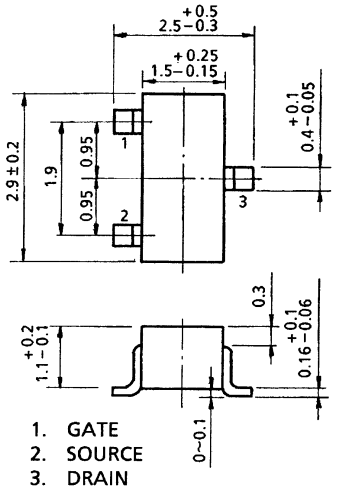
TOSHIBA Field Effect Transistor Silicon N Channel MOS Type

SSM3K01F

High Speed Switching Applications

- Small package
- Low on resistance: Ron = 120 mΩ (max) (V_{GS} = 4 V)
  : Ron = 150 mΩ (max) (V_{GS} = 2.5 V)
- Low gate threshold voltage: V_{th} = 0.6~1.1 V (V_{DS} = 3 V, I_D = 0.1 mA)

Unit: mm



S-MINI

JEDEC	TO-236MOD
JEITA	SC-59
TOSHIBA	2-3F1F

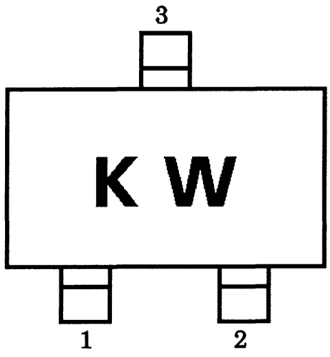
Weight: 0.012 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

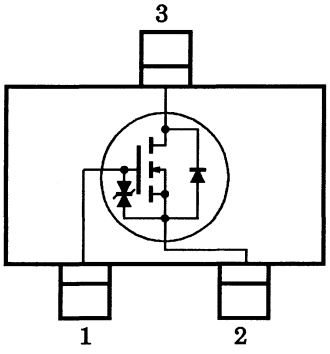
Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DS}	30	V
Gate-source voltage		V_{GSS}	±10	V
Drain current	DC	I_D	1.3	A
	Pulse	I_{DP}	2.6	
Drain power dissipation		P_D	200	mW
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55~150	°C

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).

Marking



Equivalent Circuit



Handling Precaution

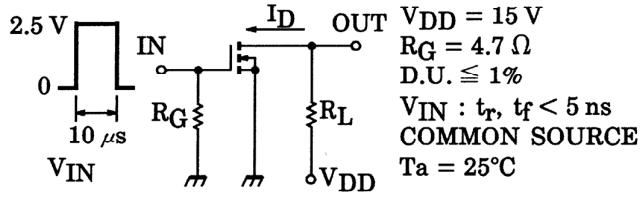
When handling individual devices (which are not yet mounted on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static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

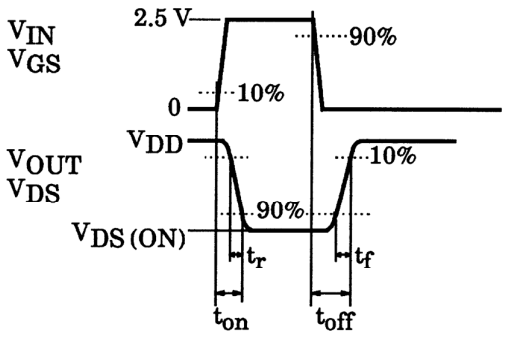
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±10 V, V_{DS} = 0	—	—	±5	μA
Drain-source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 1 mA, V_{GS} = 0	30	—	—	V
Drain cut-off current		I_{DSS}	V_{DS} = 30 V, V_{GS} = 0	—	—	1	μA
Gate threshold voltage		V_{th}	V_{DS} = 3 V, I_D = 0.1 mA	0.6	—	1.1	V
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 3 V, I_D = 0.65 A (Note)	2.0	—	—	S
Drain-source ON resistance		$R_{DS\ (ON)}$	I_D = 0.65 A, V_{GS} = 4 V (Note)	—	85	120	mΩ
			I_D = 0.65 A, V_{GS} = 2.5 V (Note)	—	115	150	
Input capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz	—	152	—	pF
Reverse transfer capacitance		C_{rss}	V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz	—	41	—	pF
Output capacitance		C_{oss}	V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz	—	102	—	pF
Switching time	Turn-on time	t_{on}	V_{DD} = 15 V, I_D = 0.5 A, V_{GS} = 0~2.5 V, R_G = 4.7 Ω	—	45	—	ns
	Turn-off time	t_{off}		—	69	—	

