

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

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Applicant:	Cal-Comp Big Data, Inc.
	No. 147, Sec. 3, Beishen Rd., Shenkeng Dist., New Taipei City 222,
	Taiwan (R.O.C.)
Product Name:	HiMirror
Brand Name:	HiMirror
Model No.:	BM619, BM609
Model Difference:	Light Bar & Cover Glass
FCC ID:	2AJTF-BM619
Report Number:	E2/2017/80110
FCC Rule Part:	§15.247, Cat: DTS
Issue Date:	Oct. 17, 2017
Date of Test:	Aug. 21, 2017 ~ Oct. 03, 2017
Date of EUT Received:	Aug. 21, 2017

We hereby certify that:

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

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

Prepared By:

karen

Karen Huang / Clerk

Approved By:

Jim Chang / Asst. Manager



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Revision History

Report Number	Revision	Description	Issue Date
E2/2017/80110	Rev.00	Initial creation of document	Oct. 17, 2017

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Contents

1	GENERAL INFORMATION	4
2	SYSTEM TEST CONFIGURATION	6
3	SUMMARY OF TEST RESULTS	8
4	DESCRIPTION OF TEST MODES	9
5	MEASUREMENT UNCERTAINTY	11
6	CONDUCTED EMISSION TEST	12
7	DUTY CYCLE OF TEST SIGNAL	16
8	PEAK OUTPUT POWER MEASUREMENT	19
9	CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT	27
10	RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT	37
11	PEAK POWER SPECTRAL DENSITY	78
12	ANTENNA REQUIREMENT	82



GENERAL INFORMATION 1

1.1 Product description

General:

Product Name:	HiMirror				
Brand Name:	HiMirror	HiMirror			
Model No.:	BM619, BI	BM619, BM609			
Model Difference:	Light Bar & Cover Glass				
Product HW version:	N/A				
Product SW version:	N/A				
	12Vdc from AC/DC adapter				
Power Supply:	Adapter:	Model No.: WA-36A12FU, Supplier: Asian Power Devices Inc.			

WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power	Modulation Technology
11b/g	2412-2462	11	b: 17.05dBm g: 21.42dBm	DSSS, OFDM
11n	HT20 2412-2462	11	HT20: 20.57dBm	OFDM
Modulati	on type:		PSK, DBPSK for DSSS 16QAM, QPSK, BPSK for OFD	M
Transition Rate: 802		802.11 g:	1/2/5.5/11 Mbps 6/9/12/18/24/36/48/54 Mbps _20MHz: 6.5 – 72.2Mbps	

Antenna Designation

Antenna Type	Part Number	Supplier	Peak Gain (dBi)
PCB / Main	RFPCA371025IMLB901	Walsin Technology Corporation	4.06
PCB / Aux	RFPCA371035IMLB901	Walsin Technology Corporation	4.0

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1.2 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

ANSI C63.10:2013

Note:

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

1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333 (TAF code 0513)

FCC Registration Number and Designation number are: 735305 / TW0002

1.4 Special Accessories

There are no special accessories used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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SYSTEM TEST CONFIGURATION 2

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

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

2.3.2 Radiated Emissions

The EUT is a placed on as turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this 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 and attenuator.

SISO Offset:

= RF cable loss (dB)+ attenuation factor(dB) dB =11.0dB

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2.5 Configuration of Tested System Fig. 2-1 Conducted (Antenna Port) Emission

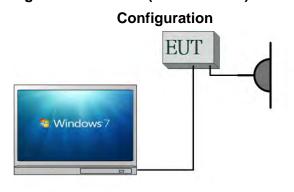


Fig 2-3 Conduction (AC Power Line) Radiated

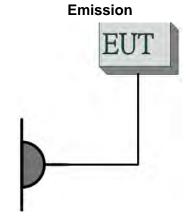


Fig 2-2 Radiated Emission

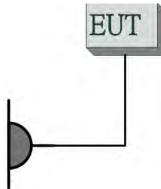


Table 2-1 Equipment Used in Tested System

ltem	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	Unshielded

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SUMMARY OF TEST RESULTS 3

FCC Rules / IC 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 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

4.1 Operated in 2400 ~ 2483.5MHz Band

11 channels are provided for 802.11b, 802.11g and 802.11n_HT20

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

4.2 The Worst Test Modes and Channel Details

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

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RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT	
802.11g	1 to 11	1,6,11	OFDM	6	Aux	
	RADIATED EMISSION TEST (ABOVE 1 GHz)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT	
802.11b	1 to 11	1, 6, 11	DSSS	1	Aux	
802.11g	1 to 11	1, 6, 11	OFDM	6	Aux	
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS0	SISO	
Note:						

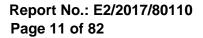
The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11b/g/n WLAN Transmitter for channel Low, Mid and High, the worst case H position was reported.

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	MCS0	SISO		

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MEASUREMENT UNCERTAINTY 5

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

Radiated Spurious Emission:

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

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

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

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CONDUCTED EMISSION TEST 6

6.1 Standard Applicable

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

Frequency range	Limits dB(uV)					
MHz	Quasi-peak Average					
0.15 to 0.50	66 to 56	56 to 46				
0.50 to 5	56	46				
5 to 30	60	50				
Note						
1.The lower limit shall apply at th	1.The lower limit shall apply at the transition frequencies					
2. The limit decreases linearly wit	h the logarithm of the frequency in	the range 0.15 MHz to 0.50				
MHz.	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 7	100950	12/12/2016	12/11/2017			
Coaxial Cables	N/A	N30N30-1042-150cm	N/A	08/30/2016	08/29/2017			
LISN	Schwarzbeck	NSLK 8127	8127-648	06/18/2017	06/17/2018			
Test Software	Farad	EZ-EMC	Ver. SGS-03A2	N.C.R.	N.C.R.			

6.3 EUT Setup

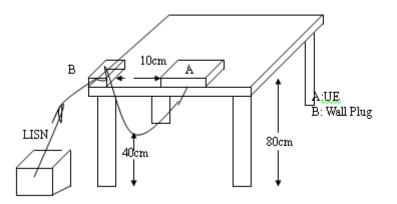
- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- The LISN was connected with 120Vac/60Hz power source.

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6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure

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

6.6 Measurement Result

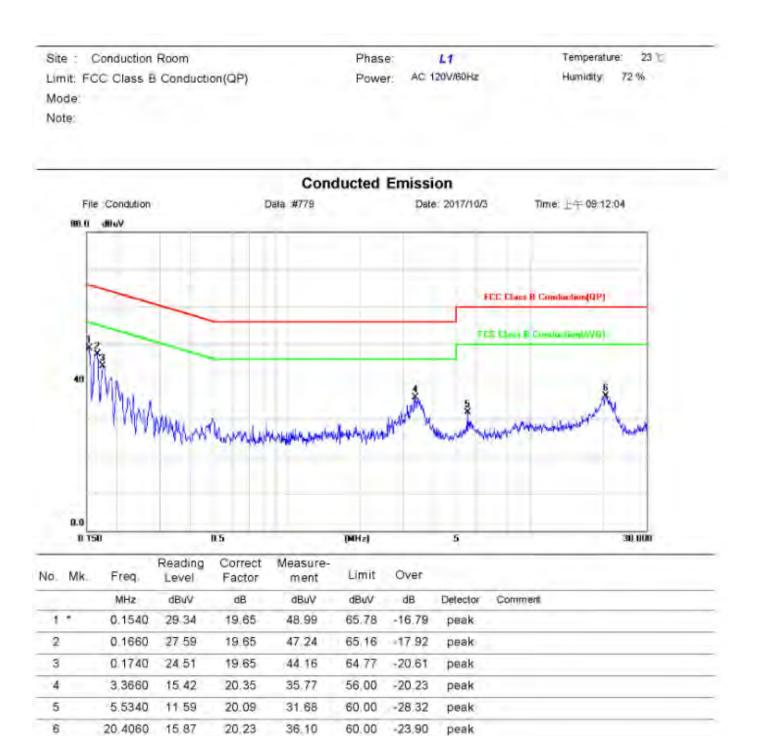
Note: Refer to next page for measurement data and plots. Note2: The * reveals the worst-case results that closet to the limit

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AC POWER LINE CONDUCTED EMISSION TEST DATA



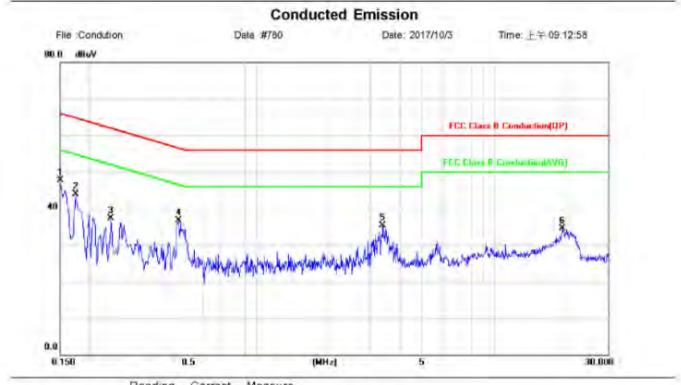
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Site : Conduction Room	Phase: N	Temperature: 23 °C
Limit: FCC Class B Conduction(QP)	Power: AC 120V/60Hz	Humidity: 72 %
Mode:		
Note:		



No. Mk.	Freq.	Level	Factor	Measure- ment	Limit	Over			
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment	
1.1	0.1500	28.14	19.50	47.64	66.00	-18.36	peak		
2	0.1740	24.32	19.50	43.82	64,77	-20.95	peak		
3	0.2460	17.79	19.57	37.36	61 89	-24.53	peak		
4	0.4740	16 66	19,95	36.61	56,44	-19.83	peak		
5	3.4020	15.13	20.20	35.33	56.00	-20.67	peak		
6	19.4060	14.46	20.05	34.51	60.00	-25.49	peak		

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DUTY CYCLE OF TEST SIGNAL 7

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

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

Formula:

Duty Cycle = Ton / (Ton+Toff)

Measurement Procedure:

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

Duty Cycle:

	Duty Cycle (%)	Duty Factor (dB)
802.11b	98.86	0.05
802.11g	93.39	0.30
802.11n_20	92.62	0.33

b = 98.86%, *g* = 93.39%,*n*_*ht*_20 = 92.62%

Duty Cycle Factor: $10 * \log(1/0.9886) = 0.05$ Duty Cycle Factor: $10 * \log(1/0.9339) = 0.3$ Duty Cycle Factor: $10 * \log(1/0.9262) = 0.33$

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7.1 Duty Cycle Test Signal Measurement Result

802.11 b



802.11 g

RL N Su center Freq 2.4370	0 DC	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr	62-10;38 PM Sec 20, 2017 TRACE 1,2 F 4 1 TYPE WOMMEND OFT P N 10 Mart	Frequency
Ref Offset 1 0 dB/div Ref 30.00	11 dB 0 dBm		Δ	1.01 dB	Auto Tun
000 2000 1000 1000	inditri Xaurisertuineere	ulfryrigitastuagethyritett	904) 1052479542144792444	neterszeriny Risernuszy kaju	Center Free 2.437000000 GH
00					Start Fre 2.437000000 GH
001	HW		ha#		Stop Fre 2.437000000 GH
enter 2.437000000 es BW 8 MHz		/ 8.0 MHz		Span 0 Hz 300 ms (1001 pts)	CF Ste 9.000000 MH Auto Ma
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1.398 ms (Δ) 972.8 μs 1.497 ms (Δ) 972.8 μs	-3.05 dB 13.93 dBm 1.01 dB 13.93 dBm		FUNCTION VALUE	Freq Offse 0 H

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802.11 n_20 MHz

Center Freq 2.437000000	CH2 PNO: Fest IFGain:Low #Atten: 30 dB	ALIGN SUFO (22-28):15 3W See 20, 2017 Avg Type: Log-Pwr TRACE TO THE TYPE OFT OFT	Frequency
Ref Offset 11 dB		ΔMkr3 1.396 ms -0.66 dB	
-09 200 100 100 100	varias Kyldesanitaisessesses	an week of the states of the states and the states of the	Center Fre 2.437000000 GH
(p.p. 			Start Fre 2.437000000 GH
40 II 50 D 60 D			Stop Fre 2.437000000 GH
Center 2.437000000 GHz Res BW 8 MHz	#VBW 8.0 MHz	Span 0 Hz Sweep 3,533 ms (1001 pts) Function Function value	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1.297 ms (Δ) -1.70 dB 1.230 ms 14.18 dBm 1.396 ms (Δ) -0.66 dB 1.230 ms 14.18 dBm		Freq Offse 0 H
	-	ETÁTUS	

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PEAK OUTPUT POWER MEASUREMENT 8

8.1 Standard Applicable

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

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.

