MBN1200F33F

Silicon N-channel IGBT 3300V F version

FEATURES

- Soft switching behavior, low switching loss & low conduction loss :
  Soft low-injection punch-through
  Advanced Trench High conductivity IGBT.
- Low driving power due to low input capacitance with trench MOS gate.
- Low noise recovery: Ultra soft fast recovery diode.
- High Current rate Package.
- Low Rth(j-c) & low stray inductance.
- RoHS
- High thermal fatigue durability:
  (delta Tc=70K, N>30,000cycles)

ABSOLUTE MAXIMUM RATINGS (Tc=25°C)

Item		Symbol	Unit	MBN1200F33F
Collector Emitter Voltage		V_{CES}	V	3,300
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	1200
	1ms	I_{CRM}		2,400
Forward Current	DC	I_F	A	1200
	1ms	I_{FRM}		2,400
Junction Temperature		T_j	°C	-50 ~ +150
Storage Temperature		T_{stg}	°C	-55 ~ +150
Isolation Voltage		V_{ISO}	V_{RMS}	6,000(AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	N·m	2/15 (1)
	Mounting (M6)	-		6 (2)

Notes: (1) Recommended Value 1.8±0.2/15$^{+0}_{-3}$N·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	-	-	0.4	V_{CE}=3,300V, V_{GE}=0V, Tj=25°C
				-	25	65	V_{CE}=3,300V, V_{GE}=0V, Tj=150°C
Gate Emitter Leakage Current		I_{GES}	nA	-500	-	+500	V_{GE}=±20V, V_{CE}=0V, Tj=25°C
Collector Emitter Saturation Voltage		V_{CEsat}	V	2.5	2.85	3.5	I_C=1200A, V_{GE}=15V, Tj=150°C
Gate Emitter Threshold Voltage		$V_{GE(th)}$	V	5.5	6.5	7.5	V_{CE}=10V, I_C=1200mA, Tj=25°C
Input Capacitance		C_{ies}	nF	-	88	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Internal Gate Resistance		r_g	Ω	-	1.9	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Switching Times	Rise Time	t_r	µs	0.1	0.2	0.3	V_{CC}=1,800V, Ic=1200A
	Turn On Time	t_{on}		0.8	1.2	1.6	Ls=100nH
	Fall Time	t_f		1.0	1.8	2.6	R_G(on)=6.8Ω,R_G(off)=8.2Ω (3)
	Turn Off Time	t_{off}		2.7	4.5	5.9	V_{GE}=±15V, Tj=150°C
Peak Forward Voltage Drop		V_F	V	2.2	2.6	2.9	IF=1200A, V_{GE}=0V, Tj=150°C
Reverse Recovery Time		t_{rr}	µs	0.2	0.7	1.1	V_{CC}=1,800V, IF=1200A, Ls=100nH Tj=150°C
Turn On Loss		E_{on}	J/P	-	2.6	3.4	V_{CC}=1,800V, Ic=1200A, Ls=100nH
Turn Off Loss		E_{off}	J/P	-	2.2	2.7	R_G(on)=6.8Ω,R_G(off)=8.2Ω (3)
Reverse Recovery Loss		E_{rr}	J/P	-	1.7	2.2	V_{GE}=±15V, Tj=150°C
Stray inductance module		L_{SCE}	nH	-	10	-	
Thermal Impedance	IGBT	Rth(j-c)	K/W	-	-	0.010	Junction to case
	FWD	Rth(j-c)		-	-	0.017	
Contact Thermal Impedance		Rth(c-f)	K/W	-	0.008	-	Case to fin

Notes: (3) R_G value is a test condition value for evaluation, not recommended value.
Please, determine the suitable R_G value by measuring switching behaviors.

