Pch -20V -200mA Small Signal MOSFET

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

● **Outline**

SOT-723

● **Inner circuit**

(1) Gate
(2) Source
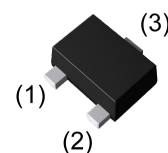(3) Drain

*1 ESD Protection Diode
*2 Body Diode

● **Features**

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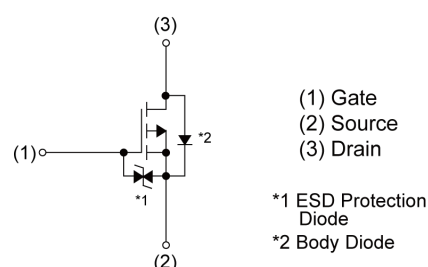3) Low voltage drive(1.2V) makes this device ideal for partable equipment.

● **Application**

Switching

● **Absolute maximum ratings** (T_a = 25°C ,unless otherwise specified)

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

● **Thermal resistance**

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA}[*2]	-	-	833	$^{\circ}$C/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	$\dfrac{\Delta V_{(BR)DSS}}{\Delta T_j}$	I_D = -1mA referenced to 25℃	-	-21.9	-	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 = -100μA	-0.3	-	-1.0	V
Gate threshold voltage temperature coefficient	$\dfrac{\Delta V_{GS(th)}}{\Delta T_j}$	I_D = -1mA referenced to 25℃	-	2.4	-	mV/℃
Static drain - source on - state resistance	$R_{DS(on)}$[*3]	V_{GS} = -4.5V, I_D = -200mA	-	0.8	1.2	Ω
		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 Pw≦10μs , Duty cycle≦1%

*2 Each terminal mounted on a reference land.

*3 Pulsed

● **Electrical characteristics** (T_a = 25°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 = 1MHz	-	6	-	
Turn - on delay time	$t_{d(on)}$[3]	$V_{DD} \simeq$ -10V,V_{GS} = -4.5V	-	6	-	ns
Rise time	t_r[3]	I_D = -100mA	-	4	-	
Turn - off delay time	$t_{d(off)}$[3]	$R_L \simeq$ 100Ω	-	17	-	
Fall time	t_f[3]	R_G = 10Ω	-	17	-	

● **Gate charge characteristics** (T_a = 25°C)

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

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

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

● **Electrical characteristic curves**
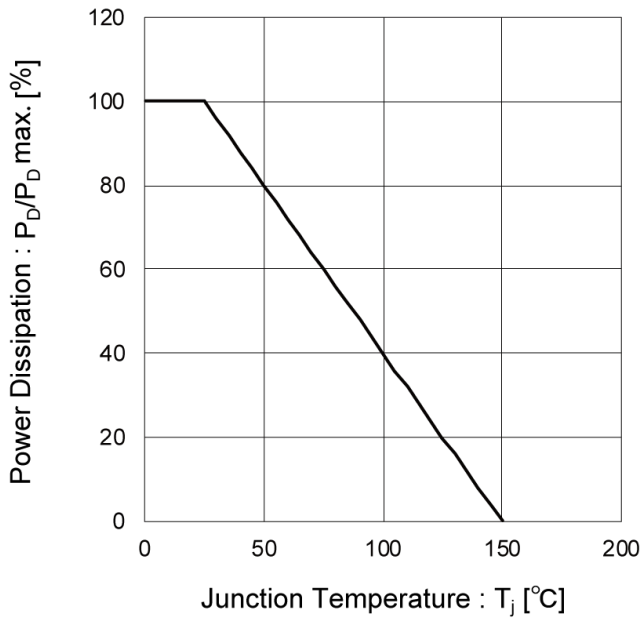
Fig.1 Power Dissipation Derating Curve

