

Date	2017.10.26
Revision	1.1
Page	42
MSL Level	4

PRODUCT APPROVAL DATASHEET

PRODUCT	Bluetooth Adapter Card
MODEL NAME	WB1NP8
MCSLogic P/N	MB8675C0
LG P/N	EAT64075301
CUSTOMER	LG Electronics

Checked By	Approved By	Company Seal
		

MCSLOGIC

Revision History

Version	Date (YY/MM/DD)	Revision Description
1.0	17/09/18	Initial release
1.1	17/10/26	"6. Module Schematic" is updated "7. Electrical Characteristics" is updated "12. Planar figure of parts" is updated Add LG P/N Add "17. Reliability Test" Add "18. RF Test Data"

The present condition of RF Certification

MODEL NAME	WB1NP8
LG P/N	EAT64075301

TBD TBD

No	Country of RF Certification	Mark of RF Certification
1	Canada(IC)	TBD
2	North America(FCC)	TBD
3	South Korea(KC)	TBD
4	Europe(CE)	TBD
5	Taiwan(NCC)	TBD
6	Japan(TELEC)	TBD
7	China(SRRC)	TBD
8	Argentina(CNC)	TBD

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1. General Description

WB1NP8 is a fully integrated Bluetooth module. It is based on CSR's Bluecore 8675 chip with specific interface design to meet LG Electronics's needs.

WB1NP8 is compatible with Bluetooth specification version 4.2. It integrates RF, Baseband controller, etc., a completed Bluetooth subsystem.

Features :

- Operation Range (Class I)
- Fully Compatible with Bluetooth Specification 4.2
- Dual-mode Bluetooth / Bluetooth low energy
- Operating Temperature Range : -10°C ~ 70°C
- Operating VDD Range : 3.0 V ~ 3.6V
- Interface : UART/USB
- Internal Antenna
- RoHS Compliant

Applications :

- Consumer Products

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.

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.

4. Block Diagram

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5. Pin Descriptions

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No	Pin Name	I/O	Description
1	GND	I	CON CONNECTION FOR AUDIO
2	MIC_LP	I	MIC INPUT POSITIVIE LEFT
3	MIC_LN	I	MIC INPUT NEGATIVE LEFT
4	MIC_BIAS_A	O	MIC BIAS A
5	MIC_BIAS_B	O	MIC BIAS B
6	MIC_RN	I	MIC INPUT NEGATIVE RIGHT
7	MIC_RP	I	MIC INPUT POSITIVIE RIGHT
8	GND	I	GND CONNECTION FOR INTERNAL DIGITAL CIRCUITTRY AND PADS
9	PCM_IN	I/O	SYNCHRONOUS DATA INPUT, Alternative function PIO[17]
10	PCM_CLK	I/O	SYNCHRONOUS DATA CLOCK, Alternative function PIO[20]
11	PCM_OUT	I/O	SYNCHRONOUS DATA OUTPUT, Alternative function PIO[18]
12	PCM_SYNC	I/O	SYNCHRONOUS DATA SYNC, Alternative function PIO[19]
13	SPI_CLK	I	SPI CLOCK
14	SPI_MOSI	I	SPI DATA INPUT
15	SPI_MISO	O	SPI DATA OUTPUT
16	SPI_CS#	I	CHIP SELECT FOR SPI, ACTIVE LOW
17	AIO[1]	I	AIO
18	AIO[0]	I	AIO
19	VDD_USB	I	POSITIVE SUPPLY FOR USB PORT
20	USB_N	I/O	USB DATA MINUS
21	USB_P	I/O	USB DATA PLUS
22	VDD_PADS_1	I	1.7~3.6V SUPPLY INPUT FOR IO PORTS (RST#, UART, PCM, SPI, PIO[3:0])
23	RST#	I	RESET IF LOW (>5ms)
24	LED[0]	O	LED DRIVER
25	LED[2]	O	LED DRIVER
26	LED[1]	O	LED DRIVER
27	GND	I	GND CONNECTION FOR INTERNAL DIGITAL CIRCUITTRY AND PADS
28	UART_RTS	I/O	UART REQUEST TO SEND, ACTIVE LOW, Alternative function PIO[16]
29	UART_RX	I	UART DATA IN
30	UART_CTS	I/O	UART CLEAR TO SEND, ACTIVE LOW
31	UART_TX	O	UART DATA OUT
32	PIO[0]	I/O	GPIO
33	PIO[1]	I/O	GPIO
34	PIO[2]	I/O	GPIO
35	PIO[15]	I/O	GPIO
36	PIO[7]	I/O	GPIO
37	PIO[6]	I/O	GPIO

