

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

## 2SK3403

### Switching Regulator Applications

- Low drain-source ON resistance:  $R_{DS(ON)} = 0.29 \Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 5.8 S$  (typ.)
- Low leakage current:  $I_{DSS} = 100 \mu A$  (max) ( $V_{DSS} = 450 V$ )
- Enhancement-mode:  $V_{th} = 3.0 \sim 5.0 V$  ( $V_{DS} = 10 V$ ,  $I_D = 1 mA$ )

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

| Characteristics                                |                | Symbol    | Rating         | Unit       |
|--|----------------|-----------|----------------|------------|
| Drain-source voltage                           |                | $V_{DSS}$ | 450            | V          |
| Drain-gate voltage ( $R_{GS} = 20 k\Omega$ )   |                | $V_{DGR}$ | 450            | V          |
| Gate-source voltage                            |                | $V_{GSS}$ | $\pm 30$       | V          |
| Drain current                                  | DC (Note 1)    | $I_D$     | 13             | A          |
|  | Pulse (Note 1) | $I_{DP}$  | 52             |            |
| Drain power dissipation ( $T_c = 25^\circ C$ ) |                | $P_D$     | 100            | W          |
| Single pulse avalanche energy (Note 2)         |                | $E_{AS}$  | 350            | mJ         |
| Avalanche current                              |                | $I_{AR}$  | 13             | A          |
| Repetitive avalanche energy (Note 3)           |                | $E_{AR}$  | 10             | mJ         |
| Channel temperature                            |                | $T_{ch}$  | 150            | $^\circ C$ |
| Storage temperature range                      |                | $T_{stg}$ | $-55 \sim 150$ | $^\circ C$ |

### Thermal Characteristics

| Characteristics                        | Symbol         | Max  | Unit         |
|--|----------------|------|--------------|
| Thermal resistance, channel to case    | $R_{th(ch-c)}$ | 1.25 | $^\circ C/W$ |
| Thermal resistance, channel to ambient | $R_{th(ch-a)}$ | 83.3 | $^\circ C/W$ |

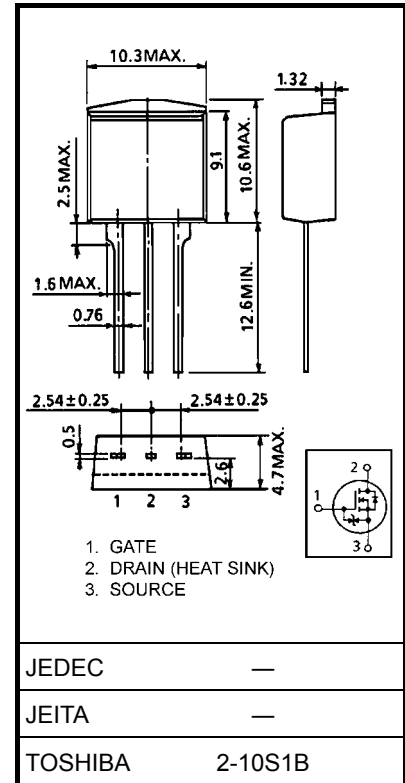
Note 1: Please use device on condition that the channel temperature is below  $150^\circ C$ .

Note 2:  $V_{DD} = 90 V$ ,  $T_{ch} = 25^\circ C$  (initial),  $L = 3.46 mH$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = 13 A$

