TOSHIBA Transistor Silicon P Channel MOS Type

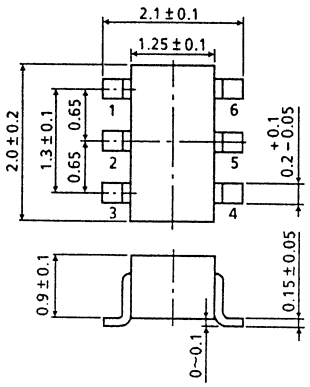
SSM6J07FU

Power Management Switch

High Speed Switching Applications

- Small package
- Low on resistance
  : $R_{DS(ON)}$ = 450 mΩ (max) (V_{GS} = −10 V)
  : $R_{DS(ON)}$ = 800 mΩ (max) (V_{GS} = −4 V)

Unit: mm



1, 2, 5, 6 : DRAIN
3 : GATE
4 : SOURCE

US6

JEDEC	—
JEITA	—
TOSHIBA	2-2J1D

Weight: 6.8 mg (typ.)

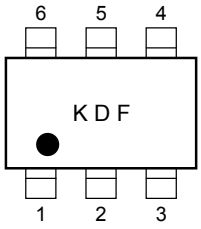
Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DS}	−30	V
Gate-source voltage		V_{GSS}	±20	V
Drain current	DC	I_D	−0.8	A
	Pulse	I_{DP}	−1.6	
Drain power dissipation		P_D (Note 1)	300	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: 0.32 mm^2 × 6)

Marking



Equivalent Circuit (top view)

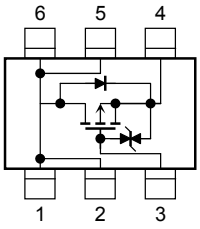
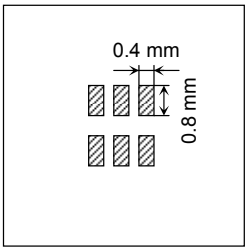


Figure 1: 25.4 mm × 25.4 mm × 1.6 t, Cu Pad: 0.32 mm^2 × 6



Handling Precaution

When handling individual devices (which are not yet mounting on a circuit board), be sure that the environment is protected against electrostatic 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.

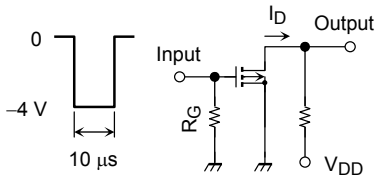
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0	—	—	±1	μA
Drain-source breakdown voltage		$V_{(BR)\ DSS}$	I_D = −1 mA, V_{GS} = 0	−30	—	—	V
Drain cut-off current		I_{DSS}	V_{DS} = −30 V, V_{GS} = 0	—	—	−1	μA
Gate threshold voltage		V_{th}	V_{DS} = −5 V, I_D = −0.1 mA	−1.1	—	−1.8	V
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = −5 V, I_D = −0.4 A (Note2)	0.7	—	—	S
Drain-source ON resistance		$R_{DS\ (ON)}$	I_D = −0.4 A, V_{GS} = −10 V (Note2)	—	350	450	mΩ
			I_D = −0.4 A, V_{GS} = −4 V (Note2)	—	570	800	
			I_D = −0.4 A, V_{GS} = −3.3 V (Note2)	—	0.7	1.6	Ω
Input capacitance		C_{iss}	V_{DS} = −15 V, V_{GS} = 0, f = 1 MHz	—	130	—	pF
Reverse transfer capacitance		C_{rss}	V_{DS} = −15 V, V_{GS} = 0, f = 1 MHz	—	16	—	pF
Output capacitance		C_{oss}	V_{DS} = −15 V, V_{GS} = 0, f = 1 MHz	—	52	—	pF
Switching time	Turn-on time	t_{on}	V_{DD} = −15 V, I_D = −0.4 A,	—	28	—	ns
	Turn-off time	t_{off}	V_{GS} = 0 to −4 V, R_G = 10 Ω	—	38	—	ns

Note 2: Pulse test

Switching Time Test Circuit

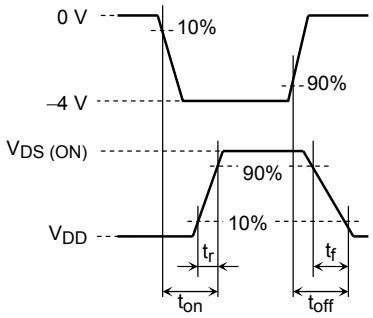
(a) Test circuit



V_{DD} = −15 V
R_G = 10 Ω
Duty ≤ 1%
Input: t_r, t_f < 5 ns
Common source
Ta = 25°C

