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

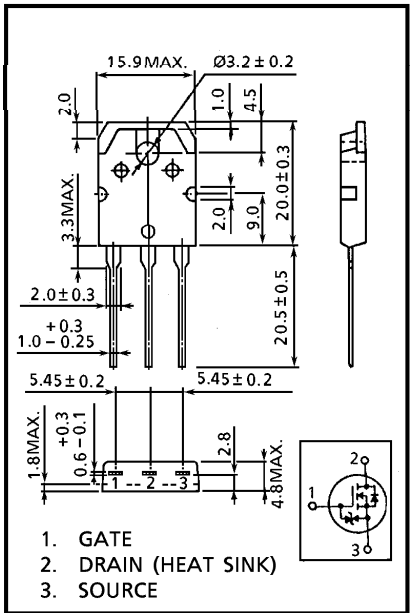
# 2SK2837

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 |

Weight : 4.6g

- Low Drain-Source ON Resistance : $R_{DS\,(ON)}=0.21\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|=17S$ (Typ.)
- Low Leakage Current : $I_{DSS}=100\mu A$ (Max.) ($V_{DSS}=500V$)
- Enhancement-Mode : $V_{th}=2.0\sim4.0V$ ($V_{DS}=10V$, $I_D=1mA$)

MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 500 | V |
| Drain-Gate Voltage ($R_{GS}=20k\Omega$) | | $V_{DGR}$ | 500 | V |
| Gate-Source Voltage | | $V_{GSS}$ | ±30 | V |
| Drain Current | DC | $I_D$ | 20 | A |
| | Pulse | $I_{DP}$ | 80 | A |
| Drain Power Dissipation (Tc=25°C) | | $P_D$ | 150 | W |
| Single Pulse Avalanche Energy** | | $E_{AS}$ | 960 | mJ |
| Avalanche Current | | $I_{AR}$ | 20 | A |
| Repetitive Avalanche Energy* | | $E_{AR}$ | 15 | 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 |

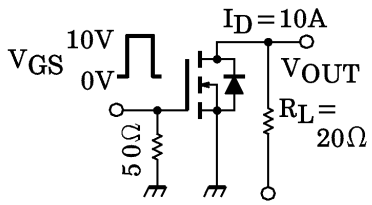
Note ;

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

** $V_{DD}=90V$, Starting $T_{ch}=25°C$, $L=4.08mH$
$R_G=25\Omega$, $I_{AR}=20A$

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

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

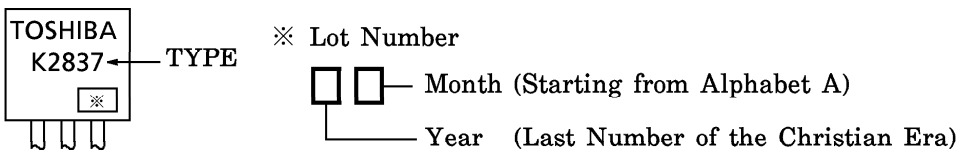
| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Gate Leakage Current | | $I_{GSS}$ | $V_{GS}=\pm25V$, $V_{DS}=0V$ | — | — | ±10 | μA |
| Gate-Source Breakdown Voltage | | $V_{(BR)\,GSS}$ | $I_G=\pm10\mu A$, $V_{DS}=0V$ | ±30 | — | — | V |
| Drain Cut-off Current | | $I_{DSS}$ | $V_{DS}=500V$, $V_{GS}=0V$ | — | — | 100 | μA |
| Drain-Source Breakdown Voltage | | $V_{(BR)\,DSS}$ | $I_D=10mA$, $V_{GS}=0V$ | 500 | — | — | V |
| Gate Threshold Voltage | | $V_{th}$ | $V_{DS}=10V$, $I_D=1mA$ | 2.0 | — | 4.0 | V |
| Drain-Source ON Resistance | | $R_{DS\,(ON)}$ | $V_{GS}=10V$, $I_D=10A$ | — | 0.21 | 0.27 | Ω |
| Forward Transfer Admittance | | $\|Y_{fs}\|$ | $V_{DS}=10V$, $I_D=10A$ | 10 | 17 | — | S |
| Input Capacitance | | $C_{iss}$ | $V_{DS}=10V$, $V_{GS}=0V$, f=1MHz | — | 3720 | — | pF |
| Reverse Transfer Capacitance | | $C_{rss}$ | | — | 340 | — | |
| Output Capacitance | | $C_{oss}$ | | — | 1165 | — | |
| Switching Time | Rise Time | $t_r$ |  | — | 30 | — | ns |
| | Turn-on Time | $t_{on}$ | | — | 70 | — | |
| | Fall Time | $t_f$ | | — | 50 | — | |
| | Turn-off Time | $t_{off}$ | | — | 290 | — | |
| Total Gate Charge (Gate-Source Plus Gate-Drain) | | $Q_g$ | $V_{DD}\fallingdotseq400V$, $V_{GS}=10V$, $I_D=6A$ | — | 80 | — | nC |
| Gate-Source Charge | | $Q_{gs}$ | | — | 48 | — | |
| Gate-Drain ("Miller") Charge | | $Q_{gd}$ | | — | 32 | — | |