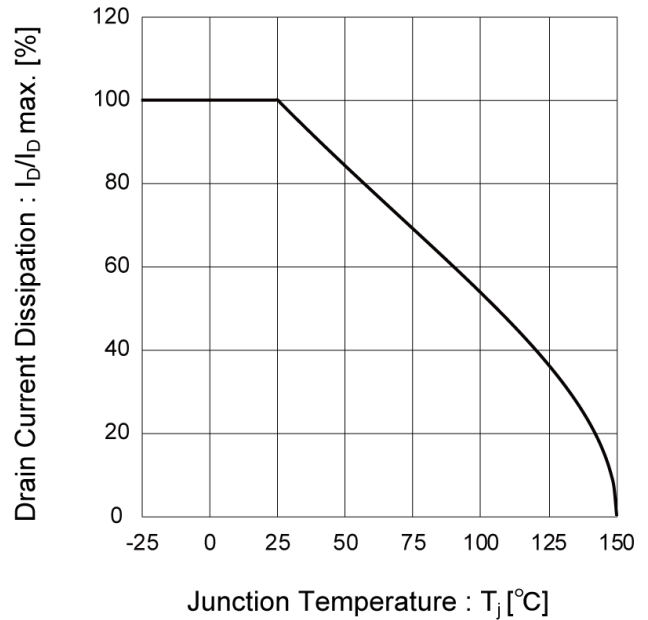Fig.2 Drain Current Derating Curve
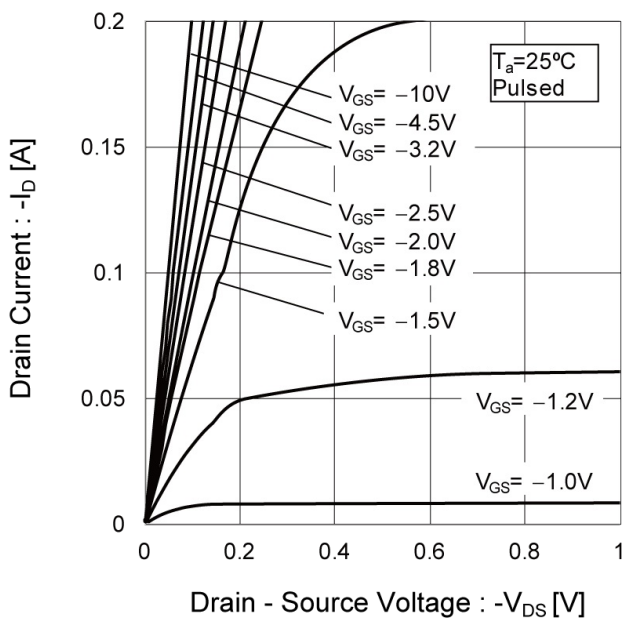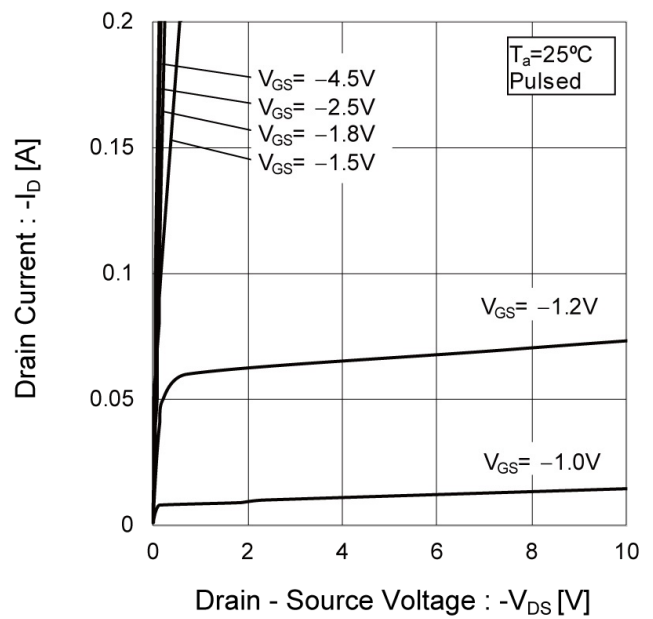

Fig.3 Typical Output Characteristics(I)

Fig.4 Typical Output Characteristics(II)

●**Electrical characteristic curves**
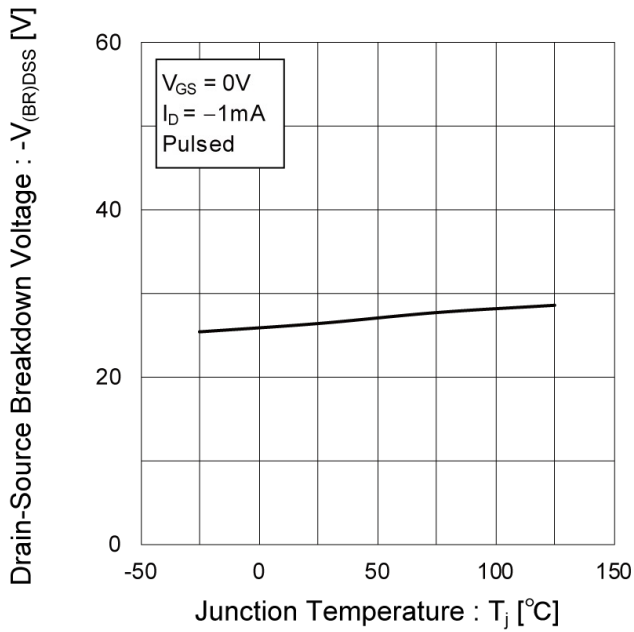
Fig.5 Breakdown Voltage vs.
Junction Temperature