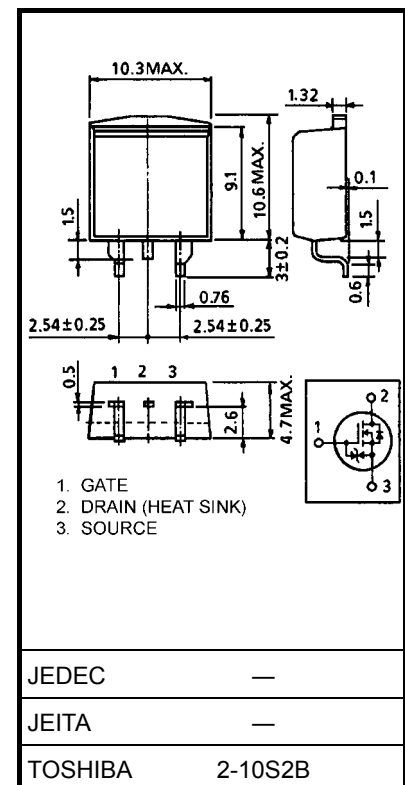
Note 3: Repetitive rating; pulse width limited by maximum channel temperature.

This transistor is an electrostatic sensitive device. Please handle with caution.

Unit: mm

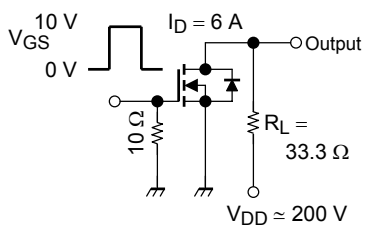


Weight: 1.5 g (typ.)



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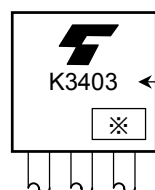
## Electrical Characteristics (Tc = 25°C)

| Characteristics                |               | Symbol        | Test Condition   | Min      | Typ. | Max      | Unit          |
|--------------------------------|---------------|---------------|--|----------|------|----------|---------------|
| Gate leakage current           |               | $I_{GSS}$     | $V_{GS} = \pm 25 \text{ V}, V_{DS} = 0 \text{ V}$                                  | —        | —    | $\pm 10$ | $\mu\text{A}$ |
| Gate-source breakdown voltage  |               | $V_{(BR)GSS}$ | $I_G = 10 \mu\text{A}, V_{DS} = 0 \text{ V}$                                       | $\pm 30$ | —    | —        | V             |
| Drain cut-off current          |               | $I_{DSS}$     | $V_{DS} = 450 \text{ V}, V_{GS} = 0 \text{ V}$                                     | —        | —    | 100      | $\mu\text{A}$ |
| Drain-source breakdown voltage |               | $V_{(BR)DSS}$ | $I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$  | 450      | —    | —        | V             |
| Gate threshold voltage         |               | $V_{th}$      | $V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$  | 3.0      | —    | 5.0      | V             |
| Drain-source ON resistance     |               | $R_{DS(ON)}$  | $V_{GS} = 10 \text{ V}, I_D = 6 \text{ A}$   | —        | 0.29 | 0.4      | $\Omega$      |
| Forward transfer admittance    |               | $ Y_{fs} $    | $V_{DS} = 10 \text{ V}, I_D = 6 \text{ A}$   | 3.0      | 5.8  | —        | S             |
| Input capacitance              |               | $C_{iss}$     | $V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$                   | —        | 1600 | —        | pF            |
| Reverse transfer capacitance   |               | $C_{rss}$     |  | —        | 17   | —        |               |
| Output capacitance             |               | $C_{oss}$     |  | —        | 220  | —        |               |
| Switching time                 | Rise time     | $t_r$         |  | —        | 28   | —        | ns            |
|                                | Turn-on time  | $t_{on}$      |  | —        | 45   | —        |               |
|                                | Fall time     | $t_f$         |  | —        | 10   | —        |               |
|                                | Turn-off time | $t_{off}$     |  | —        | 56   | —        |               |
| Total gate charge              |               | $Q_g$         | $V_{DD} \approx 360 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 13 \text{ A}$          | —        | 34   | —        | nC            |
| Gate-source charge             |               | $Q_{gs}$      |  | —        | 19   | —        |               |
| Gate-drain charge              |               | $Q_{gd}$      |  | —        | 15   | —        |               |

