Report No.: ER/2019/10088
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ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART F REQUIREMENT

OF

Applicant: Catapult Sports Pty Ltd

75-83 High St, Prahran, Victoria, 3181, Australia

Product Name: Clearsky T6 Anchor

Brand Name: Clearsky T6 Anchor

Model No.: T6 Anchor

Model Difference: N/A

Report Number: ER/2019/10088

FCC ID: 2ADAL-32832A

FCC Rule Part: §15.519, Cat: UWB

Issue Date: Oct. 17, 2019

Date of Test: Aug. 14, 2019 ~ Sep. 25. 2019 / Oct. 17, 2019

Date of EUT Received: Aug. 14, 2019

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:

Nick Lin / Sr. Engineer

Approved By:

Blue Yang / Asst. Manager





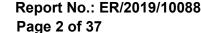
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| Revision History | | | | | | | |
|--|------------------------|---------------|-------------------------|--|--|--|--|
| Revision Description Issue Date Remark | | | | | | | |
| Rev.00 | Original. | Sep. 26, 2019 | Revised by: Tiffany Kao | | | | |
| Rev.01 | Update Section 9 & 10. | Oct. 17, 2019 | Revised by: Tiffany Kao | | | | |

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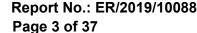




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GENERAL INFORMATION

1.1 Product description

| Product Name: | Clearsky T6 Anchor | | | |
|-------------------|----------------------------------|--|--|--|
| Brand Name: | Clearsky T6 Anchor | | | |
| Model No.: | T6 Anchor | | | |
| Model Difference: | N/A | | | |
| Hardware Version: | V1.25 | | | |
| Software Version: | V5.0 | | | |
| | 3.7Vdc from Re or 54V from Po | echargeable Li-ion Polymer Battery E Injector | | |
| Power Supply: | Battery: | Model No.: HYP 105085, Supplier: Shenzhen Huayou Power Energy Technology Co., Ltd. | | |
| | PoE Injector: | Model No.: POE-G30, Supplier: N/A. | | |

| Radio Technology: | Ultra WideBand |
|----------------------|--------------------------------|
| Operating Band: | 3774.0MHz ~ 4243.2MHz |
| Channel number: | 1 channel |
| Modulation type: | BPSK |
| Transmit Power: | -0.54dBm |
| Antenna Designation: | Monopole Antenna, Gain: 2.2dBi |

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1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.519

ANSI C63.10:2013

KDB 393764D01 UWB FAQ v02

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

1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803 (TAF code 0513)

FCC Designation number: 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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SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed according to §15.207. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Conducted Test (RF)

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

2.3.3 Radiated Emissions

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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



Fig. 2-2 Conduction (AC Power Line) Radiated Emission

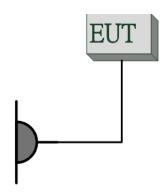


Table 2-1 Equipment Used in Tested System

| Item | Equipment | Mfr/Brand | Model/Type No. | Series No. | Data Cable | Power Cord |
|------|----------------------|-----------|----------------|------------|------------|------------|
| 1 | UWB Test Software | N/A | N/A | N/A | N/A | N/A |

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SUMMARY OF TEST RESULTS

| FCC Rules | Description Of Test | Test Report Section | Result |
|---------------------------|--|------------------------|-----------|
| §15.207(a) | AC Power Line Conducted Emission | 6.6 | Compliant |
| §15.519(b) §15.503 (d) | UWB bandwidth | 7.5 | Compliant |
| §15.209 §15.519(c) (d) | Radiated Emission below 960MHz and above 960MHz. Radiated Emissions in GPS bands. Average Emissions of UWB transmissions in a 1MHz Bandwidth | 8.6 8.7 8.8 | Compliant |
| §15.519(e) | Peak level of the Emission | 8.5 | Compliant |
| §15.519(a) (1) | Transmitter Timeout | 9.5 | Compliant |

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 4000MHz is chosen for full testing.

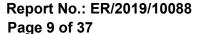
The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) the worst case H position was reported.

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MEASUREMENT UNCERTAINTY

| Test Items | Uncertainty | | |
|----------------------------------|-----------------------------|--|--|
| AC Power Line Conducted Emission | +/- 2.586 dB | | |
| UWB Bandwidth | +/- 51.33 Hz | | |
| Temperature | +/- 0.65 °C | | |
| Humidity | +/- 4.6 % | | |
| DC / AC Power Source | DC= +/- 0.13%, AC= +/- 0.2% | | |

| Radiated Spurious Emission Measurement Uncertainty | | | | | |
|--|----------------------------|--|--|--|--|
| | 9kHz~30MHz: +-2.3dB | | | | |
| | 30MHz - 180MHz: +/- 3.37dB | | | | |
| Polarization: Vertical | 180MHz -417MHz: +/- 3.19dB | | | | |
| Polarization, vertical | 0.417GHz-1GHz: +/- 3.19dB | | | | |
| | 1GHz - 18GHz: +/- 4.04dB | | | | |
| | 18GHz - 40GHz: +/- 4.04dB | | | | |
| | 9kHz~30MHz: +-2.3dB | | | | |
| | 30MHz - 167MHz: +/- 4.22dB | | | | |
| Polarization: Horizontal | 167MHz -500MHz: +/- 3.44dB | | | | |
| Folarization. Horizontal | 0.5GHz-1GHz: +/- 3.39dB | | | | |
| | 1GHz - 18GHz: +/- 4.08dB | | | | |
| | 18GHz - 40GHz: +/- 4.08dB | | | | |

Note:

- 1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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CONDUCTED EMISSION TEST

