

$V_{DSS}$	20V
$R_{DS(on)(Max.)}$	12m $\Omega$
$I_D$	$\pm 10A$
$P_D$	2.0W

### ●Features

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

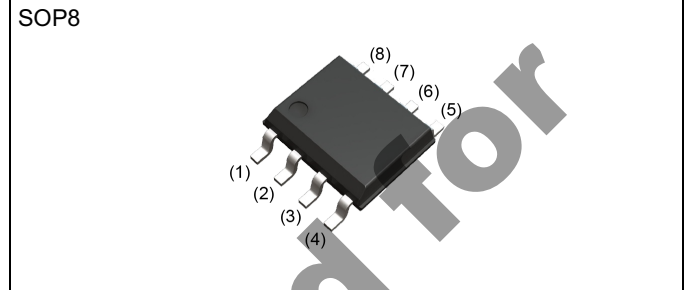
### ●Application

Switching

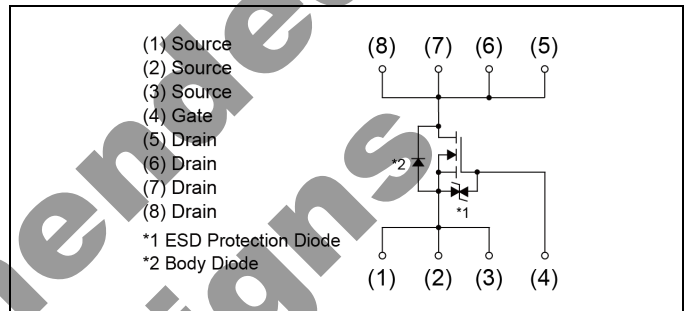
### ●Absolute maximum ratings ( $T_a = 25^\circ C$ )

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

### ●Outline



### ●Inner circuit



### ●Packaging specifications

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

● Thermal resistance

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

● Electrical characteristics ( $T_a = 25^\circ\text{C}$ )

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 $25^\circ\text{C}$	-	18.7	-	mV/°C
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 20V, V_{GS} = 0V$	-	-	1	μA
Gate - Source leakage current	$I_{GSS}$	$V_{GS} = \pm 10V, V_{DS} = 0V$	-	-	±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 $25^\circ\text{C}$	-	2.5	-	mV/°C
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  $P_w \leq 10\mu s$ , Duty cycle  $\leq 1\%$

\*2 Mounted on a ceramic board

\*3 Pulsed

● **Electrical characteristics** ( $T_a = 25^\circ\text{C}$ )

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	$C_{rss}$	$f = 1\text{MHz}$	-	280	-	
Turn - on delay time	$t_{d(on)}^{*3}$	$V_{DD} \approx 10V, V_{GS} = 4.5V$	-	25	-	ns
Rise time	$t_r^{*3}$	$I_D = 5A$	-	65	-	
Turn - off delay time	$t_{d(off)}^{*3}$	$R_L \approx 2\Omega$	-	125	-	
Fall time	$t_f^{*3}$	$R_G = 10\Omega$	-	125	-	

● **Gate charge characteristics** ( $T_a = 25^\circ\text{C}$ )

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

● **Body diode electrical characteristics** (Source-Drain) ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Body diode continuous forward current	$I_S$	$T_a = 25^\circ\text{C}$	-	-	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