Note: Pulse test

Switching Time Test Circuit





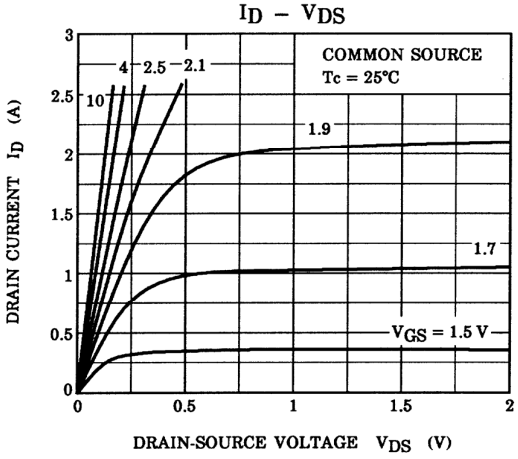
Precaution

V_{th} can be expressed as voltage between gate and source when low operating current value is I_D = 100 μA 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}.

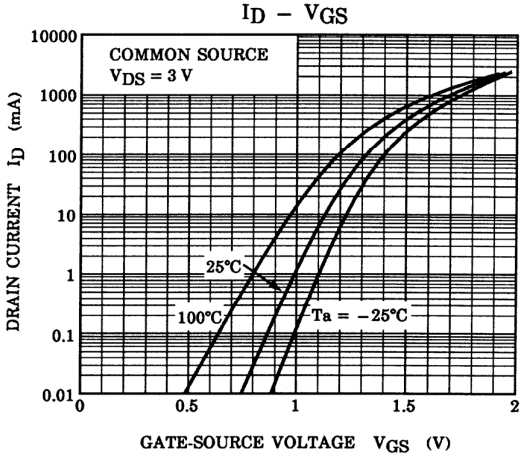
(Relationship can be established as follows: $V_{GS\ (off)} < V_{th} < V_{GS\ (ON)}$)

Please take this into consideration for using the device.

