

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L<sup>2</sup>-π-MOSV)

# 2SK2782

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

- 4V Gate Drive
- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.039\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 11S$  (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 (Ta = 25°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        | $I_D$    | 20 A |
|   | Pulse     | $I_{DP}$ | 50 A |
| Drain Power Dissipation (Tc = 25°C)         | $P_D$     | 40       | W    |
| Single Pulse Avalanche Energy**             | $E_{AS}$  | 156      | mJ   |
| Avalanche Current                           | $I_{AR}$  | 20       | A    |
| Repetitive Avalanche Energy*                | $E_{AR}$  | 4        | mJ   |
| Channel Temperature                         | $T_{ch}$  | 150      | °C   |
| Storage Temperature Range                   | $T_{stg}$ | -55~150  | °C   |

Thermal Characteristics

| CHARACTERISTIC                         | SYMBOL         | MAX.  | UNIT |
|--|----------------|-------|------|
| Thermal Resistance, Channel to Case    | $R_{th(ch-c)}$ | 3.125 | °C/W |
| Thermal Resistance, Channel to Ambient | $R_{th(ch-a)}$ | 125   | °C/W |

Note ;

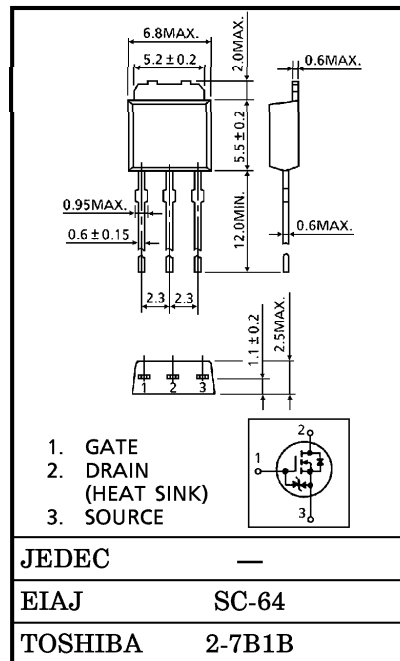
\* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

\*\*  $V_{DD} = 25V$ , Starting  $T_{ch} = 25^\circ C$ ,  $L = 530\mu H$ ,  $R_G = 25\Omega$ ,  $I_D = 20A$

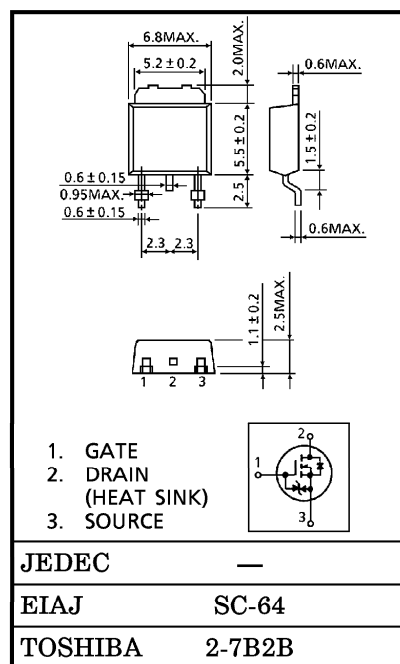
**This transistor is an electrostatic sensitive device. Please handle with caution.**

INDUSTRIAL APPLICATIONS

Unit in mm



Weight : 0.36g



Weight : 0.36g

961001EAA2

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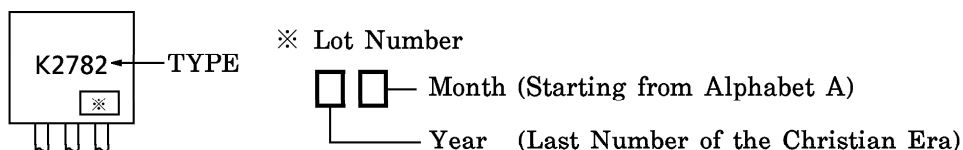
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

