

MBN1600E17F

Silicon N-channel IGBT 1700V F version

FEATURES

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

ABSOLUTE MAXIMUM RATINGS (T_c=25°C)

Item	Symbol	Unit	MBN1600E17F
Collector Emitter Voltage	V _{CES}	V	1,700
Gate Emitter Voltage	V _{GES}	V	±20
Collector Current	DC	I _c	1,600
	1ms	I _{cp}	3,200
Forward Current	DC	I _F	1,600
	1ms	I _{FM}	3,200
Junction Temperature	T _{j op}	°C	-50 ~ +150
Storage Temperature	T _{stg}	°C	-40 ~ +125
Isolation Voltage	V _{ISO}	V _{RMS}	4,000(AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	2/15 (1)
	Mounting (M6)	-	6 (2)

Notes: (1) Recommended Value $1.8 \pm 0.2/15^{+0}_{-0.3}$ N·m (2) Recommended Value 5.5 ± 0.5 N·m

ELECTRICAL CHARACTERISTICS

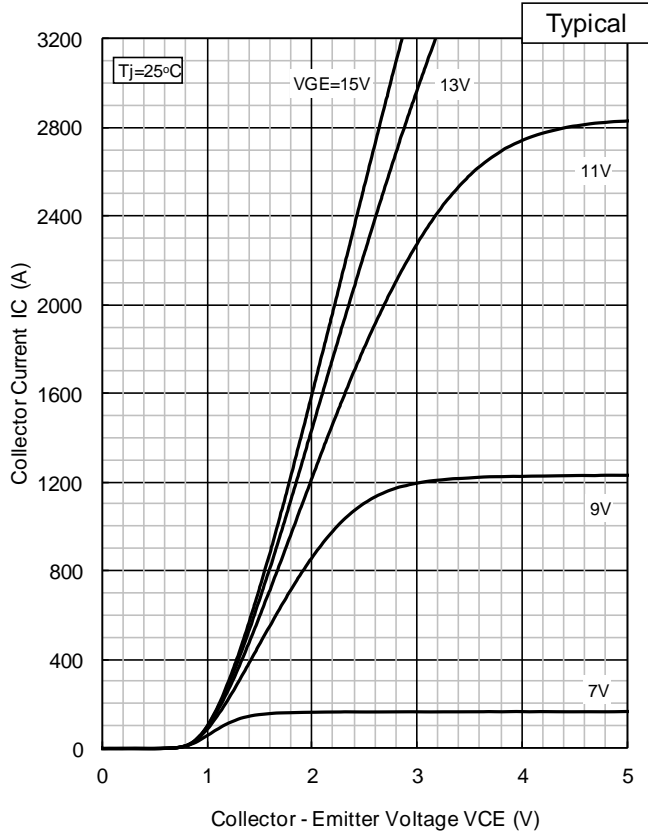
Item	Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current	I _{CES}	mA	-	5	-	V _{CE} =1,700V, V _{GE} =0V, T _j =25°C
			-	20	80	V _{CE} =1,700V, V _{GE} =0V, T _j =150°C
Gate Emitter Leakage Current	I _{GES}	nA	-500	-	+500	V _{GE} =±20V, V _{CE} =0V, T _j =25°C
Collector Emitter Saturation Voltage	V _{CE(sat)}	V	-	2.0	-	I _c =1,600A, V _{GE} =15V, T _j =25°C
			1.9	2.4	2.8	I _c =1,600A, V _{GE} =15V, T _j =150°C
Gate Emitter Threshold Voltage	V _{GE(TO)}	V	4.1	5.5	7.1	V _{CE} =10V, I _c =160mA, T _j =25°C
Input Capacitance	C _{ies}	nF	-	87	-	V _{CE} =10V, V _{GE} =0V, f=100kHz, T _j =25°C
Internal Gate Resistance	R _{ge}	Ω	-	2.3	-	V _{CE} =10V, V _{GE} =0V, f=100kHz, T _j =25°C
Switching Times	Rise Time	t _r	-	0.4	0.8	V _{CC} =900V, I _c =1,600A
	Turn On Time	t _{on}	-	1.0	2.0	L _s =65nH (3)
	Fall Time	t _f	-	1.4	2.8	R _{G(on/off)} =3.9Ω/3.9Ω (3)
	Turn Off Time	t _{off}	-	3.2	6.4	V _{GE} =±15V, T _j =150°C
Peak Forward Voltage Drop	V _{FM}	V	-	1.8	-	I _F =1,600A, V _{GE} =0V, T _j =25°C
			1.3	2.0	2.7	I _F =1,600A, V _{GE} =0V, T _j =150°C
Reverse Recovery Time	t _{rr}	μs	-	0.65	1.3	
Turn On Loss	E _{on}	J/P	-	0.6	-	V _{CC} =900V, I _c =1,600A L _s =65nH (3)
Turn Off Loss	E _{off}	J/P	-	1.3	-	R _{G(on/off)} =3.9Ω/3.9Ω (3) V _{GE} =±15V, T _j =150°C
Reverse Recovery Loss	E _{rr}	J/P	-	0.85	-	
Stray inductance in module	L _{SCE}	nH	-	18	-	
Thermal Impedance	IGBT	R _{th(j-c)}	-	-	0.015	Junction to case
	FWD	R _{th(j-c)}	-	-	0.023	
Contact Thermal Impedance	R _{th(c-f)}	K/W	-	0.008	-	Case to fin (λ _{grease} =1W/(m·K), heat-sink flatness ≤50μm)

