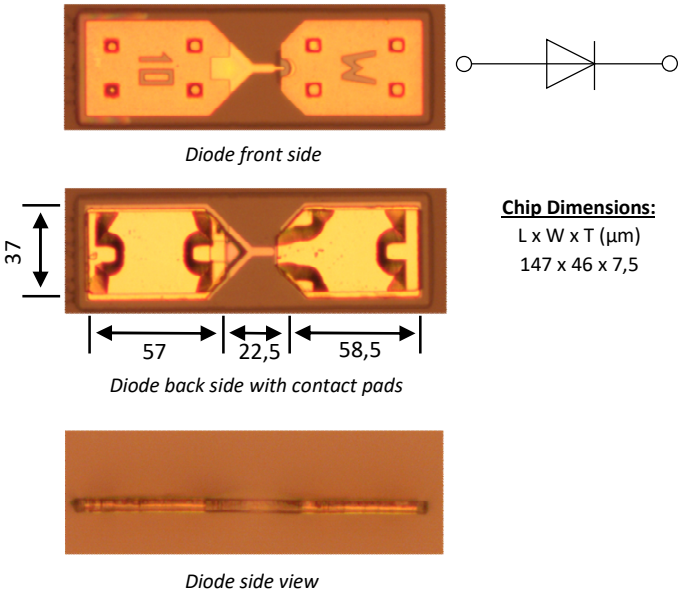
Schottky Diode
Type 3DSF20

Product Description

Type 3DSFx family of structures are fabricated by ACST Film-Diode (FD) Process. FD-Structures are implemented on a transferred membrane-Substrate, which is just few µm thin and of a low dielectric constant insulator. This allows for a drastic reduction of structure parasitic and, therefore, aims at ultimate performance at MM/SubMM-Waves. Optically-transparent membrane-substrate allows for accurate positioning for diode mounting/assembly.



Diode front side

Diode back side with contact pads

Diode side view

Chip Dimensions:
L x W x T (µm)
147 x 46 x 7,5

Fig. 1: Optical view of the product

The 3DSF structure represents a single-anode Schottky diode, optimised for operation in varistor mode under Zero-Bias Condition. Low differential resistance enables easy matching with 50_Ohm reading electronics, which is of a crucial importance for high-speed electronics (data transmission systems).

Application Areas

- Zero-Bias square-low (envelope) detectors
- Power sensors
- Frequency mixers with low-LO-requirements
- High-frequency low-power rectifiers for wireless power transmission

Product features

- Low noise due to 0V-bias
- Low 0V differential resistance (easy matching with 50_Ohm reading electronics)
- Strongly reduced shunt (pad-to-pad) capacitance
- Suitable for flip-chip mounting approach
- Structure geometry optimized for MM/SubMM-Waves applications

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Application Note

- This diode can be assembled onto RF-circuit-substrate by soldering or by gluing contact pads using a conductive adhesive. Maximal temperature for soldering is 170 °C for a duration of maximum 30 sec.
  Curing temperature of conductive adhesive should not exceed 125 °C for a duration of maximum 30 min. Higher curing temperature and/or longer curing time can lead to increase of differential resistance Rd of the diode and in extreme cases can cause total device failure.
- Contact pads are finished by a 500nm Gold layer and are situated on the **back-side** of the diode structure. For user reference: contact pads do not have individual markers like “W17”. Individual markers are seen only on the front-side of the structure.
- Front-side of the structure is covered by a transparent insulator film (Film-Substrate) and is not suited for assembly. However, the Film-Substrate has windows, which allow contacting (whiskering) the diode from front-side for electrical measurements even after diode has been mounted/soldered/glued onto RF-circuit substrate.

