MBN2400E17F

Target Specification

Silicon N-channel IGBT 1700V F version

FEATURES

* Soft switching behavior & low conduction loss:
  Soft low-injection punch-through with trench gate IGBT.
* Low driving power:
  Low input capacitance advanced trench gate.
* Ultra soft fast recovery diode.

ABSOLUTE MAXIMUM RATINGS (Tc=25°C)

Item		Symbol	Unit	MBN2400E17F
Collector Emitter Voltage		V_{CES}	V	1,700
Gate Emitter Voltage		V_{GES}	V	±20
Collector Current	DC	I_C	A	2,400
	1ms	I_{Cp}		4,800
Forward Current	DC	I_F	A	2,400
	1ms	I_{FM}		4,800
Junction Temperature		$T_{j\,op}$	°C	-40 ~ +150
Storage Temperature		T_{stg}	°C	-40 ~ +125
Isolation Voltage		V_{ISO}	V_{RMS}	4,000(AC 1 minute)
Screw Torque	Terminals (M4/M8)	-	N·m	2/15 (1)
	Mounting (M6)	-		6 (2)

Notes: (1) Recommended Value $1.8\pm0.2/15^{+0}_{-3}$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	-	3	50	V_{CE}=1,700V, V_{GE}=0V, Tj=125°C
				-	30	-	V_{CE}=1,700V, 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		$V_{CE(sat)}$	V	TBD	2.0	TBD	I_C=2,400A, V_{GE}=15V, Tj=25°C
				-	2.4	-	I_C=2,400A, V_{GE}=15V, Tj=150°C
Gate Emitter Threshold Voltage		$V_{GE(TO)}$	V	4.1	5.5	7.1	V_{CE}=10V, I_C=240mA, Tj=25°C
Input Capacitance		C_{ies}	nF	-	130	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Internal Gate Resistance		Rge	Ω	-	1.8	-	V_{CE}=10V, V_{GE}=0V, f=100kHz, Tj=25°C
Switching Times	Rise Time	t_r	µs	TBD	0.7	TBD	V_{CC}=900V, Ic=2,400A Ls=55nH (3) R_G(on/off)=2.7/2.7Ω (3) V_{GE}=±15V, Tj=150°C
	Turn On Time	t_{on}		TBD	1.55	TBD	
	Fall Time	t_f		TBD	1.4	TBD	
	Turn Off Time	t_{off}		TBD	3.2	TBD	
Peak Forward Voltage Drop		V_{FM}	V	TBD	1.8	TBD	IF=2,400A, V_{GE}=0V, Tj=25°C
				-	2.25	-	IF=2,400A, V_{GE}=0V, Tj=150°C
Reverse Recovery Time		t_{rr}	µs	TBD	0.65	-	V_{CC}=900V, Ic=2,400A Ls=55nH (3) R_G(on/off)= 2.7/2.7Ω (3) V_{GE}=±15V, Tj=150°C
Turn On Loss		$E_{on(10\%)}$	J/P	-	0.90	-	
		$E_{on(full)}$	J/P	TBD	1.20	TBD	
Turn Off Loss		$E_{off(10\%)}$	J/P	-	1.60	-	
		$E_{off(full)}$	J/P	TBD	1.90	TBD	
Reverse Recovery Loss		$E_{rr(10\%)}$	J/P	-	0.90	-	
		$E_{rr(full)}$	J/P	TBD	1.10	TBD	
Stray inductance in module		L_{SCE}	nH	-	12	-	
Thermal Impedance	IGBT	Rth(j-c)	K/W	-	-	0.010	Junction to case
	FWD	Rth(j-c)		-	-	0.015	
Contact Thermal Impedance		Rth(c-f)	K/W	-	0.005	-	Case to fin (λgrease=1W/(m·K), heat-sink flatness ≤50um)

Notes:(3) Ls 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.

