

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type

# SSM3K02F

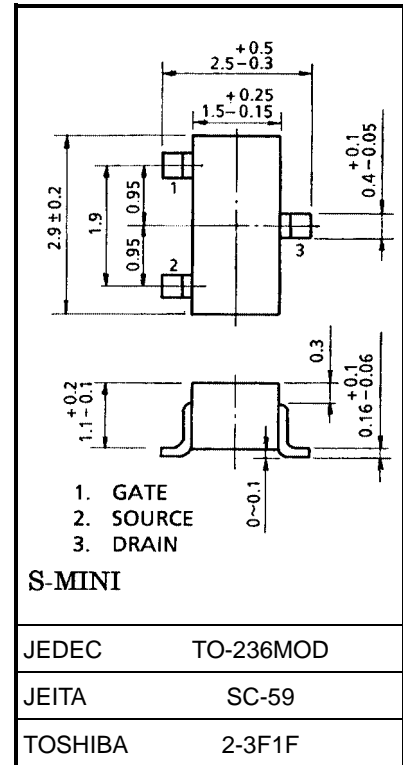
## High Speed Switching Applications

- Small package
- Low on resistance:  $R_{on} = 200 \text{ m}\Omega$  (max) ( $V_{GS} = 4 \text{ V}$ )  
 $R_{on} = 250 \text{ m}\Omega$  (max) ( $V_{GS} = 2.5 \text{ V}$ )
- Low gate threshold voltage:  $V_{th} = 0.6\sim 1.1 \text{ V}$  ( $V_{DS} = 3 \text{ V}$ ,  $I_D = 0.1 \text{ mA}$ )

## Maximum Ratings (Ta = 25°C)

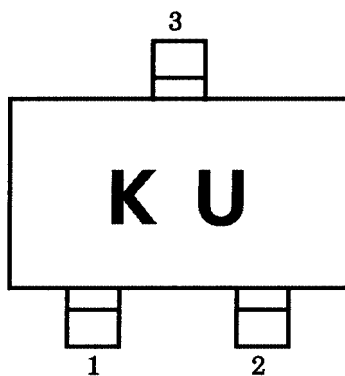
Characteristics		Symbol	Rating	Unit
Drain-source voltage		$V_{DS}$	30	V
Gate-source voltage		$V_{GSS}$	$\pm 10$	V
Drain current	DC	$I_D$	1.0	A
	Pulse	$I_{DP}$	2.0	
Drain power dissipation		$P_D$	200	mW
Channel temperature		$T_{ch}$	150	°C
Storage temperature range		$T_{stg}$	-55~150	°C

Unit: mm

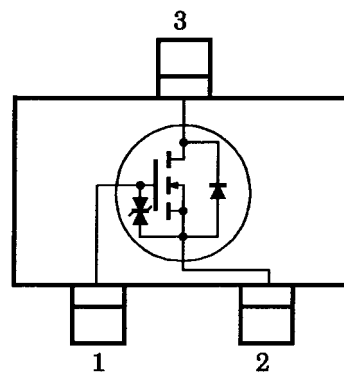


Weight: 0.012 g (typ.)