(b) V_{IN}

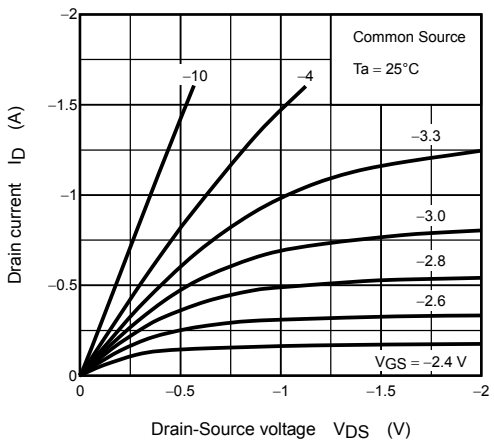
(c) V_{OUT}



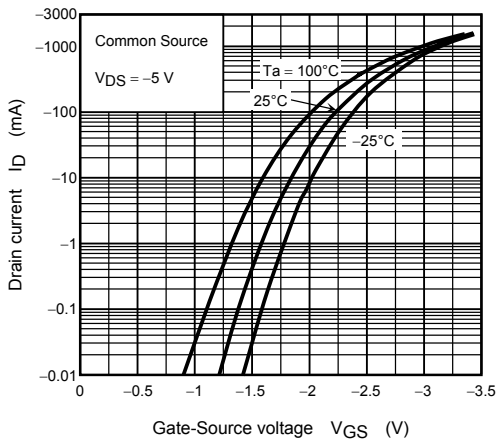
Precaution

V_{th} can be expressed as voltage between gate and source when low operating current value is I_D = −100 μA for this product. For normal switching operation, $V_{GS\ (on)}$ requires higher voltage than V_{th} and $V_{GS\ (off)}$ requires lower voltage than Vth.
(relationship can be established as follows: $V_{GS\ (off)} < V_{th} < V_{GS\ (on)}$)
Please take this into consideration for using the device.

