A Test Lab Techno Corp.

Changan Lab：No. 140-1, Changan Street, Bade District, Taoyuan City 33465, Taiwan (R.O.C)
Tel：886-3-271-0188 / Fax：886-3-271-0190

MPE Report

Test Report No.	:	1709FS11-01
Applicant	:	Linctronix Ltd.
Product Type	:	Bluetooth IoT Gateway
Trade Name	:	LINCTRONIX
Model Number	:	LBS-3026
Date of Received	:	Feb. 03, 2016
Test Period	:	Mar. 18 ~ Apr. 14, 2016
Date of Issued	:	Nov. 06, 2017
Test Specification	:	ANSI / IEEE Std.C95.1-1992 / IEEE Std. 1528-2013
		47 CFR § 2.1091
		47 CFR § 1.1310
Location of Test Lab.	:	Chang-an Lab.

1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
3. The measurement report has to be written approval of A Test Lab Techno Corp. It may only be reproduced or published in full. This report shall not be reproduced except in full, without the written approval of A Test Lab Techno Corp.
4. This document may be altered or revised by A Test Lab Techno. Corp. personnel only, and shall be noted in the revision section of the document.

Approved By : (Mark Duan) Tested By : (Sky Chou)

Contents

1. Description of Equipment under Test (EUT)

Applicant	Linctronix Ltd. 9F-1, No.66, Chongqing Rd., Banqiao Dist.,New Taipei City 22063, Taiwan		
Manufacturer	Linctronix Ltd. 9F-1, No.66, Chongqing Rd., Banqiao Dist.,New Taipei City 22063, Taiwan		
Product Type	Bluetooth IoT Gateway		
Trade Name	LINCTRONIX		
Model Number	LBS-3026		
FCC ID	2ALHC-LBS3026		
Frequency Range	Operate Band		Frequency Range (MHz)
	IEEE 802.11b / 802.11g IEEE 802.11n 2.4GHz 20MHz		2412 - 2462
	IEEE 802.11n 2.4GHz 40MHz		2422 - 2452
	IEEE 802.11a U-NII Band I		5180 - 5240
	IEEE 802.11a U-NII Band II-A		5260 - 5320
	IEEE 802.11a U-NII Band II-C		5500 - 5700
	IEEE 802.11a U-NII Band III		5745 - 5825
	IEEE 802.11n 5GHz 20MHz U-NII Band I		5180 - 5240
	IEEE 802.11n 5GHz 20MHz U-NII Band II-A		5260 - 5320
	IEEE 802.11n 5GHz 20MHz U-NII Band II-C		5500 - 5700
	IEEE 802.11n 5GHz 20MHz U-NII Band III		5745 - 5825
	IEEE 802.11n 5GHz 40MHz U-NII Band I		5190 - 5230
	IEEE 802.11n 5GHz 40MHz U-NII Band II-A		5270 - 5310
	IEEE 802.11n 5GHz 40MHz U-NII Band II-C		5510 - 5670
	IEEE 802.11n 5GHz 40MHz U-NII Band III		5755 - 5795
	Bluetooth LE		2402 - 2480
Antenna information	Type	Max. Gain (dBi)	
	FPC Antenna	2.4GHz	2
		5GHz	2.5
RF Chip use	Cypress, BCM20737 (LE) AzureWave, AH-640 (WLAN 2.4GHz+5GHz+LE)		
Antenna Delivery	1TX		
RF Evaluation	0.006 mw/cm^2		
Temperature Range	-10 ~ +55°C		

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 / 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties

2. Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR § 1.1310 titled “Radiofrequency radiation exposure limits”, generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device as “a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter’s radiating structure(s) and the body of the user or nearby persons. ” This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: “IMPORTANT: To meet the FCC’s RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna”. Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a “mobile device” as defined in section § 2.1091 paragraph (b).

Exposure evaluation
$$S = \frac{PG}{4\pi R^2}$$ Where S: power density P: power input to the antenna G: power gain of the antenna in the direction of interest relative to an isotropic radiator. R: distance to the center of radiation of the antenna.

3. RF Output Power

The conducted power turn-up tolerance reference manufacturer specification.

