MBN3600E17F

Silicon N-channel IGBT 1700V F version

FEATURES

- Soft switching behavior & low conduction loss :
  Soft low-injection punch-through with
  Advanced trench HiGT* (*High conductivity IGBT)
- Low driving power:
  Low input capacitance advanced trench gate.
- Low noise recovery: Ultra soft fast recovery diode.

ABSOLUTE MAXIMUM RATINGS (T_C=25°C)

Item		Symbol	Unit	MBN3600E17F
Collector Emitter Voltage		V_{CES}	V	1,700
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	3,600
	1ms	I_{CRM}		7,200
Forward Current	DC	I_F	A	3,600
	1ms	I_{FRM}		7,200
Junction Temperature		$T_{vj\ op}$	°C	-50 ~ +150
Storage Temperature		T_{stg}	°C	-55 ~ +125
Isolation Voltage		V_{ISO}	V_{RMS}	4,000(AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	N·m	2/15 (1)
	Mounting (M6)	-		6 (2)

Notes: (1) Recommended Value 1.8±0.2/15$^{+0}_{-3}$N·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	-	-	10	V_{CE}=1,700V, V_{GE}=0V, T_{vj}=25°C
				-	35	150	V_{CE}=1,700V, 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	-	2.4	2.8	I_C=3,600A, V_{GE}=15V, T_{vj}=150°C
Gate Emitter Threshold Voltage		$V_{GE(th)}$	V	4.1	5.5	7.1	V_{CE}=10V, I_C=360mA, T_{vj}=25°C
Input Capacitance		C_{ies}	nF	-	177	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, T_{vj}=25°C
Internal Gate Resistance		$R_{G(int)}$	Ω	-	1.3	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, T_{vj}=25°C
Turn On Delay Time		$t_{d(on)}$	μs	-	1.05	2.0	V_{CC}=900V, I_C=3,600A
Rise Time		t_r		-	0.35	0.8	L_S=55nH
Turn Off Delay Time		$t_{d(off)}$		-	1.7	3.4	R_G(on/off)=3.3/3.3Ω (3)
Fall Time		t_f		-	1.6	3.2	V_{GE}=±15V, T_{vj}=150°C
Peak Forward Voltage Drop		V_F	V	-	2.25	2.7	I_F=3,600A, V_{GE}=0V, T_{vj}=150°C
Reverse Recovery Time		t_{rr}	μs	-	0.8	1.6	V_{CC}=900V, I_F=3,600A, L_S=55nH T_{vj}=150°C
Turn On Loss		E_{on}	J/P	-	1.4	-	V_{CC}=900V, I_C=3,600A, L_S=55nH
Turn Off Loss		E_{off}	J/P	-	3.0	-	R_G(on/off)=3.3/3.3Ω (3)
Reverse Recovery Loss		E_{rr}	J/P	-	1.15	-	V_{GE}=±15V, T_{vj}=150°C
Short Circuit Pulse Width		t_{sc}	μs	10	-	-	V_{CC}=1,100V,Ls=55nH R_G(on/off)=3.3/15Ω,V_{GE}=±15V, T_{vj}=150°C
Stray inductance module		L_{SCE}	nH	-	8	-	
Thermal Impedance	IGBT	$R_{th(j-c)}$	K/W	-	-	0.0072	Junction to case
	FWD	$R_{th(j-c)}$		-	-	0.011	
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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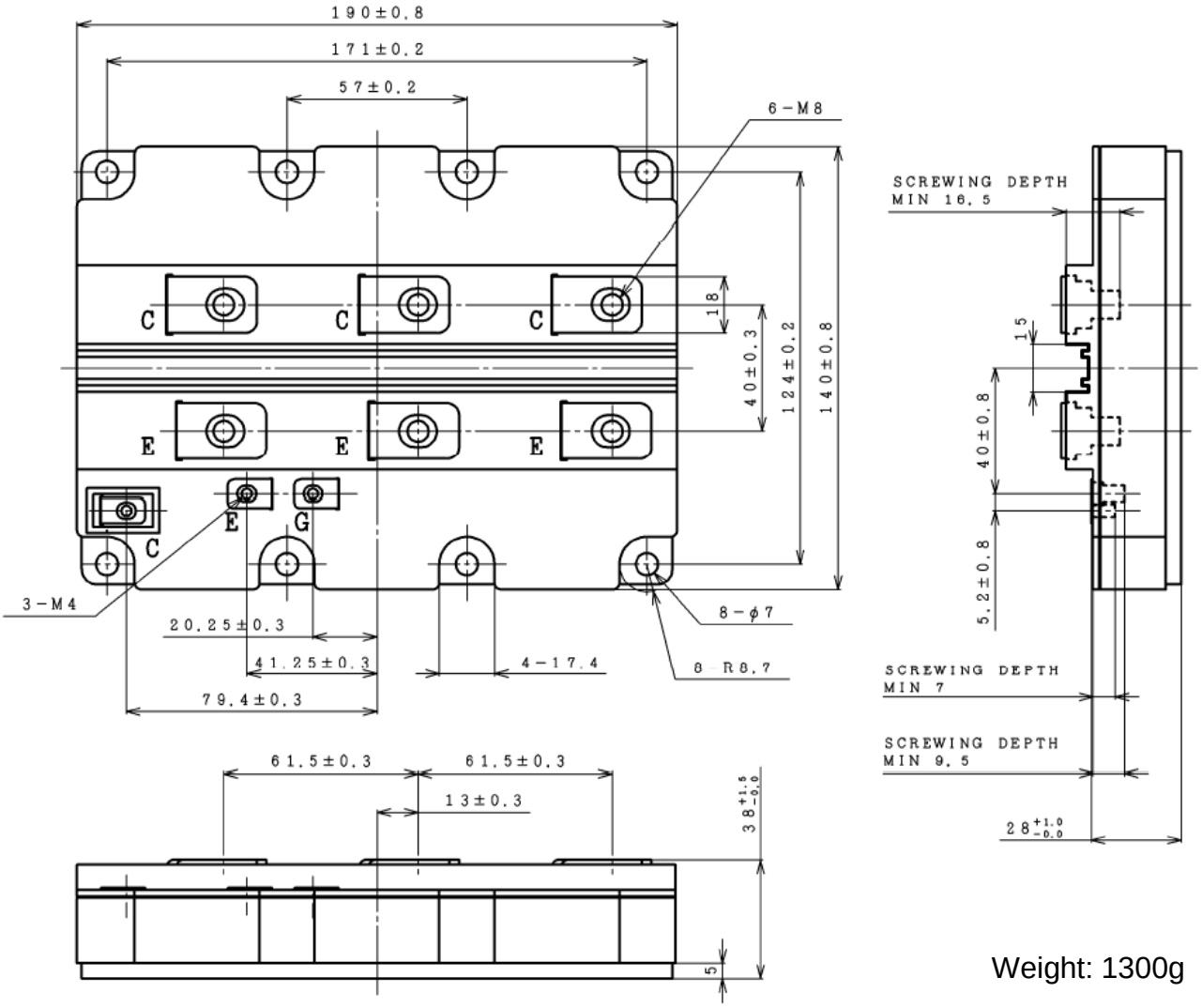
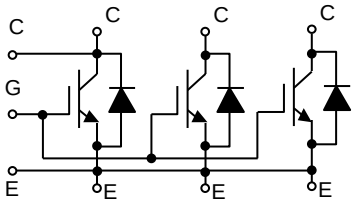
OUTLINE DRAWING

