



CERTIFICATION TEST REPORT

Report Number. : 12530276-E4V2

Applicant : Samsung Electronics Co., Ltd.
129 Samsung-Ro, Yeongtong-Gu,
Suwon-Si, Gyeonggi-Do, 16677, Korea

Model : SM-T927A

FCC ID : A3LSMT927A

EUT Description : WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C

Date Of Issue:

January 09, 2019

Prepared by:

UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888



NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	12/26/2018	Initial Issue	
V2	1/9/2019	Updated Section 2,6 and Removed GSM technology from the report.	K.Kedida

REPORT REVISION HISTORY 2

1. ATTESTATION OF TEST RESULTS 5

2. TEST METHODOLOGY 6

3. FACILITIES AND ACCREDITATION 6

4. CALIBRATION AND UNCERTAINTY 7

 4.1. *MEASURING INSTRUMENT CALIBRATION* 7

 4.2. *SAMPLE CALCULATION* 7

 4.3. *MEASUREMENT UNCERTAINTY* 7

5. EQUIPMENT UNDER TEST 8

 5.1. *EUT DESCRIPTION* 8

 5.2. *MAXIMUM OUTPUT POWER* 8

 5.3. *DESCRIPTION OF AVAILABLE ANTENNAS* 9

 5.4. *SOFTWARE AND FIRMWARE* 9

 5.5. *WORST-CASE CONFIGURATION AND MODE* 9

 5.6. *DESCRIPTION OF TEST SETUP* 10

6. MEASUREMENT METHOD 13

7. TEST AND MEASUREMENT EQUIPMENT 14

8. ANTENNA PORT TEST RESULTS 15

 8.1. *ON TIME AND DUTY CYCLE* 15

 8.2. *99% BANDWIDTH* 17

 8.2.1. *802.11b MODE* 18

 8.2.2. *802.11g MODE* 20

 8.2.3. *802.11n HT20 MODE* 22

 8.3. *6 dB BANDWIDTH* 24

 8.3.1. *802.11b MODE* 25

 8.3.2. *802.11g MODE* 27

 8.3.3. *802.11n HT20 MODE* 29

 8.4. *OUTPUT POWER* 31

 8.4.1. *802.11b MODE* 33

 8.4.2. *802.11g MODE* 34

 8.4.3. *802.11n HT20 MODE* 35

 8.5. *POWER SPECTRAL DENSITY* 36

 8.5.1. *802.11b MODE* 37

 8.5.2. *802.11g MODE* 39

 8.5.3. *802.11n HT20 MODE* 41

 8.6. *CONDUCTED SPURIOUS EMISSIONS* 43

 8.6.1. *802.11b MODE* 44

 8.6.2. *802.11g MODE* 45

8.6.3.	802.11n HT20 MODE	46
9.	RADIATED TEST RESULTS.....	47
9.1.	TRANSMITTER ABOVE 1 GHz.....	48
9.1.1.	TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND	48
9.1.2.	TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND	58
9.1.3.	TX ABOVE 1 GHz 802.11n HT20 MODE IN THE 2.4 GHz BAND.....	68
9.2.	Worst Case Below 30 MHz	78
9.3.	Worst Case Below 1 GHz	79
9.4.	Worst Case 18-26 GHz.....	81
10.	AC POWER LINE CONDUCTED EMISSIONS	83
10.1.1.	AC Power Line Norm	84
11.	SETUP PHOTOS.....	86

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Samsung Electronics Co., Ltd.
129 Samsung-Ro, Yeongtong-Gu,
Suwon-Si, Gyeonggi-Do, 16677, Korea

EUT DESCRIPTION: WCDMA/LTE Tablet with BT, DTS/UNII a/b/g/n/ac

MODEL: SM-T927A

SERIAL NUMBER: Conducted: R32K700261B
Radiated: R32K70042PL, R32K70042VT

DATE TESTED: August 13, 2018 – September 06, 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:

Reviewed By:



DAN CORONIA
CONSUMER TECHNOLOGY DIVISION
OPERATIONS LEADER
UL Verification Services Inc.

KIYA EDIDA
CONSUMER TECHNOLOGY DIVISION
SENIOR PROJECT ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 558074 D01 v5, ANSI C63.10-2013

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd.
<input checked="" type="checkbox"/> Chamber A (IC:2324B-1)	<input type="checkbox"/> Chamber D (IC:22541-1)	<input type="checkbox"/> Chamber I (IC: 2324A-5)
<input type="checkbox"/> Chamber B (IC:2324B-2)	<input type="checkbox"/> Chamber E (IC:22541-2)	<input type="checkbox"/> Chamber J (IC: 2324A-6)
<input type="checkbox"/> Chamber C (IC:2324B-3)	<input type="checkbox"/> Chamber F (IC:22541-3)	<input checked="" type="checkbox"/> Chamber K (IC: 2324A-1)
	<input type="checkbox"/> Chamber G (IC:22541-4)	<input type="checkbox"/> Chamber L (IC: 2324A-3)
	<input type="checkbox"/> Chamber H (IC:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through C are covered under ISED company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under ISED company address code 22541 with site numbers 22541 -1 through 22541-5, respectively. Chambers K and L are covered under ISED company address code 2324A with site numbers 2324A-1 and 2324A-3, respectively.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a WCDMA/LTE Tablet with BT, DTS/UNII a/b/g/n/ac.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

2.4GHz BAND

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
1Tx			
2412 - 2462	802.11b	17.12	51.52
2412 - 2462	802.11g	14.41	27.61
2412 - 2462	802.11n HT20	13.78	23.88

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antenna, with a maximum gain of 1.71 dBi.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was T927A.001

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps

802.11g mode: 6 Mbps

802.11n HT20mode: MCS0

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	EP-TA300	R37K5PK1GA3SE3	N/A
Earphone	Samsung	N/A	N/A	N/A

I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	RF	Shielded	0.2	To PSA
2	USB Type C	1	USB Type C	Un-shielded	1	EUT to AC Mains

