

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

TPCA8007-H

Switching Regulator Applications

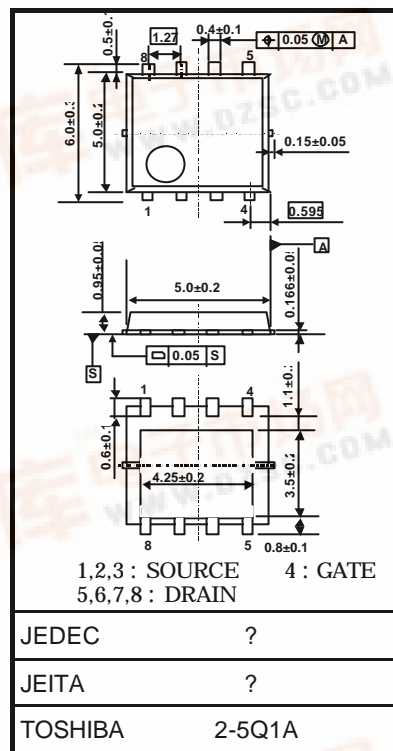
Motor Drive Applications

Unit: mm

- Small footprint due to small and thin package
- High speed switching
- Low drain-source ON resistance
: $R_{DS(ON)} = 30 \text{ m}\Omega$ (typ.) ($V_G = 10\text{V}$, $I_D = 10\text{A}$)
- High forward transfer admittance: $|Y_{fs}| = 19 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \mu\text{A}$ (max) ($V_{DS} = 100 \text{ V}$)
- Enhancement mode: $V_{th} = 3.0$ to 5.0 V ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

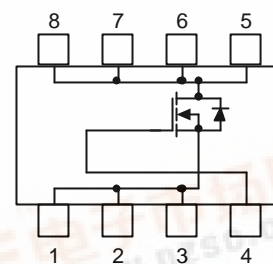
Maximum Ratings ($T_a = 25^\circ\text{C}$)

| Characteristics | Symbol | Rating | Unit |
|---|-----------------|------------|------------------|
| Drain-source voltage | V_{DSS} | 100 | V |
| Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$) | V_{DGR} | 100 | V |
| Gate-source voltage | V_{GSS} | ± 20 | V |
| Drain current | DC (Note 1) | I_D | A |
| | Pulsed (Note 1) | I_{DP} | |
| Drain power dissipation ($T_c = 25^\circ\text{C}$) | P_D | 45 | W |
| Drain power dissipation ($t = 10 \text{ s}$) (Note 2a) | P_D | 2.8 | W |
| Drain power dissipation ($t = 10 \text{ s}$) (Note 2b) | P_D | 1.6 | W |
| Single pulse avalanche energy (Note 3) | E_{AS} | 351 | mJ |
| Avalanche current | I_{AR} | 20 | A |
| Repetitive avalanche energy (Note 2a) (Note 4) | E_{AR} | 4.5 | mJ |
| Channel temperature | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage temperature range | T_{stg} | -55 to 150 | $^\circ\text{C}$ |



Weight: 0.080 g (typ.)

Circuit Configuration



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

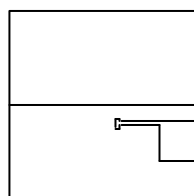
This transistor is an electrostatic sensitive device. Please handle with caution.

Thermal Characteristics

| Characteristics | Symbol | Max | Unit |
|---|----------------|------|--------------------|
| Thermal resistance, channel to case ($T_c=25^\circ\text{C}$) | $R_{th(ch-c)}$ | 2.78 | $^\circ\text{C/W}$ |
| Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2a) | $R_{th(ch-a)}$ | 44.6 | $^\circ\text{C/W}$ |
| Thermal resistance, channel to ambient ($t = 10\text{ s}$) (Note 2b) | $R_{th(ch-a)}$ | 78.1 | $^\circ\text{C/W}$ |

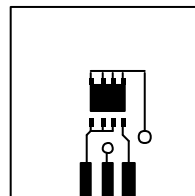
Note 1: Please use devices on condition that the channel temperature is below 150°C .

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



(a)

FR-4
 $25.4 \times 25.4 \times 0.8$
 (Unit: mm)



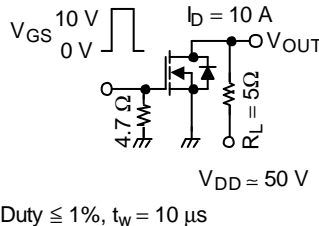
(b)

FR-4
 $25.4 \times 25.4 \times 0.8$
 (Unit: mm)

Note 3: $V_{DD} = 50\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 1.0\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = 20\text{ A}$

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

Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---------------|----------------|---|-----|------|-----------|------------------|
| Gate leakage current | | I_{GSS} | $V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$ | — | — | ± 100 | nA |
| Drain cut-OFF current | | I_{DSS} | $V_{DS} = 100 \text{ V}, V_{GS} = 0 \text{ V}$ | — | — | 100 | μA |
| Drain-source breakdown voltage | | $V_{(BR) DSS}$ | $I_D = 10 \text{ mA}, V_{GS} = 0 \text{ V}$ | 100 | — | — | V |
| Gate threshold voltage | | V_{th} | $V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$ | 3.0 | — | 5.0 | V |
| Drain-source ON resistance | | $R_{DS(ON)}$ | $V_{GS} = 10 \text{ V}, I_D = 10 \text{ A}$ | — | 30 | 47 | $\text{m}\Omega$ |
| Forward transfer admittance | | $ Y_{fs} $ | $V_{DS} = 10 \text{ V}, I_D = 10 \text{ A}$ | 9.5 | 19 | — | S |
| Input capacitance | | C_{iss} | $V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$ | — | 1000 | — | pF |
| Reverse transfer capacitance | | C_{rss} | | — | 21 | — | |
| Output capacitance | | C_{oss} | | — | 500 | — | |
| Switching time | Rise time | t_r |  | — | (2) | — | ns |
| | Turn-ON time | t_{on} | | — | (13) | — | |
| | Fall time | t_f | | — | 3 | — | |
| | Turn-OFF time | t_{off} | | — | 13 | — | |
| Total gate charge (gate-source plus gate-drain) | | Q_g | $V_{DD} = 80 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 20 \text{ A}$ | — | 15 | — | nC |
| Gate-source charge 1 | | Q_{gs1} | | — | 7.2 | — | |
| Gate-drain ("miller") charge | | Q_{gd} | | — | 5.0 | — | |
| Gate switch charge | | Q_{SW} | | — | 8.5 | — | |

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

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-------------------------|----------------|-----------|---|-----|------|------|------|
| Drain reverse current | Pulse (tw=1ms) | I_{DRP} | — | — | — | 40 | A |
| Forward voltage (diode) | | V_{DSF} | $I_{DR} = 20 \text{ A}, V_{GS} = 0 \text{ V}$ | — | — | -1.7 | V |

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