

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

TPCS8104

Lithium Ion Battery Applications
 Notebook PC Applications
 Portable Equipment Applications

- Small footprint due to small and thin package
- Low drain-source ON resistance: $R_{DS(ON)} = 8.1\text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 23\text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -10\text{ }\mu\text{A}$ (max) ($V_{DS} = -30\text{ V}$)
- Enhancement-mode: $V_{th} = -0.8\text{ to }-2.0\text{ V}$ ($V_{DS} = -10\text{ V}$, $I_D = -1\text{ mA}$)

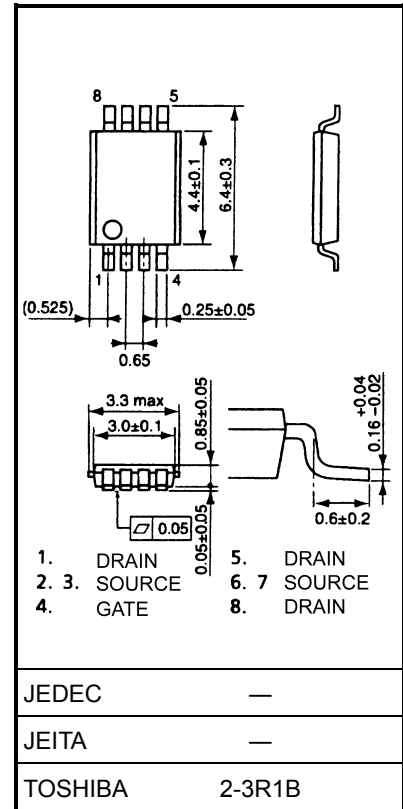
Maximum Ratings ($T_a = 25^\circ\text{C}$)

| 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 | -11 | A |
| | Pulse (Note 1) | I_{DP} | -44 | |
| Drain power dissipation ($t = 10\text{ s}$) (Note 2a) | | P_D | 1.1 | W |
| Drain power dissipation ($t = 10\text{ s}$) (Note 2b) | | P_D | 0.6 | W |
| Single pulse avalanche energy (Note 3) | | E_{AS} | 31.5 | mJ |
| Avalanche current | | I_{AR} | -11 | A |
| Repetitive avalanche energy (Note 2a) (Note 4) | | E_{AR} | 0.11 | 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.

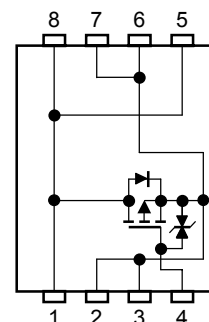
This transistor is an electrostatic sensitive device. Please handle with caution.

Unit: mm



Weight: 0.035 g (typ.)

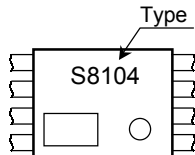
Circuit Configuration



Thermal Characteristics

| Characteristics | Symbol | Max | Unit |
|---|----------------|-----|------|
| Thermal resistance, channel to ambient (t = 10 s) (Note 2a) | $R_{th(ch-a)}$ | 114 | °C/W |
| Thermal resistance, channel to ambient (t = 10 s) (Note 2b) | $R_{th(ch-a)}$ | 208 | °C/W |

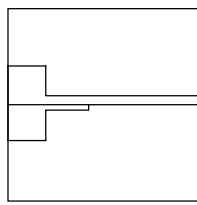
Marking (Note 5)



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

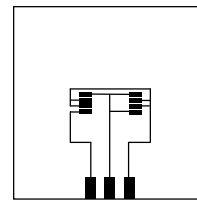
Note 2:

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



(a)

FR-4
25.4 × 25.4 × 0.8
(unit: mm)



(b)

FR-4
25.4 × 25.4 × 0.8
(unit: mm)

Note 3: $V_{DD} = -24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.2\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = -11\text{ A}$

