

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	3,600
	1ms	I _{Cp}	7,200
Forward Current	DC	I _F	3,600
	1ms	I _{FM}	7,200
Junction Temperature	T _{j op}	°C	-50 ~ +150
Maximum Junction Temperature	T _{vj max}	°C	175 (1)
Storage Temperature	T _{stg}	°C	-55 ~ +125
Isolation Voltage	V _{ISO}	V _{RMS}	4,000(AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	2/15 (2)
	Mounting (M6)	-	6 (3)

Notes: (1) Only applicable for non-switching operation. Regarding the definition for each operation mode, please refer to LD-ES-130737.

(2) Recommended Value $1.8 \pm 0.2/15^{+0}_{-0.3}$ N·m (3) 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	-	-	10	V _{CE} =1,700V, V _{GE} =0V, T _j =25°C
			-	35	150	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 =3,600A, V _{GE} =15V, T _j =25°C
			-	2.3	-	I _C =3,600A, V _{GE} =15V, T _j =125°C
			-	2.4	2.8	I _C =3,600A, 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 =360mA, T _j =25°C
Input Capacitance	C _{ies}	nF	-	177	-	V _{CE} =10V, V _{GE} =0V, f=100kHz, T _j =25°C
Internal Gate Resistance	R _{ge}	Ω	-	1.3	-	V _{CE} =10V, V _{GE} =0V, f=100kHz, T _j =25°C
Switching Times	Rise Time	t _r	-	0.35	0.8	V _{CC} =900V, I _C =3,600A
	Turn On Time	t _{on}	-	1.4	2.8	L _s =55nH (3)
	Fall Time	t _f	-	1.6	3.2	R _{G(on/off)} =3.3/3.3Ω (4)
	Turn Off Time	t _{off}	-	3.3	6.6	V _{GE} =±15V, T _j =150°C
Peak Forward Voltage Drop	V _{FM}	V	-	2.1	-	I _F =3,600A, V _{GE} =0V, T _j =25°C
			-	2.3	-	I _F =3,600A, V _{GE} =0V, T _j =125°C
			-	2.25	2.7	I _F =3,600A, V _{GE} =0V, T _j =150°C
Reverse Recovery Time	t _{rr}	μs	-	0.8	1.6	150 °C
Turn On Loss	E _{on}	J/P	-	0.95	-	125 °C
			-	1.0	-	150 °C
Turn Off Loss	E _{off}	J/P	-	2.75	-	125 °C
			-	3.0	-	150 °C
Reverse Recovery Loss	E _{rr}	J/P	-	1.0	-	125 °C
			-	1.15	-	150 °C
Stray inductance in module	L _{SCE}	nH	-	8	-	
Thermal Impedance	IGBT	R _{th(j-c)}	-	-	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 (λ.grease=1W/(m·K), heat-sink flatness ≤50um)

Notes:(4) 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.

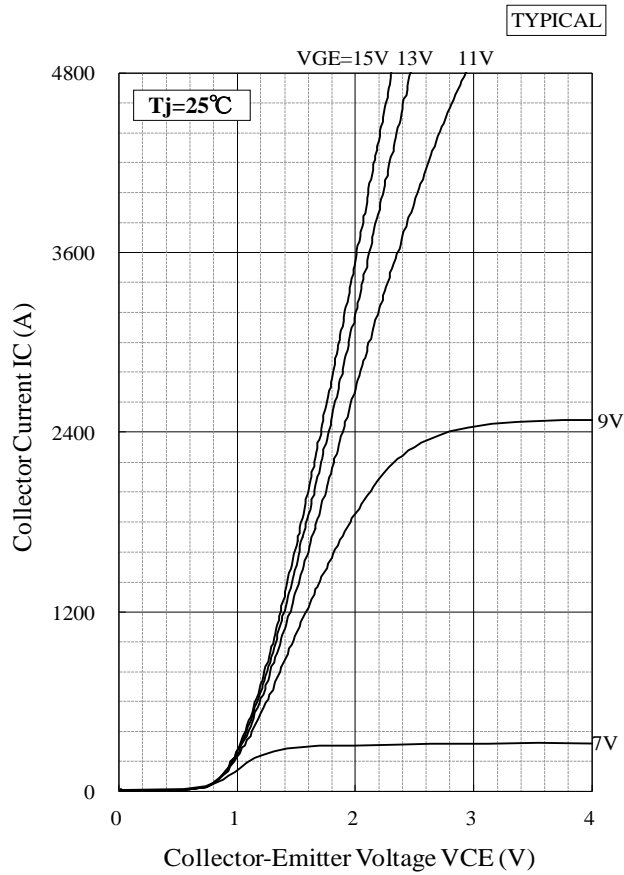
* For improvement, specifications are subject to change without notice.

* For actual application, please confirm this spec sheet is the newest revision.