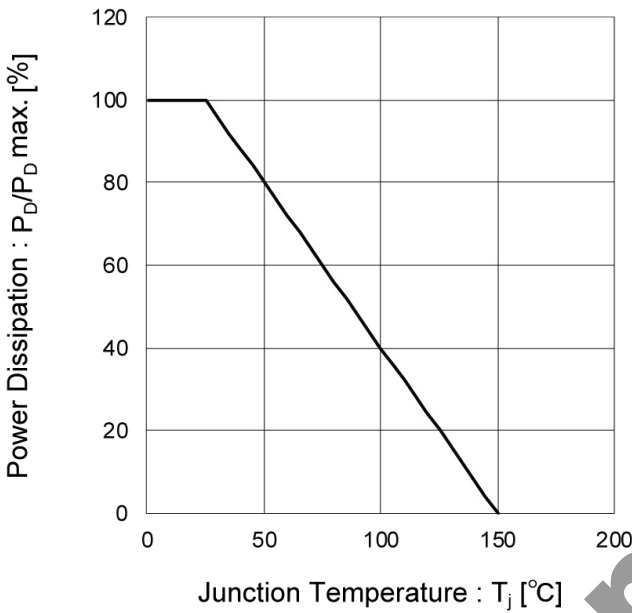


Fig.2 Maximum Safe Operating Area

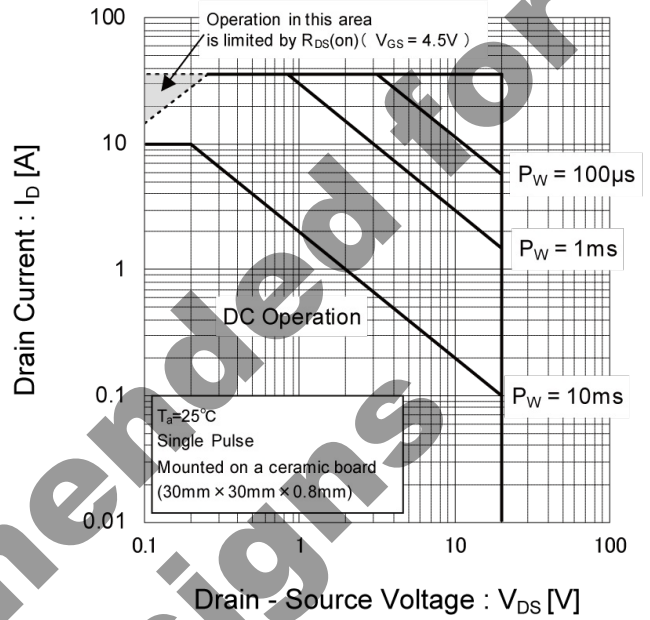


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

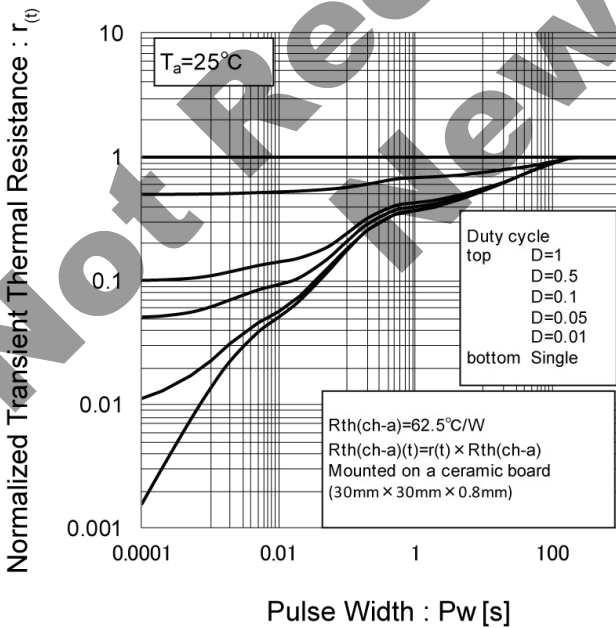
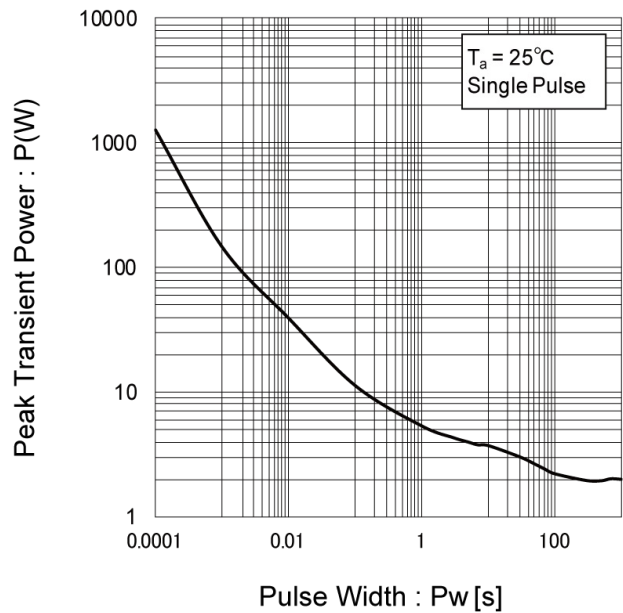


Fig.4 Single Pulse Maximum Power dissipation



● Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

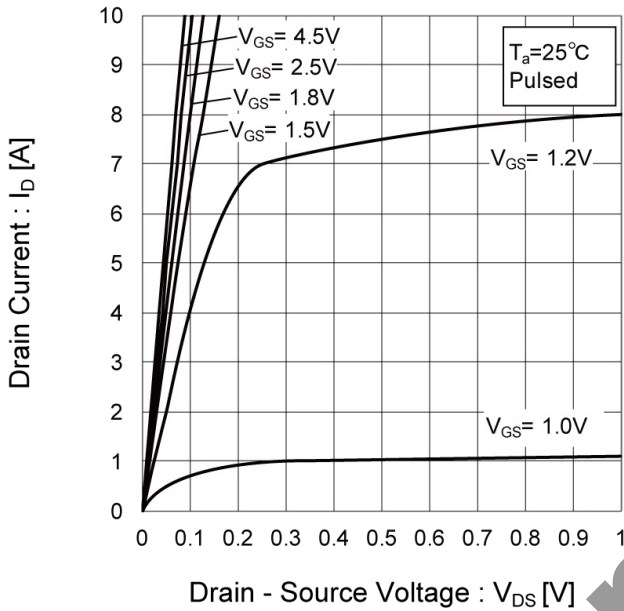


Fig.6 Typical Output Characteristics(II)