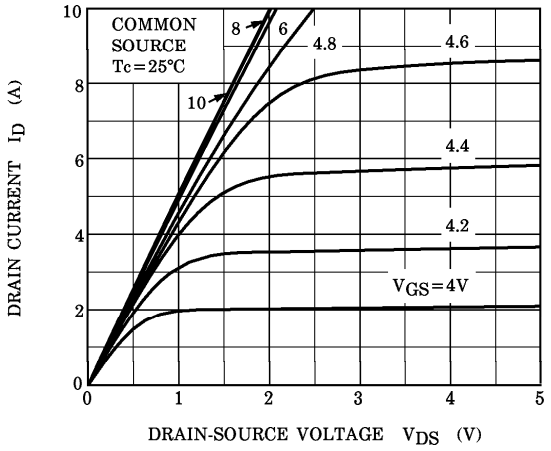
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Continuous Drain Reverse Current | $I_{DR}$ | — | — | — | 20 | A |
| Pulse Drain Reverse Current | $I_{DRP}$ | — | — | — | 80 | A |
| Diode Forward Voltage | $V_{DSF}$ | $I_{DR}=20A$, $V_{GS}=0V$ | — | — | −1.7 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_{DR}=20A$, $V_{GS}=0V$, $dI_{DR}/dt=100A/\mu s$ | — | 540 | — | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | — | 5.4 | — | μC |

