

TOSHIBA Field-Effect Transistor Silicon N-Channel MOS Type

SSM6N35FU

- High-Speed Switching Applications
- Analog Switch Applications

- 1.2-V drive
- N-ch 2-in-1
- Low ON-resistance:
 - $R_{DS(ON)} = 20 \Omega$ (max) (@ $V_{GS} = 1.2$ V)
 - $R_{DS(ON)} = 8 \Omega$ (max) (@ $V_{GS} = 1.5$ V)
 - $R_{DS(ON)} = 4 \Omega$ (max) (@ $V_{GS} = 2.5$ V)
 - $R_{DS(ON)} = 3 \Omega$ (max) (@ $V_{GS} = 4.0$ V)

Absolute Maximum Ratings (Ta = 25°C) (Q1, Q2 Common)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DS}	20	V
Gate-source voltage		V_{GSS}	± 10	V
Drain current	DC	I_D	180	mA
	Pulse	I_{DP}	360	
Power dissipation		P_D (Note 1)	200	mW
Channel temperature		T_{ch}	150	°C
Storage temperature		T_{stg}	-55 to 150	°C

Unit: mm

Dimensions (mm):

- Top View: Total width = 2.1 ± 0.1 , Total height = 2.0 ± 0.2 , Gate width = 1.25 ± 0.1 , Gate height = 1.3 ± 0.1 , Gate thickness = 0.65 ± 0.05 , Drain thickness = 0.2 ± 0.1 , Drain height = 0.15 ± 0.05 , Drain thickness = 0 ± 0.1 .
- Bottom View: Total width = 0.9 ± 0.1 , Total height = 0.15 ± 0.05 .

Component Labels:

- 1. Source 1
- 2. Gate 1
- 3. Drain 2
- 4. Source 2
- 5. Gate 2
- 6. Drain 1

JEDEC

JEITA

TOSHIBA

T-2-2J1C

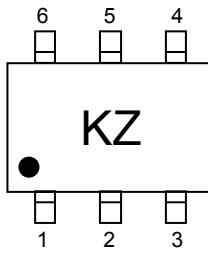
Weight: 6.8 mg (typ.)

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. Weight: 6.8 mg (typ.)

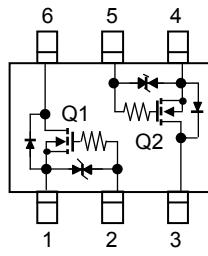
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note1: Total rating

Marking



Equivalent Circuit (top view)



Start of commercial production
2008-02

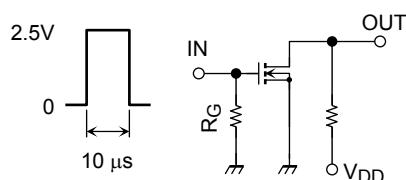
Electrical Characteristics (Ta = 25°C) (Q1, Q2 Common)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I _{GSS}	V _{GS} = ±10 V, V _{DS} = 0 V	—	—	±10	µA
Drain–source breakdown voltage	V _{(BR) DSS}	I _D = 0.1 mA, V _{GS} = 0 V	20	—	—	V
Drain cutoff current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V	—	—	1	µA
Gate threshold voltage	V _{th}	V _{DS} = 3 V, I _D = 1 mA	0.4	—	1.0	V
Forward transfer admittance	Y _{fs}	V _{DS} = 3 V, I _D = 50 mA (Note 2)	115	—	—	mS
Drain–source ON-resistance	R _{DS} (ON)	I _D = 50 mA, V _{GS} = 4 V (Note 2)	—	1.5	3	Ω
		I _D = 50 mA, V _{GS} = 2.5 V (Note 2)	—	2	4	
		I _D = 5 mA, V _{GS} = 1.5 V (Note 2)	—	3	8	
		I _D = 5 mA, V _{GS} = 1.2 V (Note 2)	—	5	20	
Input capacitance	C _{iss}	V _{DS} = 3 V, V _{GS} = 0 V, f = 1 MHz	—	9.5	—	pF
Reverse transfer capacitance	C _{rss}		—	4.1	—	
Output capacitance	C _{oss}		—	9.5	—	
Switching time	Turn-on time	t _{on}	V _{DD} = 3 V, I _D = 50 mA V _{GS} = 0 to 2.5 V	—	115	ns
	Turn-off time	t _{off}		—	300	
Drain–source forward voltage	V _{DSF}	I _D = -180 mA, V _{GS} = 0 V (Note 2)	—	-0.9	-1.2	V

