

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

# TPC8111

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:  $V_{th} = -0.8 \text{ to } -2.0 \text{ V}$  ( $V_{DS} = -10 \text{ V}$ ,  $I_D = -1 \text{ mA}$ )

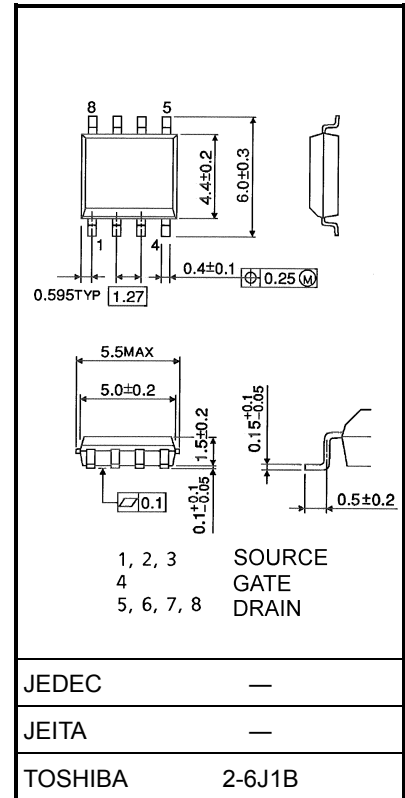
## Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

| 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   |                | $V_{GSS}$ | $\pm 20$   | V                |
| Drain current   | DC (Note 1)    | $I_D$     | -11        | A                |
|   | Pulse (Note 1) | $I_{DP}$  | -44        |                  |
| Drain power dissipation ( $t = 10 \text{ s}$ )<br>(Note 2a) |                | $P_D$     | 1.9        | W                |
| Drain power dissipation ( $t = 10 \text{ s}$ )<br>(Note 2b) |                | $P_D$     | 1.0        | W                |
| Single pulse avalanche energy<br>(Note 3)                   |                | $E_{AS}$  | 31.5       | mJ               |
| Avalanche current   |                | $I_{AR}$  | -11        | A                |
| Repetitive avalanche energy<br>(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.

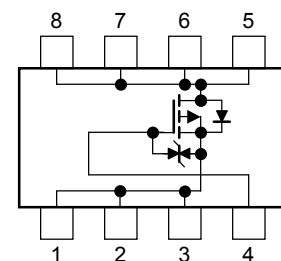
This transistor is an electrostatic sensitive device. Please handle with caution.

Unit: mm



Weight: 0.080 g (typ.)

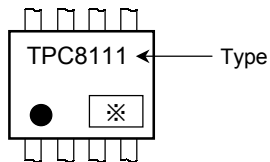
## Circuit Configuration



## Thermal Characteristics

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

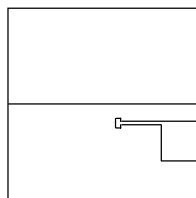
## Marking (Note 5)



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

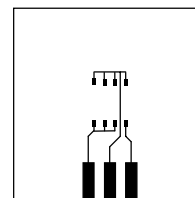
Note 2:

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



FR-4  
25.4 × 25.4 × 0.8  
(unit: mm)

(a)



FR-4  
25.4 × 25.4 × 0.8  
(unit: mm)

(b)

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 left of the marking indicates Pin 1.

