

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (π -MOSV)

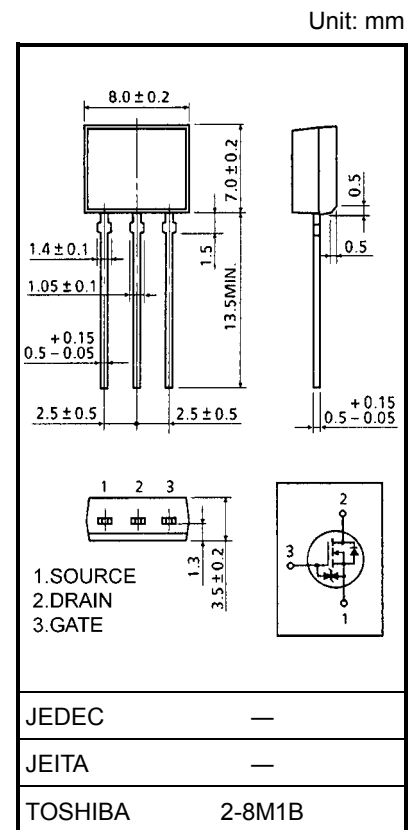
2SK2599

Chopper Regulator, DC-DC Converter and Motor Drive Applications

- Low drain-source ON resistance : $R_{DS(ON)} = 2.9 \Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 1.7 S$ (typ.)
- Low leakage current : $I_{DSS} = 100 \mu A$ (max) ($V_{DS} = 500 V$)
- Enhancement-mode : $V_{th} = 2.0 \sim 4.0 V$ ($V_{DS} = 10 V, I_D = 1 mA$)

Maximum Ratings ($T_a = 25^\circ C$)

| Characteristics | | Symbol | Rating | Unit |
|--|------------------------------------|-----------|----------------|------------|
| Drain-source voltage | | V_{DSS} | 500 | V |
| Drain-gate voltage ($R_{GS} = 20 k\Omega$) | | V_{DGR} | 500 | V |
| Gate-source voltage | | V_{GSS} | ± 30 | V |
| Drain current | DC (Note 1) | I_D | 2 | A |
| | Pulse ($t = 1 ms$) (Note 1) | I_{DP} | 5 | A |
| | Pulse ($t = 100 \mu s$) (Note 1) | I_{DP} | 12 | A |
| Drain power dissipation | | P_D | 1.3 | W |
| Single pulse avalanche energy (Note 2) | | E_{AS} | 112 | mJ |
| Avalanche current | | I_{AR} | 2 | A |
| Repetitive avalanche energy (Note 3) | | E_{AR} | 0.13 | mJ |
| Channel temperature | | T_{ch} | 150 | $^\circ C$ |
| Storage temperature range | | T_{stg} | $-55 \sim 150$ | $^\circ C$ |



Weight: 0.54 g (typ.)

Thermal Characteristics

| Characteristics | Symbol | Max | Unit |
|--|----------------|------|----------------|
| Thermal resistance, channel to ambient | $R_{th(ch-a)}$ | 96.1 | $^\circ C / W$ |

Note 1: Please use devices on condition that the channel temperature is below $150^\circ C$.

Note 2: $V_{DD} = 90 V, T_{ch} = 25^\circ C$ (initial), $L = 48.4 mH, R_G = 25 \Omega, I_{AR} = 2 A$

Note 3: Repetitive rating; Pulse width limited by maximum channel temperature.

This transistor is an electrostatic sensitive device.

Please handle with caution.

