ESD Protection Diodes Silicon Epitaxial Planar

DF3D36FU

1. Applications

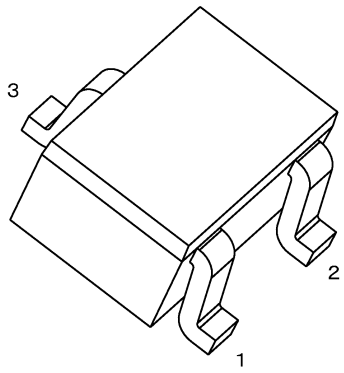
- ESD Protection

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.

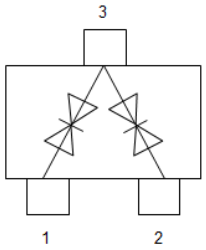
2. Features

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

3. Packaging and Internal Circuit



USM



1: Pin 1
2: Pin 2
3: GND

4. Orderable part number

Orderable part number	AEC-Q101		Note	
DF3D36FU,LF	—		General Use	
DF3D36FU,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
DF3D36FU,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
2016-03

5. Absolute Maximum Ratings (Note) (Unless otherwise specified, T_a = 25°C)

Characteristics	Symbol	Note	Rating	Unit
Electrostatic discharge voltage (IEC61000-4-2)(Contact)	V_{ESD}	(Note 1)	±20	kV
Electrostatic discharge voltage (IEC61000-4-2)(Air)				
Electrostatic discharge voltage (ISO10605)(Contact)	V_{ESD}	(Note 2)	±20	kV
Electrostatic discharge voltage (ISO10605)(Air)				
Peak pulse power (tp = 8/20 μs)	P_{PK}		150	W
Peak pulse current (tp = 8/20 μs)	I_{PP}	(Note 3)	2.5	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°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

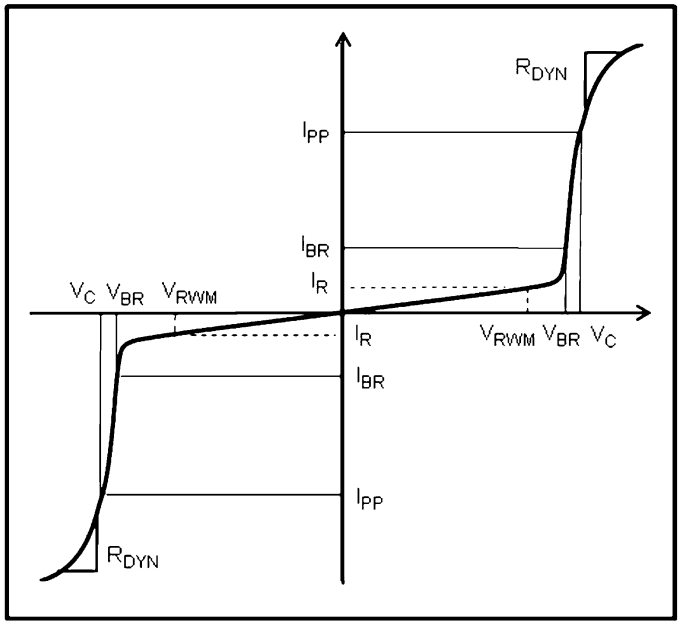


Fig. 6.1 Definitions of Electrical Characteristics

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Working peak reverse voltage	V_{RWM}		—	—	—	28	V
Reverse breakdown voltage	V_{BR}		I_{BR} = 1 mA	32	36	40	V
Reverse current	I_R		V_{RWM} = 28 V	—	—	0.1	μA
Clamp voltage	V_C	(Note 1)	I_{PP} = 1 A	—	40	—	V
			I_{PP} = 2.5 A	—	50	60	
Dynamic resistance	R_{DYN}	(Note 2)	—	—	1.5	—	Ω
Total capacitance	C_t	(Note 3)	V_R = 0 V, f = 1 MHz	—	6.5	8	pF

Note 1: Based on IEC61000-4-5 8/20 μs pulse.
Note 2: TLP parameter: Z0 = 50 Ω, tp = 100 ns, tr = 300 ps, averaging window: t1 = 30 ns to t2 = 60 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

