

TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type (MACH II π -MOS V)

TPCS8007-H

High-Speed Switching Applications

Switching Regulator Applications

DC/DC Converter Applications

- Low drain-source ON-resistance: $R_{DS(ON)} = 0.36 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 2.1 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \mu\text{A}$ (max) ($V_{DS} = 200 \text{ V}$)
- Enhancement model: $V_{th} = 2.0 \sim 4.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

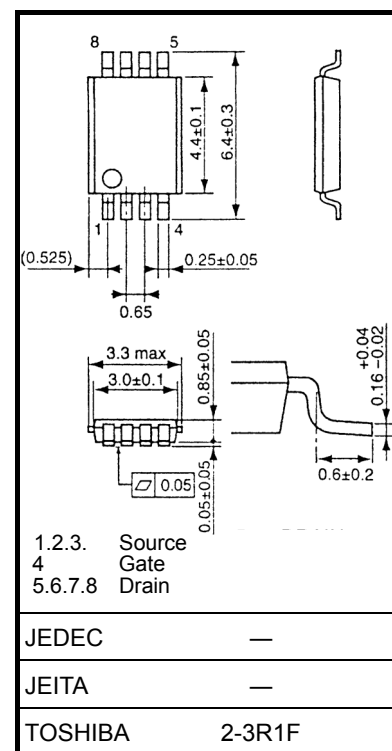
| Characteristic | | Symbol | Rating | Unit |
|---|----------------|-----------|----------------|------------------|
| Drain-source voltage | | V_{DSS} | 200 | V |
| Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$) | | V_{DGR} | 200 | V |
| Gate-source voltage | | V_{GSS} | ± 20 | V |
| Drain current | DC (Note 1) | I_D | 1.9 | A |
| | Pulse (Note 1) | I_{DP} | 7.6 | |
| Drain power dissipation ($t = 10 \text{ s}$) (Note 2a) | | P_D | 1.5 | W |
| Drain power dissipation ($t = 10 \text{ s}$) (Note 2b) | | P_D | 0.6 | |
| Single-pulse avalanche energy (Note 3) | | E_{AS} | 2.3 | mJ |
| Avalanche current | | I_{AR} | 1.9 | A |
| Repetitive avalanche energy (Note 2a, Note 4) | | E_{AR} | 0.15 | mJ |
| Channel temperature | | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage temperature range | | T_{stg} | $-55 \sim 150$ | $^\circ\text{C}$ |

Note: For Notes 1 to 4, refer to the next page.

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).

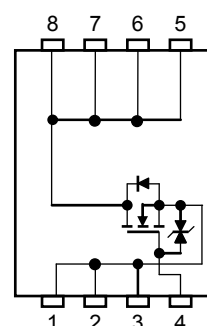
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.036 g (typ.)

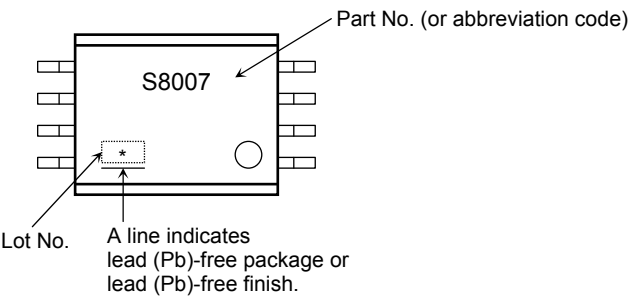
Circuit Configuration



Thermal Characteristics

| Characteristic | Symbol | Max | Unit |
|---|-----------------|------|------|
| Thermal resistance, channel to ambient (t = 10 s) (Note 2a) | $R_{th (ch-a)}$ | 83.3 | °C/W |
| Thermal resistance, channel to ambient (t = 10 s) (Note 2b) | $R_{th (ch-a)}$ | 208 | °C/W |

Marking (Note 5)



Note 1: The channel temperature should not exceed 150°C during use.

