
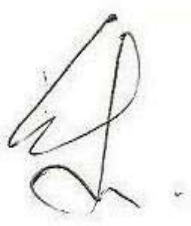



PRODUCT APPROVAL DATASHEET

PRODUCT	MCSLogic Class 2 Bluetooth Module
MODEL NAME	MB0402C1
CUSTOMER	LG Electronics

Checked By	Approved By	Company Seal
		

MCSLOGIC

Revision History

Version	Date	Revision Description
0.1	11/05/27	First release
0.2	11/06/03	Changed Pin Description
0.3	11/07/08	Changed Label Information
0.4	11/07/15	Changed Dimension
0.5	11/07/21	Changed BOM
0.6	11/08/17	Changed Mechanical Dimension
0.7	11/09/20	Derating release
0.9	11/09/28	Add PCB Layout
1.0	11/09/29	Changed Label Information

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1.1 General Description

MB0402C1 is a fully integrated Bluetooth module. It is based on CSR's Bluecore4-ROM with specific interface design to meet LG Electronics's needs.

MB0402C1 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

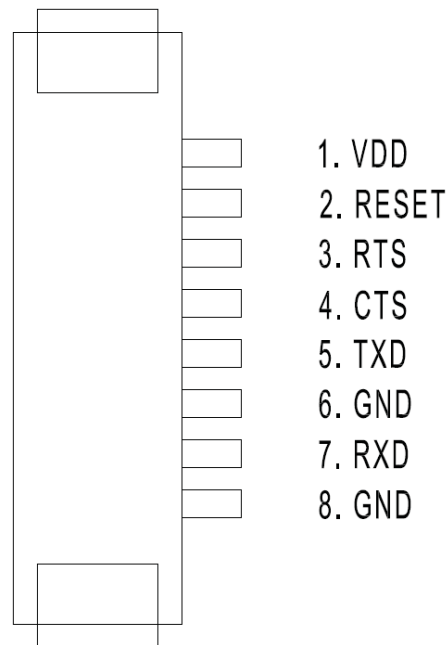
Quality should meet each condition which mentioned on this specification. However, the items which are not mentioned on this specification follow the inspection agreements and standards which are agree with both companies.

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.

1.5 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



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 _{IL} Input Voltage Low	-0.4	0.8	V
V _{IH} Input Voltage High	0.7*VDD	VDD+0.4	V
V _{OL} Output Voltage Low	-	0.2	V
V _{OH} 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		-6	0	4	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

