

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

TPC8125

Lithium Ion Battery Applications

Power Management Switch Applications

- Small footprint due to small and thin package
- Low drain-source ON-resistance: $R_{DS(ON)} = 10 \text{ m}\Omega$ (typ.)
- Low leakage current: $I_{DSS} = -10 \mu\text{A}$ (max) ($V_{DS} = -30 \text{ V}$)
- Enhancement mode: $V_{th} = -0.8$ to -2.0 V ($V_{DS} = -10 \text{ V}$, $I_D = -0.5 \text{ mA}$)

Absolute 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} | -25/+20 | V |
| Drain current | DC (Note 1) | I_D | -10 | A |
| | Pulse (Note 1) | I_{DP} | -40 | |
| Drain power dissipation (t = 10 s) (Note 2a) | | P_D | 1.9 | W |
| Drain power dissipation (t = 10 s) (Note 2b) | | P_D | 1.0 | W |
| Single pulse avalanche energy (Note 3) | | E_{AS} | 65 | mJ |
| Avalanche current (Note 1) | | I_{AR} | -10 | A |
| Channel temperature | | T_{ch} | 150 | °C |
| Storage temperature range | | T_{stg} | -55 to 150 | °C |

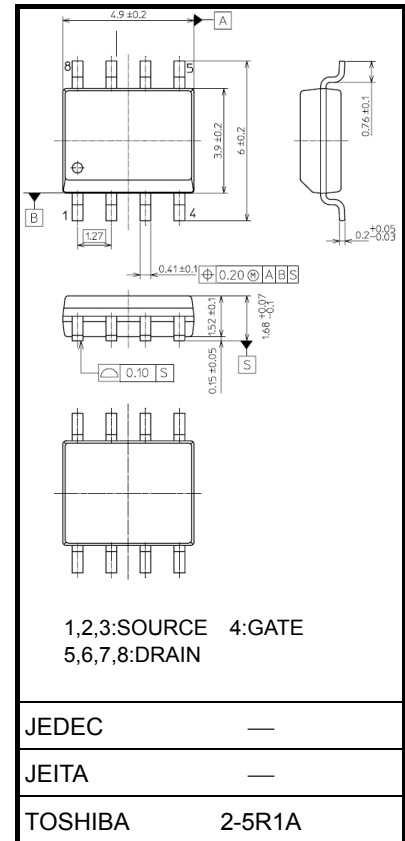
Note 1, Note 2, Note 3 : See the next page.

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.).

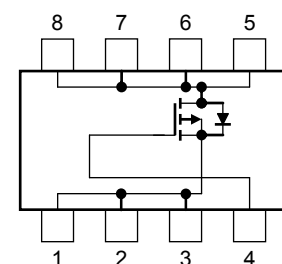
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.085 g (typ.)

Circuit Configuration

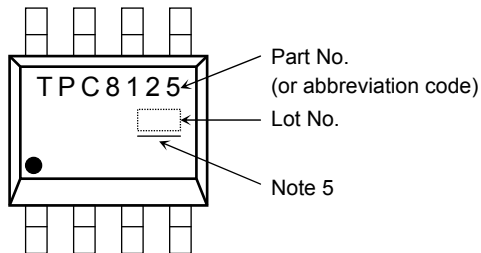


Start of commercial production
2009-11

Thermal Characteristics

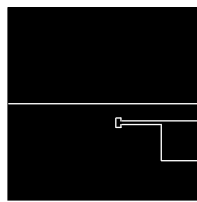
| Characteristics | Symbol | Max | Unit |
|-------------------------------------------------------------------|-----------------|------|------|
| Thermal resistance, channel to ambient (t = 10 s) (Note 2a) | $R_{th} (ch-a)$ | 65.8 | °C/W |
| Thermal resistance, channel to ambient (t = 10 s) (Note 2b)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

Marking (Note 4)



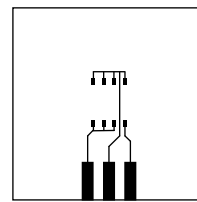
Note 1: Ensure that the channel temperature does not exceed 150°C.

