

TOSHIBA Transistor Silicon P Channel MOS Type

# SSM6J07FU

Power Management Switch  
High Speed Switching Applications

- Small package
- Low on resistance
  - :  $R_{on} = 450 \text{ m}\Omega$  (max) ( $V_{GS} = -10 \text{ V}$ )
  - :  $R_{on} = 800 \text{ m}\Omega$  (max) ( $V_{GS} = -4 \text{ V}$ )

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

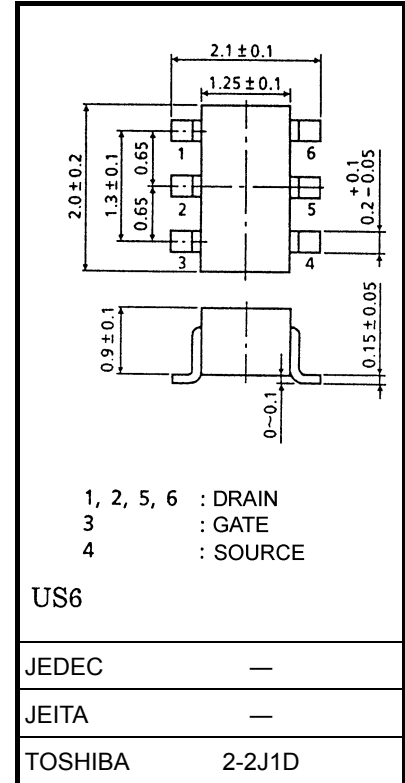
Characteristics	Symbol	Rating	Unit
Drain-source voltage	$V_{DS}$	-30	V
Gate-source voltage	$V_{GSS}$	$\pm 20$	V
Drain current	DC	$I_D$	-0.8
	Pulse	$I_{DP}$	-1.6
Drain power dissipation	$P_D$ (Note 1)	300	mW
Channel temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55~150	$^\circ\text{C}$

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 Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

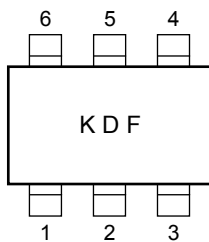
Note 1: Mounted on FR4 board  
(25.4 mm  $\times$  25.4 mm  $\times$  1.6 t, Cu Pad:  $0.32 \text{ mm}^2 \times 6$ )

Unit: mm



Weight: 6.8 mg (typ.)

### Marking



### Equivalent Circuit (top view)

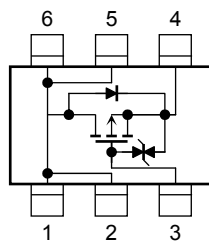
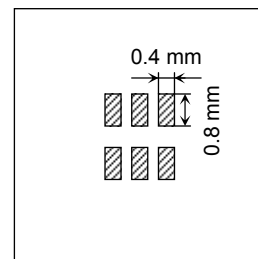


Figure 1: 25.4 mm  $\times$  25.4 mm  $\times$  1.6 t, Cu Pad:  $0.32 \text{ mm}^2 \times 6$



## Handling Precaution

When handling individual devices (which are not yet 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.

