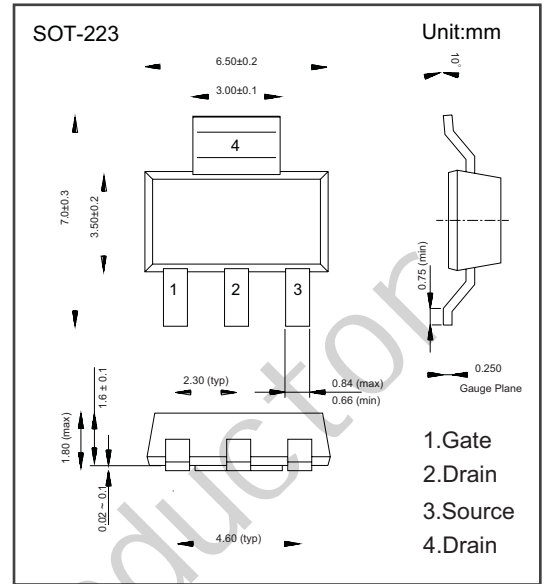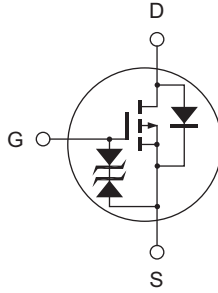## Features

- Low on-resistance
- High speed switching
- Low drive current
- 4 V gate drive device can be driven from 5 V source
- Suitable for switching regulator, DC-DC converter

SOT-223   Unit:mm

1.Gate
2.Drain
3.Source
4.Drain

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Value	Unit
Drain to source voltage	V_{DSS}	−60	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	−3	A
Drain peak current	$I_{D (pulse)}$	−4	A
Body to drain diode reverse drain current	I_{DR}	−1	A
Channel dissipation	Pch	1	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	−55 to +150	°C

Electrical Characteristics

(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR) DSS}$	−60	—	—	V	$I_D = -10$ mA, $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR) GSS}$	±20	—	—	V	$I_G = \pm100$ μA, $V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	±5	μA	$V_{GS} = \pm16$ V, $V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	−10	μA	$V_{DS} = -50$ V, $V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS (off)}$	−1.0	—	−2.25	V	$I_D = -1$ mA, $V_{DS} = -10$ V
Static drain to source on state resistance	$R_{DS (on)}$	—	0.15	0.17	Ω	$I_D = -0.5$ A, $V_{GS} = -10$ V [Note 3]
	$R_{DS (on)}$	—	0.19	0.2	Ω	$I_D = -0.5$ A, $V_{GS} = -4$ V [Note 3]
Forward transfer admittance	$|y_{fs}|$	0.6	1.0	—	S	$I_D = -0.5$ A, $V_{DS} = -10$ V [Note 3]
Input capacitance	Ciss	—	160	—	pF	$V_{DS} = -10$ V
Output capacitance	Coss	—	80	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	Crss	—	28	—	pF	f = 1 MHz
Turn-on delay time	$t_{d (on)}$	—	7	—	ns	$I_D = -0.5$ A
Rise time	t_r	—	8	—	ns	$V_{GS} = -10$ V
Turn-off delay time	$t_{d (off)}$	—	30	—	ns	$R_L = 60$ Ω
Fall time	t_f	—	25	—	ns	
Body to drain diode forward voltage	V_{DF}	—	−1.1	—	V	$I_F = -1$ A, $V_{GS} = 0$
Body to drain diode reverse recovery time	t_{rr}	—	90	—	ns	$I_F = -1$ A, $V_{GS} = 0$ $di_F/dt = 50$ A/μs

