

## Pch -20V -200mA Small Signal MOSFET

$V_{DSS}$	-20V
$R_{DS(on)(Max.)}$	1.2 $\Omega$
$I_D$	$\pm 200mA$
$P_D$	150mW

### ●Features

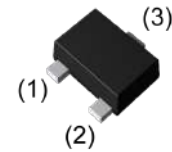
- 1) High speed switching
- 2) Small package (SOT-723).
- 3) Low voltage drive(1.2V) makes this device ideal for portable equipment.

### ●Application

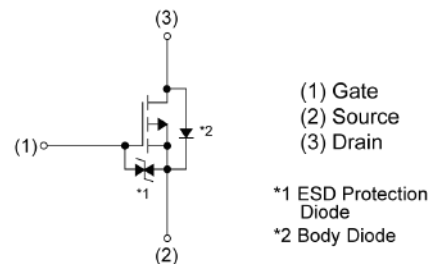
Switching

### ●Outline

SOT-723



### ●Inner circuit



### ●Absolute maximum ratings ( $T_a = 25^\circ C$ , unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain - Source voltage	$V_{DSS}$	-20	V
Continuous drain current	$I_D$	$\pm 200$	mA
Pulsed drain current	$I_{DP}^{*1}$	$\pm 800$	mA
Gate - Source voltage	$V_{GSS}$	$\pm 10$	V
Power dissipation	$P_D^{*2}$	150	mW
Junction temperature	$T_j$	150	$^\circ C$
Operating junction and storage temperature range	$T_{stg}$	-55 to +150	$^\circ C$

**● Thermal resistance**

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	$R_{thJA}^{*2}$	-	-	833	°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 $25^\circ\text{C}$	-	-21.9	-	mV/°C
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = -20V, V_{GS} = 0V$	-	-	-1	$\mu\text{A}$
Gate - Source leakage current	$I_{GSS}$	$V_{GS} = \pm 10V, V_{DS} = 0V$	-	-	$\pm 10$	$\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = -10V, I_D = -100\mu\text{A}$	-0.3	-	-1.0	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	$I_D = -1mA$ referenced to $25^\circ\text{C}$	-	2.4	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}^{*3}$	$V_{GS} = -4.5V, I_D = -200mA$	-	0.8	1.2	$\Omega$
		$V_{GS} = -2.5V, I_D = -100mA$	-	1.0	1.5	
		$V_{GS} = -1.8V, I_D = -100mA$	-	1.3	2.2	
		$V_{GS} = -1.5V, I_D = -40mA$	-	1.6	3.5	
		$V_{GS} = -1.2V, I_D = -10mA$	-	2.4	9.6	
Forward Transfer Admittance	$ Y_{fs} ^{*3}$	$V_{DS} = -10V, I_D = -200mA$	200	-	-	mS

\*1  $P_w \leq 10\mu\text{s}$ , Duty cycle  $\leq 1\%$

\*2 Each terminal mounted on a reference land.

\*3 Pulsed

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	$C_{iss}$	$V_{GS} = 0V$	-	115	-	pF
Output capacitance	$C_{oss}$	$V_{DS} = -10V$	-	10	-	
Reverse transfer capacitance	$C_{rss}$	$f = 1\text{MHz}$	-	6	-	
Turn - on delay time	$t_{d(on)}^{*3}$	$V_{DD} \approx -10V, V_{GS} = -4.5V$	-	6	-	ns
Rise time	$t_r^{*3}$	$I_D = -100\text{mA}$	-	4	-	
Turn - off delay time	$t_{d(off)}^{*3}$	$R_L \approx 100\Omega$	-	17	-	
Fall time	$t_f^{*3}$	$R_G = 10\Omega$	-	17	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	$Q_g^{*3}$	$V_{DD} \approx -10V,$	-	1.4	-	nC
Gate - Source charge	$Q_{gs}^{*3}$	$I_D = -200\text{mA},$	-	0.3	-	
Gate - Drain charge	$Q_{gd}^{*3}$	$V_{GS} = -4.5V$	-	0.3	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Continuous forward current	$I_S$	$T_a = 25^\circ\text{C}$	-	-	-100	mA
Pulse forward current	$I_{SP}^{*1}$		-	-	-800	mA
Forward voltage	$V_{SD}^{*3}$	$V_{GS} = 0V, I_S = -200\text{mA}$	-	-	-1.2	V