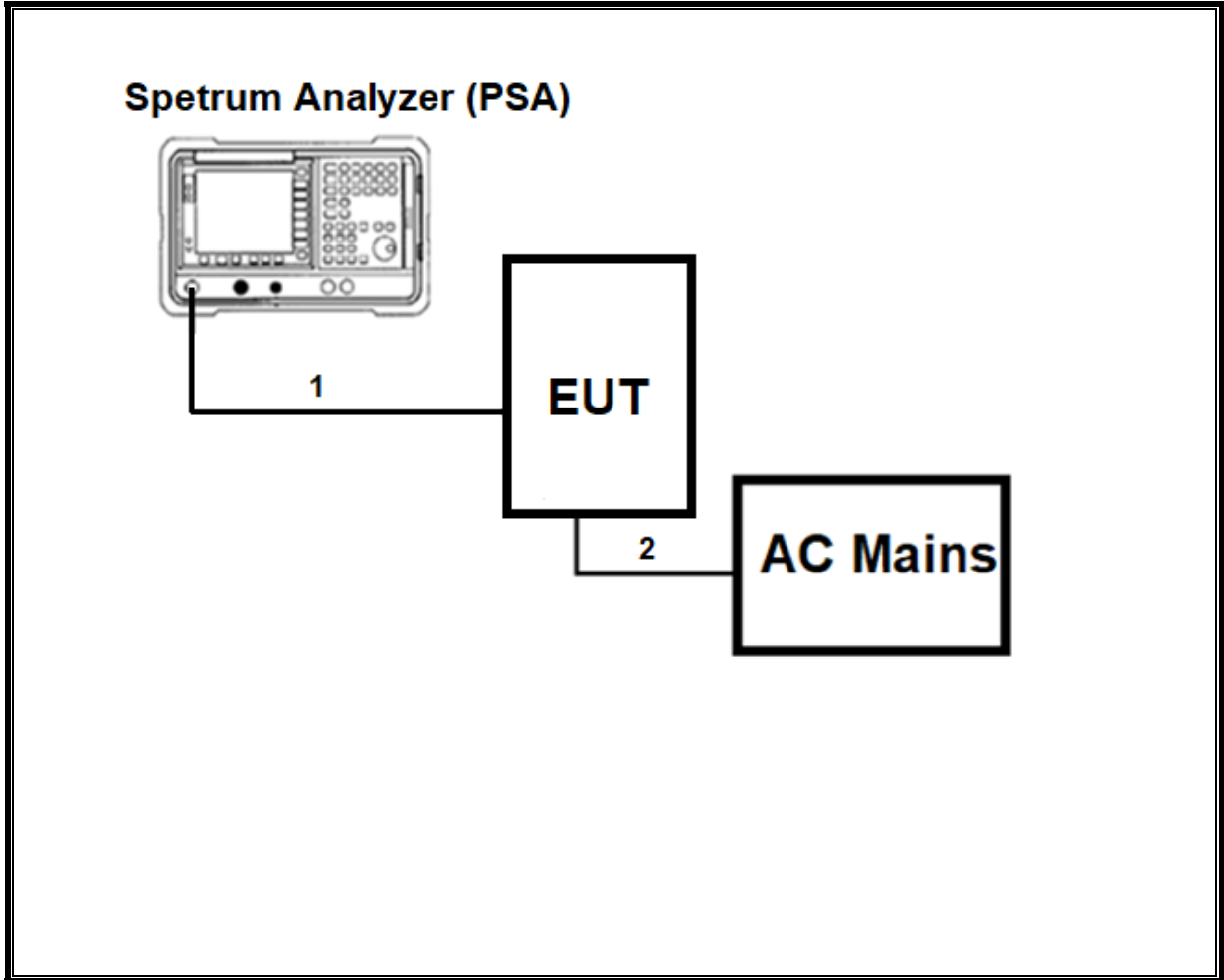
I/O CABLES (RADIATED AND CONDUCTED EMISSIONS)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB Type C	1	USB Type C	Shielded	1	N/A
2	earphone	1	3.5mm	Un-shielded	1	N/A

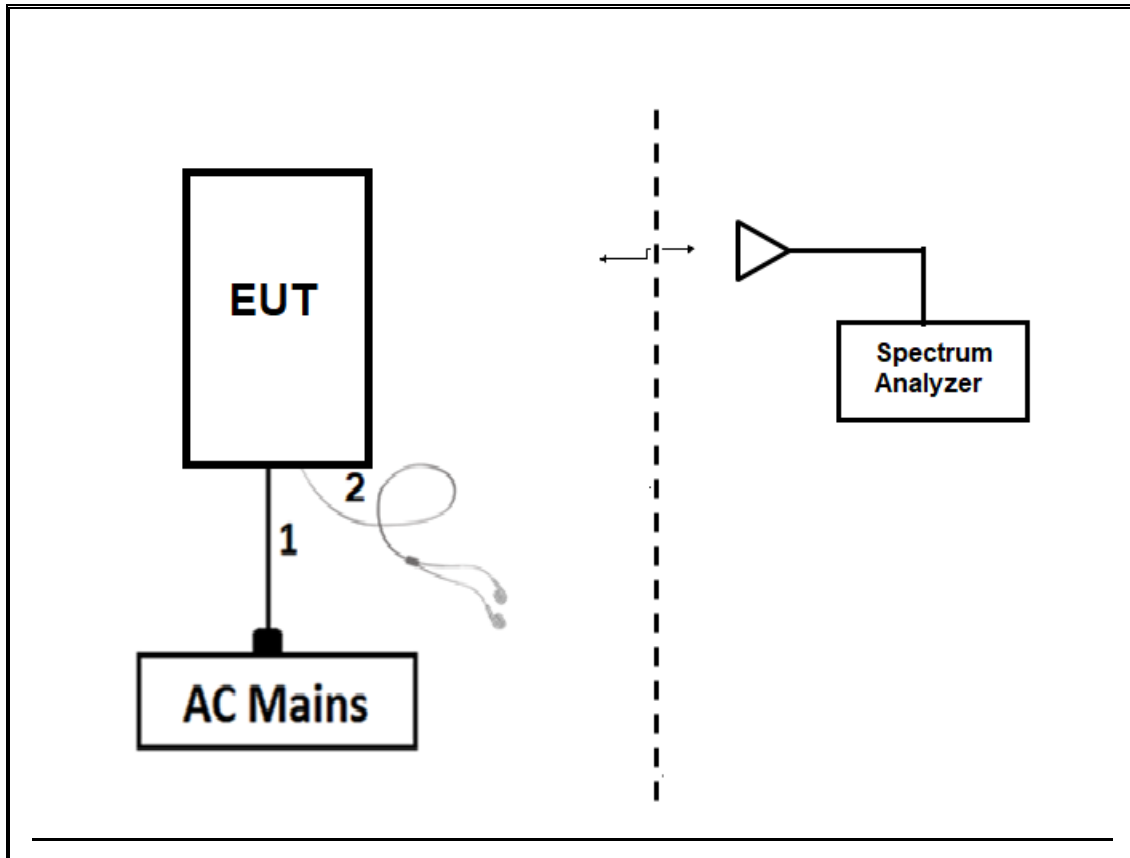
TEST SETUP

The EUT is a stand alone. Test software exercised the radio card.

CONDUCTED TEST SETUP DIAGRAM



RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM



6. MEASUREMENT METHOD

On Time and Duty Cycle: ANSI C63.10-2013 Section 11.6.

6 dB BW: ANSI C63.10 Section 11.8.1. Option 1

Output Power: ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter)

Power Spectral Density: ANSI C63.10 Section 11.10.3 Method AVGPSD-1.

Radiated emissions non-restricted frequency bands: ANSI C63.10 Section 11.12.1

Radiated emissions restricted frequency bands: ANSI C63.10 Section 11.11.

Conducted emissions in restricted frequency bands: ANSI C63.10 Section 11.12.2.

Band-edge: ANSI C63.10 Subclause -11.13.3.4 Integration method -Trace averaging across ON and OFF times DC correction

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
Amplifier, 10KHz to 1GHz, 32dB	Agilent (Keysight) Technologies	8447D	T15	10/16/2018	10/16/2017
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB1	T130	10/16/2018	10/16/2017
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T345	04/25/2019	04/25/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T4294	04/03/2019	04/03/2018
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179522	05/11/2019	05/11/2018
RF Amplifier, 1-18GHz	MITEQ	AFS42-00101800-25-S-42	T1568	06/21/2019	06/21/2018
RF Amplifier	MITEQ	AFS42-00101800-25-S-42	T493	08/30/2019	08/30/2018
RF Amplifier, 1-18GHz	MITEQ	AFS42-00101800-25-S-42	T1165	06/12/2019	06/12/2018
Spectrum Analyzer	Agilent (Keysight) Technologies	N9030A	T200	10/18/2018	10/18/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1113	12/21/2018	12/21/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1466	04/16/2019	04/16/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1454	01/08/2019	01/08/2018
Antenna, Active Loop 9kHz-30MHz	Com-Power Corp.	AL-130R	T1866	10/10/2018	10/10/2017
18 - 26.5 GHz Horn Antenna	Seavey Division	MWH-1826/B	T89	01/18/2019	01/18/2018
Pre-Amp 1-26.5 GHz	Agilent	8449B	T404	03/09/2019	03/09/2018
EMI Reciever	Rohde & Schwarz	ESR	T1436	02/21/2019	02/22/2018
L.I.S.N.	FCC INC.	FCC LISN 50/250	T1310	06/15/2019	02/26/2018
L.I.S.N.	FCC INC.	FCC LISN 50/250	T24	03/06/2019	03/06/2018

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Ver 9.5, June 22, 2018
Antenna Port Software	UL	UL RF	Ver 8.7, Aug 8, 2018