JSMICRO SEMICONDUCTOR
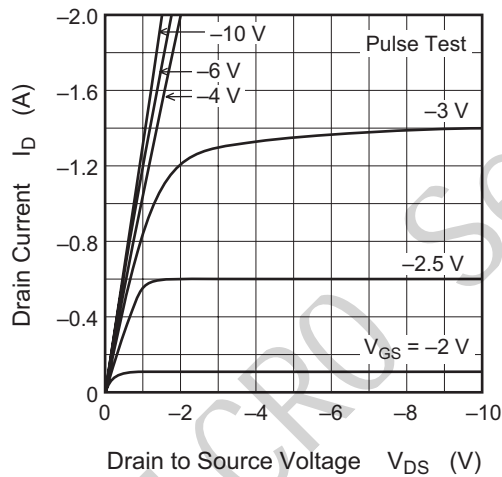
Main Characteristics
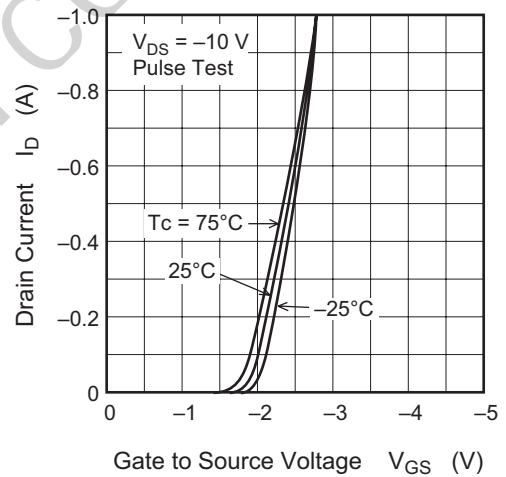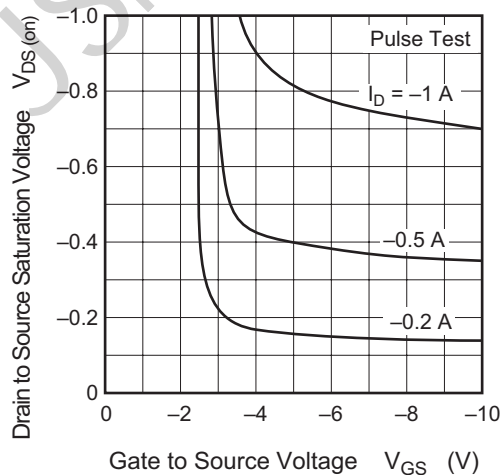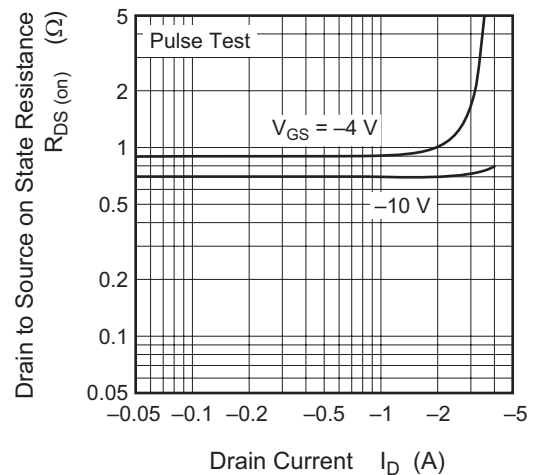
Power vs. Temperature Derating
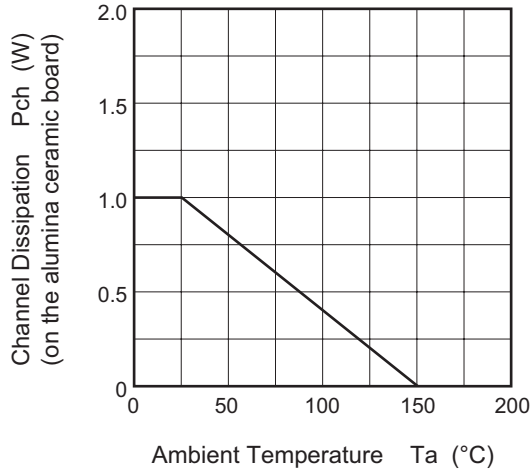
Maximum Safe Operation Area