* 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 CHARACTERISTIC values according to IEC 60747–2 IEC 60747–9

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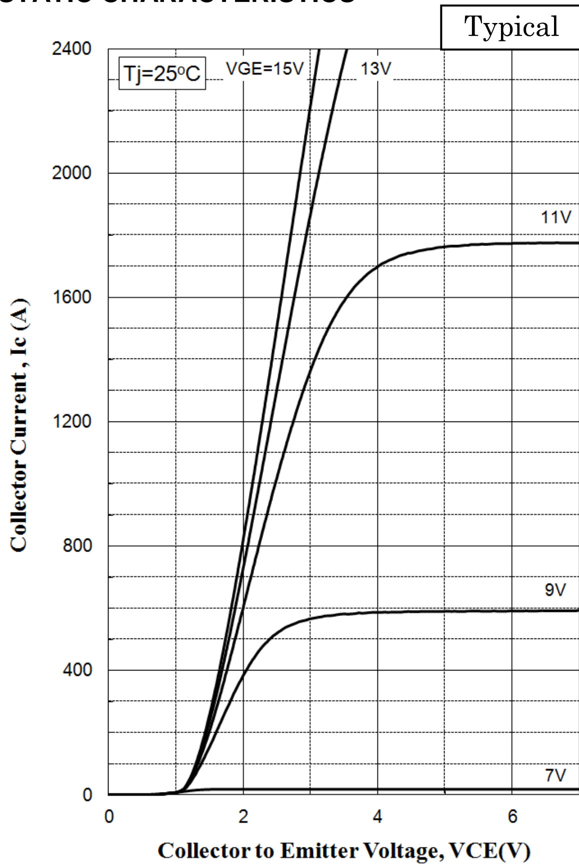
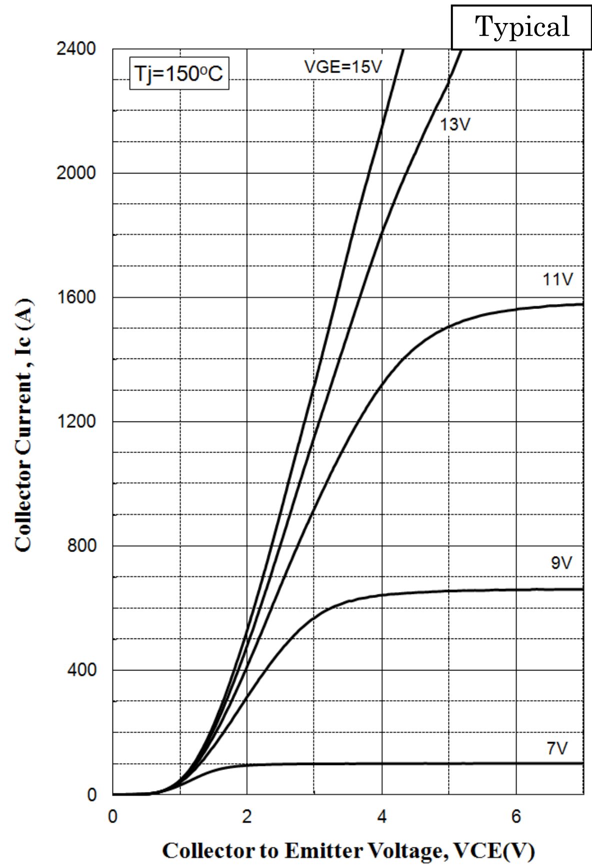
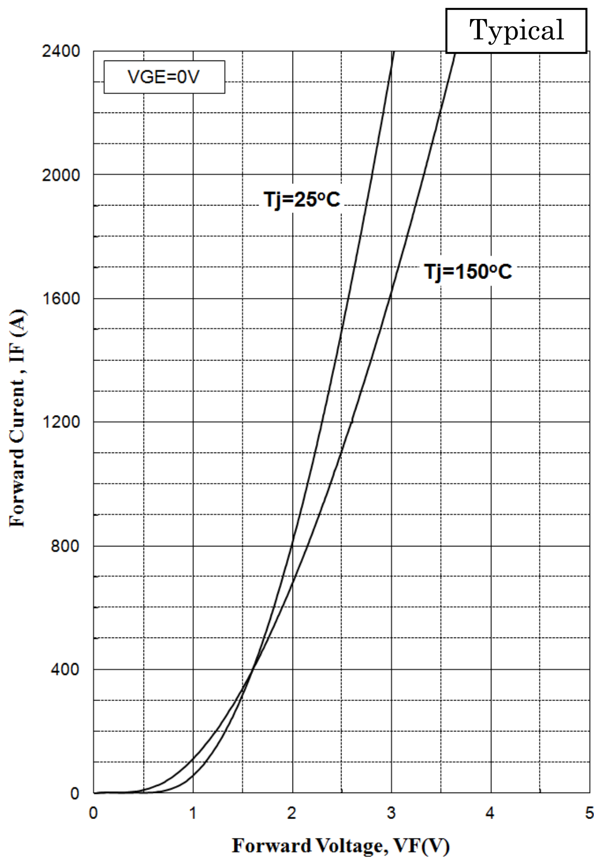
STATIC CHARACTERISTICS



