

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

# INTENTIONAL RADIATOR CERTIFICATION TO **FCC PART 15 SUBPART C REQUIREMENT**

**Product Name:** Wi-Fi Module

**Brand Name:** CC&C

Model No.: WM-8188E

**Model Difference:** N/A

FCC ID: **2AHVJWM-8188E** 

Report No.: E2/2016/30047

Issue Date: Apr. 14, 2016

**FCC Rule Part:** §15.247, Cat: DTS

**AV Design Solution Corp.** 

**Prepared for:** 2F., No.250, Nanyang St., Xizhi Dist., New

Taipei City 221, Taiwan R.O.C.

SGS Taiwan Ltd.

**Electronics & Communication Laboratory** Prepared by:

No.2, Keji 1st Rd., Guishan District, Taoyuan

City, Taiwan 333





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# VERIFICATION OF COMPLIANCE

**Applicant:** AV Design Solution Corp.

2F., No.250, Nanyang St., Xizhi Dist., New Taipei City 221,

Taiwan R.O.C.

Wi-Fi Module **Product Name:** 

**Brand Name:** CC&C

Model No.: WM-8188E

**Model Difference:** N/A

FCC ID: 2AHVJWM-8188E

**Report Number:** E2/2016/30047

Date of test: Mar. 11, 2016 ~ Apr. 8, 2016

Date of EUT Received: Mar. 11, 2016

# 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:	Aken Huang	Date:	Apr. 14, 2016
Prepared By:	Aken Huang/Engineer Karen Huang	Date:	Apr. 14, 2016
Approved By:	Karen Huang / Clerk  Jim Chang / Asst. Manager	Date:	Apr. 14, 2016

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f (886-2) 2298-0488



# **Revision History**

Report Number	Revision	Description	Issue Date
E2/2016/30047	Rev.00	Initial creation of document	Apr. 14, 2016

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## **GENERAL INFORMATION**

## 1.1 Product description

#### General:

eneral.				
Product Name:	Wi-Fi Module			
Brand Name:	CC&C			
Model No.:	WM-8188E			
Model Difference:	N/A			
Product SW/HW version:	N/A / N/A			
Radio SW/HW version:	N/A / N/A			
Test SW Version:	N/A			
RF power setting in TEST SW:	N/A			
Power Supply:	3.3Vdc from DC power supply			

### WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power	Modulation Technology		
11b/g	2412-2462	11	b: 25.77dBm g: 25.38dBm	DSSS, OFDM		
11n	HT20 2412-2462	11	HT20:24.94dBm	OFDM		
11n	HT40 2422-2452	7	HT40: 24.50dBm	OFDM		
Antenna	Designation:	<ol> <li>PIFA Antenna, Gain:-3.9dBi</li> <li>P/N: N/A; Supplier: N/A</li> <li>Chip Antenna, Gain: 5.05dBi</li> <li>P/N: ANT3216LL00R2400A; Supplier: YAGEO</li> </ol>				
Modulati	on type:	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM				
Transition Rate:		802.11 b: up to 11 Mbps; 802.11 g: up to 54 Mbps 802.11 n_20MHz: up to 72.2Mbps 802.11 n_40MHz: up to 150Mbps				

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## 1.2 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is supporting Wi-Fi 802.11b/g/n, and below are details of information

etails of information.			
	Product Feature		
Product Name:	Wi-Fi Module		
Brand Name:	CC&C		
Model No.:	WM-8188E		
Model Difference:	N/A		
FCC ID:	2AHVJWM-8188E		
Wi-Fi Specification	802.11b/g/n		

Note: The above EUT information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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## 1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 DTS Meas. Guidance

FCC KDB 662911 D01 Multiple Transmitter Output V02r01

ANSI C63.10:2013

#### Note:

- All test items have been performed and record as per the above standards.
- 2. The composite system is compliance with FCC Subpart B is authorized under a DoC procedure.

## 1.4 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333

(TAF code 0513)

FCC Registration Numbers are: 628985

Canada Registration Number: 4620A-5.

# 1.5 Special Accessories

There are no special accessories used while test was conducted.

## 1.6 Equipment Modifications

There was no modification incorporated into the EUT.

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## SYSTEM TEST CONFIGURATION

## 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 hand-held 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 1dB and 10 dB attenuator.

## offset:

= RF cable loss (dB)+ attenuation factor(dB)=11(dB)

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## 2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission Configuration



Fig. 2-2 Conducted (Antenna Port) Configuration



**Table 2-1 Equipment Used in Tested 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	L430	R9-YYG88	Shielded	Un-shielded

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## SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	N/A
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(a)(2)	6dB Emission Bandwidth	Compliant
§15.247(d)	Conducted Band Edge and Spurious Emission	Compliant
§15.247(d)	Radiated Band Edge and Spurious Emission	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.203 §15.247(b)	Antenna Requirement	Compliant

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## **DESCRIPTION OF TEST MODES**

## 4.1 Operated in 2400 ~ 2483.5MHz Band

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

'.	are provided for observing, observing and observing in the					
	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

	<u>                                    </u>						
	CHANNEL	FREQUENCY	CHANNEL	FREQUENCY			
ſ	3	2422 MHz	7	2442 MHz			
Ī	4	2427 MHz	8	2447 MHz			
	5	2432 MHz	9	2452 MHz			
Ī	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:**

RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT	
802.11b	1 to 11	1,6,11	OFDM	6	Chip Antenna (Main)	
802.11b	1 to 11	1,6,11	OFDM	6	PIFA Antenna (Main)	

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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	1	Chip Antenna (Main)				
802.11b	1 to 11	1, 6, 11	DSSS	1	PIFA Antenna (Main)				
802.11g	1 to 11	1, 6, 11	OFDM	6	Chip Antenna (Main)				
802.11g	1 to 11	1, 6, 11	OFDM	6	PIFA Antenna (Main)				
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 0	Chip Antenna (Main)				
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 0	PIFA Antenna (Main)				
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	MCS 0	Chip Antenna (Main)				
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	MCS 0	PIFA Antenna (Main)				

#### 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 E2 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	1	Chip Antenna (Main)		
802.11g	1 to 11	1, 6, 11	OFDM	6	Chip Antenna (Main)		
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 0	Chip Antenna (Main)		
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	MCS 0	Chip Antenna (Main)		

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## **MEASUREMENT UNCERTAINTY**

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

## 6.1 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 with 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	ESCI 3	101311	06/18/2015	06/17/2016			
Coaxial Cables	N/A	N30N30-1042-150cm	N/A	02/07/2016	02/06/2017			
LISN	Schwarzbeck	NSLK 8127	8127-648	06/09/2015	06/08/2016			
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.			

## 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.

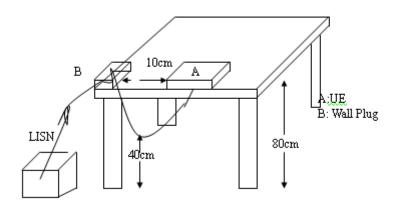
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## 6.4 Test SET-UP (Block Diagram of Configuration)



## **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

N/A, it be powered by DC power supply.

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## **DUTY CYCLE OF TEST SIGNAL**

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:**

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

# **Duty Cycle:**

	Duty Cycle (%)	Duty Factor (dB)
802.11b	100.00	0.00
802.11g	100.00	0.00
802.11n_20	100.00	0.00
802.11n_40	100.00	0.00

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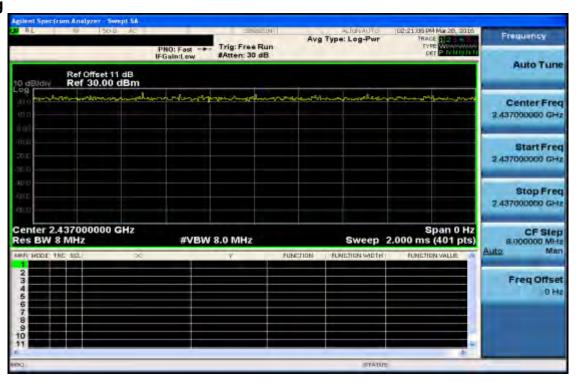
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# 7.1 DUTY CYCLE TEST SIGNAL Measurement Result 802.11 b



## 802.11 g



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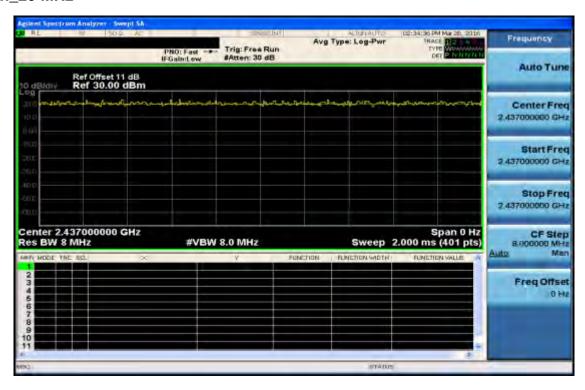
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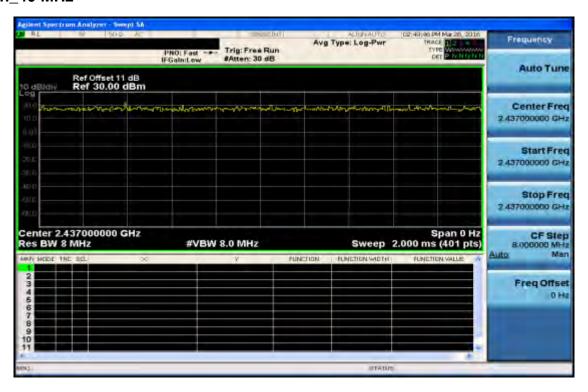
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## 802.11 n\_20 MHz



## 802.11 n\_40 MHz



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## PEAK OUTPUT POWER MEASUREMENT

## 8.1 Standard Applicable

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

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.

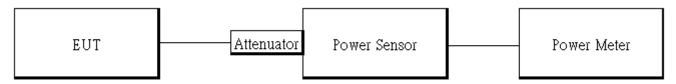
In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

## 8.2 Measurement Equipment Used

Conducted Emission Test Site									
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
Power Meter	Anritsu	ML2496A	1326001	06/23/2015	06/22/2016				
Power Sensor	Anritsu	MA2411B	1315048	06/23/2015	06/22/2016				
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2015	04/13/2016				
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016				
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/12/2015	12/11/2016				
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016				

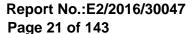
## 8.3 Test Set-up

Power Meter:



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### **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 DTS Meas. Guidance v03r05.
- 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 Main							
СН	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit			RESULT
1	2412	1	25.77	377.57	1 Watt =	30.00	dBm	PASS
6	2437	1	25.32	340.41	1 Watt =	30.00	dBm	PASS
11	2462	1	24.34	271.64	1 Watt =	30.00	dBm	PASS
802.1	1b Main							
СН	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit			RESULT
1	2412	1	24.6	288.40	1 Watt =	30.00	dBm	PASS
6	2437	1	24.2	263.03	1 Watt =	30.00	dBm	PASS
11	2462	1	22.9	194.98	1 Watt =	30.00	dBm	PASS

802.1°	1g Main							
СН	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit		RESULT	
1	2412	6	25.38	345.14	1 Watt =	30.00	dBm	PASS
6	2437	6	25.03	318.42	1 Watt =	30.00	dBm	PASS
11	2462	6	24.57	286.42	1 Watt =	30.00	dBm	PASS
802.1°	1g Main							
СН	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit		RESULT	
1	2412	6	19.75	94.41	1 Watt =	30.00	dBm	PASS
6	2437	6	19.95	98.86	1 Watt =	30.00	dBm	PASS
11	2462	6	19.5	89.13	1 Watt =	30.00	dBm	PASS

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802.1	802.11n_HT20M Main								
СН	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit		RESULT		
1	2412	MCS0	24.94	311.89	1 Watt =	30.00	dBm	PASS	
6	2437	MCS0	24.65	291.74	1 Watt =	30.00	dBm	PASS	
11	2462	MCS0	24.26	266.69	1 Watt =	30.00	dBm	PASS	
802.1	1n_HT20M Main								
СН	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit			RESULT	
1	2412	MCS0	17.7	58.88	1 Watt =	30.00	dBm	PASS	
6	2437	MCS0	18.15	65.31	1 Watt =	30.00	dBm	PASS	
11	2462	MCS0	18.35	68.39	1 Watt =	30.00	dBm	PASS	

802.1	802.11n_HT40M Main								
СН	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit		RESULT		
3	2422	MCS0	24.25	266.07	1 Watt =	30.00	dBm	PASS	
6	2437	MCS0	24.5	281.84	1 Watt =	30.00	dBm	PASS	
9	2452	MCS0	24.35	272.27	1 Watt =	30.00	dBm	PASS	
802.1	802.11n_HT40M Main								
СН	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit		RESULT		
3	2422	MCS0	16.75	47.32	1 Watt =	30.00	dBm	PASS	
6	2437	MCS0	18.01	63.24	1 Watt =	30.00	dBm	PASS	
9	2452	MCS0	18.1	64.57	1 Watt =	30.00	dBm	PASS	

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

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**6DB BANDWIDTH MEASUREMENT** 

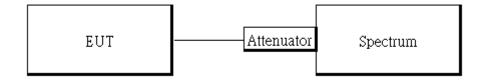
## 9.1 Standard Applicable

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

# 9.2 Measurement Equipment Used

Conducted Emission Test Site							
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2015	04/13/2016		
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016		
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016		

### 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 DTS Meas. Guidance v03r05.
- 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.

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# 9.5 Measurement Result 6dB Bandwidth

#### 802.11b Main

OUZII IS Maiii						
Frequency (MHz)	6d B Ban dwid th (kHz)	Limit (kHz)	Result			
2412	10120	> 500	PASS			
2437	10125	> 500	PASS			
2462	10120	> 500	PASS			

## 802.11g Main

Frequency (MHz)	6d B Ban dwid th (kHz)	Limit (kHz)	Result
2412	16580	> 500	PASS
2437	16570	> 500	PASS
2462	16570	> 500	PASS

## 802.11 n HT20 Main

Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
2412	17840	> 500	PASS
2437	17840	> 500	PASS
2462	17840	> 500	PASS

## 802.11 n HT40 Main

Frequency (MHz)	6d B Ban dwid th (kHz)	Limit (kHz)	Result	
2422	36420	> 500	PASS	
2437	36410	> 500	PASS	
2452	36430	> 500	PASS	

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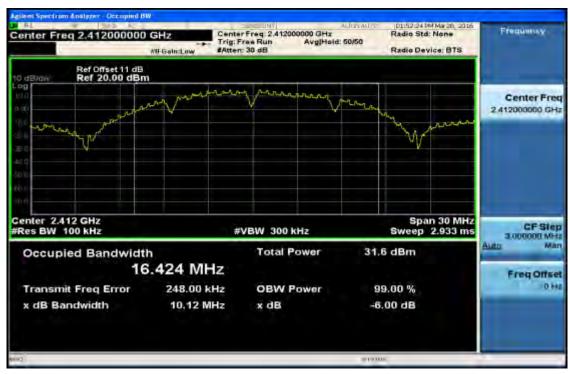
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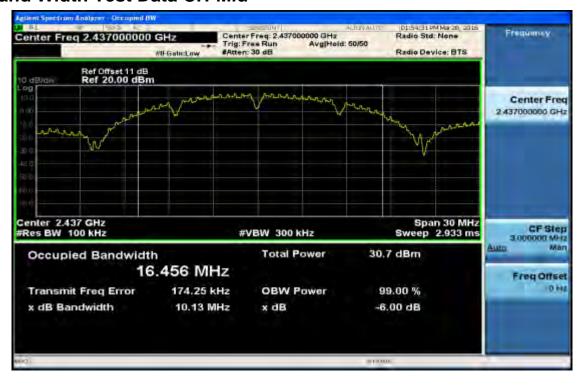
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# 802.11b 6dB Band Width Test Data CH-Low



