

# 2SK3462

Switching Regulator, DC-DC Converter and Motor Drive Applications

- 4 V Gate drive
- Low drain-source ON resistance:  $R_{DS(ON)} = 1.2 \Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 2.2 S$  (typ.)
- Low leakage current:  $I_{DSS} = 100 \mu A$  ( $V_{DS} = 250 V$ )
- Enhancement-mode:  $V_{th} = 1.5 \sim 3.5 V$  ( $V_{DS} = 10 V, I_D = 1 mA$ )

## Maximum Ratings ( $T_a = 25^\circ C$ )

| Characteristics                                |                               | Symbol    | Rating         | Unit       |
|--|-------------------------------|-----------|----------------|------------|
| Drain-source voltage                           |                               | $V_{DSS}$ | 250            | V          |
| Drain-gate voltage ( $R_{GS} = 20 k\Omega$ )   |                               | $V_{DGR}$ | 250            | V          |
| Gate-source voltage                            |                               | $V_{GSS}$ | $\pm 20$       | V          |
| Drain current                                  | DC (Note 1)                   | $I_D$     | 3              | A          |
|  | Pulse ( $t = 1 ms$ ) (Note 1) | $I_{DP}$  | 6              |            |
| Drain power dissipation ( $T_c = 25^\circ C$ ) |                               | $P_D$     | 20             | W          |
| Single pulse avalanche energy (Note 2)         |                               | $E_{AS}$  | 36.2           | mJ         |
| Avalanche current                              |                               | $I_{AR}$  | 3              | A          |
| Repetitive avalanche energy (Note 3)           |                               | $E_{AR}$  | 2              | mJ         |
| Channel temperature                            |                               | $T_{ch}$  | 150            | $^\circ C$ |
| Storage temperature range                      |                               | $T_{stg}$ | $-55 \sim 150$ | $^\circ C$ |

## Thermal Characteristics

| Characteristics                        | Symbol         | Max  | Unit         |
|--|----------------|------|--------------|
| Thermal resistance, channel to case    | $R_{th(ch-c)}$ | 6.25 | $^\circ C/W$ |
| Thermal resistance, channel to ambient | $R_{th(ch-a)}$ | 125  | $^\circ C/W$ |

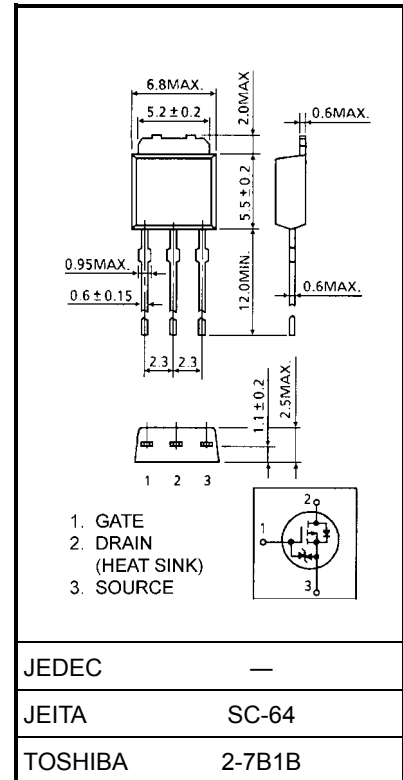
Note 1: Please use devices on conditions that the channel temperature is below  $150^\circ C$ .

Note 2:  $V_{DD} = 50 V, T_{ch} = 25^\circ C, L = 6.7 mH, I_{AR} = 3 A, R_G = 25 \Omega$