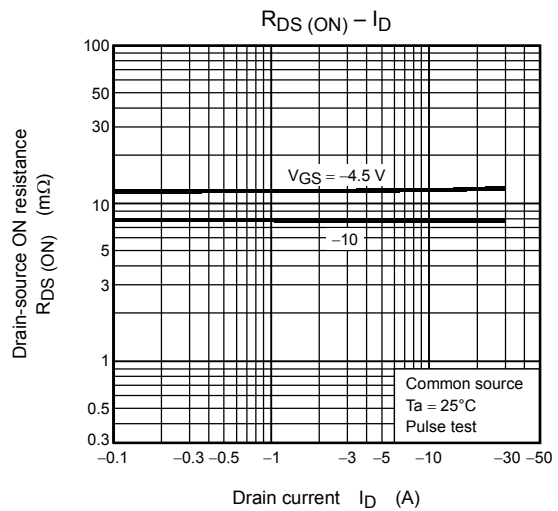
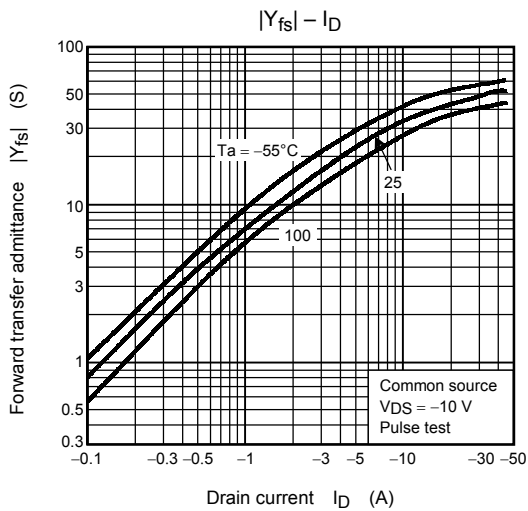
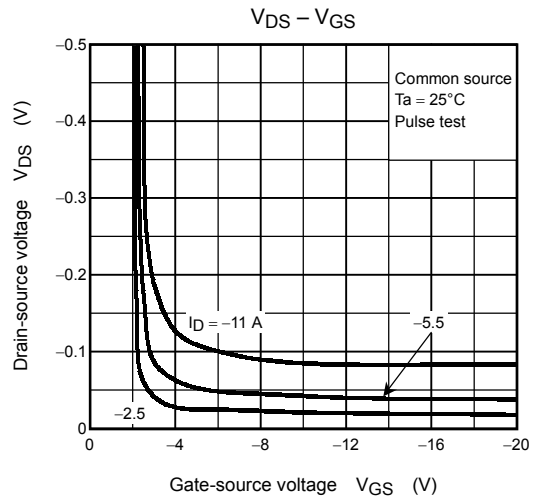
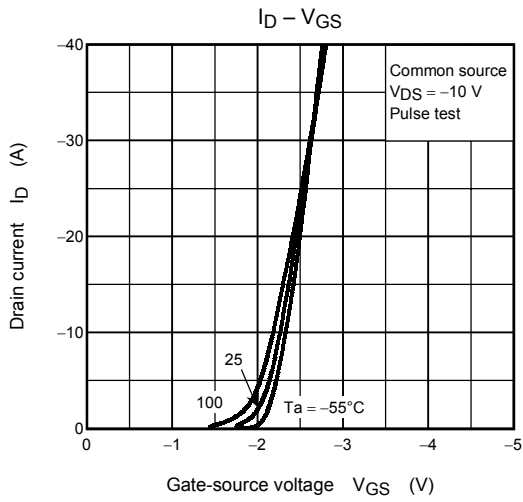
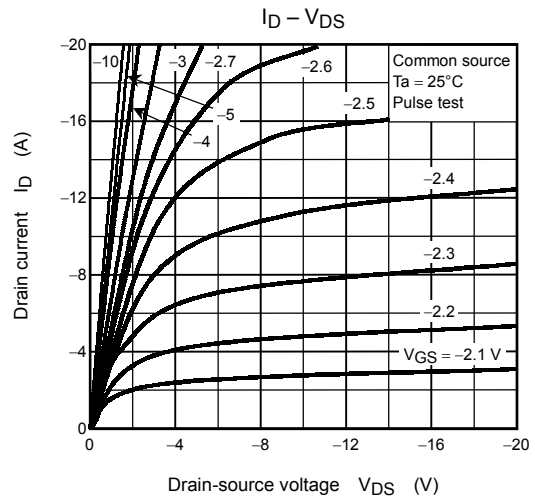
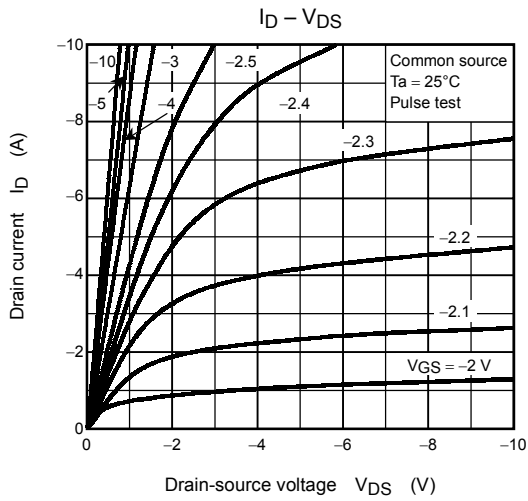
※ shows lot number. (year of manufacture: last decimal digit of the year of manufacture, month of manufacture: January to December are denoted by letters A to L respectively.)

