

# PRODUCT APPROVAL DATASHEET

<b>PRODUCT</b>	<b>MCSLogic Class 2 Bluetooth Module</b>
<b>MODEL NAME</b>	<b>MB0402C0</b>
<b>CUSTOMER</b>	<b>LG Electronics</b>

<b>Checked By</b>	<b>Approved By</b>	<b>Company Seal</b>
		

**MCSLOGIC**

## Revision History

Version	Date	Revision Description
0.1	10/08/20	First release
1.0	10/11/04	Changed Tray Changed Bill of Materials Changed De-rating Changed PCB Patterns

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## 1.1 General Description

MB0402C0 is a fully integrated Bluetooth module. It is based on CSR's Bluecore4-ROM with specific interface design to meet LG Electronics's needs.

MB0402C0 is compatible with Bluetooth specification version 2.1. It integrates RF, Baseband controller, etc., a completed Bluetooth subsystem.

### Features :

- Operation Range (Class II) : 10 meters
- Operating Temperature Range : -10°C ~ 80°C
- Operating VDD Range : 3.0 V ~ 3.6V
- Interface : UART
- Internal Antenna
- Fully Compatible with Bluetooth Specification 2.1
- RoHS Compliant

### Applications :

- Consumer Products

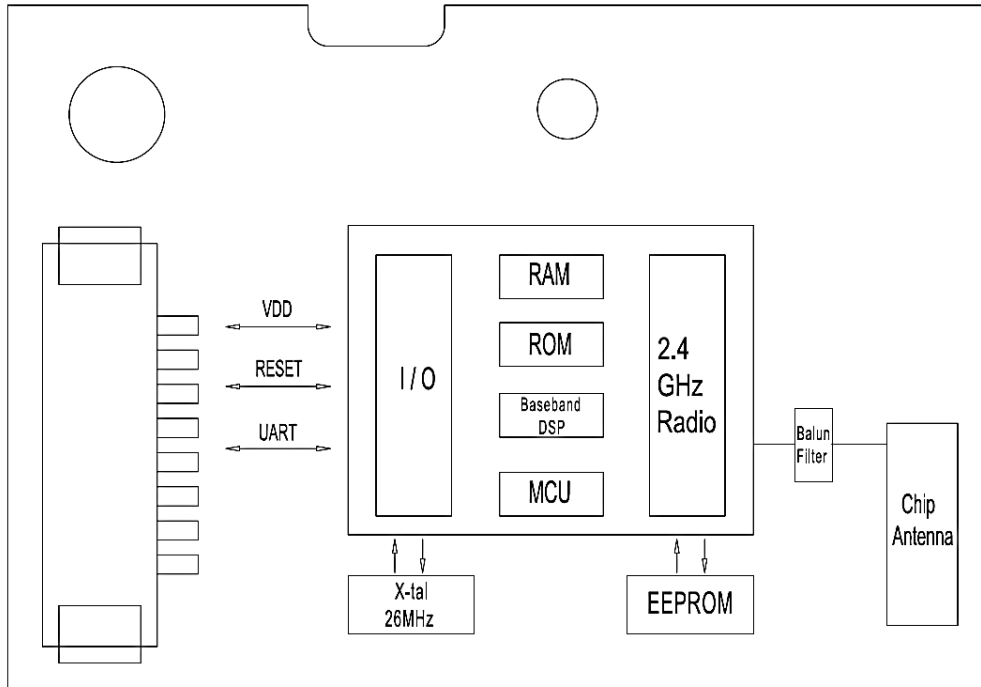
## 1.2 Quality

Quality should meet each condition which mentioned on this specification. However, the items which are not mentioned on this specification follow the inspection agreements and standards which are agree with both companies.