Note 2:

- a) Device mounted on a glass-epoxy board (a) b) Device mounted on a glass-epoxy board (b)



Note 3: $V_{DD} = 50 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 1.0 \text{ mH}$, $R_G = 25 \Omega$, $I_{AR} = 1.9 \text{ A}$

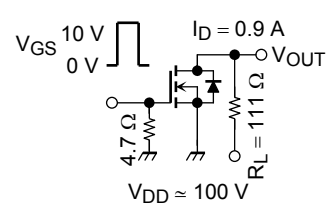
Note 4: Repetitive rating: pulse width limited by maximum channel temperature

Note 5: \bigcirc on the lower right of the marking indicates Pin 1.

* Weekly code: (Three digits)

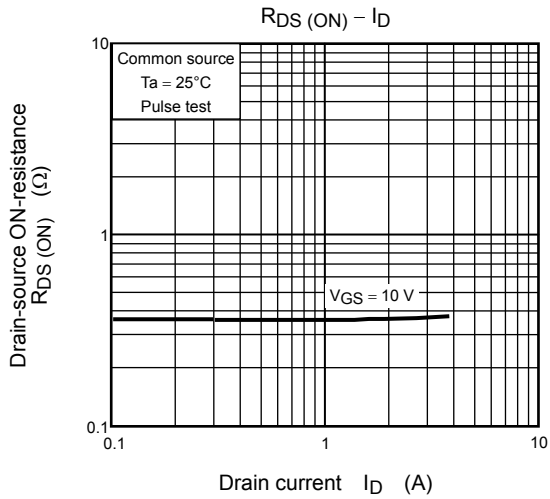
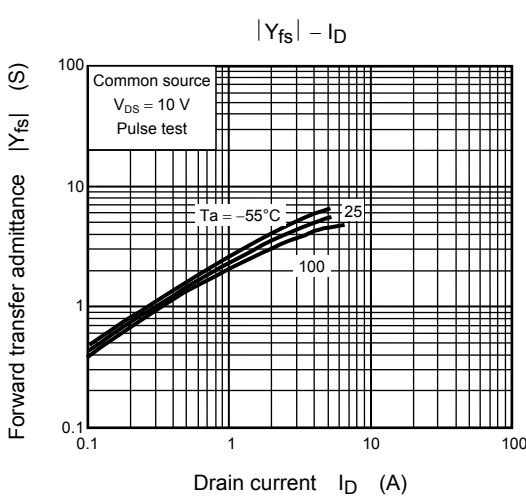
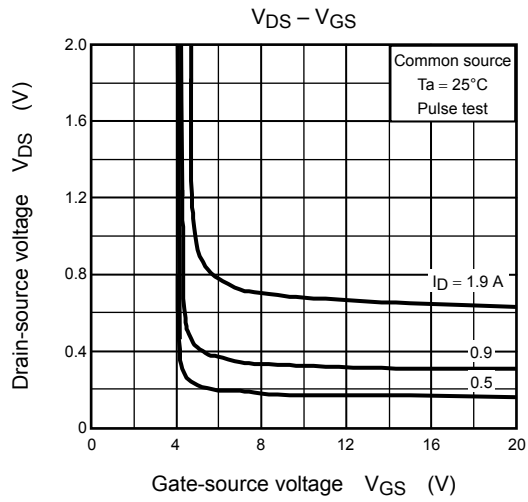
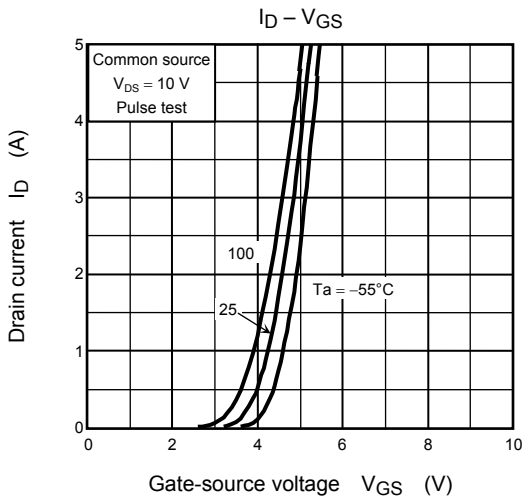
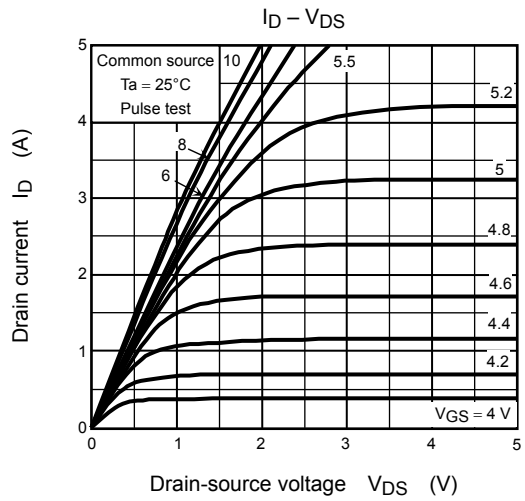
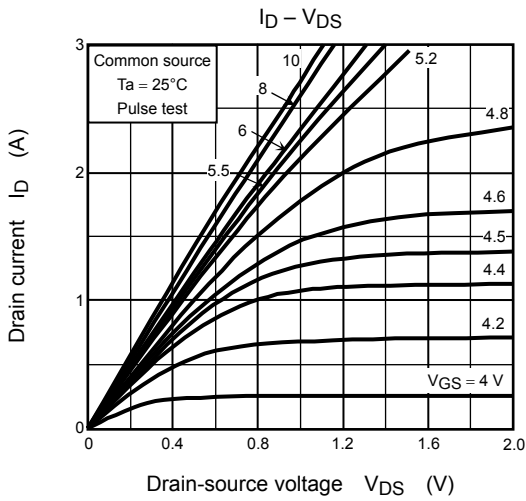
| | |
|--|---|
| <div><div></div><div></div><div></div></div> | Week of manufacture (01 for first week of year, continuing up to 52 or 53) |
| <div><div></div><div></div></div> | Year of manufacture (The last digit of the calendar year) |

