MBN800H45E2

Silicon N-channel IGBT 4500V E2 version

FEATURES

* Low conduction 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=25ºC)

Item		Symbol	Unit	MBN800H45E2
Collector Emitter Voltage		V_{CES}	V	4,500
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	800 (Tc=80 ºC)
	1ms	I_{Cp}		1,600
Forward Current	DC	I_F	A	800
	1ms	I_{FM}		1,600
Junction Temperature		T_j	ºC	-40 ~ +125
Storage Temperature		T_{stg}	ºC	-50 ~ +125 (1)
Isolation Voltage		V_{ISO}	V_{RMS}	10,200 (AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	N·m	2/10 (2)
	Mounting (M6)	-		6 (3)

Notes: (1) Terminal temperature shall not exceed the specified temperature in any operation.
(2) Recommended Value 1.8±0.2/9±1N·m (3) 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	-	-	17	V_{CE}=4,500V, V_{GE}=0V, Tj=25ºC
				-	17	67	V_{CE}=4,500V, V_{GE}=0V, Tj=125ºC
Gate Emitter Leakage Current		I_{GES}	nA	-500	-	+500	V_{GE}=±20V, V_{CE}=0V, Tj=25ºC
Collector Emitter Saturation Voltage		$V_{CE(sat)}$	V	3.1	3.7	4.2	I_C=800A, V_{GE}=15V, Tj=125ºC
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	5.4	6.4	7.4	V_{CE}=10V, I_C=800mA, Tj=25ºC
Input Capacitance		C_{ies}	nF	-	110	-	V_{CE}=10V,V_{GE}=0V, f=100kHz, Tj=25ºC
Internal Gate Resistance		Rge	Ω	-	2.4	-	V_{CE}=10V,V_{GE}=0V, f=100kHz, Tj=25ºC
Rise Time		t_r	μs	1.0	2.2	3.3	V_{CC}=2,600V, Ic=800A
Turn On Delay Time		$t_{d(on)}$		-	0.9	-	Ls=165nH
Fall Time		t_f		1.5	3.0	4.5	Rg=4.7Ω (4)
Turn Off Delay Time		$t_{d(off)}$		-	2.5	-	V_{GE}=+/-15V, Tj=125ºC
Forward Voltage Drop		V_{FM}	V	2.3	2.9	3.4	IF=800A, V_{GE}=0V, Tj=125ºC
Reverse Recovery Time		t_{rr}	μs	-	0.8	1.6	Vcc=2,600V, IF=800A, Ls=165nH Tj=125ºC
Turn On Loss		$E_{on(10\%)}$	J/p	-	2.6	3.9	V_{CC}=2,600V, Ic= IF=800A, Ls=165nH Rg= 4.7Ω (4) V_{GE}=+/-15V, Tj=125ºC
		$E_{on(full)}$		-	2.9	-	
Turn Off Loss		$E_{off(10\%)}$	J/ p	-	2.8	4.2	
		$E_{off(full)}$		-	3.2	-	
Reverse Recovery Loss		$E_{rr(10\%)}$	J/ p	-	2.1	3.2	
		$E_{rr(full)}$		-	2.3	-	
Thermal Impedance	IGBT	Rth(j-c)	K/W	-	-	0.013	Junction to case
	FWD	Rth(j-c)		-	-	0.026	
Contact Thermal Impedance		Rth(c-f)	K/W	-	0.007	-	Case to fin (λgrease=1W/(m・K), Heat-sink flatness ≤50um)

Notes:(4) Rg value is the test condition's value for evaluation of the switching times, not recommended value.
Please, determine the suitable Rg 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

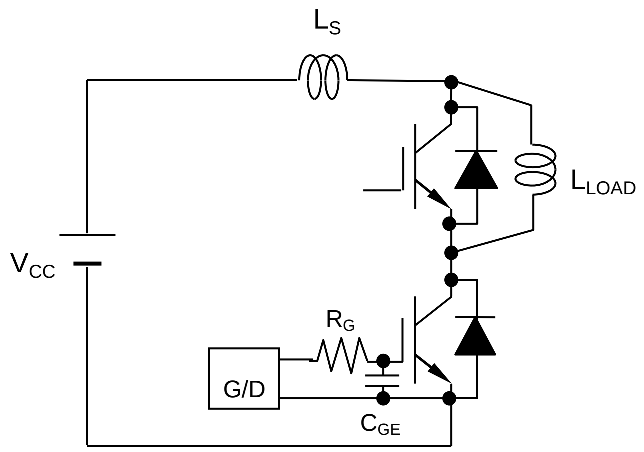
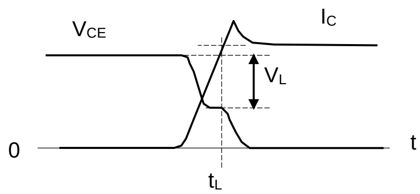
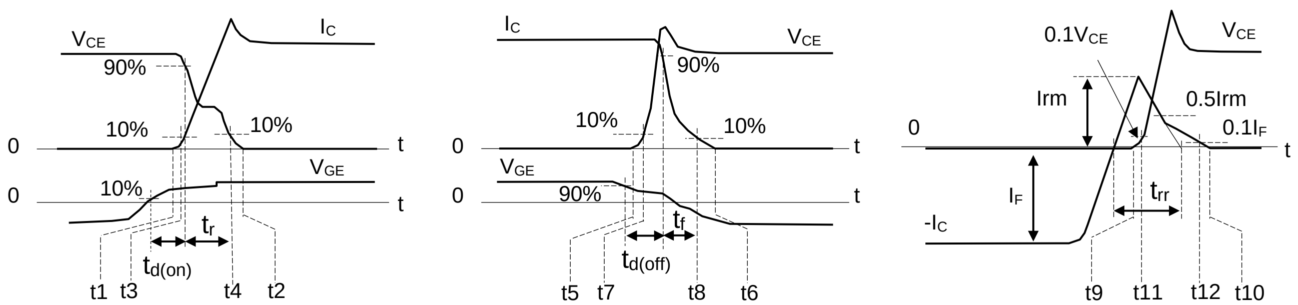


