

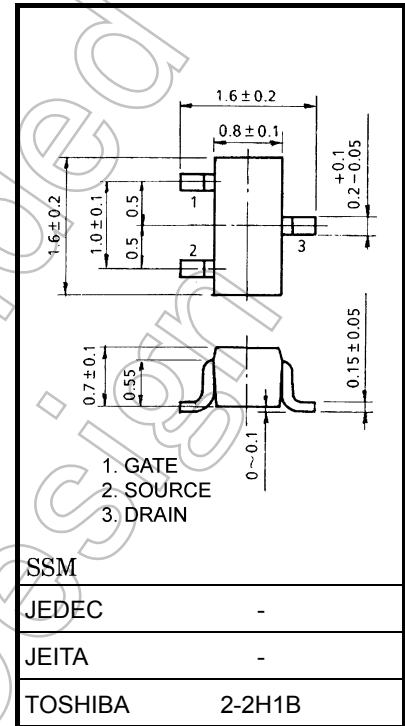
TOSHIBA Field-Effect Transistor Silicon N-Channel MOS Type

SSM3K35FS

- High-Speed Switching Applications
- Analog Switch Applications

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

Unit: mm



Weight: 2.4 mg (typ.)

Absolute Maximum Ratings (Ta = 25°C)

| Characteristics | Symbol | Rating | Unit |
|-------------------------|-----------|------------|------|
| Drain-source voltage | V_{DSS} | 20 | V |
| Gate-source voltage | V_{GSS} | ±10 | V |
| Drain current | DC | I_D | 180 |
| | Pulse | I_{DP} | 360 |
| Drain power dissipation | P_D | 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).

Electrical Characteristics (Ta = 25°C)

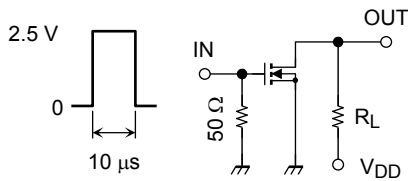
| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit | |
|--------------------------------|---------------|---|---|------|------|------|----|
| Gate leakage current | I_{GSS} | $V_{GS} = \pm 10 V, V_{DS} = 0 V$ | — | — | ±10 | μA | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $I_D = 0.1 mA, V_{GS} = 0 V$ | 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 1) | 115 | — | — | mS | |
| Drain-source ON-resistance | $R_{DS(ON)}$ | $I_D = 50 mA, V_{GS} = 4 V$ (Note 1) | — | 1.5 | 3 | Ω | |
| | | $I_D = 50 mA, V_{GS} = 2.5 V$ (Note 1) | — | 2 | 4 | | |
| | | $I_D = 5 mA, V_{GS} = 1.5 V$ (Note 1) | — | 3 | 8 | | |
| | | $I_D = 5 mA, V_{GS} = 1.2 V$ (Note 1) | — | 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} | $V_{DD} = 3 V, I_D = 50 mA, V_{GS} = 0 \text{ to } 2.5 V$ | — | 115 | — | ns |
| | Turn-off time | t_{off} | | — | 300 | — | |
| Drain-source forward voltage | V_{DSF} | $I_D = -180 mA, V_{GS} = 0 V$ (Note 1) | — | -0.9 | -1.2 | V | |

Note 1: Pulse test

Start of commercial production
2008-02

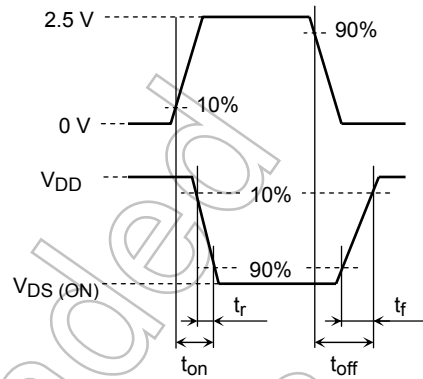
Switching Time Test Circuit

(a) Test Circuit



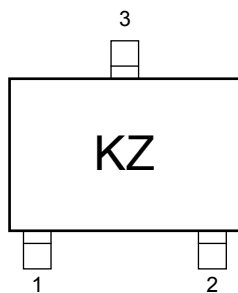
$V_{DD} = 3\text{ V}$
 Duty $\leq 1\%$
 V_{IN} : $t_r, t_f < 5\text{ ns}$
 $(Z_{out} = 50\ \Omega)$
 Common Source
 $T_a = 25^\circ\text{C}$

