



RADIO TEST REPORT

Report No: STS2012025W02

Issued for

TRACKERWAVE PRIVATE LIMITED

No. 4, 363, Block C, 3rd Floor, OMR Road, Kanthanchavadi,
Chennai-600096, Tamilnadu, India.

Product Name:	DIGITRACE ID CARD-U
Brand Name:	TRACKERWAVE
Model Name:	TWBL22-UWB-COASTER
Series Model:	TWBL22-U
FCC ID:	2ATS5-TWBL22UWB
Test Standard:	Title 47 of the CFR, Part 15. Subpart F

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TEST RESULT CERTIFICATION

Applicant's Name: TRACKERWAVE PRIVATE LIMITED
Address.....: No. 4, 363, Block C, 3rd Floor, OMR Road, Kanthanchavadi, Chennai-600096, Tamilnadu, India.
Manufacturer's Name: TRACKERWAVE PRIVATE LIMITED
Address.....: No. 4, 363, Block C, 3rd Floor, OMR Road, Kanthanchavadi, Chennai-600096, Tamilnadu, India.
Product Description
Product Name: DIGITRACE ID CARD-U
Brand Name: TWBL22-UWB-COASTER
Model Name.....: TWBL22-U
Series Model: TWBL22-UWB-COASTER
Test Standards.....: Title 47 of the CFR, Part 15. Subpart F
Test Procedure.....: ANSI C63.10-2013

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report. This report shall not be reproduced except in full, without the written approval of STS, this document only be altered or revised by STS, personal only, and shall be noted in the revision of the document.

Date of Test.....:
Date of receipt of test item.....: 03 Dec. 2020
Date of performance of tests ...: 03 Dec. 2020 ~ 29 Dec. 2020
Date of Issue.....: 29 Dec. 2020
Test Result: Pass

Testing Engineer : [Signature]
(Chris Chen)

Technical Manager : [Signature]
(Sean she)

Authorized Signatory : [Signature]
(Vita Li)





Table of Contents	Page
1. SUMMARY OF TEST RESULTS	6
1.1 TEST FACTORY	7
1.2 MEASUREMENT UNCERTAINTY	7
2. GENERAL INFORMATION	8
2.1 GENERAL DESCRIPTION OF THE EUT	8
2.2 DESCRIPTION OF THE TEST MODES	9
2.3 TEST SOFTWARE AND POWER LEVEL	9
2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS	11
2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS	12
3. EMISSION TEST	14
3.1 CONDUCTED EMISSION MEASUREMENT	14
3.2 RADIATED EMISSION MEASUREMENT (FOR 15.519(C))	18
3.3 RADIATED EMISSION MEASUREMENT (FOR 15.519(D))	39
4. UWB BANDWIDTH	45
4.1 LIMITS OF UWB BANDWIDTH MEASUREMENT	45
4.2 INSTRUMENT SETUP VALUE AND MEASUREMENT DISTANCE	45
4.3 TEST PROCEDURE	45
4.4 TEST SETUP	45
4.5 EUT OPERATION CONDITIONS	45
4.6 TEST RESULTS	46
5 PEAK EMISSION WITHIN A 50MHZ BANDWIDTH (FOR 15.519(E))	47
5.1 LIMITS OF PEAK EMISSION	47
5.2 INSTRUMENT SETUP VALUE AND MEASUREMENT DISTANCE	47
5.3 TEST PROCEDURE	47
5.4 DEVIATION FROM TEST STANDARD	47
5.5 TEST SETUP	47
5.6 FIELD STRENGTH CALCULATION	47
5.7 EUT OPERATING CONDITIONS	47
5.8 TEST RESULTS	48
6 CESSATION TIME	50
6.1 CESSATION TIME	50
6.2 TEST PROCEDURE	50
6.3 TEST RESULTS	50
7. ANTENNA REQUIREMENT	52



Table of Contents	Page
7.1 STANDARD REQUIREMENT	52
7.2 EUT ANTENNA	52
APPENDIX- PHOTOS OF TEST SETUP	53





Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	29 Dec. 2020	STS2012025W02	ALL	Initial Issue





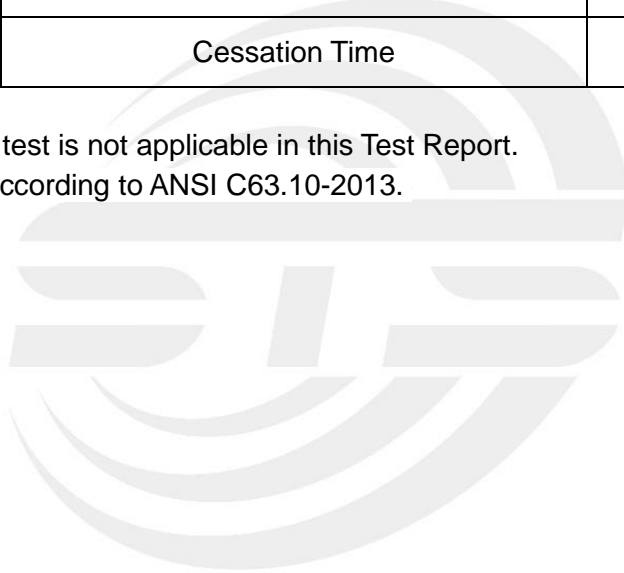
1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part 15. Subpart F			
Standard Section	Test Item	Judgment	Remark
15.207	AC Power Conducted Emission	Pass	
15.203	Antenna Requirement	Pass	
15.209 15.519(c)	Radiated Spurious Emission	Pass	
15.209 15.519(d)	Radiated Spurious Emission in GPS Band	Pass	
15.519(e)	Peak Emissions within a 50MHz Bandwidth	Pass	
15.519(b)	UWB Bandwidth	Pass	
15.519(a)(1)	Cessation Time	Pass	

NOTE:

- (1) 'N/A' denotes test is not applicable in this Test Report.
- (2) All tests are according to ANSI C63.10-2013.





1.1 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD

Add. : A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95 %**.

No.	Item	Uncertainty
1	RF output power, conducted	$\pm 0.68\text{dB}$
2	Unwanted Emissions, conducted	$\pm 2.988\text{dB}$
3	All emissions, radiated 9KHz - 30MHz	$\pm 2.68\text{dB}$
4	All emissions, radiated 30MHz-1GHz	$\pm 4.39\text{dB}$
5	All emissions, radiated 1G-6GHz	$\pm 5.10\text{dB}$
6	All emissions, radiated >6G	$\pm 5.48\text{dB}$
7	Conducted Emission (9KHz-150KHz)	$\pm 2.79\text{dB}$
8	Conducted Emission (150KHz-30MHz)	$\pm 2.80\text{dB}$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	DIGITRACE ID CARD-U								
Trade Name	TRACKERWAVE								
Model Name	TWBL22-UWB-COASTER								
Series Model	TWBL22-U								
Model Difference	TWBL22-U is a ID Card without display. TWBL22-UWB-COASTER is a ID Card with display.								
Product Description	<p>The EUT is a DIGITRACE ID CARD-U</p> <table border="1"> <tr> <td>Operation Frequency:</td> <td>6.4896GHz</td> </tr> <tr> <td>Modulation Type:</td> <td>BPSK</td> </tr> <tr> <td>Antenna Designation:</td> <td>Please refer to the Note 3.</td> </tr> <tr> <td>Antenna Gain(Peak):</td> <td>Chip Antenna</td> </tr> </table> <p>Based on the application, features, or specification exhibited in User Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User Manual.</p>	Operation Frequency:	6.4896GHz	Modulation Type:	BPSK	Antenna Designation:	Please refer to the Note 3.	Antenna Gain(Peak):	Chip Antenna
Operation Frequency:	6.4896GHz								
Modulation Type:	BPSK								
Antenna Designation:	Please refer to the Note 3.								
Antenna Gain(Peak):	Chip Antenna								
Channel List	Please refer to the Note 2.								
Power Rating	Input: DC 5V								
Battery	Rated Voltage:3.7V Charge Limit Voltage:4.2V Capacity: 1200mAh								
Hardware version number	N/A								
Software version number	N/A								
Connecting I/O Port(s)	Please refer to the Note 1.								

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.

2.

Test channel	Frequency(GHz)	Test channel	Frequency(GHz)
1	6.4896	--	--

3. Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	TRACKER WAVE	TWBL22-UWB- COASTER	Chip	N/A	3 dBi	Antenna

Note: The antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report.



2.2 DESCRIPTION OF THE TEST MODES

For Radiated spurious emissions

Each of these EUT operation mode(s) or test configuration mode(s) mentioned below was evaluated respectively.

Pretest Mode	Description	Modulation
Mode 1	TX	BPSK

Note:

- (1) All above mode have been measurement, only worst data was reported.
- (2) We have be tested for all avaiable U.S. voltage and frequencies(For 120V,50/60Hz and 240V, 50/60Hz) for which the device is capable of operation, and the worst case of 120V/60Hz is shown in the report.
- (3) The battery is fully-charged during the radited and RF conducted test.

For AC Conducted Emission

Test Case	
AC Conducted Emission	Mode 2: Keeping TX

2.3 TEST SOFTWARE AND POWER LEVEL

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

RF Function	Type	Mode Or Modulation type	Ant Gain(dBi)	Power Class	Software For Testing
Other SRD	UWB	BPSK	3	Default	The EUT has signal transmission when it is powered on

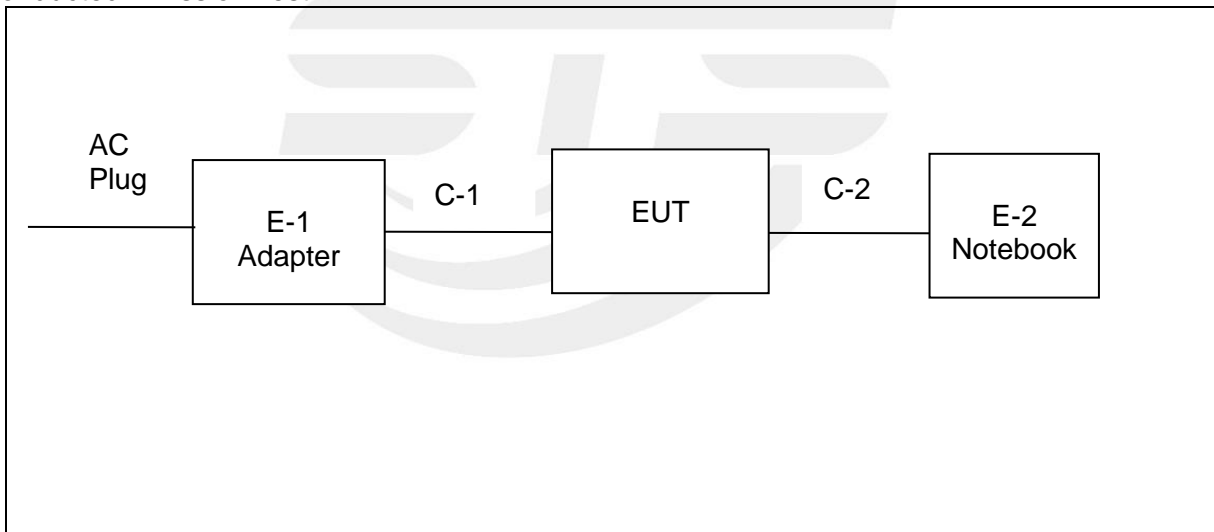
2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters.

Radiated Spurious Emission Test



Conducted Emission Test





2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
C-1	DC Cable	N/A	N/A	105cm	NO

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
E-1	Adapter	SZTY	TPA-46050100VU	N/A	N/A
E-2	Notebook	Lenovo	ThinkPad E470	N/A	N/A
C-2	USB Cable	N/A	N/A	100cm	NO

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (2) “YES” is means “with core”; “NO” is means “without core”.



2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2020.10.12	2021.10.11
Signal Analyzer	R&S	FSV 40-N	101823	2020.10.10	2021.10.09
Active loop Antenna	ZHINAN	ZN30900C	16035	2019.07.11	2021.07.10
Bilog Antenna	TESEQ	CBL6111D	34678	2020.10.12	2021.10.11
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	2019.10.15	2021.10.14
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	J211020657	2020.10.12	2022.10.11
Pre-Amplifier(0.1M-3G Hz)	EM	EM330	060665	2020.10.12	2021.10.11
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK201808090 1	2020.10.12	2021.10.11
Pre-Amplifier (18G-40GHz)	SKET	LNPA-1840-50	SK201810180 1	2020.10.10	2021.10.09
Temperature & Humidity	HH660	Mieo	N/A	2020.10.13	2021.10.12
Turn table	EM	SC100_1	60531	N/A	N/A
Antenna mast	EM	SC100	N/A	N/A	N/A
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 RE)			

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2020.10.12	2021.10.11
LISN	R&S	ENV216	101242	2020.10.12	2021.10.11
LISN	EMCO	3810/2NM	23625	2020.10.12	2021.10.11
Temperature & Humidity	HH660	Mieo	N/A	2020.10.13	2021.10.12
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 CE)			



RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Power Sensor	Keysight	U2021XA	MY55520005	2020.10.10	2021.10.09
			MY55520006	2020.10.10	2021.10.09
			MY56120038	2020.10.10	2021.10.09
			MY56280002	2020.10.10	2021.10.09
Signal Analyzer	Agilent	N9020A	MY51110105	2020.03.05	2021.03.04
Temperature & Humidity	HH660	Mieo	N/A	2020.10.13	2021.10.12
Test SW	FARAD	LZ-RF /LzRf-3A3			





3. EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table.

FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of “*” marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

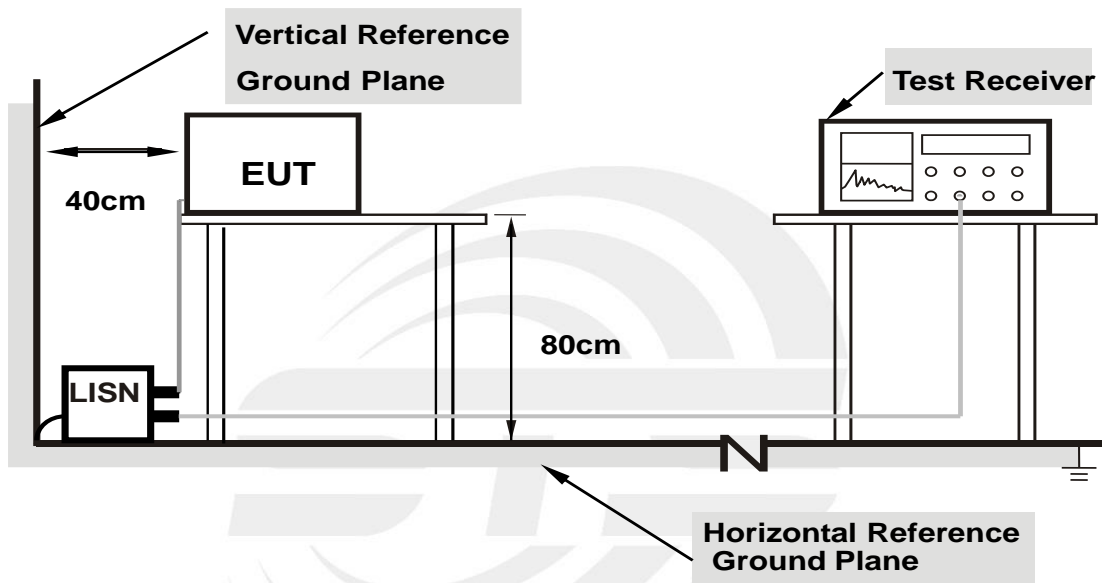
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.2 TEST PROCEDURE

- a. The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN is at least 80 cm from the nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP



- Note: 1. Support units were connected to second LISN.**
- 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.**

