SH8KA4

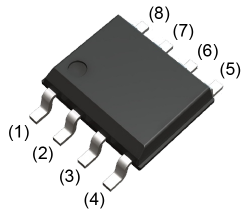
30V Nch+Nch Middle Power MOSFET

Datasheet

V_{DSS}	30V
$R_{DS(on)}$(Max.)	21.4mΩ
I_D	±9.0A
P_D	3.0W

●Outline

SOP8

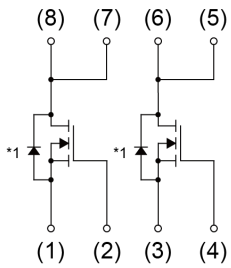


●Features

1) Low on - resistance.
2) Small Surface Mount Package (SOP8).
3) Pb-free lead plating ; RoHS compliant.
4) Halogen Free.

●Inner circuit

(1) Tr1 Source
(2) Tr1 Gate
(3) Tr2 Source
(4) Tr2 Gate
(5) Tr2 Drain
(6) Tr2 Drain
(7) Tr1 Drain
(8) Tr1 Drain
*1 Body Diode



●Application

Switching

Motor Drive

●Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	330
	Tape width (mm)	12
	Basic ordering unit (pcs)	2500
	Taping code	TB
	Marking	SH8KA4

●Absolute maximum ratings (T_a = 25°C ,unless otherwise specified) <Tr1 and Tr2>

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	30	V
Continuous drain current		I_D *1	±9.0	A
Pulsed drain current		I_{DP} *2	±18	A
Gate - Source voltage		V_{GSS}	±20	V
Avalanche current, single pulse		I_{AS} *3	8.0	A
Avalanche energy, single pulse		E_{AS} *3	4.6	mJ
Power dissipation	total	P_D *1	3.0	W
	total	P_D *4	2.0	
	total	P_D *5	1.4	
	element	P_D *4	1.4	
Junction temperature		T_j	150	℃
Operating junction and storage temperature range		T_{stg}	-55 to +150	℃

●Thermal resistance

Parameter		Symbol	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance, junction - ambient	total	R_{thJA}*4	-	-	62.5	℃/W
	element		-	-	89.2	
	total	R_{thJA}*5	-	-	89.2	

●Electrical characteristics (T_a = 25°C) <Tr1 and Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 1mA	30	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	I_D = 1mA referenced to 25℃	-	21	-	mV/℃
Zero gate voltage drain current	I_{DSS}	V_{DS} = 30V, V_{GS} = 0V	-	-	1	μA
Gate - Source leakage current	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1mA	1.0	-	2.5	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	I_D = 1mA referenced to 25℃	-	-3	-	mV/℃
Static drain - source on - state resistance	$R_{DS(on)}$*6	V_{GS} = 10V, I_D = 9.0A	-	16.5	21.4	mΩ
		V_{GS} = 4.5V, I_D = 8.0A	-	22.2	28.9	
Gate resistance	R_G	f = 1MHz, open drain	-	3.4	-	Ω
Forward Transfer Admittance	$\|Y_{fs}\|$*6	V_{DS} = 5V, I_D = 8.0A	4.6	-	-	S

*1 Pw ≦ 1s, Mounted on a ceramic board (30×30×0.8mm), Limited only by maximum temperature allowed.

*2 Pw ≦ 10μs, Duty cycle ≦ 1%

*3 L ≃ 0.1mH, V_{DD} = 15V, R_G = 25Ω, STARTING T_j = 25℃ Fig.3-1,3-2

*4 Mounted on a ceramic board (30×30×0.8mm)

*5 Mounted on a FR4 (25×25×0.8mm)

*6 Pulsed

●Electrical characteristics (T_a = 25°C) <Tr1 and Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	640	-	pF
Output capacitance	C_{oss}	V_{DS} = 15V	-	110	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	90	-	
Turn - on delay time	$t_{d(on)}$ *6	V_{DD} ≃ 15V, V_{GS} = 10V	-	8	-	ns
Rise time	t_r *6	I_D = 4.5A	-	19	-	
Turn - off delay time	$t_{d(off)}$ *6	R_L = 3.3Ω	-	33	-	
Fall time	t_f *6	R_G = 10Ω	-	7	-	

●Gate charge characteristics (T_a = 25°C) <Tr1 and Tr2>

Parameter	Symbol	Conditions		Values			Unit
				Min.	Typ.	Max.	
Total gate charge	Q_g *6	V_{DD} ≃ 15V I_D = 9.0A	V_{GS} = 10V	-	15.5	-	nC
			V_{GS} = 4.5V	-	7.9	-	
Gate - Source charge	Q_{gs} *6			-	3.1	-	
Gate - Drain charge	Q_{gd} *6			-	2.8	-	

●Body diode electrical characteristics (Source-Drain) (T_a = 25°C)

<Tr1 and Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Continuous forward current	I_S	T_a = 25°C	-	-	1.67	A
Pulse forward current	I_{SP} *2		-	-	18	
Forward voltage	V_{SD} *6	V_{GS} = 0V, I_S = 1.67A	-	-	1.2	V

