

**TOSHIBA****2SK2996**TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE ( $\pi$ -MOS V)**2SK2996**

HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

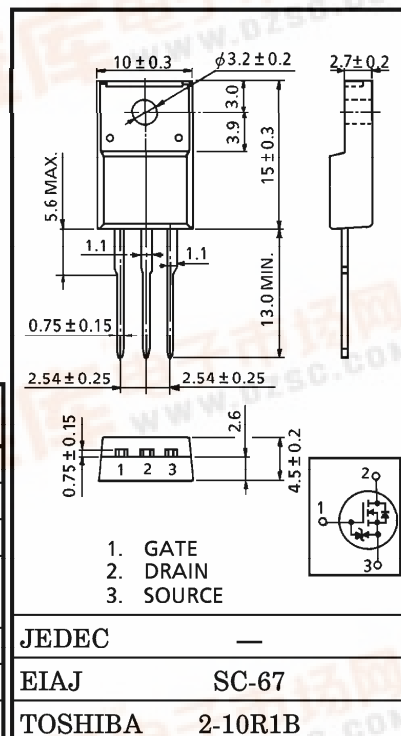
INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.74\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 6.8S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100\mu A$  (Max.) ( $V_{DS} = 600V$ )
- Enhancement-Mode :  $V_{th} = 2.0 \sim 4.0V$  ( $V_{DS} = 10V$ ,  $I_D = 1mA$ )

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

| CHARACTERISTIC                                 | SYMBOL    | RATING         | UNIT       |
|------------------------------------------------|-----------|----------------|------------|
| Drain-Source Voltage                           | $V_{DSS}$ | 600            | V          |
| Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ )    | $V_{DGR}$ | 600            | V          |
| Gate-Source Voltage                            | $V_{GSS}$ | $\pm 30$       | V          |
| Drain Current                                  | DC        | $I_D$          | A          |
|                                                | Pulse     | $I_{DP}$       |            |
| Drain Power Dissipation ( $T_c = 25^\circ C$ ) | $P_D$     | 45             | W          |
| Single Pulse Avalanche Energy**                | $E_{AS}$  | 252            | mJ         |
| Avalanche Current                              | $I_{AR}$  | 10             | A          |
| Repetitive Avalanche Energy*                   | $E_{AR}$  | 4.5            | mJ         |
| Channel Temperature                            | $T_{ch}$  | 150            | $^\circ C$ |
| Storage Temperature Range                      | $T_{stg}$ | $-55 \sim 150$ | $^\circ C$ |



Weight : 1.9g

## THERMAL CHARACTERISTICS

| CHARACTERISTIC                         | SYMBOL         | MAX. | UNIT         |
|----------------------------------------|----------------|------|--------------|
| Thermal Resistance, Channel to Case    | $R_{th(ch-c)}$ | 2.78 | $^\circ C/W$ |
| Thermal Resistance, Channel to Ambient | $R_{th(ch-a)}$ | 62.5 | $^\circ C/W$ |

Note ;

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

\*\*  $V_{DD} = 90V$ ,  $T_{ch} = 25^\circ C$ ,  $L = 4.41mH$ ,  $R_G = 25\Omega$ ,  $I_{AR} = 10A$ 

This transistor is an electrostatic sensitive device.

Please handle with caution.

