MSM600GS33ALT

SiC MOSFET 3300V

FEATURES

- Ultra low switching loss with SiC MOSFET
- High current density package
- Low stray inductance & low Rth(j-c)
- Half-bridge (2in1)
- Built in temperature sensor
- Scalable large current easily handled by paralleling
- Equipped with current sensing terminals
- Sintered copper bonding technology
- SBD-less SiC module

ABSOLUTE MAXIMUM RATINGS (T_C=25°C)

Item		Symbol	Unit	MSM600FS33ALT
Drain Source Voltage		V_{DSS}	V	3,300
Gate Source Voltage		V_{GSS}	V	+20/-15
Drain Current	DC	I_D	A	600
	1ms	I_{DM}		1,200
Source Current	DC	I_S	A	600
	1ms	I_{SM}		1,200
Junction Temperature		$T_{vj\ op}$	°C	-50 ~ +175
Storage Temperature		T_{stg}	°C	-55 ~ +150
Isolation Voltage		V_{ISO}	V_{RMS}	6,000(AC 1 minute)
Screw Torque	Terminals (M3/M8)	M	N·m	0.8/15
	Mounting (M6)	M		6.0 (1)

Notes: (1) Recommended Value 5.5±0.5N·m

ELECTRICAL CHARACTERISTICS

Item		Symbol	Unit	Min.	Typ.	Max.	Test Conditions
Drain Source Cut-Off Current		I_{DSS}	mA	-	-	0.05	V_{DS}=3,300V, V_{GS}=0V, T_{vj}=25°C
				-	-	1	V_{DS}=3,300V, V_{GS}=0V, T_{vj}=175°C
Gate Source Leakage Current		I_{GSS}	nA	-	-	+100	V_{GS}=20V, V_{DS}=0V, T_{vj}=25°C
				-100	-	-	V_{GS}=-15V, V_{DS}=0V, T_{vj}=25°C
Drain Source on-state Voltage		$V_{DS(on)}$	V	-	2.3	-	I_D=600A, V_{GS}=15V, T_{vj}=25°C
				-	4.2	4.78	I_D=600A, V_{GS}=15V, T_{vj}=175°C
Gate Source Threshold Voltage		$V_{GS(th)}$	V	TBD	3.0	TBD	V_{DS}=10V, I_D=600mA, T_{vj}=25°C
Input Capacitance		C_{iss}	nF	-	173	-	V_{DS}=10V, V_{GS}=0V, f=100kHz, T_{vj}=25°C
Internal Gate Resistance		$R_{G(int)}$	Ω	-	2.4	-	
Turn On Delay Time		$t_{d(on)}$	μs	-	1.3	-	V_{DD}=1,800V, I_D=600A L_S=40nH, $R_{G(ON/OFF)}$=1.5/2.2Ω (2) V_{GS}=+15/-10V, T_{vj}=175°C
Rise Time		t_r		-	0.37	-	
Turn Off Delay Time		$t_{d(off)}$		-	1.6	-	
Fall Time		t_f		-	0.25	-	
Source Drain Voltage		V_{SD}	V	-	1.7	-	I_S=600A, V_{GS}=15V, T_{vj}=25°C
				-	3.8	5	I_S=600A, V_{GS}=15V, T_{vj}=175°C
				-	8.2	-	I_S=600A, V_{GS}=-10V, T_{vj}=25°C
				-	6.4	-	I_S=600A, V_{GS}=-10V, T_{vj}=175°C
Reverse Recovery Time		t_{rr}	μs	-	0.75	-	V_{DD}=1,800V, I_S=600A, L_S=40nH, $R_{G(ON/OFF)}$=1.5/2.2Ω, T_{vj}=175°C
Turn On Loss		E_{on}	J/P	-	0.52	0.63	V_{DD}=1,800V, I_D=600A,
Turn Off Loss		E_{off}	J/P	-	0.23	0.3	L_S=40nH, $R_{G(ON/OFF)}$=1.5/2.2Ω (2)
Reverse Recovery Loss		E_{rr}	J/P	-	0.04	0.07	V_{GS}=+15V/-10V, T_{vj}=175°C
Stray inductance module		L_{SCE}	nH	-	10	-	Between D1(main) and S2(main)
NTC-Thermistor	Resistance	R_{25}	kΩ	-	5	-	Tc=25°C
	Deviation	ΔR/R	%	-5	-	5	Tc=25°C
	B-constant	$B_{(25/50)}$	K	-	3375	-	Between 25°C and 50°C
Thermal Impedance	MOS	$R_{th(j-c)}$	K/W	-	-	0.033	Junction to case
Contact Thermal Impedance		$R_{th(c-f)}$	K/W	-	0.02	-	Case to fin(par 1 arm)

Notes: (2) R_G value is a test condition value for evaluation, not recommended value.
Please determine the suitable R_G value by measuring switching behavior and checking results with the respective SOA.

