

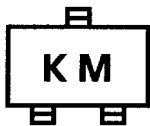
## 2SK2009

High Speed Switching Applications

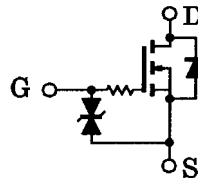
Analog Switch Applications

- High input impedance.
- Low gate threshold voltage:  $V_{th} = 0.5$  to  $1.5$  V
- Excellent switching times:  $t_{on} = 0.06$   $\mu$ s (typ.)  
 $t_{off} = 0.12$   $\mu$ s (typ.)
- Low drain-source ON resistance:  $R_{DS(ON)} = 1.2$   $\Omega$  (typ.)
- Small package
- Enhancement-mode

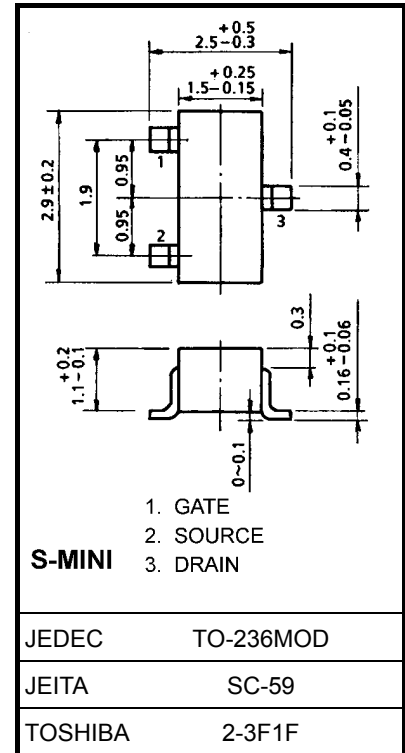
### Marking



### Equivalent Circuit



Unit: mm



Weight: 0.012 g (typ.)

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

| Characteristics           | Symbol    | Rating     | Unit             |
|---------------------------|-----------|------------|------------------|
| Drain-source voltage      | $V_{DS}$  | 30         | V                |
| Gate-source voltage       | $V_{GSS}$ | $\pm 20$   | V                |
| DC drain current          | $I_D$     | 200        | mA               |
| Drain power dissipation   | $P_D$     | 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).

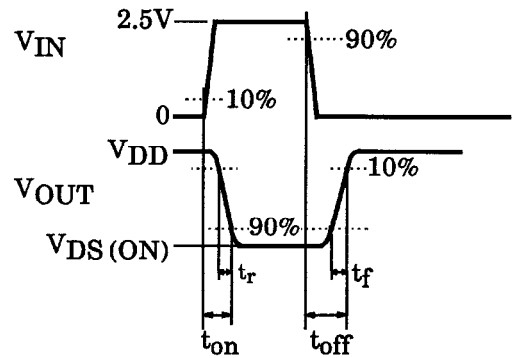
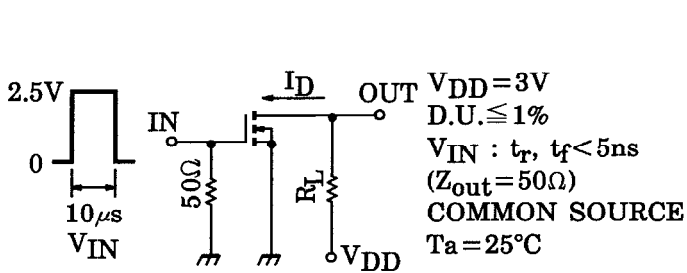
Note: This transistor is electrostatic sensitive device. Please handle with caution.

