

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF Sharp Corporation, Mobile Communication B.U. **Applicant:** 2-13-1, Hachihonmatsu-Iida, Higashi-hiroshima-shi, Hiroshima 739-0192, Japan Sharp Corporation Manufacturer: 1 Takumi-cho, Sakai-ku, Sakai-Shi, Osaka 590-8522, Japan **Product Name:** Smart Phone **Report Number:** ER/2018/30060 FCC ID: APYHRO00261 FCC Rule Part: §15.247, Cat: DTS Issue Date: Apr. 13, 2018 Mar. 20, 2018 ~ Apr. 02, 2018 Date of Test:

Date of EUT Received: Mar. 20, 2018

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.

Marcus Isen

Tested By:

Approved By:

Marcus Tseng / Sr. Engineer

Jim Chang / Manager





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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
ER/2018/30060	Rev.00	Initial creation of document	All	Apr. 13, 2018	Tiffany Kao

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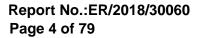
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Contents

1	GENERAL INFORMATION	4
2	SYSTEM TEST CONFIGURATION	6
3	SUMMARY OF TEST RESULTS	8
4	DESCRIPTION OF TEST MODES	8
5	MEASUREMENT UNCERTAINTY	10
6	CONDUCTED EMISSION TEST	11
7	DUTY CYCLE OF TEST SIGNAL	15
8	PEAK OUTPUT POWER MEASUREMENT	18
9	6dB BANDWIDTH MEASUREMENT	21
10	CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT	25
11	RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT	37
12	PEAK POWER SPECTRAL DENSITY	74
13	ANTENNA REQUIREMENT	79

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GENERAL INFORMATION 1

1.1 Product description

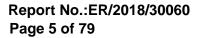
General:

Product Name:	Smart Phone		
Hardware Version:	DVT		
Software Version:	N/A		
	3.85V from Rechargeable Li-ion Battery		
Power Supply:	Battery:	Model No.: UBATIA287AFN2, Supplier: SCUD (FUJIAN) Electronics Co., Ltd.	

WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power	Modulation Technology	
11b/g	2412-2462	11	b: 18.00dBm g: 17.36dBm	DSSS, OFDM	
11n	HT20 2412-2462	11	17.71dBm	OFDM	
Modulation	Modulation type:		CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM		
Antenna D	Antenna Designation:		IFA Antenna, Gain: -1.4dBi		
Transition Rate:		802.11 g: 6/9	2/5.5/11 Mbps 9/12/18/24/36/48/54 Mb MHz: 6.5 – 144.4 Mbps	•	

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

KDB 558074 D01 DTS Meas. Guidance v04

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.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803

(TAF code 0513)

FCC Registration Numbers are: 509634 / TW0001

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.

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2.5 Configuration of Tested System

Fia	2-1 Radiated	& AC Powe	r Line Co	nducted	Fmission
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Fig. 2-2 Conducted (Antenna Port) Emission

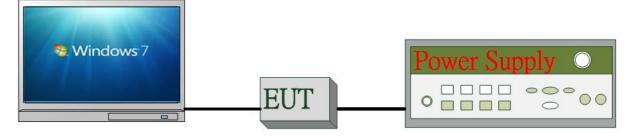


Table 2-1 Equipment Used in Tested System

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.	DC Power Supply	Anritsu	E3640A	MY52410006	N/A	Unshielded
3.	Notebook	Lenovo	T440	P0000564	Shielded	Unshielded

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SUMMARY OF TEST RESULTS 3

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 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

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

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4.2 The Worst Test Modes and Channel Details

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

RADIATED EMISSION TEST:

	RADIATED EMISSION TEST (BELOW 1 GHz)				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT
802.11g	1 to 11	1, 6, 11	OFDM	6	Main
	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	Main
802.11g	1 to 11	1, 6, 11	OFDM	6	Main
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 0	Main

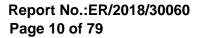
Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11b/g/n WLAN Transmitter for channel Low, Mid and High, the worst case 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	Main
802.11g	1 to 11	1, 6, 11	OFDM	6	Main
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS 0	Main

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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	Note						
1. The lower limit shall apply at the transition frequencies							
2. The limit decreases linearly wit	h the logarithm of the frequency in	the range 0.15 MHz to 0.50					

MHz.

6.2 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	2017/06/06	2018/06/05
Coaxial Cables	N/A	WK CE Cable	N/A	2018/01/02	2019/01/01
Notebook	Lenovo	T440P	P0000564	N/A	N/A
LISN	SCHWARZBECK	NSLK 8127	8127-649	2017/05/22	2018/05/21

6.3 EUT Setup

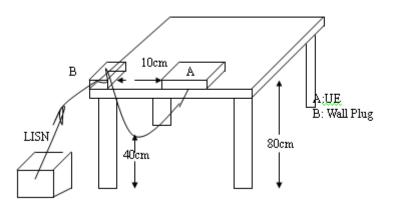
- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure

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

6.6 Measurement Result

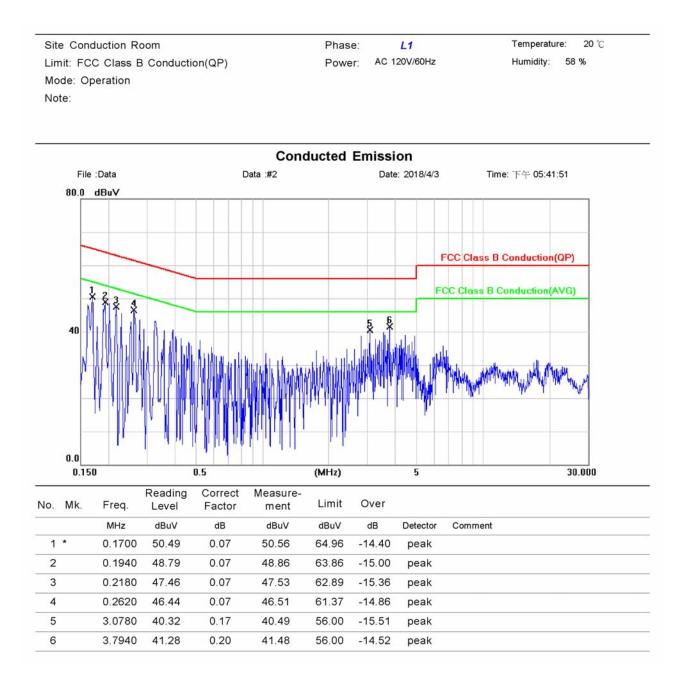
Note: Refer to next page for measurement data and plots.

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

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AC POWER LINE CONDUCTED EMISSION TEST DATA



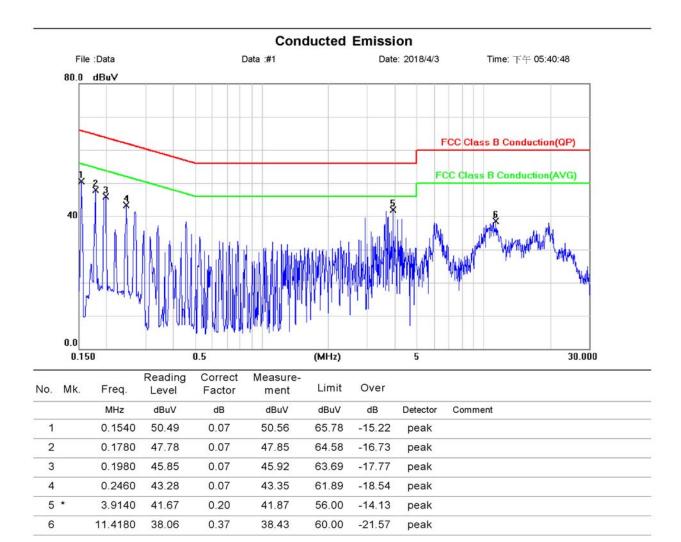
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Temperature: 20 °C Site Conduction Room Phase: Ν AC 120V/60Hz Humidity: 58 % Limit: FCC Class B Conduction(QP) Power: Mode: Operation Note:



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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)	1/T (kHz)	VBW setting (kHz)
802.11b	99.25	0.03	0.08	1.00
802.11g	95.49	0.20	0.49	1.00
802.11n_20	94.74	0.23	0.92	1.00

b = 99.25%, *g* = 95.49%,*n*_*ht*_20 = 94.74%

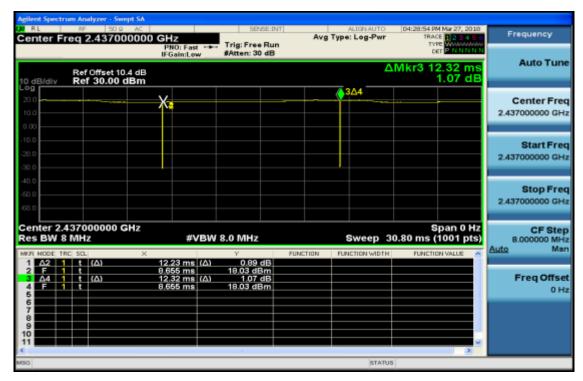
Duty Cycle Factor: $10 * \log(1/0.9925) = 0.03$ Duty Cycle Factor: 10 * log(1/0.9549) = 0.2 Duty Cycle Factor: $10 * \log(1/0.9474) = 0.23$

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7.1 Duty Cycle Test Signal Measurement Result

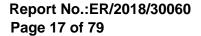
802.11 b



802.11 g

enter Fr	eq 2.4370	00000 GH		Trig: Free Ru	Avg	ALIGNAUTO Type: Log-Pwr	04:45:21 PM Mar 27, 2018 TRACE 1 2 3 4 5 TYPE WWWWWW	Frequency
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6 7 8 9								
1								

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802.11 n_20 MHz

Agilent Spectr	um An	dyzer - Swe	pt SA										
RL		50 £				SBY	/SE:INT			ALIGNAUTO		M Mar 27, 2018	Frequency
Center F	req 2	2.43700	0000			Trig: Free	Run	Avg	Туре	e: Log-Pwr	TRA		
				PNO: IEGain	Fast	#Atten: 30					D	PE WAALAAAAAAA ET P N N N N N	
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		Offset 10.										0.24 dB	
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8 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.