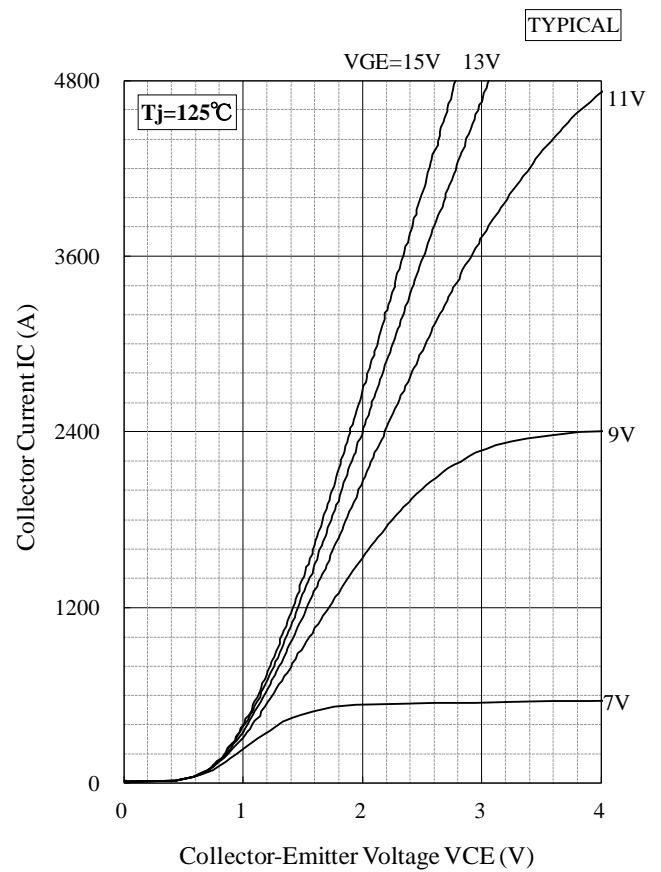
* ELECTRICAL CHARACTERISTICS values are according to IEC 60747-2 and IEC 60747-9.

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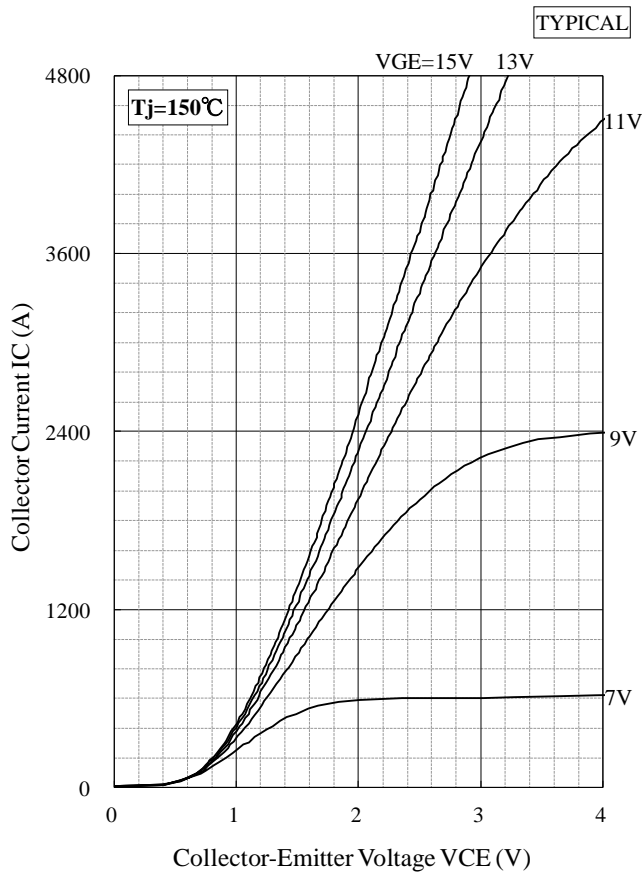
STATIC CHARACTERISTICS