## ●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

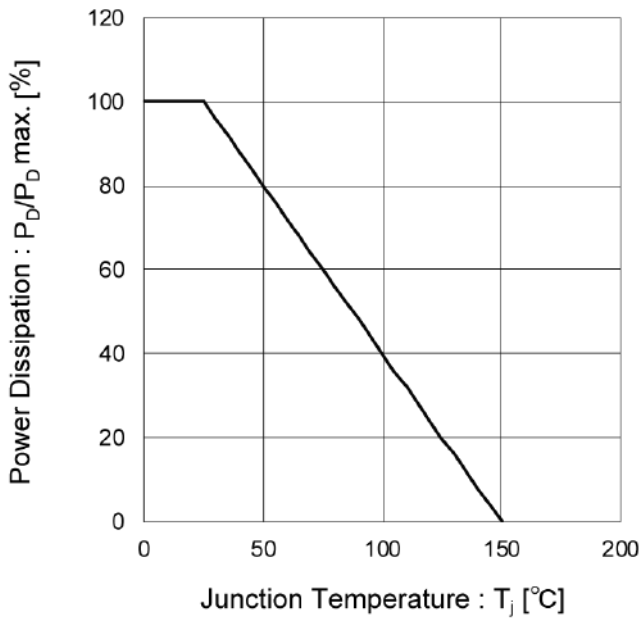


Fig.2 Drain Current Derating Curve

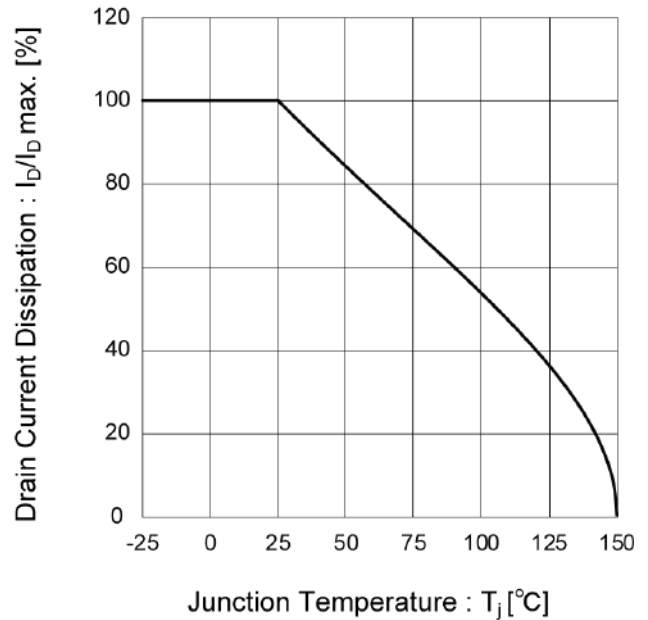


Fig.3 Typical Output Characteristics(I)

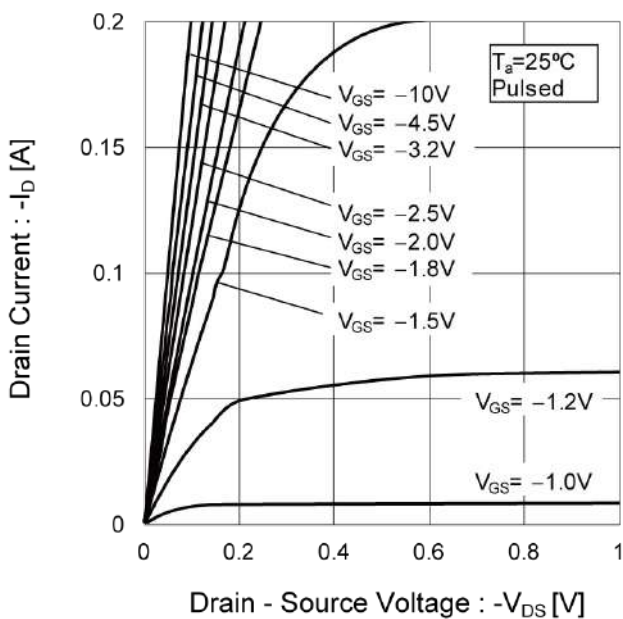
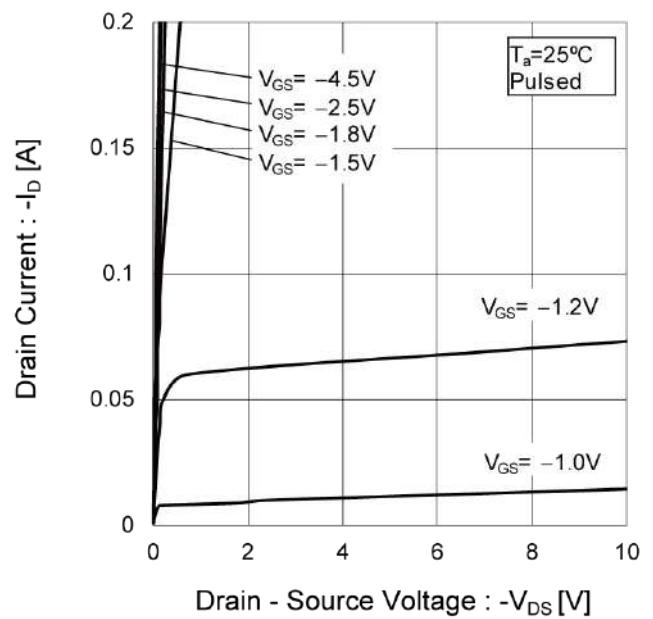


