

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

# 2SK2842

HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

CHOPPER REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

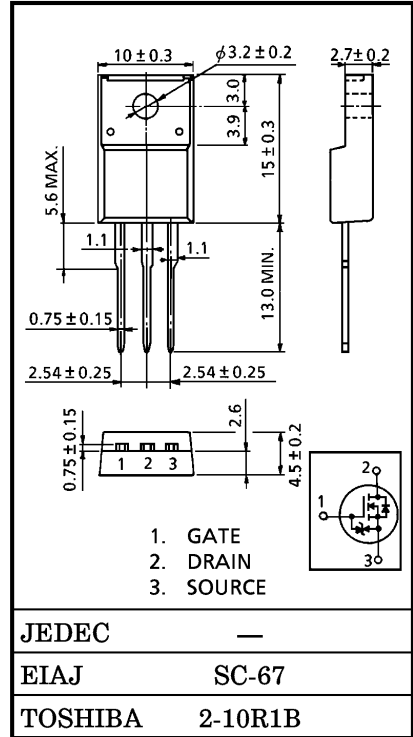
INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.4 \Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 9.0 S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100 \mu A$  (Max.) ( $V_{DS} = 500 V$ )
- Enhancement-Mode :  $V_{th} = 2.0 \sim 4.0 V$   
( $V_{DS} = 10 V, I_D = 1 mA$ )

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

| CHARACTERISTIC                                 |       | SYMBOL    | RATING         | UNIT       |
|--|-------|-----------|----------------|------------|
| Drain-Source Voltage                           |       | $V_{DSS}$ | 500            | V          |
| Drain-Gate Voltage ( $R_{GS} = 20 k\Omega$ )   |       | $V_{DGR}$ | 500            | V          |
| Gate-Source Voltage                            |       | $V_{GSS}$ | $\pm 30$       | V          |
| Drain Current                                  | DC    | $I_D$     | 12             | A          |
|  | Pulse | $I_{DP}$  | 48             | A          |
| Drain Power Dissipation ( $T_c = 25^\circ C$ ) |       | $P_D$     | 40             | W          |
| Single Pulse Avalanche Energy**                |       | $E_{AS}$  | 364            | mJ         |
| Avalanche Current                              |       | $I_{AR}$  | 12             | A          |
| Repetitive Avalanche Energy*                   |       | $E_{AR}$  | 4.0            | mJ         |
| Channel Temperature                            |       | $T_{ch}$  | 150            | $^\circ C$ |
| Storage Temperature Range                      |       | $T_{stg}$ | $-55 \sim 150$ | $^\circ C$ |



Weight : 1.9 g (Typ.)

HERMAL CHARACTERISTICS

| CHARACTERISTIC                         | SYMBOL         | MAX.  | UNIT           |
|--|----------------|-------|----------------|
| Thermal Resistance, Channel to Case    | $R_{th(ch-c)}$ | 3.125 | $^\circ C / W$ |
| Thermal Resistance, Channel to Ambient | $R_{th(ch-a)}$ | 62.5  | $^\circ C / W$ |

Note ;

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

\*\*  $V_{DD} = 90 V, Starting T_{ch} = 25^\circ C, L = 4.3 mH, R_G = 25 \Omega, I_{AR} = 12 A$

