

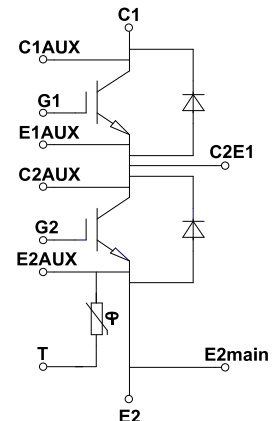
MBM600FS33G2

Silicon N-channel IGBT 3300V G2 version

FEATURES

- * Low power dissipation by side-gate HiGT
- * Low noise & easy drive through low Cies and Cres
- * High current density & half-bridge nHPD² module
- * Low stray inductance & low Rth(j-c)
- * Built in temperature sensor
- * Scalable large current easily handled by paralleling
- * Equipped with current sensing terminals

HiGT : High-conductivity IGBT
nHPD² : next High Power Density Dual



Circuit diagram

ABSOLUTE MAXIMUM RATINGS (T_C=25°C)

Item	Symbol	Unit	MBM600FS33G2
Collector Emitter Voltage	V _{CES}	V	3,300
Gate Emitter Voltage	V _{GES}	V	±20
Collector Current	DC	I _C	600
	1ms	I _{CRM}	1,200
Forward Current	DC	I _F	600
	1ms	I _{FRM}	1,200
Junction Temperature	T _{vj op}	°C	-50 ~ +150
Storage Temperature	T _{stg}	°C	-40 ~ +125
Isolation Voltage	V _{ISO}	V _{RMS}	6,000(AC 1 minute)
Screw Torque	Terminals (M3/M8)	-	0.8/15
	Mounting (M6)	-	6.0 (1)

Notes: (1) 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	-	-	0.40	V _{CE} =3,300V, V _{GE} =0V, T _{vj} =25°C
			-	15	50	V _{CE} =3,300V, V _{GE} =0V, T _{vj} =150°C
Gate Emitter Leakage Current	I _{GES}	nA	-500	-	+500	V _{GE} =±20V, V _{CE} =0V, T _{vj} =25°C
Collector Emitter Saturation Voltage	V _{CE(sat)}	V	-	2.2	-	I _C =600A, V _{GE} =15V, T _{vj} =25°C
			2.3	2.8	3.3	I _C =600A, V _{GE} =15V, T _{vj} =150°C
Gate Emitter Threshold Voltage	V _{GE(th)}	V	5.5	6.5	7.5	V _{CE} =10V, I _C =600mA, T _{vj} =25°C
Input Capacitance	C _{ies}	nF	-	46	-	V _{CE} =10V, V _{GE} =0V, f=100kHz, T _{vj} =25°C
Internal Gate Resistance	R _{G(int)}	Ω	-	11.0	-	V _{CE} =10V, V _{GE} =0V, f=100kHz, T _{vj} =25°C
Turn On Delay Time	t _{d(on)}	μs	-	0.95	-	V _{CC} =1,800V, I _C =600A
Rise Time	t _r		-	0.15	-	L _S =40nH (2)
Turn Off Delay Time	t _{d(off)}		-	1.25	-	R _{G(on/off)} =1.8/5.6Ω (2)
Fall Time	t _f		-	1.25	-	V _{GE} =±15V, T _{vj} =150°C
Forward Voltage Drop	V _F	V	-	2.55	-	I _F =600A, V _{GE} =0V, T _{vj} =25°C
			2.25	2.75	3.25	I _F =600A, V _{GE} =0V, T _{vj} =150°C
Reverse Recovery Time	t _{rr}	μs	-	1.25	-	V _{CC} =1,800V, I _C =600A
Turn On Loss	E _{on}	J/P	-	0.73	-	L _S =40nH (2)
Turn Off Loss	E _{off}	J/P	-	0.78	-	R _{G(on/off)} =1.8/5.6Ω (2)
Reverse Recovery Loss	E _{rr}	J/P	-	0.66	-	V _{GE} =±15V, T _{vj} =150°C
Short Circuit Pulse Width	t _{sc}	μs	10	-	-	V _{CC} =2,200V, L _S =40nH R _{G(on/off)} =1.8/56Ω, V _{GE} =±15V, T _{vj} =150°C
Stray inductance module	L _{SCCE}	nH	-	9	-	Collector Main to Emitter Main
NTC-Thermistor	Resistance	R ₂₅	-	5	-	T _C =25°C
	B-constant	B(25/50)	-	3375	-	Between 25°C and 50°C
di/dt detecting terminal inductance	Upper	L _{E1(int)-AC(int)}	nH	-	3.6	-
	Lower	L _{E2(int)-E2}	nH	-	3.2	-
Thermal Impedance	IGBT	R _{th(j-c)}	K/W	-	-	0.029
	FWD	R _{th(j-c)}	K/W	-	-	0.038
Contact Thermal Impedance	R _{th(c-f)}	K/W	-	0.02	-	Case to fin (per 1 arm)

Notes:(2) L_S 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.