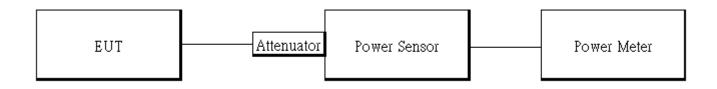
If the transmitting antenna of directional gain greater than 6dBi are used the peak output power form the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the Antenna exceeds 6dBi.

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

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2496A	1242004	2017/10/16	2018/10/15
DC Power Supply	Anritsu	E3640A	MY52410006	2017/11/28	2018/11/27
Attenuator	Mini-Circuit	BW-S10W2+	2	2018/01/02	2019/01/01
Notebook	Lenovo	T440	P0000564	N/A	N/A

8.3 Test Set-up



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.



8.5 Measurement Result

802.1	802.11b Main						
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)		Limit		RESULT
1	2412	1	18.00	1 Watt =	30.00	dBm	PASS
6	2437	1	17.75	1 Watt =	30.00	dBm	PASS
11	2462	1	17.64	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	14.99	1 Watt =	30.00	dBm	PASS
6	2437	1	14.97	1 Watt =	30.00	dBm	PASS
11	2462	1	14.90	1 Watt =	30.00	dBm	PASS

802.1	802.11g Main							
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)		Limit		RESULT	
1	2412	6	17.24	1 Watt =	30.00	dBm	PASS	
6	2437	6	17.35	1 Watt =	30.00	dBm	PASS	
11	2462	6	17.36	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	12.62	1 Watt =	30.00	dBm	PASS	
6	2437	6	12.72	1 Watt =	30.00	dBm	PASS	
11	2462	6	12.85	1 Watt =	30.00	dBm	PASS	

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802.1	1n_HT20	M Main					
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)		Limit		RESULT
1	2412	MCS0	17.71	1 Watt =	30.00	dBm	PASS
6	2437	MCS0	17.32	1 Watt =	30.00	dBm	PASS
11	2462	MCS0	17.28	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	12.51	1 Watt =	30.00	dBm	PASS
6	2437	MCS0	12.57	1 Watt =	30.00	dBm	PASS
11	2462	MCS0	12.64	1 Watt =	30.00	dBm	PASS

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

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6DB BANDWIDTH MEASUREMENT 9

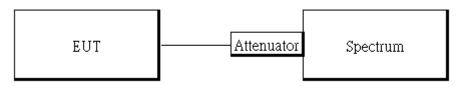
9.1 Standard Applicable

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

9.2 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY54200716	2017/10/16	2018/10/15
DC Power Supply	Anritsu	E3640A	MY52410006	2017/11/28	2018/11/27
Attenuator	Mini-Circuit	BW-S10W2+	2	2018/01/02	2019/01/01
Notebook	Lenovo	T440	P0000564	N/A	N/A

9.3 Test Set-up



9.4 Measurement Procedure

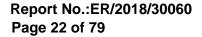
- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 4. For 6dB Bandwidth:

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

- 5. Mark the peak frequency and -6dB (upper and lower) frequency.
- 6. Repeat above procedures until all frequency of interest measured was complete.

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9.5 Measurement Result

802.1	1b I	Main
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Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result	Freq. (MHz)	e
2412	7590	> 500	PASS	2412	
2437	7610	> 500	PASS	2437	
2462	7600	> 500	PASS	2462	

lt	Freq. (MHz)	-		Result	
3	2412	15470	> 500	PASS	
3	2437	16040	> 500	PASS	
3	2462	15310	> 500	PASS	

802.11_n_HT20 Main

Freq. (MHz)	6dB BW (kHz)	Limit (kHz)	Result	
2412	15470	> 500	PASS	
2437	15720	> 500	PASS	
2462	16410	> 500	PASS	

*Refer to next page for plots

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802.11b (Main) CH-Low



eq 2.43700 D4:28:30 PM Mar 27 Radio Std: None Ref Offset 10.4 d Ref 30.00 dBn Center Fre 2.437 GHz W 100 kHz Span 30 MH: eep 2.933 m CFS VBW 300 kH; S vidth 12.698 MHz 22.3 dBm nied Bandy Total Powe 30.871 kHz it Freq Erre OBW Po 99.00 % 7 610 MHz -6 00 dB

802.11b (Main) CH-Mid

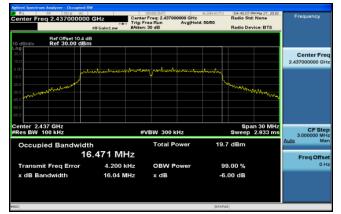
802.11b (Main) CH-High



802.11g (Main) CH-Low



802.11g (Main) CH-Mid



802.11g (Main) CH-High

Center 2.462 GHz Res BW 100 kHz Cocupied Bandwidth 16.485 MHz Center 19.7 dBm Total Power 19.7 dBm Total Power 19.7 dBm Total Power 19.7 dBm Total Power 19.7 dBm Total Power 19.7 dBm Treq off Treq off	RL 18 500 AC Center Freq 2.4620000	Trig:	sense:inri er Freq: 2.462000000 GHz Free Run Avg Hol m: 30 dB	Radio S d: 50/50	td: None evice: BTS	Frequency
Center P 2.46200000 Center D 2.462 Center D 2.562 Center D	10 dB/div Ref 30.00 dl					
Center 2.462 CHz #VBW 300 kHz Sweep 2.633 ms Center 2.462 CHz #VBW 300 kHz Sweep 2.633 ms Center 19.7 dBm 16.485 MHz Transmit Freq Error -15.861 kHz OBW Power 99.00 %	20.0	estimation and the second second	on probane ture	موقد سرارمو		Center Fre 2.462000000 Gi
Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.933 ms Occupied Bandwidth Total Power 19.7 dBm 16.485 MHz Transmit Freq Error -15.861 kHz OBW Power 99.00 %	-20.0 -30.0			harren and a second	-	
Autor Average Sweep Zustan Autor	-60.0 Center 2.462 GHz			Sr	an 30 MHz	CESI
Transmit Freq Error -15.861 kHz OBW Power 99.00 %					2.933 ms	3.000000 MI
						Freg Offs
x dB Bandwidth 15,31 MHz x dB -6.00 dB	Transmit Freq Error	-15.861 kHz	OBW Power	99.00 %		01
	x dB Bandwidth	15.31 MHz	x dB	-6.00 dB		

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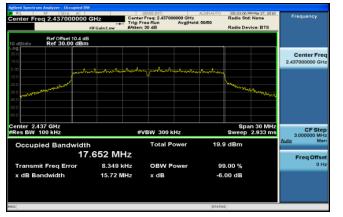
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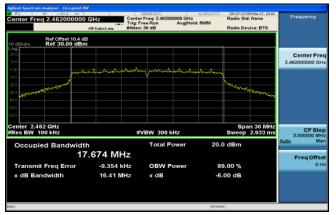
802.11n_20M (Main) CH-Low



802.11n_20M (Main) CH-Mid



802.11n_20M (Main) CH-High



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10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT

10.1 Standard Applicable

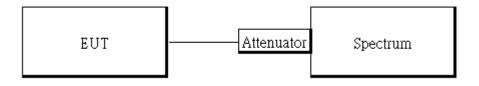
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

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

10.2 Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY54200716	2017/10/16	2018/10/15
DC Power Supply	Anritsu	E3640A	MY52410006	2017/11/28	2018/11/27
Attenuator	Mini-Circuit	BW-S10W2+	2	2018/01/02	2019/01/01
Notebook	Lenovo	T440	P0000564	N/A	N/A

10.3 Test SET-UP



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10.4 Measurement Procedure

Reference Level of Emission Calculation:

- 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 = 100kHz & VBW = 300 kHz.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- Trace mode = max hold.
- 8. Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level.

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
- Mark the highest reading of the emission as the reference level measurement.
- 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.
- 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.
- Repeat above procedures until all default test channel measured were complete.

