LMX9838DONGLE - Hardware User Guide

National Semiconductor
Application Note 1710
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1.0 Scope

National Semiconductor LMX9838 Bluetooth™ serial dongle evaluation kit is a plug and play serial adapter for serial cable replacement applications and more. It is able to support more profiles than just the Serial Port Profile (including audio support with external codec boards). By using the enclosed Simply Blue Commander software, it allows user to develop their own SW applications easily given the built in interpreter for HEX commands. SBSmart is a higher level application tool that provides buttons with the built in commands to easily set up or demonstrate different profile support using the Simply Blue SPP package.

2.0 General Description

2.1 EVALUATION KIT CONTENTS

- LMX9838 Bluetooth serial adapter reference board
- USB Dongle and application software stack
- Null modem cable
- Sedona Lite board (Audio CODEC Board)
- 110V to 240V AC to 5V DC power adapter and pigtail
- CDROM with design documents and Simply Blue software Application tools.

2.2 LMX9838 BLUETOOTH SERIAL ADAPTER

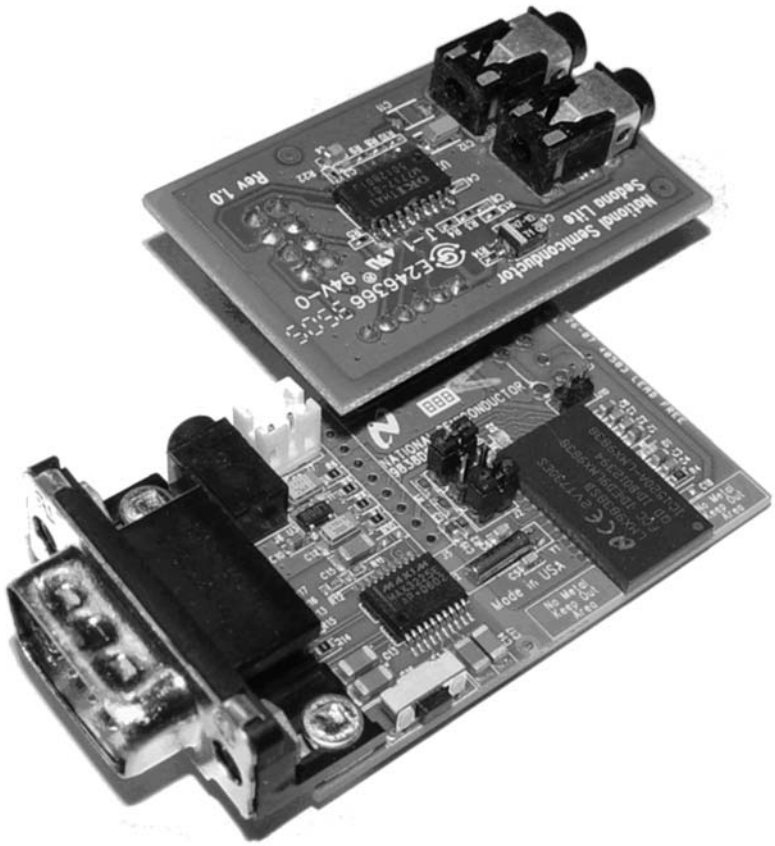

Figure 1. LMX9838Dongle and Sedona Lite Board

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3.0 Qualification

- FCC certified:
  - FCC ID: ED9LMX9838
- FCC compliance: The device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:
  - This device may not cause harmful interference
  - This device must accept any interference received, including interference that may cause undesired operation
- IC certified:
  - IC: 1520A-LMX9838
- Bluetooth SIG QD ID: B012394

4.0 Requirement and Setup

4.1 BASIC REQUIREMENT

- X86 PC with serial port.
- One of the following operating system is required.
  - Windows 2000
  - Windows XP

4.2 APPLICATION SOFTWARE

4.2.1 Simply Blue Commander

Application command oriented tool to generate commands and watch events in the Simply Blue Command interface window. Reference the Simply Blue Commander User Guide document for details.

4.2.2 SBSmart

Easy to use Windows based tool to demonstrate additional profile support of the Simply Blue functionality. Reference the SBSmart User Guide for additional details.

4.2.3 Patch Programming

LMX9838 allows for patch programming for firmware updates if necessary. Reference [2] for details. This can also be done with the Simply Blue Commander and SBSmart tools.