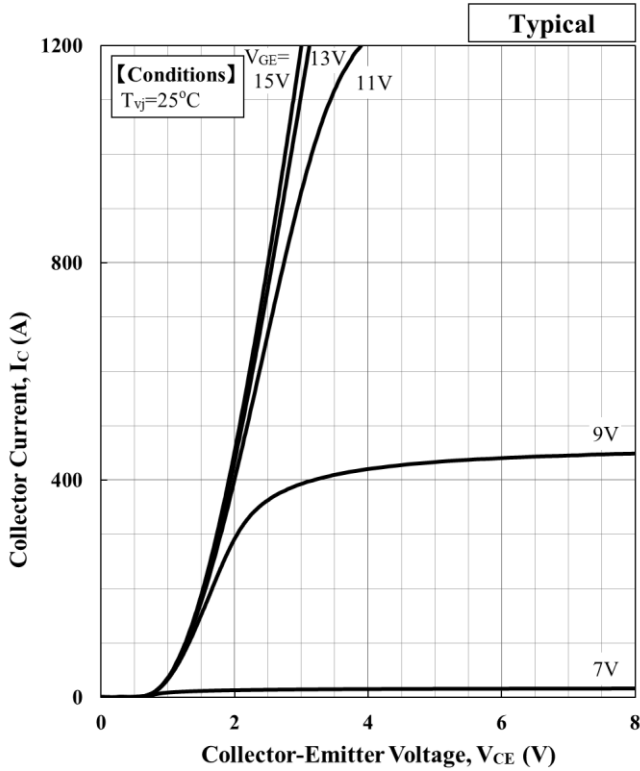
* Please contact our representatives at order.

* For improvement, specifications are subject to change without notice.

* For actual application, please confirm this spec sheet is the newest revision.

* ELECTRICAL CHARACTERISTIC items shown in above table are according to IEC 60747-2 and IEC 60747-9.

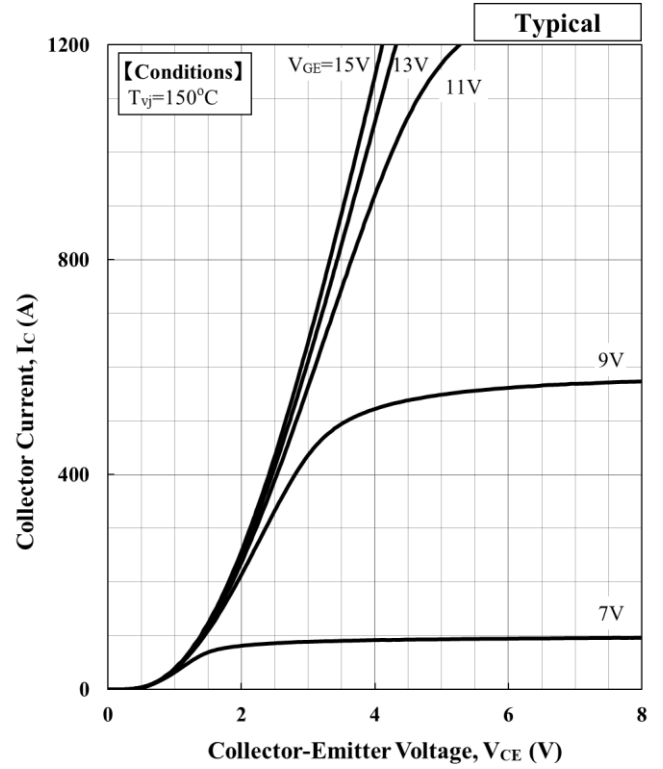
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$$V_{CE}(sat)[V] = a_3 \cdot |I_c|^3 + a_2 \cdot |I_c|^2 + a_1 \cdot |I_c| + a_0$$

Temp.[°C]	V _{GE} [V]	a ₃	a ₂	a ₁	a ₀
25	15	6.59E-10	-2.04E-06	3.22E-03	9.09E-01

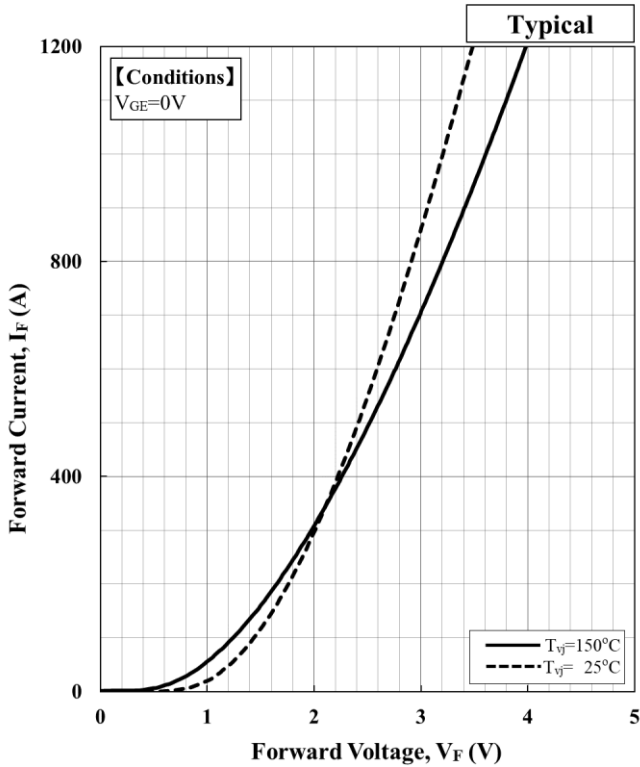
Collector Current vs. Collector Emitter Voltage



$$V_{CE}(sat)[V] = a_3 \cdot |I_c|^3 + a_2 \cdot |I_c|^2 + a_1 \cdot |I_c| + a_0$$

