

MBN1200H45E2

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.
($\Delta T_c=70^\circ\text{C}$, $N>30,000$ cycles)
- * Isolated heat sink (terminal to base).

ABSOLUTE MAXIMUM RATINGS ($T_c=25^\circ\text{C}$)

Item		Symbol	Unit	MBN1200H45E2
Collector Emitter Voltage		V_{CES}	V	4,500
Gate Emitter Voltage		V_{GES}	V	± 20
Collector Current	DC	I_c	A	1,200 ($T_c=80^\circ\text{C}$)
	1ms	I_{cp}		2,400
Forward Current	DC	I_F	A	1,200
	1ms	I_{FM}		2,400
Junction Temperature		T_j	$^\circ\text{C}$	-40 ~ +125
Maximum Junction Temperature		$T_{vj\max}$	$^\circ\text{C}$	150 (1)
Storage Temperature		T_{stg}	$^\circ\text{C}$	-50 ~ +125 (2)
Isolation Voltage		V_{ISO}	V_{RMS}	10,200 (AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	N·m	2/10 (3)
	Mounting (M6)	-		6 (4)

Notes: (1) Regarding the definition of $T_{vj\max}$ for each operation mode, please refer to LD-ES-130737.

(2) Terminal temperature shall not exceed the specified temperature in any operation.

(3) Recommended Value $1.8\pm 0.2/9\pm 1\text{N}\cdot\text{m}$ (4) Recommended Value $5.5\pm 0.5\text{N}\cdot\text{m}$

ELECTRICAL CHARACTERISTICS

Item		Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Collector Emitter Cut-Off Current		I_{CES}	mA	-	-	5	$V_{CE}=4,500\text{V}$, $V_{GE}=0\text{V}$, $T_j=25^\circ\text{C}$
				-	25	100	$V_{CE}=4,500\text{V}$, $V_{GE}=0\text{V}$, $T_j=125^\circ\text{C}$
Gate Emitter Leakage Current		I_{GES}	nA	-500	-	+500	$V_{GE}=\pm 20\text{V}$, $V_{CE}=0\text{V}$, $T_j=25^\circ\text{C}$
Collector Emitter Saturation Voltage		$V_{CE(sat)}$	V	3.1	3.7	4.2	$I_c=1200\text{A}$, $V_{GE}=15\text{V}$, $T_j=125^\circ\text{C}$
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	5.4	6.4	7.4	$V_{CE}=10\text{V}$, $I_c=1200\text{mA}$, $T_j=25^\circ\text{C}$
Input Capacitance		C_{ies}	nF	-	165	-	$V_{CE}=10\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_j=25^\circ\text{C}$
Internal Gate Resistance		R_{ge}	Ω	-	1.6	-	$V_{CE}=10\text{V}$, $V_{GE}=0\text{V}$, $f=100\text{kHz}$, $T_j=25^\circ\text{C}$
Rise Time		t_r	μs	1.0	2.2	3.3	$V_{CC}=2,600\text{V}$, $I_c=1200\text{A}$
Turn On Delay Time		$t_{d(on)}$		-	0.9	-	$L_s=150\text{nH}$
Fall Time		t_f		1.5	3.0	4.5	$R_G=3.3\Omega$ (5)
Turn Off Delay Time		$t_{d(off)}$		-	2.5	-	$V_{GE}=\pm 15\text{V}$, $T_j=125^\circ\text{C}$
Forward Voltage Drop		V_{FM}	V	2.3	2.9	3.4	$I_F=1200\text{A}$, $V_{GE}=0\text{V}$, $T_j=125^\circ\text{C}$
Reverse Recovery Time		t_{rr}	μs	-	0.8	1.6	$V_{CC}=2600\text{V}$, $I_F=1200\text{A}$, $L_s=150\text{nH}$ $T_j=125^\circ\text{C}$
Turn On Loss	$E_{on(10\%)}$	J/p		-	3.9	5.8	$V_{CC}=2600\text{V}$, $I_c=I_F=1200\text{A}$, $L_s=150\text{nH}$ $R_G=3.3\Omega$ (5) $V_{GE}=\pm 15\text{V}$, $T_j=125^\circ\text{C}$
	$E_{on(full)}$			-	4.3	-	
Turn Off Loss	$E_{off(10\%)}$	J/p		-	4.2	6.3	
	$E_{off(full)}$			-	4.8	-	
Reverse Recovery Loss	$E_{rr(10\%)}$	J/p		-	3.2	4.8	
	$E_{rr(full)}$			-	3.5	-	
Thermal Impedance	IGBT	$R_{th(j-c)}$	K/W	-	-	0.0085	Junction to case
	FWD	$R_{th(j-c)}$		-	-	0.017	
Contact Thermal Impedance		$R_{th(c-f)}$	K/W	-	0.005	-	Case to fin ($\lambda_{grease}=1\text{W}/(\text{m}\cdot\text{K})$, heat-sink flatness $\leq 50\mu\text{m}$)