## 1.3 Test

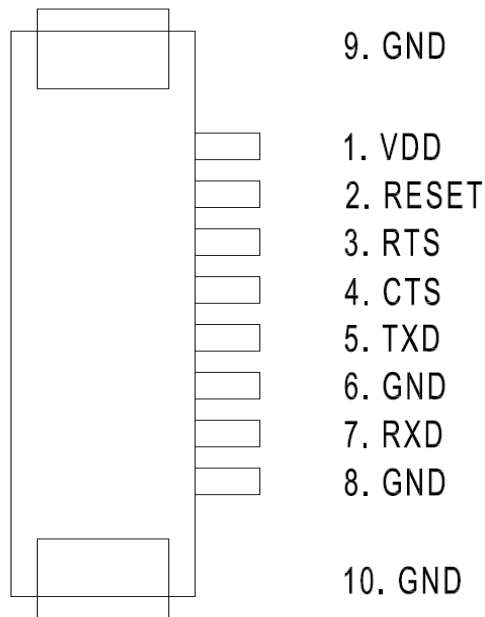
Electrical characteristics are tested for every products. However, if there are any objection in judgement, it should be treated with agreements of companies.

## 1.4 Block Diagram



## 1.5 Pin Descriptions

No	Pin Name	I/O	Description
1	VDD	I	Positive Input for the internal regulator (3.0 ~ 3.6V)
2	RESET	I	Reset if low. Input debounced so must be low for >5ms to cause a reset
3	RTS	O	Bluetooth UART Request to Send. Active-low request.
4	CTS	I	Bluetooth UART Clear to Send.Active-low clear.
5	TXD	O	Bluetooth UART Serial Output.
6	GND	-	Ground.
7	RXD	I	Bluetooth UART Serial Input.
8	GND	-	Ground
9	GND	-	Ground.
10	GND	-	Ground



## 1.6 Electrical Characteristics

Conditions : VDD = 3.3V, Ta = 25 °C, unless otherwise noted.

### Absolute Maximum Ratings

Parameter	Min	Max	Unit
Power Supply Voltage : VDD	-0.4V	3.6V	DCV
Storage Temperature	-40	85	°C

### Recommended Operating Conditions

Parameter	Min	Max	Unit
Power Supply Voltage	3.0V	3.6V	DCV
Operation Temperature	-10	80	°C

### Current consumption

Parameter	Avg	Peak	Unit
Standby	0.3	-	mA
TX-CW	57.6	63	mA
TX-Modulation	36	63	mA
RX	37.9	-	mA

### Input/Output Characteristics

Parameter	Min	Max	Unit
V <sub>IL</sub> Input Voltage Low	-0.4	0.8	V
V <sub>IH</sub> Input Voltage High	0.7*VDD	VDD+0.4	V
V <sub>OL</sub> Output Voltage Low	-	0.2	V
V <sub>OH</sub> Output Voltage High	VDD-0.2	-	V

General Performance					
Parameter	Condition	Min	Type	Max	Unit
Frequency Range		2402		2480	MHz

Transmitter Performance					
Parameter	Condition	Min	Type	Max	Unit
Transmit Power					dBm
Power density		-	-	20	dBm
20dB bandwidth				1000	KHz
Adjacent channel power	$\pm 2\%$	-	-	-20	dBm
	$\pm 3\%$	-	-	-40	dBm
	$\pm 4\%$	-	-	-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	$\Delta F_{1_{avg}}$	140	-	175	KHz
	$\Delta F_{2_{max}}$	115	-	-	KHz
	$\Delta F_{2_{avg}} / \Delta F_{1_{avg}}$	80	-	-	%
Initial Carrier Frequency Tolerance	DH1 packet	-75	-	75	KHz
Carrier Frequency Drift	DH5 packet	-25		25	KHz



Receiver Performance					
Parameter	Condition	Min	Type	Max	Unit
Sensitivity at 0.1% BER	Single slot (DH1 packet)	-70	-	-	dBm
Sensitivity at 0.1% BER	Multi slot (DH5 packet)	-70	-	-	dBm
Maximum received signal at 0.1% BER		-20	-	-	dBm
Maximum level of intermodulation interferers	f1-f2 = 5 MHz, Pwanted= -64 dBm	-39	-	-	dBm

