RUS100N02

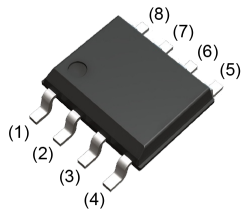
Nch 20V 10A Middle Power MOSFET

Datasheet

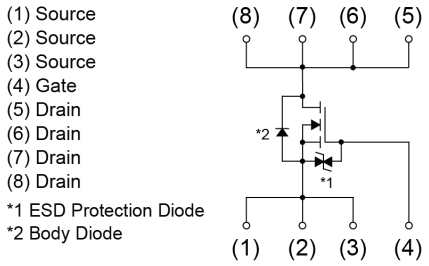
V_{DSS}	20V
$R_{DS(on)}$(Max.)	12mΩ
I_D	±10A
P_D	2.0W

●Outline

SOP8



●Inner circuit



●Features

1) Low on - resistance.
2) High Power small mold Package (SOP8).
3) Pb-free lead plating ; RoHS compliant.

●Application

Switching

●Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	330
	Tape width (mm)	12
	Basic ordering unit (pcs)	2500
	Taping code	TB
	Marking	RUS100N02

●Absolute maximum ratings (T_a = 25°C)

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	20	V
Continuous drain current	I_D	±10	A
Pulsed drain current	$I_{D,pulse}$ *1	±36	A
Gate - Source voltage	V_{GSS}	±10	V
Power dissipation	P_D *2	2.0	W
Junction temperature	T_j	150	℃
Range of storage temperature	T_{stg}	-55 to +150	℃

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA} *2	-	62.5	-	℃/W

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 1mA	20	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	I_D = 1mA referenced to 25℃	-	18.7	-	mV/℃
Zero gate voltage drain current	I_{DSS}	V_{DS} = 20V, V_{GS} = 0V	-	-	1	μA
Gate - Source leakage current	I_{GSS}	V_{GS} = ±10V, V_{DS} = 0V	-	-	±10	μA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = 10V, I_D = 1mA	0.3	-	1.0	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	I_D = 1mA referenced to 25℃	-	2.5	-	mV/℃
Static drain - source on - state resistance	$R_{DS(on)}$ *3	V_{GS} = 4.5V, I_D = 10A	-	8	12	mΩ
		V_{GS} = 2.5V, I_D = 10A	-	9	13	
		V_{GS} = 1.8V, I_D = 5A	-	11	16	
		V_{GS} = 1.5V, I_D = 2.5A	-	13	19	
Forward Transfer Admittance	$\|Y_{fs}\|$ *3	V_{DS} = 10V, I_D = 10A	15	-	-	S

*1 Pw ≦ 10μs, Duty cycle ≦ 1%

*2 Mounted on a ceramic boad

*3 Pulsed

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	2250	-	pF
Output capacitance	C_{oss}	V_{DS} = 10V	-	550	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	280	-	
Turn - on delay time	$t_{d(on)}$ *3	V_{DD} ≃ 10V, V_{GS} = 4.5V	-	25	-	ns
Rise time	t_r *3	I_D = 5A	-	65	-	
Turn - off delay time	$t_{d(off)}$ *3	R_L ≃ 2Ω	-	125	-	
Fall time	t_f *3	R_G = 10Ω	-	125	-	

●Gate charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *3	V_{DD} ≃ 10V, I_D = 10A, V_{GS} = 4.5V	-	24	-	nC
Gate - Source charge	Q_{gs} *3		-	3.2	-	
Gate - Drain charge	Q_{gd} *3		-	6.4	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Body diode continuous forward current	I_S	T_a = 25°C	-	-	1.6	A
Body diode pulse current	I_{SP} *1		-	-	36	A
Forward voltage	V_{SD} *3	V_{GS} = 0V, I_S = 10A	-	-	1.2	V

