

## TEST REPORT

**Product** : G3  
**Trade mark** : Genesis 3  
**Model/Type reference** : G3-E, G3-H  
**Serial number** : N/A  
**Ratings** : DC 3V  
**FCC ID** : YGN-RF2BTN001U  
**Report number** : EED32H000971  
**Date** : Aug. 12, 2015  
**Regulations** : See below

| Test Standards                                                                | Results |
|-------------------------------------------------------------------------------|---------|
| <input checked="" type="checkbox"/> 47 CFR FCC Part 15 Subpart C 15.231: 2014 | PASS    |

Prepared for:

**American Technology Components Inc.**  
**2905 LaVanture Place, Elkhart, IN 46514, United States**

Prepared by:

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Aug. 12, 2015

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Check No.: 2093605500



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*N/A means not applicable.*

## 1. CERTIFICATION INFORMATION

**Applicant:** American Technology Components Inc.  
2905 LaVanture Place, Elkhart, IN 46514, United States

**Manufacturer:** Wuxi Contact Electronics Co., Ltd.  
No.8 Chunxing Industrial Park Youyi Road, Dongting Town,  
Xishan District, Wuxi City

**FCC ID:** YGN-RF2BTN001U

**Product:** G3

**Model/Type reference:** G3-E, G3-H

**Trade Name:** Genesis 3

**Serial Number:** N/A

**Report Number:** EED32H000971

**Sample Received Date:** Aug. 01, 2015

**Sample tested Date:** Aug. 01, 2015 to Aug. 12, 2015

The above equipment was tested by Centre Testing International (Shenzhen) Corporation for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, Subpart C and the measurement procedure according to ANSI C63.4:2014 and ANSI C63.10:2013.

## 2. TEST SUMMARY

| No. | Test Item                 | Rule              | Result                      |
|-----|---------------------------|-------------------|-----------------------------|
| 1   | Operation characteristics | FCC Part15.231(a) | <b>PASS</b>                 |
| 2   | Radiated Emission         | FCC Part15.231(b) | <b>PASS</b>                 |
| 3   | 20dB bandwidth            | FCC Part15.231 &  | <b>PASS</b>                 |
| 4   | AC Conducted Emission     | FCC PART15.207    | <b>N/A</b>                  |
| 5   | Antenna requirements      | FCC PART15.203    | <b>PASS</b><br>(See Note 1) |

Note:

1. According to Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The EUT has a built in the PCB; this is permanently attached antenna and meets the requirements of this section.
2. New battery is used during all the test.

### 3. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the product 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  $k=2$ .

| Test item                              | Value (dB) |
|----------------------------------------|------------|
| Conducted Emission Test                | 3.2 dB     |
| Radiated Emissions / Bandedge Emission | 4.5 dB     |

### 4. PRODUCT INFORMATION

| Items              | Description      |
|--------------------|------------------|
| Rating             | DC 3V            |
| Type of Modulation | ASK              |
| Antenna Type       | Integral antenna |
| Frequency          | 433.92 MHz       |
| Gain               | 0dBi             |

All models are same except model name. Model G3-E was selected for test.