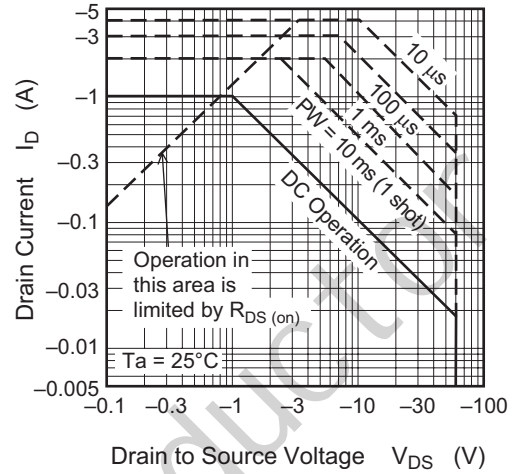
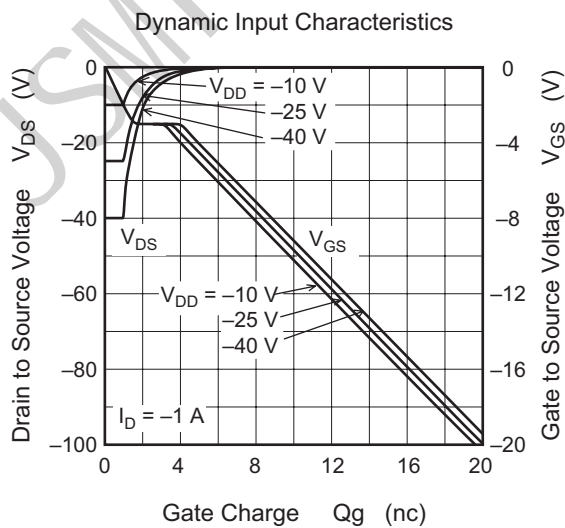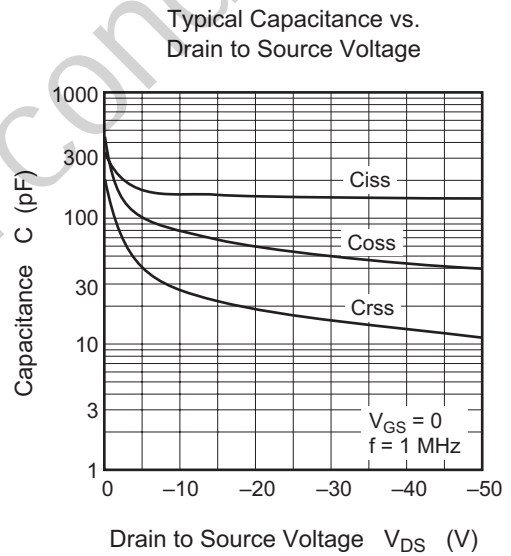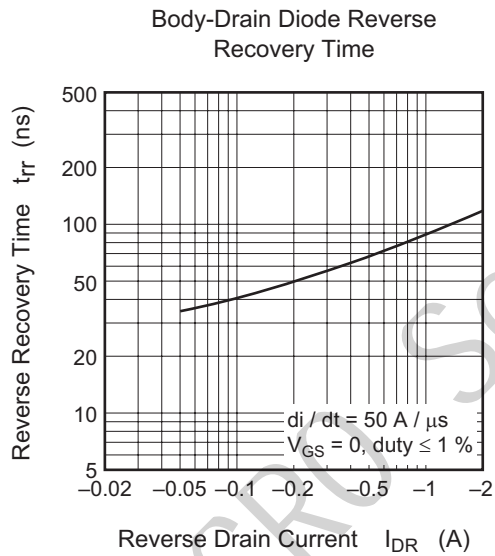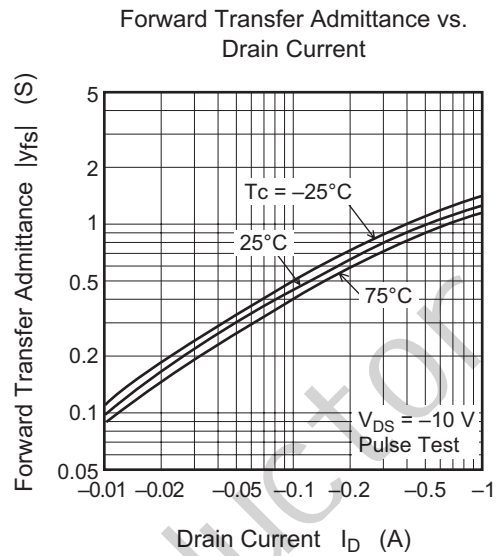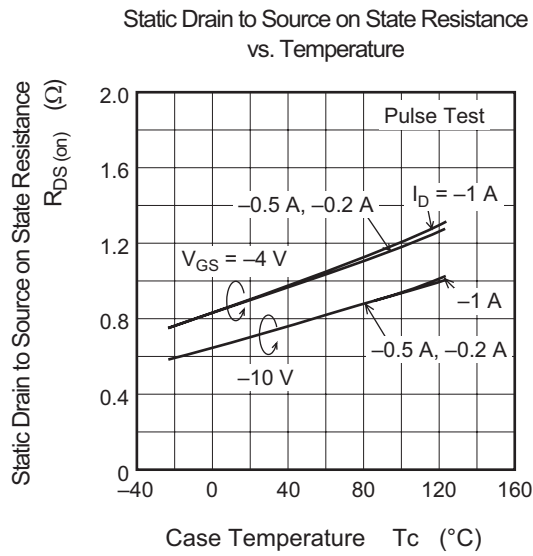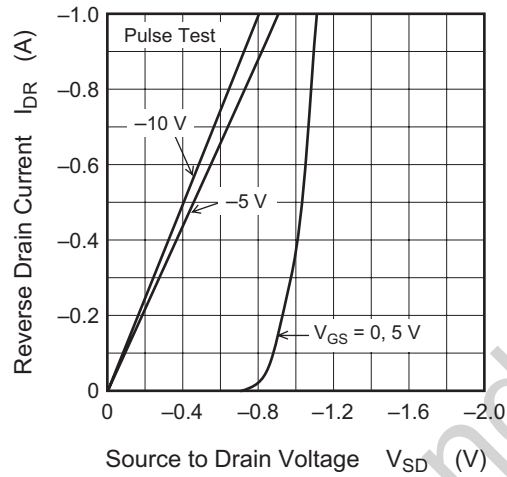Typical Output Characteristics