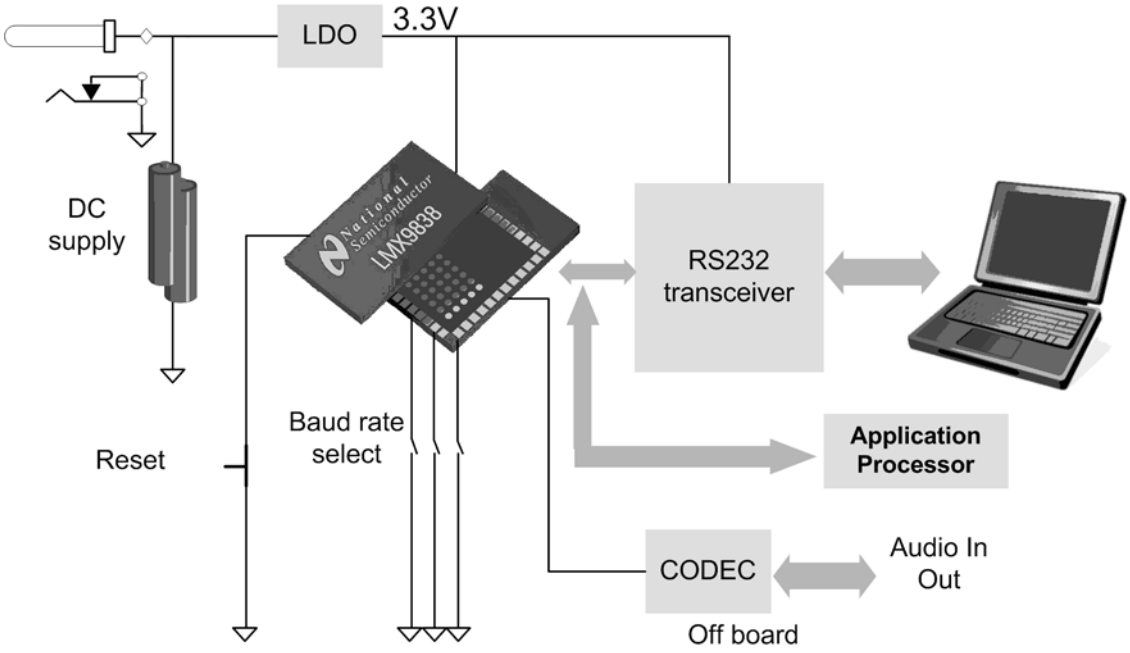

Figure 2. System Block Diagram

5.0 Functional Description

5.1 POWER SUPPLY

- DC Power Jack (6V max)
- Battery Holder (6V max)

5.2 MAIN SYSTEM

- Reset button for manual Reset
- Jumper option for Baud rate selection

5.3 UART INTERFACE

DB9 connector for RS232 standard PC interface using Onboard level shifter IC for handling LMX9838 module's 3.3V UART interface.

5.4 ADVANCE AUDIO INTERFACE

- Support Audio applications
- PCM codec interface (support linear and A-law)
- PCM Master or Slave operation (SW configurable)
- Direct connection to Sedona Lite Board (A-law only)

6.0 Design Consideration

6.1 POWER MANAGEMENT

- 3.3V output single LDO is used to provide power for RS232 interface chip and Digital portion of the LMX9838.

7.0 Layout

The LMX9838 reference design is split into 2 sections, one section is RS232 transceiver circuit for PC connection, another section is LMX9838 main circuit for Host processor.

7.1 PCB DESIGN

- 4 layers PCB
- 1.6 mm overall thickness

7.2 LAYERS CLASSIFICATION

- Top layer is the components and connection wiring
- Layer 2 is Ground plane
- Layer 3 is Power plane
- Bottom layer is interface signals

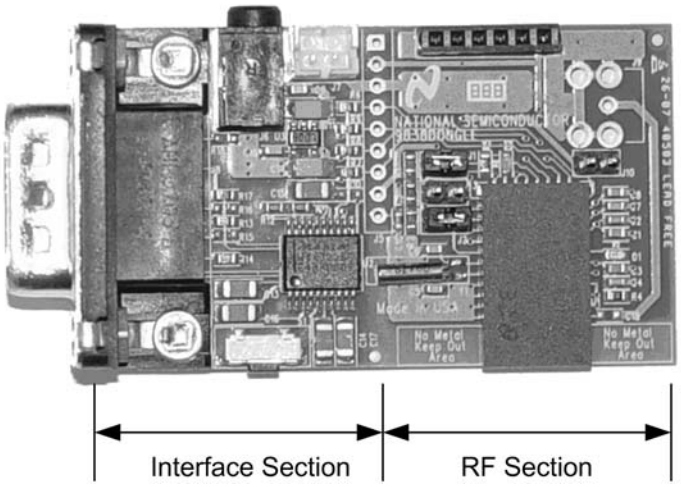

Figure 3. LMX9838Dongle

8.0 AUDIO CODEC Board

Sedona Lite Board contains an audio codec and two phone jacks. This board can be used in conjuction with LMX9838DONGLE to realize the audio (SCO) transmission and reception capabilities. (See Table 9)

Figure 4. Sedona Lite Audio Codec Board

9.0 Board components and Pin Assignments

A summary of the configuration and selection jumpers is provided in the tables that follow. Reference both the schematic and PCB layout (included on the CD in the kit)

Table 1. Major Components List

Device	Description
U1	National LMX9838 Serial Port Module - Reference the device datasheet.
U3	National LP3985 Low-Dropout Voltage Regulator
U2	Maxim MAX3225 1 Mbps High Speed UART Driver

Table 2 Connectors Summary

Connector	Description	Details
J7	Battery Connector 2mm pitch	Maximum input voltage is 6V
J6	DC jack	Same as above
J8	DP9 serial connector (male)	See Table 5
J5	External processor interface	See Table 6
J4	Advance Audio interface	See Table 7