Temp.[°C]	V _{GE} [V]	a ₃	a ₂	a ₁	a ₀
150	15	9.78E-10	-3.08E-06	4.97E-03	8.51E-01

Collector Current vs. Collector Emitter Voltage

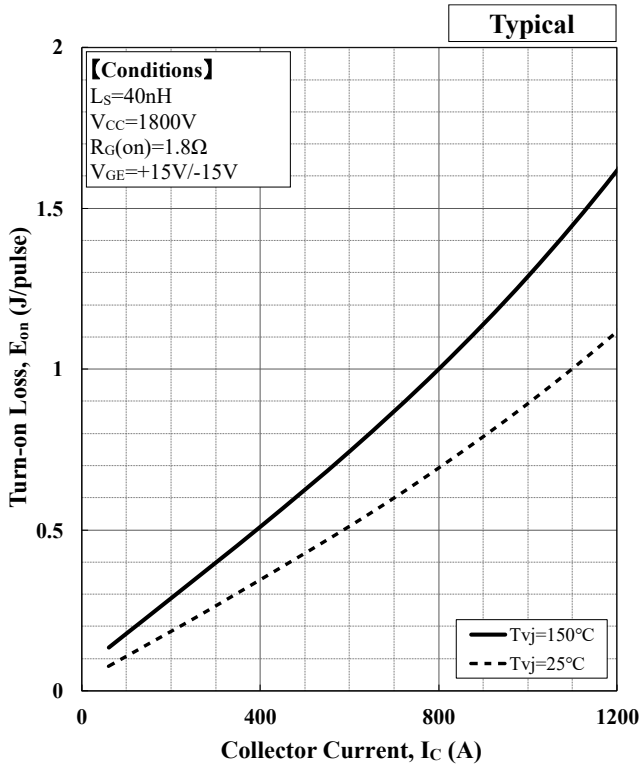


$$V_F[V] = a_3 \cdot |I_F|^3 + a_2 \cdot |I_F|^2 + a_1 \cdot |I_F| + a_0$$

Temp.[°C]	a ₃	a ₂	a ₁	a ₀
25	9.63E-10	-2.85E-06	4.09E-03	9.90E-01
150	8.84E-10	-2.83E-06	4.80E-03	7.42E-01

Forward Voltage of free-wheeling diode

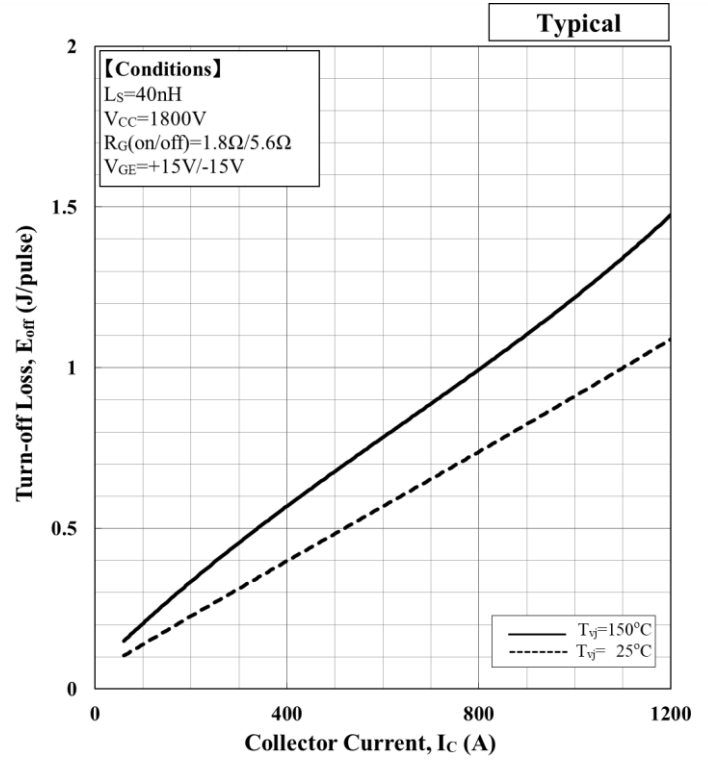
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$$E [J] = a_3 \cdot |I_c|^3 + a_2 \cdot |I_c|^2 + a_1 \cdot |I_c| + a_0$$