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10.5 Measurement Result:

Refere	ence Leve	l of Limit 802.11b mode	Reference Level of Limit 802.11g mode			
Freq.	PSD	Reference Level of Limit	Freq.	PSD	Reference Level of Limit	
(MHz)	(dBm)	(dBm)	(MHz)	(dBm)	(dBm)	
2412	7.94	-12.06	2412	2.42	-17.58	
2462	7.37	-12.63	2462	3.01	-16.99	

Reference Level of Limit 802.11n20 mode

Freq.	PSD	Reference Level of Limit					
(MHz)	(dBm)	(dBm)					
2412	2.62	-17.38					
2462	2.73	-17.27					

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802.11b Reference Level of Emission Limit (CH-Low)

802.11b Reference Level of Emission Limit(CH-High)



2.41 Trig: Free Ru Auto Tur Ref Offset 10.4 dB Ref 30.00 dBm Center Fre Start Fr CF Ste Freq Offs Stop 2.42700 GHz 2.933 ms (1001 pte 2.39700 GH2 BW 100 kHz

802.11g Reference Level of Emission Limit(CH-Low)

802.11g Reference Level of Emission Limit(CH-High)



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802.11n HT20 Reference Level of Emission Limit(CH-Low)

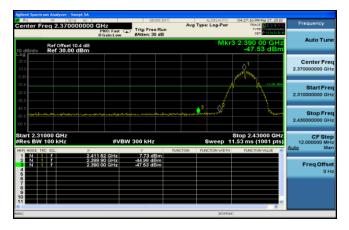


802.11n_HT20 Reference Level of Emission Limit(CH-High)

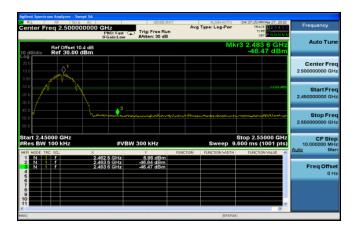


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802.11b: Band Edges Test Data CH-High



802.11b: Band Edges Test Data CH-Low 802.11g: Band Edges Test Data CH-Low



802.11g: Band Edges Test Data CH-High



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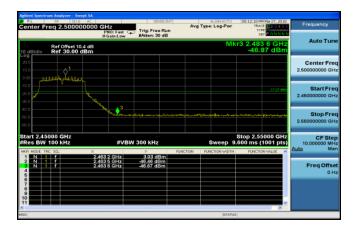
S Taiwan Ltd. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134號



802.11n_HT20: Band Edges Test Data CH-Low



802.11n_HT20: Band Edges Test Data CH-High



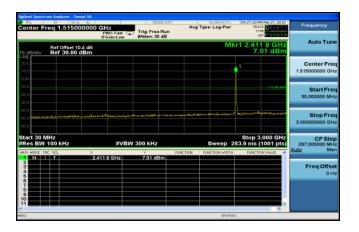
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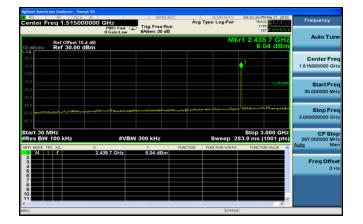


802.11b: Spurious Emission Test Data CH-Low



gilent Spectro	am Analyzer - '	Swept SA			NEEDNT		ALIGNALITO	04:27:41 PM M		
	eq 14.75		PNO: Fast	Trig: Fre	e Run	Avg	Type: Log-Pwr	TRACE		Frequency
10 dB/div	Ref Offset Ref 30.0	10.4 dB 0 dBm					Mkr	1 24.714 -26.91		Auto Tune
20.0 10.0										Center Free 14.750000000 GH
10.0 20.0 30.0							والأمريقي والمرين	Second Accession		Start Free 3.000000000 GH
40.0 50.0 60.0	~~~~~~	~~~~	^س ر، «دیرود _م ارسی	adore the restor of the party		*********				Stop Fre 26.500000000 GH
Res BW	100 kHz	×		BW 300 KHz	FUE	NCTION	Sweep FUNCTION WIDTH	Stop 26. 2.246 s (10	01 pts)	CF Ste 2.350000000 GH Auto Ma
1 N 1 23 4 5 6 7 8 9 10 11		24.7	14 0 GHz	-26.91 d	Bm					Freq Offse 0 H
13							STATUS	1		

802.11b: Spurious Emission Test Data CH-Mid

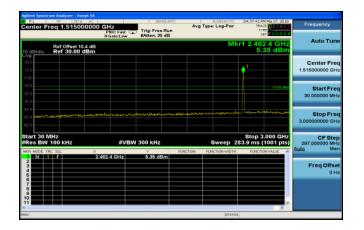


enter Fr	eq 14.7500		Trig: Free F	Av	alignauto g Type: Log-Pwr	D4:31:38 PM Mar 27, 201 TRACE 1 2 3 4 TYPE 1 2 3 4 TYPE 1 2 3 4 OFT P N N N N	Frequency
0 dB/div	Ref Offset 10. Ref 30.00 d	4 dB	V BIALON OF		Mkr	1 26.406 0 GH: -27.32 dBn	Auto Tun
20.0 10.0							Center Fre 14.750000000 GH
10.0 20.0 30.0						-13 45 650 -13 450 -13 450 -10 -10 -10 -10 -10 -10 -10 -10 -10 -1	Start Fre 3.000000000 GH
40.0 50.0 50.0	به موجعه ماند ماندادهر	ىرەسىلەيتەر بال ورار _{لىرىدۇ} لەت	and the second second	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Spile Apple of Performance of Performan Performance of Performance		Stop Fre 26.500000000 GH
Res BW	100 kHz	×	'BW 300 kHz	FUNCTION	Sweep FUNCTION WIDTH	Stop 26.50 GH 2.246 s (1001 pts FUNCTION VALUE	CF Ste 2.350000000 GH Auto Ma
1 N 1 2 3 4 5 6 7 8 9		26.406 0 GHz	-27.32 dBn				Freq Offse 0 H

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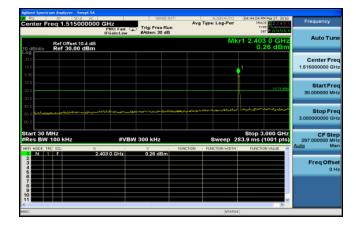


802.11b: Spurious Emission Test Data CH-High



enter Freq 14	50 0 AC 750000000 GH PN0	Fast 😱 Trig: Free Run	Avg Type: Log-Pwr	04:37:55 PM Mar 27, 2018 TRACE 1 2 3 4 5 6 TYPE 2 10 10 10	Frequency
dB/div Ref 3	IFGal fset 10.4 dB 0.00 dBm	a:Low BAtten: 30 db	Mkr	1 26.406 0 GHz -25.15 dBm	Auto Tun
					Center Fre 14.750000000 GH
0.0			ungel and a start of the start	-1485 cm 1 1	Start Fre 3.000000000 GH
	and the second second	مليني - مطا ^{رم} مواداي والارم العيد الرياب	and the second		Stop Fre 26.50000000 GF
tart 3.00 GHz Res BW 100 kH	×	#VBW 300 kHz	Sweep	Stop 26.50 GHz 2.246 s (1001 pts)	CF Ste 2.350000000 GH Auto Ma
1 N 1 f 2 3 4 4 5 6 6 7 7 8 8 9 0	26.406 0 0	Hz -25.15 dBm			Freq Offs 01

802.11g: Spurious Emission Test Data CH-Low

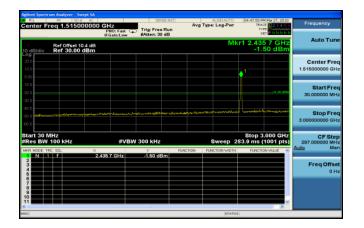


RL Center F	req 14.7500	00000 GH2	Fast 😱	SENSE Trig: Free R IAtten: 30 d	un		Lignauto	TRA TY	M Mar 27, 2018 CE 1 2 3 4 5 6 PE 7 000000000 ET P.N.N.N.N.N.	Frequency
0 dB/div	Ref Offset 10 Ref 30.00 d	.4 dB JBm					Mkr		2 5 GHz 97 dBm	Auto Tur
.og 20.0 10.0 0.00										Center Fre 14.750000000 GF
10.0 20.0 30.0									-10.74 c 1.	Start Fre 3.000000000 GF
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Start 3.00 Res BW	100 kHz		#VBW 3					2.246 \$	6.50 GHz 1001 pts)	CF Ste 2.35000000 GH Auto Mi
4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		× 26,302 5 G	Hz	¥ 26.97 dBm	FUNCT		ICTION WIDTH	FUNCTI	ON VALLE .	Freq Offs

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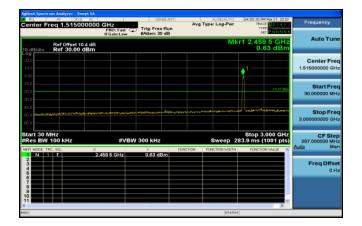


