

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (U-MOS III)

SSM6K18TU

High Current Switching Applications

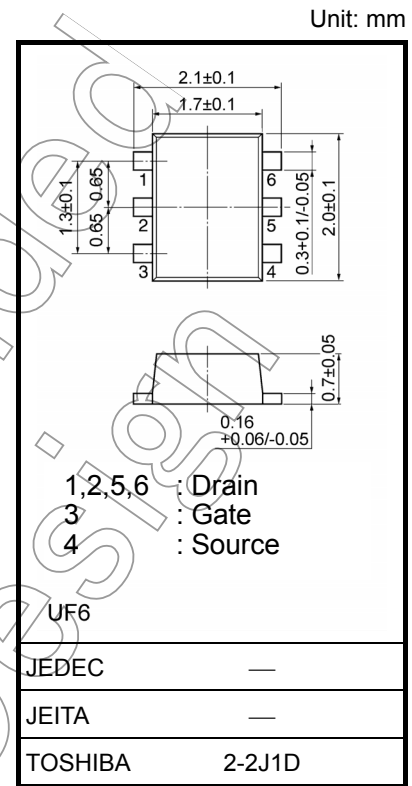
- Suitable for high-density mounting due to compact package
- Low on resistance: $R_{DS(ON)} = 54 \text{ m}\Omega$ (max) (@ $V_{GS} = 2.5 \text{ V}$)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-Source voltage		V_{DS}	20	V
Gate-Source voltage		V_{GSS}	± 12	V
Drain current	DC	I_D	4	A
	Pulse	I_{DP}	8	
Drain power dissipation		P_D (Note 1)	500	mW
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	-55 to 150	°C

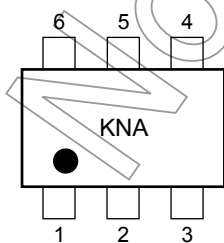
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

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

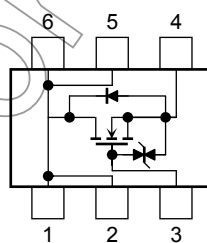


Weight: 7 mg (typ.)

Marking



Equivalent Circuit (Top View)



Handling Precaution

When handling individual devices (which are not yet mounting on a circuit board), be sure that the environment is protected against electrostatic discharge. Operators should wear anti-static clothing and use containers and other objects that are made of anti-static materials.

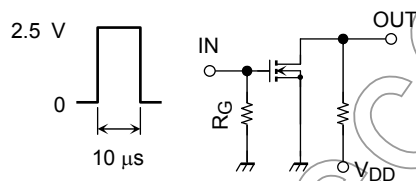
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GSS}	$V_{GS} = \pm 12\text{ V}, V_{DS} = 0$	—	—	± 1	μA
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 threshold voltage	V_{th}	$V_{DS} = 3\text{ V}, I_D = 0.1\text{ mA}$	0.5	—	1.1	V
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 3\text{ V}, I_D = 2\text{ A}$ (Note2)	5.5	—	—	S
Drain-Source ON resistance	$R_{DS(ON)}$	$I_D = 2\text{ A}, V_{GS} = 4\text{ V}$ (Note2)	—	34	40	m Ω
		$I_D = 2\text{ A}, V_{GS} = 2.5\text{ V}$ (Note2)	—	41	54	
Input capacitance	C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	1100	—	pF
Reverse transfer capacitance	C_{rss}	$V_{DS} = 10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	160	—	pF
Output capacitance	C_{oss}	$V_{DS} = 10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$	—	185	—	pF
Switching time	Turn-on time	t_{on}	$V_{DD} = 10\text{ V}, I_D = 2\text{ A},$		43	ns
	Turn-off time	t_{off}	$V_{GS} = 0\text{ to }2.5\text{ V}, R_G = 4.7\ \Omega$		50	

