

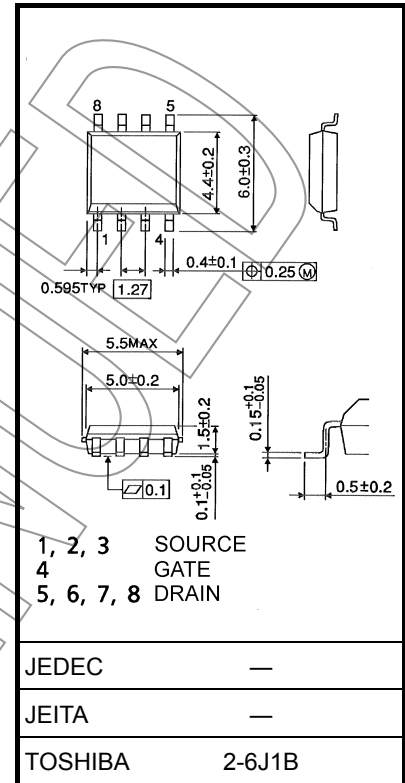
TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type (Ultra-High-Speed U-MOSIII)

# TPC8020-H

High-Efficiency DC/DC Converter Applications  
 Notebook PC Applications  
 Portable Equipment Applications

- Small footprint due to a small and thin package
- High-speed switching
- Small gate charge:  $Q_{SW} = 6.9 \text{ nC}$  (typ.)
- Low drain-source ON-resistance:  $R_{DS(ON)} = 6.8 \text{ m}\Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 32 \text{ S}$  (typ.)
- Low leakage current:  $I_{DSS} = 10 \text{ }\mu\text{A}$  (max) ( $V_{DS} = 30 \text{ V}$ )
- Enhancement mode:  $V_{th} = 1.1 \text{ to } 2.3 \text{ V}$  ( $V_{DS} = 10 \text{ V}$ ,  $I_D = 1 \text{ mA}$ )

Unit: mm



Weight: 0.085 g (typ.)

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

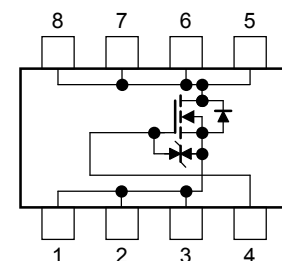
| Characteristic  | Symbol          | Rating     | Unit             |
|---|-----------------|------------|------------------|
| Drain-source voltage  | $V_{DSS}$       | 30         | V                |
| Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ )        | $V_{DGR}$       | 30         | V                |
| Gate-source voltage   | $V_{GSS}$       | $\pm 20$   | V                |
| Drain current   | DC (Note 1)     | $I_D$      | 13               |
|   | Pulsed (Note 1) | $I_{DP}$   | 52               |
| Drain power dissipation ( $t = 10 \text{ s}$ ) (Note 2a)    | $P_D$           | 1.9        | W                |
| Drain power dissipation ( $t \neq 10 \text{ s}$ ) (Note 2b) | $P_D$           | 1.0        | W                |
| Single-pulse avalanche energy (Note 3)                      | $E_{AS}$        | 110        | mJ               |
| Avalanche current   | $I_{AR}$        | 13         | A                |
| Repetitive avalanche energy (Note 2a) (Note 4)              | $E_{AR}$        | 0.084      | mJ               |
| Channel temperature   | $T_{ch}$        | 150        | $^\circ\text{C}$ |
| Storage temperature range                                   | $T_{stg}$       | -55 to 150 | $^\circ\text{C}$ |

Note: For Notes 1 to 4, refer to 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.

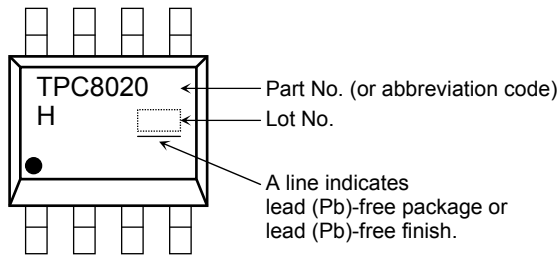
## Circuit Configuration



## Thermal Characteristics

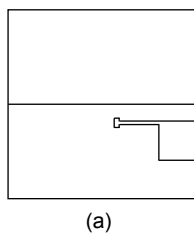
| Characteristic   | Symbol         | Max  | Unit |
|--|----------------|------|------|
| Thermal resistance, channel to ambient<br>(t = 10 s) (Note 2a) | $R_{th(ch-a)}$ | 65.8 | °C/W |
| Thermal resistance, channel to ambient<br>(t = 10 s) (Note 2b) | $R_{th(ch-a)}$ | 125  | °C/W |

## Marking (Note 5)

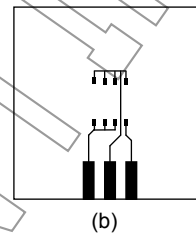


Note 1: The channel temperature should not exceed 150°C during use.

