TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE ($\pi$-MOSⅥ)

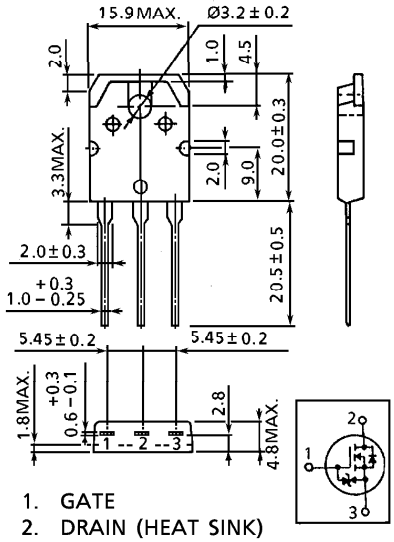
# 2SK3129

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

Unit in mm




| | |
|---|---|
| JEDEC | — |
| EIAJ | SC-65 |
| TOSHIBA | 2-16C1B |

- Low Drain-Source ON Resistance : $R_{DS\ (ON)}$ = 5.5 mΩ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|$ = 70 S (Typ.)
- Low Leakage Current : $I_{DSS}$ = 100 $\mu$A (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)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 50 | V |
| Drain-Gate Voltage ($R_{GS}$ = 20 kΩ) | | $V_{DGR}$ | 50 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±20 | V |
| Drain Current | DC | $I_D$ | 60 | A |
| | Pulse | $I_{DP}$ | 240 | A |
| Drain Power Dissipation (Tc = 25°C) | | $P_D$ | 150 | W |
| Single Pulse Avalanche Energy** | | $E_{AS}$ | 721 | mJ |
| Avalanche Current | | $I_{AR}$ | 60 | A |
| Repetitive Avalanche Energy* | | $E_{AR}$ | 12 | 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 | $R_{th\ (ch-c)}$ | 0.833 | °C / W |
| Thermal Resistance, Channel to Ambient | $R_{th\ (ch-a)}$ | 50 | °C / W |

Note ;

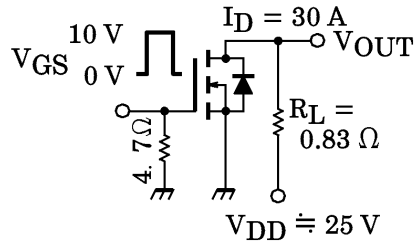
* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

** $V_{DD}$ = 25 V, $T_{ch}$ = 25°C (initial), L = 246 $\mu$H, $R_G$ = 25 Ω, $I_{AR}$ = 60 A

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

961001EAA1

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC | | 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 | 50 | — | — | V |
| Gate Threshold Voltage | | $V_{th}$ | $V_{DS}$ = 10 V, $I_D$ = 1 mA | 0.8 | — | 2.0 | V |
| Drain-Source ON Resistance | | $R_{DS\,(ON)}$ | $V_{GS}$ = 10 V, $I_D$ = 30 A | — | 5.5 | 7 | mΩ |
| Forward Transfer Admittance | | $\|Y_{fs}\|$ | $V_{DS}$ = 10 V, $I_D$ = 30 A | 40 | 70 | — | S |
| Input Capacitance | | $C_{iss}$ | $V_{DS}$ = 10 V, $V_{GS}$ = 0 V<br>f = 1 MHz | — | 3700 | — | pF |
| Reverse Transfer Capacitance | | $C_{rss}$ | | — | 650 | — | |
| Output Capacitance | | $C_{oss}$ | | — | 1800 | — | |
| Switching Time | Rise Time | $t_r$ |  <br>$V_{IN}$ : $t_r$, $t_f$ < 5 ns,<br>Duty ≦ 1%, $t_w$ = 10 μs | — | 20 | — | ns |
| | Turn-on Time | $t_{on}$ | | — | 35 | — | |
| | Fall Time | $t_f$ | | — | 160 | — | |
| | Turn-off Time | $t_{off}$ | | — | 480 | — | |
| Total Gate Charge (Gate-Source Plus Gate-Drain) | | $Q_g$ | $V_{DD}$ ≒ 40 V, $V_{GS}$ = 10 V<br>$I_D$ = 60 A | — | 135 | — | nC |
| Gate-Source Charge | | $Q_{gs}$ | | — | 90 | — | |
| Gate-Drain ("Miller") Charge | | $Q_{gd}$ | | — | 45 | — | |

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

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Continuous Drain Reverse Current | $I_{DR}$ | — | — | — | 60 | A |
| Pulse Drain Reverse Current | $I_{DRP}$ | — | — | — | 240 | A |
| Diode Forward Voltage | $V_{DSF}$ | $I_{DR}$ = 60 A, $V_{GS}$ = 0 V | — | — | −1.4 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_{DR}$ = 60 A, $V_{GS}$ = 0 V<br>$dI_{DR}/dt$ = 50 A/μs | — | 180 | — | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | — | 0.32 | — | μC |

MARKING