



Spectrum Research & Testing Lab., Inc.
No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan County 320, Taiwan (R.O.C.)

TEST REPORT

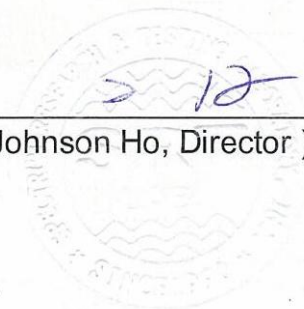
Reference No.: A14101501
Report No.: FCCA14101501
FCC ID : QSWDHRCs1
Page: 1 of 52
Date: Nov. 10, 2014

Product Name: TP3 Duplex Heart Rate Transmitter
Model No.: ZT26D
Applicant: Zentan Technology Co., Ltd
NO.92, Hsing-Sheng Road, Chia-Li District, Tainan City, 72254 Taiwan
Date of Receipt: Oct. 15, 2014
Finished date of Test: Nov. 05, 2014
Applicable Standards: 47 CFR Part 15, Subpart C, 15.247
ANSI C63.4: 2003
FCC publication KDB 558074 D01 v03r02 Measurement of Digital Transmission Systems (DTS) Operating under Section 15.247 June 5, 2014

We, **Spectrum Research & Testing Laboratory Inc.**, hereby certify that one sample of the above was tested in our laboratory with positive results according to the above-mentioned standards. The records in the report are an accurate account of the results. Details of the results are given in the subsequent pages of this report.

Tested By : Richard Lin , Date: 11/10/2014
(Richard Lin)

Approved By : [Signature] , Date: 11/10/2014
(Johnson Ho, Director)



	Spectrum Research & Testing Lab., Inc. No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan County 320, Taiwan (R.O.C.)	TEST REPORT	Reference No.: A14101501 Report No.: FCCA14101501 FCC ID : QSWDHRCS1 Page: 2 of 52 Date: Nov. 10, 2014
---	---	----------------------	--

Revisions History

Report No.	Issue Date	Revisions
FCCA14101501	Nov. 10, 2014	Initial issue



Table of Contents

1. DOCUMENT POLICY AND TEST STATEMENT	5
1.1 DOCUMENT POLICY	5
1.2 TEST STATEMENT	5
1.3 EUT MODIFICATION	5
2. DESCRIPTION OF EUT AND TEST MODE	6
2.1 GENERAL DESCRIPTION OF EUT	6
2.2 DESCRIPTION OF EUT INTERNAL DEVICE	6
2.3 DESCRIPTION OF TEST MODE	7
2.4 EUT OPERATING CONDITION	7
2.5 DESCRIPTION OF SUPPORT UNIT	8
2.6 CHANNEL AND FREQUENCY TABLE	8
3. DESCRIPTION OF APPLIED STANDARDS	9
3.1 SUMMARY OF TEST RESULTS	9
4. TECHNICAL CHARACTERISTICS TEST	10
4.1 RADIATED EMISSION TEST	10
4.1.1 LIMIT	10
4.1.2 TEST EQUIPMENT	11
4.1.3 TEST SET-UP	12
4.1.4 TEST PROCEDURE	13
4.1.5 TEST RESULT	14
4.2 6DB BANDWIDTH	30
4.2.1 LIMIT	30
4.2.2 TEST EQUIPMENT	30
4.2.3 TEST SET-UP	30
4.2.4 TEST PROCEDURE	30
4.2.5 EUT OPERATING CONDITION	30
4.2.6 TEST RESULT	31
4.3 PEAK POWER TEST	33
4.3.1 LIMIT	33
4.3.2 TEST EQUIPMENT	33
4.3.3 TEST SET-UP	33
4.3.4 TEST PROCEDURE	33
4.3.5 EUT OPERATING CONDITION	33
4.3.6 TEST RESULT	34
4.4 BAND EDGE TEST	36
4.4.1 LIMIT	36
4.4.2 TEST EQUIPMENT	37
4.4.3 TEST SETUP	38
4.4.4 TEST PROCEDURE	39
4.4.5 EUT OPERATING CONDITION	39
4.4.6 TEST RESULT	40
4.5 POWER DENSITY TEST	44
4.5.1 LIMIT	44



**Spectrum Research &
Testing Lab., Inc.**

No.167, Ln. 780, Shan-Tong
Rd., Ling 8, Shan-Tong Li,
Chung-Li City, Taoyuan County
320, Taiwan (R.O.C.)

TEST REPORT

Reference No.: A14101501
Report No.: FCCA14101501
FCC ID : QSWDHRCS1
Page: 4 of 52
Date: Nov. 10, 2014

4.5.2	TEST EQUIPMENT	44
4.5.3	TEST SET-UP.....	44
4.5.4	TEST PROCEDURE.....	44
4.5.5	EUT OPERATING CONDITION.....	44
4.5.6	TEST RESULT.....	45
5.	ANTENNA APPLICATION.....	47
5.1	ANTENNA REQUIREMENT	47
5.2	RESULT	47
6.	DESCRIPTION OF RF EXPOSURE.....	48
7.	PHOTOS OF TESTING	49
8.	TERMS OF ABBREVIATION	52



Spectrum Research & Testing Lab., Inc.
No.167, Ln. 780, Shan-Tong
Rd., Ling 8, Shan-Tong Li,
Chung-Li City, Taoyuan County
320, Taiwan (R.O.C.)

TEST REPORT

Reference No.: A14101501
Report No.: FCCA14101501
FCC ID : QSWDHRCS1
Page: 5 of 52
Date: Nov. 10, 2014

1. DOCUMENT POLICY AND TEST STATEMENT

1.1 DOCUMENT POLICY

- The report shall not be reproduced except in full, without the written approval of SRT Lab, Inc.

1.2 TEST STATEMENT

- The test results in the report apply only to the unit tested by SRT Lab.
- There was no deviation from the requirements of test standards during the test.
- DC power source, 3Vdc of CR2032 battery.
- New DC dry battery (CR2032) was used during testing.

1.3 EUT MODIFICATION

- No modification in SRT Lab.



Spectrum Research & Testing Lab., Inc.
No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan County 320, Taiwan (R.O.C.)

TEST REPORT

Reference No.: A14101501
Report No.: FCCA14101501
FCC ID : QSWDHRCS1
Page: 6 of 52
Date: Nov. 10, 2014

2. DESCRIPTION OF EUT AND TEST MODE

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	TP3 Duplex Heart Rate Transmitter
MODEL NO.	ZT26D
POWER SUPPLY	DC power source from CR2032 battery : DC 3.0V
CABLE	NA
FREQUENCY BAND	2.4 GHz (Bluetooth V4.0 Low Energy, no BR/EDR)
CARRIER FREQUENCY	2.402 GHz ~ 2.480 GHz
NUMBER OF CHANNEL	40
RATED RF OUTPUT POWER	-4.23 dBm
MODULATION TYPE	GFSK
MODE OF OPERATION	Duplex
ANTENNA TYPE	Chip Antenna
ANTENNA GAIN	1.57 dBi
OPERATING TEMPERATURE RANGE	-20 ~ 55°C

NOTE:

The EUT operates in single mode Bluetooth Low Energy, therefore, no BR/EDR tests were performed. For more detailed information, please refer to the EUT's specification or user's manual provided by manufacturer.

2.2 DESCRIPTION OF EUT INTERNAL DEVICE

DEVICE	BRAND / MAKER	MODEL #	FCC ID / DOC	REMARK



2.3 DESCRIPTION OF TEST MODE

Mode		Frequency
1	Tx-1	2402 MHz
2	Tx-2	2440 MHz
3	Tx-3	2480 MHz
4	Standby	N/A
5	Link	N/A

NOTE: The axis X,Y and Z we evaluate in chamber, the X axis is worst case.

X axis:



Y axis:



Z axis:



2.4 EUT OPERATING CONDITION

Tx-1, Tx-2, Tx3 :

1. For use customer provided continuous transmission EUT.
2. Setup 3V CR2032 Battery to EUT. Turn on the power.
3. Shake one time. Into mode : Tx-1.
4. Shake one time. Into mode : Tx-2.
5. Shake one time. Into mode : Tx-3.

Standby, Link :

1. For use customer provided normal EUT.
2. Setup 3V CR2032 Battery to EUT. Turn on the power.
3. Into mode : Standby.
4. Turn on peripheral devices (iPad) & open Cadence Pod App.
5. Connect & Pair the EUT to iPad App. Into mode : Link.



TEST REPORT

2.5 DESCRIPTION OF SUPPORT UNIT

The EUT was configured by the requirement of ANSI C63.4:2003. All interface ports were connected to the appropriate support units via specific cables. The support units and cables are listed below.

NO	DEVICE	BRAND	MODEL #	FCC ID/DOC	CABLE
1	iPad Wi-Fi 16G	Apple	A1458	BCGA1458	N/A

NOTE: For the actual test configuration, please refer to the photos of testing.

2.6 CHANNEL AND FREQUENCY TABLE

Channel	Frequency	Channel	Frequency
CH01	2402 MHz	CH21	2442 MHz
CH02	2404 MHz	CH22	2444 MHz
CH03	2406 MHz	CH23	2446 MHz
CH04	2408 MHz	CH24	2448 MHz
CH05	2410 MHz	CH25	2450 MHz
CH06	2412 MHz	CH26	2452 MHz
CH07	2414 MHz	CH27	2454 MHz
CH08	2416 MHz	CH28	2456 MHz
CH09	2418 MHz	CH29	2458 MHz
CH10	2420 MHz	CH30	2460 MHz
CH11	2422 MHz	CH31	2462 MHz
CH12	2424 MHz	CH32	2464 MHz
CH13	2426 MHz	CH33	2466 MHz
CH14	2428 MHz	CH34	2468 MHz
CH15	2420 MHz	CH35	2470 MHz
CH16	2432 MHz	CH36	2472 MHz
CH17	2434 MHz	CH37	2474 MHz
CH18	2436 MHz	CH38	2476 MHz
CH19	2438 MHz	CH39	2478 MHz
CH20	2440 MHz	CH40	2480 MHz



3. DESCRIPTION OF APPLIED STANDARDS

The EUT is a wireless product. According to the specifications provided by the applicant, it must comply with the requirements of the following standards:

47 CFR Part 15, Subpart C, 15.247

ANSI C63.4: 2003

FCC publication KDB 558074 D01 v03r02 Measurement of Digital Transmission Systems (DTS) Operating under Section 15.247 June 5, 2014

All tests have been performed and recorded as the above standards.

3.1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

STANDARD SECTION	TEST TYPE AND LIMIT RESULTS	RESULTS
15.203	Antenna requirement	PASS
15.207	AC Power Line Conducted Emission	N/A
15.247(a)(2)	6 dB Bandwidth Limit: minimum of 500 kHz	PASS
15.247(b)	Peak Power Test: Limit: 21 dBm	PASS
15.247(d)	Band Edge Measurement: Limit: 20dB less than the peak value of fundamental frequency	PASS
15.247(d)	Transmitter Radiated Emissions Limit: Table 15.209	PASS
15.247(e)	Power Density: Limit: 8dBm/3kHz	PASS



4. TECHNICAL CHARACTERISTICS TEST

4.1 RADIATED EMISSION TEST

4.1.1 LIMIT

FCC Part15, Subpart C Section 15.209 limit of radiated emission for frequency below1000MHz. The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

FREQUENCY (MHz)	FIELD STRENGTH (microvolts/meter)	DISTANCE (m)	FIELD STRENGTH (dB μ V/m)
0.009 - 0.490	2400/F(kHz)	300	67.6-20log(kHz)
0.490 - 1.705	24000/F(kHz)	30	87.6-20log(kHz)
1.705 - 30	30	30	30
30 - 88	100	3	40.0
88 - 216	150	3	43.5
216 - 960	200	3	46.0
Above 960	500	3	54.0

NOTE:

1. 30 dBuV (in 30m) = 70 dBuV (in 3m).
2. In the emission tables above , the tighter limit applies at the band edges.
3. Distance refers to the distance between measuring instrument, antenna, and the closest point of any part of the device or system.