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

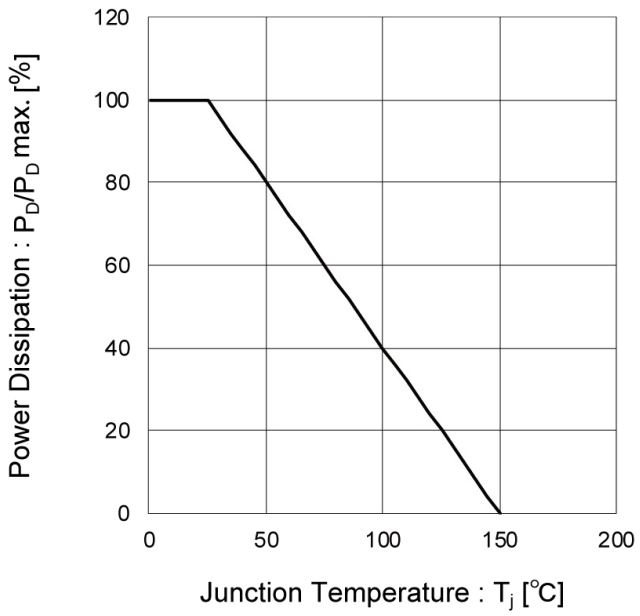


Fig.2 Maximum Safe Operating Area

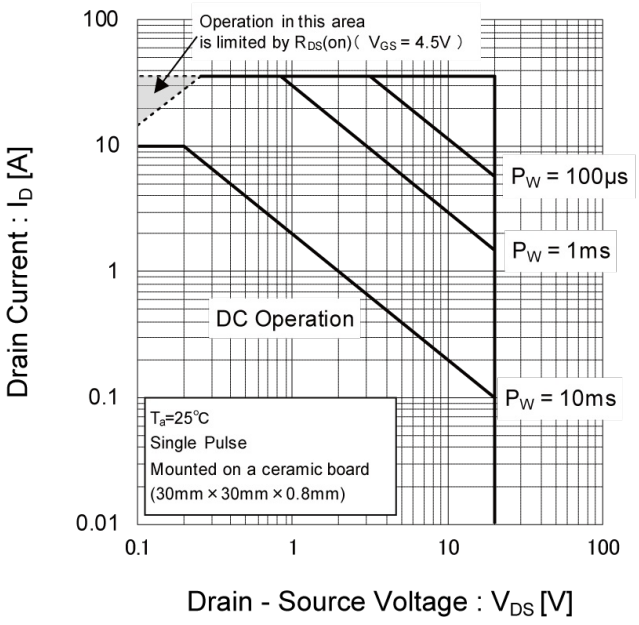


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

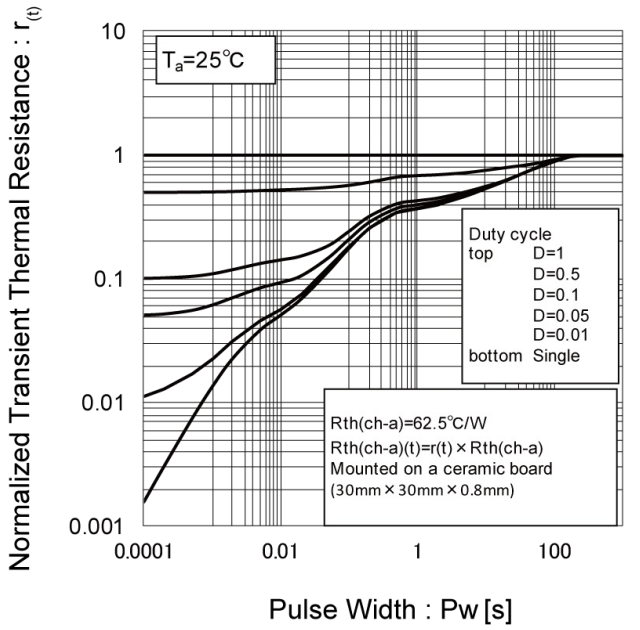
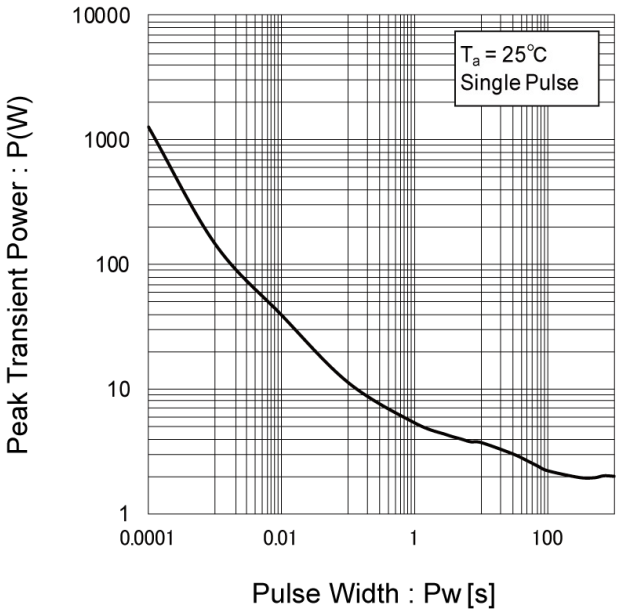


Fig.4 Single Pulse Maximum Power dissipation



●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

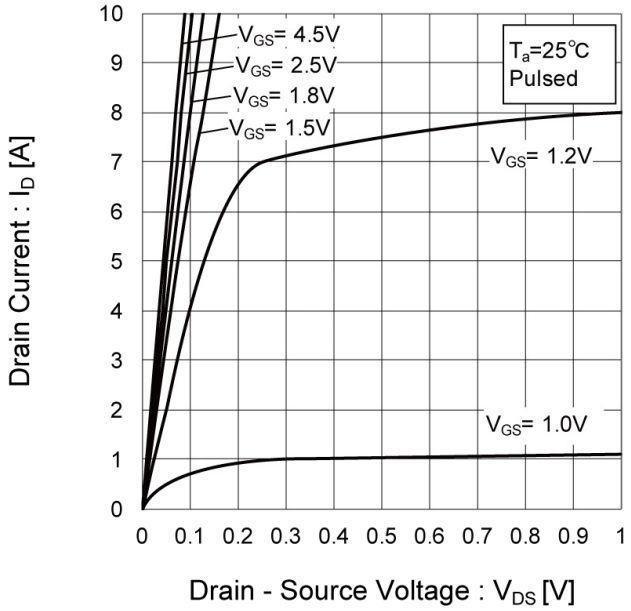


Fig.6 Typical Output Characteristics(II)