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

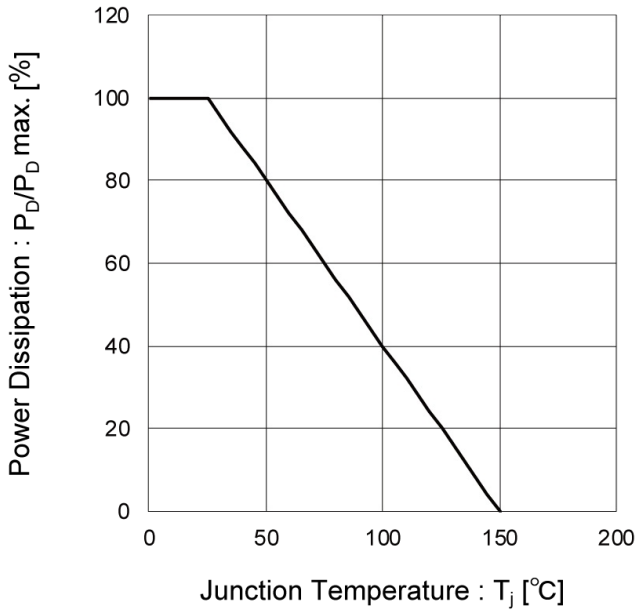


Fig.2 Maximum Safe Operating Area

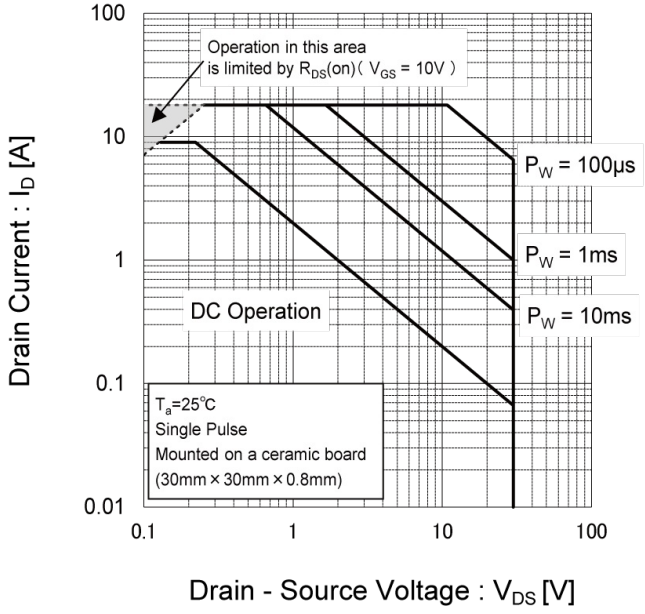


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

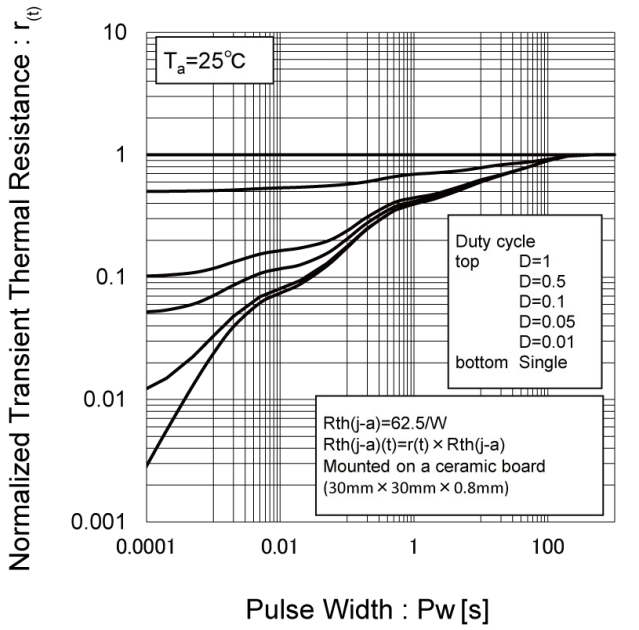
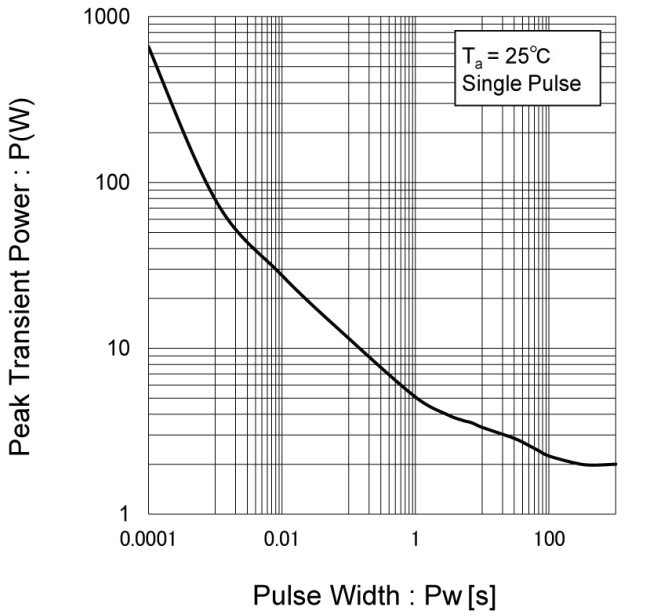


