

ESD Protection Diodes Silicon Epitaxial Planar

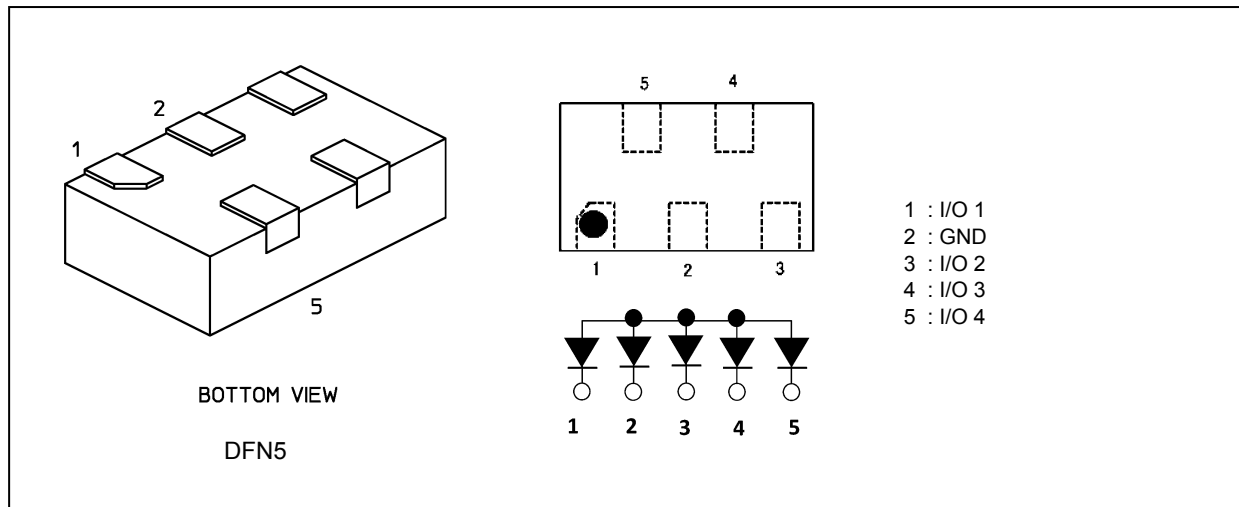
# DF5G7M2N

## 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	Note	Rating	Unit
Electrostatic discharge voltage (IEC61000-4-2)(Contact)	$V_{ESD}$	(Note 1)	$\pm 12$	kV
Electrostatic discharge voltage (IEC61000-4-2)(Air)			$\pm 15$	
Peak pulse power	$P_{PK}$		50	W
Peak pulse current	$I_{PP}$	(Note 2)	2.5	A
Junction temperature	$T_j$		150	$^\circ\text{C}$
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).

Note 1: According to IEC61000-4-2.

Note 2: According to IEC61000-4-5.

