TOSHIBA Field Effect Transistor Silicon P Channel MOS Type

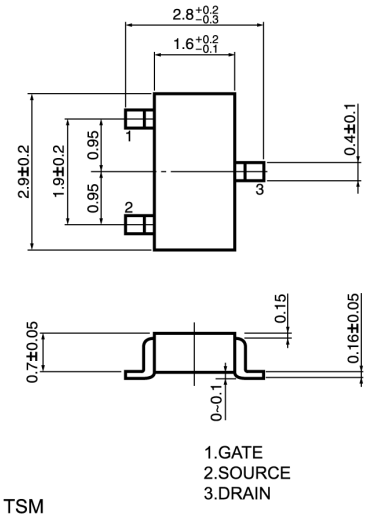
SSM3J02T

Power Management Switch

High Speed Switching Applications

- Component package suitable for high-density mounting
- Small Package
- Low ON Resistance : R_{on} = 0.5 Ω (max) (@V_{GS} = −4 V)
  : R_{on} = 0.7 Ω (max) (@V_{GS} = −2.5 V)
- Low-voltage operation possible

Unit: mm



TSM

JEDEC	—
JEITA	—
TOSHIBA	2-3S1A

Weight: 10 mg (typ.)

Maximum Ratings (Ta = 25°C)

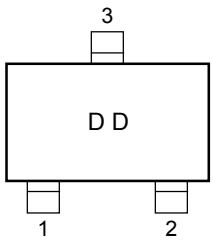
Characteristic		Symbol	Rating	Unit
Drain-Source voltage		V_{DS}	−30	V
Gate-Source voltage		V_{GSS}	±10	V
Drain current	DC	I_D	−1.5	A
	Pulse	I_{DP} (Note2)	−3.0	
Drain power dissipation (Ta = 25°C)		P_D (Note1)	1250	mW
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

Note1: Mounted on FR4 board

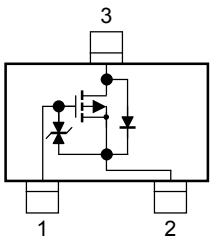
(25.4 mm × 25.4 mm × 1.6 t, Cu pad: 645 mm2, t = 10 s)

Note2: The pulse width limited by max channel temperature.

Marking



Equivalent Circuit



Handling Precaution

When handling individual devices (which are not yet mounted 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.

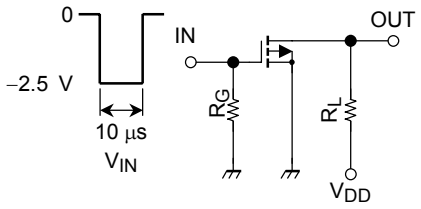
Electrical Characteristics (Ta = 25°C)

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 = −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} = −3 V, I_D = −0.1 mA	−0.6	—	−1.1	V
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = −3 V, I_D = −0.3 A (Note3)	0.6	—	—	S
Drain-Source ON resistance		$R_{DS\ (ON)}$	I_D = −0.3 A, V_{GS} = −4 V (Note3)	—	0.4	0.5	Ω
			I_D = −0.3 A, V_{GS} = −2.5 V (Note3)	—	0.55	0.7	
Input capacitance		C_{iss}	V_{DS} = −10 V, V_{GS} = 0, f = 1 MHz	—	150	—	pF
Reverse transfer capacitance		C_{rss}	V_{DS} = −10 V, V_{GS} = 0, f = 1 MHz	—	21	—	pF
Output capacitance		C_{oss}	V_{DS} = −10 V, V_{GS} = 0, f = 1 MHz	—	61	—	pF
Switching time	Turn-on time	t_{on}	V_{DD} = −15 V, I_D = −0.3 A, V_{GS} = 0 to −2.5 V, R_G = 4.7 Ω	—	55	—	ns
	Turn-off time	t_{off}		—	52	—	

Note3: Pulse test

Switching Time Test Circuit

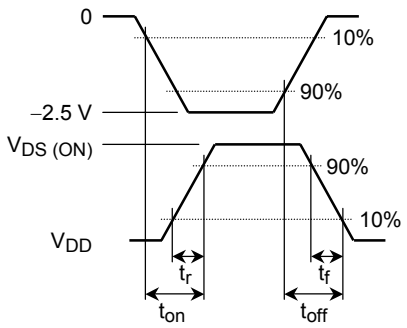
(a) Test circuit



V_{DD} = −15 V
R_G = 4.7 Ω
D.U. ≦ 1%
V_{IN}: t_r, t_f < 5 ns
COMMON SOURCE
Ta = 25°C

