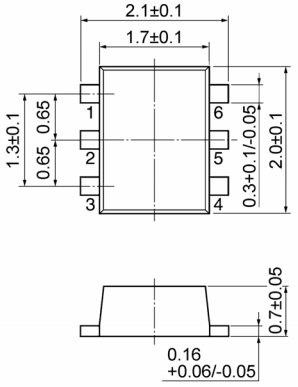
TOSHIBA Field Effect Transistor Silicon P Channel MOS Type (U-MOSⅢ)

SSM6J50TU

○ High Current Switching Applications

- Compact package suitable for high-density mounting
- Low on-resistance: R_{on} = 205mΩ (max) (@V_{GS} = -2.0 V)
  R_{on} = 100mΩ (max) (@V_{GS} = -2.5 V)
  R_{on} = 64mΩ (max) (@V_{GS} = -4.5 V)

Unit: mm



1,2,5,6 : Drain
3 : Gate
4 : Source

UF6

JEDEC	-
JEITA	-
TOSHIBA	2-2T1D

Weight: 7 mg (typ.)

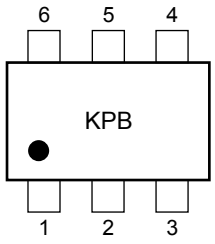
Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-Source voltage		V_{DS}	-20	V
Gate-Source voltage		V_{GSS}	±10	V
Drain current	DC	I_D	-2.5	A
	Pulse	I_{DP}	-5	
Drain power dissipation		P_D (Note 1)	500	mW
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

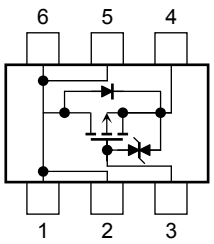
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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 t, Cu Pad: 645 mm^2)

Marking



Equivalent Circuit



Handling Precaution

When handling individual devices that 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.

Start of commercial production
2003-11

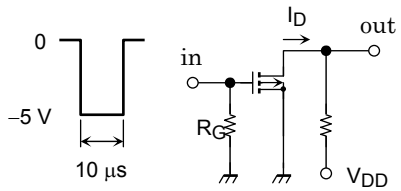
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±8 V, V_{DS} = 0	—	—	±10	μA
Drain-Source breakdown voltage		$V_{(BR)\ DSS}$	I_D = −10 mA, V_{GS} = 0	-20	—	—	V
		$V_{(BR)\ DSX}$	I_D = −10 mA, V_{GS} = +10 V	-10	—	—	
Drain cut-off current		I_{DSS}	V_{DS} = −20 V, V_{GS} = 0	—	—	−10	μA
Gate threshold voltage		V_{th}	V_{DS} = −10 V, I_D = −0.2 mA	−0.5	—	−1.2	V
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = −10 V, I_D = −1.5 A (Note2)	3.1	6.2	—	S
Drain-Source on-resistance		$R_{DS\ (ON)}$	I_D = −1.5 A, V_{GS} = −4.5 V (Note2)	—	49	64	mΩ
			I_D = −1.5 A, V_{GS} = −2.5 V (Note2)	—	73	100	
			I_D = −1.5 A, V_{GS} = −2.0 V (Note2)	—	105	205	
Input capacitance		C_{iss}	V_{DS} = −10 V, V_{GS} = 0, f = 1 MHz	—	800	—	pF
Reverse transfer capacitance		C_{rss}	V_{DS} = −10 V, V_{GS} = 0, f = 1 MHz	—	120	—	pF
Output capacitance		C_{oss}	V_{DS} = −10 V, V_{GS} = 0, f = 1 MHz	—	160	—	pF
Switching time	Turn-on time	t_{on}	V_{DD} = −10 V, I_D = −1.5 A,	—	15	—	ns
	Turn-off time	t_{off}	V_{GS} = 0 to −5 V, R_G = 4.7 Ω	—	51	—	

