

FCC 15.247 & RSS-247 2.4 GHz Test Report

for

LG Electronics Inc.

**222, LG-ro Jinwi-myeon, Pyeongtaek-Si, Gyeonggi-Do,
451-713, Korea**

Product Name : Wireless Scheduling Switch
Model Name : (1)9SSA2B2B520
(2)9SSA2B1B520
Brand : LG
FCC ID : BEJ9SSA2B2B520
IC : 2703H-9SSA2B2B520

**Prepared by : AUDIX Technology Corporation,
EMC Department**



The statement is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, TAF or any government agencies.

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TEST REPORT CERTIFICATION

Applicant : LG Electronics Inc.
Manufacturer : LG Electronics Inc.
Factory : OHSUNG ELECTRONICS CO., LTD.
EUT Description
(1) Product : Wireless Scheduling Switch
(2) Model : (1)9SSA2B2B520 (2)9SSA2B1B520
(3) Brand : LG
(4) Power Supply: DC 3V

Applicable Standards:

47 CFR FCC Part 15 Subpart C
RSS-Gen (Issue 4), November 2014
RSS-247 (Issue 2), February 2017
ANSI C63.10:2013
KDB 558074 D01 DTS Meas Guidance v04

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2018. 03. 28

Reviewed by:



(Annie Yu/Administrator)

Approved by:



(Ben Cheng/Manager)

1. REVISION RECORD OF TEST REPORT

Edition No	Issued Data	Revision Summary	Report Number
0	2018. 03. 28	Original Report	EM-F180124

2. SUMMARY OF TEST RESULTS

Rule		Description	Results
FCC	IC		
15.207	RSS-Gen §8.8	Conducted Emission	N/A, Note
15.247(d)/ 15.205	RSS-Gen §8.9 RSS-247 §5.5	Radiated Band Edge and Radiated Spurious Emission	PASS
15.247(a)(2)	RSS-247 §5.2(1)	6dB Bandwidth	PASS
15.247(b)(3)	RSS-247 §5.4(4)	Maximum Peak Output	PASS
15.247(d)	RSS-247 §5.5	Conducted Band Edges and Conducted Spurious Emission	PASS
15.247 (e)	RSS-247 §5.2(2)	Peak Power Spectral Density	PASS
15.203	RSS-Gen §8.3	Antenna Requirement	Compliance

Note: The EUT only employs battery power for operation, so it is unnecessary to test.

3. GENERAL INFORMATION

3.1. Description of Application

Applicant	LG Electronics Inc. 222, LG-ro Jinwi-myeon, Pyeongtaek-Si, Gyeonggi-Do, 451-713, Korea						
Manufacturer	LG Electronics Inc. 222, LG-ro Jinwi-myeon, Pyeongtaek-Si, Gyeonggi-Do, 451-713, Korea						
Factory	OHSUNG ELECTRONICS Co., Ltd. 335-4, Sanho-daero, Gumi-si, Gyeongsangbuk-do, Korea						
Product	Wireless Scheduling Switch						
Model	(1)9SSA2B2B520 (2)9SSA2B1B520 The difference lists for all models please see as below: <table border="1"><thead><tr><th>Model</th><th>Switch</th></tr></thead><tbody><tr><td>9SSA2B2B520</td><td>2-Group</td></tr><tr><td>9SSA2B1B520</td><td>1-Group</td></tr></tbody></table> The model 9SSA2B2B520 was tested in this report, and 9SSA2B1B520 was assessed frequency below 1GHz for different switch.	Model	Switch	9SSA2B2B520	2-Group	9SSA2B1B520	1-Group
Model	Switch						
9SSA2B2B520	2-Group						
9SSA2B1B520	1-Group						
Brand	LG						

3.2. Description of EUT

Test Model	9SSA2B2B520
Serial Number	N/A
Power Rating	DC 3V
RF Features	ZigBee (IEEE 802.15.4)
Transmit Type	1T1R
Sample Status	Production
Date of Receipt	2018. 03. 26
Date of Test	2018. 03. 27 ~ 28
Interface Ports of EUT	<ul style="list-style-type: none">• None
Accessories Supplied	<ul style="list-style-type: none">• None

3.3. Antenna Information

No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
1	PNCFA1357A	OHSUNG ELECTRONICS Co., Ltd.	PCB	2405 - 2480	0.0727242

3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (Mbps)
ZigBee (IEEE 802.15.4)	2405-2480	16	DSSS (O-QPSK)	0.25

Channel List			
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
11	2405	19	2445
12	2410	20	2450
13	2415	21	2455
14	2420	22	2460
15	2425	23	2465
16	2430	24	2470
17	2435	25	2475
18	2440	26	2480

3.5. Descriptions of Key Components

None

3.6. Test Configuration

Mode	Duty Cycle (x)	Duty Cycle Factor (dB)
ZigBee	1	0

Note: When duty cycle is less than 98% (0.98) that duty cycle factor $10\log(1/x)$ is needed to add in conducted test items measured in average detector.

Item	Mode	Test Channel
Radiated Test Case	Radiated Band Edge <small>Note1</small>	ZigBee 11/18/26
	Radiated Spurious Emission <small>Note1 & 2</small>	ZigBee 11/18/26
Conducted Test Case	6dB Bandwidth	ZigBee 11/18/26
	Peak Output Power	ZigBee 11/18/26
	Band Edge	ZigBee 11/18/26
	Spurious Emission	ZigBee 11/18/26
	Peak Power Spectral Density	ZigBee 11/18/26

Note 1: Mobile Device

Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow: Lie Side Stand

Note 2: Low, mid, and high channels were measured, only the worst channel of each modulation was presented in this report.

3.7. Tested Supporting System List

3.7.1. Support Peripheral Unit

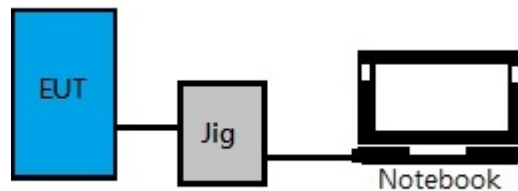
No.	Product	Brand	Model No.	Serial No.	Approval
1.	Notebook PC	acer	MS2362	N/A	Contains FCC ID: PPD-AAR5B225
2.	Test Jig	N/A	N/A	N/A	N/A

3.7.2. Cable Lists

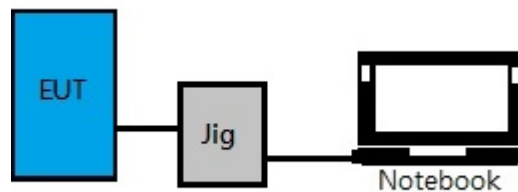
No.	Cable Description Of The Above Support Units
1.	USB Cable: Shielded, Detachable, 0.6m LAN Cable: Shielded, Detachable, 1.0m Adapter: Chicony, M/N CPA09-A065N1, DC Cord: Unshielded, Undetachable, 1.8m Bonded a ferrite core AC Power Cord: Unshielded, Detachable, 1.8m
2.	BUS Cable: Non-Shielded, Detachable, 0.2m

3.8. Setup Configuration

3.8.1. EUT Configuration for Power Line & Radiated Emission



3.8.2. EUT Configuration for RF Conducted Test Items



3.9. Operating Condition of EUT

Test program “Tera Term” is used for enabling EUT RF function under continues transmitting and choosing data rate/ channel.

3.10. Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: attemc_report@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2005 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724 (3) FCC OET Designation No. TW1004 & TW1090 & TW1724
Test Facilities	Semi-Anechoic Chamber (IC Test Site Registration No.: 5183B-1)

3.11. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	±3.50dB
Radiation Test (Distance: 3m)	30MHz~1000MHz	± 3.68dB
	Above 1GHz	± 5.82dB

Remark : Uncertainty = $ku_c(y)$

Test Item	Uncertainty
6dB Bandwidth	± 0.05kHz
Maximum peak output power	± 0.33dB
Power spectral density	± 0.13dB
Conducted Emission Limitations	± 0.13dB