(b) V_{IN}
V_{GS}

(c) V_{OUT}
V_{DS}



Precaution

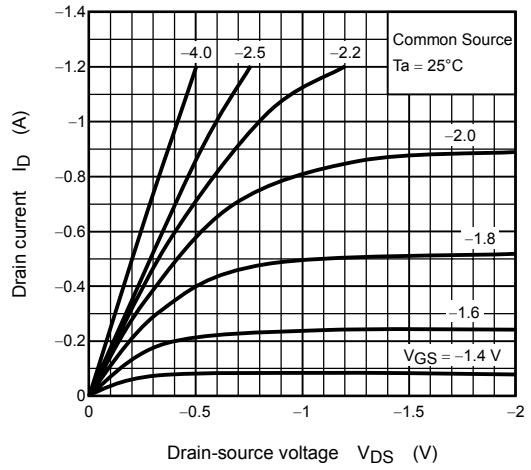
V_{th} can be expressed as voltage between gate and source when low operating current value is I_D = −100 μA for this product. For normal switching operation, $V_{GS\ (on)}$ requires higher voltage than V_{th} and $V_{GS\ (off)}$ requires lower voltage than V_{th}.

(relationship can be established as follows: $V_{GS\ (off)} < V_{th} < V_{GS\ (on)}$)

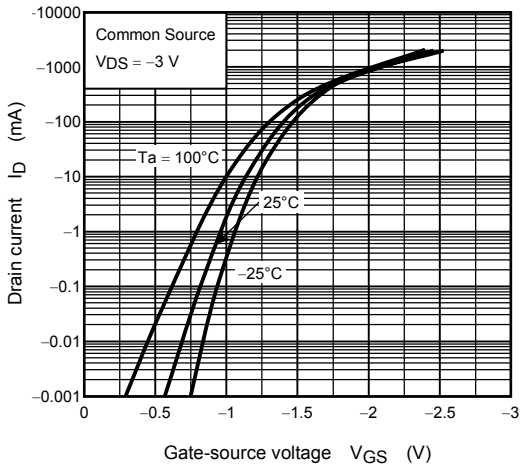
Please take this into consideration for using the device.

V_{GS} recommended voltage of −2.5 V or higher to turn on this product.

