MBN1500FH45F

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 Rth(j-c) & low stray inductance.
- RoHS

ABSOLUTE MAXIMUM RATINGS (Tc=25°C)

Item		Symbol	Unit	MBN1500FH45F
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_j	°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, Tj=25°C
			-	60	180	V_{CE}=4,500V, V_{GE}=0V, Tj=150°C
Gate Emitter Leakage Current	I_{GES}	nA	-500	-	+500	V_{GE}=±20V, V_{CE}=0V, Tj=25°C
Collector Emitter Saturation Voltage	V_{CEsat}	V	-	3.0	3.4	I_C=1500A, V_{GE}=15V, Tj=150°C
Gate Emitter Threshold Voltage	$V_{GE(th)}$	V	6.0	6.5	7.0	V_{CE}=10V, I_C=1500mA, Tj=25°C
Input Capacitance	C_{ies}	nF	-	83	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Internal Gate Resistance	rg	Ω	-	2.6	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Turn On Delay Time	$t_{d(on)}$	μs	-	0.5	-	V_{CC}=2,800V, Ic=1500A
Rise Time	t_r		-	0.25	-	Ls=165nH
Turn Off Delay Time	$t_{d(off)}$		-	2.8	-	R_G=3.3Ω (3)
Fall Time	t_f		-	2.1	-	V_{GE}=±15V, Tj=150°C
Peak Forward Voltage Drop	V_F	V	-	2.8	3.2	IF=1500A, V_{GE}=0V, Tj=150°C
Reverse Recovery Time	t_{rr}	μs	-	1.3	-	V_{CC}=2,800V, IF=1500A, Ls=165nH Tj=150°C
Turn On Loss	E_{on}	J/P	-	4.8	-	V_{CC}=2,800V, Ic=1500A, Ls=165nH
Turn Off Loss	E_{off}	J/P	-	8.0	-	R_G=3.3Ω (3)
Reverse Recovery Loss	E_{rr}	J/P	-	6.3	-	V_{GE}=±15V, Tj=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,Tj=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	Rth(j-c)	K/W	-	-	0.0085	Junction to case
Thermal Impedance FWD	Rth(j-c)		-	-	0.0115	Junction to case
Contact Thermal Impedance	Rth(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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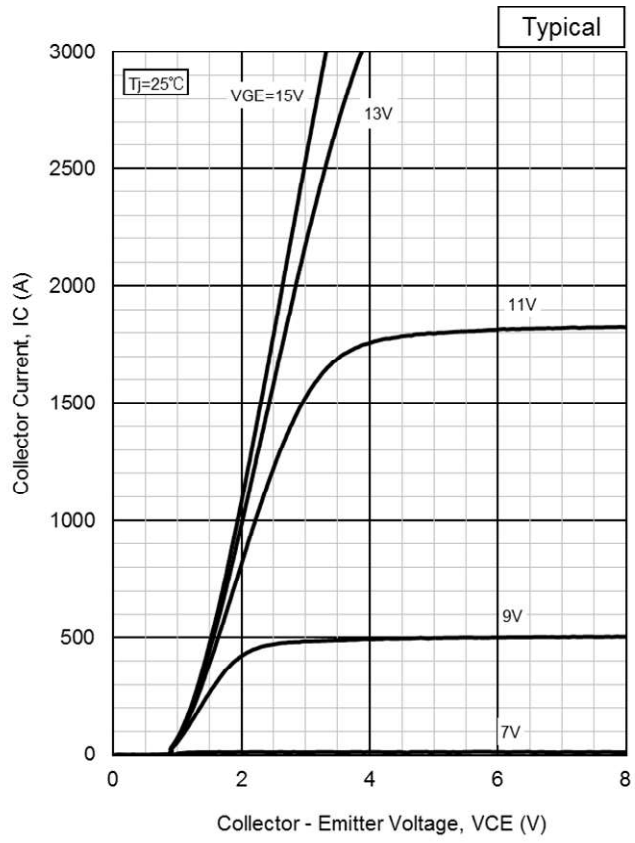
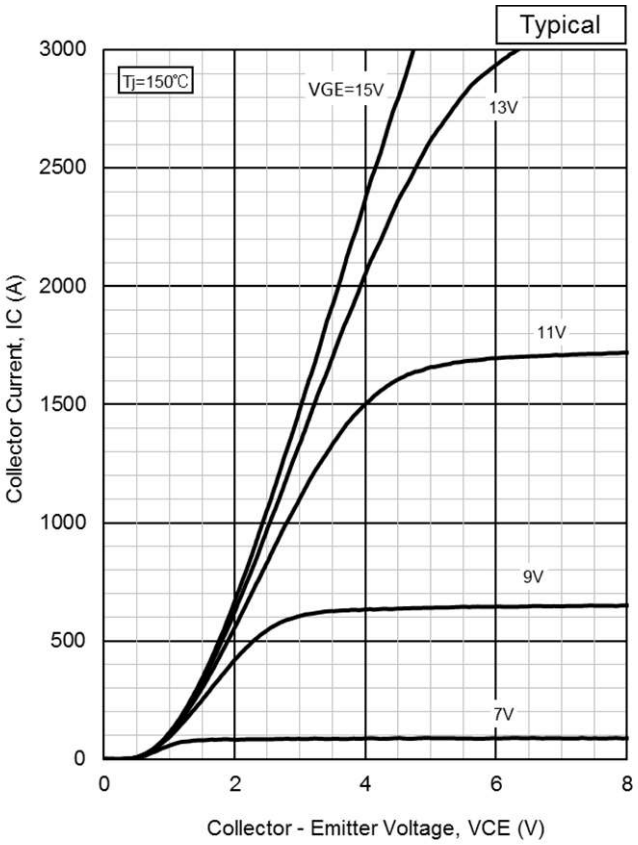
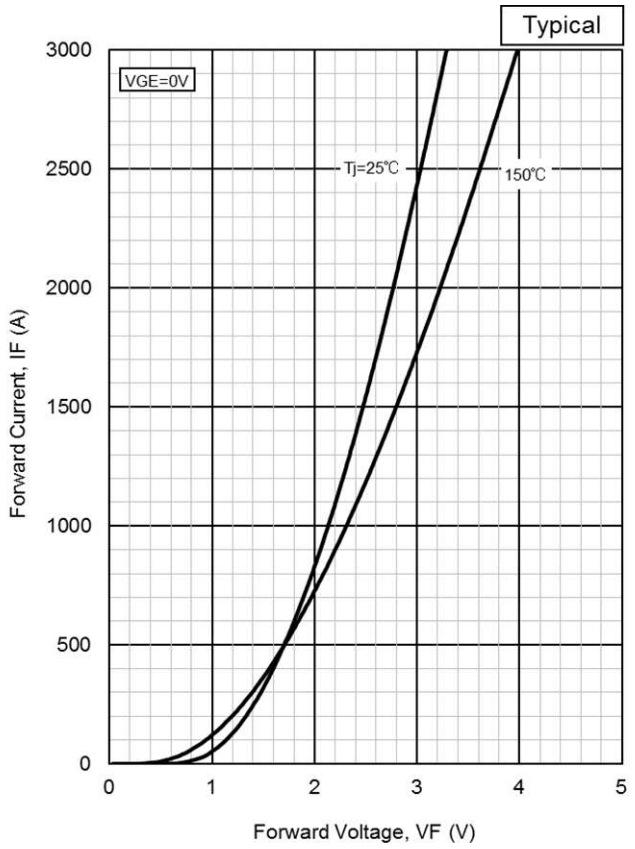
STATIC CHARACTERISTICS



