RUS100N02

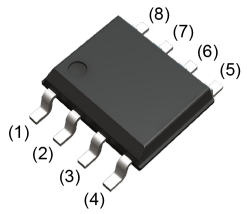
Nch 20V 10A Middle Power MOSFET

Datasheet

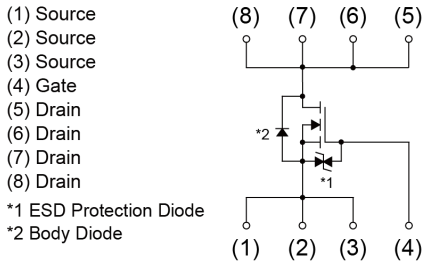
V_{DSS}	20V
$R_{DS(on)}$(Max.)	12mΩ
I_D	±10A
P_D	2.0W

●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

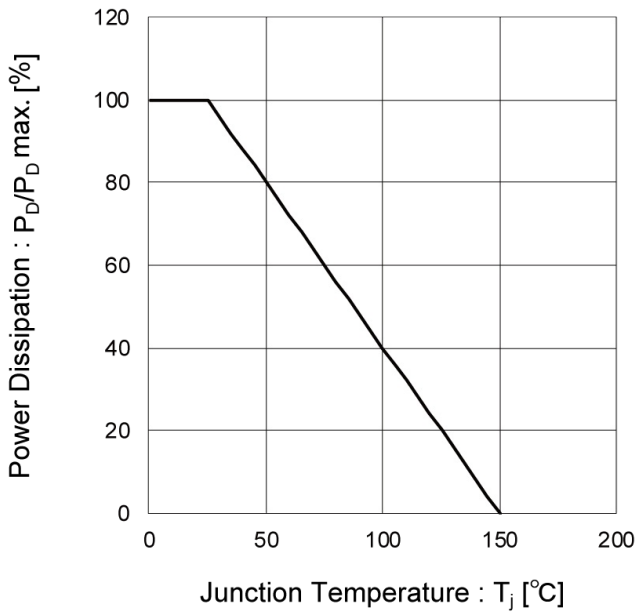


Fig.2 Maximum Safe Operating Area

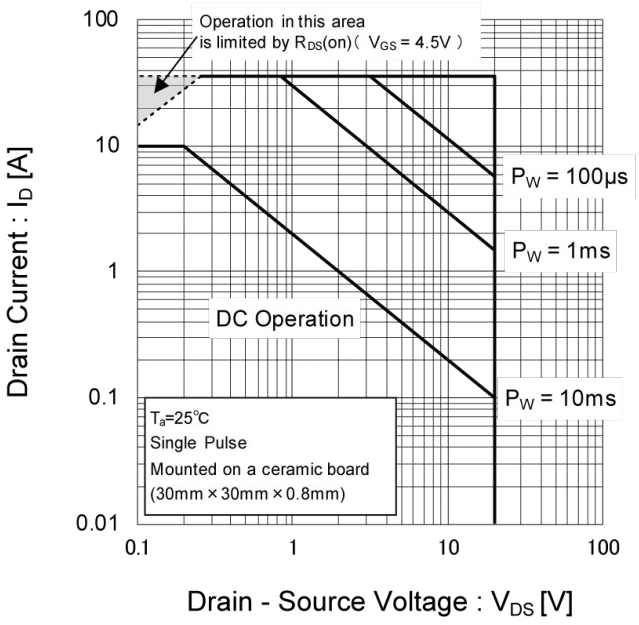