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)



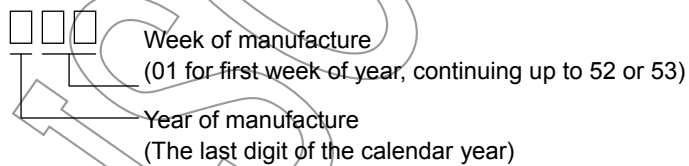
FR-4  
25.4 × 25.4 × 0.8  
(Unit: mm)

Note 3:  $V_{DD} = 24\text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 0.5\text{ mH}$ ,  $R_G = 25\ \Omega$ ,  $I_{AR} = 13\text{ A}$

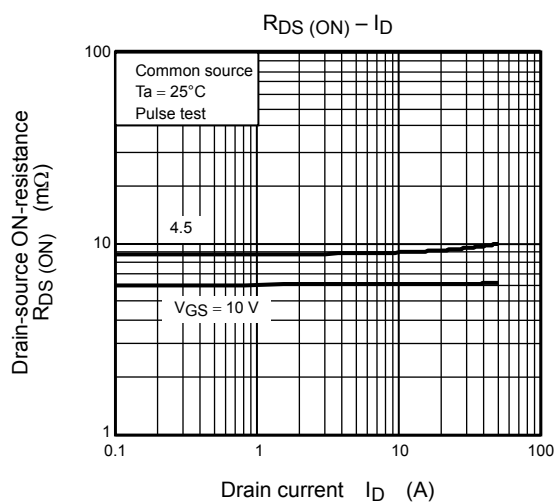
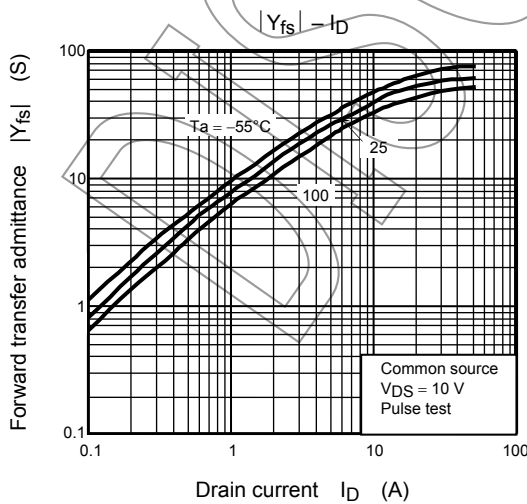
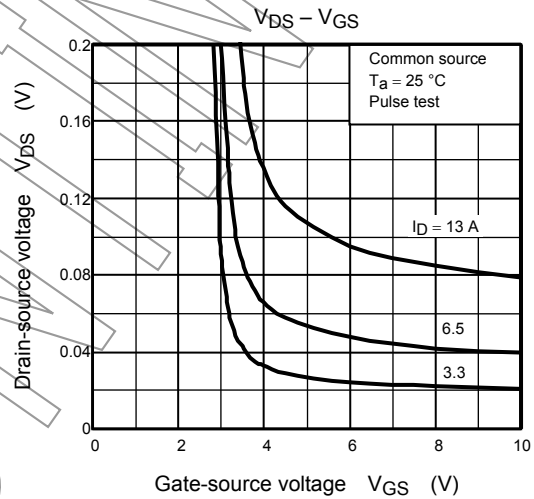
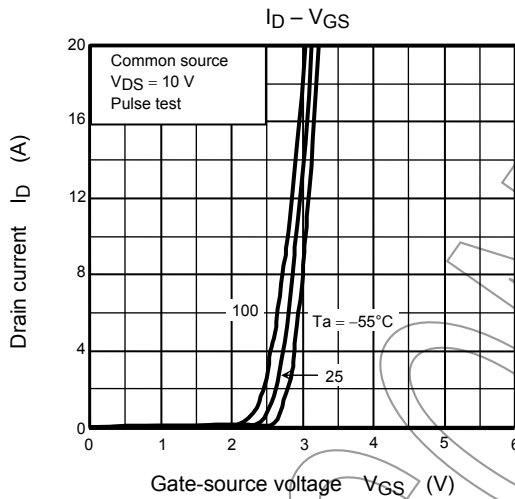
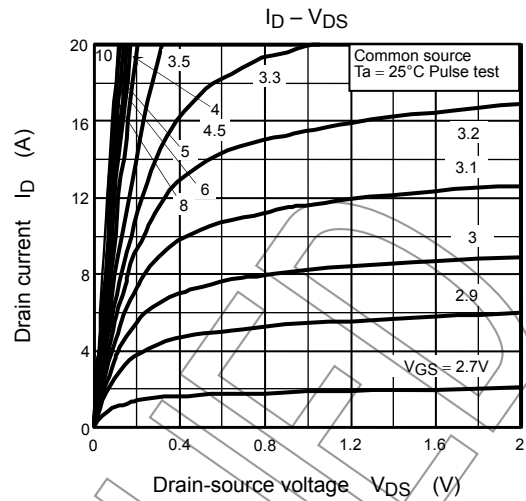
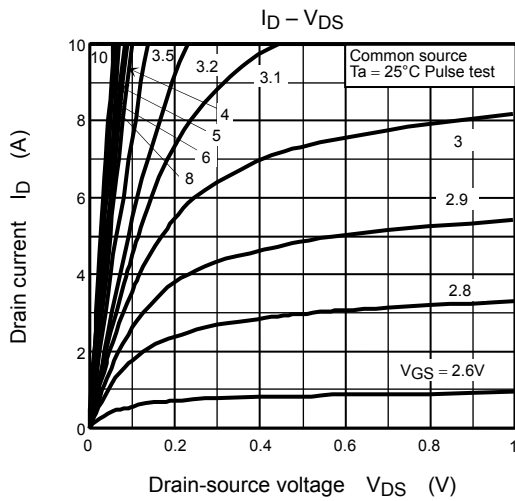
Note 4: Repetitive rating; pulse width limited by max channel temperature