Notes: (5) 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

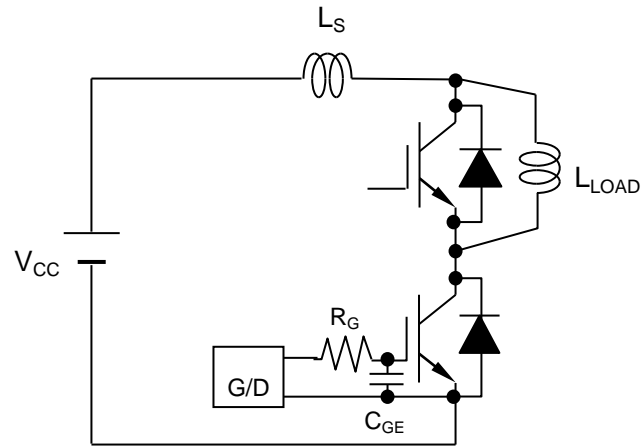


Fig.1 Switching test circuit

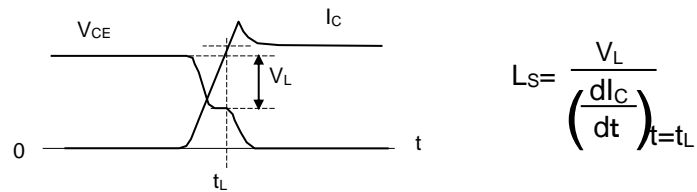


Fig.2 Definition of stray inductance

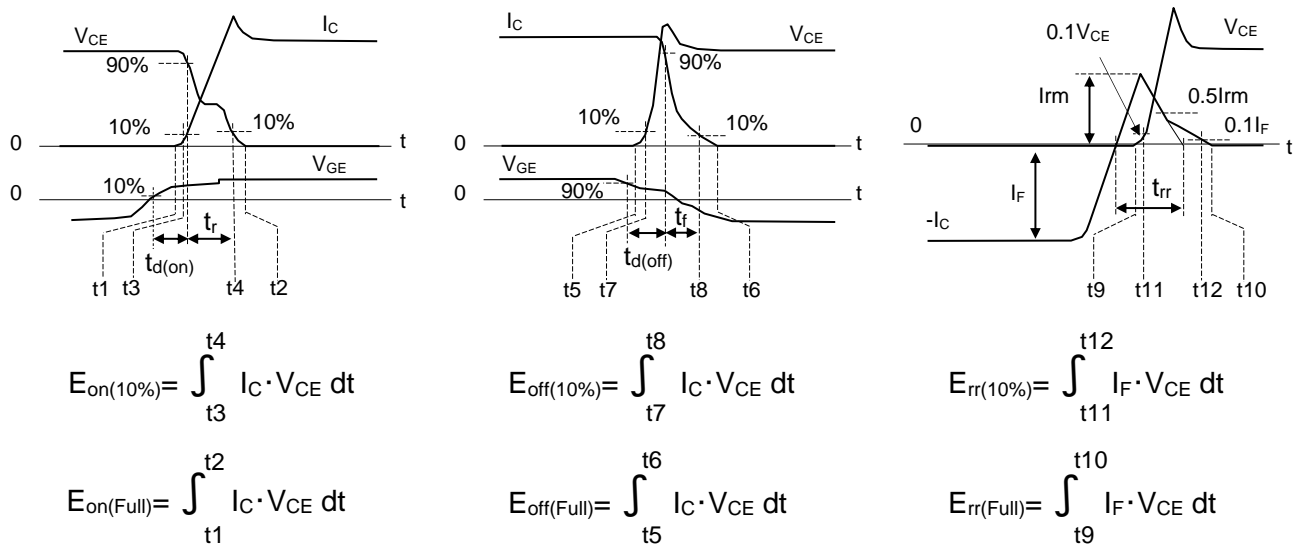
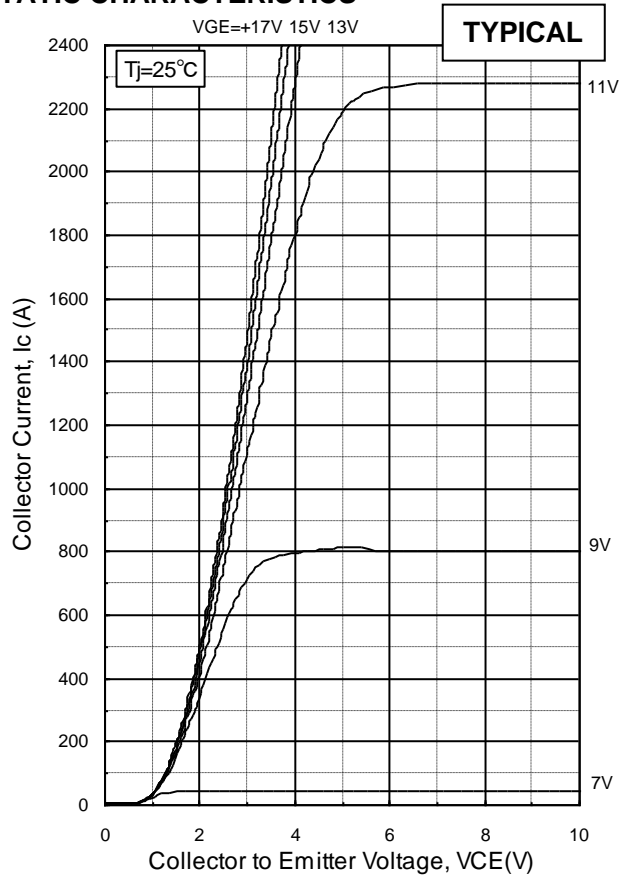