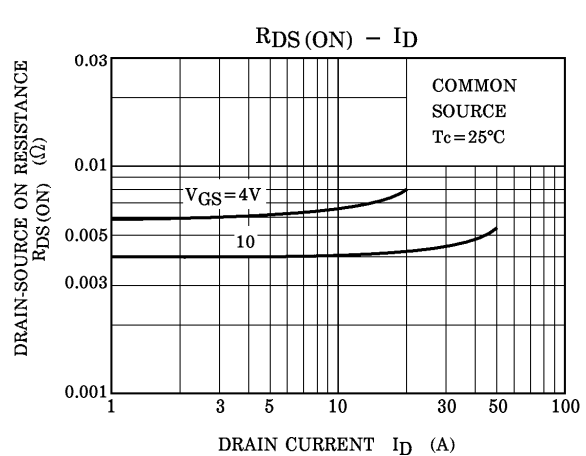
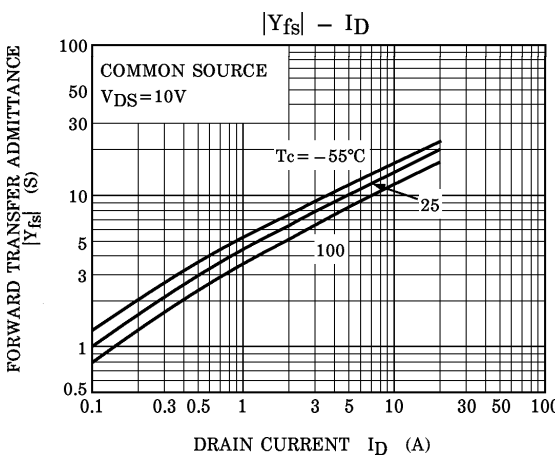
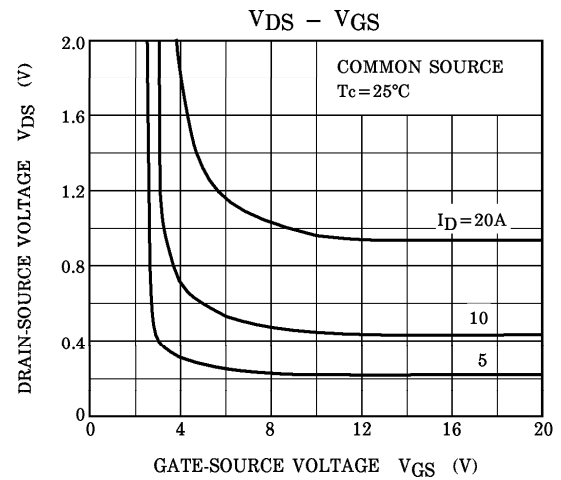
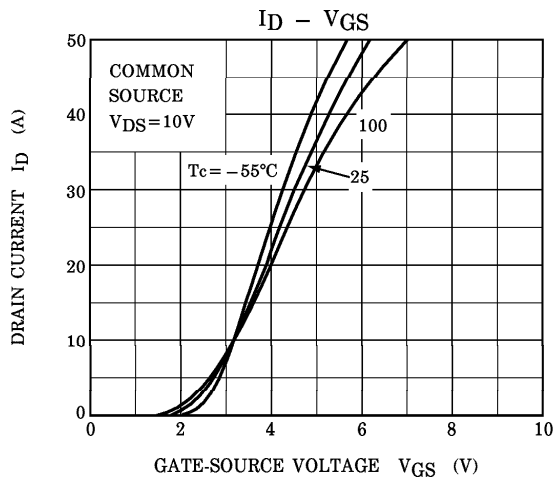
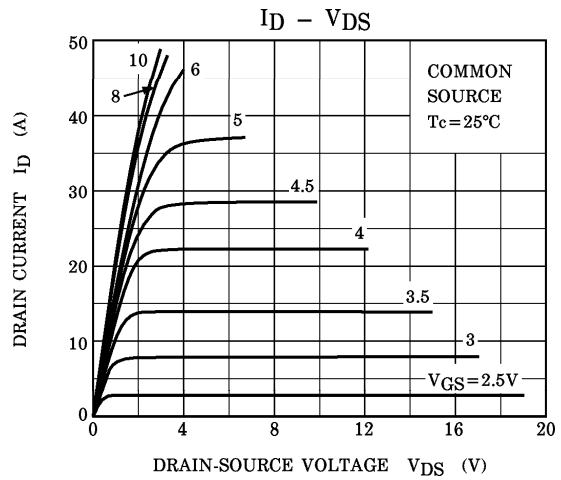
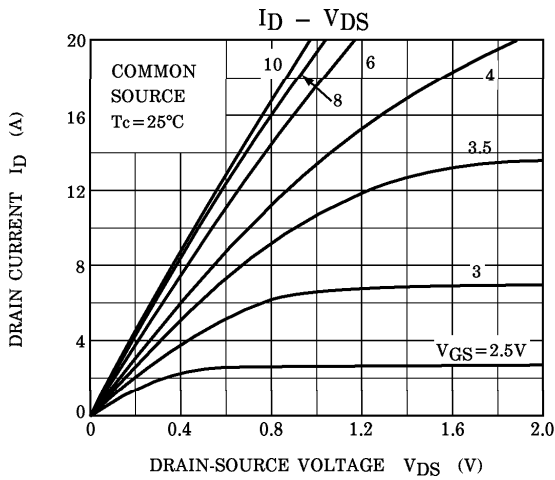
| CHARACTERISTIC                                  |               | SYMBOL   | TEST CONDITION   | MIN. | TYP.  | MAX.  | UNIT |
|---|---------------|----------|--|------|-------|-------|------|
| Gate Leakage Current                            |               | IGSS     | VGS = ±16V, VDS = 0V   | —    | —     | ±10   | μA   |
| Drain Cut-off Current                           |               | IDSS     | VDS = 60V, VGS = 0V  | —    | —     | 100   | μA   |
| Drain-Source Breakdown Voltage                  |               | V(BR)DSS | ID = 10mA, VGS = 0V  | 60   | —     | —     | V    |
| Gate Threshold Voltage                          |               | Vth      | VDS = 10V, ID = 1mA  | 0.8  | —     | 2.0   | V    |
| Drain-Source ON Resistance                      |               | RDS(ON)  | VGS = 4V, ID = 5A  | —    | 0.06  | 0.09  | Ω    |
|   |               |          | VGS = 10V, ID = 10A  | —    | 0.039 | 0.055 |      |
