



**Shenzhen Zoko Industry Development Co.,Ltd**

**Application  
For  
Certification**

**FCC ID: 2AA7IT550-BT**

**RFID Handheld Reader**

**Model: T550**

**Report No.: 140924017SZN-001**

Prepared and Checked by:

Approved by:

Sign on file

Benson Wang  
Assistant Engineer

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Andy Yan  
Senior Project Engineer  
Date: 23 June, 2015

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
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TRF No.: FCC 15C\_TX\_b

**Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch**

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## LIST OF EXHIBITS

### *INTRODUCTION*

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# INTERTEK TESTING SERVICES

## MEASUREMENT/TECHNICAL REPORT

Shenzhen Zoko Industry Development Co.,Ltd

Model: T550

FCC ID: 2AA7IT550-BT

This report concerns (check one:) Original Grant ☒ Class II Change ☐

Equipment Type: DSS - Part 15 Spread Spectrum Transmitter

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes ☐ No ☒

If yes, defer until: \_\_\_\_\_  
date

Company Name agrees to notify the Commission by: \_\_\_\_\_  
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes ☐ No ☒

If no, assumed Part 15, Subpart C for intentional radiator – the new 47 CFR [10-1-13 Edition] provision.

Report prepared by:

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# INTERTEK TESTING SERVICES

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## INTERTEK TESTING SERVICES

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### List of attached file

| Exhibit type            | File Description           | filename             |
|-------------------------|----------------------------|----------------------|
| Test Report             | Test Report                | report.pdf           |
| Test Report             | Test Report                | sar report.pdf       |
| Operational Description | Technical Description      | descri.pdf           |
| Test Setup Photo        | Radiated Emission          | radiated photos.pdf  |
| Test Setup Photo        | Conducted Emission         | conducted photos.pdf |
| External Photos         | External Photo             | external photos.pdf  |
| Internal Photos         | Internal Photo             | internal photos.pdf  |
| ID Label/Location Info  | Label Artwork and Location | label.pdf            |
| Block Diagram           | Block Diagram              | block.pdf            |
| Schematics              | Circuit Diagram            | circuit.pdf          |
| Users Manual            | User Manual                | manual.pdf           |
| Cover Letter            | Letter of Agency           | letter of agency.pdf |

**EXHIBIT 1**

**GENERAL DESCRIPTION**

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### 1.0 General Description

#### 1.1 Product Description

The equipment under test (EUT) is a RFID Handheld Reader, it is able to read ID cards through 902.75-927.25MHz and transmit data through Bluetooth function operating at 2402-2480MHz. The EUT was powered by a 3.7 VDC Li-ion rechargeable battery which is charged by USB Power Adapter with AC 120V, 60Hz input. For more detail information pls. refer to the user manual.

Antenna Type: Integral antenna  
Modulation Type: DSB-ASK

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

#### 1.2 Related Submittal(s) Grants

1. This is an application for certification of the RFID function operation at 902.75-927.25MHz.
2. BT Function: Refer to report 140924017SZN-002
3. Data Transfer function with PC: this function has been completed in DoC.

#### 1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4: 2009 and DA 00-705. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

#### 1.4 Test Facility

The Semi-Anechoic chamber and shield room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, Block D, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: 242492).

**EXHIBIT 2**

**SYSTEM TEST CONFIGURATION**

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## INTERTEK TESTING SERVICES

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### 2.0 **System Test Configuration**

#### 2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4: 2009.

The EUT was powered by a 3.7 VDC fully charged Li-ion rechargeable battery which is charged by USB Power Adapter with AC 120V, 60Hz input during the test.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on a turn table, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

#### 2.2 EUT Exercising Software

The EUT engineering mode (provided by client) used during testing as similar to a typical use.

#### 2.3 Special Accessories

One shielded USB cable with a ferrite core attached with the EUT is used.

#### 2.4 Equipment Modification

Any modifications installed previous to testing by Shenzhen Zoko Industry Development Co.,Ltd will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch.

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### 2.5 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

### 2.6 Support Equipment List and Description

| Description                                  | Manufacturer                               | Model No.                                                                 |
|----------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------|
| 110cm shielded USB Cable with a ferrite core | Shenzhen Zoko Industry Development Co.,Ltd | N/A                                                                       |
| USB Power Adapter                            | Juxing Electronic (Huizhou) Co.,Ltd.       | JXAS0050500100VU,<br>Input: AC 100-240V; 50/60Hz<br>Output: DC 5V; 1000mA |

**EXHIBIT 3**  
**TEST RESULTS**

### 3.0 **Test Results**

Data is included worst-case configuration (the configuration which resulted in the highest emission levels).

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### 3.1 **Radiated Test Results**

A sample calculation, configuration photographs and data tables of the emissions are included.

#### 3.1.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

Where      FS = Field Strength in dBμV/m  
              RA = Receiver Amplitude (including preamplifier) in dBμV  
              CF = Cable Attenuation Factor in dB  
              AF = Antenna Factor in dB  
              AG = Amplifier Gain in dB  
              PD = Pulse Desensitization in dB  
              AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV  
AF = 7.4 dB  
CF = 1.6 dB  
AG = 29.0 dB  
PD = 0 dB

AV = -10 dB

$$FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

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### 3.1.2 Radiated Emission Data and Configuration Photograph - FCC section 15.209

Worst Case Radiated Emission

At

86.280 MHz

Judgement: Passed by 12.8 dB

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos.pdf.

#### **TEST PERSONNEL:**

*Sign on file*

Benson Wang, Assistant Engineer

*Typed / Printed Name*

January 8, 2015

*Date*

## INTERTEK TESTING SERVICES

Applicant: Shenzhen Zoko Industry Development Co.,Ltd

Date of Test: January 8, 2015

Model: T550

Worst Case Operating Mode: Transmit with charging

Table 1

### Radiated Emissions

| Polarization | Frequency (MHz) | Reading (dB $\mu$ V) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dB $\mu$ V/m) | Limit at 3m (dB $\mu$ V/m) | Margin (dB) |
|--------------|-----------------|----------------------|-------------------|---------------------|--------------------------|----------------------------|-------------|
| Horizontal   | 30.970          | 22.3                 | 20.0              | 18.6                | 20.9                     | 40.0                       | -19.1       |
| Horizontal   | 403.440         | 36.7                 | 20.0              | 13.5                | 30.2                     | 46.0                       | -15.8       |
| Horizontal   | 486.385         | 33.3                 | 20.0              | 17.0                | 30.3                     | 46.0                       | -15.7       |
| Vertical     | 32.910          | 23.6                 | 20.0              | 18.2                | 21.8                     | 40.0                       | -18.2       |
| Vertical     | 86.280          | 40.1                 | 20.0              | 7.1                 | 27.2                     | 40.0                       | -12.8       |
| Vertical     | 314.210         | 22.6                 | 20.0              | 22.1                | 24.7                     | 46.0                       | -21.3       |

- NOTES: 1. Quasi-Peak detector is used except for others stated.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. All emissions are below the QP limit.

Test Engineer: Benson Wang

## INTERTEK TESTING SERVICES

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### 3.1.3 Transmitter Spurious Emissions (Radiated) - FCC section 15.209

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission  
at  
3611 MHz

Judgement: Passed by 6.5 dB

#### **TEST PERSONNEL:**

*Sign on file*

Benson Wang, Assistant Engineer  
*Typed/Printed Name*

January 8, 2015  
*Date*

## INTERTEK TESTING SERVICES

Applicant: Shenzhen Zoko Industry Development Co.,Ltd

Date of Test: January 8, 2015

Model: T550

Mode: Transmit with charging (902.75MHz)

Table 2

### Radiated Emissions

(902.75MHz)

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|---------------------------|-------------|
| Horizontal   | *2708.250       | 61.2           | 36.8              | 26.5                | 50.9               | 74.0                      | -23.1       |
| Horizontal   | *3611.000       | 49.0           | 35.6              | 39.5                | 52.9               | 74.0                      | -21.1       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|------------------------------|-------------|
| Horizontal   | *2708.250       | 57.1           | 36.8              | 26.5                | 46.8               | 54.0                         | -7.2        |
| Horizontal   | *3611.000       | 43.6           | 35.6              | 39.5                | 47.5               | 54.0                         | -6.5        |

- NOTES:
1. Peak detector is used except for others stated. Peak detector is used for spurious emission with RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Test Engineer: Benson Wang

## INTERTEK TESTING SERVICES

Applicant: Shenzhen Zoko Industry Development Co.,Ltd

Date of Test: January 8, 2015

Model: T550

Mode: Transmit with charging (914.75MHz)

Table 3

### Radiated Emissions

(914.75MHz)

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|---------------------------|-------------|
| Horizontal   | *2744.250       | 43.5           | 36.2              | 37.9                | 45.2               | 74.0                      | -28.8       |
| Horizontal   | *3659.000       | 45.8           | 35.6              | 39.5                | 49.7               | 74.0                      | -24.3       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|------------------------------|-------------|
| Horizontal   | *2744.250       | 36.6           | 36.2              | 37.9                | 38.3               | 54.0                         | -15.7       |
| Horizontal   | *3659.000       | 36.6           | 35.6              | 39.5                | 40.5               | 54.0                         | -13.5       |

- NOTES:
1. Peak detector is used except for others stated. Peak detector is used for spurious emission with RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Test Engineer: Benson Wang

## INTERTEK TESTING SERVICES

Applicant: Shenzhen Zoko Industry Development Co.,Ltd

Date of Test: January 8, 2015

Model: T550

Mode: Transmit with charging (927.25MHz)

Table 4

### Radiated Emissions

(927.25MHz)

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Peak Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|---------------------------|-------------|
| Horizontal   | *2781.750       | 57.2           | 36.8              | 26.5                | 46.9               | 74.0                      | -27.1       |
| Horizontal   | *3709.000       | 43.3           | 35.6              | 39.5                | 47.2               | 74.0                      | -26.8       |

| Polarization | Frequency (MHz) | Reading (dBμV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBμV/m) | Average Limit at 3m (dBμV/m) | Margin (dB) |
|--------------|-----------------|----------------|-------------------|---------------------|--------------------|------------------------------|-------------|
| Horizontal   | *2781.750       | 51.6           | 36.8              | 26.5                | 41.3               | 54.0                         | -12.7       |
| Horizontal   | *3709.000       | 29.3           | 35.6              | 39.5                | 33.2               | 54.0                         | -20.8       |

- NOTES:
1. Peak detector is used except for others stated. Peak detector is used for spurious emission with RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Test Engineer: Benson Wang

## INTERTEK TESTING SERVICES

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### 3.2 Conducted Emission at Mains Terminal

#### 3.2.1 Conducted Emissions and Data Configuration Photograph

Worst Case Conducted Configuration  
at  
0.906 MHz

Judgement: Passed by 6.8 dB

For electronic filing, the worst case conducted emission configuration photograph is saved with filename: conducted photos.pdf.

