

# TPC6107

Notebook PC Applications

Portable Equipment Applications

- Small footprint due to small and thin package
- Low drain-source ON resistance:  $R_{DS(ON)} = 40 \text{ m}\Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 9.6 \text{ S}$  (typ.)
- Low leakage current:  $I_{DSS} = -10 \text{ }\mu\text{A}$  (max) ( $V_{DS} = -20 \text{ V}$ )
- Enhancement model:  $V_{th} = -0.5$  to  $-1.2 \text{ V}$   
( $V_{DS} = -10 \text{ V}$ ,  $I_D = -200 \text{ }\mu\text{A}$ )

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

| Characteristics                                      |                | Symbol    | Rating     | Unit             |
|--|----------------|-----------|------------|------------------|
| Drain-source voltage                                 |                | $V_{DSS}$ | -20        | V                |
| Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ ) |                | $V_{DGR}$ | -20        | V                |
| Gate-source voltage                                  |                | $V_{GSS}$ | $\pm 12$   | V                |
| Drain current  | DC (Note 1)    | $I_D$     | -4.5       | A                |
|  | Pulse (Note 1) | $I_{DP}$  | -18        |                  |
| Drain power dissipation (t = 5 s) (Note 2a)          |                | $P_D$     | 2.2        | W                |
| Drain power dissipation (t = 5 s) (Note 2b)          |                | $P_D$     | 0.7        | W                |
| Single pulse avalanche energy (Note 3)               |                | $E_{AS}$  | 1.3        | mJ               |
| Avalanche current                                    |                | $I_{AR}$  | -2.25      | A                |
| Repetitive avalanche energy (Note 4)                 |                | $E_{AR}$  | 0.22       | mJ               |
| Channel temperature                                  |                | $T_{ch}$  | 150        | $^\circ\text{C}$ |
| Storage temperature range                            |                | $T_{stg}$ | -55 to 150 | $^\circ\text{C}$ |

Note: 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).

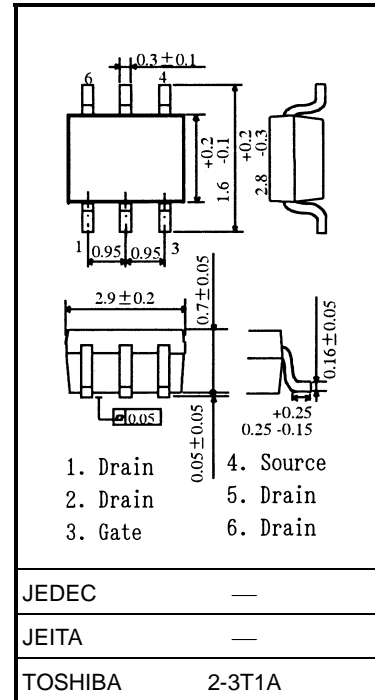
## Thermal Characteristics

| Characteristics  | Symbol         | Max   | Unit               |
|--|----------------|-------|--------------------|
| Thermal resistance, channel to ambient (t = 5 s) (Note 2a) | $R_{th(ch-a)}$ | 56.8  | $^\circ\text{C/W}$ |
| Thermal resistance, channel to ambient (t = 5 s) (Note 2b) | $R_{th(ch-a)}$ | 178.5 | $^\circ\text{C/W}$ |

Note: (Note 1), (Note 2), (Note 3), (Note 4) and (Note 5): See the next page.

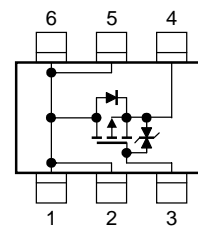
This transistor is an electrostatic-sensitive device. Please handle with caution.

Unit: mm



Weight: 0.011 g (typ.)

