

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

# INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT **AND INDUSTRY CANADA RSS 247**

	OF
Product Name:	Arlo Bridge
Brand Name:	Netgear
Model No.:	ABB1000
Model Difference:	N/A
FCC ID:	PY317300394
IC:	4054A-17300394
Report No.:	ER/2017/70119
Issue Date:	Sep. 08, 2017
FCC Rule Part:	§15.247, Cat: DTS
IC Rule Part:	RSS-247 issue 2 Feb. :2017
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Prepared for IC Applicant:	NETGEAR Inc. Suite 168-10760 Shellbridge Way, Richmond British Columbia V6X 3H1 Canada
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# VERIFICATION OF COMPLIANCE

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IC Applicant:	NETGEAR Inc. Suite 168-10760 Shellbridge Way, Richmond British Columbia V6X 3H1 Canada		
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Model No.:	ABB1000		
Model Difference:	N/A		
FCC ID:	PY317300394		
IC:	4054A-17300394		
File Number:	ER/2017/70119		
Date of Test:	Jul. 19, 2017 ~ Sep. 08, 2017		
Date of EUT Received:	Jul. 19, 2017		

## We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Test By:	Ton Lis	Date:	Sep. 08, 2017
-	Tin Lin / Engineer		
Prepared By:	Yun Tsou	Date:	Sep. 08, 2017
_	Yuri Tsai / Clerk		
Approved By:	Jim Chang	Date:	Sep. 08, 2017
-	Jim Chang / Asst. Manager		
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# **Revision History**

Report Number	Revision	Description	Issue Date
ER/2017/70119	Rev.00	Initial creation of document	Sep. 08, 2017

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#### **GENERAL INFORMATION** 1

### **1.1 Product description**

General:

Product Name:	Arlo Bridge
Brand Name:	Netgear
Model No.:	ABB1000
Model Difference:	N/A
Product SW/HW version:	VMDB1000-20170824 / 2976552902
Radio SW/HW version:	qca-wifi-10.4 / 2976552902
Test SW Version:	N/A
RF power setting in TEST SW:	N/A
Test SW Version:	N/A
RF power setting in TEST SW:	N/A
Power Supply:	100~240Vac

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#### WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power / (EIRP)	Type of Emission	Modulation Technology
11b/g	2412-2462	11	b: 28.61dBm b: 31.50dBm (EIRP) g: 29.50dBm g: 29.92dBm (EIRP)	b: 15M1G1D g:16M4D1D	DSSS, OFDM
11n	HT/VHT20 2412-2462	11	HT20:29.39dBm (MIMO Chain 0+1) HT20:29.59dBm (MIMO Chain 0+1) (EIRP)	HT20:17M5D1D	OFDM
11n	HT/VHT40 2422-2452	7	HT40: 29.64dBm (MIMO Chain 0+1) HT40: 31.17dBm (MIMO Chain 0+1) (EIRP)	HT40:36M2D1D	OFDM
Antenna	Designation	Suppl 2.4GF 2. Part N Suppl	ntenna No.: 902E00006N0(555), ier: Master Wave Technolog Iz Gain: 1.62 dBi Io.: 902E00007N0(555), ier: Master Wave Technolog Iz Gain: 2.58 dBi	-	
Modulati	on type:	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM			
Transitio	n Rate:	802.11 g: 802.11 n_	1/2/5.5/11 Mbps 6/9/12/18/24/36/48/54 Mbp 20MHz: 6.5 – 216.7Mbps 40MHz: 13.5 – 450.0Mbps	S	

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### 1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247 FCC KDB 558074 D01 v04 DTS Meas. Guidance FCC KDB 662911 D01 v02r01 Multiple Transmitter Output Canada RSS-247 issue 2 Feb. 2017 Canada RSS-Gen issue 4 Nov. 2014 ANSI C63.10:2013 Note:

All test items have been performed and record as per the above standards. 1.

#### **1.3 Test Facility**

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803

(TAF code 0513)

FCC Registration Numbers are: 509634

Canada Registration Number: 4620A-5 .

#### **1.4 Special Accessories**

There are no special accessories used while test was conducted.

#### 1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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#### SYSTEM TEST CONFIGURATION 2

#### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

#### 2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

#### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz,. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

#### 2.4 Measurement Results Explanation Example

#### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level. Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor. Following shows an offset computation example with cable loss 5.9dB and 10dB attenuator.

#### Offset:

= RF cable loss (dB)+ attenuation factor(dB) dB = 15.36dB)

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### 2.5 Configuration of Tested System

## Fig. 2-1 Radiated Emission configuration & Conducted (Antenna Port) Configuration Emis-

sion

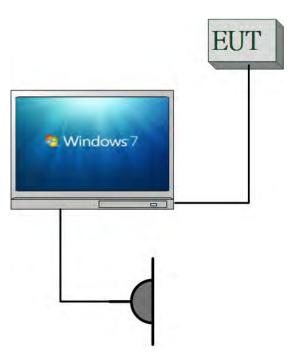


Table 2-1 Equipment Used in Tested 9	System
--------------------------------------	--------

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	L420	LR-7HXZA	N/A	Un-shielded

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#### SUMMARY OF TEST RESULTS 3

FCC Rules / IC Rules	s / IC Rules Description Of Test	
§15.207(a) RSS-Gen §8.8	AC Power Line Conducted Emission	Compliant
§15.247(b) (3) RSS-247 §5.4(d)	Peak Output Power	Compliant
§15.247(a)(2) RSS-247 §5.2 (a) RSS-Gen §6.6	6dB & 99% Emission Bandwidth	Compliant
§15.247(d) RSS-247 §5.5	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d) RSS-247 §5.5	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e) RSS-247 §5.2(b)	Power Spectral Density	Compliant
§15.203 §15.247(b) RSS- Gen §6.7 RSS- Gen §8.3	Antenna Requirement	Compliant

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#### DESCRIPTION OF TEST MODES 4

### 4.1 Operated in 2400 ~ 2483.5MHz Band

#### 11 channels are provided for 802.11b, 802.11g and 802.11n HT20

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412 MHz	7	2442 MHz
2	2417 MHz	8	2447 MHz
3	2422 MHz	9	2452 MHz
4	2427 MHz	10	2457 MHz
5	2432 MHz	11	2462 MHz
6	2437 MHz		

7 channels are provided for 802.11n HT40

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY		
3	2422 MHz	7	2442 MHz		
4	2427 MHz	8	2447 MHz		
5	2432 MHz	9	2452 MHz		
6	2437 MHz				

#### 4.2 The Worst Test Modes and Channel Details

- 1. The EUT has been tested under operating condition.
- 2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
- 3. Investigation has been done on all the possible configurations for searching the worst case.

_			•								
	RADIATED EMISSION TEST (BELOW 1 GHz)										
	MODE AVAILABLE CHANNEL		TESTED CHANNEL			ANTENNA PORT					
	802.11g	1 to 11	1,6,11	OFDM	54	MIMO					

#### **BADIATED EMISSION TEST**

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RADIATED EMISSION TEST (ABOVE 1 GHz)									
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT				
802.11b	1 to 11	1, 6, 11	DSSS	11	MIMO				
802.11g	1 to 11	1, 6, 11	OFDM	54	MIMO				
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 8	MIMO				
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	MCS 8	MIMO				

#### Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11b/g/n WLAN Transmitter for channel Low, Mid and High, the worst case E1 position was reported.

#### ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST									
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT				
802.11b	1 to 11	1, 6, 11	DSSS	11	MIMO				
802.11g	1 to 11	1, 6, 11	OFDM	54	MIMO				
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 8	MIMO				
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	MCS 8	MIMO				

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#### Directional gain (MIMO)

The Tx transmission to construct MIMO operation is cyclic delay diversity, and the following deduction to obtain the array gain of MIMO operation is based on the approach given by KDB 662911 D01 v02r01.

Array gain = 4.77dBi (peak spectral density, conducted spurious emission) Gain that is combined with different magnitude of two antennas:

- If antenna gains are not equal, the user may use either of the following methods to calculate (ii) directional gain, provided that each transmit antenna is driven by only one spatial stream:
  - Directional gain may be calculated by using the formulas applicable to equal gain antennas with  $G_{ANT}$  set equal to the gain of the antenna having the highest gain; or,

$$DirectionalGain = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;  $N_{SS}$  = the number of independent spatial streams of data;

 $N_{ANT}$  = the total number of antennas

 $g_{j,k} = 10^{G_k/20}$  if the kth antenna is being fed by spatial stream j, or zero if it is not;  $G_k$  is the gain in dBi of the kth antenna.

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#### MEASUREMENT UNCERTAINTY 5

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
6dB Bandwidth	+/- 51.33 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 dB
Peak Power Density	+/- 1.3 dB
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

	9kHz-30MHz: +/-2.87dB
	30MHz - 180MHz: +/- 3.37dB
Measurement uncertainty	180MHz -417MHz: +/- 3.19dB
(Polarization : Vertical)	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

	9kHz-30MHz: +/-2.87dB
	30MHz - 167MHz: +/- 4.22dB
Measurement uncertainty	167MHz -500MHz: +/- 3.44dB
(Polarization : Horizontal)	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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#### CONDUCTED EMISSION TEST 6

### 6.1 Standard Applicable

Frequency range within 150kHz to 30MHz shall not exceed the Limit table as below.

Frequency range	Limits dB(uV)						
MHz	Quasi-peak	Average					
0.15 to 0.50	66 to 56	56 to 46					
0.50 to 5	56	46					
5 to 30	60	50					
Note							
1.The lower limit shall apply at the transition frequencies							
2. The limit decreases linearly wit	h the logarithm of the frequency in	the range 0.15 MHz to 0.50					
MHz.							

#### 6.2 Measurement Equipment Used

Conducted Emission Test Site									
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
EMI Test Receiver	R&S	ESCI7	100760	05/11/2017	05/10/2018				
LISN	SCHWARZ BECK	NSLK 8127	8127-649	05/22/2017	05/21/2018				
LISN	MESS TEC	FCC-LISN-50/250-2 5-2-01	4034	03/19/2017	03/18/2018				
Coaxial Cables	N/A	WK CE Cable	N/A	11/26/2016	11/25/2017				

#### 6.3 EUT Setup

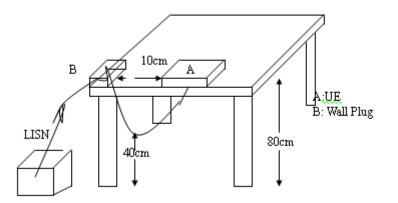
- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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### 6.4 Test SET-UP (Block Diagram of Configuration)



#### **6.5 Measurement Procedure**

- 1. The EUT was placed on a table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all phases of power being supplied by given UE are completed

#### 6.6 Measurement Result

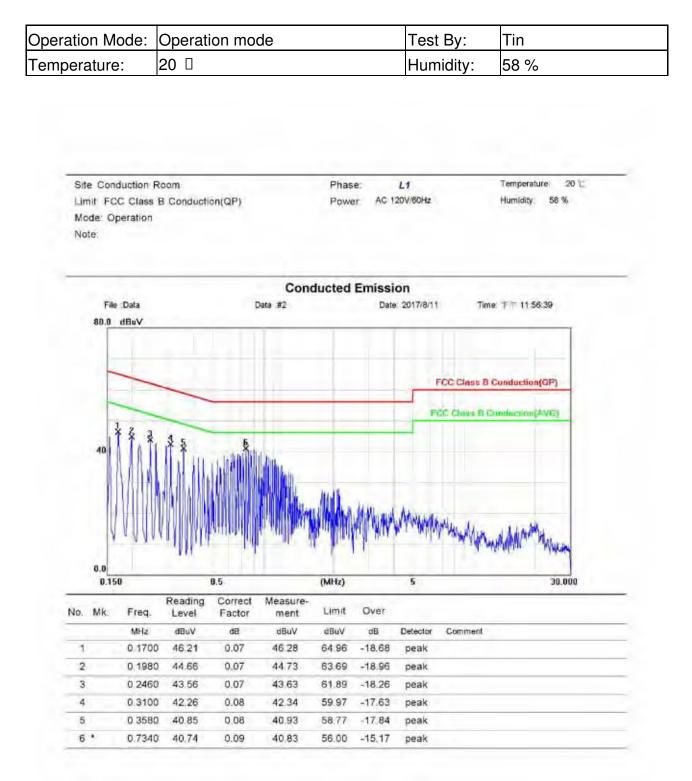
Note: Refer to next page for measurement data and plots. Note2: The \* reveals the worst-case results that closet to the limit

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# AC POWER LINE CONDUCTED EMISSION TEST DATA



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2

3

4

5

6 .

0.1900

0.2060

0,2380

0.3300

0 8020

45.39

42.88

43.21

40.82

41 40

0.07

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0.08

0.09

45.46

42.95

43.28

40.90

41.49

64.04

63 37

62.17

59.45

56 00

-18.58

-20.42

-18.89

-18.55

-14.51

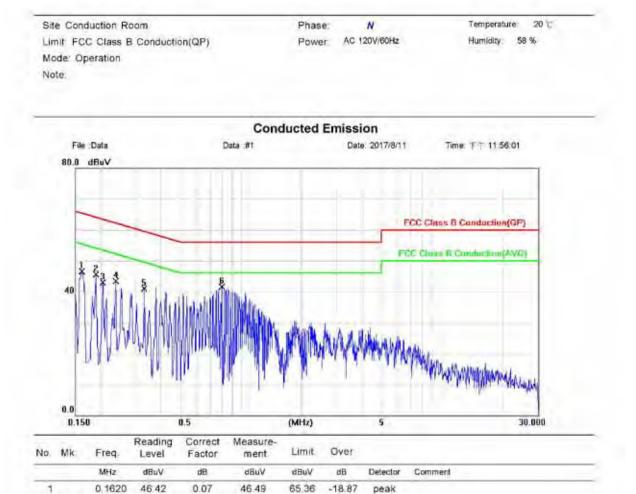
peak

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peak



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#### **DUTY CYCLE OF TEST SIGNAL** 7

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

#### Formula:

Duty Cycle = Ton / (Ton+Toff)

#### **Measurement Procedure:**

- 1. Set span = Zero
- 2. RBW = 8MHz
- 3. VBW = 8MHz,
- 4. Detector = Peak

### **Duty Cycle:**

	Duty Cycle (%)	Duty Factor (dB)
802.11b	99.45	0.02
802.11g	97.57	0.11
802.11n_20	95.14	0.22
802.11n_40	92.76	0.33

b = 99.45%, g = 97.57%, n ht 20 = 95.14%

Duty Cycle Factor:  $10 * \log(1/0.9945) = 0.02$ Duty Cycle Factor: 10 \* log(1/0.9757) = 0.11 Duty Cycle Factor:  $10 * \log(1/0.9514) = 0.22$ Duty Cycle Factor:  $10 * \log(1/0.9276) = 0.33$ 

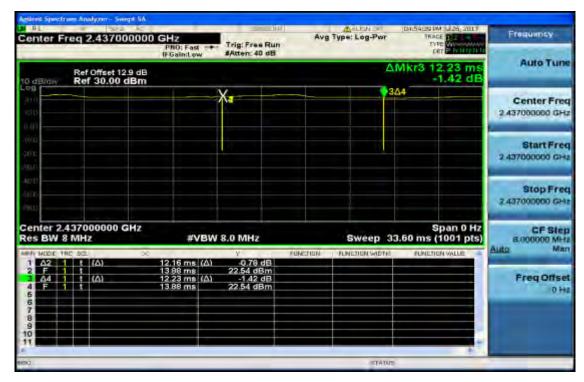
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# 7.1 DUTY CYCLE TEST SIGNAL Measurement Result

#### 802.11 b



#### 802.11 g

enter	Fred	2,4370	100000 GH	NO: Fast -	Trig: Free #Atten: 40			Log-Pwr	DRISSUZY IM TRACE TVPD DET		Frequency
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.09 310 7/10 100	Titeda)	(gruiper			ernsternigeterne	hours	304	dadaa halbantika	silvin Moreek	tern the log to	Center Free 2.437000000 GH
(0.0 2010 18.0	4					•					Start Free 2.437000000 GH
								1			Stop Fre 2.437000000 GH
enter 2 es BW		'000000 Hz	GHZ	#VBV	N 8.0 MHz		-	Sweep 4.		an 0 Hz 001 pts)	CF Stej 8.000000 MH
AN MODE			× 20	24 ms (A)	V -0.21 d		TION I FLM	ILTION WADTHE	FUNCTION	WALLIE	Auto Mar
2 F 3 A4 4 F	1	(4)	38	6.4 μs 75 ms (Δ) 6.4 μs	19,38 dB	m					Freq Offse 0 H
12											
6 7 8 9 10				=		_				5	

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#### 802.11 n\_20 MHz

enter Freq 2.437000000 GHz	Fast Trig: Free Run Low #Atten: 40 dB	Avg Type: Log-Pwr	DHISUDSEM SUZS, JILL7 TRACE 12 TYPE DET P TUTTTTT	Frequency
Ref Offset 16.9 dB dB/div Ref 30.00 dBm		Δ	/kr3 1.017 ms 0.00 dB	Auto Tune
n nunterlassilistististististististististististististi	Xzerinetillisierenineture	aaronandoondoo 3304 w	an-dennanderskeinigtsdage	Center Freq 2.437000000 GHz
		<u> </u>		Start Freq 2 437000000 GHz
00				Stop Freq 2.437000000 GHz
enter 2.437000000 GHz es BW 8 MHz	#VBW 8.0 MHz		Span 0 Hz 500 ms (1001 pts)	CF Step a 000000 MHz Auto Man
2 F 1 1 8918	μs (Δ) -1.26 dB μs 23.48 dBm ms (Δ) 0.00 dB	NETION ( TUNETION SADTH)	FURIESION VALUE	Freq Offset 0 Hz
		ETATUE		

#### 802.11 n 40 MHz

nter Freq	2.43700		Fast -+-	Trig: Free Run #Atten: 40 dB	Ave	Type: Log-Pwr	1RI T	ALE 1 2 2017 ALE 1	Frequency
derdiv Re	Offset 16					1	MKr3	526,5 µs 4.60 dB	Auto Tune
a Martifationalis	Xa		houghtered	nti luni-anazzili	raphaticle	elantipe pre-technisti	μ <sup>1Δ2</sup> 3	A4 Year you had the w	Center Freq 2.437000000 GHz
	1444						whyte		Start Freq 2 437000000 GHz
									Stop Freq 2.437000000 GHz
nter 2.4370 BW 8 MH	z	Hz	#VBW	8.0 MHz	FUNCTION	Sweep 7	733.3 µs	Span 0 Hz (1001 pts)	CF Step 8.000000 MHz Auto Man
A2 1 1 F 1 1	(A) (A)	488.4	µs (Δ)	6.19 dB 9.53 dBm 4.60 dB 9.53 dBm	TORY ID:				Freq Offset 0 Hz

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#### PEAK OUTPUT POWER MEASUREMENT 8

### 8.1 Standard Applicable

For systems using digital modulation in the 2400-2483.5 MHz bands, the limit for peak output power is 1Watt.

Per RSS-247 5.4(4)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

Main Antenna Gain:	1.62	dBi
Aux1 Antenna Gain:	2.58	dBi
Aux2 Antenna Gain:	0.00	dBi
Aux3 Antenna Gain:	0.00	dBi
Number Antenna:	2	pcs
Limit:	30	dBm
The antenna gain is grater than 6dBi in MIMO mode the limit reduce as below:		
Directional gain = gain of antenna element + 10 log (# of TX antenna elements)		

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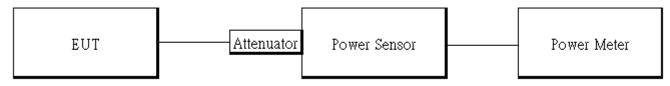


#### 8.2 Measurement Equipment Used

	Conduc	ted Emission	Test Site		
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
TYPE		NUMBER	NUMBER	CAL.	
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017
Spectrum Analyzer	Agilent	N9010A	MY50420195	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017
Temperature Chamber	TERCHY	MHG-120LF	911009	05/19/2017	05/18/2018

#### 8.3 Test Set-up

Power Meter:



#### **8.4 Measurement Procedure**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 v04 DTS Meas. Guidance .
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.

#### **Power Meter:**

It is used as the auxiliary test equipment to conduct the output power measurement.

