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## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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

**Product Name: Personal Device Assistant** 

**Brand Name: Datalogic** 

Model No.: **DL-Axist** 

**TYPE** with

00ANM4HL1FT1A4 WLAN/BT/NFC:

**Model Difference:** N/A

FCC ID: **U4GDLNFCR1** 

**Report No.:** E2/2015/B0091

**Issue Date:** Mar. 14, 2016

**FCC Rule Part:** §15.247, Cat: DTS

Datalogic ADC S.r.l.

**Prepared for:** Via San Vitalino no. 13, Calderara di Reno -

40012 (Bologna) Italy

SGS Taiwan Ltd.

**Electronics & Communication Laboratory** Prepared by:

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## VERIFICATION OF COMPLIANCE

**Applicant:** Datalogic ADC S.r.l.

Via San Vitalino no. 13, Calderara di Reno - 40012 (Bologna) It-

**Product Name:** Personal Device Assistant

**Brand Name:** Datalogic **DL-Axist** Model No.:

**TYPE** with

00ANM4HL1FT1A4

WLAN/BT/NFC:

**Model Difference:** N/A

FCC ID: U4GDLNFCR1

**Report Number:** E2/2015/B0091

Date of test: Nov. 24, 2015 ~ Mar. 14, 2016

Date of EUT Received: Nov. 24, 2015

## 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:	Mar. 14, 2016	
-	Aken Huang / Engineer		M 44 0040	
Prepared By:	Tiffany Kao / Clerk	Date:	Mar. 14, 2016	
Approved By:	Tim Chang	Date:	Mar. 14, 2016	
	Jim Chang / Asst. Manager			

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# **Revision History**

Report Number	Revision	Description	Issue Date
E2/2015/B0091	Rev.00	Initial creation of document	Mar. 14, 2016

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#### GENERAL INFORMATION

## 1.1 Product description

#### General:

Product Name:	Personal Device Assistant			
Brand Name:	Datalogic			
Model No.:	DL-Axist			
TYPE with WLAN/BT/NFC:	00ANM4F	HL1FT1A4		
Model Difference:	N/A			
Product SW/HW version:	4.1.1 0.00.17.2015 1106 eng / DLX WLAN R1			
Radio SW/HW version:	N/A / N/A			
Test SW Version:	N/A			
RF power setting in TEST SW:	N/A			
	3.8Vdc fro	om rechargeable battery and 5.0Vdc from adapter		
Power Supply:	Battery:	<ol> <li>Model No.: Standard BTDL1, Supplier: JMS</li> <li>Model No.: Extended BTDL1, Supplier: JMS</li> </ol>		
т отог опррту.	Adapter:	<ol> <li>Model No.: SYS1460-1005, Supplier: Sunny</li> <li>Model No.: SYS1561-1005, Supplier: Sunny</li> </ol>		

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#### WLAN 2.4GHz:

<u> </u>	1 12 1					
Wi-Fi	Frequency Range	Channels	Rated Power	Modulation Technology		
11b/g	2412-2462	11	b: 16.70dBm g: 20.55dBm	DSSS, OFDM		
11n	HT20 2412-2462	11	HT20:24.07dBm (MIMO Chain 0+1)	OFDM		
11n	HT40 2422-2452	7	HT40: 18.61dBm	OFDM		
Antenna	Designation:	PIFA Antenna Gain: 0.85dBi (Main), Gain: 2.75dBi (Aux)				
Modulation type:		CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM				
Transition Rate:		802.11 g: 802.11 n_	up to 11 Mbps; up to 54 Mbps _20MHz: up to 144Mbps _40MHz: up to 300Mbps			

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## 1.2 Product Feature of Equipment Under Test

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

	Product Feature				
Product Name:	Personal Device Assistant				
Brand Name:	Datalogic				
Model No.:	DL-Axist				
Model Difference:	N/A				
FCC ID:	U4GDLNFCR1				
Wi-Fi Specification	802.11a/b/g/n				
Bluetooth Version	V4.0 (dual mode)				
NFC Specification	NFC				

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.
- 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 4dB and 10dB attenuator.

#### SISO mode offset:

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

#### MIMO mode offset:

= RF cable loss (dB)+ attenuation factor(dB)+ 10 log(Nant) dB =14(dB)

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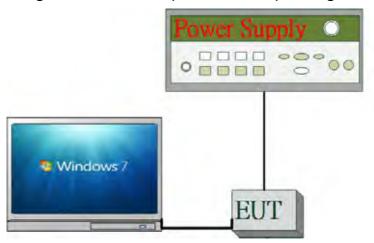


## 2.5 Configuration of Tested System

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
3.	DC Power Supply	Agilent	E3640A	MY53140006	N/A	Un-shielded

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## **SUMMARY OF TEST RESULTS**

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(a)(2)	6dB & 99% 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

<u>and provided for double to, double to be </u>							
CHANNEL	CHANNEL FREQUENCY		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						

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RADIATED EMISSION TEST (ABOVE 1 GHz)								
MODE AVAILABLE TESTED CHANNEL MODULATION RATE (Mbps) ANTENNA PORT								
802.11b	1 to 11	1, 6, 11	DSSS	1	Aux			
802.11g	1 to 11	1, 6, 11	OFDM	6	Aux			
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 8	MIMO			
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	MCS 0	Aux			

#### Note:

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

#### ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST							
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT		
802.11b	1 to 11	1, 6, 11	DSSS	1	Aux		
802.11g	1 to 11	1, 6, 11	OFDM	6	Aux		
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 8	MIMO		
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	MCS 0	Aux		

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## Directional gain (MIMO)

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

Array gain = 3.01dBi (peak spectral density, conducted spurious emission) Gain that is combined with different magnitude of two antennas:

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

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

where

Each antenna is driven by no more than one spatial stream;

 $N_{SS}$  = the number of independent spatial streams of data:

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

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

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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	Lin dB(	nits 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	N30N30-1042-150c m	N/A	02/07/2015	02/06/2016			
LISN	Schwarzbeck	NSLK 8127	8127-648	06/09/2015	06/08/2016			
LISN	Rolf-Heine	NNB-2/16Z	99012	03/04/2015	03/03/2016			
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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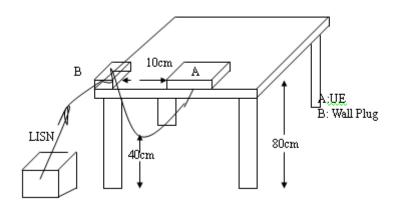
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## 6.4 Test SET-UP (Block Diagram of Configuration)



#### **6.5 Measurement Procedure**

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

#### 6.6 Measurement Result

Note: Refer to next page for measurement data and plots.

Note2: The \* reveals the worst-case results that closet to the limit.

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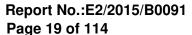
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#### AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode: Operation mode Test Date: Dec. 15, 2015

Temperature: 23.8

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Conduction Room

Phase:

Temperature: 21 %

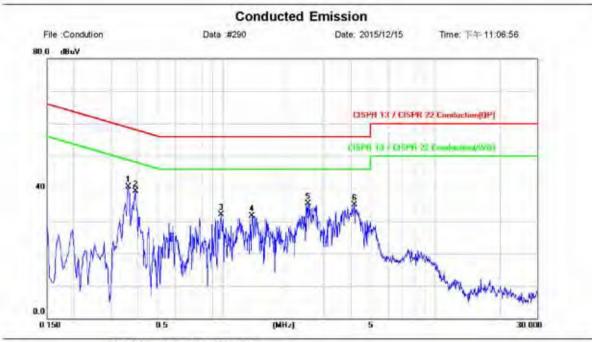
AC 120V/60Hz Power:

Humidity: 69 %

Mode:

Note: Adapter:SYS1460-1005

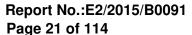
Limit CISPR 13 / CISPR 22 Conduction(QP)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment	
1		0.3620	40.23	0.20	40.43	58.68	-18.25	peak		
2		0.3900	38.80	0.21	39.01	58.06	-19.05	peak		
3	4	0.9860	31.44	0.46	31.90	56.00	-24.10	peak		
4	9	1.3780	30.96	0.54	31.50	56.00	-24.50	peak		
5		2.5140	34.67	0.64	35.31	56.00	-20.69	peak		
6	×	4.1780	34.34	0.66	35.00	56.00	-21.00	peak		
_										

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Operation Mode: Operation mode Test Date: Dec. 15, 2015

Temperature: 23.8

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Site Conduction Room Phase:

22 T Temperature:

Limit CISPR 13 / CISPR 22 Conduction(QP)

AC 120V/60Hz Power:

N

Humidity:

Mode:

Note: Adapter:SYS1561-1005

#### Conducted Emission Data :#321 Date: 2016/1/7 File : Condution Time: 下午 11:17:40 dBuV CISPR 13 / CISPR 22 Conduction(UP) COMPR. 12 / KISPT. 22 1 0.0 0.150 5 [MHz] 30 000 Reading Correct Measure-Limit Over No Mk Freq. Level Factor ment MHZ dBuV dB dBuV dBuV dB Detector Comment 1 0.14 -19.85 0.1540 45.79 45.93 65.78 peak 0.14 62.60 -20.12 2 0.2260 42 34 42.48 peak 3 0.28 0.5260 43.33 43.61 56.00 -12.39peak 4 1.6380 39.18 0.57 39.75 56.00 -16.25peak 5 2.5740 37:12 0.64 37.76 56.00 -18.24peak 6 4.0740 35.83 0.66 36.49 56.00 -19.51 peak

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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:**

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

#### **Duty Cycle:**

	Duty Cycle (%)	Duty Factor (dB)
802.11b	97.70	0.10
802.11g	84.93	0.71
802.11n_20	92.31	0.35
802.11n_40	72.25	1.41

Duty Cycle Factor: 10 \* log (1/Duty cycle)

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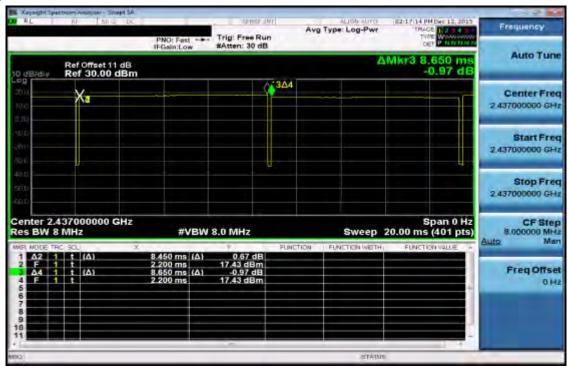
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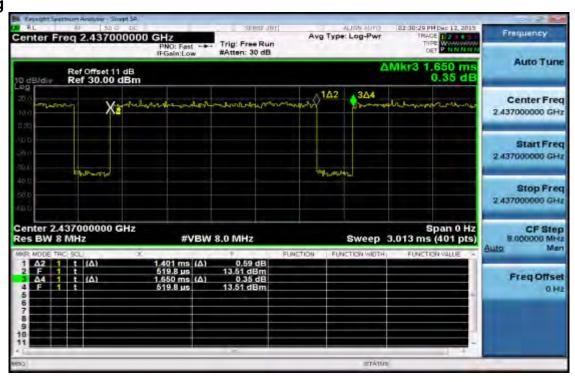
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## 7.1 DUTY CYCLE TEST SIGNAL Measurement Result 802.11 b



#### 802.11 q



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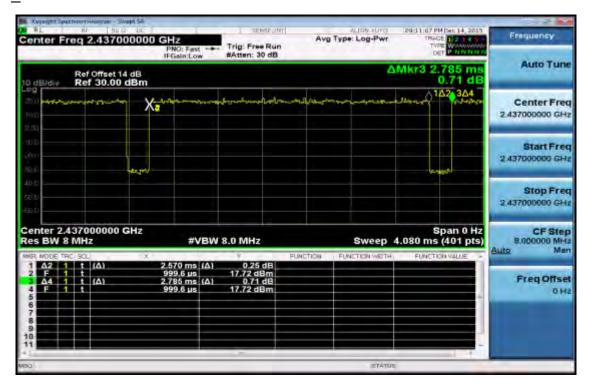
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#### 802.11 n 20 MHz



#### 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.

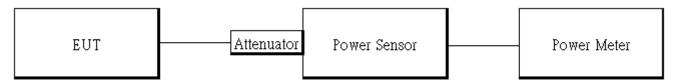
In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of Antenna exceeds 6dBi.