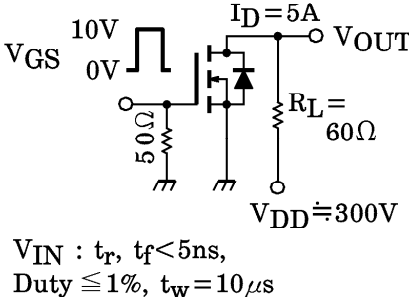
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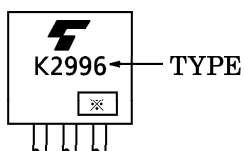
## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC                                  |               | SYMBOL        | TEST CONDITION                                                                      | MIN.     | TYP. | MAX.     | UNIT     |
|-------------------------------------------------|---------------|---------------|-------------------------------------------------------------------------------------|----------|------|----------|----------|
| Gate Leakage Current                            |               | $I_{GSS}$     | $V_{GS} = \pm 25V, V_{DS} = 0V$                                                     | —        | —    | $\pm 10$ | $\mu A$  |
| Gate-Source Breakdown Voltage                   |               | $V_{(BR)GSS}$ | $I_G = \pm 10\mu A, V_{DS} = 0V$                                                    | $\pm 30$ | —    | —        | V        |
| Drain Cut-off Current                           |               | $I_{DSS}$     | $V_{DS} = 600V, V_{GS} = 0V$                                                        | —        | —    | 100      | $\mu A$  |
| Drain-Source Breakdown Voltage                  |               | $V_{(BR)DSS}$ | $I_D = 10mA, V_{GS} = 0V$                                                           | 600      | —    | —        | V        |
| Gate Threshold Voltage                          |               | $V_{th}$      | $V_{DS} = 10V, I_D = 1mA$                                                           | 2.0      | —    | 4.0      | V        |
| Drain-Source ON Resistance                      |               | $R_{DS(ON)}$  | $V_{GS} = 10V, I_D = 5A$                                                            | —        | 0.74 | 1.0      | $\Omega$ |
| Forward Transfer Admittance                     |               | $ Y_{fs} $    | $V_{DS} = 10V, I_D = 5A$                                                            | 3.4      | 6.8  | —        | S        |
| Input Capacitance                               |               | $C_{iss}$     | $V_{DS} = 20V, V_{GS} = 0V, f = 1MHz$                                               | —        | 1500 | —        | pF       |
| Reverse Transfer Capacitance                    |               | $C_{rss}$     |                                                                                     | —        | 13   | —        |          |
| Output Capacitance                              |               | $C_{oss}$     |                                                                                     | —        | 140  | —        |          |
| Switching Time                                  | Rise Time     | $t_r$         |  | —        | 15   | —        | ns       |
|                                                 | Turn-on Time  | $t_{on}$      |                                                                                     | —        | 55   | —        |          |
|                                                 | Fall Time     | $t_f$         |                                                                                     | —        | 27   | —        |          |
|                                                 | Turn-off Time | $t_{off}$     |                                                                                     | —        | 145  | —        |          |
| Total Gate Charge (Gate-Source Plus Gate-Drain) |               | $Q_g$         | $V_{DD} = 400V, V_{GS} = 10V, I_D = 10A$                                            | —        | 38   | —        | nC       |
| Gate-Source Charge                              |               | $Q_{gs}$      |                                                                                     | —        | 21   | —        |          |
| Gate-Drain ("Miller") Charge                    |               | $Q_{gd}$      |                                                                                     | —        | 17   | —        |          |

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

| CHARACTERISTIC                   | SYMBOL    | TEST CONDITION              | MIN. | TYP. | MAX. | UNIT    |
|----------------------------------|-----------|-----------------------------|------|------|------|---------|
| Continuous Drain Reverse Current | $I_{DR}$  | —                           | —    | —    | 10   | A       |
| Pulse Drain Reverse Current      | $I_{DRP}$ | —                           | —    | —    | 30   | A       |
| Diode Forward Voltage            | $V_{DSF}$ | $I_{DR} = 10A, V_{GS} = 0V$ | —    | —    | —1.7 | V       |
| Reverse Recovery Time            | $t_{rr}$  | $I_{DR} = 10A, V_{GS} = 0V$ | —    | 380  | —    | ns      |
| Reverse Recovery Charge          | $Q_{rr}$  | $dI_{DR}/dt = 100A/\mu s$   | —    | 3.6  | —    | $\mu C$ |