4. Record the max. Reading as observed from Spectrum or Power Meter.

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#### 8.5 Measurement Result

802.1	1b_MIMC	)								
СН	Freq. (MHz)	Data Rate	Po	Sulpul wer Sm) CH 1	Total Peak Output Power (dBm)	Total Peak Output Power (mW)		Limit		RESULT
1	2412	1	25.21	25.13	28.18	657.73	1 Watt =	30.00	dBm	PASS
6	2437	1	25.54	25.65	28.61	725.38	1 Watt =	30.00	dBm	PASS
11	2462	1	25.35	24.78	28.08	643.38	1 Watt =	30.00	dBm	PASS
802.1	1b_MIMC	)		-	-					
СН	Freq. (MHz)	Data Rate	Po (dE	Dutput wer 3m)	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit		RESULT	
4	2412	1	CH 0 22.98	CH 1 22.78	25.92	388.28	1 Watt =	30.00	dBm	PASS
1 6	2412	1	22.98	22.78	25.92 <b>25.93</b>	300.20	1 Watt =	30.00	dBm	PASS
0 11	2437	1	22.90	22.02	25.85	390.04	1 Watt =	30.00	dBm	PASS
			22.30	22.10	25.05	302.40	i wali –	30.00	uDili	1400
802.1	1g_MIMC	)	ГРеак	Jutput	1					
СН	Freq. (MHz)	Data Rate	Po	wer 3m) CH 1	Total Peak Output Power (dBm)	Total Peak Output Power (mW)		Limit		RESULT
1	2412	6	24.98	24.71	27.86	610.58	1 Watt =	30.00	dBm	PASS
6	2412	6	24.90	26.47	<b>29.50</b>	890.29	1 Watt =	30.00	dBm	PASS
11	2462	6	20.30	24.45	27.58	572.38	1 Watt =	30.00	dBm	PASS
	1g_MIMC	-	24.00	24.43	27.30	572.50	1 Wall –	50.00	uDili	1 400
СН	Freq. (MHz)	Data Rate	Po	Dutput wer 3m)	Avg. Output Power (dBm)	Avg. Output Power (mW)	r Limit			RESULT
			CH 0	CH 1						
1	2412	6	18.84	18.63	21.85	149.51	1 Watt =	30.00	dBm	PASS
6	2437	6	21.46	21.17	24.43	270.88	1 Watt =	30.00	dBm	PASS
11	2462	6	18.43	18.08	21.38	133.93	1 Watt =	30.00	dBm	PASS

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802.1	802.11n_HT20M MIMO												
СН	Freq. (MHz)	Data Rate			Power I otal Peak (dBm) Output Power		Output Power	Total Peak Output Power (mW)		RESULT			
1	2412	MCS8	24.87	24.56	27.73	592.66	1 Watt =	30.00	dBm	PASS			
	2412	IVIC 30	24.07	24.00	21.13	392.00	T Wall =	30.00	UDIII	FA33			
6	2437	MCS8	26.44	26.32	29.39	869.10	1 Watt =	30.00	dBm	PASS			
11	2462	MCS8	24.22	24.18	27.21	526.06	1 Watt = 30.00 dBm		PASS				
802.1	1n_HT20	м мімс	)										
СН	Freq. (MHz)	Data Rate	Po	Dutput wer Bm)	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit		RESULT				
			CH 0	CH 1									
1	2412	MCS8	17.79	17.44	20.85	115.58	1 Watt =	30.00	dBm	PASS			
6	2437	MCS8	21.17	20.80	24.22	251.14	1 Watt =	30.00	dBm	PASS			
11	2462	MCS8	17.76	17.43	20.82	115.04	1 Watt =	30.00	dBm	PASS			

802.1	1n_HT40	м мімс								
СН	Freq. (MHz)	Data Rate	Po <sup>r</sup> (dF	wer	Total Peak Output Power	Total Peak Output Power	Limit		RESULT	
			CH 0	CH 1	(dBm)	(mW)				
3	2422	MCS8	19.84	18.78	22.35	171.89	1 Watt =	30.00	dBm	PASS
6	2437	MCS8	26.41	26.83	29.64	919.47	1 Watt =	30.00	dBm	PASS
9	2452	MCS8	19.83	19.23	22.55	179.91	1 Watt =	30.00	dBm	PASS
802.1	1n_HT40	м мімс	)							
СН	Freq. (MHz)	Data Rate	Po	Dutput wer Bm)	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit		RESULT	
			CH 0	CH 1						
3	2422	MCS8	13.78	13.22	16.85	44.87	1 Watt =	30.00	dBm	PASS
6	2437	MCS8	22.70	22.43	25.90	361.19	1 Watt =	30.00	dBm	PASS
9	2452	MCS8	14.40	13.85	17.47	51.81	1 Watt =	30.00	dBm	PASS

\* Note: The duty cycle factor is compensated to obtain the maximum value of measurement in average.

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6       2437       1       22.98       22.82       25.93       390.04       5.59       31.52       4W=       36       dl         11       2462       1       22.90       22.73       25.85       382.48       5.59       31.44       4W=       36       dl         802.11g_MIMO       Total Peak (MHz)       Data Rate       Avg. Output (dBm)       Avg. Output (dBm)       Total Peak Output Power (dBm)       Antenna Gain (mW)       EIRP (dBn)       Limit         1       2412       6       18.84       18.63       21.85       149.51       5.59       27.44       4W=       36       dl         6       2437       6       21.46       21.17       24.43       270.88       5.59       30.02       4W=       36       dl	m PASS m PASS m PASS m PASS
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	m PASS m PASS m PASS
CH 0         CH 1         (dBm)         (mw)         Ave         Ave           1         2412         1         22.98         22.78         25.92         388.28         5.59         31.51         4W=         36         dl           6         2437         1         22.98         22.82         25.93         390.04         5.59         31.51         4W=         36         dl           11         2462         1         22.90         22.73         25.85         382.48         5.59         31.44         4W=         36         dl           802.11g_MIMO         Data         Power (dBm)         Avg. Output Power (dBm)         Total Peak Output Power (mW)         Antenna Gain (dBi)         EIRP (dBm)         Limit         Limit           1         2412         6         18.84         18.63         21.85         149.51         5.59         27.44         4W=         36         dl           1         2412         6         18.84         18.63         21.85         149.51         5.59         27.44         4W=         36         dl           6         2437         6         21.46         21.17         24.43         270.88	m PASS m PASS
6       2437       1       22.98       22.82       25.93       390.04       5.59       31.52       4W=       36       dl         11       2462       1       22.90       22.73       25.85       382.48       5.59       31.44       4W=       36       dl         802.11g_MIMO       Total Peak (MHz)       Data Rate       Avg. Output (dBm)       Avg. Output (dBm)       Total Peak Output Power (dBm)       Antenna Gain (mW)       EIRP (dBn)       Limit       Limit         1       2412       6       18.84       18.63       21.85       149.51       5.59       27.44       4W=       36       dl         6       2437       6       21.46       21.17       24.43       270.88       5.59       30.02       4W=       36       dl	m PASS m PASS
11       2462       1       22.90       22.73       25.85       382.48       5.59       31.44       4W= 36       dd <b>B02.11g_MIMO</b> CH       Freq. (MHz)       Data Rate       Avg. Output (dBm)       Avg. Output (dBm)       Total Peak Output Power (dBm)       Antenna Gain (dBi)       EIRP (dBm)       Limit         1       2412       6       18.84       18.63       21.85       149.51 <b>5.59</b> 27.44       4W= 36       dd         6       2437       6       21.46       21.17 <b>24.43 270.88 5.59 30.02</b> 4W= 36       dd	m PASS
B02.11g_MIMO         Avg. Output (MHz)         Avg. Output Power (MHz)         Avg. Output (dBm)         Total Peak Output (dBm)         Antenna Gain (dBm)         EIRP (dBn)         Limit           1         2412         6         18.84         18.63         21.85         149.51         5.59         27.44         4W=         36         dl           6         2437         6         21.46         21.17         24.43         270.88         5.59         30.02         4W=         36         dl	
CH         Freq. (MHz)         Data Rate         Avg. Output Power (dBm)         Avg. Output (dBm)         Total Peak Output Power (dBm)         Antenna Gain (mW)         EIRP (dBm)         Limit           1         2412         6         18.84         18.63         21.85         149.51         5.59         27.44         4W=         36         dl           6         2437         6         21.46         21.17         24.43         270.88         5.59         30.02         4W=         36         dl	RESULT
CH         Freq. (MHz)         Data Rate         Power (dBm)         Output Power (dBm)         Output Power (dBm)         Output Power (mW)         Antenna Gain (dBi)         EIRP (dBm)         Limit           1         2412         6         18.84         18.63         21.85         149.51         5.59         27.44         4W=         36         dl           6         2437         6         21.46         21.17         24.43         270.88         5.59         30.02         4W=         36         dl	RESULT
CH 0         CH 1         (dBm)         (mw)         CH 2         CH 2 <thch 2<="" th="">         CH 2         CH 2         <th< th=""><th></th></th<></thch>	
6 2437 6 21.46 21.17 <b>24.43 270.88 5.59 30.02</b> 4W= 36 d	
	m PASS
	m PASS
11 2462 6 18.43 18.08 21.38 133.93 <b>5.59</b> 26.97 4W= 36 di	m PASS
802.11n_HT20M MIMO	
CH     Freq. (MHz)     Data Rate     Avg. Output Power     Avg. Output (dBm)     Total Peak Output     Antenna Gain (dBm)     EIRP (dBm)       CH 0     CH 1     (dBm)     (mW)     (dBm)     (dBm)     Limit	RESULT
	m PASS
	m PASS
11 2462 MCS8 17.76 17.43 20.82 115.04 <b>5.59</b> 26.41 4W= 36 d	

802.11	802.11n_HT40M MIMO												
СН	Freq. (MHz)	Data Rate	Po	Dutput wer Bm)	Avg. Output Power	Total Peak Output Power	Antenna Gain (dBi)	EIRP (dBm)		Limit		RESULT	
			CH 0	CH 1	(dBm)	(mW)	(421)						
3	2422	MCS8	13.78	13.22	16.85	44.87	5.59	22.44	4W=	36	dBm	PASS	
6	2437	MCS8	22.70	22.43	25.90	361.19	5.59	31.49	4W=	36	dBm	PASS	
9	2452	MCS8	14.40	13.85	17.47	51.81	5.59	23.06	4W=	36	dBm	PASS	

\* Note: EIRP = Average Power + Gain



#### 6DB & 99% BANDWIDTH MEASUREMENT 9

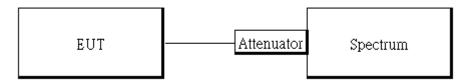
### 9.1 Standard Applicable

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

#### 9.2 Measurement Equipment Used

	Conducted Emission Test Site											
EQUIPMENT	MFR	MODEL	MODEL SERIAL		CAL DUE.							
TYPE		NUMBER	NUMBER	CAL.								
EXA Spectrum Ana- lyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018							
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018							
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018							

#### 9.3 Test Set-up



#### 9.4 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 v04 DTS Meas. Guidance.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. For 6dB Bandwidth:

Set the spectrum analyzer as RBW = 100 kHz, VBW = 3\*RBW, Span = 30M/50MHz, Detector=peak, Sweep=auto.

- 5. Mark the peak frequency and –6dB (upper and lower) frequency.
- 6. For 99% Bandwidth:

Set the spectrum analyzer as RBW=1%, VBW = 3\*RBW, Span = 30M/50MHz, Detector=Sample, Sweep=auto.

- 7. Turn on the 99% bandwidth function, max reading.
- 8. Repeat above procedures until all frequency of interest measured was complete.

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#### 9.5 Measurement Result

#### 6dB Bandwidth

802.11b	o Main			802.11b	Aux1		
Freq.	6dB BW (kHz)	Limit (kHz)	Result	Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	10097	> 500	PASS	2412	10091	> 500	PASS
2437	10088	> 500	PASS	2437	10077	> 500	PASS
2462	10096	> 500	PASS	2462	10094	> 500	PASS

#### 202 11 a Main

802.11g Main 802.11g Aux1								
Freq. (MHz)		Limit (kHz)	Result	Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result	
2412	15120	> 500	PASS	2412	15120	> 500	PASS	
2437	15140	> 500	PASS	2437	15130	> 500	PASS	
2462	15130	> 500	PASS	2462	15120	> 500	PASS	

#### 802 11 n HT20 Main

	n_HT20 Ma				n_HT20 Au	x1	
Freq.	6dB BW	Limit	Result	Freq.	6dB BW	Limit	Result
(MHz)	(kHz)	(kHz)	nooun	(MHz)	(kHz)	(kHz)	
2412	15120	> 500	PASS	2412	15130	> 500	PASS
2437	15130	> 500	PASS	2437	15130	> 500	PASS
2462	15130	> 500	PASS	2462	15130	> 500	PASS

#### 802.11 n HT40 Main

802.11 n HT40 Aux1

				•••			
Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result	Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2422	33860	> 500	PASS	2422	33880	> 500	PASS
2437	32600	> 500	PASS	2437	32620	> 500	PASS
2452	33840	> 500	PASS	2452	33880	> 500	PASS



#### 99% Bandwidth

802.11b Main		802.11b Aux1		
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)	
2412	14.504	2412	14.084	
2437	15.096	2437	14.013	
2462	14.385	2462	14.728	

802.11g Main		802.11g Aux1		
Freq. (MHz)	•		99% BW (MHz)	
2412	16.271	2412	16.257	
2437	16.435	2437	16.325	
2462	16.158	2462	16.272	

802.11n_HT20M Main		802.11n_HT20M Aux1		
Freq. 99% BW		Freq.	99% BW	
(MHz)	(MHz)	(MHz)	(MHz)	
2412	17.411	2412	17.410	
2437	17.445	2437	17.327	
2462	17.458	2462	17.493	

802.11n_HT40M Main		802.11n_HT40M Aux1		
Freq. (MHz)	99% BW (MHz)	Freq. (MHz)	99% BW (MHz)	
2422	33.872	2422	35.647	
2437	36.226	2437	36.035	
2452	35.894	2452	35.745	

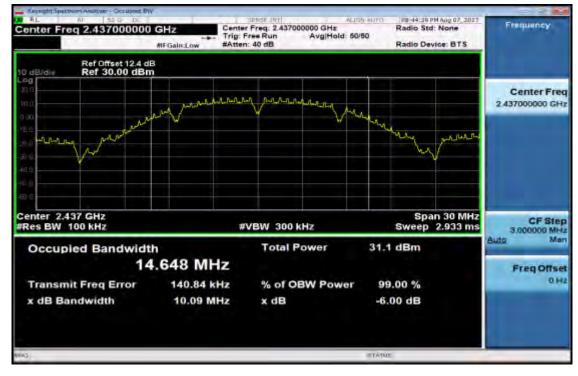
\*Refer to next page for plots



# 802.11b (Main) 6dB Band Width Test Data CH-Low



# 6dB Band Width Test Data CH-Mid



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# 6dB Band Width Test Data CH-High



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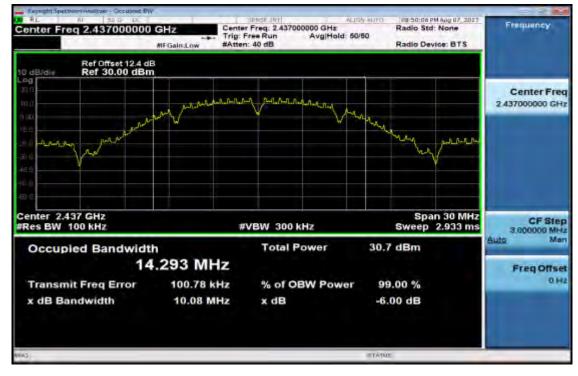
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# 802.11b (AUX1) 6dB Band Width Test Data CH-Low



# 6dB Band Width Test Data CH-Mid

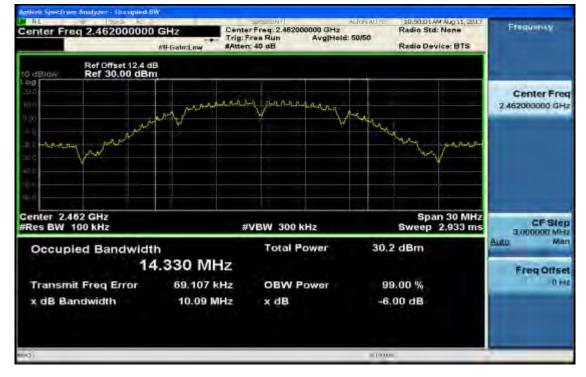


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# 6dB Band Width Test Data CH-High



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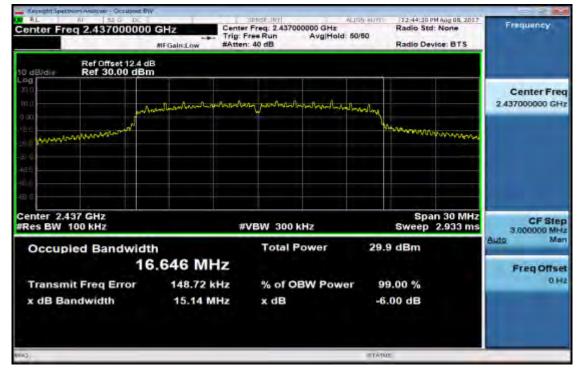
SGS Taiwan Ltd. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號



# 802.11g (Main) 6dB Band Width Test Data CH-Low



# 6dB Band Width Test Data CH-Mid



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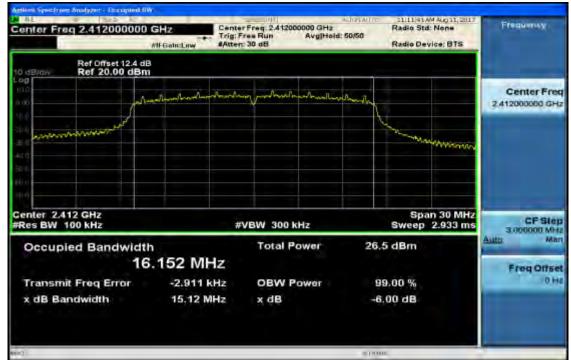
# 6dB Band Width Test Data CH-High

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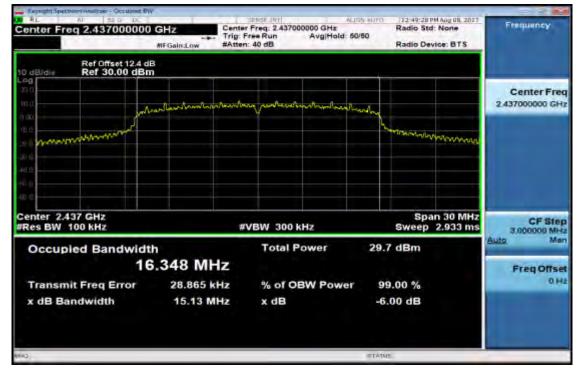
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# 802.11g (AUX1) 6dB Band Width Test Data CH-Low



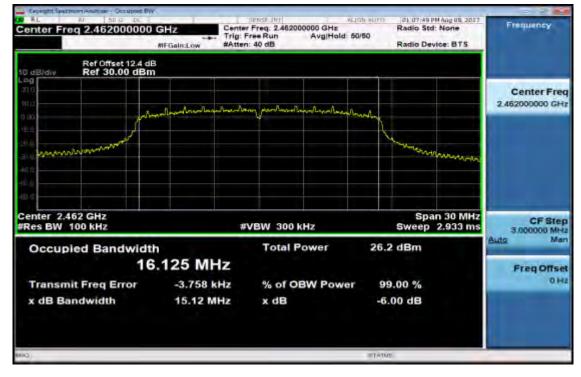
# 6dB Band Width Test Data CH-Mid



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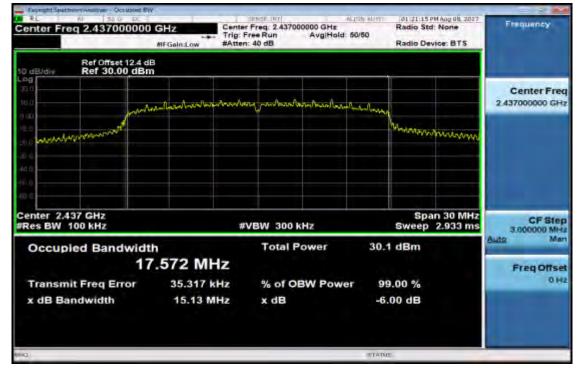
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# 802.11n 20M (Main) 6dB Band Width Test Data CH-Low

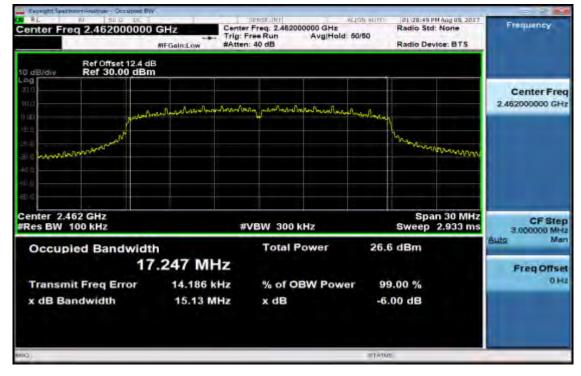


# 6dB Band Width Test Data CH-Mid



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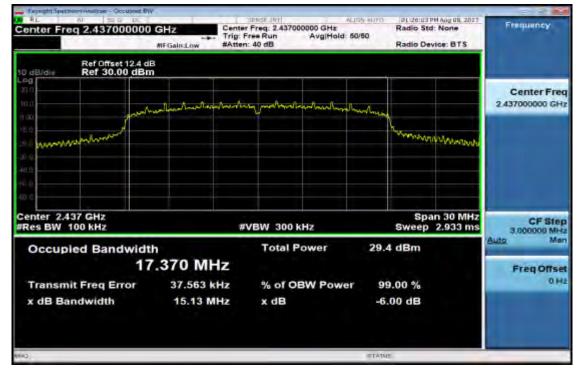
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# 802.11n 20M (AUX1) 6dB Band Width Test Data CH-Low

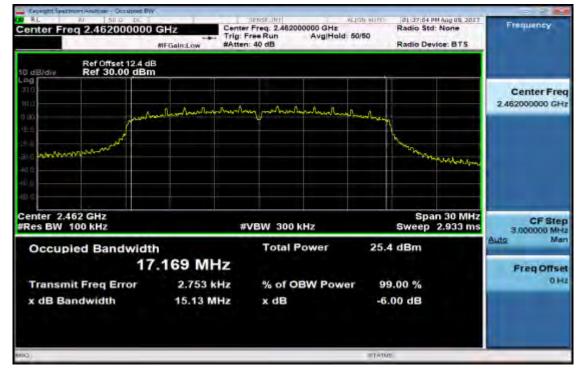


# 6dB Band Width Test Data CH-Mid



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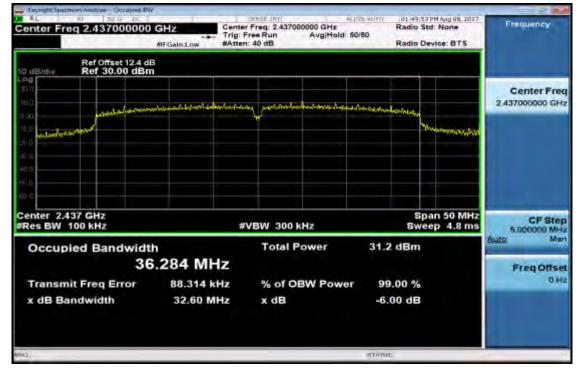
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# 802.11n 40M (Main) 6dB Band Width Test Data CH-Low