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

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

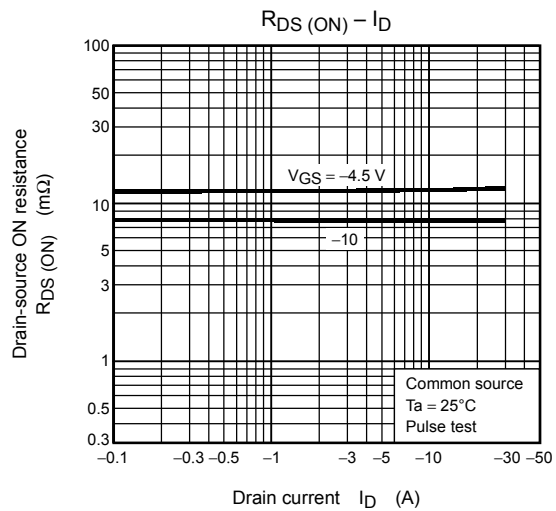
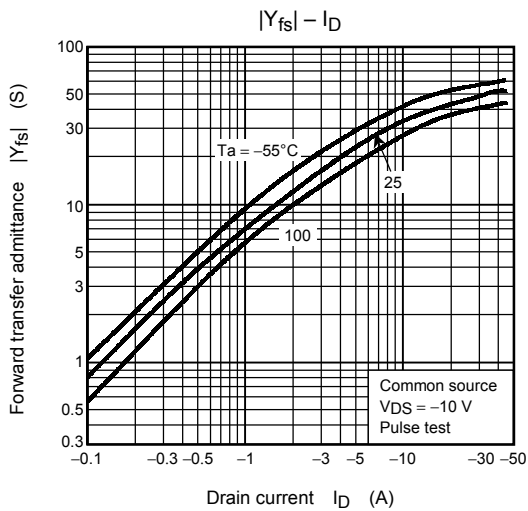
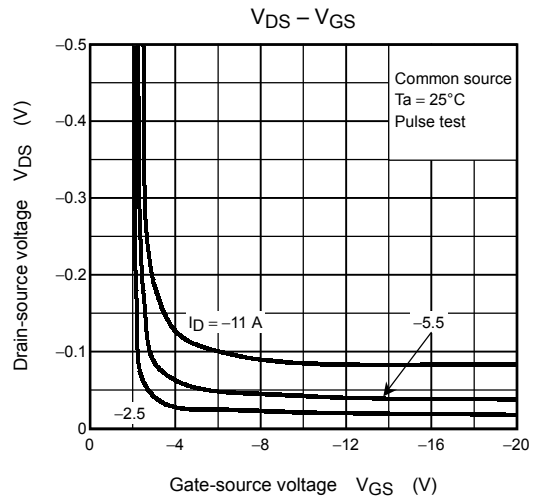
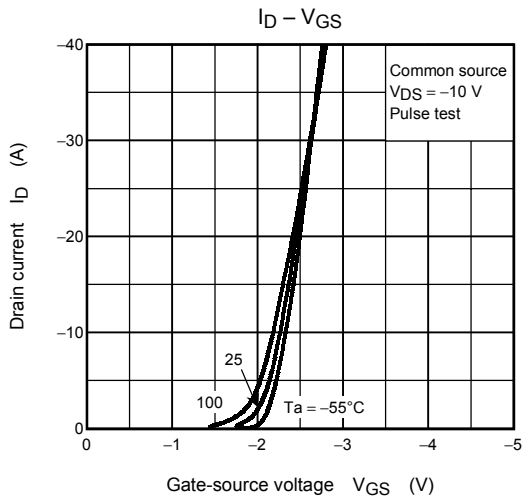