Fig.4 Single Pulse Maximum Power dissipation



●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

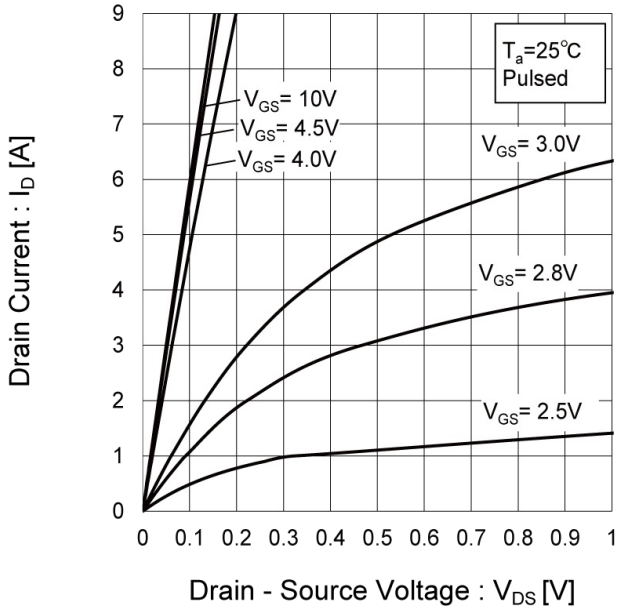


Fig.6 Typical Output Characteristics(II)

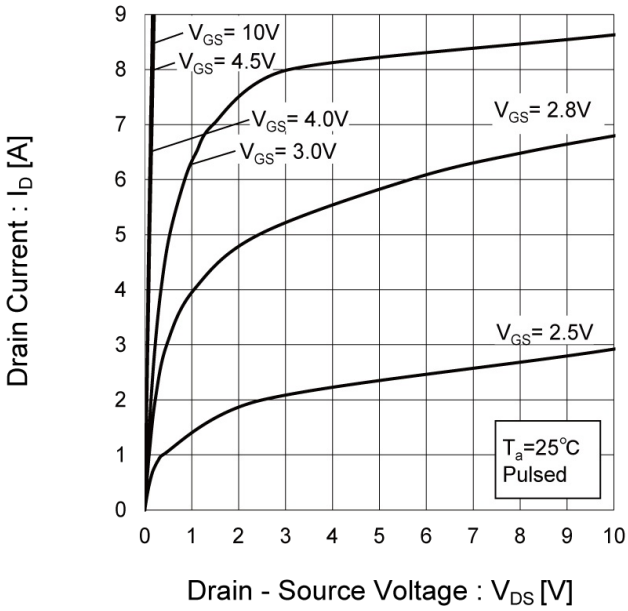
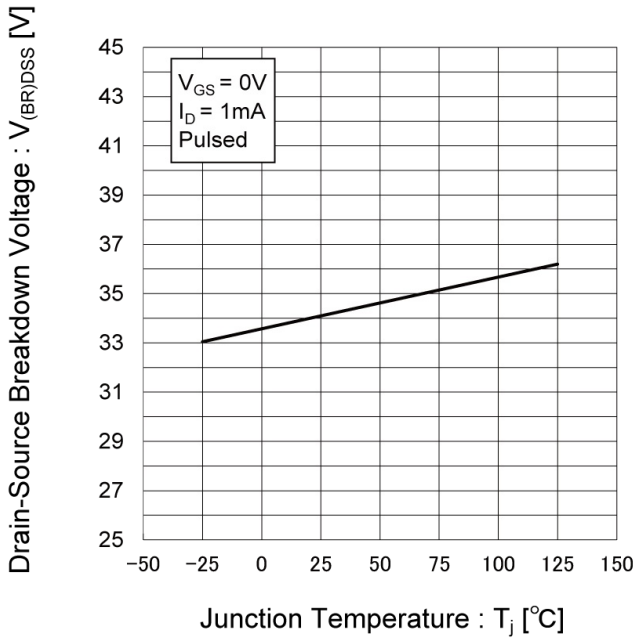