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 789033 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
802.11b 1TX	8.615	8.648	0.996	99.62%	0.00	0.010
802.11g 1TX	1.428	1.464	0.975	97.54%	0.11	0.700
802.11n HT20 1TX	1.336	1.372	0.974	97.38%	0.12	0.749



8.2. 99% BANDWIDTH

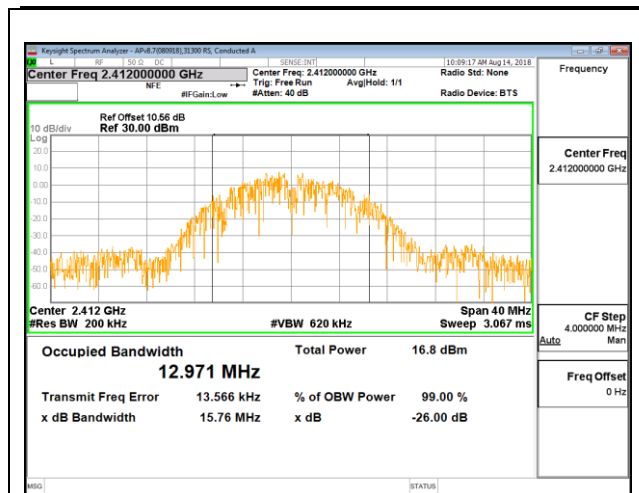
LIMITS

None; for reporting purposes only.

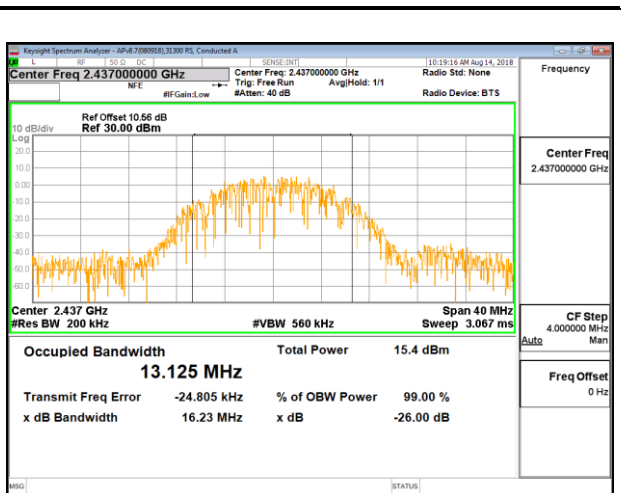
RESULTS

8.2.1. 802.11b MODE

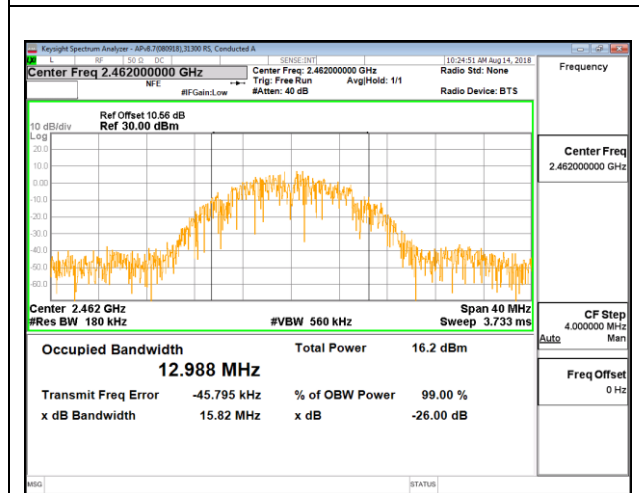
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	12.9710
Mid 6	2437	13.1250
High 11	2462	12.9880



LOW CHANNEL 1



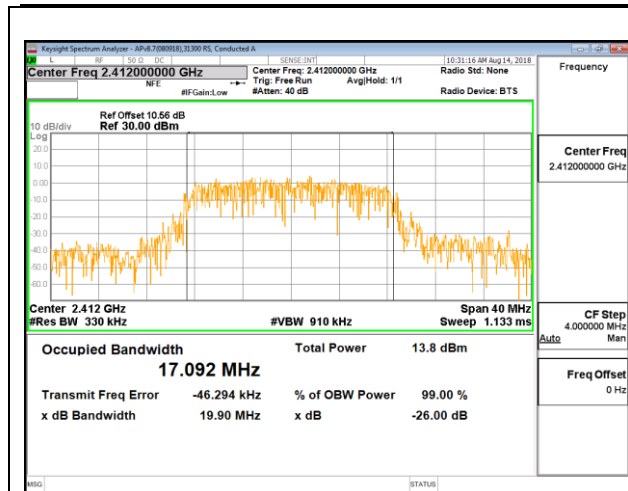
MID CHANNEL 6



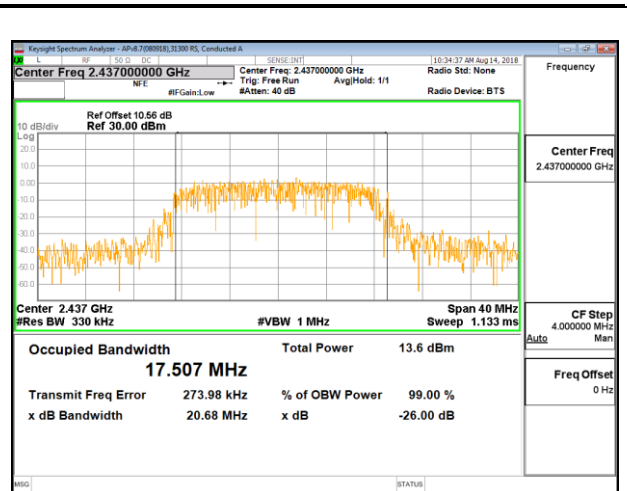
HIGH CHANNEL 11

8.2.2. 802.11g MODE

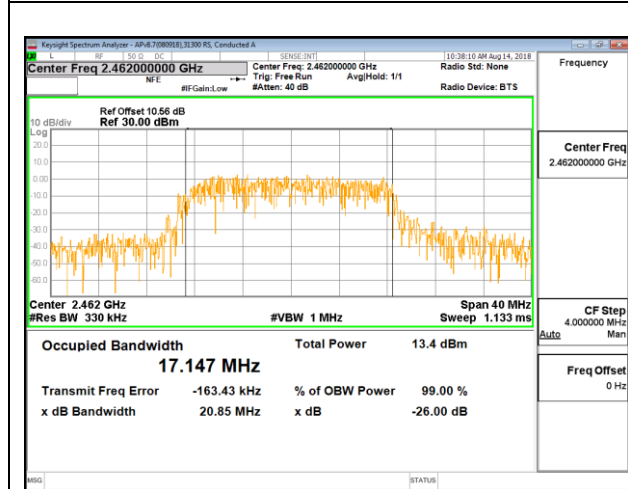
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	17.0920
Mid 6	2437	17.5070
High 11	2462	17.1470