Temp.[°C]	a_3	a_2	a_1	a_0
25	1.05E-10	-1.78E-08	7.74E-04	3.05E-02
150	2.08E-10	-9.89E-08	1.11E-03	6.78E-02

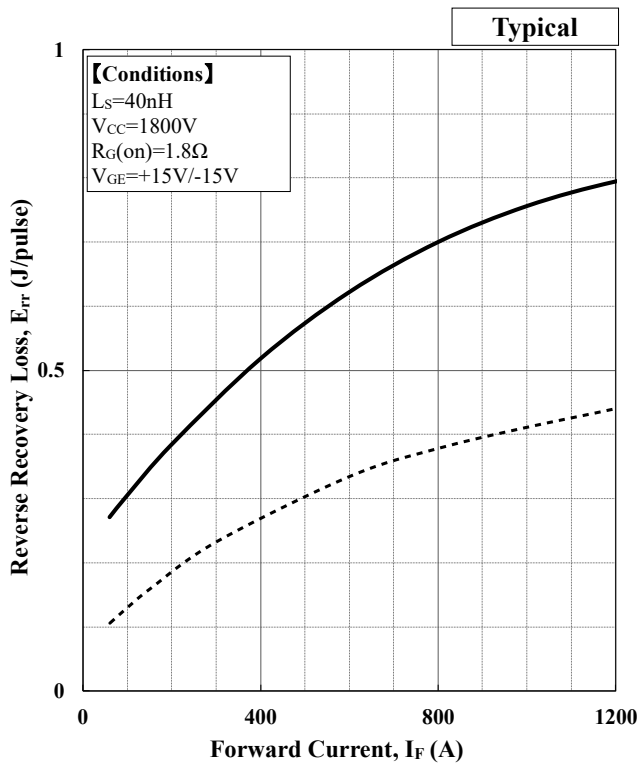
Turn-on loss vs. Collector current



$$E [J] = a_3 \cdot |I_c|^3 + a_2 \cdot |I_c|^2 + a_1 \cdot |I_c| + a_0$$

Temp.[°C]	a_3	a_2	a_1	a_0
25	4.60E-11	-7.86E-08	8.93E-04	5.07E-02
150	3.55E-10	-6.78E-07	1.48E-03	6.30E-02