Table 3 Jumper and Test Point Summary

Jumper / Test Point	Description	Details
J1, J2 and J3	Clock & UART setting jumper	See Table 8

Table 4 Switch and LEDs

Switch/LED	Description
S1	Reset button
D1	Operation Status
D2	Data Traffic (TX/RX)

Table 5 J8 DP9 (male) Pin Assignments

Pin #	Signal name	Description
1	NC	No connection
2	RxD	Receive Data (input)
3	TxD	Transmit Data (output)
4	NC	No connection
5	GND	Ground
6	NC	No connection
7	RTS	Ready to send (output)
8	CTS	Clear to send (input)
9	NC	No connection

Table 6 J5 External Processor Interface

Pin #	Signal name	Description
1	POWER_D#	ON/OFF control of LMX9838
2	VCC	LDO output (3.3V)
3	GND	Ground
4	TXD	Transmit Data (output)
5	CTS#	Clear to send (input)
6	RXD	Receive Data (input)
7	RTS#	Ready to send (output)
8	VCC_CORE_IN	1.8V voltage regulator input/output
9	RESET#	Reset (input)

Table 7 J4 Advance Audio Interface

Pin #	Signal name	Description
1	VCC	LDO output (3.3V)
2	SCLK	Advanced Audio Interface Clock
3	STD	Advanced Audio Interface Transmit Data
4	SFS	Advanced Audio Interface Frame Synchronization
5	SRD	Advanced Audio Interface Receive Data
6	GND	Ground

Table 8 UART interface setting

J2	J3	J1	UART baud rate
Short	Short	Short	921600bps
Short	Open	Short	115200bps(default)
Open	Short	Short	9600bps
Open	Open	Short	NVS (Default 9600bps)

Table 9 Audio Connection

P17	For PC Microphone
P15	For PC Headphone

10.0 Bill of materials (LMX9838DONGLE)

Item Name	Description	Vendor	Part Number
C5,C6	Capacitor 22p 0603 C0G 50V	MuRata	GRM39C0G220J50
C1,C3,C8, C10	Capacitor 100n 0603 Y5V 50V	MuRata	GRM39Y5V104Z50
C2,C4,C7	Capacitor 2u2F 0603 Y5V 10V	MuRata	GRM39Y5V225Z10
C9	Capacitor 100p 0603 C0G 50V	MuRata	GRM39C0G101J50
C11,C12	TANT CAP 1uF 16V SIZE A	Any	
C13,C14,C15 ,C16,C17	Capacitor 1uF 1206 X7R 25V	MuRata	GRM42-6X7R105K25
C19	Capacitor 1uF 0603 Y5V 10V	MuRata	GRM39Y5V105Z10
J7	Battery holder (2mm pitch)	Any	
S1	TACK SWITCH TS-1135HS	RAINBOW	
Y1	Tuning fork crystal 32.768KHz	Any	
J6	DC POWER JACK	Morning star limited	DC-015
D1	Red Color LED 0603 Size	Any	
D2	Blue Color LED 0603 Size	Any	
J8	DB9 (male) serial connector	Any	
J4	2mm Socket (6 poles)	Any	
U1	Bluetooth SPP Micro Module	National Semiconductor	LMX9838SB
U3	Low Dropout Regulator	National Semiconductor	LP3985IM5X-3.3
U2	High Speed RS232 Transceivers	Maxim	MAX3225EEAP+
R1,R2,R3	Resistor 0603 Size, 1K	Any	
R11,R12	Resistor 0603 Size, 10K	Any	
R6,R7,R8,R9, R13,R14,R17	Resistor 0603 Size, 0R	Any	
R4,R5	Resistor 0603 Size, 330R	Any	
J3,J10	2mm header	Any	
J1,J2	2mm header (with jumper)	Any	

11.0 Bill of Materials (Sedona Lite Board)

Item Name	Description	Vendor	Part Number
C3,C4,C5,C6	Capacitor 100nF	Any	Ceramic cap
C6	Capacitor 1uF	Any	Ceramic cap
C12	TANT CAP 10uF, 10V	Any	
C40	TANT CAP 47uF, 6.3V	Any	
C11	Not mount		
J1	2mm socket (6 poles)	Any	
J2	2.54mm socket (2 x 4 poles)	Any	
P15	Socket for speaker (mono)	Morning Star	MSJ-1537
P17	Socket for microphone (mono)	Morning Star	MSJ-1537
R10	Resistor 0402 Size, 10R	Any	
R13,R14	Resistor 0402 Size, 1K	Any	
R5,R22	Resistor 0402 Size, 4.7K	Any	
R3	Resistor 0402 Size, 10K	Any	
R4,R8,R9	Resistor 0402 Size, 47K	Any	
U2	Single Rail Codec	OKI	MSM7717-01MS-K

12.0 Bibliography

[1] LMX9838 Bluetooth Serial Port Module data sheet

[2] AN1699-LMX9838 Bluetooth Serial Port Module - Software Users Guide

[3] SBSmart user guide

NOTES

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