

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type

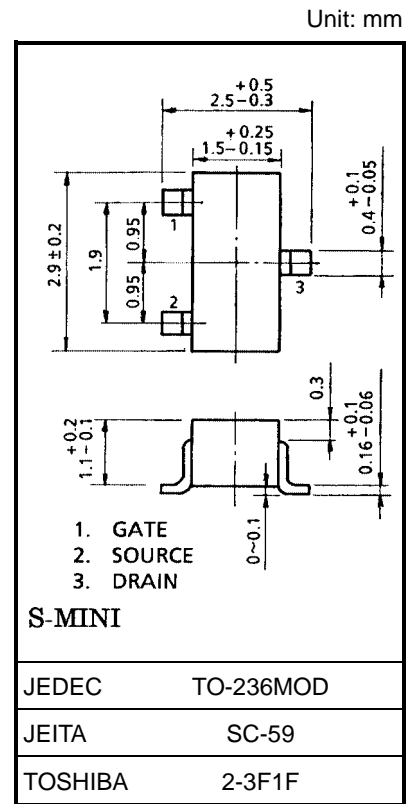
# SSM3J02F

Power Management Switch  
High Speed Switching Applications

- Small package
- Low on resistance:  $R_{on} = 0.5 \Omega$  (max) (@ $V_{GS} = -4 V$ )  
:  $R_{on} = 0.7 \Omega$  (max) (@ $V_{GS} = -2.5 V$ )
- Low gate threshold voltage

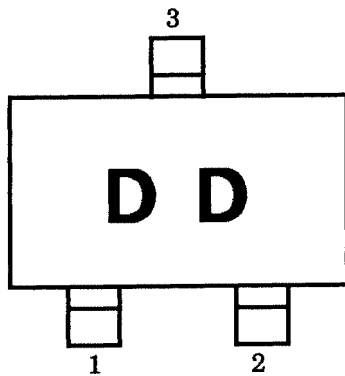
### Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		$V_{DS}$	-30	V
Gate-source voltage		$V_{GSS}$	$\pm 10$	V
Drain current	DC	$I_D$	-600	mA
	Pulse	$I_{DP}$	-1200	
Drain power dissipation (Ta = 25°C)		$P_D$	200	mW
Channel temperature		$T_{ch}$	150	°C
Storage temperature range		$T_{stg}$	-55~150	°C

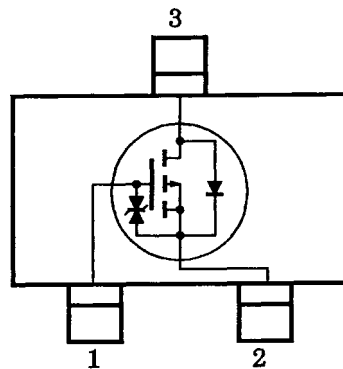


Weight: 0.012 g (typ.)

### Marking



### Equivalent Circuit



### Handling Precaution

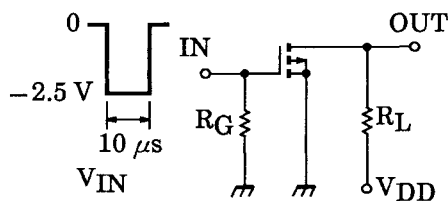
When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static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

## Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	$I_{GSS}$	$V_{GS} = \pm 10\text{ V}, V_{DS} = 0$	—	—	$\pm 1$	$\mu\text{A}$
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	$V_{th}$	$V_{DS} = -3\text{ V}, I_D = -0.1\text{ mA}$	-0.6	—	-1.1	V
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = -3\text{ V}, I_D = -0.3\text{ A}$ (Note)	0.6	—	—	S
Drain-source ON resistance	$R_{DS(ON)}$	$I_D = -0.3\text{ A}, V_{GS} = -4\text{ V}$ (Note)	—	0.4	0.5	$\Omega$
		$I_D = -0.3\text{ A}, V_{GS} = -2.5\text{ V}$ (Note)	—	0.55	0.7	
Input capacitance	$C_{iss}$	$V_{DS} = -10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	150	—	pF
Reverse transfer capacitance	$C_{rss}$	$V_{DS} = -10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	21	—	pF
Output capacitance	$C_{oss}$	$V_{DS} = -10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	61	—	pF
Switching time	Turn-on time	$V_{DD} = -15\text{ V}, I_D = -0.3\text{ A},$ $V_{GS} = 0 \sim -2.5\text{ V}, R_G = 4.7\ \Omega$	—	55	—	ns
	Turn-off time		—	52	—	