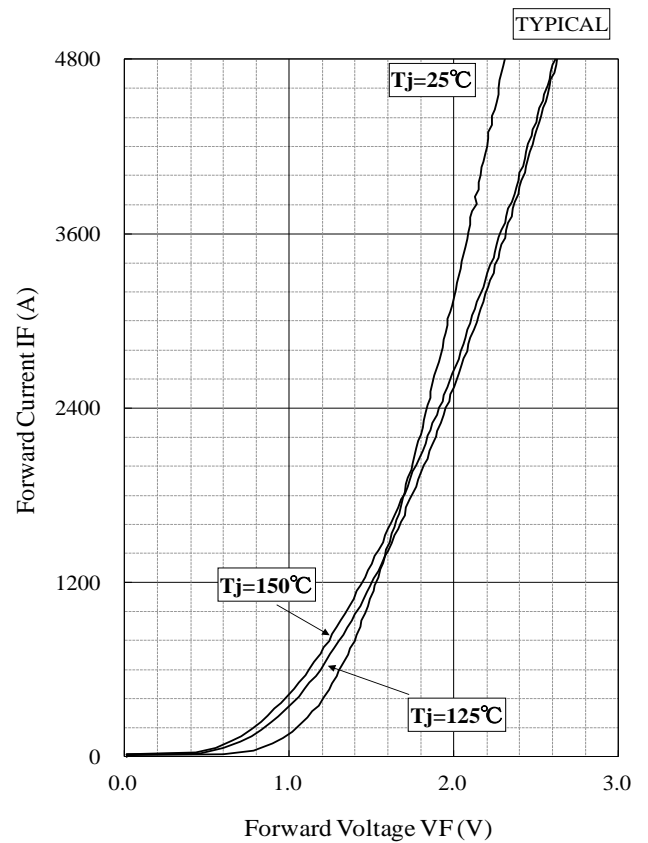
Collector Current vs. Collector to Emmitter Voltage



Collector Current vs. Collector to Emmitter Voltage