6.1 Standard Applicable

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

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

Note

- 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 | MFR | MODEL | SERIAL | LAST | CAL DUE. | | | | |
| TYPE | | NUMBER NUMBER | | CAL. | | | | | |
| EMI Test Receiver | R&S | ESCI 3 | 100335 | 02/12/2019 | 02/11/2020 | | | | |
| Coaxial Cables | N/A | WK CE Cable | N/A | 11/26/2018 | 11/25/2019 | | | | |
| LISN | LISN SCHWARZBECK | | 8127-649 | 04/02/2019 | 04/01/2020 | | | | |
| LISN | FCC | FCC-LISN-50/250-25 -2-01 | 4034 | 04/09/2019 | 04/08/2020 | | | | |
| Test Software | Farad | EZ-EMC | Ver. SGS-03A2 | N.C.R | N.C.R | | | | |

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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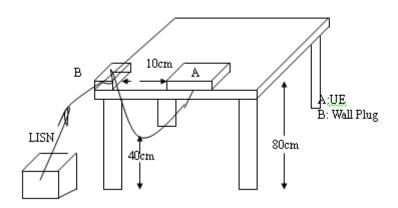
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6.4 Test SET-UP (Block Diagram of Configuration)



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

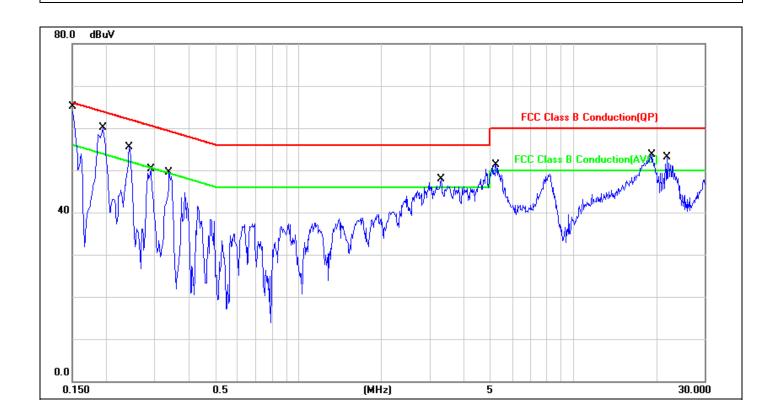
Site: **1F Conduction Room** Date: 2019/9/19 Time: 下午 05:57:43

Limit: FCC Class B Conduction(QP) Probe:L1 Temperature: 24°C

EUT: **EVO WRC TAG** Power: AC 120V/60Hz Humidity:55%RH **T6 Anchor** Air Pressure:1012 M/N:

Mode: Operation(UWB) No.: ER-2019-10088 Note:

Nick Test by:

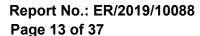


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| No. | Mk. | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Comment |
|-----|-----|---------|---------|--------|-------------|--------|--------|----------|---------|
| | | (MHz) | dBuV | (dB) | (dBuV) | (dBuV) | (dB) | | |
| 1 | * | 0.1500 | 61.20 | 0.00 | 61.20 | 66.00 | -4.80 | QP | |
| 2 | | 0.1500 | 43.50 | 0.00 | 43.50 | 56.00 | -12.50 | AVG | |
| 3 | | 0.1940 | 58.10 | 0.01 | 58.11 | 63.86 | -5.75 | QP | |
| 4 | | 0.1940 | 44.40 | 0.01 | 44.41 | 53.86 | -9.45 | AVG | |
| 5 | | 0.2420 | 53.90 | 0.01 | 53.91 | 62.03 | -8.12 | QP | |
| 6 | | 0.2420 | 42.10 | 0.01 | 42.11 | 52.03 | -9.92 | AVG | |
| 7 | | 0.2900 | 48.10 | 0.01 | 48.11 | 60.52 | -12.41 | QP | |
| 8 | | 0.2900 | 39.20 | 0.01 | 39.21 | 50.52 | -11.31 | AVG | |
| 9 | | 0.3380 | 47.00 | 0.01 | 47.01 | 59.25 | -12.24 | QP | |
| 10 | | 0.3380 | 38.90 | 0.01 | 38.91 | 49.25 | -10.34 | AVG | |
| 11 | | 3.3020 | 42.40 | 0.16 | 42.56 | 56.00 | -13.44 | QP | |
| 12 | | 3.3020 | 35.80 | 0.16 | 35.96 | 46.00 | -10.04 | AVG | |
| 13 | | 5.2340 | 45.40 | 0.19 | 45.59 | 60.00 | -14.41 | QP | |
| 14 | | 5.2340 | 33.80 | 0.19 | 33.99 | 50.00 | -16.01 | AVG | |
| 15 | | 19.2500 | 48.00 | 0.38 | 48.38 | 60.00 | -11.62 | QP | |
| 16 | | 19.2500 | 40.80 | 0.38 | 41.18 | 50.00 | -8.82 | AVG | |
| 17 | | 21.9220 | 43.20 | 0.45 | 43.65 | 60.00 | -16.35 | QP | |
| 18 | | 21.9220 | 37.80 | 0.45 | 38.25 | 50.00 | -11.75 | AVG | |

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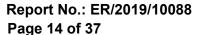
INC 3.13 *

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**INC 3.13 **

**INC 3.1

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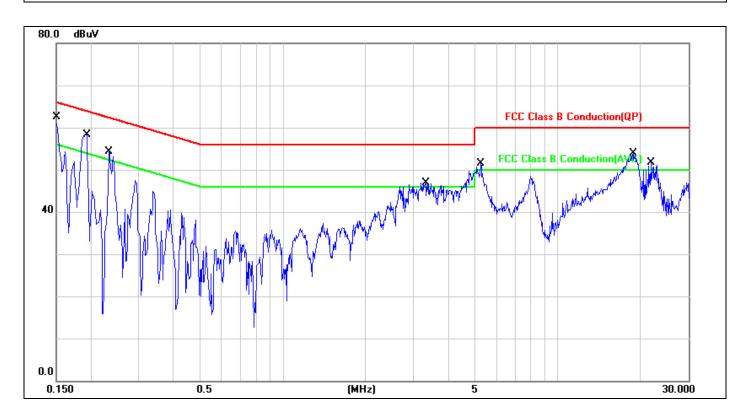
Site: 1F Conduction Room Date: 2019/9/19 Time: 下午 06:03:18