Notes:(3) L_s and R_G are the test condition's values for evaluation of the switching times, not recommended value.
Please, determine the suitable R_G value after the measurement of switching waveforms (overshoot voltage, etc.) with appliance mounted.

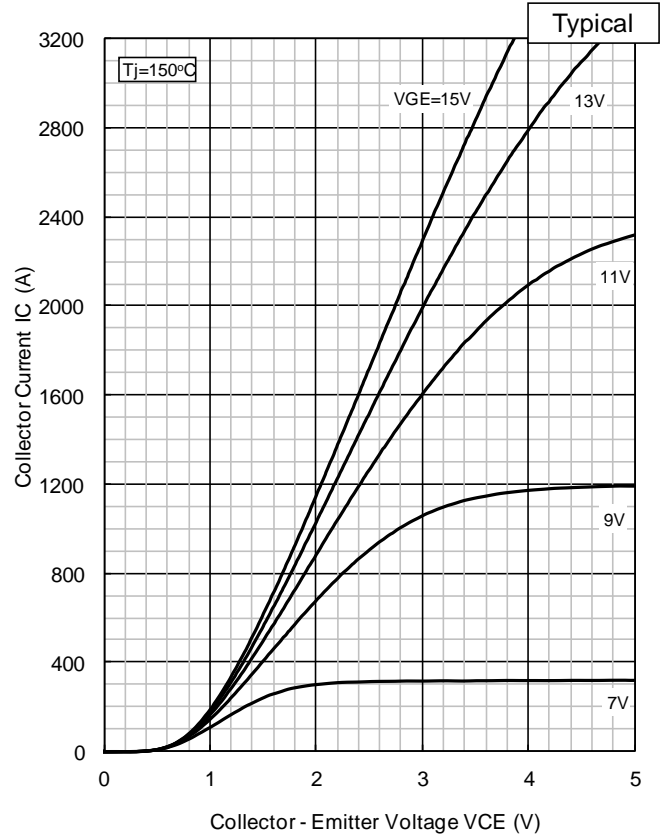
- * Please contact our representatives at order.
- * For improvement, specifications are subject to change without notice.
- * For actual application, please confirm this spec sheet is the newest revision.
- * ELECTRIC CHARACTERISTICS values are according to IEC 60747-2 and IEC 60747-9.

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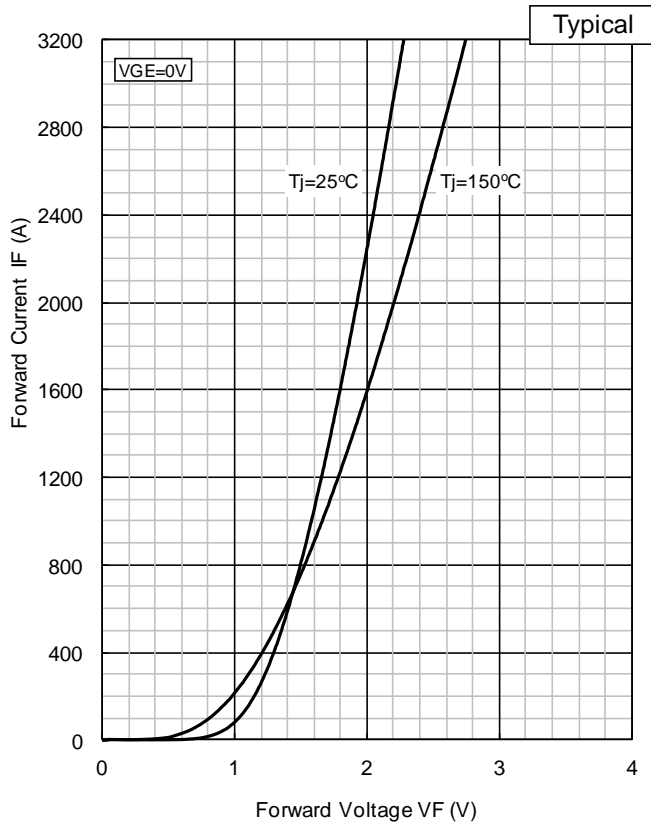
STATIC CHARACTERISTICS



