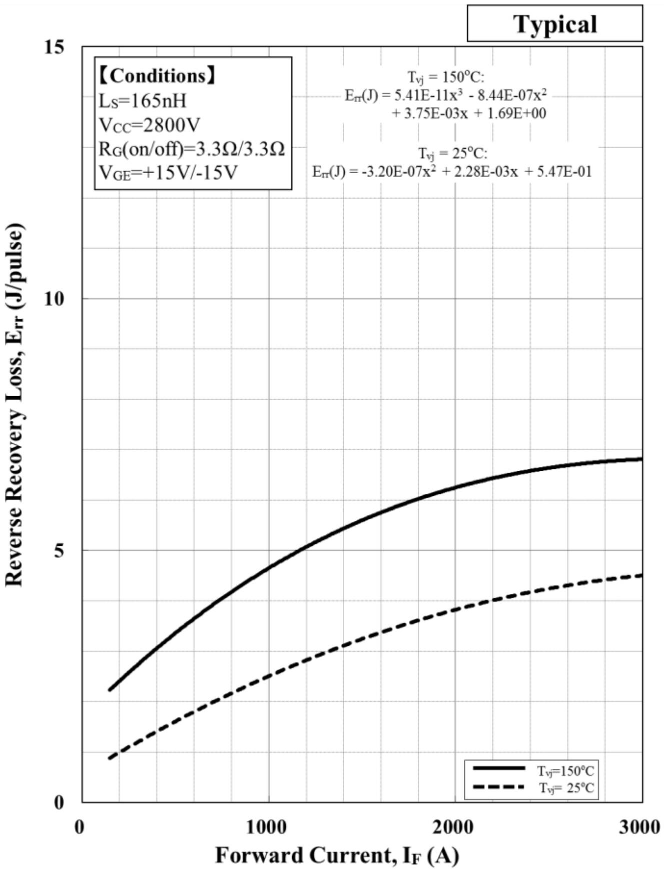


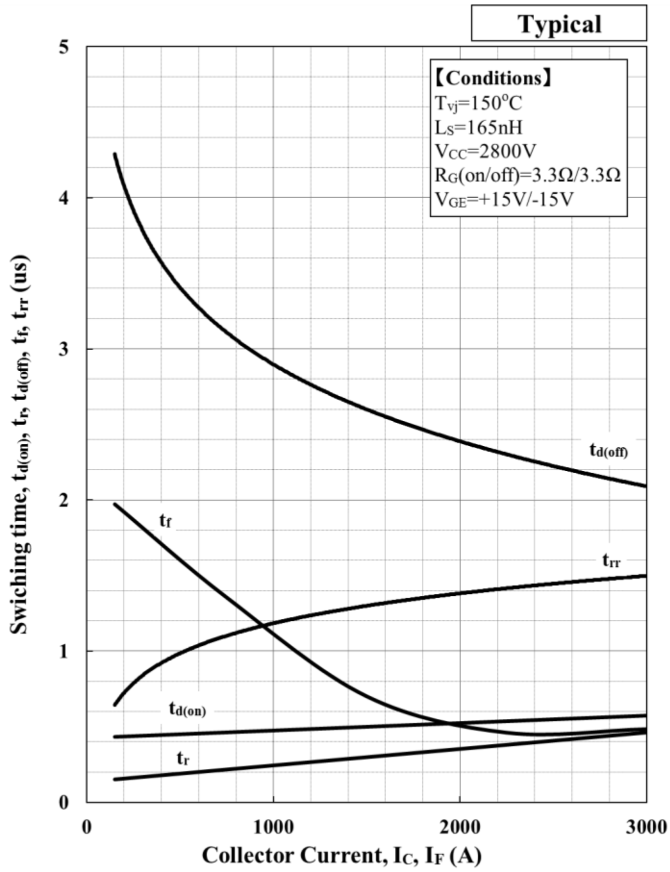
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current