RF Chip : BCM20737

Operate Band	Frequency (MHz)	Packet Type	Average Conducted power (dBm)
Bluetooth LE	2402	---	1.76
	2440		1.28
	2480		0.73

RF Chip : AH-640

Operate Band	Frequency (MHz)	Packet Type	Average Conducted power (dBm)
Bluetooth LE	2402	---	-1.50
	2440		-1.10
	2480		-0.95

RF Chip : AH-640

Band	Date Rate	Frequency	Average Conducted power
IEEE 802.11b	1	2412.0	12.95
		2437.0	12.86
		2462.0	12.88
	2	2437.0	12.85
	5.5	2437.0	12.83
	11	2437.0	12.82
IEEE 802.11g	6	2412.0	12.79
		2437.0	12.82
		2462.0	12.81
	9	2437.0	12.81
	12	2437.0	12.79
	18	2437.0	12.78
	24	2437.0	12.76
	36	2437.0	12.75
	48	2437.0	12.73
	54	2437.0	12.72
IEEE 802.11n 2.4GHz 20MHz	6.5	2412.0	12.04
		2437.0	11.97
		2462.0	11.92
	13	2437.0	11.96
	19.5	2437.0	11.93
	26	2437.0	11.92
	39	2437.0	11.90
	52	2437.0	11.88
	58.5	2437.0	11.86
	65	2437.0	11.85
IEEE 802.11n 2.4GHz 40MHz	13.5	2422.0	11.03
		2437.0	10.95
		2452.0	11.00
	27	2437.0	10.94
	40.5	2437.0	10.92
	54	2437.0	10.91
	81	2437.0	10.89
	108	2437.0	10.88
	121.5	2437.0	10.86
	135	2437.0	10.85

Note: The relevant measured result has the offset with cable loss already.

Band	Date Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)
IEEE 802.11a	6	5180.0	12.23
		5200.0	12.12
		5220.0	12.02
		5240.0	11.99
		5260.0	11.86
		5280.0	11.72
		5300.0	11.59
		5320.0	11.52
		5500.0	11.14
		5520.0	11.10
		5540.0	11.11
		5560.0	11.06
		5580.0	11.13
		5600.0	11.05
		5620.0	11.02
		5640.0	11.01
		5660.0	10.97
		5680.0	10.91
		5700.0	10.85
		5745.0	10.69
		5765.0	10.57
		5785.0	10.33
		5805.0	10.12
		5825.0	9.82

Note: The relevant measured result has the offset with cable loss already.

Band	Date Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)
IEEE 802.11a	54	5180.0	12.11
		5200.0	12.05
		5220.0	11.92
		5240.0	11.89
		5260.0	11.73
		5280.0	11.65
		5300.0	11.49
		5320.0	11.42
		5500.0	11.07
		5520.0	11.01
		5540.0	10.98
		5560.0	10.93
		5580.0	10.97
		5600.0	10.95
		5620.0	10.88
		5640.0	10.90
		5660.0	10.83
		5680.0	10.78
		5700.0	10.75
		5745.0	10.61
		5765.0	10.49
		5785.0	10.25
		5805.0	10.02
		5825.0	9.75

Note: The relevant measured result has the offset with cable loss already.

Band	Date Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)
IEEE 802.11n 5GHz 20MHz	6.5	5180.0	12.20
		5200.0	11.97
		5220.0	11.75
		5240.0	11.74
		5260.0	11.82
		5280.0	11.64
		5300.0	11.42
		5320.0	11.31
		5500.0	11.38
		5520.0	11.45
		5540.0	10.95
		5560.0	11.06
		5580.0	11.07
		5600.0	11.03
		5620.0	10.96
		5640.0	11.05
		5660.0	11.09
		5680.0	10.78
		5700.0	10.87
		5745.0	10.78
		5765.0	10.75
		5785.0	10.68
		5805.0	10.51
		5825.0	10.14

Note: The relevant measured result has the offset with cable loss already.