| Forward Transfer Admittance                     |               | Yfs      | VDS = 10V, ID = 10A  | 7    | 11    | —     | S    |
| Input Capacitance                               |               | Ciss     | VDS = 10V, VGS = 0V<br>f = 1MHz  | —    | 880   | —     | pF   |
| Reverse Transfer Capacitance                    |               | Crss     |  | —    | 90    | —     |      |
| Output Capacitance                              |               | Coss     |  | —    | 330   | —     |      |
| Switching Time                                  | Rise Time     | tr       | <p>VGS 10V 0V, ID = 10A, RL = 3.0Ω, VDD ≐ 30V</p> <p>VIN : tr, tf &lt; 5ns, Duty ≤ 1%, tw = 10μs</p> | —    | 15    | —     | ns   |
|   | Turn-on Time  | ton      |  | —    | 25    | —     |      |
|   | Fall Time     | tf       |  | —    | 30    | —     |      |
|   | Turn-off Time | toff     |  | —    | 100   | —     |      |
| Total Gate Charge (Gate-Source Plus Gate-Drain) |               | Qg       | VDD ≐ 48V, VGS = 10V<br>ID = 20A   | —    | 25    | —     | nC   |
| Gate-Source Charge                              |               | Qgs      |  | —    | 19    | —     |      |
| Gate-Drain ("Miller") Charge                    |               | Qgd      |  | —    | 6     | —     |      |