Start of commercial production

2022-03

## 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

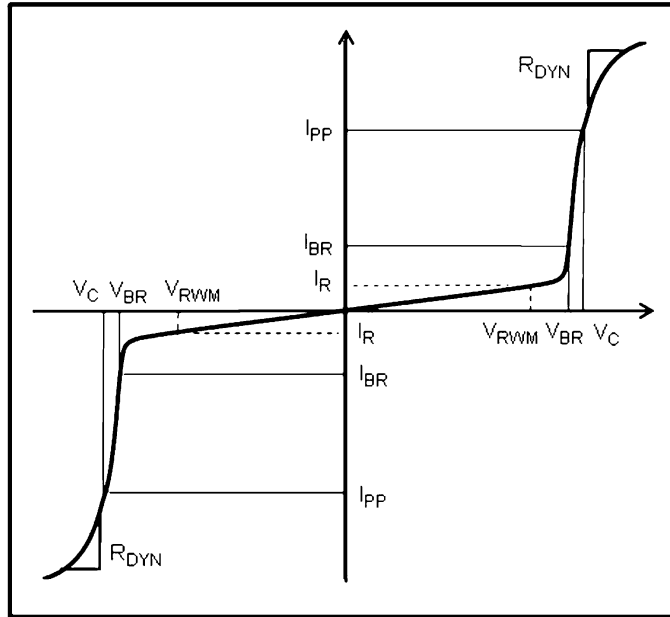


Fig. 4.1 Definitions of Electrical Characteristics

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Working peak reverse voltage	$V_{RWM}$		—	—	—	5.5	V
Reverse breakdown voltage	$V_{BR}$		$I_{BR} = 1 \text{ mA}$	6.0	—	11	V
Reverse current	$I_R$		$V_{RWM} = 5.5 \text{ V}$	—	—	0.5	$\mu\text{A}$
Clamp voltage	$V_C$	(Note 1)	$I_{PP} = 1 \text{ A}$	—	12.5	—	V
			$I_{PP} = 2.5 \text{ A}$	—	16	20	
Dynamic resistance	$R_{DYN}$	(Note 2)	—	—	1.0	—	$\Omega$
Total capacitance	$C_t$	(Note 3)	$V_R = 0 \text{ V}, f = 1 \text{ MHz}$	—	0.2	0.4	pF

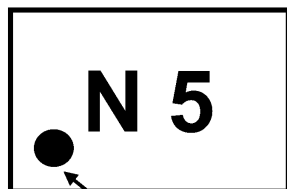
Note 1: Based on IEC61000-4-5 8/20  $\mu\text{s}$  pulse.

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.