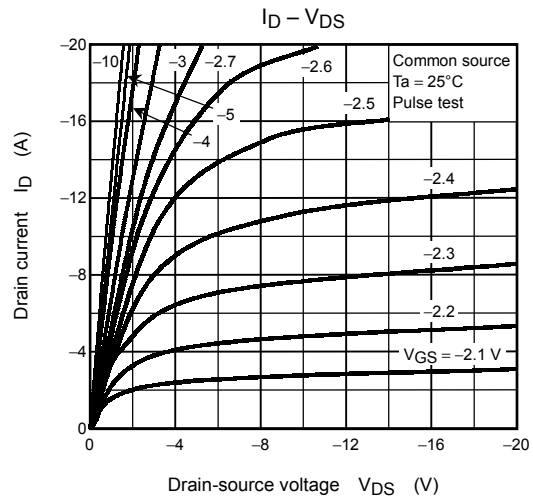
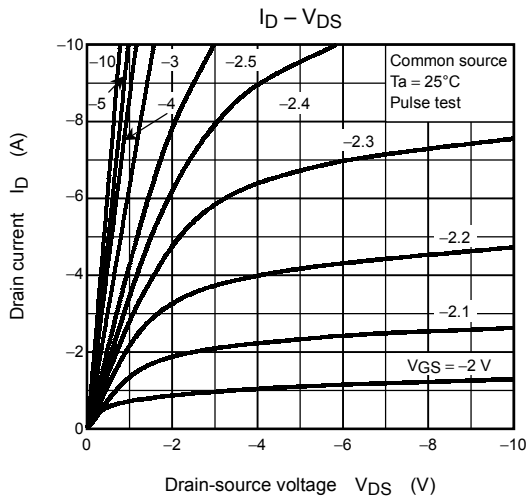
shows lot number. (year of manufacture: last decimal digit of the year of manufacture, month of manufacture: January to December are denoted by letters A to L respectively.)