## 6dB Band Width Test Data CH-Mid



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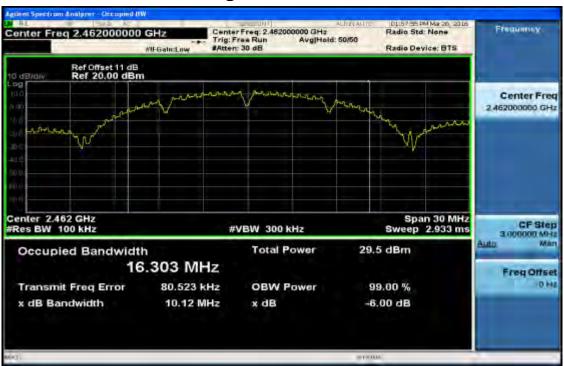
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# 6dB Band Width Test Data CH-High



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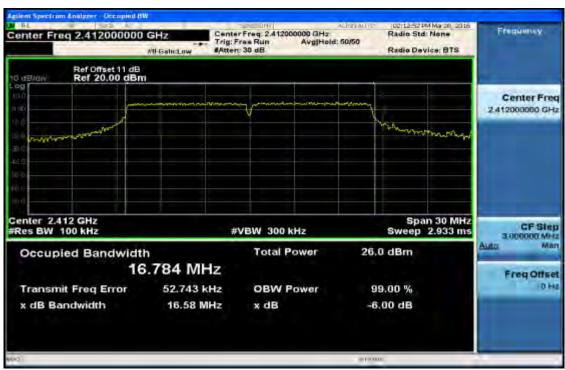
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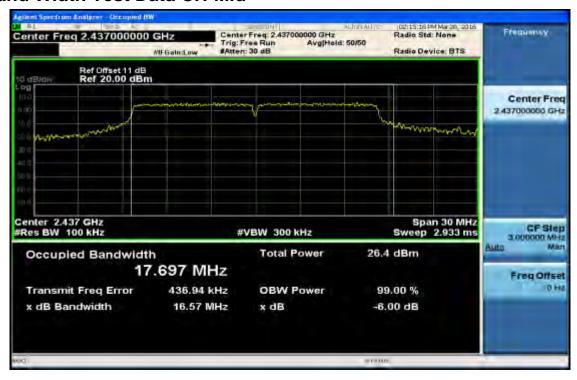


# 802.11g

## 6dB Band Width Test Data CH-Low



## 6dB Band Width Test Data CH-Mid

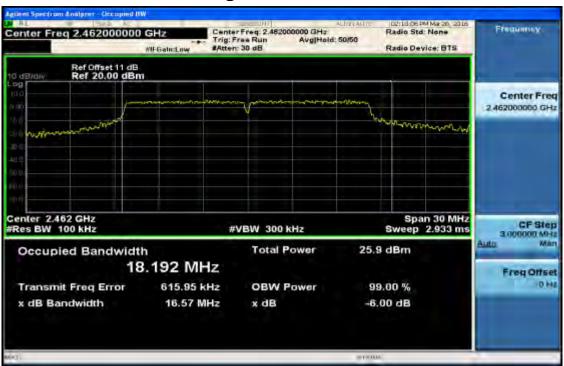


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# 6dB Band Width Test Data CH-High



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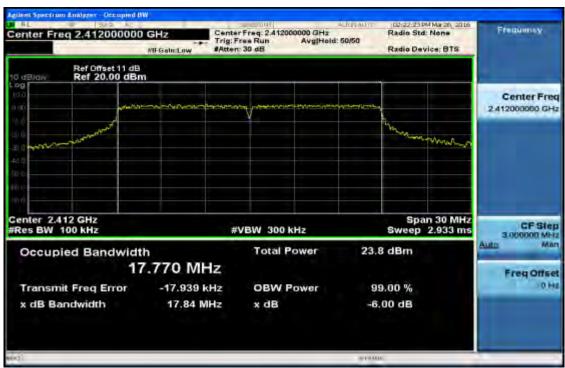
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# 802.11n 20M 6dB Band Width Test Data CH-Low



## 6dB Band Width Test Data CH-Mid



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# 6dB Band Width Test Data CH-High



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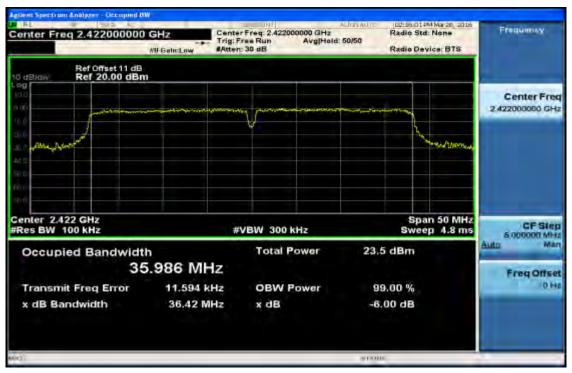
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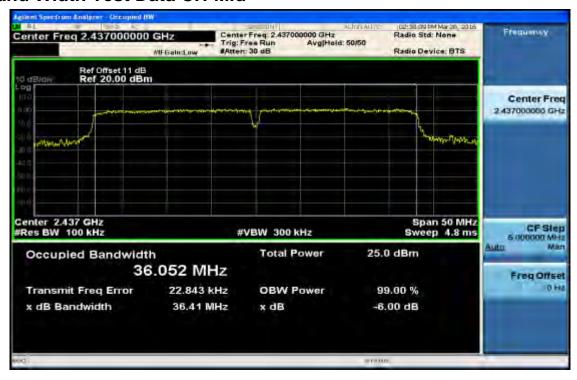
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# 802.11n 40M 6dB Band Width Test Data CH-Low



## 6dB Band Width Test Data CH-Mid



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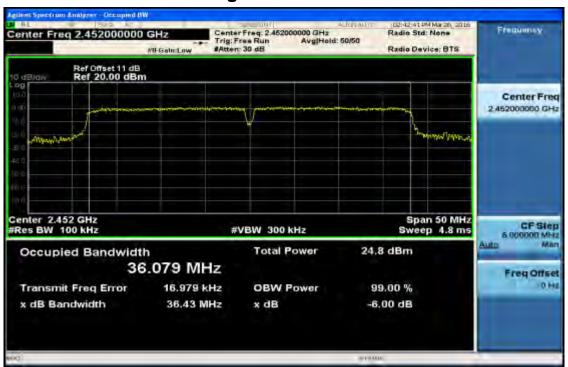
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10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

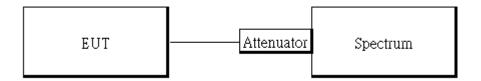
## 10.1 Standard Applicable

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), must also comply with the radiated emission limits specified in §15.209(a).

## 10.2 Measurement Equipment Used

Conducted Emission Test Site							
<b>EQUIPMENT</b>	MFR	MODEL	SERIAL	LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2015	04/13/2016		
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016		
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016		

## 10.3 Test SET-UP



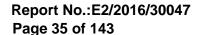
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#### 10.4 Measurement Procedure

## **Conducted Band Edge:**

- To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 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.
- 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 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: Refer to next page spectrum analyzer data chart and tabular data sheets.

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



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



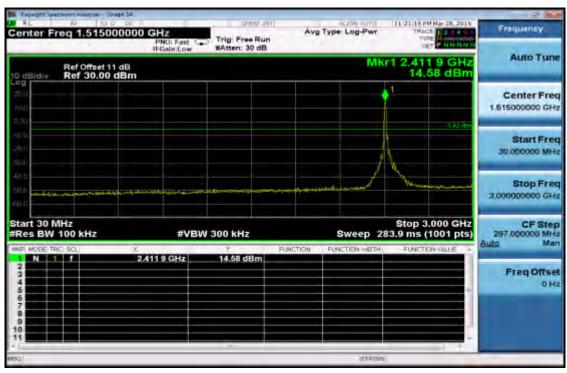
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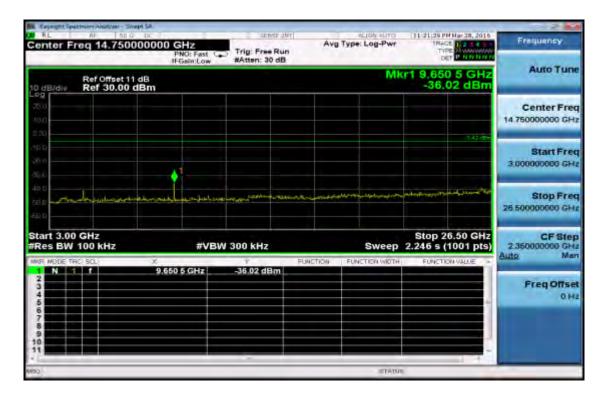
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# 802.11b

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





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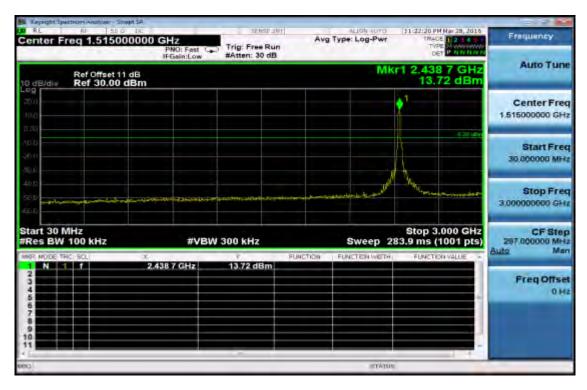
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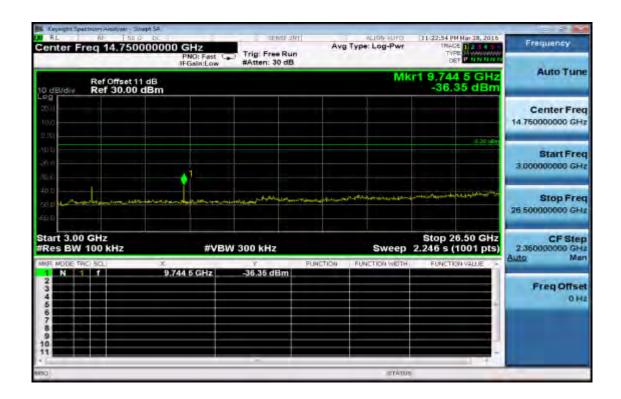
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# **Spurious Emission Test Data CH-Mid**





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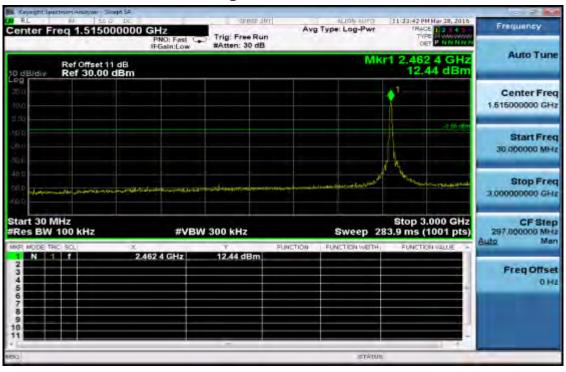
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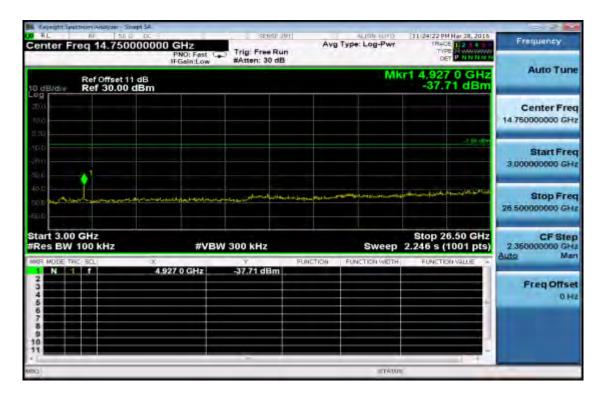
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# **Spurious Emission Test Data CH-High**





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



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



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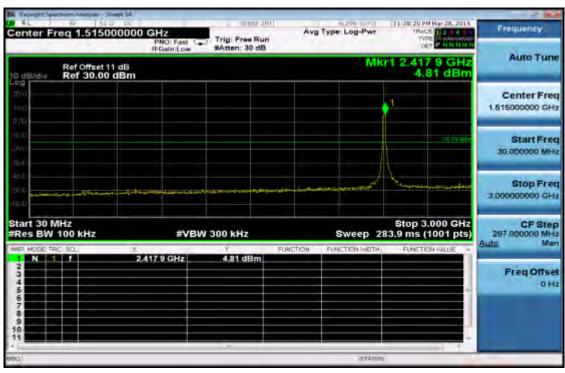
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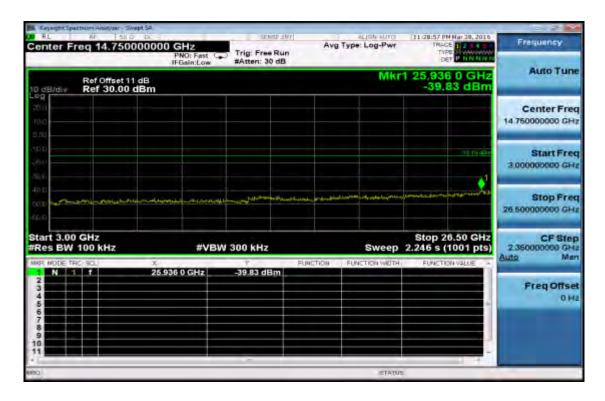
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# 802.11g

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





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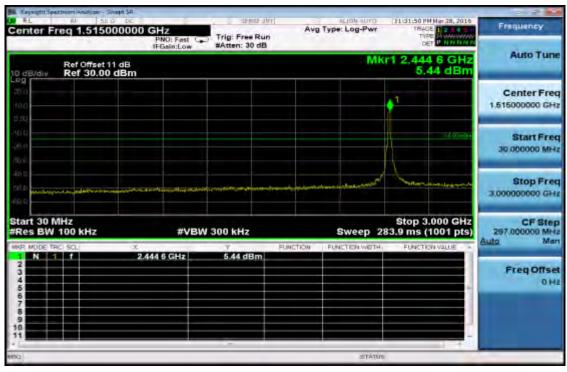
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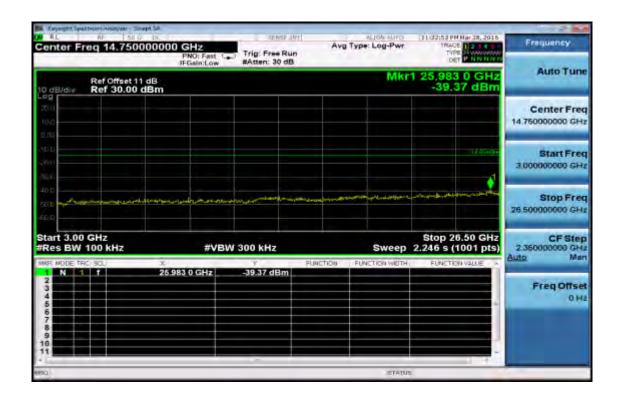
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## **Spurious Emission Test Data CH-Mid**





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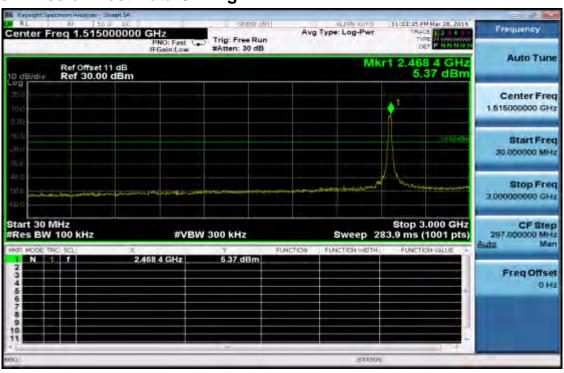
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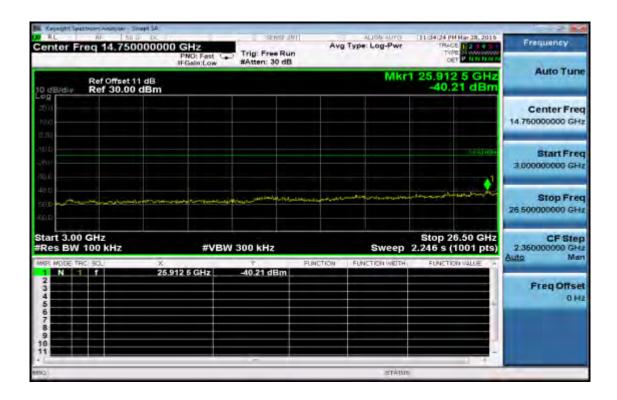
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# **Spurious Emission Test Data CH-High**