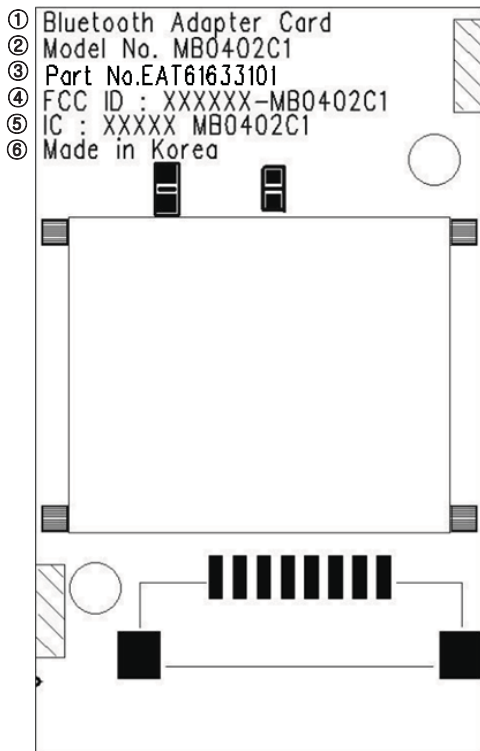
Derating

NO	ITEM	SIZE	VALUE	RATED V/C/W	INPUT VOLTAGE	INPUT CURRENT	USAGE RATIO
1	CL05F105ZQ5NNNC	1.0 X 0.5	1uF	6.3V	3.3V	-	52.38%
2	CL05B103KB5NNNC	1.0 X 0.5	10nF	50V	3.3V	-	6.60%
3	CL05B104KO5NNNC	1.0 X 0.5	100nF	50V	3.3V	-	6.60%
4	RC1005J222CS	1.0 X 0.5	2.2KΩ	1/16W	3.3V		0.0001%
5	CIH05T15NJ	1.0 X 0.5	15nH	300mA	3.3V	60mA	20%
6	CIH05T10NJ	1.0 X 0.5	10nH	300mA	1.8V	<0.01uA	<0.033%
7	CL05C221FB5NNNC	1.0 X 0.5	220pF	50V	1.8V		3.6%
8	CL05B103KB5NNNC	1.0 X 0.5	10nF	50V	1.8V		3.6%
9	CL05B104KO5NNNC	1.0 X 0.5	100nF	50V	1.8V		3.6%
10	CL05F105ZQ5NNNC	1.0 X 0.5	1uF	6.3V	1.8V		28.57%

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 ±5%	No electrical problem
2	High Temp Load Test	Initial value measured at standard test condition. Test Conditions : 25°C → 85°C, 100hr (Within 1hr) Supply Voltage Condition : standard ±5%	No electrical problem
3	Low Temp Load Test	Initial value measured at standard test condition. Test Conditions : 25°C → -40°C, 100hr (Within 1hr) Supply Voltage Condition : standard ±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, 15min, 50cycle	No electrical problem
7	Vibration Test	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 Test	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	ESD HBM	Initial value measured at standard test condition. Test Conditions : 2000V	No electrical problem No mechanical damage
10	ESD MM	Initial value measured at standard test condition. Test Conditions : 200V	No electrical problem No mechanical damage
11	Temperature Rising Test	Initial value measured at standard test condition. Test Conditions : 40°C, 2hr Module Condition : A2DP Stream	BT IC : 42.1°C EEPROM : 42°C Crystal : 42.2°C PCB : 41.2°C Connector : 41.1°C

1.8 Module's Label Information



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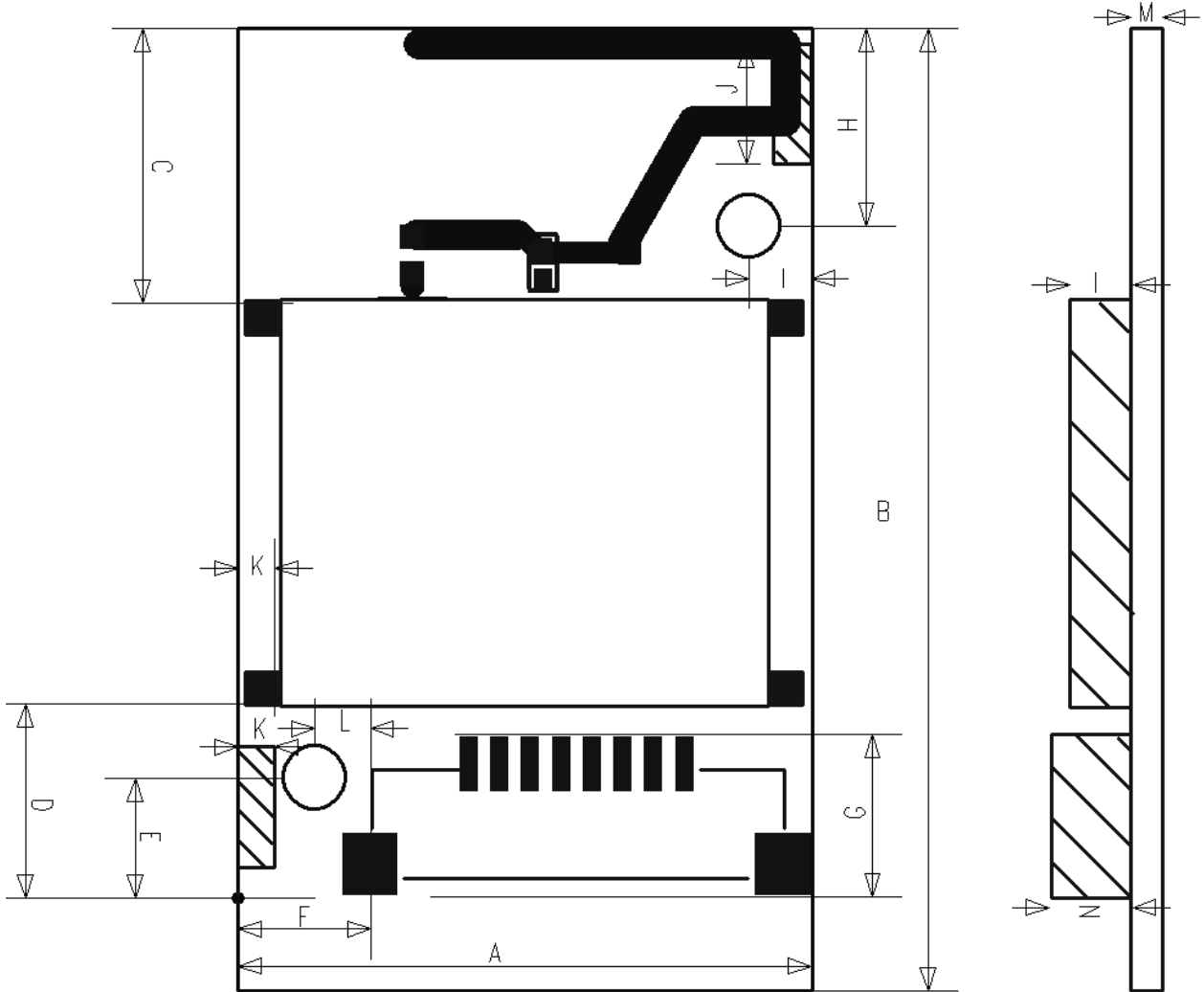


