

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART F REQUIREMENT

OF

Applicant: TOP CENTRAL R&D CENTER
74, Panggyo-ro 255 beon-gil, Bundang-gu, Seongnam-si,
Gyeonggi-do, Korea

Product Name: UWB Smart Radar

Brand Name: N/A

Model No.: TSR-M241U

Model Difference: N/A

FCC ID: 2APYW-TSR-M241U

Report Number: ER/2018/60001

FCC Rule Part: §15.519, Cat: UWB

Issue Date: Jun. 15, 2018

Date of Test: Jun. 01, 2018 ~ Jun. 08, 2018

**Date of EUT
Received:** Jun. 01, 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.

Tested By:

Marcus Tseng

Marcus Tseng / Sr. Engineer

Approved By:

Jim Chang

Jim Chang / Manager



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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
ER/2018/60001	Rev.00	Initial creation of document	All	Jun. 15, 2018	Violetta Tang

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1 GENERAL INFORMATION

1.1 Product description

General:

Product Name:	UWB Smart Radar
Brand Name:	N/A
Model No.:	TSR-M241U
Model Difference:	N/A
Hardware Version:	N/A
Software Version:	N/A
Power Supply:	3.3V from DC Power Supply

UWB:

Operating Band:	7200MHz
Channel number:	1 channels
Modulation type:	$\pi/2$ shifted BPSK + DSSS
Peak Power (dBm/50MHz) EIRP	-19.05
Antenna Designation:	Patch Antenna, Gain: 6.18dBi

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.519

ANSI C63.10:2013

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

1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803

(TAF code 0513)

FCC Registration Number and Designation are: 509634 / TW0001

1.4 Special Accessories

There is no special accessory 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 plan. 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/ 50 uH 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 plan. 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. 2-1 Radiated Emission Configuration

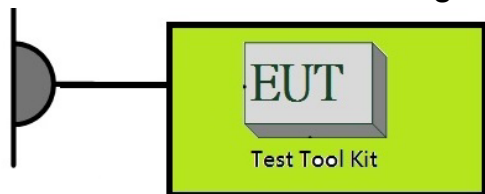


Fig. 2-3 Conducted (Antenna Port) Configuration

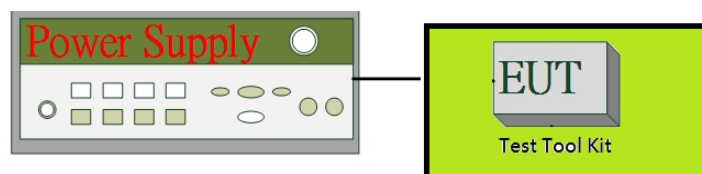


Fig. 2-2 AC Power Line Conducted Emission Configuration

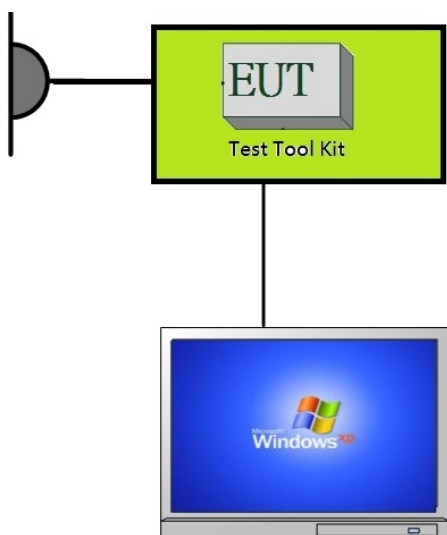


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	L430	R9-X11BG	Shielded	Unshielded
3.	DC Power Supply	Agilent	E3640A	MY52410006	N/A	Unshielded

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3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.519(b)	UWB bandwidth	Compliant
§15.209 §15.519(c) (d)	Radiated Emission	Compliant
§15.519(e)	Peak level of the Emission	Compliant
§15.519(a) (1)	Transmitter Timeout	Compliant

4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Test frequency 7200MHz is chosen for full testing.

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) the worst case H position was reported.

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5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 0.84 dB
100 KHz Bandwidth Of Frequency Band Edges	+/- 0.84 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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6 CONDUCTED EMISSION TEST

6.1 Standard Applicable

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

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note

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

6.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESC17	100335	2018/02/02	2019/02/01
LISN	SCHWARZBECK	NSLK 8127	8127-649	2018/05/18	2019/5/17
Notebook	Lenovo	L430	R9-X11BG	N/A	N/A

6.3 EUT Setup

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

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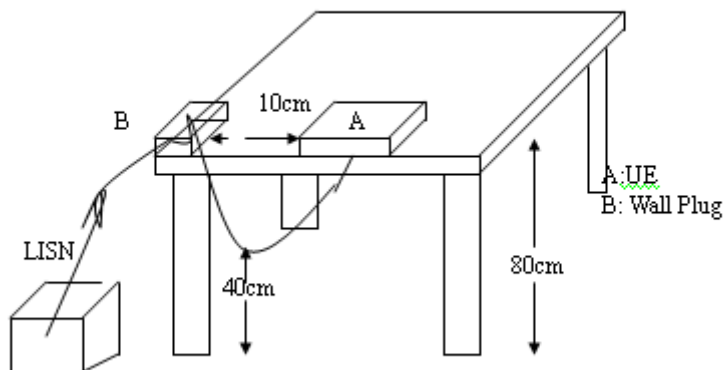
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6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plan.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