## Circuit Configuration



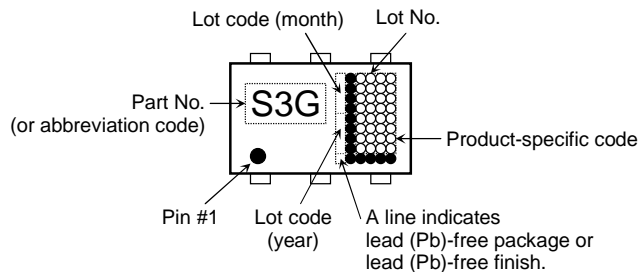
## Electrical Characteristics (Ta = 25°C)

| Characteristics                                 |               | Symbol        | Test Condition   | Min  | Typ. | Max      | Unit          |
|---|---------------|---------------|--|------|------|----------|---------------|
| Gate leakage current                            |               | $I_{GSS}$     | $V_{GS} = \pm 10\text{ V}, V_{DS} = 0\text{ V}$                          | —    | —    | $\pm 10$ | $\mu\text{A}$ |
| Drain cut-OFF current                           |               | $I_{DSS}$     | $V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$                             | —    | —    | -10      | $\mu\text{A}$ |
| Drain-source breakdown voltage                  |               | $V_{(BR)DSS}$ | $I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$                               | -20  | —    | —        | V             |
|   |               | $V_{(BR)DSX}$ | $I_D = -10\text{ mA}, V_{GS} = 12\text{ V}$                              | -8   | —    | —        |               |
| Gate threshold voltage                          |               | $V_{th}$      | $V_{DS} = -10\text{ V}, I_D = -200\text{ }\mu\text{A}$                   | -0.5 | —    | -1.2     | V             |
| Drain-source ON resistance                      |               | $R_{DS(ON)}$  | $V_{GS} = -2\text{ V}, I_D = -2.2\text{ A}$                              | —    | 110  | 180      | m $\Omega$    |
|   |               | $R_{DS(ON)}$  | $V_{GS} = -2.5\text{ V}, I_D = -2.2\text{ A}$                            | —    | 70   | 100      |               |
|   |               | $R_{DS(ON)}$  | $V_{GS} = -4.5\text{ V}, I_D = -2.2\text{ A}$                            | —    | 40   | 55       |               |
| Forward transfer admittance                     |               | $ Y_{fs} $    | $V_{DS} = -10\text{ V}, I_D = -2.2\text{ A}$                             | 4.8  | 9.6  | —        | S             |
| Input capacitance                               |               | $C_{iss}$     | $V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$           | —    | 680  | —        | pF            |
| Reverse transfer capacitance                    |               | $C_{rss}$     |  | —    | 130  | —        |               |
| Output capacitance                              |               | $C_{oss}$     |  | —    | 140  | —        |               |
| Switching time                                  | Rise time     | $t_r$         |  | —    | 6    | —        | ns            |
|   | Turn-ON time  | $t_{on}$      |  | —    | 16   | —        |               |
|   | Fall time     | $t_f$         |  | —    | 38   | —        |               |
|   | Turn-OFF time | $t_{off}$     |  | —    | 85   | —        |               |
| Total gate charge (gate-source plus gate-drain) |               | $Q_g$         | $V_{DD} \approx -16\text{ V}, V_{GS} = -5\text{ V}, I_D = -4.5\text{ A}$ | —    | 9.8  | —        | nC            |
| Gate-source charge                              |               | $Q_{gs}$      |  | —    | 2    | —        |               |
| Gate-drain ("miller") charge                    |               | $Q_{gd}$      |  | —    | 3    | —        |               |

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

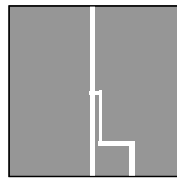
| Characteristics                      | Symbol    | Test Condition                                | Min | Typ. | Max | Unit |
|--------------------------------------|-----------|---|-----|------|-----|------|
| Pulse drain reverse current (Note 1) | $I_{DRP}$ | —   | —   | —    | -18 | A    |
| Forward voltage (diode)              | $V_{DSF}$ | $I_{DR} = -4.5\text{ A}, V_{GS} = 0\text{ V}$ | —   | —    | 1.2 | V    |

## Marking (Note 5)



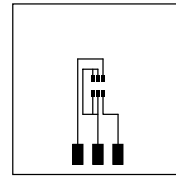
Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2: (a) Device mounted on a glass-epoxy board (a) (t = 5 s)  
(b) Device mounted on a glass-epoxy board (b) (t = 5 s)



(a)

