

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE ( $L^2$ - $\pi$ -MOS V)**2SK2376**

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

- 4V Gate Drive
- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 13m\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 40S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100\mu A$  (Max.) ( $V_{DS} = 60V$ )
- Enhancement-Mode :  $V_{th} = 0.8 \sim 2.0V$  ( $V_{DS} = 10V$ ,  $I_D = 1mA$ )

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

| CHARACTERISTIC                                 |       | SYMBOL    | RATING         | UNIT       |
|------------------------------------------------|-------|-----------|----------------|------------|
| Drain-Source Voltage                           |       | $V_{DSS}$ | 60             | V          |
| Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ )    |       | $V_{DGR}$ | 60             | V          |
| Gate-Source Voltage                            |       | $V_{GSS}$ | $\pm 20$       | V          |
| Drain Current                                  | DC    | $I_D$     | 45             | A          |
|                                                | Pulse | $I_{DP}$  | 180            | A          |
| Drain Power Dissipation ( $T_c = 25^\circ C$ ) |       | $P_D$     | 100            | W          |
| Single Pulse Avalanche Energy**                |       | $E_{AS}$  | 701            | mJ         |
| Avalanche Current                              |       | $I_{AR}$  | 45             | A          |
| Repetitive Avalanche Energy*                   |       | $E_{AR}$  | 10             | mJ         |
| Channel Temperature                            |       | $T_{ch}$  | 150            | $^\circ C$ |
| Storage Temperature Range                      |       | $T_{stg}$ | $-55 \sim 150$ | $^\circ C$ |

## THERMAL CHARACTERISTICS

| CHARACTERISTIC                         | 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 ;

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

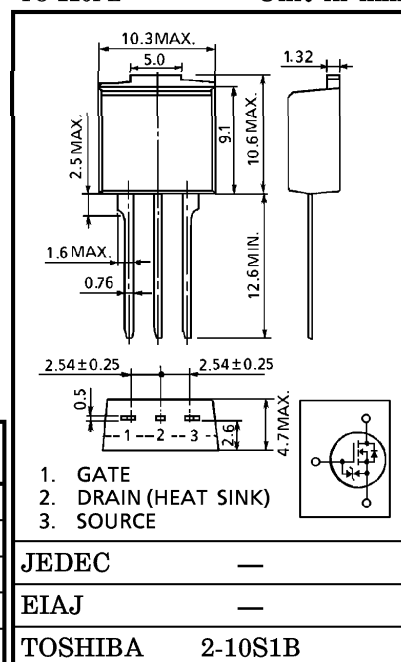
\*\*  $V_{DD} = 25V$ , Starting  $T_{ch} = 25^\circ C$ ,  $L = 471\mu H$ ,  $R_G = 25\Omega$ ,  $I_{AR} = 45A$ 