6.6 Measurement Result

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

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

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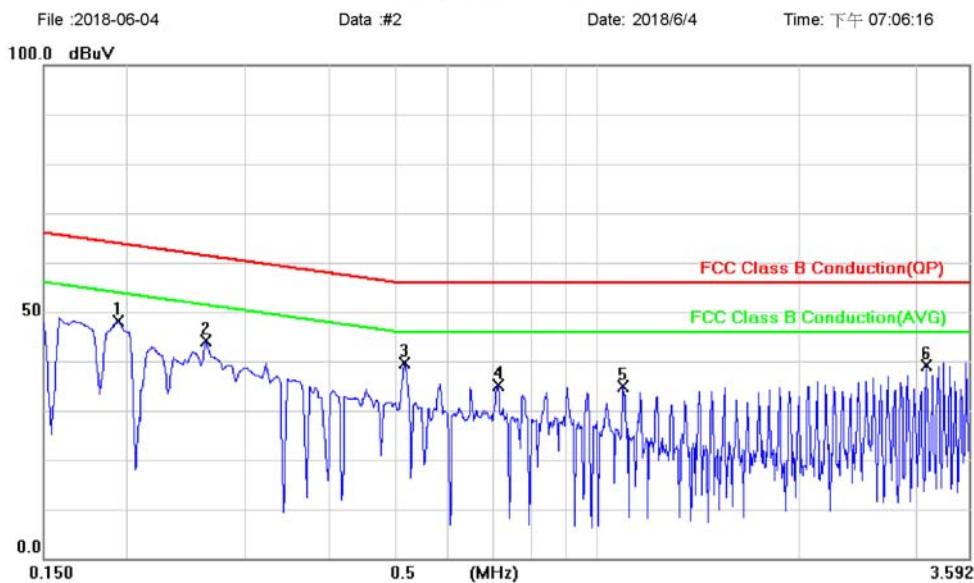
AC POWER LINE CONDUCTED EMISSION TEST DATA

Site: Conduction Room
 Limit: FCC Class B Conduction(QP)
 Mode:
 Note:

Phase: **L1**
 Power: AC 120V/60Hz

Temperature: 25 °C
 Humidity: 85 %

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1940	47.95	0.12	48.07	63.86	-15.79	peak	
2		0.2620	44.00	0.12	44.12	61.37	-17.25	peak	
3		0.5180	39.50	0.11	39.61	56.00	-16.39	peak	
4		0.7140	34.97	0.12	35.09	56.00	-20.91	peak	
5		1.0980	34.66	0.12	34.78	56.00	-21.22	peak	
6		3.1100	38.88	0.20	39.08	56.00	-16.92	peak	

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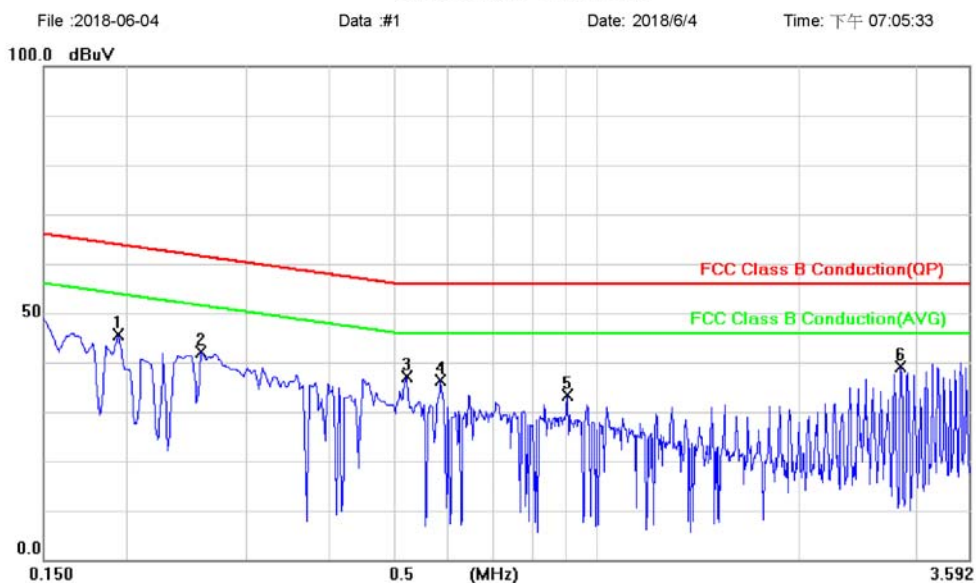
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Site: Conduction Room	Phase: N	Temperature: 25 °C
Limit: FCC Class B Conduction(QP)	Power: AC 120V/60Hz	Humidity: 85 %
Mode:		
Note:		

Conducted Emission



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1940	45.44	0.07	45.51	63.86	-18.35	peak	
2		0.2580	41.96	0.07	42.03	61.50	-19.47	peak	
3		0.5220	37.08	0.08	37.16	56.00	-18.84	peak	
4		0.5860	36.34	0.08	36.42	56.00	-19.58	peak	
5		0.9060	33.25	0.09	33.34	56.00	-22.66	peak	
6 *		2.8460	38.96	0.15	39.11	56.00	-16.89	peak	

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7 UWB BANDWIDTH

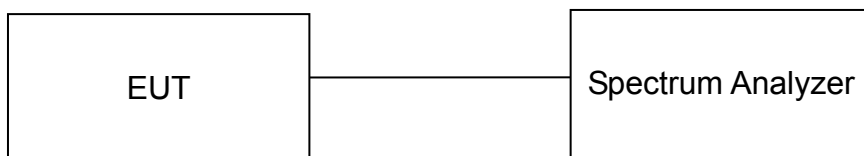
7.1 Standard Applicable

According to §15.519 (b) The UWB bandwidth of a device operating under the provisions of this section must be contained between 3100 MHz and 10,600 MHz

7.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	2018/05/03	2019/05/02
Attenuator	Mini-Circuit	BW-S10W2+	2	2018/01/02	2019/01/01
Coaxial Cables	N/A	WK CE Cable	N/A	2018/01/02	2019/01/01
DC Power Supply	Agilent	E3640A	MY53140006	2017/11/28	2018/11/27

7.3 Test Set-up:



7.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum. RBW = 1MHz, VBW = 3 times more than RBW, Span: 5GHz, Detector = Peak, Sweep = Auto.
3. Record the max. Reading as observed from Spectrum.
4. Repeat above procedures until all test default channel measured was complete.

