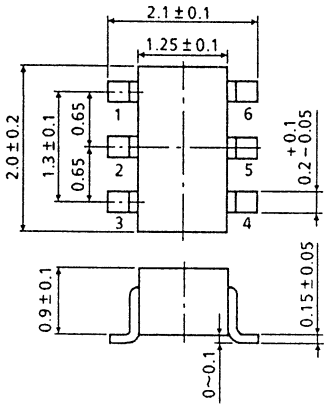
TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (U-MOSII)

SSM6K08FU

High-Speed Switching Applications

- Small package
- Low ON-resistance: $R_{DS(ON)}$ = 105 mΩ (max) (@V_{GS} = 4 V)
  $R_{DS(ON)}$ = 140 mΩ (max) (@V_{GS} = 2.5 V)
- High-speed switching: t_{on} = 16 ns (typ.)
  t_{off} = 15 ns (typ.)

Unit: mm



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

US6	
JEDEC	—
JEITA	—
TOSHIBA	2-2J1D

Weight: 6.8 mg (typ.)

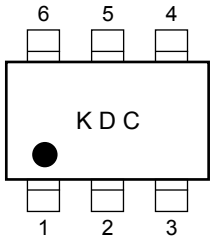
Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DS}	20	V
Gate-source voltage		V_{GSS}	±12	V
Drain current	DC	I_D	1.6	A
	Pulse	I_{DP}	3.2	
Power dissipation		P_D (Note 1)	300	mW
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

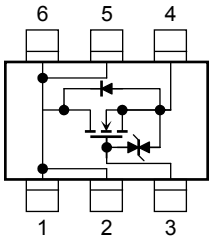
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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) Figure 1.

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 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.

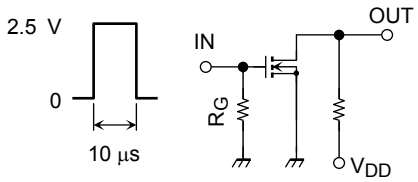
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±12 V, V_{DS} = 0	—	—	±1	μA
Drain-source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 1 mA, V_{GS} = 0	20	—	—	V
		$V_{(BR)\ DSX}$	I_D = 1 mA, V_{GS} = −12 V	12	—	—	
Drain cut-off current		I_{DSS}	V_{DS} = 20 V, V_{GS} = 0	—	—	1	μA
Gate threshold voltage		V_{th}	V_{DS} = 3 V, I_D = 0.1 mA	0.5	—	1.2	V
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 3 V, I_D = 0.8 A (Note2)	2.0	—	—	S
Drain-Source ON resistance		$R_{DS\ (ON)}$	I_D = 0.8 A, V_{GS} = 4 V (Note2)	—	77	105	mΩ
			I_D = 0.8 A, V_{GS} = 2.5 V (Note2)	—	100	140	
			I_D = 0.8 A, V_{GS} = 2.0 V (Note2)	—	125	210	
Input capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz	—	306	—	pF
Reverse transfer capacitance		C_{rss}	V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz	—	44	—	pF
Output capacitance		C_{oss}	V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz	—	74	—	pF
Switching time	Turn-on time	t_{on}	V_{DD} = 10 V, I_D = 0.8 A,	—	16	—	ns
	Turn-off time	t_{off}	V_{GS} = 0 to 2.5 V, R_G = 4.7 Ω	—	15	—	

