

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 : $R_{on} = 3.0 \Omega$ (max) (@ $V_{GS} = 4$ V)
- : $R_{on} = 4.0 \Omega$ (max) (@ $V_{GS} = 2.5$ V)
- : $R_{on} = 15 \Omega$ (max) (@ $V_{GS} = 1.5$ V)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

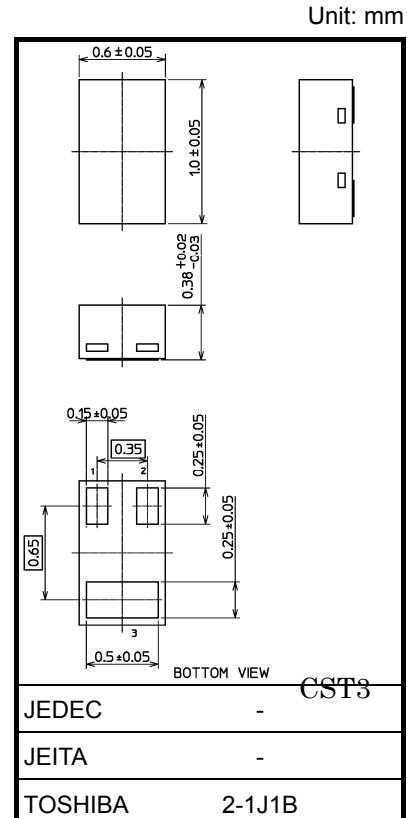
Characteristics	Symbol	Rating	Unit
Drain-Source voltage	V_{DS}	20	V
Gate-Source voltage	V_{GSS}	± 10	V
Drain current	DC	I_D	mA
	Pulse	I_{DP}	
Drain power dissipation ($T_a = 25^\circ\text{C}$)	P_D (Note 1)	100	mW
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to 150	$^\circ\text{C}$

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).

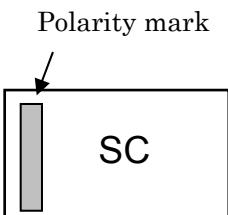
Note 1: Mounted on FR4 board

(10 mm \times 10 mm \times 1.0 t, Cu Pad: 100 mm 2)



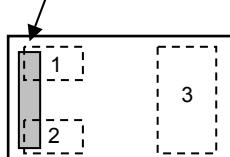
Weight: 0.75 mg (typ.)

Marking (Top View)



Pin Condition (Top View)

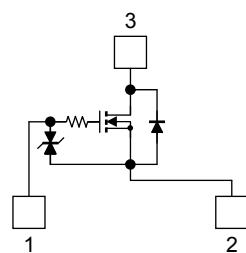
Polarity mark (on the top)



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.

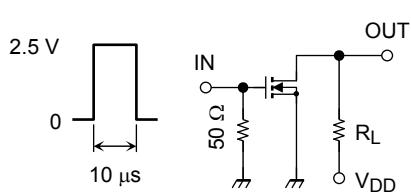
Start of commercial production
2004-08

Electrical Characteristics (Ta = 25°C)

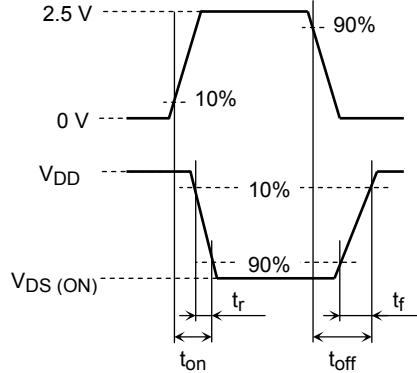
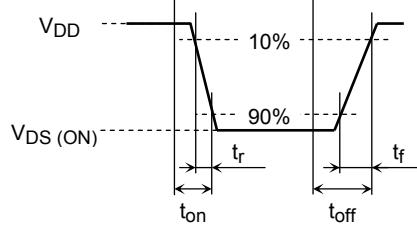
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I _{GSS}	V _{GS} = ±10 V, V _{DS} = 0	—	—	±1	µA
Drain-Source breakdown voltage	V _(BR) DSS	I _D = 0.1 mA, V _{GS} = 0	20	—	—	V
Drain cut-off current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0	—	—	1	µA
Gate threshold voltage	V _{th}	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	—	—	mA
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



