

TOSHIBA Field-Effect Transistor Silicon N-Channel MOS Type

SSM3K35FS

- High-Speed Switching Applications
- Analog Switch Applications

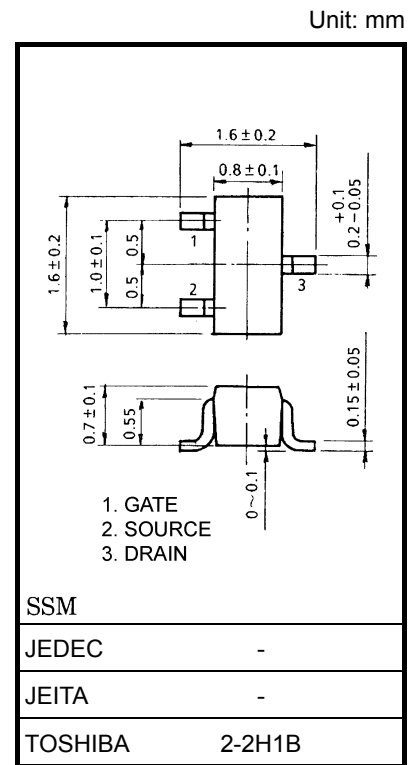
- 1.2-V drive
- Low ON-resistance: $R_{ON} = 20\ \Omega$ (max) (@ $V_{GS} = 1.2\text{ V}$)
 $R_{ON} = 8\ \Omega$ (max) (@ $V_{GS} = 1.5\text{ V}$)
 $R_{ON} = 4\ \Omega$ (max) (@ $V_{GS} = 2.5\text{ V}$)
 $R_{ON} = 3\ \Omega$ (max) (@ $V_{GS} = 4.0\text{ V}$)

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

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



Weight: 2.4 mg (typ.)

Electrical Characteristics ($T_a = 25^\circ\text{C}$)

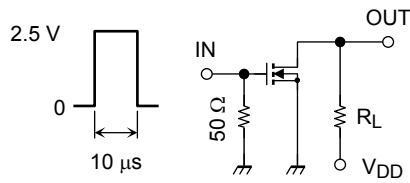
| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------|---------------|-----------------------|--|-----|------|------|------|
| Gate leakage current | | I _{GSS} | V _{GS} = ±10 V, V _{DS} = 0V | — | — | ±10 | μA |
| Drain–source breakdown voltage | | V _(BR) DSS | I _D = 0.1 mA, V _{GS} = 0V | 20 | — | — | V |
| Drain cutoff current | | I _{DSS} | V _{DS} = 20 V, V _{GS} = 0V | — | — | 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} = 0V, 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} = 0V (Note 1) | — | -0.9 | -1.2 | V |

Note 1: Pulse test

Start of commercial production
2008-02

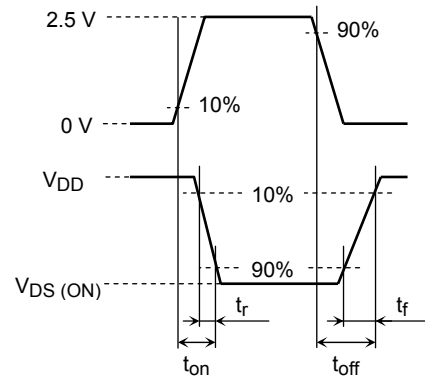
Switching Time Test Circuit

(a) Test Circuit



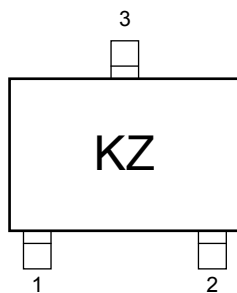
$V_{DD} = 3 \text{ V}$
 Duty $\leq 1\%$
 V_{IN} : $t_r, t_f < 5 \text{ ns}$
 $(Z_{out} = 50 \Omega)$
 Common Source
 $T_a = 25^\circ\text{C}$

(b) V_{IN}

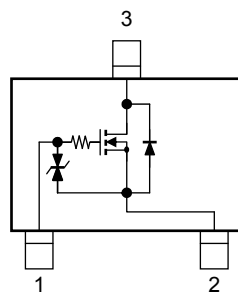


(c) V_{OUT}

Marking



Equivalent Circuit (top view)