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# 802.11n\_HT20 **Band Edges Test Data CH-Low**



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



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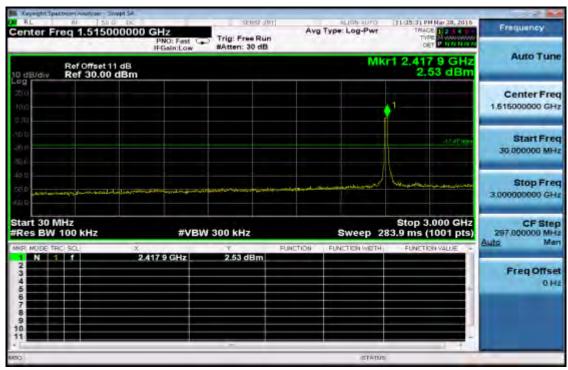
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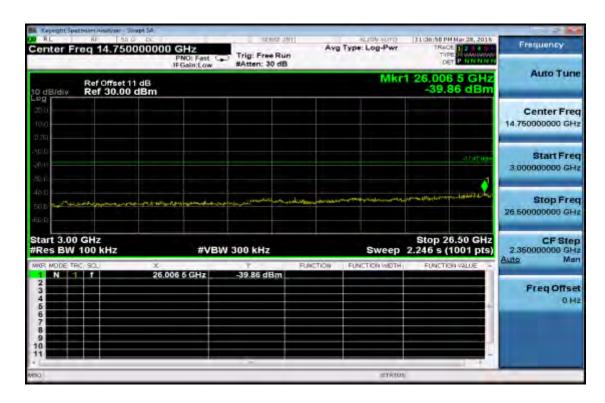
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## 802.11n HT20

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



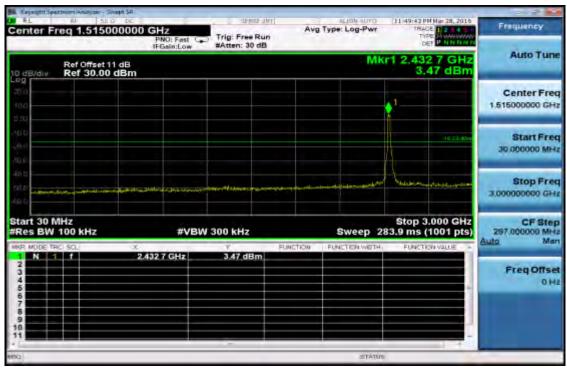


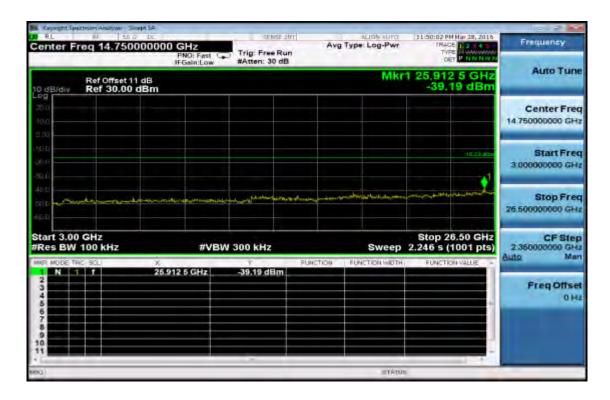
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## **Spurious Emission Test Data CH-Mid**



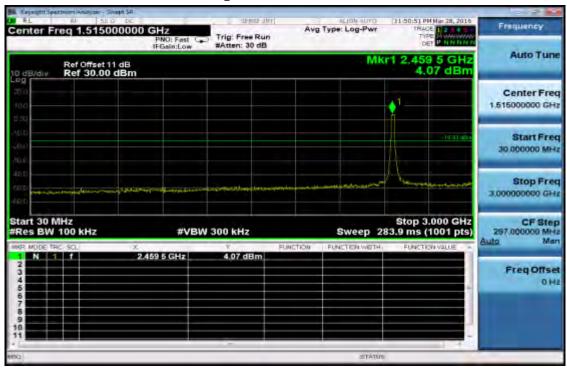


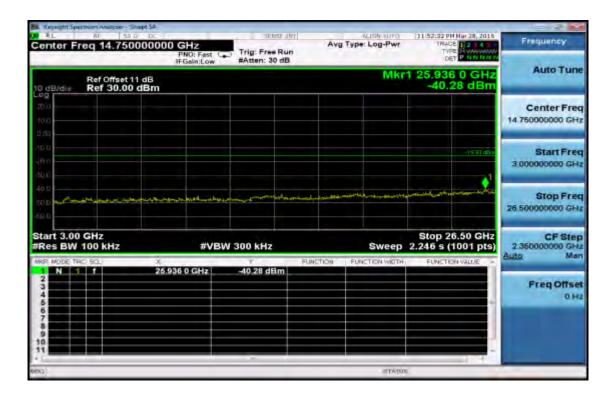
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# **Spurious Emission Test Data CH-High**





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



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



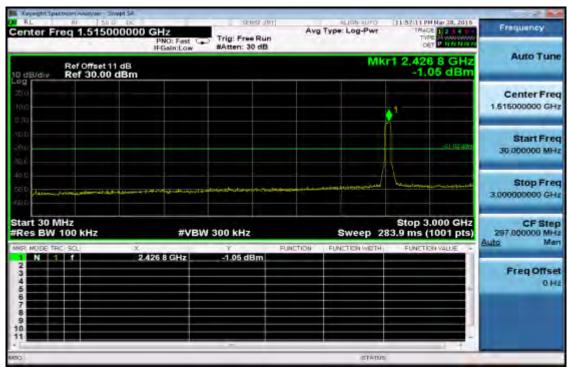
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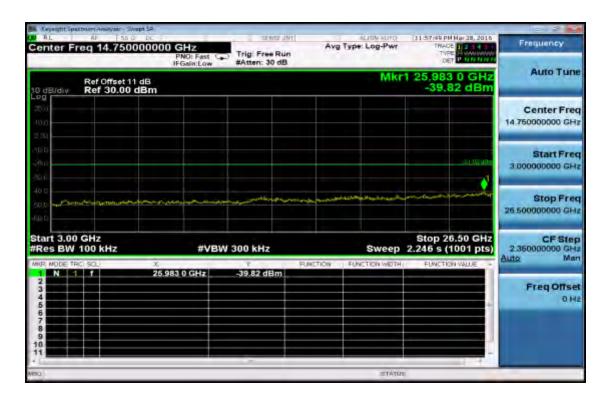
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# 802.11n HT40

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





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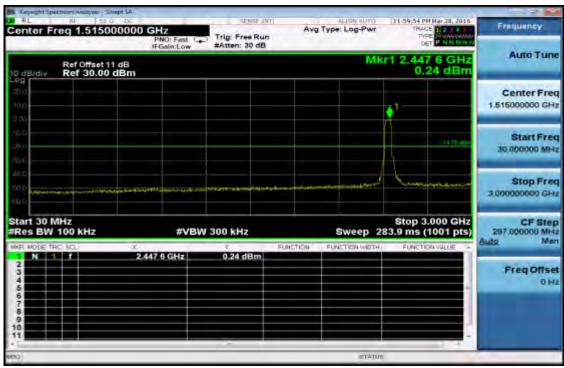
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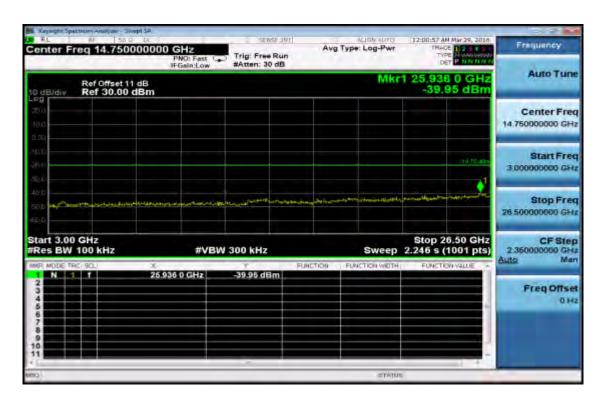
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## **Spurious Emission Test Data CH-Mid**



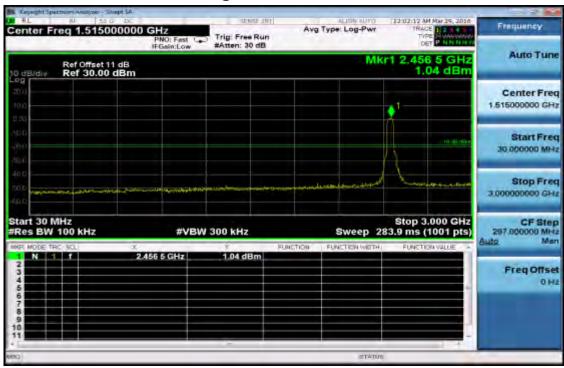


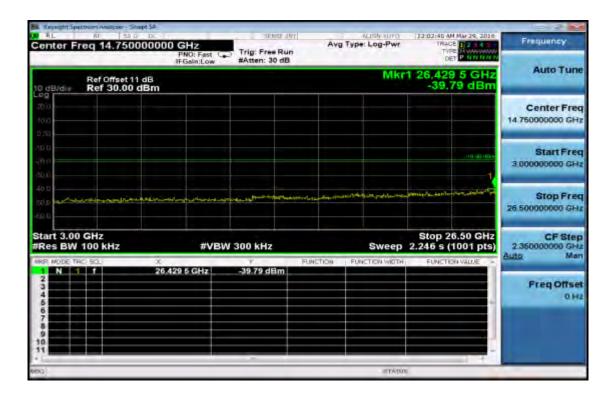
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# **Spurious Emission Test Data CH-High**





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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 limit as below.

And according to §15.33(a) (1), 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.
- Emission level (dBµV/m) = 20 log Emission level (dBµV/m)

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#### 11.2 Measurement Equipment Used:

III Modedioment 2	2 Measurement Equipment Osed: 966 Chamber									
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.					
TYPE		NUMBER	NUMBER	CAL.						
EMI Test Receiver	R&S	ESU 40	100363	04/09/2015	04/08/2016					
Loop Antenna	ETS-Lindgren	6502	00143303	12/09/2015	12/08/2016					
Broadband Antenna	TESEQ	CBL 6112D	35240	10/28/2015	10/27/2016					
Horn Antenna	ETS-Lindgren	3117	00143272	12/08/2015	12/07/2016					
Horn Antenna	Schwarzbeck	BBHA9170	185	07/25/2015	07/24/2016					
Pre Amplifier	<b>EMC Instruments</b>	EMC330	980096	12/12/2015	12/11/2016					
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/12/2015	12/11/2016					
Pre Amplifier	R&S	SCU-18	10204	12/12/2015	12/11/2016					
Pre Amplifier	R&S	SCU-26	100780	12/12/2015	12/11/2016					
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/12/2015	12/11/2016					
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/12/2015	12/11/2016					
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/12/2015	12/11/2016					
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/12/2015	12/11/2016					
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/12/2015	12/11/2016					
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/12/2015	12/11/2016					
Attenuator	WOKEN	218FS-10	RF27	12/12/2015	12/11/2016					
Site NSA	SGS	966 Chamber C	SAC-C	03/04/2016	03/03/2017					
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2016	03/03/2017					
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2015	05/03/2016					
Controller	MF	MF-7802	N/A	N.C.R.	N.C.R.					
Antenna Master	enna Master MF		N/A	N.C.R.	N.C.R.					
Turn Table	MF	N/A	N/A	N.C.R.	N.C.R.					
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.					

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

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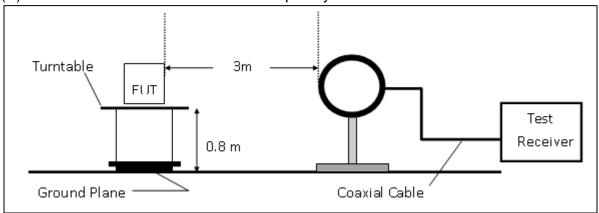
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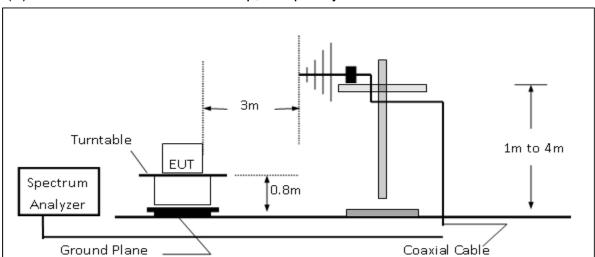


#### 11.3 Test SET-UP

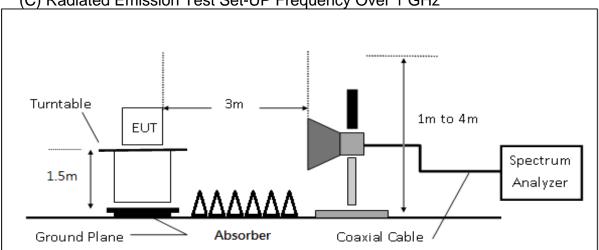
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



## (C) Radiated Emission Test Set-UP Frequency Over 1 GHz

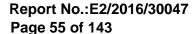


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#### 11.4 Measurement Procedure

- The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guid-
- 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 ≥ 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	<u> </u>	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(dBµV/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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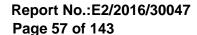
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# Radiated Band Edge Measurement Result (802.11b) (Chip Antenna)

Operation Mode: 802.11b Test Date: 2016/3/23

Fundamental Frequency: Temp. / Humi.: 2412 MHz 22.7deg\_C/57RH

Operation Band: **BE CH Low** Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: Vertical E2

Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2385.84	S	Peak	47.26	5.72	52.98	74	-21.02
2385.84	S	Average	37.14	5.72	42.86	54	-11.14
2390.00	E	Peak	44.08	5.78	49.86	74	-24.14
2390.00	Е	Average	33.92	5.78	39.70	54	-14.30

Operation Mode: 802.11b Test Date: 2016/3/22

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

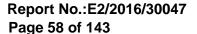
Operation Band: Test Engineer: BE CH Low Ashton EUT Pol.: Measurement Antenna Pol.: Horizontal E2

Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2386.08	S	Peak	53.26	5.73	58.98	74	-15.02
2386.08	S	Average	45.02	5.73	50.75	54	-3.25
2390.00	E	Peak	48.24	5.78	54.01	74	-19.99
2390.00	Ε	Average	40.09	5.78	45.87	54	-8.13

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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Test Engineer: BE CH High Ashton EUT Pol.: Measurement Antenna Pol.: Vertical E2

Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Peak	48.22	5.88	54.11	74	-19.89
2483.50	E	Average	40.09	5.88	45.97	54	-8.03
2487.60	S	Peak	48.75	5.87	54.61	74	-19.39
2487.60	S	Average	39.76	5.87	45.63	54	-8.37

Operation Mode: 802.11b Test Date: 2016/3/23

Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

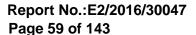
Operation Band: BE CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
_	MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
	2483.50	Е	Peak	52.75	5.88	58.63	74	-15.37
	2483.50	F	Average	46.24	5.88	52.12	54	-1.88

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## Radiated Band Edge Measurement Result (802.11g)

Operation Mode: Test Date: 2016/3/23 802.11g

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH Low Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: Vertical E2

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2390.00	E	Peak	60.91	5.78	66.69	74	-7.31
2390.00	Е	Average	41.25	5.78	47.03	54	-6.97

Operation Mode: 802.11g Test Date: 2016/3/23

2412 MHz Fundamental Frequency: Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Test Engineer: BE CH Low Ashton EUT Pol.: E2 Measurement Antenna Pol.: Horizontal

Freq.	Note	Detector	Spectum	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	Peak	67.18	5.78	72.96	74	-1.04	
2390.00	Е	Average	47.12	5.78	52.90	54	-1.10	

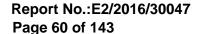
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Operation Mode: Test Date: 802.11g 2016/3/23

Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
_	MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
	2483.50	Е	Peak	59.89	5.88	65.77	74	-8.23
	2483.50	Е	Average	40.03	5.88	45.91	54	-8.09