FCC Part 15, Section15.35(b) limit of radiated emission for frequency above 1000 MHz

FREQUENCY (MHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80.0	60.0	74.0	54.0

 Spectrum Research & Testing Lab., Inc. No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan County 320, Taiwan (R.O.C.)	TEST REPORT	Reference No.: A14101501 Report No.: FCCA14101501 FCC ID : QSWDHRCS1 Page: 11 of 52 Date: Nov. 10, 2014
---	----------------------	---

4.1.2 TEST EQUIPMENT

The following test equipment was used during the radiated emission test:

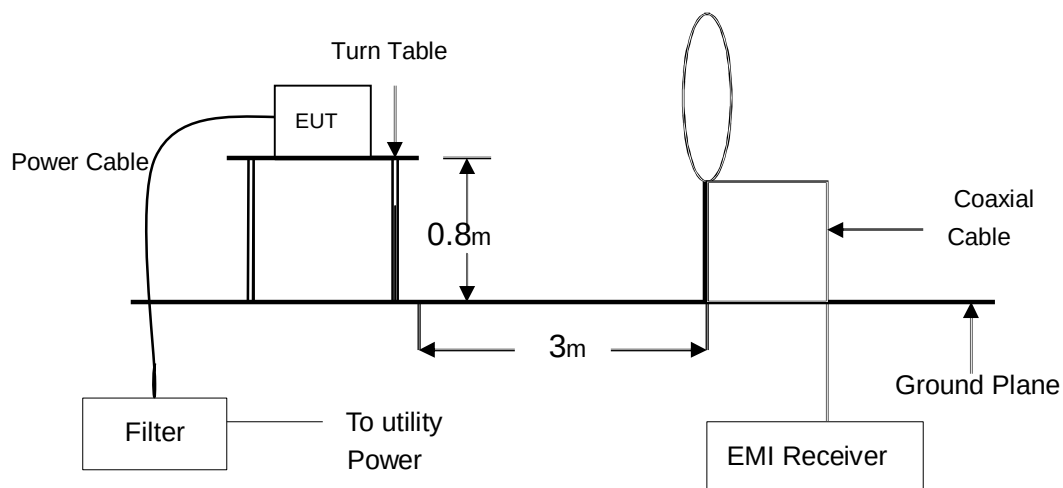
EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
EMI TEST RECEIVER	9 kHz ~ 2.75 GHz	ROHDE & SCHWARZ	ESCS30 / 100376	JAN. 12, 2015 ETC
EMI TEST RECEIVER	20 MHz ~ 1000 MHz	ROHDE & SCHWARZ	ESVS30 / 841977/003	DEC. 08, 2014 ETC
SPECTRUM ANALYZER	9 kHz ~ 40GHz	ROHDE & SCHWARZ	FSP40 / 100093	DEC 08, 2014 ETC
EMI TEST RECEIVER (INCLUDE SPECTRUM ANALYZER)	9 KHz ~ 6 GHz	ROHDE & SCHWARZ	ESL /100176	MAR. 28, 2015 ETC
LOOP ANTENNA	9 kHz ~ 30 MHz	ETS.LINDGREN	HFH2-Z2/ 860605/002 (1162 1/2)	MAR. 17, 2015 ETC
BI-LOG ANTENNA	30 MHz ~ 2 GHz	SCHAFFNER	CBL6141A / 4181	JUN. 18, 2015 ETC
HORN ANTENNA	1 GHz ~ 18 GHz	EMCO	3115/ 9602-4681	DEC. 12, 2014 ETC
HORN ANTENNA	18 ~ 40 GHZ	ETS-LINDGREN	3116 /00032255	JAN. 10, 2015 ETC
PRE-AMPLIFIER	1 GHz ~ 26.5 GHz	AGILENT	8449B/ 3008A01995	DEC. 10, 2014 ETC
OPEN AREA TEST SITE	3 – 10 M MEASUREMENT	SRT	A02 / SRT002	MAR. 07, 2015 SRT
ANECHOIC CHAMBER	3 M MEASUREMENT	SRT	A01 / SRT001	MAY. 7, 2015 SRT
COAXIAL CABLE	30 M	TIMES	LMR-400 / #30M(L1TCAB014)	MAY. 21, 2015 ETC
FILTER	2 LINE, 30 A	FIL.COIL	FC-943 / 869	NCR
K-TYPE CABLE	UP TO 40 GHz 3 m	HUBER+SUHNE R	SF102-46/2*11SK 252 /MY2611/2	MAR. 09, 2015 ETC
K-TYPE CABLE	UP TO 40 GHz, 1 m	HUBER+SUHNE R	SF 102-40/2*11 /23934/2	OCT. 12, 2015 ETC
CDN	0.15 MHz ~ 300 MHz	LUTHI	CDN L-801 M2/M3 / 2790	MAY. 20, 2015 ETC

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

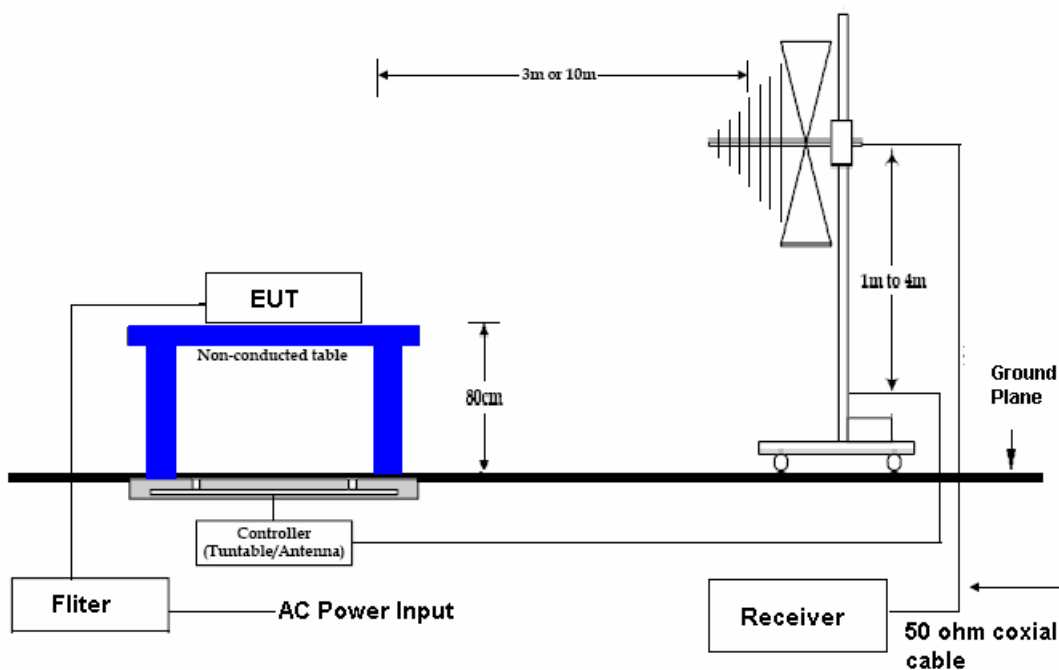


4.1.3 TEST SET-UP

9KHz ~ 30MHz

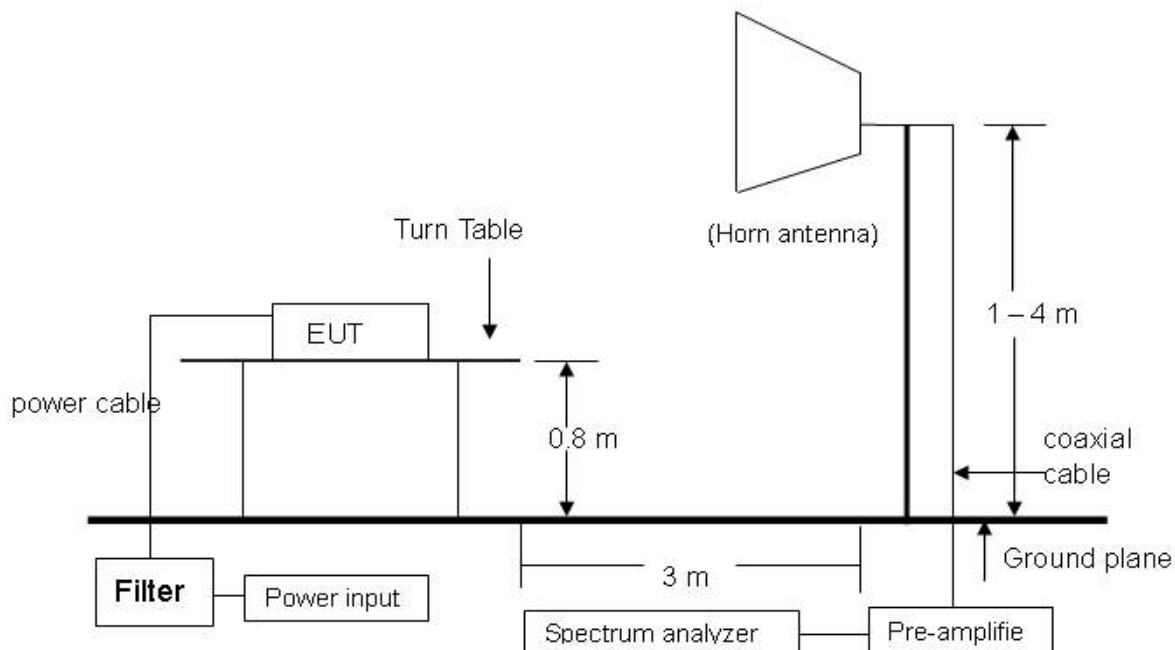


30 MHz ~ 1 GHz





Above 1 GHz



NOTE: The EUT system was put on a wooden table with 0.8m heights above a ground plane.
For the actual test configuration, please refer to the photos of testing.

4.1.4 TEST PROCEDURE

The EUT was tested according to the requirement of ANSI C63.4:2003 and CISPR 22:2003. When the frequency spectrum measured started from 9 kHz to 30 MHz, then use antenna is a loop antenna. The measurements were made at an open area test site with 3 meter measurement distance under 1 GHz and with 3m distance above 1GHz. The frequency spectrum measured started from 9kHz to 30MHz and 30 MHz to 1 GHz, all readings were quasi-peak values with 120 kHz resolution bandwidth of the test receiver. Above 1 GHz, the measurements were made at an open area test site with 3 meter measurement distance and all readings were peak or average values with 1 MHz resolution bandwidth of the test receiver. The EUT system was operated in all typical methods by users. The cables connected to EUT and support units were moved to find the maximum emission levels for each frequency. First, find the margin or higher points at least 6 points by software, then use manual to find the maximum data. The procedure is referred on the test procedure of SRT LAB.



TEST REPORT

4.1.5 TEST RESULT

Temperature:	24 °C	Humidity:	60 %RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	AV.	Tested Mode:	Tx-1
Tested By:	Richard Lin	Tested Date:	Nov. 05, 2014

Frequency (KHz)	Cable Loss (dB)	Ant. Fac. (dB)	Reading (dBμV)	Emission (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)
8.24	0.62	20.52	7.83	28.97	70.00	-41.03
14.41	0.82	21.19	5.63	27.63	70.00	-42.37
17.75	0.92	21.55	6.25	28.71	70.00	-41.29
19.69	0.97	21.76	6.13	28.86	70.00	-41.14
25.02	1.12	21.85	7.47	30.44	70.00	-39.56
27.13	1.17	21.87	5.41	28.45	70.00	-41.55

Temperature:	24 °C	Humidity:	60 %RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	AV.	Tested Mode:	Tx-2
Tested By:	Richard Lin	Tested Date:	Nov. 05, 2014

Frequency (KHz)	Cable Loss (dB)	Ant. Fac. (dB)	Reading (dBμV)	Emission (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)
8.04	0.61	20.50	8.83	29.94	70.00	-40.06
8.67	0.63	20.57	7.88	29.08	70.00	-40.92
11.48	0.73	20.86	7.06	28.65	70.00	-41.35
22.40	1.05	21.82	7.11	29.98	70.00	-40.02
24.98	1.12	21.85	6.85	29.82	70.00	-40.18
27.52	1.18	21.88	5.55	28.61	70.00	-41.39



Spectrum Research & Testing Lab., Inc.
No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan County 320, Taiwan (R.O.C.)

TEST REPORT

Reference No.: A14101501
Report No.: FCCA14101501
FCC ID : QSWDHRCS1
Page: 15 of 52
Date: Nov. 10, 2014

Temperature:	24 °C	Humidity:	60 %RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	AV.	Tested Mode:	Tx-3
Tested By:	Richard Lin	Tested Date:	Nov. 05, 2014

Frequency (KHz)	Cable Loss (dB)	Ant. Fac. (dB)	Reading (dBμV)	Emission (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)
8.56	0.63	20.56	7.55	28.73	70.00	-41.27
16.55	0.88	21.42	6.81	29.11	70.00	-40.89
17.16	0.90	21.48	6.37	28.75	70.00	-41.25
22.03	1.04	21.82	5.96	28.82	70.00	-41.18
25.09	1.12	21.85	7.89	30.86	70.00	-39.14
29.17	1.22	21.89	5.26	28.37	70.00	-41.63

Temperature:	24 °C	Humidity:	60 %RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	AV.	Tested Mode:	Standby
Tested By:	Richard Lin	Tested Date:	Nov. 05, 2014

Frequency (KHz)	Cable Loss (dB)	Ant. Fac. (dB)	Reading (dBμV)	Emission (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)
8.57	0.63	20.56	8.05	29.24	70.00	-40.76
14.85	0.83	21.23	6.86	28.92	70.00	-41.08
19.62	0.97	21.75	5.94	28.66	70.00	-41.34
22.77	1.06	21.83	6.10	28.99	70.00	-41.01
23.51	1.08	21.84	6.21	29.12	70.00	-40.88
25.06	1.12	21.85	7.11	30.08	70.00	-39.92



Spectrum Research & Testing Lab., Inc.
No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan County 320, Taiwan (R.O.C.)