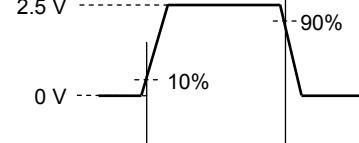
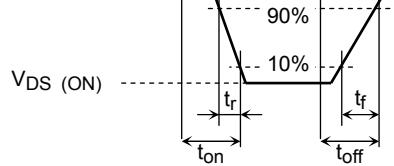
Note 2: Pulse test

Switching Time Test Circuit

(a) Test Circuit



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

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

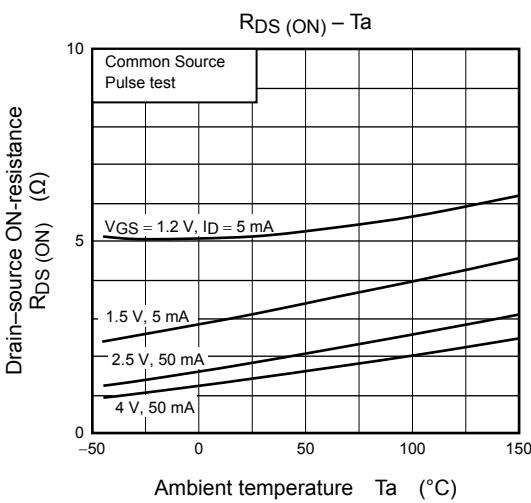
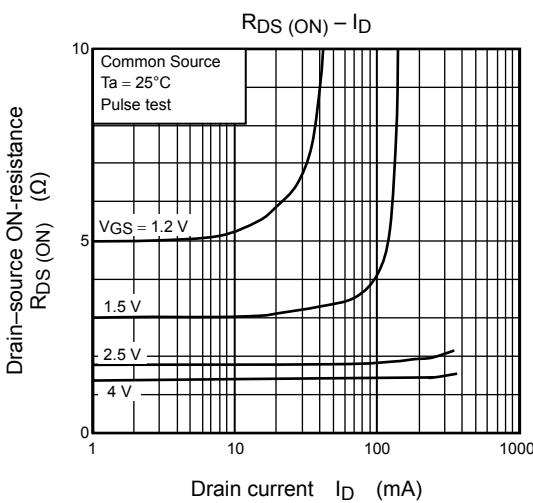
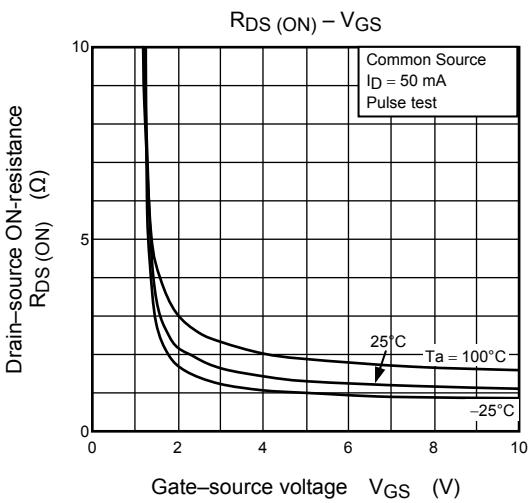
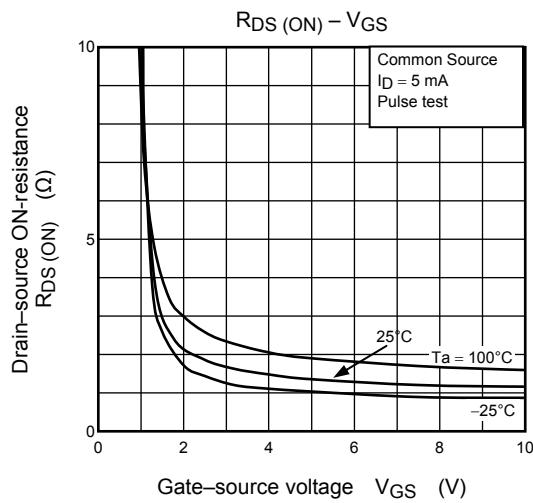
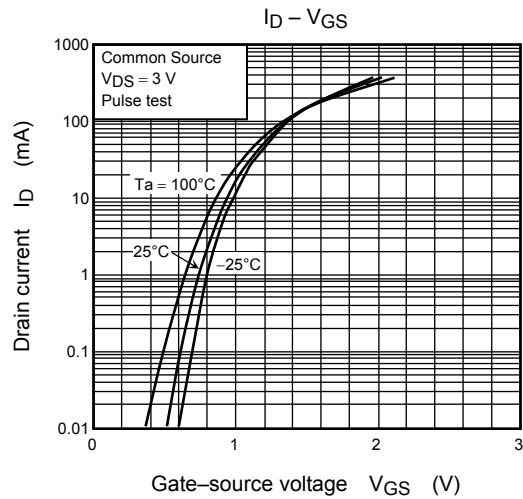
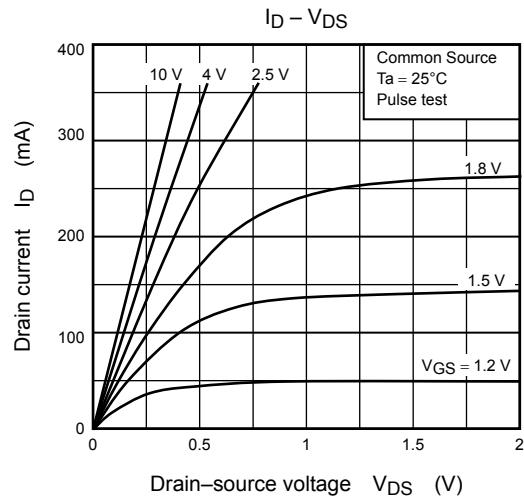
Handling Precaution

