

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (High speed U-MOS III)

TPC8016-H

High Speed and High Efficiency DC-DC Converters

Notebook PC Applications

Portable Equipment Applications

- Small footprint due to small and thin package
- High speed switching
- Small gate charge: $Q_g = 48 \text{ nc (typ.)}$
- Low drain-source ON resistance: $R_{DS(ON)} = 3.7 \text{ m}\Omega \text{ (typ.)}$
- High forward transfer admittance: $|Y_{fs}| = 25 \text{ S (typ.)}$
- Low leakage current: $I_{DSS} = 10 \mu\text{A (max)}$ ($V_{DS} = 30 \text{ V}$)
- Enhancement-mode: $V_{th} = 1.1 \text{ to } 2.3 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

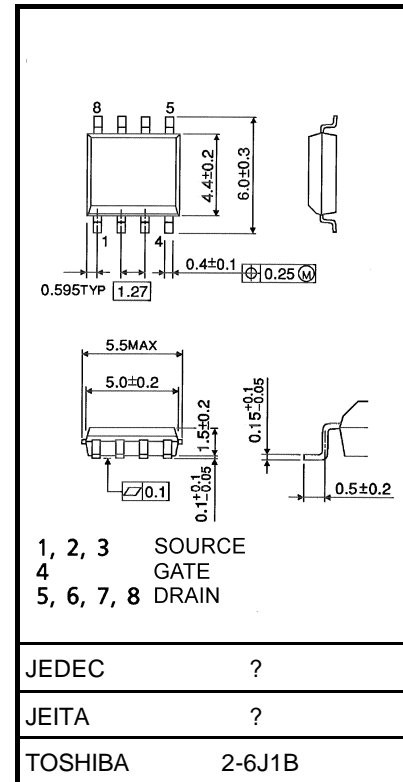
Maximum Ratings ($T_a = 25^\circ\text{C}$)

| Characteristics | | Symbol | Rating | Unit |
|---|-----------------|-----------|------------|------------------|
| Drain-source voltage | | V_{DSS} | 30 | V |
| Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$) | | V_{DGR} | 30 | V |
| Gate-source voltage | | V_{GSS} | ± 20 | V |
| Drain current | DC (Note 1) | I_D | 15 | A |
| | Pulsed (Note 1) | I_{DP} | 60 | |
| Drain power dissipation ($t = 10 \text{ s}$) (Note 2a) | | P_D | 1.9 | W |
| Drain power dissipation ($t = 10 \text{ s}$) (Note 2b) | | P_D | 1.0 | W |
| Single pulse avalanche energy (Note 3) | | E_{AS} | 146 | mJ |
| Avalanche current | | I_{AR} | 15 | A |
| Repetitive avalanche energy (Note 2a) (Note 4) | | E_{AR} | 0.19 | mJ |
| Channel temperature | | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage temperature range | | T_{stg} | -55 to 150 | $^\circ\text{C}$ |

Note: For (Note 1), (Note 2), (Note 3) and (Note 4), please refer to the next page.

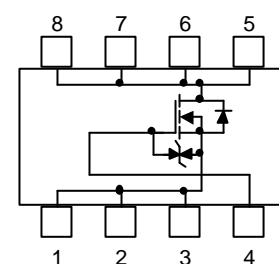
This transistor is an electrostatic sensitive device. Please handle with caution.

Unit mm



Weight: 0.080 g (typ.)

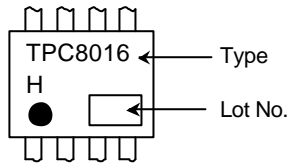
Circuit Configuration



Thermal Characteristics

| Characteristics | Symbol | Max | Unit |
|--|-----------------|------|------|
| Thermal resistance, channel to ambient (t = 10 s) (Note 2a) | $R_{th (ch-a)}$ | 65.8 | °C/W |
| Thermal resistance, channel to ambient (t = 10 s) (Note 2b) | $R_{th (ch-a)}$ | 125 | °C/W |

Marking (Note 5)



Note 1: Please use devices on condition that the channel temperature is below 150°C.

