TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (π−MOSVI)

# 2SK3090

Chopper Regulator DC−DC Converter, and Motor Drive Applications

- Low drain−source ON resistance : $R_{DS\ (ON)}$ = 16 mΩ (typ.)
- High forward transfer admittance : $|Y_{fs}|$ = 26 S (typ.)
- Low leakage current : $I_{DSS}$ = 100 μA (max) ($V_{DS}$ = 30 V)
- Enhancement−mode : $V_{th}$ = 1.5~3.0 V ($V_{DS}$ = 10 V, $I_D$ = 1 mA)

## Maximum Ratings (Ta = 25°C)

| Characteristics | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain−source voltage | | $V_{DSS}$ | 30 | V |
| Drain−gate voltage ($R_{GS}$ = 20 kΩ) | | $V_{DGR}$ | 30 | V |
| Gate−source voltage | | $V_{GSS}$ | ±20 | V |
| Drain current | DC (Note 1) | $I_D$ | 45 | A |
| | Pulse (Note 1) | $I_{DP}$ | 135 | |
| Drain power dissipation (Tc = 25°C) | | $P_D$ | 60 | W |
| Single pulse avalanche energy (Note 2) | | $E_{AS}$ | 220 | mJ |
| Avalanche current | | $I_{AR}$ | 45 | A |
| Repetitive avalanche energy (Note 3) | | $E_{AR}$ | 6 | mJ |
| Channel temperature | | $T_{ch}$ | 150 | °C |
| Storage temperature range | | $T_{stg}$ | −55~150 | °C |

## Thermal Characteristics

| Characteristics | Symbol | Max | Unit |
|---|---|---|---|
| Thermal resistance, channel to case | $R_{th\ (ch-c)}$ | 2.08 | °C / W |
| Thermal resistance, channel to ambient | $R_{th\ (ch-a)}$ | 83.3 | °C / W |

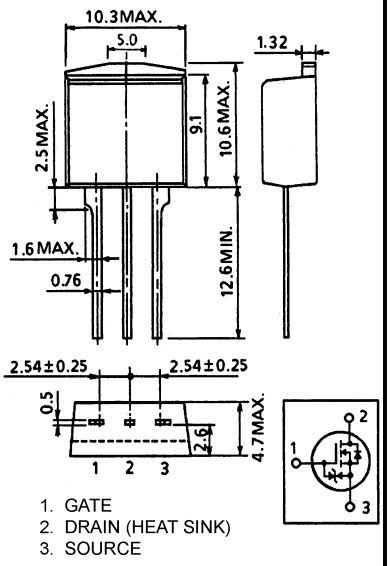
Note 1: Please use devices on condition that the channel temperature is below 150°C.

Note 2: $V_{DD}$ = 25 V, $T_{ch}$ = 25°C (initial), L = 78 μH, $R_G$ = 25 Ω, $I_{AR}$ = 45 A

Note 3: Repetitive rating; Pulse width limited by maximum channel temperature.

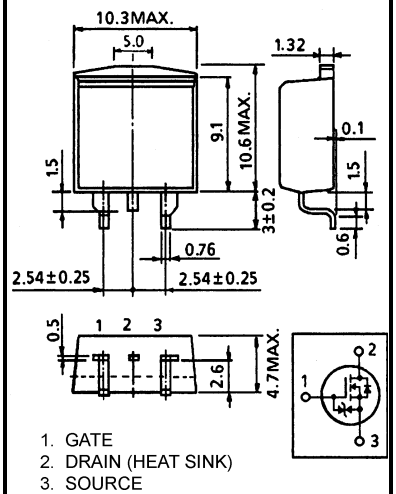
This transistor is an electrostatic sensitive device.
Please handle with caution.