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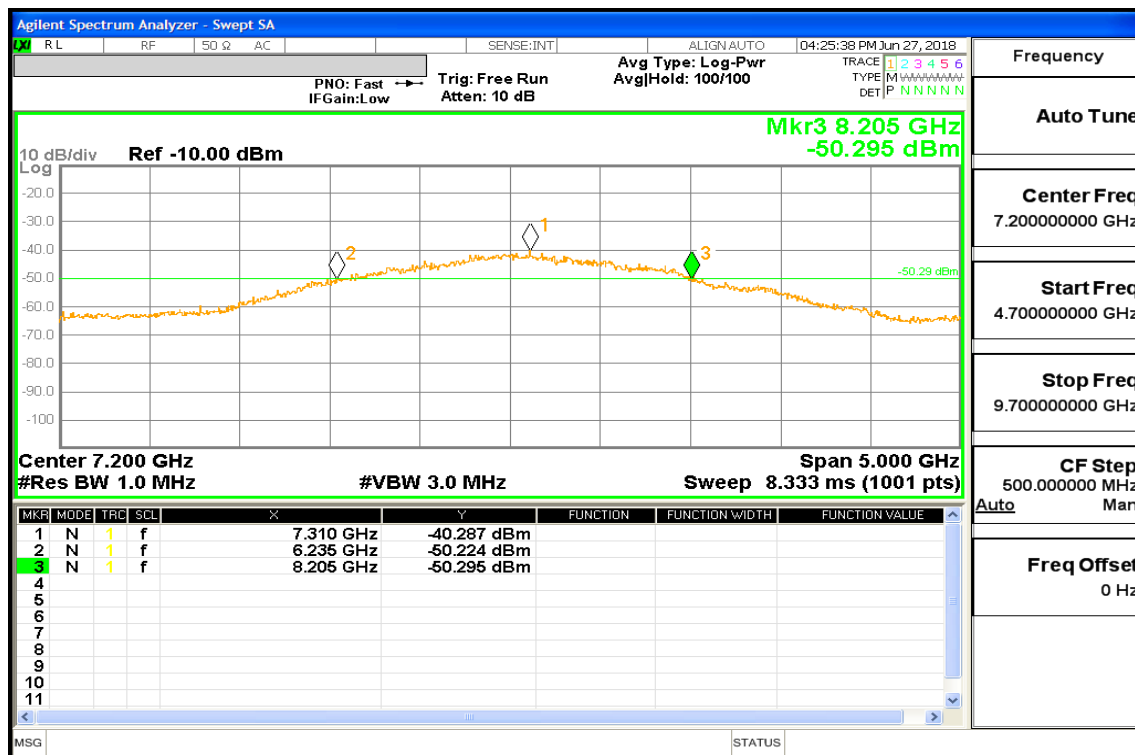
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7.5 Measurement Result:

10dB Bandwidth: 8205MHz - 6235MHz = 1970MHz ((fH - fL) is ≥500 MHz)

Center frequency: (fH + fL) / 2 = 7220MHz



Marker 2 - fLow

Marker 3- fHigh

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8 RADIATED EMISSION AND PEAK LEVEL OF THE EMISSION

8.1 Standard Applicable

According to §15.519(c), The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in § 15.209. The radiated emissions above

960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz	EIRP in dBm
960–1610	– 75.3
1610–1990	– 63.3
1990–3100	– 61.3
3100–10600	– 41.3
Above 10600	– 61.3

§15.519 (d), In addition to the radiated emission limits specified in the table in paragraph (c) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency in MHz	EIRP in dBm
1164–1240	– 85.3
1559–1610	– 85.3

§15.519 (e), There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, fM. That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in § 15.521.

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8.2 Measurement Equipment Used

Radiated Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Bi-log Antenna	SCHWAZBECK	VULB9168	378	2017/12/29	2018/12/28
Horn Antenna	Schwarzbeck	BBHA9120D	1441	2017/08/04	2018/08/03
Horn Antenna	Schwarzbeck	BBHA9170	184	2017/12/12	2018/12/11
Loop Antenna	ETS.LINDGREN	6502	148045	2017/09/26	2018/09/25
3m Site NSA	SGS	966 chamber	N/A	2018/01/02	2019/01/01
Spectrum Analyzer	Agilent	E4446A	MY51100003	2018/05/15	2019/05/14
EMI Test Receiver	R&S	ESCI7	100335	2018/02/02	2019/02/01
Pre-Amplifier	HP	8449B	3008A00578	2018/01/02	2019/01/01
Pre-Amplifier	HP	8447D	2944A07676	2018/01/02	2019/01/01
Pre-Amplifier	EMC Instruments	EMC184045B	980135	2017/10/27	2018/10/26
Low Loss Cable	Huber Suhner	966_RX	9	2018/01/02	2019/01/01
Notebook	Lenovo	L430	R9-X11BG	N/A	N/A

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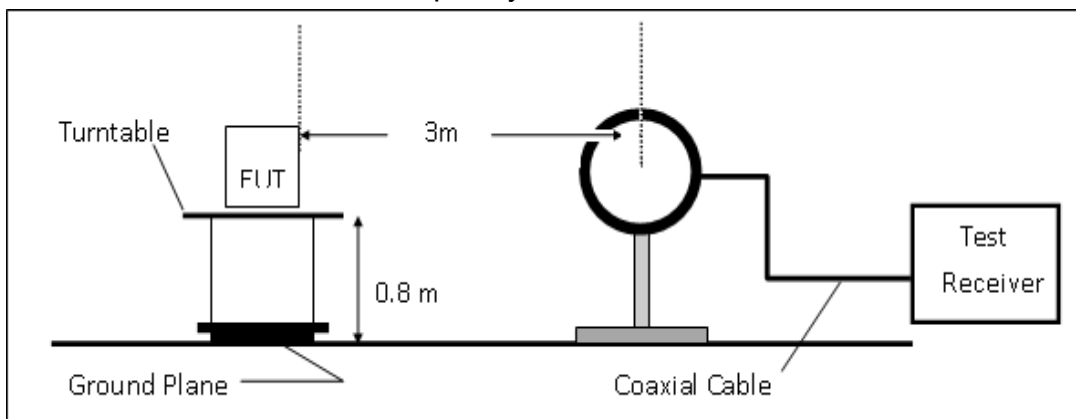
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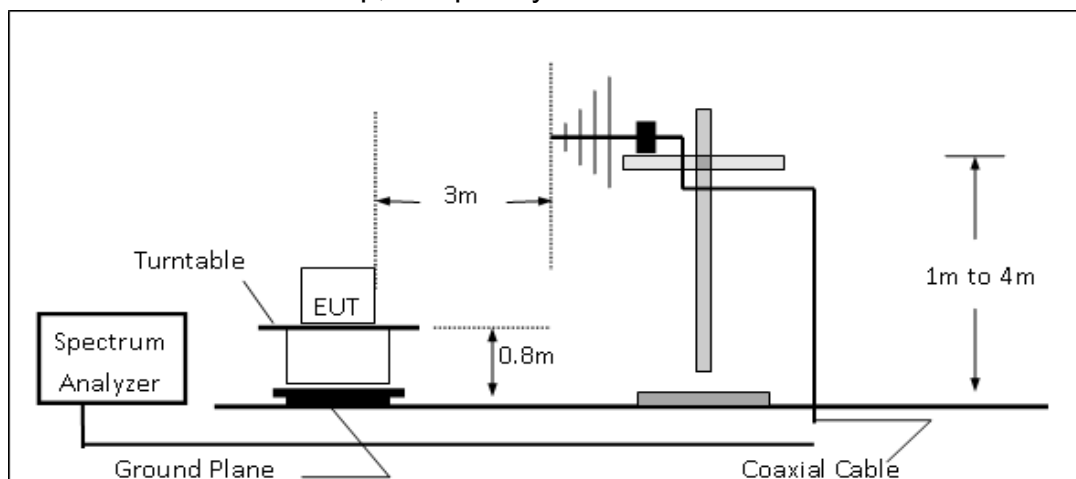
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8.3 Test Set-up