Operation Mode: 802.11g Test Date: 2016/3/23

Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

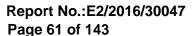
Operation Band: BE CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	66.19	5.88	72.07	74	-1.93
2483.50	Е	Average	46.35	5.88	52.23	54	-1.77
2483.70	S	Peak	66.34	5.88	72.22	74	-1.78
2483.70	S	Average	45.98	5.88	51.86	54	-2.14

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### Radiated Band Edge Measurement Result (802.11\_HT20)

Operation Mode: 802.11n20 Test Date: 2016/3/23

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH Low Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: Vertical E2

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2390.00	E	Peak	61.36	5.78	67.14	74	-6.86
2390.00	Е	Average	39.13	5.78	44.91	54	-9.09

Operation Mode: 802.11n20 Test Date: 2016/3/23

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

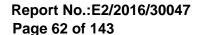
Operation Band: Test Engineer: BE CH Low Ashton EUT Pol.: Measurement Antenna Pol.: Horizontal E2

Freq.	Note	Detector	Spectum	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	Peak	66.96	5.78	72.74	74	-1.26
2390.00	Е	Average	44.42	5.78	50.20	54	-3.80

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Operation Mode: Test Date: 802.11n20 2016/3/23

Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	59.18	5.88	65.06	74	-8.94
2483.50	Е	Average	37.07	5.88	42.95	54	-11.05

Operation Mode: 802.11n20 Test Date: 2016/3/23

Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

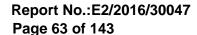
Operation Band: BE CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
_	MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
	2483.50	Е	Peak	66.52	5.88	72.40	74	-1.60
	2483.50	Е	Average	42.29	5.88	48.17	54	-5.83

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### Radiated Band Edge Measurement Result (802.11\_HT40)

Operation Mode: 802.11n40 Test Date: 2016/3/23

Fundamental Frequency: 2422 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH Low Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: Vertical E2

Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2388.72	S	Peak	57.30	5.76	63.05	74	-10.95
2388.72	S	Average	39.80	5.76	45.56	54	-8.44
2390.00	E	Peak	54.52	5.78	60.29	74	-13.71
2390.00	Е	Average	40.53	5.78	46.31	54	-7.69

Operation Mode: Test Date: 2016/3/23 802.11n40

Fundamental Frequency: 2422 MHz Temp. / Humi.: 22.7deg\_C/57RH

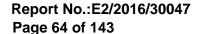
Operation Band: Test Engineer: Ashton BE CH Low EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2388.84	S	Peak	63.58	5.76	69.34	74	-4.66
2388.84	S	Average	45.71	5.76	51.47	54	-2.53
2390.00	Е	Peak	60.17	5.78	65.94	74	-8.06
2390.00	E	Average	46.62	5.78	52.40	54	-1.60

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Operation Mode: Test Date: 802.11n40 2016/3/23

Fundamental Frequency: 2452 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	57.72	5.88	63.60	74	-10.40
2483.50	E	Average	40.72	5.88	46.60	54	<b>-7</b> .40
2487.90	S	Peak	58.78	5.87	64.65	74	-9.35
2487.90	S	Average	38.05	5.87	43.92	54	-10.08

2016/3/23 Test Date: Operation Mode: 802.11n40

Fundamental Frequency: 2452 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH High Test Engineer: Ashton Measurement Antenna Pol.: EUT Pol.: E2 Horizontal

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Peak	64.51	5.88	70.39	74	-3.61
2483.50	E	Average	46.86	5.88	52.74	54	-1.26
2484.10	S	Peak	64.91	5.88	70.79	74	-3.21
2484.10	S	Average	46.66	5.88	52.54	54	-1.46

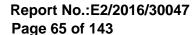
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Operation Mode: Test Date: 802.11n40 2016/3/23

Fundamental Frequency: 2452 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	57.72	5.88	63.60	74	-10.40
2483.50	Е	Average	40.72	5.88	46.60	54	-7.40
2487.90	S	Peak	58.78	5.87	64.65	74	-9.35
2487.90	S	Average	38.05	5.87	43.92	54	-10.08

Test Date: Operation Mode: 802.11n40 2016/3/23

Fundamental Frequency: 2452 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH High Test Engineer: Ashton Measurement Antenna Pol.: EUT Pol.: E2 Horizontal

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Peak	64.51	5.88	70.39	74	-3.61
2483.50	E	Average	46.86	5.88	52.74	54	-1.26
2484.10	S	Peak	64.91	5.88	70.79	74	-3.21
2484.10	S	Average	46.66	5.88	52.54	54	-1.46

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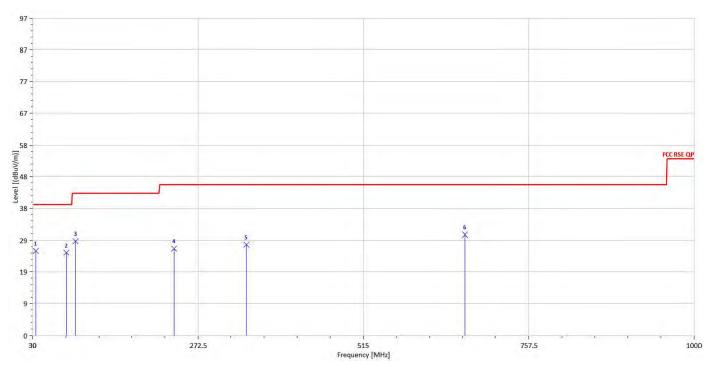
#### **Below 1GHz Worst-Case Data:**

# Radiated Spurious Emission Measurement Result (802.11 g)

Operation Mode: 802.11g Test Date: 2016/3/24

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

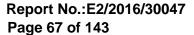
Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: E2 Measurement Antenna Pol. : Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
34.85	S	Peak	35.63	-9.78	25.85	40	-14.15
79.47	S	Peak	46.32	-21.01	25.31	40	-14.69
93.05	S	Peak	47.78	-18.95	28.83	43.5	-14.67
237.58	S	Peak	42.07	-15.53	26.54	46	-19.46
343.31	S	Peak	39.37	-11.61	27.76	46	-18.24
664.38	S	Peak	36.12	-5.33	30.80	46	-15.20

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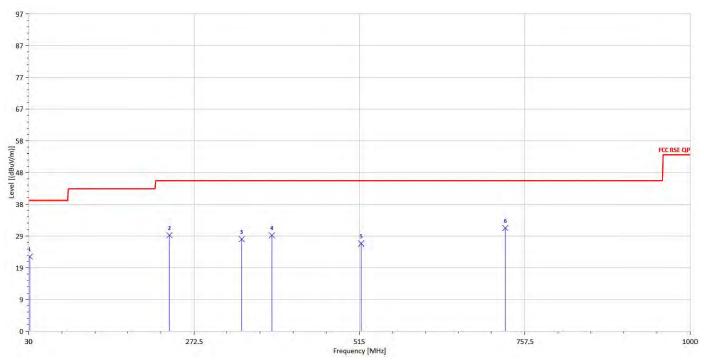
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Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol. : E2 Horizontal



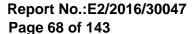
Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
31.94	S	Peak	31.09	-8.22	22.87	40	-17.13
236.61	S	Peak	44.93	-15.63	29.30	46	-16.70
342.34	S	Peak	39.72	-11.62	28.10	46	-17.90
386.96	S	Peak	39.42	-10.15	29.28	46	-16.72
517.91	S	Peak	34.43	-7.65	26.78	46	-19.22
729.37	S	Peak	36.15	-4.64	31.51	46	-14.49

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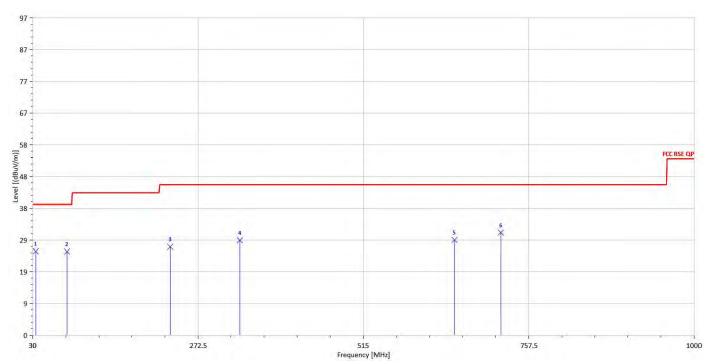
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH Mid Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol. : E2 Vertical



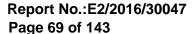
Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
34.85	S	Peak	35.43	-9.78	25.65	40	-14.35
80.44	S	Peak	46.46	-20.88	25.58	40	-14.42
231.76	S	Peak	43.08	-16.09	26.99	46	-19.01
333.61	S	Peak	40.87	-11.88	28.98	46	-17.02
648.86	S	Peak	34.15	-5.07	29.08	46	-16.92
716.76	S	Peak	36.44	-5.07	31.37	46	-14.63

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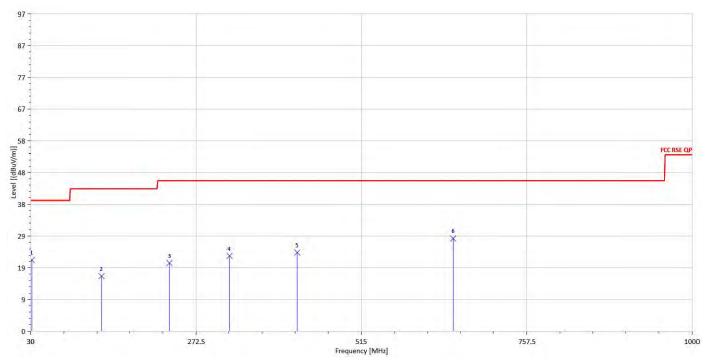
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH Mid Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol. : E2 Horizontal



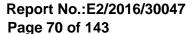
Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBμV/m	dBµV/m	dB
31.94	S	Peak	29.99	-8.22	21.77	40	-18.23
133.79	S	Peak	32.64	-15.82	16.82	43.5	-26.68
233.70	S	Peak	36.79	-15.92	20.87	46	-25.13
321.97	S	Peak	35.27	-12.19	23.07	46	-22.93
420.91	S	Peak	33.16	-9.06	24.10	46	-21.90
649.83	S	Peak	33.54	-5.24	28.31	46	-17.69

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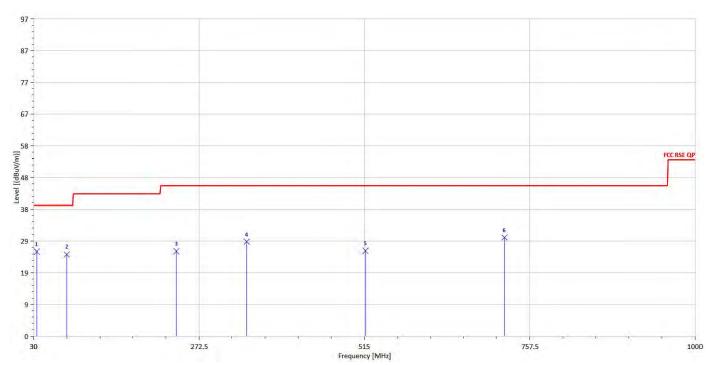
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg C/57RH

Test Engineer: Operation Band: Tx CH High Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical



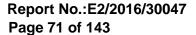
Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
34.85	S	Peak	35.63	-9.78	25.85	40	-14.15
78.50	S	Peak	46.16	-21.10	25.06	40	-14.94
239.52	S	Peak	41.27	-15.28	25.98	46	-20.02
342.34	S	Peak	40.49	-11.62	28.87	46	-17.13
516.94	S	Peak	33.90	-7.79	26.11	46	-19.89
720.64	S	Peak	34.99	-4.83	30.16	46	-15.84

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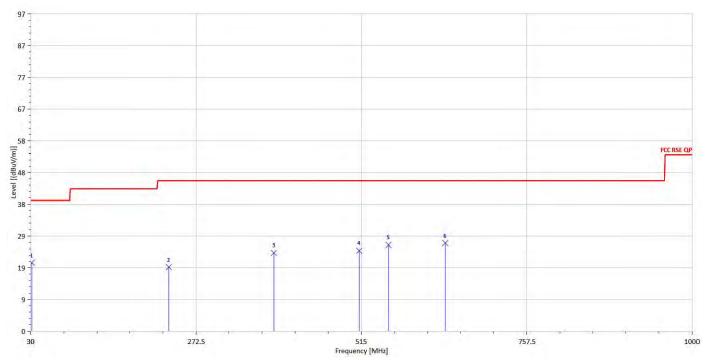
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH High **Ashton** EUT Pol.: Measurement Antenna Pol.: E2 Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
31.94	S	Peak	29.19	-8.22	20.97	40	-19.03
232.73	S	Peak	35.60	-15.99	19.61	46	-26.39
386.96	S	Peak	34.15	-10.15	24.00	46	-22.00
512.09	S	Peak	32.16	-7.51	24.65	46	-21.35
554.77	S	Peak	33.16	-6.79	26.37	46	-19.63
638.19	S	Peak	31.95	-5.05	26.91	46	-19.09

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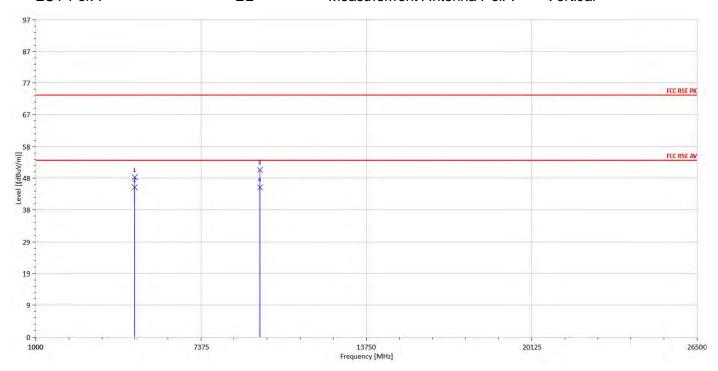
#### **Above 1GHz Data:**

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

Operation Mode: 802.11b Test Date: 2016/3/23

2412 MHz Temp. / Humi.: Fundamental Frequency: 22.7deg\_C/57RH

Operation Band: Test Engineer: Tx CH Low Ashton EUT Pol.: E2 Measurement Antenna Pol. : Vertical



Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Peak	38.36	10.43	48.79	74	-25.21
4824.00	Н	Average	35.36	10.43	45.79	54	-8.21
9648.00	Н	Peak	34.25	16.79	51.03	74	-22.97
9648.00	Н	Average	29.02	16.79	45.81	54	-8.19

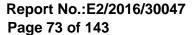
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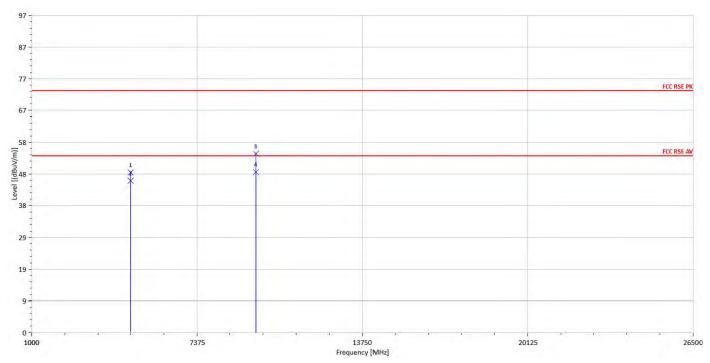
台灣檢驗科技股份有限公司





Fundamental Frequency: Temp. / Humi.: 22.7deg\_C/57RH 2412 MHz

Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: E2 Measurement Antenna Pol. : Horizontal

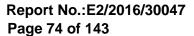


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Peak	38.59	10.43	49.02	74	-24.98
4824.00	Н	Average	36.03	10.43	46.46	54	-7.54
9648.00	Н	Peak	37.86	16.79	54.64	74	-19.36
9648.00	Н	Average	32.33	16.79	49.12	54	-4.88

