

SSM6J51TU

High Current Switching Applications

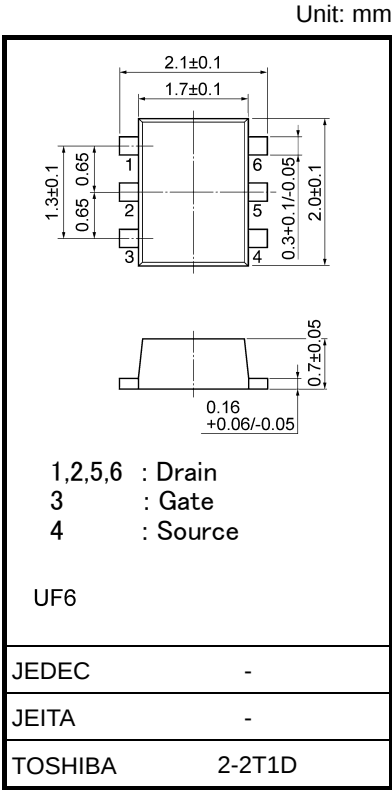
- Suitable for high-density mounting due to compact package
- Low on-resistance: $R_{on} = 54\text{ m}\Omega\text{ (max) (@}V_{GS} = -2.5\text{ V)}$
 $85\text{ m}\Omega\text{ (max) (@}V_{GS} = -1.8\text{ V)}$
 $150\text{ m}\Omega\text{ (max) (@}V_{GS} = -1.5\text{ V)}$

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-Source voltage		V_{DS}	-12	V
Gate-Source voltage		V_{GSS}	± 8	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}	-55~150	°C

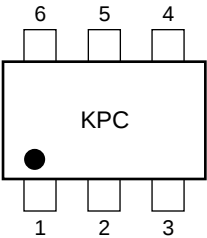
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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 an FR4 board.
(25.4 mm × 25.4 mm × 1.6 t, Cu Pad: 645 mm²)

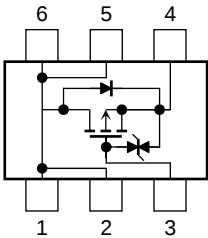


Weight: 7 mg (typ.)

Marking



Equivalent Circuit (top view)



Handling Precaution

When handling individual devices (which are not yet mounted on a circuit board), ensure that the environment is protected against static 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.

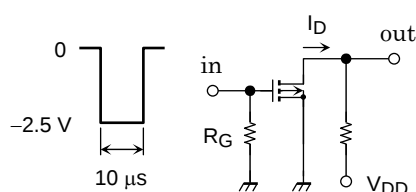
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GSS}	$V_{GS} = \pm 8 \text{ V}, V_{DS} = 0$	—	—	± 10	μA
Drain-Source breakdown voltage	$V_{(BR) DSS}$	$I_D = -1 \text{ mA}, V_{GS} = 0$	-12	—	—	V
	$V_{(BR) DSX}$	$I_D = -1 \text{ mA}, V_{GS} = +8 \text{ V}$	-4	—	—	
Drain cut-off current	I_{DSS}	$V_{DS} = -12 \text{ V}, V_{GS} = 0$	—	—	-10	μA
Gate threshold voltage	V_{th}	$V_{DS} = -3 \text{ V}, I_D = -1 \text{ mA}$	-0.3	—	-1.0	V
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = -3 \text{ V}, I_D = -2.0 \text{ A}$ (Note 2)	6.0	12.0	—	S
Drain-Source on-resistance	$R_{DS(ON)}$	$I_D = -2.0 \text{ A}, V_{GS} = -2.5 \text{ V}$ (Note 2)	—	38	54	$\text{m}\Omega$
		$I_D = -1.0 \text{ A}, V_{GS} = -1.8 \text{ V}$ (Note 2)	—	48	85	
		$I_D = -0.3 \text{ A}, V_{GS} = -1.5 \text{ V}$ (Note 2)	—	60	150	
Input capacitance	C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$	—	1700	—	
Reverse transfer capacitance	C_{rss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$	—	190	—	pF
Output capacitance	C_{oss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0, f = 1 \text{ MHz}$	—	210	—	pF
Switching time	Turn-on time	t_{on}	$V_{DS} = -10 \text{ V}, I_D = -2.0 \text{ A},$	—	57	ns
	Turn-off time	t_{off}	$V_{GS} = 0 \sim -2.5 \text{ V}, R_G = 4.7 \Omega$	—	120	