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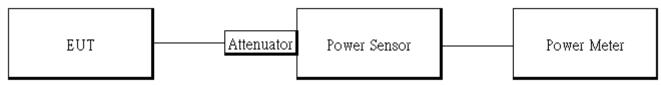


8.2 Measurement Equipment Used

Conducted Emission Test Site								
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.			
TYPE		NUMBER	NUMBER	CAL.				
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018			
Power Meter	Anritsu	ML2496A	1326001	06/23/2017	06/22/2018			
Power Sensor	Anritsu	MA2411B	1315048	06/23/2017	06/22/2018			
Power Sensor	Anritsu	MA2411B	1315049	06/23/2017	06/22/2018			
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	12/12/2016	12/11/2017			
DC Block	PASTERNACK	PE8210	RF29	12/12/2016	12/11/2017			
Splitter	RF-LAMBAD	RFLT2W1G18G	RF35	12/12/2016	12/11/2017			
Attenuator	WOKEN	218FS-10	RF23	12/12/2016	12/11/2017			
DC Power Supply	Agilent	E3640A	MY53140006	05/02/2017	05/01/2018			

8.3 Test Set-up

Power Meter:



8.4 Measurement Procedure

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

Power Meter:

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

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

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8.5 Measurement Result

802.1	1b Main						
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit			RESULT
1	2412	1	16.25	1 Watt =	30.00	dBm	PASS
6	2437	1	16.48	1 Watt =	30.00	dBm	PASS
11	2462	1	16.64	1 Watt =	30.00	dBm	PASS
802.1	1b Main						
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit			RESULT
1	2412	1	12.74	1 Watt =	30.00	dBm	PASS
6	2437	1	12.94	1 Watt =	30.00	dBm	PASS
11	2462	1	13.17	1 Watt =	30.00	dBm	PASS
802.1 CH	1b Aux1 Freq. (MHz)	Data Rate	Peak Output Power (dBm)		Limit		RESULT
1	2412	1	16.27	1 Watt =	30.00	dBm	PASS
6	2437	1	16.62	1 Watt =	30.00	dBm	PASS
11	2462	1	17.05	1 Watt =	30.00	dBm	PASS
802.1	1b Aux1						
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit			RESULT
1	2412	1	12.76	1 Watt =	30.00	dBm	PASS
6	2437	1	13.03	1 Watt =	30.00	dBm	PASS
11	2462	1	13.40	1 Watt =	30.00	dBm	PASS

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802.1	1g Main						
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	L	.imit		RESULT
1	2412	6	20.87	1 Watt =	30.00	dBm	PASS
6	2437	6	20.92	1 Watt =	30.00	dBm	PASS
11	2462	6	20.98	1 Watt =	30.00	dBm	PASS
802.1	1g Main						
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit			RESULT
1	2412	6	11.77	1 Watt =	30.00	dBm	PASS
6	2437	6	11.88	1 Watt =	30.00	dBm	PASS
11	2462	6	11.95	1 Watt =	30.00	dBm	PASS
802.1	1g Aux1						
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)		Limit		RESULT
1	2412	6	21.12	1 Watt =	30.00	dBm	PASS
6	2437	6	21.28	1 Watt =	30.00	dBm	PASS
11	2462	6	21.42	1 Watt =	30.00	dBm	PASS
802.1	1g Aux1	-	-	-			
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)		Limit		RESULT
CH 1			include tune up tolerance Power	1 Watt =	Limit 30.00	dBm	RESULT PASS
	(MHz)	Rate	include tune up tolerance Power (dBm)	1 Watt = 1 Watt =		dBm dBm	



802.1	1n_HT20	M Main					
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	L	₋imit		RESULT
1	2412	MCS0	20.15	1 Watt =	30.00	dBm	PASS
6	2437	MCS0	20.29	1 Watt =	30.00	dBm	PASS
11	2462	MCS0	20.44	1 Watt =	30.00	dBm	PASS
802.1	1n_HT20	M Main					
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit		RESULT	
1	2412	MCS0	10.88	1 Watt =	30.00	dBm	PASS
6	2437	MCS0	10.92	1 Watt =	30.00	dBm	PASS
11	2462	MCS0	10.98	1 Watt =	30.00	dBm	PASS
802.1	1n_HT20	M Aux1	1	1			
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit RESUL		RESULT	
1	2412	MCS0	20.31	1 Watt = 30.00 dBm		dBm	PASS
6	2437	MCS0	20.45	1 Watt = 30.00 dBm		dBm	PASS
11	2462	MCS0	20.57	1 Watt = 30.00 dBm		dBm	PASS
802.1	1n_HT20	M Aux1					
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit RESU		RESULT	
		Maca	10.89	1 Watt =	30.00	dBm	PASS
1	2412	MCS0	10.09			17100	
1 6	2412 2437	MCS0 MCS0	10.89	1 Watt =	30.00	dBm	PASS



802.11b Aux1

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result
2412	8111	> 500	PASS
2437	8118	> 500	PASS
2462	8107	> 500	PASS

802.11g Aux1

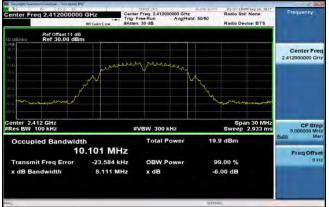
802.11 n HT20 Aux1

J	-						
Freq.	6dB BW	Limit	Result	Freq.	6dB BW	Limit	Result
(MHz)	(kHz)	(kHz)	Result	(MHz)	(kHz)	(kHz)	Result
2412	15800	> 500	PASS	2412	15500	> 500	PASS
2437	15690	> 500	PASS	2437	15390	> 500	PASS
2462	15670	> 500	PASS	2462	15320	> 500	PASS

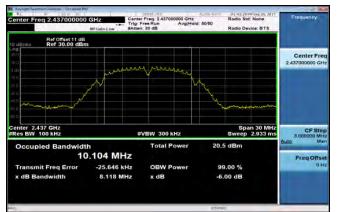
*Refer to next page for plots



802.11b 6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



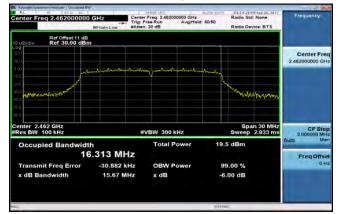
802.11g 6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



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802.11n_20M

6dB Band Width Test Data CH-Low

Center Freq 2.412000000	Trig: I	r Freq: 2.412000000 GHz Free Run AvgiHold h: 30 dB	50/50	Radio Std: None Radio Device: BTS	Frequency
10 dB/div Ref 0ffset 11 dB Ref 30.00 dBn	1				
10.0	and have been the all and the	ng partina tina tana tana	malm		Center Freq 2.412000000 GHz
and a contraction of the second of the secon				June Wanter	
Center 2.412 GHz Res BW 100 kHz	#	VBW 300 kHz		Span 30 MHz Sweep 2.933 ms	CF Step 3.000000 MHz
Occupied Bandwidt		Total Power	18.3	dBm	Auto Man
17	.393 MHz				Freq Offset
Transmit Freq Error x dB Bandwidth	-32.738 kHz 15.50 MHz	OBW Power x dB		.00 %)0 dB	0.142
0			TATA		

6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High

RL N AND D. Center Freq 2.46200000	-t- Trig	ter Freq: 2.462000000 GHz : Free Run AvgiHold en: 30 dB	#: 50/50	Radio Device: BTS	Frequency
Ref Offset 11 dB	n				
100 200					Center Freq 2.462000000 GHz
10.0 20.0	non Anno Inon Anno Annon	han yan han dina dina dina dina dina dina dina di	- And		
and and the second				Marrison Muchana	
© 0 Center 2.462 GHz Res BW 100 kHz		#VBW 300 kHz		Span 30 MHz Sweep 2.933 ms	CFStep
Occupied Bandwid		Total Power	18.		3,000000 MHJ Auto Man
1	7.414 MHz			Tala Tan	Freq Offset
Transmit Freq Error x dB Bandwidth	-31.860 kHz 15.32 MHz	OBW Power x dB		9.00 % 00 dB	0 Hz
0			TATA		

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CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT 9

9.1 Standard Applicable

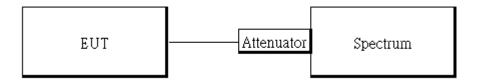
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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).