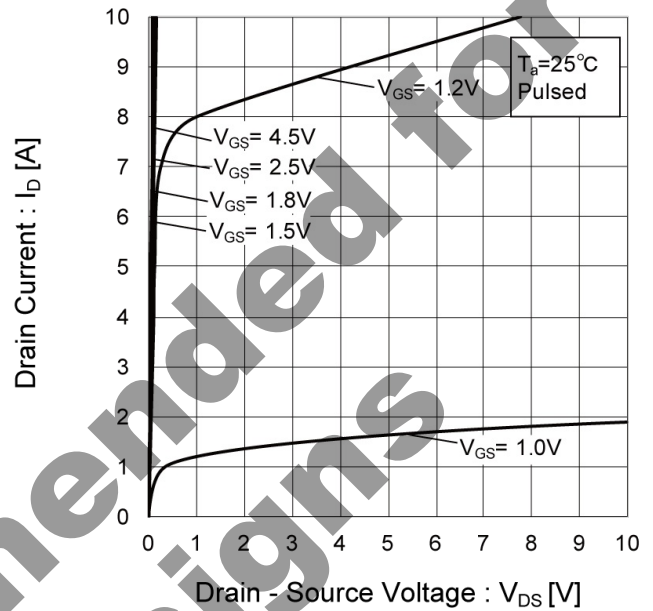


Fig.7 Breakdown Voltage vs. Junction Temperature

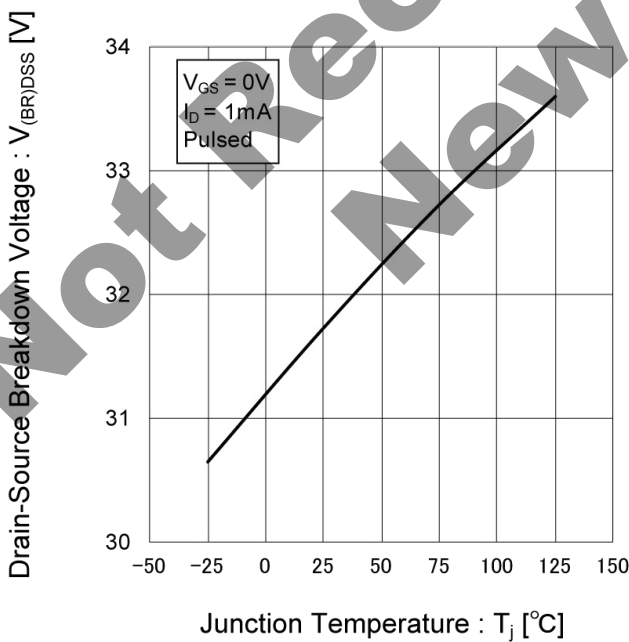
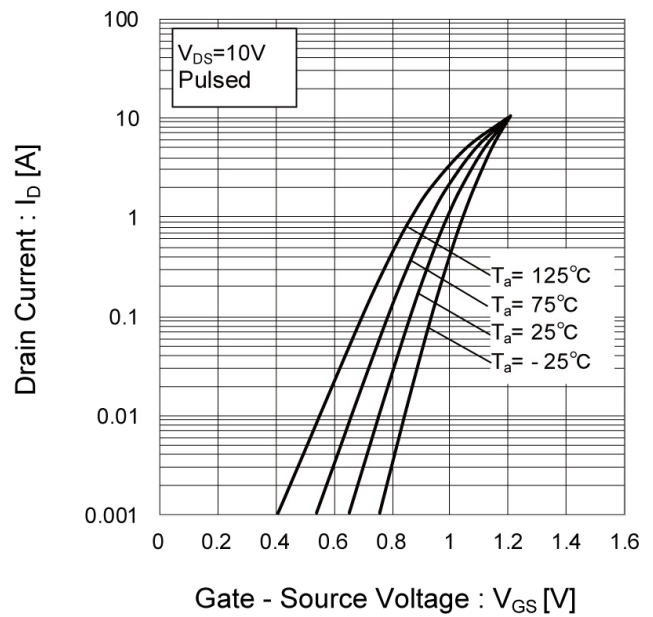


