

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (U-MOSII)

2SK2987

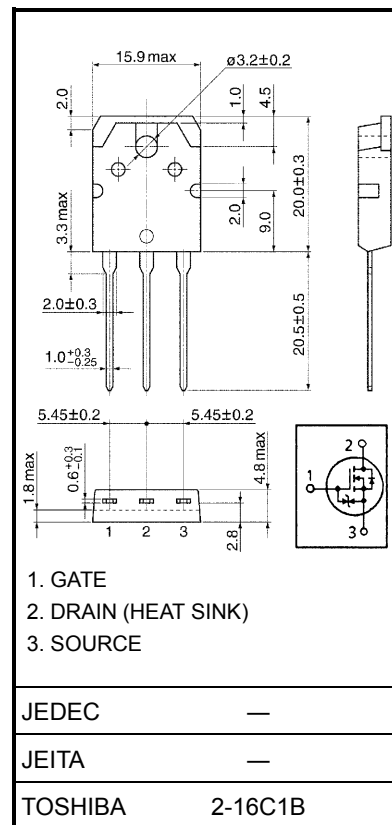
DC-DC Converter, Relay Drive and Motor Drive Applications

Unit: mm

- Low drain-source ON resistance : $R_{DS(ON)} = 4.5 \text{ m}\Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 80 \text{ S}$ (typ.)
- Low leakage current : $I_{DSS} = 100 \text{ }\mu\text{A}$ (max) ($V_{DS} = 60 \text{ V}$)
- Enhancement-mode : $V_{th} = 1.3 \sim 2.5 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

| Characteristics | | Symbol | Rating | Unit |
|--|----------------|-----------|----------------|------------------|
| Drain-source voltage | | V_{DSS} | 60 | V |
| Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$) | | V_{DGR} | 60 | V |
| Gate-source voltage | | V_{GSS} | ± 20 | V |
| Drain current | DC (Note 1) | I_D | 70 | A |
| | Pulse (Note 1) | I_{DP} | 280 | |
| Drain power dissipation ($T_c = 25^\circ\text{C}$) | | P_D | 150 | W |
| Single pulse avalanche energy (Note 2) | | E_{AS} | 490 | mJ |
| Avalanche current | | I_{AR} | 70 | 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°C .

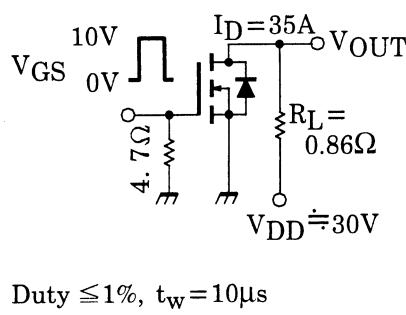
Note 2: $V_{DD} = 25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 136 \text{ }\mu\text{H}$, $I_{AR} = 70 \text{ A}$, $R_G = 25 \text{ }\Omega$

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

This transistor is an electrostatic sensitive device.

Please handle with caution.

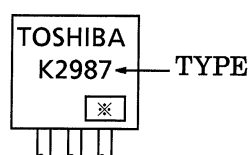
Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|----------------|---|---|-----|------|------------|---------------|
| Gate leakage current | | I_{GSS} | $V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$ | — | — | ± 10 | μA |
| Drain cut-off current | | I_{DSS} | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$ | — | — | 100 | μA |
| Drain-source breakdown voltage | $V_{(BR) DSS}$ | $I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$ | 60 | — | — | V | |
| | $V_{(BR) DSX}$ | $I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$ | 40 | — | — | | |
| Gate threshold voltage | | V_{th} | $V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$ | 1.3 | — | 2.5 | V |
| Drain-source ON resistance | $R_{DS(ON)}$ | $V_{GS} = 10\text{ V}, I_D = 35\text{ A}$ | — | 4.5 | 5.8 | m Ω | |
| | | $V_{GS} = 4\text{ V}, I_D = 35\text{ A}$ | — | 5.8 | 10 | | |
| Forward transfer admittance | | $ Y_{fs} $ | $V_{DS} = 10\text{ V}, I_D = 35\text{ A}$ | 40 | 80 | — | S |
| Input capacitance | | C_{iss} | $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | — | 9300 | — | pF |
| Reverse transfer capacitance | | C_{rss} | | — | 910 | — | |
| Output capacitance | | C_{oss} | | — | 1435 | — | |
| Switching time | Rise time | t_r |  | — | 18 | — | ns |
| | Turn-on time | t_{on} | | — | 50 | — | |
| | Fall time | t_f | | — | 110 | — | |
| | Turn-off time | t_{off} | | — | 480 | — | |
| Total gate charge (gate-source plus gate-drain) | | Q_g | $V_{DD} \approx 48\text{ V}, V_{GS} = 10\text{ V}, I_D = 70\text{ A}$ | — | 210 | — | nC |
| Gate-source charge | | Q_{gs} | | — | 145 | — | |
| Gate-drain (“miller”) Charge | | Q_{gd} | | — | 65 | — | |