Fig.1 Switching test circuit



$$L_S = \frac{V_L}{\left(\frac{dI_C}{dt}\right)_{t=t_L}}$$

Fig.2 Definition of stray inductance



$$E_{on(10\%)} = \int_{t3}^{t4} I_C \cdot V_{CE}\, dt \qquad E_{off(10\%)} = \int_{t7}^{t8} I_C \cdot V_{CE}\, dt \qquad E_{rr(10\%)} = \int_{t11}^{t12} I_F \cdot V_{CE}\, dt$$

$$E_{on(Full)} = \int_{t1}^{t2} I_C \cdot V_{CE}\, dt \qquad E_{off(Full)} = \int_{t5}^{t6} I_C \cdot V_{CE}\, dt \qquad E_{rr(Full)} = \int_{t9}^{t10} I_F \cdot V_{CE}\, dt$$

Fig.3 Definition of switching loss

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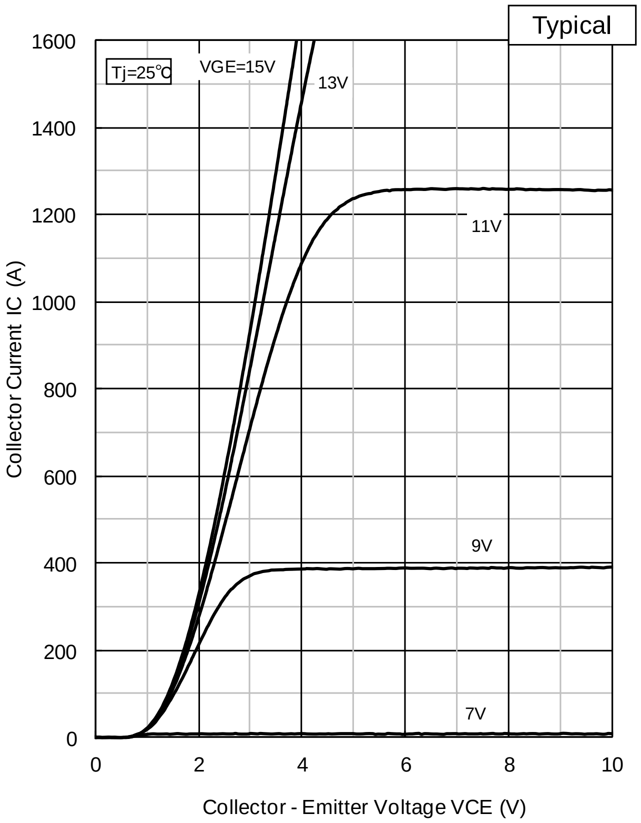
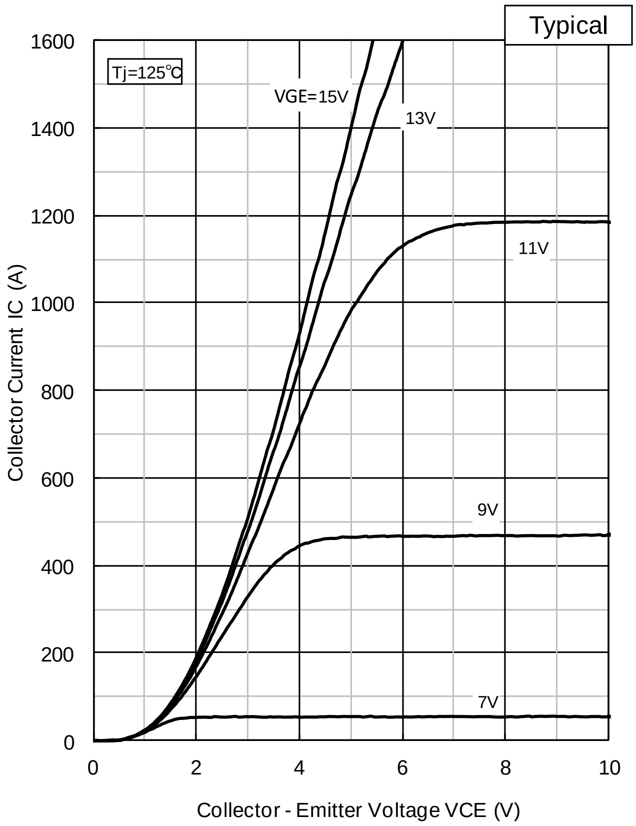
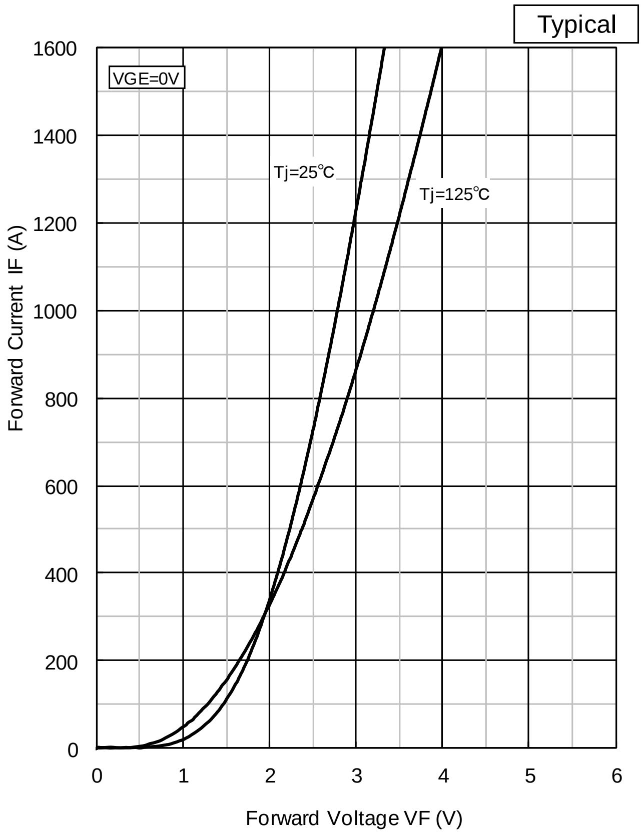
STATIC CHARACTERISTICS



