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

# TPCA8009-H

**TENTATIVE**

High Speed and High Efficiency DC-DC Converters

- Small footprint due to small and thin package
- High speed switching
- Small gate charge: $Q_g$ = 10nC (typ.)
- Low drain-source ON resistance: $R_{DS\ (ON)}$ = 240mΩ (typ.)
- High forward transfer admittance: $|Y_{fs}|$ = S (typ.)
- Low leakage current: $I_{DSS}$ = 100 μA (max) ($V_{DS}$ = 100 V)
- Enhancement mode: $V_{th}$ = 2 to 4V ($V_{DS}$ = 10 V, $I_D$ = 1 mA)

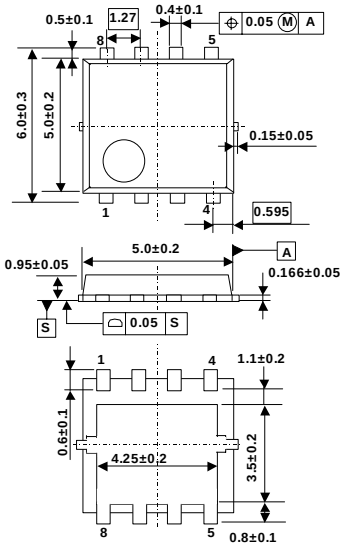
## Maximum Ratings (Ta = 25°C)

| Characteristics | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain-source voltage | | $V_{DSS}$ | 150 | V |
| Drain-gate voltage ($R_{GS}$ = 20 kΩ) | | $V_{DGR}$ | 150 | V |
| Gate-source voltage | | $V_{GSS}$ | ±20 | V |
| Drain current | DC (Note 1) | $I_D$ | 7 | A |
| | Pulsed (Note 1) | $I_{DP}$ | 14 | |
| Drain power dissipation (Tc=25°C) | | $P_D$ | 45 | W |
| Drain power dissipation (t = 10 s) (Note 2a) | | $P_D$ | 2.8 | W |
| Drain power dissipation (t = 10 s) (Note 2b) | | $P_D$ | 1.6 | W |
| Single pulse avalanche energy (Note 3) | | $E_{AS}$ | 34 | mJ |
| Avalanche current | | $I_{AR}$ | 7 | A |
| Repetitive avalanche energy (Tc=25°C) (Note 4) | | $E_{AR}$ | 1.5 | mJ |
| Channel temperature | | $T_{ch}$ | 150 | °C |
| Storage temperature range | | $T_{stg}$ | −55~150 | °C |

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.

Unit: mm

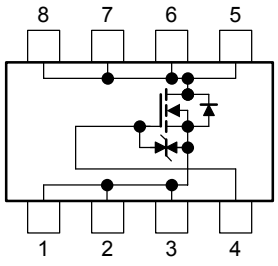



1,2,3 : SOURCE 4 : GATE
5,6,7,8 : DRAIN

| | |
|---|---|
| JEDEC | — |
| JEITA | — |
| TOSHIBA | — |

Weight: 0.08 g (typ.)

## Circuit Configuration



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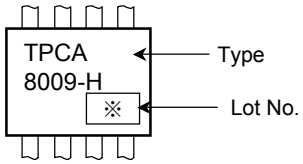
## Thermal Characteristics

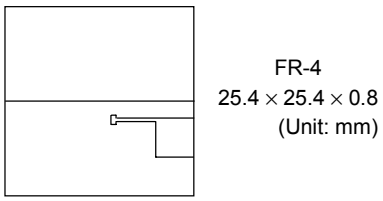
| Characteristics | Symbol | Max | Unit |
|---|---|---|---|
| Thermal resistance, channel to case (Tc=25℃) | $R_{th\ (ch-c)}$ | 2.78 | °C/W |
| Thermal resistance, channel to ambient (t = 10 s) (Note 2a) | $R_{th\ (ch-a)}$ | 44.6 | °C/W |
| Thermal resistance, channel to ambient (t = 10 s) (Note 2b)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

## Marking (Note 5)

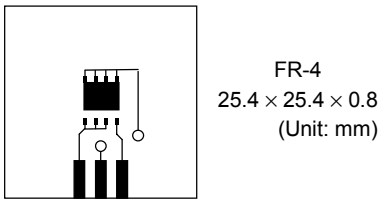



Note 1: Please use devices on condition that the channel temperature is below 150°C.