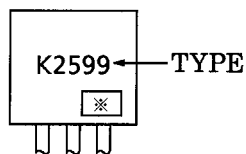
Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---------------|---------------|---|----------|------|----------|---------------|
| Gate leakage current | | I_{GSS} | $V_{GS} = \pm 25\text{ V}, V_{DS} = 0\text{ V}$ | — | — | ± 10 | μA |
| Gate-source breakdown voltage | | $V_{(BR)GSS}$ | $I_G = \pm 10\ \mu\text{A}, V_{GS} = 0\text{ V}$ | ± 30 | — | — | V |
| Drain cut-off current | | I_{DSS} | $V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$ | — | — | 100 | μA |
| Drain-source breakdown voltage | | $V_{(BR)DSS}$ | $I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$ | 500 | — | — | V |
| Gate threshold voltage | | V_{th} | $V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$ | 2.0 | — | 4.0 | V |
| Drain-source ON resistance | | $R_{DS(ON)}$ | $V_{GS} = 10\text{ V}, I_D = 1\text{ A}$ | — | 2.9 | 3.2 | Ω |
| Forward transfer admittance | | $ Y_{fs} $ | $V_{DS} = 10\text{ V}, I_D = 1\text{ A}$ | 0.8 | 1.7 | — | S |
| Input capacitance | | C_{iss} | $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | — | 380 | — | pF |
| Reverse transfer capacitance | | C_{rss} | | — | 40 | — | |
| Output capacitance | | C_{oss} | | — | 120 | — | |
| Switching time | Rise time | t_r | | — | 15 | — | ns |
| | Turn-on time | t_{on} | | — | 25 | — | |
| | Fall time | t_f | | — | 20 | — | |
| | Turn-off time | t_{off} | | — | 80 | — | |
| Total gate charge (Gate-source plus gate-drain) | | Q_g | $V_{DD} \approx 400\text{ V}, V_{GS} = 10\text{ V}, I_D = 2\text{ A}$ | — | 9 | — | nC |
| Gate-source charge | | Q_{gs} | | — | 5 | — | |
| Gate-drain ("miller") charge | | Q_{gd} | | — | 4 | — | |

Source-Drain Ratings and Characteristics (Ta = 25°C)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|-----------|---|-----|------|------|---------------|
| Continuous drain reverse current (Note 1) | I_{DR} | — | — | — | 2 | A |
| Pulse drain reverse current (Note 1) | I_{DRP} | $t = 1\text{ ms}$ | — | — | 5 | A |
| | | $t = 100\ \mu\text{s}$ | — | — | 12 | A |
| Forward voltage (diode) | V_{DSF} | $I_{DR} = 2\text{ A}, V_{GS} = 0\text{ V}$ | — | — | -1.5 | V |
| Reverse recovery time | t_{rr} | $I_{DR} = 2\text{ A}, V_{GS} = 0\text{ V}$ $di_{DR} / dt = 100\text{ A} / \mu\text{s}$ | — | 1000 | — | ns |
| Reverse recovered charge | Q_{rr} | | — | 3.5 | — | μC |

