

# **Si468x Demo Board User's Guide**

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### 1. Features

- 1.1 Two configurations:
  - FMHD configuration: supports FM and FMHD broadcasts
  - DAB configuration: supports FM and DAB/DAB+ broadcasts
- 1.2 FM band (87.5 – 107.9 MHz) support
- 1.3 FMHD band (87.5 – 107.9 MHz) support (FMHD config only)
- 1.4 DAB/DAB+ Band-III (168–240 MHz) support (DAB config only)
- 1.5 Auto seek FM/FMHD valid station (FMHD config only)
- 1.6 Autoscans DAB station (FMHD config only)
- 1.7 Station presets
  - 16 FM / 16 FMHD station presets (FMHD config only)
  - 16 FM / 16 DAB/DAB+ station presets (DAB config only)
- 1.8 FM Radio Data Service (RDS) decoding
  - PI PTY RT PST CT AF
- 1.9 FMHD Data services (FMHD config only)
  - Service information Service (SIS) decoding
    - Slogan
    - USName
    - Smessage
    - SNLong
    - SNShort
    - Location LAT
    - Location LON
  - Packet Data service (PSD) decoding
    - Title
    - Artist
    - Album
    - Genre
- 1.10 DAB Data services (DAB config only)
  - Dynamic Label System (DLS) decoding (DLS string)
- 1.11 Alarm function
- 1.12 Volume control with mute function
- 1.13 FM / FMHD band and signal quality indicator display (FMHD config only)
- 1.14 FM / Band-III band and signal quality indicator display (DAB config only)
- 1.15 Calendar display
- 1.16 4x4 matrix keypad interface
- 1.17 Power save mode
- 1.18 Support I2S, speaker and headphone interface for audio output
- 1.19 Support serial port and infrared interface (pending)

## 2. Description

The Si468x demo board is a complete digital radio receiver system. It supports FM, FMHD and DAB/DAB+ broadcasts based on two configurations:

- FMHD configuration: supports FM and FMHD broadcasts
- DAB configuration: supports FM and DAB/DAB+ broadcasts

This demo board supports all Silicon Laboratories Si468x digital radio ICs. The host MCU is a Silicon Laboratories C8051F380 MCU with internal oscillator and using an external 32.768 kHz crystal as real time clock. The internal firmware contain tuner and MCU can be updated via USB interface. The display is a 1602 LCD, it can display two line (32 characters) at most.

### 2.1. Default Settings

The Demo board will record some parameter setting before power down, and recall the setting after power on. Depending on the configuration of the board (i.e. FMHD or DAB/DAB+), one of the following modes will be selected by default the first-time the board is powered-on by the user:

- FM mode
- FMHD mode
- DAB/DAB+ mode

The follow figure shows the physical layout of the board with key components indicated.