Note2: Pulse test

Switching Time Test Circuit

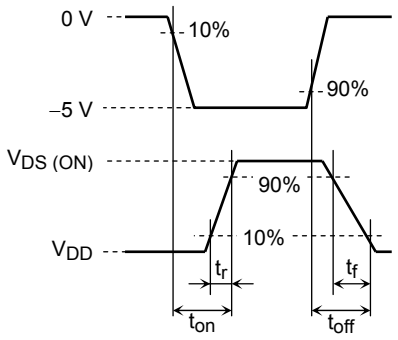
(a) Test Circuit



V_{DD} = -10 V
R_G = 4.7 Ω
Duty ≤ 1%
V_{IN}: t_r, t_f < 5 ns
Common Source
Ta = 25°C

(b) V_{IN}

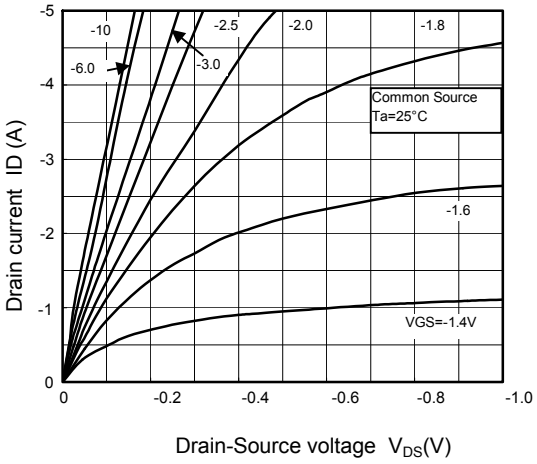
(c) V_{OUT}



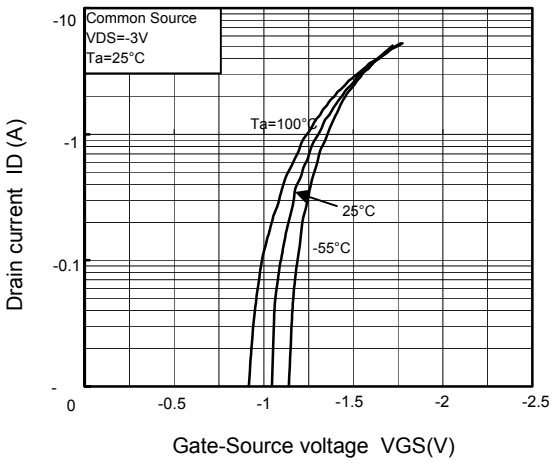
Precaution

V_{th} can be expressed as the voltage between gate and source when the low operating current value is I_D=-200 μA 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.

