

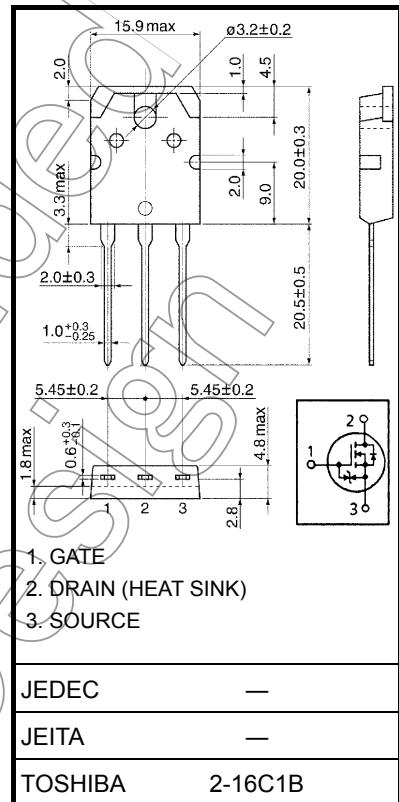
TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (π -MOSIII)

2SK2746

DC-DC Converter and Motor Drive Applications

- Low drain-source ON-resistance : $R_{DS\ (ON)} = 1.3\ \Omega\ (\text{typ.})$
- High forward transfer admittance : $|Y_{fs}| = 5.0\ \text{S}\ (\text{typ.})$
- Low leakage current : $I_{DSS} = 100\ \mu\text{A}\ (\text{max})\ (V_{DS} = 640\ \text{V})$
- Enhancement mode : $V_{th} = 2.0\ \text{to}\ 4.0\ \text{V}\ (V_{DS} = 10\ \text{V}, I_D = 1\ \text{mA})$

Unit: mm



Weight: 4.6 g (typ.)

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

| Characteristics | Symbol | Rating | Unit |
|--|----------------|------------|------------------|
| Drain-source voltage | V_{DSS} | 800 | V |
| Drain-gate voltage ($R_{GS} = 20\ \text{k}\Omega$) | V_{DGR} | 800 | V |
| Gate-source voltage | V_{GSS} | ± 30 | V |
| Drain current | DC (Note 1) | I_D | A |
| | Pulse (Note 1) | I_{DP} | A |
| Drain power dissipation ($T_c = 25^\circ\text{C}$) | P_D | 150 | W |
| Single pulse avalanche energy (Note 2) | E_{AS} | 673 | mJ |
| Avalanche current | I_{AR} | 7 | A |
| Repetitive avalanche energy (Note 3) | E_{AR} | 15 | mJ |
| Channel temperature | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage temperature range | T_{stg} | -55 to 150 | $^\circ\text{C}$ |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

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: Ensure that the channel temperature does not exceed 150°C.

Note 2: $V_{DD} = 90\ \text{V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 24.9\ \text{mH}$, $R_G = 25\ \Omega$, $I_{AR} = 7\ \text{A}$

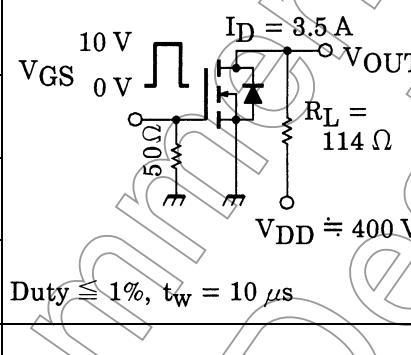
Note 3: Repetitive rating: pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device.

Please handle with caution.

