CMTBA1S

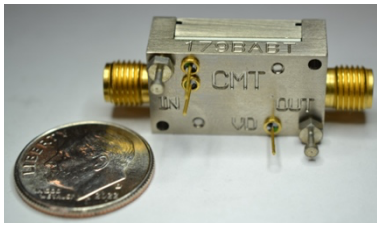
Single Stage Cryogenic SiGe Low Noise Amplifier

KEY FEATURES

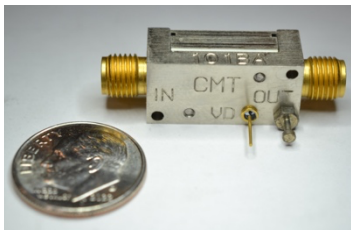
- Ideal for extremely low noise cryogenic applications.
- Powered from a single positive DC supply.
- Female SMA RF connectors.
- 2-pin Winchester DC connectors.
- Optional DC bias tees.
- Miniature Size: 21.4mm x 10.5mm x 8.6mm.
- With Bias Tees Size: 23.1mm x 13.2mm x 8.6mm

PERFORMANCE FEATURES

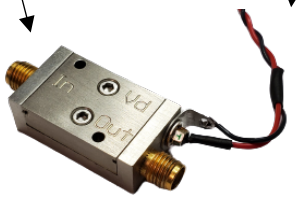
- RF Frequency
  - 0.005 to 1.0 GHz
- Gain
  - 20 dB Typ
- Noise Temperature
  - < 3.5K Typ
- Noise Figure
  - < 0.052 dB
- Input Return Loss < -15 dB Typ
- Optimum DC Power
  - Vd = 3.0 V
  - Id = 5.0 mA



Miniature BABT with Bias Tees



Miniature BA Chassis



Description

- The CMTBA1S, a single stage SiGe low noise amplifier, is intended for extremely low noise cryogenic applications where lower gain and lower power dissipation is required. The amplifier uses resistive feedback to achieve good input match (S11) and high gain stability. Typical input return loss is -20 dB. The amplifier is optimum for the frequency range of 0.005 GHz to 1.0 GHz. The amplifier has good noise performance up to 3 GHz

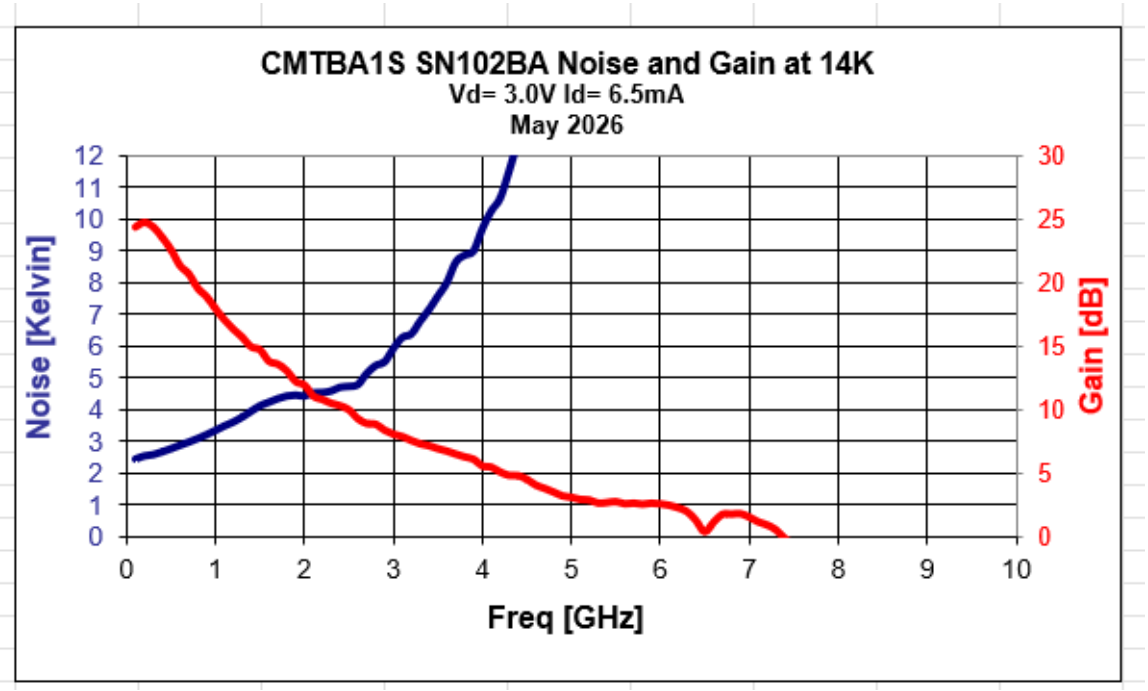
- It is powered from a single positive DC power supply which is optimum at 3.0 V.