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Target Specification

DEFINITION OF TEST CIRCUIT

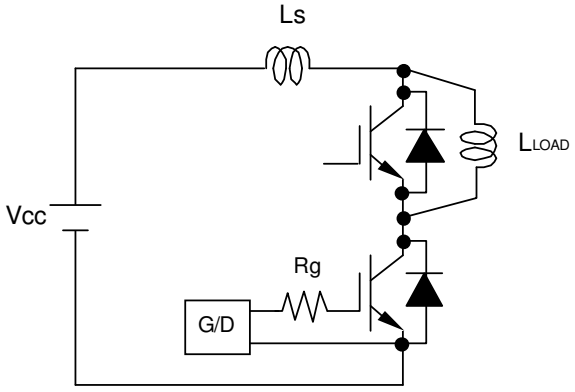
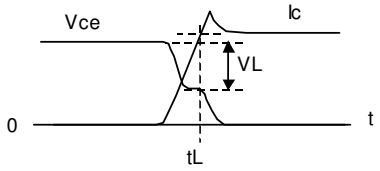
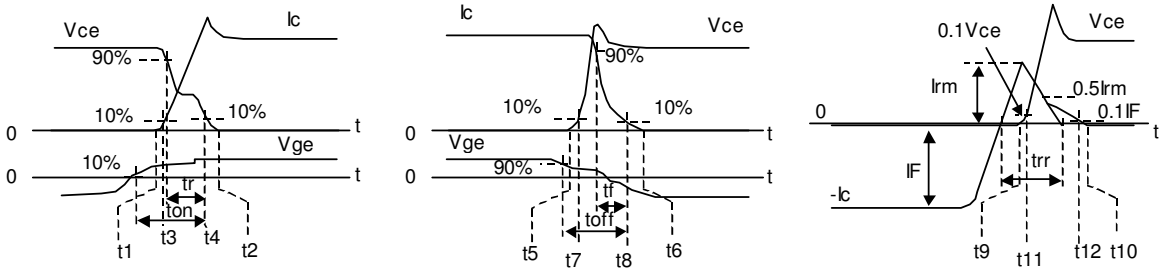


Fig.1 Switching test circuit



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

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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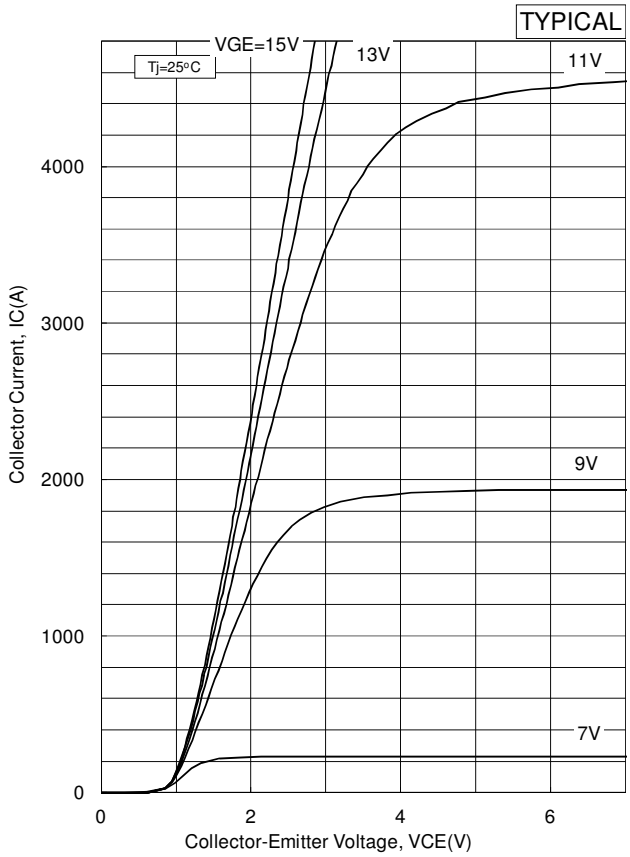
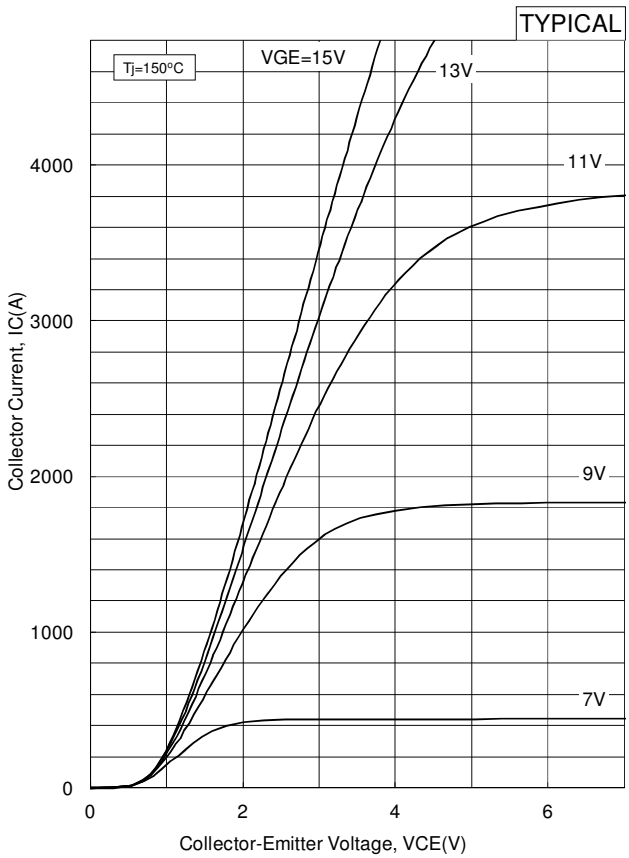
Target Specification

