

# TPC6108

Notebook PC Applications  
 Portable Equipment Applications

- Small footprint due to small and thin package
- Low drain-source ON-resistance:  $R_{DS(ON)} = 50 \text{ m}\Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 7.4 \text{ S}$  (typ.)
- Low leakage current:  $I_{DSS} = -10 \text{ }\mu\text{A}$  (max) ( $V_{DS} = -30 \text{ V}$ )
- Enhancement mode:  $V_{th} = -0.8$  to  $-2.0 \text{ V}$  ( $V_{DS} = -10 \text{ V}$ ,  $I_D = -1 \text{ mA}$ )

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

| Characteristics  |                | Symbol    | Rating     | Unit             |
|--|----------------|-----------|------------|------------------|
| Drain-source voltage   |                | $V_{DSS}$ | -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)    | $I_D$     | -4.5       | A                |
|  | Pulse (Note 1) | $I_{DP}$  | -18        |                  |
| Drain power dissipation ( $t = 5 \text{ s}$ ) (Note 2a)                          |                | $P_D$     | 2.2        | W                |
| Drain power dissipation ( $t = 5 \text{ s}$ ) (Note 2b)                          |                | $P_D$     | 0.7        |                  |
| Single-pulse avalanche energy (Note 3)   |                | $E_{AS}$  | 1.3        | mJ               |
| Avalanche current  |                | $I_{AR}$  | -2.25      | A                |
| Repetitive avalanche energy<br>Single-device value at dual operation<br>(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).

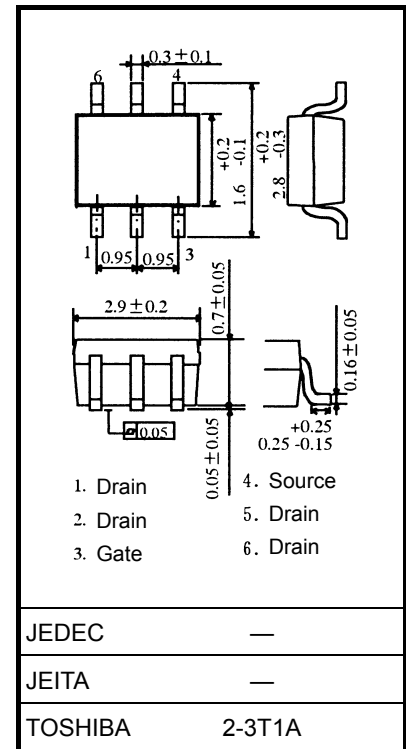
## Thermal Characteristics

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

Note: For Notes 1 to 5, see page 3.

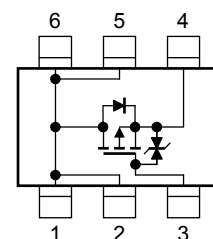
Caution: This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.011 g (typ.)

## Circuit Configuration



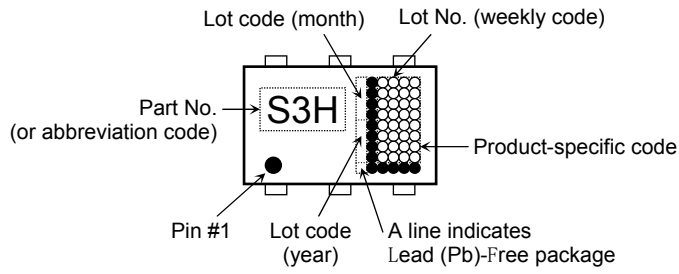
## Electrical Characteristics (Ta = 25°C)

