

# 2SK2699

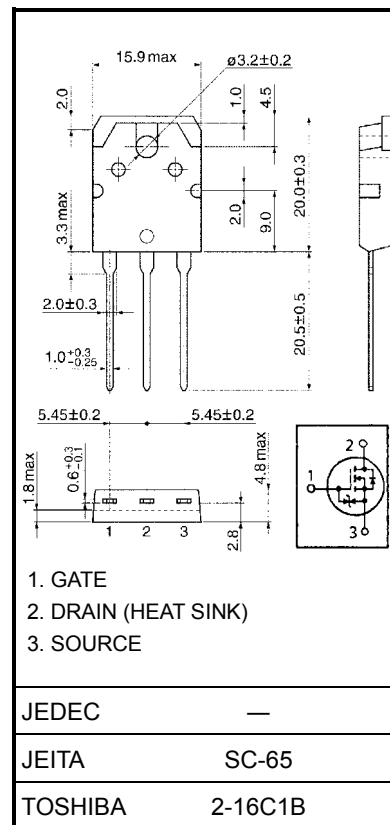
Chopper Regulator, DC-DC Converter and Motor Drive Applications

Unit: mm

- Low drain-source ON resistance :  $R_{DS(ON)} = 0.5 \Omega$  (typ.)
- High forward transfer admittance :  $|Y_{fs}| = 11 \text{ S}$  (typ.)
- Low leakage current :  $I_{DSS} = 100 \mu\text{A}$  (max) ( $V_{DS} = 600 \text{ V}$ )
- Enhancement-mode :  $V_{th} = 2.0 \sim 4.0 \text{ V}$  ( $V_{DS} = 10 \text{ V}$ ,  $I_D = 1 \text{ mA}$ )

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

| Characteristics                                      |                | Symbol    | Rating         | Unit             |
|------------------------------------------------------|----------------|-----------|----------------|------------------|
| Drain-source voltage                                 |                | $V_{DSS}$ | 600            | V                |
| Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ ) |                | $V_{DGR}$ | 600            | V                |
| Gate-source voltage                                  |                | $V_{GSS}$ | $\pm 30$       | V                |
| Drain current                                        | DC (Note 1)    | $I_D$     | 12             | A                |
|                                                      | Pulse (Note 1) | $I_{DP}$  | 48             | A                |
| Drain power dissipation ( $T_c = 25^\circ\text{C}$ ) |                | $P_D$     | 150            | W                |
| Single pulse avalanche energy (Note 2)               |                | $E_{AS}$  | 605            | mJ               |
| Avalanche current                                    |                | $I_{AR}$  | 12             | A                |
| Repetitive avalanche energy (Note 3)                 |                | $E_{AR}$  | 15             | mJ               |
| Channel temperature                                  |                | $T_{ch}$  | 150            | $^\circ\text{C}$ |
| Storage temperature range                            |                | $T_{stg}$ | $-55 \sim 150$ | $^\circ\text{C}$ |



Weight: 4.6 g (typ.)

### Thermal Characteristics

| Characteristics                        | Symbol         | Max   | Unit                        |
|----------------------------------------|----------------|-------|-----------------------------|
| Thermal resistance, channel to case    | $R_{th(ch-c)}$ | 0.833 | $^\circ\text{C} / \text{W}$ |
| Thermal resistance, channel to ambient | $R_{th(ch-a)}$ | 50    | $^\circ\text{C} / \text{W}$ |

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

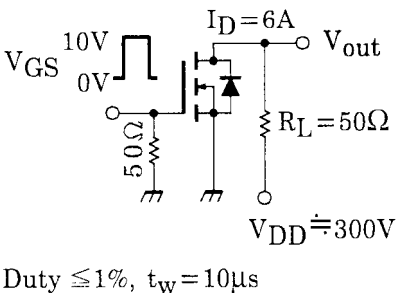
Note 2:  $V_{DD} = 90 \text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 7.35 \text{ mH}$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = 12 \text{ A}$

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

This transistor is an electrostatic sensitive device.

