TÜVRheinland®

Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**14039863 001**	**Seite 1 von 20** *Page 1 of 20*
Auftraggeber: *Client:*	**Uni-rich Technology Limited** **Unit D, 6th Floor, Haribest Industrial Building** **45-47 Au Pui Wan Street, Fotan** **Shatin, N.T., Hong Kong**	
Gegenstand der Prüfung: *Test Item:*	**Wireless Speaker**	
Bezeichnung: *Identification:*	**MLBT-1021** **ISB385** **ISB485**	**Serien-Nr.:** *Serial No.:* **Engineering sample**
Wareneingangs-Nr.: *Receipt No.:*	**A000233234-001,** **A000213407-001**	**Eingangsdatum:** *Date of Receipt:* **27.07.2015,** **13.06.2015**
Prüfort: *Testing Location:*	**Global United Technology Services Co., Ltd.** Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China	
Zustand des Prüfgegenstandes bei Anlieferung: *Condition of test item at delivery:*	Test sample(s) is/are not damaged and suitable for testing.	
Prüfgrundlage: *Test Specification:*	**FCC Part 15 Subpart C** **ANSI C63.10-2013**	
Prüfergebnis: *Test Results:*	**Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage.** The above mentioned product was tested and **passed**.	
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland Hong Kong Ltd.** 8 - 10/F., Goldin Financial Global Square, 7 Wang Tai Road, Kowloon Bay Kowloon, Hong Kong	

geprüft/ *tested by:*			**kontrolliert/** *reviewed by:*		
27.07.2015	Hugo Wan Senior Project Manager		27.07.2015	Sharon Li Department Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges: **FCC ID 2AEWCMLBT1021**
Other Aspects

Abkürzungen:				*Abbreviations:*			
	P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*
	F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*
	N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*
	N/T	=	*nicht getestet*		*N/T*	=	*not tested*

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Product information

Manufacturers declarations

	Transceiver
Operating frequency range	2402 - 2480 MHz
Type of modulation	GFSK; Pi/4 DQPSK; 8 DPSK
Number of channels	79
Channel separation	1 MHz
Type of antenna	PCB Antenna
Antenna gain (dBi)	0
Power level	fix
Type of equipment	stand alone radio device
Connection to public utility power line	Yes
Nominal voltage	V_{nor}: 3.7 VDC internal battery
Independent Operation Modes	Transmit and receive Charging

Product function and intended use

The Equipment Under Test (EUT) is a Bluetooth wireless speaker which can connect with Bluetooth enabled audio source to receive audio signal for music playing.

The EUT consists of 3 models as listed below. They are all identical in construction including schematics, PCB layouts and electronic components except the difference in housing design.

The model MLBT-1021 was provided by client as a representative model for testing.

Models
MLBT-1021
ISB385
ISB485

For details, please refer to the datasheet.

Submitted documents

Circuit Diagram
Block Diagram
Bill of materials
User manual
Rating label

Special accessories and auxiliary equipment

The product has been tested together with the following additional accessory:

1) AC/DC power adaptor
   Model: HKP06-0501000dU
   Input: 100-240V, 50/60Hz, 0.2A Max
   Output: 5VDC, 1A
2) Test control board for fix channel transmission

Independent Operation Modes

The basic operation modes are:

- Bluetooth communication link maintained with data transfer.

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The EUT was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

1) The EUT was connected with a test control board with a computer
2) A control software provided by client to set the EUT into transmission mode with longest supported packet, highest RF output power at the lowest, middle and highest frequency channels.

Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

- AC/DC power adaptor

Countermeasures to achieve EMC Compliance

- none

Test Methodology

Radiated Emission

The radiated emission measurements were performed according to the procedures in ANSI C63.10-2013.

For emission measurement at or below 1GHz, the equipment under test (EUT) was placed at the middle of the 80 cm height turntable. For emission testing above 1GHz, the EUT was placed at the middle of 1.5m height turntable. In above two measurement, the turntable is 3 meters far from the measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360 ° , the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

FS = R + AF + CF + FA – PA

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attenuation Factor in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

List of Test and Measurement Instruments

Global United Technology Services Co., Ltd.
(FCC Registration number: 600491)