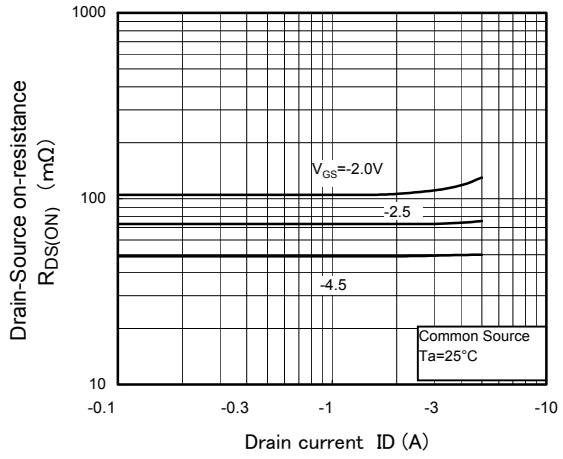
I_D-V_{DS}



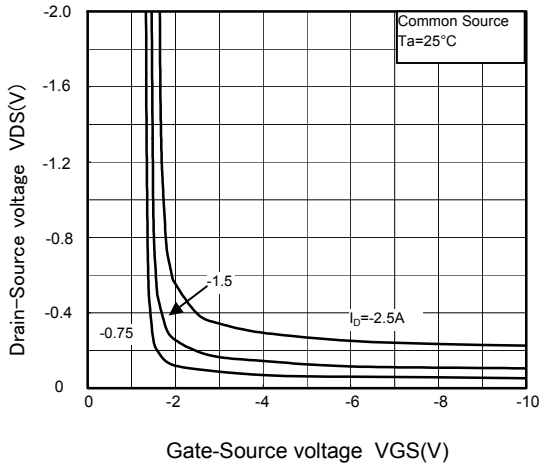
I_D-V_{GS}



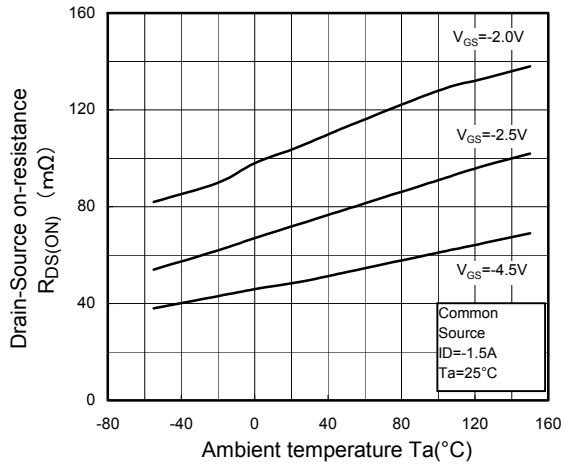
$R_{DS(ON)}$–I_D



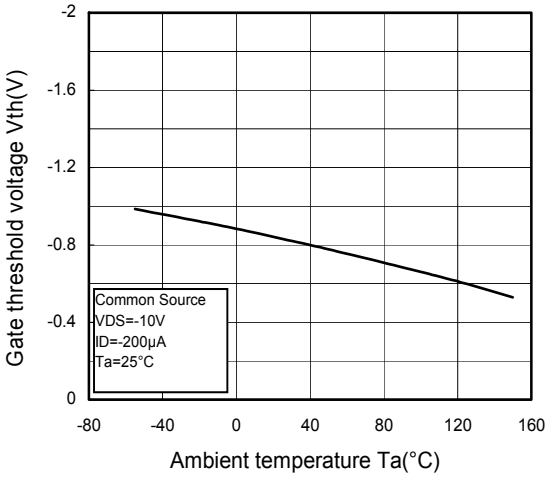
V_{DS}-V_{GS}



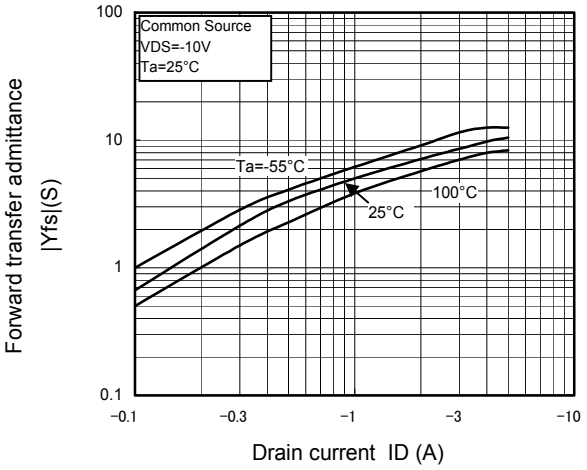
$R_{DS(ON)}$-Ta



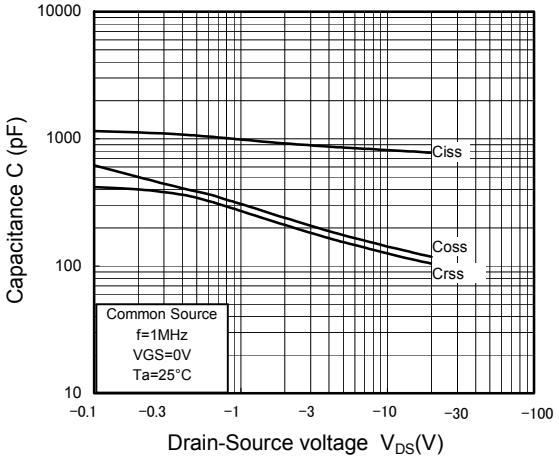