| Characteristic                                  |               | 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                      |               | $R_{DS(ON)}$  | $V_{GS} = -4.5\text{ V}, I_D = -2.2\text{ A}$                                   | —   | 75   | 100      | $\text{m}\Omega$ |
|   |               | $R_{DS(ON)}$  | $V_{GS} = -10\text{ V}, I_D = -2.2\text{ A}$                                    | —   | 50   | 60       |                  |
| Forward transfer admittance                     |               | $ Y_{fs} $    | $V_{DS} = -10\text{ V}, I_D = -2.2\text{ A}$                                    | 3.7                                       | 7.4  | —        | S                |
| Input capacitance                               |               | $C_{iss}$     | $V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$                  | —   | 570  | —        | pF               |
| Reverse transfer capacitance                    |               | $C_{rSS}$     |   | —   | 75   | —        |                  |
| Output capacitance                              |               | $C_{oss}$     |   | —   | 85   | —        |                  |
| Switching time                                  | Rise time     | $t_r$         |   | —   | 3.5  | —        | ns               |
|   | Turn-on time  | $t_{on}$      |   | —   | 12   | —        |                  |
|   | Fall time     | $t_f$         |   | —   | 21   | —        |                  |
|   | Turn-off time | $t_{off}$     |   | Duty $\leq 1\%$ , $t_w = 10\ \mu\text{s}$ | —    | 70       |                  |
| Total gate charge (gate-source plus gate-drain) |               | $Q_g$         | $V_{DD} \approx -24\text{ V}, V_{GS} \approx -10\text{ V}, I_D = -4.5\text{ A}$ | —   | 13   | —        | nC               |
| Gate-source charge1                             |               | $Q_{gs1}$     |   | —   | 1.8  | —        |                  |
| Gate-drain ("Miller") charge                    |               | $Q_{gd}$      |   | —   | 2.5  | —        |                  |

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

| Characteristic          |                | Symbol    | Test Condition                                | Min | Typ. | Max | Unit |
|-------------------------|----------------|-----------|---|-----|------|-----|------|
| Drain reverse current   | Pulse (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    |

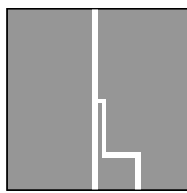
**Marking (Note 5)**



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

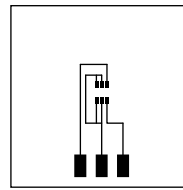
Note 2: (a) Device mounted on a glass-epoxy board (a) (t = 5 s)

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



(a)

FR-4  
25.4 × 25.4 × 0.8  
(Unit: mm)