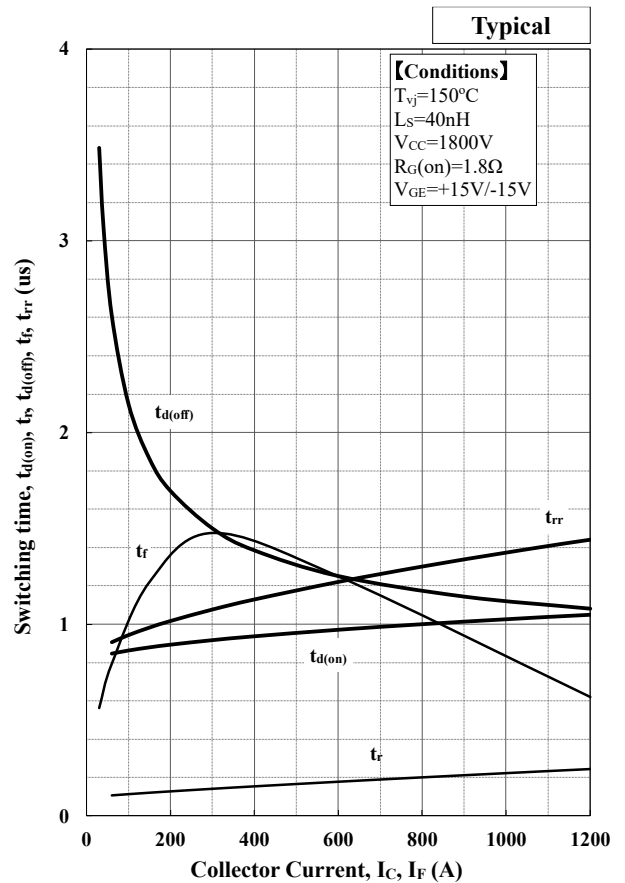
Turn-off loss vs. Collector current



$$E [J] = a_3 \cdot |I_F|^3 + a_2 \cdot |I_F|^2 + a_1 \cdot |I_F| + a_0$$

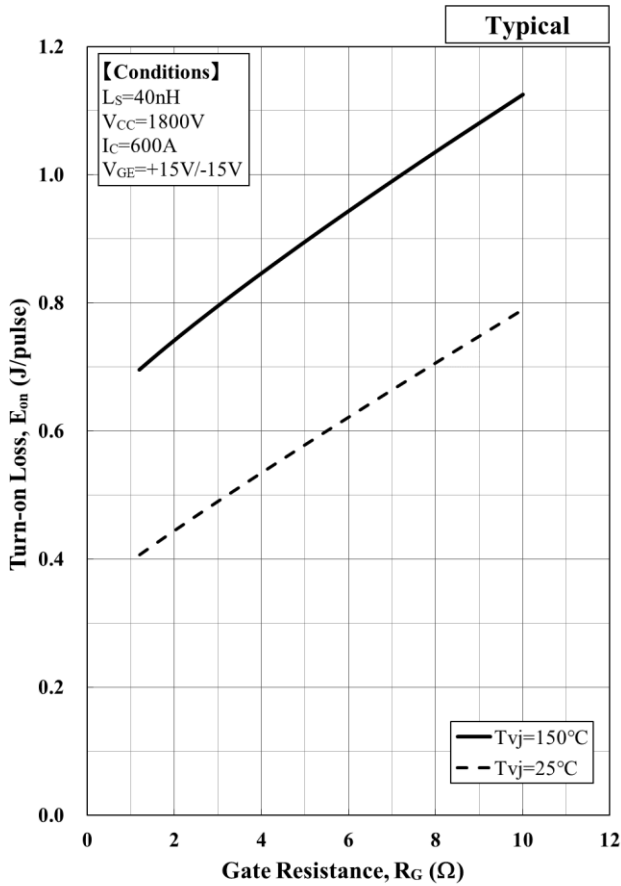
Temp.[°C]	a_3	a_2	a_1	a_0
25	1.48E-10	-4.92E-07	6.89E-04	6.59E-02
150	8.35E-11	-4.73E-07	9.29E-04	2.17E-01

