Wuxi Sicomm Communication Technologies, Inc

SCT3258 HDK

Development Board

User's Manual

Revision: 1.9

Table of Contents:

1 Introduction

The SCT3258 HDK Development Board is a comprehensive, evaluation, test and development platform that helps product designers to gain experience with the SCT3258 digital radio base band chip. The SCT3258 HDK is ideal for comparing voice quality of various vocoders, analyzing protocol bit streams, and establishing interface requirements. This valuable knowledge gives engineers the insight required to start prototyping their own digital radio system quickly and easily thereby decreasing development costs and speeding up the new product time to market time.

The SCT3258 HDK employs Sicomm's SCT3258 digital radio base band chip, which integrates 4-FSK modem, internal vocoders, and DPMR / DMR or other radio protocols, that is ideal for digital radio systems, including European DPMR and DMR, Chinese NCR, US NXDN and Japanese DCR systems..

1.1 SCT3258 HDK Features

The SCT3258 HDK is a complete functional system from analog audio interface and modem interface and digital control interface.

Sicomm's SCT3258 digital radio base band chip is the core of the SCT3258 HDK. All of the supporting chips on the board were chosen for their low cost, ease of use and wide availability.

The SCT3258 HDK features:

1. Sicomm's SCT3258 base band chip with 4-FSK modem, internal AMBE vocoder from DVSI and digital radio communication protocols.
2. Interface to AMBE3000 external vocoder
3. TI TLV320AIC3204 codec for analog audio and modem interface
4. Connect to External MCU with 8 bit parallel HPI interface
5. On board USB to HPI interface for connection with PC
6. On board MIC and LINE IN for audio input
7. Headphone output that directly drives 32-ohm headphone load
8. Two analog outputs to modem for 2-point or I/Q modulations
9. Two analog inputs for I/O modulations
10. Configuration via dipswitches, jumpers and HPI (or PC) Interface

1.2 What's included with the HDK

The development kit includes the following items:
The SCT3258 HDK base board
SCT3258F module with TLV320AIC3204 codec
USB cable
SCT3258 HDK CD that includes the control software

2 Hardware Descriptions

2.1 SCT3258 HDK Development Board

A：Version 1

The SCT3258 HDK development board is shown in Figure 1 below. The main components on the board are SCT3258 Module which includes SCT3258F digital base band chip and TLV320AIC3204 stereo codec from TI.

Other components on board are either interface components or supporting components.

The power is either provided by the 5 v power connector (1), or by the USB interface (5). In either case, power switch (2) is used to turn on of turn off the power to the main board.
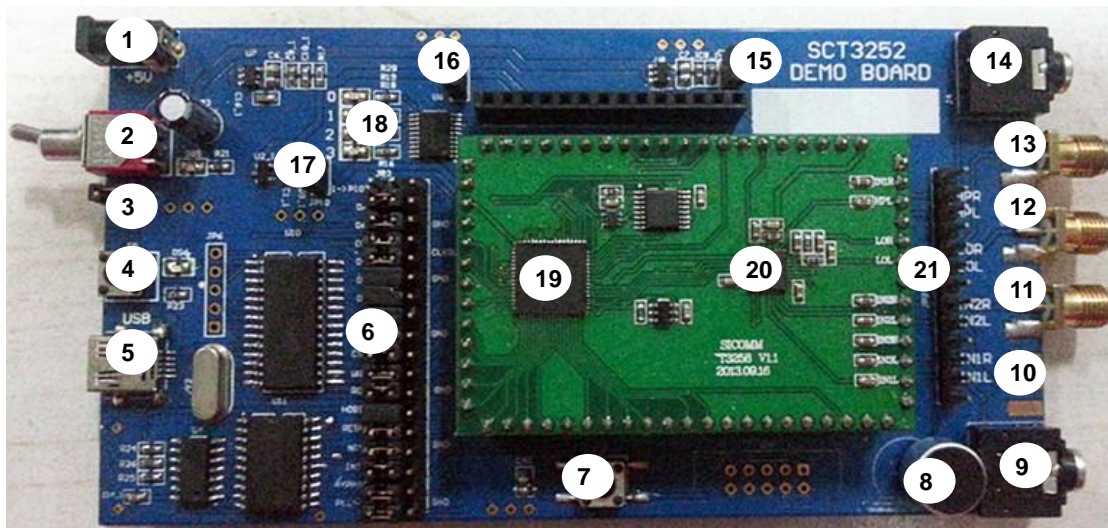

Figure 1 SCT3258 Development Board

List of Components on SCT3258 development board:

1. Power Input 4~5.5V (if not use USB power).
2. Power Switch. The switch is on when move toward the USB port (5).
3. Short for using USB power as power input.
4. USB Rest Button. Press this button once if USB port initialization fails.
5. USB port.
6. Connection to PC interface or external MCU, include HPI interface and other control signals.
7. SCT3258 RESET button.
8. On board microphone.
9. Microphone input port.
10. TLV320AIC3204 L2 (pin3) input port, used as DEMOD_IN.