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

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|-----------|--|-----|------|------|------|
| Continuous drain reverse current (Note 1) | I_{DR} | — | — | — | 70 | A |
| Pulse drain reverse current (Note 1) | I_{DRP} | — | — | — | 280 | A |
| Forward voltage (diode) | V_{DSF} | $I_{DR} = 70 \text{ A}, V_{GS} = 0 \text{ V}$ | — | — | -1.5 | V |
| Reverse recovery time | t_{rr} | $I_{DR} = 70 \text{ A}, V_{GS} = 0 \text{ V}, dI_{DR} / dt = 50 \text{ A} / \mu\text{s}$ | — | 60 | — | ns |
| Reverse recovery charge | Q_{rr} | | — | 50 | — | nC |

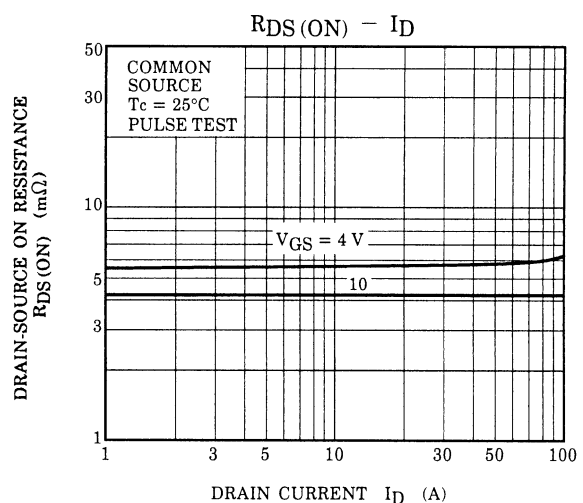
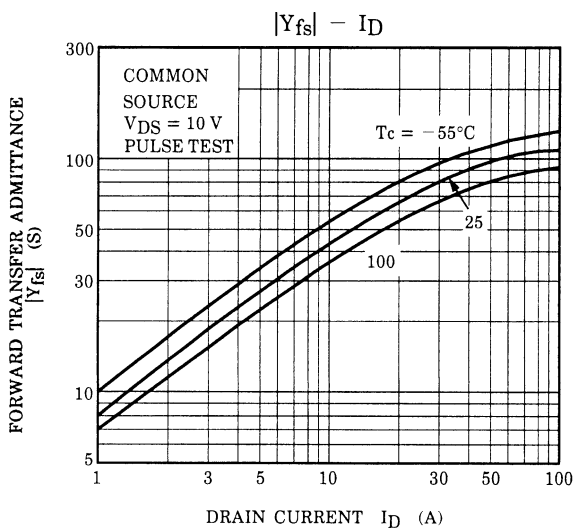
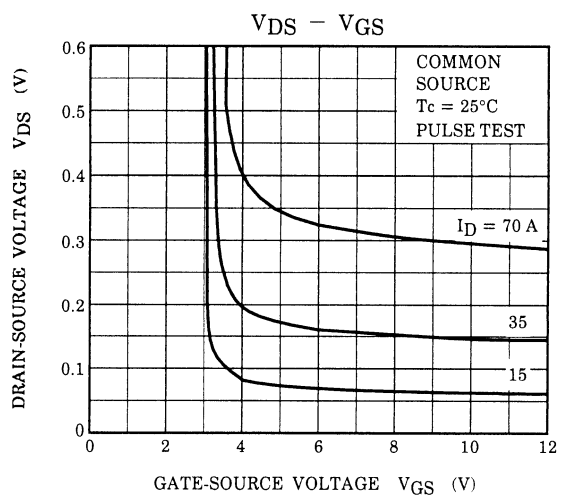
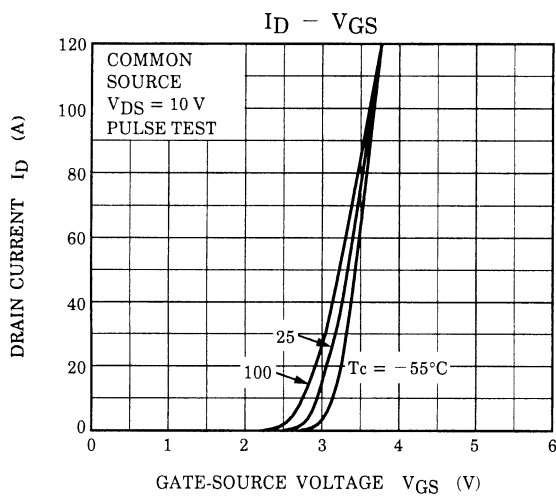