Limit: FCC Class B Conduction(QP) Probe:N Temperature: 24°C

EUT: EVO WRC TAG Power:AC 120V/60Hz Humidity:55%RH M/N: T6 Anchor Air Pressure:1012 Mode: Operation(UWB)

Note: No.: ER-2019-10088

Test by: Nick



| No. | Mk. | Freq. | Reading | Factor | Measurement | Limit | Over | Detector | Comment |
|-----|-----|---------|---------|--------|-------------|--------|--------|----------|---------|
| | | (MHz) | dBuV | (dB) | (dBuV) | (dBuV) | (dB) | | |
| 1 | * | 0.1500 | 60.20 | 0.03 | 60.23 | 66.00 | -5.77 | QP | |
| 2 | | 0.1500 | 41.90 | 0.03 | 41.93 | 56.00 | -14.07 | AVG | |
| 3 | | 0.1940 | 57.20 | 0.03 | 57.23 | 63.86 | -6.63 | QP | |
| 4 | | 0.1940 | 43.20 | 0.03 | 43.23 | 53.86 | -10.63 | AVG | |
| 5 | | 0.2340 | 50.60 | 0.03 | 50.63 | 62.31 | -11.68 | QP | |
| 6 | | 0.2340 | 34.90 | 0.03 | 34.93 | 52.31 | -17.38 | AVG | |
| 7 | | 3.3180 | 41.80 | 0.17 | 41.97 | 56.00 | -14.03 | QP | |
| 8 | | 3.3180 | 35.00 | 0.17 | 35.17 | 46.00 | -10.83 | AVG | |
| 9 | | 5.2620 | 45.50 | 0.20 | 45.70 | 60.00 | -14.30 | QP | |
| 10 | | 5.2620 | 34.00 | 0.20 | 34.20 | 50.00 | -15.80 | AVG | |
| 11 | | 18.8660 | 48.20 | 0.41 | 48.61 | 60.00 | -11.39 | QP | |
| 12 | | 18.8660 | 41.20 | 0.41 | 41.61 | 50.00 | -8.39 | AVG | |
| 13 | | 21.8820 | 44.30 | 0.47 | 44.77 | 60.00 | -15.23 | QP | |
| 14 | | 21.8820 | 39.80 | 0.47 | 40.27 | 50.00 | -9.73 | AVG | _ |

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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

According to §15.503 (d) Ultra-wideband (UWB) transmitter. An intentional radiator that, 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.

7.2 Measurement Equipment Used

| in accuration and | | 966 Chamber | | | | | |
|----------------------------|----------------------|-----------------------|---------------------|--------------|------------|--|--|
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. | | |
| Bi-log Antenna | TESEO | CBL 6112D | 35242 & AT-N0555 | 01/10/2019 | 01/09/2020 | | |
| Horn Antenna | Schwarzbeck | BBHA9170 | 07/02/1900 | 12/27/2018 | 12/26/2019 | | |
| Horn Antenna | Schwarzbeck | BBHA9120D | D803 | 12/24/2018 | 12/23/2019 | | |
| 3m Site NSA | SGS | 966 chamber | N/A | 01/02/2019 | 01/01/2020 | | |
| Loop Antenna | ETS.LINDGREN | 6502 | 148045 | 10/08/2018 | 10/07/2019 | | |
| PXA Spectrum Analyzer | Agilent | N9030A | MY53120760 | 04/22/2019 | 04/21/2020 | | |
| EMI Test Receiver | R&S | ESCI 3 | 100335 | 02/12/2019 | 02/11/2020 | | |
| Pre-Amplifier | EMC Instru- ments | EMC184045B | 980135 | 01/02/2019 | 01/01/2020 | | |
| Pre-Amplifier | EMC Instru- ments | EMC051825 | 980152 | 01/02/2019 | 01/01/2020 | | |
| Pre-Amplifier | HP | 8447D | 2944A09469 | 01/02/2019 | 01/01/2020 | | |
| Pre-Amplifier | EMC Instru- ments | EMC12645 | 980119 | 06/09/2019 | 06/08/2020 | | |
| Coaxial Cable | Huber Suhner | succoflex 102 | MY2622/2 | 01/02/2019 | 01/02/2020 | | |
| Coaxial Cable | Huber Suhner | succoflex 104A | 800086/4a | 01/02/2019 | 01/02/2020 | | |
| Coaxial Cable Huber Suhner | | EMC 104-SM-SM-2000 | 160123 | 01/02/2019 | 01/02/2020 | | |
| Software | e3 V6.11-20180413 | | | | | | |

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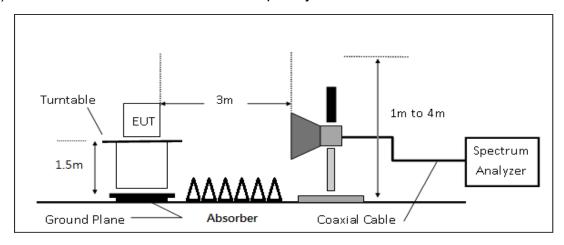
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7.3 Test Set-up:

(A) Radiated Emission Test Set-UP Frequency for 3 meter



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 = 3MHz, Span: 1GHz, 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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7.5 Measurement Result:

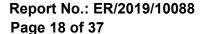


| Bandwidth Results | | | | | | | | |
|-------------------|---------------------------------------|---------------------------------------|-----------------------------|--------------------------------|--------------------------|--|--|--|
| Antenna Polarity | Frequency 10dB below peak (MHz) | Frequency 10dB above peak (MHz) | 10 dB bandwidth (MHz) | Bandwidth requirement >500 MHz | Detectors / RBW / VBW | | | |
| Vertical | 3722 | 4321 | 599 | Compliant | RMS 1MHz / 3MHz | | | |