## 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 V03r04.
- 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	16.4	43.65	1 Watt = 30.00 dBm	PASS			
6	2437	1	16.17	41.40	1 Watt = 30.00 dBm	PASS			
11	2462	1	15.95	39.36	1 Watt = 30.00 dBm	PASS			
802.1	1b Main	02.11b Main							
СН	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT			
<b>CH</b>		Data Rate	Power	Power	Limit  1 Watt = 30.00 dBm				
	(MHz)	Data Rate  1	Power (dBm)	Power (mW)		PASS			

	_							
802.1	1b Aux							
СН	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	ı	Limit		RESULT
1	2412	1	16.7	46.77	1 Watt =	30.00	dBm	PASS
6	2437	1	15.78	37.84	1 Watt =	30.00	dBm	PASS
11	2462	1	16.09	40.64	1 Watt =	30.00	dBm	PASS
802.1	1b Aux							
СН	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit		RESULT	
1	2412	1	14.46	27.93	1 Watt =	30.00	dBm	PASS
6	2437	1	14.21	26.36	1 Watt =	30.00	dBm	PASS
11	2462	1	13.99	25.06	1 Watt =	30.00	dBm	PASS

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802.1	1g Main					
СН	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit	RESULT
1	2412	6	20.16	103.75	1 Watt = 30.00 dBm	PASS
6	2437	6	20.07	101.62	1 Watt = 30.00 dBm	PASS
11	2462	6	19.82	95.94	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	11.25	13.34	1 Watt = 30.00 dBm	PASS
6	2437	6	11.14	13.00	1 Watt = 30.00 dBm	PASS

802.1	1g Aux							
СН	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit			RESULT
1	2412	6	20.55	113.50	1 Watt =	30.00	dBm	PASS
6	2437	6	20.41	109.90	1 Watt =	30.00	dBm	PASS
11	2462	6	20.4	109.65	1 Watt =	30.00	dBm	PASS
802.1	1g Aux							
					Limit			
СН	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	L	imit		RESULT
<b>CH</b>		Data Rate	Power	Power	1 Watt =	<b>imit</b> 30.00	dBm	<b>RESULT</b> PASS
	(MHz)		Power (dBm)	Power (mW)			dBm dBm	

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802.1	802.11n_20M Main							
СН	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit	RESULT		
1	2412	MCS0	20.31	107.40	1 Watt = 30.00 dBm	PASS		
6	2437	MCS0	20.24	105.68	1 Watt = 30.00 dBm	PASS		
11	2462	MCS0	19.98	99.54	1 Watt = 30.00 dBm	PASS		
802.1	1n_20M Mair	1						
СН	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT		
1	2412	MCS0	11.98	15.78	1 Watt = 30.00 dBm	PASS		
6	2437	MCS0	11.64	14.59	1 Watt = 30.00 dBm	PASS		
11	2462	MCS0	11.25	13.34	1  Watt = 30.00  dBm	PASS		

802.1	802.11n_20M Aux							
СН	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit	RESULT		
1	2412	MCS0	20.64	115.88	1 Watt = 30.00 dBm	PASS		
6	2437	MCS0	20.41	109.90	1 Watt = 30.00 dBm	PASS		
11	2462	MCS0	20.34	108.14	1 Watt = 30.00 dBm	PASS		
802.1	1n 20M Aux							
СН	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT		
1	2412	MCS0	12.08	16.14	1 Watt = 30.00 dBm	PASS		
6	2437	MCS0	11.68	14.72	1 Watt = 30.00 dBm	PASS		
11	2462	MCS0	11.29	13.46	1 Watt = 30.00 dBm	PASS		

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802.	802.11n_20M MIMO								
СН	Frequency (MHz)	Data Rate	_	Output wer Bm)	Total Peak Output Power	Total Peak Output Power	Limit		RESULT
			CHAIN 0	CHAIN 1	(dBm)	(mW)			
1	2412	MCS8	20.6	21.32	23.99	250.33	1 Watt = 30.00	dBm	PASS
6	2437	MCS8	20.61	21.47	24.07	255.36	1 Watt = 30.00	dBm	PASS
11	2462	MCS8	20.39	21.4	23.93	247.43	1 Watt = 30.00	dBm	PASS
802.	11n_20M MIN	MO							
			_	Output	Total Peak	Total Peak			
СН	Frequency	Data	Pov		Output	Output	Limit		RESULT
011	(MHz)	Rate	(dE	Bm)	Power	Power			ILSOLI
			CHAIN 0	CHAIN 1	(dBm)	(mW)			
1	2412	MCS8	12.8	12.05	15.45	35.09	1 Watt = 30.00	dBm	PASS
6	2437	MCS8	13.2	12.2	15.74	37.49	1 Watt = 30.00	dBm	PASS
11	2462	MCS8	13.05	12.61	15.85	38.42	1 Watt = 30.00	dBm	PASS

802.11n_40M Main							
СН	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit	RESULT	
1	2422	MCS0	17.8	60.26	1 Watt = 30.00 dBm	PASS	
6	2437	MCS0	17.78	59.98	1 Watt = 30.00 dBm	PASS	
11	2452	MCS0	17.65	58.21	1 Watt = 30.00 dBm	PASS	
802.1	1n_40M Mair	ı					
СН	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit	RESULT	
1	2422	MCS0	9.61	9.14	1  Watt = 30.00  dBm	PASS	
1 6	2422 2437	MCS0 MCS0	9.61 10.15	9.14 10.35	1 Watt = 30.00 dBm 1 Watt = 30.00 dBm	PASS PASS	

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802.1	802.11n_40M Aux							
СН	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit	RESULT		
1	2422	MCS0	18.5	70.79	1 Watt = 30.00 dBm	PASS		
6	2437	MCS0	18.61	72.61	1 Watt = 30.00 dBm	PASS		
11	2452	MCS0	18.4	69.18	1 Watt = 30.00 dBm	PASS		
802.1	1n_40M Aux							
	Frequency		Avg. Output	Avg. Output				
СН	(MHz)	Data Rate	Power (dBm)	Power (mW)	Limit	RESULT		
1		Data Rate MCS0		Power	<b>Limit</b> 1 Watt = 30.00 dBm			
1 6	(MHz)		(dBm)	Power (mW)		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

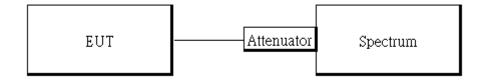
## 9.1 Standard Applicable

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

## 9.2 Measurement Equipment Used

Conducted Emission Test Site							
EQUIPMENT MFR MC		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 V03r04.
- 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 11h

33=11.13							
Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result				
2412	9583.6	> 500	PASS				
2437	9574.1	> 500	PASS				
2462	9067.4	> 500	PASS				

#### 802.11q

<u> </u>						
Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result			
2412	13825	> 500	PASS			
2437	12094	> 500	PASS			
2462	13816	> 500	PASS			

## 802.11n 20M (Main)

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
2412	12604	> 500	PASS
2437	14421	> 500	PASS
2462	15340	> 500	PASS

#### 802.11n 20M (Aux)

992:1111 <u>_</u> 2011 (AdX)						
Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result			
2412	13767	> 500	PASS			
2437	15086	> 500	PASS			
2462	15161	> 500	PASS			

#### 802.11n 40M

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
2422	31396	> 500	PASS
2437	35092	> 500	PASS
2452	35035	> 500	PASS

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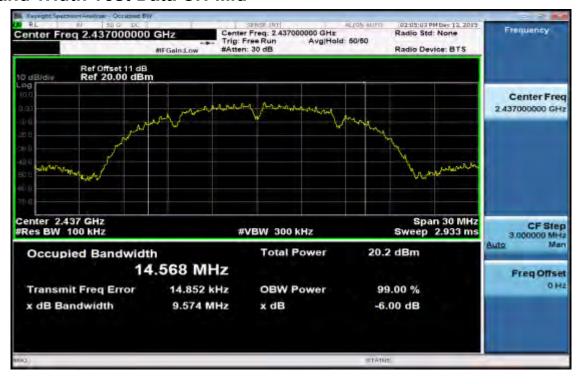
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# 802.11b (Aux) 6dB Band Width Test Data CH-Low



## 6dB Band Width Test Data CH-Mid



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# 6dB Band Width Test Data CH-High



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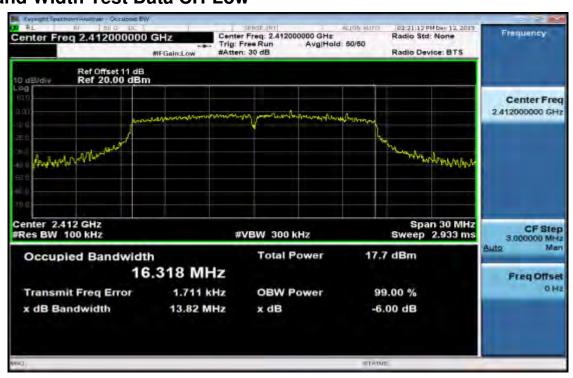
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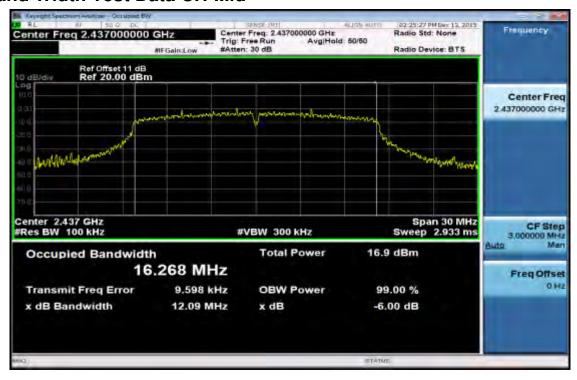
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# 802.11g (Aux) 6dB Band Width Test Data CH-Low



### 6dB Band Width Test Data CH-Mid



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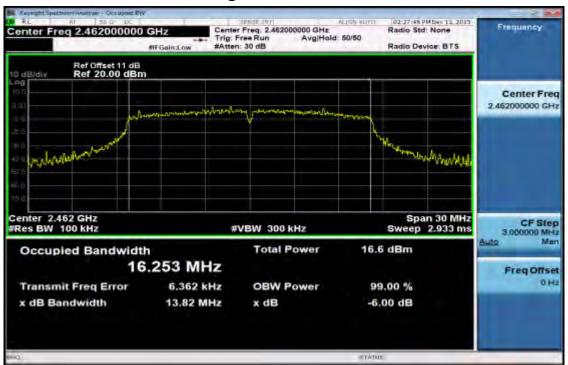
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# 6dB Band Width Test Data CH-High



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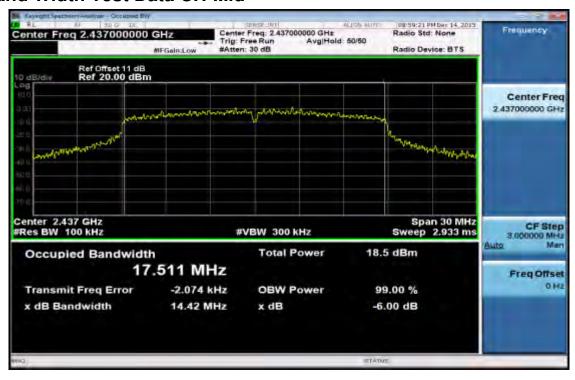
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# 802.11n 20M (Main) 6dB Band Width Test Data CH-Low



### 6dB Band Width Test Data CH-Mid



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# 6dB Band Width Test Data CH-High



# 802.11n 20M (Aux)

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



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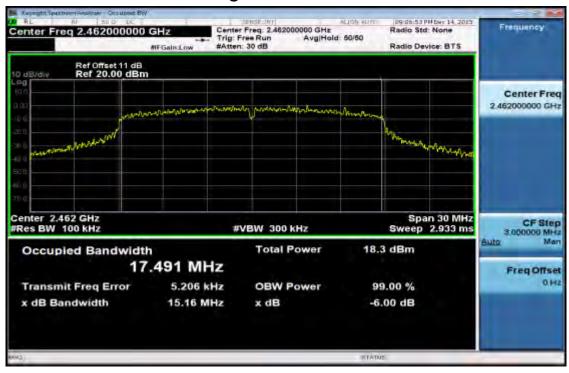
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### 6dB Band Width Test Data CH-Mid