Recovery loss vs. Forward current



Switching time vs. Collector Current

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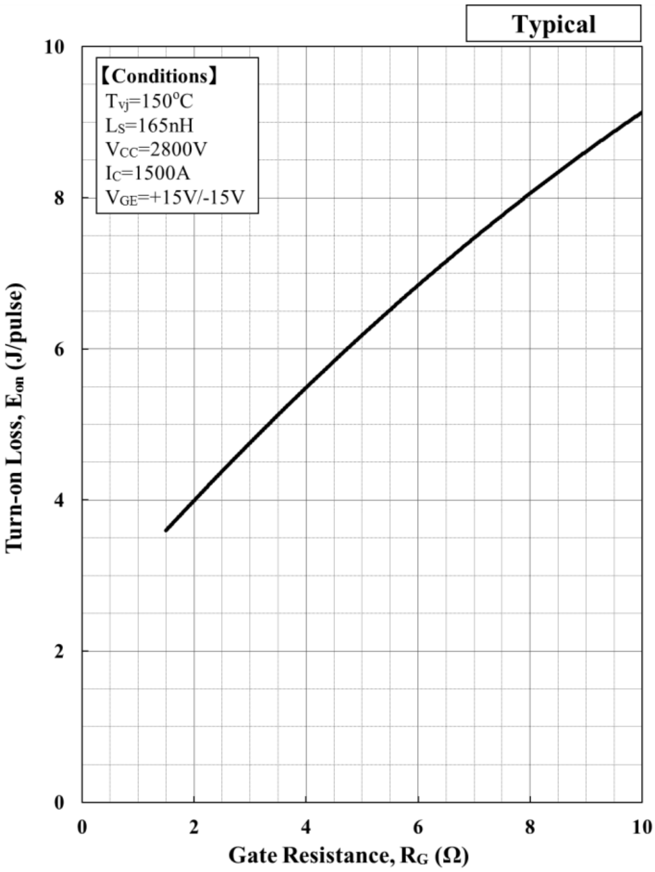
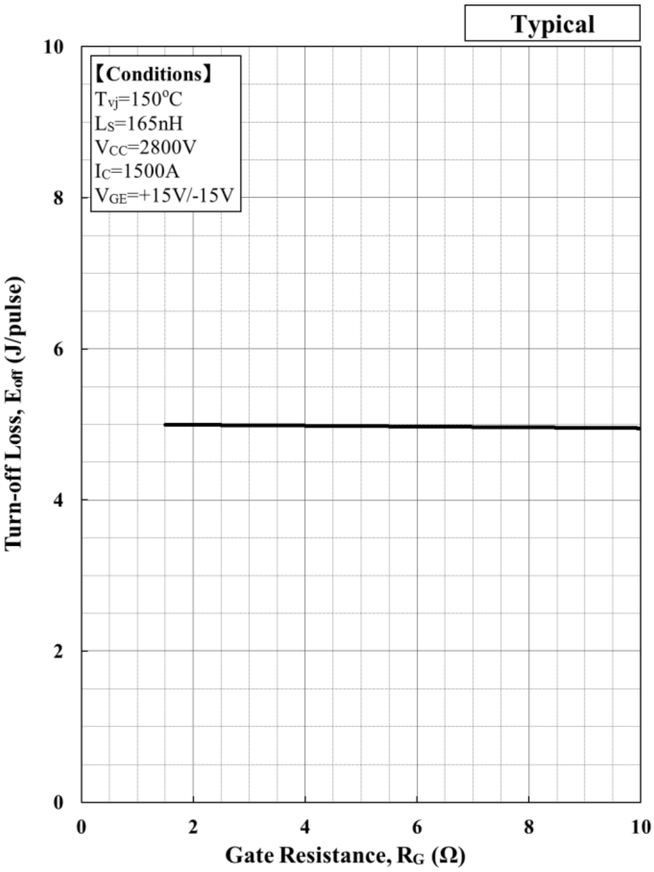
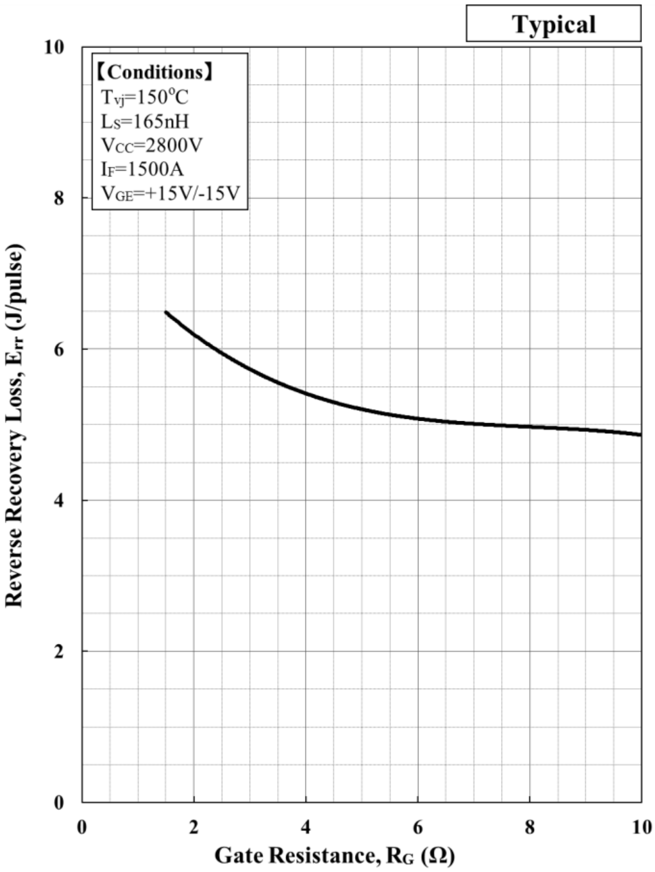


