PRODUCT APPROVAL DATASHEET

PRODUCT	MCSLogic Class 2 Bluetooth Module
MODEL NAME	MB0502LX
LG P/N	
CUSTOMER	LG Electronics

Checked By	Approved By	Company Seal

MCSLOGIC

Revision History

Version	Date	Revision Description
0.1	12/10/26	Initial release

Table of Contents

1. Introduction

MB0502LX is a fully integrated Bluetooth module. It is based on CSR's Bluecore5-Multimedia External with specific interface design to meet LG Electronics's needs.

MB0502LX is compatible with Bluetooth specification version 3.0. It integrates RF, Baseband controller, etc., a completed Bluetooth subsystem. MB0502LX supports A2DP Sink, AVRCP Controller&Target, HFP, SPP profiles. It provides a UART interface, analog/I2S/SPDIF audio output and functional GPIO.

MB0502LX can control by UART. Please refer to MB0502LX software user guide for the interfacing protocol.

2. General Features

2.1   Module Features

- Operation Range (Class II) : 10 meters

- Operating Temperature Range : -10℃ ~ 80℃

- Operating VDD Range : Typical 3.3V(3.0V ~ 3.6V)

- Output Power : 5dBm PK

- Interfaces : UART, Analog Audio Line-in, SPDIF Audio Out, Functional I/O

- Internal Antenna

- Compatible with Bluetooth Specification 3.0

- 64MIPS Kalimba DSP Co-Processor

- 16-bit Internal Stereo CODEC

- RoHS Compliant

- GFSK/8DPSK sf modulation, 79 channel

Confidential

2.2 Firmware Features

- Bluetooth Stack : UnifiedStack 3.0

- Host Interface : UART

- Support Profile : A2DP (Sink), AVRCP Controller/Target, HFP, SPP

- Profile version : A2DP V1.2, AVRCP1.4, HFP1.6, SPP1.1

- DUT(Device Under Test) Mode Support

- DFU(Device Firmware Upgrade) Support

Confidential

3. Mechanical Dimension

TOP View
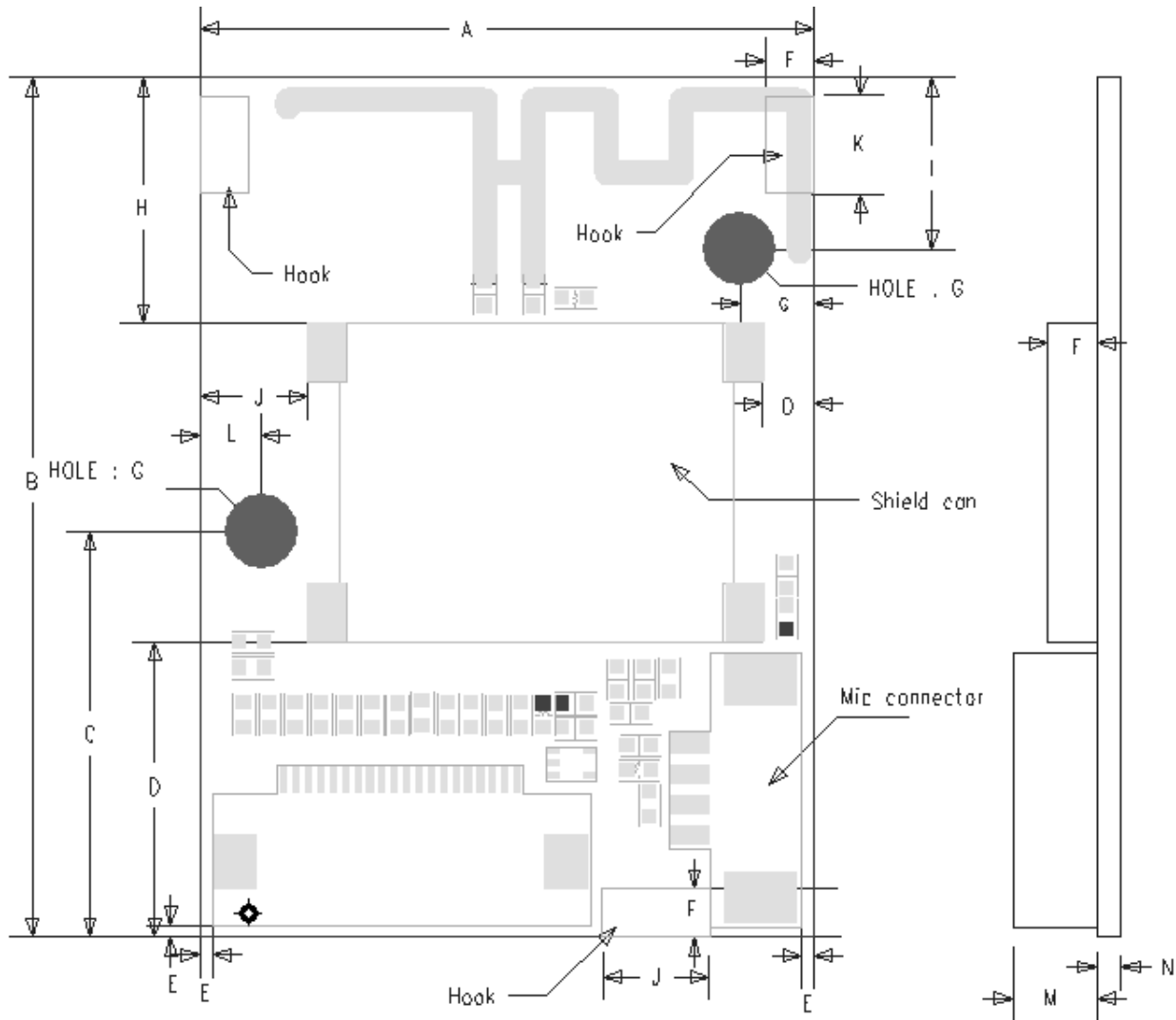
(Unit : mm)

