

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

	OF		
Product Name:	Mobile Phone		
Brand Name:	FUJITSU		
Model No.:	F-03K		
Model Difference:	N/A		
FCC ID:	VQK-F03K		
Report No.:	ER/2017/B0020		
Issue Date:	Dec. 08, 2017		
FCC Rule Part:	§15.247, Cat: DTS		
Prepared for:	Fujitsu Limited 1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki 211-8588, Japan		
Prepared by:	SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803		
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VERIFICATION OF COMPLIANCE

Applicant:	Fujitsu Limited
	1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki 211-8588,
	Japan
Product Name:	Mobile Phone
Brand Name:	FUJITSU
Model No.:	F-03K
Model Difference:	N/A
FCC ID:	VQK-F03K
Report Number:	ER/2017/B0020
Date of test:	Nov. 01, 2017 ~ Dec. 08, 2017
Date of EUT Received:	Nov. 01, 2017

We hereby certify that:

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

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

Test By:	Marcus	Tseng	Date	Dec. 08, 2017	
-	Marcus Tsen	g/ Engineer			
Prepared By:	Yun	Tson	Date	Dec. 08, 2017	
Approved By:	Yuri Tsa	Ch ang	Date	Dec. 08, 2017	_

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Revision History

Report Number	Revision	Description	Issue Date	
ER/2017/B0020	Rev.00	Initial creation of document	Dec. 08, 2017	

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GENERAL INFORMATION 1

Product description 1.1

General:

Product Name:	Mobile Ph	ione		
Brand Name:	FUJITSU			
Model No.:	F-03K			
Model Difference:	N/A			
Hardware Version:	V2.1.0			
Software Version:	V00R014Ne			
Cradle:	Model No	Model No.: F46, Supplier: FUJITSU LIMITED		
	AC/DC A	om Rechargeable Li-ion Battery or 5Vdc from dapter / Cradle Model No.: F35, Supplier: FUJITSU CON-		
Power Supply:	Battery:	NECTED TECHNOLOGIES LIMITED		
	Adapter:	Model No.: FMV-AC346, Supplier: FUJITSU LIMITED		

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WLAN 2.4GHz:

Wi-Fi	Frequency Range	Channels	Rated Power	Modulation Technology		
11b/g	2412-2462	11 b: 16.26dBm g: 20.98dBm		DSSS, OFDM		
11n	HT20 2412-2462	11	HT20: 21.04dBm	OFDM		
Anten	na Designation:	/4 Mono	pole Antenna, Gain: -5.5dBi			
Modul	Modulation type: CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM					
Transi	tion Rate:	802.11 g: ι	up to 11 Mbps; up to 54 Mbps 20MHz: up to 72.2Mbps			

1.2 Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is supporting below features.

Product Feature		
GSM Operating Band(s)	GSM 850/1900MHz	
GPRS Multi Slot Class	GPRS Class 11	
WCDMA Operating Band(s)	FDD Band V	
WCDMA Rel. Version	Rel.9	
Bluetooth Version	V4.2 dual mode	
Wi-Fi Specification	802.11 a/b/g/n/ac	
NFC Specification	NFC	

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

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Test Methodology of Applied Standards 1.3

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 DTS Meas. Guidance

ANSI C63.10:2013

Note:

- 1. All test items have been performed and record as per the above standards.
- 2. The composite system is compliance with FCC Subpart B is authorized under a DoC procedure.
- 3. The EUT was placed 1.5m height for frequency above 1GHz in accordance with ANSI C63, 10 :2013.

1.4 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

1.5 **Special Accessories**

There are no special accessories used while test was conducted.

1.6 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

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

2.3.2 Radiated Emissions

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

2.4 Measurement Results Explanation Example

For all conducted test items:

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

Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor. Following shows an offset computation example with cable loss 0.5dB and 10dB attenuator.

offset = RF cable loss (dB)+ attenuation factor(dB)=10.5(dB)



2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission Configuration



Fig. 2-2 Conducted Emission Configuration

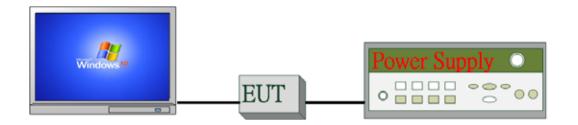
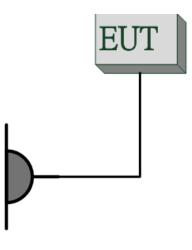


Fig. 2-3 Configuration of Conducted Tested System



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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	N/A	Shielded	Unshielded
3.	DC Power Supply	Agilent	E3640A	KR93300208	N/A	Unshielded

Table 2-1 Equipment Used in Tested System

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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

۰.						
	CHANNEL	FREQUENCY	CHANNEL	FREQUENCY		
F	1	2412 MHz	7	2442 MHz		
	2	2417 MHz	8	2447 MHz		
	3	2422 MHz	9	2452 MHz		
F	4	2427 MHz	10	2457 MHz		
	5	2432 MHz	11	2462 MHz		
	6	2437 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.

ADIATED 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		

RADIATED EMISSION TEST

Note:

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

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST									
MODE	AVAILABLE CHANNEL	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: +/- 2.87 dB
	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: +/- 2.87 dB
	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)							
		uv)						
MHz	Quasi-peak	Average						
0.15 to 0.50	66 to 56	56 to 46						
0.50 to 5	56	46						
5 to 30	60	50						
Note								
1.The lower limit shall apply at the transition frequencies								
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50								
MHz.								

6.2 Measurement Equipment Used

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

6.3 EUT Setup

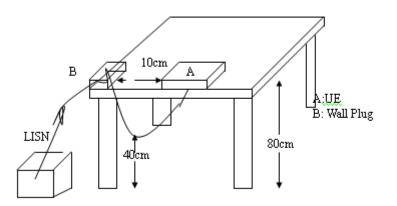
- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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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

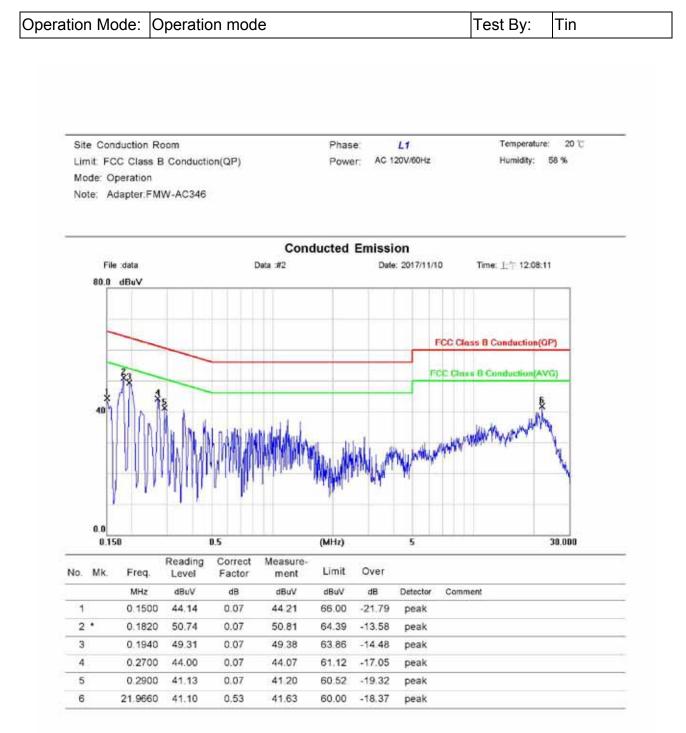
Note: Refer to next page for measurement data and plots. Note2: The * reveals the worst-case results that closet to the limit

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AC POWER LINE CONDUCTED EMISSION TEST DATA

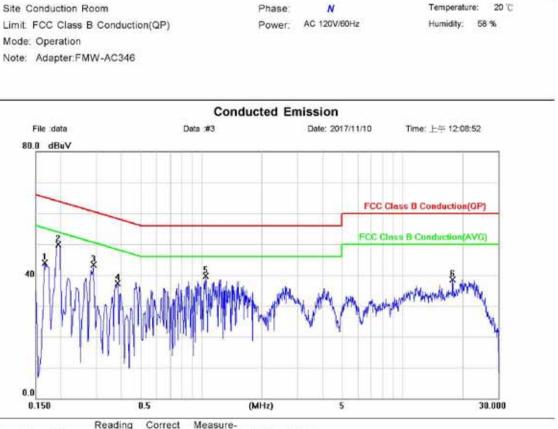


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No.	Mk.	Freq.	Level	Factor	ment	Limit	Over			
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment	
1		0.1660	43.84	0.07	43.91	65,16	-21.25	peak		
2	•	0.1940	49.93	0.07	50.00	63.86	-13.86	peak		
3		0.2900	43.22	0.07	43.29	60.52	-17.23	peak		
4		0.3820	37 29	0.08	37.37	58.24	-20.87	peak		
5		1.0540	39.61	0.09	39,70	56.00	-16.30	peak		
6	2	17.8380	38.00	0.47	38.47	60.00	-21.53	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	97.74	0.10
802.11g	87.41	0.58
802.11n_20	86.48	0.63

Duty Cycle Factor: $10 * \log(1/0.9774) = 0.1$ Duty Cycle Factor: 10 * log(1/0.8741) = 0.58 Duty Cycle Factor: $10 * \log(1/0.8648) = 0.63$

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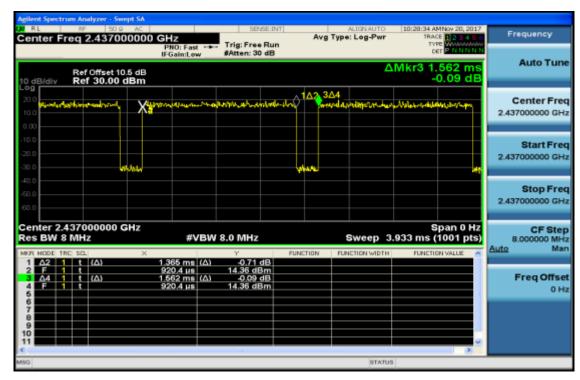
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7.1 DUTY CYCLE TEST SIGNAL Measurement Result 802.11 b



802.11 g



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802.11 n_20 MHz

Agilent Spectrum Analyzer - Swept SA				
Center Freg 2.437000000	GHz	ALIGNAUTO : Avg Type: Log-Pwr	10:50:22 AMNov 20, 2017 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB		DET PINNNN	
Ref Offset 10.5 dB	in Comment	ΔM	kr3 1.476 ms	Auto Tune
10 dB/div Ref 30.00 dBm			0.45 dB	
20.0			<u>1∆2</u> 3∆4	Center Freq
20.0 Marg 1 10.0 11 11 10 10 10 10 10 10 10 10 10 10 10	hende XII with a substantion of the	Unight the second s	er Colorwood	2.437000000 GHz
0.00				
-10.0				Start Fred
-20.0				2.437000000 GHz
-30.0	heaterfagee		- Marine	
-40.0				Stop Freq
-50.0				2.437000000 GHz
-60.0				
Center 2.437000000 GHz			Span 0 Hz	CF Step
Res BW 8 MHz	#VBW 8.0 MHz		3 ms (1001 pts)	8.000000 MHz Auto Man
MK/I MODE TRC SCL Χ	1.276 ms (Δ) 0.55 dB	TION FUNCTION WIDTH	FUNCTION VALUE	
2 F 1 t 3 Δ4 1 t (Δ)	1.025 ms 14.12 dBm 1.476 ms (Δ) 0.45 dB			Freq Offset
4 F 1 t	1.025 ms 14.12 dBm			0 Hz
6				
8				
10				
11			>	
MSG		STATUS		