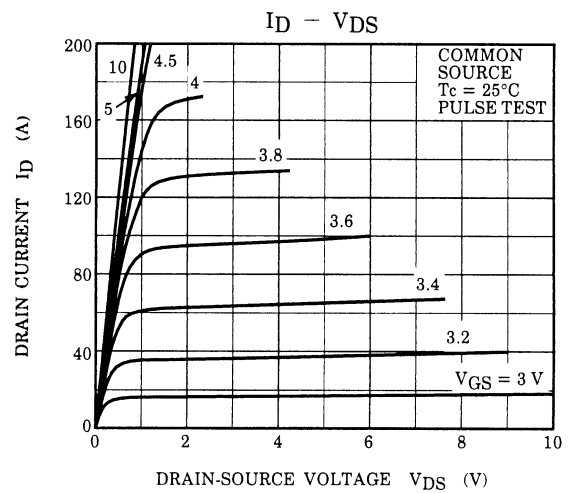
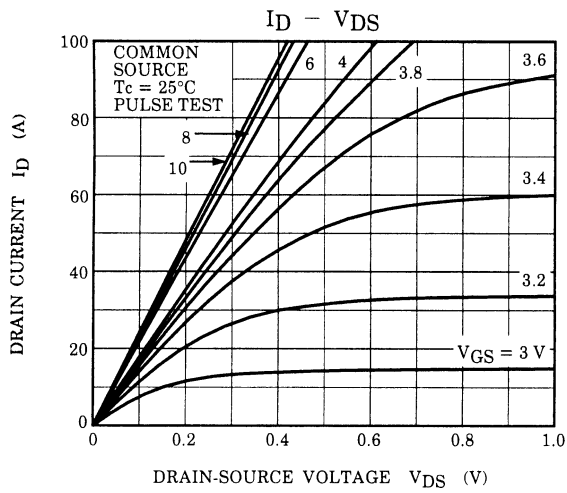
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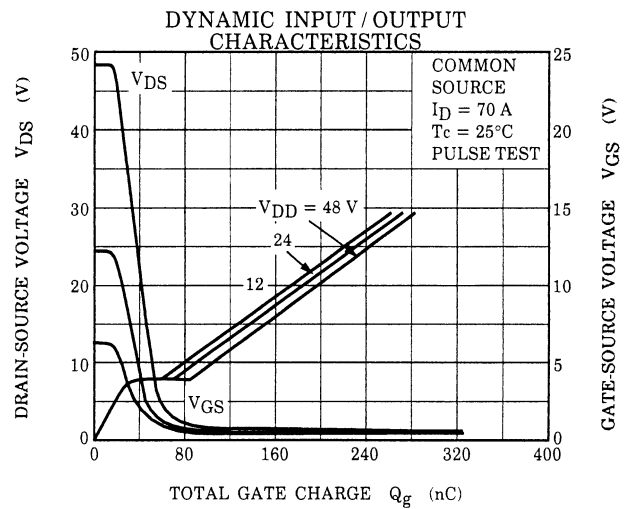
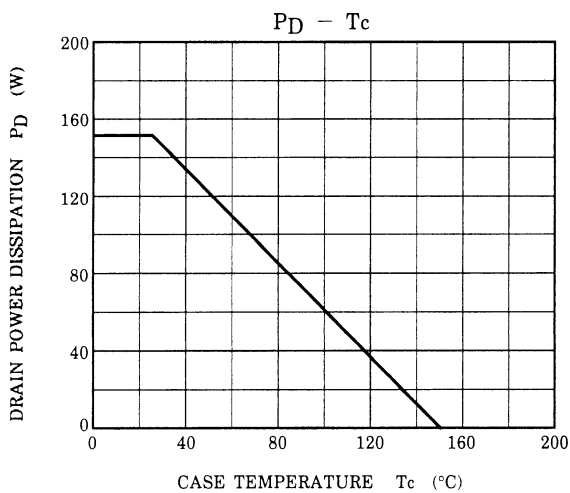
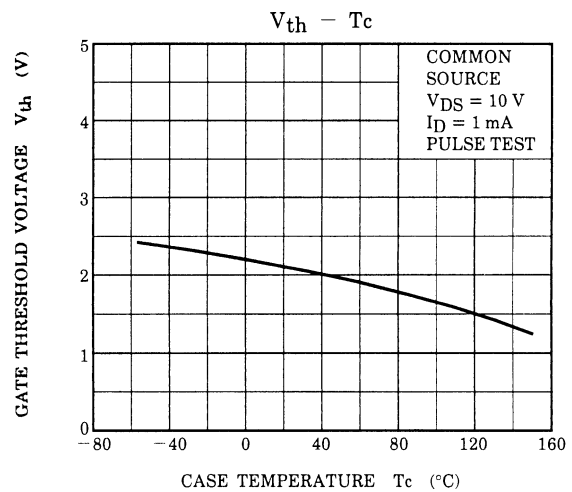
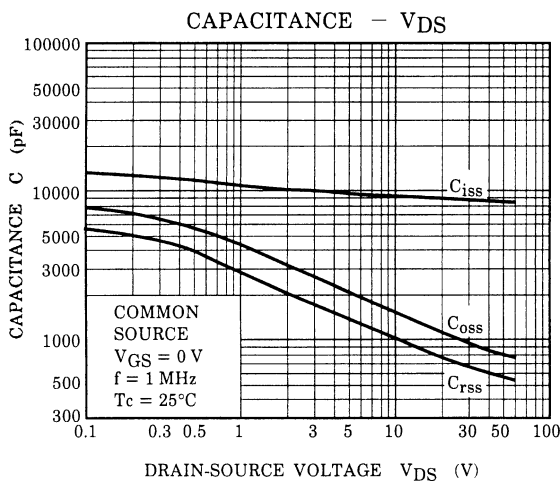
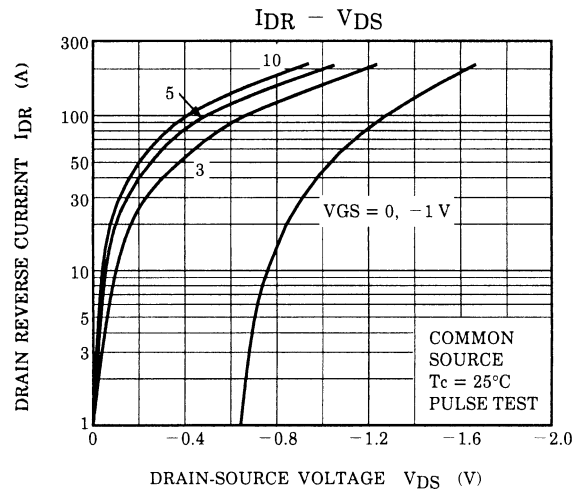
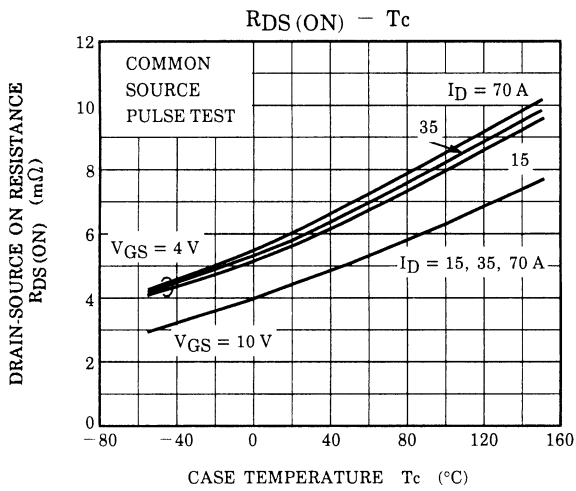