Fig.8 Typical Transfer Characteristics



● Electrical characteristic curves

Fig.9 Gate Threshold Voltage vs. Junction Temperature

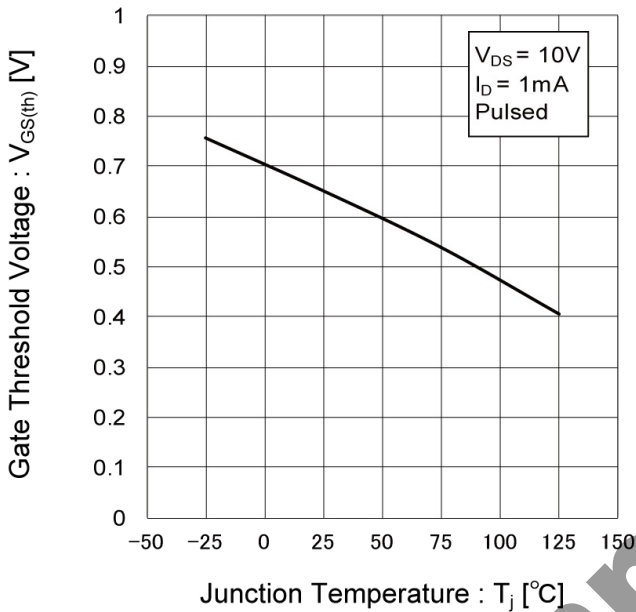


Fig.10 Transconductance vs. Drain Current

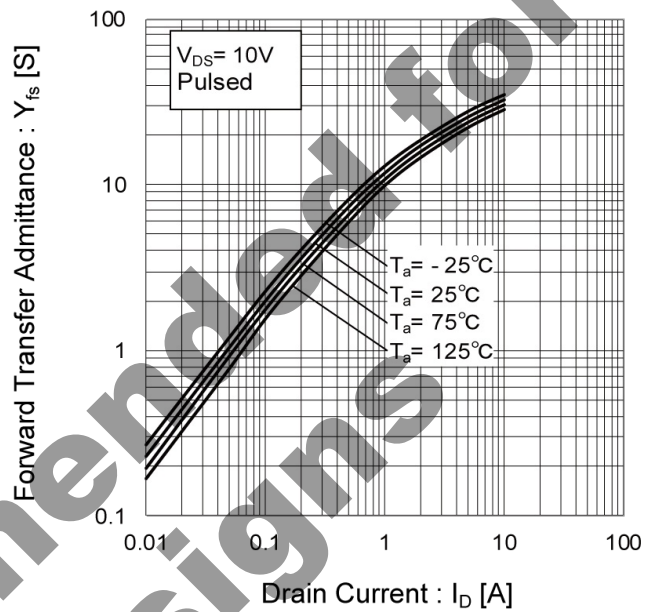


Fig.11 Drain Current Derating Curve

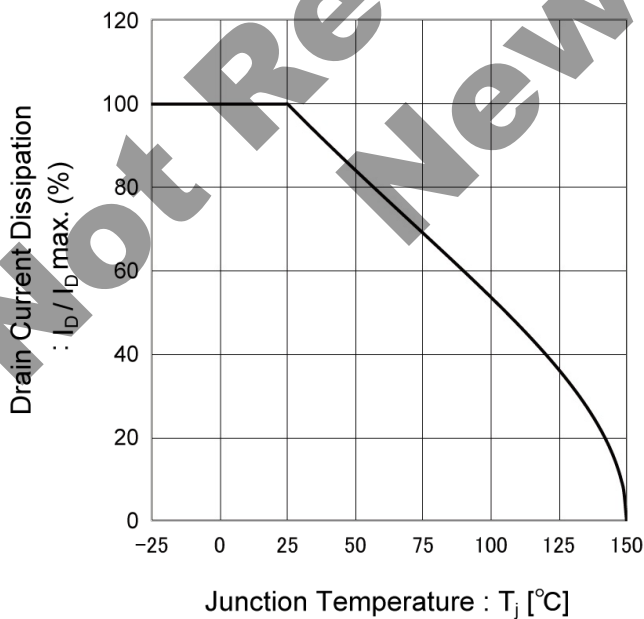
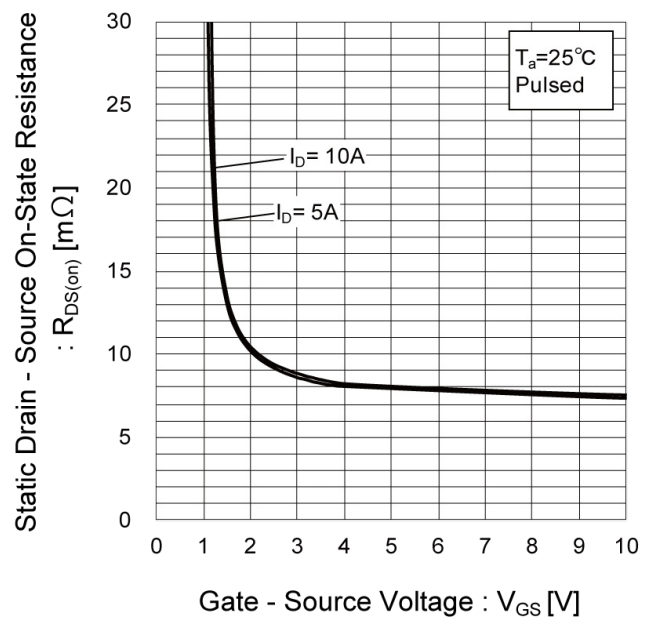