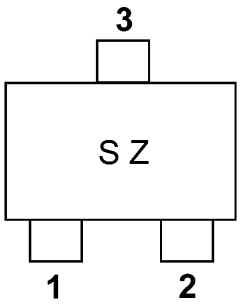


Fig. 7.1 Marking

8. Land Pattern Dimensions (for reference only)

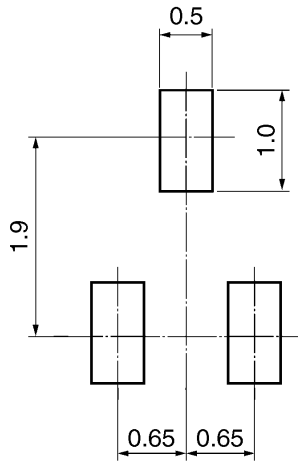


Fig. 8.1 Land Pattern Dimensions (Unit: mm)

9. Characteristics Curves (Note)

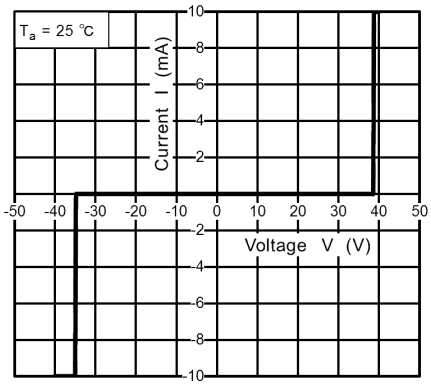


Fig. 9.1 I - V

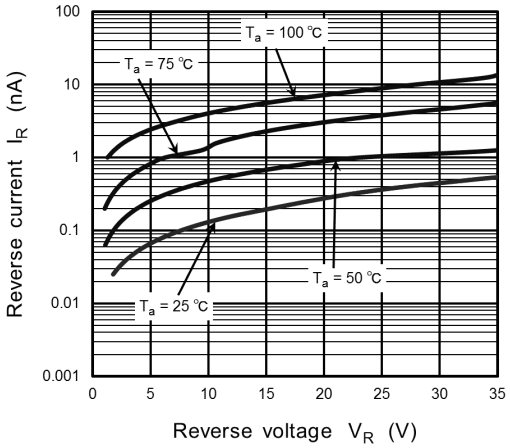


Fig. 9.2 I_R - V_R

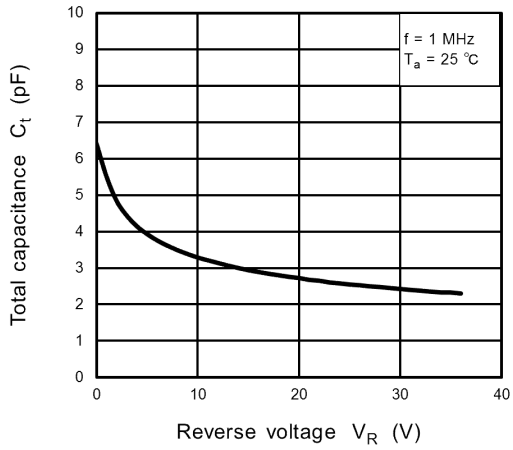


Fig. 9.3 C_t - V_R

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)

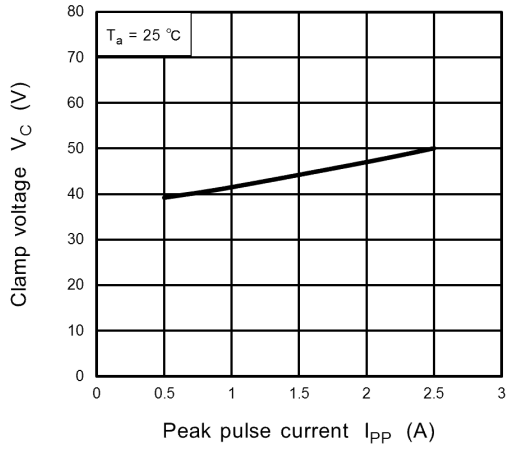


Fig. 10.1 V_C - I_{PP}

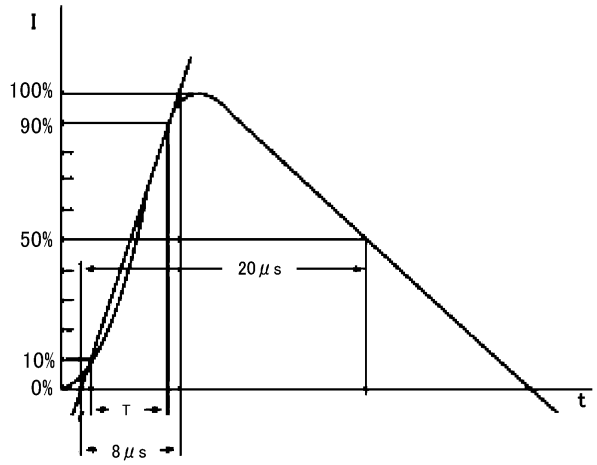


Fig. 10.2 Based on IEC61000-4-5 8/20 μs pulse. (Ed.2)

