

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

2SK2313

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

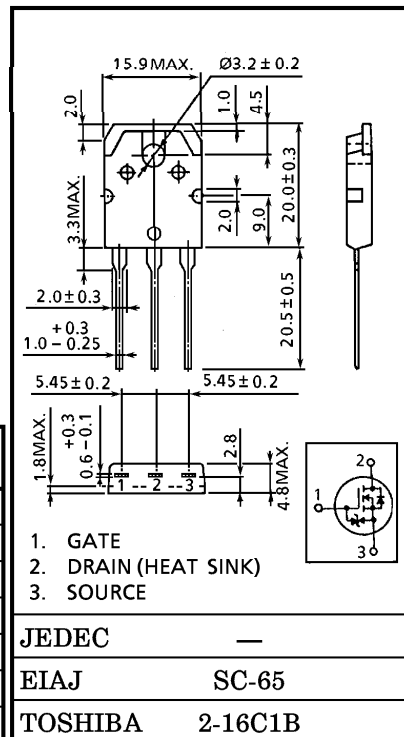
INDUSTRIAL APPLICATIONS

Unit in mm

- 4V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 8m\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 60S$ (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} | ± 20 | V |
| Drain Current | DC | I_D | 60 | A |
| | Pulse | I_{DP} | 240 | A |
| Drain Power Dissipation ($T_c = 25^\circ C$) | | P_D | 150 | W |
| Single Pulse Avalanche Energy** | | E_{AS} | 1054 | mJ |
| Avalanche Current | | I_{AR} | 60 | A |
| Repetitive Avalanche Energy* | | E_{AR} | 15 | mJ |
| Channel Temperature | | T_{ch} | 150 | °C |
| Storage Temperature Range | | T_{stg} | -55~150 | °C |



Weight : 4.6g

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.

** $V_{DD} = 25V$, Starting $T_{ch} = 25^\circ C$, $L = 398\mu H$, $R_G = 25\Omega$, $I_{AR} = 60A$

This transistor is an electrostatic sensitive device.

Please handle with caution.

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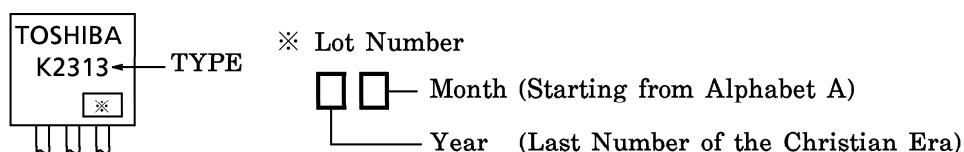
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

