

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type (U-MOSIV)

SSM6J51TU

High Current Switching Applications

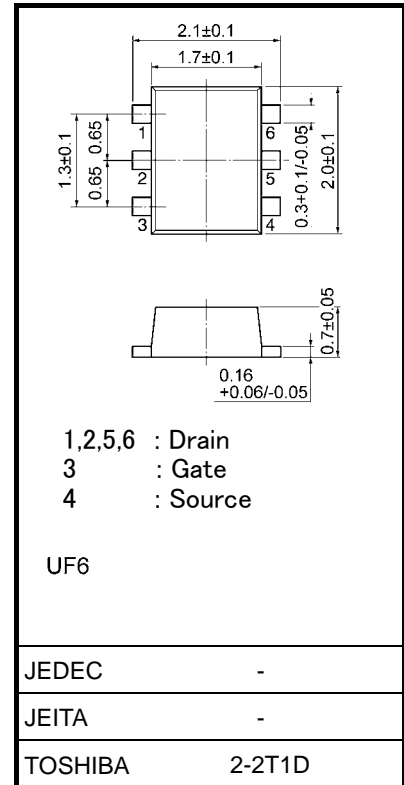
- Suitable for high-density mounting due to compact package
- Low on-resistance: $R_{on} = 54 \text{ m}\Omega$ (max) (@ $V_{GS} = -2.5 \text{ V}$)
 $85 \text{ m}\Omega$ (max) (@ $V_{GS} = -1.8 \text{ V}$)
 $150 \text{ m}\Omega$ (max) (@ $V_{GS} = -1.5 \text{ V}$)

Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Rating	Unit
Drain-Source voltage	V_{DS}	-12	V
Gate-Source voltage	V_{GSS}	± 8	V
Drain current	DC	I_D	-4
	Pulse	I_{DP}	-8
Drain power dissipation	P_D (Note1)	500	mW
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55~150	$^\circ\text{C}$

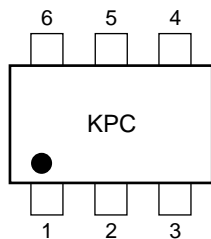
Note1: Mounted on an FR4 board.
 (25.4 mm × 25.4 mm × 1.6 t, Cu Pad: 645 mm²)

Unit: mm

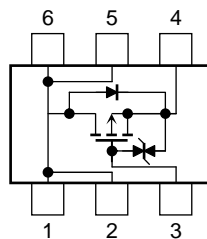


Weight: 7 mg (typ.)

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.

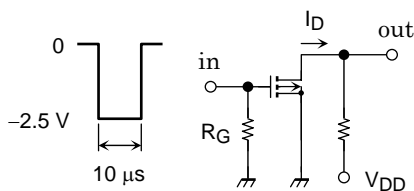
Electrical Characteristics (Ta = 25°C)

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	m Ω	
		$I_D = -1.0 \text{ A}, V_{GS} = -1.8 \text{ V}$ (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