LOW CHANNEL 1



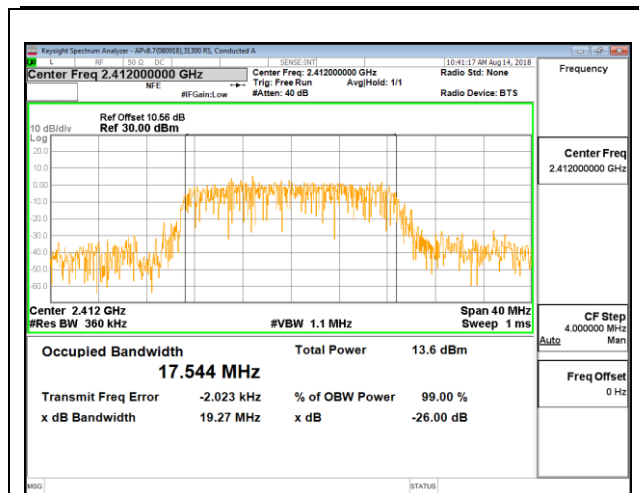
MID CHANNEL 6



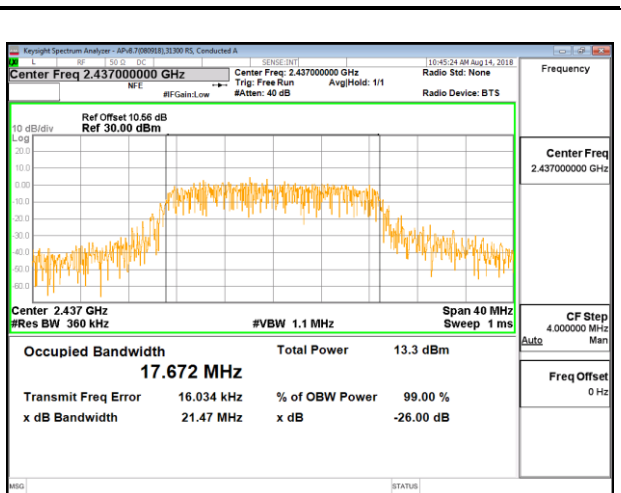
HIGH CHANNEL 11

8.2.3. 802.11n HT20 MODE

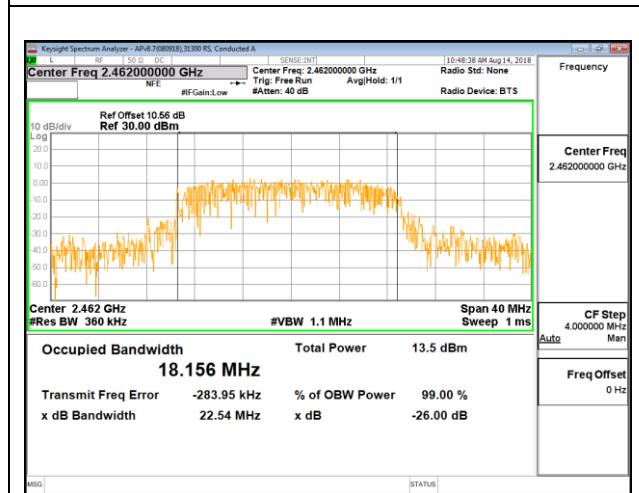
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low 1	2412	17.5440
Mid 6	2437	17.6720
High 11	2462	18.1560



LOW CHANNEL 1



MID CHANNEL 6



HIGH CHANNEL 11

8.3. 6 dB BANDWIDTH

LIMITS

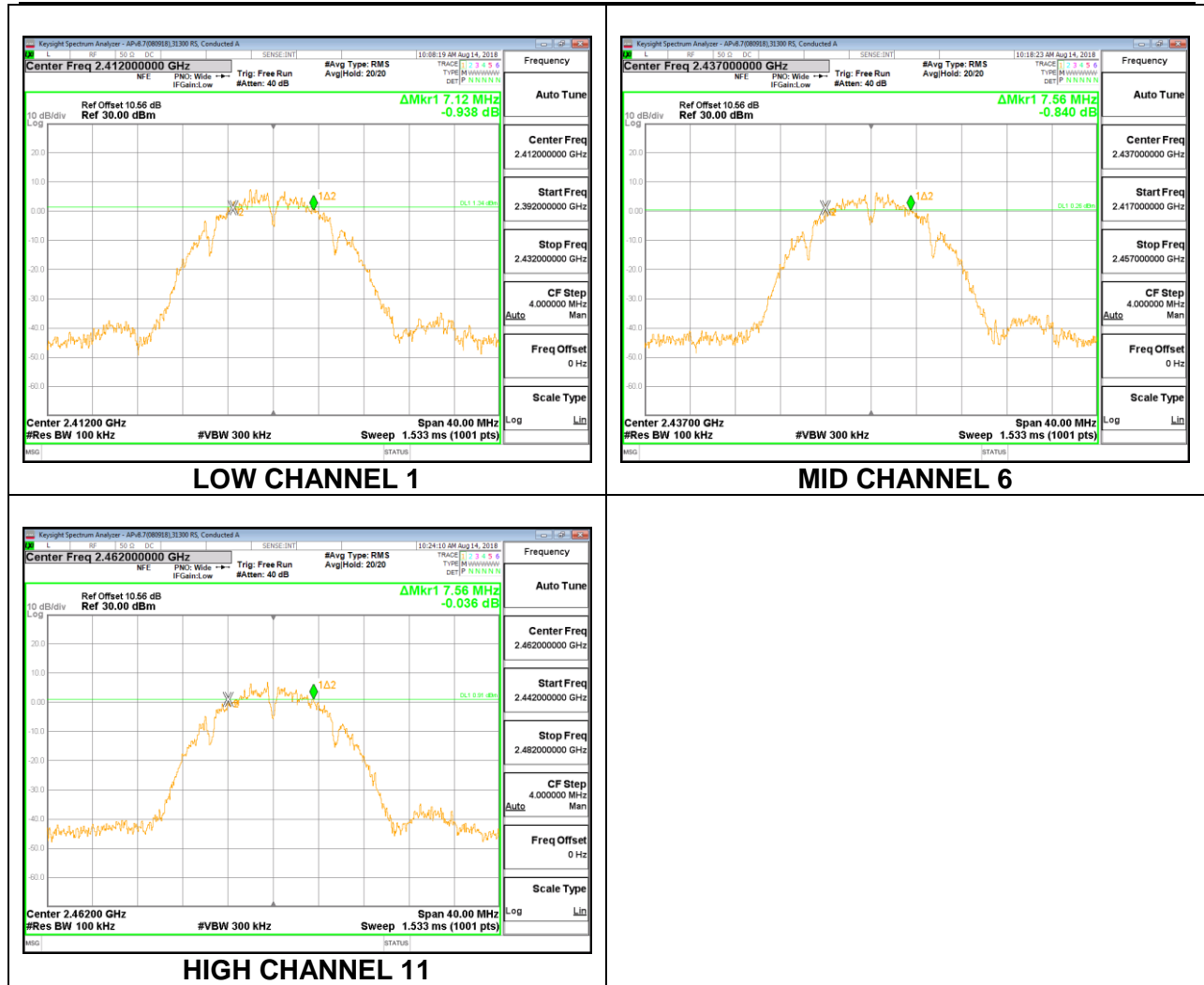
FCC §15.247 (a) (2)