## 5. TEST EQUIPMENT LIST

| Equipment                        | Manufacturer  | Mode No.                 | Serial Number | Cal. date<br>(mm-dd-yyyy) | Cal. Due date<br>(mm-dd-yyyy) |
|----------------------------------|---------------|--------------------------|---------------|---------------------------|-------------------------------|
| 3M Chamber & Accessory Equipment | TDK           | SAC-3                    | ---           | 06-02-2015                | 06-01-2016                    |
| TRILOG Broadband Antenna         | SCHWARZBECK   | VULB9163                 | 9163-617      | 07-14-2015                | 07-13-2016                    |
| Microwave Preamplifier           | Agilent       | 8449B                    | 3008A02425    | 02-05-2015                | 02-04-2016                    |
| Horn Antenna                     | ETS-LINDGREN  | 3117                     | 00057410      | 07-08-2015                | 07-07-2016                    |
| Loop Antenna                     | ETS           | 6502                     | 00071730      | 07-23-2015                | 07-22-2016                    |
| Spectrum Analyzer                | R&S           | FSP40                    | 100416        | 07-09-2015                | 07-08-2016                    |
| Receiver                         | R&S           | ESCI                     | 100435        | 07-09-2015                | 07-08-2016                    |
| Multi device Controller          | maturo        | NCD/070/10711112         | ---           | 01-13-2015                | 01-12-2016                    |
| LISN                             | schwarzbeck   | NNBM8125                 | 81251547      | 07-09-2015                | 07-08-2016                    |
| LISN                             | schwarzbeck   | NNBM8125                 | 81251546      | 07-09-2015                | 07-08-2016                    |
| Signal Generator                 | Agilent       | E4438C                   | MY45095744    | 04-19-2015                | 04-18-2016                    |
| Signal Generator                 | Keysight      | E8257D                   | MY53401106    | 04-14-2015                | 04-13-2016                    |
| Temperature/ Humidity Indicator  | TAYLOR        | 1451                     | 5190          | 07-10-2015                | 07-09-2016                    |
| Communication test set           | Agilent       | E5515C                   | GB47050533    | 01-13-2015                | 01-12-2016                    |
| Cable line                       | Fulai(7M)     | SF106                    | 5219/6A       | 01-13-2015                | 01-12-2016                    |
| Cable line                       | Fulai(6M)     | SF106                    | 5220/6A       | 01-13-2015                | 01-12-2016                    |
| Cable line                       | Fulai(3M)     | SF106                    | 5216/6A       | 01-13-2015                | 01-12-2016                    |
| Cable line                       | Fulai(3M)     | SF106                    | 5217/6A       | 01-13-2015                | 01-12-2016                    |
| Communication test set           | R&S           | CMW500                   | 152394        | 04-19-2015                | 04-18-2016                    |
| High-pass filter(3-18GHz)        | Sinoscite     | FL3CX03WG18NM12-0398-002 | ---           | 01-13-2015                | 01-12-2016                    |
| High-pass filter(5-18GHz)        | MICRO-TRONICS | SPA-F-63029-4            | ---           | 01-13-2015                | 01-12-2016                    |
| band rejection filter            | Sinoscite     | FL5CX01CA09CL12-0395-001 | ---           | 01-13-2015                | 01-12-2016                    |
| band rejection filter            | Sinoscite     | FL5CX01CA08CL12-0393-001 | ---           | 01-13-2015                | 01-12-2016                    |
| band rejection filter            | Sinoscite     | FL5CX02CA04CL12-0396-002 | ---           | 01-13-2015                | 01-12-2016                    |
| band rejection filter            | Sinoscite     | FL5CX02CA03CL12-0394-001 | ---           | 01-13-2015                | 01-12-2016                    |

## 6. SUPPORT EQUIPMENT LIST

| Device Type | Brand | Model | Data Cable | Remark |
|-------------|-------|-------|------------|--------|
| ---         | ---   | ---   | ---        | ---    |

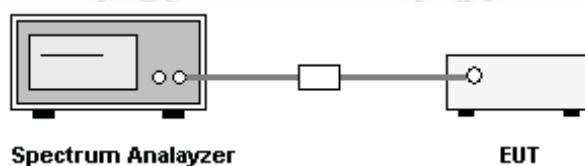
## 7. Operation characteristics

### 7.1. LIMITS

FCC PART15.231 a(1):