# 6dB Band Width Test Data CH-Mid



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# 802.11n 40M (AUX1) 6dB Band Width Test Data CH-Low



# 6dB Band Width Test Data CH-Mid



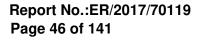
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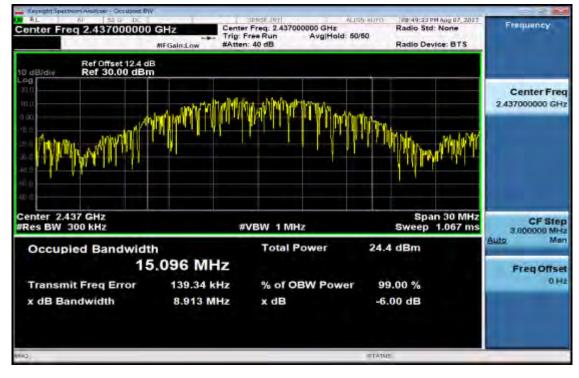




# 802.11b (Main) 99% Band Width Test Data CH-Low

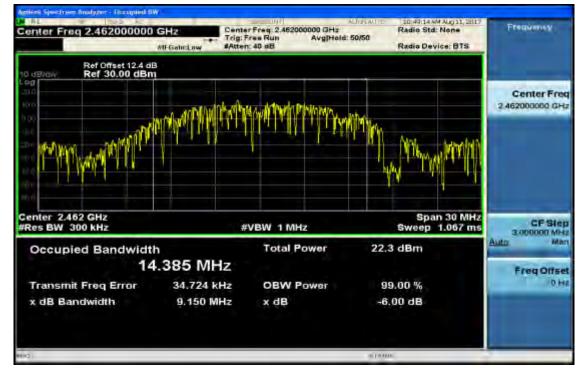


# 99% Band Width Test Data CH-Mid



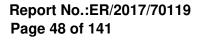
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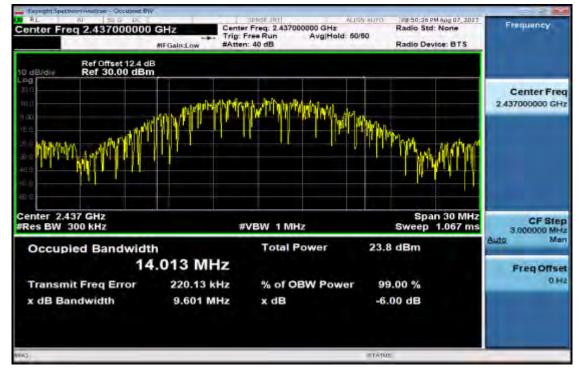




# 802.11b (AUX1) 99% Band Width Test Data CH-Low

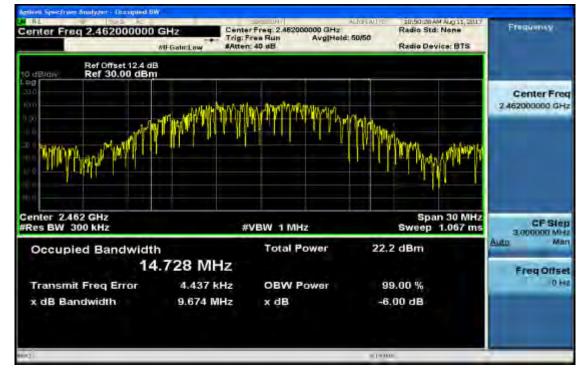


### 99% Band Width Test Data CH-Mid



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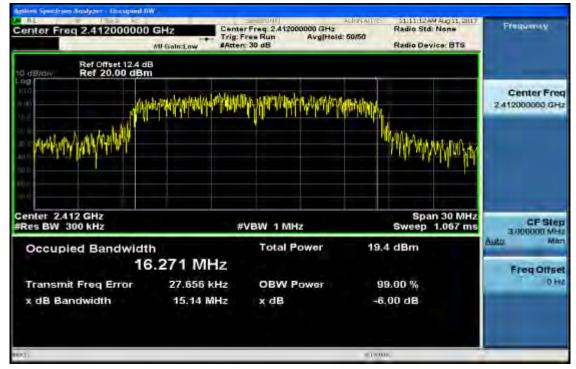
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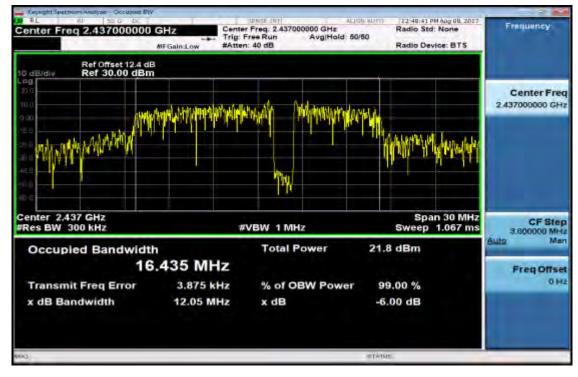




# 802.11g (Main) 99% Band Width Test Data CH-Low

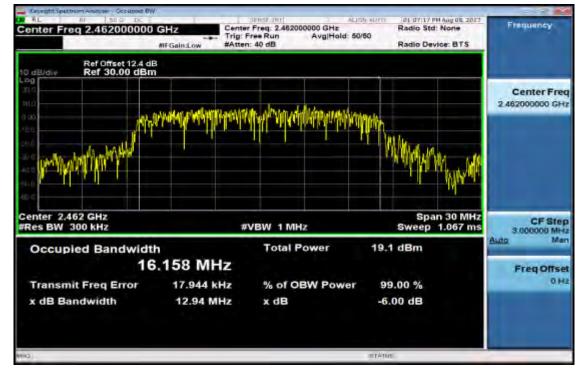


#### 99% Band Width Test Data CH-Mid



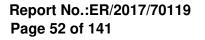
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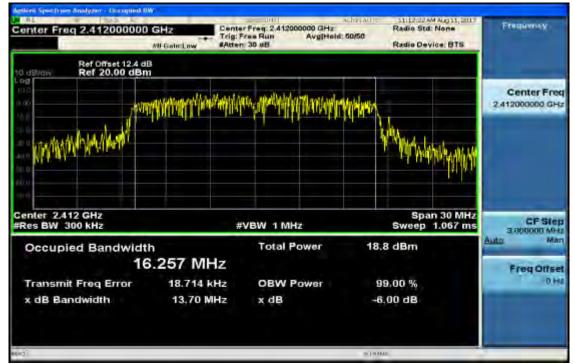
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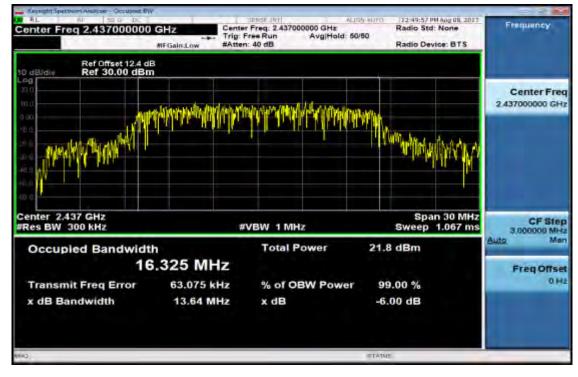




# 802.11g (AUX1) 99% Band Width Test Data CH-Low

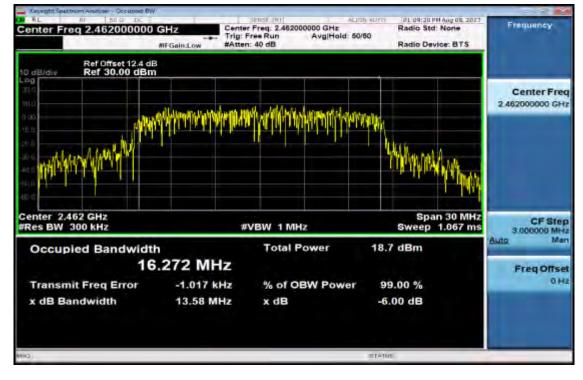


#### 99% Band Width Test Data CH-Mid



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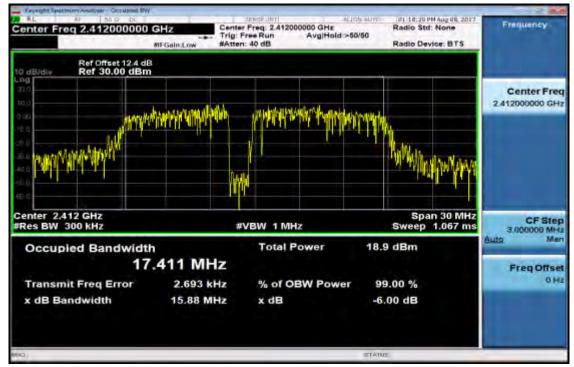


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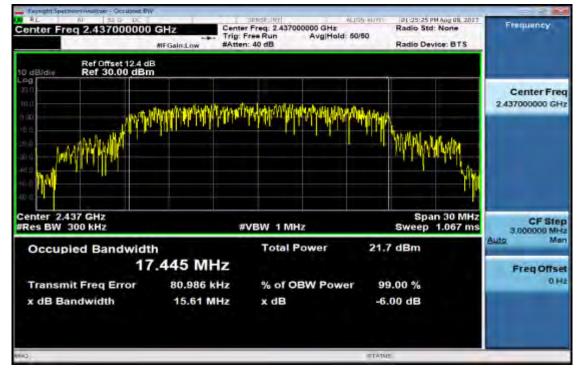
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# 802.11n 20M (Main) 99% Band Width Test Data CH-Low

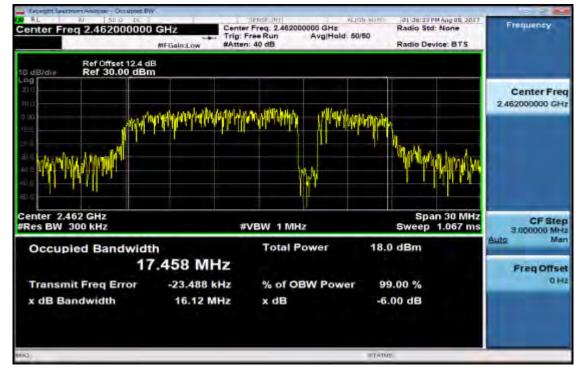


#### 99% Band Width Test Data CH-Mid



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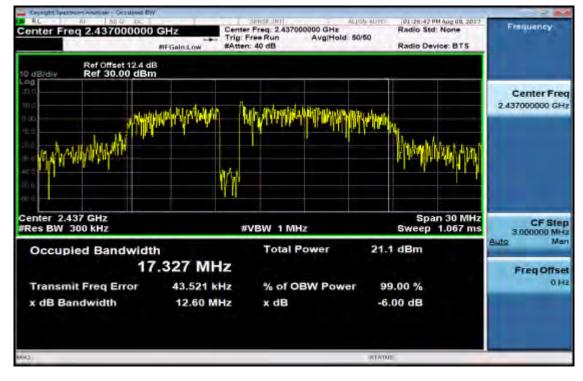
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# 802.11n 20M (AUX1) 99% Band Width Test Data CH-Low

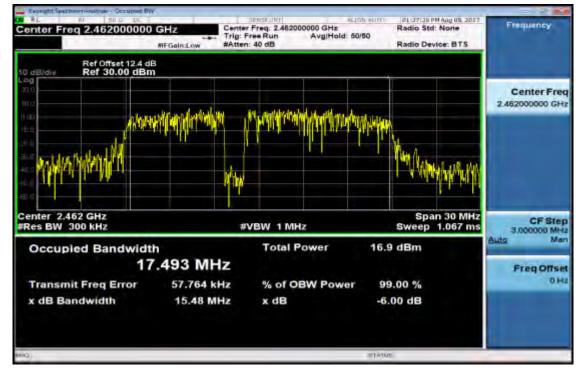


#### 99% Band Width Test Data CH-Mid



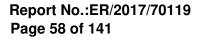
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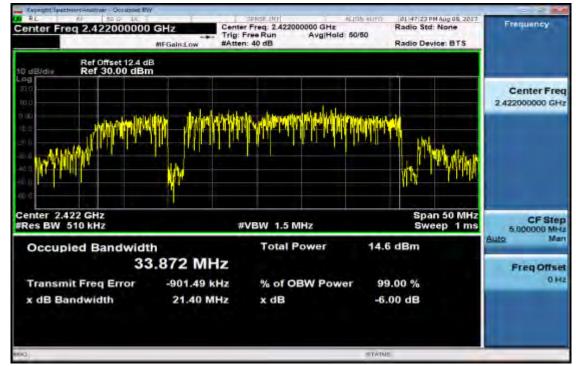
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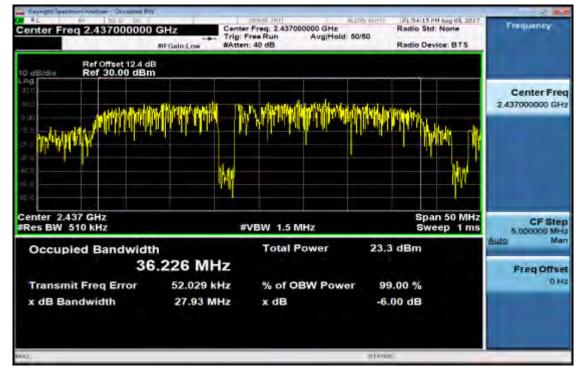




# 802.11n 40M (Main) 99% Band Width Test Data CH-Low

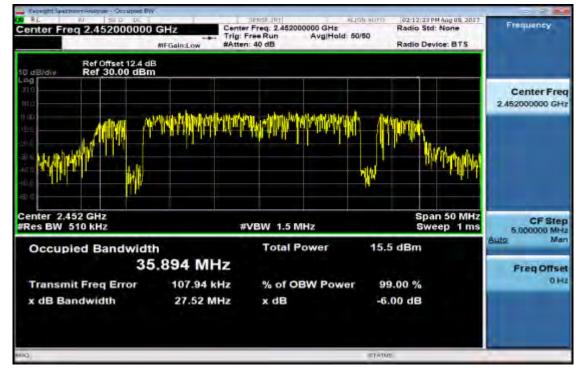


#### 99% Band Width Test Data CH-Mid



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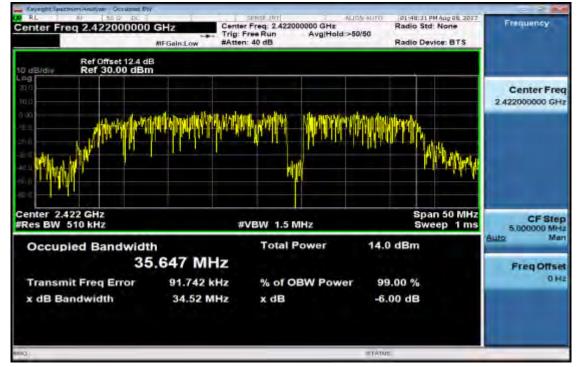


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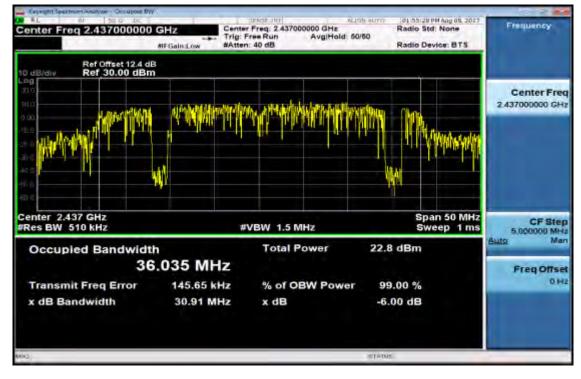
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# 802.11n 40M (AUX1) 99% Band Width Test Data CH-Low

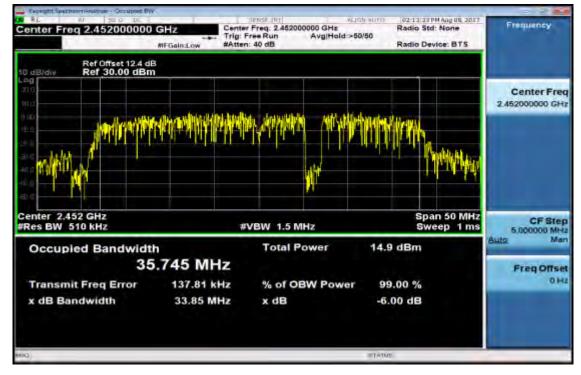


#### 99% Band Width Test Data CH-Mid



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#### CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT 10

#### **10.1 Standard Applicable**

In any 100 kHz 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 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, provided the transmitter demonstrates compliance with the peak conducted power limits.

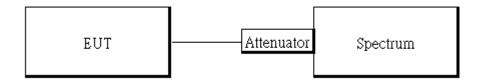
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a) & RSS-Gen §8.10, must also comply with the radiated emission limits specified in §15.209(a) & RSS-Gen §8.8.

If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

#### **10.2 Measurement Equipment Used**

Conducted Emission Test Site							
EQUIPMENT	MFR	MODEL	SERIAL	SERIAL LAST			
TYPE		NUMBER	NUMBER	CAL.			
EXA Spectrum Ana- lyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018		
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018		
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018		

#### 10.3 Test SET-UP



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#### **10.4 Measurement Procedure**

#### **Conducted Band Edge:**

- 1. To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 v04 DTS Meas. Guidance .
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
- 5. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Detector = Peak, Sweep = auto
- 6. Mark the highest reading of the emission as the reference level measurement.
- 7. Set DL as the limit = reading on marker 1 20dBm
- 8. Marker on frequency, 2.3999GHz and 2.4836GHz, and examine shall 100 kHz immediately outside the authorized (2400~2483.5) be attenuated by 20dB at least relative to the maximum emission of power.
- 9. Repeat above procedures until all default test channel (low, middle, and high) was complete.

#### **Conducted Spurious Emission:**

- To connect Antenna Port of EUT to Spectrum
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 v04 DTS Meas. Guidance.
- 3. Set RBW = 100 kHz & VBW= 300 kHz, Detector = Peak, Sweep = Auto.
- 4. Allow trace to fully stabilize.
- 5. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
- 6. Repeat above procedures until all default test channel measured were complete.

#### **10.5 Measurement Result**

Note:

- 1. Refer to next page spectrum analyzer data chart and tabular data sheets.
- 2. For Restricted Band Edge Limit, please refer to section 12.5 of this report for measurement result.

