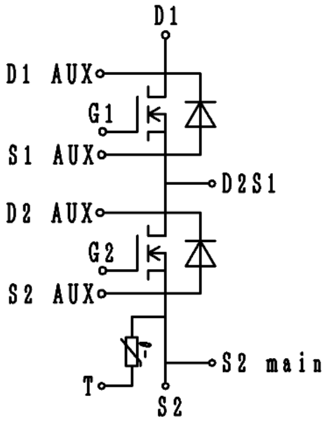
MSM900GS17CLT

Target Specification

SiC MOSFET 1700V



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 (Tc=25°C)

Item		Symbol	Unit	MSM900GS17CLT
Drain Source Voltage		V_{DSS}	V	1,700
Gate Source Voltage		V_{GSS}	V	+20/−15
Drain Current	DC	I_D	A	900
	1ms	I_{DM}		1,800
Source Current	DC	I_S	A	900
	1ms	I_{SM}		1,800
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

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ELECTRICAL CHARACTERISTICS

Item		Symbol	Unit	Min.	Typ.	Max.	Test conditions
Drain Source Cut-Off Current		I_{DSS}	mA	-	-	0.05	V_{DS}=1,700V, V_{GS}=0V, T_{vj}=25°C
				-	-	1	V_{DS}=1,700V, 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=900A, V_{GS}=17V, T_{vj}=25°C
				-	3.3	-	I_D=900A, V_{GS}=17V, T_{vj}=175°C
Gate Source Threshold Voltage		$V_{GS(th)}$	V	-	3.0	-	V_{DS}=10V, I_D=900mA, T_{vj}=25°C
Input Capacitance		C_{iss}	nF	-	115	-	V_{DS}=10V, V_{GS}=0V, f=100kHz, T_{vj}=25°C
Internal Gate Resistance		$R_{g(int)}$	Ω	-	2.4	-	
Switching Time	Rise Time	t_r	μs	-	0.24	-	V_{DD}=900V, I_D=900A, L_S=40nH, $R_{G(on/off)}$= 1.8/2.7Ω (2), V_{GS}=+17/−10V, T_{vj}=175°C
	Turn On Delay Time	$t_{d(on)}$		-	0.43	-	
	Fall Time	t_f		-	0.13	-	
	Turn Off Delay Time	$t_{d(off)}$		-	0.86	-	
Source Drain Voltage		V_{SD}	V	-	1.6	-	I_S=900A, V_{GS}=+17V, T_{vj}=25°C
				-	2.8	-	I_S=900A, V_{GS}=+17V, T_{vj}=175°C
				-	9.4	-	I_S=900A, V_{GS}=−10V, T_{vj}=25°C
				-	7.3	-	I_S=900A, V_{GS}=−10V, T_{vj}=175°C
Reverse Recovery Time		t_{rr}	μs	-	0.13	-	V_{DD}=900V, I_D=900A, L_S=40nH, $R_{G(on/off)}$= 1.8/2.7Ω (2), V_{GS}=+17/−10V, T_{vj}=175°C
Turn-on Loss		E_{on}	J/P	-	0.19	-	
Turn-off Loss		E_{off}	J/P	-	0.14	-	
Reverse Recovery Loss		E_{rr}	J/P	-	0.007	-	
Stray Inductance Module		L_{SCE}	nH	-	9	-	Between D1(main) and S2(main)
NTC-Thermistor	Resistance	R_{25}	kΩ	-	5	-	T_c=25°C
	Deviation	ΔR/R	%	−5	-	5	T_c=25°C
	B-constant	$B_{(25/50)}$	K	-	3375	-	Between 25°C and 50°C
Thermal Impedance	MOSFET	$R_{th(j-c)}$	K/W	-	-	0.048	Junction to case
Contact Thermal Impedance		$R_{th(c-f)}$	K/W	-	0.02	-	Case to fin (per 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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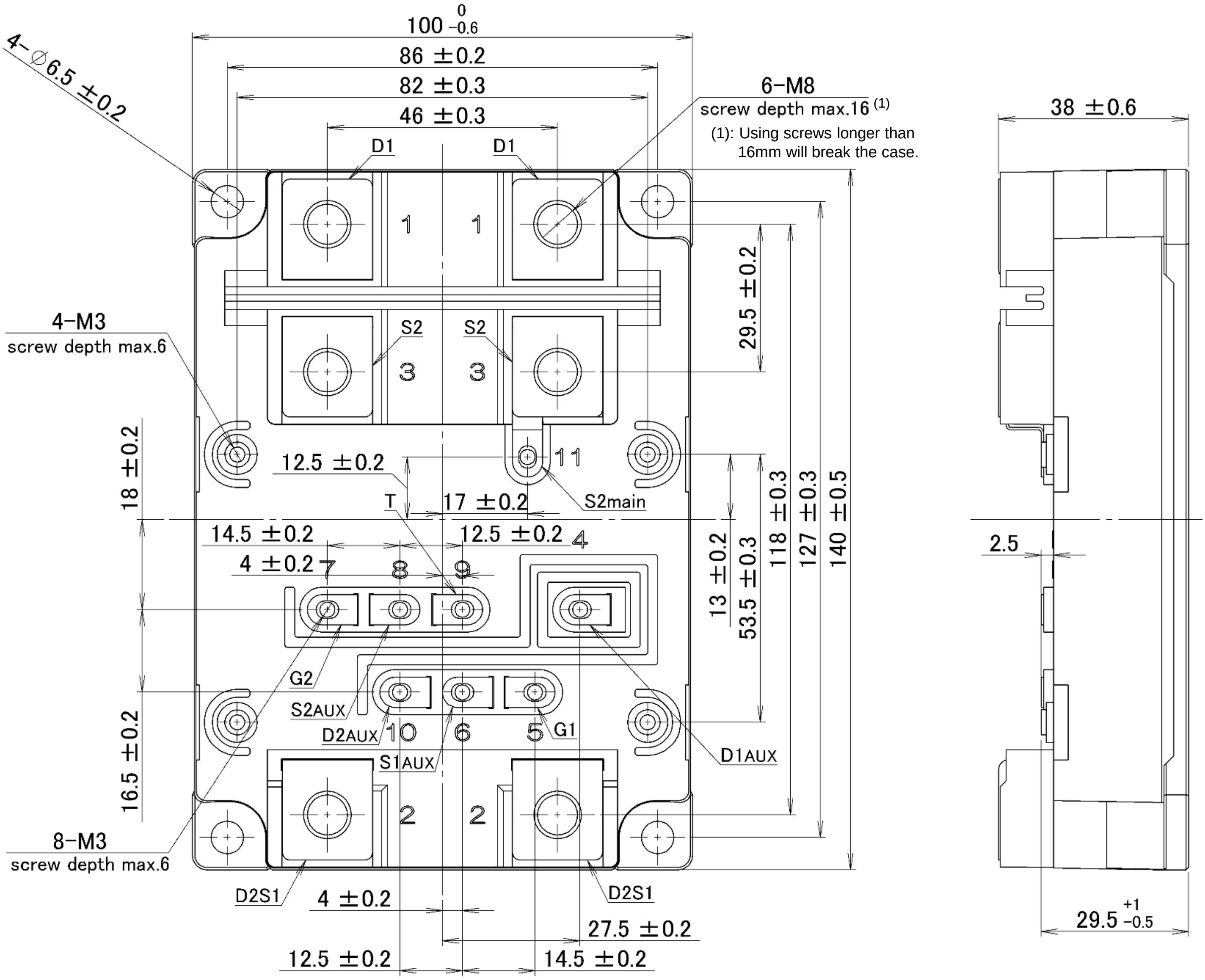
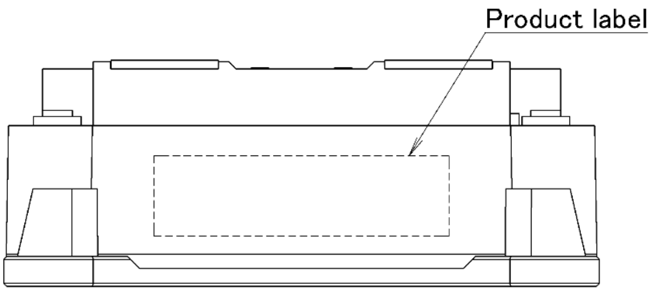
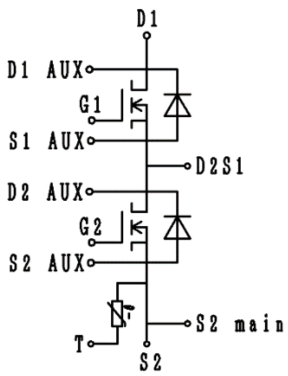
Target Specification