Note: Pulse test

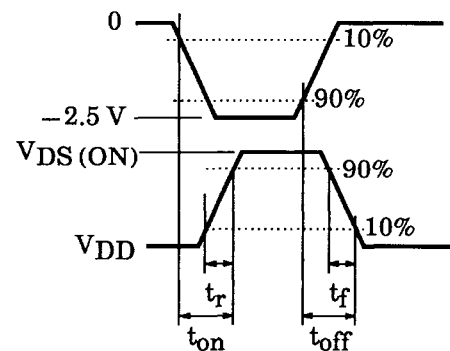
### Switching Time Test Circuit



$V_{DD} = -15\text{ V}$   
 $R_G = 4.7\ \Omega$   
 $D.U. \leq 1\%$   
 $V_{IN} : t_r, t_f < 5\text{ ns}$   
**COMMON SOURCE**  
 $T_a = 25^\circ\text{C}$

$V_{IN}$   
 $V_{GS}$

$V_{OUT}$   
 $V_{DS}$



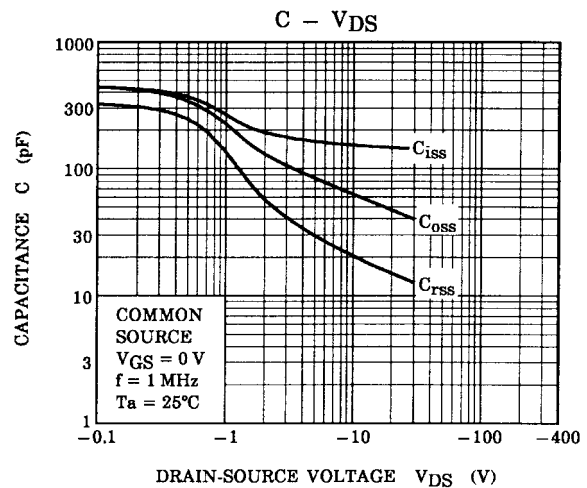
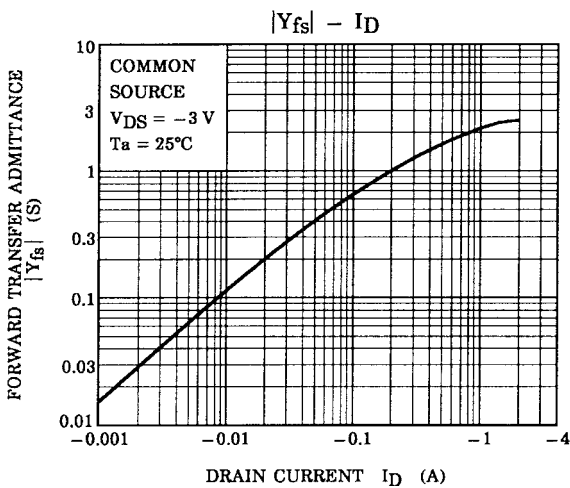
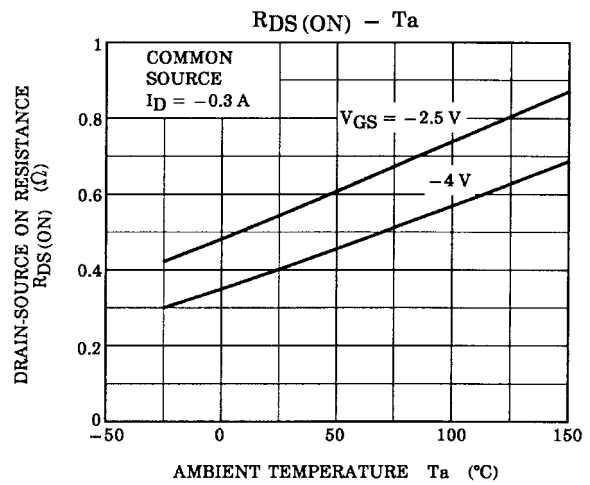
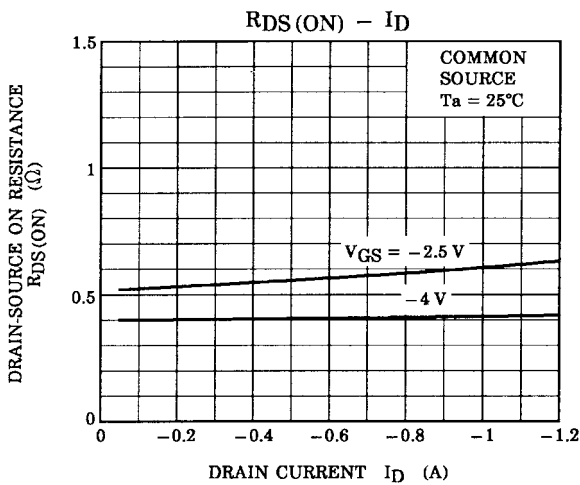
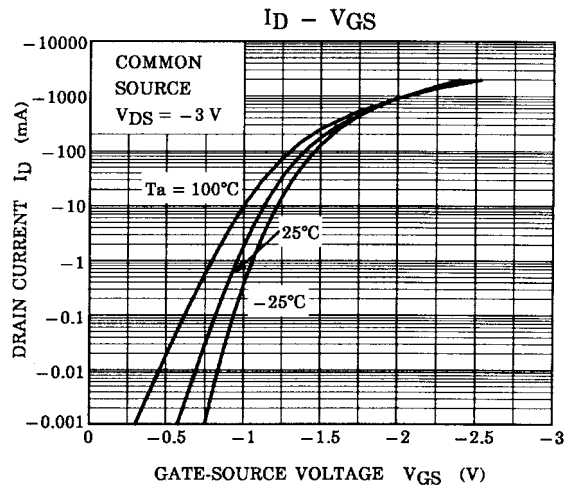
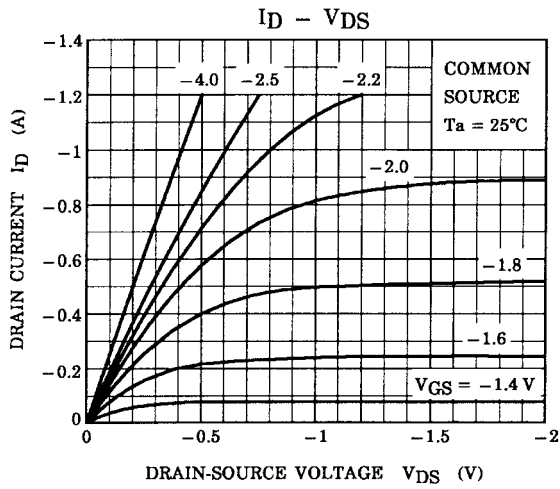
### Precaution