IC vs. VCE (Tj=25°C)



IC vs. VCE(Tj=150°C)



IF vs. VF

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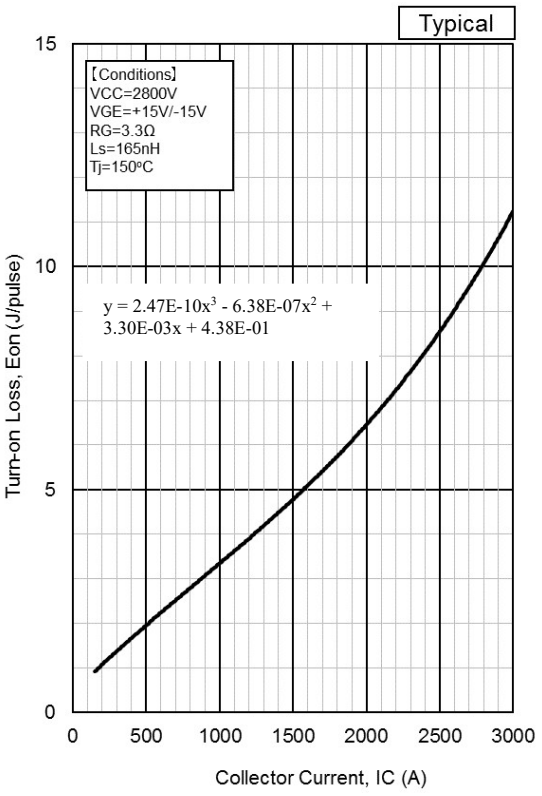
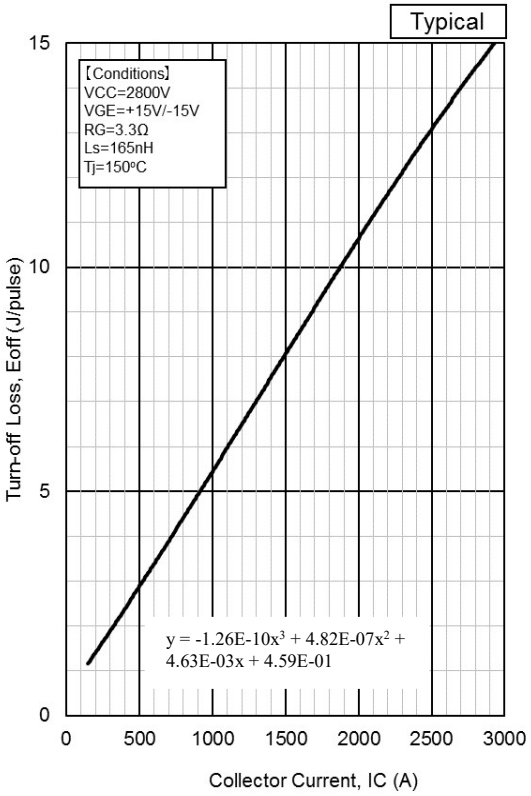
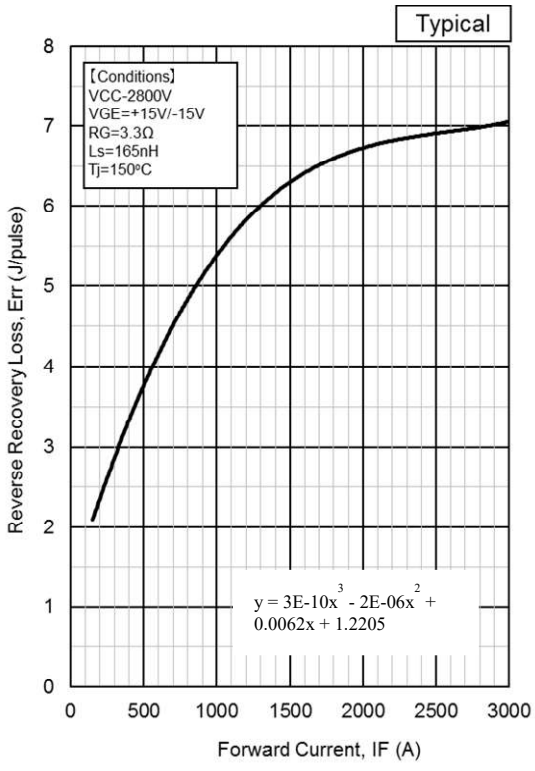
DYNAMIC CHARACTERISTICS