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

### 7.2. BLOCK DIAGRAM OF TEST SETUP



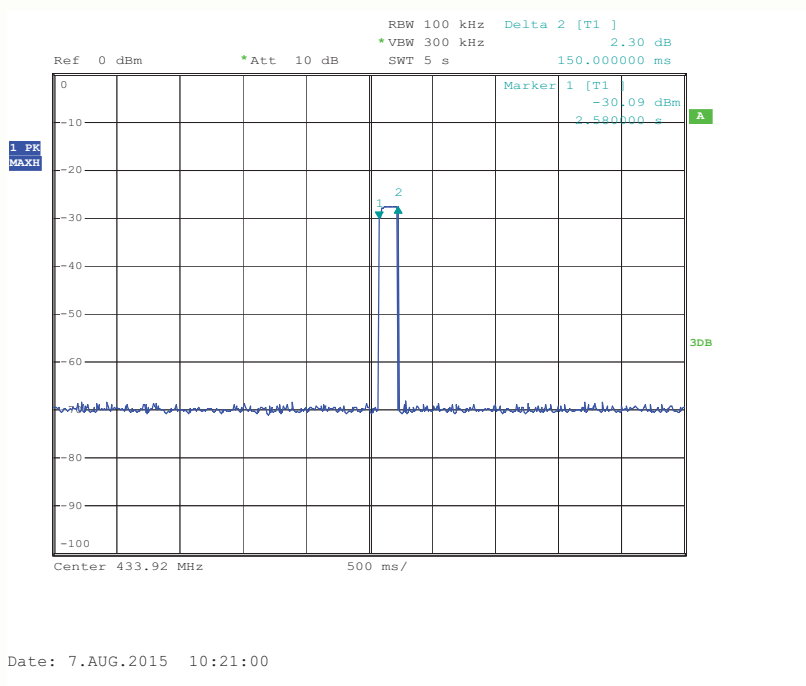
### 7.3. TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set the center frequency is 433.92MHz and set the Span is 0Hz.
3. Set spectrum analyzer's RBW and VBW to applicable value with Peak.
4. Read the transmission time and silent time from the spectrum analyzer directly.

### 7.4. TEST RESULT

The test data of worst case are below:

| Channel | Frequency (MHz) | Test (s) | Limit (s) | Result (Pass / Fail) |
|---------|-----------------|----------|-----------|----------------------|
| 1       | 433.92          | 0.15     | 5         | Pass                 |



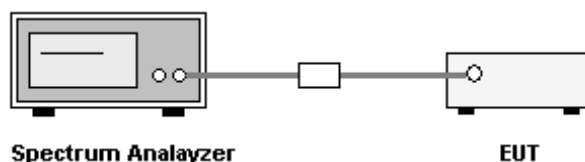
## 8. 20dB/ 99% Bandwidth Measurement

### 8.1. LIMITS

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

As the center frequency for the device operating is 433.92MHz, thus, the 20dB bandwidth limit is 1.08MHz.

### 8.2. BLOCK DIAGRAM OF TEST SETUP



### 8.3. TEST PROCEDURE

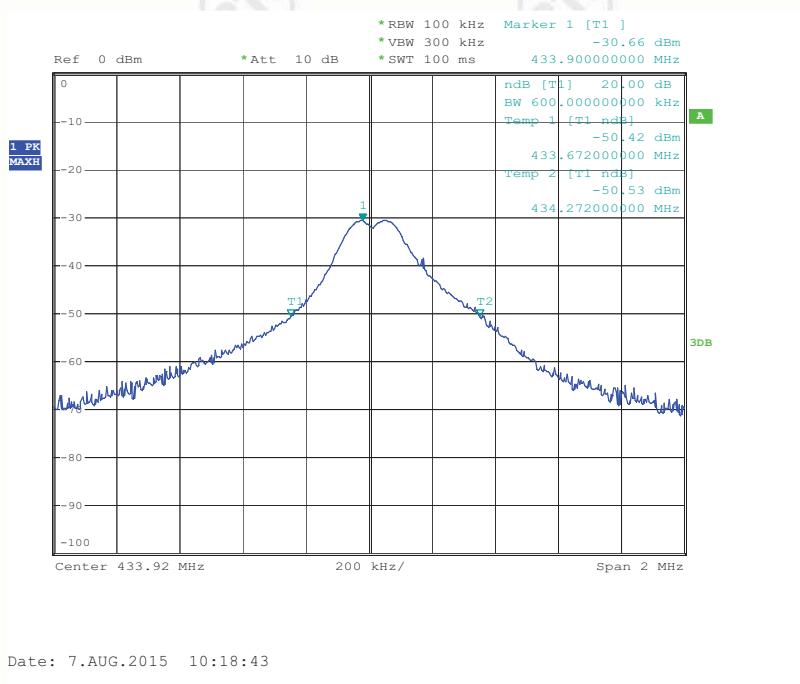
1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. A PEAK output reading and 20B BW function in spectrum analyzer were taken.