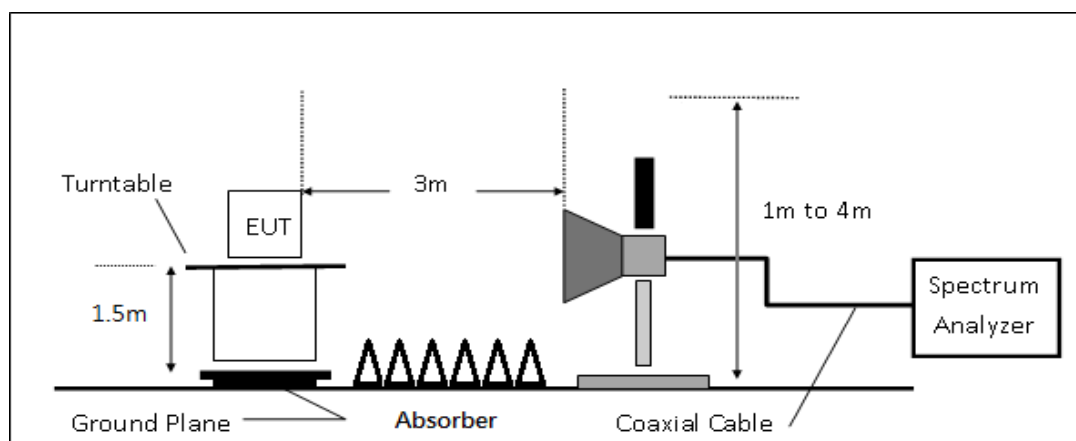
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(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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8.4 Measurement Procedure

1. The testing follows the Measurement Procedure of ANSI C63.10:2013.
2. The EUT was placed on a turn table with 0.8m for frequency < 1GHz and 1.5m for frequency > 1GHz above ground plan.
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. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
7. 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.
8. Repeat above procedures until all default test channel measured were complete.

8.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

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

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Limit calculated as follows(RBW = 1MHz)

$20 \log (RBW/50) \text{ dBm} = 2 \log (1/50) \text{ dBm} = -33.98 \text{ dBm}$

PeakE-field (3m) E(dBuV/m) = P (dBm EIRP) + 95.2 = -33.98 + 95.2 = 61.2 dBuV/m

8.6 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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8.7 Measurement Result

Peak level of the Emission Measurement Result

Freq. (MHz)	E-Field [dBuV/m]	BWCF [dB]	EIRP_1MHz [dBm]	EIRP_50MHz [dBm]	EIRP_50MHz Limit [dBm]	Margin [dB]	Pol [H/V]
7200	37.89	-33.98	-57.31	-23.33	0	-23.33	V
7200	42.17	-33.98	-53.03	-19.05	0	-19.05	H

Note 1: $EIRP_{1MHz} [dBm] = E-Field [dBuV/m] - 95.2$

Note 2: Bandwidth Correction Factor (BWCF) = $20 \log (1MHz/50MHz) = -33.97 [dB]$

Note 3: $EIRP_{50MHz} = EIRP_{3MHz} - BWCF$; $EIRP_{3MHz} = EIRP_{PSD/3MHz}$; $EIRP_{50MHz} = EIRP_{PSD/50MHz}$.

Note 4: Measurement worst emissions of receive antenna polarization.

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Operation Band :7.2G Temp./Humi. :21 deg_C / 62 RH
 Fundamental Frequency :7200 MHz Engineer :Kane
 Operation Mode :Main
 EUT Pol. :H Plane Measurement Antenna Pol. :VERTICAL

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS
MHz	PK/QP/AV	dBμV	dB	dBμV/m
7200.00	Peak	37.89	13.98	51.87

Operation Band :7.2G Temp./Humi. :21 deg_C / 62 RH
 Fundamental Frequency :7200 MHz Engineer :Kane
 Operation Mode :Main
 EUT Pol. :H Plane Measurement Antenna Pol. :HORIZONTAL

Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS
MHz	PK/QP/AV	dBμV	dB	dBμV/m
7200.00	Peak	42.17	13.98	56.15