Collector Current vs.Collector to Emitter Voltage



Collector Current vs.Collector to Emitter Voltage



Forward Voltage of free-wheeling diode

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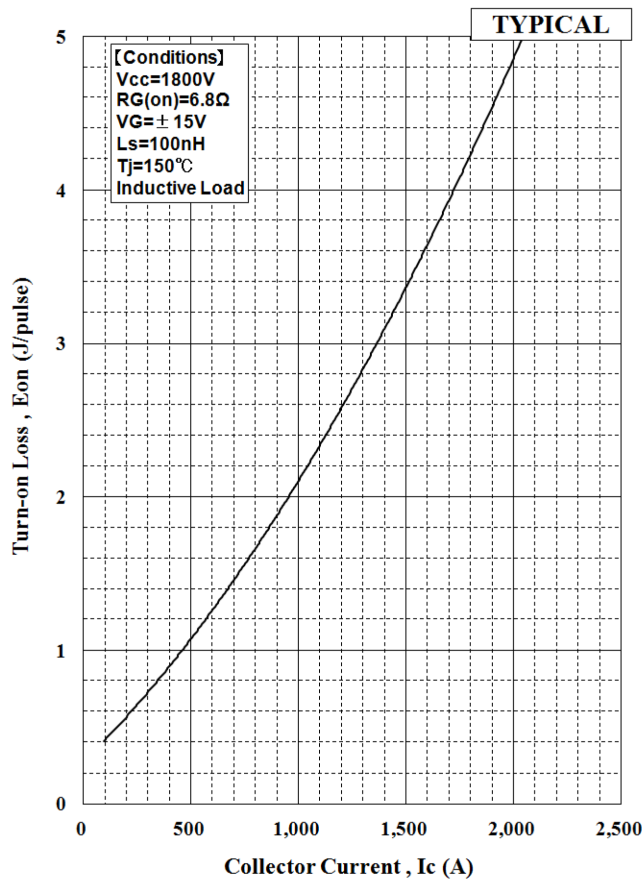
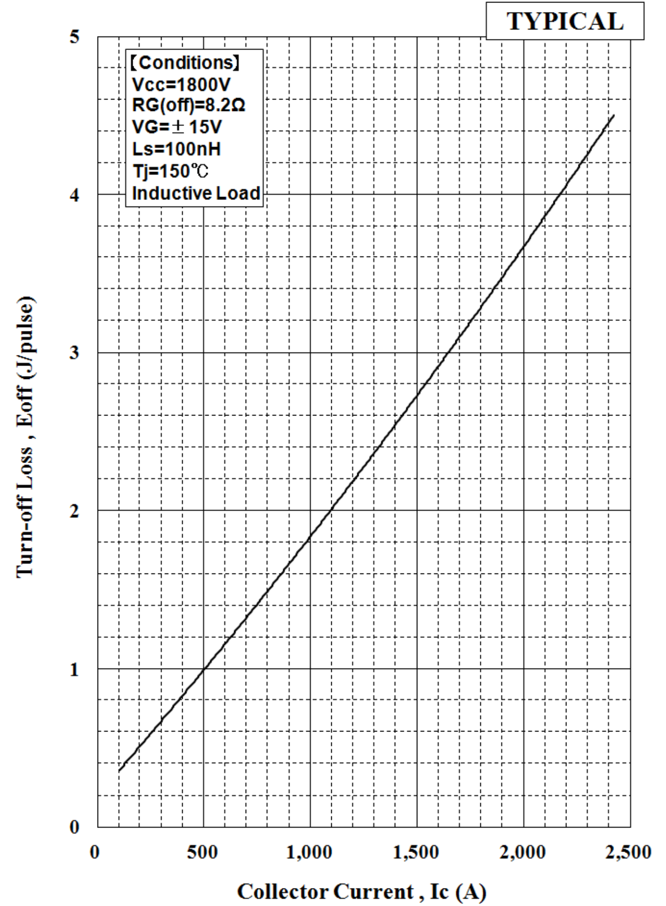
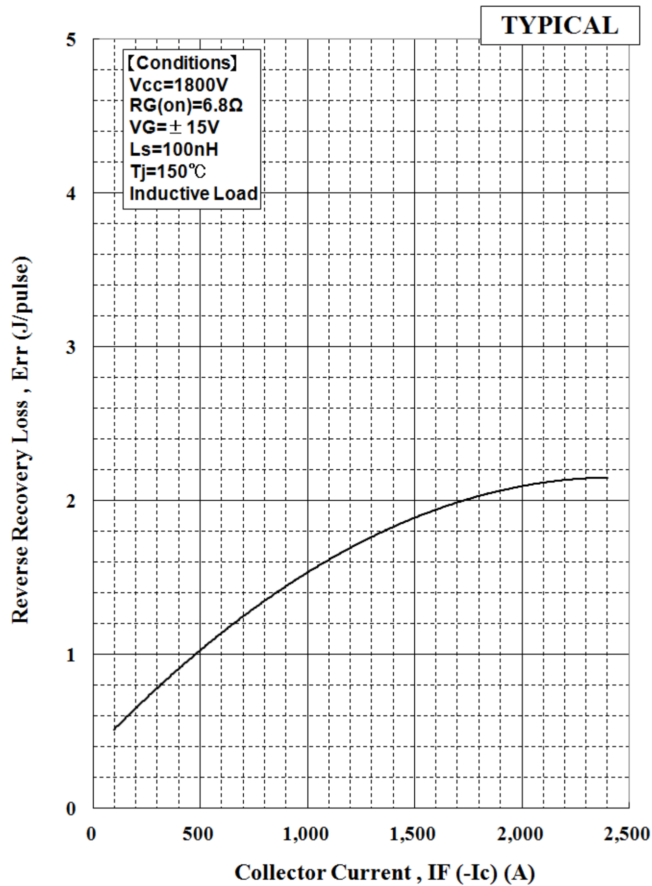
DYNAMIC CHARACTERISTICS