* 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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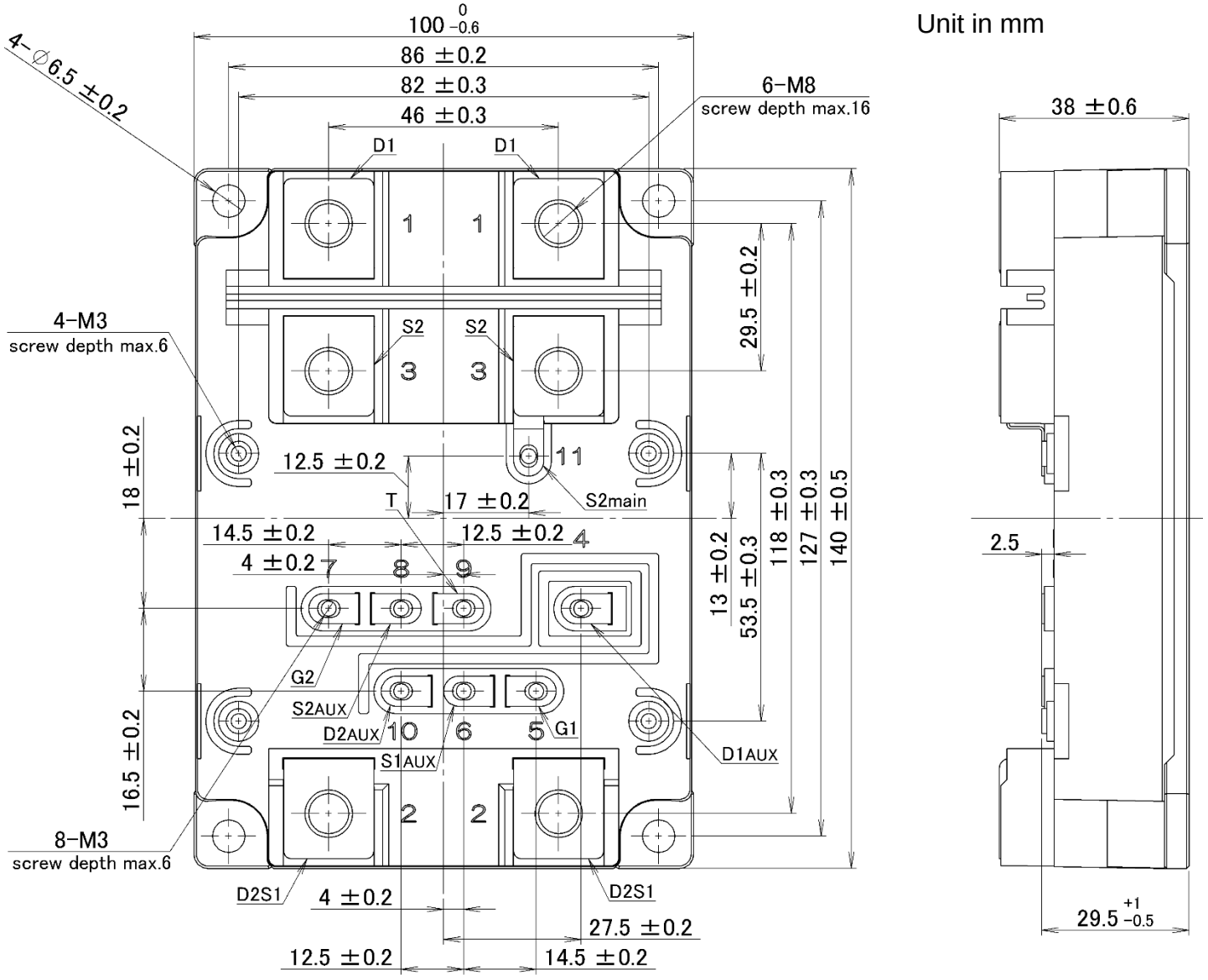
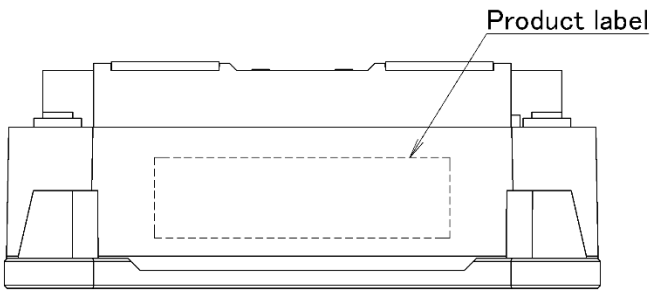
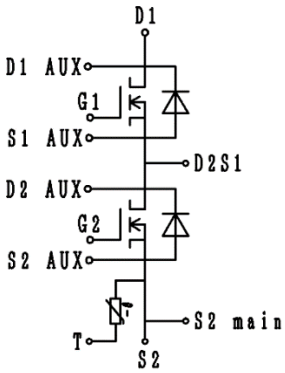
OUTLINE DRAWING

Unit in mm





1 : D1
2 : D2S1
3 : S2
4 : D1AUX
5 : G1
6 : S1AUX
7 : G2
8 : S2AUX
9 : T
10 : D2AUX
11 : S2main



Weight: 770(g)

Terminal Number **Circuit Diagram**

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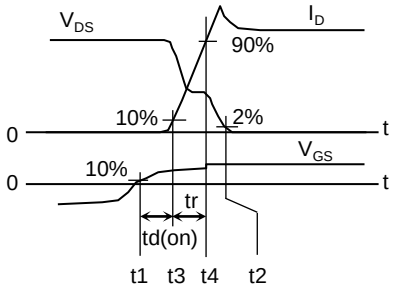
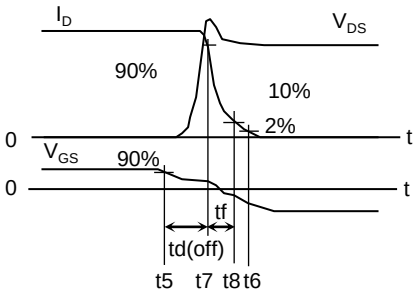
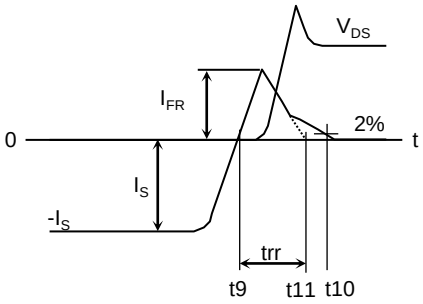
Definition of switching loss