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



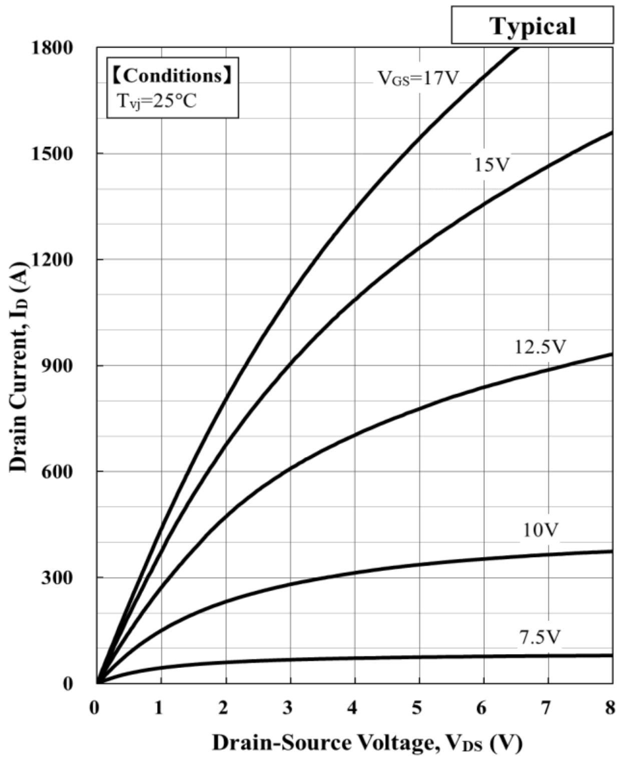
Weight: 770(g)

Terminal Number

Circuit Diagram

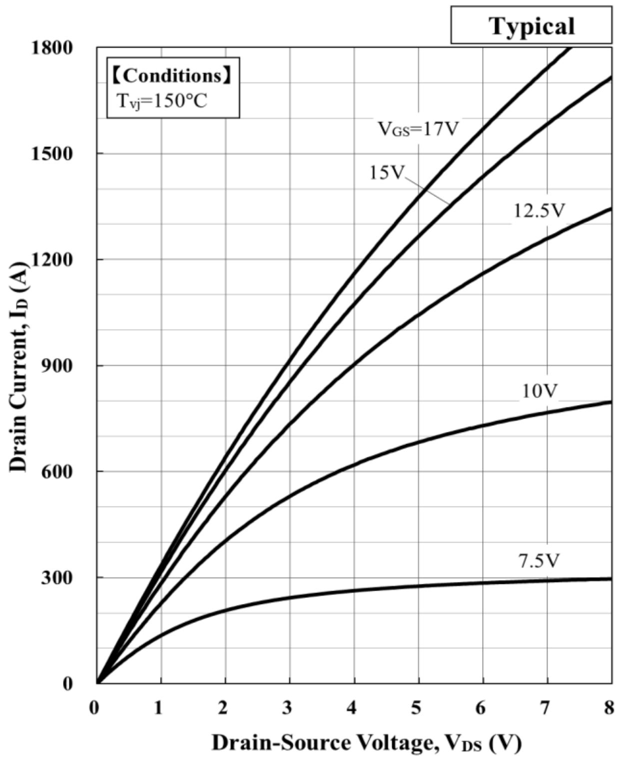
MSM900GS17CLT

Target Specification



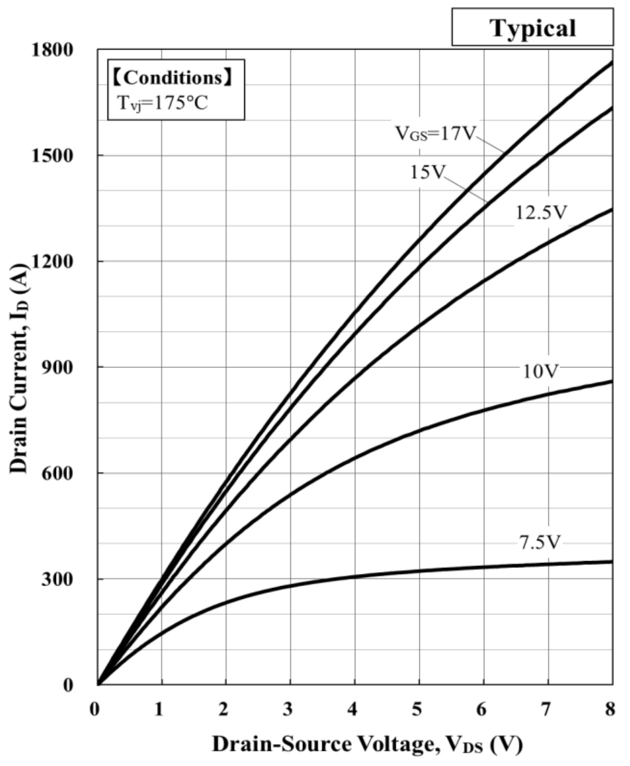
$V_{DS}[V] = a_3 \cdot \lvert I_D \rvert^3 + a_2 \cdot \lvert I_D \rvert^2 + a_1 \cdot \lvert I_D \rvert + a_0$					
Temp. [°C]	V_{GS} [V]	a_3	a_2	a_1	a_0
25	17	4.63E-10	-7.08E-08	2.25E-03	-1.02E-02

