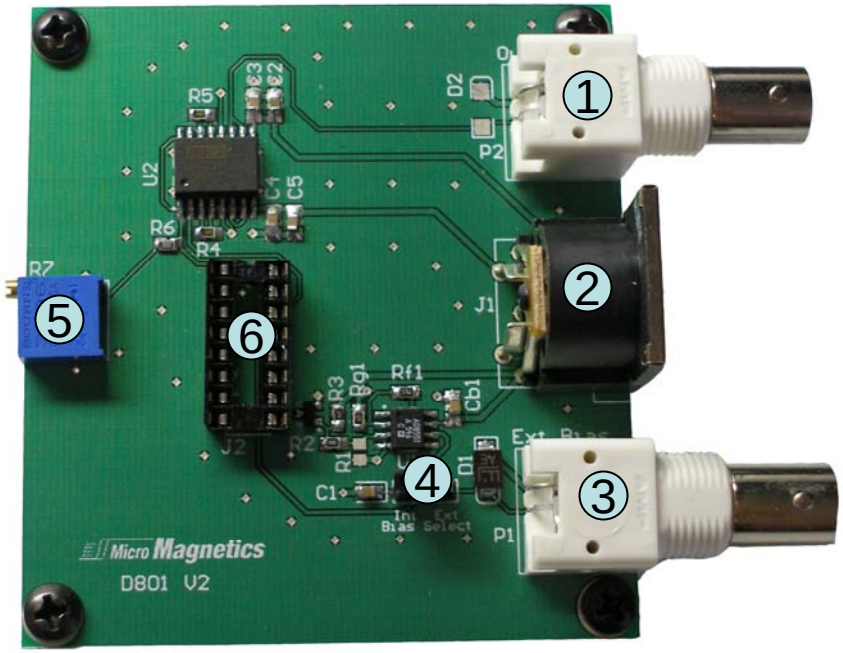
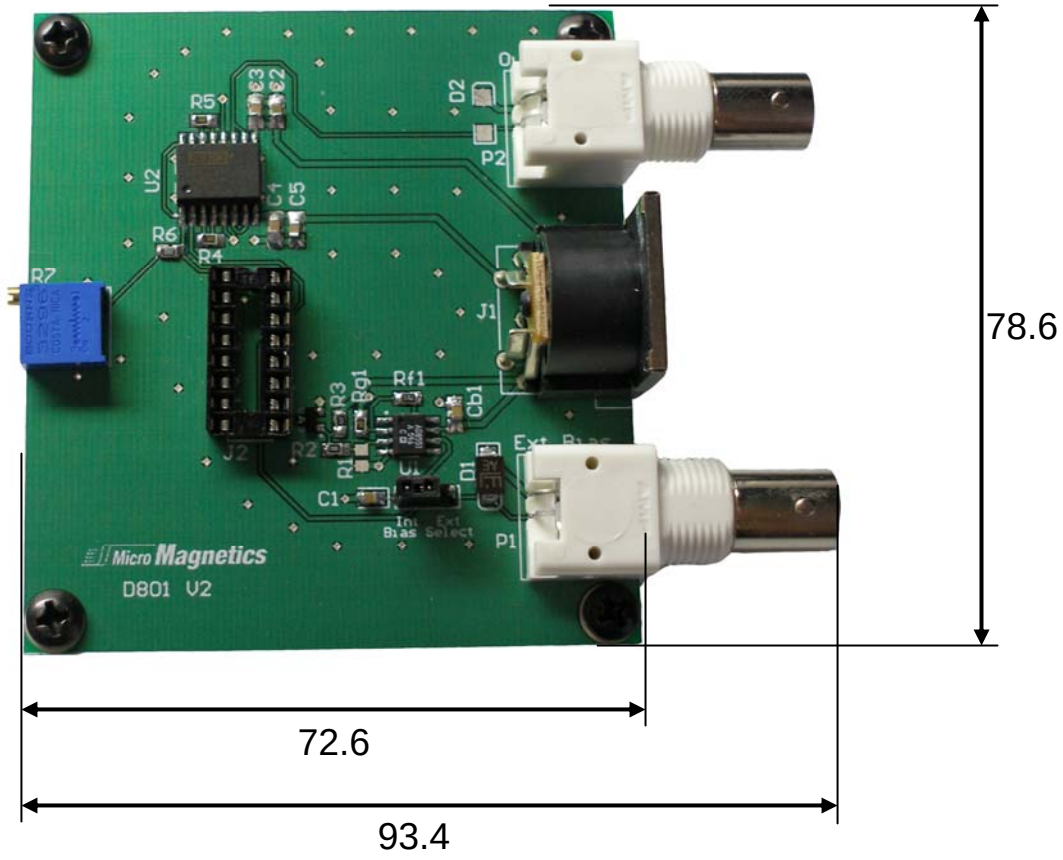
D-801 – Physical Schematic



1. Signal Output BNC
2. Power Input Connector
3. External Bias Input BNC
4. Bias Selection Jumper (JP2)
5. Null Potentiometer
6. STJ-100/STJ-101 Sensor Socket

D-801 – Product Dimensions



All dimensions are in millimeters.

The total height of the D-801 with supplied standoffs is 35.7 mm (1.41”).

The height of the D-801 without standoffs is 23.3 mm (0.92”).