<label sheet>

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

1.9 Mechanical Dimension

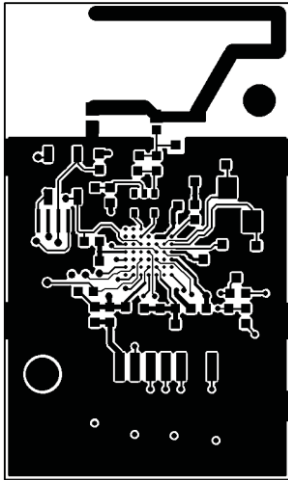
TOP View



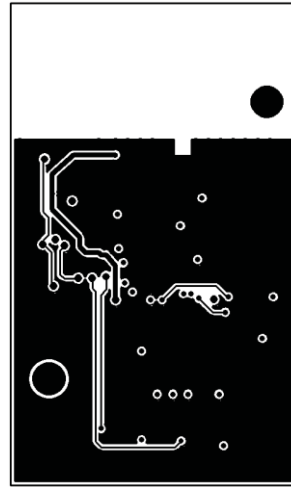
Mark	Dimension	Mark	Dimension	Mark	Dimension	Mark	Dimension	Mark	Dimension
A	18.60±0.5	D	6.30±0.3	G	5.24±0.3	J	3.90±0.3	M	1.00±0.3
B	31.20±0.3	E	3.90±0.3	H	6.40±0.3	K	1.20±0.3	N	2.60±0.3
C	8.90±0.3	F	4.30±0.3	I	2.00±0.3	L	1.80±0.3		

(Unit : mm)

