MBN1200H45E2-H

Preliminary Specification

Silicon N-channel IGBT 4500V E2 version

FEATURES

- Low switching loss IGBT module.
- Low noise due to ultra soft fast recovery diode.
- High reliability, high durability module.
- High thermal fatigue durability.
  (delta Tc=70°C, N>30,000cycles)
- Isolated heat sink (terminal to base).

ABSOLUTE MAXIMUM RATINGS (Tc=25°C)

Item		Symbol	Unit	MBN1200H45E2-H
Collector Emitter Voltage		V_{CES}	V	4,500
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	1,200 (Tc=80 °C)
	1ms	I_{Cp}		2,400
Forward Current	DC	I_F	A	1,200
	1ms	I_{FM}		2,400
Junction Temperature		T_j	°C	-40 ~ +125
Storage Temperature		T_{stg}	°C	-50 ~ +125
Isolation Voltage		V_{ISO}	V_{RMS}	8,400 (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	-	-	25	V_{CE}=4,500V, V_{GE}=0V, Tj=25°C
				-	25	100	V_{CE}=4,500V, V_{GE}=0V, Tj=125°C
Gate Emitter Leakage Current		I_{GES}	nA	-500	-	+500	V_{GE}=±20V, V_{CE}=0V, Tj=25°C
Collector Emitter Saturation Voltage		$V_{CE(sat)}$	V	TBD	4.2	4.7	I_C=1200A, V_{GE}=15V, Tj=125°C
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	5.4	6.4	7.4	V_{CE}=10V, I_C=1200mA, Tj=25°C
Input Capacitance		C_{ies}	nF	-	165	-	V_{CE}=10V,V_{GE}=0V, f=100kHz, Tj=25°C
Internal Gate Resistance		Rge	Ω	-	0.8	-	V_{CE}=10V,V_{GE}=0V, f=100kHz, Tj=25°C
Switching Times	Rise Time	t_r	µs	-	2.1	4.2	V_{CC}=2,600V, Ic=1200A
	Turn On Time	t_{on}		-	2.7	5.4	Ls=150nH
	Fall Time	t_f		-	2.4	3.6	R_G=3.3Ω (3)
	Turn Off Time	t_{off}		-	4.8	7.2	V_{GE}=+/-15V, Tj=125°C
Peak Forward Voltage Drop		V_{FM}	V	TBD	3.7	4.2	IF=1200A, V_{GE}=0V, Tj=125°C
Reverse Recovery Time		t_{rr}	µs	-	0.7	1.4	Vcc=2600V, IF=1200A, Ls=150nH Tj=125°C
Turn On Loss		$E_{on(10\%)}$	J/p	-	3.2	4.8	V_{CC}=2600V, Ic= IF=1200A, Ls=150nH R_G= 3.3Ω (3) V_{GE}=+/-15V, Tj=125°C
		$E_{on(full)}$		-	3.8	-	
Turn Off Loss		$E_{off(10\%)}$	J/ p	-	3.2	4.8	
		$E_{off(full)}$		-	3.8	-	
Reverse Recovery Loss		$E_{rr(10\%)}$	J/ p	-	2.5	3.7	
		$E_{rr(full)}$		-	2.8	-	
Thermal Impedance	IGBT	Rth(j-c)	K/W	-	-	0.0085	Junction to case
	FWD	Rth(j-c)		-	-	0.017	
Contact Thermal Impedance		Rth(c-f)	K/W	-	0.005	-	Case to fin (λgrease=1W/(m·K), Heat-sink flatness ≤50um)

Notes:(3) R_G value is the test condition's value 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.