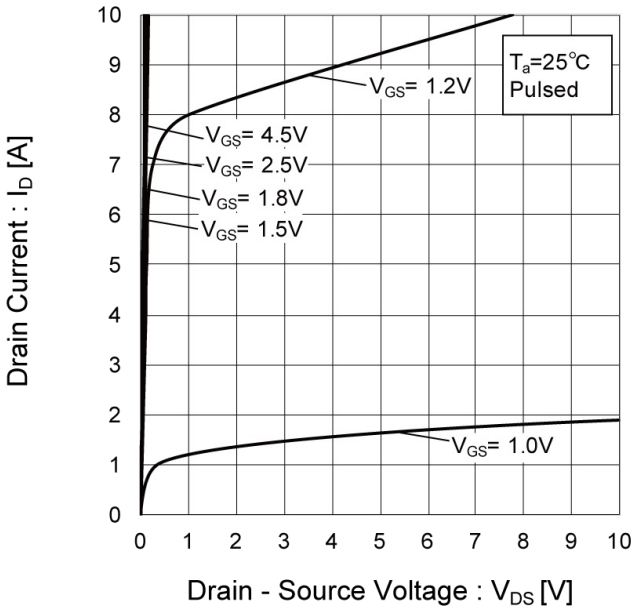


Fig.7 Breakdown Voltage vs. Junction Temperature

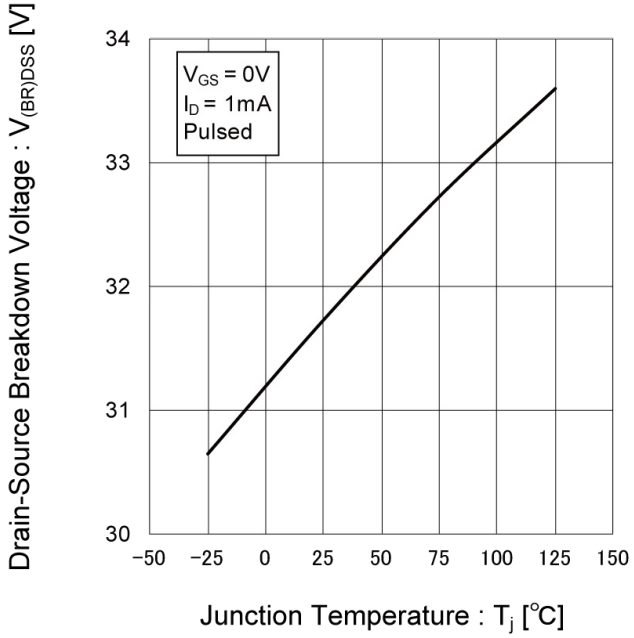
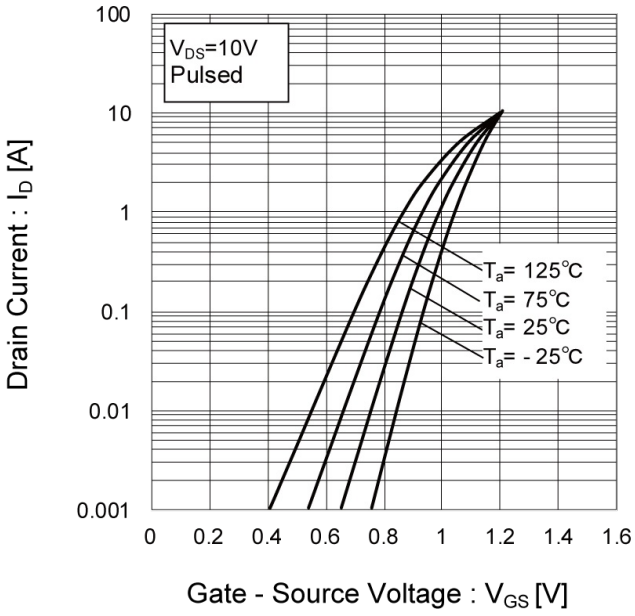