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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 -63.3 -61.3 -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

| z Measurement Equipment Osed | | | | | | | | | | |
|------------------------------|----------------------|-----------------------|---------------------|------------|------------|--|--|--|--|--|
| | | 966 Chamber | | | | | | | | |
| EQUIPMENT | MFR | MODEL | SERIAL | LAST | CAL DUE. | | | | | |
| TYPE | | NUMBER | NUMBER | CAL. | | | | | | |
| Bi-log Antenna | TESEO | CBL 6112D | 35242 & AT-N0555 | 01/10/2019 | 01/09/2020 | | | | | |
| Horn Antenna | Schwarzbeck | BBHA9170 | 07/02/1900 | 12/27/2018 | 12/26/2019 | | | | | |
| Horn Antenna | Schwarzbeck | BBHA9120D | D803 | 12/24/2018 | 12/23/2019 | | | | | |
| 3m Site NSA | SGS | 966 chamber | N/A | 01/02/2019 | 01/01/2020 | | | | | |
| Loop Antenna | ETS.LINDGREN | 6502 | 148045 | 10/08/2018 | 10/07/2019 | | | | | |
| PXA Spectrum Analyzer | PXA Spectrum Agilent | | MY53120760 | 04/22/2019 | 04/21/2020 | | | | | |
| EMI Test Receiver | R&S | ESCI 3 | 100335 | 02/12/2019 | 02/11/2020 | | | | | |
| Pre-Amplifier | EMC Instru- ments | EMC184045B | 980135 | 01/02/2019 | 01/01/2020 | | | | | |
| Pre-Amplifier | EMC Instru- ments | EMC051825 | 980152 | 01/02/2019 | 01/01/2020 | | | | | |
| Pre-Amplifier | HP | 8447D | 2944A09469 | 01/02/2019 | 01/01/2020 | | | | | |
| Pre-Amplifier | EMC Instru- ments | EMC12645 | 980119 | 06/09/2019 | 06/08/2020 | | | | | |
| Coaxial Cable | Huber Suhner | succoflex 102 | MY2622/2 | 01/02/2019 | 01/02/2020 | | | | | |
| Coaxial Cable | Huber Suhner | succoflex 104A | 800086/4a | 01/02/2019 | 01/02/2020 | | | | | |
| Coaxial Cable Huber Suhner | | EMC 104-SM-SM-2000 | 160123 | 01/02/2019 | 01/02/2020 | | | | | |
| Software | e3 V6.11-20180413 | | | | | | | | | |

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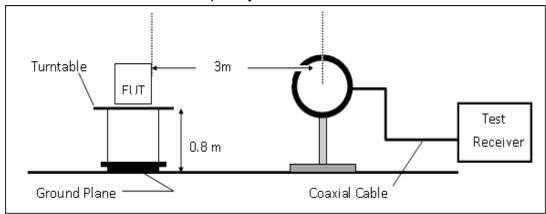
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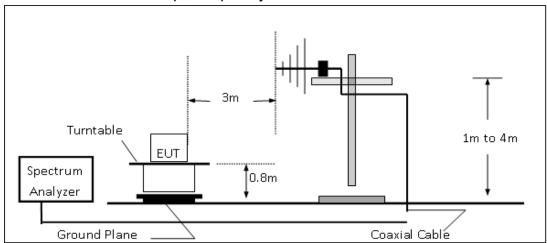


8.3 Test Set-up

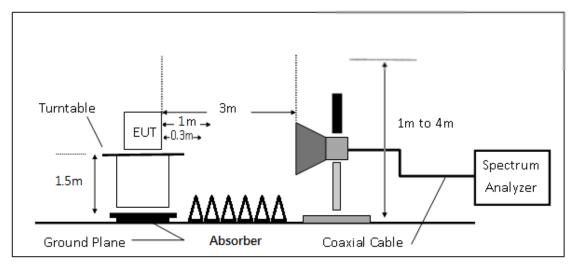
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



(B) Radiated Emission Test Set-Up, Frequency below 960MHz.



(C) Radiated Emission Test Set-UP Frequency above 960MHz for 3 and 1 and 0.3 meter



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A measurement distance of 1 meter and 0.3 meter was determined to provide the optimum dynamic range. Because the limits are so low, some frequency ranges may have been scanned at a distance closer than 1 meter and 0.3 meter.

8.4 Measurement Procedure

- The testing follows the Measurement Procedure of ANSI C63.10:2013.
- The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plan.
- 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 for 100 kHz to 30MHz, 30 MHz to 960MHz, 960MHz to 1GHz radiated emissions.
- 5. EUT is set 1m and 0.3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions for 1GHz to 10GHz, 10GHz to 18GHz, 18GHz to 40GHz radiated emissions.
- 6. Set the spectrum analyzer as RBW=200 Hz and VBW=2 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency 100kHz~30MHz.
- 7. Set the spectrum analyzer as RBW=100 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency 30MHz~960MHz and 960MHz~1GHz.
- 8. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for Peak Detector at frequency above 1 GHz.
- 9. Set the spectrum analyzer as RBW=1 MHz, VBW=3 MHz for RMS Detector for Average emissions of UWB transmission in a 1MHz bandwidth.
- 10. 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.
- 11. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 12. 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.
- 13. Sweep the frequency to determine spurious emission as seen on spectrum from span of, 960MHz to 1GHz, 1GHz to 10GHz, 10GHz to 18GHz, 18GHz to 40GHz.
- 14. Via Software, combine 4 spans of frequency range into one plot.
- 15. Repeat above procedures until all default test channel measured were complete.