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DEFINITION OF TEST CIRCUIT

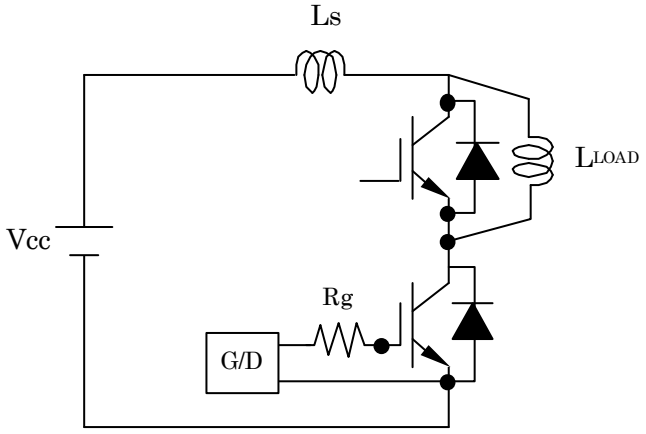
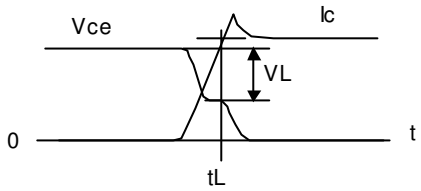
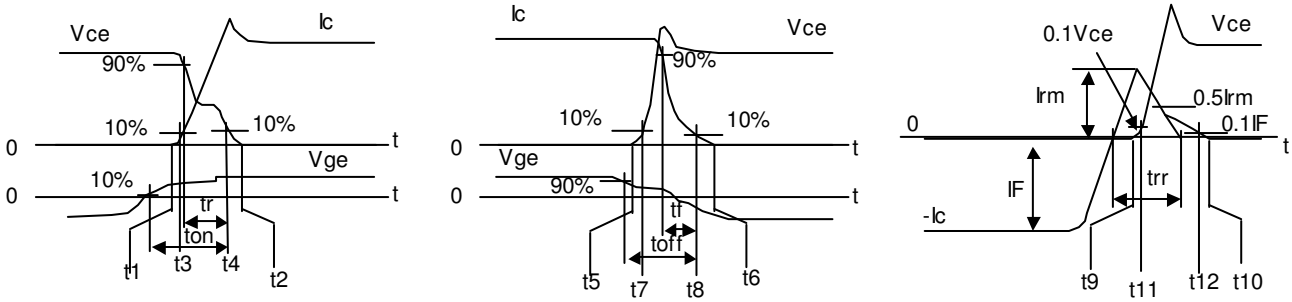


Fig.1 Switching test circuit



$$Ls = \frac{VL}{\left(\frac{dIc}{dt}\right)_{t=tL}}$$

Fig.2 Definition of Ls



$$Eon(10\%) = \int_{t3}^{t4} Ic \cdot Vce \, dt \qquad Eoff(10\%) = \int_{t7}^{t8} Ic \cdot Vce \, dt \qquad Err(10\%) = \int_{t11}^{t12} IF \cdot Vce \, dt$$

$$Eon(Full) = \int_{t1}^{t2} Ic \cdot Vce \, dt \qquad Eoff(Full) = \int_{t5}^{t6} Ic \cdot Vce \, dt \qquad Err(Full) = \int_{t9}^{t10} IF \cdot Vce \, dt$$