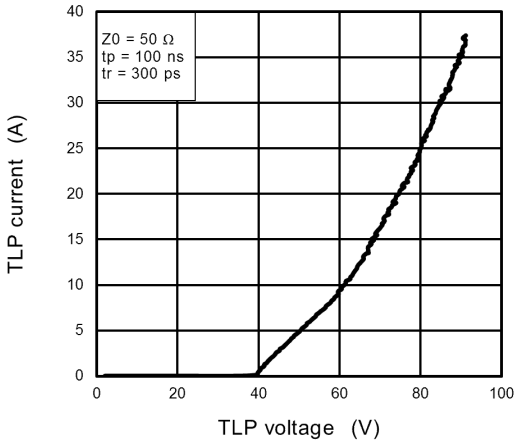


Fig. 10.3 TLP

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

11. ESD Clamp Waveform (Note)

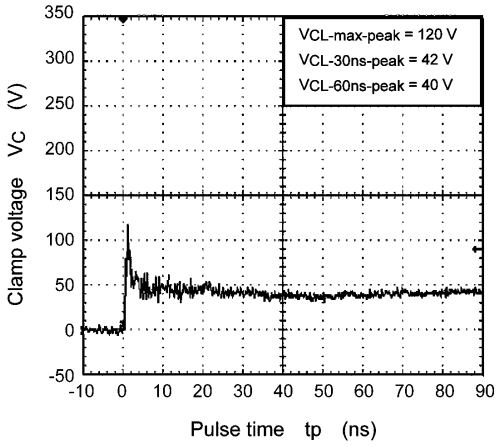


Fig. 11.1 +8 kV (IEC61000-4-2)

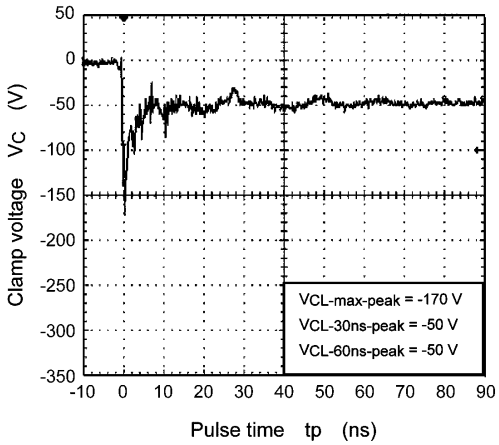


Fig. 11.2 -8 kV (IEC61000-4-2)

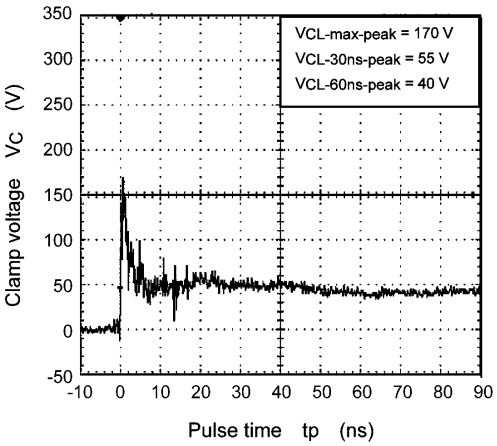


Fig. 11.3 +15 kV (IEC61000-4-2)

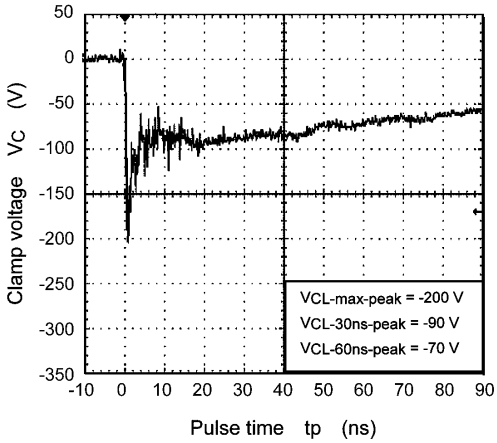


Fig. 11.4 -15 kV (IEC61000-4-2)