Conducted Emission Test Site							
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018		
DC Block	PASTERNACK	PE8210	RF29	12/12/2016	12/11/2017		
Attenuator	WOKEN	218FS-10	RF23	12/12/2016	12/11/2017		

9.2 Measurement Equipment Used

9.3 Test SET-UP



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9.4 Measurement Procedure

Conducted Band Edge:

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

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9.5 Measurement Result

Bande	Bandedge Limit 802.11b MODE			edge Lii	mit 802.11g MODE
Freq.		Bandedge Limit	Freq.	PSD	Bandedge Limit
(MHz)	(dBm)	(dBm)	(MHz)	(dBm)	(dBm)
2412	4.48	-15.52	2412	1.24	-18.76
2462	4.63	-15.37	2462	1.34	-18.66

Bandedge Limit 802.11n20 MODE

Freq.	PSD	Bandedge Limit	
(MHz)	(dBm)	(dBm)	Note:
2412	0.20	-19.80	offset
2462	0.58	-19.42	

11.00 dB for SISO mode

802.11b PSD for Band edge Limit (CH-Low)



802.11b PSD for Bandedge Limit(CH-High)



802.11g PSD for Bandedge Limit(CH-Low)







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802.11n_HT20 PSD for Bandedge Limit(CH-Low)



802.11n_HT20 PSD for Bandedge Limit(CH-High)



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802.11b Band Edges Test Data CH-Low

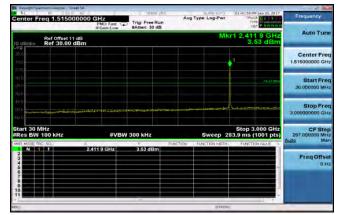


Band Edges Test Data CH-High

RL AF SEG DC		SUBSU JUL	ALLON AUTO	01:59:05 PM Sep 20, 2017	
enter Freq 2.50000000	PNO: Fast G	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr	TYPE PLONGULUE DET PLNN NUMBER	Frequency
Ref Offset 11 dB Ref 30.00 dBm			Mĸ	r3 2.483 6 GHz -48,94 dBm	Auto Tuni
					Center Free 2.500000000 GH
				n 6 97 mBrr	Start Free 2.450000000 GH
	with a state		Adaptation of the state of th	h ara da an a ang kang sama katang kang sama kang kang kang kang kang kang kang kan	Stop Fre 2.550000000 GH
tart 2.45000 GHz Res BW 100 kHz	#VBV	V 300 kHz		Stop 2.55000 GHz .600 ms (1001 pts)	CF Ste 10.000000 MH Auto Ma
1 N 1 T 2. 2 N 1 T 2.	463 5 GHz 483 6 GHz 483 6 GHz	4.44 dBm -49.06 dBm -48.94 dBm	Chair - Porchairmean	FORCIONADE A	Freq Offse OH

802.11b

Spurious Emission Test Data CH-Low



Center Fr	reg 14.75000		Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr	01:42:19:5M Sep 20, 2017 TRADE 1 2 3 4 TYPE November OET P handstoor	Frequency
0 dB/div	Ref Offset 11 dB Ref 30.00 dB	3 m		Mkr	1 26.359 0 GHz -41.20 dBm	Auto Tune
2010 1010 1010						Center Free 14.750000000 GH
100					16.47 dan	Start Free 3.000000000 GH
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Res BW	100 kHz	#VBW	300 kHz	Sweep	Stop 26.50 GHz 2.246 s (1001 pts)	CF Ste 2.350000000 GH Auto Ma
1 N 1		26,359 0 GHz	-41.20 dBm			Freq Offse 0 H
8 9 10 11						
101				STATU	6	

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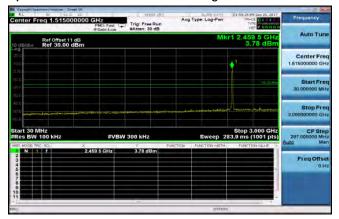


Spurious Emission Test Data CH-Mid

Center Freq 1.515000000	PNO: Fast Atten: 30 dB	Avg Type: Log-Pwr	(01:40:16 PM SHp 20, 2017 TRACE 1 2 3 4 T TYPE N WARNAWAY DET P N MARAMAN	Frequency
Ref Offset 11 dB		Mk	r1 2.435 7 GHz 3.35 dBm	Auto Tun
200 100 230			<u>•</u> 1	Center Fre 1.515000000 GH
10 0 			16.66.40 4	Start Fre 30.000000 MH
40 0 (30.0) 60.0	an municipal and a state of the	المسجيد والمستحد وال		Stop Fre 3.000000000 GH
Start 30 MHz Res BW 100 kHz MR MODE TRO SCL X		Sweep 2	Stop 3.000 GHz 83.9 ms (1001 pts) FUNCTION VALLE	CF Ste 297.800000 Mit Auto Ma
1 N 1 f 2 2 3 4 5 6 7 8	2435 7 GHz 3.35 dBm		+	Freq Offse 0 H
9 10 11				

Keyenghit Spectreer Anulyzer - Skept SA	
RL 80 500 00 Center Freq 14.75000000	Avg Type: Log-Pwr No Type: Log-Pwr No Der Photoso
Ref Offset 11 dB 0 dB/div Ref 30.00 dBm	Mkr1 26.406 0 GHz Auto Tuni -42,18 dBm
	Center Fre 14.75000000 GH
più 611	Start Fre 3.00000000 GH
01) 01	Stop Fre 26 50000000 GH
tart 3.00 GHz Res BW 100 kHz	Sweep 2,245 s (1001 pts)
NR MODE TRC SOL X	FUNCTION FUNCTION WIDTH FUNCTION VALUE +
23456	Freq Offse 0H
7 10 10 10 10 10 10 10 10 10 10 10 10 10	

Spurious Emission Test Data CH-High



Keyesphit Spactners Analyzer - Skrept SA				
Center Freq 14.75000000	PNO: Fast C Trig: Free Run	Avg Type: Log-Pwr	01.59:56 FM 5+0 20, 2017 TRACE 0 2 4 TYPE P 400 4000	Frequency
Ref Offset 11 dB	IFGain;Low #Atten: 30 dB	Mkr	1 26.265 0 GHz -41.98 dBm	Auto Tun
00 200 0.0 1.00				Center Fre 14.750000000 GH
40.0 2011			-19.22.054	Start Fre 3.000000000 GH
(0.0 20.0	and the second	م _{ال} المدينة ومعادية المراجع معادية المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع الم	And a state of the	Stop Fre 26 50000000 GH
Start 3.00 GHz Res BW 100 kHz MR MODE TRC SQL X		Sweep	Stop 26.50 GHz 2.246 s (1001 pts) FUNCTION VALLE *	CF Ste 2.35000000 GH Auto Ma
2 N 1 7 26.	285 0 GHz 41.98 dBm		-	Freq Offse 0 H
		STATUS		

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802.11g Band Edges Test Data CH-Low



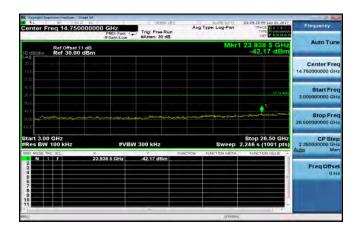
Band Edges Test Data CH-High



802.11g

Spurious Emission Test Data CH-Low

Center Freq 1.51	5000000 GHz PNO: Fast IEGain Low		Avg Type: Log-Pwr	02:09:15 PM 5+0 20, 2017 TRADE 1 2:34 TO TYPE PLANE 1	Frequency Auto Tune
	et 11 dB 00 dBm		Mk	r1 2.411 9 GHz 0.27 dBm	
2000 10.0				1	Center Free 1.515000000 GH
100 				19.71,404	Start Free 30,000000 MH
40 U 50 U 60 U	an ganalan sa	and a Minant Strand Stranger and the A	- Construction of the sector o		Stop Fre 3.000000000 GH
Start 30 MHz #Res BW 100 kHz	#V	BW 300 kHz	Sweep 2	Stop 3.000 GHz 83.9 ms (1001 pts)	CF Step 297.000000 MH Auto Mar
1 N 1 1 2 3 4 5	2.411 9 GHz	0.27 dBm			Freq Offse 0 H
6 7 8 9 10					
			STATUS		



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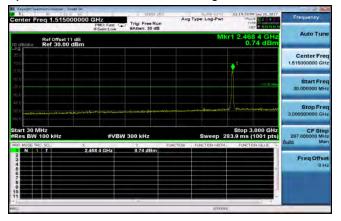


Spurious Emission Test Data CH-Mid

Center Freq 1.515000000			62-13/28 TH Sec 20, 2017 THEOR 1 2 3 4 4 11 TIPE OFT P NO 2010	Frequency Auto Tun
Ref Offset 11 dB		M	(r1 2.444 6 GHz -1.47 dBm	
200 100 100			1	Center Fre 1.515000000 GH
100 200				Start Fre 30.000000 MH
40 D 1970 - Marine Marine California Angele Antonio Antonio Antonio 1970 - D	dur ang	a sign for internal from the second	A	Stop Fre 3.00000000 GH
Start 30 MHz Res BW 100 kHz	#VBW 300 kHz	Sweep 2 Function Function Wetter	Stop 3.000 GHz 83.9 ms (1001 pts)	CF Ste 297.000000 Mi Auto Ma
1 N 1 f 2. 3 4 5 5 6 7	444 6 GHz1.47 dE	3m	-	Freq Offse 0 H
8 9 10 11				

					_		bestern Ansatyther - Sil	Kayaight Spi
Frequency	02:13:44 PM Sep 20, 2017 TRACE 1 2 3 4 4 T TYPE OET P NIN TRACE	Type: Log-Pwr	un	Trig: Free I #Atten: 30	GHZ PNO: Fast	p	eq 14.750	
Auto Tune	1 26.265 0 GHz -42.37 dBm	Mkr			CONTRACT.	dB	Ref Offset 1 Ref 30.00	0 dB/div
Center Fred 14.750000000 GH:								20:0 10:0 13:0
Start Free 3.000000000 GH	-31.4(16)							100 100 100
Stop Free 26 50000000 GH	مان المان المريق والمان المان المريق المراجع المريق والمراجع المريق والمراجع المراجع المراجع المراجع المراجع ا	and		mailed have	to-sectority		and the second states	
CF Step 2.350000000 GH Auto Mar	Stop 26.50 GHz 2.246 s (1001 pts)	Sweep	FLAICTIC	300 kHz	#VBW	×	00 kHz	tart 3.00 Res BW
Freq Offse 0 H				-42.37 dBr	5 0 GHz			1 N 1 2 3 4 5 6
								7 8 9 10
		STATUS						5

Spurious Emission Test Data CH-High



enter Freg	14.75000000	D GHz PNO: Fast G IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Type	Log-Pwr	TRACE	5+p 20, 2017	Frequency Auto Tune
0 dB/div Re	f Offset 11 dB f 30.00 dBm				Mkr	1 26.241	5 GHz 7 dBm	
0.0								Center Free 14.750000000 GH
(0 0 (0 0 (0 0								Start Free 3.000000000 GH
(0.0 50.0 50.0			anne anna anna anna anna anna anna anna	ر بند اور	فسيعادوسه	وسرو به الماليني		Stop Free 26 50000000 GH
tart 3.00 GH Res BW 100	z kHz	#VBI	Stop 26.50 GHz 3W 300 kHz Sweep 2.246 s (1001 pts)					CF Step 2.35000000 GH Auto Ma
NR MODE TRC SO		241 5 GHz	-41.67 dBm	UNCTION FUR	ACTION WIDTH	FUNCTIO	N VALUE	Auto Mar
234667789910								Freq Offse 0 H
2					TATU		<u> </u>	1+

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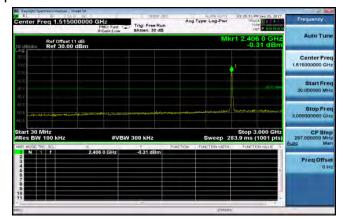
802.11n_HT20 Band Edges Test Data CH-Low

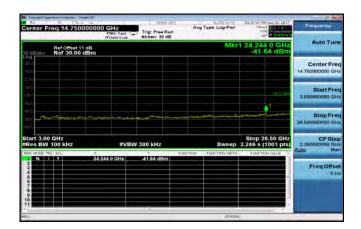


Band Edges Test Data CH-High



802.11n_HT20 Spurious Emission Test Data CH-Low



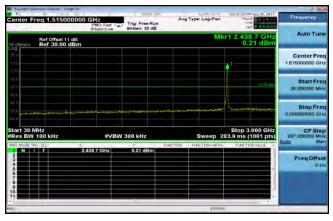


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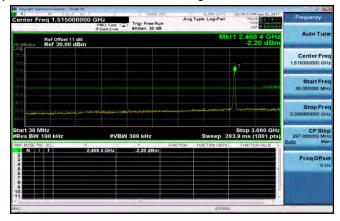