#### **TEST PERSONNEL:**

*Sign on file*

Benson Wang, Assistant Engineer  
*Typed/Printed Name*

January 8, 2015  
*Date*

## INTERTEK TESTING SERVICES

Company: Shenzhen Zoko Industry Development Co.,Ltd

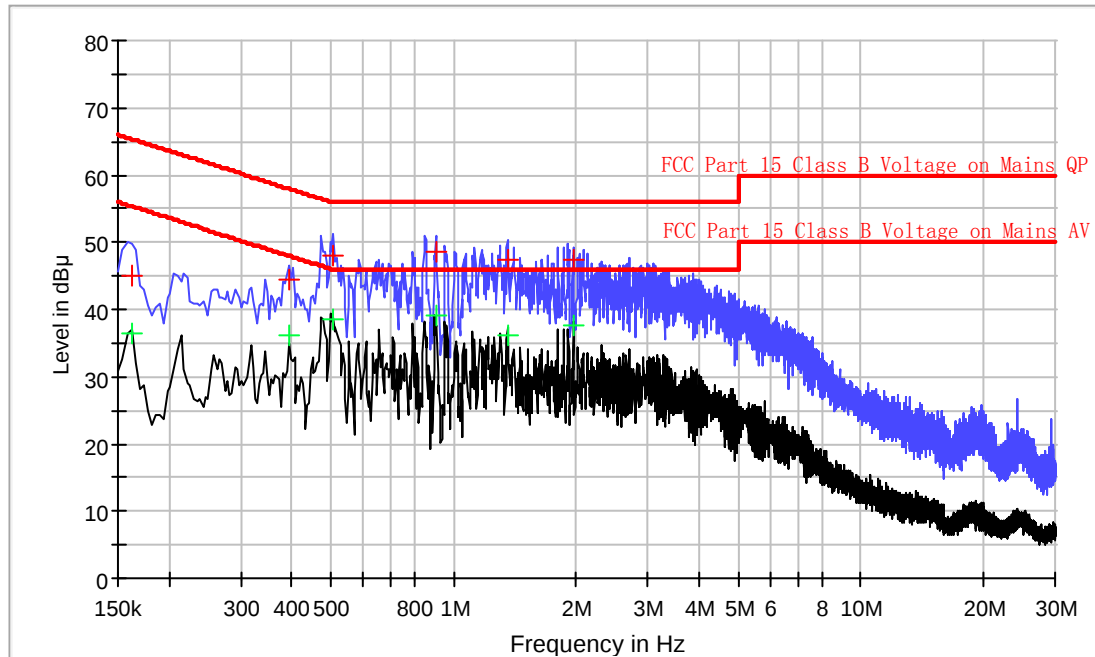
Date of Test: January 8, 2015

Model: T550

Worst Case Operating Mode: Transmit with charging

### Conducted Emission Test – FCC

Pursuant to 15.207 Emissions Requirement



### Result Table QP

| Frequency (MHz) | QuasiPeak (dB $\mu$ V) | Line | Corr. (dB) | Margin (dB) | Limit (dB $\mu$ V) |
|-----------------|------------------------|------|------------|-------------|--------------------|
| 0.162000        | 45.0                   | L1   | 9.8        | 20.4        | 65.4               |
| 0.394000        | 44.5                   | L1   | 9.8        | 13.5        | 58.0               |
| 0.506000        | 48.1                   | L1   | 9.8        | 7.9         | 56.0               |
| 0.906000        | 48.7                   | L1   | 9.9        | 7.3         | 56.0               |
| 1.354000        | 47.4                   | L1   | 9.9        | 8.6         | 56.0               |
| 1.966000        | 47.3                   | L1   | 9.9        | 8.7         | 56.0               |

### Result Table AV

| Frequency (MHz) | Average (dB $\mu$ V) | Line | Corr. (dB) | Margin (dB) | Limit (dB $\mu$ V) |
|-----------------|----------------------|------|------------|-------------|--------------------|
| 0.162000        | 36.5                 | L1   | 9.8        | 18.9        | 55.4               |
| 0.394000        | 36.2                 | L1   | 9.8        | 11.8        | 48.0               |
| 0.506000        | 38.6                 | L1   | 9.8        | 7.4         | 46.0               |
| 0.906000        | 39.2                 | L1   | 9.9        | 6.8         | 46.0               |
| 1.354000        | 36.3                 | L1   | 9.9        | 9.7         | 46.0               |
| 1.966000        | 37.5                 | L1   | 9.9        | 8.5         | 46.0               |

TRF No.: FCC 15C\_TX\_b

FCC ID: 2AA7IT550-BT

## INTERTEK TESTING SERVICES

Company: Shenzhen Zoko Industry Development Co.,Ltd

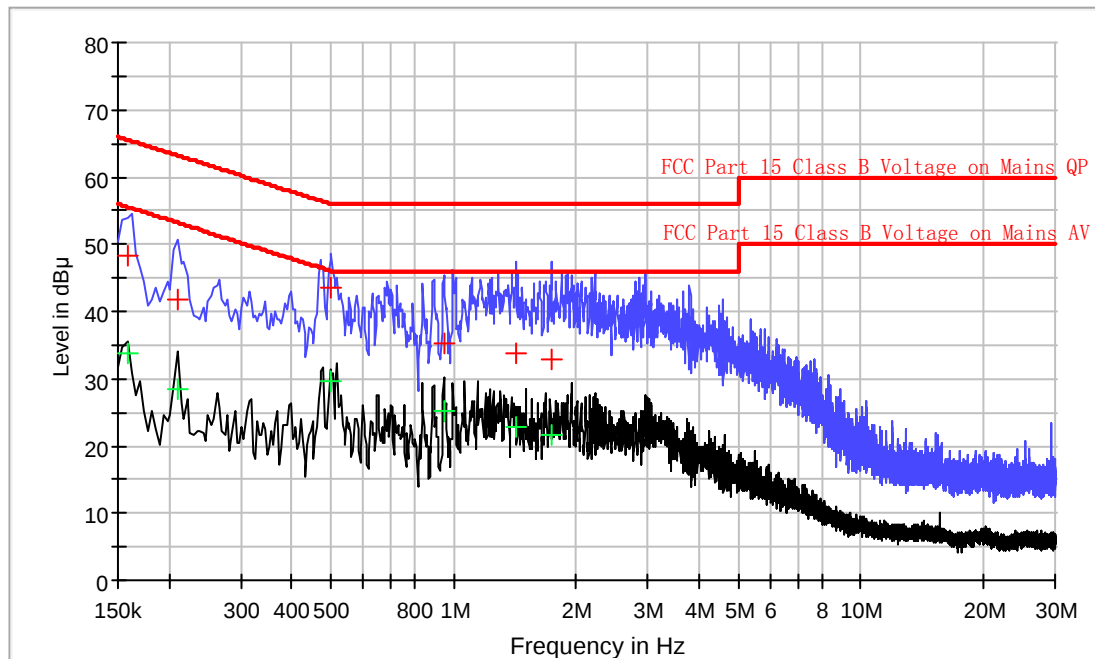
Date of Test: January 8, 2015

Model: T550

Worst Case Operating Mode: Transmit with charging

### Conducted Emission Test – FCC

Pursuant to 15.207 Emissions Requirement



### Result Table QP

| Frequency (MHz) | QuasiPeak (dB $\mu$ V) | Line | Corr. (dB) | Margin (dB) | Limit (dB $\mu$ V) |
|-----------------|------------------------|------|------------|-------------|--------------------|
| 0.158000        | 48.2                   | N    | 10.0       | 17.4        | 65.6               |
| 0.210000        | 41.7                   | N    | 10.1       | 21.5        | 63.2               |
| 0.502000        | 43.4                   | N    | 10.1       | 12.6        | 56.0               |
| 0.946000        | 35.2                   | N    | 10.2       | 20.8        | 56.0               |
| 1.426000        | 33.9                   | N    | 10.3       | 22.1        | 56.0               |
| 1.738000        | 32.9                   | N    | 10.3       | 23.1        | 56.0               |

### Result Table AV

| Frequency (MHz) | CAverage (dB $\mu$ V) | Line | Corr. (dB) | Margin (dB) | Limit (dB $\mu$ V) |
|-----------------|-----------------------|------|------------|-------------|--------------------|
| 0.158000        | 33.8                  | N    | 10.0       | 21.8        | 55.6               |
| 0.210000        | 28.4                  | N    | 10.1       | 24.8        | 53.2               |
| 0.502000        | 29.6                  | N    | 10.1       | 16.4        | 46.0               |
| 0.946000        | 25.3                  | N    | 10.2       | 20.7        | 46.0               |
| 1.426000        | 22.9                  | N    | 10.3       | 23.1        | 46.0               |
| 1.738000        | 21.5                  | N    | 10.3       | 24.5        | 46.0               |

TRF No.: FCC 15C\_TX\_b

FCC ID: 2AA7IT550-BT

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## INTERTEK TESTING SERVICES

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### 3.3 **Peak Power**

Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(1)

The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set for RBW > 20dB bandwidth and power was read directly in dBm.