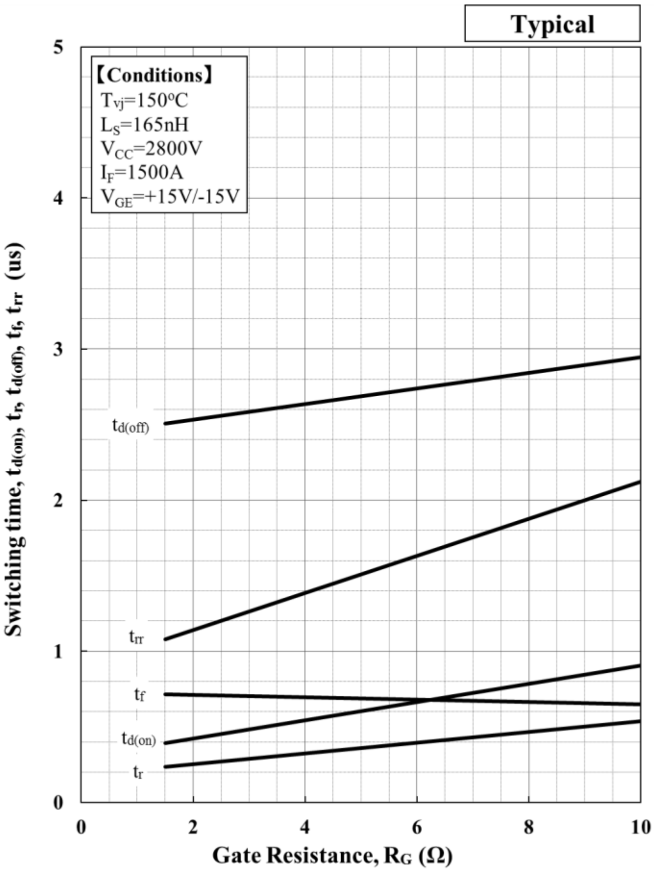
Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance



Recovery loss vs. Gate Resistance



Switching time vs. Gate Resistance

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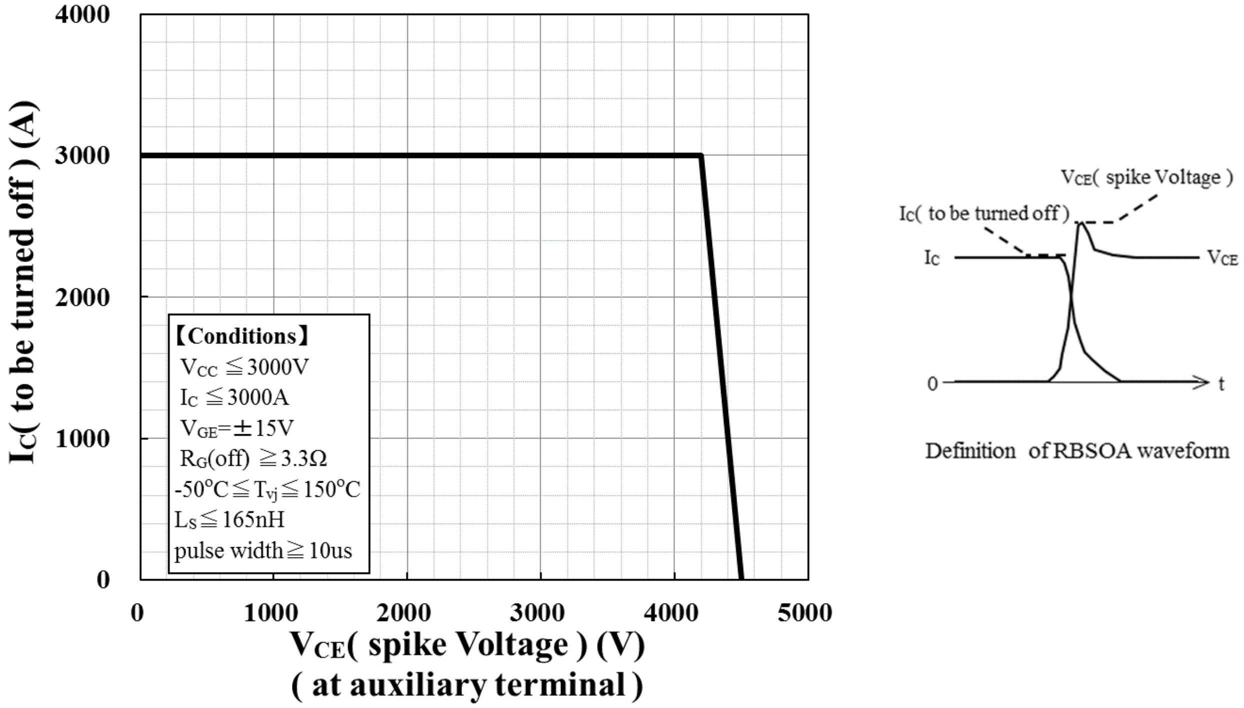
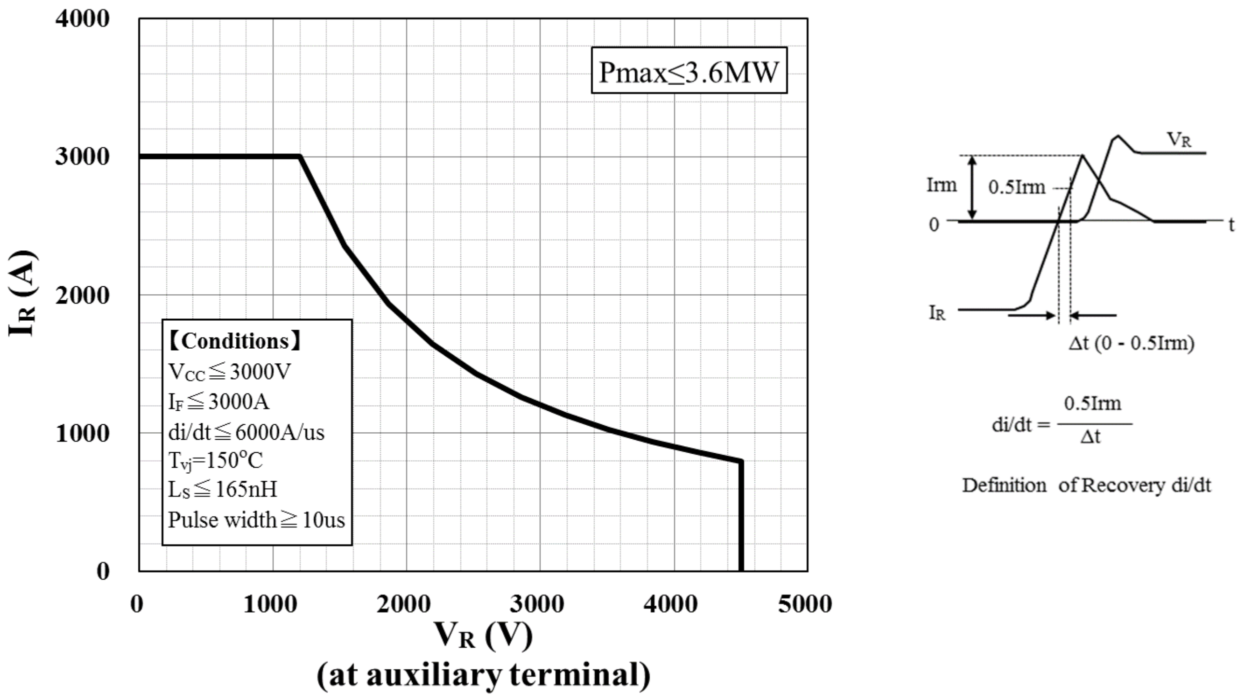


Reverse Bias Safe Operation Area (RBSOA)