Turn-on loss vs. Collector current



Turn-off loss vs. Collector current



Recovery loss vs. Forward current

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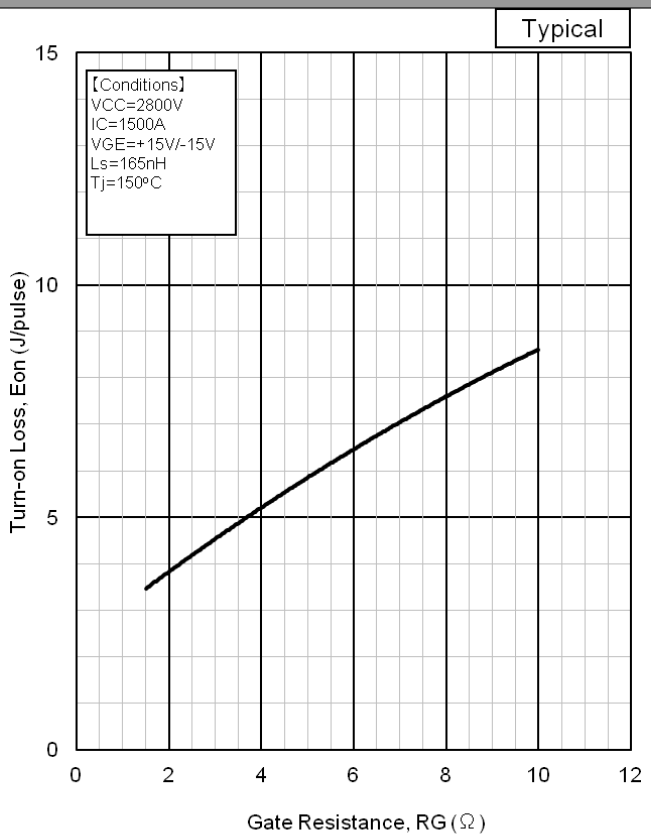
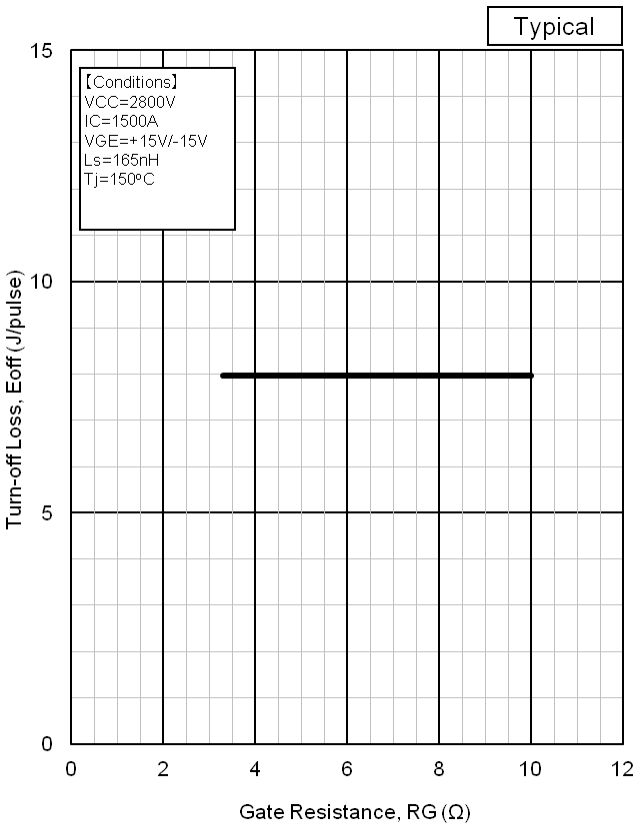
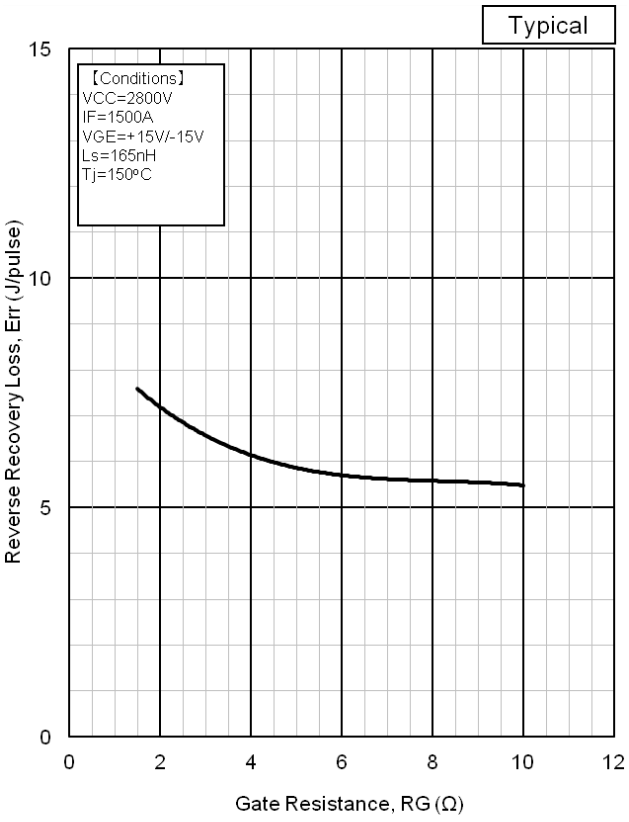


Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance



Recovery loss vs. Gate Resistance

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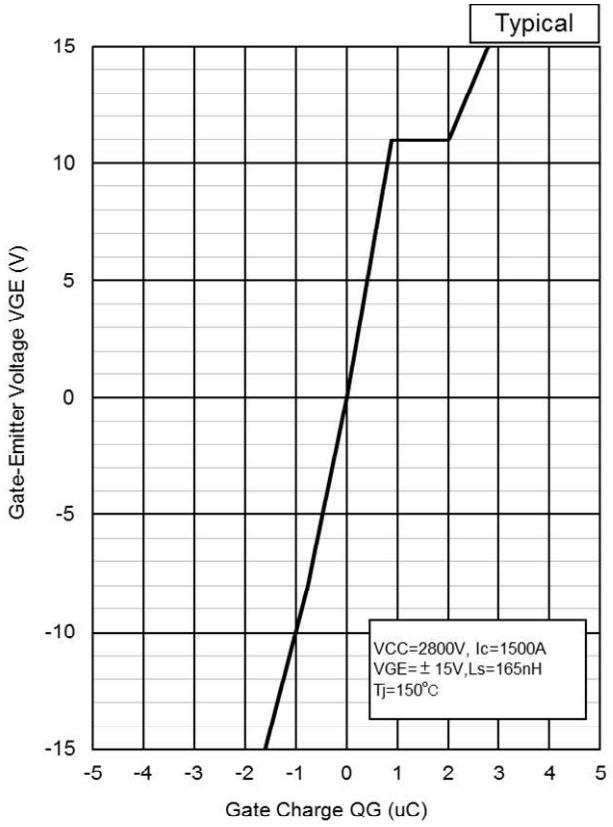
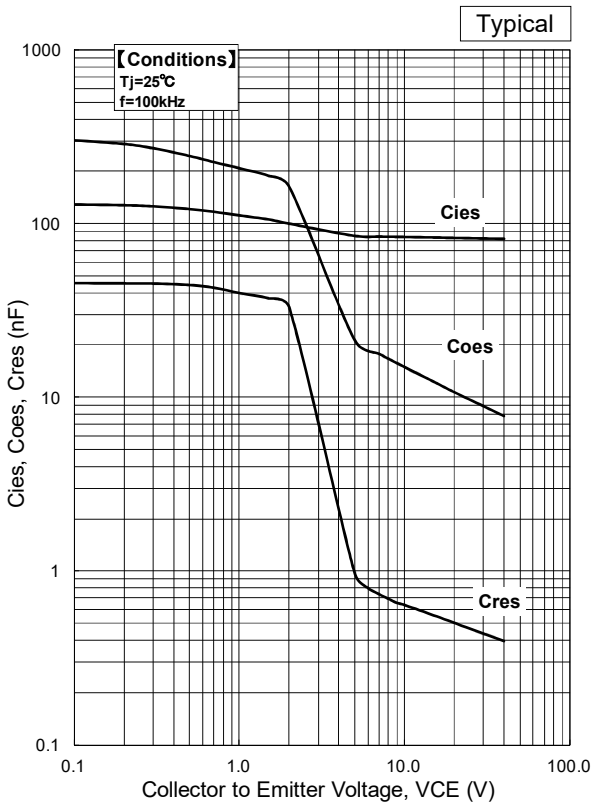
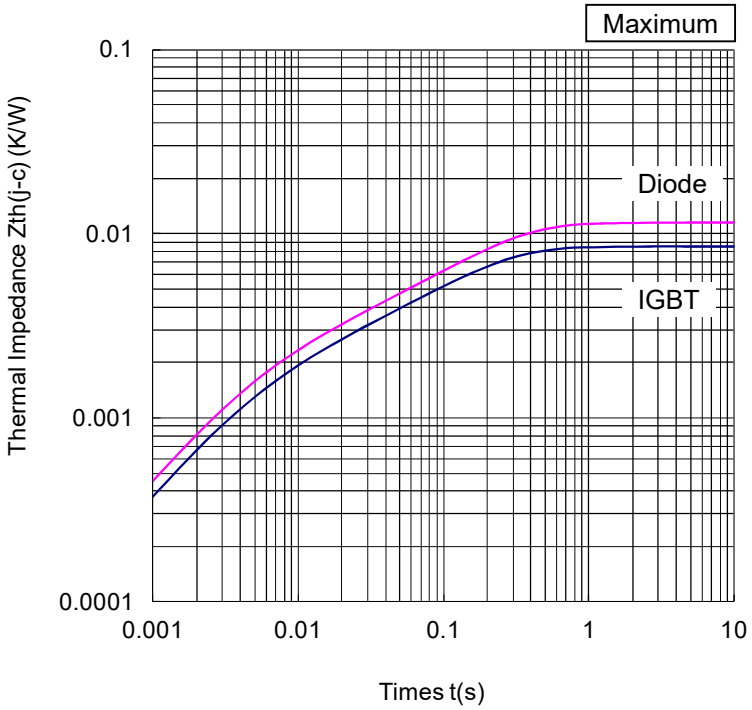