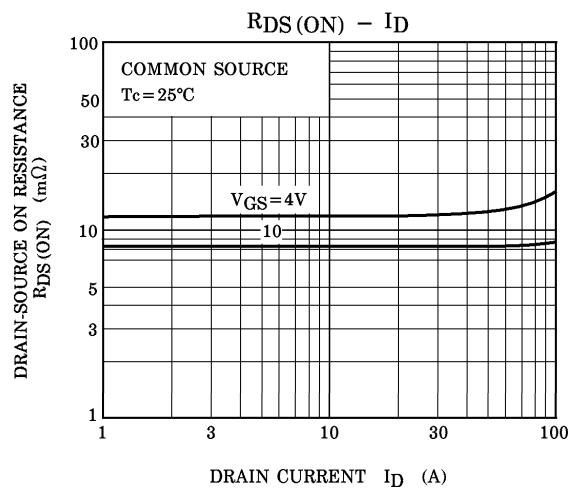
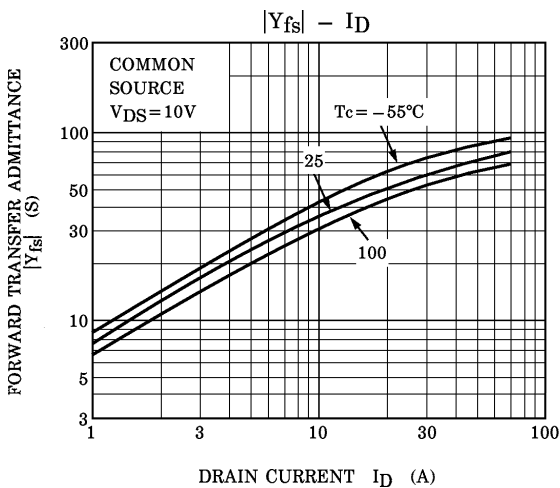
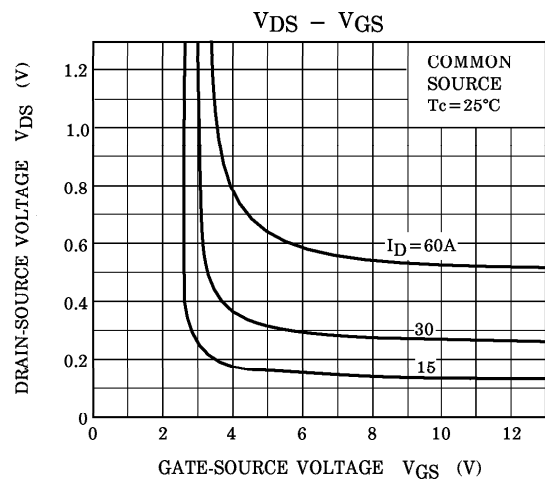
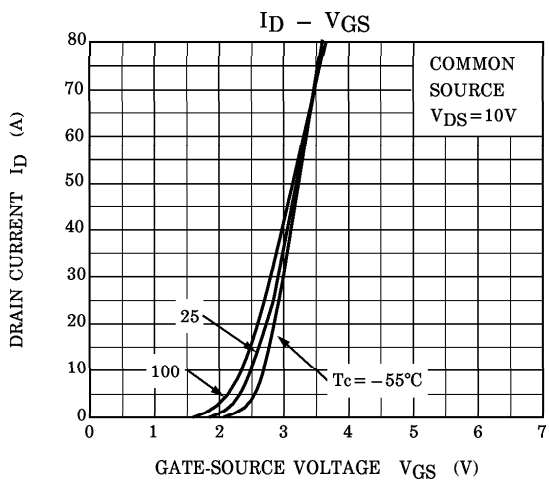
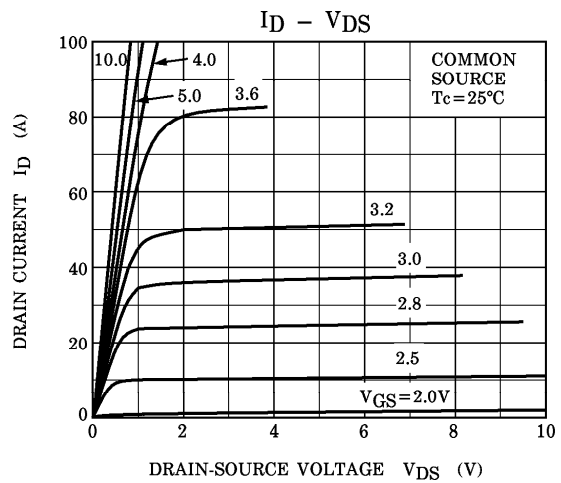
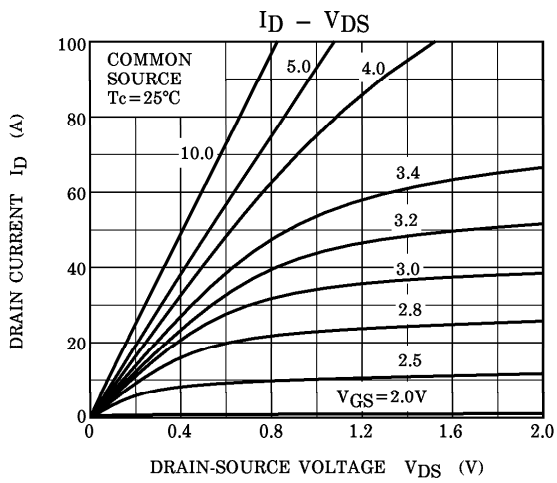
| CHARACTERISTIC | | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---------------|---------------|---|--|------|----------|------------|
| Gate Leakage Current | | I_{GSS} | $V_{GS} = \pm 16V, V_{DS} = 0V$ | — | — | ± 10 | μA |
| Drain Cut-off Current | | I_{DSS} | $V_{DS} = 60V, V_{GS} = 0V$ | — | — | 100 | μA |
| Drain-Source Breakdown Voltage | | $V(BR)_{DSS}$ | $I_D = 10mA, V_{GS} = 0V$ | 60 | — | — | V |
| Gate Threshold Voltage | | V_{th} | $V_{DS} = 10V, I_D = 1mA$ | 0.8 | — | 2.0 | V |
| Drain-Source ON Resistance | | $R_{DS(ON)}$ | $V_{GS} = 4V, I_D = 30A$ | — | 12 | 15 | m Ω |
| | | | $V_{GS} = 10V, I_D = 30A$ | — | 8 | 11 | |
