
Si4820/24 DEMO BOARD USER'S GUIDE

1. Features

- ATAD (analog tune and analog display) AM/FM/SW radio
- Worldwide FM band support from 64–109 MHz with 5 sub-bands:
 - FM1 87–108 MHz (Demo Board Default)
 - FM2 86.5–109 MHz
 - FM3 87.3–108.25 MHz
 - FM4 76–90 MHz
 - FM5 64–87 MHz (Demo Board Default)
- Worldwide AM band support from 504–1750 kHz with 5 sub-bands:
 - AM1 520–1710 kHz (Demo Board Default)
 - AM2 522–1620 kHz (Demo Board Default)
 - AM3 504–1665 kHz
 - AM4 520–1730 kHz
 - AM5 510–1750 kHz
- Worldwide SW band support from 5.6–22 MHz with 16 sub-bands:
 - SW1 5.6–6.4 MHz (DEMO Board Default, for Si4824 only)
 - SW2 5.95–6.2 MHz
 - SW3 6.8–7.6 MHz (DEMO Board Default, for Si4824 only)
 - SW4 7.1–7.6 MHz
 - SW5 9.2–10 MHz (DEMO Board Default, for Si4824 only)
 - SW6 9.2–9.9 MHz
 - SW7 11.45–12.25 MHz (DEMO Board Default, for Si4824 only)
 - SW8 11.6–12.2 MHz
 - SW9 13.4–14.2 MHz (DEMO Board Default, for Si4824 only)
 - SW10 13.57–13.87 MHz
 - SW11 15–15.9 MHz (DEMO Board Default, for Si4824 only)
 - SW12 15.1–15.8 MHz
 - SW13 17.1–18 MHz (DEMO Board Default, for Si4824 only)
 - SW14 17.48–17.9 MHz
 - SW15 21.2–22 MHz (DEMO Board Default, for Si4824 only)
 - SW16 21.45–21.85 MHz
- Twelve positions band switch for selecting different band according to the target market.
- Two AAA battery operations with working voltage down to 2.0 V
- Economical potentiometer for frequency tuning replaces more expensive variable capacitor (PVC).
- Potentiometer and/or push button volume control
- FM 50 μ s or 75 μ s (default) de-emphasis

2. Overview

This manual describes the operation of the Silicon Labs Si4820/24-DEMO board Rev1.0, Sep 02, 2011. The Silicon Laboratories Si4820/24-DEMO board is designed with the 24-pin SSOP packaged Si4820/24 chip, the revolutionary single chip AM/FM/SW receiver that integrates everything from antenna input to audio output and allows use of common and economical potentiometers to do the frequency tuning. It provides a complete portable analog tune analog display AM/FM/SW radio design. The Si4820/24-DEMO is designed with 1-layer PCB, allowing the lowest cost without sacrificing the RF performance. The demo board works with two AAA batteries and working voltage down to 2.0 V.

Si4820/24-DEMO

3. Description

Figure 1 and Figure 2 shows the physical layout of the board with key components indicated.