Fig.3 Definition of switching loss

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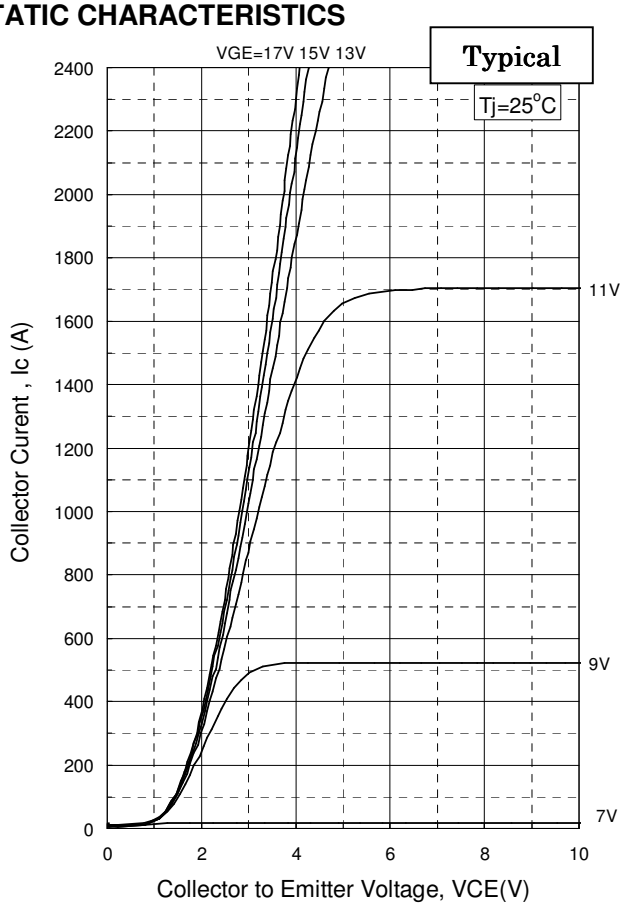
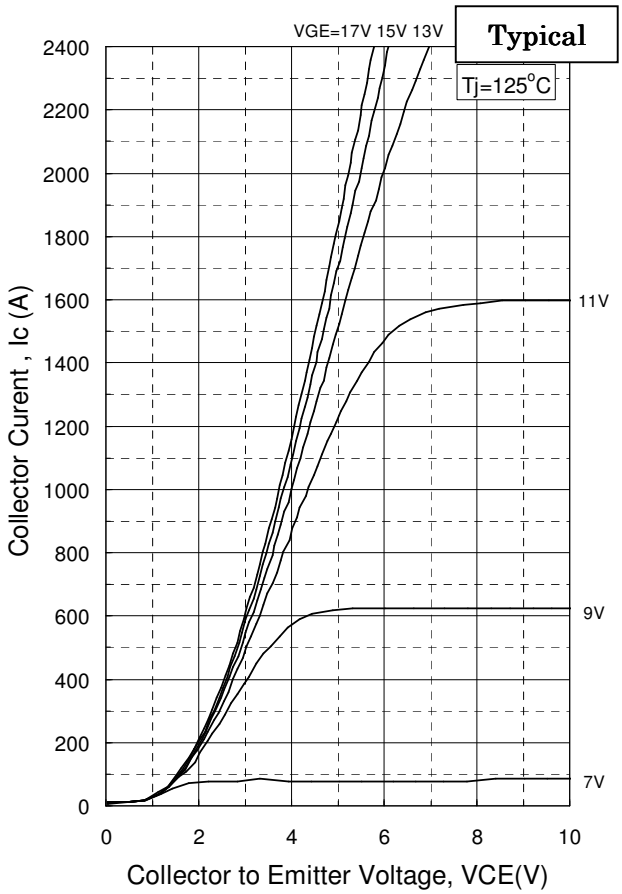
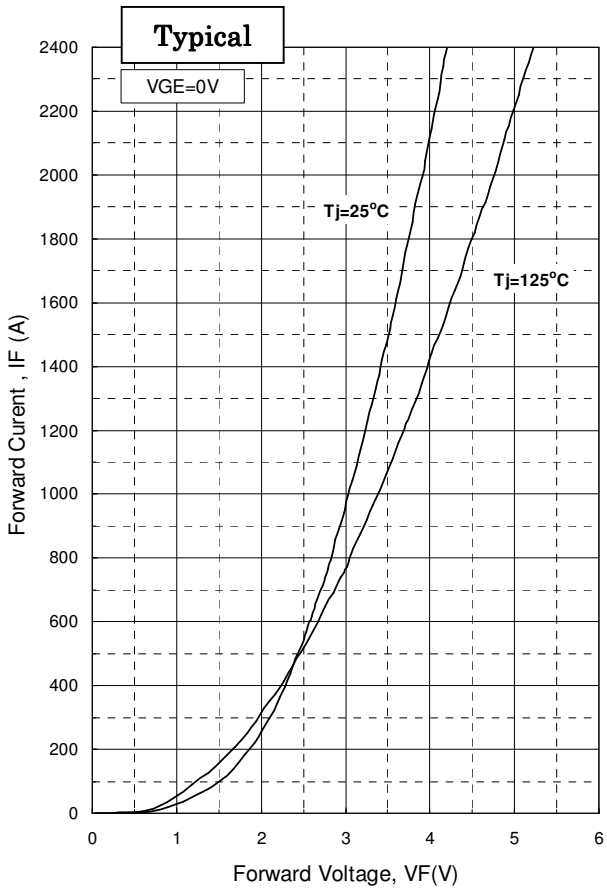
STATIC CHARACTERISTICS



Ic vs. VCE(Tj=25°C)



Ic vs. VCE(Tj=125°C)