TEST REPORT

Reference No.: A14101501
Report No.: FCCA14101501
FCC ID : QSWDHRCS1
Page: 16 of 52
Date: Nov. 10, 2014

Temperature:	24 °C	Humidity:	60 %RH
Frequency Range:	9 kHz – 30 MHz	Measured Distance:	3 m
Receiver Detector:	AV.	Tested Mode:	Link
Tested By:	Richard Lin	Tested Date:	Nov. 05, 2014

Frequency (KHz)	Cable Loss (dB)	Ant. Fac. (dB)	Reading (dBμV)	Emission (dBμV/m)	Limit Line (dBμV/m)	Margin (dB)
3.01	0.38	19.70	8.80	28.88	70.00	-41.12
8.54	0.63	20.55	8.08	29.26	70.00	-40.74
10.08	0.68	20.71	7.71	29.10	70.00	-40.90
22.19	1.04	21.82	6.61	29.47	70.00	-40.53
25.06	1.12	21.85	7.95	30.92	70.00	-39.08
29.22	1.22	21.89	6.44	29.55	70.00	-40.45



TEST REPORT

Temperature:	21 °C	Humidity:	62 %RH
Frequency Range:	30 M – 1 GHz	Tested Mode:	Tx-1
Detector Type:	Quasi-peak	IF Bandwidth:	120 kHz
Tested By:	Richard Lin	Tested Date:	Oct. 31, 2014

Antenna Polarization : Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
52.34	1.41	13.86	3.75	19.02	40	-20.98	209	3.53
415.29	3.71	16.54	4.97	25.22	46	-20.78	145	2.94
499.77	4.16	17.59	3.57	25.32	46	-20.69	257	2.68
521.50	4.28	18.31	4.29	26.89	46	-19.11	37	2.44
679.91	4.99	20.14	4.13	29.26	46	-16.74	178	1.98
804.63	5.62	21.90	3.44	30.95	46	-15.05	64	1.65

Antenna Polarization : Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
74.45	1.53	8.20	10.35	20.08	40	-19.92	231	1.13
411.83	3.68	16.48	4.10	24.26	46	-21.74	305	2.17
495.24	4.14	17.55	4.66	26.35	46	-19.66	158	2.48
517.56	4.26	18.18	3.27	25.71	46	-20.29	270	2.56
704.95	5.10	20.22	4.00	29.32	46	-16.68	182	3.08
772.22	5.48	21.69	3.79	30.95	46	-15.05	51	3.35

NOTE :

1. Measurement uncertainty is 4.73 dB.
2. "*": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss – Pre-Amplifier.
4. The field strength of other emission frequencies were very low against the limit.



TEST REPORT

Temperature:	21 °C	Humidity:	62 %RH
Frequency Range:	30 M – 1 GHz	Tested Mode:	Tx-2
Detector Type:	Quasi-peak	IF Bandwidth:	120 kHz
Tested By:	Richard Lin	Tested Date:	Oct. 31, 2014

Antenna Polarization : Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
55.71	1.42	12.90	3.35	17.67	40	-22.33	219	3.53
410.59	3.68	16.46	3.90	24.04	46	-21.96	342	2.97
492.84	4.12	17.52	5.61	27.25	46	-18.75	105	2.54
516.34	4.25	18.14	3.79	26.19	46	-19.81	75	2.31
656.06	4.89	20.19	3.97	29.04	46	-16.96	168	2.09
776.95	5.49	21.70	3.81	31.01	46	-14.99	81	1.68

Antenna Polarization : Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
56.17	1.42	12.58	5.08	19.08	40	-20.92	221	1.09
74.68	1.53	8.20	10.33	20.06	40	-19.94	68	1.15
189.39	2.29	10.57	5.33	18.19	44	-25.31	235	1.47
499.76	4.16	17.59	3.42	25.17	46	-20.84	303	2.42
613.66	4.69	19.68	3.37	27.74	46	-18.26	264	2.86
782.28	5.52	21.73	3.89	31.14	46	-14.86	292	3.35

NOTE :

1. Measurement uncertainty is 4.73 dB.
2. "*": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.



TEST REPORT

Temperature:	21 °C	Humidity:	62 %RH
Frequency Range:	30 M – 1 GHz	Tested Mode:	Tx-3
Detector Type:	Quasi-peak	IF Bandwidth:	120 kHz
Tested By:	Richard Lin	Tested Date:	Oct. 31, 2014

Antenna Polarization : Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
457.50	3.95	17.17	3.38	24.50	46	-21.51	244	2.69
499.49	4.16	17.59	3.59	25.34	46	-20.67	150	2.51
625.79	4.75	19.85	4.02	28.62	46	-17.39	169	2.17
715.32	5.17	20.55	3.30	29.02	46	-16.98	117	1.89
755.14	5.40	21.62	3.71	30.73	46	-15.27	309	1.67
850.98	5.79	23.00	3.74	32.53	46	-13.47	199	1.45

Antenna Polarization : Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
56.62	1.42	12.58	5.34	19.34	40	-20.66	228	1.04
74.53	1.53	8.20	12.03	21.76	40	-18.24	130	1.15
189.87	2.29	10.57	5.53	18.39	44	-25.11	44	1.47
614.05	4.69	19.70	3.42	27.81	46	-18.19	260	2.65
778.46	5.50	21.71	3.69	30.91	46	-15.09	286	3.02
860.29	5.83	23.16	3.56	32.55	46	-13.45	89	3.38

NOTE :

1. Measurement uncertainty is 4.73 dB.
2. "*": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.



TEST REPORT

Temperature:	21 °C	Humidity:	62 %RH
Frequency Range:	30 M – 1 GHz	Tested Mode:	Standby
Detector Type:	Quasi-peak	IF Bandwidth:	120 kHz
Tested By:	Richard Lin	Tested Date:	Oct. 31, 2014

Antenna Polarization : Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
414.90	3.70	16.52	3.74	23.97	46	-22.03	248	2.83
490.48	4.11	17.50	3.52	25.13	46	-20.87	159	2.59
660.22	4.90	20.18	4.17	29.25	46	-16.75	61	2.02
697.74	5.07	20.11	3.62	28.79	46	-17.21	174	1.96
793.15	5.57	21.77	3.79	31.13	46	-14.87	83	1.65
933.88	6.15	24.66	3.80	34.61	46	-11.39	302	1.22

Antenna Polarization : Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
44.69	1.38	17.32	3.58	22.28	40	-17.72	180	1.06
74.18	1.53	8.20	7.87	17.60	40	-22.40	225	1.17
414.02	3.70	16.52	3.64	23.87	46	-22.13	146	2.14
499.73	4.16	17.59	3.72	25.47	46	-20.54	281	2.44
713.12	5.16	20.49	3.63	29.28	46	-16.72	75	3.12
922.35	6.10	24.37	3.51	33.98	46	-12.02	113	3.52

NOTE :

1. Measurement uncertainty is 4.73 dB.
2. "*": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.



TEST REPORT

Temperature:	21 °C	Humidity:	62 %RH
Frequency Range:	30 M – 1 GHz	Tested Mode:	Link
Detector Type:	Quasi-peak	IF Bandwidth:	120 kHz
Tested By:	Richard Lin	Tested Date:	Oct. 31, 2014

Antenna Polarization : Horizontal

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
54.84	1.42	13.22	3.61	18.25	40	-21.75	119	3.52
490.11	4.11	17.50	3.81	25.42	46	-20.58	254	2.79
499.96	4.16	17.59	4.03	25.78	46	-20.23	74	2.51
515.25	4.25	18.11	4.00	26.36	46	-19.64	159	2.36
668.73	4.94	20.16	3.94	29.04	46	-16.96	170	2.01
776.06	5.49	21.70	3.58	30.78	46	-15.22	81	1.67

Antenna Polarization : Vertical

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Reading Data (dBμV)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	AZ(°)	EL(m)
56.48	1.42	12.58	5.36	19.36	40	-20.64	212	1.06
74.50	1.53	8.20	11.55	21.28	40	-18.72	329	1.15
497.12	4.15	17.57	4.81	26.53	46	-19.48	156	2.45
515.09	4.25	18.11	4.93	27.29	46	-18.71	86	2.68
703.32	5.10	20.19	3.94	29.23	46	-16.77	273	3.12
750.87	5.38	21.60	3.97	30.95	46	-15.05	173	3.31

NOTE :

1. Measurement uncertainty is 4.73 dB.
2. "*": Measurement does not apply for this frequency.
3. Emission Level = Reading Value + Ant. Factor + Cable Loss.
4. The field strength of other emission frequencies were very low against the limit.



TEST REPORT

Temperature:	23 °C	Humidity:	59 %RH
Frequency Range:	1 GHz – 25 GHz	Tested Mode:	Tx-1
Detector Type:	PK. and AV.	IF Bandwidth:	1 MHz
VBW:	3 MHz	Tested Date:	Nov. 04, 2014

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1647.38	-31.98	25.83	46.00	35.52	39.85	29.37	74	54	-34.15	-24.63	235	2.33
2314.50	-30.88	27.98	46.99	36.41	44.09	33.51	74	54	-29.91	-20.49	106	2.12
3881.24	-28.53	32.21	43.19	32.67	46.87	36.35	74	54	-27.13	-17.65	78	1.60
4432.59	-27.73	32.50	42.96	32.47	47.73	37.24	74	54	-26.27	-16.76	221	1.48
4587.66	-27.54	32.69	43.04	32.54	48.19	37.69	74	54	-25.81	-16.31	315	1.40
5549.13	-26.11	34.19	40.96	30.49	49.04	38.57	74	54	-24.96	-15.43	72	1.12

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1843.15	-31.66	26.53	45.28	34.71	40.16	29.59	74	54	-33.84	-24.41	69	1.26
3052.88	-29.93	30.31	44.20	33.82	44.58	34.20	74	54	-29.42	-19.80	217	1.67
3198.47	-29.75	30.64	43.73	33.26	44.62	34.15	74	54	-29.38	-19.85	110	1.75
3790.01	-28.73	32.00	43.29	32.85	46.56	36.12	74	54	-27.44	-17.88	89	1.83
4229.53	-27.99	32.50	43.53	33.01	48.04	37.52	74	54	-25.96	-16.48	201	1.99
5096.49	-26.84	33.72	42.53	32.14	49.41	39.02	74	54	-24.59	-14.98	297	2.25

NOTE:

1. Measurement uncertainty is 3.81 dB.
2. "F": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.



Spectrum Research & Testing Lab., Inc.
No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan County 320, Taiwan (R.O.C.)

TEST REPORT

Reference No.: A14101501
Report No.: FCCA14101501
FCC ID : QSWDHRCS1
Page: 23 of 52
Date: Nov. 10, 2014

Temperature:	23 °C	Humidity:	59 %RH
Frequency Range:	1 GHz – 25 GHz	Tested Mode:	Tx-1 (Fundamental and Harmonics)
Detector:	PK. and AV.	IF Bandwidth:	1 MHz
VBW:	3 MHz	Tested Date:	Nov. 04, 2014

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2402.00 (F)	-30.73	28.23	84.07	72.19	81.56	69.68	114	94	-32.44	-24.32	90	1.55
4804.00	-27.27	33.17	40.76	30.18	46.66	36.08	74	54	-27.34	-17.92	152	1.49
7206.00	-26.17	35.69	38.51	28.09	48.04	37.62	74	54	-25.96	-16.38	73	1.62
9608.00	-25.21	37.79	37.94	27.46	50.52	40.04	74	54	-23.48	-13.96	275	1.60
12010.0	-23.46	39.19	34.74	24.39	50.48	40.13	74	54	-23.52	-13.87	296	1.58
14412.0	-20.62	41.88	30.98	20.46	52.23	41.71	74	54	-21.77	-12.29	190	1.59

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2402.00 (F)	-30.73	28.23	80.67	68.30	78.16	65.79	114	94	-35.84	-28.21	115	1.52
4804.00	-27.27	33.17	40.65	30.12	46.55	36.02	74	54	-27.45	-17.98	48	1.47
7206.00	-26.17	35.69	38.54	28.04	48.07	37.57	74	54	-25.93	-16.43	328	1.71
9608.00	-25.21	37.79	37.42	27.02	50.00	39.60	74	54	-24.00	-14.40	66	1.64
12010.0	-23.46	39.19	34.93	24.39	50.67	40.13	74	54	-23.33	-13.87	102	1.58
14412.0	-20.62	41.88	31.25	20.60	52.50	41.85	74	54	-21.50	-12.15	305	1.45

NOTE:

1. Measurement uncertainty is 3.81 dB.
2. "※": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.



TEST REPORT

Temperature:	23 °C	Humidity:	59 %RH
Frequency Range:	1 GHz – 25 GHz	Tested Mode:	Tx-2
Detector Type:	PK. and AV.	IF Bandwidth:	1 MHz
VBW:	3 MHz	Tested Date:	Nov. 04, 2014

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1876.22	-31.60	26.65	46.12	35.67	41.17	30.72	74	54	-32.83	-23.28	322	2.35
3382.13	-29.51	31.04	43.22	32.71	44.75	34.24	74	54	-29.25	-19.76	210	1.93
3859.60	-28.58	32.16	42.96	32.53	46.54	36.11	74	54	-27.46	-17.89	205	1.77
4194.08	-28.03	32.50	43.14	32.65	47.61	37.12	74	54	-26.39	-16.88	106	1.58
5343.55	-26.34	34.01	41.63	31.11	49.30	38.78	74	54	-24.70	-15.22	82	1.24
5834.74	-26.56	34.13	41.46	31.02	49.03	38.59	74	54	-24.97	-15.41	117	1.06

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1844.13	-31.66	26.54	47.09	36.55	41.97	31.43	74	54	-32.03	-22.57	38	1.26
3158.68	-29.80	30.55	43.32	32.78	44.07	33.53	74	54	-29.93	-20.47	330	1.67
3457.05	-29.42	31.21	42.95	32.60	44.74	34.39	74	54	-29.26	-19.61	256	1.79
3981.25	-28.31	32.45	42.58	32.07	46.72	36.21	74	54	-27.28	-17.79	167	1.82
4612.86	-27.51	32.75	42.40	31.98	47.64	37.22	74	54	-26.36	-16.78	195	2.09
5139.92	-26.75	33.77	41.70	31.24	48.71	38.25	74	54	-25.29	-15.75	299	2.28

NOTE:

1. Measurement uncertainty is 3.81 dB.
2. "F": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.



Spectrum Research & Testing Lab., Inc.
No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan County 320, Taiwan (R.O.C.)