Note2: Pulse test

Switching Time Test Circuit

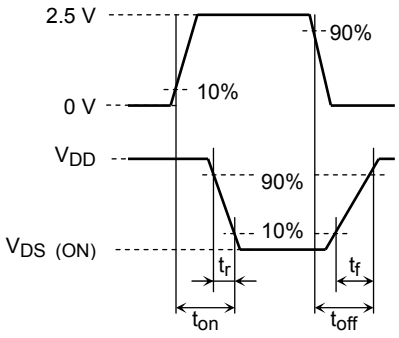
(a) Test Circuit



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}

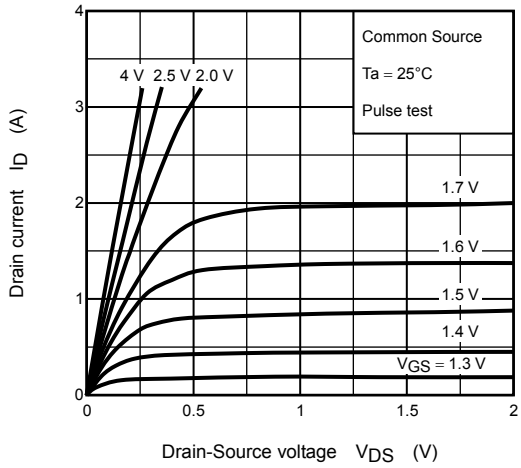
(c) V_{OUT}



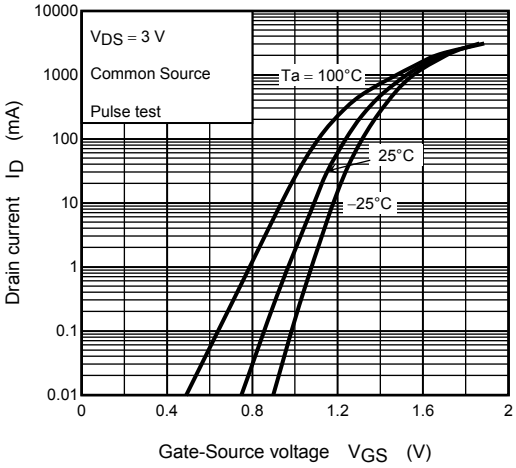
Precaution

V_{th} can be expressed as 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 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.

