

TPC8062-H

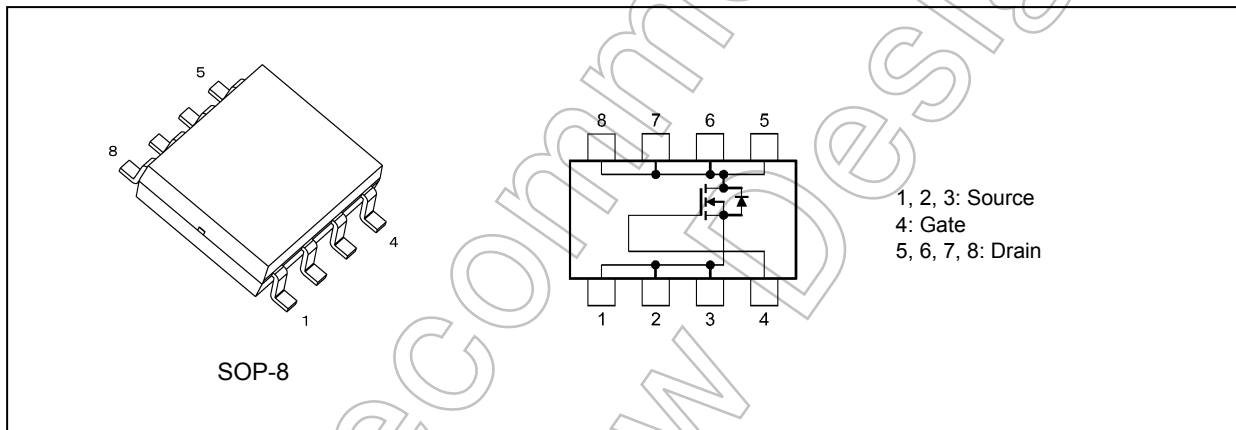
1. Applications

- High-Efficiency DC-DC Converters
- Notebook PCs
- Mobile Equipment

2. Features

- (1) Small footprint due to a small and thin package
- (2) High-speed switching
- (3) Small gate charge: $Q_{SW} = 7.4 \text{ nC}$ (typ.)
- (4) Low drain-source on-resistance: $R_{DS(ON)} = 5.6 \text{ m}\Omega$ (typ.) ($V_{GS} = 4.5 \text{ V}$)
- (5) Low leakage current: $I_{DSS} = 10 \text{ }\mu\text{A}$ (max) ($V_{DS} = 30 \text{ V}$)
- (6) Enhancement mode: $V_{th} = 1.3 \text{ to } 2.3 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 0.3 \text{ mA}$)

3. Packaging and Internal Circuit



4. Absolute Maximum Ratings (Note) ($T_a = 25 \text{ }^\circ\text{C}$ unless otherwise specified)

| Characteristics | Symbol | Rating | Unit |
|-------------------------------|---------------------------------------|------------|------|
| Drain-source voltage | V_{DSS} | 30 | V |
| Gate-source voltage | V_{GSS} | ± 20 | |
| Drain current (DC) | (Note 1) I_D | 18 | A |
| Drain current (pulsed) | (Note 1) I_{DP} | 72 | |
| Power dissipation | ($t = 10 \text{ s}$) (Note 2) P_D | 1.9 | W |
| Power dissipation | ($t = 10 \text{ s}$) (Note 3) P_D | 1.0 | |
| Single-pulse avalanche energy | (Note 4) E_{AS} | 210 | mJ |
| Avalanche current | I_{AR} | 18 | A |
| Channel temperature | T_{ch} | 150 | |
| Storage temperature | T_{stg} | -55 to 150 | |

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).

