HB2301W

Field Effect Transistor Silicon P-Channel MOS Type

High Speed Switching Applications

- 1.8V drive
- Low on-resistance: R_{on} = 363mΩ (max) (@V_{GS} = −1.8 V)

  R_{on} = 230mΩ (max) (@V_{GS} = −2.5 V)

  R_{on} = 158mΩ (max) (@V_{GS} = −4.0 V)

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Drain-Source voltage		V_{DS}	−20	V
Gate-Source voltage		V_{GSS}	± 8	V
Drain current	DC	I_D	−1.8	A
	Pulse	I_{DP}	−3.6	
Drain power dissipation		$P_{D\ (Note\ 1)}$	800	mW
		$P_{D\ (Note\ 2)}$	500	
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55~150	°C

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Note 1: Mounted on ceramic board.
(25.4 mm × 25.4 mm × 0.8 mm, Cu Pad: 645 mm^2)
Note 2: Mounted on FR4 board.
(25.4 mm × 25.4 mm × 1.6 mm, Cu Pad: 645 mm^2)

1: Gate
2: Source
3: Drain

SOT-323F

Weight: 6.6 mg (typ.)   Unit: mm
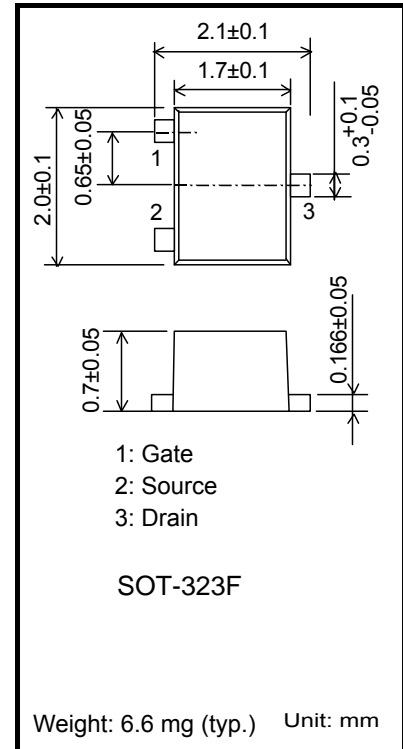
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Conditions	Min	Typ.	Max	Unit
Drain-Source breakdown voltage		$V_{(BR)DSS}$	I_D = −1 mA, V_{GS} = 0	−20	—	—	V
		$V_{(BR)DSX}$	I_D = −1 mA, V_{GS} = +8 V	−12	—	—	
Drain cut-off current		I_{DSS}	V_{DS} = −20 V, V_{GS} = 0	—	—	−10	μA
Gate leakage current		I_{GSS}	V_{GS} = ±8V, V_{DS} = 0	—	—	±1	μA
Gate threshold voltage		V_{th}	V_{DS} = −3 V, I_D = −1 mA	−0.3	—	−1.0	V
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = −3 V, I_D =− 0.8 A (Note3)	1.9	3.2	—	S
Drain-Source on-resistance		$R_{DS(ON)}$	I_D = −0.8 A, V_{GS} = −4.0 V (Note3)	—	125	158	mΩ
			I_D = −0.4 A, V_{GS} = −2.5 V (Note3)	—	170	230	
			I_D = −0.1 A, V_{GS} = −1.8 V (Note3)	—	230	363	
Input capacitance		C_{iss}	V_{DS} = −10 V, V_{GS} = 0, f = 1 MHz	—	250	—	pF
Output capacitance		C_{oss}	V_{DS} = −10 V, V_{GS} = 0, f = 1 MHz	—	45	—	pF
Reverse transfer capacitance		C_{rss}	V_{DS} = −10 V, V_{GS} = 0, f = 1 MHz	—	35	—	pF
Switching time	Turn-on time	t_{on}	V_{DD} = −10 V, I_D = −0.25 A, V_{GS} = 0~−2.5 V, R_G = 4.7 Ω	—	12	—	ns
	Turn-off time	t_{off}		—	18	—	
Drain-Source forward voltage		V_{DSF}	I_D = 1.8A, V_{GS} = 0 V (Note3)	—	0.85	1.2	V

