TOSHIBA Field Effect Transistor Silicon P Channel MOS Type(π-MOSVI)

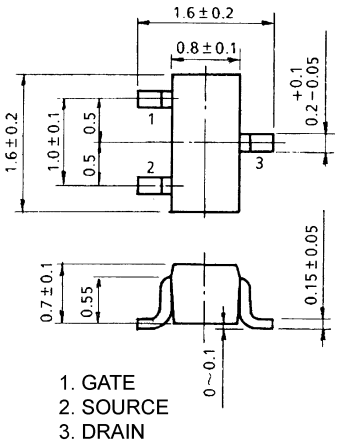
SSM3J16FS

High Speed Switching Applications

Analog Switch Applications

- Small package
- Low on-resistance : $R_{DS(ON)}$ = 8 Ω (max) (@V_{GS} = −4 V)
  : $R_{DS(ON)}$ = 12 Ω (max) (@V_{GS} = −2.5 V)
  : $R_{DS(ON)}$ = 45 Ω (max) (@V_{GS} = −1.5 V)

Unit: mm



SSM

JEDEC	—
JEITA	—
TOSHIBA	2-2H1B

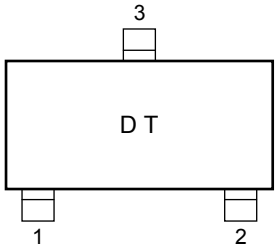
Weight: 2.4 mg (typ.)

Absolute Maximum Ratings (Ta = 25°C)

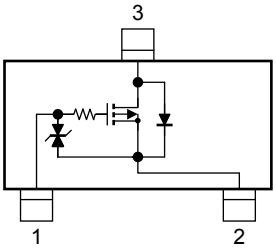
Characteristics		Symbol	Rating	Unit
Drain-Source voltage		V_{DSS}	−20	V
Gate-Source voltage		V_{GSS}	±10	V
Drain current	DC	I_D	−100	mA
	Pulse	I_{DP}	−200	
Power dissipation		P_D	100	mW
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

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).

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.

Start of commercial production
2002-01

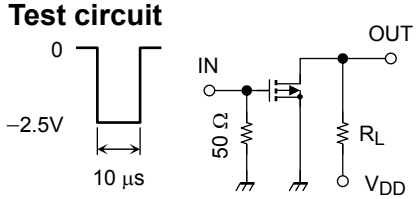
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	MIN.	TYP.	MAX.	UNIT
Gate leakage current		I_{GSS}	V_{GS} = ±10 V, V_{DS} = 0	—	—	±1	μA
Drain-Source breakdown voltage		$V_{(BR)\ DSS}$	I_D = −0.1 mA, V_{GS} = 0	−20	—	—	V
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	−0.6	—	−1.1	V
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = −3 V, I_D = −10 mA (Note1)	25	—	—	mS
Drain-Source on-resistance		$R_{DS\ (ON)}$	I_D = −10 mA, V_{GS} = −4 V (Note1)	—	6	8	Ω
			I_D = −10 mA, V_{GS} = −2.5 V (Note1)	—	8	12	
			I_D = −1 mA, V_{GS} = −1.5 V (Note1)	—	18	45	
Input capacitance		C_{iss}	V_{DS} = −3 V, V_{GS} = 0, f = 1 MHz	—	11	—	pF
Reverse transfer capacitance		C_{rss}		—	3.7	—	pF
Output capacitance		C_{oss}		—	10	—	pF
Switching time	Turn-on time	t_{on}	V_{DD} = −3 V, I_D = − 10 mA, V_{GS} = 0 to −2.5 V	—	130	—	ns
	Turn-off time	t_{off}		—	190	—	

Note1: Pulse test

Switching Time Test Circuit

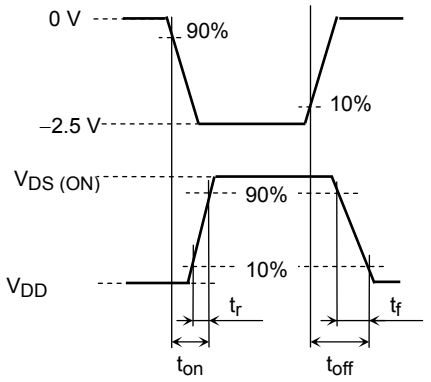
(a) Test circuit



V_{DD} = −3 V
Duty ≤ 1%
V_{IN}: t_r, t_f < 5 ns
(Z_{out} = 50 Ω)
Common Source
Ta = 25°C