Drain Current vs. Drain - Source Voltage



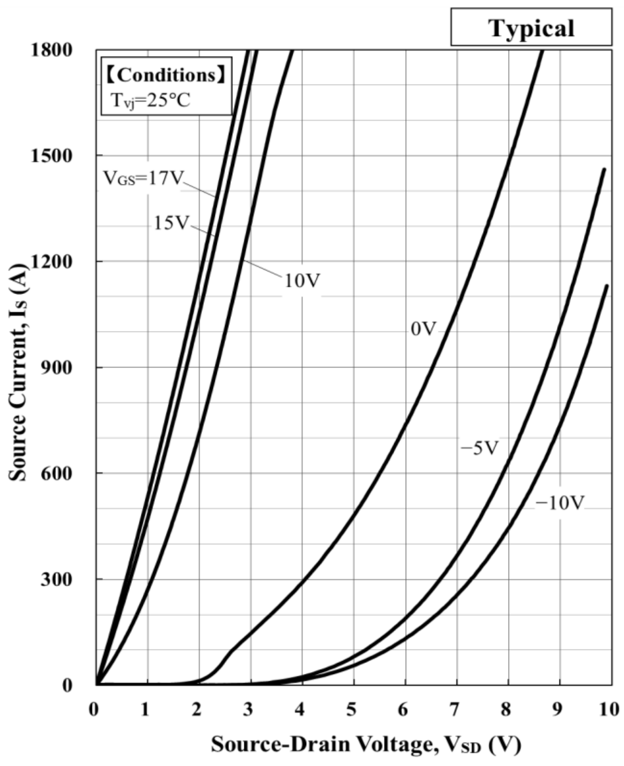
$V_{DS}[V] = a_3 \cdot \lvert I_D \rvert^3 + a_2 \cdot \lvert I_D \rvert^2 + a_1 \cdot \lvert I_D \rvert + a_0$					
Temp. [°C]	V_{GS} [V]	a_3	a_2	a_1	a_0
150	17	3.21E-10	3.48E-08	2.98E-03	-1.19E-02

Drain Current vs. Drain - Source Voltage



$V_{DS}[V] = a_3 \cdot \lvert I_D \rvert^3 + a_2 \cdot \lvert I_D \rvert^2 + a_1 \cdot \lvert I_D \rvert + a_0$					
Temp. [°C]	V_{GS} [V]	a_3	a_2	a_1	a_0
175	17	3.60E-10	1.77E-08	3.38E-03	-1.56E-02

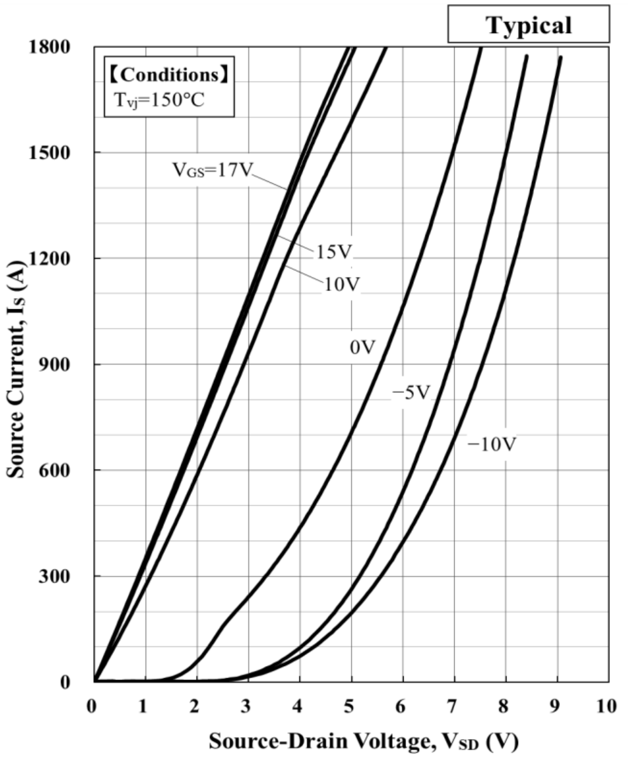
Drain Current vs. Drain - Source Voltage



$V_{SD}[V] = a_3 \cdot \lvert I_S \rvert^3 + a_2 \cdot \lvert I_S \rvert^2 + a_1 \cdot \lvert I_S \rvert + a_0$					
Temp. [°C]	V_{GS} [V]	a_3	a_2	a_1	a_0
25	17	5.65E-11	-3.13E-07	2.02E-03	1.19E-03

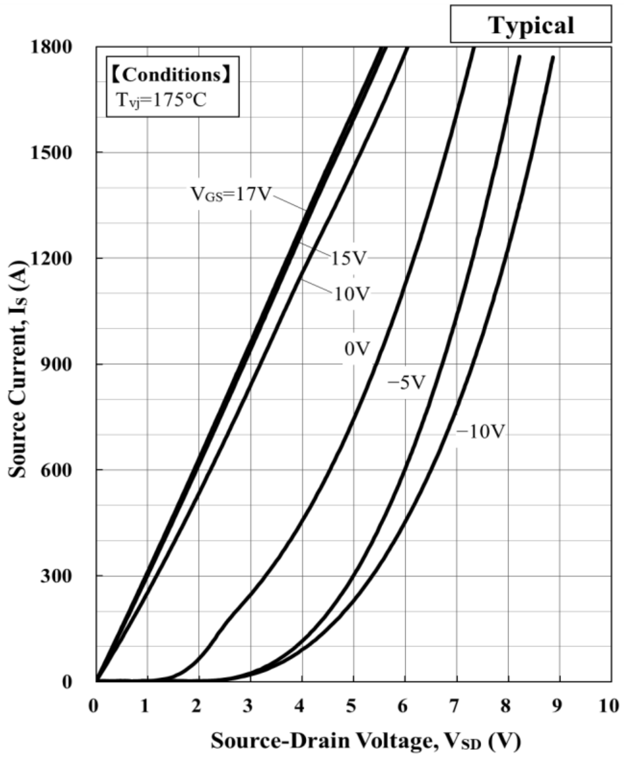
Source Current vs. Source - Drain Voltage