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

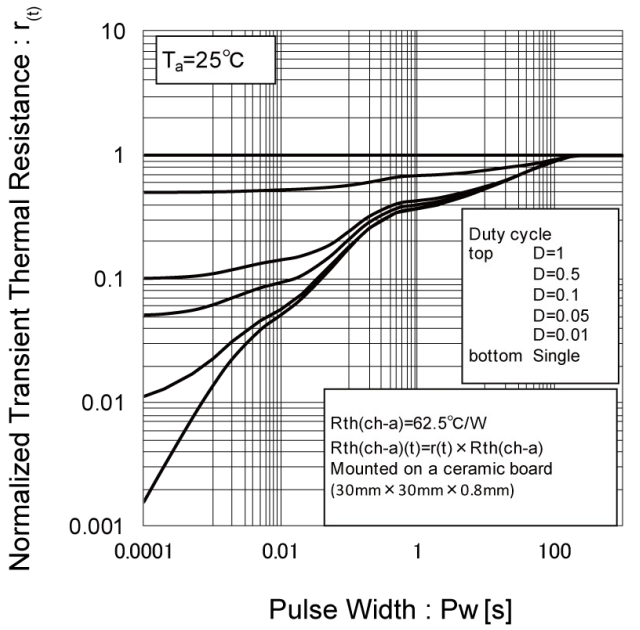
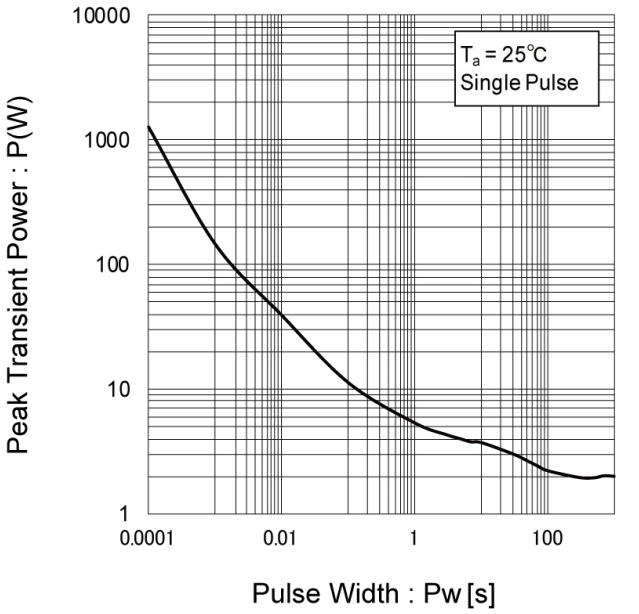


Fig.4 Single Pulse Maximum Power dissipation



●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

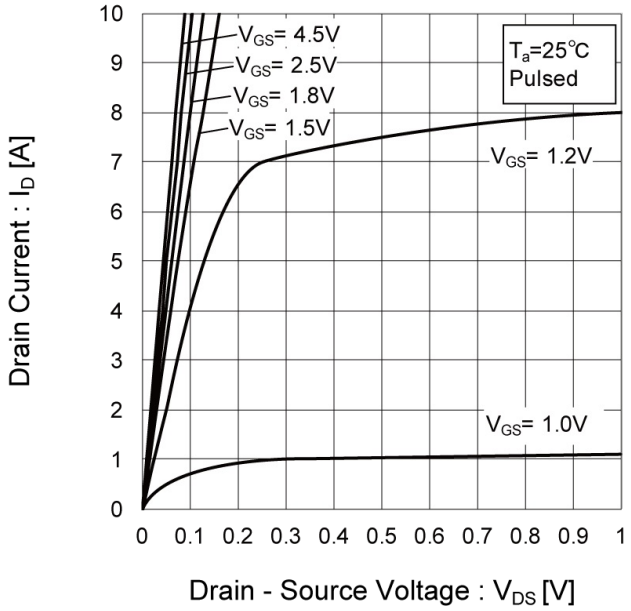


Fig.6 Typical Output Characteristics(II)