3.1.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



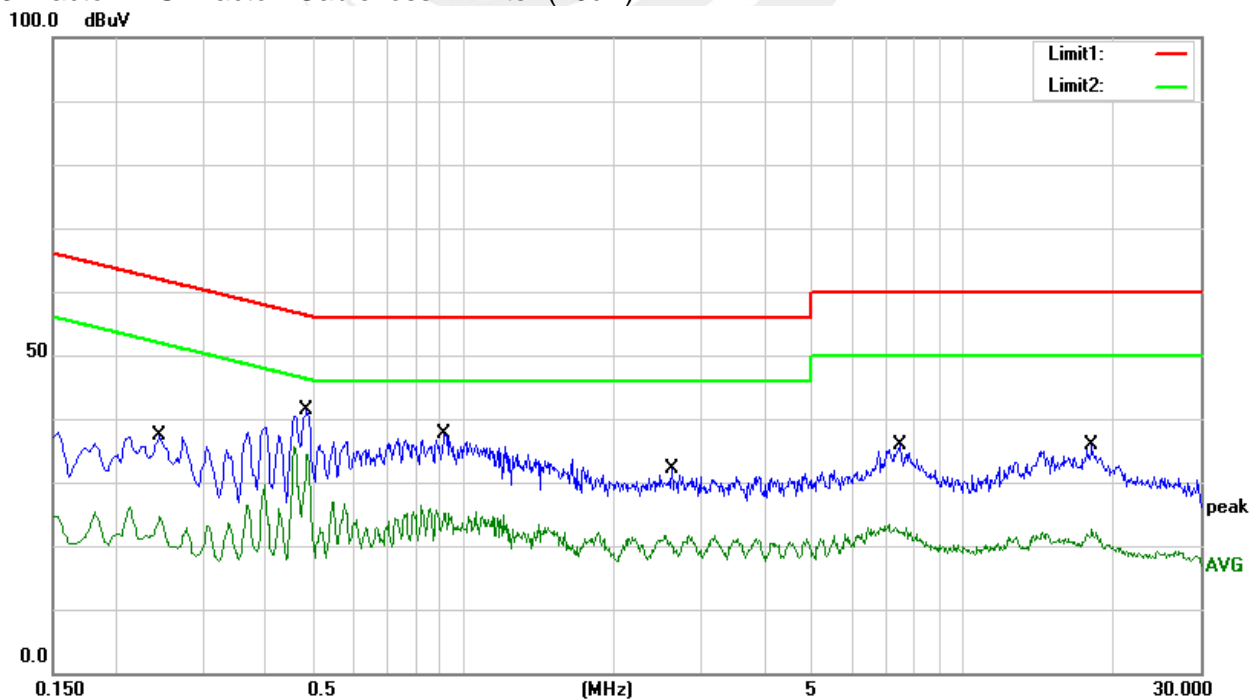
3.1.5 TEST RESULT

Temperature:	25.1(C)	Relative Humidity:	52%RH
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 2		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.2460	16.92	20.46	37.38	61.89	-24.51	QP
2	0.2460	4.20	20.46	24.66	51.89	-27.23	AVG
3	0.4860	20.78	20.48	41.26	56.24	-14.98	QP
4	0.4860	13.92	20.48	34.40	46.24	-11.84	AVG
5	0.9180	17.53	20.18	37.71	56.00	-18.29	QP
6	0.9180	4.89	20.18	25.07	46.00	-20.93	AVG
7	2.6100	12.07	20.01	32.08	56.00	-23.92	QP
8	2.6100	0.61	20.01	20.62	46.00	-25.38	AVG
9	7.5100	15.90	19.94	35.84	60.00	-24.16	QP
10	7.5100	2.90	19.94	22.84	50.00	-27.16	AVG
11	18.1380	15.42	20.49	35.91	60.00	-24.09	QP
12	18.1380	2.06	20.49	22.55	50.00	-27.45	AVG

Remark:

1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor=LISN factor+Cable loss+Limiter (10dB)



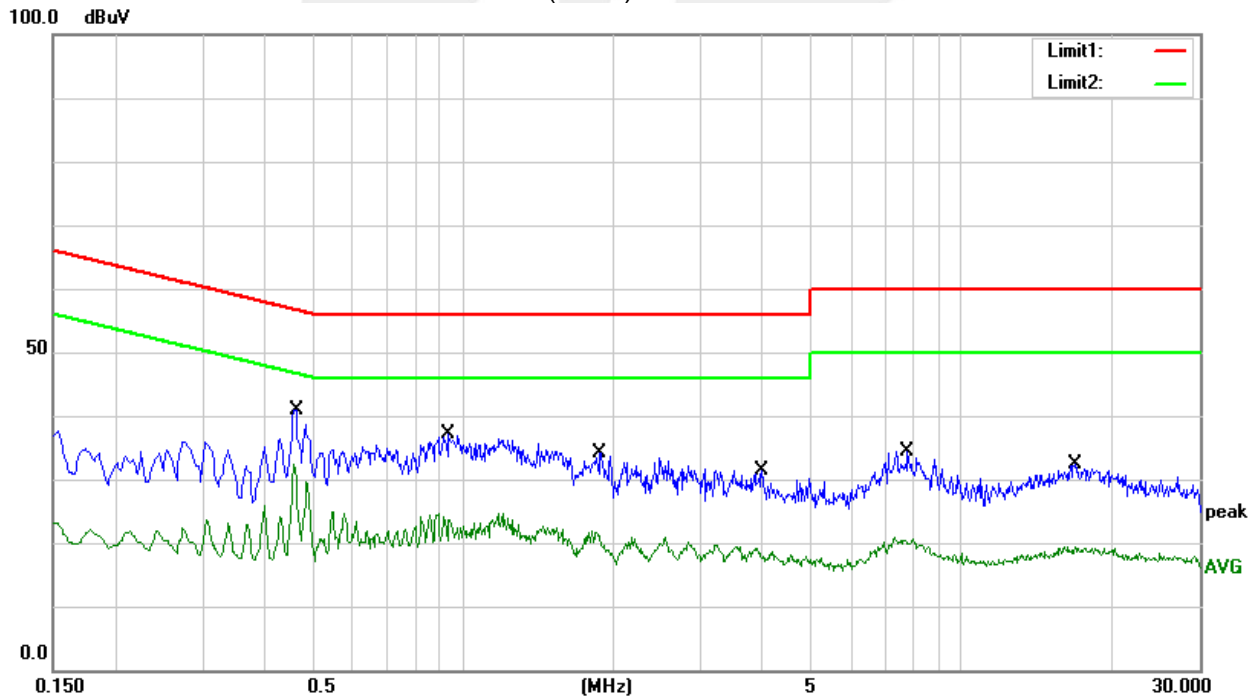


Temperature:	25.1(C)	Relative Humidity:	52%RH
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 2		

No.	Frequen cy (MHz)	Reading (dBuV)	Correct Factor(d B)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.4620	20.52	20.48	41.00	56.66	-15.66	QP
2	0.4620	11.96	20.48	32.44	46.66	-14.22	AVG
3	0.9380	17.00	20.18	37.18	56.00	-18.82	QP
4	0.9380	3.56	20.18	23.74	46.00	-22.26	AVG
5	1.8820	14.03	20.07	34.10	56.00	-21.90	QP
6	1.8820	1.50	20.07	21.57	46.00	-24.43	AVG
7	3.9740	11.32	19.95	31.27	56.00	-24.73	QP
8	3.9740	-1.57	19.95	18.38	46.00	-27.62	AVG
9	7.7700	14.47	19.96	34.43	60.00	-25.57	QP
10	7.7700	0.64	19.96	20.60	50.00	-29.40	AVG
11	16.9260	11.95	20.38	32.33	60.00	-27.67	QP
12	16.9260	-1.00	20.38	19.38	50.00	-30.62	AVG

Remark:

1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor=LISN factor+Cable loss+Limiter (10dB)





3.2 RADIATED EMISSION MEASUREMENT (FOR 15.519(c))

3.2.1 RADIATED EMISSION LIMITS

The radiated emissions at or below 960MHz from a device operating under the provisions of this section shall not exceed the emission levels in Section 15.209.

Frequencies (MHz)	Field Strength (micровolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3

Note: 1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

Frequency of Emission (MHz)	EIRP (dBm)	Field Strength (dBuV/m@3m)	Field Strength (dBuV/m@1m)
960~1610	-75.3	19.9	29.54
1610~1990	-63.3	31.9	41.54
1990~3100	-61.3	33.9	43.54
3100~10600	-41.3	53.9	63.54
Above 10600	-61.3	33.9	43.54

Notes: 1. Transfer rules follow 15.521(g),15.31(f)(1).
2. 15.521(c) Emissions from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in Section 15.209 of this chapter, rather than the limits specified in this subpart.
3. $E(\text{dBuV/m})@3\text{m} = P(\text{dBm EIRP}) + 95.2$;
 $E(\text{dBuV/m})@1\text{m} = E(\text{dBuV/m})@3\text{m} + 20 \cdot \log(3/1)$



Spectrum Parameter	Setting
Detector	RMS
Attenuation	Auto
Start Frequency	960 MHz
Stop Frequency	10th of the highest fundamental frequency or to 40 GHz, whichever is lower
RB	1MHz
VB	3MHz
Sweep Point	960 MHz -1610MHz: 1001 1610MHz – 1990MHz: 1001 1990MHz – 3100MHz: 1110 3100MHz – 10600MHz: 7500 10600MHz – 18000MHz: 7400 18000MHz – 40000MHz: 22000
SweepTime	1s

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for AVG
	90kHz~110kHz / RB 200Hz for QP
	110kHz~490kHz / RB 200Hz for AVG
	490kHz~30MHz / RB 9kHz for QP
	30MHz~960MHz / RB 120kHz for QP



3.2.2 TEST PROCEDURE

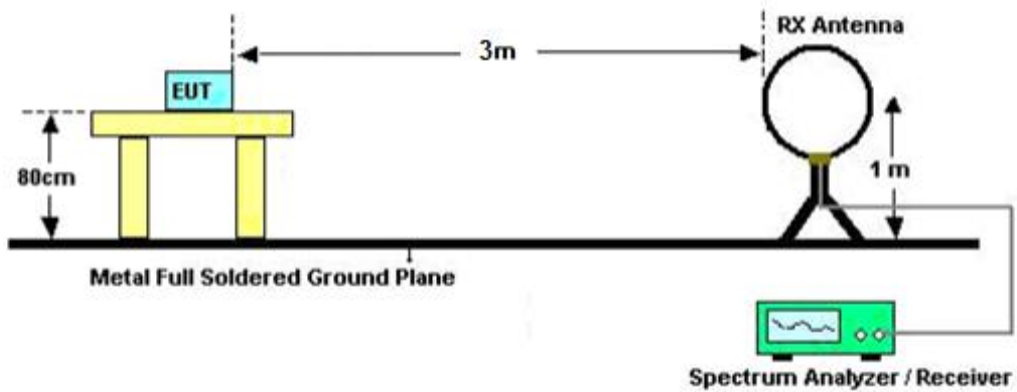
- a. The measuring distance of 1m shall be used for measurements. The EUT was placed on the top of rotating table 0.8meter (above 1GHz is 1.5 m) above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The height of the test antenna shall vary between 1m to 4m. Both horizontal and vertical polarization Of the antenna are set to make the measurement.
- c. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- d. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading compliance with the QP limits and then QP Mode measurement didn't perform (Below 960MHz)
- e. All readings are RMS mode value , for each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading . (Above 960MHz)
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

3.2.3 DEVIATION FROM TEST STANDARD

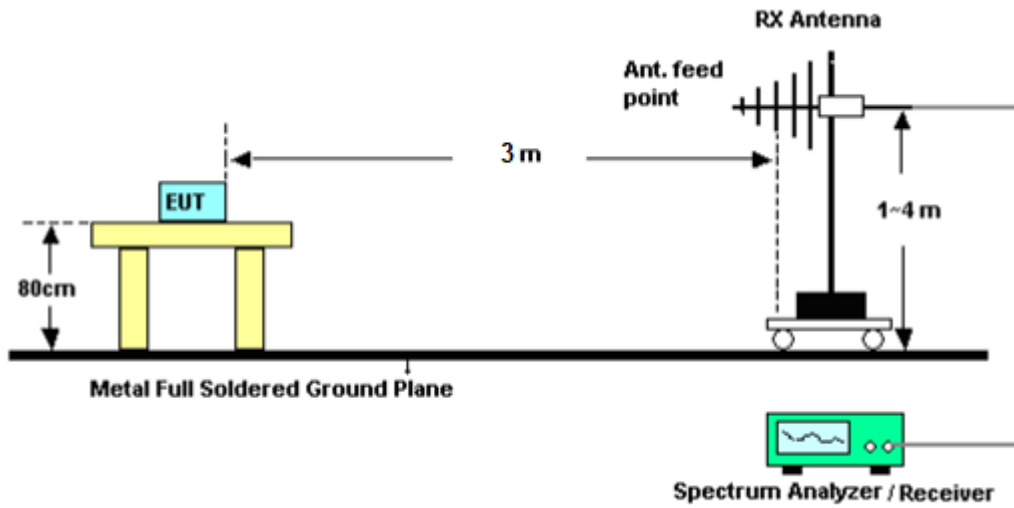
No deviation

3.2.4 TEST SETUP

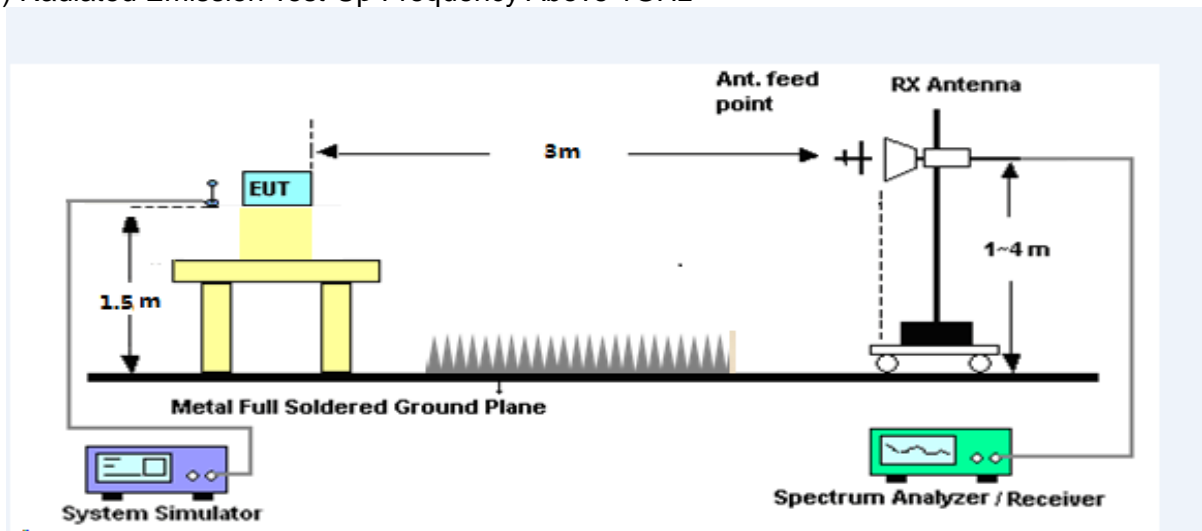
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz





3.2.5 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:

Margin=PL-PK L or AL- AV L; Margin only shown the worst case.

Where

PR = Peak Reading

AR = Average Reading

PL = Peak Level

AL = Average Level

AF = Antenna Factor

PK L = Peak Limit

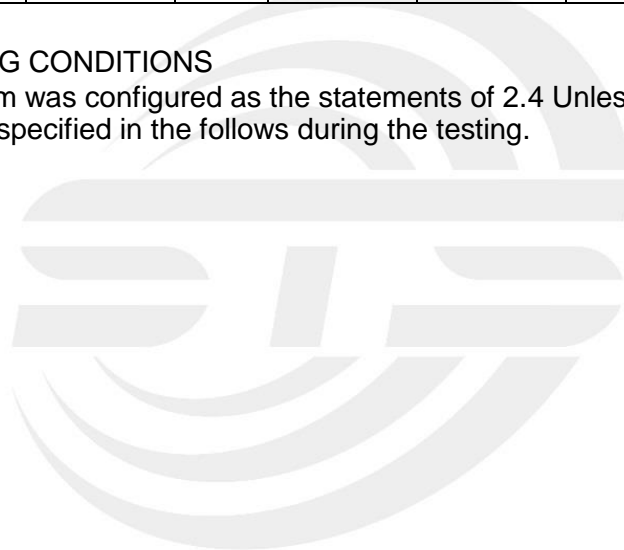
AV L = AV Limit

For example

Frequency	PR	AR	AF	PL	AL	PK L	AV L	Margin
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB μ V/m)	(dB μ V/m)	(dB)
2178	40.23	30.31	9.83	50.06	40.14	74.00	54.00	-13.86

3.2.6 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.