38	VDD_PADS_2	I	1.7~3.6V SUPPLY INPUT FOR PIO[15:4]
39	PIO[3]	I/O	GPIO
40	PIO[14]	I/O	GPIO
41	PIO[5]	I/O	GPIO
42	PIO[10]	I/O	GPIO
43	PIO[4]	I/O	GPIO
44	GND	I	GND CONNECTION FOR INTERNAL DIGITAL CIRCUITRY AND PADS
45	PIO[11]	I/O	GPIO
46	PIO[12]	I/O	GPIO
47	PIO[13]	I/O	GPIO
48	QSPI_FLASH_IO3	I/O	SERIAL QUAD IO FLASH DATA BIT 3, Alternative function PIO[28]
49	QSPI_FLASH_CS#	I/O	SPI FLASH CHIP SELECT, , Alternative function PIO[23]
50	QSPI_FLASH_CLK	I/O	SPI FLASH CLOCK, Alternative function PIO[21]
51	QSPI_FLASH_IO0	I/O	SERIAL QUAD IO FLASH DATA BIT 0, Alternative function PIO[25]
52	QSPI_SPAM_CLK	I/O	SPI RAM CLOCK, Alternative function PIO[22]
53	QSPI_FLASH_IO1	I/O	SERIAL QUAD IO FLASH DATA BIT 1, Alternative function PIO[26]
54	QSPI_FLASH_IO2	I/O	SERIAL QUAD IO FLASH DATA BIT 2, Alternative function PIO[27]
55	QSPI_SRAM_CS#	I/O	SPI RAM CHIP SELECT, Alternative function PIO[24]
56	1V8_SMPS	O	1.8V REGULATOR OUTPUT
57	VBAT_SENSE	I	BATTERY CHARGER SENSE INPUT
58	VBATT	I	BATTERY POSITIVE TERMINAL
59	VBUS	I	BATTERY CHARGER INPUT
60	3V3_OUT	O	ALTERNATIVE SUPPLY VIA BYPASS REGULATOR FOR 1.8V AND 1.35V REGULATOR INPUTS. MUST BE THE SAME POTENTIAL AS VBAT.
61	CHG_EXT	I	EXTERNAL BATTERY CHARGER CONTROL
62	GND	I	GND CONNECTION FOR AUDIO DRIVER
63	SPKR_LP	O	SPEAKER OUTPUT POSITIVE LEFT
64	SPKR_LN	O	SPEAKER OUTPUT NEGATIVE LEFT
65	SPKR_RP	O	SPEAKER OUTPUT POSITIVE RIGHT
66	SPKR_RN	O	SPEAKER OUTPUT NEGATIVE RIGHT
67	GND	I	1.35V REGULATOR GND
68	VRGEG_EN	I	REGULATOR ENABLE INPUT
69	VDD_PADS_3	I	1.7V~3.6V SUPPLY INPUT FOR SERIAL QUAD IO FLASH PORT
70	GND	I	1.8V REGULATOR GND

6. Module schematic

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Power line EOS protection components are applied (VDD_USB, VDD_PAD1, VDD_PAD_2, VDD_PAD_3, 3, 3V3_EXT)

7. 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	70	°C

Current consumption

Parameter	Connection Type	Avg	Peak	Unit
Page scan, Time interval = 1.28s	-	<1	1	mA
Inquiry and Page scan, Time interval = 1.28s	-	<1	1	mA
ACL No data transfer	Master	7	8	mA
ACL data transfer	Master	20	22	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	Typ	Max	Unit
Frequency Range	Normal	2402	-	2480	MHz