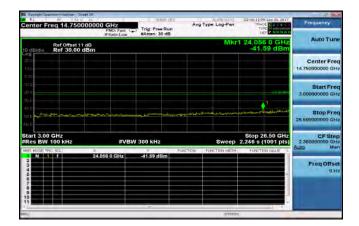
Spurious Emission Test Data CH-Mid



Frequency Auto Tune	6M Sec 20, 2017 405 12 4 4 5 19 5 10 10 10 10 10 10 10 10 10 10		Type: Log-Pwr	A	Trig: Free Rui #Atten: 30 dB	HZ NO: Fast () Gain:Low		Freq 14.75	RL enter F
	07 0 GHz .37 dBm		Mkr				t11 dB 10 dBm	Ref Offset Ref 30.0	dB/div
Center Fre 14.750000000 GF									0.0 70
Start Fre 3.000000000 GH	19 59 400								
Stop Fre 26 50000000 GH	manager have		الالمراجب الريب وسمت مد	alia fial-sta			and the second	monin	0.0 0.0
CF Ste 2.360000000 GH Auto Ma	26.50 GHz (1001 pts)	2.24	Sweep	FUNCTION	00 kHz	#VBW	Ŷ	V 100 kHz	tart 3.0 Res BW
Preg Offs 01					-42.37 dBm	0 GHz	25.607		

Spurious Emission Test Data CH-High





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10 RADIATED BANDEDGE 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 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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10.2 Measurement Equipment Used:

966 Chamber									
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
EMI Test Receiver	R&S	ESU 40	100363	04/18/2017	04/17/2018				
Loop Antenna	ETS-Lindgren	6502	00143303	12/23/2016	12/22/2017				
Broadband Antenna	TESEQ	CBL 6112D	35240	11/03/2016	11/02/2017				
Horn Antenna	ETS-Lindgren	3117	00143272	12/15/2016	12/16/2017				
Horn Antenna	Schwarzbeck	BBHA9170	185	07/24/2017	07/23/2018				
Pre Amplifier	EMC Instruments	EMC330	980096	12/12/2016	12/11/2017				
Pre Amplifier	EMC Instruments	EMC0011830	980199	12/12/2016	12/11/2017				
Pre Amplifier	R&S	SCU-18	10204	12/12/2016	12/11/2017				
Pre Amplifier	R&S	SCU-26	100780	12/12/2016	12/11/2017				
Coaxial Cable	Huber+Suhner	RG 214/U	966Rx 9K-30M	12/12/2016	12/11/2017				
Coaxial Cable	Huber+Suhner	RG 214/U SUCOFLEX 104	966Rx 30M-3G	12/12/2016	12/11/2017				
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Rx 1G-18G	12/12/2016	12/11/2017				
Coaxial Cable	Huber+Suhner	mini 141-12 SUCOFLEX 104	966Rx 18G-40G	12/12/2016	12/11/2017				
Coaxial Cable	Huber+Suhner	SUCOFLEX 104	966Tx 30M-18G	12/12/2016	12/11/2017				
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	966Tx 18G-40G	12/12/2016	12/11/2017				
Attenuator	WOKEN	218FS-10	RF27	12/12/2016	12/11/2017				
Site NSA	SGS	966 Chamber C	SAC-C	03/02/2017	03/01/2018				
Site VSWR	SGS	966 Chamber C	SAC-C	03/02/2017	03/01/2018				
DC Power Supply	HOLA	DP-3003	D7070035	05/04/2017	05/03/2018				
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.				

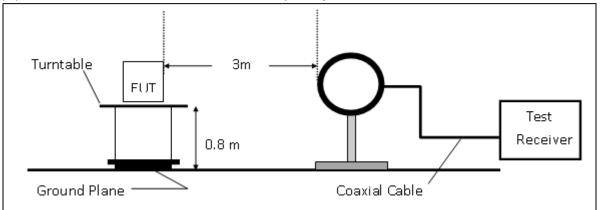
NOTE: N.C.R refers to Not Calibrated Required.

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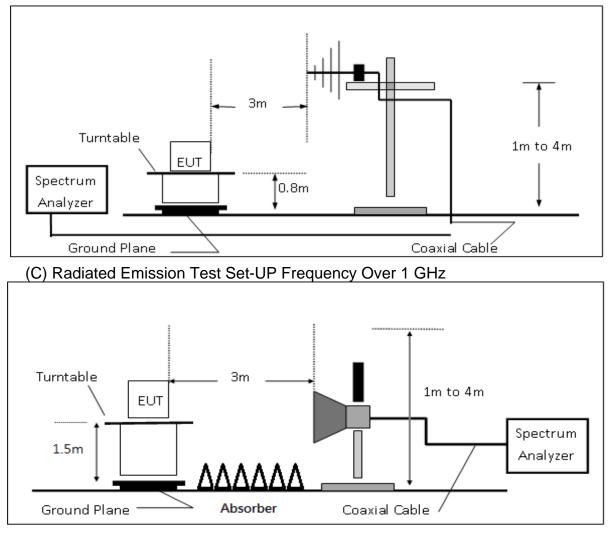


10.3 Test SET-UP

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



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



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10.4 Measurement Procedure

- 1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 2. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plane.
- 3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 5. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
- 6. Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
- 7. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
- 8. Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for Average Detector at frequency above 1 GHz.

Band	Duty Cycle(%)	T(µs)	1/T(kHz)	VBW Setting
802.11g	93.39	1398	0.71	1kHz
802.11n_20	92.68	1297	0.77	1kHz

- 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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10.5 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	0	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Actual FS(dB μ V/m) = SPA. Reading level(dB μ V) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ 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.

10.6 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.

10.7 Measurement Result

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

Note: There is a comparison data of both open-field test site and semi-Anechoic, and test result came out very similar.

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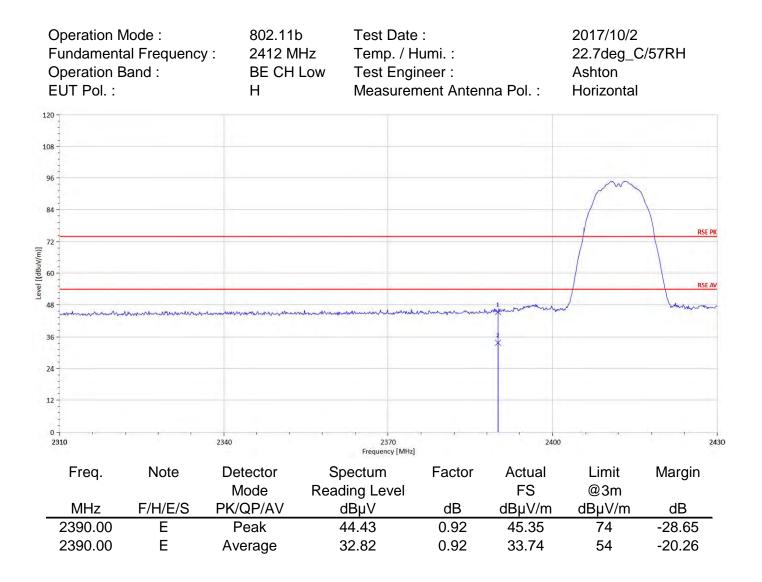
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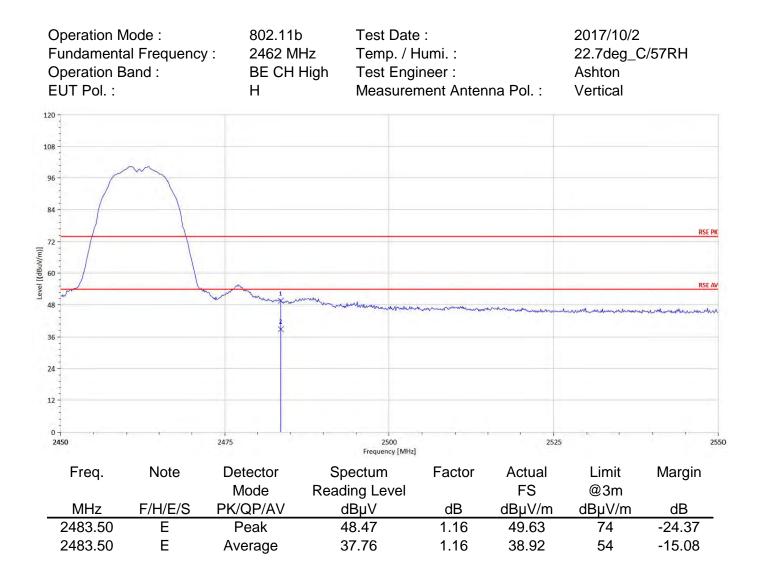
Radiated Band Edge Measurement Result (802.11b)

Fun Ope	Operation Mode : Fundamental Frequency : Operation Band : EUT Pol. :			802.11bTest Date :2412 MHzTemp. / Humi. :BE CH LowTest Engineer :HMeasurement Antenna Po			na Pol. :	2017/10/2 22.7deg_C/57RH Ashton ol. : Vertical		
120										
96					_			m		
84 -										
72 60 60									RSEPK	
[p] [evel [(d							1 marine		RSEAY	
36	un ann an ann ann ann ann ann ann ann an	an an ann an an ann an ann an ann an ann an a	ann de state de la comme	and and a second se	**************************************	- Million and and	2			
24										
12 -										
0 - 2310		r. r. r.	2340	Fre	2370 quency [MHz]		2400) n	2430	
F	req.	Note	Detector Mode	Spectu Reading		Factor	Actual FS	Limit @3m	Margin	
	MHz	F/H/E/S	PK/QP/AV	dBµ\	/	dB	dBµV/m	dBµV/m	dB	
	90.00 90.00	E E	Peak Average	46.68 34.01		0.92 0.92	47.60 34.93	74 54	-26.40 -19.07	