## MARKING



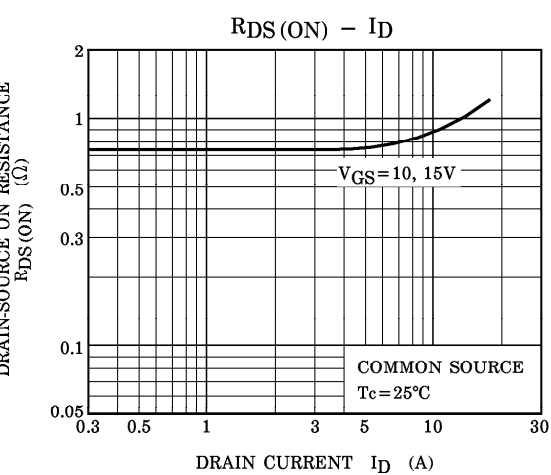
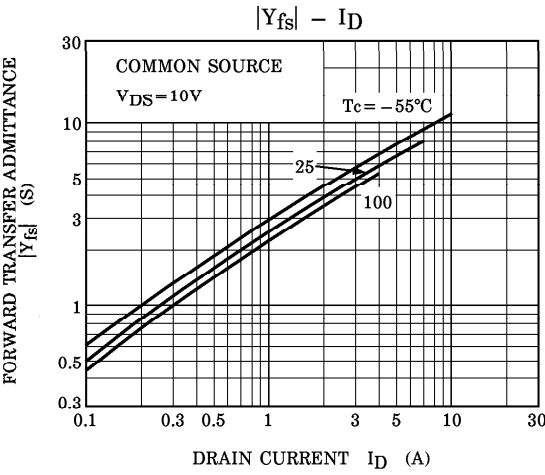
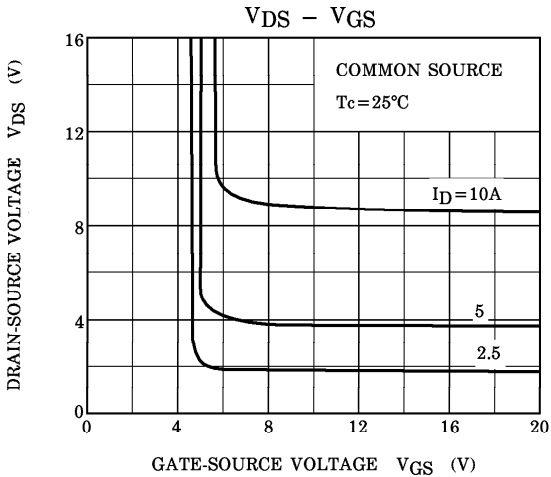
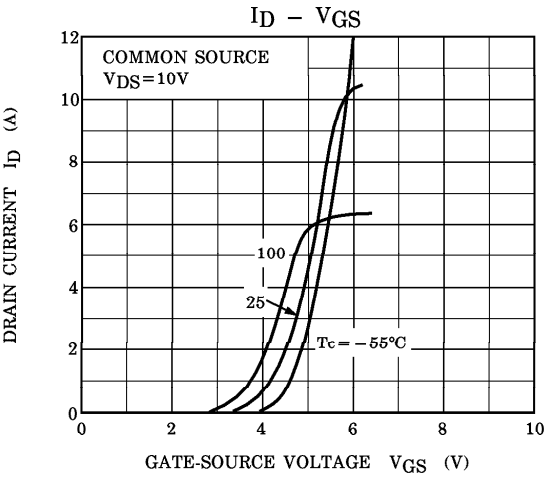
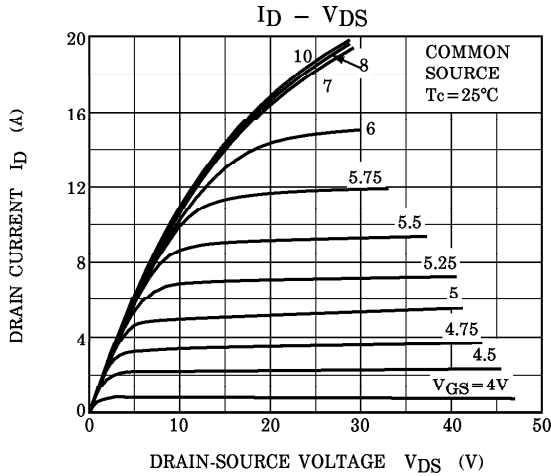
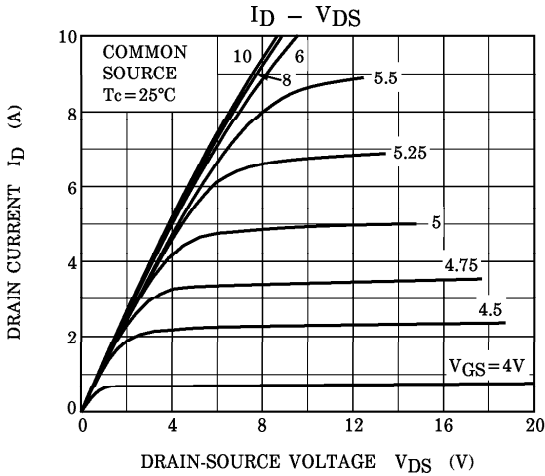