Band	Date Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)
IEEE 802.11n 5GHz 20MHz	65	5180.0	12.11
		5200.0	11.92
		5220.0	11.68
		5240.0	11.64
		5260.0	11.67
		5280.0	11.58
		5300.0	11.38
		5320.0	11.27
		5500.0	11.32
		5520.0	11.39
		5540.0	10.89
		5560.0	10.95
		5580.0	10.94
		5600.0	10.92
		5620.0	10.89
		5640.0	10.98
		5660.0	11.01
		5680.0	10.71
		5700.0	10.79
		5745.0	10.71
		5765.0	10.64
		5785.0	10.57
		5805.0	10.46
		5825.0	10.09

Note: The relevant measured result has the offset with cable loss already.

Band	Date Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)
IEEE 802.11n 5GHz 40MHz	13.5	5190.0	12.31
		5230.0	12.11
		5270.0	11.97
		5310.0	11.62
		5510.0	11.21
		5550.0	11.18
		5590.0	11.17
		5630.0	11.07
		5670.0	11.04
		5755.0	10.79
		5795.0	10.33
	135	5190.0	12.09
		5230.0	11.85
		5270.0	11.77
		5310.0	11.42
		5510.0	11.01
		5550.0	10.95
		5590.0	10.91
		5630.0	10.81
		5670.0	10.76
		5755.0	10.57
		5795.0	10.13

Note: The relevant measured result has the offset with cable loss already.

4. Test Results

RF Chip : BCM20737

Band	Test mode/RB/ Data rate	Frequency (MHz)	Limit (mw/cm^2)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm^2)
Bluetooth LE	---	2402	1	20	1.80	2.00	1.58	1	2.39	0.000
		2440	1	20	1.40	2.00	1.58	1	2.18	0.000
		2480	1	20	0.80	2.00	1.58	1	1.9	0.000

RF Chip : AH-640

Band	Test mode/RB/ Data rate	Frequency (MHz)	Limit (mw/cm^2)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm^2)
Bluetooth LE	---	2402	1	20	0.00	2.00	1.58	1	1.58	0.000
		2440	1	20	0.00	2.00	1.58	1	1.58	0.000
		2480	1	20	0.00	2.00	1.58	1	1.58	0.000
IEEE 802.11b	1M	2412	1	20	13.00	2.00	1.58	1	31.53	0.006
		2437	1	20	13.00	2.00	1.58	1	31.53	0.006
		2462	1	20	13.00	2.00	1.58	1	31.53	0.006
IEEE 802.11g	6M	2412	1	20	12.90	2.00	1.58	1	30.81	0.006
		2437	1	20	12.90	2.00	1.58	1	30.81	0.006
		2462	1	20	12.90	2.00	1.58	1	30.81	0.006
IEEE 802.11n 2.4GHz 20MHz	6.5M	2412	1	20	12.10	2.00	1.58	1	25.62	0.005
		2437	1	20	12.10	2.00	1.58	1	25.62	0.005
		2462	1	20	12.10	2.00	1.58	1	25.62	0.005
IEEE 802.11n 2.4GHz 40MHz	13.5M	2422	1	20	11.10	2.00	1.58	1	20.35	0.004
		2437	1	20	11.10	2.00	1.58	1	20.35	0.004
		2452	1	20	11.10	2.00	1.58	1	20.35	0.004

Band	Test mode/RB/Data rate	Frequency (MHz)	Limit (mw/cm^2)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm^2)
IEEE 802.11a	6M	5180	1	20	12.3	2.5	1.78	1	30.23	0.006
		5200	1	20	12.3	2.5	1.78	1	30.23	0.006
		5220	1	20	12.3	2.5	1.78	1	30.23	0.006
		5240	1	20	12.3	2.5	1.78	1	30.23	0.006
		5260	1	20	11.9	2.5	1.78	1	27.57	0.005
		5280	1	20	11.9	2.5	1.78	1	27.57	0.005
		5300	1	20	11.9	2.5	1.78	1	27.57	0.005
		5320	1	20	11.9	2.5	1.78	1	27.57	0.005
		5500	1	20	11.2	2.5	1.78	1	23.46	0.005
		5520	1	20	11.2	2.5	1.78	1	23.46	0.005
		5540	1	20	11.2	2.5	1.78	1	23.46	0.005
		5560	1	20	11.2	2.5	1.78	1	23.46	0.005
		5580	1	20	11.2	2.5	1.78	1	23.46	0.005
		5600	1	20	11.2	2.5	1.78	1	23.46	0.005
		5620	1	20	11.2	2.5	1.78	1	23.46	0.005
		5640	1	20	11.2	2.5	1.78	1	23.46	0.005
		5660	1	20	11.2	2.5	1.78	1	23.46	0.005
		5680	1	20	11.2	2.5	1.78	1	23.46	0.005
		5700	1	20	11.2	2.5	1.78	1	23.46	0.005
		5745	1	20	10.8	2.5	1.78	1	21.4	0.004
		5765	1	20	10.8	2.5	1.78	1	21.4	0.004
		5785	1	20	10.8	2.5	1.78	1	21.4	0.004
		5805	1	20	10.8	2.5	1.78	1	21.4	0.004
		5825	1	20	10.8	2.5	1.78	1	21.4	0.004

