

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C & E REQUIREMENT REFERENCING TEST DATA ACROSS SEPARATE EQUIPMENT VERIFICATION

OF

Product Name: PeopleNet Connected Tablet

Brand Name: PeopleNet

Model No.: MS5

Model Difference: N/A

FCC ID: NKS-MS5N2

Report No.: E2/2018/70107

Issue Date: Sep. 14, 2018

FCC Rule Part: §15.247, Cat: DTS & DSS & §15.407

Prepared for: PEOPLENET
4400 Baker Road, Minnetonka, MN 55343, USA

Prepared by: SGS Taiwan Ltd.
Electronics & Communication Laboratory
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VERIFICATION OF COMPLIANCE

Applicant: PeopleNet
4400 Baker Road, Minnetonka, MN 55343, USA
Product Name: PeopleNet Connected Tablet
Brand Name: PeopleNet
Model No.: MS5
Model Difference: N/A
FCC ID: NKS-MS5N2
Report Number: E2/2018/70107
Date of test: Jul. 25, 2018 ~ Sep. 13, 2018
Date of EUT Received: Jul. 25, 2018

We hereby certify that:

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

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

Test By:

Vito Pei

Date:

Sep. 14, 2018

Vito Pei / Engineer

Prepared By:

Yuri Tsai

Date:

Sep. 14, 2018

Yuri Tsai / Clerk

Approved By:

Jim Chang

Date:

Sep. 14, 2018

Jim Chang / Manager

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Revision History

Report Number	Revision	Description	Issue Date
E2/2018/70107	Rev.00	Initial creation of document	Sep. 14, 2018

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1 GENERAL INFORMATION

1.1 Product description

General:

Product Name:	PeopleNet Connected Tablet	
Brand Name:	PeopleNet	
Model No.:	MS5	
Model Difference:	N/A	
Hardware Version:	N/A	
Software Version:	N/A	
Tablet Docking Station	Model No.: MS-57602, Supplier: MSI	
Power Cable	P/N: L016-0576, Supplier: ELECTRI-CORD MFG.CO.	
Power Supply:	7.4Vdc from LITHIUM-ION rechargeable battery or 12/24Vdc from DC Car battery	
	Battery:	Model No.: MS5760 , Supplier: Getac
Referencing test data across separate equipment:	According to KDB484596, Spot-check data based on the worst-case result in the original FCC ID: NKS-MS5 filing has been submitted with this application for verification.	

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.247

FCC KDB 558074 D01 DTS Meas. Guidance

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules

FCC KDB 484596 D01 Referencing Test Data DR01-42712

ANSI C63.10:2013

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

1.3 Test Facility

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

FCC Registration Numbers are: 735305 / TW0002

1.4 Special Accessories

There are no special accessories used while test was conducted.

1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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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 placed on a 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 30 MHz. 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 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.

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.

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2.5 Configuration of Tested System

Fig 2-2 Radiated Emission Configuration

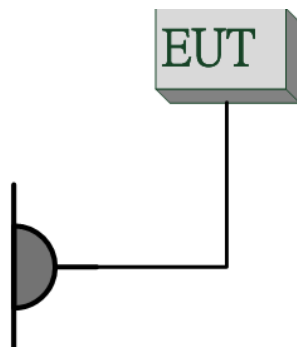


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1	WLAN Test Software	N/A	N/A	N/A	N/A	N/A
2	BT Test Software	N/A	N/A	N/A	N/A	N/A

3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.247(b)	Peak Output Power	Compliant
§15.407(a)	The Maximum Output Power Measurement	Compliant
§15.247(d)	Radiated Spurious Emission	Compliant
§15.407(b)	Undesirable Radiated Emissions	Compliant

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4 DESCRIPTION OF TEST MODES

4.1 Operated in 2400 ~ 2483.5MHz Band

40 channels are provided for Bluetooth LE

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
0	2402 MHz	14	2430 MHz	28	2458 MHz
1	2404 MHz	15	2432 MHz	29	2460 MHz
2	2406 MHz	16	2434 MHz	30	2462 MHz
3	2408 MHz	17	2436 MHz	31	2464 MHz
4	2410 MHz	18	2438 MHz	32	2466 MHz
5	2412 MHz	19	2440 MHz	33	2468 MHz
6	2414 MHz	20	2442 MHz	34	2470 MHz
7	2416MHz	21	2444 MHz	35	2472 MHz
8	2418 MHz	22	2446 MHz	36	2474 MHz
9	2420 MHz	23	2448 MHz	37	2476 MHz
10	2422 MHz	24	2450 MHz	38	2478 MHz
11	2424 MHz	25	2452 MHz	39	2480 MHz
12	2426 MHz	26	2454 MHz		
13	2428 MHz	27	2456 MHz		

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79 channels are provided for Bluetooth

CH	FREQUENCY	CH	FREQUENCY	CH	FREQUENCY	CH	FREQUENCY
0	2402 MHz	20	2422 MHz	40	2442 MHz	70	2462 MHz
1	2403 MHz	21	2423 MHz	41	2443 MHz	71	2463 MHz
2	2404 MHz	22	2424 MHz	42	2444 MHz	72	2464 MHz
3	2405 MHz	23	2425 MHz	43	2445 MHz	73	2465 MHz
4	2406 MHz	24	2426 MHz	44	2446 MHz	74	2466 MHz
5	2407 MHz	25	2427 MHz	45	2447 MHz	75	2467 MHz
6	2408 MHz	26	2428 MHz	46	2448 MHz	76	2468 MHz
7	2409 MHz	27	2429 MHz	47	2449 MHz	77	2469 MHz
8	2410 MHz	28	2430 MHz	48	2450 MHz	78	2470 MHz
9	2411 MHz	29	2431 MHz	49	2451 MHz	79	2471 MHz
10	2412 MHz	30	2432 MHz	50	2452 MHz	70	2472 MHz
11	2413 MHz	31	2433 MHz	51	2453 MHz	71	2473 MHz
12	2414 MHz	32	2434 MHz	52	2454 MHz	72	2474 MHz
13	2415 MHz	33	2435 MHz	53	2455 MHz	73	2475 MHz
14	2416 MHz	34	2436 MHz	54	2456 MHz	74	2476 MHz
15	2417 MHz	35	2437 MHz	55	2457 MHz	75	2477 MHz
16	2418 MHz	36	2438 MHz	56	2458 MHz	76	2478 MHz
17	2419 MHz	37	2439 MHz	57	2459 MHz	77	2479 MHz
18	2420 MHz	38	2440 MHz	58	2460 MHz	78	2480 MHz
19	2421 MHz	39	2441 MHz	59	2461 MHz		

11 channels are provided for 802.11b, 802.11g and 802.11n HT20

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

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Operated band in 5150 MHz ~5250 MHz:

802.11a / n HT20 Mode	
Channel	Frequency
36	5180
40	5200
44	5220
48	5240

Operated band in 5250 MHz ~5350 MHz:

802.11a / n HT20	
channel	Frequency
52	5260
56	5280
60	5300
64	5320

Operated band in 5500 MHz ~5700 MHz:

802.11a / n HT20 Mode	
Channel	Frequency
100	5500
104	5520
108	5540
112	5560
116	5580
120	5600
124	5620
128	5640
132	5660
136	5680
140	5700

Operated band in 5745 MHz ~5850 MHz:

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

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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 base on the worst case of original FCC ID:NKS-MS5.