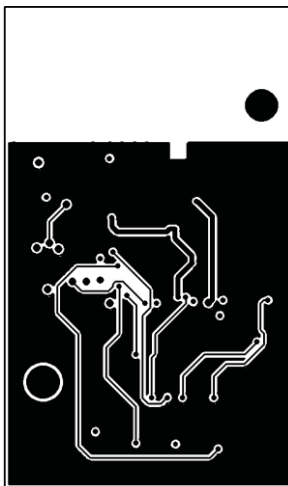
PCB LAYOUT Layer 1



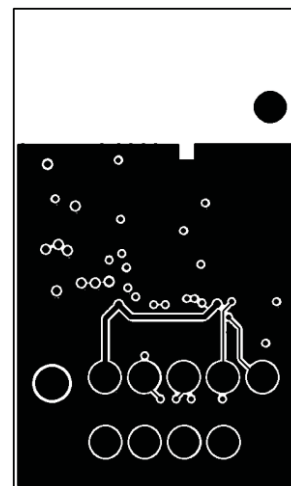
PCB LAYOUT Layer 2



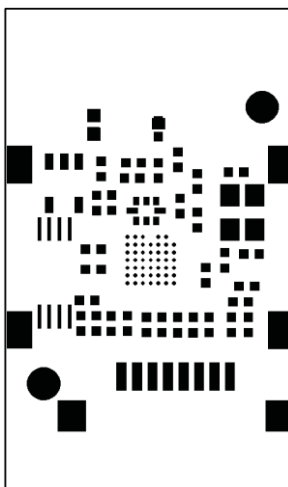
PCB LAYOUT Layer 3



PCB LAYOUT Layer 4



PCB Solder Mask

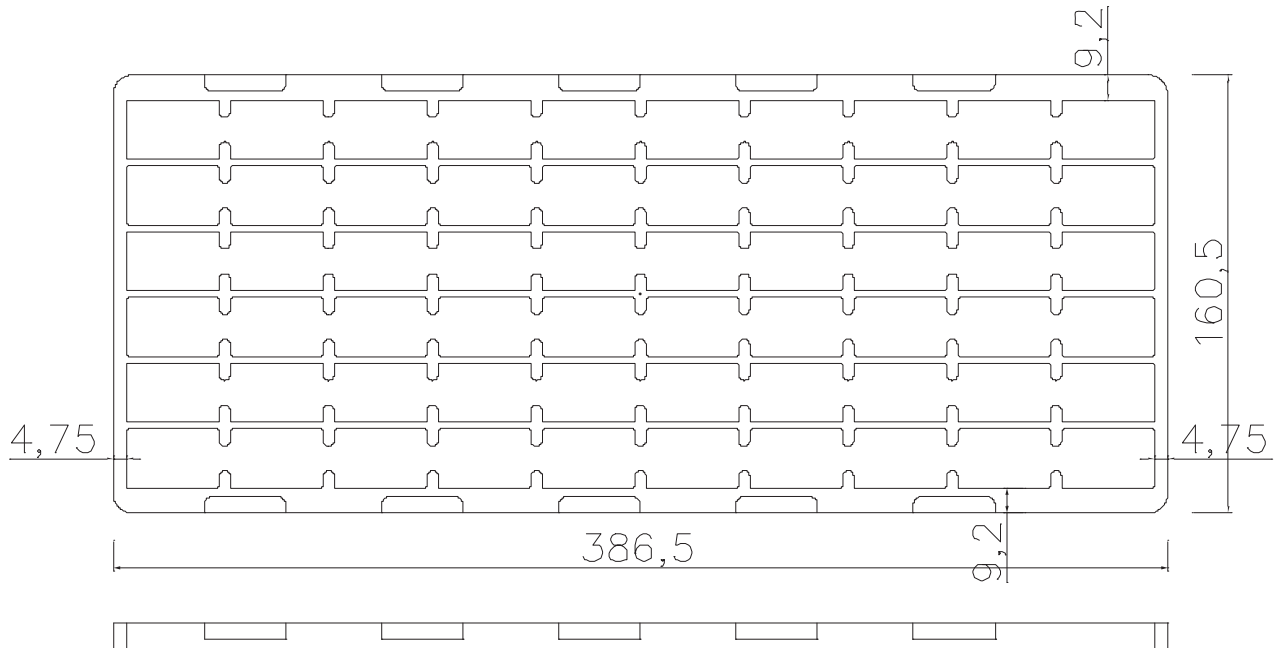


1.10 Bill of Materials

No	Q'ty	Circuit Ref	Description	Value	Package	Vendor	Part Name
1	2	R12, R13	Resistor	2.2R	1005	S.S.E.M	RC1005J2R2CS
2	3	R10, R16 R11,	Resistor	2.2kR	1005	S.S.E.M	RC1005J222CS
3	1	R41	Resistor	15pF	1608	S.S.E.M	CL10C150JB8NNNC
4	2	R14, R15	Resistor	100R	1005	S.S.E.M	RC1005J101CS
5	1	C20	Chip Ceramic	3.9pF	1005	S.S.E.M	CL05C3R9CB5NNNC
6	2	L10,L16	Chip Ceramic	0.5pF	1005	S.S.E.M	CL05C0R5BB5NNNC
7	1	L11	Chip Ceramic	1pF	1005	S.S.E.M	CL05C010CB5ANNC
8	1	C19	Chip Ceramic	6.8nH	1005	S.S.E.M	CIH05T6N8JNC
9	1	C21	Chip Ceramic	10pF	1005	S.S.E.M	CL05C100CB5NNNC
10	1	C13	Chip Ceramic	1nF	1005	S.S.E.M	CL05B102JB5NNNC
11	1	C24	Chip Ceramic	220pF	1005	S.S.E.M	CL05C221FB5NNNC