11. TLV320AIC3204 R2 (pin6) input port., used as DEMOD_IP/FM DEMOD_input

12. TLV320AIC3204 LOUT2 (pin25) output port., used as MOD_I

13. TLV320AIC3204 ROUT2 (pin23) output port, used as MOD_Q

14. TLV320AIC3204 LOUT1 (pin30) output port, used to drive left headphone

15. Short for 3.3V for TLV320AIC3204，used to current measurement

16. Short for 3.3V for SCT3258，used to current measurement

17. Short for 1.2V for SCT3258，used to current measurement

18. SCT3258 PIO3~PIO0 status LED.

19. SCT3258F chip.

20. TI TLV320AIC3204 chip.

21. Analog header

B：Version 2

The SCT3258 HDK development board is shown in Figure 2 below. The main components on the board are SCT3258 Module which includes SCT3258F digital base band chip and TLV320AIC3204 stereo codec from TI.

Other components on board are either interface components or supporting components.

The power is either provided by the 5 v power connector (1), or by the USB interface (5). In either case, power switch (2) is used to turn on of turn off the power to the main board.
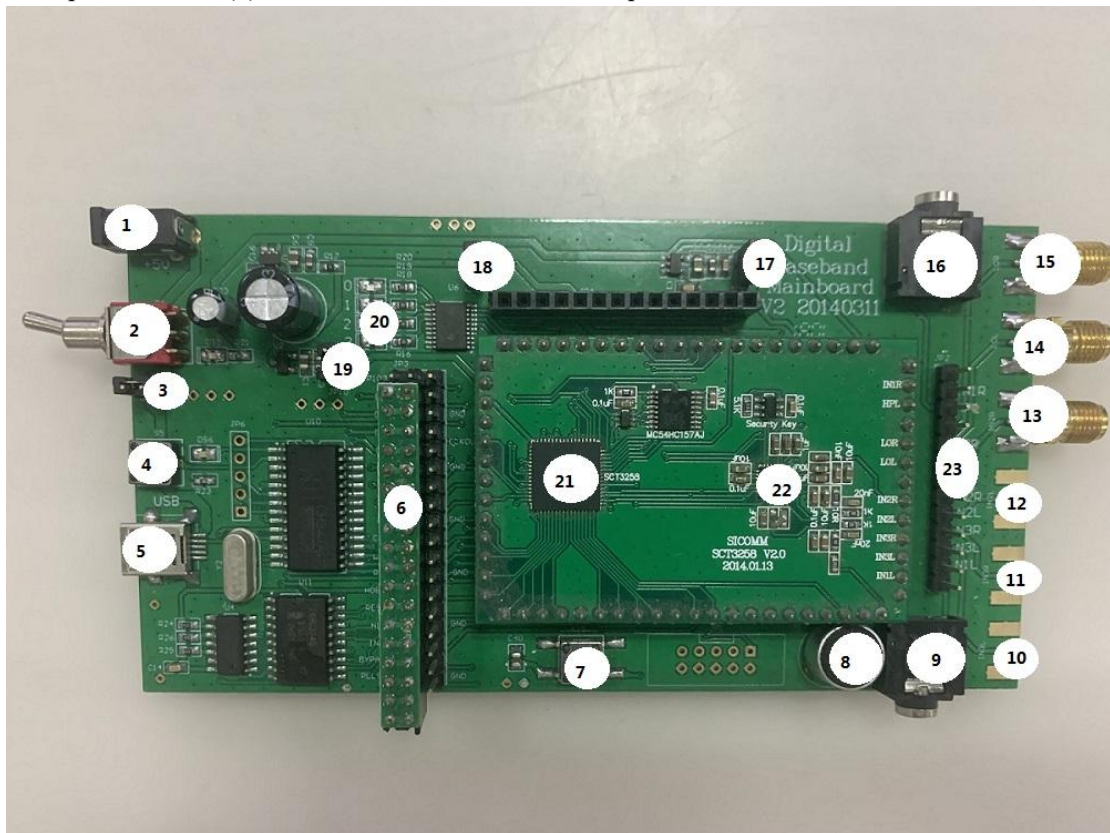

Figure 2 SCT3258 Development Board

List of Components on SCT3258 development board:

1. Power Input 4~5.5V (if not use USB power).
2. Power Switch. The switch is on when move toward the USB port (5).
3. Short for using USB power as power input.
4. USB Rest Button. Press this button once if USB port initialization fails.
5. USB port.
6. Connection to PC interface or external MCU, include HPI interface and other control signals.
7. SCT3258 RESET button.
8. On board microphone.
9. Microphone input port.
10. NULL
11. NULL
12. NULL
13. ES8388   R2 input port , used as DEMOD_IP/FM DEMOD_input
14. ES8388   LOUT2 output port, used as MOD_I
15. ES8388   ROUT2 output port, used as MOD_Q
16. ES8388   LOUT1 output port, used to drive left headphone
17. Short for 3.3V for ES8388，used to current measurement
18. Short for 3.3V for SCT3258，used to current measurement
19. Short for 1.2V for SCT3258，used to current measurement
20. SCT3258 PIO3~PIO0 status LED.
21. SCT3258 chip.
22. ES8388 chip.
23. Analog header

2.1.1 Reset Buttons

There are two reset buttons on SCT3258 board: SCT3258 Reset Button (7) and USB Reset Botton (4). When SCT325 button is pressed, all chips on board (SCT3258F, TI Codec and AMB3000 if connected) are reset. When USB Reset button is pressed, USB control chip is reset. The user can press the USB reset button when initialization of USB fails.

