

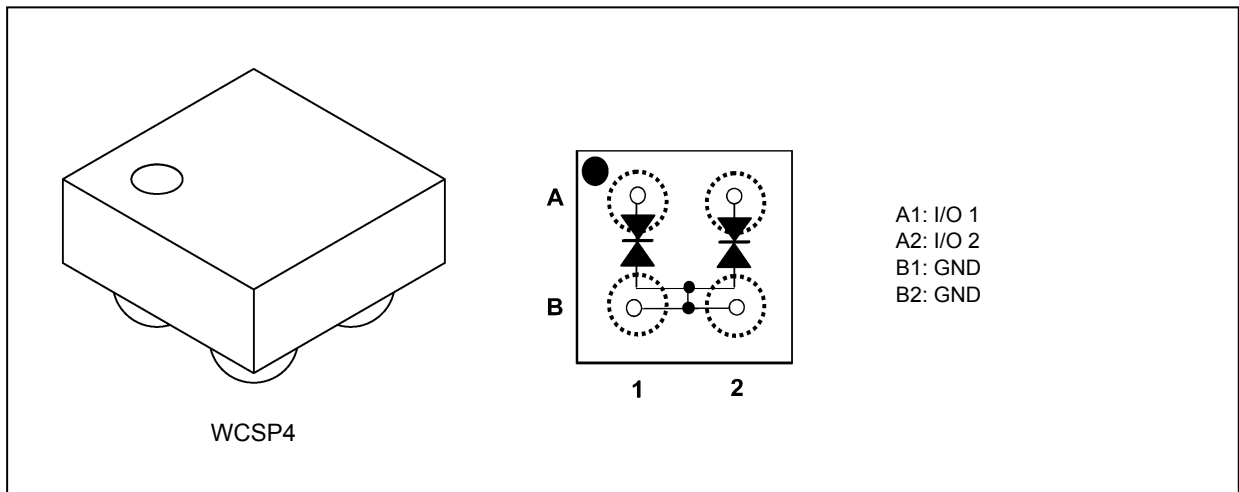
DF4D7M2G

1. Applications

- ESD Protection

Note: This product is designed for protection against electrostatic discharge (ESD) and is not intended for any other purpose, including, but not limited to, voltage regulation.

2. Packaging and Internal Circuit



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

| Characteristics | Symbol | Rating | Unit |
|---|-----------|------------|------------------|
| Electrostatic discharge voltage (IEC61000-4-2)(Contact) | V_{ESD} | ± 8 | kV |
| Junction temperature | T_j | 150 | $^\circ\text{C}$ |
| Storage temperature | 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).

4. Electrical Characteristics (Unless otherwise specified, $T_a = 25^\circ\text{C}$)

V_{RWM} : Working peak reverse voltage
 V_{BR} : Reverse breakdown voltage
 I_{BR} : Reverse breakdown current
 I_R : Reverse current
 V_C : Clamp voltage
 I_{PP} : Peak pulse current
 R_{DYN} : Dynamic resistance