4. MEASUREMENT EQUIPMENT LIST

4.1. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2017. 09. 13	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2017. 06. 19	1 Year
3.	Amplifier	HP	8447D	2944A06305	2018. 01. 30	1 Year
4.	Amplifier	HP	8449B	3008A00529	2018. 01. 24	1 Year
5.	Bilog Antenna	CHASE	CBL6112D	33821	2018. 01. 21	1 Year
6.	Loop Antenna	R&S	HFH2-Z2	891847/27	2017. 12. 18	1 Year
7.	Double-Ridged Waveguide Horn	EMCO	3115	9609-4927	2017. 06. 27	1 Year
8.	Horn Antenna	COM-POWER	AH-840	101092	2017. 05. 04	1 Year
9.	2.4GHz Notch Filter	K&L	7NSL10-244 1.5E130.5-00	1	2017. 07. 26	1 Year
10.	3GHz Notch Filter	Microwave	H3G018G1	484798	2017. 08. 25	1 Year
11.	Digital Thermo-Hygro Meter	IMax	HTC-1	No.1 3m A/C	2017. 04. 21	1 Year
12.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.2. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9010B-544	MY55460198	2017. 04. 18	1 Year
2.	Digital Thermo-Hygro Meter	Shenzhen Datronn Electronics	KT-905	RF	2017. 04. 21	1 Year

5. CONDUCTED EMISSION

【The EUT only employs battery power for operation, no conductive emission limits are required according to FCC Part 15 Section §15.207】

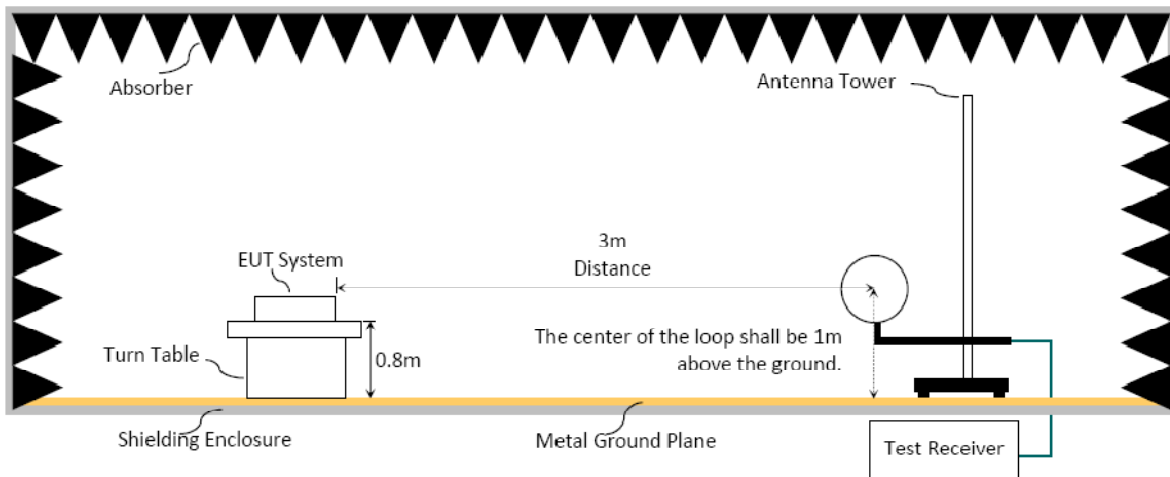
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

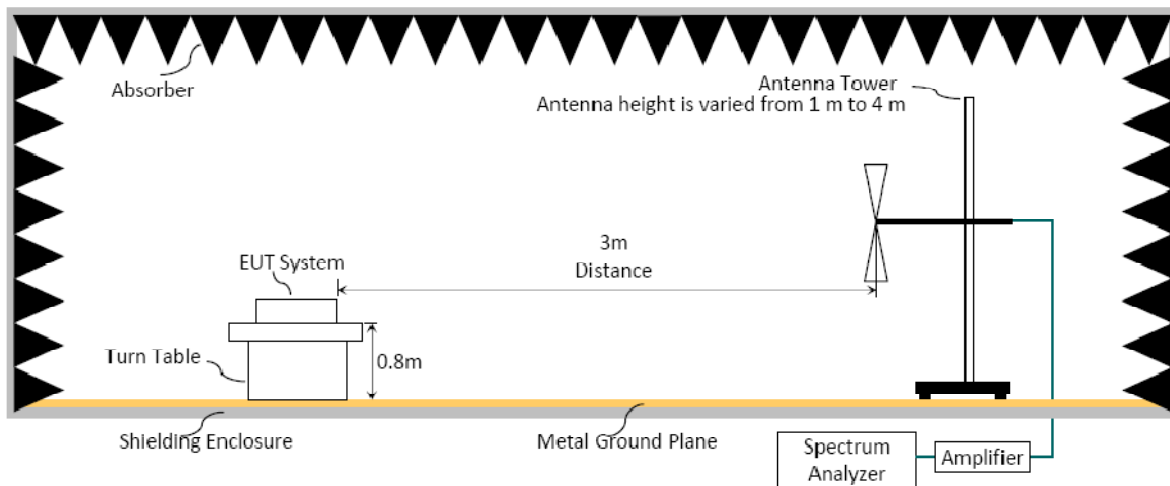
6.1.1. Block Diagram of EUT

Indicated as section 3.8

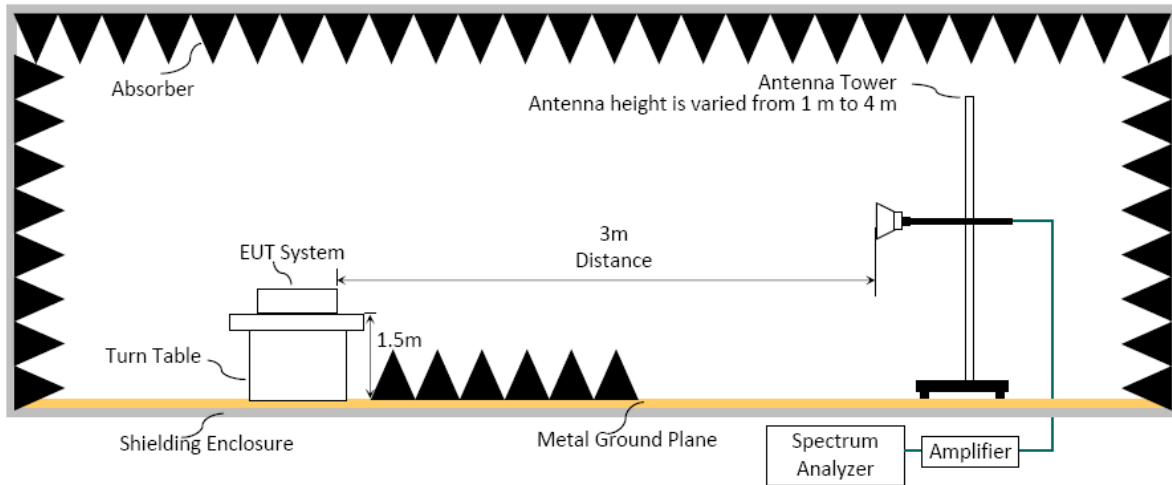
6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000 MHz



6.1.4. Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205/RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance (m)	Limits	
		dBμV/m	μV/m
0.009 - 0.490	300	67.6	2400/kHz
0.490 - 1.705	30	87.6	24000/kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dBμV/m (Peak) 54.0 dBμV/m (Average)	

Remark : (1) $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 25GHz:

The EUT setup on the turn table which has 80 cm (for 30-1000 MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1 GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1)RBW = 120KHz
- (2)VBW \geq 3 x RBW.
- (3)Detector = Peak.
- (4)Sweep time = auto.
- (5)Trace mode = max hold.
- (6)Allow sweeps to continue until the trace stabilizes.
- (7)When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Frequency above 1GHz to 10th harmonic (up to 25 GHz):

Peak Detector:

- (1)RBW = 1MHz
- (2)VBW \geq 3 x RBW.
- (3)Detector = Peak.
- (4)Sweep time = auto.
- (5)Trace mode = max hold.
- (6)Allow sweeps to continue until the trace stabilizes.
- (7)When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

Average Detector: **Option 1:**

(1) RBW = 1MHz

(2) VBW \geq 1/ T.

Modulation Type	T (ms)	1/ T (kHz)	VBW Setting (kHz)
ZigBee	---	---	10Hz

N/A: 1/ T is not implemented when duty cycle presented in section 3.7 is \geq 98 %.

(1) Detector = Peak.

(2) Sweep time = auto.

(3) Trace mode = max hold.

(4) Allow sweeps to continue until the trace stabilizes.

 Option 2:

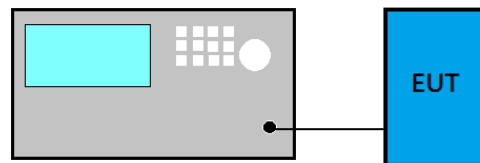
Average Emission Level = Peak Emission Level + D.C.C.F.

6.4. Measurement Result Explanation Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading Average Emission Level = Antenna Factor + Cable Loss + Meter Reading Average Emission Level = Peak Emission Level + DCCFDuty Cycle Correction Factor (DCCF) = $20 \log (TX_{on}/TX_{on+off})$ presented in section 3.7 ERP = Peak Emission Level - 95.2dB - 2.14dB**6.5. Test Results**

Please refer to Appendix A.