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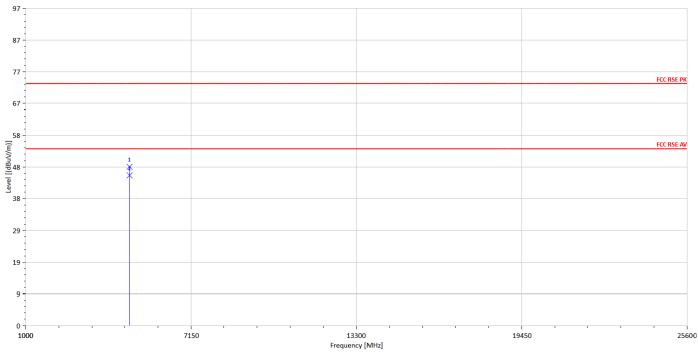
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Fundamental Frequency: Temp. / Humi.: 22.7deg\_C/57RH 2437 MHz

Operation Band: Tx CH Mid Test Engineer: Ashton EUT Pol.: E2 Measurement Antenna Pol. : Vertical

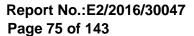


	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin	
_	MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB	
	4874.00	Н	Peak	37.93	10.66	48.60	74	-25.40	
	4874.00	Н	Average	35.29	10.66	45.95	54	-8.05	

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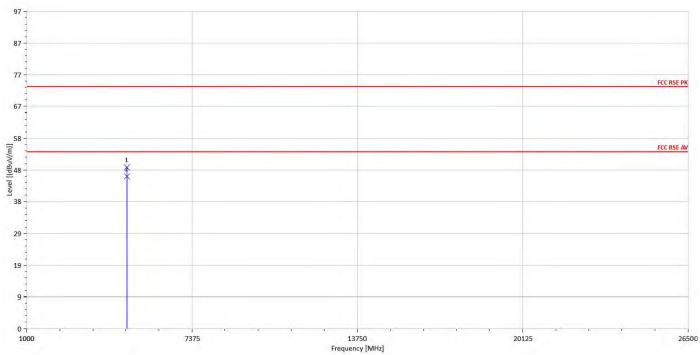
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Fundamental Frequency: Temp. / Humi.: 22.7deg\_C/57RH 2437 MHz

Operation Band: Tx CH Mid Test Engineer: Ashton EUT Pol.: E2 Measurement Antenna Pol. : Horizontal



	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
_	MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
	4874.00	S	Peak	38.67	10.66	49.33	74	-24.67
	4874.00	S	Average	35.90	10.66	46.56	54	-7.44

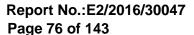
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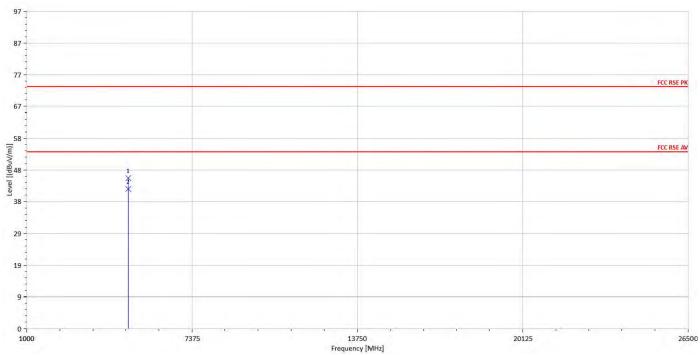
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Tx CH High Test Engineer: **Ashton** EUT Pol.: E2 Measurement Antenna Pol.: Vertical



	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin	
_	MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB	_
	4924.00	Н	Peak	35.46	10.57	46.04	74	-27.96	
	4924.00	Н	Average	32.11	10.57	42.68	54	-11.32	

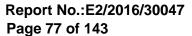
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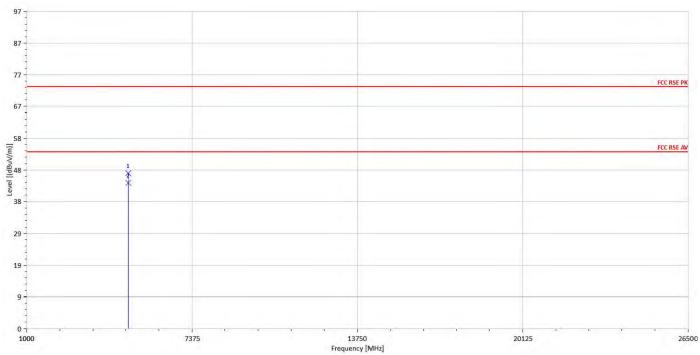
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

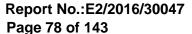
Operation Band: Tx CH High Test Engineer: **Ashton** EUT Pol.: E2 Measurement Antenna Pol.: Horizontal



	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin	
_	MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB	_
	4924.00	Н	Peak	36.94	10.57	47.52	74	-26.48	
	4924.00	Н	Average	33.96	10.57	44.53	54	-9.47	

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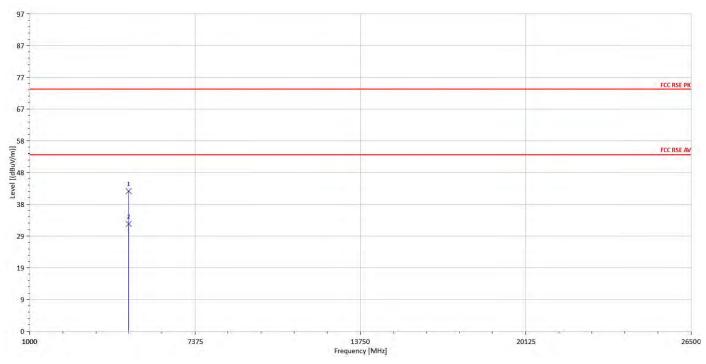


### Radiated Spurious Emission Measurement Result (802.11 g)

Test Date: Operation Mode: 802.11g 2016/3/23

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol. : E2 Vertical

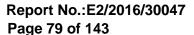


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Peak	32.35	10.43	42.77	74	-31.23
4824.00	Н	Average	22.36	10.43	32.79	54	-21.21

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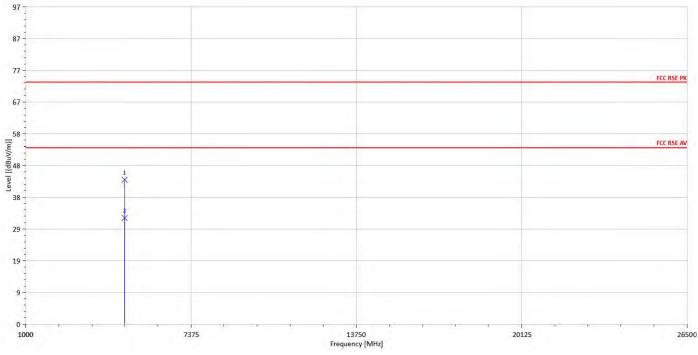
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Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: E2 Measurement Antenna Pol. : Horizontal

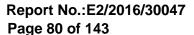


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Peak	33.71	10.43	44.14	74	-29.86
4824.00	Н	Average	22.03	10.43	32.46	54	-21.54

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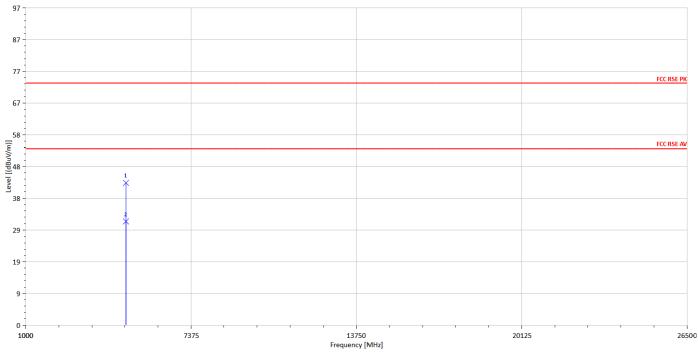




Operation Mode: Test Date: 2016/3/23 802.11g

Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH Mid Ashton EUT Pol.: E2 Measurement Antenna Pol. : Vertical

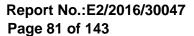


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dΒμV/m	dB
4874.00	Н	Peak	32.80	10.66	43.47	74	-30.53
4874.00	Н	Average	21.05	10.66	31.71	54	-22.29

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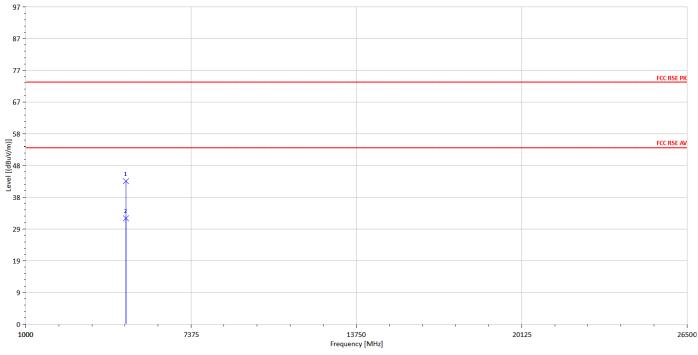




Operation Mode: Test Date: 2016/3/23 802.11g

Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH Mid Ashton EUT Pol.: E2 Measurement Antenna Pol. : Horizontal

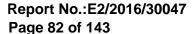


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dΒμV/m	dB
4874.00	Н	Peak	33.03	10.66	43.69	74	-30.31
4874.00	Н	Average	21.70	10.66	32.36	54	-21.64

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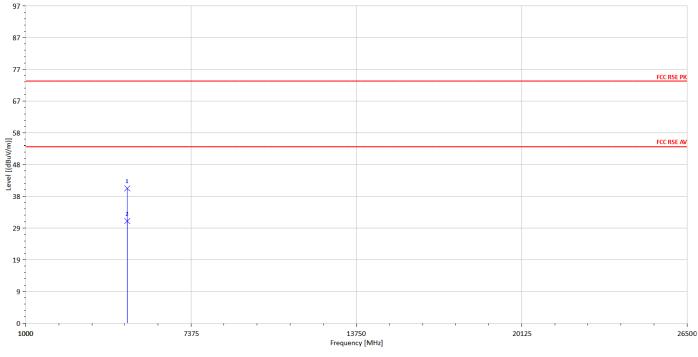
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

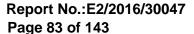


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dΒμV/m	dB
4924.00	Н	Peak	30.58	10.57	41.15	74	-32.85
4924.00	Н	Average	20.63	10.57	31.20	54	-22.80

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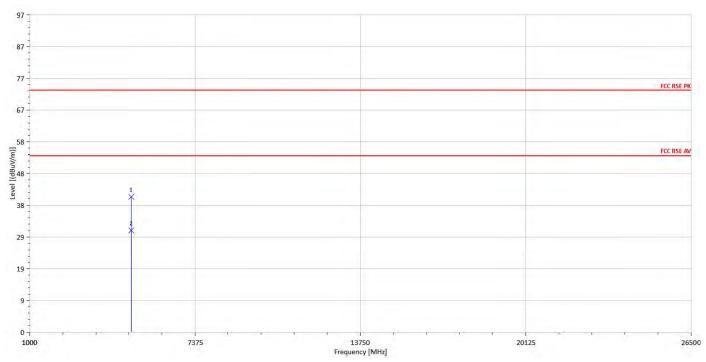
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH High Test Engineer: **Ashton** EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

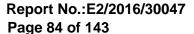


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4924.00	Н	Peak	30.75	10.57	41.33	74	-32.67
4924.00	Н	Average	20.53	10.57	31.10	54	-22.90

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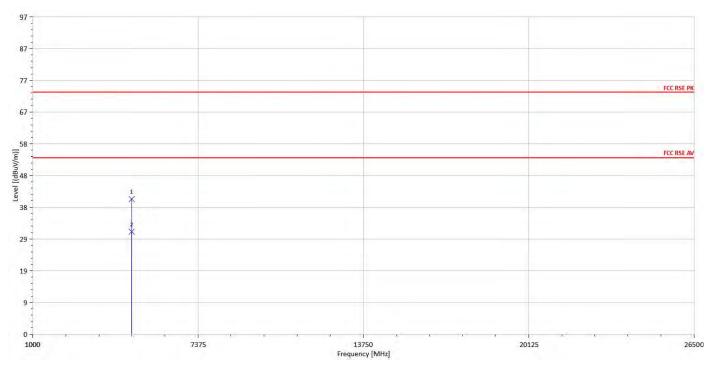


### Radiated Spurious Emission Measurement Result (802.11\_HT20)

Operation Mode: 802.11n20 Test Date: 2016/3/23

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

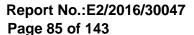


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Peak	30.81	10.43	41.24	74	-32.76
4824.00	Н	Average	20.89	10.43	31.32	54	-22.68

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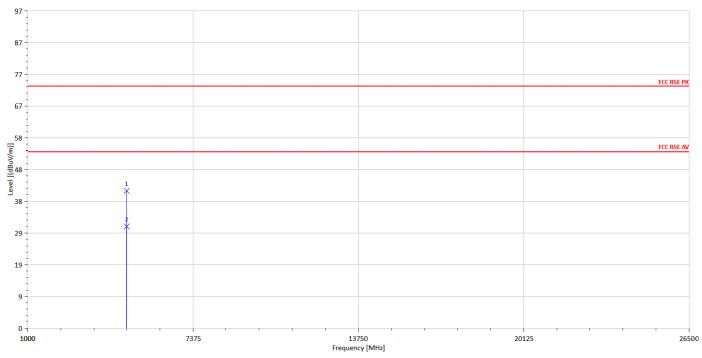
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Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH Low Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

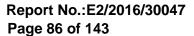


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Peak	31.50	10.43	41.93	74	-32.07
4824.00	Н	Average	20.66	10.43	31.09	54	-22.91

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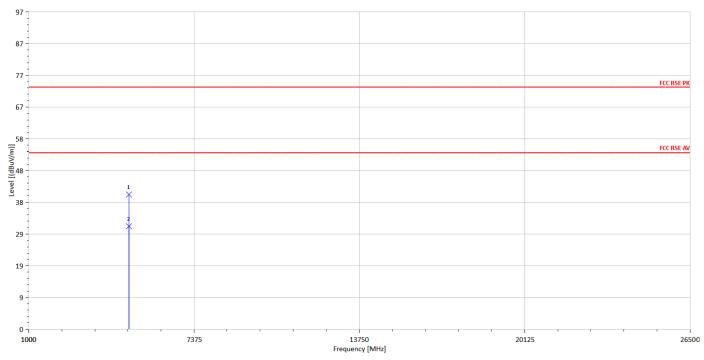
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH Mid Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

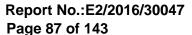


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	30.46	10.66	41.12	74	-32.88
4874.00	Н	Average	20.79	10.66	31.45	54	-22.55

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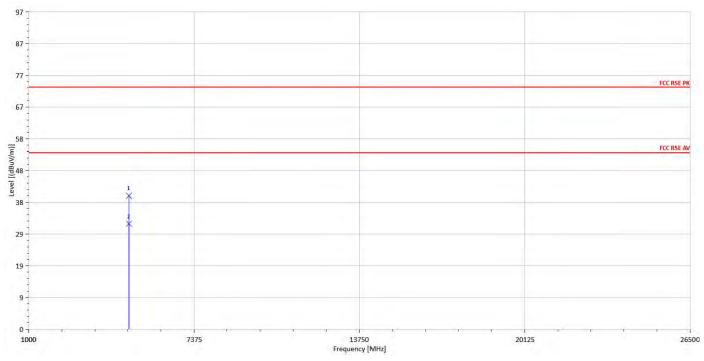
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH Mid Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

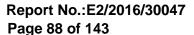


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	30.12	10.66	40.78	74	-33.22
4874.00	Н	Average	21.61	10.66	32.27	54	-21.73

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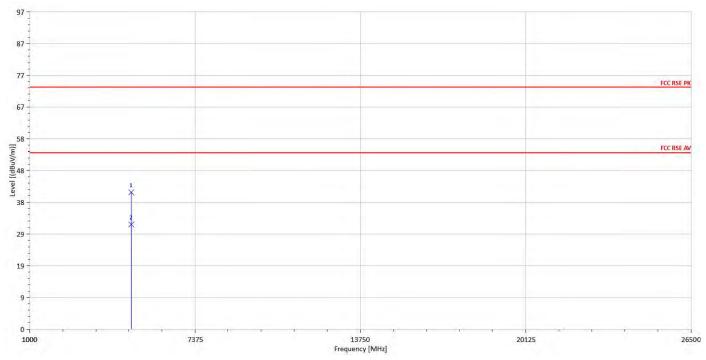
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH High Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