Mark	Dimension	Mark	Dimension	Mark	Dimension	Mark	Dimension	Mark	Dimension
A	25.00±0.5	D	12.00±0.3	G	3.00±0.3	J	4.30±0.3	M	3.40±0.3
B	35.00±1.0	E	0.50±0.15	H	10.00±0.5	K	4.00±0.3	N	1.00±0.3.
C	16.50±0.3	F	2.00±0.3	I	7.00±0.5	L	2.50±0.3		

Confidential

4. Electrical Characteristics

Current consumption

Parameter	Condition	Avg	Peak	Unit
Page Scan		3.9	-	mA
Inquiry and Page Scan		5	10	mA
SCO Connection HV1	Master	40	-	mA
SCO Connection HV3	Master	28	-	mA
ACL No data transfer	Master	5	-	mA
ACL data transfer	Master	30	-	mA

Input/Output Characteristics

Parameter	Min	Max	Unit
Digital (UART, PIO) V_{IL} Input Voltage Low	-0.4V	0.8V	V
V_{IH} Input Voltage High	2.3V	3.6V	V
V_{OL} Output Voltage Low	-	0.2V	V
V_{OH} Output Voltage High	3.1V	-	V

General Performance					
Parameter	Condition	Min	Type	Max	Unit
Frequency Range		2402		2480	MHz
Impedance at Antenna			50		Ohm

Transmitter Performance					
Parameter	Condition	Min	Type	Max	Unit
Transmit Power	Peak	3	5	7	dBm
Power density		-	-	20	dBm
20dB bandwidth				1000	KHz
Adjacent channel power	±2%	-	-	-20	dBm
	±3%	-	-	-40	dBm
	±4%	-	-	-40	dBm
Out-band Spurious Emission	30MHz ~ 1GHz	-	-	-36	dBm
	1GHz ~ 12.75GHz	-	-	-30	dBm
	1.8GHz ~ 1.9GHz	-	-	-47	dBm
	5.1GHz ~ 5.3GHz	-	-	-47	dBm
Modulation Characteristic	$\Delta F1_{avg}$	140	-	175	KHz
	$\Delta F2_{max}$	115	-	-	KHz
	$\Delta F2_{avg} / \Delta F1_{avg}$	80	-	-	%
Initial Carrier Frequency Tolerance	DH1 packet	-40	-	40	KHz
Carrier Frequency Drift	DH5 packet	-25		25	KHz