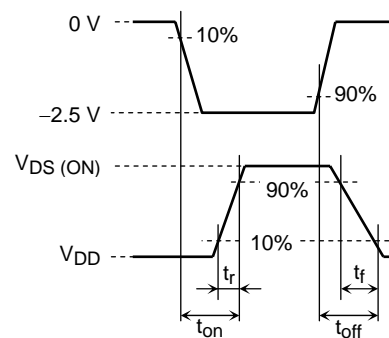
Switching Time Test Circuit

(a) Test Circuit



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

(b) V_{IN}

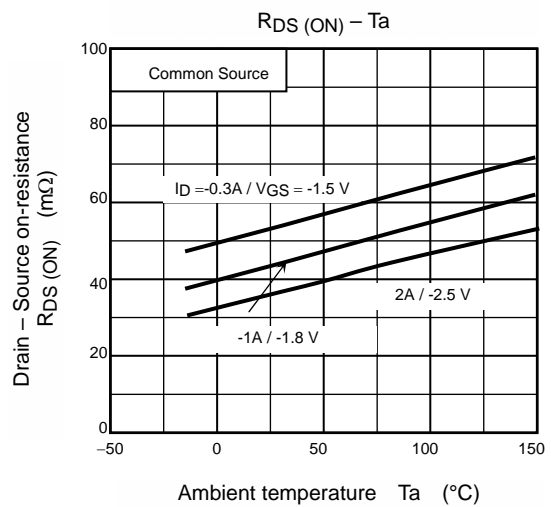
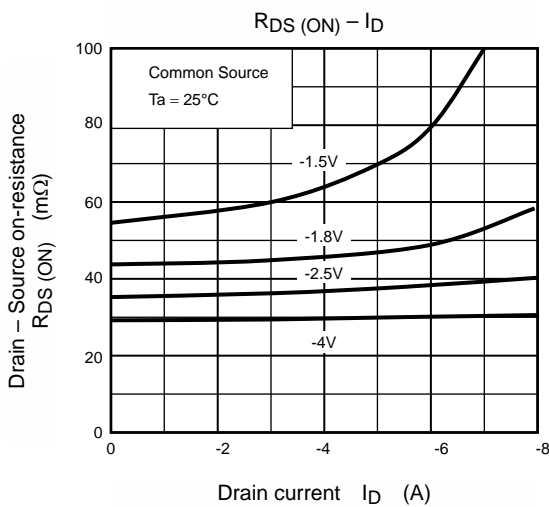
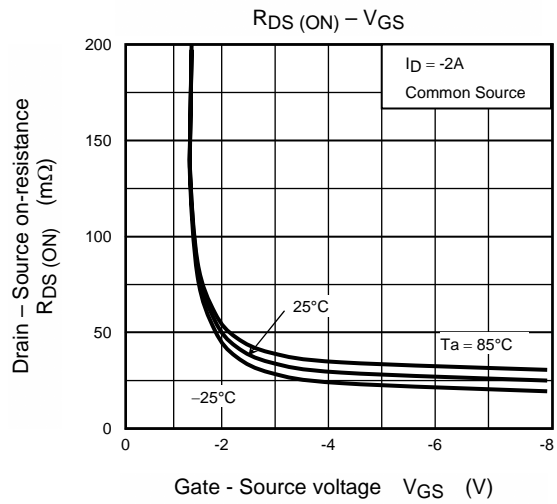
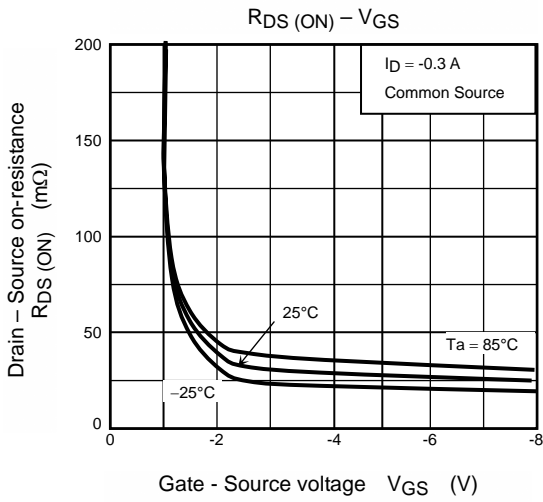
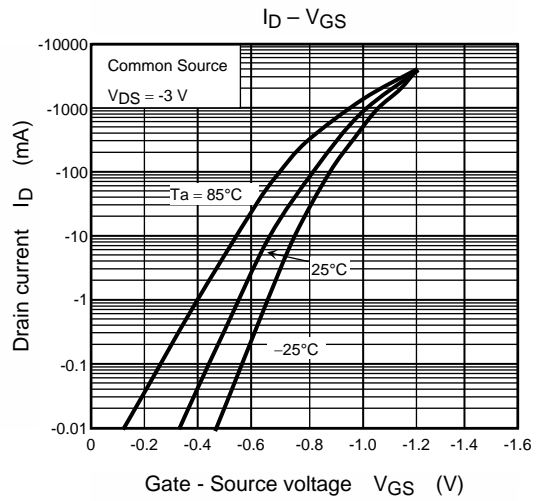
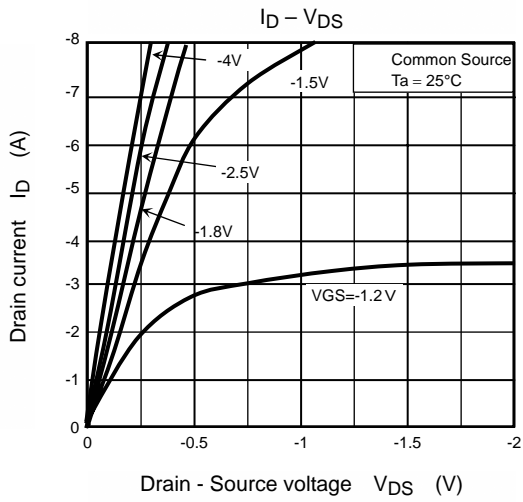