**This transistor is an electrostatic sensitive device.**

**Please handle with caution.**

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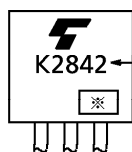
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC                                  |               | SYMBOL        | TEST CONDITION   | MIN.   | TYP. | MAX.     | UNIT          |
|---|---------------|---------------|--|--|------|----------|---------------|
| Gate Leakage Current                            |               | $I_{GSS}$     | $V_{GS} = \pm 25\text{ V}, V_{DS} = 0\text{ V}$  | —  | —    | $\pm 10$ | $\mu\text{A}$ |
| Gate-Source Breakdown Voltage                   |               | $V_{(BR)GSS}$ | $I_G = \pm 10\ \mu\text{A}, V_{DS} = 0\text{ V}$   | $\pm 30$   | —    | —        | V             |
| Drain Cut-off Current                           |               | $I_{DSS}$     | $V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$   | —  | —    | 100      | $\mu\text{A}$ |
| Drain-Source Breakdown Voltage                  |               | $V_{(BR)DSS}$ | $I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$  | 500  | —    | —        | V             |
| Gate Threshold Voltage                          |               | $V_{th}$      | $V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$  | 2.0  | —    | 4.0      | V             |
| Drain-Source ON Resistance                      |               | $R_{DS(ON)}$  | $V_{GS} = 10\text{ V}, I_D = 6\text{ A}$   | —  | 0.4  | 0.52     | $\Omega$      |
| Forward Transfer Admittance                     |               | $ Y_{fs} $    | $V_{DS} = 10\text{ V}, I_D = 6\text{ A}$   | 4.0  | 9.0  | —        | S             |
| Input Capacitance                               |               | $C_{iss}$     | $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$  | —  | 2040 | —        | pF            |
| Reverse Transfer Capacitance                    |               | $C_{rss}$     |  | —  | 200  | —        |               |
| Output Capacitance                              |               | $C_{oss}$     |  | —  | 640  | —        |               |
| Switching Time                                  | Rise Time     | $t_r$         | <p><math>I_D = 6\text{ A}</math><br/><math>V_{GS} = 10\text{ V}</math><br/><math>V_{OUT}</math><br/><math>R_L = 33\ \Omega</math><br/><math>V_{DD} \cong 200\text{ V}</math></p> | —  | 22   | —        | ns            |
|   | Turn-on Time  | $t_{on}$      |  | —  | 58   | —        |               |
|   | Fall Time     | $t_f$         |  | —  | 36   | —        |               |
|   | Turn-off Time | $t_{off}$     |  | $V_{IN} : t_r, t_f < 5\text{ ns},$<br>$Duty \leq 1\%, t_w = 10\ \mu\text{s}$ | —    | 180      |               |
| Total Gate Charge (Gate-Source Plus Gate-Drain) |               | $Q_g$         | $V_{DD} \cong 400\text{ V}, V_{GS} = 10\text{ V}, I_D = 12\text{ A}$   | —  | 45   | —        | nC            |
| Gate-Source Charge                              |               | $Q_{gs}$      |  | —  | 25   | —        |               |
| Gate-Drain ("Miller") Charge                    |               | $Q_{gd}$      |  | —  | 20   | —        |               |