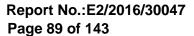


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4924.00	Н	Peak	31.22	10.57	41.79	74	-32.21
4924.00	Н	Average	21.43	10.57	32.00	54	-22.00

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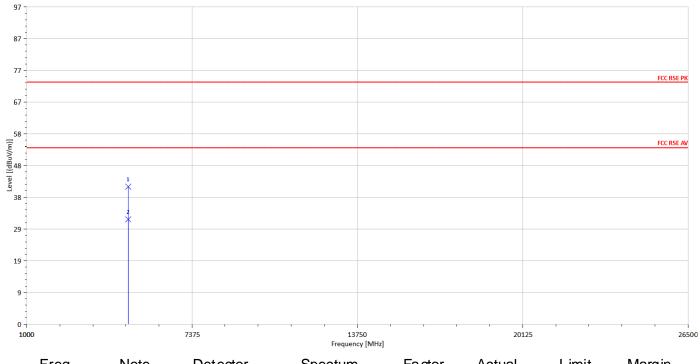
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH High Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal



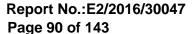
Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dΒμV/m	dB
4924.00	Н	Peak	31.41	10.57	41.99	74	-32.01
4924.00	Н	Average	21.47	10.57	32.04	54	-21.96

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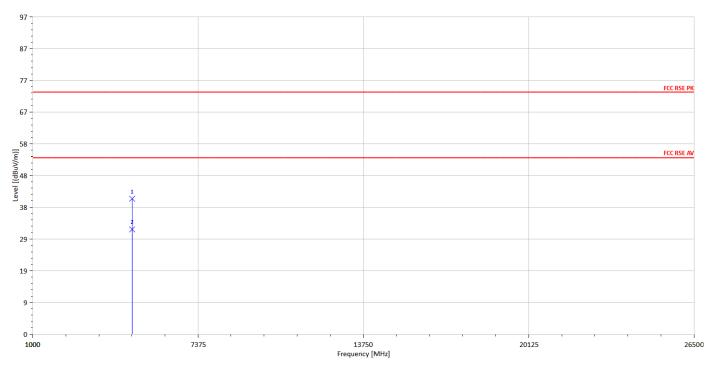


### Radiated Spurious Emission Measurement Result (802.11\_HT40)

Operation Mode: 802.11n40 Test Date: 2016/3/23

Fundamental Frequency: 2422 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

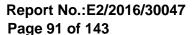


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4844.00	Н	Peak	31.00	10.36	41.37	74	-32.63
4844.00	Н	Average	21.67	10.36	32.03	54	-21.97

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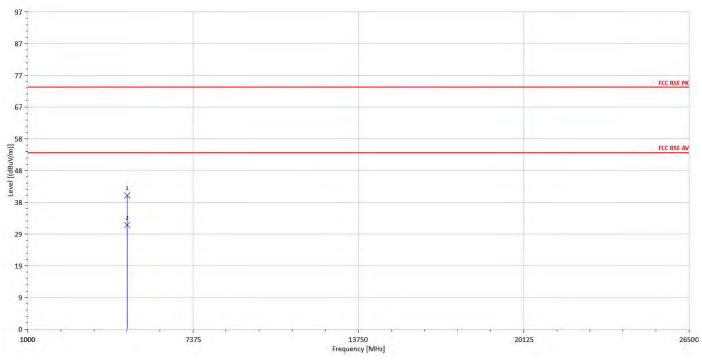
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Fundamental Frequency: 2422 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH Low Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

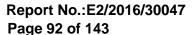


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4844.00	Н	Peak	30.48	10.36	40.84	74	-33.16
4844.00	Н	Average	21.49	10.36	31.85	54	-22.15

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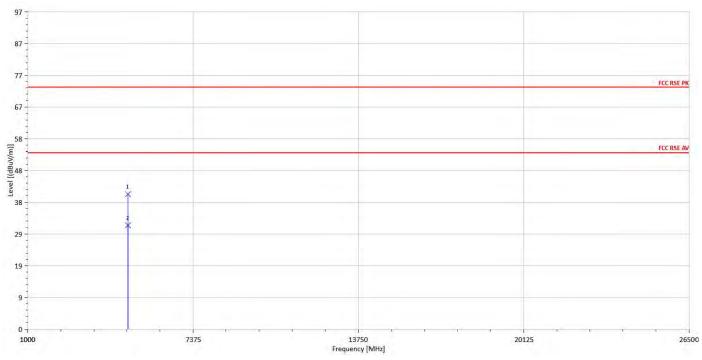
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH Mid Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

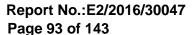


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	30.57	10.66	41.23	74	-32.77
4874.00	Н	Average	21.08	10.66	31.74	54	-22.26

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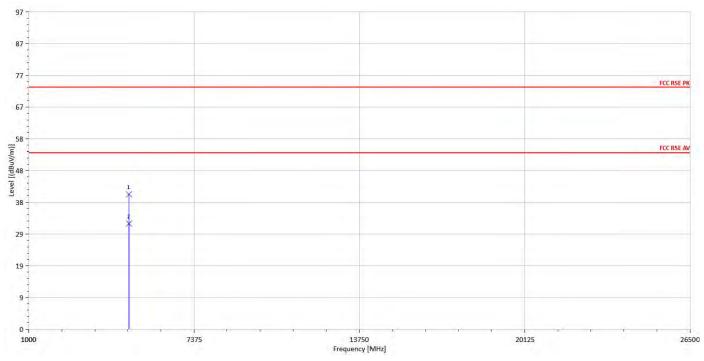
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

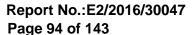
Operation Band: Test Engineer: Tx CH Mid Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal



Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	30.52	10.66	41.18	74	-32.82
4874.00	Н	Average	21.62	10.66	32.28	54	-21.72

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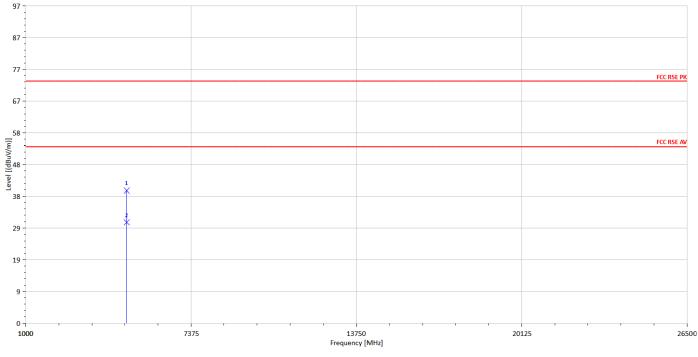
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Fundamental Frequency: 2452 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH High Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

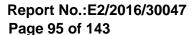


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4904.00	Н	Peak	30.40	10.14	40.53	74	-33.47
4904.00	Н	Average	20.67	10.14	30.81	54	-23.19

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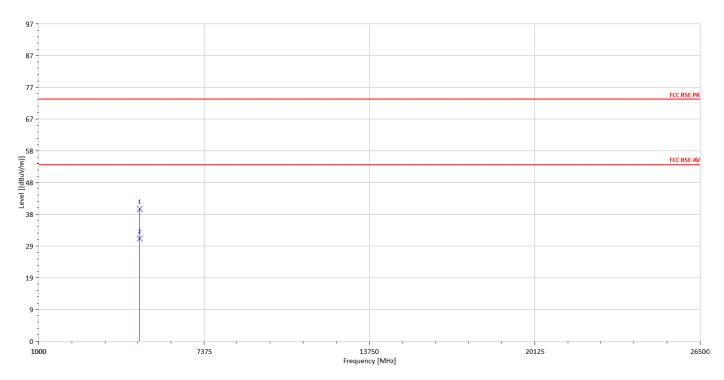
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Fundamental Frequency: 2452 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH High Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

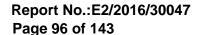


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB	
4904.00	Н	Peak	30.28	10.14	40.42	74	-33.58	
4904.00	Н	Average	21.23	10.14	31.37	54	-22.63	

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

Operation Mode: 802.11b Test Date: 2016/3/24

Fundamental Frequency: Temp. / Humi.: 2412 MHz 22.7deg\_C/57RH

Operation Band: **BE CH Low** Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: Vertical E2

Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2386.92	S	Peak	50.80	5.74	56.54	74	-17.46
2386.92	S	Average	39.09	5.74	44.83	54	<b>-</b> 9.17
2390.00	E	Peak	49.74	5.78	55.52	74	-18.48
2390.00	E	Average	39.66	5.78	45.44	54	-8.56

Operation Mode: 802.11b Test Date: 2016/3/24

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Test Engineer: BE CH Low Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

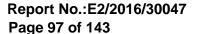
	Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
			Mode	Reading Level		FS	@3m	
	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
•	2390.00	E	Peak	56.37	5.78	62.14	74	-11.86
	2390.00	Е	Average	46.67	5.78	52.45	54	-1.55

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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Test Engineer: BE CH High Ashton EUT Pol.: Measurement Antenna Pol.: Vertical E2

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Peak	48.07	5.88	53.96	74	-20.04
2483.50	Е	Average	33.23	5.88	39.11	54	-14.89
2483.80	S	Peak	49.74	5.88	55.63	74	-18.37
2483.80	S	Average	33.17	5.88	39.05	54	-14.95

Operation Mode: 802.11b Test Date: 2016/3/24

Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

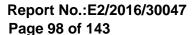
Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Peak	55.15	5.88	61.03	74	-12.97
2483.50	Е	Average	39.33	5.88	45.21	54	<b>-</b> 8.79
2484.00	S	Peak	56.40	5.88	62.28	74	-11.72
2484.00	S	Average	38.69	5.88	44.57	54	-9.43

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台灣檢驗科技股份有限公司





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

Operation Mode: Test Date: 2016/3/24 802.11g

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH Low Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: Vertical E2

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2390.00	E	Peak	59.56	5.78	65.34	74	-8.66
2390.00	Е	Average	38.06	5.78	43.84	54	-10.16

Operation Mode: 802.11g Test Date: 2016/3/24

2412 MHz Fundamental Frequency: Temp. / Humi.: 22.7deg\_C/57RH

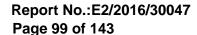
Operation Band: Test Engineer: BE CH Low Ashton EUT Pol.: Measurement Antenna Pol.: Horizontal E2

Freq.	Note	Detector	Spectum	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	Peak	66.05	5.78	71.83	74	-2.17
2390.00	Е	Average	44.44	5.78	50.22	54	-3.78

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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Peak	61.59	5.88	67.47	74	-6.53
2483.50	Е	Average	40.90	5.88	46.78	54	-7.22

Operation Mode: 802.11g Test Date: 2016/3/24

Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

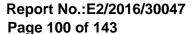
Operation Band: BE CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

	Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
_	MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
	2483.50	Е	Peak	66.61	5.88	72.49	74	-1.51
	2483.50	Е	Average	44.98	5.88	50.86	54	-3.14

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### Radiated Band Edge Measurement Result (802.11\_HT20)

Operation Mode: 802.11n20 Test Date: 2016/3/24

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH Low Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: Vertical E2

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB	
2390.00	E	Peak	60.00	5.78	65.78	74	-8.22	
2390.00	Е	Average	37.15	5.78	42.93	54	-11.07	

Operation Mode: 802.11n20 Test Date: 2016/3/24

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Test Engineer: BE CH Low Ashton Measurement Antenna Pol.: EUT Pol.: E2 Horizontal

Freq.	Note	Detector	Spectum	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	Peak	66.19	5.78	71.97	74	-2.03
2390.00	Е	Average	41.95	5.78	47.73	54	-6.27

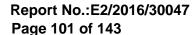
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH High Test Engineer: **Ashton** EUT Pol.: Measurement Antenna Pol.: E2 Vertical

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Peak	58.57	5.88	64.45	74	-9.55
2483.50	Е	Average	36.93	5.88	42.81	54	-11.19

Operation Mode: 802.11n20 Test Date: 2016/3/24

Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

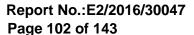
Operation Band: BE CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dΒμV/m	dBµV/m	dB
2483.50	Е	Peak	64.94	5.88	70.83	74	-3.17
2483.50	Е	Average	43.66	5.88	49.54	54	-4.46

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### Radiated Band Edge Measurement Result (802.11\_HT40)

Operation Mode: 802.11n40 Test Date: 2016/3/24

Fundamental Frequency: 2422 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH Low Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: Vertical E2

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2388.84	S	Peak	59.49	5.76	65.25	74	-8.75
2388.84	S	Average	40.63	5.76	46.39	54	-7.61
2390.00	E	Peak	57.15	5.78	62.92	74	-11.08
2390.00	E	Average	41.23	5.78	47.01	54	-6.99

Operation Mode: 802.11n40 Test Date: 2016/3/24

Fundamental Frequency: 2422 MHz Temp. / Humi.: 22.7deg\_C/57RH

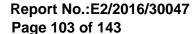
Operation Band: Test Engineer: Ashton BE CH Low EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2388.84	S	Peak	65.96	5.76	71.72	74	-2.28
2388.84	S	Average	46.56	5.76	52.32	54	-1.68
2390.00	E	Peak	63.62	5.78	69.40	74	-4.60
2390.00	Е	Average	47.07	5.78	52.85	54	-1.15

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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH High Test Engineer: **Ashton** EUT Pol.: Measurement Antenna Pol.: E2 Vertical

Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	56.30	5.88	62.18	74	-11.82
2483.50	E	Average	37.73	5.88	43.61	54	-10.39
2487.40	S	Peak	58.73	5.87	64.59	74	-9.41
2487.40	S	Average	36.42	5.87	42.29	54	-11.71

Test Date: 2016/3/24 Operation Mode: 802.11n40

Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH High Test Engineer: Ashton Measurement Antenna Pol.: EUT Pol.: E2 Horizontal

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	63.75	5.88	69.63	74	-4.37
2483.50	Е	Average	46.89	5.88	52.77	54	-1.23
2487.60	S	Peak	65.07	5.87	70.94	74	-3.06
2487.60	S	Average	43.94	5.87	49.81	54	<del>-4</del> .19

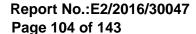
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH High Test Engineer: **Ashton** EUT Pol.: Measurement Antenna Pol.: E2 Vertical

Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	56.30	5.88	62.18	74	-11.82
2483.50	Е	Average	37.73	5.88	43.61	54	-10.39
2487.40	S	Peak	58.73	5.87	64.59	74	-9.41
2487.40	S	Average	36.42	5.87	42.29	54	-11.71

Test Date: 2016/3/24 Operation Mode: 802.11n40

Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: BE CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal

Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	63.75	5.88	69.63	74	-4.37
2483.50	E	Average	46.89	5.88	52.77	54	-1.23
2487.60	S	Peak	65.07	5.87	70.94	74	-3.06
2487.60	S	Average	43.94	5.87	49.81	54	-4.19

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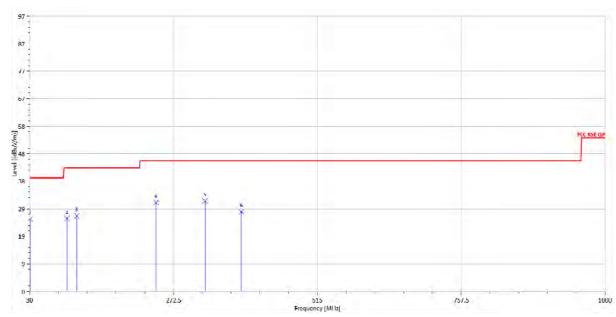
#### **Below 1GHz Worst-Case Data:**

## Radiated Spurious Emission Measurement Result (802.11 g)

Operation Mode: 802.11g Test Date: 2016/3/24

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: E2 Measurement Antenna Pol. : Vertical

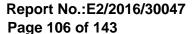


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
30.97	S	Peak	33.22	-7.70	25.52	40	-14.48
93.05	S	Peak	44.71	-18.95	25.76	43.5	-17.74
109.54	S	Peak	43.10	-16.52	26.58	43.5	-16.92
243.40	S	Peak	46.38	-15.07	31.31	46	-14.69
325.85	S	Peak	43.95	-12.05	31.90	46	-14.10
386.96	S	Peak	38.18	-10.15	28.04	46	-17.96