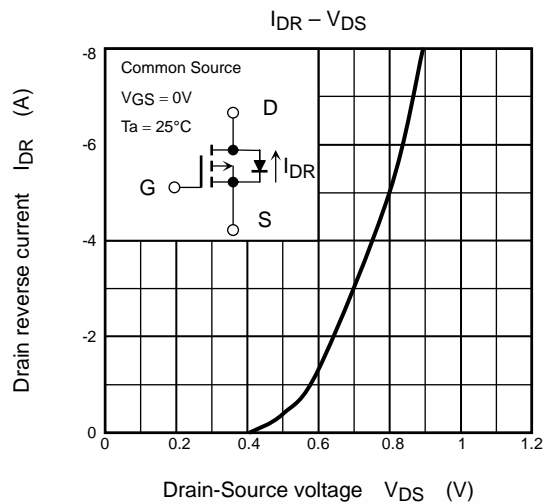
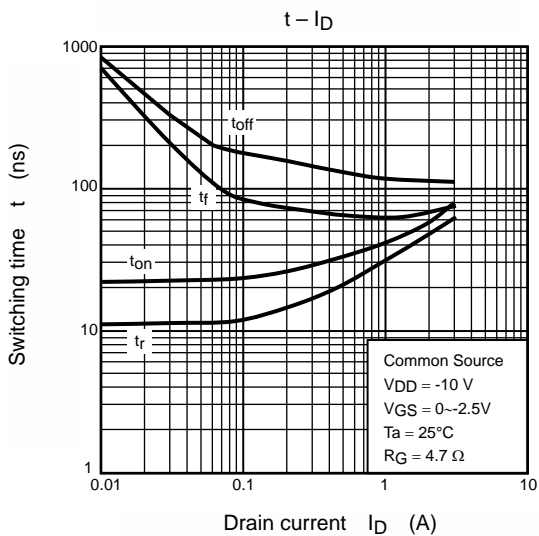
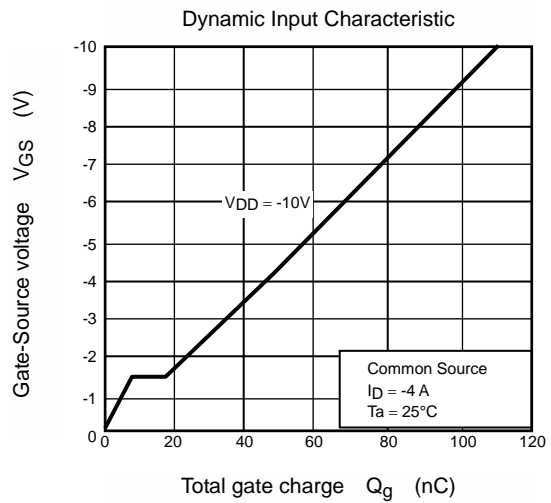
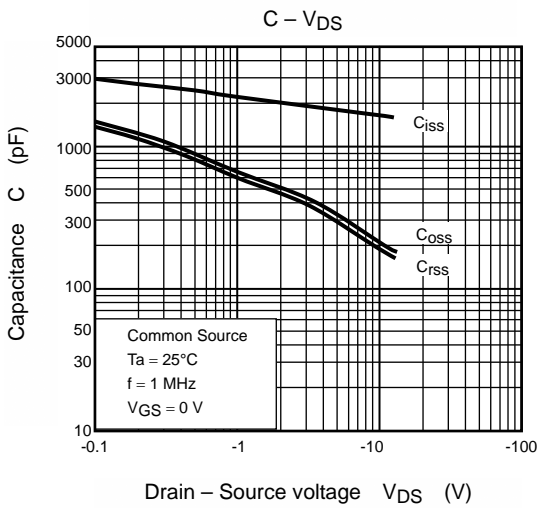
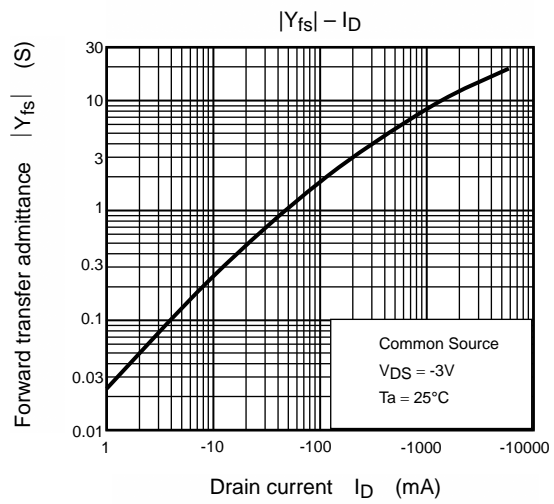
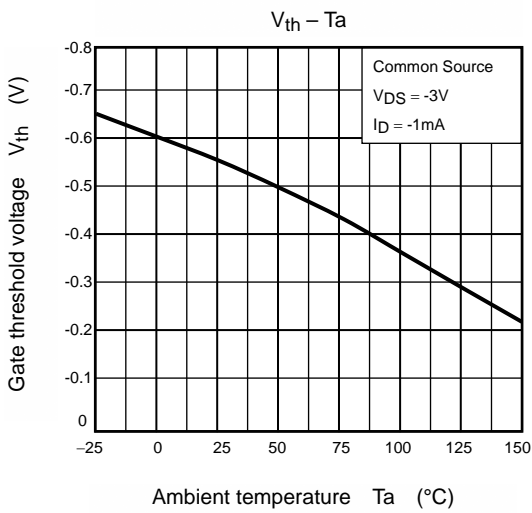
(c) V_{OUT}