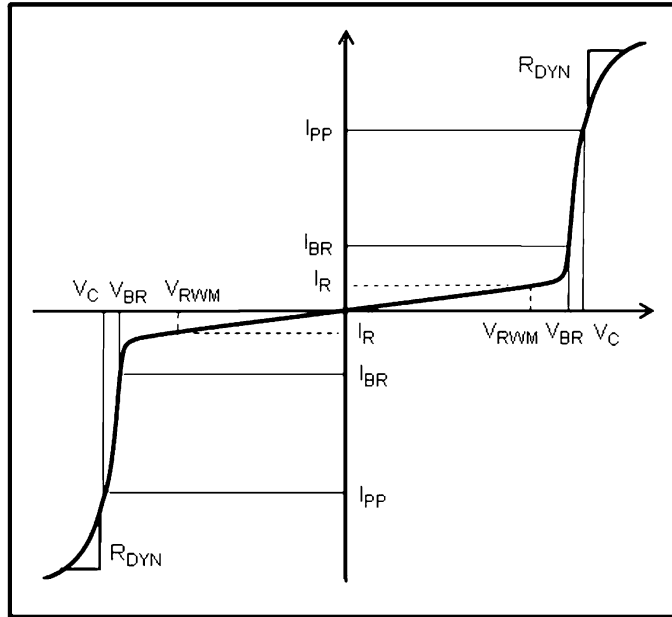


Fig. 4.1 Definitions of Electrical Characteristics

| Characteristics | Symbol | Note | Test Condition | Min | Typ. | Max | Unit |
|------------------------------|-----------|----------|--|-----|------|-----|---------------|
| Working peak reverse voltage | V_{RWM} | | — | — | — | 5.0 | V |
| Reverse breakdown voltage | V_{BR} | | $I_{BR} = 1 \text{ mA}$ | 6.0 | — | — | V |
| Reverse current | I_R | | $V_{RWM} = 5 \text{ V}$ | — | — | 0.5 | μA |
| Clamp voltage | V_C | (Note 1) | $I_{PP} = 1 \text{ A}$ | — | 13 | — | V |
| Dynamic resistance | R_{DYN} | (Note 2) | — | — | 0.8 | — | Ω |
| Total capacitance | C_t | (Note 3) | $V_R = 0 \text{ V}, f = 1 \text{ MHz}$ | — | 0.2 | 0.4 | pF |

Note 1: Based on IEC61000-4-5 8/20 μs pulse.

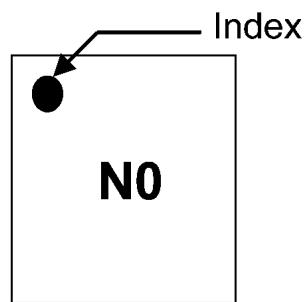
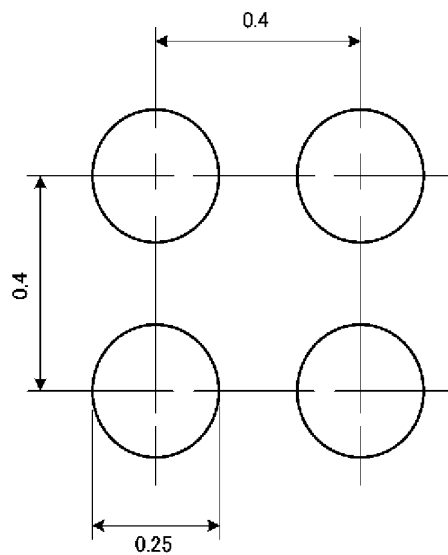
Note 2: TLP parameter: $Z_0 = 50 \Omega$, $t_p = 100 \text{ ns}$, $t_r = 300 \text{ ps}$, averaging window: $t_1 = 30 \text{ ns}$ to $t_2 = 60 \text{ ns}$, extraction of dynamic resistance using a least-squares fit of TLP characteristics at I_{PP} between 3 A to 8 A.

Note 3: Guaranteed by design.

5. Guaranteed ESD Protection (Note)

| Test Condition | ESD Protection |
|----------------------------------|--------------------|
| IEC61000-4-2 (Contact discharge) | $\pm 8 \text{ kV}$ |

Note: Criterion: No damage to devices.

6. Marking**Fig. 6.1 Marking****7. Land Pattern Dimensions (for reference only)****Fig. 7.1 Land Pattern Dimensions (Unit: mm)**