QG - VGE



Capacitance vs. Collector to Emitter Voltage



Transient Thermal Impedance Curve

Curve Approximation Model
Σ rth[n]*(1-exp(-t/τth[n]))

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

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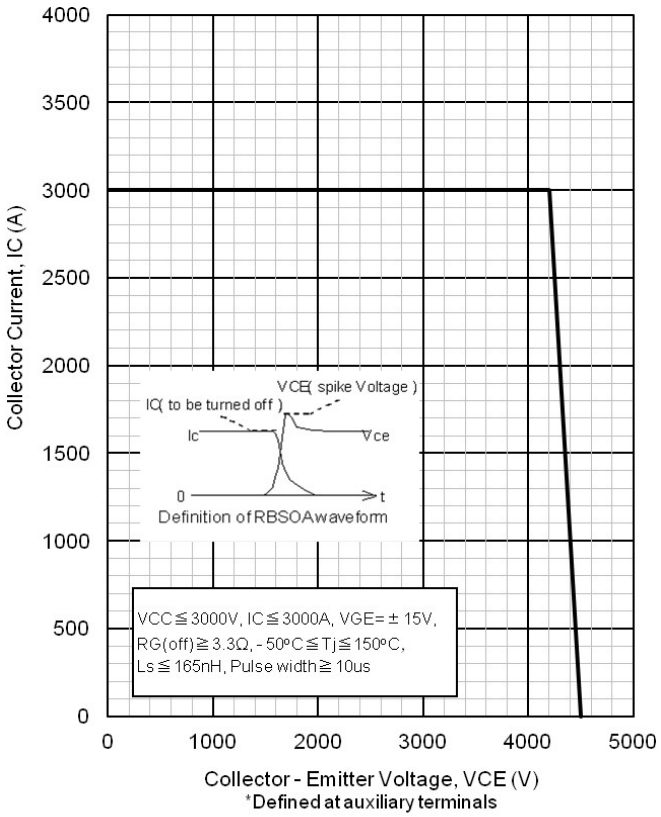
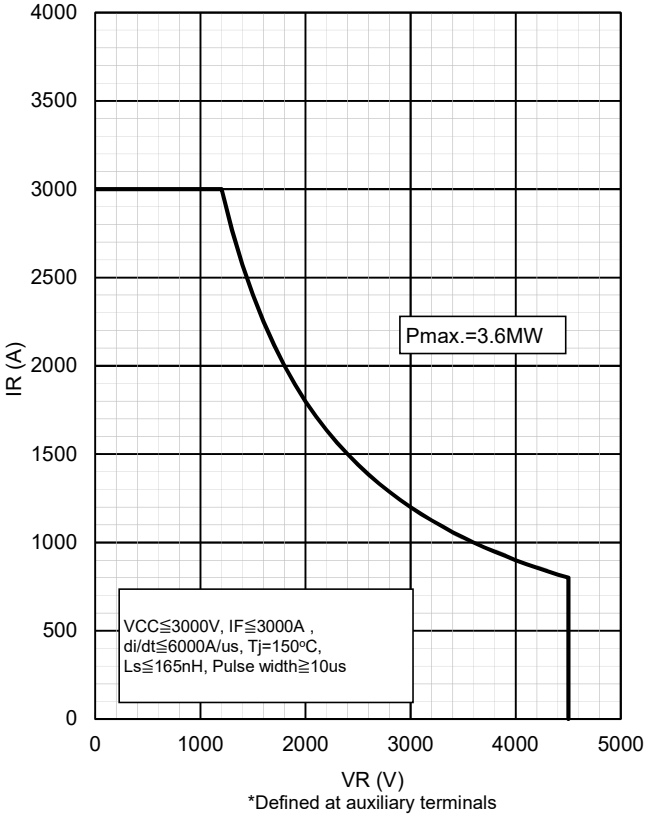
Safe Operating Area