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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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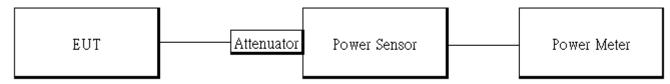


8.2 Measurement Equipment Used

Conducted Emission Test Site									
EQUIPMENT	MFR MODEL		SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017				
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017				
EXA Spectrum Ana- lyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018				
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018				
Coaxial Cable	HU- BER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018				
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018				
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018				
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2017	11/20/2018				

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	802.11b Main							
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit RESULT				
1	2412	1	16.05	1 Watt = 30.00 dBm			PASS	
6	2437	1	16.26	1 Watt =	30.00	dBm	PASS	
11	2462	1	16.00	1 Watt =	30.00	dBm	PASS	
802.1	1b Main							
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)		RESULT			
1	2412	1	13.40	1 Watt =	30.00	dBm	PASS	
6	2437	1	13.25	1 Watt =	30.00	dBm	PASS	
11	2462	1	13.20	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	20.98	1 Watt = 30.00 dBm			PASS
6	2437	6	20.86	1 Watt =	30.00	dBm	PASS
11	2462	6	20.89	1 Watt =	30.00	dBm	PASS
802.1	1g Main						
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)		RESULT		
1	2412	6	12.88	1 Watt =	30.00	dBm	PASS
6	2437	6	13.04	1 Watt =	30.00	dBm	PASS
11	2462	6	13.08	1 Watt =	30.00	dBm	PASS

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802.1	802.11n_HT20M Main						
СН	Freq. (MHz)	Data Rate	Peak Output Power (dBm)	Limit RESL		RESULT	
1	2412	MCS0	20.85	1 Watt =	30.00	dBm	PASS
6	2437	MCS0	21.01	1 Watt =	30.00	dBm	PASS
11	2462	MCS0	21.04	1 Watt =	30.00	dBm	PASS
802.1	802.11n_HT20M Main						
СН	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)			RESULT	
1	2412	MCS0	12.99	1 Watt =	30.00	dBm	PASS
6	2437	MCS0	13.18	1 Watt =	30.00	dBm	PASS
11	2462	MCS0	13.16	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

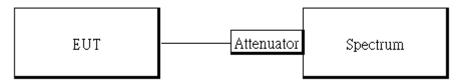
9.1 Standard Applicable

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

9.2 Measurement Equipment Used

Conducted Emission Test Site							
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018		
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018		
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018		
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018		

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.

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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9.5 **Measurement Result**

6dB Bandwidth

802.11b Main

Freq.	6dB BW	Limit	Docult	
(MHz)	(kHz)	(kHz)	Result	
2412	8100	> 500	PASS	
2437	8090	> 500	PASS	
2462	8570	> 500	PASS	

802.11g Main

Freq.	6dB BW	Limit	Pocult	
(MHz)	(kHz)	(kHz)	Result	
2412	16410	> 500	PASS	
2437	16400	> 500	PASS	
2462	16410	> 500	PASS	

802.11_n_HT20 Main

Freq.	6dB BW	Limit	Result	
(MHz)	(kHz)	(kHz)		
2412	17620	> 500	PASS	
2437	17610	> 500	PASS	
2462	17380	> 500	PASS	

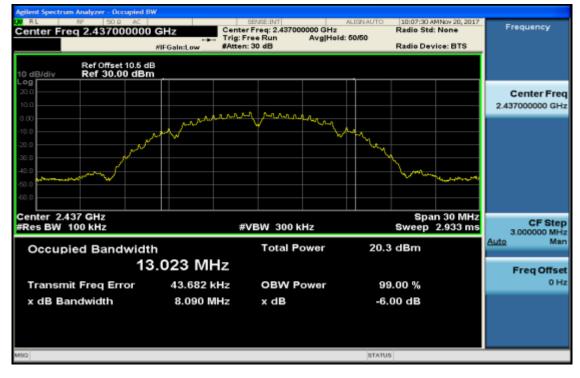
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802.11b 6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid



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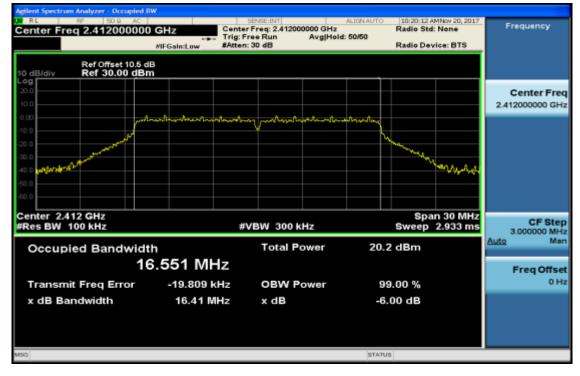
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6dB Band Width Test Data CH-High



802.11g 6dB Band Width Test Data CH-Low

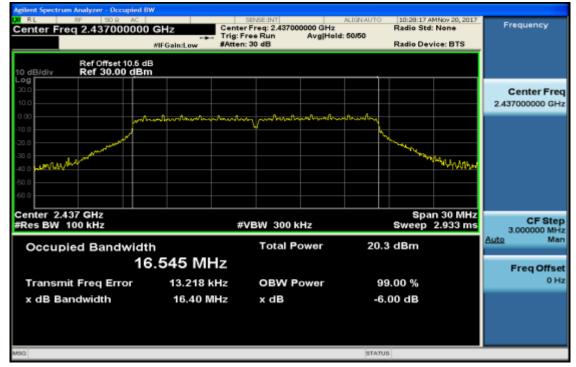


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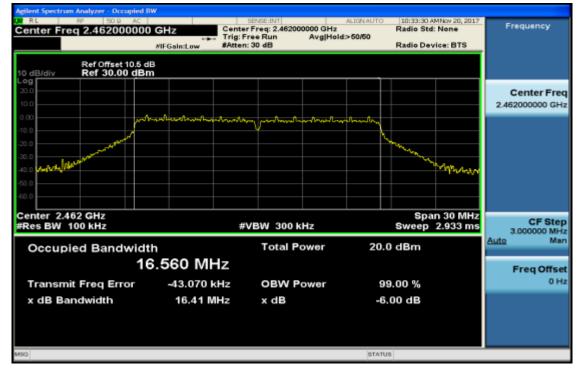
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6dB Band Width Test Data CH-Mid



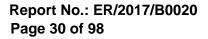
6dB Band Width Test Data CH-High



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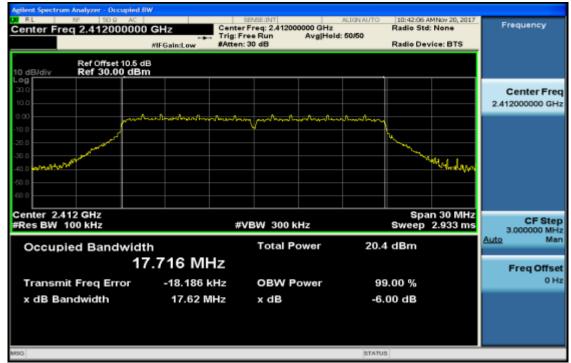
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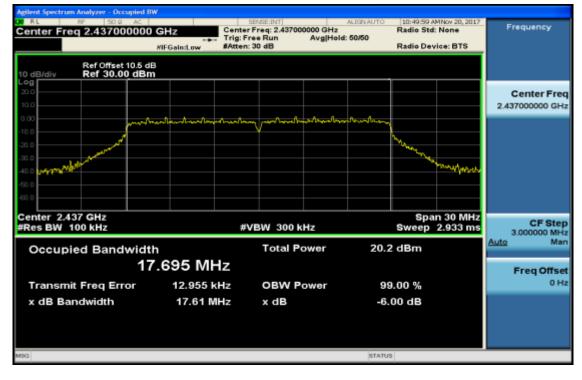




802.11n 20M 6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

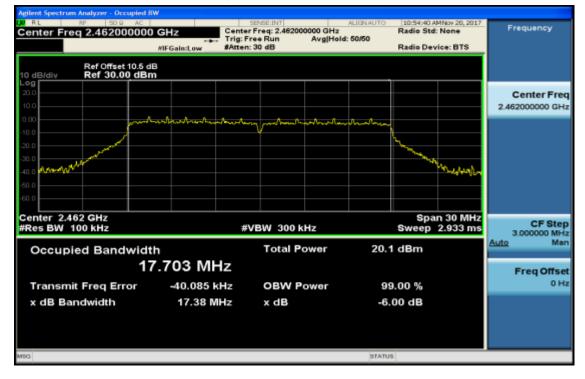


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6dB Band Width Test Data CH-High



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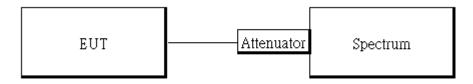
10 CONDUCTED BAND EDGES AND SPURIOUS EMISSION MEASUREMENT 10.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

10.2 Measurement Equipment Used

Conducted Emission Test Site							
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.		
TYPE		NUMBER	NUMBER	CAL.			
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018		
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018		
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018		
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018		

10.3 Test SET-UP



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10.3.1 Measurement Procedure

Conducted Band Edge:

- To connect Antenna Port of EUT to Spectrum.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 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.
- 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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10.4 Measurement Result

Bandedge Limit 802.11b MODE					
Freq.	PSD	Bandedge Limit			
(MHz)	(dBm)	(dBm)			
2412	4.91	-15.09			
2462	4.62	-15.38			

Bandedge Limit 802.11g MODE					
Freq. PSD		Bandedge Limit			
(MHz)	(dBm)	(dBm)			
2412	2.08	-17.92			
2462	2.03	-17.97			

Bandeo	Bandedge Limit 802.11n20 MODE					
Freq.		Bandedge Limit				
(MHz)	(dBm)	(dBm)				
2412	1.73	-18.27				
2462	2.02	-17.98				

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



Power Spectral Density for Bandedge Limit (CH-High)



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



Power Spectral Density for Bandedge Limit (CH-High)

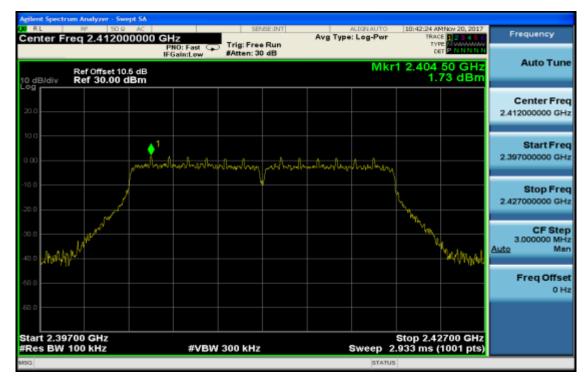


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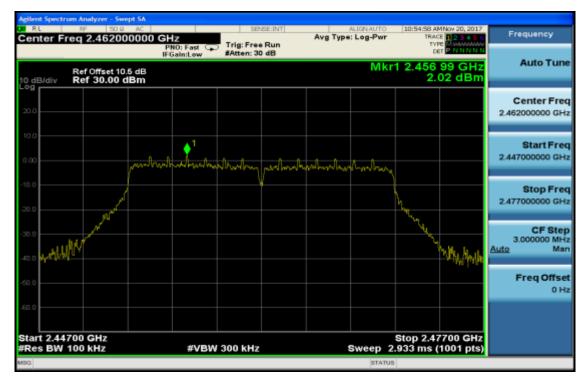
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802.11 n HT20 Power Spectral Density for Bandedge Limit (CH-Low)