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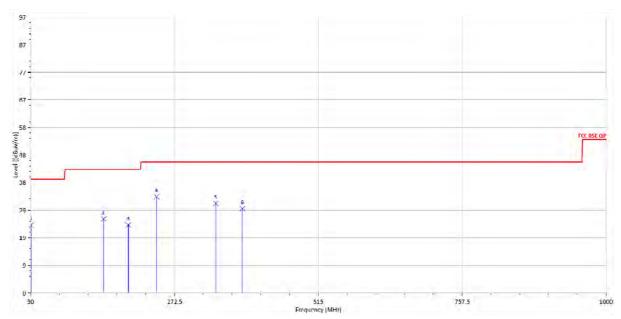
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Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol. : E2 Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
30.97	S	Peak	31.55	-7.70	23.85	40	-16.15
153.19	S	Peak	42.90	-16.88	26.02	43.5	-17.48
194.90	S	Peak	41.72	-17.85	23.87	43.5	-19.63
242.43	S	Peak	48.98	-15.16	33.82	46	-12.19
342.34	S	Peak	43.09	-11.62	31.47	46	-14.53
386.96	S	Peak	39.81	-10.15	29.66	46	-16.34

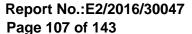
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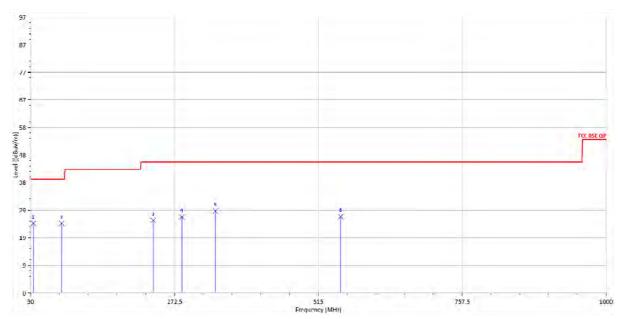
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH Mid Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol. : E2 Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
34.85	S	Peak	34.24	-9.78	24.46	40	-15.54
82.38	S	Peak	45.04	-20.61	24.43	40	-15.57
236.61	S	Peak	41.17	-15.63	25.55	46	-20.45
285.11	S	Peak	40.15	-13.45	26.70	46	-19.30
341.37	S	Peak	40.45	-11.66	28.79	46	-17.21
552.83	S	Peak	33.60	-6.78	26.82	46	-19.18

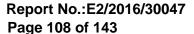
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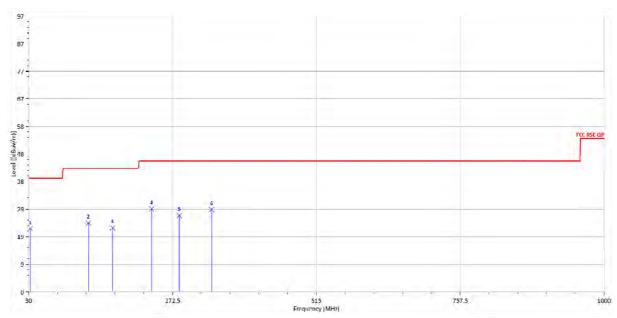
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH Mid Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol. : E2 Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
32.91	S	Peak	30.95	-8.75	22.20	40	-17.80
130.88	S	Peak	39.90	-15.71	24.19	43.5	-19.31
171.62	S	Peak	40.83	-18.33	22.50	43.5	-21.00
237.58	S	Peak	44.69	-15.53	29.16	46	-16.84
284.14	S	Peak	40.30	-13.47	26.83	46	-19.17
338.46	S	Peak	40.89	-11.93	28.97	46	-17.03

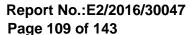
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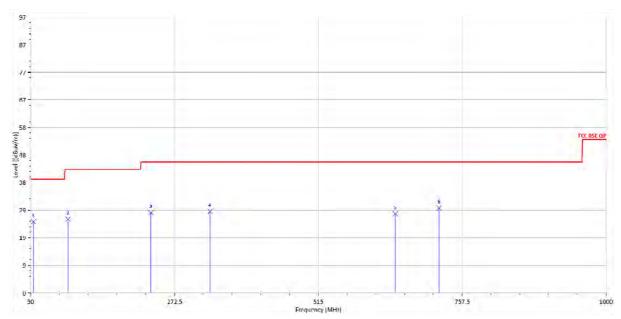
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
34.85	S	Peak	34.80	-9.78	25.02	40	-14.98
93.05	S	Peak	44.90	-18.95	25.94	43.5	-17.56
232.73	S	Peak	44.21	-15.99	28.22	46	-17.78
332.64	S	Peak	40.58	-11.92	28.67	46	-17.33
644.98	S	Peak	32.67	-4.88	27.79	46	-18.21
718.70	S	Peak	34.85	-5.00	29.84	46	-16.16

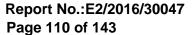
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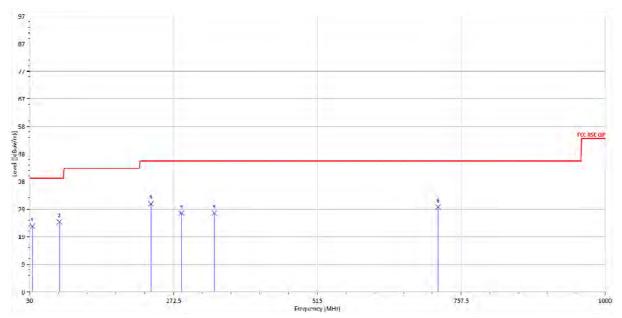
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg C/57RH

Test Engineer: Operation Band: Tx CH High Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
34.85	S	Peak	32.88	-9.78	23.10	40	-16.90
80.44	S	Peak	45.54	-20.88	24.66	40	-15.34
234.67	S	Peak	46.88	-15.87	31.02	46	-14.98
286.08	S	Peak	41.15	-13.41	27.73	46	-18.27
341.37	S	Peak	39.36	-11.66	27.70	46	-18.30
718.70	S	Peak	34.87	-5.00	29.87	46	-16.13

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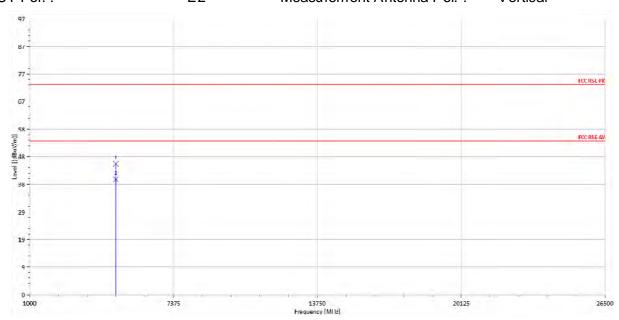
#### **Above 1GHz Data:**

# Radiated Spurious Emission Measurement Result (802.11 b)

Operation Mode: 802.11b Test Date: 2016/3/25

Temp. / Humi.: Fundamental Frequency: 2412 MHz 22.7deg\_C/57RH

Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: E2 Measurement Antenna Pol. : Vertical

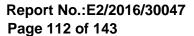


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin	
		Mode	Reading Level		FS	@3m		
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB	_
4824.00	Н	Peak	35.61	10.43	46.04	74	-27.96	
4824.00	Н	Average	30.12	10.43	40.55	54	-13.45	

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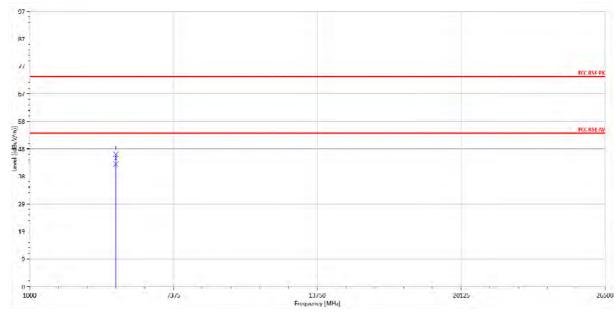
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Fundamental Frequency: Temp. / Humi.: 22.7deg\_C/57RH 2412 MHz

Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: E2 Measurement Antenna Pol. : Horizontal



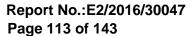
Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Peak	36.15	10.43	46.58	74	-27.42
4824.00	Н	Average	32.71	10.43	43.14	54	-10.86

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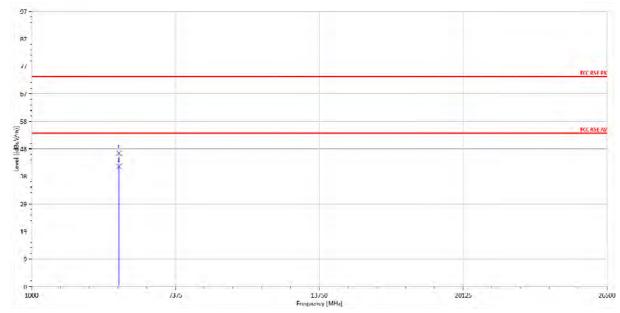
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Fundamental Frequency: Temp. / Humi.: 22.7deg\_C/57RH 2437 MHz

Operation Band: Tx CH Mid Test Engineer: Ashton EUT Pol.: E2 Measurement Antenna Pol. : Vertical



Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	36.33	10.66	46.99	74	-27.01
4874.00	Н	Average	31.62	10.66	42.28	54	-11.72

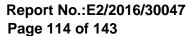
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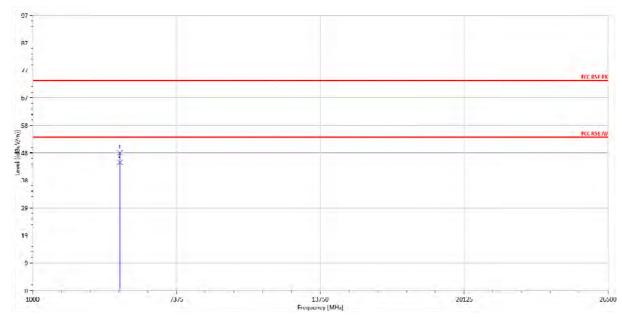
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Fundamental Frequency: Temp. / Humi.: 22.7deg\_C/57RH 2437 MHz

Operation Band: Tx CH Mid Test Engineer: Ashton EUT Pol.: E2 Measurement Antenna Pol. : Horizontal



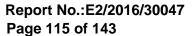
Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	37.79	10.66	48.45	74	-25.55
4874.00	Н	Average	34.50	10.66	45.16	54	-8.84

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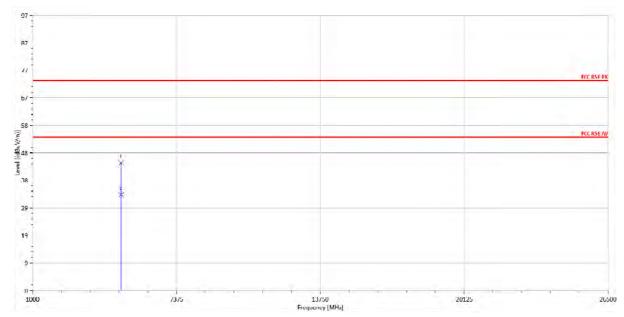
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

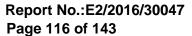
Operation Band: Tx CH High Test Engineer: **Ashton** EUT Pol.: E2 Measurement Antenna Pol.: Vertical



Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Н	Peak	34.38	10.57	44.95	74	-29.05
4924.00	Н	Average	23.22	10.57	33.79	54	-20.21

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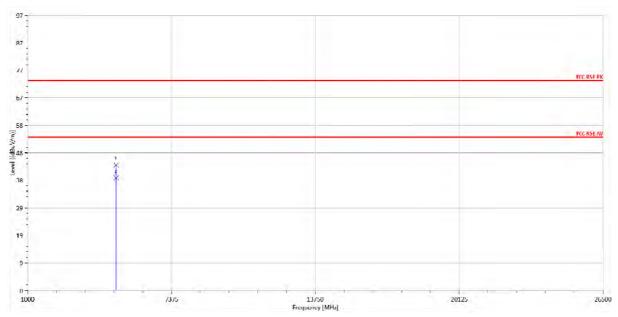
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg\_C/57RH

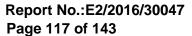
Operation Band: Tx CH High Test Engineer: **Ashton** EUT Pol.: E2 Measurement Antenna Pol.: Horizontal



Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Н	Peak	33.63	10.57	44.20	74	-29.80
4924.00	Н	Average	29.15	10.57	39.72	54	-14.28

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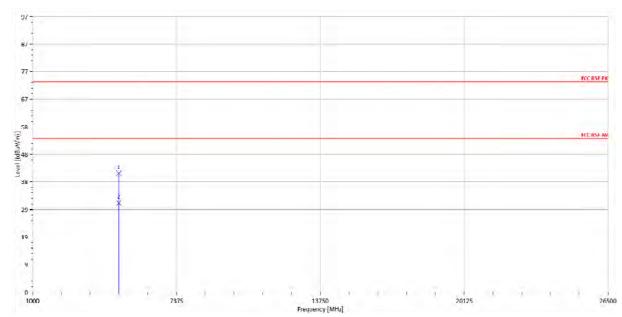


# Radiated Spurious Emission Measurement Result (802.11 g)

Operation Mode: Test Date: 802.11g 2016/3/25

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: E2 Measurement Antenna Pol. : Vertical



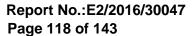
Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Peak	31.43	10.43	41.86	74	-32.14
4824.00	Н	Average	20.95	10.43	31.38	54	-22.62

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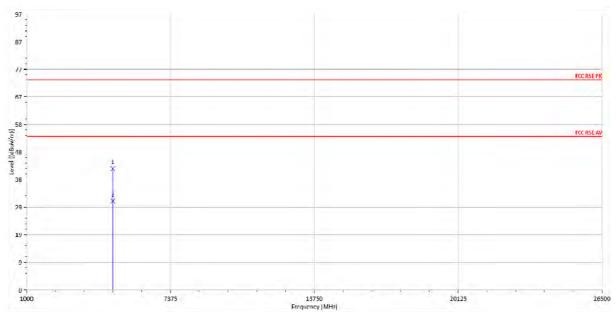
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Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg C/57RH

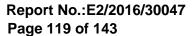
Operation Band: Test Engineer: Tx CH Low Ashton EUT Pol.: E2 Measurement Antenna Pol. : Horizontal



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Peak	32.21	10.43	42.63	74	-31.37
4824.00	Н	Average	20.80	10.43	31.23	54	-22.77

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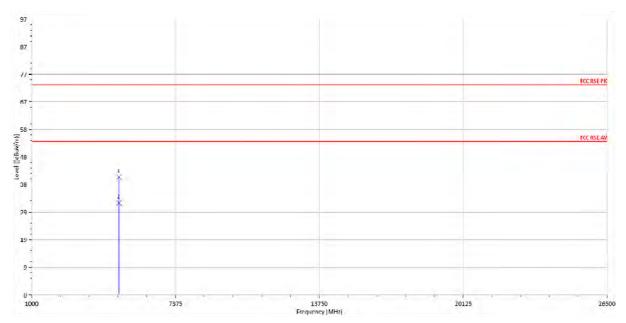
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH Mid Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol. : E2 Vertical

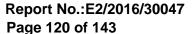


	Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
			Mode	Reading Level		FS	@3m	
	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
•	4874.00	Н	Peak	30.75	10.66	41.41	74	-32.59
	4874.00	Н	Average	21.69	10.66	32.35	54	-21.65

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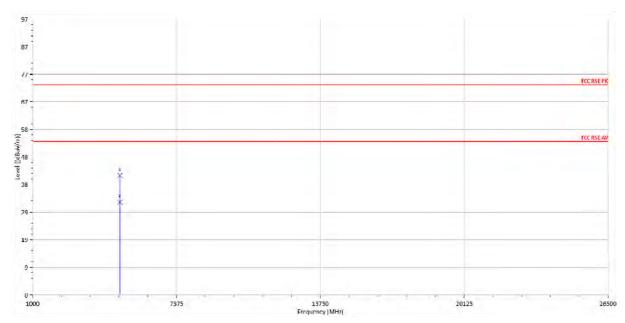
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH Mid Test Engineer: Ashton EUT Pol.: E2 Measurement Antenna Pol. : Horizontal