CHARACTERISTICS CURVE

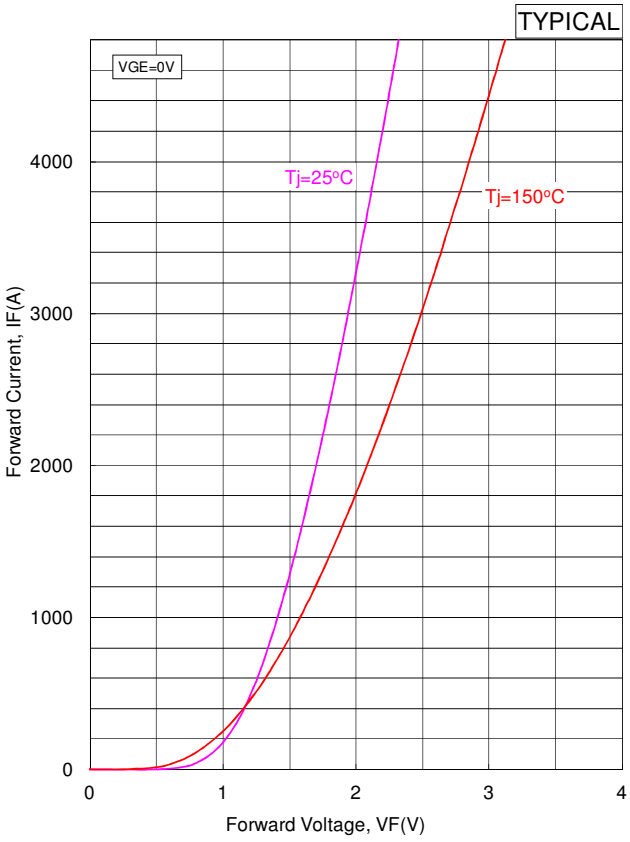
STATIC CHARACTERISTICS



Collecter Current vs. Collector to Emitter Voltage



Collecter Current vs. Collector to Emitter Voltage



Forward Voltage of free-wheeling diode

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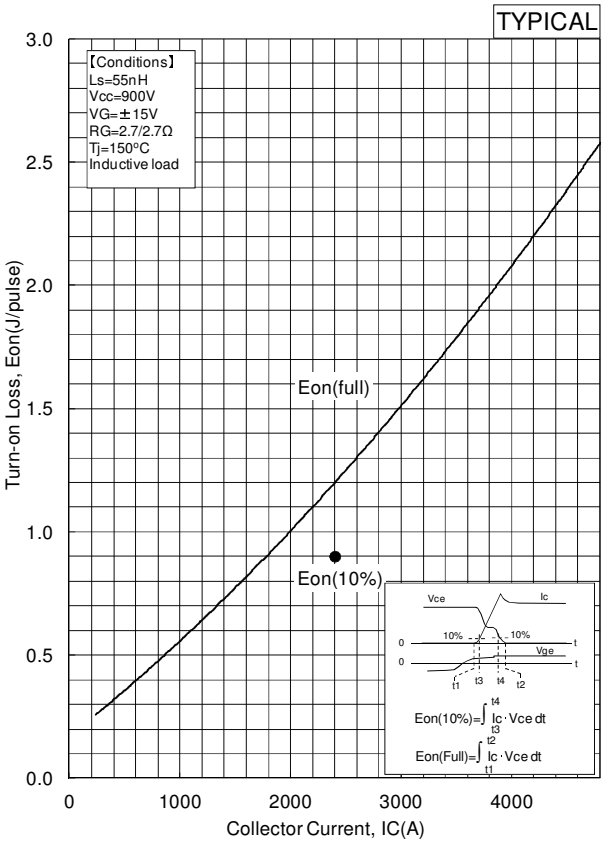
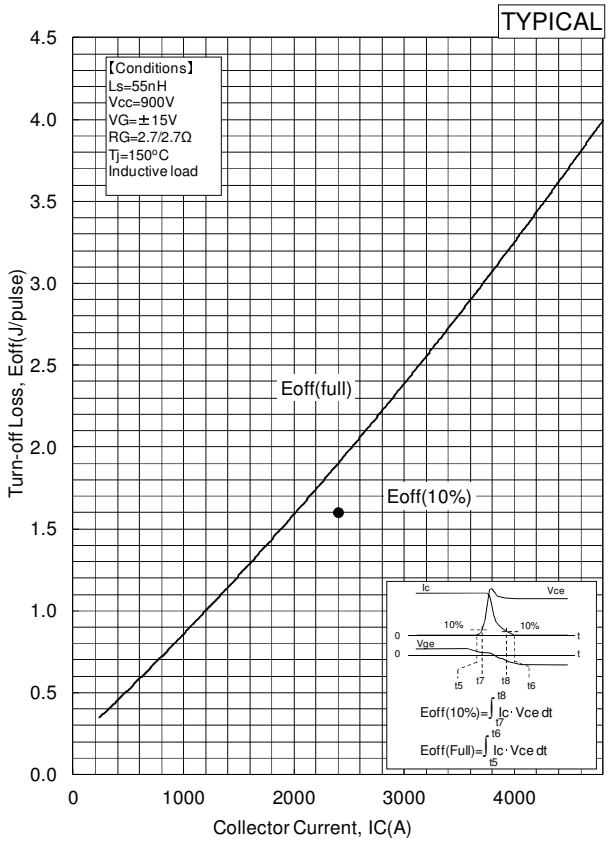
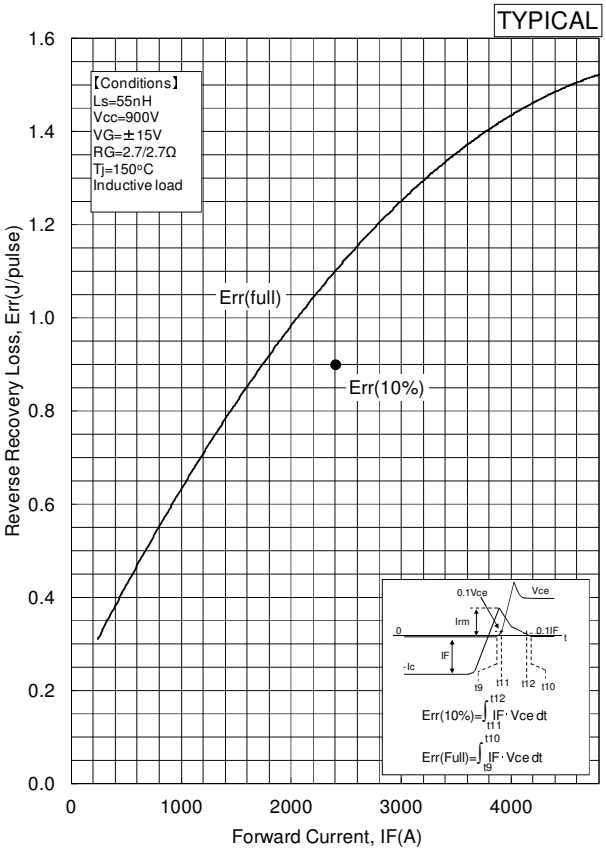
DYNAMIC CHARACTERISTICS