Fig.7 Breakdown Voltage vs. Junction Temperature



●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

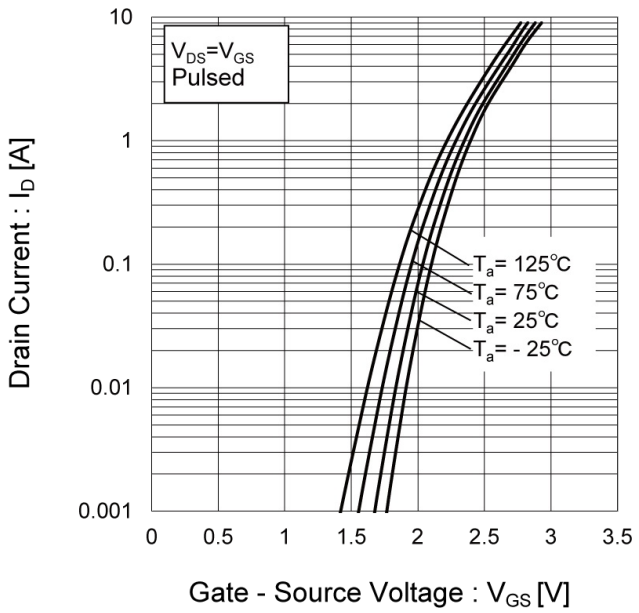


Fig.9 Gate Threshold Voltage vs. Junction Temperature

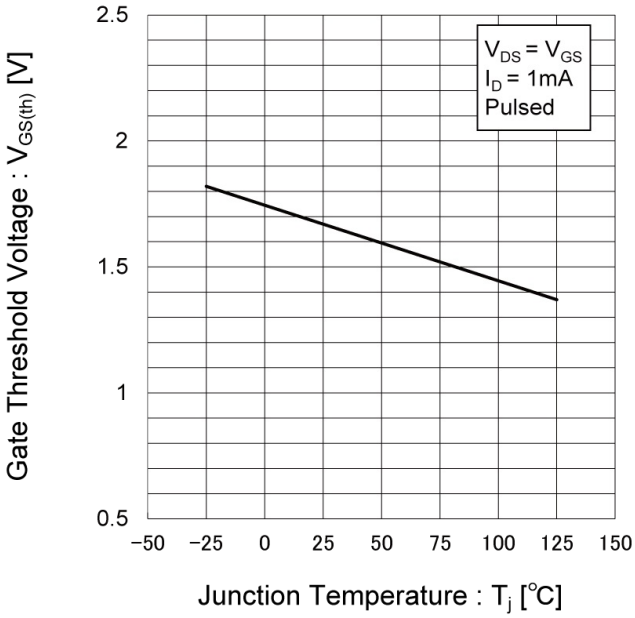
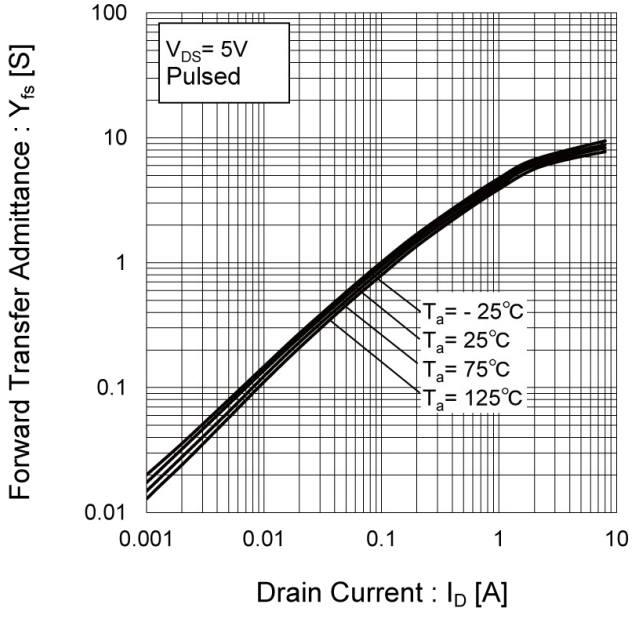