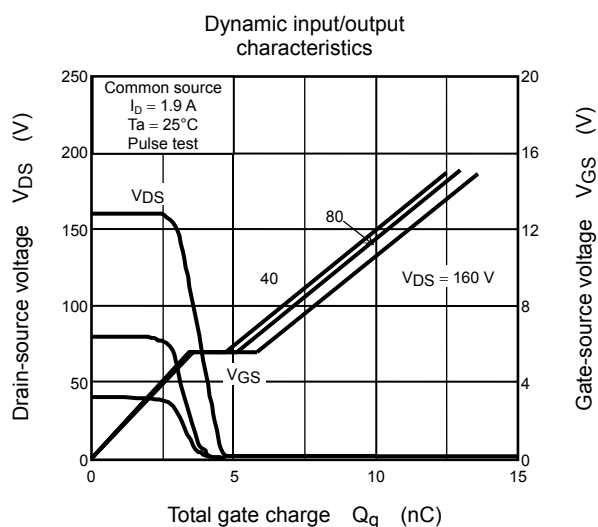
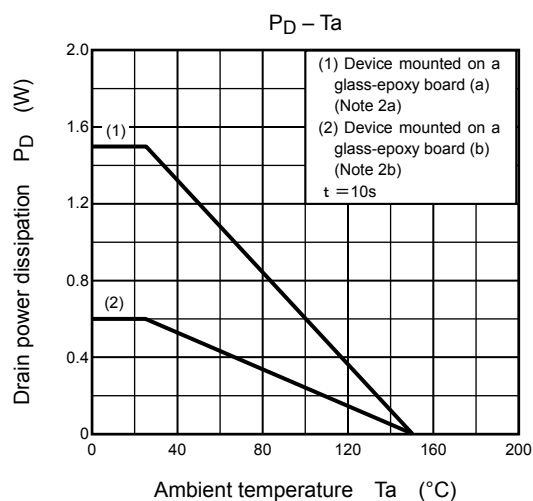
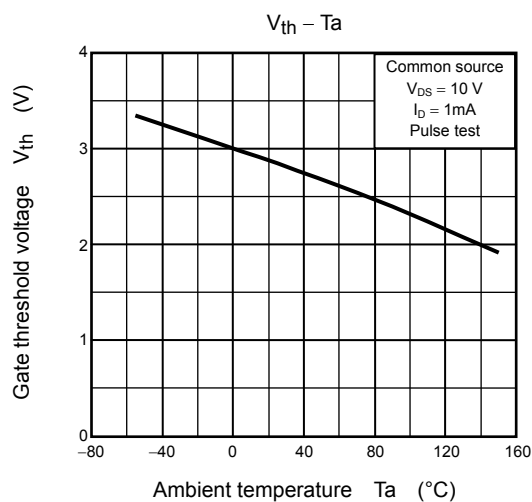
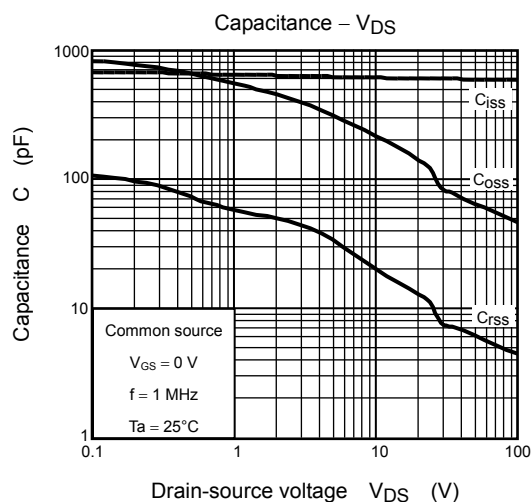
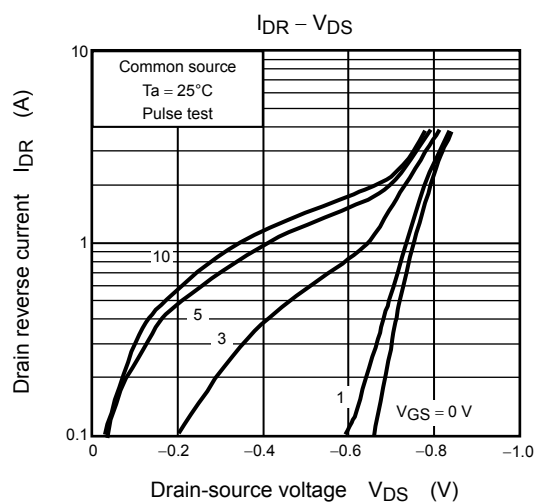
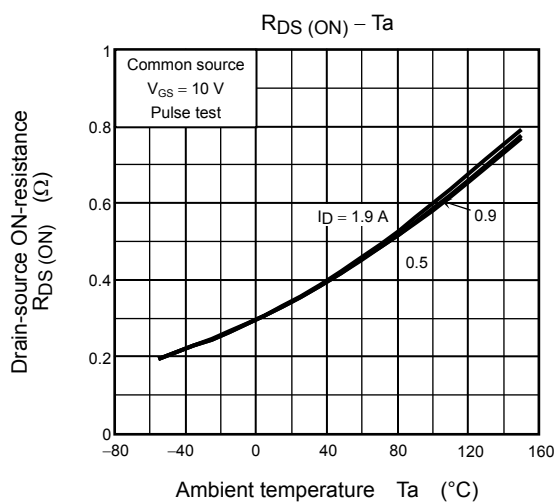
Electrical Characteristics (Ta = 25°C)

