

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE ( $\pi$ -MOSV)

## 2SK2551

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

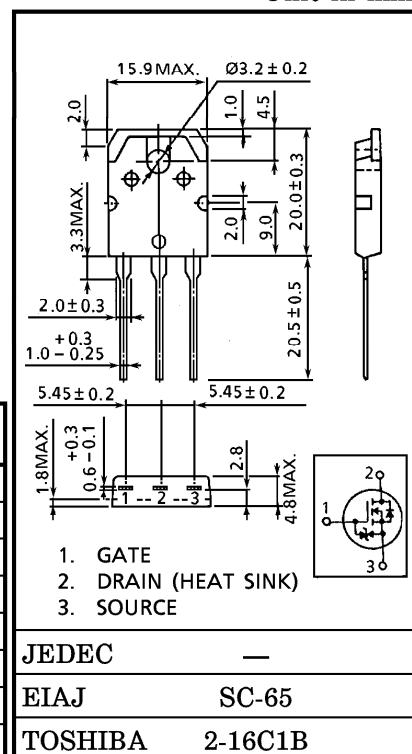
INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 7.2 \text{ m}\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 50 \text{ S}$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100 \mu\text{A}$  (Max.) ( $V_{DS} = 50 \text{ V}$ )
- Enhancement-Mode :  $V_{th} = 1.5 \sim 3.0 \text{ V}$   
( $V_{DS} = 10 \text{ V}$ ,  $I_D = 1 \text{ mA}$ )

MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

| CHARACTERISTIC                                       |       | SYMBOL    | RATING         | UNIT             |
|------------------------------------------------------|-------|-----------|----------------|------------------|
| Drain-Source Voltage                                 |       | $V_{DSS}$ | 50             | V                |
| Drain-Gate Voltage ( $R_{GS} = 20 \text{ k}\Omega$ ) |       | $V_{DGR}$ | 50             | V                |
| Gate-Source Voltage                                  |       | $V_{GSS}$ | $\pm 20$       | V                |
| Drain Current                                        | DC    | $I_D$     | 50             | A                |
|                                                      | Pulse | $I_{DP}$  | 200            | A                |
| Drain Power Dissipation ( $T_c = 25^\circ\text{C}$ ) |       | $P_D$     | 150            | W                |
| Single Pulse Avalanche Energy**                      |       | $E_{AS}$  | 894            | mJ               |
| Avalanche Current                                    |       | $I_{AR}$  | 50             | A                |
| Repetitive Avalanche Energy*                         |       | $E_{AR}$  | 15             | mJ               |
| Channel Temperature                                  |       | $T_{ch}$  | 150            | $^\circ\text{C}$ |
| Storage Temperature Range                            |       | $T_{stg}$ | $-55 \sim 150$ | $^\circ\text{C}$ |



Weight : 4.6 g

## THERMAL CHARACTERISTICS

| CHARACTERISTIC                         | SYMBOL         | MAX.  | UNIT               |
|----------------------------------------|----------------|-------|--------------------|
| Thermal Resistance, Channel to Case    | $R_{th(ch-c)}$ | 0.833 | $^\circ\text{C/W}$ |
| Thermal Resistance, Channel to Ambient | $R_{th(ch-a)}$ | 50    | $^\circ\text{C/W}$ |

Note ;

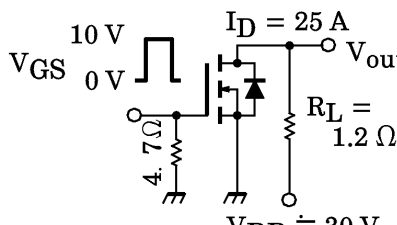
\* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

\*\*  $V_{DD} = 25 \text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 440 \mu\text{H}$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = 50 \text{ A}$ **This transistor is an electrostatic sensitive device.****Please Handle with caution.**