Reverse bias safe operation area(RBSOA)



Reverse recovery safe operation area(RRSOA)

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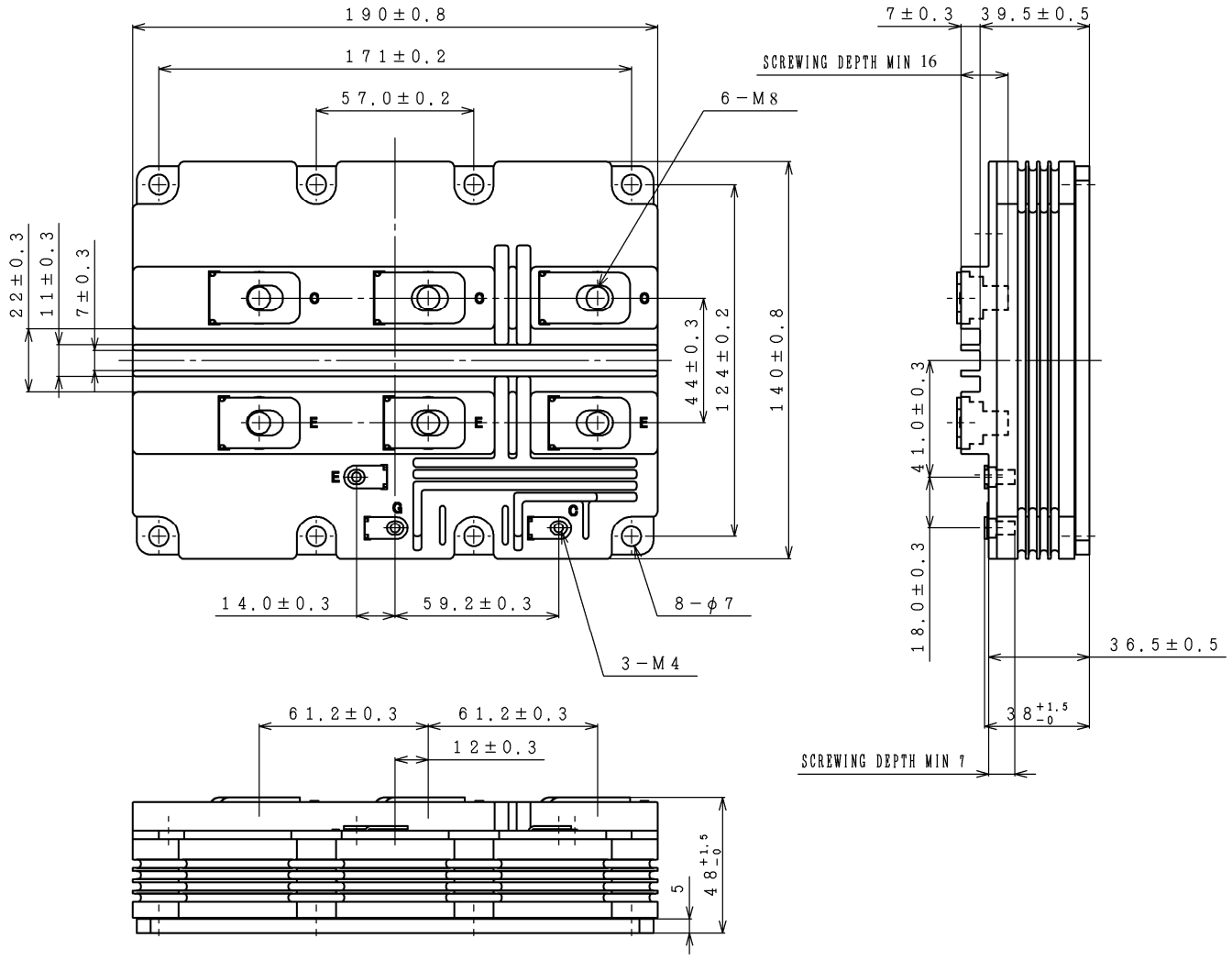
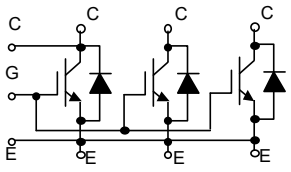
PACKAGE OUTLINE DRAWING

Unit in mm



CIRCUIT DIAGRAM



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HITACHI POWER SEMICONDUCTORS

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