TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type

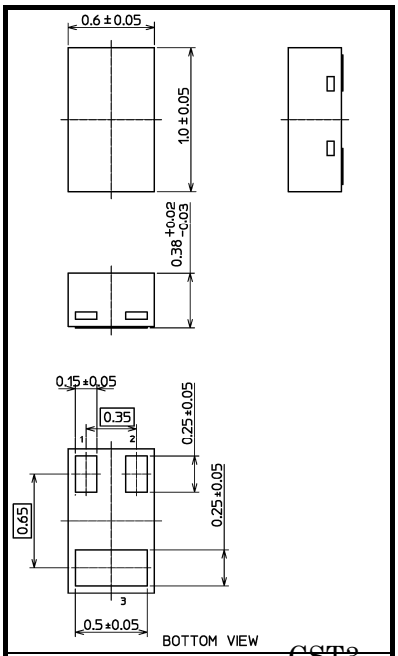
SSM3K16CT

High-Speed Switching Applications

Analog Switch Applications

- Suitable for high-density mounting due to compact package
- Low ON-resistance : R_{on} = 3.0 Ω (max) (@V_{GS} = 4 V)
  : R_{on} = 4.0 Ω (max) (@V_{GS} = 2.5 V)
  : R_{on} = 15 Ω (max) (@V_{GS} = 1.5 V)

Unit: mm



JEDEC	-
JEITA	-
TOSHIBA	2-1J1B

CST3

Weight: 0.75 mg (typ.)

Absolute Maximum Ratings (Ta = 25°C)

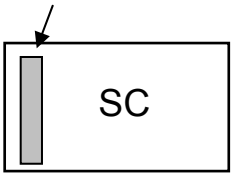
Characteristics		Symbol	Rating	Unit
Drain-Source voltage		V_{DS}	20	V
Gate-Source voltage		V_{GSS}	±10	V
Drain current	DC	I_D	100	mA
	Pulse	I_{DP}	200	
Drain power dissipation (Ta = 25°C)		P_D (Note 1)	100	mW
Channel temperature		T_{ch}	150	°C
Storage temperature		T_{stg}	−55 to 150	°C

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
(10 mm × 10 mm × 1.0 t, Cu Pad: 100 mm^2)

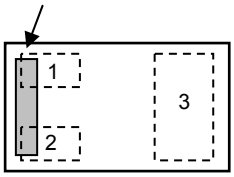
Marking (Top View)

Polarity mark



Pin Condition (Top View)

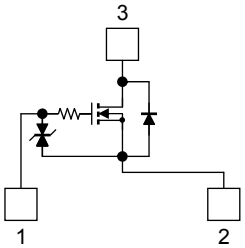
Polarity mark (on the top)



1. Gate
2. Source
3. Drain

*Electrodes: on the bottom

Equivalent Circuit



Handling Precaution

When handling individual devices that are not yet mounted on a circuit board, ensure 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.

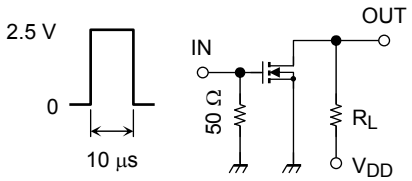
Start of commercial production
2004-08

Electrical Characteristics (Ta = 25°C)

Characteristics		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	40	—	—	mS
Drain-Source ON-resistance		$R_{DS\ (ON)}$	I_D = 10 mA, V_{GS} = 4 V	—	1.5	3.0	Ω
			I_D = 10 mA, V_{GS} = 2.5 V	—	2.2	4.0	
			I_D = 1 mA, V_{GS} = 1.5 V	—	5.2	15	
Input capacitance		C_{iss}	V_{DS} = 3 V, V_{GS} = 0, f = 1 MHz	—	9.3	—	pF
Reverse transfer capacitance		C_{rss}	V_{DS} = 3 V, V_{GS} = 0, f = 1 MHz	—	4.5	—	pF
Output capacitance		C_{oss}	V_{DS} = 3 V, V_{GS} = 0, f = 1 MHz	—	9.8	—	pF
Switching time	Turn-on time	t_{on}	V_{DD} = 3 V, I_D = 10 mA, V_{GS} = 0 to 2.5 V	—	70	—	ns
	Turn-off time	t_{off}		—	125	—	

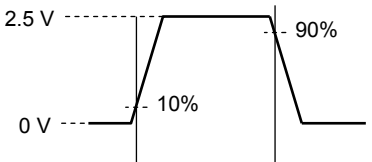
Switching Time Test Circuit

(a) Test circuit

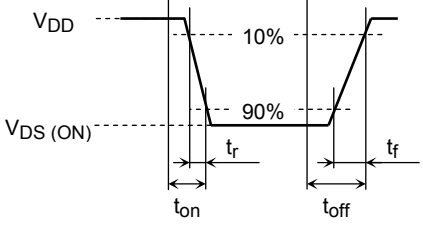


V_{DD} = 3 V
Duty ≤ 1%
V_{IN}: t_r, t_f < 5 ns
(Z_{out} = 50 Ω)
Common Source
Ta = 25°C