Please handle with caution.

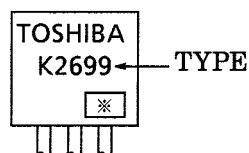
## Electrical Characteristics (Ta = 25°C)

| Characteristics                                 |               | 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                           |               | $I_{DSS}$     | $V_{DS} = 600 \text{ V}, V_{GS} = 0 \text{ V}$                                      | —        | —    | 100      | $\mu\text{A}$ |
| Drain-source breakdown voltage                  |               | $V_{(BR)DSS}$ | $I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$                                         | 600      | —    | —        | 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                      |               | $R_{DS(ON)}$  | $V_{GS} = 10 \text{ V}, I_D = 6 \text{ A}$                                          | —        | 0.5  | 0.65     | $\Omega$      |
| Forward transfer admittance                     |               | $ Y_{fs} $    | $V_{DS} = 10 \text{ V}, I_D = 6 \text{ A}$                                          | 6.0      | 11.0 | —        | S             |
| Input capacitance                               |               | $C_{iss}$     | $V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$                    | —        | 2600 | —        | pF            |
| Reverse transfer capacitance                    |               | $C_{rss}$     |                                                                                     | —        | 270  | —        |               |
| Output capacitance                              |               | $C_{oss}$     |                                                                                     | —        | 820  | —        |               |
| Switching time                                  | Rise time     | $t_r$         |  | —        | 45   | —        | ns            |
|                                                 | Turn-on time  | $t_{on}$      |                                                                                     | —        | 75   | —        |               |
|                                                 | Fall time     | $t_f$         |                                                                                     | —        | 65   | —        |               |
|                                                 | Turn-off time | $t_{off}$     |                                                                                     | —        | 270  | —        |               |
| Total gate charge (gate-source plus gate-drain) |               | $Q_g$         | $V_{DD} \approx 480 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 12 \text{ A}$           | —        | 58   | —        | nC            |
| Gate-source charge                              |               | $Q_{gs}$      |                                                                                     | —        | 37   | —        |               |
| Gate-drain ("miller") Charge                    |               | $Q_{gd}$      |                                                                                     | —        | 21   | —        |               |

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

| Characteristics                           | Symbol    | Test Condition                                | Min | Typ. | Max  | Unit          |
|-------------------------------------------|-----------|-----------------------------------------------|-----|------|------|---------------|
| Continuous drain reverse current (Note 1) | $I_{DR}$  | —                                             | —   | —    | 12   | A             |
| Pulse drain reverse current (Note 1)      | $I_{DRP}$ | —                                             | —   | —    | 48   | A             |
| Forward voltage (diode)                   | $V_{DSF}$ | $I_{DR} = 12 \text{ A}, V_{GS} = 0 \text{ V}$ | —   | —    | -1.7 | V             |
| Reverse recovery time                     | $t_{rr}$  | $I_{DR} = 12 \text{ A}, V_{GS} = 0 \text{ V}$ | —   | 460  | —    | ns            |
| Reverse recovery charge                   | $Q_{rr}$  | $dI_{DR} / dt = 100 \text{ A} / \mu\text{s}$  | —   | 4.8  | —    | $\mu\text{C}$ |