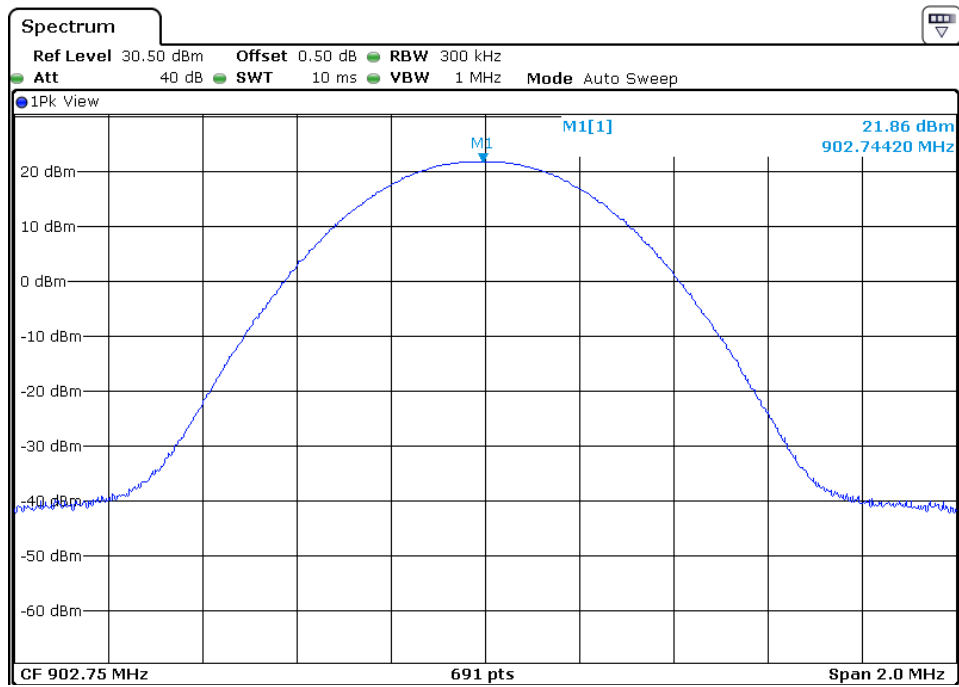
For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels.

| Antenna Gain = 2.0dBi |                 |                    |                   |
|-----------------------|-----------------|--------------------|-------------------|
| Modulation Type       | Frequency (MHz) | Output Power (dBm) | Output Power (mW) |
| DSB-ASK               | 902.75          | 21.86              | 153.46            |
|                       | 914.75          | 21.66              | 146.55            |
|                       | 927.25          | 21.38              | 137.40            |

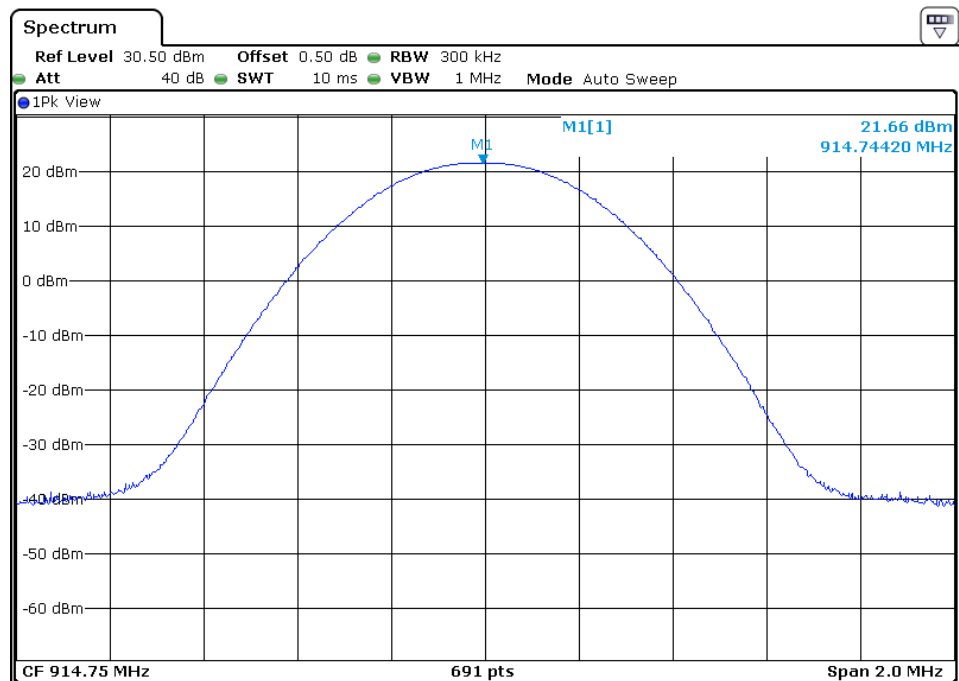
## INTERTEK TESTING SERVICES

Modulation Type: DSB-ASK

902.75 MHz

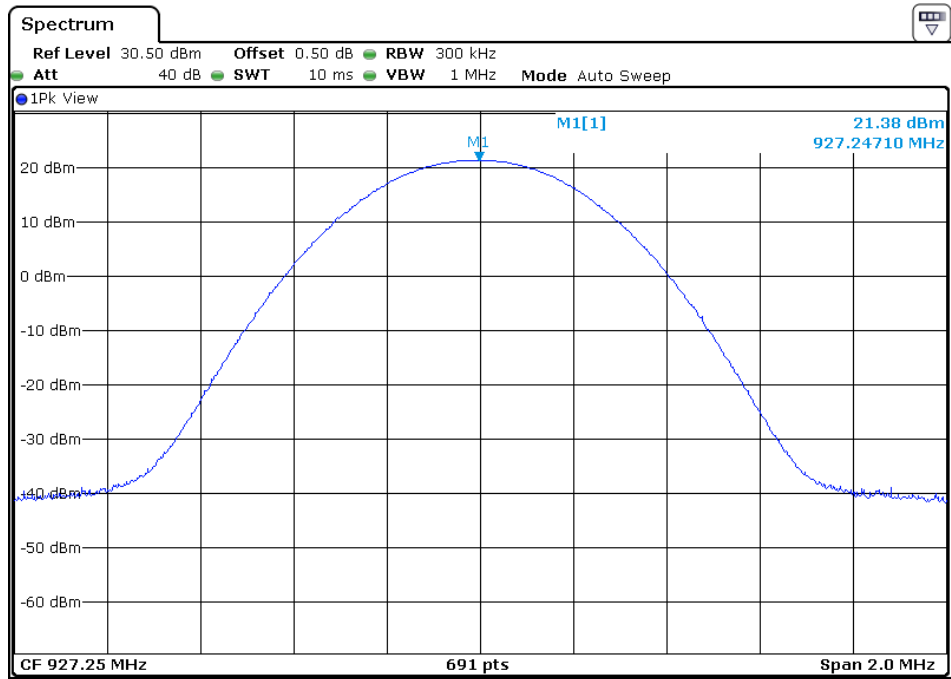


914.75 MHz



## INTERTEK TESTING SERVICES

927.25 MHz



## INTERTEK TESTING SERVICES

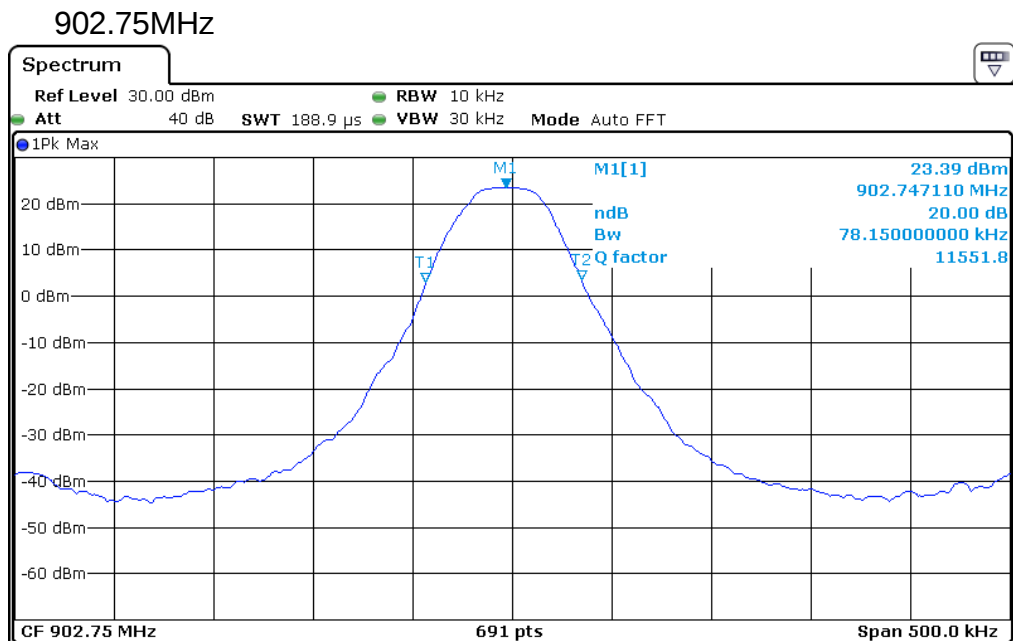
### 3.4 20dB Bandwidth

Maximum 20dB RF Bandwidth, FCC Rule 15.247(a) (1):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW was chosen so that the display was a result of the hopping channel modulation. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. Use the spectrum 20dB down delta function to measure the bandwidth.