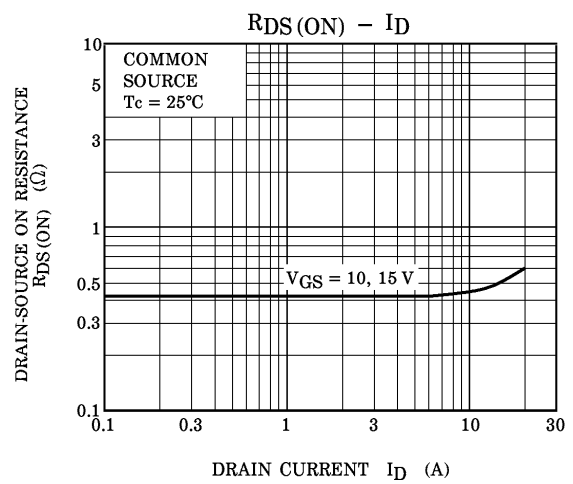
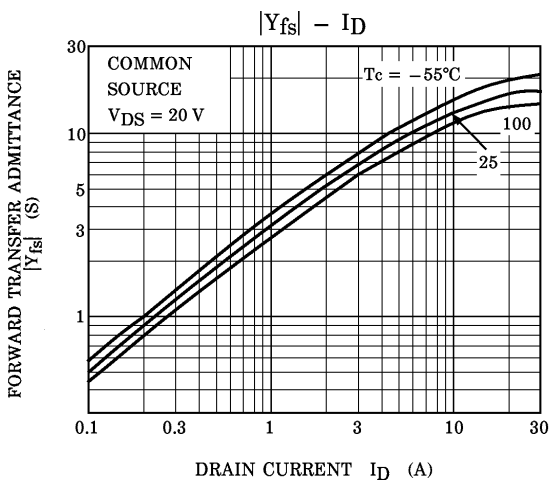
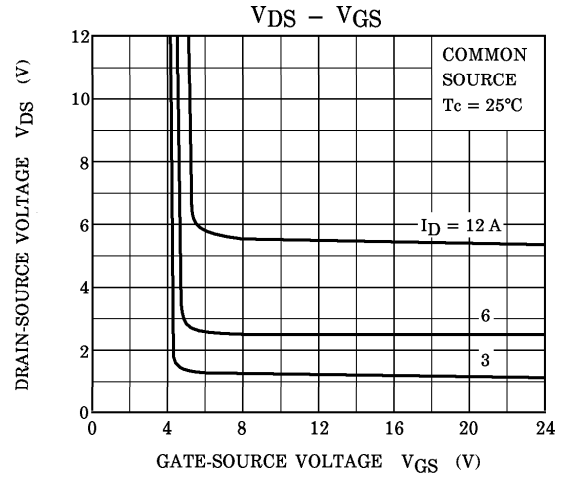
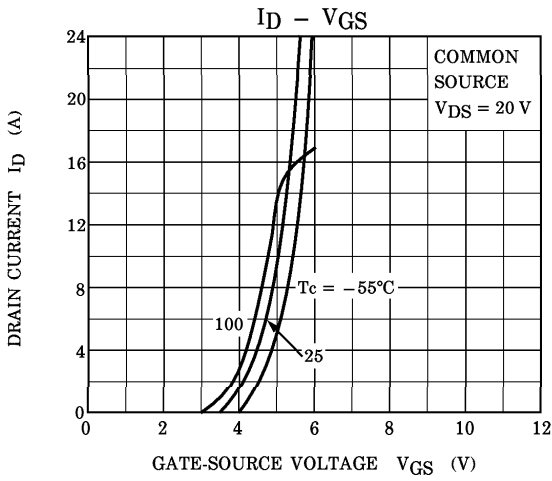
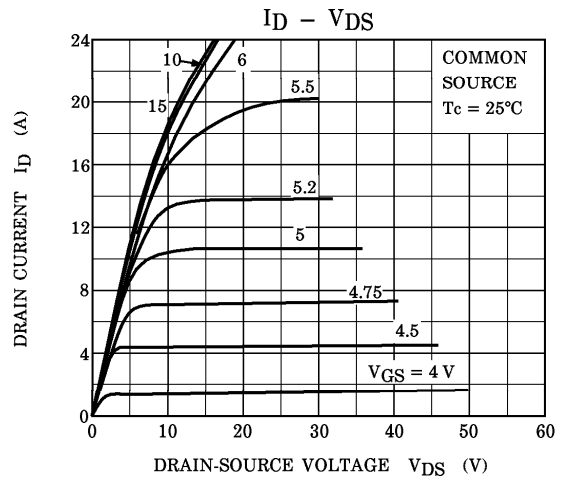
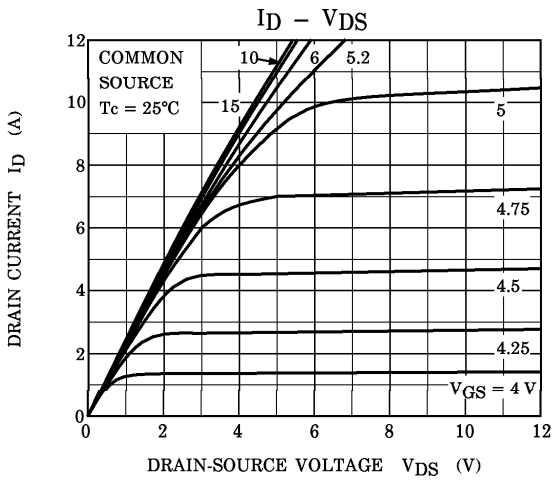
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

