

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type

SSM6N44FU

High Speed Switching Applications

Analog Switching Applications

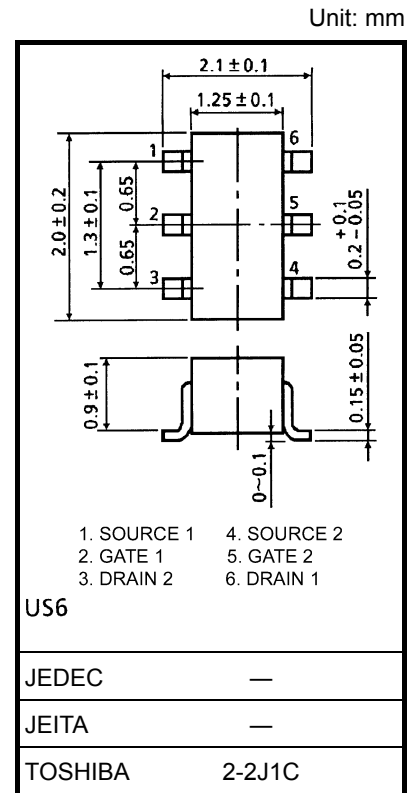
- Compact package suitable for high-density mounting
- Low ON-resistance : $R_{DS(ON)} = 4.0 \Omega$ (max) (@ $V_{GS} = 4 \text{ V}$)
: $R_{DS(ON)} = 7.0 \Omega$ (max) (@ $V_{GS} = 2.5 \text{ V}$)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$) (Q1, Q2 Common)

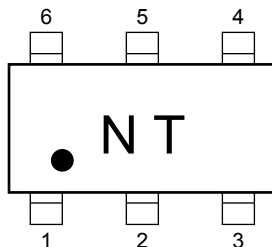
Characteristics		Symbol	Rating	Unit
Drain-Source voltage		V_{DSS}	30	V
Gate-Source voltage		V_{GSS}	± 20	V
Drain current	DC	I_D	100	mA
	Pulse	I_{DP}	200	
Drain power dissipation ($T_a = 25^\circ\text{C}$)		P_D (Note 1)	200	mW
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		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).

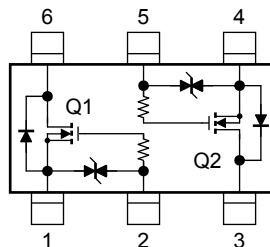
Note 1: Total rating



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.

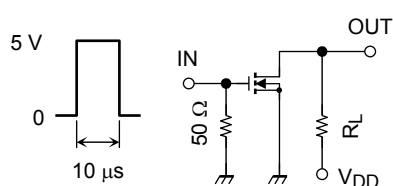
Start of commercial production
2010-01

Electrical Characteristics (Ta = 25°C) (Q1, Q2 Common)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GSS}	$V_{GS} = \pm 14 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 1	μA
Drain-Source breakdown voltage	$V_{(BR)DSS}$	$I_D = 0.1 \text{ mA}, V_{GS} = 0 \text{ V}$	30	—	—	V
Drain cut-off current	I_{DSS}	$V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	1	μA
Gate threshold voltage	V_{th}	$V_{DS} = 3 \text{ V}, I_D = 0.1 \text{ mA}$	0.8	—	1.5	V
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 3 \text{ V}, I_D = 10 \text{ mA}$	25	—	—	mS
Drain-Source ON resistance	$R_{DS(ON)}$	$I_D = 10 \text{ mA}, V_{GS} = 4 \text{ V}$	—	2.2	4.0	Ω
		$I_D = 10 \text{ mA}, V_{GS} = 2.5 \text{ V}$	—	4.0	7.0	
Input capacitance	C_{iss}	$V_{DS} = 3 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	8.5	—	pF
Reverse transfer capacitance	C_{rss}		—	5.3	—	
Output capacitance	C_{oss}		—	9.4	—	
Switching time	Turn-on time	$V_{DD} = 5 \text{ V}, I_D = 10 \text{ mA},$ $V_{GS} = 0 \text{ to } 5 \text{ V}$	—	50	—	ns
	Turn-off time		—	200	—	