Start of commercial production

2010-04

5. Thermal Characteristics

| Characteristics | | | Symbol | Max | Unit |
|---------------------------------------|------------|----------|----------------|------|------|
| Channel-to-ambient thermal resistance | (t = 10 s) | (Note 2) | $R_{th(ch-a)}$ | 65.7 | °C/W |
| Channel-to-ambient thermal resistance | (t = 10 s) | (Note 3) | $R_{th(ch-a)}$ | 125 | °C/W |

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

Note 2: Device mounted on a glass-epoxy board (a), Figure 5.1

Note 3: Device mounted on a glass-epoxy board (b), Figure 5.2

Note 4: $V_{DD} = 24\text{ V}$, $T_{ch} = 25\text{ °C}$ (initial), $L = 0.5\text{ mH}$, $R_G = 1\text{ }\Omega$, $I_{AR} = 18\text{ A}$



Fig. 5.1 Device Mounted on a Glass-Epoxy Board (a)

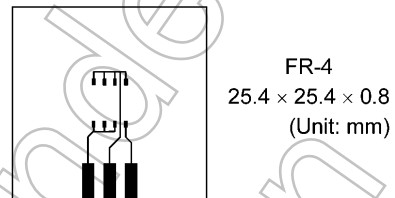


Fig. 5.2 Device Mounted on a Glass-Epoxy Board (b)

Note: This transistor is sensitive to electrostatic discharge and should be handled with care.

Not Recommended for New Design

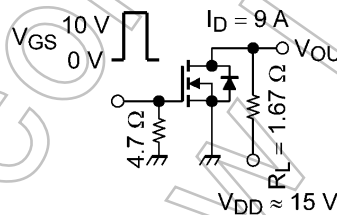
6. Electrical Characteristics

6.1. Static Characteristics ($T_a = 25\text{ }^\circ\text{C}$ unless otherwise specified)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------|---------------|---|-----|------|-----------|------------------|
| Gate leakage current | I_{GSS} | $V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$ | — | — | ± 0.1 | μA |
| Drain cut-off current | I_{DSS} | $V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$ | — | — | 10 | |
| 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} | $V_{DS} = 10\text{ V}, I_D = 0.3\text{ mA}$ | 1.3 | — | 2.3 | |
| Drain-source on-resistance | $R_{DS(ON)}$ | $V_{GS} = 4.5\text{ V}, I_D = 9\text{ A}$ | — | 5.6 | 7.3 | $\text{m}\Omega$ |
| | | $V_{GS} = 10\text{ V}, I_D = 9\text{ A}$ | — | 4.3 | 5.8 | |

6.2. Dynamic Characteristics ($T_a = 25\text{ }^\circ\text{C}$ unless otherwise specified)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------|-----------|---|-----|------|------|-------------|
| Input capacitance | C_{iss} | $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$ | — | 2400 | 2900 | pF |
| Reverse transfer capacitance | C_{rss} | | — | 120 | 180 | |
| Output capacitance | C_{oss} | | — | 430 | — | |
| Gate resistance | r_g | $V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 5\text{ MHz}$ | — | 1.4 | 2.1 | Ω |
| Switching time (rise time) | t_r | See Fig. 6.2.1. | — | 3.0 | — | ns |
| Switching time (turn-on time) | t_{on} | | — | 11 | — | |
| Switching time (fall time) | t_f | | — | 9.7 | — | |
| Switching time (turn-off time) | t_{off} | | — | 37 | — | |



Duty $\leq 1\%$, $t_w = 10\text{ }\mu\text{s}$
Fig. 6.2.1 Switching Time Test Circuit

6.3. Gate Charge Characteristics ($T_a = 25\text{ }^\circ\text{C}$ unless otherwise specified)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|-----------|---|-----|------|-----|------|
| Total gate charge (gate-source plus gate-drain) | Q_g | $V_{DD} \approx 24\text{ V}, V_{GS} = 10\text{ V}, I_D = 18\text{ A}$ | — | 34 | — | nC |
| | | $V_{DD} \approx 24\text{ V}, V_{GS} = 5\text{ V}, I_D = 18\text{ A}$ | — | 17 | — | |
| Gate-source charge 1 | Q_{gs1} | $V_{DD} \approx 24\text{ V}, V_{GS} = 10\text{ V}, I_D = 18\text{ A}$ | — | 7.4 | — | |
| Gate-drain charge | Q_{gd} | | — | 3.9 | — | |
| Gate switch charge | Q_{sw} | | — | 7.4 | — | |

6.4. Source-Drain Characteristics ($T_a = 25\text{ }^\circ\text{C}$ unless otherwise specified)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|-----------|---|-----|------|------|------|
| Reverse drain current (pulsed) (Note 5) | I_{DRP} | — | — | — | 72 | A |
| Diode forward voltage | V_{DSF} | $I_{DR} = 18\text{ A}, V_{GS} = 0\text{ V}$ | — | — | -1.2 | V |

Note 5: Ensure that the channel temperature does not exceed $150\text{ }^\circ\text{C}$.