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

RESULTS

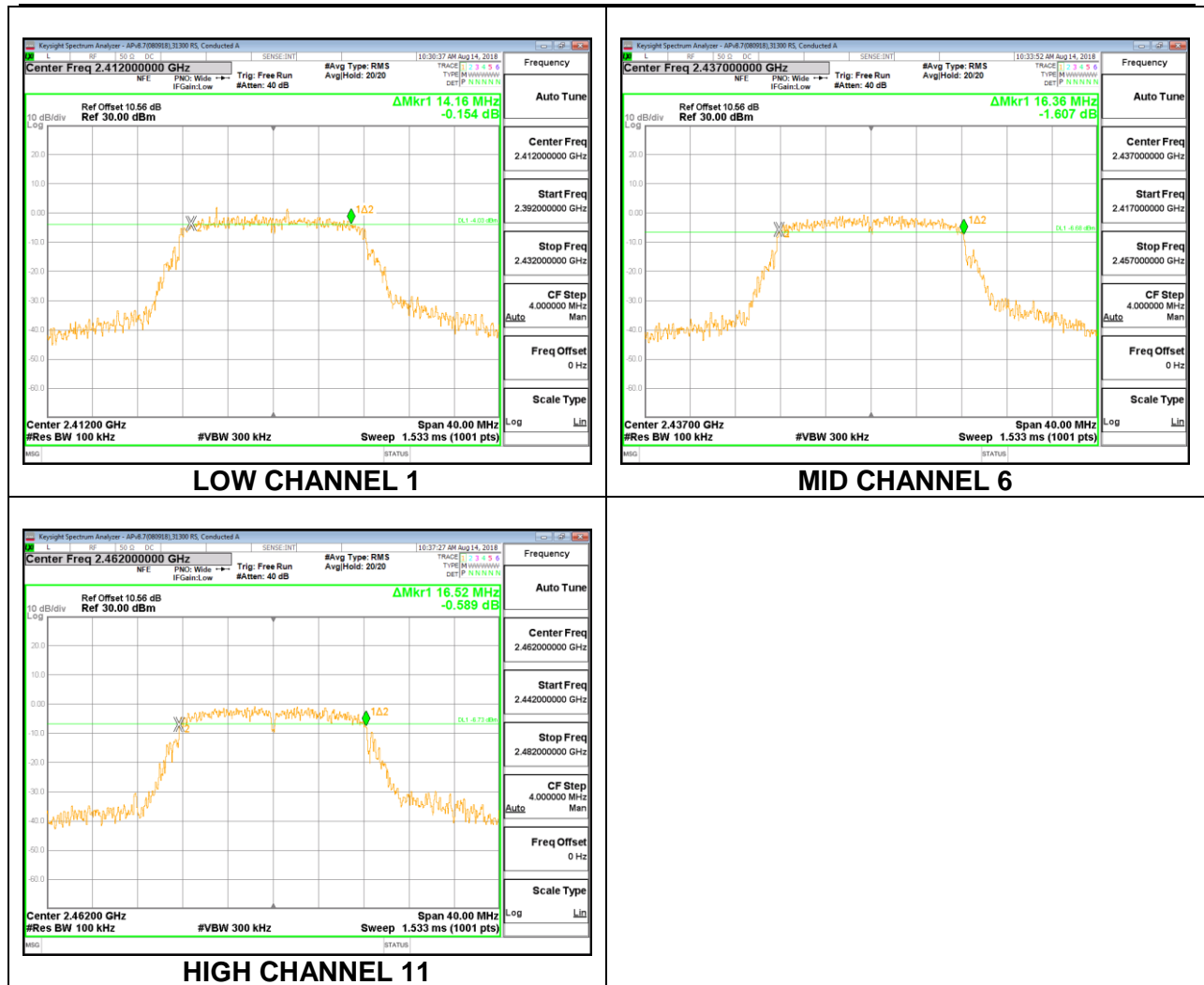
8.3.1. 802.11b MODE

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	7.1200	0.5
Mid 6	2437	7.5600	0.5
High 11	2462	7.5600	0.5



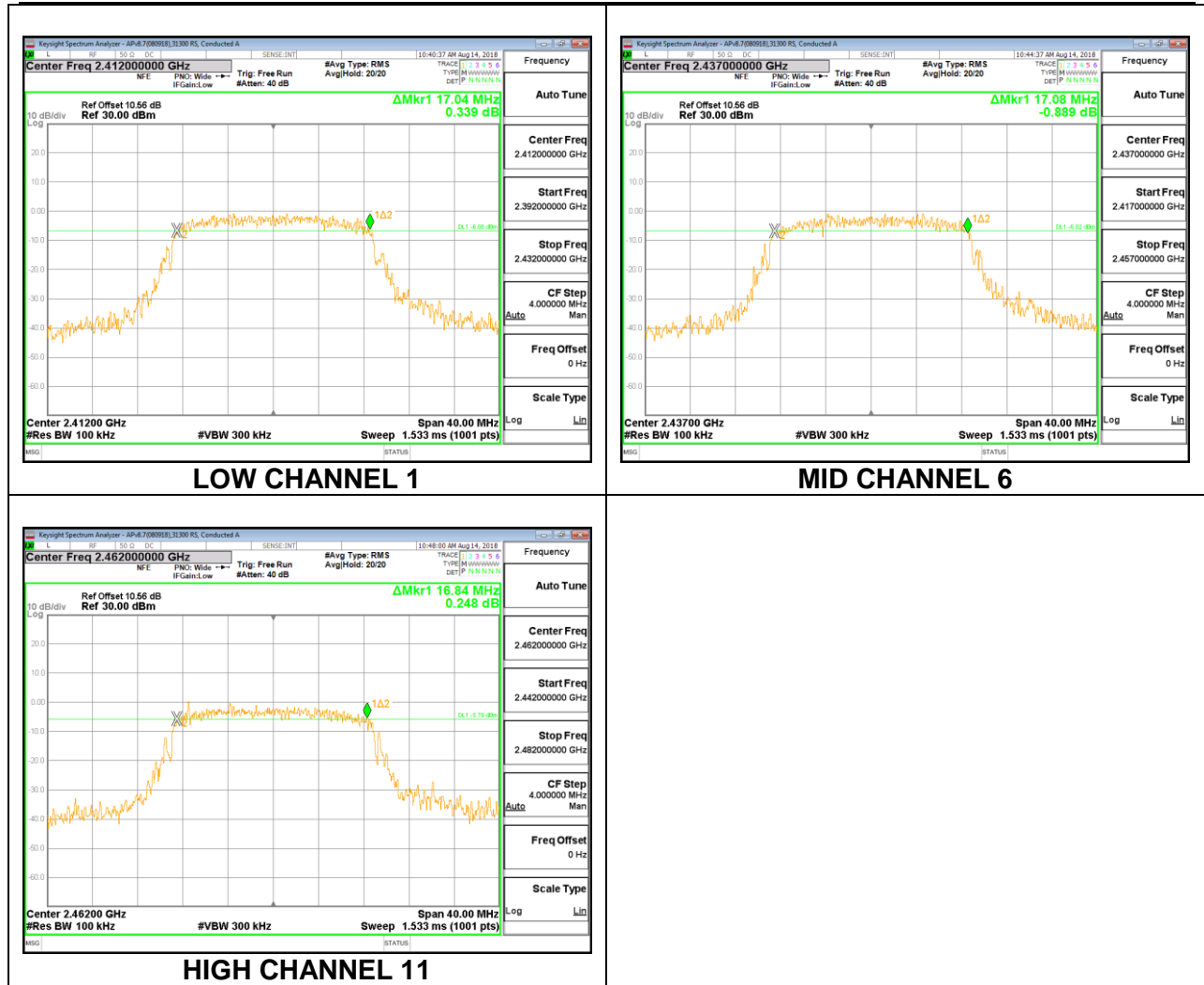
8.3.2. 802.11g MODE

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	14.1600	0.5
Mid 6	2437	16.3600	0.5
High 11	2462	16.5200	0.5



8.3.3. 802.11n HT20 MODE

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low 1	2412	17.0400	0.5
Mid 6	2437	17.0800	0.5
High 11	2462	16.8400	0.5



8.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The transmitter output is connected to a power meter. The cable assembly insertion loss was entered as an offset in the power meter to allow for a gated Average reading of power.