### 8.4. TEST RESULT

The test data of worst case are below:

| Channel | Frequency (MHz) | 20dB BW (MHz) | Limit (MHz) | Result (Pass / Fail) |
|---------|-----------------|---------------|-------------|----------------------|
| 1       | 433.92          | 0.6           | 1.08        | Pass                 |

Please see the following plots:  
**20dB BW:**



## 9. RADIATED EMISSION MEASUREMENT

### 9.1. LIMITS

FCC part 15.231(b):

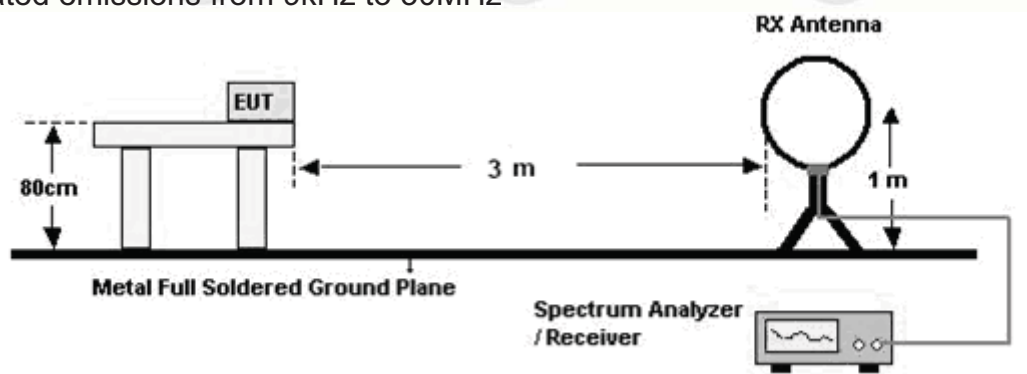
| Fundamental Frequency (MHz) | Field Strength of Fundamental microvolts/m at 3 metres | Field Strength of Unwanted Emissions microvolts/m at 3 metres |
|-----------------------------|--------------------------------------------------------|---------------------------------------------------------------|
| 260-470                     | 3750 to 12500*                                         | 375 to 1250*                                                  |

\* Linear interpolation with frequency F in MHz

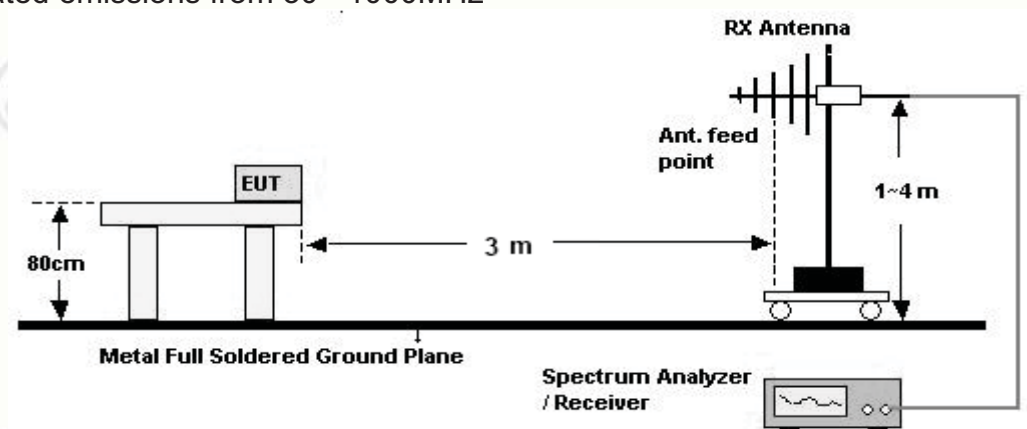
The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in § 15.209, whichever limit permits a higher field strength.

