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## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT

**Applicant:** Catapult Sports Pty Ltd

75-83 High St, Prahran, Melbourne Victoria 3181 AUS

**Product Name:** Receiver/Anchor

**Brand Name:** Catapult Model No.: VR7401

**Model Difference:** N/A

FCC ID: 2ADAL-VR7401

**Report Number:** T190606W03-RP2

**FCC Rule Part:** §15.407, Cat: NII

Issue Date: Jul. 16, 2019

**Date of Test:** May 30, 2019 ~ Jun. 19, 2019

Date of EUT Received: May 30, 2019

Issued by: Compliance Certification Services Inc.Wugu Lab.

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan.

(R.O.C.)

service@ccsrf.com

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report. The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory).

Tested By:

Gary Lee / Engineer

Approved By:

Kevin Tsai / Deputy Manager





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# **Revision History**

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
T190606W03-RP2	Rev.00	Initial creation of docu- ment	All	Jul. 02, 2019	Elle Chang
T190606W03-RP2	Rev.01	Updtaed FCC ID and report no.	Page 1	Jul. 16, 2019	Elle Chang

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### 1 GENERAL INFORMATION

#### 1.1 **Product Description**

Product Name:	Receiver/Anchor		
Brand Name:	Catapult		
Model No.:	VR7401		
Model Difference:	N/A		
Hardware Version:	N/A		
Software Version:	N/A		
	3.7Vdc from Rechargeable Li-polymer Battery		
Power Supply:	Battery: Model No.: 105085 Supplier: XPOWER SUOLUTION TECHNOLOGY		

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Wi-Fi 802.11	Frequency Range	Channels	Rated Power (Avg.) (dBm)	Modulation Technology	
	5150~5250	4	13.98	OFDM	
a	5725-5850	5	13.97	OFDIVI	
n_HT	5150~5250	4	HT: 12.96 (Worst case)	OEDM	
20M	5725-5850	5	HT: 12.95 (Worst case)	OFDM	
n_HT	5150~5250	2	HT: 9.39 (Worst case)	OFDM	
40M	5725-5850	2	HT: 9.34 (Worst case)	OFDIVI	
Modulation type		,	QAM, QPSK, BPSK for OFDM OFDM in 802.11ac only		
Transition Rate:		802.11 n_20	9/12/18/24/36/48/54 Mbps MHz: 6.5 – 72.2Mbps MHz: 13.5 – 150.0Mbps		

#### 1.2 **Antenna Designation**

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak An- tenna Gain (dBi)
Chin	N/A	N/A	5150~5250	4.03
Chip N/A	IN/A	5725~5850	3.84	

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### 1.3 Test Methodology of Applied Standards

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

ANSI C63.10:2013

Note:

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

### 1.4 Test Facility

Compliance Certification Services Inc. Wugu Lab. No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.) (TAF code 1309)

FCC Designation number: TW1309

### 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 a 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 50uH/50 ohm 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 Conducted Test (RF)

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

#### 2.3.3 **Radiated Emissions**

The EUT is a placed on a 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 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.

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### 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.

### 2.5 Configuration of Tested System

Fig. 2-1 Radiated Emission



Fig. 2-2 Conducted (Antenna Port) Configuration Emission

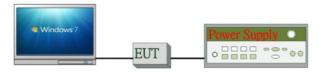
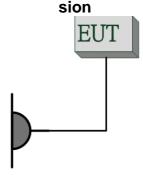


Fig. 2-3 AC Power Line Conducted Emis-



**Table 2-1 Equipment Used in Tested System** 

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Soft- ware	N/A	N/A	N/A	N/A	N/A
2.	DC Power Supply	Agilent	E3640A	MY52410006	N/A	Un-shielded
3.	Notebook	Lenovo	T440P	PC-089AH5	Shielded	Un-shielded

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### 3 SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	26 dB & 6dB & 99% Emission Bandwidth	Compliant
§15.407(a)	Maximum Conducted Output Power	Compliant
§15.407(a)	Power Spectral Density	Compliant
§15.205 §15.209 §15.407(b)	Undesirable Radiated Emissions	Compliant
§15.407(c)	Transmission in case of Absence of Information	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.203 §15.407(a)	Antenna Requirement	Compliant

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### **DESCRIPTION OF TEST MODES**

### 4.1 Operated in U-NII Bands

Operated band in 5150 MHz ~5250 MHz:

oporatoa barra ili o roo ilii		
802.11a / n HT20 Mode		
Channel	Frequency	
36	5180	
40	5200	
44	5220	
48	5240	

802.11 n HT40 Mode			
channel	Frequency		
38	5190		
46	5230		

### Operated band in 5745 MHz ~5850 MHz:

802.11a / n HT20 Mode		
Channel	Frequency	
149	5745	
153	5765	
157	5785	
161	5805	
165	5825	

802.11 n HT40 Mode			
channel Frequency			
151	5755		
159	5795		

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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 mode is programmed.
- 3. Investigation has been done on all the possible configurations for searching the worst case. The gevin UE is pre-scanned among below modes.

Modulation			
⊠ 802.11 a	⊠ 802.11 n	☐ 802.11 ac	

4. Therefore, below summary is the modes of test configuration that yield the highest reading and generate the highest emission chosen to carry out the relevantly mandatory test items.

#### RADIATED EMISSION TEST:

	RADIATED EMISSION TEST (BELOW 1 GHz)									
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT				
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	Ch0				
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Ch0				
	RADIATED EMISSION TEST (ABOVE 1 GHz)									
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT				
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6	Ch0				
802.11n_HT20	5100~5240	30 10 40	30,44,40	OFDM	MCS0	Ch0				
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0	Ch0				
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Ch0				
802.11n_HT20	3740~5625	149 (0 100	149,107,100	OFDM	MCS0	Ch0				
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS0	Ch0				

### Note:

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

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### ANTENNA PORT CONDUCTED MEASUREMENT:

	CONDUCTED TEST									
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	ANTENNA PORT				
802.11a	5180~5240	36 to 48	26 44 49	OFDM	6	Ch0				
802.11n_HT20	5160~5240	30 10 40	36,44,48	OFDM	MCS0	Ch0				
802.11n_HT40	5190~5230	38 to 46	38,46	OFDM	MCS0	Ch0				
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6	Ch0				
802.11n_HT20	5745~5625	149 (0 165	149,137,103	OFDM	MCS0	Ch0				
802.11n_HT40	5755~5795	151 to 159	151,159	OFDM	MCS0	Ch0				

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### MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575 dB
26dB & 6dB Emission Bandwidth	+/- 147.256 Hz
The Maximum Output Power	+/- 1.924 dB
Peak Power Spectral Density	+/- 2.038 dB
Frequency Stability	+/- 147.256 Hz
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12 dB
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68 dB
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18 dB
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47 dB
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81 dB
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87 dB

#### Note:

- 1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2. Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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### 6 CONDUCTED EMISSION TEST

### 6.1 Standard Applicable

Frequency range within 150 kHz to 30 MHz 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

### 6.2 Measurement Equipment Used

	Conducted Emission Test Site									
EQUIPMENT	MFR	MFR MODEL SERIAL LAST CAL D								
TYPE		NUMBER	NUMBER	CAL.						
CABLE	EMCI	CFD300-NL	CERF	06/29/2018	06/28/2019					
EMI Test Receiver	R&S	ESCI	100064	07/24/2018	07/23/2019					
LISN	SCHWARZ- BECK	NSLK 8127	8127-541	01/31/2019	01/30/2020					
LISN	SCHAFFNER	NNB 41	03/10013	02/13/2019	02/12/2020					
Adapter	SAMSUNG	ETA-U90JWS	RT4D402KS/B							
Software	EZ-EMC(CCS-3A1-CE)									

### 6.3 EUT Setup

- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
- 3. The LISN was connected with 120Vac/60Hz power source.

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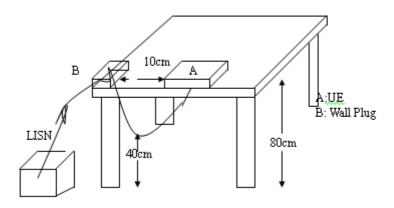
<sup>1.</sup> The lower limit shall apply at the transition frequencies

<sup>2.</sup> The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50



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### 6.4 Test SET-UP



#### 6.5 Measurement Procedure

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

#### 6.6 Measurement Result

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

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

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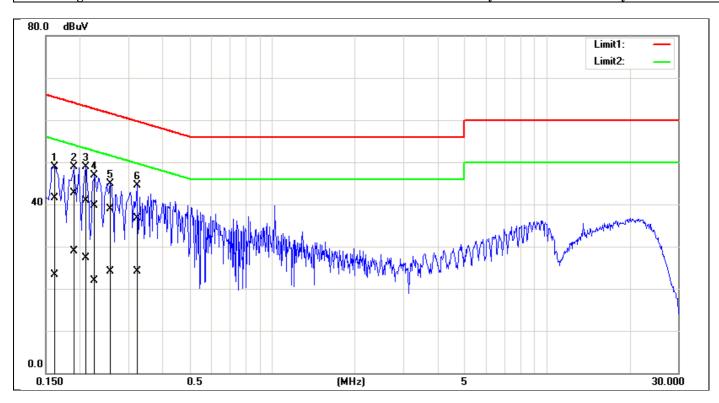


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### AC POWER LINE CONDUCTED EMISSION TEST DATA

**Description: Operation** 2019/6/17 **Temp.(℃)/Hum.(%):** Line: 24.8(°C)/58%

**Test Voltage:** AC 120V/60Hz Test By: Gary



No.	Fre- quency	Qua- siPeak	Average reading	Correc- tion	Qua- siPeak	Average result	Qua- siPeak	Average limit	Qua- siPeak	Average margin	Remark
		reading		factor	result		limit		margin		
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.1620	31.42	13.10	10.14	41.56	23.24	65.36	55.36	-23.80	-32.12	Pass
2*	0.1900	32.49	18.78	10.13	42.62	28.91	64.04	54.04	-21.42	-25.13	Pass
3	0.2100	30.80	17.25	10.13	40.93	27.38	63.21	53.21	-22.28	-25.83	Pass
4	0.2260	29.52	11.83	10.13	39.65	21.96	62.60	52.60	-22.95	-30.64	Pass
5	0.2580	28.71	13.97	10.13	38.84	24.10	61.50	51.50	-22.66	-27.40	Pass
6	0.3220	26.53	14.06	10.14	36.67	24.20	59.66	49.66	-22.99	-25.46	Pass

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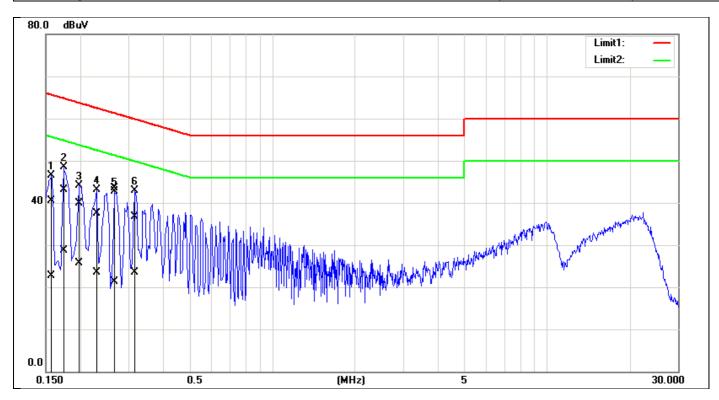
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2019/6/17 **Description:** Date: **Operation** Line: **Temp.(°C)/Hum.(%):** 24.8(°C)/58%

**Test Voltage:** AC 120V/60Hz Test By:



No.	Fre- quency	Qua- siPeak	Average reading	Correc- tion	Qua- siPeak	Average result	Qua- siPeak	Average limit	Qua- siPeak	Average margin	Remark
		reading		factor	result		limit		margin		
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.1580	30.48	12.74	10.02	40.50	22.76	65.56	55.57	-25.06	-32.81	Pass
2	0.1740	33.14	18.61	10.02	43.16	28.63	64.76	54.77	-21.60	-26.14	Pass
3	0.1986	29.83	15.59	10.02	39.85	25.61	63.66	53.67	-23.81	-28.06	Pass
4	0.2300	27.42	13.46	10.02	37.44	23.48	62.45	52.45	-25.01	-28.97	Pass
5*	0.2660	33.44	11.26	10.02	43.46	21.28	61.24	51.24	-17.78	-29.96	Pass
6	0.3180	26.63	13.40	10.03	36.66	23.43	59.76	49.76	-23.10	-26.33	Pass

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### 7 DUTY CYCLE TEST SIGNAL

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

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

#### Formula:

Duty Cycle = Ton / (Ton+Toff)

#### **Measurement Procedure:**

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

### **Duty Cycle:**

Mode	Duty Cycle (%)	Duty Factor (dB) =10*log ( 1/Duty Cycle )	1/T (kHz)	VBW setting (kHz)
802.11a	93.52	0.29	0.70	1.00
802.11n_20	93.10	0.31	0.75	1.00
802.11n_40	86.75	0.62	1.50	2.00

Duty Cycle Factor:  $10 * \log(1/0.9352) = 0.29$ Duty Cycle Factor:  $10 * \log(1/0.931) = 0.31$ Duty Cycle Factor:  $10 * \log(1/0.8675) = 0.62$ 

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### DUTY CYCLE TEST SIGNAL MEASUREMENT RESULT

#### 802.11a



### 802.11n HT20



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### 802.11n HT 40



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#### 8 26DB & 6DB EMISSION BANDWIDTH MEASUREMENT

### 8.1 Standard Applicable

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C. The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

#### 8.2 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
  - a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto, Detector = Peak, Trace Mode = Max Hold, Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.
  - b. Mark the peak frequency and –26dB (upper and lower) frequency.
- 4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
- 5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
  - a. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3\*RBW, Span = 30M/50MHz, Detector=Peak.
    - Sweep=auto
  - b. Mark the peak frequency and -6dB (upper and lower) frequency.
- 6. For 99% Bandwidth:
  - Set the spectrum analyzer as RBW=1%, VBW = 3\*RBW, Span = 30M/50MHz, Detector=Sample, Sweep=auto.
- 7. Turn on the 99% bandwidth function, max reading.
- 8. Repeat above procedures until all frequency of interest measured was complete.