7. 6dB BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

The minimum 6dB bandwidth shall be at least 500kHz.

7.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

- (1) Set RBW = 100 kHz.
- (2) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -6 dB to record the final bandwidth.

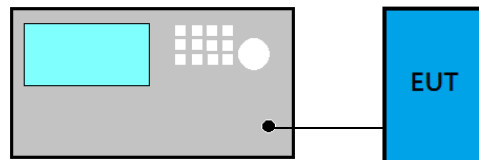
7.4. Test Results

Please refer to Appendix A

8. MAXIMUM PEAK OUTPUT POWER

8.1. Block Diagram of Test Setup

- For BLE Function



8.2. Specification Limits

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm), and E.I.R.P.: 4Watt (36dBm)

8.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

PKPM1 Peak power meter method:

EUT is connected to power sensor and record the maximum output power.

Maximum peak conducted output power method:

- (1) Set the RBW \geq DTS bandwidth
- (2) Set VBW $\geq 3 \times$ RBW
- (3) Set span $\geq 3 \times$ RBW.
- (4) Sweep time = auto couple
- (5) Detector = peak.
- (6) Trace mode = max hold.
- (7) Allow trace to fully stabilize.
- (8) Use peak marker function to determine the peak amplitude level.

Method AVGPM (Measurement using an RF average power meter):

EUT is connected to power sensor and record the maximum average output power and duty cycle factor is added when duty cycle presented in section 3.7 is $< 98\%$.

Method AVGSA-2 (Spectrum channel power)

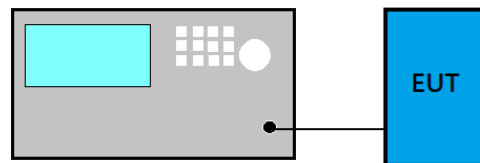
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 -5% of OBW
- (3) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
- (8) Duty cycle factor is added when duty cycle presented in section 3.7 is $< 98\%$.

8.4. Test Results

Please refer to Appendix A

9. EMISSION LIMITATIONS

9.1. Block Diagram of Test Setup



9.2. Specification Limits

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, that the required attenuation shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in Section 15.209(a)/RSS-Gen Section 8.9 table 4 is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a)/RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified in Section 15.209(a)/RSS-Gen Section 8.9 table 4 (See Section 15.205(c)).

9.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

■ Reference Level

- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: 100 kHz.
- (4) Set the VBW $\geq 3 \times$ RBW.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize to find the max PSD as reference level.

■ Emission Level Measurement

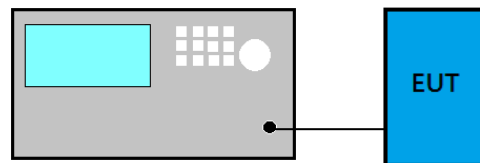
- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: 100 kHz.
- (4) Set the VBW $\geq 3 \times$ RBW.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize to find the max level.

9.4. Test Results

Please refer to Appendix A

10. POWER SPECTRAL DENSITY

10.1. Block Diagram of Test Setup



10.2. Specification Limits

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

10.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v04:

Method PKPSD (peak PSD)

- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- (4) Set the VBW $\geq 3 \times \text{RBW}$.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize.
- (9) Use the peak marker function to determine the maximum amplitude level.
- (10) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Method AVGPSD-2

- (1) Using peak PSD procedure step 1 to step 4.
- (2) Detector = RMS detector
- (3) Sweep time = auto couple
- (4) Trace mode = trace averaging over a minimum of 100 traces
- (5) Use the peak marker function to determine the maximum amplitude level.
- (6) Duty cycle factor is added when duty cycle presented in section 3.7 < 98%.
- (7) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

10.4. Test Results

Please refer to Appendix A

11.DEVIATION TO TEST SPECIFICATIONS

【NONE】



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APPDNDIX A

TEST DATA AND PLOTS

(Model: (1)9SSA2B2B520 (2)9SSA2B1B520)

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A.1 RADIATED EMISSION

Test Date	2018/03/28	Temp./Hum.	24°C/55%
Test Voltage	DC 3V (via Batteries)		

A.1.1 Emissions within Restricted Frequency Bands

A.2.1.1 Frequency 9kHz~30MHz

The emissions (9kHz~30MHz) not reported for there is no emission be found.

A.2.1.2 Frequency Below 1 GHz

Model	9SSA2B2B520		
Mode	ZigBee	Frequency	TX 2405MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
239.52	18.47	3.71	18.12	40.30	46.00	5.70	Peak
383.08	21.66	5.36	13.06	40.08	46.00	5.92	Peak
455.83	22.70	6.07	13.00	41.77	46.00	4.23	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
95.96	16.75	2.22	16.65	35.62	43.50	7.88	Peak
151.25	16.97	2.84	15.69	35.50	43.50	8.00	Peak
239.52	18.47	3.71	10.91	33.09	46.00	12.91	Peak

Model	9SSA2B1B520		
Mode	ZigBee	Frequency	TX 2405MHz

Antenna at Horizontal Polarization

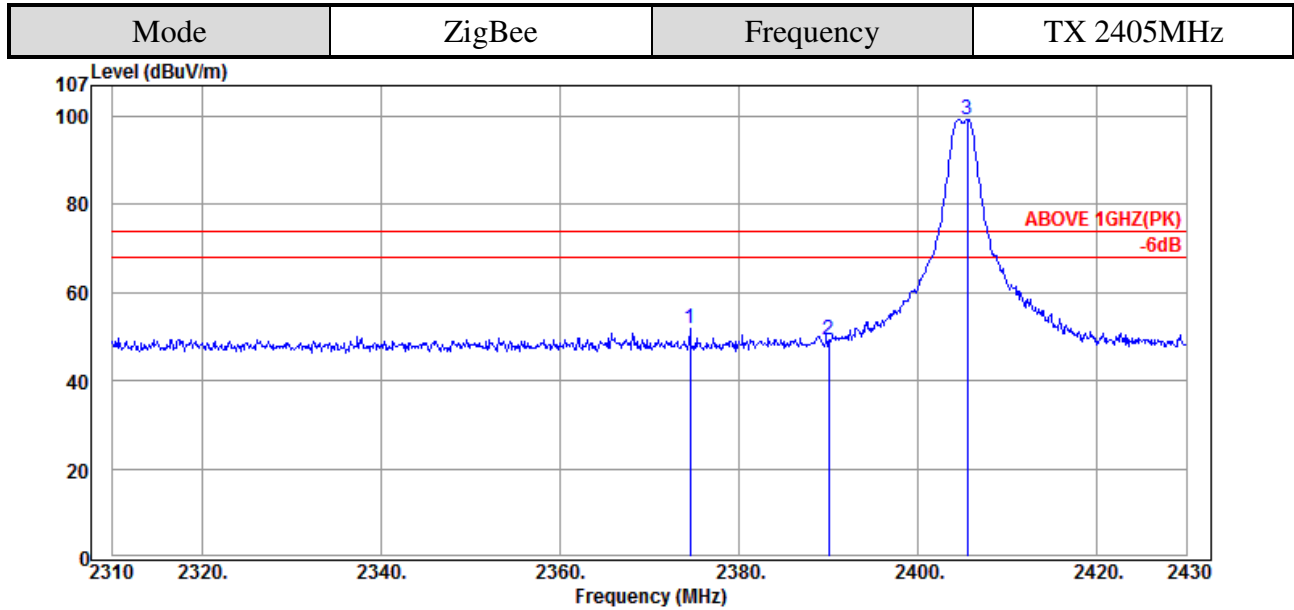
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
95.96	16.75	2.22	14.69	33.66	43.50	9.84	Peak
239.52	18.47	3.71	17.12	39.30	46.00	6.70	Peak
381.14	21.63	5.35	9.87	36.85	46.00	9.15	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
95.96	16.75	2.22	15.47	34.44	43.50	9.06	Peak
151.25	16.97	2.84	16.34	36.15	43.50	7.35	Peak
530.52	23.63	6.53	2.85	33.01	46.00	12.99	Peak