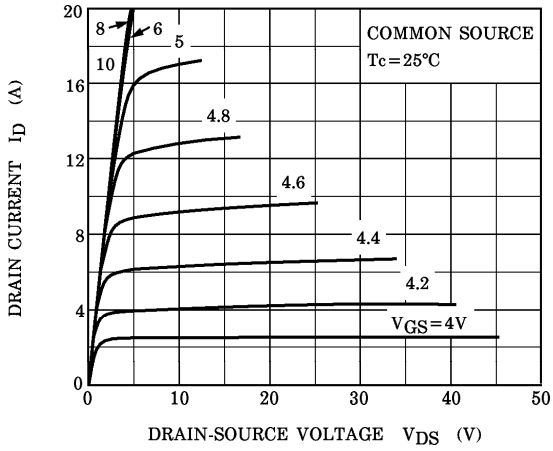
MARKING



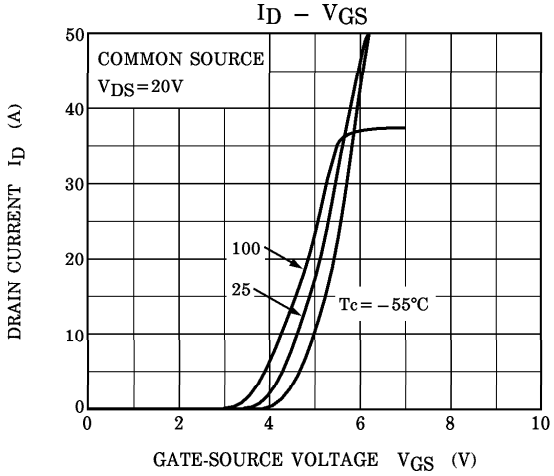
$I_D - V_{DS}$



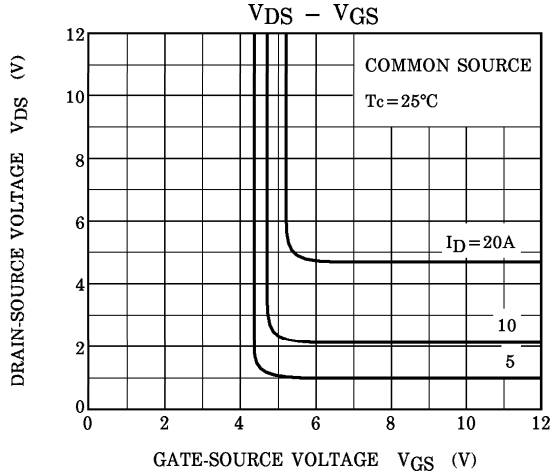

$I_D - V_{DS}$



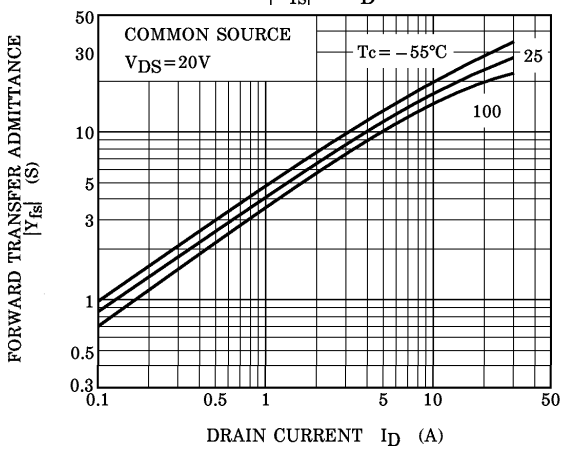

$I_D - V_{GS}$



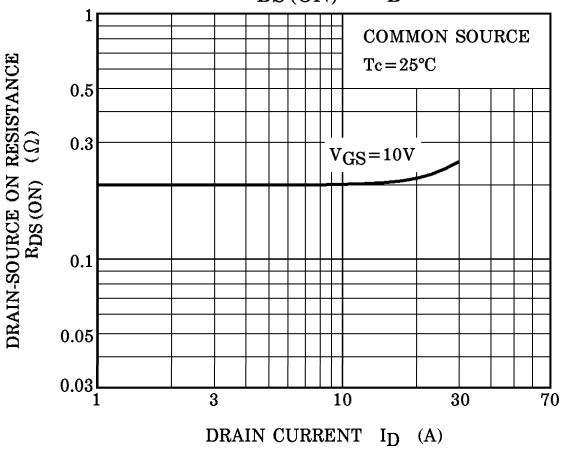

$V_{DS} - V_{GS}$



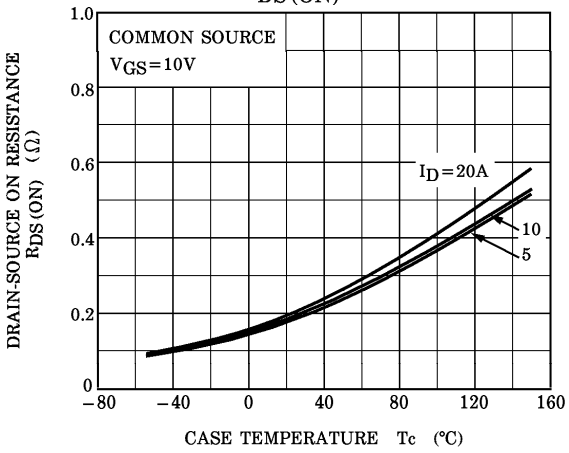

$|Y_{fs}| - I_D$