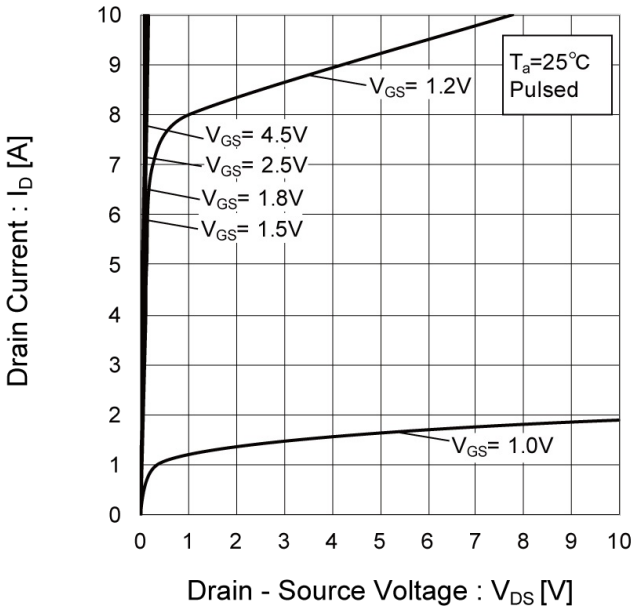


Fig.7 Breakdown Voltage vs. Junction Temperature

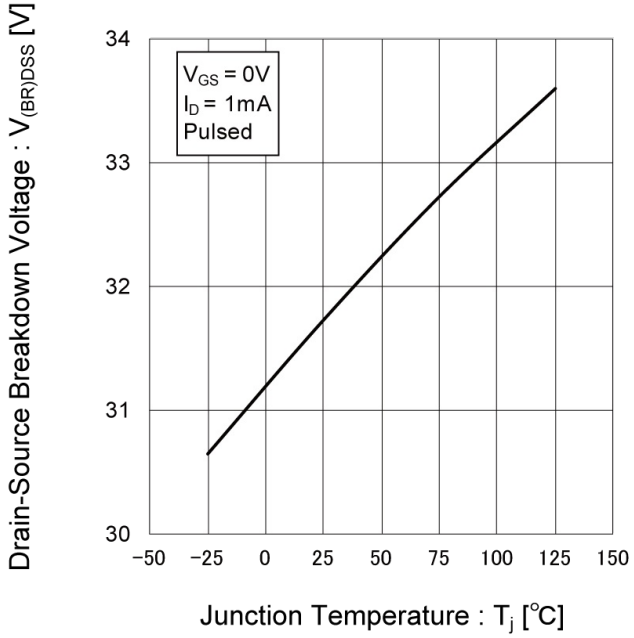
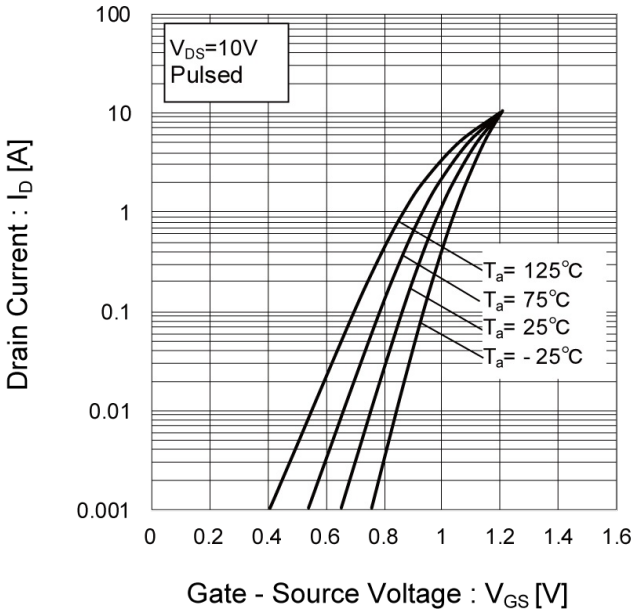


