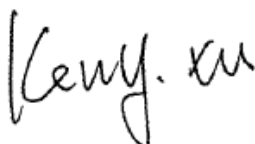


FCC REPORT

Application No.: SZEM1909018064
Applicant: Decawave Limited
Address of Applicant: Adelaide Chambers Peter Street, Dublin, D08 T6YA, Ireland
Manufacturer: Decawave Limited
Address of Manufacturer: Adelaide Chambers Peter Street, Dublin, D08 T6YA, Ireland
Equipment Under Test (EUT):
EUT Name: DWM1004C is a low cost UWB TDoA Tag
Model No.: DWM1004C
FCC ID: 2AQ33-DWM1004
Standard(s) : 47 CFR Part 15, Subpart F
Date of Receipt: 2019-09-02
Date of Test: 2019-09-10 to 2019-10-11
Date of Issue: 2019-11-01

Test Result:	Pass*
---------------------	--------------

* In the configuration tested, the EUT complied with the standards specified above.




Keny Xu
 EMC Laboratory Manager



1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2019-11-01		Original

Authorized for issue by:			
			
		<hr/> Calvin Weng /Project Engineer	
			
		<hr/> Eric Fu /Reviewer	



2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart F Section 15.519 (a)(2)	N/A	PASS
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart F 15.521(j)	ANSI C63.10 (2013) Section 6.2	PASS
UWB Bandwidth	47 CFR Part 15, Subpart F Section 15.503 (a)	ANSI C63.10 (2013) Section10.1	PASS
Dwell Time	47 CFR Part 15, Subpart F Section 15.519 (a)(1)	ANSI C63.10 (2013) Section7.8.4	N/A
Spurious Emissions	47 CFR Part 15, Subpart F Section 15.519 (c)(d)/15.209	ANSI C63.10 (2013) Section10.2&10.3	PASS
EIRP	47 CFR Part 15, Subpart F Section 15.519 (e)	ANSI C63.10 (2013) Section10.3	PASS

N/A=Not applicable





3 Contents

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4 General Information

4.1 General Description of EUT

Name:	DWM1004C is a low cost UWB TDoA Tag
Model No.:	DWM1004C
Frequency Range:	3993.6MHz, 6489.6MHz
Modulation Type:	PM
Number of Channels:	2
Sample Type:	Portable production
Antenna Type:	Integral
Antenna Gain:	2.73dBi for 3993.6MHz, 4.16dBi for 6489.6MHz
Power Supply:	For debug board: DC5V from USB port For RF module: DC3.3V from debug board

4.2 Description of Support Units

Description	Manufacturer	Model No.	S/N
Laptop	Lenovo	L480	PF-1N6C3V
Micro USB Cable	PHILIPS	SWR2101	REF. No.SEA0700
Mouse	Lenovo	M-U0025-O	REF. No.:SEA2400
Router	NETGEAR	DGN2200	REF. No.SEA2200





4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Conduction emission	$\pm 3.0\text{dB}$ (150kHz to 30MHz)
3	Occupied Bandwidth	$\pm 3\%$
4	RF Radiated power	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
5	Radiated Spurious emission test	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
6	Temperature test	$\pm 1^\circ\text{C}$
7	Supply voltages	$\pm 1.5\%$

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch E&E Lab,

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.



4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



4.8 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2019-06-13	2022-06-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2019-07-11	2020-07-10
LISN	Rohde & Schwarz	ENV216	SEM007-01	2018-09-25	2019-09-24
LISN	Rohde & Schwarz	ENV216	SEM007-01	2019-09-24	2020-09-23
LISN	ETS-LINDGREN	3816/2	SEM007-02	2019-04-01	2020-03-31
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2019-04-01	2020-03-31

RF conducted test					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2018-09-25	2019-09-24
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2019-09-24	2020-09-23
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2018-09-25	2019-09-24
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2018-09-25	2019-09-24
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2018-09-25	2019-09-24
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	NBM-550/EHP-50F	EMC2143	2018-02-07	2020-02-06





Electric Field Probe (100KHz-3GHz)	WANDEL & GOLTERMANN	EMR-20	EMC0907	2019-05-21	2020-05-20
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07

RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-08-05	2020-08-04
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2018-09-25	2019-09-24
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2019-09-24	2020-09-23
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-06-27	2020-06-26
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2019-04-01	2020-03-31
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2019-07-11	2020-07-10
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019-07-11	2020-07-10
EXA Spectrum Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16





Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2018-11-12	2019-11-11
Pre-amplifier (18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2018-09-25	2019-09-24
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2019-09-24	2020-09-23
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2019-09-26	2020-09-25





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Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2019-04-04	2020-04-03
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5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15F Section 15.519(a2)
15.519 requirement:	The use of antennas mounted on outdoor structures, e.g., antennas mounted on the outside of a building or on a telephone pole, or any fixed outdoors infrastructure is prohibited. Antennas may be mounted only on the hand held UWB device.
EUT Antenna:	Please refer to interior photos of EUT
	The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2.73dBi for 3993.6MHz, 4.16dBi for 6489.6MHz.