IF vs. VF

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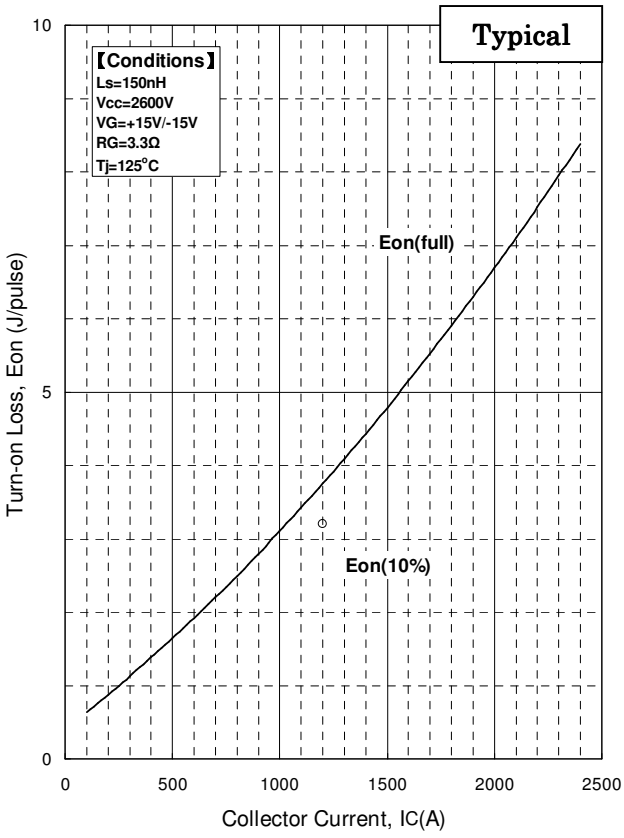
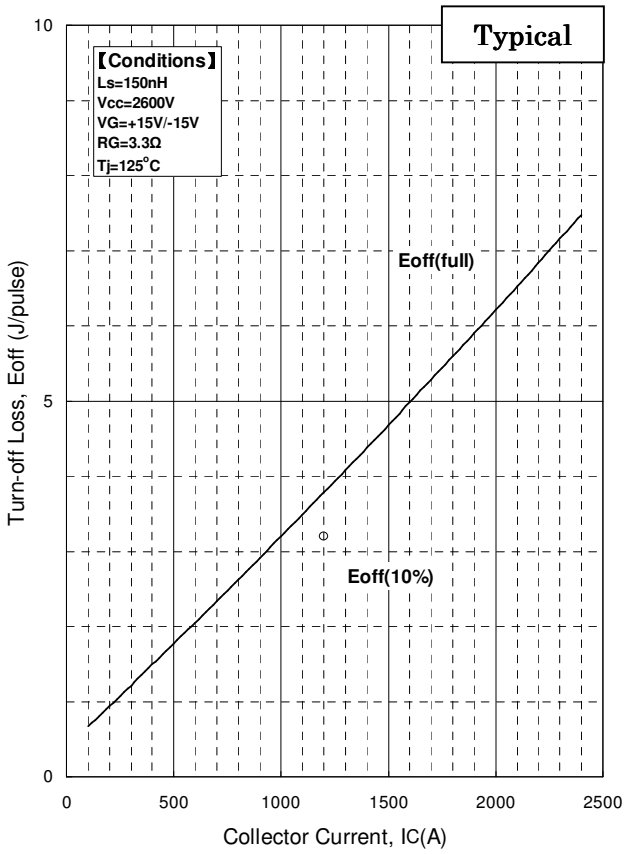
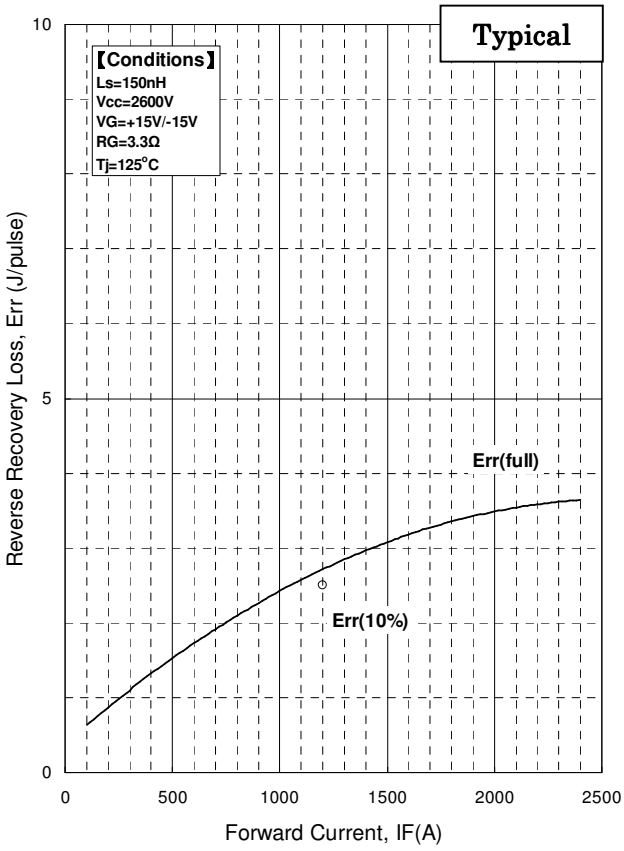
DYNAMIC CHARACTERISTICS