# 6dB Band Width Test Data CH-High



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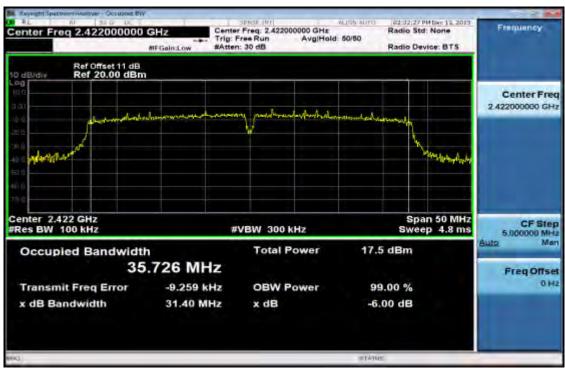
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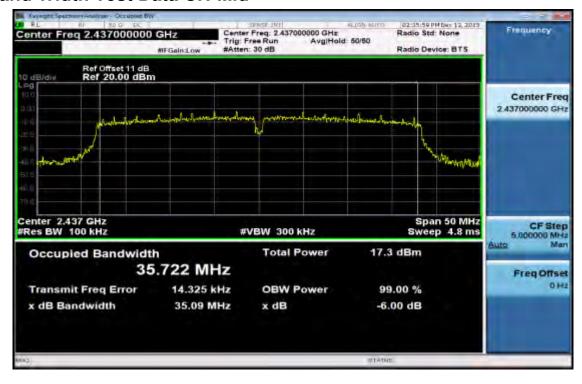
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# 802.11n 40M (Aux) 6dB Band Width Test Data CH-Low



### 6dB Band Width Test Data CH-Mid

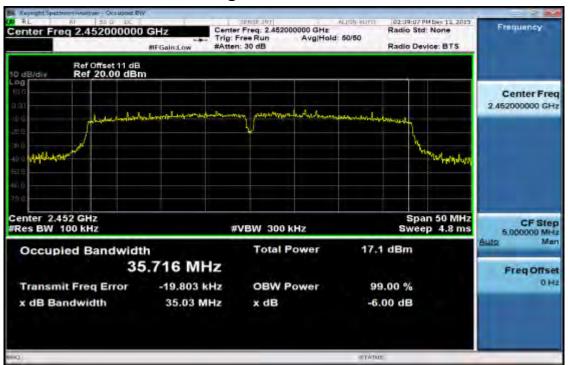


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# 6dB Band Width Test Data CH-High



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#### CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

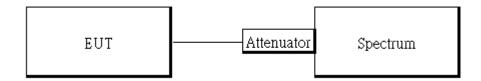
#### 10.1 Standard Applicable

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	SERIAL LAST					
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.
- 9. Repeat above procedures until all default test channel (low, middle, and high) was complete.

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

- To connect Antenna Port of EUT to Spectrum
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 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**

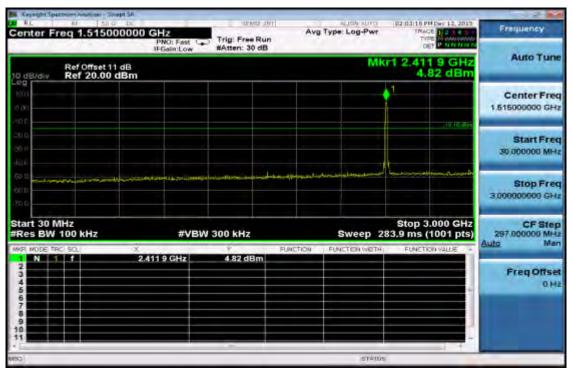


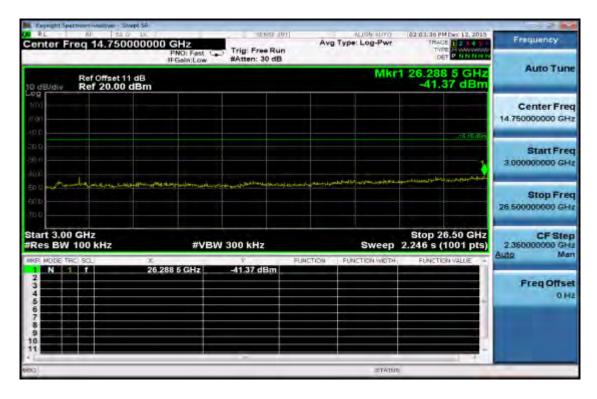
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# 802.11b **Spurious Emission Test Data CH-Low**





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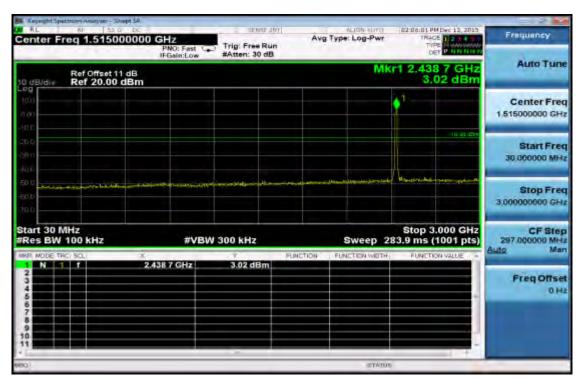
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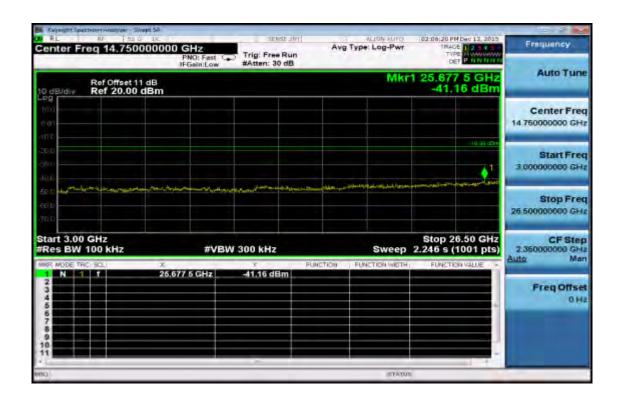
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# **Spurious Emission Test Data CH-Mid**





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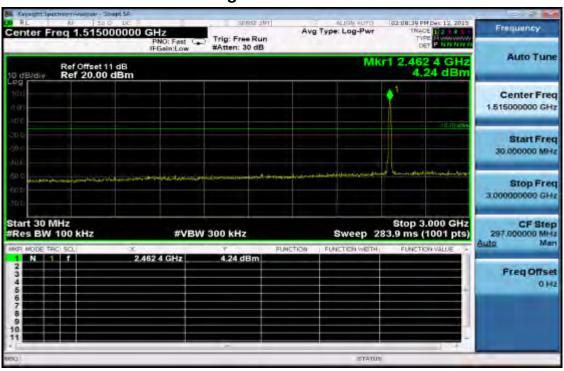
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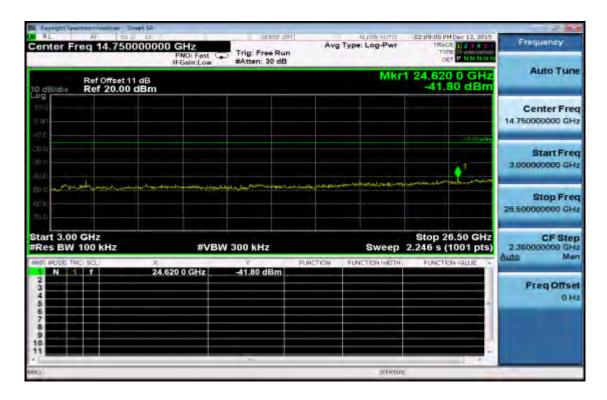
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## **Spurious Emission Test Data CH-High**





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



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

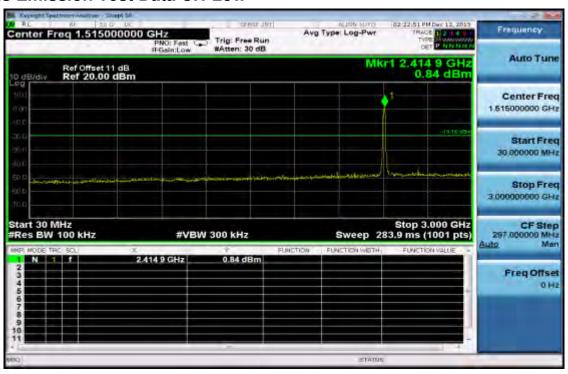


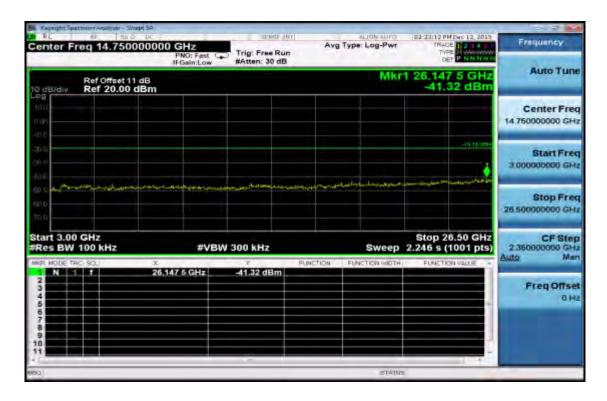
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# 802.11g **Spurious Emission Test Data CH-Low**





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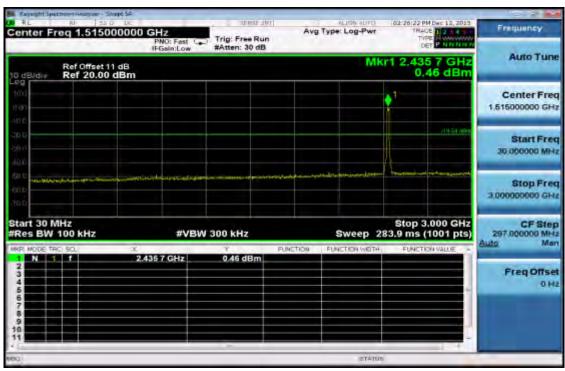
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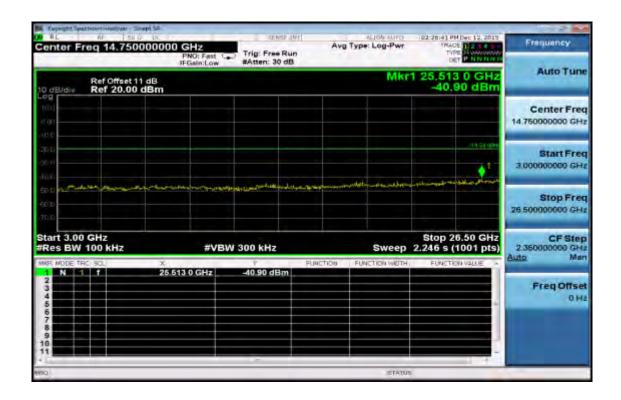
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## **Spurious Emission Test Data CH-Mid**





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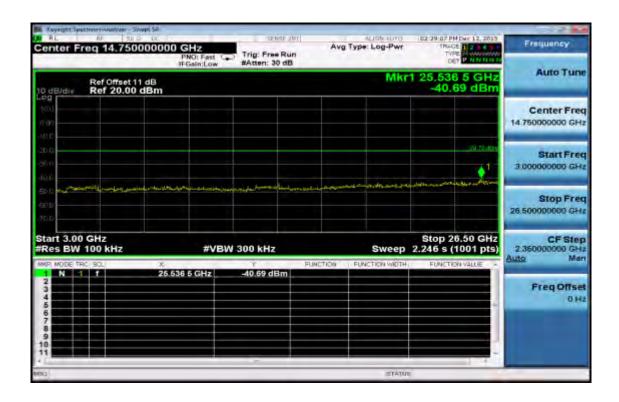
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# **Spurious Emission Test Data CH-High**