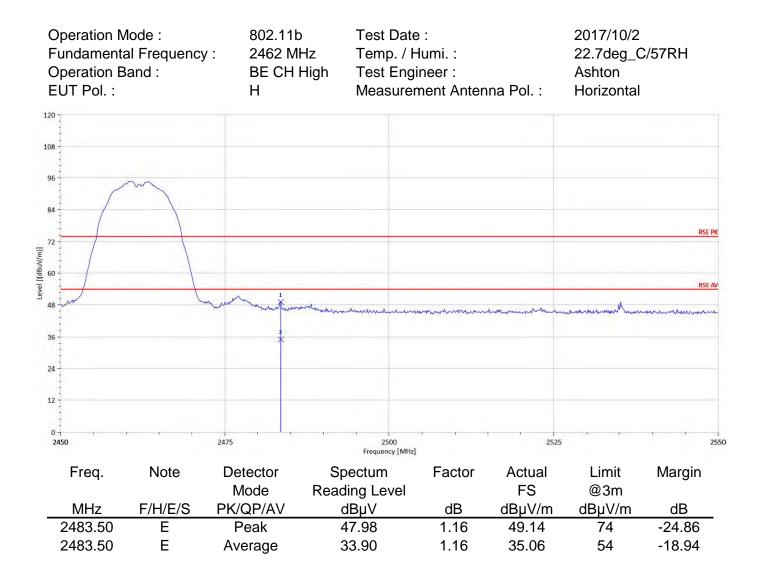






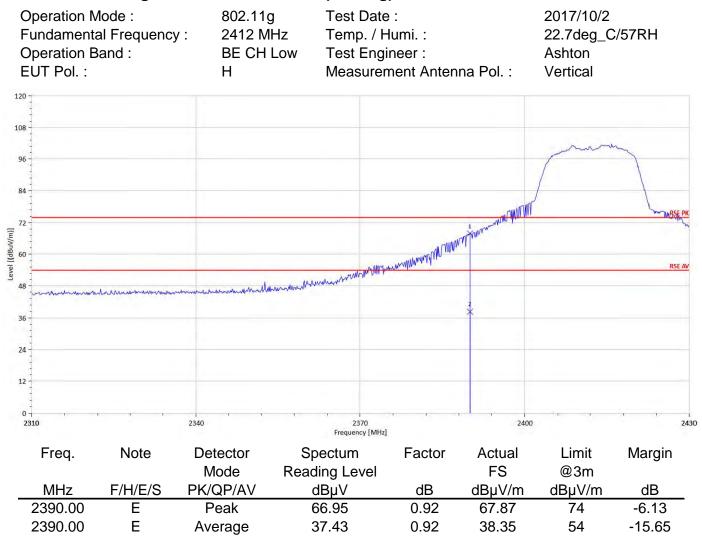






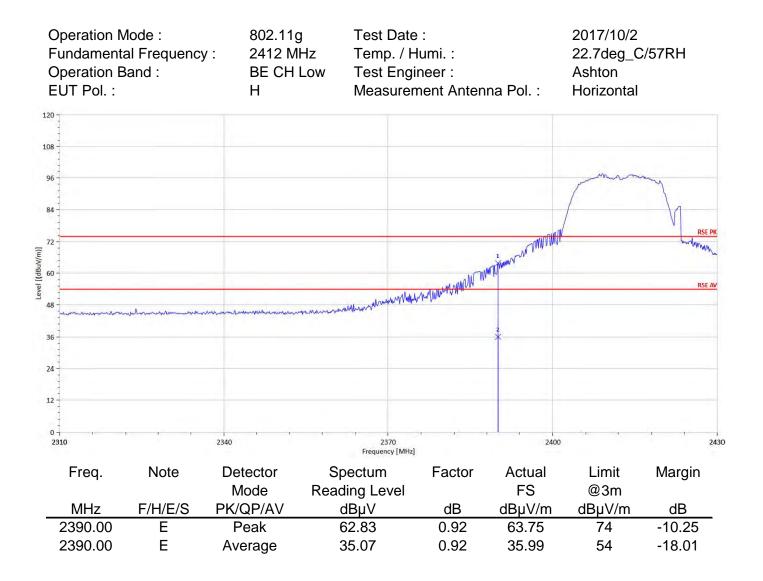


Radiated Band Edge Measurement Result (802.11g)

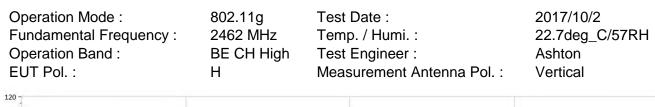


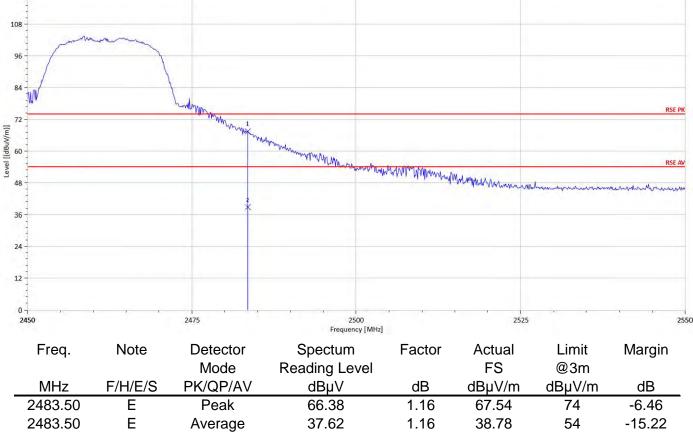
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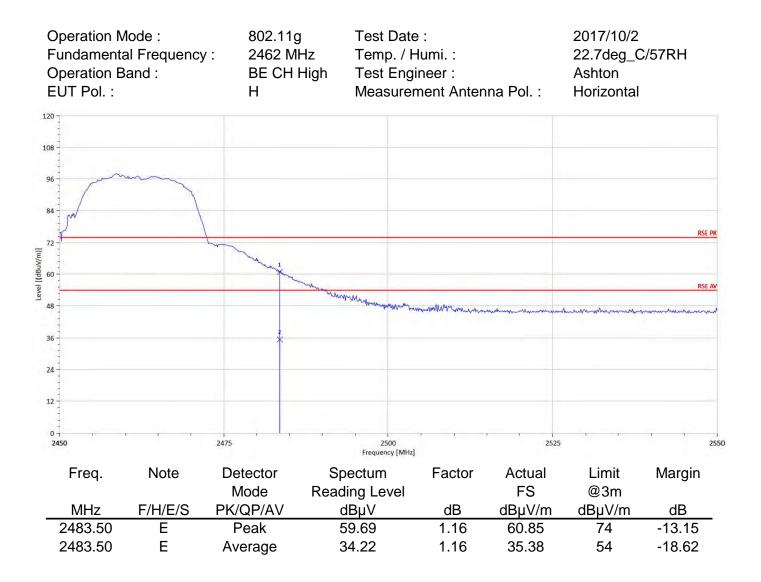






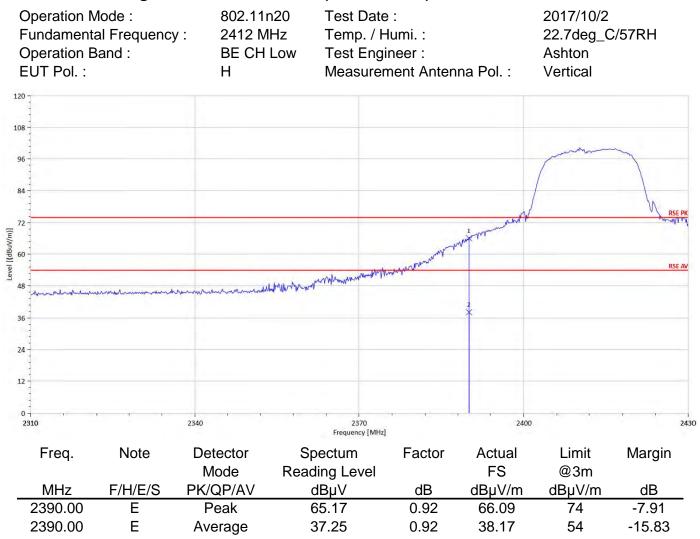






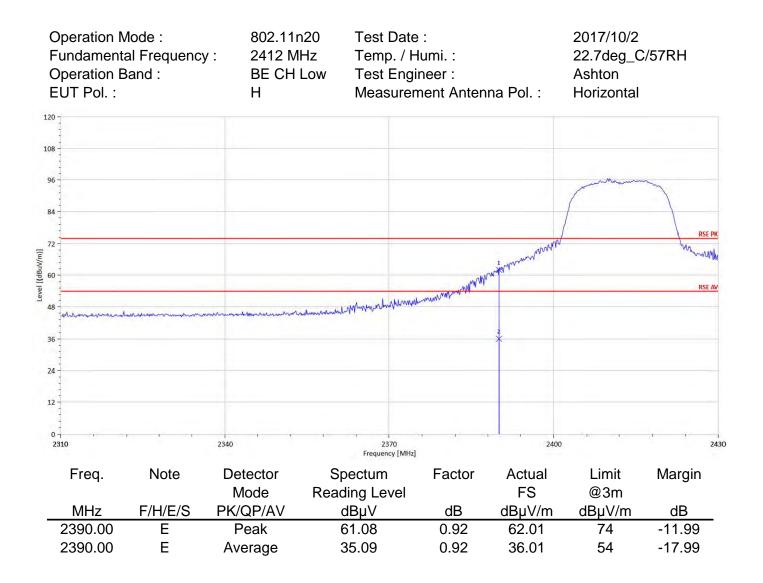


Radiated Band Edge Measurement Result (802.11_HT20)

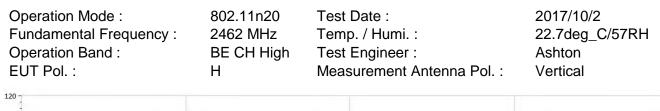


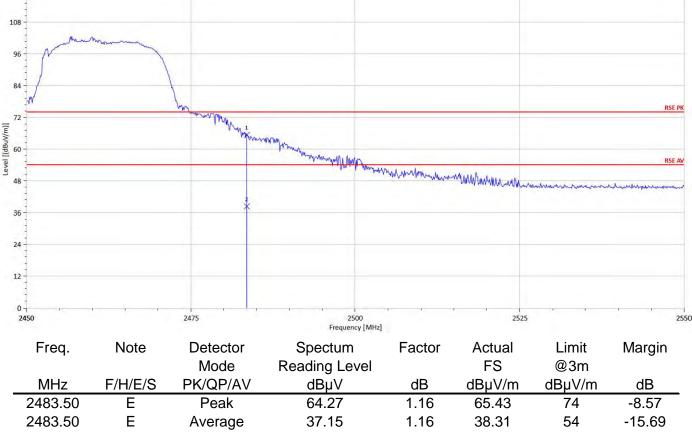
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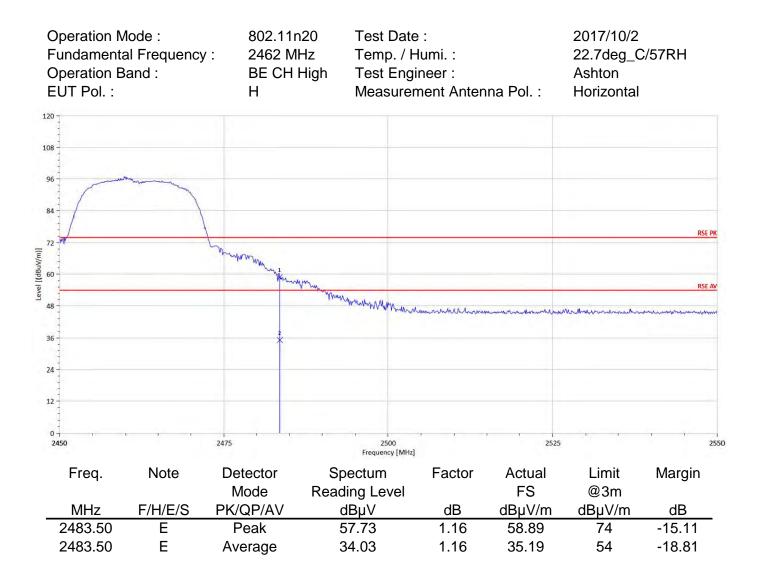