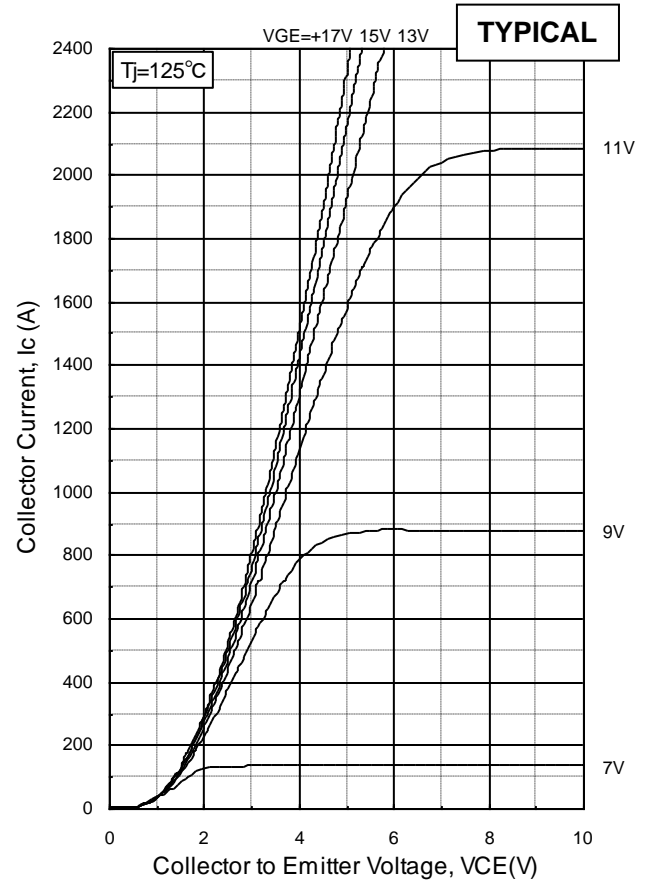
Fig.3 Definition of switching loss

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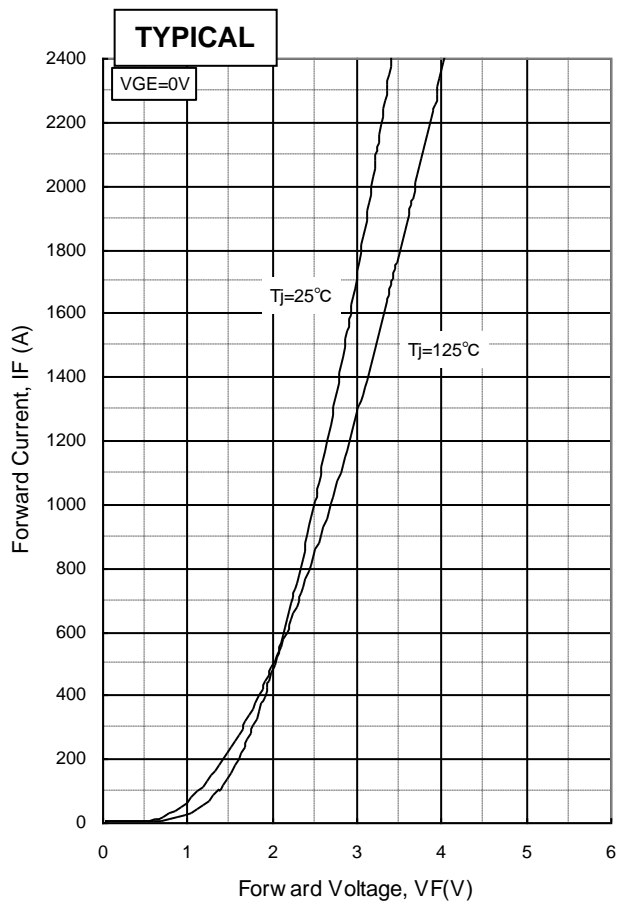
STATIC CHARACTERISTICS