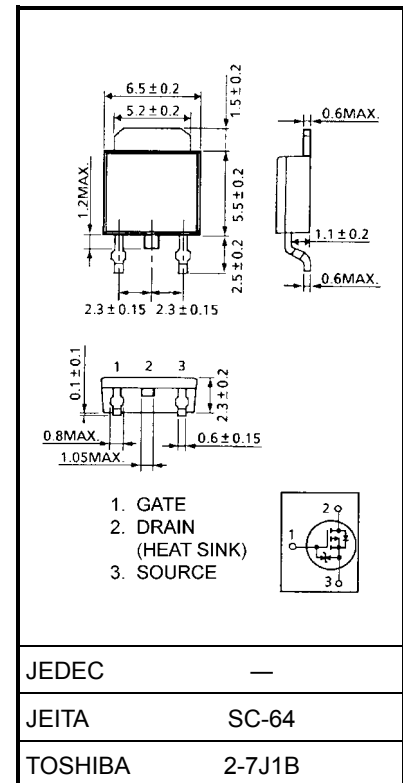
Note 3: Repetitive rating: Pulse width limited by maximum channel temperature

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

Unit: mm



Weight: 0.36 g (typ.)



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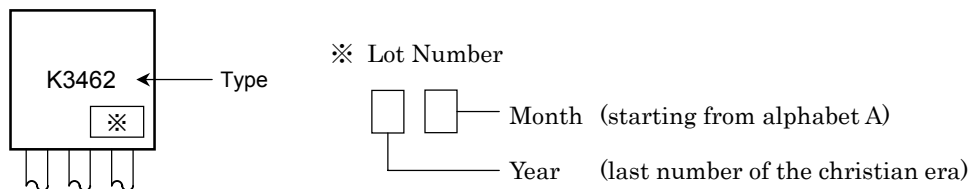
## Electrical Characteristics (Ta = 25°C)