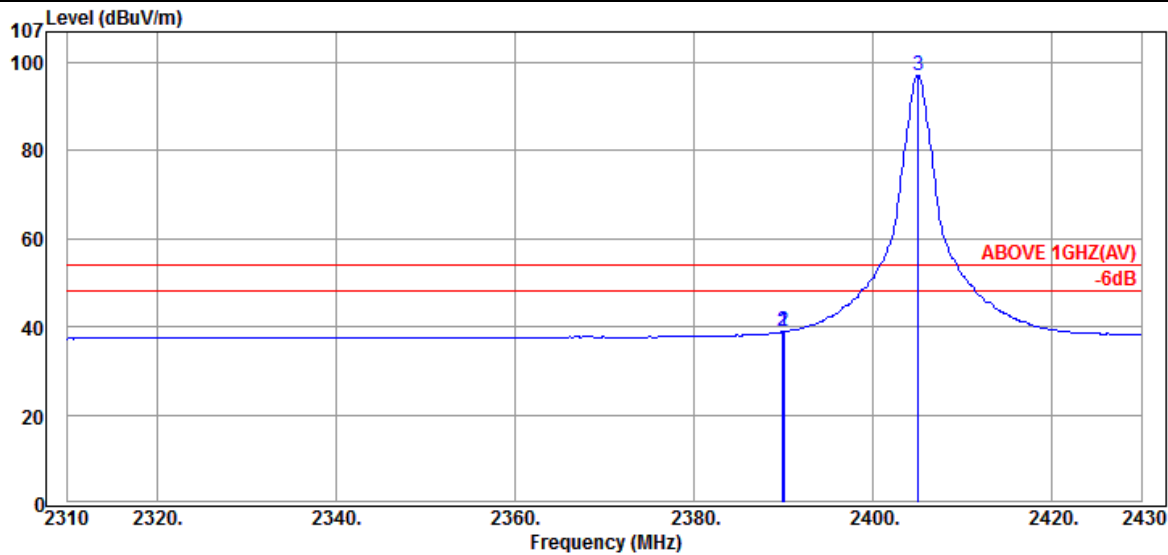
A.2.1.3 Frequency Above 1 GHz to 10th harmonics

Band Edge:



Antenna at Horizontal Polarization

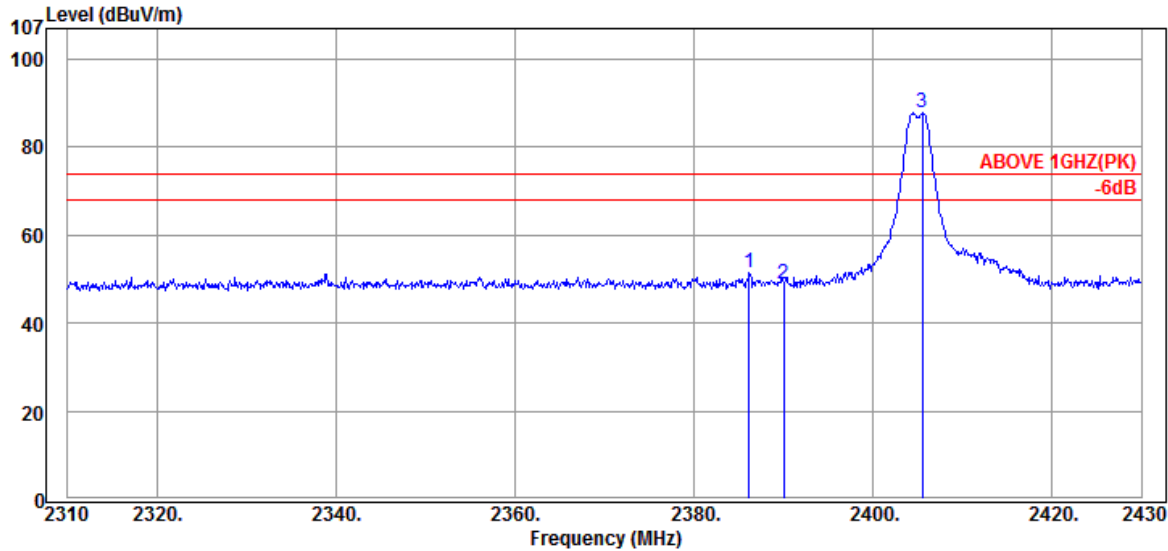
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2374.56	28.43	5.23	18.07	51.73	74.00	22.27	Peak
2390.04	28.47	5.24	15.44	49.15	74.00	24.85	Peak
2405.52	28.51	5.25	65.58	99.34	---	---	Peak



Antenna at Horizontal Polarization

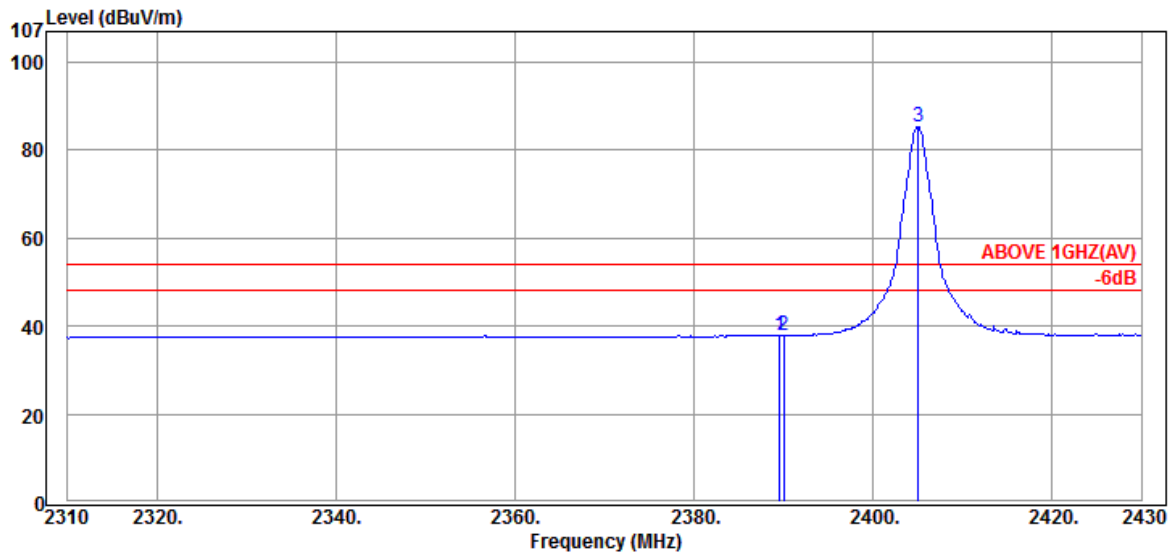
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.92	28.47	5.24	5.16	38.87	54.00	15.13	Average
2390.04	28.47	5.24	5.16	38.87	54.00	15.13	Average
2405.04	28.51	5.25	63.24	97.00	---	---	Average

Mode	ZigBee	Frequency	TX 2405MHz
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Antenna at Vertical Polarization

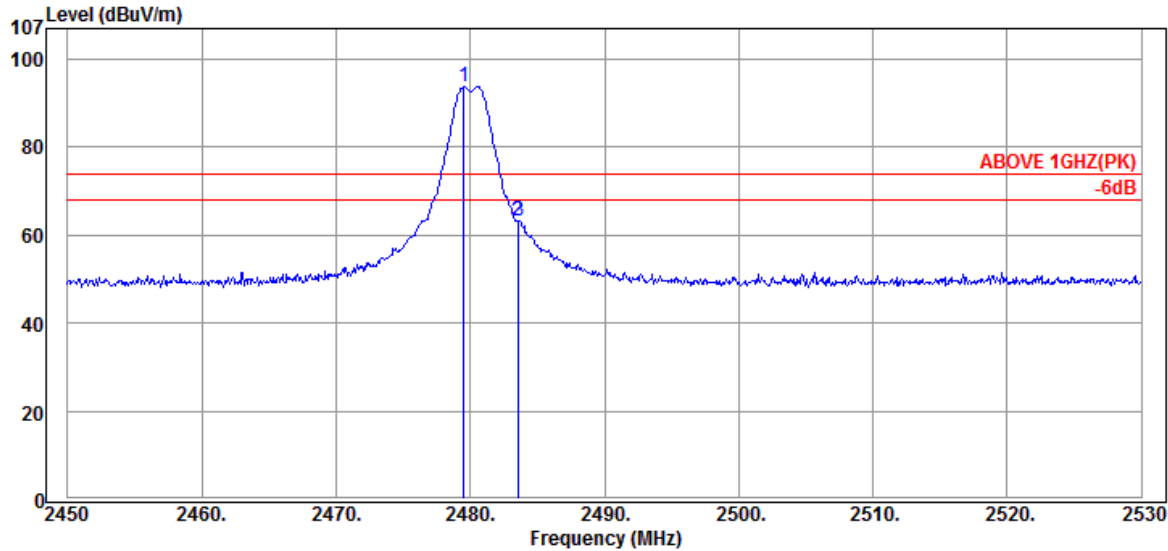
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2386.20	28.47	5.23	17.71	51.41	74.00	22.59	Peak
2390.04	28.47	5.24	15.33	49.04	74.00	24.96	Peak
2405.52	28.51	5.25	53.97	87.73	---	---	Peak