RADIATED EMISSION TEST:

RADIATED EMISSION TEST (ABOVE 1 GHz)				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
Bluetooth LE	2402 to 2480	2442	GFSK	1
Bluetooth	2402 to 2480	2441	GFSK	DH5
802.11b	1 to 11	6	DSSS	1
802.11a	36 to 48	44	OFDM	6
	52 to 64	60	OFDM	6
	100 to 144	116	OFDM	6
	149 to 165	157	OFDM	6

Note:

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

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ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
Bluetooth LE	0 to 39	0,20,39	GFSK	1
Bluetooth	0 to 78	0,39,78	GFSK	1
802.11b	1 to 11	1, 6, 11	DSSS	1
802.11g	1 to 11	1, 6, 11	OFDM	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	MCS0

CONDUCTED TEST					
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
802.11a	5180~5240	36 to 48	36,44,48	OFDM	6
802.11n_HT20				OFDM	MCS0
802.11a	5260~5320	52 to 64	52,60,64	OFDM	6
802.11n_HT20				OFDM	MCS0
802.11a	5500~5700	100 to 140	100,116,140	OFDM	6
802.11n_HT20				OFDM	MCS0
802.11a	5745~5825	149 to 165	149,157,165	OFDM	6
802.11n_HT20				OFDM	MCS0

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5 MEASUREMENT UNCERTAINTY

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

Radiated Spurious Emission:

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

Measurement uncertainty (Polarization : Horizontal)	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	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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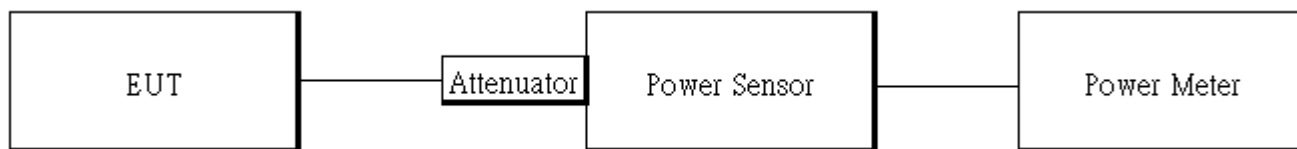
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6. PEAK OUTPUT POWER MEASUREMENT

6.1 Measurement Equipment Used:

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	2018/06/20	2019/06/19
Power Meter	Anritsu	ML2496A	1326001	2018/06/23	2019/06/22
Power Sensor	Anritsu	MA2411B	1315048	2018/06/23	2019/06/22
Power Sensor	Anritsu	MA2411B	1315049	2018/06/23	2019/06/22
Coaxial Cable 30cm	WOKEN	00100A1F1A195C	RF01	2017/12/24	2018/12/23
DC Block	PASTERNAK	PE8210	RF29	2017/12/24	2018/12/23
Splitter	RF-LAMBDA	RFLT2W1G18G	RF35	2017/12/24	2018/12/23
Attenuator	WOKEN	218FS-10	RF23	2017/12/24	2018/12/23
DC Power Supply	Agilent	E3640A	MY53140006	2018/05/02	2019/05/01

6.2 Test Set-up:



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6.3 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 Power Meter.
5. Repeat above procedures until all test default channel measured was complete.

6.4 Measurement Result:

BLE mode:

Frequency (MHz)	Reading Power (dBm)	Peak Output Power (W)	Limit (W)
2402.00	-3.28	0.00047	1
2442.00	-2.23	0.00060	1
2480.00	-4.72	0.00034	1

Frequency (MHz)	Reading Power (dBm)	Avg. Output Power (W)	Limit (W)
2402.00	-3.60	0.00044	1
2442.00	-2.46	0.00057	1
2480.00	-5.00	0.00032	1

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BR mode (GFSK) (Peak):

Frequency (MHz)	Reading Power (dBm)	Output Power (W)	Limit (W)
2402.00	-3.52	0.00044	0.125
2441.00	-2.01	0.00063	0.125
2480.00	-4.22	0.00038	0.125

BR mode (GFSK) (Average):

Frequency (MHz)	Reading Power (dBm)	Output Power (W)	Limit (W)
2402.00	-4.89	0.00032	0.125
2441.00	-3.37	0.00046	0.125
2480.00	-5.59	0.00028	0.125

EDR mode ($\pi/4$ DQPSK) (Peak):

Frequency (MHz)	Reading Power (dBm)	Output Power (W)	Limit (W)
2402.00	-1.11	0.00077	0.125
2441.00	0.48	0.00112	0.125
2480.00	-1.78	0.00066	0.125

EDR mode ($\pi/4$ DQPSK) (Average):

Frequency (MHz)	Reading Power (dBm)	Output Power (W)	Limit (W)
2402.00	-5.07	0.00031	0.125
2441.00	-3.44	0.00045	0.125
2480.00	-5.61	0.00027	0.125

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EDR mode (8DPSK) (Peak):

Frequency (MHz)	Reading Power (dBm)	Output Power (W)	Limit (W)
2402.00	-0.72	0.00085	0.125
2441.00	0.91	0.00123	0.125
2480.00	-1.51	0.00071	0.125

EDR mode (8DPSK) (Average):

Frequency (MHz)	Reading Power (dBm)	Output Power (W)	Limit (W)
2402.00	-4.96	0.00032	0.125
2441.00	-3.34	0.00046	0.125
2480.00	-5.77	0.00026	0.125

802.11b

CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit
1	2412	1	19.14	82.04	1 Watt = 30 dBm
6	2437	1	19.24	83.95	1 Watt = 30 dBm
11	2462	1	18.93	78.16	1 Watt = 30 dBm
CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit
1	2412	1	16.79	47.75	1 Watt = 30 dBm
6	2437	1	16.75	47.32	1 Watt = 30 dBm
11	2462	1	16.90	48.98	1 Watt = 30 dBm

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802.11g

CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit
1	2412	1	20.13	103.04	1 Watt = 30 dBm
6	2437	1	20.37	108.89	1 Watt = 30 dBm
11	2462	1	20.09	102.09	1 Watt = 30 dBm
CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit
1	2412	1	13.74	23.66	1 Watt = 30 dBm
6	2437	1	13.72	23.55	1 Watt = 30 dBm
11	2462	1	13.82	24.10	1 Watt = 30 dBm