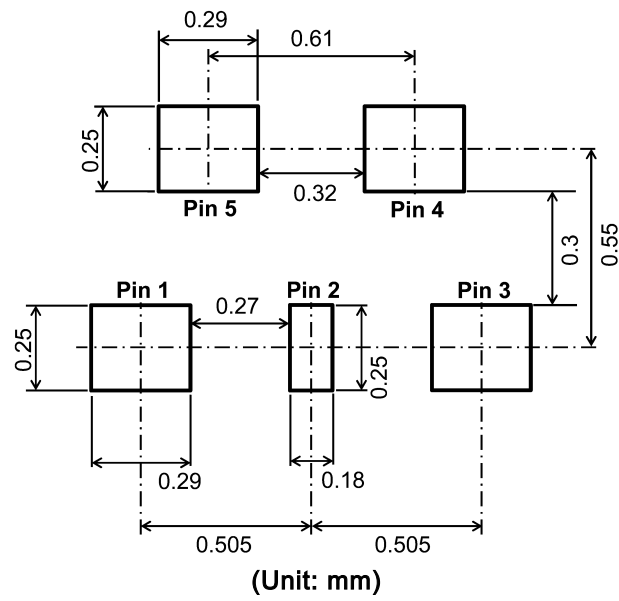
## 5. Marking



Pin 1 mark

Fig. 5.1 Marking

## 6. Land Pattern Dimensions (for reference only)



## 7. Characteristics Curves (Note)

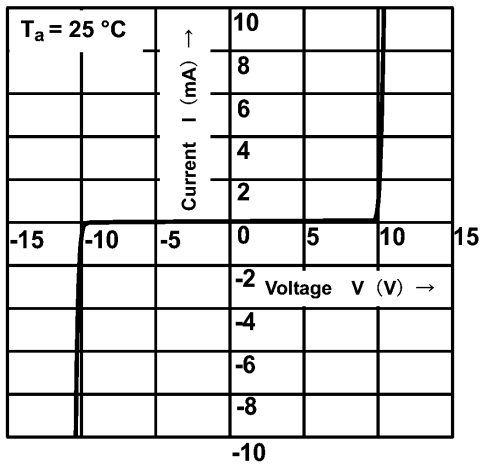


Fig. 7.1 I - V

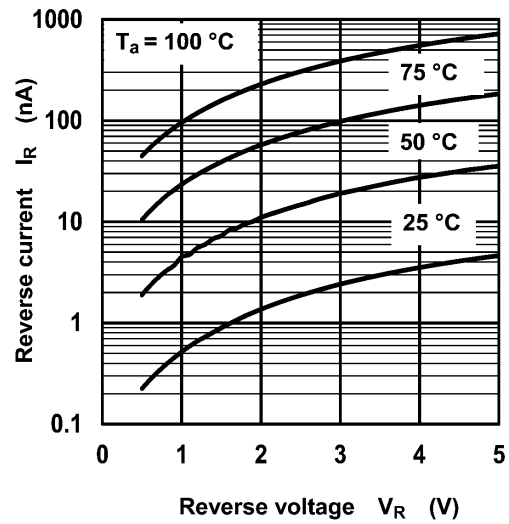


Fig. 7.2  $I_R - V_R$

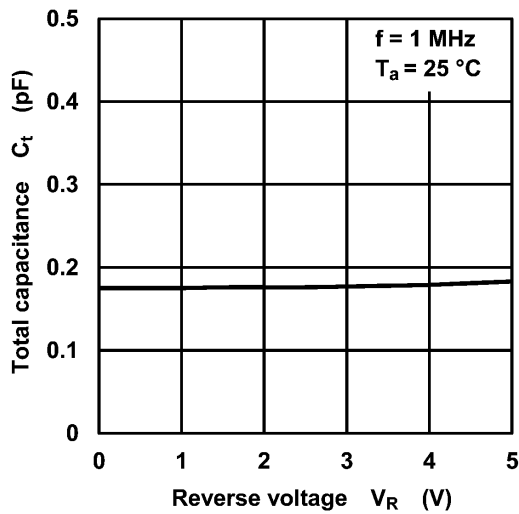


Fig. 7.3  $C_t - V_R$

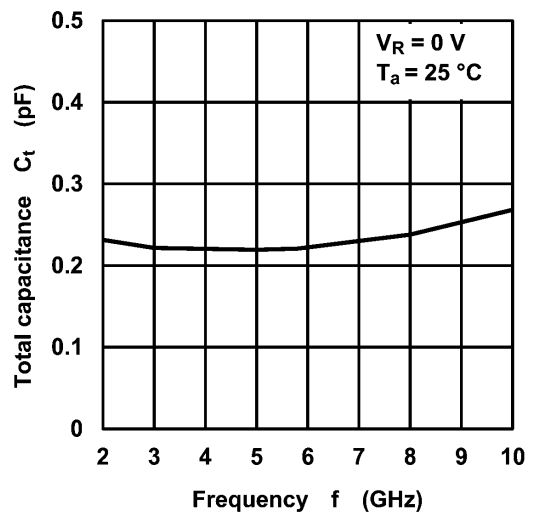


Fig. 7.4  $C_t - f$

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

## 8. Clamp Voltage $V_C$ - Peak Pulse Current ( $I_{PP}$ ) (Note)

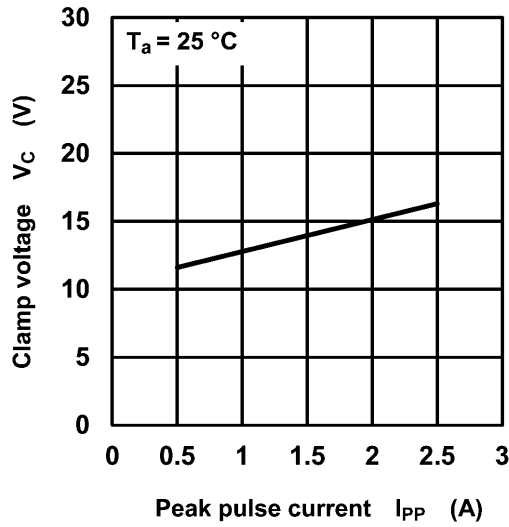


Fig. 8.1  $V_C$  -  $I_{PP}$

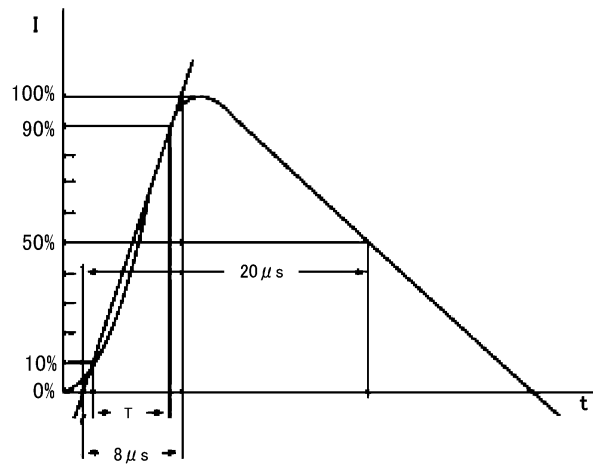


Fig. 8.2 Based on IEC61000-4-5 8/20  $\mu$ s pulse.  
(Ed.2)