| Forward Transfer Admittance | | $ Y_{fs} $ | $V_{DS} = 10V, I_D = 30A$ | 40 | 60 | — | S |
| Input Capacitance | | C_{iss} | $V_{DS} = 10V, V_{GS} = 0V$ $f = 1MHz$ | — | 5400 | — | pF |
| Reverse Transfer Capacitance | | C_{rss} | | — | 920 | — | |
| Output Capacitance | | C_{oss} | | — | 2600 | — | |
| Switching Time | Rise Time | t_r | <p>$I_D = 30A$ $V_{GS} = 10V, 0V$ $R_L = 1\Omega$ $V_{DD} \doteq 30V$</p> | — | 30 | — | ns |
| | Turn-on Time | t_{on} | | — | 60 | — | |
| | Fall Time | t_f | | — | 65 | — | |
| | Turn-off Time | t_{off} | | $V_{IN} : t_r, t_f < 5ns,$ $Duty \leq 1\%, t_w = 10\mu s$ | — | 220 | |
| Total Gate Charge (Gate-Source Plus Gate-Drain) | | Q_g | $V_{DD} \doteq 48V, V_{GS} = 10V$ $I_D = 60A$ | — | 170 | — | nC |
| Gate-Source Charge | | Q_{gs} | | — | 110 | — | |
| Gate-Drain ("Miller") Charge | | Q_{gd} | | — | 60 | — | |