Fig.8 Typical Transfer Characteristics



●Electrical characteristic curves

Fig.9 Gate Threshold Voltage vs. Junction Temperature

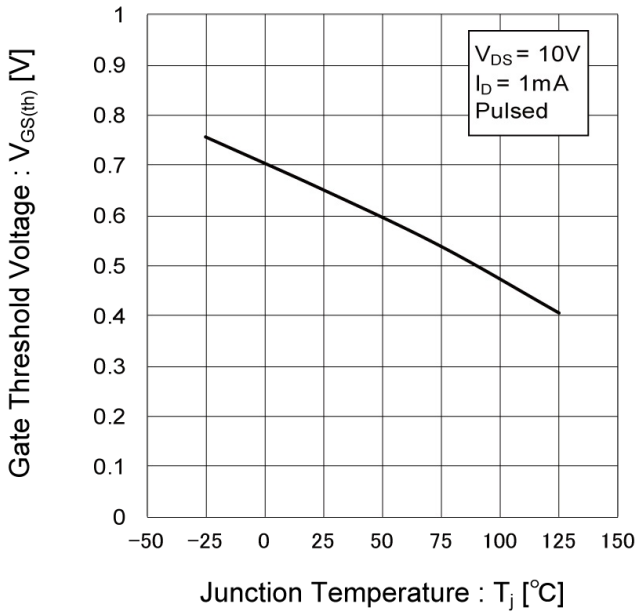


Fig.10 Tranceconductance vs. Drain Current

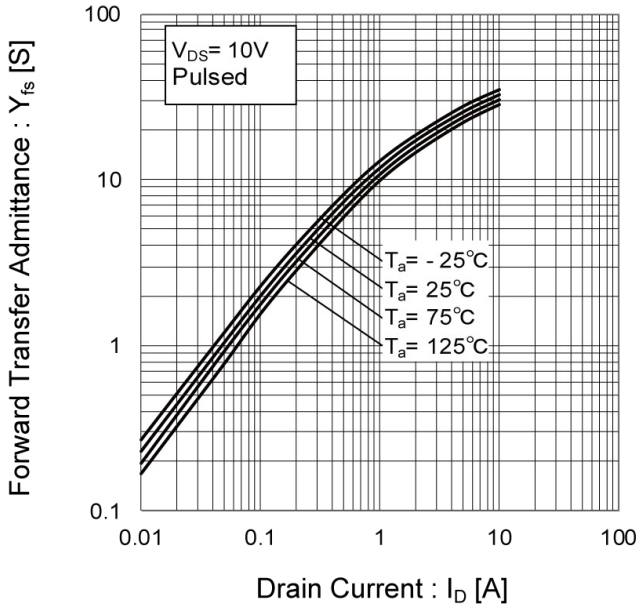


Fig.11 Drain Current Derating Curve

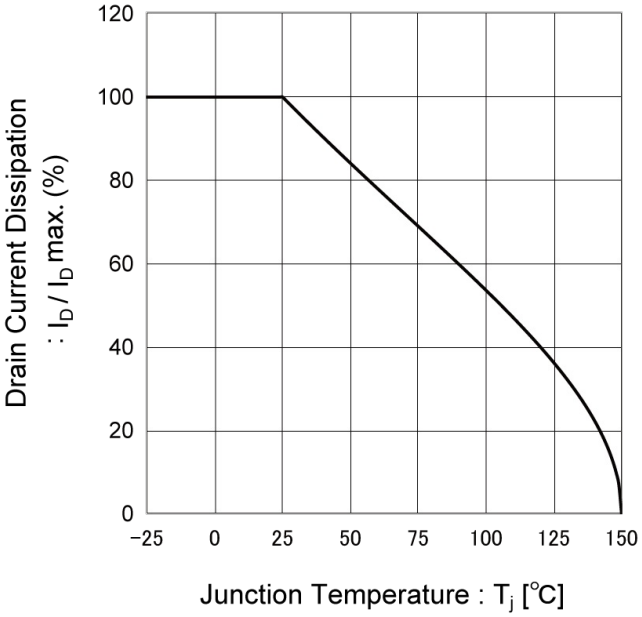
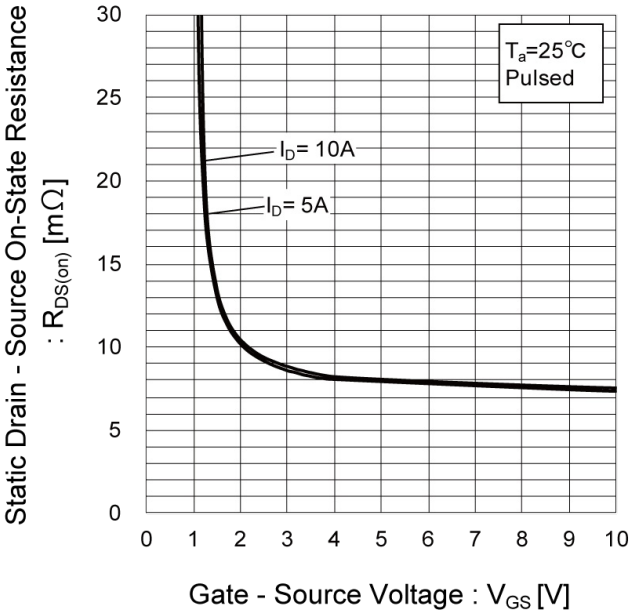