I_C vs. V_{CE} ($T_j=25^\circ\text{C}$)



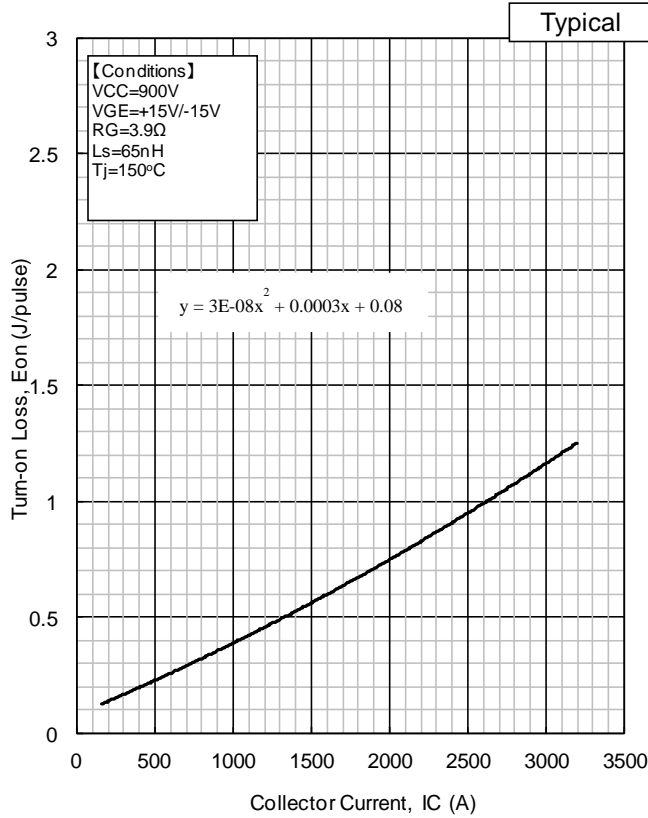
I_C vs. V_{CE} ($T_j=150^\circ\text{C}$)