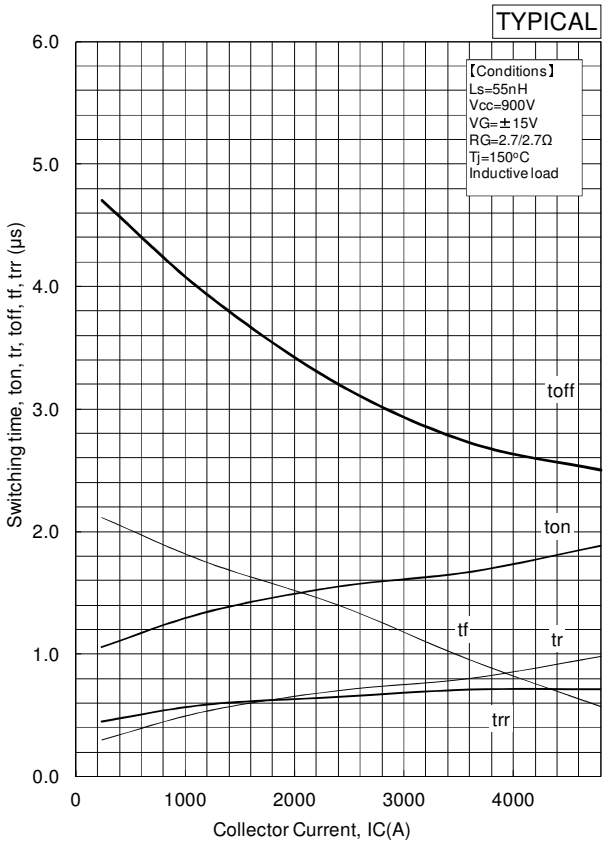
Turn-on Loss vs. Collector Current



Turn-off Loss vs. Collector Current



Recovery Loss vs. Forward Current



Switching time vs. Collector current

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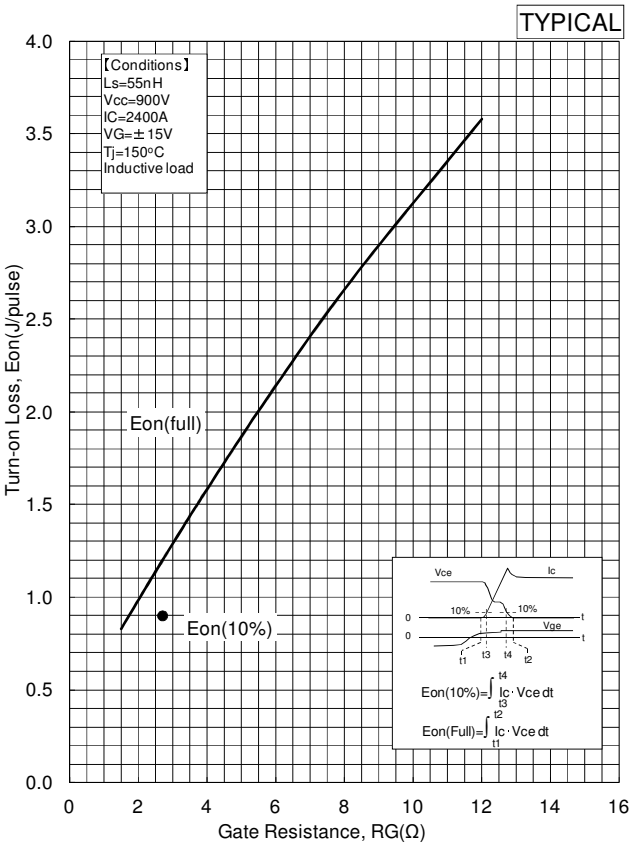
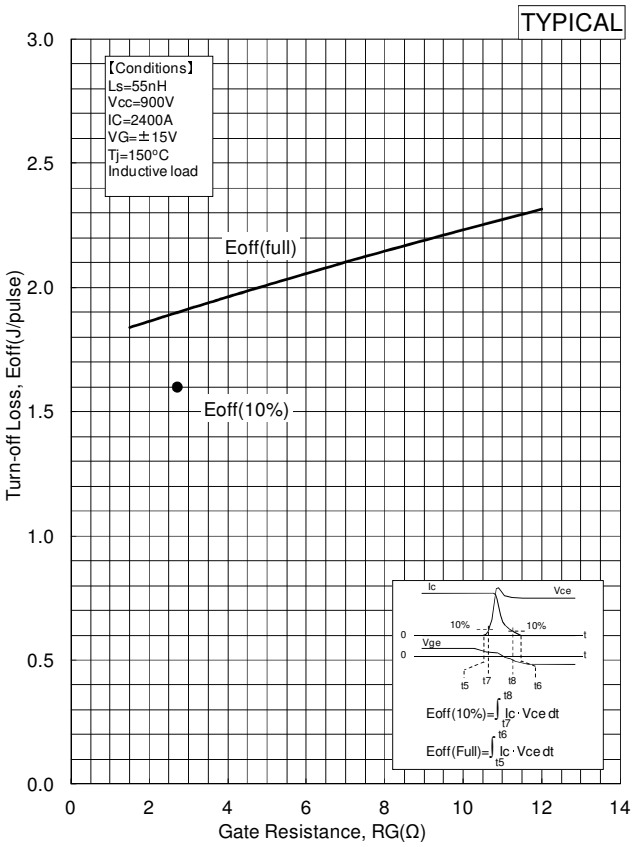
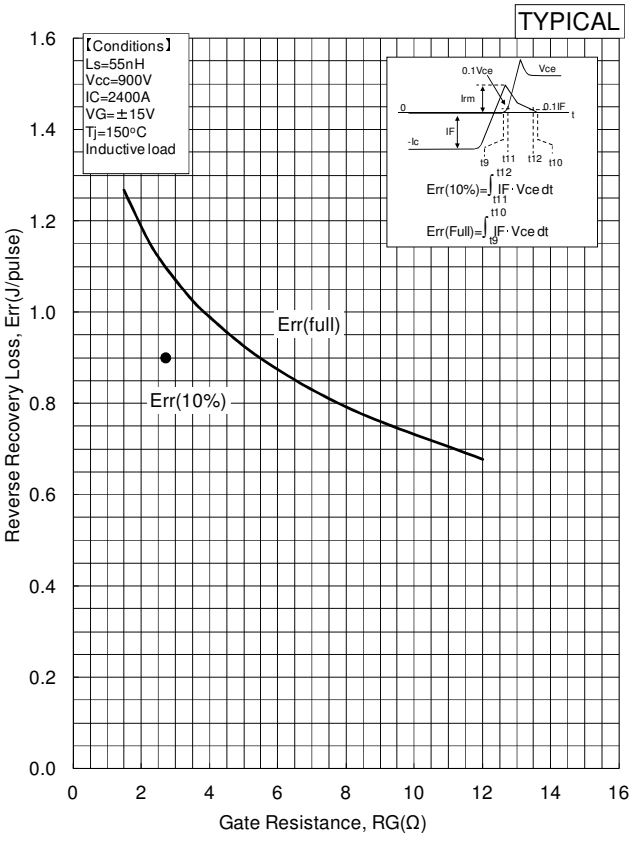
Target Specification



