# MEASUREMENT REPORT FCC PART 15.250 

## FCC ID:

APPLICANT: Ninebot (Changzhou) Tech Co., Ltd.

## 2ALS8-NB5213

Product:
Model No.:
Brand Name:
FCC Classification: Wideband Transmitter (WBT)
FCC Rule Part(s): Part 15, Section 15.250
Test Procedure(s): ANSI C63.10-2013
Test Date:

Segway miniPLUS
N4M350
SEGWAY

August 02 ~ November 19, 2017

| Reviewed By | $: \frac{\text { Sunry Sun }}{\text { (Sunny Sun) }}$ |
| ---: | :--- |
| Approved By | $: \frac{\text { Marlinchen }}{\text { (Marlin Chen) }}$ |



The test results relate only to the samples tested.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANCI 63.10-2013. Test results reported herein relate only to the item(s) tested.
The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

## Revision History

| Report No. | Version | Description | Issue Date | Note |
| :---: | :---: | :---: | :---: | :---: |
| 1708RSU01401 | Rev. 01 | Initial Report | $11-11-2017$ | Invalid |
| 1708RSU01401 | Rev. 02 | Updated the Standard | $11-19-2017$ | Valid |

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## §2.1033 General Information

| Applicant: | Ninebot (Changzhou) Tech Co., Ltd. |
| :--- | :--- |
| Applicant Address: | 16F-17F, Block A, Building 3, Changwu Mid Road 18\#, Wujin Dist., <br> Changzhou, Jiangsu, China. |
| Manufacturer: | Ninebot (Changzhou) Tech Co., Ltd. |
| Manufacturer Address: | 16F-17F, Block A, Building 3, Changwu Mid Road 18\#, Wujin Dist., <br> Changzhou, Jiangsu, China. |
| Test Site: | MRT Technology (Suzhou) Co., Ltd |
| Test Site Address: | D8 Building, No.2 Tian'edang Rd., Wuzhong Economic <br> Development Zone, Suzhou, China |
| MRT FCC Registration No.: | 893164 |
| FCC Rule Part(s): | FCC CFR 47 Part 15, section 15.250 |
| Test Device Serial No.: | N/A $\quad \square$ Production $\boxtimes$ Pre-Production $\square$ Engineering |

## Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- MRT facility is a FCC registered (MRT Reg. No. 893164) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.
- MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.
- MRT facility is a VCCI registered (R-4179, G-814, C-4664, T-2206) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications and Radio testing for FCC, Industry Canada, EU and TELEC Rules.



## 1. INTRODUCTION

### 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

### 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No. 2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.


## 2. PRODUCT INFORMATION

### 2.1. Feature of Equipment under Test

| Product Name: | Segway miniPLUS |
| :--- | :--- |
| Model No.: | N4M350 |
| Brand Name: | SEGWAY |
| RF Function: | Bluetooth v4.1 (BLE Only), UWB |
| Operation Frequency: | Bluetooth: 2402 ~ 2480MHz, UWB: 6489.6 MHz |
| Antenna Type: | Bluetooth Antenna: PCB Antenna, <br> UWB Antenna: Anchor Antenna |
| Antenna Gain: | Bluetooth Antenna: 5dBi <br> UWB Antenna: 9.95dBi |
| Modulation: | $\square$ Frequency Hopping Modulation $\square$ Stepped Frequency Modulation |
| $\square$ Swept Frequency Modulation $\boxtimes$ other |  |$|$| UWB Power Setting: |
| :--- |

### 2.2. Test Mode

| Test Mode | Mode 1: Transmit at 6489MHz |
| :--- | :--- |

### 2.3. Description of Test Software

N/A

### 2.4. Device Capabilities

This device contains the following capabilities:
UWB \& Bluetooth Device.

### 2.5. Test Configuration

The Segway miniPLUS was tested per the guidance of ANSI C63.10-2013.

### 2.6. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

### 2.7. Labeling Requirements

## Per 2.1074 \& 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase.
However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

## 3. DESCRIPTION of TEST

### 3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Procedures for measuring ultra-wideband devices (ANSI C63.10-2013).
Deviation from measurement procedure.

### 3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8 'x4'x4' shielded enclosure. A $1 \mathrm{~m} \times 2 \mathrm{~m}$ wooden table 80 cm high is placed 40 cm away from the vertical wall and 80 cm away from the sidewall of the shielded room. Two $10 \mathrm{kHz}-30 \mathrm{MHz}, 50 \Omega / 50 \mathrm{uH}$ Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40 cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150 kHz to 30 MHz . The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9 kHz . The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions were used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9 kHz resolution bandwidth for final measurements.
An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

### 3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1 GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters ( 6.56 ft .) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80 cm high PVC support structure is placed on top of the turntable.
For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30 MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1 GHz , linearly polarized double ridge horn antennas were used. For frequencies below 30 MHz , a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1 GHz was placed on top of the 0.8 meter high, $1 \times 1.5$ meter table; and test set-up for frequencies $1-40 \mathrm{GHz}$ was placed on top of the 1.5 meter high, $1 \times 1.5$ meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

## 4. ANTENNA REQUIREMENTS

## Excerpt from $\$ 15.203$ of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna of the Segway miniPLUS is permanently attached.
- There are no provisions for connection to an external antenna.


## Conclusion:

The Segway miniPLUS unit complies with the requirement of §15.203.

