TY Semicondutor® TY

SSM3K09FU

Unit: mm

- Small package
- Low on resistance
  - : R_{on} = 0.7 Ω (max) (@V_{GS} = 10 V)
  - : R_{on} = 1.2 Ω (max) (@V_{GS} = 4 V)

## Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-Source voltage		V_{DS}	30	V
Gate-Source voltage		V_{GSS}	±20	V
Drain current	DC	I_D	400	mA
	Pulse	I_{DP}	800	
Drain power dissipation (Ta = 25°C)		P_D (Note 1)	150	mW
Channel temperature		T_{ch}	150	°C
Storage temperature		T_{stg}	−55~150	°C

1 : GATE
2 : SOURCE
3 : DRAIN

USM

Weight: 0.006 g (typ.)

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.
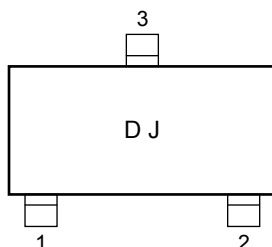
Please design the appropriate reliability upon reviewing the TY Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Mounted on FR4 board
(25.4 mm × 25.4 mm × 1.6 t, Cu Pad: 0.6 mm^2 × 3)   Figure 1.
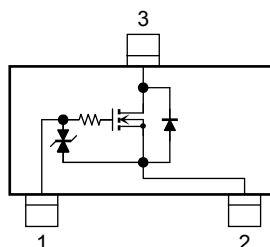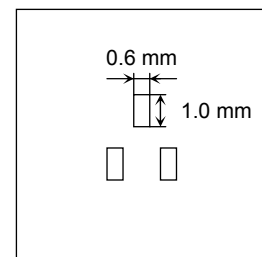
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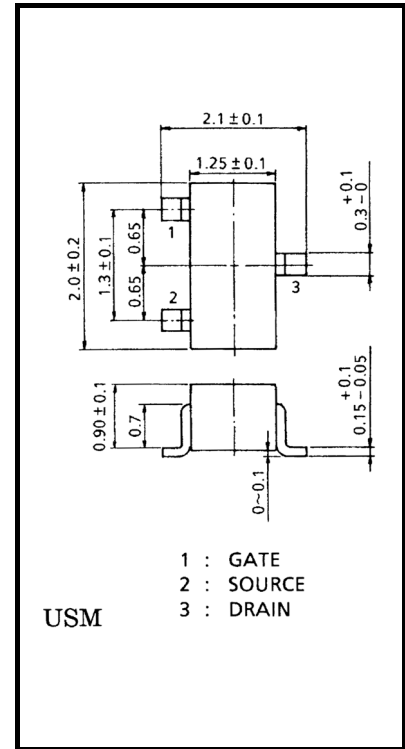
Equivalent Circuit (top view)

Figure 1: 25.4 mm × 25.4 mm × 1.6 t, Cu Pad: 0.6 mm^2 × 3

0.6 mm

1.0 mm

Handling Precaution

When handling individual devices (which are not yet mounting on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.

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Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition		Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm16$ V, $V_{DS} = 0$		—	—	±1	μA
Drain-Source breakdown voltage		$V_{(BR)DSS}$	$I_D = 1$ mA, $V_{GS} = 0$		30	—	—	V
Drain cut-off current		I_{DSS}	$V_{DS} = 30$ V, $V_{GS} = 0$		—	—	1	μA
Gate threshold voltage		V_{th}	$V_{DS} = 5$ V, $I_D = 0.1$ mA		1.1	—	1.8	V
Forward transfer admittance		$|Y_{fs}|$	$V_{DS} = 5$ V, $I_D = 200$ mA	(Note2)	270	—	—	mS
Drain-Source ON resistance		$R_{DS(ON)}$	$I_D = 200$ mA, $V_{GS} = 10$ V	(Note2)	—	0.5	0.7	Ω
			$I_D = 200$ mA, $V_{GS} = 4$ V	(Note2)	—	0.8	1.2	
			$I_D = 200$ mA, $V_{GS} = 3.3$ V	(Note2)	—	1.0	1.7	
Input capacitance		C_{iss}	$V_{DS} = 5$ V, $V_{GS} = 0$, f = 1 MHz		—	20	—	pF
Reverse transfer capacitance		C_{rss}	$V_{DS} = 5$ V, $V_{GS} = 0$, f = 1 MHz		—	7	—	pF
Output capacitance		C_{oss}	$V_{DS} = 5$ V, $V_{GS} = 0$, f = 1 MHz		—	16	—	pF
Switching time	Turn-on time	t_{on}	$V_{DD} = 5$ V, $I_D = 200$ mA,		—	72	—	ns
	Turn-off time	t_{off}	$V_{GS} = 0\sim4$ V		—	68	—	ns

Note2: Pulse test

Switching Time Test Circuit

(a) Test circuit
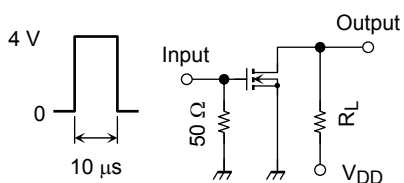
(b) V$_{IN}$

$V_{DD} = 5$ V
D.U. $\leqq$ 1%
Input: t_r, $t_f < 5$ ns
($Z_{out} = 50$ Ω)
Common Source
Ta = 25°C
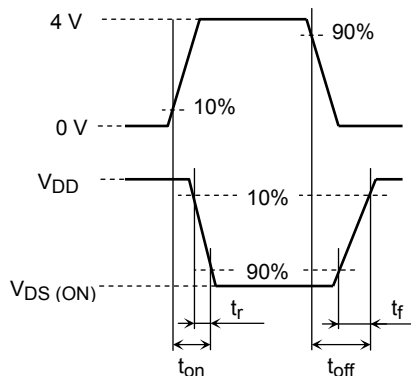
(c) V$_{OUT}$
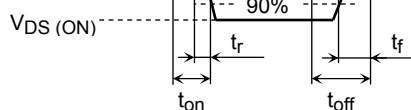
Precaution

V_{th} can be expressed as voltage between gate and source when low operating current value is $I_D = 100$ μA for this product. For normal switching operation, $V_{GS(on)}$ requires higher voltage than V_{th} and $V_{GS(off)}$ requires lower voltage than V_{th}.
(relationship can be established as follows: $V_{GS(off)} < V_{th} < V_{GS(on)}$)
Please take this into consideration for using the device.