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

## INDUSTRIAL APPLICATIONS

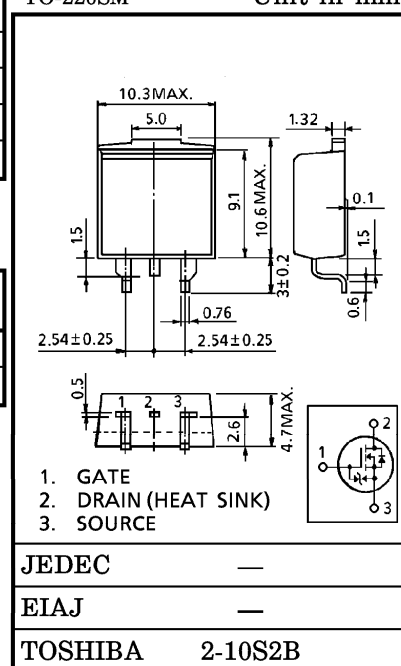
TO-220FL

Unit in mm



TO-220SM

Unit in mm

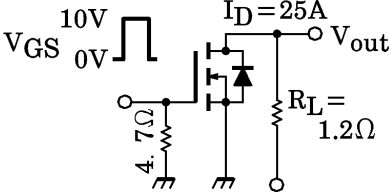


Weight : 1.5g

961001EAA2

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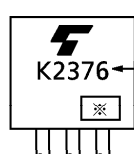
## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC                                  |               | SYMBOL                | TEST CONDITION                                                                      | MIN. | TYP. | MAX. | UNIT |
|-------------------------------------------------|---------------|-----------------------|-------------------------------------------------------------------------------------|------|------|------|------|
| Gate Leakage Current                            |               | I <sub>GSS</sub>      | V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V                                          | —    | —    | ±10  | μA   |
| Drain Cut-off Current                           |               | I <sub>DSS</sub>      | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V                                           | —    | —    | 100  | μA   |
| Drain-Source Breakdown Voltage                  |               | V <sub>(BR) DSS</sub> | I <sub>D</sub> =10mA, V <sub>GS</sub> =0V                                           | 60   | —    | —    | V    |
| Gate Threshold Voltage                          |               | V <sub>th</sub>       | V <sub>DS</sub> =10V, I <sub>D</sub> =1mA                                           | 0.8  | —    | 2.0  | V    |
| Drain-Source ON Resistance                      |               | R <sub>DS (ON)</sub>  | V <sub>GS</sub> =4V, I <sub>D</sub> =25A                                            | —    | 19   | 25   | mΩ   |
|                                                 |               |                       | V <sub>GS</sub> =10V, I <sub>D</sub> =25A                                           | —    | 13   | 17   |      |
| Forward Transfer Admittance                     |               | Y <sub>fs</sub>       | V <sub>DS</sub> =10V, I <sub>D</sub> =25A                                           | 28   | 40   | —    | S    |
| Input Capacitance                               |               | C <sub>iss</sub>      | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V<br>f=1MHz                                 | —    | 3350 | —    | pF   |
| Reverse Transfer Capacitance                    |               | C <sub>rss</sub>      |                                                                                     | —    | 550  | —    |      |
| Output Capacitance                              |               | C <sub>oss</sub>      |                                                                                     | —    | 1600 | —    |      |
| Switching Time                                  | Rise Time     | t <sub>r</sub>        |  | —    | 25   | —    | ns   |
|                                                 | Turn-on Time  | t <sub>on</sub>       |                                                                                     | —    | 55   | —    |      |
|                                                 | Fall Time     | t <sub>f</sub>        |                                                                                     | —    | 60   | —    |      |
|                                                 | Turn-off Time | t <sub>off</sub>      |                                                                                     | —    | 180  | —    |      |
| Total Gate Charge (Gate-Source Plus Gate-Drain) |               | Q <sub>g</sub>        | V <sub>DD</sub> ≐48V, V <sub>GS</sub> =10V<br>I <sub>D</sub> =45A                   | —    | 110  | —    | nC   |
| Gate-Source Charge                              |               | Q <sub>gs</sub>       |                                                                                     | —    | 70   | —    |      |
| Gate-Drain (“Miller”) Charge                    |               | Q <sub>gd</sub>       |                                                                                     | —    | 40   | —    |      |

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

| CHARACTERISTIC                   | SYMBOL    | TEST CONDITION               | MIN. | TYP. | MAX. | UNIT    |
|----------------------------------|-----------|------------------------------|------|------|------|---------|
| Continuous Drain Reverse Current | $I_{DR}$  | —                            | —    | —    | 45   | A       |
| Pulse Drain Reverse Current      | $I_{DRP}$ | —                            | —    | —    | 180  | A       |
| Diode Forward Voltage            | $V_{DSF}$ | $I_{DR} = 45A, V_{GS} = 0V$  | —    | —    | -1.7 | V       |
| Reverse Recovery Time            | $t_{rr}$  | $I_{DR} = 45A, V_{GS} = 0V$  | —    | 120  | —    | ns      |
| Reverse Recovery Charge          | $Q_{rr}$  | $dI_{DR} / dt = 50A / \mu s$ | —    | 0.2  | —    | $\mu C$ |