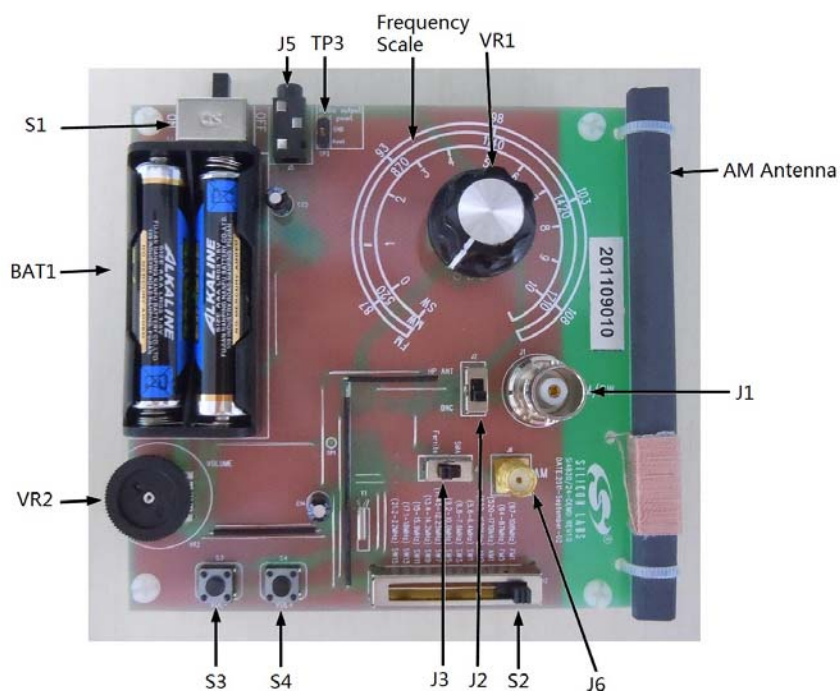


Figure 1. Si4820/24-DEMO Board Top Side

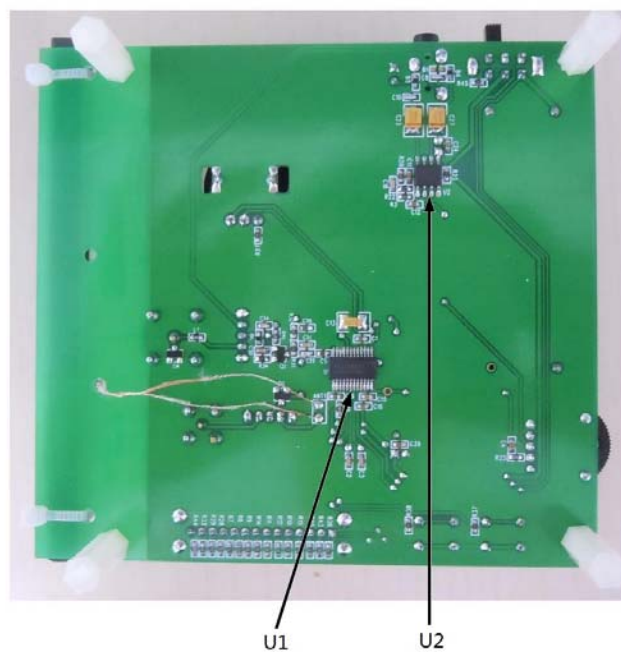


Figure 2. Si4820/24-DEMO Board Bottom Side

Power:

BAT1: 2 cells AAA battery holder

S1: Power on / off

Audio Connectors:

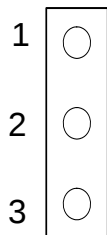
J5: Mono audio headphone output

Antenna Selections:

AM antenna: Ferrite stick antenna for AM

J1: BNC connector for FM/ SW conductive testing or FM whip antenna

J2: FM antenna selector

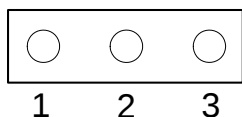


1-2: HP ANT (J5)

2-3: BNC (J1)

J6: SMA connector for AM conductive testing

J3: AM antenna selector

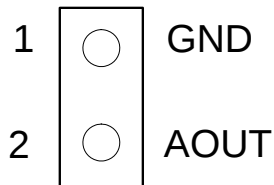


1-2: AM Ferrite Antenna

2-3: SMA for AM Conductive Test (J6)

Audio Output Test Point:

For the general specification test, TP3 is the recommended audio signal test point. The audio test instrument should be connected to TP3 to get more accurate test results. J5 can also be used as an audio test point, but the test results may not be entirely accurate under some circumstances.



Si4820/24-DEMO

Main Components:

U1: Silicon Laboratories Si482x AM/FM/SW ATAD receiver

U2: Audio amplifier

Frequency scale: The analog display for tuning frequency

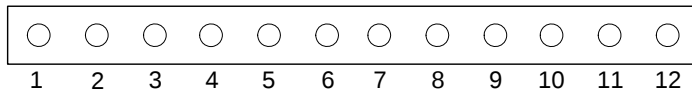
Control Interface:

VR1: Frequency tuning wheel.