Note 2: Pulse test

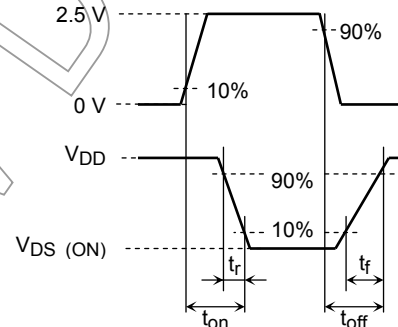
Switching Time Test Circuit

(a) Test Circuit

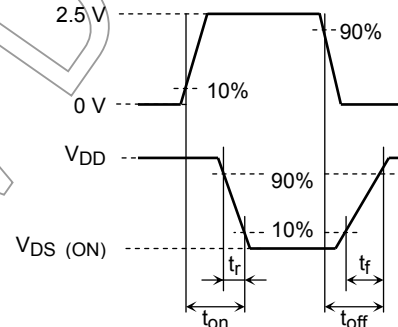


$V_{DD} = 10\text{ V}$
 $R_G = 4.7\ \Omega$
 Duty $\leq 1\%$
 V_{IN} : $t_r, t_f < 5\text{ ns}$
 Common Source
 $T_a = 25^\circ\text{C}$

(b) V_{IN}



(c) V_{OUT}

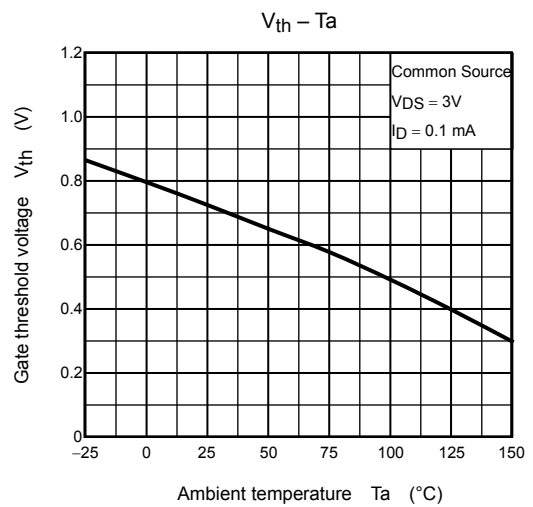
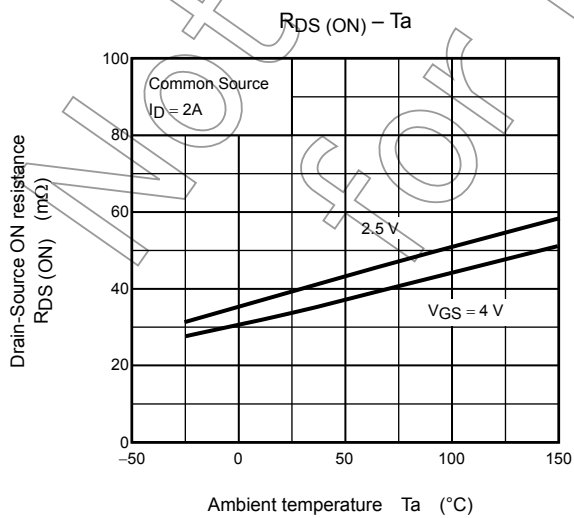
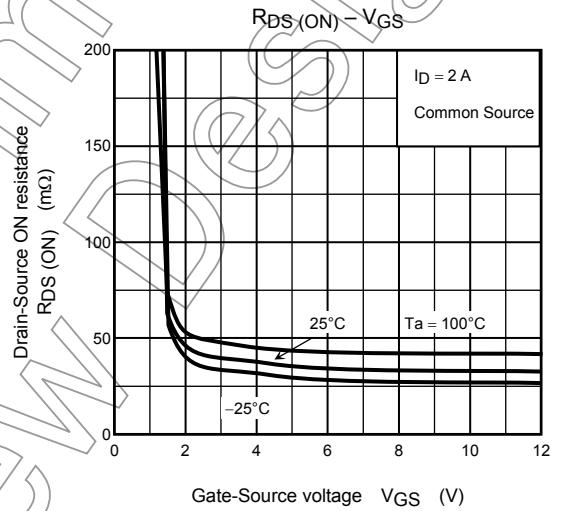
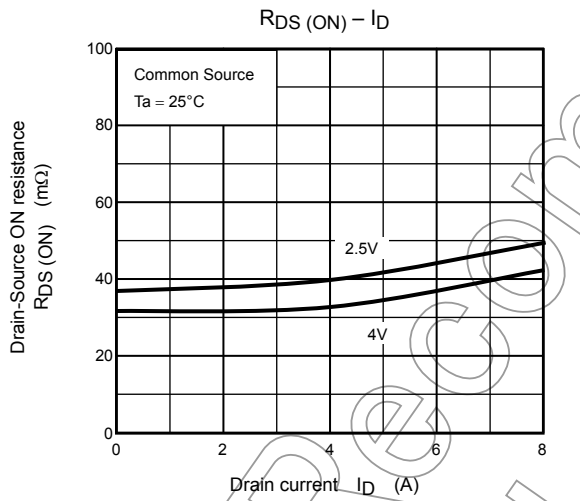
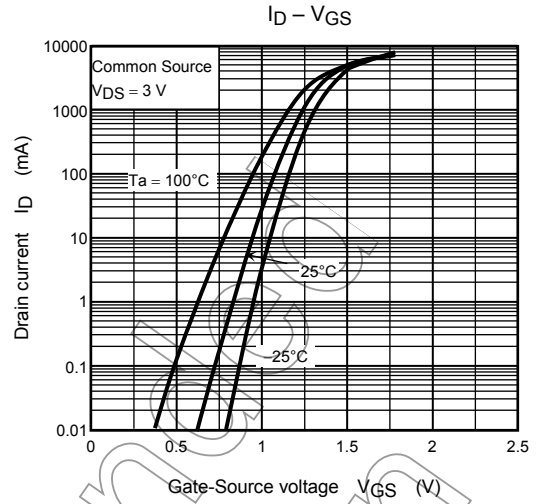
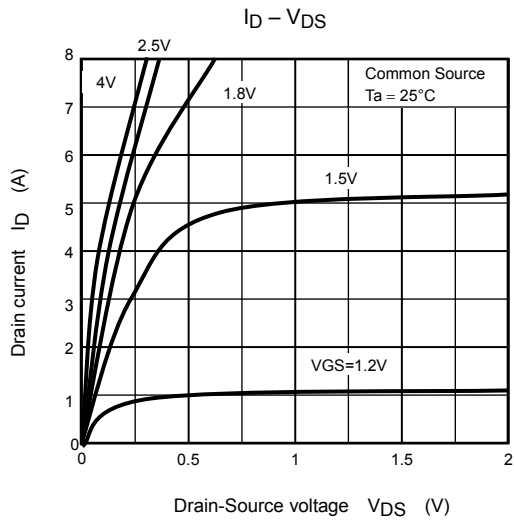