3.2.7 TEST RESULTS

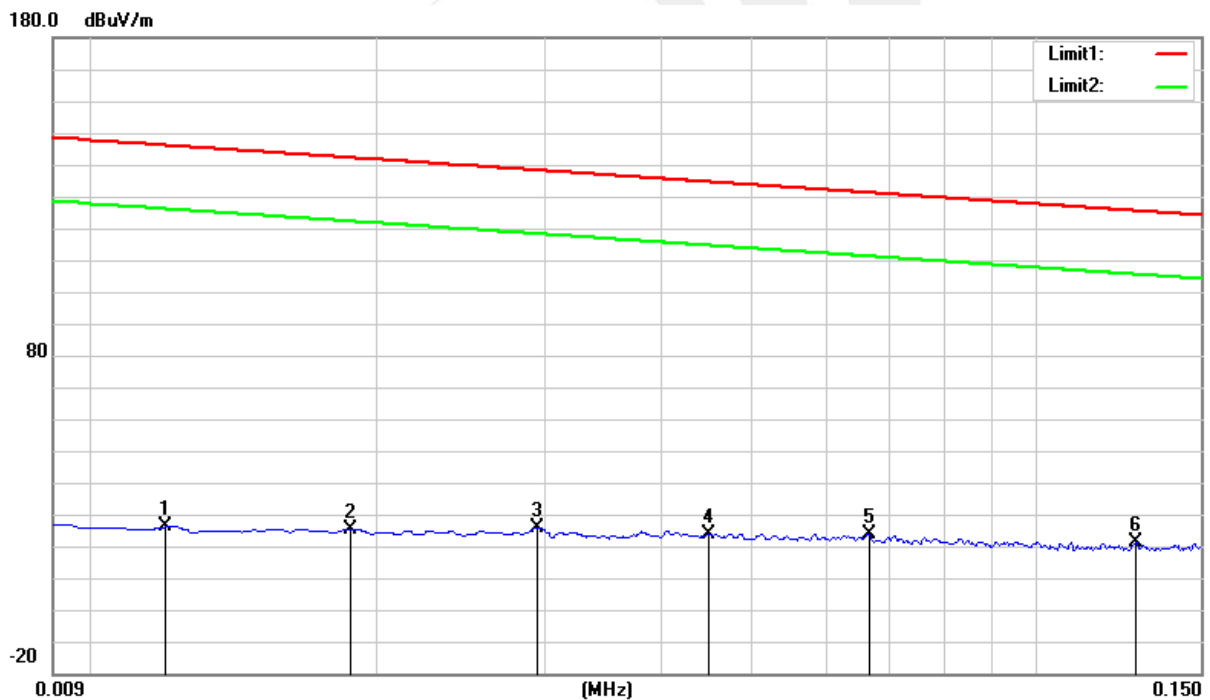
Below 30MHz

Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Test Mode:	CH 1(9KHz - 150KHz)
Test distance:	3m		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.0120	6.66	19.52	26.18	126.02	-99.84	AVG
2	0.0187	5.41	20.01	25.42	122.17	-96.75	AVG
3	0.0294	5.81	19.91	25.72	118.24	-92.52	AVG
4	0.0450	4.24	19.60	23.84	114.54	-90.70	AVG
5	0.0665	4.66	19.04	23.70	111.15	-87.45	AVG
6	0.1280	3.92	17.54	21.46	105.46	-84.00	AVG

Remark:

- Margin = Result (Result =Reading + Factor)-Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain



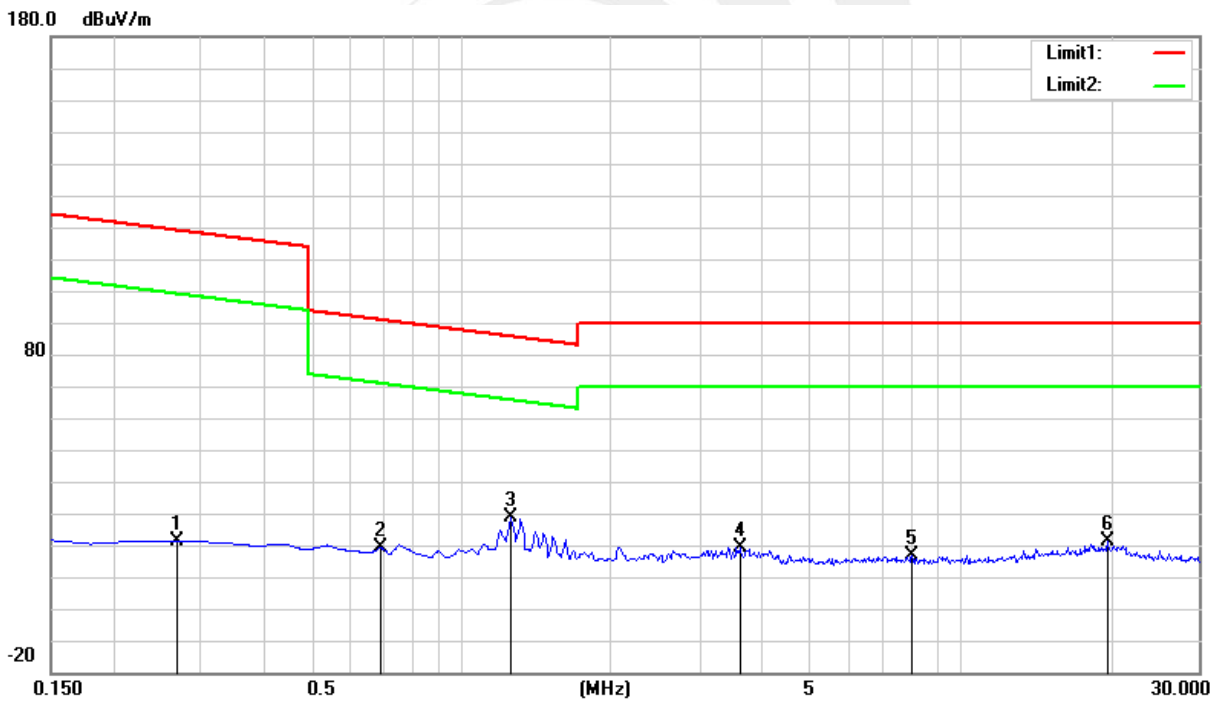


Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Test Mode:	CH 1 (150KHz – 30MHz)
Test distance:	3m		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.2694	1.26	20.11	21.37	118.99	-97.62	QP
2	0.6873	-0.84	20.27	19.43	90.86	-71.43	QP
3	1.2545	8.39	20.25	28.64	85.63	-56.99	QP
4	3.6126	-1.06	20.28	19.22	89.54	-70.32	QP
5	8.0006	-3.52	20.32	16.80	89.54	-72.74	QP
6	19.7018	-1.37	22.43	21.06	89.54	-68.48	QP

Remark:

- Margin = Result (Result =Reading + Factor)–Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain



Note: The position of the measurement polarization (Horizontal / Face-on / Face-off) all has been tested, only shown the worst mode of Horizontal position.



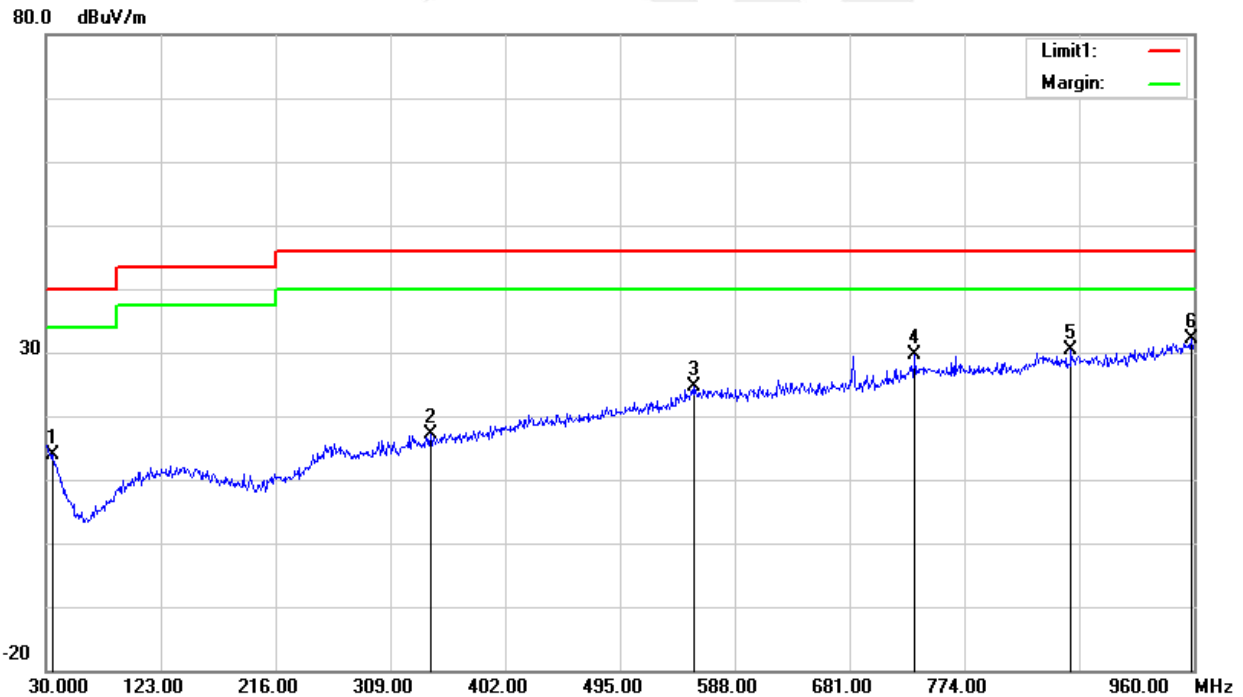
30MHz – 960MHz Radiation Spurious

Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	CH 1	Test distance:	3m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	35.5800	29.58	-15.77	13.81	40.00	-26.19	QP
2	341.5500	30.37	-13.36	17.01	46.00	-28.99	QP
3	554.5200	30.19	-5.64	24.55	46.00	-21.45	QP
4	734.0100	31.94	-2.33	29.61	46.00	-16.39	QP
5	860.4900	30.81	-0.43	30.38	46.00	-15.62	QP
6	958.1400	30.41	1.73	32.14	46.00	-13.86	QP

Remark:

1. Margin = Result (Result =Reading + Factor)-Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain



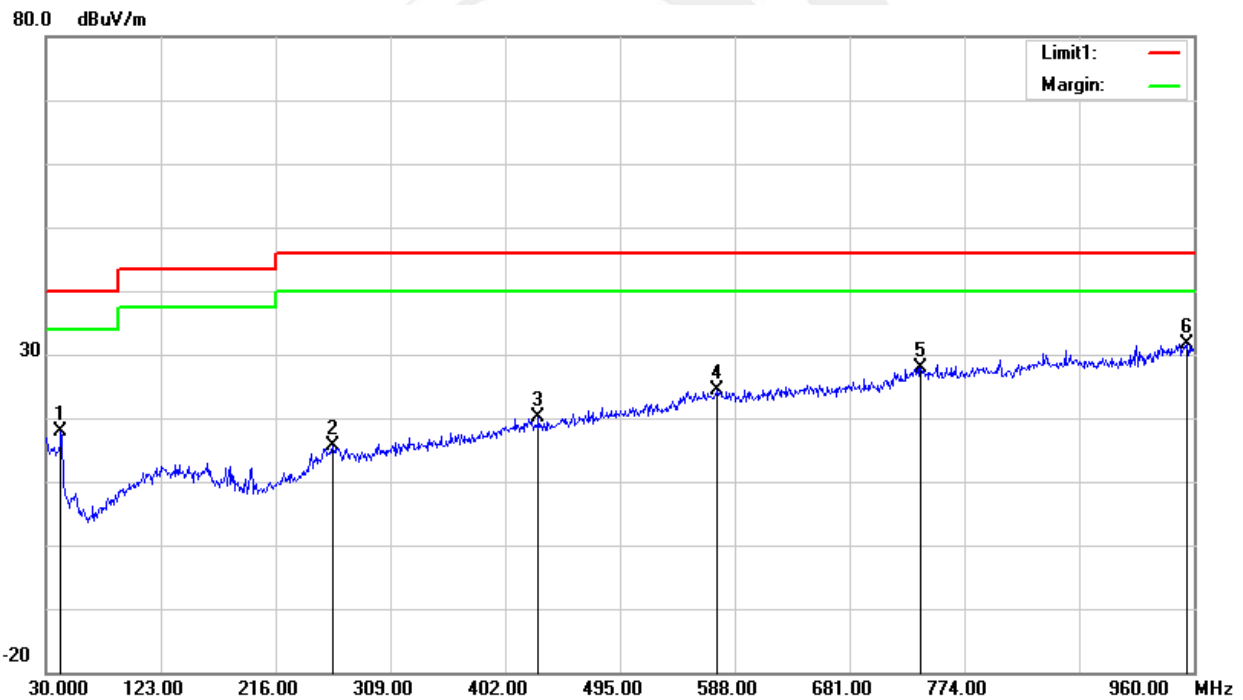


Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	CH 1	Test distance:	3m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	42.0900	37.00	-19.17	17.83	40.00	-22.17	QP
2	262.5000	30.27	-14.76	15.51	46.00	-30.49	QP
3	428.9700	30.21	-10.14	20.07	46.00	-25.93	QP
4	573.1200	30.05	-5.65	24.40	46.00	-21.60	QP
5	738.6600	30.15	-2.16	27.99	46.00	-18.01	QP
6	954.4200	29.96	1.67	31.63	46.00	-14.37	QP

Remark:

- Margin = Result (Result =Reading + Factor)-Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain





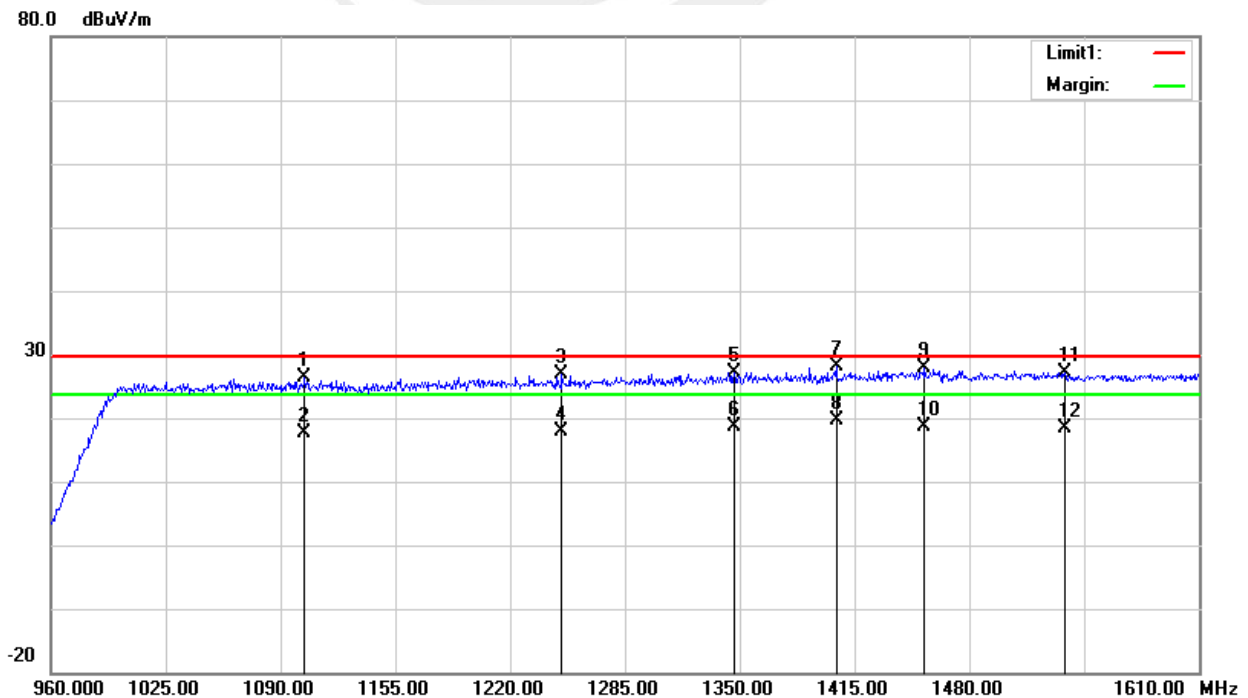
Above 960MHz Radiation Spurious

Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	CH 1(960MHz -1610MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1103.650	27.51	-1.06	26.45	29.54	-3.09	peak
2	1103.650	18.65	-1.06	17.59	29.54	-11.95	RMS
3	1249.250	27.28	-0.51	26.77	29.54	-2.77	peak
4	1249.250	18.38	-0.51	17.87	29.54	-11.67	RMS
5	1346.750	27.11	0.05	27.16	29.54	-2.38	peak
6	1346.750	18.49	0.05	18.54	29.54	-11.00	RMS
7	1404.600	27.90	0.33	28.23	29.54	-1.31	peak
8	1404.600	19.28	0.33	19.61	29.54	-9.93	RMS
9	1454.650	26.85	0.95	27.80	29.54	-1.74	peak
10	1454.650	17.69	0.95	18.64	29.54	-10.90	RMS
11	1533.950	24.92	2.29	27.21	29.54	-2.33	peak
12	1533.950	16.07	2.29	18.36	29.54	-11.18	RMS

Remark:

- Margin = Result (Result =Reading + Factor) –Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain





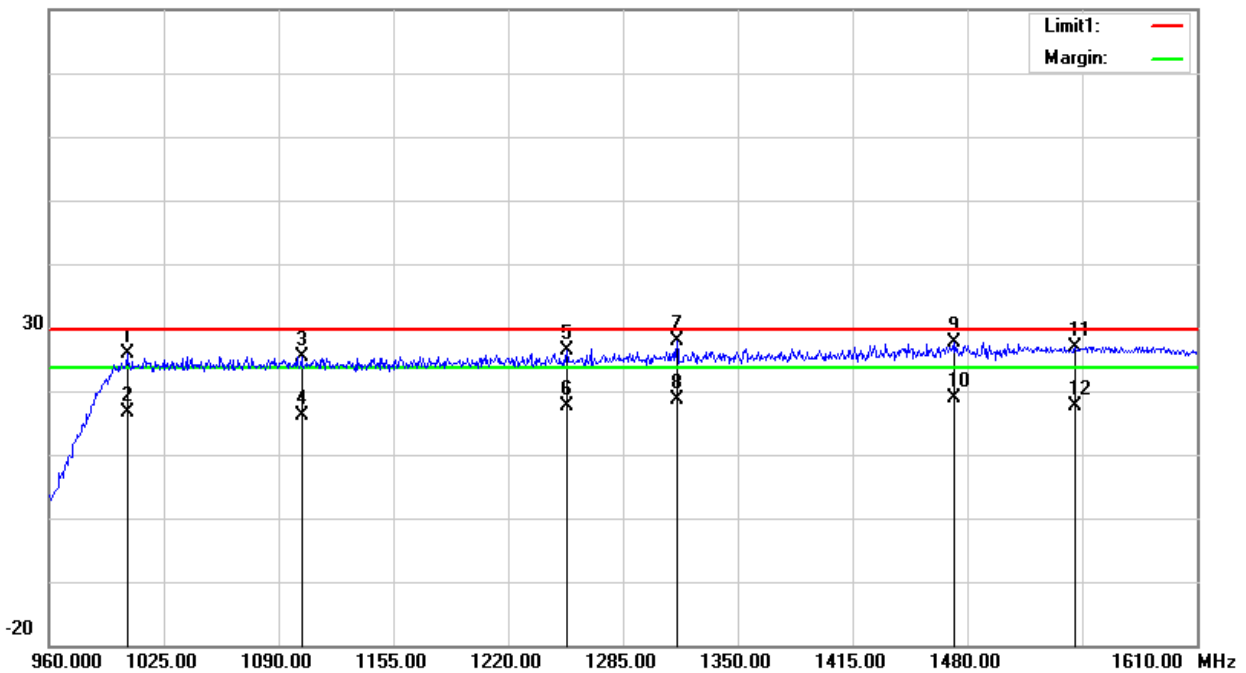
Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	CH 1(960MHz -1610MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1004.200	27.37	-1.58	25.79	29.54	-3.75	peak
2	1004.200	18.09	-1.58	16.51	29.54	-13.03	RMS
3	1103.000	26.55	-1.07	25.48	29.54	-4.06	peak
4	1103.000	17.21	-1.07	16.14	29.54	-13.40	RMS
5	1253.150	26.79	-0.49	26.30	29.54	-3.24	peak
6	1253.150	18.03	-0.49	17.54	29.54	-12.00	RMS
7	1315.550	28.03	-0.08	27.95	29.54	-1.59	peak
8	1315.550	18.69	-0.08	18.61	29.54	-10.93	RMS
9	1472.850	26.39	1.16	27.55	29.54	-1.99	peak
10	1472.850	17.66	1.16	18.82	29.54	-10.72	RMS
11	1541.100	24.52	2.46	26.98	29.54	-2.56	peak
12	1541.100	15.22	2.46	17.68	29.54	-11.86	RMS

Remark:

- Margin = Result (Result =Reading + Factor)-Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

80.0 dBuV/m





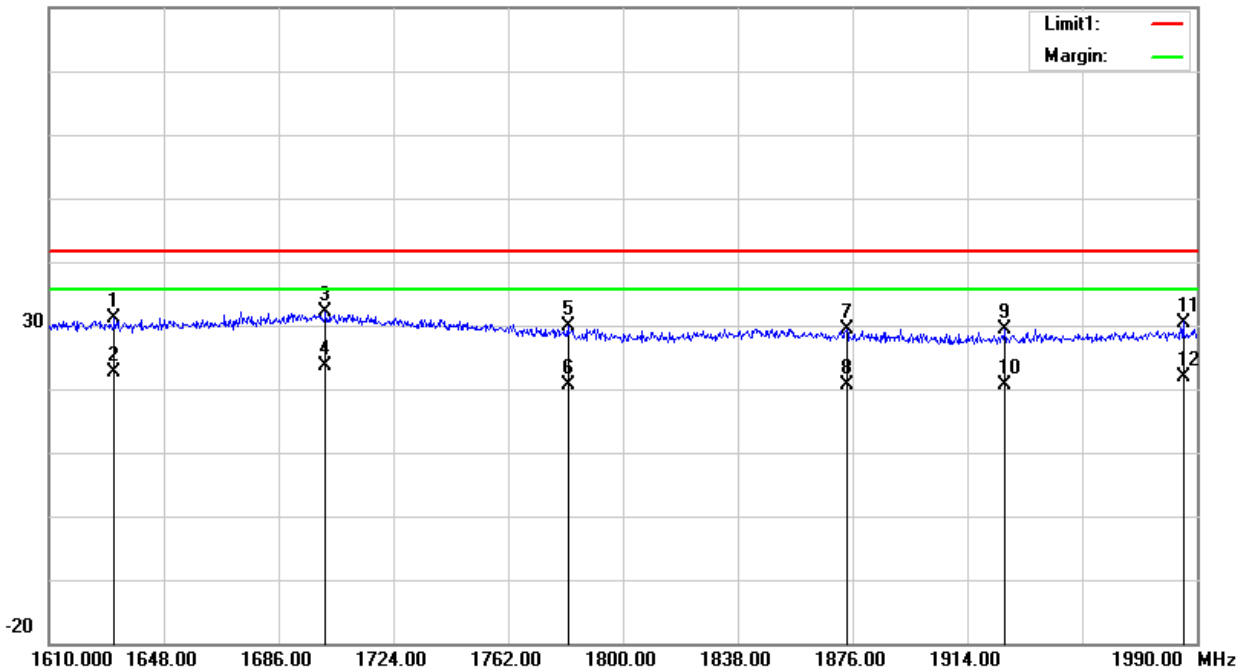
Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	CH 1(1610MHz – 1990MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1631.660	26.85	4.24	31.09	41.54	-10.45	peak
2	1631.660	18.37	4.24	22.61	41.54	-18.93	RMS
3	1701.580	26.91	5.17	32.08	41.54	-9.46	peak
4	1701.580	18.49	5.17	23.66	41.54	-17.88	RMS
5	1781.760	27.47	2.46	29.93	41.54	-11.61	peak
6	1781.760	18.12	2.46	20.58	41.54	-20.96	RMS
7	1874.100	27.53	1.92	29.45	41.54	-12.09	peak
8	1874.100	18.62	1.92	20.54	41.54	-21.00	RMS
9	1926.540	27.78	1.50	29.28	41.54	-12.26	peak
10	1926.540	19.14	1.50	20.64	41.54	-20.90	RMS
11	1985.440	28.64	1.86	30.50	41.54	-11.04	peak
12	1985.440	20.08	1.86	21.94	41.54	-19.60	RMS

Remark:

- Margin = Result (Result =Reading + Factor)–Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

80.0 dBuV/m





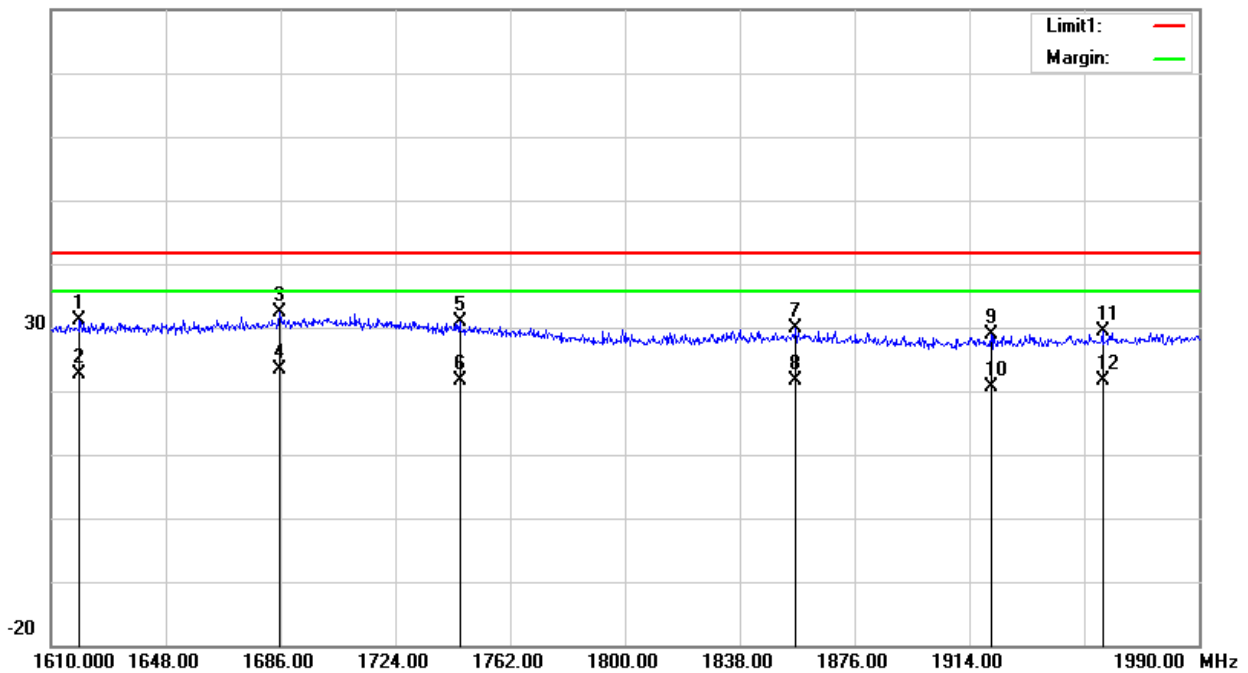
Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	CH 1(1610MHz – 1990MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1619.500	26.78	4.24	31.02	41.54	-10.52	peak
2	1619.500	18.30	4.24	22.54	41.54	-19.00	RMS
3	1685.620	27.40	4.93	32.33	41.54	-9.21	peak
4	1685.620	18.55	4.93	23.48	41.54	-18.06	RMS
5	1745.280	27.17	3.81	30.98	41.54	-10.56	peak
6	1745.280	17.86	3.81	21.67	41.54	-19.87	RMS
7	1856.620	27.67	2.23	29.90	41.54	-11.64	peak
8	1856.620	19.31	2.23	21.54	41.54	-20.00	RMS
9	1921.220	27.37	1.49	28.86	41.54	-12.68	peak
10	1921.220	19.16	1.49	20.65	41.54	-20.89	RMS
11	1958.080	27.70	1.60	29.30	41.54	-12.24	peak
12	1958.080	19.94	1.60	21.54	41.54	-20.00	RMS

Remark:

- Margin = Result (Result =Reading + Factor)–Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

80.0 dBuV/m





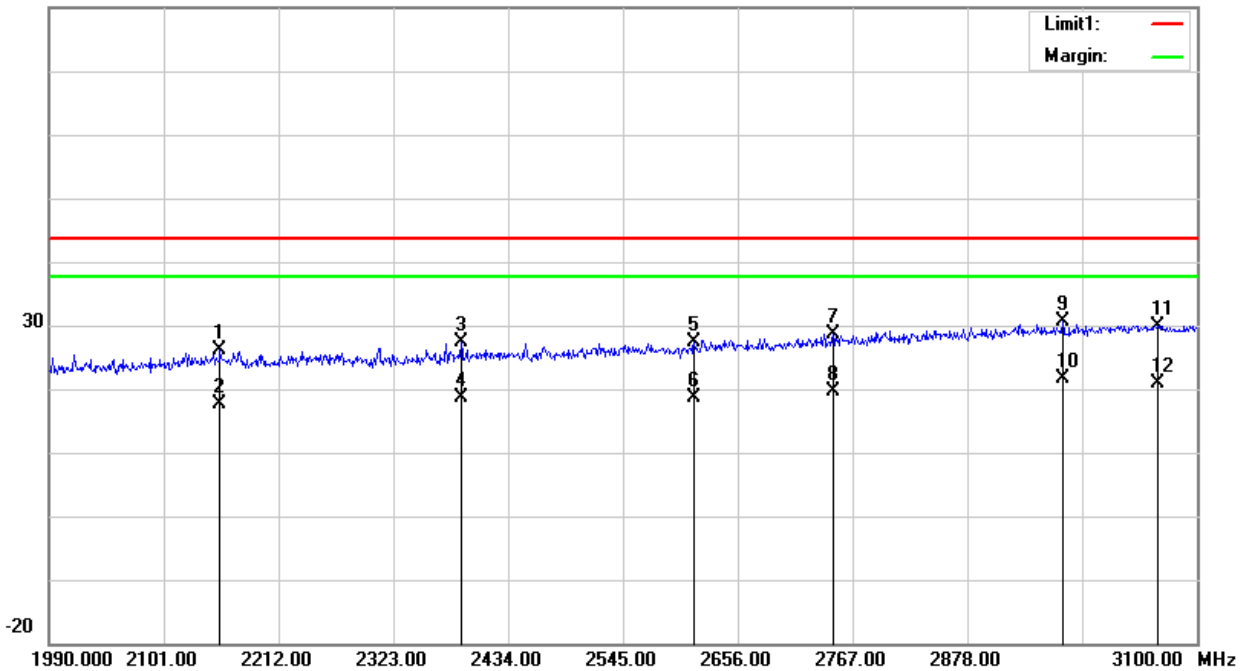
Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	CH 1(1990MHz – 3100MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2155.390	22.78	3.25	26.03	43.54	-17.51	peak
2	2155.390	14.44	3.25	17.69	43.54	-25.85	RMS
3	2388.490	22.97	4.32	27.29	43.54	-16.25	peak
4	2388.490	14.29	4.32	18.61	43.54	-24.93	RMS
5	2613.820	22.13	5.18	27.31	43.54	-16.23	peak
6	2613.820	13.48	5.18	18.66	43.54	-24.88	RMS
7	2748.130	22.64	6.06	28.70	43.54	-14.84	peak
8	2748.130	13.46	6.06	19.52	43.54	-24.02	RMS
9	2970.130	23.63	7.00	30.63	43.54	-12.91	peak
10	2970.130	14.51	7.00	21.51	43.54	-22.03	RMS
11	3062.260	1.75	28.24	29.99	43.54	-13.55	peak
12	3062.260	-7.39	28.24	20.85	43.54	-22.69	RMS