$$Eon = \int_{t1}^{t2} I_D \cdot V_{DS}\, dt$$

$$Eoff = \int_{t5}^{t6} I_D \cdot V_{DS}\, dt$$

$$Err = \int_{t9}^{t10} I_{FR} \cdot V_{DS}\, dt$$

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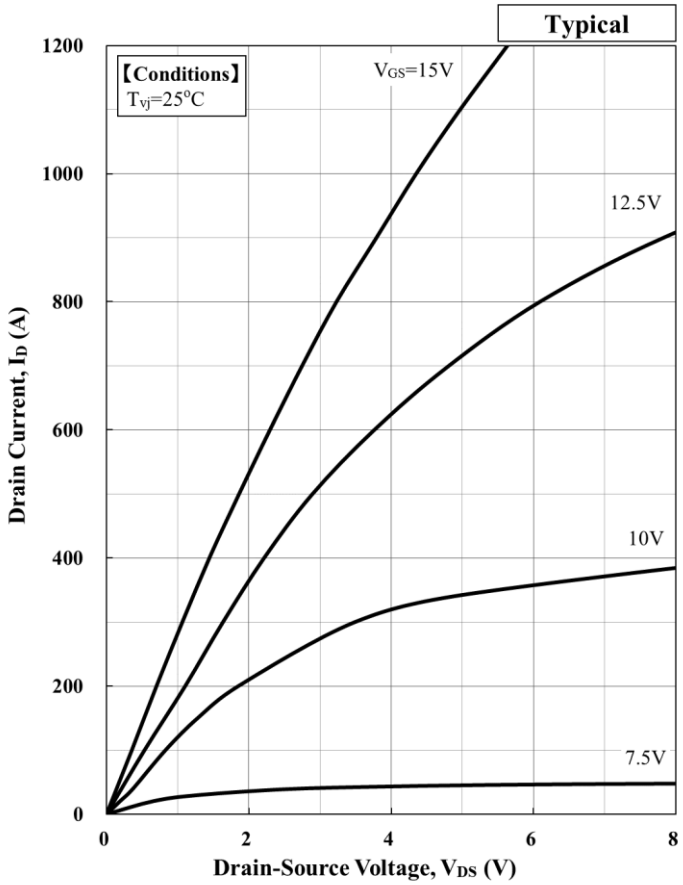
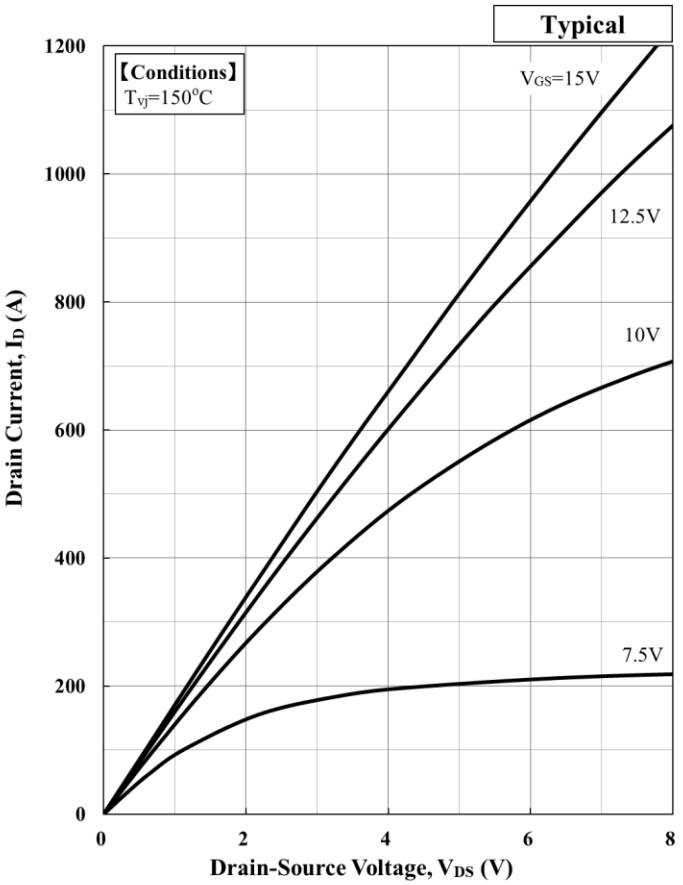
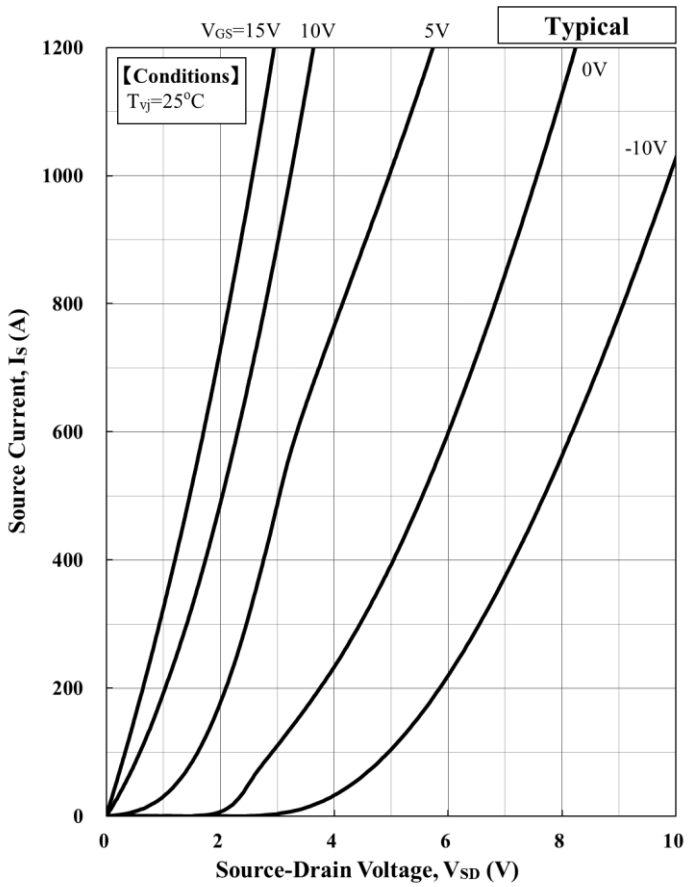


