
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.

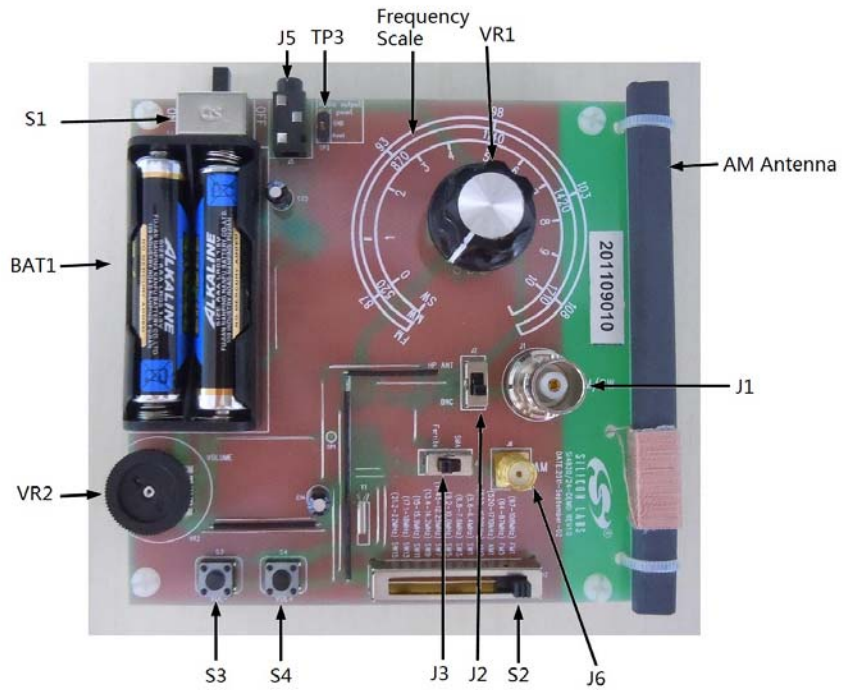


Figure 1. Si4820/24-DEMO Board Top Side

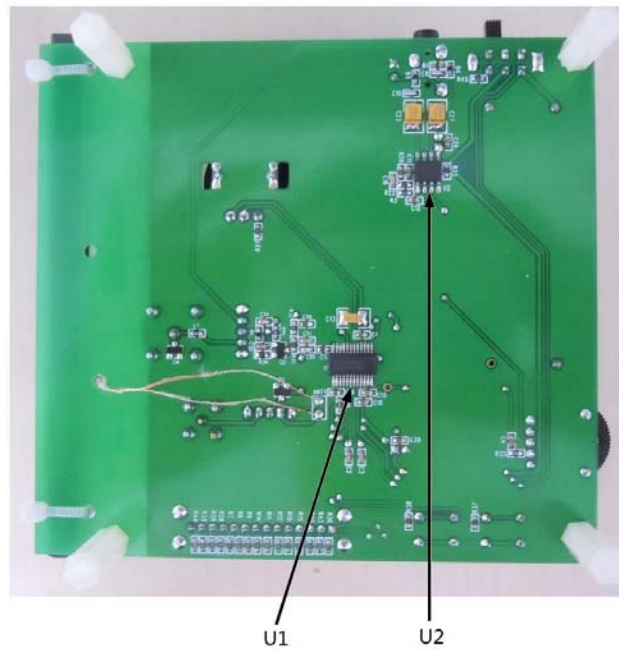


Figure 2. Si4820/24-DEMO Board Bottom Side

Power:

BAT1: 2 cells AAA battery holder

S1: Power on / off

Audio Connectors:

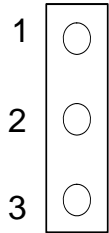
J5: Mono audio headphone output

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

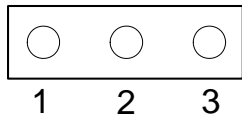


1-2: HP ANT (J5)

2-3: BNC (J1)

J6: SMA connector for AM conductive testing

J3: AM antenna selector

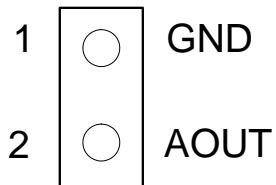


1-2: AM Ferrite Antenna

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

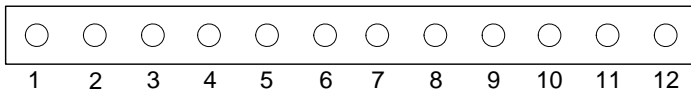
Control Interface:

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.

