

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type

# SSM3K05FU

## High Speed Switching Applications

- Small package
- Low on resistance:  $R_{on} = 0.8 \, \Omega \text{ max (@}V_{GS} = 4 \text{ V)}$   
 $R_{on} = 1.2 \, \Omega \text{ max (@}V_{GS} = 2.5 \text{ V)}$
- Low gate threshold voltage

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

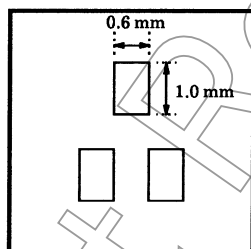
Characteristics		Symbol	Rating	Unit
Drain-source voltage		$V_{DS}$	20	V
Gate-source voltage		$V_{GSS}$	$\pm 12$	V
Drain current	DC	$I_D$	400	mA
	Pulse	$I_{DP}$	800	
Drain power dissipation ( $T_a = 25^\circ\text{C}$ )		$P_D$ (Note 1)	150	mW
Channel temperature		$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	$-55 \sim 150$	$^\circ\text{C}$

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.

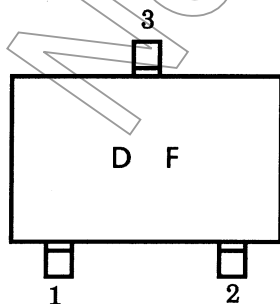
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Mounted on FR4 board.

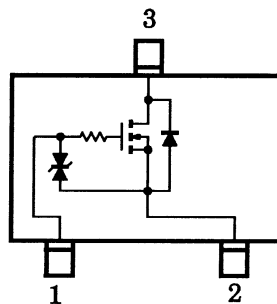
(25.4 mm × 25.4 mm × 1.6 t, Cu pad: 0.6 mm<sup>2</sup> × 3)