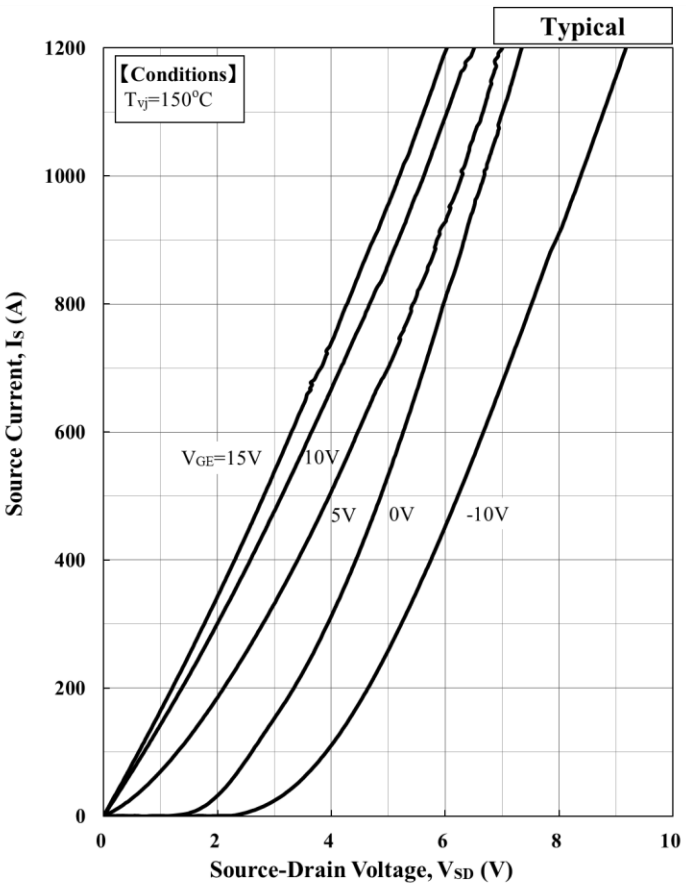
Drain Current vs. Drain - Source Voltage



Drain Current vs. Drain - Source Voltage



Source Current vs. Source - Drain Voltage



Source Current vs. Source - Drain Voltage