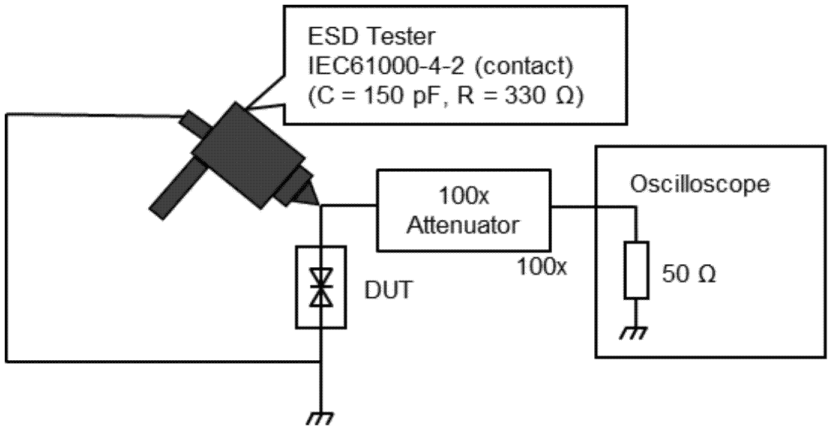


Fig. 11.5 IEC61000-4-2 (Contact)

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

12. ESD Clamp Waveform (Note)

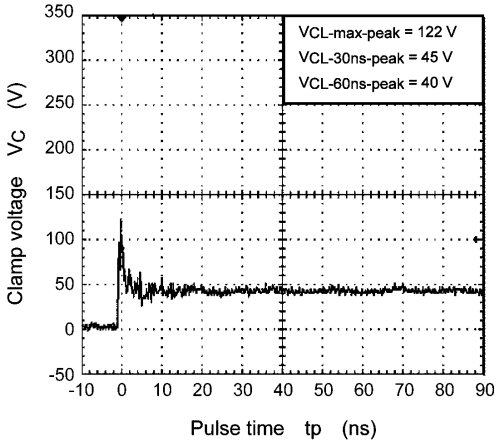


Fig. 12.1 +8 kV (ISO10605)

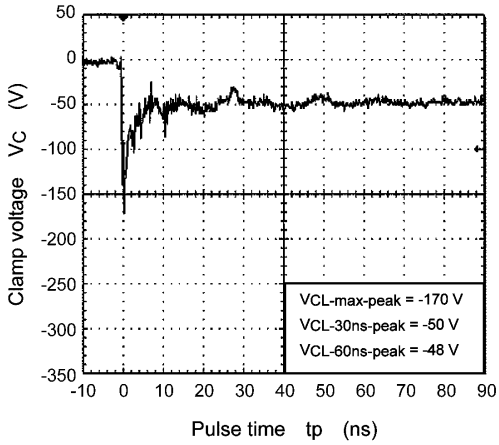


Fig. 12.2 -8 kV (ISO10605)

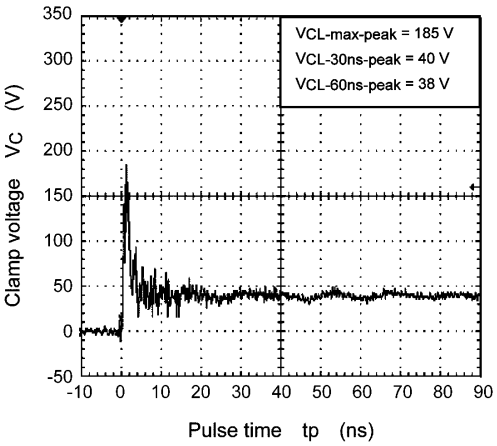


Fig. 12.3 +15 kV (ISO10605)

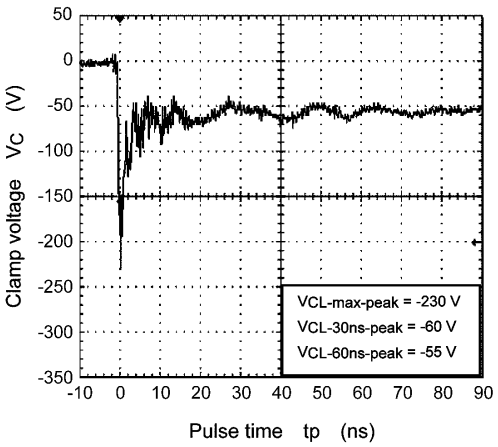


Fig. 12.4 -15 kV (ISO10605)