Note 2: Pulse test

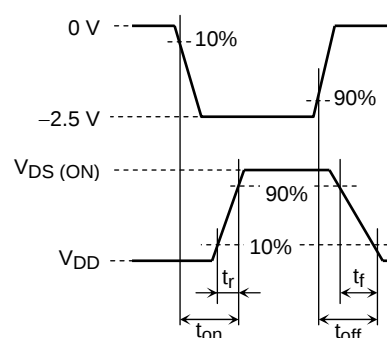
Switching Time Test Circuit

(a) Test Circuit



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

(b) V_{IN}

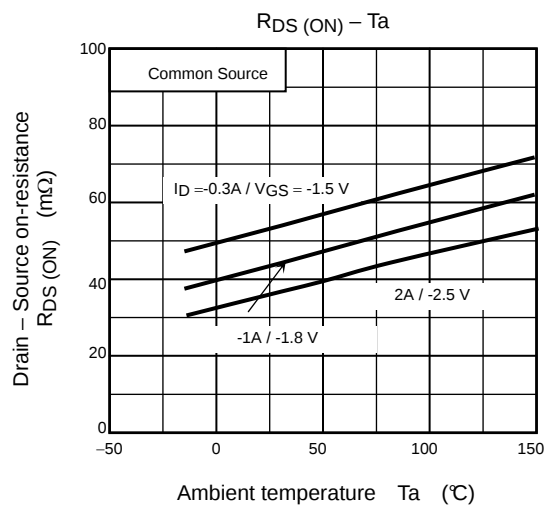