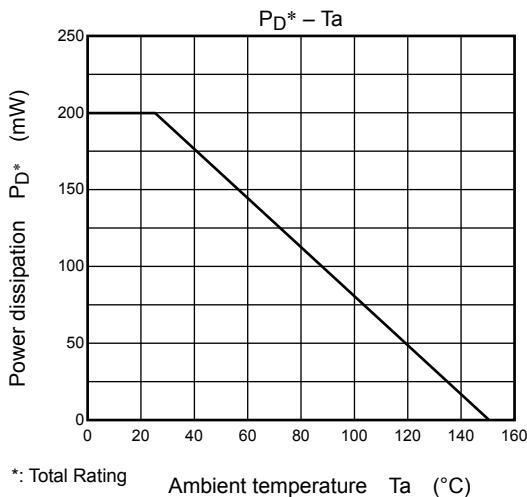
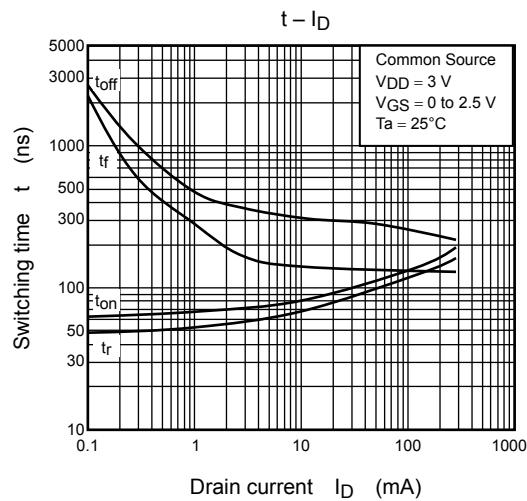
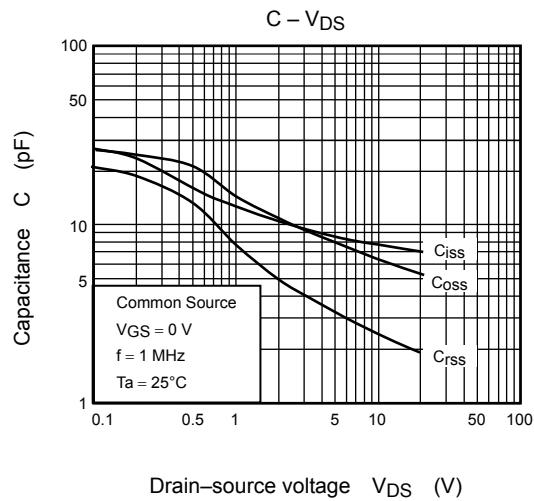
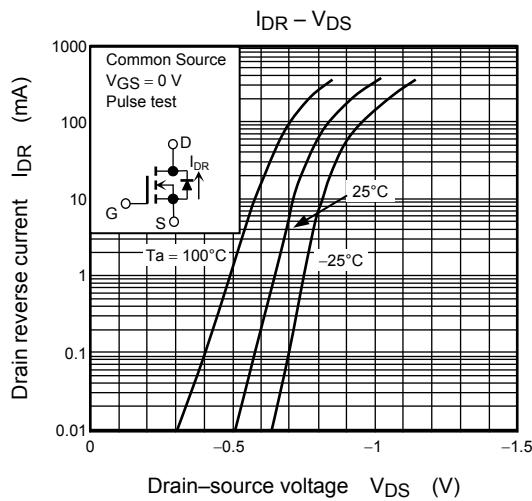
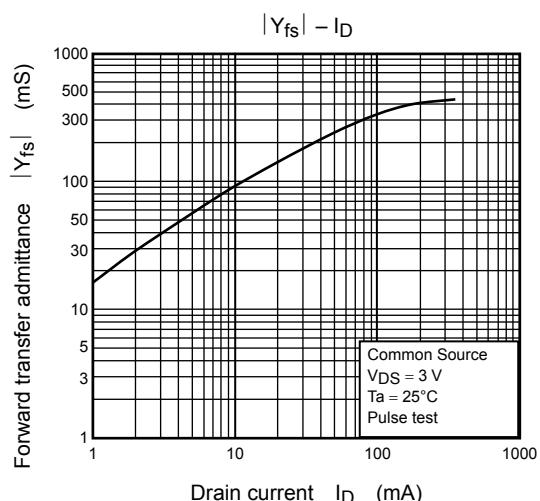
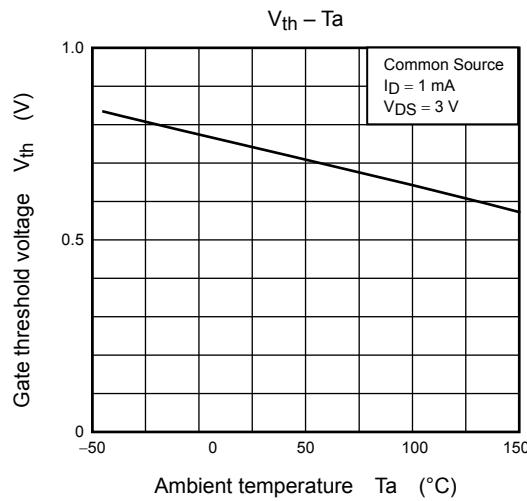
When handling individual devices that are not yet mounted on a circuit board, make sure that the environment is protected against electrostatic discharge. Operators should wear antistatic clothing, and containers and other objects that come into direct contact with devices should be made of antistatic materials.

Usage Considerations

Let V_{th} be the voltage applied between gate and source that causes the drain current (I_D) to below (1 mA for the SSM6N35FU). 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.





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