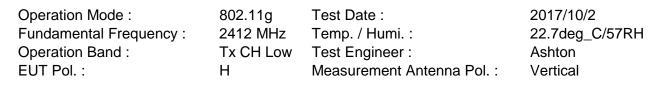


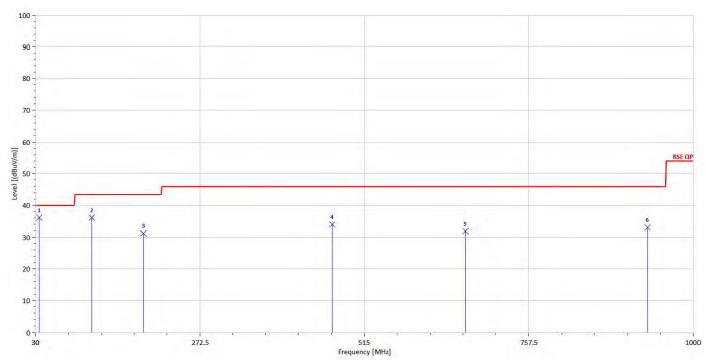




Below 1GHz Worst-Case Data:

Radiated Spurious Emission Measurement Result (802.11 g)



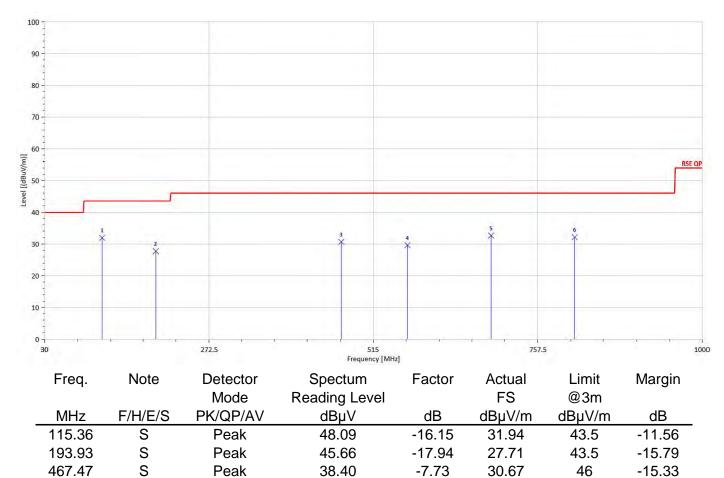


Fre	q. Note	Detector Mode	Spectum Reading Level	Factor	Actual FS	Limit @3m	Margin
MH	z F/H/E/	S PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
35.8	32 S	Peak	46.52	-10.35	36.17	40	-3.83
113.	42 S	Peak	52.46	-16.28	36.18	43.5	-7.32
189.	08 S	Peak	49.59	-18.38	31.21	43.5	-12.29
467.	47 S	Peak	41.73	-7.73	34.00	46	-12.00
664.	38 S	Peak	37.24	-5.33	31.91	46	-14.09
933.	07 S	Peak	34.68	-1.66	33.02	46	-12.98

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Operation Mode :	802.11g	Test Date :	2017/10/2
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band : EUT Pol. :	Tx CH Low H	Test Engineer : Measurement Antenna Pol. :	Ashton Horizontal



38.02

35.13

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Peak

Peak

Peak

S

S

S

565.44

688.63

811.82

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-6.49

-5.37

-3.00

29.59

32.65

32.14

46

46

46

-16.41

-13.35

-13.86



189.08

467.47

541.19

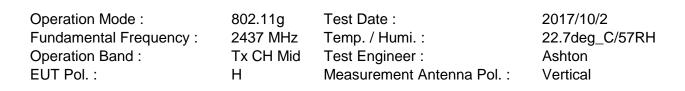
565.44

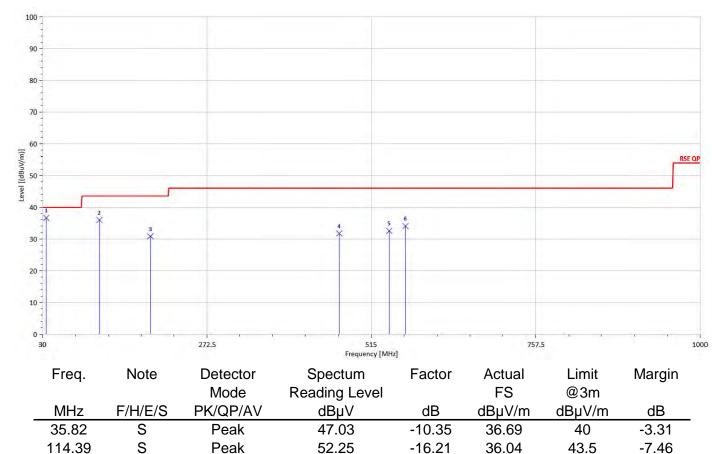
S

S

S

S





52.25

49.22

39.49

39.63

40.58

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Peak

Peak

Peak

Peak

Peak

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36.04

30.83

31.76

32.56

34.09

-18.38

-7.73

-7.06

-6.49

43.5

43.5

46

46

46

-7.46

-12.67

-14.24

-13.44

-11.91



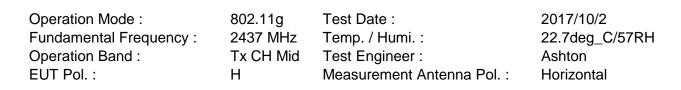
664.38

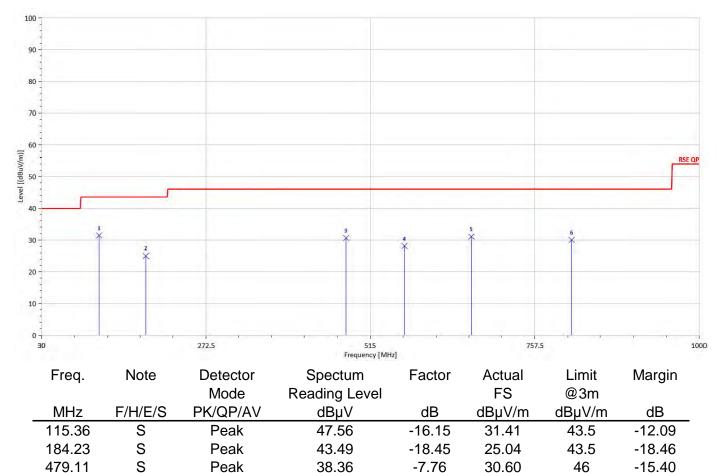
811.82

S

S

S





34.57

36.35

32.99

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-6.49

-5.33

-3.00

28.08

31.03

29.99

46

46

46

-17.92

-14.97

-16.01



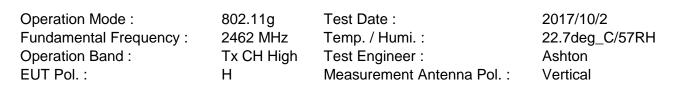
664.38

688.63

S

S

S





36.74

35.71

37.47

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-6.49

-5.33

-5.37

30.25

30.39

32.11

46

46

46

-15.75

-15.61

-13.89



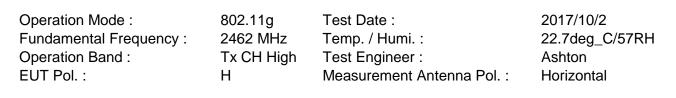
565.44

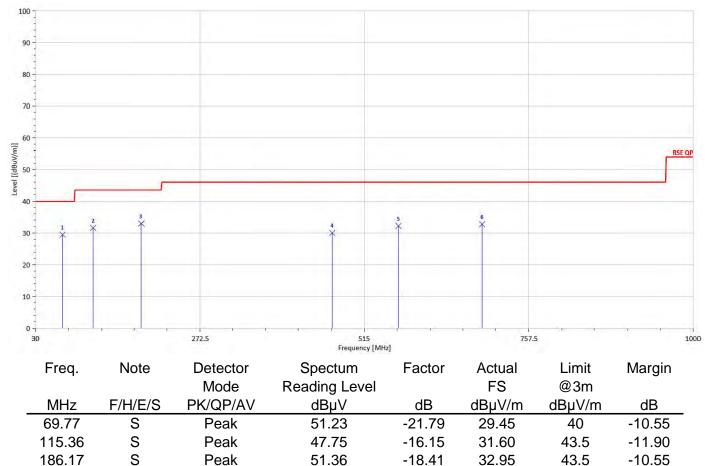
688.63

S

S

S





37.71

38.71

38.12

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Peak

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-7.73

-6.49

-5.37

29.98

32.22

32.75

46

46

46

-16.02

-13.78

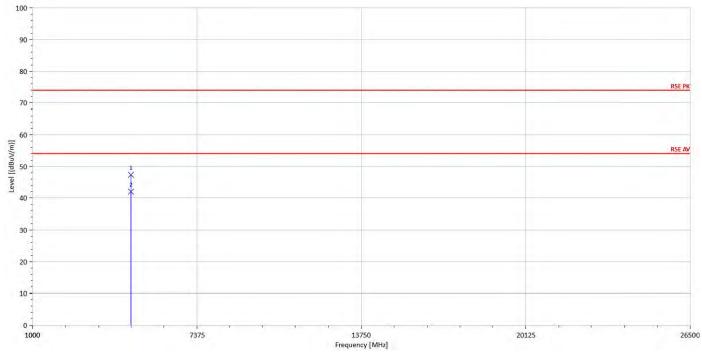
-13.25



Above 1GHz Data:

Radiated Spurious Emission Measurement Result (802.11 b)

Operation Mode :802.11bFundamental Frequency :2412 MHOperation Band :Tx CH LoEUT Pol. :H	Iz Temp. / Humi. :	2017/10/2 22.7deg_C/57RH Ashton Vertical
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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
4824.00	Н	Peak	39.81	7.58	47.39	74	-26.61
4824.00	Н	Average	34.45	7.58	42.03	54	-11.97

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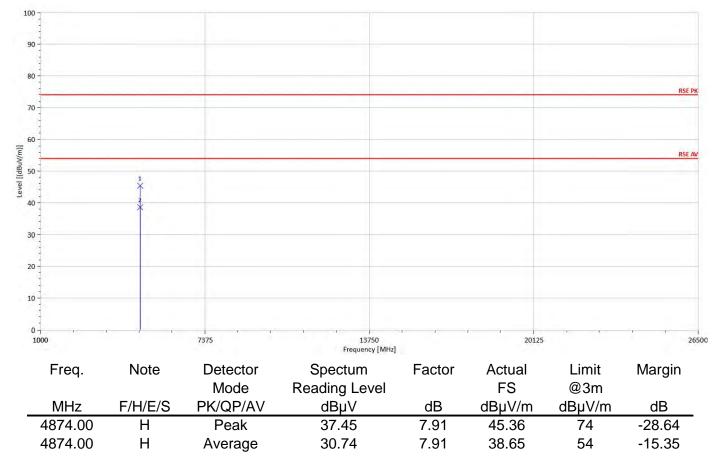


Report No.: E2/2017/80110 Page 61 of 82

Fu Op	peration I ndamen peration I JT Pol. :	tal Frequenc	802.11 cy : 2412 M Tx CH H	/IHz Temp Low Test	Date : b. / Hur Engine sureme		a Pol. :	2017/10/2 22.7deg_C/ Ashton Horizontal	57RH
100 -									
80									
70 -									RSE PK
60			1						RSE AV
Level [(dBuV/m)]		×							
30		×							
20					_				
10 -									
0 - 1000		• .	7375		13750 ency [MHz]		20125	, i i	26500
F	Freq.	Note	Detector Mode	Spectun Reading Le		Factor	Actual FS	Limit @3m	Margin
	MHz	F/H/E/S	PK/QP/AV	dBµV		dB	dBµV/m	dBµV/m	dB
	324.00 324.00	H H	Peak Average	34.82 27.22		7.58 7.58	42.40 34.80	74 54	-31.60 -19.20