802.11g: Spurious Emission Test Data CH-Mid



ilent Spectrum Analyzer - Swept SA				
enter Freq 14.75000000	PNO: East C Trig: Free Run	Aug Type: Log-Pwr	04:48:07 PM Mar 27, 2018 TRACE 2 2 4 5 6 TYPE M Mar 27, 2018	Frequency
Ref Offset 10.4 dB 0 dB/div Ref 30.00 dBm	IFGain:Low #Atten: 30 dB	Mkr	1 26.382 5 GHz -26.65 dBm	Auto Tun
00 000				Center Fre 14.750000000 GF
0.0		لېنې مې تېرند سرې چې تېرند ا	-21 ale 1	Start Fre 3.000000000 GF
0.0 0 0 0 0 0	يېومىرە ^م كار ^{يەرم} امەلىرىمە مەمىرىمە مەمەرىيە مەمەر	And the part of the second		Stop Fre 26.500000000 GP
tart 3.00 GHz Res BW 100 kHz	#VBW 300 kHz	Sweep	Stop 26.50 GHz 2.246 s (1001 pts)	CF Ste 2.350000000 GI Auto M
1 N 1 F 26.3 2 3 4 6	82 5 GHz -26.65 dBm	PORCHON	PORCHER WEDE	Freq Offs 01
6 7 9 0				
			2	

802.11g: Spurious Emission Test Data CH-High

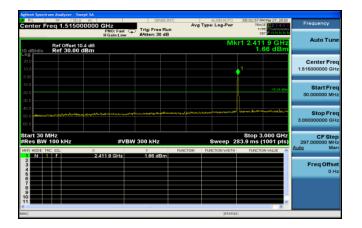


Center F	req 14.7500	000000 GI	12 0: Fast G sin:Low	Trig: Free #Atten: 30	Run	Avg Typ	e: Log-Pwr	TRA	M Mar 27, 2018 CE 1 2 3 4 5 6 TE P N N N N N	Frequency
10 dB/div	Ref Offset 10 Ref 30.00).4 dB dBm					Mkr	1 26.28 -25.	8 5 GHz 11 dBm	Auto Tun
20.0 10.0										Center Fre 14.750000000 GH
-10.0								au - Ner	-19 37 c	Start Fre 3.000000000 GH
40.0 50.0 60.0	an a	وارم راغی اردوانی ^ا	ما ^{ين} ھارياد	a Sharan a sharan a	gan and a star freedom and a star	and a second products				Stop Fre 26.50000000 GF
Start 3.00 Res BW	100 kHz	×	#VB\	W 300 kHz	FUN	DOM D	Sweep	2.246 \$	26.50 GHz (1001 pts)	CF Ste 2.35000000 GH Auto Mi
		26.208.5	GHz	-25.11 dB			NCTON WOTH	FORCI		Freq Offs 0 F
10										

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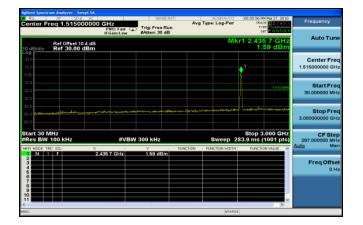


802.11n_HT20: Spurious Emission Test Data CH-Low



RL	um Analyzer - Swi RF 50 g	AC		SEN	SEIINT		ALIGN AUTO		Mar 27, 2018	Frequency
enter Fi	req 14.7500	P	NO: Fast G	Trig: Free #Atten: 30		Avg 1	ype: Log-Pwr		C Di Danayanaya	
0 dB/div	Ref Offset 10 Ref 30.00 (Mkr	1 26.335 -26.0	5 GHz 03 dBm	Auto Tun
og 80.0 10.0										Center Fre 14.750000000 GH
10.0 20.0 20.0							n dage sharenned		-18 54 c 1	Start Fre 3.000000000 GF
10.0 50.0 50.0	and the second designed to the second designe	n an	مىيىلى _{تەرك} ىم	**************************************	y all have been a second	alla regeler				Stop Fre 26.500000000 GF
tart 3.00 Res BW	GHz 100 kHz		#VBW	/ 300 kHz			Sweep	Stop 2 2.246 s (*	6.50 GHz 1001 pts)	CF Ste 2.35000000 GF Auto Mi
KFI MODE TF		× 26.335	5 GHz	-26.03 dB		CTION	FUNCTION WIDTH	FUNCTIO	N VALUE	Auto Ma
2346										Freq Offs 01
6 7 8 9										
1									×	

802.11n_HT20: Spurious Emission Test Data CH-Mid



RL Center Fi	req 14.750	p	HZ NO: Fast C Sain:Low			Avg Ty	ALIGNAUTO			Frequency
0 dB/div	Ref Offset 10 Ref 30.00						Mkr	1 26.19 -26.9	45 GHz 96 dBm	Auto Tun
20.0 10.0 0.00										Center Fre 14.750000000 GH
10.0 20.0 30.0								فللمعالية روحا والمع	-10.42 c -	Start Fre 3.000000000 GH
40.0 50.0 60.0	en service a ser	-Maryanakaka	ور مید الم	المعليه المحيون المري المري	يوالتوحيق أمني	an a				Stop Fre 26.50000000 GF
start 3.00 Res BW	100 kHz		#VB	W 300 kHz				2.246 \$ (_	CF Ste 2.35000000 GH Auto Ma
4 4 5 6 6 7 7 8 9 9 10		× 26.194	5 GHz	Υ -26.96 dB	PUNC		FUNCTION WIDTH	FUNCTION	IN VALUE	Freq Offs 01

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802.11n_HT20: Spurious Emission Test Data CH-High

enter Fr	eq 1.515000		Trig: Free Ru #Atten: 30 dB	Avg 1	ALIONAUTO Fype: Log-Pwr	05:12:30 PM Mar 27, 2018 TRACE 1 2 3 4 5 TYPE 2 000000 DET P N N N N	Frequency
0 dB/div	Ref Offset 10.4 Ref 30.00 de	dB Bm			Mk	r1 2.462 4 GH: -1.17 dBm	Auto Tune
0 9 20.0 10.0 0.00						• ¹	Center Freq 1.515000000 GHz
0.0							Start Free 30.000000 MHz
10.0 50.0 Handled 50.0	والمروا والمرجو مردوا وروان	esteritation test	a farman and a start	ymfiliaithinnei	an penglaman ang pengahan ang penghan a	heimenter	Stop Freq 3.000000000 GHz
tart 30 M Res BW	100 kHz	#VI	3W 300 kHz	FUNCTION	Sweep 2	Stop 3.000 GHz 83.9 ms (1001 pts	CF Step 297.000000 MHz Auto Mar
		2.462 4 GHz	-1.17 dBm	PURCTUR	PORCHOR WIDTH	FORCE TON VALUE	Freq Offset 0 Hz
7 8 9 0							
6					STATUS		

enter Fi	req 14.7500	PN	12 0: Fast 😱		Run Run	Avg Typ	Log-Pwr	05:12:41 PF TRAC TVI D	T NUMBER	Freque	ncy
0 dB/div	Ref Offset 10 Ref 30.00 c	.4 dB	am.cow	staten: ov			Mkr		60 GHz 85 dBm	Aut	o Tun
20.0 10.0										Cent 14.750000	
0.0							w.M.M.Markagerak	مع الروران	-21.17.0 V.	Sta 3.000000	nt Fre
0.0 0.0 0.0	and a start and a start and a start a s	and a second	Notine provide	an a	in the second	a a a a a a a a a a a a a a a a a a a				Sto 26.500000	p Fre
tart 3.00 Res BW	100 kHz	×	#VBW	300 kHz	FUNC	TION FL	Sweep	2.246 s (6.50 GHz 1001 pts)	2.350000 Auto	F Ste 200 GF Ma
1 N 1 23 4 5 6 7 8 9		26,406 0	GHZ	-26.85 dB	m					Freq	Offs 0 F

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11 RADIATED BANDEDGE AND SPURIOUS EMISSION MEASUREMENT

11.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands must also comply with the §15.209 limit as below.

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

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

Note:

- 1. The lower limit shall apply at the transition frequencies.
- Emission level (dBµV/m) = 20 log Emission level (dBµV/m)

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11.2 Measurement Equipment Used:

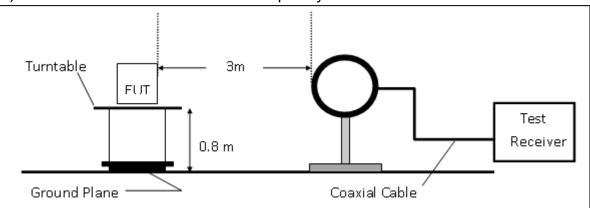
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Bi-log Antenna	SCHWAZBECK	VULB9168	378	2017/12/29	2018/12/28
Horn Antenna	Schwarzbeck	BBHA9120D	1441	2017/08/04	2018/08/03
Horn Antenna	Schwarzbeck	BBHA9170	184	2017/12/12	2018/12/11
Loop Antenna	ETS.LINDGREN	6502	148045	2017/09/26	2018/09/25
Spectrum Analyzer	Agilent	E4446A	MY51100003	2017/05/10	2018/05/09
EMI Test Receiver	R&S	ESCI7	100760	2017/06/06	2018/06/05
Pre-Amplifier	HP	8449B	3008A00578	2018/01/02	2019/01/01
Pre-Amplifier	HP	8447D	2944A07676	2018/01/02	2019/01/01
Pre-Amplifier	EMC Instru- ments Corp.	EMC0126530	980038	2018/01/02	2019/01/01
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M1	2018/01/02	2019/01/01
Low Loss Cable	Huber Suhner	966_RX	9	2018/01/02	2019/01/01
Notebook	Lenovo	T440	P0000564	N/A	N/A

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

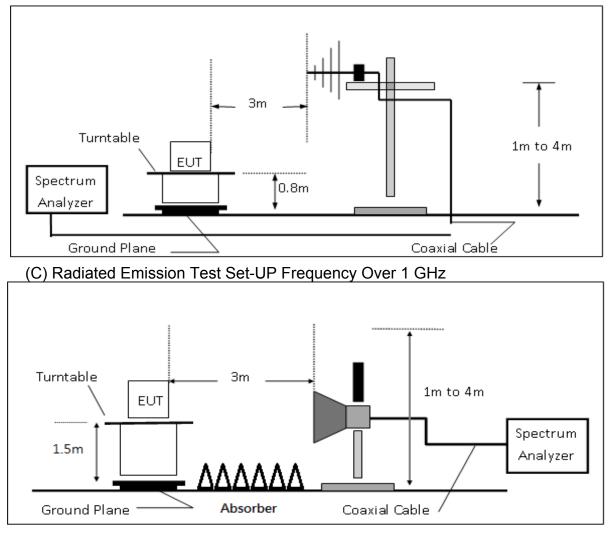


11.3 Test SET-UP





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



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11.4 Measurement Procedure

- 1. The testing follows the Measurement Procedure of FCC KDB 558074 D01 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.
- 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.
- 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	0	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

Actual FS(dBµV/m) = SPA. Reading level(dBµV) + 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.