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage



● Electrical characteristic curves

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

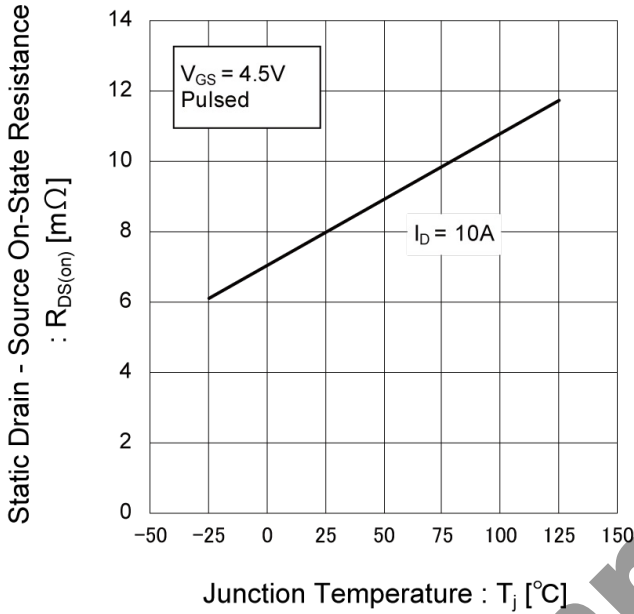


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current(I)

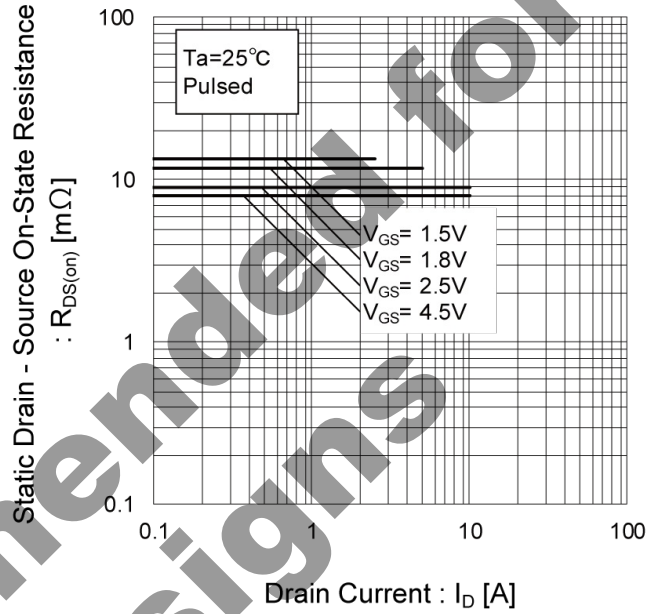


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

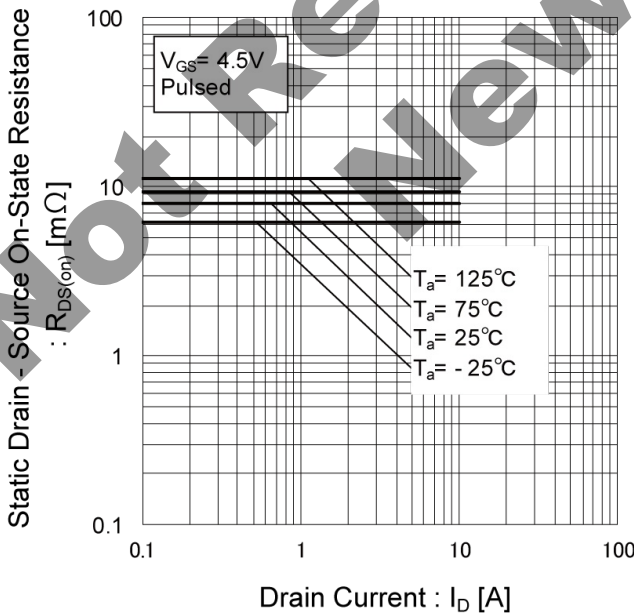
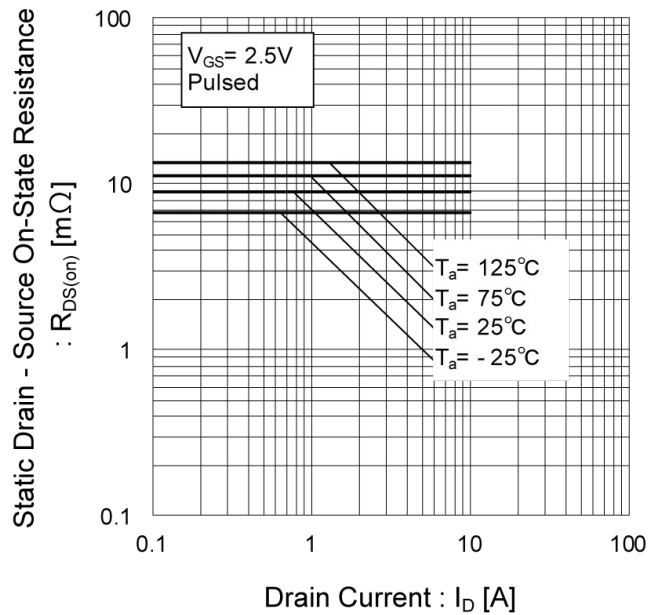