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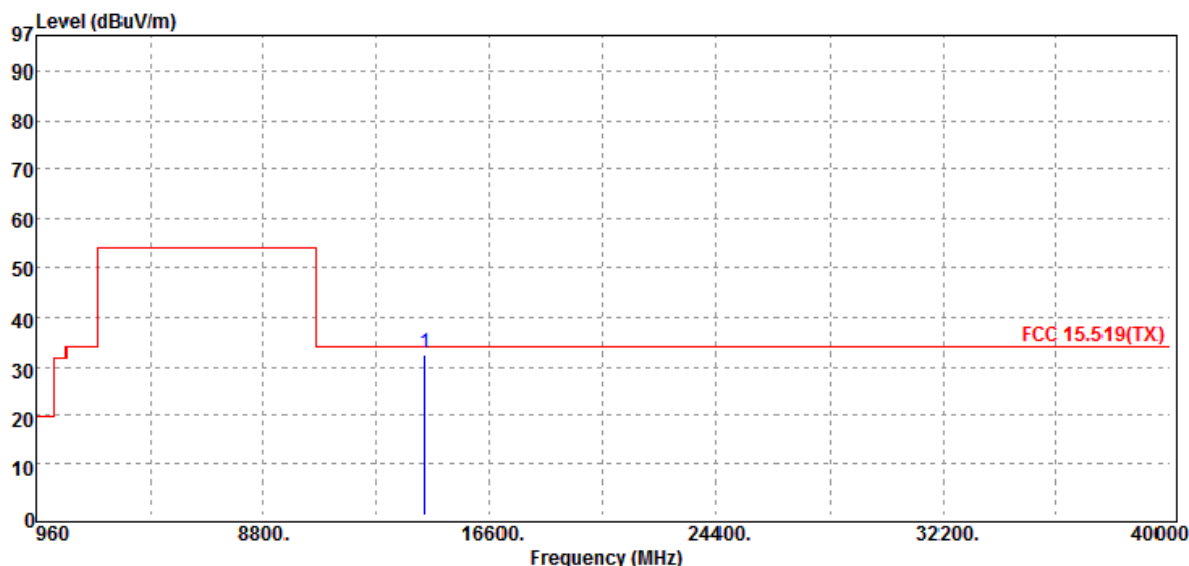
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Radiated Spurious Emission Measurement Result (\$15.519 C)

Operation Band	:7.2G	Test Date	:2018-06-28
Fundamental Frequency	:7200 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx	Engineer	:Kane
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Actual FS dBm/m	Limit @3m dBuV/m	Limit @3m dBm/m	Margin dB
14400.00	Peak	4.76	27.67	32.43	-62.77	33.90	-61.3	-1.47

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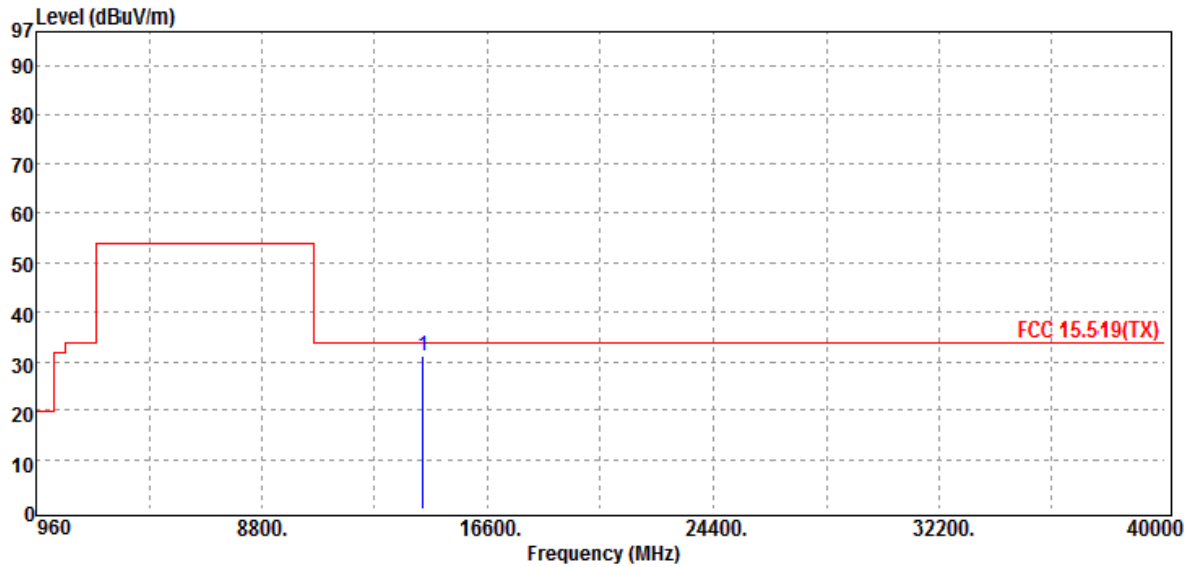
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Operation Band :7.2G
Fundamental Frequency :7200 MHz
Operation Mode :Tx
EUT Pol. :H Plane

Test Date :2018-06-28
Temp./Humi. :21 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Actual FS dBm/m	Limit @3m dBuV/m	Limit @3m dBm/m	Margin dB
14400.00	Peak	3.71	27.67	31.38	-63.82	33.90	-61.3	-2.52

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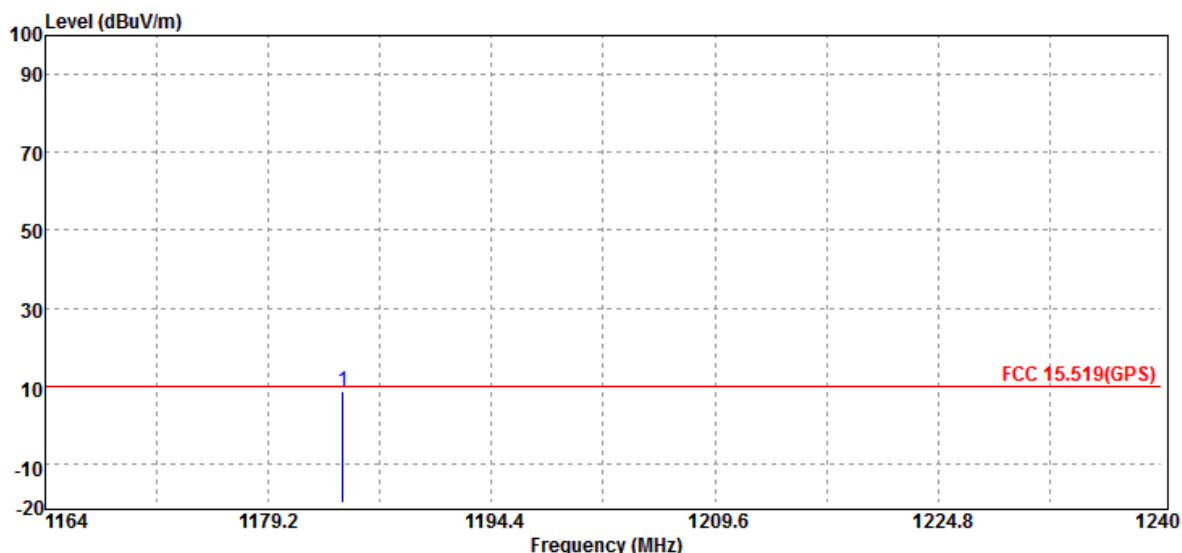
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Radiated Spurious Emission Measurement Result (\$15.519 D)