IC vs. VCE (Tj=25°C)



IC vs. VCE(Tj=125°C)



IF vs. VF

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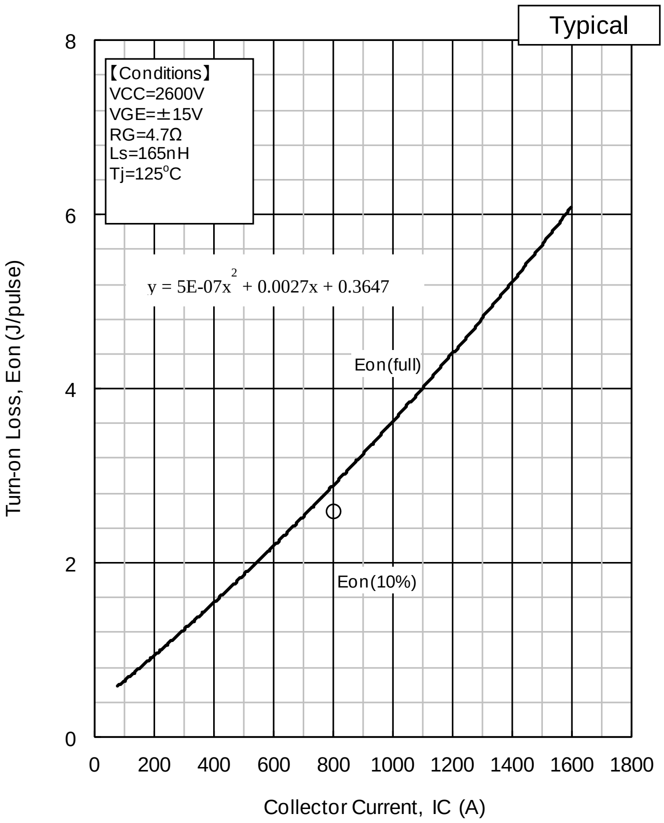
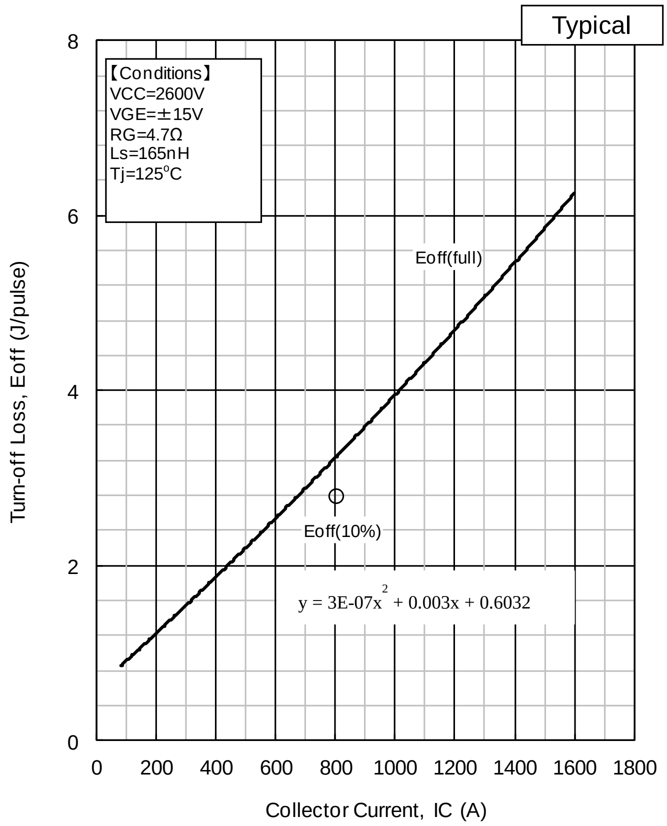