802.11n_HT20

CH	Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Peak Output Power (mW)	Limit
1	2412	1	20.14	103.28	1 Watt = 30 dBm
6	2437	1	20.22	105.20	1 Watt = 30 dBm
11	2462	1	20.02	100.46	1 Watt = 30 dBm
CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit
1	2412	1	12.94	19.68	1 Watt = 30 dBm
6	2437	1	12.90	19.50	1 Watt = 30 dBm
11	2462	1	12.98	19.86	1 Watt = 30 dBm

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802.11a

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	13.95	24.83	23.98	PASS
44	5220	13.95	24.83	23.98	PASS
48	5240	13.97	24.95	23.98	PASS
52	5260	13.96	24.89	23.98 or $11+10\log(B) = 23.17$	PASS
60	5300	13.98	25.00	23.98 or $11+10\log(B) = 23.15$	PASS
64	5320	13.73	23.60	23.98 or $11+10\log(B) = 23.12$	PASS
100	5500	13.76	23.77	23.98 or $11+10\log(B) = 23.12$	PASS
116	5600	13.89	24.49	23.98 or $11+10\log(B) = 23.15$	PASS
140	5700	13.97	24.95	23.98 or $11+10\log(B) = 23.11$	PASS
149	5745	13.76	23.77	30	PASS
157	5785	13.98	25.00	30	PASS
165	5825	13.83	24.15	30	PASS

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802.11n_HT20

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	12.97	19.82	23.98	PASS
44	5220	12.99	19.91	23.98	PASS
48	5240	12.71	18.66	23.98	PASS
52	5260	12.73	18.75	23.98 or $11+10\log(B) = 23.17$	PASS
60	5300	12.77	18.92	23.98 or $11+10\log(B) = 23.15$	PASS
64	5320	12.85	19.28	23.98 or $11+10\log(B) = 23.12$	PASS
100	5500	12.99	19.91	23.98 or $11+10\log(B) = 23.12$	PASS
116	5580	12.77	18.92	23.98 or $11+10\log(B) = 23.15$	PASS
140	5700	12.69	18.58	23.98 or $11+10\log(B) = 23.11$	PASS
149	5745	12.86	19.32	30	PASS
157	5785	12.72	18.71	30	PASS
165	5825	12.97	19.82	30	PASS

***Note: Measured by power meter**

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

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7. RADIATED SPURIOUS EMISSION MEASUREMENT

7.1 Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Broadband Antenna	TESEQ	CBL 6112D	35243	2017/11/10	2018/11/09
Horn Antenna	Schwarzbeck	BBHA9120D	1187	2018/01/04	2019/01/03
Horn Antenna	SCHWAZBECK	BBHA9170	184	2017/12/12	2018/12/11
Loop Antenna	ETS.LINDGREN	6502	148045	2017/09/26	2018/09/25
EMI Test Receiver	R&S	ESU 40	100363	2018/04/11	2019/04/10
Pre-Amplifier	EMC Instruments	EMC330	980096	2017/12/26	2018/12/25
Pre-Amplifier	EMC Instruments	EMC0011830	980199	2017/12/26	2018/12/25
Pre-Amplifier	EMC Instruments	EMC184045B	980135	2017/10/27	2018/10/26
Attenuator	Marvelous	WATT-218FS-10	RF246	2017/12/26	2018/12/25
Highpass Filter	Micro Tronics	BRM50701-01	G008	2017/12/26	2018/12/25
Coaxial Cable	Huber+Suhner	RG 214/U	W21.01	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	EMC106-SM-SM-7200	150703	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	2017/12/26	2018/12/25
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	2017/12/26	2018/12/25

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

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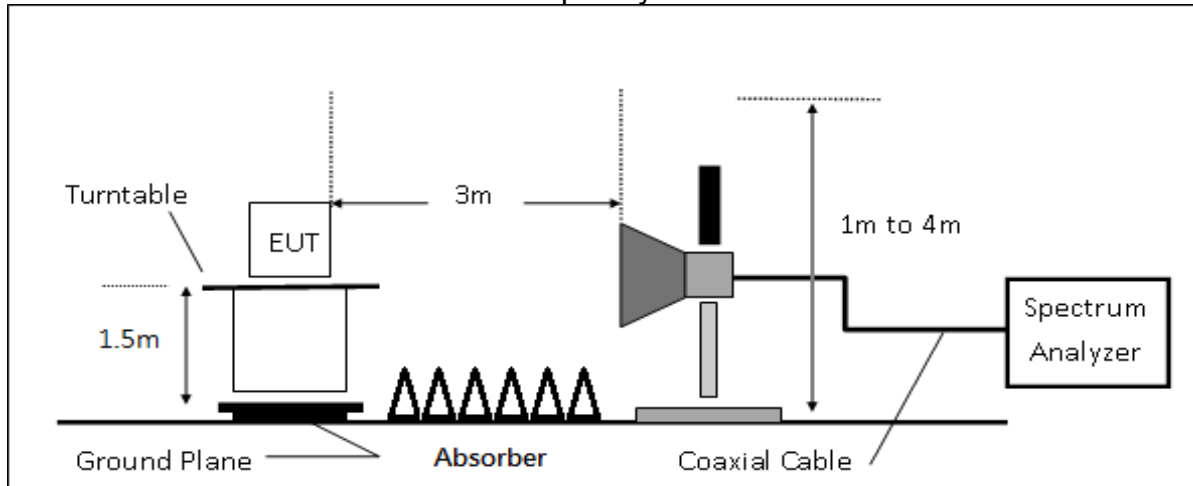
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7.2 Test SET-UP

Radiated Emission Test Set-UP Frequency Over 1 GHz



7.3 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 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=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
7. 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.
8. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
9. 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.
10. Repeat above procedures until all default test channel measured were complete.

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7.4 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(dBμV/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.