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage



●Electrical characteristic curves

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

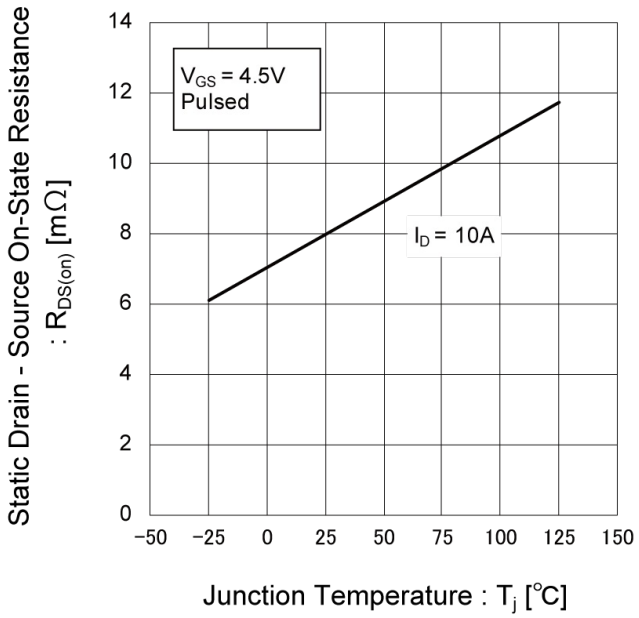


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current(I)

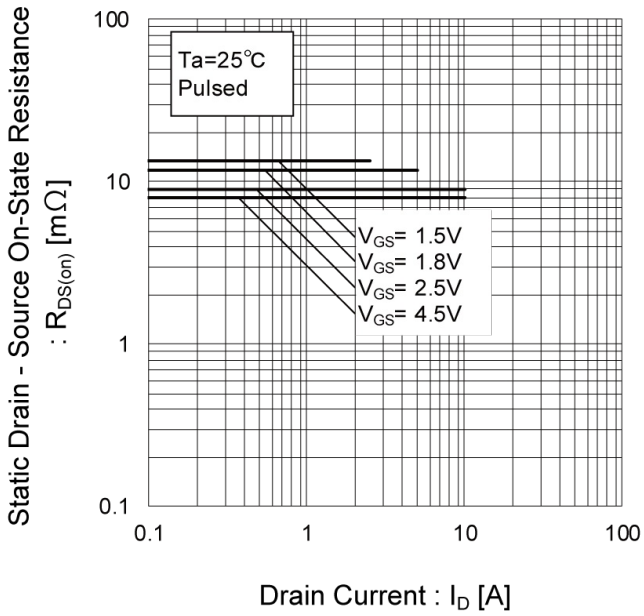


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

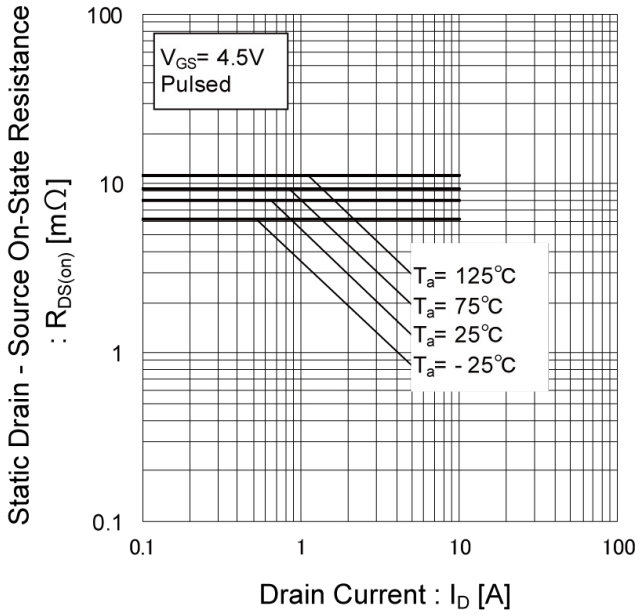
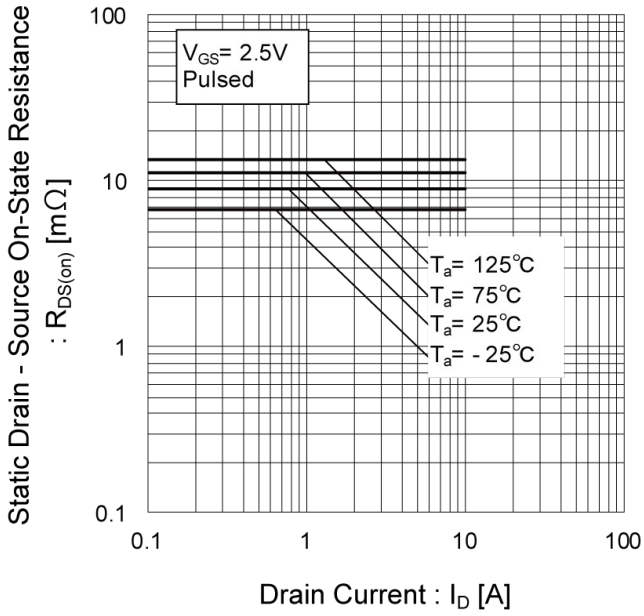