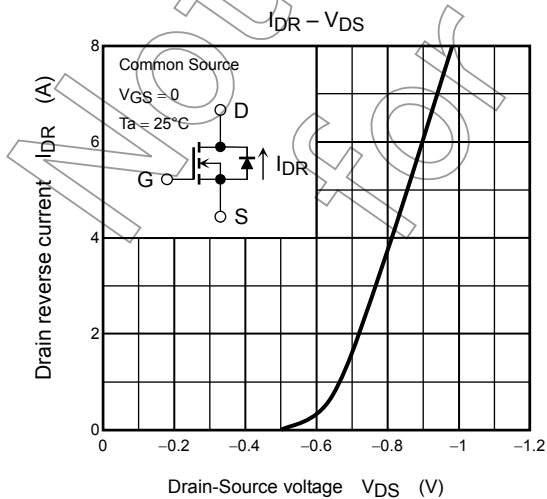
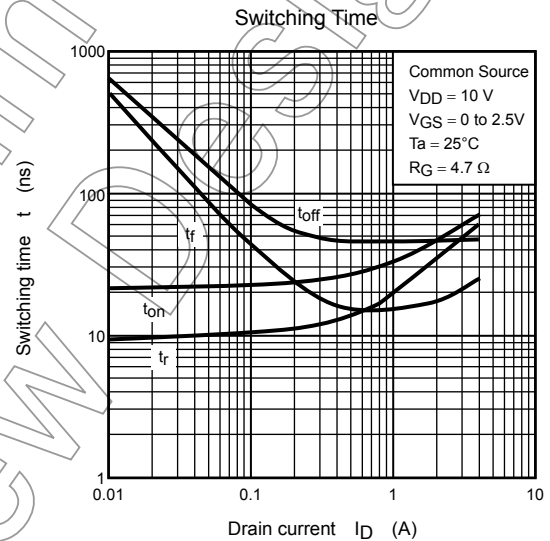
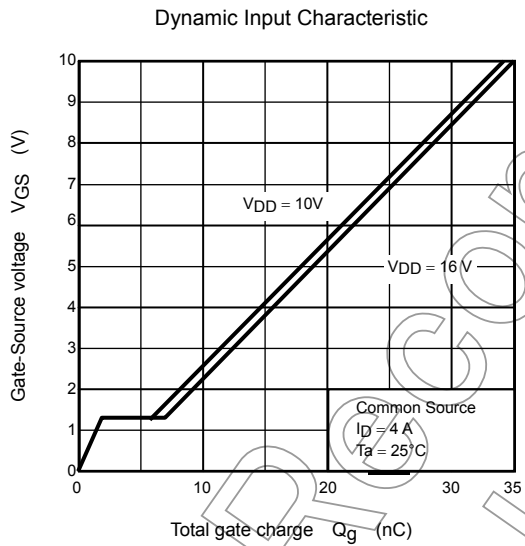
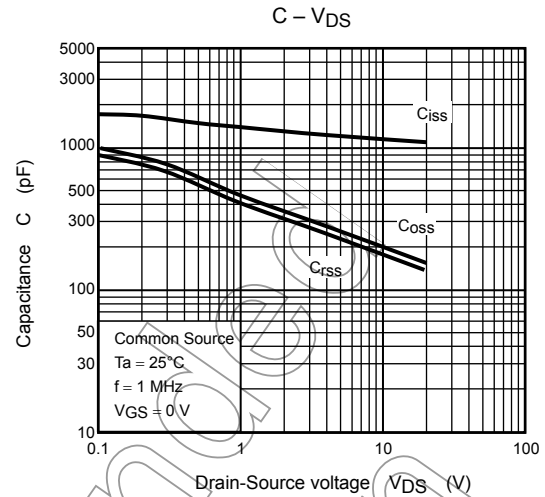
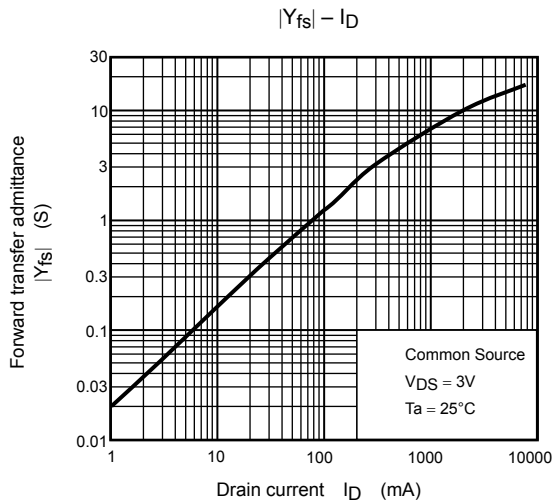
Precaution