Fig.8 Typical Transfer Characteristics



●Electrical characteristic curves

Fig.9 Gate Threshold Voltage vs. Junction Temperature

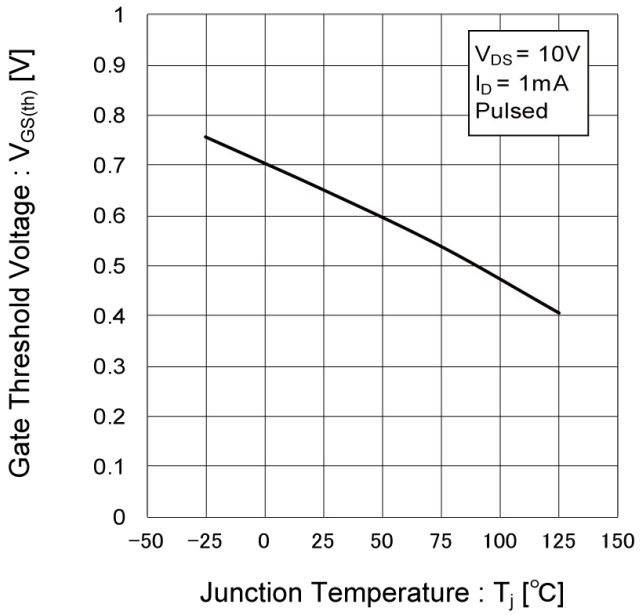


Fig.10 Tranceconductance vs. Drain Current

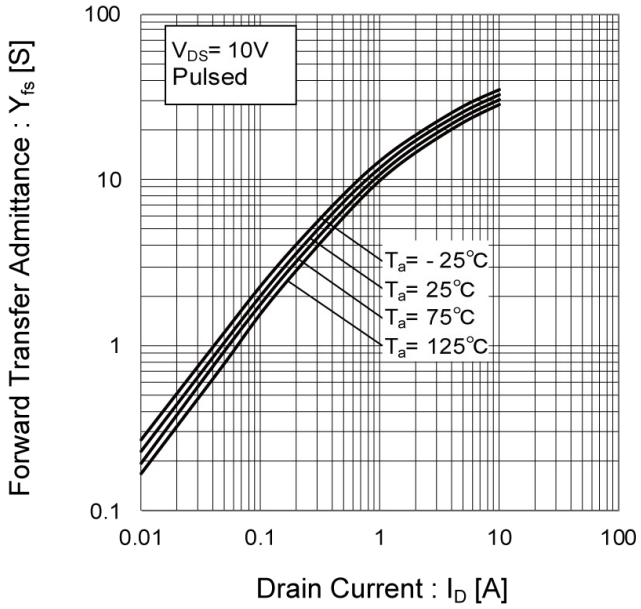


Fig.11 Drain Current Derating Curve

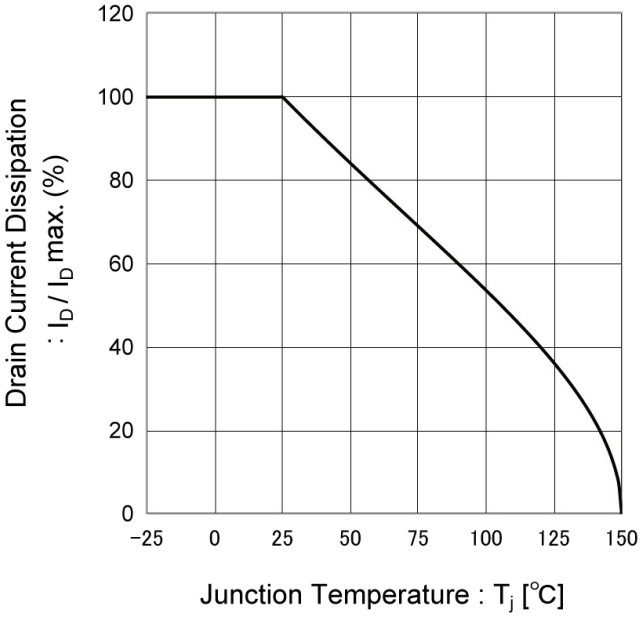
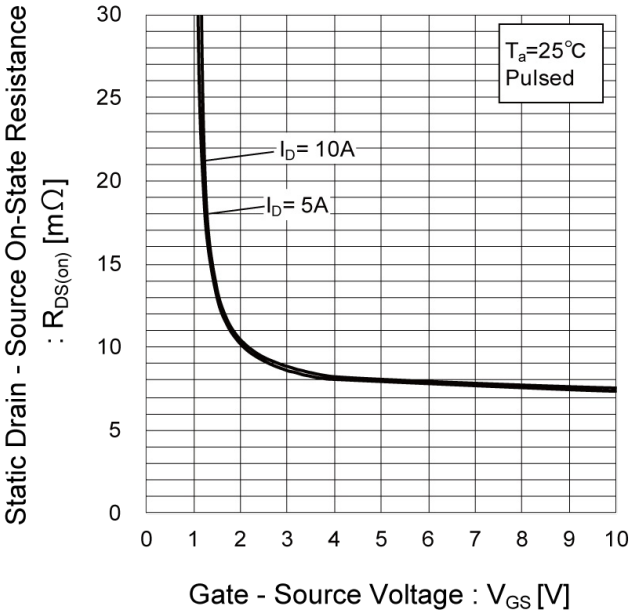


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage



●Electrical characteristic curves

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

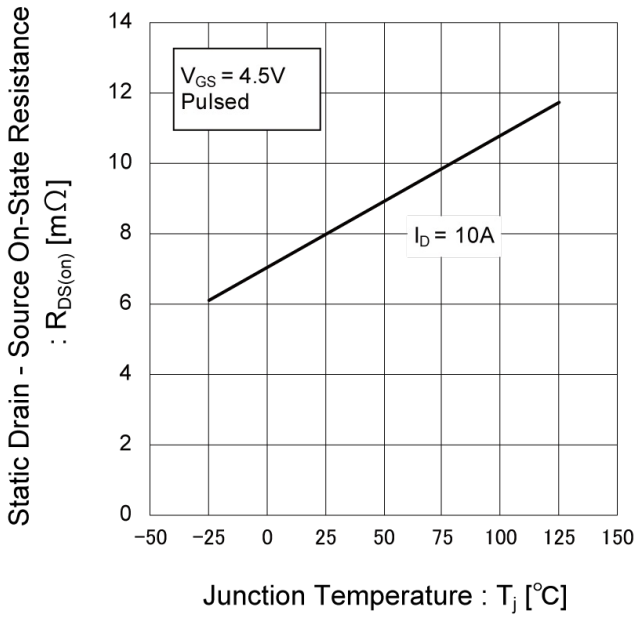


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current(I)