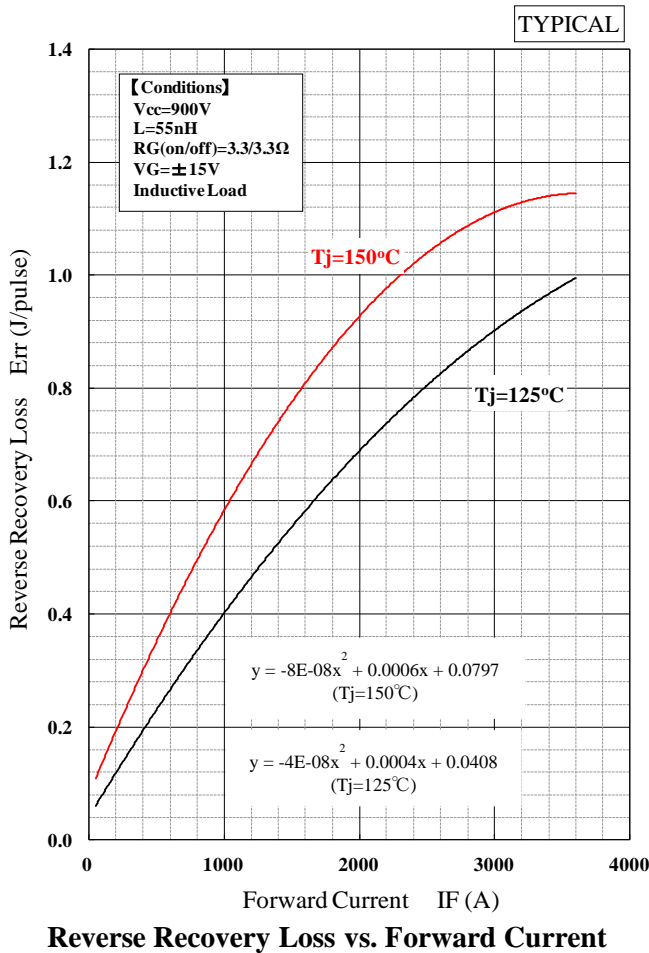
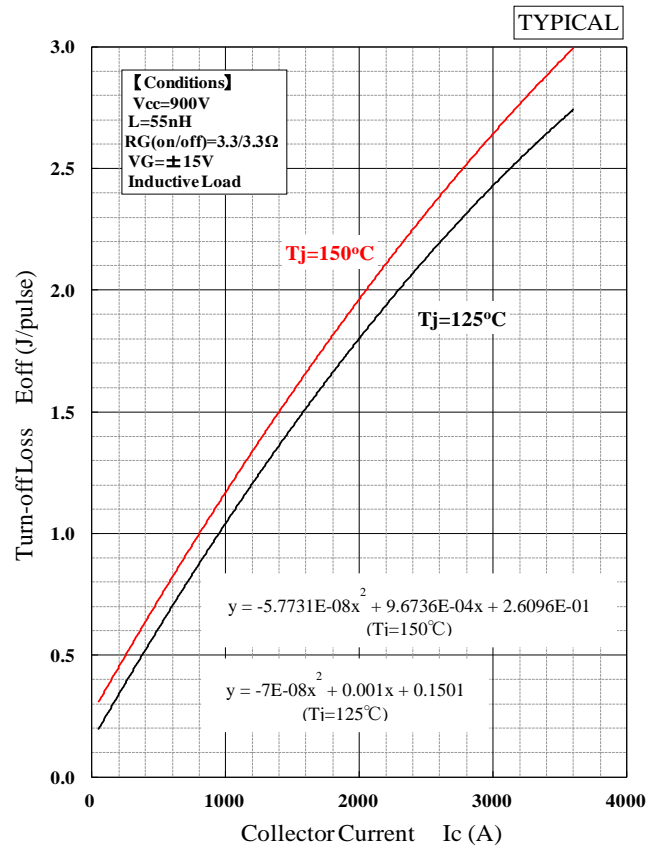
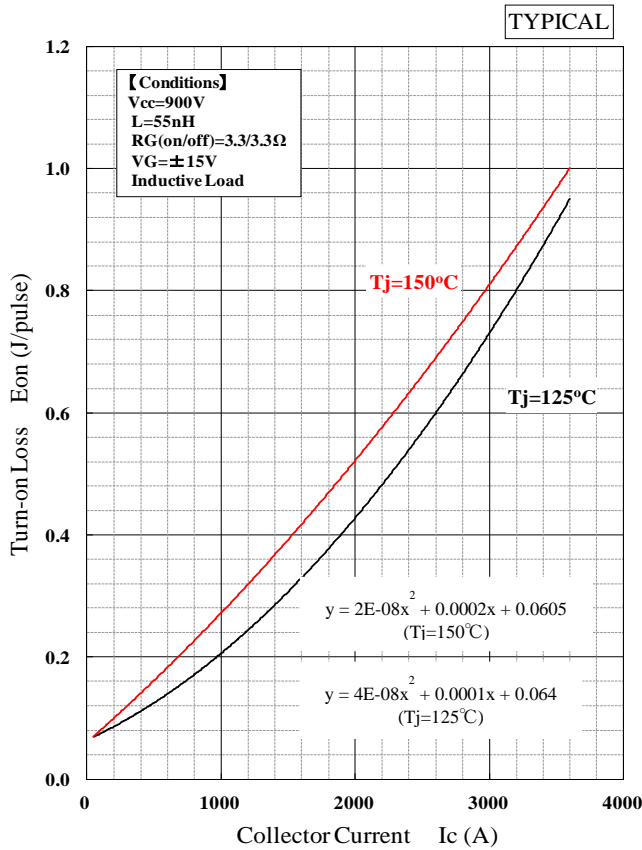
Collector Current vs. Collector to Emmitter Voltage