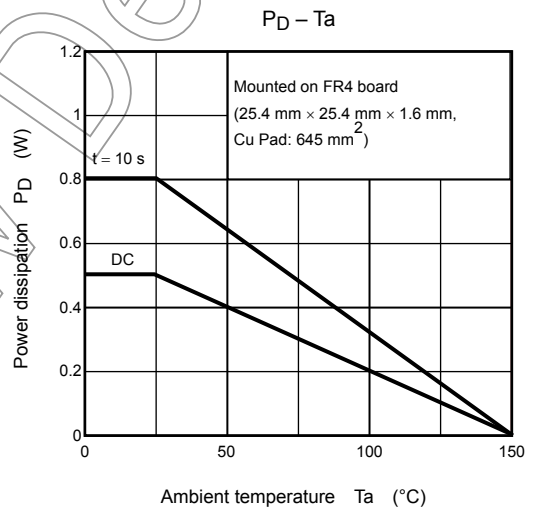
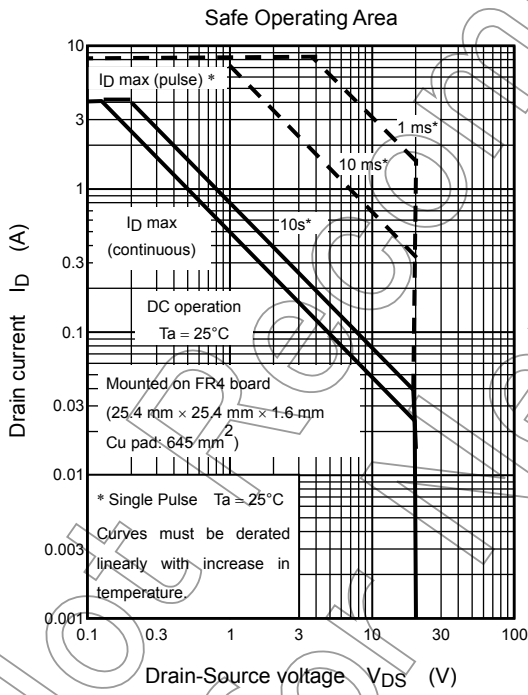
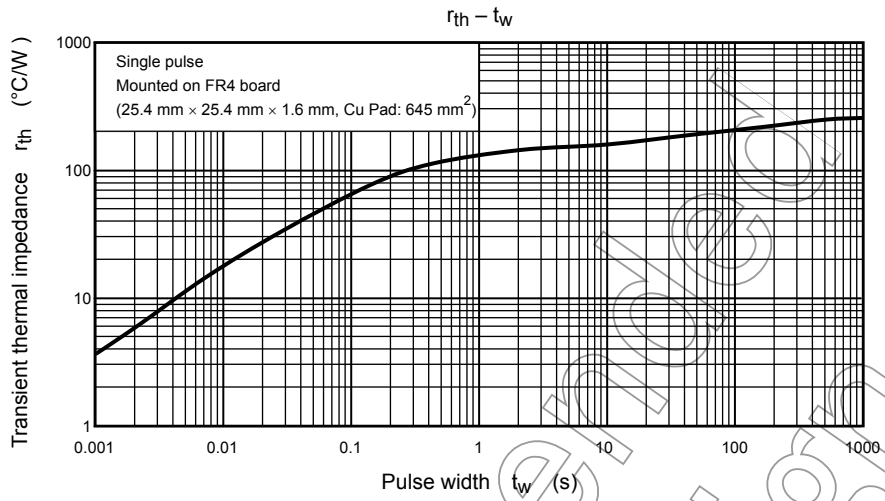
V_{th} can be expressed as voltage between gate and source when low operating current value is $I_D = 100\ \mu\text{A}$ for this product. For normal switching operation, $V_{GS(ON)}$ requires higher voltage than V_{th} and $V_{GS(OFF)}$ requires lower voltage than V_{th} .

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

Please take this into consideration for using the device.







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