D-801 – Specifications

PHYSICAL	Min.	Typical	Max.	Unit
Total Length		123		mm
Total Width		58		mm
Total Height		35.7		mm
Unit Weight (excludes P.S.)[1]		50		grams
Operating Temperature Range	0	20	40	ºC
ELECTRICAL				
AC Electrical Power Voltage	90		264	V
AC Electrical Power Frequency	47		63	Hz
RTI Voltage Noise (f > 100 Hz)		12	20	$nV/Hz^{0.5}$
Total Effective Gain[2]	10	100	2000	
Frequency Response (G ≤ 100)	0		700	kHz
Frequency Response (G = 2000)	0		200	kHz
Output Impedance		50		Ω
Common-Mode Rejection (1 kHz)	80	90		dB
First-Stage Gain (G1)		N/A[3]		
Second-Stage Gain (G2)		N/A[3]		
EXTERNAL BIAS				
External Bias Input Voltage Range	-5		5	V
Signal Output Operating Range	-10		10	V

NOTES

1. The included power supply is connected by a 1.5-meter cable. The power supply itself weighs approximately 1 kg (2.2 lbs.).
2. The gain is set by Micro Magnetics prior to shipping, but can be changed by altering resistor values on the D-801 board.
3. These parameters are set separately for each unit, based on customer requirements.

D-801 – Detailed Description and Operating Instructions

Introduction:

The D-801 is an evaluation board for use with Micro Magnetics' STJ-100 and STJ-101 magnetic microsensors. The D-801 supplies electrical power to the microsensor, and outputs an amplified analog voltage which is linear in the magnetic field strength at the sensor. This amplified signal is a bipolar single-ended output with a range of +/- 10 V.

The output voltage V_{OUT} at the signal output BNC (#1) is given by

$$V_{OUT} = V_0 + H\left(\frac{S \cdot V_{IN} \cdot G_1 \cdot G_2}{G_1 + 1}\right)$$

where H is the magnetic field strength in the sensing direction (in Gauss), S is the sensor sensitivity (in units of %/G, as specified in the sensor datasheet), and V_0 is an offset which can be adjusted using the null potentiometer (#5). The parameters G_1 and G_2 are the gain parameters of the D-801 which are set individually for each unit and are given in the D-801 specifications datasheet. The parameter V_{IN} is the voltage which is used to power the sensor. When the bias selection jumper (#4) is set for internal biasing, V_{IN} = 4.7 V. When the bias selection jumper (#4) is set for external biasing, V_{IN} is equal to the voltage which is supplied through the external bias input BNC(#3).

Note that the value of the (field-independent) DC offset voltage V_0 can be changed to any value in the device's operating range, by tuning the null potentiometer (#5) using a small screwdriver. Typically, this value is set to zero, but setting it to another value in the normal operating range will not adversely affect the performance of the D-801 board.

D-801 – Detailed Description and Operating Instructions (2)

Sensor Biasing:

The voltage which is supplied to the MTJ sensor circuit is referred to as the *bias voltage*. The user has the option of either using an external voltage to power the sensor, or using an internal 5 V bias. This option is set using the bias selection jumper (#4). When this switch is set for external biasing (jumper in the right-hand "Ext Select" position), the user may supply a bias voltage of his/her choosing directly to the sensor using the external bias input BNC (#3). ***The external bias voltage should not be set outside the safe range given in the D-801 specifications sheet.*** When the jumper is set for internal biasing (jumper in the left-hand "Int Bias" position), the 5 V internal bias voltage is used and the external bias BNC plug is isolated from the preamplification electronics.

Installing and removing SpinTJ sensors:

To install an STJ-100/101 sensor, follow these steps:

1. Power the D-801 with the included power supply. Be sure that the D-801 is set to use internal bias (the bias selection jumper can be changed after the sensor is ready to use). Use a multimeter or oscilloscope to measure the voltage at the Signal Out BNC (#1).
2. Ensure that the null potentiometer (#5) is turned to its limit in the clockwise (CW) direction. This may require up to 25 turns.
3. Fully insert the sensor into the STJ socket (#6) in the proper orientation. The STJ sensor should have its active pins inserted into pins 1 and 16 of the STJ socket (these pins are located at the top of the sensor socket in the figures on pages 1 and 2). To use the ZIF connector, first ensure that the slotted cam is in the CCW open ("O") position. Then place the sensor into the socket and use a screwdriver to turn the cam clockwise to the closed ("C) position. At this point, the STJ sensor should be firmly held in the socket.
4. Turn the null potentiometer (#5) in the counterclockwise (CCW) direction until the voltage at the Signal Out BNC (#1) is near zero (within 200 mV is sufficient).

When removing or replacing the STJ-100/101 sensor, be sure to first turn the null potentiometer (#5) to the CW limit, and also to remove any external bias voltage, before disconnecting the device.

D-801 – Detailed Description and Operating Instructions (3)

Notes on Sensor Operation:

To check if a sensor is responding properly, the user can to monitor the DC voltage at the Signal Out BNC (#1). Using the standard internal bias, a noticeable change in the output voltage should be observed if a small refrigerator magnet is brought within 1-2" of the sensor's active area.

The D-801 produces an output voltage which is linearly proportional to the magnetic field in the sensing direction, as long as the output voltage at the signal output BNC (#1) is within its operating range. At sufficiently large magnetic fields, the response becomes increasingly non-linear. In addition, the sensor sensitivity can be slightly altered by large static magnetic fields in the perpendicular in-plane direction.

If you require technical support please contact Micro Magnetics at support@micromagnetics.com or (508) 672-4665.