Radiated Emission

Equipment	Manufacturer	Type	S/N	Cal. Date	Cal. Due Date
3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	--	5 Apr 2015	4 Apr 2017
Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	--	N/A	N/A
ESU EMI Test Receiver	R&S	ESU26	--	8 Jun 2015	7 Jun 2016
Loop Antenna	Zhinan	ZN30900A	--	8 Jun 2015	7 Jun 2016
Bi-log Hybrid Antenna	SCHWARZBECK	VULB9163	--	8 Mar 2015	8 Mar 2016
Double-ridged horn antenna	SCHWARZBECK	9120D	--	8 Mar 2015	8 Mar 2016
Horn Antenna	ETS-LINDGREN	3160-09	--	8 Mar 2015	8 Mar 2016
RF Amplifier	HP	8347A	--	8 Jun 2015	7 Jun 2016
RF Amplifier	HP	8349B	--	8 Jun 2015	7 Jun 2016
EMI Test Software	AUDIX	E3	--	N/A	N/A
Coaxial cable	GTS	N/A	--	8 Jun 2015	7 Jun 2016
Coaxial Cable	GTS	N/A	--	8 Jun 2015	7 Jun 2016
Thermo meter	N/A	N/A	--	8 Jun 2015	7 Jun 2016
Spectrum Analyzer	Rohde & Schwarz	FSP30	100007	13 Jan 2015	13 Jan 2017

Conducted Emission on AC Mains Terminals

Equipment	Manufacturer	Type	S/N	Cal. Date	Cal. Due Date
Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2 .9(H)	--	6 Sep 2014	7 Sep 2015
EMI Test Receiver	R&S	ESCS30	--	6 Jun 2015	7 Jun 2016
Pulse Limiter	R&S	ESH3-Z2	--	6 Jun 2015	7 Jun 2016
Coaxial Switch	ANRITSU CORP	MP59B	--	6 Jun 2015	7 Jun 2016
Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	--	6 Jun 2015	7 Jun 2016
Coaxial Cable	GTS	N/A	--	6 Jun 2015	7 Jun 2016
EMI Test Software	AUDIX	E3	--	N/A	N/A
Thermo meter	KTJ	TA328	--	6 Jun 2015	7 Jun 2016

Results FCC Part 15 – Subpart C

FCC 15.203 – Antenna Requirement 1	**Pass**
FCC Requirement:	No antenna other than that furnished by the responsible party shall be used with the device
Results:	Permanent attached antenna
Verdict:	Pass

FCC 15.204 – Antenna Requirement 2		**Pass**
FCC Requirement:	Provide information for every antenna proposed for the use with the EUT	
Results:	a) Antenna type:	PCB Antenna
	b) Manufacturer and model no:	N.A.
	c) Gain with reference to an isotropic radiator:	0 dBi
Verdict:	Pass	

FCC 15.207 – Disturbance Voltage on AC Mains **Pass**

Test Port: AC mains input port of the AC/DC adaptor
Applied Voltage: 120VAC
Adaptor Model: Please refer to page 4

Mode of operation: Bluetooth music playing and charging

Live measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.385	35.42	26.64	66 - 56	56 - 46	Pass
	0.489	38.39	24.62	66 - 56	56 - 46	Pass
> 0,5 - 5	0.830	34.19	19.46	56	46	Pass
	1.094	34.38	18.64	56	46	Pass
	1.535	32.08	17.34	56	46	Pass
	2.309	35.83	23.11	56	46	Pass
> 5 - 30	No peak found	--	--	60	50	Pass

Neutral measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.385	36.65	27.81	66 - 56	56 - 46	Pass
	0.494	38.46	25.63	66 - 56	56 - 46	Pass
> 0,5 - 5	0.775	34.37	19.57	56	46	Pass
	1.160	36.15	21.37	56	46	Pass
	1.928	37.75	24.98	56	46	Pass
	2.707	37.46	23.71	56	46	Pass
> 5 - 30	No peak found	--	--	60	50	Pass

Results: The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz does not exceed the limits. For test Results plots refer to Appendix 1, page 2-3.

FCC 15.247 (a)(1) – 20 dB Bandwidth **Pass**

FCC Requirement: Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

Test Specification : FCC KDB DA 00-705
Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz)
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 30 kHz / 100 kHz
Supply voltage : 3.7 VDC
Temperature : 23ºC
Humidity : 50%

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

For test protocols refer to Appendix 1, page 4-7.

GFSK Modulation

Frequency (MHz)	20 dB left (MHz)	20 dB right (MHz)	20dB bandwidth (MHz)
2402	0.360	0.396	0.756
2441	0.528	0.516	1.044
2480	0.528	0.522	1.050

8DPSK Modulation

Frequency (MHz)	20 dB left (MHz)	20 dB right (MHz)	20dB bandwidth (MHz)
2402	0.510	0.582	1.092
2441	0.510	0.588	1.098
2480	0.498	0.582	1.080

FCC 15.247 (a)(1) – Carrier Frequency Separation	Pass

FCC Requirement: Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 2/3*20dB bandwidth of the hopping channel, whichever is greater.

