

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

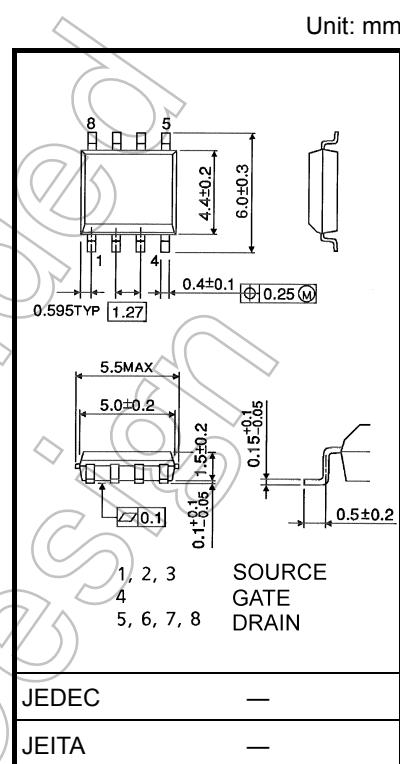
TPC8110

Lithium Ion Battery Applications

Notebook PC Applications

Portable Equipment Applications

- Small footprint due to small and thin package
- Low drain-source ON resistance: $R_{DS(ON)} = 17 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 16 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -10 \mu\text{A}$ (max) ($V_{DS} = -40 \text{ V}$)
- Enhancement mode: $V_{th} = -0.8$ to -2.0 V ($V_{DS} = -10 \text{ V}$, $I_D = -1 \text{ mA}$)

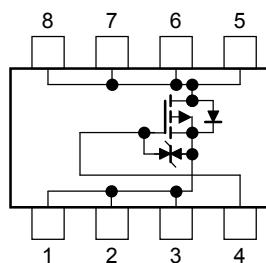


Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

| Characteristics | | Symbol | Rating | Unit |
|---|-----------------|-----------|------------|------------------|
| Drain-source voltage | | V_{DSS} | -40 | V |
| Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$) | | V_{DGR} | -40 | V |
| Gate-source voltage | | V_{GSS} | ± 20 | V |
| Drain current | DC (Note 1) | I_D | -8 | A |
| | Pulsed (Note 1) | I_{DP} | -32 | |
| Drain power dissipation ($t = 10 \text{ s}$) (Note 2a) | | P_D | 1.9 | W |
| Drain power dissipation ($t = 10 \text{ s}$) (Note 2b) | | P_D | 1.0 | W |
| Single pulse avalanche energy (Note 3) | | E_{AS} | 59.4 | mJ |
| Avalanche current | | I_{AR} | -8 | A |
| Repetitive avalanche energy (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 | $^\circ\text{C}$ |

Weight: 0.080 g (typ.)

Circuit Configuration



Note: (Note 1), (Note 2), (Note 3) and (Note 4): See the next page.

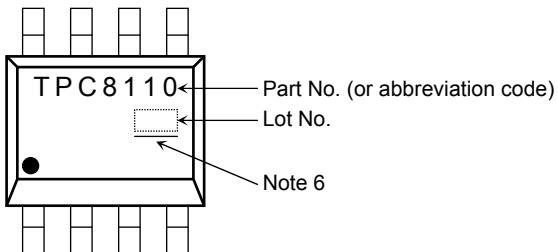
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc.).

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

Thermal Characteristics

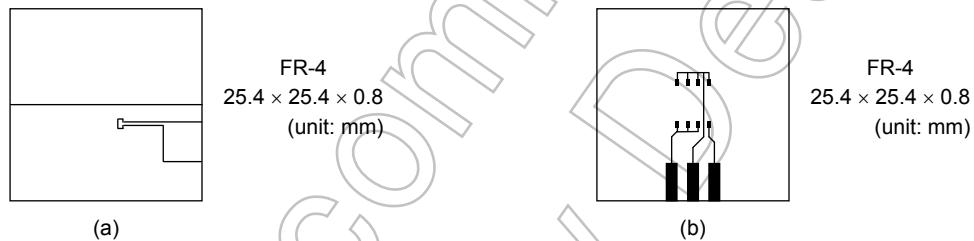
| Characteristics | Symbol | Max | Unit |
|---|-----------------|------|------|
| Thermal resistance, channel to ambient ($t = 10$ s) | R_{th} (ch-a) | 65.8 | °C/W |
| Thermal resistance, channel to ambient ($t = 10$ s) | R_{th} (ch-a) | 125 | °C/W |

Marking (Note 5)



Note 1: Ensure that the channel temperature does not exceed 150°C.