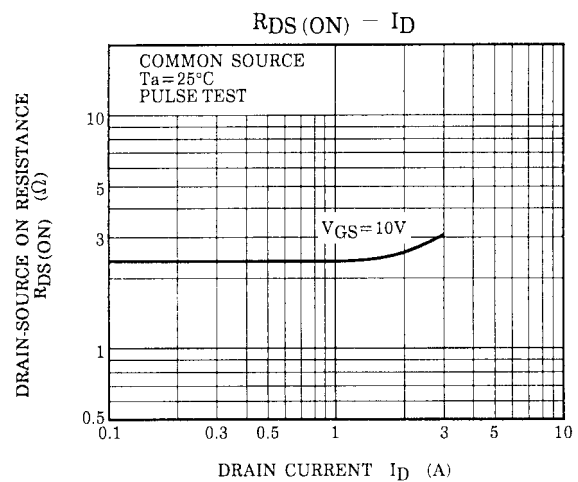
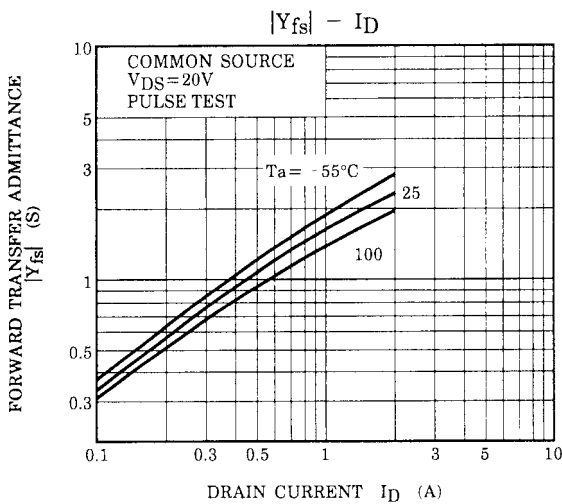
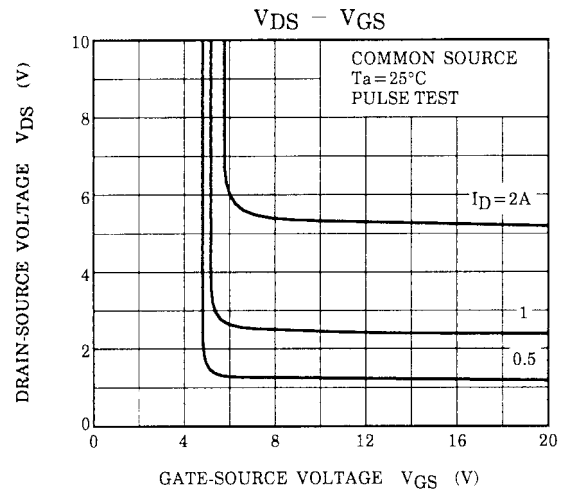
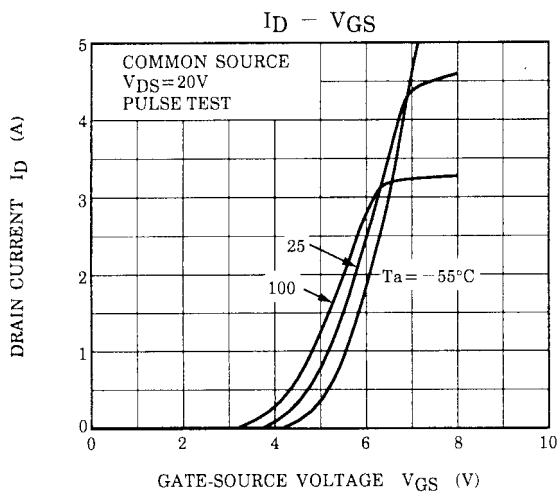
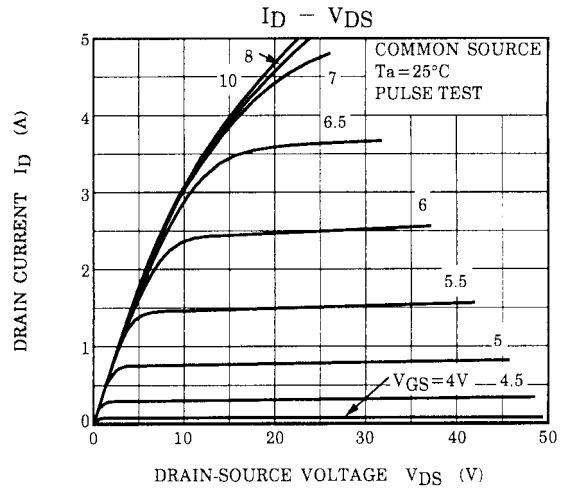
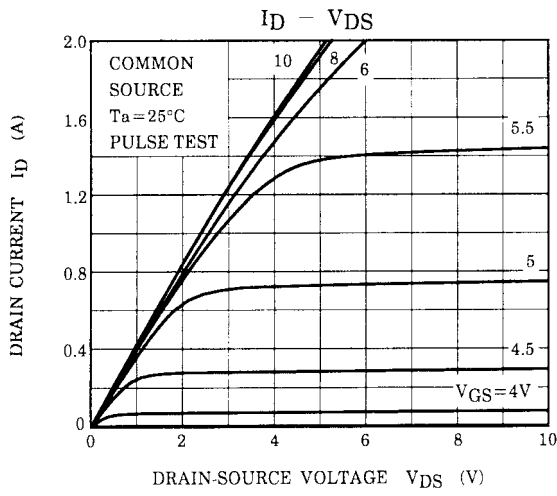