## MARKING



TYPE

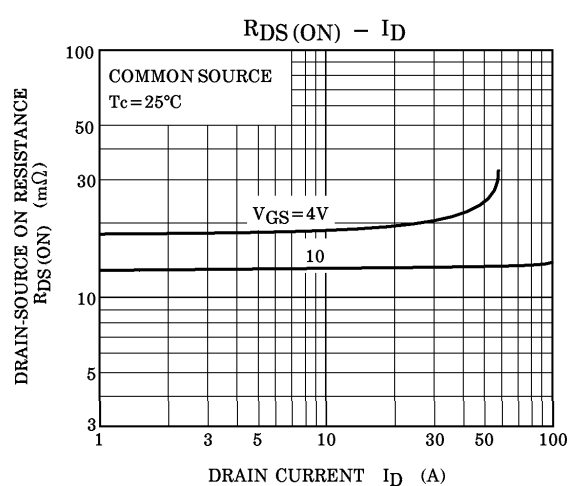
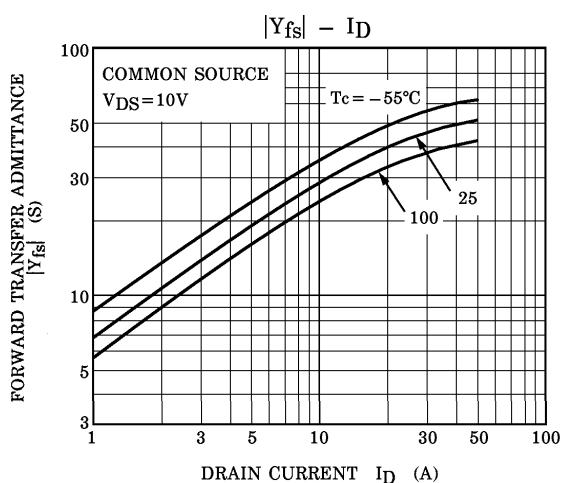
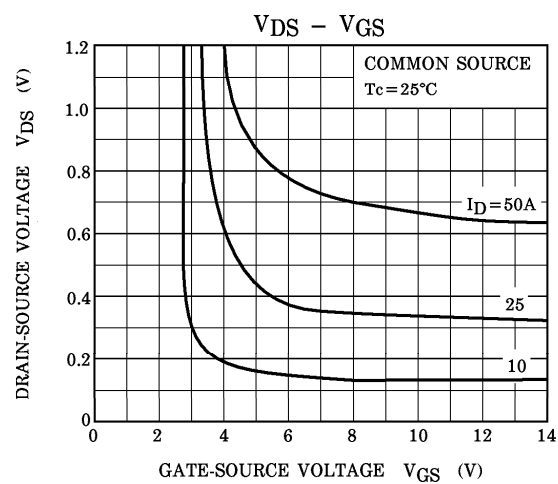
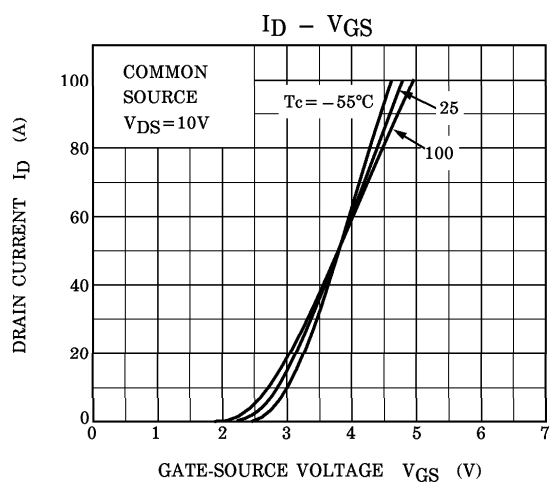
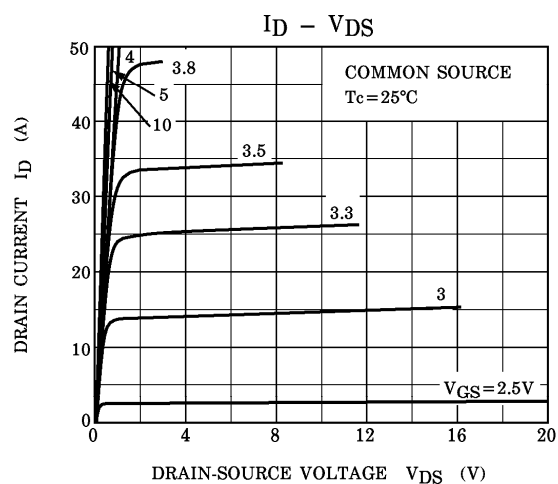
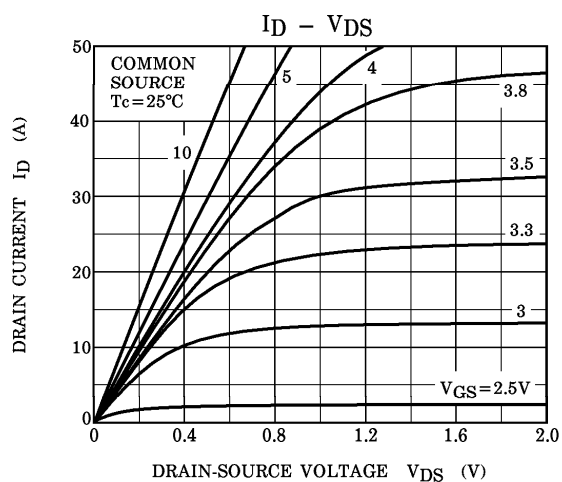
※ Lot Number