Receiver Performance					
Parameter	Condition	Min	Type	Max	Unit
Sensitivity level (BER≤0.1%)	Single slot (DH1 packet)	-70	-	-	dBm
Sensitivity level (BER≤0.1%)	Multi slot (DH5 packet)	-70	-	-	dBm
C/I performance (BER≤0.1%)	C/I$_{co-channel}$, Input = -60dBm	0	-	11	dB
	C/I$_{1MHz}$, Input = -60dBm	-	-	0	dB
	C/I$_{2MHz}$, Input = -60dBm	-	-	-20	dB
	C/I$_{\geq 3Mhz}$, Input = -67dBm	-	-	-40	dB
	Image radio, Input = -67dBm	-	-	-9	dB
	Image±1, Input = -67dBm	-	-	-20	dB
Out-of-band Blocking (BER≤0.1%)	30MHz ~ 2000MHz	-10	-	-	c
	2000MHz ~ 2400MHz	-27	-	-	dBm
	2500MHz ~ 3000MHz	-27	-	-	dBm
	3000MHz ~ 12.75GHz	-10	-	-	dBm
Intermodulation (BER≤0.1%)	Input=-64dBm, n=5	-39	-	-	dBm
Maximum Input Level (BER≤0.1%)	Single slot (DH1 packet)	-20	-5	-	dBm

5. Pin Configuration

Symbol	Description
I	CMOS input
O	Output
P1	supply voltage VDD_P1

Pin descriptions for the MB0502LX Module

NO	Pin Name	Volt	I/O	Description
1	GND	P1	I	DIGITAL Ground
2	NRESET	P1	I	System Reset(Low Active)
3	UART_RX	P1	I	UART Data Input active high
4	UART_TX	P1	O	UART Data Output active high
5	GND	P1	I	DIGITAL Ground
6	MUTE	P1	O	General Purpose I/O
7	I2S_SCK	P1	O	Bit clock
8	I2S_SD_OUT	P1	O	Data output
9	I2S_SD_IN	P1	I/O	Data input
10	I2S_WS	P1	O	LR clock
11	GND	P1	I	DIGITAL Ground
12	AOUT_P_L	P1	O	Analog audio positive left
13	AOUT_N_L	P1	O	Analog audio negative left
14	AOUT_P_R	P1	O	Analog audio positive right
15	AOUT_N_R	P1	O	Analog audio negative right
16	GND	P1	I	DIGITAL Ground
17	N/C	P1		Not Connected.
18	N/C	P1		Not Connected.
19	GND	P1	I	DIGITAL Ground
20	VDD	P1	I	VCC 3.3V

NO	Pin Name	Volt	I/O	Description
1	N/C	P1		Not Connected.
2	MIC BIAS	P1	O	Microphone bias
3	MIC INPUT	P1	I	Analog audio input
4	AGND	P1	I	Analog Ground

6. MB0502LX Control Method

1) There is UART Protocol document between Host MCU and BT Module.
   So you can use command/response via UART.

2) RF Test Utility
   First time, CSR Bluesuite program must be installed. you can use BTCli.exe and enter DUT(Device Under Test) mode. So RF equipment can inquiry and test. (reference document.)

   *reference document : MB0502LX_DUT_Manual.pdf

3) RF Test method
   RF Test tool is BlueTest.exe at CSR bluesuite program. You can see detail explanation from reference document.

   * reference document : BlueTest Instruction Manual.pdf

Confidential

7. Approval Statements

This device complies with Part 15 of the FCC`s Rules. Operation is subject to the following two Conditions:
1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesirable operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment.   This device should be installed and must not be co-located or operating in conjunction with any other antenna or transmitter. This device is intended only for OEM integrators under the following conditions:
1) This module may not be co-located with any other transmitters or antennas.
2) The antenna used with this module must be installed to provide a separation distance of at least 20cm from all persons.

As long as 2 conditions above are met, further transmitter test will not be required.   However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements with this module installed. In the event that these conditions cannot be met, then the FCC authorizations are no longer considered valid and the FCC ID cannot be used on the final product.   In these circumstances, the OEM integrator will be responsible for re-evaluating the end product including this module and obtaining separate FCC authorizations.

Any changed or modifications not expressly approved by the party responsible for compliance could void the user`s authority to operate this equipment.

To satisfy FCC exterior labeling requirements, the following text must be placed on the exterior of the end product.
Contains Transmitter module FCC ID: BEJ9QK-DMMB0502LX

Confidential