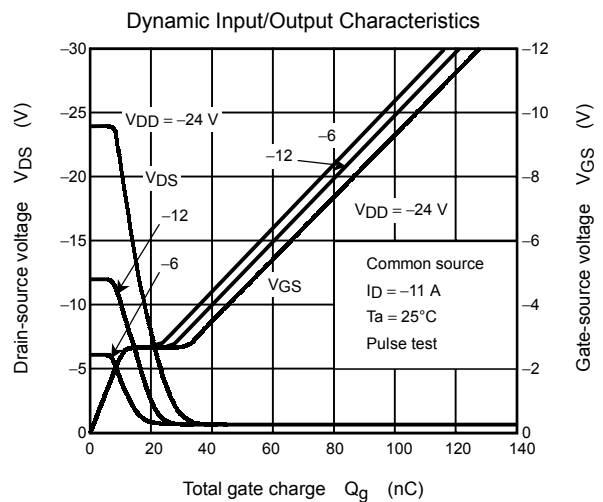
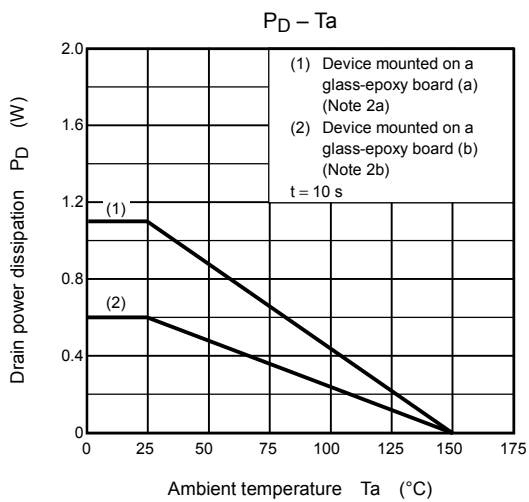
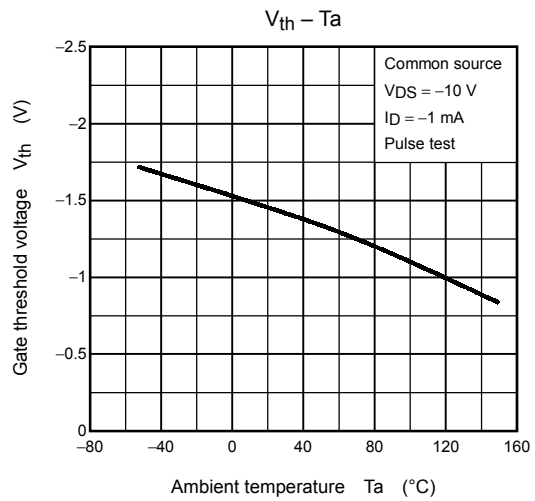
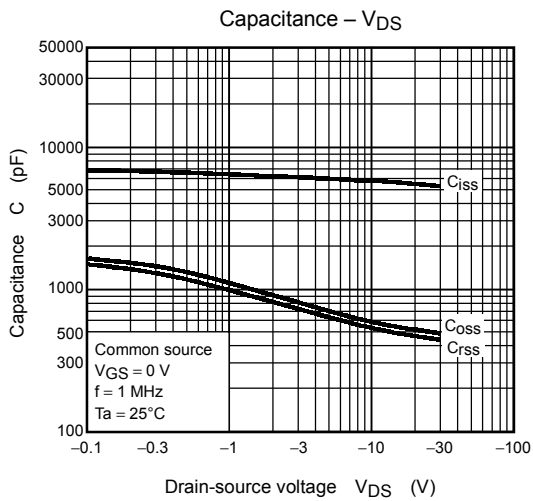
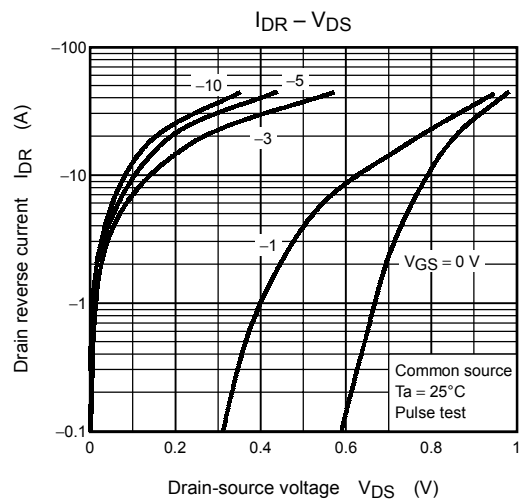
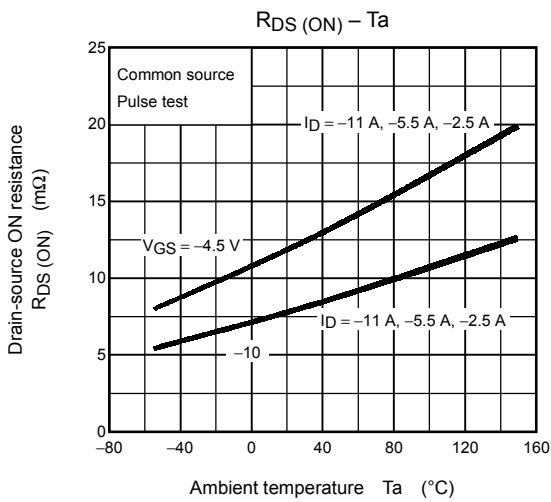
Electrical Characteristics (Ta = 25°C)