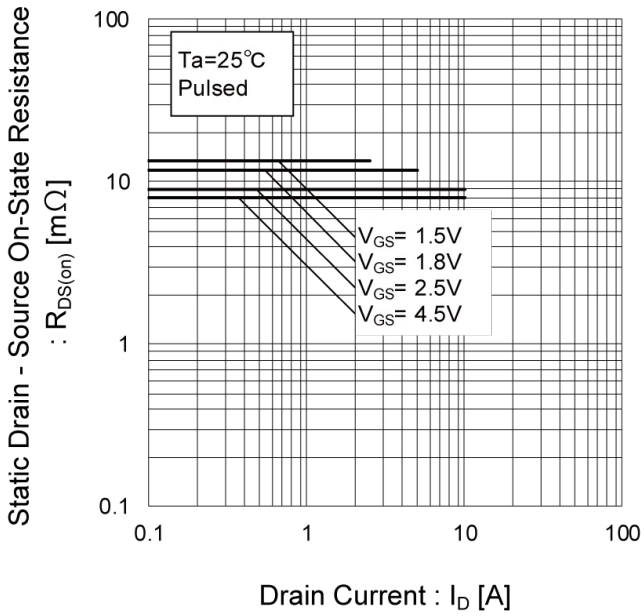


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

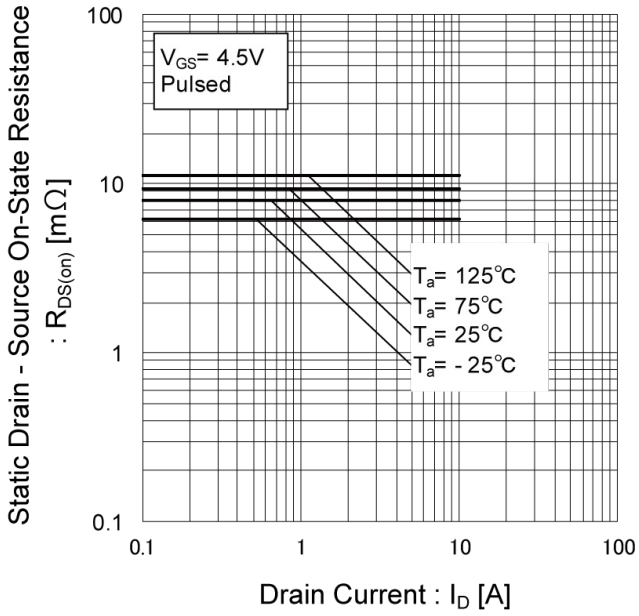
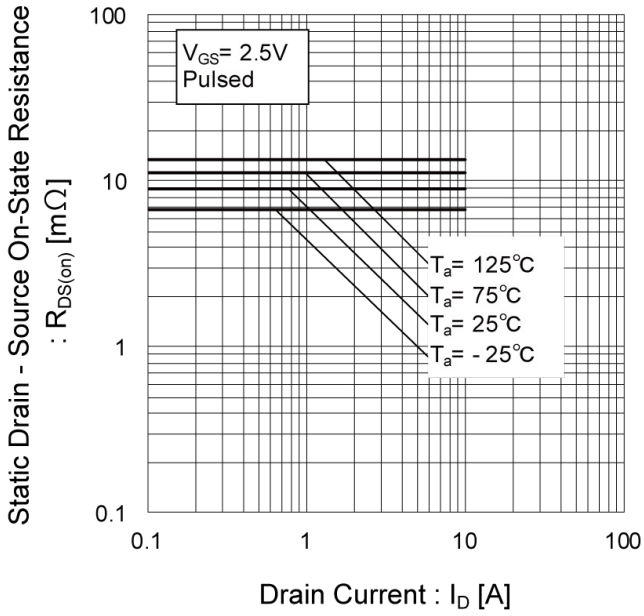


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)