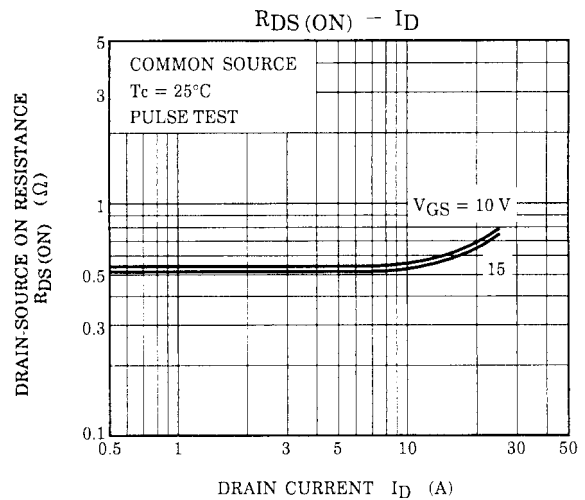
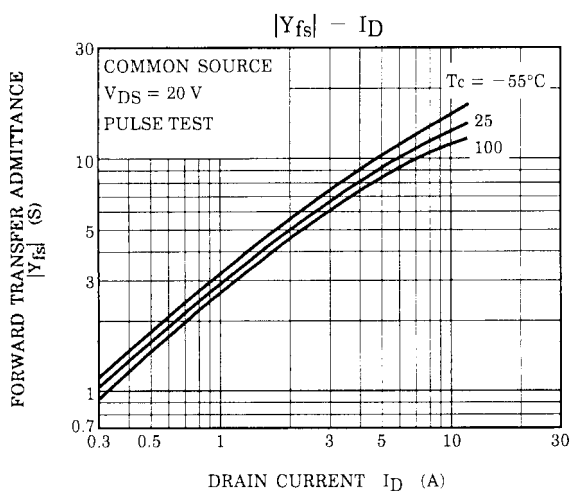
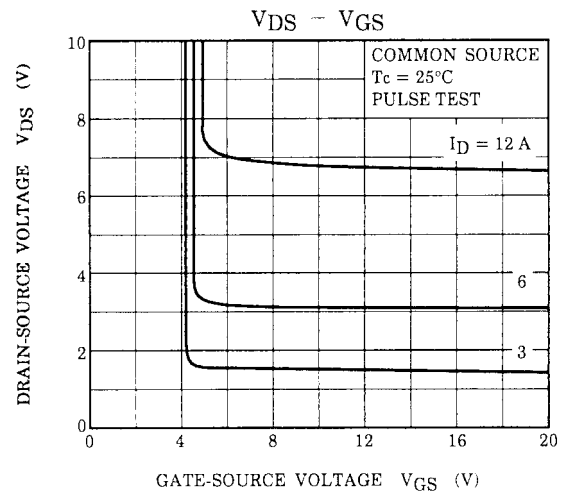
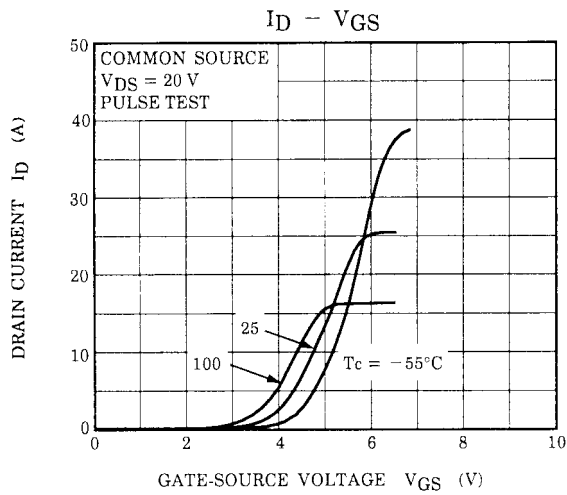
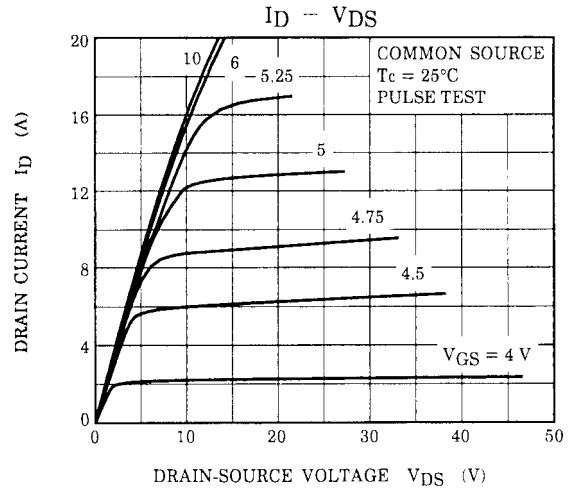
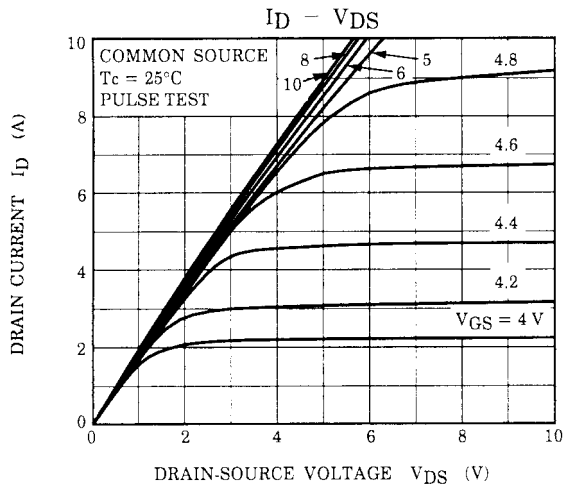
## Marking