Antenna at Vertical Polarization

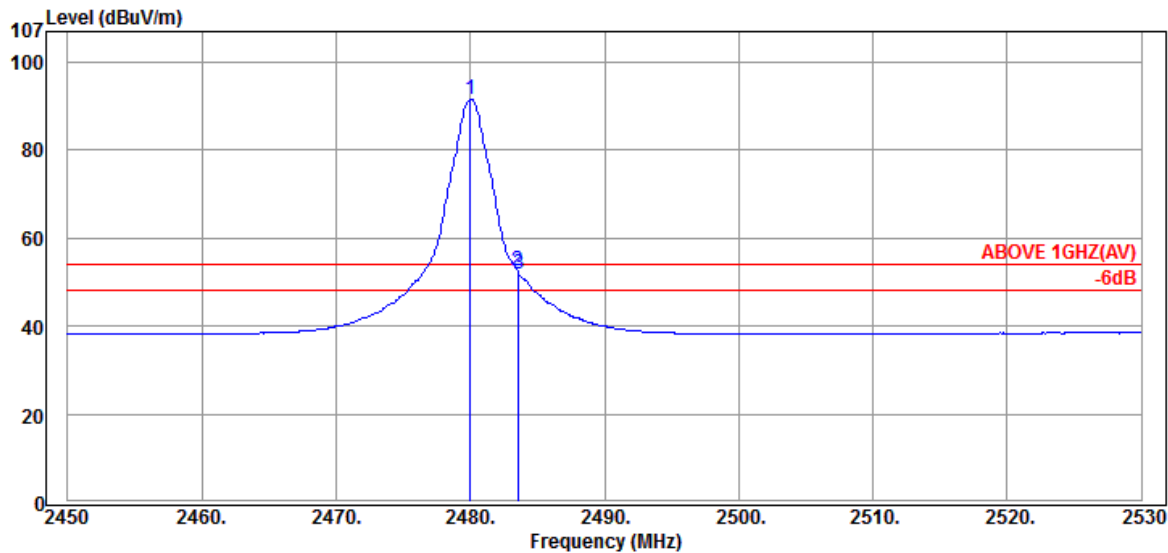
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.56	28.47	5.24	4.10	37.81	54.00	16.19	Average
2390.04	28.47	5.24	4.10	37.81	54.00	16.19	Average
2405.04	28.51	5.25	51.68	85.44	---	---	Average

Mode	ZigBee	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

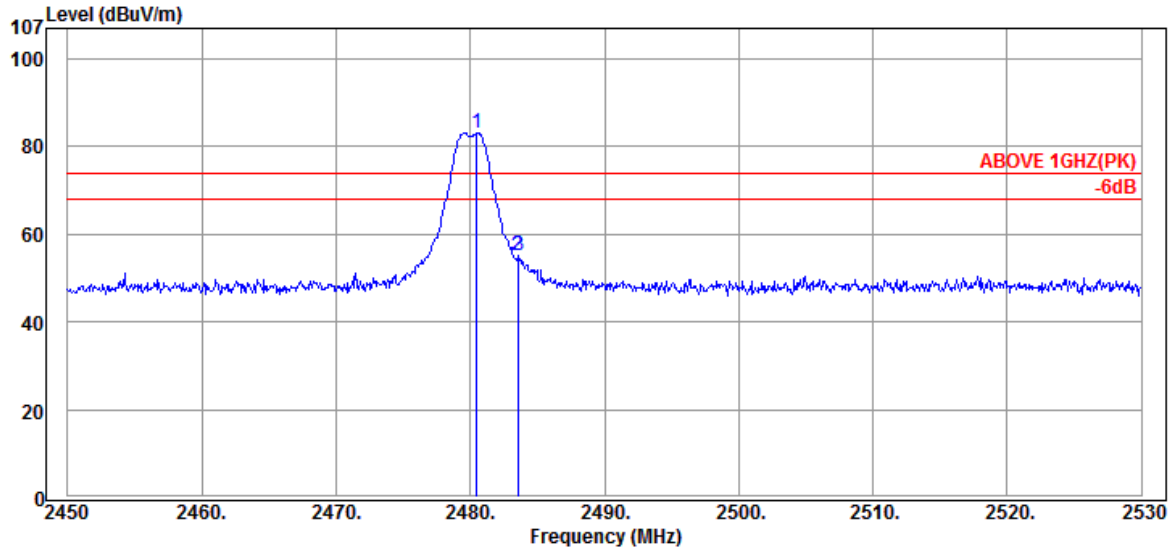
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.52	28.66	5.30	59.70	93.66	74.00	---	Peak
2483.52	28.66	5.31	29.34	63.31	74.00	10.69	Peak
2483.60	28.66	5.31	29.17	63.14	74.00	10.86	Peak



Antenna at Horizontal Polarization

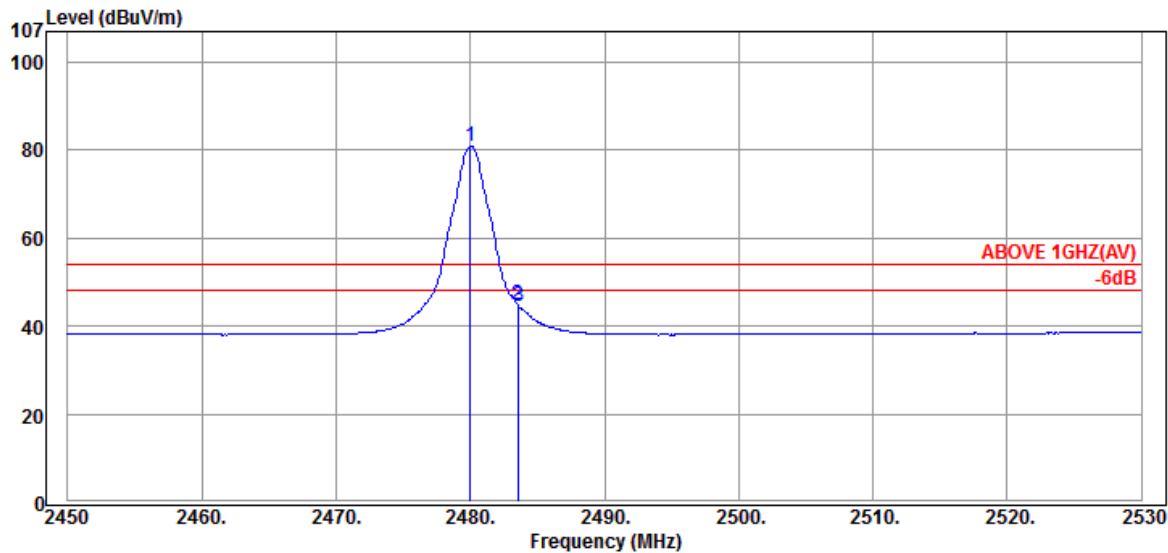
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.00	28.66	5.30	57.55	91.51	54.00	---	Average
2483.52	28.66	5.31	18.43	52.40	54.00	1.60	Average
2483.60	28.66	5.31	17.96	51.93	54.00	2.07	Average

Mode	ZigBee	Frequency	TX 2480MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.48	28.66	5.30	49.22	83.18	74.00	---	Peak
2483.52	28.66	5.31	21.34	55.31	74.00	18.69	Peak
2483.60	28.66	5.31	21.31	55.28	74.00	18.72	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.00	28.66	5.30	46.99	80.95	54.00	---	Average
2483.52	28.66	5.31	10.87	44.84	54.00	9.16	Average
2483.60	28.66	5.31	10.54	44.51	54.00	9.49	Average

A.1.2 Emissions outside the frequency band:

The emissions (up to 25GHz) not reported for there is no emission be found.

