

ESD Protection Diodes Silicon Epitaxial Planar

DF3D29FU

1. Applications

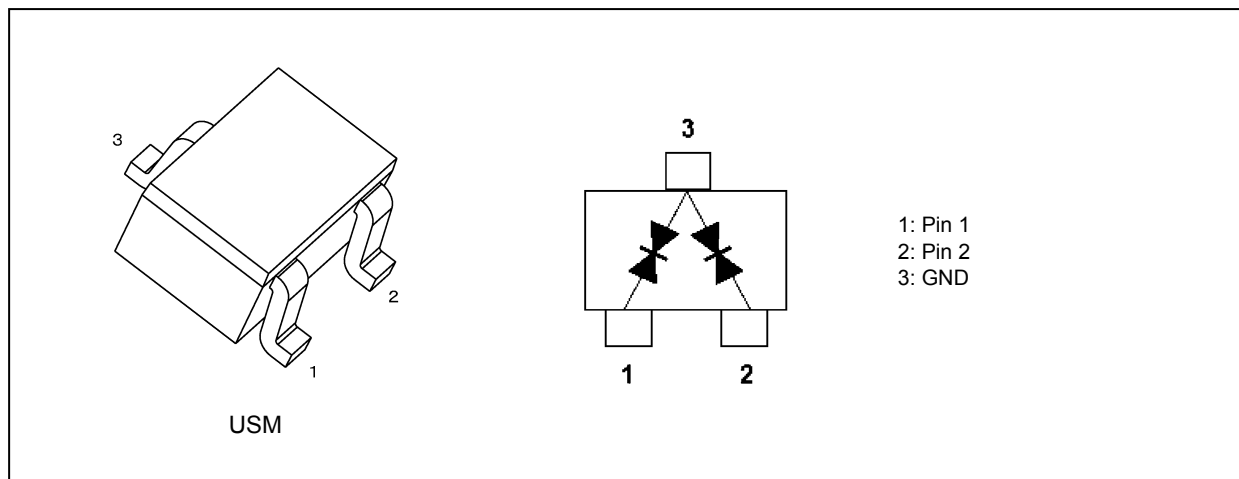
- ESD Protection

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. Features

- (1) AEC-Q101 qualified (Please see the orderable part number list)

3. Packaging and Internal Circuit



4. Orderable part number

| Orderable part number | AEC-Q101 | Note |
|-----------------------|--------------|-------------------------|
| DF3D29FU,LF | — | General Use |
| DF3D29FU,LXGF | YES (Note 1) | Unintended Use (Note 1) |
| DF3D29FU,LXHF | YES | Automotive Use |

Note 1: For more information, please contact our sales or use the inquiry form on our website.

Start of commercial production
2015-05

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

| Characteristics | Symbol | Note | Rating | Unit |
|---|------------------|----------|------------|------|
| Electrostatic discharge voltage (IEC61000-4-2)(Contact) | V _{ESD} | (Note 1) | ±25 | kV |
| Electrostatic discharge voltage(IEC61000-4-2)(Air) | | | | |
| Electrostatic discharge voltage(ISO10605)(Contact) | V _{ESD} | (Note 2) | ±30 | kV |
| Electrostatic discharge voltage(ISO10605)(Air) | | | | |
| Peak pulse power | P _{PK} | | 140 | W |
| Peak pulse current | I _{PP} | (Note 3) | 3 | A |
| Junction temperature | T _j | | 150 | °C |
| Storage temperature | T _{stg} | | -55 to 150 | °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).

Note 1: According to IEC61000-4-2.

Note 2: According to ISO10605. (@ C = 330 pF, R = 2 kΩ)

Note 3: According to IEC61000-4-5.