## 5. TEST EQUIPMENT CALIBRATION DATE

Radiated Disturbance - AC1

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
| :--- | :--- | :--- | :--- | :--- | :--- |
| MXE EMI Receiver | Agilent | N9038A | MRTSUE06125 | 1 year | $2018 / 08 / 17$ |
| Loop Antenna | Schwarzbeck | FMZB1519 | MRTSUE06025 | 1 year | $2017 / 12 / 21$ |
| Bilog Period Antenna | Schwarzbeck | VULB9162 | MRTSUE06022 | 1 year | $2018 / 10 / 21$ |
| Broad-Band Horn Antenna | Schwarzbeck | BBHA9120D | MRTSUE06171 | 1 year | $2018 / 11 / 18$ |
| Broadband Coaxial Preamplifier | Schwarzbeck | BBV 9718 | MRTSUE06106 | 1 year | $2017 / 12 / 10$ |
| Broadband Horn Antenna | Schwarzbeck | BBHA9170 | MRTSUE06024 | 1 year | $2018 / 04 / 25$ |
| Digitial Thermometer \& | Minggao | ETH529 | MRTSUE06170 | 1 year | $2017 / 11 / 30$ |
| Hygrometer | RIKEN | Chamber-AC1 | MRTSUE06213 | 1 year | $2018 / 05 / 10$ |
| Anechoic Chamber |  |  |  |  |  |

Conducted Test Equipment - TR3

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Spectrum Analyzer | Agilent | N9020A | MRTSUE06106 | 1 year | $2018 / 04 / 25$ |
| MXE EMI Receiver | Keysight | N9038A | MRTSUE06125 | 1 year | $2018 / 08 / 17$ |
| Signal Analyzer | R\&S | FSV40 | MRTSUE06218 | 1 year | $2018 / 03 / 27$ |
| Programmable Temperature <br> Humidity Chamber | BAOYT | BYH-1500L | MRTSUE06051 | 1 year | $2017 / 12 / 06$ |
| Temperature/Humidity Meter | Yuhuaze | HTC-2 | MRTSUE06184 | 1 year | $2017 / 12 / 22$ |


| Software | Version | Function |
| :--- | :--- | :--- |
| e 3 | V8.3.5 | EMI Test Software |

## 6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the $95 \%$ confidence level using a coverage factor of $\mathrm{k}=2$.

```
AC Conducted Emission Measurement - SR2
    Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):
    150kHz~30MHz: 3.46dB
Radiated Emission Measurement - AC1
    Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):
    9kHz ~ 1GHz: \pm4.18dB
    1GHz ~ 40GHz: \pm4.76dB
```


## 7. TEST RESULT

### 7.1. Summary

Product Name:
FCC ID:
FCC Classification:

Segway miniPLUS
2ALS8-NB5213
Wideband Transmitter (WBT)

| $\begin{gathered} \text { FCC } \\ \text { Section(s) } \end{gathered}$ | Test Description | Test <br> Limit | Test <br> Condition | Test <br> Result | Reference |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FCC Section 15.250(a) | Operation <br> Frequency | within the $5925-7250 \mathrm{MHz}$ | Conducted | Pass | Section 7.2 |
| FCC Section 15.250(b) | Occupied <br> Bandwidth | $>50 \mathrm{MHz}$ | Conducted | Pass | Section 7.2 |
| FCC Section <br> 15.250(d)(4) | Radiated Spurious <br> Emissions <br> below 960 MHz | Refer to Section 7.3 | Radiated | Pass | Section 7.3 |
| FCC Section <br> 15.250(d)(1) | Radiated Spurious <br> Emissions above $960 \mathrm{MHz}$ | Refer to Section 7.4 |  | Pass | Section 7.4 |
| FCC Section 15.250(d)(2) | Radiated Spurious <br> Emissions in GPS <br> Band | Refer to Section 7.4 |  | Pass | Section 7.4 |
| FCC Section $15.250 \text { (d)(3) }$ | Peak Power within 50 MHz Bandwidth | Refer to Section 7.5 |  | Pass | Section $7.5$ |
| FCC Section $15.207$ | AC Conducted Emission | Refer to Section 7.6 | Conducted | Pass | Section 7.6 |

## Notes:

The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.

### 7.2. Occupied Bandwidth and Operation Frequency Range Measurement

### 7.2.1.Test Limit

The -10 dB bandwidth of a device operating under the provisions of this section must be contained within the $5925-7250 \mathrm{MHz}$ band under all conditions and the fundamental emission shall be at least 50 MHz .

### 7.2.2.Test Procedure used

ANSI C63.10-2013, section 6.8 \& 10.1

### 7.2.3.Test Setting

The frequency at which the maximum power level is measured with the peak detector is designated $f_{M}$. The peak power measurements shall be made using a spectrum analyzer or EMI receiver with a 1 MHz resolution bandwidth and a video bandwidth of 1 MHz or greater. The instrument shall be set to peak detection using the maximum-hold trace mode. The outermost 1 MHz segments above and below $f_{M}$, where the peak power falls by $10 d B$ relative to the level at $f_{M}$, are designated as $f_{H}$ and $f_{L}$, respectively:
a) For the lowest frequency bound $f_{L}$, the emission is searched from a frequency lower than $f_{M}$ that has, by inspection, a peak power much lower than 10 dB less than the power at $\mathrm{f}_{\mathrm{M}}$ and increased toward $f_{M}$ until the peak power indicates 10 dB less than the power at $\mathrm{f}_{\mathrm{M}}$. The frequency of that segment is recorded.
b) This process is repeated for the highest frequency bound $f_{H}$, beginning at a frequency higher than $f_{M}$ that has, by inspection, a peak power much lower than 10 dB below the power at $f_{M}$. The frequency of that segment is recorded.
c) The two recorded frequencies represent the highest $f H$ and lowest $f_{L}$ bounds of the UWB transmission, and the -10 dB bandwidth $(B-10)$ is defined as ( $f_{H}-f_{L}$ ). The center frequency (fc) is mathematically determined from $\left(f_{H}-f_{L}\right) / 2$.
d) The fractional bandwidth is defined as $2\left(f_{H}-f_{L}\right) /\left(f_{H}+f_{L}\right)$.
e) Determine whether the -10 dB bandwidth $\left(\mathrm{f}_{\mathrm{H}}-\mathrm{f}_{\mathrm{L}}\right)$ is $\geq 500 \mathrm{MHz}$, or whether the fractional bandwidth $2\left(f_{H}-f_{L}\right) /\left(f_{H}+f_{L}\right)$ is $\geq 0.2$.