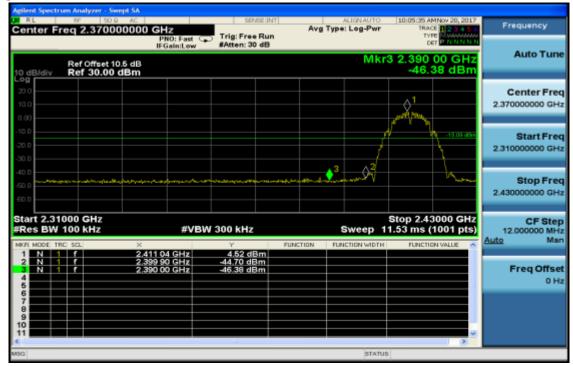
Power Spectral Density for Bandedge Limit (CH-High)



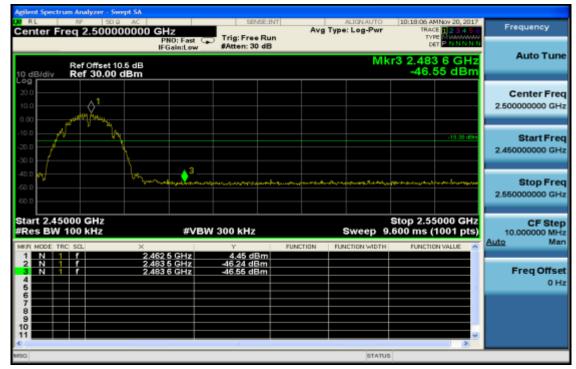
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802.11b **Band Edges Test Data CH-Low**



Band Edges Test Data CH-High

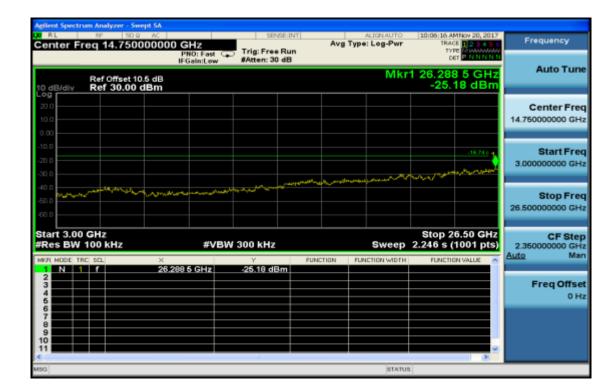


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802.11b **Spurious Emission Test Data CH-Low**

Agilent Spectrum Analyzer - Swept SA				
Center Freq 1.515000000 GHz	SENSE:INT	ALIGNAUTO Avg Type: Log-Pwr	10:05:57 AMNov 20, 2017 TRACE	Frequency
	Fast Frig: Free Run #Atten: 30 dB		DET PINNINN	Auto Tune
Ref Offset 10.5 dB 10 dB/div Ref 30.00 dBm		Mk	r1 2.409 0 GHz 3.26 dBm	Auto Tune
20.0 10.0 0.00			1	Center Freq 1.515000000 GHz
-10.0 -20.0 -30.0			-16.74.09n	Start Freq 30.000000 MHz
-40.0 -50.0 -60.0	ىرىمى ئەرىپى يەرىپىلەر بىرىكە تەرىپى يىرىپى يىرىپى مەرىپى يەرىپى يەرىپى يەرىپى يەرىپى يەرىپى يەرىپى يەرىپى يەرىپى	ana kamena ana katalahata atalahata	Yang Bashyan Yana Yana Kasalan da kuma da	Stop Freq 3.000000000 GHz
Start 30 MHz #Res BW 100 kHz	#VBW 300 kHz	Sweep 2	Stop 3.000 GHz 83.9 ms (1001 pts)	CF Step 297.000000 MHz Auto Man
1 N 1 f 2.409.0 G 2 3 4 5 6				Freq Offset 0 Hz
7 8 9 10			_	
MSG		STATU	3	

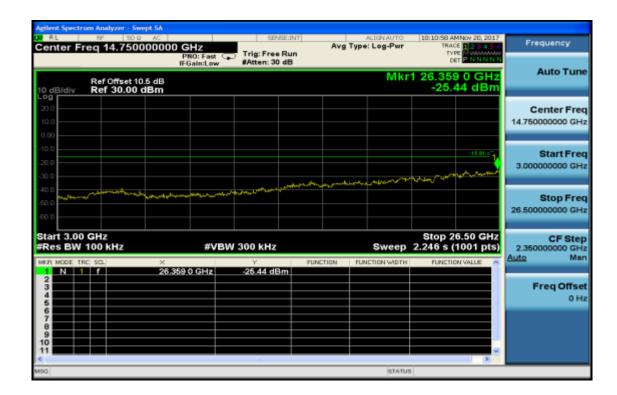


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Spurious Emission Test Data CH-Mid

Agilent Spectrum Analyzer - Swept SA				
Center Freq 1.515000000		Avg Type: Log-Pwr	10:10:37 AMNov 20, 2017 TRACE 23455 TYPE	Frequency
Ref Offset 10.5 dB 10 dB/div Ref 30.00 dBm	PNO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB		(r1 2.435 7 GHz 4.19 dBm	Auto Tune
20.0 10.0 0.00			↓1	Center Freq 1.515000000 GHz
-10.0			-15.01 dDn	Start Freq 30.000000 MHz
-40.0 -50.0 -60.0	ฉุก _{ับแล้ว} อาจุสารปฏิการแบบสารสารการการแก่งสาร	an a	al ana ana ana ang mang mang mang mang man	Stop Freq 3.000000000 GHz
Start 30 MHz #Res BW 100 kHz MKN NODE TRIC SCL ×	#VBW 300 kHz	Sweep 2	Stop 3.000 GHz 83.9 ms (1001 pts)	CF Step 297.000000 MHz Auto Man
1 N 1 f 2 3 3 3 3 4 4 4 4 4 4 6 6 7 7 8 9 9 9 10 1 11	2,435.7 GHz 4,19 dBm			Freq Offset 0 Hz

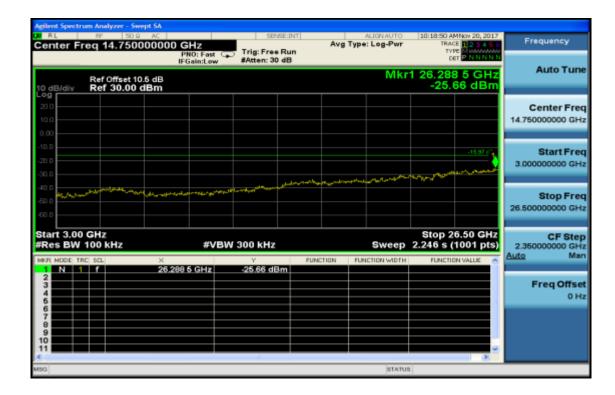


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Spurious Emission Test Data CH-High

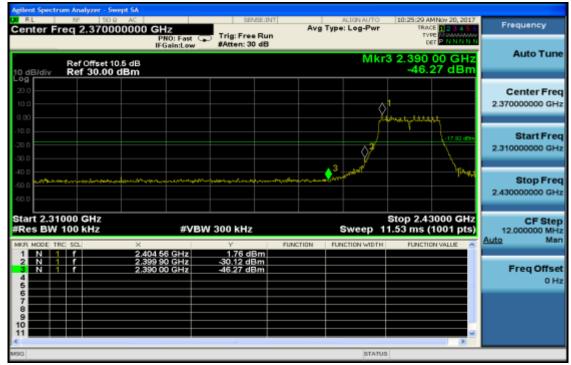
	um Analyzer - Swept SA							
Center Fi	reg 1.51500000		SENSE:IN1		ALIGNAUTO Type: Log-Pwr	10:18:29 AMN TRACE	23456	Frequency
10 dB/div	Ref Offset 10.6 dB Ref 30.00 dBm		J Trig: Free Run ≴Atten: 30 dB		Mk	r1 2.462	4 GHz dBm	Auto Tune
20.0 10.0						• ¹		Center Freq 1.515000000 GHz
-10.0 -20.0 -30.0							-15.97 001	Start Freq 30.000000 MHz
-40.0 -50.0	an a	an ang pang pang pang pang pang pang pan		اجمار الجمي ومنهو ورون	and and any second s	ىسەسىمىيەسىا لې	Nange Berleitigen	Stop Freq 3.000000000 GHz
Start 30 N #Res BW	100 kHz	C	V 300 kHz	FUNCTION	Sweep 2	Stop 3.0 83.9 ms (10 FUNCTION V	01 pts)	CF Step 297.000000 MHz <u>Auto</u> Man
1 N 1 2 3 4 5		2.462 4 GHz	4.03 dBm					Freq Offset 0 Hz
7 8 9 10 11							×	
MBG					STATUS			



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



Band Edges Test Data CH-High

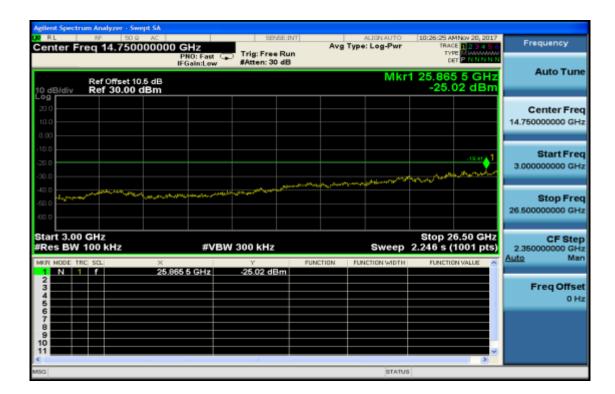


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802.11g **Spurious Emission Test Data CH-Low**

Agilent Spectrum Analyzer - Swept							
Center Freq 1.515000		SENSE:INT		Log-Pwr	TRAC	Nov 20, 2017	Frequency
Ref Offset 10.5 10 dB/div Ref 30.00 dB		Trig: Free Run #Atten: 30 dB		Mk	r1 2.409	0 GHz	Auto Tune
20.0 10.0 0.00					1		Center Freq 1.515000000 GHz
-10.0						-19.41 dBm	Start Freq 30.000000 MHz
-40.0 -50.0 -60.0	ار میں میں میں اور اور میں اور	ىمەر بىلەر مەللىرىنى يورىغ ۋە ياللىرىمىيە مەللىرىمىيە مەللىرىمىيە بىلەر يەرىخىيە يەرىغى يەرىخى يەرىخى يەرىخى يە يەرىخى يەرىخى	and and an	da radinadira		9 May 20 May	Stop Freq 3.000000000 GHz
Start 30 MHz #Res BW 100 kHz	#VBW	/ 300 kHz		Sweep 2	83.9 ms (.000 GHz 1001 pts)	CF Step 297.000000 MHz Auto Man
N 1 7 2 4 4 5 5 5 7 8 9 9 10 11	2.409 0 GHz	0,59 dBm				~	Freq Offset 0 Hz
MSG				STATUS			