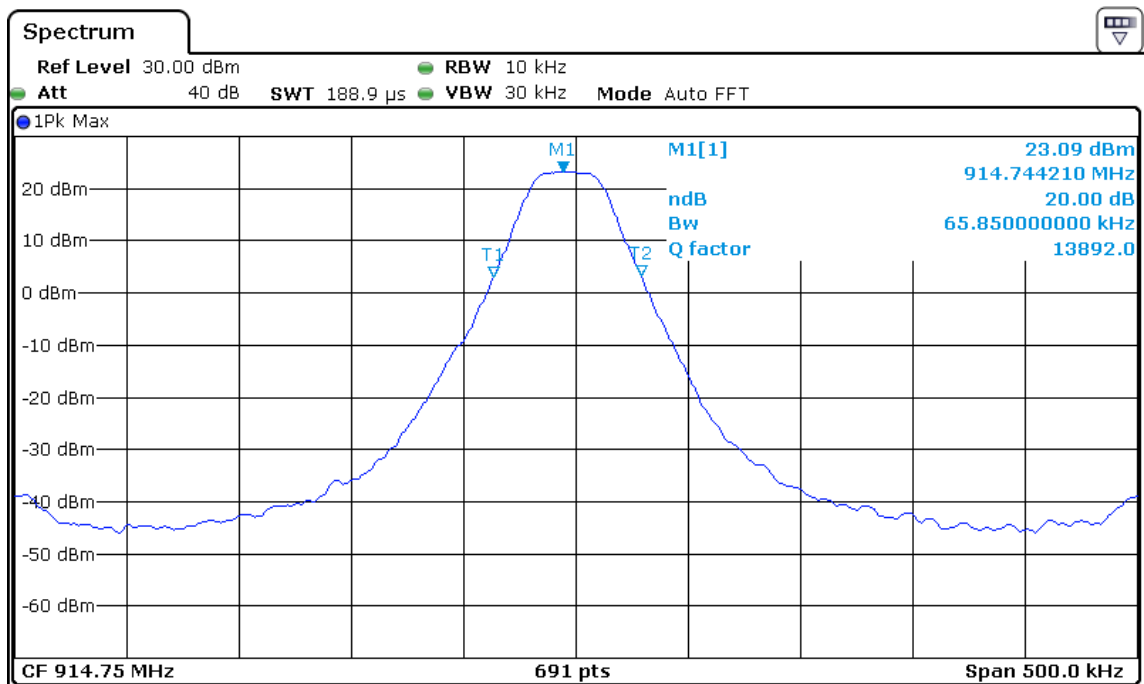
| Frequency (MHz) | 20 dB Bandwidth (KHz) | Limit (KHz) |
|-----------------|-----------------------|-------------|
| 902.75          | 78.150                | 500         |
| 914.75          | 65.850                | 500         |
| 927.25          | 57.890                | 500         |

Modulation Type: DSB-ASK

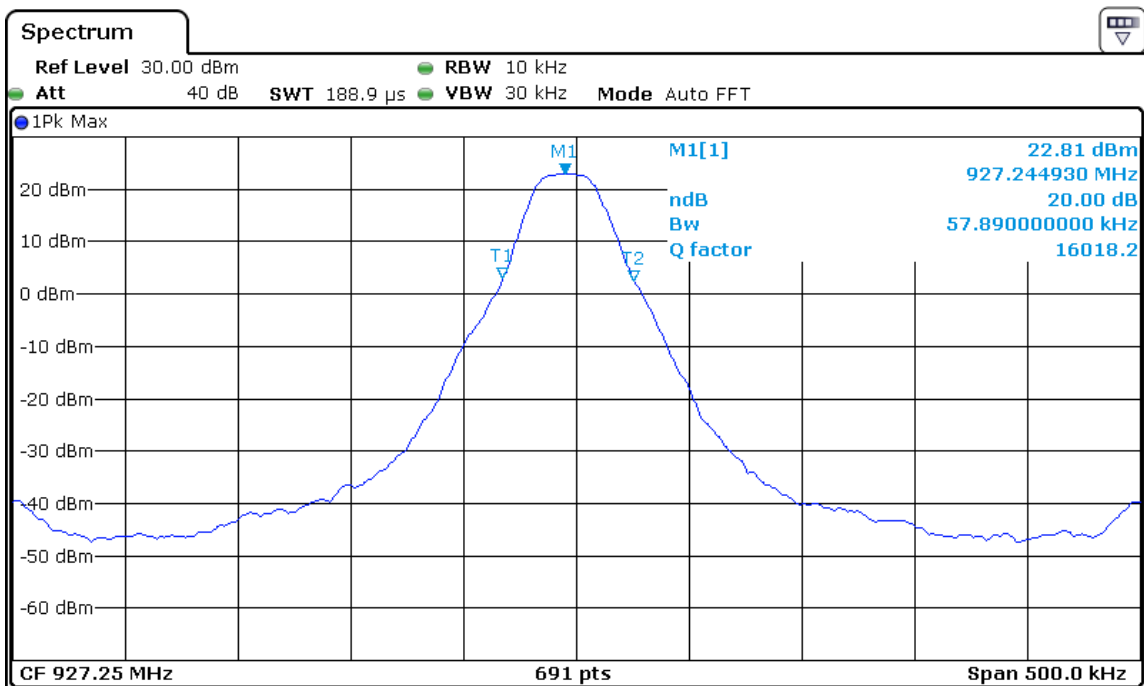


# INTERTEK TESTING SERVICES

914.75MHz



927.25MHz



## INTERTEK TESTING SERVICES

### 3.5 Channel Number (Number of Hopping Frequencies)

Minimum Number of Hopping Frequencies, FCC Rule 15.247(a) (1) (iii):

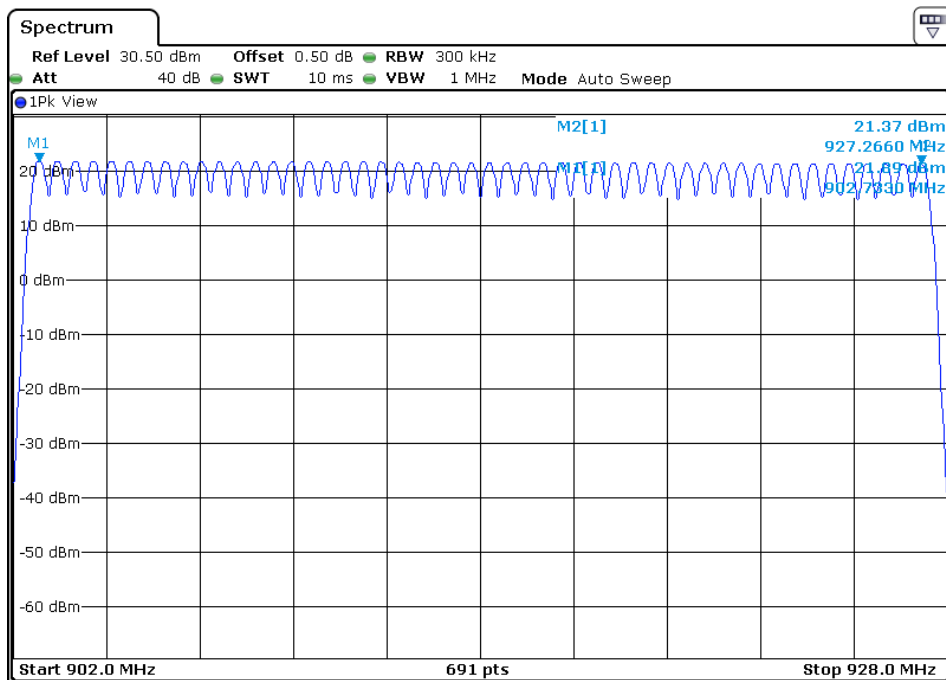
The RF passband of the EUT was divided into 3 approximately equal bands. With the analyzer set to MAX HOLD readings were taken for 2-3 minutes. The channel peaks so recorded were added together, and the total number compared to the minimum number of channels required in the regulation.

