

ADL5920 ARDUINO SHIELD 9KHz TO 7GHz DIRECTIONAL BRIDGE AND DUAL RMS DETECTOR EVAL ADL5920-ARDZ

DESCRIPTION

Demonstration circuit 2847A is a dual RMS power detector with integrated directional bridge featuring the ADL5920 IC. The ADL5920 arduino shield enables the evaluation of the device with the Linduino board, DC2026C. Together with the GUI, forward, reverse power can be measured and monitored on the computer. Return Loss is calculated and displayed.

The ADL5920 with integrated bridge simultaneously measure forward power and reverse RMS power up to 7GHz, and provides return loss results. The detector has 50dB of dynamic range at 1GHz. The demo board requires external power supply that connects to the Linduino board, by setting JP1.

Design files for this circuit board are available. Contact the Analog Devices factory.

ABSOLUTE MAXIMUM INPUT RATINGS

Supply Voltage(Vcc):	+5.5V
Voltage at RFin, Sine Wave Input:	+20Vp-p
RFin Input Power-Average:	+30dBm
T _{JMAX}	150°C
Case Operating Temperature Range	-40°C to 85°C
Storage Temperature Range	-65°C to 150°C

CAUTION: This part is sensitive to electrostatic discharge (ESD). Observe proper ESD precautions when handling the ADL5920.

L, LT, LTC, LTM, and Linear Technology are registered trademarks of Linear Technology Corporation. All other trademarks are the property of their respective owners.

TEST SETUP



Figure 1: Test Setup for RF Performance Measurements

NOTES ON TEST EQUIPMENT AND SETUP

- Use a high performance signal generator with accurate output power levels up to 7GHz.
- Use Linduino DC2026C that mates to the ADL5920 shield.
- External wall wart power supply for Linduino DC2026C is required. Alternately, 5V supply capable of 200mA can be used to power the ADL5920 shield through the screw terminal block(J7) if wall wart is not available.

QUICK START PROCEDURE

1. Remove the DC2847A from its protective packaging in an ESD-safe working area (see Figure 1).
2. Connect external wall wart power supply to J2 on Linduino board DC2026C. Set JP1.
3. Connect USB cable to PC and J5 on Linduino board.
4. Connect signal generator to RF_IN(J1) on the ADL5920 shield.
5. Connect RF load to RF_OUT.
6. Turn on signal generator, set frequency between 9KHz and GHz. Set RF power below 30dBm.
7. Go to www.analog.com and download and install quikeval.
8. Open quikeval, set frequency, click "READ" to measure forward and reverse RMS power using default calibration. See Figure 2.
9. User calibration can be performed to improve accuracy. Click "Calibrate" to calibrate the device across frequency. Linear interpolation is used to calculate the slope and intercept for frequencies between the calibration points. The calibration coefficients are stored in the GUI that can be re-used later. See figure 3.

DEMO BOARD USAGE NOTES

1. C3 and C4 are highpass capacitors for internal offset compensation loop, they are necessary for low frequency operation. They are removed for 2Ghz and above for improved directivity.
2. Return loss=(Pforward-Preverse)-insertion loss with passive load.
3. Default calibration use the typical slope and intercept value which introduce error due to part to part variations. The calibration function uses 3-point calibration which makes the power measurement highly accurate.
4. Demo kit comes with Linduino board which is pre-loaded with the firmware that is required for the ADL5920 shield kit. Contact factory for missing firmware