### 7.2.4.Test Setup



### 7.2.5.Test Result

| Product | Segway miniPLUS | Temperature | $25^{\circ} \mathrm{C}$ |
| :--- | :--- | :--- | :--- |
| Test Engineer | Roy Cheng | Relative Humidity | $60 \%$ |
| Test Site | TR3 | Test Date | $2017 / 11 / 20$ |
| Test Item | -10dB Occupied Bandwidth \& Operation Frequency | Range |  |


| Voltage <br> (\%) | Power <br> (VAC) | Temp $\left({ }^{\circ} \mathrm{C}\right)$ | -10dB Bandwidth (MHz) |  |  |  | Operation Frequency Range (MHz) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Omin | 2 min | 5 min | 10 min | Lower (Min) | Upper (Max) |
| 100\% | 120 | - 30 | 644.40 | 681.90 | 682.65 | 689.45 | 6145.35 | 6834.75 |
|  |  | -20 | 650.40 | 661.65 | 689.40 | 703.65 | 6138.60 | 6842.25 |
|  |  | -10 | 622.65 | 657.90 | 662.40 | 672.15 | 6162.60 | 6834.75 |
|  |  | 0 | 623.40 | 655.65 | 658.65 | 731.40 | 6139.35 | 6870.75 |
|  |  | + 10 | 619.65 | 669.90 | 672.15 | 693.15 | 6141.60 | 6834.75 |
|  |  | + 20 (Ref) | 675.90 | 684.90 | 686.40 | 691.65 | 6143.85 | 6835.50 |
|  |  | + 30 | 658.65 | 666.90 | 672.90 | 678.15 | 6146.10 | 6824.25 |
|  |  | + 40 | 635.40 | 647.40 | 683.40 | 684.15 | 6149.85 | 6834.00 |
|  |  | + 50 | 648.90 | 672.15 | 672.90 | 689.40 | 6145.35 | 6834.75 |
| 115\% | 138 | +20 | 655.65 | 677.40 | 689.15 | 690.15 | 6144.60 | 6834.75 |
| 85\% | 102 | +20 | 662.40 | 665.40 | 669.15 | 688.65 | 6146.10 | 6834.75 |

Note 1: All the test result of -10 dB Bandwidth is greater than 50 MHz and meet with FCC rule.
Note 2: All the test result of Operation Frequency Range is within the $5925-7250 \mathrm{MHz}$ and meet with FCC rule.

### 7.3. Radiated Spurious Emission Measurements Below 960MHz

### 7.3.1.Test Limit

| FCC Part 15 Subpart C Paragraph 15.209 |  |  |
| :---: | :---: | :---: |
| Frequency <br> $[\mathrm{MHz}]$ | Field Strength <br> $[\mathrm{uV} / \mathrm{m}]$ | Measured Distance <br> [Meters] |
| $0.009-0.490$ | $2400 / \mathrm{F}(\mathrm{kHz})$ | 300 |
| $0.490-1.705$ | $24000 / \mathrm{F}(\mathrm{kHz})$ | 30 |
| $1.705-30$ | 30 | 30 |
| $30-88$ | 100 | 3 |
| $88-216$ | 150 | 3 |
| $216-960$ | 200 | 3 |
| Above 960 | 500 | 3 |

### 7.3.2.Test Procedure Used

ANSI C63.10-2013, sections 10.2, 10.3

### 7.3.3.Test Setting

1. RBW $=$ as specified in Table 1
2. VBW $\geq 3$ RBW
3. Sweep Detector $=$ peak
4. Sweep time = auto couple
5. Trace mode $=\max$ hold
6. Trace was allowed to stabilize and record the test result with Table 1 measurement detector.

Table 1-RBW as a function of frequency

| Frequency | RBW | Measurement Detector |
| :---: | :---: | :---: |
| $9 \sim 150 \mathrm{kHz}$ | $200 \sim 300 \mathrm{~Hz}$ | Peak or CISPR quasi-peak |
| $0.15 \sim 30 \mathrm{MHz}$ | $9 \sim 10 \mathrm{kHz}$ | Peak or CISPR quasi-peak |
| $30 \sim 1000 \mathrm{MHz}$ | $100 \sim 120 \mathrm{kHz}$ | CISPR quasi-peak |

### 7.3.4.Test Setup

## $\underline{9 k H z} \sim 30 \mathrm{MHz}$ Test Setup:


$30 \mathrm{MHz} \sim 1 \mathrm{GHz}$ Test Setup:


### 7.3.5.Test Result

| Product | Segway miniPLUS | Temperature | $25^{\circ} \mathrm{C}$ |
| :--- | :--- | :--- | :--- |
| Test Engineer | Roy Cheng | Relative Humidity | $60 \%$ |
| Test Site | AC1 | Test Date | $2017 / 08 / 06$ |
| Test Item | Radiated Spurious Emission Measurements Below 960 MHz |  |  |


| Frequency <br> $(\mathrm{MHz})$ | Equivalent field <br> strength $\mathrm{dB} \mu \mathrm{v} / \mathrm{m}(\mathrm{MHz})$ | Limit <br> $\mathrm{dB} \mu \mathrm{v} / \mathrm{m}(\mathrm{MHz})$ | Margin <br> $(\mathrm{dB})$ | Polarity | Verdict |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 83.73 | 16.84 | 40.00 | -23.16 | Horizontal | Pass |
| 146.18 | 24.98 | 43.50 | -18.52 | Horizontal | Pass |
| 281.18 | 32.52 | 46.00 | -13.48 | Horizontal | Pass |
| 299.48 | 34.40 | 46.00 | -11.60 | Horizontal | Pass |
| 345.78 | 29.45 | 46.00 | -16.55 | Horizontal | Pass |
| 474.12 | 28.50 | 46.00 | -17.50 | Horizontal | Pass |
| 80.23 | 24.19 | 40.00 | -15.81 | Vertical | Pass |
| 111.50 | 29.80 | 43.50 | -13.70 | Vertical | Pass |
| 143.12 | 30.49 | 43.50 | -13.01 | Vertical | Pass |
| 201.83 | 32.71 | 43.50 | -10.79 | Vertical | Pass |
| 345.13 | 30.78 | 46.00 | -15.22 | Vertical | Pass |
| 476.15 | 27.16 | 46.00 | -18.84 | Vertical | Pass |
| Note 1: The Margin = Equivalent field strength - Limit. <br> Note 2: The detail test plots have been showed as below. |  |  |  |  |  |


| Site: AC1 | Time: 2017/08/07-22:30 |
| :--- | :--- |
| Limit: FCC_Part15.209_RE $(3 \mathrm{~m})$ | Engineer: Will Yan |
| Probe: VULB 9168_20-2000MHz | Polarity: Horizontal |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489 MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  |  | 83.726 | 16.837 | 6.723 | -23.163 | 40.000 | 10.115 | QP |
| 2 |  |  | 146.183 | 24.973 | 10.048 | -18.527 | 43.500 | 14.925 | QP |
| 3 |  |  | 281.176 | 32.512 | 18.715 | -13.488 | 46.000 | 13.797 | QP |
| 4 |  | $*$ | 299.475 | 34.396 | 20.158 | -11.604 | 46.000 | 14.238 | QP |
| 5 |  |  | 345.781 | 29.451 | 14.128 | -16.549 | 46.000 | 15.323 | QP |
| 6 |  |  | 474.124 | 28.499 | 10.487 | -17.501 | 46.000 | 18.012 | QP |

Note 1: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$
Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20 dB below the permissible (the test frequency range: $9 \mathrm{kHz} \sim 30 \mathrm{MHz}$ ), therefore no data appear in the report.

| Site: AC1 | Time: 2017/08/07-22:53 |
| :--- | :--- |
| Limit: FCC_Part15.209_RE $(3 \mathrm{~m})$ | Engineer: Will Yan |
| Probe: VULB 9168_20-2000MHz | Polarity: Vertical |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  |  | 80.226 | 24.195 | 14.091 | -15.805 | 40.000 | 10.104 | QP |
| 2 |  |  | 111.495 | 29.799 | 17.618 | -13.701 | 43.500 | 12.181 | QP |
| 3 |  |  | 143.119 | 30.488 | 15.772 | -13.012 | 43.500 | 14.716 | QP |
| 4 |  | $*$ | 201.825 | 32.709 | 21.590 | -10.791 | 43.500 | 11.119 | QP |
| 5 |  |  | 345.125 | 30.784 | 15.472 | -15.216 | 46.000 | 15.312 | QP |
| 6 |  |  | 476.153 | 27.154 | 9.115 | -18.846 | 46.000 | 18.040 | QP |

Note 1: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$
Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20 dB below the permissible (the test frequency range: $9 \mathrm{kHz} \sim 30 \mathrm{MHz}$ ), therefore no data appear in the report.

### 7.4. Radiated Spurious Emission Measurements Above 960MHz

### 7.4.1.Test Limit

| Radiated emission average limits above 960 MHz |  |  |  |
| :---: | :---: | :---: | :---: |
| Frequency <br> [MHz] | $\begin{aligned} & \mathrm{RBW} \\ & {[\mathrm{kHz}]} \end{aligned}$ | EIRP of spurious [dBm] | Equivalent field strength <br> limit @ 1m [dB $(\mu \mathrm{V} / \mathrm{m})]$ |
| 960-1610 | 1000 | -75.3 | 29.4 |
| 1610-1990 | 1000 | -63.3 | 41.4 |
| 1990-3100 | 1000 | -61.3 | 43.4 |
| 3100-5925 | 1000 | -51.3 | 53.4 |
| 5925-7250 | 1000 | -41.3 | 63.4 |
| 7250-10600 | 1000 | -51.3 | 53.4 |
| Above 10600 | 1000 | -61.3 | 43.4 |
| Radiated emission average limits in GPS Band |  |  |  |
| 1164-1240 | $\geq 1$ | -85.3 | 19.4 |
| 1559-1610 | $\geq 1$ | -85.3 | 19.4 |

Note 1: Because the limits are so low, some bands may have been scanned at a distance closer than 1 meter. If any emissions were detected in these bands, final measurements were made at distance of 1 meter or greater. The actual distance for final measurement was indicated in the measurement data.