Operation Band	:7.2G	Test Date	:2018-06-27
Fundamental Frequency	:7200 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx	Engineer	:Kane
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq.	Detector	Spectrum	Factor	Actual	Limit	Margin
MHz	Mode	Reading Level		FS	@3m	
	PK/QP/AV	dBuV	dB	dBuV/m	dBuV/m	dB
1184.29	Peak	13.34	-4.68	8.66	9.90	-1.24

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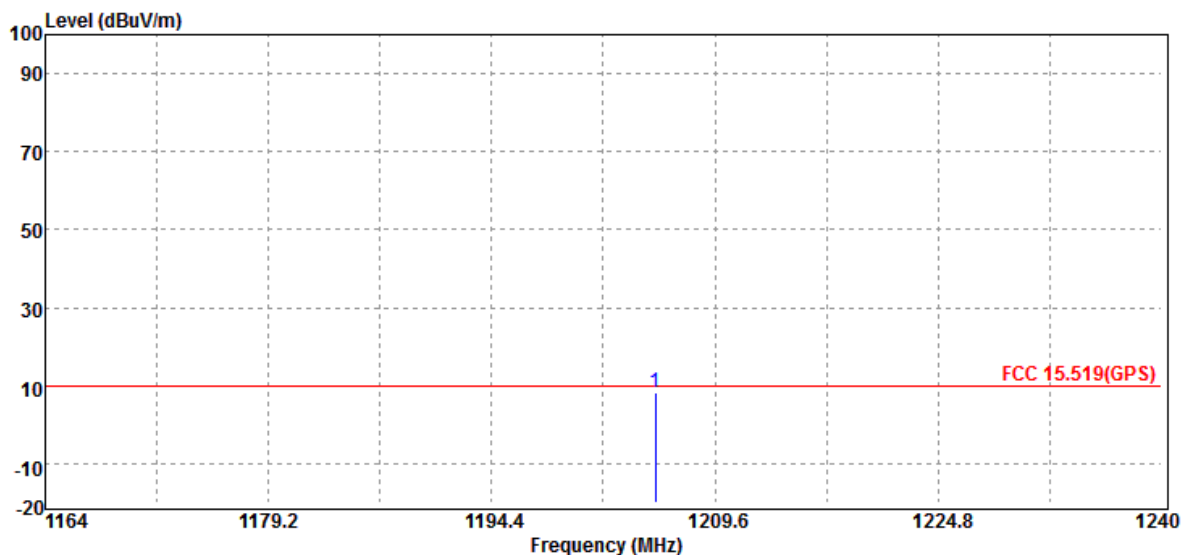
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Operation Band :7.2G
Fundamental Frequency :7200 MHz
Operation Mode :Tx
EUT Pol. :H Plane

Test Date :2018-06-27
Temp./Humi. :21 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
1205.57	Peak	12.96	-4.57	8.39	9.90	-1.51

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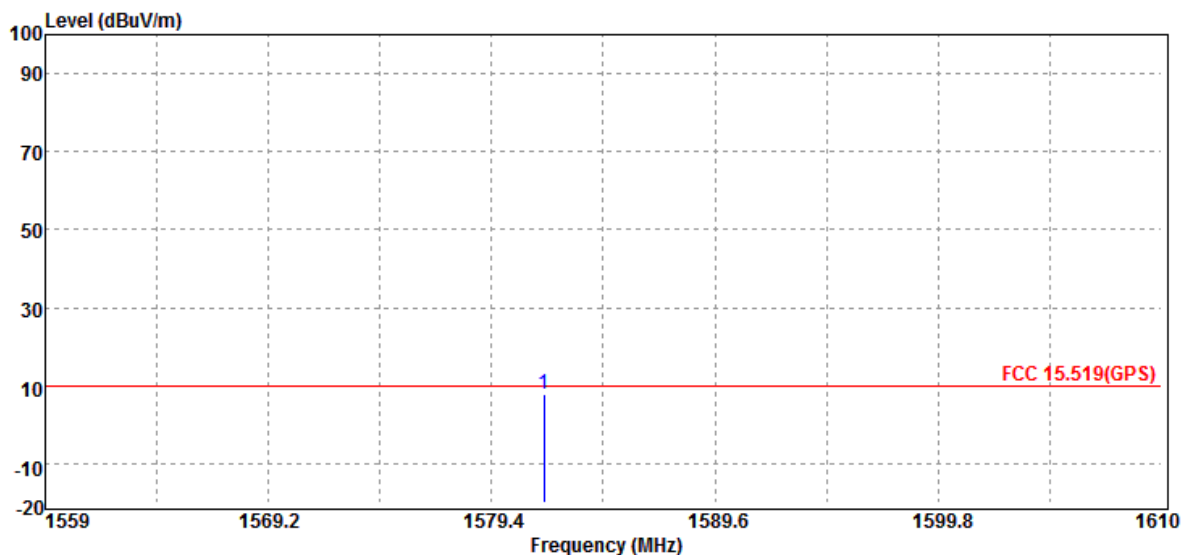
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Operation Band :7.2G
Fundamental Frequency :7200 MHz
Operation Mode :Tx
EUT Pol. :H Plane

Test Date :2018-06-27
Temp./Humi. :21 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
1581.80	Peak	10.76	-2.88	7.88	9.90	-2.02