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



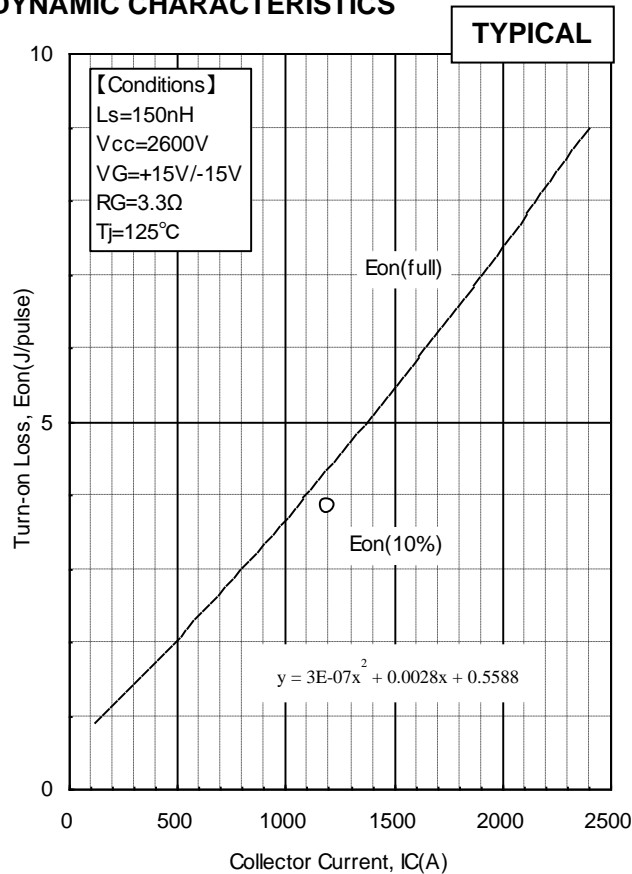
I_c vs. $V_{CE}(T_j=125^{\circ}\text{C})$



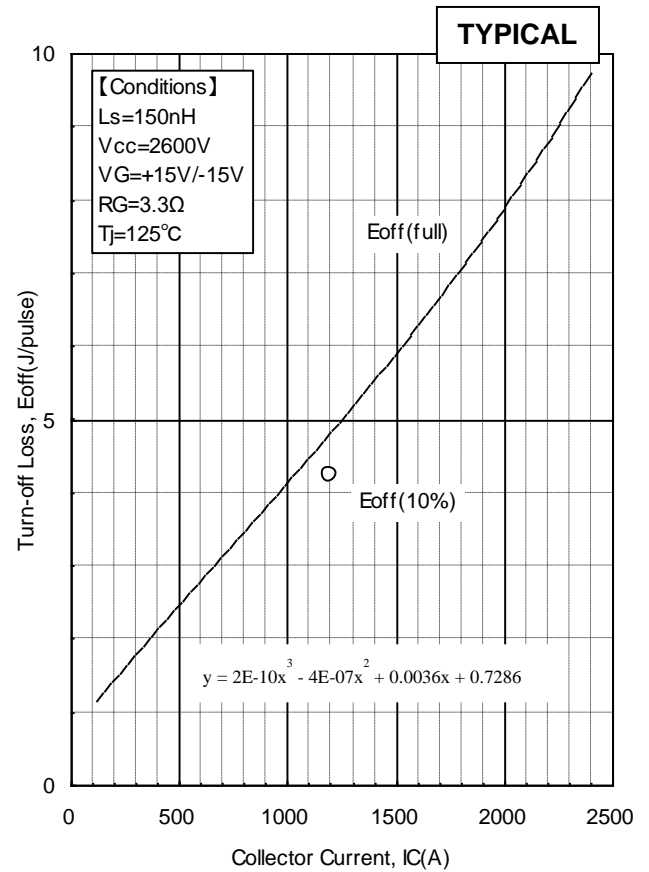
I_F vs. V_F

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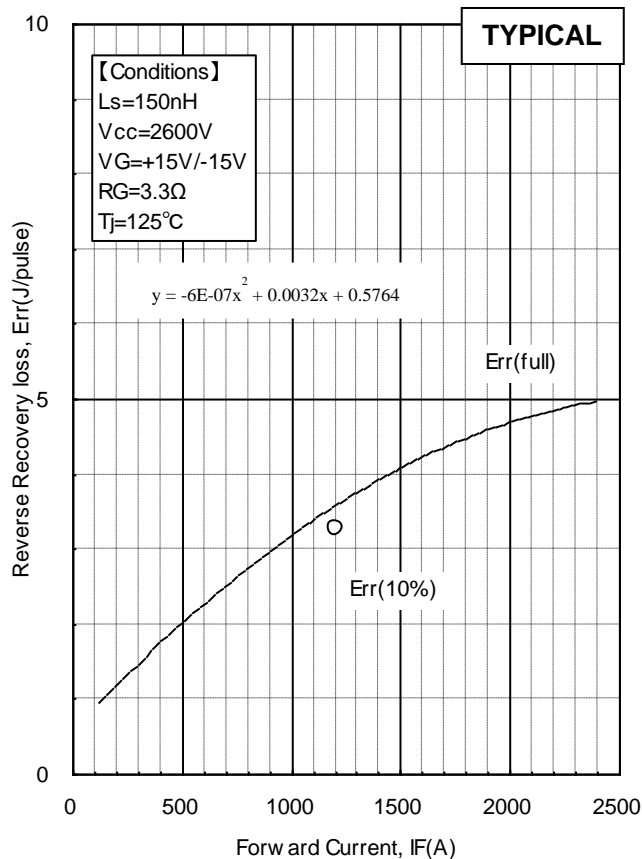
DYNAMIC CHARACTERISTICS