TEST REPORT

Reference No.: A14101501
Report No.: FCCA14101501
FCC ID : QSWDHRCS1
Page: 25 of 52
Date: Nov. 10, 2014

Temperature:	23 °C	Humidity:	59 %RH
Frequency Range:	1 GHz – 25 GHz	Tested Mode:	Tx-2 (Fundamental and Harmonics)
Detector:	PK.and AV.	IF Bandwidth:	1 MHz
VBW:	3 MHz	Tested Date:	Nov. 04, 2014

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2440.00 (F)	-30.67	28.33	86.63	74.57	84.29	72.23	114	94	-29.71	-21.77	224	1.62
4880.00	-27.18	33.34	39.51	29.04	45.67	35.20	74	54	-28.33	-18.80	80	1.64
7320.00	-26.11	35.97	37.78	27.23	47.64	37.09	74	54	-26.36	-16.91	97	1.55
9760.00	-25.07	37.91	37.30	26.78	50.14	39.62	74	54	-23.86	-14.38	162	1.57
12200.0	-22.84	39.08	34.25	23.77	50.49	40.01	74	54	-23.51	-13.99	150	1.60
14640.0	-20.65	41.58	29.37	18.85	50.30	39.78	74	54	-23.70	-14.22	273	1.48

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2440.00 (F)	-30.67	28.33	80.49	68.18	78.15	65.84	114	94	-35.85	-28.16	269	1.67
4880.00	-27.18	33.34	39.65	29.28	45.81	35.44	74	54	-28.19	-18.56	332	1.59
7320.00	-26.11	35.97	37.69	27.23	47.55	37.09	74	54	-26.45	-16.91	70	1.51
9760.00	-25.07	37.91	37.02	26.54	49.86	39.38	74	54	-24.14	-14.62	184	1.49
12200.0	-22.84	39.08	34.07	23.51	50.31	39.75	74	54	-23.69	-14.25	296	1.44
14640.0	-20.65	41.58	29.21	18.62	50.14	39.55	74	54	-23.86	-14.45	91	1.48

NOTE:

1. Measurement uncertainty is 3.81 dB.
2. "※": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.



TEST REPORT

Temperature:	23 °C	Humidity:	59 %RH
Frequency Range:	1 GHz – 25 GHz	Tested Mode:	Tx-3
Detector Type:	PK. and AV.	IF Bandwidth:	1 MHz
VBW:	3 MHz	Tested Date:	Nov. 04, 2014

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1842.97	-31.66	26.53	47.37	36.81	42.24	31.68	74	54	-31.76	-22.32	127	2.31
3048.38	-29.94	30.31	44.68	33.24	45.05	33.61	74	54	-28.95	-20.39	215	1.92
3719.23	-28.88	31.83	43.43	32.87	46.37	35.81	74	54	-27.63	-18.19	109	1.67
4007.79	-28.26	32.50	42.87	32.40	47.11	36.64	74	54	-26.89	-17.36	67	1.58
4553.81	-27.58	32.62	42.22	31.76	47.25	36.79	74	54	-26.75	-17.21	195	1.42
5744.60	-26.42	34.15	41.17	30.69	48.90	38.42	74	54	-25.10	-15.58	63	1.09

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
1844.20	-31.66	26.54	47.18	36.66	42.06	31.54	74	54	-31.94	-22.46	234	1.24
2558.19	-30.50	28.70	45.79	35.21	43.98	33.40	74	54	-30.02	-20.60	170	1.48
3052.36	-29.93	30.31	44.14	33.67	44.52	34.05	74	54	-29.48	-19.95	248	1.63
3693.54	-28.94	31.76	42.72	32.30	45.54	35.12	74	54	-28.46	-18.88	329	1.85
4414.90	-27.76	32.50	42.45	31.85	47.19	36.59	74	54	-26.81	-17.41	192	2.03
5787.67	-26.49	34.14	41.45	31.01	49.10	38.66	74	54	-24.90	-15.34	285	2.45

NOTE:

- Measurement uncertainty is 3.81 dB.
- "*": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
- Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
- The field strength of other emission frequencies were very low against the limit.
- (F): The field strength of fundamental frequency.



TEST REPORT

Temperature:	23 °C	Humidity:	59 %RH
Frequency Range:	1 GHz – 25 GHz	Tested Mode:	Tx-3 (Fundamental and Harmonics)
Detector:	PK. and AV.	IF Bandwidth:	1 MHz
VBW:	3 MHz	Tested Date:	Nov. 04, 2014

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2480.00 (F)	-30.60	28.44	85.57	73.25	83.41	71.09	114	94	-30.59	-22.91	134	1.56
4960.00	-27.08	33.51	41.30	30.78	47.73	37.21	74	54	-26.27	-16.79	62	1.60
7440.00	-26.05	36.26	38.25	27.76	48.46	37.97	74	54	-25.54	-16.03	85	1.63
9920.00	-24.92	38.04	37.11	26.64	50.22	39.75	74	54	-23.78	-14.25	302	1.57
12400.0	-22.19	38.96	33.49	23.05	50.26	39.82	74	54	-23.74	-14.18	260	1.52
14880.0	-20.71	40.86	30.82	20.38	50.97	40.53	74	54	-23.03	-13.47	291	1.50

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
2480.00 (F)	-30.60	28.44	80.10	67.84	77.94	65.68	114	94	-36.06	-28.32	183	1.48
4960.00	-27.08	33.51	40.28	29.76	46.71	36.19	74	54	-27.29	-17.81	75	1.45
7440.00	-26.05	36.26	38.31	27.76	48.52	37.97	74	54	-25.48	-16.03	327	1.63
9920.00	-24.92	38.04	36.97	26.54	50.08	39.65	74	54	-23.92	-14.35	129	1.59
12400.0	-22.19	38.96	33.84	23.33	50.61	40.10	74	54	-23.39	-13.90	95	1.55
14880.0	-20.71	40.86	30.87	20.40	51.02	40.55	74	54	-22.98	-13.45	33	1.52

NOTE:

1. Measurement uncertainty is 3.81 dB.
2. "※": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.



TEST REPORT

Temperature:	23 °C	Humidity:	59 %RH
Frequency Range:	1 GHz – 25 GHz	Tested Mode:	Standby
Detector Type:	PK. and AV.	IF Bandwidth:	1 MHz
VBW:	3 MHz	Tested Date:	Nov. 04, 2014

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
3562.88	-29.22	31.45	43.79	33.24	46.01	35.46	74	54	-27.99	-18.54	116	1.95
3619.46	-29.10	31.59	43.59	33.01	46.08	35.50	74	54	-27.92	-18.50	301	1.76
4368.17	-27.81	32.50	42.09	31.59	46.78	36.28	74	54	-27.22	-17.72	88	1.52
4814.02	-27.26	33.19	41.24	30.76	47.17	36.69	74	54	-26.83	-17.31	322	1.33
5174.83	-26.68	33.81	41.20	30.72	48.33	37.85	74	54	-25.67	-16.15	60	1.29
5319.96	-26.39	33.98	41.05	30.57	48.64	38.16	74	54	-25.36	-15.84	132	1.20

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
3287.93	-29.63	30.83	43.04	32.57	44.24	33.77	74	54	-29.76	-20.23	215	1.68
3549.22	-29.25	31.42	43.43	32.96	45.59	35.12	74	54	-28.41	-18.88	194	1.74
3912.56	-28.46	32.29	42.57	32.01	46.40	35.84	74	54	-27.60	-18.16	255	1.92
4611.85	-27.51	32.74	42.33	31.88	47.56	37.11	74	54	-26.44	-16.89	194	1.98
5214.06	-26.60	33.86	41.57	31.04	48.82	38.29	74	54	-25.18	-15.71	278	2.11
5778.34	-26.47	34.14	40.44	29.95	48.11	37.62	74	54	-25.89	-16.38	314	2.34

NOTE:

1. Measurement uncertainty is 3.81 dB.
2. "*": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.



TEST REPORT

Temperature:	23 °C	Humidity:	59 %RH
Frequency Range:	1 GHz – 25 GHz	Tested Mode:	Link
Detector Type:	PK. and AV.	IF Bandwidth:	1 MHz
VBW:	3 MHz	Tested Date:	Nov. 04, 2014

Antenna Polarization : Horizontal

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
3607.85	-29.13	31.56	43.46	33.01	45.89	35.44	74	54	-28.11	-18.56	109	1.83
3842.46	-28.61	32.12	43.35	32.84	46.86	36.35	74	54	-27.14	-17.65	55	1.66
4354.70	-27.83	32.50	43.46	32.95	48.13	37.62	74	54	-25.87	-16.38	200	1.47
4676.15	-27.43	32.89	42.39	31.87	47.85	37.33	74	54	-26.15	-16.67	64	1.33
5377.28	-26.28	34.05	41.40	30.96	49.18	38.74	74	54	-24.82	-15.26	247	1.18
5729.96	-26.40	34.15	40.46	30.13	48.22	37.89	74	54	-25.78	-16.11	70	1.07

Antenna Polarization : Vertical

Frequency (MHz)	Correct Factor (dB)	Ant. Factor (dB/m)	Reading Data (dBμV)		Emission Level (dBμV/m)		Limit (dBμV/m)		Margin (dB)		AZ (°)	EL (m)
			PK.	AV.	PK.	AV.	PK.	AV.	PK.	AV.		
3093.44	-29.88	30.40	44.63	34.17	45.15	34.69	74	54	-28.85	-19.31	314	1.62
3669.15	-28.99	31.71	44.08	33.54	46.79	36.25	74	54	-27.21	-17.75	209	1.85
4311.84	-27.88	32.50	43.28	32.76	47.90	37.38	74	54	-26.10	-16.62	263	1.96
4657.67	-27.46	32.85	42.68	32.18	48.07	37.57	74	54	-25.93	-16.43	195	2.13
5178.39	-26.67	33.81	41.72	31.24	48.86	38.38	74	54	-25.14	-15.62	281	2.28
5716.94	-26.38	34.16	40.43	29.94	48.21	37.72	74	54	-25.79	-16.28	185	2.43

NOTE:

1. Measurement uncertainty is 3.81 dB.
2. "F": The Peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. Emission Level = Reading Value + Ant. Factor + Correct Factor (incl.: Cable Loss and Pre-Amplifier Gain)
4. The field strength of other emission frequencies were very low against the limit.
5. (F): The field strength of fundamental frequency.

 Spectrum Research & Testing Lab., Inc. No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan County 320, Taiwan (R.O.C.)	TEST REPORT	Reference No.: A14101501 Report No.: FCCA14101501 FCC ID : QSWDHRCS1 Page: 30 of 52 Date: Nov. 10, 2014
---	----------------------	---

4.2 6dB Bandwidth

4.2.1 LIMIT

FCC Part15, Subpart C Section 15.247 (a)(2). The minimum 6dB bandwidth shall be at least 500 kHz.

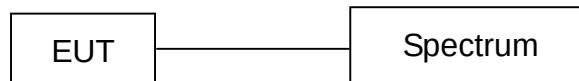
4.2.2 TEST EQUIPMENT

The following test equipment was used during the test :

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
EMI TEST RECEIVER (INCLUDE SPECTRUM ANALYZER)	9 KHz ~ 6 GHz	ROHDE & SCHWARZ	ESL /100176	MAR. 28, 2015 ETC

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

4.2.3 TEST SET-UP



The EUT was connected to a spectrum through a 50Ω RF cable.

4.2.4 TEST PROCEDURE

The EUT was operated in hopping mode or any specific channel.
 Printed out the test result from the spectrum by hard copy function.