Turn-on Loss vs. Gate Resistance



Turn-off Loss vs. Gate Resistance



Recovery Loss vs. Gate Resistance

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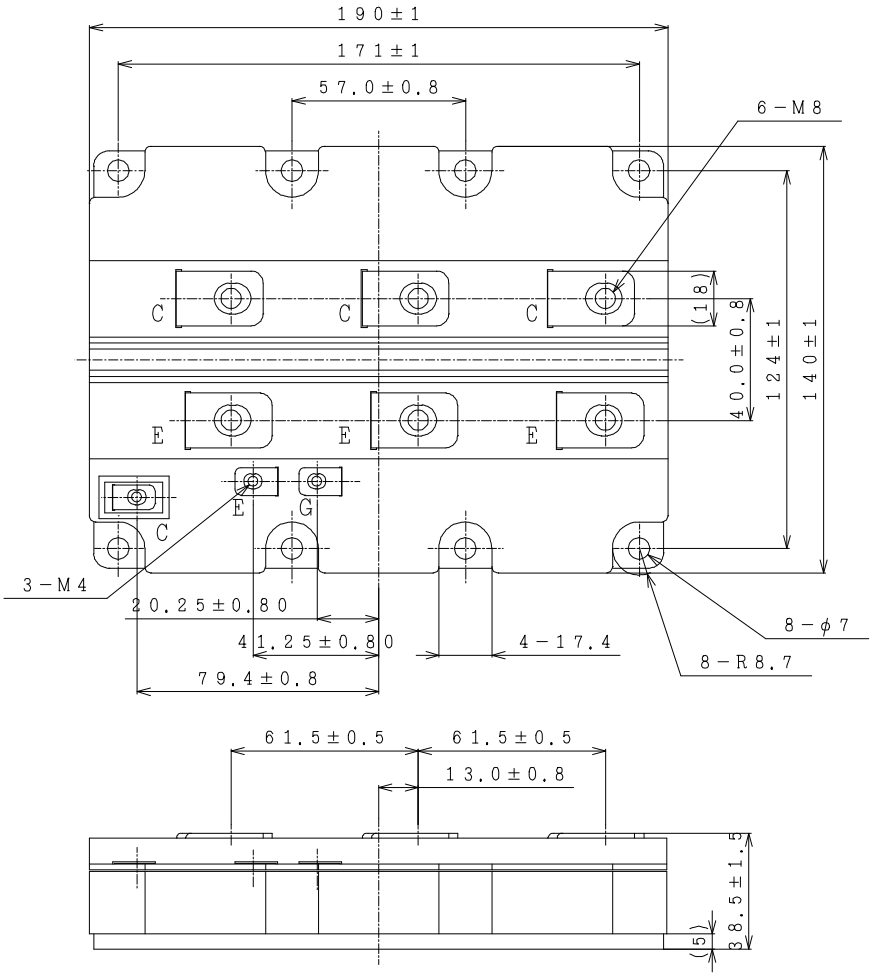
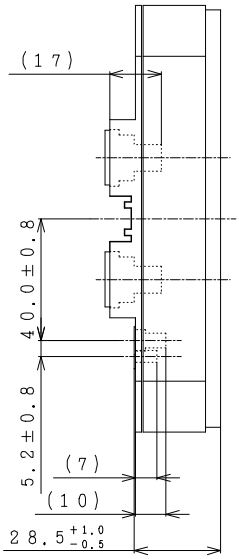
Target Specification