DIRECTIONAL ANTENNA GAIN

For 1 TX:

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

RESULTS

8.4.1. 802.11b MODE

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	1.71	30.00	30	36	30.00
Mid 6	2437	1.71	30.00	30	36	30.00
High 11	2462	1.71	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	17.10	17.10	30.00	-12.90
Mid 6	2437	17.12	17.12	30.00	-12.88
High 11	2462	17.00	17.00	30.00	-13.00

8.4.2. 802.11g MODE

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	1.71	30.00	30	36	30.00
Mid 6	2437	1.71	30.00	30	36	30.00
High 11	2462	1.71	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	14.35	14.35	30.00	-15.65
Mid 6	2437	14.40	14.40	30.00	-15.60
High 11	2462	14.41	14.41	30.00	-15.59

8.4.3. 802.11n HT20 MODE

Limits

Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	ISED Power Limit (dBm)	ISED EIRP Limit (dBm)	Max Power (dBm)
Low 1	2412	1.71	30.00	30	36	30.00
Mid 6	2437	1.71	30.00	30	36	30.00
High 11	2462	1.71	30.00	30	36	30.00

Results

Channel	Frequency (MHz)	Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low 1	2412	13.68	13.68	30.00	-16.32
Mid 6	2437	13.78	13.78	30.00	-16.22
High 11	2462	13.58	13.58	30.00	-16.42

8.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

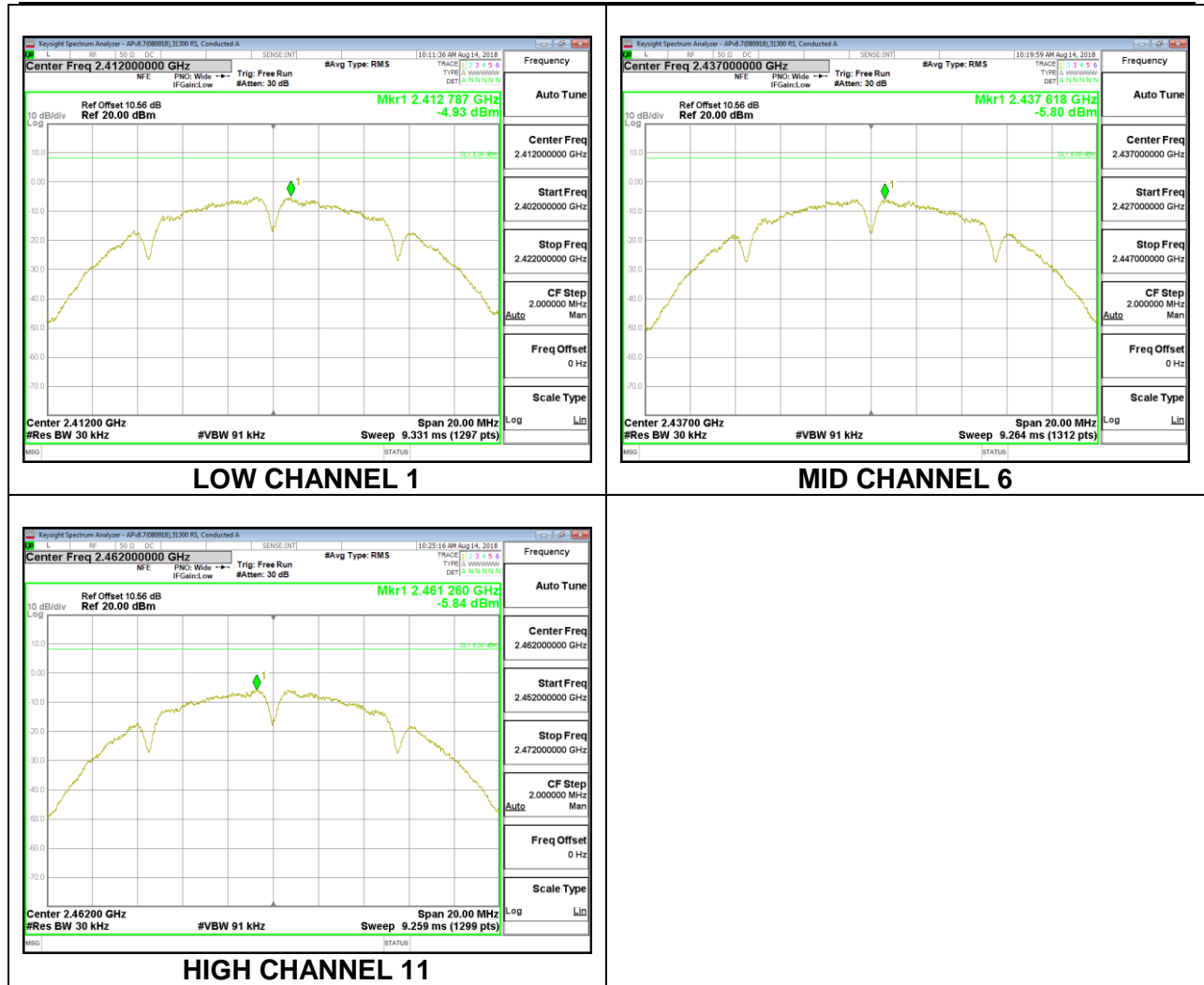
RESULTS

8.5.1. 802.11b MODE

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd PSD
---------------------------	------	---

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 30kHz)	Total Corr'd PSD (dBm/ 30kHz)	Limit (dBm/ 30kHz)	Margin (dB)
Low 1	2412	-4.92	-4.92	8.0	-12.9
Mid 6	2437	-5.80	-5.80	8.0	-13.8
High 11	2462	-5.84	-5.84	8.0	-13.8

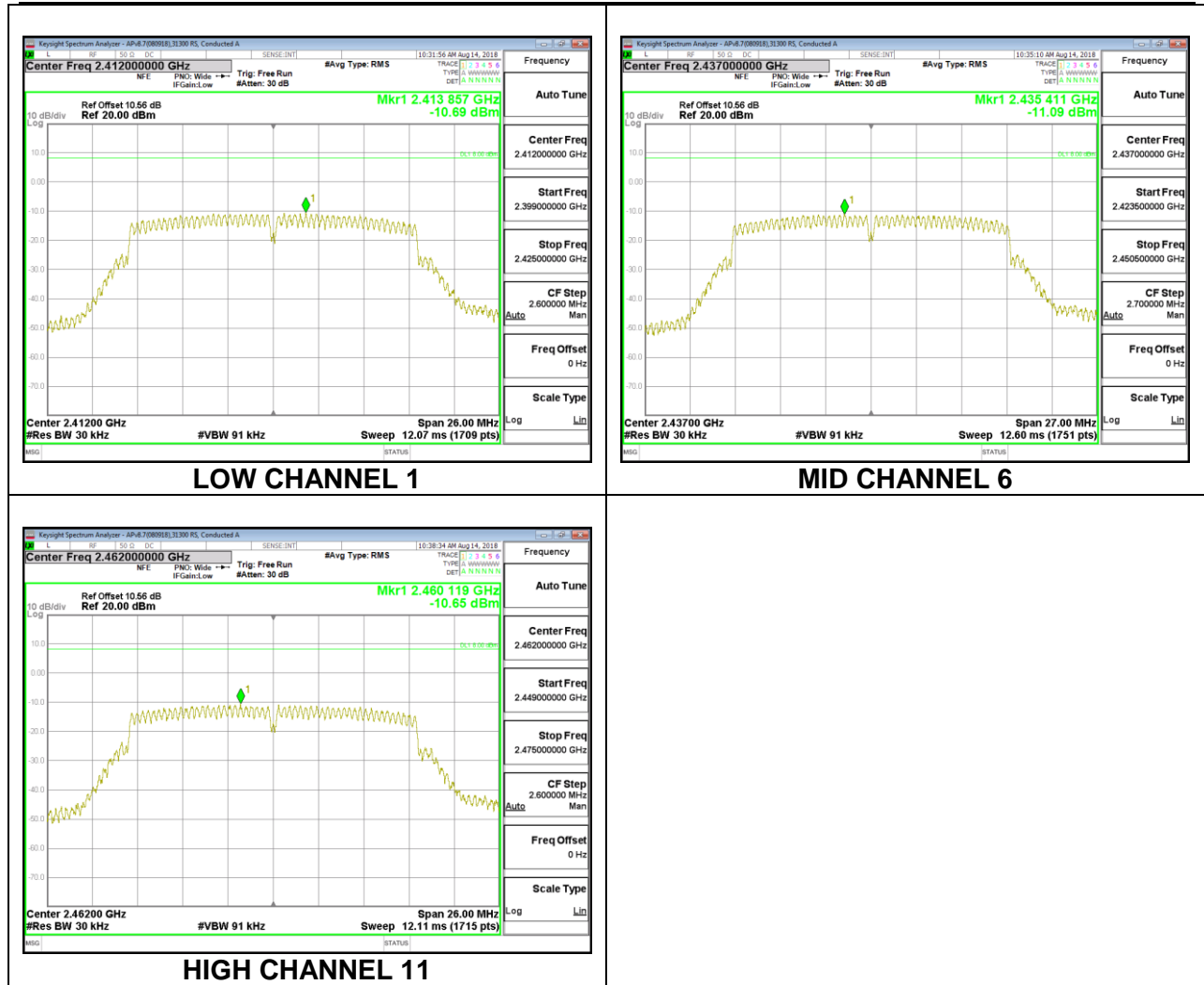


8.5.2. 802.11g MODE

Duty Cycle CF (dB)	0.11	Included in Calculations of Corr'd PSD
---------------------------	------	---