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



(a)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)



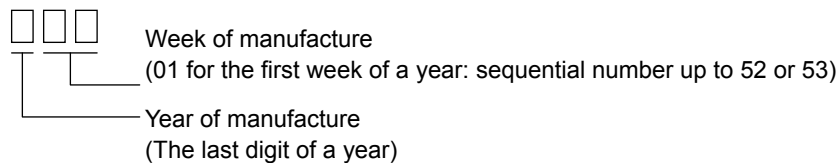
(b)

FR-4
25.4 × 25.4 × 0.8
(Unit: mm)

Note 3: $V_{DD} = -24\text{ V}$, $T_{ch} = 25\text{ °C}$ (initial), $L = 500\text{ }\mu\text{H}$, $R_G = 25\text{ }\Omega$, $I_{AR} = -10\text{ A}$

Note 4: • on lower left of the marking indicates Pin 1.

※ Weekly code: (Three digits)



Note 5: A line under a Lot No. identifies the indication of product Labels.

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

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

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

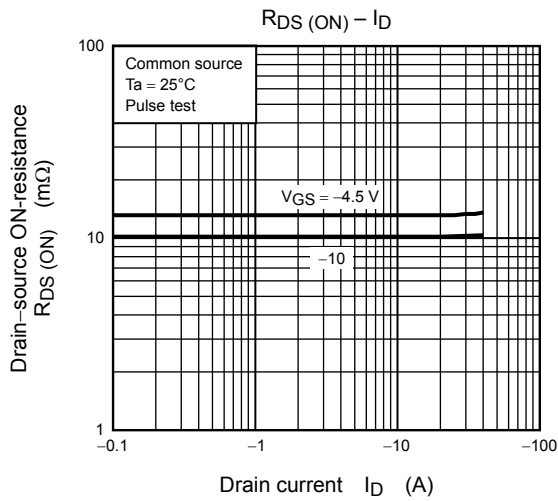
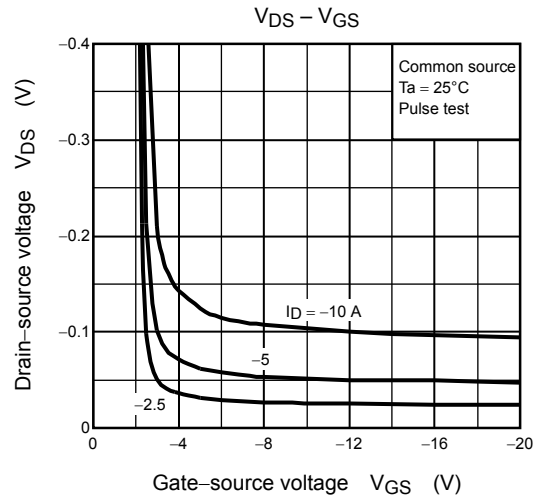
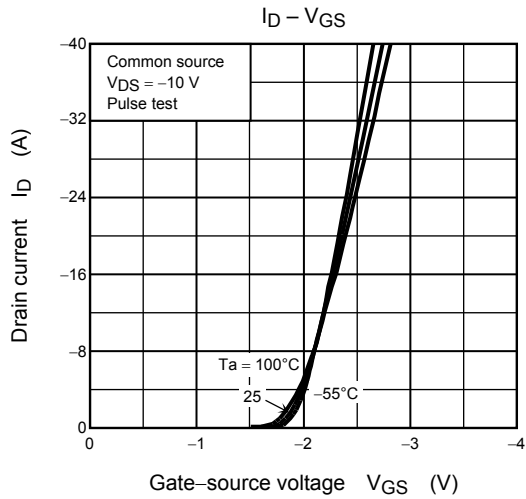
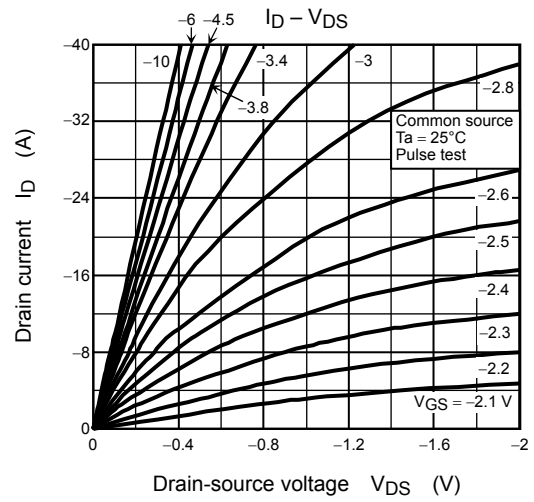
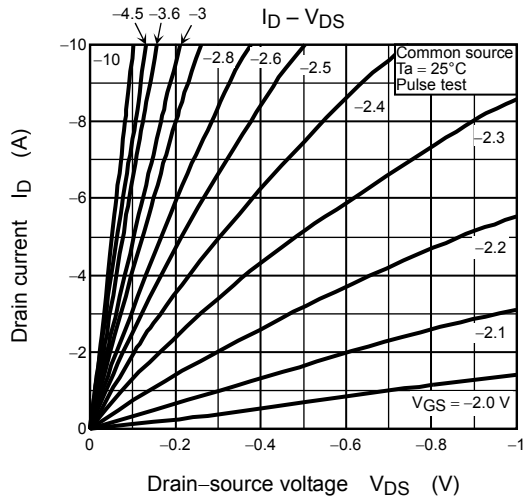
Electrical Characteristics (Ta = 25°C)