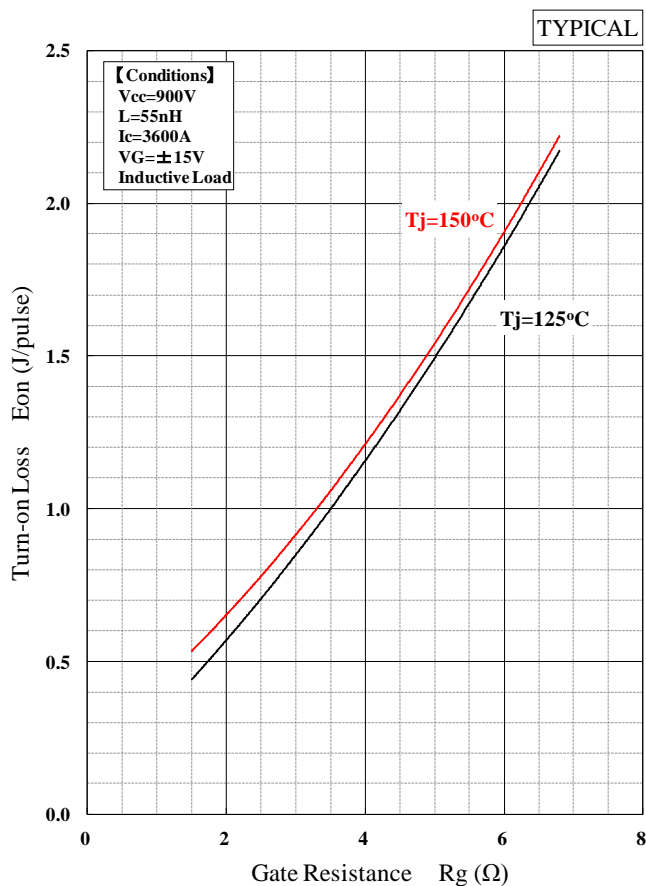
Forward Voltage of free-wheeling diode

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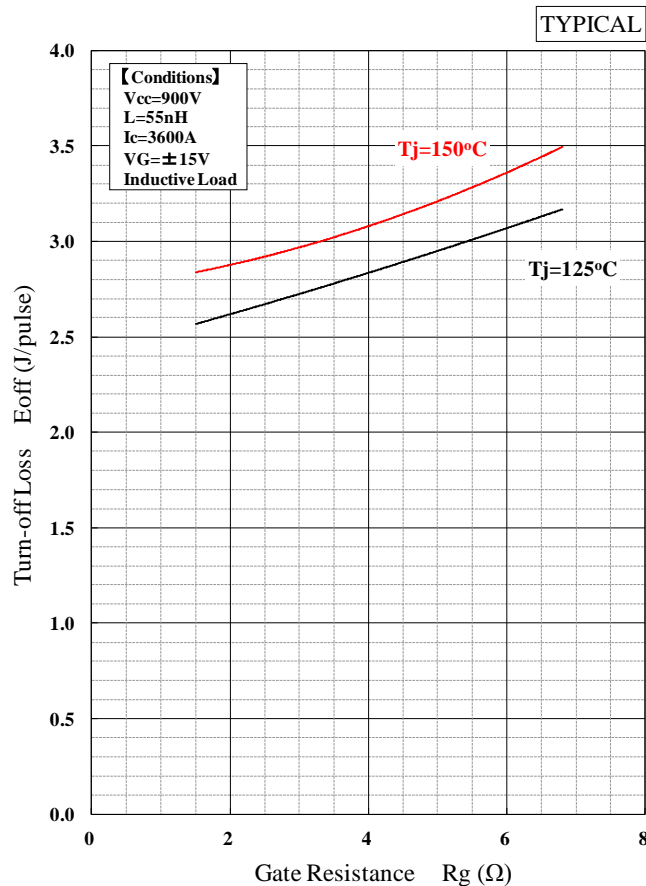
DYNAMIC CHARACTERISTICS



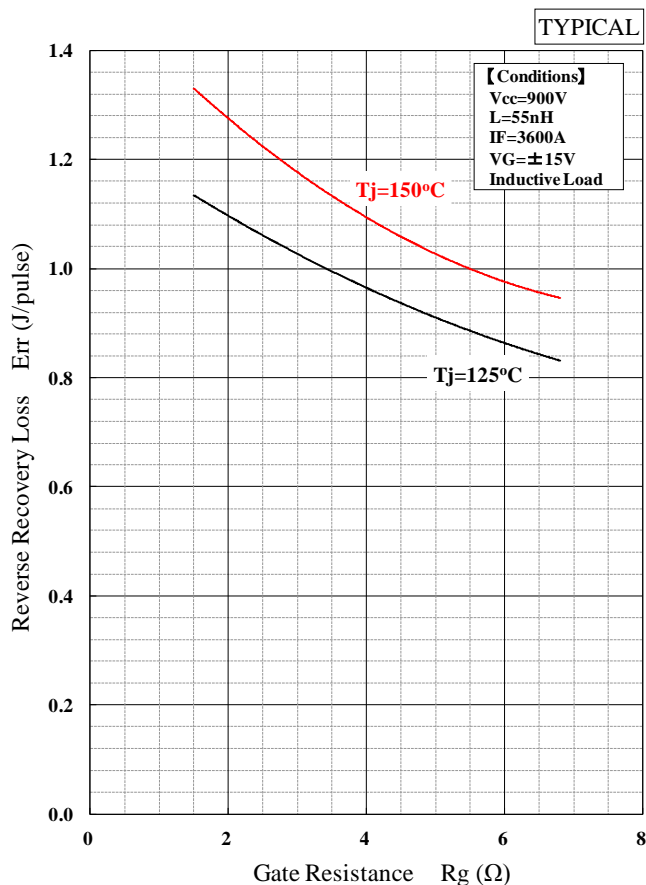
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Turn-on Loss vs. Gate Resistance