●Electrical characteristic curves

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

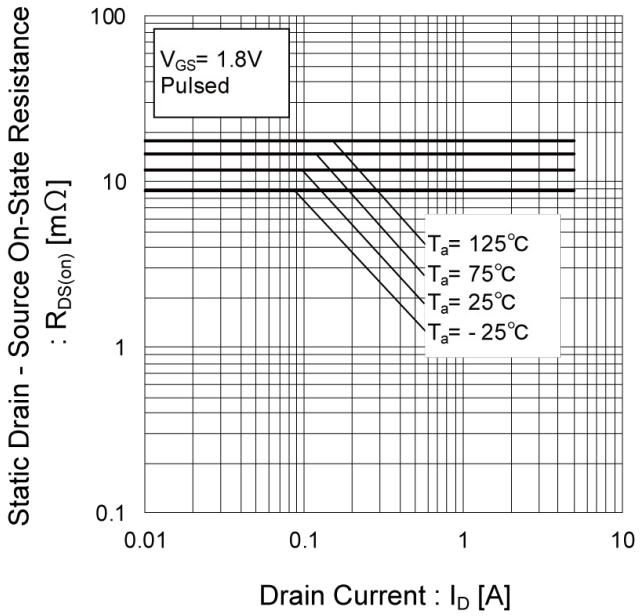


Fig.18 Static Drain - Source On - State Resistance vs. Drain Current(Ⅴ)

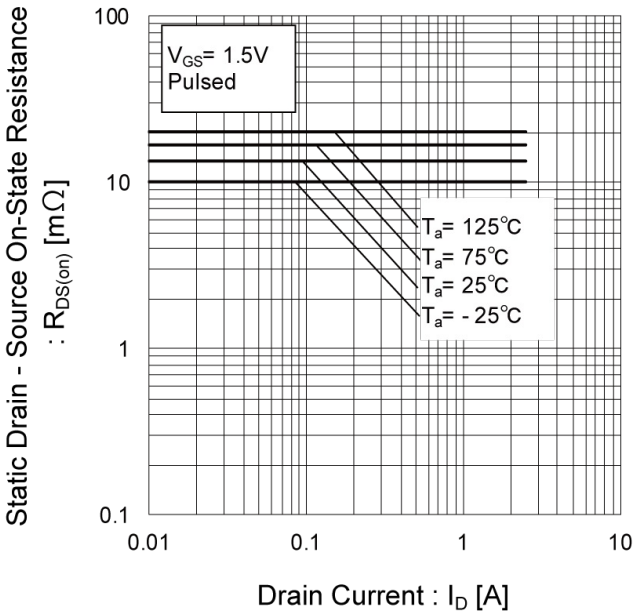


Fig.19 Typical Capacitance vs. Drain - Source Voltage

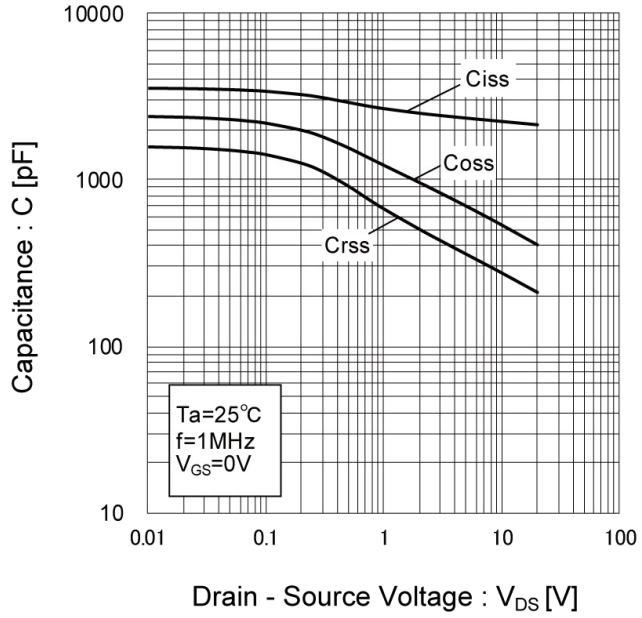
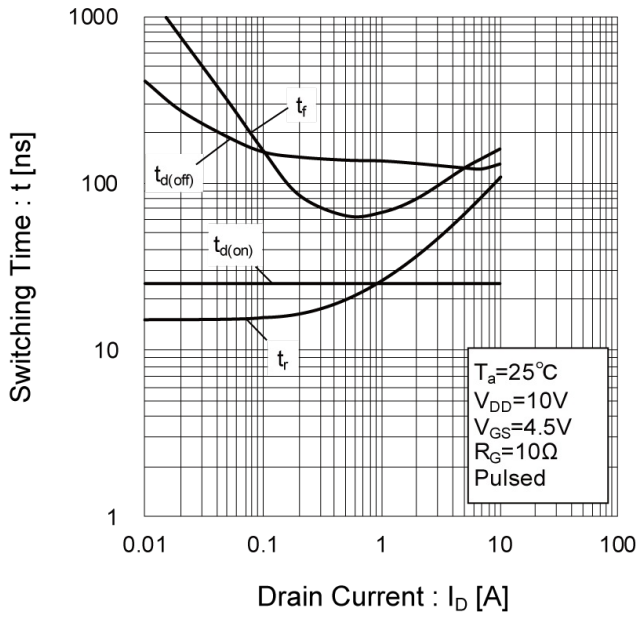