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)



●Electrical characteristic curves

Fig.17 Static Drain - Source On - State Resistance vs. Drain Current(Ⅳ)

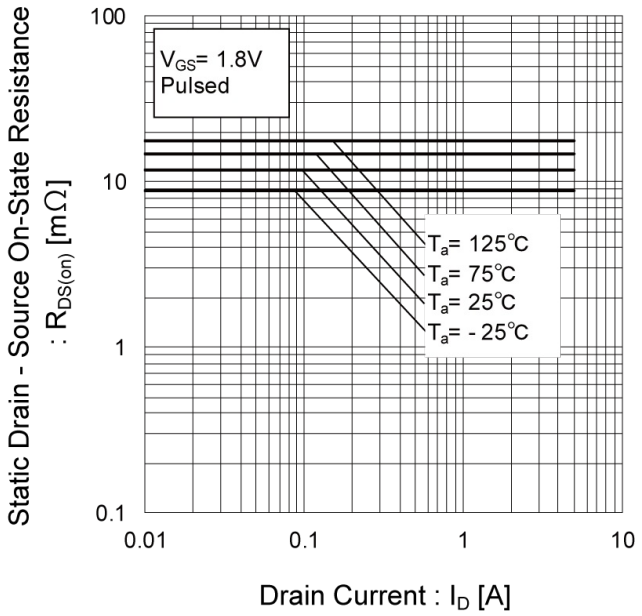


Fig.18 Static Drain - Source On - State Resistance vs. Drain Current(Ⅴ)

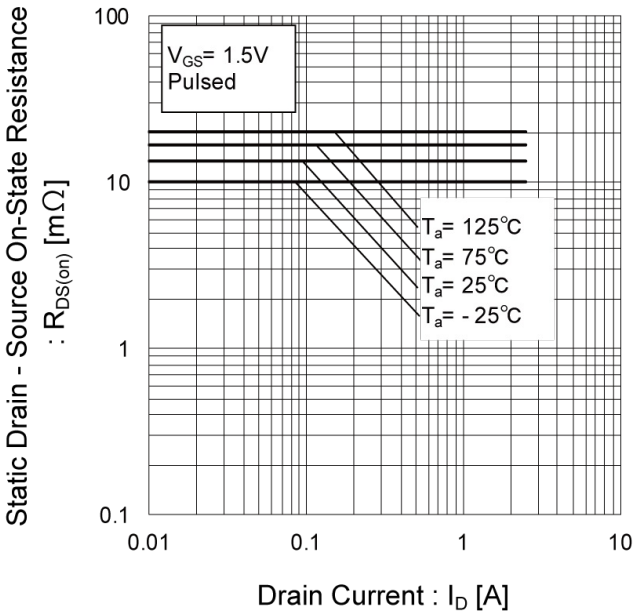


Fig.19 Typical Capacitance vs. Drain - Source Voltage

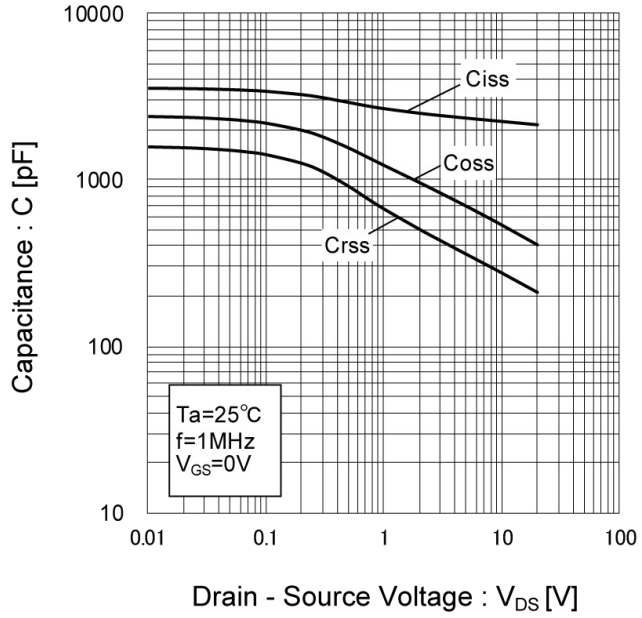
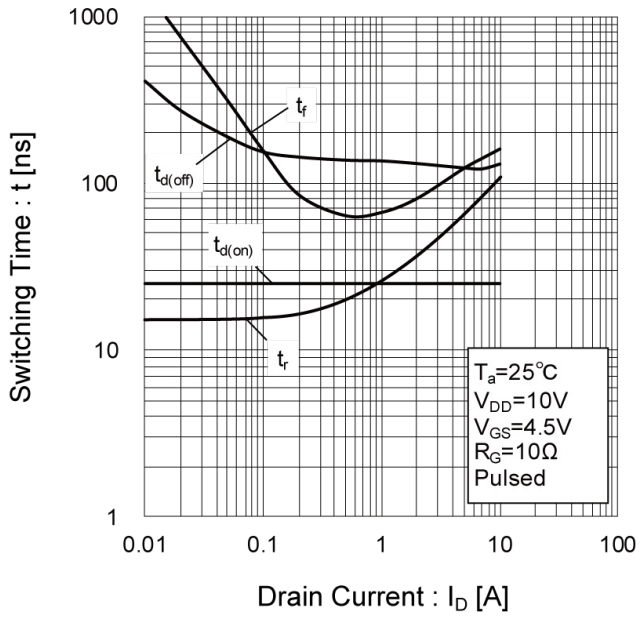


