

TOSHIBA Field Effect Transistor Silicon P Channel MOS Type (U-MOSⅢ)

TPCA8101

Lithium Ion Battery Applications

Notebook PC Applications

Portable Equipment Applications

- Small footprint due to small and thin package
- Low drain-source ON resistance: $R_{DS(ON)} = 5.5\text{m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 60\text{S}$ (typ.)
- Low leakage current: $I_{DSS} = -10\text{ }\mu\text{A}$ (max) ($V_{DS} = -30\text{ V}$)
- Enhancement mode: $V_{th} = -0.8\text{ to }-2.0\text{ V}$ ($V_{DS} = -10\text{ V}$, $I_D = -1\text{ mA}$)

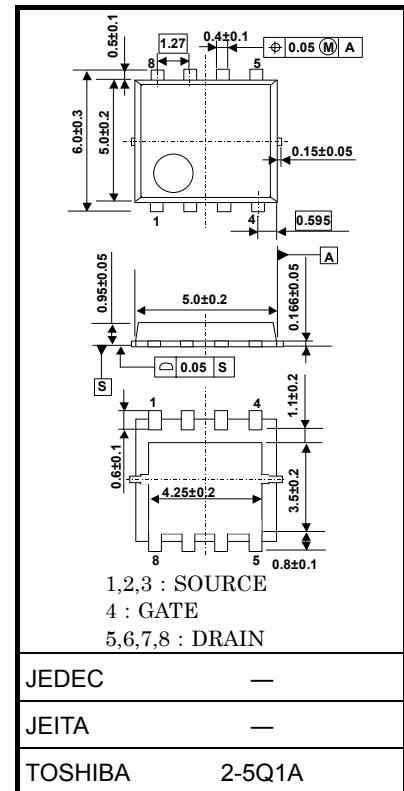
Maximum Ratings (Ta = 25°C)

| 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 | -40 | A |
| | Pulsed (Note 1) | I_{DP} | -120 | |
| 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} | 208 | mJ |
| Avalanche current | | I_{AR} | -40 | A |
| Repetitive avalanche energy ($T_c=25^\circ\text{C}$) (Note 4) | | E_{AR} | 4.5 | mJ |
| Channel temperature | | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage temperature range | | T_{stg} | -55 to 150 | $^\circ\text{C}$ |

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

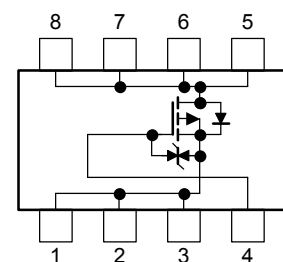
This transistor is an electrostatic sensitive device. Please handle with caution.

Unit: mm



Weight: 0.076 g (typ.)

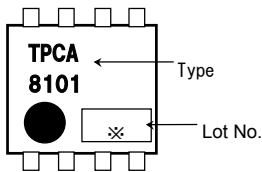
Circuit Configuration



Thermal Characteristics

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

Marking (Note 5)



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

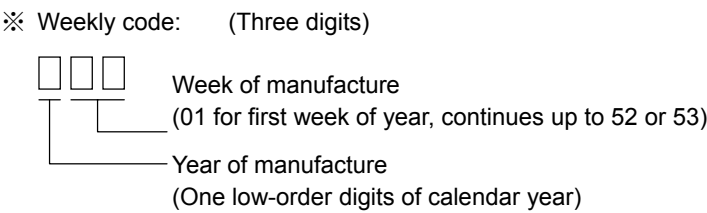
Note 2: (a) Device mounted on a glass-epoxy board (a) (b) Device mounted on a glass-epoxy board (b)



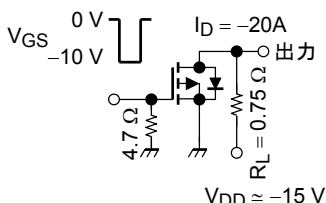
Note 3: $V_{\text{DD}} = 24 \text{ V}$, $T_{\text{ch}} = 25^{\circ}\text{C}$ (initial), $L = 100 \mu\text{H}$, $R_{\text{G}} = 25 \Omega$, $I_{\text{AR}} = -40 \text{ A}$

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

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



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} = -30 V, V _{GS} = 0 V | — | — | -10 | μA |
| Drain-source breakdown voltage | | V _(BR) DSS | I _D = -10 mA, V _{GS} = 0 V | -30 | — | — | V |
| | | V _(BR) DSX | I _D = -10 mA, V _{GS} = 20 V | -15 | — | — | |
| Gate threshold voltage | | V _{th} | V _{DS} = -10 V, I _D = - 1 mA | -0.8 | — | -2.0 | V |
| Drain-source ON resistance | | R _{DS} (ON) | V _{GS} = -4 V, I _D = -20 A | — | 10 | 15 | mΩ |
| | | | V _{GS} = -10 V, I _D = -20 A | — | 5.5 | 7.0 | |
| Forward transfer admittance | | Y _{fs} | V _{DS} = -10 V, I _D = -20 A | 30 | 60 | — | S |
| Input capacitance | | C _{iss} | V _{DS} = -10 V, V _{GS} = 0 V, f = 1 MHz | — | 4600 | — | pF |
| Reverse transfer capacitance | | C _{rss} | | — | 850 | — | |
| Output capacitance | | C _{oss} | | — | 980 | — | |
| Switching time | Rise time | t _r |  V _{GS} = 0 V, -10 V I _D = -20 A R _L = 0.75 Ω V _{DD} ≈ -15 V Duty ≤ 1%, t _w = 10 μs | — | 10 | — | ns |
| | Turn-ON time | t _{on} | | — | 20 | — | |
| | Fall time | t _f | | — | 78 | — | |
| | Turn-OFF time | t _{off} | | — | 220 | — | |
| Total gate charge (gate-source plus gate-drain) | | Q _g | V _{DD} ≈ -24 V, V _{GS} = 10 V, I _D = -40 A | — | 109 | — | nC |
| Gate-source charge 1 | | Q _{gs1} | | — | 24 | — | |
| Gate-drain (“miller”) charge | | Q _{gd} | | — | 25 | — | |

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

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-------------------------|----------------|-----------|--|-----|------|------|------|
| Drain reverse current | Pulse (Note 1) | I_{DRP} | — | — | — | -120 | A |
| Forward voltage (diode) | | V_{DSF} | $I_{DR} = -40 \text{ A}, V_{GS} = 0 \text{ V}$ | — | — | 1.2 | V |

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