Reverse Recovery Safe Operation Area (RRSOA)

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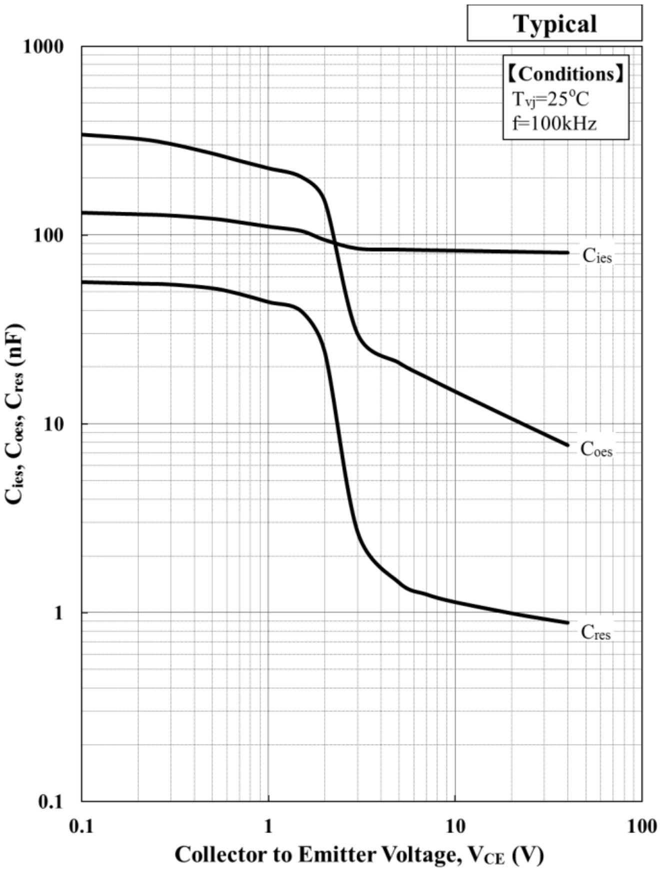
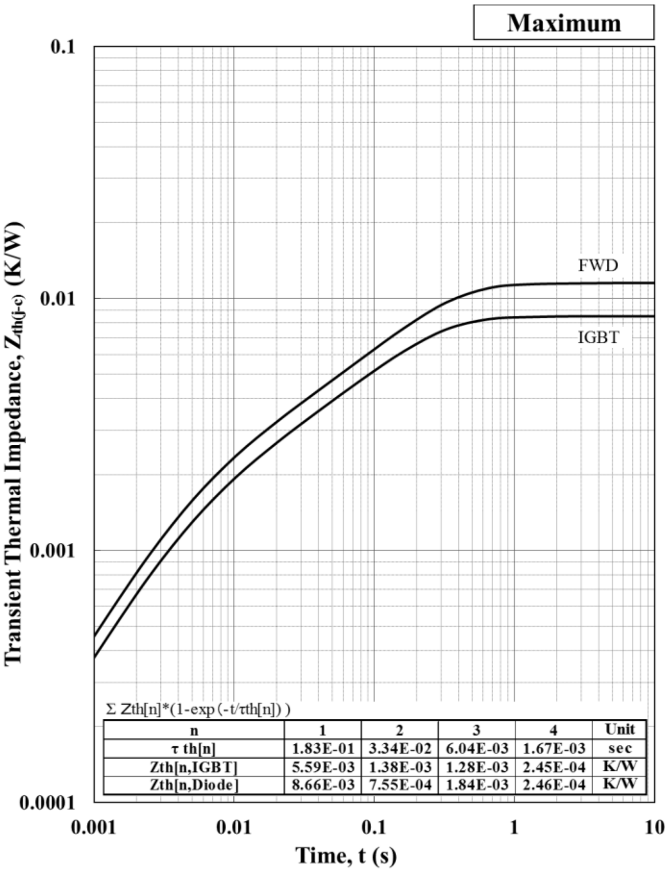


Capacitance vs. Collector to Emitter Voltage



n	1	2	3	4	Unit
τ th[n]	1.83E-01	3.34E-02	6.04E-03	1.67E-03	sec
Zth[n,IGBT]	5.59E-03	1.38E-03	1.28E-03	2.45E-04	K/W
Zth[n,Diode]	8.66E-03	7.55E-04	1.84E-03	2.46E-04	K/W

Transient Thermal Impedance Curve

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