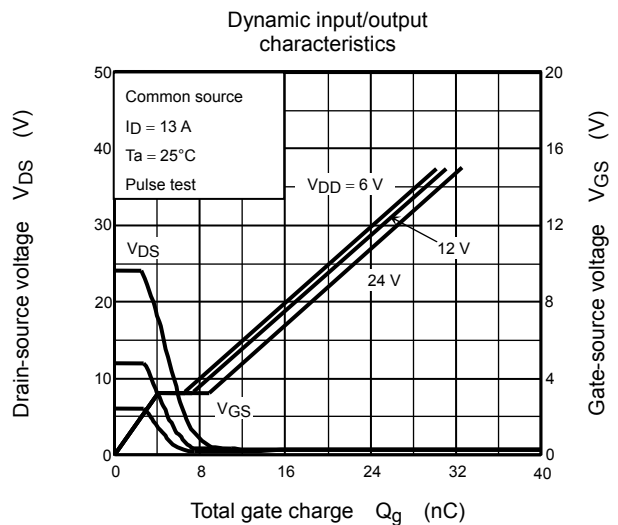
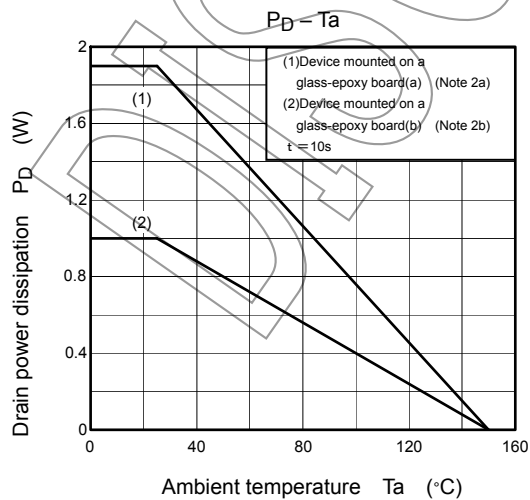
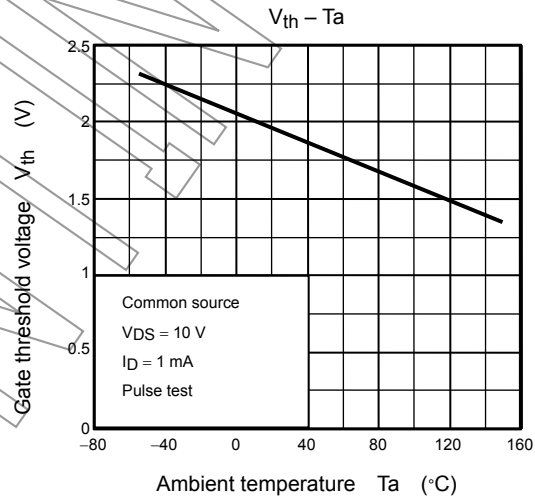
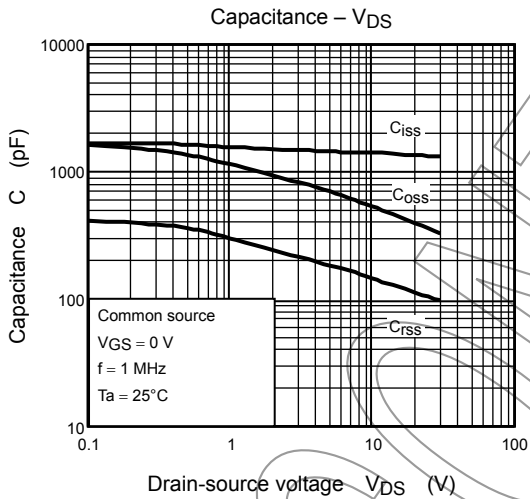
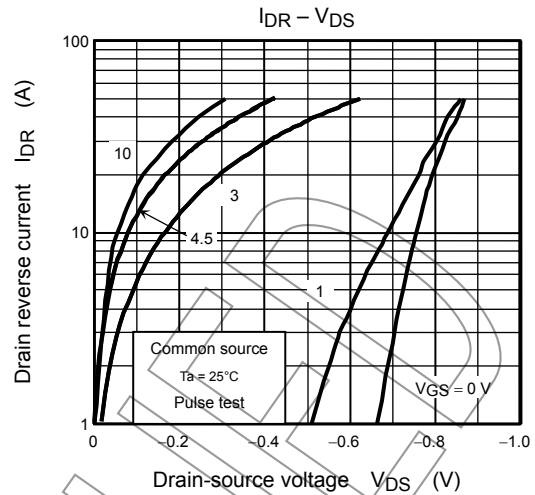
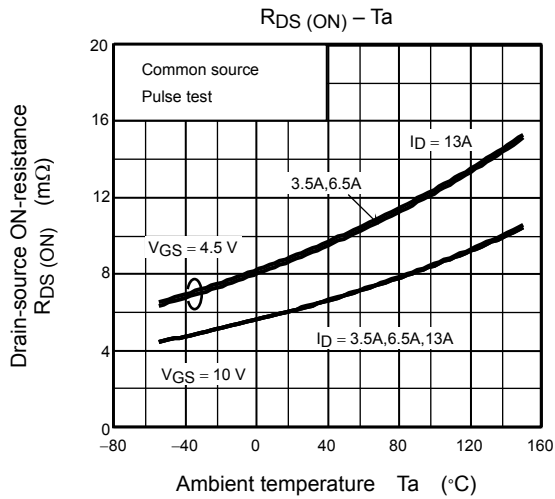
Note 5: • on the lower left of the marking indicates Pin 1.