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



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



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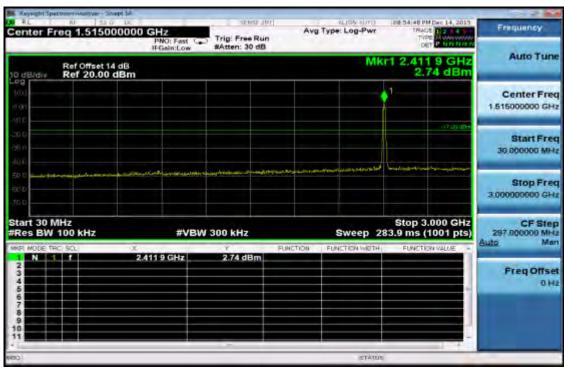
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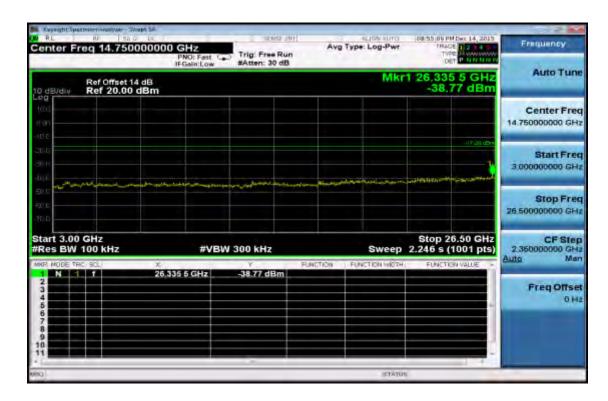
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## 802.11n HT20

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





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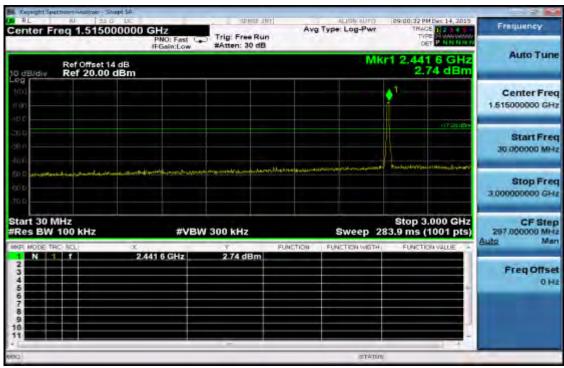
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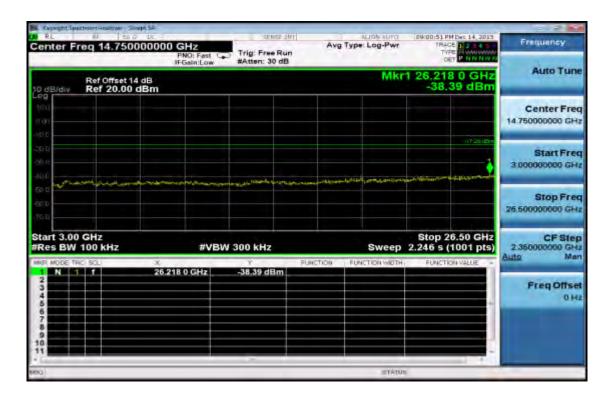
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## **Spurious Emission Test Data CH-Mid**





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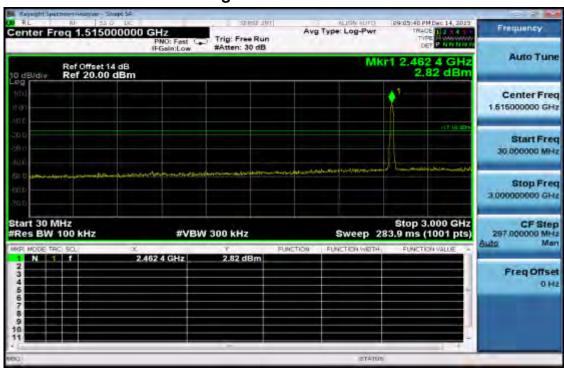
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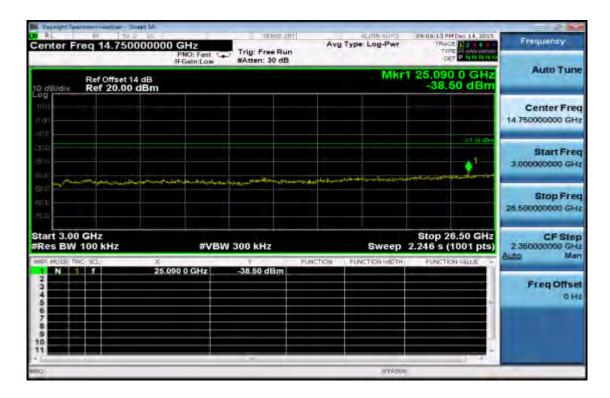
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## **Spurious Emission Test Data CH-High**





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



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



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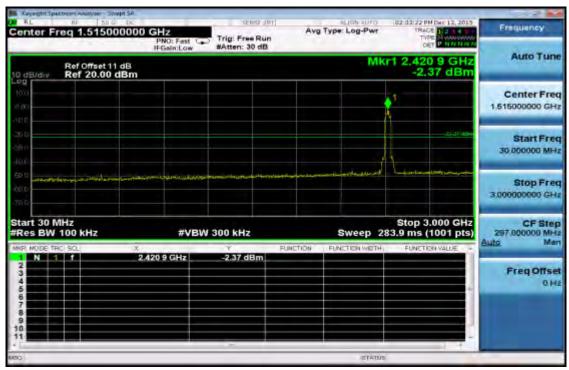
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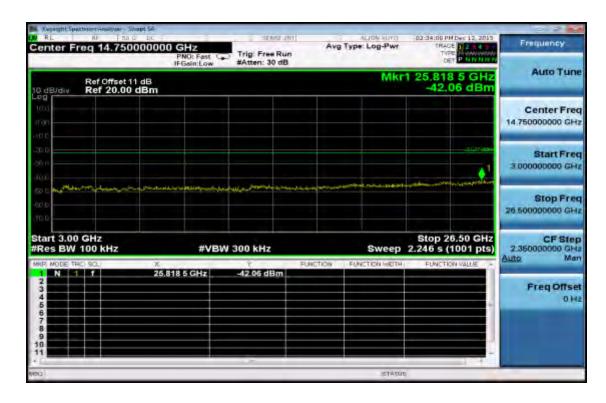
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# 802.11n HT40

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





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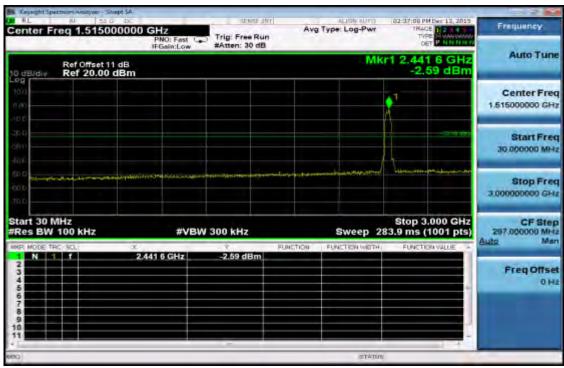
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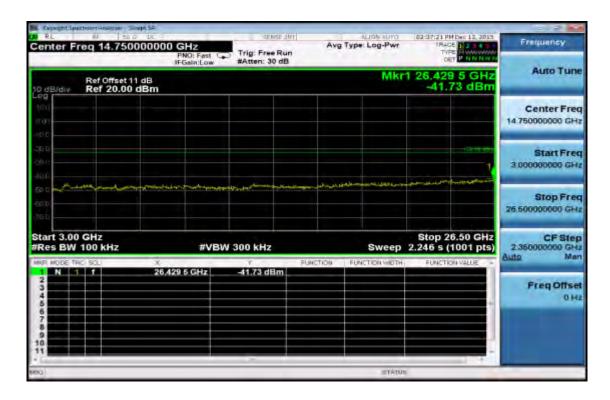
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## **Spurious Emission Test Data CH-Mid**





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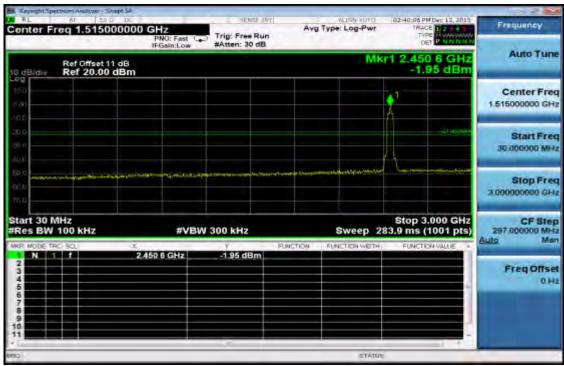
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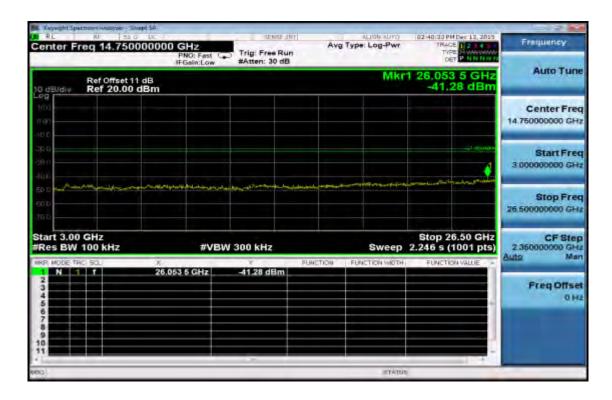
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# **Spurious Emission Test Data CH-High**





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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.
- 2. Emission level  $(dB\mu V/m) = 20 \log Emission level (dB\mu V/m)$

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#### 11.2 Measurement Equipment Used:

		966 Chambe	r		
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	EMC Instruments	EMC330	980096	12/12/2015	12/11/2016
Pre Amplifier	<b>EMC Instruments</b>	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	03/04/2015	03/03/2016
Site VSWR	SGS	966 Chamber C	SAC-C	03/04/2015	03/03/2016
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	MF	N/A	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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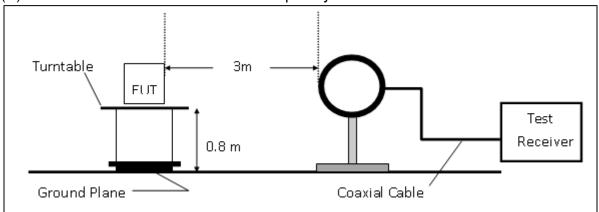
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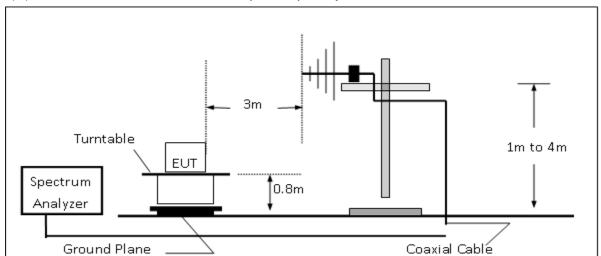


#### 11.3 Test SET-UP

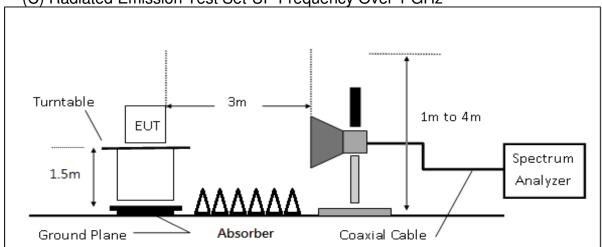
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



## (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

- 1. 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(dB $\mu$ V/m) + Cable Loss(dB) - Pre Amplifier Gain(dB)

#### Note:

"F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency. "E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

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

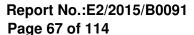
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

#### 11.7 Measurement Result

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

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

Operation Mode: 802.11b Test Date: 2015/12/17

Fundamental Frequency: 2412 MHz Temp. / Humi.: 24.1deg C/48RH

Operation Band: BE CH Low Test Engineer: Pony EUT Pol.: E1 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
•	2390.00	E	Peak	44.73	6.62	51.35	74	-22.65
	2390.00	Е	Average	32.83	6.62	39.45	54	-14.55

Operation Mode: 802.11b Test Date: 2015/12/17

Fundamental Frequency: 2412 MHz Temp. / Humi.: 24.1deg C/48RH

Operation Band: BE CH Low Test Engineer: Pony EUT Pol.: Measurement Antenna Pol. : Horizontal E1

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
2385.36	S	Peak	48.58	6.62	55.20	74	-18.80
2385.36	S	Average	36.53	6.62	43.15	54	-10.85
2390.00	E	Peak	45.61	6.62	52.23	74	-21.77
2390.00	Е	Average	34.04	6.62	40.66	54	-13.34