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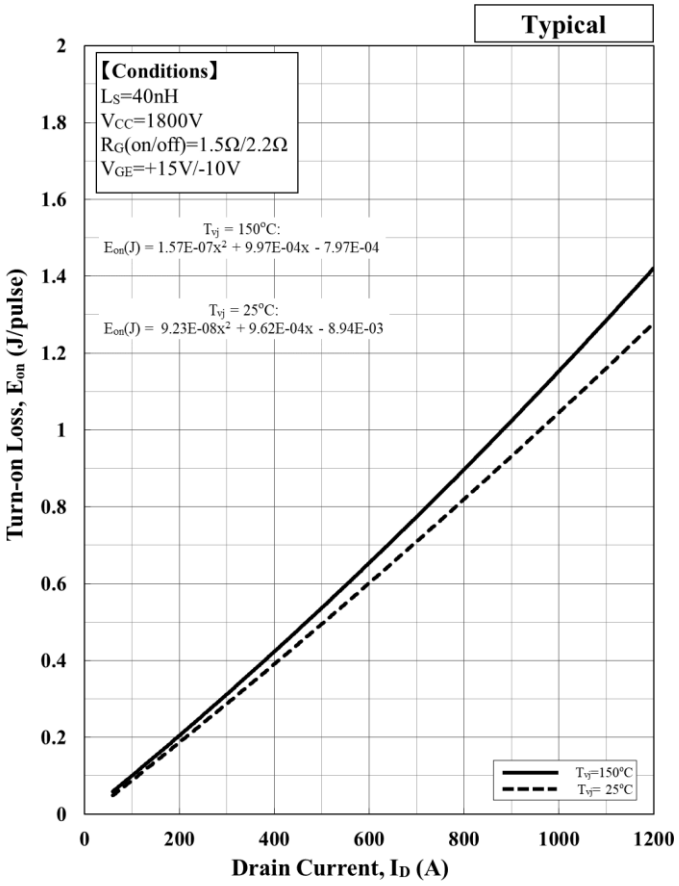
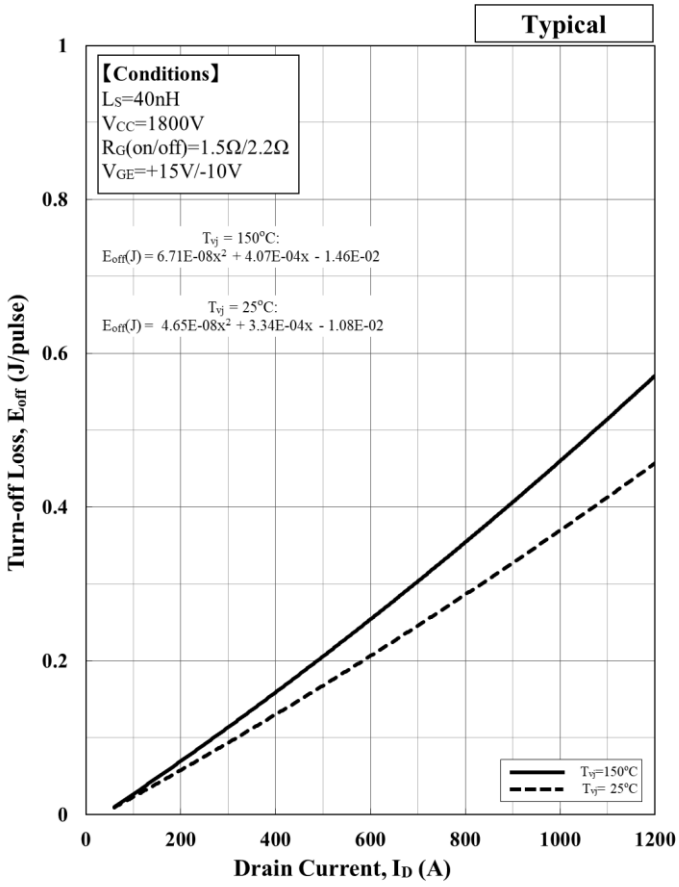
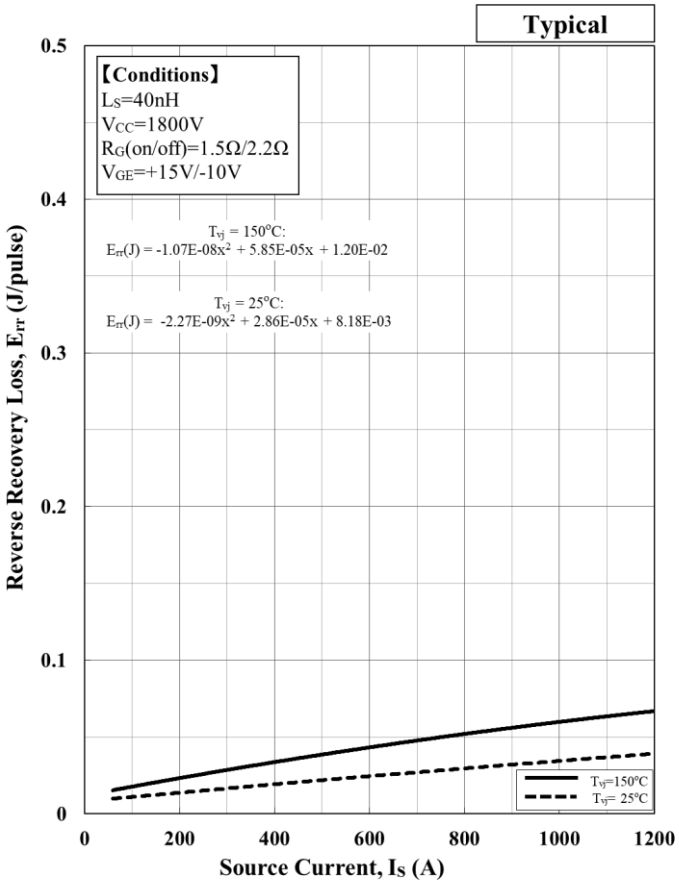