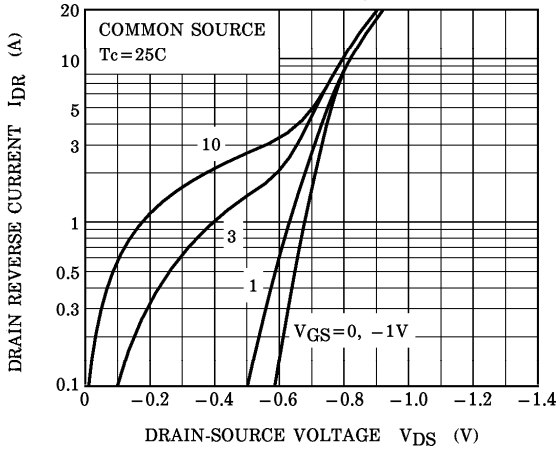

$R_{DS\,(ON)} - I_D$



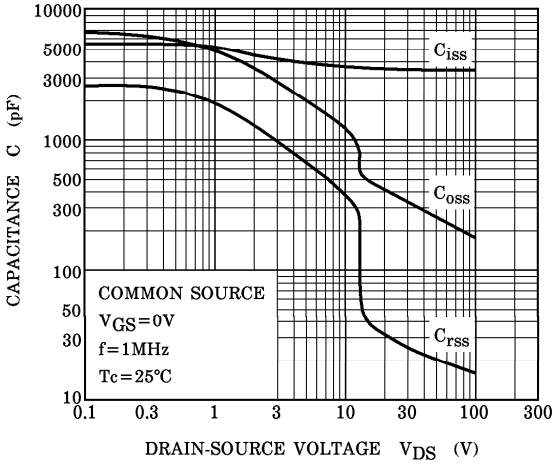
$R_{DS(ON)}$ – Tc



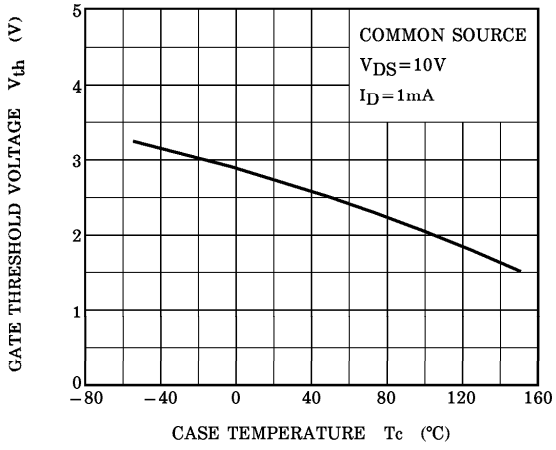

$I_{DR}$ – $V_{DS}$



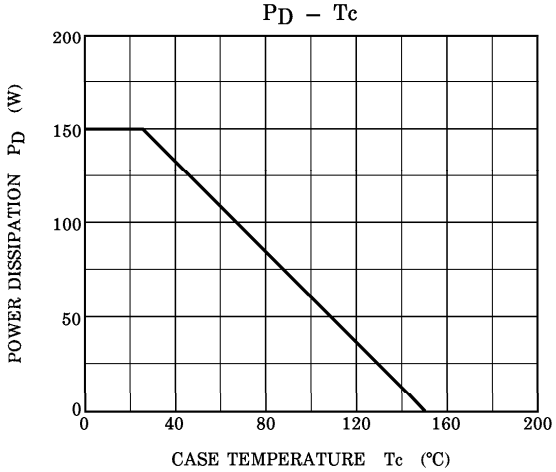

CAPACITANCE – $V_{DS}$



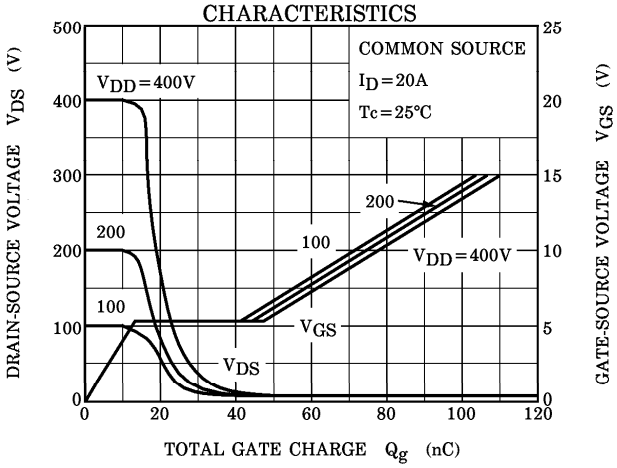

$V_{th}$ – Tc



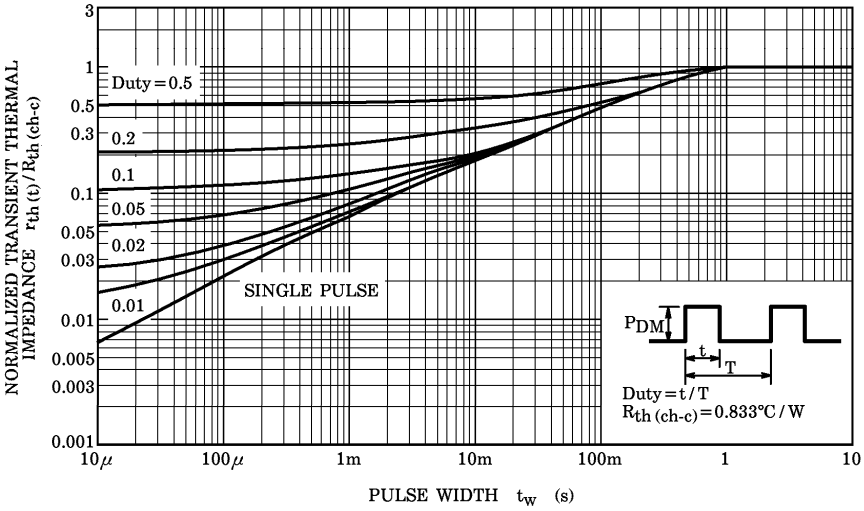