Note: For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies

|                              |    |
|------------------------------|----|
| Number of hopping channels = | 50 |
|------------------------------|----|

Modulation Type: DSB-ASK

CH00-CH49



## INTERTEK TESTING SERVICES

### 3.6 Channel Separation (Carrier Frequency Separation)

Minimum Hopping Channel Carrier Frequency Separation, FCC Ref: 15.247(a)(1):

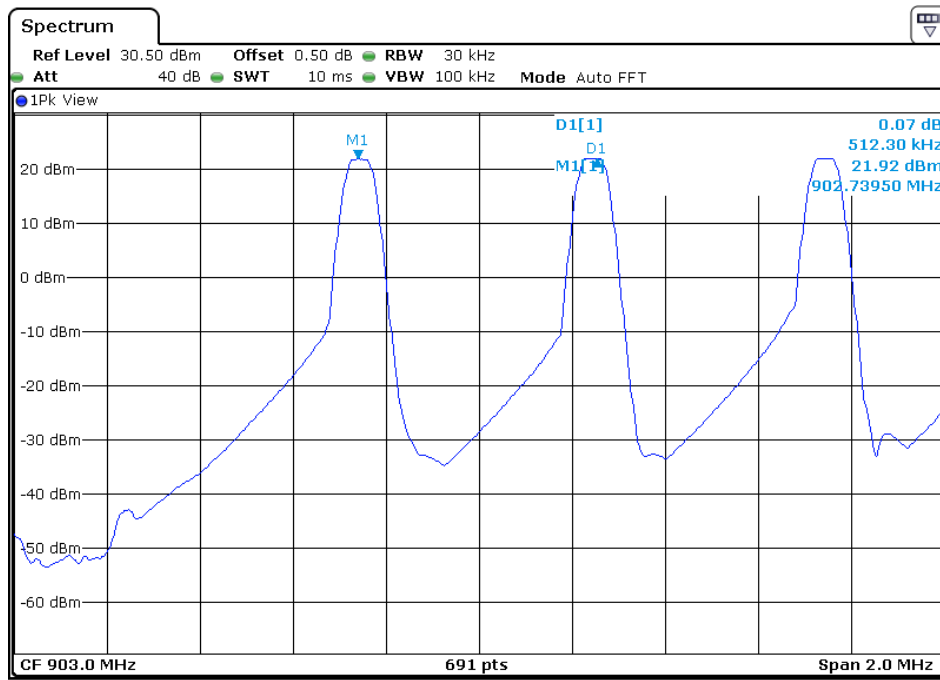
Using the DELTA MARKER function of the analyzer, the frequency separation between two adjacent channels was measured and compared against the limit:

Limit: Not less than 20dB bandwidth: 78KHz

| Channel | Channel Separation (KHz) | Limit (KHz) |
|---------|--------------------------|-------------|
| Low     | 512.3                    | 78          |
| Mid     | 506.5                    | 78          |
| High    | 506.5                    | 78          |

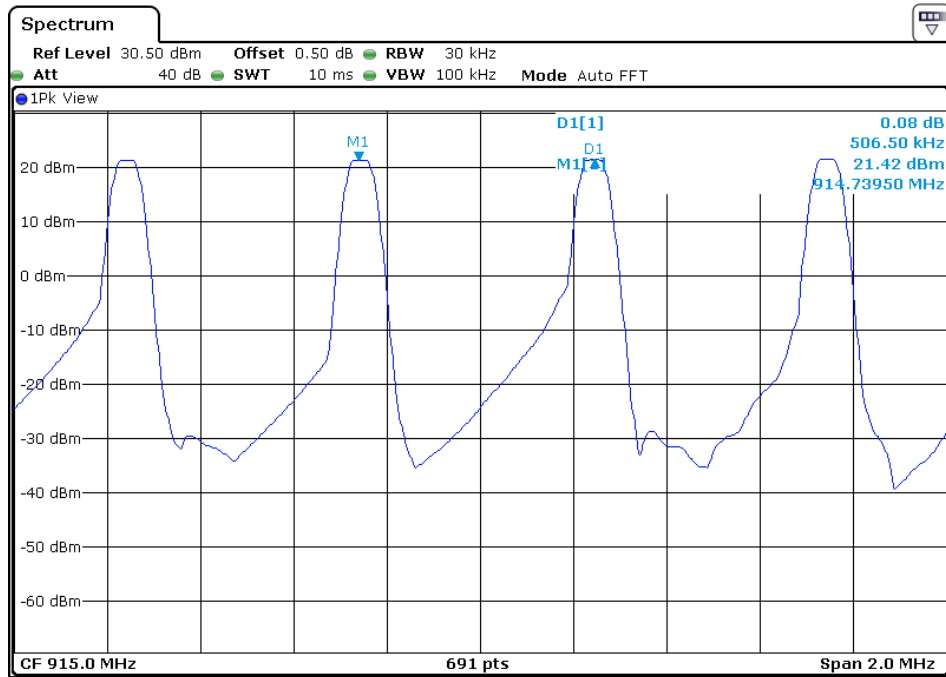
Modulation Type: DSB-ASK

#### Low Channel

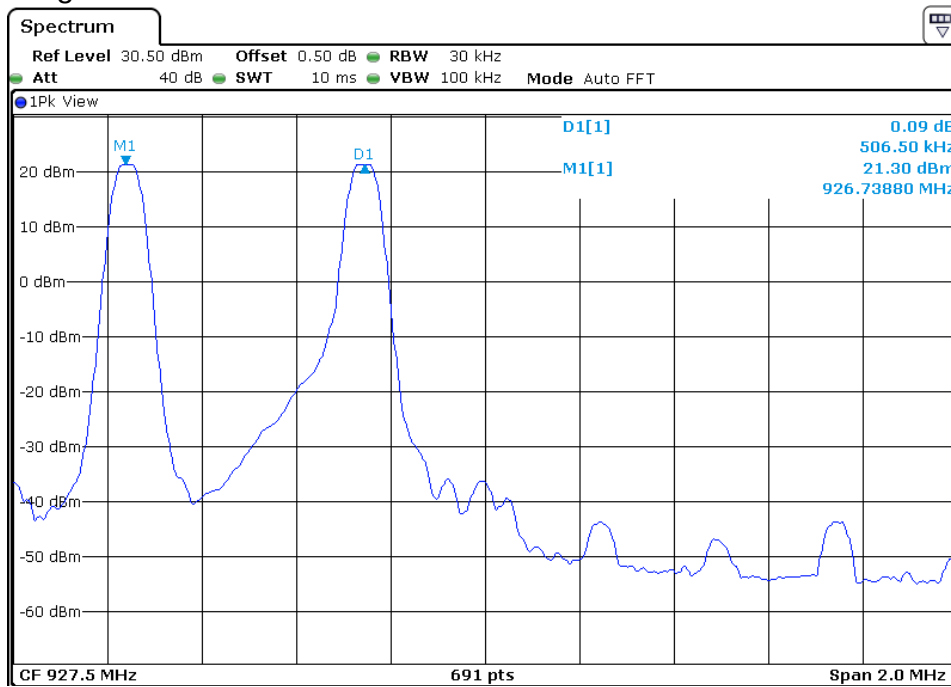


# INTERTEK TESTING SERVICES

## Middle Channel



## High Channel



## INTERTEK TESTING SERVICES

### 3.7 Dwell Time (Time of Occupancy)

Average Channel Occupancy Time, FCC Ref: 15.247(a)(1)(iii):

The spectrum analyzer center frequency was set to one of the known hopping channels. The SWEEP was set to 20s, the SPAN was set to ZERO SPAN, and the TRIGGER was set to VIDEO. The time duration of the transmissions so captured was measured with the MARKER DELTA function.

Note: For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

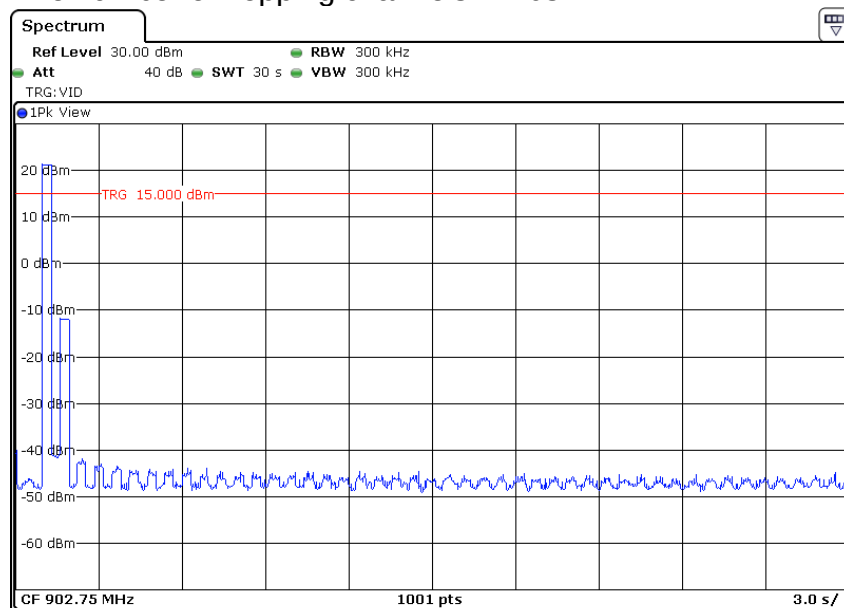
The maximum number of hopping channels in 20s:

| Frequency (MHz) | Dwell time Per Hop(s) | Number of hopping channels in 20s | Dwell time (s) | Limit (s) |
|-----------------|-----------------------|-----------------------------------|----------------|-----------|
| 902.75          | 0.33                  | 1                                 | 0.33           | 0.4       |
| 914.75          | 0.33                  | 1                                 | 0.33           | 0.4       |
| 927.25          | 0.33                  | 1                                 | 0.33           | 0.4       |

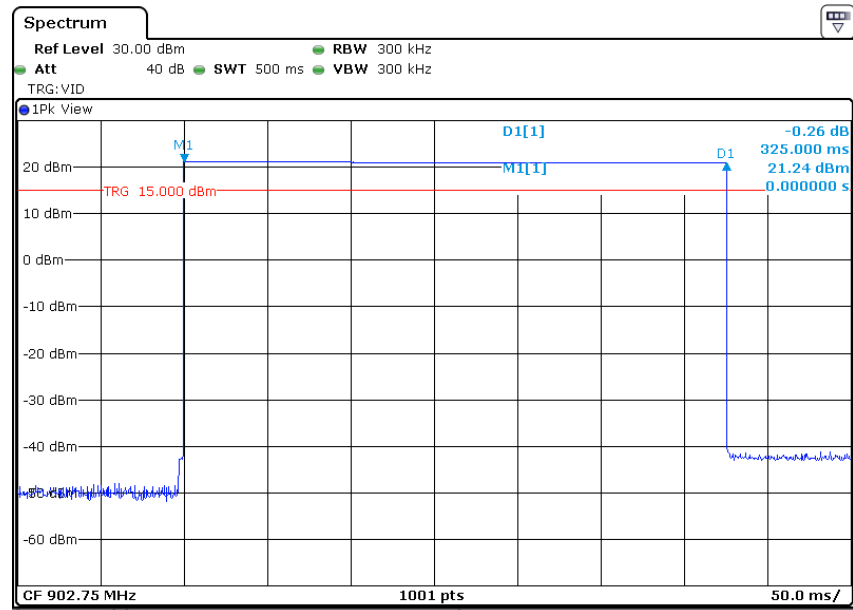
Modulation Type: DSB-ASK

902.75MHz

The number of hopping channels in 20s:

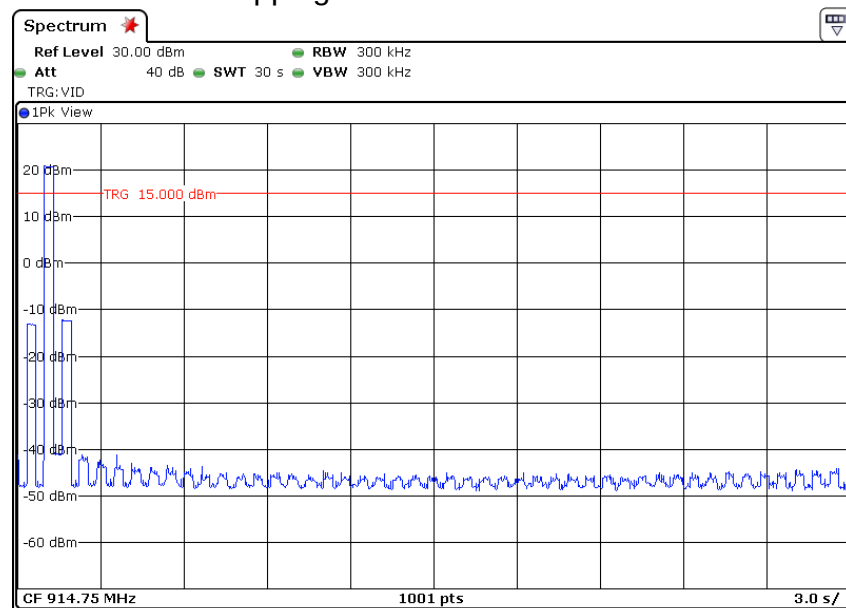


TRF No.: FCC 15C\_TX\_b  
FCC ID: 2AA7IT550-BT

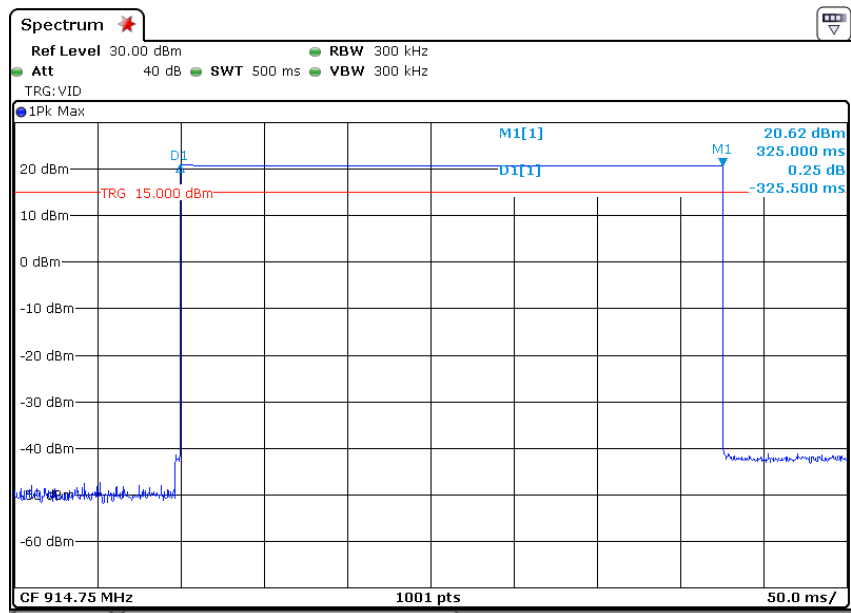


914.75MHz

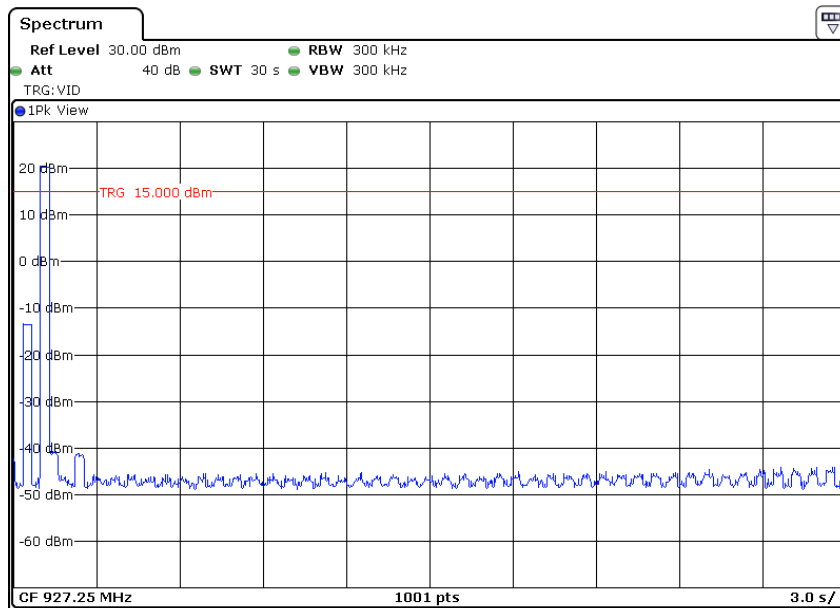
The number of hopping channels in 20s:



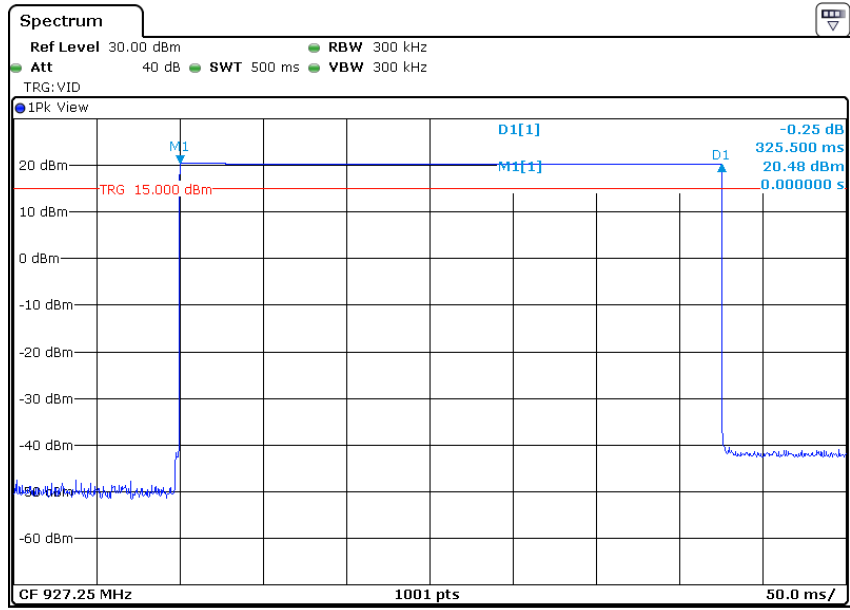
# INTERTEK TESTING SERVICES



927.25MHz



# INTERTEK TESTING SERVICES

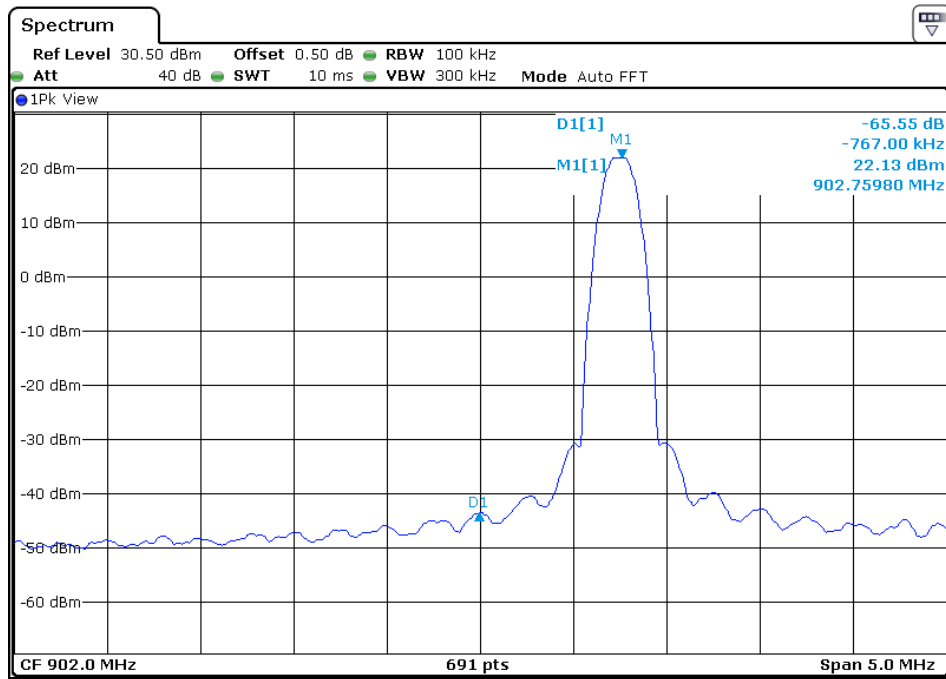


## 3.8 Band Edge

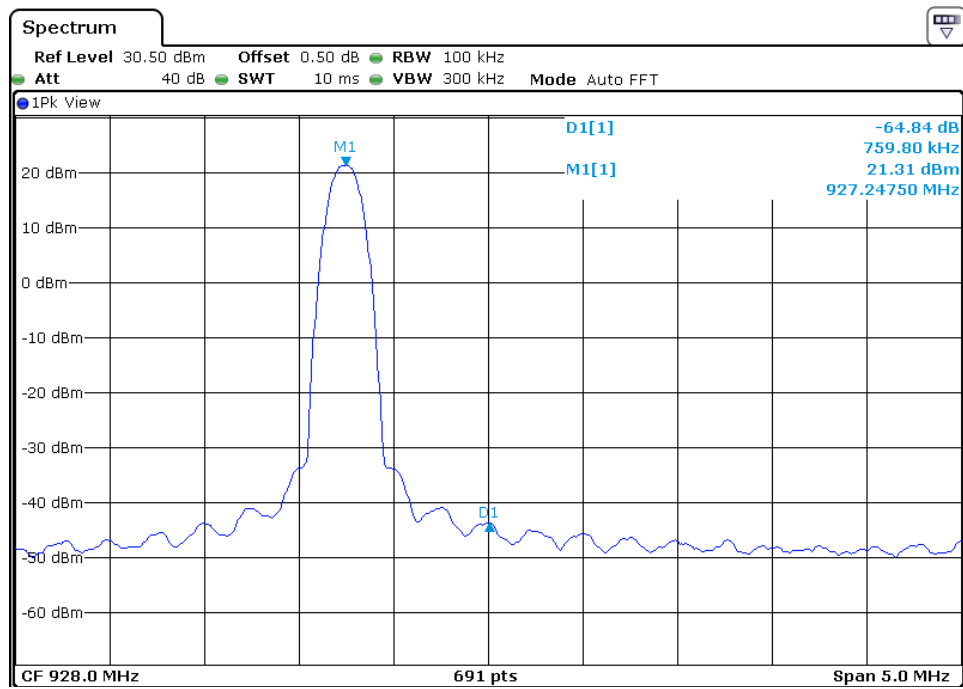
Out of Band Conducted Emissions, FCC Rule 15.247(d):

In any 100 KHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission.

Modulation Type: DSB-ASK



## INTERTEK TESTING SERVICES



### 3.9 Transmitter Spurious Emissions (Conducted)

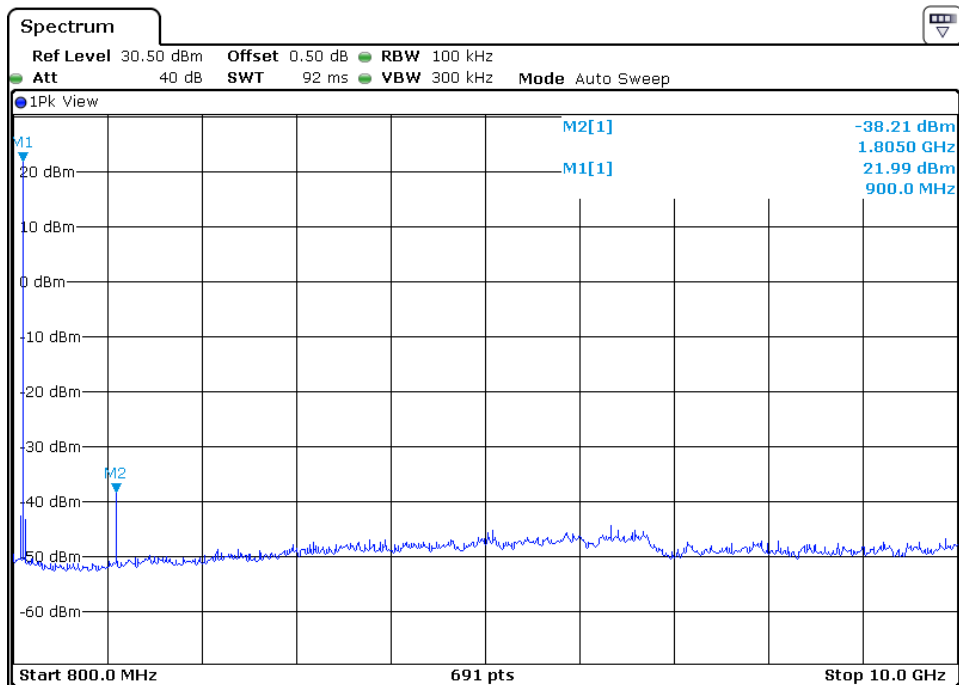
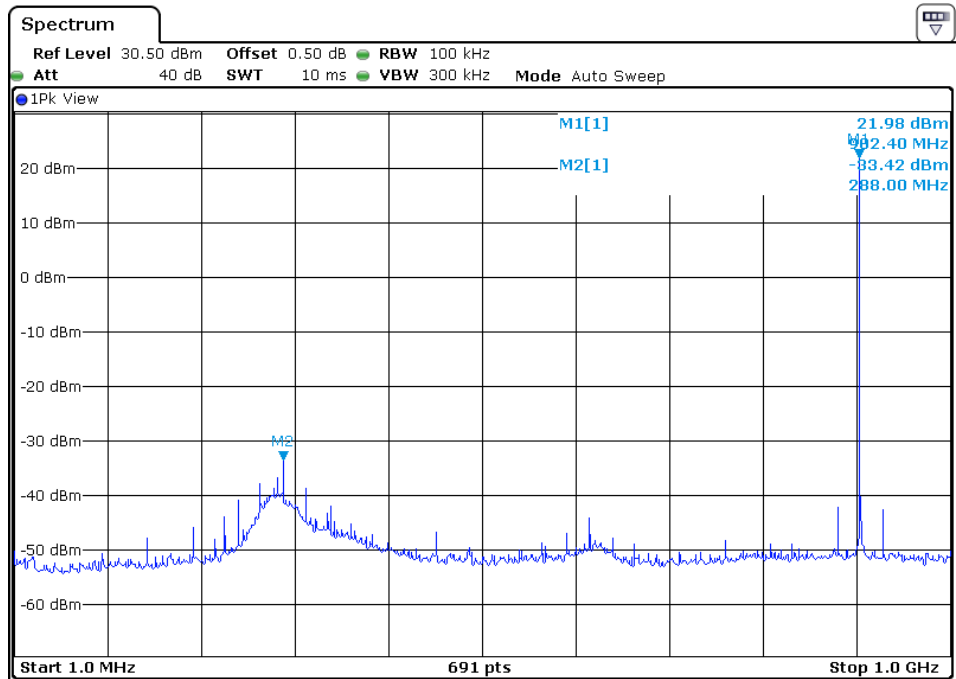
Out of Band Conducted Spurious Emissions, FCC Rule 15.247(d):

All spurious emission and up to the tenth harmonic was measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

## INTERTEK TESTING SERVICES

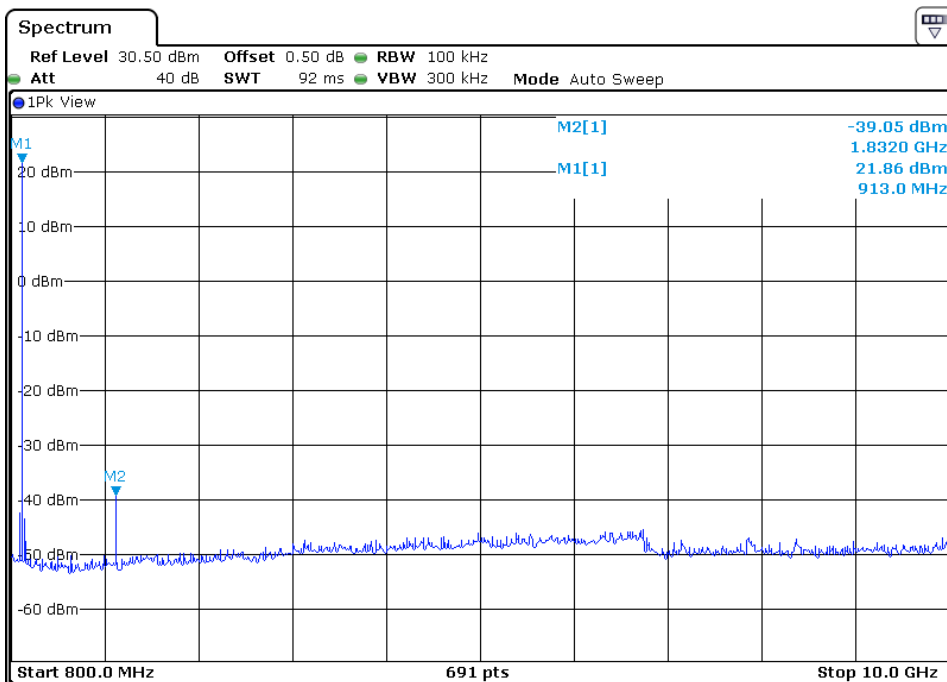
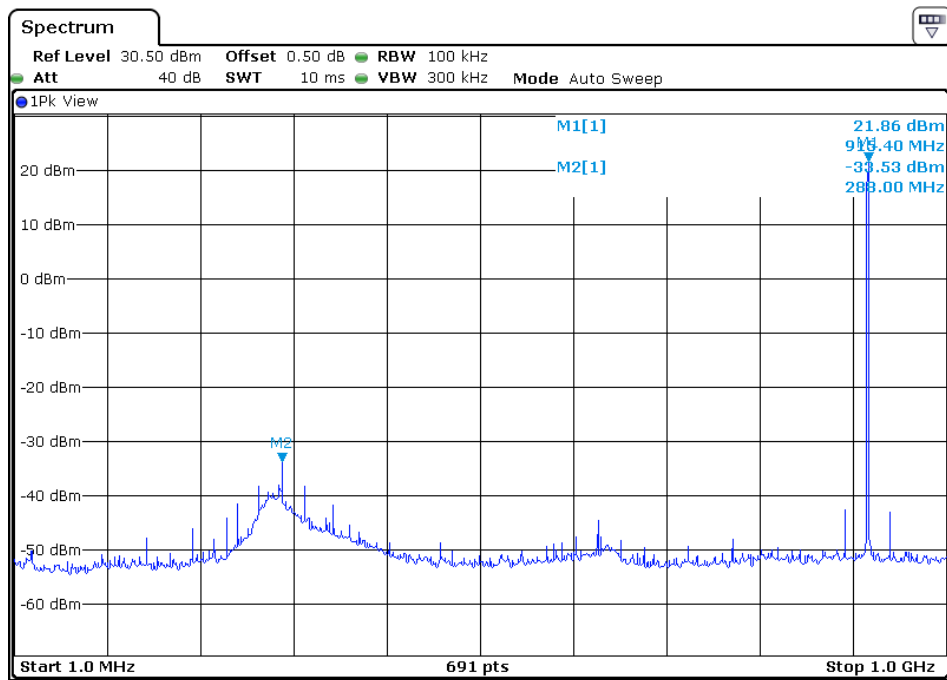
Modulation Type: DSB-ASK