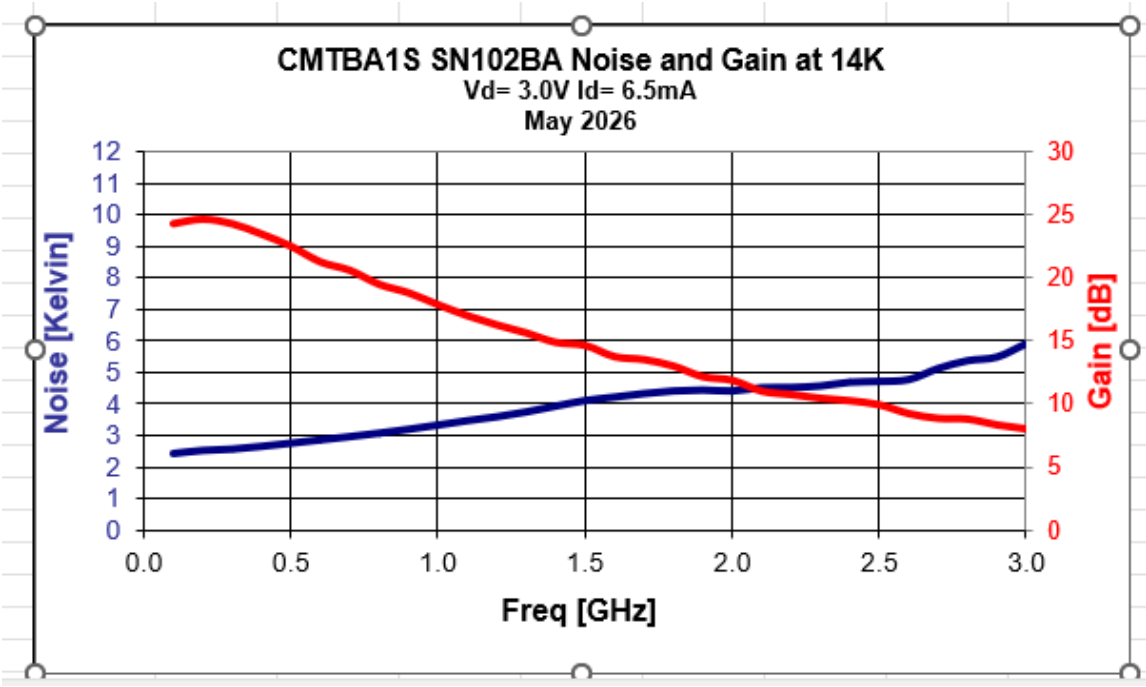
- The amplifier is available in a miniature configuration, with or without integrated resistive bias tees.