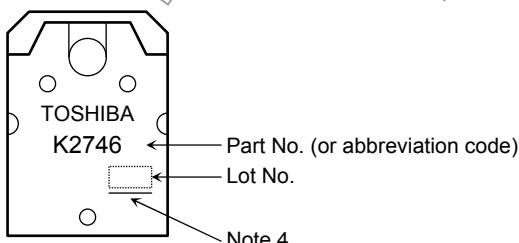
Electrical Characteristics ($T_a = 25^\circ\text{C}$)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|-----------------------------|---|----------|------|----------|---------------|
| Gate leakage current | I_{GSS} | $V_{GS} = \pm 30\text{ V}$, $V_{DS} = 0\text{ V}$ | — | — | ± 10 | μA |
| Gate-source breakdown voltage | $V_{(\text{BR})\text{GSS}}$ | $I_G = \pm 10\text{ }\mu\text{A}$, $V_{DS} = 0\text{ V}$ | ± 30 | — | — | V |
| Drain cut-off current | I_{DSS} | $V_{DS} = 640\text{ V}$, $V_{GS} = 0\text{ V}$ | — | — | 100 | μA |
| Drain-source breakdown voltage | $V_{(\text{BR})\text{DSS}}$ | $I_D = 10\text{ mA}$, $V_{GS} = 0\text{ V}$ | 800 | — | — | 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 | $R_{DS(\text{ON})}$ | $V_{GS} = 10\text{ V}$, $I_D = 3.5\text{ A}$ | — | 1.3 | 1.7 | Ω |
| Forward transfer admittance | $ Y_{fs} $ | $V_{DS} = 20\text{ V}$, $I_D = 3.5\text{ A}$ | 1.25 | 5.0 | — | S |
| Input capacitance | C_{iss} | $V_{DS} = 25\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$ | — | 1500 | — | pF |
| Reverse transfer capacitance | C_{rss} | | — | 30 | — | |
| Output capacitance | C_{oss} | | — | 140 | — | |
| Switching time | Rise time | t_r | — | 35 | — | ns |
| | Turn-on time | t_{on} | — | 80 | — | |
| | Fall time | t_f | — | 50 | — | |
| | Turn-off time | t_{off} | — | 220 | — | |
| Total gate charge (gate-source plus gate-drain) | Q_g | $V_{DD} \approx 400\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 7\text{ A}$ | — | 55 | — | nC |
| Gate-source charge | Q_{gs} | | — | 30 | — | |
| Gate-drain ("miller") Charge | Q_{gd} | | — | 25 | — | |

Source-Drain Ratings and Characteristics ($T_a = 25^\circ\text{C}$)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|-----------|---|-----|------|------|---------------|
| Continuous drain reverse current (Note 1) | I_{DR} | — | — | — | 7 | A |
| Pulse drain reverse current (Note 1) | I_{DRP} | — | — | — | 21 | A |
| Forward voltage (diode) | V_{DSF} | $I_{DR} = 7\text{ A}$, $V_{GS} = 0\text{ V}$ | — | — | -1.9 | V |
| Reverse recovery time | t_{rr} | $I_{DR} = 7\text{ A}$, $V_{GS} = 0\text{ V}$, $dI_{DR} / dt = 100\text{ A} / \mu\text{s}$ | — | 1300 | — | ns |
| Reverse recovery charge | Q_{rr} | | — | 14 | — | μC |