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# 802.11b **Band Edges Test Data CH-Low**



### **Band Edges Test Data CH-High**

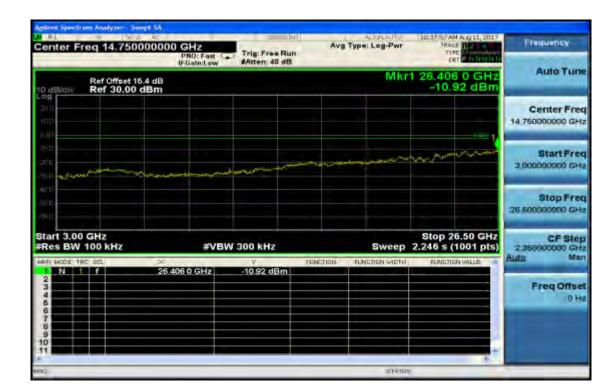


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# 802.11b **Spurious Emission Test Data CH-Low**

enter Freq 1.515000	000 GHz	Trig: Free Run Mitten: 40 dB	Avg Type: Log-Pwr	10:37:27 AM ALG 11, 2817 TRACE 11 2 TYPE CET P N. N. 1711	Frequency
Ref Offset 16.4 dB Mkr1 2.411 9 GHz 0 dB/dr/v Ref 30.00 dBm 17.78 dBm					Auto Tune
9 10 10					Center Free 1,516000000 GH
	u substances and and	المتح الحرار المراجع	and we can be seen in the second	Constant of the second se	Start Free 30,000000 MH
					Stop Free 3.00000000 GH
art 30 MHz Res BW 100 kHz	#VBW 3		Sweep 2	Stop 3.000 GHz 33.9 ms (1001 pts)	CF Step 297.000000 MH
	2.411 9 GHz	17.78 dBm		TONE TON YOLDE	Freq Offse 0H

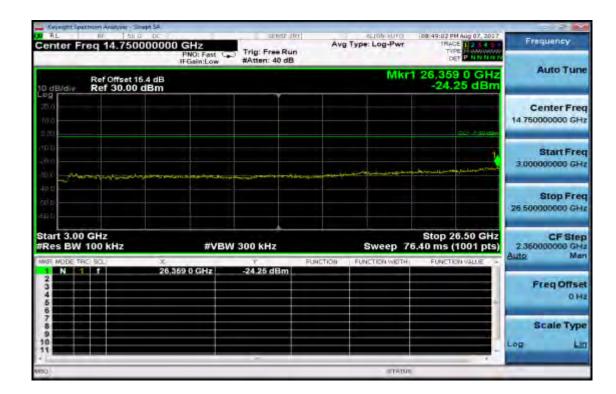


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### **Spurious Emission Test Data CH-Mid**

Keynight Spectrum Analyzer - Shapt SA				68-46:32 PM Aug 07, 2017	
Center Freq 1.515000000	PNO: Fast	Trig: Free Run #Atten: 40 dB	Avg Type: Log-Pwr	TRACE 1 2 14 TYPE DURING OF PINN NUM	Frequency
Ref Offset 15.4 dB	POBILLOW	HYCHINI: HE OLD	Mk	r1 2.435 7 GHz 18.01 dBm	
200 100 100					Center Fre 1.515000000 GH
100 					Start Fre 30,000000 MH
40 D	Look + + + + + + + + + + + + + + + + + +				Stop Fre 3,000000000 GH
Start 0.030 GHz #Res BW 100 kHz	#VBW	300 kHz		Stop 3.000 GHz .667 ms (1001 pts	CF Ste 297.000000 MH Auto Ma
WR MODE TRC. SCL X. 1 N 1 1 2 3 4 5 6	.435 7 GHz	18.01 dBm	INCTION   FUNCTION WIETH	FUNCTION VALUE	Freq Offse 0 H
7 8 9 10 11					Scale Typ
60			STATUS		-



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# **Spurious Emission Test Data CH-High**

RL enter Fr	eq 1.51500		Trig: Free Run #Atten: 40 dB	Aug Type: Log-Pwr	10:40:00 AM AUG 11, 2017 TRACE 11 2	Frequency
0 dB/div	Ref Offset 16. Ref 30.00 d			MK	r1 2.462 4 GHz 16.04 dBm	Auto Tune
					1	Center Free 1 516000000 GH
	and the second second second			- Martine	Languran	Start Free 30,000000 MH
						Stop Free 3.00000000 GH
tart 30 M Res BW	IOO KHZ		V 300 kHz		Stop 3.000 GHz 83.9 ms (1001 pts)	CF Stej 297.000000 MH Auto Ma
IN 1		2.462 4 GHz	16.04 dBm	INCTION FUNCTION VAD 141	FUNCTION WALLE	the second second second
234557890						Freq Offse 0 H
				TAU		···· ··· ···

er Freq 14.75000000	PNO: Fast C Trig: Free Run IFGain:Low #Atten: 40 dB	Avg Type: Log-Pwr	10:40:47 AM AUG 11, 2017 TRACE 11 2 2 4 TVPE Processory DET P N 2017111	Frequency Auto Tune	
Ref Offset 16.4 dB Mkr1 26.288 5 GHz Ref 30.00 dBm -10.35 dBm					
				Center Fred 14,750000000 GH;	
Jannan			morned	Start Free 3,000000000 GH	
				Stop Fre 26.50000000 GH	
3.00 GHz BW 100 kHz	#VBW 300 kHz		Stop 26.50 GHz 2.246 s (1001 pts)	CF Step 2.350000000 GH Auto Mar	
	200 5 GHz -10.35 dBm	FUNCTION FUNCTION (ADTH)	PURCHEN WILLE	Freq Offse 0 H	



### 802.11g **Band Edges Test Data CH-Low**



# **Band Edges Test Data CH-High**



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# 802.11g **Spurious Emission Test Data CH-Low**

enter Freg 1.515000000	PRO: Fast	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr	11110:12 AM AUG 11, 2017 TRALE 112 TO TYPE COMMAND DET P TO DITATION	Frequency
Ref Offset 16.4 dB dB/div Ref 20.00 dBm			Mk	r1 2,414 9 GHz 12,43 dBm	Auto Tuni
				-1 54 (20)	Center Free 1.516000000 GH
		و و الم المراجع	menund	mune	Start Free 30,000000 MH
00 00 010					Stop Fre 3 800800000 GH
art 30 MHz Res BW 100 kHz	#VBW 3	300 kHz	Sweep 2	Stop 3.000 GHz 33.9 ms (1001 pts)	CF Stel 297.000000 MH
	414 9 GHz	7 FD 12.43 dBm	NETION ILNETION SADTH	FUNCTION WALLS	Auto Ma
2 3 4 5 5 6 7 7 8 9 9 9					Freq Offse 0 H
			STATUS		

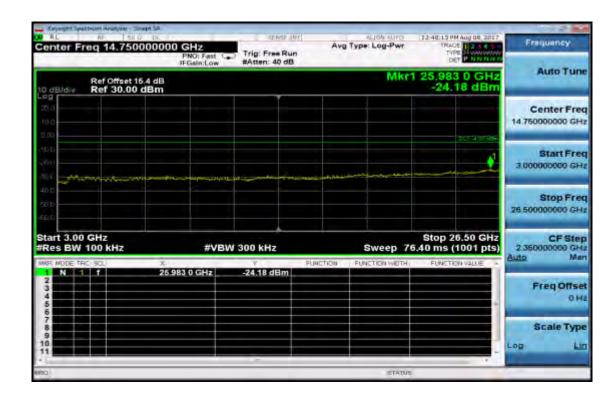


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### **Spurious Emission Test Data CH-Mid**

Key night Spectrum Analyzer - Skrept SA			and the second second second	1
Center Freq 1.51500000	O GHZ PNO: Fest C Trig: Free R #Atten: 40 d	Avg Type: Log-Pwr	12-47/45 PM Aug 08, 2017 TRACE 1 2 4 4 5 TYPE PARAMETER CET 10 10 10 10	Frequency
Ref Offset 15.4 dB	Prosent Low Writight 19 w		(r1 2,435 7 GHz 15,17 dBm	Auto Tuni
200			1	Center Fre 1.515000000 GH
1.15) 10.15 20.1				Start Free 30,00000 MH
(0 0 <b>0 0000000000000000000000000000000</b>				Stop Fre 3.000000000 GH
Start 0.030 GHz #Res BW 100 kHz	#VBW 300 kHz	and the second	Stop 3.000 GHz 9.667 ms (1001 pts)	CF Ster 297.000000 MH Auto Ma
MRR MODE TRC: SCL X. 1 N 1 7 2 3 4 5	2.435 7 GHz 15.17 dBm	FUNCTION FUNCTION WOTH	EUNICTION VALUE	Freq Offse 0 H
6 7 8 9 10				Scale Type
(B2)		STATU	5	



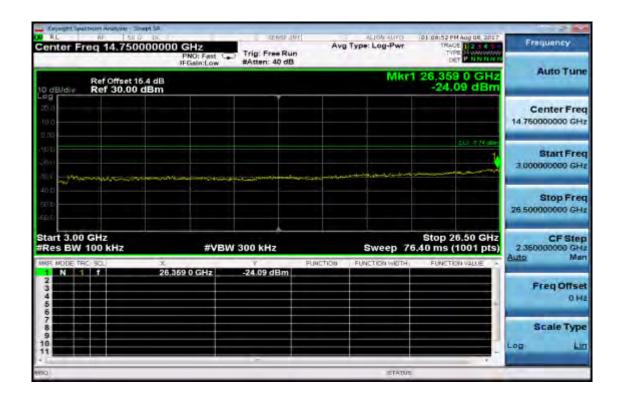
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### **Spurious Emission Test Data CH-High**

Keyleight Spectram Analyzer - Skrept SA	-	a second second second		the second second second	
Center Freq 1.515000000	GHz PNO: Fast Ca	Trig: Free Run #Atten: 40 dB	Avg Type: Log-Pwr	01:06:22 PM Aug 08, 2 TRACE 12:34 TVPE PLANT	Frequency
Ref Offset 16.4 dB 10 dEVdiv Ref 30.00 dBm	HZ Auto Tune				
200 10.0				<b>*</b> <sup>1</sup>	Center Free 1.515000000 GH
975 160 201			1000 1000 1000 1000 1000 1000 1000 100	241-7.74	Start Free 30.000000 MH
40 0	in an in the second				Stop Free 3.00000000 GH
Start 0.030 GHz #Res BW 100 kHz	#VBW	/ 300 kHz	Sweep 9	Stop 3.000 G .667 ms (1001 p	Hz CF Ster 297,000000 MH Auto Ma
234	462 4 GHz	12.26 dBm			Freq Offse
6 7 8 9 10					Scale Type
• ( )			STATUS	-	



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### 802.11n HT20 **Band Edges Test Data CH-Low**



### **Band Edges Test Data CH-High**

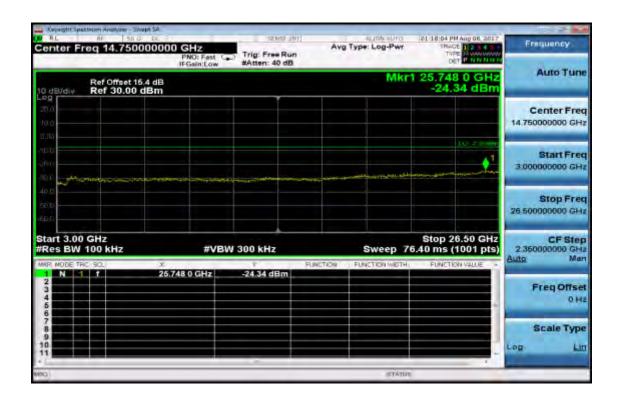


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# 802.11n HT20 **Spurious Emission Test Data CH-Low**

RL RP 50 C	2 DC	SENSE JUT	ALIGN ADIA	01 17 30 PM Aug 08, 2017	
enter Freq 1.5150	PNO: Fast G	Trig: Free Run	Avg Type: Log-Pwr	THACE I 2 4 4 5 TYPE MUMMUMUM DET P N P N P	
Ref Offset 10	5.4 dB	ACTIVIT. NO OD	M	r1 2.414 9 GHz 12.65 dBm	Auto Tuni
1000				1	Center Free 1.515000000 GH
0 0				0.1 -7 30 miler	Start Free 30,000000 MH
0 D +	ىزچىنىدى، بەن مەسىرىكى <sub>بىر</sub>				Stop Fre 3.000000000 GH
tart 0.030 GHz Res BW 100 kHz	#VB\	V 300 kHz	Sweep 9	Stop 3.000 GHz .667 ms (1001 pts)	CF Step 297,000000 MH Auto Ma
R MODE TRC SCL	× 2.414 9 GHz	12.65 dBm	INCTION : FUNCTION WIDTH	FUNCTION VALUE	Freq Offset
					Scale Type
a)			STATU:		



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## **Spurious Emission Test Data CH-Mid**

RL N Start Conter Freq 1.5150000		T Samer Juri	Avg Type: Log-Pwr	(01:29:27 PM Aug 08, 2017 TRACE	Frequency
	PNO: Fest C	Trig: Free Run #Atten: 40 dB		DET P NIN MIN	
Ref Offset 15.4 dl			M	r1 2.438 7 GHz 15.41 dBm	Auto Tun
200				2 <sup>1</sup>	Center Fre
1.00				10.7 -4 -50.467	1313000000
40.0 2011 50.0					Start Fre 30.000000 MH
40 D					Stop Fre 3.00000000 GH
Start 0.030 GHz #Res BW 100 kHz	#vBw	300 kHz	Sweep 9	Stop 3.000 GHz .667 ms (1001 pts)	CF Ste 297.000000 MH
MRR MODE TRC SCL	× 2.438 7 GHz	Y FU 15.41 dBm	ICTION FUNCTION WIDTH	FUNCTION VALUE -	CMAS 000
2 3 4 5 6					Freq Offse
7					Scale Typ
10				-	Log L
83			STATU	-	

DC.	SPRSP JWT	ALIGN ALITO	01:24:57 PM Aug 08, 2017	Hard Contractor
	Trig: Free Run #Atten: 40 dB	Avg Type: Log-Pwr	TYPE PLOADED	Frequency
		Mkr	1 25.818 5 GHz -24.00 dBm	Auto Tun
				Center Fre 14.750000000 GH
		المحادثة بربا بالمحادث		Start Fre 3.00000000 GH
				Stop Fre 26 50000000 GH
			5.40 ms (1001 pts)	CF Ste 2.35000000 GH Auto Ma
25.818 5 GHz	-24.00 dBm	CTOR PORCIONARDING	FORCHONNEDE	Freq Offse 01
				Scale Typ
	000000 GHz PNO: Fast IFGain:Low 4 dB 18m #VBW	Trig: Free Run PNO: Fast PNO: Fast Trig: Free Run #Atten: 40 dB 4 dB 18m #VBW 300 kHz X Y FU	Avg Type: Log-Pwr PND: Fast  PND: Fast  Trig: Free Run #Atten: 40 dB	OUCCOO GHz PNO: Fast IFGsin:Low         Trig: Free Run #Atten: 40 dB         Avg Type: Log-Pwr Mkr1 25,818 5 GHz -24,00 dBm           4 dB IBm         Mkr1 25,818 5 GHz -24,00 dBm           4 dB IBm         00000 GHZ -24,00 dBm           500 26:50 GHz           #VBW 300 kHz           Y<

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## **Spurious Emission Test Data CH-High**

RL III Succession Strapp Se RL III Succession Content Center Freg 1.51500000		Trig: Free Run #Atten: 40 dB	Avg Type: Log-Pwr	TP	PM Aug 08, 2017	Frequency
Ref Offset 15.4 dl			M	(r1 2,4 12	62 4 GHz 2.14 dBm	Auto Tuni
200 100				¢1		Center Fre 1.515000000 GH
2.10 ADD 2011					2017/07/09	Start Fre 30,000000 MH
40 D	hada an		9			Stop Fre 3.000000000 GH
Start 0.030 GHz Res BW 100 kHz	x		Sweep 9	.667 ms	3.000 GHz (1001 pts)	CF Ste 297,000000 MH Auto Ma
1 N 1 7 2 3 4 5	2.462 4 GHz	12.14 dBm				Freq Offse 0 H
6 7 8 9 10						Scale Typ
28			STATU	5		

enter Freg 14.750000		TWE BRIEF	Avg Type: Log-Pwr	01:35:50 PM Aug 08, 2017 TRACE	Frequency
sinter Freq 14.750000	PNO: Fast C IFGain:Low	Trig: Free Run #Atten: 40 dB	AND THE WALL HI	DET P NIN RICH	
Ref Offset 15.4 d Ref 30.00 dBr			Mkr	1 25.889 0 GHz -23.85 dBm	Auto Tun
0.0					Center Fre 14.750000000 GH
00 00 00 00			and a star of a star	261-7 17 18 m	Start Fre 3.00000000 GF
	Contractor Contractor (1997-1-1-1-	And the second second			
00 00 00					and the line of the local state of the local
tart 3.00 GHz Res BW 100 kHz	#VB	W 300 kHz	the last have been deep the balance of the second	Stop 26.50 GHz 5.40 ms (1001 pts)	26 50000000 Gi CF Ste 2.36000000 Gi
tart 3.00 GHz Res BW 100 kHz	#VB X 25.889 0 GHz		Sweep 7 JHCTICH : FUNCTION WIDTH		2.350000000 Gi
tart 3.00 GHz Res BW 100 kHz	x	Ŷ F	the last have been deep the balance of the second	6.40 ms (1001 pts)	26 50000000 G CF St 2.36000000 G <u>Auto</u> M Freq Offs



# 802.11n HT40 **Band Edges Test Data CH-Low**



## **Band Edges Test Data CH-High**



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# 802.11n HT40 **Spurious Emission Test Data CH-Low**

nter Freg 1.51500		Avg Type: Log	-Pwr TRAD	Frequency
1.51500	PNO: Fast C Trig: F	ree Run : 40 dB	TVP	P NIN N II II II
Ref Offset 15	4 dB	40.00	Mkr1 2.417	Auto To
				Center F
a				1.515000000
0				Start F
6				30,000000
Distance in the second se	and a state of the			Stop F
D				3,000000000
art 0.030 GHz es BW 100 kHz	#VBW 300 kH	tz Swee	Stop 3. ep 9.667 ms (*	
R MODE TRIC SOL	X Y	FUNCTION   FUNCTION	WIDTH: FUNCTIO	NVALUE - Auto
N 1 f	2.417 9 GHz 5.34	dBm		FreqOff
				Scale T
				Log
				-
Counstit Spectrum Analyzer - Silv	wbt SA		ETÁTUS	
RL RF Sh G	000000 GHz PN0: Fast ( ) Trig: F	sinsi sirri Avg Type: Log	-Pwr TRAC	Aug 08, 2027 E 12 2 4 P 2014 August Prequency
RE Ref Offset 16	DOUDO GHZ PND: Fast IFGain:Low #Atten	strictrative Avg Type: Log ree Run r: 40 dB	-Uro (\$1:46:56 Pi -Pwr tR40 Tri O Mikr1 26,355	Phone Prequency
RL BL Sho enter Freq 14.7500 Ref Offset 16 Ref 30.00 o	DOUDO GHZ PND: Fast IFGain:Low #Atten	strictrative Avg Type: Log ree Run r: 40 dB	-Uro (\$1:46:56 Pi -Pwr tR40 Tri O Mikr1 26,355	D GHZ 21 dBm Center F
RL BL Sho enter Freq 14.7500 Ref Offset 16 Ref 30.00 of 0	DOUDO GHZ PND: Fast IFGain:Low #Atten	strictrative Avg Type: Log ree Run r: 40 dB	-Uro (\$1:46:56 Pi -Pwr tR40 Tri O Mikr1 26,355	D GHZ 21 dBm
RE 00 000000000000000000000000000000000	DOUDO GHZ PND: Fast IFGain:Low #Atten	strictrative Avg Type: Log ree Run r: 40 dB	-Uro (\$1:46:56 Pi -Pwr tR40 Tri O Mikr1 26,355	D GHZ Auto T Auto T Center F 14.750000000 Start F
RL Ref Offset 15 dEXdiv Ref 30.00 c	DOUDO GHZ PND: Fast IFGain:Low #Atten	strictrative Avg Type: Log ree Run r: 40 dB	-Uro (\$1:46:56 Pi -Pwr tR40 Tri O Mikr1 26,355	D GHZ Auto T Center F 14.750000000
Ref Offset 15 dB/div Ref 30.00 c	A dB	strictrative Avg Type: Log ree Run r: 40 dB	-Uro (\$1:46:56 Pi -Pwr tR40 Tri O Mikr1 26,355	Auto T O GHZ 1 dBm Center F 14.750000000 Start F 3.000000000 Stop F
Ref Offset 15 dB/div Ref 30.00 c	A dB	strictrative Avg Type: Log ree Run r: 40 dB	-Uro (\$1:46:56 Pi -Pwr tR40 Tri O Mikr1 26,355	Auto T O GHZ 1 dBm Center F 14.750000000 Start F 3.000000000
Ref Offset 15 Ref 30.00 of Ref 30.00 of art 3.00 GHz	A dB	Andrawi Avg Type: Log Free Run 1: 40 dB	Mkr1 26.355 -24.1	Auto T Auto T Auto T Center F 14.750000000 Start F 3.00000000 Stop F 26 50000000
Ref Offset 16 Ref Offset 16 Ref 30.00 d Ref 30.00 d art 3.00 GHz Res BW 100 kHz	A dB	Ares dir Avg Type: Log Free Run :: 40 dB	Mkr1 26,355 -24.1 Stop 2 ep 76.40 ms (	Center F           1 dBm           Center F           14.750000000           Start F           3.000000000           Stor F           2.3500000000           Auto T           2.35000000000000000000000000000000000000
Ref Offset 16 Ref Offset 16 Ref 30.00 C	#VBW 300 kHz	Andrawi Avg Type: Log Free Run 1: 40 dB	Mkr1 26,355 -24.1 Stop 2 ep 76.40 ms (	Center F           1 dBm         Center F           14.750000000         14.750000000           Start F         3.000000000           Start F         3.000000000           Start F         2.500000000           Start F         2.500000000           Start F         2.500000000           Start F         2.500000000           Start F         2.3500000000           Auto         CF S           2.3500000000         Auto
Ref Offset 16 Ref Offset 16 Ref 30.00 of Ref 30.00 of	#VBW 300 kHz	Avg Type: Log Free Run 1: 40 dB	Mkr1 26,355 -24.1 Stop 2 ep 76.40 ms (	0 GHz         Auto T           1 dBm         Center F           14.75000000         Start F           3.000000000         Storp F           5.50 GHz         CF S           0.001 pts)         2.350000000           NVALUE         Freq Of
RE Ref Offset 16 Ref Offset 16 Ref 30.00 c	#VBW 300 kHz	Avg Type: Log Free Run 1: 40 dB	Mkr1 26,355 -24.1 Stop 2 ep 76.40 ms (	Center F           1 dBm         Center F           14.750000000         14.750000000           Start F         3.000000000           Start F         3.000000000           Start F         2.500000000           Start F         2.500000000           Start F         2.500000000           Start F         2.500000000           Start F         2.3500000000           Auto         CF S           2.3500000000         Auto
RL         RL         AL         AL<	#VBW 300 kHz	Avg Type: Log Free Run 1: 40 dB	Mkr1 26,355 -24.1 Stop 2 ep 76.40 ms (	0 GHz         Auto T           1 dBm         Center F           14.75000000         Start F           3.000000000         Storp F           5.50 GHz         CF S           0.001 pts)         2.350000000           NVALUE         Freq Of
Ref Offset 16 Ref Offset 16 Ref 30.00 of art 3.00 GHz res BW 100 kHz N 1 f	#VBW 300 kHz	Avg Type: Log Free Run 1: 40 dB	Mkr1 26,355 -24.1 Stop 2 ep 76.40 ms (	Center F           1 dBm         Center F           14.750000000         Start F           3.000000000         Start F           3.000000000         Start F           5.50 GHz         CF S           2.350000000         Auto T           WVALUE         Freq Or

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## **Spurious Emission Test Data CH-Mid**

RL N/ 50 G DC	SENSE JULY	ALION AUTO	1:53:04 PM Aug 08, 2017	
Center Freq 1.51500000	PNO: Fast C Trig: Free Run IFGain:Low #Atten: 40 dB	Avg Type: Log-Pwr	THREE DET P NITTANIN	Frequency
Ref Offset 15.4 dB 10 dB/div Ref 30.00 dBm		Mkr1	2.441 6 GHz 14.90 dBm	Auto Tuni
100				Center Fre 1.515000000 GH
100 200 300				Start Fre 30.000000 MH
40 0	م من من الم من			Stop Fre 3.000000000 GH
Start 0.030 GHz #Res BW 100 kHz	#VBW 300 kHz		Stop 3.000 GHz 7 ms (1001 pts)	CF Ster 297,000000 MH Auto Ma
1 N 1 T	2.441 6 GHz 14.90 dBm			Freq Offse 0 H
7 8 9 10 11				Scale Typ
• (20)		STATUS		