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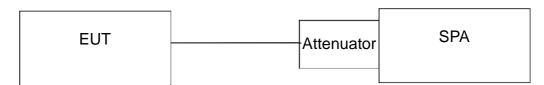


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### 8.3 Measurement Equipment Used

	SGS Conducted Room									
Name of Equip- ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due					
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/22/2019	04/21/2020					
Thermo- static/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/08/2018	10/07/2019					
DC Block	Mini-Circuits	BLK-18-S+	31129(1)	02/26/2019	02/25/2020					
DC Power Supply	Agilent	E3640A	KR93300208	08/15/2018	08/14/2019					
Attenuator	Mini-Circuit	BW-S10W2+	1	02/26/2019	02/25/2020					

### 8.4 Test Set-up



#### 8.5 Measurement Result

#### 26dB Bandwidth

802.11a\_Ch0

#### 802.11n\_HT20\_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)	Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5180	20.64	13.147	5180	21.63	13.351
5220	21.48	13.320	5220	21.82	13.389
5240	21.74	13.373	5240	21.79	13.383

#### 802.11n \_HT40\_Ch0

Frequency (MHz)	26dB BW (MHz)	10 Log (B) (dB)
5190	40.09	16.030
5230	39.93	16.013

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### 6dB Bandwidth (5725 MHz~ 5850 MHz) measure with Peak detector for FCC

802.11a\_Ch0

802.11n\_HT20\_Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.34	12.133
5785	16.38	12.143
5825	16.37	12.140

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	
5745	17.6	12.455	
5785	17.61	12.458	
5825	17.59	12.453	

#### 802.11n\_HT40\_Ch0

Frequency (MHz)	6dB BW (MHz)	10 Log (B) (dB)	
5755	36.33	15.603	
5795	36.34	15.604	

### 99% BW verification for DFS Function

802.11a\_Ch0

802.11n\_HT20\_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)	Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)
5240	5248.46	< 5250	5240	5248.97	< 5250
5745	5736.72	> 5725	5745	5736.12	> 5725

#### 802.11n \_HT40\_Ch0

Frequency (MHz)	Measured Frequency (MHz)	Limit (MHz)	
5230	5248.20	< 5250	
5755	5736.85	> 5725	

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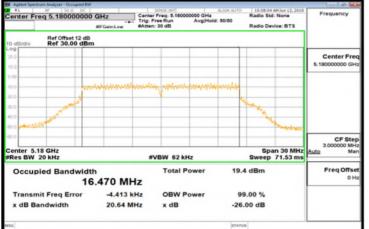
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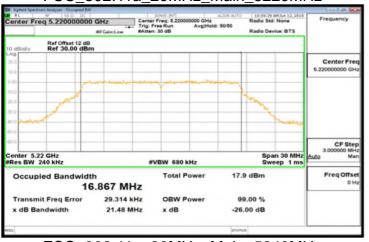


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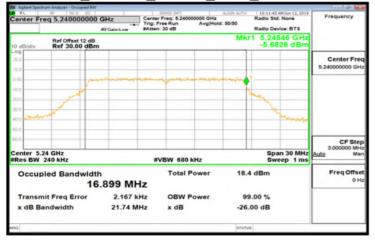
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## FCC\_802.11a\_20MHz\_Main\_5220MHz



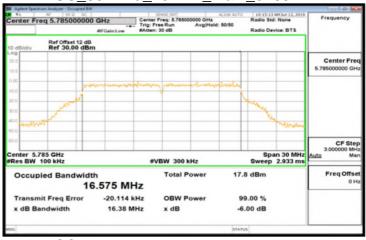
### FCC 802.11a 20MHz Main 5240MHz



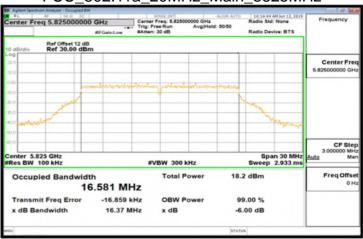
#### FCC\_802.11a\_20MHz\_Main\_5745MHz



### FCC\_802.11a\_20MHz\_Main\_5785MHz



### FCC 802.11a 20MHz Main 5825MHz



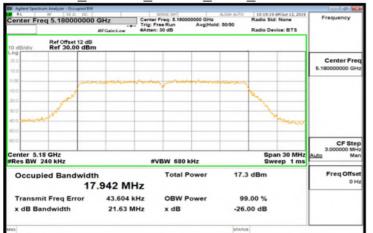
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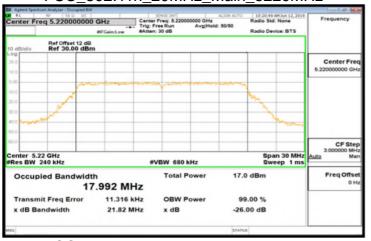


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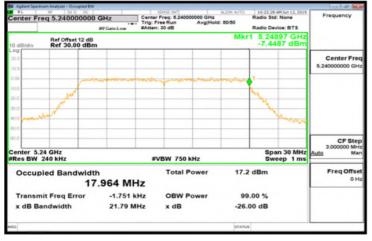
### FCC\_802.11n\_20MHz\_Main\_5180MHz



## FCC\_802.11n\_20MHz\_Main\_5220MHz



### FCC 802.11n 20MHz Main 5240MHz



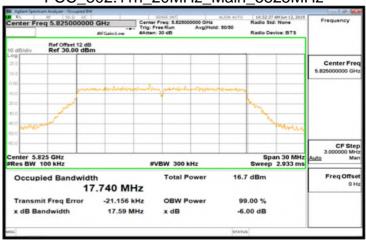
#### FCC\_802.11n\_20MHz\_Main\_5745MHz



### FCC\_802.11n\_20MHz\_Main\_5785MHz



### FCC 802.11n 20MHz Main 5825MHz



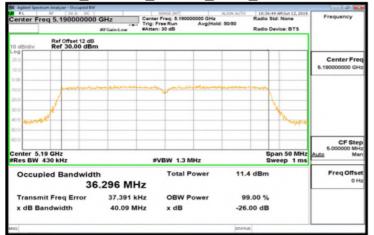
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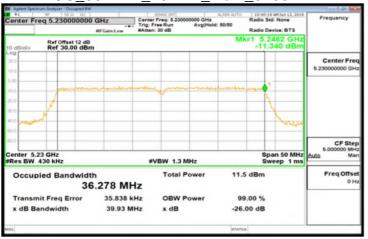


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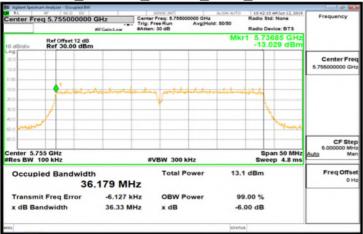
### FCC\_802.11n\_40MHz\_Main\_5190MHz



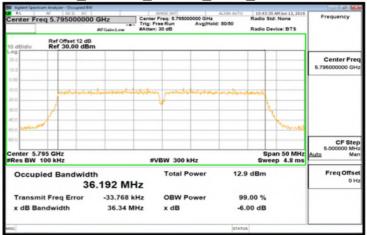
## FCC\_802.11n\_40MHz\_Main\_5230MHz



### FCC 802.11n 40MHz Main 5755MHz



### FCC\_802.11n\_40MHz\_Main\_5795MHz



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### MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

### Standard Applicable

OPERZTION Band	EUT CATEGORY	LIMIT
	Access Point (Master device )	1 Watt(30dBm)
U-NII-1	Fixed point-to-point Access Ponit	1 Watt(30dBm)
	 Mobile and portable client device	250mW(23.98dBm)
U-NII-2A		250mW(23.98dBm) or 11dBm+10 log B
U-NII-2C		250mW(23.98dBm) or 11dBm+10 log B
U-NII-3		1 Watt(30dBm)

If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna exceeds 6 dBi.

The antenna gain is not grater than 6 dBi. Therefore, reduction of power is not required.

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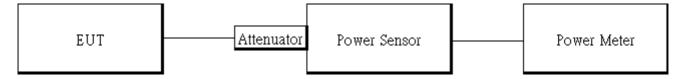
### 9.2 Measurement Procedure

- Place the EUT on the table and set it in transmitting mode.
- The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
- Power Meter is used as the SISOiliary test equipment to conduct the output power meas-
- Record the max. reading and add 10 log(1/duty cycle).
- Repeat above procedures until all frequency (low, middle, and high channel) measured were

### 9.3 Measurement Equipment Used

SGS Conducted Room									
Name of Equip- ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due				
Power Meter	Anritsu	ML2496A	1242004	10/23/2018	10/22/2019				
Power Sensor	Anritsu	MA2411B	1207365	10/23/2018	10/22/2019				
Power Sensor	Anritsu	MA2411B	1207368	10/24/2018	10/23/2019				
DC Power Supply	Agilent	E3640A	KR93300208	08/15/2018	08/14/2019				
Attenuator	Mini-Circuit	BW-S10W2+	3	02/26/2019	02/25/2020				

### 9.4 Test Set-up



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## 9.5 Measurement Result **Conducted output power (FCC)**

802.11a Ch0

CII	Frequency	Data	TOTAL	TOTAL	REQUIRED	DECLUT	
СН	CH (MHz)		POWER POWER (dBm) (mW)		LIMIT (dBm)	RESULT	
36	5180	6	13.95	24.837	23.98	PASS	
44	5220	6	13.84	24.216	23.98	PASS	
48	5240	6	13.98	25.009	23.98	PASS	
149	5745	6	13.97	24.951	30	PASS	
157	5785	6	13.92	24.666	30	PASS	
165	5825	6	13.95	24.837	30	PASS	

#### 802.11n HT20 Ch0

СН	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT		
36	5180	MCS0	12.96	19.772	23.98	PASS		
44	5220	MCS0	12.89	19.456	23.98	PASS		
48	5240	MCS0	12.93	19.636	23.98	PASS		
149	5745	MCS0	12.95	19.727	30	PASS		
157	5785	MCS0	12.91	19.546	30	PASS		
165	5825	MCS0	12.94	19.681	30	PASS		

#### 802.11n HT40 Ch0

СН	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	9.39	8.684	23.98	PASS
46	5230	MCS0	9.37	8.644	23.98	PASS
151	5755	MCS0	9.34	8.585	30	PASS
159	5795	MCS0	9.29	8.487	30	PASS

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#### 10 MAXIMUM POWER SPECTRAL DENSITY

### 10.1 Standard Applicable

OPERZTION Band	EUT CATEGORY	LIMIT
	Access Point (Master device )	17dBm/ MHz
U-NII-1	Fixed point-to-point Access Ponit	17 dbm/ wilz
	 Mobile and portable client device	11dBm/ MHz
U-NII-2A		11dBm/ MHz
U-NII-2C		11dBm/ MHz
U-NII-3		30dBm/ 500kHz

If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The antenna gain is not grater than 6 dBi. Therefore, reduction of power is not required.