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 30kHz)	Total Corr'd PSD (dBm/ 30kHz)	Limit (dBm/ 30kHz)	Margin (dB)
Low 1	2412	-10.69	-10.58	8.0	-18.6
Mid 6	2437	-11.09	-10.98	8.0	-19.0
High 11	2462	-10.65	-10.54	8.0	-18.5

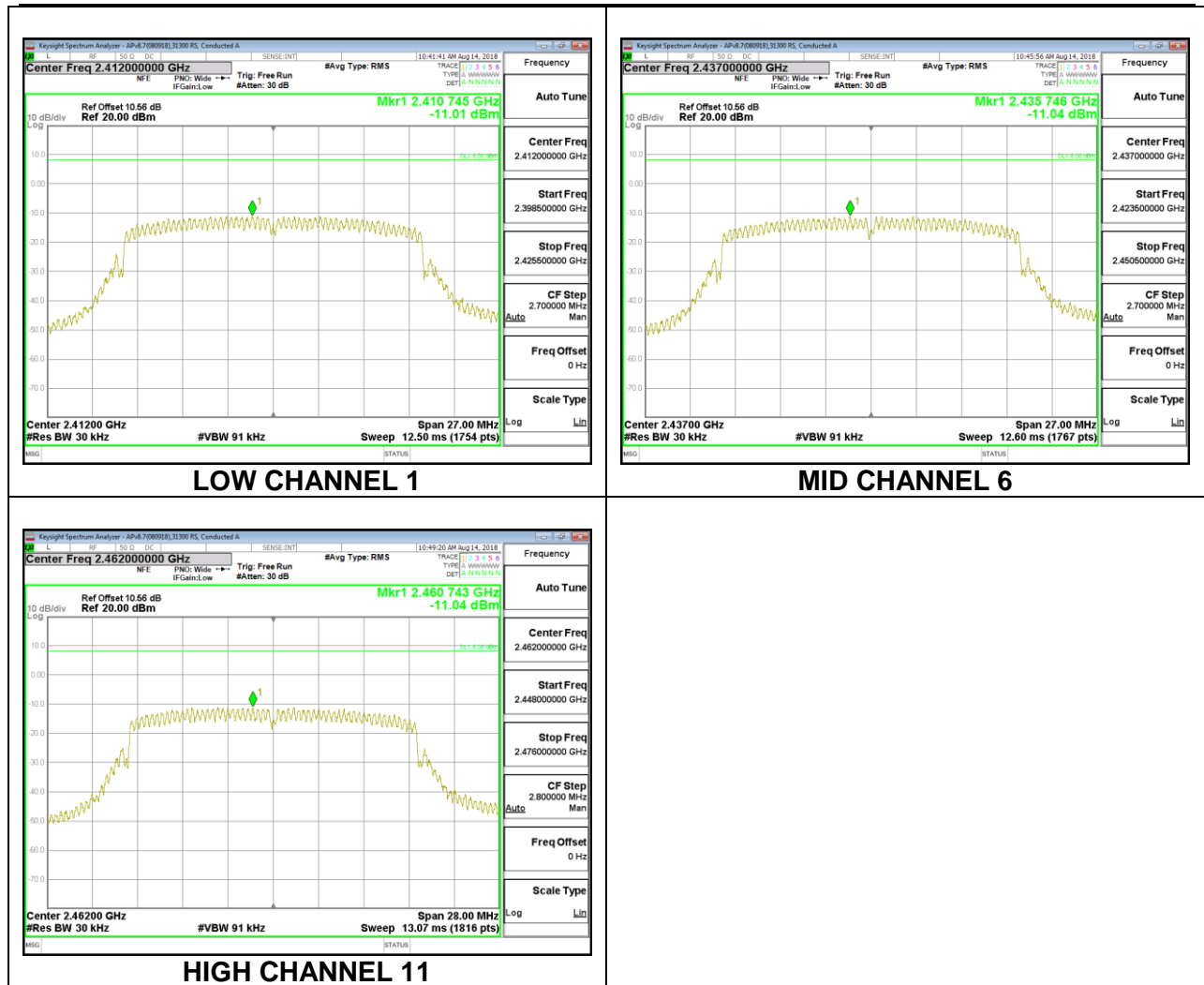


8.5.3. 802.11n HT20 MODE

Duty Cycle CF (dB)	0.12	Included in Calculations of Corr'd PSD
---------------------------	------	---

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas (dBm/ 30kHz)	Total Corr'd PSD (dBm/ 30kHz)	Limit (dBm/ 30kHz)	Margin (dB)
Low 1	2412	-11.01	-10.89	8.0	-18.9
Mid 6	2437	-11.04	-10.92	8.0	-18.9
High 11	2462	-11.04	-10.92	8.0	-18.9



8.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

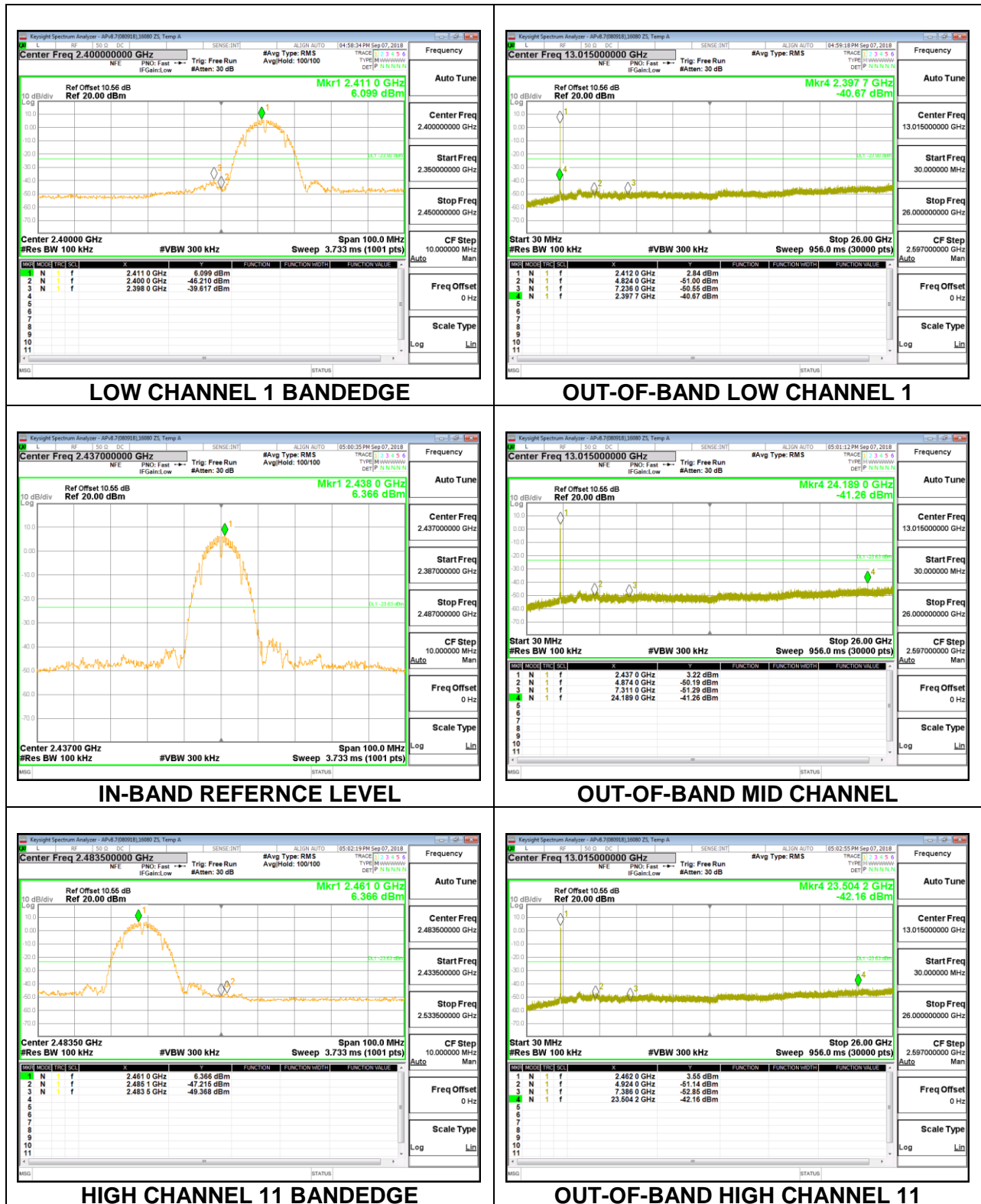
FCC §15.247 (d)