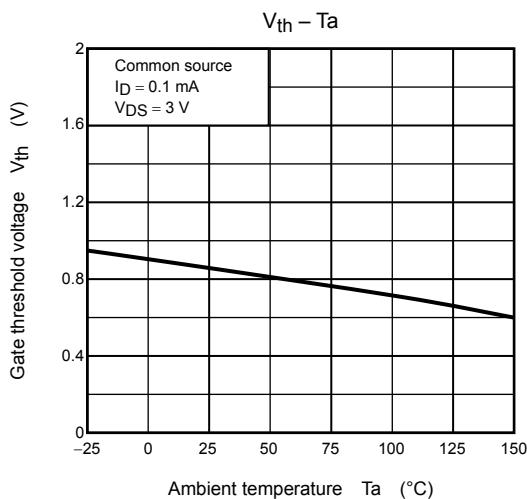
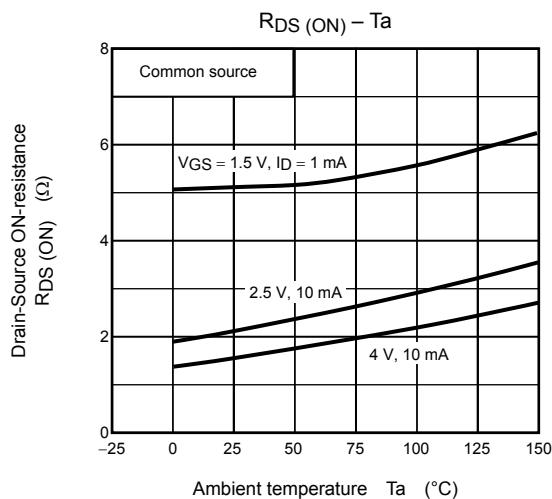
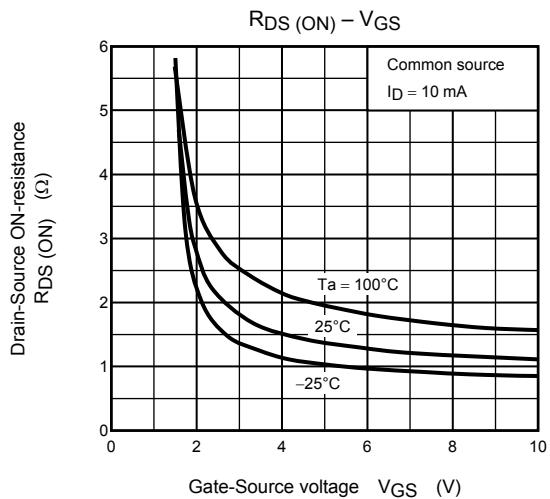
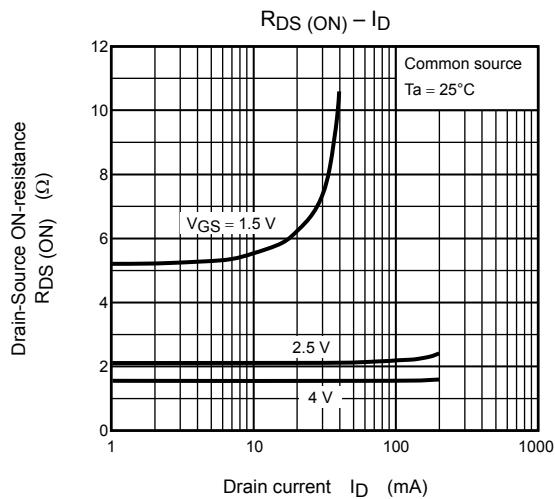
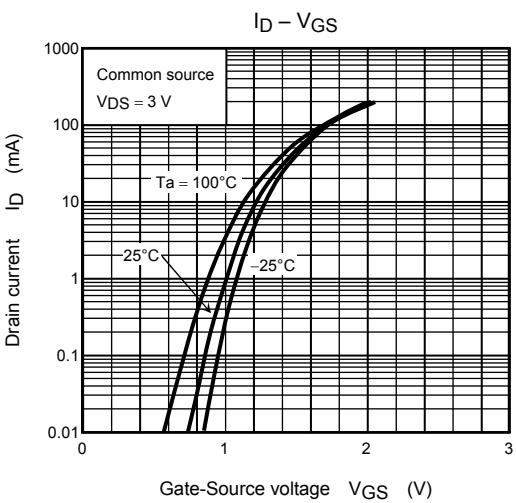
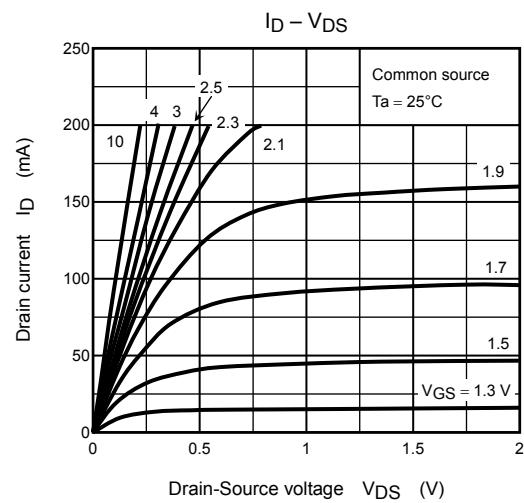
$V_{DD} = 3$ V
 Duty $\leq 1\%$
 V_{IN} : $t_r, t_f < 5$ ns
 $(Z_{out} = 50 \Omega)$
 Common Source
 $T_a = 25^\circ\text{C}$