Fig.10 Forward Transfer Admittance vs. Drain Current



●Electrical characteristic curves

Fig.11 Drain Current Derating Curve

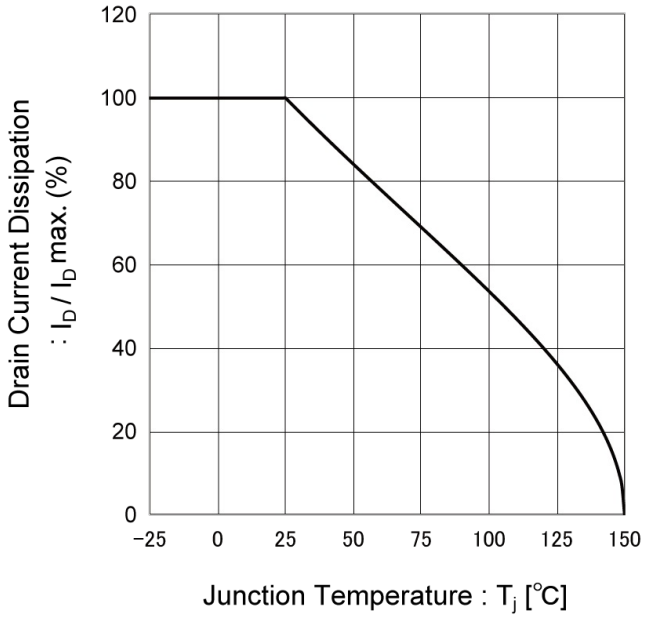


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

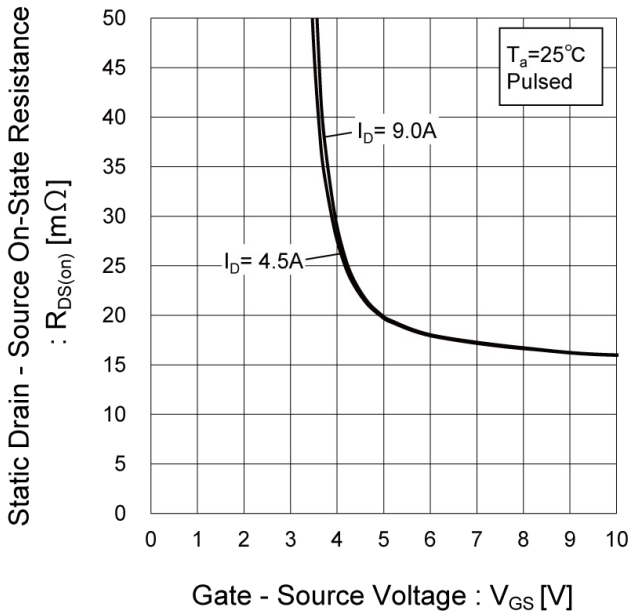
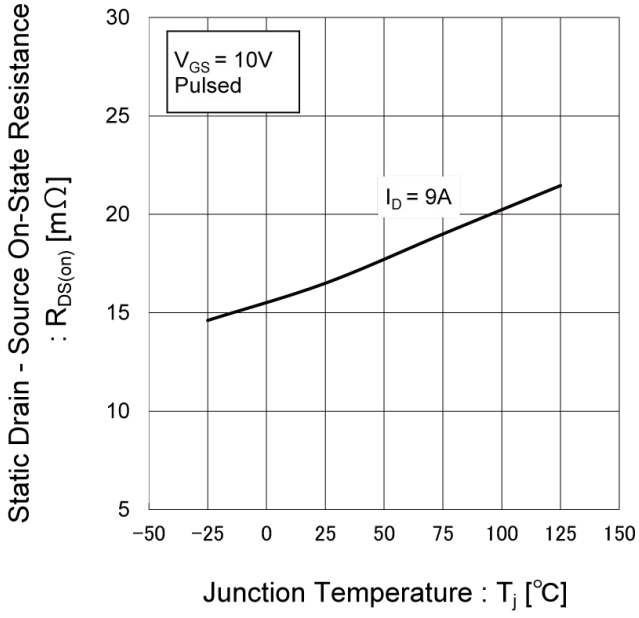


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



●Electrical characteristic curves

Fig.14 Static Drain - Source On - State Resistance vs. Drain Current(I)

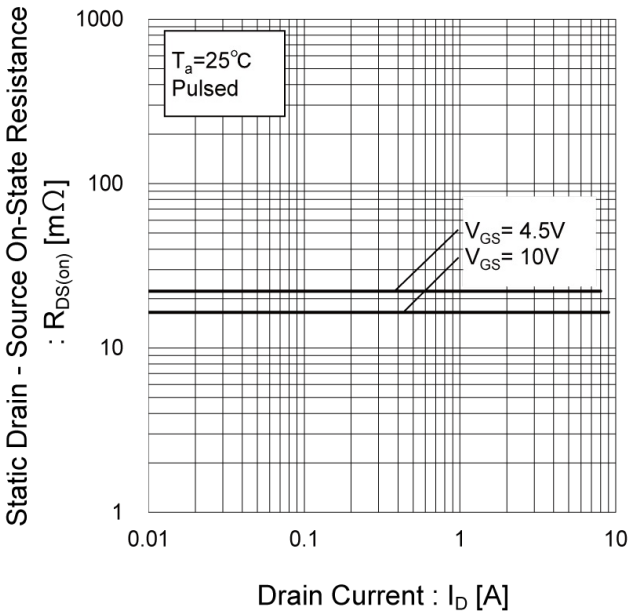


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

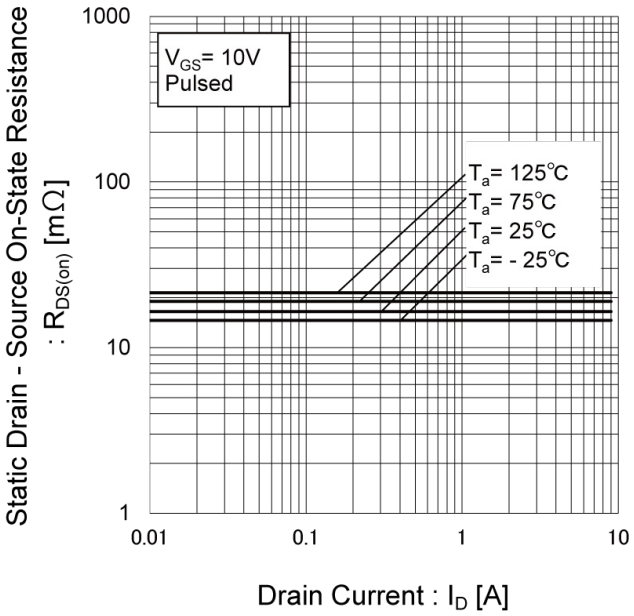
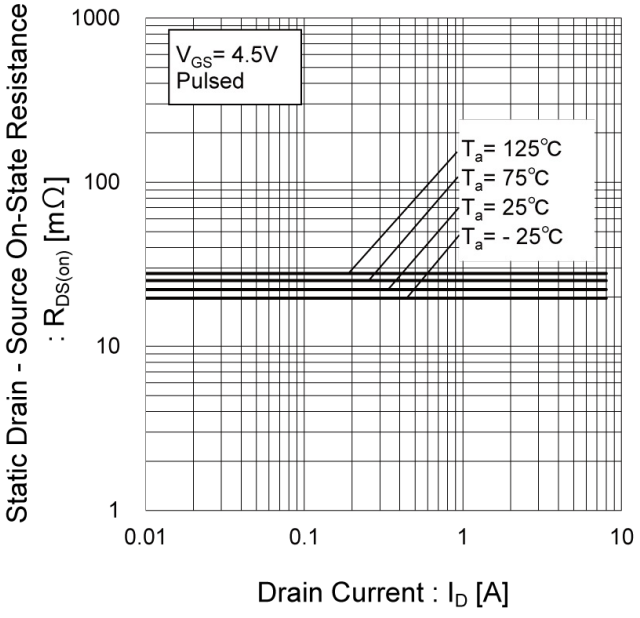