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

| Characteristics                           | Symbol    | Test Condition                                 | Min | Typ. | Max  | Unit          |
|---|-----------|--|-----|------|------|---------------|
| Continuous drain reverse current (Note 1) | $I_{DR}$  | —  | —   | —    | 13   | A             |
| Pulse drain reverse current (Note 1)      | $I_{DRP}$ | —  | —   | —    | 52   | A             |
| Forward voltage (diode)                   | $V_{DSF}$ | $I_{DR} = 13 \text{ A}, V_{GS} = 0 \text{ V}$  | —   | —    | -1.7 | V             |
| Reverse recovery time                     | $t_{rr}$  | $I_{DR} = 13 \text{ A}, V_{GS} = 0 \text{ V},$ | —   | 300  | —    | ns            |
| Reverse recovery charge                   | $Q_{rr}$  | $dI_{DR}/dt = 100 \text{ A}/\mu\text{s}$       | —   | 3.4  | —    | $\mu\text{C}$ |

## Marking

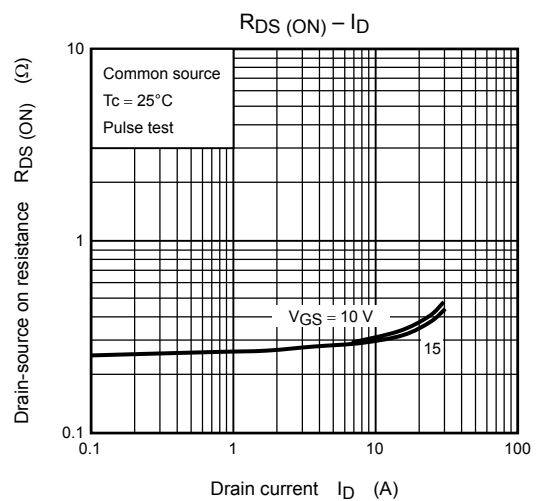
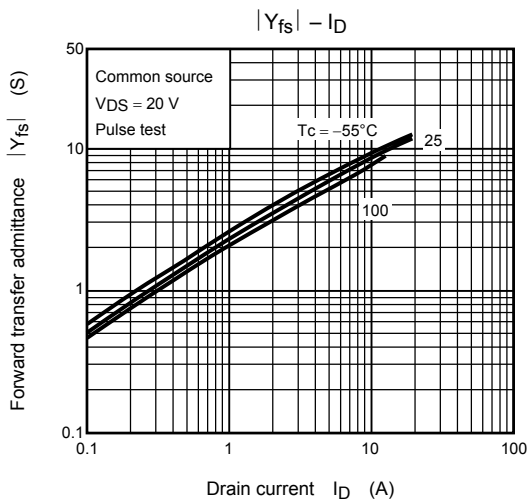
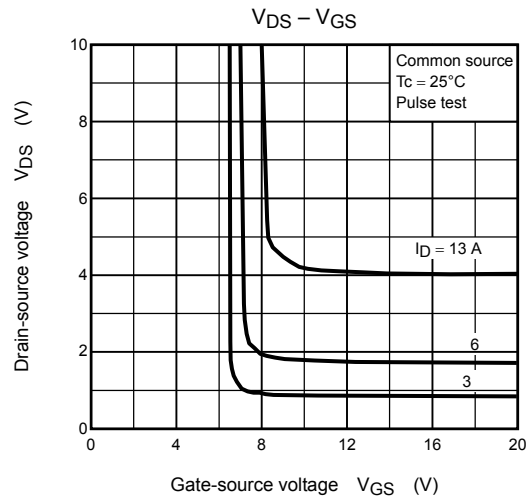
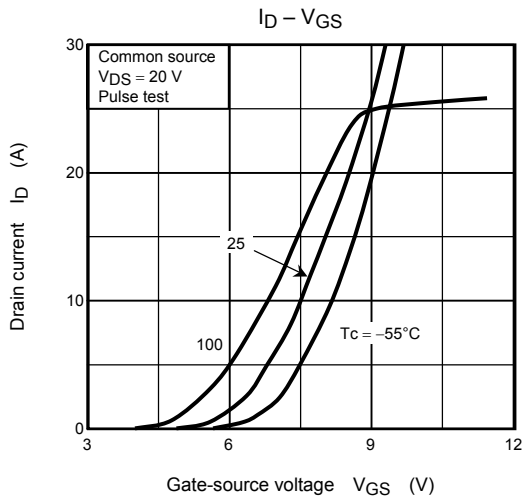
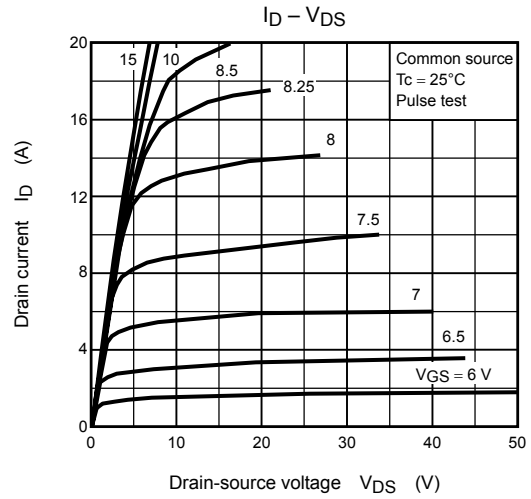
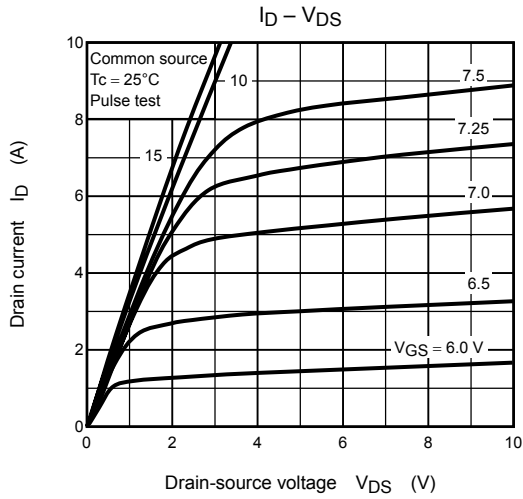