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.

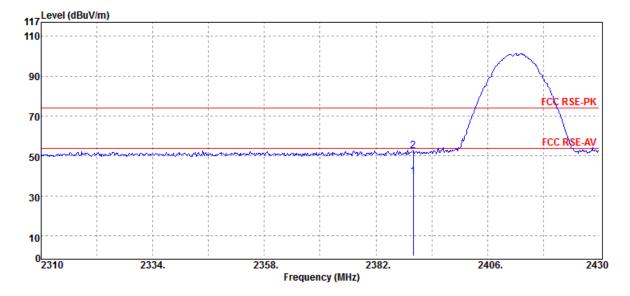
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only

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Radiated Band Edge Measurement Result (802.11b)

Operation Band	:802.11b	Test Date	:2018-03-30
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Tin
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Е	Average	39.29	0.20	39.49	54.00	-14.51
2390.00	Е	Peak	52.50	0.20	52.70	74.00	-21.30

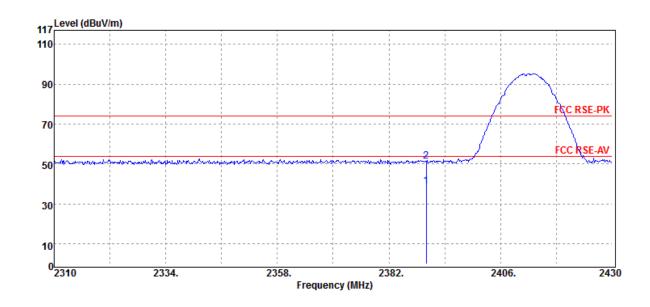
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Report No.:ER/2018/30060 Page 43 of 79



Operation Band :802.11b Fundamental Frequency :2412 MHz **Operation Mode** :Bandedge CH LOW EUT Pol. :H Plane

Test Date :2018-03-30 Temp./Humi. :21 deg_C / 62 RH Engineer :Tin :HORIZONTAL Measurement Antenna Pol.



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Е	Average	38.56	0.20	38.76	54.00	-15.24
2390.00	E	Peak	51.12	0.20	51.32	74.00	-22.68

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.

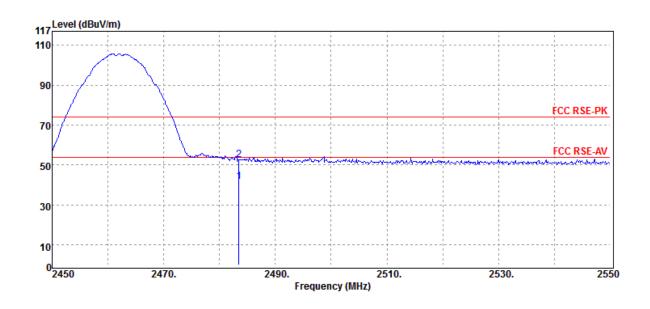
Report No.:ER/2018/30060 Page 44 of 79



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

:2462 MHz :Bandedge CH HIGH :H Plane

Test Date :2018-03-30 Temp./Humi. :21 deg_C / 62 RH Engineer :Tin :VERTICAL Measurement Antenna Pol.



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	41.20	0.53	41.73	54.00	-12.27
2483.50	Е	Peak	52.14	0.53	52.67	74.00	-21.33

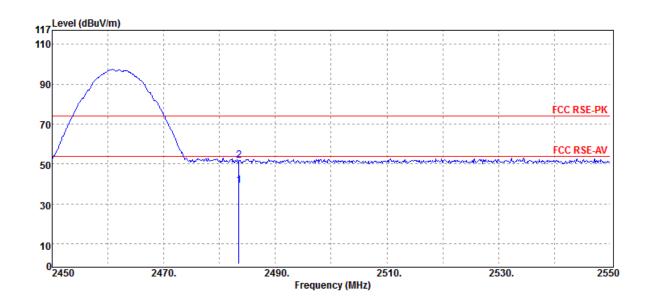
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Report No.:ER/2018/30060 Page 45 of 79



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

:2462 MHz :Bandedge CH HIGH Test Date :2018-03-30 Temp./Humi. :21 deg_C / 62 RH Engineer :Tin :HORIZONTAL Measurement Antenna Pol.



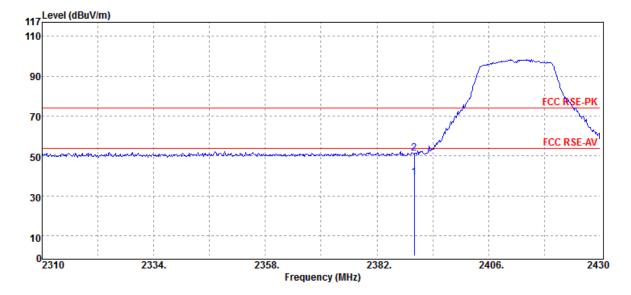
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	38.66	0.53	39.19	54.00	-14.81
2483.50	Е	Peak	51.23	0.53	51.76	74.00	-22.24

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.



Radiated Band Edge Measurement Result (802.11g)

Operation Band	:802.11g	Test Date	:2018-03-30
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Tin
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Е	Average	39.19	0.20	39.39	54.00	-14.61
2390.00	Е	Peak	51.19	0.20	51.39	74.00	-22.61

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.

Report No.:ER/2018/30060 Page 47 of 79

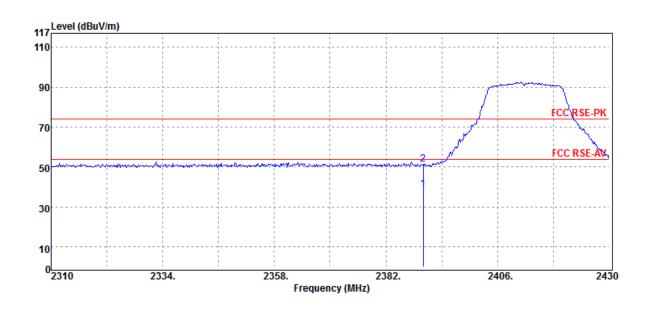


Operation Band Fundamental Frequency **Operation Mode** EUT Pol.

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

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

:2018-03-30 :21 deg_C / 62 RH :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Е	Average	38.59	0.20	38.79	54.00	-15.21
2390.00	Е	Peak	51.07	0.20	51.27	74.00	-22.73

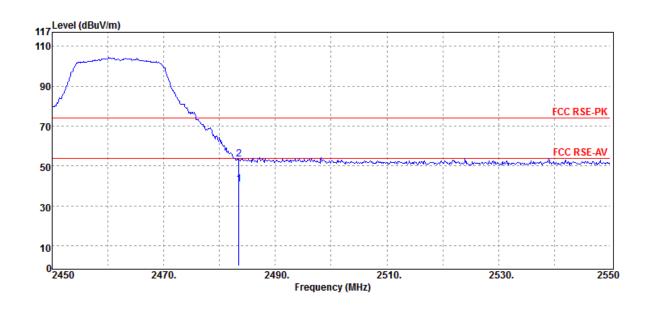
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Report No.:ER/2018/30060 Page 48 of 79



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

:2462 MHz :Bandedge CH HIGH Test Date :2018-03-30 Temp./Humi. :21 deg_C / 62 RH Engineer :Tin :VERTICAL Measurement Antenna Pol.



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	40.31	0.53	40.84	54.00	-13.16
2483.50	Е	Peak	52.84	0.53	53.37	74.00	-20.63

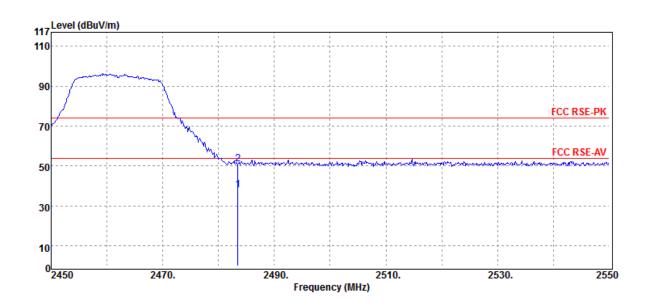
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Report No.:ER/2018/30060 Page 49 of 79



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

Test Date :2018-03-30 Temp./Humi. :21 deg_C / 62 RH Engineer :Tin :HORIZONTAL Measurement Antenna Pol.