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

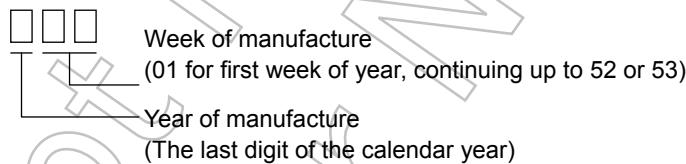


Note 3: $V_{DD} = -24$ V, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 1.0$ mH, $R_G = 25 \Omega$, $I_{AR} = -8$ A

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

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

* Weekly code: (Three digits)



Note 6: A line under a Lot No. identifies the indication of product Labels.

Not underlined: [[Pb]]/INCLUDES > MCV

Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

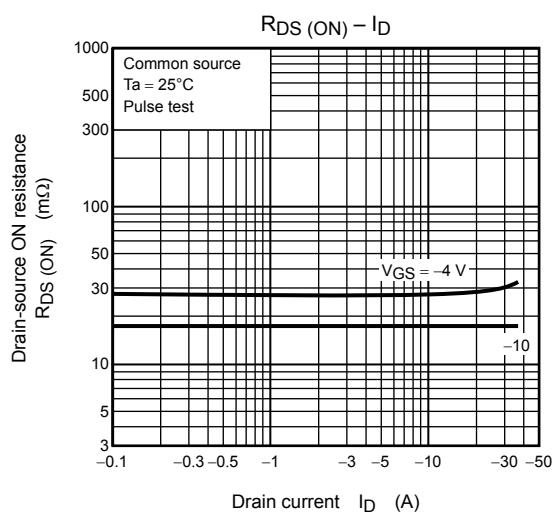
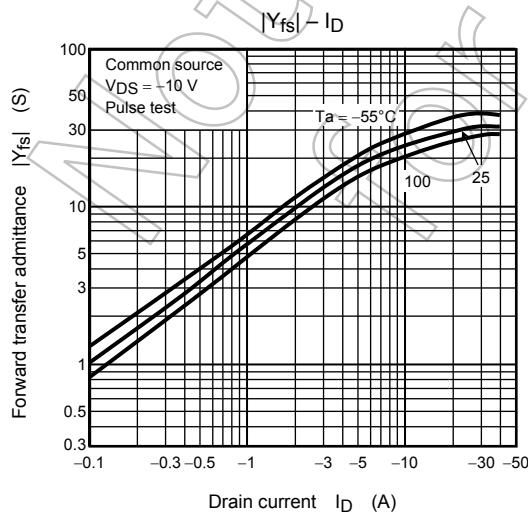
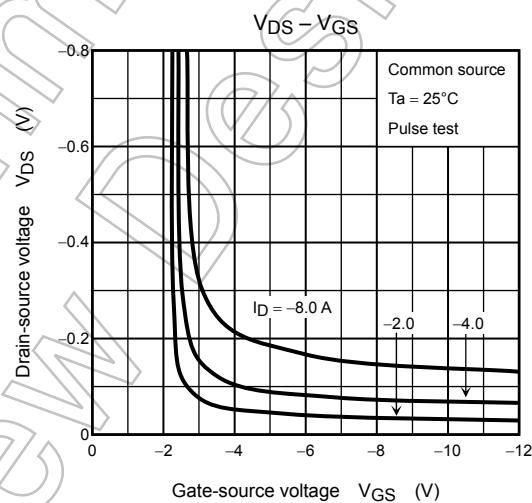
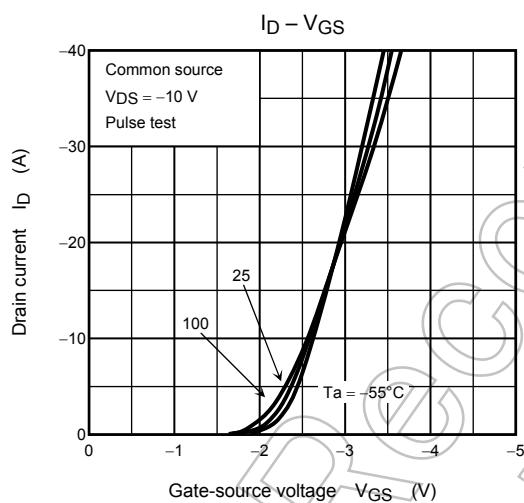
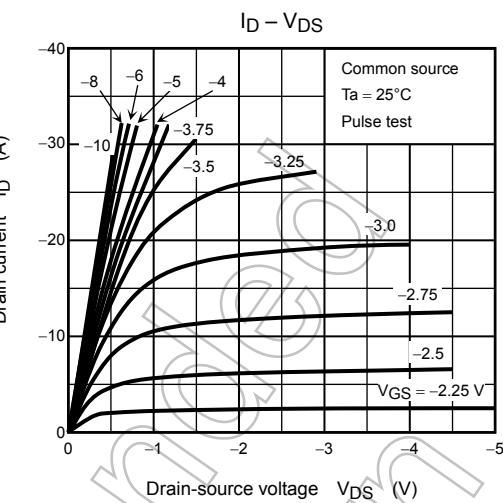
