

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type

SSM3K101TU

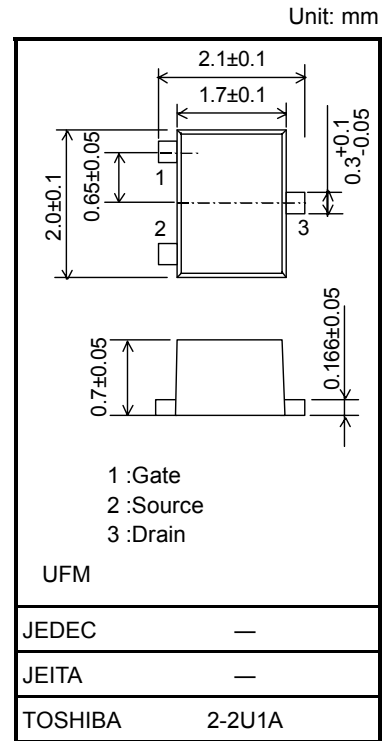
High Speed Switching Applications

- 1.8V drive
- Low on-resistance: $R_{ON} = 230\text{m}\Omega$ (max) (@ $V_{GS} = 1.8\text{ V}$)
 $R_{ON} = 138\text{m}\Omega$ (max) (@ $V_{GS} = 2.5\text{ V}$)
 $R_{ON} = 103\text{m}\Omega$ (max) (@ $V_{GS} = 4.0\text{ V}$)
- Lead(Pb)-free

Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Drain-Source voltage	V_{DS}	20	V
Gate-Source voltage	V_{GSS}	± 12	V
Drain current	DC	I_D	2.2
	Pulse	I_{DP}	4.4
Drain power dissipation	P_D (Note1)	800	mW
	P_D (Note2)	500	
Channel temperature	T_{ch}	150	°C
Storage temperature range	T_{stg}	-55~150	°C

- Note1: Mounted on ceramic board.
 (25.4 mm × 25.4 mm × 0.8 mm, Cu Pad: 645 mm²)
- Note2: Mounted on FR4 board.
 (25.4 mm × 25.4 mm × 1.6 mm, Cu Pad: 645 mm²)



Weight: 6.6 mg (typ.)

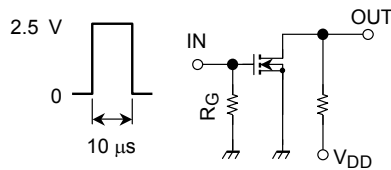
Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Conditions	Min	Typ.	Max	Unit	
Drain-Source breakdown voltage	$V_{(BR)DSS}$	$I_D = 1\text{ mA}, V_{GS} = 0$	20	—	—	V	
	$V_{(BR)DSX}$	$I_D = 1\text{ mA}, V_{GS} = -12\text{ V}$	12	—	—		
Drain cut-off current	I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0$	—	—	1	μA	
Gate leakage current	I_{GSS}	$V_{GS} = \pm 12\text{ V}, V_{DS} = 0$	—	—	± 1	μA	
Gate threshold voltage	V_{th}	$V_{DS} = 3\text{ V}, I_D = 1\text{ mA}$	0.4	—	1.0	V	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 3\text{ V}, I_D = 1.0\text{ A}$ (Note3)	2.7	4.5	—	S	
Drain-Source on-resistance	$R_{DS(ON)}$	$I_D = 1.0\text{ A}, V_{GS} = 4.0\text{ V}$ (Note3)	—	85	103	mΩ	
		$I_D = 0.5\text{ A}, V_{GS} = 2.5\text{ V}$ (Note3)	—	105	138		
		$I_D = 0.2\text{ A}, V_{GS} = 1.8\text{ V}$ (Note3)	—	140	230		
Input capacitance	C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	125	—	pF	
Output capacitance	C_{oss}	$V_{DS} = 10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	42	—	pF	
Reverse transfer capacitance	C_{rss}	$V_{DS} = 10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	17	—	pF	
Switching time	Turn-on time	t_{on}	$V_{DD} = 10\text{ V}, I_D = 0.75\text{ A},$		—	14	ns
	Turn-off time	t_{off}	$V_{GS} = 0\sim 2.5\text{ V}, R_G = 4.7\ \Omega$		—	20	
Drain-Source forward voltage	V_{DSF}	$I_D = -2.2\text{ A}, V_{GS} = 0\text{ V}$ (Note3)	—	-0.85	-1.2	V	