7. Marking (Note)

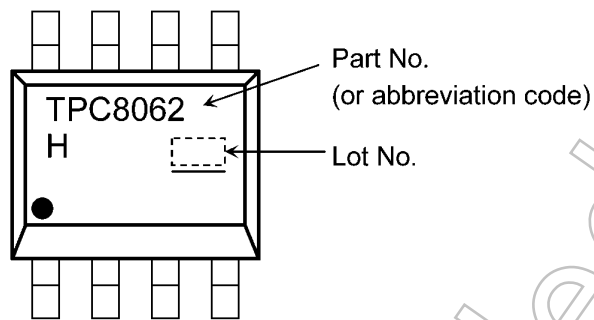


Fig. 7.1 Marking

Note: 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.

Not Recommended for New Design

8. Characteristics Curves (Note)

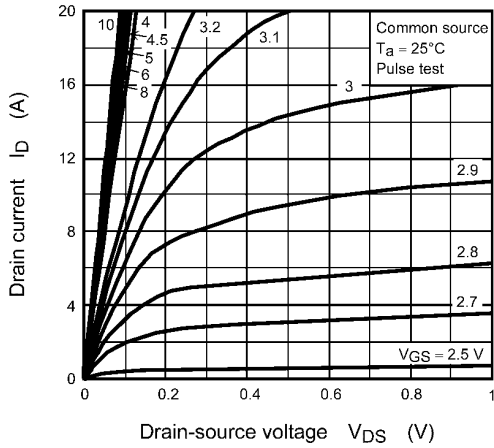


Fig. 8.1 ID - VDS

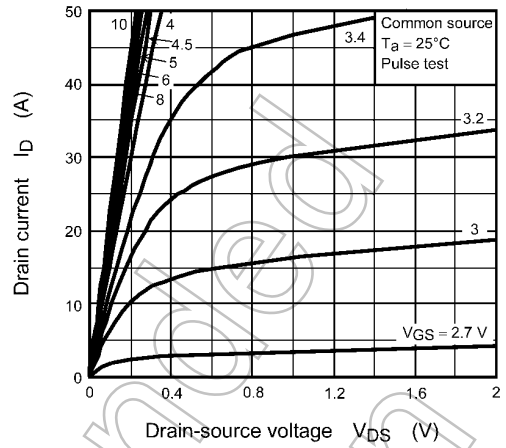


Fig. 8.2 ID - VDS

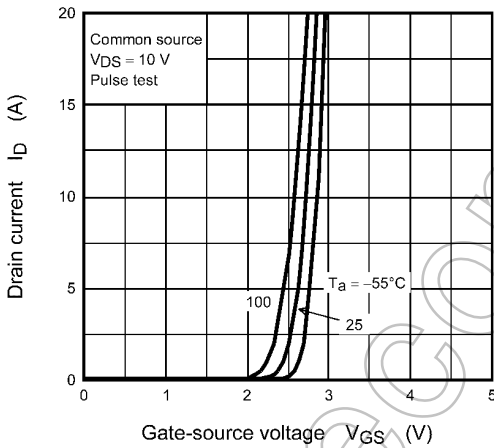