6. 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

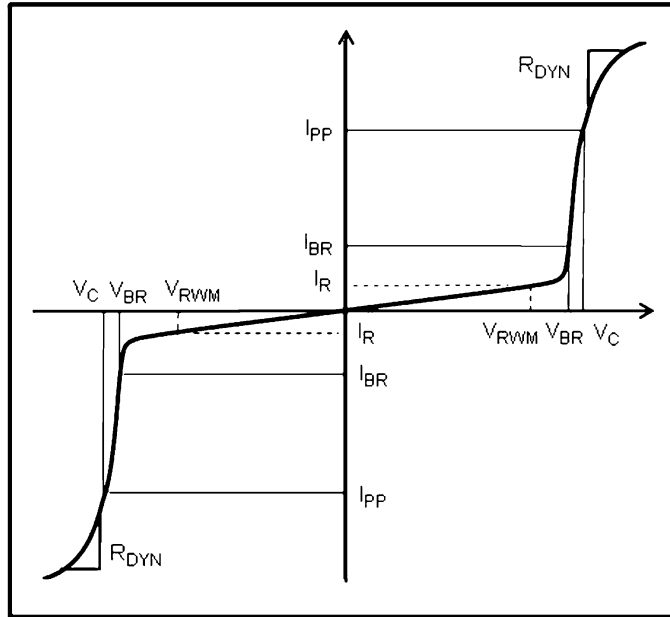


Fig. 6.1 Definitions of Electrical Characteristics

| Characteristics | Symbol | Note | Test Condition | Min | Typ. | Max | Unit |
|------------------------------|-----------|----------|--|-----|------|-----|---------------|
| Working peak reverse voltage | V_{RWM} | | — | — | — | 24 | V |
| Reverse breakdown voltage | V_{BR} | | $I_{BR} = 1 \text{ mA}$ | 26 | — | 32 | V |
| Reverse current | I_R | | $V_{RWM} = 24 \text{ V}$ | — | — | 0.1 | μA |
| Clamp voltage | V_C | (Note 1) | $I_{PP} = 1 \text{ A}$ | — | 30 | — | V |
| | | | $I_{PP} = 3 \text{ A}$ | — | 37 | 47 | |
| Dynamic resistance | R_{DYN} | (Note 2) | — | — | 1.1 | — | Ω |
| Total capacitance | C_t | (Note 3) | $V_R = 0 \text{ V}, f = 1 \text{ MHz}$ | — | 9 | 10 | 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 8 A to 16 A.

Note 3: Guaranteed by design.

7. Marking

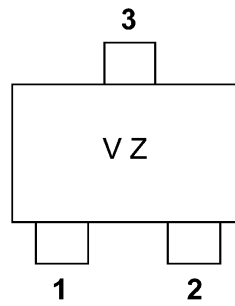


Fig. 7.1 Marking

8. Land Pattern Dimensions (for reference only)

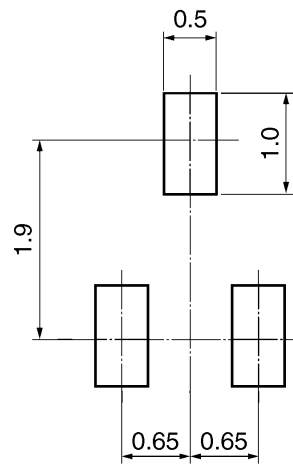


Fig. 8.1 Land Pattern Dimensions (Unit: mm)

