

Tentative

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type

SSM6K201FE

Power Management Switch Applications

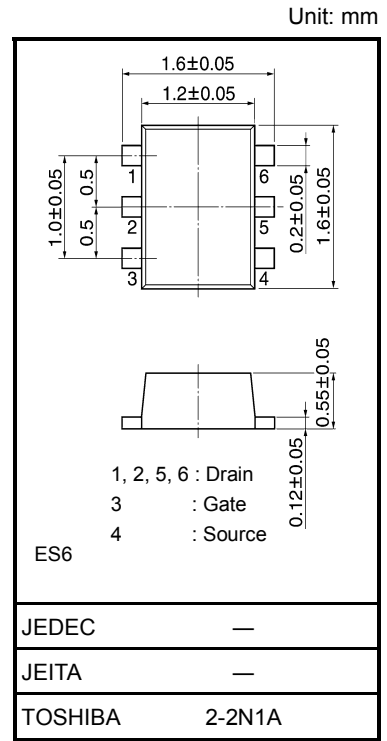
High Speed Switching Applications

- 1.8 V drive
- Low ON-resistance: $R_{on} = 186 \text{ m}\Omega$ (max) (@ $V_{GS} = 1.8\text{V}$)
 $R_{on} = 119 \text{ m}\Omega$ (max) (@ $V_{GS} = 2.5\text{V}$)
 $R_{on} = 91 \text{ m}\Omega$ (max) (@ $V_{GS} = 4.0\text{V}$)

Absolute 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	2.3
	Pulse	I_{DP}	4.6
Drain power dissipation	P_D (Note 1)	500	W
Channel temperature	T_{ch}	150	°C
Storage temperature range	T_{stg}	-55~150	°C

Note 1: Mounted on an FR4 board.
 (25.4 mm × 25.4 mm × 1.6 t, Cu Pad: 645 mm²)



Weight: 3 mg (typ.)

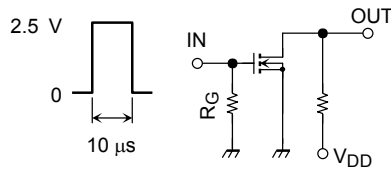
Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = 1 \text{ mA}, V_{GS} = 0$	20	—	—	V
	$V_{(BR)DSX}$	$I_D = 1 \text{ mA}, V_{GS} = -12 \text{ V}$	10	—	—	V
Drain cutoff 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} $	$V_{DS} = 3 \text{ V}, I_D = 1.0 \text{ A}$ (Note2)	2.8	5.5	—	S
Drain-source ON-resistance	$R_{DS(ON)}$	$I_D = 1.0 \text{ A}, V_{GS} = 4.0 \text{ V}$ (Note2)	—	71	91	mΩ
		$I_D = 0.5 \text{ A}, V_{GS} = 2.5 \text{ V}$ (Note2)	—	91	119	
		$I_D = 0.2 \text{ A}, V_{GS} = 1.8 \text{ V}$ (Note2)	—	121	186	
Input capacitance	C_{iss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$	—	220	—	pF
Output capacitance	C_{oss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$	—	51	—	pF
Reverse transfer capacitance	C_{rss}	$V_{DS} = 10 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$	—	42	—	pF
Switching time	Turn-on time	t_{on}	—	12	—	ns
	Turn-off time	t_{off}	—	10	—	
Drain-source forward voltage	V_{DSF}	$I_D = -2.3 \text{ A}, V_{GS} = 0 \text{ V}$ (Note2)	—	-0.85	-1.20	V

Note2: Pulse test

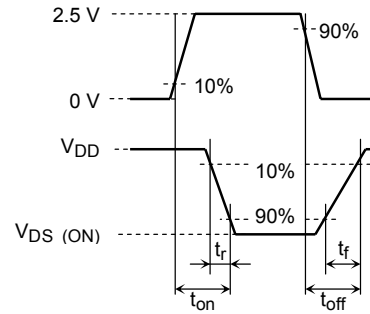
Switching Time Test Circuit

(a) Test Circuit



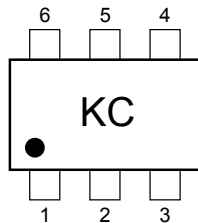
$V_{DD} = 10\text{ V}$
 $R_G = 4.7\ \Omega$
 $D.U. \leq 1\%$
 $V_{IN}: t_r, t_f < 5\text{ ns}$
 Common Source
 $T_a = 25^\circ\text{C}$

(b) V_{IN}

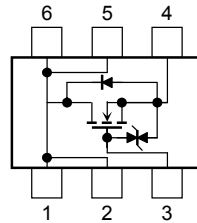


(c) V_{OUT}

Marking



Equivalent Circuit (top view)