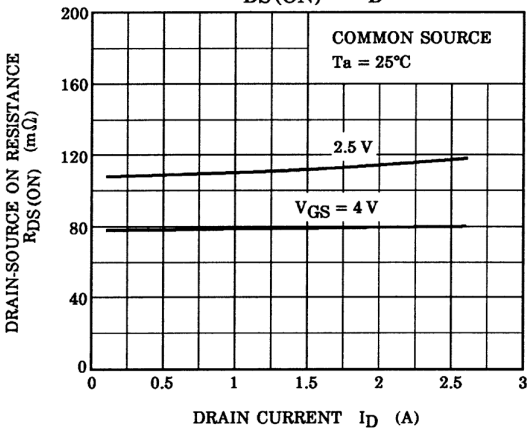
I_D – V_{DS}



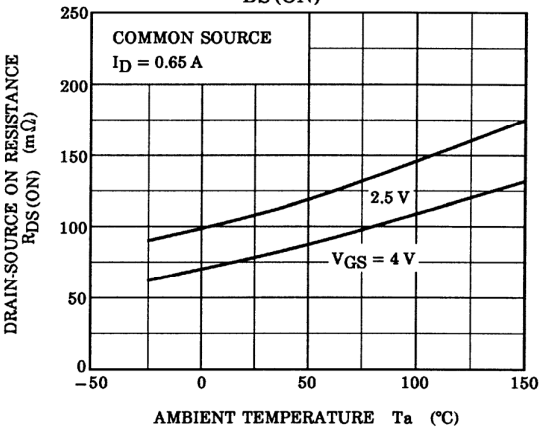
I_D – V_{GS}



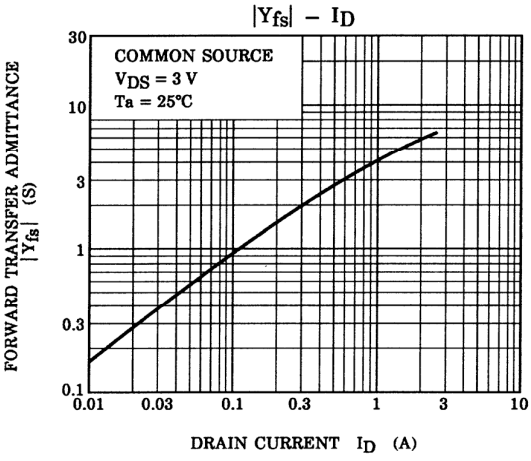
$R_{DS\,(ON)}$ – I_D



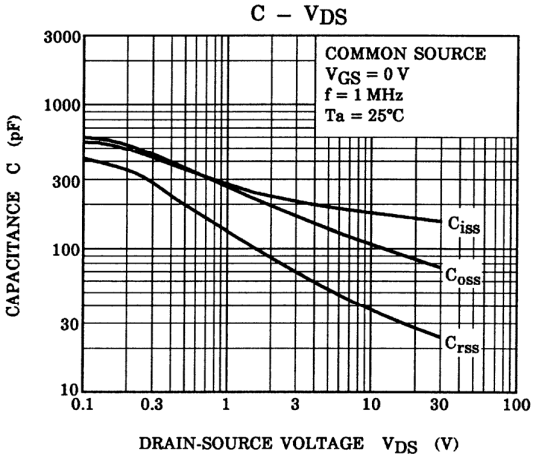
$R_{DS\,(ON)}$ – Ta

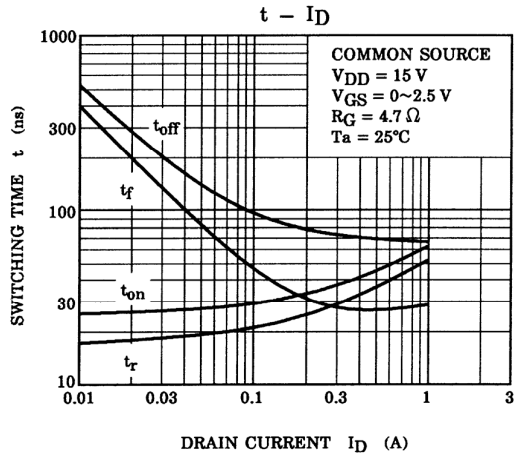


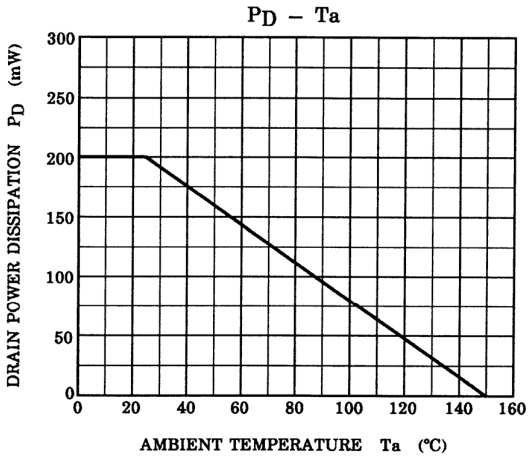
$|Y_{fs}|$ – I_D

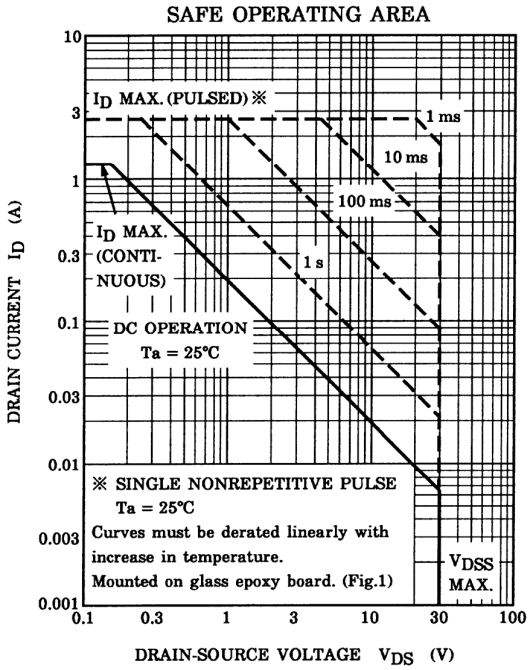


C – V_{DS}









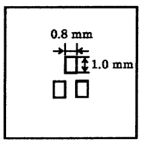


Figure 1 25.4 mm × 25.4 mm × 1.6 t (a Cu pad of 0.8 mm^2 area)

RESTRICTIONS ON PRODUCT USE

20070701-EN GENERAL

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  In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc.
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