Marking

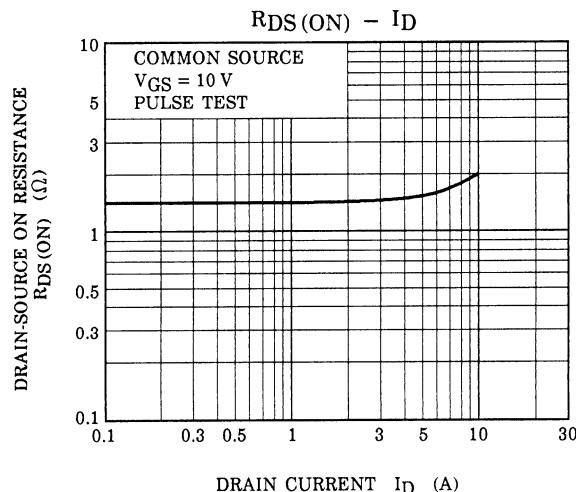
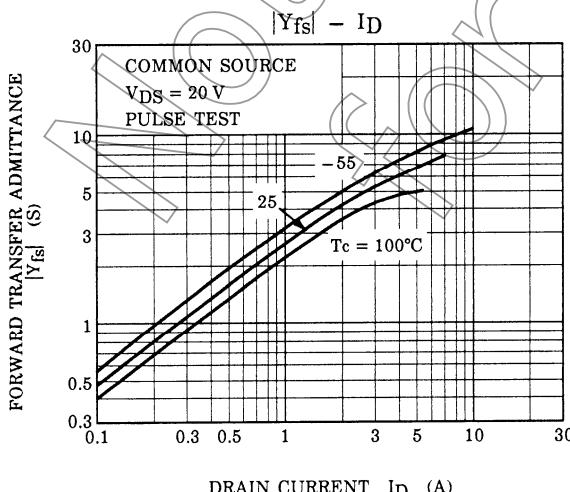
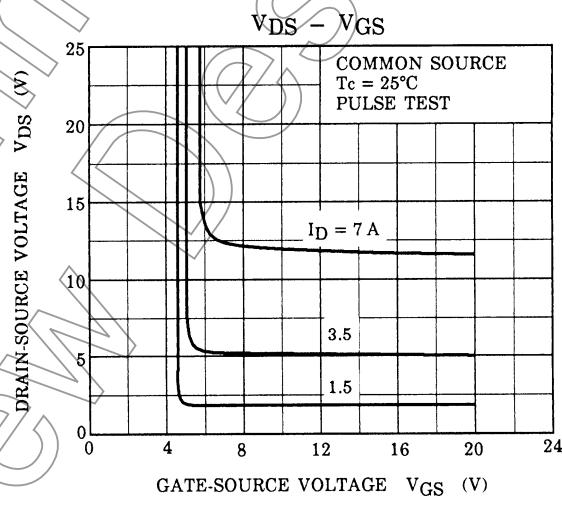
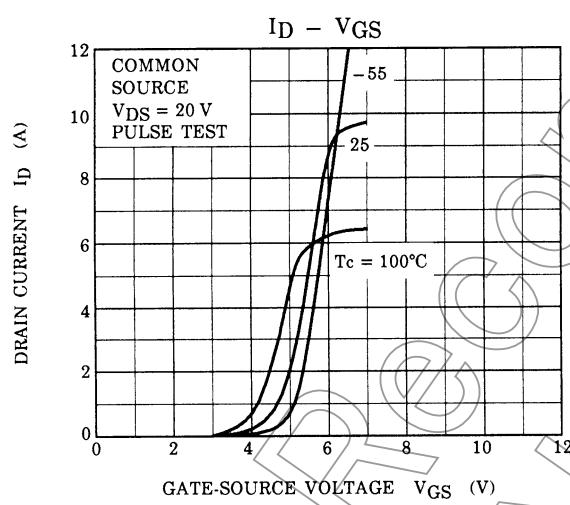
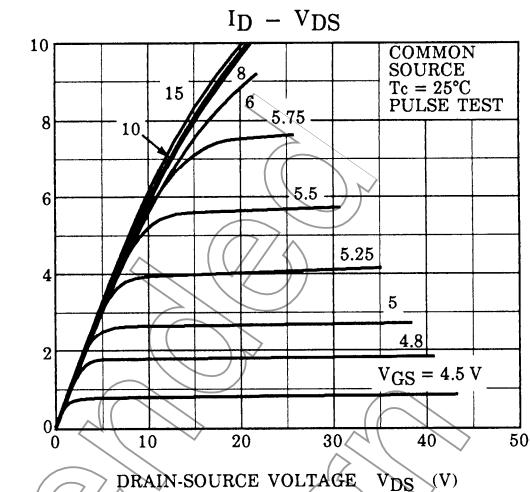
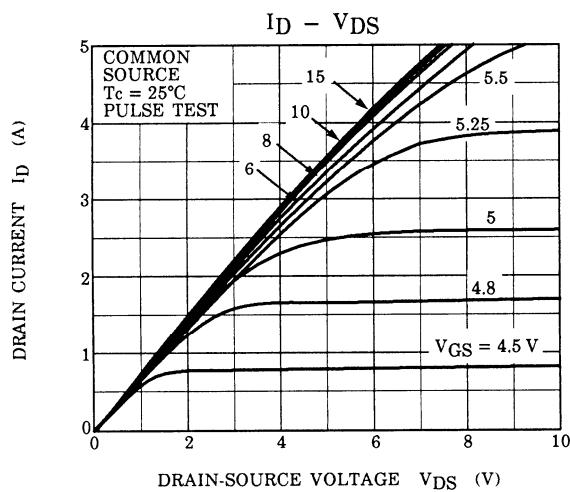


