Unit: mm

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

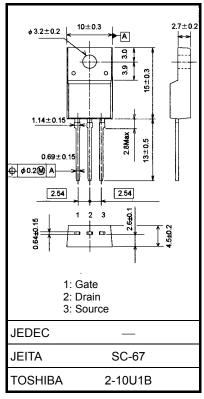
TK7A50D

Switching Regulator Applications

- Low drain-source ON-resistance: $R_{DS (ON)} = 1.0 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 2.5 \text{ S}$ (typ.)
- Low leakage current: I_{DSS} = 10 μ A (max) (V_{DS} = 500 V)
- Enhancement mode: V_{th} = 2.4 to 4.4 V (V_{DS} = 10 V, I_D = 1 mA)

| Characteristics | | Symbol | Rating | Unit | |
|---|------------------------------|------------------|------------|------|--|
| Drain-source voltage | | V _{DSS} | 500 | V | |
| Gate-source voltage | | V _{GSS} | ±30 | V | |
| Drain current | DC (Note 1) | ID | 7 | | |
| | Pulse (t = 1 ms) (Note 1) | I _{DP} | 28 | A | |
| Drain power dissipation (Tc = 25° C) | | PD | 35 | W | |
| Single pulse avalanche energy (Note 2) | | E _{AS} | 129 | mJ | |
| Avalanche current | | I _{AR} | 7 | А | |
| Repetitive avalanche energy (Note 3) | | E _{AR} | 3.5 | mJ | |
| Channel temperature | | T _{ch} | 150 | °C | |
| Storage temperature range | | T _{stg} | -55 to 150 | °C | |

Absolute Maximum Ratings (Ta = 25°C)



Weight: 1.7 g (typ.)

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

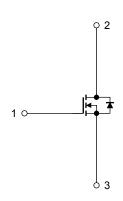
| Characteristics | Symbol | Max | Unit |
|--|------------------------|------|------|
| Thermal resistance, channel to case | R _{th (ch-c)} | 3.57 | °C/W |
| Thermal resistance, channel to ambient | R _{th (ch-a)} | 62.5 | °C/W |

Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2: V_{DD} = 90 V, T_{ch} = 25°C (initial), L = 4.5 mH, R_G = 25 Ω , I_{AR} = 7 A

This transistor is an electrostatic-sensitive device. Handle with care.

Internal Connection



Start of commercial production 2008-10

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

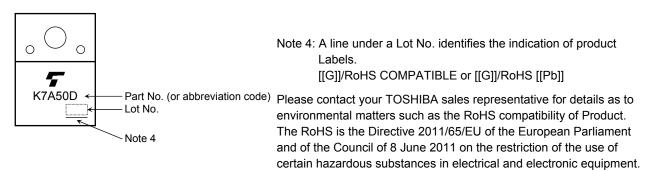
Electrical Characteristics (Ta = 25°C)

| Char | acteristics | Symbol | Test Condition | Min | Тур. | Max | Unit |
|------------------------------|----------------|----------------------|--|-----|------|------|------|
| Gate leakage current | | I _{GSS} | $V_{GS}=\pm 30~V,~V_{DS}=0~V$ | | | ±1 | μA |
| Drain cut-off current | | I _{DSS} | $V_{DS} = 500 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$ | | | 10 | μA |
| Drain-source bre | akdown voltage | V (BR) DSS | $I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$ | 500 | | | V |
| Gate threshold v | oltage | V _{th} | $V_{DS} = 10 \text{ V}, \text{ I}_{D} = 1 \text{ mA}$ | 2.4 | | 4.4 | V |
| Drain-source ON | -resistance | R _{DS (ON)} | $V_{GS} = 10 \text{ V}, \text{ I}_{D} = 3.5 \text{ A}$ | | 1.0 | 1.22 | Ω |
| Forward transfer | admittance | Y _{fs} | $V_{DS} = 10 \text{ V}, \text{ I}_{D} = 3.5 \text{ A}$ | 0.7 | 2.5 | | S |
| Input capacitance | | C _{iss} | | | 600 | | pF |
| Reverse transfer capacitance | | C _{rss} | $V_{DS} = 25 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ f} = 1 \text{ MHz}$ | | 4 | | |
| Output capacitance | | C _{oss} | | | 70 | | |
| Switching time | Rise time | tr | V_{GS} 0 V 0 V V 0 V V 0 V V 0 V V V V V V V V V V V V V V V V V V V | | 18 | _ | ns |
| | Turn-on time | t _{on} | | | 40 | | |
| | Fall time | t _f | | | 8 | | |
| | Turn-off time | t _{off} | Duty \le 1%, t _W = 10 µs | _ | 55 | _ | |
| Total gate charge | | Qg | | | 12 | | |
| Gate-source charge | | Q _{gs} | $V_{DD} \approx 400 \text{ V}, \text{ V}_{GS} = 10 \text{ V}, \text{ I}_{D} = 7 \text{ A}$ | | 7 | | nC |
| Gate-drain charge | | Q _{gd} |] | | 5 | — | |