MSM900GS17CLT Target Specification



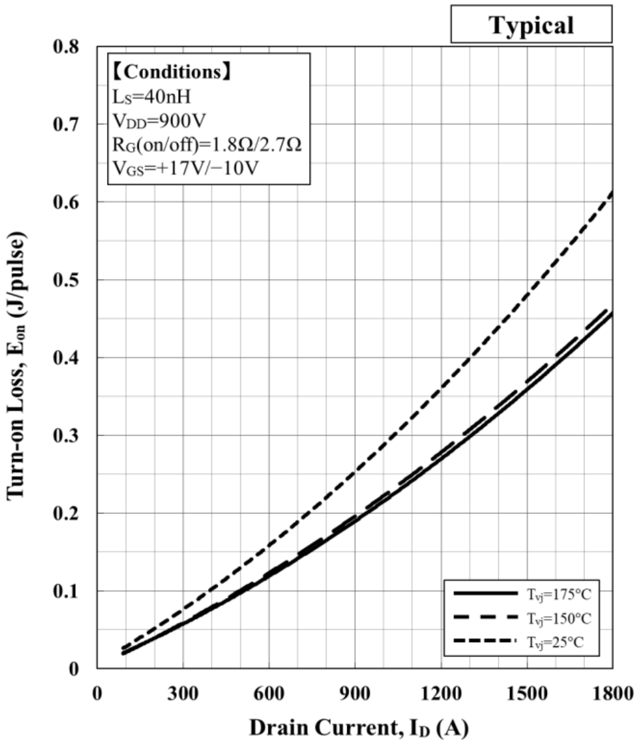
$V_{SD}[V] = a_3 \cdot \lvert I_S \rvert^3 + a_2 \cdot \lvert I_S \rvert^2 + a_1 \cdot \lvert I_S \rvert + a_0$					
Temp. [°C]	V_{GS} [V]	A_3	a_2	a_1	a_0
150	17	1.47E-10	-4.26E-07	3.04E-03	-2.27E-02

Source Current vs. Source - Drain Voltage



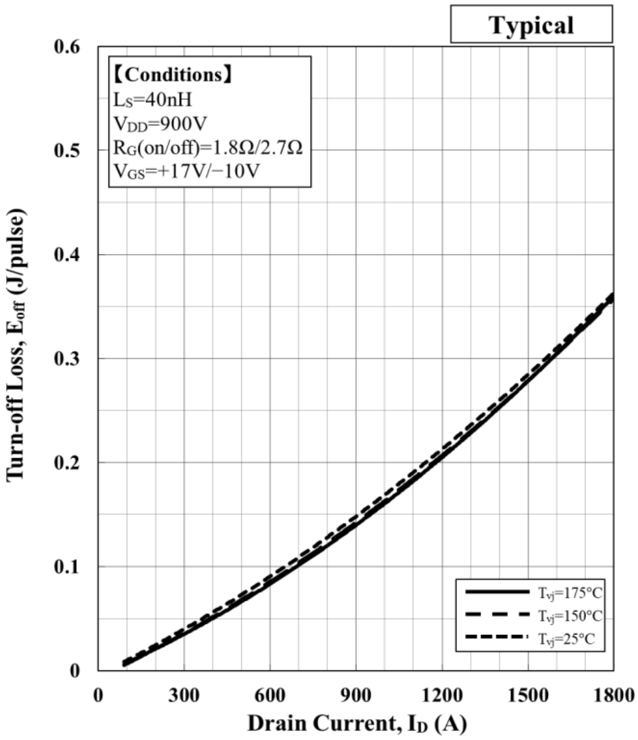
$V_{SD}[V] = a_3 \cdot \lvert I_S \rvert^3 + a_2 \cdot \lvert I_S \rvert^2 + a_1 \cdot \lvert I_S \rvert + a_0$					
Temp. [°C]	V_{GS} [V]	a_3	a_2	a_1	a_0
175	17	9.76E-11	-3.10E-07	3.33E-03	-1.05E-02

Source Current vs. Source - Drain Voltage



E_{on} [J] $= a_2 \cdot \lvert I_D \rvert^2 + a_1 \cdot \lvert I_D \rvert + a_0$			
Temp. [°C]	a_2	a_1	a_0
25	6.95E-08	2.11E-04	6.91E-03
150	4.96E-08	1.69E-04	3.96E-03
175	5.12E-08	1.59E-04	5.61E-03

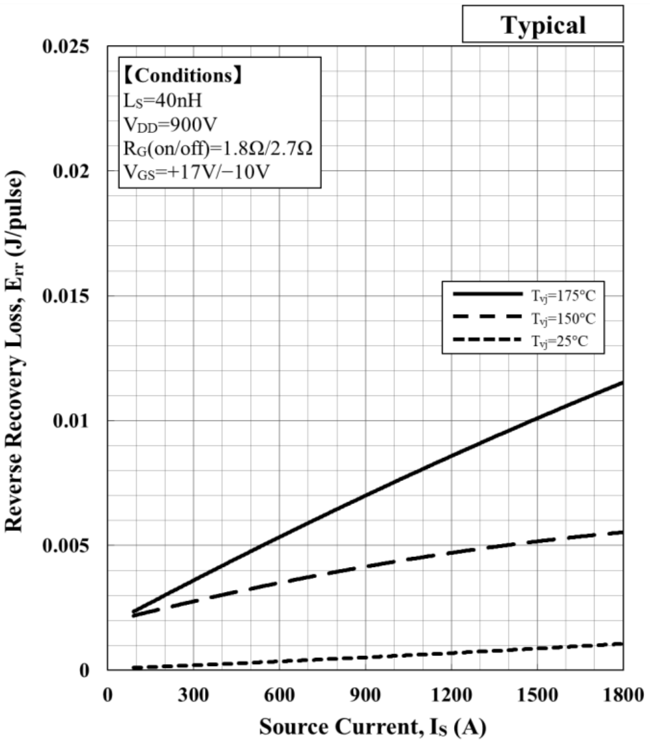
Turn-on loss vs. Drain current



E_{off} [J] $= a_2 \cdot \lvert I_D \rvert^2 + a_1 \cdot \lvert I_D \rvert + a_0$			
Temp. [°C]	a_2	a_1	a_0
25	3.87E-08	1.34E-04	-3.83E-03
150	4.09E-08	1.29E-04	-6.48E-03
175	4.66E-08	1.19E-04	-4.64E-03