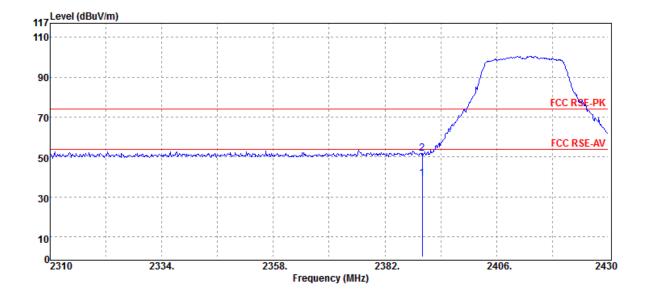
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	37.70	0.53	38.23	54.00	-15.77
2483.50	Е	Peak	50.33	0.53	50.86	74.00	-23.14

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.



Radiated Band Edge Measurement Result (802.11_HT20)

Operation Band	:802.11n20	Test Date	:2018-03-30
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Bandedge CH LOW	Engineer	:Tin
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Е	Average	38.99	0.20	39.19	54.00	-14.81
2390.00	Е	Peak	51.44	0.20	51.64	74.00	-22.36

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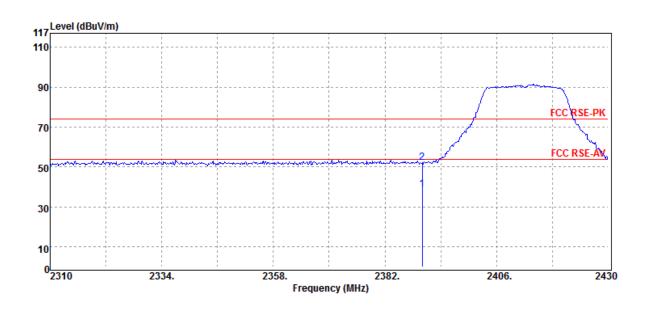
Report No.:ER/2018/30060 Page 51 of 79



Operation Band :802.11n20 Fundamental Frequency :2412 MHz **Operation Mode** :Bandedge CH LOW EUT Pol. :H Plane

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

:2018-03-30 :21 deg_C / 62 RH :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2390.00	Е	Average	38.60	0.20	38.80	54.00	-15.20
2390.00	Е	Peak	52.00	0.20	52.20	74.00	-21.80

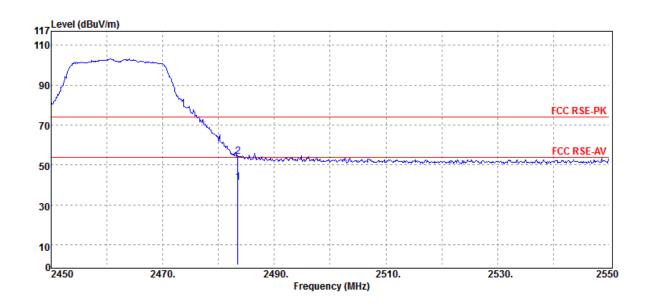
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Report No.:ER/2018/30060 Page 52 of 79



Operation Band :802.11n20 Fundamental Frequency :2462 MHz **Operation Mode** :Bandedge CH HIGH EUT Pol. :H Plane

Test Date :2018-03-30 Temp./Humi. :21 deg_C / 62 RH Engineer :Tin :VERTICAL Measurement Antenna Pol.



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	40.64	0.53	41.17	54.00	-12.83
2483.50	Е	Peak	53.86	0.53	54.39	74.00	-19.61

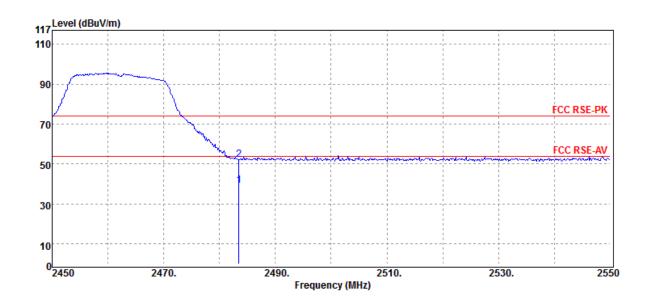
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Report No.:ER/2018/30060 Page 53 of 79



Operation Band :802.11n20 Fundamental Frequency :2462 MHz **Operation Mode** :Bandedge CH HIGH EUT Pol. :H Plane

Test Date :2018-03-30 Temp./Humi. :21 deg_C / 62 RH Engineer :Tin :HORIZONTAL Measurement Antenna Pol.



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
2483.50	Е	Average	38.82	0.53	39.35	54.00	-14.65
2483.50	Е	Peak	51.67	0.53	52.20	74.00	-21.80

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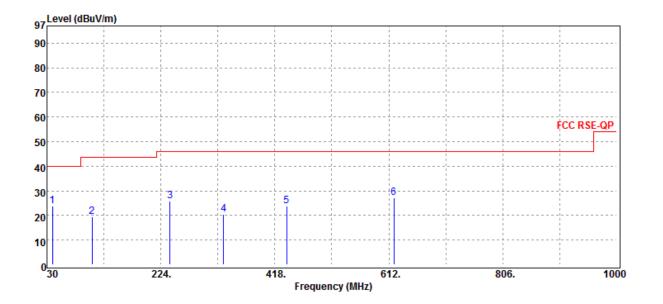
Below 1GHz Worst-Case Data:

Radiated Spurious Emission Measurement Result (802.11 g)

Operation Band
Fundamental Frequency
Operation Mode
EUT Pol.

:802.11g :2437 MHz :Tx CH MID :H Plane

Test Date Temp./Humi. Engineer Measurement Antenna Pol. :2018-04-02 :21 deg_C / 62 RH :Tin :VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
39.70	S	Peak	32.12	-8.28	23.84	40.00	-16.16
106.63	S	Peak	31.05	-11.43	19.62	43.50	-23.88
239.52	S	Peak	33.64	-7.83	25.81	46.00	-20.19
330.70	S	Peak	25.37	-4.91	20.46	46.00	-25.54
438.37	S	Peak	26.76	-2.91	23.85	46.00	-22.15
620.73	S	Peak	26.76	0.39	27.15	46.00	-18.85

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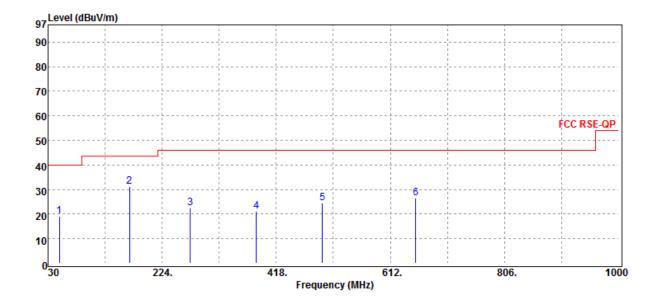
S Taiwan Ltd. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134號



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

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

:2018-04-02 :21 deg_C / 62 RH :HORIZONTAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
49.40	S	Peak	26.65	-7.48	19.17	40.00	-20.83
168.71	S	Peak	38.43	-7.31	31.12	43.50	-12.38
271.53	S	Peak	29.13	-6.58	22.55	46.00	-23.45
384.05	S	Peak	24.78	-3.79	20.99	46.00	-25.01
496.57	S	Peak	27.28	-2.74	24.54	46.00	-21.46
654.68	S	Peak	27.01	-0.43	26.58	46.00	-19.42

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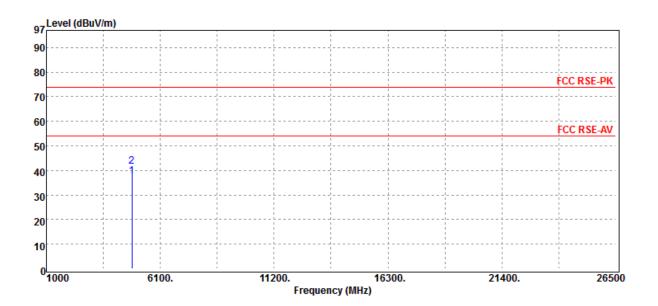
No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號 S Taiwan Ltd.



Above 1GHz Data:

Radiated Spurious Emission Measurement Result (802.11 b)

Operation Band	:802.11b	Test Date	:2018-04-02
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
		•	
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL
		Measurement Antenna Pol.	