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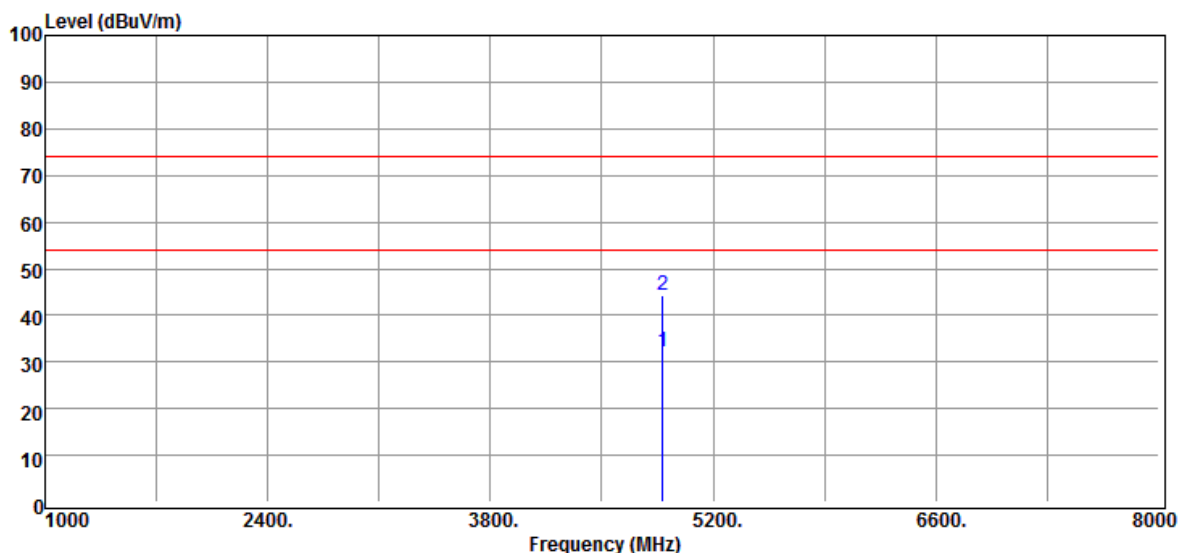
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7.5 Measurement Result

Operation Mode	:BLE	Test Date	:2018-09-13
Test Mode	:TX CH MID	Temp./Humi.	:24/62
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2442 MHz	Engineer	:Ashton



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4884.00	Average	19.61	12.63	32.24	54.00	-21.76
4884.00	Peak	31.77	12.63	44.40	74.00	-29.60

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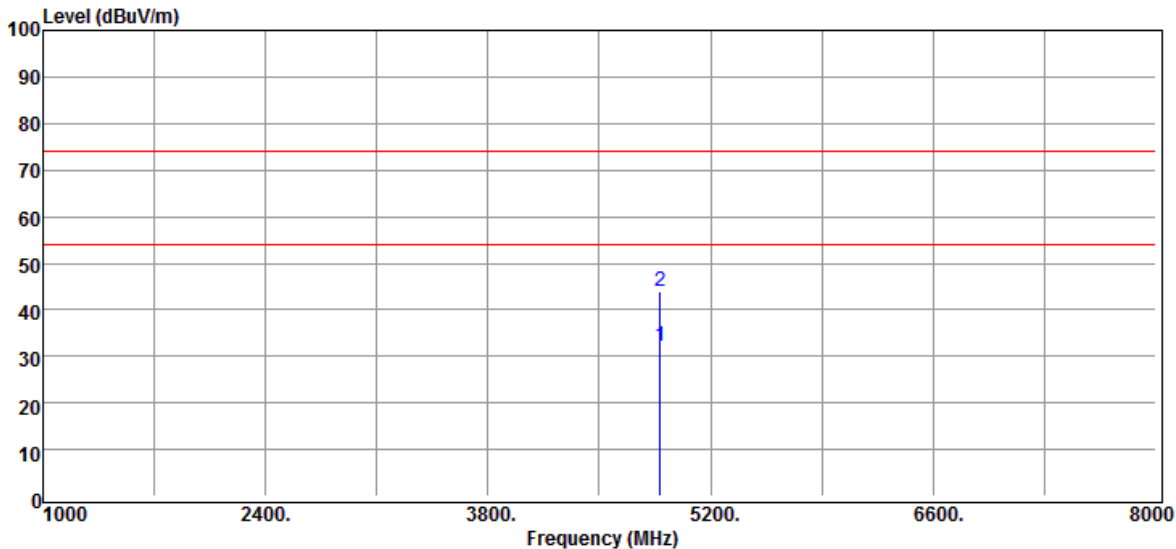
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Operation Mode	:BLE	Test Date	:2018-09-13
Test Mode	:TX CH MID	Temp./Humi.	:24/62
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2442 MHz	Engineer	:Ashton



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4884.00	Average	19.61	12.63	32.24	54.00	-21.76
4884.00	Peak	31.43	12.63	44.06	74.00	-29.94

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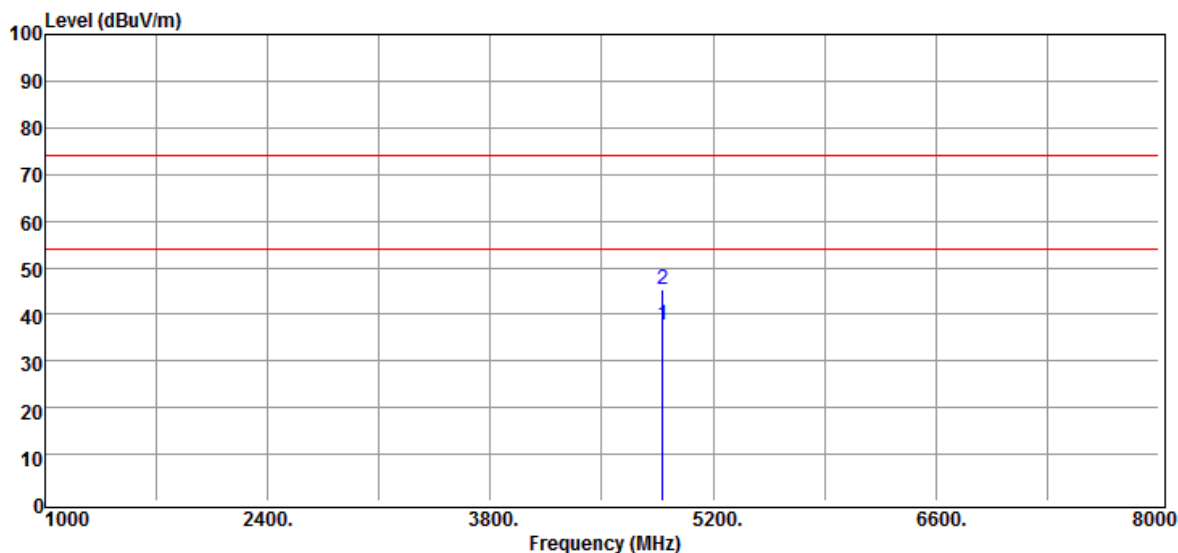
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Operation Mode	:BT BR	Test Date	:2018-09-13
Test Mode	:TX CH MID	Temp./Humi.	:24/62
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2441 MHz	Engineer	:Ashton



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
4882.00	Average	25.20	12.61	37.81	54.00	-16.19
4882.00	Peak	32.67	12.61	45.28	74.00	-28.72