12	4	C11, C12, C16, C26	Chip Ceramic	10nF	1005	S.S.E.M	CL05B103KB5NNNC
13	3	C15, C27, C29	Chip Ceramic	100nF	1005	S.S.E.M	CL05B104KO5NNNC
14	2	C14, C17	Chip Ceramic	100pF	1005	S.S.E.M	CL05C101KB5NNNC
15	3	C22, C23, C28	Chip Ceramic	1uF	1005	S.S.E.M	CL05A105KQ5NNNC
16	1	C25	Chip Ceramic	5.6nH	1005	S.S.E.M	CIH05T5N6S
17	1	L14	Chip Ceramic	10nH	1005	S.S.E.M	CIH05T10NJ
18	1	L13	Chip Ceramic	15nH	1005	S.S.E.M	CIH05T15NJ
19	1	DIODE10	Chip Varistor		1005	JOINSET	ECVAL1005 05E20 100NBT
20	1	U10	BT CHIP		3.8x4.0	CSR	BC41B143A07-IXB-E4
21	1	U11	X-TAL	26MHz	3.2 x 2.5	PARTRON	CXC6X260000GHVRR70
22	1	U13	Balance Filter		2.0x1.25	AAC	BF24A4R218D8
23	1	U12	EEPROM		SOT-23	MICROCHIP	24AA16T-I/OT
					TSSOP	GIANTEC	GT24C16-2ZLI
24	1	CON10	Connector		10031HR-H08	YEONHO	10031HR-H08
25	1		Shield Can		16 X 13	HUMAN TECH	MB0402C1_SHIELD_CAN
26	1		PCB		31.2 X 18.6 X 1	A.P.G	MB0402C1

1.11 Packing Information

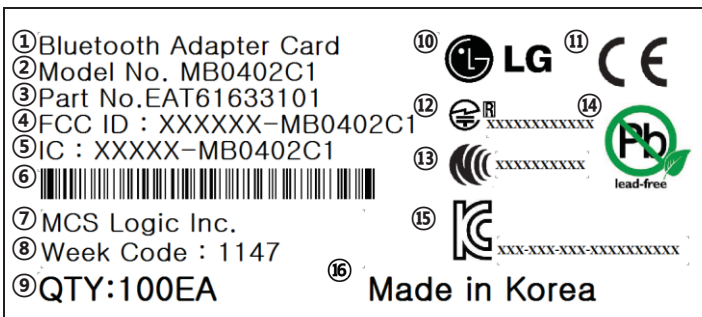
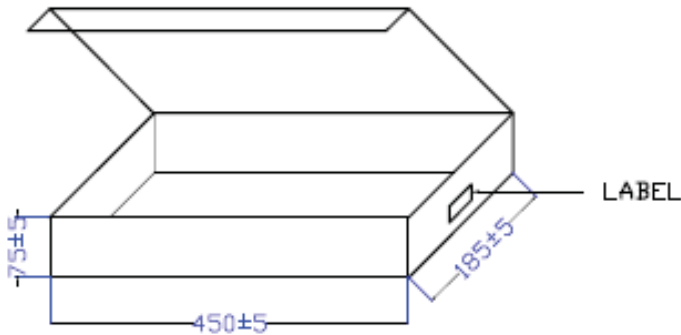
1.12 Tray