Note 2: (a) Device mounted on a glass-epoxy board (a) (b) Device mounted on a glass-epoxy board (b)

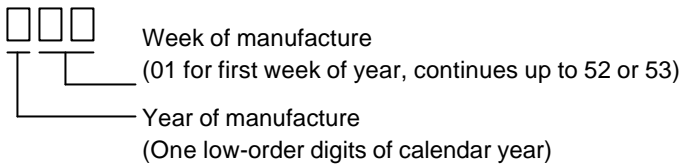


Note 3: $V_{DD} = 24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.5\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = 15\text{ A}$

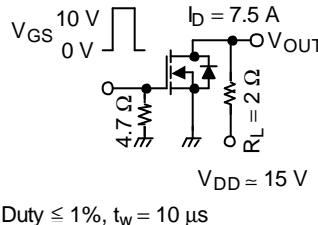
Note 4: Repetitive rating: pulse width limited by max channel temperature

Note 5: • on lower left of the marking indicates Pin 1.

* Weekly code: (Three digits)

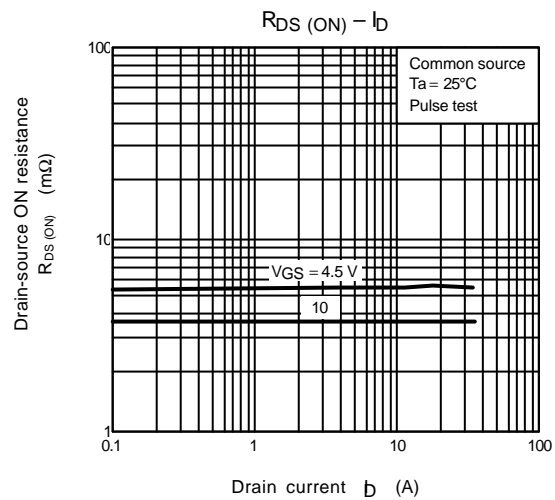
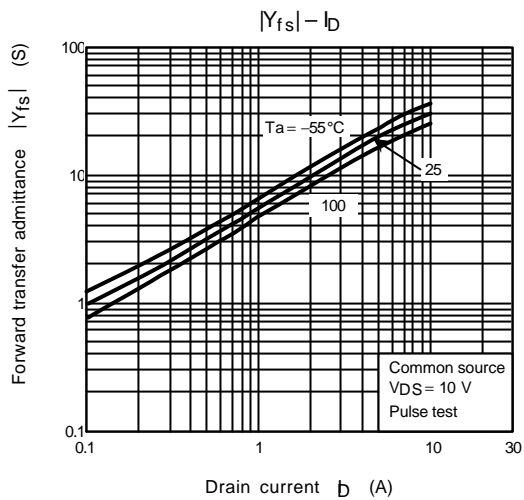
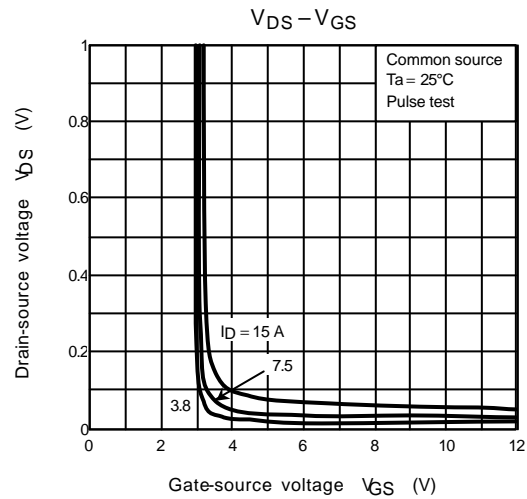
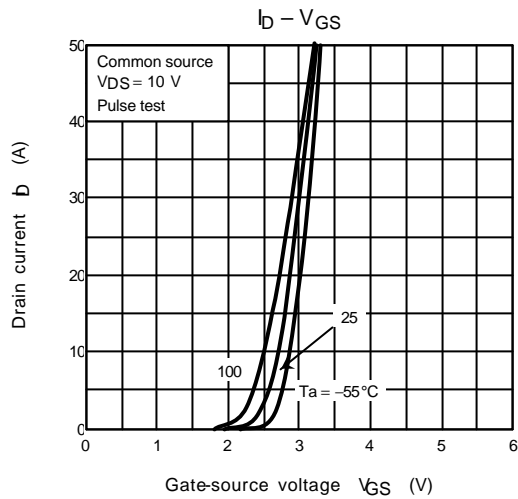
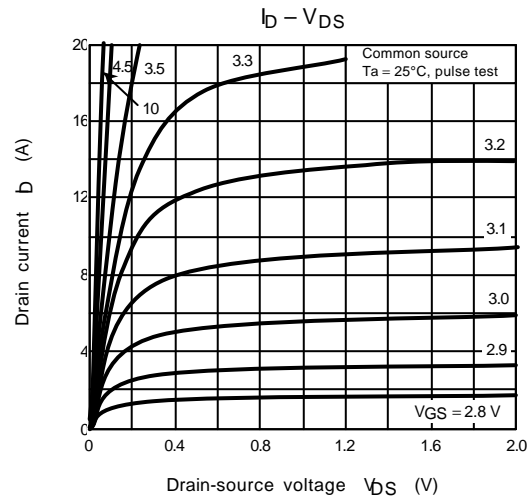
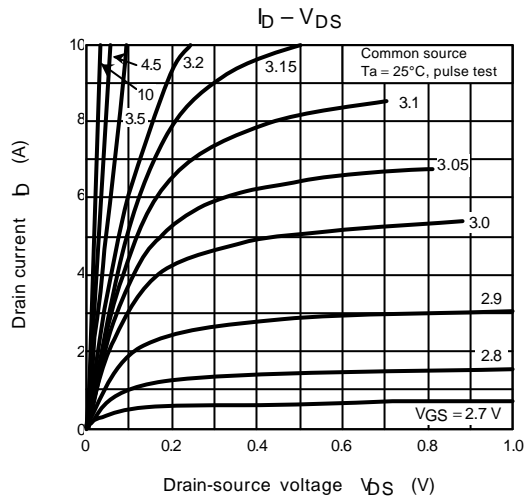