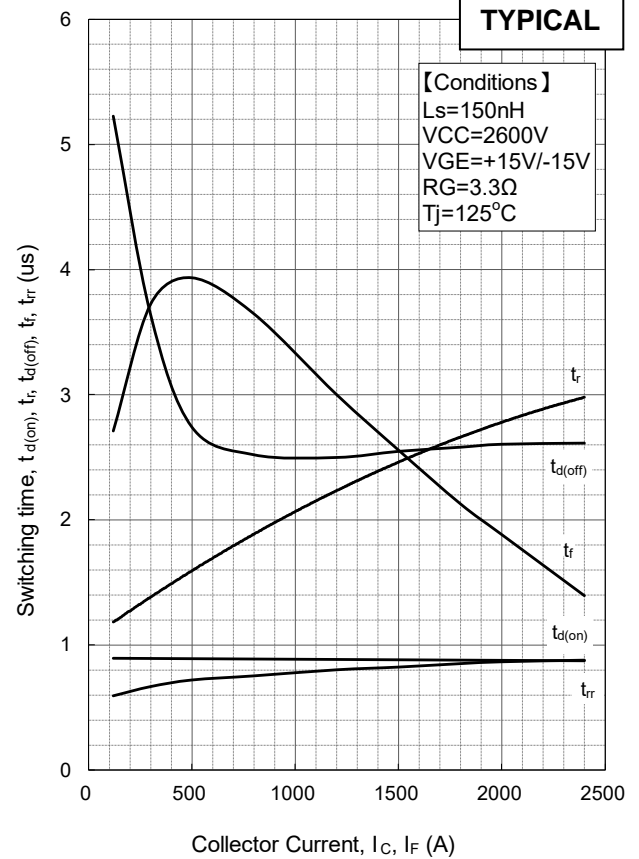
Turn-on loss vs. Collector current



Turn-off loss vs. Collector current



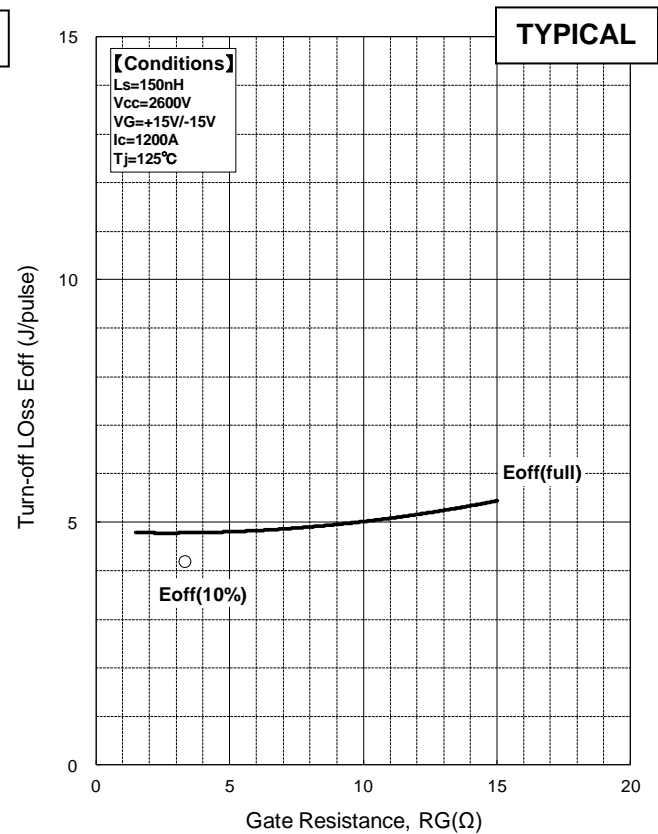
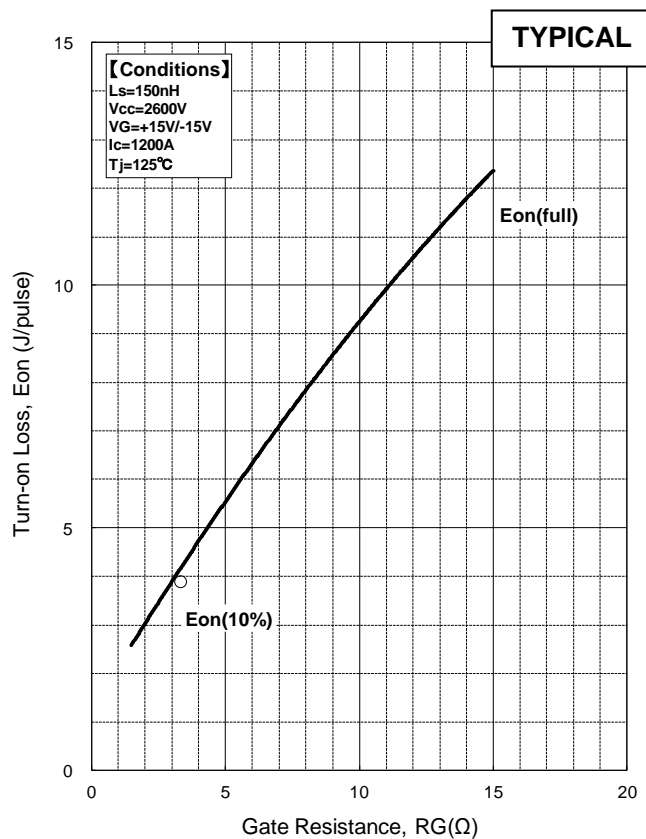
Recovery loss vs. Forward current