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

## 9. Insertion Loss ( $S_{21}$ ) (Note)

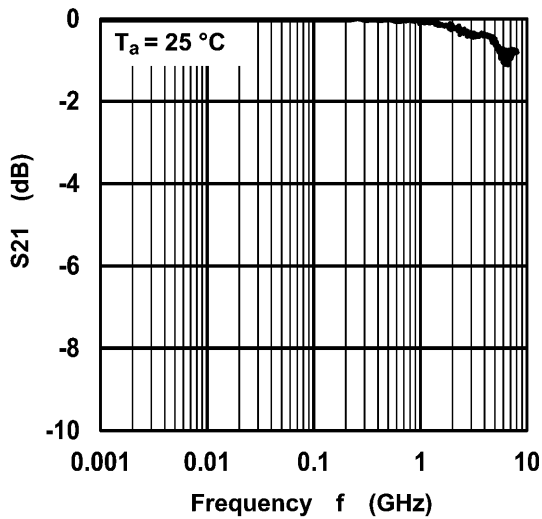
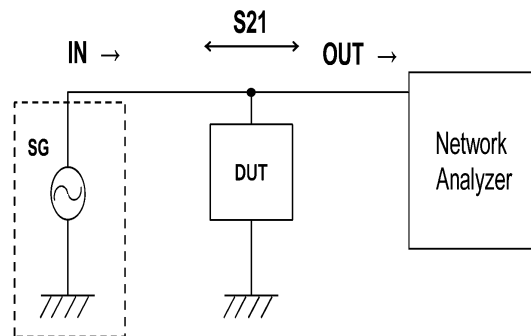


