



International Certification Corp.

No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.

Tel: 886-3-271-8666

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FCC C2PC Test Report

FCC ID : SQGBT800
Equipment : BTv4.0 Dual Mode USB Dongle
Model No. : BT820
Brand Name : Laird Technologies
Applicant : Laird Technologies
Address : 11160 Thompson Ave. / Lenexa, Kansas /
66219 / USA
Standard : 47 CFR FCC Part 15.247
Received Date : Jun. 25, 2013
Tested Date : Jun. 28 ~ Jul. 01, 2013

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Approved & Reviewed by:


Gary Chang / Manager





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Release Record

Report No.	Version	Description	Issued Date
FR362601-01AE	Rev. 01	Initial issue	Aug. 09, 2013



Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	[dBuV]:0.162MHz 50.02 (Margin -15.36dB) - QP	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 46.24MHz 37.61 (Margin -2.39dB) - QP	Pass
15.247(b)(3)	Fundamental Emission Output Power	---	N/A
15.247(a)(2)	6dB Bandwidth	---	N/A
15.247(e)	Power Spectral Density	---	N/A
15.203	Antenna Requirement	---	N/A



1 General Description

1.1 Information

1.1.1 Product Details

This report is prepared for FCC class II permissive change. The difference compared with original design is model BT820 adding plastics housing to change type from modular to non-modular. In this report, conducted emission and radiated emission tests of BT820 had been re-tested and only its data was recorded in the following sections.

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	Bluetooth Mode	Ch. Freq. (MHz)	Channel Number	Data Rate / MCS
2400-2483.5	BR	2402-2480	0-39 [40]	1 Mbps
Note 1: Bluetooth uses a GFSK (1Mbps).				

1.1.3 Antenna Details

Ant. No.	Brand	Type	Gain (dBi)	Connector	Model
1	ACX	Chip	0.5	N/A	AT3216-B2R7HAA_3216

1.1.4 EUT Operational Condition

Supply Voltage	☐ AC mains	☒ DC (5Vdc)	
Type of DC Source	☐ Internal DC supply	☐ External DC adapter	☒ From Host

1.1.5 Accessories

N/A



1.1.6 Channel List

Frequency band (MHz)				2400~2483.5			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
37	2402	9	2422	18	2442	28	2462
0	2404	10	2424	19	2444	29	2464
1	2406	38	2426	20	2446	30	2466
2	2408	11	2428	21	2448	31	2468
3	2410	12	2430	22	2450	32	2470
4	2412	13	2432	23	2452	33	2472
5	2414	14	2434	24	2454	34	2474
6	2416	15	2436	25	2456	35	2476
7	2418	16	2438	26	2458	36	2478
8	2420	17	2440	27	2460	39	2480

1.1.7 Test Tool and Duty Cycle

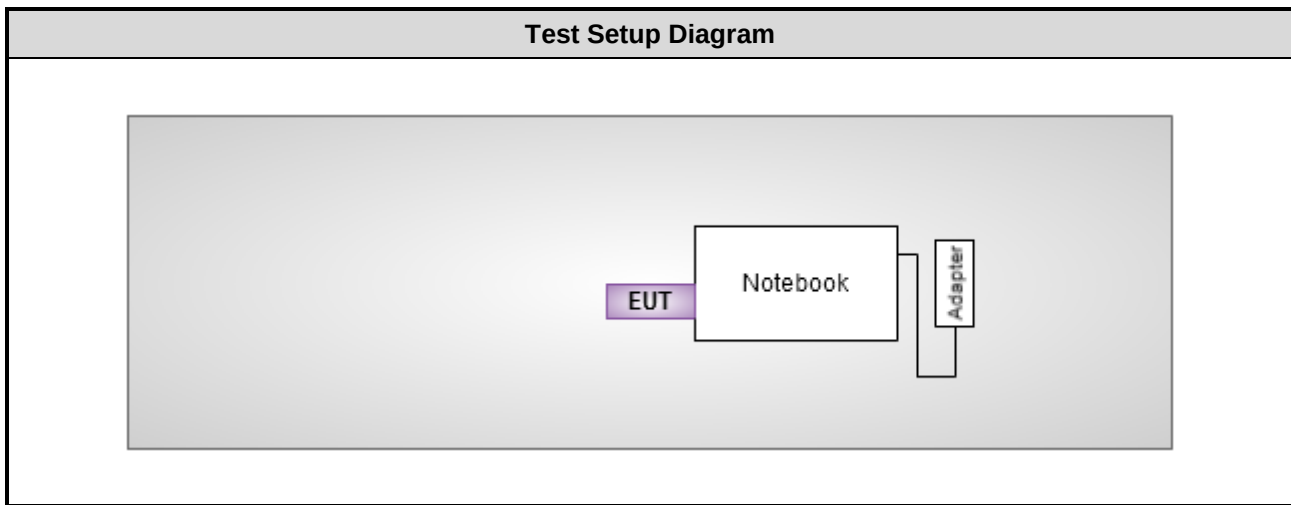
Test tool	Blue Tool, ver. 2.5
Duty cycle of test signal (%)	66.37%
Duty Factor (dB)	1.78