Fig.4 Typical Output Characteristics(II)



## ●Electrical characteristic curves

Fig.5 Breakdown Voltage vs. Junction Temperature

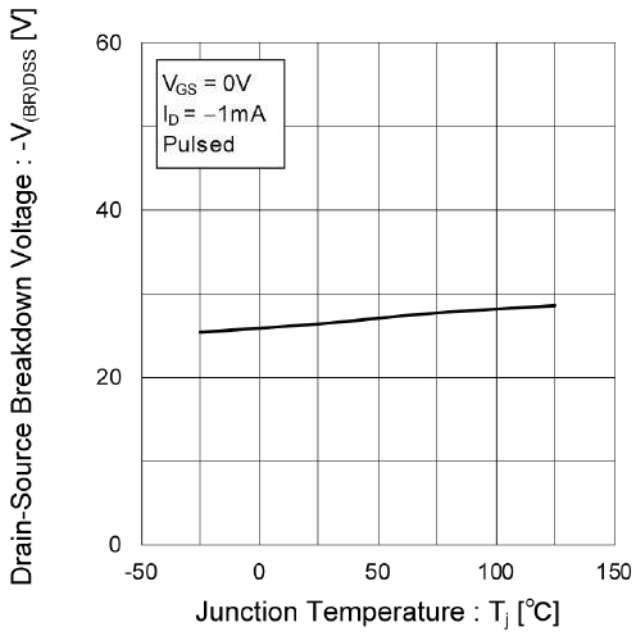


Fig.6 Typical Transfer Characteristics

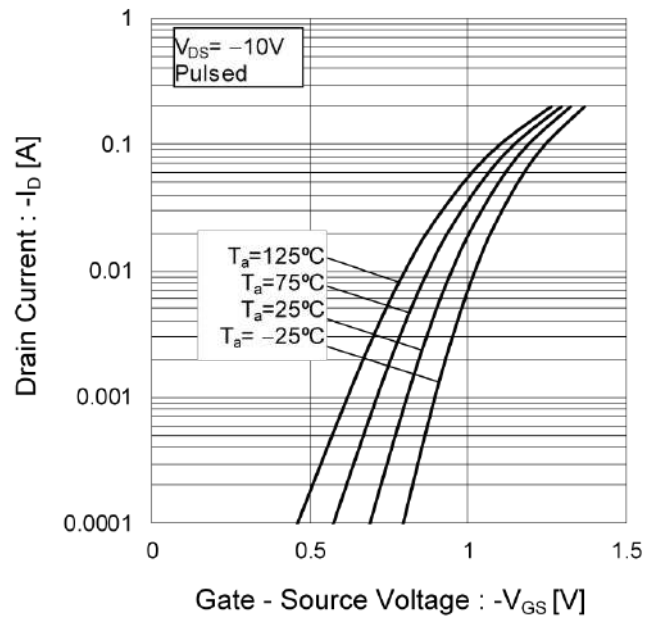


Fig.7 Gate Threshold Voltage vs. Junction Temperature

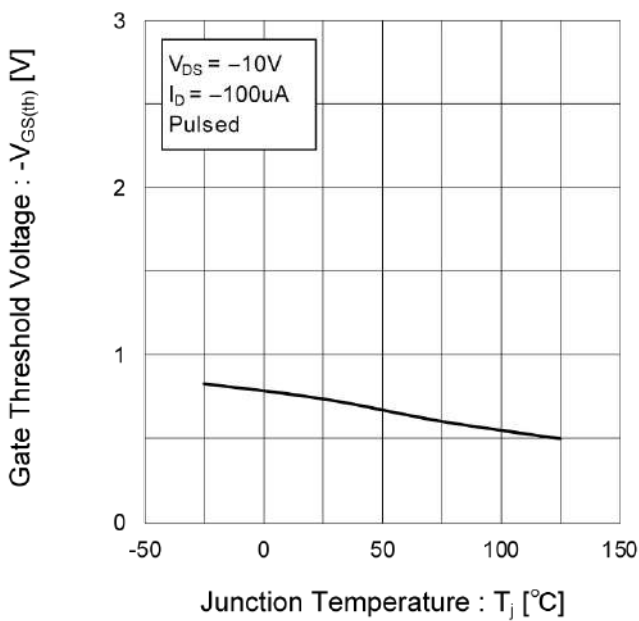
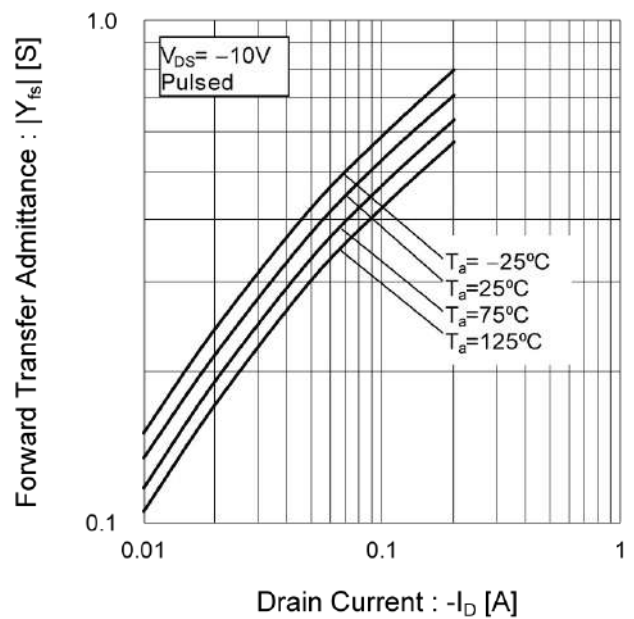


