

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type

## SSM3K15FU

High Speed Switching Applications

Analog Switch Applications

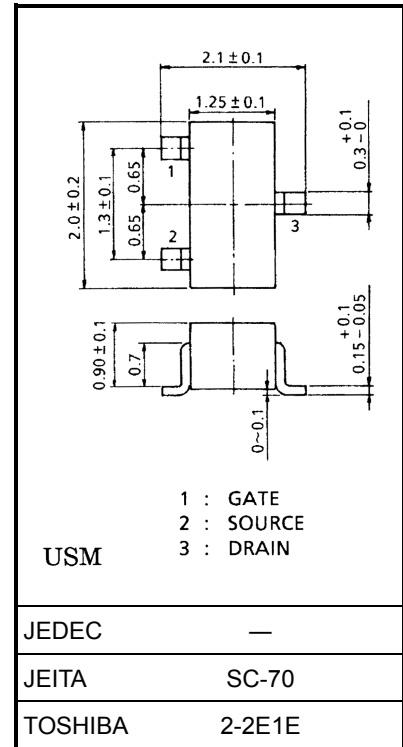
- Small package
- Low on resistance
  - :  $R_{on} = 4.0 \Omega$  (max) (@ $V_{GS} = 4 V$ )
  - :  $R_{on} = 7.0 \Omega$  (max) (@ $V_{GS} = 2.5 V$ )

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

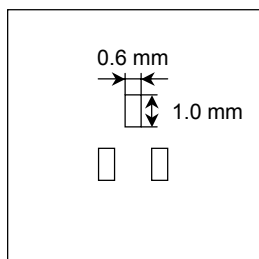
Characteristics	Symbol	Rating	Unit
Drain-source voltage	$V_{DS}$	30	V
Gate-source voltage	$V_{GSS}$	$\pm 20$	V
Drain current	DC	$I_D$	mA
	Pulse	$I_{DP}$	
Drain power dissipation ( $T_a = 25^\circ C$ )	$P_D$ (Note)	150	mW
Channel temperature	$T_{ch}$	150	$^\circ C$
Storage temperature	$T_{stg}$	$-55 \sim 150$	$^\circ C$

Note: Mounted on FR4 board  
( $25.4 \text{ mm} \times 25.4 \text{ mm} \times 1.6 \text{ t}$ , Cu Pad:  $0.6 \text{ mm}^2 \times 3$ )

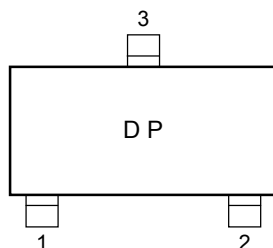
Unit: mm



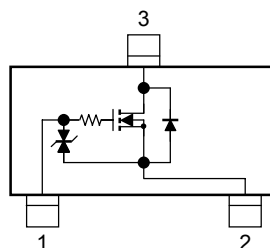
Weight: 0.006 g (typ.)



### Marking



### Equivalent Circuit



### Handling Precaution

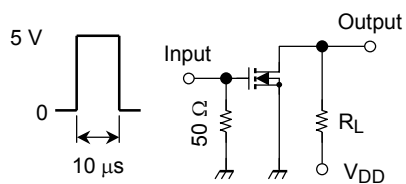
When handling individual devices (which are not yet mounting on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static 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	$V_{(BR)DSS}$	$I_D = 0.1 \text{ mA}, V_{GS} = 0$	30	—	—	V
Drain cut-off current	$I_{DSS}$	$V_{DS} = 30 \text{ V}, V_{GS} = 0$	—	—	1	$\mu\text{A}$
Gate threshold voltage	$V_{th}$	$V_{DS} = 3 \text{ V}, I_D = 0.1 \text{ mA}$	0.8	—	1.5	V
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 3 \text{ V}, I_D = 10 \text{ mA}$	25	—	—	mS
Drain-source ON resistance	$R_{DS(ON)}$	$I_D = 10 \text{ mA}, V_{GS} = 4 \text{ V}$	—	2.2	4.0	$\Omega$
		$I_D = 10 \text{ mA}, V_{GS} = 2.5 \text{ V}$	—	4.0	7.0	
Input capacitance	$C_{iss}$	$V_{DS} = 3 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$	—	7.8	—	pF
Reverse transfer capacitance	$C_{rss}$	$V_{DS} = 3 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$	—	3.6	—	pF
Output capacitance	$C_{oss}$	$V_{DS} = 3 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$	—	8.8	—	pF
Switching time	Turn-on time	$V_{DD} = 5 \text{ V}, I_D = 10 \text{ mA}, V_{GS} = 0 \sim 5 \text{ V}$	—	50	—	ns
	Turn-off time		—	180	—	