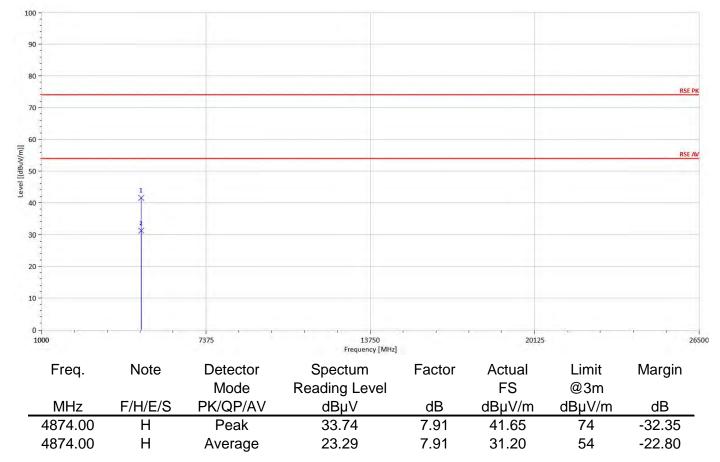


Operation Mode :	802.11b	Test Date :	2017/10/2
Fundamental Frequency :	2437 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



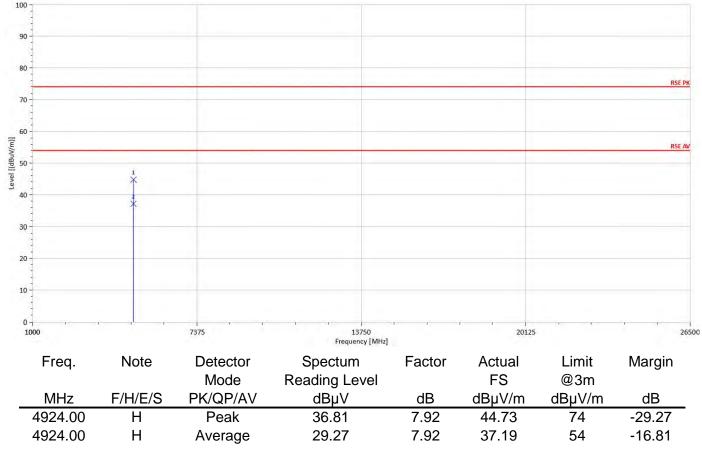


Operation Mode :	802.11b	Test Date :	2017/10/2
Fundamental Frequency :	2437 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band : EUT Pol. :	Tx CH Mid H	Test Engineer : Measurement Antenna Pol. :	Ashton Horizontal

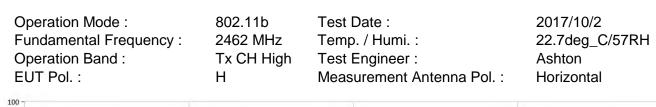


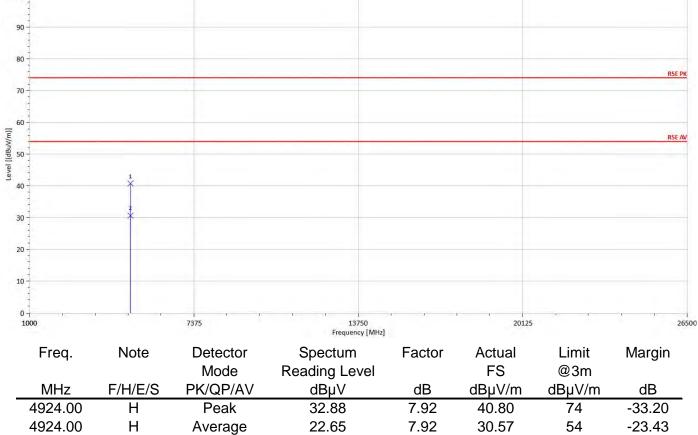


Operation Mode :	802.11b	Test Date :	2017/10/2
Fundamental Frequency :	2462 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical
EUT Pol. :	Н	Measurement Antenna Pol. :	Vertical





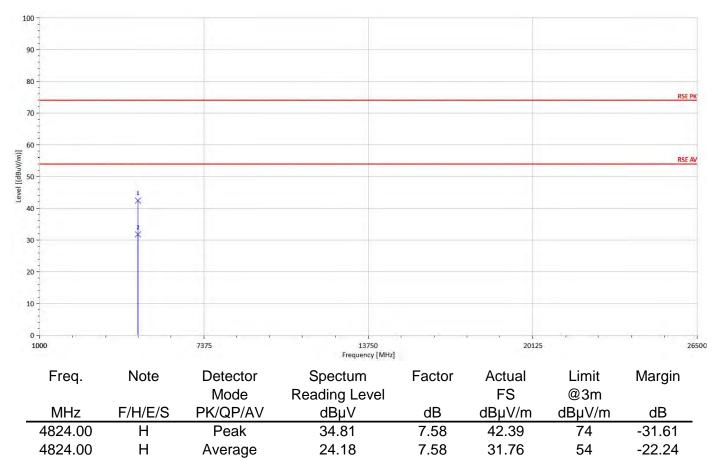






Radiated Spurious Emission Measurement Result (802.11 g)

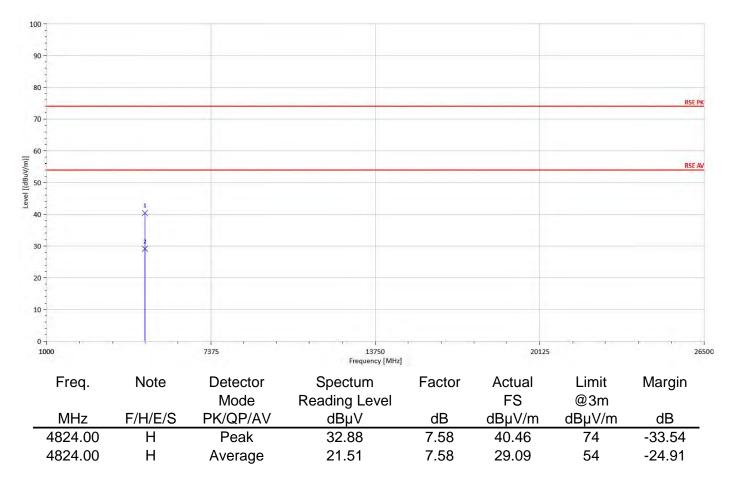
Operation Mode : 802.11g Test Date : 2017/10	0/2
Fundamental Frequency: 2412 MHz Temp. / Humi.: 22.7deg	g_C/57RH
Operation Band : Tx CH Low Test Engineer : Ashton	
EUT Pol.: H Measurement Antenna Pol.: Vertical	l



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

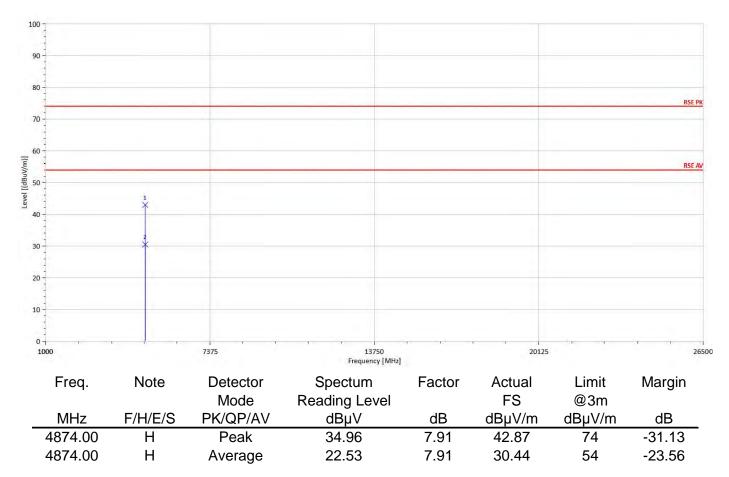


Operation Mode :	802.11g	Test Date :	2017/10/2
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	Н	Measurement Antenna Pol. :	Horizontal



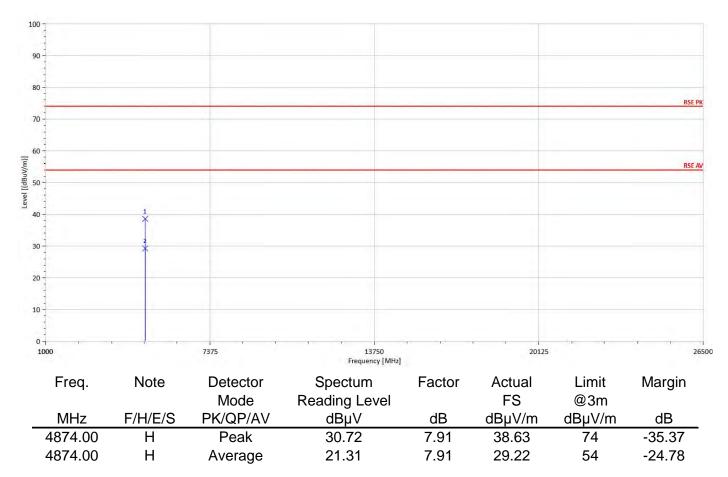


Operation Mode :	802.11g	Test Date :	2017/10/2
Fundamental Frequency :	2437 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	Н	Measurement Antenna Pol. :	Vertical



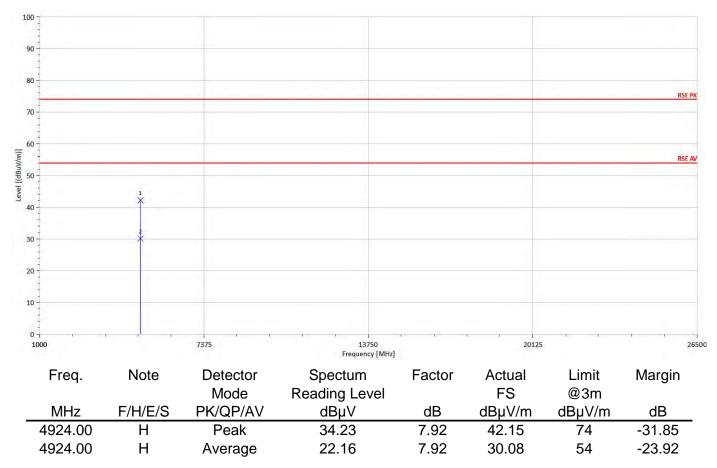


Operation Mode :	802.11g	Test Date :	2017/10/2
Fundamental Frequency :	2437 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	Н	Measurement Antenna Pol. :	Horizontal

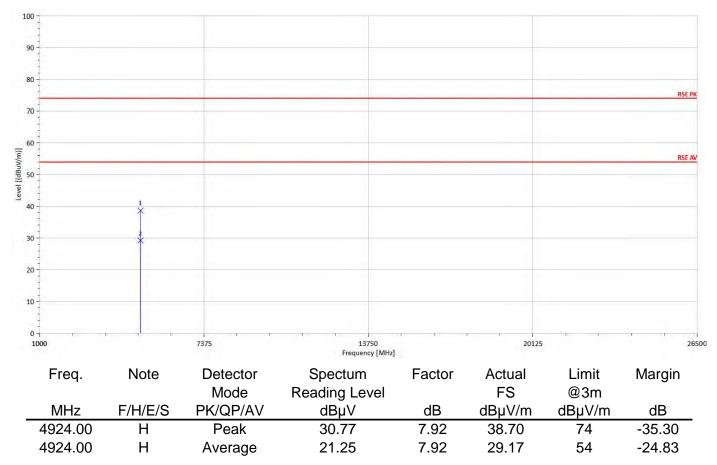




Operation Mode :	802.11g	Test Date :	2017/10/2
Fundamental Frequency :	2462 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	H	Measurement Antenna Pol. :	Vertical