Electrical Specifications @ 13 K

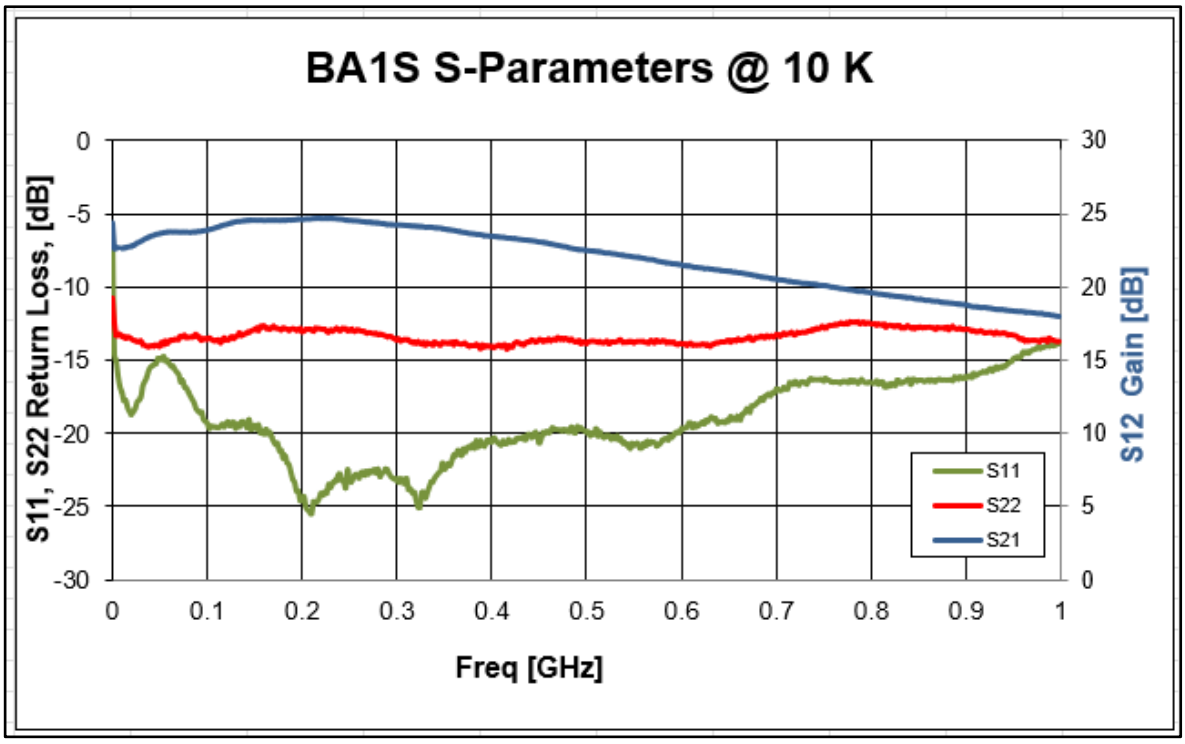
Description	Typical	Minimum	Maximum
RF Frequency	3 GHz	0.005 GHz	1 GHz
Gain	20 dB	18 dB	25 dB
Noise Temperature	< 3.5K	2.5 K	3.5 K