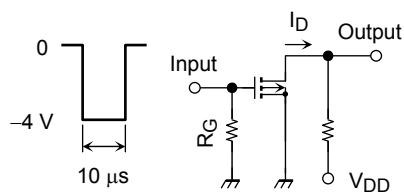
## Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	$I_{GSS}$	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0$	—	—	$\pm 1$	$\mu\text{A}$	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = -1\text{ mA}, V_{GS} = 0$	-30	—	—	V	
Drain cut-off current	$I_{DSS}$	$V_{DS} = -30\text{ V}, V_{GS} = 0$	—	—	-1	$\mu\text{A}$	
Gate threshold voltage	$V_{th}$	$V_{DS} = -5\text{ V}, I_D = -0.1\text{ mA}$	-1.1	—	-1.8	V	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = -5\text{ V}, I_D = -0.4\text{ A}$ (Note2)	0.7	—	—	S	
Drain-source ON resistance	$R_{DS(ON)}$	$I_D = -0.4\text{ A}, V_{GS} = -10\text{ V}$ (Note2)	—	350	450	$\text{m}\Omega$	
		$I_D = -0.4\text{ A}, V_{GS} = -4\text{ V}$ (Note2)	—	570	800		
		$I_D = -0.4\text{ A}, V_{GS} = -3.3\text{ V}$ (Note2)	—	0.7	1.6	$\Omega$	
Input capacitance	$C_{iss}$	$V_{DS} = -15\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	130	—	pF	
Reverse transfer capacitance	$C_{rss}$	$V_{DS} = -15\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	16	—	pF	
Output capacitance	$C_{oss}$	$V_{DS} = -15\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	52	—	pF	
Switching time	Turn-on time	$t_{on}$	$V_{DD} = -15\text{ V}, I_D = -0.4\text{ A},$ $V_{GS} = 0 \sim -4\text{ V}, R_G = 10\ \Omega$	—	28	—	ns
	Turn-off time	$t_{off}$		—	38	—	ns

Note 2: Pulse test

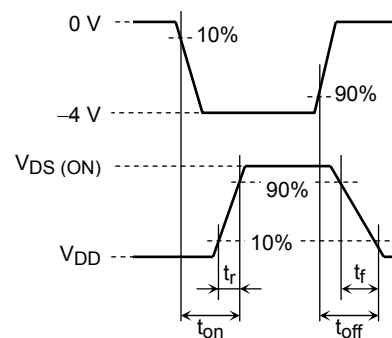
## Switching Time Test Circuit

### (a) Test circuit



$V_{DD} = -15\text{ V}$   
 $R_G = 10\ \Omega$   
 D.U.  $\leq 1\%$   
 Input:  $t_r, t_f < 5\text{ ns}$   
 Common source  
 $T_a = 25^\circ\text{C}$