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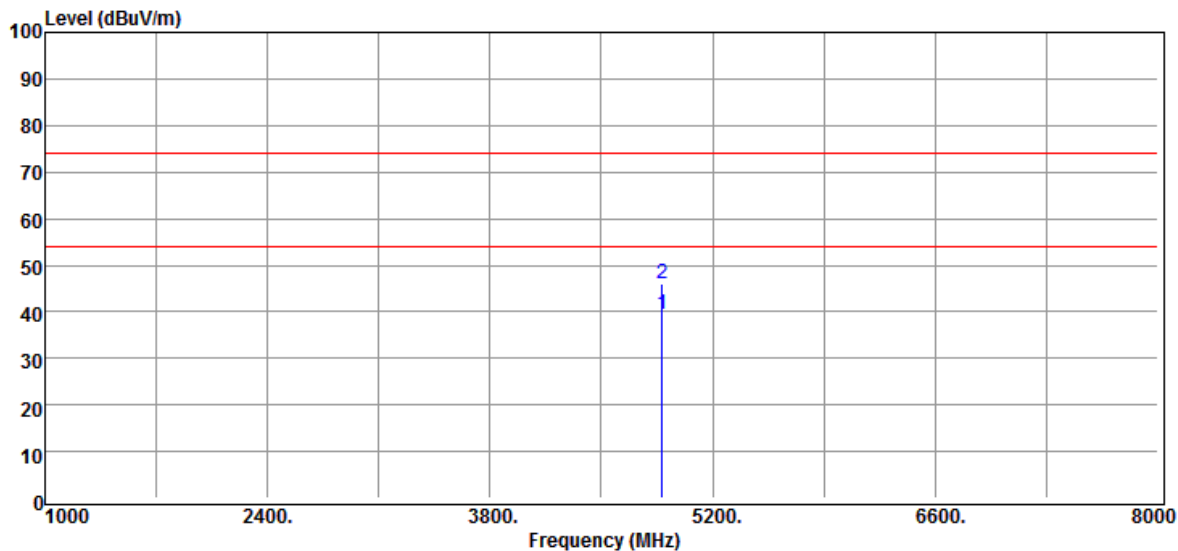
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Operation Mode	:BT BR	Test Date	:2018-09-13
Test Mode	:TX CH MID	Temp./Humi.	:24/62
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2441 MHz	Engineer	:Ashton



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4882.00	Average	26.82	12.61	39.43	54.00	-14.57
4882.00	Peak	33.47	12.61	46.08	74.00	-27.92

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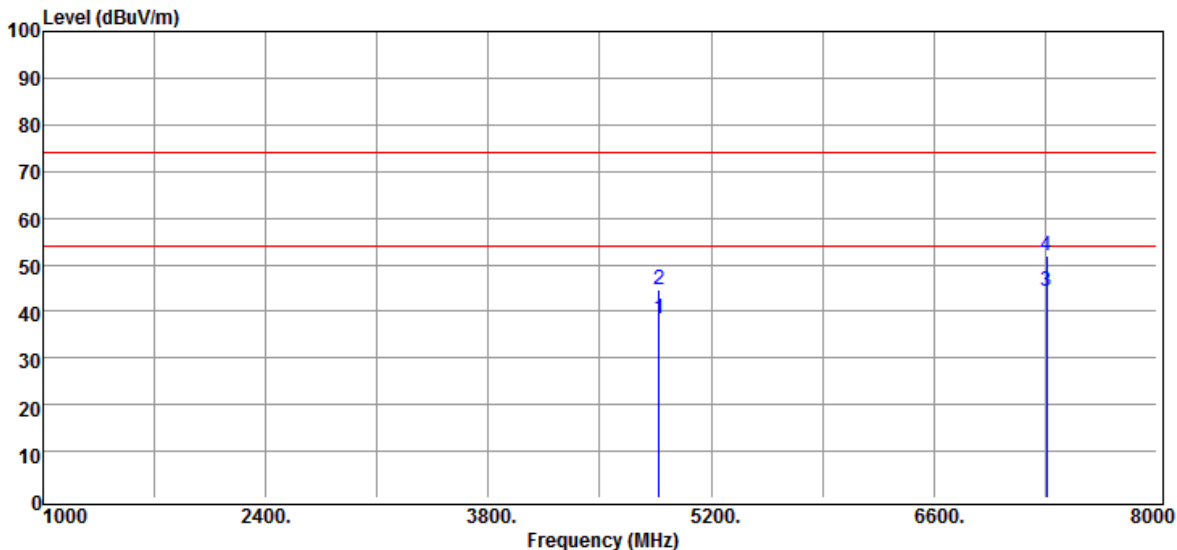
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Operation Mode	:802.11b	Test Date	:2018-08-10
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:2437 MHz	Engineer	:Enzo



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4874.00	Average	25.75	12.58	38.33	54.00	-15.67
4874.00	Peak	32.21	12.58	44.79	74.00	-29.21
7311.00	Average	24.15	20.06	44.21	54.00	-9.79
7311.00	Peak	31.83	20.06	51.89	74.00	-22.11

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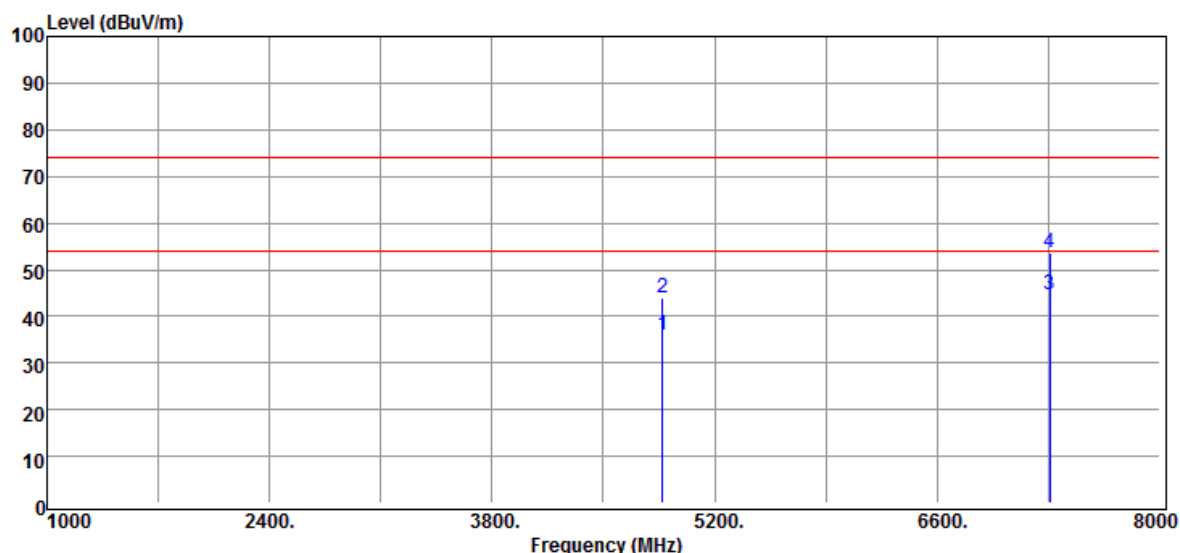
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Operation Mode	:802.11b	Test Date	:2018-08-10
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:2437 MHz	Engineer	:Enzo