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#### 10.2 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.

#### 4. For U-NII1, U-NII-2A, U-NII-2C Band:

Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

#### For U-NII-3 Band:

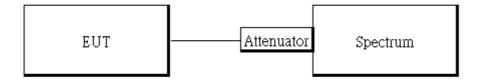
Set RBW=500 kHz, VBW≥ 3RBW, where span is enough to capture the entire bandwidth. Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

- 5. User the cursor on spectrum to peak search the highest level of trace
- 6. Record the max. reading and add 10 log(1/duty cycle).
- 7. Repeat above procedures until all default test channel (low, middle, and high) was complete.

### 10.3 Measurement Equipment Used

SGS Conducted Room									
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due				
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/22/2019	04/21/2020				
Thermostatic/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/08/2018	10/07/2019				
DC Block	Mini-Circuits	BLK-18-S+	31129(1)	02/26/2019	02/25/2020				
DC Power Supply	Agilent	E3640A	KR93300208	08/15/2018	08/14/2019				
Attenuator	Mini-Circuit	BW-S10W2+	1	02/26/2019	02/25/2020				

#### 10.4 Test Set-up



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#### 10.5 Measurement Result

	POWER DENS	SITY 802.11	a MODE_Ch	0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)				
5180.00	1.26	0.29	1.55	11.00	-9.45				
5220.00	1.44	0.29	1.73	11.00	-9.27				
5240.00	1.08	0.29	1.37	11.00	-9.63				
5745.00	-1.48	0.29	-1.19	30.00	-31.19				
5785.00	-1.33	0.29	-1.04	30.00	-31.04				
5825.00	-1.55	0.29	-1.26	30.00	-31.26				
	POWER DENSITY 802.11n HT20 MODE_Ch0								
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)				
5180	0.30	0.32	0.62	11	-10.38				
5220	-0.08	0.32	0.24	11	-10.76				
5240	-0.08	0.32	0.24	11	-10.76				
5745	-2.72	0.32	-2.40	30	-32.40				
5785	-3.07	0.32	-2.75	30	-32.75				
5825	-3.05	0.32	-2.73	30	-32.73				
	POWER DENSIT	Y 802.11n F	IT40 MODE_	Ch0					
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm)	Limit (dBm)	Margin (dB)				
5190	-8.84	0.61	-8.23	11	-19.23				
5230	-9.3	0.61	-8.69	11	-19.69				
5755	-10.41	0.61	-9.80	30	-39.80				
5795	-10.32	0.61	-9.71	30	-39.71				

Note:

Cable Loss=

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### 802.11a\_20MHz\_5180MHz



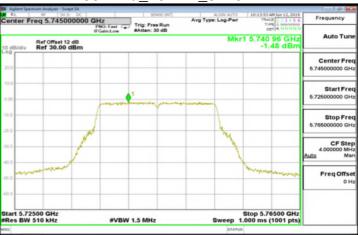
### 802.11a\_20MHz\_5220MHz



## 802.11a\_20MHz\_5240MHz



### 802.11a\_20MHz\_5745MHz



#### 802.11a\_20MHz\_5785MHz



## 802.11a\_20MHz\_5825MHz



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### 802.11n\_20MHz\_5180MHz



# 802.11n\_20MHz\_5220MHz



## 802.11n\_20MHz\_5240MHz



### 802.11n\_20MHz\_5745MHz



#### 802.11n\_20MHz\_5785MHz



### 802.11n\_20MHz\_5825MHz



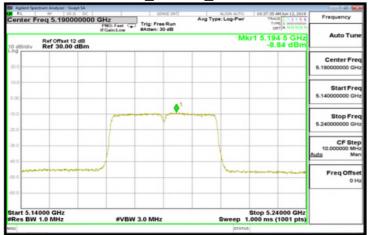
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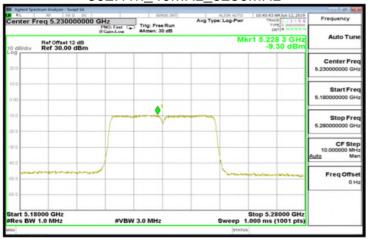


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### 802.11n\_40MHz\_5190MHz



### 802.11n\_40MHz\_5230MHz



#### 802.11n\_40MHz\_5775MHz



#### 802.11n\_40MHz\_5795MHz



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### 11 UNDESIRABLE RADIATED EMISSION MEASUREMENT

### 11.1 Standard Applicable

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- 1. For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- 2. For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

APPLICABLE TO	LIMIT	
FCC KDB 789033 D02 General UNII Test Procedures New Rules	FIELD STRENGTH AT 3m	
	PK: 74 (dBμV/m)	AV 54 (dBµV/m)
APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m
15.407(b)(1)		
15.407(b)(2)	PK: -27 (dBm/MHz)	PK: 68.3 (dBµV/m)
15.407(b)(3)		
15.407(b)(4)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBµV/m) *1 PK:105.2 (dBµV/m) *2 PK: 110.8(dBµV/m) *3 PK:122.2 (dBµV/m) *4

<sup>\*1</sup> beyond 75 MHz or more above of the bandedge.

EIRP = ( (E\*d)^2) / 30, where E is the field in V/m, d is the measurement distance (3m), EIRP is the equivalent isotropically radiated power in Watts.

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<sup>\*2</sup> below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

<sup>\*3</sup> below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

<sup>\*4</sup> from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.



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Unwanted spurious emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

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

#### Note:

- 1. The lower limit shall apply at the transition frequencies.
- 2. Emission level  $(dB\mu V/m) = 20 \log Emission level (dB\mu V/m)$

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# 11.2 Measurement Equipment Used

	966A Chamber							
Name of Equip- ment	Manufacturer	Model	Serial Num- ber	Calibration Date	Calibration Due			
Horn Antenna	ETS LIND- GREN	3116	00026370	12/26/2018	12/25/2019			
Bilog Antenna	Sunol Sciences	JB3	A030105	07/13/2018	07/12/2019			
Cable	HUBER SU- HNER	SUCOFLEX 104PEA	25157	06/29/2018	06/28/2019			
Cable	HUBER SU- HNER	SUCOFLEX 104PEA	20995	06/29/2018	06/28/2019			
Digital Thermo-Hy- gro Meter	WISEWIND	1206	D07	01/30/2019	01/29/2020			
double Ridged Guide Horn An- tenna	ETC	MCTD 1209	DRH13M02003	08/20/2018	08/19/2019			
High Pass Filters	MICRO TRON- ICS	HPM13195	003	02/26/2019	02/25/2020			
Horn Antenna	ETS LIND- GREN	3116	00026370	12/26/2018	12/25/2019			
Loop Ant	COM-POWER	AL-130	121051	03/22/2019	03/21/2020			
Pre-Amplifier	EMEC	EM330	060609	06/29/2018	06/28/2019			
Pre-Amplifier	MITEQ	AMF-6F- 260400-40-8P	985646	06/21/2018	06/20/2019			
Pre-Amplifier	HP	8449B	3008A00965	06/29/2018	06/28/2019			
PSA Series Spec- trum Analyzer	Agilent	E4446A	MY46180323	05/29/2019	05/28/2020			
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R			
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R			
Software		e3 V	6.11-20180413					

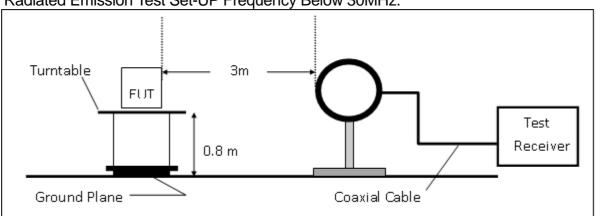
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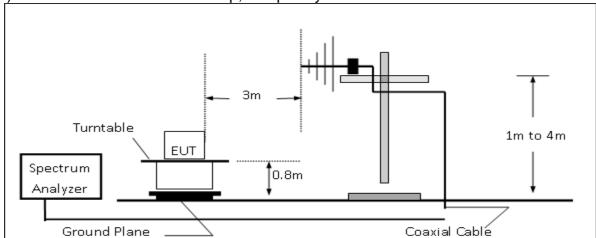
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### 11.3 Test SET-UP

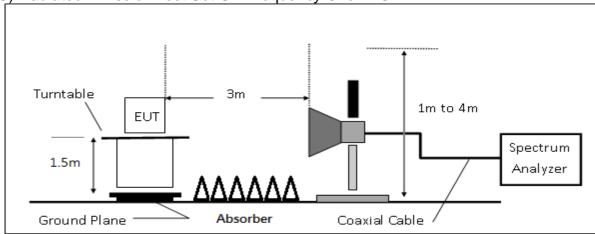
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



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



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



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#### 11.4 Measurement Procedure

- The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
- 3. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plane.
- 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 emissions.
- 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.
- Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
- 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.
- Maximum procedure was performed on the six highest emissions to ensure EUT compli-9. ance.
- 10. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 11. Repeat above procedures until all frequency 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  $FS(dB\mu V/m) = SPA$ . Reading level $(dB\mu V) + Factor(dB)$ Factor(dB) = Antenna Factor(dBµV/m) + Cable Loss(dB) - Pre Amplifier Gain(dB)

## 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.

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### 11.7 Measurement Result

**Radiated Spurious Emission Measurement Result** 

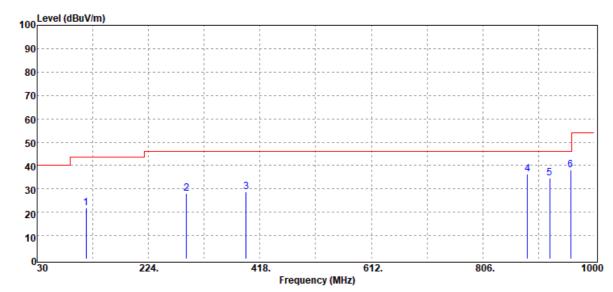
**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11a / Band1 Temp./Humi. :21/53

:VERTICAL Frequency :5220 MHz Antenna Pol.

Operation Mode :Tx CH Mid Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
115.36	Peak	30.94	-9.27	21.67	43.50	-21.83
289.96	Peak	36.30	-8.34	27.96	46.00	-18.04
393.75	Peak	34.75	-5.89	28.86	46.00	-17.14
883.60	Peak	32.62	3.65	36.27	46.00	-9.73
922.40	Peak	30.63	3.93	34.56	46.00	-11.44
959.26	Peak	33.66	4.48	38.14	46.00	-7.86

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EUT Pol.

Report No.: T190606W03-RP2

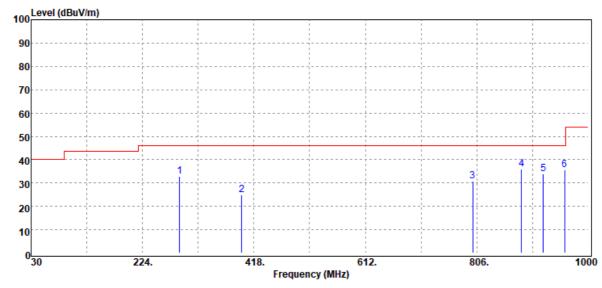
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**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11a / Band1 Temp./Humi. :21/53

:HORIZONTAL Frequency :5220 MHz Antenna Pol.

Operation Mode :Tx CH Mid Engineer :Kane



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
288.99	Peak	41.09	-8.36	32.73	46.00	-13.27
396.66	Peak	30.68	-5.75	24.93	46.00	-21.07
799.21	Peak	29.29	1.52	30.81	46.00	-15.19
883.60	Peak	32.43	3.65	36.08	46.00	-9.92
921.43	Peak	29.97	3.95	33.92	46.00	-12.08
959.26	Peak	31.26	4.48	35.74	46.00	-10.26

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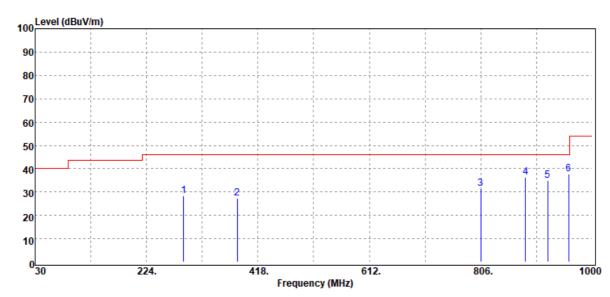
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**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11a / Band4 Temp./Humi. :21/53

:VERTICAL Frequency :5785 MHz Antenna Pol.