(b) V_{IN}



(c) V_{OUT}

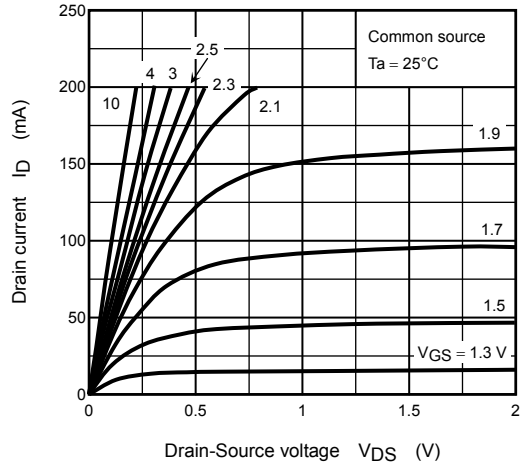


Precaution

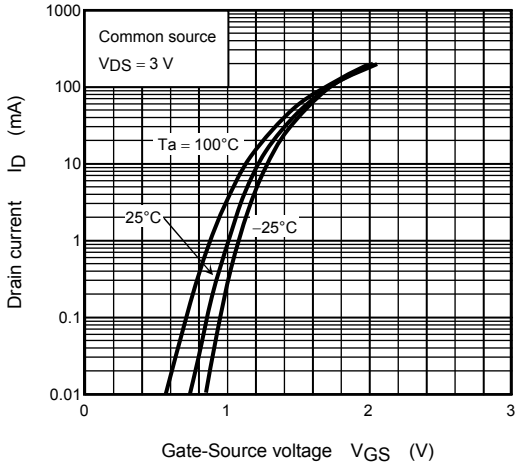
V_{th} can be expressed as the voltage between gate and source when the low operating current value is I_D = 100 μA for this product. For normal switching operation, $V_{GS\ (on)}$ requires a higher voltage than V_{th} and $V_{GS\ (off)}$ requires a lower voltage than V_{th}. (The relationship can be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

Take this into consideration when using the device.