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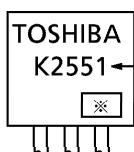
## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC                                  |               | SYMBOL         | TEST CONDITION                                                                                                                                                                                                                                               | MIN. | TYP. | MAX.     | UNIT             |
|-------------------------------------------------|---------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|----------|------------------|
| Gate Leakage Current                            |               | $I_{GSS}$      | $V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$                                                                                                                                                                                                            | —    | —    | $\pm 10$ | $\mu\text{A}$    |
| Drain Cut-off Current                           |               | $I_{DSS}$      | $V_{DS} = 50 \text{ V}, V_{GS} = 0 \text{ V}$                                                                                                                                                                                                                | —    | —    | 100      | $\mu\text{A}$    |
| Drain-Source Breakdown Voltage                  |               | $V_{(BR) DSS}$ | $I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$                                                                                                                                                                                                                  | 50   | —    | —        | V                |
| Gate Threshold Voltage                          |               | $V_{th}$       | $V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$                                                                                                                                                                                                                  | 1.5  | —    | 3.0      | V                |
| Drain-Source ON Resistance                      |               | $R_{DS(ON)}$   | $V_{GS} = 10 \text{ V}, I_D = 25 \text{ A}$                                                                                                                                                                                                                  | —    | 7.2  | 11       | $\text{m}\Omega$ |
| Forward Transfer Admittance                     |               | $ Y_{fs} $     | $V_{DS} = 10 \text{ V}, I_D = 25 \text{ A}$                                                                                                                                                                                                                  | 30   | 50   | —        | S                |
| Input Capacitance                               |               | $C_{iss}$      | $V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V},$<br>$f = 1 \text{ MHz}$                                                                                                                                                                                        | —    | 4000 | —        | pF               |
| Reverse Transfer Capacitance                    |               | $C_{rss}$      |                                                                                                                                                                                                                                                              | —    | 800  | —        |                  |
| Output Capacitance                              |               | $C_{oss}$      |                                                                                                                                                                                                                                                              | —    | 2000 | —        |                  |
| Switching Time                                  | Rise Time     | $t_r$          |  <p><math>V_{GS} = 10 \text{ V}, 0 \text{ V}</math><br/><math>I_D = 25 \text{ A}</math><br/><math>R_L = 1.2 \Omega</math><br/><math>V_{DD} \doteq 30 \text{ V}</math></p> | —    | 25   | —        | ns               |
|                                                 | Turn-on Time  | $t_{on}$       |                                                                                                                                                                                                                                                              | —    | 40   | —        |                  |
|                                                 | Fall Time     | $t_f$          |                                                                                                                                                                                                                                                              | —    | 120  | —        |                  |
|                                                 | Turn-off Time | $t_{off}$      |                                                                                                                                                                                                                                                              | —    | 360  | —        |                  |
| Total Gate Charge (Gate-Source Plus Gate-Drain) |               | $Q_g$          | $V_{DD} \doteq 40 \text{ V}, V_{GS} = 10 \text{ V}$<br>$I_D = 50 \text{ A}$                                                                                                                                                                                  | —    | 130  | —        | nC               |
| Gate-Source Charge                              |               | $Q_{gs}$       |                                                                                                                                                                                                                                                              | —    | 90   | —        |                  |
| Gate-Drain ("Miller") Charge                    |               | $Q_{gd}$       |                                                                                                                                                                                                                                                              | —    | 40   | —        |                  |