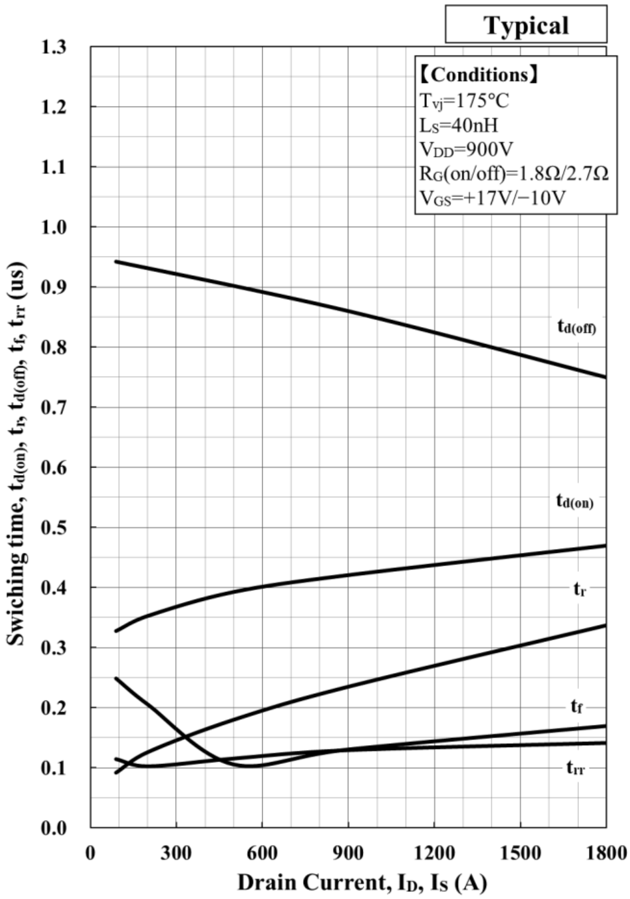
Turn-off loss vs. Drain current

MSM900GS17CLT Target Specification



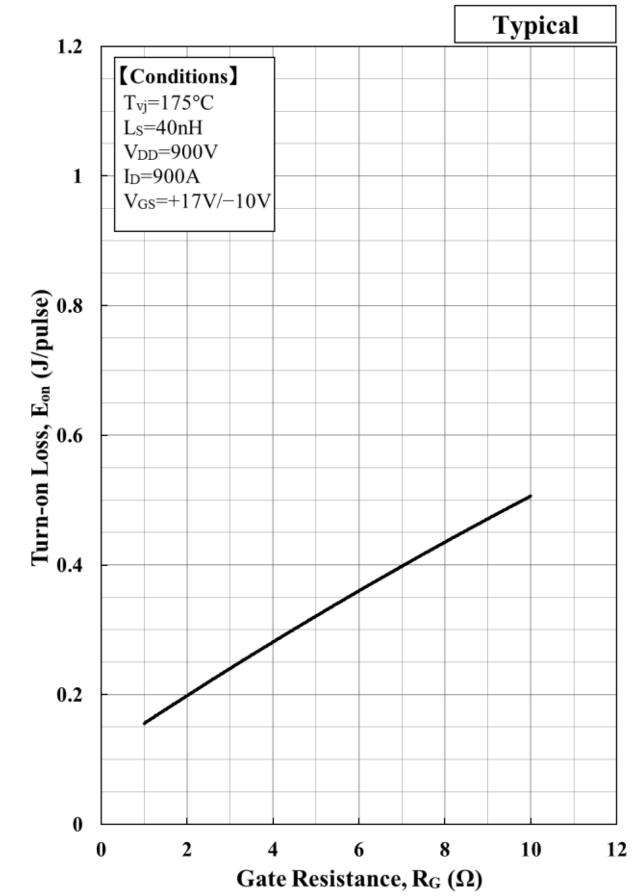
E_{rr} [J] $= a_2 \cdot \lvert I_S \rvert^2 + a_1 \cdot \lvert I_S \rvert + a_0$			
Temp. [°C]	a_2	a_1	A_0
25	5.76E-11	4.53E-07	6.31E-05
150	-5.24E-10	2.95E-06	1.93E-03
175	-4.13E-10	6.15E-06	1.80E-03