1.1.8 Power Setting

Modulation Mode	Test Frequency (MHz)		
	2402	2440	2480
GFSK/1Mbps	Default	Default	Default



1.2 Test Setup Chart



1.3 Local Support Equipment List

Support Equipment List						
No.	Equipment	Brand	Model	S/N	FCC ID	Length (m)
1	Notebook	DELL	E6430	---	---	---



1.4 Test Equipment List and Calibration Data

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
EMC Receiver	R&S	ESCS 30	100169	Dec. 12, 2012	Dec. 11, 2013
LISN	SCHWARZBECK MESS-ELEKTRONIK	Schwarzbeck 8127	8127-667	Dec. 04, 2012	Dec. 03, 2013
LISN (Support Unit)	SCHWARZBECK MESS-ELEKTRONIK	Schwarzbeck 8127	8127-666	Dec. 04, 2012	Dec. 03, 2013
ISN	TESEQ	ISN T800	34406	Apr. 08, 2013	Apr. 07, 2014
ISN	TESEQ	ISN T200A	30494	Apr. 09, 2013	Apr. 08, 2014
ISN	TESEQ	ISN T8-Cat6	27262	Sep. 17, 2012	Sep. 16, 2013
ISN	TESEQ	ISN ST08	22589	Jan. 24, 2013	Jan. 23, 2014
RF Current Probe	FCC	F-33-4	121630	Dec. 04, 2012	Dec. 03, 2013
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Dec. 25, 2012	Dec. 24, 2013
ESH3-Z6 V-Network(+)	R&S	ESH3-Z6	100920	Nov. 21, 2012	Nov. 20, 2013
ESH3-Z6 V-Network(-)	R&S	ESH3-Z6	100951	Jan. 03, 2013	Jan. 02, 2014
Two-Line V-Network	R&S	ENV216	101579	Jan. 07, 2013	Jan. 06, 2014
50 ohm terminal	NA	50	01	Apr. 22, 2013	Apr. 21, 2014
50 ohm terminal	NA	50	02	Apr. 22, 2013	Apr. 21, 2014
50 ohm terminal	NA	50	03	Apr. 22, 2013	Apr. 21, 2014
50 ohm terminal (Support Unit)	NA	50	04	Apr. 22, 2013	Apr. 21, 2014
Note: Calibration Interval of instruments listed above is one year.					



Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
3m semi-anechoic chamber	CHAMPRO	SAC-03	03CH01-WS	Jan. 04, 2013	Jan. 03, 2014
Spectrum Analyzer	R&S	FSV40	101498	Jan. 24, 2013	Jan. 23, 2014
Receiver	ROHDE&SCHWARZ	ESR3	101658	Jan. 28, 2013	Jan. 27, 2014
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jan. 11, 2013	Jan. 10, 2014
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Feb. 18, 2013	Feb. 17, 2014
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Jan. 14, 2013	Jan. 13, 2014
Amplifier	Burgeon	BPA-530	100219	Nov. 28, 2012	Nov. 27, 2013
Amplifier	Agilent	83017A	MY39501308	Dec. 18, 2012	Dec. 17, 2013
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 25, 2012	Dec. 24, 2013
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 25, 2012	Dec. 24, 2013
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 25, 2012	Dec. 24, 2013
RF Cable-R03m	Woken	CFD400NL-LW	CFD400NL-001	Dec. 25, 2012	Dec. 24, 2013
RF Cable-R10m	Woken	CFD400NL-LW	CFD400NL-002	Dec. 25, 2012	Dec. 24, 2013
control	EM Electronics	EM1000	60612	N/A	N/A
Note: Calibration Interval of instruments listed above is one year.					

Loop Antenna	R&S	HFH2-Z2	100330	Nov. 15, 2012	Nov. 14, 2014
Amplifier	MITEQ	AMF-6F-260400	9121372	Apr. 19, 2013	Apr. 18, 2015
Note: Calibration Interval of instruments listed above is two year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247

ANSI C63.10-2009

FCC KDB 558074 D01 DTS Meas Guidance v03

Note: The EUT has been tested and complied with FCC part 15B requirement. FCC Part 15B test results are issued to another report.



1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$))

Measurement Uncertainty	
Parameters	Uncertainty
AC conducted emission	± 2.43 dB
Radiated emission	± 2.49 dB



2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	22°C / 52%	Skys Huang
Radiated Emissions	03CH01-WS	25°C / 65%	Aska Huang

➤ FCC site registration No.: 657002

➤ IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data rate (Mbps)	Test Configuration
AC Power Line Conducted Emissions	GFSK	2480	1Mbps	---
Radiated Emissions (below 1GHz)	GFSK	2480	1Mbps	---
Radiated Emissions (above 1GHz)	GFSK	2480	1Mbps	---



3 Transmitter Test Results

3.1 AC Power Line Conducted Emissions

3.1.1 Limit of AC Power Line Conducted Emissions

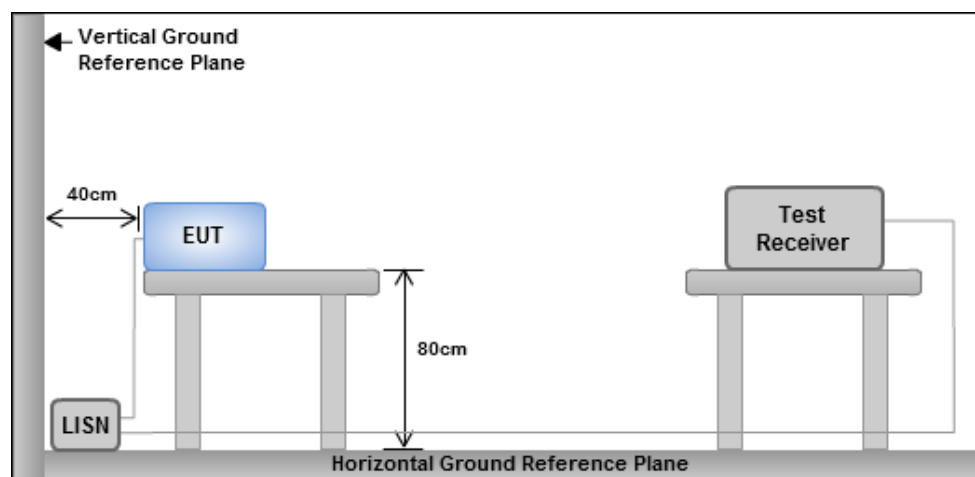
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

3.1.2 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V/60Hz

3.1.3 Test Setup



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes



3.1.4 Test Result of Conducted Emissions

Modulation Mode	GFSK	Test Freq. (MHz)	2480
Power Phase	Line		

Level (dBuV)

Date: 2013-07-01

Frequency (MHz)