9. Characteristics Curves (Note)

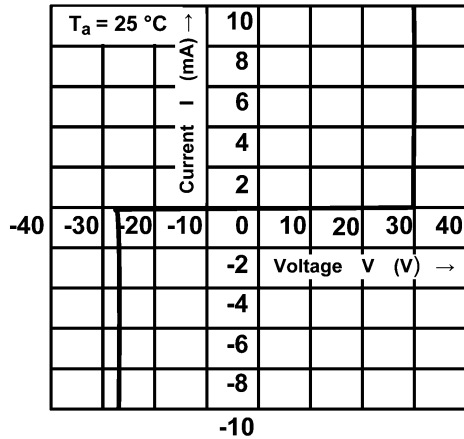


Fig. 9.1 I - V

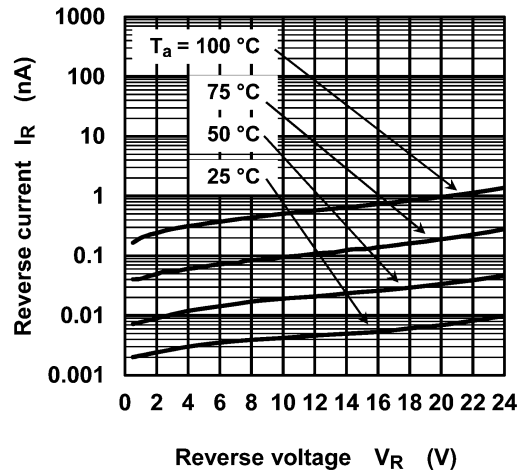


Fig. 9.2 $I_R - V_R$

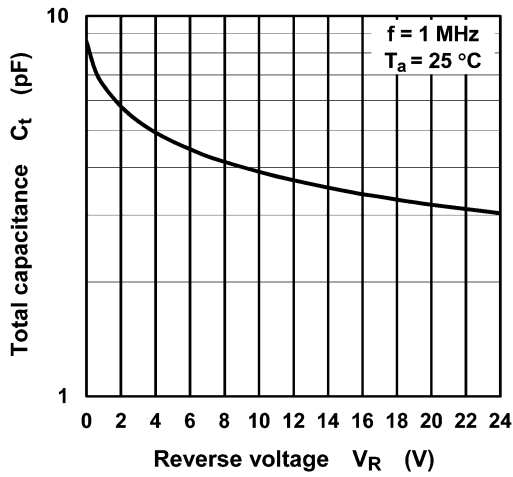


Fig. 9.3 $C_t - V_R$

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

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

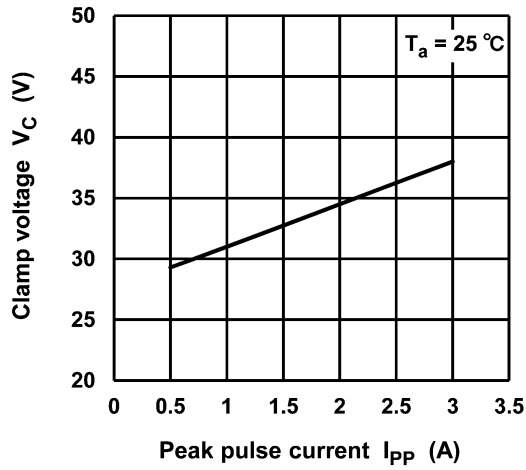


Fig. 10.1 $V_C - I_{PP}$

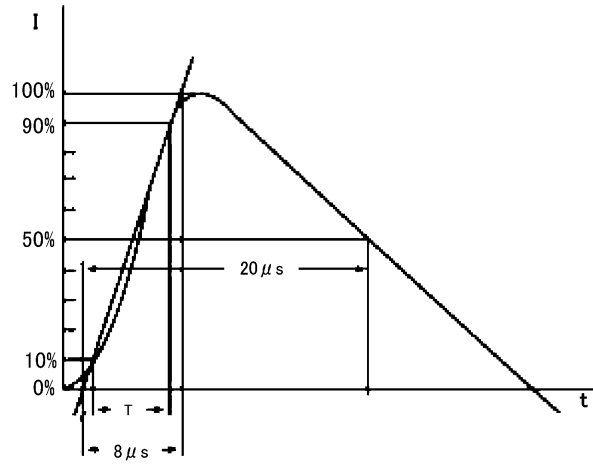


Fig. 10.2 Based on IEC61000-4-5 8/20 μs pulse.
(Ed.2)