## Marking



## Equivalent Circuit



## Handling Precaution

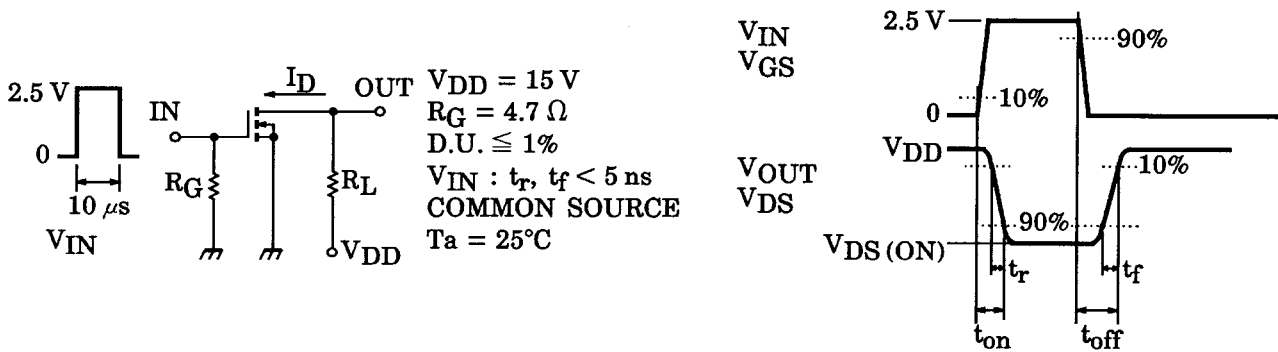
When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static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

**Electrical Characteristics (Ta = 25°C)**

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 10\text{ V}, V_{DS} = 0$	—	—	$\pm 5$	$\mu\text{A}$
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		$V_{th}$	$V_{DS} = 3\text{ V}, I_D = 0.1\text{ mA}$	0.6	—	1.1	V
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 3\text{ V}, I_D = 0.5\text{ A}$ (Note)	1.5	—	—	S
Drain-source ON resistance		$R_{DS(ON)}$	$I_D = 0.5\text{ A}, V_{GS} = 4\text{ V}$ (Note)	—	140	200	m $\Omega$
			$I_D = 0.5\text{ A}, V_{GS} = 2.5\text{ V}$ (Note)	—	180	250	
Input capacitance		$C_{iss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	115	—	pF
Reverse transfer capacitance		$C_{rss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	24	—	pF
Output capacitance		$C_{oss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	60	—	pF
Switching time	Turn-on time	$t_{on}$	$V_{DD} = 15\text{ V}, I_D = 0.5\text{ A},$ $V_{GS} = 0 \sim 2.5\text{ V}, R_G = 4.7\ \Omega$	—	52	—	ns
	Turn-off time	$t_{off}$		—	80	—	