VR2: Volume control wheel

S3,S4: The push buttons for volume control

S2: Band switch for FM, AM and SW



1: FM1 (87–108 MHz)

2: FM5 (64–87 MHz)

3: AM1 (520–1710 kHz)

4: AM2 (522–1620 kHz)

5:SW1 (5.6–6.4 MHz)

6:SW3 (6.8–7.6 MHz)

7:SW5 (9.2–10.0 MHz)

8:SW7 (11.45–12.25 MHz)

9:SW9 (13.4–14.2 MHz)

10:SW11 (15–15.9 MHz)

11:SW13 (17.1–18 MHz)

12:SW15 (21.2– 22 MHz)

4. Operation

S4820/24-DEMO board, a complete analog tune and analog display radio, is very easy to operate:

1. Put two AAA batteries into the battery compartment.
2. Switch the power switch to the ON position. The board will power up to a radio band according to the position of the band switch.
3. Change the band switch to the desired band.
4. Rotate the tuning wheel and find the desired frequency.
5. Rotate the volume control wheel or press the volume control push buttons to get a comfortable volume.

Note: For FM listening, the earphone cable must be connected to the board when J2 is set to "HP ANT" or an external antenna must be connected to the BNC connector when J2 is set to "BNC".

For AM listening, the ferrite antenna must be connected to the board and the J3 is set to "Ferrite" before Turning on the radio or band switching to AM.

For FM/AM sensitivity and SNR test, the tuner output volume level must be set to maximum by pressing push button S4, or you might get degraded test results.

5. Bill of Materials

- ATAD AM/FM/SW receiver IC Si4820/24 with external 32.768 kHz crystal oscillator support
- LM4910 Audio amplifier IC
- See Table 1 for details

Table 1. Si4820/24-DEMO Board Rev 1.0 Bill of Materials

Item	Qty	Reference	Description	Value
1	5	C1 C16 C19 C24 C39	CAP,SM,0603,X7R	0.1 μ
2	2	C23 C27	CAP,SM,1210,X7R	220 μ
3	1	C13	CAP,SM,1210,X7R	47 μ
4	2	C14 C25	Electrolytic capacitor	100 μ /4 V
5	2	C2-3	CAP,SM,0603,C0G	22 p
6	2	C30-31	CAP,SM,0603,X7R	33 n
7	1	C33	CAP,SM,0603,C0G	10 p
8	1	C34	CAP,SM,0603,C0G	33 p
9	3	C4 C12 C15	CAP,SM,0603,X7R	4.7 μ
10	2	C5 C36	CAP,SM,0603,X7R	0.47 μ
11	2	C8 C10	CAP,SM,0603,C0G	100 p
12	1	C11	CAP,SM,0603,C0G	330 p
13	1	C18	CAP,SM,0603,X7R	820 p
14	1	R25	RES,SM,0603	0R
15	1	R22	RES,SM,0603	12 k
16	1	R27	RES,SM,0603	100R
17	1	R31	RES,SM,0603	1 k
18	1	R32	RES,SM,0603	10R
19	1	R41	RES,SM,0603	120 k
20	1	R3	RES,SM,0603	2.2 k
21	1	R45	RES,SM,0603	200R
22	3	R6 R23 R34	RES,SM,0603	100 k
23	1	R20	RES,SM,0603	6.8 k
24	2	R37 R38	RES,SM,0603	56 k
25	1	R36	RES,SM,0603,Tolerance $\pm 1\%$	33 k
26	1	R29	RES,SM,0603,Tolerance $\pm 1\%$	160 k
27	1	R43	RES,SM,0603,Tolerance $\pm 1\%$	30 k
28	1	R44	RES,SM,0603,Tolerance $\pm 1\%$	47 k
29	1	R7	RES,SM,0603,Tolerance $\pm 1\%$	10 k