Transmitter Performance

Parameter	Condition	Min	Avg	Max	Unit
Transmit Power(e.i.r.p)	Normal	-	-	-	dBm
Parameter	Condition	Min	Typ	Max	Unit
Power density	Normal	-	-	<20	dBm
20dB bandwidth	Normal			1000	KHz
Adjacent channel power ($F_0 = 2441\text{MHz}$)	$F = F_0 \pm 2\text{MHz}$	-	-	-20	dBm
	$F = F_0 \pm 3\text{MHz}$	-	-	-40	dBm
	$F = F_0 \pm 4\text{MHz}$	-	-	-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	$\Delta F_{1\text{avg}}$	140	-	175	KHz
	$\Delta F_{2\text{max}}$	115	-	-	KHz
	$\Delta F_{2\text{avg}} / \Delta F_{1\text{avg}}$	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	$f_1 - f_2 = 5\text{ MHz}$, $P_{\text{wanted}} = -64\text{ dBm}$	-39	-	-	dBm

Derating (Operating)

N O		ITEM	SIZE	VALUE	RATED V/C/W	INPUT VOLTAGE	INPUT CURRENT	USAGE RATIO
1	C10,C20,C21	CL05A105KP5NNNC LMK105 BJ105KV-F	1005	1uF	10V	3.3V		33%
2	C4	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	3.3V		33%
3	C14,C16	CL05B103KB5NNNC 0402B103K500	1005	10nF	50V	1.8V		3.60%
4	C13	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	1.8V		18%
5	C5	CL05C150JB5NNNC 0402N150J500	1005	15pF	50V	1.35V		2.70%
6	C35	CL05B103KB5NNNC 0402B103K500	1005	10nF	50V	1.35V		2.70%
7	C19	CL05A105KP5NNNC LMK105 BJ105KV-F	1005	1uF	10V	1.35V		13.50%
8	C8	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	1.35V		13.50%
9	C18	CL10A475KQ8NNNC LDK107 BJ475KA-T	1608	4.7uF	6.3V	1.35V		21.42%
10	C24	CL05A474KQ5NNNC LMK105 BJ474KV-F	1005	470nF	6.3V 10V	1.2V		19.04% 8.33%
11	L1	CIG21W4R7MNE CKP2012N4R7M-T	2012	4.7uH	650mA 700mA	1.8V	3mA	0.46% 0.42%
12	L2	CIG21W4R7MNE CKP2012N4R7M-T	2012	4.7uH	650mA 700mA	1.35V	25mA	3.84% 3.57%
13	R20	RC1005J102CS WR04X102 JTL	1005	1k		3.3V	0.3uA	0.0015%
14	C1	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	5.0V		50%
15	C3	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	4.2V		42%
16	B9	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	0.9V		9%
17	C11, C12, C15, C17	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	0.65V		6.50%
18	U1	CSR8675C-IBBH-R	112-BALL , 6.5mm x 6.5mm x 1mm	CSR8670	3.6V	3.3V	22mA	
19	L4	CIH05T3N3SNC	1005	3.3nH	300mA	RF Components are not measured		
20	L3	CIH05T2N2SNC	1005	2.2nH	300mA			
21	C6	CL05C0R5BB5NNNC	1005	0.5pF	50V			
22	R8, R9	RC1005J000CS	1005	0R	20mA(1/16W)			
23	C23	CL05C4R7CB5NNNC	1005	4.7pF	50V			
24	F1	BF2012-L2R4DAR	2.0mm x 1.25mm x 1mm	2.4GHZ	0.5W			

Derating (Stand-by)