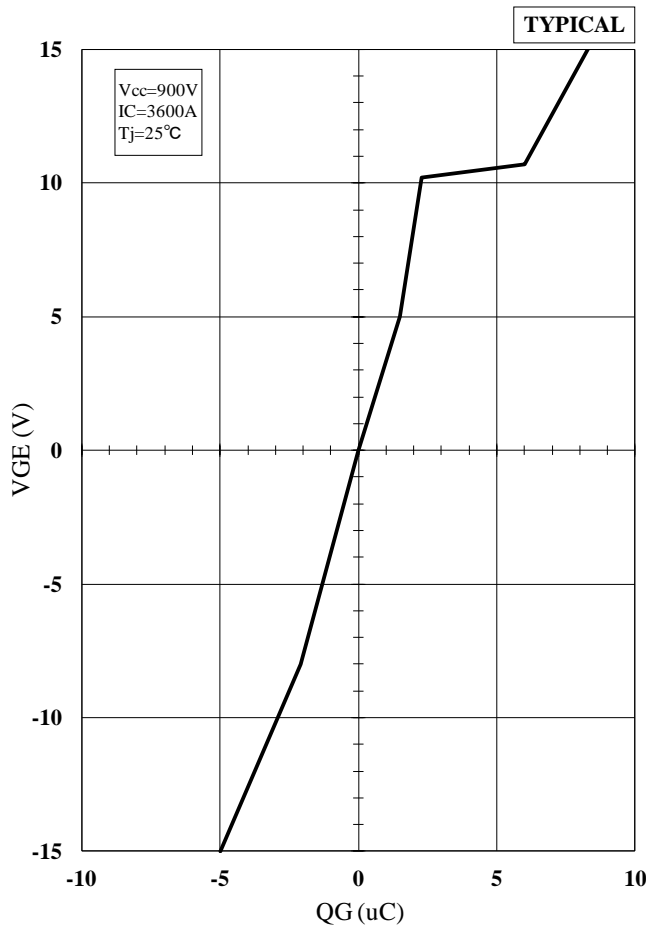
Turn-off Loss vs. Gate Resistance



Reverse Recovery Loss vs. Gate Resistance

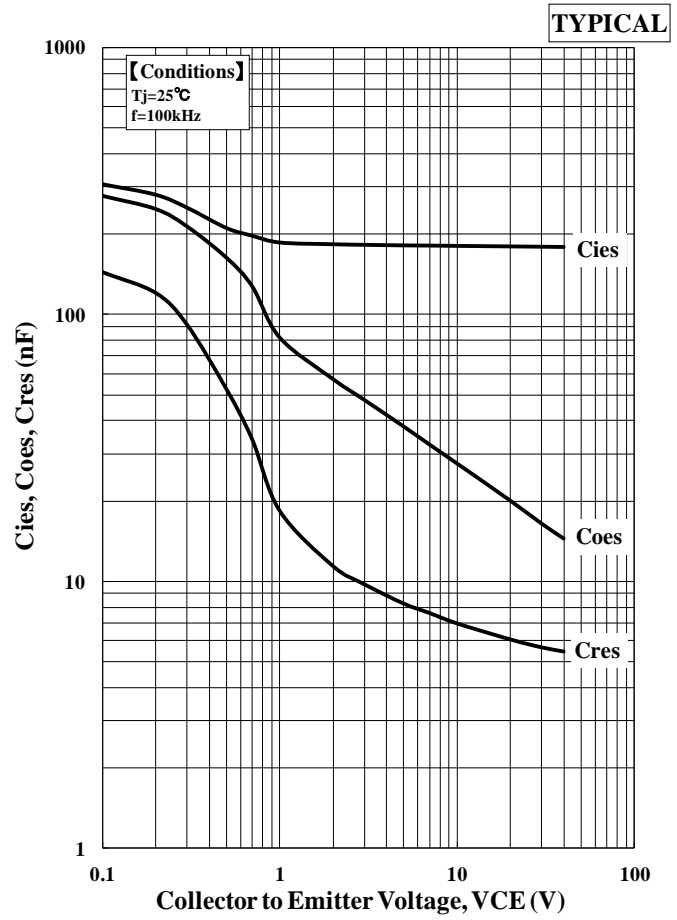
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Qg-Vg curve