Fig. 8.3 ID - VGS

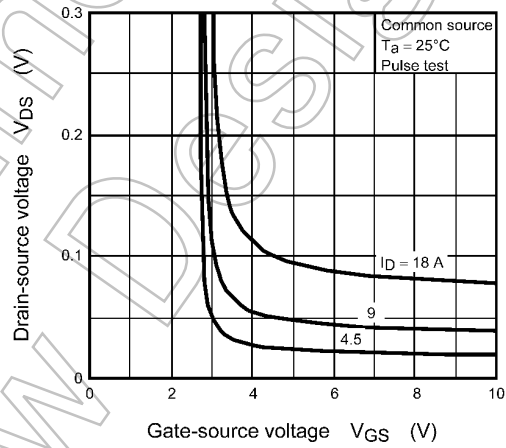


Fig. 8.4 VDS - VGS

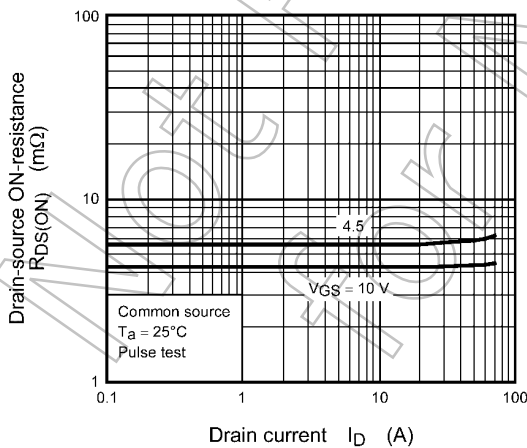


Fig. 8.5 RDS(ON) - ID

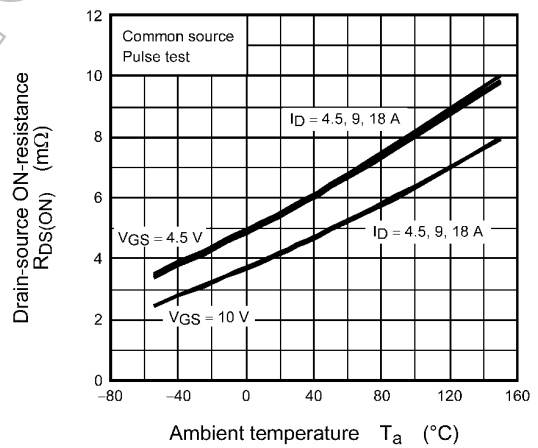


Fig. 8.6 RDS(ON) - Ta

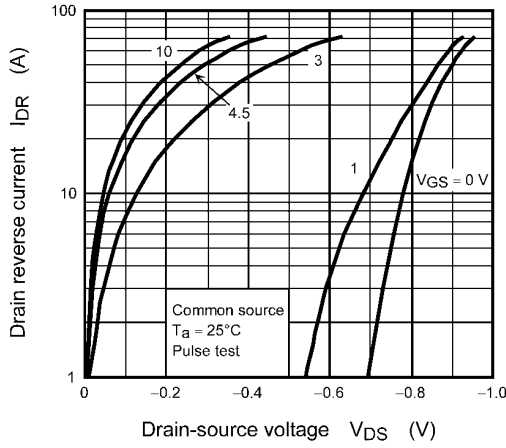


Fig. 8.7 $I_{DR} - V_{DS}$

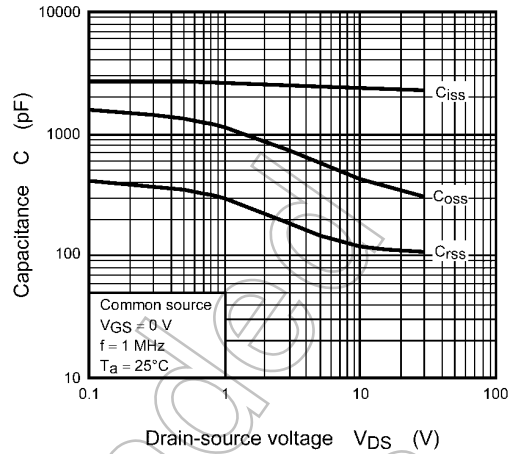