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)



●Electrical characteristic curves

Fig.17 Typical Capacitance vs. Drain - Source Voltage

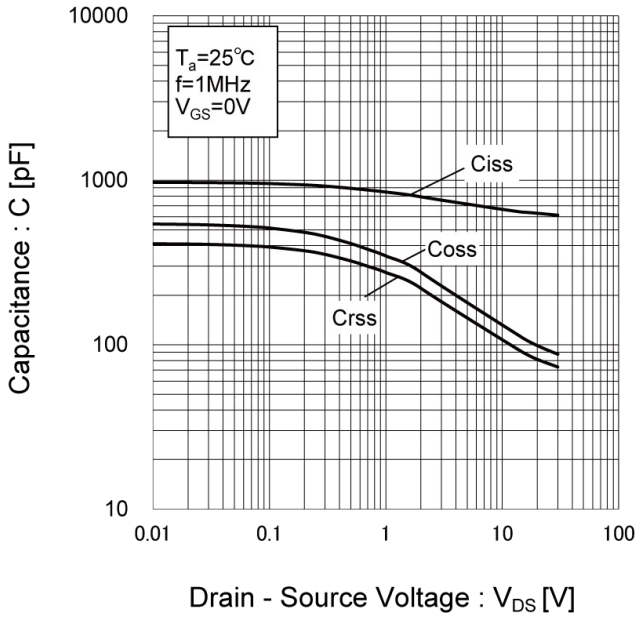


Fig.18 Switching Characteristics

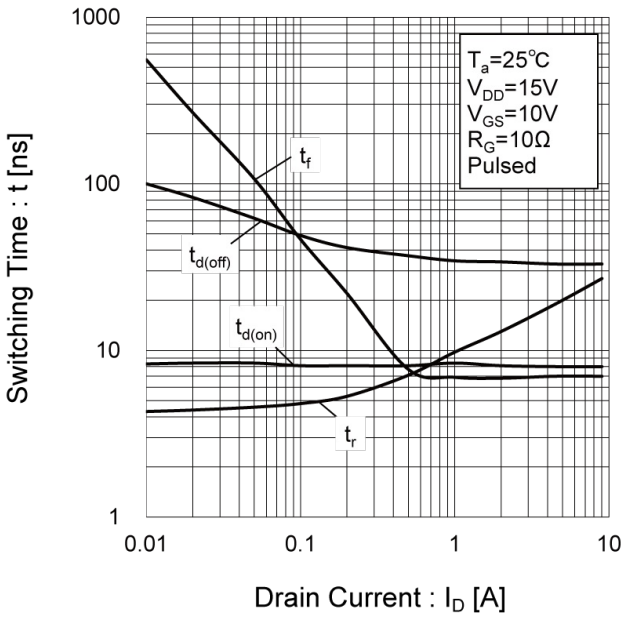


Fig.19 Dynamic Input Characteristics

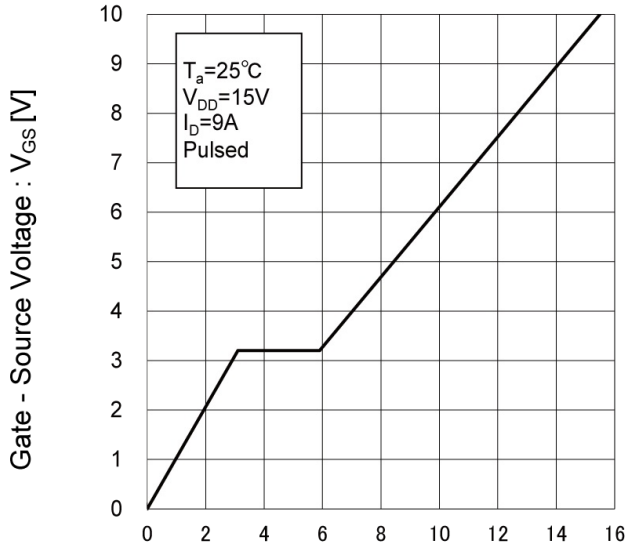
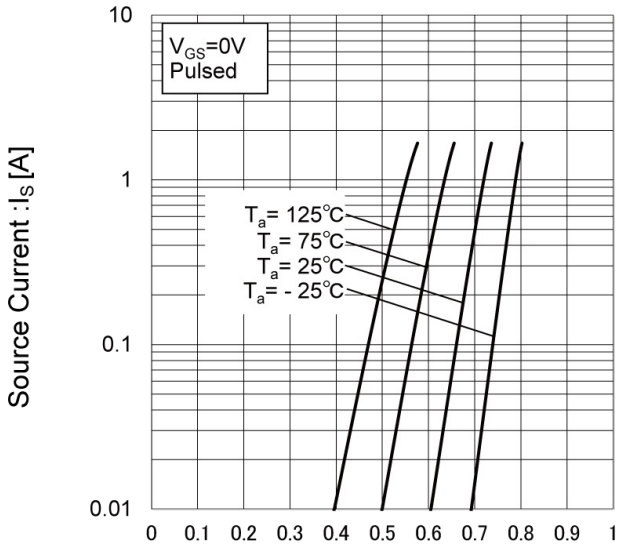