Recovery loss vs. Source current

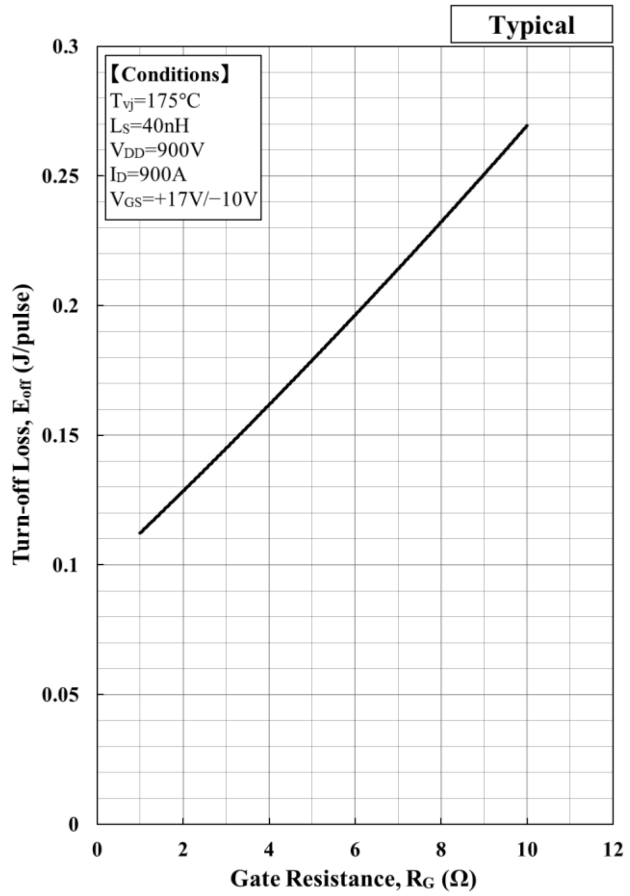


Switching time vs. Drain Current

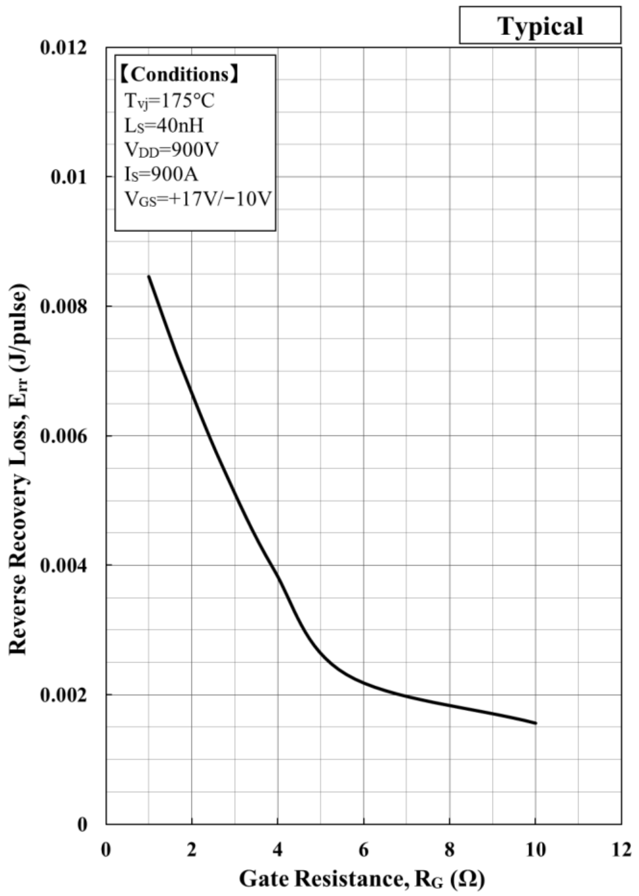
MSM900GS17CLT Target Specification



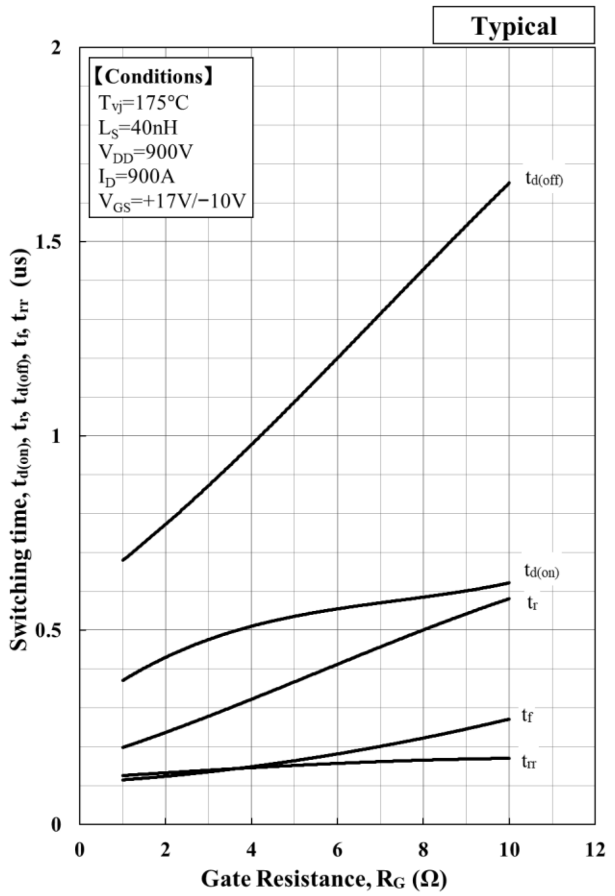
Turn-on loss vs. Gate Resistance



Turn-off loss vs. Gate Resistance



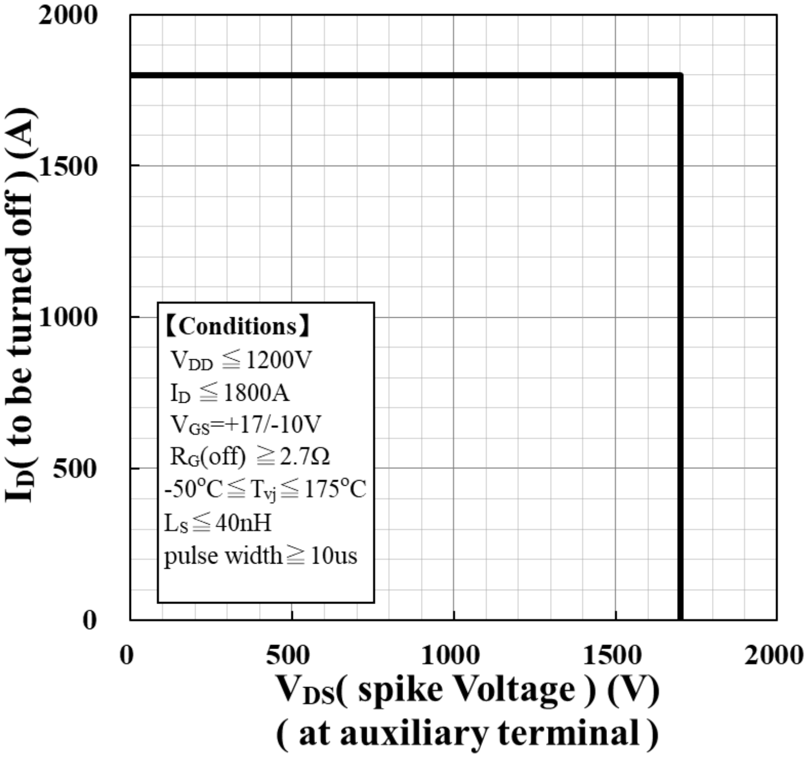
Recovery loss vs. Gate Resistance

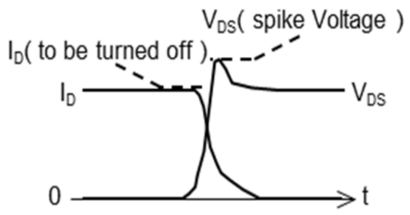