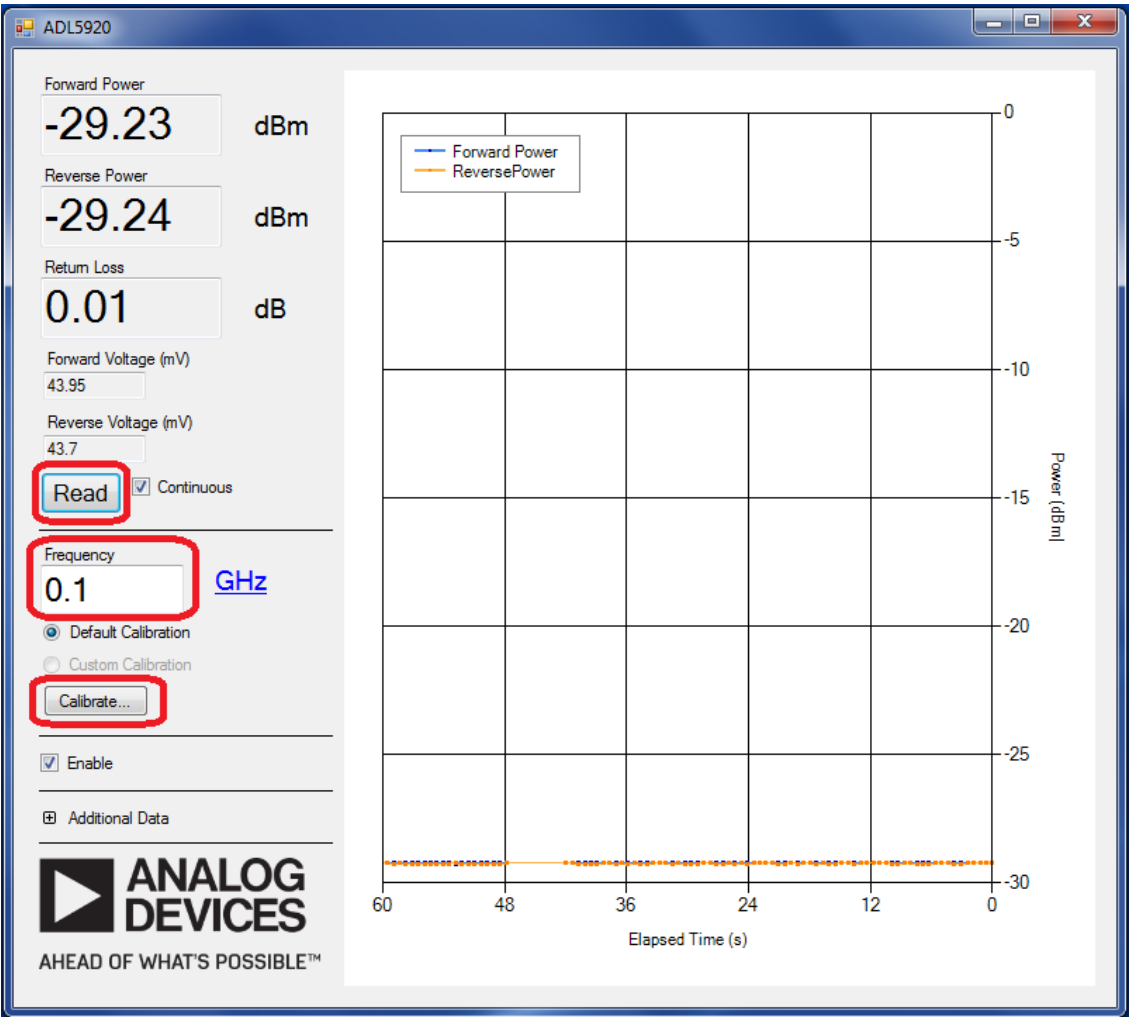


Figure 2: User Interface

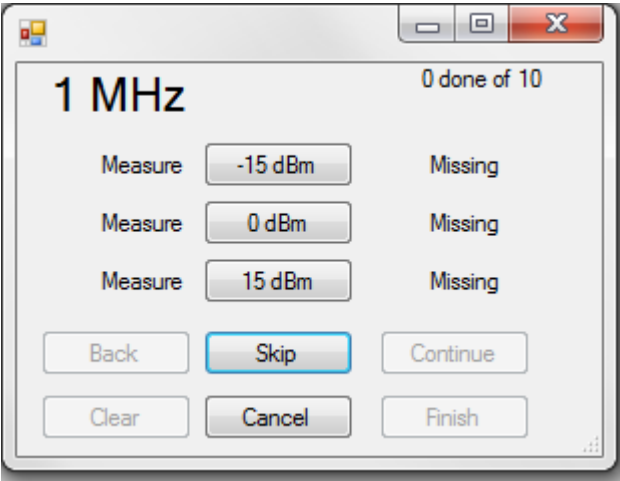


Figure 3: Calibration

DEMOBOARD SCHEMATIC

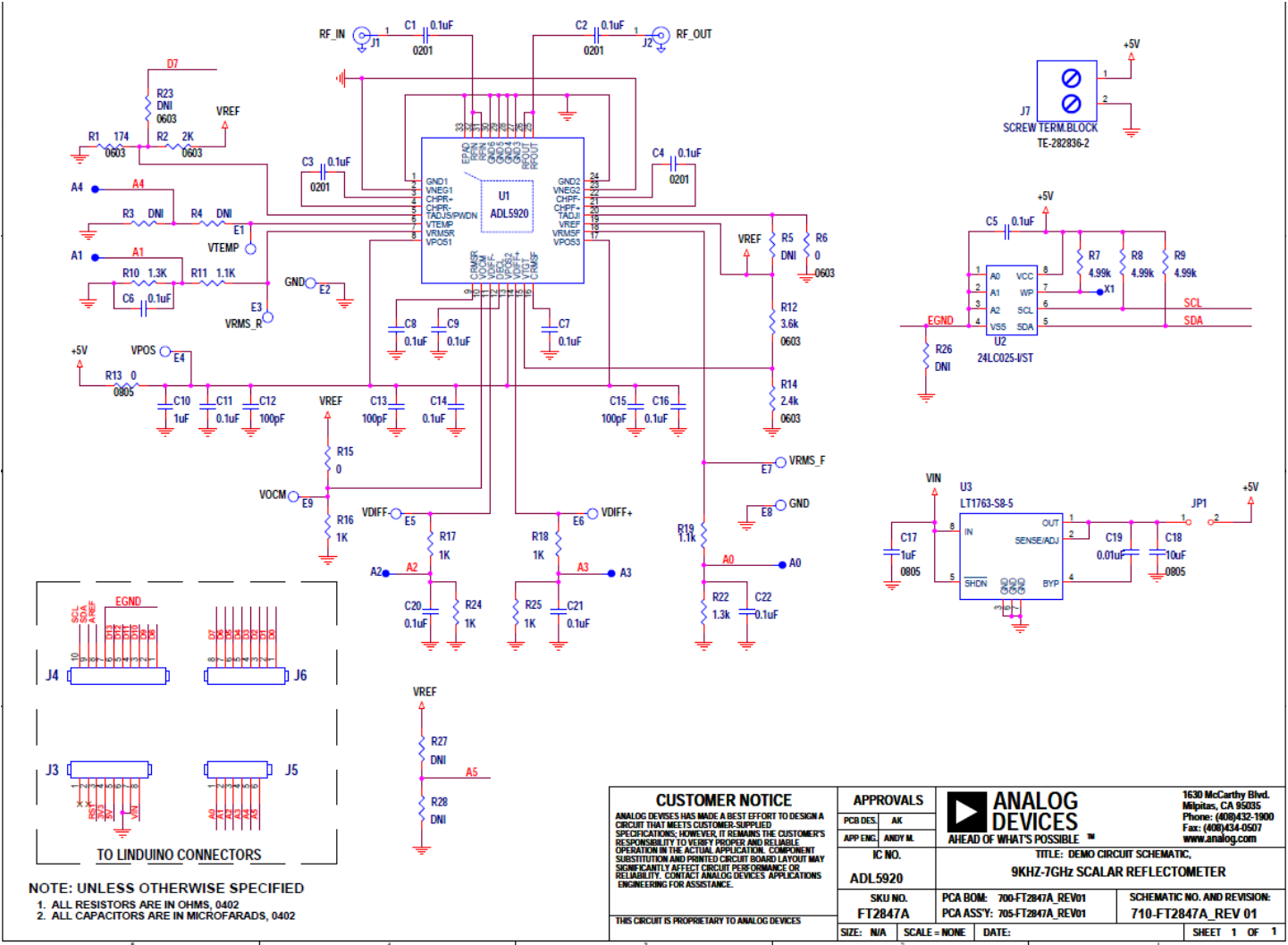


Figure 4: Demo Board Schematic

BUILD OF MATERIALS

1	2	C1,C2,C3,C4	CAP., for 16KHz-40GHz, 0.1uF,16V,10%,0201	PASSIVE PLUS INC.,0201BB104KW160
3	1	C5-C9,C11,C14,C16,C20-C22	CAP.,0.1uF,X5R,100V,10%,0402	MURATA, GRM155R62A104KE14D
4	1	C10	CAP., 1.0uF, X5R,10V, 10%, 0402	TDK, C1005X5R1C105K
5	3	C12,C13,C15	CAP.,100pF,X7R,50V,10%,0402	AVX, 04025C101KAT2A
6	1	C17	CAP., 1.0uF,X7R,10V,10% 0805	AVX, 0805ZC105KAT
7	1	C18	CAP., 10uF,X7R,10V,10%, 0805	AVX, 0805ZC106KAT
8	1	C19	CAP.,0.01uF,X7R,25V,10%,0402	MURATA, GRM155R71E103KA01D