Note3: Pulse test

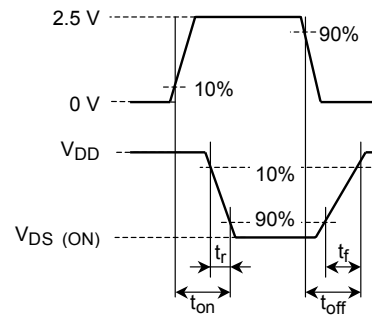
Switching Time Test Circuit

(a) Test Circuit



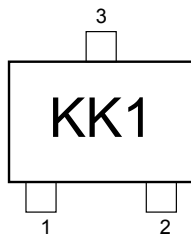
$V_{DD} = 10\text{ V}$
 $R_G = 4.7\ \Omega$
 $D.U. \leq 1\%$
 $V_{IN}: t_r, t_f < 5\text{ ns}$
 Common Source
 $T_a = 25^\circ\text{C}$

(b) V_{IN}

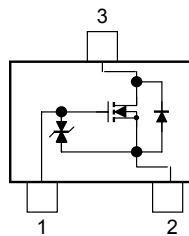


(c) V_{OUT}

Marking



Equivalent Circuit (top view)



Precaution

V_{th} can be expressed as the voltage between gate and source when the low operating current value is $I_D=1\text{mA}$ for this product. For normal switching operation, $V_{GS (on)}$ requires a higher voltage than V_{th} , and $V_{GS (off)}$ requires a lower voltage than V_{th} .