2.1.2 Clock and PLL

A 12.288 MHz clock generator provides clock to SCT3258F and external codec.

SCT3258 has an internal PLL to generate the main clock for SCT3258. The PLL clock frequency is selected with two PINs on SCT3258, PLLSEL2 and PLLBYPASS. These two pin are brought out on SCT3258 HDK board and can be controlled by PC interface or external MCU.

The PLL frequency is related to settings of PLLBYPASS and PLLSEL2, as described in the following table

PLLBYPASS, PLLSEL2	PLL Multiplier	Clock Frequency (MHz)
0b00	5	61.44
0b01	9	110.5920
0b1x	1	12.288

Table 1 PLL Settings

2.1.3 Analog Input/Output

Numerous analog input/output are provided on board, including on board MIC (8) and line in (9), stereo headphone outputs (14), modem inputs (10, 11) and modem output (12, 13).

The dual channel modem outputs allows for separate output for 2-point modulation required for 4-FSK modem, as well as I/Q modulation for other types modems such as QPSK or QAM. Similarity, the dual channel modem inputs also support QPSK or QAM base band signals.

For SCT3258 TX testing, the user can either send the audio signals from the on board MIC or from audio line in port, and get the 4-FSK modem signal from MOD_I and MOD_Q port. For SCT3258 RX testing, the user sends 4-FSK input signal through DEMOD_Q port, and gets audio signal from the headphone port.

In audio loop back mode, the user can speak to the on board MIC and hear his voice from the head phone output.

The audio signals are also brought out through Analog Header (21). With Audio Header, the user can easily connect to an existing radio system.

Pin	Signal
1	Ground
2	HPR, connected to headphone out right (ROUT1 on TLV320AIC3204)
3	HPL, connected headphone out left (LOUT1 on TLV320AIC3204)
4	Ground
5	LOR, connected to MOD_Q (ROUT2 on TLV320AIC3204)
6	LOL, connected to MOD_I (LOUT2 on TLV320AIC3204)
7	Ground
9	IN2R, connected to DEMOD_Q (R2 on TLV320AIC3204)
10	IN2L, connected to DEMOD_I (L2 on TLV320AIC3204)
11	Ground
12	IN1R, audio right input (R1 on TLV320AIC3204)
13	IN1L, audio left input (L1 on TLV320AIC3204), connected on board microphone, or line in
14	Ground

Table 2 Analog Header Signal Descriptions

2.1.4 Status LED

Status LED indicates the on/off status of SCT3258 PIO ports. This is shown in the picture below from top to bottom: PIO3, PIO2, PIO1, and PIO0.
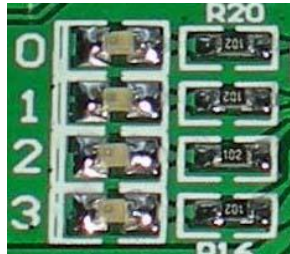

Figure 3 Status LED

2.1.5 Control Signals

Certain control PIN's on SCT3258 can be controlled directly through the USB interface or by the external MCU. These PIN's are brought out by control header (6) and listed below (in the middle column).

Pin	Signal
1	PIO3
2	HPI D7
3	HPI D6
4	HPI D5
5	HPI D4
6	HPI D3
7	HPI D2
8	HPI D1
9	HPI D0
10	HPI HCSN
11	HPI HWRN
12	HPI HRDN
13	HPI HOBIB
14	RESET
15	NMI
16	INT0
17	PLLBYPASS
18	PLLSEL2

Table 3 Control Header

The left column is connected to USB control signals. SCT3258 HDK is shipped with jumpers (left pins to mid pins) for connection with the USB interface for PC connections. To connect to an external MCU, the user can remove these jumpers and connect the mid pins to external MCU through a cable along with and right pins (all ground).

2.2 Connecting Hardware

The SCT3258 HDK development board connects to the PC through a USB cable (included). The USB cable also provides the power to the SCT3258 development board.

The user can also connect a headphone to the SCT3258 HDK development board.

3 Software Descriptions

SCT3258 HDK development board is supported by SCT_PORT software, which is a comprehensive software suite supporting all Sicomm's digital base band processor, including SCT3252, SCT3258 and SCT3928.

Details of SCT_PORT are described in "SCT_PORT Software Users Guide".