RL RP Sh Q DL		SPREE DATE	ALION ALITO	01:53:37 PM Aug 08, 2017	
enter Freq 14.7500000	PN0: Fast C	1	Avg Type: Log-Pwr	TRAGE 234 P	Frequency
Ref Offset 16.4 dB Ref 30.00 dBm			Mkr	1 26.030 0 GHz -23.82 dBm	Auto Tun
0.0					Center Fre 14.750000000 GH
ii)				217.2.1000	
0 			المريدي مالي الم المريد المريد الم		Start Fre 3.00000000 GF
					Stop Fre 26 50000000 Gi
art 3.00 GHz Res BW 100 kHz	#VBV	/ 300 kHz	Sweep 7	Stop 26.50 GHz 6.40 ms (1001 pts)	
	AND OCH-		INCTION   FUNCTION WIDTH	FUNCTION VALUE	Auto M
N 1 1 26	5.030 0 GHz	-23.82 dBm	INCTION : FUNCTION WIGTH:	FUNCTION VALUE	Freq Offs
R MODE TRC SOL X	5,030 0 GHz		INETION : FUNCTION WETH	FUNCTION VALUE	Freq Offs 01
N 1 f 28	5,030 0 GHz		INCTION : FUNCTION WIDTH	FUNCTION VALUE	Auto Mo Freq Offs 01 Scale Typ Log L

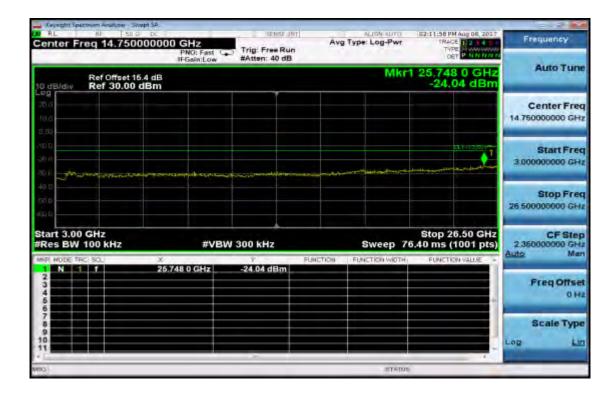
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## **Spurious Emission Test Data CH-High**

Corjught Spectrum Analyzer - Strept SA		Contraction Street, St			
Center Freq 1.515000000	PNO: East C Trig	Free Run en: 40 dB	Avg Type: Log-Pwr	C2-11:22 PM Aug DE, 2017 TRACE 1 2 14 5 TYPE N WWWWWW OET P N N N M W	Frequency
Ref Offset 15.4 dB			MK	r1 2,447 6 GHz 6,50 dBm	Auto Tun
200 10.0 5.10				<b>₹</b>	Center Fre 1.515000000 GH
60 00					Start Fre 30.000000 MH
0 D 0 D 0 D 0 D 0 D 0 D 0 D 0 D	and a second				Stop Fre 3.000000000 GH
Res BW 100 kHz	#VBW 300	kHz FLAD	the second se	Stop 3.000 GHz 667 ms (1001 pts)	CF Ste 297,000000 MH Auto Ma
1 N 1 f 2 3 4 5	.447 6 GHz 6	50 dBm			Freq Offse 0 P
6 7 8 9 9 10					Scale Typ
10)			STATUS		



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## 11 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

### **11.1 Standard Applicable**

In any 100 kHz 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 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, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 & RSS-Gen §8.8, 8.9 limit as below.

And according to §15.33(a) (1) & RSS-Gen §6.13(a), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

#### Note:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level  $(dB\mu V/m) = 20 \log Emission level (dB\mu V/m)$

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### **11.2 Measurement Equipment Used:**

966 Chamber					
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
ТҮРЕ		NUMBER	NUMBER	CAL.	
EMI Test Receiver	R&S	ESCI7	100760	05/11/2017	05/10/2018
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/25/2017	04/24/2018
Loop Antenna	ETS.LINDGREN	6502	148045	09/20/2016	09/19/2017
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/19/2016	12/18/2017
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/04/2017	08/03/2018
Pre-Amplifier	Agilent	8447D	2944A07676	01/03/2017	01/02/2018
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/03/2017	01/02/2018
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	ChamPro	AM-BS-4500-B	060776-ABS	N.C.R	N.C.R
Controller	ChamPro	EM1000	60776	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_RX	9	01/05/2017	01/04/2018
3m Site NSA	SGS	966 chamber	N/A	07/01/2017	06/30/2018
Low Loss Cable	Huber Suhner	966 TX	1	01/05/2017	01/04/2018

NOTE: N.C.R refers to Not Calibrated Required.

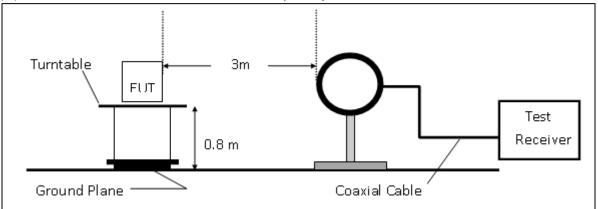
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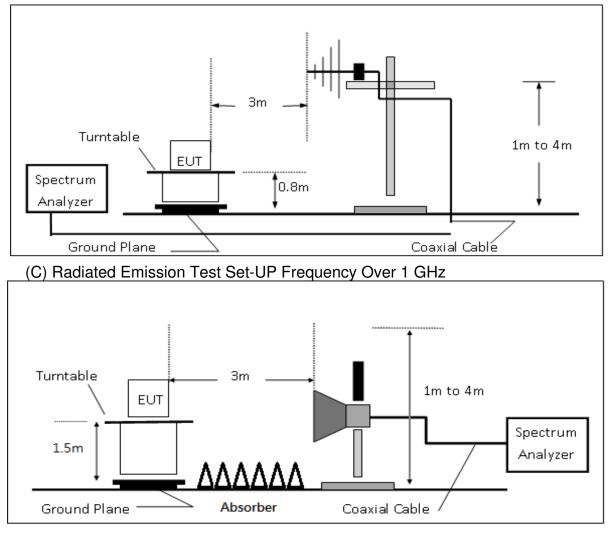


### 11.3 Test SET-UP

(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



### (B) Radiated Emission Test Set-Up, Frequency form 30MHz to 1000MHz



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### **11.4 Measurement Procedure**

- 1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 v04 DTS Meas. Guidance.
- 2. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plane.
- 3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 5. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
- 6. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
- 7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
- 8. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW  $\geq$  1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.
- 9. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- 10. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 11. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
- 12. Repeat above procedures until all default test channel measured were complete.

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### **11.5 Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

### FS = RA + AF + CL - AG

Where	Ū.	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Actual FS(dB $\mu$ V/m) = SPA. Reading level(dB $\mu$ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB $\mu$ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

### Note :

"F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

### 11.6 Test Results of Radiated Spurious Emissions form 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

### **11.7 Measurement Result**

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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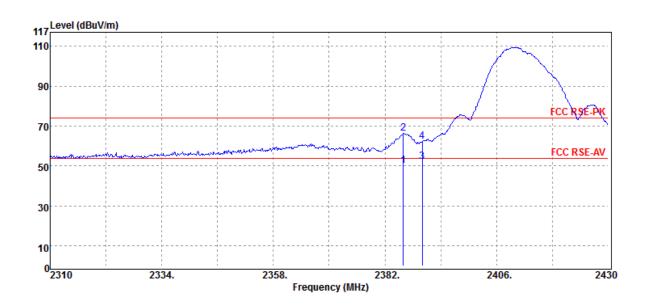
### Radiated Band Edge Measurement Result (802.11b)

**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11b :2412 MHz :Bandedge CH LOW :E1 Plane

Test Date Temp./Humi. Engineer Measurement Antenna Pol.

:2017-08-09 :21 deg\_C / 62 RH :Tin :VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2385.96	S	Average	52.01	-1.72	50.29	54.00	-3.71
2385.96	S	Peak	68.00	-1.72	66.28	74.00	-7.72
2390.00	Е	Average	54.16	-1.74	52.42	54.00	-1.58
2390.00	Е	Peak	63.96	-1.74	62.22	74.00	-11.78

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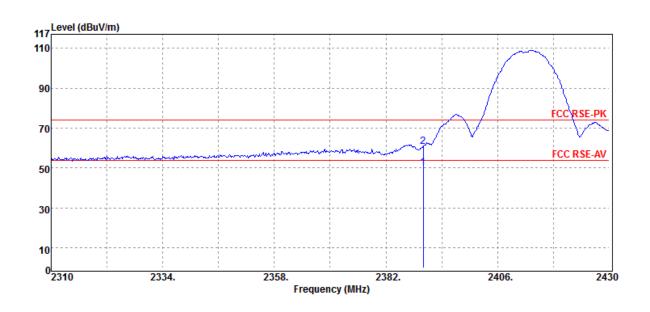


**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11b :2412 MHz :Bandedge CH LOW :E1 Plane

Test Date Temp./Humi. Engineer :Tin Measurement Antenna Pol.

:2017-08-09 :21 deg\_C / 62 RH :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Е	Average	52.03	-1.74	50.29	54.00	-3.71
2390.00	Е	Peak	62.49	-1.74	60.75	74.00	-13.25

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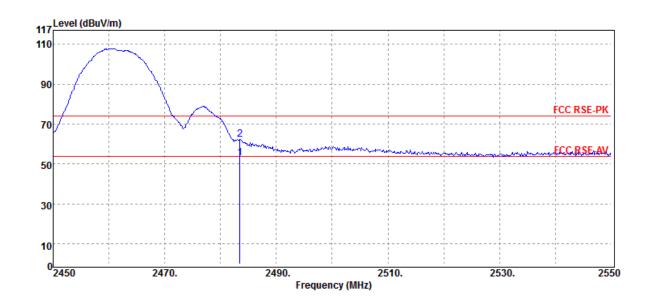
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**Operation Band** :802.11b Fundamental Frequency **Operation Mode** EUT Pol.

:2462 MHz :Bandedge CH HIGH :E1 Plane

Test Date :2017-08-09 :21 deg\_C / 62 RH Temp./Humi. Engineer :Tin :VERTICAL Measurement Antenna Pol.



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	54.67	-1.62	53.05	54.00	-0.95
2483.50	Е	Peak	64.04	-1.62	62.42	74.00	-11.58

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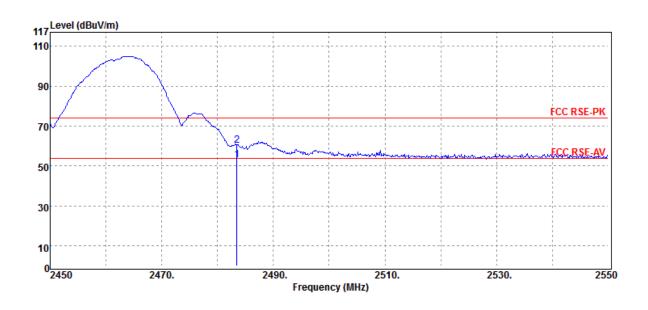
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**Operation Band** :802.11b Fundamental Frequency :2462 MHz **Operation Mode** :Bandedge CH HIGH EUT Pol. :E1 Plane

Test Date Temp./Humi. Engineer :Tin Measurement Antenna Pol.

:2017-08-09 :21 deg\_C / 62 RH :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	54.73	-1.62	53.11	54.00	-0.89
2483.50	Е	Peak	62.10	-1.62	60.48	74.00	-13.52

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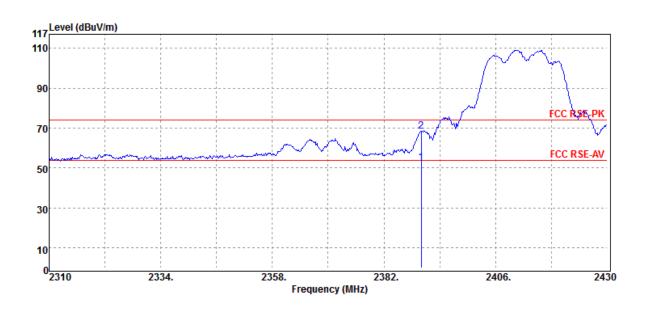
### Radiated Band Edge Measurement Result (802.11g)

**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11g :2412 MHz :Bandedge CH LOW :E1 Plane

Test Date Temp./Humi. Engineer Measurement Antenna Pol.

:2017-08-09 :21 deg\_C / 62 RH :Tin :VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Е	Average	54.51	-1.74	52.77	54.00	-1.23
2390.00	Е	Peak	70.10	-1.74	68.36	74.00	-5.64

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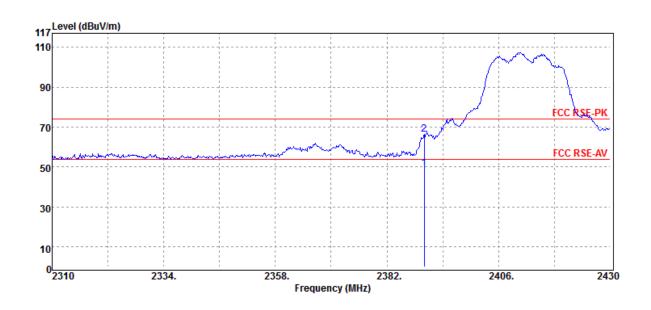


**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11g :2412 MHz :Bandedge CH LOW :E1 Plane

Test Date Temp./Humi. Engineer Measurement Antenna Pol.

:2017-08-09 :21 deg\_C / 62 RH :Tin :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Е	Average	51.32	-1.74	49.58	54.00	-4.42
2390.00	Е	Peak	68.11	-1.74	66.37	74.00	-7.63

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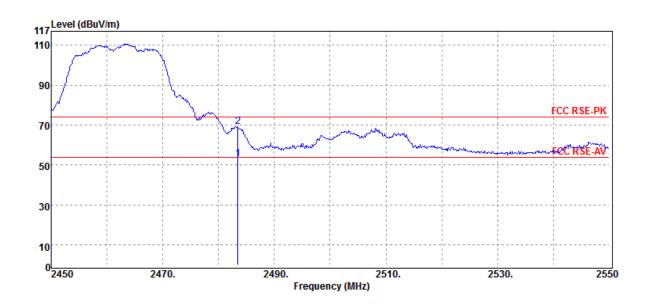
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**Operation Band** :802.11g Fundamental Frequency **Operation Mode** EUT Pol.

:2462 MHz :Bandedge CH HIGH :E1 Plane

Test Date :2017-08-03 Temp./Humi. :21 deg\_C / 62 RH Engineer :Tin :VERTICAL Measurement Antenna Pol.



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	54.50	-1.62	52.88	54.00	-1.12
2483.50	Е	Peak	70.95	-1.62	69.33	74.00	-4.67

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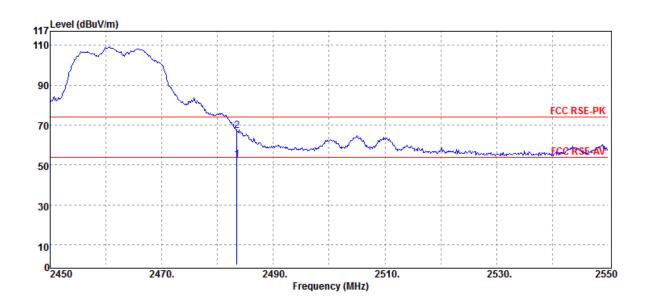


**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11g :2462 MHz :Bandedge CH HIGH :E1 Plane

Test Date Temp./Humi. Engineer :Tin Measurement Antenna Pol.

:2017-08-03 :21 deg\_C / 62 RH :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	54.09	-1.62	52.47	54.00	-1.53
2483.50	Е	Peak	68.93	-1.62	67.31	74.00	-6.69

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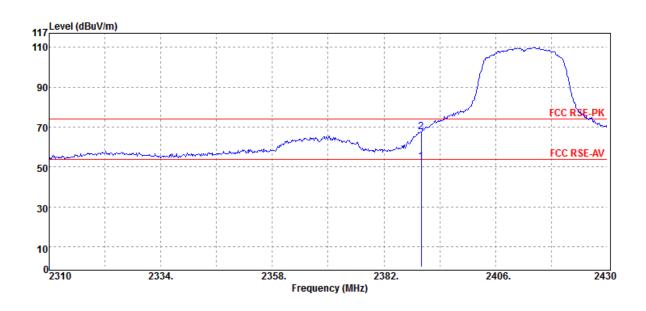


#### Radiated Band Edge Measurement Result (802.11 HT20)

**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11n20 :2412 MHz :Bandedge CH LOW :E1 Plane

Test Date Temp./Humi. Engineer Measurement Antenna Pol. :2017-08-03 :21 deg\_C / 62 RH :Tin :VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Е	Average	54.41	-1.74	52.67	54.00	-1.33
2390.00	Е	Peak	69.44	-1.74	67.70	74.00	-6.30

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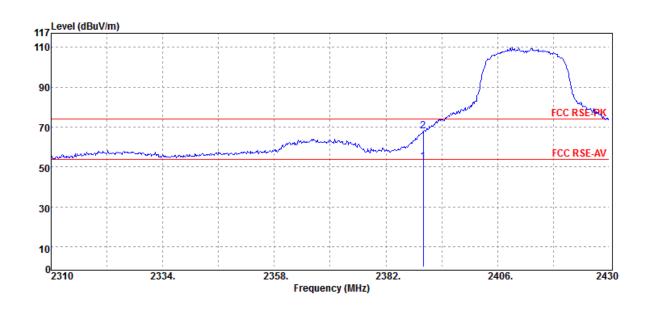


**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11n20 :2412 MHz :Bandedge CH LOW :E1 Plane

Test Date Temp./Humi. Engineer Measurement Antenna Pol.

:2017-08-03 :21 deg\_C / 62 RH :Tin :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Е	Average	54.25	-1.74	52.51	54.00	-1.49
2390.00	Е	Peak	69.76	-1.74	68.02	74.00	-5.98

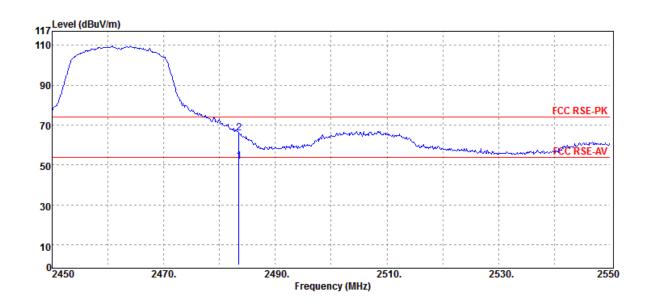
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**Operation Band** :802.11n20 Fundamental Frequency **Operation Mode** EUT Pol. :E1 Plane

:2462 MHz :Bandedge CH HIGH Test Date :2017-08-03 Temp./Humi. :21 deg\_C / 62 RH Engineer :Tin :VERTICAL Measurement Antenna Pol.



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	53.43	-1.62	51.81	54.00	-2.19
2483.50	Е	Peak	67.67	-1.62	66.05	74.00	-7.95

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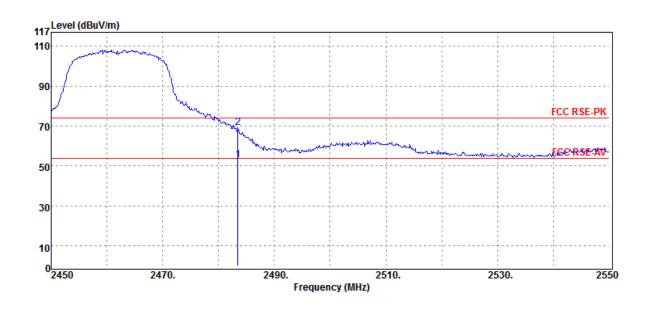


**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11n20 :2462 MHz :Bandedge CH HIGH :E1 Plane

Test Date Temp./Humi. Engineer :Tin Measurement Antenna Pol.

:2017-08-03 :21 deg\_C / 62 RH :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	54.55	-1.62	52.93	54.00	-1.07
2483.50	Е	Peak	70.71	-1.62	69.09	74.00	-4.91

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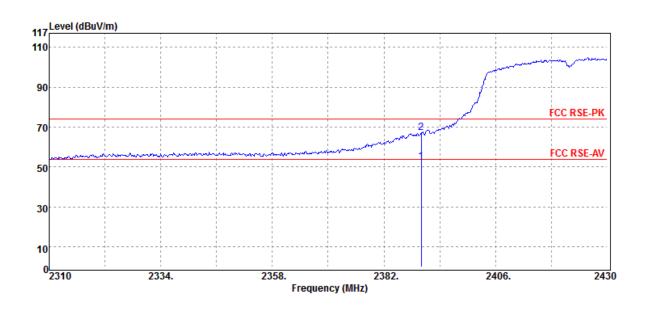


#### Radiated Band Edge Measurement Result (802.11 HT40)

**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11n40 :2422 MHz :Bandedge CH LOW :E1 Plane

Test Date Temp./Humi. Engineer Measurement Antenna Pol. :2017-08-03 :21 deg\_C / 62 RH :Tin :VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Е	Average	54.38	-1.74	52.64	54.00	-1.36
2390.00	E	Peak	68.94	-1.74	67.20	74.00	-6.80

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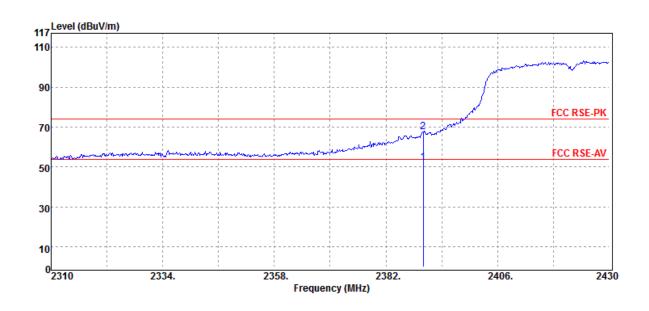
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**Operation Band** Fundamental Frequency **Operation Mode** EUT Pol.