4.2.5 EUT OPERATING CONDITION

1. Set the EUT under continuous transmission condition.
2. The EUT was set to the highest available power level.



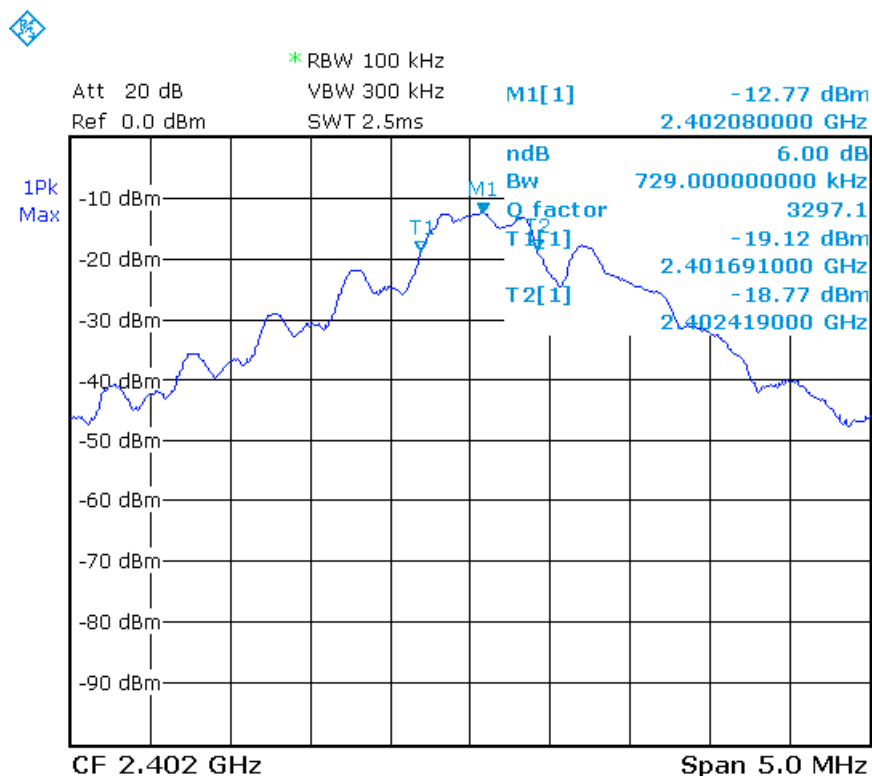
TEST REPORT

4.2.6 TEST RESULT

Temperature:	25 °C	Humidity:	64 %RH
Detector:	Peak	Test Mode:	Tx-1, Tx-2, Tx-3
RBW:	100 kHz	VBW:	300 kHz
Tested By:	Richard Lin	Tested Date:	Nov. 03, 2014

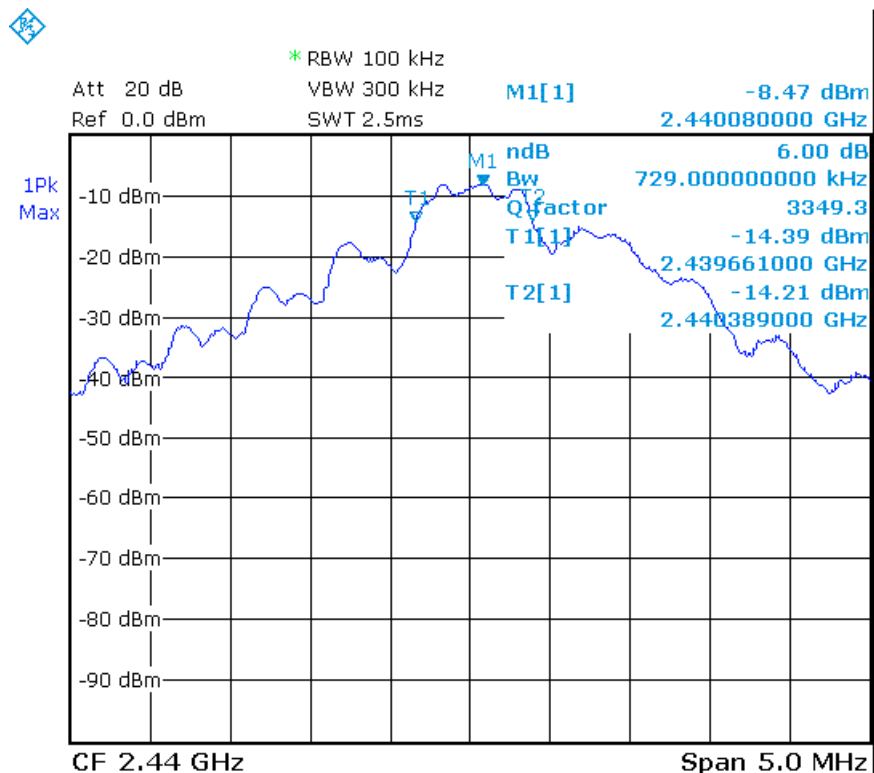
Channel Number	Channel Frequency (MHz)	6dB Down Bandwidth (kHz)	Limit (kHz)	Pass/Fail
CH01	2402	729	> 500	Pass
CH20	2440	729	> 500	Pass
CH40	2480	798	> 500	Pass

CH01 :

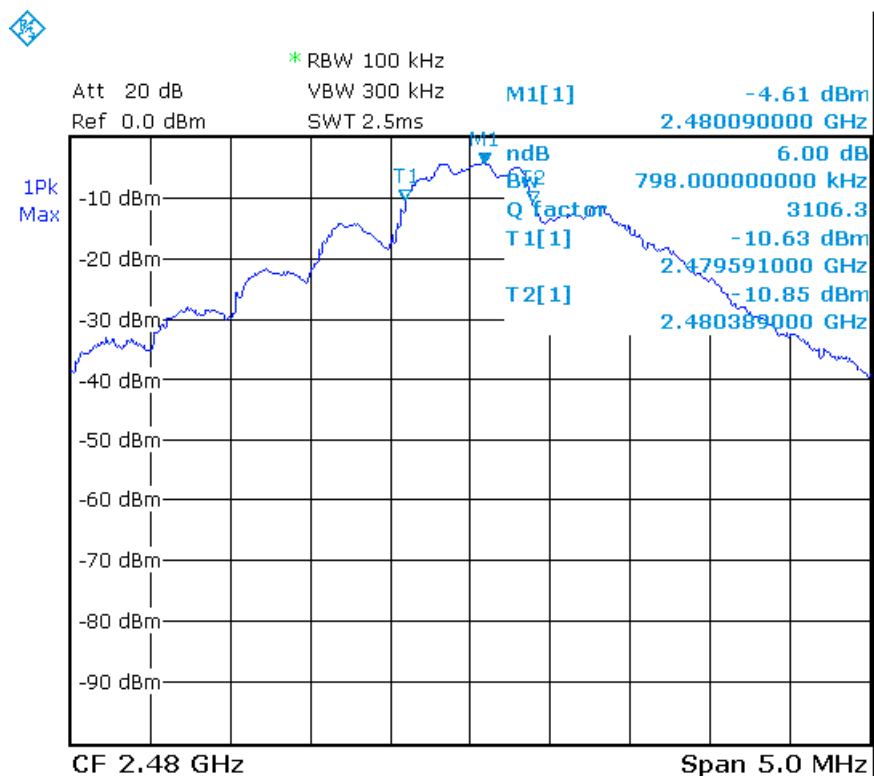




CH20 :



CH40 :



	Spectrum Research & Testing Lab., Inc. No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan County 320, Taiwan (R.O.C.)	TEST REPORT	Reference No.: A14101501 Report No.: FCCA14101501 FCC ID : QSWDHRCS1 Page: 33 of 52 Date: Nov. 10, 2014
---	---	----------------------	---

4.3 PEAK POWER TEST

4.3.1 LIMIT

FCC Part15, Subpart C Section 15.247(b).

Frequency Range (MHz)	Limit(W)				
	Quantity of Hopping Channel	50	25	15	75
902-928		1(30 dBm)	0.125(21 dBm)	NA	NA
2400-2483.5		NA	NA	0.125(21dBm)	1(30 dBm)
5725-5850		NA	NA	NA	1(30 dBm)

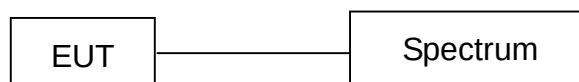
4.3.2 TEST EQUIPMENT

The following test equipment was used during the test :

Equipment/ Facilities	Specifications	Manufacturer	Model#/ Serial#	Due Date of Cal. & Cal. Center
EMI TEST RECEIVER (INCLUDE SPECTRUM ANALYZER)	9 KHz ~ 6 GHz	ROHDE & SCHWARZ	ESL /100176	MAR. 28, 2015 ETC

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

4.3.3 TEST SET-UP



The EUT was connected to a spectrum through a 50Ω RF cable.

4.3.4 TEST PROCEDURE

The EUT was operating in hopping mode or could control its channel.
 Printed out the test result from the spectrum by hard copy function.

4.3.5 EUT OPERATING CONDITION

1. Set the EUT under frequency hopping transmission condition.
2. The EUT was set to the highest available power level.

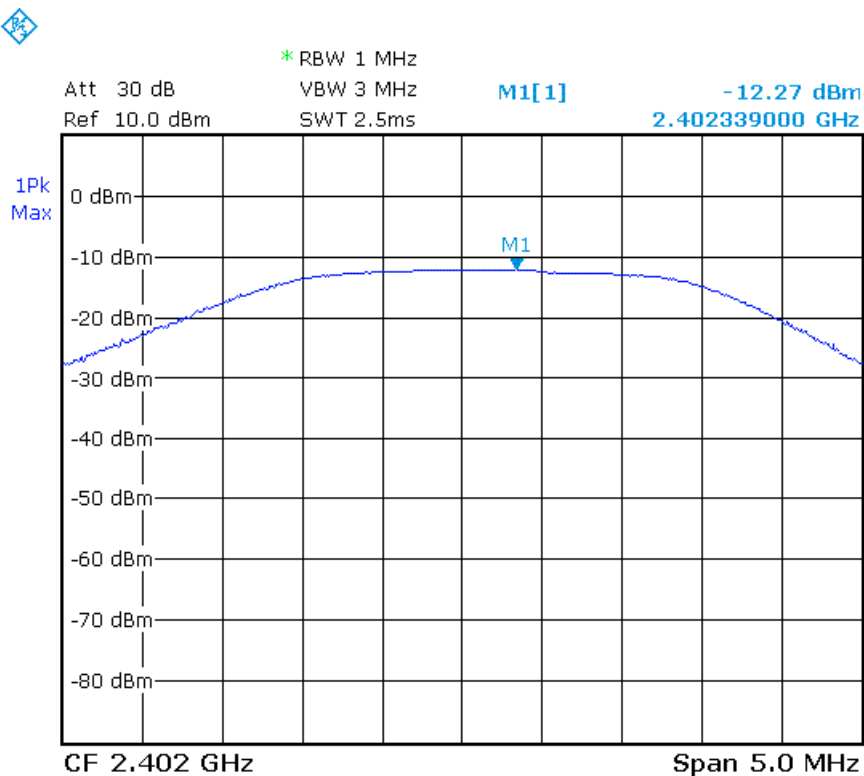


4.3.6 TEST RESULT

Temperature:	25 °C	Humidity:	64 %RH
Spectrum Detector:	PK.	Test Mode:	Tx-1, Tx-2, Tx-3
RBW:	1 MHz	VBW:	3 MHz
Tested By:	Richard Lin	Tested Date:	Nov. 03, 2014

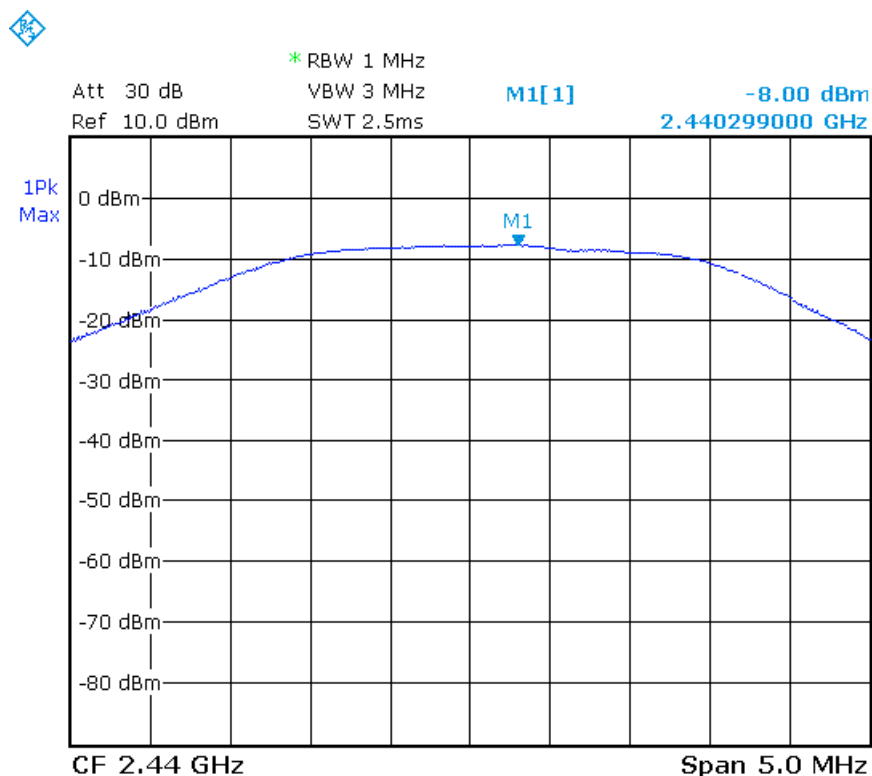
Channel Number	Channel Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)
CH01	2402	-12.27	21
CH20	2440	-8.00	21
CH40	2480	-4.23	21

CH01 :