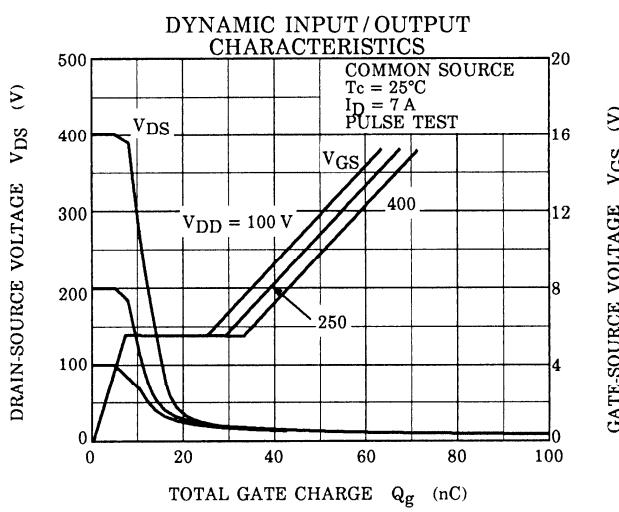
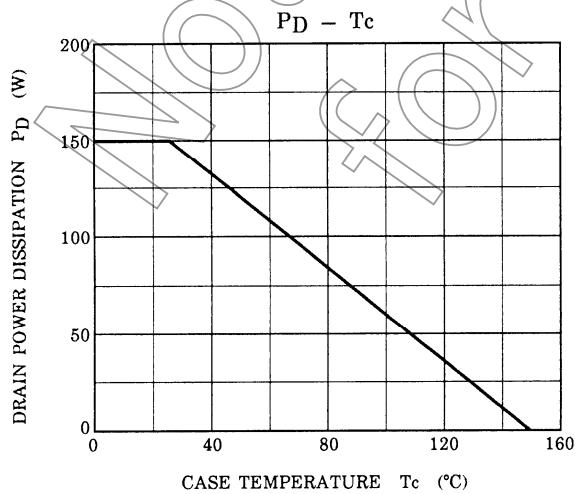
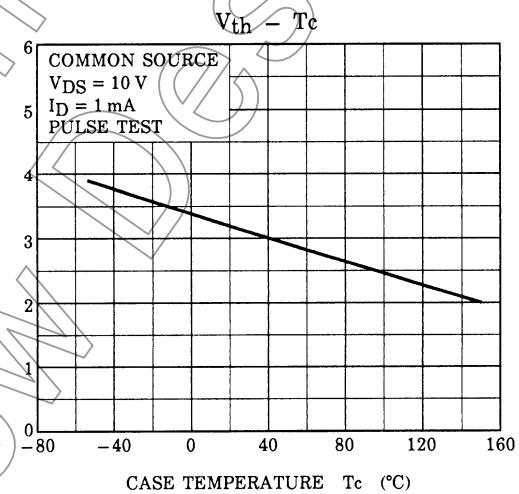
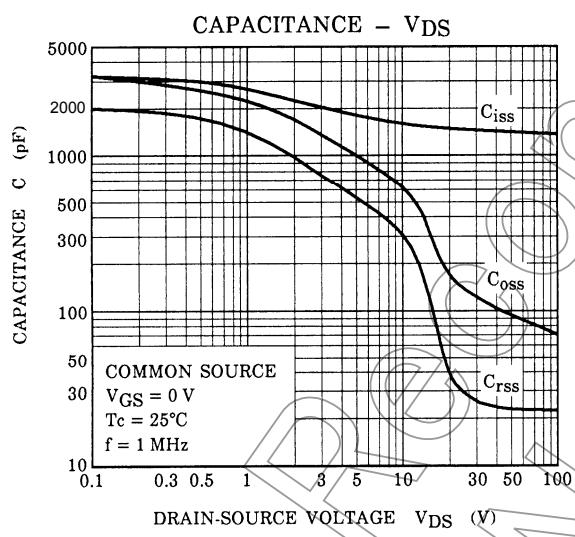
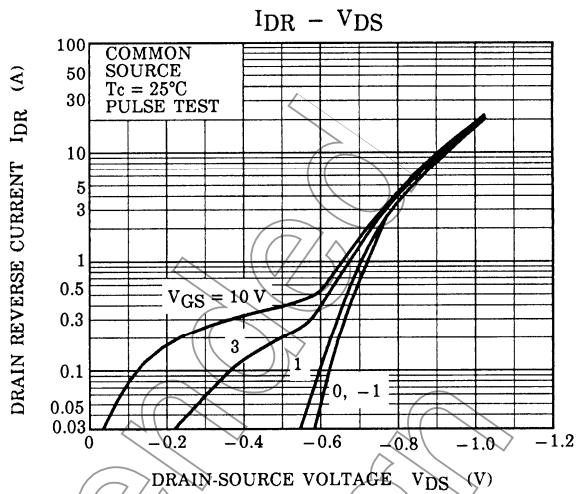
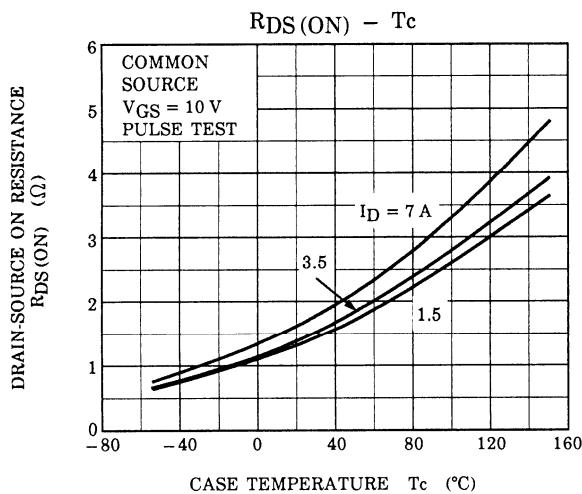
Note 4: A line under a Lot No. identifies the indication of product Labels.