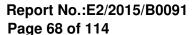
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Operation Mode: 802.11b Test Date: 2015/12/17

Fundamental Frequency: 2462 MHz Temp. / Humi.: 24.1deg C/48RH

Operation Band: Test Engineer: BE CH High Pony EUT Pol.: E1 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	
•	2483.50	E	Peak	44.65	6.96	51.61	74	-22.39	
	2483.50	E	Average	33.39	6.96	40.35	54	-13.65	

Operation Mode: 802.11b Test Date: 2015/12/17

Fundamental Frequency: 2462 MHz Temp. / Humi.: 24.1deg C/48RH

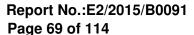
Operation Band: BE CH High Test Engineer: Pony EUT Pol.: Measurement Antenna Pol.: Horizontal

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
2483.50	Е	Peak	46.84	6.96	53.80	74	-20.20
2483.50	Е	Average	35.22	6.96	42.18	54	-11.82
2487.40	S	Peak	49.06	6.98	56.04	74	-17.96
2487.40	S	Average	37.86	6.98	44.84	54	-9.16

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

Operation Mode: 802.11g Test Date: 2015/12/17

Fundamental Frequency: 2412 MHz Temp. / Humi.: 24.1deg C/48RH

Operation Band: BE CH Low Test Engineer: Pony EUT Pol.: E1 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
•	2390.00	E	Peak	49.10	6.62	55.72	74	-18.28
	2390.00	E	Average	33.09	6.62	39.71	54	-14.29

Operation Mode: 802.11g Test Date: 2015/12/17

Fundamental Frequency: 2412 MHz Temp. / Humi.: 24.1deg C/48RH

Operation Band: BE CH Low Test Engineer: Pony EUT Pol.: 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
2390.00	E	Peak	60.98	6.62	67.60	74	-6.40
2390.00	E	Average	37.39	6.62	44.01	54	-9.99

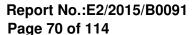
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Operation Mode: Test Date: 2015/12/18 802.11g

Fundamental Frequency: 2462 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: BE CH High Test Engineer: Pony EUT Pol.: Measurement Antenna Pol.: Vertical E1

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	53.00	6.96	59.97	74	-14.03
2483.50	Е	Average	34.51	6.96	41.47	54	-12.53

Operation Mode: Test Date: 2015/12/18 802.11g

Fundamental Frequency: 2462 MHz 24.1deg C/48RH Temp. / Humi.:

BE CH High Operation Band: Test Engineer: Pony EUT Pol.: Measurement Antenna Pol.: Horizontal E1

	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	58.50	6.96	65.46	74	-8.54	_
	2483.50	Е	Average	36.54	6.96	43.50	54	-10.50	

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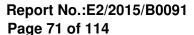
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### Radiated Band Edge Measurement Result (802.11 HT20)

Operation Mode: 802.11n20 Test Date: 2015/12/21

Fundamental Frequency: 2412 MHz Temp. / Humi. : 24.1deg C/48RH

Operation Band: BE CH Low Test Engineer: Pony EUT Pol.: E1 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
•	2390.00	E	Peak	61.29	6.62	67.90	74	-6.10
	2390.00	Е	Average	37.57	6.62	44.19	54	-9.81

Operation Mode: 802.11n20 Test Date: 2015/12/21

Fundamental Frequency: 2412 MHz Temp. / Humi.: 24.1deg C/48RH

Operation Band: BE CH Low Test Engineer: Pony EUT Pol.: Measurement Antenna Pol. : Horizontal E1

	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
	2390.00	E	Peak	62.33	6.62	68.95	74	-5.05
	2390.00	E	Average	36.95	6.62	43.57	54	-10.43

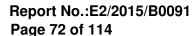
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Operation Mode: 802.11n20 Test Date: 2015/12/21

Fundamental Frequency: 2462 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: BE CH High Test Engineer: Pony EUT Pol.: Measurement Antenna Pol.: Vertical E1

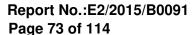
Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2483.50	E	Peak	59.38	6.96	66.34	74	-7.66
2483.50	E	Average	36.24	6.96	43.20	54	-10.80

Operation Mode: 802.11n20 Test Date: 2015/12/21

Fundamental Frequency: Temp. / Humi.: 24.1deg C/48RH 2462 MHz

Operation Band: Test Engineer: BE CH High Pony EUT Pol.: Measurement Antenna Pol.: Horizontal E1

	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	62.73	6.96	69.69	74	-4.31	_
	2483.50	Е	Average	39.46	6.96	46.42	54	-7.58	





## Radiated Band Edge Measurement Result (802.11 HT40)

Operation Mode: 802.11n40 Test Date: 2015/12/18

Fundamental Frequency: 2422 MHz Temp. / Humi. : 24.1deg C/48RH

Operation Band: Test Engineer: BE CH Low Pony EUT Pol.: E1 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
_	2389.68	S	Peak	60.70	6.62	67.31	74	-6.69
	2389.68	S	Average	36.96	6.62	43.58	54	-10.42
	2390.00	Е	Peak	59.76	6.62	66.38	74	-7.62
	2390.00	Ε	Average	36.98	6.62	43.60	54	-10.40

Operation Mode: 802.11n40 Test Date: 2015/12/18

Fundamental Frequency: 2422 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: Test Engineer: BE CH Low Pony EUT Pol. : Measurement Antenna Pol. : Horizontal E1

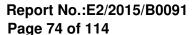
Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
2389.32	S	Peak	66.88	6.62	73.50	74	-0.50
2389.32	S	Average	39.78	6.62	46.40	54	-7.60
2390.00	E	Peak	63.49	6.62	70.10	74	-3.90
2390.00	Е	Average	39.83	6.62	46.45	54	-7.55

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Fundamental Frequency: 2452 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: BE CH High Test Engineer: Pony EUT Pol.: Measurement Antenna Pol.: Vertical E1

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	62.58	6.96	69.55	74	-4.45
2483.50	Ε	Average	37.78	6.96	44.74	54	-9.26

Operation Mode: 802.11n40 Test Date: 2015/12/18

Fundamental Frequency: Temp. / Humi.: 24.1deg C/48RH 2452 MHz

Operation Band: Test Engineer: BE CH High Pony EUT Pol.: Measurement Antenna Pol.: Horizontal E1

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	65.94	6.96	72.90	74	-1.10	
2483.50	Е	Average	40.15	6.96	47.11	54	-6.89	

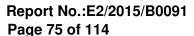
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Fundamental Frequency: 2452 MHz Temp. / Humi.: 22.7deg\_C/57RH

Operation Band: Test Engineer: BE 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	
•	2483.50	Е	Peak	56.16	6.96	63.13	74	-10.87	•
	2483.50	Е	Average	41.59	6.96	48.55	54	-5.45	

Operation Mode: 802.11n40 Test Date: 2015/12/2

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

Operation Band: BE 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	dΒμV	dB	dBµV/m	dBµV/m	dB	
2483.50	E	Peak	50.73	6.96	57.69	74	-16.31	_
2483.50	Е	Average	35.98	6.96	42.94	54	-11.06	

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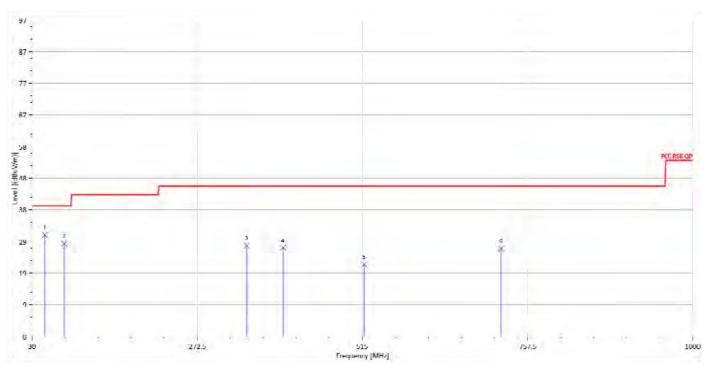
#### **Below 1GHz Worst-Case Data:**

# Radiated Spurious Emission Measurement Result (802.11 g)

Operation Mode: 802.11g Test Date: 2015/12/8

Fundamental Frequency: 2412 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: 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
49.40	S	Peak	56.26	-25.16	31.10	40	-8.90
77.53	S	Peak	55.58	-27.08	28.50	40	-11.50
345.25	S	Peak	45.48	-17.54	27.94	46	-18.06
398.60	S	Peak	43.17	-15.93	27.24	46	-18.76
517.91	S	Peak	35.68	-13.60	22.07	46	-23.93
718.70	S	Peak	37.71	-10.72	26.99	46	-19.01

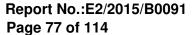
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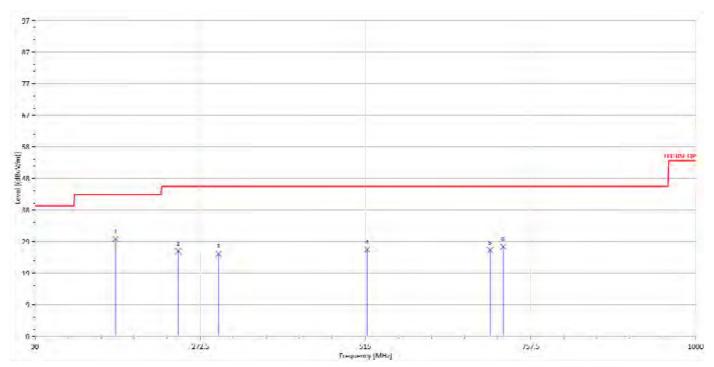
台灣檢驗科技股份有限公司





Fundamental Frequency: 2412 MHz Temp. / Humi.: 24.1deg C/48RH

Operation Band: Tx CH Low Test Engineer: Ashton EUT Pol.: E1 Measurement Antenna Pol. : Horizontal

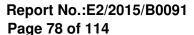


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
148.34	S	Peak	52.42	-22.52	29.90	43.5	-13.60
240.49	S	Peak	47.21	-21.03	26.18	46	-19.82
299.66	S	Peak	44.61	-19.28	25.34	46	-20.66
517.91	S	Peak	40.22	-13.60	26.62	46	-19.38
698.33	S	Peak	37.62	-11.14	26.48	46	-19.52
717.73	S	Peak	38.23	-10.77	27.46	46	-18.54

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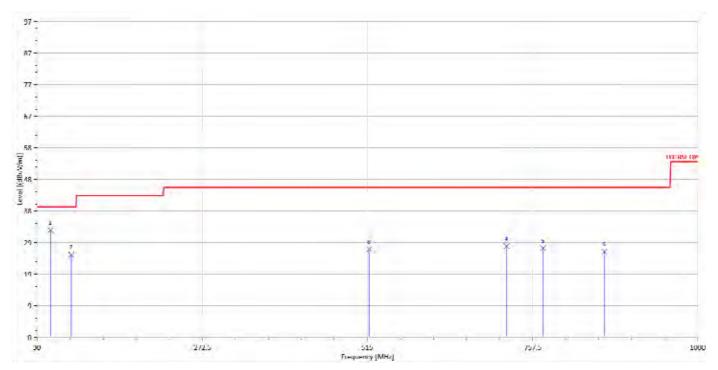
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 24.1deg C/48RH

Operation Band: Tx CH Mid Test Engineer: Ashton EUT Pol.: E1 Measurement Antenna Pol. : Vertical

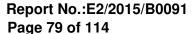


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
50.37	S	Peak	58.57	-25.65	32.92	40	-7.08
80.44	S	Peak	52.16	-26.83	25.33	40	-14.67
517.91	S	Peak	40.58	-13.60	26.98	46	-19.02
719.67	S	Peak	38.65	-10.73	27.92	46	-18.08
773.02	S	Peak	37.58	-10.26	27.32	46	-18.68
863.23	S	Peak	34.77	-8.53	26.25	46	-19.75