Fig.20 Switching Characteristics



●Electrical characteristic curves

Fig.21 Dynamic Input Characteristics

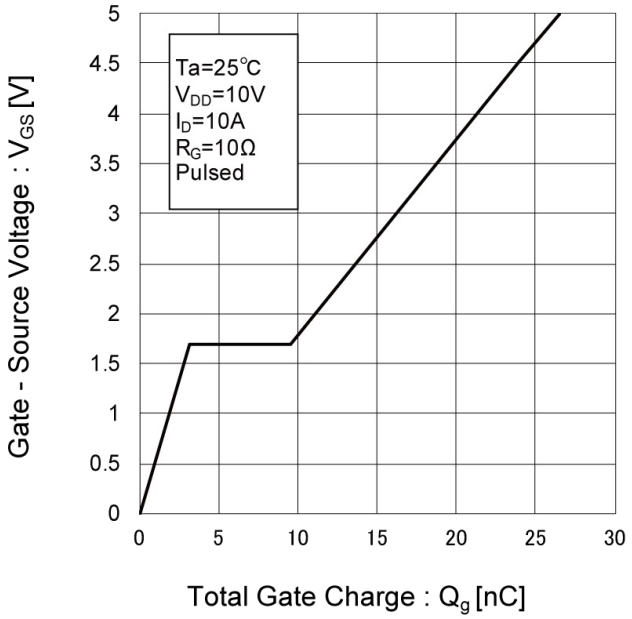
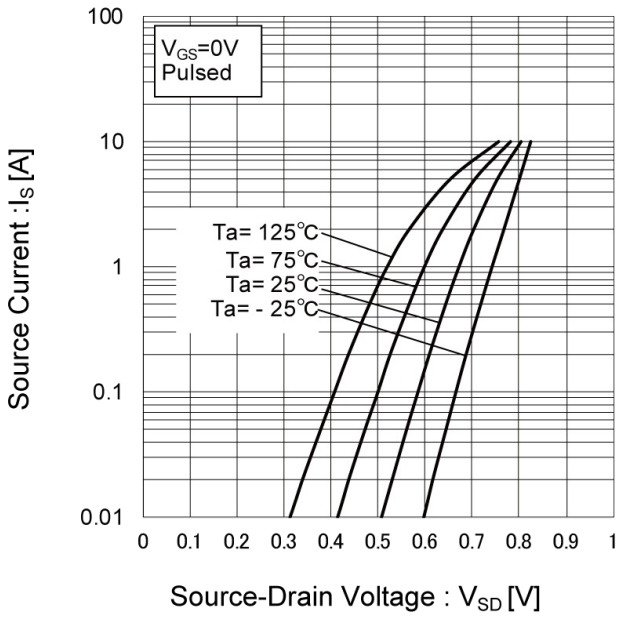