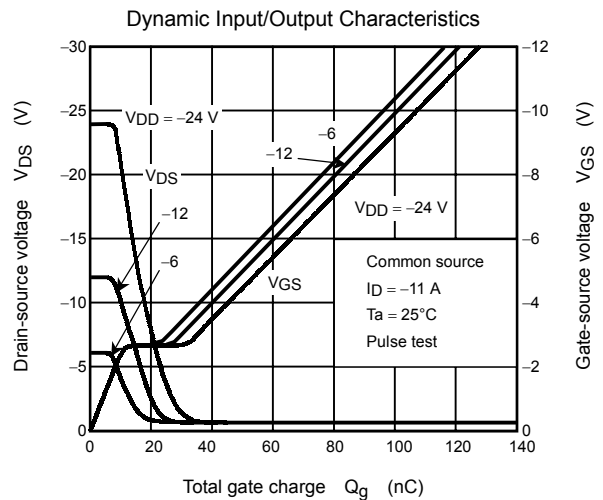
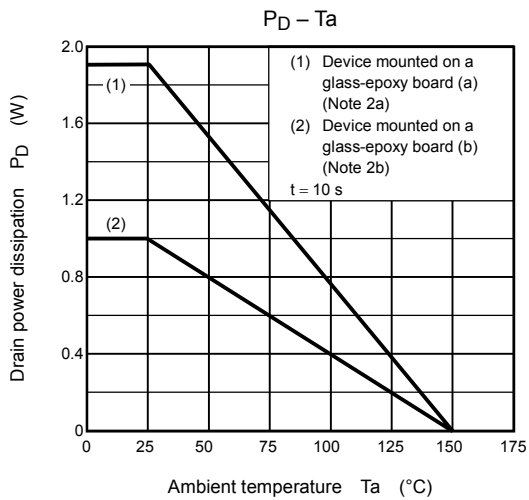
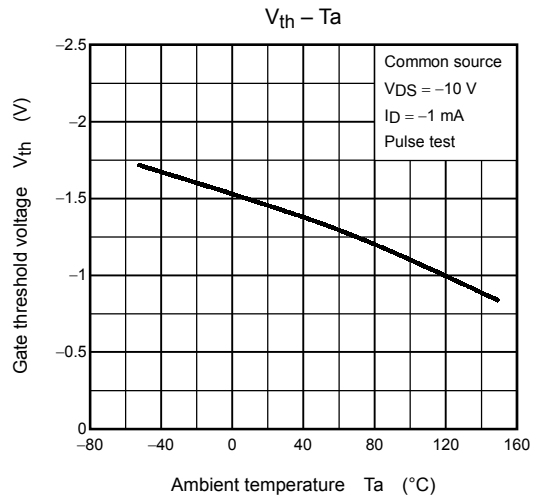
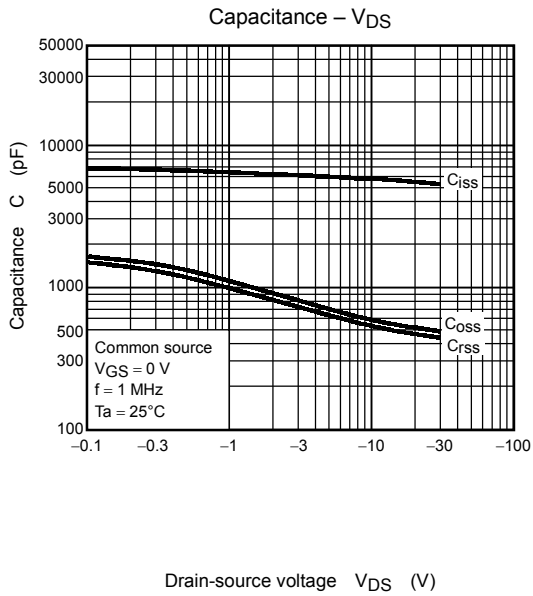
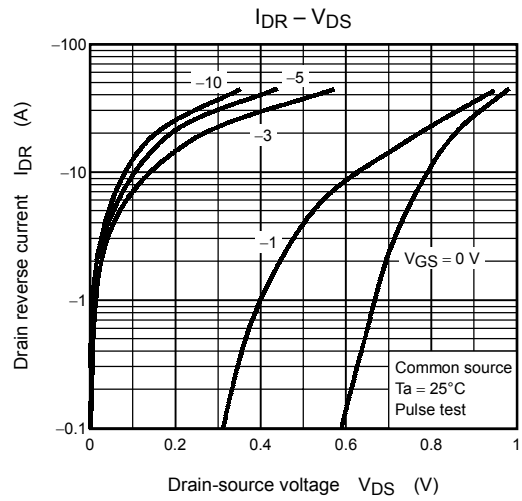
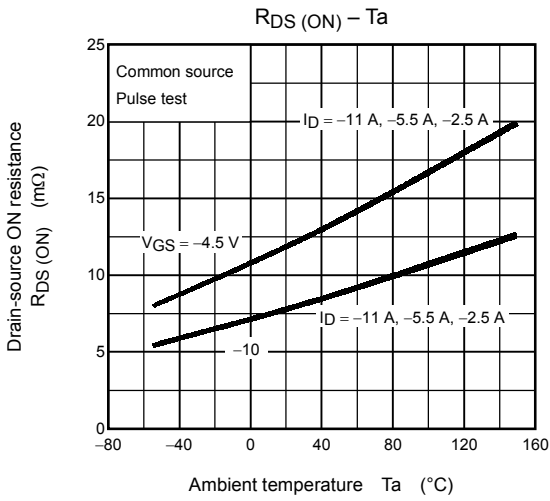
## Electrical Characteristics (Ta = 25°C)