5.2 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement:	47 CFR Part 15, Subpart F 15.521(j)		
Test Method:	ANSI C63.10 (2013) Section 6.2		
Test Setup:			
Limit:	Frequency of emission(MHz)	Conducted limit(dB μ V)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	*Decreases with the logarithm of the frequency.		
Test Procedure:	<ol style="list-style-type: none"> 1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50 μ H + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the 		



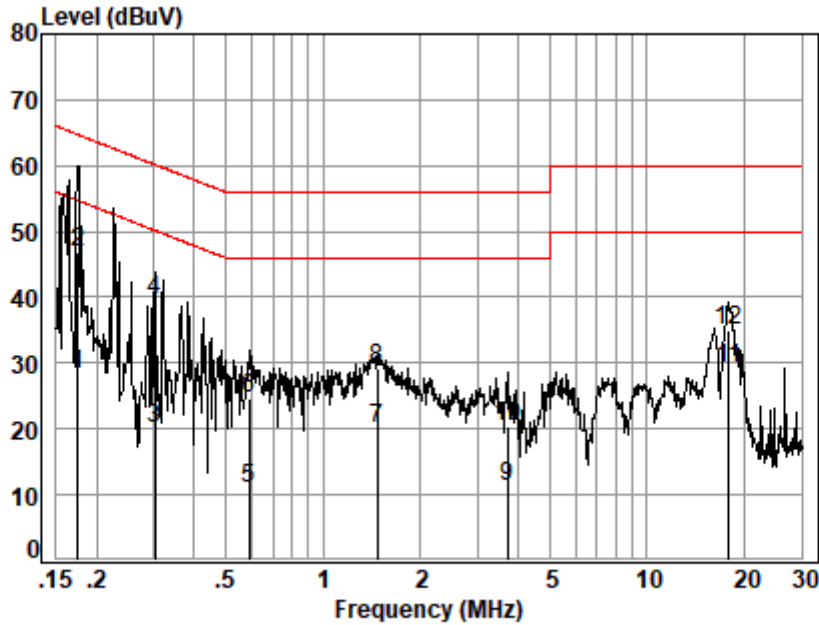


	<p>horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.</p> <p>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.</p> <p>Remark: LISN=Read Level+ Cable Loss+ LISN Factor</p>
Exploratory Test Mode:	a:TX mode_Keep the EUT in transmitting with modulation mode.
Instruments Used:	Refer to section 4.8 for details
Test Results:	Pass



Measurement Data

Mode:a; Line:Live Line



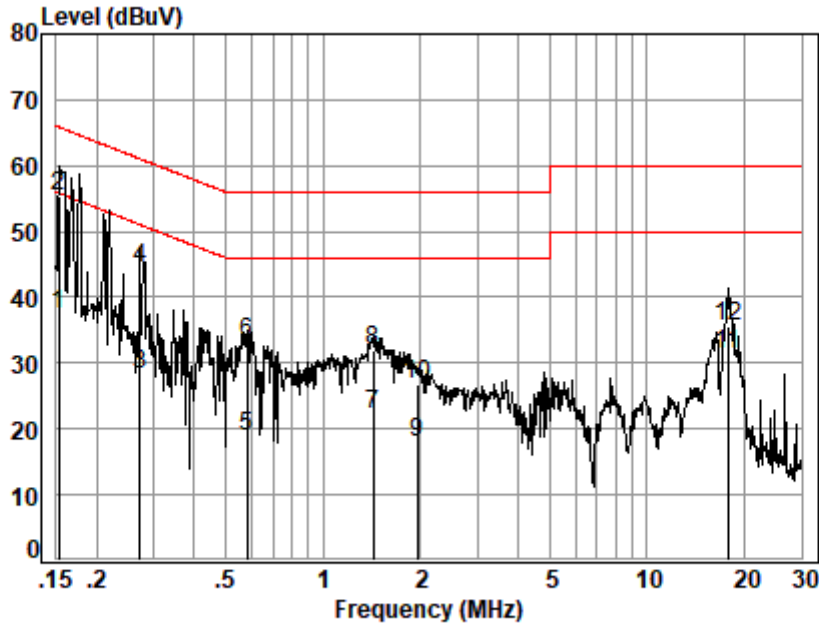
Site : Shielding Room
 Condition: Line
 Job No. : 18064CR
 Test mode: a