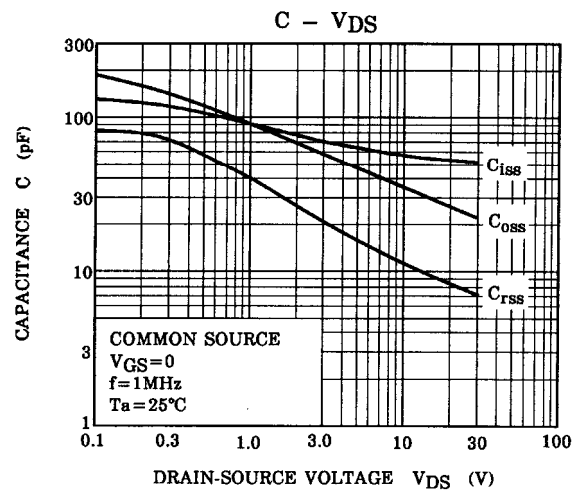
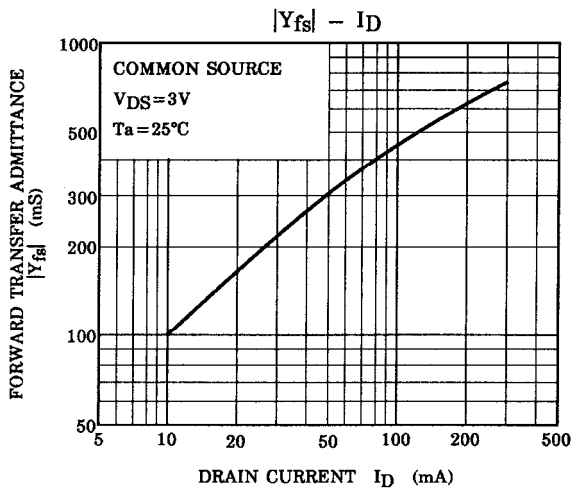
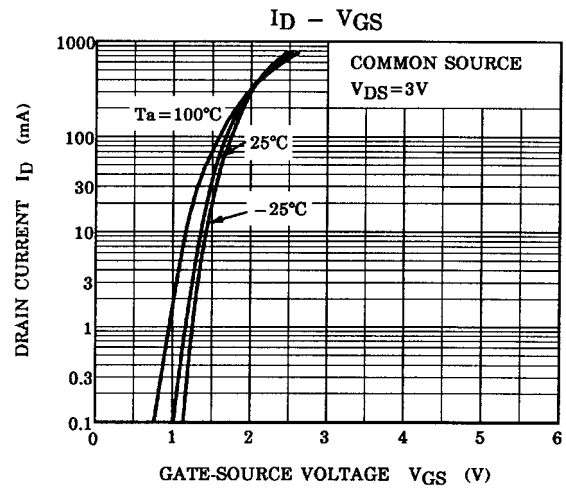
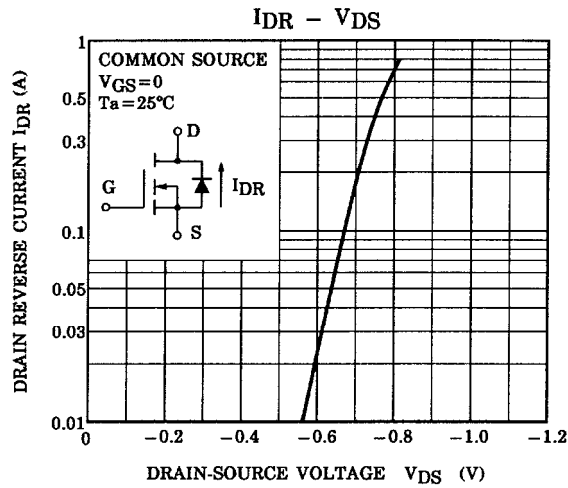
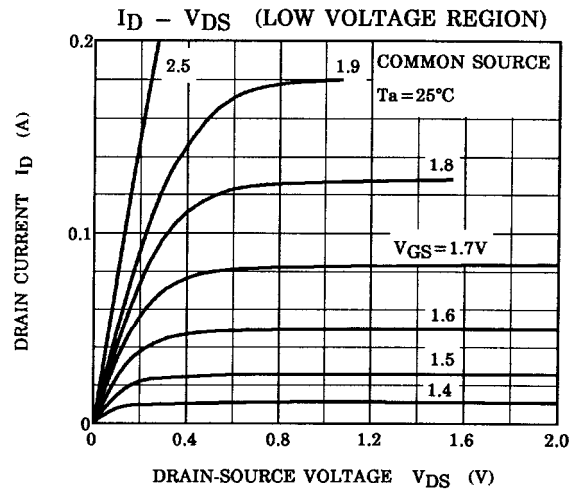
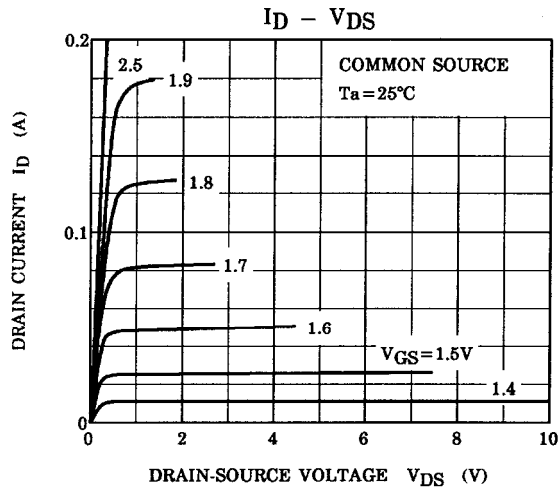
Start of commercial production  
1992-04