Drain-Source Breakdown Voltage : -$V_{(BR)DSS}$ [V]

V_{GS} = 0V
I_D = −1mA
Pulsed

Junction Temperature : T_j [°C]

Fig.6 Typical Transfer Characteristics

Drain Current : -I_D [A]

V_{DS}= −10V
Pulsed

T_a=125°C
T_a=75°C
T_a=25°C
T_a=−25°C

Gate - Source Voltage : -V_{GS} [V]

Fig.7 Gate Threshold Voltage vs.
Junction Temperature

Gate Threshold Voltage : -$V_{GS(th)}$ [V]

V_{DS} = −10V
I_D = −100uA
Pulsed

Junction Temperature : T_j [°C]

Fig.8 Forward Transfer Admittance vs.
Drain Current

Forward Transfer Admittance : |Y_{fs}| [S]

V_{DS}= −10V
Pulsed

T_a= −25°C
T_a=25°C
T_a=75°C
T_a=125°C

Drain Current : -I_D [A]

● **Electrical characteristic curves**

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

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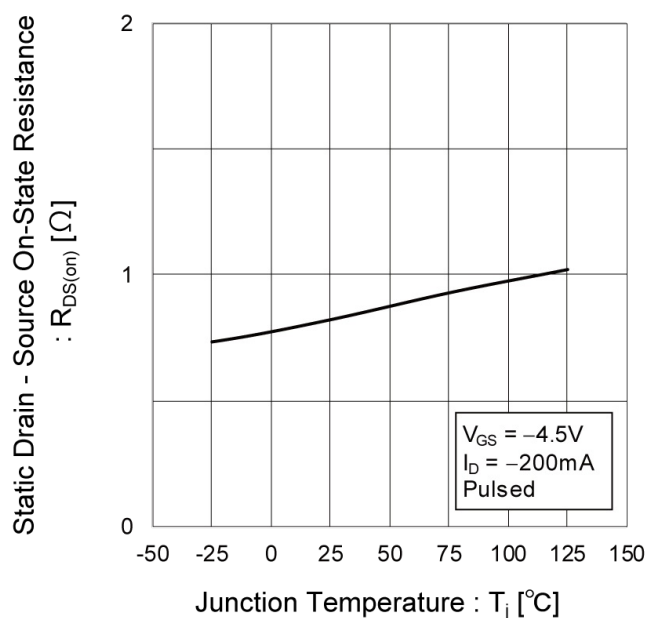Resistance vs. Junction Temperature