Table 1. Si4820/24-DEMO Board Rev 1.0 Bill of Materials (Continued)

Item	Qty	Reference	Description	Value
30	1	R8	RES,SM,0603,Tolerance $\pm 1\%$	40 k
31	9	R9-12 R14-15 R28 R33 R35	RES,SM,0603,Tolerance $\pm 1\%$	20 k
32	1	L1	RES,SM,0603	0R
33	3	B4 B5 B6	FERRITE BEAD,SM,0603	2.5 k/100 M
34	1	B1	FERRITE BEAD,SM,0603	NP
35	1	VR1	100k, $\pm 10\%$,Variable resistor(POT)	100 k
36	1	VR2	10k, $\pm 20\%$,Variable resistor(POT)	10 k
37	1	U1	SI4820/24,SSOP24	Si4820/24
38	1	U2	LM4910MA,SO8	LM4910MA
39	2	D2 D4	DIODE,SM,ESD,SOT23	BAV99
40	1	Q1	TRANSISTOR NPN SOT23	2SC9018
41	1	Y1	CRYSTAL	32.768 kHz
42	1	J1	BNC VERTICAL	BNC For FM/ SW testing
43	1	J6	SMA VERTICAL	SMA For AM testing
44	2	J2 J3	Single pole two throw switch	
45	1	J5	earphone jack	
46	1	S1	Two pole two throw switch	
47	1	S2	Single pole twelve throw switch	
48	1	S3	Push button	
49	1	S4	Push button	
50	1	ANT1	AW ferrite stick antenna	220 μ H
51	1	BAT1	BATTERY BOX ,AAA*2 SIZE	
52	1	TP3	CONN,TH,1x2,HDR	CONN,TH,1x2,HDR