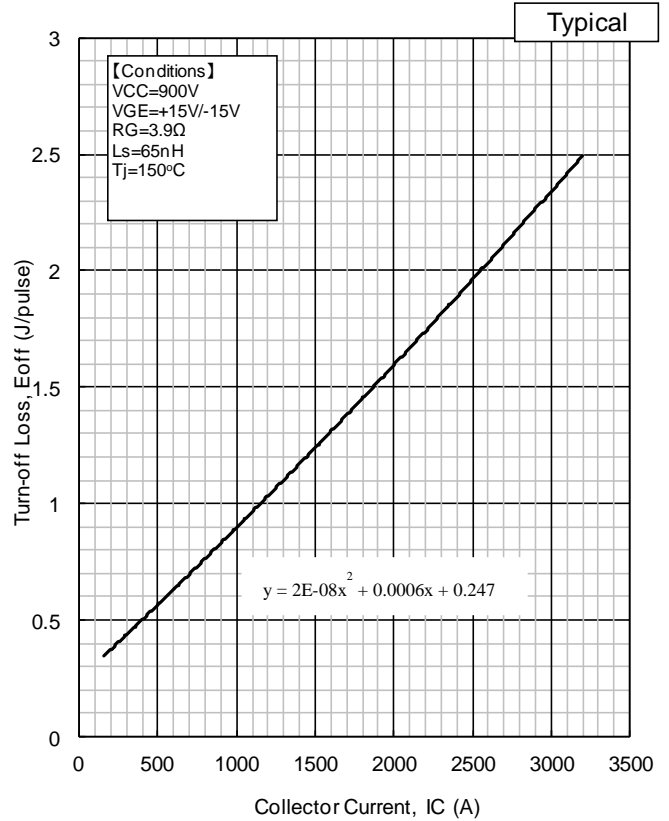
I_F vs. V_F

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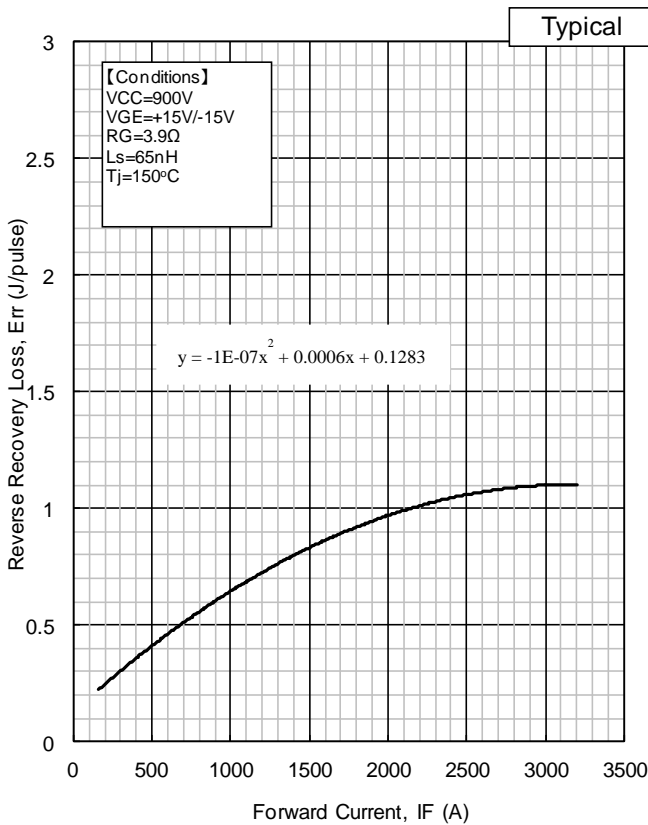
DYNAMIC CHARACTERISTICS



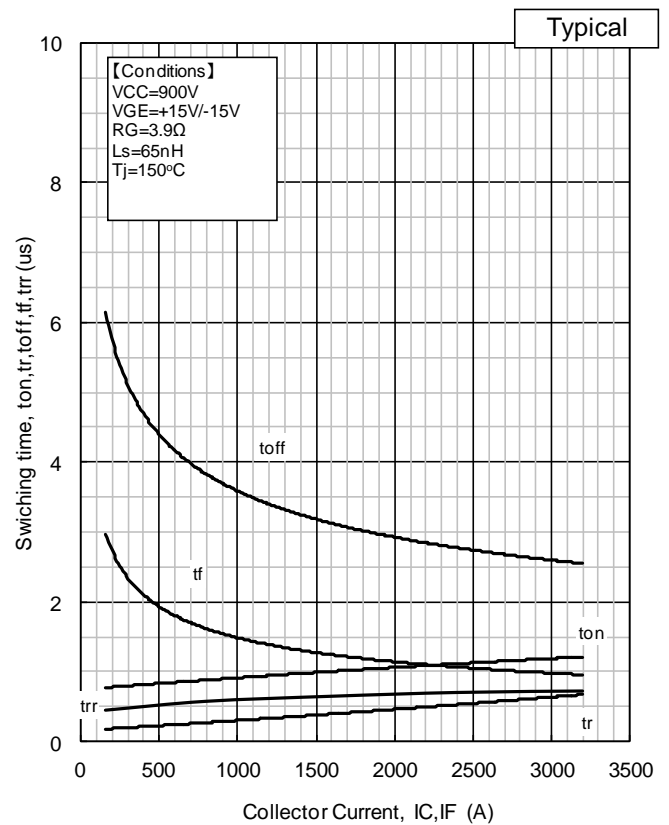
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current