Mode	ZigBee	Frequency	TX 2405MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2130.00	27.87	5.03	13.01	45.91	54.00	8.09	Peak
2996.00	30.34	5.71	12.49	48.54	54.00	5.46	Peak
4810.00	33.06	8.98	3.69	45.73	54.00	8.27	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2124.00	27.87	5.03	16.96	49.86	54.00	4.14	Peak
3000.00	30.40	5.72	15.41	51.53	54.00	2.47	Peak
4810.00	33.06	8.98	9.37	51.41	54.00	2.59	Peak

Mode	ZigBee	Frequency	TX 2440MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1598.00	26.08	4.15	11.21	41.44	54.00	12.56	Peak
2124.00	27.87	5.03	12.46	45.36	54.00	8.64	Peak
4880.00	33.18	9.08	3.93	46.19	54.00	7.81	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2134.00	27.90	5.04	18.16	51.10	54.00	2.90	Peak
2990.00	30.34	5.71	14.41	50.46	54.00	3.54	Peak
4880.00	33.18	9.08	8.34	50.60	54.00	3.40	Peak

Mode	ZigBee	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector
2130.00	27.87	5.03	12.53	45.43	54.00	8.57	Peak
2996.00	30.34	5.71	12.75	48.80	54.00	5.20	Peak
4960.00	33.34	9.20	4.82	47.36	54.00	6.64	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector
2130.00	27.87	5.03	17.70	50.60	54.00	3.40	Peak
2998.00	30.40	5.72	14.66	50.78	54.00	3.22	Peak
4960.00	33.34	9.20	5.49	48.03	54.00	5.97	Peak

A.1.3 Emissions in Non-restricted Frequency Bands:

Pursuant to KDB 558074 D01 DTS Meas Guidance v04 that emission levels below the 15.209 general radiated emissions limits is not required.

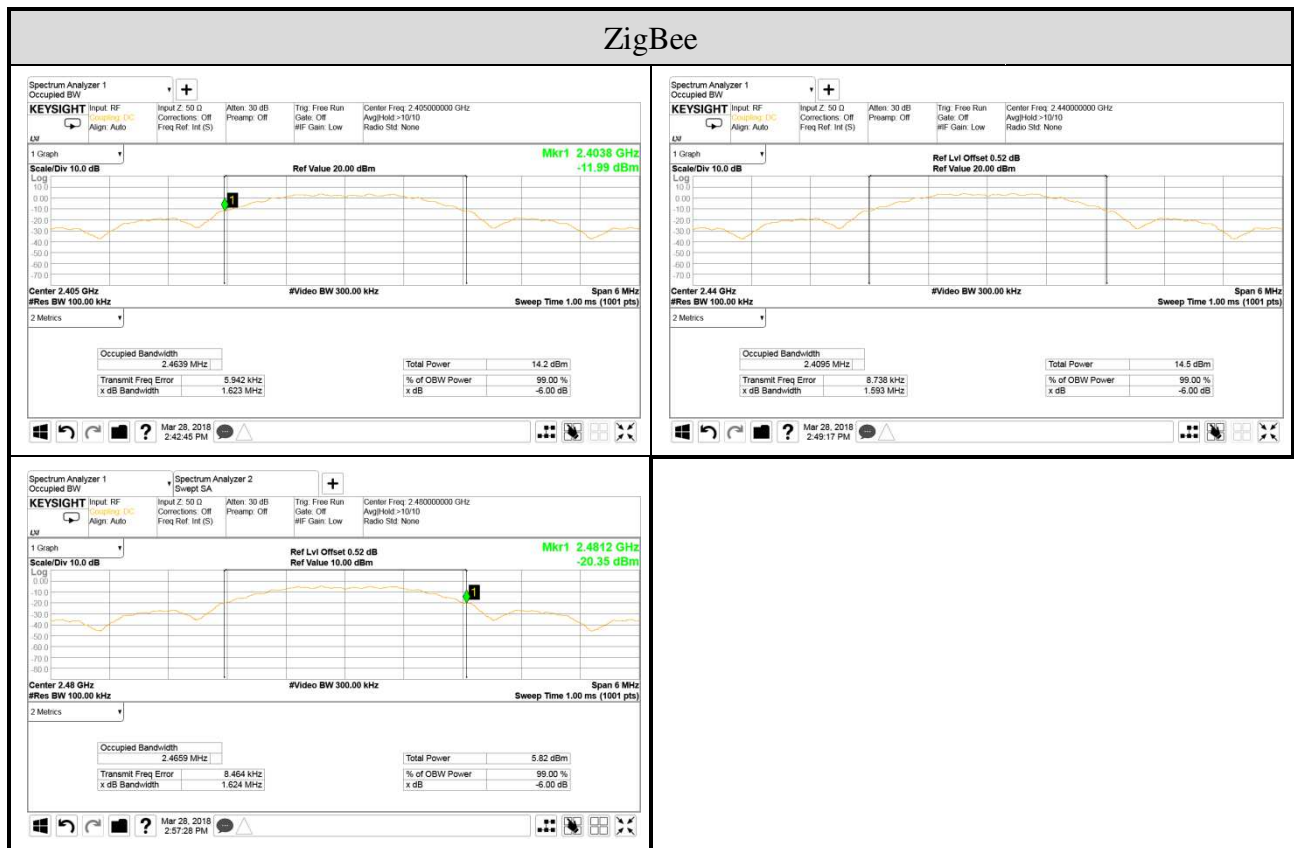
A.2 6dB BANDWIDTH

Test Date	2018/03/28	Temp./Hum.	24°C/55%
Cable Loss	---	Test Voltage	DC 3V (Via Batteries)

A.2.1 6dB Bandwidth Result

Mode	Centre Frequency (MHz)	6 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz) (Reference only)	Limit
ZigBee	2405	1.623	2.4639	>500kHz
	2440	1.593	2.4095	
	2480	1.624	2.4659	

A.2.2 Measurement Plots



A.3 MAXIMUM PEAK OUTPUT POWER

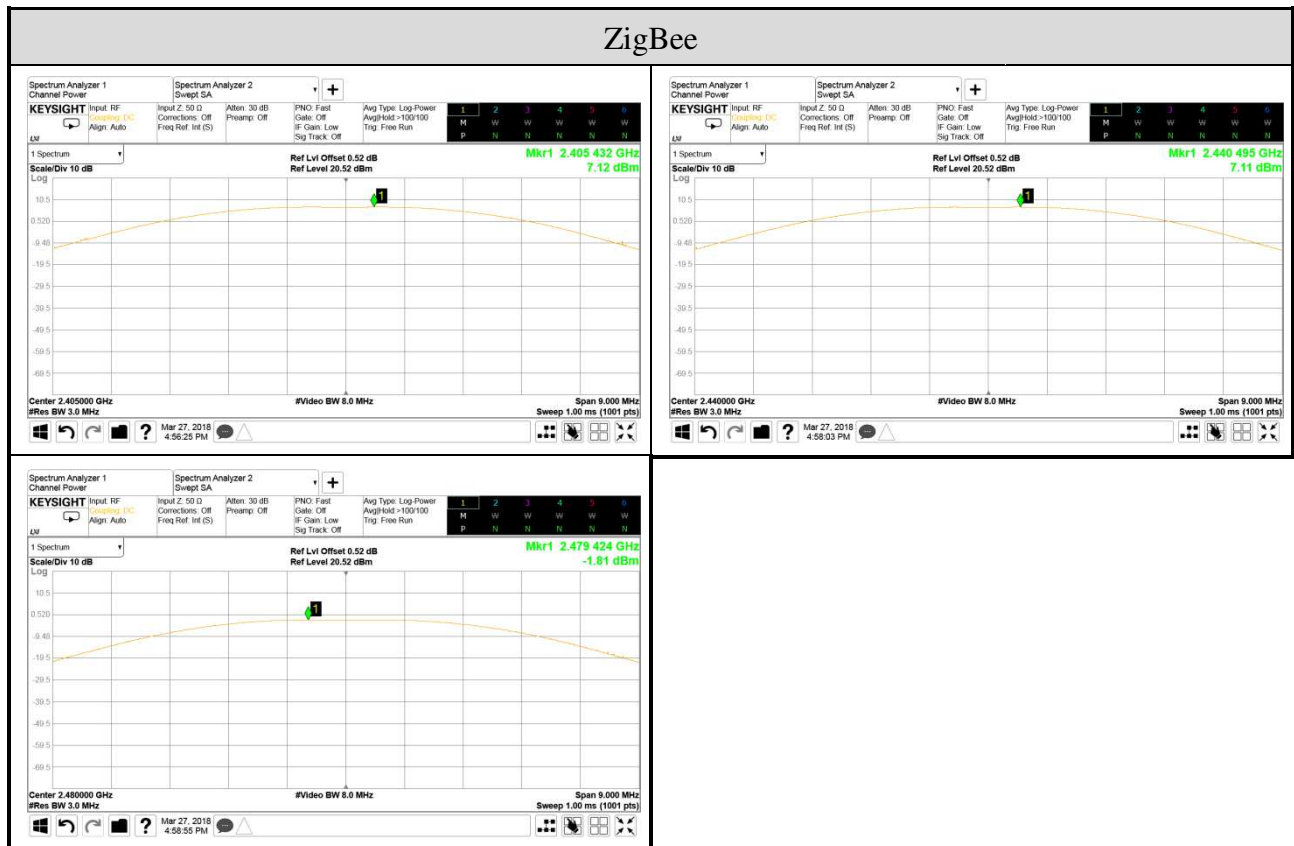
Test Date	2018/03/27	Temp./Hum.	24°C/55%
Cable Loss	0.52dB	Test Voltage	DC 3V (Via Batteries)