Reverse Recovery loss vs. Forward current

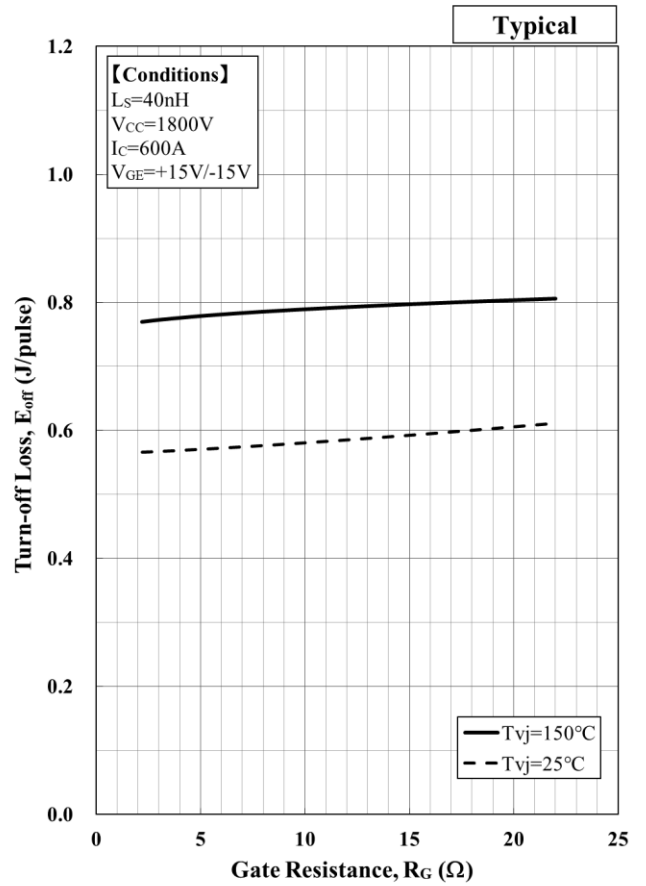


Switching time vs. Collector Current

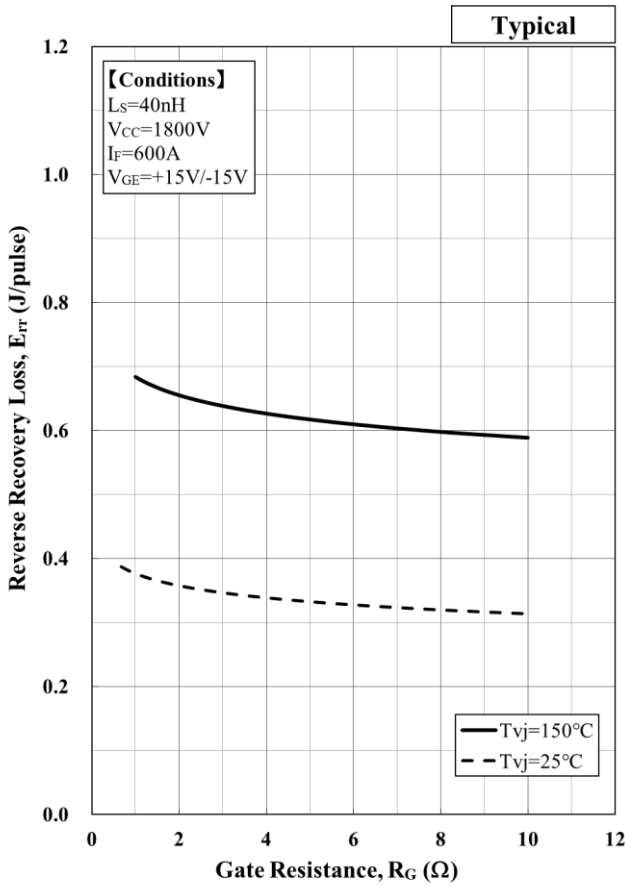
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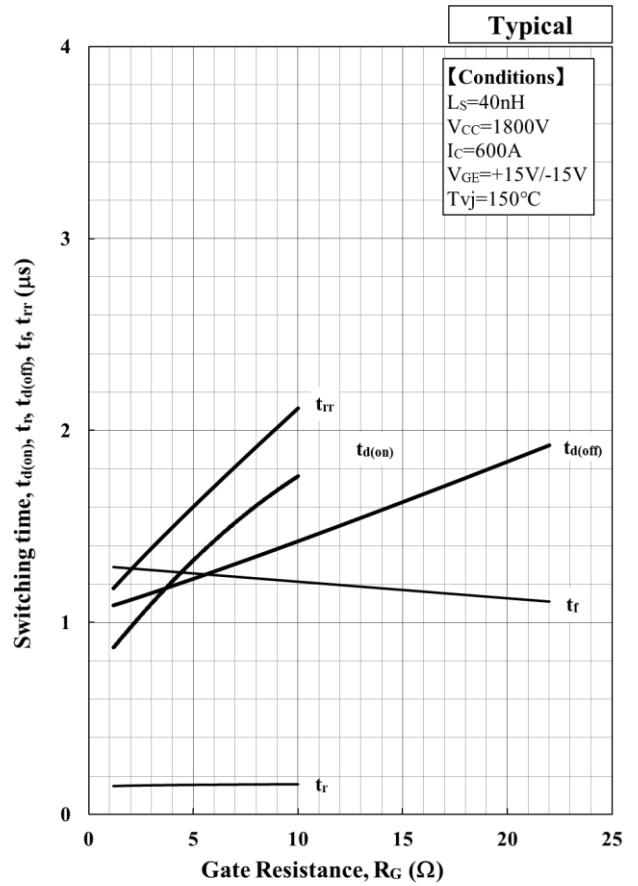
Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance

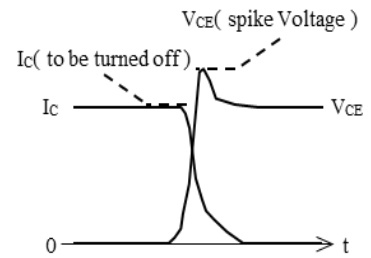
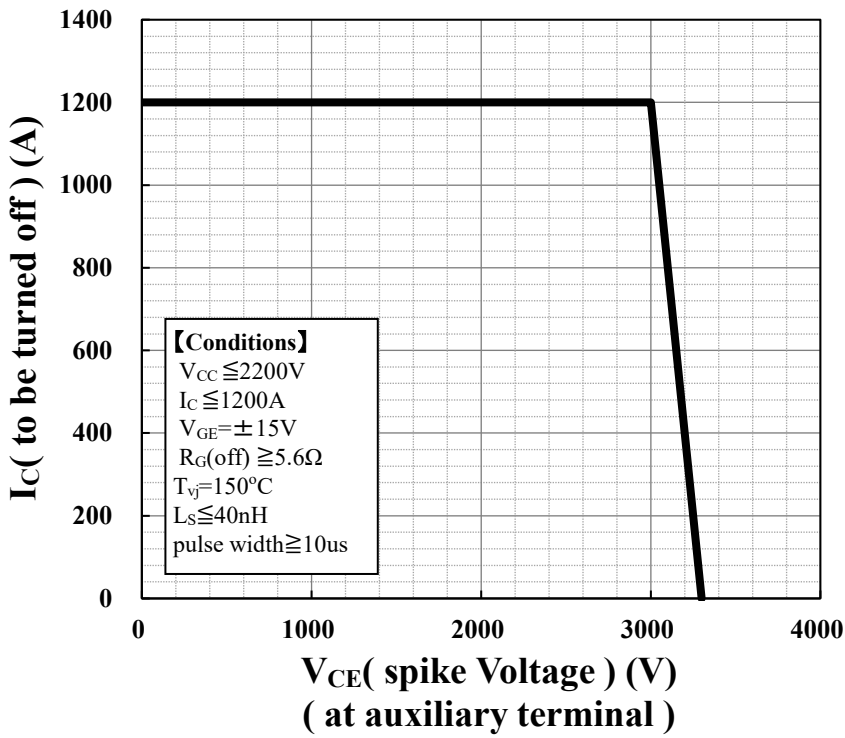