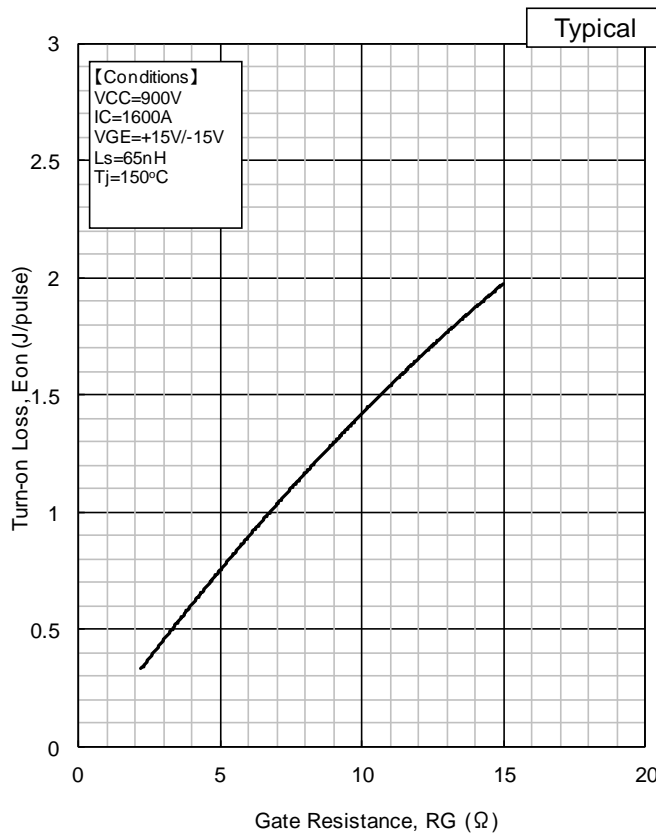
Recovery loss vs. Forward current



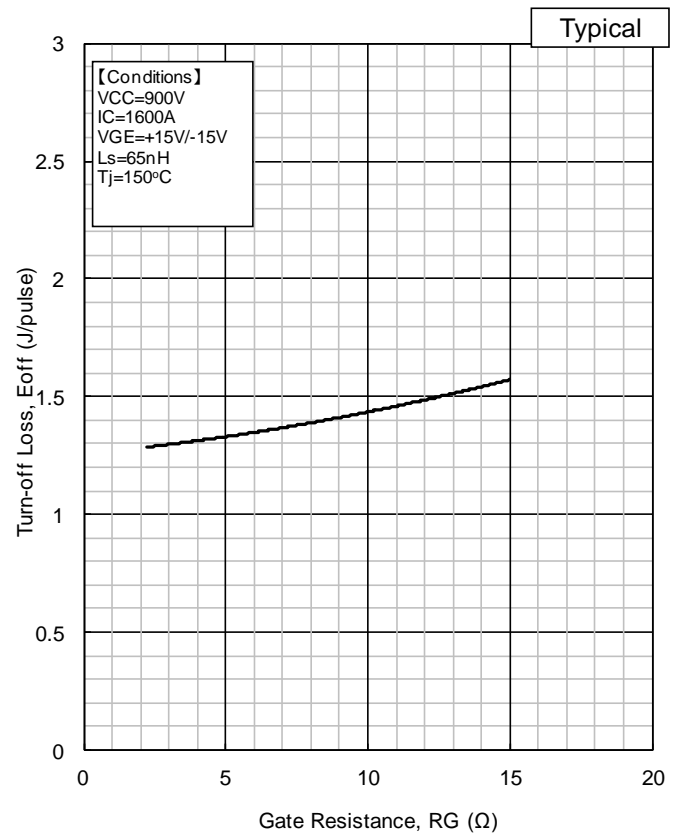
Switching time vs. Collector current

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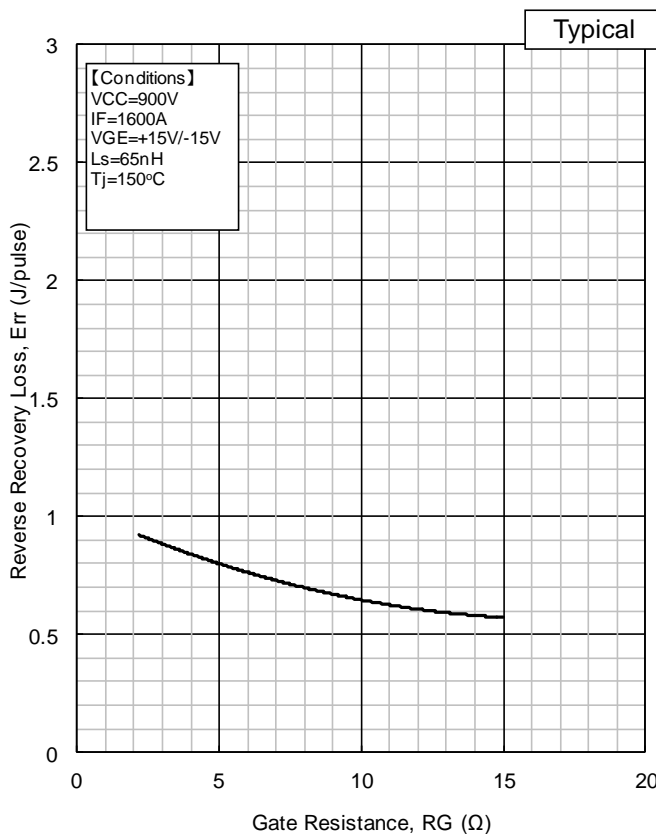
DYNAMIC CHARACTERISTICS