	Cable	LISN	Read	Limit	Over		
Freq	Loss	Factor	Level	Level	Line	Limit Remark	
MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.17	0.02	9.66	18.72	28.40	54.72	-26.32 Average
2	0.17	0.02	9.66	37.08	46.76	64.72	-17.96 QP
3	0.30	0.04	9.67	10.24	19.95	50.19	-30.24 Average
4	0.30	0.04	9.67	29.83	39.54	60.19	-20.65 QP
5	0.59	0.07	9.67	1.25	10.99	46.00	-35.01 Average
6	0.59	0.07	9.67	14.77	24.51	56.00	-31.49 QP
7	1.47	0.13	9.73	10.31	20.17	46.00	-25.83 Average
8	1.47	0.13	9.73	19.28	29.14	56.00	-26.86 QP
9	3.70	0.16	9.72	1.37	11.25	46.00	-34.75 Average
10	3.70	0.16	9.72	10.40	20.28	56.00	-35.72 QP
11	17.85	0.23	10.17	18.87	29.27	50.00	-20.73 Average
12	17.85	0.23	10.17	24.55	34.95	60.00	-25.05 QP



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Mode:a; Line:Neutral Line



Site : Shielding Room
 Condition: Neutral
 Job No. : 18064CR
 Test mode: a

	Freq	Cable Loss	LISN Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15	0.01	9.63	27.68	37.32	55.82	-18.50	Average
2	0.15	0.01	9.63	45.64	55.28	65.82	-10.54	QP
3	0.27	0.03	9.64	18.71	28.38	51.07	-22.69	Average
4	0.27	0.03	9.64	34.71	44.38	61.07	-16.69	QP
5	0.58	0.07	9.64	9.14	18.85	46.00	-27.15	Average
6	0.58	0.07	9.64	23.52	33.23	56.00	-22.77	QP
7	1.43	0.13	9.70	12.43	22.26	46.00	-23.74	Average
8	1.43	0.13	9.70	22.10	31.93	56.00	-24.07	QP
9	1.95	0.16	9.69	8.21	18.06	46.00	-27.94	Average
10	1.95	0.16	9.69	16.78	26.63	56.00	-29.37	QP
11	17.75	0.23	10.22	20.88	31.33	50.00	-18.67	Average
12	17.75	0.23	10.22	25.07	35.52	60.00	-24.48	QP



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5.3 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15, Subpart F Section 15.519 (c)(d)/15.209				
Test Method:	ANSI C63.10: 2013 section 10.2 & 10.3				
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-960MHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
	Above 960MHz	RMS	1MHz	3MHz	RMS
Limit: (Spurious Emissions)	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1610MHz	-75.3 dBm (EIRP, RBW=1MHz)		RMS	3
	1610MHz-1990MHz	-63.3 dBm (EIRP, RBW=1MHz)		RMS	3
	1990MHz-3100MHz	-61.3 dBm (EIRP, RBW=1MHz)		RMS	3
	3100MHz-10600MHz	-41.3 dBm (EIRP, RBW=1MHz)		RMS	3
	Above 10600MHz	-61.3 dBm (EIRP, RBW=1MHz)		RMS	3
	1164MHz-1240MHz	-85.3 dBm (EIRP, RBW=1kHz)		RMS	3
	1559MHz-1610MHz	-85.3 dBm (EIRP, RBW=1kHz)		RMS	3



Test Setup:

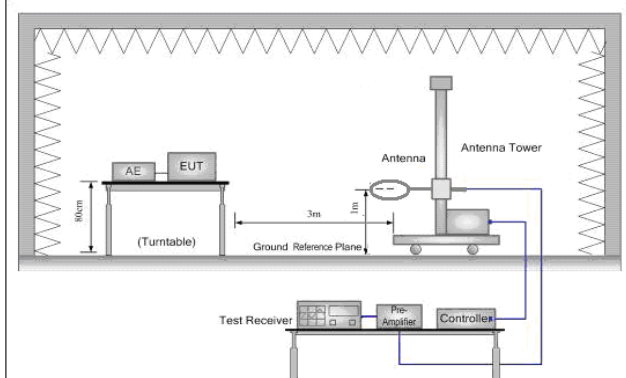


Figure 1. Below 30MHz

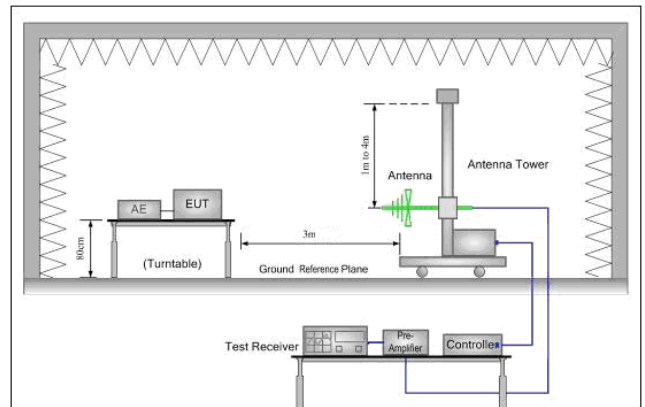


Figure 2. 30MHz to 1GHz

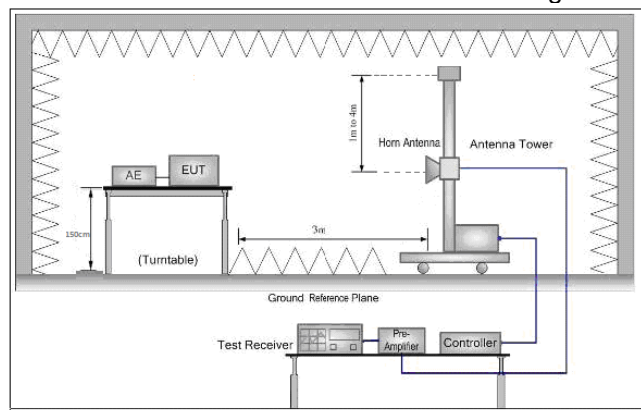


Figure 3. Above 1 GHz

Test Procedure:

- 1) For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2) For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- 3) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 4) The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 5) For each suspected emission, the EUT was arranged to its worst case





	<p>and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>6) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>7) If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p> <p>8) Test the EUT in the lowest channel,the middle channel,the Highest channel</p> <p>9) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode,And found the X axis positioning which it is worse case.</p> <p>10) Repeat above procedures until all frequencies measured was complete.</p>
Exploratory Test Mode:	a:TX mode_Keep the EUT in transmitting with modulation mode.
Final Test Mode:	a:TX mode_Keep the EUT in transmitting with modulation mode.
Instruments Used:	Refer to section 4.8 for details
Test Results:	Pass

According to ANSI 63.10 Clause 10.3.9, the EIRP to field strength at a specified measurement distance of 3 m is below:

$$E \text{ (dBuV/m)} = \text{EIRP(dBm)} + 95.3$$

For peak power test, the spectrum analyzer was set to RBW=10MHz, VBW=10MHz, and add a conversion factor of $20 \cdot \log(50\text{MHz}/10\text{MHz})=13.98$

Thus, the field strength limit for the test above 1GHz is below:

Frequency	Limit		Detector	Measurement Distance
	EIRP (dBm)	Field Strength (dBuV/m)		
960MHz-1610MHz	-75.3 (RBW=1MHz)	20.00	RMS	3
1610MHz-1990MHz	-63.3 (RBW=1MHz)	32.00	RMS	3
1990MHz-3100MHz	-61.3 (RBW=1MHz)	34.00	RMS	3
3100MHz-10600MHz	-41.3 (RBW=1MHz)	54.00	RMS	3
Above 10600MHz	-61.3 (RBW=1MHz)	34.00	RMS	3
1164MHz-1240MHz	-85.3 (RBW=1kHz)	10.00	RMS	3
1559MHz-1610MHz	-85.3 (RBW=1kHz)	10.00	RMS	3



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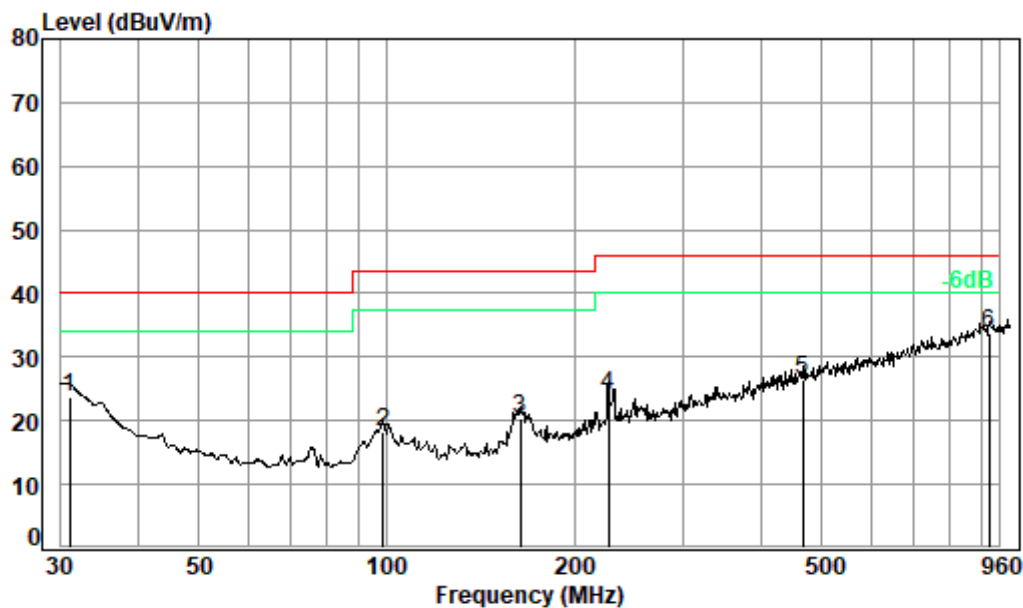