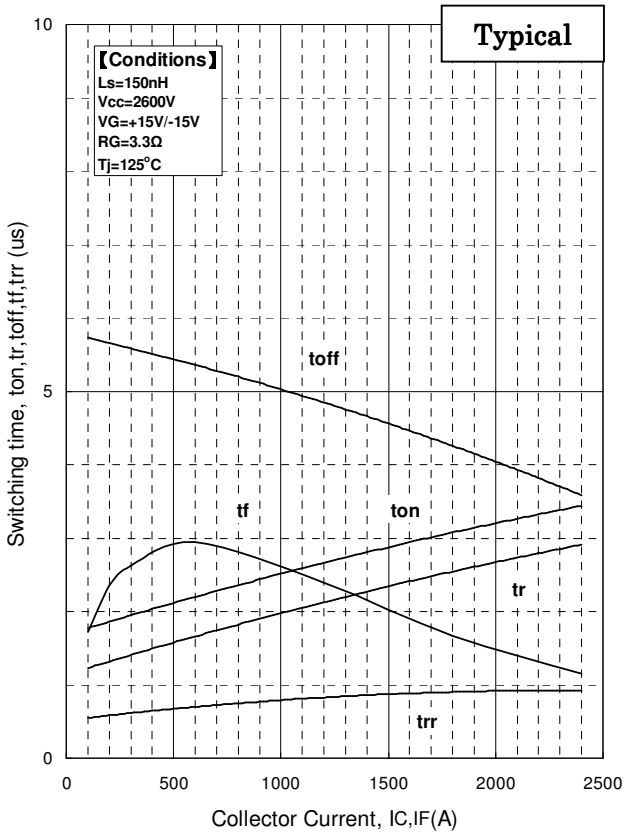
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current



Recovery loss vs. Forward current



Switching time vs. Collector current

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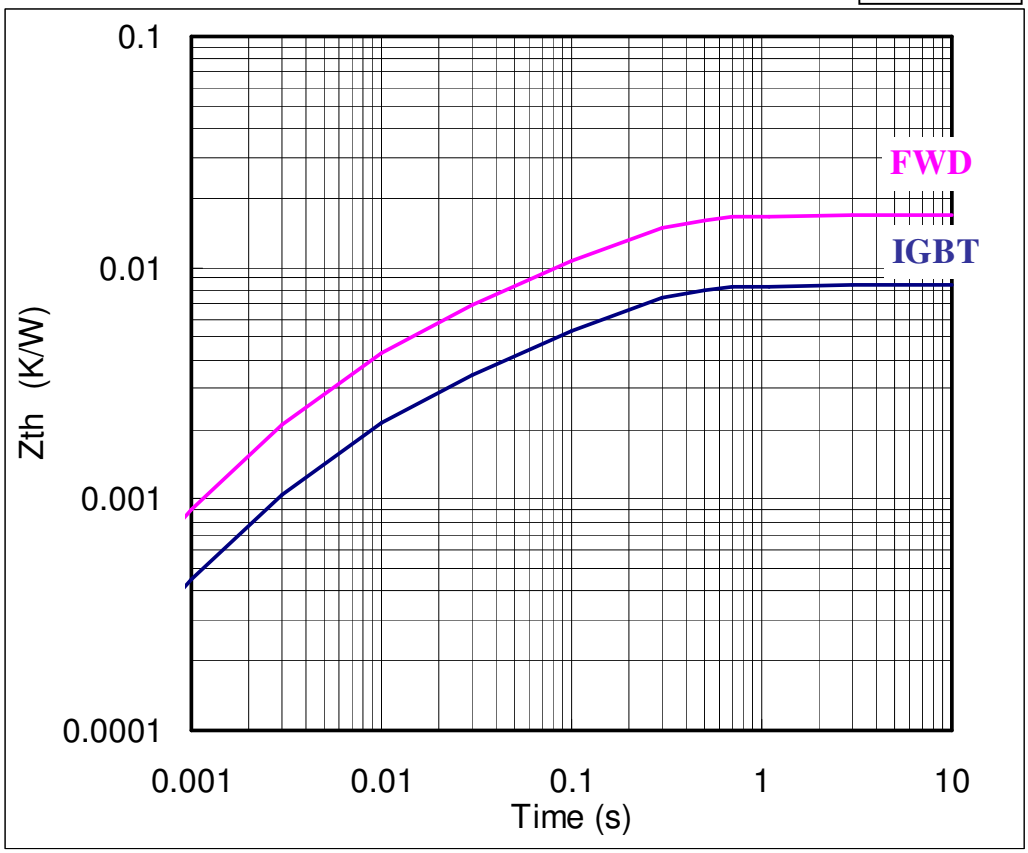
TRANSIENT THERMAL IMPEDANCE