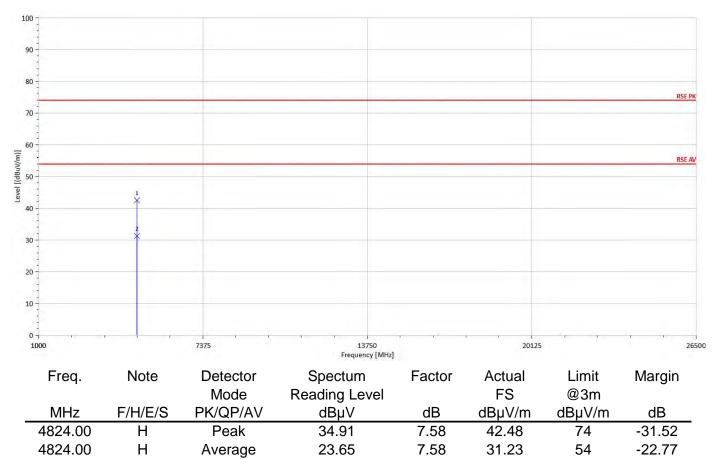






Radiated Spurious Emission Measurement Result (802.11_HT20)

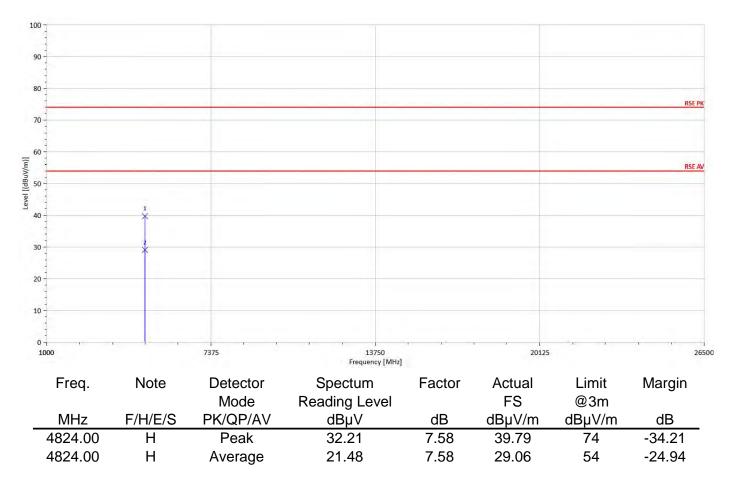
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Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	Н	Measurement Antenna Pol. :	Vertical



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

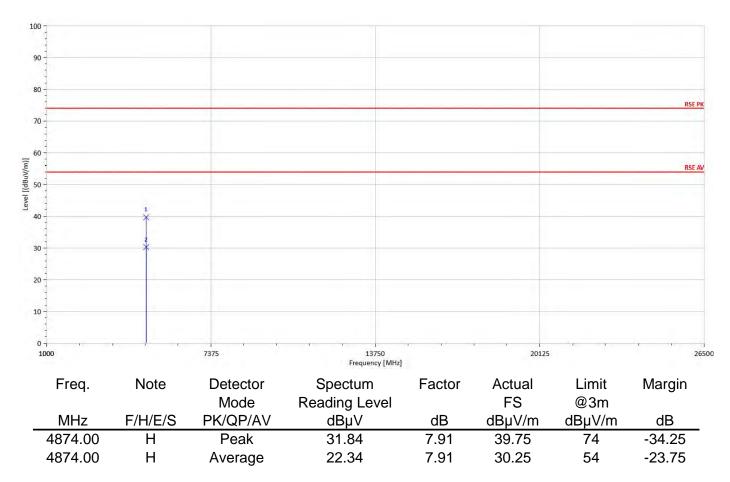


Operation Mode :	802.11n20	Test Date :	2017/10/2
Fundamental Frequency :	2412 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Low	Test Engineer :	Ashton
EUT Pol. :	Н	Measurement Antenna Pol. :	Horizontal



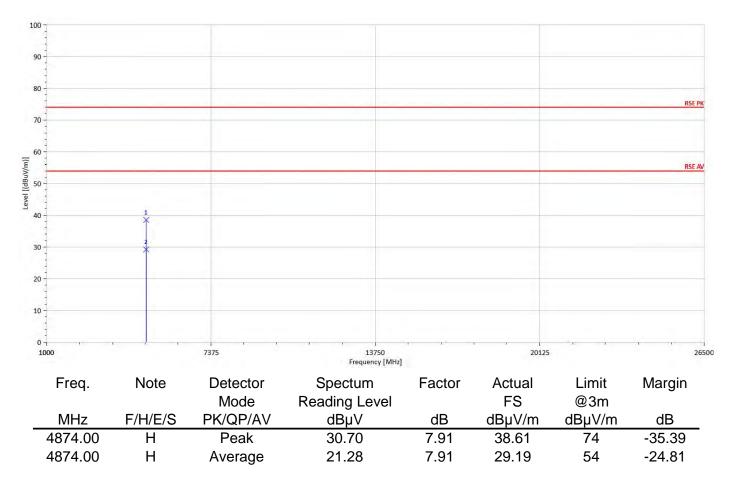


Operation Mode :	802.11n20	Test Date :	2017/10/2
Fundamental Frequency :	2437 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	Н	Measurement Antenna Pol. :	Vertical



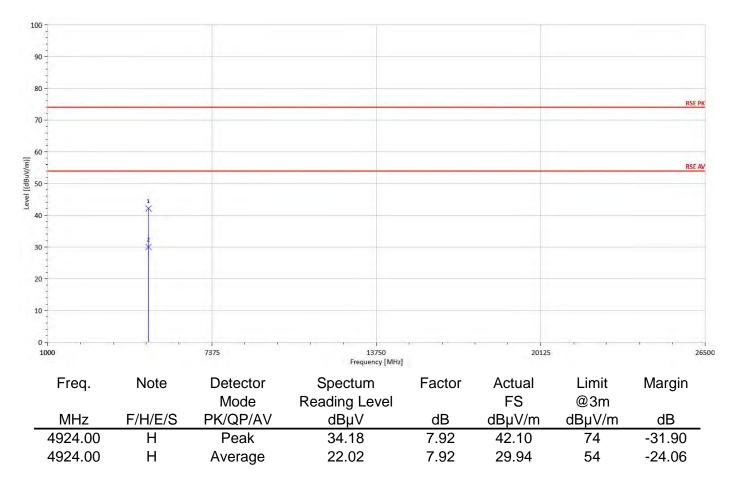


Operation Mode :	802.11n20	Test Date :	2017/10/2
Fundamental Frequency :	2437 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH Mid	Test Engineer :	Ashton
EUT Pol. :	Н	Measurement Antenna Pol. :	Horizontal



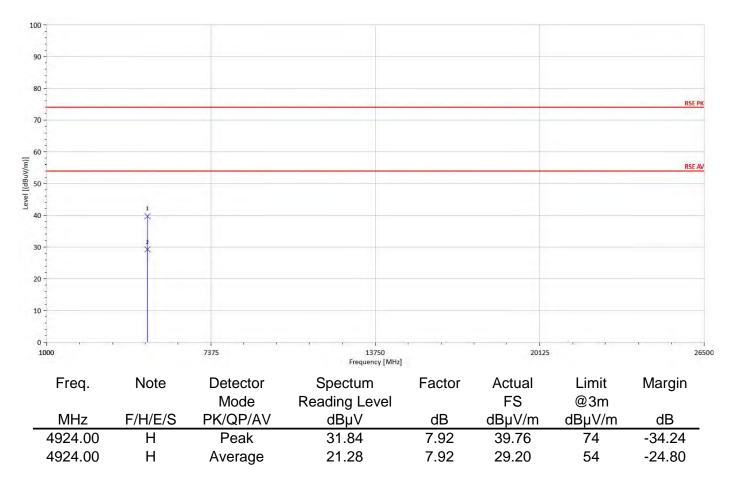


Operation Mode :	802.11n20	Test Date :	2017/10/2
Fundamental Frequency :	2462 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	Н	Measurement Antenna Pol. :	Vertical





Operation Mode :	802.11n20	Test Date :	2017/10/2
Fundamental Frequency :	2462 MHz	Temp. / Humi. :	22.7deg_C/57RH
Operation Band :	Tx CH High	Test Engineer :	Ashton
EUT Pol. :	Н	Measurement Antenna Pol. :	Horizontal





11 PEAK POWER SPECTRAL DENSITY

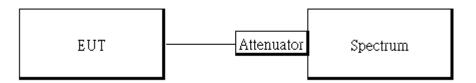
11.1 Standard Applicable

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.

11.2 Measurement Equipment Used

Conducted Emission Test Site									
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.				
ТҮРЕ		NUMBER	NUMBER	CAL.					
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	06/20/2017	06/19/2018				
DC Block	PASTERNACK	PE8210	RF29	12/12/2016	12/11/2017				
Attenuator	WOKEN	218FS-10	RF23	12/12/2016	12/11/2017				

11.3 Test Set-up



11.4 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.

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



11.5 Measurement Result

POWER DENSITY 802.11b								
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result		
2412	-10.54	11.00	0.05	-10.49	8.00	PASS		
2437	-9.69	11.00	0.05	-9.64	8.00	PASS		
2462	-9.41	11.00	0.05	-9.36	8.00	PASS		
	POWER DENSITY 802.11g							
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result		
2412	-14.27	11.00	0.30	-13.97	8.00	PASS		
2437	-12.71	11.00	0.30	-12.41	8.00	PASS		
2462	-13.16	11.00	0.30	-12.86	8.00	PASS		
	POWER DENSITY 802.11n HT20							
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result		
2412	-14.39	11.00	0.33	-14.06	8.00	PASS		
2437	-15.28	11.00	0.33	-14.95	8.00	PASS		
2462	-14.32	11.00	0.33	-13.99	8.00	PASS		

*Refer to next page for plots



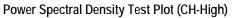
802.11b

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

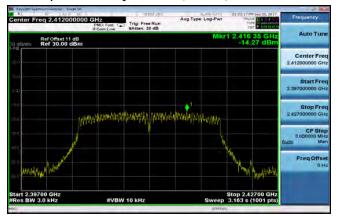




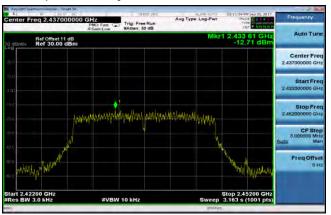


802.11g

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)







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

Contention is stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are relative for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms and conditions.htm</u> and, for elec-tronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms e-document.htm</u>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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802.11n_HT20 Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



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12 ANTENNA REQUIREMENT

12.1 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.

12.2 Antenna Connected Construction

An embedded-in antenna design is used.

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

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

~ End of Report ~

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