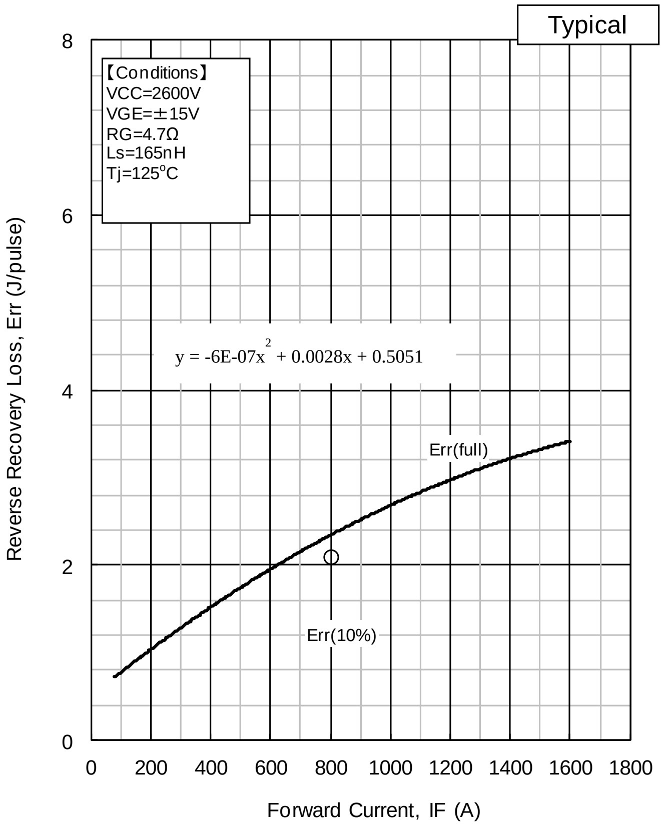
DYNAMIC CHARACTERISTICS



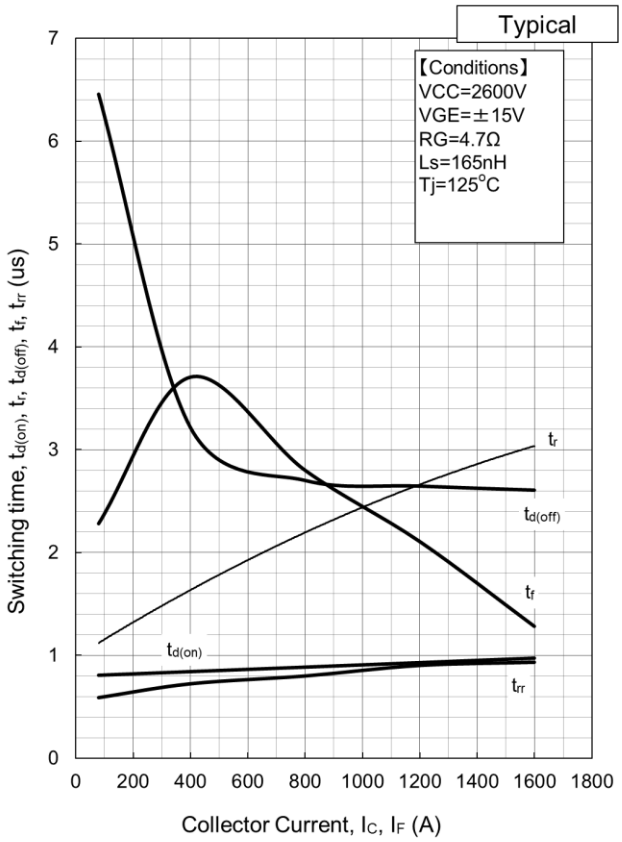
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current