## Si468x Demo Board

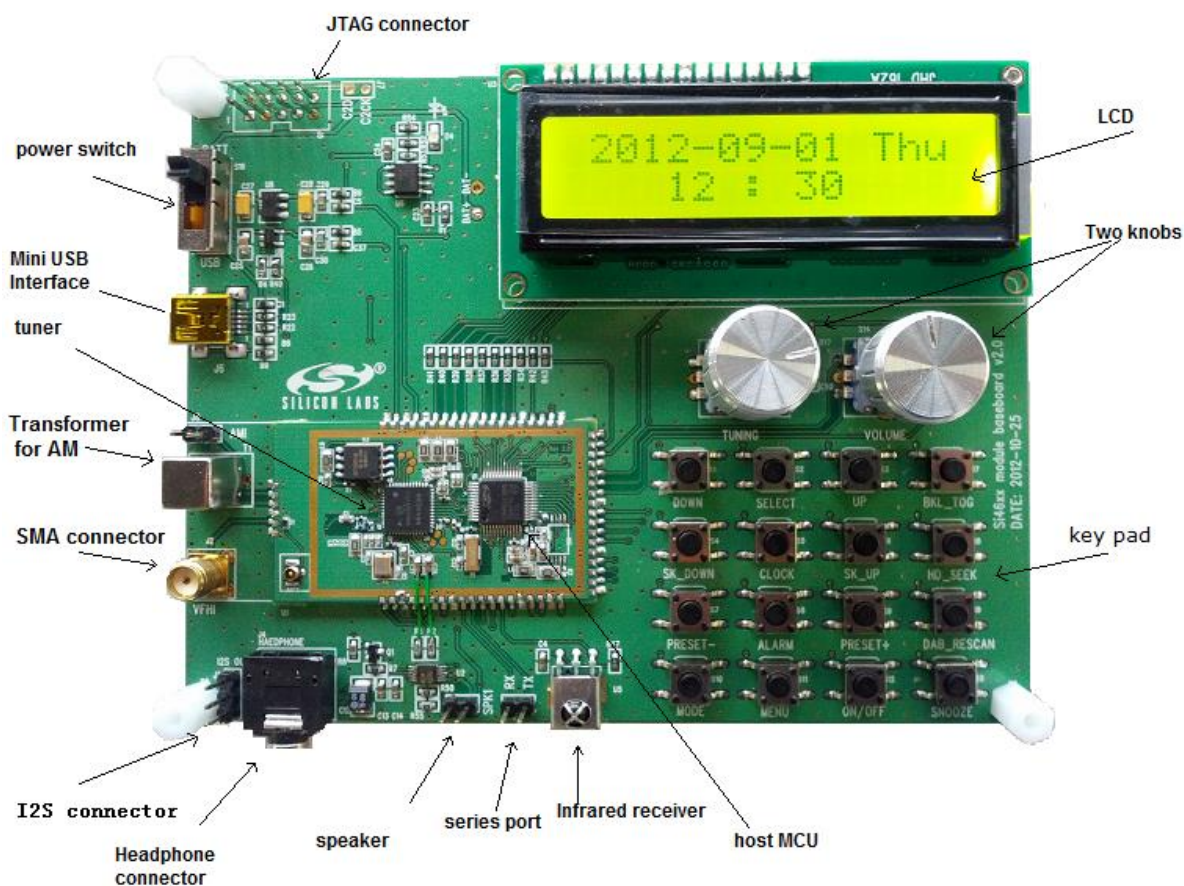


Figure 1. Si468x demo board top side in calendar mode

### 3. Operation

This section describes the operating modes of the Si468x-DEMO board. The board provides three major modes of operation: Clock, Alarm and FM/FMHD/DAB radio.

#### 3.1. Calendar mode

Upon power on and after welcomed interface, the board automatically enters the Calendar Mode and displays the following information:

- Year-month-day
- Day of the week
- Hour-minute

In this mode , the SELECT key is used for entering setup menu and select difference adjustable item like year, month day of the week, hour and minute), and DOWN and UP key are used to set the value for each select item

#### 3.2. Alarm mode

*Note: the alarm function is not included in the sample MMI by default.*

There is alarm function on this board. After turn on alarm and alarm time is up, the LCD will display “Alarm Time up” prompting. At this time, press ALARM key will clean up the alarm.

The ALARM key is used for entering the alarm interface. If there are an alarm has been set, then it will display alarm time when entering the alarm interface, or will display “not alarm set”. At this time press SELECT key will enter set up menu and select difference adjustable items as calendar setting

#### 3.3. FM, FMHD and DAB modes

From Calendar mode, pressing the ON/OFF key will enter the last mode that was used before powerdown. In this mode, it will have the follow functions:

##### 3.3.1. Band selection

Pressing the MODE key will cycle select the band mode from FM and FMHD or FM and DAB, based on the chosen configuration. And wait a moment, demo board will auto boot up and work in the selection mode.

*Note: Band Selection is not available when in calendar mode – you must first turn the radio on using the ON/OFF key and then switch bands.*

##### 3.3.2. Tune

Right/Left turn the TUNING knob to tune to the previous/next station (FM and FMHD modes) or to the previous/next service (DAB/DAB+ mode). Press the knob to confirm/tune to the target station/service.

### 3.3.3. Seek

SK\_DOWN/SK\_UP is used for auto seek valid station when in FM mode and FMHD mode. Press those key, the demo radio will seek and stay at a valid station but if there are no valid station in the air, then the radio will tune back previous station.

HD\_SEEK is only used for FMHD.

### 3.3.4. Station presets

PRESET-/PRESET+ is used for delete/add preset stations in the FM, FMHD or DAB mode.

As of SDK v1.6.0 the DAB preset implementation has two options “stack” and “favorites” with the default sample MMI using the “favorites” implementation. The favorites style presets has several advantages: smaller MCU code requirements as well as enabling as many presets as there are services rather than the hard limit imposed by the “stack” style.

FM/FMHD only implement the “stack” style presets.

#### 3.3.4.1 FM/FMHD/DAB presets – Stack

- Add a preset: press and hold the preset+ button.
- Remove a preset: from the preset selection screen, select the desired preset to remove and hold the preset- button.
- Select/Start a preset: A press to preset+ or preset- enters the preset selection screen and subsequent presses will move up or down the stack to select the desired preset.

#### 3.3.4.2 DAB presets – Favorites

- Add a preset: from any service screen (now playing or browse) press (not hold) the preset+ button to mark that service
- Remove a preset: from any service screen (now playing or browse) press (not hold) the preset- button to remove that service
- Select the service browse mode: using the normal service selection process incorporates the preset items
  - Enter Browse mode of **only** presets: hold the preset+ button
  - Browse all services: hold the preset- button

### 3.3.5. Scan (DAB mode only)

Press the DAB\_RESCAN key to scan entire DAB band.

### 3.3.6. Volume control

Rotate turn VOLUME knob to increase or decrease the volume, the range of volume is from 1 to 16, press the knob to mute/un-mute the volume.

### 3.3.7. Menu setting

Press menu button will enter menu interface. Menu item will vary according to each band mode, at this time SELECT key is used for select/unselect item, DOWN and UP are used to set the value for each select item.