Typical Transfer Characteristics

Drain to Source Saturation Voltage vs.
Gate to Source Voltage

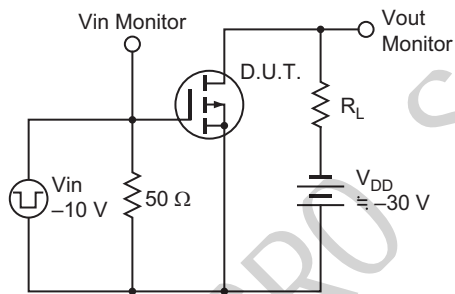Static Drain to Source on State Resistance
vs. Drain Current

Static Drain to Source on State Resistance vs. Temperature

Pulse Test

-0.5 A, -0.2 A $I_D = -1$ A

$V_{GS} = -4$ V

-1 A

-0.5 A, -0.2 A

-10 V

X-axis: Case Temperature   Tc   (°C)
Y-axis: Static Drain to Source on State Resistance $R_{DS(on)}$ (Ω)

Forward Transfer Admittance vs. Drain Current

Tc = -25°C

25°C

75°C

$V_{DS} = -10$ V
Pulse Test

X-axis: Drain Current I_D (A)
Y-axis: Forward Transfer Admittance $|y_{fs}|$ (S)

Body-Drain Diode Reverse Recovery Time

di / dt = 50 A / μs
$V_{GS} = 0$, duty ≤ 1 %

X-axis: Reverse Drain Current I_{DR} (A)
Y-axis: Reverse Recovery Time t_{rr} (ns)

Typical Capacitance vs. Drain to Source Voltage

Ciss

Coss

Crss

$V_{GS} = 0$
f = 1 MHz

X-axis: Drain to Source Voltage V_{DS} (V)
Y-axis: Capacitance   C   (pF)

Dynamic Input Characteristics

$V_{DD} = -10$ V
-25 V
-40 V

V_{DS} V_{GS}

$V_{DD} = -10$ V
-25 V
-40 V

$I_D = -1$ A

X-axis: Gate Charge   Qg   (nc)
Y-axis (left): Drain to Source Voltage V_{DS} (V)
Y-axis (right): Gate to Source Voltage V_{GS} (V)

Switching Characteristics

$V_{GS} = -10$ V, $V_{DD} = -30$ V
PW = 2 μs, duty ≤ 1 %

t_f

$t_{d(off)}$

$t_{d(on)}$

t_r

X-axis: Drain Current I_D (A)
Y-axis: Switching Time   t   (ns)

Reverse Drain Current vs.
Source to Drain Voltage

Switching Time Test Circuit

Waveform