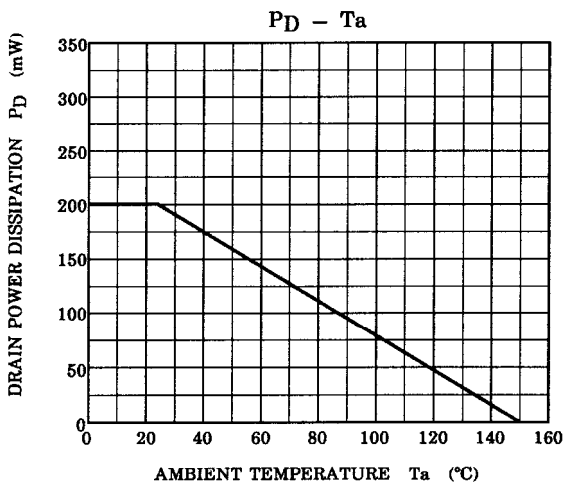
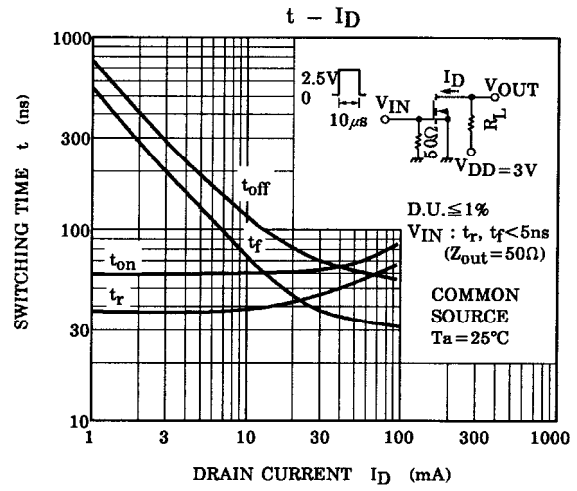
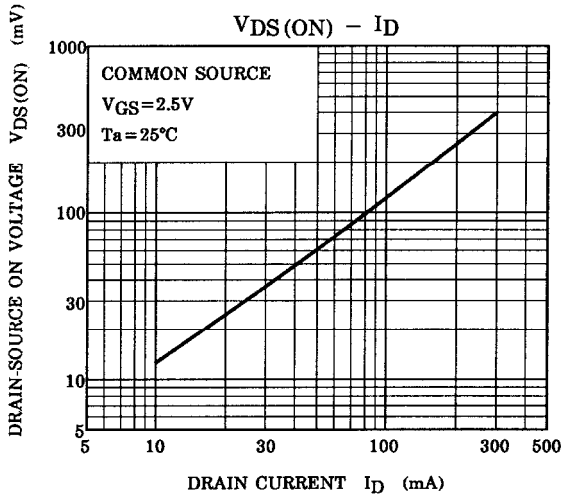
## Electrical Characteristics (Ta = 25°C)

| Characteristics                | Symbol        | Test Condition                                      | Min  | Typ. | Max       | Unit          |               |
|--------------------------------|---------------|---|--|------|-----------|---------------|---------------|
| Gate leakage current           | $I_{GSS}$     | $V_{GS} = \pm 10\text{ V}, V_{DS} = 0$              | —  | —    | $\pm 0.1$ | $\mu\text{A}$ |               |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $I_D = 1\text{ mA}, V_{GS} = 0$                     | 30   | —    | —         | V             |               |
| Drain cut-off current          | $I_{DSS}$     | $V_{DS} = 30\text{ V}, V_{GS} = 0$                  | —  | —    | 10        | $\mu\text{A}$ |               |
| Gate threshold voltage         | $V_{th}$      | $V_{DS} = 3\text{ V}, I_D = 0.1\text{ mA}$          | 0.5  | —    | 1.5       | V             |               |
| Forward transfer admittance    | $ Y_{fs} $    | $V_{DS} = 3\text{ V}, I_D = 50\text{ mA}$           | 100  | —    | —         | mS            |               |
| Drain-source ON resistance     | $R_{DS(ON)}$  | $I_D = 50\text{ mA}, V_{GS} = 2.5\text{ V}$         | —  | 1.2  | 2         | $\Omega$      |               |
| Input capacitance              | $C_{iss}$     | $V_{DS} = 3\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$ | —  | 70   | —         | pF            |               |
| Reverse transfer capacitance   | $C_{rss}$     | $V_{DS} = 3\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$ | —  | 23   | —         | pF            |               |
| Output capacitance             | $C_{oss}$     | $V_{DS} = 3\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$ | —  | 58   | —         | pF            |               |
| Switching time                 | Turn-on time  | $t_{on}$  | $V_{DD} = 3\text{ V}, I_D = 10\text{ mA}, V_{GS} = 0\text{ to }2.5\text{ V}$ | —    | 0.06      | —             | $\mu\text{s}$ |
|                                | Turn-off time | $t_{off}$   | $V_{DD} = 3\text{ V}, I_D = 10\text{ mA}, V_{GS} = 0\text{ to }2.5\text{ V}$ | —    | 0.12      | —             |               |

## Switching Time Test Circuit







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