Recovery loss vs. Gate Resistance



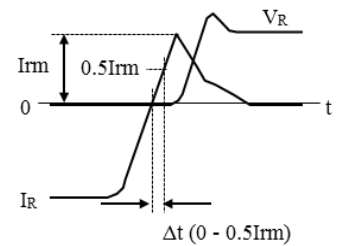
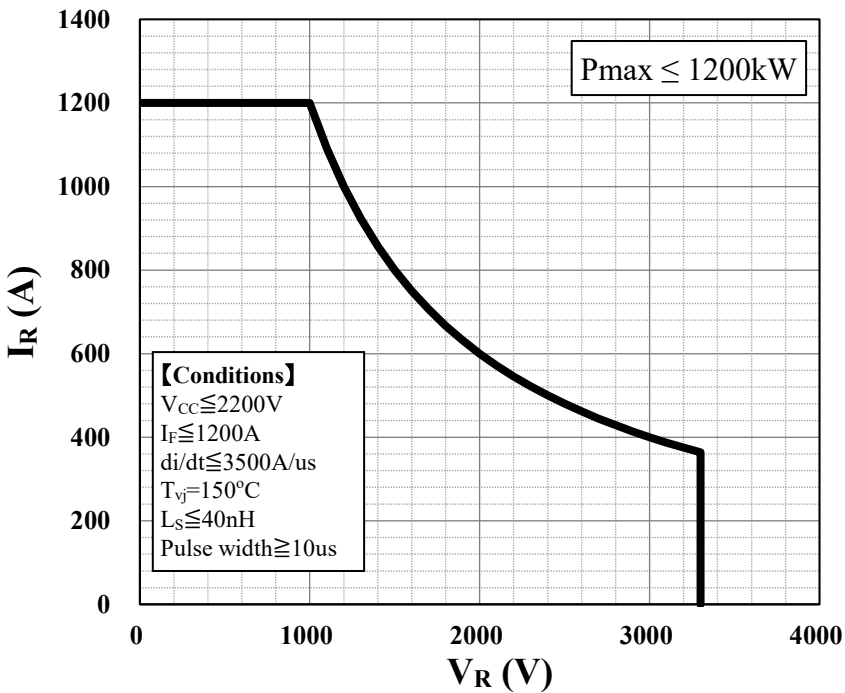
Switching time vs. Gate Resistance

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Definition of RBSOA waveform

Reverse Bias Safe Operation Area (RBSOA)