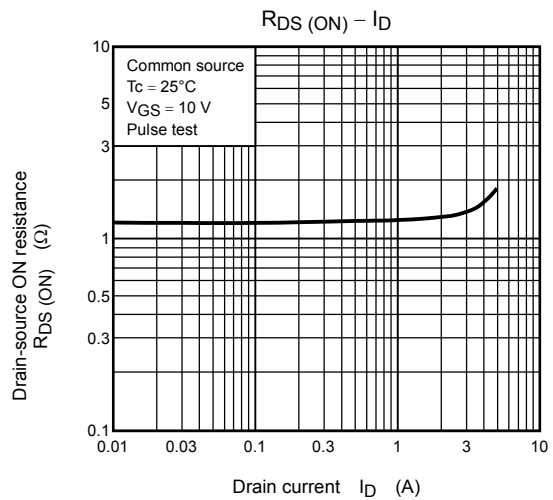
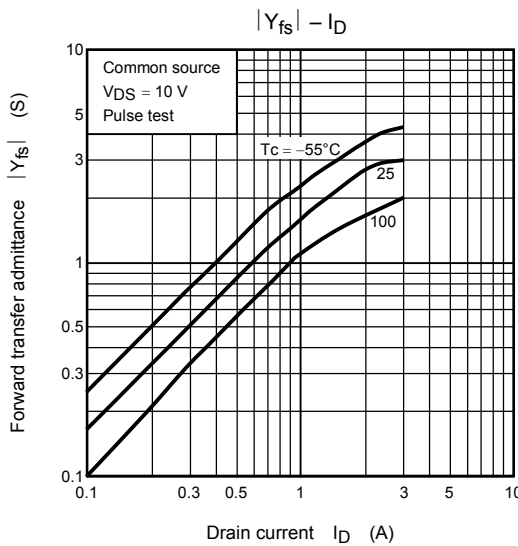
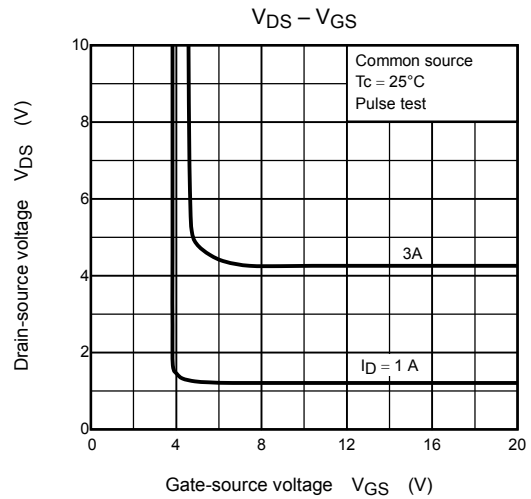
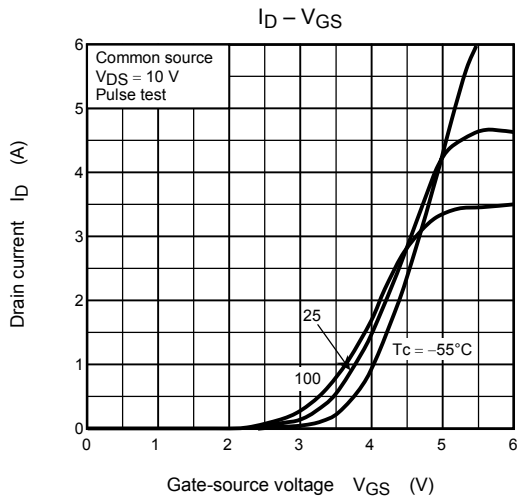
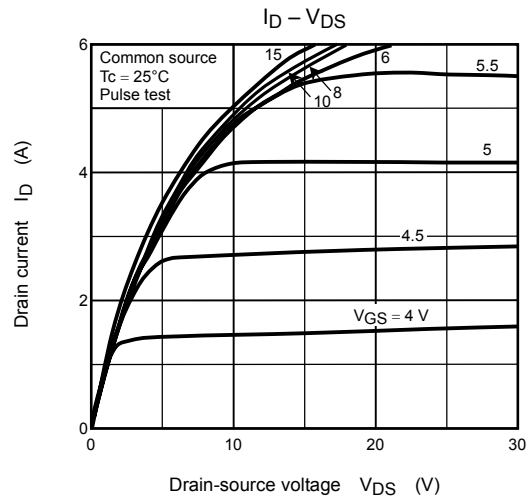
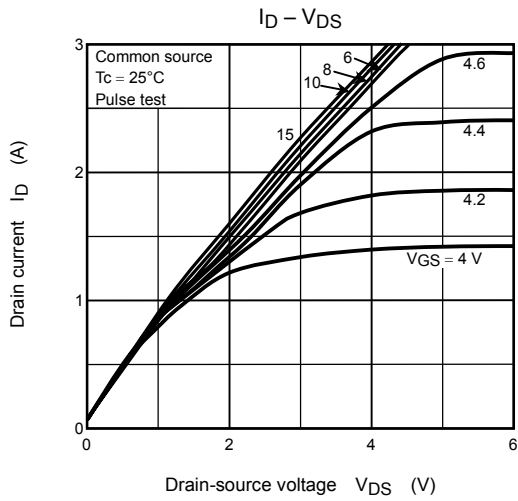
| Characteristics                |               | Symbol        | Test Condition   | Min | Typ. | Max      | Unit          |
|--------------------------------|---------------|---------------|--|-----|------|----------|---------------|
| Gate leakage current           |               | $I_{GSS}$     | $V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$  | —   | —    | $\pm 10$ | $\mu\text{A}$ |
| Drain cut-off current          |               | $I_{DSS}$     | $V_{DS} = 250\text{ V}, V_{GS} = 0\text{ V}$   | —   | —    | 100      | $\mu\text{A}$ |
| Drain-source breakdown voltage |               | $V_{(BR)DSS}$ | $I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$  | 250 | —    | —        | V             |
| Gate threshold voltage         |               | $V_{th}$      | $V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$  | 1.5 | —    | 3.5      | V             |
| Drain-source ON resistance     |               | $R_{DS(ON)}$  | $V_{GS} = 10\text{ V}, I_D = 1.5\text{ A}$   | —   | 1.2  | 1.7      | $\Omega$      |
| Forward transfer admittance    |               | $ Y_{fs} $    | $V_{DS} = 10\text{ V}, I_D = 1.5\text{ A}$   | 0.5 | 2.2  | —        | S             |