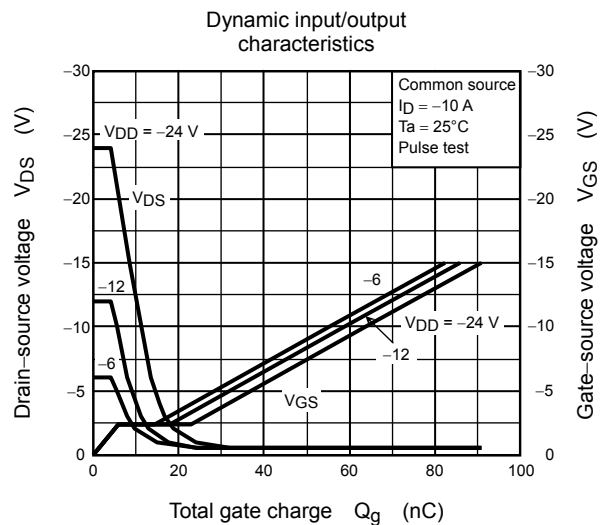
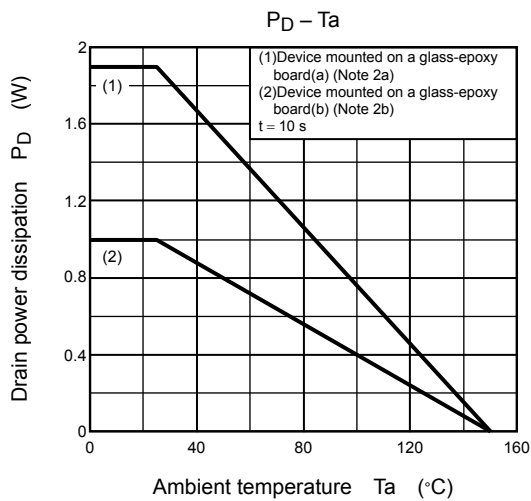
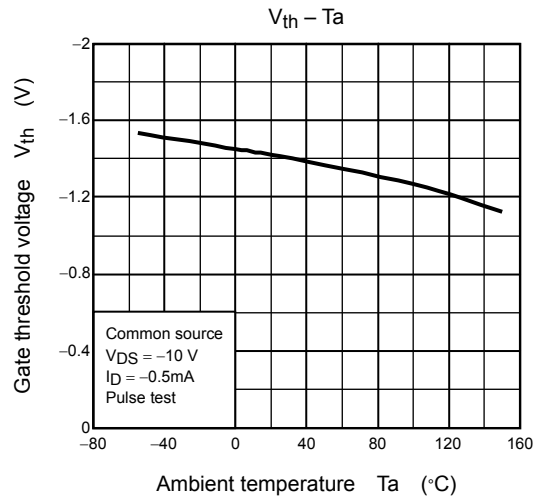
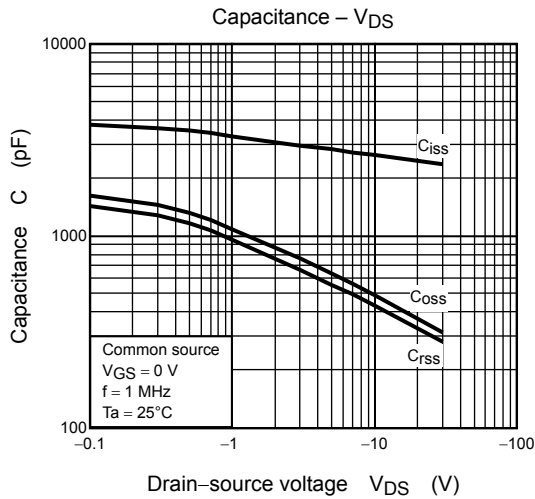
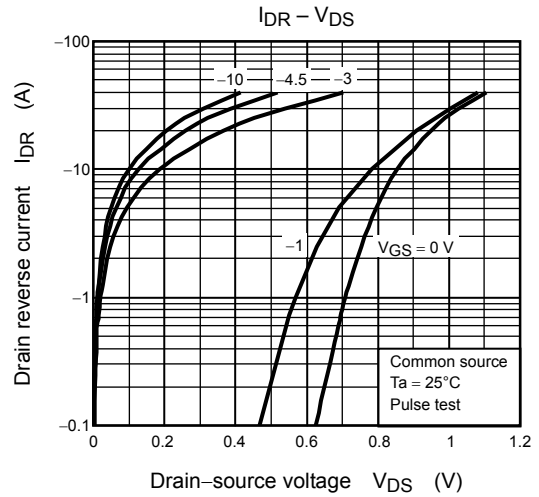
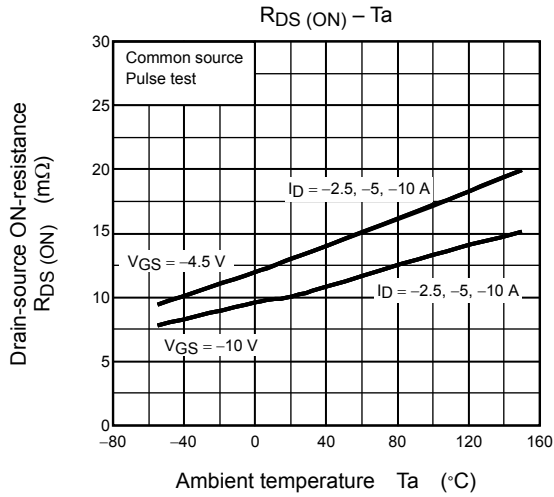
| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-------------------------------------------------|---------------|---------------|--------------------------------------------------------------------------|------|------|-----------|---------------|
| Gate leakage current | | I_{GSS} | $V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$ | — | — | ± 100 | nA |
| 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 |
| | | $V_{(BR)DSX}$ | $I_D = -10\text{ mA}, V_{GS} = 10\text{ V}$ (Note 6) | -21 | — | — | |
| Gate threshold voltage | | V_{th} | $V_{DS} = -10\text{ V}, I_D = -0.5\text{ mA}$ | -0.8 | — | -2.0 | V |
| Drain-source ON-resistance | | $R_{DS(ON)}$ | $V_{GS} = -4.5\text{ V}, I_D = -5\text{ A}$ | — | 13 | 17 | m Ω |
| | | | $V_{GS} = -10\text{ V}, I_D = -5\text{ A}$ | — | 10 | 13 | |
| Input capacitance | | C_{iss} | $V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | — | 2580 | — | pF |
| Reverse transfer capacitance | | C_{rss} | | — | 430 | — | |
| Output capacitance | | C_{oss} | | — | 490 | — | |
| Switching time | Rise time | t_r | | — | 8 | — | ns |
| | Turn-ON time | t_{on} | | — | 16 | — | |
| | Fall time | t_f | | — | 75 | — | |
| | Turn-OFF time | t_{off} | | — | 245 | — | |
| Total gate charge (gate-source plus gate-drain) | | Q_g | $V_{DD} \approx -24\text{ V}, V_{GS} = -10\text{ V}, I_D = -10\text{ A}$ | — | 64 | — | nC |
| Gate-source charge 1 | | Q_{gs1} | | — | 6 | — | |
| Gate-drain ("miller") charge | | Q_{gd} | | — | 17 | — | |