Operation Mode :Tx CH Mid Engineer :Kane EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBμV/m	dBµV/m	dB
288.99	Peak	36.71	-8.36	28.35	46.00	-17.65
382.11	Peak	33.72	-6.31	27.41	46.00	-18.59
806.00	Peak	29.35	2.03	31.38	46.00	-14.62
883.60	Peak	32.64	3.65	36.29	46.00	-9.71
922.40	Peak	30.89	3.93	34.82	46.00	-11.18
959.26	Peak	33.32	4.48	37.80	46.00	-8.20

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EUT Pol.

Report No.: T190606W03-RP2

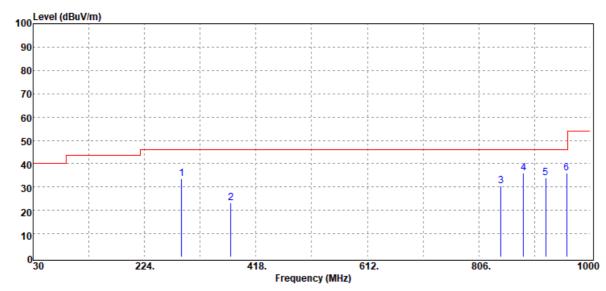
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**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11a / Band4 Temp./Humi. :21/53

:HORIZONTAL Frequency :5785 MHz Antenna Pol.

Operation Mode :Tx CH Mid Engineer :Kane



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBµV/m	dB
288.99	Peak	41.95	-8.36	33.59	46.00	-12.41
374.35	Peak	29.64	-6.37	23.27	46.00	-22.73
844.80	Peak	27.25	3.12	30.37	46.00	-15.63
883.60	Peak	32.22	3.65	35.87	46.00	-10.13
922.40	Peak	29.97	3.93	33.90	46.00	-12.10
959.26	Peak	31.42	4.48	35.90	46.00	-10.10

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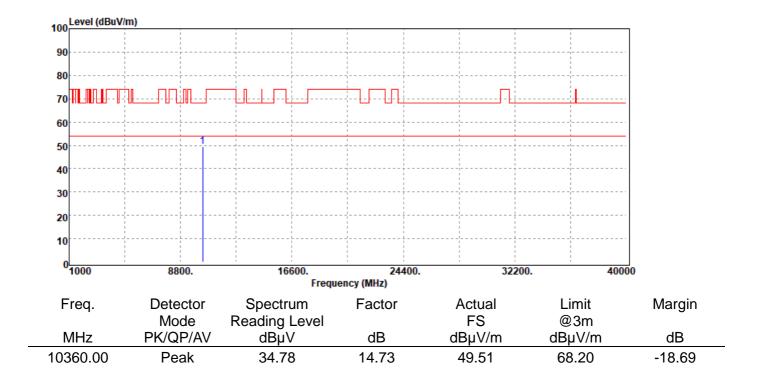
Project Number :T190606W03 Test Date :2019-06-19

Operation Band :802.11a / Band1 Temp./Humi. :21/53

Frequency :5180 MHz Antenna Pol. :VERTICAL

Operation Mode :Tx CH Low Engineer :Kane

EUT Pol. :E2 Plan



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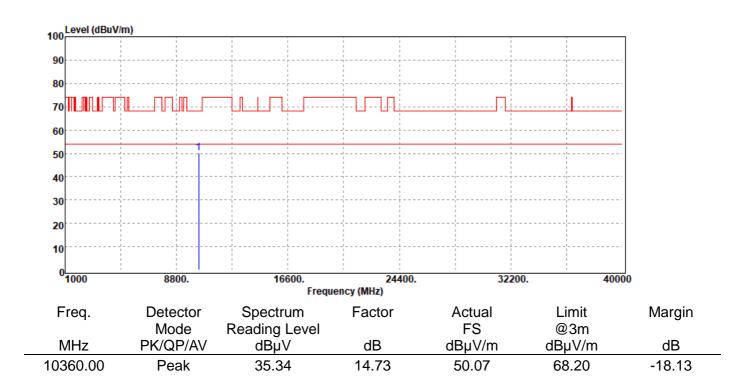
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Project Number :T190606W03 Test Date :2019-06-19

Operation Band :802.11a / Band1 Temp./Humi. :21/53

Frequency :5180 MHz Antenna Pol. :HORIZONTAL

Operation Mode :Tx CH Low Engineer :Kane



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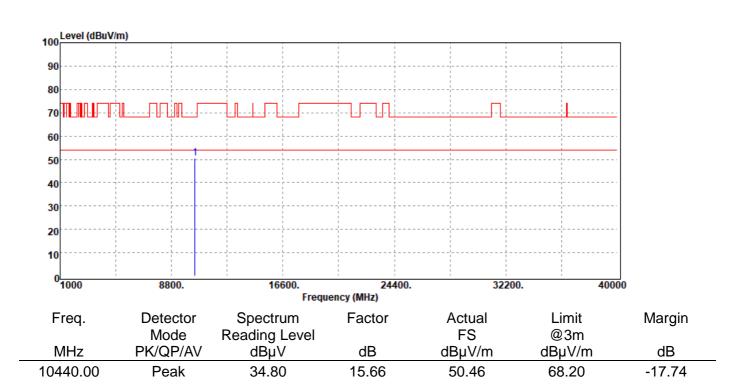
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Project Number :T190606W03 Test Date :2019-06-19

Operation Band :802.11a / Band1 Temp./Humi. :21/53

Frequency :5220 MHz Antenna Pol. :VERTICAL

Operation Mode :Tx CH Mid Engineer :Kane



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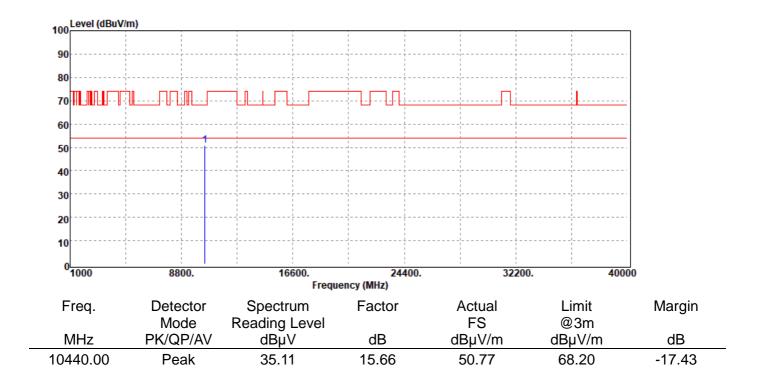
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Operation Band :802.11a / Band1 Temp./Humi. :21/53

Frequency :5220 MHz Antenna Pol. :HORIZONTAL

Operation Mode :Tx CH Mid Engineer :Kane

EUT Pol. :E2 Plan



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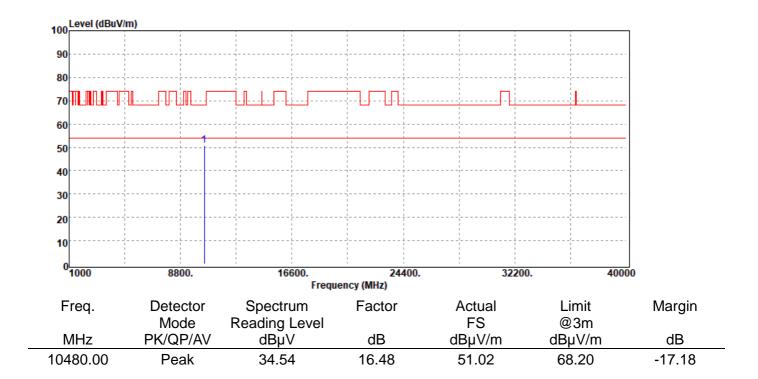
Project Number :T190606W03 Test Date :2019-06-19

Operation Band :802.11a / Band1 Temp./Humi. :21/53

Frequency :5240 MHz Antenna Pol. :VERTICAL

Operation Mode :Tx CH High Engineer :Kane

EUT Pol. :E2 Plan



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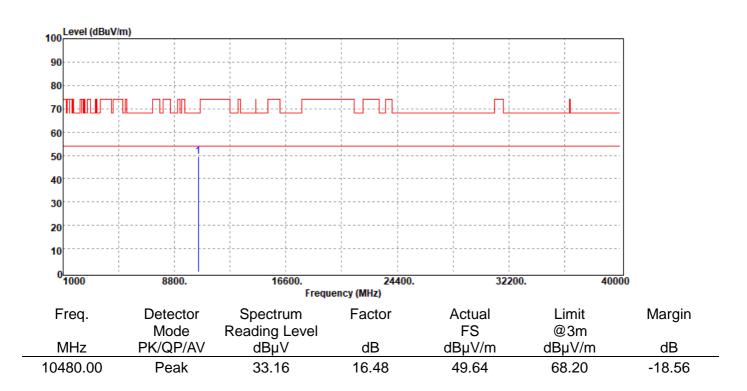
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Project Number :T190606W03 Test Date :2019-06-19

Operation Band :802.11a / Band1 Temp./Humi. :21/53

Frequency :5240 MHz Antenna Pol. :HORIZONTAL

Operation Mode :Tx CH High Engineer :Kane



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:Kane

Engineer

**Project Number** :T190606W03 **Test Date** :2019-06-19

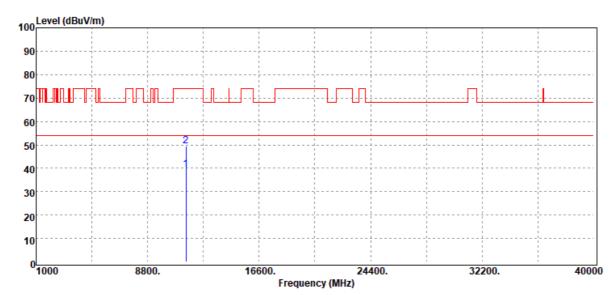
**Operation Band** :802.11a / Band4 Temp./Humi. :21/53

:VERTICAL Frequency :5745 MHz Antenna Pol.

EUT Pol. :E2 Plan

:Tx CH Low

**Operation Mode** 



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
		•		. •		
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBµV/m	dB
11490.00	Average	23.48	15.95	39.43	54.00	-14.57
11490.00	Peak	33.63	15.95	49.58	74.00	-24.42

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EUT Pol.

Report No.: T190606W03-RP2

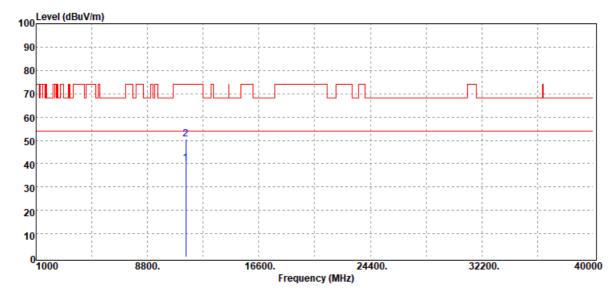
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**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11a / Band4 Temp./Humi. :21/53

:HORIZONTAL Frequency :5745 MHz Antenna Pol.

**Operation Mode** :Tx CH Low Engineer :Kane



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	-
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
11490.00	Average	24.17	15.95	40.12	54.00	-13.88
11490.00	Peak	34.41	15.95	50.36	74.00	-23.64

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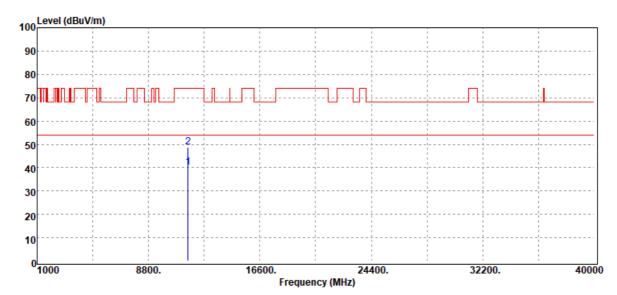
Page: 54 of 100

**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11a / Band4 Temp./Humi. :21/53

:VERTICAL Frequency :5785 MHz Antenna Pol.

**Operation Mode** :Tx CH Mid Engineer :Kane EUT Pol. :E2 Plan



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
11570.00	Average	23.84	16.41	40.25	54.00	-13.75
11570.00	Peak	32.28	16.41	48.69	74.00	-25.31

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天。本報告未經本公司書面許可‧不可部份複製。



EUT Pol.