## Marking

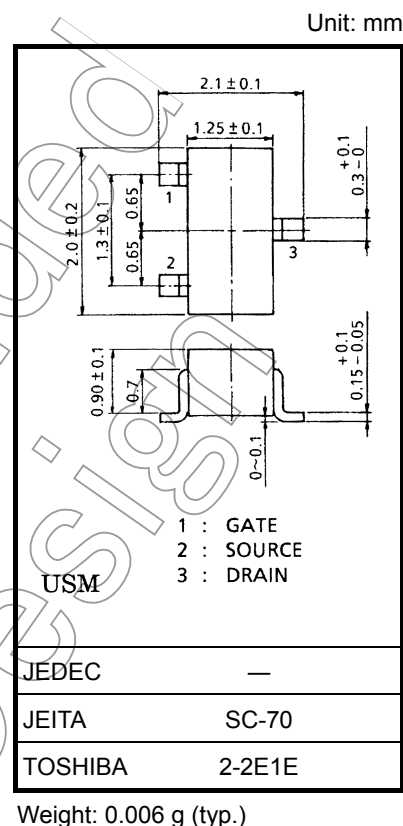


## Equivalent Circuit



## 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.

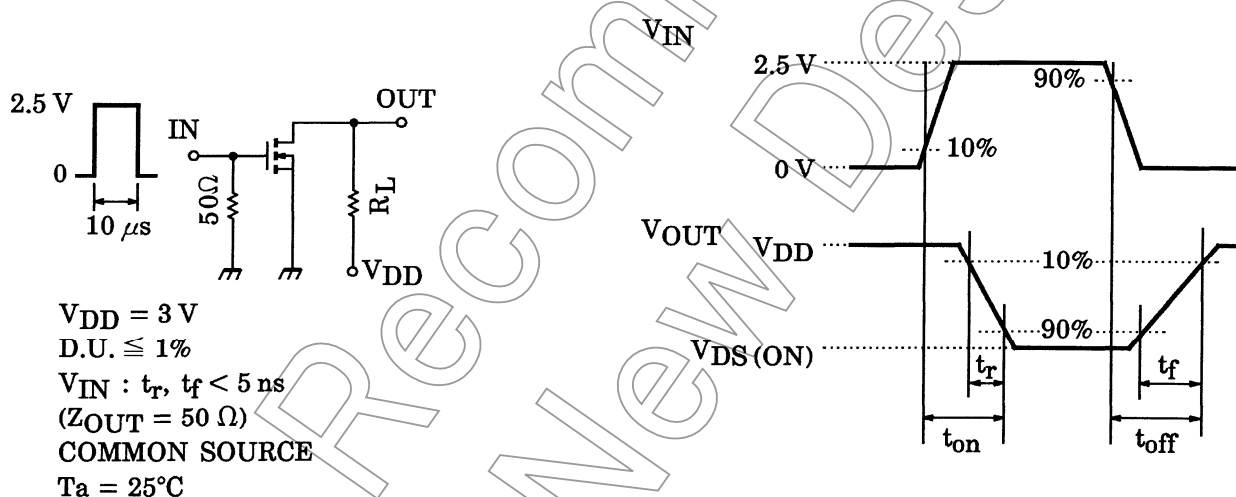


## Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 12\text{ V}, V_{DS} = 0$	—	—	$\pm 1$	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 1\text{ mA}, V_{GS} = 0$	20	—	—	V
Drain cut-off current		$I_{DSS}$	$V_{DS} = 20\text{ V}, V_{GS} = 0$	—	—	1	$\mu\text{A}$
Gate threshold voltage		$V_{th}$	$V_{DS} = 3\text{ V}, I_D = 0.1\text{ mA}$	0.6	—	1.1	V
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 3\text{ V}, I_D = 200\text{ mA}$ (Note 2)	350	—	—	mS
Drain-source ON resistance		$R_{DS(ON)}$	$I_D = 200\text{ mA}, V_{GS} = 4\text{ V}$ (Note 2)	—	0.6	0.8	$\Omega$
			$I_D = 200\text{ mA}, V_{GS} = 2.5\text{ V}$ (Note 2)	—	0.85	1.2	
Input capacitance		$C_{iss}$	$V_{DS} = 3\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	22	—	pF
Reverse transfer capacitance		$C_{rss}$	$V_{DS} = 3\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	9	—	pF
Output capacitance		$C_{oss}$	$V_{DS} = 3\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	21	—	pF
Switching time	Turn-on time	$t_{on}$	$V_{DD} = 3\text{ V}, I_D = 100\text{ mA}, V_{GS} = 0 \sim 2.5\text{ V}$	—	60	—	ns
	Turn-off time	$t_{off}$		—	70	—	