Low Channel:



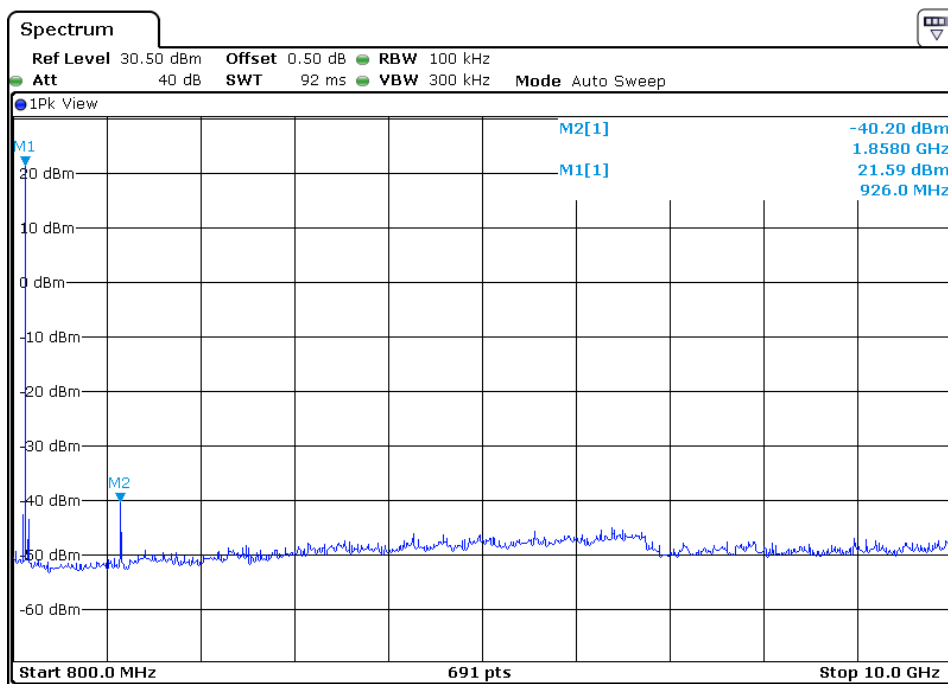
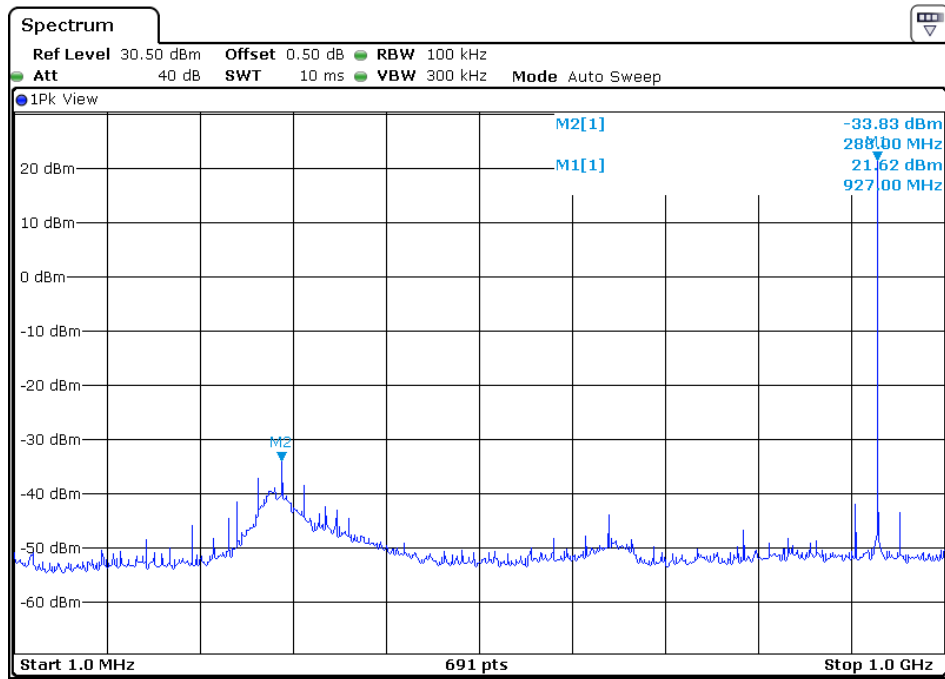
## INTERTEK TESTING SERVICES

Middle Channel:



## INTERTEK TESTING SERVICES

High Channel:



**EXHIBIT 4**  
**EQUIPMENT PHOTOGRAPHS**

### 4.0 **Equipment Photographs**

For electronic filing, the photographs of the tested EUT are saved with filename: external photos.pdf & internal photos.pdf.

**EXHIBIT 5**  
**PRODUCT LABELLING**

## INTERTEK TESTING SERVICES

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### 5.0 **Product Labelling**

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

**EXHIBIT 6**

**TECHNICAL SPECIFICATIONS**

### 6.0 **Technical Specifications**

For electronic filing, the block diagram and schematics of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

**EXHIBIT 7**  
**INSTRUCTION MANUAL**

### 7.0 **Instruction Manual**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

**EXHIBIT 8**

**MISCELLANEOUS INFORMATION**

### 8.0 **Miscellaneous Information**

This miscellaneous information includes details of the test procedure and calculation of factor such as pulse desensitization.

### 8.1 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device.

### 8.2 **Emissions Test Procedures**

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4: 2009.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

Detector function for conducted emissions is in QP & AV mode and IFBW setting is 9 kHz from the frequency band 150 kHz to 30MHz.

### 8.3 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements are made as described in ANSI C63.4: 2009.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

**EXHIBIT 9**  
**TEST EQUIPMENT LIST**

## INTERTEK TESTING SERVICES

### 9.0 Test Equipment List

| Equipment No. | Equipment              | Manufacturer    | Model No.    | Serial No. | Cal. Date | Due Date  |
|---------------|------------------------|-----------------|--------------|------------|-----------|-----------|
| SZ061-03      | BiConiLog Antenna      | ETS             | 3142C        | 00066460   | 28-Jun-14 | 28-Jun-15 |
| SZ061-07      | Pyramidal Horn Antenna | ETS             | 3160-09      | 00083067   | 3-Sep-14  | 3-Sep-15  |
| SZ061-08      | Horn Antenna           | ETS             | 3115         | 00092346   | 19-Oct-14 | 19-Oct-15 |
| SZ061-06      | Active Loop Antenna    | Electro-Metrics | EM-6876      | 217        | 29-Apr-14 | 29-Apr-15 |
| EM031-03      | Spectrum Analyzer      | R&S             | FSV40        | 101148     | 9-Jun-14  | 9-Jun-15  |
| SZ181-04      | Preamplifier           | Agilent         | 8449B        | 3008A02474 | 10-Mar-14 | 10-Mar-15 |
| SZ188-01      | Anechoic Chamber       | ETS             | RFD-F/A-100  | 4102       | 19-Apr-14 | 19-Apr-15 |
| SZ062-02      | RF Cable               | RADIAL          | RG 213U      | --         | 8-Jan-15  | 8-Jul-15  |
| SZ062-06      | RF Cable               | RADIAL          | 0.04-26.5GHz | --         | 8-Jan-15  | 8-Jul-15  |
| SZ062-12      | RF Cable               | RADIAL          | 0.04-26.5GHz | --         | 17-Oct-14 | 17-Apr-15 |
| SZ067-04      | Notch Filter           | Micro-Tronics   | BRM5070 2-02 | --         | 21-May-14 | 21-May-15 |
| SZ185-02      | EMI Test Receiver      | R&S             | ESCI         | 100692     | 1-Nov-14  | 1-Nov-15  |
| SZ187-01      | Two-Line V-Network     | R&S             | ENV216       | 100072     | 1-Nov-14  | 1-Nov-15  |
| SZ187-02      | Two-Line V-Network     | R&S             | ENV216       | 100073     | 1-Nov-14  | 1-Nov-15  |
| SZ188-03      | Shielding Room         | ETS             | RFD-100      | 4100       | 23-Aug-14 | 23-Aug-15 |