Fig. 8.8 Capacitance - V_{DS}

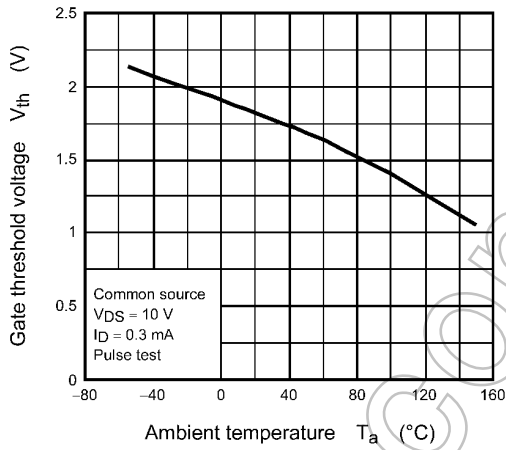


Fig. 8.9 $V_{th} - T_a$

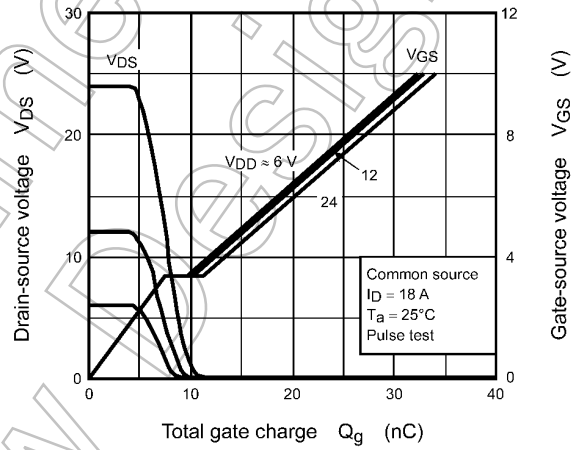


Fig. 8.10 Dynamic Input/Output Characteristics

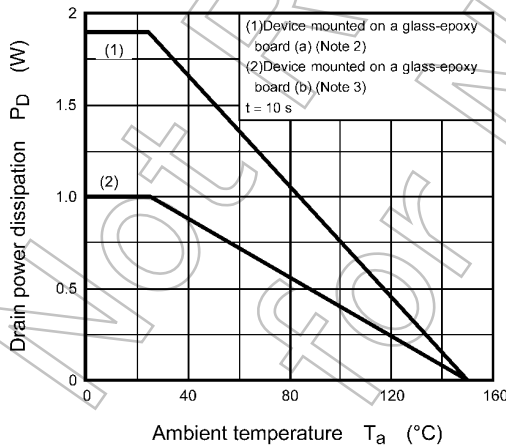


Fig. 8.11 $P_D - T_a$
(Guaranteed Maximum)

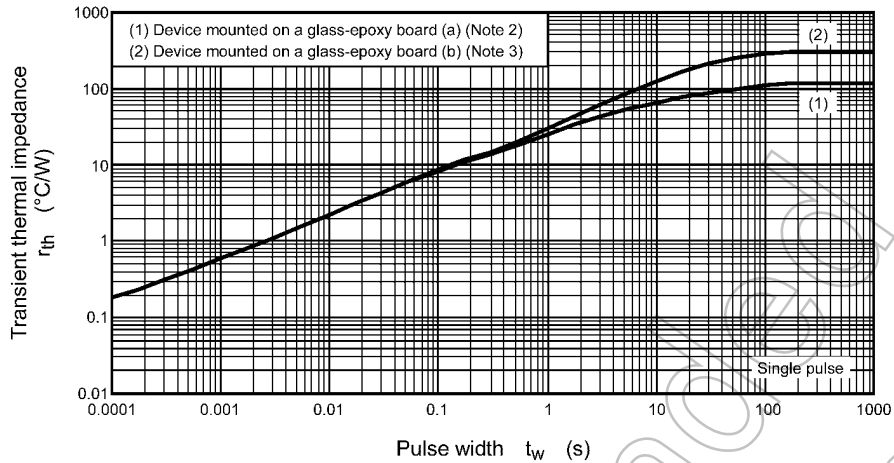


Fig. 8.12 $r_{th} - t_w$
(Guaranteed Maximum)