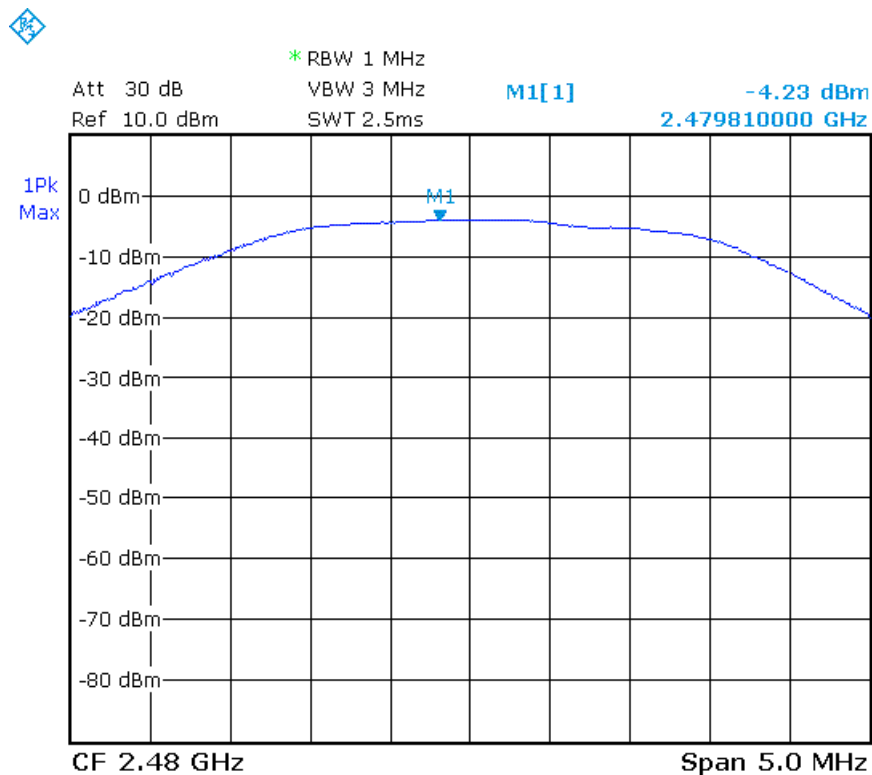




CH20 :



CH40 :





4.4 BAND EDGE TEST

4.4.1 LIMIT

FCC Part15, Subpart C Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

OPERATING FREQUENCY RANGE (MHz)	SPURIOUS EMISSION FREQUENCY (MHz)	LIMIT	
		Peak power ration to emission(dBc)	Emission level(dBuV/m)
902 - 928	< 902	> 20	N/A
	> 928	> 20	N/A
	960-1240	N/A	54
2400 - 2483.5	< 2400	> 20	N/A
	> 2483.5-2500	N/A	54
5725 - 5850	< 5350-5460	N/A	54
	< 5725	> 20	N/A
	> 5850	> 20	N/A

	Spectrum Research & Testing Lab., Inc. No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan County 320, Taiwan (R.O.C.)	TEST REPORT	Reference No.: A14101501 Report No.: FCCA14101501 FCC ID : QSWDHRCS1 Page: 37 of 52 Date: Nov. 10, 2014
---	---	----------------------	---

4.4.2 TEST EQUIPMENT

The following test equipment was used during the test:

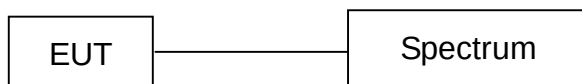
EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
EMI TEST RECEIVER (INCLUDE SPECTRUM ANALYZER)	9 KHz ~ 6 GHz	ROHDE & SCHWARZ	ESL /100176	MAR. 28, 2015 ETC
SPECTRUM ANALYZER	9 kHz ~ 40GHz	ROHDE & SCHWARZ	FSP40 / 100093	DEC 08, 2014 ETC
HORN ANTENNA	1 GHz ~ 18 GHz	EMCO	3115/ 9602-4681	DEC. 12, 2014 ETC
PRE-AMPLIFIER	1 GHz ~ 26.5 GHz	AGILENT	8449B/ 3008A01995	DEC. 10, 2014 ETC
OPEN AREA TEST SITE	3 – 10 M MEASUREMENT	SRT	A02 / SRT002	MAR. 07, 2015 SRT
ANECHOIC CHAMBER	3 M MEASUREMENT	SRT	A01 / SRT001	MAY. 07, 2015 SRT
K-TYPE CABLE	UP TO 40 GHz 3 m	HUBER+SUHNE R	SF102-46/2*11SK 252 /MY2611/2	MAR. 09, 2015 ETC
K-TYPE CABLE	UP TO 40 GHz, 1 m	HUBER+SUHNE R	SF 102-40/2*11 /23934/2	OCT. 12, 2015 ETC
FILTER	2 LINE, 30 A	FIL.COIL	FC-943/ 869	NCR

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.



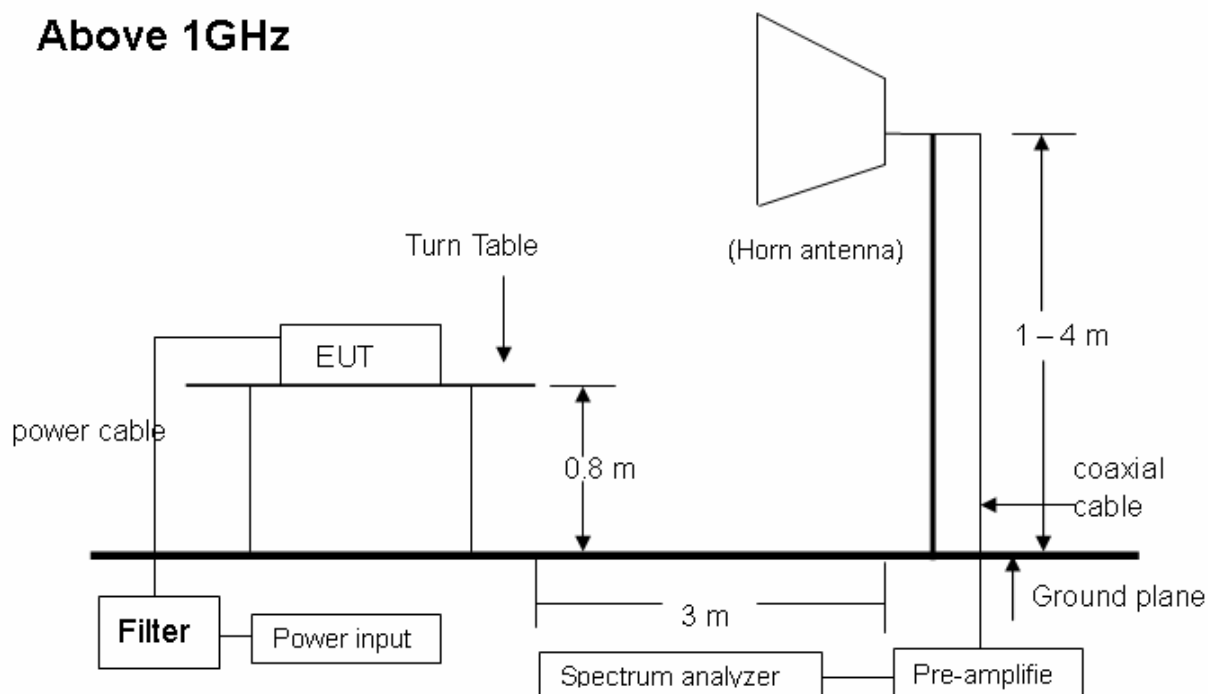
4.4.3 TEST SETUP

FOR RF CONDUCTED TEST (dBc)



The EUT was connected to a spectrum through a 50Ω RF cable.

Above 1GHz



NOTE: The EUT system was put on a wooden table with 0.8m heights above a ground plane. For the actual test configuration, please refer to the photos of testing.



4.4.4 TEST PROCEDURE

1. The EUT was operating in continuous transmission mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.
2. The EUT was tested according to the requirement of ANSI C63.4 and CISPR 22.
The measurements were made at an open area test site with 3 meter measurement distance under 1 GHz and with 3m distance above 1GHz. The frequency spectrum measured started from 30 MHz. Under 1 GHz. All readings were quasi-peak values with 120 kHz resolution bandwidth of the test receiver. Above 1 GHz, the measurements were made at an open area test site with 3 meter measurement distance and all readings were peak and average values with 1 MHz resolution bandwidth of the test receiver. The EUT system was operated in all typical methods by users. The cables connected to EUT and support units were moved to find the maximum emission levels for each frequency.

4.4.5 EUT OPERATING CONDITION

1. Set the EUT under continuous transmission condition.
2. The EUT was set to the highest available power level.



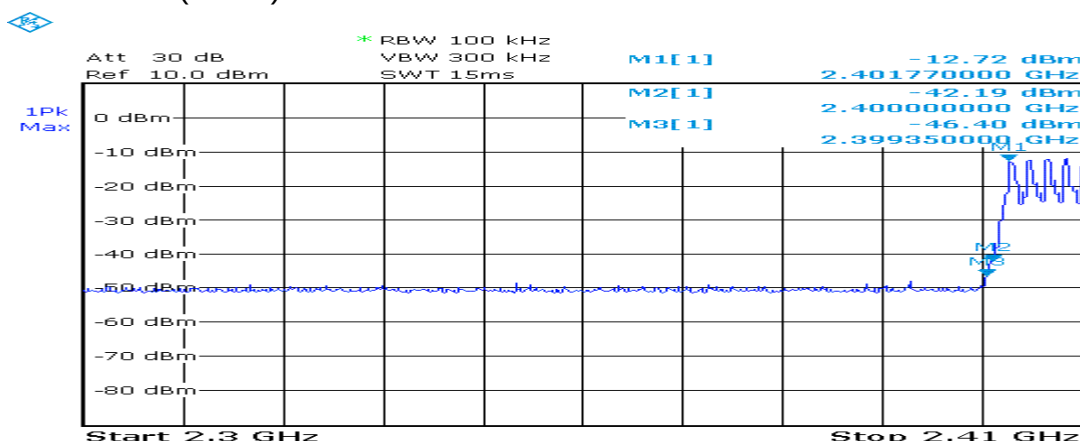
4.4.6 TEST RESULT

Temperature:	25 °C	Humidity:	64 %RH
Spectrum Detector:	PK.	Tesr Mode:	Tx-1, Tx-3
RBW:	100 kHz	VBW:	300 kHz
Tested By:	Richard Lin	Tested Date:	Nov. 03, 2014

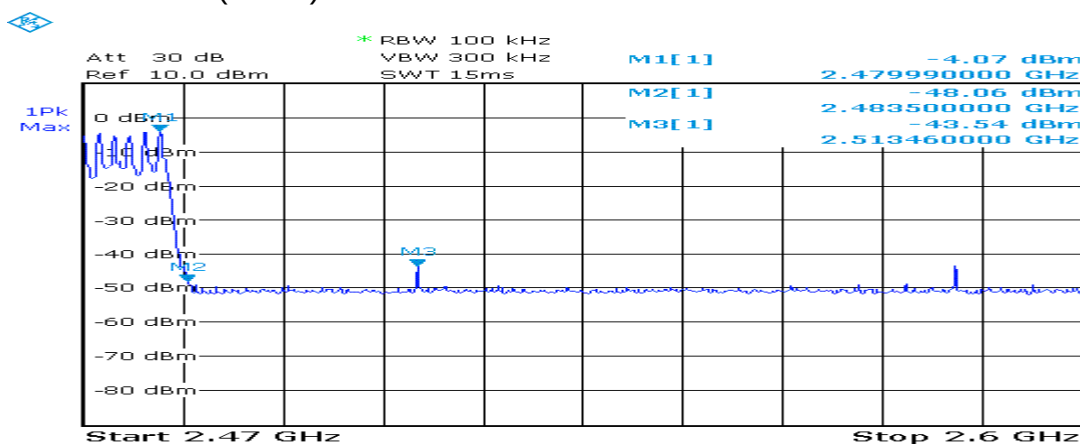
1. Conducted test

Frequency (MHz)	PEAK POWER OUTPUT (dBm)	Emission read Value(dBm)	Result of Band edge (dBc)	Band edge LIMIT (dBc)
< 2400	-12.72	-46.40	33.68	> 20 dBc
> 2483.5	-4.07	-43.54	39.47	> 20 dBc

Below 2400MHz (CH01) :



Above 2483.5 MHz (CH40) :





TEST REPORT

2. Radiated emission test :

Below 2400MHz (CH01)

Temperature:	23 °C	Humidity:	59 %RH
Frequency Range:	2.3 GHz – 2.41 GHz	Tested Mode:	Tx-1
Receiver Detector:	PK. and AV.	IF Bandwidth:	1 MHz
Tested By:	Richard Lin	Tested Date:	Nov. 04, 2014

Frequency (MHz)	Correct Factor (dB)	Ant. Fac. (dB)	Ant. Pol. (H/V)	Reading (dBuV)		Emission (dBuV/m)		Limit Line (dBuV/m)		Over Limit (dBuV/m)	
				PK	AV	PK	AV	PK	AV	PK	AV
2399.38	-30.74	28.22	H	47.38	36.82	44.86	34.30	74.00	54.00	-29.14	-19.70
2399.75	-30.74	28.22	V	47.56	35.01	45.04	32.49	74.00	54.00	-28.96	-21.51
2400.00	-30.74	28.22	H	49.69	39.18	47.17	36.66	74.00	54.00	-26.83	-17.34
2400.00	-30.74	28.22	V	48.61	38.24	46.09	35.72	74.00	54.00	-27.91	-18.28