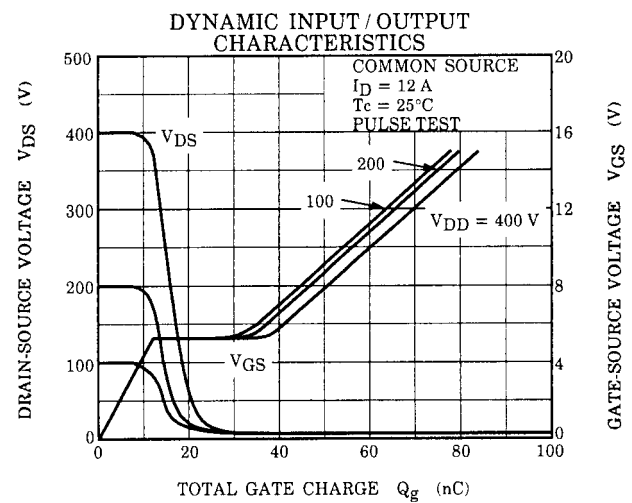
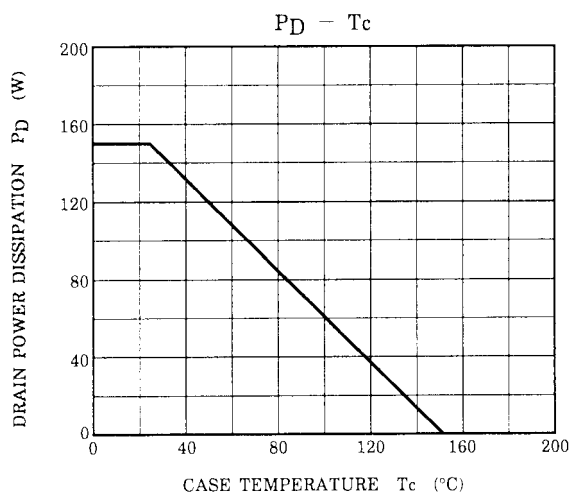
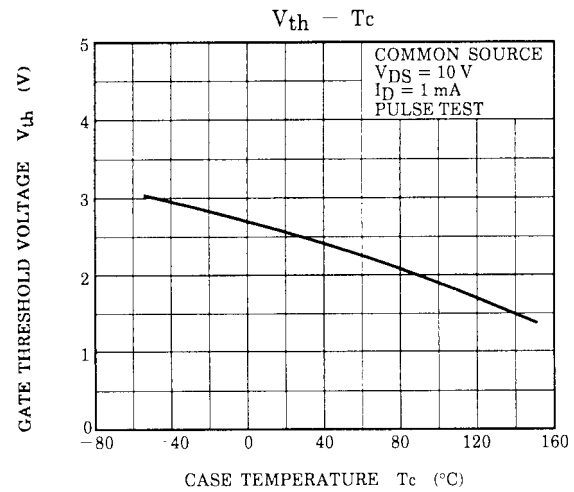