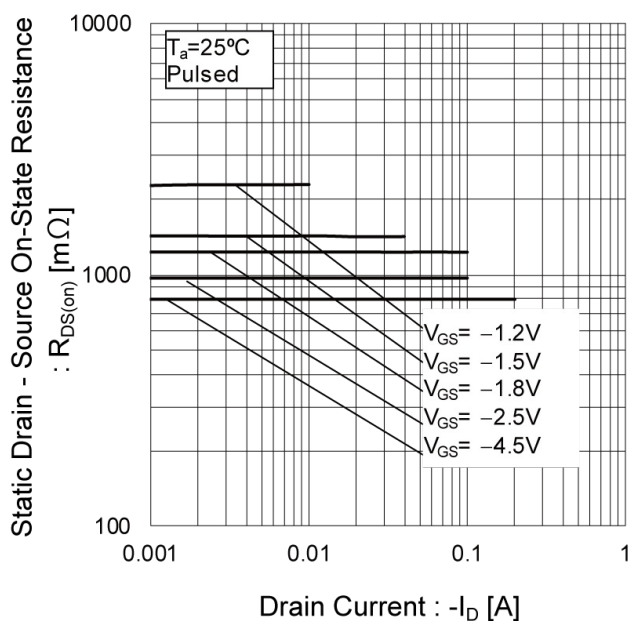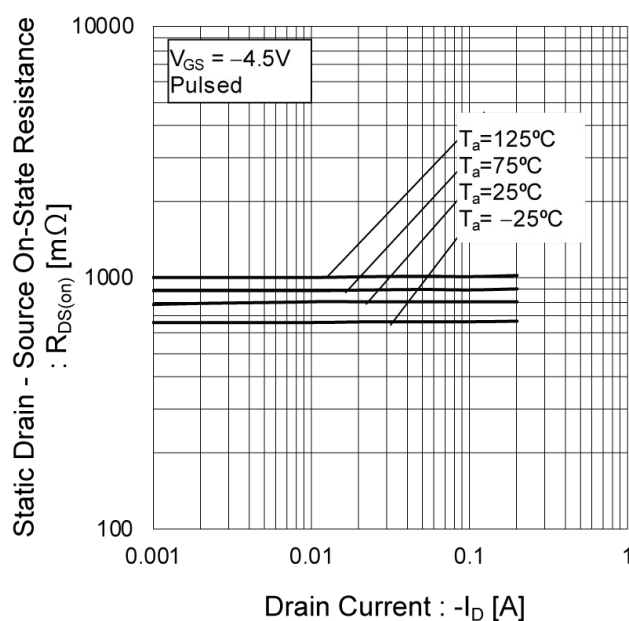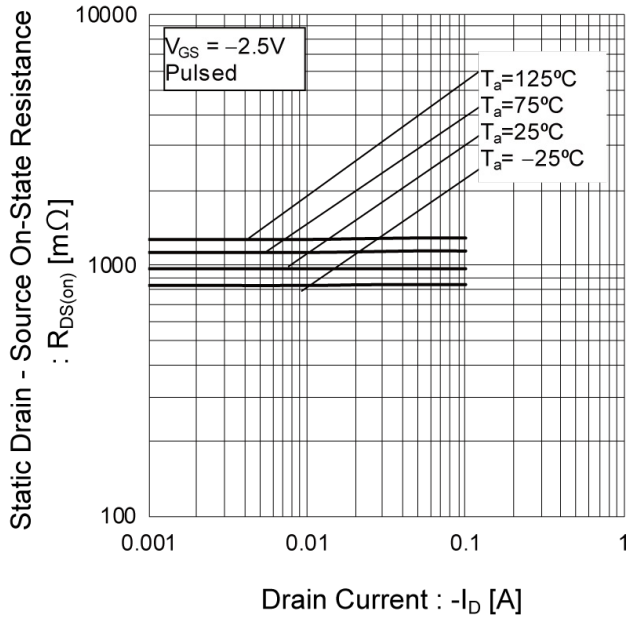Fig.11 Static Drain - Source On - State
Resistance vs. Drain Current (I)

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)

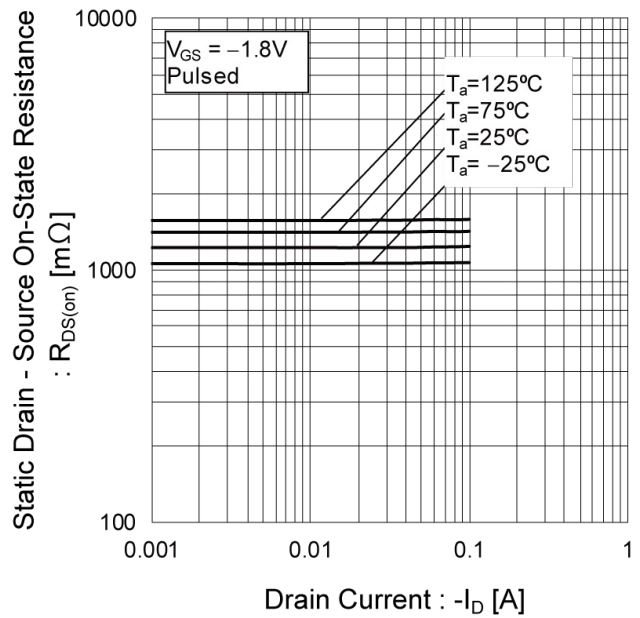Fig.14 Static Drain - Source On - State
Resistance vs. Drain Current (IV)