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe	
		Mode	Reading Level		FS	@3m	Margin	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	_
4824.00	Н	Average	30.33	7.35	37.68	54.00	-16.32	
4824.00	Н	Peak	34.31	7.35	41.66	74.00	-32.34	

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 Bar Fundamental Operation Mo EUT Pol.	Frequency	:802.11b :2412 MHz :Tx CH LOV :H Plane	V	Test Date Temp./Humi. Engineer Measurement Antenna Pol.		:Tin	4-02 _C / 62 RH ONTAL
97	uV/m)				,	· · · · · · · · · · · · · · · · · · ·	
90			· · · · · · · · · · · · · · · · · · ·				
80						FCC RSE-PK	
70			·				
60						FCC RSE-AV	
50	2						
40							
30			·	1 1 1 1			
20			· · · · · · · · · · · · · · · · · · ·				
10		 				1	
0 <mark></mark> 1000	610	0.	11200. Frequency (MH	16300.	21400.	2650	D
			riequency (mn	L)			
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Average	31.02	7.35	38.37	54.00	-15.63
4824.00	Н	Peak	34.18	7.35	41.53	74.00	-32.47



Operation Ba Fundamental Operation Mc EUT Pol.	Frequency	:802.11b :2437 MHz :Tx CH MID :H Plane		Test Date Temp./Humi. Engineer Measurement Antenna Pol.			04-02 g_C / 62 RH ICAL
97 Level (dE	BuV/m)						1
90							
80						FCC RSE-PK	
70			· · · · · · · · · · · · · · · · · · ·	 			
60						FCC RSE-AV	
50	· · · · · · · · · · · · · · · · · · ·						
40	2						
30				·			
20				 	·		
10				 			
0 <mark></mark> 1000	0 <mark>0</mark> 1000 6100. 11200			16300. z)	21400.	2650	0
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Average	27.68	7.62	35.30	54.00	-18.70
4874.00	Н	Peak	34.01	7.62	41.63	74.00	-32.37



Operation Ba Fundamental Operation Mc EUT Pol.	Frequency	:802.11b :2437 MHz :Tx CH MID :H Plane)	Test Date Temp./Humi. Engineer Measurement Antenna Pol.			4-02 _C / 62 RH ONTAL
97 Level (dE	BuV/m)						
90							
80						FCC RSE-PK	
70							
60			· · · · · · · · · · · · · · · · · · ·			FCC RSE-AV	
50			· · · · · · · · · · · · · · · · · · ·				
40	2		· · · · · · · · · · · · · · · · · · ·			1 	
30						 	
20							
10						 	
0 <mark>0</mark> 0	610	0.	11200.	16300.	21400.	2650	n
1000			Frequency (MH		21100	2000	-
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Average	27.88	7.62	35.50	54.00	-18.50
4874.00	Н	Peak	34.29	7.62	41.91	74.00	-32.09



Operation Ba Fundamental Operation Mc EUT Pol.	Frequency	:802.11b :2462 MHz :Tx CH HIG :H Plane	Η	Test Date Temp./Humi. Engineer Measurement Antenna Pol.		:21 deg :Tin	:2018-04-02 :21 deg_C / 62 RH :Tin :VERTICAL	
97 <mark>Level (dE</mark>	3uV/m)						_	
90 90								
80						FCC RSE-PK		
70	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		CC NJE-PN		
60	· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·		FCC RSE-AV		
50	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·					
40	2	 	· · · · · · · · · · · · · · · · · · ·					
30		 	· · · · · · · · · · · · · · · · · · ·	 				
20		 		 				
10								
0 <mark></mark>	610	0.	11200. Frequency (MH	16300. 7)	21400.	2650	0	
			i requency (iii)	_,				
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe	
		Mode	Reading Level		FS	@3m	Margin	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
4924.00	Н	Average	24.62	7.59	32.21	54.00	-21.79	
4924.00	Н	Peak	31.75	7.59	39.34	74.00	-34.66	



Operation Band Fundamental Frequency Operation Mode		:802.11b :2462 MHz :Tx CH HIGH		Test Date Temp./Hu Engineer	umi.	:21 deg :Tin	:2018-04-02 :21 deg_C / 62 RH :Tin :HORIZONTAL	
EUT Pol.		:H Plane		Measure	ment Antenna F	Pol. HURI	ZONTAL	
97 Level (dl	BuV/m)	i					1	
90								
80		· · · · · · · · · · · · · · · · · · ·				FCC RSE-PK		
70								
60						FCC RSE-AV		
50								
40	2							
30								
20								
10								
0 1000	610	0	11200.	16300.	21400.	2650		
1000	010	υ.		200. 16300. 21400. Frequency (MHz)			0	
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe	
		Mode	Reading Level		FS	@3m	Margin	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
4924.00	Н	Average	26.75	7.59	34.34	54.00	-19.66	
4924.00	Н	Peak	32.72	7.59	40.31	74.00	-33.69	



MHz

4824.00

4824.00

F/H/E/S

Н

Н

Radiated Spurious Emission Measurement Result (802.11 g)

Operation Band Fundamental Frequency Operation Mode EUT Pol.	:802.11g :2412 MHz :Tx CH LOW :H Plane	Test Date Temp./Humi. Engineer Measurement Antenna F	:2018-04-02 :21 deg_C / 62 RH :Tin Pol. :VERTICAL
97 Level (dBuV/m)			
90			
80			FCC RSE-PK
70			
60			FCC RSE-AV
50			
40 2			
30			
20			
10			
0 <mark></mark>). 11200. Frequency (16300. 21400. (MHz)	26500
Freq. Note	Detector Spectrum Mode Reading Leve	Factor Actual	Limit Safe @3m Margin

dBµV

23.57

33.11

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

PK/QP/AV

Average

Peak

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dB

7.35

7.35

dBµV/m

30.92

40.46

dBµV/m

54.00

74.00

dB

-23.08

-33.54



Operation Bai Fundamental Operation Mo EUT Pol.	Frequency	:802.11g :2412 MHz :Tx CH LOV :H Plane	V	Test Date Temp./Humi. Engineer Measurement Antenna Pol.		:Tin	_C / 62 RH
97 Level (dB	uV/m)						
90							
80						FCC RSE-PK	
70			·				
60						FCC RSE-AV	
50			·				
40	2						
30							
20							
10							
0 <mark></mark> 1000	610	0.	11200. Frequency (MH	16300. z)	21400.	26500)
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Average	23.49	7.35	30.84	54.00	-23.16
4824.00	Н	Peak	33.12	7.35	40.47	74.00	-33.53



Operation Ba Fundamental Operation Mc EUT Pol.	Frequency	:802.11g :2437 MHz :Tx CH MID :H Plane)	Test Date Temp./Humi. Engineer Measurement Antenna Pol.			04-02 9_C / 62 RH CAL
97	BuV/m)						1
90						 	
80						FCC RSE-PK	
70			· · · · · · · · · · · · · · · · · · ·			(CC NGL-FR	
60						FCC RSE-AV	
50			· · · · · · · · · · · · · · · · · · ·				
40	2		· · · · · · · · · · · · · · · · · · ·			 	
30				 		 	
20				 	1 1 	 	
10				 	·	 	
0 <mark>0</mark> 0	610	0.	11200.	16300.	21400.	2650	0
			Frequency (MH				
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Average	21.58	7.62	29.20	54.00	-24.80
4874.00	Н	Peak	33.07	7.62	40.69	74.00	-33.31



Operation Bar Fundamental Operation Mo EUT Pol.	Frequency	:802.11g :2437 MHz :Tx CH MID :H Plane		Test Date Temp./Humi. Engineer Measurement Antenna Pol.			04-02 J_C / 62 RH CONTAL
97 Level (dE	BuV/m)						
90							
80				 		FCC RSE-PK	
70				 			
60				 		FCC RSE-AV	
50	· · · · · · · · · · · · · · · · · · ·			 			
40	2					¹	
30							
20				 		 	
10			· · · · · · · · · · · · · · · · · · ·	 		 	
0 <mark></mark> 1000	610	0.	11200. Frequency (MH	16300. z)	21400.	2650	0
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Average	22.55	7.62	30.17	54.00	-23.83
4874.00	Н	Peak	32.95	7.62	40.57	74.00	-33.43



Operation Ba Fundamental Operation Mo EUT Pol.	I Frequency	:802.11g :2462 MHz :Tx CH HIG :H Plane	iΗ	Test Date Temp./Humi. Engineer Measurement Antenna Pol		:21 deg :Tin	VEDTION	
97 Level (d	BuV/m)				; ;		1	
90								
80				·		FCC RSE-PK		
70								
60				·		FCC RSE-AV		
50								
40	2							
30						 		
20						 		
10						 		
0 <mark></mark> 1000	6100.		11200. 16300. Frequency (MHz)		21400.	2650	00	
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe	
		Mode	Reading Level		FS	@3m	Margin	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
100 (00			00 T 0		00.04	-		
4924.00	Н	Average	22.72	7.59	30.31	54.00	-23.69	
4924.00	Н	Peak	31.92	7.59	39.51	74.00	-34.49	



Operation Band Fundamental Frequency Operation Mode		:2462 MHz		Test Date Temp./Hu Engineer			:2018-04-02 :21 deg_C / 62 RH :Tin	
EUT Pol.		:H Plane		Measurer	ment Antenna P	ol. :HORIZ	ZONTAL	
97	BuV/m)						7	
90						·		
80				 	·	FCC RSE-PK		
70						CC NJL-FN		
60						FCC RSE-AV		
50						FCC K3E-AV		
40	2							
30						 		
20						 		
10								
0 ^L 1000	610	0.	11200. 16300. Frequency (MHz)		21400.	2650	50	
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe	
		Mode	Reading Level		FS	@3m	Margin	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
4924.00	Н	Average	22.47	7.59	30.06	54.00	-23.94	
4924.00	Н	Peak	32.58	7.59	40.17	74.00	-33.83	