Remark:

- Margin = Result (Result =Reading + Factor)–Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

80.0 dBuV/m





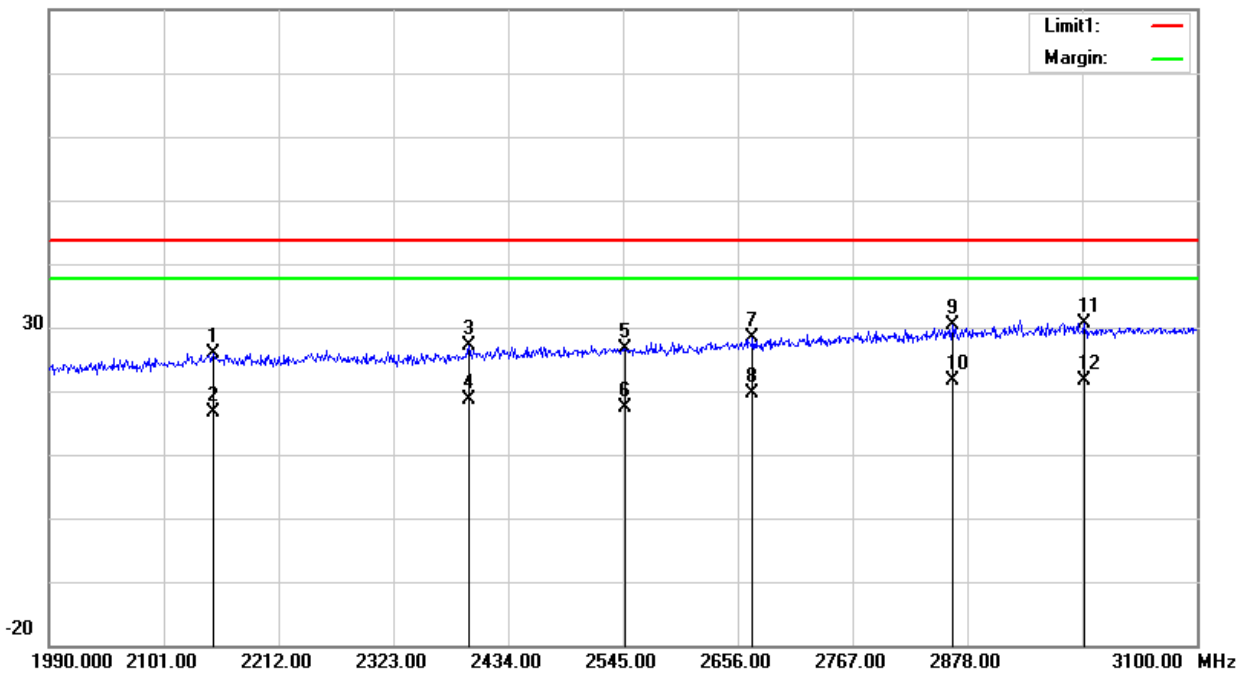
Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	CH 1(1990MHz – 3100MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2148.730	22.64	3.27	25.91	43.54	-17.63	peak
2	2148.730	13.34	3.27	16.61	43.54	-26.93	RMS
3	2396.260	22.65	4.44	27.09	43.54	-16.45	peak
4	2396.260	14.18	4.44	18.62	43.54	-24.92	RMS
5	2547.220	21.78	4.96	26.74	43.54	-16.80	peak
6	2547.220	12.31	4.96	17.27	43.54	-26.27	RMS
7	2670.430	22.69	5.57	28.26	43.54	-15.28	peak
8	2670.430	14.14	5.57	19.71	43.54	-23.83	RMS
9	2863.570	23.75	6.61	30.36	43.54	-13.18	peak
10	2863.570	14.93	6.61	21.54	43.54	-22.00	RMS
11	2991.220	23.65	7.03	30.68	43.54	-12.86	peak
12	2991.220	14.69	7.03	21.72	43.54	-21.82	RMS

Remark:

- Margin = Result (Result =Reading + Factor)-Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

80.0 dBuV/m



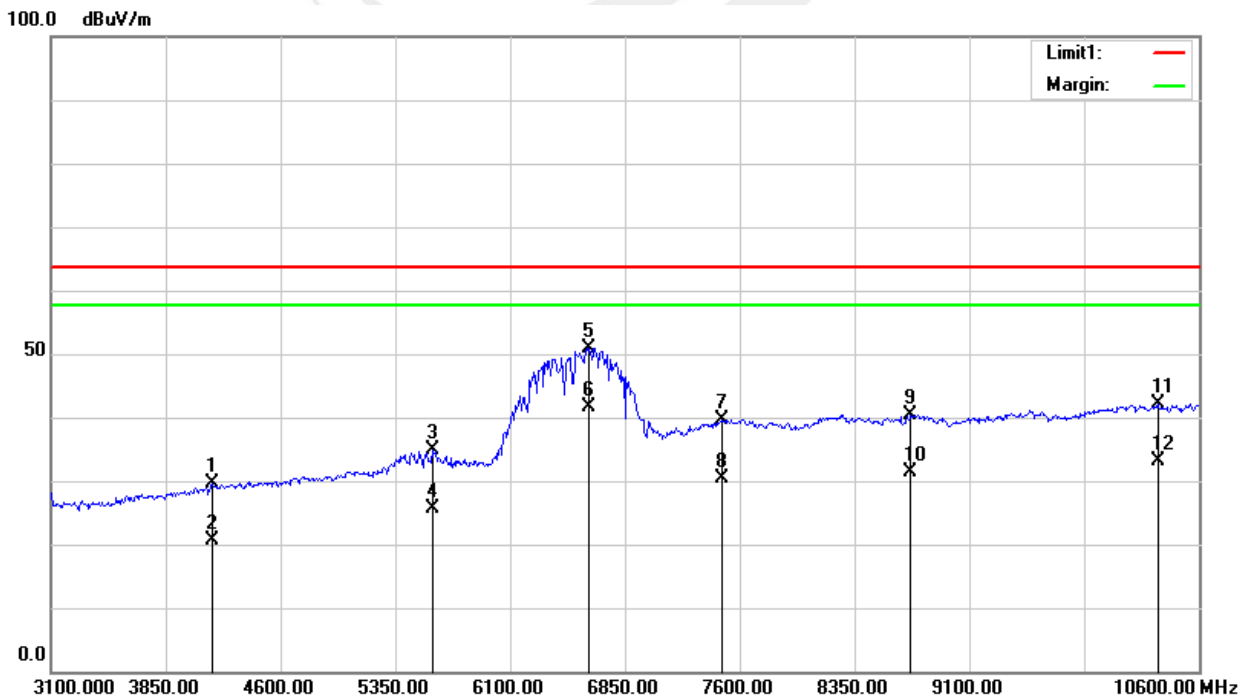


Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	CH 1 (3100MHz – 10600MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4150.000	38.44	-8.78	29.66	63.54	-33.88	peak
2	4150.000	29.39	-8.78	20.61	63.54	-42.93	RMS
3	5590.000	39.51	-4.74	34.77	63.54	-28.77	peak
4	5590.000	30.30	-4.74	25.56	63.54	-37.98	RMS
5	6617.500	52.54	-1.63	50.91	63.54	-12.63	peak
6	6617.500	43.17	-1.63	41.54	63.54	-22.00	RMS
7	7487.500	38.11	1.58	39.69	63.54	-23.85	peak
8	7487.500	28.92	1.58	30.50	63.54	-33.04	RMS
9	8717.500	37.77	2.61	40.38	63.54	-23.16	peak
10	8717.500	28.79	2.61	31.40	63.54	-32.14	RMS
11	10330.000	37.67	4.42	42.09	63.54	-21.45	peak
12	10330.000	28.79	4.42	33.21	63.54	-30.33	RMS

Remark:

- Margin = Result (Result = Reading + Factor) - Limit
- Factor = Antenna factor + Cable attenuation factor (cable loss) - Amplifier gain



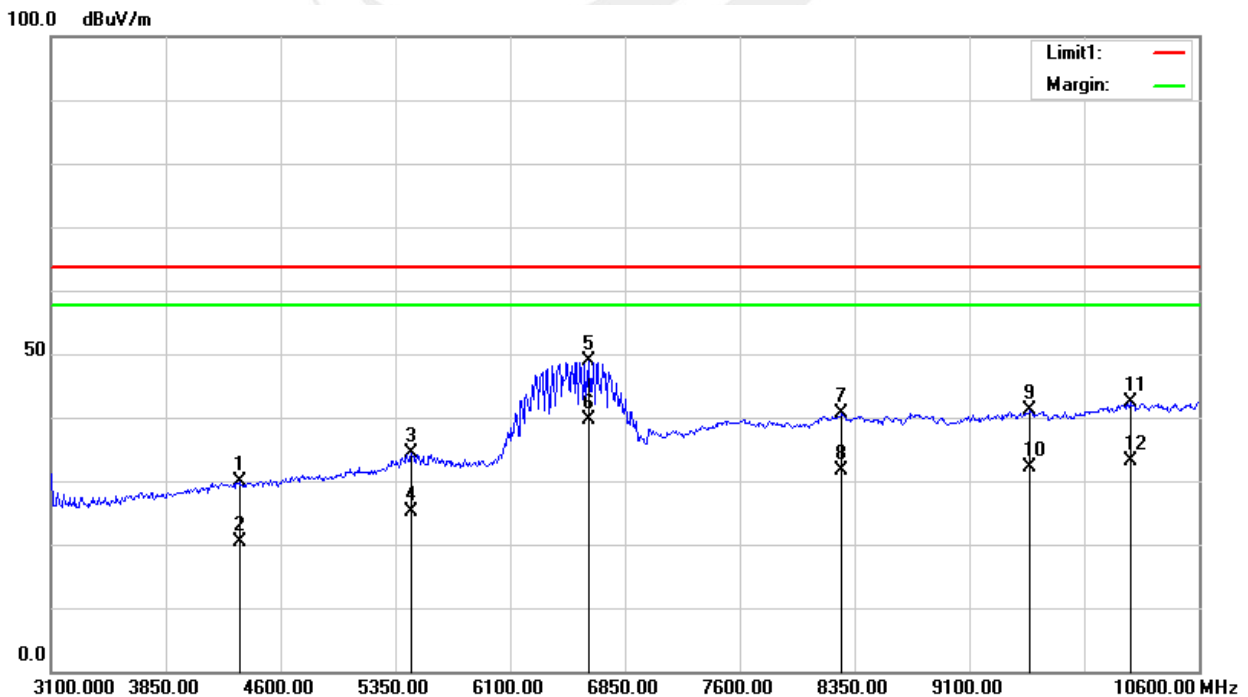


Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	CH 1 (3100MHz – 10600MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4330.000	38.11	-8.22	29.89	63.54	-33.65	peak
2	4330.000	28.63	-8.22	20.41	63.54	-43.13	RMS
3	5455.000	39.52	-5.13	34.39	63.54	-29.15	peak
4	5455.000	30.28	-5.13	25.15	63.54	-38.39	RMS
5	6610.000	50.67	-1.68	48.99	63.54	-14.55	peak
6	6610.000	41.19	-1.68	39.51	63.54	-24.03	RMS
7	8267.500	38.15	2.47	40.62	63.54	-22.92	peak
8	8267.500	29.18	2.47	31.65	63.54	-31.89	RMS
9	9497.500	38.05	3.14	41.19	63.54	-22.35	peak
10	9497.500	29.01	3.14	32.15	63.54	-31.39	RMS
11	10150.000	38.52	3.84	42.36	63.54	-21.18	peak
12	10150.000	29.30	3.84	33.14	63.54	-30.40	RMS

Remark:

- Margin = Result (Result =Reading + Factor)-Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain



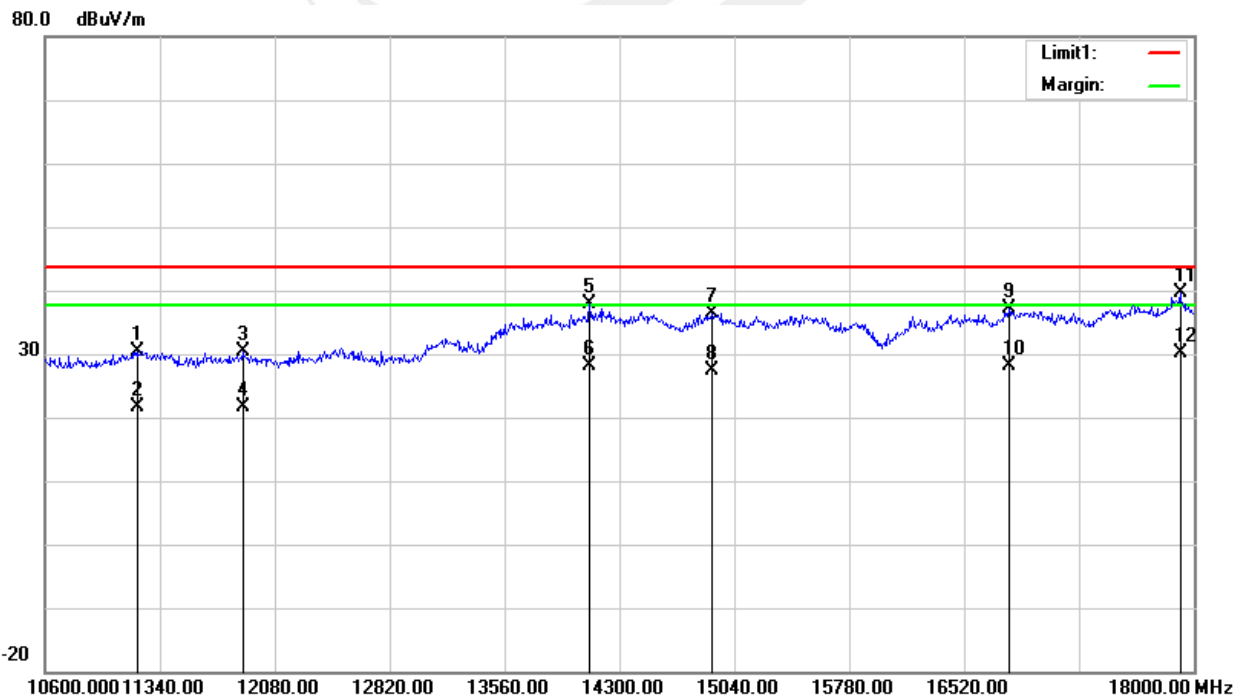


Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	CH 1 (10600MHz – 18000MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11192.000	24.03	6.34	30.37	43.54	-13.17	peak
2	11192.000	15.27	6.34	21.61	43.54	-21.93	RMS
3	11872.800	24.51	5.95	30.46	43.54	-13.08	peak
4	11872.800	15.66	5.95	21.61	43.54	-21.93	RMS
5	14107.600	25.73	12.12	37.85	43.54	-5.69	peak
6	14107.600	16.03	12.12	28.15	43.54	-15.39	RMS
7	14899.400	25.97	10.33	36.30	43.54	-7.24	peak
8	14899.400	16.98	10.33	27.31	43.54	-16.23	RMS
9	16808.600	27.54	9.61	37.15	43.54	-6.39	peak
10	16808.600	18.60	9.61	28.21	43.54	-15.33	RMS
11	17911.200	27.93	11.81	39.74	43.54	-3.80	peak
12	17911.200	18.40	11.81	30.21	43.54	-13.33	RMS