Report No.: T190606W03-RP2

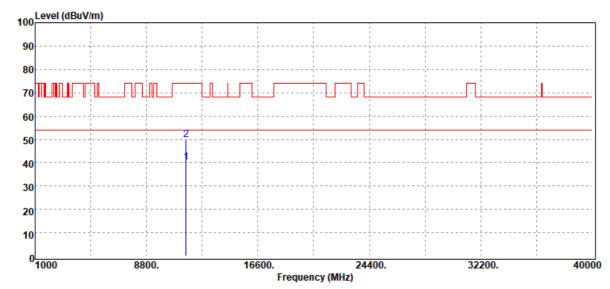
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**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11a / Band4 Temp./Humi. :21/53

:HORIZONTAL Frequency :5785 MHz Antenna Pol.

**Operation Mode** :Tx CH Mid Engineer :Kane



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	-
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
11570.00	Average	23.87	16.41	40.28	54.00	-13.72
11570.00	Peak	33.54	16.41	49.95	74.00	-24.05

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天。本報告未經本公司書面許可‧不可部份複製。



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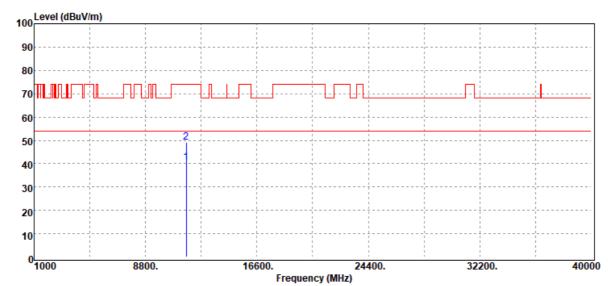
:Kane

**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11a / Band4 Temp./Humi. :21/53

:VERTICAL Frequency :5825 MHz Antenna Pol.

Operation Mode :Tx CH High Engineer EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
11650.00	Average	24.13	16.21	40.34	54.00	-13.66
11650.00	Peak	33.09	16.21	49.30	74.00	-24.70

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天‧本報告未經本公司書面許可‧不可部份複製。



EUT Pol.

Report No.: T190606W03-RP2

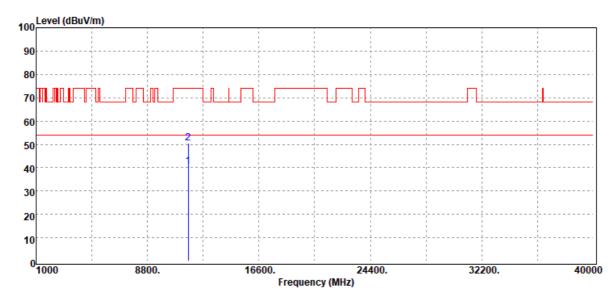
Page: 57 of 100

**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11a / Band4 Temp./Humi. :21/53

:HORIZONTAL Frequency :5825 MHz Antenna Pol.

Operation Mode :Tx CH High Engineer :Kane



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	-
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
11650.00	Average	24.23	16.21	40.44	54.00	-13.56
11650.00	Peak	34.38	16.21	50.59	74.00	-23.41

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天‧本報告未經本公司書面許可‧不可部份複製。



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:Kane

Engineer

Project Number :T190606W03 Test Date :2019-06-19

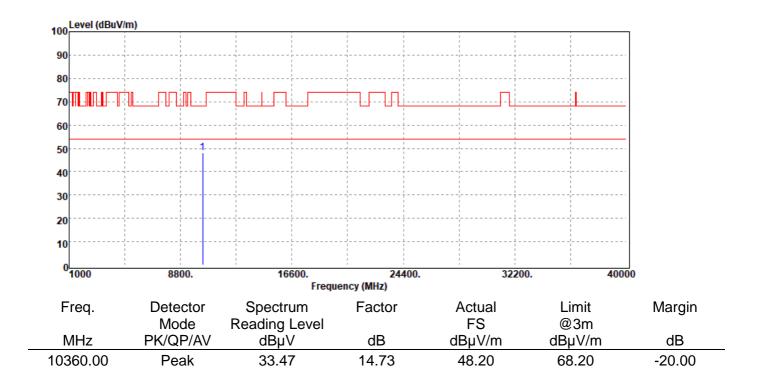
Operation Band :802.11n20/Band 1 Temp./Humi. :21/53

Frequency :5180 MHz Antenna Pol. :VERTICAL

EUT Pol. :E2 Plan

:Tx CH Low

Operation Mode



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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



EUT Pol.

Report No.: T190606W03-RP2

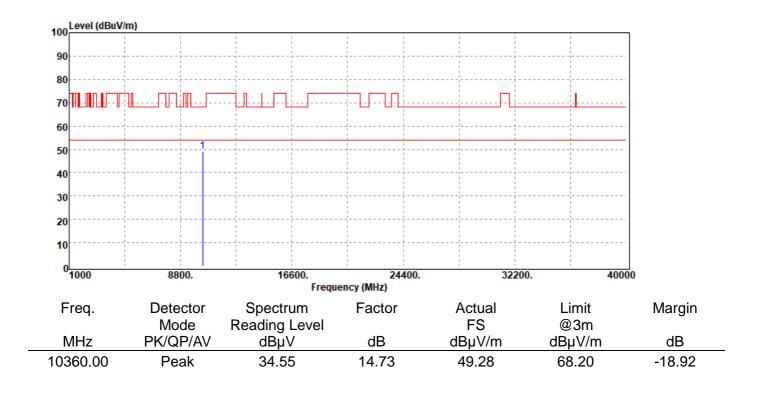
Page: 59 of 100

Project Number :T190606W03 Test Date :2019-06-19

Operation Band :802.11n20/Band 1 Temp./Humi. :21/53

Frequency :5180 MHz Antenna Pol. :HORIZONTAL

Operation Mode :Tx CH Low Engineer :Kane



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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



EUT Pol.

Report No.: T190606W03-RP2

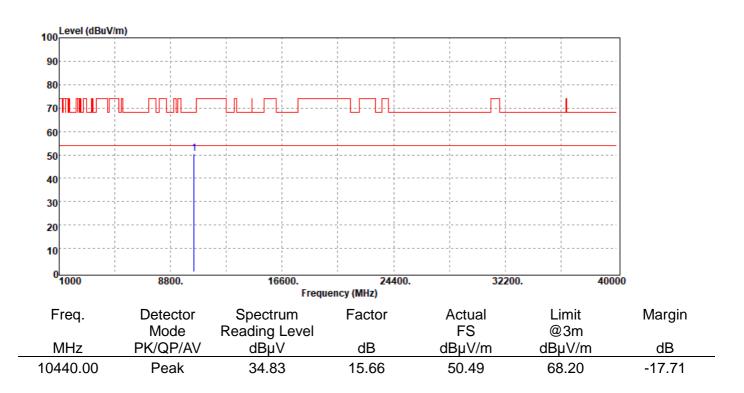
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Project Number :T190606W03 Test Date :2019-06-19

Operation Band :802.11n20/Band 1 Temp./Humi. :21/53

Frequency :5220 MHz Antenna Pol. :VERTICAL

Operation Mode :Tx CH Mid Engineer :Kane



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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



EUT Pol.

Report No.: T190606W03-RP2

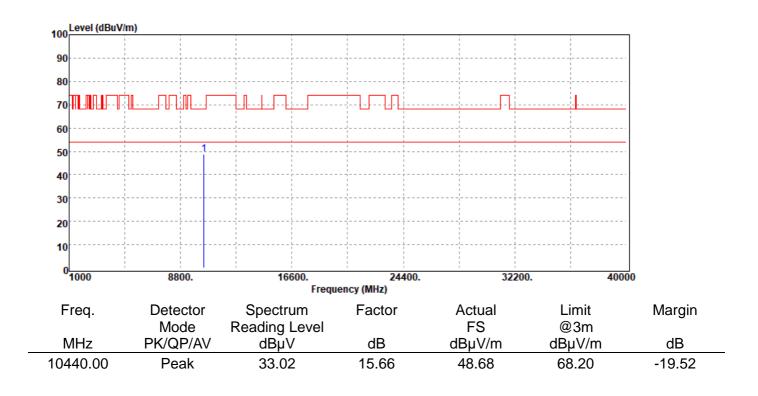
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Project Number :T190606W03 Test Date :2019-06-19

Operation Band :802.11n20/Band 1 Temp./Humi. :21/53

Frequency :5220 MHz Antenna Pol. :HORIZONTAL

Operation Mode :Tx CH Mid Engineer :Kane



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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



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:Kane

Engineer

Project Number :T190606W03 Test Date :2019-06-19

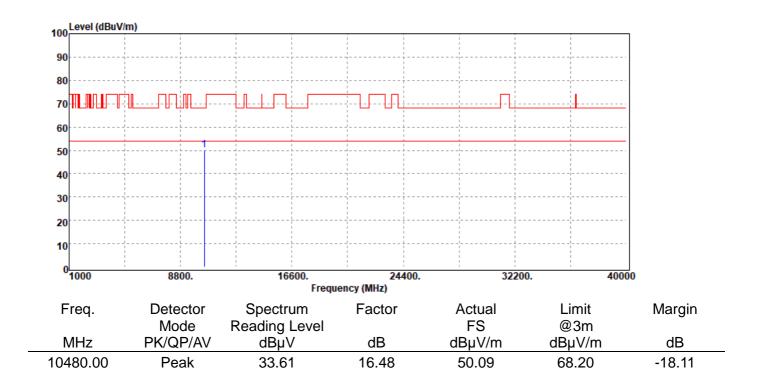
Operation Band :802.11n20/Band 1 Temp./Humi. :21/53

Frequency :5240 MHz Antenna Pol. :VERTICAL

EUT Pol. :E2 Plan

:Tx CH High

Operation Mode



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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



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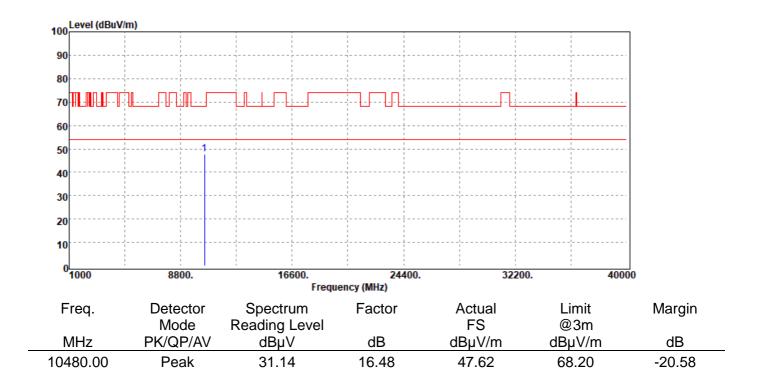
Project Number :T190606W03 Test Date :2019-06-19

Operation Band :802.11n20/Band 1 Temp./Humi. :21/53

Frequency :5240 MHz Antenna Pol. :HORIZONTAL

Operation Mode :Tx CH High Engineer :Kane

EUT Pol. :E2 Plan



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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



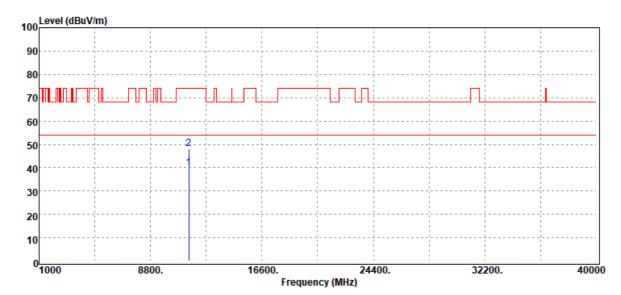
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**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11n20/Band 4 Temp./Humi. :21/53

:VERTICAL Frequency :5745 MHz Antenna Pol. **Operation Mode** :Tx CH Low Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	_
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
11490.00	Average	23.88	15.95	39.83	54.00	-14.17
11490.00	Peak	31.98	15.95	47.93	74.00	-26.07

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天‧本報告未經本公司書面許可‧不可部份複製。



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:Kane

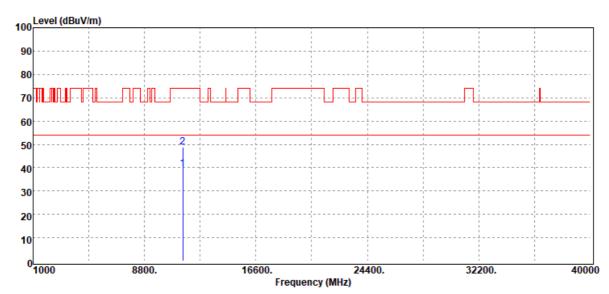
Engineer

**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11n20/Band 4 Temp./Humi. :21/53

:HORIZONTAL Frequency :5745 MHz Antenna Pol.