8. Characteristics Curves (Note)

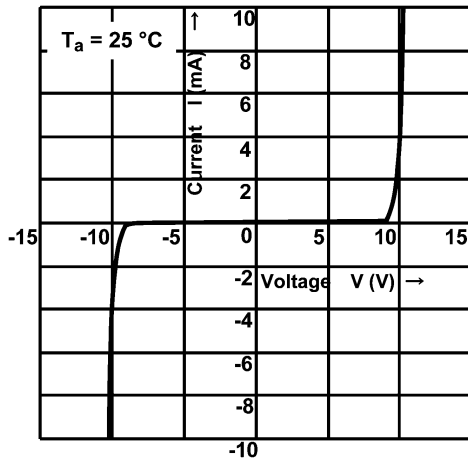


Fig. 8.1 I - V

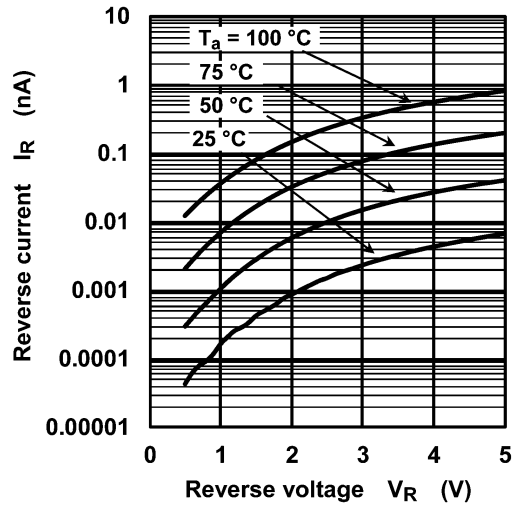


Fig. 8.2 $I_R - V_R$

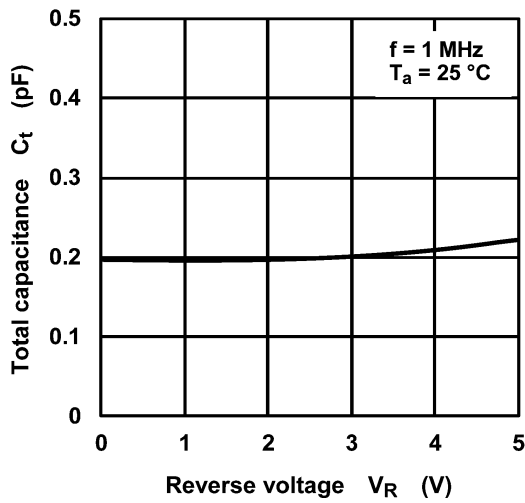


Fig. 8.3 $C_t - V_R$

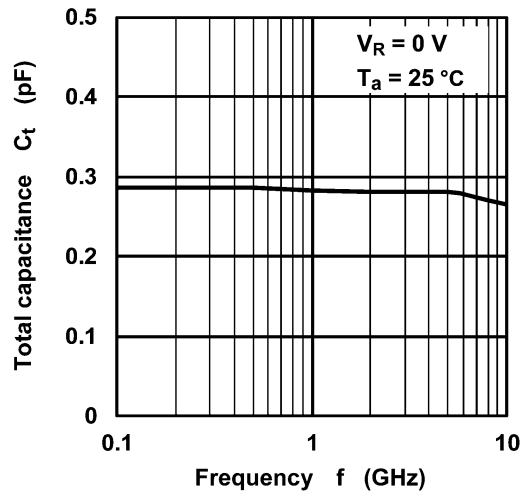


Fig. 8.4 $C_t - f$

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

9. Clamp Voltage V_C - Peak Pulse Current (I_{PP}) (Note)

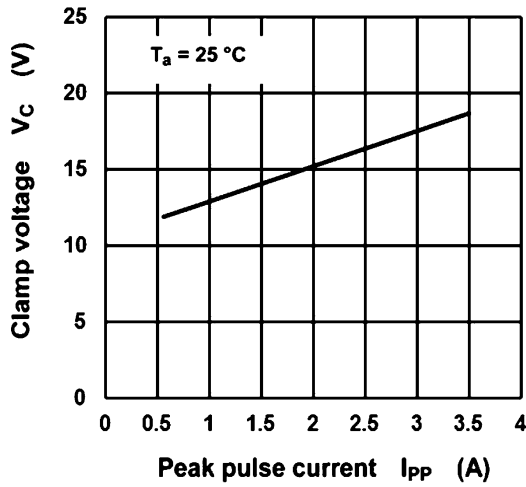


Fig. 9.1 V_C - I_{PP}

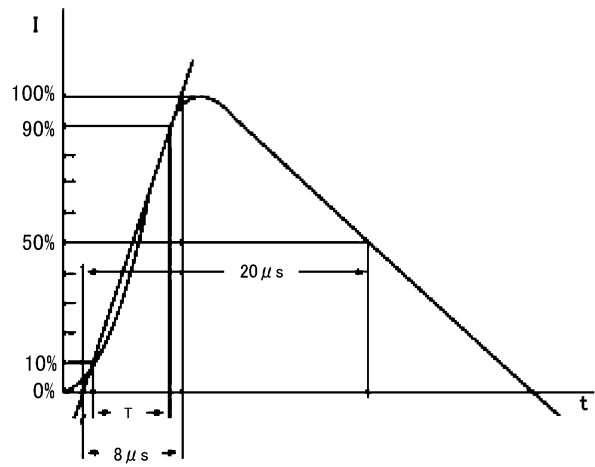


Fig. 9.2 Based on IEC61000-4-5 8/20 μs pulse.