Switching time vs. Collector current

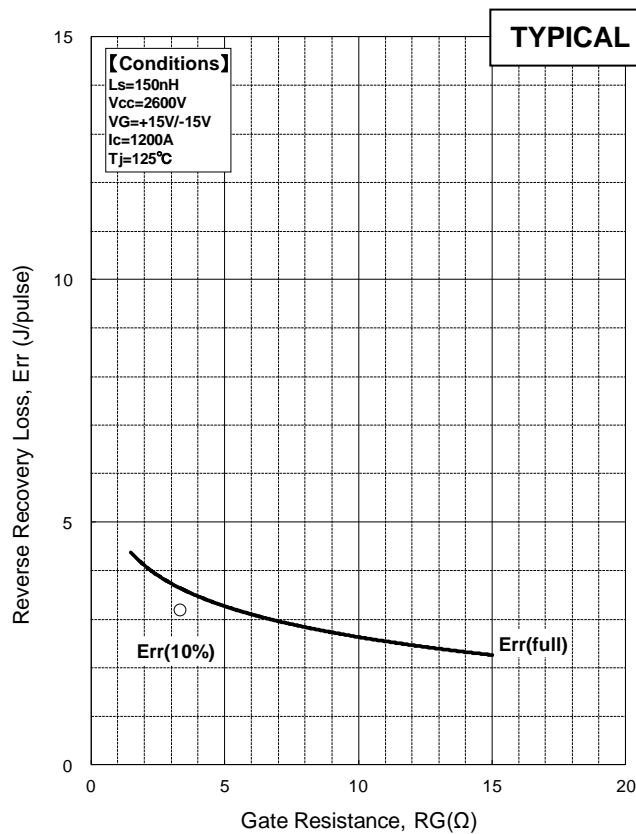
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DYNAMIC CHARACTERISTICS