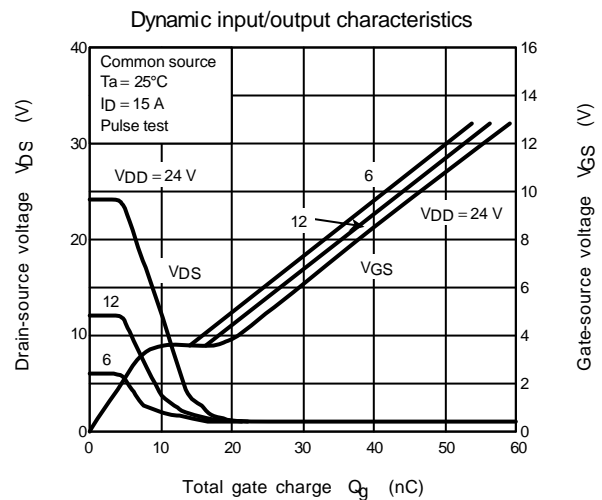
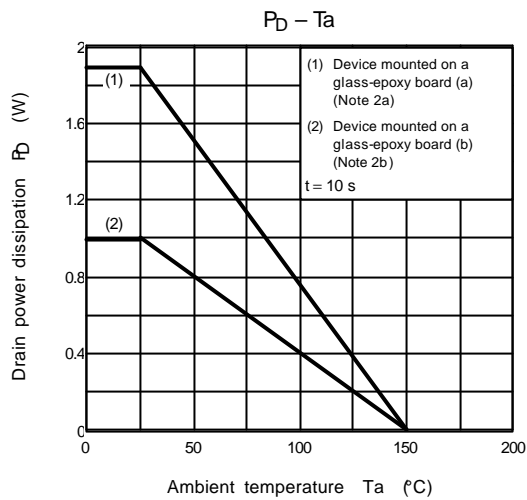
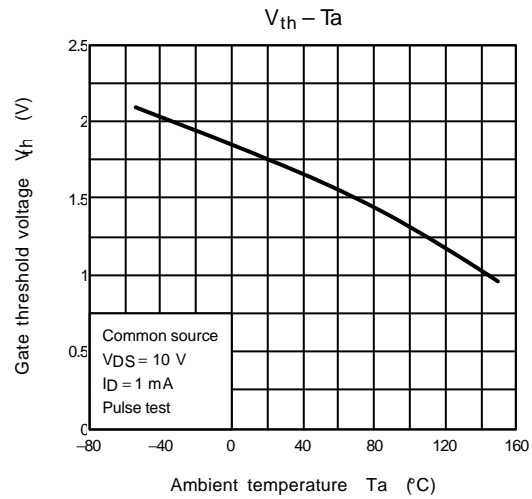
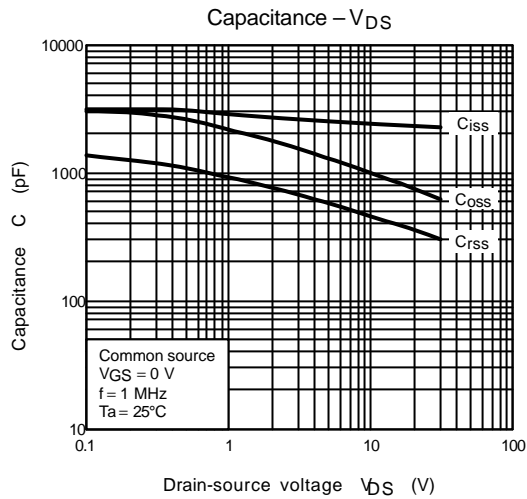
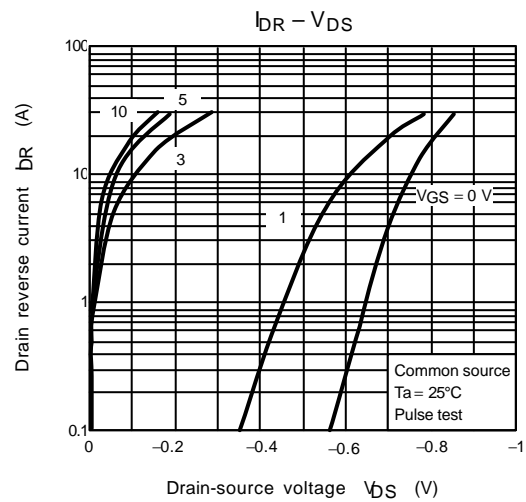
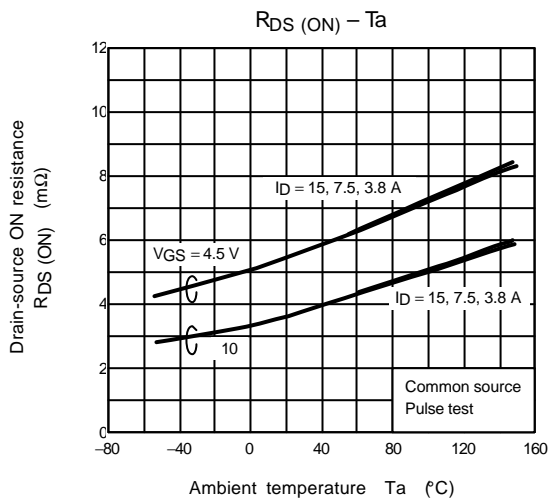
Electrical Characteristics (Ta = 25°C)