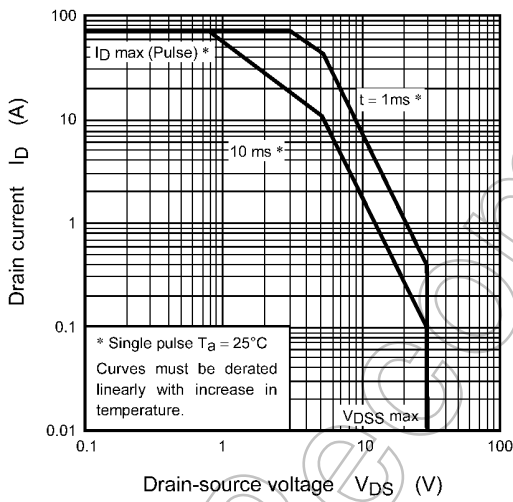
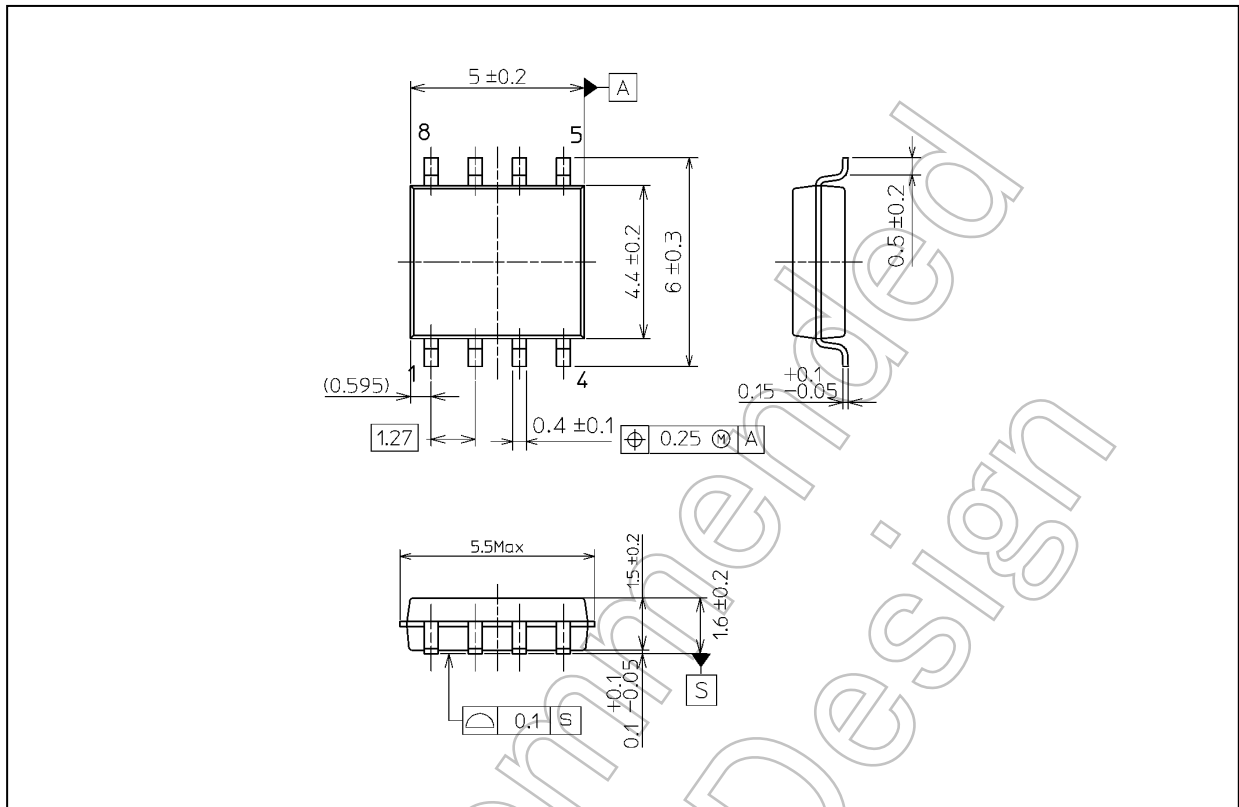


Fig. 8.13 Safe Operating Area
(Guaranteed Maximum)

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Package Dimensions

Unit: mm



Weight: 0.085 g (typ.)

| Package Name(s) |
|-----------------|
| TOSHIBA: 2-6J1S |
| Nickname: SOP-8 |

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