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Note:

EIRP(dBm) = Spectrum + Factor - 95.2 Limit calculated as fllows(RBW = 1MHz) 20 log (RBW/50) dBm = 2 log (1/50) dBm = -33.98 dBm PeakE-filed (3m) E(dBuV/m) = P (dBm EIRP) + 95.2=-33.98 + 95.2 = 61.2 dBuV/m

Note:

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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8.5 Measurement Result

Peak level of the Emission Measurement Result

EIRP Peak at 3 Meter

Report Number :ER-2019-10088 **Test Date** :2019-09-25 Temp./Humi. **Operation Mode** :UWB :23.4/55 **Test Channel** Antenna Pol. :VERTICAL :4000 MHz Test Mode :Main CH Low Engineer :Nick

EUT Pol :H Plane

| | Freq. | Detector | Spectrum | Factor | Actual | |
|---|---------|----------|---------------|--------|--------|--|
| | | Mode | Reading Level | | FS | |
| _ | MHz | PK/QP/AV | dBµV | dB | dBµV/m | |
| | 4078.00 | Peak | 49.12 | 11.56 | 60.68 | |

| Frequency (MHz) | Detector Function | Antenna Polarity | BWCF (dB) | EIRP_1MHz Reading Level (dBµV/m) | EIRP_50MHz Reading Level (dBµV/m) | EIRP_50MHz Reading Level (dBm) | EIRP_50MHz Limit (dBm) | Margin (dBm) |
|--------------------|----------------------|---------------------|--------------|--|---|--------------------------------------|------------------------------|-----------------|
| 4000 | Peak | VERTICAL | -33.98 | 60.68 | 94.66 | -0.54 | 0 | -0.54 |

Note:

Bandwidth Correction Factor (BWCF) = 20 log (1MHz/50MHz) = -33.98 [dB]

EIRP 1MHz[dBm] = E-Field [dBuV/m] - 95.2

EIRP 50MHz[dBm] = EIRP 1MHz[dBm] - BWCF

Measurement worst emissions of receive antenna polarization.

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Report Number **Operation Mode** Test Channel Test Mode

EUT Pol

:ER-2019-10088

:UWB :4000 MHz :Main CH Low

:H Plane

Test Date Temp./Humi. Antenna Pol. :2019-09-25 :23.4/55

:HORIZONTAL

Engineer :Nick

Spectrum Factor Freq. Detector Actual Reading Level Mode FS MHz PK/QP/AV dBµV dB dBµV/m 4149.00 45.15 Peak 11.74 56.89

| Frequency (MHz) | Detector Function | Antenna Polarity | BWCF (dB) | EIRP_1MHz Reading Level (dBµV/m) | EIRP_50MHz Reading Level (dBµV/m) | EIRP_50MHz Reading Level (dBm) | EIRP_50MHz Limit (dBm) | Margin (dBm) |
|--------------------|----------------------|---------------------|--------------|--|---|--------------------------------------|------------------------------|-----------------|
| 4000 | Peak | HORIZONTAL | -33.98 | 56.89 | 90.87 | -4.33 | 0 | -4.33 |

Note:

Bandwidth Correction Factor (BWCF) = 20 log (1MHz/50MHz) = -33.98 [dB]

EIRP_1MHz[dBm] = E-Field [dBuV/m] - 95.2

EIRP 50MHz[dBm] = EIRP 1MHz[dBm] - BWCF

Measurement worst emissions of receive antenna polarization.

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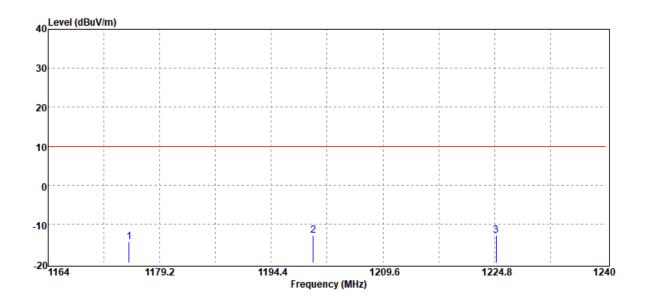


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8.6 Radiated Emission in GPS bands Measurement Result GPS receive band (1164-1240MHz) at 1 Meter

:2019-09-20 Report Number :ER-2019-10088 **Test Date** Operation Mode :UWB Temp./Humi. :23.4/55 Antenna Pol. Test Channel :4000 MHz :VERTICAL Test Mode :Tx CH Low Engineer :Nick

EUT Pol :H Plane

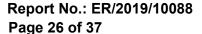


| Freq. | Detector | Spectrum | Factor | Actual | Actual | Limit | Limit | Margin |
|---------|----------|---------------|--------|--------|---------|--------|--------|--------|
| | Mode | Reading Level | | FS | FS | @3m | @3m | |
| MHz | PK/QP/AV | dΒμV | dB | dBµV/m | dBm | dBµV/m | dBm | dB |
| 1175.02 | Peak | -16.50 | 1.95 | -14.55 | -109.75 | 9.90 | -85.30 | -24.45 |
| 1200.10 | Peak | -14.89 | 1.99 | -12.90 | -108.10 | 9.90 | -85.30 | -22.80 |
| 1225.03 | Peak | -15.18 | 2.27 | -12.91 | -108.11 | 9.90 | -85.30 | -22.81 |

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Report Number **Operation Mode** Test Channel