Fig.20 Source Current vs. Source Drain Voltage



●Measurement circuits <It is the same for the Tr1 and Tr2>

Fig.1-1 Switching Time Measurement Circuit

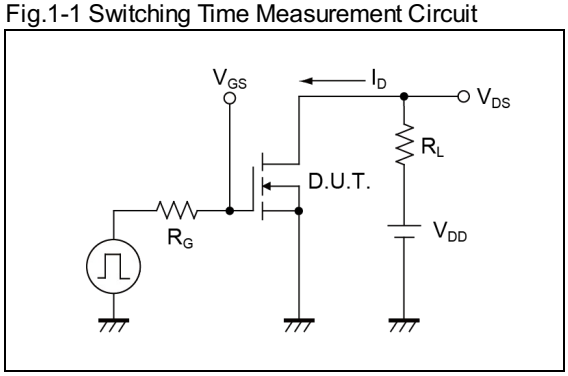


Fig.1-2 Switching Waveforms

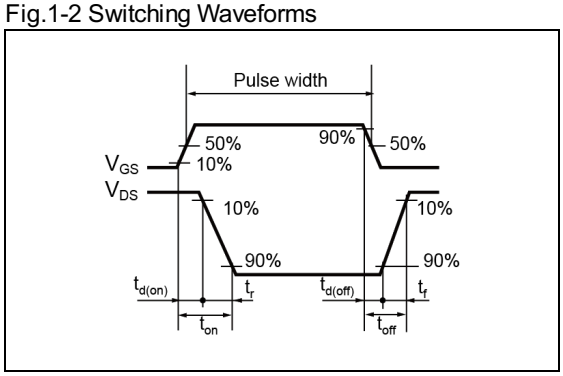


Fig.2-1 Gate Charge Measurement Circuit

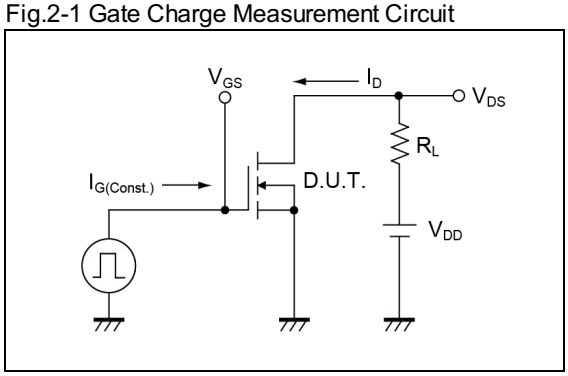


Fig.2-2 Gate Charge Waveform

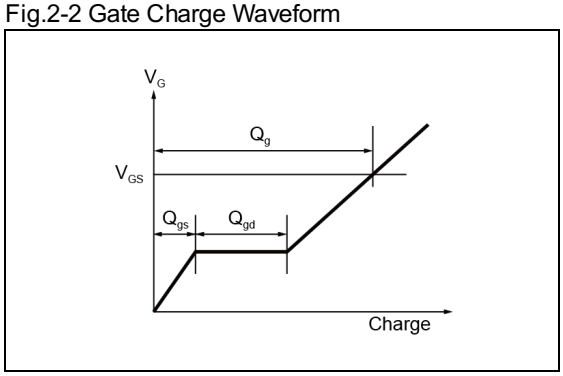


Fig.3-1 Avalanche Measurement Circuit

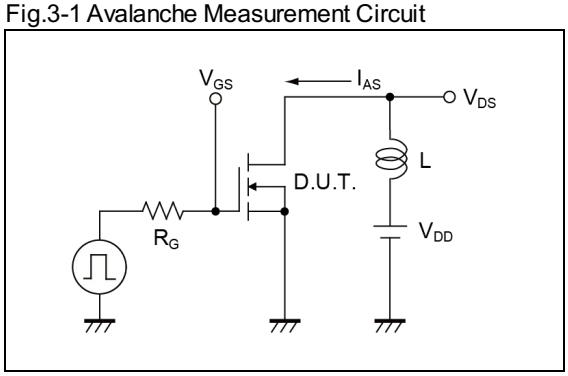
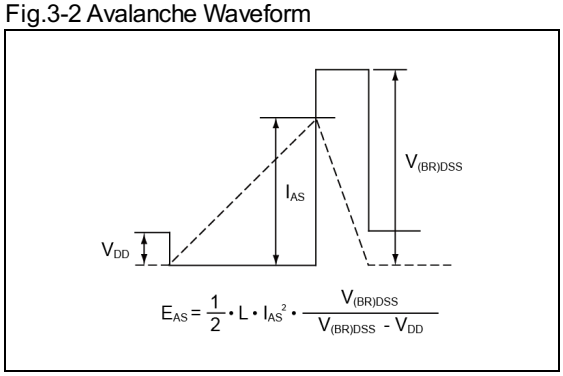