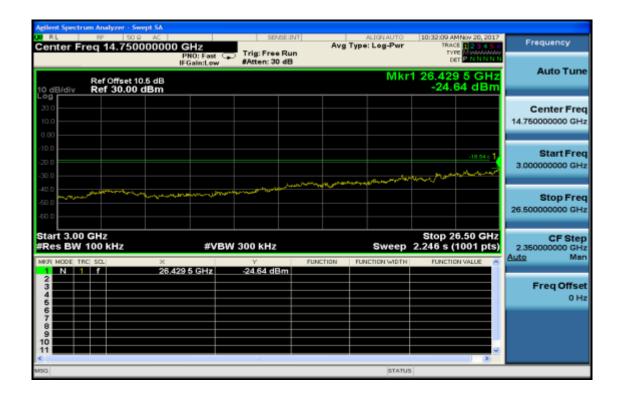


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Spurious Emission Test Data CH-Mid

100 1 1.515000000 GHz 000 1.515000000 GHz 200 1.054 dm 300 1.055 dm 400 1.055 dm 500 1.055 dm	Agilent Spectrum Analyzer - Swept SA				
Ref Offset 10.6 dB Mkr1 2.444 6 GHz Auto Tune 10 dEldiv Ref 30.00 dBm 1.46 dBm 1.46 dBm 10 dStatu		GHz	Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6	Frequency
300 1 Center Freq 100 1 1 1 100 1 1 1 100 1 1 1 100 1 1 1 100 1 1 1 100 1 1 1 200 1 1 1 300 1 1 1 400 1 1 1 500 1 1 1 500 1 1 1 1 500 1 1 1 1 1 500 1 1 1 1 1 1 500 1 1 1 1 1 1 1 500 1 <th>10 dB/div Ref 30.00 dBm</th> <th></th> <th>1</th> <th>r1 2.444 6 GHz</th> <th>Auto Tune</th>	10 dB/div Ref 30.00 dBm		1	r1 2.444 6 GHz	Auto Tune
20.0 .10.54 dBm 30.000000 MHz 30.0 .10.54 dBm .10.54 dBm .10.54 dBm 40.0 .10.54 dBm .10.54 dBm .10.54 dBm 50.0 .10.54 dBm .10.54 dBm .10.54 dBm 20.00000000 GHz .10.54 dBm .10.54 dBm .10.54 dBm 20.00000000 GHz .10.54 dBm .10.54 dBm .10.54 dBm 20.000000 MHz .10.54 dBm .10.54 dBm .10.54 dBm 20.000000 MHz .10.54 dBm .10.54 dBm .10.54 dBm 20.00000 MHz .10.54 dBm .10.54 dBm .10.54 dBm 20.00000 MHz .10.54 dBm .10.54 dBm .10.54 dBm	20.0			↓1	
50.0 1	-20.0			-18.54 dbn	
#Res BW 100 kHz #VBW 300 kHz Sweep 283.9 ms (1001 pts) 297.000000 MHz MCR MCR MCR PUNCTION PUNCTION PUNCTION WIDTH PUNC	-50.0 fed, merging all data and the feature of the	มหมาย และ ที่ เลย ประกอบ เป็นสุขาง เห็นไปสี่มา และ แปกประชาก เมาะ	nety mande a general system de state de tradestate de tradestate de tradestate de tradestate de tradestate de t	No. or a second s	
2 3	#Res BW 100 kHz	Y		33.9 ms (1001 pts)	297.000000 MHz
	2 3 4 5 6 7 8 9	.444 6 GHz 1.46 dBm		~	



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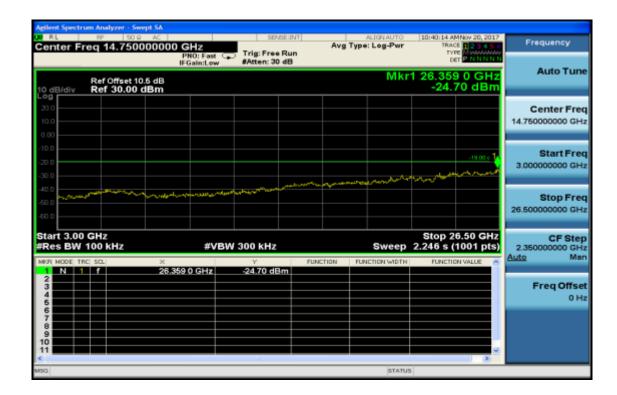
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Spurious Emission Test Data CH-High

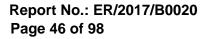
		DA AC		SENSE		ALIONAUTO		AMNov 20, 2017	Frequency
enter F	req 1.515	000000 GHz	0: Fast 🕞	Trig: Free R	un	g Type: Log-Pw	T	ACE 123456 YPE MUNANANAN DET PINNNNN	Frequency
10 dB/div	Ref Offset Ref 30.0	10.5 dB	in:Low	#Atten: 30 d	В	N	lkr1 2.46	8 4 GHz .00 dBm	Auto Tune
20.0 10.0							<p1 ↓ 1 1 1 1 1 1 1 1 1 1 1 1 1</p1 		Center Free 1.515000000 GH
-10.0								-19.00 dBm	Start Free 30.000000 MH
40.0 50.0 60.0	and data providents	an a sharan	olasa a	jayumilajaujimilajau	المعيدين العميم المراد	المراجع	and have	9	Stop Fre 3.000000000 GH
Start 30 M Res BW	100 kHz	×	#VBW	/ 300 kHz	FUNCTION	Sweep	283.9 ms	3.000 GHz (1001 pts)	CF Ste 297.000000 MH Auto Ma
1 N 1 2 3 4 5		2.469.4	GHz	1.00 dBn					Freq Offse 0 H
6 7 8									
10									



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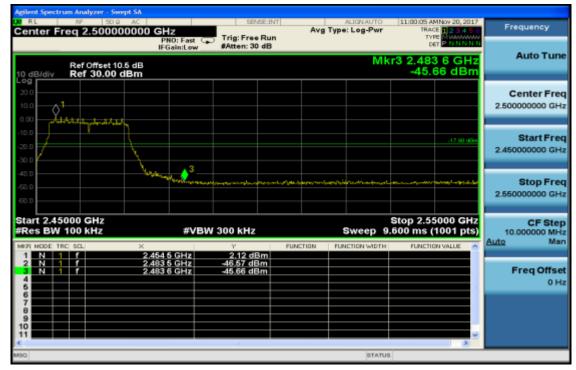




802.11n_HT20 **Band Edges Test Data CH-Low**



Band Edges Test Data CH-High

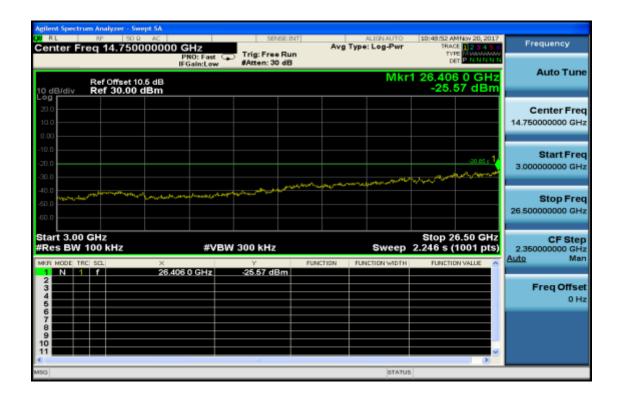


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802.11n_HT20 **Spurious Emission Test Data CH-Low**

Center Fre		P	12 NO: Fast C Gain:Low	Trig: Free F #Atten: 30 d	A		LIGNAUTO	TRA	MNov 20, 2017 CE 123456 PE MAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	Frequency
10 dB/div	Ref Offset 10 Ref 30.00	0.6 dB dBm					Mk		6 0 GHz 85 dBm	Auto Tune
20.0 10.0								1		Center Free 1.515000000 GH
-10.0									-20.05 dDm	Start Free 30.000000 MH
40.0 50.0 ayili ayina 60.0	9.9	يە بەلۋەيەتلەرىيىتى ھەل ۋى _ي	ميد الإمر ميدا ا	wyonaja ka maasa daa		مىيەر يەروپىرىيەر. مەربىيەر يەروپىرىيەر	blantariyetteriyeri	Harrandown	ala na shekara ta sheka	Stop Fre 3.000000000 GH
Start 30 MH #Res BW 10	SOL KHZ	ж	1	W 300 kHz	FUNCTION		Sweep 2	83.9 ms (000 GHz 1001 pts)	CF Ste 297.000000 MH <u>Auto</u> Ma
1 N 1 2 3 4 5 6 7 8		2,406	0 GHz	-0.85 dBn						Freq Offse 0 H
9									~	



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Spurious Emission Test Data CH-Mid

Agilent Spectr	rum Analyzer - Swept	SA						
Center E	reg 1.515000		SENSE:		ALIGNAUTO Type: Log-Pwr		MNov 20, 2017	Frequency
	roq no roooo	PNO: Fast IFGain:Low	Trig: Free Ru #Atten: 30 dt			TY D	FE PINNNNN	Auto Tune
10 dB/div	Ref Offset 10.5 Ref 30.00 dB				MI		2 7 GHz 63 dBm	Auto Tune
20.0						•1		Center Freq 1.515000000 GHz
-10.0 -20.0 -30.0							-19.37 dBn	Start Freq 30.000000 MHz
-40.0 -50.0	Auguran (1, al) and Mary 199 Marine and	an a	فالله والبي وهديت بيني مرويون	ومانجم معومور ومنع	شيويوليون. م	a daganda sanyaba	e Prinipante e	Stop Freq 3.000000000 GHz
Start 30 M #Res BW	100 kHz	#VI	3W 300 kHz	FUNCTION	Sweep 2	83.9 ms (.000 GHz 1001 pts)	CF Step 297.000000 MHz Auto Man
1 N 1 2 3 4 5 6 7 8 9 9 10 11		2,432 7 GHz	0.63 dBm					Freq Offset 0 Hz
MSG					STATU	5		

enter Fr	req 14.7500	00000 GI	HZ 0: Fast ⊂ ain:Low			Avg Typ	ALIGNAUTO	TRAC	INOV 20, 2017	Frequency
0 dB/div	Ref Offset 10.0 Ref 30.00 d	5 dB	dimit of				Mkr	1 26.288 -25.5	5 GHz 3 dBm	Auto Tun
0 9 20.0 10.0										Center Fre 14.750000000 GF
20.0								to the second	-19.37 e }	Start Fre 3.000000000 GR
40.0 50.0 50.0	and the second	ما خربة ورو _{ر وا} ي	na sa	a paga ang ang ang ang ang ang ang ang ang	aller and the loss	A garden de				Stop Fr 26.50000000 G
tart 3.00 Res BW	100 kHz		#VBV	V 300 kHz				Stop 20 2.246 s (1		CF St 2.350000000 G Auto M
NODE TH N 1 2 4 5 6 7 8 9 9 0 1	ſ	× 26.208.5	GHz	¥ -25.53 d⊟			INCTION WIDTH			Freq Offs 0

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Spurious Emission Test Data CH-High