Note 2: Equivalent field strength limit @ $1 \mathrm{~m}=$ EIRP of spurious $[\mathrm{dBm}]+95.2+20 * \log (3 \mathrm{~m} / 1 \mathrm{~m})$

### 7.4.2.Test Procedure Used

ANSI C63.10-2013, sections 10.2, 10.3

### 7.4.3.Test Setting

The rms detector is selected, make the trace to max hold and the sweep time and number of measurement bins are set to provide the requisite 1 ms integration time. In this test, the RBW may be reduced to a minimum of $1 \mathrm{kHz}(30 \mathrm{kHz}$ is recommended) to enhance the resolution of the individual spectral lines. A ratio of VBW / RBW > 3 shall be maintained when possible.

### 7.4.4.Test Setup

$9 \mathrm{kHz} \sim 30 \mathrm{MHz}$ Test Setup:

$30 \mathrm{MHz} \sim 1 \mathrm{GHz}$ Test Setup:

$1 \mathrm{GHz} \sim 40 \mathrm{GHz}$ Test Setup:


### 7.4.5.Test Result

| Product | Segway miniPLUS | Temperature | $25^{\circ} \mathrm{C}$ |
| :--- | :--- | :--- | :--- |
| Test Engineer | Roy Cheng | Relative Humidity | $60 \%$ |
| Test Site | AC1 | Test Date | $2017 / 08 / 06$ |
| Test Item | Radiated Spurious Emission Measurements above 960 MHz |  |  |


| Frequency <br> Range (MHz) | Equivalent field strength in $\mathrm{MHz}(\mathrm{dB} \mu \mathrm{v} / \mathrm{m})$ | Limit in MHz ( $\mathrm{dB} \mu \mathrm{v} / \mathrm{m}$ ) | Margin <br> (dB) | Polarity | Verdict |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 960 ~ 1610 | 27.78 | 29.40 | -1.62 | Horizontal | Pass |
|  | 26.53 | 29.40 | -2.87 | Vertical | Pass |
| 1610 ~ 1990 | 23.11 | 41.40 | -18.29 | Horizontal | Pass |
|  | 23.44 | 41.40 | -17.96 | Vertical | Pass |
| 1990 ~ 3100 | 22.30 | 43.40 | -21.10 | Horizontal | Pass |
|  | 22.81 | 43.40 | -20.59 | Vertical | Pass |
| 3100-5925 | 32.01 | 53.40 | -21.39 | Horizontal | Pass |
|  | 32.24 | 53.40 | -21.16 | Vertical | Pass |
| 5925-7250 | 48.65 | 63.40 | -14.75 | Horizontal | Pass |
|  | 52.93 | 63.40 | -10.47 | Vertical | Pass |
| 7250-10600 | 40.77 | 53.40 | -12.63 | Horizontal | Pass |
|  | 40.84 | 53.40 | -12.56 | Vertical | Pass |
| Above 10600 | 27.78 | 43.40 | -15.62 | Horizontal | Pass |
|  | 26.53 | 43.40 | -16.87 | Vertical | Pass |
| Note 1: The Margin = Equivalent field strength - Limit. <br> Note 2: The detail test plots have been showed as below. |  |  |  |  |  |


| Site: AC1 | Time: 2017/08/07-19:10 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Will Yan |
| Probe: BBHA9120D_1-18GHz | Polarity: Horizontal |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489 MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  | $*$ | 998.350 | 27.776 | 39.030 | -1.624 | 29.400 | -11.254 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)

| Site: AC1 | Time: 2017/08/07-19:21 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Will Yan |
| Probe: BBHA9120D_1-18GHz | Polarity: Vertical |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489 MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  | $*$ | 1305.475 | 26.528 | 34.736 | -2.872 | 29.400 | -8.208 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)

| Site: AC1 | Time: 2017/08/07-19:30 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Will Yan |
| Probe: BBHA9120D_1-18GHz | Polarity: Horizontal |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489 MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  | $*$ | 1842.940 | 23.105 | 29.773 | -18.295 | 41.400 | -6.668 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)

| Site: AC1 | Time: 2017/08/07-19:35 |  |
| :--- | :--- | :---: |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Will Yan |  |
| Probe: BBHA9120D_1-18GHz | Polarity: Vertical |  |
| EUT: Segway miniPLUS | Power: By Battery |  |
| Note: Transmit at 6489MHz |  |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  | $*$ | 1843.130 | 23.437 | 30.104 | -17.963 | 41.400 | -6.667 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)

| Site: AC1 | Time: 2017/08/07-19:39 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Alex Ma |
| Probe: BBHA9120D_1-18GHz | Polarity: Horizontal |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489 MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  | $*$ | 2864.680 | 22.298 | 24.649 | -21.102 | 43.400 | -2.351 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)

| Site: AC1 | Time: 2017/08/07-19:39 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Alex Ma |
| Probe: BBHA9120D_1-18GHz | Polarity: Vertical |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489MHz |  |