:802.11n40 :2422 MHz :Bandedge CH LOW :E1 Plane

Test Date Temp./Humi. Engineer Measurement Antenna Pol. :2017-08-03 :21 deg\_C / 62 RH :Tin :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Е	Average	53.87	-1.74	52.13	54.00	-1.87
2390.00	Е	Peak	69.47	-1.74	67.73	74.00	-6.27

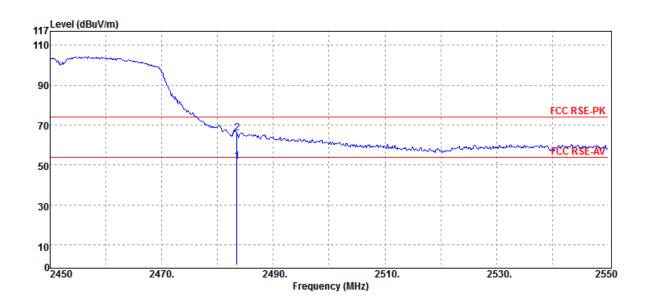
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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**Operation Band** :802.11n40 Fundamental Frequency :2422 MHz **Operation Mode** :Bandedge CH HIGH EUT Pol. :E1 Plane

Test Date :2017-08-03 :21 deg\_C / 62 RH Temp./Humi. Engineer :Tin :VERTICAL Measurement Antenna Pol.



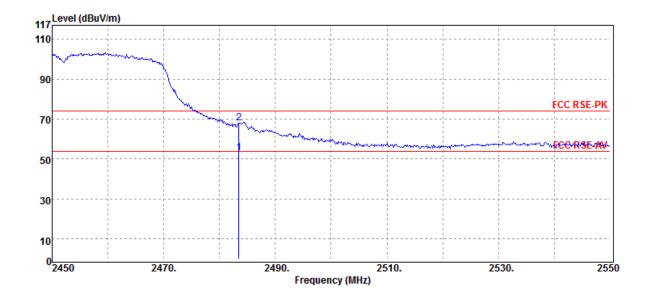
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	53.51	-1.62	51.89	54.00	-2.11
2483.50	Е	Peak	67.77	-1.62	66.15	74.00	-7.85

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**Operation Band** :802.11n40 Fundamental Frequency :2422 MHz **Operation Mode** :Bandedge CH HIGH EUT Pol. :E1 Plane

Test Date :2017-08-03 Temp./Humi. :21 deg\_C / 62 RH Engineer :Tin :HORIZONTAL Measurement Antenna Pol.



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	54.45	-1.62	52.83	54.00	-1.17
2483.50	Е	Peak	69.61	-1.62	67.99	74.00	-6.01

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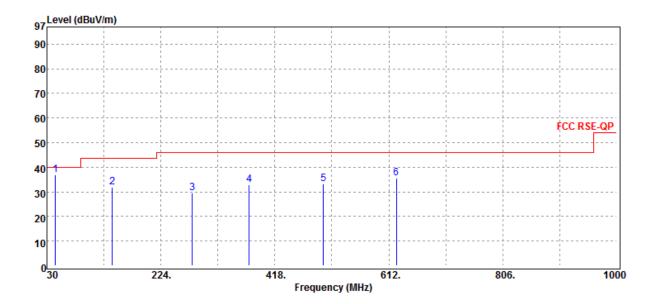


### **Below 1GHz Worst-Case Data:**

#### Radiated Spurious Emission Measurement Result (802.11 g)

Operation Band	:802.11g
Fundamental Frequency	:2412 MHz
Operation Mode	:Tx CH LOW
EUT Pol.	:E1 Plane

Test Date Temp./Humi. Engineer Measurement Antenna Pol. :2017-08-03 :21 deg\_C / 62 RH :Tin :VERTICAL



ł	Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
			Mode	Reading Level		FS	@3m	
	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
Z	14.55	S	Peak	45.12	-8.09	37.03	40.00	-2.97
1	41.55	S	Peak	40.12	-8.26	31.86	43.50	-11.64
2	77.35	S	Peak	36.14	-6.55	29.59	46.00	-16.41
3	74.35	S	Peak	37.48	-4.54	32.94	46.00	-13.06
5	00.45	S	Peak	36.05	-2.68	33.37	46.00	-12.63
6	24.61	S	Peak	35.55	0.15	35.70	46.00	-10.30

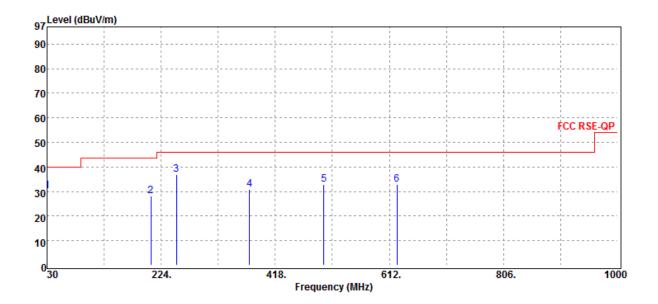
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



Operation Band	:802.11g
Fundamental Frequency	:2412 MHz
Operation Mode	:Tx CH LOW
EUT Pol.	:E1 Plane

Test Date Temp./Humi. Engineer Measurement Antenna Pol.

:2017-08-03 :21 deg\_C / 62 RH :Tin :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
30.00	S	Peak	39.26	-9.19	30.07	40.00	-9.93
206.54	S	Peak	37.98	-9.71	28.27	43.50	-15.23
250.19	S	Peak	44.69	-7.93	36.76	46.00	-9.24
374.35	S	Peak	35.39	-4.54	30.85	46.00	-15.15
500.45	S	Peak	35.55	-2.68	32.87	46.00	-13.13
624.61	S	Peak	32.62	0.15	32.77	46.00	-13.23

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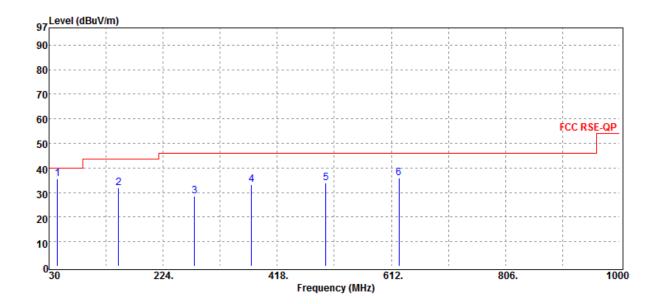
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Operation Band	:802.11g
Fundamental Frequency	:2437 MHz
Operation Mode	:Tx CH MID
EUT Pol.	:E1 Plane

Test Date :2017-08-03 Temp./Humi. :21 deg\_C / 62 RH Engineer :Tin :VERTICAL Measurement Antenna Pol.



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
44.55	S	Peak	43.59	-8.09	35.50	40.00	-4.50
148.34	S	Peak	39.89	-7.89	32.00	43.50	-11.50
277.35	S	Peak	35.04	-6.55	28.49	46.00	-17.51
374.35	S	Peak	37.73	-4.54	33.19	46.00	-12.81
500.45	S	Peak	36.56	-2.68	33.88	46.00	-12.12
624.61	S	Peak	35.77	0.15	35.92	46.00	-10.08

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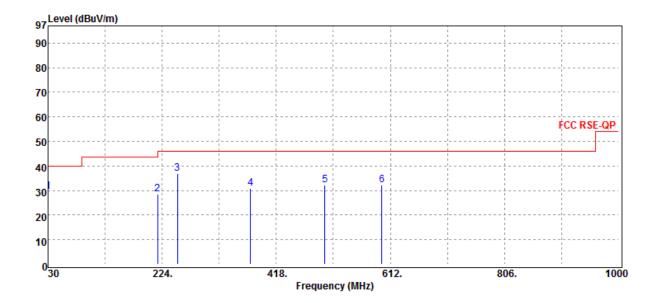
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Operation Band	:802.11g
Fundamental Frequency	:2437 MHz
Operation Mode	:Tx CH MID
EUT Pol.	:E1 Plane

Test Date Temp./Humi. Engineer Measurement Antenna Pol.

:2017-08-03 :21 deg\_C / 62 RH :Tin :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
30.00	S	Peak	38.63	-9.19	29.44	40.00	-10.56
216.24	S	Peak	37.79	-9.43	28.36	46.00	-17.64
250.19	S	Peak	44.88	-7.93	36.95	46.00	-9.05
374.35	S	Peak	35.33	-4.54	30.79	46.00	-15.21
500.45	S	Peak	34.75	-2.68	32.07	46.00	-13.93
597.45	S	Peak	32.31	-0.19	32.12	46.00	-13.88

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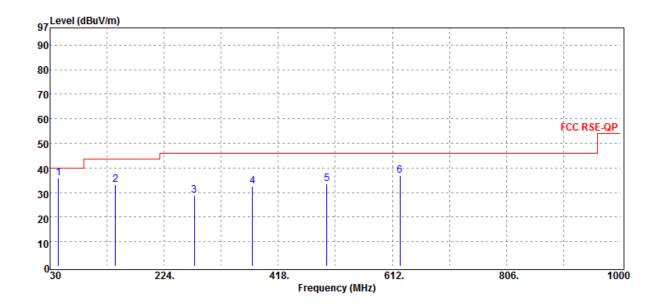
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**Operation Band** :802.11g **Fundamental Frequency** :2462 MHz **Operation Mode** :Tx CH HIGH EUT Pol. :E1 Plane

:2017-08-03 Test Date Temp./Humi. :21 deg\_C / 62 RH Engineer :Tin :VERTICAL Measurement Antenna Pol.



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
44.55	S	Peak	44.01	-8.09	35.92	40.00	-4.08
141.55	S	Peak	41.40	-8.26	33.14	43.50	-10.36
275.41	S	Peak	35.37	-6.63	28.74	46.00	-17.26
374.35	S	Peak	37.02	-4.54	32.48	46.00	-13.52
500.45	S	Peak	36.18	-2.68	33.50	46.00	-12.50
624.61	S	Peak	36.78	0.15	36.93	46.00	-9.07

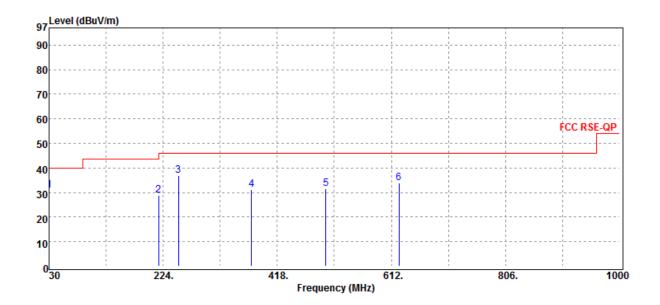
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**Operation Band** :802.11g **Fundamental Frequency** :2462 MHz **Operation Mode** :Tx CH HIGH EUT Pol. :E1 Plane

Test Date Temp./Humi. Engineer Measurement Antenna Pol.

:2017-08-03 :21 deg\_C / 62 RH :Tin :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
30.00	S	Peak	39.98	-9.19	30.79	40.00	-9.21
216.24	S	Peak	38.21	-9.43	28.78	46.00	-17.22
250.19	S	Peak	45.00	-7.93	37.07	46.00	-8.93
374.35	S	Peak	35.72	-4.54	31.18	46.00	-14.82
500.45	S	Peak	34.15	-2.68	31.47	46.00	-14.53
624.61	S	Peak	33.66	0.15	33.81	46.00	-12.19

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### Above 1GHz Data:

#### Radiated Spurious Emission Measurement Result (802.11 b)

Operation Band	:8
Fundamental Frequency	:2
Operation Mode	:T
EUT Pol.	:E

302.11b 2412 MHz **FX CH LOW** :E1 Plane

Test Date Temp./Humi. Engineer Measurement Antenna Pol.

:2017-08-14 :21 deg\_C / 62 RH :Tin :VERTICAL

97 90 80 FCC RSE-PK 70 60 CC RSE-AV 50 b 40 30 20 10 0<sup>L</sup> 1000 6100. 11200. 16300. 21400. 26500 Frequency (MHz)

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Average	27.33	4.93	32.26	54.00	-21.74
4824.00	Н	Peak	36.02	4.93	40.95	74.00	-33.05

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



4824.00

Н

Operation Bar Fundamental Operation Mor EUT Pol.	Frequency	:802.11b :2412 MHz :Tx CH LOV :E1 Plane	V	Test Date Temp./Hu Engineer Measure	umi.	:Tin	08-14 9_C / 62 RH ZONTAL
97 Level (dB	uV/m)						1
90						· · · · · · · · · · · · · · · · · · ·	
80		· · · · · · · · · · · · · · · · · · ·				FCC RSE-PK	
70						FUC KJE-PK	
60				·		FCC RSE-AV	
50							
40	2			·			
30			· · · · · · · · · · · · · · · · · · ·	·		       	
20						 	
10							
0 1000	610	0.	11200.	16300.	21400.	2650	0
			Frequency (MH	Z)			
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Average	26.62	4.93	31.55	54.00	-22.45

Peak

35.79

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4.93

40.72

74.00

-33.28



Operation Ba Fundamental Operation Mo EUT Pol.	Frequency	:802.11b :2437 MHz :Tx CH MID :E1 Plane		Test Date Temp./Hu Engineer Measurer	ımi.	:Tin	g_C / 62 RH
97 Level (dE	BuV/m)						1
90				       			
80			· · · · · · · · · · · · · · · · · · ·			FCC RSE-PK	
70				       			
60						FCC RSE-AV	
50	2		· · · · · · · · · · · · · · · · · · ·	       			
40			·····	1 1 1 1			
30			· · · · · · · · · · · · · · · · · · ·	       			
20			· · · · · · · · · · · · · · · · · · ·	1 1 1 1 1		 	
10						 	
0 <mark>0</mark> 0	610	0.	11200.	16300.	21400.	2650	0
			Frequency (MH				
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Average	26.97	5.13	32.10	54.00	-21.90
4874.00	Н	Peak	41.90	5.13	47.03	74.00	-26.97



Operation Ba Fundamental Operation Mc EUT Pol.	Frequency	:802.11b :2437 MHz :Tx CH MID :E1 Plane	)	Test Date Temp./Hu Engineer Measure	umi.	:Tin	08-14 g_C / 62 RH ZONTAL
97	BuV/m)				-,,		1
90							
80						FCC RSE-PK	
70							
60						FCC RSE-AV	
50	2						
40							
30		       					
20							
10							
0 <mark>0</mark>	610	0.	11200.	16300.	21400.	2650	00
			Frequency (MH	z)			
Гис и	Niete	Detector		Feeter	A stual	l insit	Cata
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level	15	FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
		_					
4874.00	Н	Average	27.11	5.13	32.24	54.00	-21.76
4874.00	Н	Peak	38.10	5.13	43.23	74.00	-30.77



Н

000 441

0017 00 11

Operation Ba Fundamental Operation Mo	I Frequency	:802.11b :2462 MHz :Tx CH HIG	Н	Test Date Temp./Humi. Engineer			:2017-08-14 :21 deg_C / 62 RH :Tin		
EUT Pol.		:E1 Plane		Measure	ment Antenna F	ol. :VERT	ICAL		
97 Level (d	BuV/m)						_		
90									
80						FOC DEE DK			
70						FCC RSE-PK	-		
60						FCC RSE-AV			
50	2			 			-		
40						 			
30									
20						 			
10						       			
0	610	0.	11200. Frequency (MH	16300. z)	21400.	265	 00		
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe		
		Mode	Reading Level		FS	@3m	Margin		
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB		
4924.00	н	Average	27.20	5.25	32.45	54.00	-21.56		

. . .

Peak

37.75

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5.25

43.00

74.00

-31.00



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4924.00

Н

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0017 00 11

| Dperation Ba<br>Fundamental<br>Dperation Mo | Frequency                             | :802.11b<br>:2462 MHz<br>:Tx CH HIG | Н                       | Test Date<br>Temp./Humi.<br>Engineer |                |            |        |  |
|---------------------------------------------|---------------------------------------|-------------------------------------|-------------------------|--------------------------------------|----------------|------------|--------|--|
| EUT Pol.                                    |                                       | :E1 Plane                           |                         | Measure                              | ment Antenna F | ol. :HORI  | ZONTAL |  |
|                                             |                                       |                                     |                         |                                      |                |            |        |  |
| 97 Level (d                                 | BuV/m)                                |                                     |                         |                                      |                |            | -      |  |
| 90                                          |                                       |                                     |                         |                                      |                |            |        |  |
| 80                                          |                                       |                                     |                         |                                      |                |            |        |  |
| 70                                          | · · · · · · · · · · · · · · · · · · · |                                     |                         |                                      |                | FCC RSE-PK | -      |  |
| 60                                          | · · · · · · · · · · · · · · · · · · · |                                     |                         |                                      |                |            |        |  |
| 50                                          | · · · · · · · · · · · · · · · · · · · |                                     |                         |                                      |                | FCC RSE-AV | -      |  |
| 40                                          | 2                                     |                                     |                         |                                      |                |            |        |  |
| 30                                          | 1                                     |                                     |                         |                                      |                |            |        |  |
|                                             |                                       | <br> <br> <br>                      |                         |                                      |                | 1          |        |  |
| 20                                          |                                       |                                     |                         |                                      |                |            |        |  |
| 10                                          |                                       | 1                                   |                         |                                      |                |            |        |  |
| 0 <mark>1000</mark>                         | 610                                   | 0.                                  | 11200.<br>Frequency (MH | 16300.                               | 21400.         | 265        | 00     |  |
|                                             |                                       |                                     | riequency (min          | 2)                                   |                |            |        |  |
| Freq.                                       | Note                                  | Detector                            | Spectrum                | Factor                               | Actual         | Limit      | Safe   |  |
|                                             |                                       | Mode                                | Reading Level           |                                      | FS             | @3m        | Margin |  |
| MHz                                         | F/H/E/S                               | PK/QP/AV                            | dBµV                    | dB                                   | dBµV/m         | dBµV/m     | dB     |  |
|                                             |                                       |                                     |                         |                                      |                |            |        |  |
| 4924.00                                     | Н                                     | Average                             | 27.62                   | 5.25                                 | 32.87          | 54.00      | -21.13 |  |

. . .

Peak

35.82

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5.25

41.07

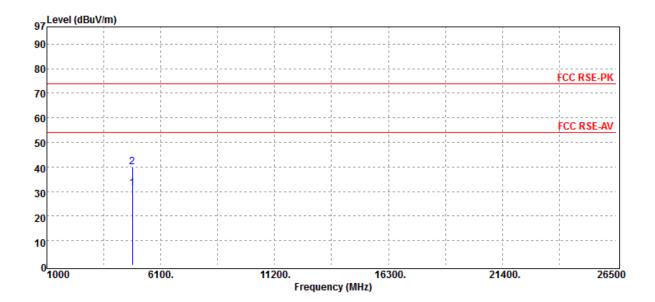
74.00

-32.93



#### Radiated Spurious Emission Measurement Result (802.11 g)

| Operation Band        | :802.11g   | Test Date                | :2017-08-03       |
|-----------------------|------------|--------------------------|-------------------|
| Fundamental Frequency | :2412 MHz  | Temp./Humi.              | :21 deg_C / 62 RH |
| Operation Mode        | :Tx CH LOW | Engineer                 | :Tin              |
| EUT Pol.              | :E1 Plane  | Measurement Antenna Pol. | :VERTICAL         |



| Freq.   | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Safe   |
|---------|---------|----------|---------------|--------|--------|--------|--------|
|         |         | Mode     | Reading Level |        | FS     | @3m    | Margin |
| MHz     | F/H/E/S | PK/QP/AV | dBµV          | dB     | dBµV/m | dBµV/m | dB     |
|         |         |          |               |        |        |        |        |
| 4824.00 | Н       | Average  | 25.47         | 4.93   | 30.40  | 54.00  | -23.60 |
| 4824.00 | Н       | Peak     | 34.52         | 4.93   | 39.45  | 74.00  | -34.55 |