(b) V_{IN}

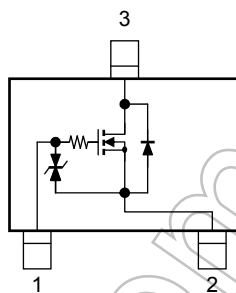


(c) V_{OUT}

Marking



Equivalent Circuit (top view)

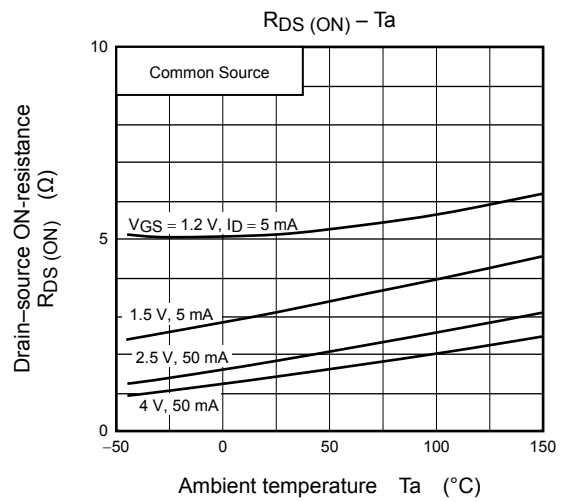
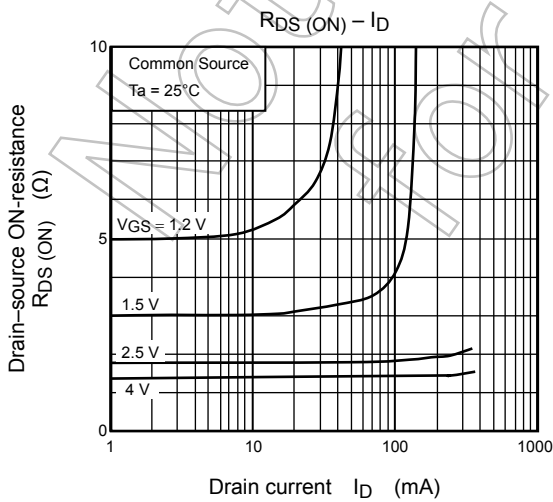