$P_D$ – Tc



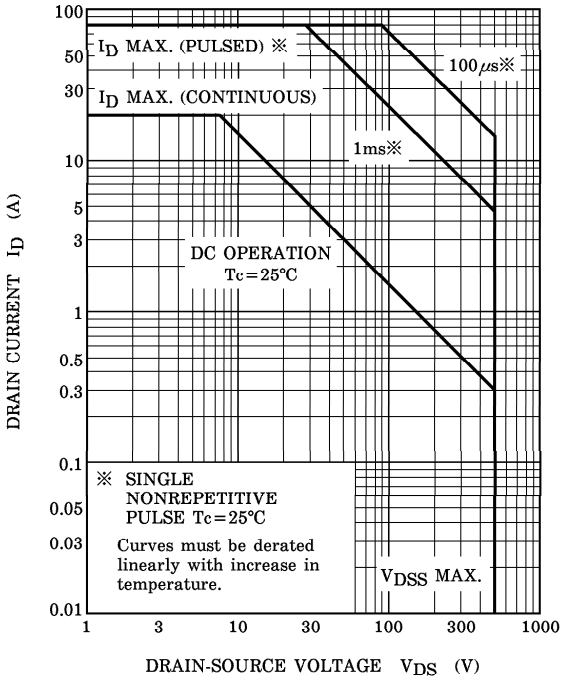

DYNAMIC INPUT / OUTPUT CHARACTERISTICS



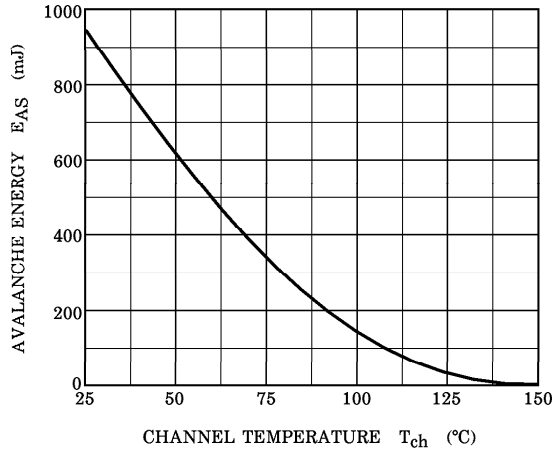
$r_{th}$ – $t_w$

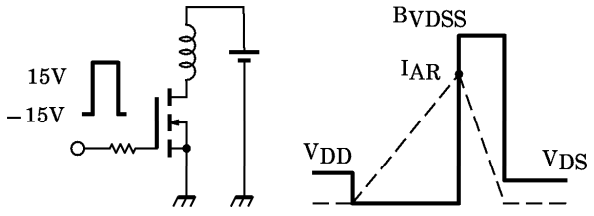



SAFE OPERATING AREA




$E_{AS}$ – $T_{ch}$




Peak $I_{AR}$ = 20A, $R_G$ = 25Ω
$V_{DD}$ = 90V, L = 4.08mH

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