### (b) $V_{IN}$



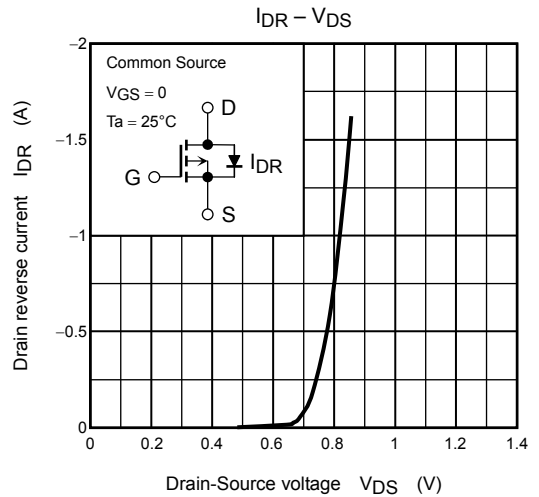
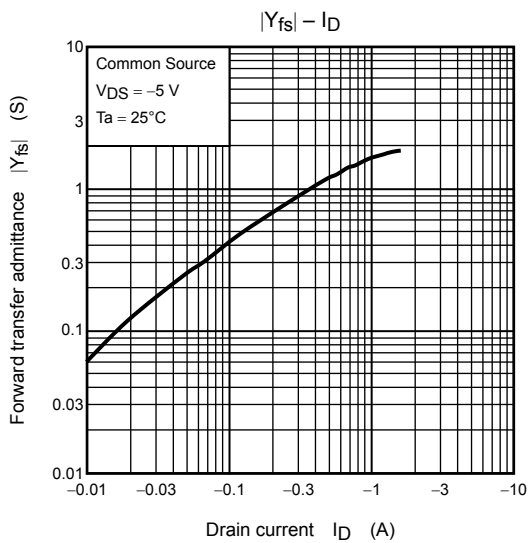
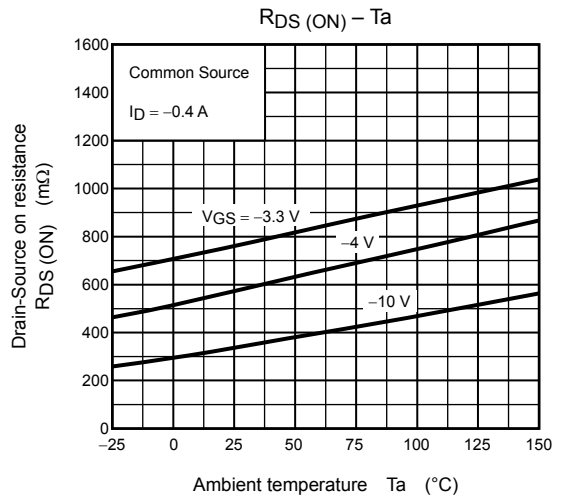
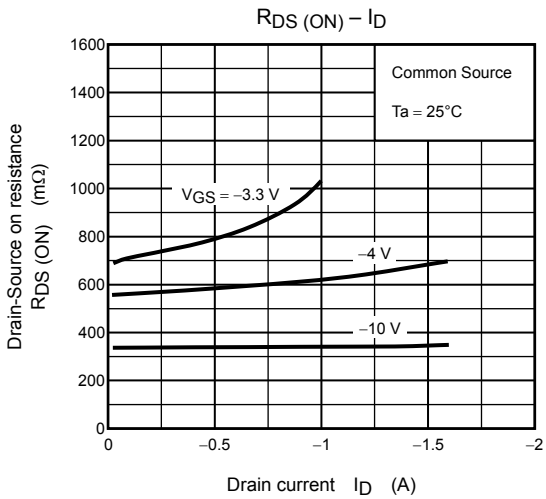
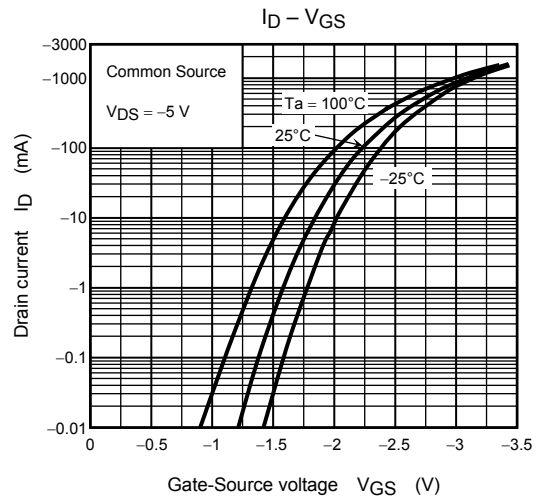
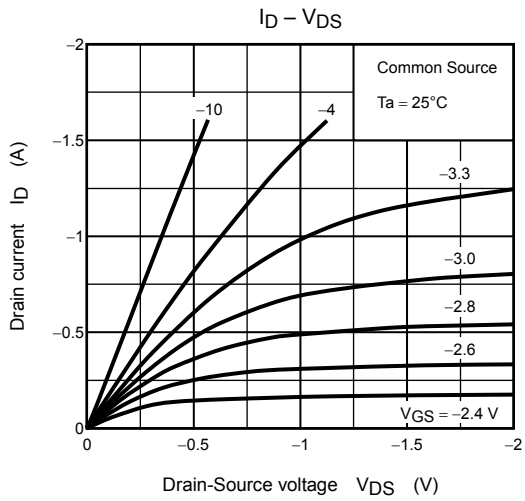
### (c) $V_{OUT}$