Fig.3-2 Avalanche Waveform

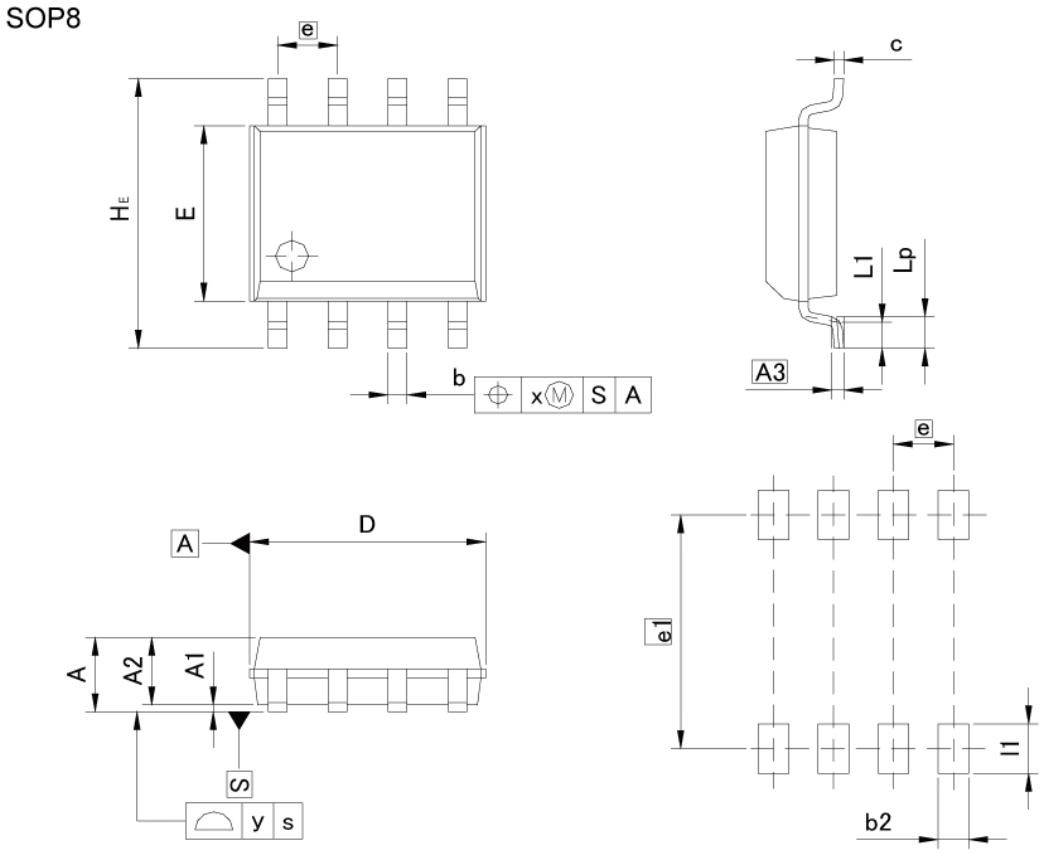


●Notice

This product might cause chip aging and breakdown under the large electrified environment.
Please consider to design ESD protection circuit.

●Dimensions

SOP8



Pattern of terminal position areas
[Not a pattern of soldering pads]

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	–	1.75	–	0.069
A1	0.15		0.006	
A2	1.40	1.60	0.055	0.063
A3	0.25		0.010	
b	0.30	0.50	0.012	0.020
c	0.10	0.30	0.004	0.012
D	4.80	5.20	0.189	0.205
E	3.75	4.05	0.148	0.159
e	1.27		0.050	
HE	5.70	6.30	0.224	0.248
L1	0.40	0.60	0.016	0.024
Lp	0.65	0.85	0.026	0.033
x	0.15		0.006	
y	0.10		0.004	

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	–	0.65	–	0.026
e1	5.15		0.203	
l1	–	1.15	–	0.045

Dimension in mm/inches

Notes

1) The information contained herein is subject to change without notice.

2) Before you use our Products, please contact our sales representative and verify the latest specifications :

3) Although ROHM is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors.
Therefore, in order to prevent personal injury or fire arising from failure, please take safety measures such as complying with the derating characteristics, implementing redundant and fire prevention designs, and utilizing backups and fail-safe procedures. ROHM shall have no responsibility for any damages arising out of the use of our Poducts beyond the rating specified by ROHM.

4) Examples of application circuits, circuit constants and any other information contained herein are provided only to illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

5) The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM or any other parties. ROHM shall have no responsibility whatsoever for any dispute arising out of the use of such technical information.

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7) The Products specified in this document are not designed to be radiation tolerant.

8) For use of our Products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a ROHM representative : transportation equipment (i.e. cars, ships, trains), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems.

9) Do not use our Products in applications requiring extremely high reliability, such as aerospace equipment, nuclear power control systems, and submarine repeaters.

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