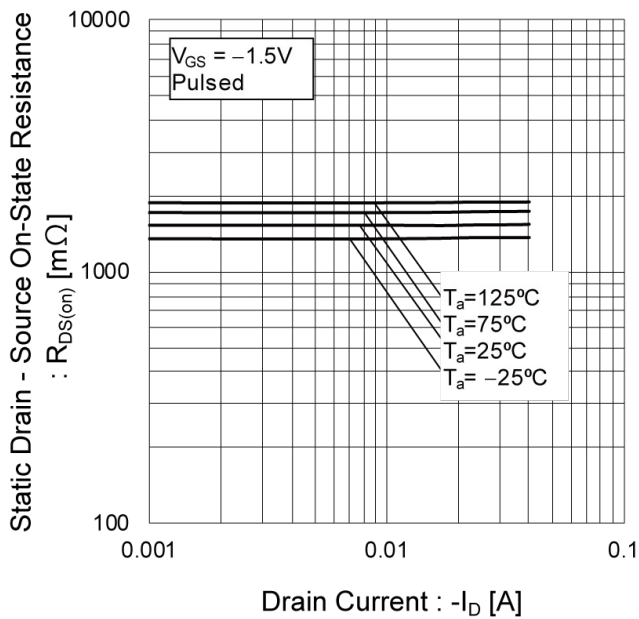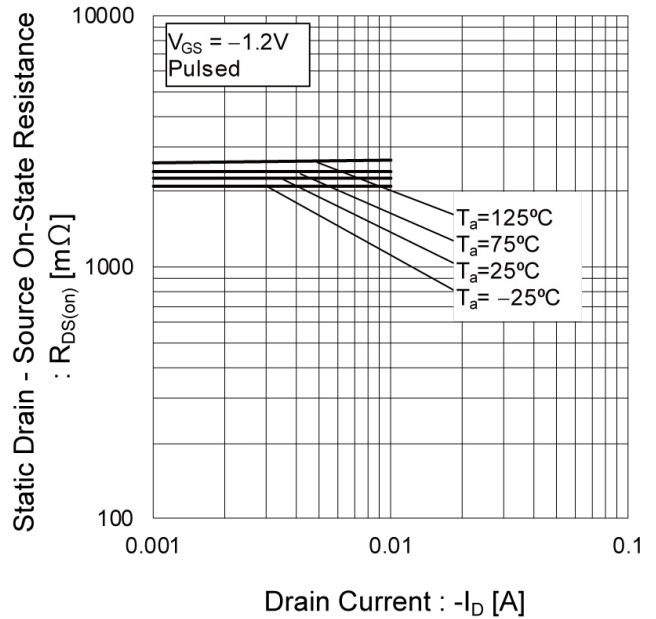Fig.15 Static Drain - Source On - State
Resistance vs. Drain Current (V)