A.3.1 Peak Output Power

Mode	Centre Frequency (MHz)	MAX Output Power		Limit
		(dBm)	(W)	
ZigBee	2405	7.12	0.005152	< 30dBm (1W)
	2440	7.11	0.005140	
	2480	-1.81	0.000659	

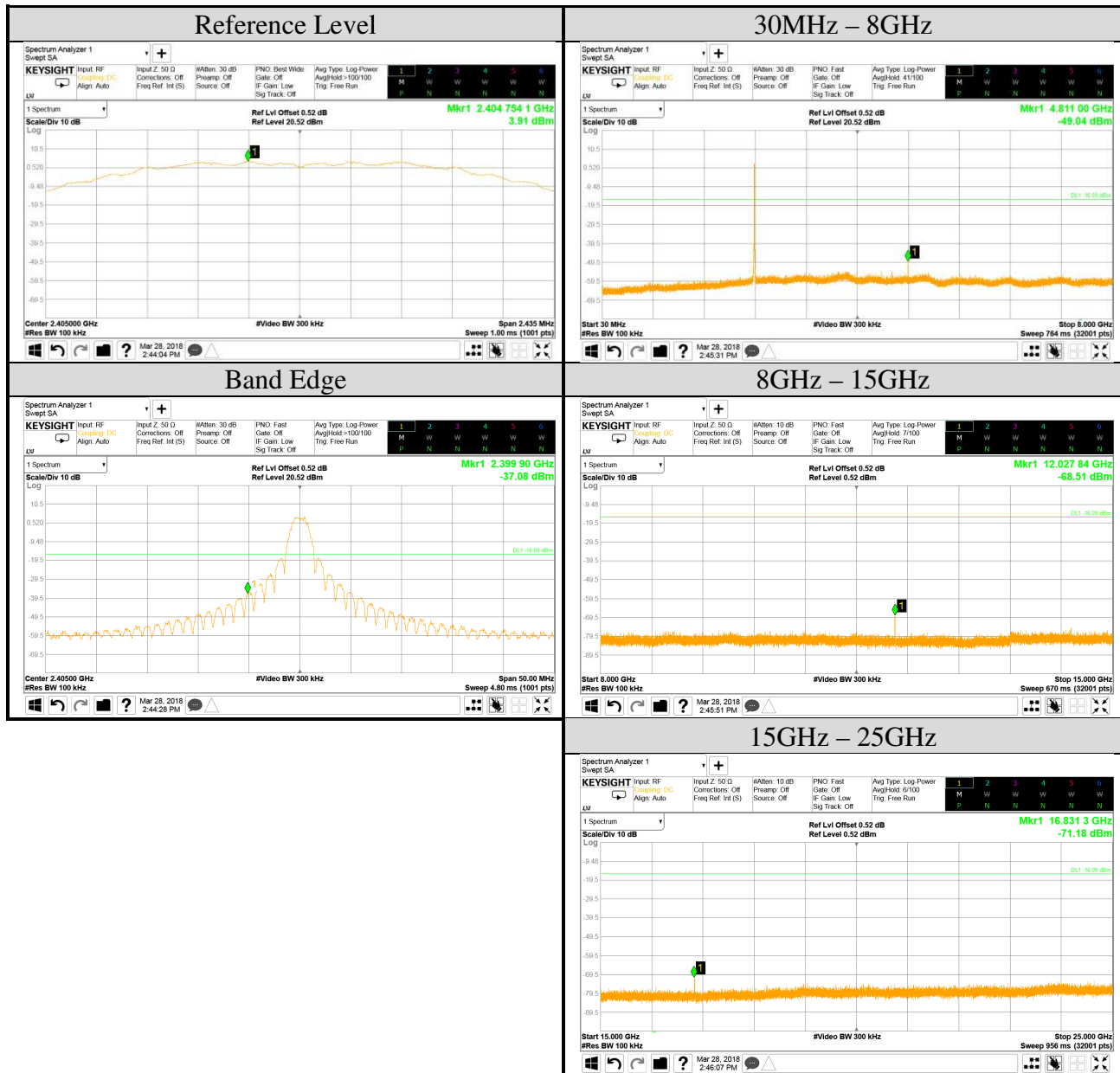
Note: The results have been included cable loss.

A.3.2 Measurement Plots



A.4 EMISSION LIMITATIONS

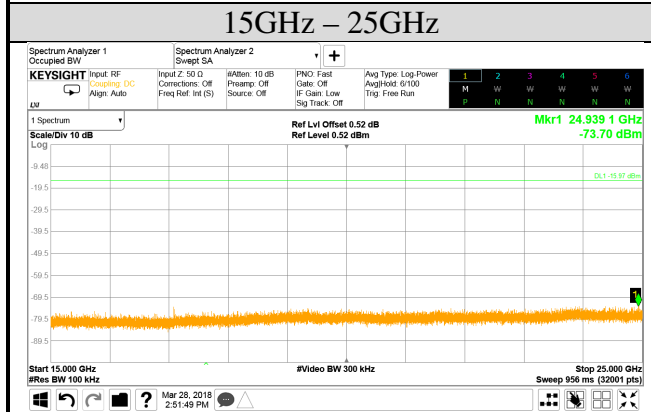
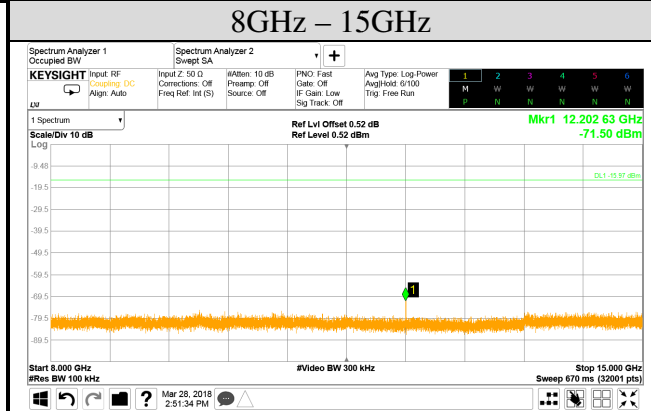
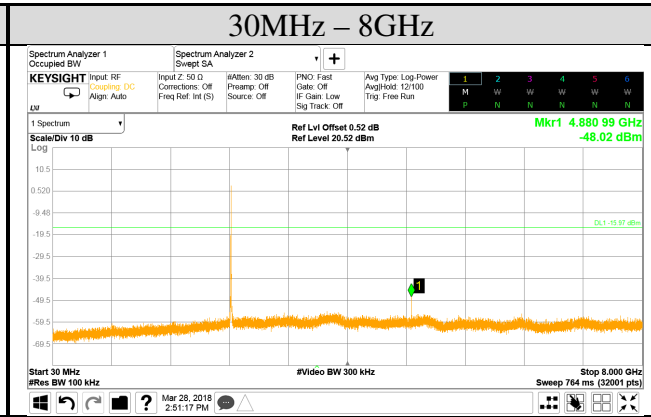
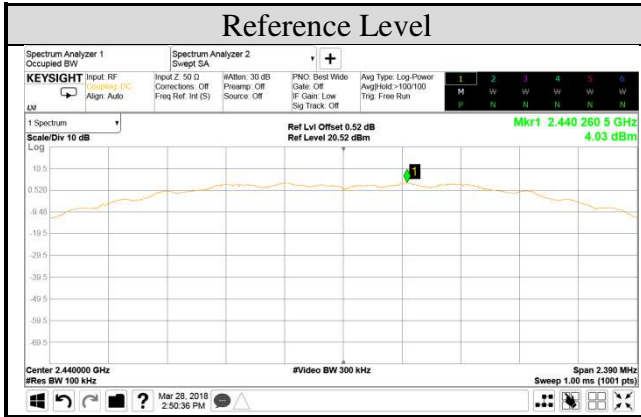
Test Date	2018/03/28	Temp./Hum.	24°C/55%
Cable Loss	0.52dB	Test Voltage	DC 3V (Via Batteries)
Mode	ZigBee	Frequency	TX 2405MHz