Notice on Usage

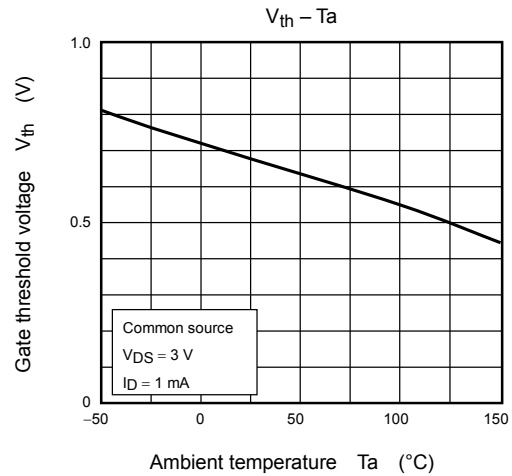
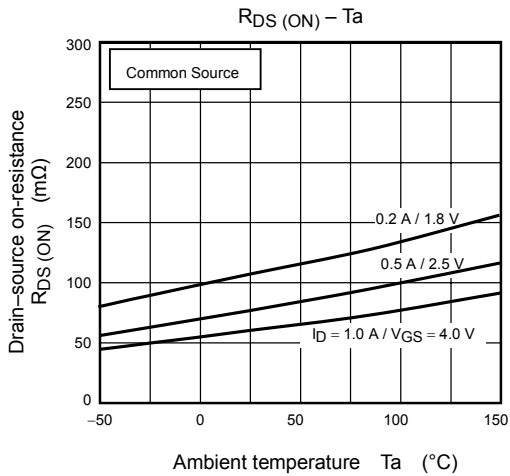
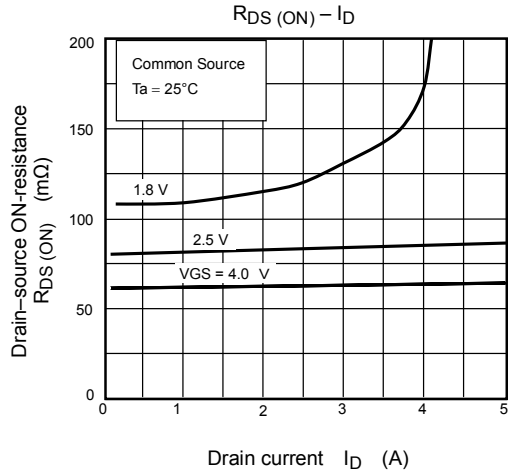
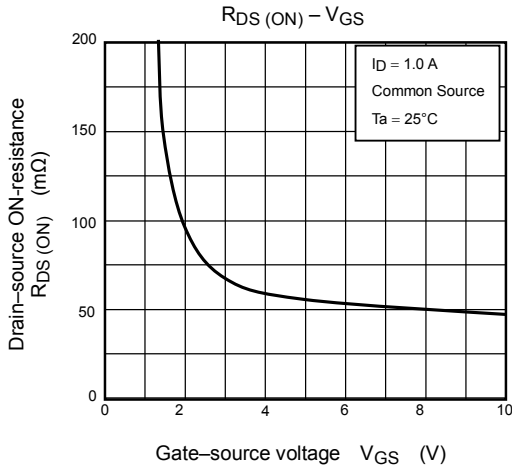
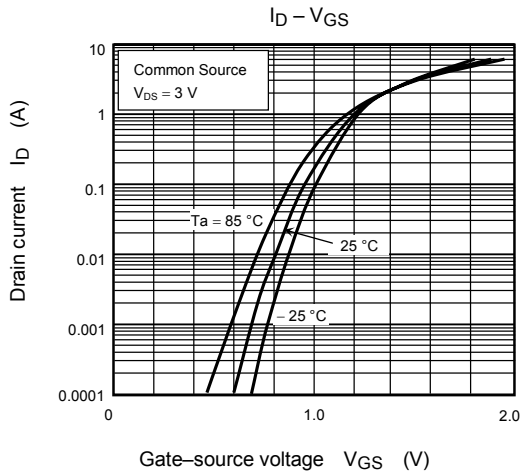
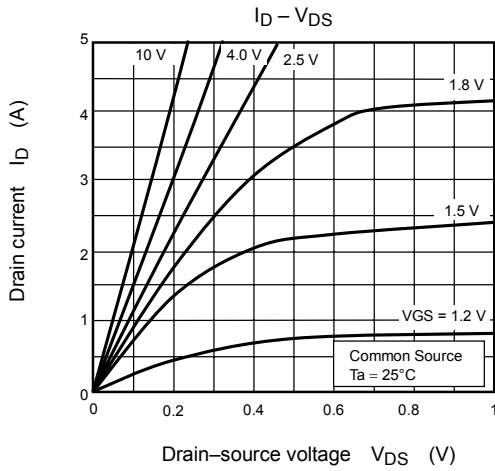
V_{th} can be expressed as the voltage between gate and source when the low operating current value is $I_D = 1\text{ mA}$ for this product. For normal switching operation, $V_{GS (on)}$ requires a higher voltage than V_{th} and $V_{GS (off)}$ requires a lower voltage than V_{th} .