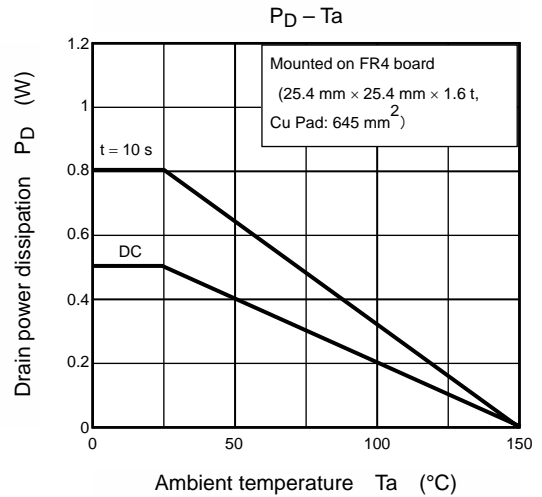
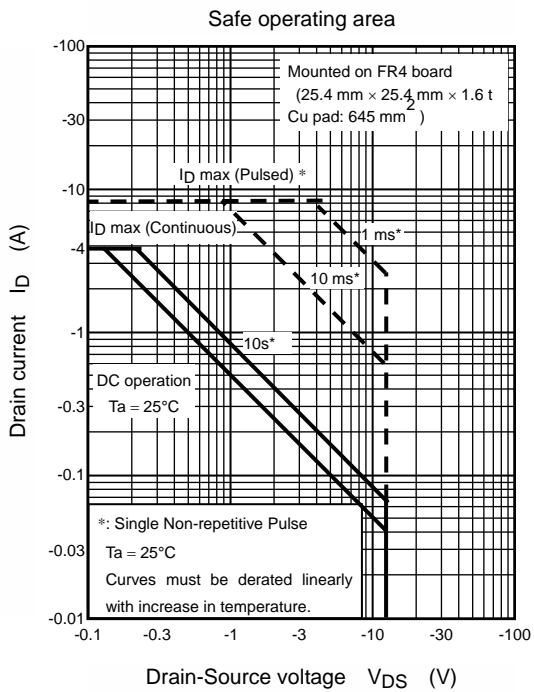
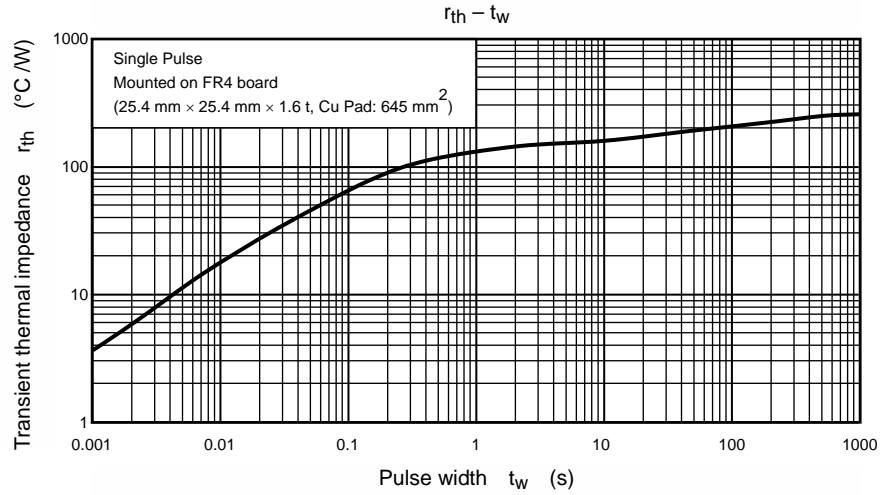
Precaution

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. The V_{GS} recommended voltage for turning on this product is -1.5V or higher.







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