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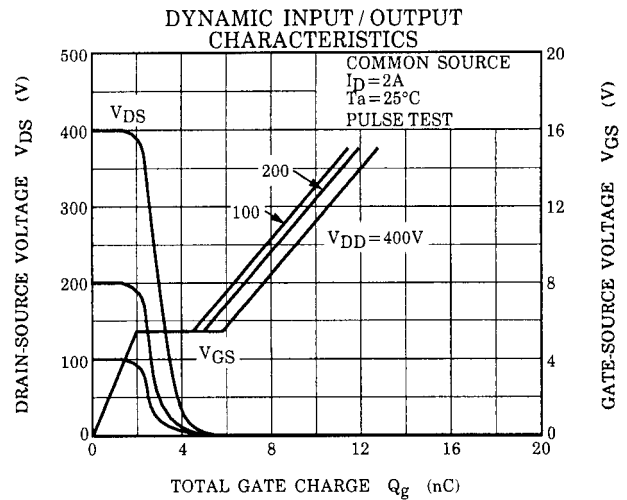
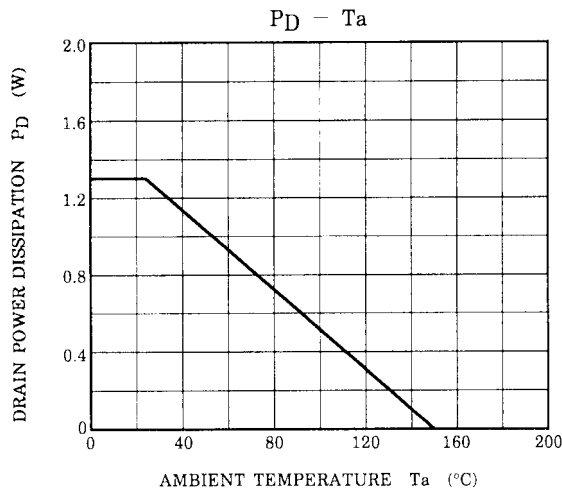
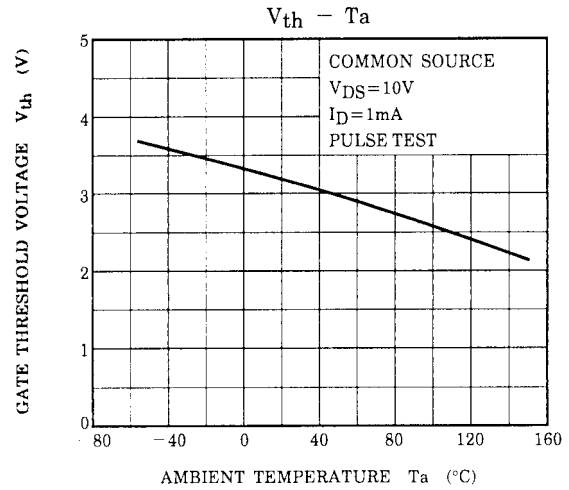
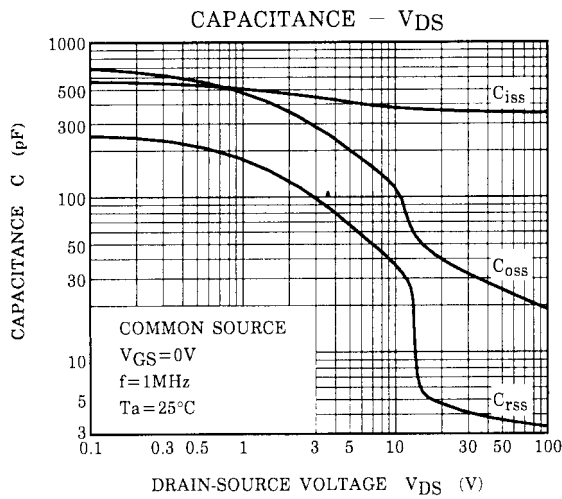
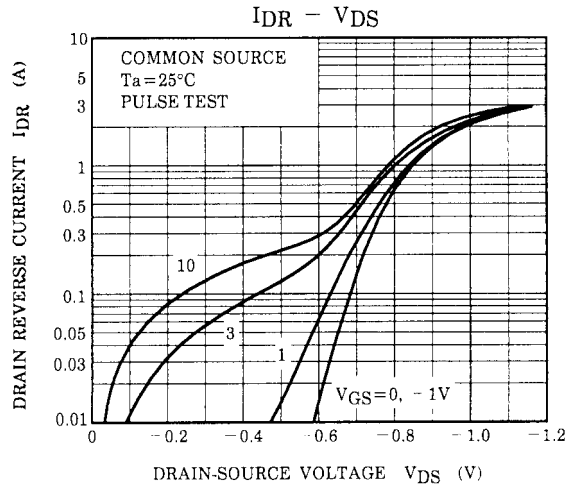
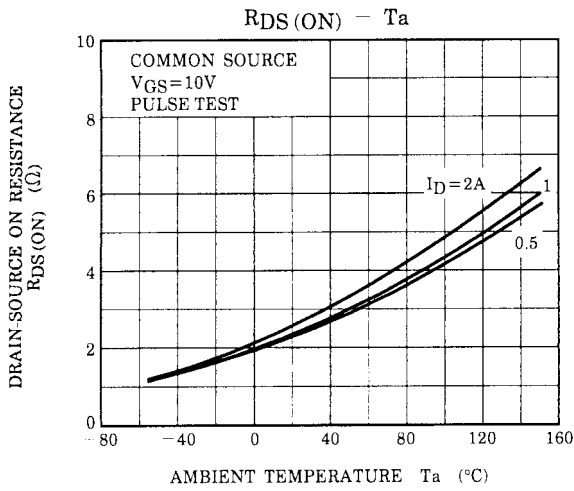