Frequency $(\mathrm{MHz})$

| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  | $*$ | 2864.680 | 22.814 | 25.165 | -20.586 | 43.400 | -2.351 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)

| Site: AC1 | Time: 2017/08/07-19:45 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Will Yan |
| Probe: BBHA9120D_1-18GHz | Polarity: Horizontal |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489 MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  |  | 5226.250 | 32.013 | 28.808 | -21.387 | 53.400 | 3.205 | AV |
| 2 |  |  | 6490.000 | 48.650 | 42.748 | -14.750 | 63.400 | 5.901 | AV |
| 3 |  | $*$ | 10510.000 | 40.766 | 28.330 | -12.634 | 53.400 | 12.436 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)

| Site: AC1 | Time: 2017/08/07-19:57 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Will Yan |
| Probe: BBHA9120D_1-18GHz | Polarity: Vertical |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor <br> $(\mathrm{dB})$ | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  |  | 5230.000 | 32.239 | 29.037 | -21.161 | 53.400 | 3.202 | AV |
| 2 |  | $*$ | 6373.750 | 52.932 | 47.659 | -10.468 | 63.400 | 5.273 | AV |
| 3 |  |  | 10506.250 | 40.839 | 28.408 | -12.561 | 53.400 | 12.432 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)

| Site: AC1 | Time: 2017/08/07-20:03 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Will Yan |
| Probe: BBHA9120D_1-18GHz | Polarity: Horizontal |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  |  | 14533.100 | 40.496 | 24.807 | -2.904 | 43.400 | 15.689 | AV |
| 2 |  | $*$ | 17996.301 | 47.742 | 24.857 | N/A | N/A | 22.885 | AV |

Note 1: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain ( dB )
Note 2: The test plot of this frequency range was base noise unrelated to the UWB transmission. We had reduced the RBW to assess this frequency range.

| Site: AC1 | Time: 2017/08/07-20:08 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Will Yan |
| Probe: BBHA9120D_1-18GHz | Polarity: Vertical |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  |  | 14544.200 | 40.635 | 24.985 | -2.765 | 43.400 | 15.649 | AV |
| 2 |  | $*$ | 17992.600 | 47.707 | 24.904 | $\mathrm{~N} / \mathrm{A}$ | $\mathrm{N} / \mathrm{A}$ | 22.803 | AV |

Note 1: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)
Note 2: The test plot of this frequency range was base noise unrelated to the UWB transmission. We had reduced the RBW to assess this frequency range.

| Site: AC1 | Time: 2017/08/07-21:09 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Will Yan |
| Probe: BBHA9170_18-40GHz | Polarity: Horizontal |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  |  | 18451.000 | 39.366 | 29.984 | -4.034 | 43.400 | 9.382 | AV |
| 2 |  | $*$ | 39989.000 | 46.888 | 27.924 | $\mathrm{~N} / \mathrm{A}$ | $\mathrm{N} / \mathrm{A}$ | 18.964 | AV |

Note 1: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)
Note 2: The test plot of this frequency range was base noise unrelated to the UWB transmission. We had reduced the RBW to assess this frequency range.

| Site: AC1 | Time: 2017/08/07-21:11 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Will Yan |
| Probe: BBHA9170_18-40GHz | Polarity: Vertical |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  |  | 18440.000 | 39.667 | 30.232 | -3.733 | 43.400 | 9.435 | AV |
| 2 |  | $*$ | 39978.000 | 46.497 | 27.610 | N/A | N/A | 18.887 | AV |

Note 1: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)
Note 2: The test plot of this frequency range was base noise unrelated to the UWB transmission. We had reduced the RBW to assess this frequency range.

Radiated Emission in GPS Receive Band Test Result Summary

| Frequency <br> $(\mathrm{MHz})$ | Equivalent field strength <br> in $\mathrm{MHz}(\mathrm{dB} \mu \mathrm{v} / \mathrm{m})$ | Limit in MHz <br> $(\mathrm{dB} \mu \mathrm{v} / \mathrm{m})$ | Margin (dB) | Polarity | Verdict |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $1164 \sim 1240$ | 4.95 | 19.40 | -14.45 | Horizontal | Pass |
|  | 10.48 | 19.40 | -8.92 | Vertical | Pass |
|  | 0.50 | 19.40 | -18.90 | Horizontal | Pass |
| Note 1: The Margin = Equivalent field strength - Limit. <br> Note 2: The detail test plots have been showed as below. |  |  |  |  |  |


| Site: AC1 |  |  |  |  |  | Time: 2017/08/07-20:17 |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Limit: FCC_Part 15.250_RMS (1M) |  |  |  |  |  | Engineer: Will Yan |  |  |  |
| Probe: BBHA9120D_1-18GHz |  |  |  |  |  | Polarity: Horizontal |  |  |  |
| EUT: Segway miniPLUS |  |  |  |  |  | Power: By Battery |  |  |  |
| Note: Transmit at 6489MHz |  |  |  |  |  |  |  |  |  |
| $\qquad$ |  |  |  |  |  |  |  |  |  |
| No | Flag | Mark | Frequency <br> (MHz) | Measure <br> Level <br> (dBuV/m) | Reading <br> Level <br> (dBuV) | Over Limit <br> (dB) | Limit (dBuV/m) | Factor | Type |
| 1 |  |  | 1190.410 | -2.279 | 7.069 | -21.679 | 19.400 | -9.347 | AV |
| 2 |  | * | 1228.790 | 4.948 | 13.762 | -14.452 | 19.400 | -8.813 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor ( $\mathrm{dB} / \mathrm{m}$ ) - Pre_Amplifier Gain (dB)

| Site: AC1 | Time: 2017/08/07-20:24 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Will Yan |
| Probe: BBHA9120D_1-18GHz | Polarity: Vertical |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489 MHz |  |