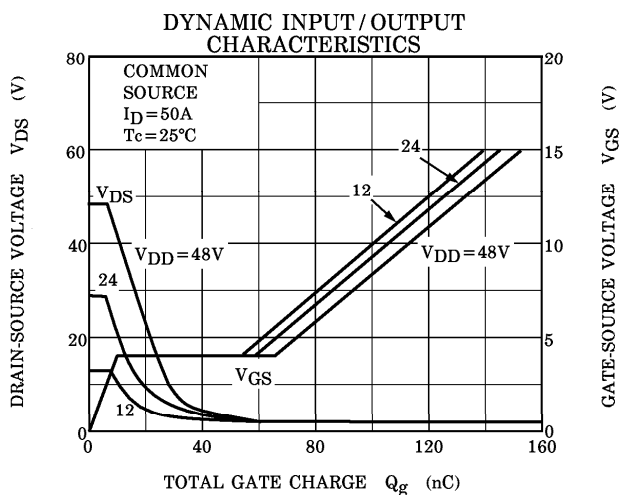
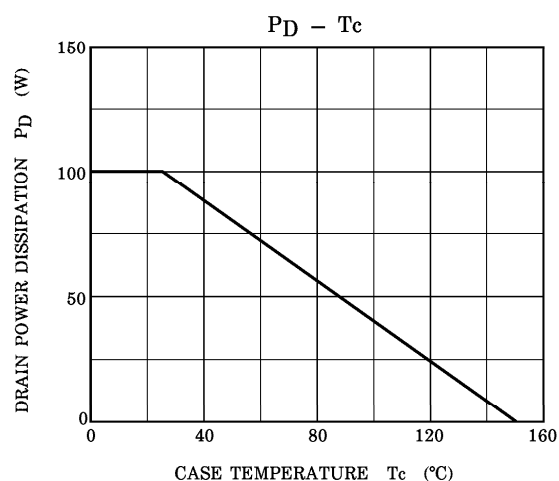
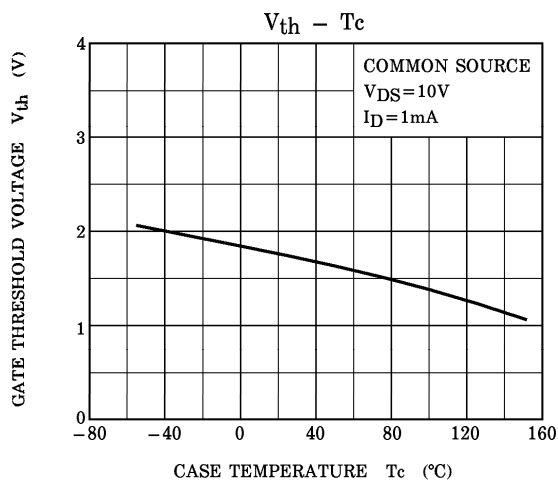