9	9	E1,E2,E3,E4,E5,E6,E7,E8,E9	TEST POINT, TURRET, .064" MTG. HOLE	MILL-MAX, 2308-2-00-80-00-00-07-0
10	1	JP1	HDR, 1X2, 2MM	SAMTEC, TMM-102-02-L-S
11	2	J1,J2	CON., SMA, 50-OHM, EDGE-LANCH	EF JOHNSON, 142-0761-871
12	2	J3,J6	CONN.,HDR,MALE,1x8,2.54mm,STR, THT	SAMTEC, TSW-108-07-L-S
13	1	J4	CONN.,HDR,MALE,1x10,2.54mm,THT,STR	SAMTEC, TSW-110-07-L-S
14	1	J5	CONN.,HDR.,MALE,1x6,2.54mm,THT, STR	SAMTEC, TSW-106-07-L-S
15	1	J7	CONN.,TERM. BLOCK,RECEPT,1x2,5mm,SIDE ENTRY, THT,13.5A	TE CONN. TE-282836-2
16	1	R1	RES.,174 OHMS,1%,1/16W,0603	VISHAY, CRCW0603174RFKEA
17	1	R2	RES.,2K OHMS,1%,1/16W,0603	VISHAY, CRCW06032K00FKEA
18	3	R3,R4,R5,R26,R27,R28	RES., 0402, DNI	
19	2	R15	RES.,0 OHM,1/16W,0402	ROHM, MCR01MZPJ000
20	1	R6	RES.,0 OHMS, 0603	VISHAY,CRCW06030000Z0EA
21	3	R7,R8,R9	RES.,4.99k OHMS,1%,1/16W,0402	VISHAY, CRCW04024K99FKED