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| Operation Ba<br>Fundamental<br>Operation Mc<br>EUT Pol. | Frequency | :802.11g<br>:2412 MHz<br>:Tx CH LOV<br>:E1 Plane | V                                     | Test Date<br>Temp./Hu<br>Engineer<br>Measurer | umi.   | :Tin       | 08-03<br>g_C / 62 RH<br>ZONTAL |
|---------------------------------------------------------|-----------|--------------------------------------------------|---------------------------------------|-----------------------------------------------|--------|------------|--------------------------------|
| 97 Level (dE                                            | BuV/m)    |                                                  |                                       |                                               |        |            | 1                              |
| 90                                                      |           |                                                  |                                       |                                               |        |            |                                |
| 80                                                      |           |                                                  |                                       |                                               |        | FCC RSE-PK |                                |
| 70                                                      |           |                                                  |                                       |                                               |        |            |                                |
| 60                                                      |           |                                                  | · · · · · · · · · · · · · · · · · · · |                                               |        | FCC RSE-AV |                                |
| 50                                                      |           |                                                  |                                       |                                               |        |            |                                |
| 40                                                      | 2         |                                                  |                                       |                                               |        |            |                                |
| 30                                                      |           |                                                  |                                       |                                               |        |            |                                |
| 20                                                      |           |                                                  |                                       |                                               |        |            |                                |
| 10                                                      |           |                                                  |                                       |                                               |        |            |                                |
| 0 <mark>1000</mark>                                     | 610       | 0.                                               | 11200.                                | 16300.                                        | 21400. | 265        | ]<br>)0                        |
|                                                         |           |                                                  | Frequency (MI                         | łz)                                           |        |            |                                |
| <b>F</b> actor                                          | Nista     | Datastan                                         |                                       | Feeten                                        | Astusl | 1          | 0(-                            |
| Freq.                                                   | Note      | Detector                                         | Spectrum                              | Factor                                        | Actual | Limit      | Safe                           |
|                                                         |           | Mode                                             | Reading Level                         |                                               | FS     | @3m        | Margin                         |
| MHz                                                     | F/H/E/S   | PK/QP/AV                                         | dBµV                                  | dB                                            | dBµV/m | dBµV/m     | dB                             |
|                                                         |           |                                                  |                                       |                                               |        |            |                                |
| 4824.00                                                 | Н         | Average                                          | 25.39                                 | 4.93                                          | 30.32  | 54.00      | -23.68                         |
| 4824.00                                                 | Н         | Peak                                             | 35.11                                 | 4.93                                          | 40.04  | 74.00      | -33.96                         |



| Operation Ba<br>Fundamenta<br>Operation M<br>EUT Pol. | I Frequency | :802.11g<br>:2437 MHz<br>:Tx CH MID<br>:E1 Plane |                         | Test Date<br>Temp./Hu<br>Engineer<br>Measurer | umi.   | :Tin         | _C / 62 RH |
|-------------------------------------------------------|-------------|--------------------------------------------------|-------------------------|-----------------------------------------------|--------|--------------|------------|
| 97 Level (d                                           | IBuV/m)     |                                                  |                         |                                               |        |              |            |
| 90                                                    |             |                                                  |                         |                                               |        |              |            |
| 80                                                    |             |                                                  |                         |                                               |        | FCC RSE-PK   |            |
| 70                                                    |             |                                                  |                         |                                               |        |              |            |
| 60                                                    |             |                                                  |                         |                                               |        | FCC RSE-AV   |            |
| 50                                                    | 2           |                                                  |                         |                                               |        | <sup>1</sup> |            |
| 40                                                    |             |                                                  |                         |                                               |        |              |            |
| 30                                                    |             |                                                  | ·····                   | <br>!<br>!                                    |        |              |            |
| 20                                                    |             |                                                  |                         |                                               |        |              |            |
| 10                                                    |             |                                                  |                         |                                               |        |              |            |
| 0 <mark>1000</mark>                                   | 610         | 0.                                               | 11200.<br>Frequency (MH | 16300.<br>z)                                  | 21400. | 2650         | 0          |
| Freq.                                                 | Note        | Detector                                         | Spectrum                | Factor                                        | Actual | Limit        | Safe       |
|                                                       |             | Mode                                             | Reading Level           |                                               | FS     | @3m          | Margin     |
| MHz                                                   | F/H/E/S     | PK/QP/AV                                         | dBµV                    | dB                                            | dBµV/m | dBµV/m       | dB         |
|                                                       |             |                                                  |                         |                                               |        |              |            |
| 4874.00                                               | Н           | Average                                          | 25.31                   | 5.13                                          | 30.44  | 54.00        | -23.56     |
| 4874.00                                               | Н           | Peak                                             | 39.09                   | 5.13                                          | 44.22  | 74.00        | -29.78     |



| Operation Ba<br>Fundamental<br>Operation Mc<br>EUT Pol. | Frequency | :802.11g<br>:2437 MHz<br>:Tx CH MID<br>:E1 Plane |               | Test Date<br>Temp./Hu<br>Engineer<br>Measure | umi.    | :Tin       | 08-03<br>g_C / 62 RH<br>ZONTAL |
|---------------------------------------------------------|-----------|--------------------------------------------------|---------------|----------------------------------------------|---------|------------|--------------------------------|
| 97                                                      | BuV/m)    |                                                  |               |                                              | -,,     |            | 1                              |
| 90                                                      |           |                                                  |               |                                              |         |            |                                |
| 80                                                      |           |                                                  |               |                                              |         | FCC RSE-PK |                                |
| 70                                                      |           |                                                  |               |                                              |         |            |                                |
| 60                                                      |           |                                                  |               |                                              |         | FCC RSE-AV |                                |
| 50                                                      |           |                                                  |               |                                              |         |            |                                |
| 40                                                      | 2         |                                                  | ·····         |                                              |         |            |                                |
| 30                                                      |           | <br> <br> <br> <br>                              |               |                                              |         |            |                                |
| 20                                                      |           |                                                  |               |                                              |         |            |                                |
| 10                                                      |           |                                                  |               |                                              |         |            |                                |
| 0 <mark>0</mark>                                        | 610       | 0.                                               | 11200.        | 16300.                                       | 21400.  | 2650       | 00                             |
|                                                         |           |                                                  | Frequency (MH | z)                                           |         |            |                                |
| Гис e                                                   | Nata      | Detector                                         |               | Feeter                                       | A stual | Lizzit     | Cata                           |
| Freq.                                                   | Note      | Detector                                         | Spectrum      | Factor                                       | Actual  | Limit      | Safe                           |
|                                                         |           | Mode                                             | Reading Level | 15                                           | FS      | @3m        | Margin                         |
| MHz                                                     | F/H/E/S   | PK/QP/AV                                         | dBµV          | dB                                           | dBµV/m  | dBµV/m     | dB                             |
|                                                         |           | _                                                |               |                                              |         |            |                                |
| 4874.00                                                 | Н         | Average                                          | 25.91         | 5.13                                         | 31.04   | 54.00      | -22.96                         |
| 4874.00                                                 | Н         | Peak                                             | 36.99         | 5.13                                         | 42.12   | 74.00      | -31.88                         |



Н

| Operation B<br>Fundamenta<br>Operation M<br>EUT Pol. | I Frequency | :802.11g<br>:2462 MHz<br>:Tx CH HIG<br>:E1 Plane | Н                       | Test Date<br>Temp./Hu<br>Engineer<br>Measure | umi.   | :Tin       | 9_C / 62 RH |
|------------------------------------------------------|-------------|--------------------------------------------------|-------------------------|----------------------------------------------|--------|------------|-------------|
| 97                                                   | dBuV/m)     |                                                  |                         |                                              |        |            | _           |
| 90                                                   |             |                                                  |                         |                                              |        |            |             |
| 80                                                   |             |                                                  |                         |                                              |        | FCC RSE-PK |             |
| 70                                                   |             |                                                  |                         | ·                                            |        | FUC KSE-PK |             |
| 60                                                   |             |                                                  |                         |                                              |        | FCC RSE-AV |             |
| 50                                                   |             |                                                  |                         |                                              |        |            |             |
| 40                                                   | 2           | ·                                                |                         | ·                                            |        |            |             |
| 30                                                   |             |                                                  |                         | ·                                            |        |            |             |
| 20                                                   |             | <br> <br> <br> <br>                              |                         |                                              |        |            |             |
| 10                                                   |             |                                                  |                         | <br> <br> <br> <br>                          |        |            |             |
| 0                                                    | 610         | 00.                                              | 11200.<br>Frequency (MH | 16300.<br>z)                                 | 21400. | 2650       | 0           |
| Freq.                                                | Note        | Detector                                         | Spectrum                | Factor                                       | Actual | Limit      | Safe        |
|                                                      |             | Mode                                             | Reading Level           |                                              | FS     | @3m        | Margin      |
| MHz                                                  | F/H/E/S     | PK/QP/AV                                         | dBµV                    | dB                                           | dBµV/m | dBµV/m     | dB          |
| 4924.00                                              | н           | Average                                          | 26.24                   | 5.25                                         | 31.49  | 54.00      | -22.51      |

Peak

36.08

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5.25

41.33

74.00

-32.67



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| Operation Ba<br>Fundamental<br>Operation Mo | I Frequency                           | :802.11g<br>:2462 MHz<br>:Tx CH HIG | Н             | Test Date<br>Temp./Humi.<br>Engineer |                |            |        |  |
|---|---------------------------------------|-------------------------------------|---------------|--------------------------------------|----------------|------------|--------|--|
| EUT Pol.                                    |                                       | :E1 Plane                           |               | Measure                              | ment Antenna P | ol. :HORI  | ZONTAL |  |
| 97  | BuV/m)                                |                                     |               |                                      |                |            | 7      |  |
| 90  |                                       |                                     |               |                                      |                |            |        |  |
| 80  |                                       |                                     |               |                                      |                | FCC RSE-PK |        |  |
| 70  | · · · · · · · · · · · · · · · · · · · |                                     |               | <br>1                                |                |            | •      |  |
| 60  |                                       |                                     |               |                                      |                | FCC RSE-AV |        |  |
| 50  |                                       |                                     |               | <br>                                 |                |            | •      |  |
| 40  | 2                                     |                                     |               |                                      |                |            |        |  |
| 30  |                                       |                                     |               |                                      |                |            |        |  |
| 20  |                                       |                                     |               | <br>                                 |                |            |        |  |
| 10  |                                       | <br> <br> <br>                      |               |                                      |                |            |        |  |
| 0 <mark></mark>                             | 610                                   | 0.                                  | 11200.        | 16300.                               | 21400.         | 265        | 00     |  |
|   |                                       |                                     | Frequency (MH | Z)                                   |                |            |        |  |
| Freq.                                       | Note                                  | Detector                            | Spectrum      | Factor                               | Actual         | Limit      | Safe   |  |
|   |                                       | Mode                                | Reading Level |                                      | FS             | @3m        | Margin |  |
| MHz   | F/H/E/S                               | PK/QP/AV                            | dBµV          | dB                                   | dBµV/m         | dBµV/m     | dB     |  |
| 4924.00                                     | Н                                     | Avorago                             | 26.98         | 5.25                                 | 32.23          | 54.00      | -21.77 |  |
| 4924.00                                     | П                                     | Average                             | 20.90         | 0.20                                 | 32.23          | 54.00      | -21.// |  |

. . .

Peak

34.97

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5.25

40.22

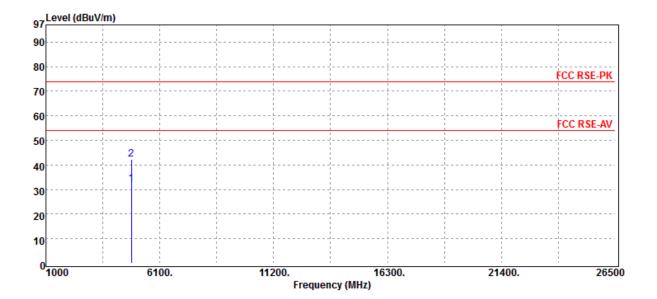
74.00

-33.78



#### Radiated Spurious Emission Measurement Result (802.11 HT20)

| Operation Band        | :802.11n20 | Test Date /              | :2017-08-03       |
|-----------------------|------------|--------------------------|-------------------|
| Fundamental Frequency | :2412 MHz  | Temp./Humi.              | :21 deg_C / 62 RH |
| Operation Mode        | :Tx CH LOW | Engineer                 | :Tin              |
| EUT Pol.              | :E1 Plane  | Measurement Antenna Pol. | :VERTICAL         |



| Freq.   | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Safe   |
|---------|---------|----------|---------------|--------|--------|--------|--------|
|         |         | Mode     | Reading Level |        | FS     | @3m    | Margin |
| MHz     | F/H/E/S | PK/QP/AV | dBµV          | dB     | dBµV/m | dBµV/m | dB     |
|         |         |          |               |        |        |        |        |
| 4824.00 | Н       | Average  | 27.20         | 4.93   | 32.13  | 54.00  | -21.87 |
| 4824.00 | Н       | Peak     | 37.12         | 4.93   | 42.05  | 74.00  | -31.95 |

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| Operation Ba<br>Fundamental<br>Operation Mo<br>EUT Pol. | Frequency | :802.11n20<br>:2412 MHz<br>:Tx CH LOV<br>:E1 Plane | v                       | Test Date<br>Temp./Hu<br>Engineer<br>Measurer | ımi.   | :Tin                                  | 08-03<br>C / 62 RH<br>CONTAL |
|---|-----------|--|-------------------------|---|--------|---------------------------------------|------------------------------|
| 97 Level (dl  | BuV/m)    |  |                         |   |        |                                       |                              |
| 90  |           |  |                         | ·   |        |                                       |                              |
| 80  |           |  |                         | ·   |        | FCC RSE-PK                            |                              |
| 70  |           |  |                         |   |        |                                       |                              |
| 60  |           |  |                         |   |        | FCC RSE-AV                            |                              |
| 50  |           |  |                         |   |        |                                       |                              |
| 40  | 2         |  |                         |   |        |                                       |                              |
| 30  |           |  |                         | ·   |        | · · · · · · · · · · · · · · · · · · · |                              |
| 20  |           |  |                         |   |        | 1<br>                                 |                              |
| 10  |           |  |                         |   |        | <br>                                  |                              |
| 0 <mark></mark><br>1000                                 | 610       | 0.   | 11200.<br>Frequency (MH | 16300.<br>z)                                  | 21400. | 2650                                  | 0                            |
| Freq.   | Note      | Detector   | Spectrum                | Factor  | Actual | Limit                                 | Safe                         |
|   |           | Mode   | Reading Level           |   | FS     | @3m                                   | Margin                       |
| MHz   | F/H/E/S   | PK/QP/AV   | dBµV                    | dB  | dBµV/m | dBµV/m                                | dB                           |
| 4824.00   | н         | Average  | 27.39                   | 4.93  | 32.32  | 54.00                                 | -21.68                       |

Peak

35.58

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4.93

40.51

74.00

-33.49



| Operation Ba<br>Fundamental<br>Operation Mc<br>EUT Pol. | Frequency | :802.11n20<br>:2437 MHz<br>:Tx CH MID<br>:E1 Plane | )                       | Test Date<br>Temp./Hu<br>Engineer<br>Measure | ımi.    | :Tin       | g_C / 62 RH |
|---|-----------|--|-------------------------|--|---------|------------|-------------|
| 97  | BuV/m)    |  |                         |  | -::     |            | 1           |
| 90  |           |  |                         |  |         |            |             |
| 80  |           |  |                         |  |         | FCC RSE-PK |             |
| 70  |           | <br> <br> <br> <br>                                |                         |  |         |            |             |
| 60  |           |  |                         |  |         | FCC RSE-AV |             |
| 50  |           |  |                         |  |         |            |             |
| 40  | 2         |  |                         |  |         |            |             |
| 30  |           | <br>   |                         |  |         |            |             |
| 20  |           |  |                         |  | 1 1<br> | <br>       |             |
| 10  |           |  |                         |  |         | <br>       |             |
| 0 <mark></mark><br>1000                                 | 610       | 0.   | 11200.<br>Frequency (Mł | 16300.<br>Iz)                                | 21400.  | 2650       | 0           |
| Freq.   | Note      | Detector   | Spectrum                | Factor                                       | Actual  | Limit      | Safe        |
|   |           | Mode   | Reading Level           |  | FS      | @3m        | Margin      |
| MHz   | F/H/E/S   | PK/QP/AV   | dBµV                    | dB   | dBµV/m  | dBµV/m     | dB          |
|   |           |  |                         |  |         |            |             |
| 4874.00   | Н         | Average  | 26.77                   | 5.13   | 31.90   | 54.00      | -22.10      |
| 4874.00   | Н         | Peak   | 34.56                   | 5.13   | 39.69   | 74.00      | -34.31      |



| Operation Ba<br>Fundamental<br>Operation Mo<br>EUT Pol. | Frequency | :802.11n20<br>:2437 MHz<br>:Tx CH MID<br>:E1 Plane | )             | Test Date<br>Temp./Hu<br>Engineer<br>Measure | umi.         | :Tin       | 08-03<br>g_C / 62 RH<br>ZONTAL |
|---|-----------|--|---------------|--|--------------|------------|--------------------------------|
| 97  | BuV/m)    |  |               |  |              |            | 7                              |
| 90  |           |  |               |  |              |            |                                |
| 80  |           |  |               |  |              | FCC RSE-PK |                                |
| 70  |           |  |               | <br> <br> <br> <br>                          |              |            |                                |
| 60  |           |  |               |  |              | FCC RSE-AV |                                |
| 50  |           |  |               | 1<br>  |              |            |                                |
| 40  | 2         |  |               |  |              |            |                                |
| 30  |           |  |               |  |              |            |                                |
| 20  |           |  |               |  |              |            |                                |
| 10  |           |  |               |  |              |            |                                |
| 0 <mark>0</mark> 0                                      | 610       | 0.   | 11200.        | 16300.                                       | 21400.       | 2650       | <br>D0                         |
|   |           |  | Frequency (MH | z)   |              |            |                                |
| Гиса  | Nata      | Detector   |               | Feeter                                       | A atual      | Lingit     | Coto                           |
| Freq.   | Note      | Detector   | Spectrum      | Factor                                       | Actual<br>FS | Limit      | Safe                           |
|   |           | Mode   | Reading Level |  |              | @3m        | Margin                         |
| MHz   | F/H/E/S   | PK/QP/AV   | dBµV          | dB   | dBµV/m       | dBµV/m     | dB                             |
| 4074.00   |           | A  | 07.40         | E 40   | 00.00        | 54.00      | 04 74                          |
| 4874.00   | н         | Average  | 27.16         | 5.13   | 32.29        | 54.00      | -21.71                         |
| 4874.00   | Н         | Peak   | 34.92         | 5.13   | 40.05        | 74.00      | -33.95                         |



4924.00

Н

Н

| Operation<br>Fundame<br>Operation<br>EUT Pol. | ental Frequency<br>n Mode | :802.11n20<br>:2462 MHz<br>:Tx CH HIG<br>:E1 Plane | Н                                     | Test Date<br>Temp./Humi.<br>Engineer<br>Measurement Antenna Pol |        |            | 08-03<br>J_C / 62 RH<br>CAL |
|---|---------------------------|--|---------------------------------------|---|--------|------------|-----------------------------|
| 97 Le   | vel (dBuV/m)              |  |                                       |   |        |            |                             |
| 90  |                           |  |                                       |   |        |            |                             |
| 80  |                           |  |                                       |   |        | FCC RSE-PK |                             |
| 70  |                           |  | · · · · · · · · · · · · · · · · · · · |   |        |            |                             |
| 60  |                           |  |                                       |   |        | FCC RSE-AV |                             |
| 50  |                           |  |                                       |   |        |            |                             |
| 40  | 2                         | · · · · · · · · · · · · · · · · · · ·              |                                       |   |        | ·          |                             |
| 30  |                           |  |                                       |   |        |            |                             |
| 20  |                           |  |                                       |   |        | <br>       |                             |
| 10  |                           |  |                                       |   |        | ·          |                             |
| 0   | 00 610                    | 0  | 11200.                                | 16300.  | 21400. | 2650       | 0                           |
| 10  |                           |  | Frequency (MHz                        |   | 21400. | 2050       |                             |
|   |                           |  |                                       |   |        |            |                             |
| Freq.   | Note                      | Detector   | Spectrum                              | Factor  | Actual | Limit      | Safe                        |
|   |                           | Mode   | Reading Level                         |   | FS     | @3m        | Margin                      |
| MHz   | F/H/E/S                   | PK/QP/AV   | dBµV                                  | dB  | dBµV/m | dBµV/m     | dB                          |
|   |                           |  |                                       |   |        |            |                             |
|   |                           | _  |                                       |   |        |            |                             |

26.03

35.70

Average

Peak

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5.25

5.25

31.28

40.95

54.00

74.00

-22.72

-33.05



4924.00

Н

Н

| Operation Ba<br>Fundamenta<br>Operation Mo<br>EUT Pol. | I Frequency                           | :802.11n20<br>:2462 MHz<br>:Tx CH HIG<br>:E1 Plane | Н                                     | Test Date<br>Temp./Humi.<br>Engineer<br>Measurement Antenna Pol. |        | :Tin       | 08-03<br>9_C / 62 RH<br>ZONTAL |
|--|---------------------------------------|--|---------------------------------------|--|--------|------------|--------------------------------|
| 97   | BuV/m)                                |  |                                       |  |        |            |                                |
| 90   |                                       |  |                                       |  |        |            |                                |
| 80   |                                       |  |                                       |  |        | FCC RSE-PK |                                |
| 70   |                                       |  |                                       |  |        |            |                                |
| 60   | · · · · · · · · · · · · · · · · · · · |  | · · · · · · · · · · · · · · · · · · · | <br> <br> <br> <br> <br>   |        | FCC RSE-AV |                                |
| 50   |                                       |  |                                       | <br> <br> <br> <br> <br>   |        |            |                                |
| 40   | 2                                     |  | · · · · · · · · · · · · · · · · · · · | <br> <br> <br> <br>  |        |            |                                |
| 30   |                                       |  |                                       |  |        | ·          |                                |
| 20   |                                       |  |                                       | <br> <br> <br> <br>  |        |            |                                |
| 10   |                                       |  |                                       |  |        |            |                                |
| 0  | 610                                   | 0.   | 11200.<br>Frequency (N                | 16300.   | 21400. | 2650       | 0                              |
|  |                                       |  | i requelicy (i                        |  |        |            |                                |
| Freq.  | Note                                  | Detector   | Spectrum                              | Factor   | Actual | Limit      | Safe                           |
|  |                                       | Mode   | Reading Level                         |  | FS     | @3m        | Margin                         |
| MHz  | F/H/E/S                               | PK/QP/AV   | dBµV                                  | dB   | dBµV/m | dBµV/m     | dB                             |
|  |                                       |  |                                       |  |        |            |                                |

26.88

36.60

Average

Peak

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5.25

5.25

32.13

41.85

54.00

74.00

-21.87

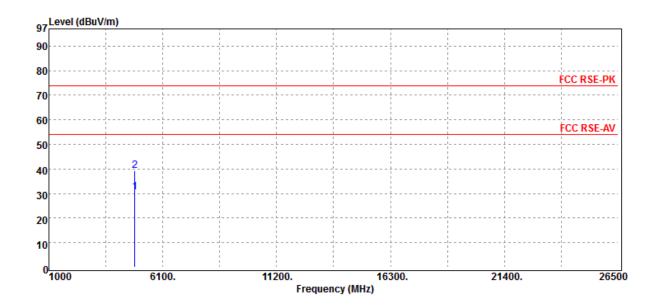
-32.15



#### Radiated Spurious Emission Measurement Result (802.11 HT40)

| Operation Band        | :802.11n40 | Test Date /              |
|-----------------------|------------|--------------------------|
| Fundamental Frequency | :2422 MHz  | Temp./Humi.              |
| Operation Mode        | :Tx CH LOW | Engineer                 |
| EUT Pol.              | :E1 Plane  | Measurement Antenna Pol. |