Agilent Spectr	um Analyzer - S									
Center F	reg 1.5150		z		SE:INT	Avg Typ	e: Log-Pwr	TRA	MNov 20, 2017	Frequency
10 dB/div	Ref Offset 1 Ref 30.00	IF0	NO: Fast Gain:Low	#Atten: 30			MI	(r1 2.45	9 5 GHz 12 dBm	Auto Tune
20.0 10.0 0.00								•_1		Center Freq 1.515000000 GHz
-10.0 -20.0 -30.0									-20.13 dBn	Start Freq 30.000000 MHz
-40.0 -50.0	hana dadi ma ⁿ andi singha Antigen	- 110 varieter sineret (1743 Auger an	hand,a, gan,Al	وارهور مرد ارمیر و	ومنامر المحار ، الماليو		iqongitangalga attanla	n have a start		Stop Freq 3.000000000 GHz
Start 30 F #Res BW	100 kHz	×		V 300 kHz			Sweep 2	83.9 ms	3.000 GHz (1001 pts)	CF Step 297.000000 MHz Auto Man
1 N 2 3 4 5 6 7 8 9 10 11		2,459	5 GHz	-0.12 dB					×	Freq Offset 0 Hz
MSG							STATU	8		

enter Fr	req 14.750000			Avg	Type: Log-Pwr	11:00:53 AMNov 20, 2017 TRACE 1 2 3 4 5 5 TYPE DET P N N N N	Frequency
0 dB/div	Ref Offset 10.5 d Ref 30.00 dBn	8			Mkr	1 26.476 5 GHz -26.08 dBm	Auto Tun
0 9 20.0 10.0							Center Fre 14.750000000 GF
10.0 20.0 30.0						-2013 c 1	Start Fre 3.000000000 G
40.0 50.0 50.0	and the state of the	م _{ورو} مورده ورواد و مرواد	an and a start of the start of		a foreigned of the state of the		Stop Fr 26.50000000 G
tart 3.00 Res BW	100 kHz	#V	BW 300 kHz		Sweep	Stop 26.50 GHz 2.246 s (1001 pts)	CF Sto 2.350000000 G Auto M
KPI MODE TH 1 1 1 2 3 4 5 6 7 8 9		× 26.476 5 GHz	¥ -26.08 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Freq Offs 0

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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.

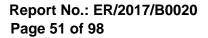
Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

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:

966 Chamber										
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.					
ТҮРЕ		NUMBER	NUMBER	CAL.						
EMI Test Receiver	R&S	ESCI7	100760	05/11/2017	05/10/2018					
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/25/2017	04/24/2018					
Loop Antenna	ETS-Lindgren	6502	148045	09/20/2017	09/19/2018					
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/19/2016	12/18/2017					
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/04/2017	08/03/2018					
Pre-Amplifier	Agilent	8447D	2944A07676	01/03/2017	01/02/2018					
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/03/2017	01/02/2018					
Turn Table	HD	DT420	N/A	N.C.R	N.C.R					
Antenna Tower	ChamPro	AM-BS-4500-B	060776-ABS	N.C.R	N.C.R					
Controller	ChamPro	EM1000	60776	N.C.R	N.C.R					
Low Loss Cable	Huber Suhner	966_RX	9	01/05/2017	01/04/2018					
3m Site NSA	SGS	966 chamber	N/A	07/01/2017	06/30/2018					
Low Loss Cable	Huber Suhner	966 TX	1	01/05/2017	01/04/2018					
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2016	12/11/2017					
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/05/2017	01/04/2018					

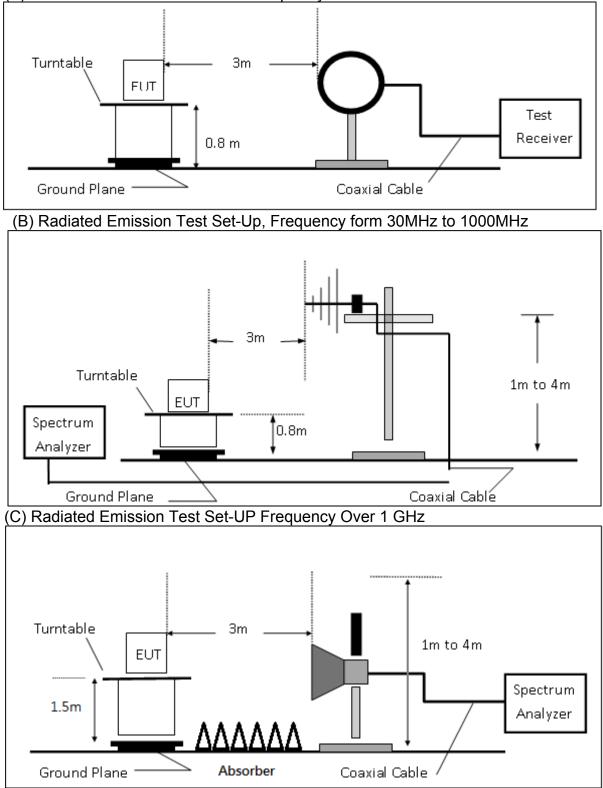
NOTE: N.C.R refers to Not Calibrated Required.

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11.3 Test SET-UP

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



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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	FS = Field Strength	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.

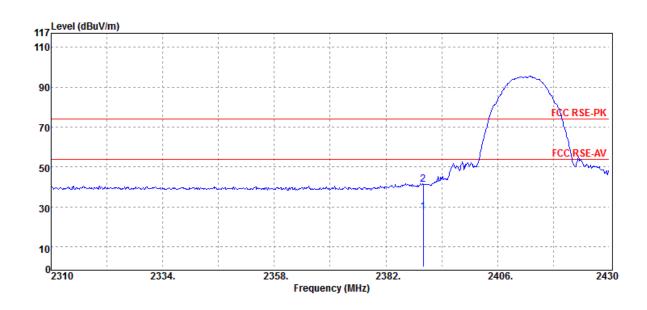


Radiated Band Edge Measurement Result (802.11b)

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

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

Test Date :2017-11-15 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
2390.00	Е	Average	29.22	-1.74	27.48	54.00	-26.52
2390.00	Е	Peak	43.19	-1.74	41.45	74.00	-32.55

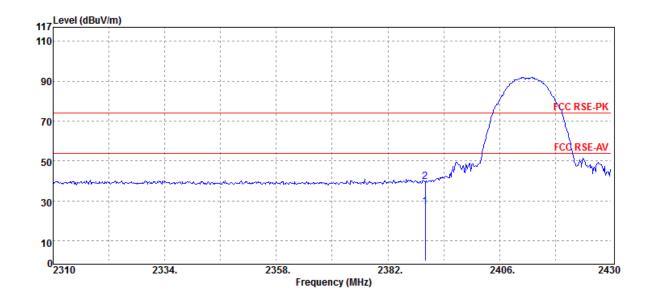
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Report No.: ER/2017/B0020 Page 56 of 98



Operation Band :802.11b Fundamental Frequency :2412 MHz **Operation Mode** :Bandedge CH LOW EUT Pol. :E1 Plane

Test Date :2017-11-13 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	29.03	-1.74	27.29	54.00	-26.71
2390.00	Е	Peak	41.41	-1.74	39.67	74.00	-34.33

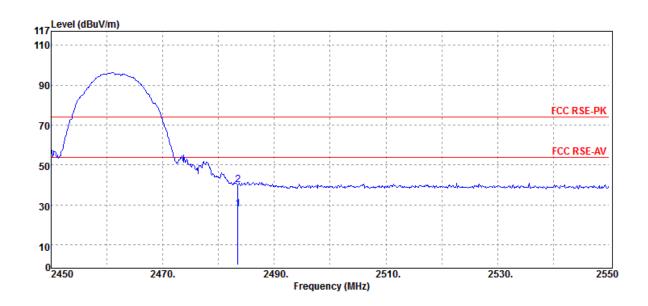
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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

Test Date :2017-11-13 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	29.53	-1.62	27.91	54.00	-26.09
2483.50	Е	Peak	41.80	-1.62	40.18	74.00	-33.82

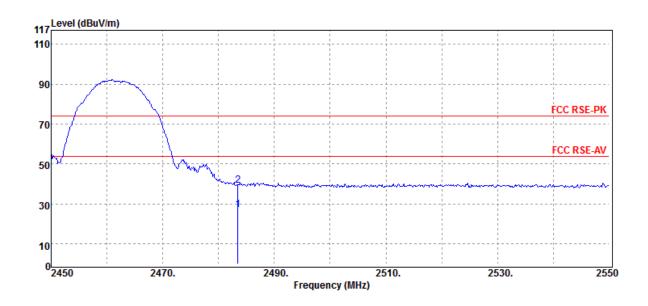
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Report No.: ER/2017/B0020 Page 58 of 98



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

Test Date :2017-11-13 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	28.76	-1.62	27.14	54.00	-26.86
2483.50	Е	Peak	41.05	-1.62	39.43	74.00	-34.57

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.

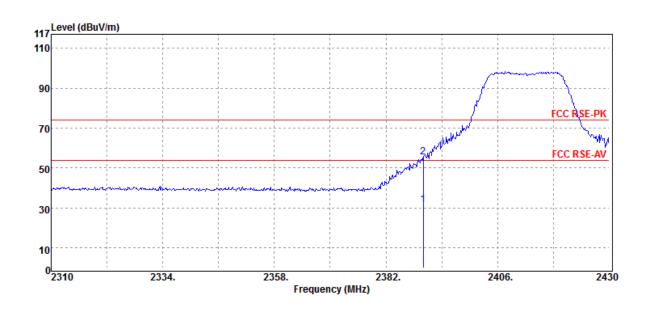


Radiated Band Edge Measurement Result (802.11g)

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

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

Test Date :2017-11-13 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
2390.00	Е	Average	33.42	-1.74	31.68	54.00	-22.32
2390.00	E	Peak	57.01	-1.74	55.27	74.00	-18.73

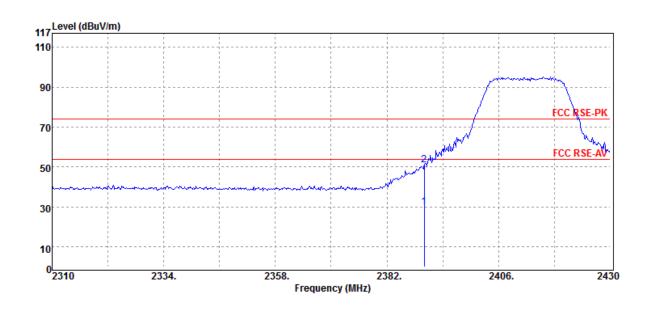
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Report No.: ER/2017/B0020 Page 60 of 98



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

Test Date :2017-11-13 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	31.51	-1.74	29.77	54.00	-24.23
2390.00	Е	Peak	52.89	-1.74	51.15	74.00	-22.85

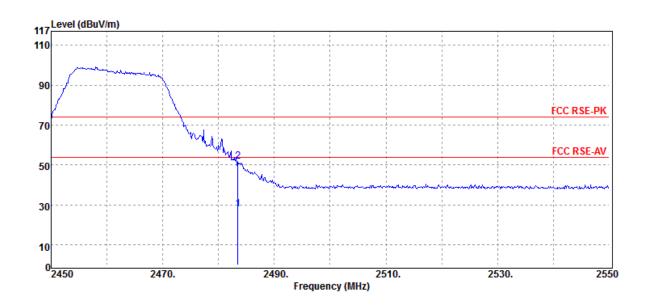
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Report No.: ER/2017/B0020 Page 61 of 98



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

Test Date :2017-11-13 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	29.42	-1.62	27.80	54.00	-26.20
2483.50	E	Peak	53.33	-1.62	51.71	74.00	-22.29

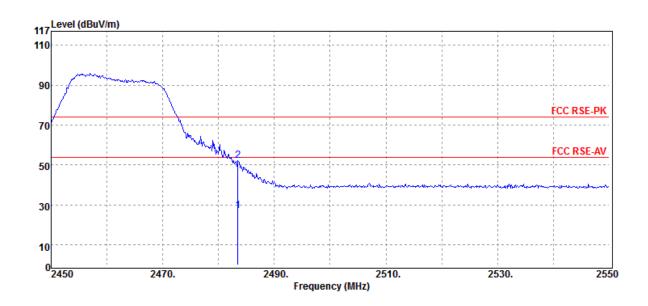
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Report No.: ER/2017/B0020 Page 62 of 98



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

Test Date :2017-11-13 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	28.62	-1.62	27.00	54.00	-27.00
2483.50	Е	Peak	53.84	-1.62	52.22	74.00	-21.78

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.