Note 2: Pulse test

## Switching Time Test Circuit

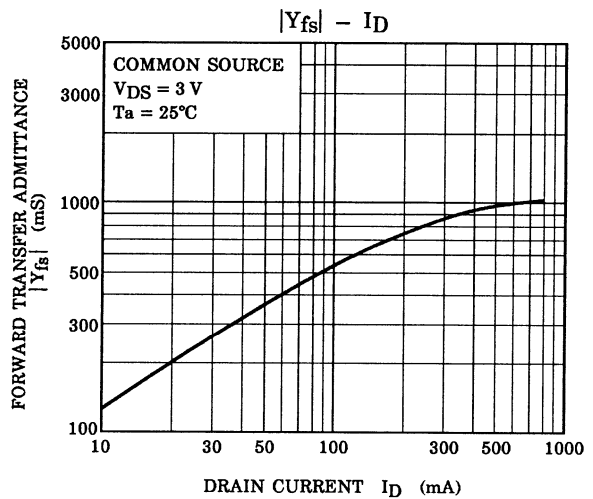
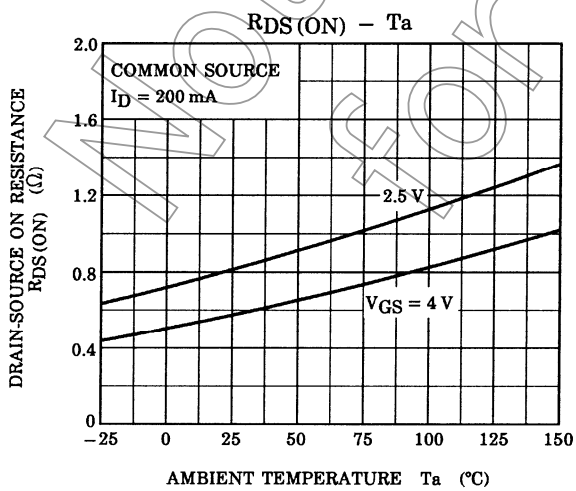
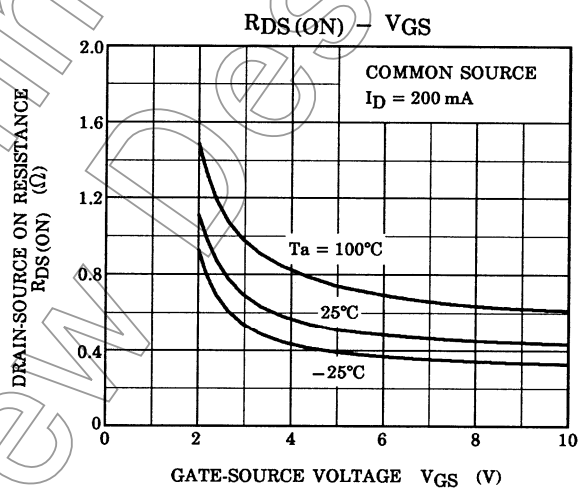
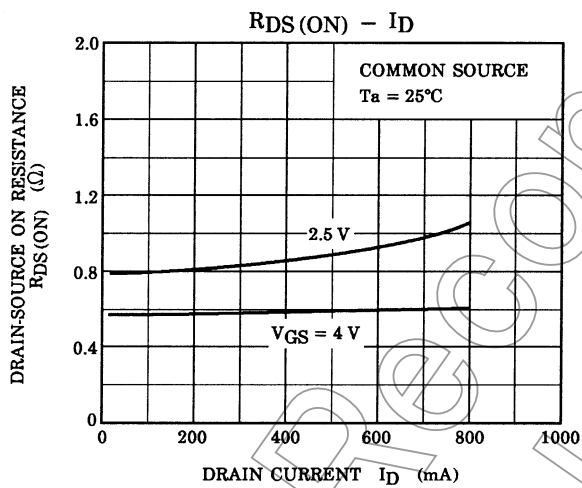
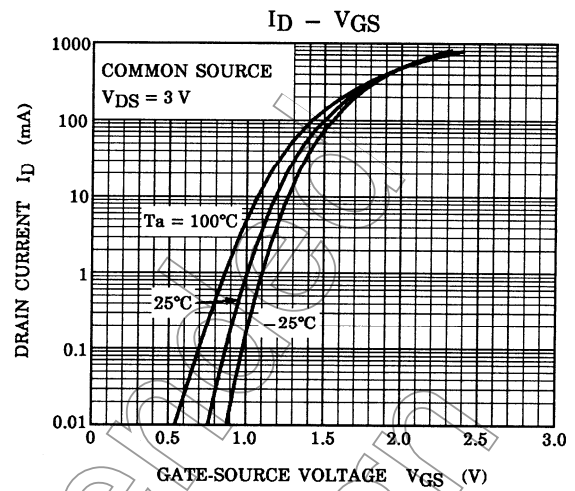
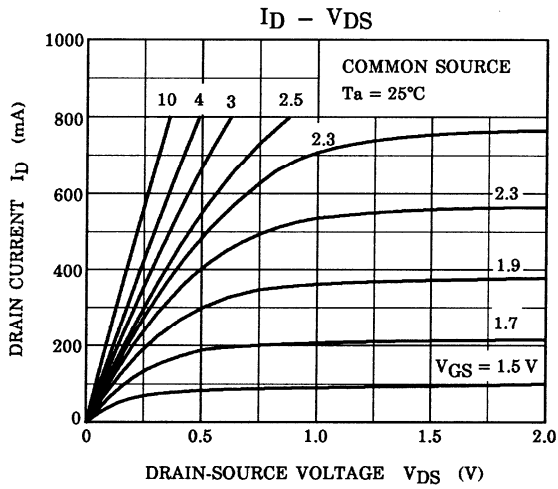