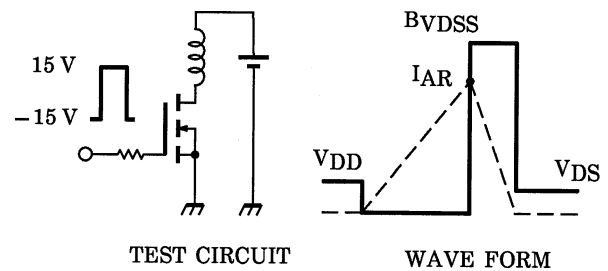
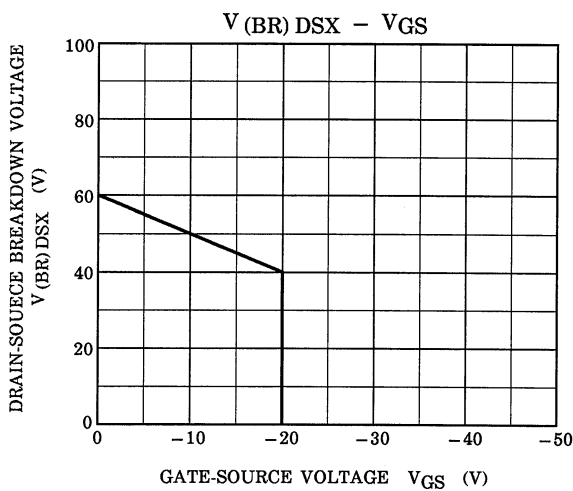
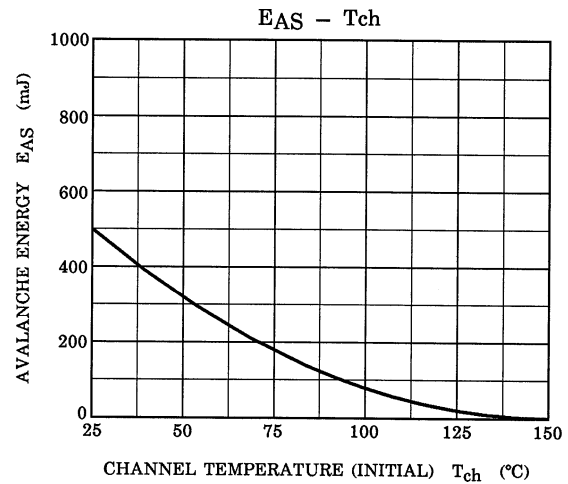
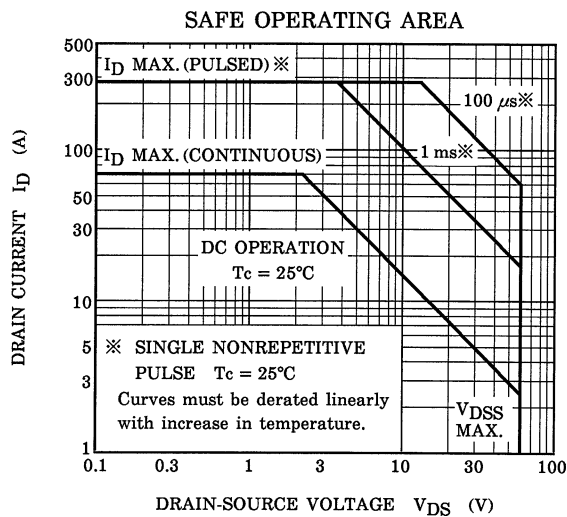
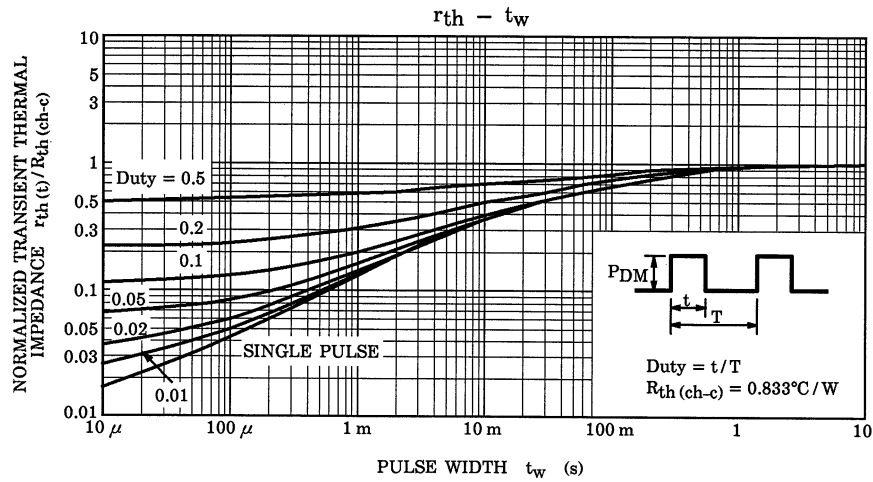
※ Lot Number

□ □ — Month (Starting from Alphabet A)

— Year (Last Number of the Christian Era)







$$R_G = 25 \, \Omega$$

$$V_{DD} = 25 \, \text{V}, L = 136 \, \mu\text{H}$$

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

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