Target



Transient Thermal Impedance Curve ***(Maximum Value)***

- **Negative environmental impact material**

Please note that following materials are contained in the product
In order to keep characteristics and reliability level.

Material	Contained part
Lead (Pb) and its compounds	Solder
Arsenic and its compounds	Si chip

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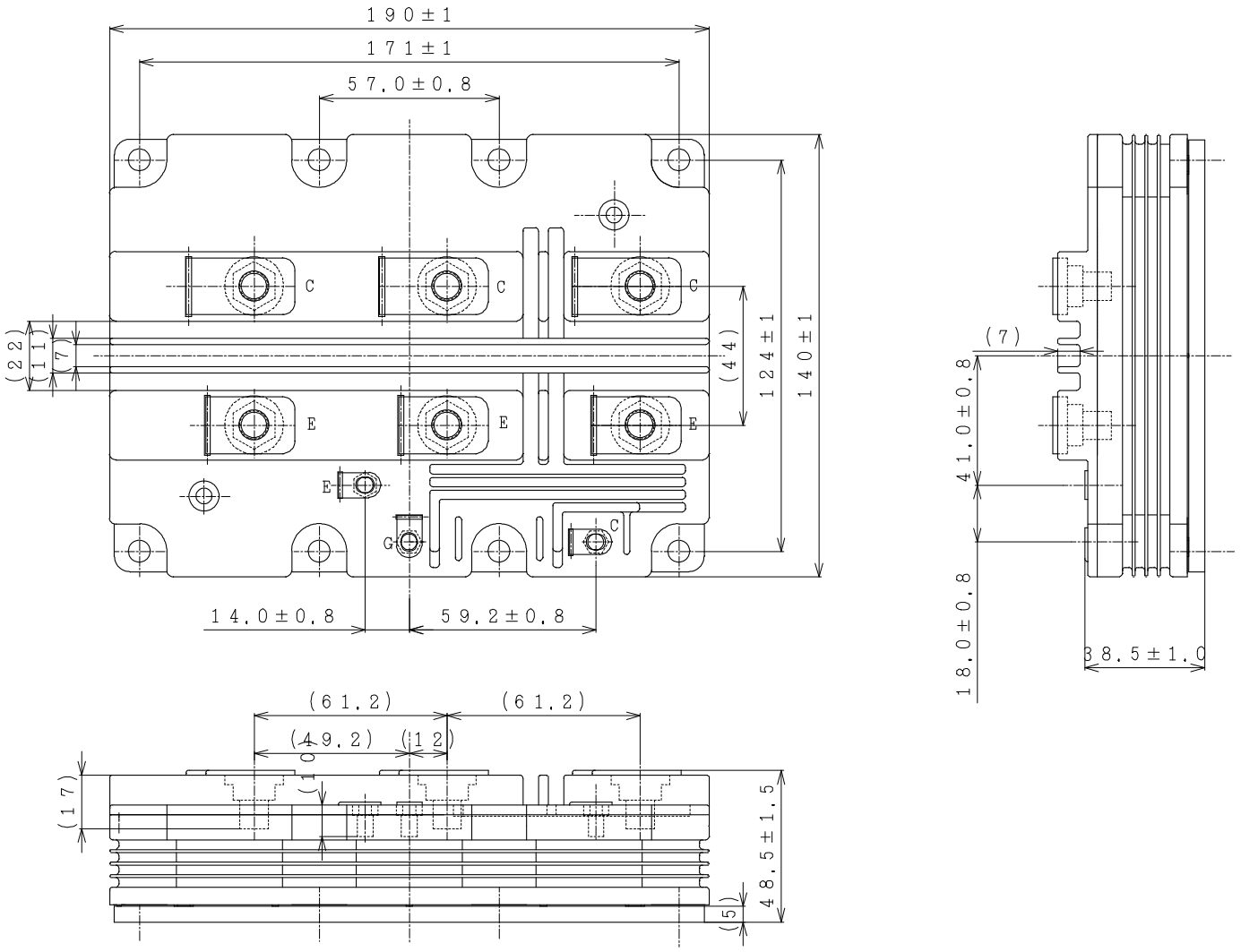
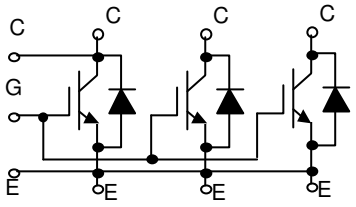
Module Outline Drawing