Note3: Pulse test

Switching Time Test Circuit

(a) Test circuit

IN

OUT

R_G R_L

V_{DD}

0

−2.5V

10 µs
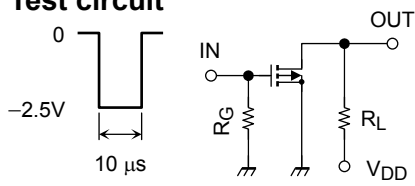
$V_{DD} = -10\ V$
$R_G = 4.7\ \Omega$
D.U. $\leqq$ 1%
V_{IN}: t_r, t_f < 5 ns
Common Source
Ta = 25°C

(b) V_{IN}

0 V
10%

−2.5 V
90%

(c) V_{OUT}

$V_{DS\ (ON)}$
90%

V_{DD}
10%

t_r

t_f

t_{on}

t_{off}
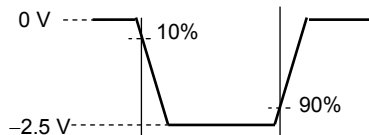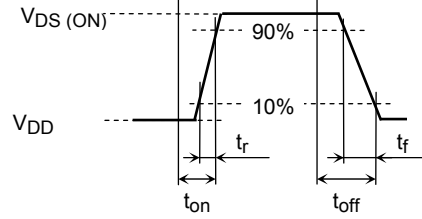
Equivalent Circuit (top view)

3

1   2

ID - VDS

Drain current ID (A) vs Drain-Source voltage VDS (V)

-10, -4.0, -2.5, -1.8, -1.5, VGS=-1.2V

Common Source Ta=25°C

ID - VGS

Drain Current ID (A) vs Gate-Source voltage VGS (V)

Ta=85°C, 25°C, -25°C

Common Source VDS=-3V

RDS(ON) - VGS

Drain-Source on-resistance RDS(ON) (mΩ) vs Gate-Source voltage VGS (V)

Common Source Ta=25°C

-0.8A, -0.4A, ID=-0.1A

RDS(ON) - Ta

Drain-Source on-resistance RDS(ON) (mΩ) vs Ambient temperature Ta(°C)

Common Source

-1.8V,-0.1A, -2.5V,-0.4A, VGS=-4V,ID=-0.8A

RDS(ON) - ID

Drain-Source on-resistance RDS(ON) (mΩ) vs Drain current ID (A)

-1.8V, -2.5V, VGS=-4V

Common Source Ta=25°C

Vth - Ta

Gate threshold voltage Vth(V) vs Ambient temperature Ta(°C)

Common Source ID=-1mA VDS=-3V

|Yfs| - ID

Forward transfer admittance |Yfs| (S) vs Drain current ID (A)

25°C
-25°C
Ta=85°C

Common Source
VDS=-3V
Ta=25°C

IDR - VDS

Drain reverse current IDR (A) vs Drain-Source voltage VDS (V)

Common Source
VGS=0V
Ta=25°C

25°C
-25°C
Ta=85°C

C - VDS

Capacitance C (pF) vs Drain-Source voltage VDS (V)

Ciss
Coss
Crss

Common Source
VGS=0V
f=1MHz
Ta=25°C

t - ID

Switching time t (ns) vs Drain current ID (A)

Common Source
VDD=10V
VGS=0 to 2.5V
Ta=25°C

toff
tf
ton
tr

PD - Ta

Drain power dissipation PD(mW) vs Ambient temperature Ta(°C)

a: mounted on FR4 board
(25.4mm×25.4mm×1.6mm)
Cu Pad :25.4mm×25.4mm
b:mounted on ceramic board
(25.4mm×25.4mm×0.8mm)
Cu Pad :25.4mm×25.4mm

a
b

Rth - tw

Transient thermal impedance Rth(°C/W) vs Pulse width tw (S)

a
b
c

Single pulse
a:Mounted on ceramic board
(25.4mm×25.4mm×0.8mm)
Cu Pad :25.4mm×25.4mm
b:Mounted on FR4 board
(25.4mm×25.4mm×1.6mm)
Cu Pad :25.4mm×25.4mm
c:Mounted on FR4 Board
(25.4mm×25.4mm×1.6mm)
Cu Pad :0.45mm×0.8mm×3