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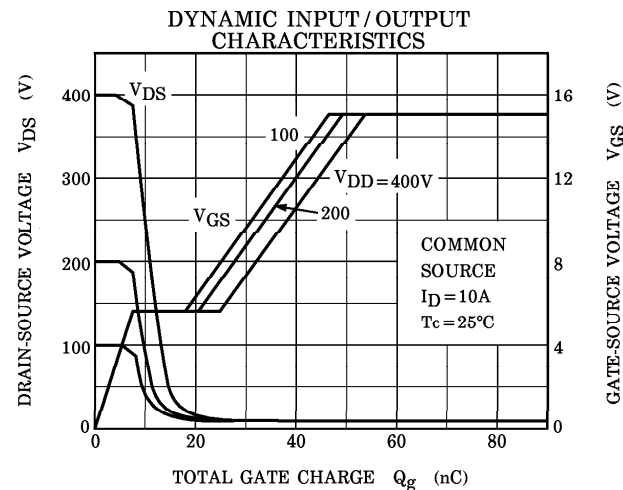
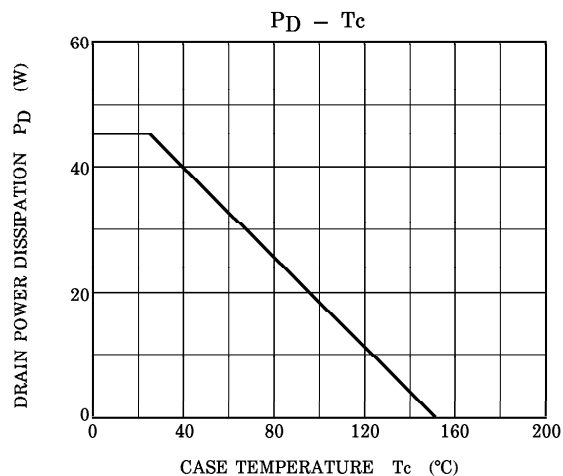
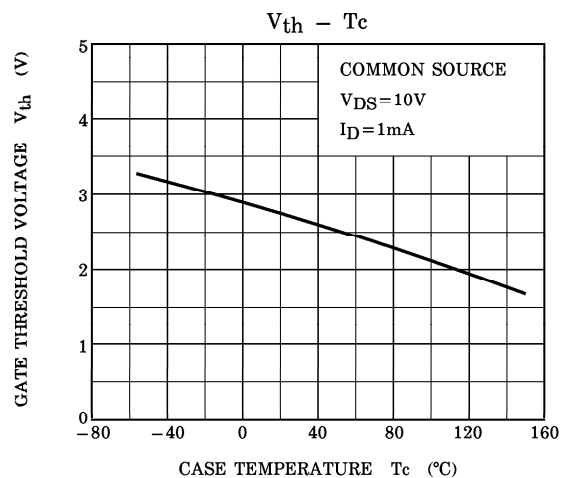
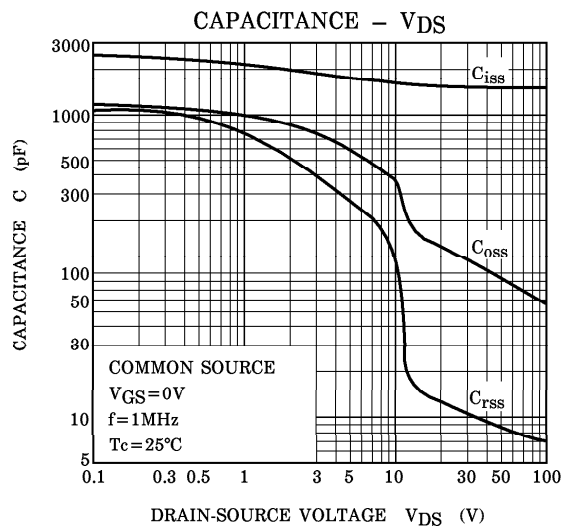