IRL (-20log|S_{11}|)	< -15 dB	-15 dB	-20 dB
ORL (-20log|S_{22}|)	< -7 dB		
DC Voltage	3.0 V		
DC Current	5.0 mA		

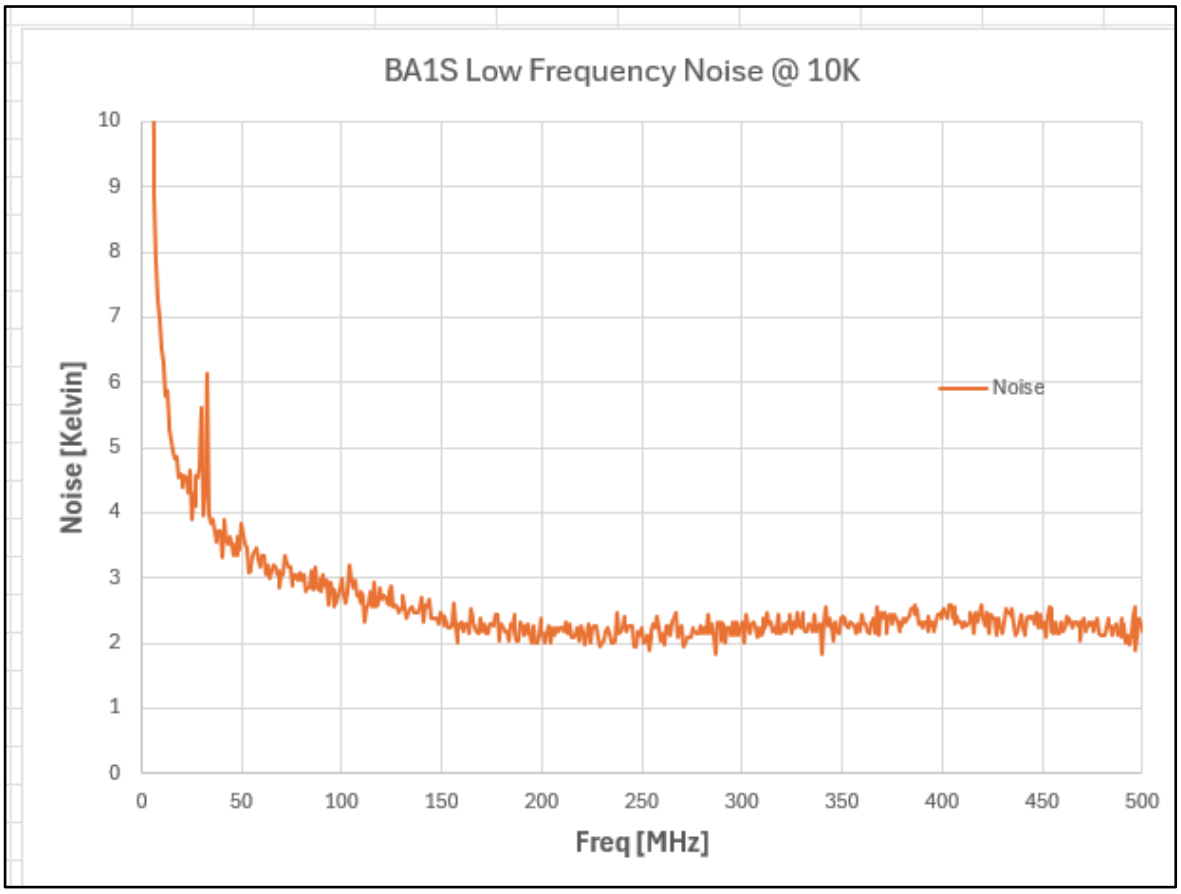
Typical Test Results – Optimum DC Bias @ 14 K