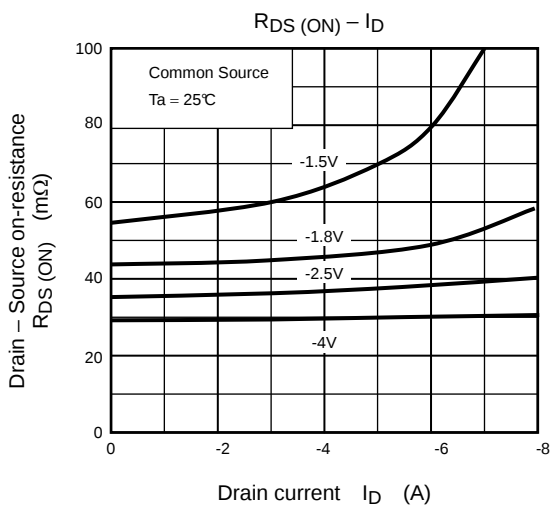
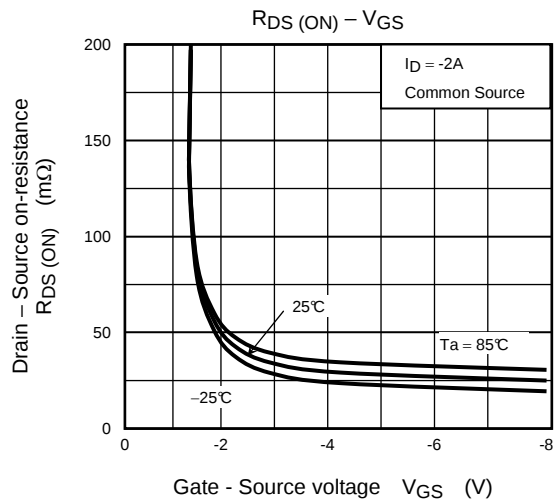
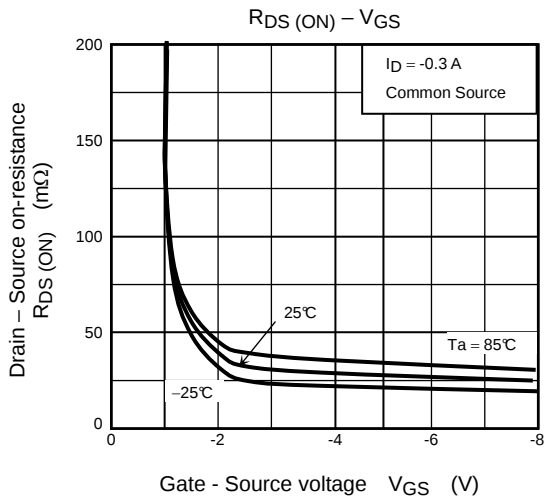
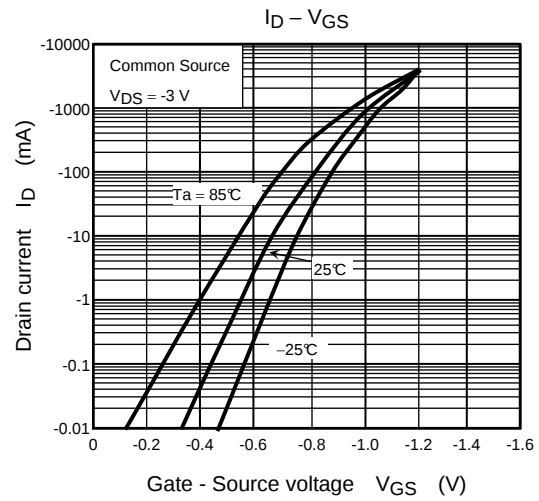
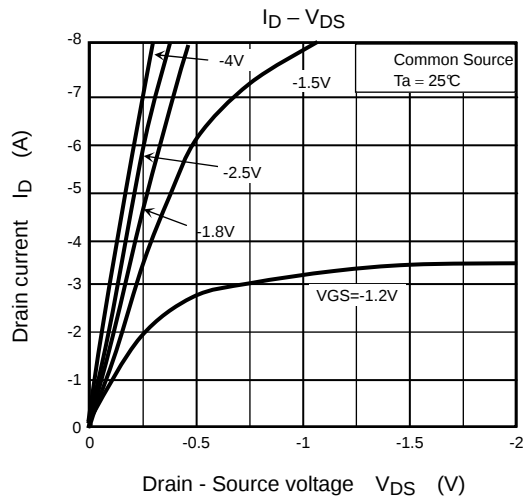