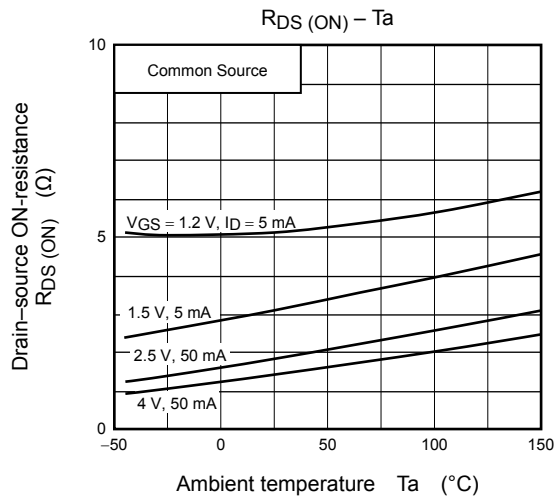
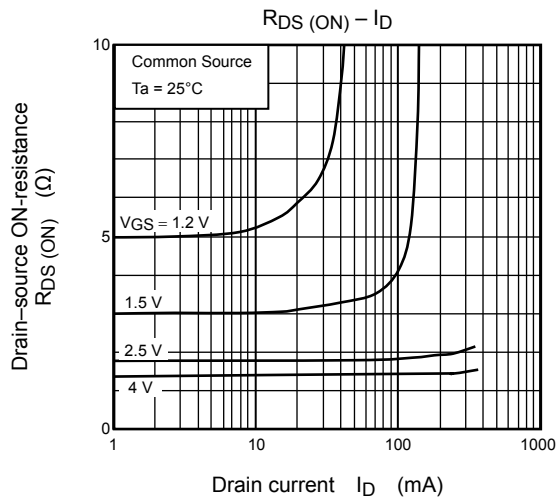
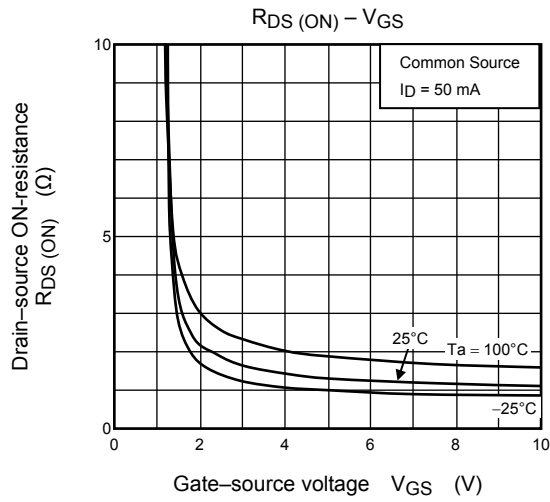
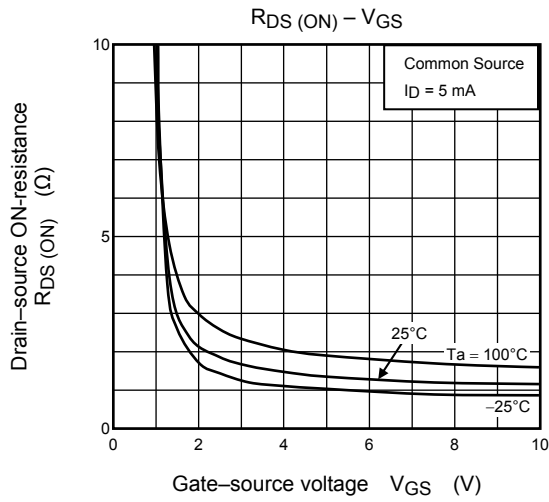
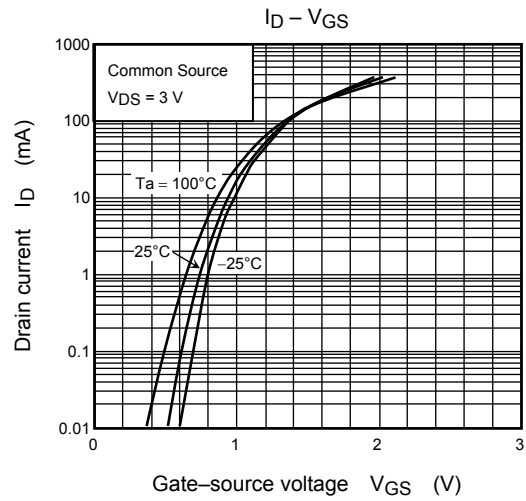
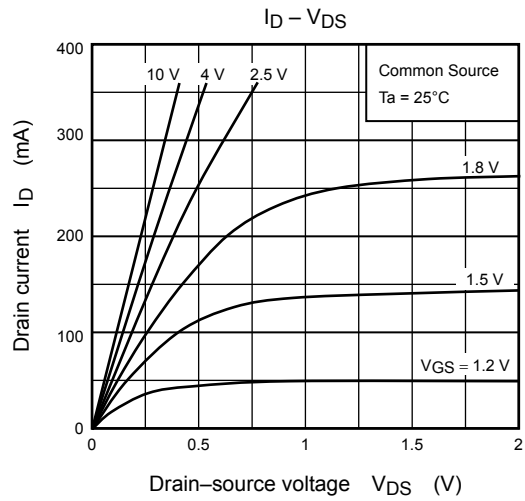