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)



● Electrical characteristic curves

Fig.17 Static Drain - Source On - State Resistance vs. Drain Current(I<sub>D</sub>)

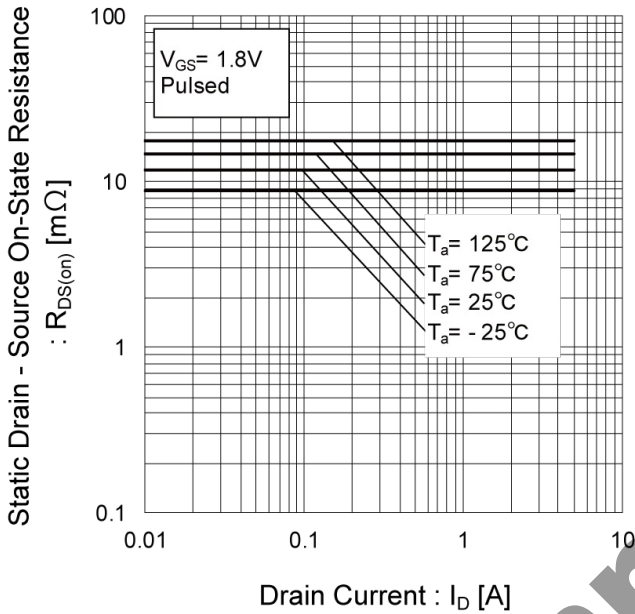


Fig.18 Static Drain - Source On - State Resistance vs. Drain Current(I<sub>D</sub>)

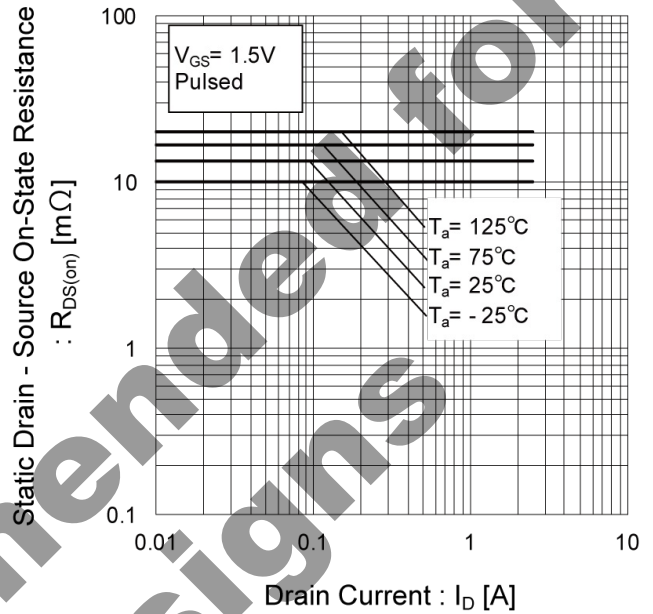


Fig.19 Typical Capacitance vs. Drain - Source Voltage

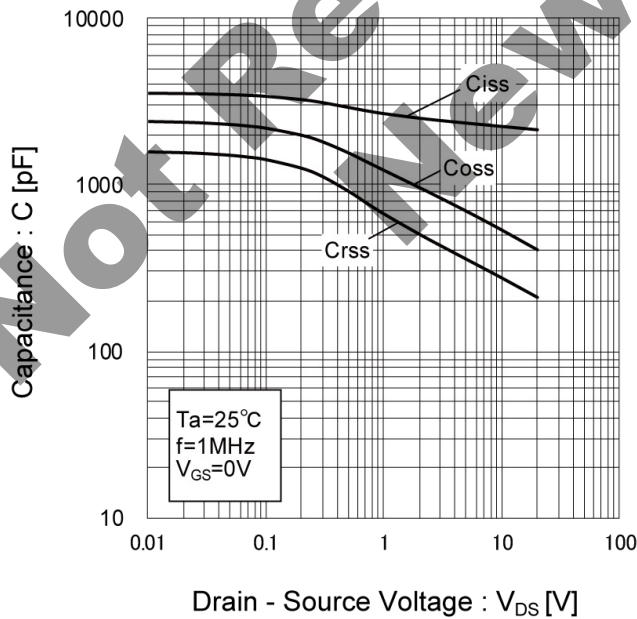
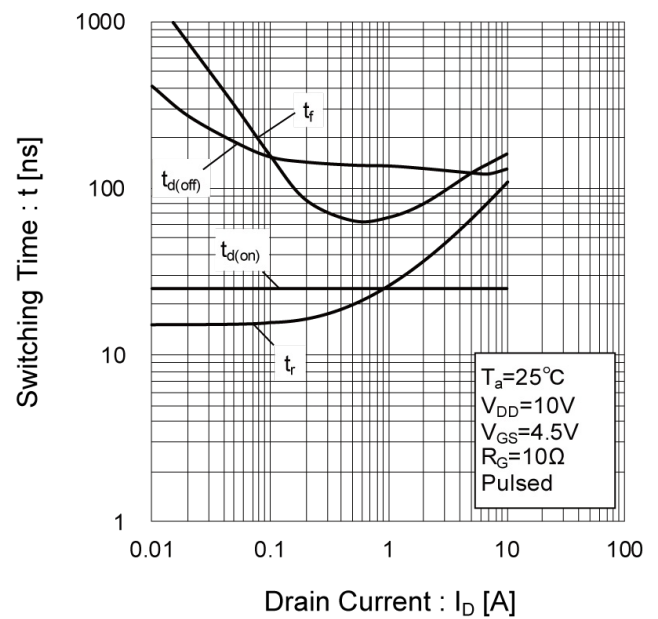