$V_{th}$  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.



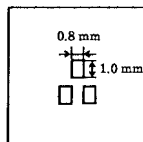
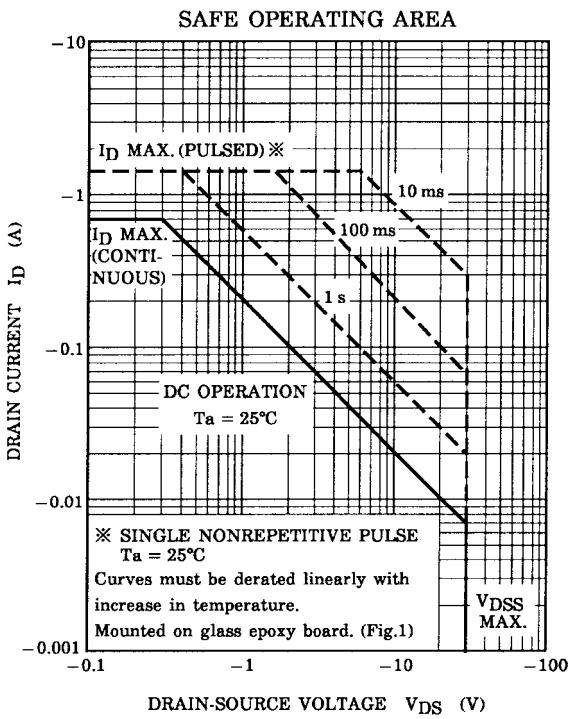
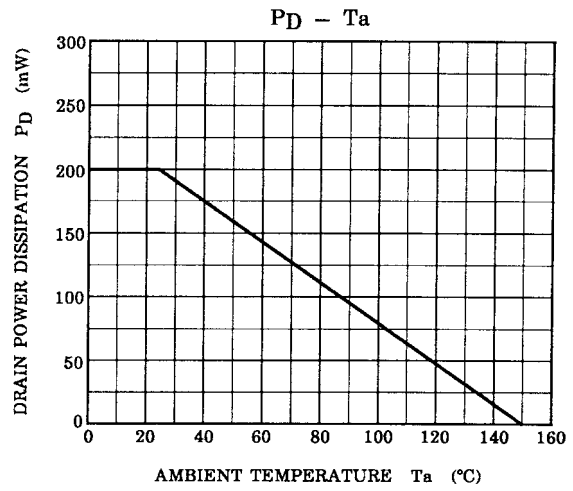
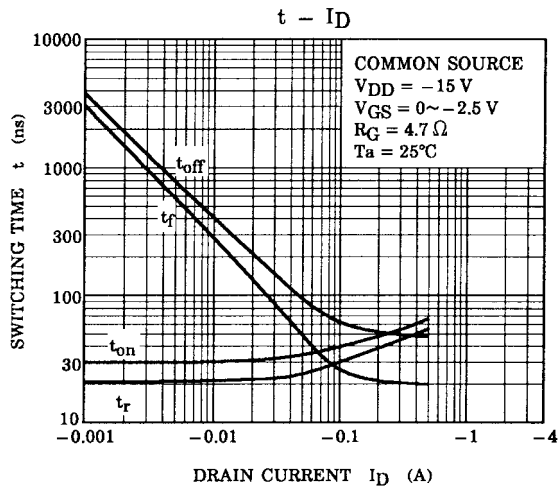


Figure 1 25.4 mm × 25.4 mm × 1.6 t (a Cu pad of 0.8 mm<sup>2</sup> area)

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