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
4874.00	Average	23.42	12.58	36.00	54.00	-18.00
4874.00	Peak	31.48	12.58	44.06	74.00	-29.94
7311.00	Average	24.48	20.06	44.54	54.00	-9.46
7311.00	Peak	33.42	20.06	53.48	74.00	-20.52

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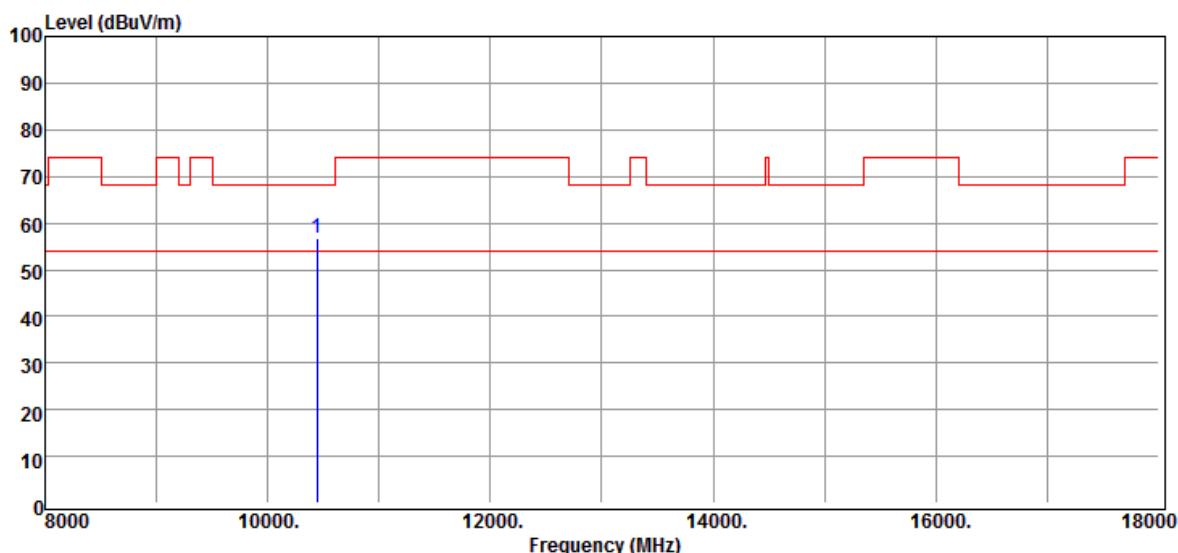
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Operation Mode	:802.11a / Band 1	Test Date	:2018-08-10
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:5220 MHz	Engineer	:Enzo



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10440.00	Peak	29.77	26.98	56.75	68.20	-11.45

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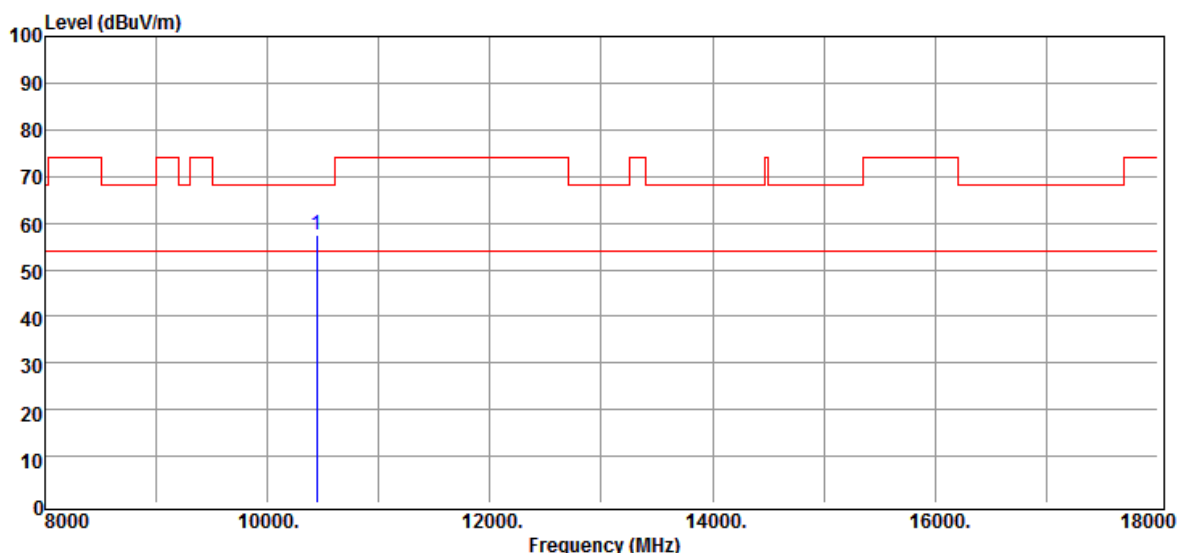
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Operation Mode	:802.11a / Band 1	Test Date	:2018-08-10
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:5220 MHz	Engineer	:Enzo



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10440.00	Peak	30.45	26.98	57.43	68.20	-10.77

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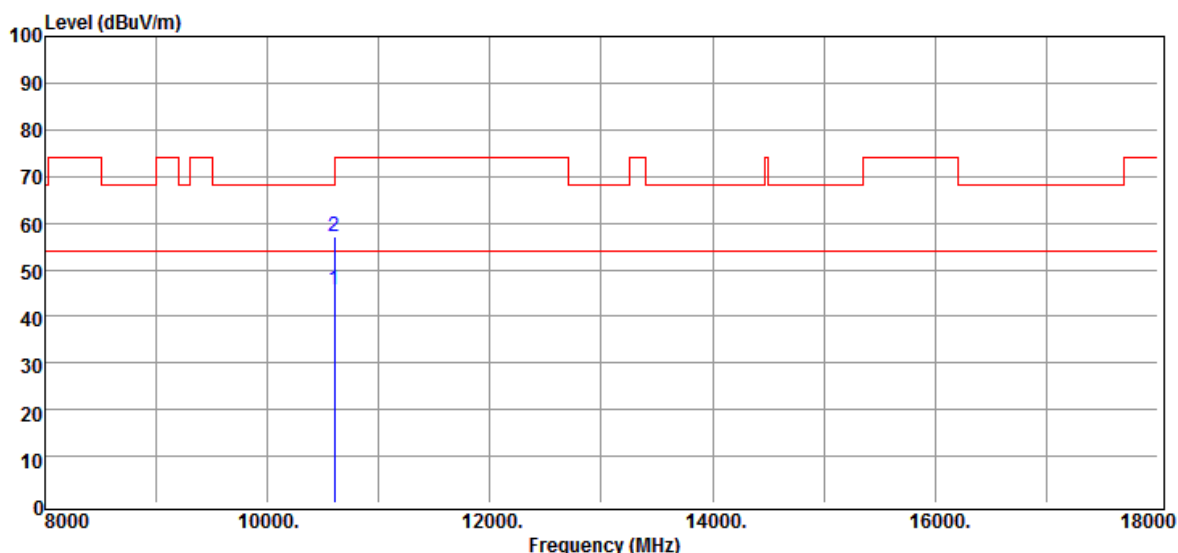
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Operation Mode	:802.11a / Band 2	Test Date	:2018-08-10
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:5300 MHz	Engineer	:Enzo



