

**Preliminary**

TOSHIBA Field Effect Transistor  
Silicon P Channel MOS Type (U-MOSII)

# SSM6J08FU

Power Management Switch  
DC-DC Converter

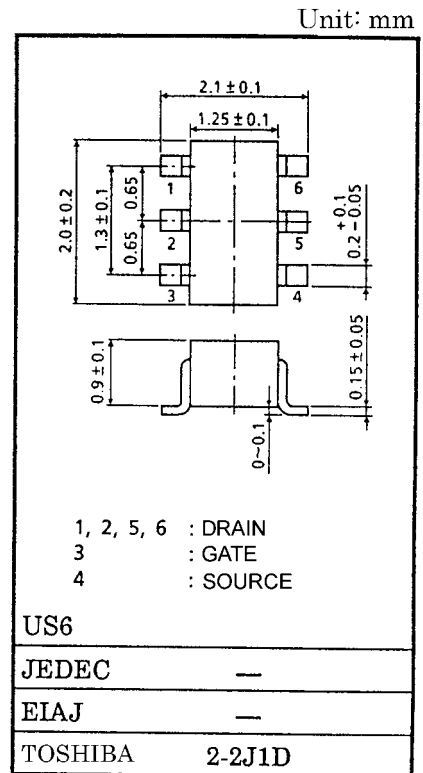
- Small Package
- Low on Resistance :  $R_{on} = 0.18 \Omega$  (max) (@ $V_{GS} = -4$  V)  
:  $R_{on} = 0.26 \Omega$  (max) (@ $V_{GS} = -2.5$  V)
- Low Gate Threshold Voltage

## Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristics		Symbol	Rating	Unit
Drain-Source voltage		$V_{DS}$	-20	V
Gate-Source voltage		$V_{GSS}$	$\pm 12$	V
Drain current	DC	$I_D$	-1.3	A
	Pulse	$I_{DP}$ (Note 2)	-2.6	
Drain power dissipation		$P_D$ (Note 1)	300	mW
Channel temperature		$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55~150	$^\circ\text{C}$

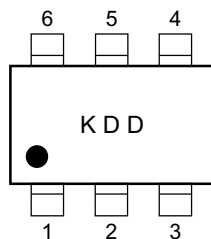
Note1: Mounted on FR4 board  
(25.4 mm  $\times$  25.4 mm  $\times$  1.6 t, Cu Pad:  $0.32 \text{ mm}^2 \times 6$ ) Fig: 1.

Note2: The pulse width limited by max channel temperature.

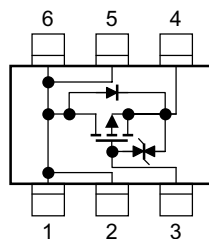


Weight: 6.8 mg

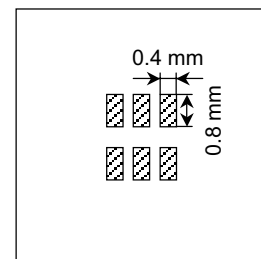
## Marking



## Equivalent Circuit



**Fig 1: 25.4 mm  $\times$  25.4 mm  $\times$  1.6 t,  
Cu Pad:  $0.32 \text{ mm}^2 \times 6$**



## Handling Precaution

When handling individual devices (which are not yet mounted 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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• TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.  
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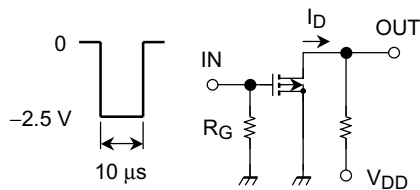
## Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	$I_{GSS}$	$V_{GS} = \pm 12 \text{ V}, V_{DS} = 0$	—	—	$\pm 1$	$\mu\text{A}$
Drain-Source breakdown voltage	$V_{(BR) DSS}$	$I_D = -1 \text{ mA}, V_{GS} = 0$	-20	—	—	V
	$V_{(BR) DSX}$	$I_D = -1 \text{ mA}, V_{GS} = 12 \text{ V}$	-8	—	—	
Drain Cut-off current	$I_{DSS}$	$V_{DS} = -20 \text{ V}, V_{GS} = 0$	—	—	-1	$\mu\text{A}$
Gate threshold voltage	$V_{th}$	$V_{DS} = -3 \text{ V}, I_D = -0.1 \text{ mA}$	-0.5	—	-1.1	V
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = -3 \text{ V}, I_D = -0.65 \text{ A}$ (Note 3)	1.3	2.7	—	S
Drain-Source ON resistance	$R_{DS(ON)}$	$I_D = -0.65 \text{ A}, V_{GS} = -4 \text{ V}$ (Note 3)	—	140	180	$\text{m}\Omega$
		$I_D = -0.65 \text{ A}, V_{GS} = -2.5 \text{ V}$ (Note 3)	—	200	260	
		$I_D = -0.65 \text{ A}, V_{GS} = -2.0 \text{ V}$ (Note 3)	—	260	460	
Input capacitance	$C_{iss}$	$V_{DS} = -10 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$	—	370	—	pF
Reverse transfer capacitance	$C_{rss}$	$V_{DS} = -10 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$	—	73	—	pF
Output capacitance	$C_{oss}$	$V_{DS} = -10 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$	—	116	—	pF
Switching time	Turn-on time	$t_{on}$	$V_{DD} = -10 \text{ V}, I_D = -0.65 \text{ A},$	—	33	ns
	Turn-off time	$t_{off}$	$V_{GS} = 0 \sim -2.5 \text{ V}, R_G = 4.7 \Omega$	—	47	ns

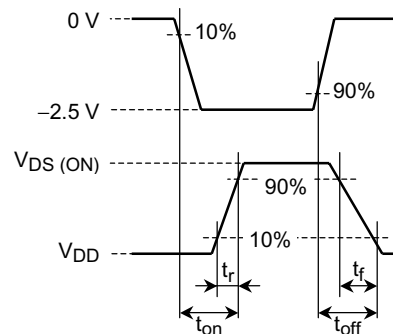
Note 3: Pulse test

## Switching Time Test Circuit

## (a) Test circuit



$V_{DD} = -10 \text{ V}$   
 $R_G = 4.7 \Omega$   
 $\text{D.U.} \leq 1\%$   
 $V_{IN}: t_r, t_f < 5 \text{ ns}$   
 COMMON SOURCE  
 $T_a = 25^\circ\text{C}$

(b)  $V_{IN}$ (c)  $V_{OUT}$ 

## Precaution

$V_{th}$  can be expressed as voltage between gate and source when low operating current value is  $I_D = -100 \mu\text{A}$  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.

$V_{GS}$  recommended voltage of  $-2.5 \text{ V}$  or higher to turn on this product.

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