Output power was measured based on the use of Average measurement, therefore the required attenuation is 30 dB.

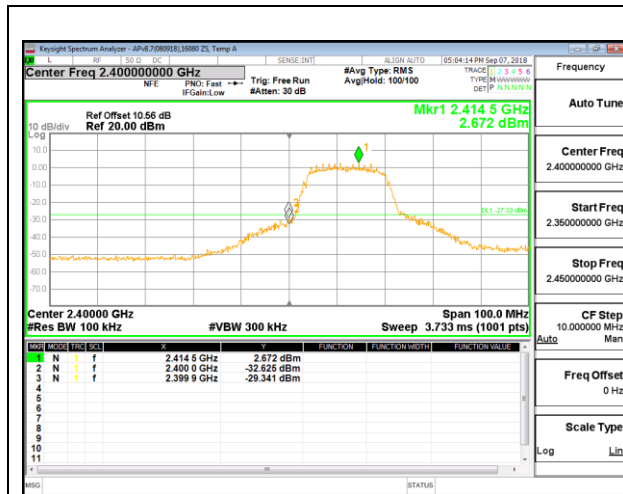
RESULTS

8.6.1. 802.11b MODE

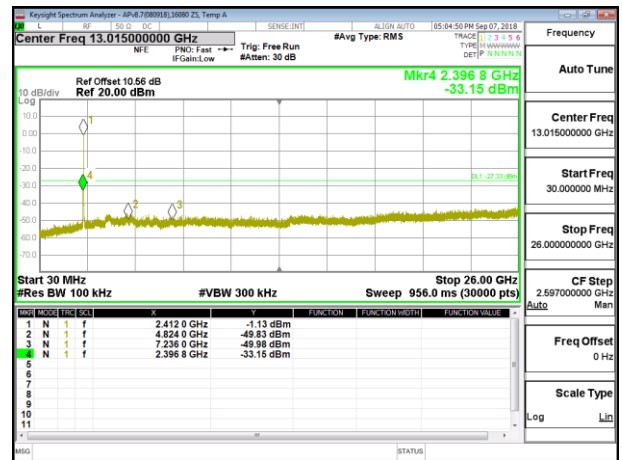
1TX Antenna 1 MODE



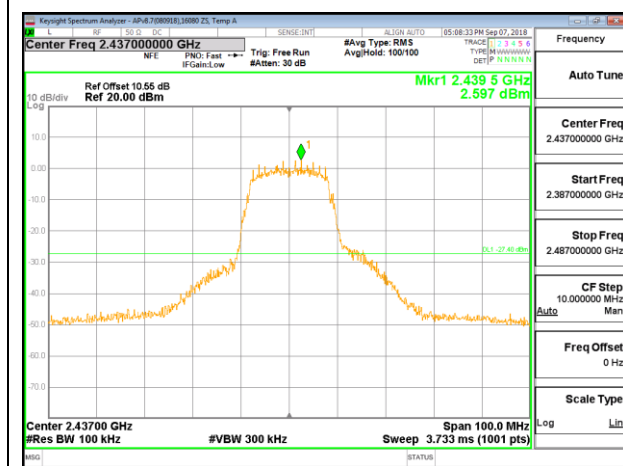
8.6.2. 802.11g MODE



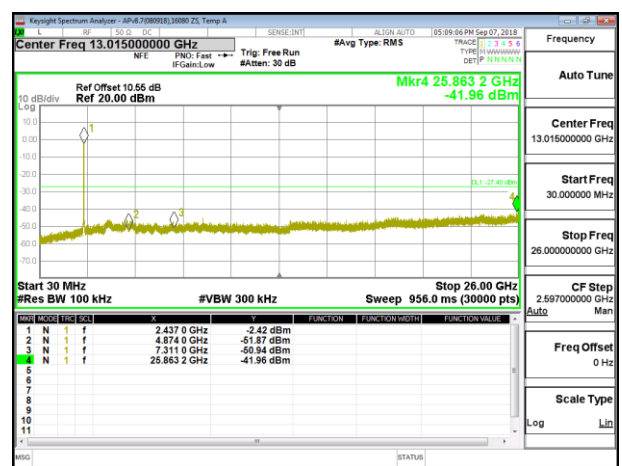
LOW CHANNEL 1 BANDEDGE



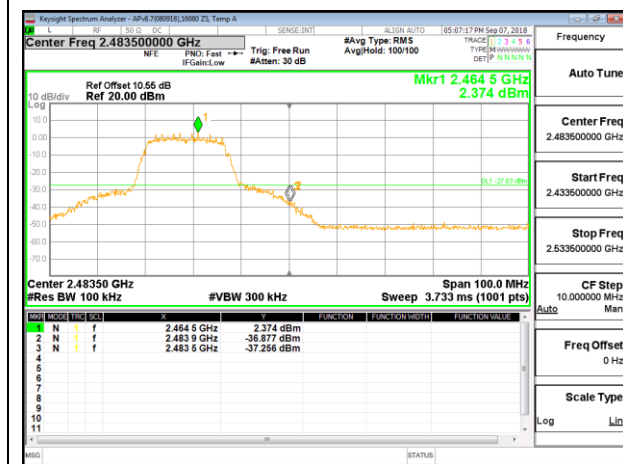
OUT-OF-BAND LOW CHANNEL 1



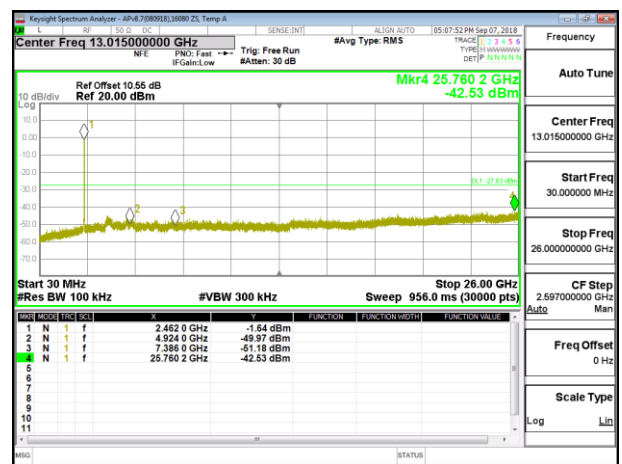
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL 11 BANDEDGE



OUT-OF-BAND HIGH CHANNEL 11