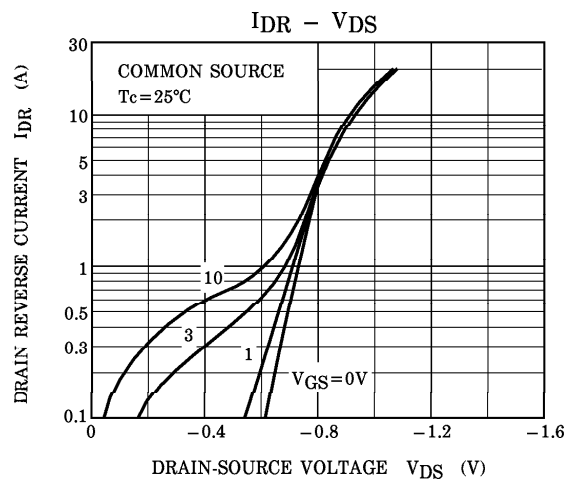
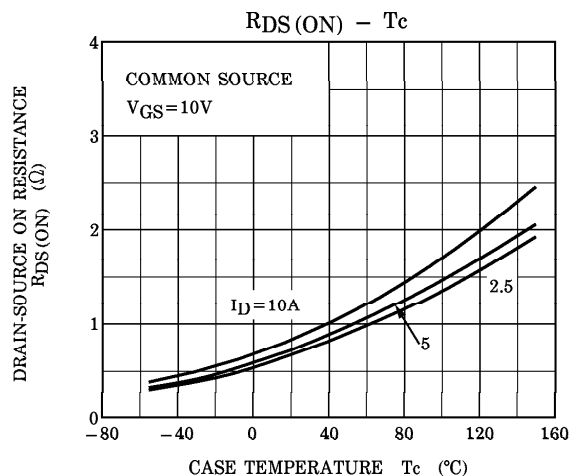
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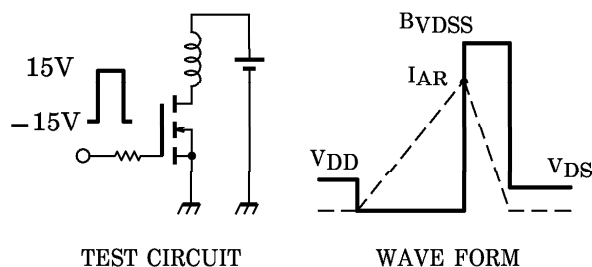
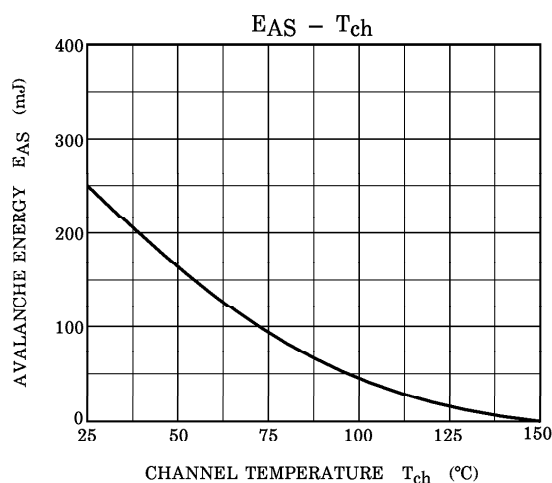
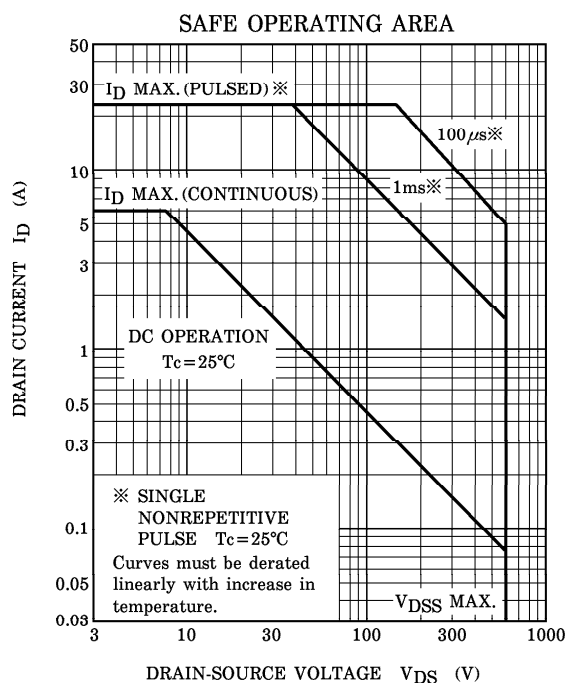