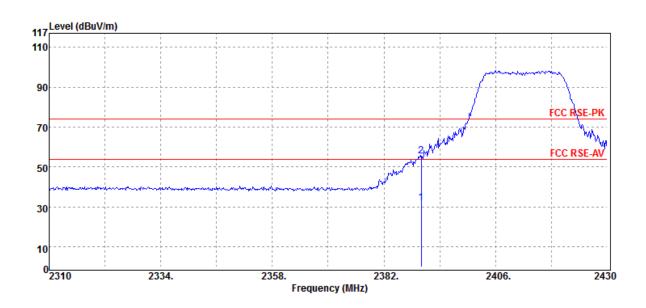


Radiated Band Edge Measurement Result (802.11_HT20)

Operation Band
Fundamental Frequency
Operation Mode
EUT Pol.

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

Test Date :2017-11-13 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
2390.00	Е	Average	33.91	-1.74	32.17	54.00	-21.83
2390.00	Е	Peak	57.16	-1.74	55.42	74.00	-18.58

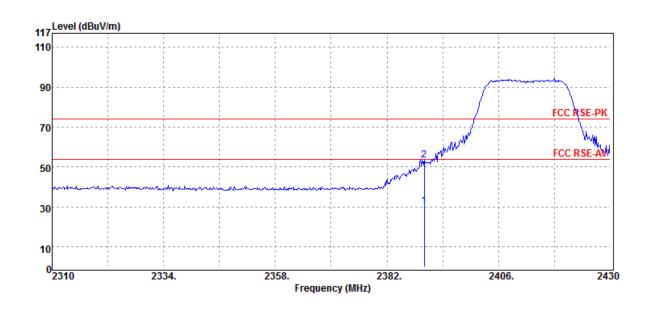
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Operation Band :802.11n20 Fundamental Frequency :2412 MHz **Operation Mode** :Bandedge CH LOW EUT Pol. :E1 Plane

Test Date :2017-11-13 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	32.07	-1.74	30.33	54.00	-23.67
2390.00	Е	Peak	55.36	-1.74	53.62	74.00	-20.38

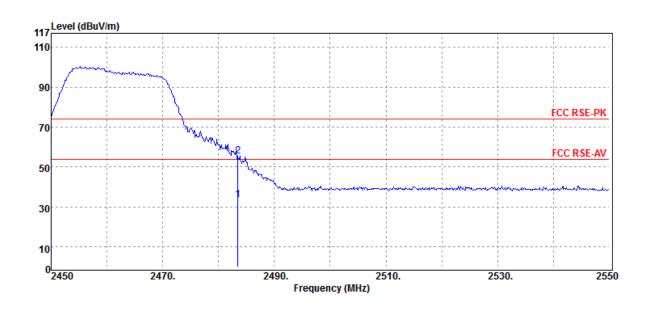
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Report No.: ER/2017/B0020 Page 65 of 98



Operation Band :802.11n20 Fundamental Frequency :2462 MHz **Operation Mode** :Bandedge CH HIGH EUT Pol. :E1 Plane

Test Date :2017-11-13 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	35.23	-1.62	33.61	54.00	-20.39
2483.50	Е	Peak	57.07	-1.62	55.45	74.00	-18.55

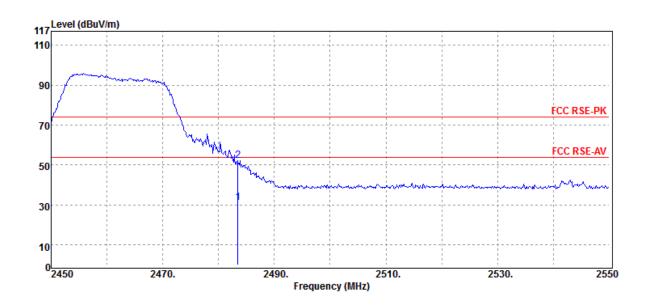
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Report No.: ER/2017/B0020 Page 66 of 98



Operation Band :802.11n20 Fundamental Frequency :2462 MHz **Operation Mode** :Bandedge CH HIGH EUT Pol. :E1 Plane

Test Date :2017-11-13 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	32.98	-1.62	31.36	54.00	-22.64
2483.50	Е	Peak	53.75	-1.62	52.13	74.00	-21.87

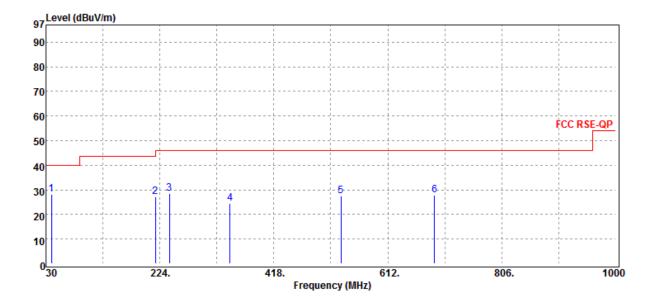
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



Below 1GHz Worst-Case Data:

Radiated Spurious Emission Measurement Result (802.11 g)

Operation Band	:802.11g	Test Date	:2017-11-14
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



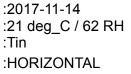
	Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
			Mode	Reading Level		FS	@3m	
_	MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
	39.70	S	Peak	36.60	-8.56	28.04	40.00	-11.96
	216.24	S	Peak	36.47	-9.43	27.04	46.00	-18.96
	240.49	S	Peak	36.51	-8.04	28.47	46.00	-17.53
	343.31	S	Peak	29.73	-5.13	24.60	46.00	-21.40
	532.46	S	Peak	29.16	-1.68	27.48	46.00	-18.52
	691.54	S	Peak	26.25	1.47	27.72	46.00	-18.28

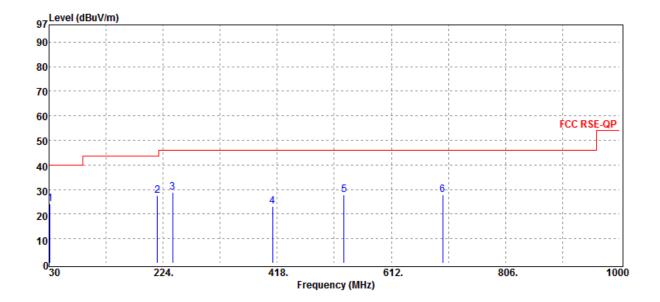
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



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

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





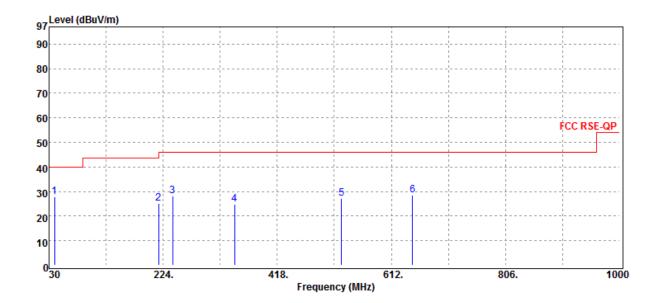
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
31.94	S	Peak	33.11	-9.11	24.00	40.00	-16.00
214.30	S	Peak	37.11	-9.55	27.56	43.50	-15.94
240.49	S	Peak	36.99	-8.04	28.95	46.00	-17.05
410.24	S	Peak	26.75	-3.62	23.13	46.00	-22.87
531.49	S	Peak	29.42	-1.57	27.85	46.00	-18.15
699.30	S	Peak	26.28	1.44	27.72	46.00	-18.28

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



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

Test Date :2017-11-14 Temp./Humi. :21 deg_C / 62 RH Engineer :Tin :VERTICAL Measurement Antenna Pol.



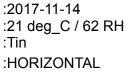
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
39.70	S	Peak	36.39	-8.56	27.83	40.00	-12.17
216.24	S	Peak	34.67	-9.43	25.24	46.00	-20.76
240.49	S	Peak	36.24	-8.04	28.20	46.00	-17.80
345.25	S	Peak	29.90	-5.10	24.80	46.00	-21.20
527.61	S	Peak	28.38	-1.32	27.06	46.00	-18.94
647.89	S	Peak	28.01	0.42	28.43	46.00	-17.57

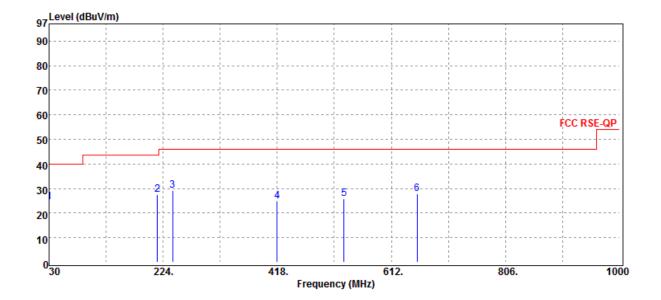
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.



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

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





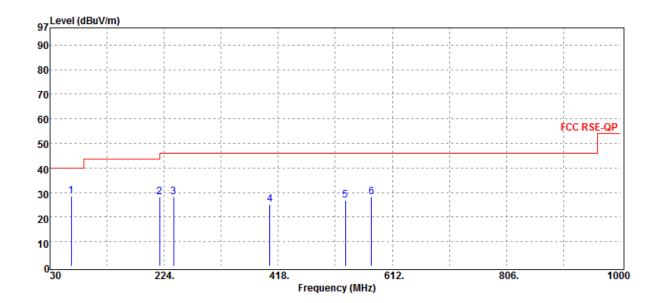
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
30.00	S	Peak	33.55	-9.19	24.36	40.00	-15.64
214.30	S	Peak	36.92	-9.55	27.37	43.50	-16.13
240.49	S	Peak	37.27	-8.04	29.23	46.00	-16.77
418.00	S	Peak	28.34	-3.37	24.97	46.00	-21.03
531.49	S	Peak	27.30	-1.57	25.73	46.00	-20.27
655.65	S	Peak	27.70	0.27	27.97	46.00	-18.03

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.