**Operation Mode** :Tx CH Low EUT Pol. :E2 Plan



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	-
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBµV/m	dB
11490.00	Average	23.49	15.95	39.44	54.00	-14.56
11490.00	Peak	32.68	15.95	48.63	74.00	-25.37

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天。本報告未經本公司書面許可‧不可部份複製。



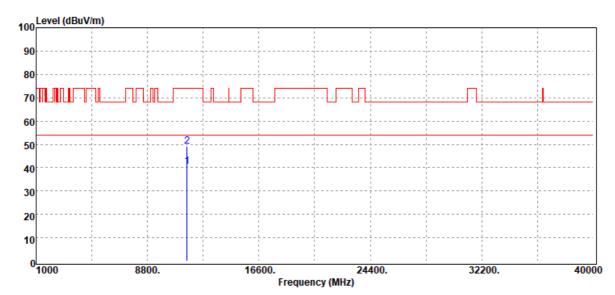
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**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11n20/Band 4 Temp./Humi. :21/53

:VERTICAL Frequency :5785 MHz Antenna Pol. **Operation Mode** :Tx CH Mid Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
11570.00	Average	23.93	16.41	40.34	54.00	-13.66
11570.00	Peak	32.69	16.41	49.10	74.00	-24.90

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天‧本報告未經本公司書面許可‧不可部份複製。



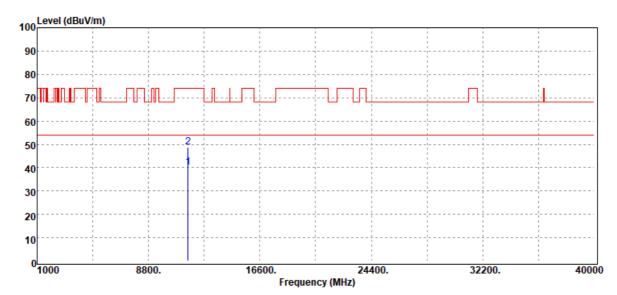
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Project Number :T190606W03 **Test Date** :2019-06-19

Operation Band :802.11n20/Band 4 Temp./Humi. :21/53

Antenna Pol. :HORIZONTAL Frequency :5785 MHz Operation Mode :Tx CH Mid Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	-
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
11570.00	Average	23.88	16.41	40.29	54.00	-13.71
11570.00	Peak	32.27	16.41	48.68	74.00	-25.32

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天‧本報告未經本公司書面許可‧不可部份複製。



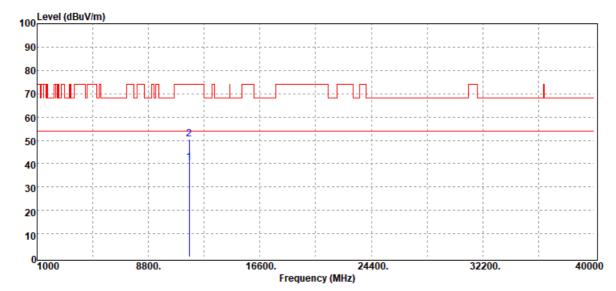
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**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11n20/Band 4 Temp./Humi. :21/53

:VERTICAL Frequency :5825 MHz Antenna Pol. Operation Mode :Tx CH High Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
11650.00	Average	24.16	16.21	40.37	54.00	-13.63
11650.00	Peak	34.44	16.21	50.65	74.00	-23.35

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天‧本報告未經本公司書面許可‧不可部份複製。



EUT Pol.

Report No.: T190606W03-RP2

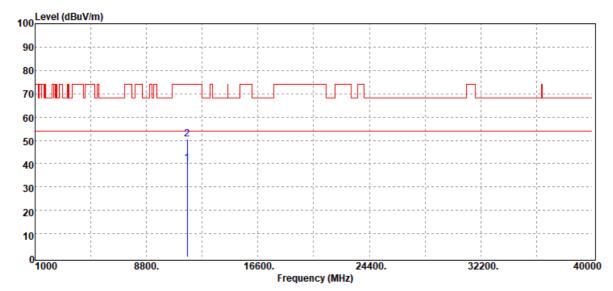
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**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11n20/Band 4 Temp./Humi. :21/53

:HORIZONTAL Frequency :5825 MHz Antenna Pol.

Operation Mode :Tx CH High Engineer :Kane



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	-
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
11650.00	Average	23.97	16.21	40.18	54.00	-13.82
11650.00	Peak	34.29	16.21	50.50	74.00	-23.50

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天。本報告未經本公司書面許可‧不可部份複製。



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:Kane

Engineer

Project Number :T190606W03 Test Date :2019-06-19

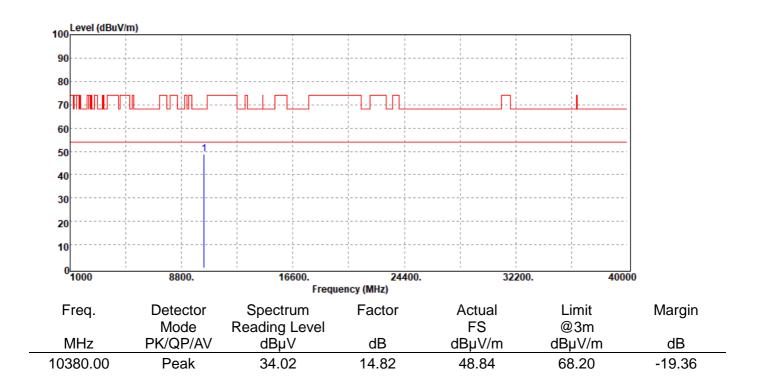
Operation Band :802.11n40 / Band1 Temp./Humi. :21/53

Frequency :5190 MHz Antenna Pol. :VERTICAL

EUT Pol. :E2 Plan

:Tx CH Low

Operation Mode



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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



EUT Pol.

Report No.: T190606W03-RP2

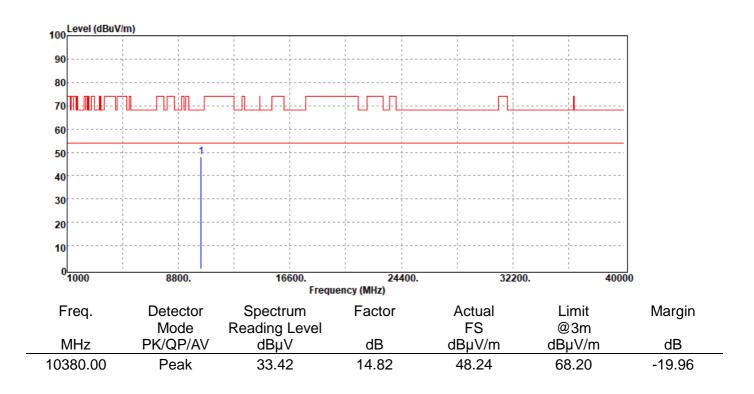
Page: 71 of 100

Project Number :T190606W03 Test Date :2019-06-19

Operation Band :802.11n40 / Band1 Temp./Humi. :21/53

Frequency :5190 MHz Antenna Pol. :HORIZONTAL

Operation Mode :Tx CH Low Engineer :Kane



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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



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:Kane

Engineer

Project Number :T190606W03 Test Date :2019-06-19

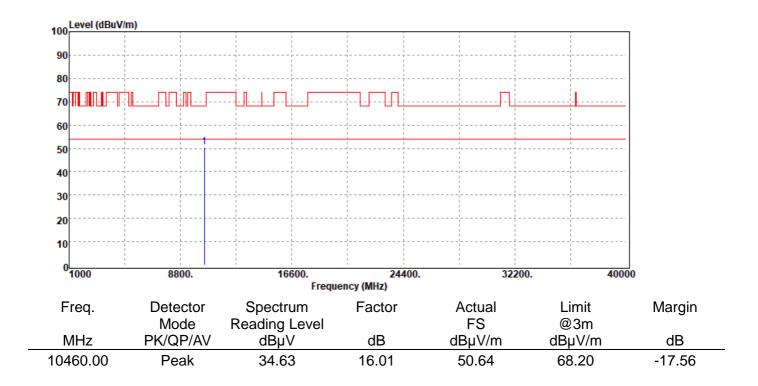
Operation Band :802.11n40 / Band1 Temp./Humi. :21/53

Frequency :5230 MHz Antenna Pol. :VERTICAL

EUT Pol. :E2 Plan

:Tx CH High

Operation Mode



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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



:E2 Plan

EUT Pol.

Report No.: T190606W03-RP2

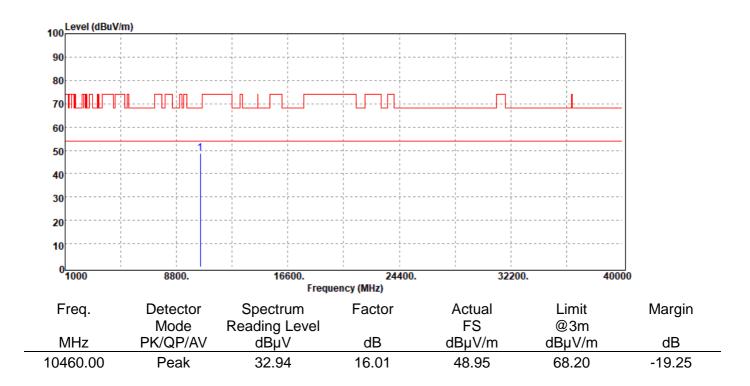
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Project Number :T190606W03 Test Date :2019-06-19

Operation Band :802.11n40 / Band1 Temp./Humi. :21/53

Frequency :5230 MHz Antenna Pol. :HORIZONTAL

Operation Mode :Tx CH High Engineer :Kane



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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



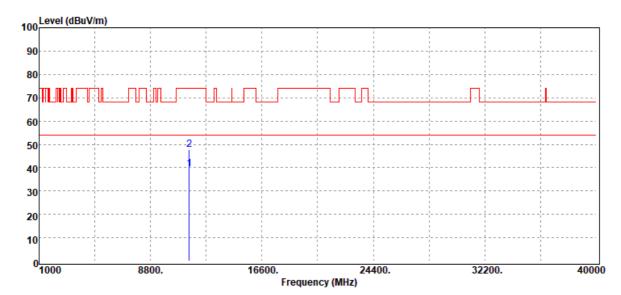
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**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11n40 / Band4 Temp./Humi. :21/53

:VERTICAL Frequency :5755 MHz Antenna Pol. **Operation Mode** :Tx CH Low Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	_
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
11510.00	Average	23.50	15.83	39.33	54.00	-14.67
11510.00	Peak	31.99	15.83	47.82	74.00	-26.18

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天‧本報告未經本公司書面許可‧不可部份複製。



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:Kane

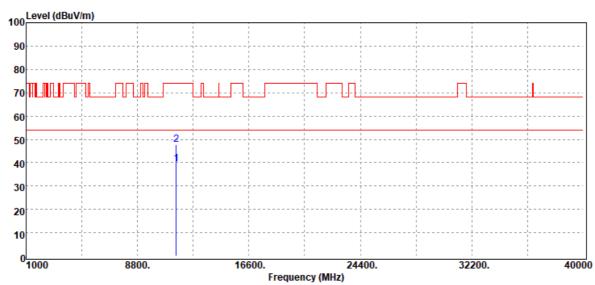
Engineer

**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11n40 / Band4 Temp./Humi. :21/53

:HORIZONTAL Frequency :5755 MHz Antenna Pol.