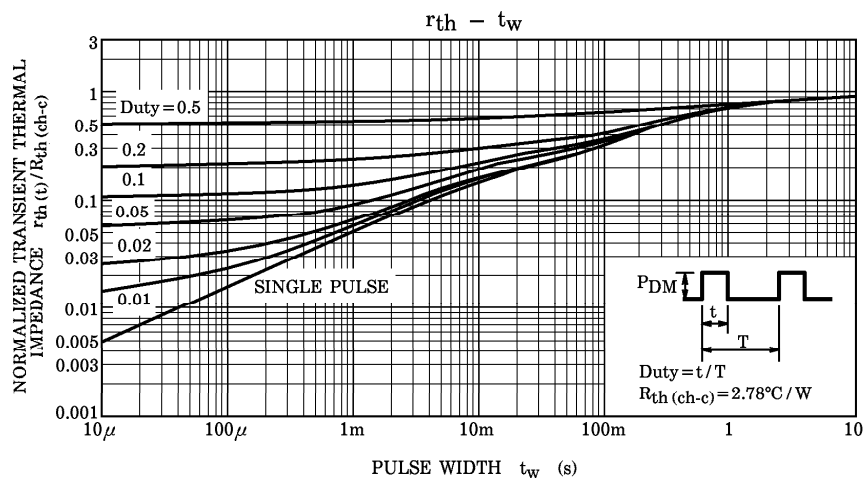


Month (Starting from Alphabet A)

Year (Last Number of the Christian Era)







Peak  $I_{AR}=10A$ ,  $R_G=25\Omega$   
 $V_{DD}=90V$ ,  $L=4.41mH$

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