Fig.22 Source Current vs. Source Drain Voltage



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

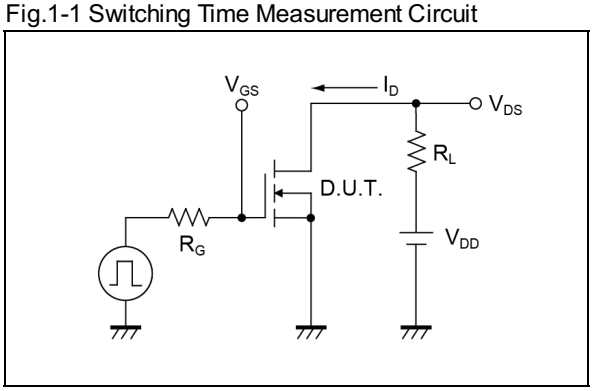


Fig.1-2 Switching Waveforms

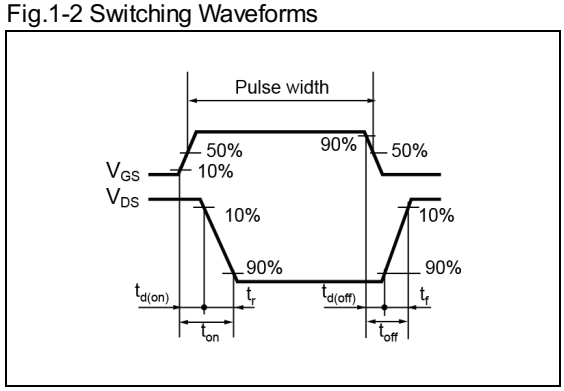


Fig.2-1 Gate Charge Measurement Circuit

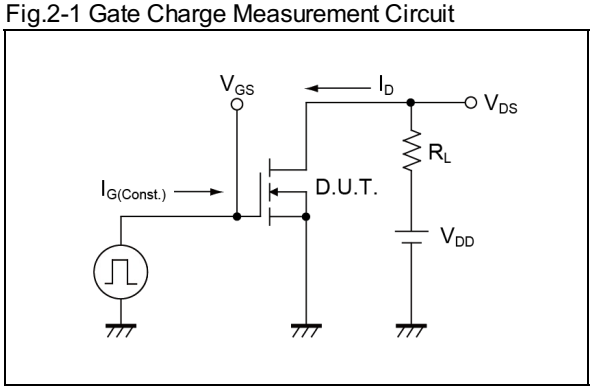
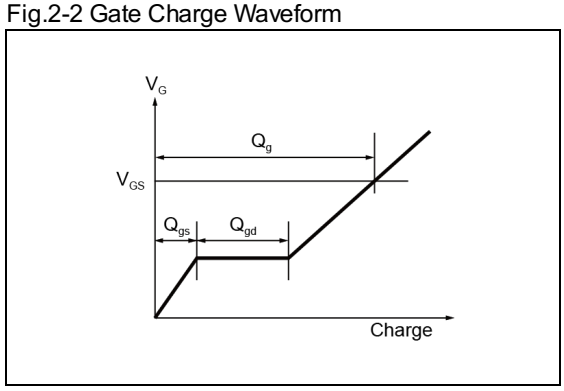
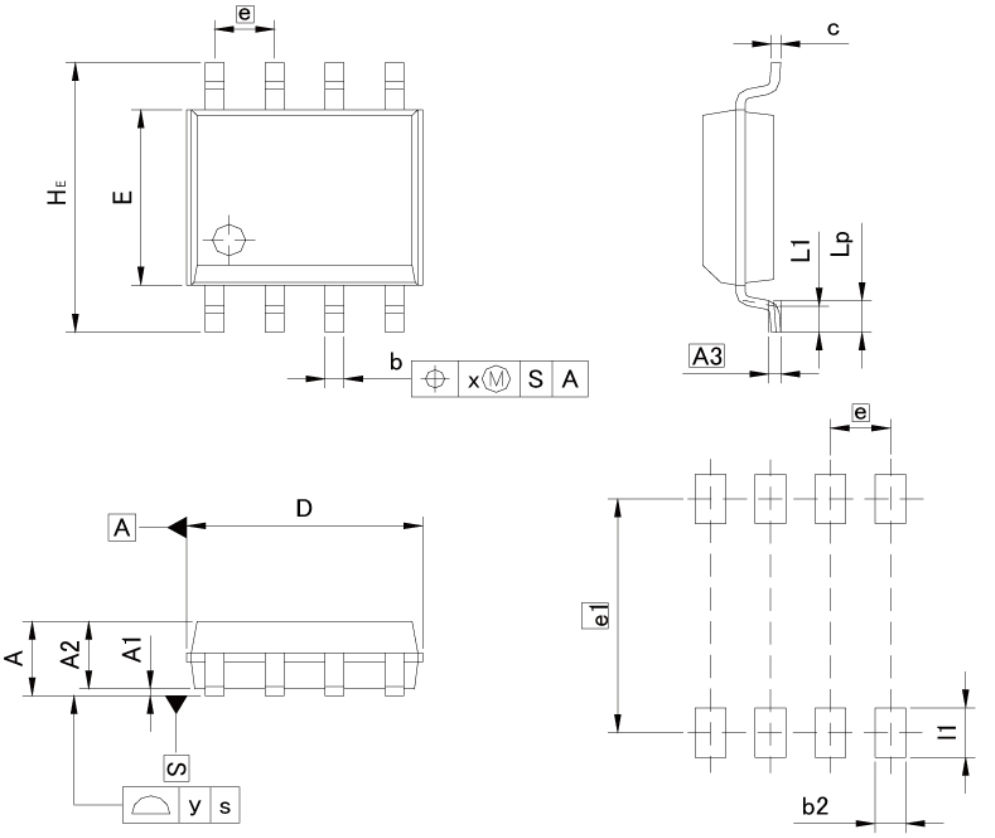


Fig.2-2 Gate Charge Waveform



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

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