- Each tray has 60 units of products.

1.13 Inner Box

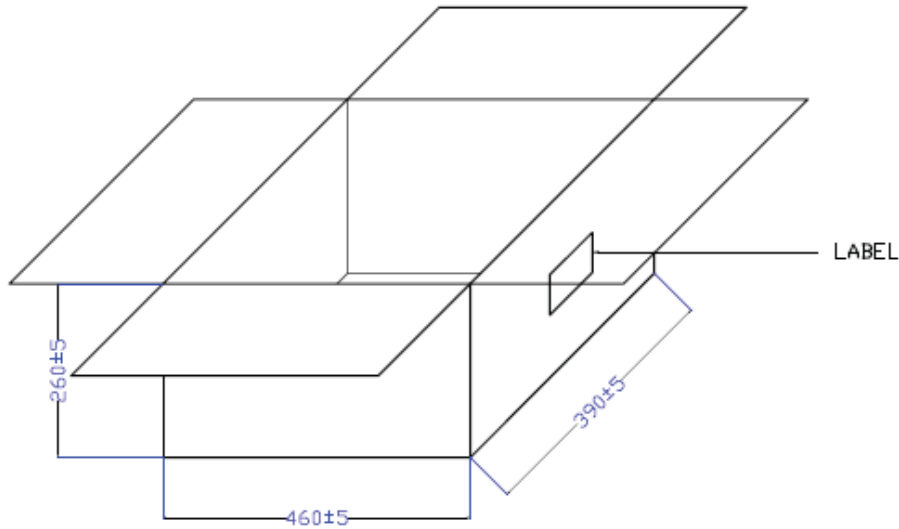
(Unit : mm)



No.	Description
①	Module Name
②	Model No. of MCSLogic
③	Part No. of LGE
④	Contains Transmitter FCC ID
⑤	Contains Transmitter IC
⑥	Model Name Bar-Code
⑦	Manufacturer
⑧	Week Code (YY : Year, WC : Week Code)
⑨	Quantity
⑩	LG Logo
⑪	CE Certification Logo
⑫	Japan's MIC Certification Logo
⑬	NCC Certification Logo
⑭	RoHS Logo
⑮	KC Logo
⑯	Manufacture Country

1.14 Outter Box

(Unit : mm)