Measurement Data

5.3.1.1 Spurious Emissions

30MHz~1GHz	
Test mode:	Transmitting

Horizontal:



Condition: 3m HORIZONTAL

Job No. : 18064CR

Test Mode: a

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	30.96	0.60	21.95	27.73	29.06	40.00	-16.12
2	98.83	1.19	13.90	27.64	30.67	43.50	-25.38
3	163.76	1.34	15.58	27.30	30.67	43.50	-23.21
4	226.89	1.56	17.77	27.08	31.82	46.00	-21.93
5	465.60	2.47	23.90	27.70	27.94	46.00	-19.39
6 pp	925.76	3.63	29.93	27.19	27.37	46.00	-12.26

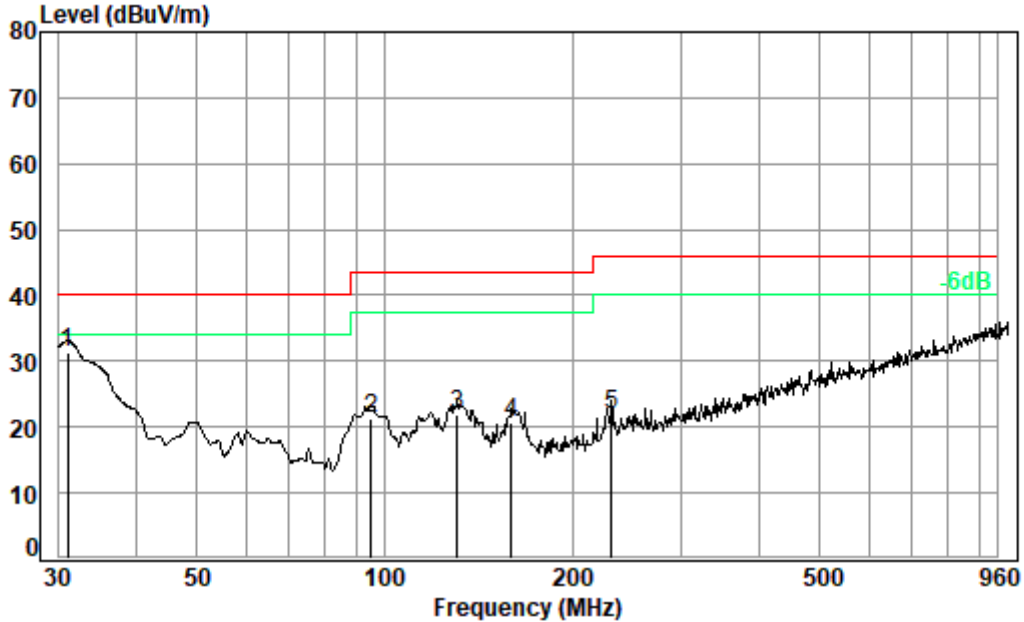


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Vertical:



Condition: 3m VERTICAL

Job No. : 18064CR

Test Mode: a

	Cable	Ant	Preamp	Read	Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	0.60	21.95	27.73	36.44	31.26	40.00	-8.74
2	1.15	13.57	27.64	34.15	21.23	43.50	-22.27
3	1.28	13.44	27.46	34.63	21.89	43.50	-21.61
4	1.34	15.48	27.32	31.16	20.66	43.50	-22.84
5	1.58	18.09	27.07	29.28	21.88	46.00	-24.12
6	3.67	30.17	27.01	27.20	34.03	54.00	-19.97



Test Data:

Transmitting with modulation Mode at 3993.6MHz								
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1164MHz ≤ f ≤ 1240MHz & 1559MHz ≤ f ≤ 1610MHz								
1200.53	24.59	4.42	40.48	16.28	4.81	10.00	-5.19	Vertical
1565.12	25.80	5.48	40.71	14.55	5.12	10.00	-4.88	Vertical
960MHz ≤ f ≤ 3100MHz (except for above frequency range)								
1334.39	25.17	4.92	40.59	22.19	11.69	20.00	-8.31	Vertical
2924.91	30.59	2.82	41.37	24.67	16.71	34.00	-17.29	Vertical
f > 3100MHz								
3948.41	33.46	6.93	42.69	51.87	49.57	54.00	-4.43	Vertical
4123.76	33.60	7.13	42.89	52.52	50.36	54.00	-3.64	Vertical
4227.16	33.60	7.25	43.01	51.54	49.38	54.00	-4.62	Vertical
10671.00	35.78	12.49	42.45	23.35	29.17	34.00	-4.83	Vertical
12455.40	36.30	12.93	43.44	24.3	30.09	34.00	-3.91	Vertical
16016.20	37.71	14.49	43.76	22.14	30.58	34.00	-3.42	Vertical
1164MHz ≤ f ≤ 1240MHz & 1559MHz ≤ f ≤ 1610MHz								
1199.40	24.59	4.41	40.45	15.57	4.12	10.00	-5.88	Horizontal
1570.31	25.77	5.42	40.73	14.93	5.39	10.00	-4.61	Horizontal
960MHz ≤ f ≤ 3100MHz (except for above frequency range)								
1345.66	25.18	4.90	40.57	23.47	12.98	20.00	-7.02	Horizontal
2925.25	30.61	2.84	41.35	25.36	17.46	34.00	-16.54	Horizontal
f > 3100MHz								
3902.56	33.34	6.88	42.64	48.57	46.15	54.00	-7.85	Horizontal
4082.55	33.60	7.08	42.85	47.83	45.66	54.00	-8.34	Horizontal
4305.90	33.60	7.34	43.10	45.52	43.36	54.00	-10.64	Horizontal
10673.00	35.78	12.49	42.45	23.83	29.65	34.00	-4.35	Horizontal
12463.10	36.34	12.90	43.37	25.71	31.58	34.00	-2.42	Horizontal
16010.00	37.70	14.45	43.71	22.46	30.9	34.00	-3.1	Horizontal





Transmitting with modulation Mode at 6489.6MHz								
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1164MHz ≤ f ≤ 1240MHz & 1559MHz ≤ f ≤ 1610MHz								
1191.44	24.60	4.46	40.50	14.50	3.07	10.00	-6.93	Vertical
1573.86	25.90	5.45	40.78	15.44	6.01	10.00	-3.99	Vertical
960MHz ≤ f ≤ 3100MHz (except for above frequency range)								
1338.41	25.11	4.95	40.61	20.93	10.38	20.00	-9.62	Vertical
2919.49	30.55	2.87	41.36	26.22	18.27	34.00	-15.73	Vertical
f > 3100MHz								
6377.10	35.00	11.31	42.51	49.67	53.47	54.00	-0.53	Vertical
6471.04	35.08	11.49	42.43	49.38	53.52	54.00	-0.48	Vertical
6575.59	35.32	11.32	42.34	48.01	52.31	54.00	-1.69	Vertical
10677.19	35.79	12.45	42.49	25.23	30.97	34.00	-3.03	Vertical
12449.93	36.28	12.99	43.46	22.69	28.50	34.00	-5.50	Vertical
16014.82	37.77	14.54	43.66	21.23	29.87	34.00	-4.13	Vertical
1164MHz ≤ f ≤ 1240MHz & 1559MHz ≤ f ≤ 1610MHz								
1197.09	24.65	4.33	40.45	17.13	5.66	10.00	-4.34	Horizontal
1579.17	25.74	5.48	40.74	13.95	4.44	10.00	-5.56	Horizontal
960MHz ≤ f ≤ 3100MHz (except for above frequency range)								
1354.92	25.14	4.87	40.60	24.24	13.64	20.00	-6.36	Horizontal
2929.16	30.52	2.81	41.35	24.76	16.75	34.00	-17.25	Horizontal
f > 3100MHz								
6317.41	34.96	11.19	42.56	45.66	49.25	54.00	-4.75	Horizontal
6417.21	35.04	11.38	42.77	46.05	49.7	54.00	-4.3	Horizontal
6548.16	35.24	11.40	42.37	44.73	49.00	54.00	-5.00	Horizontal
10666.43	35.73	12.41	42.42	22.70	28.41	34.00	-5.59	Horizontal
12464.12	36.34	12.98	43.32	26.61	32.60	34.00	-1.40	Horizontal
16008.37	37.69	14.43	43.80	21.54	29.86	34.00	-4.14	Horizontal

Remark:

- 1) Scan from 9kHz to 40GHz, The disturbance above 18GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported .