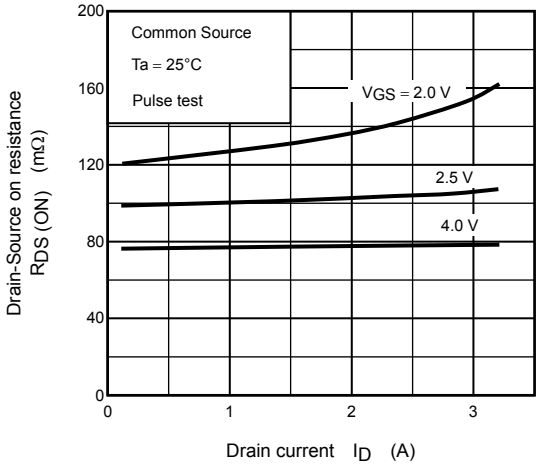
$I_D - V_{DS}$



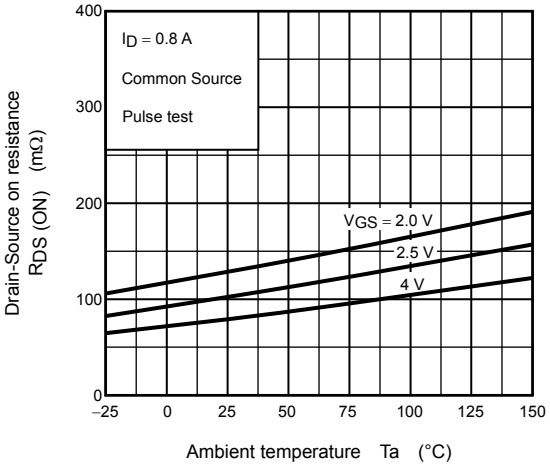
$I_D - V_{GS}$



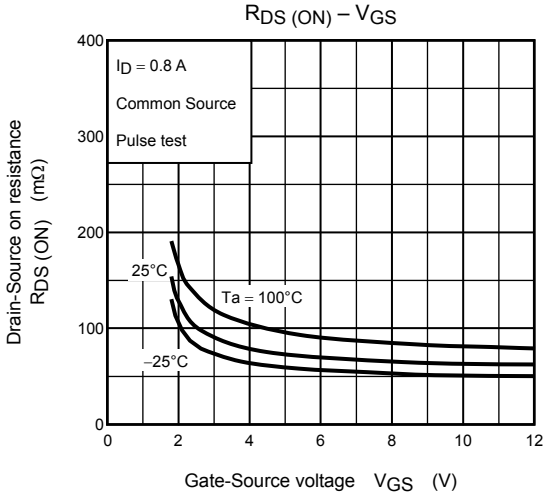
$R_{DS\ (ON)} - I_D$



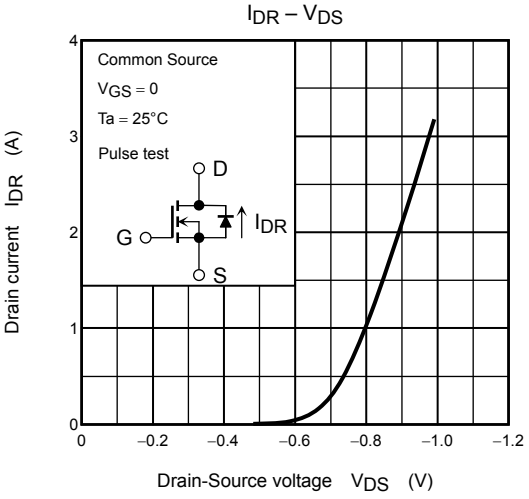
$R_{DS\ (ON)} - Ta$



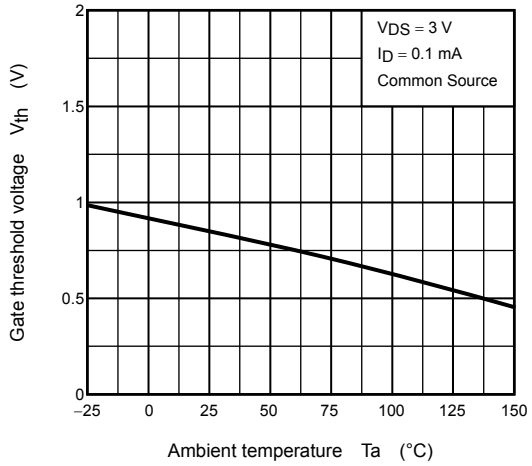
$R_{DS\ (ON)} - V_{GS}$



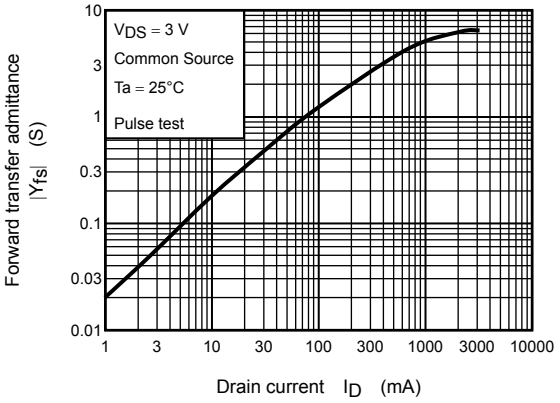
$I_{DR} - V_{DS}$



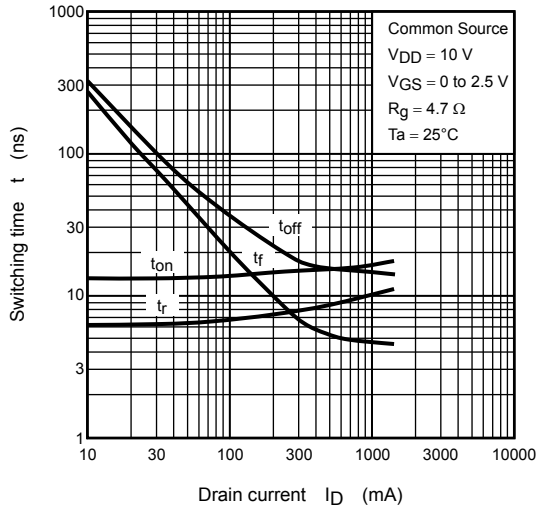