Unit in mm



Weight: 1300g

CIRCUIT DIAGRAM



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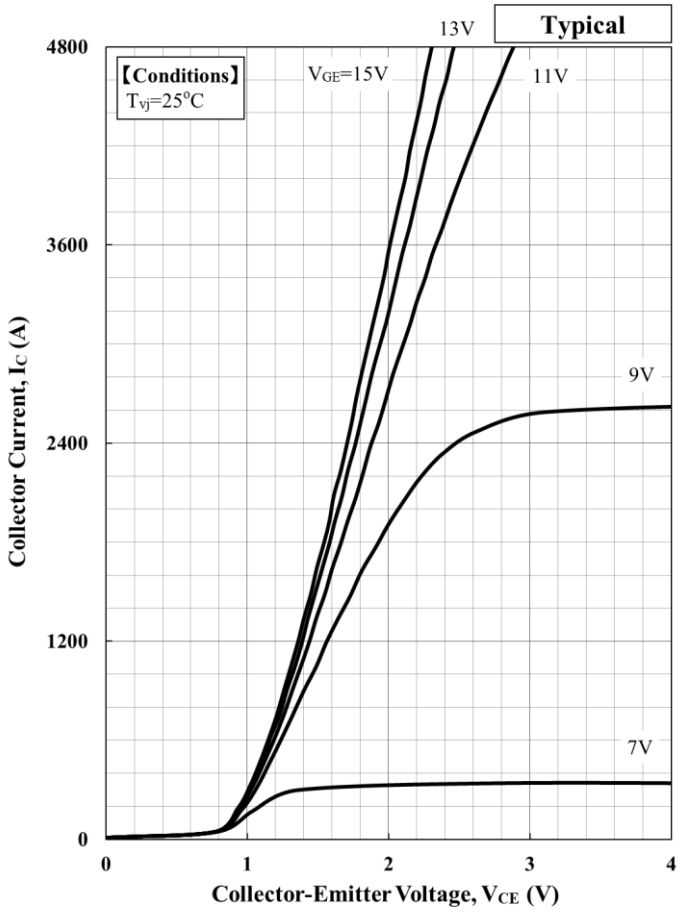