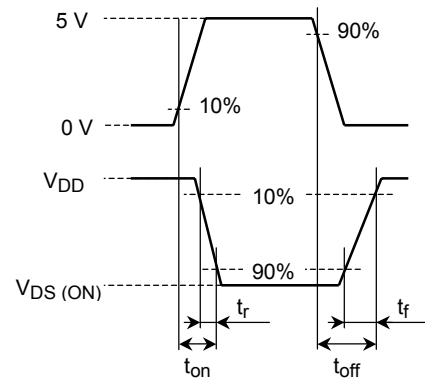
## Switching Time Test Circuit

(a) Test circuit



$V_{DD} = 5 \text{ V}$   
 $D.U. \leq 1\%$   
 Input:  $t_r, t_f < 5 \text{ ns}$   
 $(Z_{out} = 50 \Omega)$   
 Common Source  
 $T_a = 25^\circ\text{C}$

(b)  $V_{IN}$



(c)  $V_{OUT}$

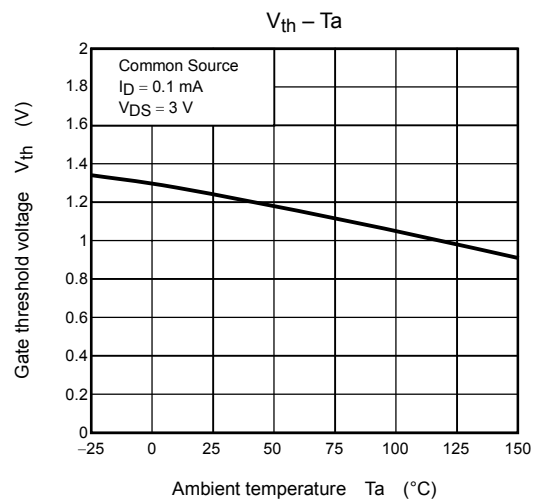
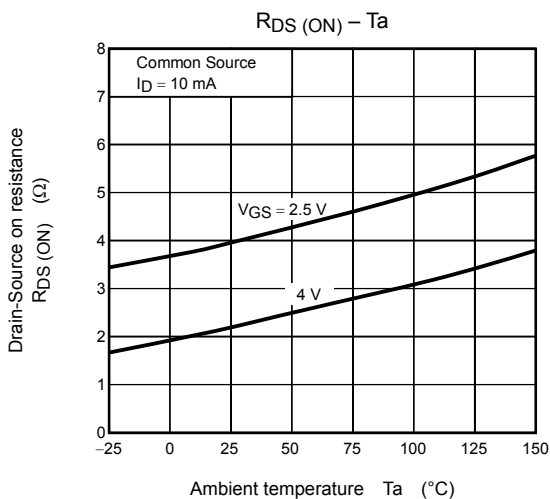
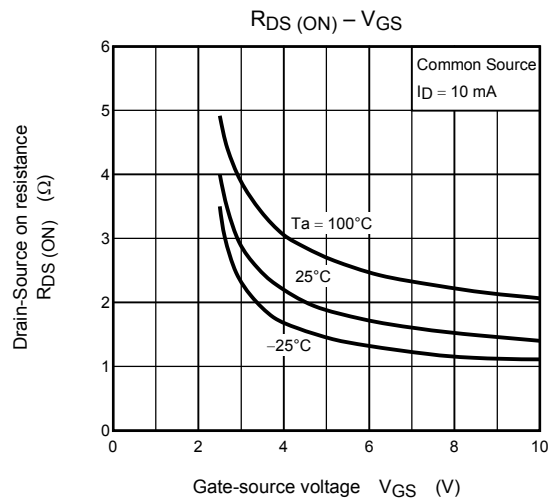
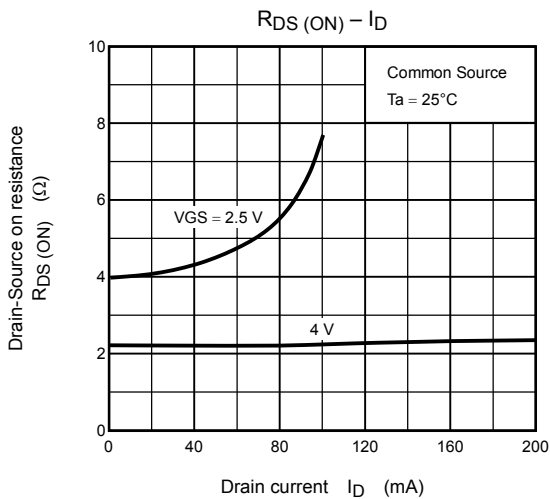
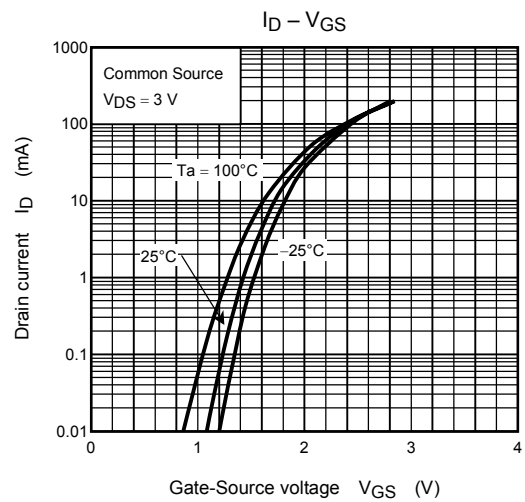
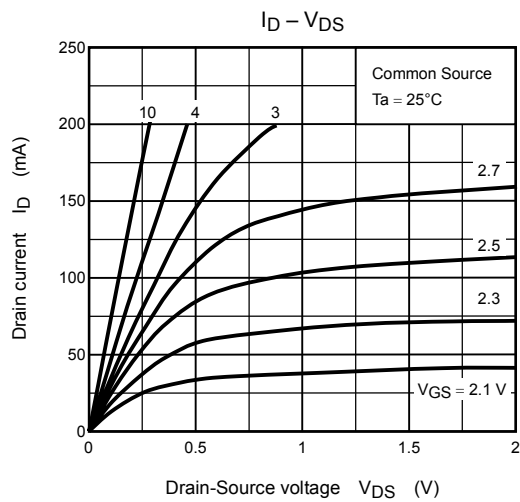
## Precaution