Recovery loss vs. Forward current



Switching time vs. Collector Current

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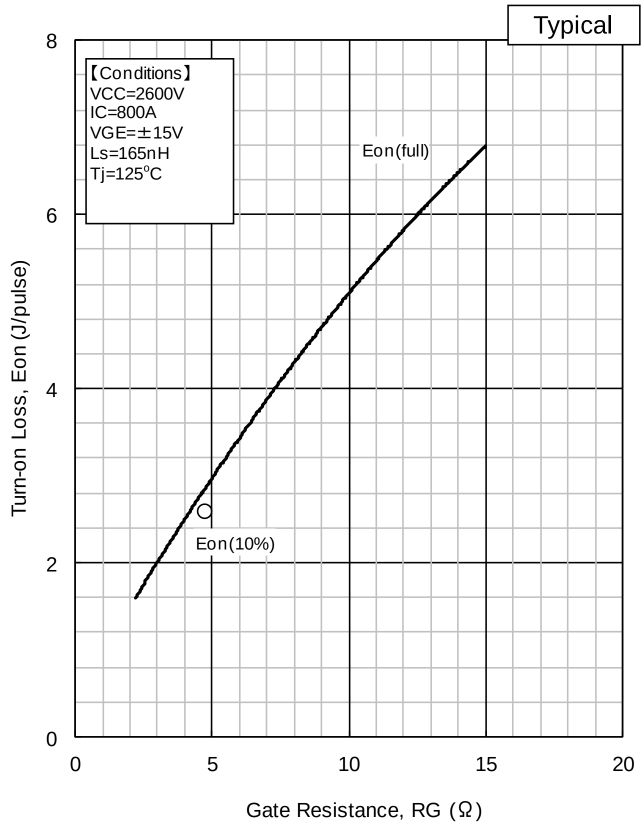
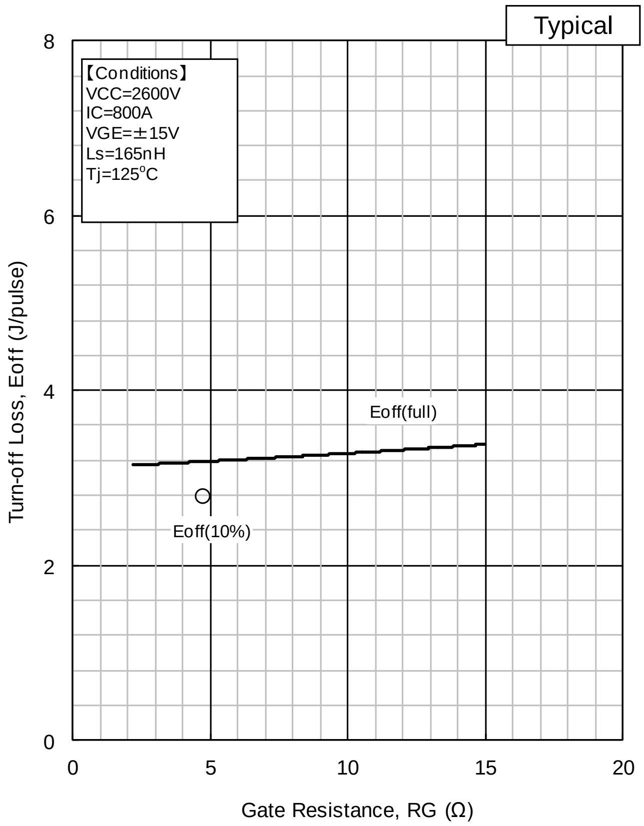
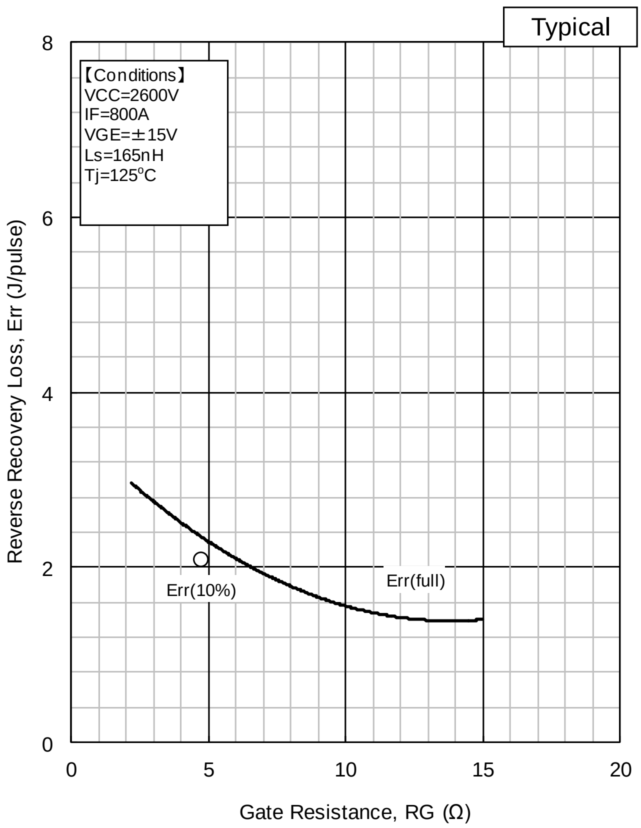


Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance



Recovery loss vs. Gate Resistance

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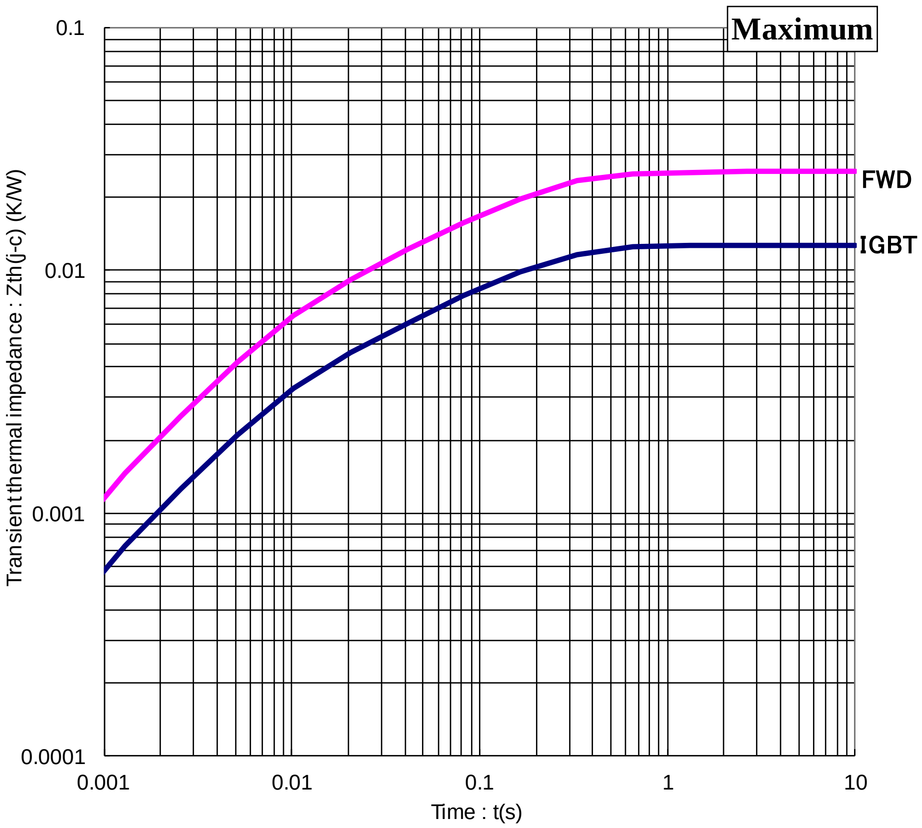
TRANSIENT THERMAL IMPEDANCE



Transient Thermal Impedance Curve

Curve approximation model

$\Sigma rth[n]*(1-\exp(-t/\tau th[n]))$

n	1	2	3	4	Unit
τ th[n]	1.63E-01	2.71E-02	6.11E-03	8.61E-04	sec
rth[n,IGBT]	8.05E-03	2.47E-03	2.39E-03	1.31E-04	K/W
rth[n,Diode]	1.61E-02	4.91E-03	4.76E-03	2.61E-04	K/W

Material declaration

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

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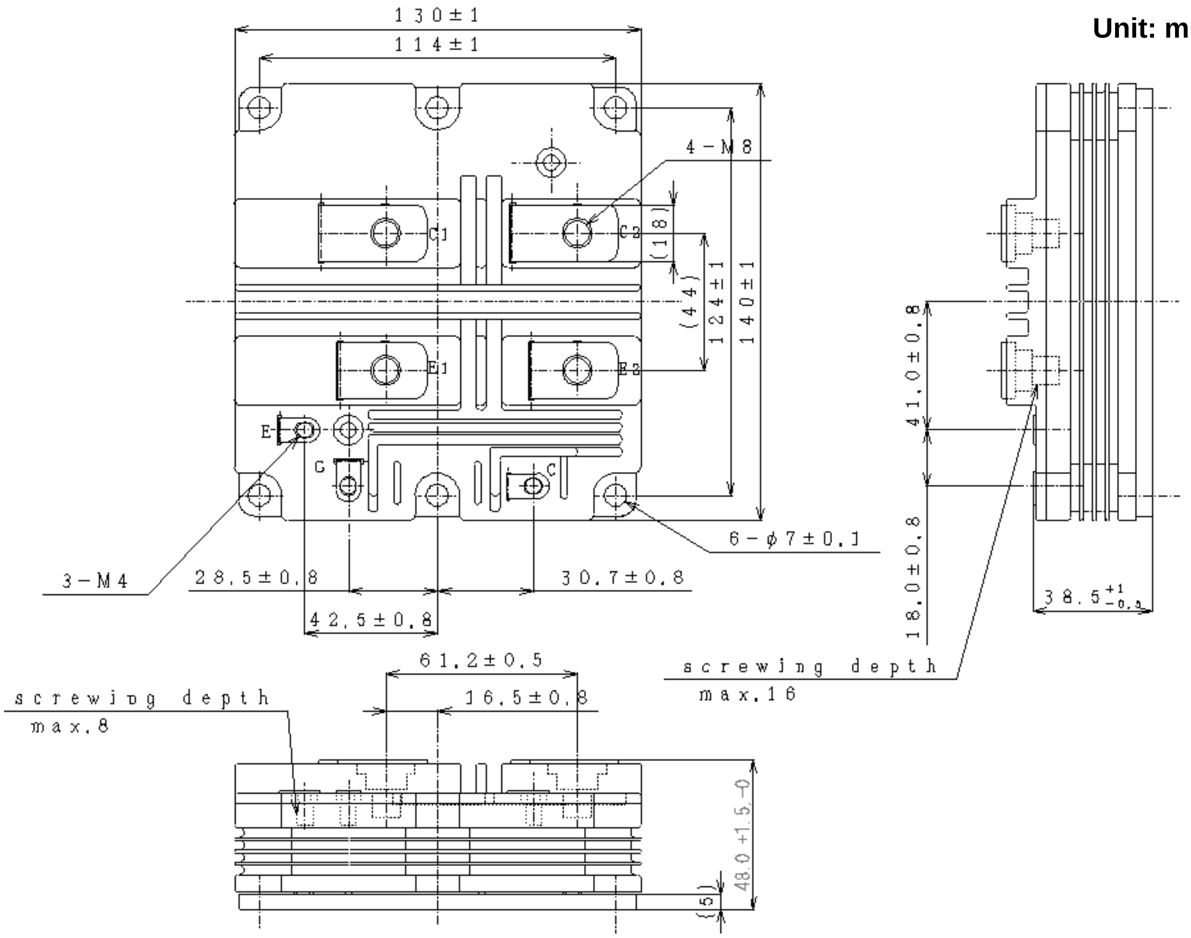
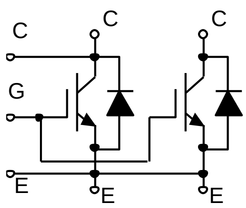
Module Outline Drawing