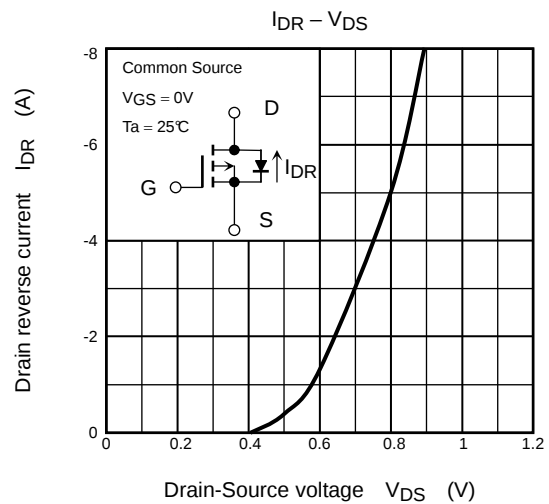
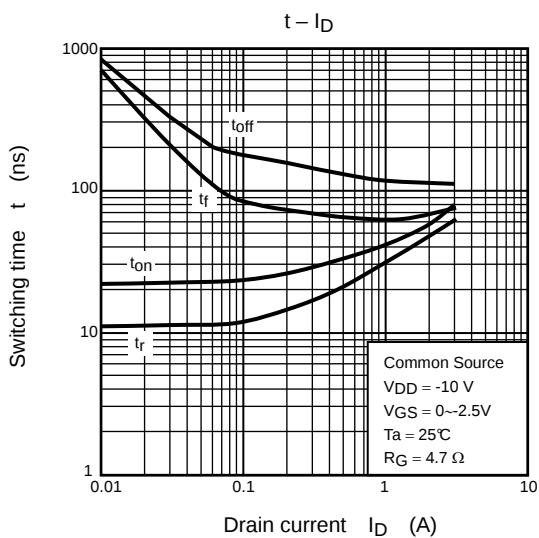
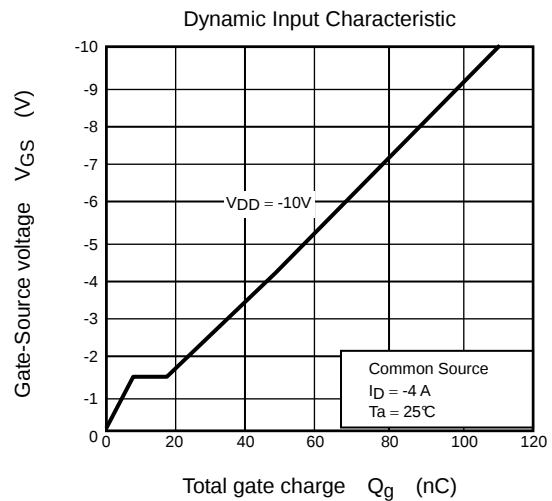
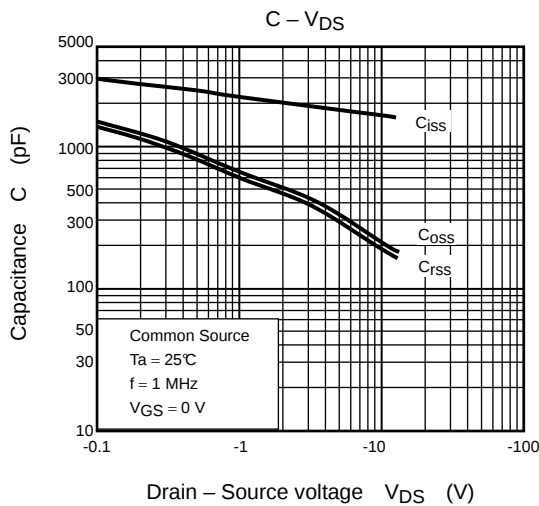
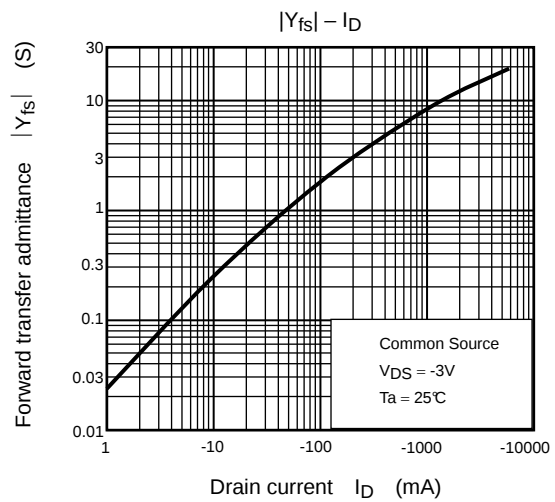
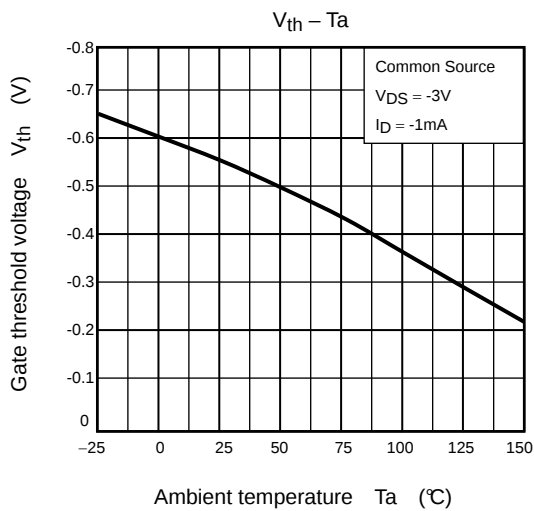
(c) V_{OUT}