Fig.8 Forward Transfer Admittance vs. Drain Current



## ● Electrical characteristic curves

Fig.9 Static Drain - Source On - State Resistance vs. Gate Source Voltage

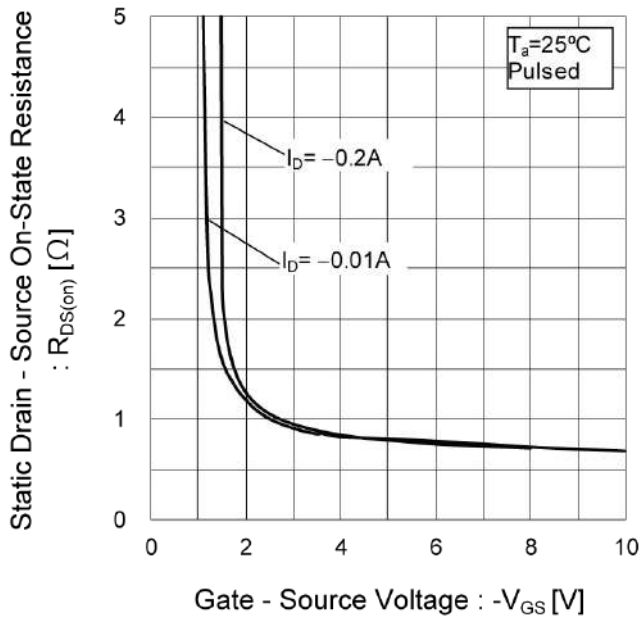


Fig.10 Static Drain - Source On - State Resistance vs. Junction Temperature

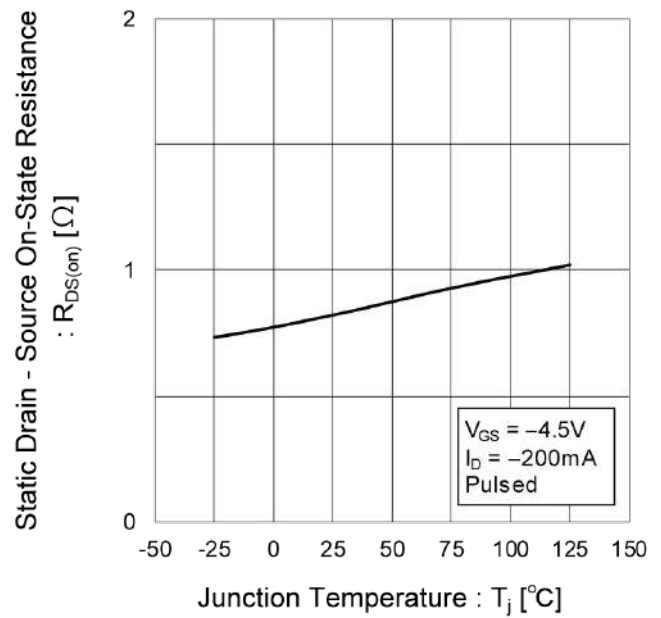


Fig.11 Static Drain - Source On - State Resistance vs. Drain Current (I)