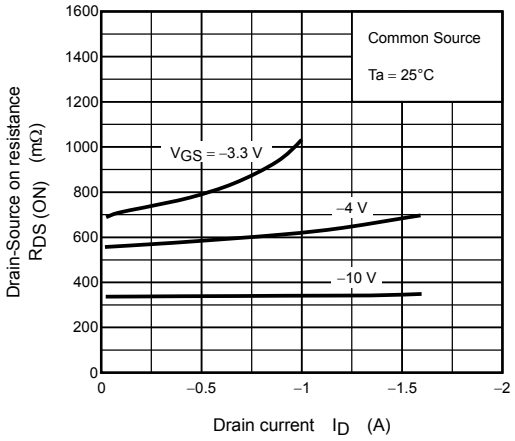
$I_D - V_{DS}$



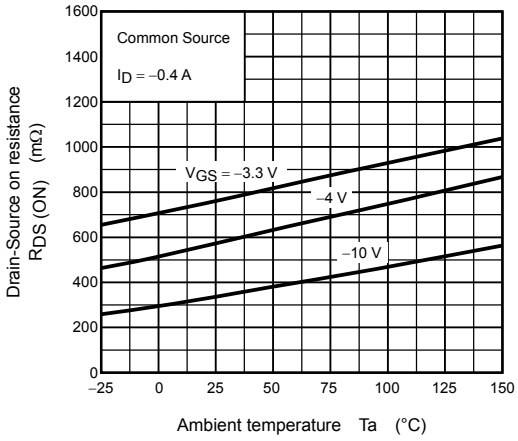
$I_D - V_{GS}$



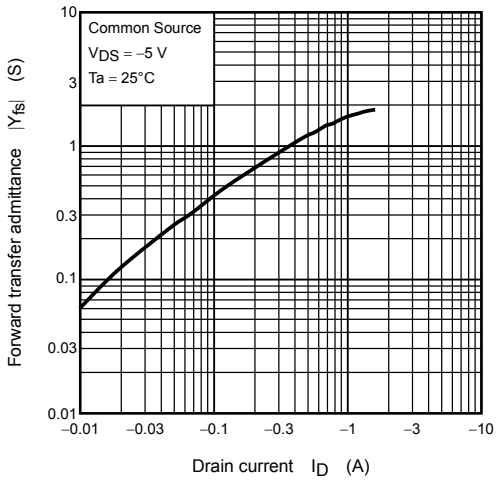
$R_{DS\ (ON)} - I_D$



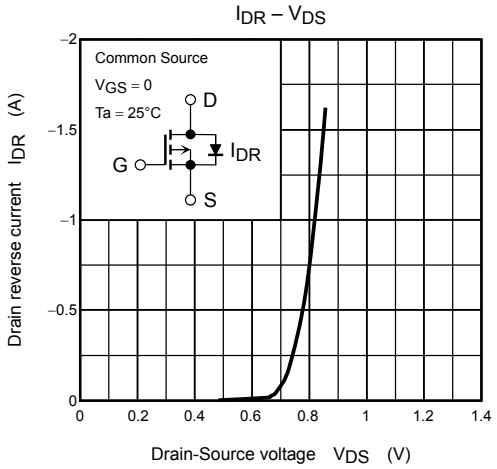
$R_{DS\ (ON)} - Ta$



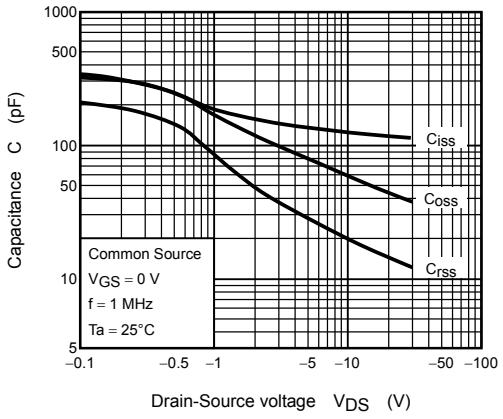
$|Y_{fs}| - I_D$



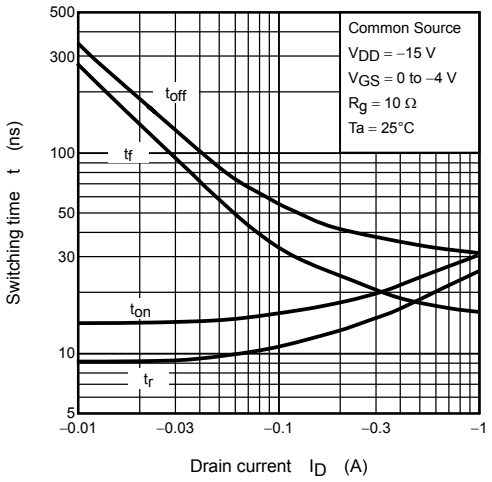
$I_{DR} - V_{DS}$



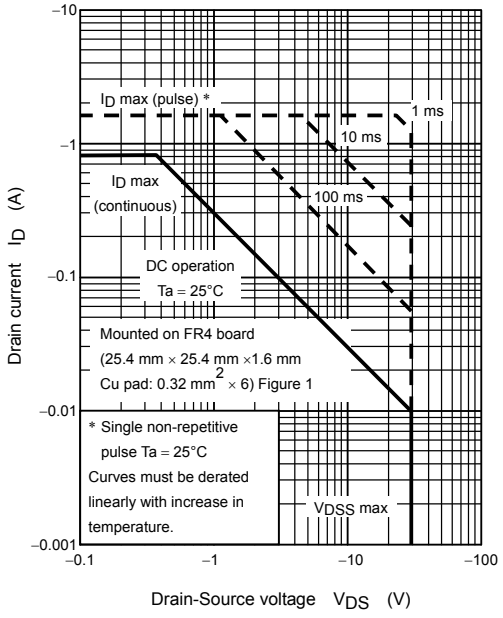
C – V_{DS}



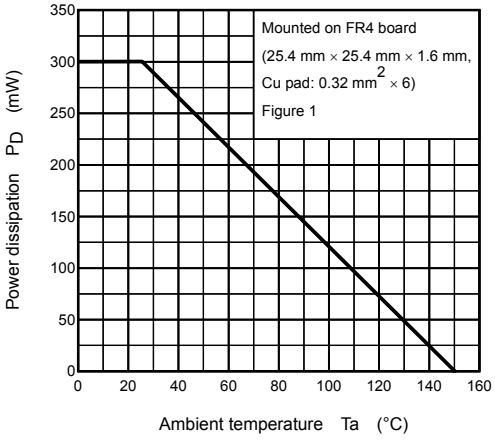
t – I_D



Safe Operating Area



P_D – Ta



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