NO		ITEM	SIZE	VALUE	RATED V/C/W	INPUT VOLTAGE	INPUT CURRENT	USAGE RATIO
1	C10,C20,C21	CL05A105KP5NNNC LMK105 BJ105KV-F	1005	1uF	10V	3.3V		33%
2	C4	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	3.3V		33%
3	C14,C16	CL05B103KB5NNNC 0402B103K500	1005	10nF	50V	1.8V		3.60%
4	C13	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	1.8V		18%
5	C5	CL05C150JB5NNNC 0402N150J500	1005	15pF	50V	1.35V		2.70%
6	C35	CL05B103KB5NNNC 0402B103K500	1005	10nF	50V	1.35V		2.70%
7	C19	CL05A105KP5NNNC LMK105 BJ105KV-F	1005	1uF	10V	1.35V		13.50%
8	C8	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	1.35V		13.50%
9	C18	CL10A475KQ8NNNC LDK107 BJ475KA-T	1608	4.7uF	6.3V	1.35V		21.42%
10	C24	CL05A474KQ5NNNC LMK105 BJ474KV-F	1005	470nF	6.3V 10V	1.2V		19.04% 8.33%
11	L1	CIG21W4R7MNE CKP2012N4R7M-T	2012	4.7uH	650mA 700mA	1.8V	<1mA	0.15% 0.14%
12	L2	CIG21W4R7MNE CKP2012N4R7M-T	2012	4.7uH	650mA 700mA	1.35V	<1mA	0.15% 0.14%
13	R20	RC1005J102CS WR04X102 JTL	1005	1k		3.3V	0.3uA	0.0015%
14	C1	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	5.0V		50%
15	C3	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	4.2V		42%
16	B9	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	0.9V		9%
17	C11, C12, C15, C17	CL10A225KP8NNNC LMK107 BJ225KA-T	1608	2.2uF	10V	0.65V		6.50%
18	U1	CSR8675C-IBBH-R	112-BALL , 6.5mm x 6.5mm x 1mm	CSR8670	3.6V	3.3V	22mA	
19	L4	CIH05T3N3SNC	1005	3.3nH	300mA	RF Components are not measured		
20	L3	CIH05T2N2SNC	1005	2.2nH	300mA			
21	C6	CL05C0R5BB5NNNC	1005	0.5pF	50V			
22	R8, R9	RC1005J000CS	1005	0R	20mA(1/16W)			
23	C23	CL05C4R7CB5NNNC	1005	4.7pF	50V			
24	F1	BF2012-L2R4DAR	2.0mm x 1.25mm x 1mm	2.4GHZ	0.5W			

8. Module's Marking Information

TBD
[top]

TBD
[bottom]

No.	Description	No.	Description
①		②	
③		④	
⑤		⑥	
⑦		⑧	
⑨		⑩	
⑪		⑫	
⑬		⑭	
⑮		⑯	

9. Mechanical Dimension

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Mark	Dimension	Mark	Dimension	Mark	Dimension	Mark	Dimension
A	33.0±0.3	D	19.0±0.3	G	1.5±0.2	J	0.4±0.1
B	20.0±0.6	E	7.2±0.2	H	0.6±0.2	K	3±0.3
C	24.0±0.3	F	1.0±0.3	I	0.5±0.1		

(Unit : mm)

Module PCB coplanarity measured from seating plane ≤ 0.1 mm

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10. PCB SMT Guide

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Mark	Dimension	Mark	Dimension	Mark	Dimension	Mark	Dimension	Mark	Dimension
A	33.0	D	25.15	G	7.0	J	0.72	M	0.28
B	20.0	E	21.6	H	1.6	K	1.0	N	0.14
C	18.4	F	7.15	I	0.8	L	0.29		

(Unit : mm)