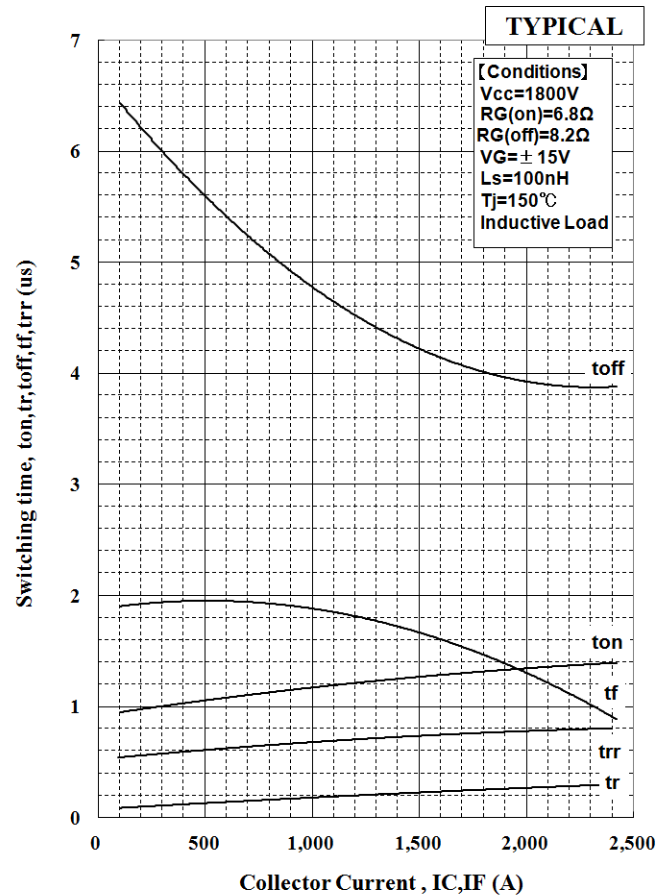
Turn-on Loss vs.Collector Current



Turn-off Loss vs.Collector Current



Recovery Loss vs.Collector Current



Switching time vs.Collector Current