| Input capacitance              |               | $C_{iss}$     | $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$  | —   | 267  | —        | pF            |
| Reverse transfer capacitance   |               | $C_{rss}$     |  | —   | 32   | —        |               |
| Output capacitance             |               | $C_{oss}$     |  | —   | 98   | —        |               |
| Switching time                 | Rise time     | $t_r$         | <p><math>10\text{ V}</math><br/><math>V_{GS}</math><br/><math>0\text{ V}</math><br/><math>4.7\ \Omega</math><br/><math>I_D = 1.5\text{ A}</math><br/><math>V_{OUT}</math><br/><math>R_L = 67\ \Omega</math><br/><math>V_{DD} \approx 100\text{ V}</math></p> | —   | 5    | —        | ns            |
|                                | Turn-on time  | $t_{on}$      |  | —   | 20   | —        |               |
|                                | Fall time     | $t_f$         |  | —   | 5    | —        |               |
|                                | Turn-off time | $t_{off}$     |  | —   | 30   | —        |               |
| Total gate charge              |               | $Q_g$         | $V_{DD} \approx 200\text{ V}, V_{GS} = 10\text{ V}, I_D = 3\text{ A}$  | —   | 12   | —        | nC            |
| Gate-source charge             |               | $Q_{gs}$      |  | —   | 6    | —        |               |
| Gate-drain charge              |               | $Q_{gd}$      |  | —   | 6    | —        |               |