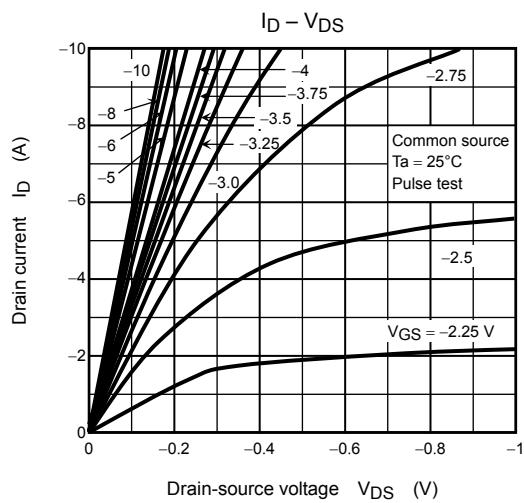
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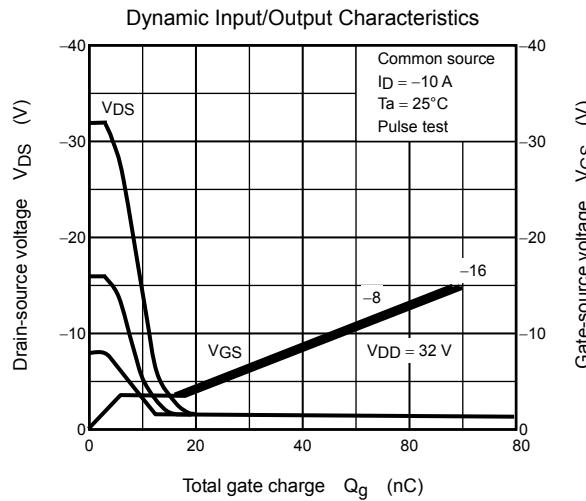
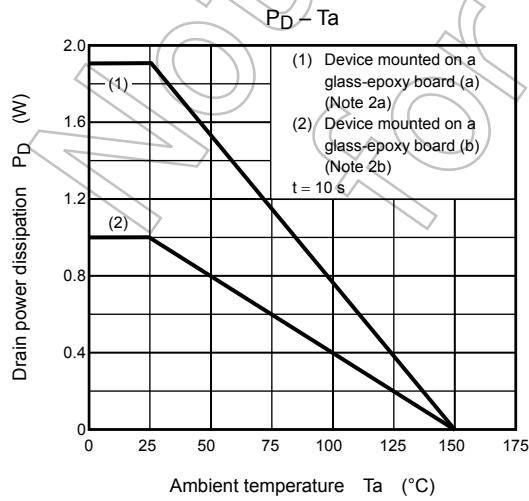
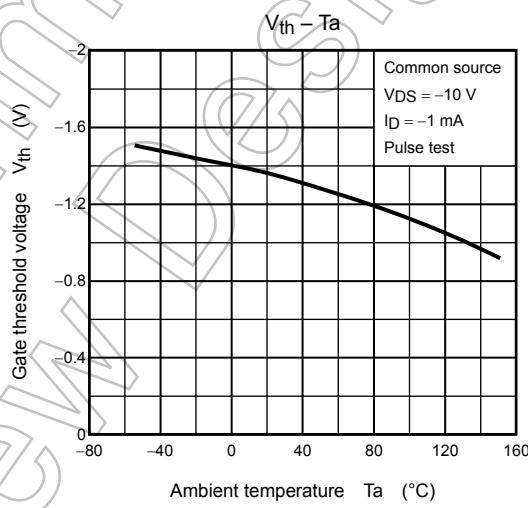
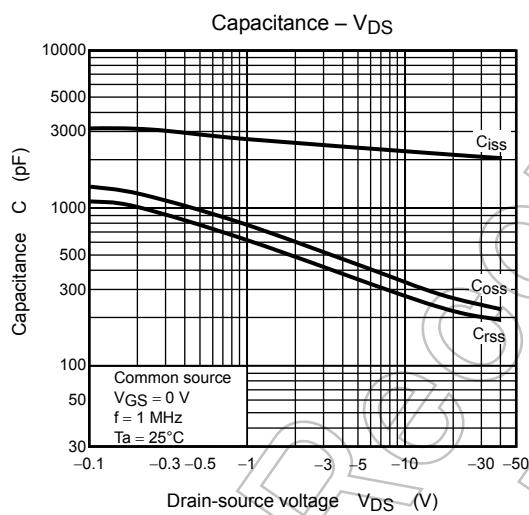
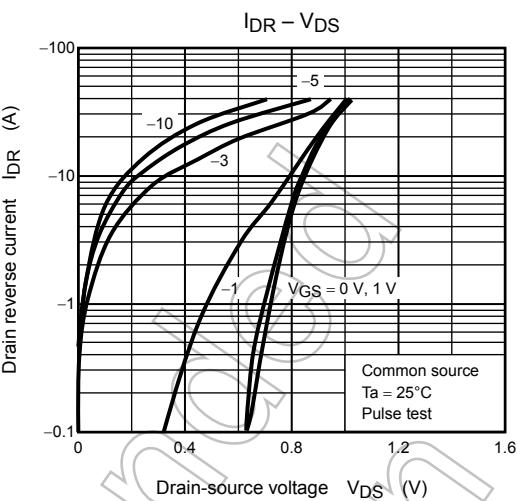
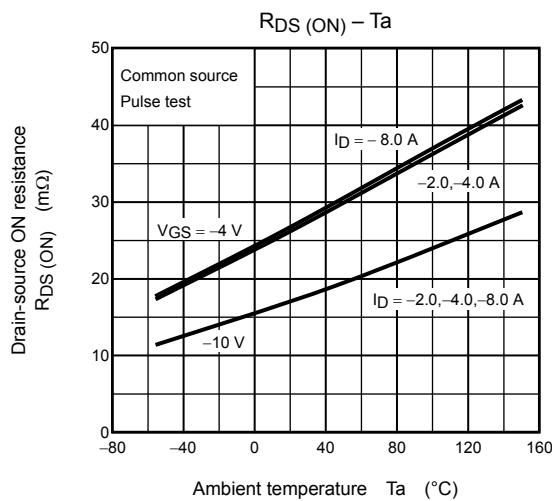
Electrical Characteristics ($T_a = 25^\circ\text{C}$)