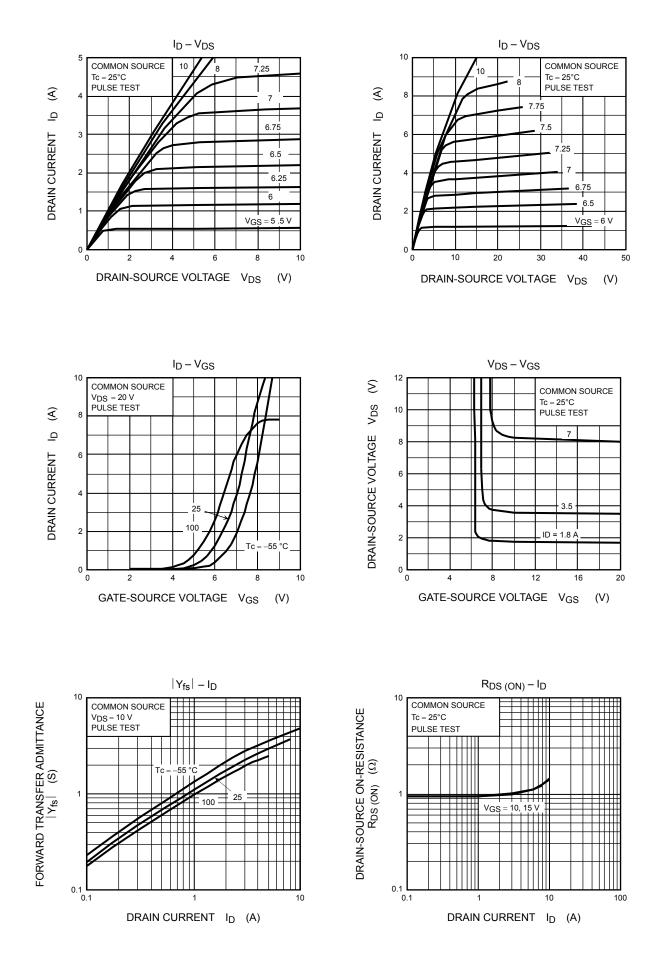
Source-Drain Ratings and Characteristics (Ta = 25°C)

| Characteristics | Symbol | Test Condition | Min | Тур. | Max | Unit |
|---|------------------|---|-----|------|------|------|
| Continuous drain reverse current (Note 1) | I _{DR} | — | _ | _ | 7 | А |
| Pulse drain reverse current (Note 1) | I _{DRP} | — | _ | _ | 28 | А |
| Forward voltage (diode) | V _{DSF} | $I_{DR} = 7 \text{ A}, V_{GS} = 0 \text{ V}$ | _ | _ | -1.7 | V |
| Reverse recovery time | t _{rr} | $I_{DR} = 7 \text{ A}, V_{GS} = 0 \text{ V},$ | _ | 1200 | _ | ns |
| Reverse recovery charge | Q _{rr} | dl _{DR} /dt = 100 A/μs | _ | 7 | _ | μC |

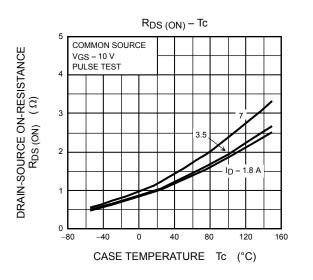
Marking

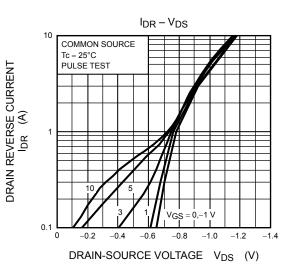


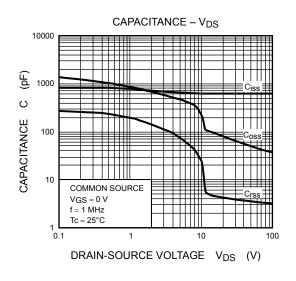
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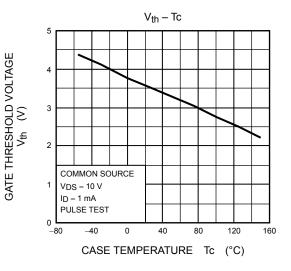


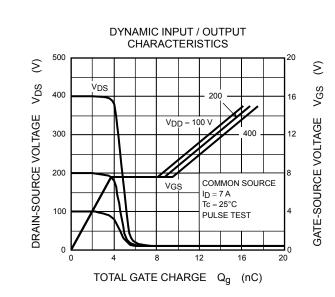
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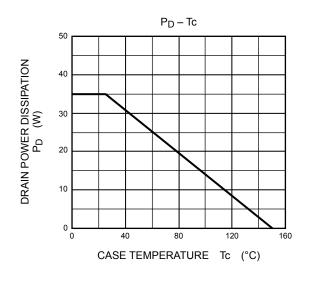


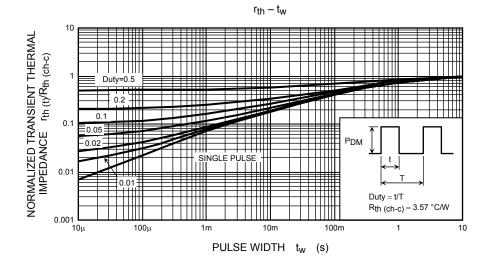


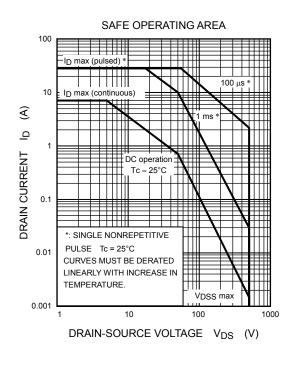


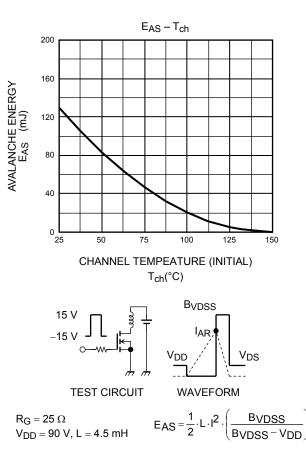












TOSHIBA

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