FR-4  
25.4 × 25.4 × 0.8  
Unit: (mm)



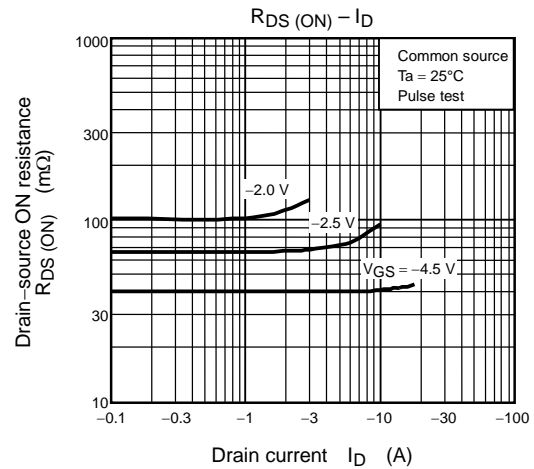
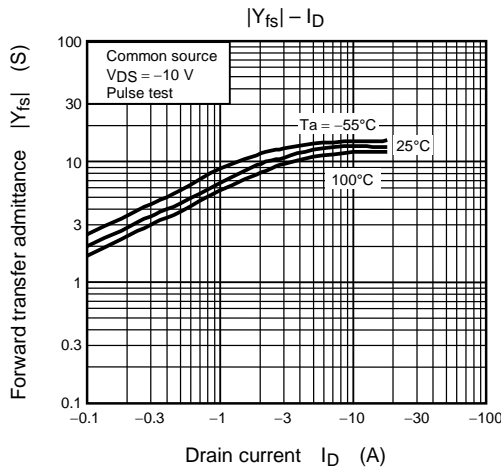
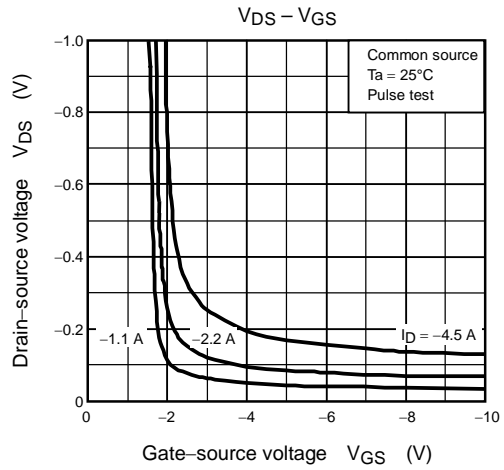
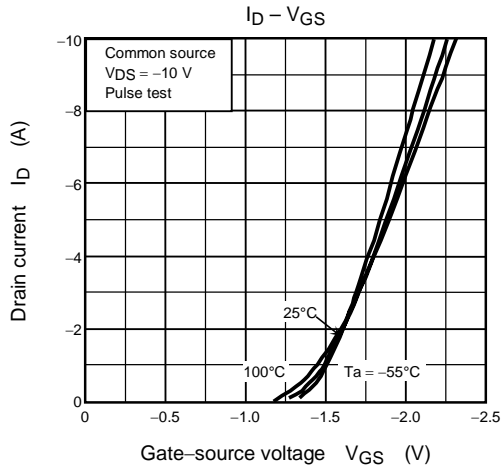
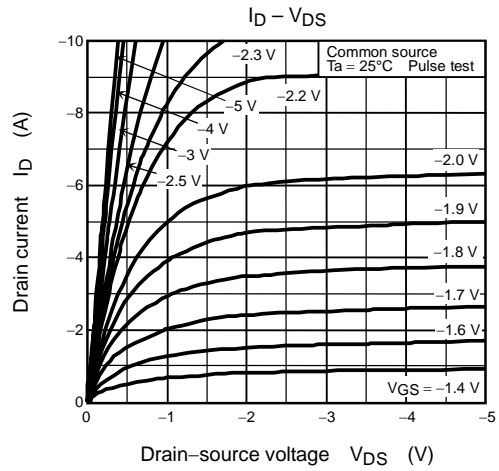
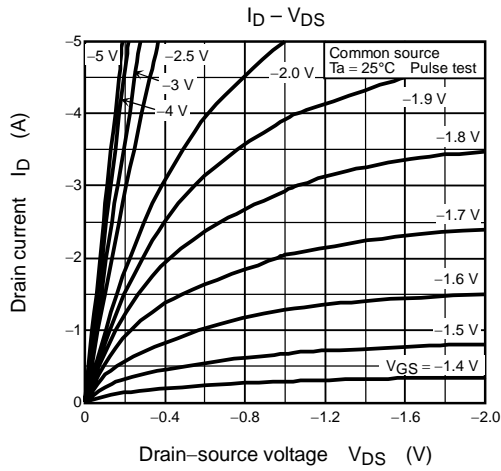
(b)