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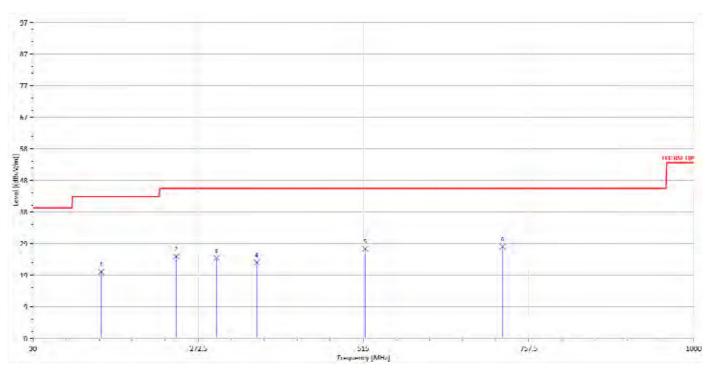
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 24.1deg C/48RH

Operation Band: Tx CH Mid Test Engineer: Ashton EUT Pol.: E1 Measurement Antenna Pol. : Horizontal

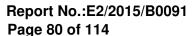


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
129.91	S	Peak	41.77	-21.34	20.43	43.5	-23.07
240.49	S	Peak	46.20	-21.03	25.18	46	-20.82
299.66	S	Peak	44.00	-19.28	24.73	46	-21.27
358.83	S	Peak	40.53	-17.20	23.33	46	-22.67
517.91	S	Peak	41.02	-13.60	27.42	46	-18.58
719.67	S	Peak	38.83	-10.73	28.10	46	-17.90

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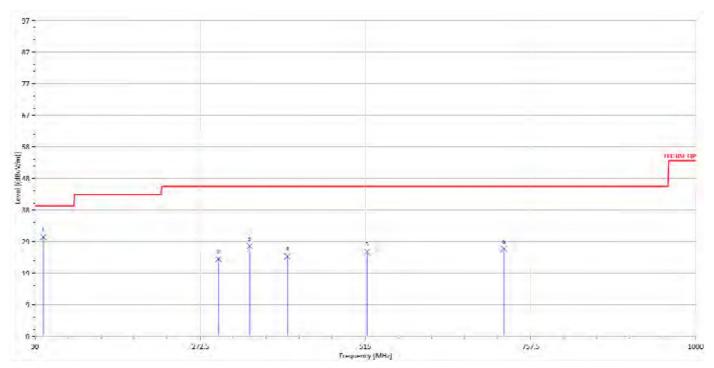
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 24.1 deg\_C/48RH

Operation Band: Tx CH High Test Engineer: Ashton EUT Pol.: E1 Measurement Antenna Pol.: Vertical

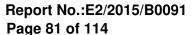


Freq.	Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
42.61	S	Peak	51.19	-20.76	30.43	40	-9.57
299.66	S	Peak	43.02	-19.28	23.74	46	-22.26
345.25	S	Peak	45.22	-17.54	27.68	46	-18.32
400.54	S	Peak	40.41	-15.84	24.57	46	-21.43
517.91	S	Peak	39.53	-13.60	25.93	46	-20.07
718.70	S	Peak	37.51	-10.72	26.79	46	-19.21

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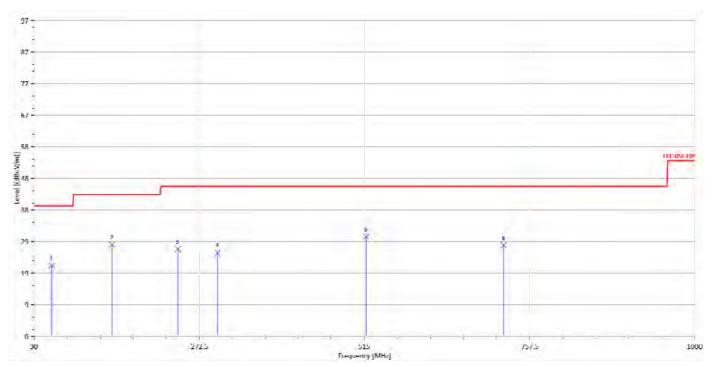
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 24.1 deg C/48RH

Operation Band: Tx CH High Test Engineer: Ashton EUT Pol.: E1 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
56.19	S	Peak	49.04	-27.33	21.72	40	-18.28
144.46	S	Peak	50.30	-22.17	28.13	43.5	-15.37
241.46	S	Peak	47.73	-20.97	26.76	46	-19.24
299.66	S	Peak	44.90	-19.28	25.63	46	-20.37
517.91	S	Peak	44.22	-13.60	30.61	46	-15.39
719.67	S	Peak	38.68	-10.73	27.95	46	-18.05

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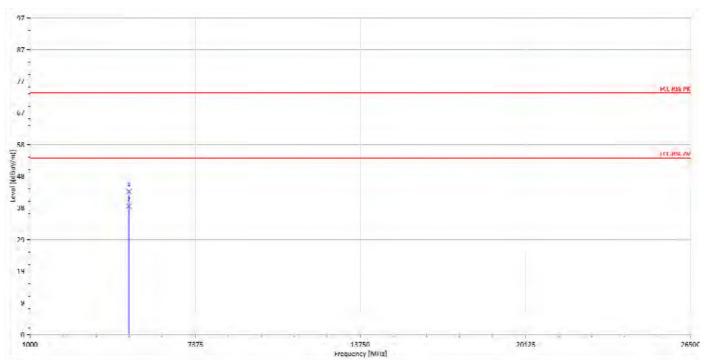
#### **Above 1GHz Data:**

## Radiated Spurious Emission Measurement Result (802.11 b)

Operation Mode: 802.11b Test Date: 2015/12/21

Temp. / Humi.: Fundamental Frequency: 2412 MHz 24.1deg\_C/48RH

Operation Band: Tx CH Low Test Engineer: Pony EUT Pol.: E1 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	34.46	10.97	45.43	74	-28.57
4824.00	Н	Average	29.14	10.97	40.11	54	-13.89

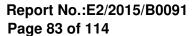
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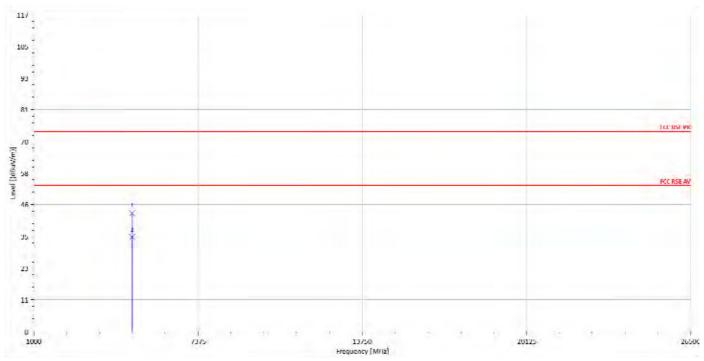
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Fundamental Frequency: 2412 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: Tx CH Low Test Engineer: Pony EUT Pol.: Measurement Antenna Pol. : Horizontal E1



	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	32.89	10.97	43.86	74	-30.14	
	4824.00	Н	Average	23.97	10.97	34.94	54	-19.06	

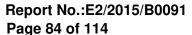
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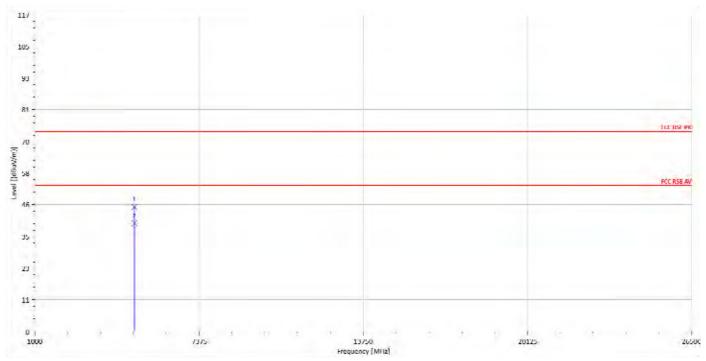
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: Tx CH Mid Test Engineer: Pony EUT Pol.: Measurement Antenna Pol. : Vertical E1



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	35.14	10.89	46.03	74	-27.97	
4874.00	Н	Average	29.21	10.89	40.10	54	-13.90	

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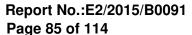
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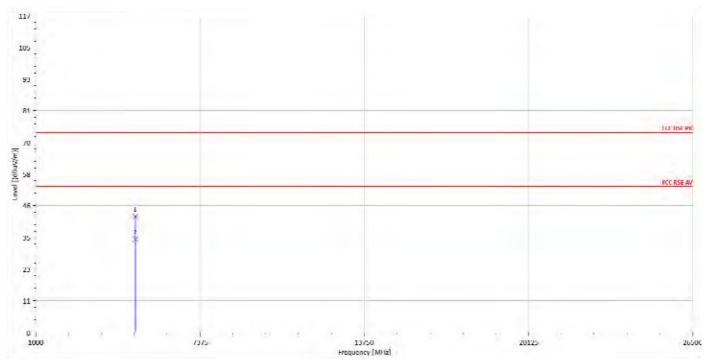
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: Tx CH Mid Test Engineer: Pony EUT Pol.: Measurement Antenna Pol. : Horizontal E1



	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	32.01	10.89	42.90	74	-31.10	-
	4874.00	Н	Average	23.60	10.89	34.49	54	-19.51	

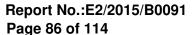
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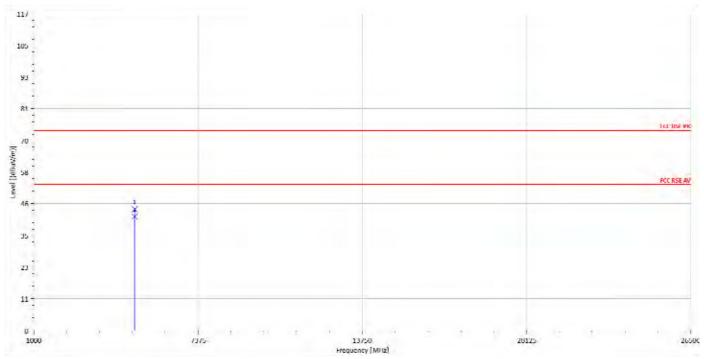
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Fundamental Frequency: Temp. / Humi.: 2462 MHz 24.1 deg\_C/48RH

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



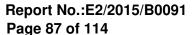
	Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
			Mode	Reading Level		FS	@3m	
_	MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
	4924.00	Н	Peak	33.89	10.98	44.87	74	-29.13
	4924.00	Н	Average	31.18	10.98	42.16	54	-11.84

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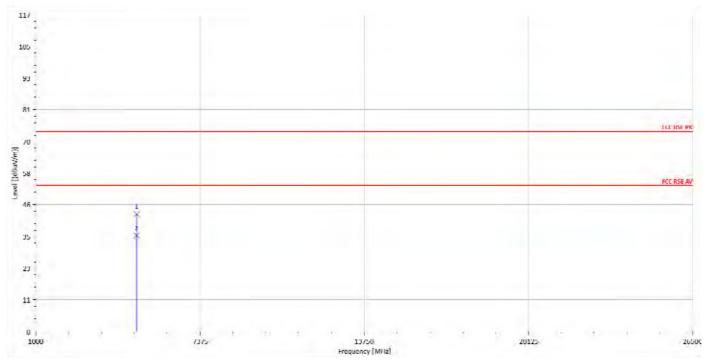
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Fundamental Frequency: Temp. / Humi.: 2462 MHz 24.1 deg\_C/48RH

Operation Band: Tx CH High Test Engineer: Pony EUT Pol.: 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
	4924.00	Н	Peak	32.48	10.98	43.46	74	-30.54
	4924.00	Н	Average	24.53	10.98	35.51	54	-18.49

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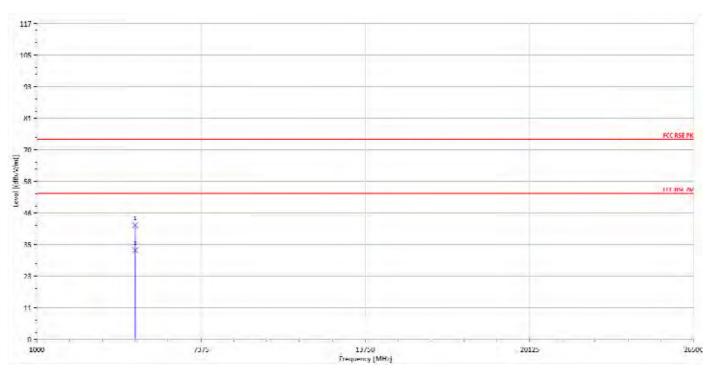