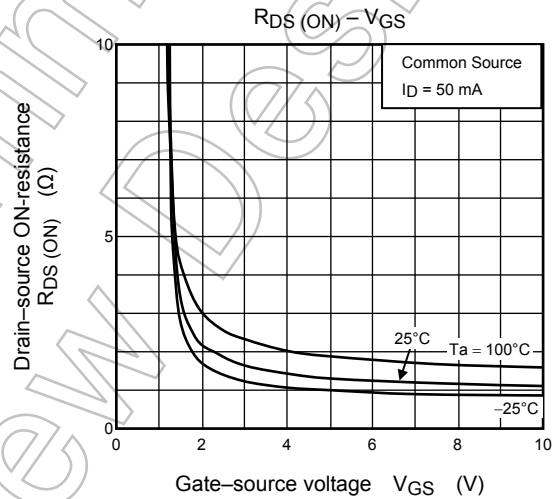
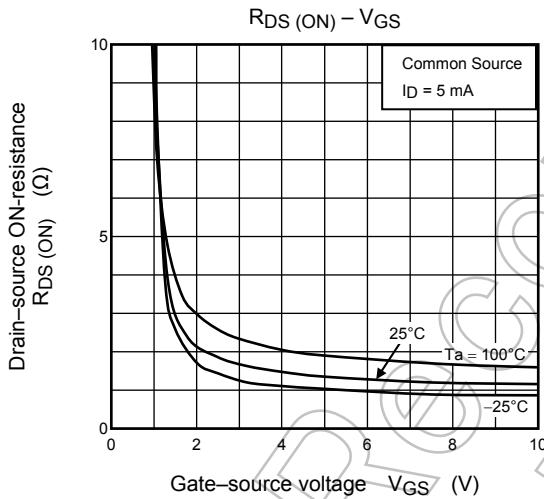
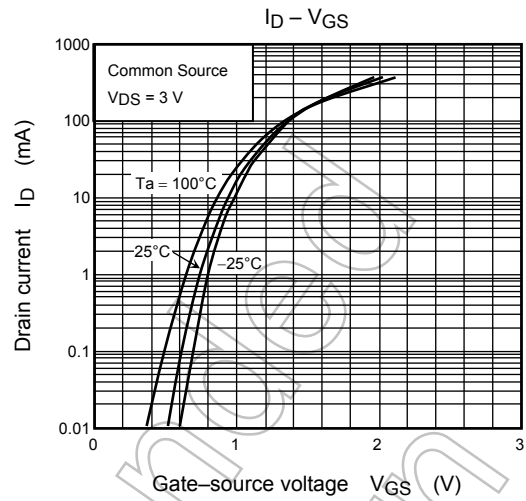
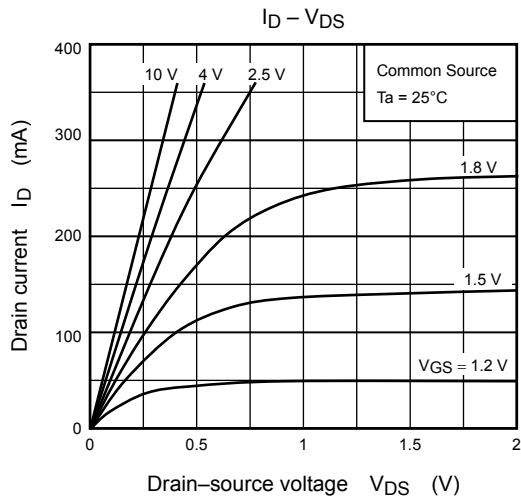