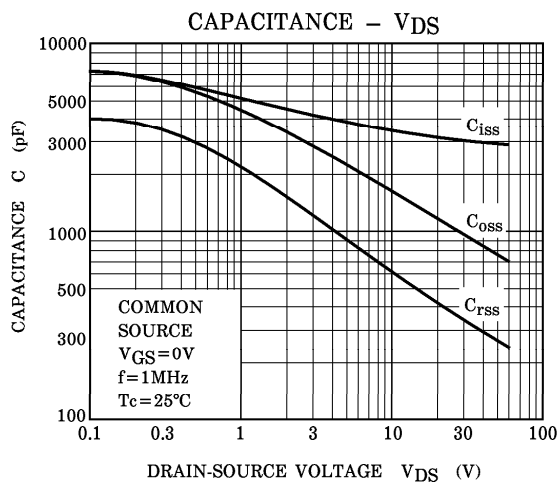
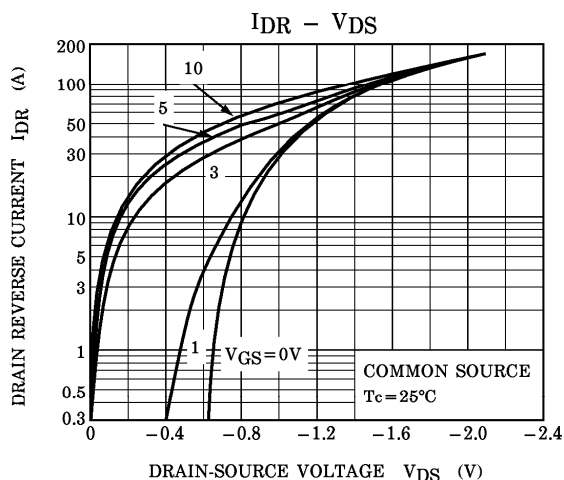
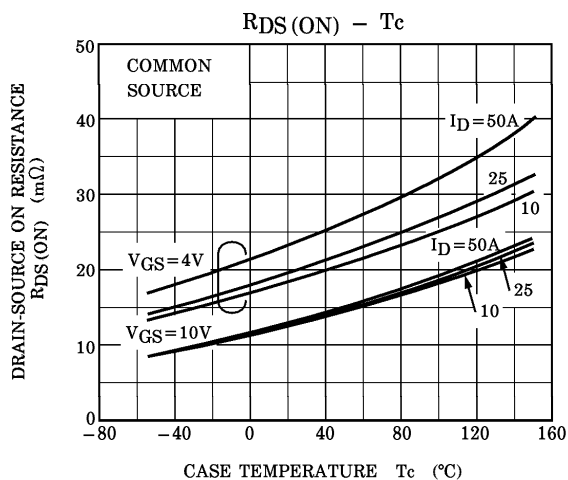