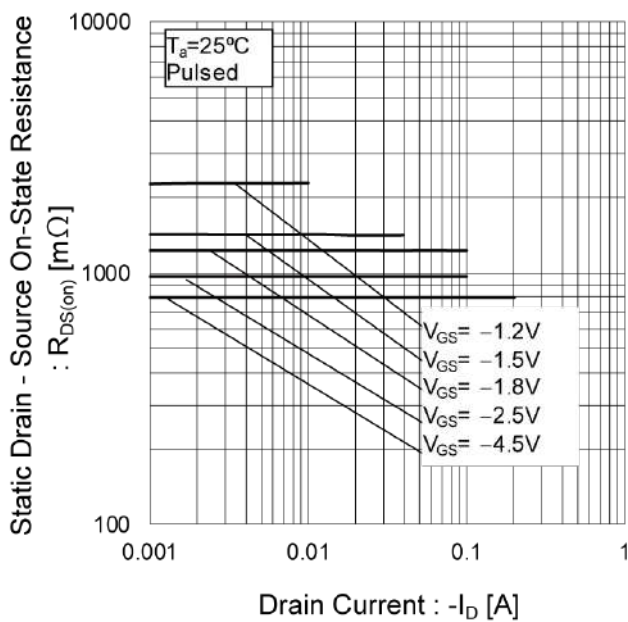
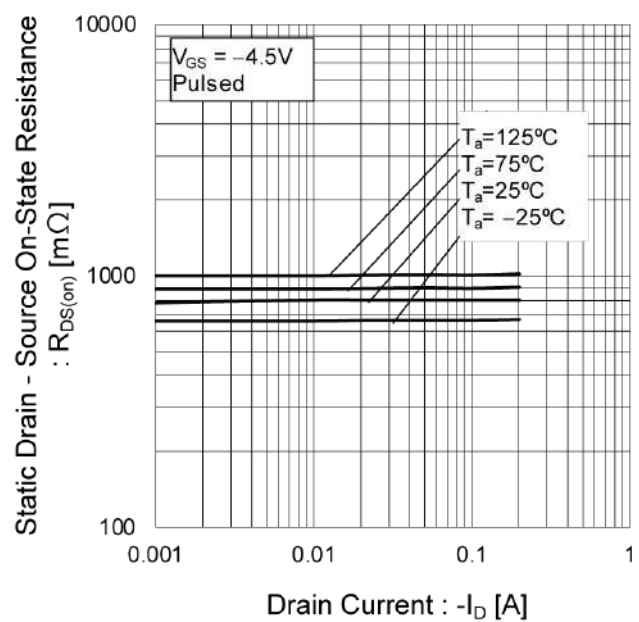


Fig.12 Static Drain - Source On - State Resistance vs. Drain Current (II)



## ● Electrical characteristic curves

Fig.13 Static Drain - Source On - State Resistance vs. Drain Current (III)

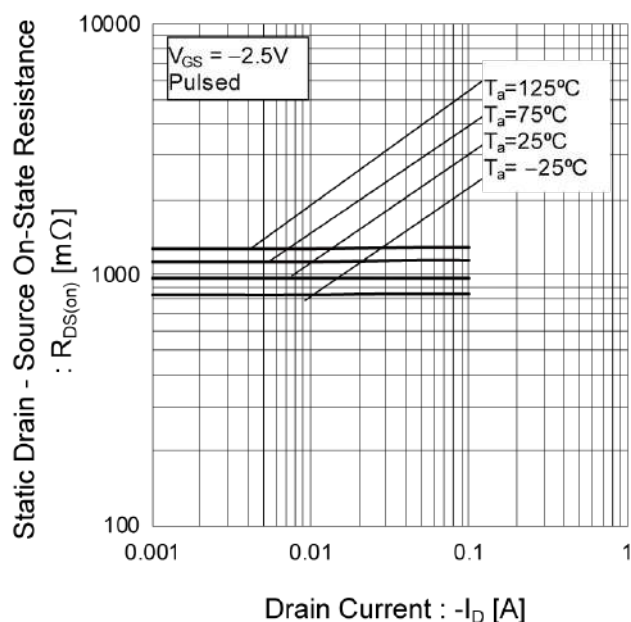


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current (IV)