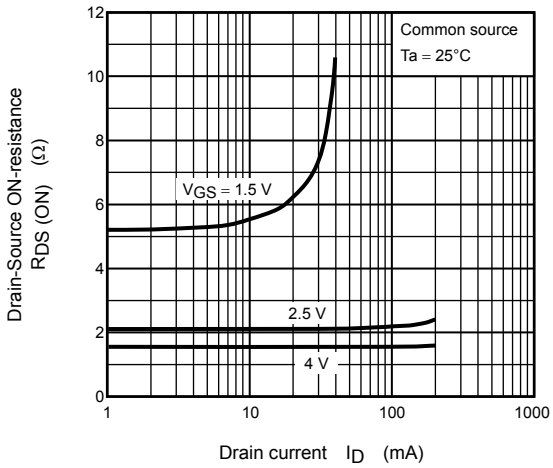
$I_D - V_{DS}$



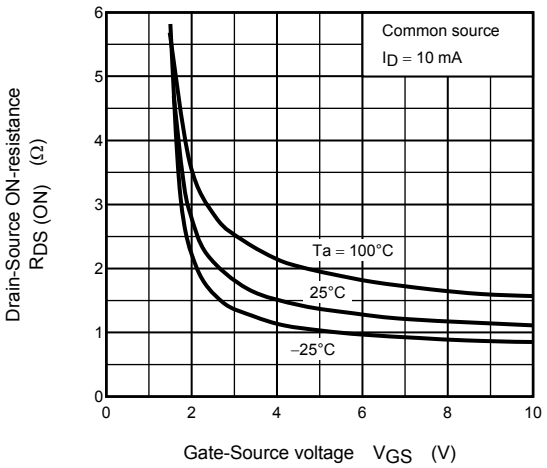
$I_D - V_{GS}$



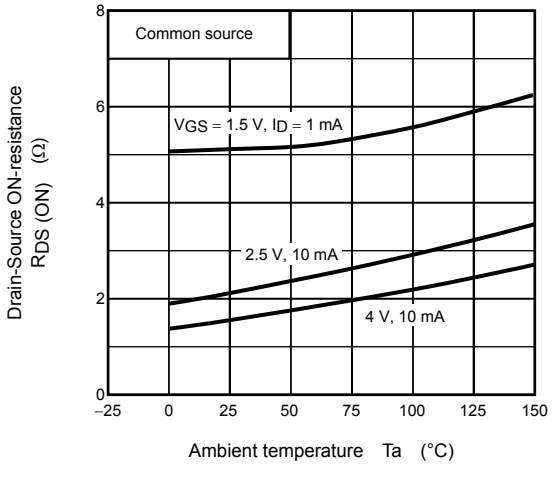
$R_{DS\ (ON)} - I_D$



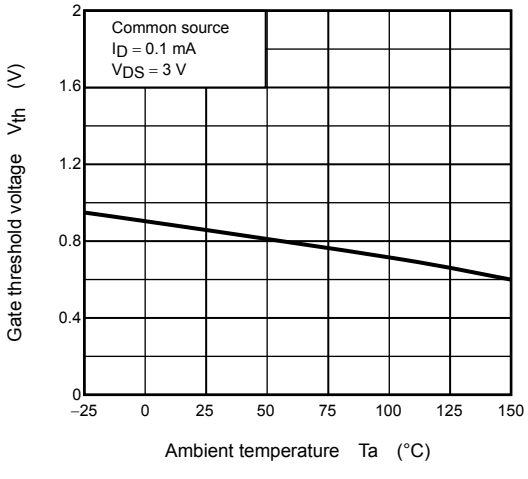
$R_{DS\ (ON)} - V_{GS}$



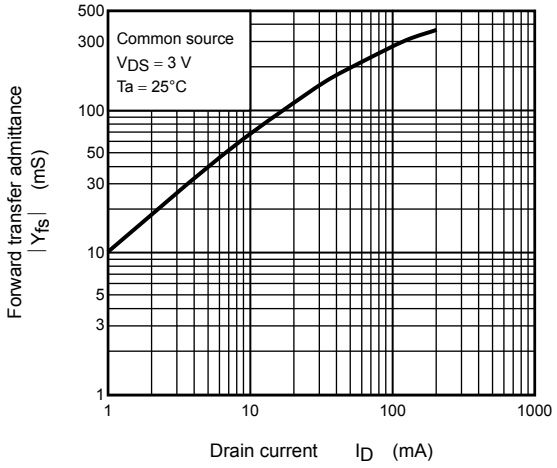
$R_{DS\ (ON)} - Ta$



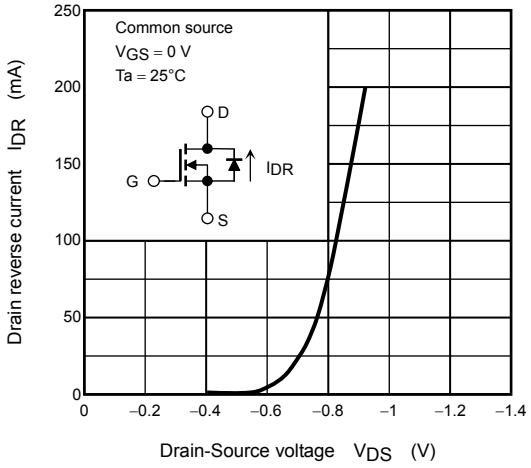
$V_{th} - Ta$



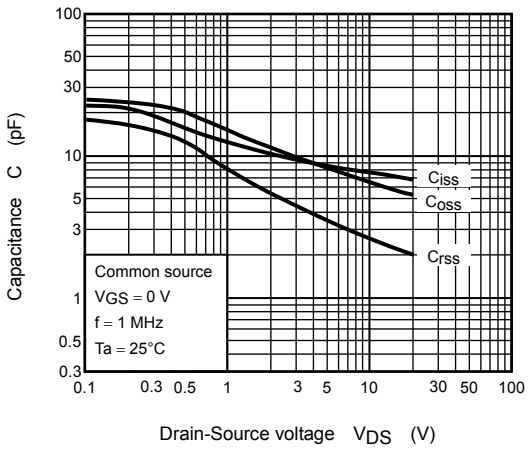
$|Y_{fs}| - I_D$



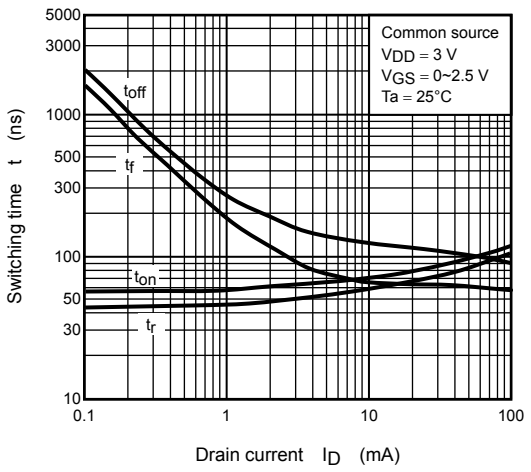
$I_{DR} - V_{DS}$



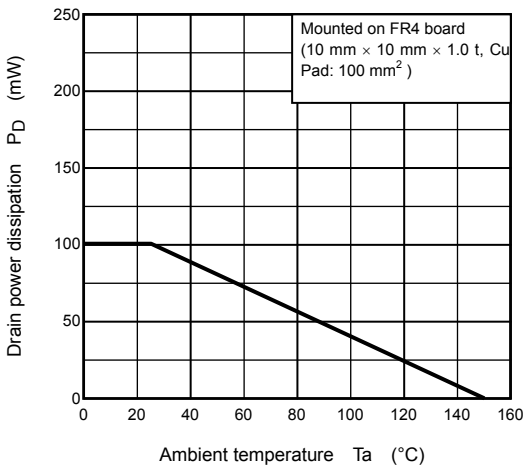
$C - V_{DS}$



$t - I_D$



$P_D - Ta$



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