Switching time vs. Gate Resistance

MSM900GS17CLT

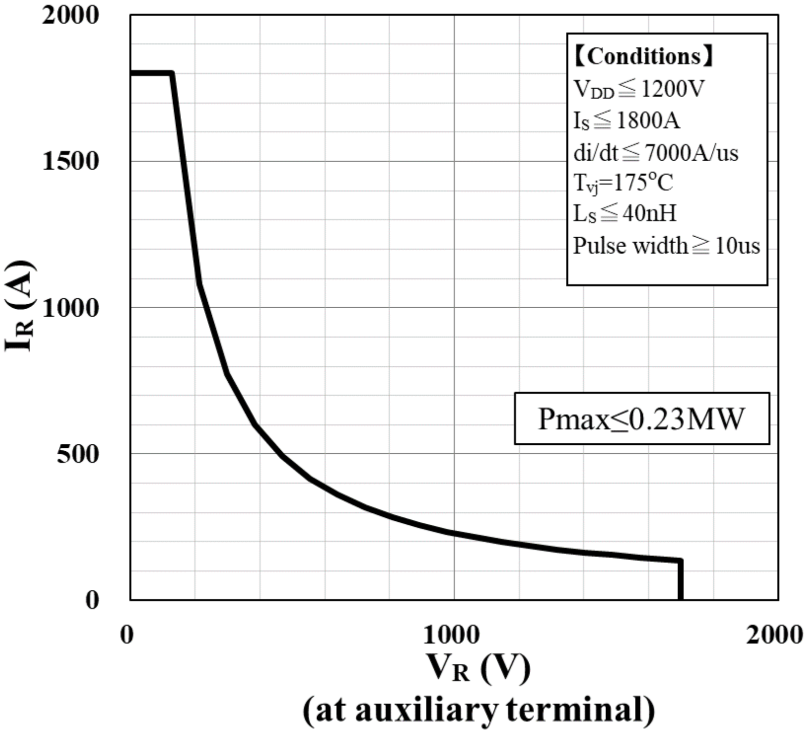
Target Specification

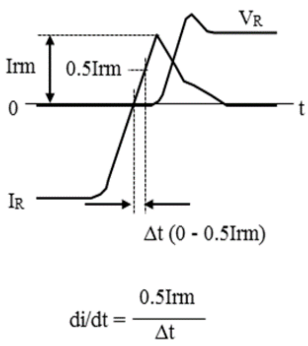




Definition of RBSOA waveform

Reverse Bias Safe Operation Area (RBSOA)



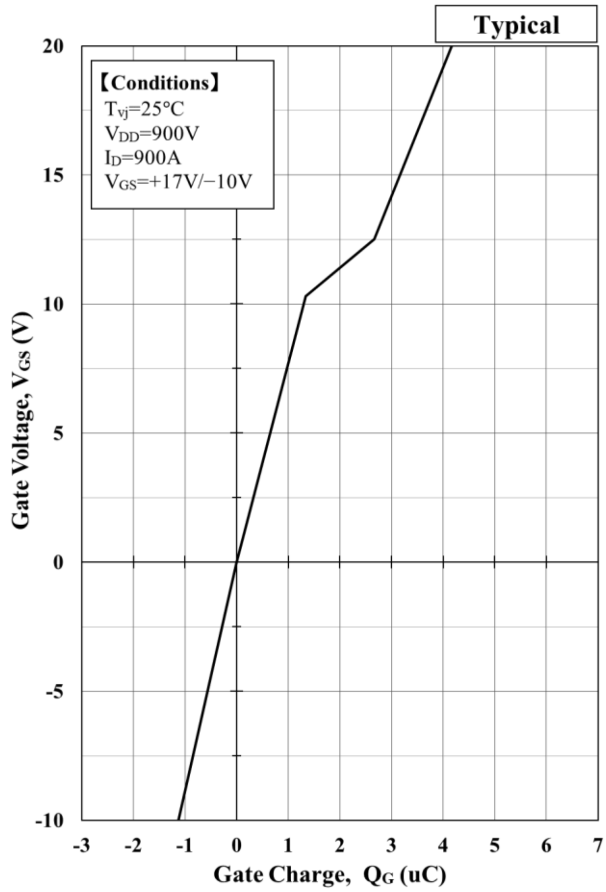


Definition of Recovery di/dt

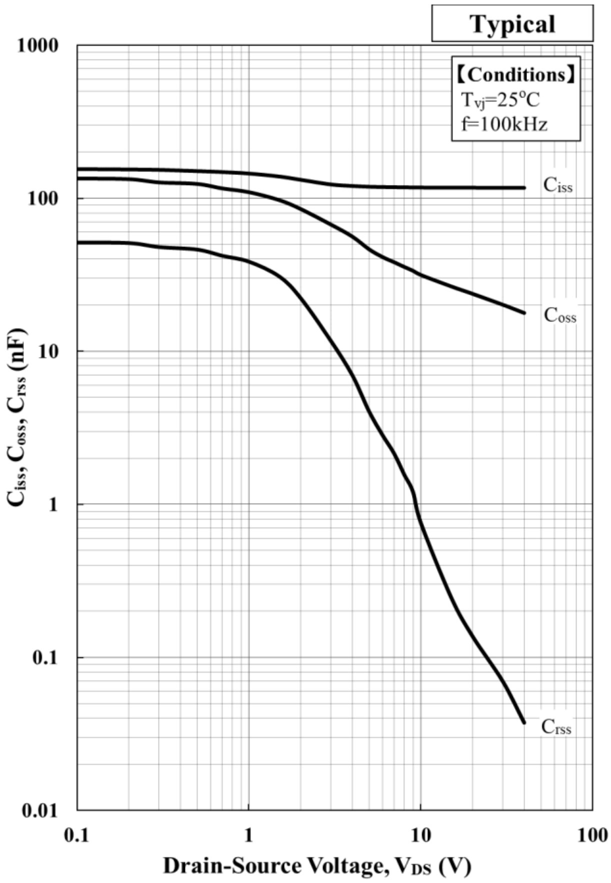
Reverse Recovery Safe Operation Area (RRSOA)