Radiated Spurious Emission Measurement Result (802.11_HT20)

Operation Band Fundamental Frequency Operation Mode EUT Pol.	:802.11n20 :2412 MHz :Tx CH LOW :H Plane	Test Date Temp./Humi. Engineer Measurement Antenna Pol.	:2018-04-02 :21 deg_C / 62 RH :Tin :VERTICAL
97 			
90			
80			CC RSE-PK
70	· · · · · · · · · · · · · · · · · · ·		
60			FCC RSE-AV
50			
40			
30			
20			
10	· · · · · · · · · · · · · · · · · · ·		
0 <mark></mark> 1000 610)0. 11200. Frequency (N	16300. 21400. IHz)	26500
		-	

Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe	
		Mode	Reading Level		FS	@3m	Margin	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
4824.00	Н	Average	22.48	7.35	29.83	54.00	-24.17	
4824.00	Н	Peak	34.51	7.35	41.86	74.00	-32.14	



Operation Bar Fundamental Operation Mo EUT Pol.	Frequency	:802.11n20 :2412 MHz :Tx CH LOV :H Plane	V	Test Date Temp./Hu Engineer Measurer		:Tin	04-02 _C / 62 RH CONTAL
97	uV/m)						
90	·	· · · · · · · · · · · · · · · · · · ·					
80	·					FCC RSE-PK	
70				 			
60	· J	 				FCC RSE-AV	
50	· J	 		 			
40	2	 					
30		 		I I I I		 	
20							
10							
0 <mark></mark> 1000	610	0.	11200. Frequency (MH	16300. z)	21400.	2650	0
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Average	22.21	7.35	29.56	54.00	-24.44
4824.00	Н	Peak	34.09	7.35	41.44	74.00	-32.56



Operation Bar Fundamental Operation Mo EUT Pol.	Frequency	:802.11n20 :2437 MHz :Tx CH MID :H Plane		Test Date Temp./Hu Engineer Measurer		:Tin	_C / 62 RH
97	uV/m)						
90	·						
80	·		· · · · · · · · · · · · · · · · · · ·			FCC RSE-PK	
70	· J						
60	·		· · · · · · · · · · · · · · · · · · ·			FCC RSE-AV	
50							
40	2		· · · · · · · · · · · · · · · · · · ·				
30						 	
20						 	
10		 					
0 1000	610	0.	11200.	16300.	21400.	2650	0
			Frequency (MH	Z)			
_			a 1				.
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Average	22.47	7.62	30.09	54.00	-23.91
4874.00	Н	Peak	33.66	7.62	41.28	74.00	-32.72



Operation Bar Fundamental Operation Mo EUT Pol.	Frequency	:802.11n20 :2437 MHz :Tx CH MID :H Plane		Test Date Temp./Hu Engineer Measurer		:Tin	_C / 62 RH
97	BuV/m)						
90							
80			·			FCC RSE-PK	
70			 				
60			·			FCC RSE-AV	
50	· · · · · · · · · · · · · · · · · · ·						
40	2		·				
30			·				
20							
10							
0 <mark></mark>	610	0.	11200.	16300.	21400.	2650	0
			Frequency (MHz	L)			
			_				
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	Н	Average	22.47	7.62	30.09	54.00	-23.91
4874.00	Н	Peak	33.55	7.62	41.17	74.00	-32.83



Operation Ba Fundamental Operation Mc EUT Pol.	Frequency	:802.11n20 :2462 MHz :Tx CH HIG :H Plane	Η	Test Date Temp./Hu Engineer Measurer	ımi.	:Tin	J_C / 62 RH
97	BuV/m)						
90				 			
80		· · · · · · · · · · · · · · · · · · ·		 		FCC RSE-PK	
70	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·				
60			· · · · · · · · · · · · · · · · · · ·			FCC RSE-AV	
50	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	 			
40	2		· · · · · · · · · · · · · · · · · · ·	 		 	
30				·			
20				 		 	
10		 				 	
0	610	0.	11200.	16300.	21400.	2650	0
			Frequency (MH	Z)			
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Н	Average	23.20	7.59	30.79	54.00	-23.21
4924.00	Н	Peak	34.10	7.59	41.69	74.00	-32.31



Operation Ba Fundamental Operation Mo EUT Pol.	Frequency	:802.11n20 :2462 MHz :Tx CH HIG :H Plane	Н	Test Date Temp./Hu Engineer Measure	ımi.	:Tin	04-02 g_C / 62 RH ZONTAL
97	BuV/m)						_
90			·····				
80						FCC RSE-PK	
70			· · · · · · · · · · · · · · · · · · ·	 			
<u>60</u>			· · · · · · · · · · · · · · · · · · ·			FCC RSE-AV	
50			· · · · · · · · · · · · · · · · · · ·			 	
40	2						
30							
20				· · · · · · · · · · · · · · · · · · ·			
10			· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·			
0 <mark></mark> 1000	610	0.	11200. Frequency (MH	16300. z)	21400.	2650	_ 00
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4924.00	Н	Average	21.85	7.59	29.44	54.00	-24.56
4924.00	Н	Peak	33.22	7.59	40.81	74.00	-33.19



12 PEAK POWER SPECTRAL DENSITY

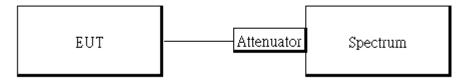
12.1 Standard Applicable

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

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY54200716	2017/10/16	2018/10/15
DC Power Supply	Anritsu	E3640A	MY52410006	2017/11/28	2018/11/27
Attenuator	Mini-Circuit	BW-S10W2+	2	2018/01/02	2019/01/01
Notebook	Lenovo	T440	P0000564	N/A	N/A

12.3 Test Set-up



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.



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 & VBW = 10 kHz.
- 5. For defining Restricted Band Edge Limit: Set the RBW = 100kHz & VBW = 300 kHz.
- 6. Detector = peak.
- 7. Sweep time = auto couple.
- 8. Trace mode = max hold.
- 9. Allow trace to fully stabilize.
- 10. Use the peak marker function to determine the maximum amplitude level.

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

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12.5 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	-7.87	10.40	0.03	-7.84	8.00	PASS			
2437	-7.26	10.40	0.03	-7.23	8.00	PASS			
2462	-6.31	10.40	0.03	-6.28	8.00	PASS			
	POW	ER DEN	SITY 802.	11g					
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result			
2412	-11.92	10.40	0.20	-11.72	8.00	PASS			
2437	-12.60	10.40	0.20	-12.40	8.00	PASS			
2462	-12.94	10.40	0.20	-12.74	8.00	PASS			
	POWER	DENSIT	Y 802.11r	ו HT20					
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result			
2412	-13.52	10.40	0.23	-13.29	8.00	PASS			
2437	-12.72	10.40	0.23	-12.49	8.00	PASS			
2462	-13.86	10.40	0.23	-13.63	8.00	PASS			

*Refer to next page for plots.



802.11b PSD(CH-Low)



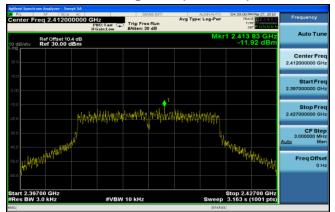
802.11b PSD (CH-Mid)



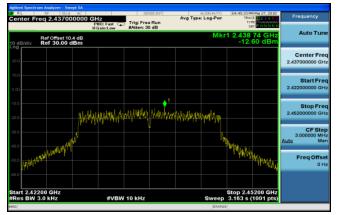
802.11b PSD (CH-High)



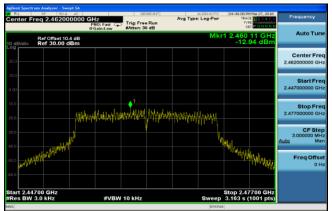
802.11g PSD(CH-Low)



802.11g PSD (CH-Mid)



P802.11g PSD (CH-High)



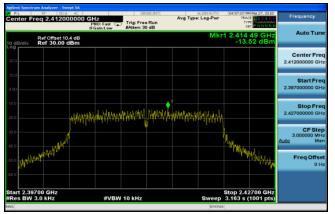
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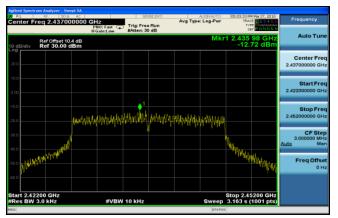
S Taiwan Ltd. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134號



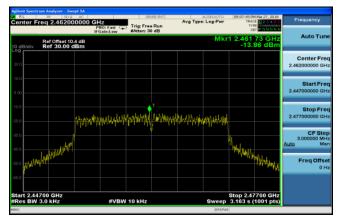
802.11n_HT20 PSD (CH-Low)



802.11n_HT20 PSD (CH-Mid)



802.11n_HT20 PSD (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.

In case of point-to-point operation, the power shall be reduced by the one dB for every 3 dB that the directional gain of antenna exceeds 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.

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

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