Turn-on loss vs. Gate Resistance

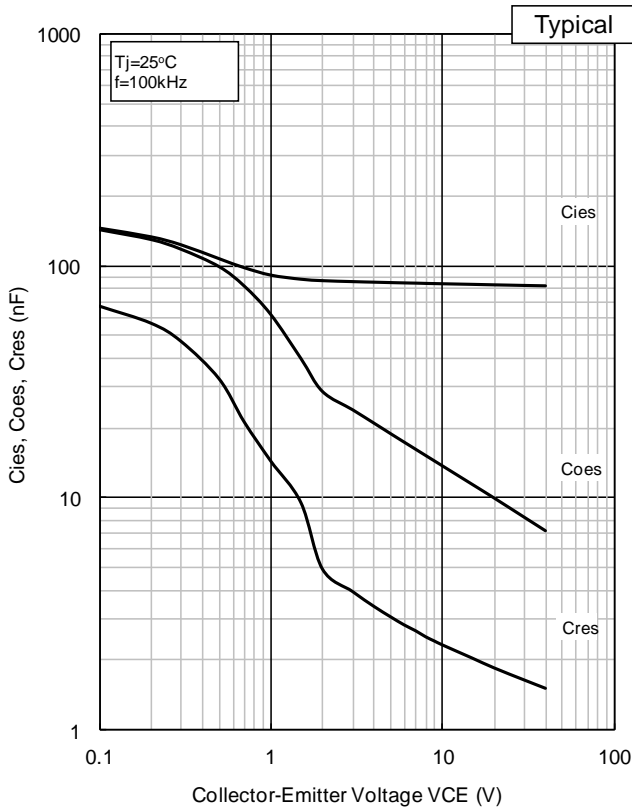


Turn-off loss vs. Gate Resistance

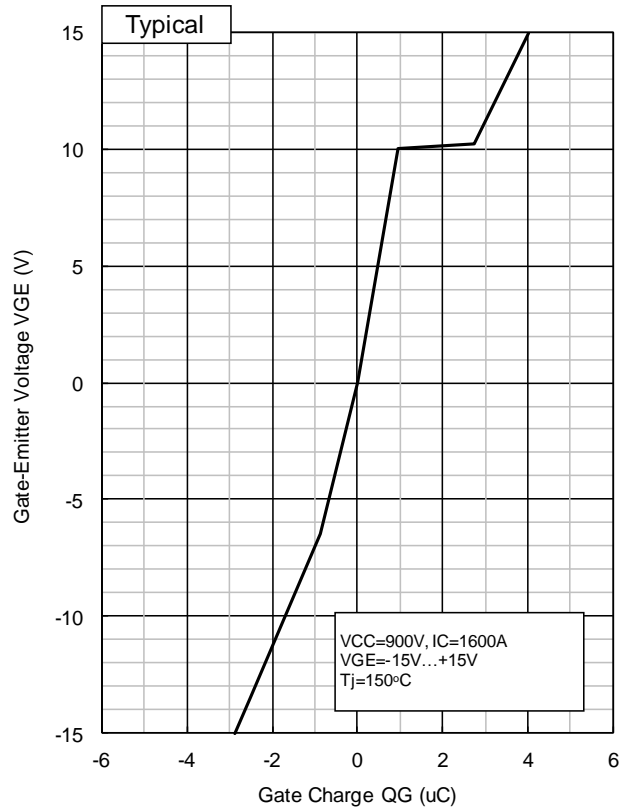


Recovery loss vs. Gate Resistance

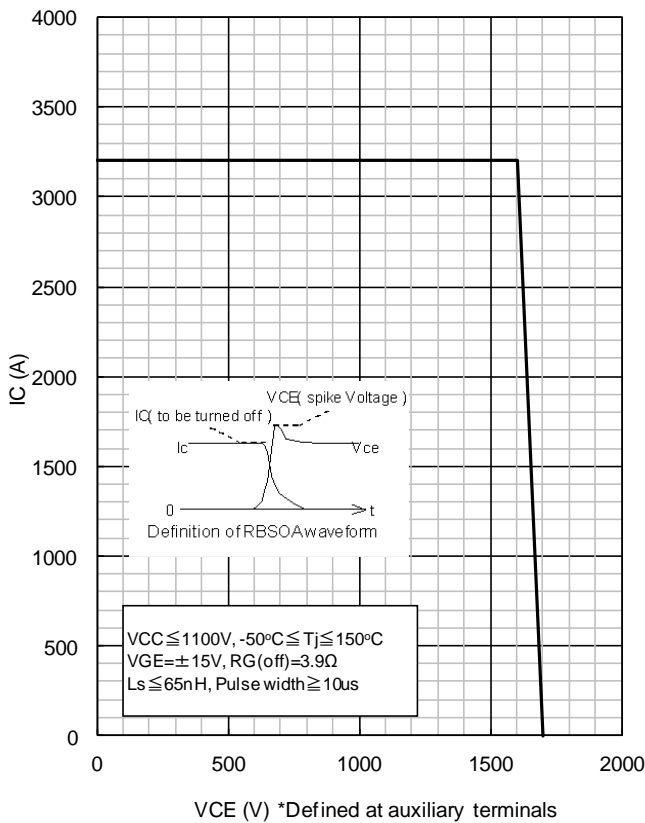
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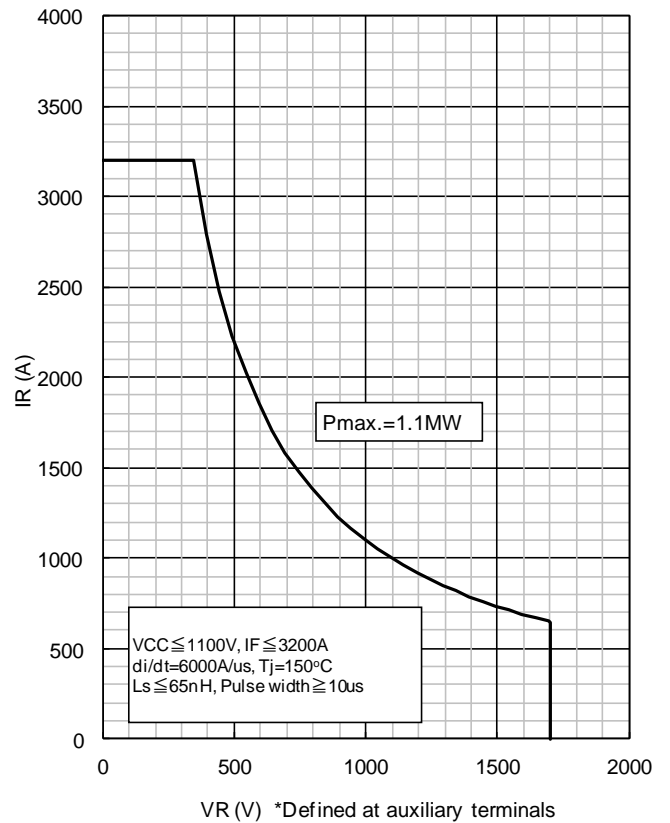
Cies, Coes, Cres - VCE