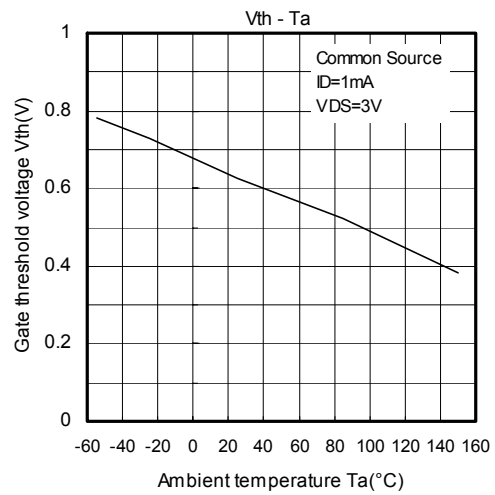
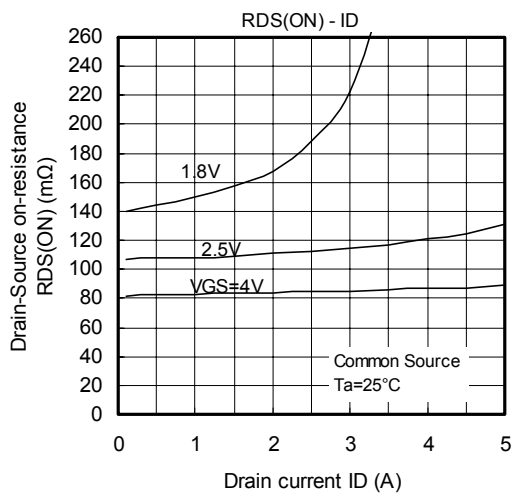
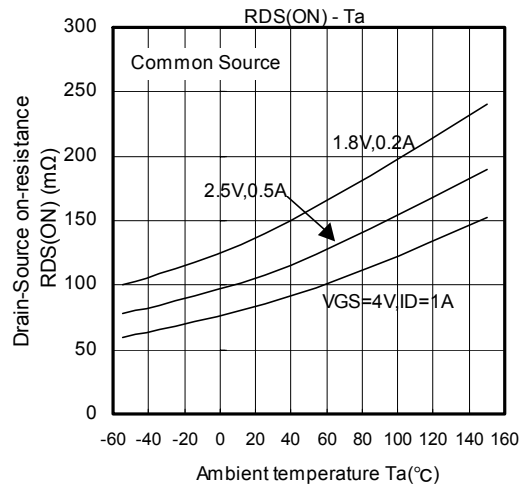
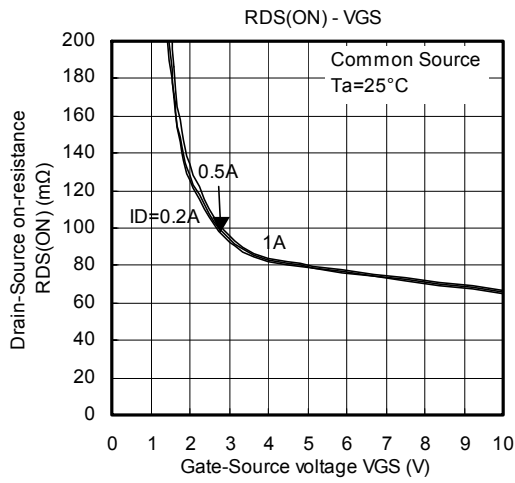
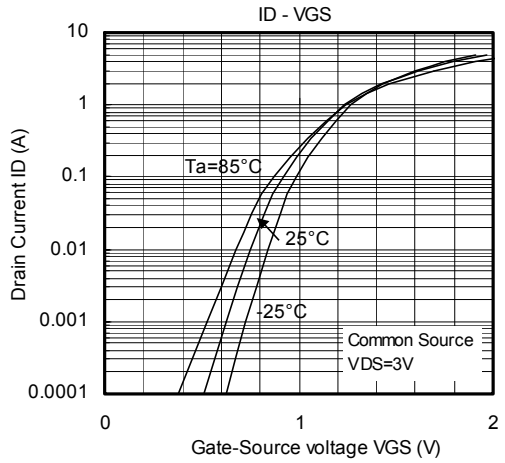
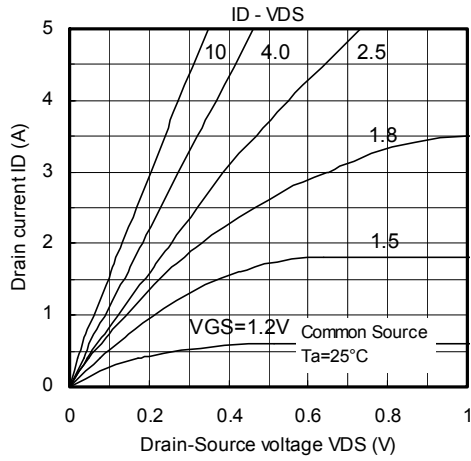
(The relationship can be established as follows: $V_{GS (off)} < V_{th} < V_{GS (on)}$)