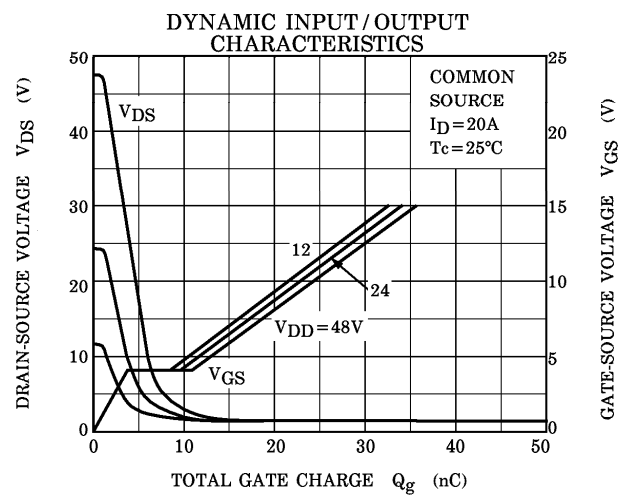
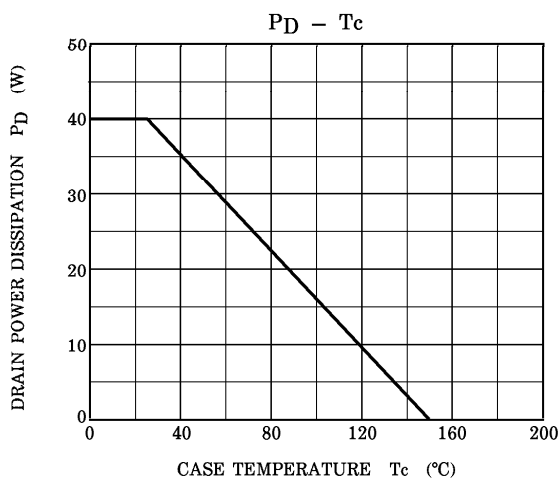
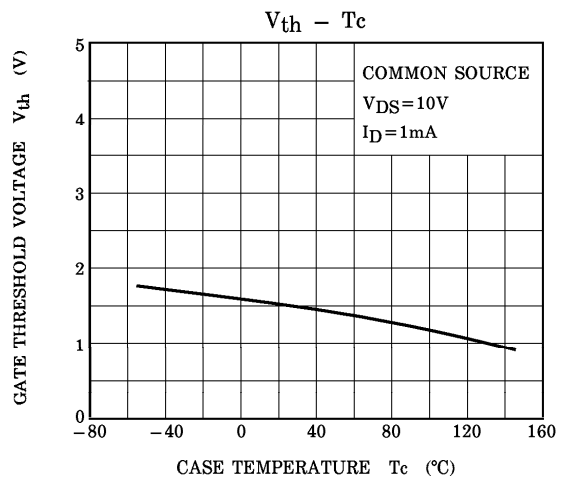
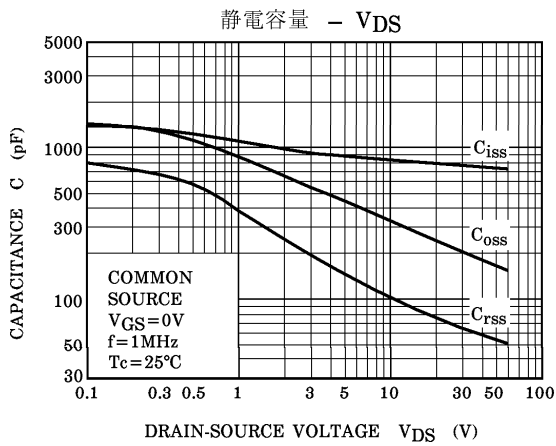
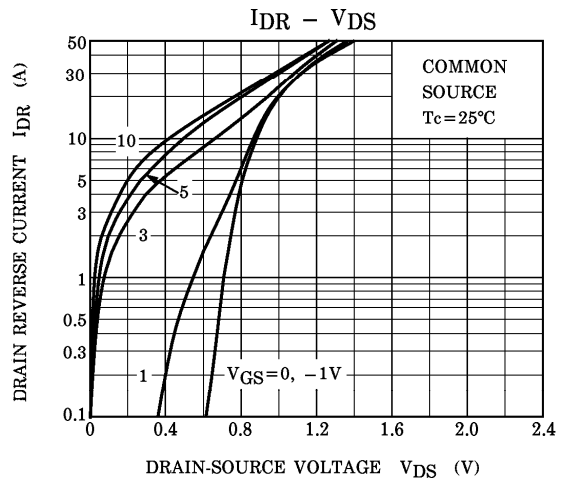
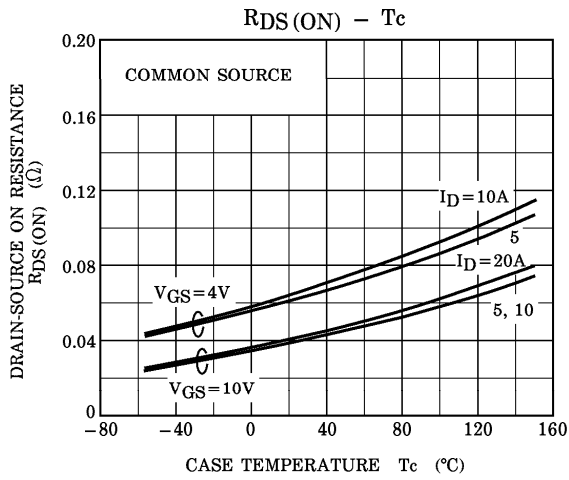
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