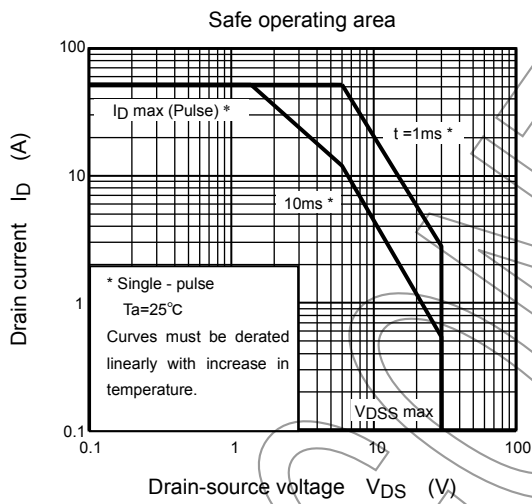
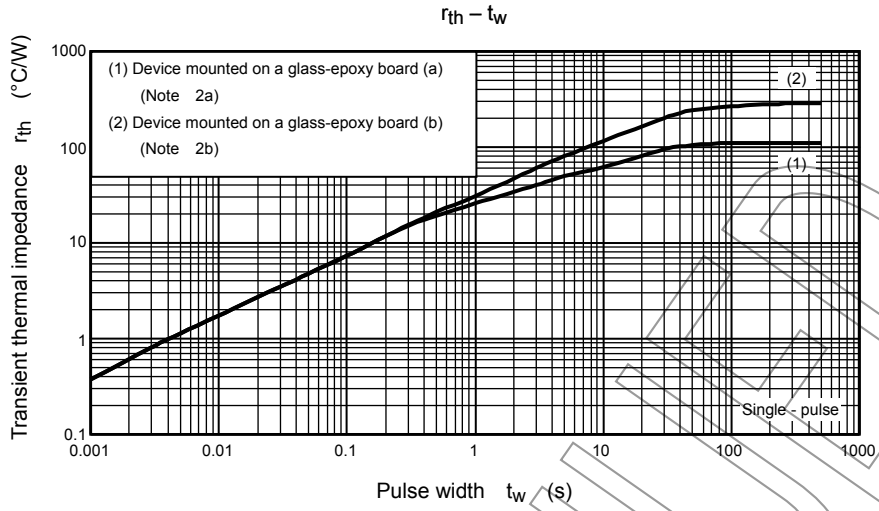
\* Weekly code: (Three digits)











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