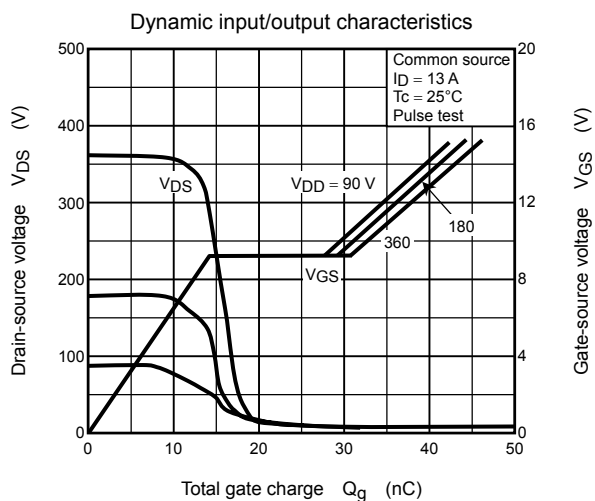
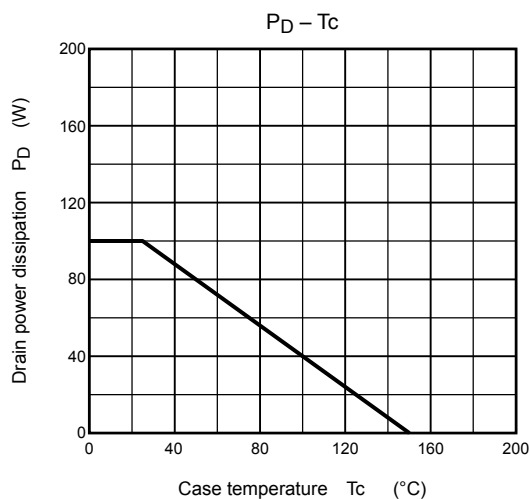
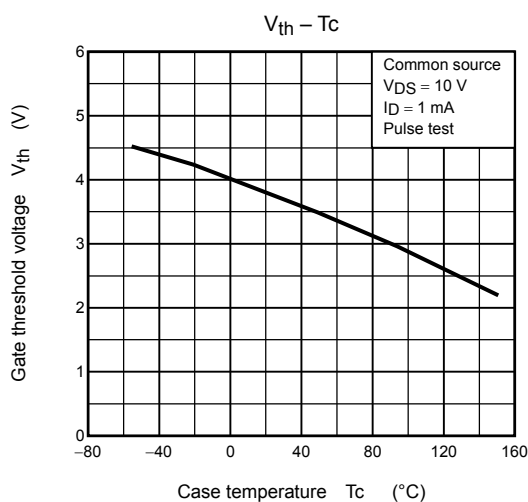
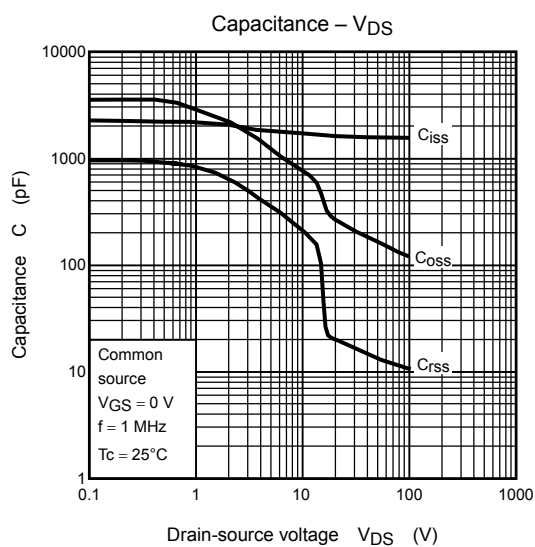
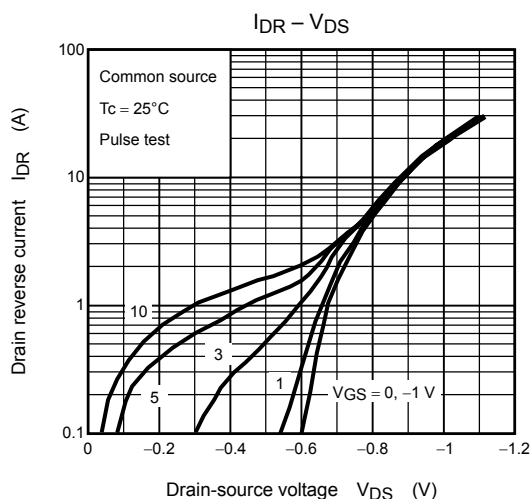
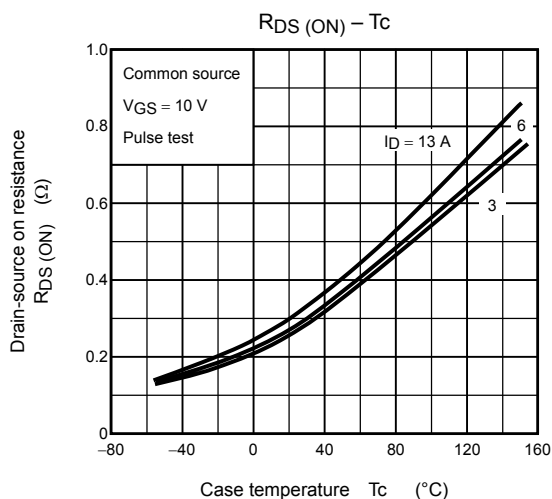
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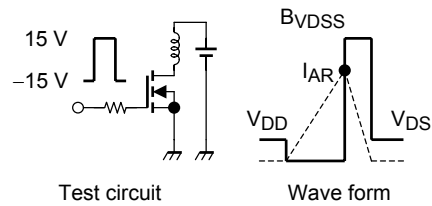
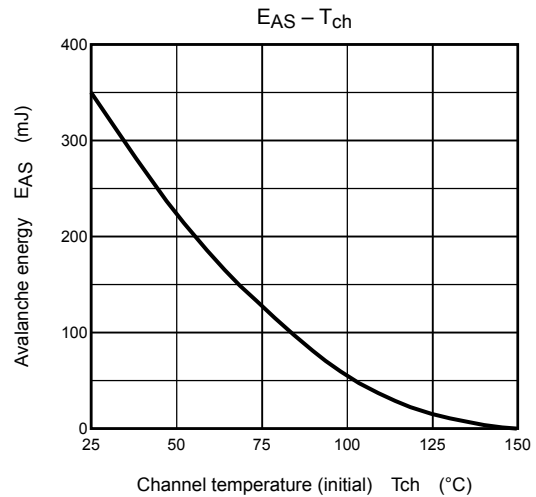