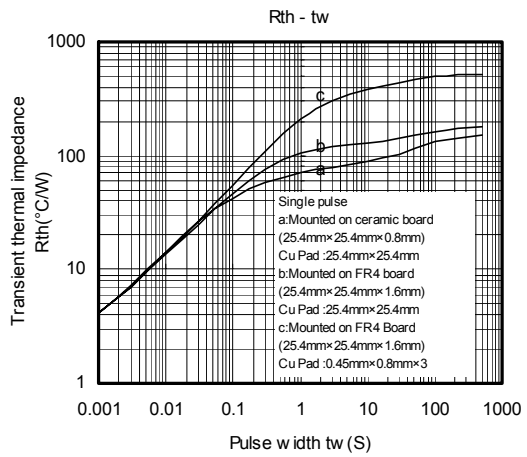
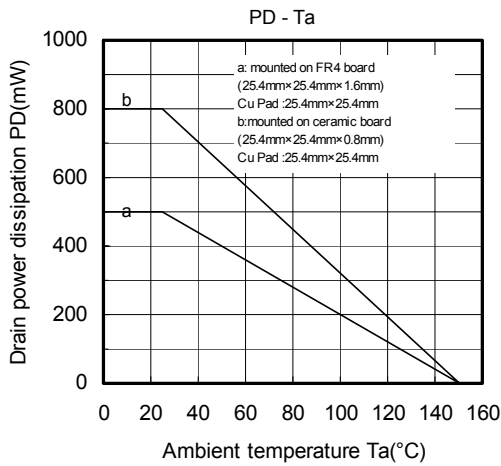
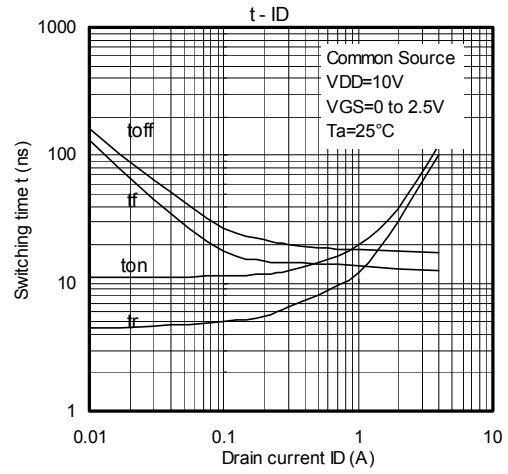
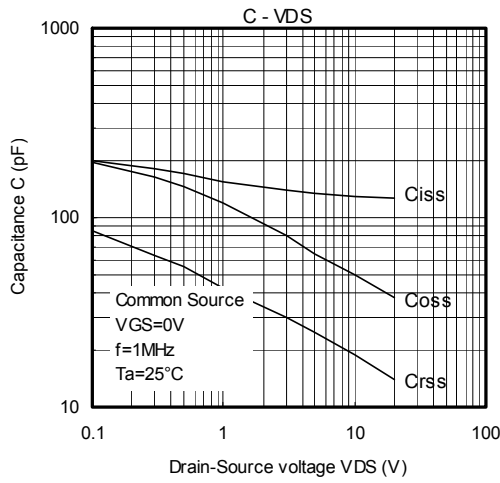
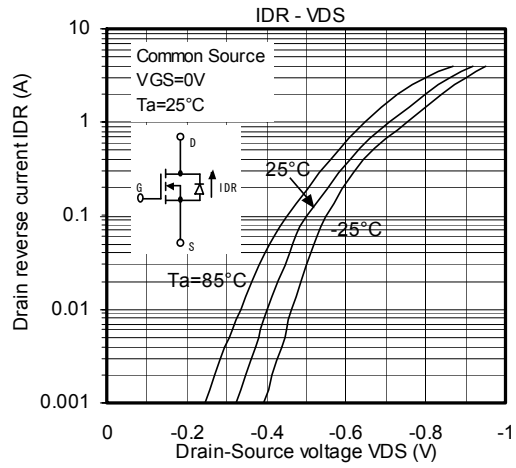
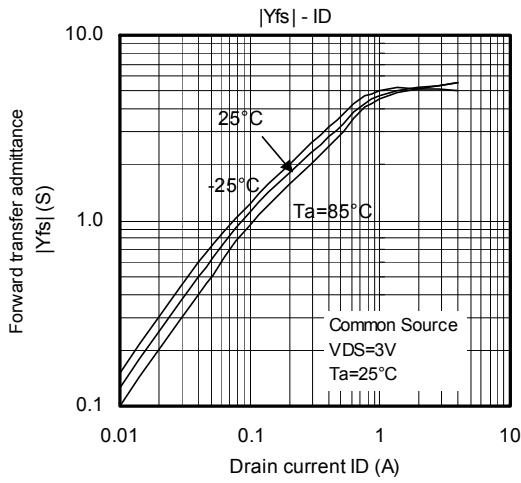
Take this into consideration when using the device.

The recommended V_{GS} voltage for turning on this product is 1.8 V or higher.

Handling Precaution

When handling individual devices which are not yet mounted on a circuit board, be sure that the environment is protected against electrostatic discharge. 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.





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