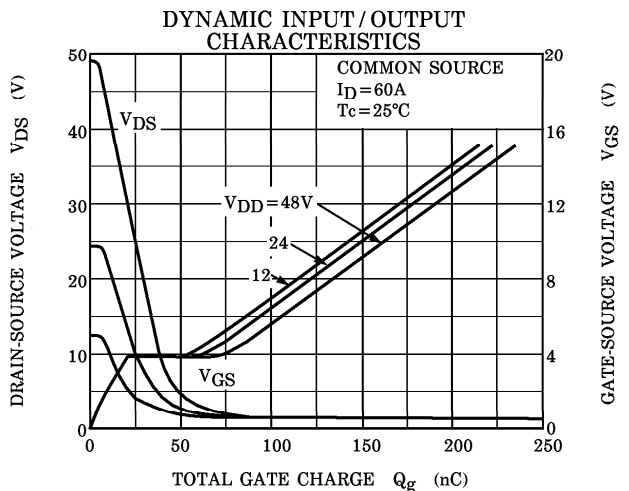
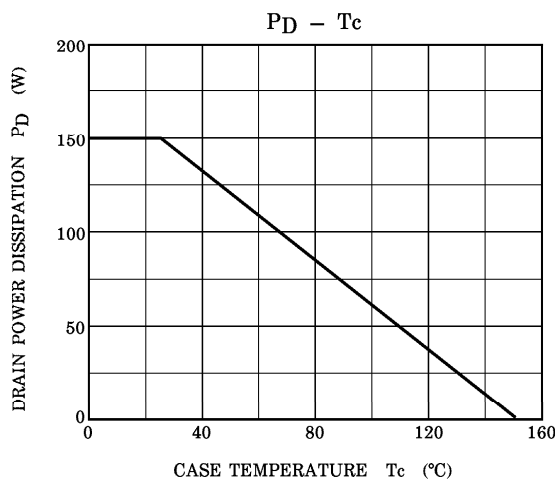
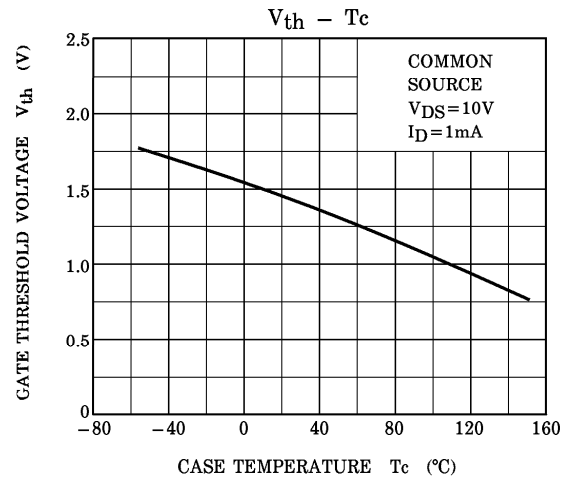
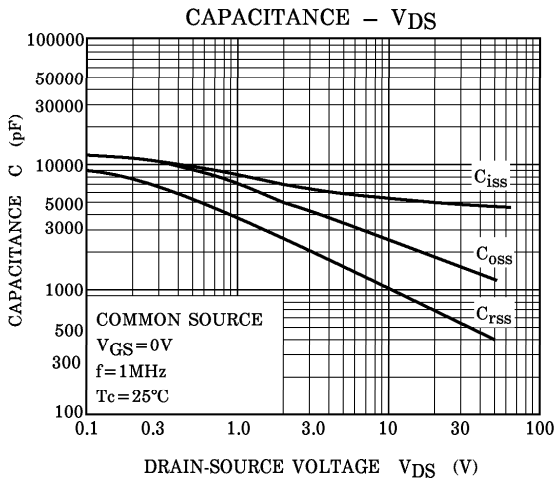
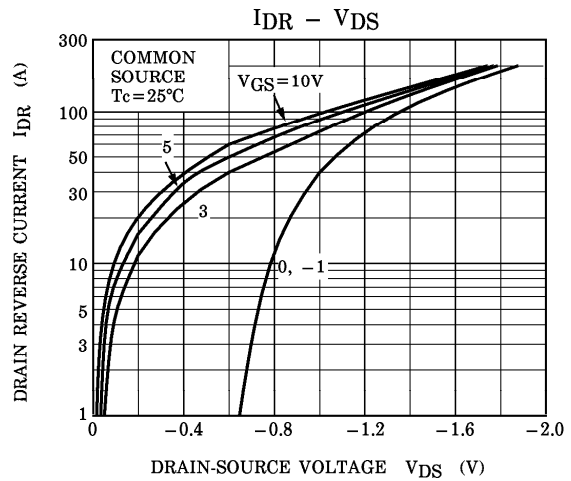
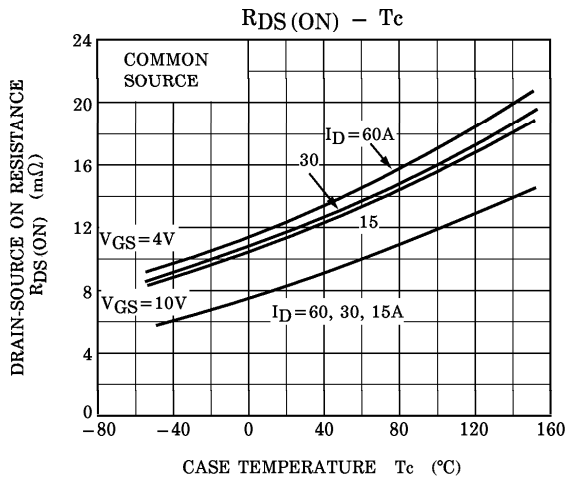
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