Unit: mm



Weight: 1550(g)

CIRCUIT DIAGRAM



TERMINALS

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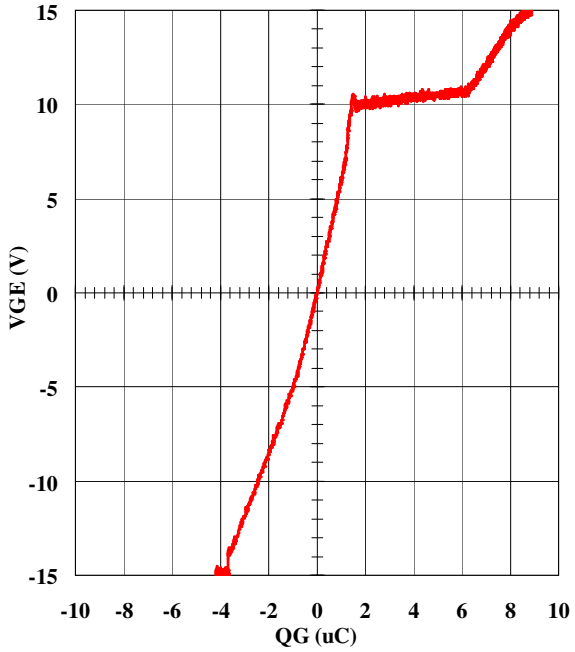
QG-VGE Curve

TYPICAL

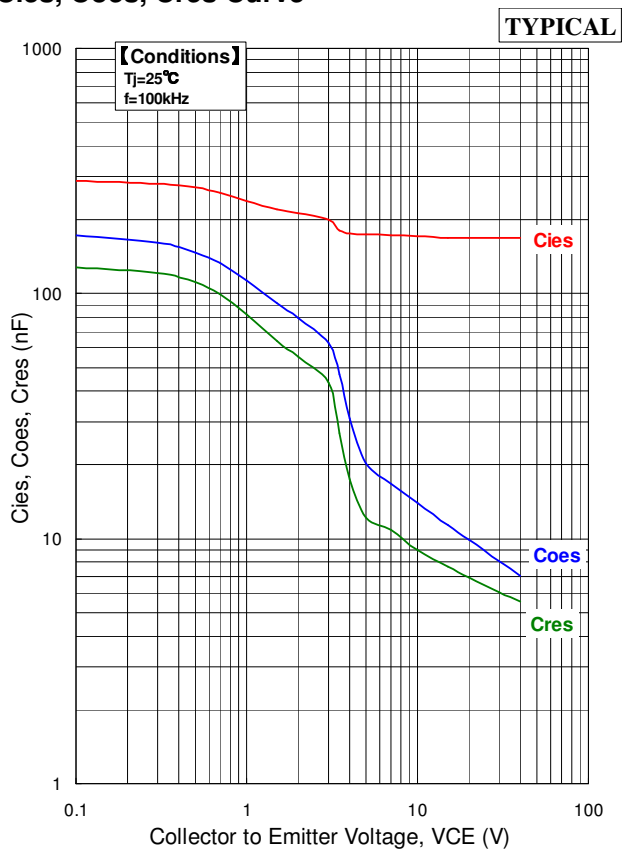
Conditions: Ls=150nH,VCC=2600V,VGE=+/-15V,
RG(on/off)=27Ω/27Ω,Tj=25°C,



QG-VGE curve

Cies, Coes, Cres Curve

TYPICAL



Capacitance vs. Collector to Emitter Voltage

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HITACHI POWER SEMICONDUCTORS

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