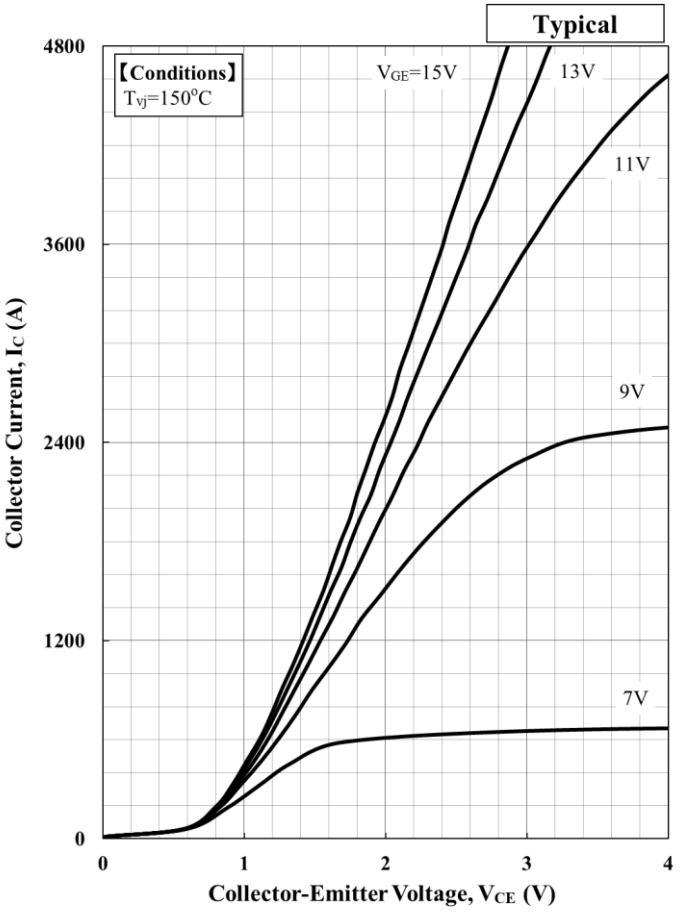
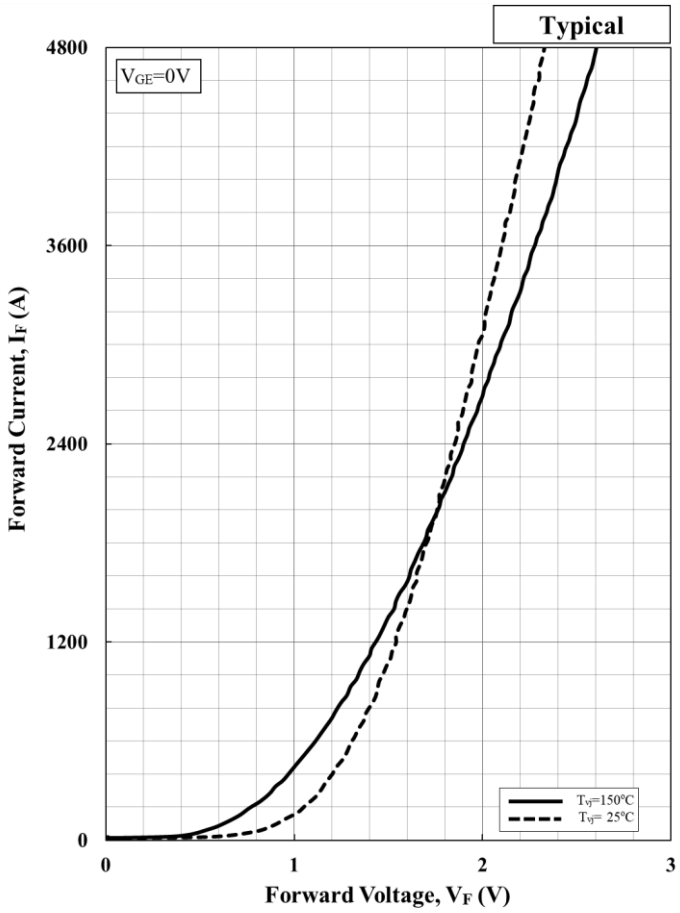


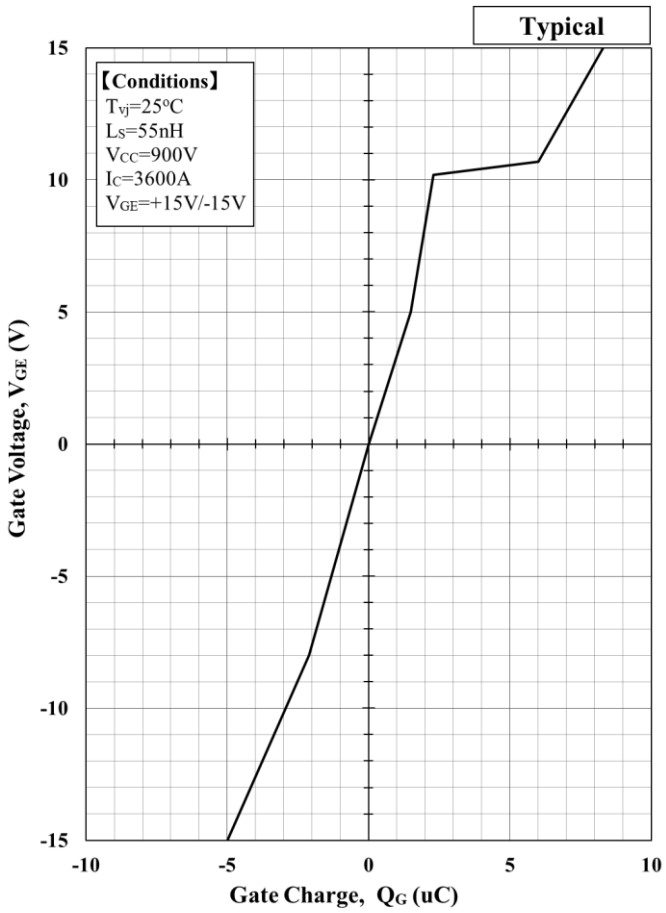
Collector Current vs. Collector Emitter Voltage