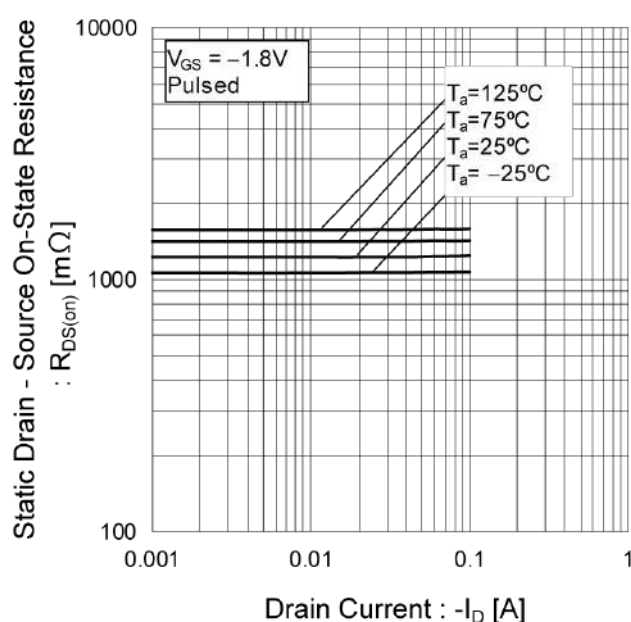


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current (V)

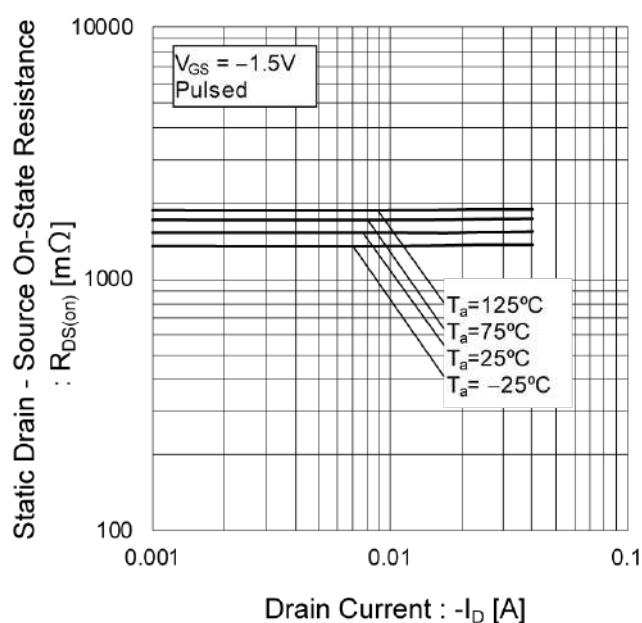
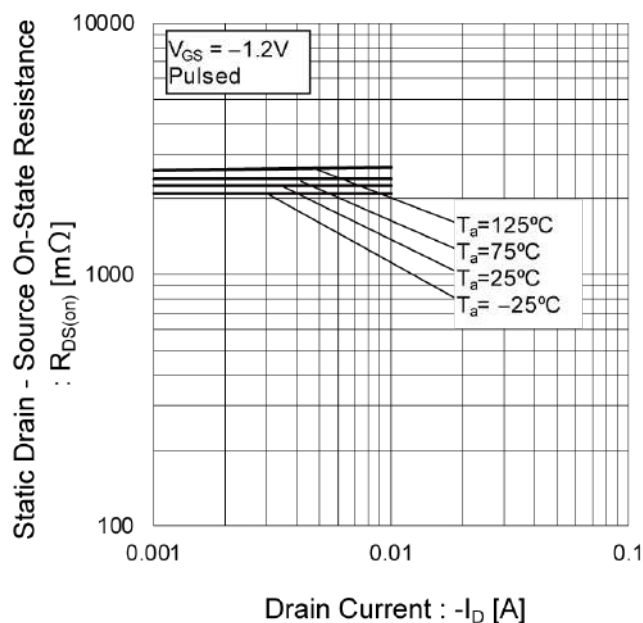


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current (VI)