Fig.20 Switching Characteristics



●Electrical characteristic curves

Fig.21 Dynamic Input Characteristics

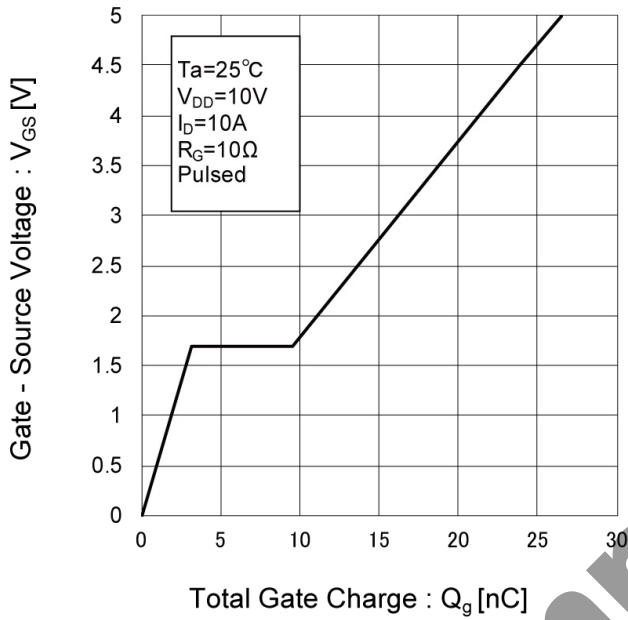
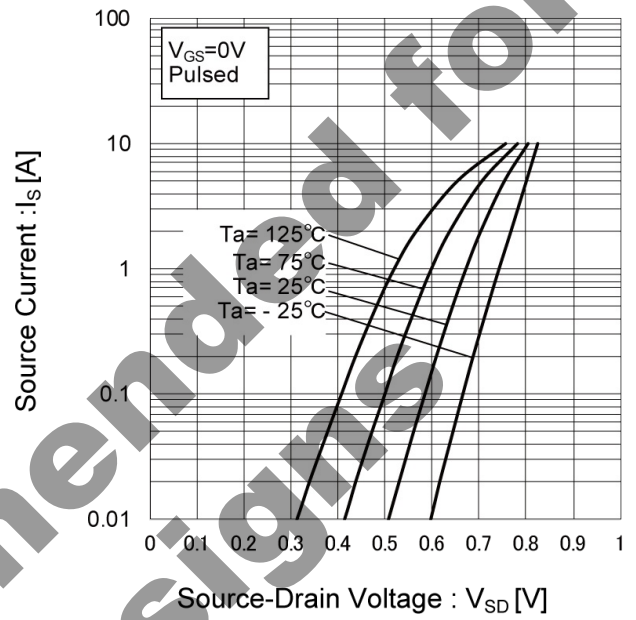