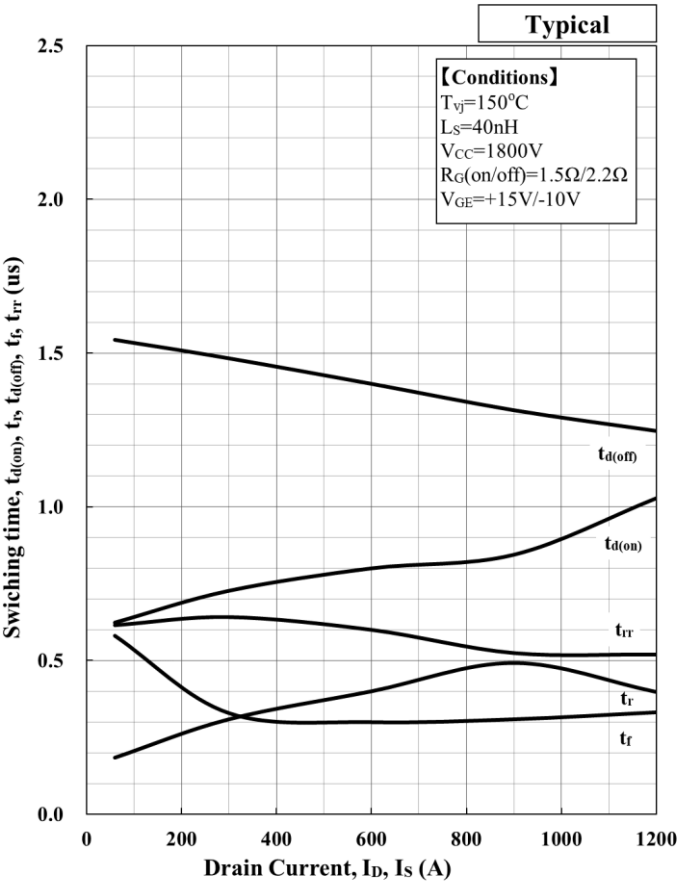
Turn-on loss vs. Drain current



Turn-off loss vs. Drain current



Recovery loss vs. Source current



Switching time vs. Drain Current

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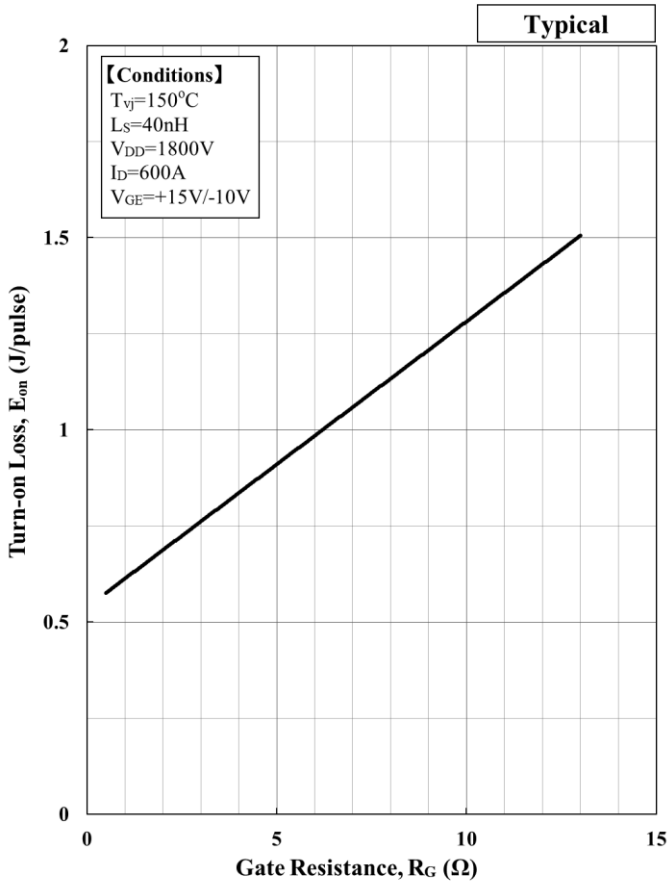
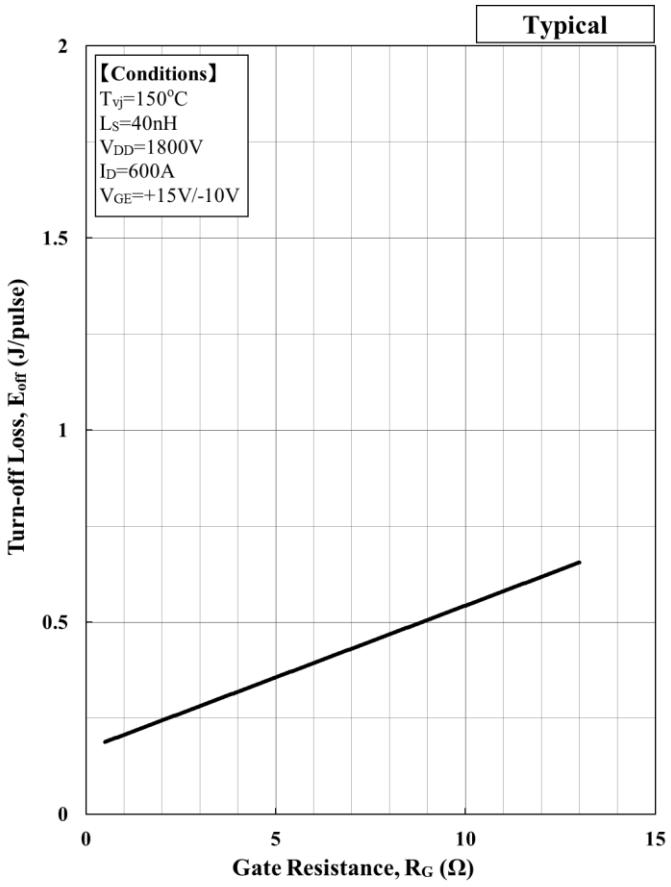
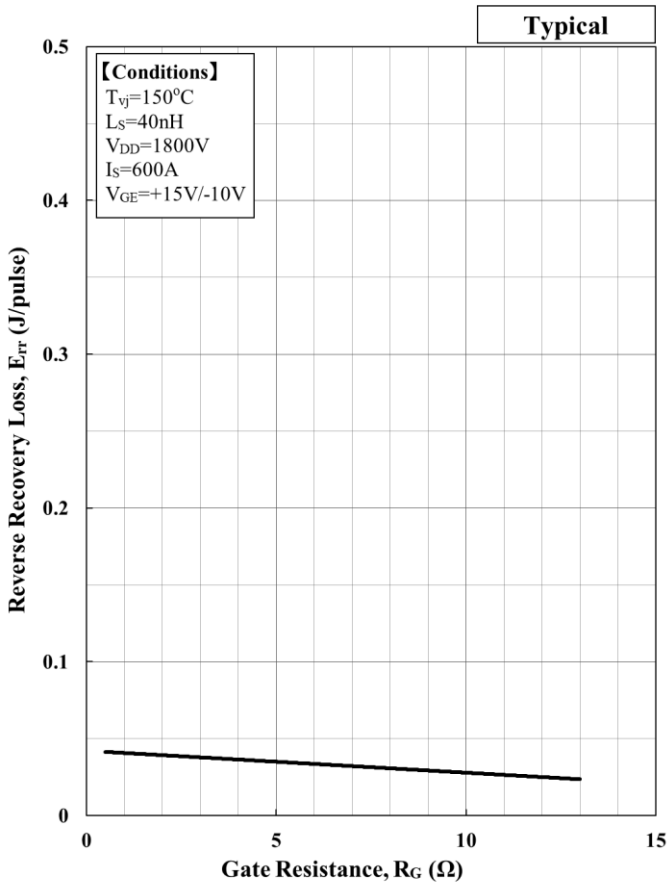


Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance



Recovery loss vs. Gate Resistance

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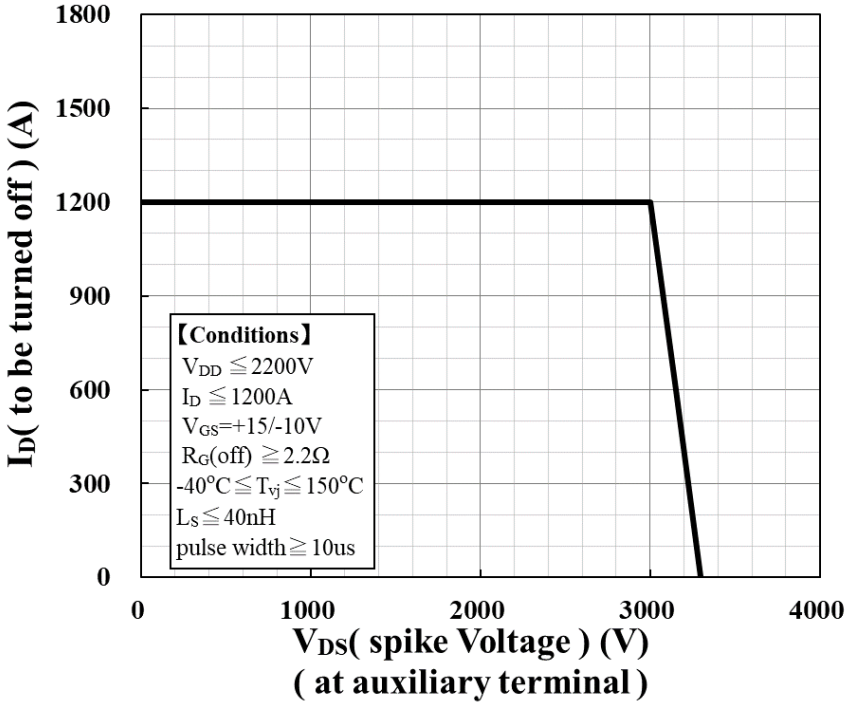
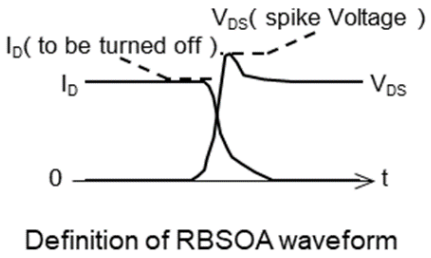
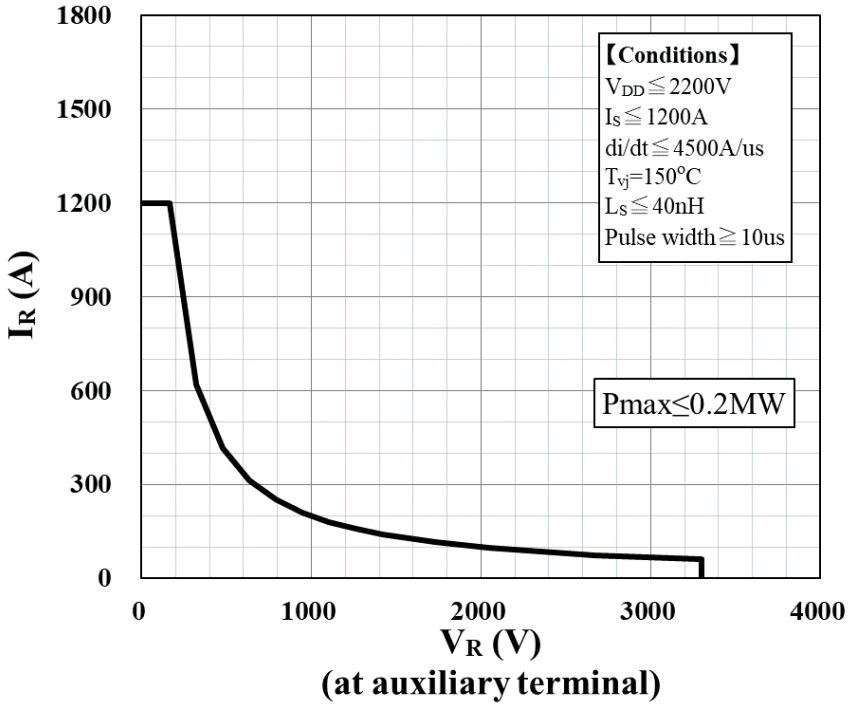
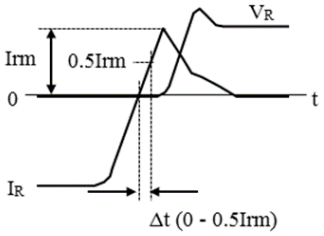




Definition of RBSOA waveform

Reverse Bias Safe Operation Area (RBSOA)





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

Definition of Recovery di/dt

Reverse Recovery Safe Operation Area (RRSOA)