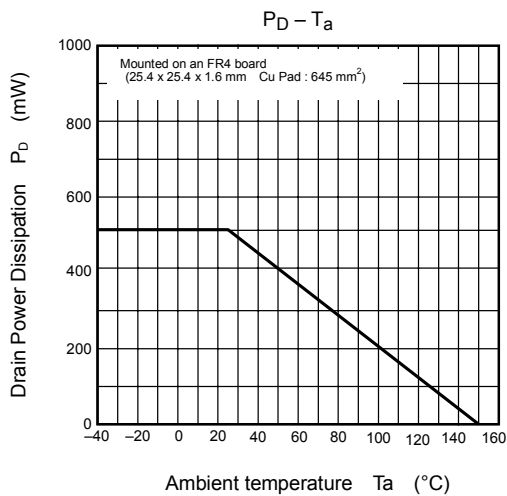
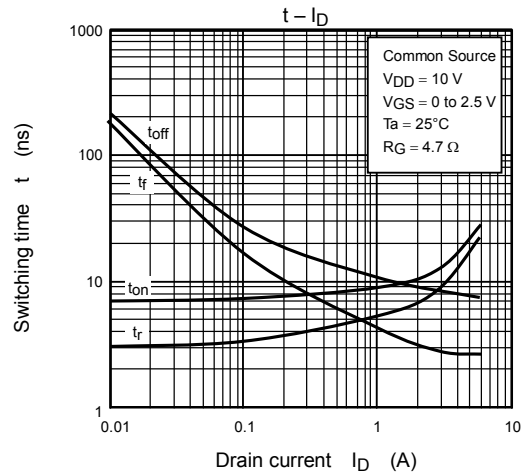
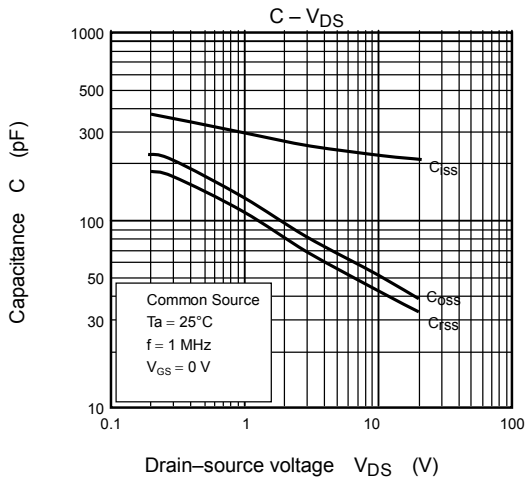
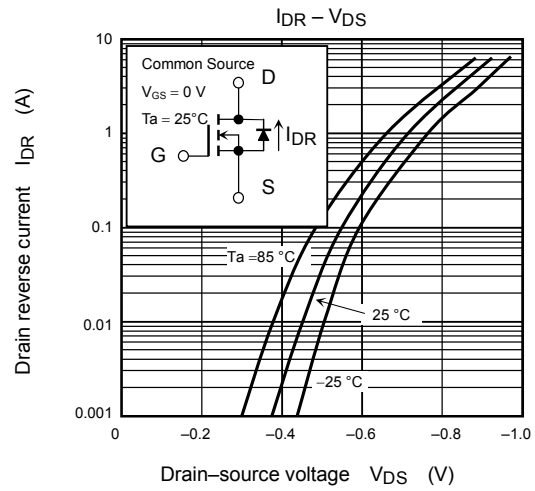
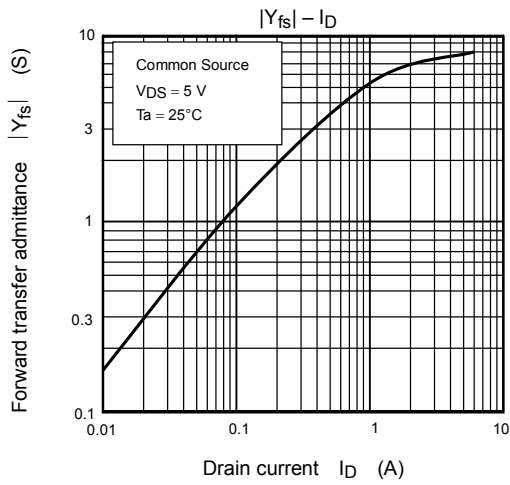
(The relationship can be established as follows: $V_{GS (off)} < V_{th} < V_{GS (on)}$.)

Take this into consideration when using the device. The V_{GS} recommended voltage for turning on this product is 1.8 V or higher.

Handling Precaution

When handling individual devices that are not yet mounted on a circuit board, make sure that the environment is protected against electrostatic discharge. Operators should wear antistatic clothing, and containers and other objects that come into direct contact with devices should be made of antistatic materials.





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