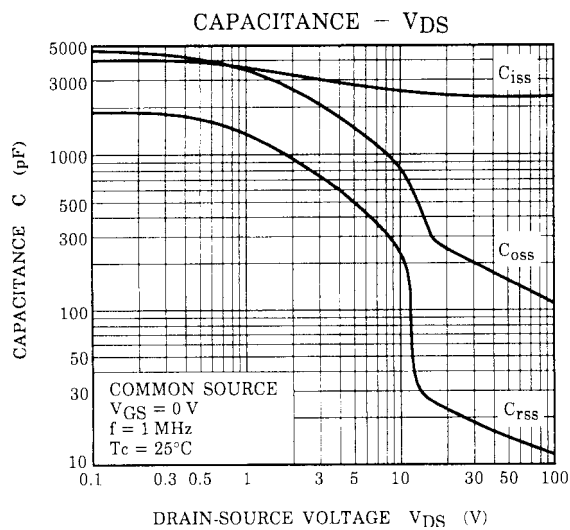
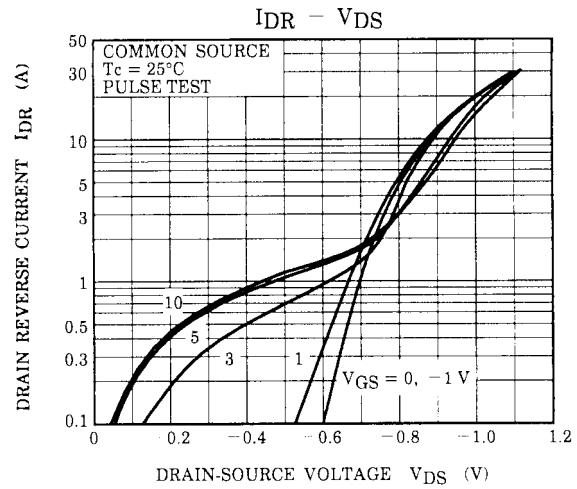
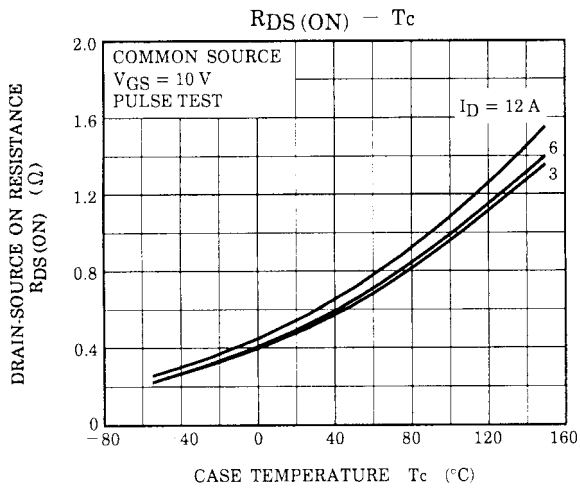