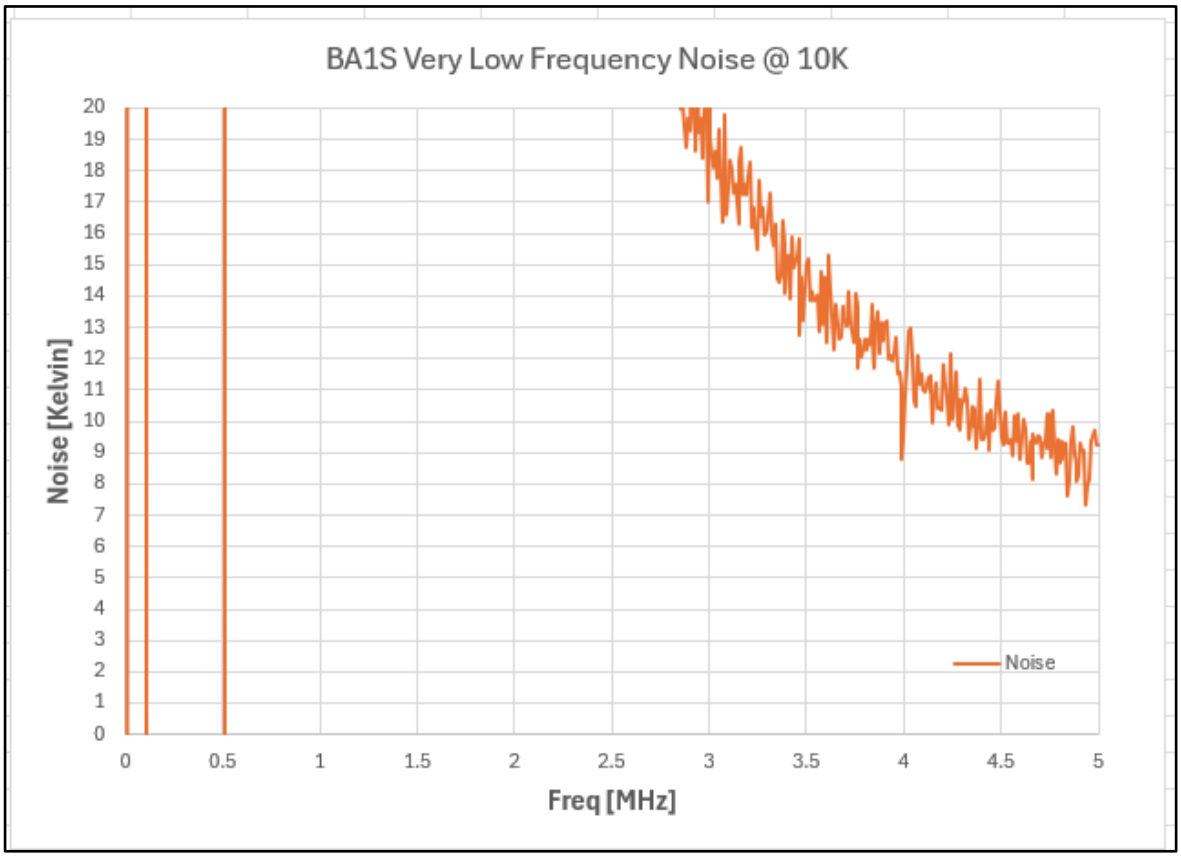


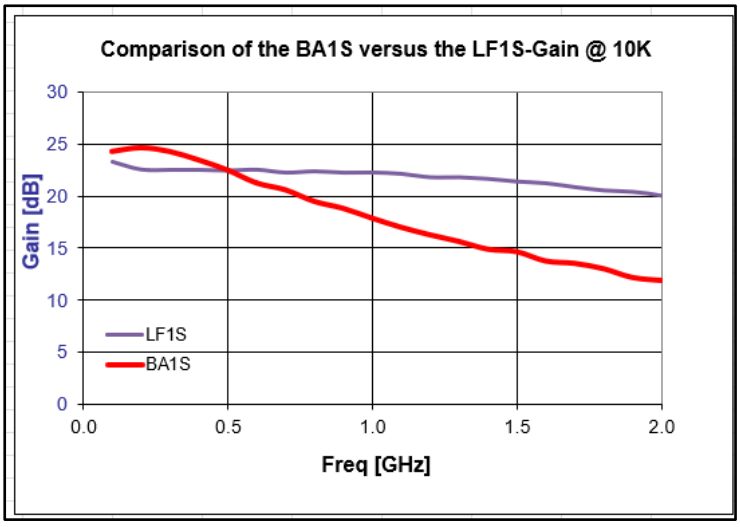


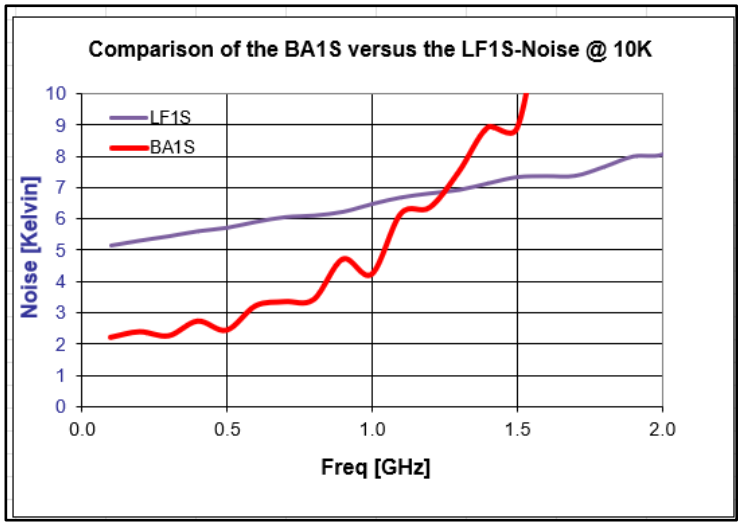
Typical Test Results – BA1S S-Parameters @ 10 K