Above 2483.5MHz (CH40)

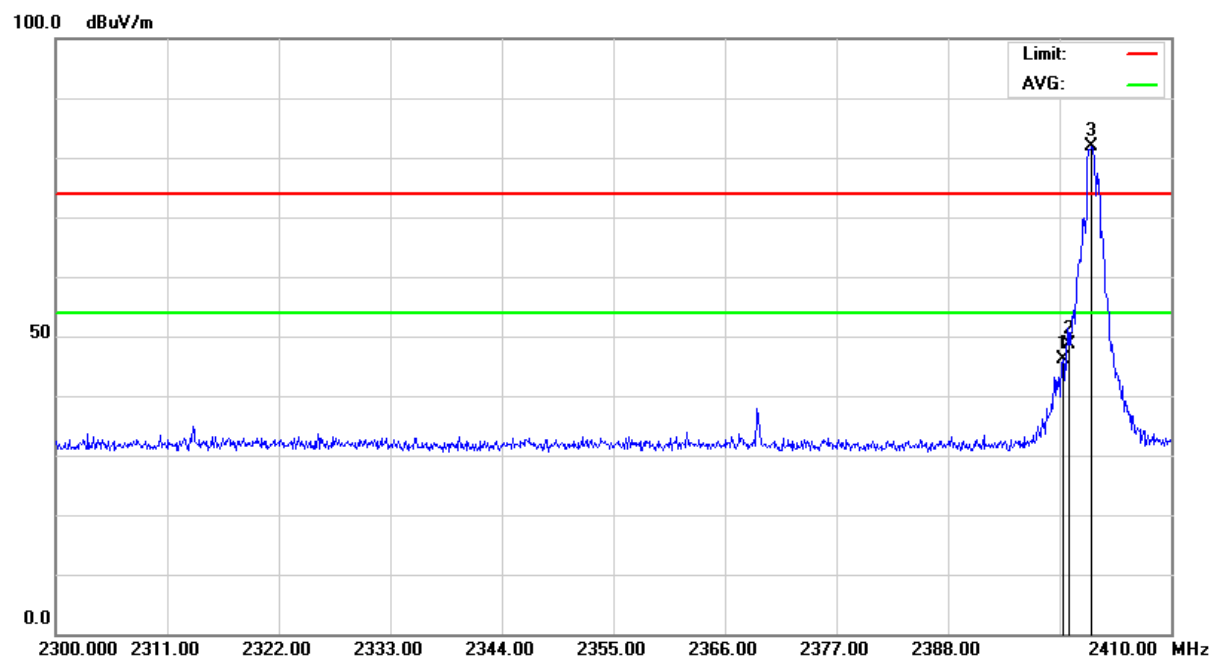
Temperature:	23 °C	Humidity:	59 %RH
Frequency Range:	2.47 GHz – 2.6 GHz	Tested Mode:	Tx-3
Receiver Detector:	PK. and AV.	IF Bandwidth:	1 MHz
Tested By:	Richard Lin	Tested Date:	Nov. 04, 2014

Frequency (MHz)	Correct Factor (dB)	Ant. Fac. (dB)	Ant. Pol. (H/V)	Reading (dBuV)		Emission (dBuV/m)		Limit Line (dBuV/m)		Over Limit (dBuV/m)	
				PK	AV	PK	AV	PK	AV	PK	AV
2483.50	-30.60	28.45	H	40.76	30.25	38.61	28.10	74.00	54.00	-35.39	-25.90
2483.50	-30.60	28.45	V	35.84	25.40	33.69	23.25	74.00	54.00	-40.31	-30.75
2490.03	-30.59	28.47	H	39.78	29.28	37.67	27.17	74.00	54.00	-36.33	-26.83
2490.05	-30.59	28.47	V	38.99	28.47	36.88	26.36	74.00	54.00	-37.12	-27.64

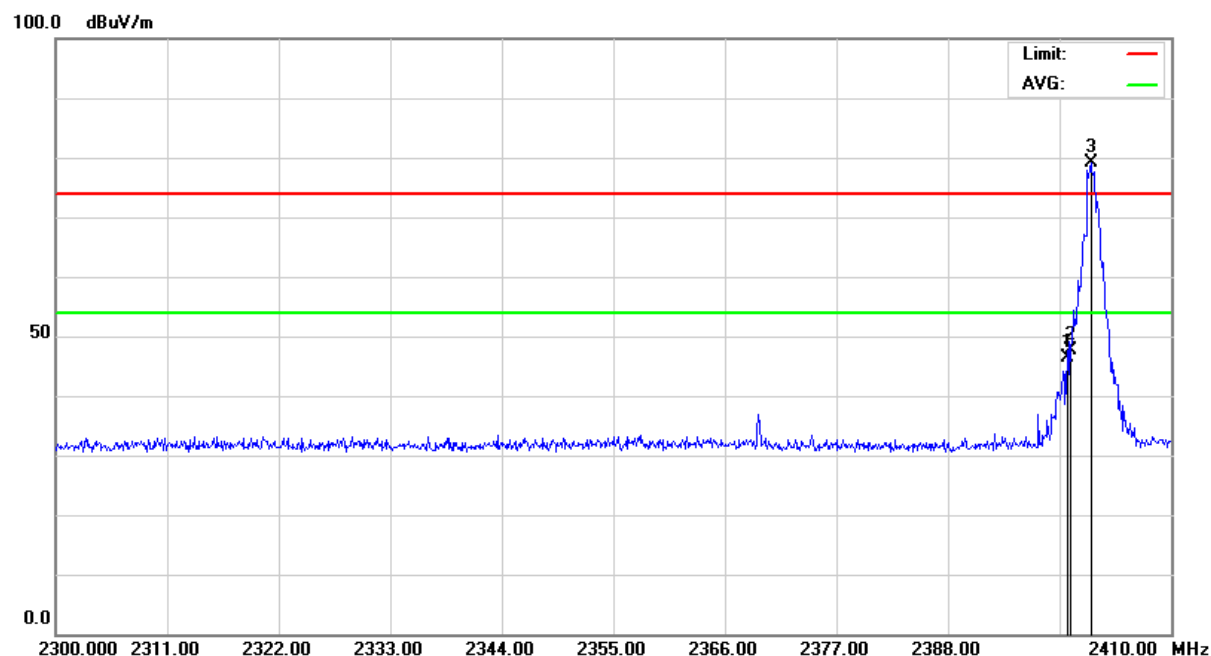


Below 2400MHz (CH01)

Antenna Polarization : Horizontal



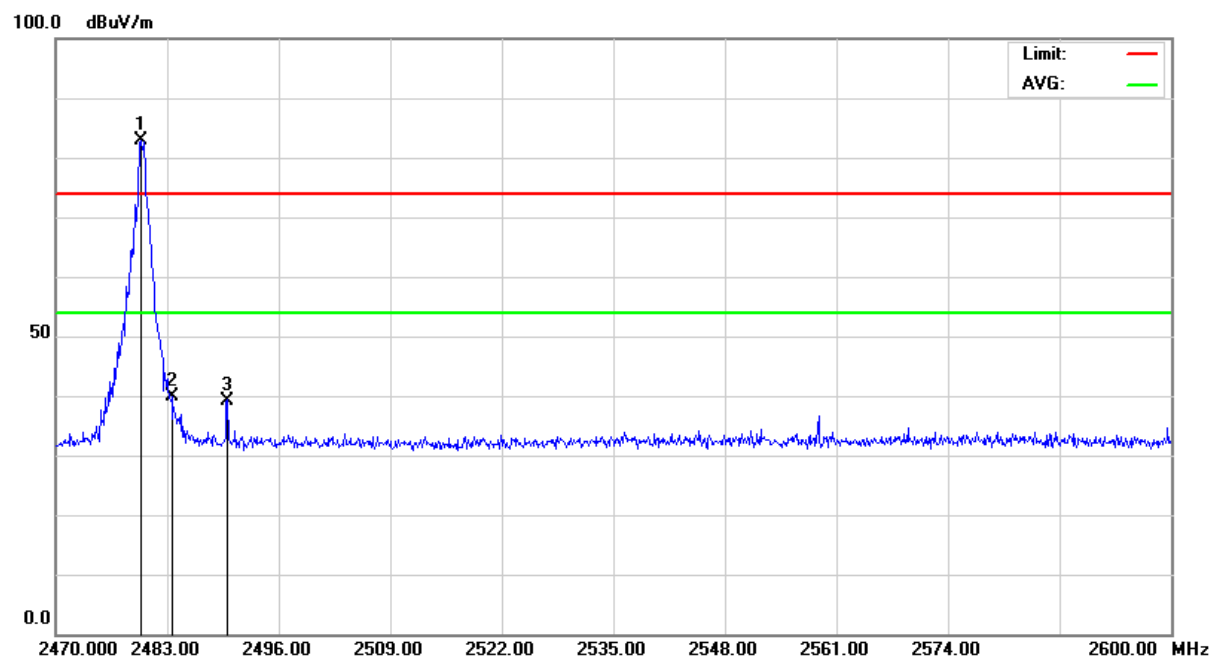
Antenna Polarization : Vertical



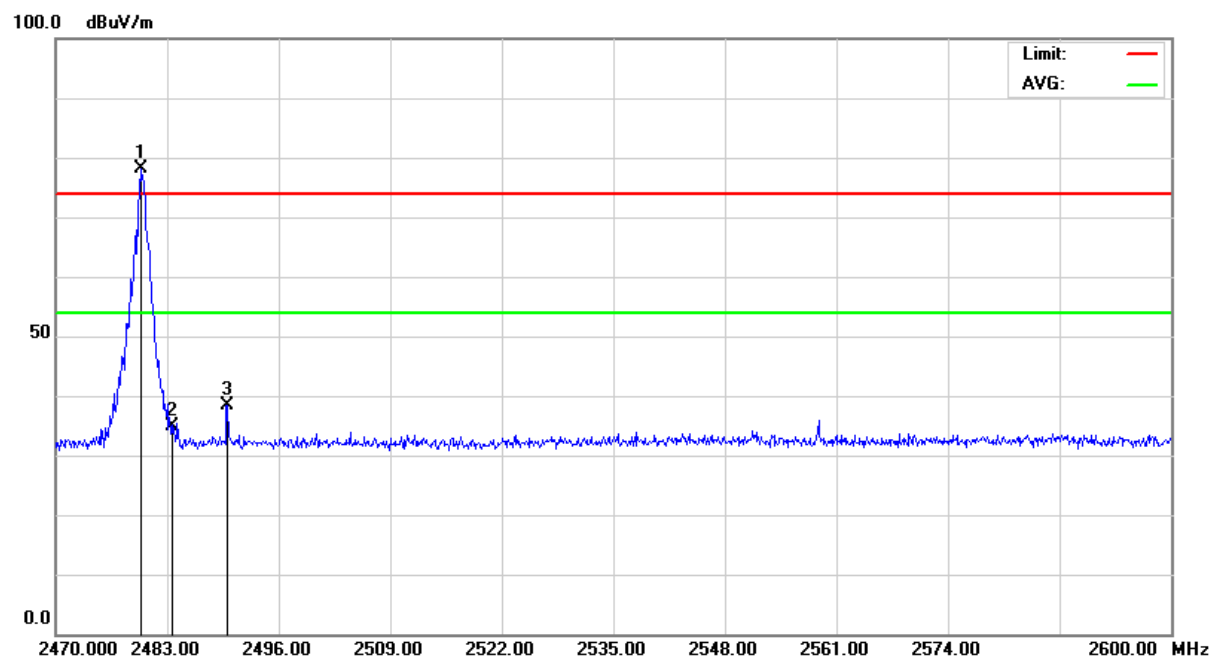


Above 2483.5MHz (CH40)

Antenna Polarization : Horizontal



Antenna Polarization : Vertical



 Spectrum Research & Testing Lab., Inc. No.167, Ln. 780, Shan-Tong Rd., Ling 8, Shan-Tong Li, Chung-Li City, Taoyuan County 320, Taiwan (R.O.C.)	TEST REPORT	Reference No.: A14101501 Report No.: FCCA14101501 FCC ID : QSWDHRCS1 Page: 44 of 52 Date: Nov. 10, 2014
---	----------------------	---

4.5 POWER DENSITY TEST

4.5.1 LIMIT

FCC Part15, Subpart C Section 15.247(e)

FREQUENCY RANGE (MHz)	Limit (dBm / kHz)
902-928	8 dBm / 3 kHz
2400-2483.5	
5725-5850	

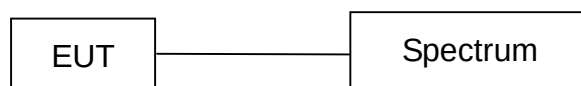
4.5.2 TEST EQUIPMENT

The following test equipment was used during the radiated emission test:

EQUIPMENT/ FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL#/ SERIAL#	DUE DATE OF CAL. & CAL. CENTER
EMI TEST RECEIVER (INCLUDE SPECTRUM ANALYZER)	9 KHz ~ 6 GHz	ROHDE & SCHWARZ	ESL /100176	MAR. 28, 2015 ETC

NOTE: The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

4.5.3 TEST SET-UP



The EUT was connected to a spectrum through a 50Ω RF cable.