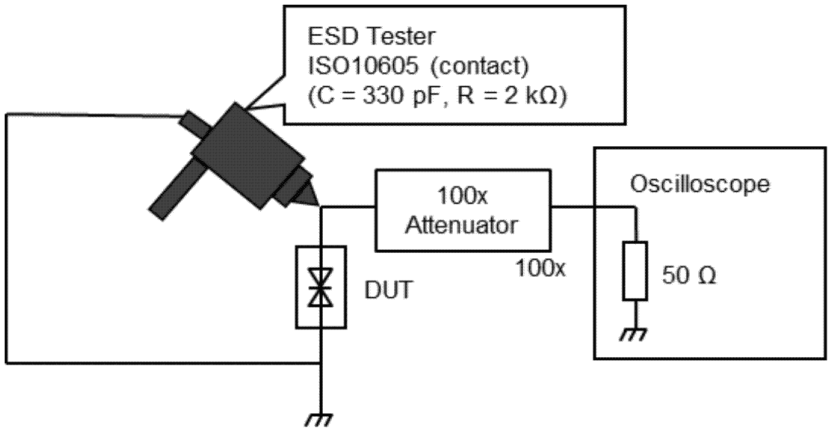
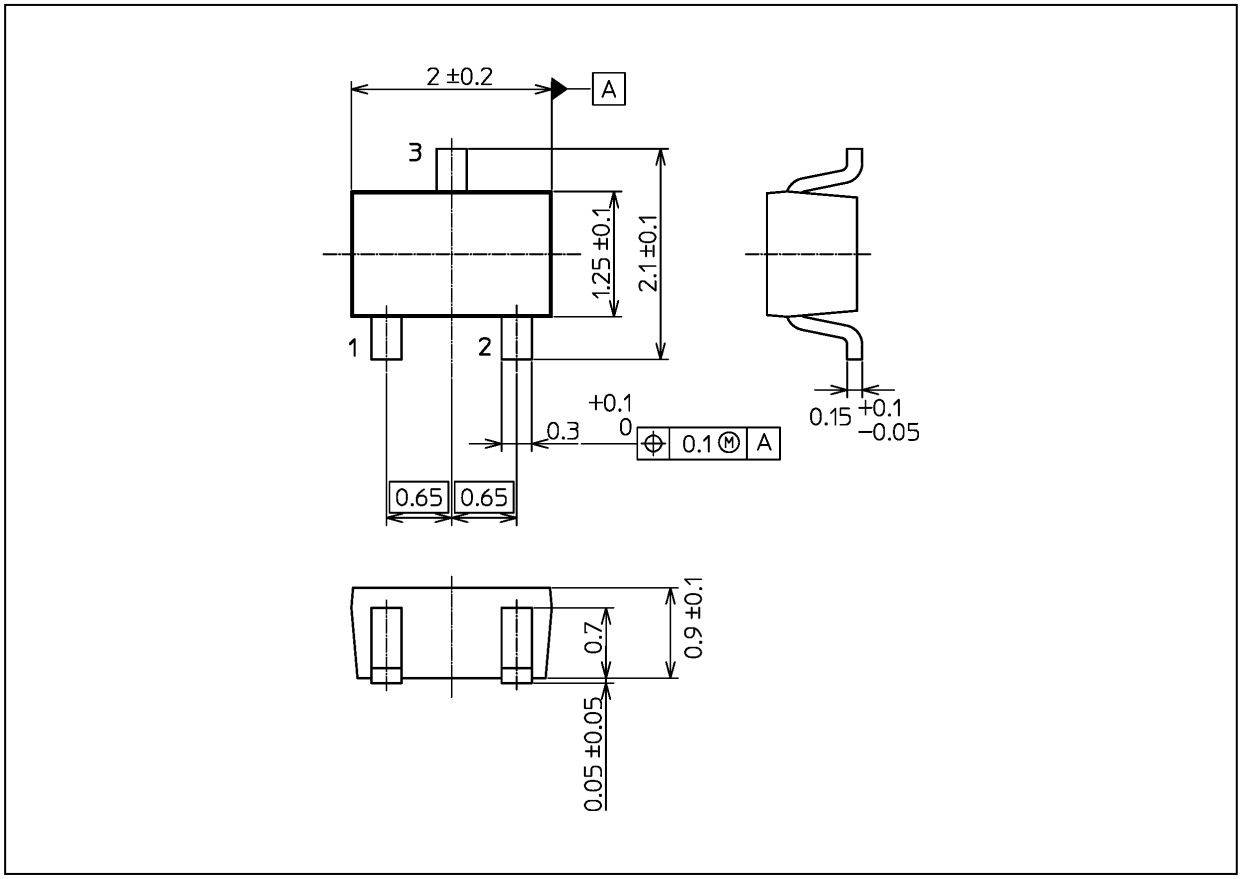


Fig. 12.5 ISO10605 (contact)

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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