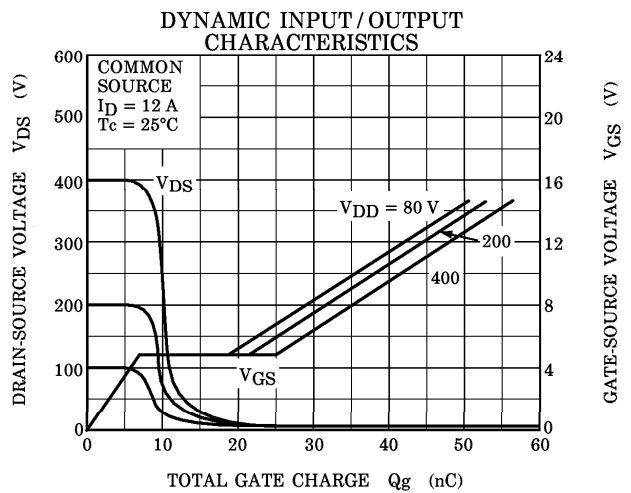
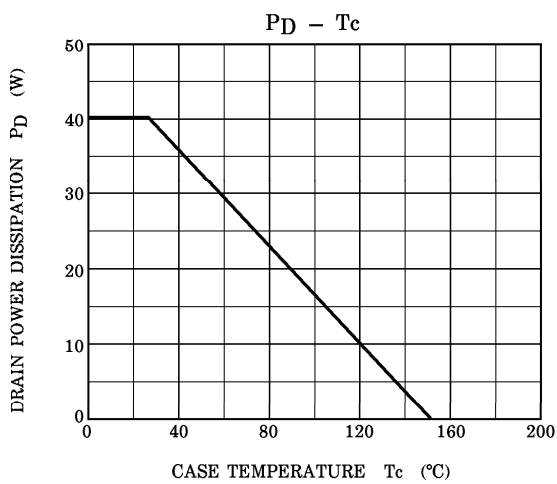
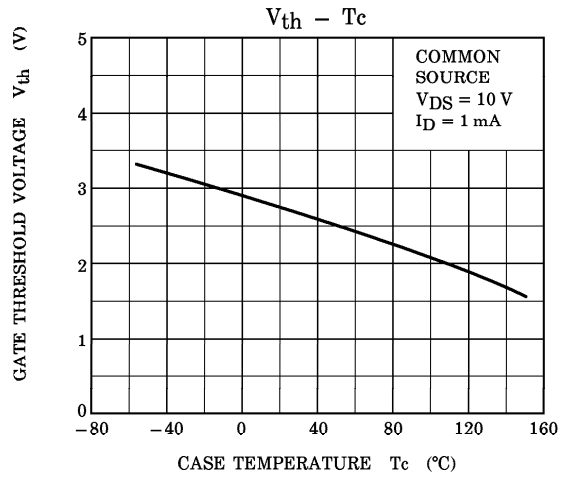
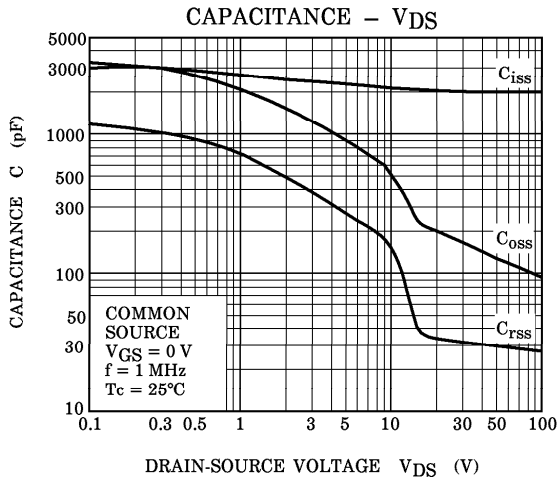
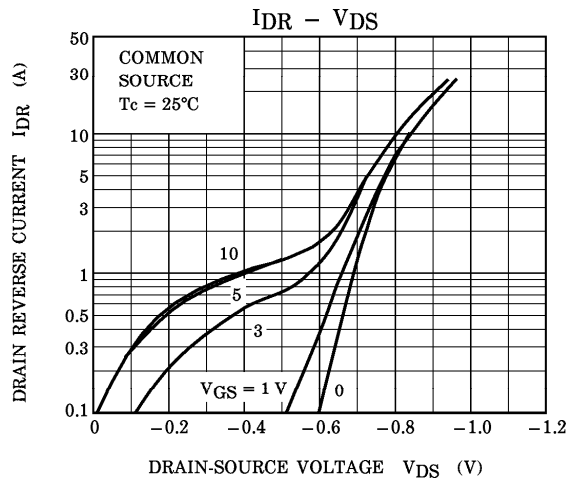
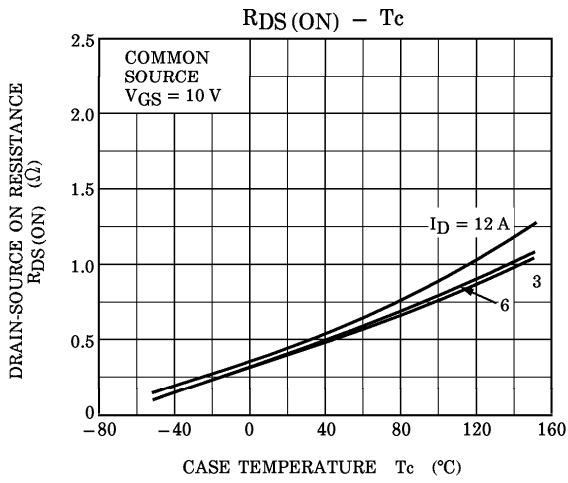
| CHARACTERISTIC                   | SYMBOL    | TEST CONDITION                              | MIN. | TYP. | MAX. | UNIT          |
|----------------------------------|-----------|---|------|------|------|---------------|
| Continuous Drain Reverse Current | $I_{DR}$  | —   | —    | —    | 12   | A             |
| Pulse Drain Reverse Current      | $I_{DRP}$ | —   | —    | —    | 48   | A             |
| Diode Forward Voltage            | $V_{DSF}$ | $I_{DR} = 12\text{ A}, V_{GS} = 0\text{ V}$ | —    | —    | -1.7 | V             |
| Reverse Recovery Time            | $t_{rr}$  | $I_{DR} = 12\text{ A}, V_{GS} = 0\text{ V}$ | —    | 1200 | —    | ns            |
| Reverse Recovery Charge          | $Q_{rr}$  | $dI_{DR}/dt = 100\text{ A}/\mu\text{s}$     | —    | 16   | —    | $\mu\text{C}$ |