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




(a)

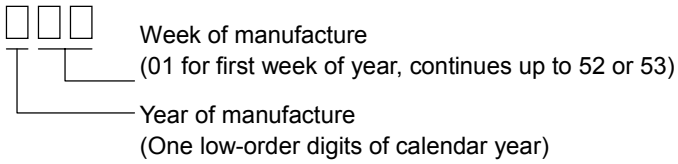



(b)

Note 3: $V_{DD}$ = 50 V, $T_{ch}$ = 25°C (initial), L = 1 mH, $R_G$ = 25 Ω, $I_{AR}$ = 7 A

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

Note 5: * Weekly code: (Three digits)



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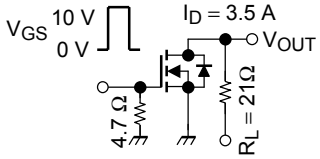
## Electrical Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Gate leakage current | | $I_{GSS}$ | $V_{GS}$ = ±16 V, $V_{DS}$ = 0 V | — | — | ±10 | μA |
| Drain cut-OFF current | | $I_{DSS}$ | $V_{DS}$ = 150 V, $V_{GS}$ = 0 V | — | — | 100 | μA |
| Drain-source breakdown voltage | | $V_{(BR)\ DSS}$ | $I_D$ = 10 mA, $V_{GS}$ = 0 V | 150 | — | — | V |
| | | $V_{(BR)\ DSX}$ | $I_D$ = 10 mA, $V_{GS}$ = -5 V | 150 | — | — | |
| | | $V_{(BR)\ DSX}$ | $I_D$ = 10 mA, $V_{GS}$ = -20 V | 100 | — | — | |
| Gate threshold voltage | | $V_{th}$ | $V_{DS}$ = 10 V, $I_D$ = 1mA | 2.0 | — | 4.0 | V |
| Drain-source ON resistance | | $R_{DS\ (ON)}$ | $V_{GS}$ = 10 V, $I_D$ = 3.5A | — | 0.23 | (0.35) | Ω |
| Forward transfer admittance | | $\|Y_{fs}\|$ | $V_{DS}$ = 10 V, $I_D$ = 3.5A | TBD | TBD | — | S |
| Input capacitance | | $C_{iss}$ | $V_{DS}$ = 10 V, $V_{GS}$ = 0 V, f = 1 MHz | — | 600 | — | pF |
| Reverse transfer capacitance | | $C_{rss}$ | | — | 20 | — | |
| Output capacitance | | $C_{oss}$ | | — | 220 | — | |
| Switching time | Rise time | $t_r$ |   Duty ≦ 1%, $t_w$ = 10 μs | — | (7) | — | ns |
| | Turn-ON time | $t_{on}$ | | — | (17) | — | |
| | Fall time | $t_f$ | | — | (13) | — | |
| | Turn-OFF time | $t_{off}$ | | — | (70) | — | |
| Total gate charge (gate-source plus gate-drain) | | $Q_g$ | $V_{DD}$ ≃ 120 V, $V_{GS}$ = 10 V, $I_D$ = 7A | — | (10) | — | nC |
| Gate-source charge 1 | | $Q_{gs1}$ | | — | (7.6) | — | |
| Gate-drain (“miller”) charge | | $Q_{gd}$ | | — | (2.4) | — | |
| Gate switch charge | | $Q_{SW}$ | | — | (3.7) | — | |

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

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Drain reverse current | Pulse (Note 1) | $I_{DRP}$ | — | — | — | 14 | A |
| Forward voltage (diode) | | $V_{DSF}$ | $I_{DR}$ = 7A, $V_{GS}$ = 0 V | — | — | -2.0 | V |

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