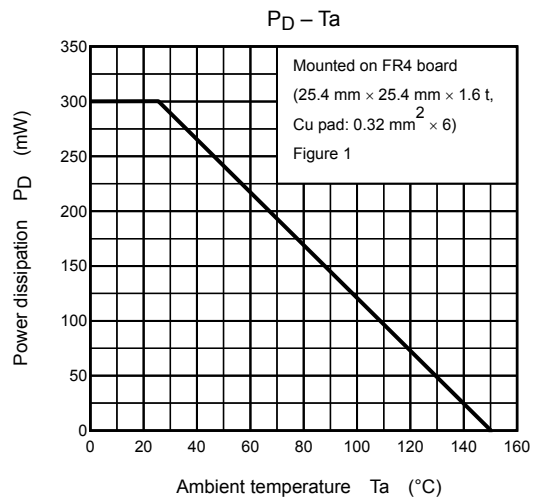
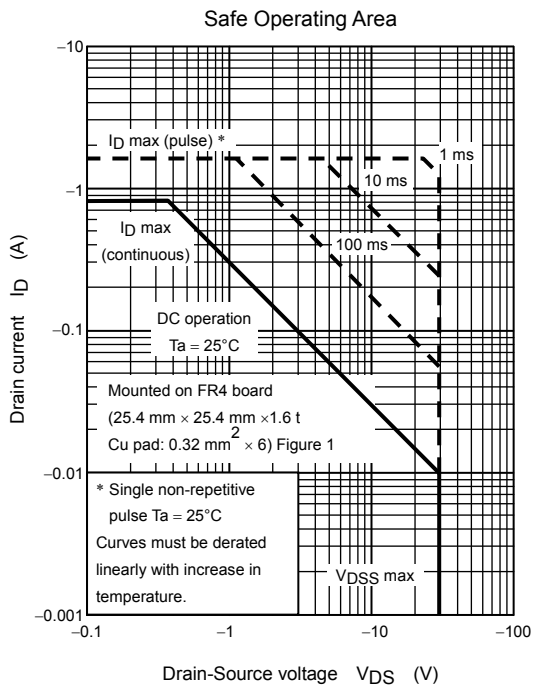
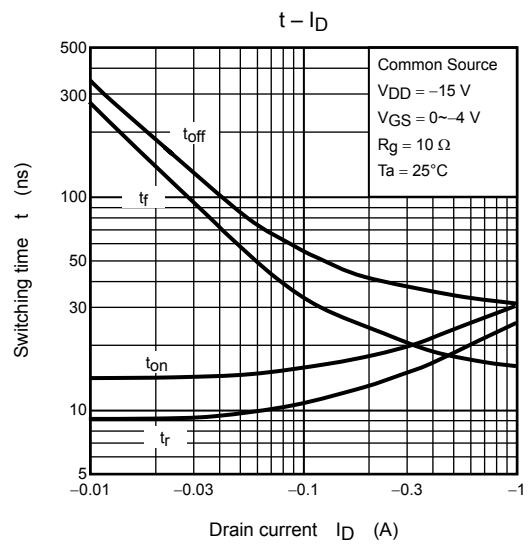
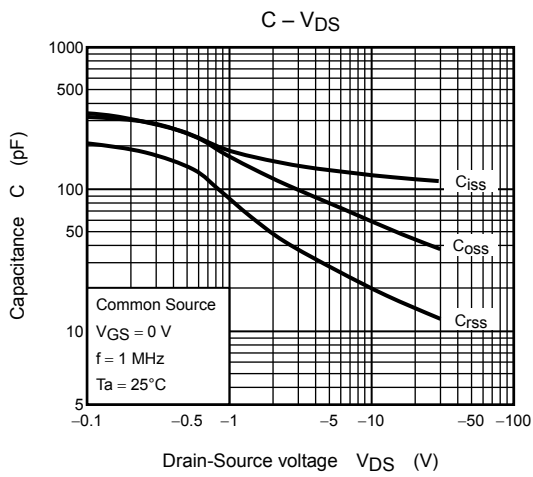
## Precaution

$V_{th}$  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.





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20070701-EN GENERAL

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