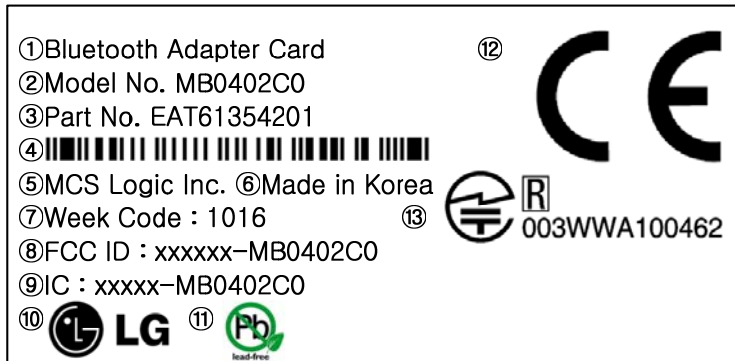
### Derating

NO	ITEM	SIZE	VALUE	RATED V/C/W	INPUT VOLTAGE	INPUT CURRENT	USAGE RATIO
1	CL05C3R9CB5NNNC	1.0 x 0.5	3.9pF	50V	3.3 V	-	6.60 %
2	CL05C120JB5NNNC	1.0 x 0.5	12pF	50V	3.3 V	-	6.60 %
3	CL05C150JB5NNNC	1.0 x 0.5	15pF	50V	3.3 V	-	6.60 %
4	CL05B103KB5NNNC	1.0 x 0.5	10nF	50V	3.3 V	-	6.60 %
5	CL05B104KO5NNNC	1.0 x 0.5	100nF	16V	3.3 V	-	20.63%
6	CL05A105KQ5NNNC	1.0 x 0.5	1uF	6.3V	3.3 V	-	52.38 %
7	CI-B1005-39NSJT	1.0 x 0.5	3.9nH	300mA	-	<0.01 uA	<0.033 %
8	CIH 05T 3N9S						
9	CI-B1005-56NSJT	1.0 x 0.5	5.6nH	300mA	-	<0.01 uA	<0.033 %
10	CIH 05T 5N6S						
11	CI-B1005-150JJT	1.0 x 0.5	15nH	200mA	-	< 60 mA	< 30 %

## 1.7 Reliability Test Conditions

NO	ITEM	Condition	Characteristics
1	Constant Humidity Load Test	Initial value measured at standard test condition Test Conditions : 35 °C , 90% RH, 100hr 25 °C , 50% RH, 2hr Supply Voltage Condition : standard $\pm 5\%$	No electrical problem
2	High Temperature Load Test	Initial value measured at standard test condition. Test Conditions : 85 °C , 100hr (Within 1hr) Supply Voltage Condition : standard $\pm 5\%$	No electrical problem
3	Low Temperature Load Test	Initial value measured at standard test condition. Test Conditions : -40 °C , 100hr (Within 1hr) Supply Voltage Condition : standard $\pm 5\%$	No electrical problem
4	High Temp Storage Test	Initial value measured at standard test condition. Test Conditions : 85 °C , 100hr	No electrical problem
5	Low Temp Storage Test	Initial value measured at standard test condition. Test Conditions : -40 °C , 100hr	No electrical problem
6	Temperature Cycle	Initial value measured at standard test condition. Test Conditions : -40 °C ~ 85 °C , 1h, 50cycle	No electrical problem
7	Vibration	Initial value measured at standard test condition. Test Conditions : - Freq : 10~55Hz, acceleration: 5G (Sine wave vibration) - Test time : X, Y, Z axis for 2hr	No electrical problem No mechanical damage
8	Drop	Initial value measured at standard test condition. Test Conditions : - Test height : 100cm - Test times : 10 times Drop the product onto a 10mm thickness plywood	No electrical problem No mechanical damage
9	Shock Test	Initial value measured at standard test condition. Test Conditions : - Impact acceleration : 300m/sec <sup>2</sup> - Impact times : 25 msec - Impact times and direction : 10 times each in 6 directions	No electrical problem No mechanical damage
10	ESD HBM	Initial value measured at standard test condition. Test Conditions : 2000V	No electrical problem No mechanical damage
11	ESD MM	Initial value measured at standard test condition. Test Conditions : 200V	No electrical problem No mechanical damage
12	Temperature Rising Test	Initial value measured at standard test condition. Test Conditions : 40 °C , 2hr Module Condition : A2DP Stream	BT IC : 44 °C EEPROM : 40 °C Crystal : 41 °C Filter : 41 °C Antenna : 40 °C Connector : 40 °C PCB : 41 °C