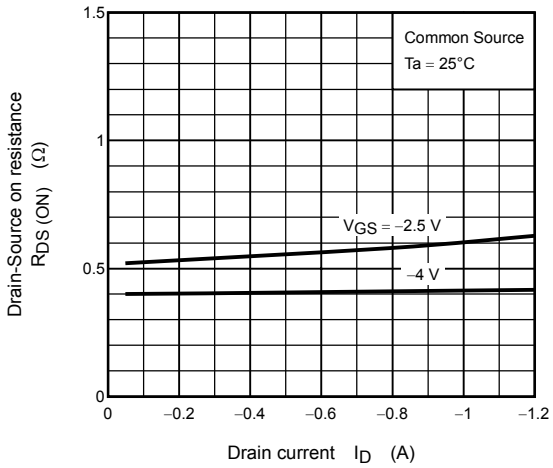
$I_D - V_{DS}$



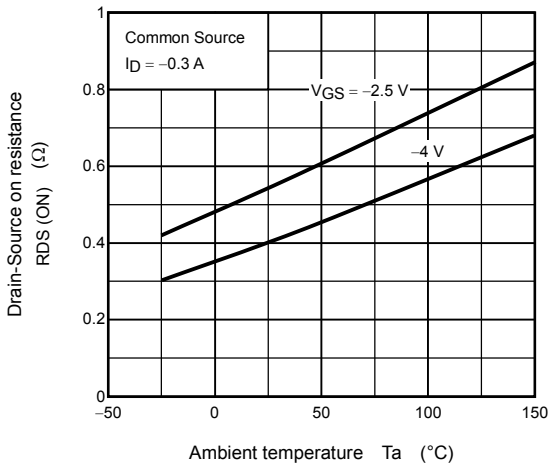
$I_D - V_{GS}$



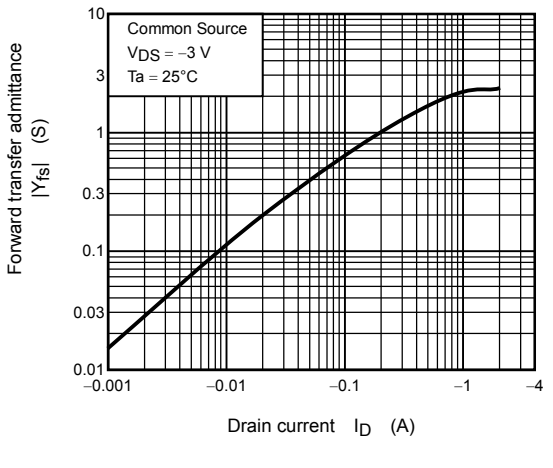
$R_{DS\ (ON)} - I_D$



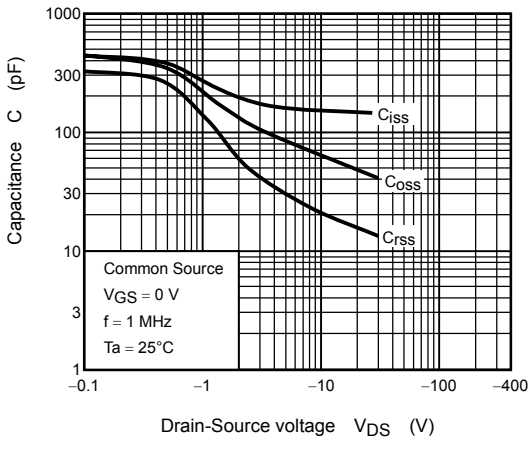
$R_{DS\ (ON)} - Ta$



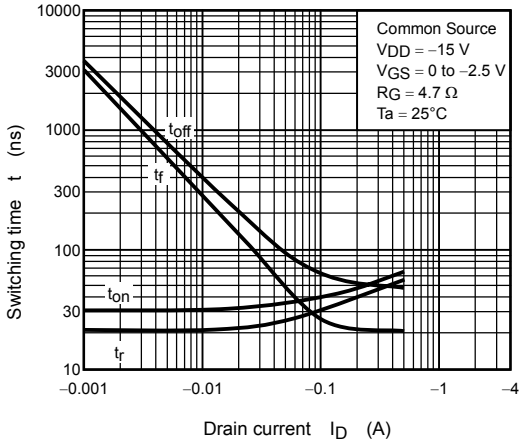
$|Y_{fs}| - I_D$



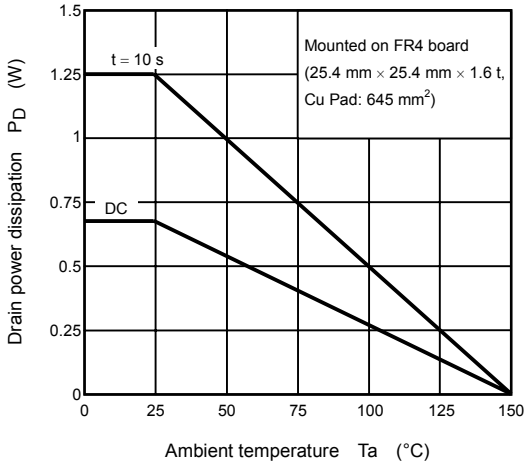
$C - V_{DS}$



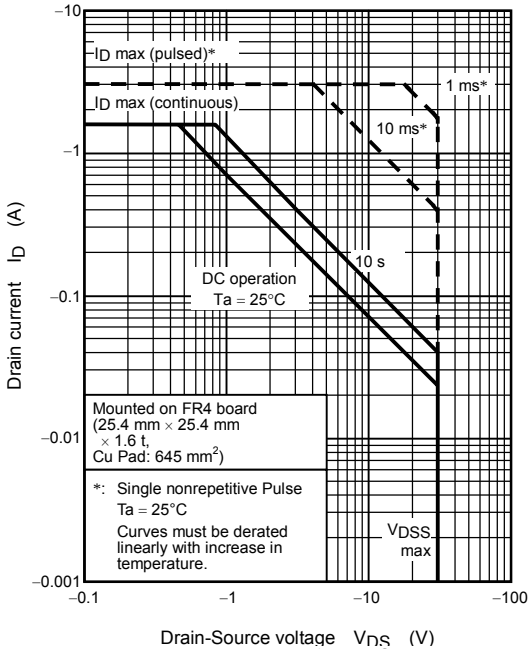
$t - I_D$



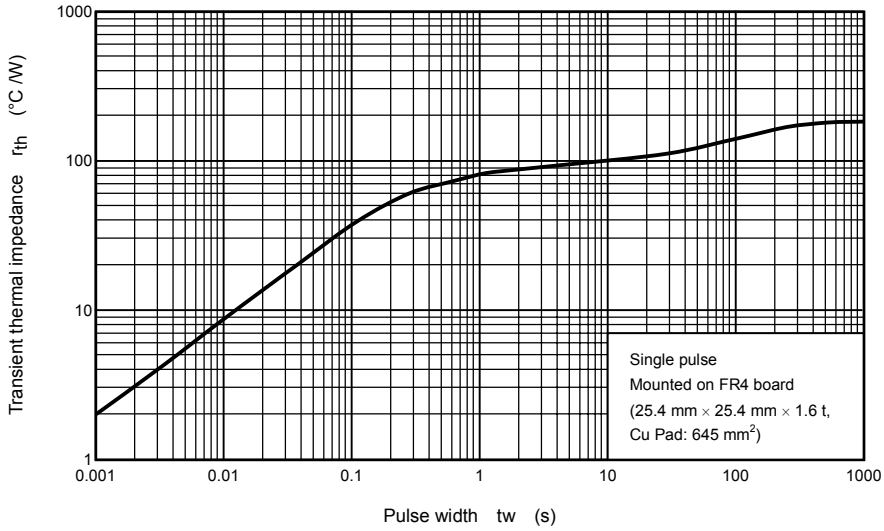
$P_D - Ta$



Safe operating area



$r_{th} - tw$



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