MSM900GS17CLT

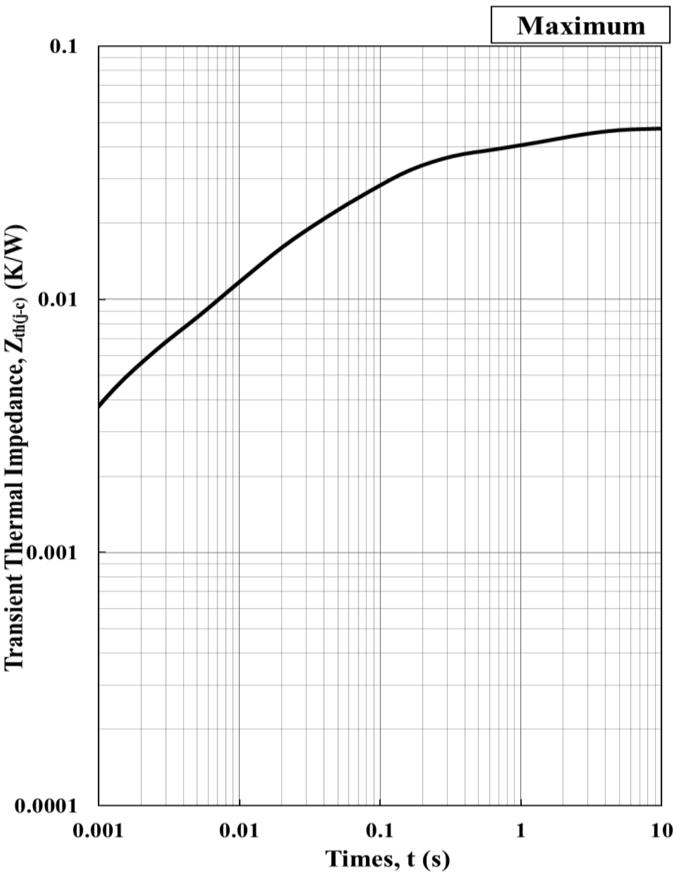
Target Specification



V_{GS}-Q_G curve



Capacitance vs. Drain - Source Voltage



Transient Thermal Impedance Curve

Foster model lumped circuit constant

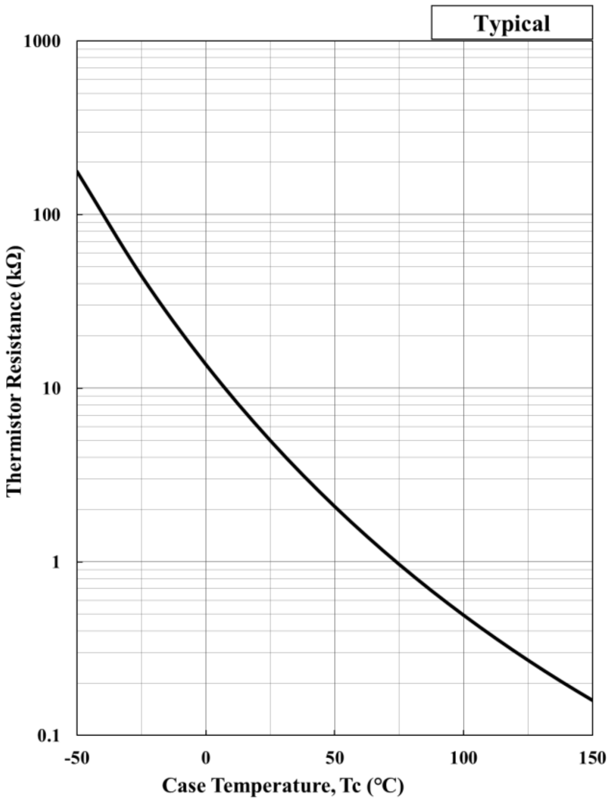
n	1	2	3	4
Rth, MOS [n]	1.18E-02	2.21E-02	9.42E-03	4.09E-03
Cth, MOS [n]	1.52E+02	4.44E+00	1.23E+00	2.13E-01

Cauer model lumped circuit constant

n	1	2	3	4
Rth, MOS [n]	6.03E-03	1.35E-02	1.75E-02	1.04E-02
Cth, MOS [n]	1.75E-01	9.11E-01	4.55E+00	1.67E+02

MSM900GS17CLT

Target Specification



Thermistor Resistance vs. Temperature

MSM900GS17CLT Target Specification

Minebea POWER SEMICONDUCTORS

Notices

1. Since mishandling of semiconductor devices may cause malfunctions, please be sure to read "Precautions for Safe Use and Notices" in the individual brochure before use.
2. When designing an electronic circuit using semiconductor devices, please do not exceed the absolute maximum rating specified for the device under any external fluctuations. And for pulse applications, please also do not exceed the "Safe Operating Area (SOA)".
3. Semiconductor devices may sometimes break down by accidental or unexpected surge voltage, so please be careful about the safety design such as redundant design and malfunction prevention design which don't cause the damage expand even if they break down.
4. In cases where extremely high reliability is required (such as use in nuclear power control, aerospace and aviation, traffic equipment, life-support-related medical equipment, fuel control equipment and various kinds of safety equipment), safety should be ensured by using semiconductor devices that feature assured safety or by means of users' fail-safe precautions or other arrangement. Or consult with MPSD's sales department staff. (When semiconductor devices fail, as a result the semiconductor devices or wiring, wiring pattern may smoke, ignite, or the semiconductor devices themselves may burst.)
5. A semi-processed article is done now using solder which contains lead inside the semiconductor devices. There is possibility of the regulation substance depend on the applied models, so please check before using.
6. This specification is a material for component selection, which describes specifications of power semiconductor devices (hereinafter referred to as products), characteristic charts, and external dimension drawings.
7. The information given herein, including the specifications and dimensions, is subject to change without prior notice to improve product characteristics. Before ordering, purchasers are advised to contact with Minebea power semiconductor sales department for the latest version of this data sheets.
8. For handling other than described in this manual, follow the handling instructions (IGBT-HI-00002).
9. In this module, the maximum depth of the screw holes on the main terminals is 16mm. Using screws longer than 16mm will break the case.

■ For inquiries relating to the products, please contact nearest representatives that is located "Inquiry" portion on the top page of a home page.

Minebea power semiconductor home page address
https://www.minebea-psd.com/en
https://www.minebea-psd.com/

MSM900GS17CLT

Target Specification

Minebea POWER SEMICONDUCTORS

Usage

1. MPSD warrants that the MPSD products have the specified performance according to the respective specifications at the time of its sale. Testing and other quality control techniques of the MPSD products by MPSD are utilized to the extent MPSD needs to meet the specifications described in this document. Not every device of the MPSD products is specifically tested on all parameters, except those mandated by relevant laws and/or regulations.
2. Following any claim regarding the failure of a product to meet the performance described in this document made within one month of product delivery, all the products in relevant lot(s) shall be re-tested and re-delivered. The MPSD products delivered more than one month before such a claim shall not be counted for such response.
3. MPSD assumes no obligation nor makes any promise of compensation for any fault which should be found in a customer’s goods incorporating the products in the market. If a product failure occurs for reasons obviously attributable to MPSD and a claim is made within six months of product delivery, MPSD shall offer free replacement or payment of compensation. The maximum compensation shall be the amount paid for the products, and MPSD shall not assume responsibility for any other compensation.
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