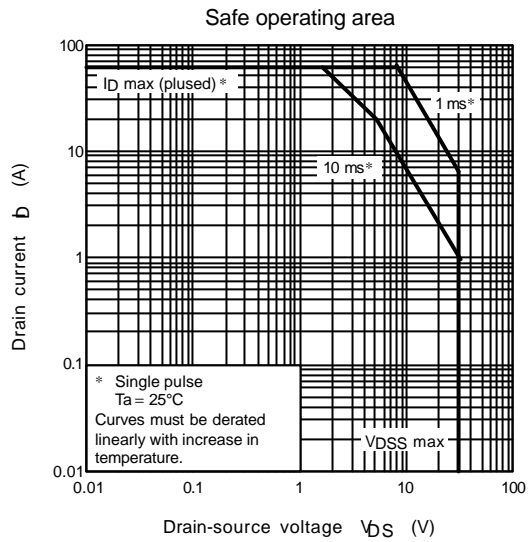
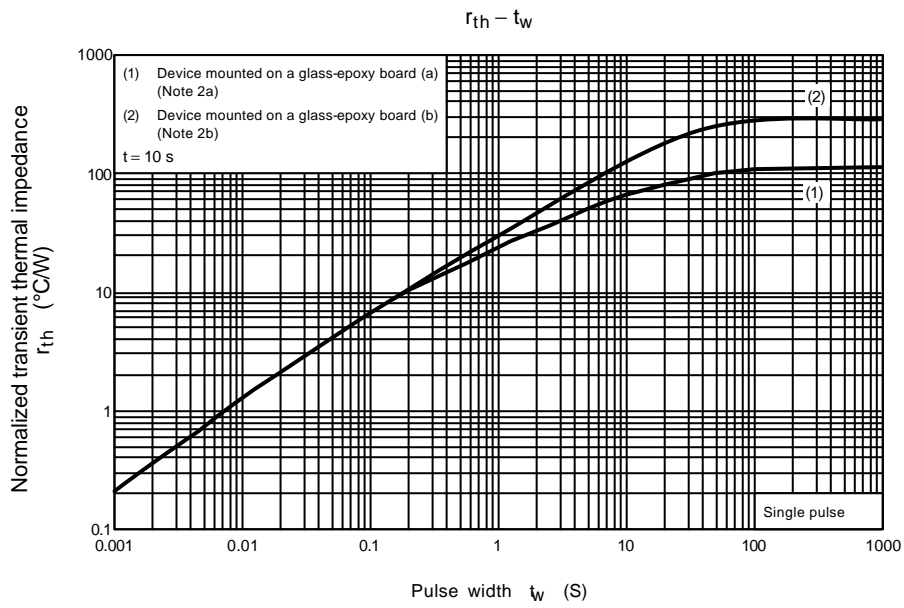
| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---------------|----------------|---|------|------|----------|------------------|
| Gate leakage current | | I_{GSS} | $V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$ | — | — | ± 10 | μA |
| Drain cut-OFF current | | I_{DSS} | $V_{DS} = 30 \text{ V}, V_{GS} = 0 \text{ V}$ | — | — | 10 | μA |
| Drain-source breakdown voltage | | $V_{(BR) DSS}$ | $I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$ | 30 | — | — | V |
| | | $V_{(BR) DSX}$ | $I_D = 10 \text{ mA}, V_{GS} = -20 \text{ V}$ | 15 | — | — | |
| Gate threshold voltage | | V_{th} | $V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$ | 1.1 | — | 2.3 | V |
| Drain-source ON resistance | | $R_{DS(ON)}$ | $V_{GS} = 4.5 \text{ V}, I_D = 7.5 \text{ A}$ | — | 5.5 | 7.5 | $\text{m}\Omega$ |
| | | | $V_{GS} = 10 \text{ V}, I_D = 7.5 \text{ A}$ | — | 3.7 | 5.7 | |
| Forward transfer admittance | | $ Y_{fs} $ | $V_{DS} = 10 \text{ V}, I_D = 7.5 \text{ A}$ | 12.5 | 25 | — | S |
| Input capacitance | | C_{iss} | $V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$ | — | 2380 | — | pF |
| Reverse transfer capacitance | | C_{rss} | | — | 410 | — | |
| Output capacitance | | C_{oss} | | — | 980 | — | |
| Switching time | Rise time | t_r |  <p>$V_{GS} = 10 \text{ V}$ 0 V $I_D = 7.5 \text{ A}$ $V_{DD} = 15 \text{ V}$ $Duty \leq 1\%, t_w = 10 \mu\text{s}$</p> | — | 9.8 | — | ns |
| | Turn-ON time | t_{on} | | — | 21 | — | |
| | Fall time | t_f | | — | 15 | — | |
| | Turn-OFF time | t_{off} | | — | 60 | — | |
| Total gate charge (gate-source plus gate-drain) | | Q_g | $V_{DD} = 24 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 15 \text{ A}$ | — | 46 | — | nC |
| | | | $V_{DD} = 24 \text{ V}, V_{GS} = 5 \text{ V}, I_D = 15 \text{ A}$ | — | 26 | — | |
| Gate-source charge 1 | | Q_{gs1} | $V_{DD} = 24 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 15 \text{ A}$ | — | 7.2 | — | |
| Gate-drain ("miller") charge | | Q_{gd} | | — | 12.2 | — | |
| Gate switch charge | | Q_{SW} | | — | 15.6 | — | |

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

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-------------------------|----------------|-----------|---|-----|------|------|------|
| Drain reverse current | Pulse (Note 1) | I_{DRP} | — | — | — | 60 | A |
| Forward voltage (diode) | | V_{DSF} | $I_{DR} = 15 \text{ A}, V_{GS} = 0 \text{ V}$ | — | — | -1.2 | V |







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