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

● **Electrical characteristic curves**
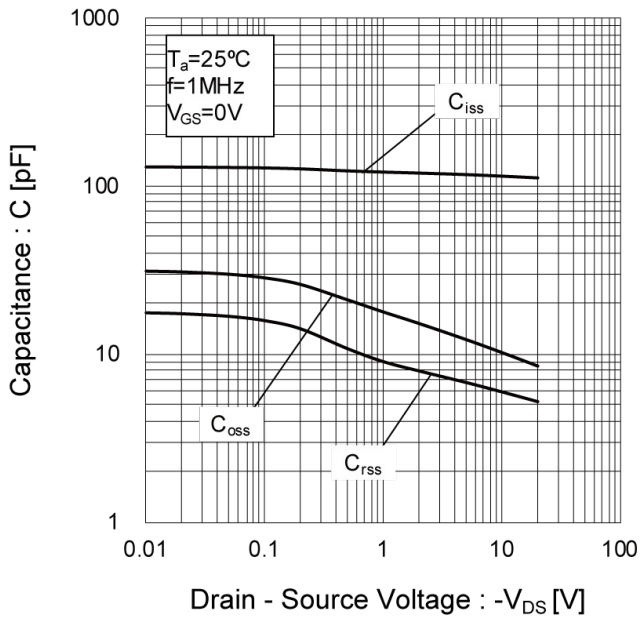
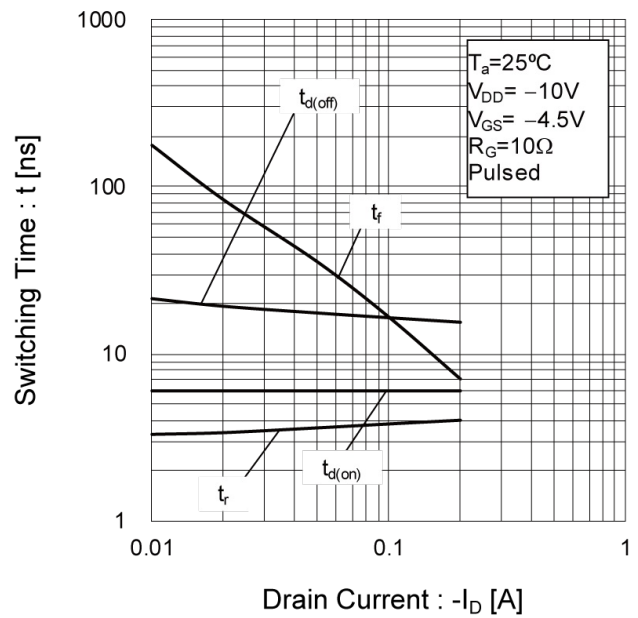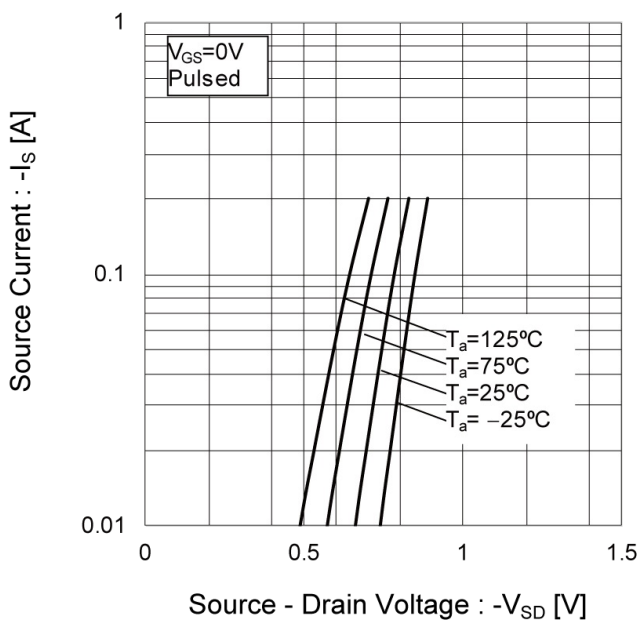Fig.17 Typical Capacitance vs.
Drain - Source Voltage

Capacitance : C [pF]

T_a=25ºC
f=1MHz
V_{GS}=0V

C_{iss}

C_{oss}

C_{rss}

Drain - Source Voltage : -V_{DS} [V]

Fig.18 Switching Characteristics

Switching Time : t [ns]

T_a=25ºC
V_{DD}= −10V
V_{GS}= −4.5V
R_G=10Ω
Pulsed

$t_{d(off)}$

t_f

$t_{d(on)}$

t_r

Drain Current : -I_D [A]

Fig.19 Source Current vs.
Source Drain Voltage

Source Current : -I_S [A]

V_{GS}=0V
Pulsed

T_a=125ºC
T_a=75ºC
T_a=25ºC
T_a= −25ºC

Source - Drain Voltage : -V_{SD} [V]

● **Measurement circuits**
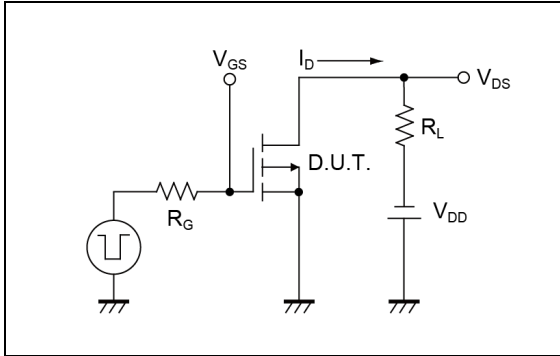
Fig. 1-1 SWITCHING TIME MEASUREMENT CIRCUIT
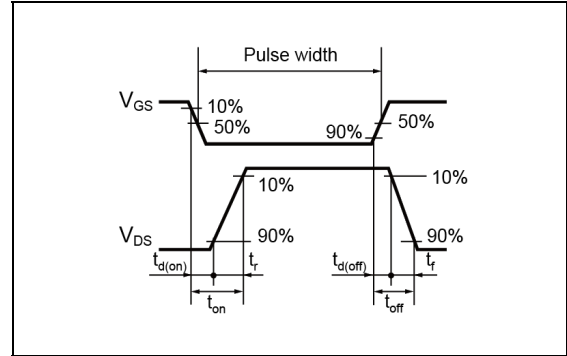