## 1.8 Module's Label Information

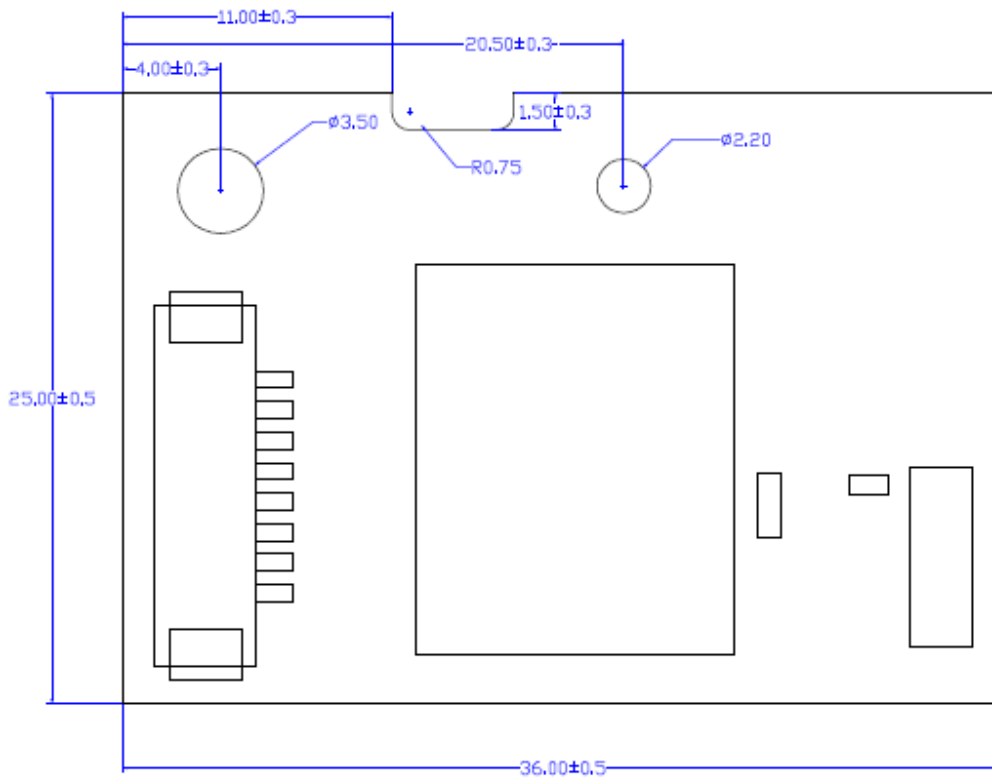
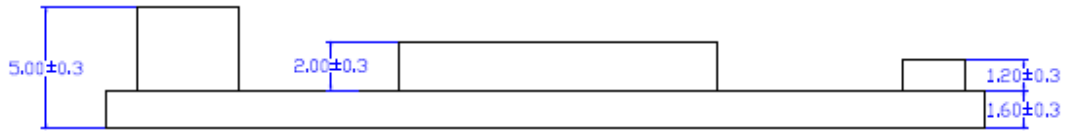


No.	Description
①	Module Name
②	Model No. of MCSLogic
③	Part No. of LGE
④	Model Name Bar-Code
⑤	Manufacturer
⑥	Manufacture Country
⑦	Week Code (YY : Year, WC : Week Code)
⑧	Contains Transmitter FCC ID
⑨	Contains Transmitter IC
⑩	LG Logo
⑪	RoHS Logo
⑫	CE Certification Logo
⑬	Japan's MIC Certification Logo