Tab. 1: Electrical parameters at room temperature

Parameter	Symbol	Specified Range		
		Minimum	Nom.	Maximum
Chip length [µm]	L	146	147	157
Chip width [µm]	W	45	46	56
Chip thickness [µm]	T	6.5	7.5	8.5
Total capacitance [fF]	C_{tot}	18.5	23	27.5
Junction capacitance [fF]	C_{j0}	16	20	24
Forward voltage at current level of 100µA [mV]	$V_{f@100µA}$	26	32	36
*Junction Resistance at 0V [Ω]	R_{dif}	400	500	600
**Current Responsivity at 0V [A/W]	$ß_0$	14	14.5	15

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Comments

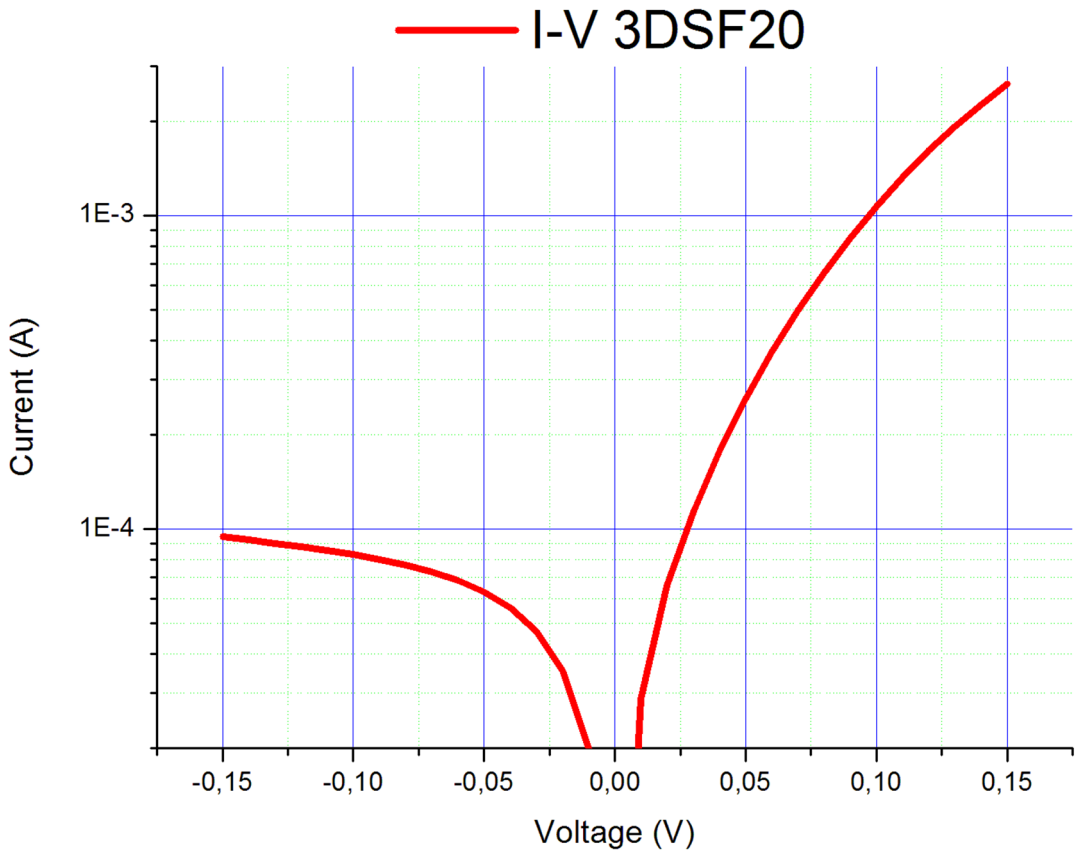
* R_J - Junction Resistance (0V):

$$R_J = \frac{1}{\frac{dI}{dV}} = \frac{dV}{dI}$$

** β_0 - Current Responsivity (0V):

$$\beta_0 = -\frac{\frac{d^2V}{dI^2}}{2 \cdot \left(\frac{dV}{dI}\right)^2}$$

Typical Forward IV Curve (22 °C)



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