**Operation Mode** :Tx CH Low EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin	
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB	
11510.00	Average	23.53	15.83	39.36	54.00	-14.64	
11510.00	Peak	31.83	15.83	47.66	74.00	-26.34	

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天‧本報告未經本公司書面許可‧不可部份複製。



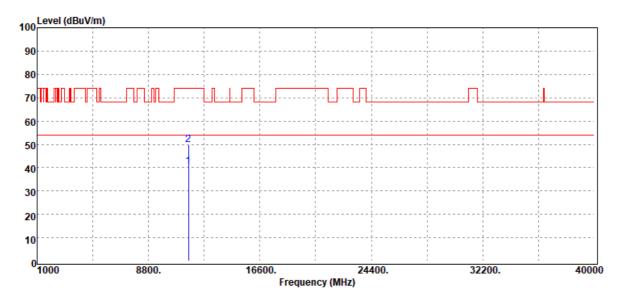
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**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11n40 / Band4 Temp./Humi. :21/53

:VERTICAL Frequency :5795 MHz Antenna Pol. Operation Mode :Tx CH High Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	_
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
11590.00	Average	23.86	16.74	40.60	54.00	-13.40
11590.00	Peak	32.95	16.74	49.69	74.00	-24.31

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天‧本報告未經本公司書面許可‧不可部份複製。



:E2 Plan

EUT Pol.

Report No.: T190606W03-RP2

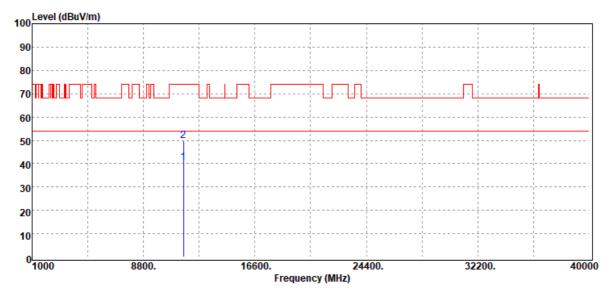
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**Project Number** :T190606W03 **Test Date** :2019-06-19

**Operation Band** :802.11n40 / Band4 Temp./Humi. :21/53

:HORIZONTAL Frequency :5795 MHz Antenna Pol.

Operation Mode :Tx CH High Engineer :Kane



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	-
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
11590.00	Average	23.85	16.74	40.59	54.00	-13.41
11590.00	Peak	33.22	16.74	49.96	74.00	-24.04

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天。本報告未經本公司書面許可‧不可部份複製。



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# Band edge falling to restricted band

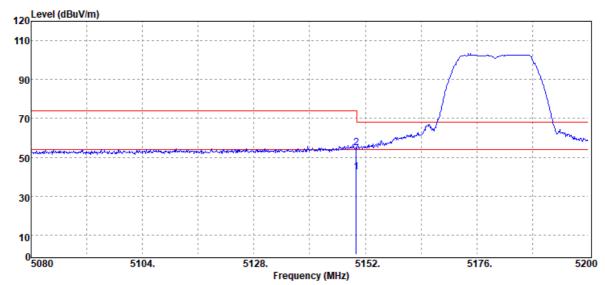
**Project Number** :T190606W03 **Test Date** :2019-06-14

**Operation Band** :802.11a / Band1 Temp./Humi. :21/53

Frequency :VERTICAL :5180 MHz Antenna Pol.

**Operation Mode** :BE CH Low Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
5150.00	Average	37.35	4.92	42.27	54.00	-11.73
5150.00	Peak	49.76	4.92	54.68	74.00	-19.32

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. 除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天‧本報告未經本公司書面許可‧不可部份複製。



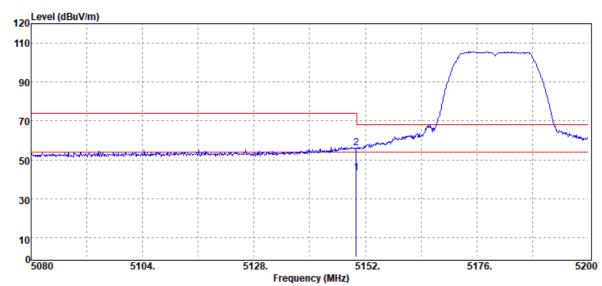
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11a / Band1 Temp./Humi. :21/53

Frequency :5180 MHz Antenna Pol. :HORIZONTAL

Operation Mode :BE CH Low Engineer :Kane EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin	
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB	
5150.00	Average	38.22	4.92	43.14	54.00	-10.86	
5150.00	Peak	51.18	4.92	56.10	74.00	-17.90	

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



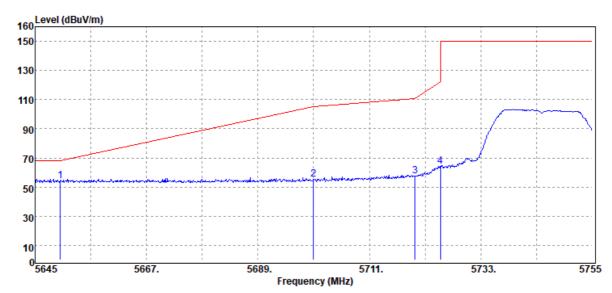
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11a / Band4 Temp./Humi. :21/53

Frequency :5745 MHz Antenna Pol. :VERTICAL
Operation Mode :BE CH Low Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
5650.00	Peak	48.19	6.04	54.23	68.20	-13.97
5700.00	Peak	48.90	6.32	55.22	105.20	-49.98
5720.00	Peak	51.49	6.33	57.82	110.80	-52.98
5725.00	Peak	57.84	6.34	64.18	122.20	-58.02

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



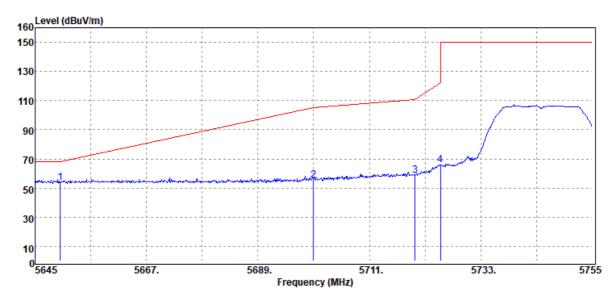
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11a / Band4 Temp./Humi. :21/53

Frequency :5745 MHz Antenna Pol. :HORIZONTAL

Operation Mode :BE CH Low Engineer :Kane EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
5650.00	Peak	47.79	6.04	53.83	68.20	-14.37
5700.00	Peak	49.14	6.32	55.46	105.20	-49.74
5720.00	Peak	52.37	6.33	58.70	110.80	-52.10
5725.00	Peak	59.34	6.34	65.68	122.20	-56.52

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



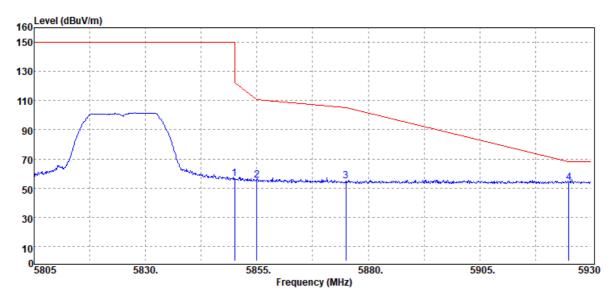
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11a / Band4 Temp./Humi. :21/53

Frequency :5825 MHz Antenna Pol. :VERTICAL

Operation Mode :BE CH High Engineer :Kane EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
5850.00	Peak	50.09	6.39	56.48	122.20	-65.72
5855.00	Peak	48.71	6.38	55.09	110.80	-55.71
5875.00	Peak	48.19	6.37	54.56	105.20	-50.64
5925.00	Peak	47.49	6.42	53.91	68.20	-14.29

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留%天。本報告未經本公司書面許可·不可部份複製。



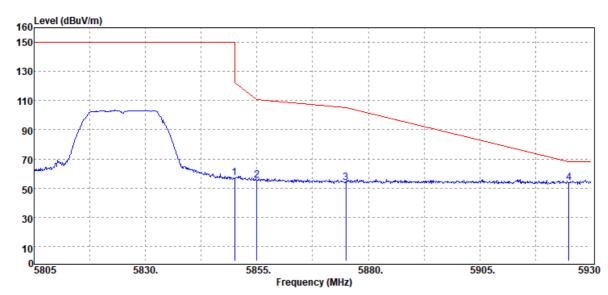
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11a / Band4 Temp./Humi. :21/53

Frequency :5825 MHz Antenna Pol. :HORIZONTAL

Operation Mode :BE CH High Engineer :Kane EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBµV/m	dB
5850.00	Peak	50.83	6.39	57.22	122.20	-64.98
5855.00	Peak	48.84	6.38	55.22	110.80	-55.58
5875.00	Peak	47.33	6.37	53.70	105.20	-51.50
5925.00	Peak	47.33	6.42	53.75	68.20	-14.45

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



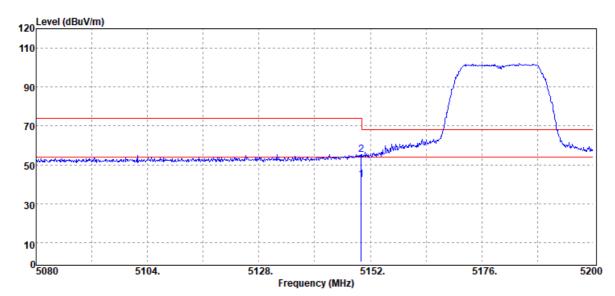
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11n20 / Band1 Temp./Humi. :21/53

Frequency :5180 MHz Antenna Pol. :VERTICAL
Operation Mode :BE CH Low Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	-
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
5150.00	Average	37.44	4.92	42.36	54.00	-11.64
5150.00	Peak	50.23	4.92	55.15	74.00	-18.85

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



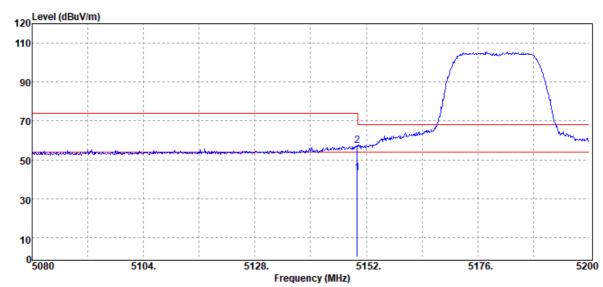
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11n20 / Band1 Temp./Humi. :21/53

Frequency :5180 MHz Antenna Pol. :HORIZONTAL

Operation Mode :BE CH Low Engineer :Kane EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin	
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB	
5150.00	Average	38.14	4.92	43.06	54.00	-10.94	
5150.00	Peak	52.23	4.92	57.15	74.00	-16.85	

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



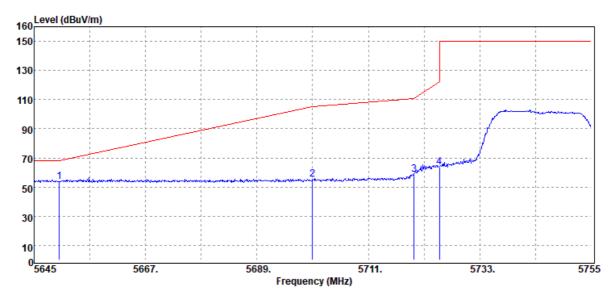
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11n20 / Band4 Temp./Humi. :21/53

Frequency :5745 MHz Antenna Pol. :VERTICAL
Operation Mode :BE CH Low Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
5650.00	Peak	47.78	6.04	53.82	68.20	-14.38
5700.00	Peak	49.32	6.32	55.64	105.20	-49.56
5720.00	Peak	52.38	6.33	58.71	110.80	-52.09
5725.00	Peak	57.06	6.34	63.40	122.20	-58.80

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



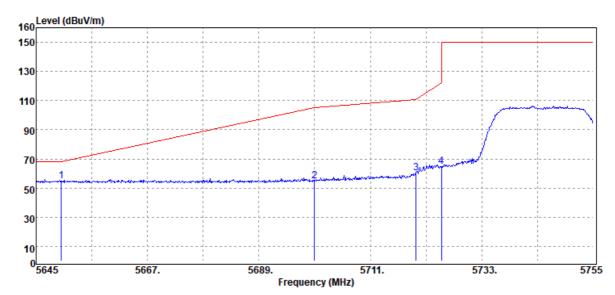
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**Project Number** :T190606W03 **Test Date** :2019-06-14

**Operation Band** :802.11n20 / Band4 Temp./Humi. :21/53

:HORIZONTAL Frequency :5745 MHz Antenna Pol. **Operation Mode** :BE CH Low Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBμV/m	dB
5650.00	Peak	48.65	6.04	54.69	68.20	-13.51
5700.00	Peak	48.59	6.32	54.91	105.20	-50.29
5720.00	Peak	54.28	6.33	60.61	110.80	-50.19
5725.00	Peak	58.63	6.34	64.97	122.20	-57.23

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.