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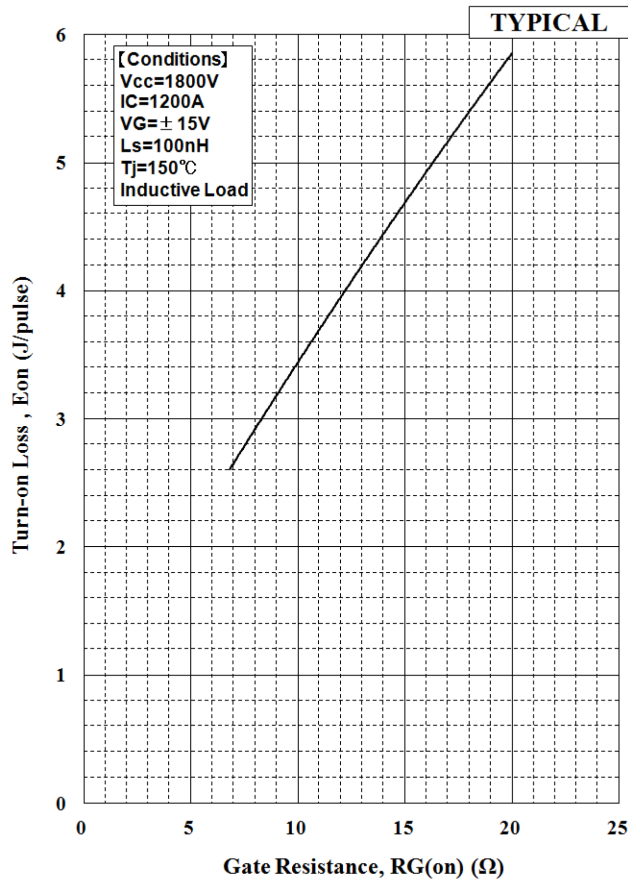
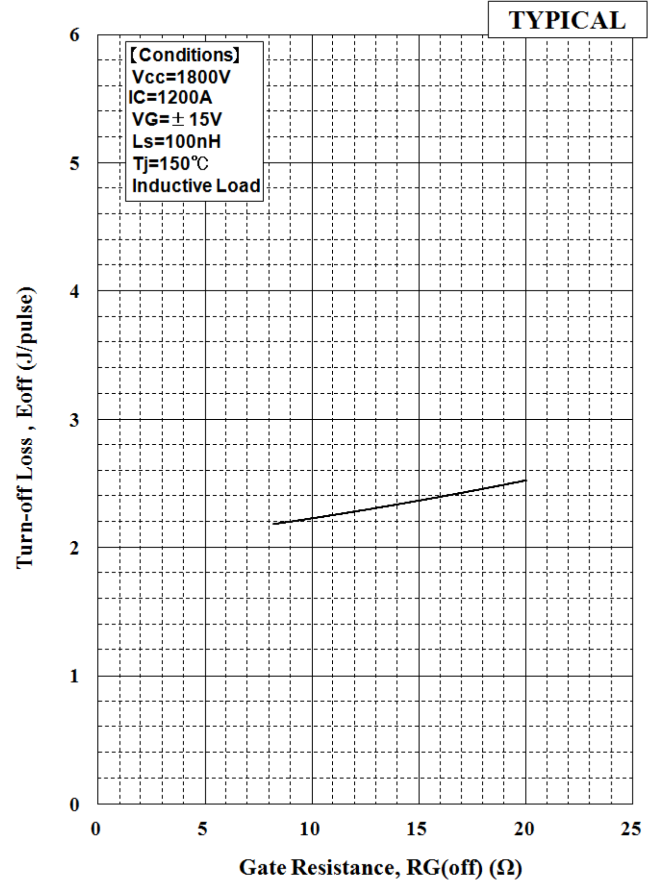
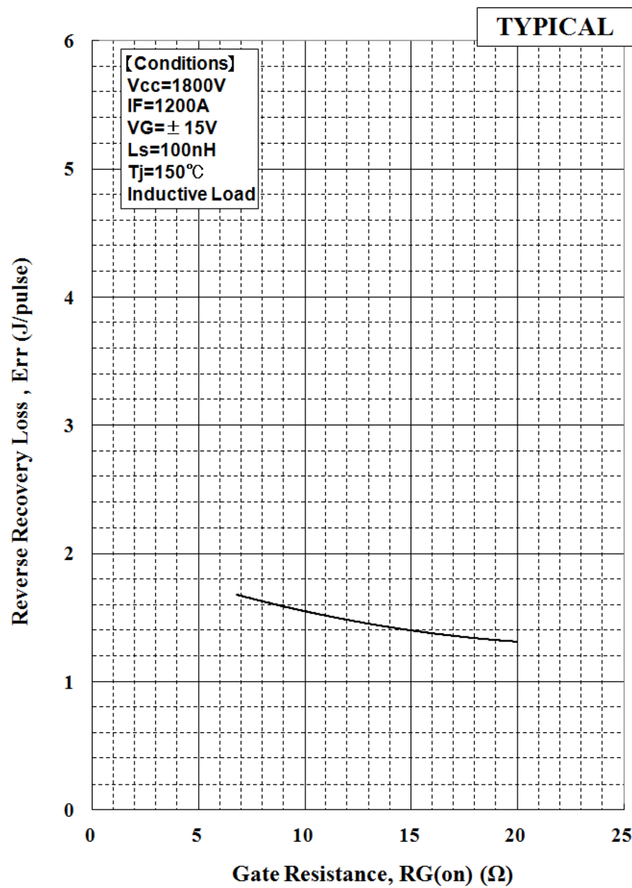