Frequency $(\mathrm{MHz})$

| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  | $*$ | 1228.790 | 10.475 | 19.289 | -8.925 | 19.400 | -8.813 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)

| Site: AC1 | Time: 2017/08/07-20:34 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Will Yan |
| Probe: BBHA9120D_1-18GHz | Polarity: Horizontal |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489 MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  | $*$ | 1574.402 | 0.503 | 8.188 | -18.897 | 19.400 | -7.685 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)

| Site: AC1 | Time: 2017/08/07-20:44 |
| :--- | :--- |
| Limit: FCC_Part 15.250_RMS (1M) | Engineer: Will Yan |
| Probe: BBHA9120D_1-18GHz | Polarity: Vertical |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Transmit at 6489 MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  | $*$ | 1574.402 | 1.126 | 8.811 | -18.274 | 19.400 | -7.685 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB)

### 7.5. Peak Power within 50 MHz bandwidth

### 7.5.1.Test Limit

This test was performed to measure effective radiated power emanated by transmitter at carrier frequency. Specification test limits are given in the following table.

Peak Power Limit (EIRP)

| Assigned frequency band <br> $(\mathrm{MHz})$ | EIRP in 50 MHz BW <br> $(\mathrm{dBm})$ | Equivalent field strength limit in <br> $\mathrm{MHz} @ 1 \mathrm{~m}(\mathrm{~dB} \mu \mathrm{v} / \mathrm{m})$ |
| :---: | :---: | :---: |
| FCC section $15.250(\mathrm{~d})(3)$ | 70.74 |  |
| $5925 \sim 7250$ | $20 \log ^{(\mathrm{RBW} / 50)}$ |  |

Note 1: Because the limits are so low, some bands may have been scanned at a distance closer than 1 meter. If any emissions were detected in these bands, final measurements were made at distance of 1 meter or greater. The actual distance for final measurement was indicated in the measurement data.

Note 2: Peak power limit at $1 \mathrm{~m}=20^{*} \log (1 \mathrm{MHz} / 50 \mathrm{MHz})+95.2+20^{*} \log (3 \mathrm{~m} / 1 \mathrm{~m})=70.74 \mathrm{~dB} \mu \mathrm{v} / \mathrm{m}$

### 7.5.2.Test Procedure Used

ANSI C63.10-2013, Section 10.3

### 7.5.3.Test Setting

## Bandwidth conversion of peak power measurements

It is acceptable to employ an RBW $(1 \mathrm{MHz}$ ) of less than 50 MHz (but no less than 1 MHz ) when performing the required peak power measurements. When this approach is employed, the peak emissions EIRP limit ( $0 \mathrm{dBm} / 50 \mathrm{MHz}$ ) is converted to a limit commensurate with the RBW by employing a [20 log (RBW/50 MHz)] relationship. For example, the peak power limit could be expressed in a 1 MHz
bandwidth as follows in Equation:

$$
E I R P_{1 M H z}=20 \log (1 \mathrm{MHz} / 50 \mathrm{MHz}) \mathrm{dBm}=(-34 \mathrm{~dB})=-34 \mathrm{dBm}
$$

When a resolution bandwidth of less than 50 MHz is used, this measurement shall be performed over a 50 MHz span centered on the frequency associated with the highest detected average emission level.

### 7.5.4.Test Setup

$\underline{1 \mathrm{GHz} \sim 40 \mathrm{GHz} \text { Test Setup: }}$


### 7.5.5.Test Result

| Product | Segway miniPLUS | Temperature | $25^{\circ} \mathrm{C}$ |
| :--- | :--- | :--- | :--- |
| Test Engineer | Roy Cheng | Relative Humidity | $60 \%$ |
| Test Site | AC1 | Test Date | $2017 / 08 / 07$ |
| Test Item | Peak Power within 50MHz BW |  |  |


| Frequency <br> $(\mathrm{MHz})$ | Equivalent field <br> strength $\mathrm{dB} \mu \mathrm{v} / \mathrm{m}(\mathrm{MHz})$ | Limit <br> $\mathrm{dB} \mu \mathrm{v} / \mathrm{m}(\mathrm{MHz})$ | Margin (dB) | Polarity | Verdict |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 6335.10 | 62.84 | 70.74 | -7.90 | Horizontal | Pass |
| 6489.63 | 57.12 | 70.74 | -13.62 | Vertical | Pass |

Note 1: The Margin = Equivalent field strength - Limit.
Note 2: The detail test plots have been showed as below.

| Site: AC1 | Time: 2017/08/07-18:44 |
| :--- | :--- |
| Limit: FCC_Part 15.250_(1m) | Engineer: Will Yan |
| Probe: BBHA9120D_1-18GHz | Polarity: Horizontal |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Bandwidth conversion of peak power measurements |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  | $*$ | 6335.100 | 62.842 | 57.791 | -7.898 | 70.740 | 5.051 | PK |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})$ + Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB).

| Site: AC1 | Time: 2017/08/07-18:53 |
| :--- | :--- |
| Limit: FCC_Part 15.250_(1m) | Engineer: Will Yan |
| Probe: BBHA9120D_1-18GHz | Polarity: Vertical |
| EUT: Segway miniPLUS | Power: By Battery |
| Note: Bandwidth conversion of peak power measurements |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV} / \mathrm{m})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV} / \mathrm{m})$ | Factor | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  | $*$ | 6489.625 | 57.119 | 51.219 | -13.621 | 70.740 | 5.899 | PK |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V} / \mathrm{m})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ Antenna Factor $(\mathrm{dB} / \mathrm{m})$ - Pre_Amplifier Gain (dB).