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC                   | SYMBOL    | TEST CONDITION                                                                           | MIN. | TYP. | MAX. | UNIT |
|----------------------------------|-----------|------------------------------------------------------------------------------------------|------|------|------|------|
| Continuous Drain Reverse Current | $I_{DR}$  | —                                                                                        | —    | —    | 50   | A    |
| Pulse Drain Reverse Current      | $I_{DRP}$ | —                                                                                        | —    | —    | 200  | A    |
| Diode Forward Voltage            | $V_{DSF}$ | $I_{DR} = 50 \text{ A}, V_{GS} = 0 \text{ V}$                                            | —    | —    | −1.7 | V    |
| Reverse Recovery Time            | $t_{rr}$  | $I_{DR} = 50 \text{ A}, V_{GS} = 0 \text{ V}$<br>$dI_{DR}/dt = 50 \text{ A}/\mu\text{s}$ | —    | 140  | —    | ns   |
| Reverse Recovery Charge          | $Q_{rr}$  |                                                                                          | —    | 77   | —    | nC   |

## MARKING



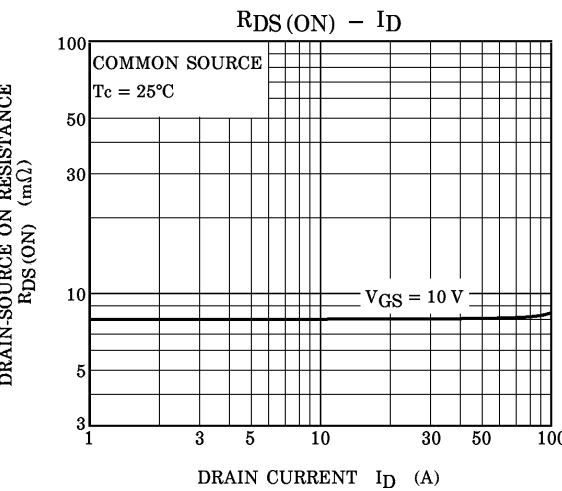
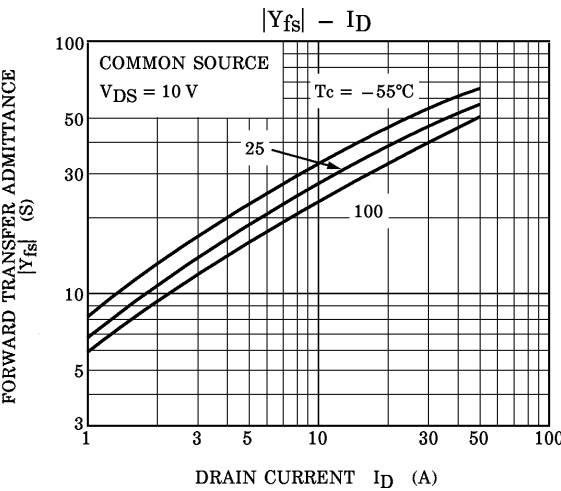
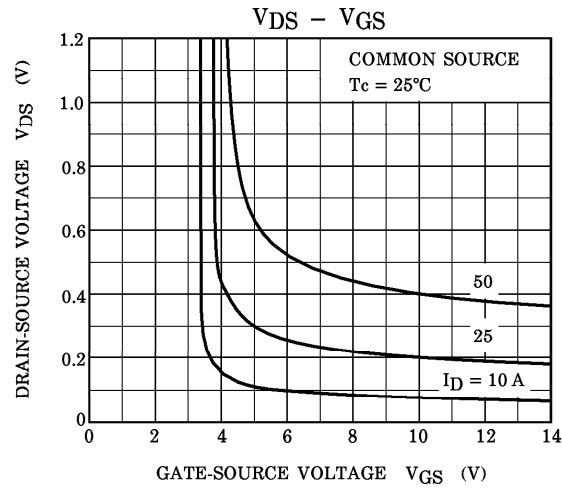
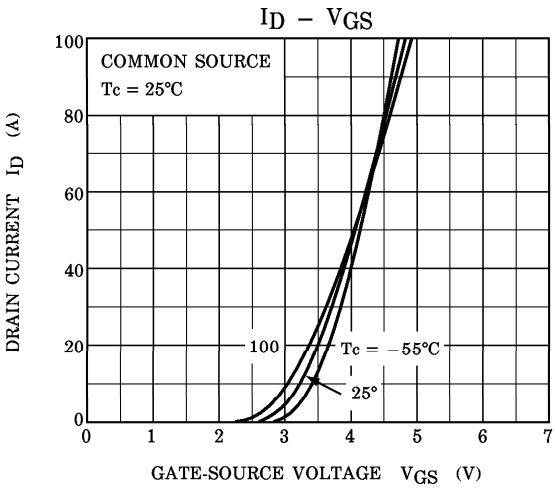
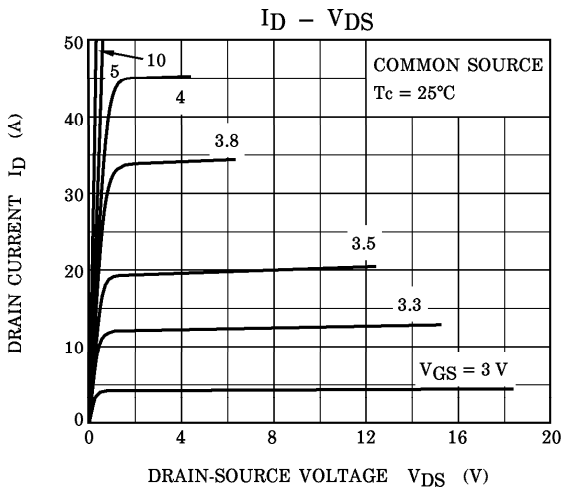
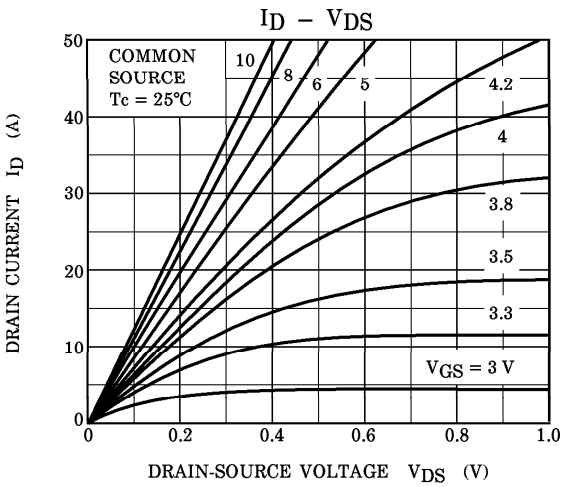
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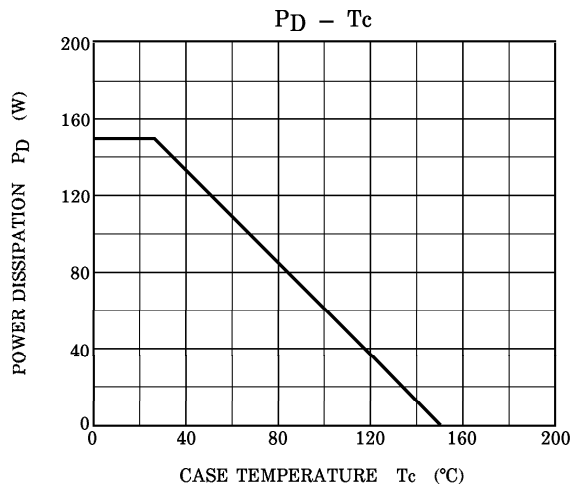
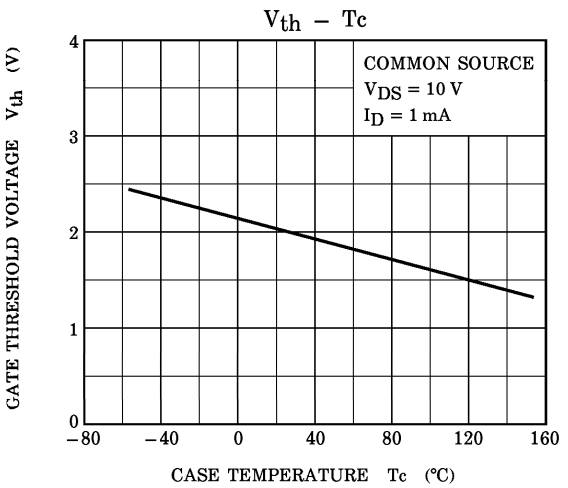
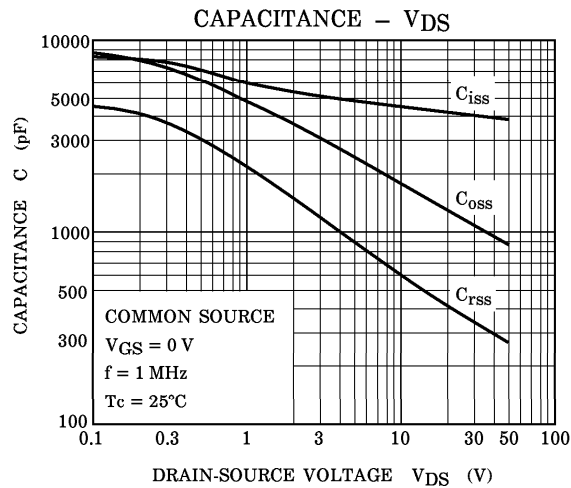
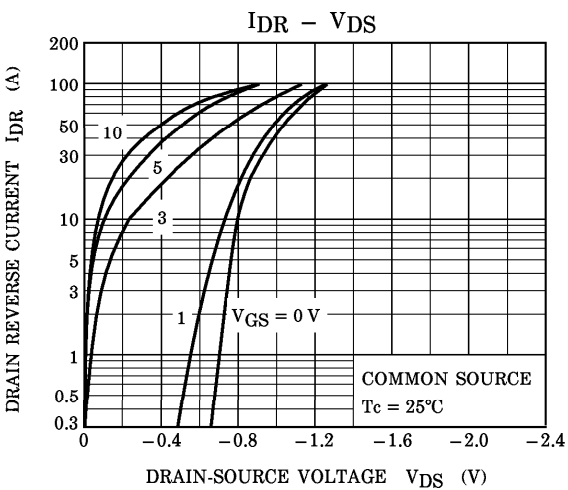
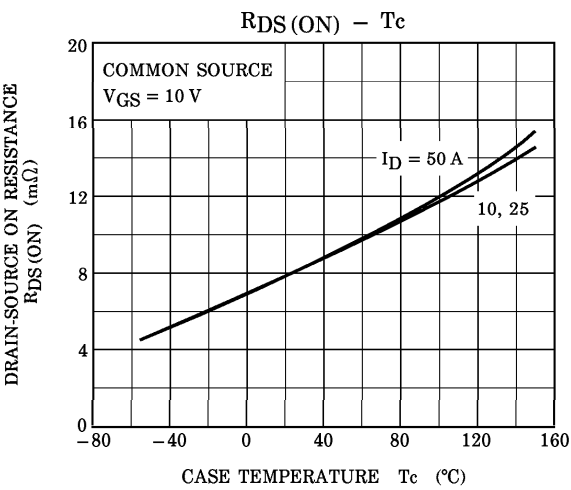
※ Lot Number