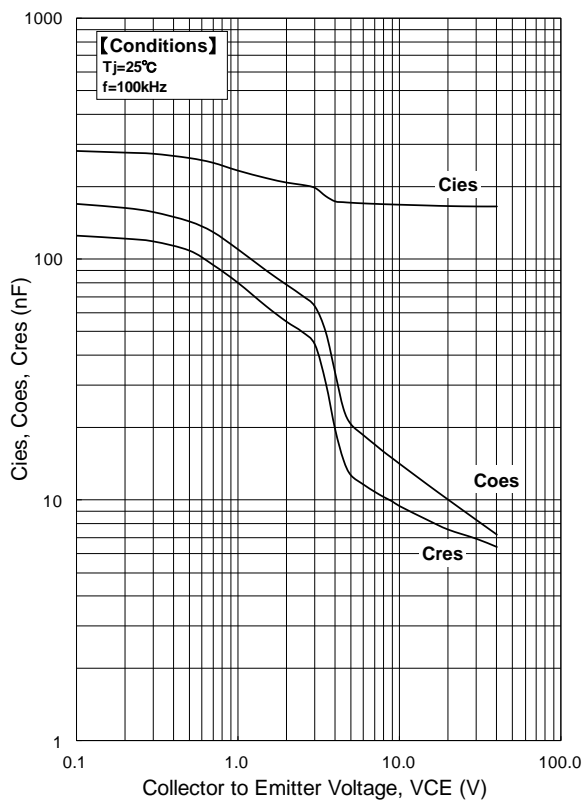
Turn-on loss vs. Gate Resistance

Turn-off loss vs. Gate Resistance

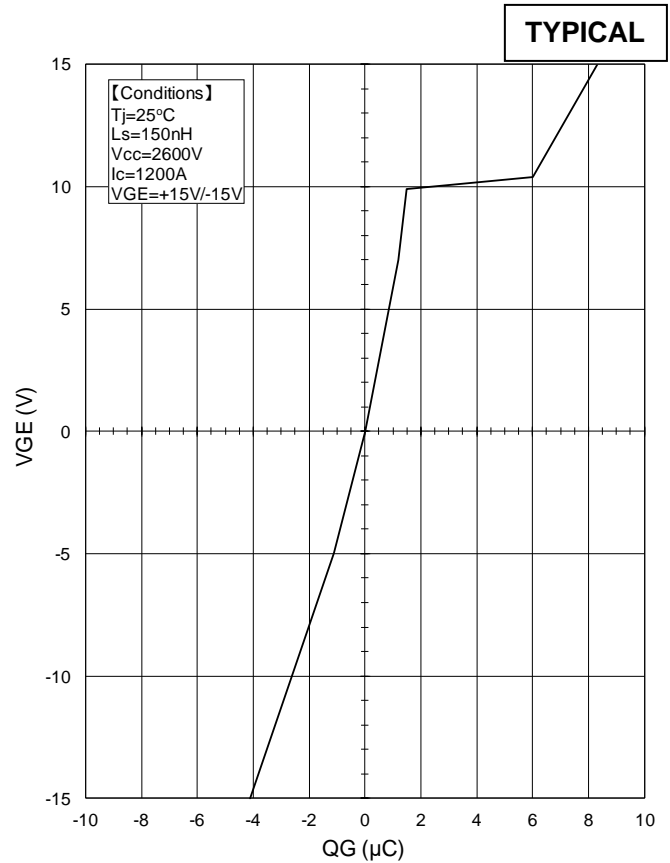


Recovery loss vs. Gate Resistance

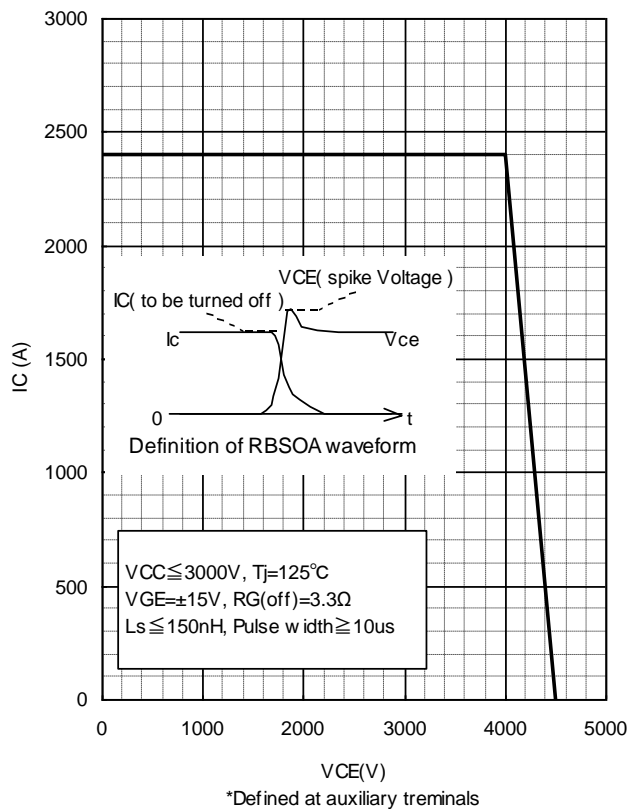
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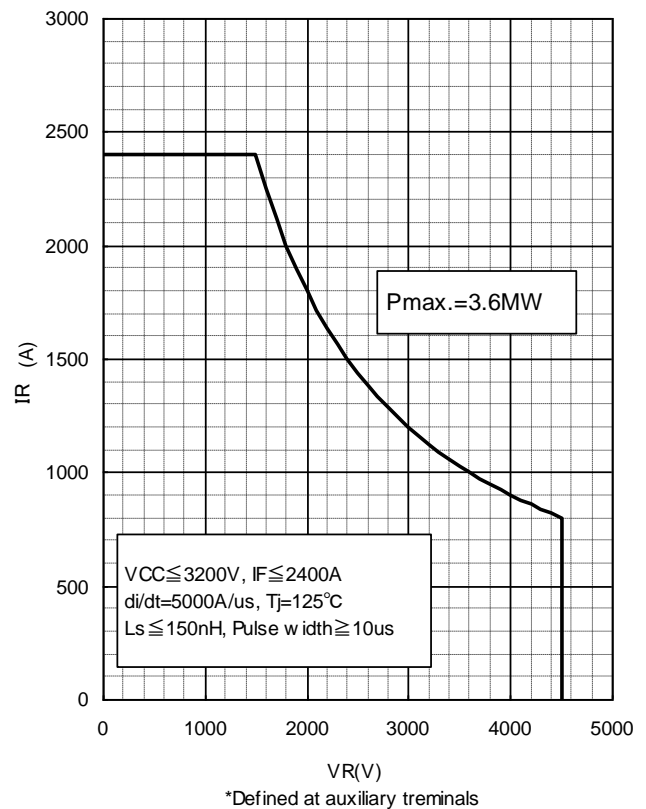
Cies, Coes, Cres - VCE