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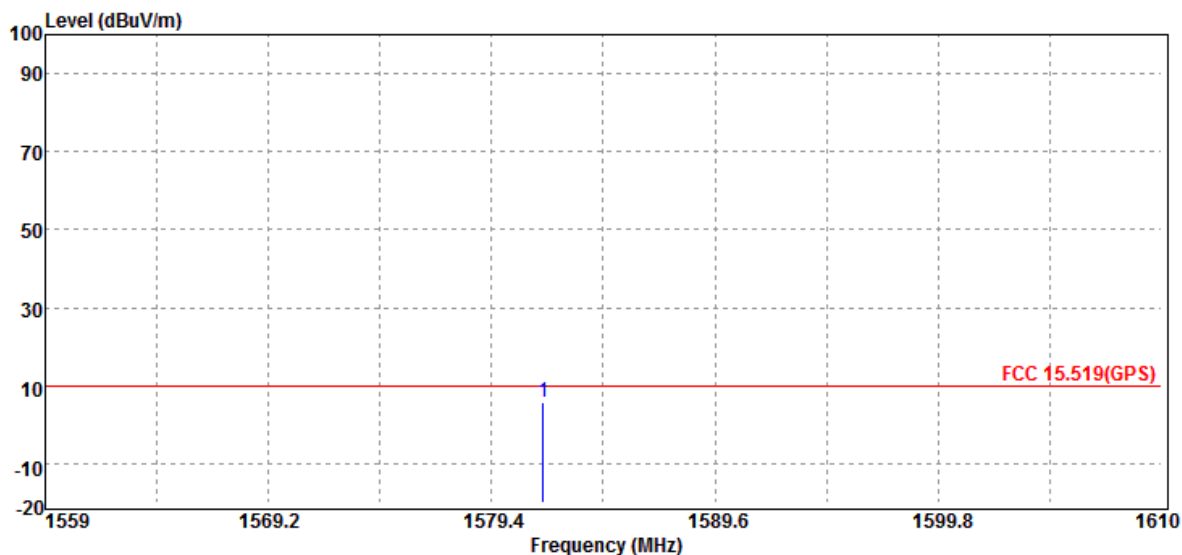
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Operation Band :7.2G
Fundamental Frequency :7200 MHz
Operation Mode :Tx
EUT Pol. :H Plane

Test Date :2018-06-27
Temp./Humi. :21 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
1581.75	Peak	8.79	-2.88	5.91	9.90	-3.99

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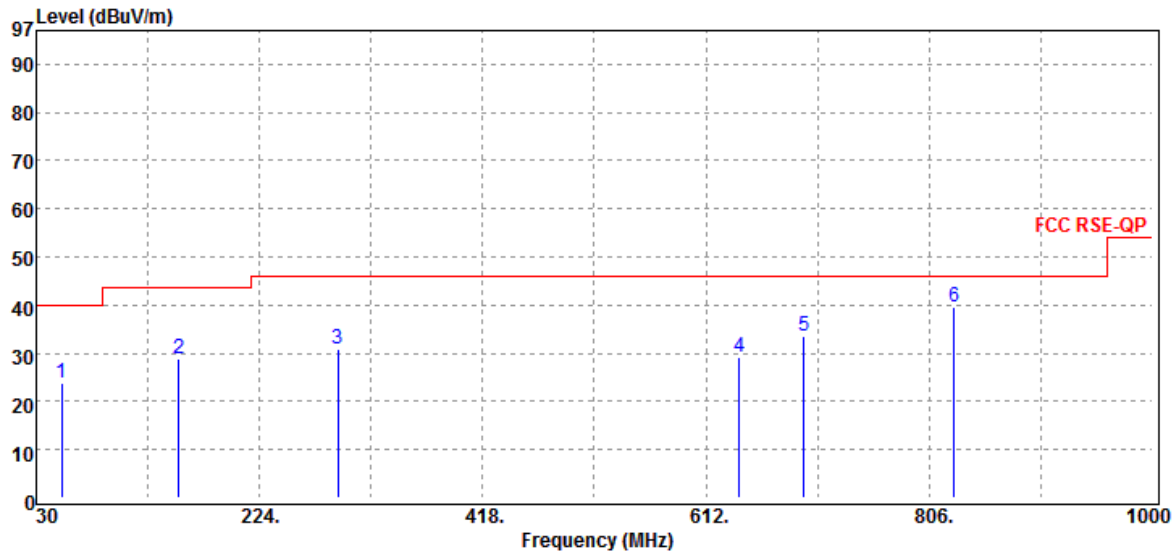
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Radiated Spurious Emission Measurement Result (\$15.209) *Below 1GHz

Operation Band	:7.2G	Test Date	:2018-06-04
Fundamental Frequency	:7200 MHz	Temp./Humi.	:21 deg_C / 62 RH
Operation Mode	:Tx	Engineer	:Kane
EUT Pol.	:H Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
52.31	Peak	31.43	-7.55	23.88	40.00	-16.12
154.16	Peak	36.17	-7.30	28.87	43.50	-14.63
291.90	Peak	36.48	-5.76	30.72	46.00	-15.28
641.10	Peak	28.59	0.66	29.25	46.00	-16.75
697.36	Peak	32.16	1.33	33.49	46.00	-12.51
827.34	Peak	35.57	4.17	39.74	46.00	-6.26

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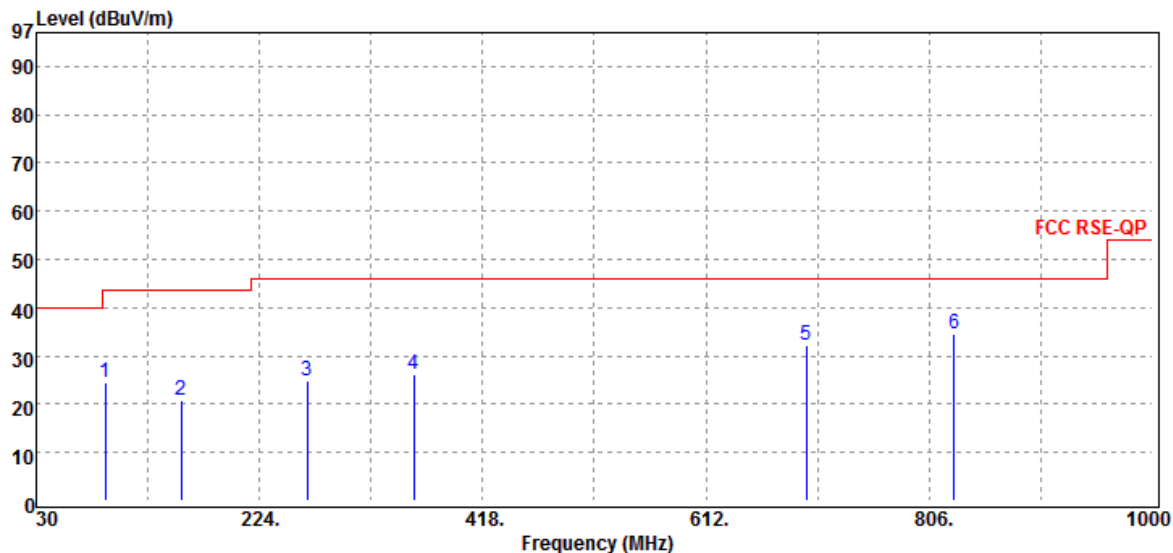
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Operation Band :7.2G
Fundamental Frequency :7200 MHz
Operation Mode :Tx
EUT Pol. :H Plane