6. Schematics

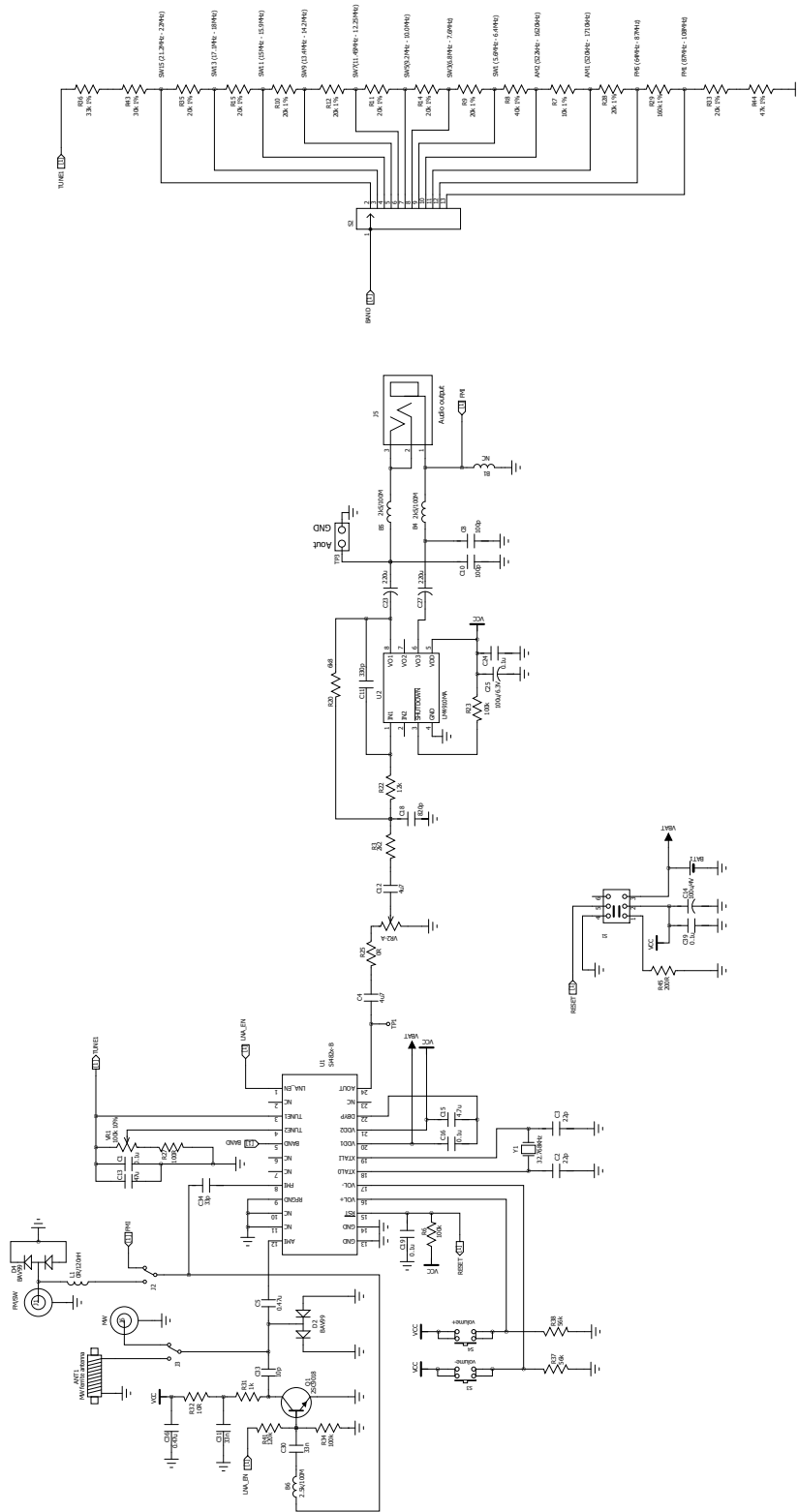


Figure 3. Si4820/24-DEMO Board Rev 1.0 Schematic