Note: Pulse test

**Switching Time Test Circuit**



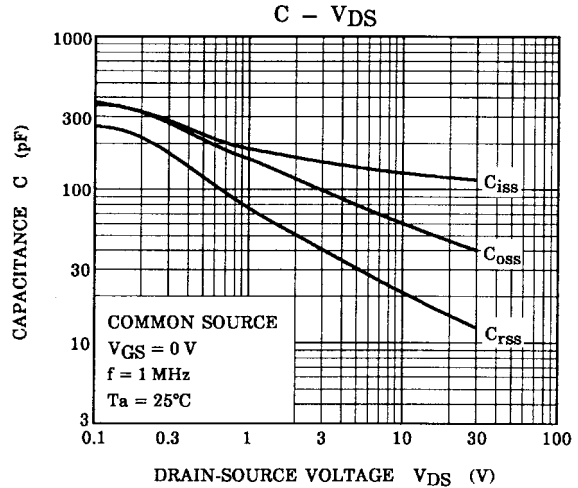
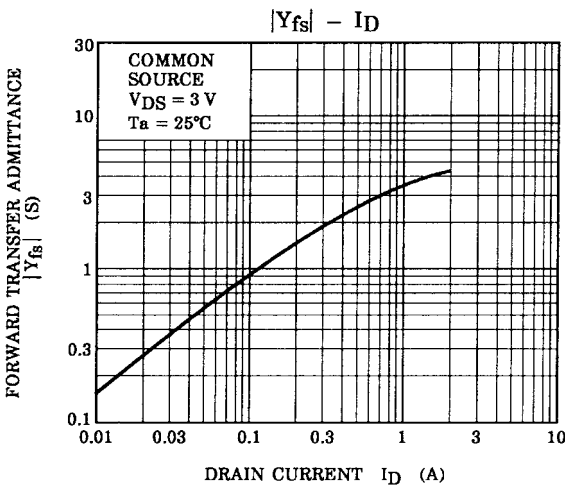
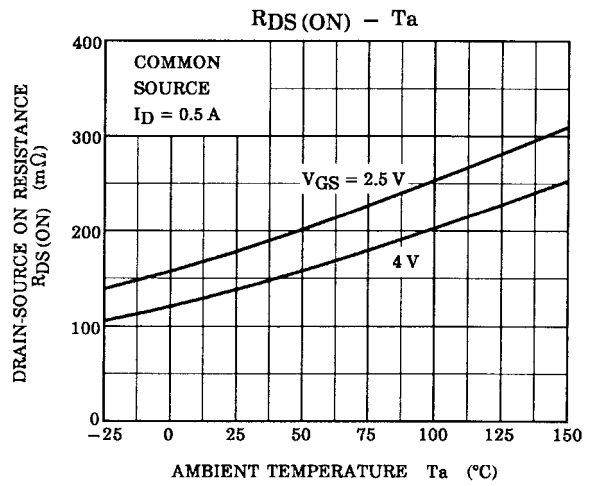
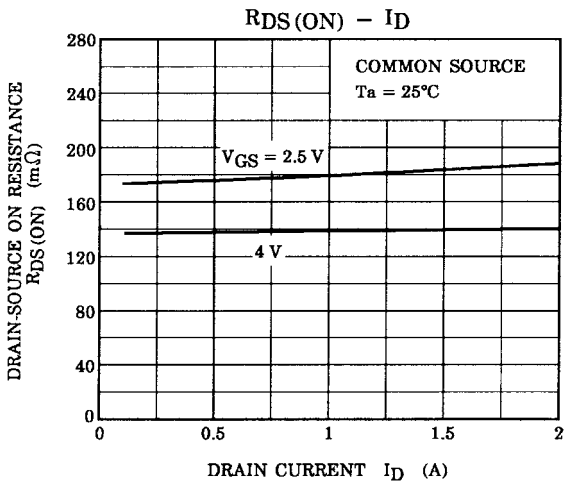
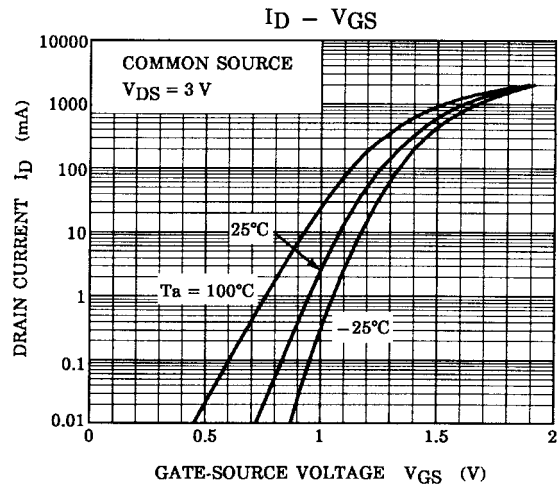
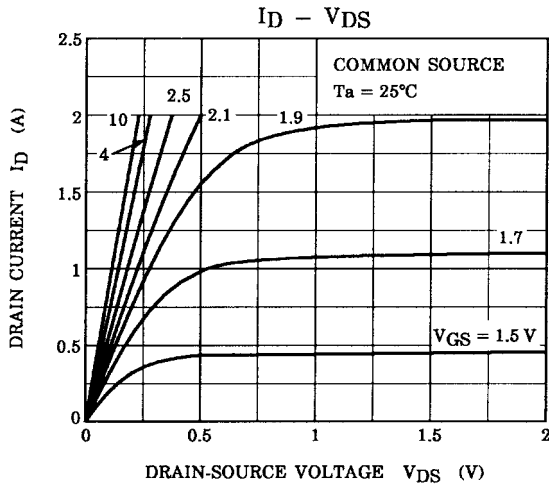
**Precaution**