Fig. 1-2 SWITCHING WAVEFORMS

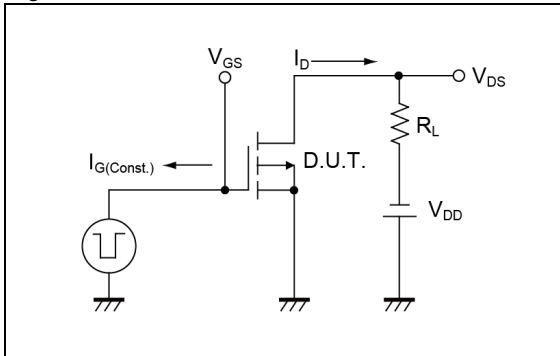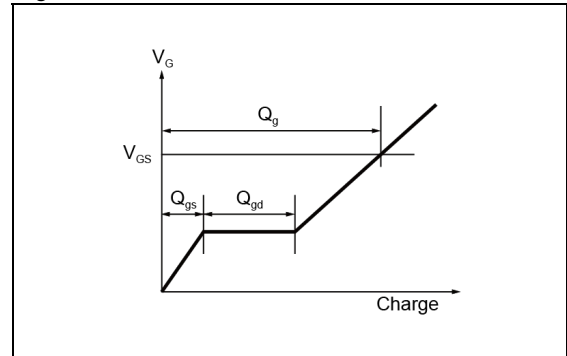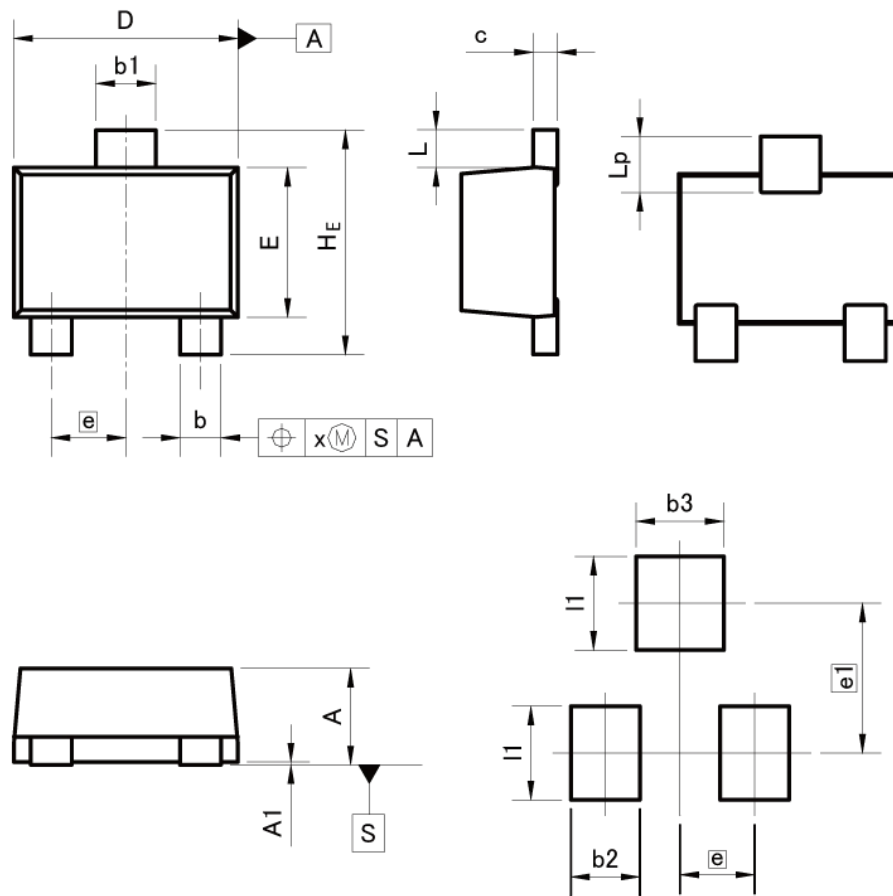Fig. 2-1 GATE CHARGE MEASUREMENT CIRCUIT

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	
l1	–	0.50	–	0.020

Dimension in mm/inches