Collector Current vs. Collector Emitter Voltage



Forward Voltage of free-wheeling diode



VGE-QG curve

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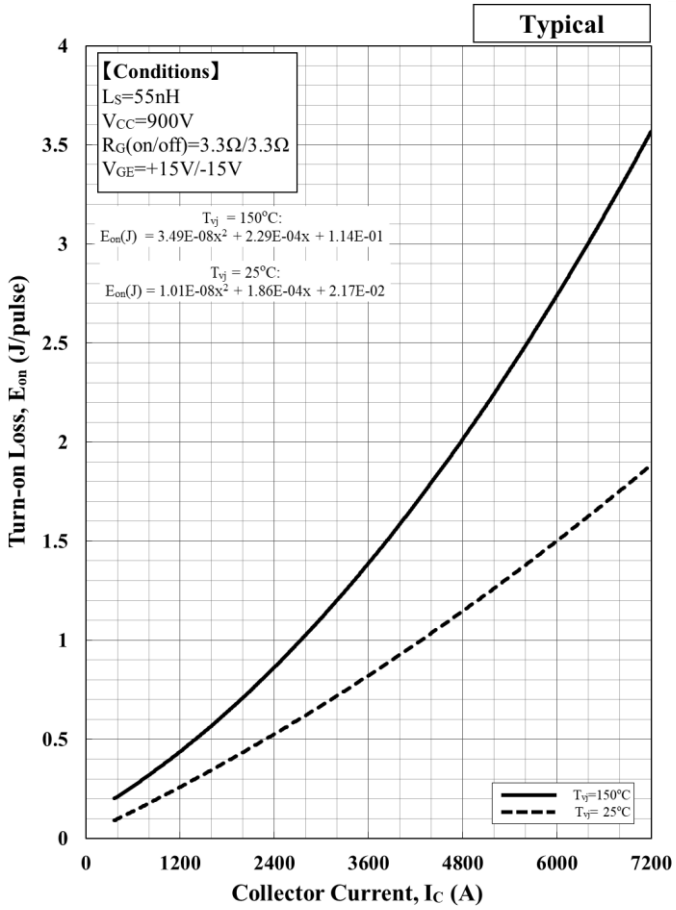
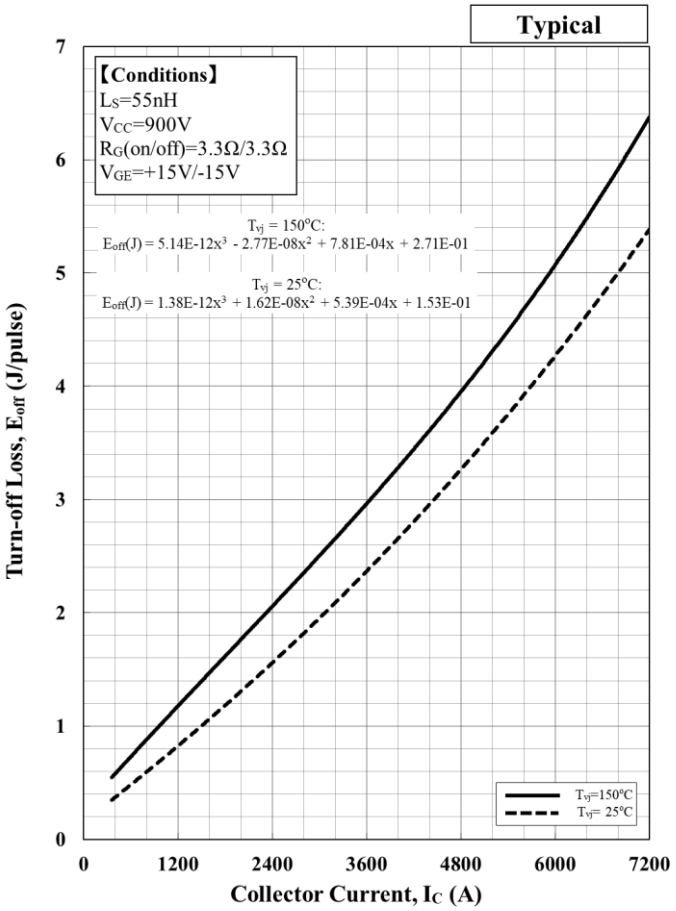
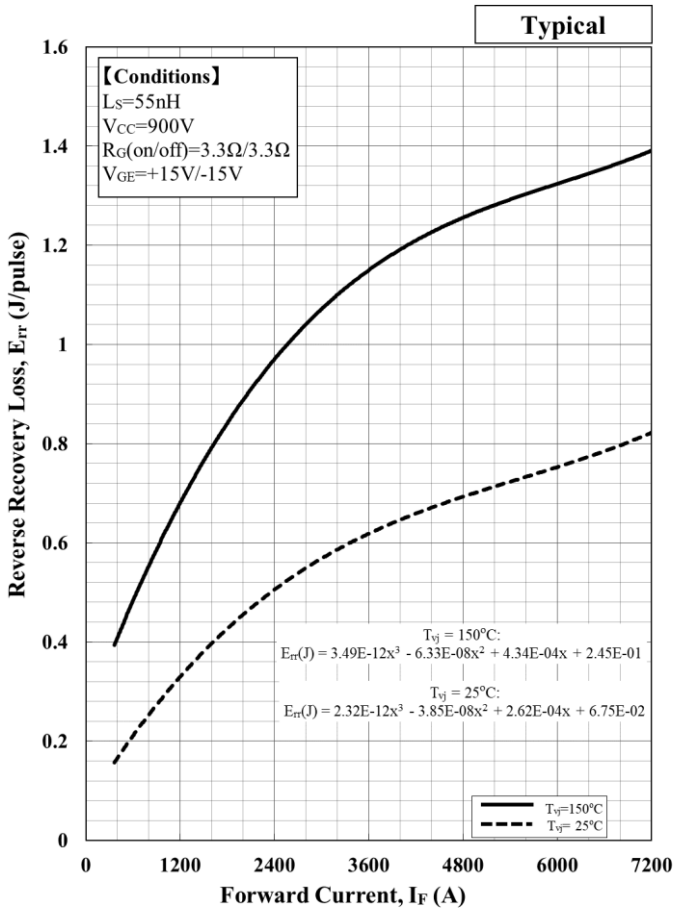