Fig.20 Switching Characteristics



●Electrical characteristic curves

Fig.21 Dynamic Input Characteristics

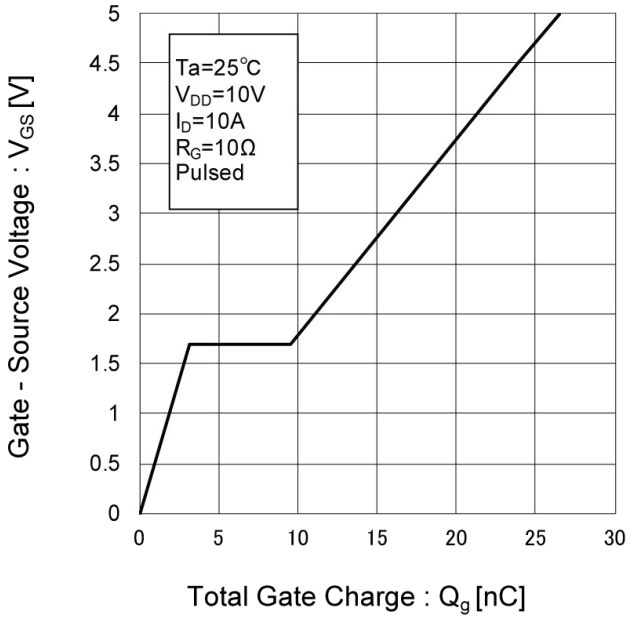
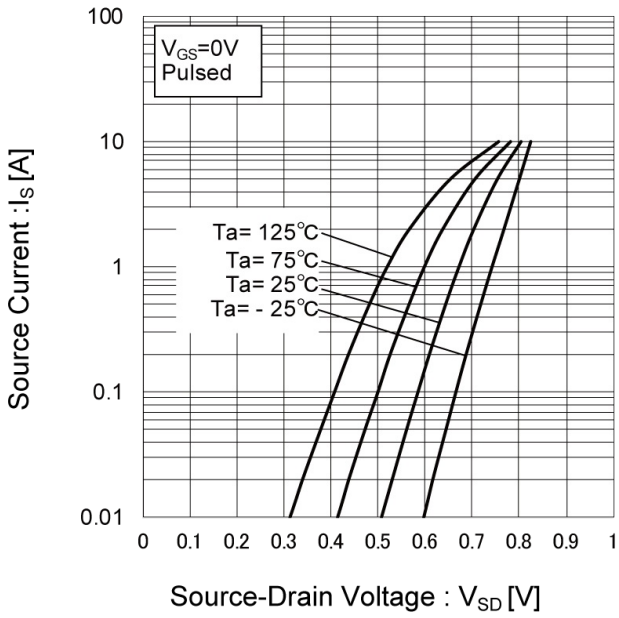