Si4820/24-DEMO

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

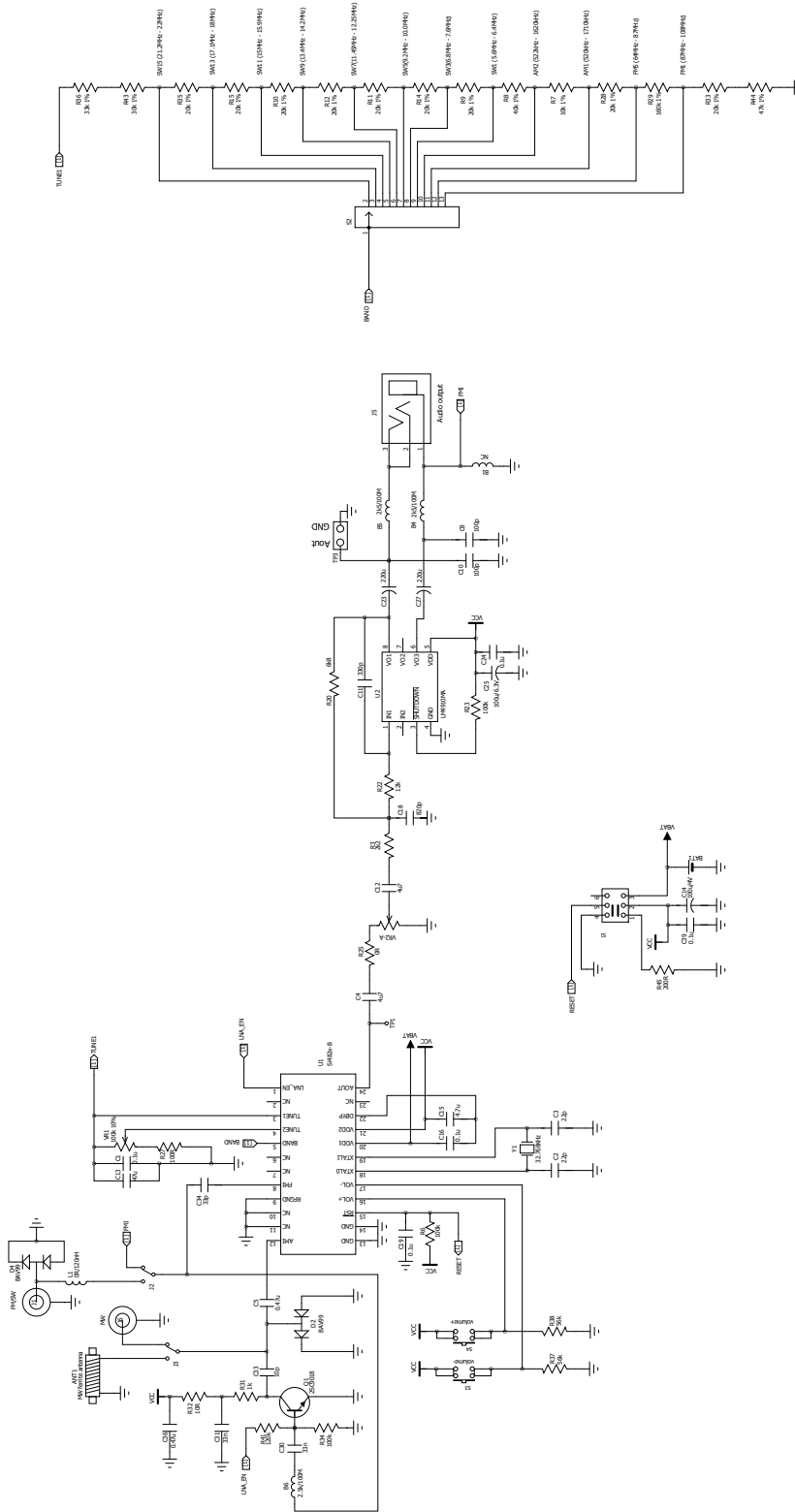


Figure 3. Si4820/24-DEMO Board Rev 1.0 Schematic