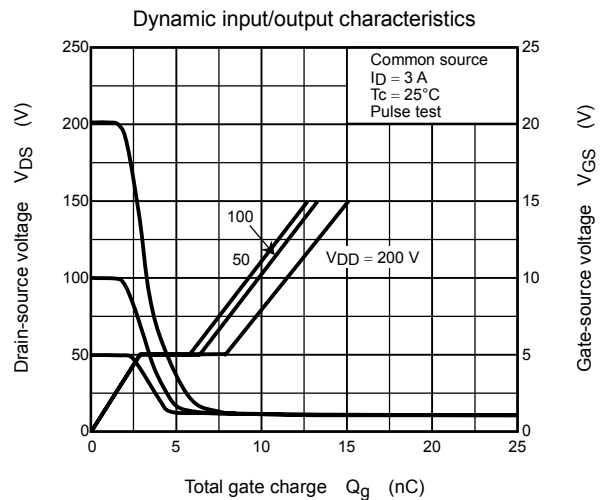
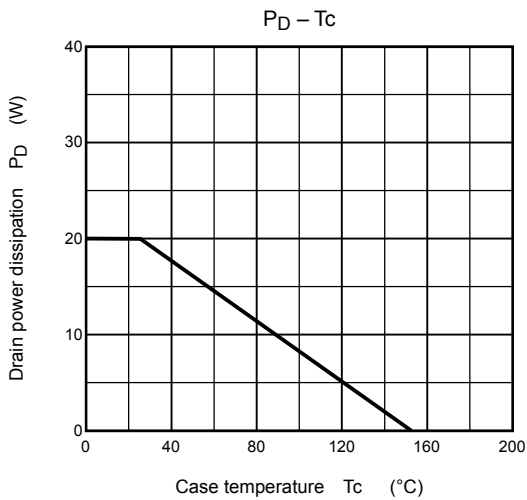
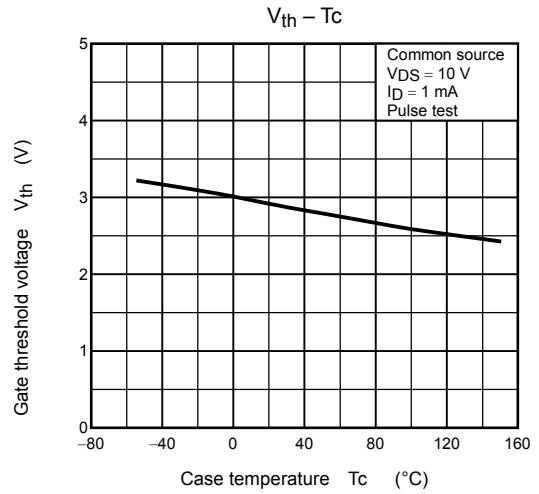
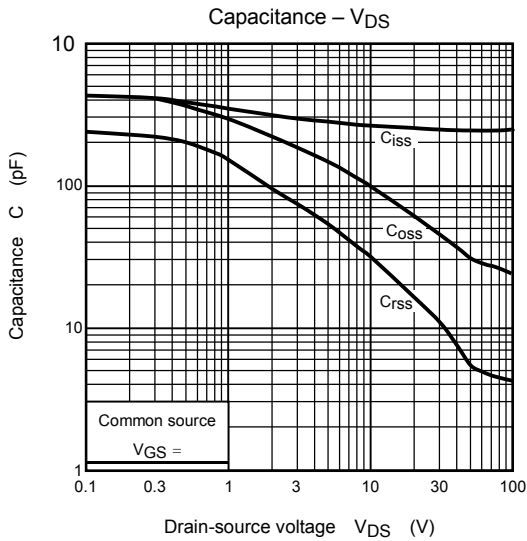
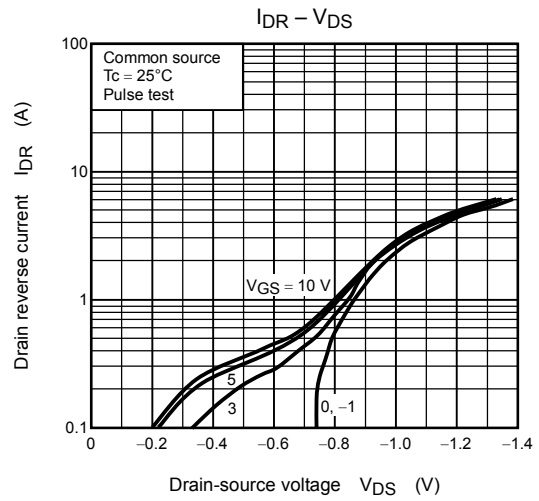
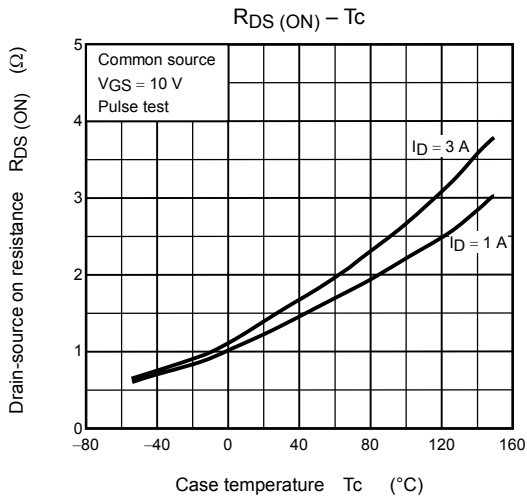
## Source-Drain Ratings and Characteristics (Ta = 25°C)