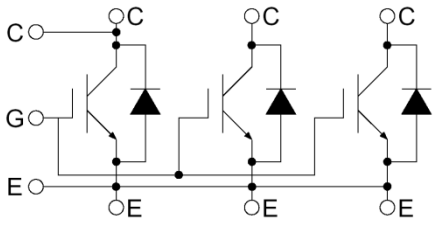
Outline Drawing

Unit in mm





Weight: 1300g



Circuit Diagram

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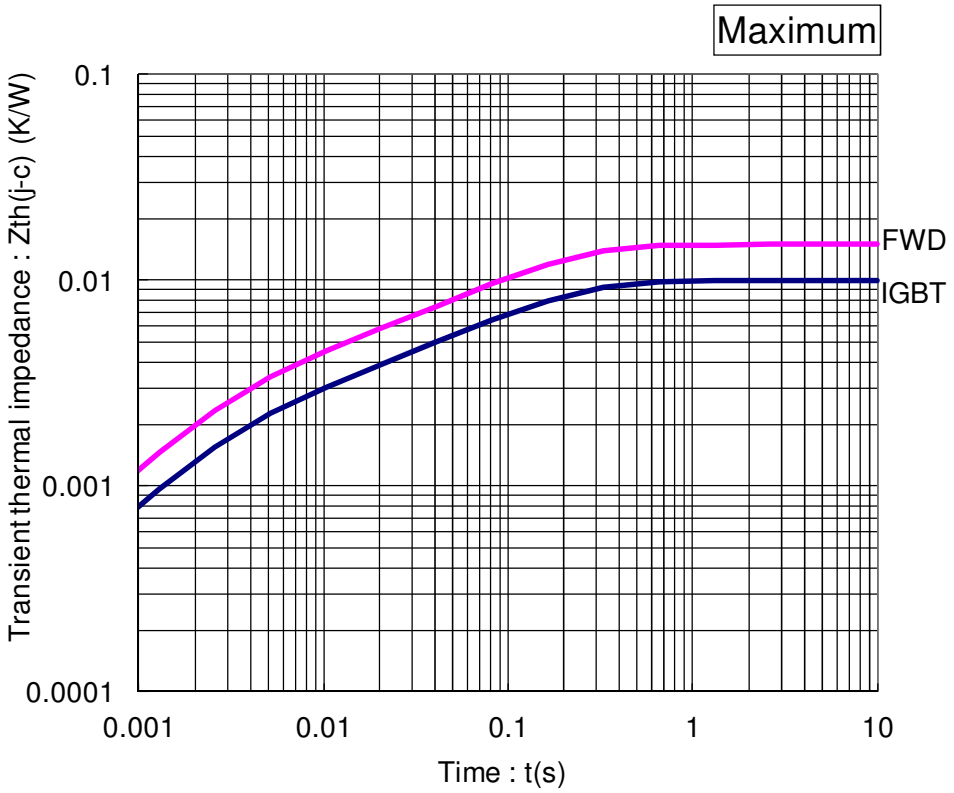
Target Specification

TRANSIENT THERMAL IMPEDANCE



Transient Thermal Impedance Curve

Curve approximation model

(ΣZth[n]*(1-exp(-t/τth[n])))

n	1	2	3	4	5	6	7	Unit