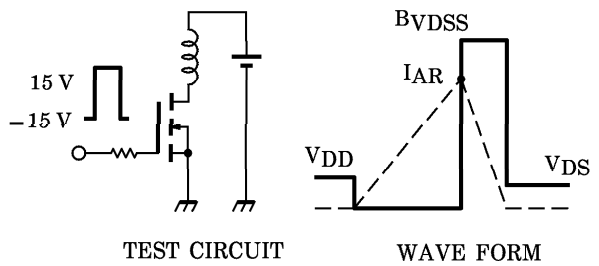
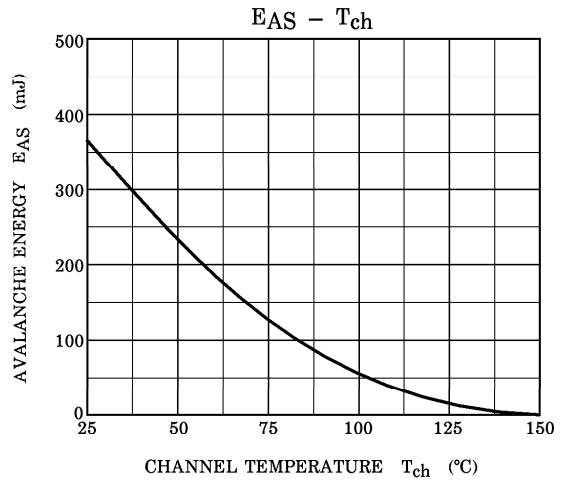
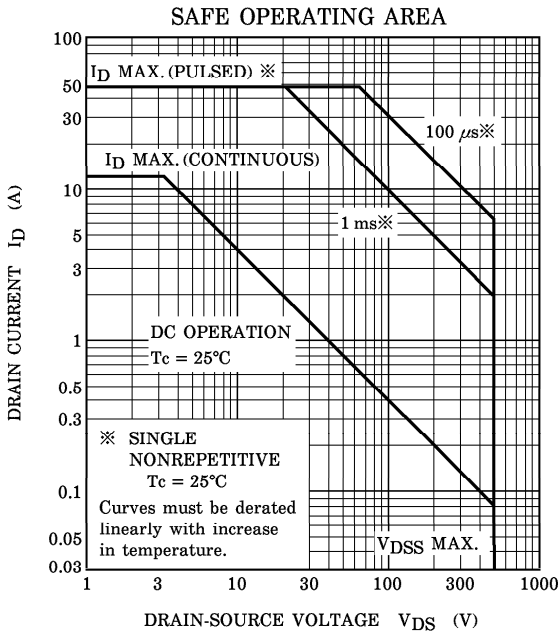
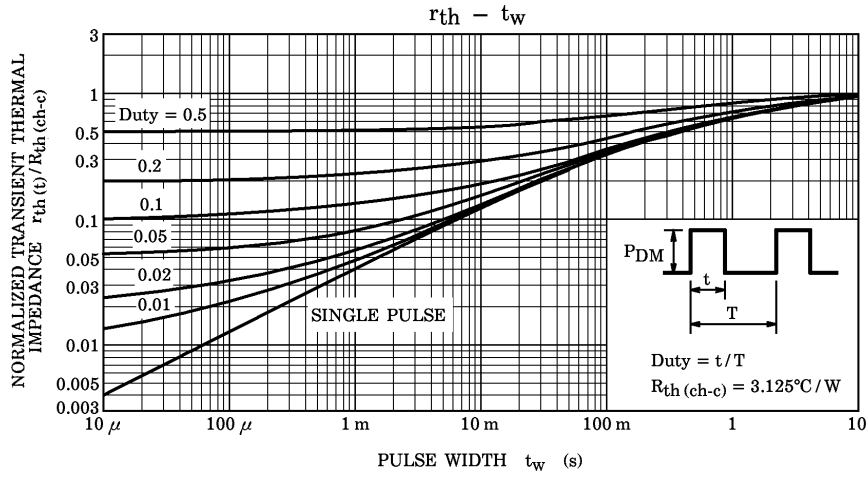
MARKING



TYPE → K2842  
 ※ Lot Number  
 □ □ → Month (Starting from Alphabet A)  
 ———→ Year (Last Number of the Christian Era)







Peak  $I_{AR} = 12 \text{ A}$ ,  $R_G = 25 \Omega$      $E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left( \frac{BVDSS}{BVDSS - V_{DD}} \right)$   
 $V_{DD} = 90 \text{ V}$ ,  $L = 4.3 \text{ mH}$