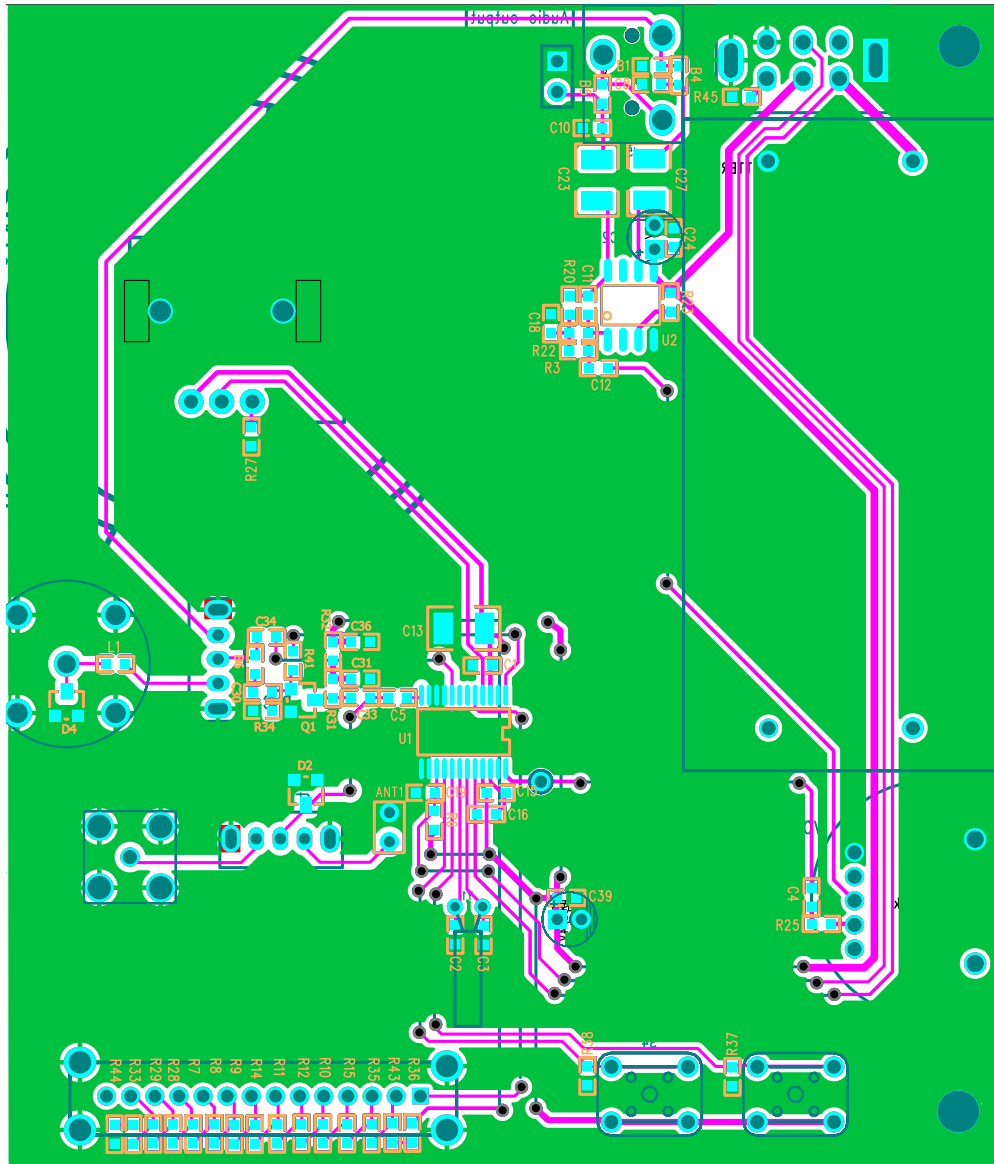


Figure 4. Si4820/24-DEMO Board Gerber Rev 1.0



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

<http://www.silabs.com>