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

Test Date :2017-11-14 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
65.89	S	Peak	38.01	-9.38	28.63	40.00	-11.37
216.24	S	Peak	37.70	-9.43	28.27	46.00	-17.73
240.49	S	Peak	36.40	-8.04	28.36	46.00	-17.64
403.45	S	Peak	29.25	-3.93	25.32	46.00	-20.68
532.46	S	Peak	28.54	-1.68	26.86	46.00	-19.14
576.11	S	Peak	28.88	-0.64	28.24	46.00	-17.76

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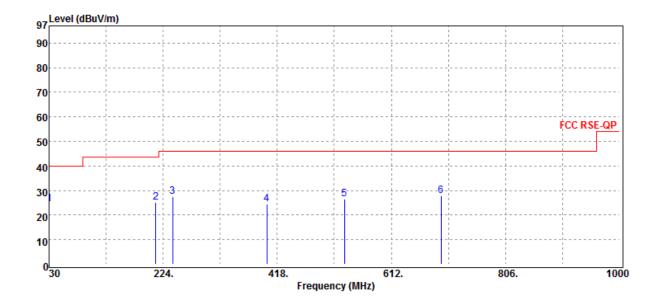
S Taiwan Ltd. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134號



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

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

:2017-11-14 :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
30.00	S	Peak	33.57	-9.19	24.38	40.00	-15.62
211.39	S	Peak	34.92	-9.70	25.22	43.50	-18.28
240.49	S	Peak	35.49	-8.04	27.45	46.00	-18.55
400.54	S	Peak	28.35	-3.94	24.41	46.00	-21.59
532.46	S	Peak	28.25	-1.68	26.57	46.00	-19.43
696.39	S	Peak	26.60	1.35	27.95	46.00	-18.05

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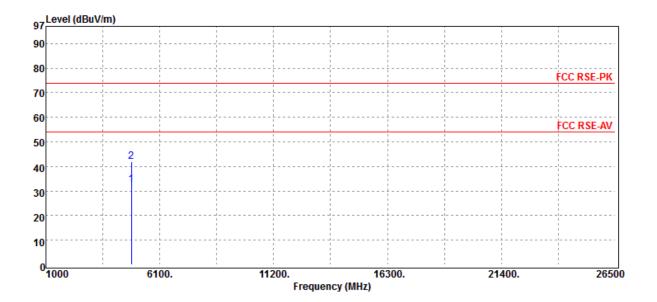
S Taiwan Ltd. No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134號



Above 1GHz Data:

Radiated Spurious Emission Measurement Result (802.11 b)

Operation Band	:802.11b	Test Date	:2017-11-14
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe	
		Mode	Reading Level		FS	@3m	Margin	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	_
4824.00	Н	Average	27.56	4.93	32.49	54.00	-21.51	
4824.00	Н	Peak	36.93	4.93	41.86	74.00	-32.14	

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Н

Operation Ban Fundamental Operation Mo EUT Pol.	Frequency	:802.11b :2412 MHz :Tx CH LOV :E1 Plane	V	Test Date Temp./Humi. Engineer Measurement Antenna Pol.		:Tin	1-14 _C / 62 RH CONTAL
97 Level (dE	BuV/m)						
<mark>90</mark>							
80						FCC RSE-PK	
70	· · · · · · · · · · · · · · · · · · ·	 		 			
60	·····					FCC RSE-AV	
50							
40	2						
30							
20							
10							
0 <mark></mark> 1000	610	0.	11200. Frequency (MHz	16300.)	21400.	2650	0
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Average	27.83	4.93	32.76	54.00	-21.24

Peak

36.86

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4.93

41.79

74.00

-32.21



Operation Ba Fundamental Operation Mc EUT Pol.	Frequency	:802.11b :2437 MHz :Tx CH MID :E1 Plane		equency :2437 MHz Temp./Humi. :Tx CH MID Engineer		Temp./Humi.		Hz Temp./Humi. :21 MD Engineer :Tin		:2017-11-14 :21 deg_C / 62 RH :Tin Pol. :VERTICAL	
97 Level (dl	BuV/m)						7				
90											
80						FCC RSE-PK					
70											
60						FCC RSE-AV					
50											
40	2										
30											
20											
10											
0 <mark>0</mark> 0	610	0.	11200.	16300.	21400.	265	 D O				
			Frequency (MH	lz)							
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe				
	11010	Mode	Reading Level		FS	@3m	Margin				
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB				
			F -		* p	P					
4874.00	Н	Average	27.13	5.13	32.26	54.00	-21.74				
4874.00	Н	Peak	36.08	5.13	41.21	74.00	-32.79				

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Operation Ba Fundamental Operation Mo	Frequency	:802.11b :2437 MHz :Tx CH MID			umi.	:2017- :21 de :Tin	11-14 g_C / 62 RH
EUT Pol.		:E1 Plane		Measure	ment Antenna I	Pol. :HORI	ZONTAL
97 <mark>Level (d</mark>	BuV/m)	i			; ;		7
90							
80	·					FCC RSE-PK	
70	·						
60	·		L			FCC RSE-AV	
50							
40	2						
30							
20							
10							
0 ^L 1000	610	0.	11200. Frequency (MH	16300. z)	21400.	265	00
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4874.00	н	Average	27.93	5.13	33.06	54.00	-20.94
4874.00	Н	Peak	36.58	5.13	41.71	74.00	-32.29

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4924.00

000 441

00474444

eration Band :802.11b ndamental Frequency :2462 MHz peration Mode :Tx CH Hi UT Data			iΗ					
IT Pol.		:E1 Plane		Measure	ment Antenna	Pol. :VERT	:VERTICAL	
97 Level (di	BuV/m)						-	
90						 		
80								
						FCC RSE-PK		
70								
60						FCC RSE-AV		
50	2							
40						 		
30								
20			· · · · · · · · · · · · · · · · · · ·					
10								
0 <mark>1000</mark>	610	0.	11200. Frequency (16300. MHz)	21400.	265	ดีด	
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	

. . .

Average

Peak

Н

Н

27.81

35.97

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5.25

5.25

33.06

41.22

54.00

74.00

-20.94

-32.78



4924.00

Н

Н

Operation Bar Fundamental Operation Mo EUT Pol.	Frequency	:802.11b :2462 MHz :Tx CH HIG :E1 Plane	Η	Test Date Temp./Humi. Engineer Measurement Antenna Pol.		:Tin	11-14 9_C / 62 RH ZONTAL
97	BuV/m)						
90							
80						FCC RSE-PK	
70						·	
<mark>60</mark>						FCC RSE-AV	
50							
40	2		·····			·	
30							
20						·	
10		 		 		 	
0							
°1000	610	0.	11200. Frequency (MI	16300. Hz)	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

28.09

35.71

Average

Peak

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5.25

5.25

33.34

40.96

54.00

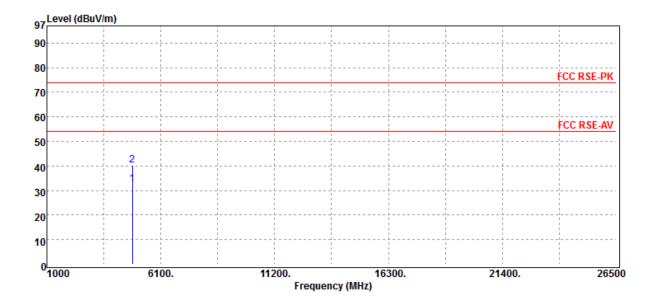
74.00

-20.66



Radiated Spurious Emission Measurement Result (802.11 g)

Operation Band	:802.11g	Test Date	:2017-11-14
Fundamental Frequency	:2412 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx CH LOW	Engineer	:Tin
EUT Pol.	:E1 Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
4824.00	Н	Average	27.78	4.93	32.71	54.00	-21.29
4824.00	Н	Peak	35.26	4.93	40.19	74.00	-33.81

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4824.00

Н

Operation Ba Fundamental Operation Mc EUT Pol.	Frequency	:802.11g :2412 MHz :Tx CH LOV :E1 Plane	V	Test Date Temp./Humi. Engineer Measurement Antenna Pol.		:Tin	_C / 62 RH
97	BuV/m)						
90							
80				1 1 1 1 1			
70		·	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			FCC RSE-PK	
60				1 1 1 1			
50		·	· · · · · · · · · · · · · · · · · · ·			FCC RSE-AV	
40	2			1 1 1 1			
30							
20		 				 	
10						 	
0							
⁰ 1000	610)0.	11200. Frequency (MH	16300. z)	21400.	2650	D
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	28.20	4.93	33.13	54.00	-20.87

Peak

36.35

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4.93

41.28

74.00

-32.72



Operation Band Fundamental Frequency Operation Mode		:802.11g :2437 MHz :Tx CH MID		Test Date Temp./Hu Engineer		:2017- :21 deg :Tin	11-14 g_C / 62 RH
EUT Pol.		:E1 Plane		Measure	ment Antenna I	Pol. :VERT	ICAL
97 Level (d	BuV/m)						1
90							
80						FCC RSE-PK	
70							
60						FCC RSE-AV	
50						CC NJL-AV	
40	2		L				
30							
20					· · · · · · · · · · · · · · · · · · ·		
10							
0 ^L 1000	610	0.	11200. 16300. Frequency (MHz)		21400.	265	ōo
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	27.83	5.13	32.96	54.00	-21.04
4874.00	Н	Peak	35.12	5.13	40.25	74.00	-33.75

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Operation Ba Fundamental Operation Mc EUT Pol.	Frequency	:802.11g :2437 MHz :Tx CH MID :E1 Plane)	Test Date Temp./Hu Engineer Measurer	umi.	:Tin	11-14 g_C / 62 RH ZONTAL
97 Level (dl	BuV/m)						1
90							
80						FCC RSE-PK	
70							
60						FCC RSE-AV	
50							
40	2						
30							
20							
10							
0 <mark></mark>	610	0	44200	16300.	21400	2650	
1000	010	υ.	11200. Frequency (MH		21400.	JU	
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	28.33	5.13	33.46	54.00	-20.54
4874.00	Н	Peak	36.92	5.13	42.05	74.00	-31.95

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4924.00

н

Н

Operation Ba Fundamental Operation Mo EUT Pol.	Frequency	:802.11g :2462 MHz :Tx CH HIG :E1 Plane	Н	Test Date Temp./Hu Engineer Measure	umi.	:Tin	g_C / 62 RH
97 Level (d	BuV/m)						
97				1]
80				 i i i		FCC RSE-PK	
70							
60						FCC RSE-AV	
50			· · · · · · · · · · · · · · · · · · ·				
40	2						
30			· · · · · · · · · · · · · · · · · · ·				
20							
10							
0 ^L 1000	610	0.	11200.	16300.	21400.	265	0
			Frequency (M	n <i>z)</i>			
_	N 1 <i>i</i>	.		- <i>i</i>			.
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB

27.64

35.37

Average

Peak

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5.25

5.25

32.89

40.62

54.00

74.00

-21.11



4924.00

Н

Н

peration Mo	Frequency	:802.11g :2462 MHz :Tx CH HIG	θH	Test Date Temp./Hu Engineer	ımi.	:Tin	g_C / 62 RI
JT Pol.		:E1 Plane		Measure	ment Antenna Po	ol. :HORIZ	ZONTAL
97 Level (dl	BuV/m)						_
90							
80				·		FCC RSE-PK	
70							
60				·		FCC RSE-AV	
50				·			
40	2						
30							
20							
10							
0 <mark></mark>	610	0.	11200. Frequency (Mi	16300. Hz)	21400.	265	00
Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe
		Mode	Reading Level		FS	@3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB

28.17

36.13

Average

Peak

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5.25

5.25

33.42

41.38

54.00

74.00

-20.58

-32.62

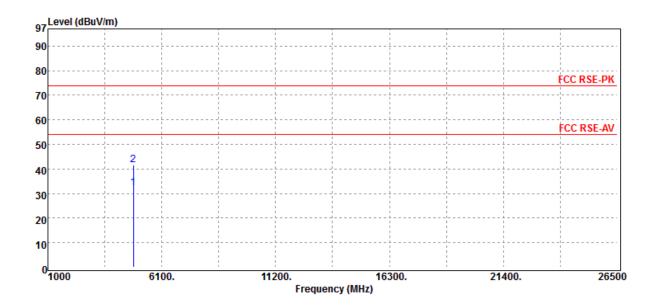


Antenna Pol.