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5.3.1.2 Peak Power

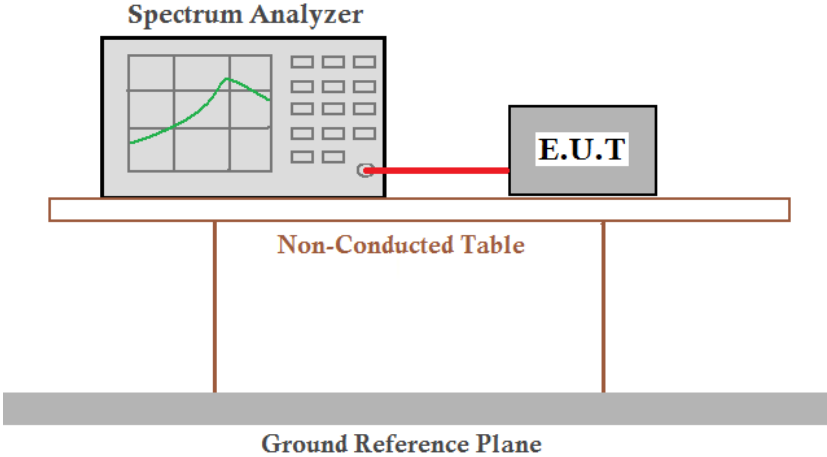
Field Strength for fundamental @ RBW=10MHz						
Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Polarization
3993.60	33.35	6.89	42.64	78.86	76.46	Horizontal
6489.60	35.24	11.40	42.37	75.06	79.33	Horizontal
3993.60	33.35	6.89	42.64	75.77	73.37	Vertical
6489.60	35.24	11.40	42.37	72.25	76.52	Vertical

Calculated Field Strength of fundamental @ RBW=50MHz					
Frequency (MHz)	Measured Field Strength of fundamental (FS _M) (dBuV/m)	Calculated Field Strength of fundamental (FS _C) (dBuV/m)	Limit (dBuV/m)	Margin	Polarization
3993.60	76.46	90.44	95.30	-4.86	Horizontal
6489.60	79.33	93.31	95.30	-1.99	Horizontal
3993.60	73.37	87.35	95.30	-7.95	Vertical
6489.60	76.52	90.50	95.30	-4.80	Vertical

Note: $FS_C = FS_M + 20\log(50\text{MHz}/10\text{MHz}) = FS_M + 13.98$



5.4 UWB Bandwidth (10dB Bandwidth)

Test Requirement:	47 CFR Part 15F Section 15.503(a)
Test Method:	ANSI C63.10:2013 section 10.1
Test Setup:	
Limit:	≥500MHz
Exploratory Test Mode:	a:TX mode_Keep the EUT in transmitting with modulation mode.
Instruments Used:	Refer to section 4.8 for details
Test Results:	Pass

Measurement Data

Test Frequency (MHz)	F _L (MHz)	F _H (MHz)	10dB bandwidth (MHz)	Limit (MHz)	Results
3993.6	3579.32	4415.86	836.54	≥500MHz	Pass
6489.6	6084.13	6896.63	812.50	≥500MHz	Pass