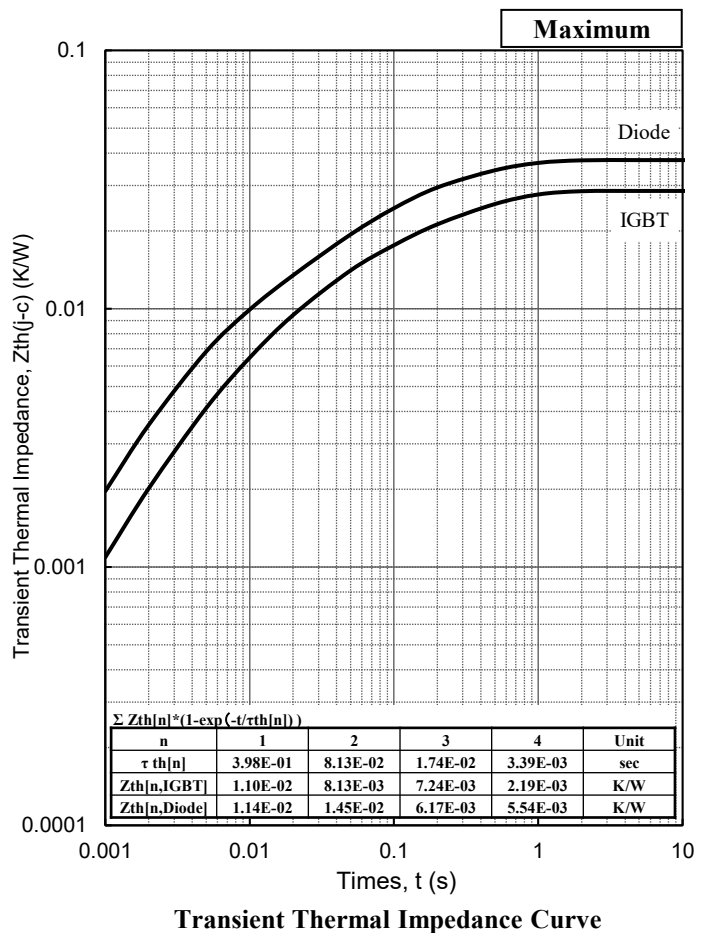
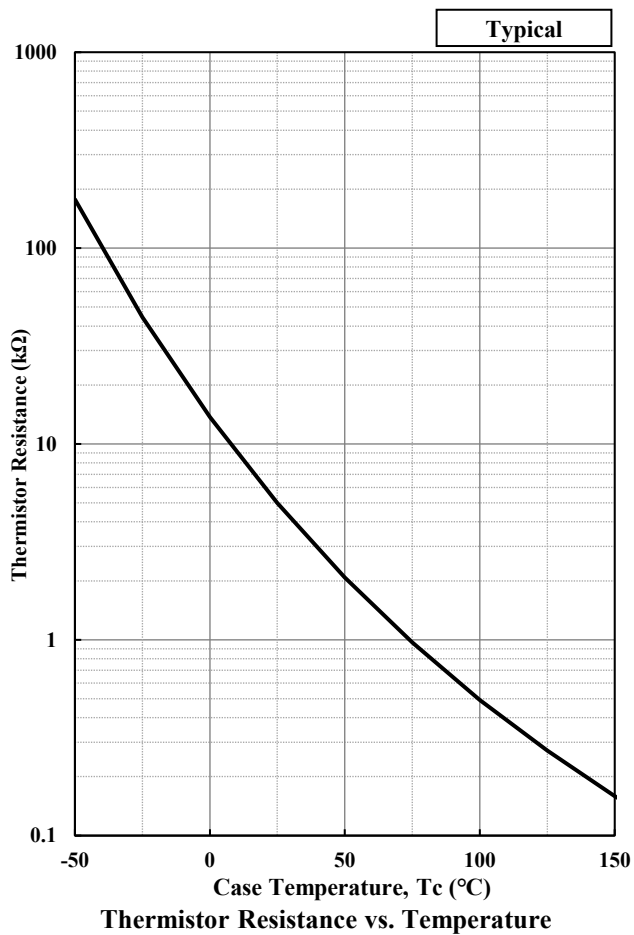
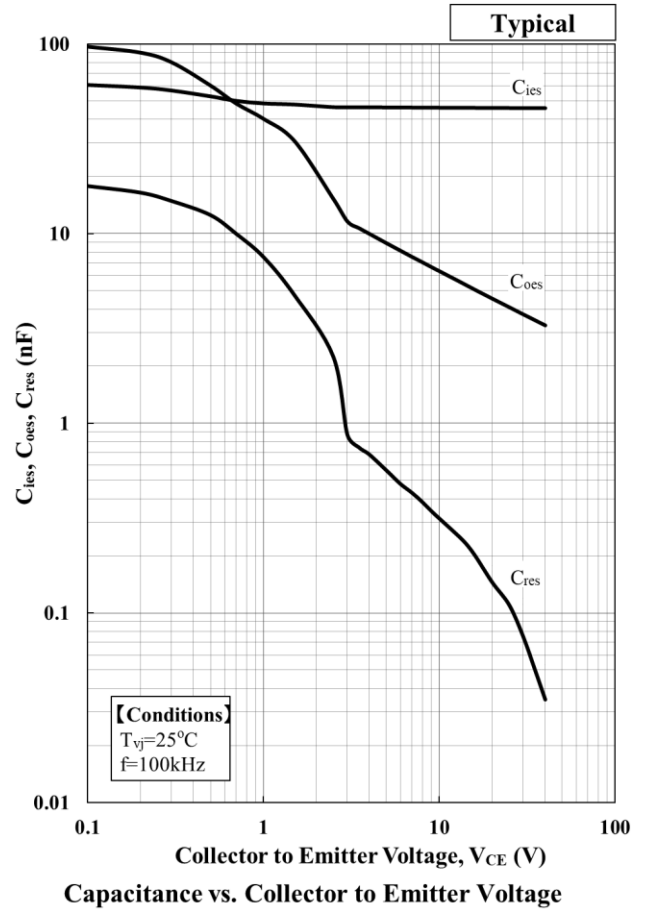
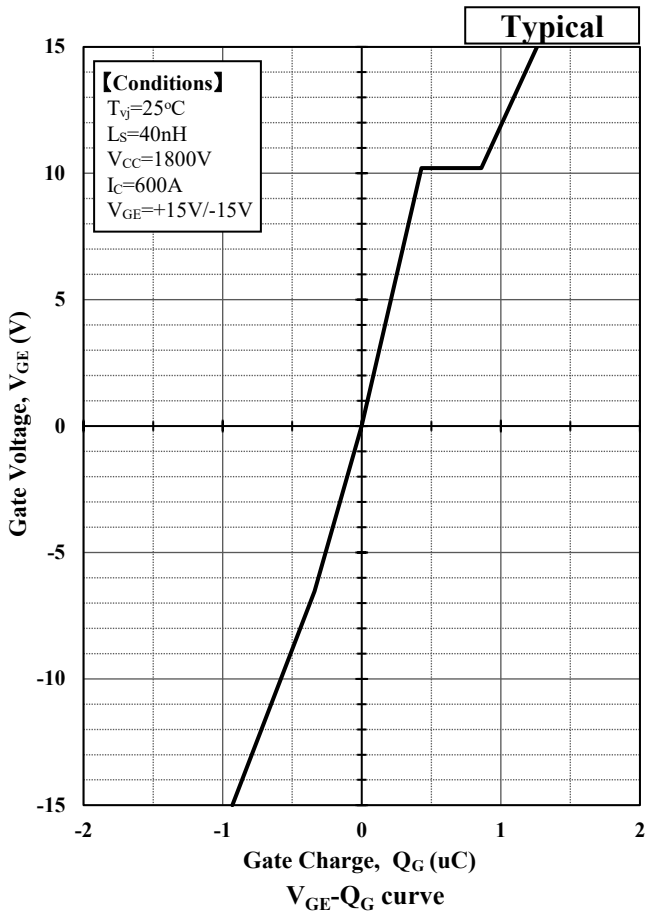


$$di/dt = \frac{0.5I_{rm}}{\Delta t}$$

Definition of Recovery di/dt

Reverse Recovery Safe Operation Area (RRSOA)

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