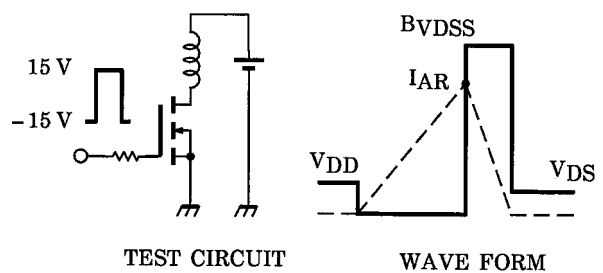
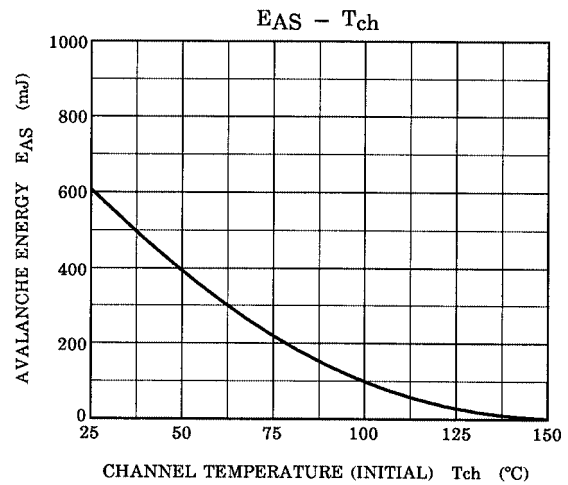
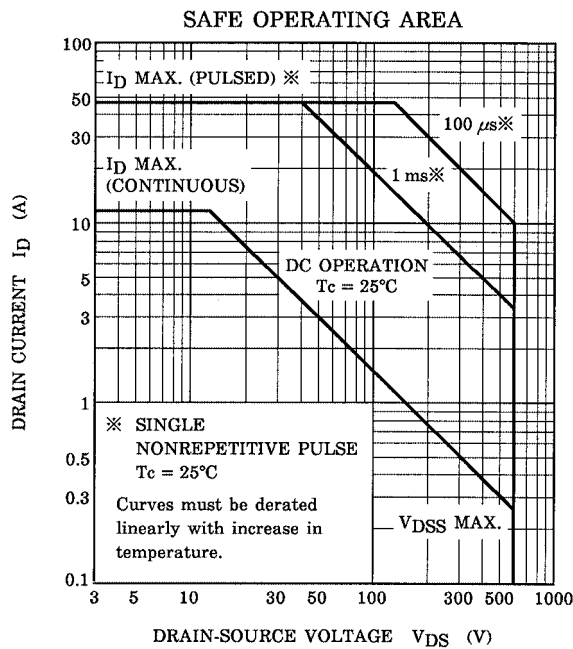
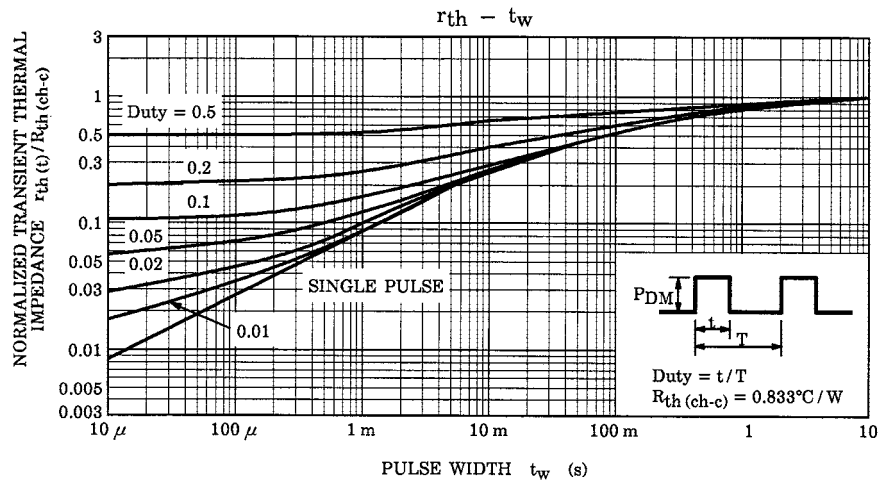
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







$$R_G = 25 \, \Omega$$

$$V_{DD} = 90 \, \text{V}, L = 7.35 \, \text{mH}$$

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

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