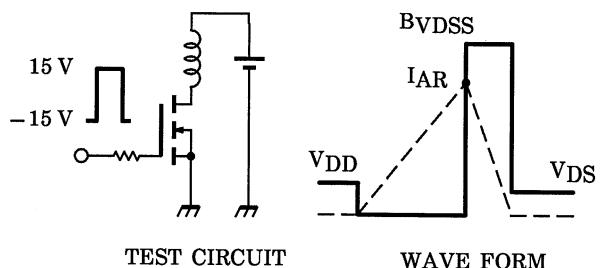
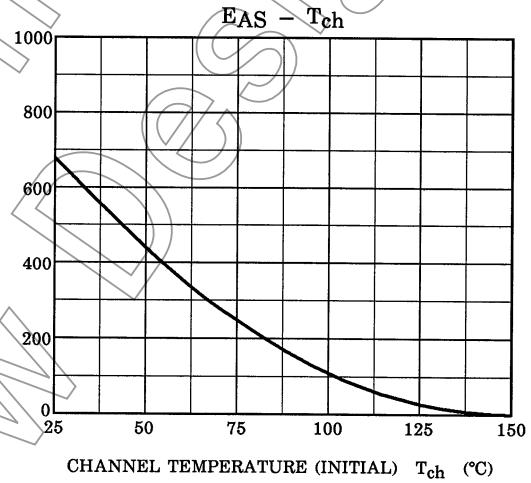
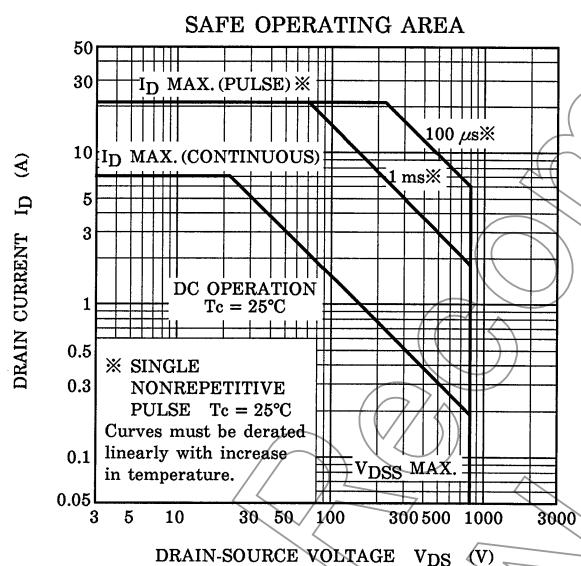
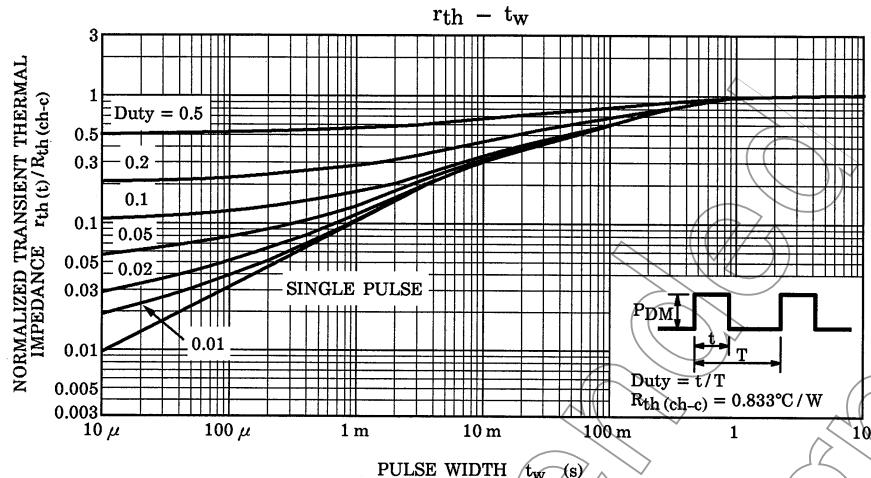
Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [G]/RoHS [[Pb]]

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$$R_G = 25 \Omega$$

$$V_{DD} = 90 \text{ V}, L = 24.9 \text{ mH}$$

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

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