:2017-08-03 :21 deg\_C / 62 RH :Tin :VERTICAL



| Freq.   | Note    | Detector | Spectrum      | Factor | Actual | Limit  | Safe   |
|---------|---------|----------|---------------|--------|--------|--------|--------|
|         |         | Mode     | Reading Level |        | FS     | @3m    | Margin |
| MHz     | F/H/E/S | PK/QP/AV | dBµV          | dB     | dBµV/m | dBµV/m | dB     |
|         |         |          |               |        |        |        |        |
| 4844.00 | Н       | Average  | 25.41         | 4.97   | 30.38  | 54.00  | -23.62 |
| 4844.00 | Н       | Peak     | 34.19         | 4.97   | 39.16  | 74.00  | -34.84 |

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



Н

| Operation Ba<br>Fundamental<br>Operation Mo<br>EUT Pol. | Frequency | :802.11n40<br>:2422 MHz<br>:Tx CH LOV<br>:E1 Plane | V                       | Test Date<br>Temp./Hu<br>Engineer<br>Measure | umi.   | :Tin       | 08-03<br>g_C / 62 RH<br>ZONTAL |
|---|-----------|--|-------------------------|--|--------|------------|--------------------------------|
| 97  | BuV/m)    |  |                         |  |        |            |                                |
| 90  |           |  |                         |  |        |            |                                |
| 80  |           |  |                         | 1<br>  |        | FCC RSE-PK |                                |
| 70  |           |  |                         |  |        |            |                                |
| 60  |           |  |                         | 1<br>  |        | FCC RSE-AV |                                |
| 50  |           |  |                         |  |        |            |                                |
| 40  | 2         |  |                         |  |        |            |                                |
| 30  |           |  |                         | 1<br><br>1<br>1                              |        | 1<br>      |                                |
| 20  |           |  |                         |  |        | <br>       |                                |
| 10  |           |  |                         |  |        |            |                                |
| 0 <mark></mark><br>1000                                 | 610       | 0.   | 11200.<br>Frequency (MH | 16300.<br>z)                                 | 21400. | 2650       | ]<br>90                        |
| Freq.   | Note      | Detector   | Spectrum                | Factor                                       | Actual | Limit      | Safe                           |
|   |           | Mode   | Reading Level           |  | FS     | @3m        | Margin                         |
| MHz   | F/H/E/S   | PK/QP/AV   | dBµV                    | dB   | dBµV/m | dBµV/m     | dB                             |
| 4844.00   | н         | Average  | 25.87                   | 4.97   | 30.84  | 54.00      | -23.16                         |

Peak

33.18

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4.97

38.15

74.00

-35.85



| Operation Bar<br>Fundamental<br>Operation Mo<br>EUT Pol. | Frequency                             | :802.11n40<br>:2437 MHz<br>:Tx CH MID<br>:E1 Plane |                                       | Test Date<br>Temp./Hu<br>Engineer<br>Measurer |        | :Tin                | <u>_</u> C / 62 RH |
|--|---------------------------------------|--|---------------------------------------|---|--------|---------------------|--------------------|
| 97   | uV/m)                                 |  |                                       |   |        |                     |                    |
| 90   |                                       | · · · · · · · · · · · · · · · · · · ·              |                                       |   |        |                     |                    |
| 80   | · · · · · · · · · · · · · · · · · · · |  |                                       |   |        | FCC RSE-PK          |                    |
| 70   | ·                                     |  | · · · · · · · · · · · · · · · · · · · |   |        |                     |                    |
| 60   |                                       |  |                                       |   |        | FCC RSE-AV          |                    |
| 50   |                                       | · · · · · · · · · · · · · · · · · · ·              | · · · · · · · · · · · · · · · · · · · |   |        |                     |                    |
| 40   |                                       | ·····  |                                       |   |        |                     |                    |
| 30   |                                       | · · · · · · · · · · · · · · · · · · ·              |                                       |   |        |                     |                    |
| 20   |                                       | <br> <br> <br> <br>                                |                                       | <br> <br> <br>                                |        | <br> <br> <br>      |                    |
| 10   |                                       | <br> <br> <br> <br> <br>                           | ·····                                 | <br> <br> <br> <br>                           |        | <br> <br> <br> <br> |                    |
| 0 <mark></mark><br>1000                                  | 610                                   | 0.   | 11200.<br>Frequency (MH               | 16300.<br>z)                                  | 21400. | 2650                | 0                  |
|  |                                       |  |                                       |   |        |                     |                    |
| Freq.  | Note                                  | Detector   | Spectrum                              | Factor  | Actual | Limit               | Safe               |
|  |                                       | Mode   | Reading Level                         |   | FS     | @3m                 | Margin             |
| MHz  | F/H/E/S                               | PK/QP/AV   | dBµV                                  | dB  | dBµV/m | dBµV/m              | dB                 |
|  |                                       |  |                                       |   |        |                     |                    |
| 4874.00  | Н                                     | Average  | 26.00                                 | 5.13  | 31.13  | 54.00               | -22.87             |
| 4874.00  | Н                                     | Peak   | 33.25                                 | 5.13  | 38.38  | 74.00               | -35.62             |



| Operation Ba<br>Fundamental<br>Operation Mo<br>EUT Pol. | Frequency | :802.11n40<br>:2437 MHz<br>:Tx CH MID<br>:E1 Plane | )             | Test Date<br>Temp./Hu<br>Engineer<br>Measurer |        | :Tin       | 08-03<br> _C / 62 RH<br>CONTAL |
|---|-----------|--|---------------|---|--------|------------|--------------------------------|
| 97  | BuV/m)    |  |               |   |        |            |                                |
| 90  |           |  |               |   |        |            |                                |
| 80  |           |  |               | ·   |        | FCC RSE-PK |                                |
| 70  |           |  |               |   |        |            |                                |
| 60  |           |  |               |   |        | FCC RSE-AV |                                |
| 50  |           |  |               | ·   |        |            |                                |
| 40  | 2         |  |               |   |        |            |                                |
| 30  |           |  |               |   |        |            |                                |
| 20  |           |  |               | ·   |        | 1<br>1<br> |                                |
| 10  |           |  |               |   |        | <br>       |                                |
| 0 <mark>0</mark> 0                                      | 610       | 0.   | 11200.        | 16300.  | 21400. | 2650       | 0                              |
|   |           |  | Frequency (MH |   |        | 2000       | -                              |
|   |           |  |               |   |        |            |                                |
| Freq.   | Note      | Detector   | Spectrum      | Factor  | Actual | Limit      | Safe                           |
|   |           | Mode   | Reading Level |   | FS     | @3m        | Margin                         |
| MHz   | F/H/E/S   | PK/QP/AV   | dBµV          | dB  | dBµV/m | dBµV/m     | dB                             |
|   |           |  |               |   |        |            |                                |
| 4874.00   | Н         | Average  | 26.22         | 5.13  | 31.35  | 54.00      | -22.65                         |
| 4874.00   | Н         | Peak   | 34.17         | 5.13  | 39.30  | 74.00      | -34.70                         |



# 12 PEAK POWER SPECTRAL DENSITY

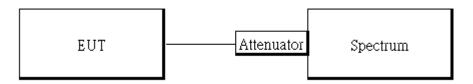
#### **12.1 Standard Applicable**

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

#### **12.2 Measurement Equipment Used**

| Conducted Emission Test Site |               |              |            |            |            |  |  |  |
|------------------------------|---------------|--------------|------------|------------|------------|--|--|--|
| EQUIPMENT                    | MFR           | MODEL SERIAL |            | LAST       | CAL DUE.   |  |  |  |
| TYPE                         |               | NUMBER       | NUMBER     | CAL.       |            |  |  |  |
| EXA Spectrum<br>Analyzer     | Agilent       | N9030A       | MY53120760 | 03/21/2017 | 03/20/2018 |  |  |  |
| DC Block                     | Mini-Circuits | BLK-18-S+    | 1          | 01/05/2017 | 01/04/2018 |  |  |  |
| Attenuator                   | Mini-Circuit  | BW-S10W2+    | 2          | 01/05/2017 | 01/04/2018 |  |  |  |

#### 12.3 Test Set-up



#### **12.4 Measurement Procedure**

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 v04 DTS Meas. Guidance .
- 3. Set the span to 1.5 times the DTS channel bandwidth.
- 4. Set the RBW = 3 kHz. & the VBW = 10 kHz
- 5. For defining Restricted Band Edge Limit: Set the RBW = 100kHz & VBW = 300 kHz.
- 6. Detector = peak.
- 7. Sweep time = auto couple.
- 8. Trace mode = max hold.
- 9. Allow trace to fully stabilize.
- 10. Use the peak marker function to determine the maximum amplitude level.
- 11.802.11n MIMO mode: offset is set following "measure and add 10 Log (N)" on spectrum to measure the PSD for MIMO mode. Offset = cable loss + 10 log (N), where N is number of transmitting antenna. N=2 for this given application.

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| Note:                           |                                    |
|---------------------------------|------------------------------------|
| Antenna Gain:                   | <i>1.62</i> dBi                    |
| Aux1 Antenna Gain:              | <i>2.58</i> dBi                    |
| Aux2 Antenna Gain:              | <i>0.00</i> dBi                    |
| Aux3 Antenna Gain:              | <i>0.00</i> dBi                    |
| Number Antenna:                 | <i>2</i> pcs                       |
| Limit:                          | <i>8</i> dBm                       |
| The antenna gain is grater than | 6dBi in MIMO mode the limit reduce |

as below: Directional gain = gain of antenna element + 10 log (# of TX antenna elements) Effective Legacy Gain (dBi) = 2.58+3.01=5.59dBi Limit: 8dBm - (5.59-6dBi)=8

#### **12.5 Measurement Result**

| POWER DENSITY 802.11b |                                  |                |                                   |                |        |  |
|-----------------------|----------------------------------|----------------|-----------------------------------|----------------|--------|--|
| Freq.<br>(MHz)        | PPSD W/O<br>Duty Factor<br>(dBm) | Duty<br>Factor | PPSD With<br>Duty Factor<br>(dBm) | Limit<br>(dBm) | Result |  |
| 2412                  | 3.74                             | 0.02           | 3.76                              | 8.00           | PASS   |  |
| 2437                  | 3.87                             | 0.02           | 3.89                              | 8.00           | PASS   |  |
| 2462                  | 2.46                             | 0.02           | 2.48                              | 8.00           | PASS   |  |

| POWER DENSITY 802.11g |                                  |                |                                   |                |        |  |
|-----------------------|----------------------------------|----------------|-----------------------------------|----------------|--------|--|
| Freq.<br>(MHz)        | PPSD W/O<br>Duty Factor<br>(dBm) | Duty<br>Factor | PPSD With<br>Duty Factor<br>(dBm) | Limit<br>(dBm) | Result |  |
| 2412                  | -1.57                            | 0.11           | -1.46                             | 8.00           | PASS   |  |
| 2437                  | 1.64                             | 0.11           | 1.75                              | 8.00           | PASS   |  |
| 2462                  | -1.39                            | 0.11           | -1.28                             | 8.00           | PASS   |  |

| POWER DENSITY 802.11n HT20 |                                  |                |                                   |                |        |  |
|----------------------------|----------------------------------|----------------|-----------------------------------|----------------|--------|--|
| Freq.<br>(MHz)             | PPSD W/O<br>Duty Factor<br>(dBm) | Duty<br>Factor | PPSD With<br>Duty Factor<br>(dBm) | Limit<br>(dBm) | Result |  |
| 2412                       | -0.96                            | 0.22           | -0.74                             | 8.00           | PASS   |  |
| 2437                       | 1.59                             | 0.22           | 1.81                              | 8.00           | PASS   |  |
| 2462                       | -1.57                            | 0.22           | -1.35                             | 8.00           | PASS   |  |

| POWER DENSITY 802.11n HT40 |                                  |                |                                   |                |        |  |
|----------------------------|----------------------------------|----------------|-----------------------------------|----------------|--------|--|
| Freq.<br>(MHz)             | PPSD W/O<br>Duty Factor<br>(dBm) | Duty<br>Factor | PPSD With<br>Duty Factor<br>(dBm) | Limit<br>(dBm) | Result |  |
| 2422                       | -8.94                            | 0.33           | -8.61                             | 8.00           | PASS   |  |
| 2437                       | -0.2                             | 0.33           | 0.13                              | 8.00           | PASS   |  |
| 2452                       | -6.61                            | 0.33           | -6.28                             | 8.00           | PASS   |  |

#### \*Refer to next page for plots

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# 802.11b Power Spectral Density Test Plot (CH-Low)



## **Power Spectral Density Test Plot (CH-Mid)**



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# Power Spectral Density Test Plot (CH-High)



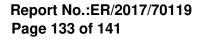
# 802.11g

# Power Spectral Density Test Plot (CH-Low)



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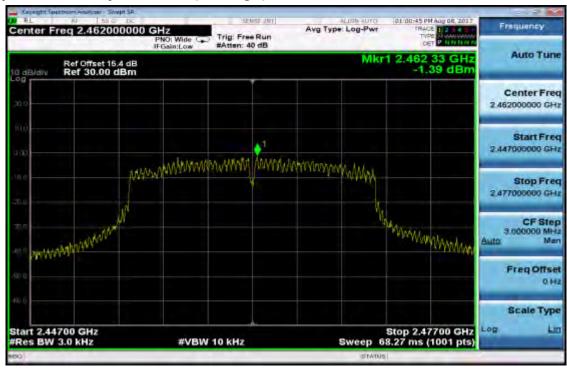




## Power Spectral Density Test Plot (CH-Mid)



#### Power Spectral Density Test Plot (CH-High)



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# 802.11n HT20 (MIMO) Power Spectral Density Test Plot (CH-Low)



## Power Spectral Density Test Plot (CH-Mid)

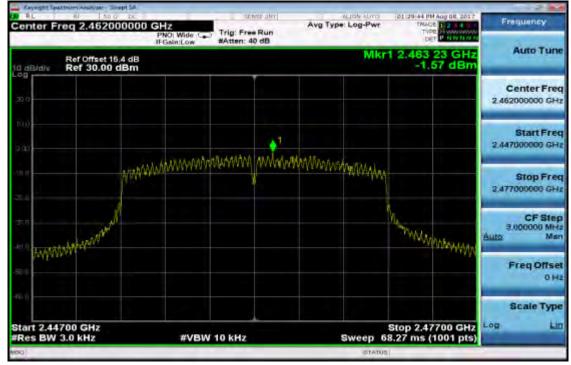


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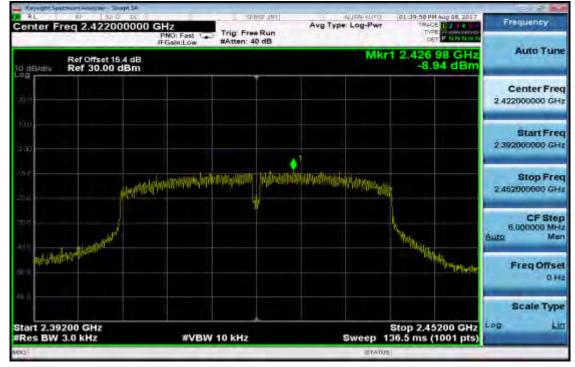


# Power Spectral Density Test Plot (CH-High)



# 802.11n HT40 (MIMO)

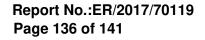
## Power Spectral Density Test Plot (CH-Low)



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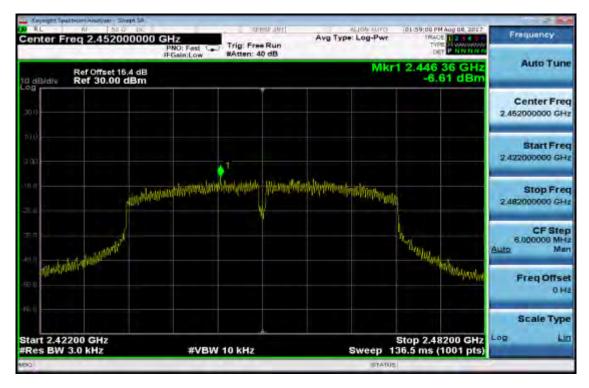




## **Power Spectral Density Test Plot (CH-Mid)**

| Keyleght Spectrum Assayter - Skep<br>RL R/ 55.0 | DC.                               | The cares of                    | 4105 store   | 01:50:22 PM Aug 08, 2017               |                                  |
|---|-----------------------------------|---------------------------------|--|--|----------------------------------|
| Center Freq 2.437000                            | PNO: Fast C                       | Trig: Free Run<br>#Atten: 40 dB | Avg Type: Log-Pwr  | TRACE 2 2 4 2 1<br>TYPE PLANAGED       | Frequency                        |
| Ref Offset 15.4<br>Ref 30.00 dB                 | dB                                | HARMEN IN COM                   | Mkr  | 1 2.438 56 GHz<br>-0.20 dBm            | Auto Tun                         |
| <b>0</b> 0                                      |                                   |                                 |  |  | Center Fre<br>2.437000000 GH     |
| 10.0<br>2 aŭ                                    | and a stranger with               | dokumitran aliamediri           | MWW. Hotocome Linters  |  | Start Fre<br>2.407000000 GF      |
| 70.0  | eventingen an der sternen sind på | Y<br>Y                          | an standard and a st | Maria                                  | Stop Fre<br>2.46700000 GH        |
| AND         |                                   |                                 |  |  | CF Ste<br>6.000000 MP<br>Auto Mo |
| 50 0  |                                   |                                 |  |  | Freq Offs<br>01                  |
| Start 2.40700 GHz<br>Res BW 3.0 kHz             | #VBW                              | 10 kHz                          | Sweep  | Stop 2.46700 GHz<br>36.5 ms (1001 pts) | Scale Typ                        |
| 00  |                                   |                                 | STATU  |  |                                  |

#### Power Spectral Density Test Plot (CH-High)



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# 802.11b Power Spectral Density for Bandedge Limit (CH-Low)



#### Power Spectral Density for Bandedge Limit (CH-High)



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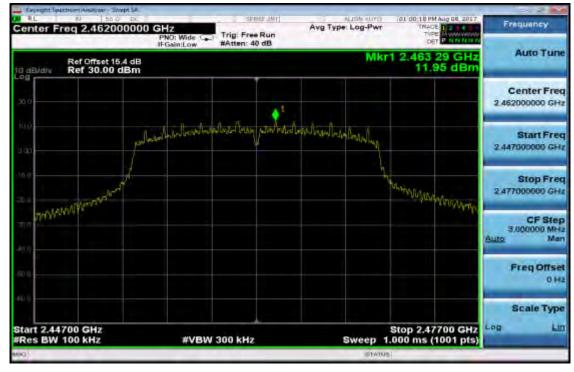
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## 802.11g Power Spectral Density for Bandedge Limit (CH-Low)



# Power Spectral Density for Bandedge Limit (CH-High)

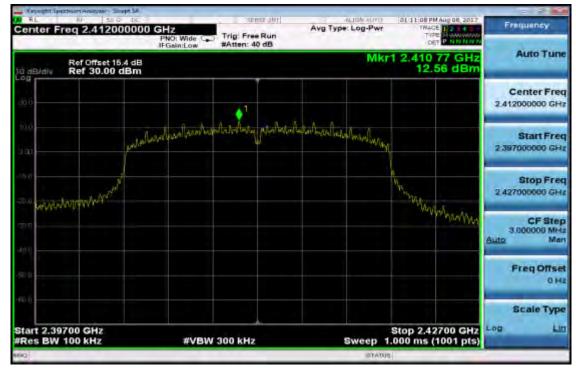


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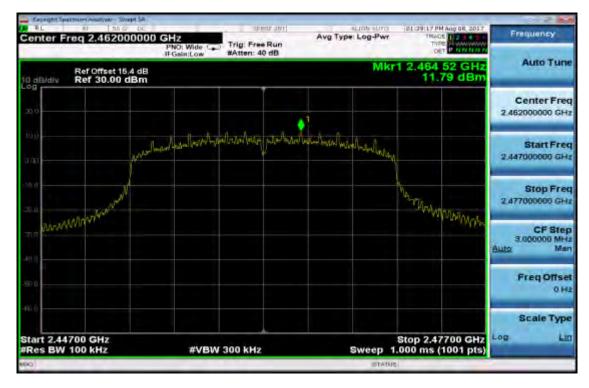
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## 802.11n HT20 Power Spectral Density for Bandedge Limit (CH-Low)



# Power Spectral Density for Bandedge Limit (CH-High)



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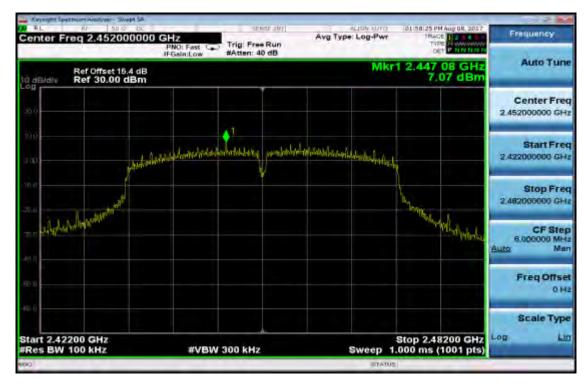
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## 802.11n HT40 Power Spectral Density for Bandedge Limit (CH-Low)



# Power Spectral Density for Bandedge Limit (CH-High)



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# **13 ANTENNA REQUIREMENT**

#### **13.1 Standard Applicable**

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

If the transmitting antenna is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi.

According to RSS-GEN 8.3

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.9 When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

#### **13.2 Antenna Connected Construction**

An embedded-in antenna design is used.

The antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.

~ End of Report ~

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