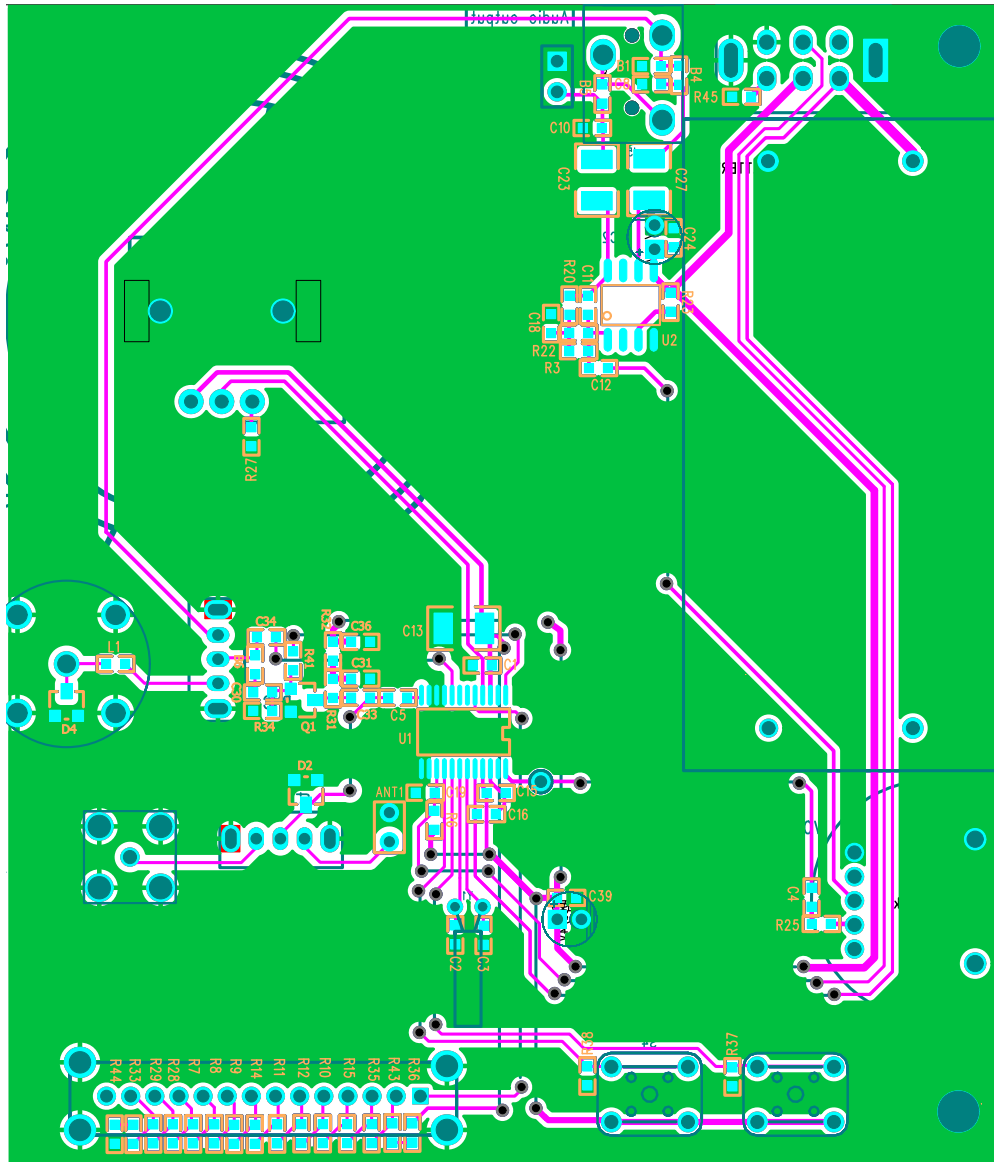
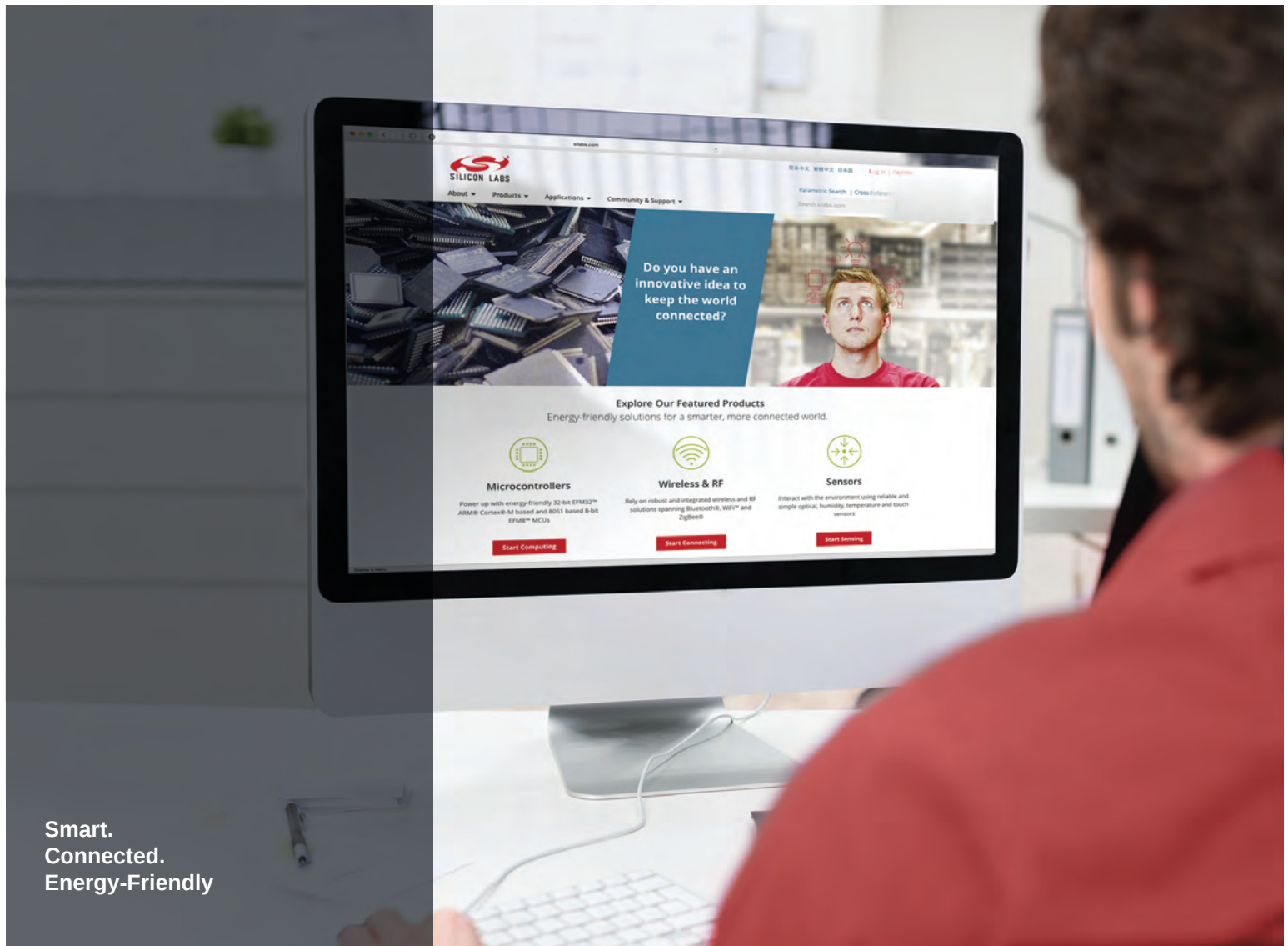