除非另有說明‧此報告結果僅對測試之樣品負責‧同時此樣品僅保留90天。本報告未經本公司書面許可‧不可部份複製。



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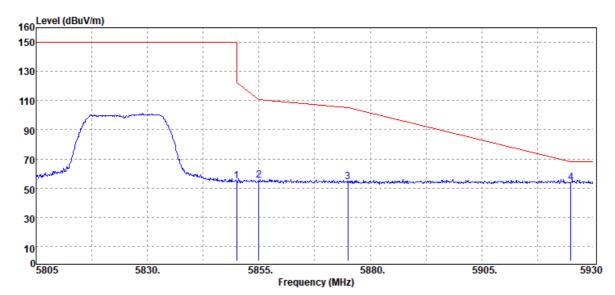
Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11n20 / Band4 Temp./Humi. :21/53

Frequency :5825 MHz Antenna Pol. :VERTICAL

Operation Mode :BE CH High Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBµV/m	dB
5850.00	Peak	48.39	6.39	54.78	122.20	-67.42
5855.00	Peak	48.87	6.38	55.25	110.80	-55.55
5875.00	Peak	47.92	6.37	54.29	105.20	-50.91
5925.00	Peak	47.52	6.42	53.94	68.20	-14.26

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



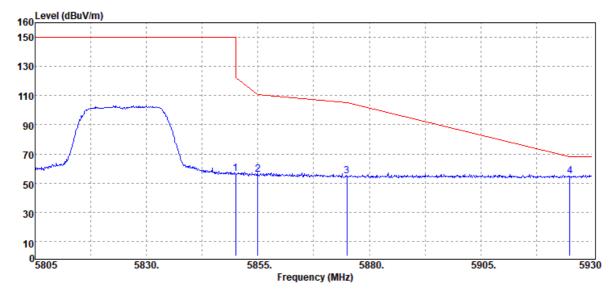
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11n20 / Band4 Temp./Humi. :21/53

Frequency :5825 MHz Antenna Pol. :HORIZONTAL
Operation Mode :BE CH High Engineer :Kane





Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dBµV/m	dBμV/m	dB
5850.00	Peak	49.94	6.39	56.33	122.20	-65.87
5855.00	Peak	49.72	6.38	56.10	110.80	-54.70
5875.00	Peak	48.55	6.37	54.92	105.20	-50.28
5925.00	Peak	48.32	6.42	54.74	68.20	-13.46

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



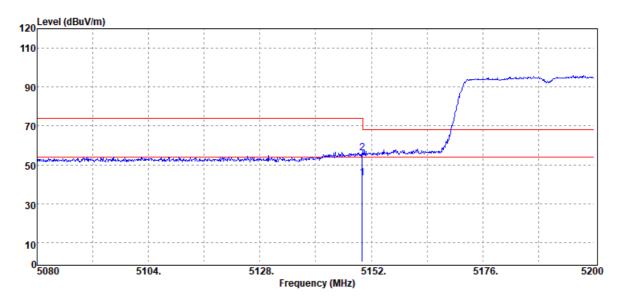
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11n40 / Band1 Temp./Humi. :21/53

Frequency :5190 MHz Antenna Pol. :VERTICAL
Operation Mode :BE CH Low Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	_
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBµV/m	dB
5150.00	Average	38.31	4.92	43.23	54.00	-10.77
5150.00	Peak	51.19	4.92	56.11	74.00	-17.89

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



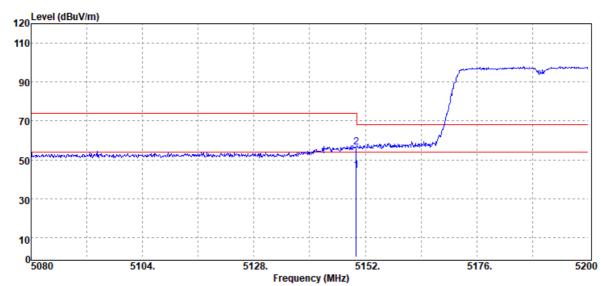
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11n40 / Band1 Temp./Humi. :21/53

Frequency :5190 MHz Antenna Pol. :HORIZONTAL

Operation Mode :BE CH Low Engineer :Kane EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin	
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB	
5150.00	Average	39.55	4.92	44.47	54.00	-9.53	
5150.00	Peak	51.42	4.92	56.34	74.00	-17.66	

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留%天。本報告未經本公司書面許可·不可部份複製。



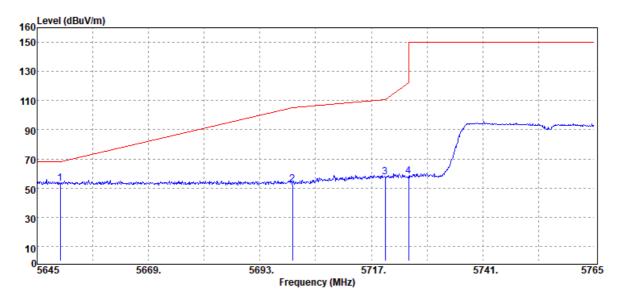
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11n40 / Band4 Temp./Humi. :21/53

Frequency :5755 MHz Antenna Pol. :VERTICAL
Operation Mode :BE CH Low Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBμV/m	dB
5650.00	Peak	47.04	6.04	53.08	68.20	-15.12
5700.00	Peak	46.48	6.32	52.80	105.20	-52.40
5720.00	Peak	51.03	6.33	57.36	110.80	-53.44
5725.00	Peak	51.95	6.34	58.29	122.20	-63.91

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



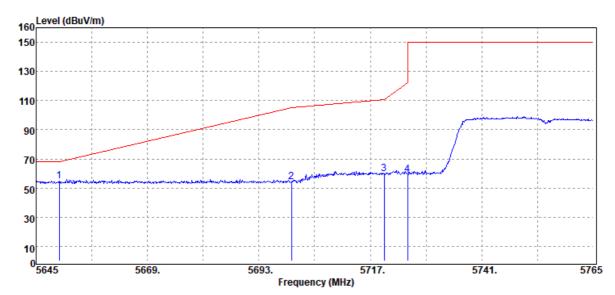
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11n40 / Band4 Temp./Humi. :21/53

Frequency :5755 MHz Antenna Pol. :HORIZONTAL
Operation Mode :BE CH Low Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBμV/m	dB
5650.00	Peak	48.83	6.04	54.87	68.20	-13.33
5700.00	Peak	48.06	6.32	54.38	105.20	-50.82
5720.00	Peak	53.56	6.33	59.89	110.80	-50.91
5725.00	Peak	52.76	6.34	59.10	122.20	-63.10

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



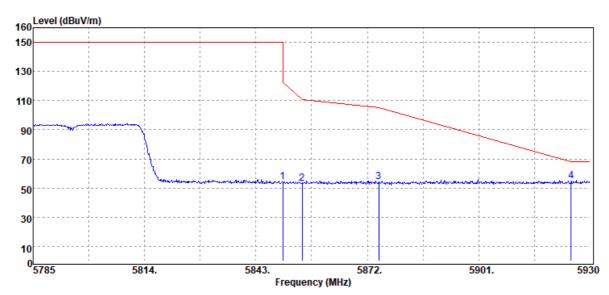
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11n40 / Band4 Temp./Humi. :21/53

Frequency :5795 MHz Antenna Pol. :VERTICAL
Operation Mode :BE CH High Engineer :Kane

EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBµV/m	dB
5850.00	Peak	47.82	6.39	54.21	122.20	-67.99
5855.00	Peak	46.84	6.38	53.22	110.80	-57.58
5875.00	Peak	47.87	6.37	54.24	105.20	-50.96
5925.00	Peak	48.26	6.42	54.68	68.20	-13.52

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. 除非另有說明·此報告結果僅對測試之樣品負責·同時此樣品僅保留90天。本報告未經本公司書面許可·不可部份複製。



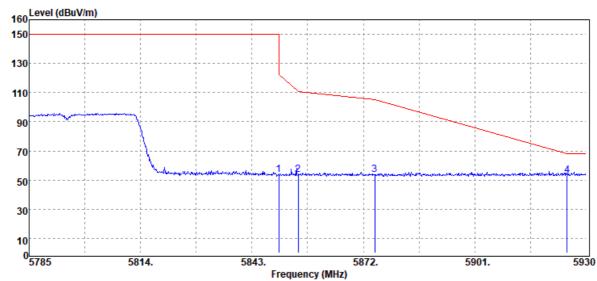
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Project Number :T190606W03 Test Date :2019-06-14

Operation Band :802.11n40 / Band4 Temp./Humi. :21/53

Frequency :5795 MHz Antenna Pol. :HORIZONTAL

Operation Mode :BE CH High Engineer :Kane EUT Pol. :E2 Plan



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
5850.00	Peak	47.47	6.39	53.86	122.20	-68.34
5855.00	Peak	47.31	6.38	53.69	110.80	-57.11
5875.00	Peak	47.13	6.37	53.50	105.20	-51.70
5925.00	Peak	46.71	6.42	53.13	68.20	-15.07

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## 12TRANSMISSION IN THE ABSENCE OF DATA

# 12.1 Standard Applicable

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

#### 12.2 Result

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

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## 13 FREQUENCY STABILITY

# 13.1 Standard Applicable

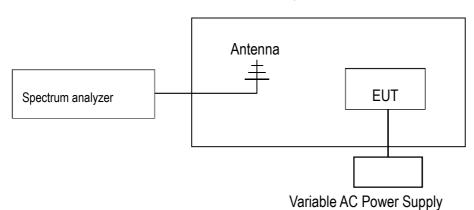
Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

#### 13.2 Measurement Procedure

- 1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
- 2. Set EUT as normal operation.
- 3. Turn the EUT on and couple its output to spectrum.
- 4. Turn the EUT off and set the chamber to the highest temperature specified.
- 5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
- 6. Repeat step with the temperature chamber set to the lowest temperature.

#### 13.3 Test SET-UP

Temperature Chamber



# 13.4 Measurement Equipment Used:

	SGS Conducted Room								
Name of Equip- ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due				
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/22/2019	04/21/2020				
Thermo- static/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/08/2018	10/07/2019				
DC Block	Mini-Circuits	BLK-18-S+	31129(1)	02/26/2019	02/25/2020				
DC Power Supply	Agilent	E3640A	KR93300208	08/15/2018	08/14/2019				
Attenuator	Mini-Circuit	BW-S10W2+	1	02/26/2019	02/25/2020				

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## 13.5 Measurement Result

# Startup:

Operation Mode	802.11 a	Test Date	2019.06.12
Temperature	: 20.8°C	Test By	Gary
Humidity	: 56%	-	

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0	4.2	36	5180	5,179.99343	0.00000127
	3.5	36	5180	5,179.99539	0.00000089
25	3.7	36	5180	5,180.00209	-0.00000040
55	4.2	36	5180	5,180.00349	-0.00000067
	3.5	36	5180	5,180.00216	-0.00000042

# 2 Minutes:

Operation Mode	802.11 a	Test Date	2019.06.12
Temperature	: 20.8°C	Test By	Gary
Humidity	: 56%		

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0	4.2	36	5180	5,179.99453	0.00000106
	3.5	36	5180	5,179.99383	0.00000119
25	3.7	36	5180	5,180.00216	-0.00000042
55	4.2	36	5180	5,180.00667	-0.00000129
33	3.5	36	5180	5,180.00652	-0.00000126

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# 5 Minutes:

Operation Mode	802.11 a	Test Date	2019.06.12
Temperature	: 20.8℃	Test By	Gary
Humidity	: 56%	-	,

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0	4.2	36	5180	5,179.99454	0.00000105
	3.5	36	5180	5,179.99378	0.00000120
25	3.7	36	5180	5,179.99987	0.00000002
55	4.2	36	5180	5,180.00390	-0.00000075
	3.5	36	5180	5,180.00576	-0.00000111

## 10 Minutes:

Operation Mode	802.11 a	Test Date	2019.06.12
Temperature	: 20.8°C	Test By	Gary
Humidity	: 56%		

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
0	4.2	36	5180	5,179.99044	0.00000184
	3.5	36	5180	5,179.99019	0.00000189
25	3.7	36	5180	5,180.00123	-0.00000024
55	4.2	36	5180	5,180.00673	-0.00000130
	3.5	36	5180	5,180.00849	-0.00000164

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# 14 ANTENNA REQUIREMENT

# 14.1 Standard Applicable

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.

According to §15.407, If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### 14.2 Antenna Connected Construction

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

~ End of Report ~

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