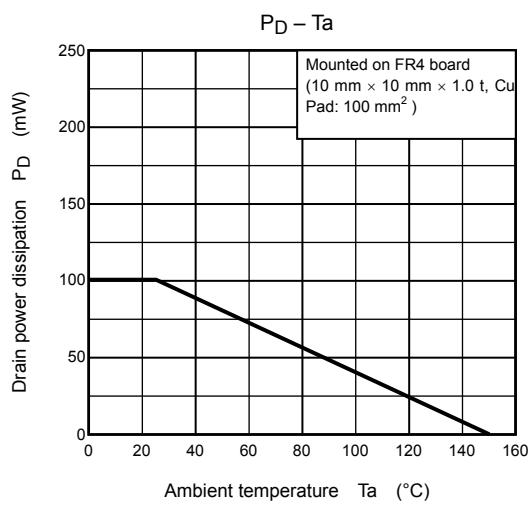
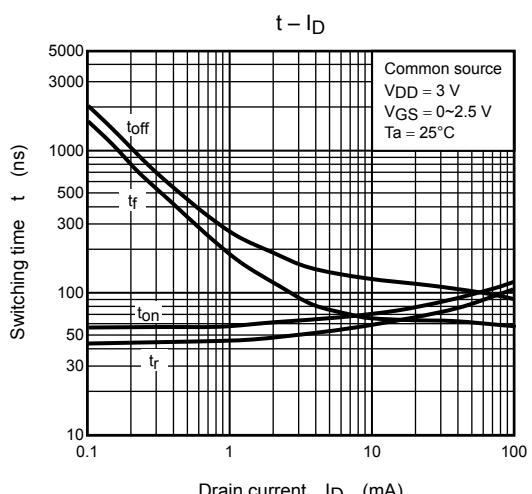
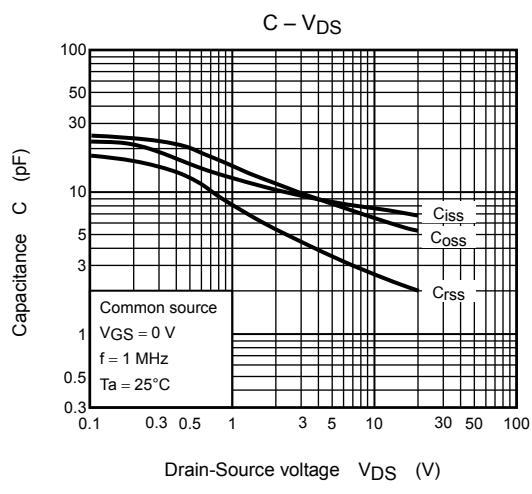
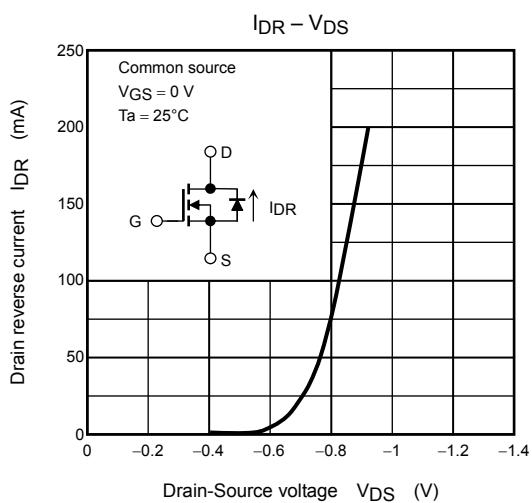
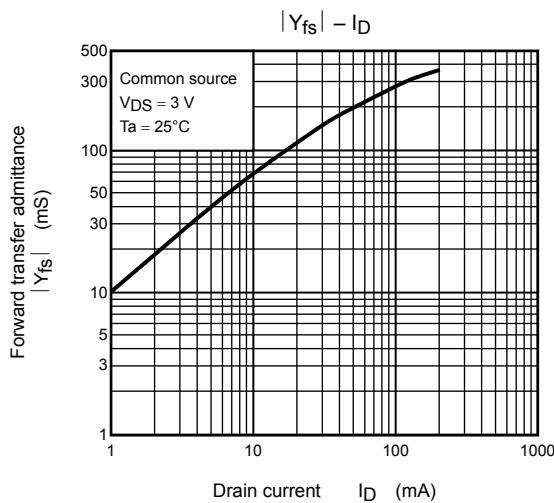
(b) V_{IN} (c) V_{OUT} 

Precaution

V_{th} can be expressed as the voltage between gate and source when the low operating current value is $I_D = 100 \mu\text{A}$ 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.





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