## Radiated Spurious Emission Measurement Result (802.11 g)

Operation Mode: 802.11g Test Date: 2015/12/21

Fundamental Frequency: 2412 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: Tx CH Low Test Engineer: Pony EUT Pol.: E1 Measurement Antenna Pol. : Vertical



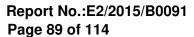
Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Peak	31.53	10.75	42.28	74	-31.72
4824.00	Н	Average	22.16	10.75	32.91	54	-21.09

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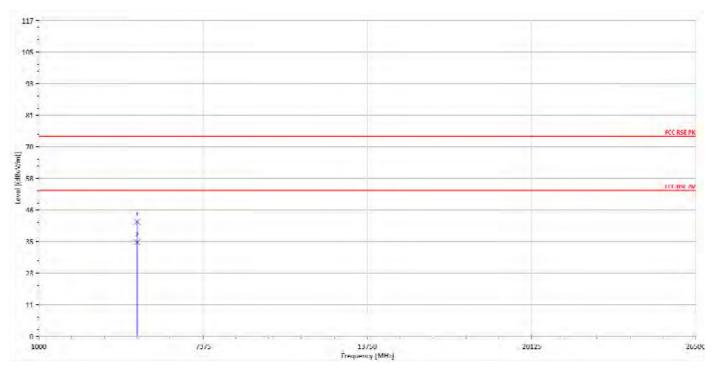
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Fundamental Frequency: 2412 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: Tx CH Low Test Engineer: Pony EUT Pol.: E1 Measurement Antenna Pol. : Horizontal

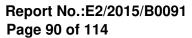


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Peak	31.46	10.97	42.43	74	-31.57
4824.00	Н	Average	23.88	10.97	34.85	54	-19.15

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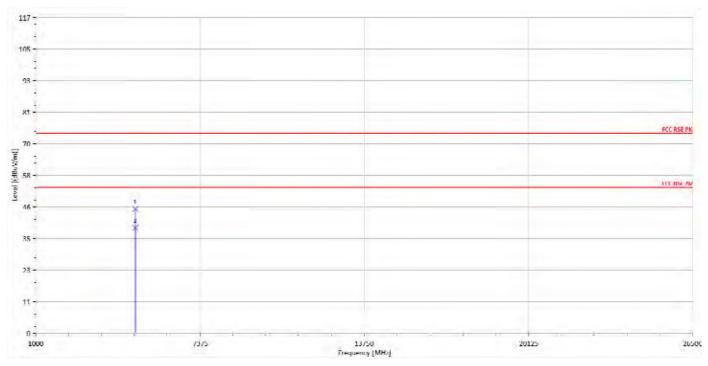
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 24.1deg\_C/48RH

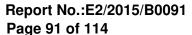
Operation Band: Tx CH Mid Test Engineer: Pony EUT Pol.: E1 Measurement Antenna Pol. : Vertical



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
4874.00	Н	Peak	35.24	10.89	46.13	74	-27.87
4874.00	Н	Average	28.16	10.89	39.05	54	-14.95

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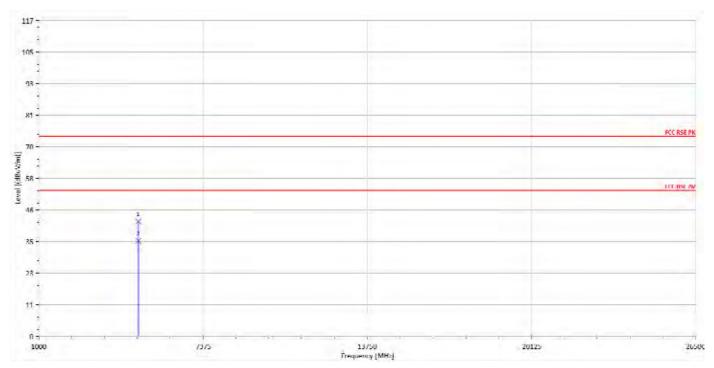
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: Tx CH Mid Test Engineer: Pony EUT Pol.: E1 Measurement Antenna Pol. : Horizontal

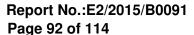


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	31.68	10.89	42.57	74	-31.43
4874.00	Н	Average	24.44	10.89	35.33	54	-18.67

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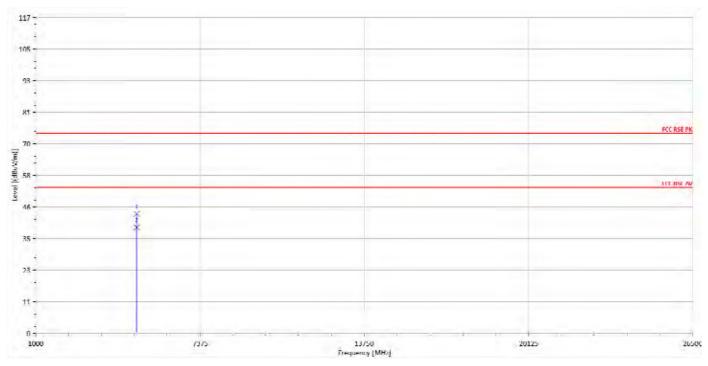
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 24.1 deg\_C/48RH

Operation Band: Tx CH High Test Engineer: Pony EUT Pol.: E1 Measurement Antenna Pol.: Vertical

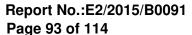


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4924.00	Н	Peak	33.33	10.98	44.31	74	-29.69
4924.00	Н	Average	28.22	10.98	39.20	54	-14.80

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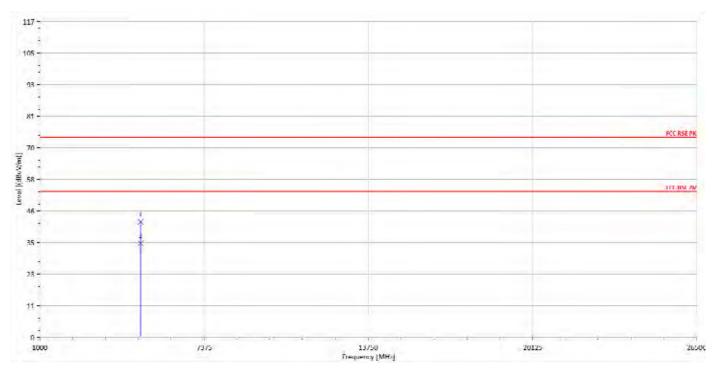
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Fundamental Frequency: 2462 MHz Temp. / Humi.: 24.1 deg\_C/48RH

Operation Band: Tx CH High Test Engineer: Pony EUT Pol.: E1 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
4924.00	Н	Peak	31.76	10.98	42.74	74	-31.26
4924.00	Н	Average	23.75	10.98	34.73	54	-19.27

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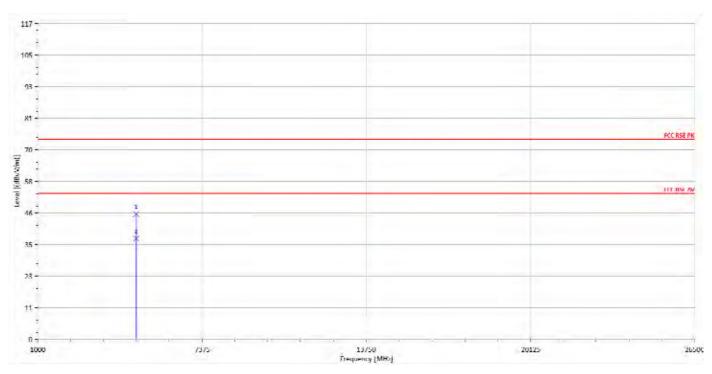


#### Radiated Spurious Emission Measurement Result (802.11\_HT20)

Operation Mode: 802.11n20 Test Date: 2015/12/21

Fundamental Frequency: 2412 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: Tx CH Low Test Engineer: Pony EUT Pol.: E1 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	35.47	10.97	46.44	74	-27.56
4824.00	Н	Average	26.28	10.97	37.25	54	-16.75

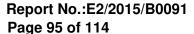
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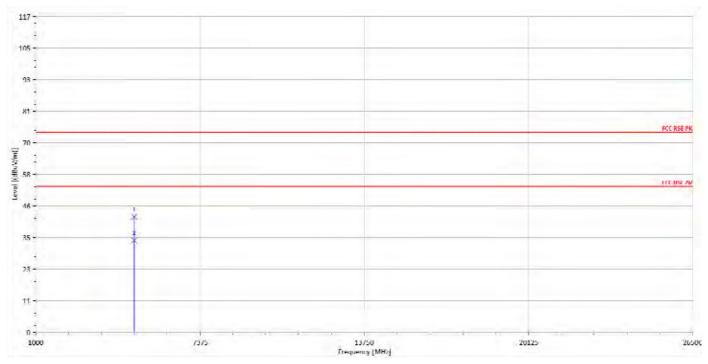




Fundamental Frequency: 2412 MHz Temp. / Humi.: 24.1deg C/48RH

Operation Band: Tx CH Low Test Engineer: Pony

EUT Pol.: E1 Measurement Antenna Pol.: Horizontal

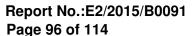


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
4824.00	Н	Peak	31.81	10.97	42.78	74	-31.22
4824.00	Н	Average	22.99	10.97	33.96	54	-20.04

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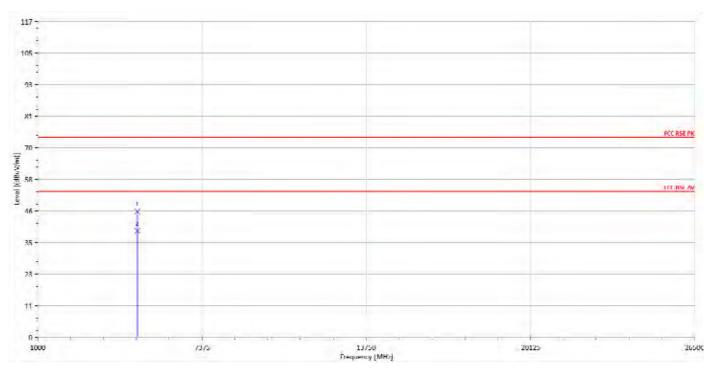
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 24.1deg C/48RH

Operation Band: Tx CH Mid Test Engineer: Pony EUT Pol.: E1 Measurement Antenna Pol.: Vertical

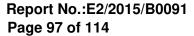


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	35.78	10.89	46.67	74	-27.33
4874.00	Н	Average	28.53	10.89	39.42	54	-14.58

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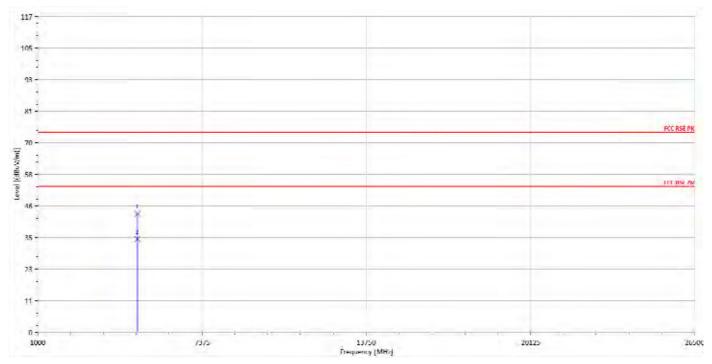




Fundamental Frequency: 2437 MHz Temp. / Humi.: 24.1deg C/48RH

Operation Band: Tx CH Mid Test Engineer: Pony

EUT Pol.: E1 Measurement Antenna Pol.: Horizontal

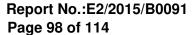


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	33.09	10.89	43.98	74	-30.02
4874.00	Н	Average	23.58	10.89	34.47	54	-19.53

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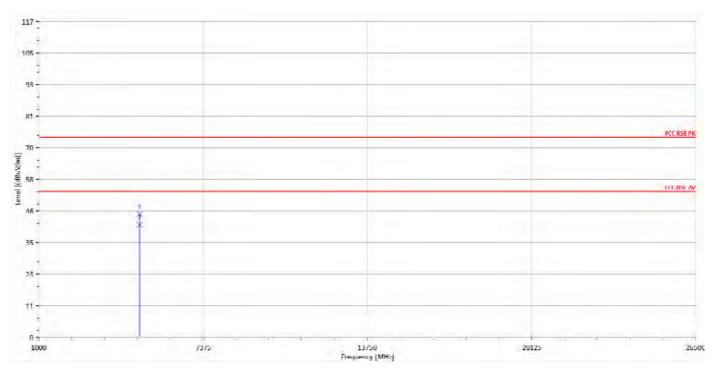
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Fundamental Frequency: Temp. / Humi.: 2462 MHz 24.1deg C/48RH