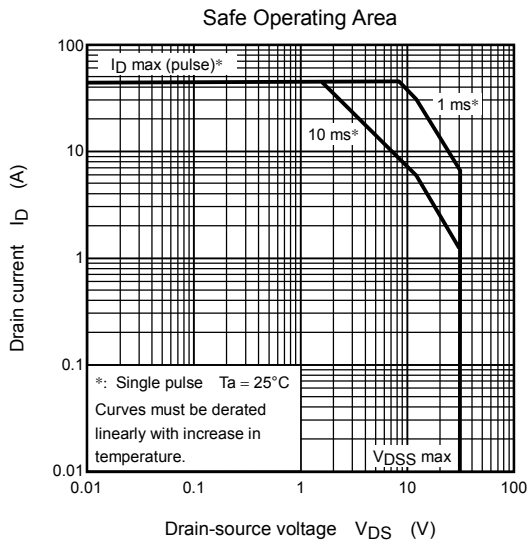
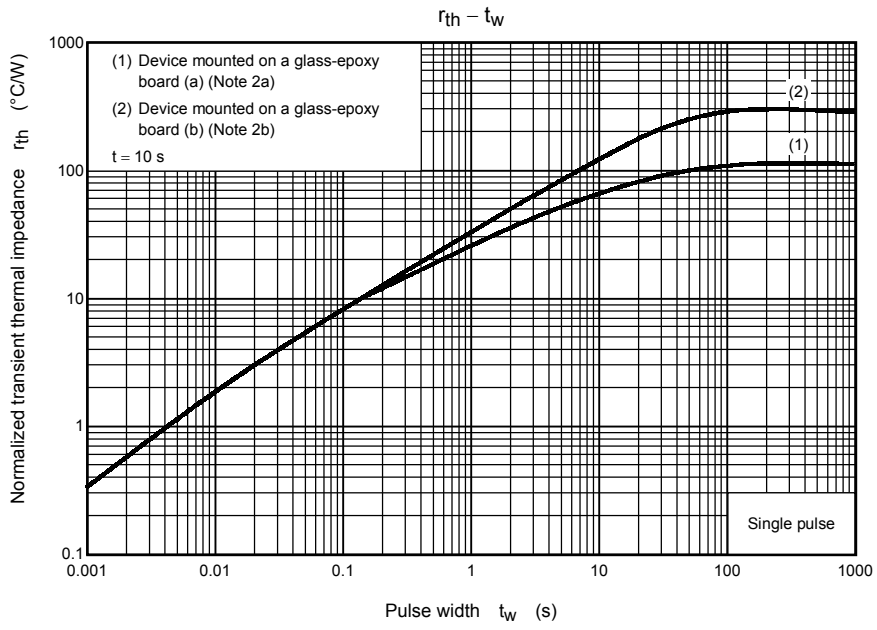
| Characteristics                                 |               | Symbol        | Test Condition   | Min  | Typ. | Max      | Unit             |
|---|---------------|---------------|--|------|------|----------|------------------|
| Gate leakage current                            |               | $I_{GSS}$     | $V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$  | —    | —    | $\pm 10$ | $\mu\text{A}$    |
| Drain cut-OFF current                           |               | $I_{DSS}$     | $V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$   | —    | —    | -10      | $\mu\text{A}$    |
| 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       | $\text{m}\Omega$ |
|   |               |               | $V_{GS} = -10\text{ V}, I_D = -5.5\text{ A}$   | —    | 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     | $t_r$         | <p><math>V_{GS}</math> 0 V / -10 V, <math>I_D = -5.5\text{ A}</math>, <math>R_L = 2.7\ \Omega</math>, <math>V_{DD} \approx -15\text{ V}</math>, <math>t_w = 10\ \mu\text{s}</math>, Duty <math>\leq 1\%</math></p> | —    | 18   | —        | ns               |
|   | Turn-ON time  | $t_{on}$      |  | —    | 23   | —        |                  |
|   | Fall time     | $t_f$         |  | —    | 109  | —        |                  |
|   | Turn-OFF time | $t_{off}$     |  | —    | 396  | —        |                  |
| Total gate charge (gate-source plus gate-drain) |               | $Q_g$         | $V_{DD} \approx -24\text{ V}, V_{GS} = 10\text{ V}, I_D = -11\text{ A}$  | —    | 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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