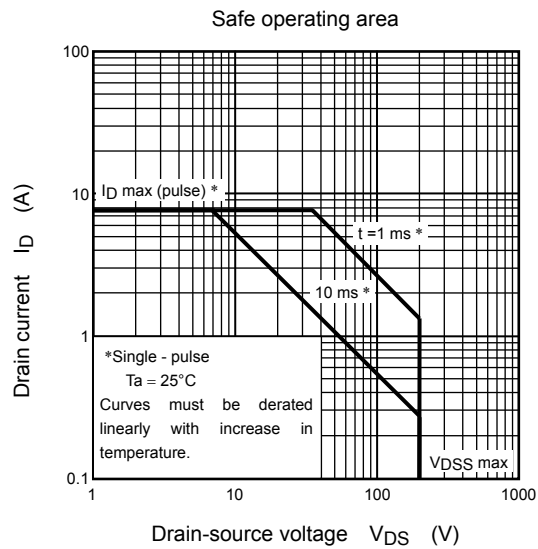
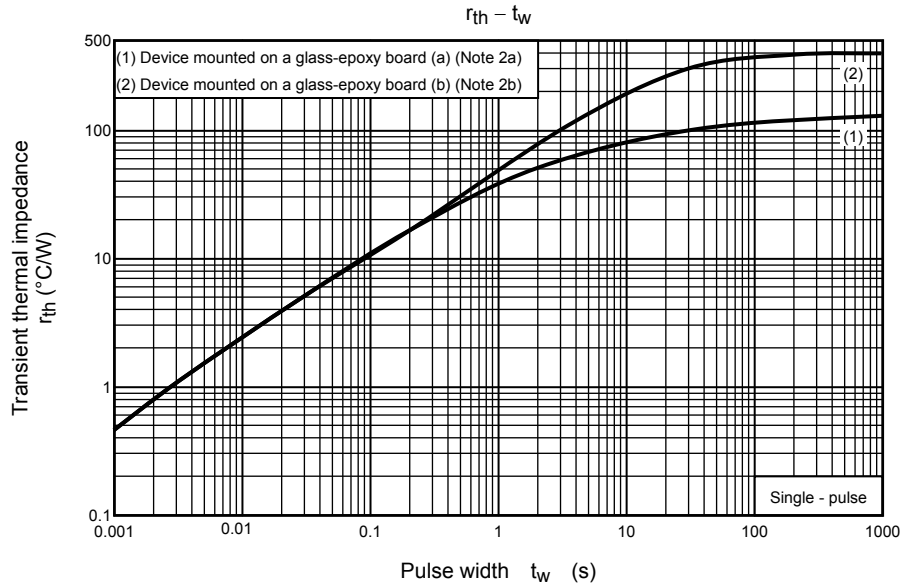
| Characteristic | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---------------|---|---|-----|------|------|------|
| Gate leakage current | | I _{GSS} | V _{GS} = ±16 V, V _{DS} = 0 V | — | — | ±10 | μA |
| Drain cutoff current | | I _{DSS} | V _{DS} = 200 V, V _{GS} = 0 V | — | — | 100 | μA |
| Drain-source breakdown voltage | V (BR) DSS | I _D = 10 mA, V _{GS} = 0 V | 200 | — | — | V | |
| | V (BR) DSX | I _D = 10 mA, V _{GS} = −5 V | 200 | — | — | | |
| | V (BR) DSX | I _D = 10 mA, V _{GS} = −20 V | 150 | — | — | | |
| Gate threshold voltage | | V _{th} | V _{DS} = 10 V, I _D = 1 mA | 2.0 | — | 4.0 | V |
| Drain-source ON-resistance | | R _{DS (ON)} | V _{GS} = 10 V, I _D = 0.9 A | — | 0.36 | 0.45 | Ω |
| Forward transfer admittance | | Y _{fs} | V _{DS} = 10 V, I _D = 0.9 A | 0.9 | 2.1 | — | S |
| Input capacitance | | C _{iss} | V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz | — | 600 | — | pF |
| Reverse transfer capacitance | | C _{rss} | | — | 20 | — | pF |
| Output capacitance | | C _{oss} | | — | 220 | — | pF |
| Switching time | Rise time | t _r |  <p>V_{GS} 10 V 0 V</p> <p>I_D = 0.9 A</p> <p>V_{OUT}</p> <p>4.7 Ω</p> <p>R_L = 111 Ω</p> <p>V_{DD} ≈ 100 V</p> <p>Duty ≤ 1%, t_W = 10 μs</p> | — | 35 | — | ns |
| | Turn-on time | t _{on} | | — | 95 | — | |
| | Fall time | t _f | | — | 20 | — | |
| | Turn-off time | t _{off} | | — | 120 | — | |
| Total gate charge (gate-source plus gate-drain) | | Q _g | V _{DD} ≈ 160V, V _{GS} = 10 V, I _D = 1.9 A | — | 10 | — | nC |
| Gate-source charge | | Q _{gs} | | — | 7.5 | — | nC |
| Gate-drain (“Miller”) charge | | Q _{gd} | | — | 2.5 | — | nC |
| Gate switch charge | | Q _{sw} | | — | 3.3 | — | nC |

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

| Characteristic | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--|-----------|--|-----|------|------|------|
| Drain reverse current (pulse) (Note 1) | I_{DRP} | — | — | — | 7.6 | A |
| Forward voltage (diode) | V_{DSF} | $I_{DR} = 1.9 \text{ A}, V_{GS} = 0 \text{ V}$ | — | — | -2.0 | V |







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20070701-EN

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