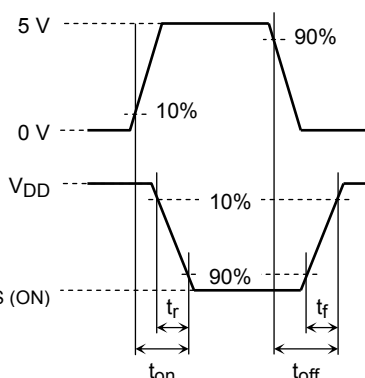
Switching Time Test Circuit

(a) Test circuit

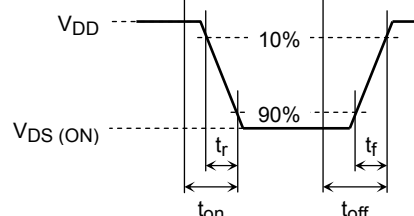


$V_{DD} = 5 \text{ V}$
 Duty $\leq 1\%$
 V_{IN} : $t_r, t_f < 5 \text{ ns}$
 $(Z_{out} = 50 \Omega)$
 Common Source
 $T_a = 25^\circ\text{C}$

(b) V_{IN}



(c) V_{OUT}

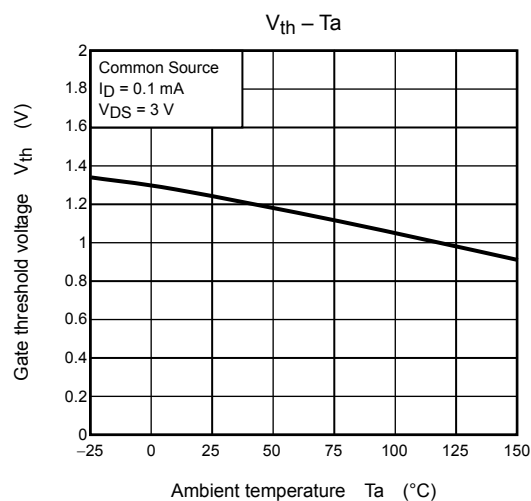
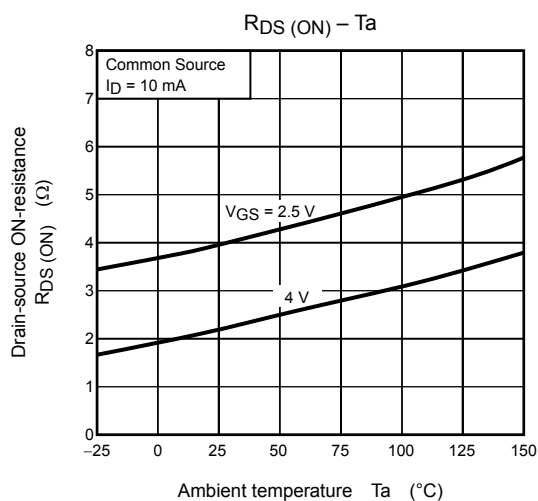
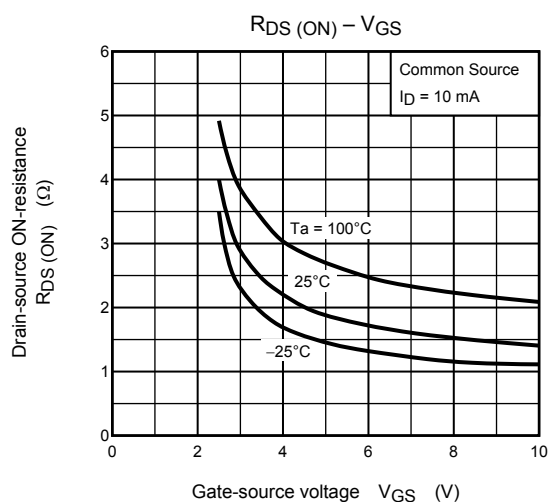
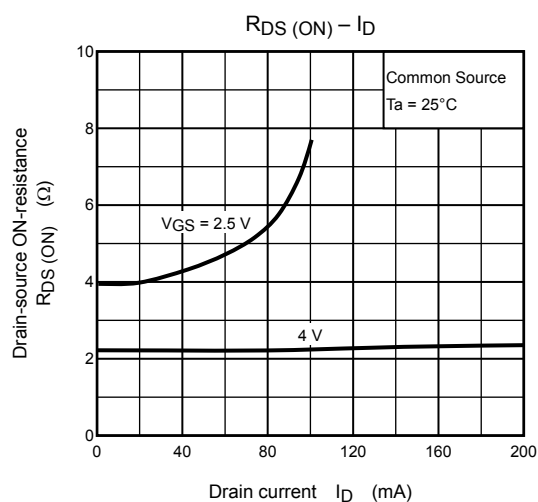
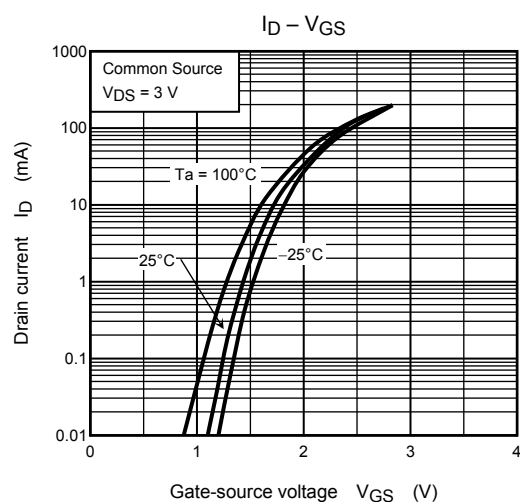
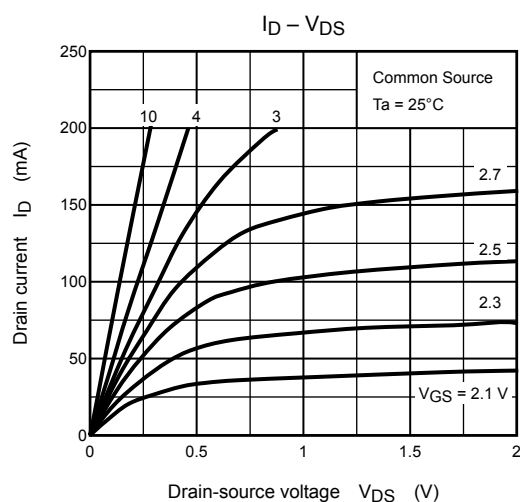