QG-VGE curve

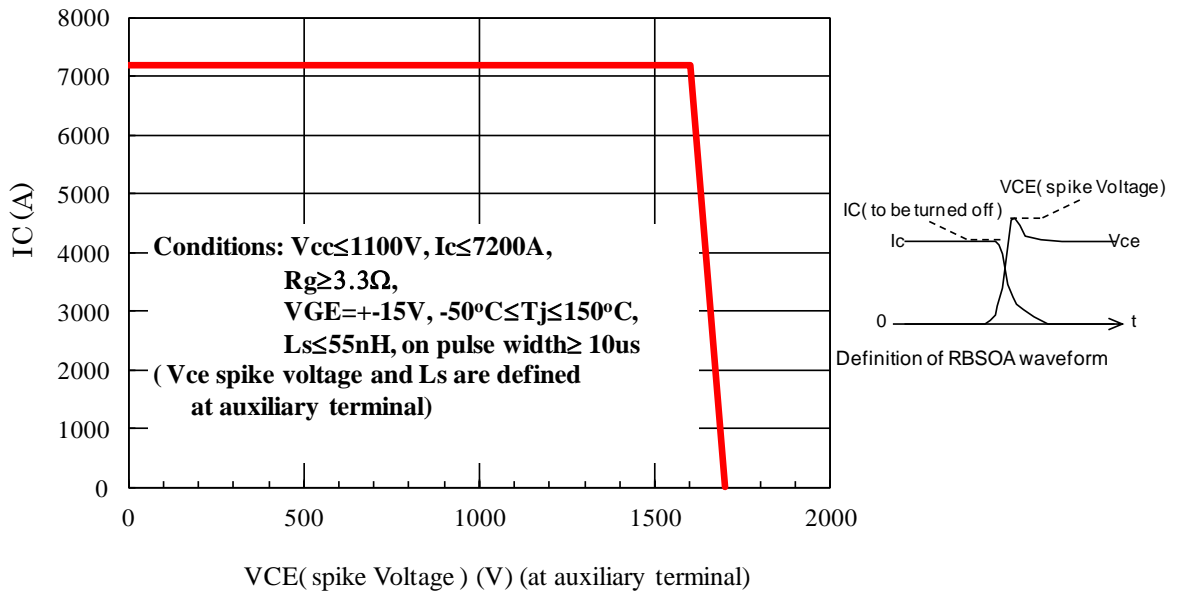
Capacitance Curve



Capacitance vs. Collector to Emitter Voltage

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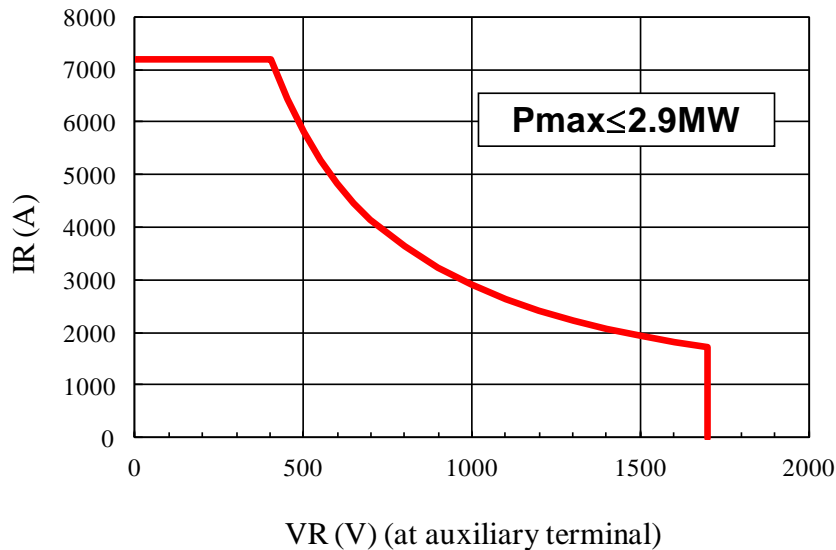
RBSOA



Reverse bias safe operation area (RBSOA)

Recovery SOA

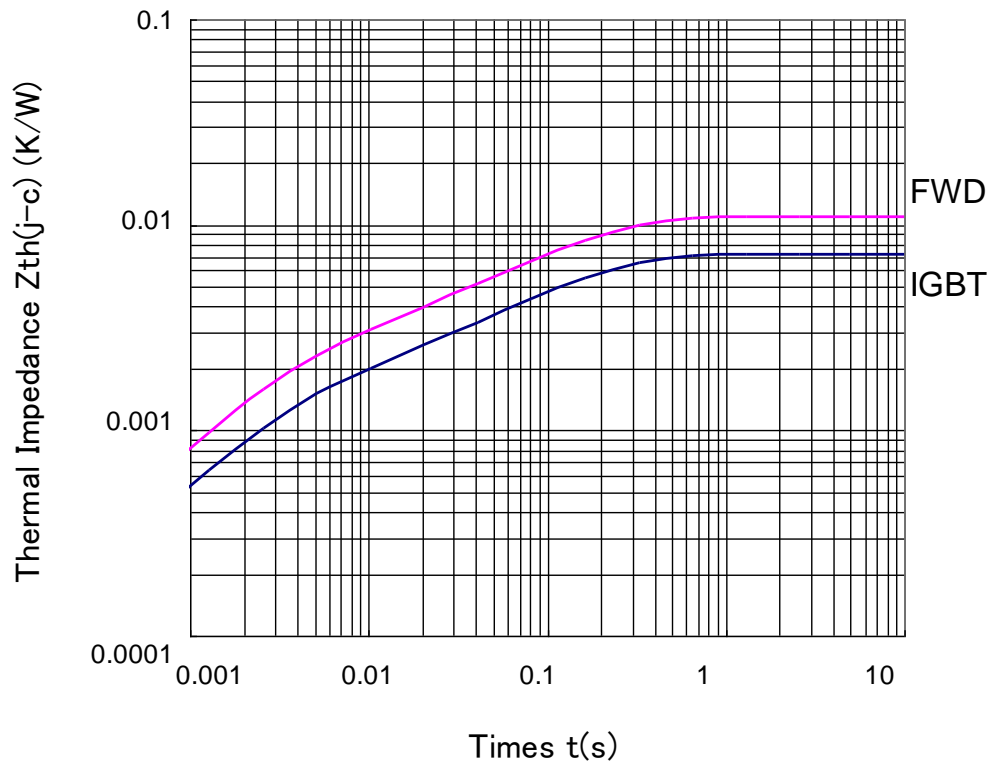
Conditions: $V_{cc} \leq 1100V$, $I_F \leq 7200A$, $di/dt \leq 12000A/\mu s$
 $L_s \leq 55nH$, $-50^\circ C \leq T_j \leq 150^\circ C$



Recovery SOA

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TRANSIENT THERMAL IMPEDANCE



Transient Thermal Impedance Curve (Maximum Value)