Test Mode **EUT Pol**

:ER-2019-10088

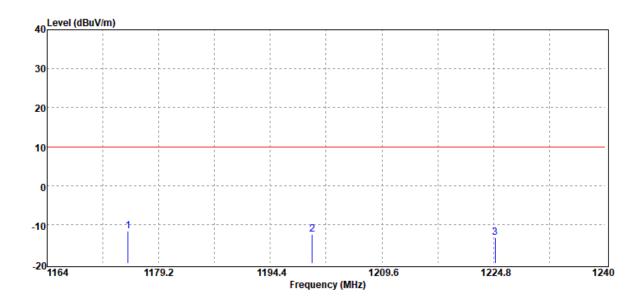
:UWB :4000 MHz

:Tx CH Low :H Plane

Test Date :2019-09-20 Temp./Humi. :23.4/55

Antenna Pol. :HORIZONTAL

Engineer :Nick

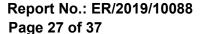


| Freq. | Detector | Spectrum | Factor | Actual | Actual | Limit | Limit | Margin |
|---------|----------|---------------|--------|--------|---------|--------|--------|--------|
| | Mode | Reading Level | | FS | FS | @3m | @3m | |
| MHz | PK/QP/AV | dBµV | dB | dBµV/m | dBm | dBµV/m | dBm | dB |
| 1175.02 | Peak | -13.72 | 1.95 | -11.77 | -106.97 | 9.90 | -85.30 | -21.67 |
| 1200.10 | Peak | -14.50 | 1.99 | -12.51 | -107.71 | 9.90 | -85.30 | -22.41 |
| 1225.03 | Peak | -15.62 | 2.27 | -13.35 | -108.55 | 9.90 | -85.30 | -23.25 |

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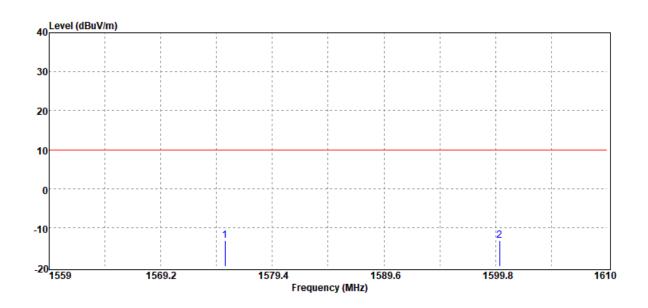


GPS receive band (1559-1610MHz) at 1 Meter

Report Number :ER-2019-10088 **Operation Mode** :UWB **Test Channel** :4000 MHz

Test Mode :Tx CH Low

EUT Pol :H Plane **Test Date** :2019-09-20 Temp./Humi. :23.4/55 Antenna Pol. :VERTICAL Engineer :Nick

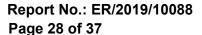


| Freq. | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Actual FS | Limit @3m | Limit @3m | Margin |
|---------|------------------|---------------------------|--------|--------------|--------------|--------------|--------------|--------|
| MHz | PK/QP/AV | dΒμV | dB | dBµV/m | dBm | dΒμV/m | dBm | dB |
| 1575.07 | Peak | -16.21 | 2.75 | -13.46 | -108.66 | 9.90 | -85.30 | -23.36 |
| 1600.16 | Peak | -16.01 | 2.73 | -13.28 | -108.48 | 9.90 | -85.30 | -23.18 |

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Report Number **Operation Mode** Test Channel

Test Mode **EUT Pol**

:ER-2019-10088

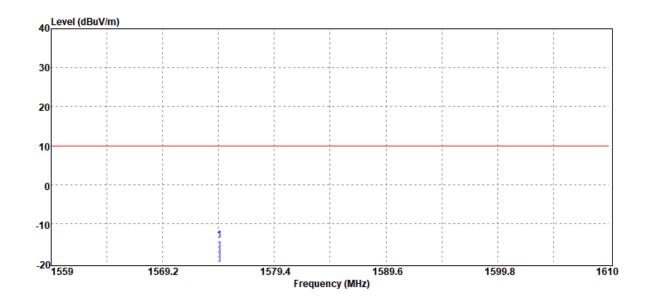
:UWB

:4000 MHz :Tx CH Low :H Plane

Test Date :2019-09-20 Temp./Humi. :23.4/55

Antenna Pol. :HORIZONTAL

Engineer :Nick



| Freq. | Detector | Spectrum | Factor | Actual | Actual | Limit | Limit | Margin |
|---------|----------|---------------|--------|--------|---------|--------|--------|--------|
| | Mode | Reading Level | | FS | FS | @3m | @3m | |
| MHz | PK/QP/AV | dBµV | dB | dBµV/m | dBm | dBµV/m | dBm | dB |
| 1574.40 | Peak | -17.13 | 2.76 | -14.37 | -109.57 | 9.90 | -85.30 | -24.27 |

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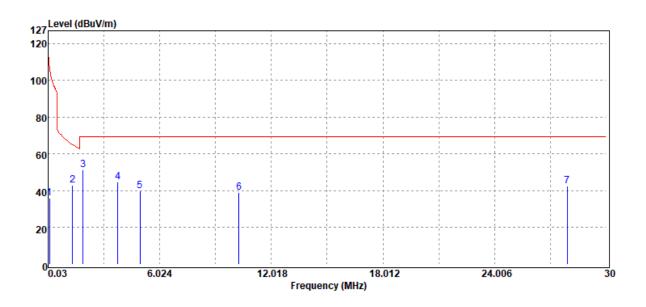
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8.7 Radiated Spurious Emission Measurement Result (§15.209 & §15.519)

Below 1GHz at 3 Meter

Report Number :ER-2019-10088 **Operation Mode** :UWB Test Channel :4000 MHz Test Mode :Tx CH Low **EUT Pol** :H Plane

Test Date :2019-09-19 Temp./Humi. :23.4/55 Antenna Pol. :VERTICAL Engineer :Nick



| Freq. | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|-------|------------------|---------------------------|--------|--------------|--------------|--------|
| MHz | PK/QP/AV | dΒμV | dB | dBµV/m | dBµV/m | dB |
| 0.10 | Peak | 35.84 | 0.17 | 36.01 | 107.96 | -71.95 |
| 1.34 | Peak | 42.94 | 0.34 | 43.28 | 65.04 | -21.76 |
| 1.91 | Peak | 51.00 | 0.36 | 51.36 | 69.54 | -18.18 |
| 3.76 | Peak | 44.27 | 0.40 | 44.67 | 69.54 | -24.87 |
| 4.96 | Peak | 39.42 | 0.42 | 39.84 | 69.54 | -29.70 |
| 10.27 | Peak | 38.83 | 0.47 | 39.30 | 69.54 | -30.24 |
| 27.91 | Peak | 42.07 | 0.55 | 42.62 | 69.54 | -26.92 |