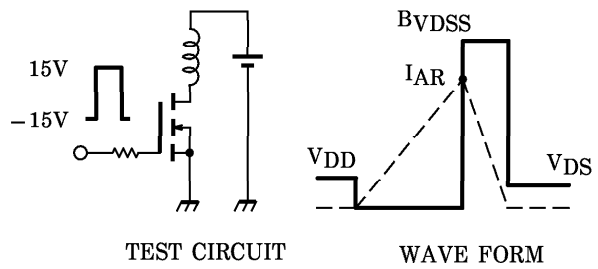
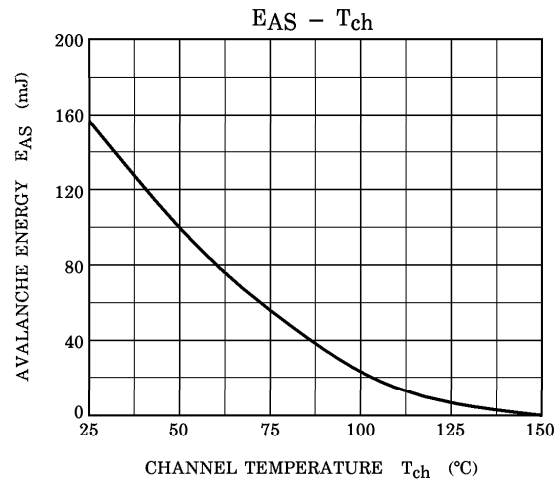
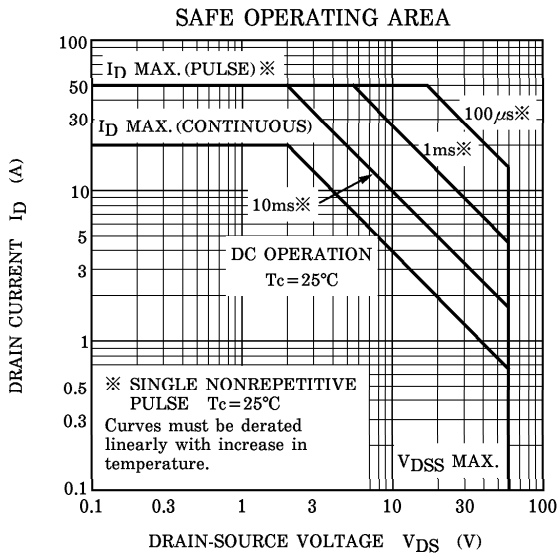
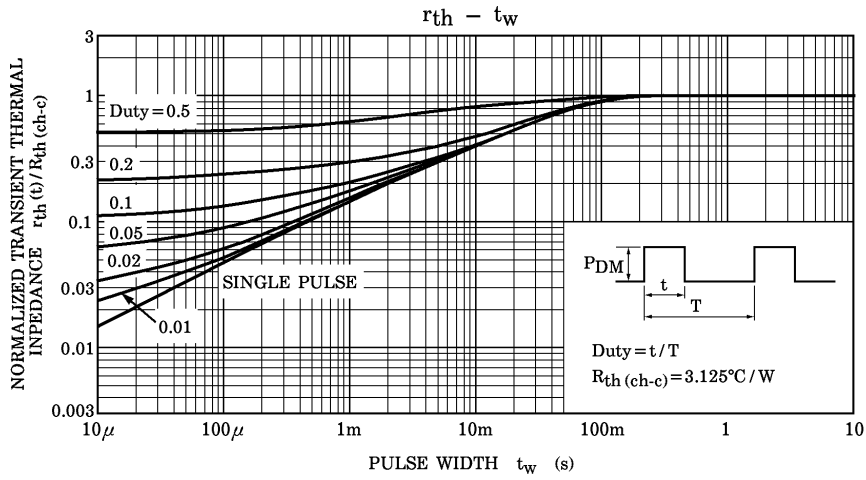
| CHARACTERISTIC                   | SYMBOL | TEST CONDITION       | MIN. | TYP. | MAX. | UNIT |
|----------------------------------|--------|----------------------|------|------|------|------|
| Continuous Drain Reverse Current | IDR    | —                    | —    | —    | 20   | A    |
| Pulse Drain Reverse Current      | IDRP   | —                    | —    | —    | 50   | A    |
| Diode Forward Voltage            | VDSF   | IDR = 20A, VGS = 0V  | —    | —    | -2.0 | V    |
| Reverse Recovery Time            | trr    | IDR = 20A, VGS = 0V  | —    | 60   | —    | ns   |
| Reverse Recovery Charge          | Qrr    | dIDR / dt = 50A / μs | —    | 45   | —    | μC   |

MARKING









Peak  $I_{AR} = 20A$ ,  $R_G = 25\Omega$   
 $V_{DD} = 25V$ ,  $L = 530\mu H$

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