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11. Bill of Materials

No	Q'ty	Circuit Ref	Description	Value	Package	Part Name	Tolerance	Temp. Characteristic	Rated Voltage	Temperature	MTTF(Hour)	Vendor
1	1	C6	Chip Ceramic	0.5pF	1005	CL05C0R5BB5NNNC	±0.25pF	C0G	50V	-55°C ~ +125°C	31,853,943,612	S.S.E.M
						0402N0R5C500					56,700,000,000	WALSIN
2	1	C23	Chip Ceramic	4.7pF	1005	CL05C4R7CB5NNNC	±0.25pF	C0G	50V	-55°C ~ +125°C	31,853,943,612	S.S.E.M
						0402N4R7C500					56,700,000,000	WALSIN
3	1	C5	Chip Ceramic	15pF	1005	CL05C150JB5NNNC	±5%	C0G	50V	-55°C ~ +125°C	31,853,943,612	S.S.E.M
						0402N150J500					56,700,000,000	WALSIN
4	3	C14, C16, C35	Chip Ceramic	10nF	1005	CL05B103KB5NNNC	±10%	X7R	50V	-55°C ~ +125°C	31,853,943,612	S.S.E.M
						0402B103K500					56,700,000,000	WALSIN
5	1	C24	Chip Ceramic	470nF	1005	CL05A474KQ5NNNC	±10%	X5R	6.3V	-55°C ~ +85°C	55,897,774	S.S.E.M
						LMK105 BJ474KV-F			10V		809,000,000	TAIYO YUDEN
6	4	C19,C10, C20,C21	Chip Ceramic	1uF	1005	CL05A105KP5NNNC	±10%	X5R	10V	-55°C ~ +85°C	55,897,774	S.S.E.M
						LMK105 BJ105KV-F					809,000,000	TAIYO YUDEN
7	10	C1,C3,C4,C8,C11,C12,C13,C15,C17,C40	Chip Ceramic	2.2uF	1608	CL10A225KP8NNNC	±10%	X5R	10V	-55°C ~ +85°C	55,897,774	S.S.E.M
						LMK107 BJ225KA-T					809,000,000	TAIYO YUDEN
8	2	C22,C18	Chip Ceramic	4.7uF	1608	CL10A475KQ8NNNC	±10%	X5R	6.3V	-55°C ~ +85°C	55,897,774	S.S.E.M
						LDK107 BJ475KA-T			10V		809,000,000	TAIYO YUDEN
9	2	R8, R9	Resistor	0R	1005	RC1005J000CS	±5%		1/16W	-55°C ~ 155°C	15,490,052	S.S.E.M
						WR04X000 PTL					112,000,000	WALSIN
10	6	R5,R6,R7,R32,R36,R37	Resistor	2.2R	1005	RC1005J2R2CS	±5%		1/16W	-55°C ~ 155°C	15,490,052	S.S.E.M
						WR04X2R2 JTL					112,000,000	WALSIN
11	5	R20 , R3, R2, R1, R4	Resistor	1K	1005	RC1005J102CS	±5%		1/16W	-55°C ~ +125°C	15,490,052	S.S.E.M
						WR04X102 JTL					112,000,000	WALSIN
12	1	L3	Chip inductor	2.2nH	1005	CIH05T2N2SNC	±0.3nH		300mA	-55°C ~ +125°C	181,145	S.S.E.M
						HK10052N2S-T					78,192,000,000	TAIYO YUDEN
13	1	L4	Chip inductor	3.3nH	1005	CIH05T3N3SNC	±0.3nH		300mA	-55°C ~ +125°C	181,145	S.S.E.M
						HK10053N3S-T					78,192,000,000	TAIYO YUDEN
14	2	L1, L2	Power inductor	4.7uH	2012	CIG21W4R7MNE	±20%		650mA	-40°C ~ 85°C	181,145	S.S.E.M
						CKP2012N4R7M-T			700mA	-40°C ~ 85°C	30,535,000,000	TAIYO YUDEN
15	5	DIODE1, DIODE2, DIODE3, DIODE4, DIODE5	Chip Varistor	100pF	1005	ECVAL1005 05E20 100NBT			5.5V	-55°C ~ +125°C	2,000,000	JOINSET
16	1	VARI	Chip Varistor	0.15pF	1005	LOPIVA05G12D			12V	-40°C ~ +85°C	2,000,000	JOINSET
17	1	U1	BLUETOOTH CHIP	CSR8675	112-BALL, 6.5mm x 6.5mm x 1mm	CSR8675C-IBBH-R				-40°C ~ +85°C	47,000,000	CSR
18	1	U3	X-TAL	26MHz	3.2mm x 2.5mm x 0.7mm	JYD3A1C3G8-8.7-26.000	±10PPM			-40°C ~ +125°C	10,000,000	정원전자

19	1	F1	Filter	2.4GHZ	2.0mm x 1.25mm x 1mm	BF2012-L2R4DAR				-40°C ~ +85°C	988,000,000	ACX
20	1		PCB		33mm x 20mm x 1mm	MB8675C0						TLB PCB
21	1		SHIELD CAN		16mm x 13mm x 2mm	SHIELD CAN						HUMAN TECH

12. Planar figure of parts

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