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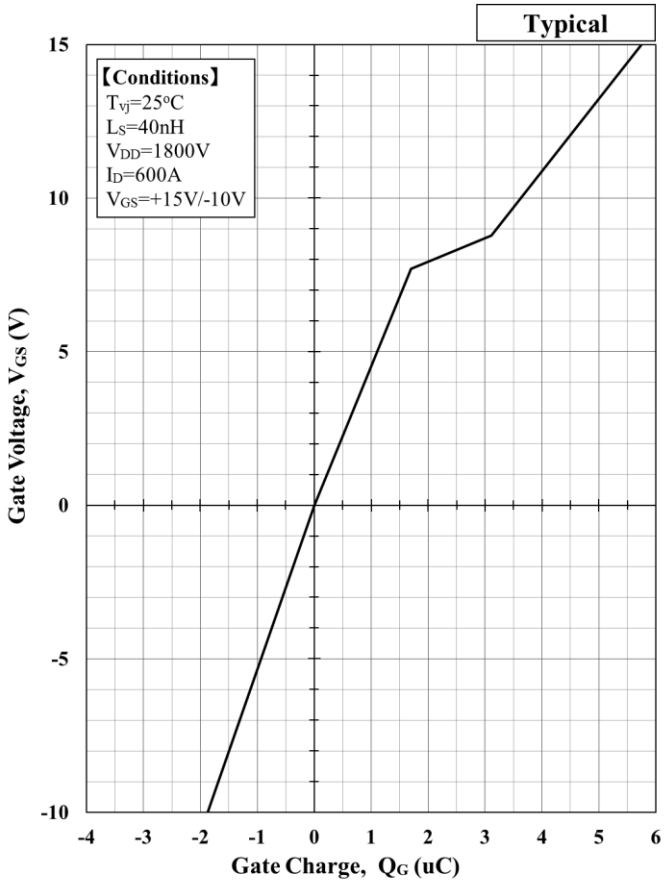
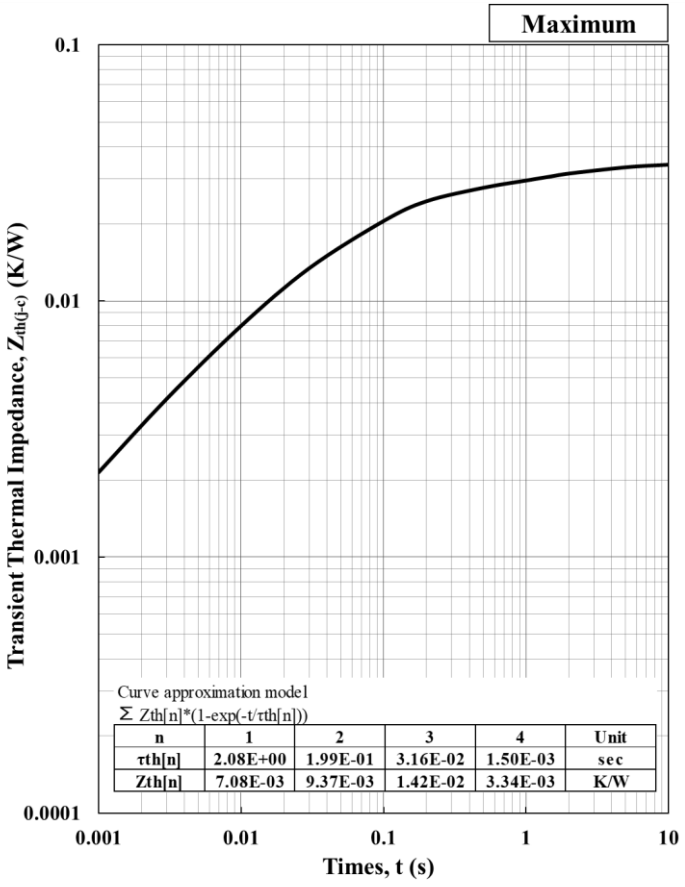
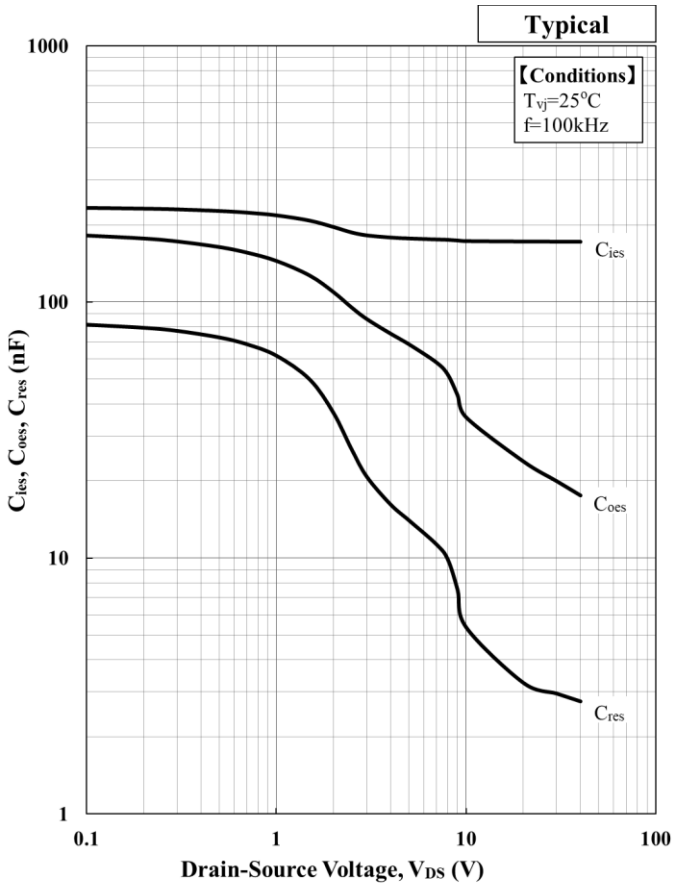


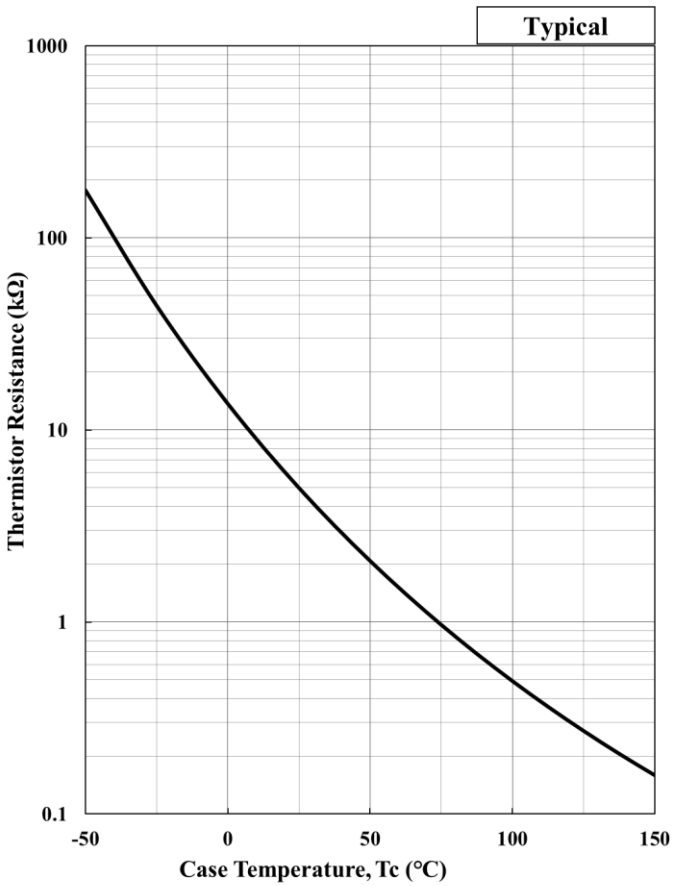
V_{GS}-Q_G curve



Transient Thermal Ipedance Curve



Capacitance vs. Drain - Source Voltage



Thermistor Resistance vs. Temperature

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