Band	Test mode/RB/Data rate	Frequency (MHz)	Limit (mw/cm^2)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm^2)
IEEE 802.11n 5GHz 20MHz	6.5M	5180	1	20	12.3	2.5	1.78	1	30.23	0.006
		5200	1	20	12.3	2.5	1.78	1	30.23	0.006
		5220	1	20	12.3	2.5	1.78	1	30.23	0.006
		5240	1	20	12.3	2.5	1.78	1	30.23	0.006
		5260	1	20	11.9	2.5	1.78	1	27.57	0.005
		5280	1	20	11.9	2.5	1.78	1	27.57	0.005
		5300	1	20	11.9	2.5	1.78	1	27.57	0.005
		5320	1	20	11.9	2.5	1.78	1	27.57	0.005
		5500	1	20	11.5	2.5	1.78	1	25.14	0.005
		5520	1	20	11.5	2.5	1.78	1	25.14	0.005
		5540	1	20	11.5	2.5	1.78	1	25.14	0.005
		5560	1	20	11.5	2.5	1.78	1	25.14	0.005
		5580	1	20	11.5	2.5	1.78	1	25.14	0.005
		5600	1	20	11.5	2.5	1.78	1	25.14	0.005
		5620	1	20	11.5	2.5	1.78	1	25.14	0.005
		5640	1	20	11.5	2.5	1.78	1	25.14	0.005
		5660	1	20	11.5	2.5	1.78	1	25.14	0.005
		5680	1	20	11.5	2.5	1.78	1	25.14	0.005
		5700	1	20	11.5	2.5	1.78	1	25.14	0.005
		5745	1	20	10.9	2.5	1.78	1	21.9	0.004
		5765	1	20	10.9	2.5	1.78	1	21.9	0.004
		5785	1	20	10.9	2.5	1.78	1	21.9	0.004
		5805	1	20	10.9	2.5	1.78	1	21.9	0.004
		5825	1	20	10.9	2.5	1.78	1	21.9	0.004

Band	Test mode/RB/Data rate	Frequency (MHz)	Limit (mw/cm^2)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm^2)
IEEE 802.11n 5GHz 40MHz	13.5M	5190	1	20	12.4	2.5	1.78	1	30.93	0.006
		5230	1	20	12.4	2.5	1.78	1	30.93	0.006
		5270	1	20	12.1	2.5	1.78	1	28.87	0.006
		5310	1	20	12.1	2.5	1.78	1	28.87	0.006
		5510	1	20	11.3	2.5	1.78	1	24.01	0.005
		5550	1	20	11.3	2.5	1.78	1	24.01	0.005
		5590	1	20	11.3	2.5	1.78	1	24.01	0.005
		5630	1	20	11.3	2.5	1.78	1	24.01	0.005
		5670	1	20	11.3	2.5	1.78	1	24.01	0.005
		5755	1	20	10.9	2.5	1.78	1	21.9	0.004
		5795	1	20	10.9	2.5	1.78	1	21.9	0.004

Note:

1. Mobile or fixed location transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.
2. The Numeric Gain calculated by 10^(ant. Gain(dBi) /10).
3. Each band max power which perform MPE of any configurations.
4. The MPE results are evaluated by lowest data rate for WLAN.
5. The device operating IEEE 802.11 a/b/g/n mode is 1TX (SISO).
6. The device not support simultaneous transmission.