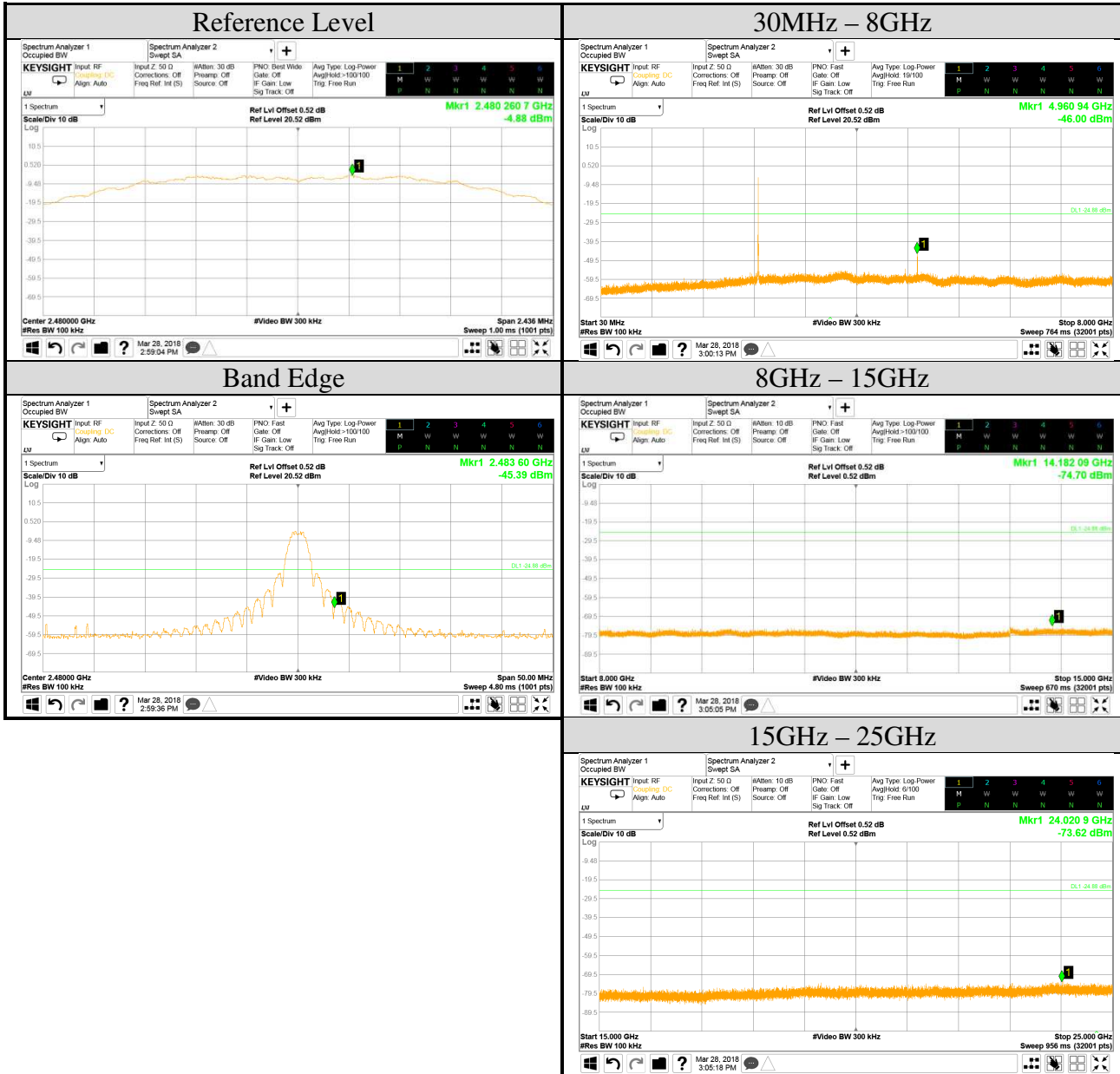
Audix Technology Corp.
 No. 53-11, Dingfu, Linkou, Dist.,
 New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Test Date	2018/03/28	Temp./Hum.	24°C/55%
Cable Loss	0.52dB	Test Voltage	DC 3V (Via Batteries)
Mode	ZigBee	Frequency	TX 2440MHz



Test Date	2018/03/28	Temp./Hum.	24°C/55%
Cable Loss	0.52dB	Test Voltage	DC 3V (Via Batteries)
Mode	ZigBee	Frequency	TX 2480MHz



A.5 POWER SPECTRAL DENSITY

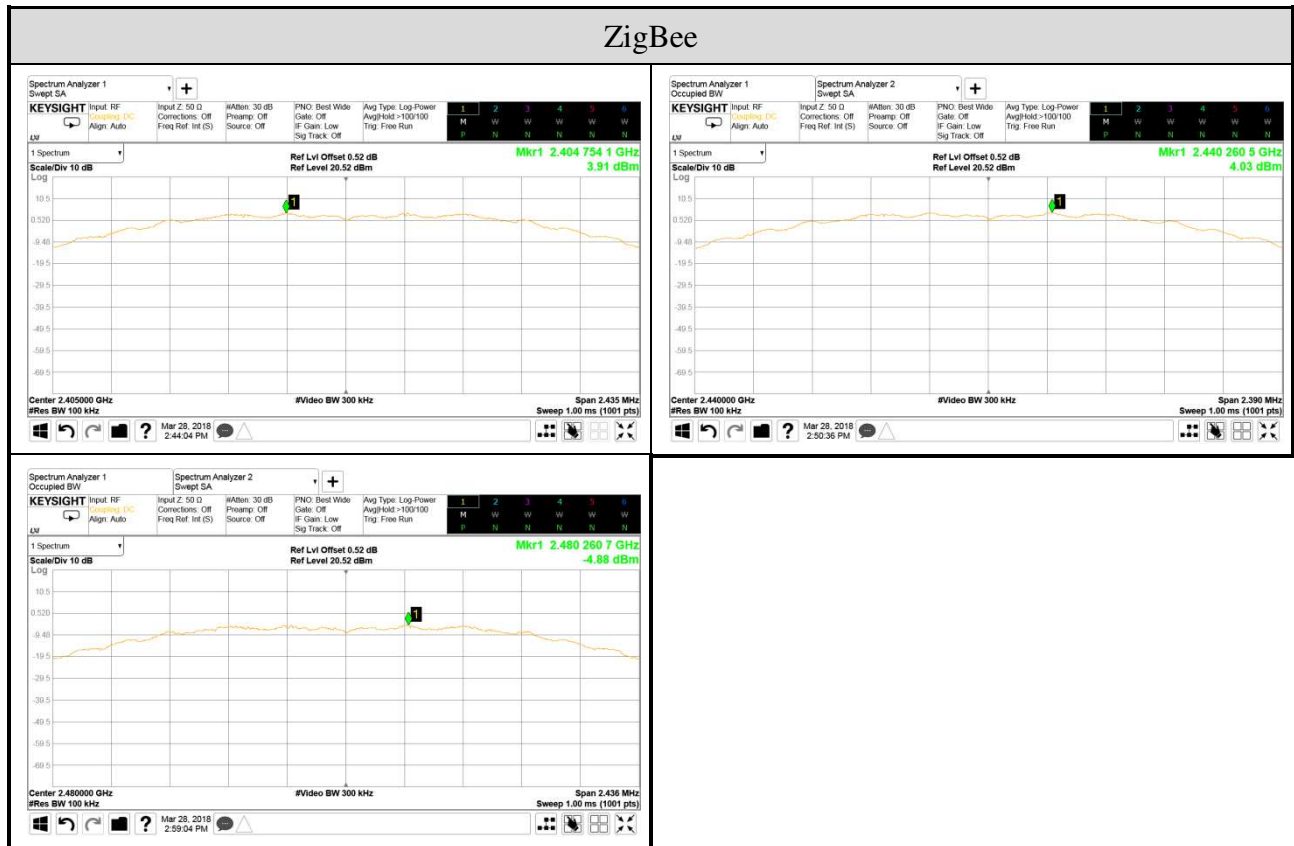
Test Date	2018/03/28	Temp./Hum.	24°C/55%
Cable Loss	0.52dB	Test Voltage	DC 3V (Via Batteries)

A.5.1 Power Spectral Density Result

Mode	Centre Frequency (MHz)	Power Spectral Density (dBm)	Limit
ZigBee	2405	3.91	< 8 dBm/3kHz
	2440	4.03	
	2480	-4.88	

Note: 1. All results have been included cable loss and Simultaneous Factor.
 2. For KDB558074 D01V04, in the test result, when RBW set at 100kHz is stricter than 3kHz.

A.5.2 Measurement Plots



Note: All results have been included cable loss and Simultaneous Factor.



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APPENDIX B

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APPDNDIX B

TEST PHOTOGRAPHS

(Model: (1)9SSA2B2B520 (2)9SSA2B1B520)