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10600.00	Average	18.47	27.21	45.68	54.00	-8.32
10600.00	Peak	29.74	27.21	56.95	68.20	-11.25

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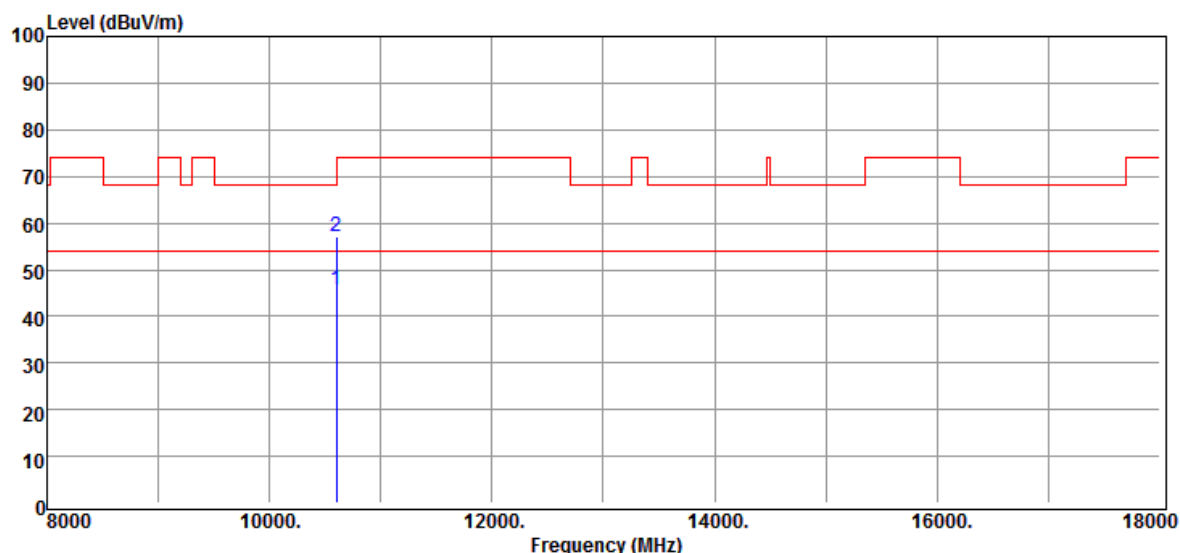
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Operation Mode :802.11a / Band 2
Test Mode :TX CH MID
EUT Pol :H Plan
Test Channel :5300 MHz

Test Date :2018-08-10
Temp./Humi. :25/60
Antenna Pol. :HORIZONTAL
Engineer :Enzo



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
10600.00	Average	18.47	27.21	45.68	54.00	-8.32
10600.00	Peak	29.79	27.21	57.00	68.20	-11.20

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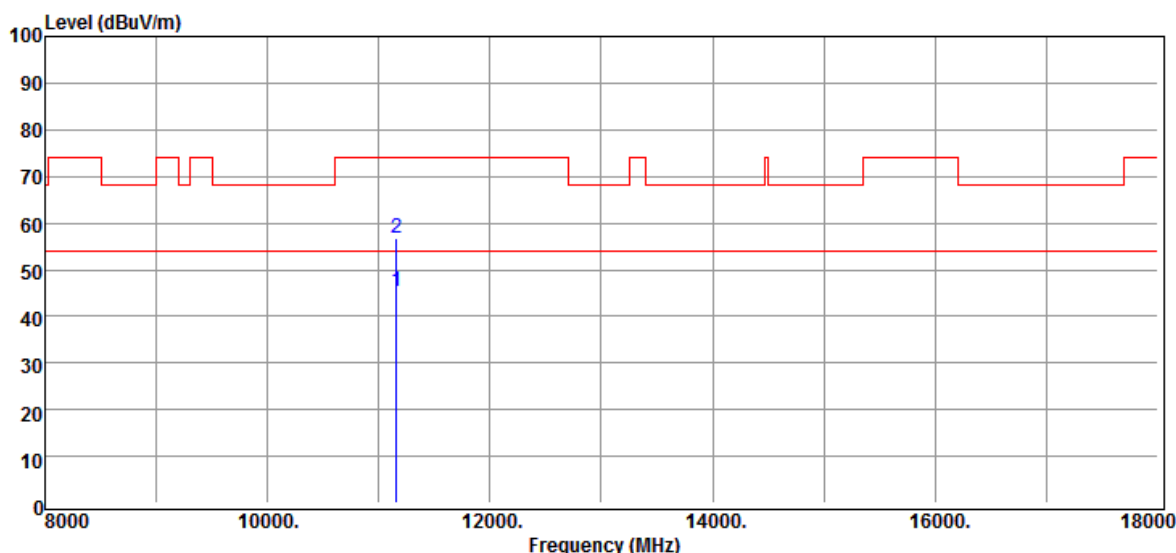
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Operation Mode	:802.11a / Band 3	Test Date	:2018-08-10
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:5580 MHz	Engineer	:Enzo



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11160.00	Average	18.57	26.67	45.24	54.00	-8.76
11160.00	Peak	29.93	26.67	56.60	74.00	-17.40