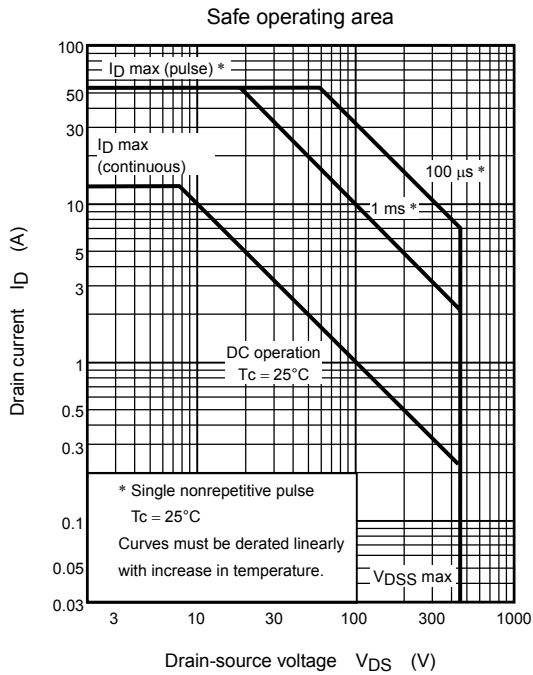
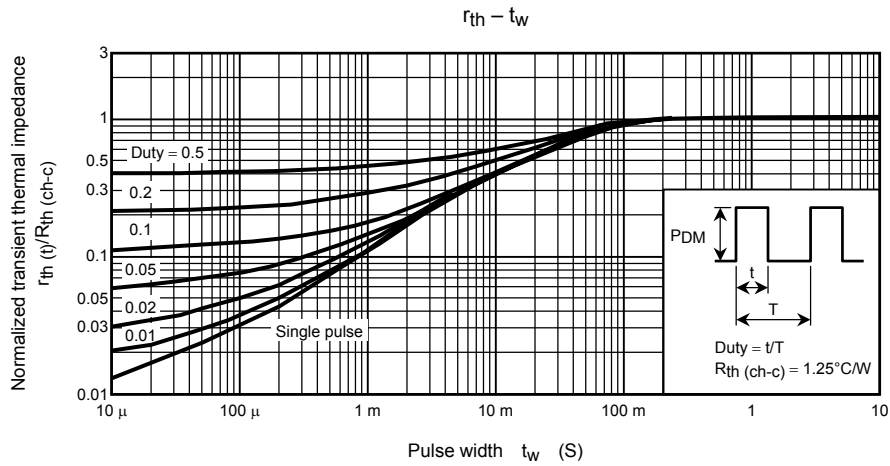
※ Lot Number

Month (starting from alphabet A)

Year (last number of the christian era)







$$R_G = 25 \, \Omega$$

$$V_{DD} = 90 \, \text{V}, L = 3.46 \, \text{mH}$$

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

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