Remark:

- Margin = Result (Result = Reading + Factor) – Limit
- Factor = Antenna factor + Cable attenuation factor (cable loss) – Amplifier gain





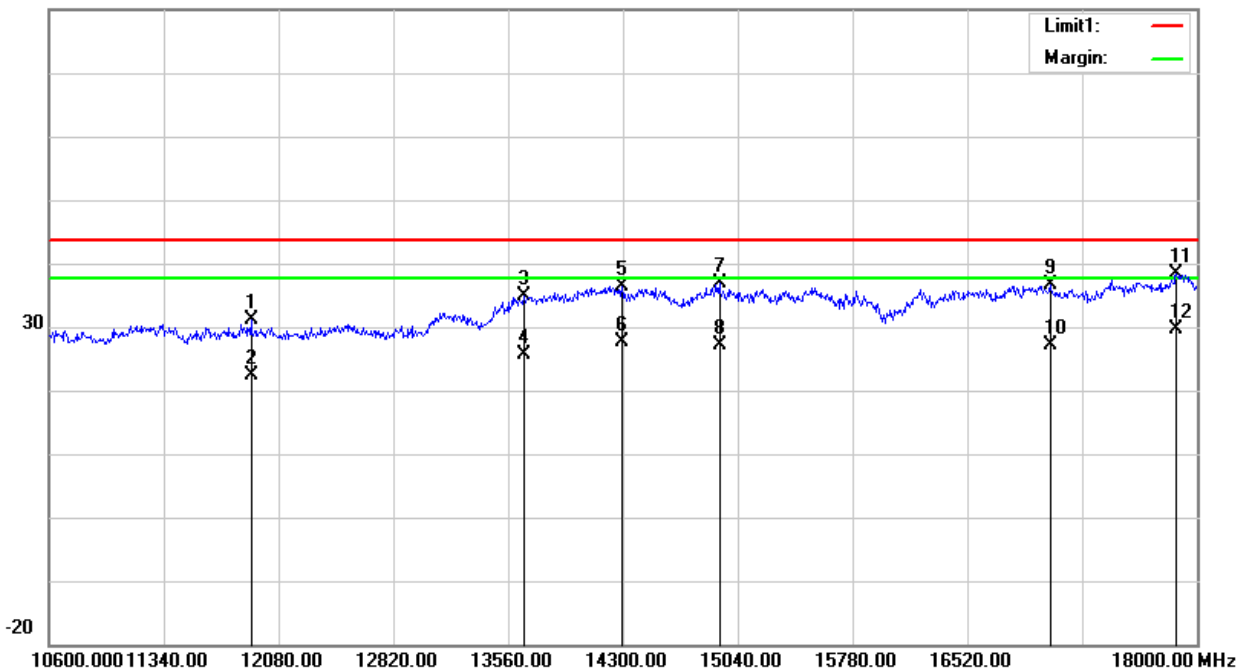
Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	CH 1 (10600MHz – 18000MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11902.400	25.30	5.92	31.22	43.54	-12.32	peak
2	11902.400	16.56	5.92	22.48	43.54	-21.06	RMS
3	13663.600	24.34	10.49	34.83	43.54	-8.71	peak
4	13663.600	15.02	10.49	25.51	43.54	-18.03	RMS
5	14292.600	24.68	11.79	36.47	43.54	-7.07	peak
6	14292.600	15.82	11.79	27.61	43.54	-15.93	RMS
7	14921.600	26.49	10.27	36.76	43.54	-6.78	peak
8	14921.600	16.98	10.27	27.25	43.54	-16.29	RMS
9	17052.800	26.64	9.91	36.55	43.54	-6.99	peak
10	17052.800	17.34	9.91	27.25	43.54	-16.29	RMS
11	17866.800	26.70	11.68	38.38	43.54	-5.16	peak
12	17866.800	17.94	11.68	29.62	43.54	-13.92	RMS

Remark:

- Margin = Result (Result = Reading + Factor) – Limit
- Factor = Antenna factor + Cable attenuation factor (cable loss) – Amplifier gain

80.0 dBuV/m





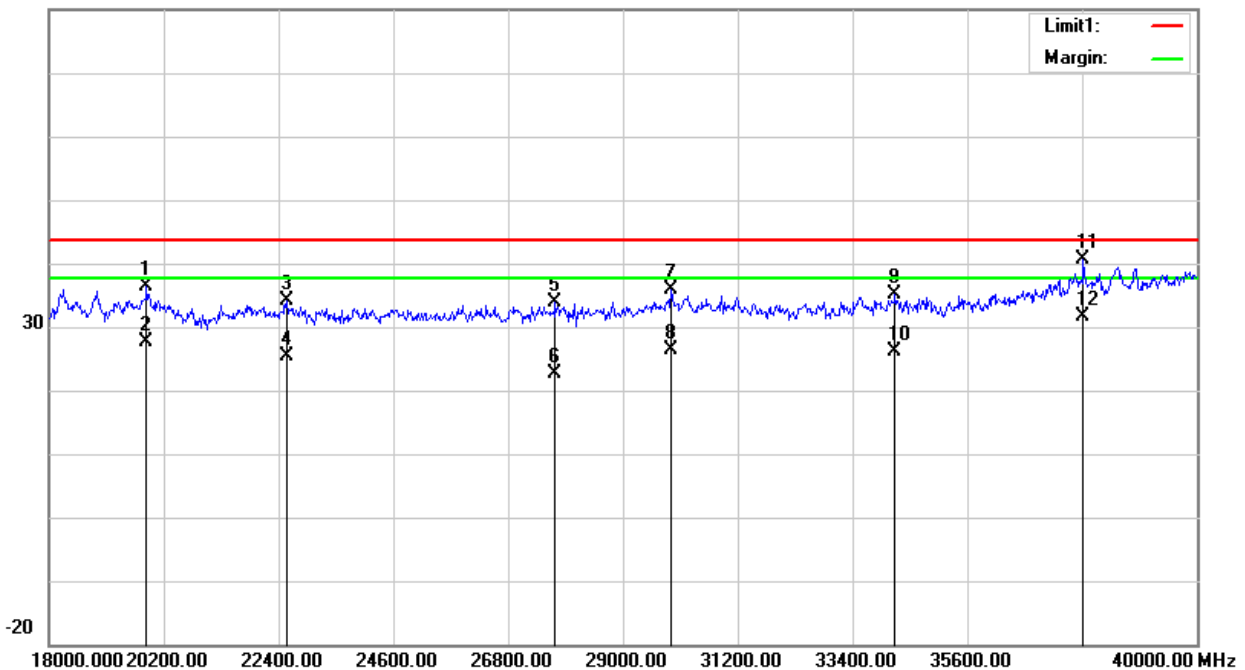
Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	CH 1 (18000MHz – 40000MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	19870.000	30.41	5.91	36.32	43.54	-7.22	peak
2	19870.000	21.71	5.91	27.62	43.54	-15.92	RMS
3	22554.000	27.46	6.74	34.20	43.54	-9.34	peak
4	22554.000	18.68	6.74	25.42	43.54	-18.12	RMS
5	27702.000	27.69	6.09	33.78	43.54	-9.76	peak
6	27702.000	16.55	6.09	22.64	43.54	-20.90	RMS
7	29924.000	82.70	-46.79	35.91	43.54	-7.63	peak
8	29924.000	73.13	-46.79	26.34	43.54	-17.20	RMS
9	34214.000	82.39	-47.29	35.10	43.54	-8.44	peak
10	34214.000	73.47	-47.29	26.18	43.54	-17.36	RMS
11	37822.000	88.23	-47.56	40.67	43.54	-2.87	peak
12	37822.000	79.17	-47.56	31.61	43.54	-11.93	RMS

Remark:

- Margin = Result (Result =Reading + Factor)-Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

80.0 dBuV/m





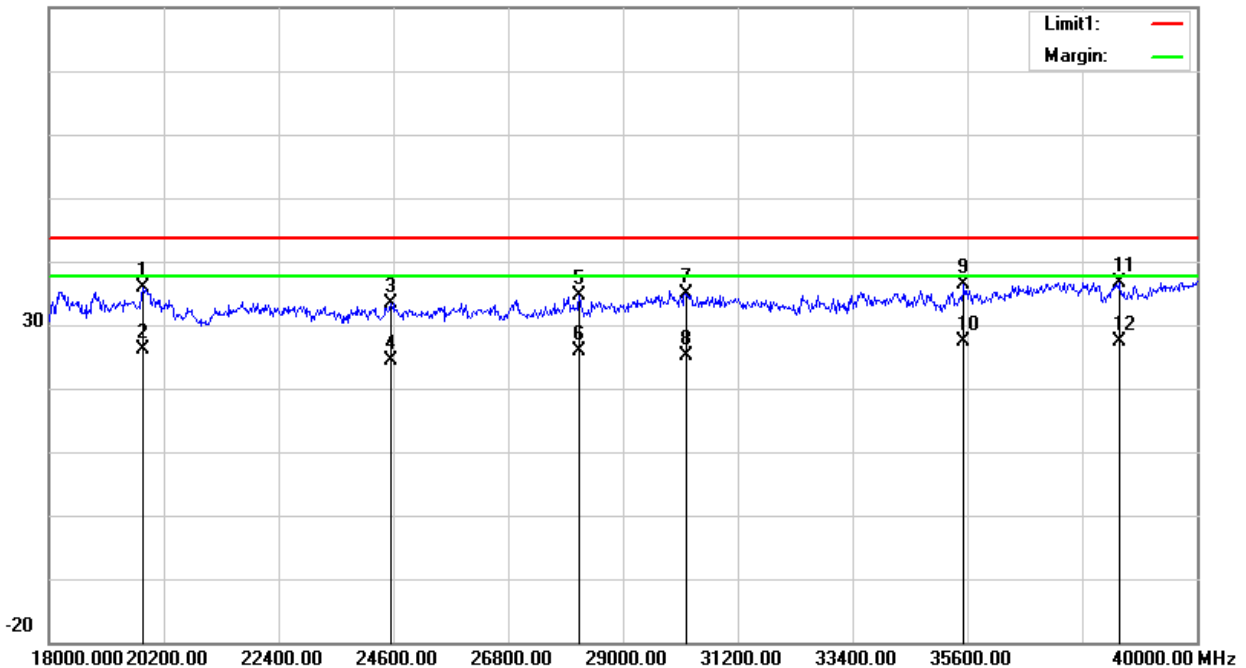
Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	CH 1 (18000MHz – 40000MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	19804.000	41.92	-6.08	35.84	43.54	-7.70	peak
2	19804.000	32.21	-6.08	26.13	43.54	-17.41	RMS
3	24556.000	38.39	-5.04	33.35	43.54	-10.19	peak
4	24556.000	29.35	-5.04	24.31	43.54	-19.23	RMS
5	28164.000	81.14	-46.52	34.62	43.54	-8.92	peak
6	28164.000	72.46	-46.52	25.94	43.54	-17.60	RMS
7	30210.000	81.72	-46.83	34.89	43.54	-8.65	peak
8	30210.000	71.98	-46.83	25.15	43.54	-18.39	RMS
9	35534.000	83.60	-47.22	36.38	43.54	-7.16	peak
10	35534.000	74.70	-47.22	27.48	43.54	-16.06	RMS
11	38504.000	85.30	-48.58	36.72	43.54	-6.82	peak
12	38504.000	76.07	-48.58	27.49	43.54	-16.05	RMS

Remark:

- Margin = Result (Result = Reading + Factor) - Limit
- Factor = Antenna factor + Cable attenuation factor (cable loss) - Amplifier gain

80.0 dBuV/m





3.3 RADIATED EMISSION MEASUREMENT (FOR 15.519(d))

3.3.1 RADIATED EMISSION LIMITS

Frequency of Emission (MHz)	EIRP (dBm)	Field Strength (dBuV/m@3m)	Field Strength (dBuV/m@1m)
1164~1240	-85.3	10	19.54
1559~1610	-85.3	10	19.54

Notes: 1. Transfer rules follow 15.521(g),15.31(f)(1).

2. 15.521(g) converted to a peak field strength level at 3 meters using $E(\text{dBuV/m}) = P(\text{dBmEIRP}) + 95.3$.

3. $\text{dBuV/m@1m} = \text{dBuV/m@3m} + 20 \cdot \log(3/1)$

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 Range	RBW	VBW	Detector	Measurement Distance
1164~1240	1kHz	3kHz	RMS	1 Meter
1559~1610	1kHz	3kHz	RMS	1 Meter

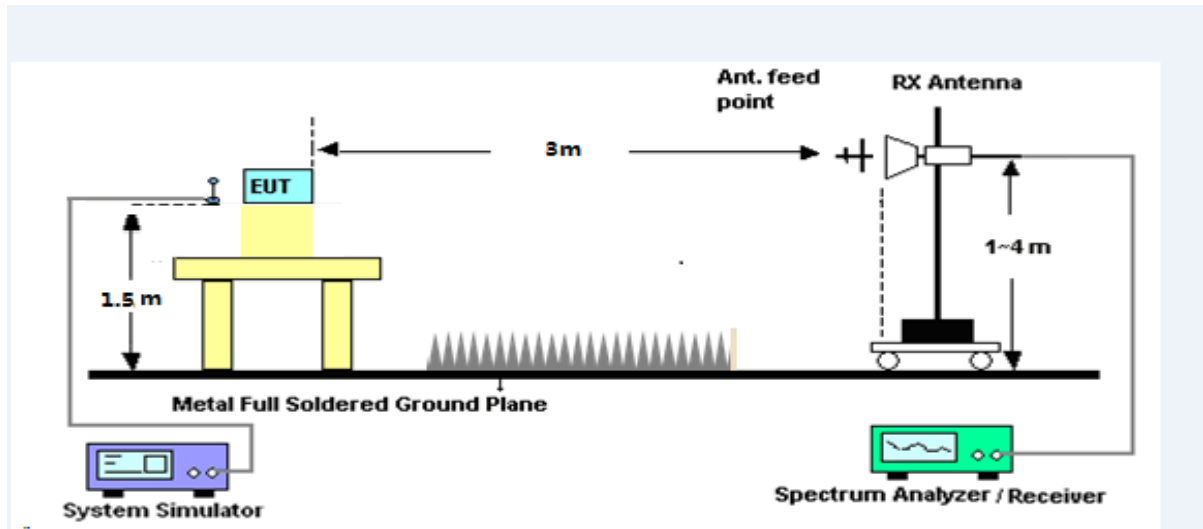
3.3.2 TEST PROCEDURE

- The measuring distance of 1m shall be used for measurements. The EUT was placed on the top of rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the test antenna shall vary between 1m to 4m. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- All readings are RMS mode value, for each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
(Above 960MHz)
- For the actual test configuration, please refer to the related Item –EUT Test Photos.
Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP

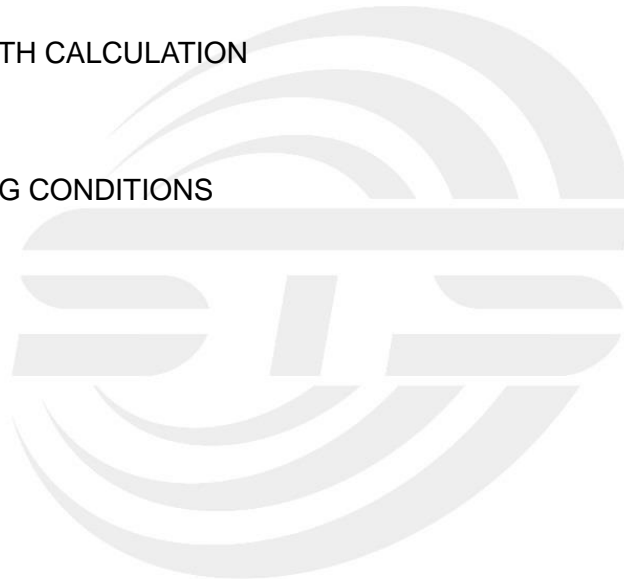


3.3.5 FIELD STRENGTH CALCULATION

Same as 3.2.5

3.3.6 EUT OPERATING CONDITIONS

Same as 3.2.6





3.3.7 TEST RESULTS

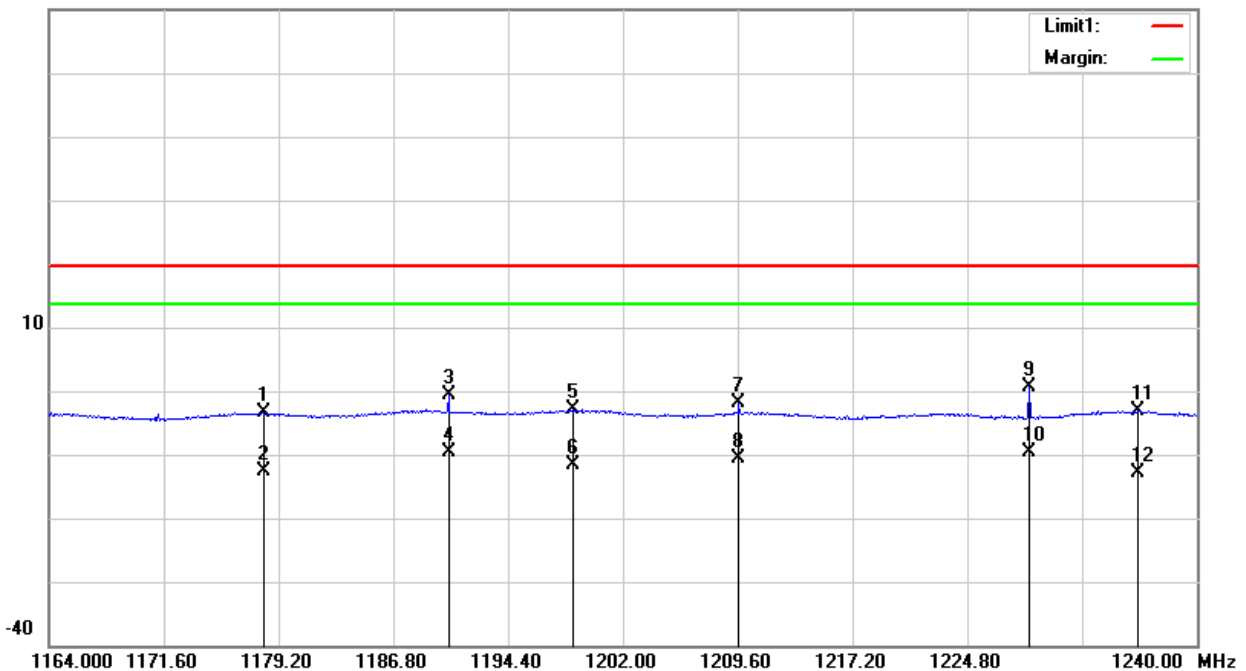
Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	CH 1(1164Hz – 1240MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1178.212	-2.84	-0.64	-3.48	19.54	-23.02	peak
2	1178.212	-11.97	-0.64	-12.61	19.54	-32.15	RMS
3	1190.448	-0.14	-0.52	-0.66	19.54	-20.20	peak
4	1190.448	-9.09	-0.52	-9.61	19.54	-29.15	RMS
5	1198.656	-2.46	-0.43	-2.89	19.54	-22.43	peak
6	1198.656	-11.21	-0.43	-11.64	19.54	-31.18	RMS
7	1209.676	-1.32	-0.43	-1.75	19.54	-21.29	peak
8	1209.676	-10.17	-0.43	-10.60	19.54	-30.14	RMS
9	1228.904	1.09	-0.47	0.62	19.54	-18.92	peak
10	1228.904	-9.04	-0.47	-9.51	19.54	-29.05	RMS
11	1236.124	-2.63	-0.49	-3.12	19.54	-22.66	peak
12	1236.124	-12.42	-0.49	-12.91	19.54	-32.45	RMS

Remark:

- Margin = Result (Result =Reading + Factor)-Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

60.0 dBuV/m





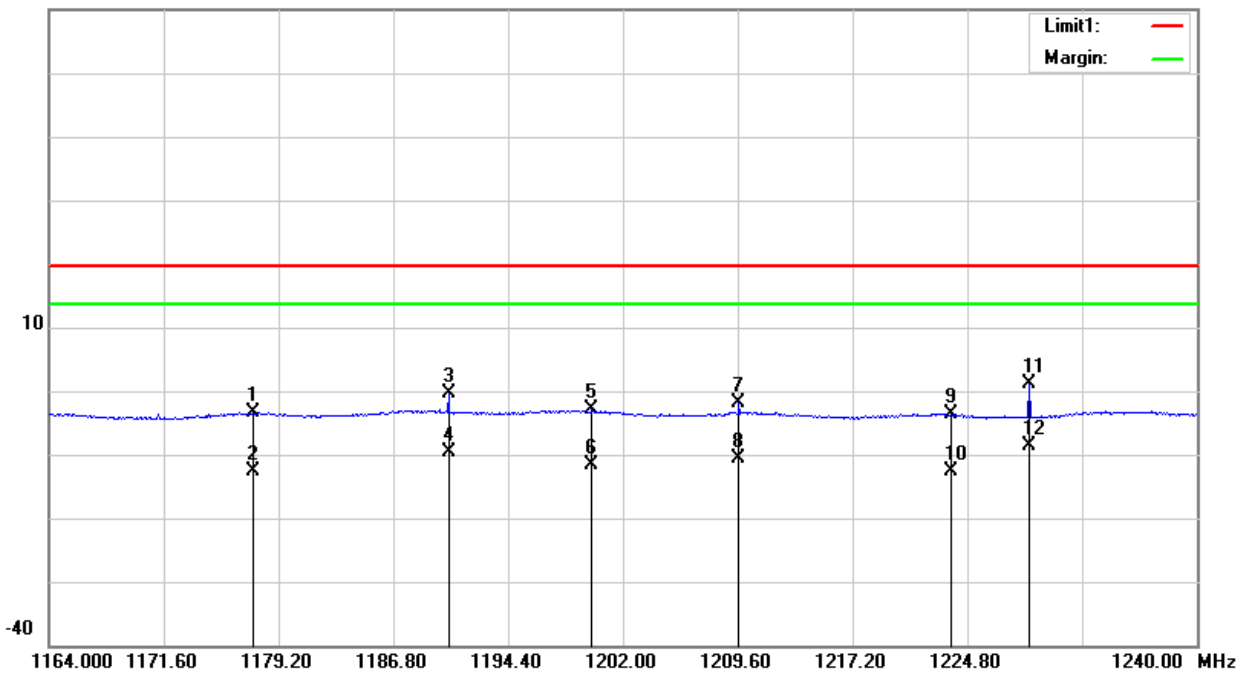
Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	CH 1(1164Hz – 1240MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1177.528	-2.83	-0.64	-3.47	19.54	-23.01	peak
2	1177.528	-11.97	-0.64	-12.61	19.54	-32.15	RMS
3	1190.448	0.03	-0.52	-0.49	19.54	-20.03	peak
4	1190.448	-9.02	-0.52	-9.54	19.54	-29.08	RMS
5	1199.948	-2.56	-0.42	-2.98	19.54	-22.52	peak
6	1199.948	-11.22	-0.42	-11.64	19.54	-31.18	RMS
7	1209.676	-1.52	-0.43	-1.95	19.54	-21.49	peak
8	1209.676	-10.16	-0.43	-10.59	19.54	-30.13	RMS
9	1223.736	-3.13	-0.47	-3.60	19.54	-23.14	peak
10	1223.736	-12.07	-0.47	-12.54	19.54	-32.08	RMS
11	1228.904	1.63	-0.47	1.16	19.54	-18.38	peak
12	1228.904	-8.17	-0.47	-8.64	19.54	-28.18	RMS

Remark:

- Margin = Result (Result =Reading + Factor)-Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

60.0 dBuV/m





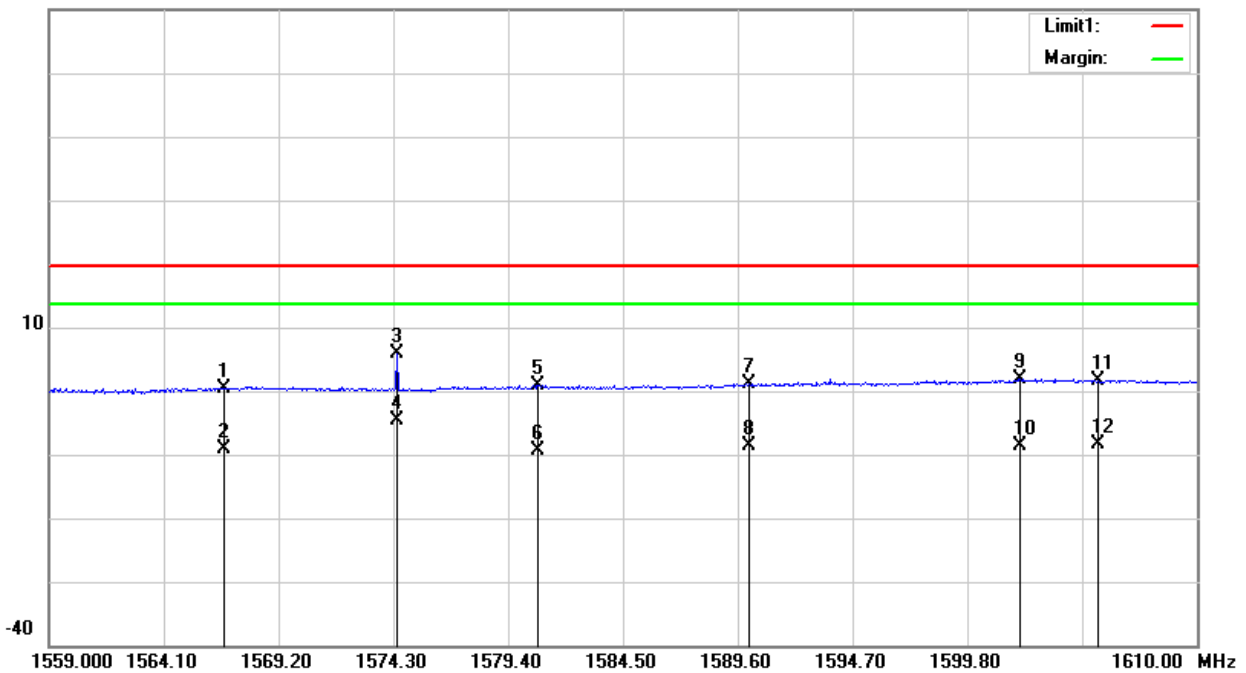
Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	CH 1(1559Hz – 1610MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1566.752	-2.70	3.19	0.49	19.54	-19.05	peak
2	1566.752	-12.35	3.19	-9.16	19.54	-28.70	RMS
3	1574.453	2.35	3.44	5.79	19.54	-13.75	peak
4	1574.453	-8.08	3.44	-4.64	19.54	-24.18	RMS
5	1580.726	-2.71	3.64	0.93	19.54	-18.61	peak
6	1580.726	-13.10	3.64	-9.46	19.54	-29.00	RMS
7	1590.110	-2.78	3.93	1.15	19.54	-18.39	peak
8	1590.110	-12.57	3.93	-8.64	19.54	-28.18	RMS
9	1602.146	-2.42	4.24	1.82	19.54	-17.72	peak
10	1602.146	-12.88	4.24	-8.64	19.54	-28.18	RMS
11	1605.614	-2.49	4.24	1.75	19.54	-17.79	peak
12	1605.614	-12.51	4.24	-8.27	19.54	-27.81	RMS

Remark:

- Margin = Result (Result =Reading + Factor)-Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

60.0 dBuV/m





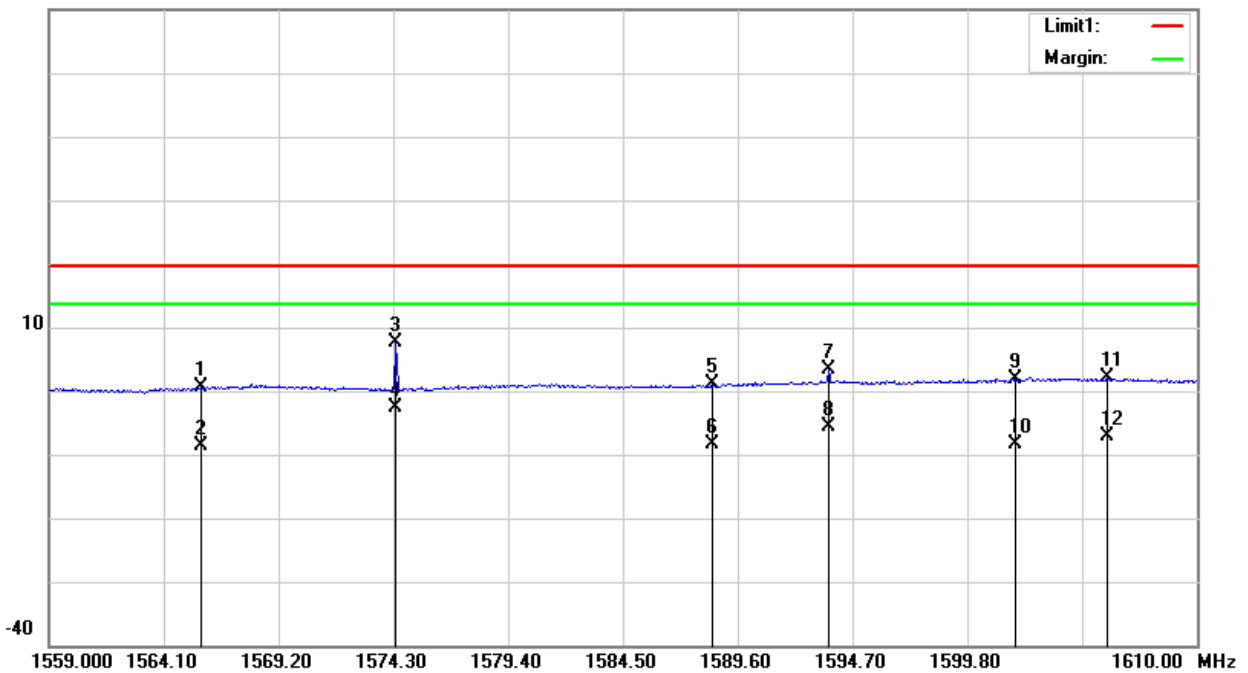
Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	CH 1(1559Hz – 1610MHz)	Test distance:	1m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1565.783	-2.51	3.16	0.65	19.54	-18.89	peak
2	1565.783	-11.70	3.16	-8.54	19.54	-28.08	RMS
3	1574.402	4.31	3.44	7.75	19.54	-11.79	peak
4	1574.402	-6.08	3.44	-2.64	19.54	-22.18	RMS
5	1588.478	-2.76	3.88	1.12	19.54	-18.42	peak
6	1588.478	-12.20	3.88	-8.32	19.54	-27.86	RMS
7	1593.629	-0.75	4.04	3.29	19.54	-16.25	peak
8	1593.629	-9.58	4.04	-5.54	19.54	-25.08	RMS
9	1601.942	-2.35	4.24	1.89	19.54	-17.65	peak
10	1601.942	-12.61	4.24	-8.37	19.54	-27.91	RMS
11	1606.022	-2.16	4.24	2.08	19.54	-17.46	peak
12	1606.022	-11.41	4.24	-7.17	19.54	-26.71	RMS

Remark:

- Margin = Result (Result =Reading + Factor)–Limit
- Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

60.0 dBuV/m





4. UWB BANDWIDTH

4.1 LIMITS OF UWB BANDWIDTH MEASUREMENT

The UWB bandwidth of a UWB system operating under the provisions of this section must be contained between 3100 MHz and 10,600 MHz.