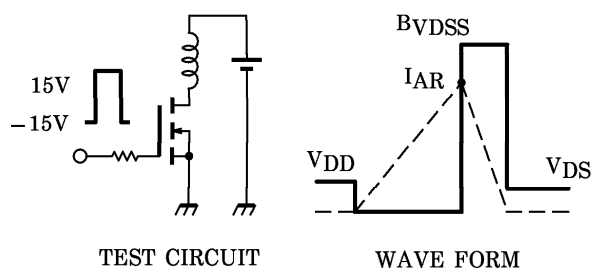
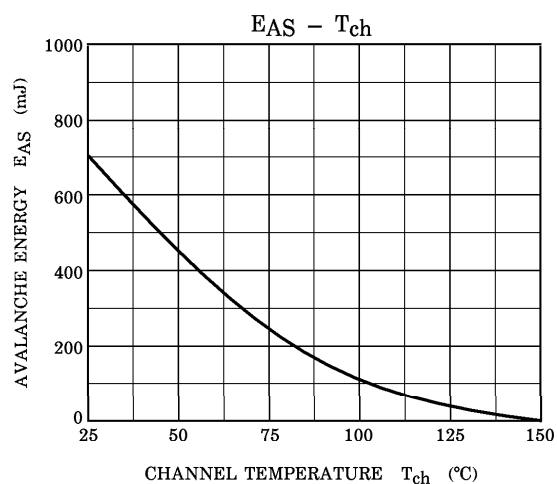
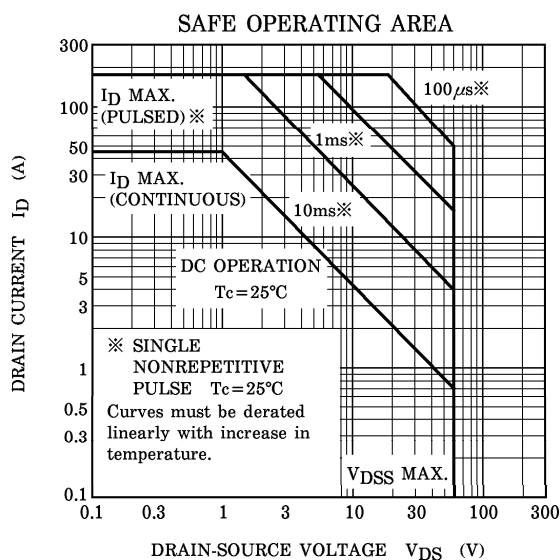
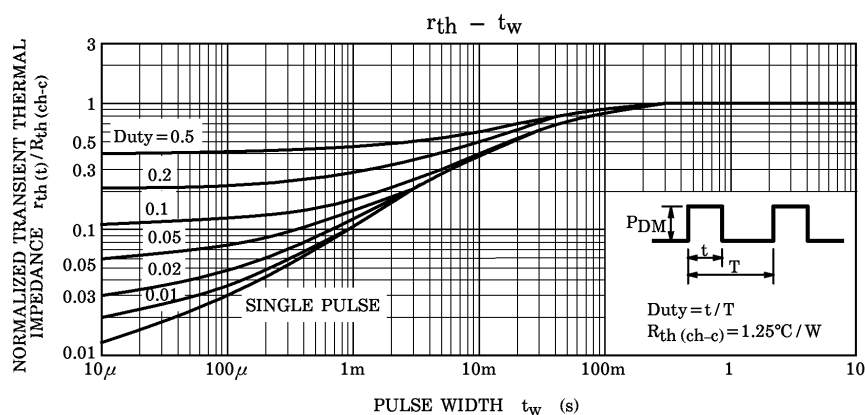
Month (Starting from Alphabet A)



Year (Last Number of the Christian Era)







Peak  $I_{AR} = 45A$ ,  $R_G = 25\Omega$   
 $V_{DD} = 25V$ ,  $L = 471\mu H$

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