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

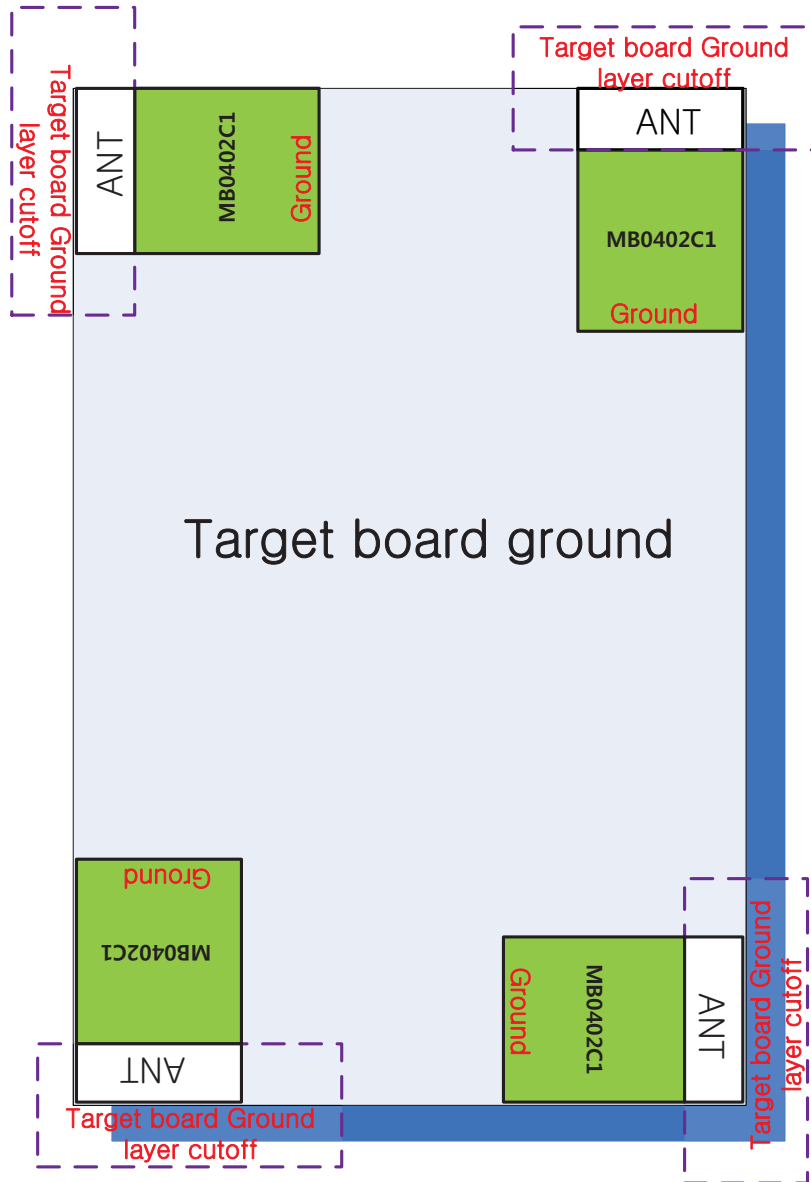
No.	Description
①	Company
②	Company Address
③	Customer
④	Model No & LGE Part No.
⑤	Quantity
⑥	Gross Weight(Kg)
⑦	Carton No.
⑧	Rohs

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 the FCC 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 undesired operation of the device.

FCC RF Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

(5) Industry Canada(IC) Statement

This device complies with RSS-210 of the Industry Canada Rules.

Operation is subject to the following two conditions:

- 1) this device may not cause interference and
- 2) this device must accept any interference. Including interference that may cause undesired operation of device.

This class B digital apparatus complies with Canadian ICES-003

Avis d'Industrie Canada

Cet appareil est conforme à norme CNR-210 des règlements d'Industrie Canada. Son fonctionnement est sujet aux deux conditions suivantes:

- 1) Cet appareil ne doit pas provoquer d'interférences et
- 2) Cet appareil doit accepter toute les interférences. y compris celles pouvant entraîner son dys-fonctionnement.

Cet appareil numérique de classe B est conforme à la norme NMB-003 du Canada.

IC Radiation Exposure Statement:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

NOTE: THE MANUFACTURERE IS NO T RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

Avis d'Industrie Canada sur I'exposition aux rayonnements

Cet appareil est conforme aux limites d'exposition aux rayonnements d'Industrie Canaca pour unenvironnement non contrôlé.

II doit être installé de façon à garder une distance minimale de 20 centimètres entre la source de rayonnements et votre corps.

REMARQUE: LE FABRICANT N'EST PAS RESPONSIBLE DES INTERFÉRENCES RADIOÉLECTRIQUES CAUSÉES PAR DES MODIFICATIONS NON AUTORISÉES APPORTÉES APPORTÉES À CET APPAREIL. DE TELLES MODIFICATIONS POURRAIT ANNULER L'AUTORISATION ACCORDÉE À L'UTILISATEUR DE FAIRE FONCTIONNER L'APPAREIL.