Fig. 9.1  $S_{21}$  - f



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

## 10. ESD Clamp Waveform (Note)

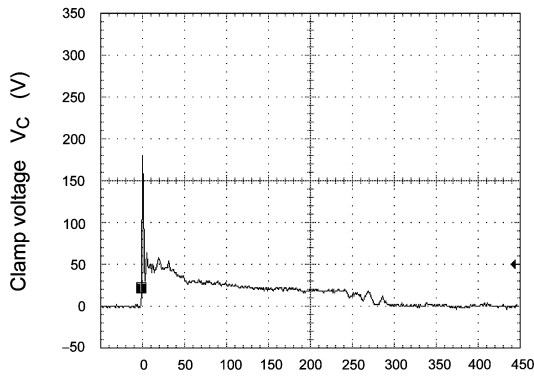


Fig. 10.1 +8 kV

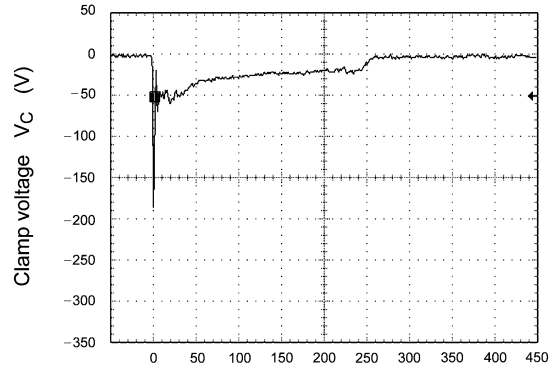


Fig. 10.2 -8 kV

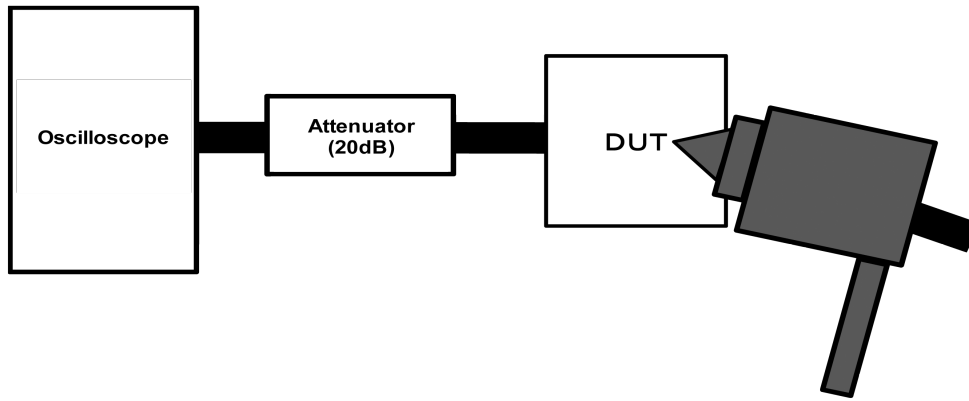
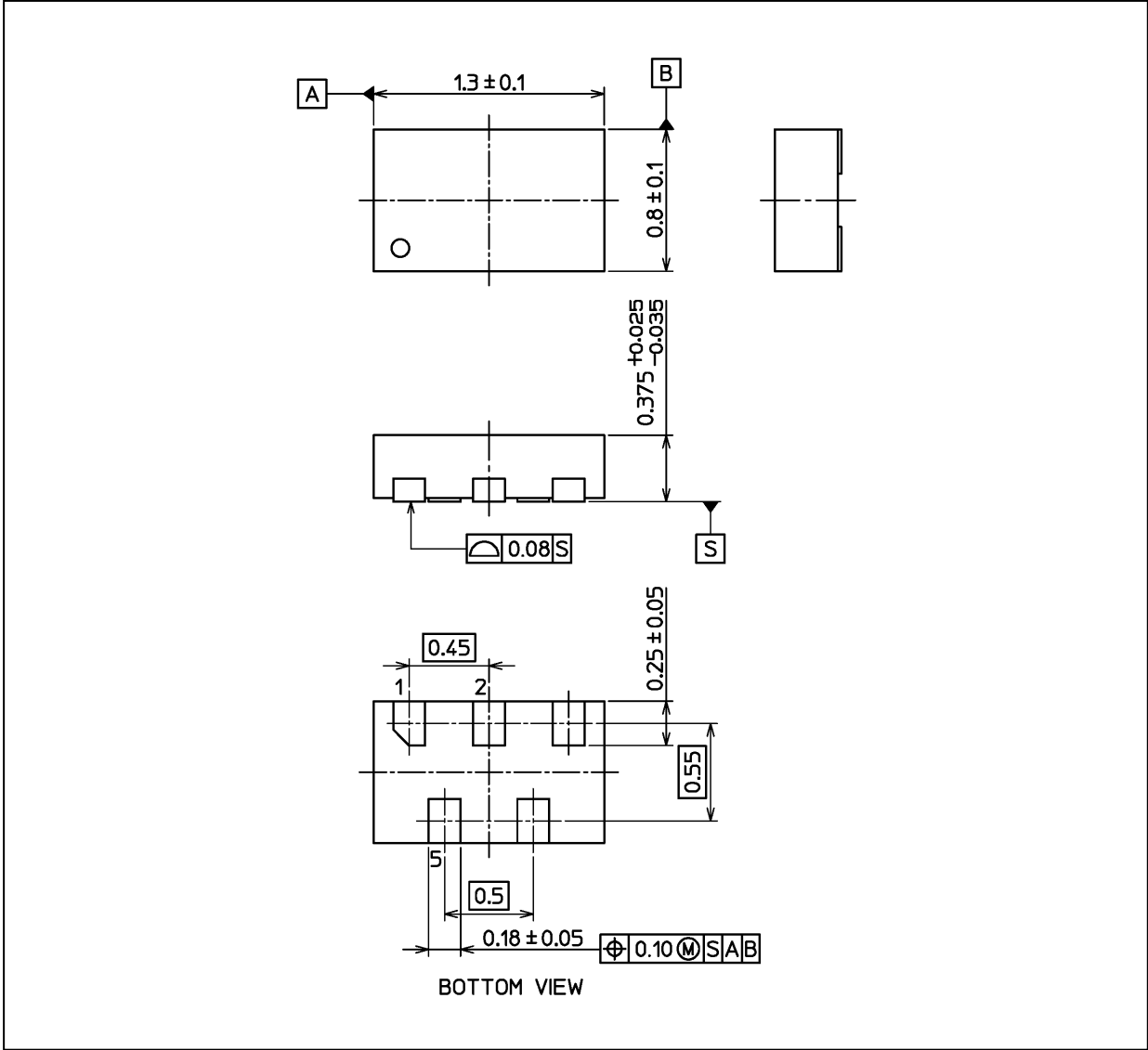


Fig. 10.3 IEC61000-4-2 (Contact)

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

Package Dimensions

Unit: mm



Weight: 1 mg (typ.)

Package Name(s)
TOSHIBA: 1-1AK1A
Nickname: DFN5

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