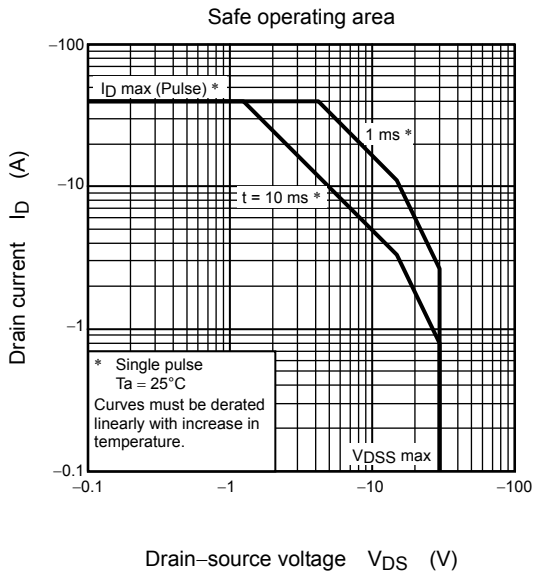
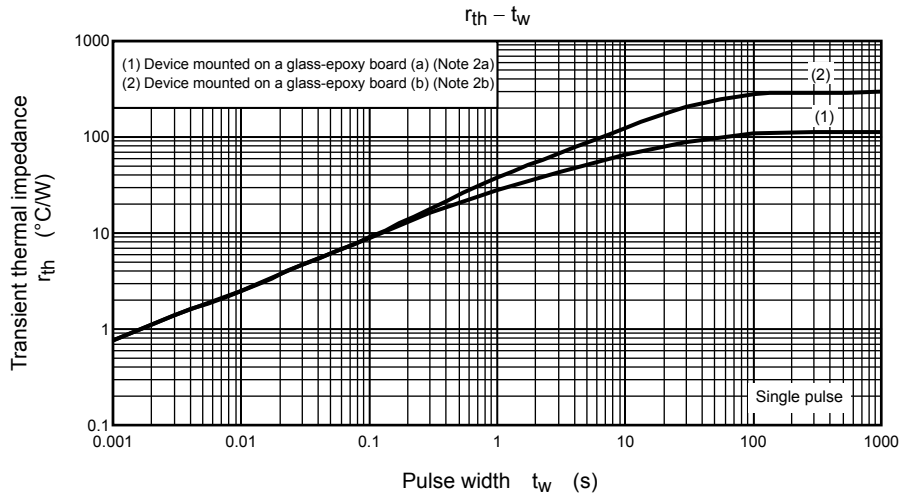
Source-Drain Ratings and Characteristics (Ta = 25°C)

| Characteristics | | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-------------------------|----------------|-----------|----------------------------------------------|-----|------|-----|------|
| Drain reverse current | Pulse (Note 1) | I_{DRP} | — | — | — | -40 | A |
| Forward voltage (diode) | | V_{DSF} | $I_{DR} = -10\text{ A}, V_{GS} = 0\text{ V}$ | — | — | 1.2 | V |

Note 6: VDSX mode (the application of a plus voltage between gate and source) may cause decrease in maximum rating of drain-source voltage.







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