Precaution

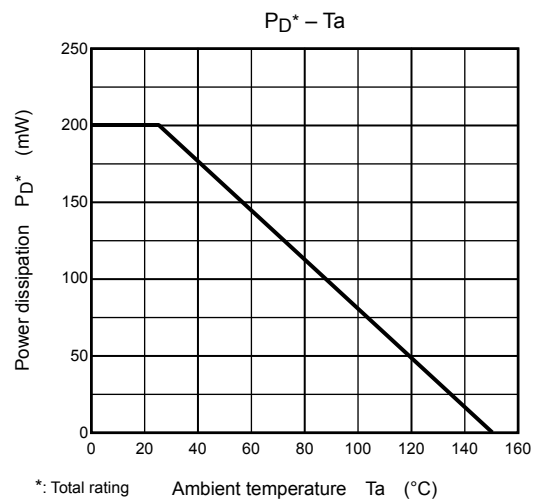
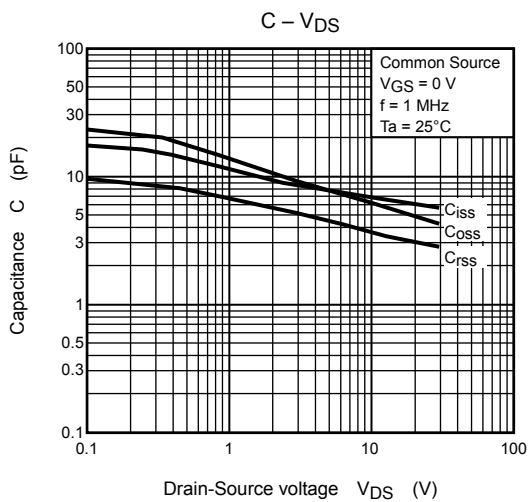
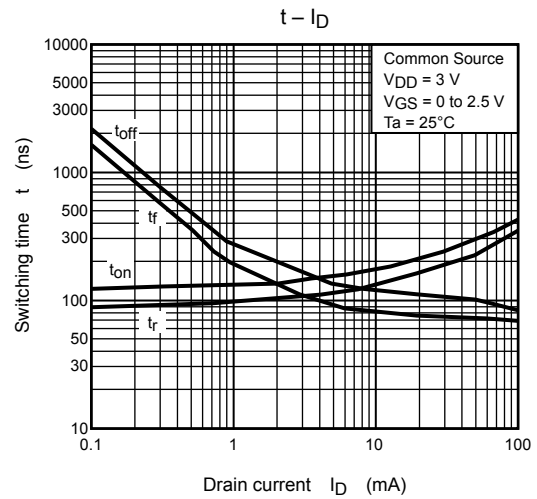
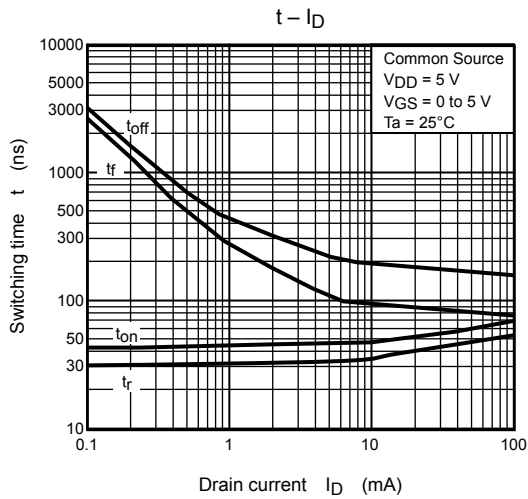
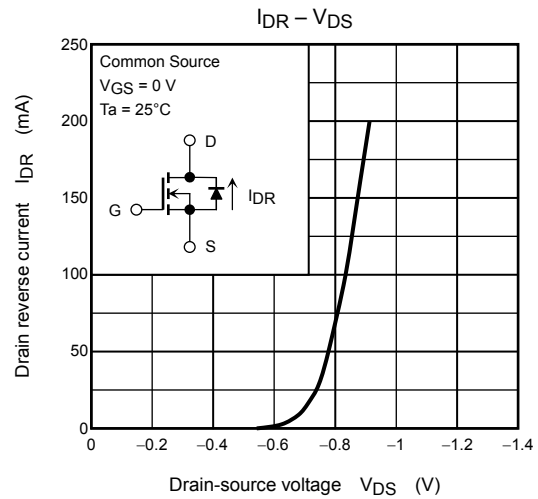
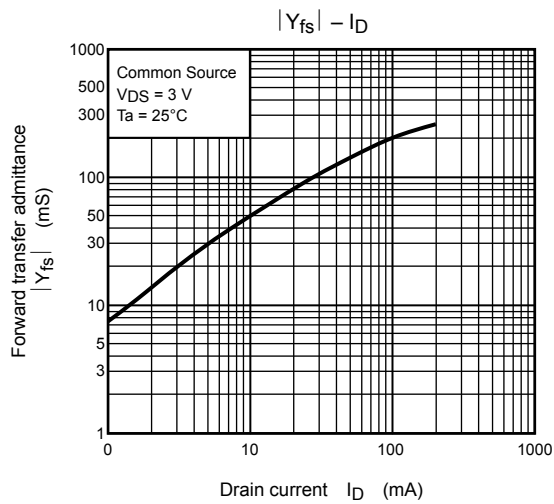
Let V_{th} be the voltage applied between gate and source that causes the drain current (I_D) to be low (0.1mA for the SSM6N44FU). Then, for normal switching operation, $V_{GS(on)}$ must be higher than V_{th} , and $V_{GS(off)}$ must be lower than V_{th} . This relationship can be expressed as: $V_{GS(off)} < V_{th} < V_{GS(on)}$.

Take this into consideration when using the device.

(Q1, Q2 Common)



(Q1, Q2 Common)



*: Total rating

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