22	2	R10,R22	RES.,1.3k OHMS,1%,1/16W,0402	VISHAY, CRCW04021K30FKED
23	2	R11,R19	RES.,1.1k OHMS,1%,1/16W,0402	VISHAY, CRCW04021K10FKED
24	1	R12	RES.,3.6k OHMS,1%,1/16W,0603	VISHAY, CRCW06033K60FKED
25	1	R13	RES.,0 OHMS, 0805	VISHAY,CRCW08050000Z0EA
26	1	R14	RES.,2.4k OHMS,1%,1/16W,0603	VISHAY, CRCW06032K40FKED
27	7	R16,R17,R18,R24,R25	RES.,1k OHMS,1%,1/16W,0402	YAGEO, RC0402FR-071KL
28	1	R23	RES., 0603, DNI	

DEMO MANUAL DC2847A

8				
2				
9	1	U1	I.C., 9KHz-7GHz, ADL5920	ANALOG DEVICES, ADI-CP-32-7
3				
0	1	U2	IC, MEMORY,EEPROM,2Kb (256x8),TSSOP-8,400kHz MICROCHIP, 24LC025-I/ST	MICROCHIP, 24LC025-I/ST
3				
1	1	U3	IC,Low Noise LDO uPwr. Reg.,S8	LINEAR, LT1763IS8-5#PBF
3				
2	4	MP1-MP4	STANDOFF,NYLON, SNAP-ON, 0.250"	KEYSTONE, 8831, STANDOFF