τth[n]	0.30	0.10	0.03	0.01	0.003	0.001	0.0003	sec
Zth[n,IGBT]	1.625E-03	5.328E-03	1.284E-04	1.218E-03	1.323E-03	3.071E-04	6.996E-05	K/W
Zth[n,Diode]	2.400E-03	8.082E-03	1.077E-04	1.881E-03	1.953E-03	4.723E-04	1.047E-04	K/W

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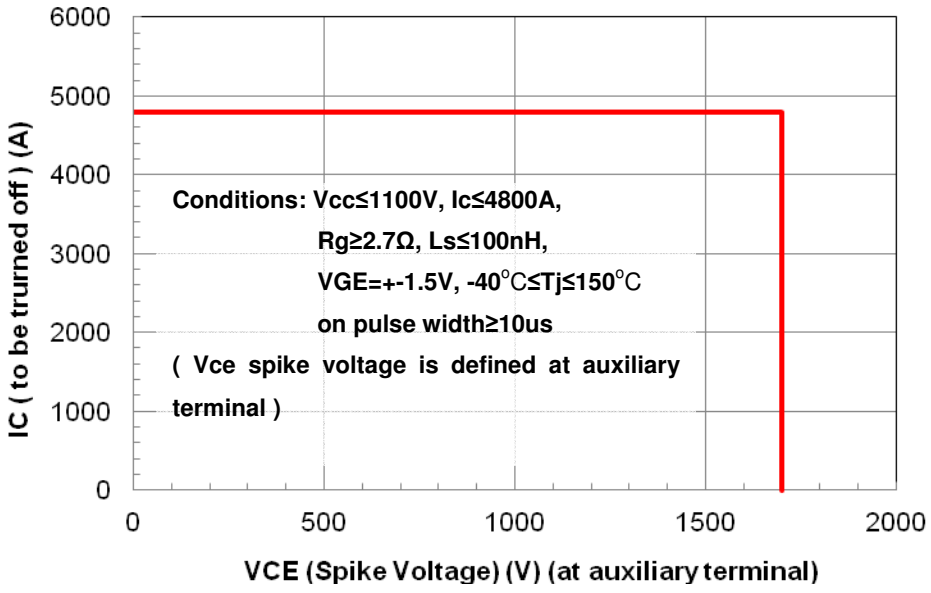
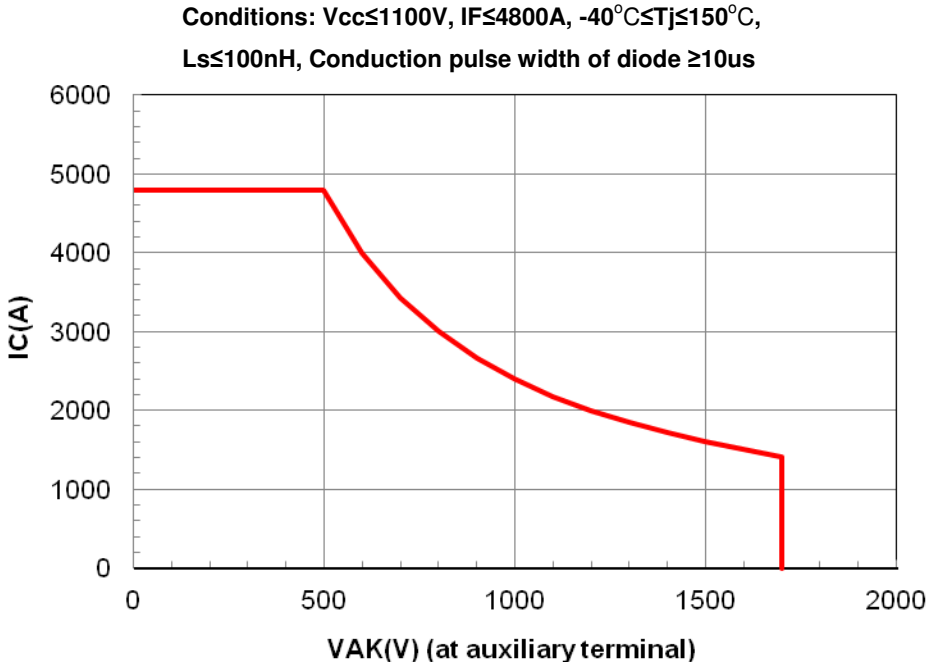
Target Specification