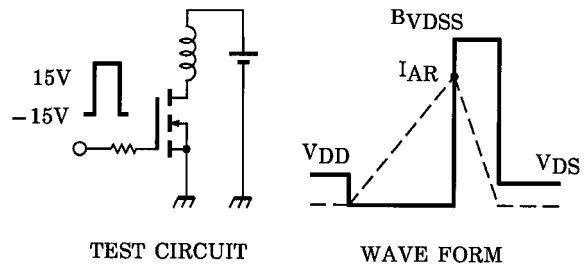
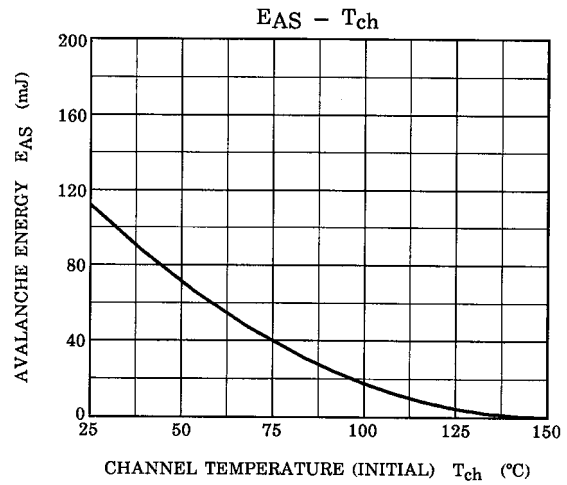
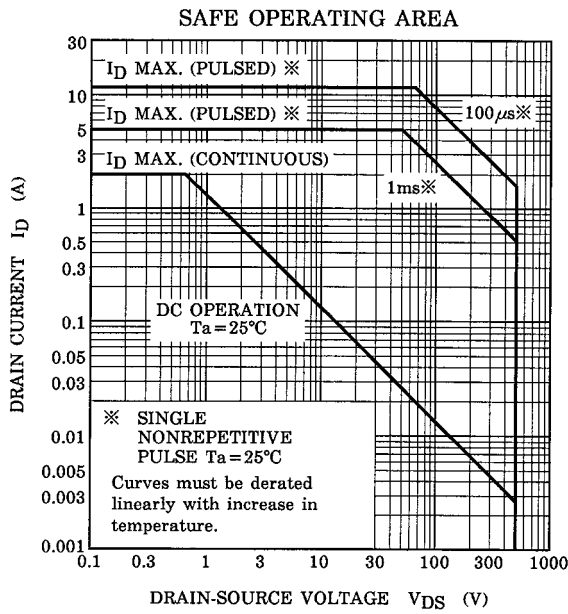
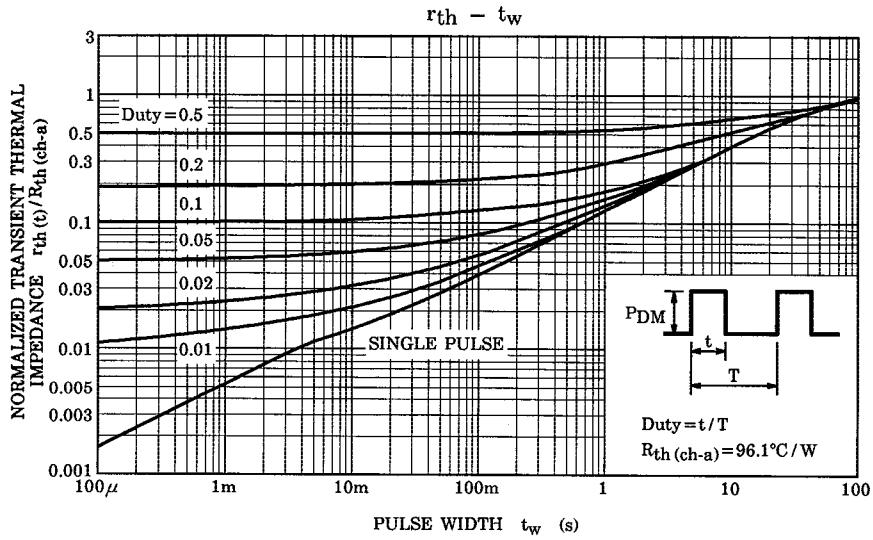
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







$R_G = 25 \Omega$
 $V_{DD} = 90 \text{ V}, L = 48.4 \text{ mH}$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BV_{DSS}}{BV_{DSS} - V_{DD}} \right)$$

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