Unit: mm



Weight: 1050(g)

Circuit diagram



TERMINALS

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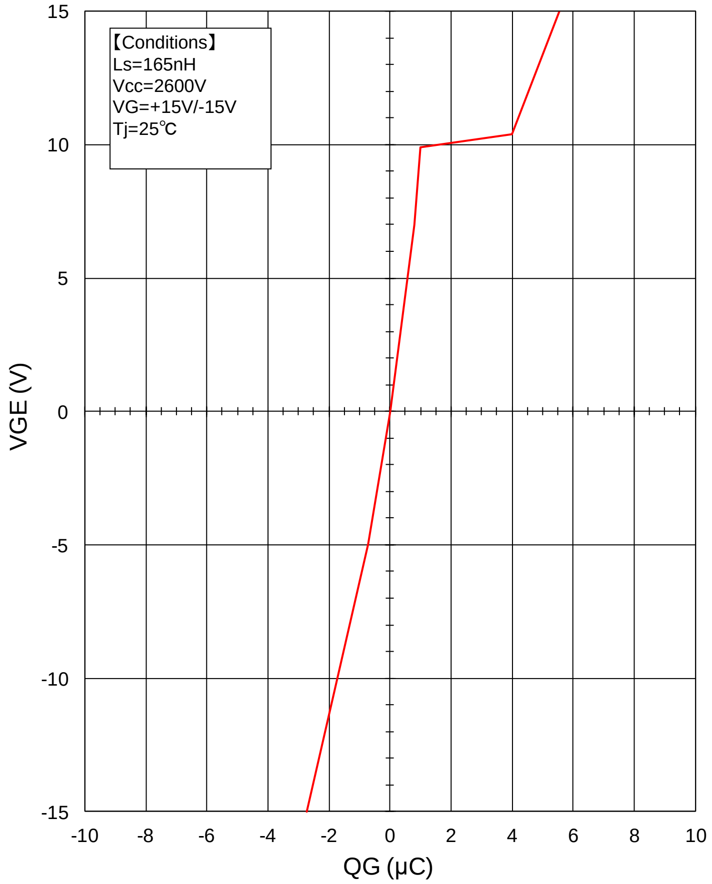
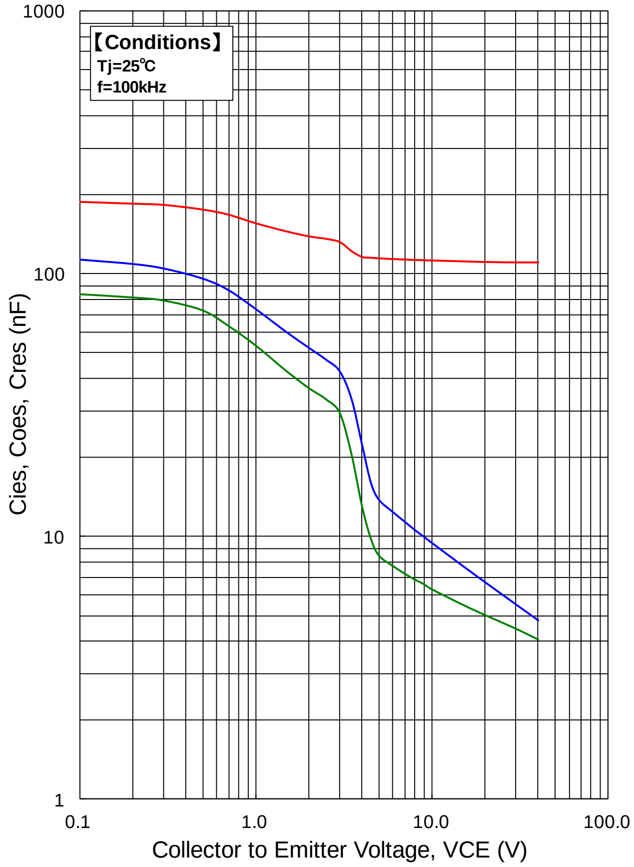
QG-VGE Curve