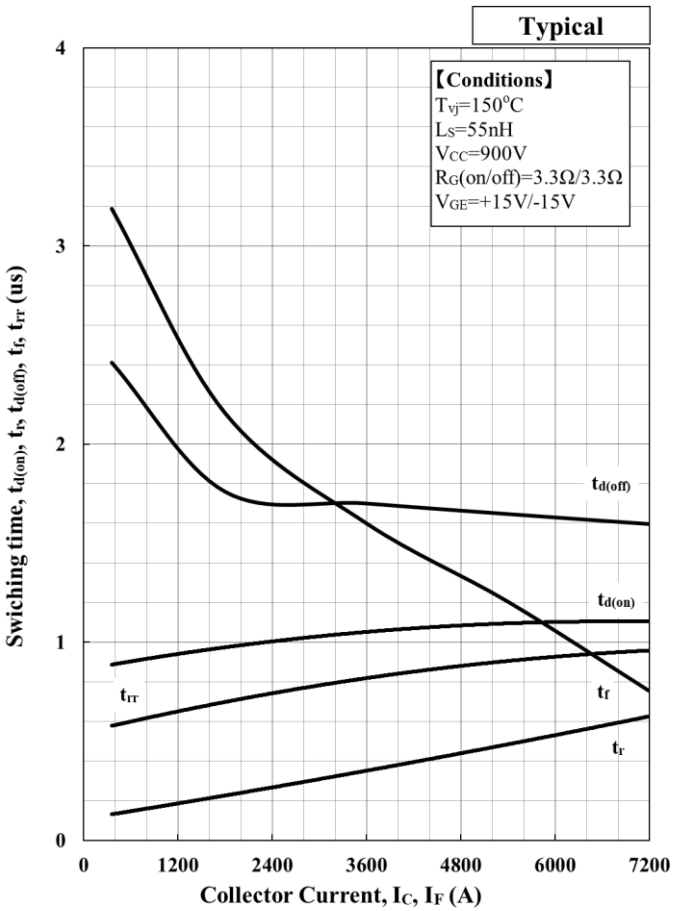
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current