(b) V_{IN}

(c) V_{OUT}

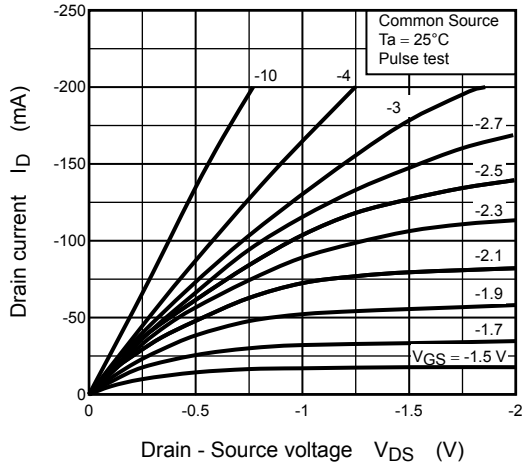


Precaution

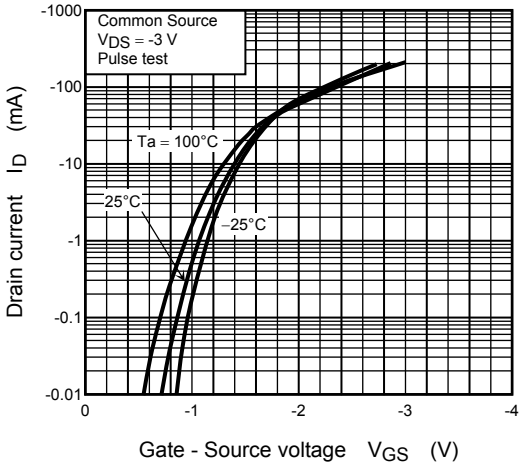
V_{th} can be expressed as the voltage between the gate and source when the low operating current value is I_D = - 0.1 mA for this product. For normal switching operation, $V_{GS\ (on)}$ requires a higher voltage than V_{th} and $V_{GS\ (off)}$ requires a lower voltage than V_{th}. (The relationship can be established as follows: $V_{GS\ (off)} < V_{th} < V_{GS\ (on)}$.)