At any point in time, has a fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth.

4.2 INSTRUMENT SETUP VALUE AND MEASUREMENT DISTANCE

Frequency Range	RBW	VBW	Detector	Measurement Distance
3100~10600	1MHz	1MHz	PEAK	1 Meter

4.3 TEST PROCEDURE

- a. The measuring distance of 1m shall be used for measurements. The EUT was placed on the top of arotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The height of the test antenna shall vary between 1m to 4m.Both horizontal and vertical polarization of the antenna are set to make the measurement.
- c. All readings are RMS mode value , for each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading .
- d. For the actual test configuration, please refer to the related Item –EUT Test Photos.
- e. The Spectrum Analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. The UWB Bandwidth is measured at the 10 dB point (FL, FH).

Note: Both horizontal and vertical antenna polarities were tested. The worst case emissions were reported.

4.4 TEST SETUP

Same as 3.3.4

4.5 EUT OPERATION CONDITIONS

Same as 3.2.6

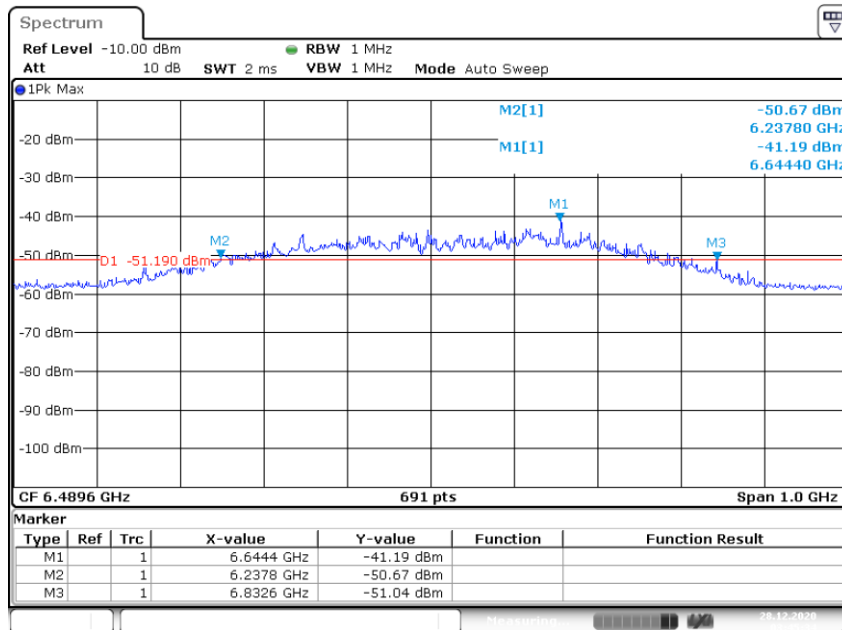


4.6 TEST RESULTS

Temperature:	25 °C	Relative Humidity:	50%
Test Voltage:	DC 3.7V		

Test Channel	f _M (MHz)	f _L (MHz)	f _H (MHz)	-10dB Bandwidth (MHz)	f _c (MHz)	Fractional Bandwidth (MHz)	Limit	Result
CH1	6644.4	6237.8	6832.6	594.8	6535.2	0.09	-10dB Bandwidth ≥ 500MHz or Fractional Bandwidth ≥ 0.2	Pass

CH 1



Date: 28.DEC.2020 03:45:33



5 PEAK EMISSION WITHIN A 50MHZ BANDWIDTH (FOR 15.519(e))

5.1 LIMITS OF PEAK EMISSION

The Maximum Peak Output Power Measurement is 0dBm(RBW=50MHz).

If a resolution bandwidth other than 50 MHz is Employed, the peak EIRP limit shall be $20 \log(RBW/50)$ dBm where RBW is the resolution bandwidth in megahertz that is employed. The resolution bandwidth used to make the peak measurement was 1MHz, resulting in a limit of -34dBm.

This may be converted to a peak field strength level at 3 meters using

$$E(\text{dBuV/m}) = P(\text{dBm EIRP}) + 95.2 = -34 + 95.2 = 61.2 \text{ dBuV/m}$$

Note: $\text{EIRP}_{1\text{MHz}} = \text{EIRP}_{50\text{MHz}} + 20\log(1\text{MHz} / 50 \text{ MHz}) = 0 \text{ dBm} + -34 \text{ dB} = -34 \text{ dBm}$

5.2 INSTRUMENT SETUP VALUE AND MEASUREMENT DISTANCE

Frequency Range	RBW	VBW	Detector	Measurement Distance
3100~10600	1MHz	3MHz	PEAK	3 Meter

5.3 TEST PROCEDURE

Same as 3.3.2

5.4 DEVIATION FROM TEST STANDARD

No deviation

5.5 TEST SETUP

Same as 3.3.4

5.6 FIELD STRENGTH CALCULATION

Same as 3.2.5

5.7 EUT OPERATING CONDITIONS

Same as 3.2.5



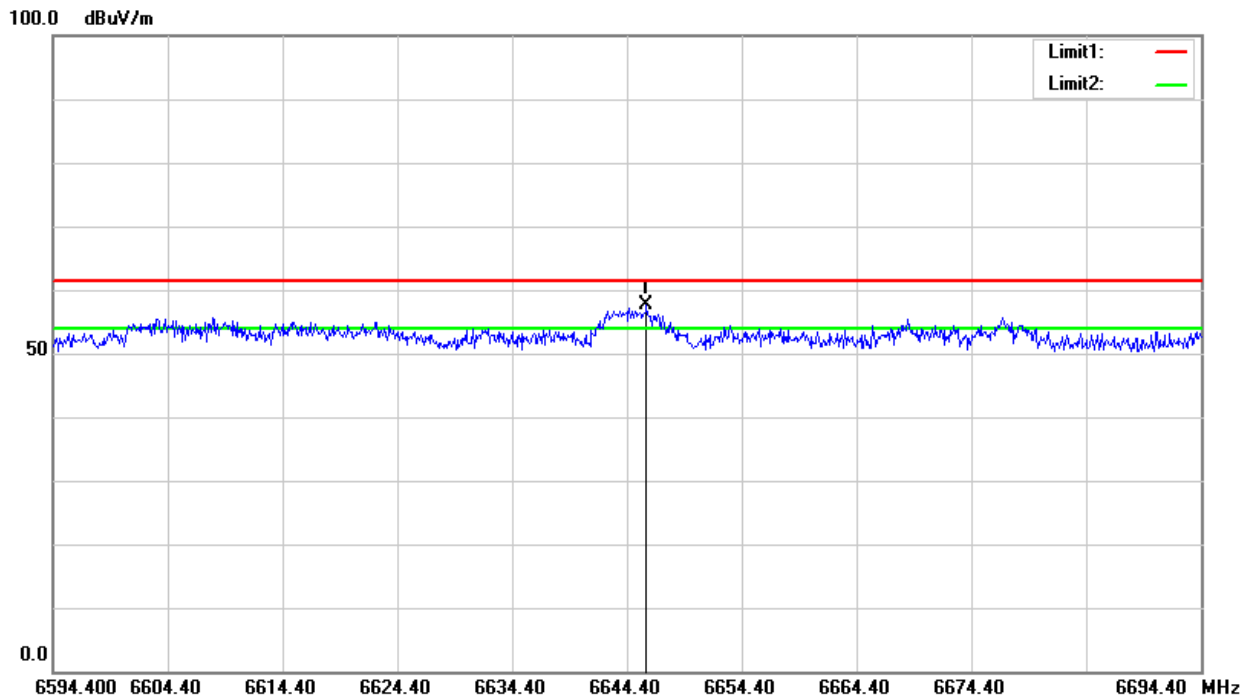
5.8 TEST RESULTS

Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	CH 1	Test distance:	3m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	6646.100	58.97	-1.42	57.55	61.20	-3.75	peak

Remark:

- 1. Margin = Result (Result =Reading + Factor)-Limit
- 2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain





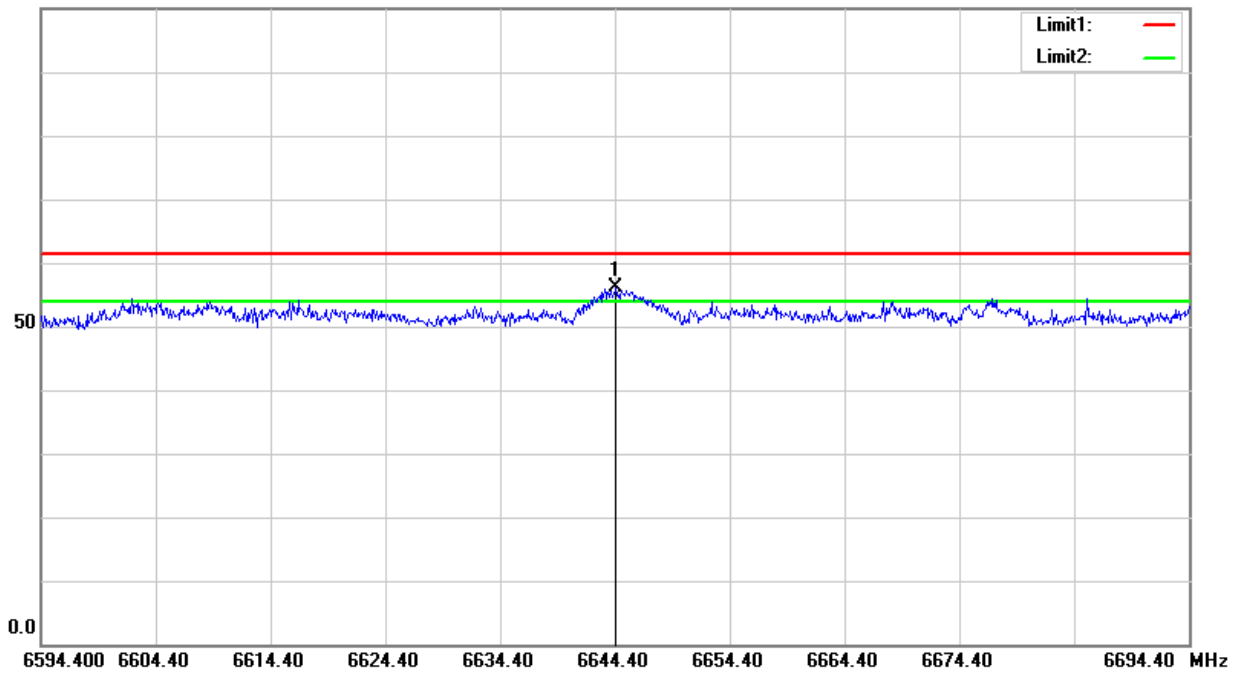
Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	CH 1	Test distance:	3m

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	6644.500	57.58	-1.43	56.15	61.20	-5.15	peak

Remark:

- 1. Margin = Result (Result =Reading + Factor)-Limit
- 2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

100.0 dBuV/m





6 CESSATION TIME

6.1 CESSATION TIME

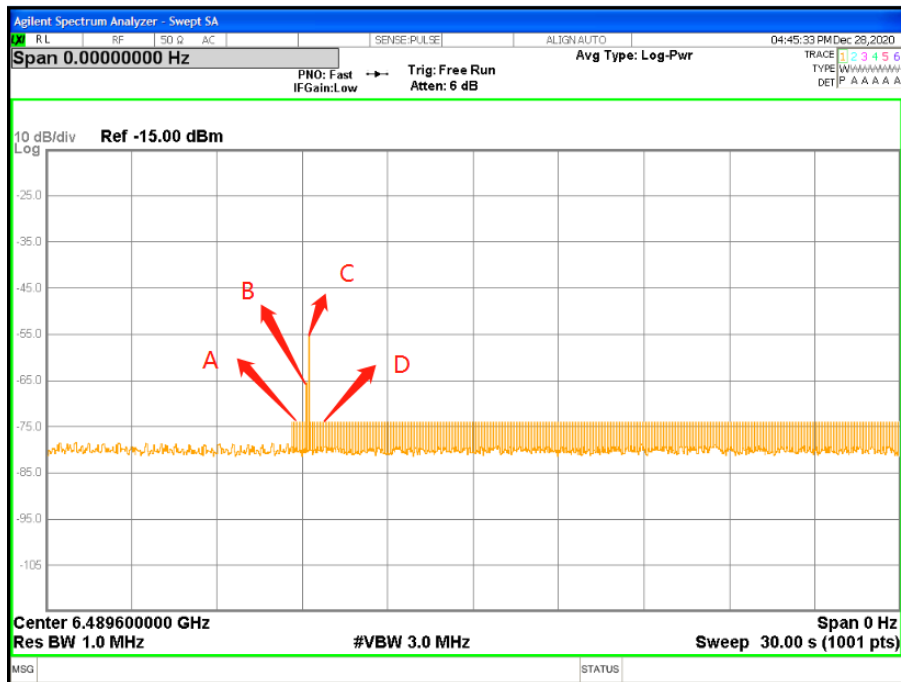
FCC Part 15.519(a)(1): A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that 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.

6.2 TEST PROCEDURE

EUT and receiving pairing device keep UWB normal connection.

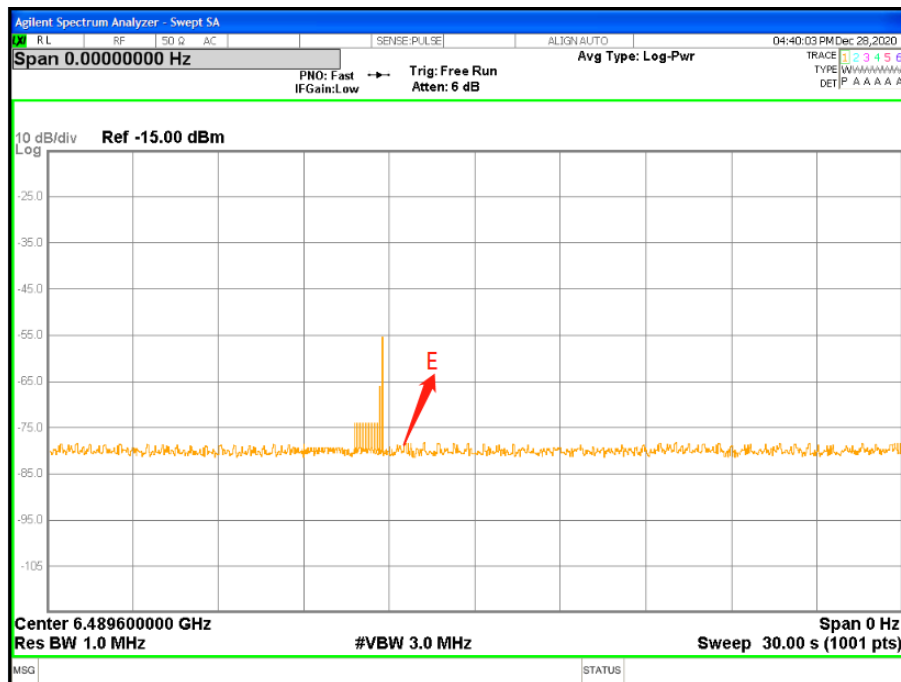
6.3 TEST RESULTS

Transmitter closed





Receiver closed



Remark A: Receiver signal.

Remark B: Signal paired with transmitter.

Remark C: Working signal after successful pairing.

Remark D: Turn off the transmitter, the working signal and the signal paired with the transmitter are stopped, and the receiver signal still exists.

Remark E: After removing the receiver, both the transmitting signal and the working signal are stopped.

Note: It can be seen from the test result graph of the transmitter and receiver turned off that the scan time is 30s, and the transmitter immediately stops working signals after the transmitter is turned off and the receiver is turned off, so the EUT meets the requirements of cessation time.



7. ANTENNA REQUIREMENT

7.1 STANDARD REQUIREMENT

According to the FCC Part 15 Paragraph 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

7.2 EUT ANTENNA

The EUT antenna is Chip Antenna. It conforms to the standard requirements.





APPENDIX- PHOTOS OF TEST SETUP

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

*****END OF THE REPORT*****