The common menu item includes:

- LCD back light control
- Snooze
- Version



## 3.4. Human interface

There are 16 keys for controlling the demo board as shown in below figure

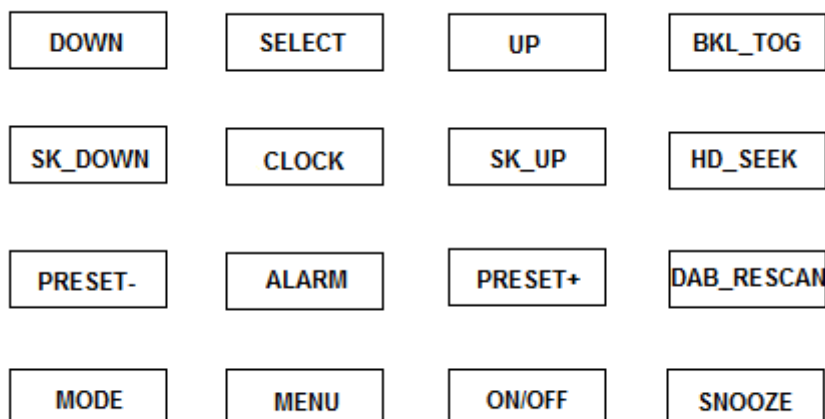


Figure 2.Human Interface Keys

The functions of the buttons are summarized in Table 1:

Table 1. Key Function Description

<b><u>Button</u></b>	<b><u>Calendar / Alarm / Menu</u></b>	<b><u>FM</u></b>	<b><u>FMHD</u></b>	<b><u>DAB</u></b>
DOWN	Decrease the value of selection item	Tune to previous station by step	Tune to previous station/sub channel	Browse previous service station
SELECT	Select the adjustable item	None		Tune to current service station when in browse service mode
UP	Increase the value of selection item	Tune to next station by step	Tune to next station by step or sub channel	Browse next service station
BKL_TOG	Turn on/off LCD back light			
SK_DOWN	None	Seek to previous valid station	Seek to previous valid station/tune to previous sub channel	None
CLOCK	Display current time			
SK_UP	None	Seek to next valid station	Seek to next valid station/tune to next sub	None

			channel	
HD_SEEK	None		Toggle HD only seek.	Start DAB BER Test
HD_SEEK (HOLD)	None		None	Start DAB FE Calibration
PRESET-	None	Enter the preset screen, move down in the “stack” of presets		<b>“Stack” option:</b> Enter the preset screen, move down in the “stack” of presets. <b>“Favorites” option:</b> Toggle mark/unmark the currently selected service as a favorite.
PRESET+	None	Enter the preset screen, move up in the “stack” of presets		<b>“Stack” option:</b> Enter the preset screen, move up in the “stack” of presets. <b>“Favorites” option:</b> Toggle mark/unmark the currently selected service as a favorite.
PRESET- (HOLD)	None	Remove the current frequency from preset table.		<b>“Stack” option:</b> Remove the service from the preset table. <b>“Favorites” option:</b> Toggle the service browse mode between “FAVORITES” / “ALL” services. In “FAVORITES” mode - Only those service marked as favorites will be in the list to select.
PRESET+ (HOLD)	None	Add the current frequency to preset table		<b>“Stack” option:</b> Add the current frequency to preset table <b>“Favorites” option:</b> Toggle the service browse mode between “FAVORITES” / “ALL” services. In “FAVORITES” mode - Only those service marked as favorites will be in the list to select.

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ALARM	Enter alarm interface – <i>Note: not currently included in default MMI options</i>			
DAB_RESCAN	None		Start HD BER Test	Force a re-scan of the DAB band – this will erase all service list stored info and recapture the current visible service list.
DAB_RESCAN (HOLD)	None		Enable HD audio “Split Mode”	None
MODE	None	Change the band mode between FM, FMHD, and DAB. <i>Only modes included in the built image AND available for the Si468x device will be shown.</i>		
MENU	None	Enter menu interface		
ON/OFF	Turn on or turn off radio operation			
SNOOZE	Extend the alarm time to 10 minutes ,when radio prompting alarm time up – <i>Note: not currently included in default MMI options</i>			
TUNING knob Left - Rotate	None	Tune to previous station by step	Tune to previous station/sub channel	Browse previous service name
TUNING knob right- Rotate	None	Tune to next station by step	Tune to next station/sub channel	Browse next service name
TUNING knob press	None	Rotate to next info screen (auto scroll display info/fix display metrics or RDS info)	Rotate to next info screen (auto scroll display info or fix display metrics, or display RDS info or display or fix display SIS or fix display PSD)	<b><u>Service Selection Screen:</u></b> Tune to current service station when in browsing service mode <b><u>Current Playing Screen:</u></b> rotate to next info screen(auto scroll display info or fix display metric or fix display DLS info)
VOLUME knob Left-Rotate	None	Decrease the volume by 1(1-16)		
VOLUME knob Right-Rotate	None	Increase the volume by 1(1-16)		



## Si468x Demo Board

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