Vth-Ta



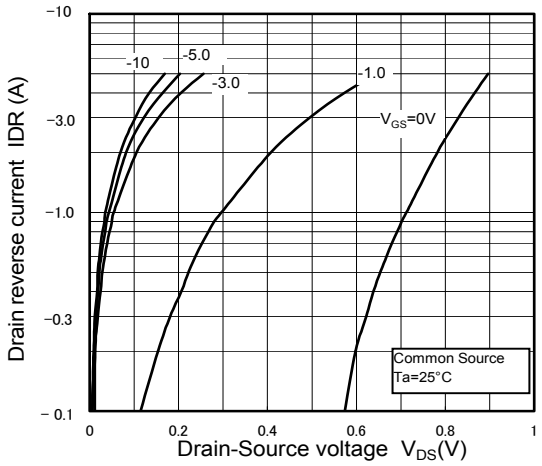
|Yfs|-I_D



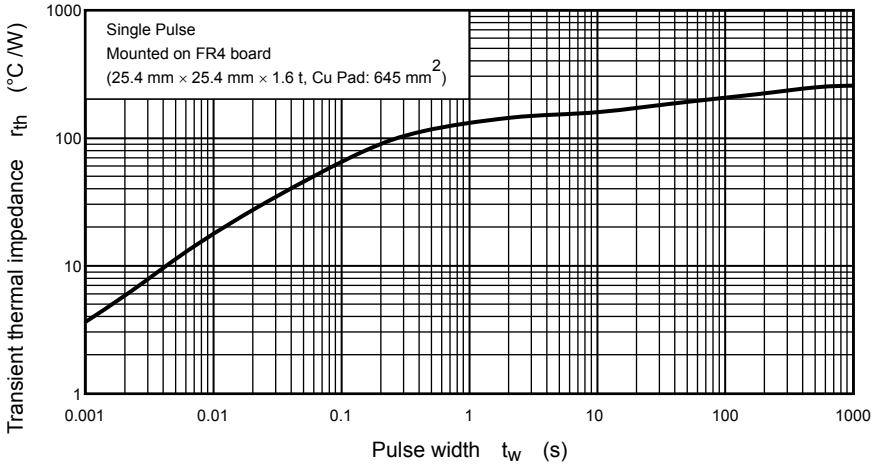
C-V_{DS}



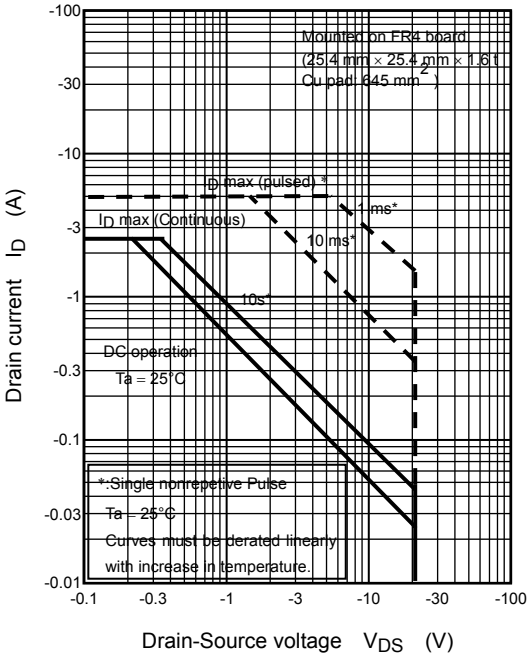
I_{DR}-V_{DS}



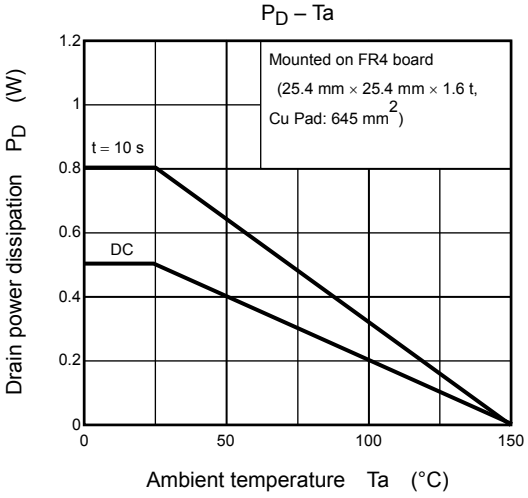
$r_{th} - t_w$



Safe operating area



$P_D - Ta$



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