	Freq	Level	Limit	Over	Read	LISN	cable	
	MHz	dBuV	Line	Limit	Level	factor	loss	Remark
			dBuV	dB	dBuV	dB	dB	
1	0.153	27.07	55.82	-28.75	26.97	0.03	0.07	Average
2	0.153	50.25	65.82	-15.57	50.15	0.03	0.07	QP
3	0.197	36.50	53.76	-17.26	36.30	0.03	0.17	Average
4	0.197	44.38	63.76	-19.38	44.18	0.03	0.17	QP
5	0.226	26.76	52.61	-25.85	26.57	0.03	0.16	Average
6	0.226	41.00	62.61	-21.61	40.81	0.03	0.16	QP
7	0.320	18.99	49.71	-30.72	18.87	0.03	0.09	Average
8	0.320	30.68	59.71	-29.03	30.56	0.03	0.09	QP
9	3.661	27.93	46.00	-18.07	27.64	0.06	0.23	Average
10	3.661	34.52	56.00	-21.48	34.23	0.06	0.23	QP
11	16.312	12.53	50.00	-37.47	12.27	0.11	0.15	Average
12	16.312	21.30	60.00	-38.70	21.04	0.11	0.15	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).

Note 2: Over Limit (dBuV) = Limit Line (dBuV) – Level (dBuV).



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Modulation Mode	GFSK	Test Freq. (MHz)	2480
Power Phase	Neutral		

Level (dBuV)

Date: 2013-07-01

CISPR/CNS/VCCI-B

CISPR/CNS/VCCI-B AV

Frequency (MHz)

	Freq	Level	Limit	Over	Read	LISN	cable	
	MHz	dBuV	Line	Limit	Level	factor	loss	Remark
			dBuV	dB	dBuV	dB	dB	
1	0.162	30.77	55.38	-24.61	30.66	0.02	0.09	Average
2	0.162	50.02	65.38	-15.36	49.91	0.02	0.09	QP
3	0.224	23.74	52.66	-28.92	23.56	0.02	0.16	Average
4	0.224	41.59	62.66	-21.07	41.41	0.02	0.16	QP
5	0.249	24.36	51.78	-27.42	24.20	0.02	0.14	Average
6	0.249	38.51	61.78	-23.27	38.35	0.02	0.14	QP
7	0.538	17.29	46.00	-28.71	17.22	0.02	0.05	Average
8	0.538	24.52	56.00	-31.48	24.45	0.02	0.05	QP
9	3.720	25.83	46.00	-20.17	25.55	0.05	0.23	Average
10	3.720	33.77	56.00	-22.23	33.49	0.05	0.23	QP
11	16.226	14.74	50.00	-35.26	14.48	0.11	0.15	Average
12	16.226	21.77	60.00	-38.23	21.51	0.11	0.15	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).

2: Over Limit (dBuV) = Limit Line (dBuV) – Level (dBuV).



3.2 Emissions in Restricted Frequency Bands

3.2.1 Limit of Emissions in Restricted Frequency Bands

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.2.2 Test Procedures

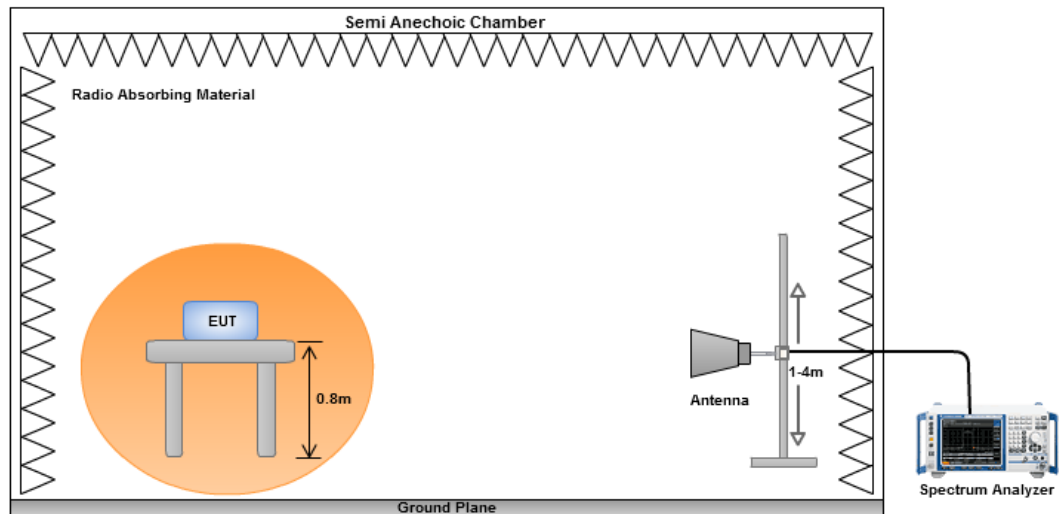
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at a height of 0.8 m test table above the ground plane.
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