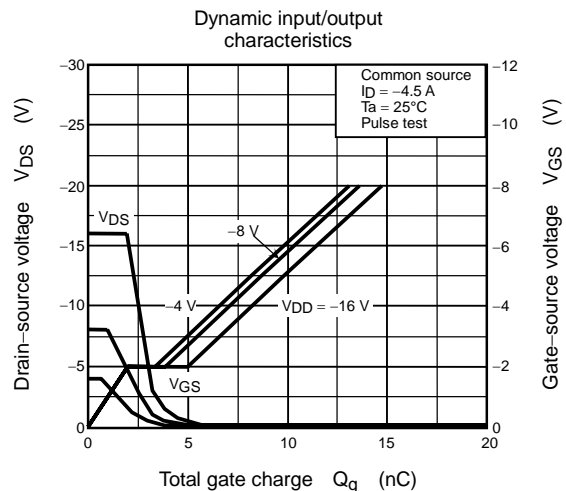
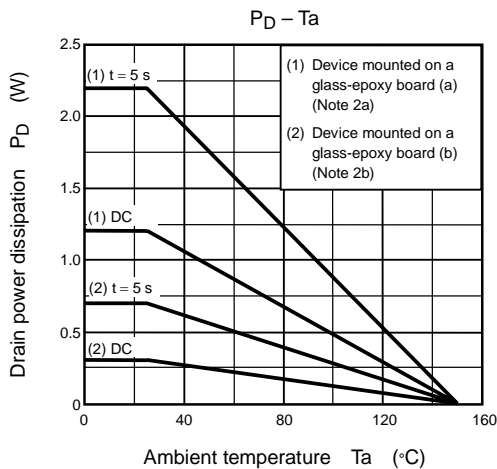
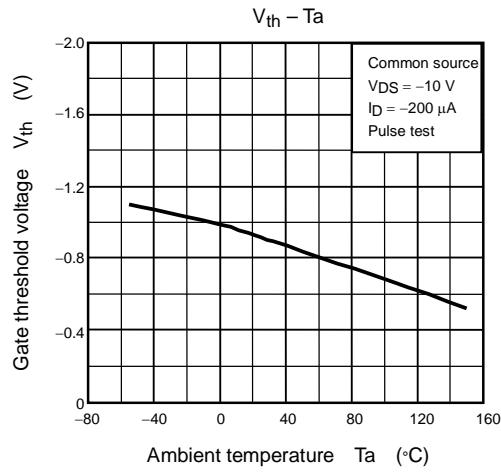
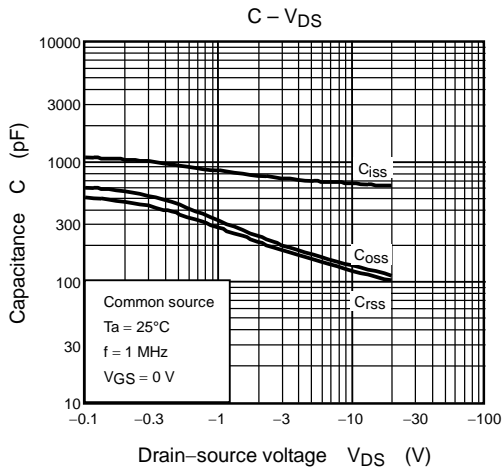
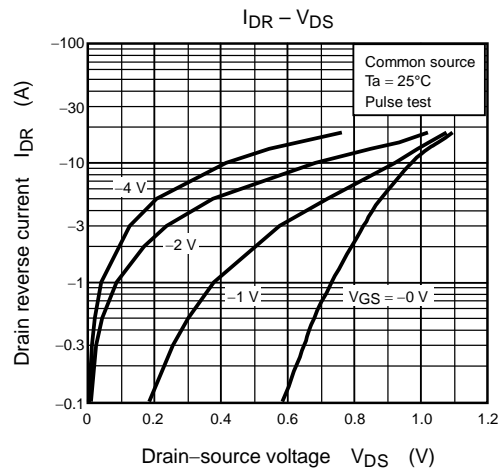
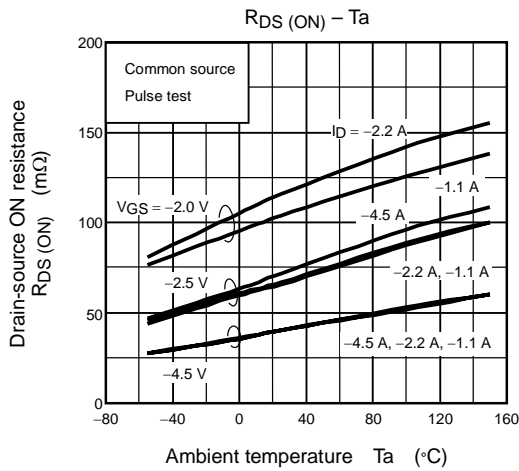
FR-4  
25.4 × 25.4 × 0.8  
Unit: (mm)