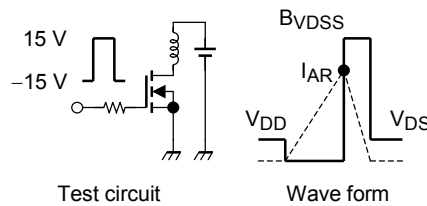
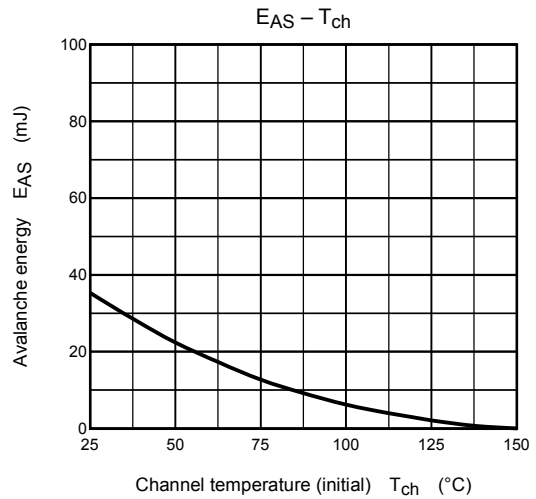
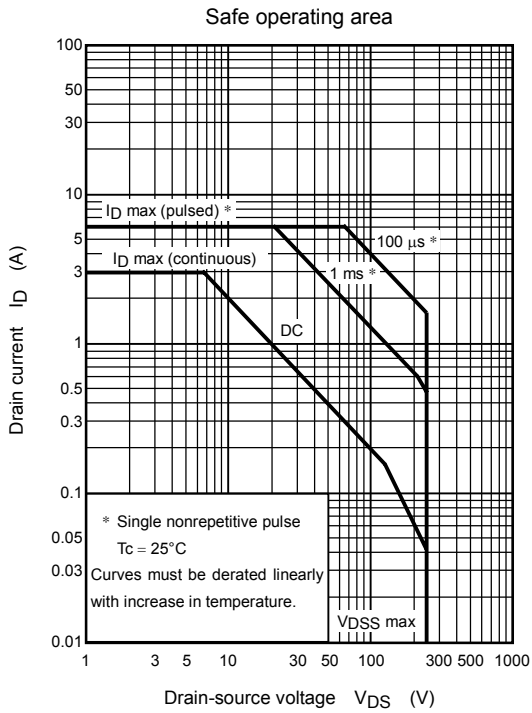
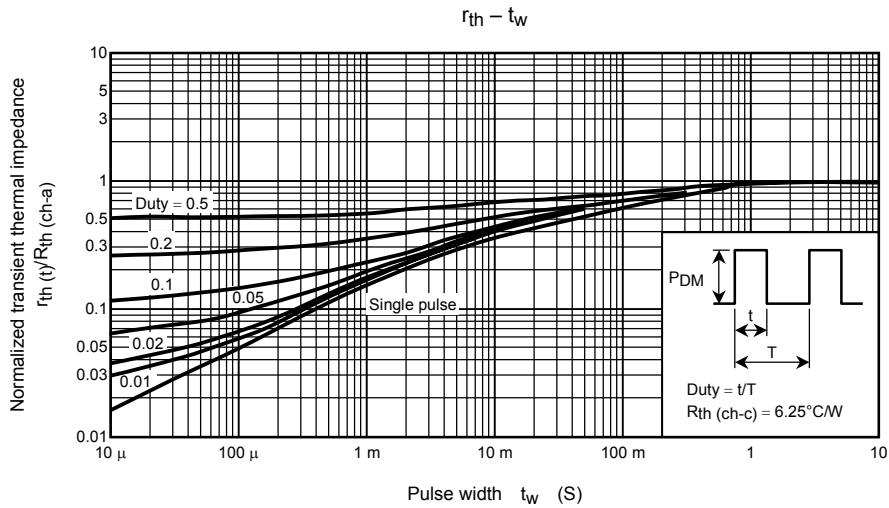
| Characteristics                              | Symbol    | Test Condition                              | Min | Typ. | Max  | Unit |
|--|-----------|---|-----|------|------|------|
| Continuous drain reverse current<br>(Note 1) | $I_{DR}$  | —   | —   | —    | 3    | A    |
| Pulse drain reverse current<br>(Note 1)      | $I_{DRP}$ | —   | —   | —    | 6    | A    |
| Forward voltage (diode)                      | $V_{DSF}$ | $I_{DR} = 3\text{ A}, V_{GS} = 0\text{ V}$  | —   | —    | -2.0 | V    |
| Reverse recovery time                        | $t_{rr}$  | $I_{DR} = 3\text{ A}, V_{GS} = 0\text{ V},$ | —   | 125  | —    | ns   |
| Reverse recovery charge                      | $Q_{rr}$  | $dI_{DR}/dt = 100\text{ A}/\mu\text{s}$     | —   | 470  | —    | nC   |

## Marking









$$R_G = 25 \Omega$$

$$V_{DD} = 50 V, L = 6.7 \text{ mH}$$

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

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