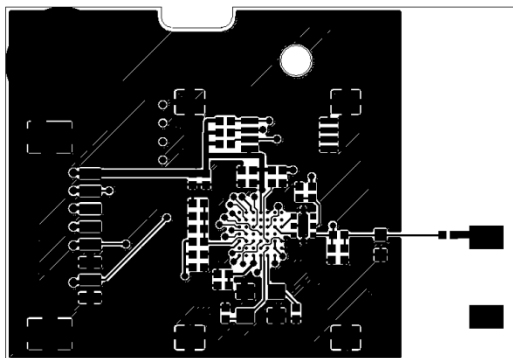
# 1.9 Mechanical Dimension

## TOP View

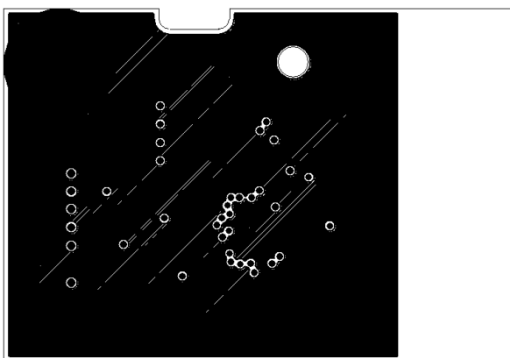
(Unit : mm)