Figure 4. Si4820/24-DEMO Board Gerber Rev 1.0

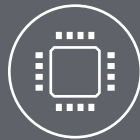


Smart.
Connected.
Energy-Friendly



Products

www.silabs.com/products



Quality

www.silabs.com/quality



Support and Community

community.silabs.com

Disclaimer

Silicon Laboratories intends to provide customers with the latest, accurate, and in-depth documentation of all peripherals and modules available for system and software implementers using or intending to use the Silicon Laboratories products. Characterization data, available modules and peripherals, memory sizes and memory addresses refer to each specific device, and "Typical" parameters provided can and do vary in different applications. Application examples described herein are for illustrative purposes only. Silicon Laboratories reserves the right to make changes without further notice and limitation to product information, specifications, and descriptions herein, and does not give warranties as to the accuracy or completeness of the included information. Silicon Laboratories shall have no liability for the consequences of use of the information supplied herein. This document does not imply or express copyright licenses granted hereunder to design or fabricate any integrated circuits. The products must not be used within any Life Support System without the specific written consent of Silicon Laboratories. A "Life Support System" is any product or system intended to support or sustain life and/or health, which, if it fails, can be reasonably expected to result in significant personal injury or death. Silicon Laboratories products are generally not intended for military applications. Silicon Laboratories products shall under no circumstances be used in weapons of mass destruction including (but not limited to) nuclear, biological or chemical weapons, or missiles capable of delivering such weapons.

Trademark Information

Silicon Laboratories Inc., Silicon Laboratories, Silicon Labs, SiLabs and the Silicon Labs logo, CMEMS®, EFM, EFM32, EFR, Energy Micro, Energy Micro logo and combinations thereof, "the world's most energy friendly microcontrollers", Ember®, EZLink®, EZMac®, EZRadio®, EZRadioPRO®, DSPLL®, ISOmodem®, Precision32®, ProSLIC®, SiPHY®, USBXpress® and others are trademarks or registered trademarks of Silicon Laboratories Inc. ARM, CORTEX, Cortex-M3 and THUMB are trademarks or registered trademarks of ARM Holdings. Keil is a registered trademark of ARM Limited. All other products or brand names mentioned herein are trademarks of their respective holders.



Silicon Laboratories Inc.
400 West Cesar Chavez
Austin, TX 78701
USA

<http://www.silabs.com>