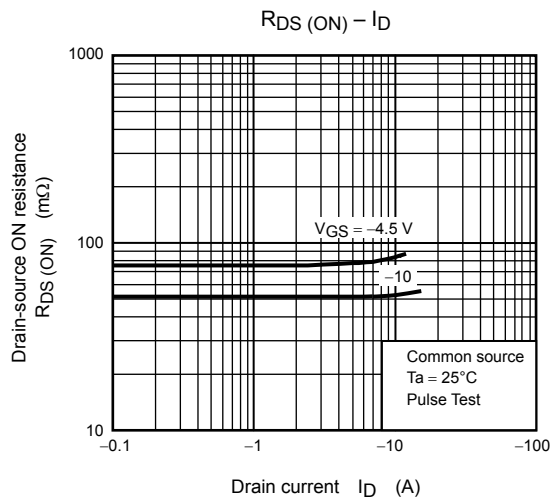
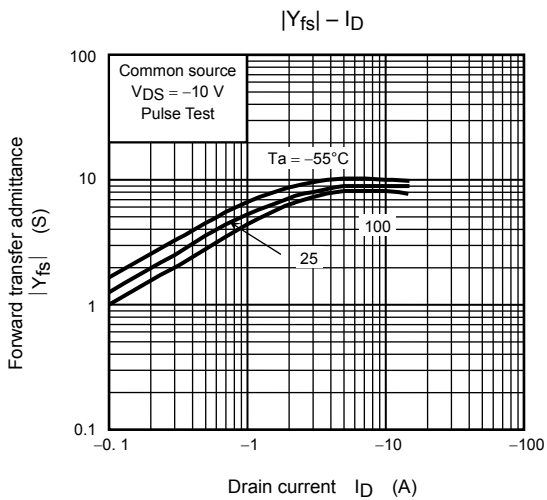
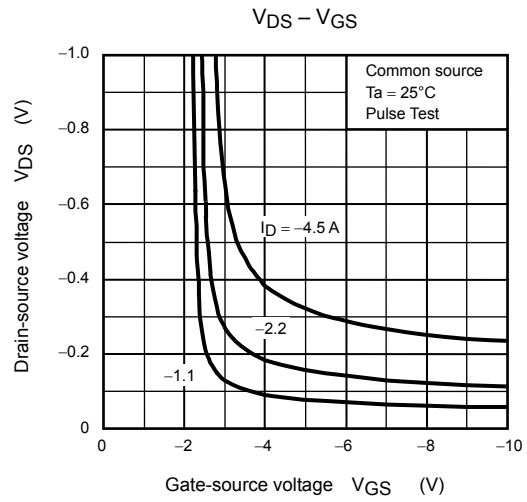
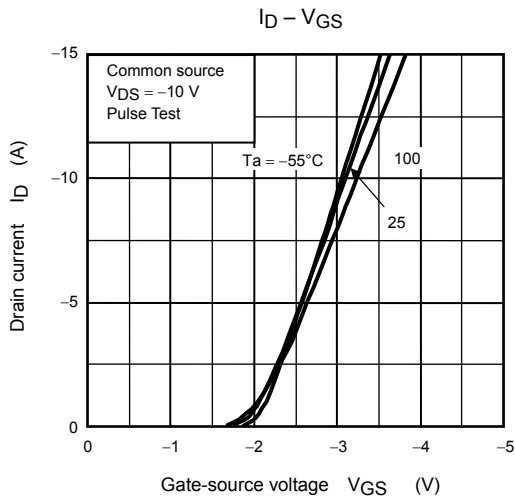
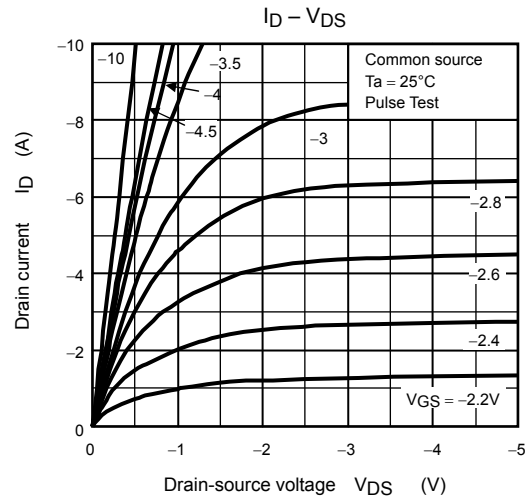
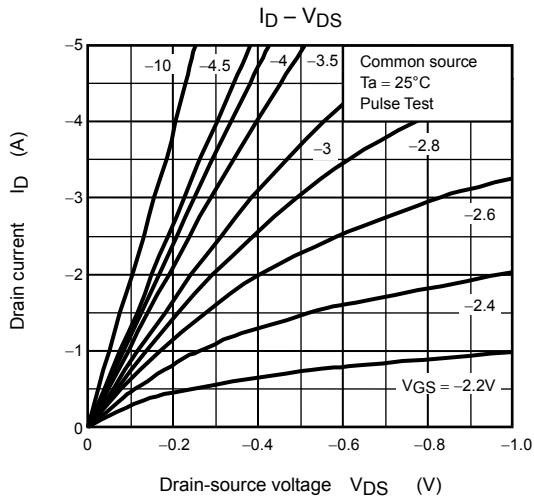
(b)

FR-4  
25.4 × 25.4 × 0.8  
(Unit: mm)