Fig.22 Source Current vs. Source Drain Voltage



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

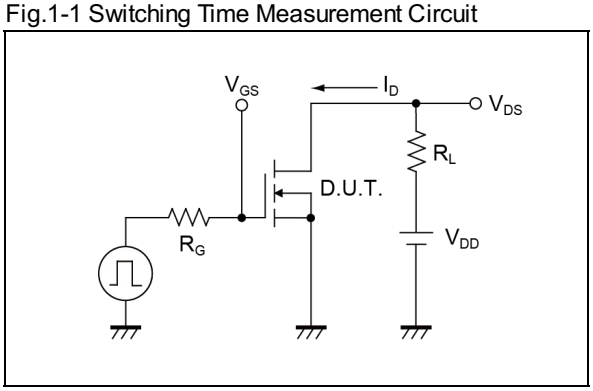


Fig.1-2 Switching Waveforms

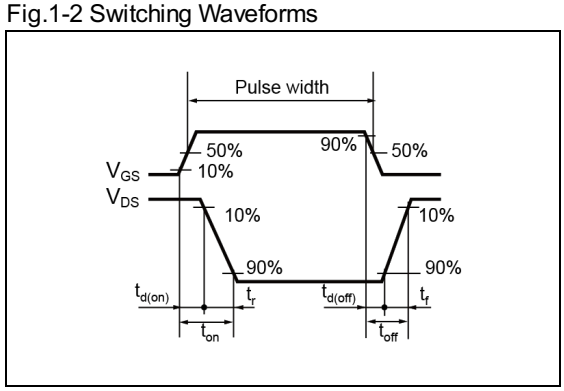


Fig.2-1 Gate Charge Measurement Circuit

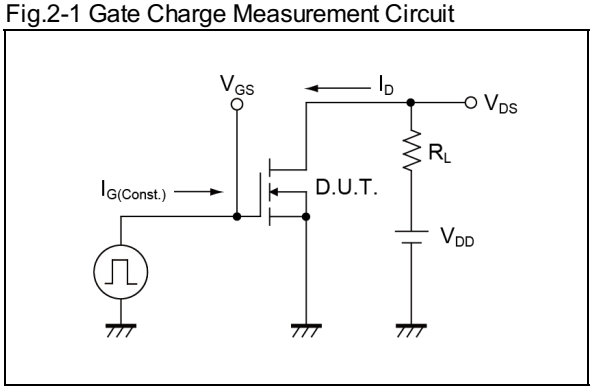
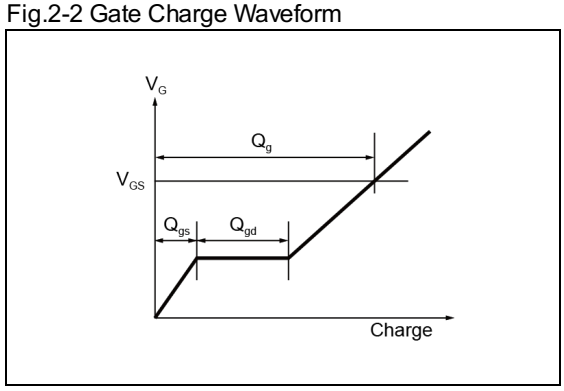
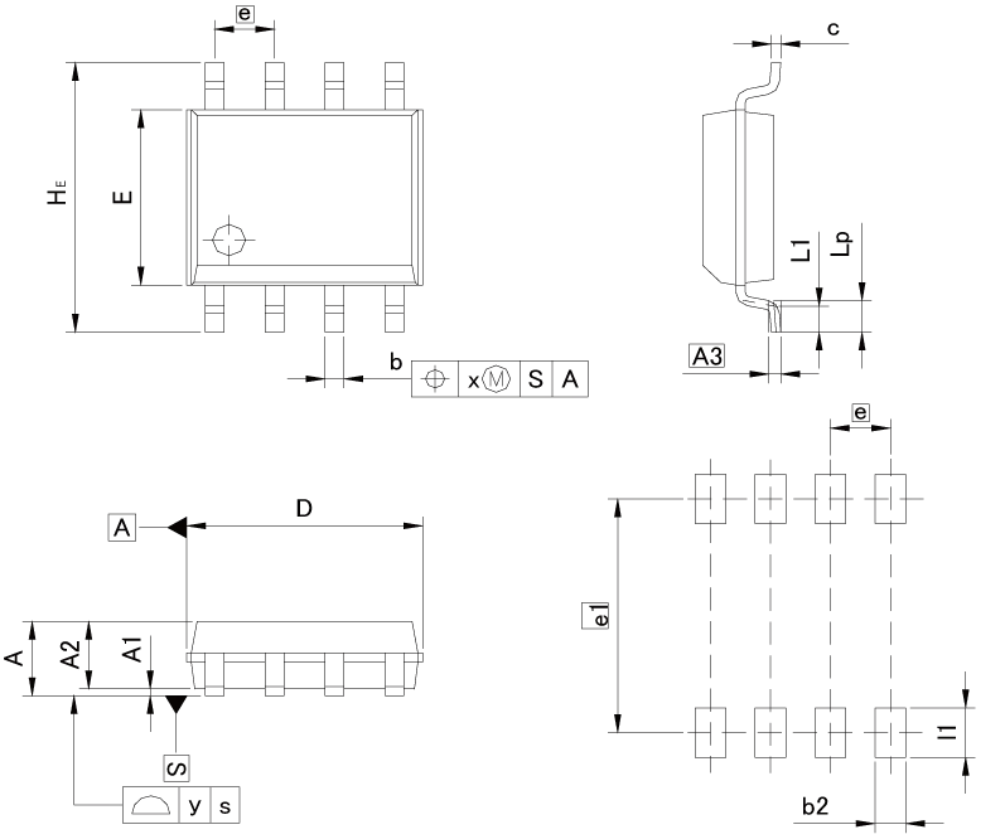


Fig.2-2 Gate Charge Waveform



●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	0.50	0.70	0.020	0.028
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

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3) Although ROHM is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors.
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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.

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

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ROHM SEMICONDUCTOR

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