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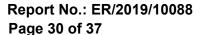
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Report Number **Operation Mode** Test Channel

Test Mode **EUT Pol**

:ER-2019-10088

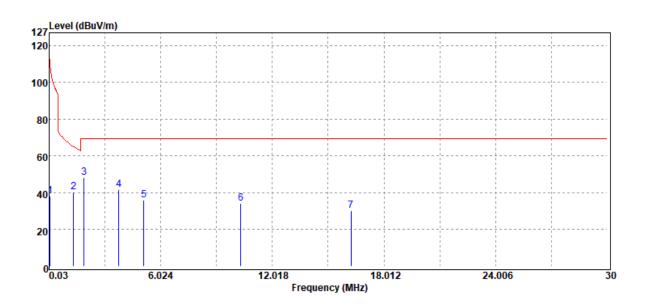
:UWB :4000 MHz :Tx CH Low

:H Plane

Test Date :2019-09-19 Temp./Humi. :23.4/55

Antenna Pol. :HORIZONTAL

Engineer :Nick

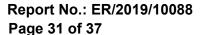


| Freq. | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|-------|------------------|---------------------------|--------|--------------|--------------|--------|
| MHz | PK/QP/AV | dΒμV | dB | dBµV/m | dΒμV/m | dB |
| 0.07 | Peak | 38.17 | 0.15 | 38.32 | 110.29 | -71.97 |
| 1.34 | Peak | 40.18 | 0.34 | 40.52 | 65.04 | -24.52 |
| 1.91 | Peak | 47.96 | 0.36 | 48.32 | 69.54 | -21.22 |
| 3.76 | Peak | 41.30 | 0.40 | 41.70 | 69.54 | -27.84 |
| 5.11 | Peak | 35.78 | 0.42 | 36.20 | 69.54 | -33.34 |
| 10.33 | Peak | 33.81 | 0.47 | 34.28 | 69.54 | -35.26 |
| 16.24 | Peak | 29.72 | 0.54 | 30.26 | 69.54 | -39.28 |

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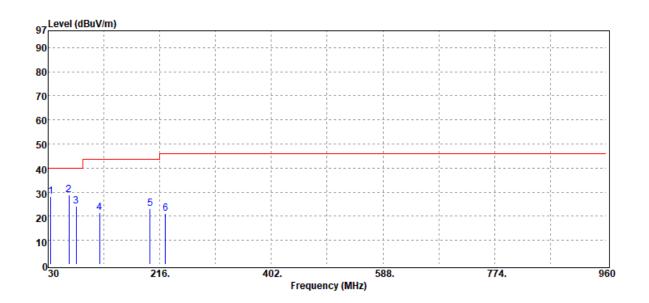


Report Number **Operation Mode** Test Channel Test Mode **EUT Pol**

:ER-2019-10088 :UWB :4000 MHz :Tx CH Low

:H Plane

Test Date :2019-09-18 Temp./Humi. :23.4/55 Antenna Pol. :VERTICAL Engineer :Nick

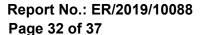


| Freq. | Detector | Spectrum | Factor | Actual | Limit | Margin |
|--------|----------|---------------|--------|--------|--------|--------|
| | Mode | Reading Level | | FS | @3m | |
| MHz | PK/QP/AV | dΒμV | dB | dBµV/m | dBµV/m | dB |
| 34.65 | Peak | 34.64 | -6.53 | 28.11 | 40.00 | -11.89 |
| 64.41 | Peak | 46.19 | -17.38 | 28.81 | 40.00 | -11.19 |
| 76.50 | Peak | 40.72 | -16.70 | 24.02 | 40.00 | -15.98 |
| 115.56 | Peak | 32.80 | -11.35 | 21.45 | 43.50 | -22.05 |
| 200.19 | Peak | 35.40 | -12.31 | 23.09 | 43.50 | -20.41 |
| 225.30 | Peak | 33.02 | -11.71 | 21.31 | 46.00 | -24.69 |

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Report Number **Operation Mode** Test Channel Test Mode

EUT Pol

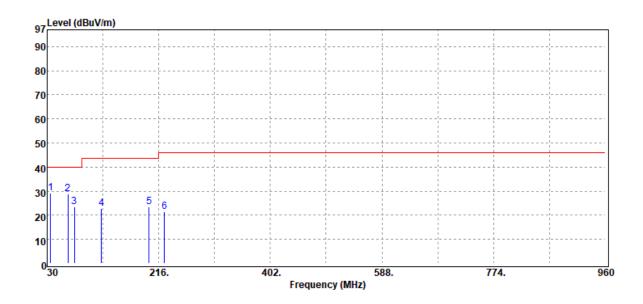
:ER-2019-10088 :UWB

:4000 MHz :Tx CH Low :H Plane

Test Date :2019-09-18 Temp./Humi. :23.4/55

Antenna Pol. :HORIZONTAL

Engineer :Nick



| Freq. | Detector Mode | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin | |
|--------|------------------|---------------------------|--------|--------------|--------------|--------|---|
| MHz | PK/QP/AV | dΒμV | dB | dBμV/m | dBµV/m | dB | |
| 35.58 | Peak | 36.28 | -7.10 | 29.18 | 40.00 | -10.82 | - |
| 64.41 | Peak | 46.26 | -17.38 | 28.88 | 40.00 | -11.12 | |
| 75.57 | Peak | 40.29 | -16.74 | 23.55 | 40.00 | -16.45 | |
| 120.21 | Peak | 34.02 | -11.19 | 22.83 | 43.50 | -20.67 | |
| 200.19 | Peak | 35.95 | -12.31 | 23.64 | 43.50 | -19.86 | |
| 225.30 | Peak | 33.11 | -11.71 | 21.40 | 46.00 | -24.60 | |