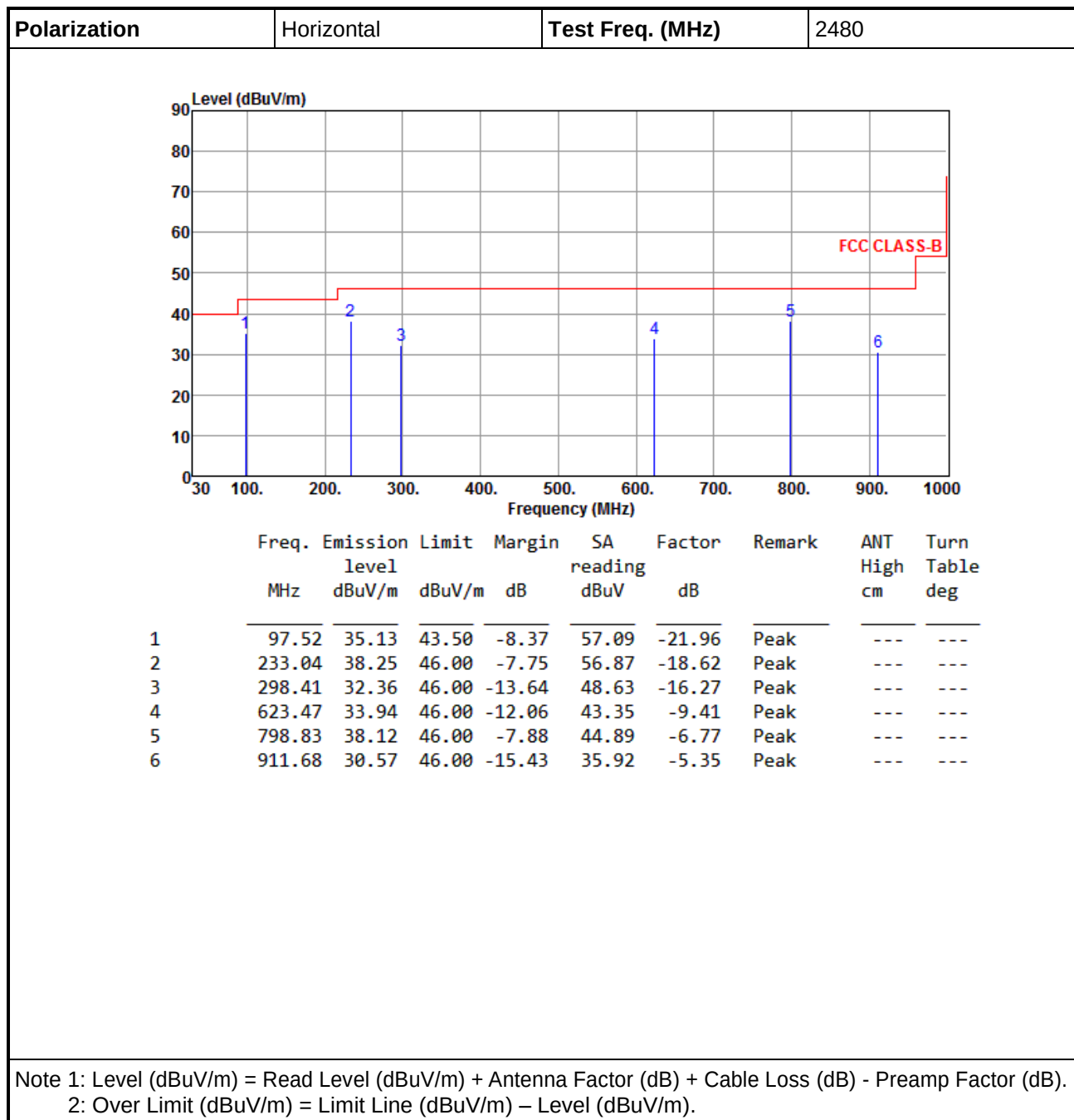


3.2.3 Test Setup





3.2.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)





Polarization	Vertical			Test Freq. (MHz)			2480																																																																								
Level (dBuV/m) <table><tr><th></th><th>Freq. MHz</th><th>Emission level dBuV/m</th><th>Limit dBuV/m</th><th>Margin dB</th><th>SA reading dBuV</th><th>Factor dB</th><th>Remark</th><th>ANT High cm</th><th>Turn Table deg</th></tr><tr><td>1</td><td>32.47</td><td>37.21</td><td>40.00</td><td>-2.79</td><td>54.79</td><td>-17.58</td><td>QP</td><td>---</td><td>---</td></tr><tr><td>2</td><td>46.24</td><td>37.61</td><td>40.00</td><td>-2.39</td><td>54.28</td><td>-16.67</td><td>QP</td><td>---</td><td>---</td></tr><tr><td>3</td><td>151.68</td><td>33.82</td><td>43.50</td><td>-9.68</td><td>50.74</td><td>-16.92</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>4</td><td>232.93</td><td>31.26</td><td>46.00</td><td>-14.74</td><td>49.88</td><td>-18.62</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>5</td><td>626.82</td><td>38.92</td><td>46.00</td><td>-7.08</td><td>48.28</td><td>-9.36</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>6</td><td>798.76</td><td>36.53</td><td>46.00</td><td>-9.47</td><td>43.30</td><td>-6.77</td><td>Peak</td><td>---</td><td>---</td></tr></table>											Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg	1	32.47	37.21	40.00	-2.79	54.79	-17.58	QP	---	---	2	46.24	37.61	40.00	-2.39	54.28	-16.67	QP	---	---	3	151.68	33.82	43.50	-9.68	50.74	-16.92	Peak	---	---	4	232.93	31.26	46.00	-14.74	49.88	-18.62	Peak	---	---	5	626.82	38.92	46.00	-7.08	48.28	-9.36	Peak	---	---	6	798.76	36.53	46.00	-9.47	43.30	-6.77	Peak	---	---
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg																																																																						
1	32.47	37.21	40.00	-2.79	54.79	-17.58	QP	---	---																																																																						
2	46.24	37.61	40.00	-2.39	54.28	-16.67	QP	---	---																																																																						
3	151.68	33.82	43.50	-9.68	50.74	-16.92	Peak	---	---																																																																						
4	232.93	31.26	46.00	-14.74	49.88	-18.62	Peak	---	---																																																																						
5	626.82	38.92	46.00	-7.08	48.28	-9.36	Peak	---	---																																																																						
6	798.76	36.53	46.00	-9.47	43.30	-6.77	Peak	---	---																																																																						
Note 1: Level (dBuV/m) = Read Level (dBuV/m) + Antenna Factor (dB) + Cable Loss (dB) - Preamp Factor (dB). 2: Over Limit (dBuV/m) = Limit Line (dBuV/m) – Level (dBuV/m).																																																																															



3.2.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Polarization	Horizontal			Test Freq. (MHz)			2480		
Level (dBuV/m)									



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Polarization	Vertical	Test Freq. (MHz)	2480
Level (dBuV/m) 117 110 90 70 50 30 10 0 4 2 3 1 6 5 8 7			

==END==