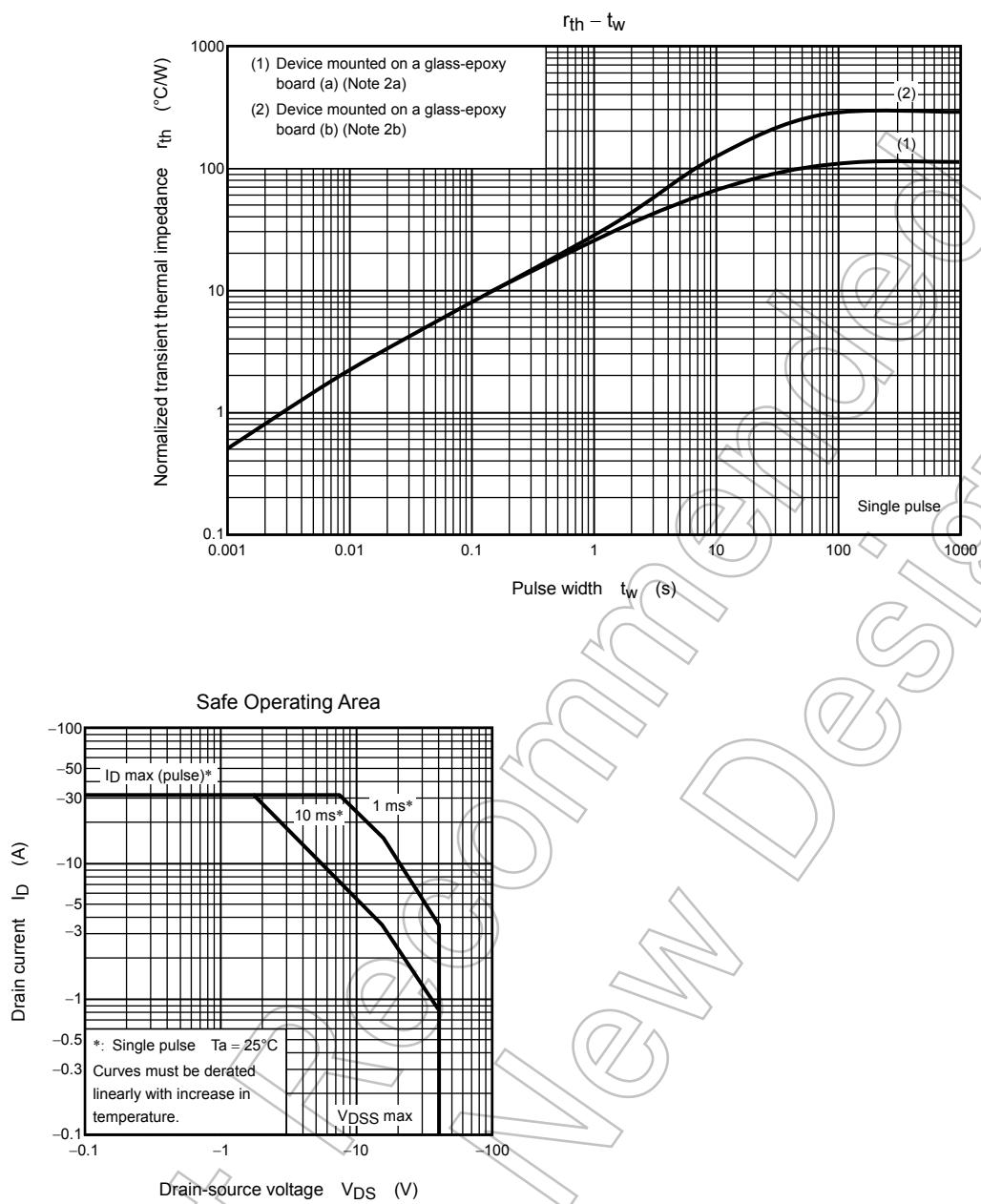
| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|-----------------------------|--|------|------|----------|------------------|
| Gate leakage current | I_{GSS} | $V_{GS} = \pm 16\text{ V}$, $V_{DS} = 0\text{ V}$ | — | — | ± 10 | μA |
| Drain cut-OFF current | I_{DSS} | $V_{DS} = -40\text{ V}$, $V_{GS} = 0\text{ V}$ | — | — | -10 | μA |
| Drain-source breakdown voltage | $V_{(\text{BR})\text{DSS}}$ | $I_D = -10\text{ mA}$, $V_{GS} = 0\text{ V}$ | -40 | — | — | V |
| | $V_{(\text{BR})\text{DSX}}$ | $I_D = -10\text{ mA}$, $V_{GS} = 20\text{ V}$ | -25 | — | — | |
| Gate threshold voltage | V_{th} | $V_{DS} = -10\text{ V}$, $I_D = -1\text{ mA}$ | -0.8 | — | -2.0 | V |
| Drain-source ON resistance | $R_{DS\text{ (ON)}}$ | $V_{GS} = -4\text{ V}$, $I_D = -4.0\text{ A}$ | — | 27 | 35 | $\text{m}\Omega$ |
| | | $V_{GS} = -10\text{ V}$, $I_D = -4.0\text{ A}$ | — | 17 | 25 | |
| Forward transfer admittance | $ Y_{fs} $ | $V_{DS} = -10\text{ V}$, $I_D = -4.0\text{ A}$ | 8 | 16 | — | S |
| Input capacitance | C_{iss} | $V_{DS} = -10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$ | — | 2180 | — | pF |
| Reverse transfer capacitance | C_{rss} | | — | 275 | — | |
| Output capacitance | C_{oss} | | — | 330 | — | |
| Switching time | Rise time | t_r | | 6.0 | — | ns |
| | Turn-ON time | t_{on} | | 15 | — | |
| | Fall time | t_f | | 30 | — | |
| | Turn-OFF time | t_{off} | | 115 | — | |
| Total gate charge (gate-source plus gate-drain) | Q_g | $V_{DD} \approx -20\text{ V}$ $V_{GS} = -10\text{ V}$, $I_D = -8\text{ A}$ | — | 48 | — | nC |
| Gate-source charge 1 | Q_{gs1} | | — | 5.5 | — | |
| Gate-drain ("miller") charge | Q_{gd} | | — | 12 | — | |

Source-Drain Ratings and Characteristics ($T_a = 25^\circ\text{C}$)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|-----------|--|-----|------|-----|------|
| Drain reverse current Pulse (Note 1) | I_{DRP} | — | — | — | -32 | A |
| Forward voltage (diode) | V_{DSF} | $I_{DR} = -8\text{ A}$, $V_{GS} = 0\text{ V}$ | — | — | 1.2 | V |







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