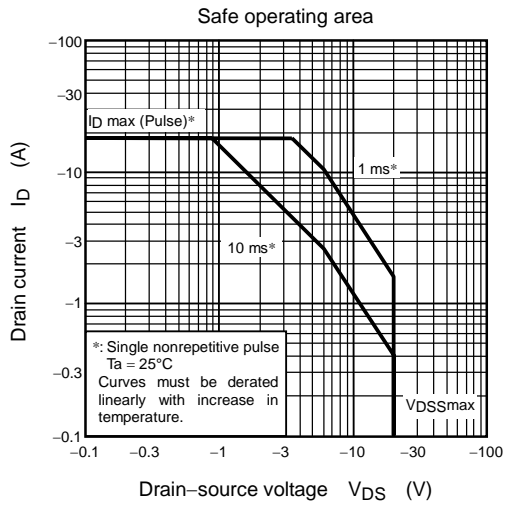
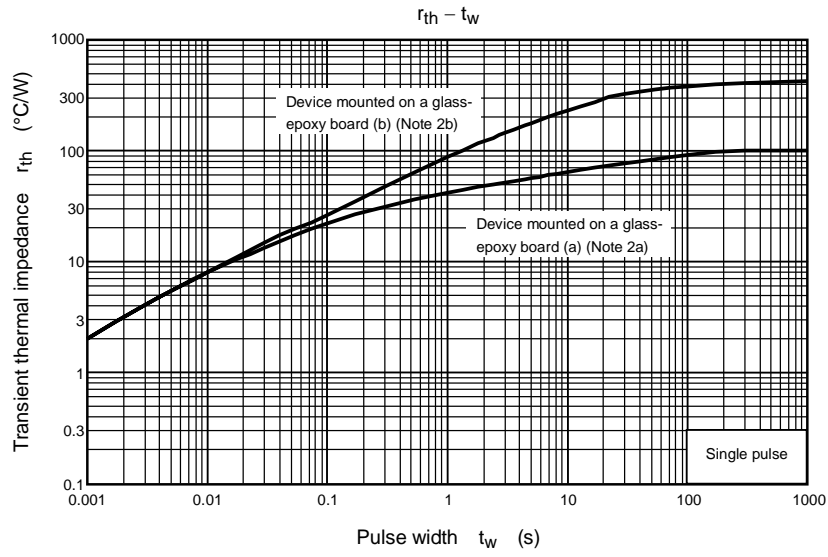
Note 3:  $V_{DD} = 16\text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 0.2\text{ mH}$ ,  $R_G = 25\ \Omega$ ,  $I_{AR} = -2.25\text{ A}$

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

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







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