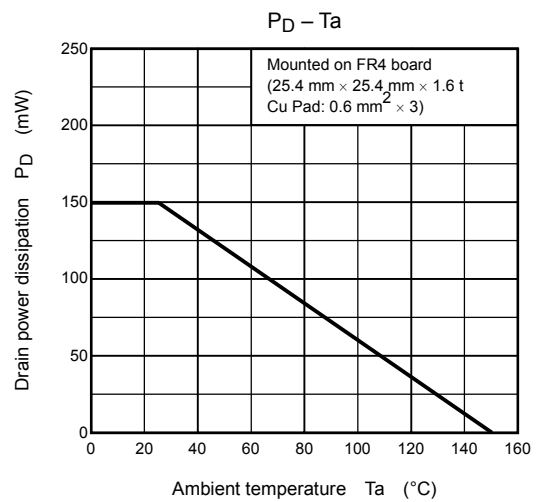
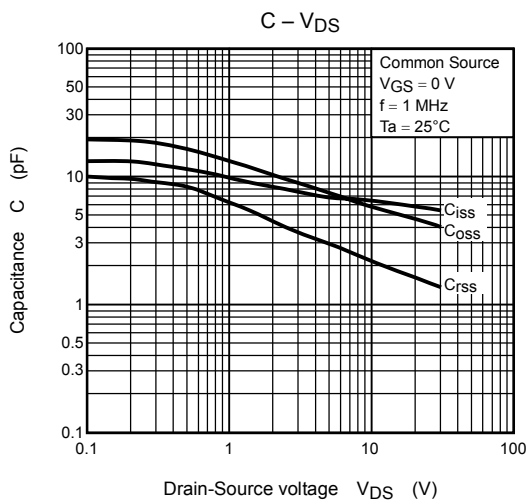
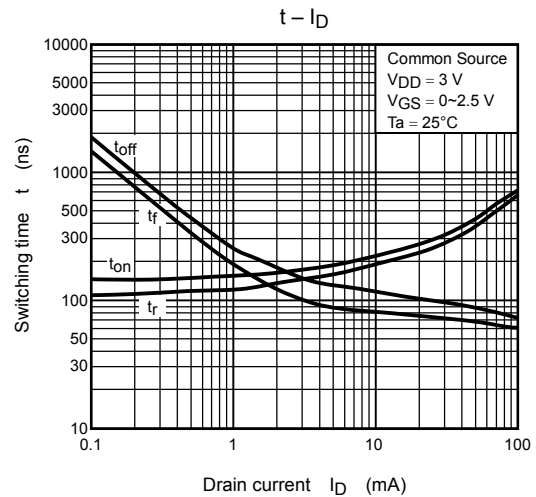
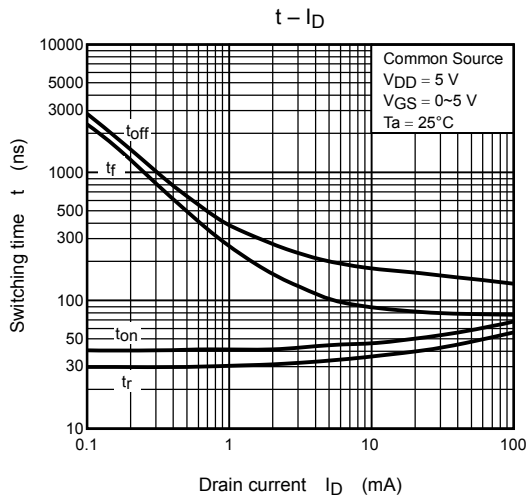
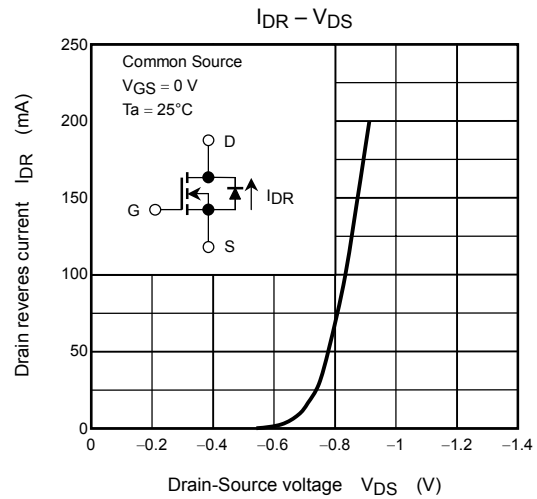
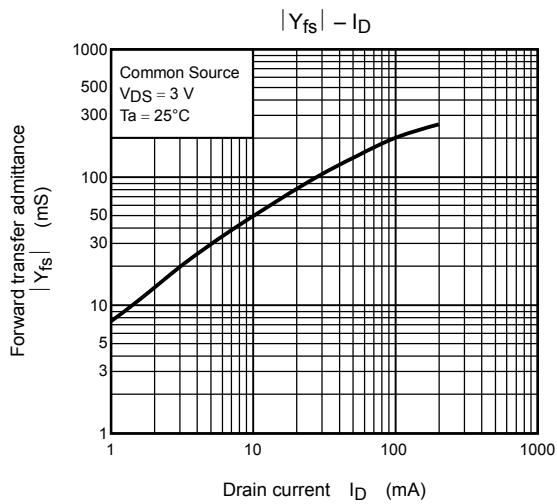
$V_{th}$  can be expressed as voltage between gate and source when low operating current value is  $I_D = 100 \mu\text{A}$  for this product. For normal switching operation,  $V_{GS(on)}$  requires higher voltage than  $V_{th}$  and  $V_{GS(off)}$  requires lower voltage than  $V_{th}$ .

(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 V or higher to turn on this product.





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