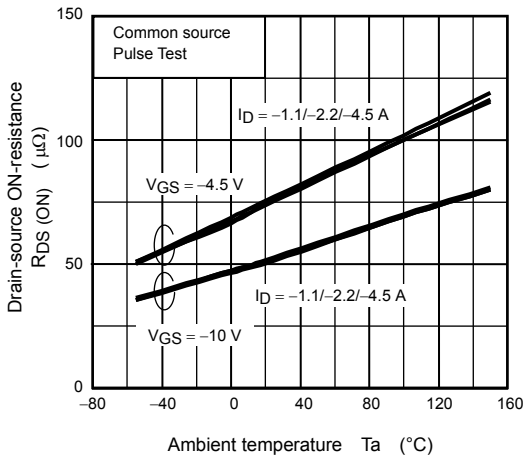
Note 3:  $V_{DD} = -24\text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 0.2\text{ mH}$ ,  $R_G = 25\ \Omega$ ,  $I_{AR} = -2.25\text{ A}$

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

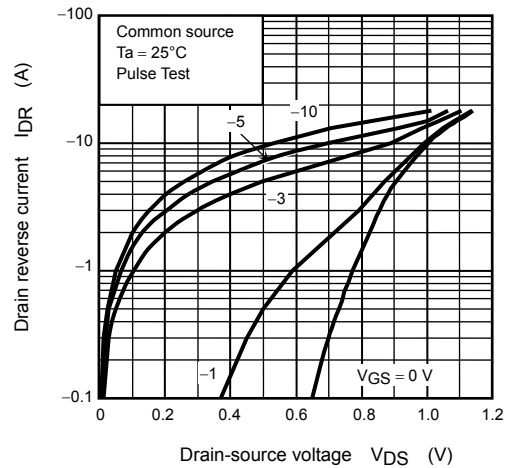
Note 5: ● to the lower left of the Part No. marking indicates Pin 1.