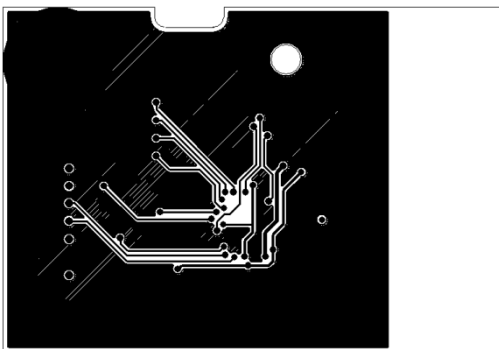
### PCB LAYOUT LAYER 1



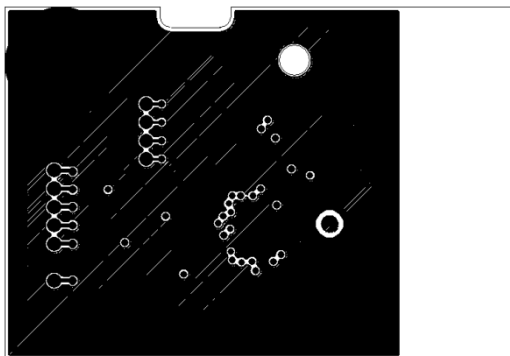
### PCB LAYOUT LAYER 2



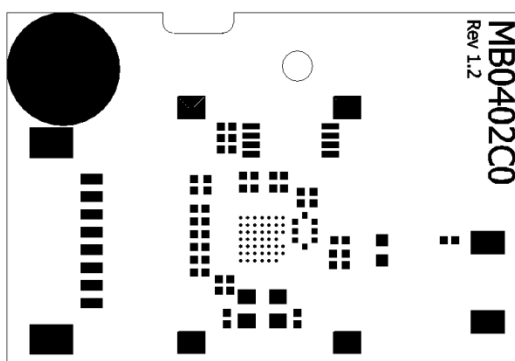
### PCB LAYOUT LAYER 3



### PCB LAYOUT LAYER 4



### PCB Solder Mask



## 1.10 Bill of Materials

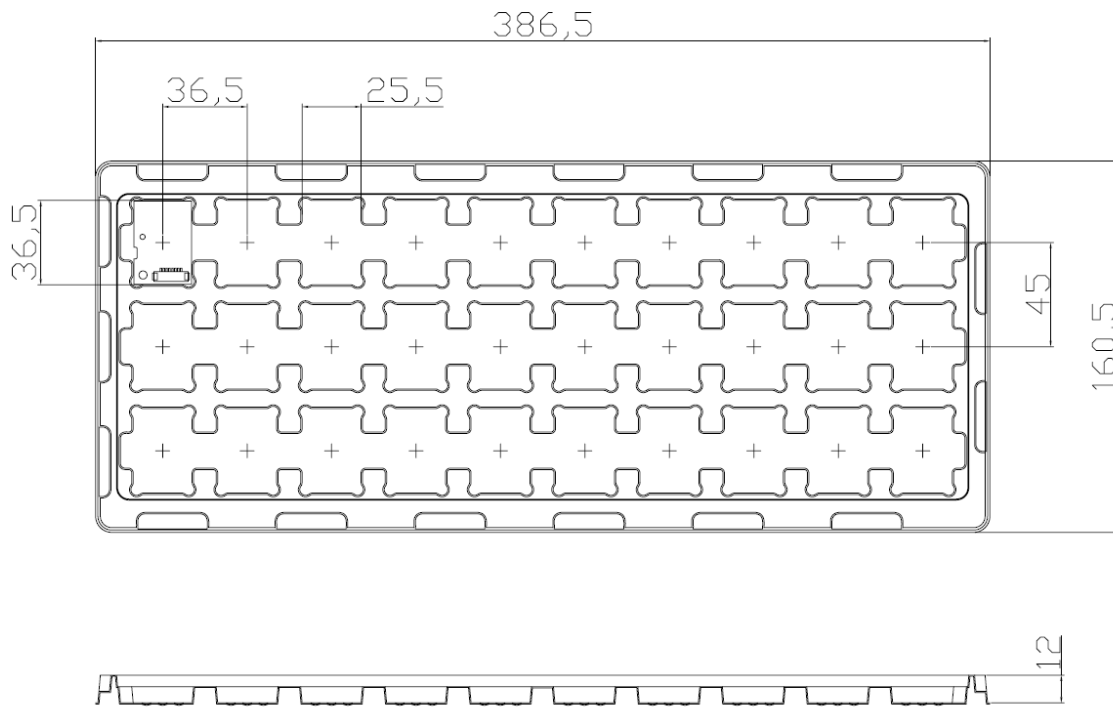
No	Q'TY	Circuit Ref	Description	Value	Package	Vendor	Part Name
1	1	R5	Resistor	2.2R	1005	S.S.E.M	RC1005J2R2CS
2	3	R1,R2,R3	Resistor	2.2kR	1005	S.S.E.M	RC1005J222CS
3	1	C1	MLCC	3.9pF	1005	S.S.E.M	CL05C3R9CB5NUNC
4	1	C2	MLCC	12pF	1005	S.S.E.M	CL05C120JB5NUNC
5	2	C6,C8	MLCC	15pF	1005	S.S.E.M	CL05C150JB5NUNC
6	4	C3,C4,C7,C12	MLCC	10nF	1005	S.S.E.M	CL05B103KB5NUNC
7	3	C9,C10,C17	MLCC	100nF	1005	S.S.E.M	CL05B104KO5NUNC
8	3	C11,C13,C15	MLCC	1uF	1005	S.S.E.M	CL05A105KQ5NUNC
9	1	L6	Chip Inductor	3.9nH	1005	CERATECH	CI-B1005-39NSJT
						S.S.E.M	CIH 05T 3N9S
10	2	L2,L4	Chip Inductor	5.6nH	1005	CERATECH	CI-B1005-56NSJT
						S.S.E.M	CIH 05T 5N6S
11	2	L1,L5	Chip Inductor	15nH	1005	CERATECH	CI-B1005-150JJT
						S.S.E.M	CIH 05T 15NJ
12	1	U1	BT CHIP		3.8x4.0	CSR	BC41B143A07
13	1	U4	X-TAL	26MHz	3225	PARTRON	CXC6X260000EHVRR70
14	1	U2	Balance Filter		2.0x1.25	SOSHIN	DBF81F104-CSR-T
15	1	U9	EEPROM		6.4x3.0	SEIKO	S-24C16CI-T8T1U3
16	1	U5	Antenna		7.0x2.0x1.2	PARTRON	ODBTPTR7020
17	1	R4	Varistor		1005	JOINSET	ECVAL 1005 05E20 100NBT
18	1	U12	Connector		12505WR	YEONHO	12505WR-08
19	1		Shield Can		16x13	HUMANTEC	
20	1		PCB		36x25x1.6	DAEDUCK	MB0402C0