### 7.6. AC Conducted Emissions Measurement

### 7.6.1.Test Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits

| Frequency <br> $(\mathrm{MHz})$ | QP <br> $(\mathrm{dBuV})$ | AV <br> $(\mathrm{dBuV})$ |
| :---: | :---: | :---: |
| $0.15-0.50$ | $66-56$ | $56-46$ |
| $0.50-5.0$ | 56 | 46 |
| $5.0-30$ | 60 | 50 |

Note 1: The lower limit shall apply at the transition frequencies.
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz .

### 7.6.2.Test Procedure Used

FCC Part 15 Subpart C Paragraph 15.207

### 7.6.3.Test Setting

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, as measured using a $50 \mu \mathrm{H} / 50$ ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

### 7.6.4.Test Setup



### 7.6.5.Test Result

| Site: SR2 | Time: 2017/08/09-20:13 |
| :--- | :--- |
| Limit: FCC_Part15.207_CE_AC Power | Engineer: Bacon Dong |
| Probe: ENV216_101683_Filter On | Polarity: Line |
| EUT: Segway miniPLUS | Power: AC $120 \mathrm{~V} / 60 \mathrm{~Hz}$ |
| Worst Case Mode: Transmit at 6489 MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV})$ | Factor <br> $(\mathrm{dB})$ | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  |  | 0.274 | 38.949 | 28.965 | -22.047 | 60.996 | 9.983 | QP |
| 2 |  |  | 0.274 | 31.888 | 21.904 | -19.108 | 50.996 | 9.983 | AV |
| 3 |  |  | 1.046 | 39.545 | 29.638 | -16.455 | 56.000 | 9.907 | QP |
| 4 |  | $*$ | 1.046 | 36.988 | 27.081 | -9.012 | 46.000 | 9.907 | AV |
| 5 |  |  | 1.642 | 39.066 | 29.183 | -16.934 | 56.000 | 9.884 | QP |
| 6 |  |  | 1.642 | 30.777 | 20.893 | -15.223 | 46.000 | 9.884 | AV |
| 7 |  |  | 3.114 | 38.586 | 28.728 | -17.414 | 56.000 | 9.858 | QP |
| 8 |  |  | 3.114 | 30.633 | 20.775 | -15.367 | 46.000 | 9.858 | AV |
| 9 |  |  | 4.250 | 42.654 | 32.677 | -13.346 | 56.000 | 9.978 | QP |
| 10 |  |  | 4.250 | 35.973 | 25.996 | -10.027 | 46.000 | 9.978 | AV |
| 11 |  |  | 5.170 | 38.515 | 28.469 | -21.485 | 60.000 | 10.047 | QP |
| 12 |  |  | 5.170 | 32.527 | 22.480 | -17.473 | 50.000 | 10.047 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ LISN Factor ( dB )

| Site: SR2 | Time: 2017/08/09-20:19 |
| :--- | :--- |
| Limit: FCC_Part15.207_CE_AC Power | Engineer: Bacon Dong |
| Probe: ENV216_101683_Filter On | Polarity: Neutral |
| EUT: Segway miniPLUS | Power: AC $120 \mathrm{~V} / 60 \mathrm{~Hz}$ |
| Worst Case Mode: Transmit at 6489 MHz |  |



| No | Flag | Mark | Frequency <br> $(\mathrm{MHz})$ | Measure <br> Level <br> $(\mathrm{dBuV})$ | Reading <br> Level <br> $(\mathrm{dBuV})$ | Over Limit <br> $(\mathrm{dB})$ | Limit <br> $(\mathrm{dBuV})$ | Factor <br> $(\mathrm{dB})$ | Type |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  |  | 0.274 | 42.798 | 32.779 | -18.198 | 60.996 | 10.019 | QP |
| 2 |  |  | 0.274 | 34.593 | 24.575 | -16.403 | 50.996 | 10.019 | AV |
| 3 |  |  | 1.214 | 41.464 | 31.562 | -14.536 | 56.000 | 9.902 | QP |
| 4 |  | $*$ | 1.214 | 38.495 | 28.594 | -7.505 | 46.000 | 9.902 | AV |
| 5 |  |  | 1.426 | 40.653 | 30.760 | -15.347 | 56.000 | 9.893 | QP |
| 6 |  |  | 1.426 | 32.163 | 22.271 | -13.837 | 46.000 | 9.893 | AV |
| 7 |  |  | 2.986 | 40.976 | 31.110 | -15.024 | 56.000 | 9.866 | QP |
| 8 |  |  | 2.986 | 34.939 | 25.073 | -11.061 | 46.000 | 9.866 | AV |
| 9 |  |  | 4.334 | 43.119 | 33.131 | -12.881 | 56.000 | 9.988 | QP |
| 10 |  |  | 4.334 | 35.835 | 25.846 | -10.165 | 46.000 | 9.988 | AV |
| 11 |  |  | 6.230 | 37.211 | 27.076 | -22.789 | 60.000 | 10.135 | QP |
| 12 |  |  | 6.230 | 31.222 | 21.087 | -18.778 | 50.000 | 10.135 | AV |

Note: Measure Level $(\mathrm{dB} \mu \mathrm{V})=$ Reading Level $(\mathrm{dB} \mu \mathrm{V})+$ Factor $(\mathrm{dB})$
Factor $(\mathrm{dB})=$ Cable Loss $(\mathrm{dB})+$ LISN Factor $(\mathrm{dB})$

## 8. CONCLUSION

The data collected relate only the item(s) tested and show that the Segway miniPLUS FCC ID:
2ALS8-NB5213 is in compliance with Part 15.250 of the FCC Rules.