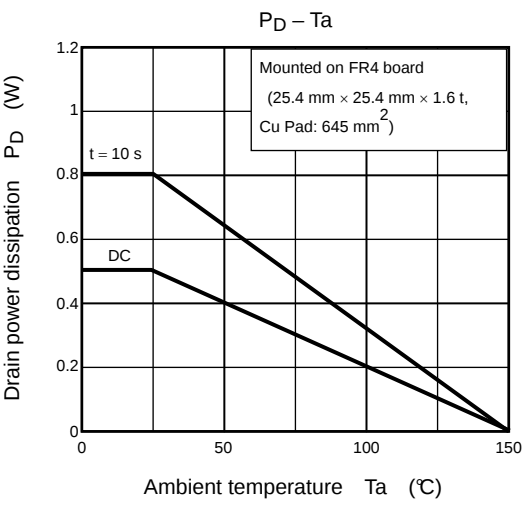
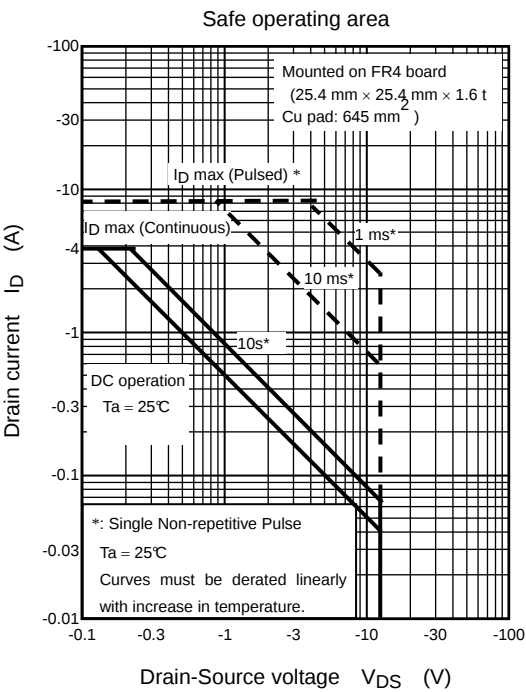
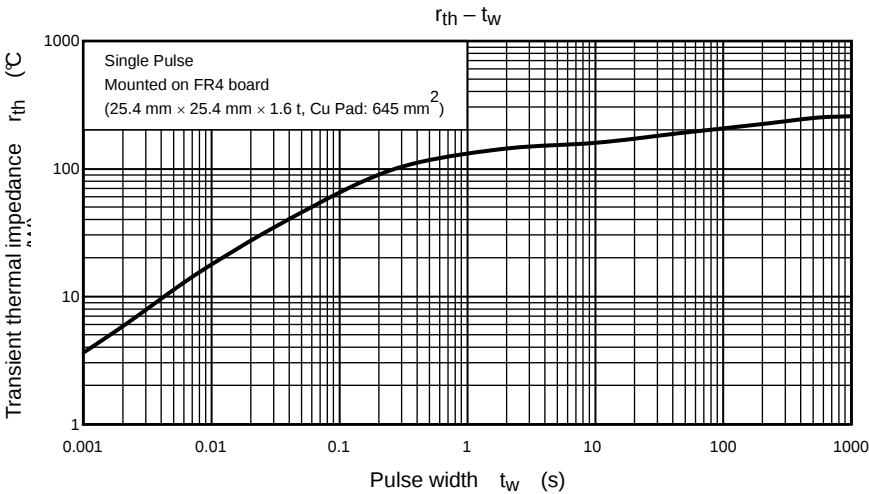
Precaution

V_{th} can be expressed as the voltage between the 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: $V_{GS(OFF)} < V_{th} < V_{GS(ON)}$.)

Be sure to take this into consideration when using the device.







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