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

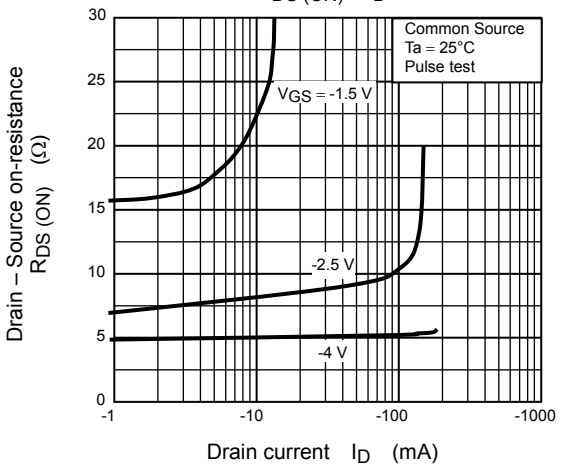
$I_D - V_{DS}$



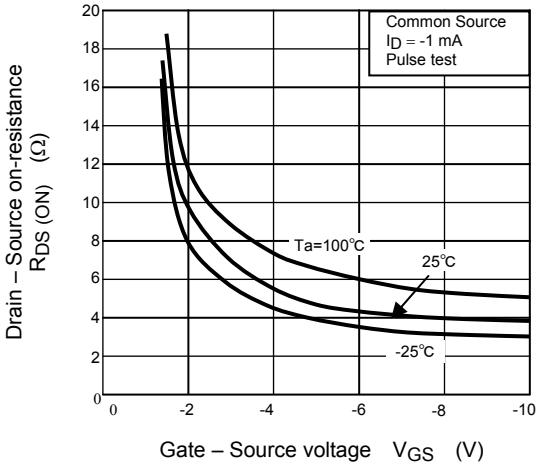
$I_D - V_{GS}$



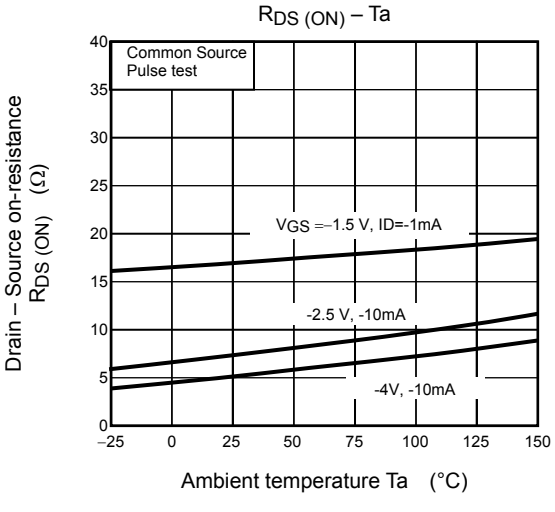
$R_{DS\ (ON)} - I_D$



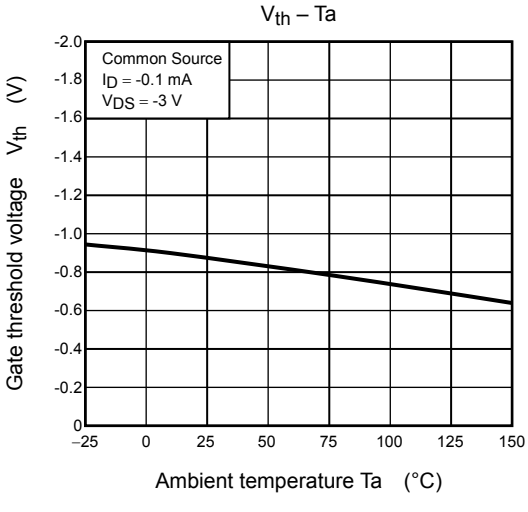
$R_{DS\ (ON)} - V_{GS}$



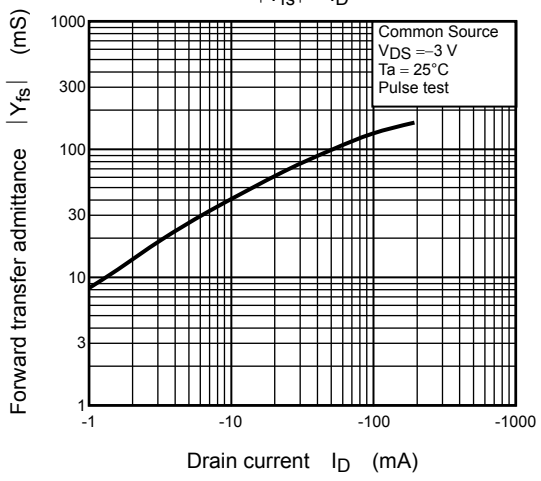
$R_{DS\ (ON)} - Ta$



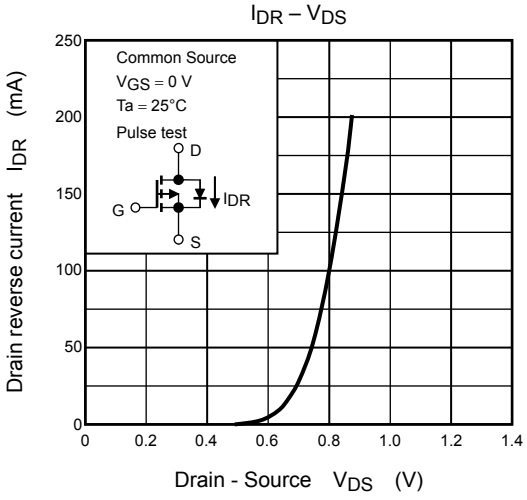
$V_{th} - Ta$



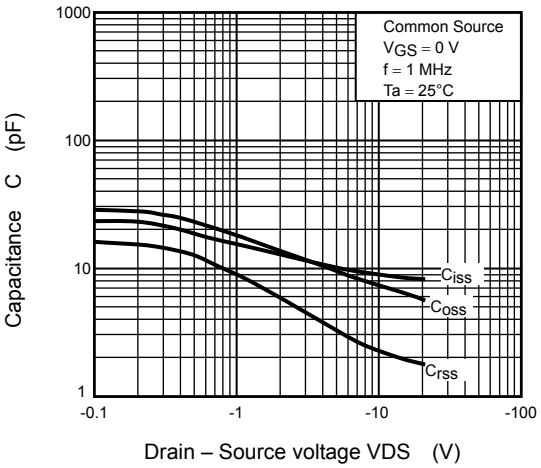
$|Y_{fs}| - I_D$



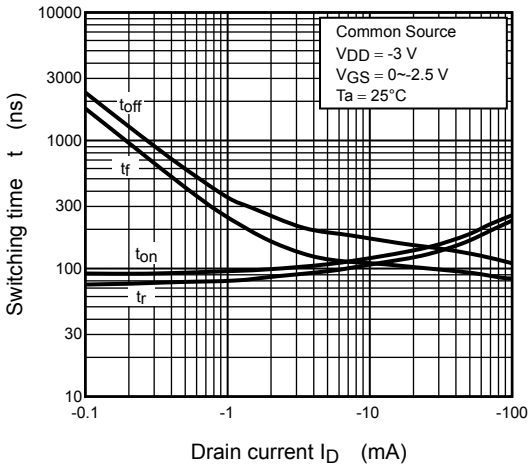
$I_{DR} - V_{DS}$



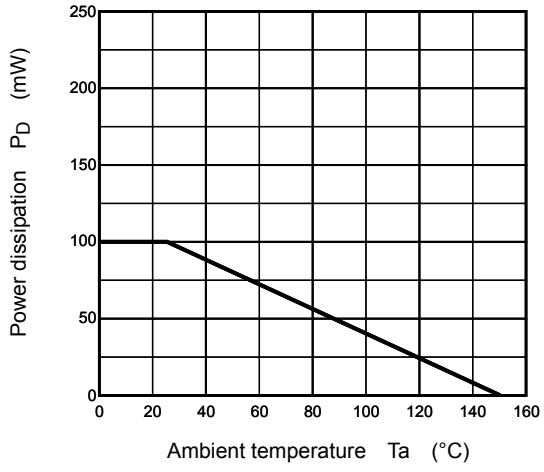
$C - V_{DS}$



$t - I_D$



$P_D - Ta$



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