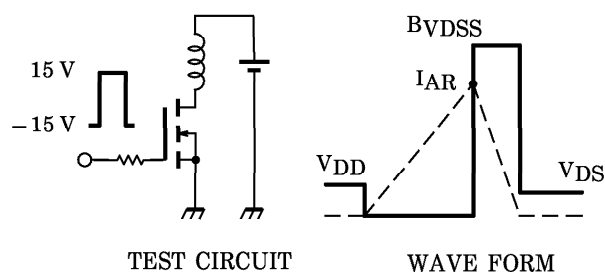
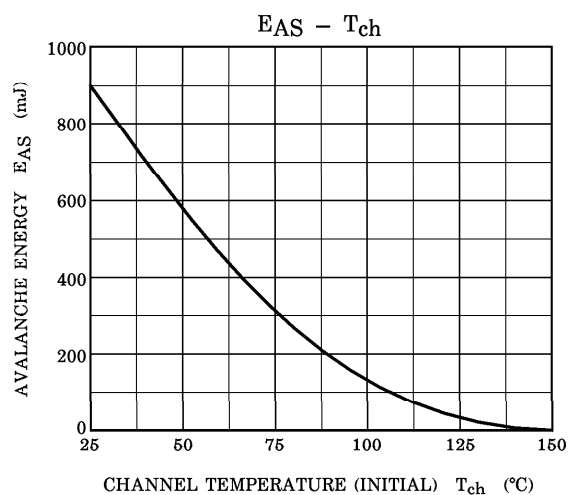
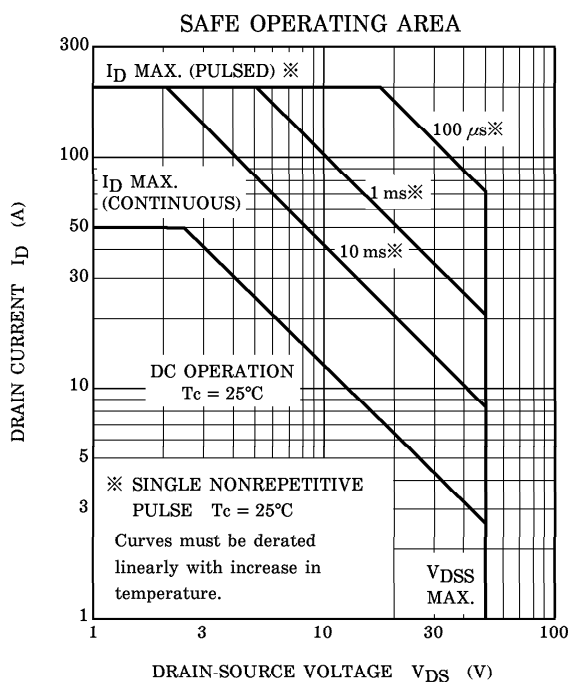
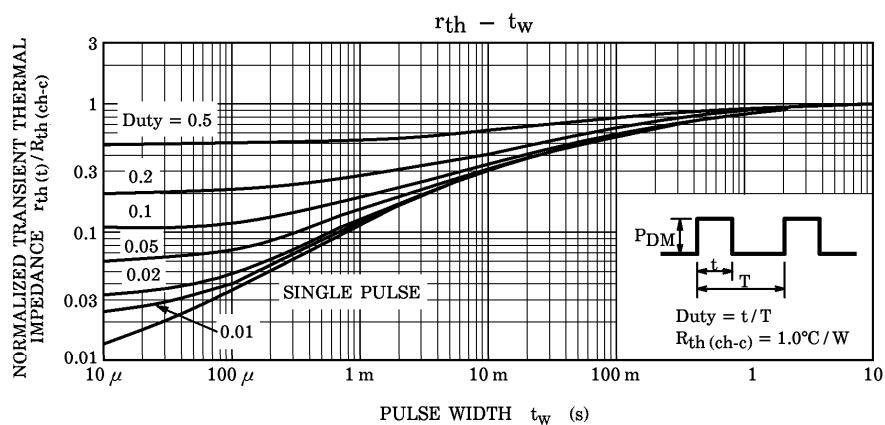


Month (Starting from Alphabet A)

Year (Last Number of the Christian Era)







Peak  $I_{AR} = 50$  A,  $R_G = 25 \Omega$   
 $V_{DD} = 25$  V,  $L = 440 \mu\text{H}$

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