Note) S.S.E.M : Samsung Electro-Mechanics

## 1.11 Packing Information

## 1.12 Tray

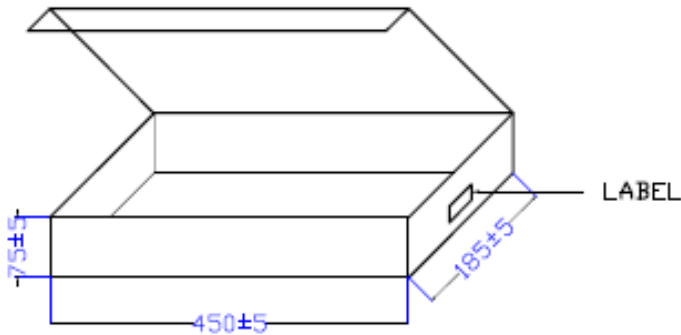
(Unit : mm)






### 1.13 Inner Box

(Unit : mm)

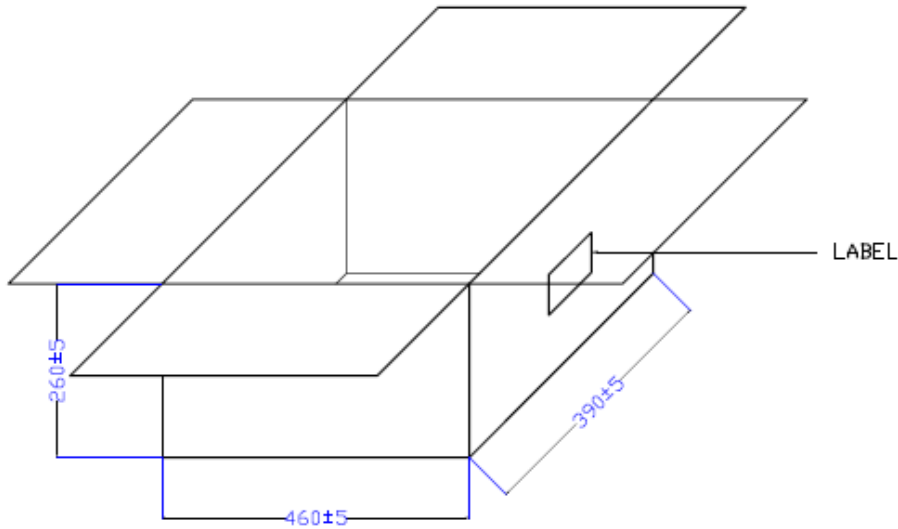


①Bluetooth Adapter Card	⑧ 	⑨ 
②Model No. MB0402C0		
③Part No. EAT61354201	⑩ 	⑪ 
④ 		
⑤MCS Logic Inc.	⑫FCC ID : xxxxxx-MB0402C0	
⑥Week Code : 0943	⑬IC : xxxxx-MB0402C0	
⑦QTY:	⑭Made in Korea	

No.	Description
①	Module Name
②	Model No. of MCSLogic
③	Part No. of LGE
④	Model Name Bar-Code
⑤	Manufacturer
⑥	Week Code (YY : Year, WC : Week Code)
⑦	Manufacture Country
⑧	LG Logo
⑨	CE Certification Logo
⑩	Japan's MIC Certification Logo
⑪	RoHS Logo
⑫	Contains Transmitter FCC ID
⑬	Contains Transmitter IC
⑭	Manufacture Country

# 1.14 Outter Box

(Unit : mm)



①MCS Logic Inc	②Address
③Customer	⑧Rohs
④Description	⑤Q'ty
	⑥G.weight(Kg)
	⑦C/T No.