Fig.22 Source Current vs. Source Drain Voltage



Not Recommended for New Designs

● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

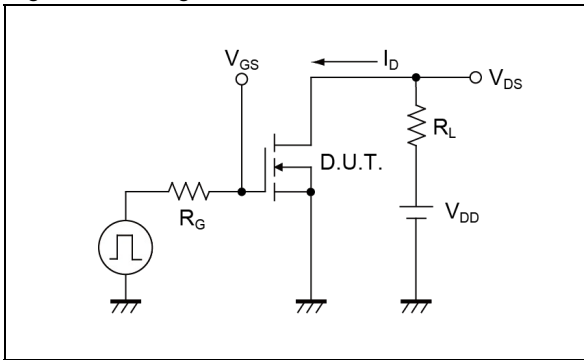


Fig.1-2 Switching Waveforms

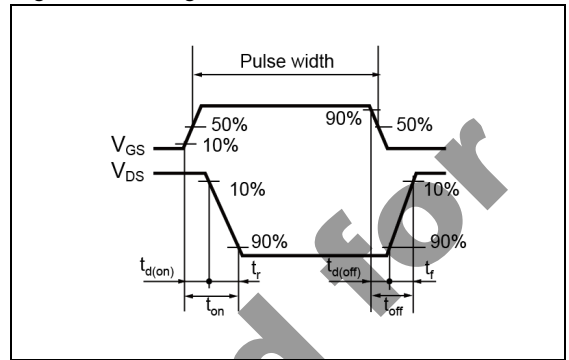


Fig.2-1 Gate Charge Measurement Circuit

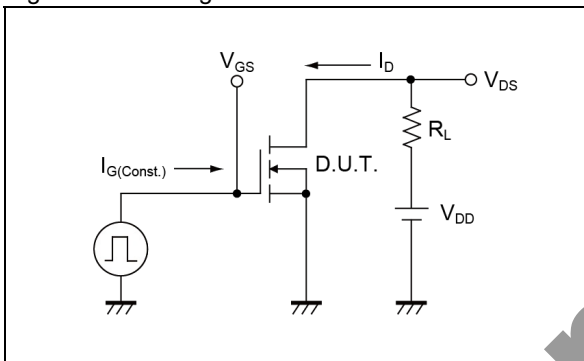
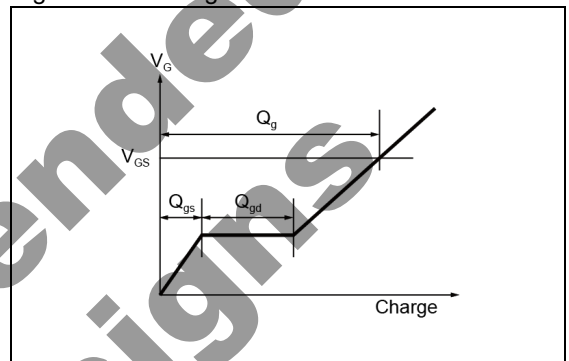


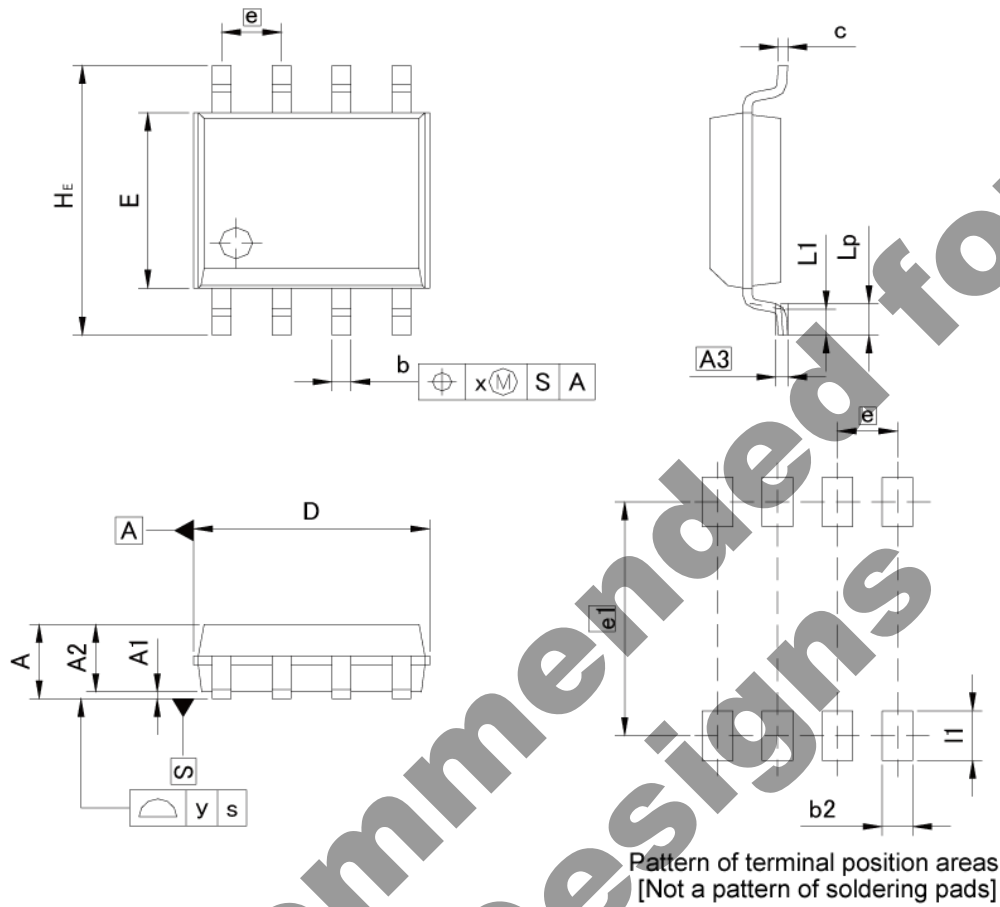
Fig.2-2 Gate Charge Waveform



Not Recommended for New Designs

●Dimensions

SOP8



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

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