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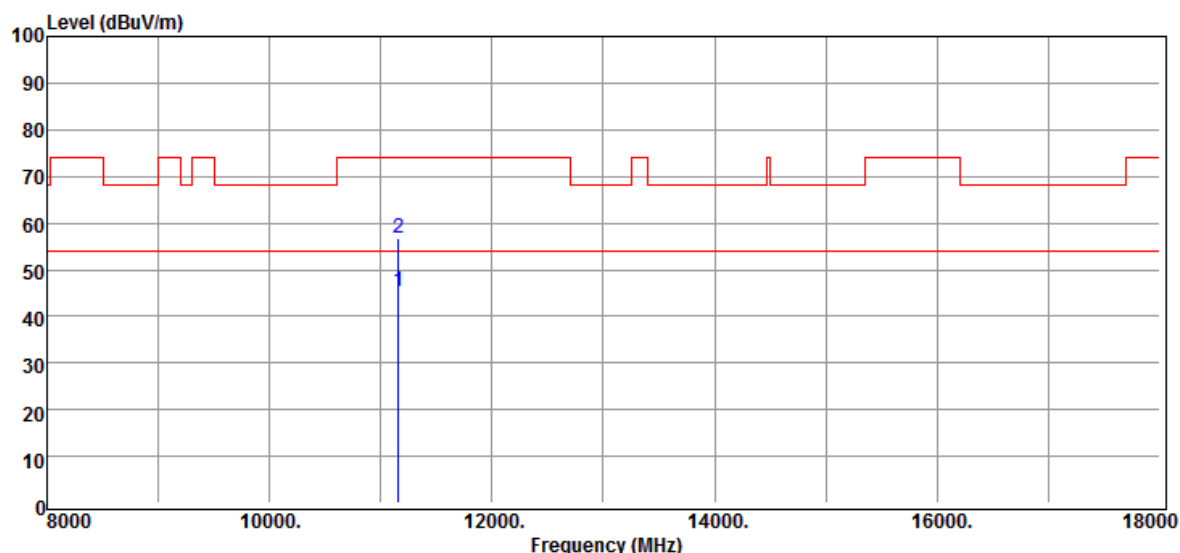
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Operation Mode :802.11a / Band 3
Test Mode :TX CH MID
EUT Pol :H Plan
Test Channel :5580 MHz

Test Date :2018-08-10
Temp./Humi. :25/60
Antenna Pol. :HORIZONTAL
Engineer :Enzo



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11160.00	Average	18.55	26.67	45.22	54.00	-8.78
11160.00	Peak	30.04	26.67	56.71	74.00	-17.29

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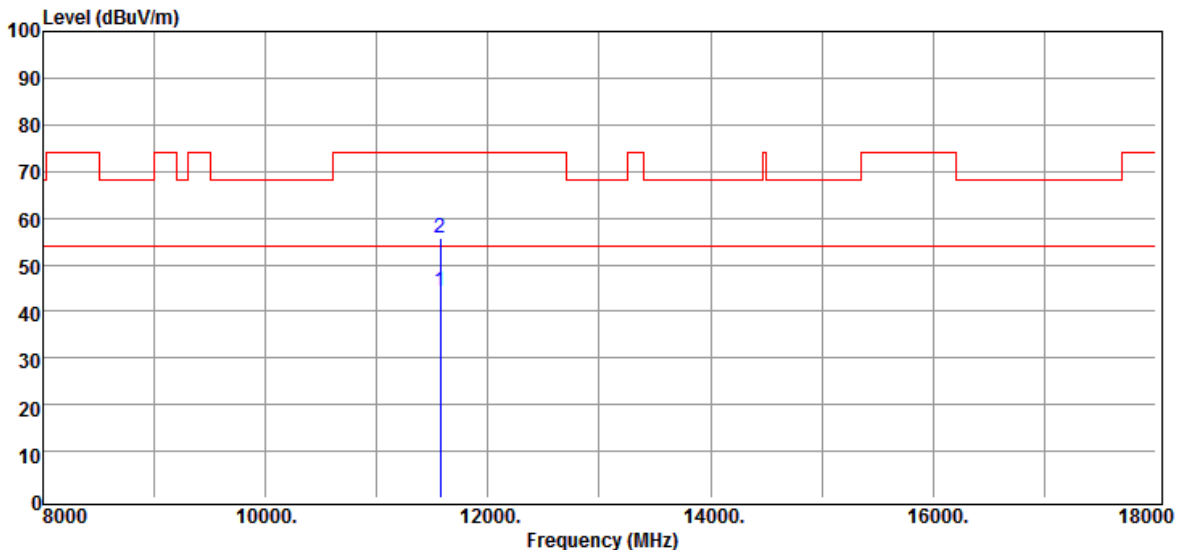
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Operation Mode	:802.11a / Band 4	Test Date	:2018-08-10
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:VERTICAL
Test Channel	:5785 MHz	Engineer	:Enzo



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
11570.00	Average	18.47	25.87	44.34	54.00	-9.66
11570.00	Peak	30.00	25.87	55.87	74.00	-18.13

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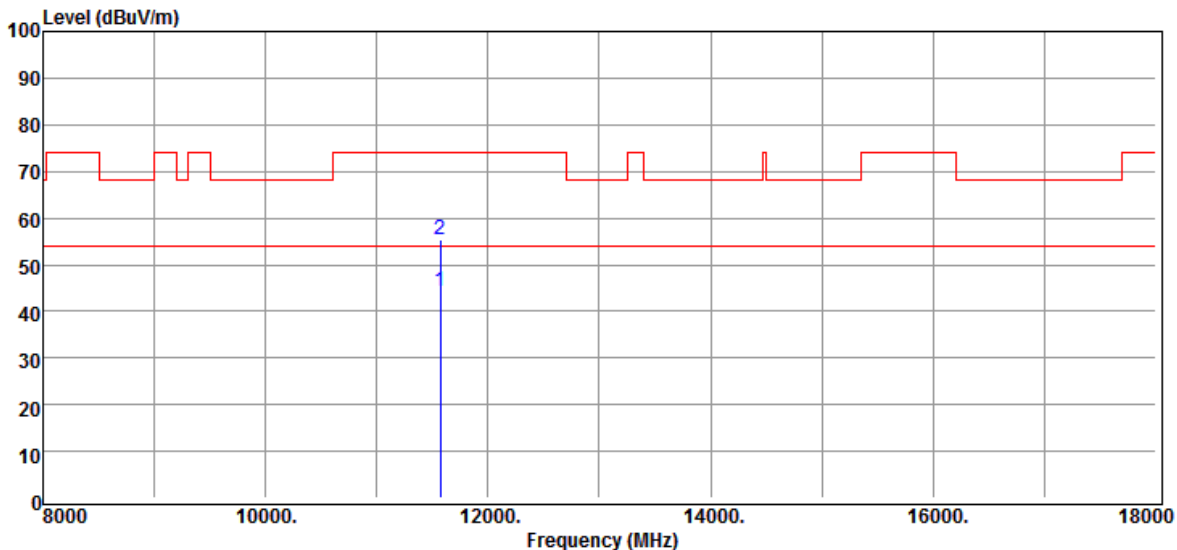
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Operation Mode	:802.11a / Band 4	Test Date	:2018-08-10
Test Mode	:TX CH MID	Temp./Humi.	:25/60
EUT Pol	:H Plan	Antenna Pol.	:HORIZONTAL
Test Channel	:5785 MHz	Engineer	:Enzo



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
MHz	PK/QP/AV	dB μ V	dB	dB μ V/m	dB μ V/m	dB
11570.00	Average	18.45	25.87	44.32	54.00	-9.68
11570.00	Peak	29.65	25.87	55.52	74.00	-18.48

~ End of Report ~

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