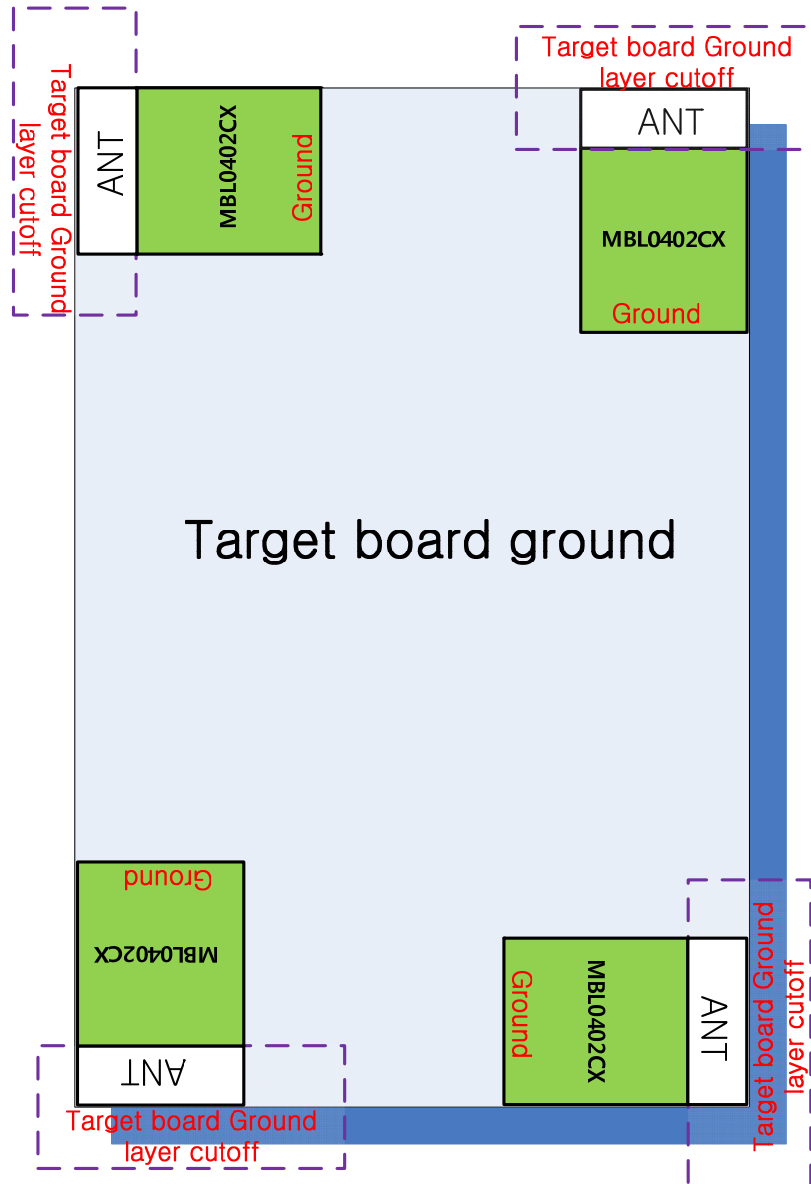
No.	Description
①	Company
②	Company Address
③	Customer
④	Model No & LGE Part No.
⑤	Quantity
⑥	Gross Weight(Kg)
⑦	Carton No.
⑧	Rohs

## 1.15 Package Reliability Test Conditions

NO	ITEM	Condition	Characteristics
1	Drop Test	Initial value measured at standard test condition. Test Conditions : - Test height : 100cm - Test times and Directions : 10 times each in 14 directions Drop the product onto a 10mm thickness plywood	No electrical problem No mechanical damage

## 1.16 Module Position Guide

Ground & Shield CAN must not exist around Antenna area.



This device complies with part 15 of FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference received.
2. This device must accept any interference received. Including interference that may cause undesired operation.

#### FCC WARNING

This equipment may generate or use radio frequency energy.

Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.

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-MB0402C0

CAUTION: This device and its antenna(s) must not be co-located or operated in conjunction with any other antenna or transmitter. End users cannot modify this transmitter device. Any Unauthorized modification could void the user's authority to operate this device.