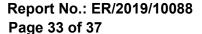
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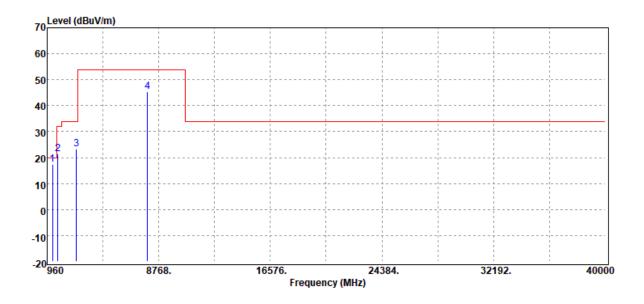
1GHz to 10GHz and 10GHz to 18GHz at 1 Meter 18GHz to 40 GHz at 0.3 Meter

:ER-2019-10088 Report Number

Operation Mode :UWB **Test Channel** :4000 MHz Test Mode :Tx CH Low **EUT Pol** :H Plane

Test Date :2019-09-19 Temp./Humi. :23.4/55 Antenna Pol. :VERTICAL

Engineer :Nick

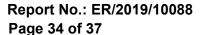


| Freq. | Detector | Spectrum | Factor | Actual | Actual | Limit | Limit | Margin |
|---------|----------|---------------|--------|--------|--------|--------|--------|--------|
| | Mode | Reading Level | | FS | FS | @3m | @3m | |
| MHz | PK/QP/AV | dBµV | dB | dBµV/m | dBm | dBµV/m | dBm | dB |
| 1342.00 | Peak | 14.22 | 3.28 | 17.50 | -77.70 | 19.90 | -75.30 | -2.40 |
| 1720.00 | Peak | 17.92 | 3.48 | 21.40 | -73.80 | 31.90 | -63.30 | -10.50 |
| 3007.00 | Peak | 13.29 | 9.96 | 23.25 | -71.95 | 33.90 | -61.30 | -10.65 |
| 7993.00 | Peak | 22.67 | 22.59 | 45.26 | -49.94 | 53.90 | -41.30 | -8.64 |

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Report Number **Operation Mode** Test Channel

Test Mode **EUT Pol**

:ER-2019-10088

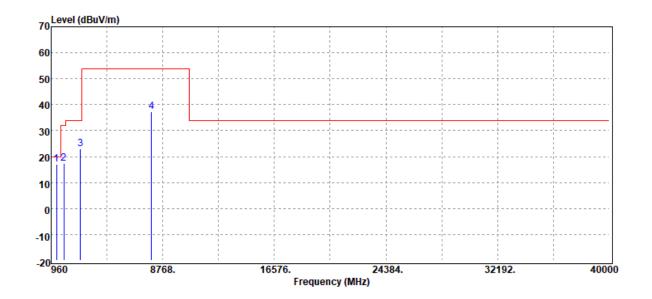
:UWB

:4000 MHz :Tx CH Low :H Plane

Test Date :2019-09-19 Temp./Humi. :23.4/55

Antenna Pol. :HORIZONTAL





| Freq. | Detector | Spectrum | Factor | Actual | Actual | Limit | Limit | Margin |
|---------|----------|---------------|--------|--------|--------|--------|--------|--------|
| | Mode | Reading Level | | FS | FS | @3m | @3m | |
| MHz | PK/QP/AV | dBµV | dB | dBµV/m | dBm | dBµV/m | dBm | dB |
| 1342.00 | Peak | 13.90 | 3.28 | 17.18 | -78.02 | 19.90 | -75.30 | -2.72 |
| 1855.00 | Peak | 13.57 | 3.95 | 17.52 | -77.68 | 31.90 | -63.30 | -14.38 |
| 3007.00 | Peak | 12.99 | 9.96 | 22.95 | -72.25 | 33.90 | -61.30 | -10.95 |
| 7993.00 | Peak | 14.56 | 22.59 | 37.15 | -58.05 | 53.90 | -41.30 | -16.75 |

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TRANSMITTER TIMEOUT

9.1 Standard Applicable

According to §15.519(a) (1), UWB devices operating under the provisions of this section must be hand held, i.e., they are relatively small devices that are primarily hand held while being operated and do not employ a fixed infrastructure.

(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

Refer to section 7.2 for details.

9.3 Test SET-UP

Refer to section 7.3 for details.

9.4 Measurement Procedure

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

9.5 Measurement Result

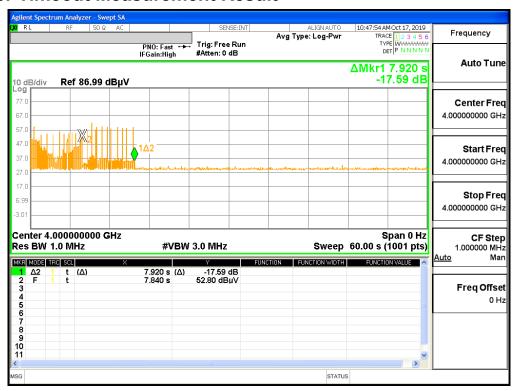
Note: Refer to next page spectrum analyzer data chart.

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Transmitter Timeout Measurement Result



Note: The receiver was removed at t = 7.84 seconds.

The last transmission occurred 7.92 seconds later which is less that the 10 seconds allowed. No additional transmissions were measured until the receiver was replaced.

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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 utilized by the device under test is a soldered surface mount type.

~ End of Report ~

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