4.5.4 TEST PROCEDURE

The EUT was operating in transmitter mode and could be controlled its channel.
 Printed out the test result from the spectrum by hard copy function.

4.5.5 EUT OPERATING CONDITION

1. Set the EUT under continuous transmission condition.
2. The EUT was set to the highest available power level.



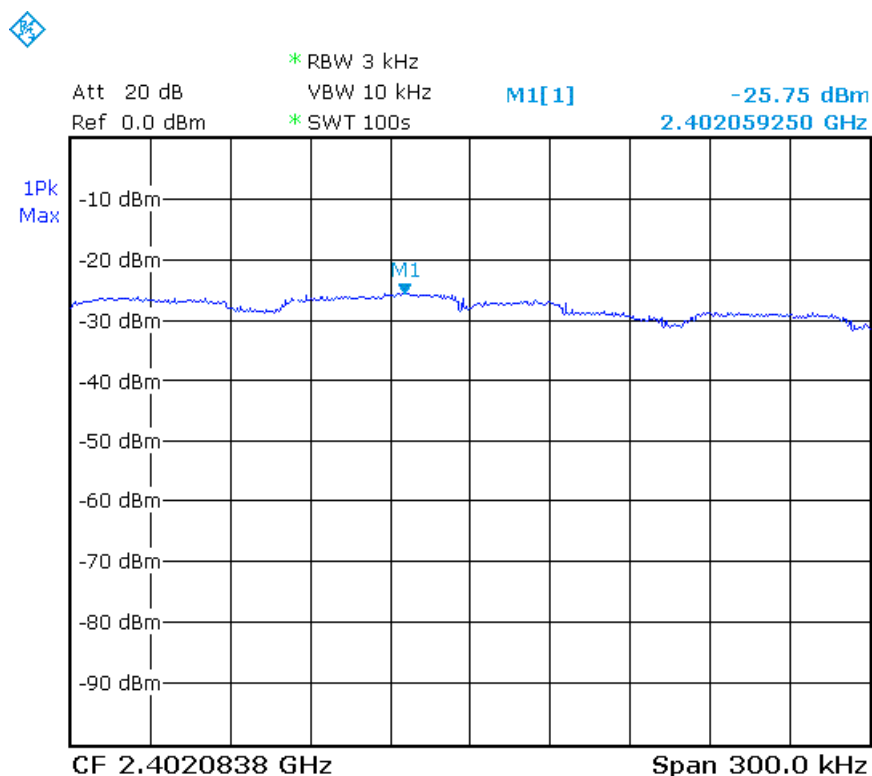
TEST REPORT

4.5.6 TEST RESULT

Temperature:	25 °C	Humidity:	64 %RH
Spectrum Detector:	PK.	Test Mode:	Tx-1, Tx-2, Tx-3
RBW:	3 kHz	VBW:	10 kHz
Tested By:	Richard Lin	Tested Date:	Nov. 03, 2014

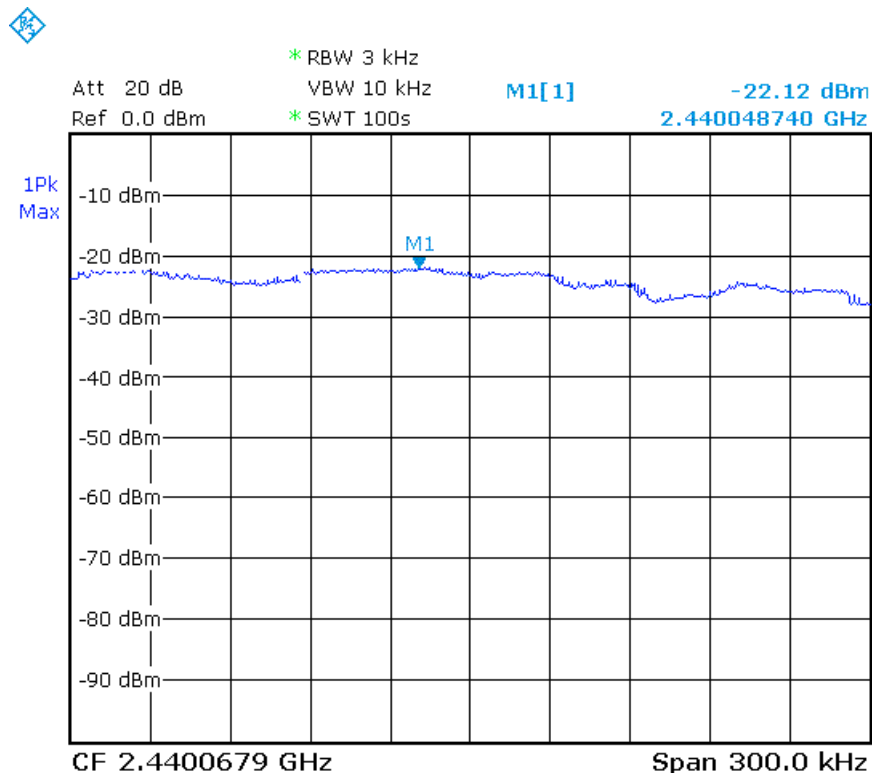
Channel Number	Channel Frequency (MHz)	RF Power Level in 3 KHz BW (dBm/3kHz)	Maximum Limit (dBm/3kHz)
CH01	2402	-25.75	8
CH20	2440	-22.12	8
CH40	2480	-18.52	8

CH01 :

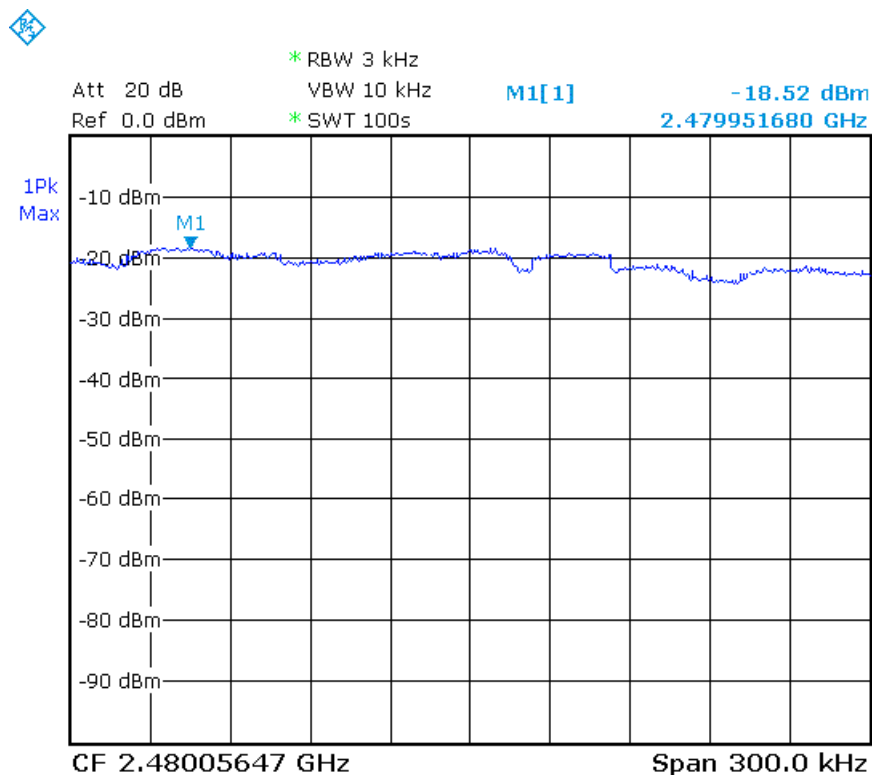




CH20 :



CH40 :





5. Antenna application

5.1 Antenna requirement

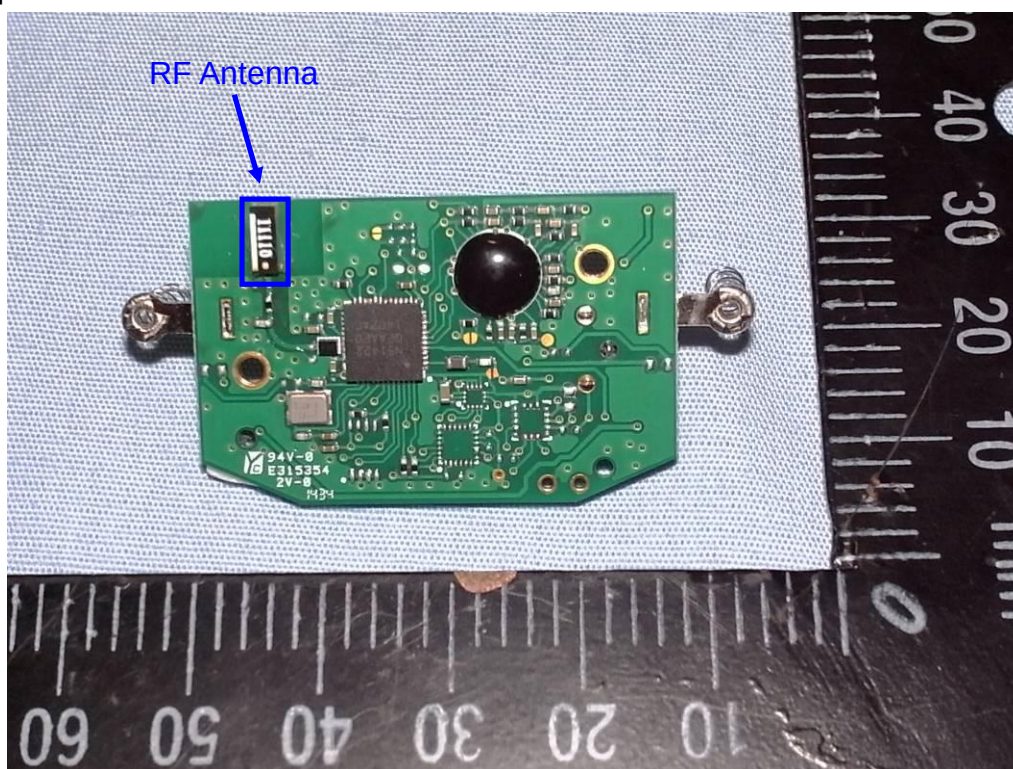
The EUT's antenna is met the requirement of FCC Part 15C section 15.203.

FCC part15C section15.247 requirement:

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

5.2 Result

The EUT's antenna used a Chip Antenna. Gain of antenna types is 1.57 dBi that meet the requirement.





**Spectrum Research &
Testing Lab., Inc.**

No.167,Ln. 780, Shan-Tong
Rd.,Ling 8, Shan-Tong Li,
Chung-Li City, Taoyuan County
320, Taiwan (R.O.C.)

TEST REPORT

Reference No.: A14101501
Report No.:FCCA14101501
FCC ID : QSWDHRCS1
Page: 48 of 52
Date: Nov. 10, 2014

6. Description of RF Exposure

SAR compliance has been evaluated in the product(s), and can be used in host product(s) with substantially similar physical dimensions, construction, and electrical and RF characteristics. End-users must be provided with specific information required to satisfy RF exposure compliance for all final host devices. Compliance of this device in all final host configurations is the responsibility of the Grantee.

- I The separation distance -20 cm must be clearly stated in the operating and/or installation manual that is supplied to the User.
- I This application is being made on behalf of the “Grantee”.



7. PHOTOS OF TESTING

- Radiated test (below 30M , Tx, Standby)





Spectrum Research & Testing Lab., Inc.
No.167, Ln. 780, Shan-Tong
Rd., Ling 8, Shan-Tong Li,
Chung-Li City, Taoyuan County
320, Taiwan (R.O.C.)

TEST REPORT

Reference No.: A14101501
Report No.: FCCA14101501
FCC ID : QSWDHRCS1
Page: 50 of 52
Date: Nov. 10, 2014

- Radiated test (below 1G , Tx, Standby)





Spectrum Research & Testing Lab., Inc.
No.167, Ln. 780, Shan-Tong
Rd., Ling 8, Shan-Tong Li,
Chung-Li City, Taoyuan County
320, Taiwan (R.O.C.)

TEST REPORT

Reference No.: A14101501
Report No.: FCCA14101501
FCC ID : QSWDHRCS1
Page: 51 of 52
Date: Nov. 10, 2014

- Radiated test (above 1G , Tx, Standby)





Spectrum Research & Testing Lab., Inc.
No.167, Ln. 780, Shan-Tong
Rd., Ling 8, Shan-Tong Li,
Chung-Li City, Taoyuan County
320, Taiwan (R.O.C.)

TEST REPORT

Reference No.: A14101501
Report No.: FCCA14101501
FCC ID : QSWDHRCS1
Page: 52 of 52
Date: Nov. 10, 2014

8. TERMS OF ABBREVIATION

AV.	Average detection
AZ(°)	Turn table azimuth
Correct.	Correction
EL(m)	Antenna height (meter)
EUT	Equipment Under Test
Horiz.	Horizontal direction
LISN	Line Impedance Stabilization Network
NSA	Normalized Site Attenuation
Q.P.	Quasi-peak detection
SRT Lab	Spectrum Research & Testing Laboratory, Inc.
Vert.	Vertical direction