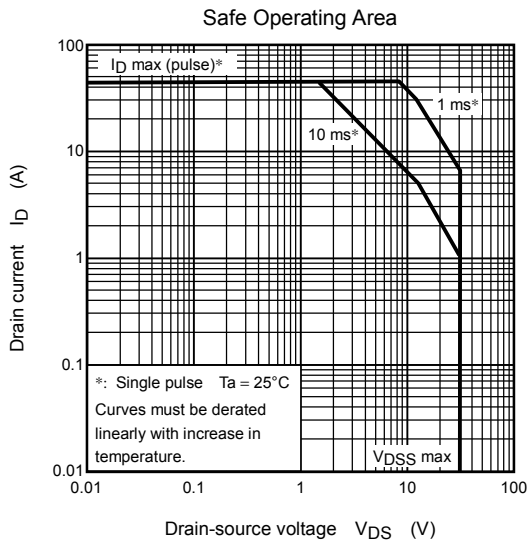
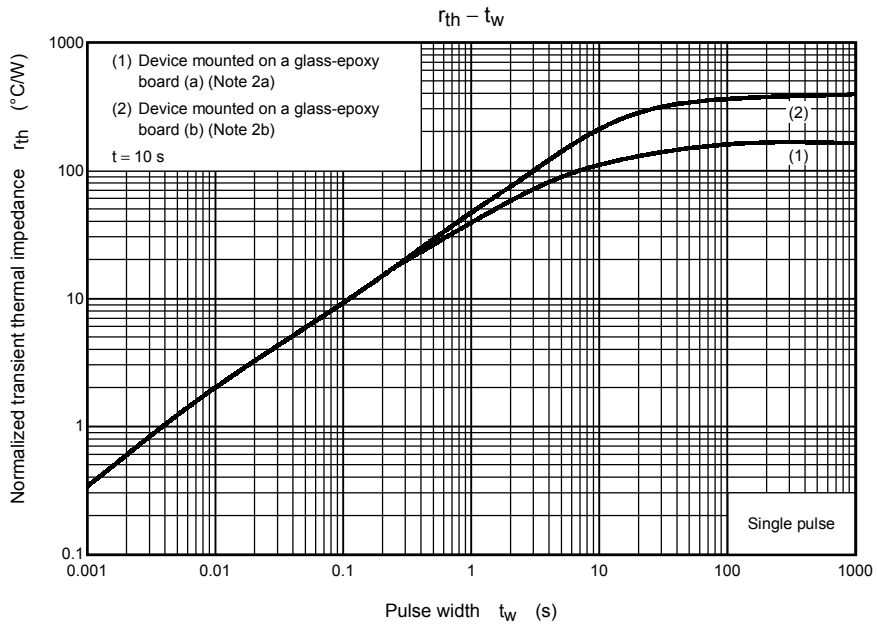
| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---------------|---------------|--|--|------|----------|---------------|
| Gate leakage current | | I_{GSS} | $V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$ | — | — | ± 10 | μA |
| Drain cut-OFF current | | I_{DSS} | $V_{DS} = -30 \text{ V}, V_{GS} = 0 \text{ V}$ | — | — | -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} | $V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA}$ | -0.8 | — | -2.0 | V |
| Drain-source ON resistance | | $R_{DS(ON)}$ | $V_{GS} = -4 \text{ V}, I_D = -5.5 \text{ A}$ | — | 12 | 18 | m Ω |
| | | | $V_{GS} = -10 \text{ V}, I_D = -5.5 \text{ A}$ | — | 8.1 | 12 | |
| Forward transfer admittance | | $ Y_{fs} $ | $V_{DS} = -10 \text{ V}, I_D = -5.5 \text{ A}$ | 11 | 23 | — | S |
| Input capacitance | | C_{iss} | $V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$ | — | 5710 | — | pF |
| Reverse transfer capacitance | | C_{rss} | | — | 560 | — | |
| Output capacitance | | C_{oss} | | — | 590 | — | |
| Switching time | Rise time | t_r | | — | 18 | — | ns |
| | Turn-ON time | t_{on} | | — | 23 | — | |
| | Fall time | t_f | | — | 109 | — | |
| | Turn-OFF time | t_{off} | | Duty $\leq 1\%$, $t_w = 10 \mu\text{s}$ | — | 396 | |
| Total gate charge (gate-source plus gate-drain) | | Q_g | $V_{DD} = -24 \text{ V}, V_{GS} = 10 \text{ V}, I_D = -11 \text{ A}$ | — | 107 | — | nC |
| Gate-source charge 1 | | Q_{gs1} | | — | 12 | — | |
| Gate-drain ("miller") charge | | Q_{gd} | | — | 20 | — | |

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

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-------------------------|----------------|-----------|--|-----|------|-----|------|
| Drain reverse current | Pulse (Note 1) | I_{DRP} | — | — | — | -44 | A |
| Forward voltage (diode) | | V_{DSF} | $I_{DR} = -11 \text{ A}, V_{GS} = 0 \text{ V}$ | — | — | 1.2 | V |







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