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

10. Insertion Loss (S_{21}) (Note)

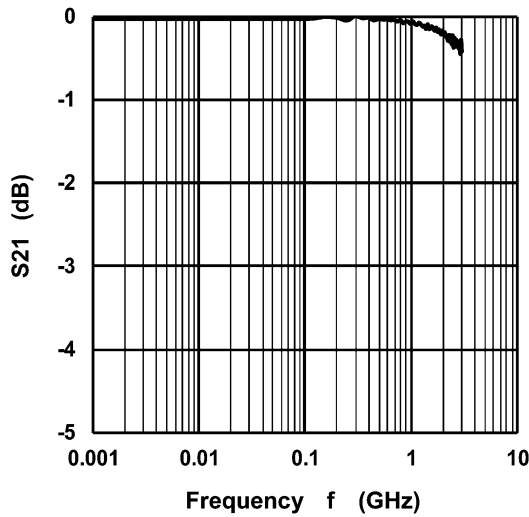
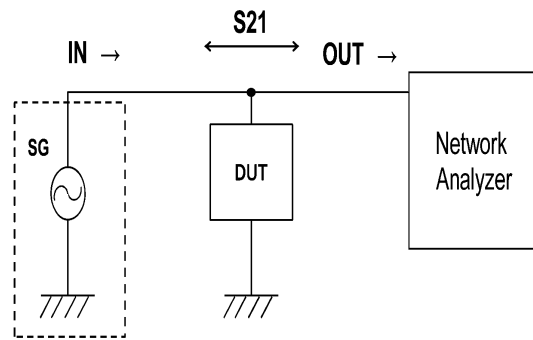