Cies,Coes,Cres Curve



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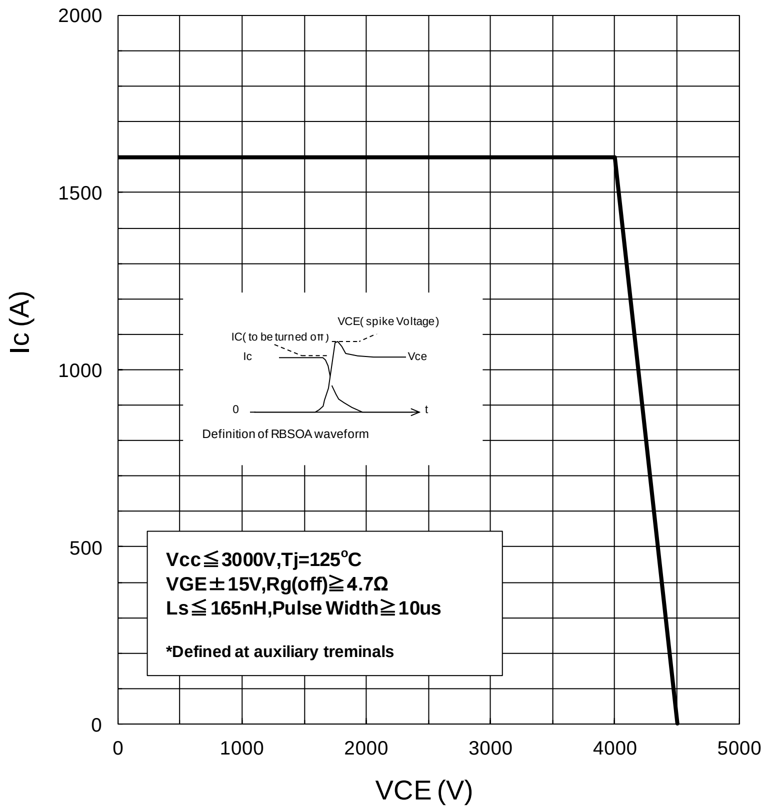
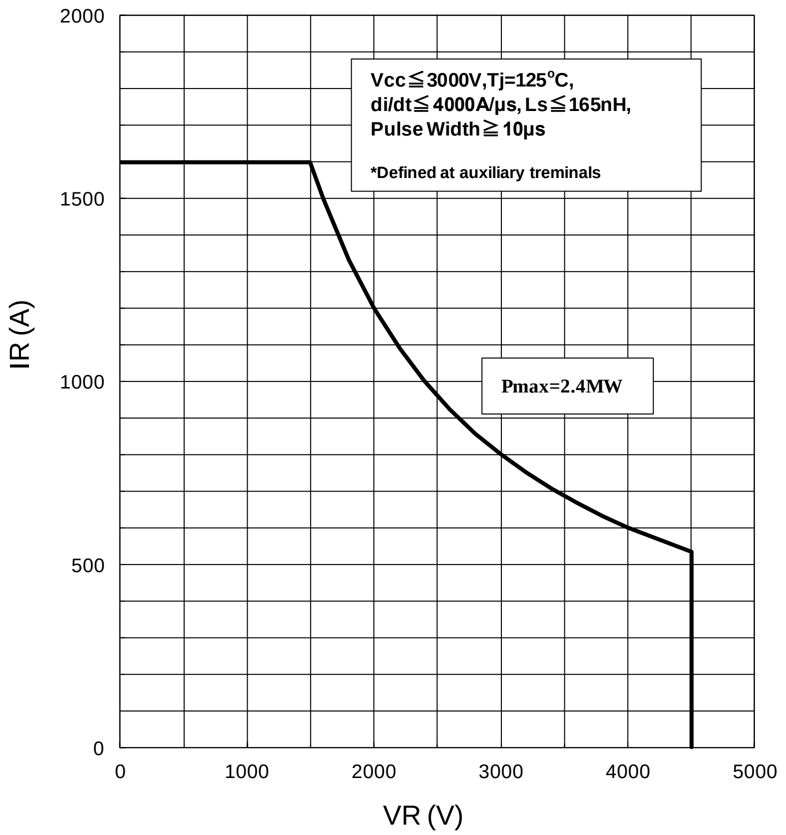
RBSOA



RRSOA



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