QG - VGE



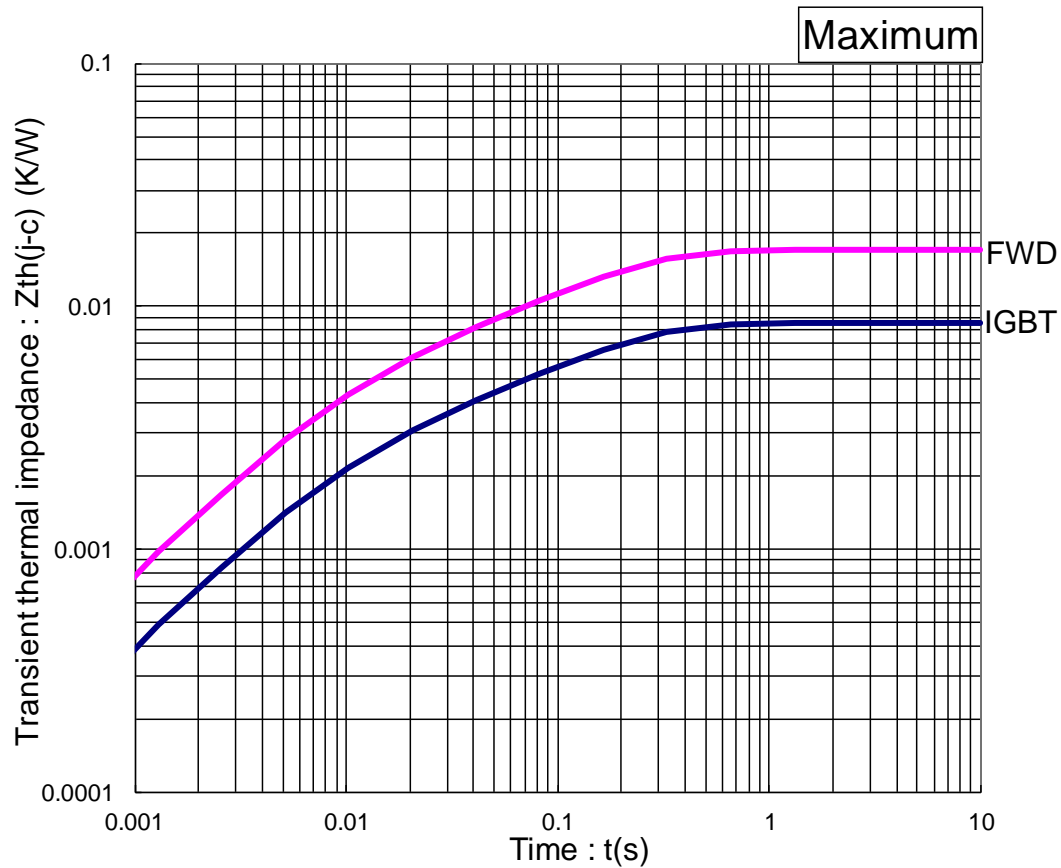
RBSOA



RecSOA

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TRANSIENT THERMAL IMPEDANCE



Transient Thermal Impedance Curve

Curve Approximation Model

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

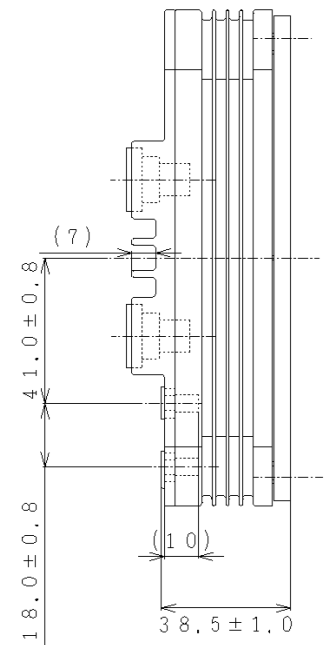
n	1	2	3	4	Unit
$\tau_{th}[n]$	1.63E-01	2.71E-02	6.12E-03	8.66E-04	sec
$r_{th}[n,IGBT]$	5.24E-03	1.61E-03	1.56E-03	8.64E-05	K/W
$r_{th}[n,Diode]$	1.05E-02	3.18E-03	3.13E-03	1.71E-04	K/W

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

Module Outline Drawing



Weight: 1550(g)

TERMINALS

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Minebea POWER SEMICONDUCTORS

Notices

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