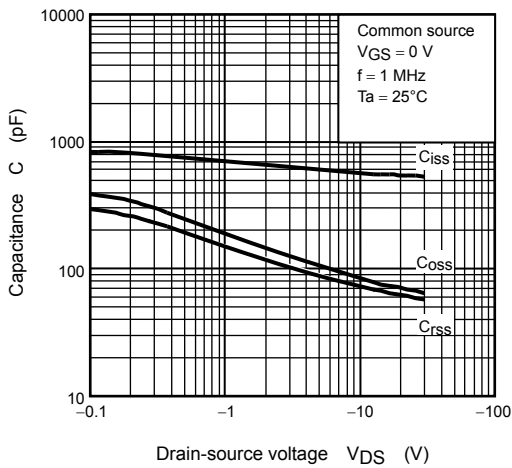
$R_{DS(ON)} - T_a$



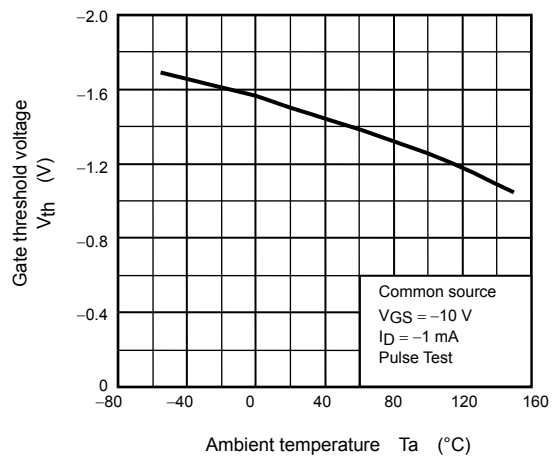
$I_{DR} - V_{DS}$



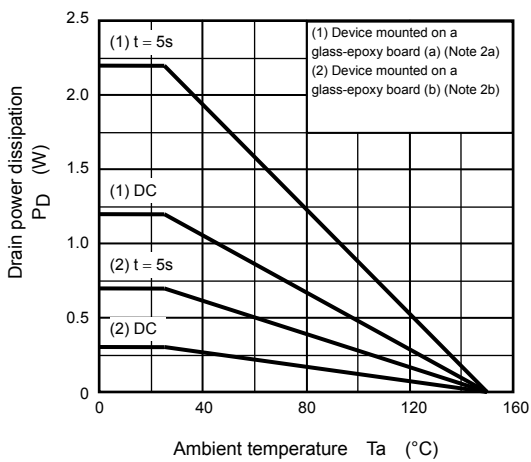
Capacitance -  $V_{DS}$



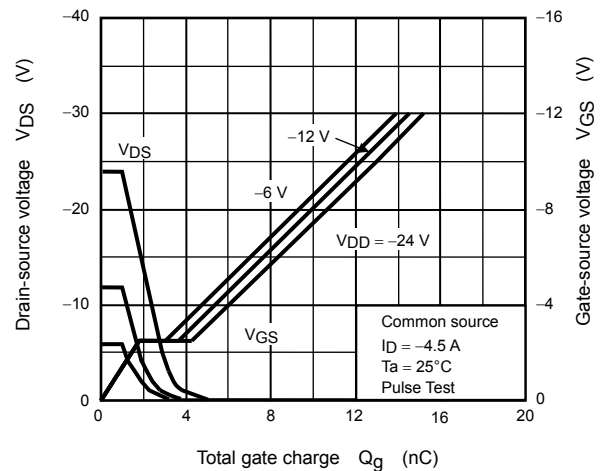
$V_{th} - T_a$

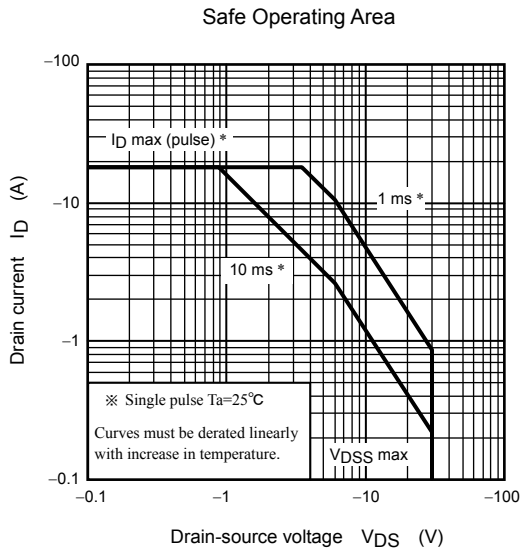
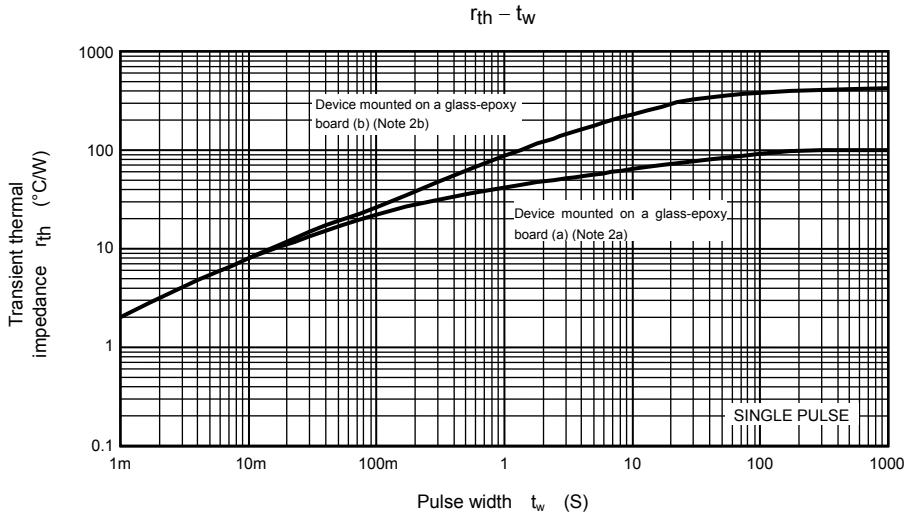


$P_D - T_a$



Dynamic input / output characteristics





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20070701-EN GENERAL

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