Test Specification : FCC KDB DA 00-705
Mode of operation : Tx mode (hopping on), GFSK and 8DPSK
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz
Supply voltage : 3.7VDC
Temperature : 23ºC
Humidity : 50%

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

The centre frequencies of the hopping channels are separated by more than the 2/3*20dB bandwidth. For test Results plots refer to Appendix 1, page 8.

Verdict: Pass

GFSK Modulation

Test Frequency (MHz)	Lower channel separation (MHz)	Upper channel separation (MHz)	Two-third of 20dB bandwidth (MHz)
2441	1.014	0.990	0.700

8DPSK Modulation

Test Frequency (MHz)	Lower channel separation (MHz)	Upper channel separation (MHz)	Two-third of 20dB bandwidth (MHz)
2441	0.996	1.008	0.728

FCC 15.247 (a)(1)(iii) – Number of hopping channels	Pass

FCC Requirement: Frequency hopping systems operating in the 2400MHz-2483.5MHz bands shall use at least 15 hopping frequencies.

Test Specification : FCC KDB DA 00-705
Mode of operation : Tx mode (hopping on), GFSK
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 1 MHz / 3 MHz
Supply voltage : 3.7 VDC
Temperature : 23ºC
Humidity : 50%

Results: The total number of hopping frequencies is more than 15. For test Results plots refer to Appendix 1, page 9.

Verdict: Pass

FCC 15.247 (a)(1)(iii) – Time of Occupancy (Dwell Time)	Pass

FCC Requirement: Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Test Specification	:	FCC KDB DA 00-705
Mode of operation	:	Tx mode (hopping on), DH5 packet
Port of testing	:	Temporary antenna port
Detector	:	Peak
RBW/VBW	:	1 MHz / 3 MHz
Supply voltage	:	3.7 VDC
Temperature	:	23ºC
Humidity	:	50%

Results: Time period calculation = 0.4 x 79 = 31.6s

Dwell time = 105 x 2.930 x 10^{-3} = 307.65 x 10^{-3} s

<= 400 x 10^{-3} s

For test protocols please refer to Appendix 1, page 10.

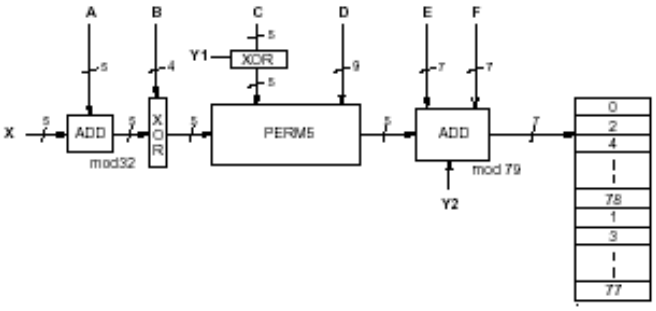
Verdict: Pass

FCC 15.247 (a) – Hopping Sequence	Pass

FCC Requirement: The hopping sequence is generated and provided with an example.

Hopping sequence

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master. The X input determines the phase in the 32-hop segment, whereas Y1 and Y2 selects between master-to-slave and slave-to-master transmission. The inputs A to D determine the ordering within the segment, the inputs E and F determine the mapping onto the hop frequencies.



Example data:

Hop sequence {k} for CONNECTION STATE:
CLK start: 0x0000010
ULAP: 0x00000000

#ticks:	00 02	04 06	08 0a	0c 0e	10 12	14 16	18 1a	1c 1e
0x0000010:	08 66	10 70	12 19	14 23	16 01	18 05	20 33	22 37
0x0000030:	24 03	26 07	28 35	30 39	32 72	34 76	36 25	38 29
0x0000050:	40 74	42 78	44 27	46 31	48 09	50 13	52 41	54 45
0x0000070:	56 11	58 15	60 43	62 47	32 17	36 19	34 49	38 51
0x0000090:	40 21	44 23	42 53	46 55	48 33	52 35	50 65	54 67
0x00000b0:	56 37	60 39	58 69	62 71	64 25	68 27	66 57	70 59
0x00000d0:	72 29	76 31	74 61	78 63	01 41	05 43	03 73	07 75
0x00000f0:	09 45	13 47	11 77	15 00	64 49	66 53	68 02	70 06
0x0000110:	01 51	03 55	05 04	07 08	72 57	74 61	76 10	78 14
0x0000130:	09 59	11 63	13 12	15 16	17 65	19 69	21 18	23 22
0x0000150:	33 67	35 71	37 20	39 24	25 73	27 77	29 26	31 30
0x0000170:	41 75	43 00	45 28	47 32	17 02	21 04	19 34	23 36
0x0000190:	33 06	37 08	35 38	39 40	25 10	29 12	27 42	31 44
0x00001b0:	41 14	45 16	43 46	47 48	49 18	53 20	51 50	55 52
0x00001d0:	65 22	69 24	67 54	71 56	57 26	61 28	59 58	63 60
0x00001f0:	73 30	77 32	75 62	00 64	49 34	51 42	57 66	59 74
0x0000210:	53 36	55 44	61 68	63 76	65 50	67 58	73 03	75 11
0x0000230:	69 52	71 60	77 05	00 13	02 38	04 46	10 70	12 78
0x0000250:	06 40	08 48	14 72	16 01	18 54	20 62	26 07	28 15
0x0000270:	22 56	24 64	30 09	32 17	02 66	06 74	10 19	14 27
0x0000290:	04 70	08 78	12 23	16 31	18 03	22 11	26 35	30 43
0x00002b0:	20 07	24 15	28 39	32 47	34 68	38 76	42 21	46 29
0x00002d0:	36 72	40 01	44 25	48 33	50 05	54 13	58 37	62 45
0x00002f0:	52 09	56 17	60 41	64 49	34 19	36 35	50 51	52 67
0x0000310:	38 21	40 37	54 53	56 69	42 27	44 43	58 59	60 75
0x0000330:	46 29	48 45	62 61	64 77	66 23	68 39	03 55	05 71
0x0000350:	70 25	72 41	07 57	09 73	74 31	76 47	11 63	13 00
0x0000370:	78 33	01 49	15 65	17 02	66 51	70 67	03 04	07 20
0x0000390:	68 55	72 71	05 08	09 24	74 59	78 75	11 12	15 28
0x00003b0:	76 63	01 00	13 16	17 32	19 53	23 69	35 06	39 22
0x00003d0:	21 57	25 73	37 10	41 26	27 61	31 77	43 14	47 30
0x00003f0:	29 65	33 02	45 18	49 34	19 04	21 08	23 20	25 24

FCC 15.247 (a) – Equal Hopping Frequency Use	**Pass**
FCC Requirement: Each of the transmitter's hopping channels is used equally on average.	
Equal hopping frequency use The EUT complies with the Bluetooth RF specifications. For details refer to the Bluetooth standard.	

FCC 15.247 (a) – Receiver Input Bandwidth	Pass
FCC Requirement:	The associated receiver(s) complies with the requirement that its input bandwidth matches the bandwidth of the transmitted signal.
Receiver input bandwidth The receiver bandwidth is equal to the receiver bandwidth in the 79 hopping channel mode, which is 1 MHz. The receiver bandwidth was verified during Bluetooth RF conformance testing.	

FCC 15.247 (a) – Receiver Hopping Capability	Pass
FCC Requirement:	The associated receiver has the ability to shift frequencies in synchronisation with the transmitted signals.
Receiver hopping Capability The EUT complies with the Bluetooth RF specifications. For details refer to the Bluetooth standard.	

FCC 15.247 (b)(1) – Peak Output Power **Pass**

Test Specification : FCC KDB DA 00-705
Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), GFSP and 8DPSK
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 3 MHz / 10 MHz
Supply voltage : 3.7 VDC
Temperature : 23ºC
Humidity : 50%

FCC Requirement: For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 Watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts.

Results: For test protocols please refer to Appendix 1, page 11-16.

GFSK Modulation

Frequency (MHz)	Maximum peak output power (dBm)	Cable loss + attenuator (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2402	-22.00	8.15	-13.85	1 / 30.0	Pass
2441	-21.42	8.15	-13.27	1 / 30.0	Pass
2480	-27.56	8.15	-19.41	1 / 30.0	Pass

Pi/4 DQPSK Modulation

Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2402	-22.61	8.15	-14.46	0.125 / 21.0	Pass
2441	-19.84	8.15	-11.69	0.125 / 21.0	Pass
2480	-18.49	8.15	-10.34	0.125 / 21.0	Pass

8DPSK Modulation

Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2402	-16.69	8.15	-8.54	0.125 / 21.0	Pass
2441	-21.36	8.15	-13.21	0.125 / 21.0	Pass
2480	-28.05	8.15	-19.90	0.125 / 21.0	Pass

FCC 15.247 (d) – Spurious Conducted Emissions **Pass**

Test Specification : FCC KDB DA 00-705
Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), GFSK, 8DPSK
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz
Supply voltage : 3.7 VDC
Temperature : 23 ºC
Humidity : 50 %

FCC Requirement: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

All three transmit frequency modes comply with the limit stated in subclause 15.247(d). For test protocols refer to Appendix 1, page 17-22.