Unit: mm




| | |
|---|---|
| JEDEC | — |
| JEITA | — |
| TOSHIBA | 2-10S1B |

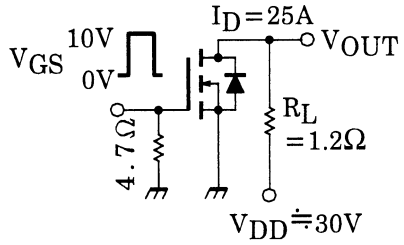
Weight: 1.5 g (typ.)




| | |
|---|---|
| JEDEC | — |
| JEITA | — |
| TOSHIBA | 2-10S2B |

Weight: 1.5 g (typ.)

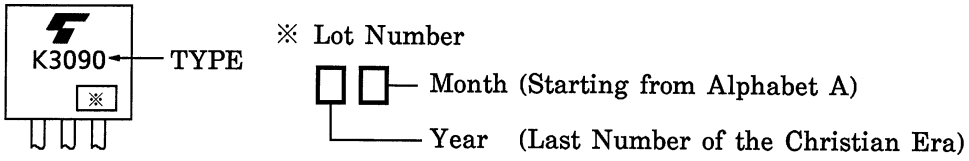
## Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Gate leakage current | | $I_{GSS}$ | $V_{GS}$ = ±16 V, $V_{DS}$ = 0 V | — | — | ±10 | μA |
| Drain cut−off current | | $I_{DSS}$ | $V_{DS}$ = 30 V, $V_{GS}$ = 0 V | — | — | 100 | μA |
| Drain−source breakdown voltage | | $V_{(BR)\ DSS}$ | $I_D$ = 10 mA, $V_{GS}$ = 0 V | 30 | — | — | V |
| Gate threshold voltage | | $V_{th}$ | $V_{DS}$ = 10 V, $I_D$ = 1 mA | 1.5 | — | 3.0 | V |
| Drain−source ON resistance | | $R_{DS\ (ON)}$ | $V_{GS}$ = 10 V, $I_D$ = 25 A | — | 16 | 20 | mΩ |
| Forward transfer admittance | | $\|Y_{fs}\|$ | $V_{DS}$ = 10 V, $I_D$ = 25 A | 13 | 26 | — | S |
| Input capacitance | | $C_{iss}$ | $V_{DS}$ = 10 V, $V_{GS}$ = 0 V, f = 1 MHz | — | 1500 | — | pF |
| Reverse transfer capacitance | | $C_{rss}$ | | — | 480 | — | |
| Output capacitance | | $C_{oss}$ | | — | 680 | — | |
| Switching time | Rise time | tr |  | — | 11 | — | ns |
| | Turn−on time | $t_{on}$ | | — | 18 | — | |
| | Fall time | $t_f$ | | — | 60 | — | |
| | Turn−off time | $t_{off}$ | | — | 130 | — | |
| Total gate charge (Gate−source plus gate−drain) | | $Q_g$ | $V_{DD}$ ≈ 24 V, $V_{GS}$ = 10 V, $I_D$ = 45 A | — | 39 | — | nC |
| Gate−source charge | | $Q_{gs}$ | | — | 25 | — | |
| Gate−drain (“miller”) charge | | $Q_{gd}$ | | — | 14 | — | |

## Source−Drain Ratings and Characteristics (Ta = 25°C)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Continuous drain reverse current (Note 1) | $I_{DR}$ | — | — | — | 45 | A |
| Pulse drain reverse current (Note 1) | $I_{DRP}$ | — | — | — | 135 | A |
| Forward voltage (diode) | $V_{DSF}$ | $I_{DR}$ = 45 A, $V_{GS}$ = 0 V | — | — | −1.7 | V |
| Reverse recovery time | $t_{rr}$ | $I_{DR}$ = 45 A, $V_{GS}$ = 0 V<br>$dI_{DR}$ / dt = 50 A / μs | — | 100 | — | ns |
| Reverse recovery charge | $Q_{rr}$ | | — | 200 | — | nC |

## Marking



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