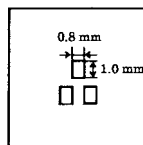
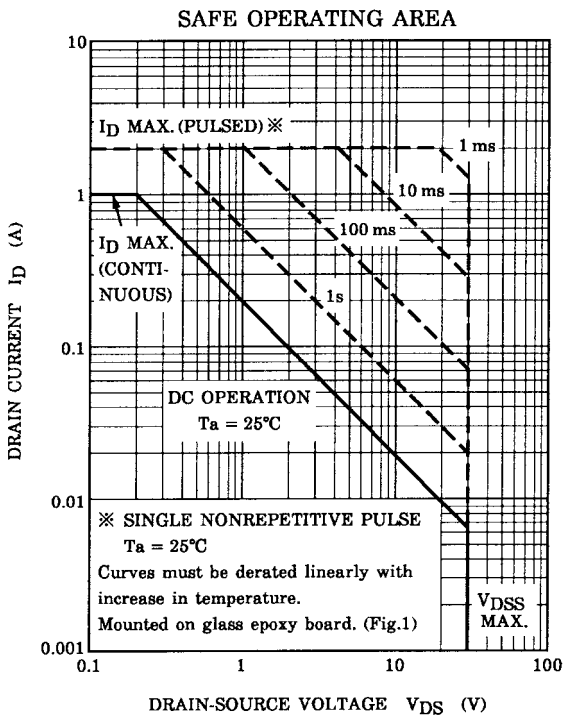
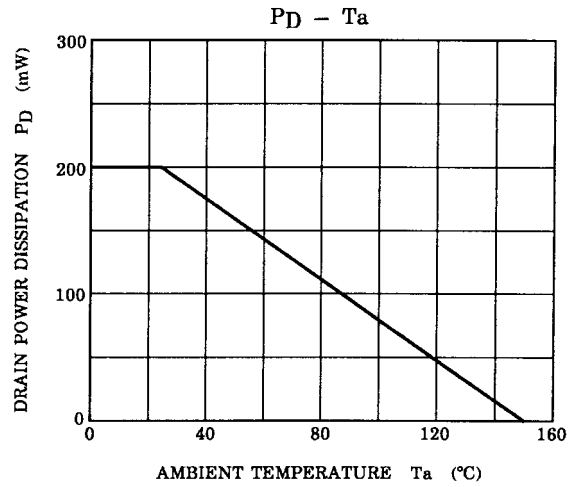
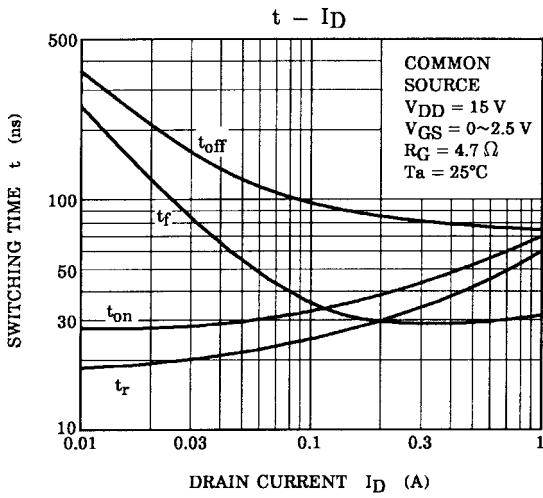
$V_{th}$  can be expressed as voltage between gate and source when low operating current value is  $I_D = 100\ \mu\text{A}$  for this product. For normal switching operation,  $V_{GS(ON)}$  requires higher voltage than  $V_{th}$  and  $V_{GS(off)}$  requires lower voltage than  $V_{th}$ .

(Relationship can be established as follows:  $V_{GS(off)} < V_{th} < V_{GS(ON)}$ )

Please take this into consideration for using the device.

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





**Figure 1 25.4 mm × 25.4 mm × 1.6 t (a Cu pad of 0.8 mm<sup>2</sup> area)**

**RESTRICTIONS ON PRODUCT USE**

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