Test Date :2018-06-04
Temp./Humi. :21 deg_C / 62 RH
Engineer :Kane
Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBuV	Factor dB	Actual FS dBuV/m	Limit @3m dBuV/m	Margin dB
90.14	Peak	38.14	-13.66	24.48	43.50	-19.02
156.10	Peak	28.05	-7.24	20.81	43.50	-22.69
265.71	Peak	31.80	-6.80	25.00	46.00	-21.00
357.86	Peak	30.55	-4.22	26.33	46.00	-19.67
699.30	Peak	30.51	1.74	32.25	46.00	-13.75
827.34	Peak	30.38	4.17	34.55	46.00	-11.45

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9 TRANSMITTER TIMEOUT

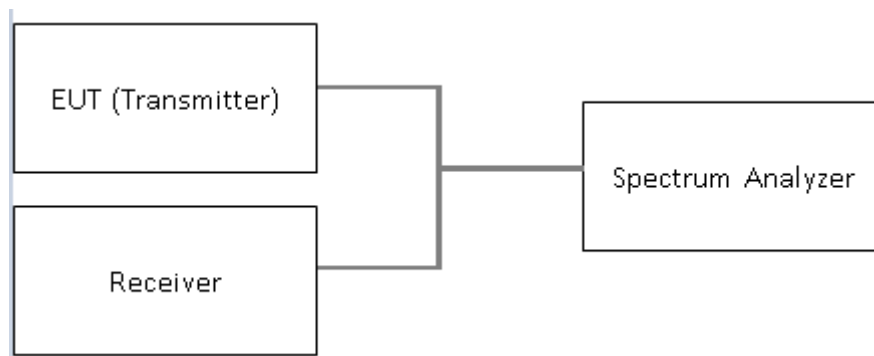
9.1 Standard Applicable

According to §15.519(a) (1), A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.

9.2 Measurement Equipment Used

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	2018/05/03	2019/05/02
Attenuator	Mini-Circuit	BW-S10W2+	2	2018/01/02	2019/01/01
Coaxial Cables	N/A	WK CE Cable	N/A	2018/01/02	2019/01/01
DC Power Supply	Agilent	E3640A	MY53140006	2017/11/28	2018/11/27

9.3 Test SET-UP



9.4 Measurement Procedure

The Transmitter Timeout was measured with a spectrum analyzer connected to the antenna port

9.5 Measurement Result

Note: Refer to next page for the spectrum analyzer data chart.

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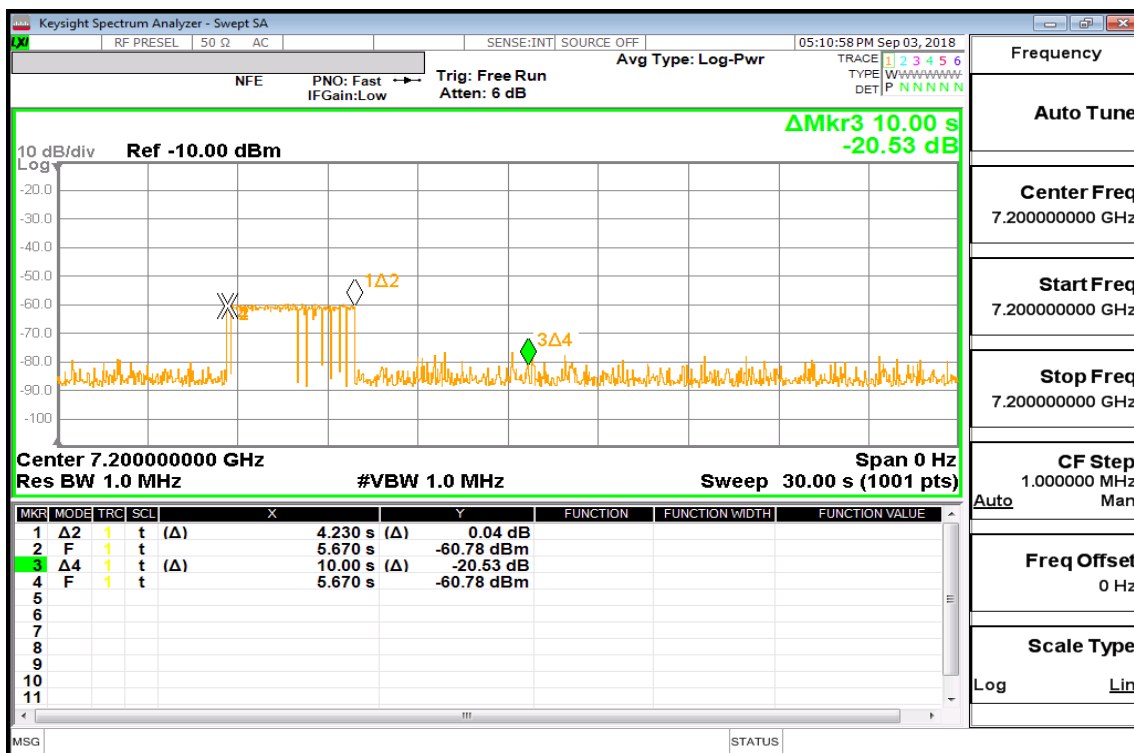
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Transmitter Timeout Measurement Result



Marker F: The time that the receiver was removed (during data transmitting).

Marker 1Δ2: The time that the EUT stopped transmitting.

Transmitter Timeout: 4.230s

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10 ANTENNA REQUIREMENT

10.1 Standard Applicable

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

10.2 Antenna Connected Construction

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~

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