Turn-on Loss vs.Gate Resistance





Recovery Loss vs.Gate Resistance

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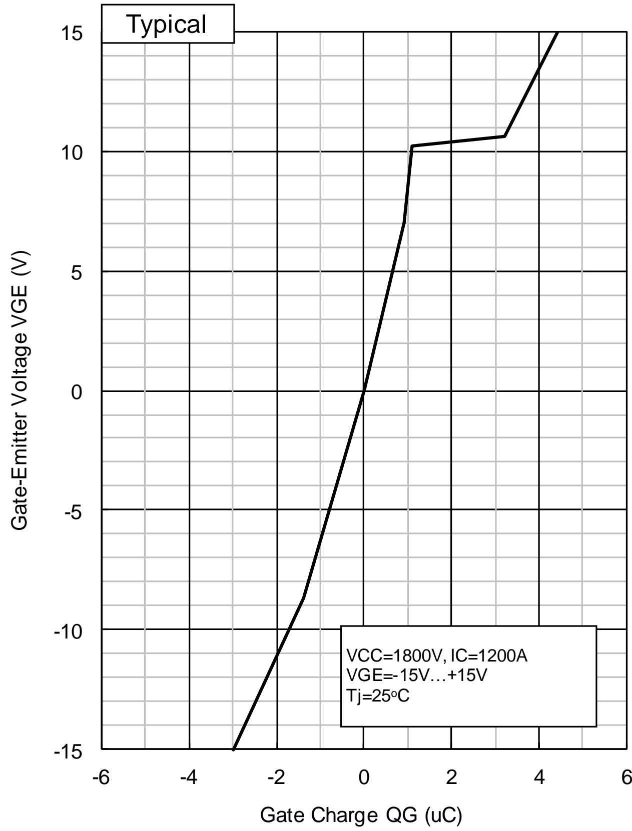
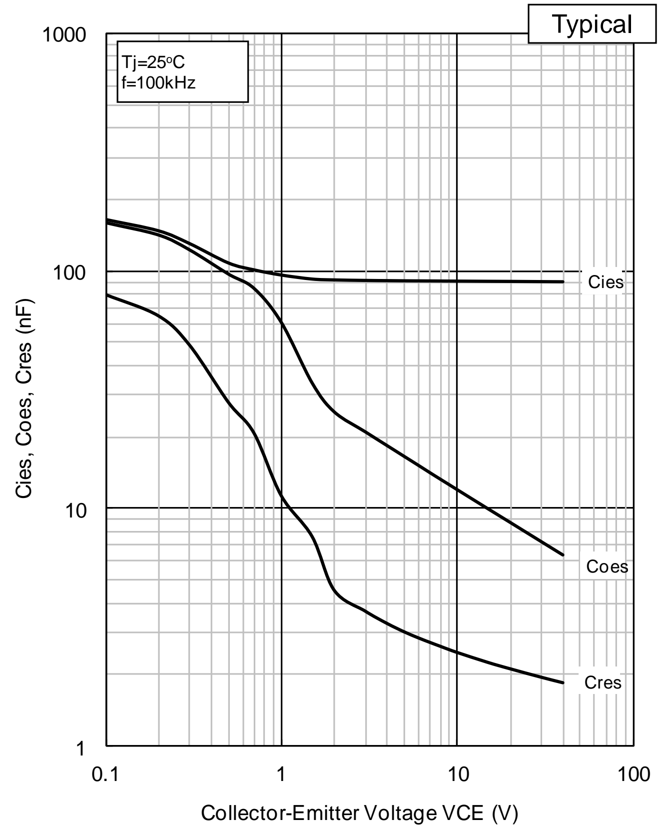
QG-VG CURVE