Fig. 10.1 S_{21} - f



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

11. ESD Clamp Waveform (Note)

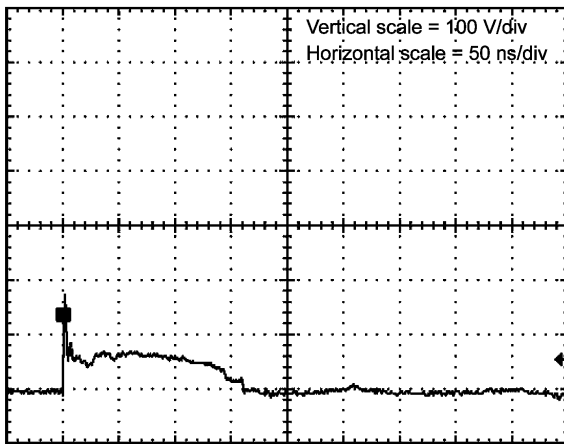


Fig. 11.1 +8 kV

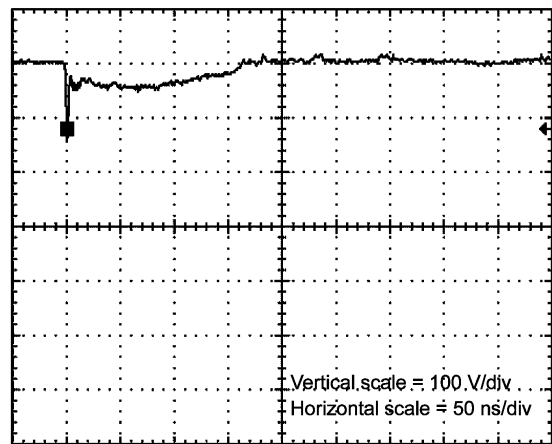


Fig. 11.2 -8 kV

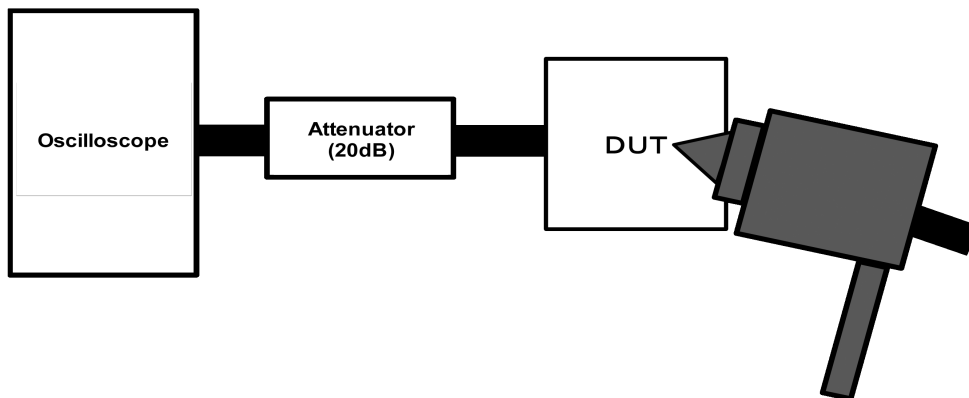
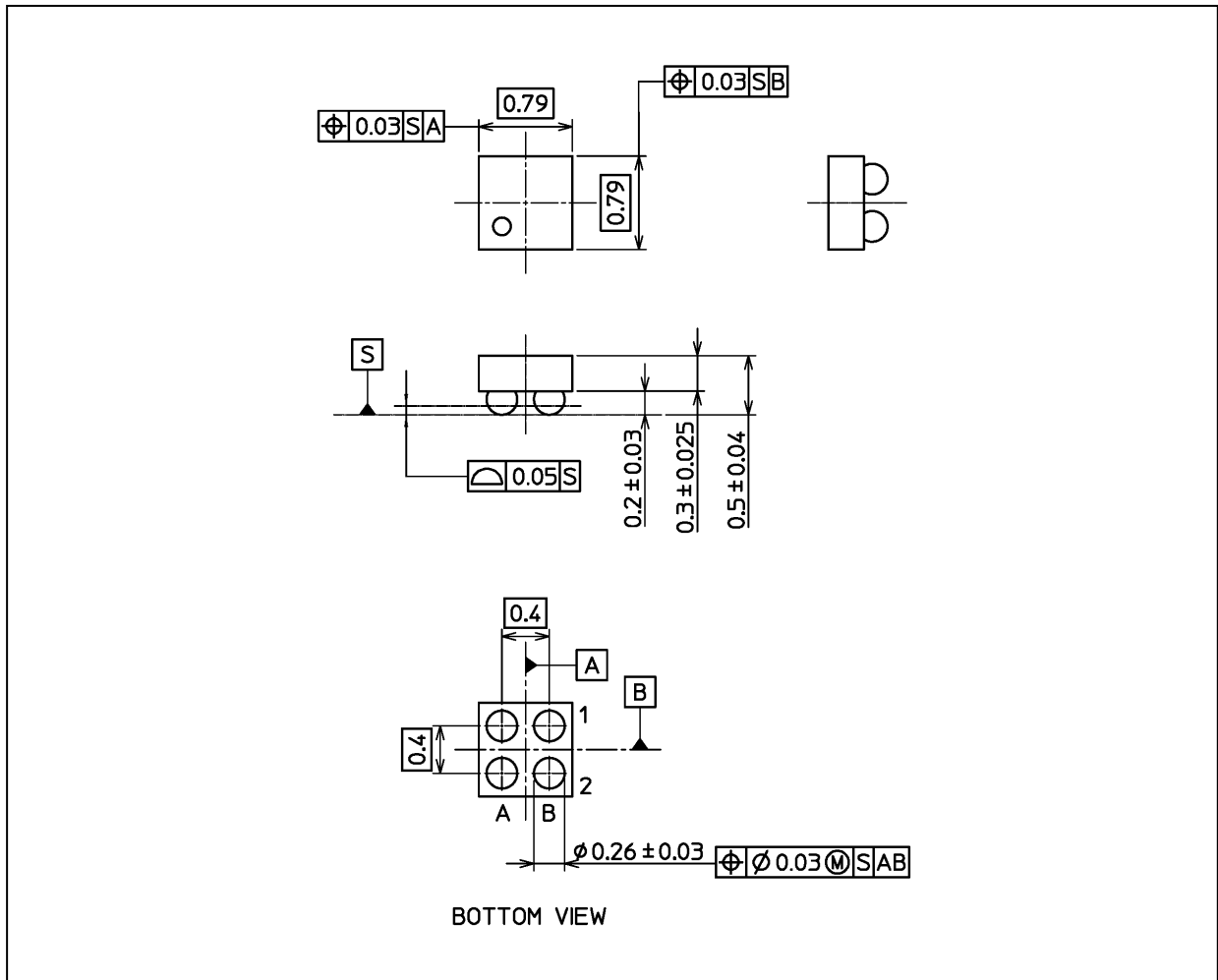


Fig. 11.3 IEC61000-4-2 (Contact)

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

Package Dimensions

Unit: mm



Weight: 0.7 mg (typ.)

| Package Name(s) |
|------------------|
| TOSHIBA: 1-1AF1A |
| Nickname: WCSP4 |

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