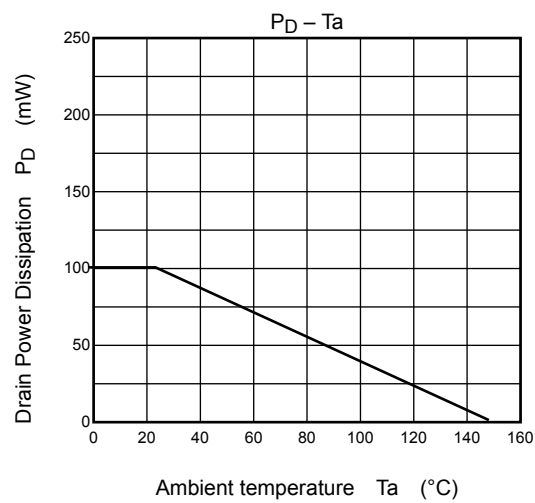
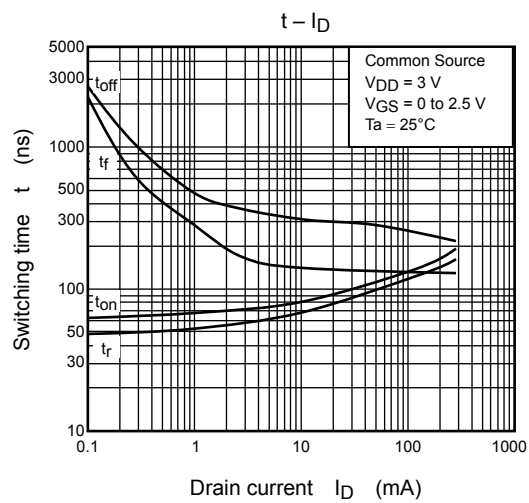
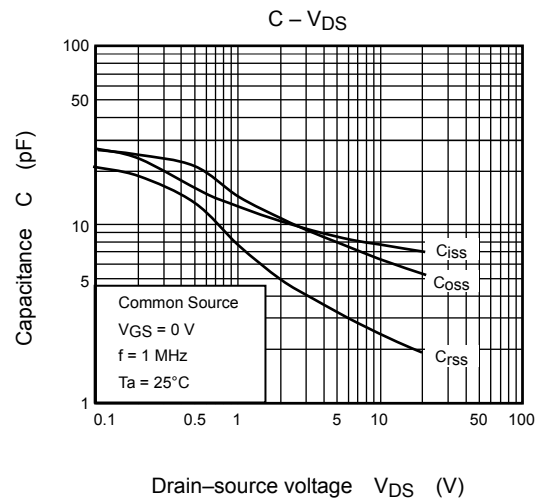
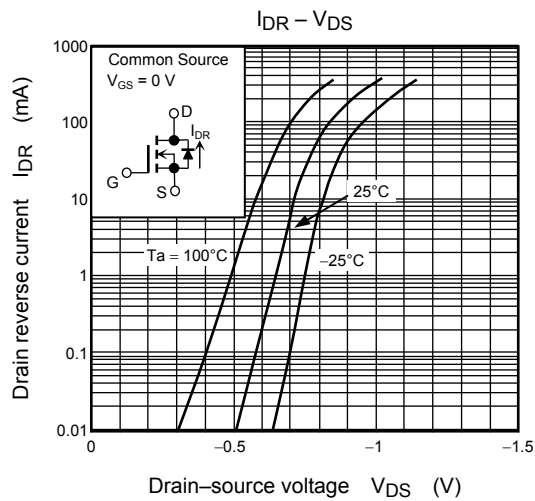
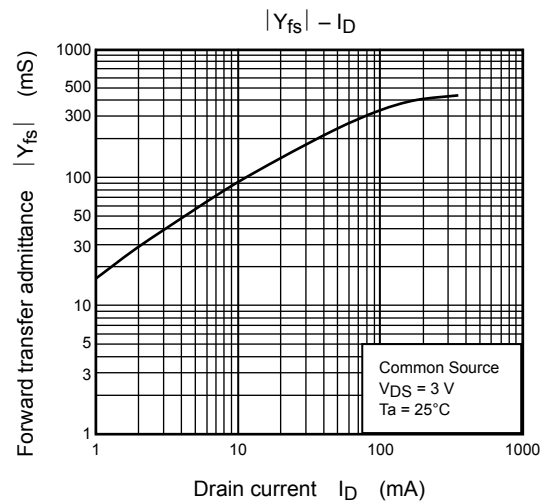
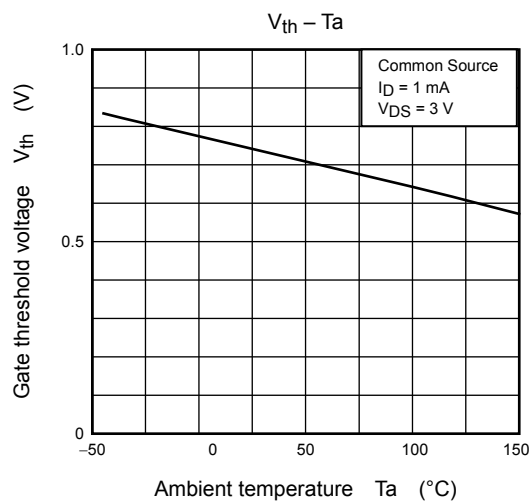
Usage Considerations

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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