## ● Electrical characteristic curves

Fig.17 Typical Capacitance vs. Drain - Source Voltage

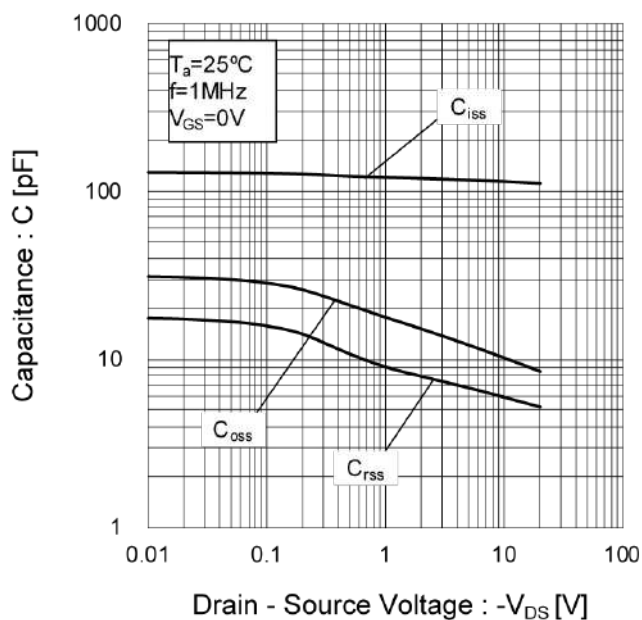


Fig.18 Switching Characteristics

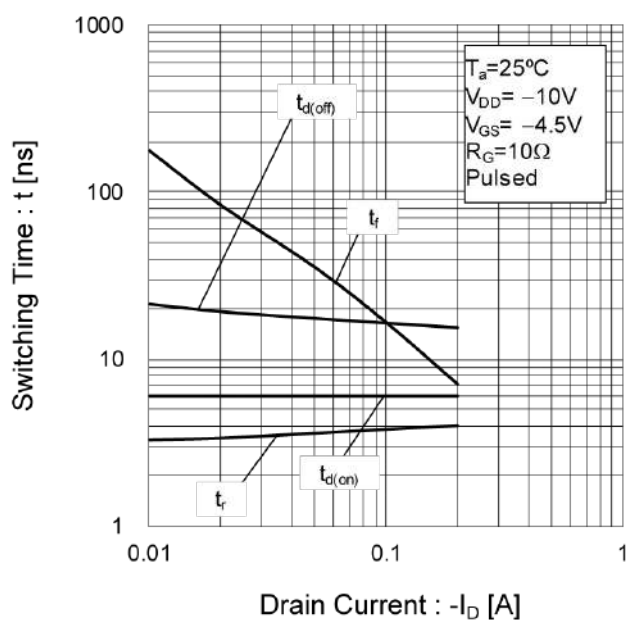
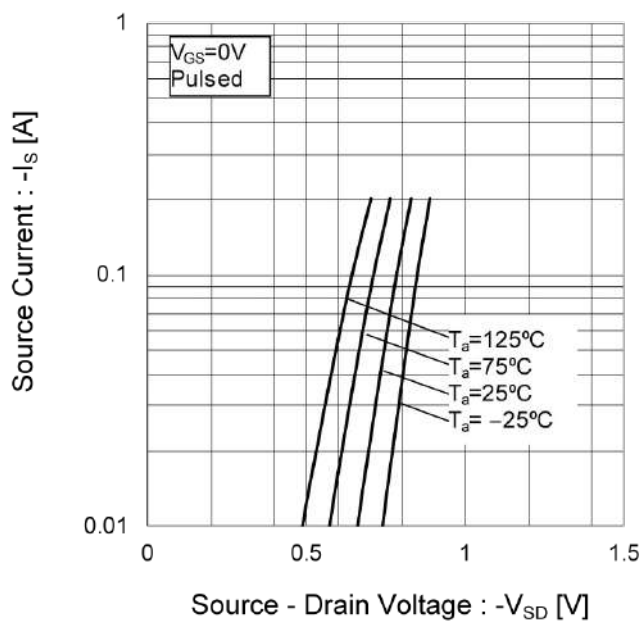