RBSOA



Reverse bias safe operation area (RBSOA)

Recovery SOA



Recovery SOA

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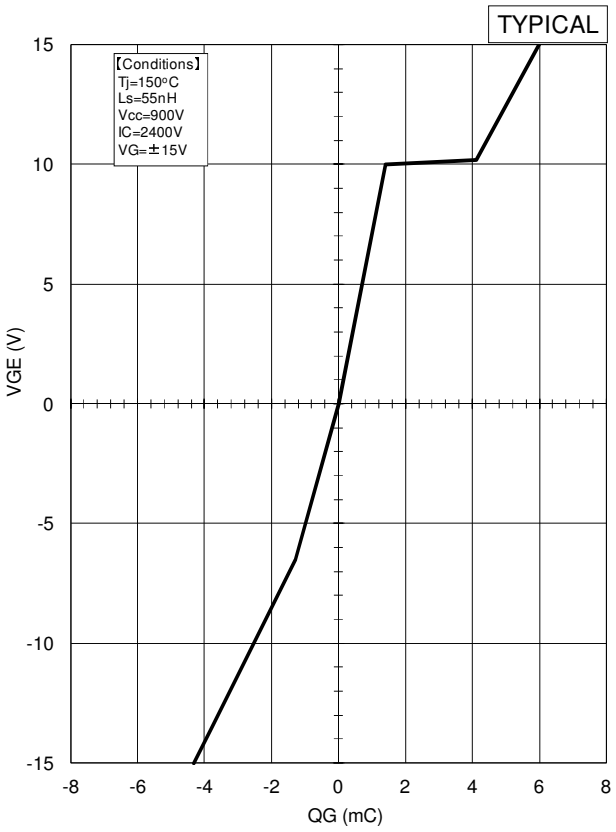
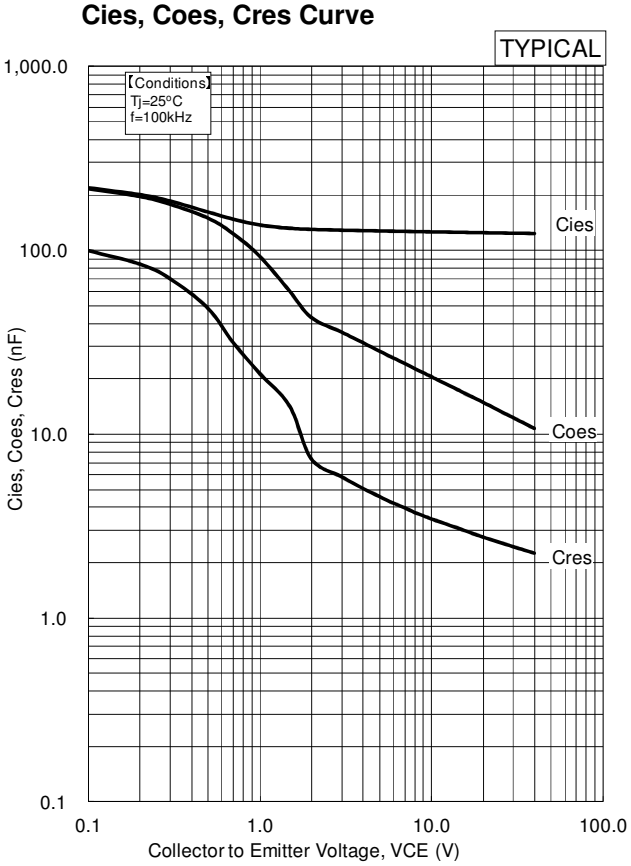
Qg-Vg curve



QG-VGE curve

Cies, Coes, Cres Curve



Capacitance vs. Collector to Emitter Voltage

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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Target Specification

HITACHI POWER SEMICONDUCTORS

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