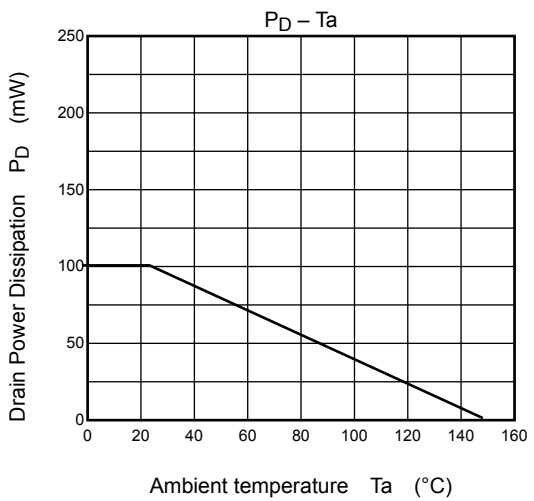
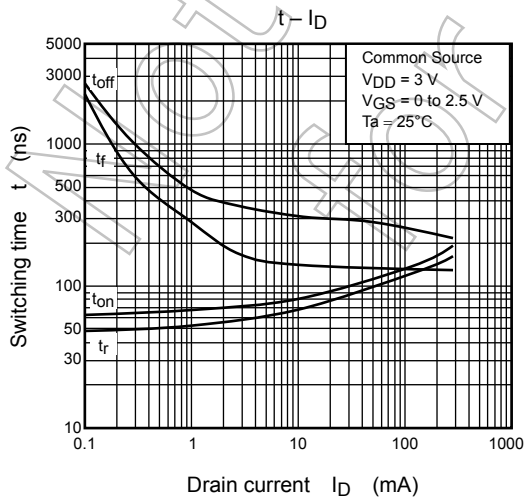
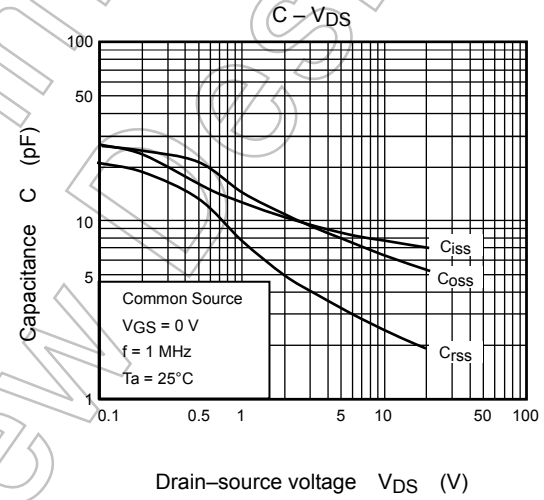
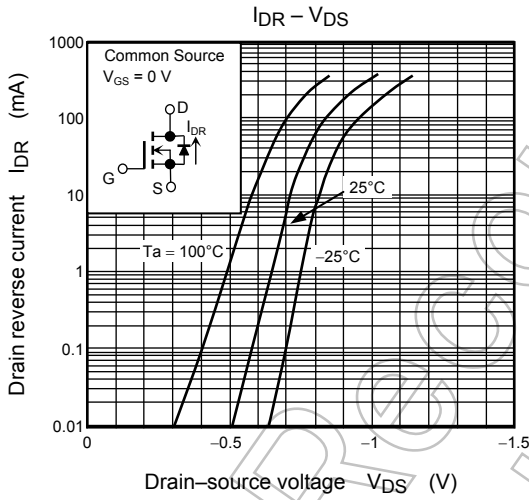
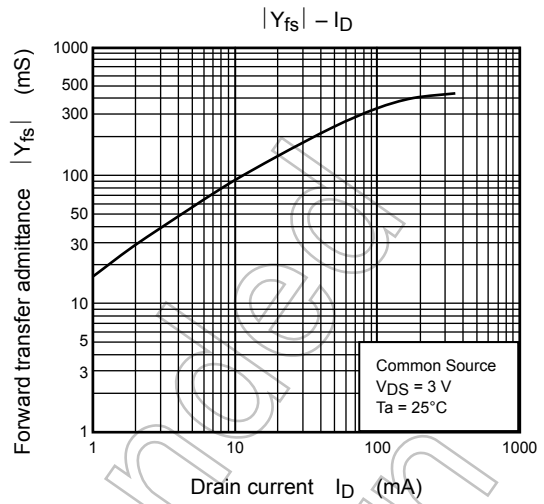
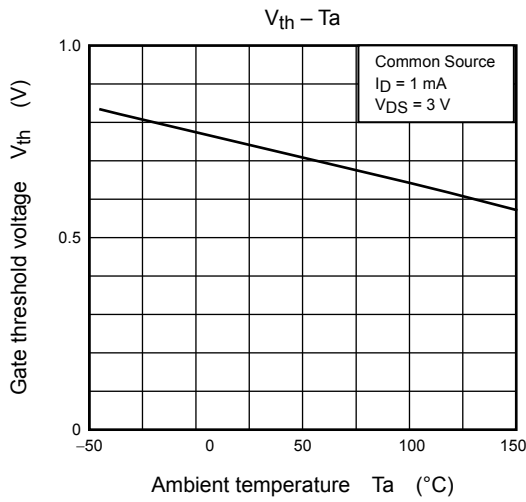
Usage Considerations

Let V_{th} be the voltage applied between gate and source that causes the drain current (I_D) to be below (1 mA for the SSM3K35FS). 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.

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.





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