Field-Effect Transistor   Silicon P-Channel MOS Type

Power management switch Applications

- 4 V drive
- Low ON-resistance: R_{on} = 225 mΩ (max) (@V_{GS} = −4 V)
  R_{on} = 117 mΩ (max) (@V_{GS} = −10 V)

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Drain–source voltage		V_{DS}	−30	V
Gate–source voltage		V_{GSS}	± 20	V
Drain current	DC	I_D	−2.4	A
	Pulse	I_{DP}	−4.8	
Drain power dissipation		P_{D} (Note 1)	700	mW
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

Unit: mm

1. GATE
2. SOURCE
3. DRAIN

SOT-23F
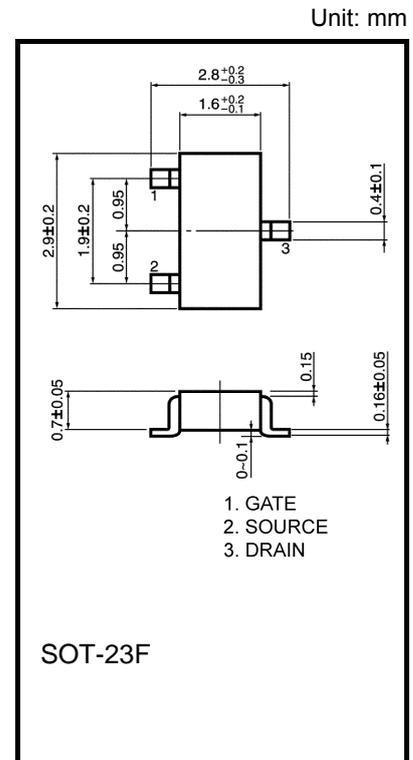
Weight: 10 mg (typ.)

Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition		Min	Typ.	Max	Unit
Drain–source breakdown voltage		$V_{(BR)DSS}$	I_D = −1 mA, V_{GS} = 0		−30	—	—	V
		$V_{(BR)DSX}$	I_D = −1 mA, V_{GS} = +20 V		−15	—	—	
Drain cutoff current		I_{DSS}	V_{DS} = −30 V, V_{GS} = 0		—	—	−1	μA
Gate leakage current		I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0		—	—	±1	μA
Gate threshold voltage		V_{th}	V_{DS} = −5 V, I_D = −1 mA		−1.2	—	−2.6	V
Forward transfer admittance		$|Y_{fs}|$	V_{DS} = −5 V, I_D = −1 A	(Note 2)	1.6	3.1	—	S
Drain–source ON-resistance		$R_{DS(ON)}$	I_D = −1 A, V_{GS} = −10 V	(Note 2)	—	80	117	mΩ
			I_D = −0.5 A, V_{GS} = −4 V	(Note 2)	—	160	225	
Input capacitance		C_{iss}	V_{DS} = −15 V, V_{GS} = 0, f = 1 MHz		—	280	—	pF
Output capacitance		C_{oss}			—	80	—	
Reverse transfer capacitance		C_{rss}			—	45	—	
Total Gate Charge		Q_g	V_{DS} = -15 V, I_{DS} = -2.4 A V_{GS} = -4 V		—	2.5	—	nC
Gate-Source Charge		Q_{gs}			—	1.3	—	
Gate-Drain Charge		Q_{gd}			—	1.2	—	
Switching time	Turn-on time	t_{on}	V_{DD} = −15 V, I_D = −1 A, V_{GS} = 0 to −4 V, R_G = 10 Ω		—	16	—	ns
	Turn-off time	t_{off}			—	35	—	
Drain–source forward voltage		V_{DSF}	I_D = 2.4 A, V_{GS} = 0 V	(Note 2)	—	0.8	1.2	V

Note 2: Pulse test

Switching Time Test Circuit

(a) Test circuit

0

−4 V

10 μs

OUT

IN

R_G

R_L

V_{DD}
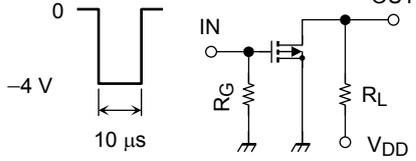
$V_{DD} = -15$ V
$R_G = 10$ Ω
D.U. $\leqq$ 1%
V_{IN}: t_r, $t_f < 5$ ns
Common Source
Ta $= 25°$C

(b) V_{IN}

0 V

10%

90%

−4 V

(c) V_{OUT}

$V_{DS\,(ON)}$

90%

V_{DD}

10%

t_r

t_f

t_{on}

t_{off}

Marking

3

JJ9

1

2
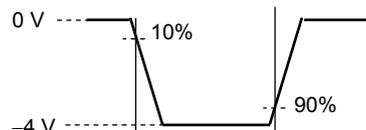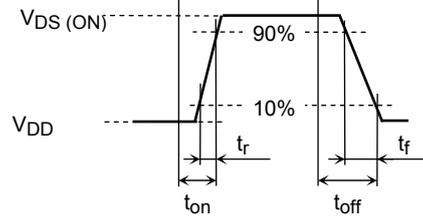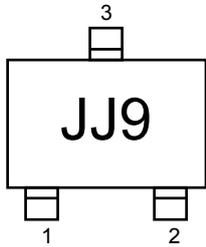
Equivalent Circuit (top view)

3

1

2

$I_D - V_{DS}$

$I_D - V_{GS}$

$R_{DS (ON)} - V_{GS}$

$R_{DS (ON)} - I_D$

$R_{DS (ON)} - Ta$

$V_{th} - Ta$

$|Y_{fs}| - I_D$

Common Source
$V_{DS} = -5\ V$
Ta = 25°C

Forward transfer admittance $|Y_{fs}|$ (S)

Drain current I_D (A)

$I_{DR} - V_{DS}$

Common Source
$V_{GS} = 0\ V$
Ta = 25°C

D
G
S
I_{DR}

Drain reverse current I_{DR} (A)

Ta = 100°C
25°C
−25°C

Drain–source voltage V_{DS} (V)

$C - V_{DS}$

C_{iss}
C_{oss}
C_{rss}

Common Source
Ta = 25°C
f = 1 MHz
$V_{GS} = 0\ V$

Capacitance C (pF)

Drain–source voltage V_{DS} (V)

$t - I_D$

Common Source
$V_{DD} = -10\ V$
$V_{GS} = 0$ to $-4\ V$
Ta = 25°C
$R_G = 10\ \Omega$

t_{off}
t_f
t_{on}
t_r

Switching time t (ns)

Drain current I_D (A)

Dynamic Input Characteristic

Common Source
$I_D = -2.4\ A$
Ta = 25°C

VDD = -15V
VDD = -24V

Gate–Source voltage V_{GS} (V)

Total Gate Charge Q_g (nC)

$r_{th} - t_w$

Transient thermal impedance Rth (°C/W)

Pulse width t_w (s)

Single Pulse
a: Mounted on FR4 board
 (25.4mm × 25.4mm × 1.6t ,
 Cu Pad : 645 mm²)
b: Mounted on FR4 board
 (25.4mm × 25.4mm × 1.6t ,
 Cu Pad : 0.8 mm²×3)

$P_D - T_a$

Drain power dissipation P_D (mW)

Ambient temperature T_a (°C)

a: Mounted on FR4 board
 (25.4mm × 25.4mm × 1.6t ,
 Cu Pad : 645 mm²)
b: Mounted on FR4 board
 (25.4mm × 25.4mm × 1.6t ,
 Cu Pad : 0.8 mm²×3)