Curve approximation model

$$(\sum Z_{th}[n] * (1 - \exp(-t/\tau_{th}[n])))$$

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

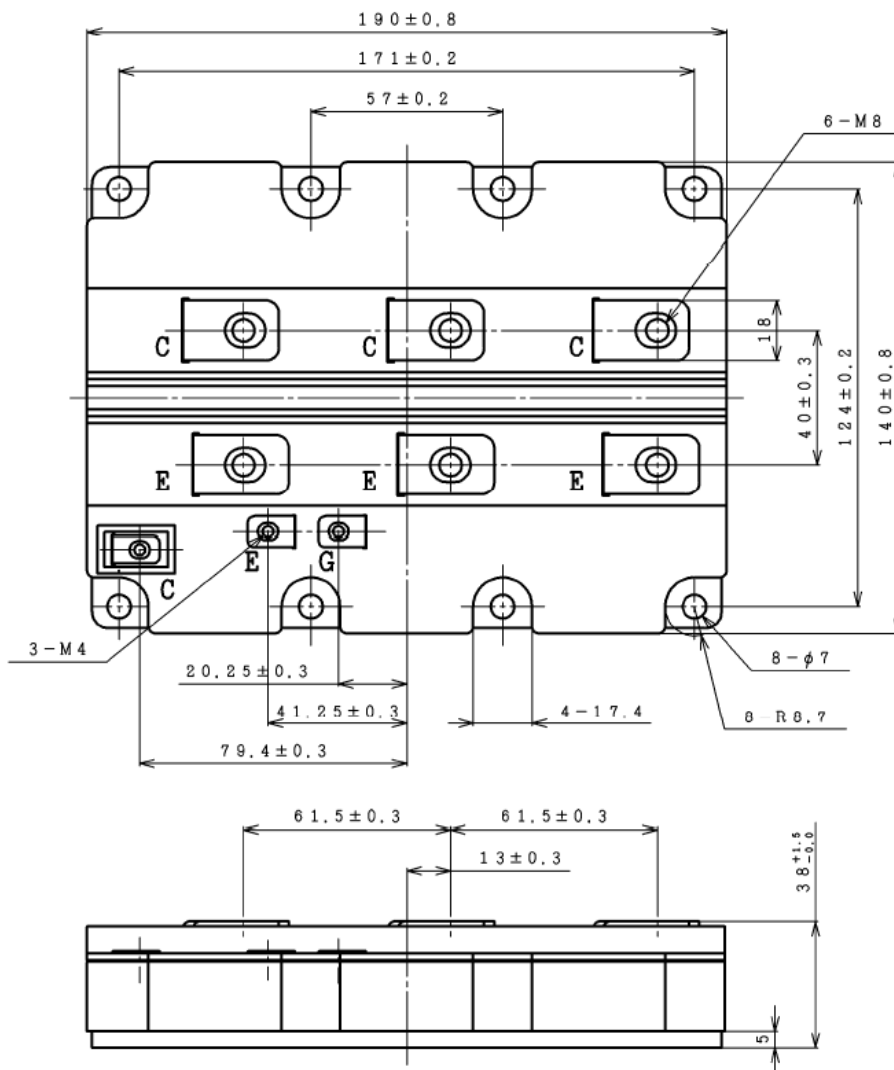
Material declaration

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

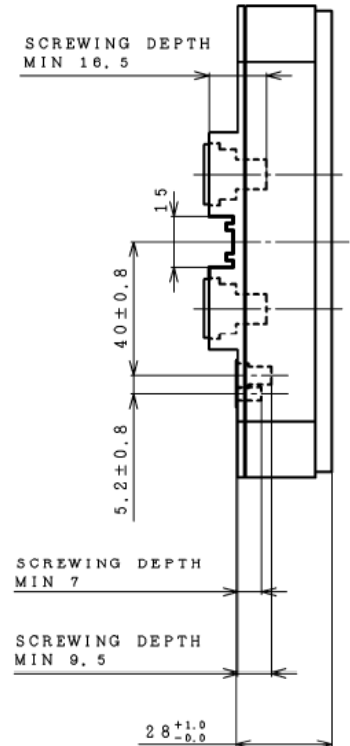
Material	Contained part
Lead (Pb) and its compounds	Solder

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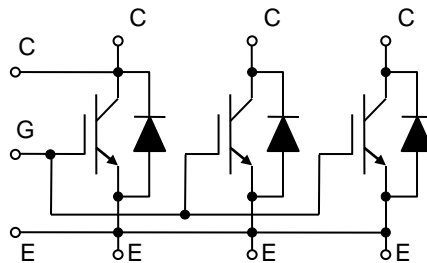
Outline Drawing



Unit in mm



Weight: 1300g



Circuit Diagram

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HITACHI POWER SEMICONDUCTORS

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