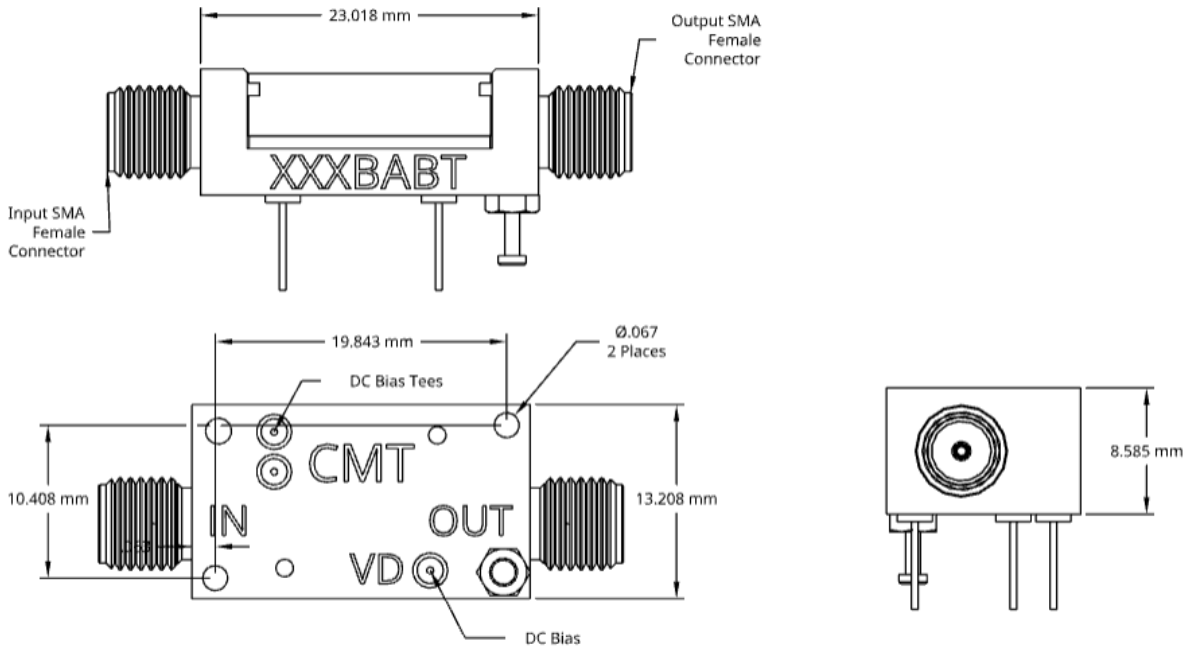



BA1S Very Low Frequency Noise @ 10K
Noise [Kelvin]
Freq [MHz]
Noise

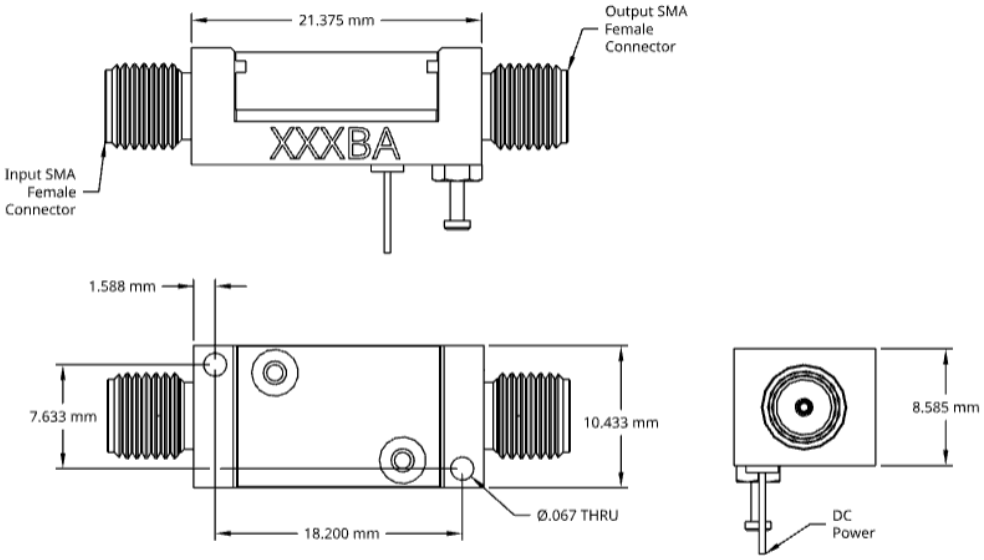

Comparison of the BA1S versus the LF1S-Gain @ 10K
Gain [dB]
Freq [GHz]
LF1S
BA1S


Comparison of the BA1S versus the LF1S-Noise @ 10K
Noise [Kelvin]
Freq [GHz]
LF1S
BA1S

CAD Housing Drawing



Miniature



Miniature with Bias Tees

*Dimensions are in mm

Optional Input Protection Diodes

As an option, the amplifier can be supplied with ESD protection & voltage spike protection at the RF input to the amplifier. There will be a slight degradation of the amplifier performance. Please note that the optional input protection diodes cannot be used if DC voltages are applied to the RF line using input bias tees.

To order an amplifier with internal bias resistors, add the resistance to the part #. For instance, CMTBA1S-PD.

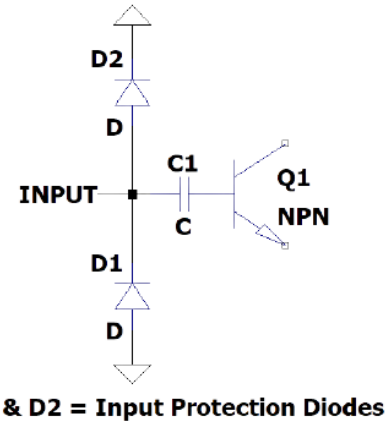


Figure 1. Protection Diodes Schematic

Product Care and Maintenance

- Use care to not bend (and break) the DC bias pin when tightening the output SMA connector.
- The amplifier should not be connected to the power supply when connecting the input connector.
- Set the power of Port 1 in your VNA to be less than -45 dB when testing the amplifier. Otherwise, the amplifier may saturate and the data obtained will be incorrect.
- Do not attempt to open the amplifier.
- Electrostatic discharge can damage the amplifier.

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