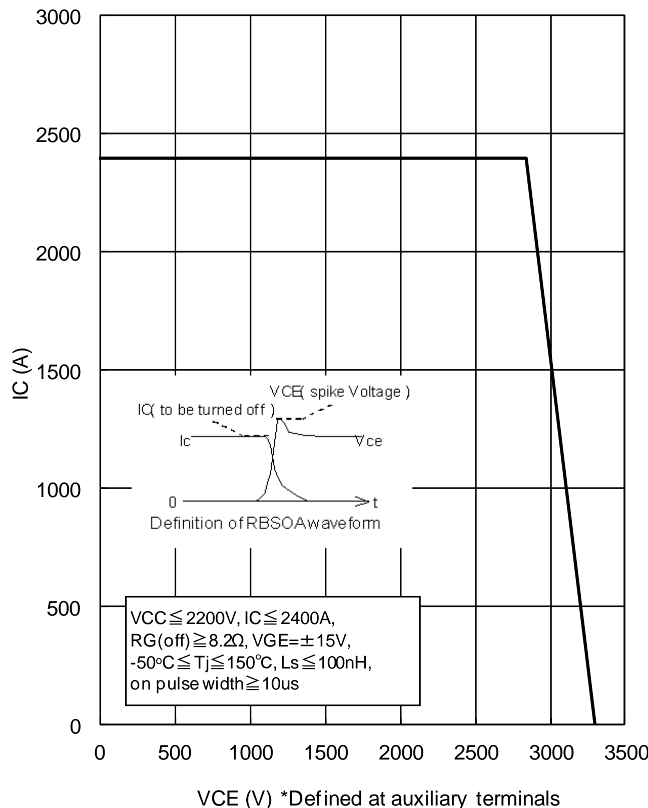
QG - VGE

Cies,Coes,Cres Curve

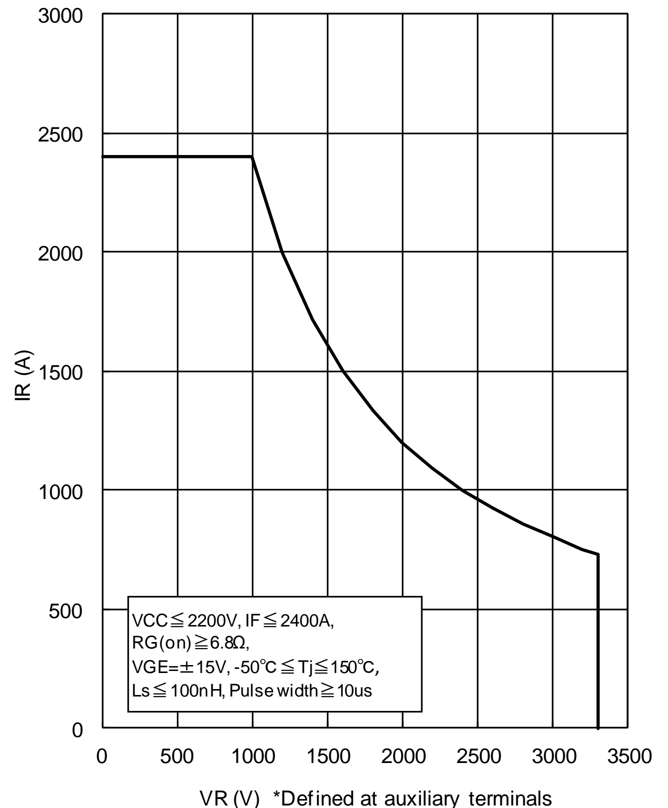


Cies, Coes, Cres - VCE

Safe Operating Area



RBSOA



RecSOA

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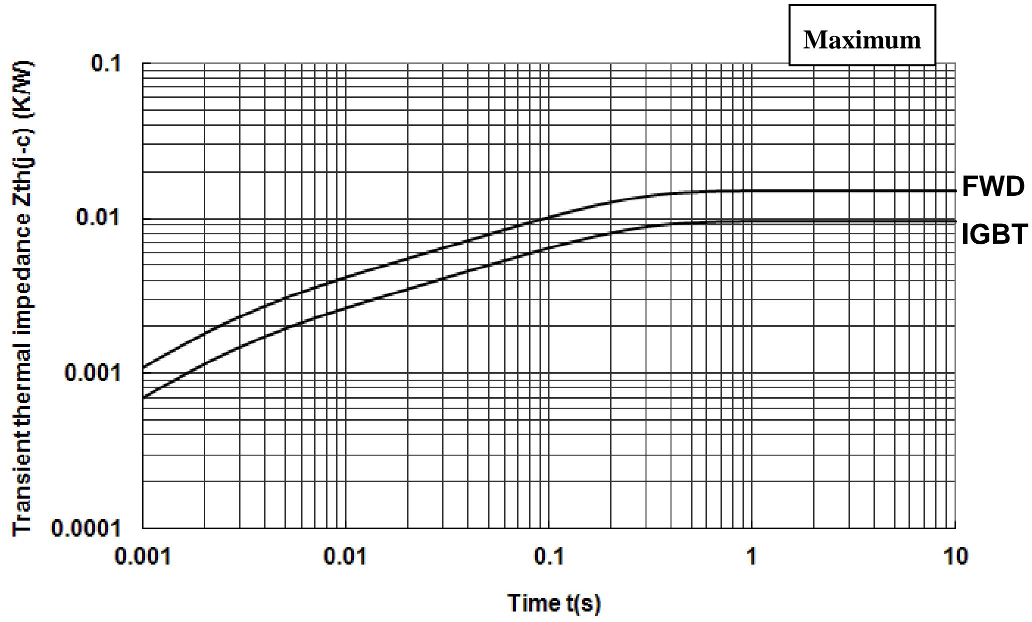
TRANSIENT THERMAL IMPEDANCE



Transient Thermal Impedance Curve

Curve approximation model

Zth = Σ rth[n]*(1-exp(-t/τth[n]))

n	1	2	3	4	Unit
τ th[n]	1.28E-01	1.56E-02	2.69E-03	3.16E-04	sec
rth[n,IGBT]	6.47E-03	2.18E-03	1.28E-03	7.04E-05	K/W
rth[n,Diode]	1.10E-02	3.78E-03	2.13E-03	1.24E-04	K/W

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OUTLINE DRAWINGS

Unit in mm

Weight: 870g

Fig.1 Outline Drawings

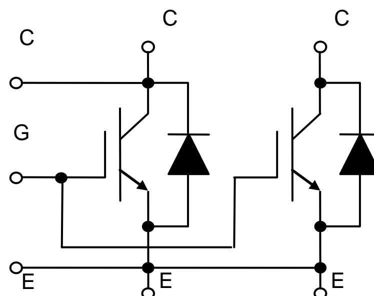

Fig.2 Circuit diagram

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HITACHI POWER SEMICONDUCTORS

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