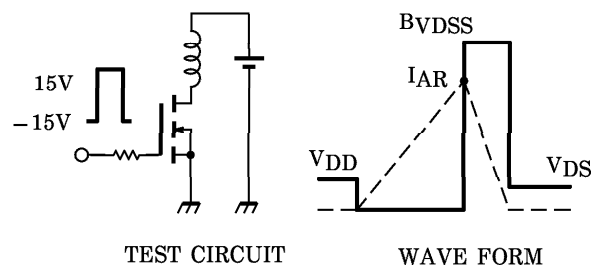
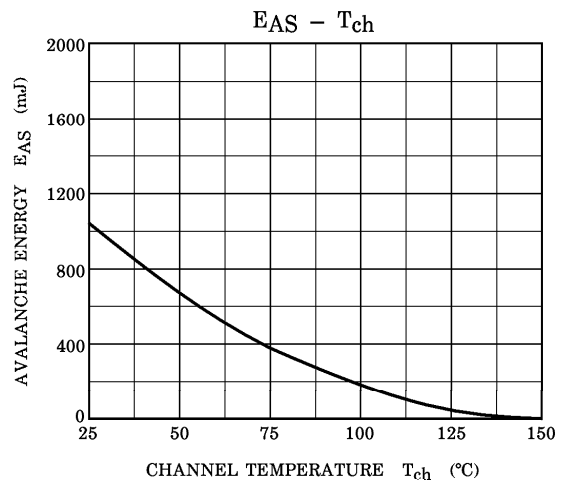
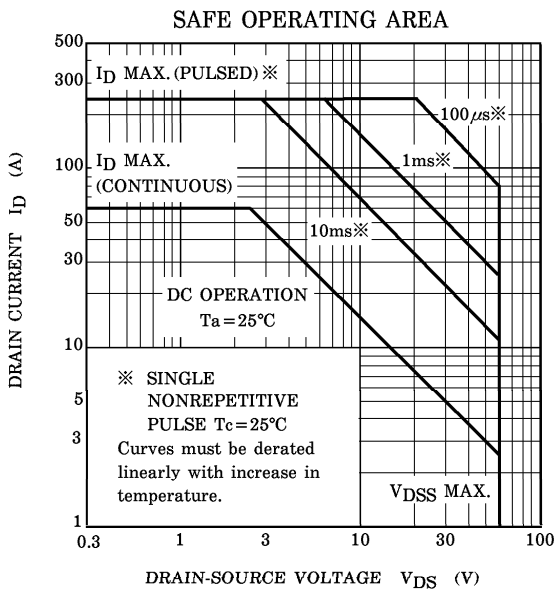
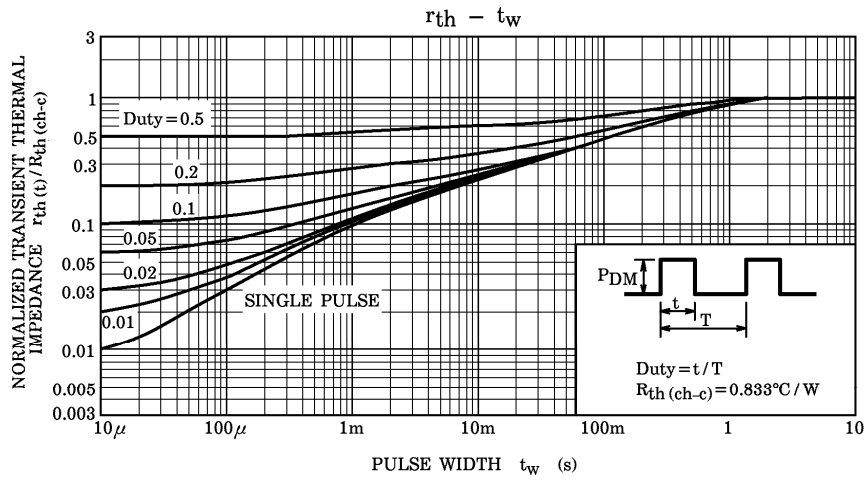
| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|----------------------------------|-----------|------------------------------|------|------|------|---------|
| Continuous Drain Reverse Current | I_{DR} | — | — | — | 60 | A |
| Pulse Drain Reverse Current | I_{DRP} | — | — | — | 240 | A |
| Diode Forward Voltage | V_{DSF} | $I_{DR} = 60A, V_{GS} = 0V$ | — | — | -1.7 | V |
| Reverse Recovery Time | t_{rr} | $I_{DR} = 60A, V_{GS} = 0V$ | — | 150 | — | ns |
| Reverse Recovery Charge | Q_{rr} | $dI_{DR} / dt = 50A / \mu s$ | — | 0.3 | — | μC |

MARKING









Peak $I_{AR} = 60A$, $R_G = 25\Omega$
 $V_{DD} = 25V$, $L = 398\mu H$

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