Recovery loss vs. Forward current



Switching time vs. Collector Current

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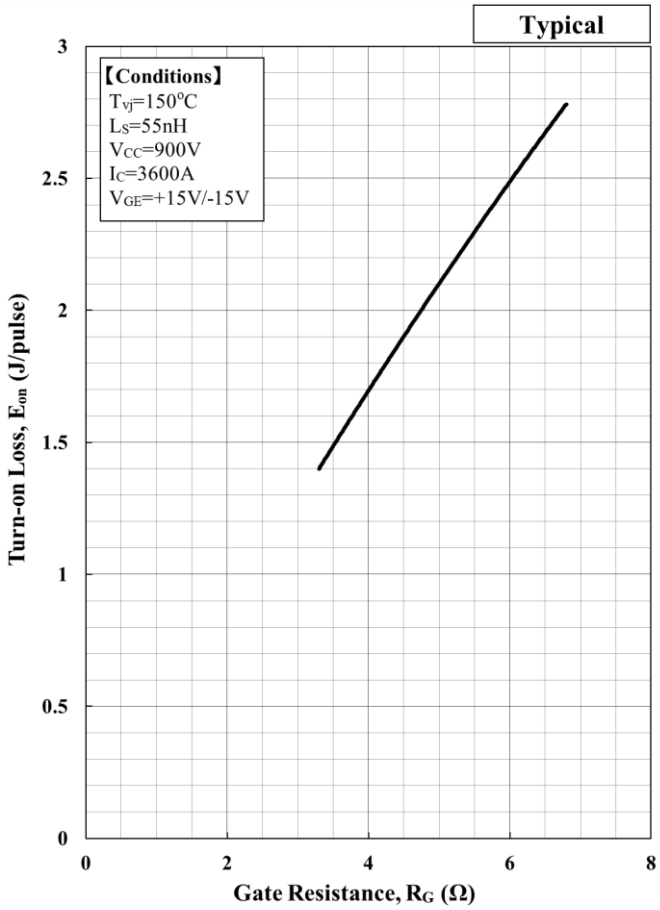
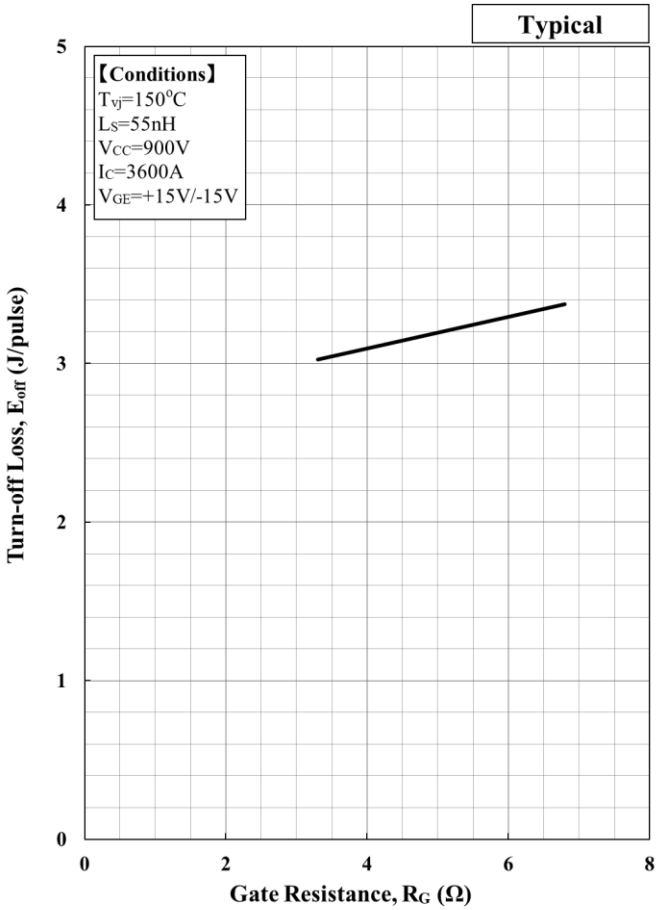
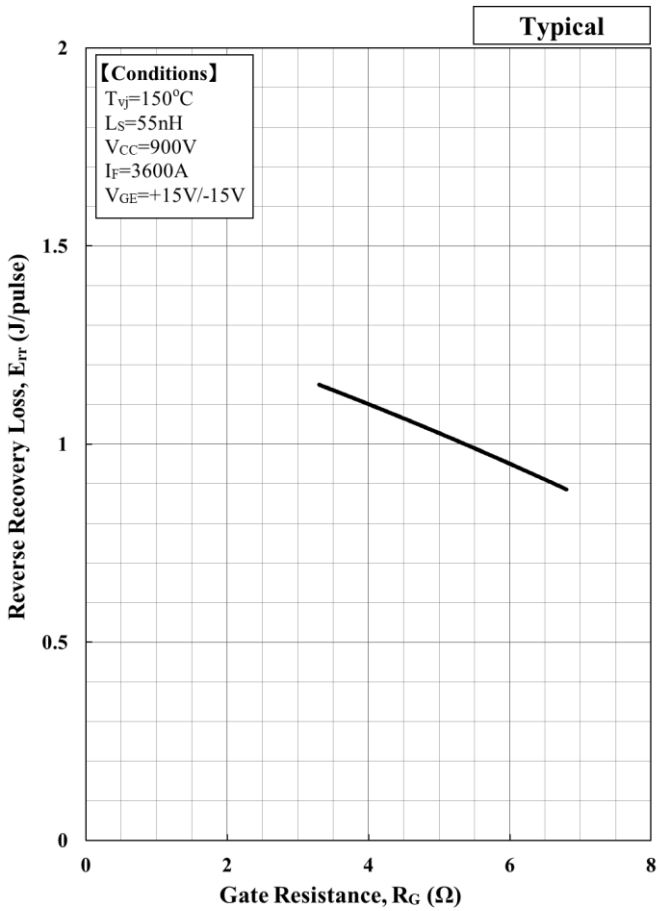


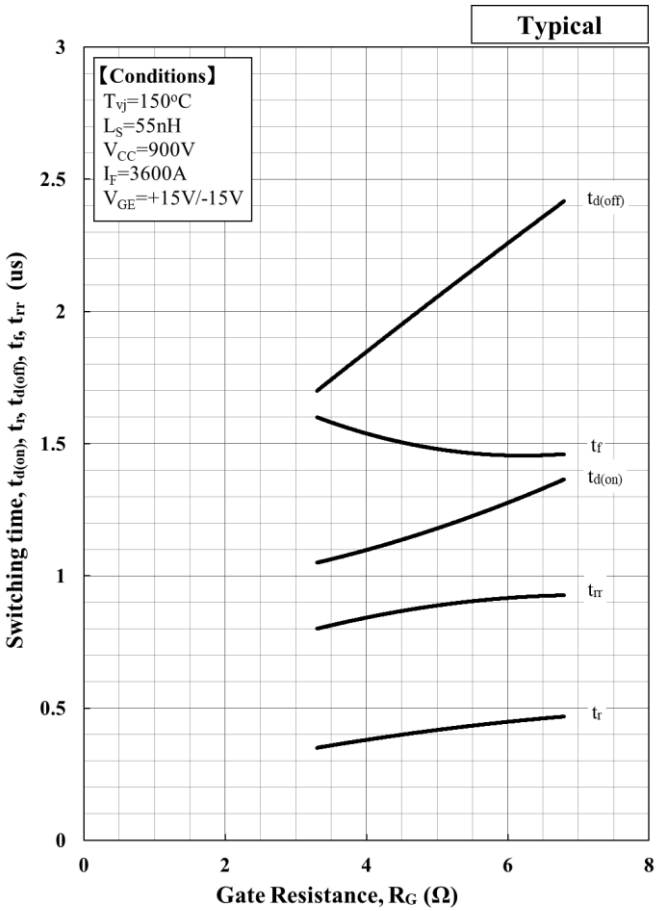
Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance



Recovery loss vs. Gate Resistance



Switching time vs. Gate Resistance

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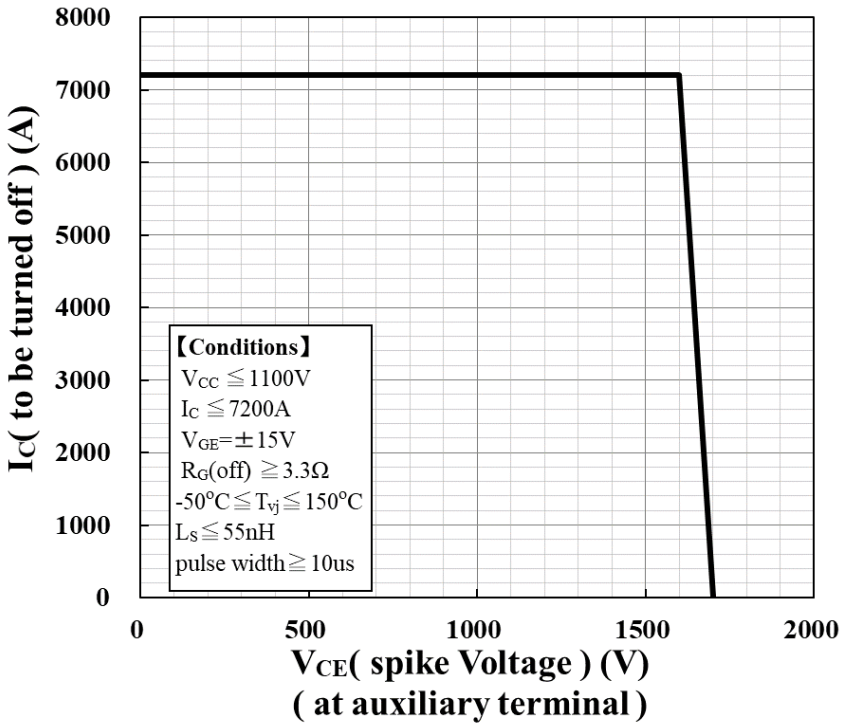
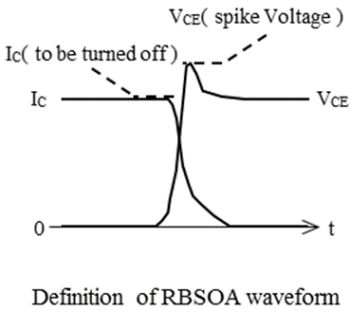
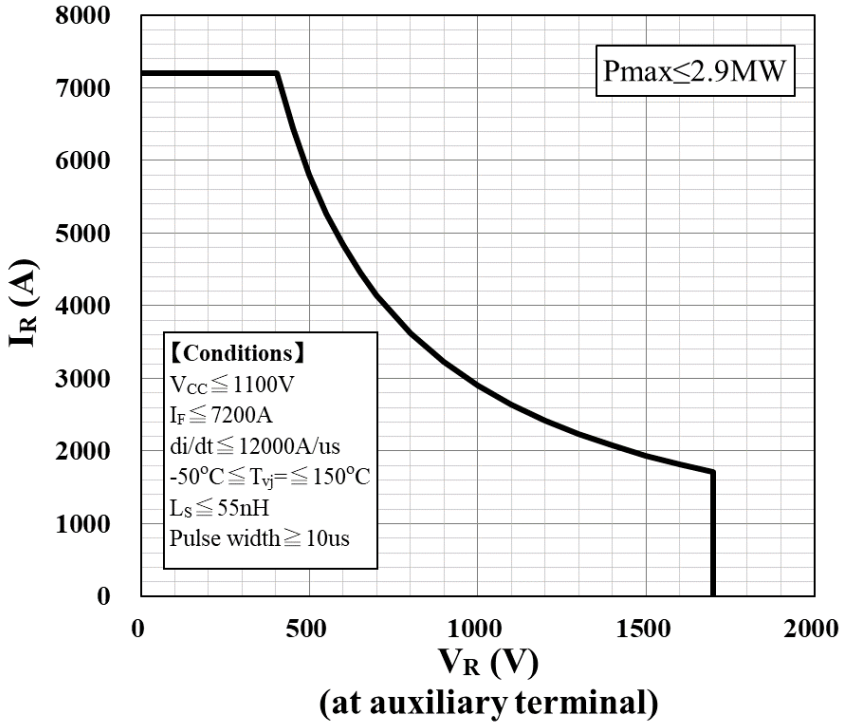
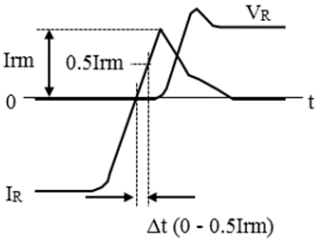




Definition of RBSOA waveform

Reverse Bias Safe Operation Area (RBSOA)





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

Definition of Recovery di/dt

Reverse Recovery Safe Operation Area (RRSOA)