Operation Band: Tx CH High Test Engineer: Pony EUT Pol.: E1 Measurement Antenna Pol.: Vertical

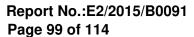


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4924.00	Н	Peak	34.77	10.98	45.75	74	-28.25
4924.00	Н	Average	30.69	10.98	41.67	54	-12.33

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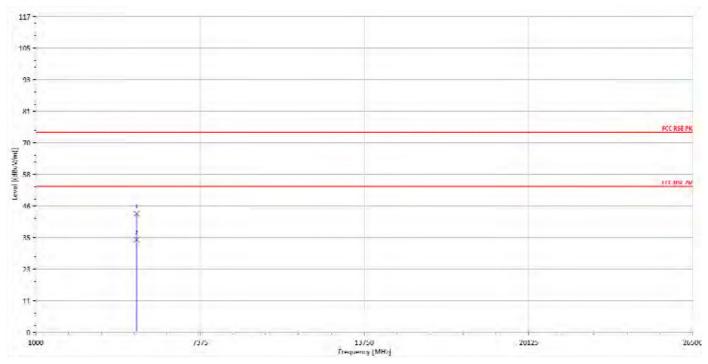




Fundamental Frequency: Temp. / Humi.: 2462 MHz 24.1deg C/48RH

Operation Band: Tx CH High Test Engineer: Pony

EUT Pol.: E1 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
4924.00	Н	Peak	33.01	10.98	43.99	74	-30.01
4924.00	Н	Average	23.25	10.98	34.23	54	-19.77

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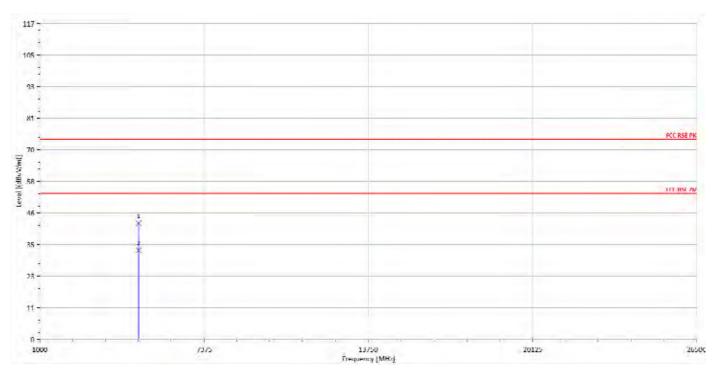


#### Radiated Spurious Emission Measurement Result (802.11\_HT40)

Operation Mode: 802.11n40 Test Date: 2015/12/21

Fundamental Frequency: 2422 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: Tx CH Low Test Engineer: Pony EUT Pol.: E1 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
4844.00	Н	Peak	32.10	10.93	43.03	74	-30.97
4844.00	Н	Average	21.98	10.93	32.91	54	-21.09

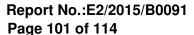
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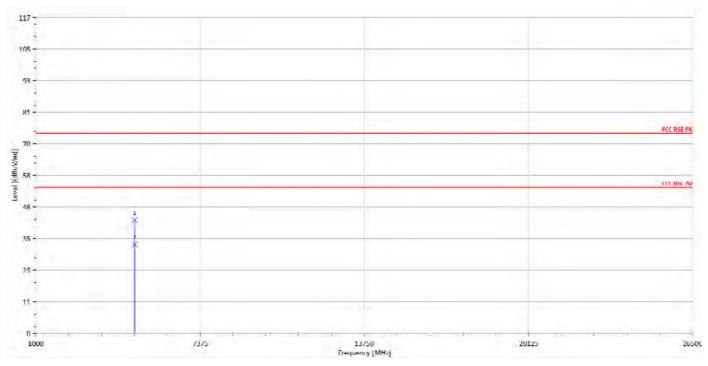




Fundamental Frequency: 2422 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: Tx CH Low Test Engineer: Pony

EUT Pol.: E1 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
4844.00	Н	Peak	31.04	10.93	41.97	74	-32.03
4844.00	Н	Average	21.92	10.93	32.85	54	-21.15

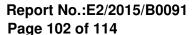
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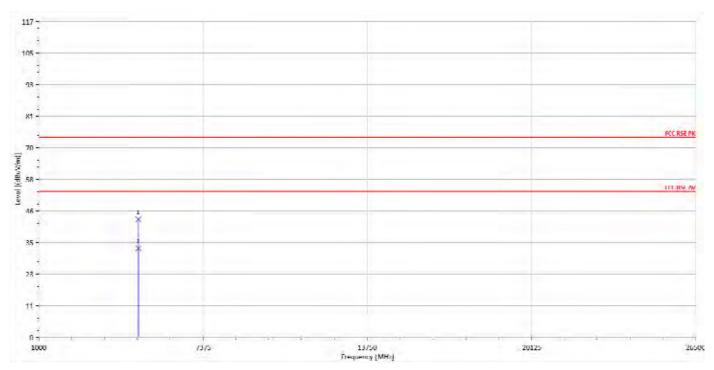
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Fundamental Frequency: 2437 MHz Temp. / Humi.: 24.1deg C/48RH

Operation Band: Tx CH Mid Test Engineer: Pony EUT Pol.: E1 Measurement Antenna Pol.: Vertical

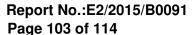


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	32.88	10.89	43.76	74	-30.24
4874.00	H C	Average	21.98	10.89	32.87	54	-21.13

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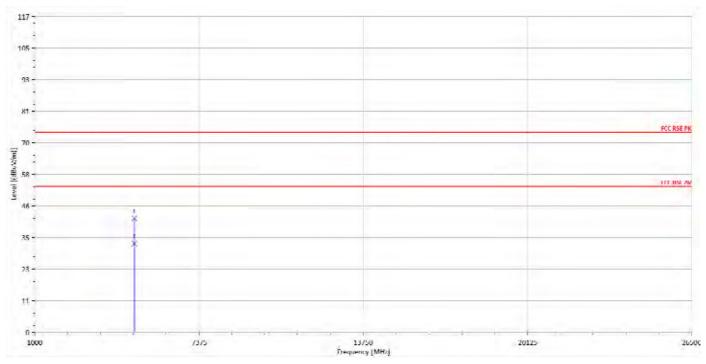




Fundamental Frequency: 2437 MHz Temp. / Humi.: 24.1deg\_C/48RH

Operation Band: Tx CH Mid Test Engineer: Pony

EUT Pol.: E1 Measurement Antenna Pol.: Horizontal

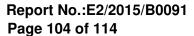


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Peak	31.31	10.89	42.19	74	-31.81
4874.00	Н	Average	21.92	10.89	32.81	54	-21.19

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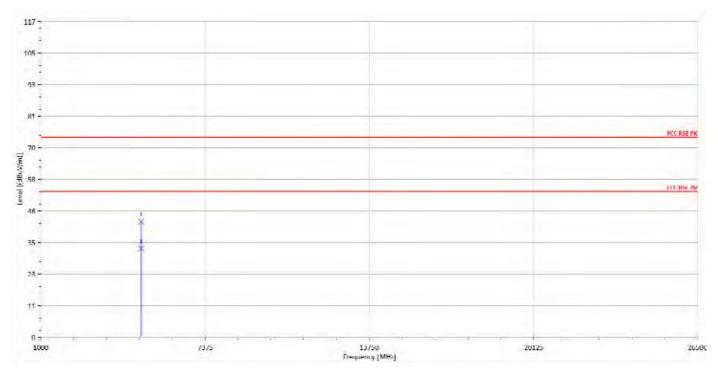
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Fundamental Frequency: Temp. / Humi.: 2452 MHz 24.1deg C/48RH

Operation Band: Tx CH High Test Engineer: Pony EUT Pol.: E1 Measurement Antenna Pol.: Vertical

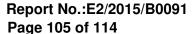


Freq.	Note	Detector	Spectum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
4904.00	Н	Peak	31.90	10.98	42.88	74	-31.12
4904.00	Н	Average	21.91	10.98	32.89	54	-21.11

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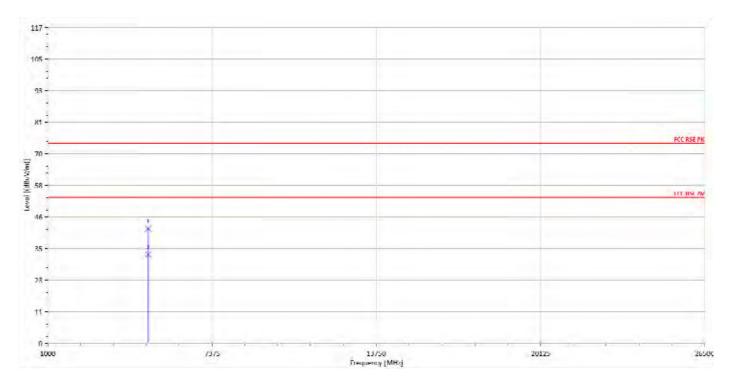




Fundamental Frequency: Temp. / Humi.: 2452 MHz 24.1deg\_C/48RH

Operation Band: Tx CH High Test Engineer: Pony

EUT Pol.: E1 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
4904.00	Н	Peak	31.56	10.98	42.54	74	-31.46
4904.00	Н	Average	21.86	10.98	32.84	54	-21.16

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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

Frequency (MHz)	RF Power Density (dBm)	Maximum Limit (dBm)	Result
2412	-9.15	8	PASS
2437	-8.66	8	PASS
2462	-9.22	8	PASS

Frequency	RF Power Density	Maximum Limit	Result
(MHz)	(dBm)	(dBm)	nesuit
2412	-13.18	8	PASS
2437	-14.33	8	PASS
2462	-14.04	8	PASS

Frequency (MHz)	RF Power Density	Maximum Limit	Result
	(dBm)	(dBm)	
2412	-10.51	8	PASS
2437	-9.15	8	PASS
2462	-9.80	8	PASS

Frequency	RF Power	Maximum	
(MHz)	Density	Limit	Result
(IVIDZ)	(dBm)	(dBm)	
2422	-16.68	8	PASS
2437	-15.79	8	PASS
2452	-17.26	8	PASS

<sup>\*</sup>Refer to next page for plots



#### 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)



802.11q **Power Spectral Density Test Plot (CH-Low)** 



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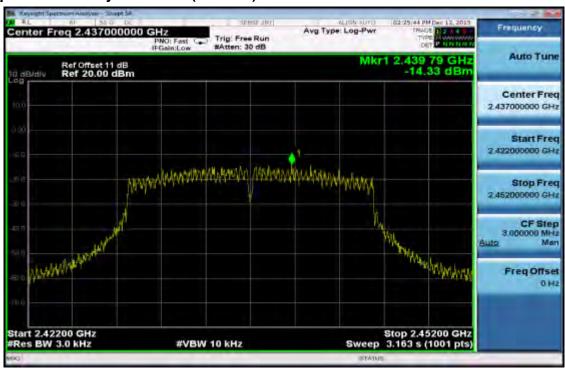
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## **Power Spectral Density Test Plot (CH-Mid)**



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



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## 802.11n HT20 (MIMO)

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



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



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



## 802.11n HT40 (MIMO)

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



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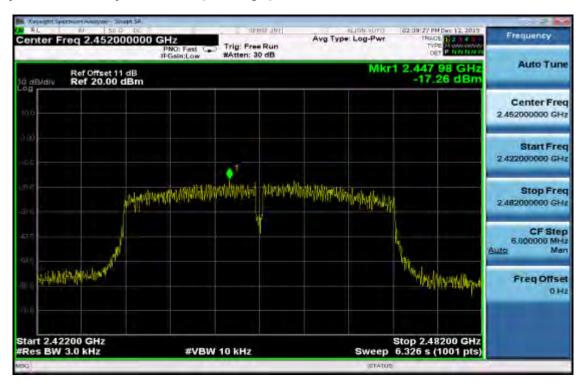
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## **Power Spectral Density Test Plot (CH-Mid)**



## 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.

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