GFSK

Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	4810.0057	-57.39	-13.85	-43.54	Pass
2441	2366.0074	-53.00	-13.27	-39.73	Pass
	4888.0056	-51.46	-13.27	-38.19	Pass
	7332.0061	-51.81	-13.27	-38.54	Pass
2480	2158.0075	-52.10	-19.41	-32.69	Pass
	4966.0056	-54.80	-19.41	-35.39	Pass
	7436.0039	-55.15	-19.41	-35.39	Pass

8DPSK

Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	2002.0076	-53.71	-8.54	-45.17	Pass
	4810.0057	-54.01	-8.54	-45.47	Pass
	7202.0040	-47.05	-8.54	-38.51	Pass
2441	2314.0074	-52.24	-13.21	-39.03	Pass
	7332.0039	-50.03	-13.21	-36.82	Pass
	4888.0056	-52.12	-13.21	-38.91	Pass
2480	2106.0075	-53.92	-19.90	-34.02	Pass
	4966.0056	-56.30	-19.90	-36.40	Pass
	7436.0039	-51.96	-19.90	-32.06	Pass

FCC 15.247 (d) – Spurious Radiated Emissions **Pass**

Test Specification : ANSI C63.10 – 2013
Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), GFSK
Port of testing : Enclosure
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz for f < 1 GHz
1 MHz / 3 MHz for f > 1 GHz
Supply voltage : 3.7 VDC
Temperature : 23ºC
Humidity : 50%

FCC Requirement: In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in section15.205(a), must also comply with the radiated emission limits specified in section 15.205(c).

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.

All three transmit frequency modes comply with the field strength within the restricted bands. There is no spurious found below 30MHz.

Tx frequency 2402MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
35.749	22.7	40.0 / QP
128.113	29.0	43.5 / QP
191.745	31.1	43.5 / QP
223.733	34.3	46.0 / QP
256.521	35.5	46.0 / QP
2400.000	52.5	74.0 / PK
2400.000	25.4	54.0 / AV
4804.081	50.1	74.0 / PK
4804.081	39.4	54.0 / AV

Tx frequency 2402MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
128.113	31.2	43.5 / QP
191.745	36.4	43.5 / QP
223.733	39.0	46.0 / QP
256.521	38.9	46.0 / QP
480.528	29.4	46.0 / QP
2400.000	51.7	74.0 / PK
2400.000	36.5	54.0 / AV
4804.081	47.9	74.0 / PK
4804.081	37.5	54.0 / AV

Tx frequency 2441MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
128.113	35.4	43.5 / QP

191.745	31.1	43.5 / QP
223.733	34.7	46.0 / QP
256.521	36.0	46.0 / QP
4882.105	49.4	74.0 / PK
4882.105	39.5	54.0 / AV
Tx frequency 2441MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
128.113	31.4	43.5 / QP
191.745	36.8	43.5 / QP
223.733	39.6	46.0 / QP
256.521	38.3	46.0 / QP
480.528	29.1	46.0 / QP
4882.105	48.0	74.0 / PK
4882.105	38.1	54.0 / AV
Tx frequency 2480MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
128.113	35.5	43.5 / QP
191.745	32.3	43.5 / QP
223.733	34.6	46.0 / QP
256.521	35.1	46.0 / QP
2483.500	44.3	74.0 / PK
2483.500	28.7	54.0 / AV
4961.000	48.4	74.0 / PK
4961.000	39.4	54.0 / AV
Tx frequency 2480MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
128.113	35.8	43.5 / QP
191.745	36.9	43.5 / QP
223.733	38.7	46.0 / QP
256.521	39.2	46.0 / QP
2483.500	40.2	74.0 / PK
2483.500	24.3	54.0 / AV
4961.000	49.5	74.0 / PK
4961.000	40.2	54.0 / AV

FCC 15.247 (d) – Band edge compliance of conducted emissions	**Pass**
Test Specification : FCC KDB DA 00-705 Mode of operation : Tx mode (2402MHz, 2480MHz), GFSK, 8DPSK Port of testing : Temporary antenna port Detector : Peak RBW/VBW : 100 kHz / 300 kHz Supply voltage : 3.7 VDC Temperature : 23ºC Humidity : 50%	
FCC Requirement:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Results:	Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types. There is no peak found outside any 100 kHz bandwidth of the operating frequency band. For test protocols refer to Appendix 1, page 23-24.