Fig.19 Source Current vs. Source Drain Voltage





## ● Measurement circuits

Fig. 1-1 SWITCHING TIME MEASUREMENT CIRCUIT

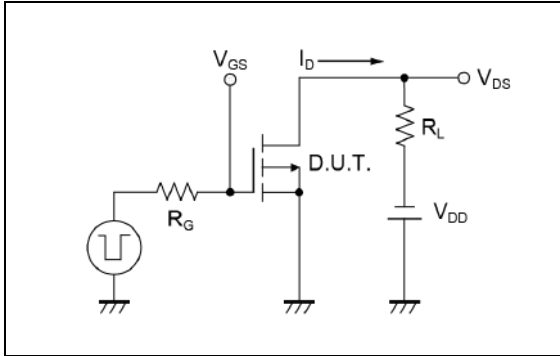


Fig. 1-2 SWITCHING WAVEFORMS

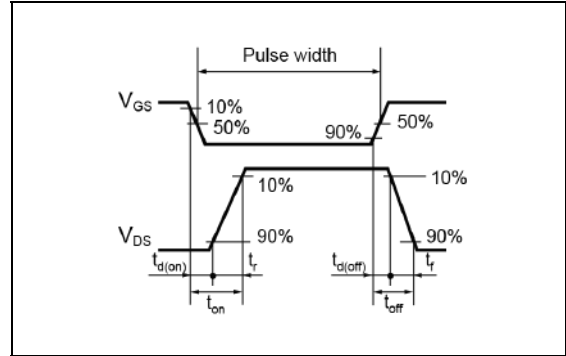


Fig. 2-1 GATE CHARGE MEASUREMENT CIRCUIT

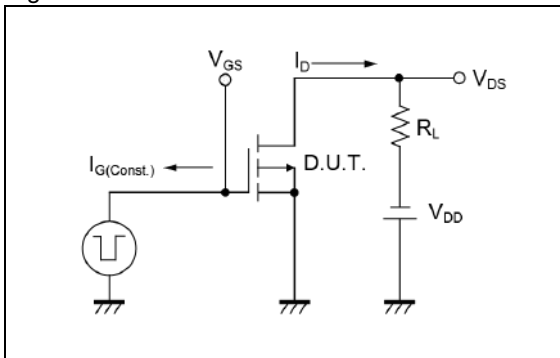
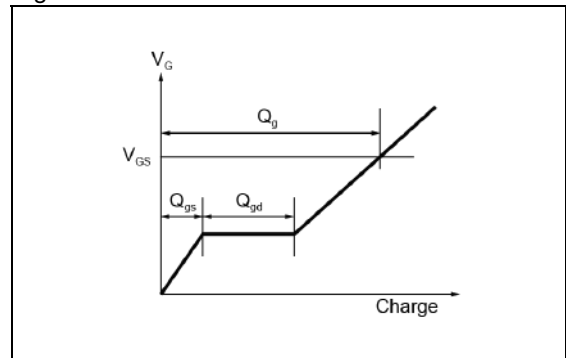
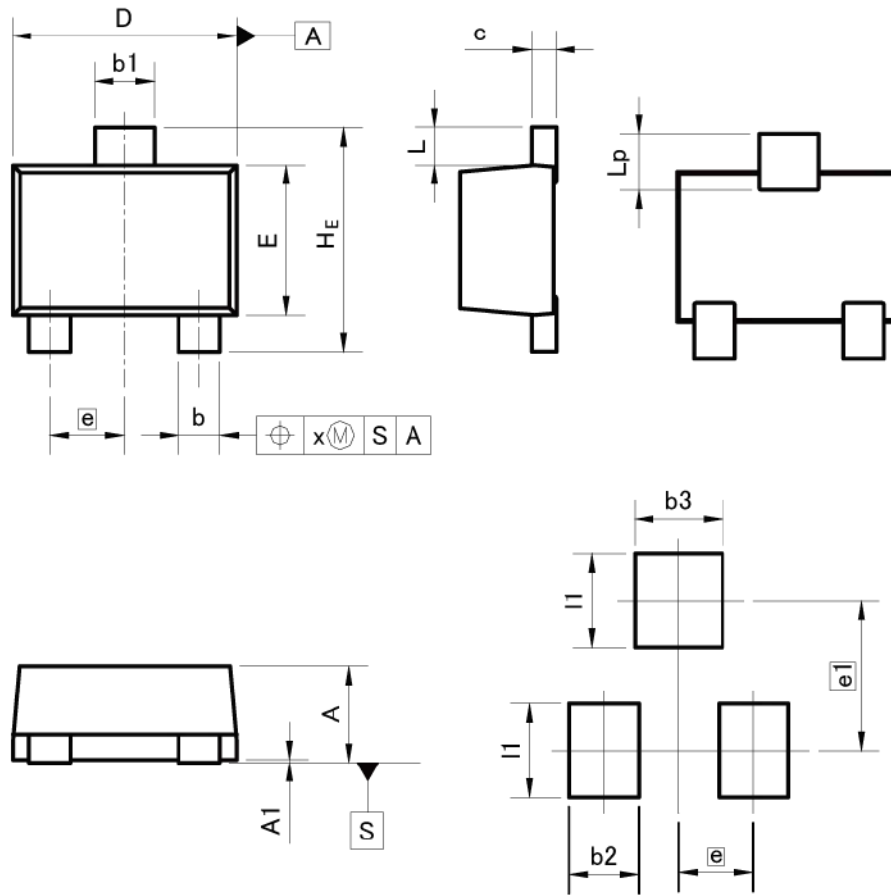


Fig. 2-2 GATE CHARGE WAVEFORM



●Dimensions

SOT-723  
SC-105AA  
(VMT3)



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

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.45	0.55	0.018	0.022
A1	0.00	0.10	0.000	0.004
b	0.17	0.27	0.007	0.011
b1	0.27	0.37	0.011	0.015
c	0.08	0.18	0.003	0.007
D	1.10	1.30	0.043	0.051
E	0.70	0.90	0.028	0.035
e	0.40		0.02	
HE	1.10	1.30	0.043	0.051
L	0.10	0.30	0.004	0.012
Lp	0.20	0.40	0.008	0.016
x	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.37	-	0.015
b3	-	0.47	-	0.019
e1	0.80		0.031	
I1	-	0.50	-	0.020

Dimension in mm/inches

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