

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L²-π-MOSV)

2SK3205

HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS

SWITCHING REGULATOR APPLICATIONS, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

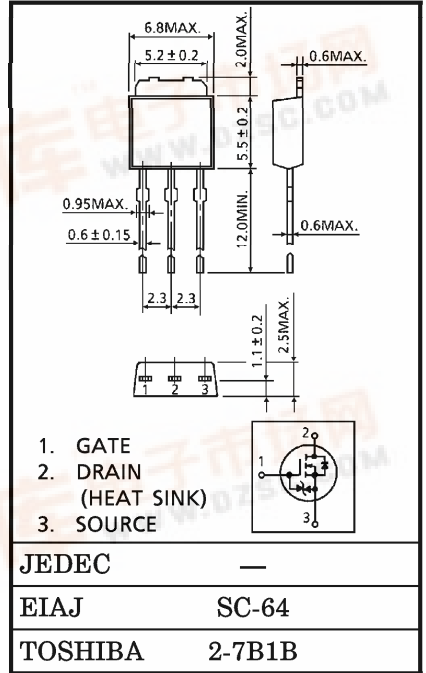
INDUSTRIAL APPLICATIONS

Unit in mm

- 4 V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 0.36 \Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 4.5 S$ (Typ.)
- Low Leakage Current : $I_{DSS} = 100 \mu A$ (Max.) ($V_{DS} = 150 V$)
- Enhancement-Mode : $V_{th} = 0.8 \sim 2.0 V$ ($V_{DS} = 10 V, I_D = 1mA$)

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

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|--|-----------|----------------|------------|
| Drain-Source Voltage | V_{DSS} | 150 | V |
| Drain-Gate Voltage ($R_{GS} = 20 k\Omega$) | V_{DGR} | 150 | V |
| Gate-Source Voltage | V_{GSS} | ± 20 | V |
| Drain Current | DC | I_D | 5 |
| | Pulse | I_{DP} | 20 |
| Drain Power Dissipation ($T_c = 25^\circ C$) | P_D | 20 | W |
| Single Pulse Avalanche Energy* | E_{AS} | 71 | mJ |
| Avalanche Current | I_{AR} | 5 | A |
| Repetitive Avalanche Energy** | E_{AR} | 2 | 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 | $R_{th(ch-c)}$ | 6.25 | $^\circ C / W$ |
| Thermal Resistance, Channel to Ambient | $R_{th(ch-a)}$ | 125 | $^\circ C / W$ |

Note ;

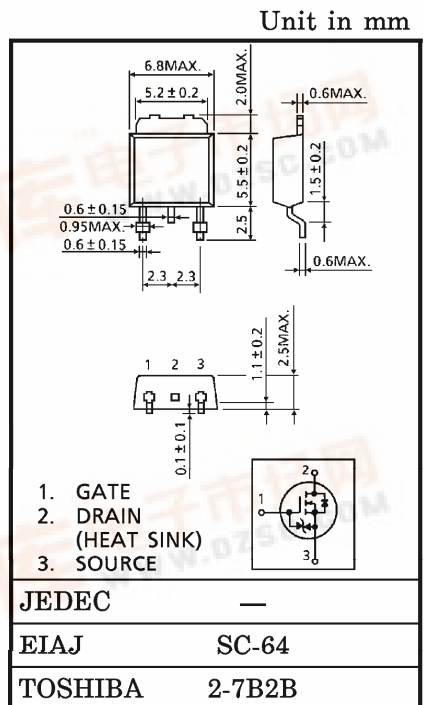
* $V_{DD} = 50 V, T_{ch} = 25^\circ C$ (initial), $L = 4.2 mH,$

$I_{AR} = 5 A, R_G = 25 \Omega$

** Repetitive rating ; Pulse Width Limited by Max.

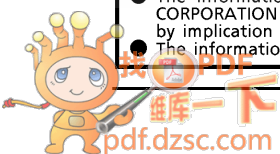
This transistor is an electrostatic sensitive device.

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} | $V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$ | — | — | ± 10 | μA | |
| Drain Cut-off Current | I_{DSS} | $V_{DS} = 150\text{ V}, V_{GS} = 0\text{ V}$ | — | — | 100 | μA | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$ | 150 | — | — | V | |
| Gate Threshold Voltage | V_{th} | $V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$ | 0.8 | — | 2.0 | V | |
| Drain-Source ON Resistance | $R_{DS(ON)}$ | $V_{GS} = 4\text{ V}, I_D = 2.5\text{ A}$ | — | 0.54 | 0.75 | Ω | |
| | $R_{DS(ON)}$ | $V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$ | — | 0.36 | 0.5 | | |
| Forward Transfer Admittance | $ Y_{fs} $ | $V_{DS} = 10\text{ V}, I_D = 2.5\text{ A}$ | 2.0 | 4.5 | — | S | |
| Input Capacitance | C_{iss} | $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$ | — | 330 | — | pF | |
| Reverse Transfer Capacitance | C_{rss} | | — | 50 | — | | |
| Output Capacitance | C_{oss} | | — | 145 | — | | |
| Switching Time | Rise Time | t_r | | — | 10 | — | ns |
| | Turn-on Time | t_{on} | | — | 15 | — | |
| | Fall Time | t_f | | — | 10 | — | |
| | Turn-off Time | t_{off} | | $V_{IN} : t_r, t_f < 5\text{ ns},$ $\text{Duty} \leq 1\%, t_w = 10\ \mu\text{s}$ | — | 60 | |
| Total Gate Charge (Gate-Source Plus Gate-Drain) | Q_g | $V_{DD} \cong 120\text{ V}, V_{GS} = 10\text{ V},$ $I_D = 5\text{ A}$ | — | 12 | — | nC | |
| Gate-Source Charge | Q_{gs} | | — | 8 | — | | |
| Gate-Drain (“Miller”) Charge | Q_{gd} | | — | 4 | — | | |

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

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|----------------------------------|-----------|--|------|------|------|------|
| Continuous Drain Reverse Current | I_{DR} | — | — | — | 5 | A |
| Pulse Drain Reverse Current | I_{DRP} | — | — | — | 20 | A |
| Diode Forward Voltage | V_{DSF} | $I_{DR} = 5\text{ A}, V_{GS} = 0\text{ V}$ | — | — | -1.7 | V |
| Reverse Recovery Time | t_{rr} | $I_{DR} = 5\text{ A}, V_{GS} = 0\text{ V}$ | — | 110 | — | ns |
| Reverse Recovery Charge | Q_{rr} | $dI_{DR}/dt = 100\text{ A}/\mu\text{s}$ | — | 0.47 | — | nC |