V_{th} – Ta



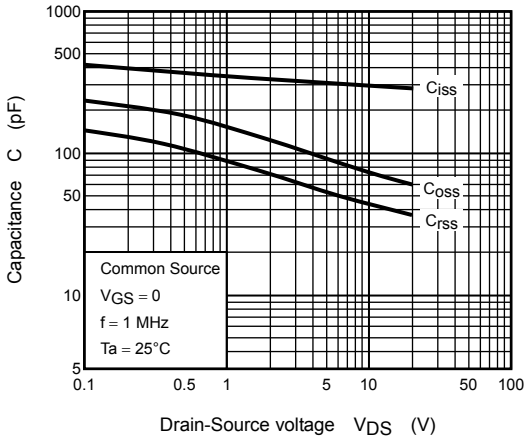
$|Y_{fs}|$ – I_D



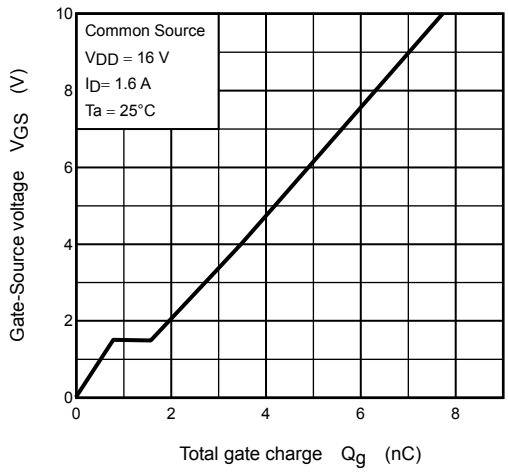
Switching Time



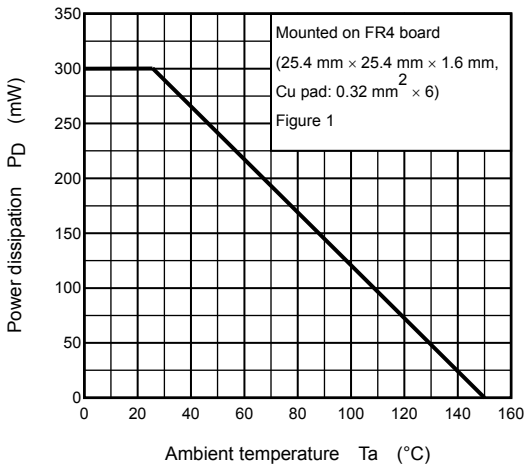
C – V_{DS}

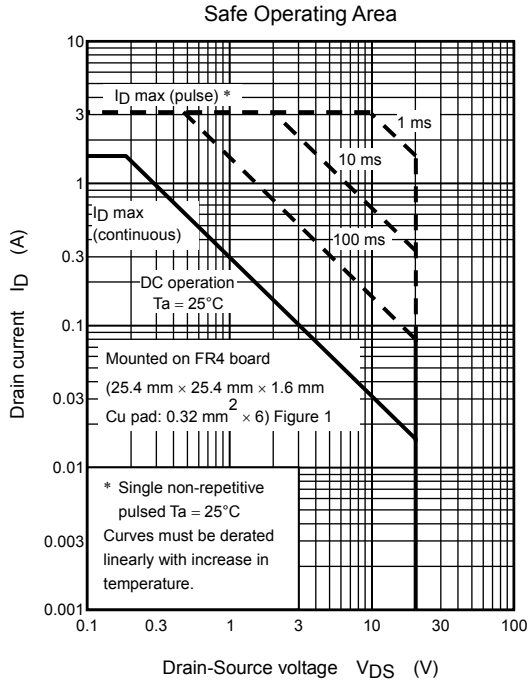


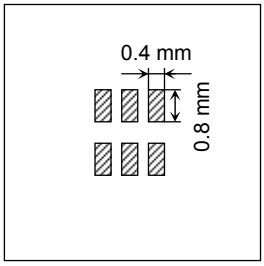
Dynamic Input Characteristic



P_D – Ta







25.4 mm × 25.4 mm × 1.6 mm,
Cu Pad: 0.32 mm² × 6

Figure 1

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