Radiated Spurious Emission Measurement Result (802.11_HT20)

Operation Band	:802.11n20	Test Date
Fundamental Frequency	:2412 MHz	Temp./Humi.
Operation Mode	:Tx CH LOW	Engineer
EUT Pol.	:E1 Plane	Measurement

:2017-11-14 :21 deg_C / 62 RH :Tin :VERTICAL



Freq.	Note	Detector	Spectrum	Factor	Actual	Limit	Safe	
		Mode	Reading Level		FS	@3m	Margin	
MHz	F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB	
4824.00	Н	Average	27.45	4.93	32.38	54.00	-21.62	
4824.00	Н	Peak	36.76	4.93	41.69	74.00	-32.31	

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Н

Operation Ba Fundamental Operation Mo EUT Pol.	Frequency	:802.11n20 :2412 MHz :Tx CH LOV :E1 Plane	V	Test Date Temp./Hu Engineer Measure	umi.	:Tin	11-14 9_C / 62 RH CONTAL
97 Level (d	BuV/m)						
90							
80							
70						FCC RSE-PK	
60						FCC RSE-AV	
50				· · · · · · · · · · · · · · · · · · ·			
40	2			· · · · · · · · · · · · · · · · · · ·			
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
4824.00	Н	Average	28.10	4.93	33.03	54.00	-20.97

Peak

36.02

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4.93

40.95

74.00



Н

Operation Ba Jundamenta Operation Mo OT Pol.	I Frequency	:802.11n20 :2437 MHz :Tx CH MID :E1 Plane)	Test Date Temp./Hu Engineer Measure	umi.	:Tin	g_C / 62 RI
97	IBuV/m)						_
90							
80						FCC RSE-PK	
70						ICC NSE-PN	
60						FCC RSE-AV	
50							
40	2					 	
30		 				 	
20							
10							
0 <mark></mark> 1000	610	00.	11200. Frequency (MH	16300. Iz)	21400.	265	 DO
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	27.56	5.13	32.69	54.00	-21.31
4074.00			05.04	F 40	40.47	74.00	00.00

Peak

35.04

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5.13

40.17

74.00



Н

Dperation Bar Fundamental I Dperation Mod EUT Pol.	Frequency	:802.11n20 :2437 MHz :Tx CH MID :E1 Plane)	Test Date Temp./Hu Engineer Measure	umi.	:Tin	11-14 g_C / 62 RH ZONTAL
				medeuro			
97 Level (dB	uV/m)					1	1
90							
80						FCC RSE-PK	
70							
60	J					FCC RSE-AV	
50							
40	2						
30							
20						 	
10							
0 ^L 1000	610	0.	11200. Frequency (MH	16300. z)	21400.	2650	<u>J</u> O
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	28.07	5.13	33.20	54.00	-20.80

Peak

35.28

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5.13

40.41

74.00



4924.00

Н

Н

Operation Band Fundamental Frequency Operation Mode EUT Pol.	:802.11n20 :2462 MHz :Tx CH HIGH :E1 Plane		Test Date Temp./Hur Engineer Measurem	ni. nent Antenna Po	:Tin	_C / 62 RH
97						
90			·	 		
80					FCC RSE-PK	
70			· 1			
60			·	; 	FCC RSE-AV	
50			·			
40						
30			L			
20		· · · · · · · · · · · · · · · · · · ·	·	;		
10			·	I I I I I I I I I I I I I I I I I I I		
0 <mark>1000 6100</mark>).	11200. Frequency (MHz	16300.)	21400.	26500)
Freq. Note	Detector	Spectrum	Factor	Actual	Limit	Safe
	Mode I	Reading Level		FS	@3m	Margin
MHz F/H/E/S	PK/QP/AV	dBµV	dB	dBµV/m c	lBµV/m	dB

27.82

35.72

Average

Peak

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5.25

5.25

33.07

40.97

54.00

74.00

-20.93



4924.00

н

Н

Operation Bar Fundamental Operation Mod EUT Pol.	Frequency	:802.11n20 :2462 MHz :Tx CH HIG :E1 Plane	Н	Test Date Temp./Hu Engineer Measure	umi.	:Tin	1-14 _C / 62 RH CONTAL
97	uV/m)						
90				·			
80						FCC RSE-PK	
70		·					
60						FCC RSE-AV	
50		·		·			
40	2						
30		·		·		· · · · · · · · · · · · · · · · · · ·	
20		 				 	
10							
0 <mark></mark> 1000	610	D.	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

Average

Peak

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5.25

5.25

28.49

35.97

33.74

41.22

54.00

74.00

-20.26

-32.78



12 PEAK POWER SPECTRAL DENSITY

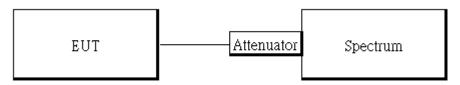
12.1 Standard Applicable

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

12.2 Measurement Equipment Used

Conducted Emission Test Site								
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.			
TYPE		NUMBER	NUMBER	CAL.				
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018			
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018			
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018			
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018			

12.3 Test Set-up



12.4 Measurement Procedure

- 1. Set analyzer center frequency to DTS channel center frequency.
- 2. The testing follows the Measurement Procedure of FCC KDB 558074 D01 DTS Meas. Guidance.
- 3. Set the span to 1.5 times the DTS channel bandwidth.
- 4. Set the RBW = 3 kHz. & the VBW = 10 kHz
- 5. For defining Restricted Band Edge Limit: Set the RBW = 100kHz & VBW = 300 kHz.
- 6. Detector = peak.
- 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.

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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	-9.91	10.50	0.10	-9.81	8.00	PASS		
2437	-10.24	10.50	0.10	-10.14	8.00	PASS		
2462	-9.95	10.50	0.10	-9.85	8.00	PASS		
	POW	ER DENS	SITY 802.	11g				
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result		
2412	-9.93	10.50	0.58	-9.35	8.00	PASS		
2437	-12.80	10.50	0.58	-12.22	8.00	PASS		
2462	-12.51	10.50	0.58	-11.93	8.00	PASS		
	POWER	DENSIT	Y 802.11r	n HT20				
Freq. (MHz)	PPSD W/O Duty Factor (dBm)	Offset	Duty Factor	PPSD With Duty Factor (dBm)	Limit (dBm)	Result		
2412	-12.53	10.50	0.63	-11.90	8.00	PASS		
2437	-12.38	10.50	0.63	-11.75	8.00	PASS		
2462	-12.69	10.50	0.63	-12.06	8.00	PASS		

*Refer to next page for plots

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

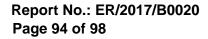


Power Spectral Density Test Plot (CH-Mid)



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Power Spectral Density Test Plot (CH-High)



802.11g



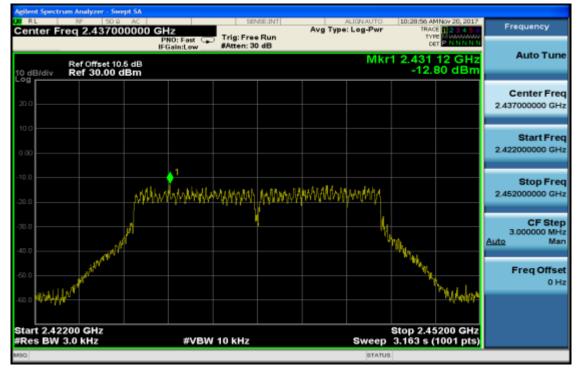


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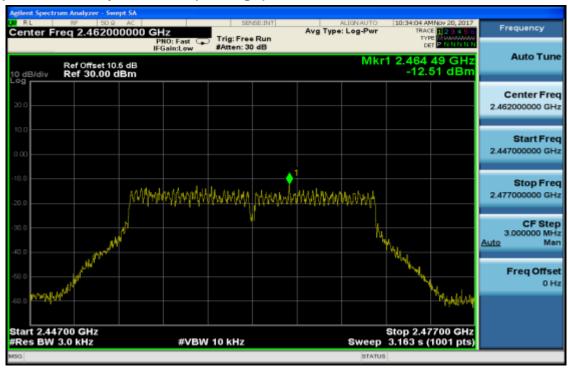
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Power Spectral Density Test Plot (CH-Mid)



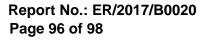
Power Spectral Density Test Plot (CH-High)



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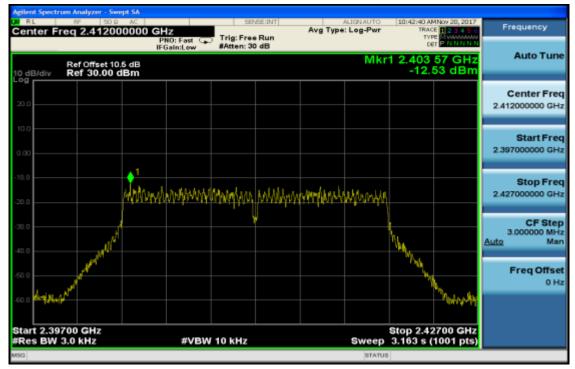
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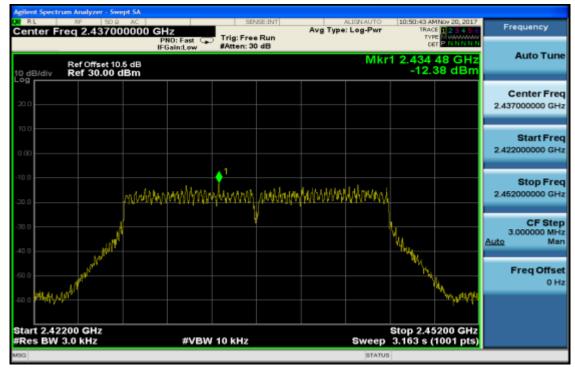


802.11n HT20

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

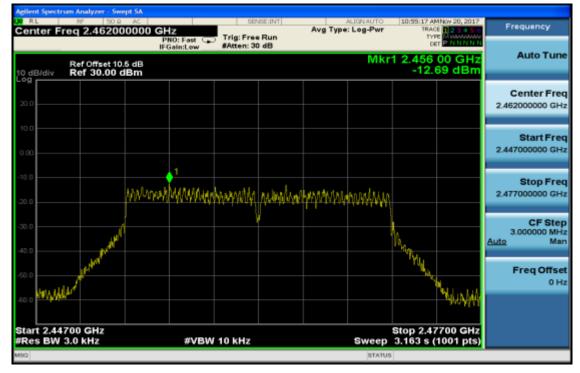


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Power Spectral Density Test Plot (CH-High)



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13 ANTENNA REQUIREMENT

13.1 Standard Applicable

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

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

13.2 Antenna Connected Construction

An embedded-in antenna design is used.

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

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

~ End of Report ~

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