QG - VGE



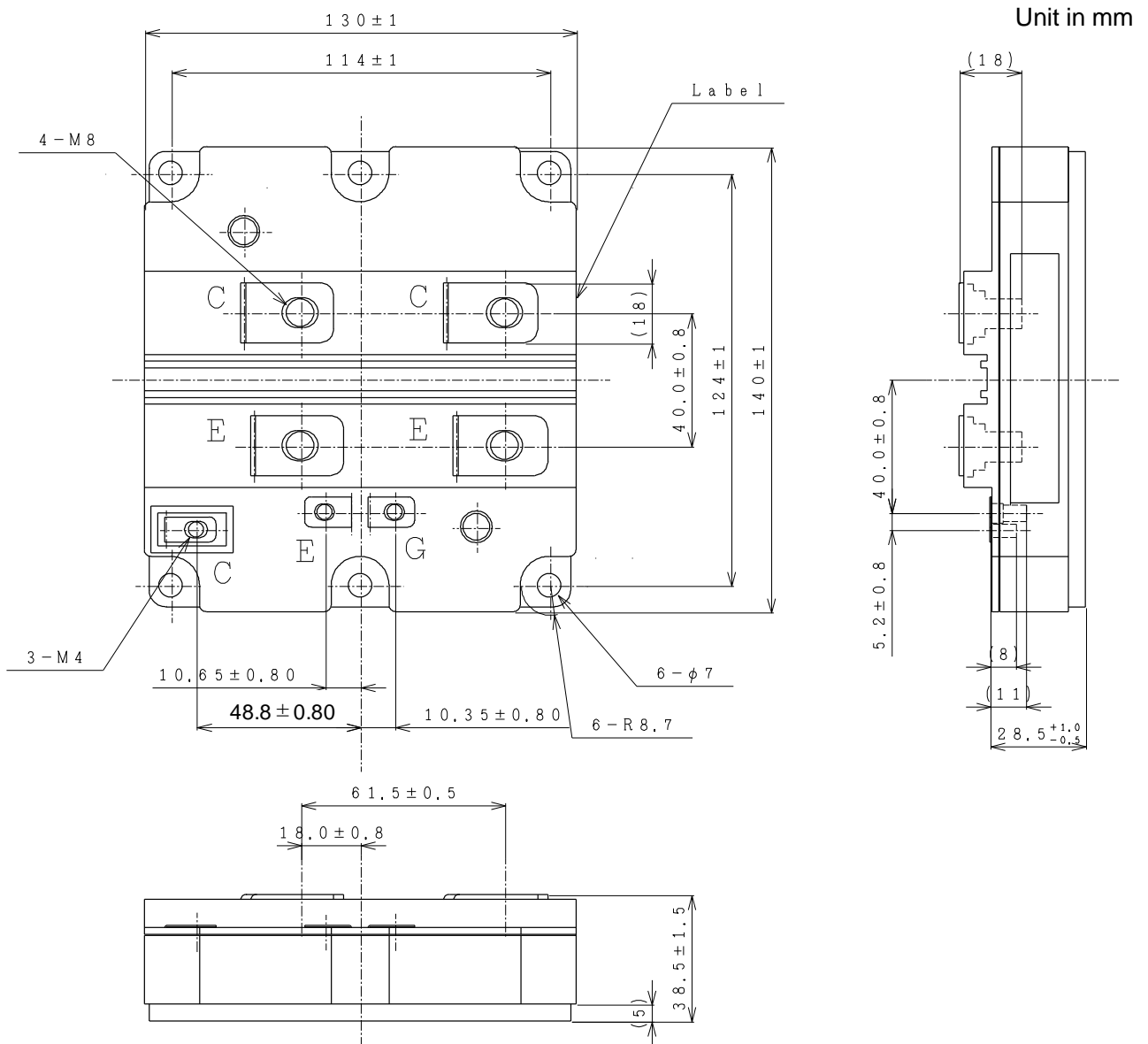
RBSOA



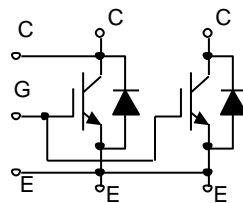
RecSOA

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Outline Drawing



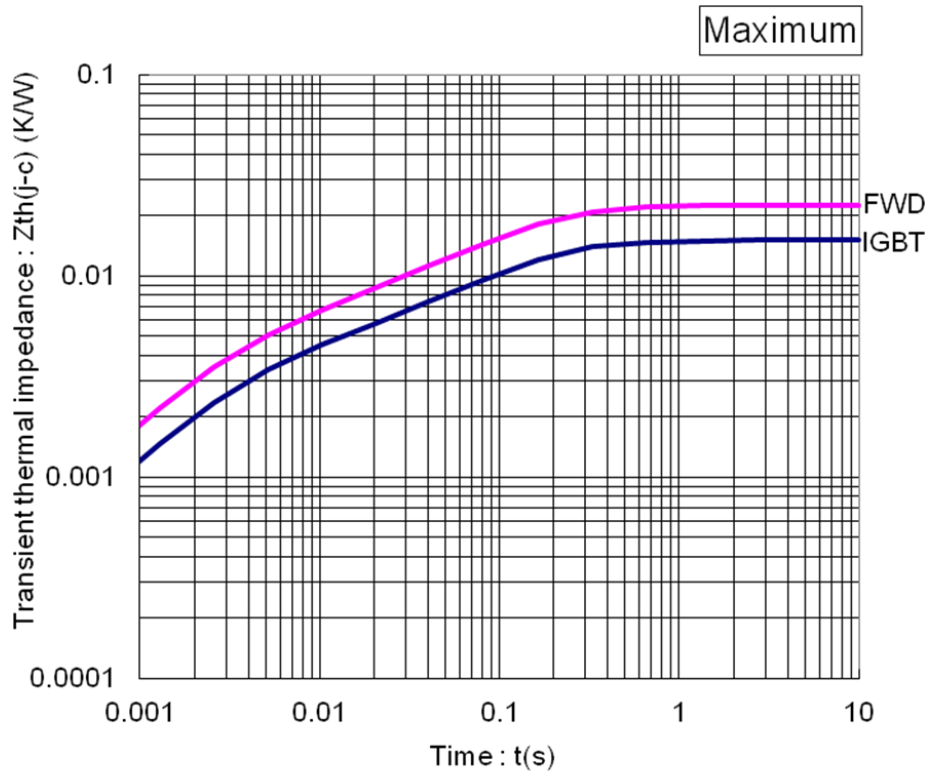
Weight: 900g



Circuit Diagram

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TRANSIENT THERMAL IMPEDANCE



Transient Thermal Impedance Curve

Curve Approximation Model
 $\sum r_{th}[n] * (1 - \exp(-t/\tau_{th}[n]))$

n	1	2	3	4	Unit
$\tau_{th}[n]$	1.50E-01	2.58E-02	3.09E-03	5.61E-04	sec
$r_{th}[n,IGBT]$	8.97E-03	2.93E-03	2.70E-03	3.97E-04	K/W
$r_{th}[n,Diode]$	1.36E-02	4.73E-03	4.01E-03	6.26E-04	K/W

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

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