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

11. ESD Clamp Waveform (Note)

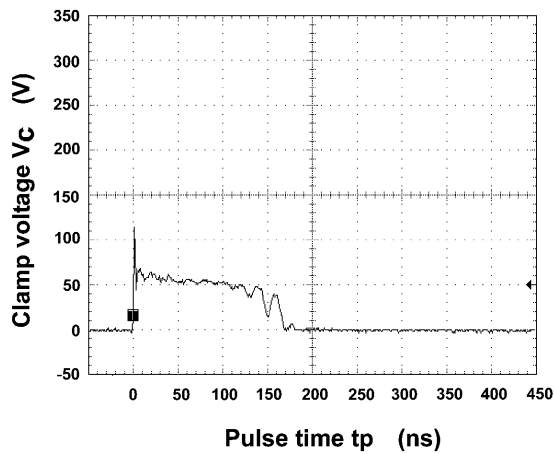


Fig. 11.1 +8 kV

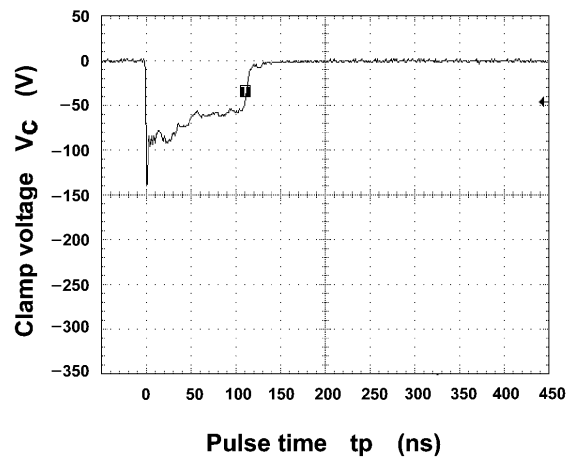


Fig. 11.2 -8 kV

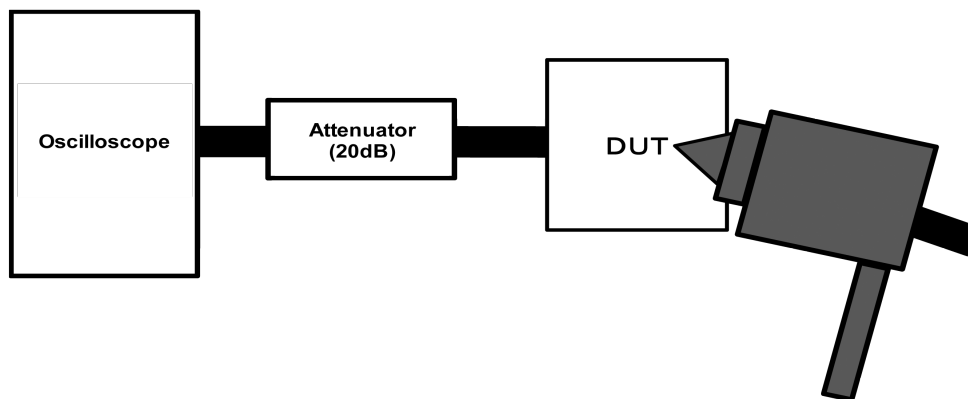
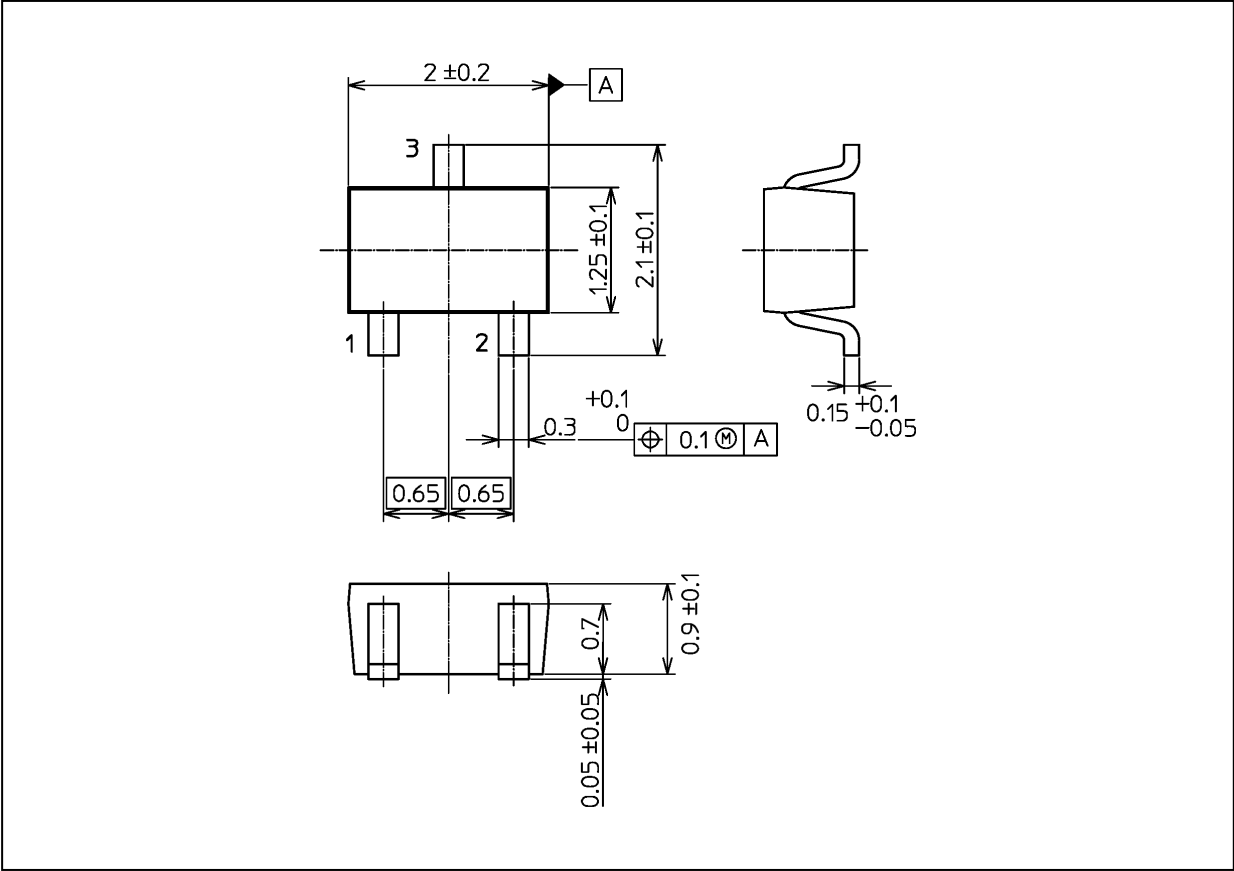


Fig. 11.3 IEC61000-4-2 (Contact)

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

Package Dimensions

Unit: mm



Weight: 6.0 mg (typ.)

| |
|-----------------|
| Package Name(s) |
| Nickname: USM |

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