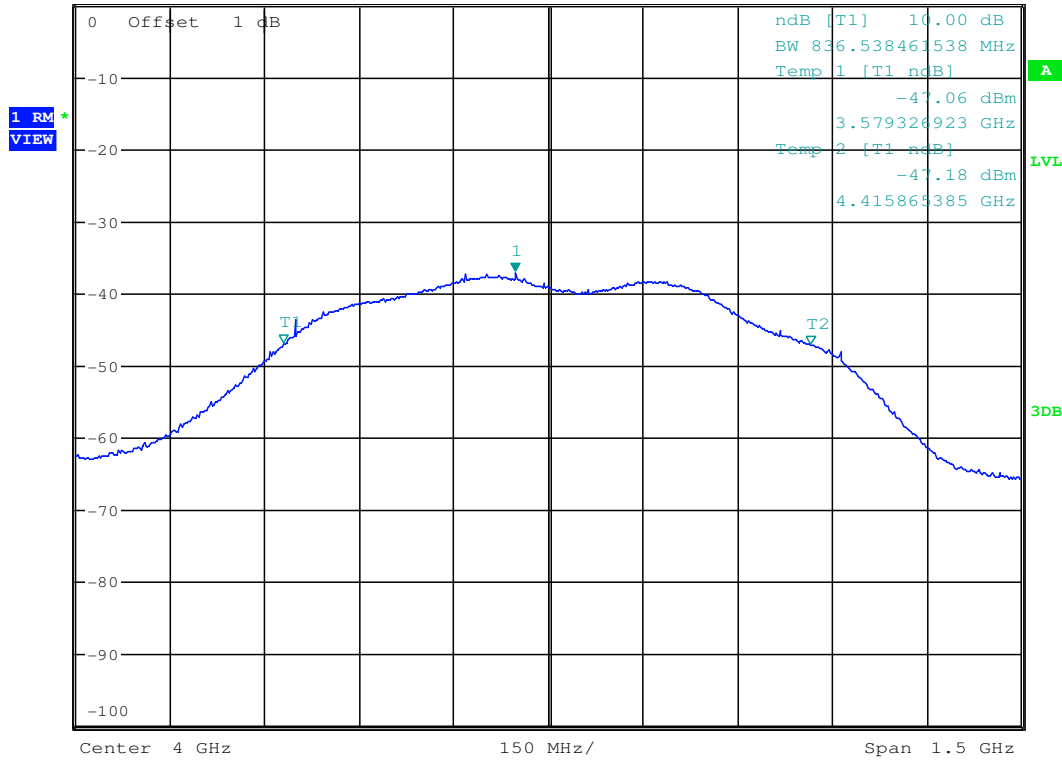


Test plot as follows:

Test channel:	3993.6MHz
---------------	-----------



* RBW 1 MHz Marker 1 [T1]
 * VBW 1 MHz -37.13 dBm
 Ref 0 dBm Att 25 dB SWT 20 ms 3.947115385 GHz



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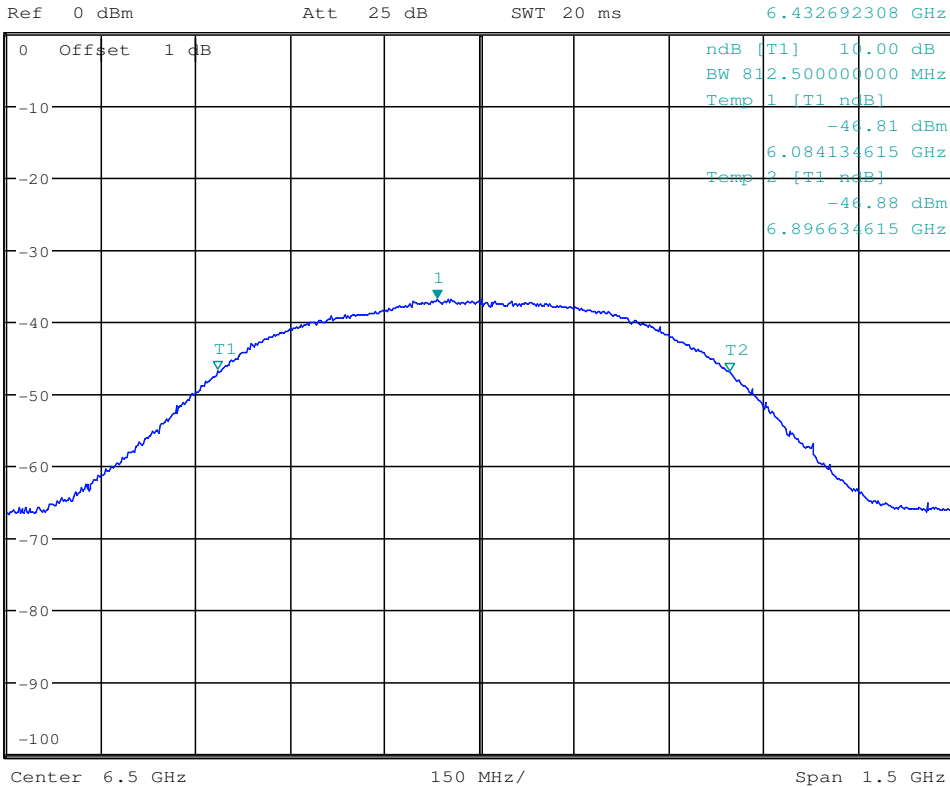
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Test channel:	6489.6MHz
---------------	-----------



* RBW 1 MHz Marker 1 [T1]
 * VBW 1 MHz -36.92 dBm
 SWT 20 ms 6.432692308 GHz



1 RM
VIEW

A

LVL

3DB



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5.5 Dwell Time

Test Requirement:	47 CFR Part 15F Section 15.519(a)(1)
Test Method:	ANSI C63.10:2013 section 7.8.4
Test Setup:	<p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Limit:	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
Exploratory Test Mode:	b.Normal operation mode
Instruments Used:	Refer to section 4.8 for details
Test Results:	N/A





6 Photographs - EUT Test Setup

Please refer to test setup photos.

7 Photographs - EUT Constructional Details

Please refer to external photos and internal photos of EUT.

- End of the Report -