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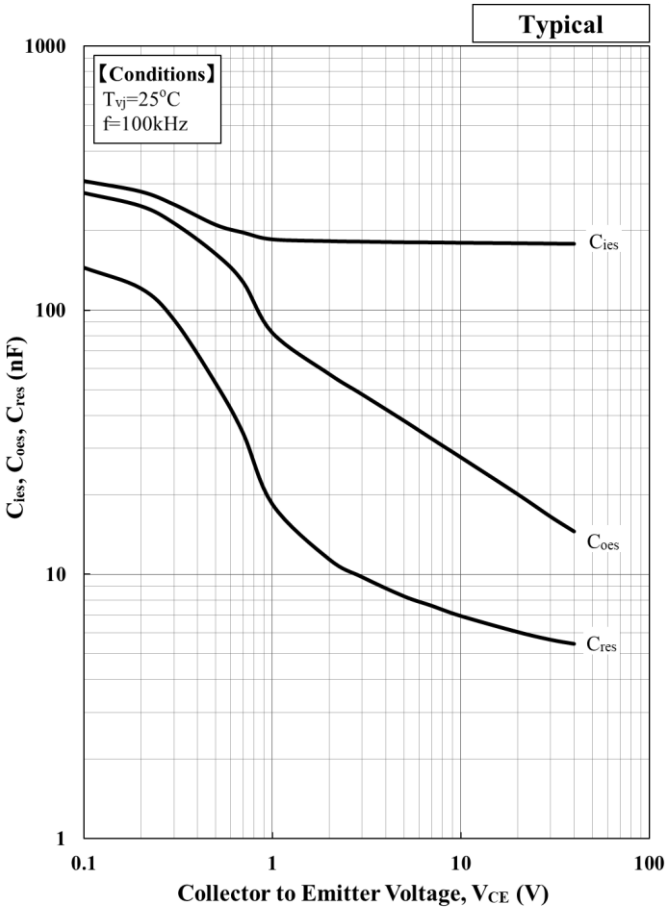
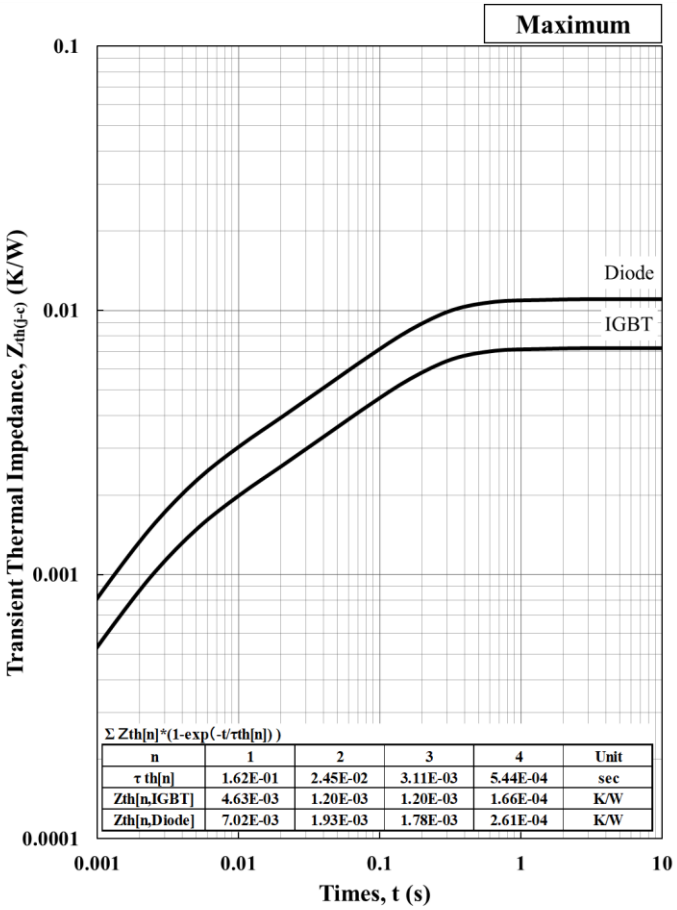


Capacitance vs. Collector to Emitter Voltage



Σ Zth[n]*(1-exp(-t/τth[n]))

n	1	2	3	4	Unit
τ th[n]	1.62E-01	2.45E-02	3.11E-03	5.44E-04	sec
Zth[n,IGBT]	4.63E-03	1.20E-03	1.20E-03	1.66E-04	K/W
Zth[n,Diode]	7.02E-03	1.93E-03	1.78E-03	2.61E-04	K/W

Transient Thermal Ipedance Curve

Material declaration

Please note the following materials are contained in the product, in order to keep characteristic and reliability level.

Material	Contained part
Lead (Pb) and its compounds	Solder

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HITACHI POWER SEMICONDUCTORS

Notices

1. Since mishandling of semiconductor devices may cause malfunctions, please be sure to read "Precautions for Safe Use and Notices" in the individual brochure before use.
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5. A semi-processed article is done now using solder which contains lead inside the semiconductor devices. There is possibility of the regulation substance depend on the applied models, so please check before using.
6. This specification is a material for component selection, which describes specifications of power semiconductor devices (hereinafter referred to as products), characteristic charts, and external dimension drawings.
7. The information given herein, including the specifications and dimensions, is subject to change without prior notice to improve product characteristics. Before ordering, purchasers are advised to contact with Hitachi power semiconductor sales department for the latest version of this data sheets.
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■ For inquiries relating to the products, please contact nearest representatives that is located "Inquiry" portion on the top page of a home page.

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