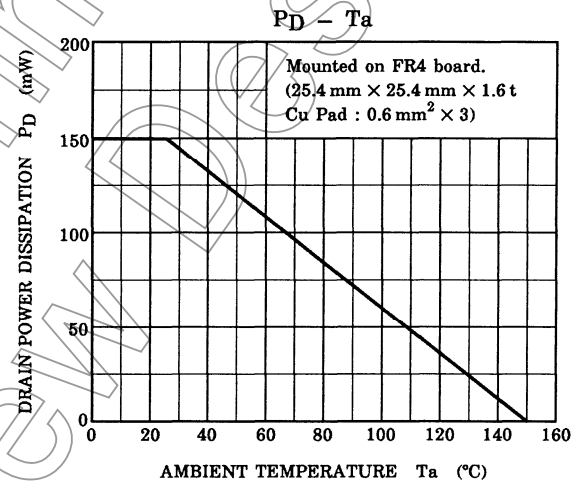
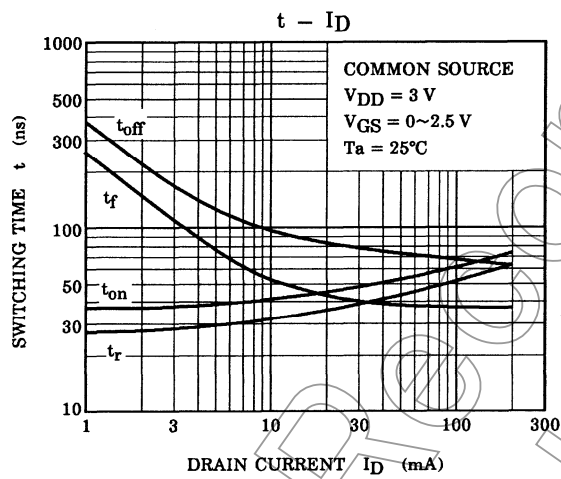
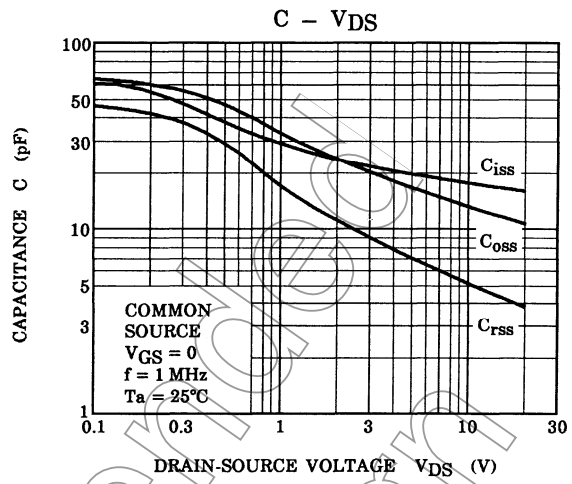
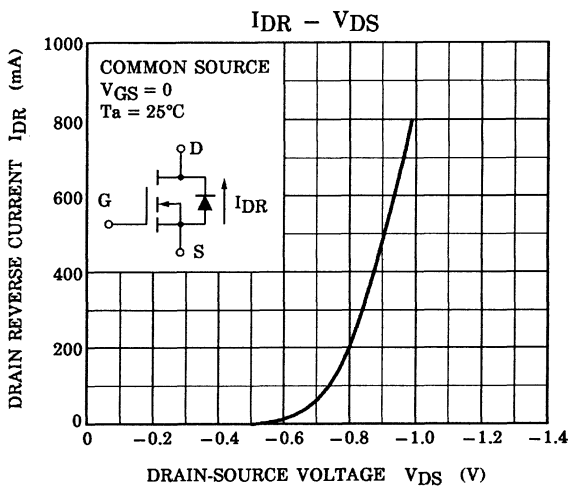
## Precaution

$V_{th}$  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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