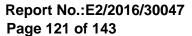


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	31.34	10.66	42.01	74	-31.99
4874.00	Н	Average	21.99	10.66	32.65	54	-21.35

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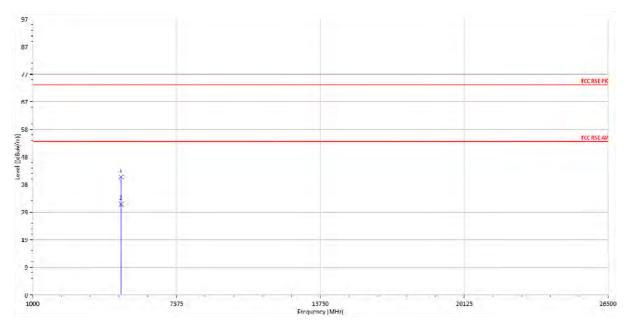
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

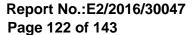


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Н	Peak	30.92	10.57	41.50	74	-32.50
4924.00	Н	Average	21.33	10.57	31.90	54	-22.10

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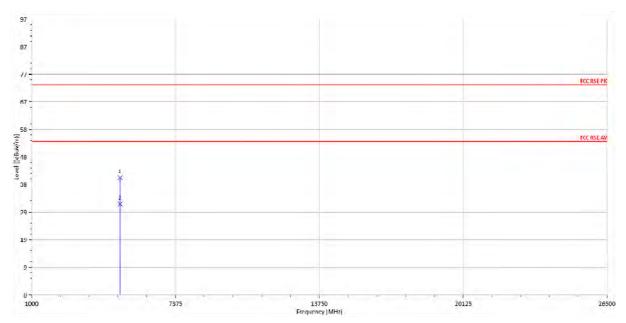
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Tx CH High Test Engineer: Ashton EUT Pol.: Measurement Antenna Pol.: E2 Horizontal



Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Н	Peak	30.66	10.57	41.23	74	-32.77
4924.00	Н	Average	21.42	10.57	31.99	54	-22.01

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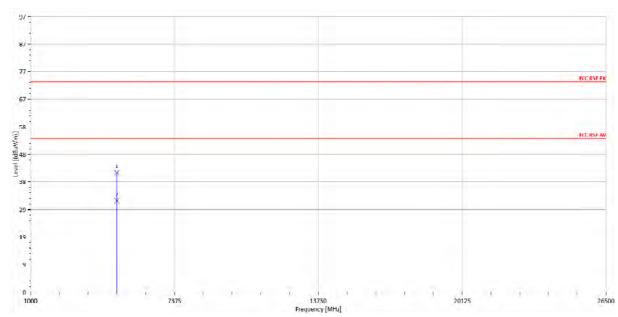


#### Radiated Spurious Emission Measurement Result (802.11\_HT20)

Operation Mode: 802.11n20 Test Date: 2016/3/25

Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Test Engineer: Tx CH Low Ashton EUT Pol.: Measurement Antenna Pol.: E2 Vertical

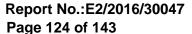


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Peak	31.59	10.43	42.02	74	-31.98
4824.00	Н	Average	21.73	10.43	32.16	54	-21.84

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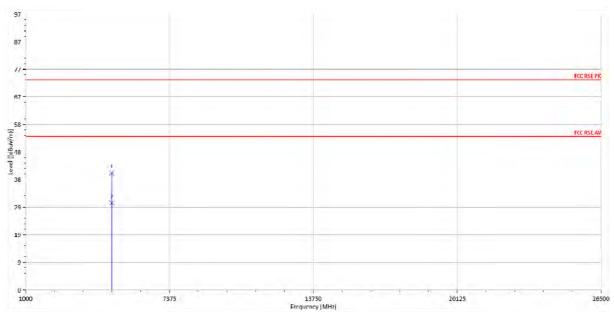
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Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH Low Ashton EUT Pol.: Measurement Antenna Pol. : E2 Horizontal

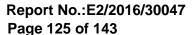


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Peak	30.67	10.43	41.10	74	-32.90
4824.00	Н	Average	20.19	10.43	30.62	54	-23.38

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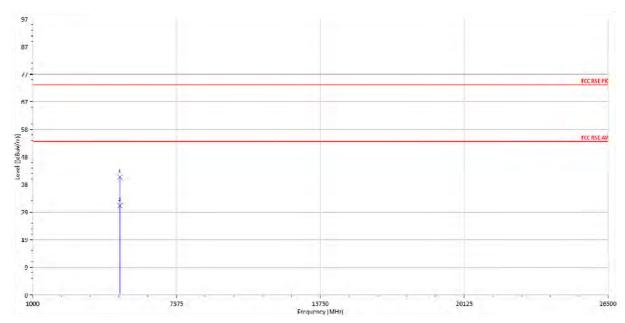
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH Mid Ashton EUT Pol.: Measurement Antenna Pol. : E2 Vertical

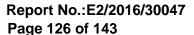


	Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
			Mode	Reading Level		FS	@3m	
	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4	874.00	Н	Peak	30.75	10.66	41.41	74	-32.59
4	874.00	Н	Average	20.68	10.66	31.34	54	-22.66

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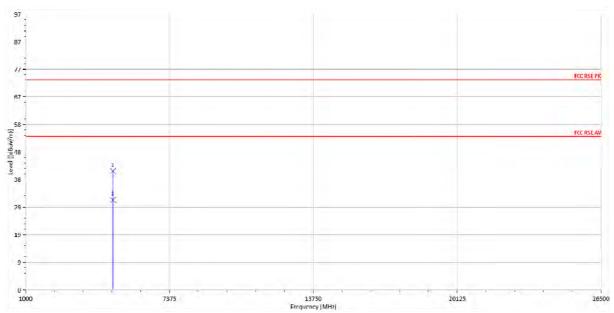
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH Mid Ashton EUT Pol.: Measurement Antenna Pol. : E2 Horizontal

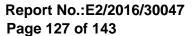


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	31.14	10.66	41.80	74	-32.20
4874.00	Н	Average	20.95	10.66	31.61	54	-22.39

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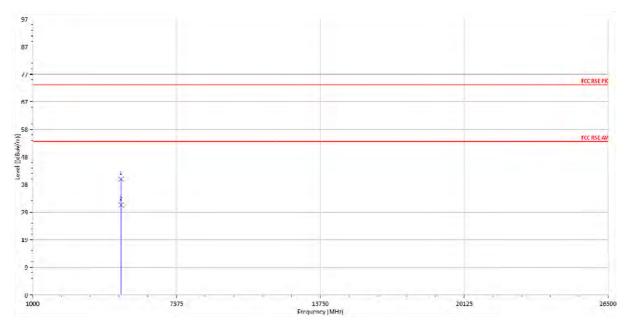
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg C/57RH

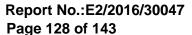
Operation Band: Test Engineer: Tx CH High Ashton EUT Pol.: Measurement Antenna Pol. : E2 Vertical



Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Н	Peak	30.16	10.57	40.73	74	-33.27
4924.00	Н	Average	21.05	10.57	31.62	54	-22.38

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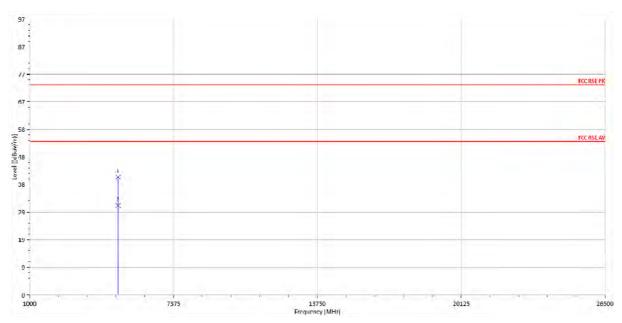
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH High Ashton EUT Pol.: Measurement Antenna Pol. : E2 Horizontal



Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Н	Peak	30.85	10.57	41.42	74	-32.58
4924.00	Н	Average	20.85	10.57	31.42	54	-22.58

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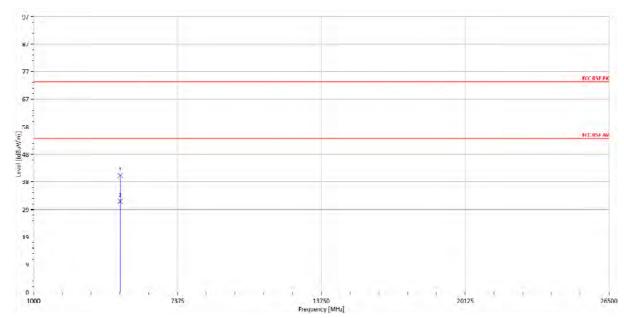


#### Radiated Spurious Emission Measurement Result (802.11\_HT40)

Operation Mode: 802.11n40 Test Date: 2016/3/25

Fundamental Frequency: 2422 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Test Engineer: Tx CH Low Ashton EUT Pol.: E2 Measurement Antenna Pol.: Vertical

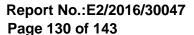


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4844.00	Н	Peak	30.69	10.36	41.05	74	-32.95
4844.00	Н	Average	21.63	10.36	31.99	54	-22.01

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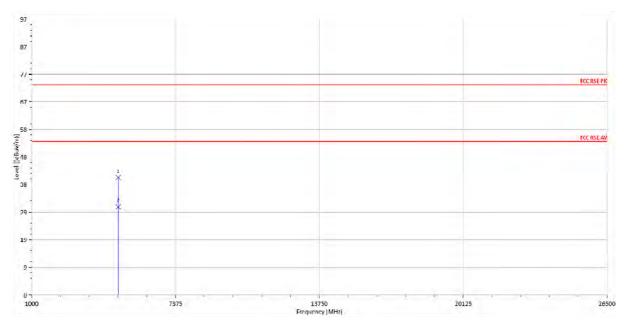
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Fundamental Frequency: 2422 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH Low Ashton EUT Pol.: Measurement Antenna Pol. : E2 Horizontal

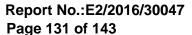


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4844.00	Н	Peak	30.95	10.36	41.31	74	-32.69
4844.00	Н	Average	20.61	10.36	30.97	54	-23.03

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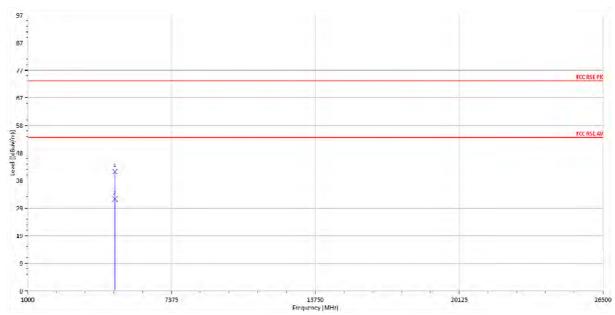
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

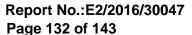
Operation Band: Test Engineer: Tx CH Mid Ashton EUT Pol.: Measurement Antenna Pol. : E2 Vertical



Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	31.32	10.66	41.99	74	-32.01
4874.00	Н	Average	21.64	10.66	32.30	54	-21.70

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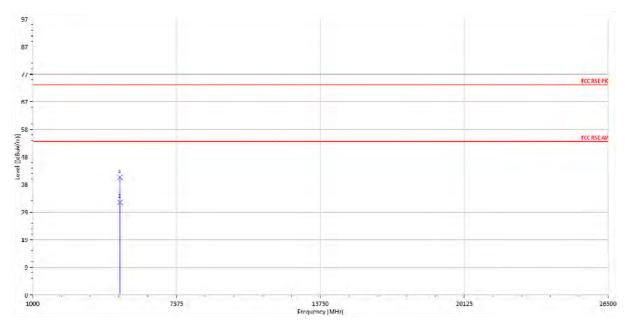
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH Mid Ashton EUT Pol.: Measurement Antenna Pol. : E2 Horizontal

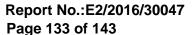


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	30.70	10.66	41.36	74	-32.64
4874.00	Н	Average	21.83	10.66	32.49	54	-21.51

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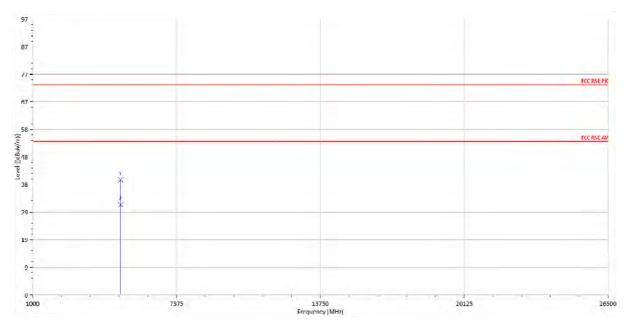
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Fundamental Frequency: 2452 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH High Ashton EUT Pol.: Measurement Antenna Pol. : E2 Vertical

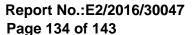


	Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
			Mode	Reading Level		FS	@3m	
	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
•	4904.00	Н	Peak	30.37	10.14	40.50	74	-33.50
	4904.00	Н	Average	21.60	10.14	31.74	54	-22.26

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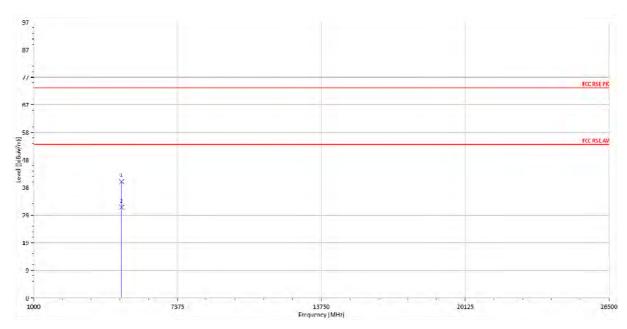
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Fundamental Frequency: 2452 MHz Temp. / Humi.: 22.7deg C/57RH

Operation Band: Test Engineer: Tx CH High Ashton EUT Pol.: Measurement Antenna Pol. : E2 Horizontal



Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4904.00	Н	Peak	30.80	10.14	40.93	74	-33.07
4904.00	Н	Average	21.74	10.14	31.88	54	-22.12

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#### 12 PEAK POWER SPECTRAL DENSITY

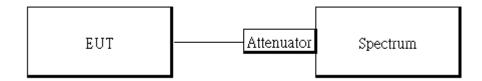
## 12.1 Standard Applicable

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.		
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510568	04/14/2015	04/13/2016	
DC Block	PASTERNACK	PE8210	RF29	12/12/2015	12/11/2016	
Attenuator	WOKEN	218FS-10	RF23	12/12/2015	12/11/2016	

#### 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 DTS Meas. Guidance.
- 3. Set the span to 1.5 times the DTS channel bandwidth.
- 4. Set the RBW = 3 kHz.
- 5. Set the VBW = 10 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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#### 12.5 Measurement Result

POWER DENSITY 802.11b MODE					
Frequency	RF Power	Maximum			
(MHz)	Density	Limit	Result		
(IVIITIZ)	(dBm)	(dBm)			
2412	-5.86	8.00	PASS		
2437	-6.64	8.00	PASS		
2462	-7.82	8.00	PASS		

POWER DENSITY 802.11g MODE						
Frequency	RF Power	Maximum				
(MHz)	Density	Limit	Result			
(1711-12)	(dBm)	(dBm)				
2412	-9.20	8.00	PASS			
2437	-8.55	8.00	PASS			
2462	-9.17	8.00	PASS			

POWER DENSITY 802.11n HT20 MODE						
Frequency	RF Power	Maximum				
(MHz)	Density	Limit	Result			
(1011 12)	(dBm)	(dBm)				
2412	-10.87	8.00	PASS			
2437	-10.53	8.00	PASS			
2462	-9.64	8.00	PASS			

POWER D	POWER DENSITY 802.11n HT40 MODE						
Frequency	RF Power	Maximum					
(MHz)	Density	Limit	Result				
(IVIITIZ)	(dBm)	(dBm)					
2422	-11.04	8.00	PASS				
2437	-12.4	8.00	PASS				
2452	-11.85	8.00	PASS				

<sup>\*</sup>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

# **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

# **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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#### 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.

#### 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.

The antenna gain is less than 6dBi. Therefore, it is not necessary to reduce maximum output power limit.

~ End of Report ~

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