### 9.2. BLOCK DIAGRAM OF TEST SETUP

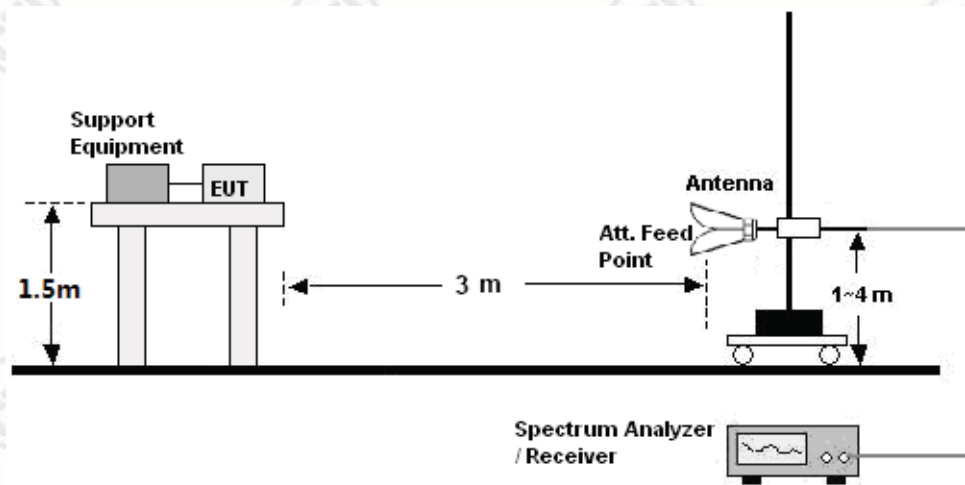
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30 - 1000MHz



For radiated emissions from 1GHz to 25GHz



### 9.3. TEST PROCEDURE

#### Below 30MHz

- The Product is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.
- For each suspected emission, the Product was arranged to its worst case and then turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test frequency analyzer system was set to Peak Detect (300Hz RBW in 9kHz to 150kHz and 10kHz RBW in 150kHz to 30MHz) Function and Specified Bandwidth with Maximum Hold Mode.

#### 30MHz ~ 1GHz:

- The Product was placed on the non-conductive turntable 0.8m above the ground at a chamber.
- Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 100 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- For each frequency whose maximum record was higher or close to limit, measure its QP value (120 kHz RBW): vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

#### Above 1GHz:

- The EUT was placed on the non-conductive turntable 1.5m above the ground at a chamber.
- Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the

antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

#### 9.4. TEST RESULT

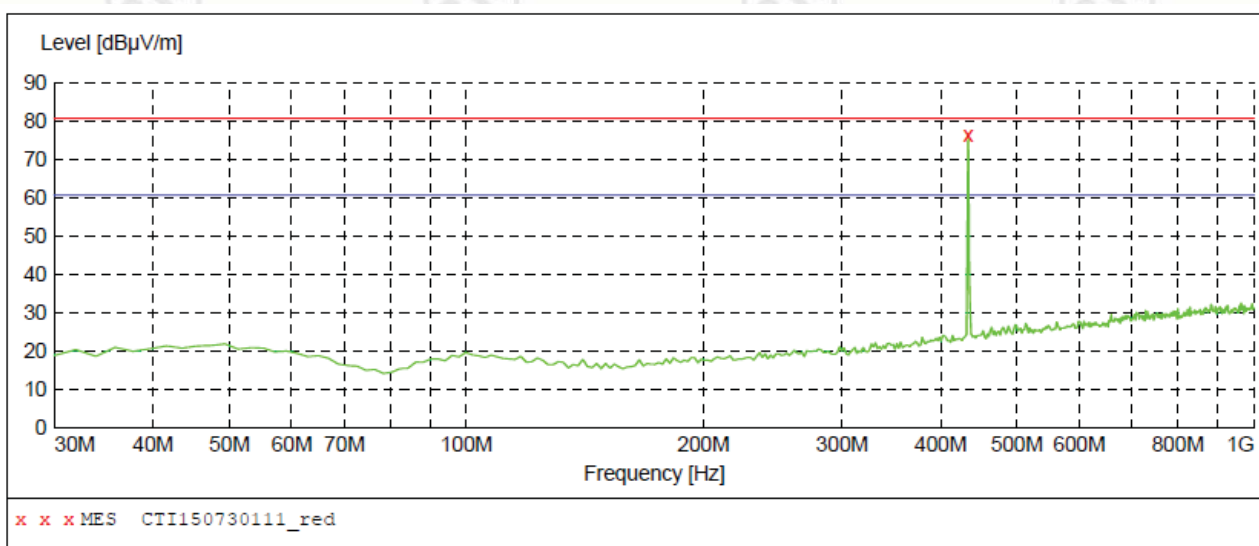
All the modes of operation (X, Y, Z) were investigated and the worst-case emissions are reported.

##### Below 30MHz:

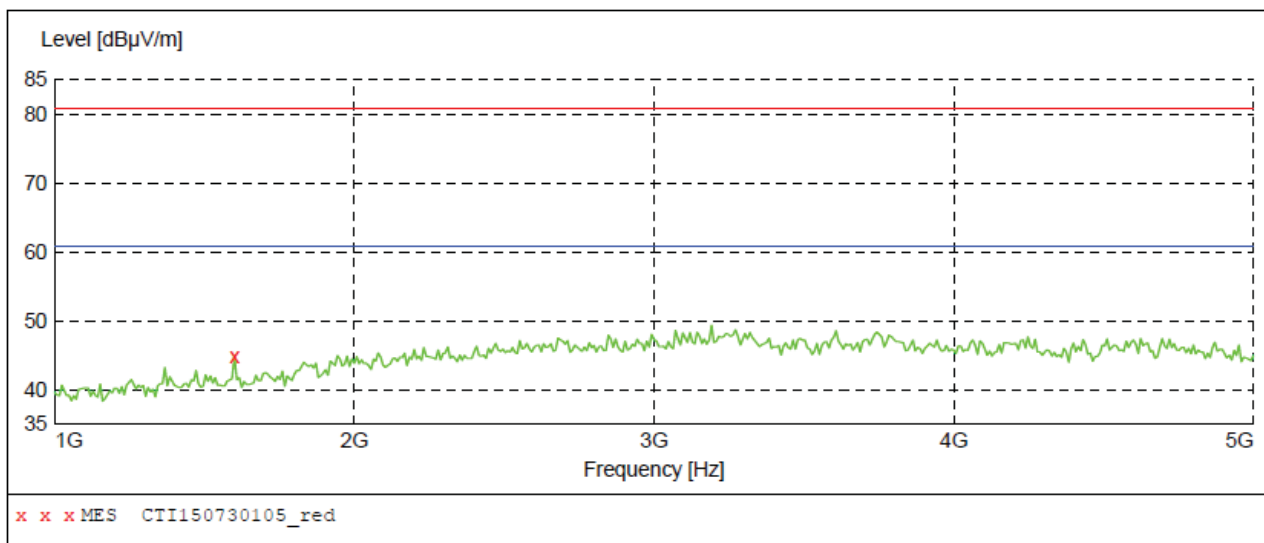
No emissions were found higher than the background below 30MHz and background is lower than the limit, so it deems to compliance with the limit without recorded.

##### H:

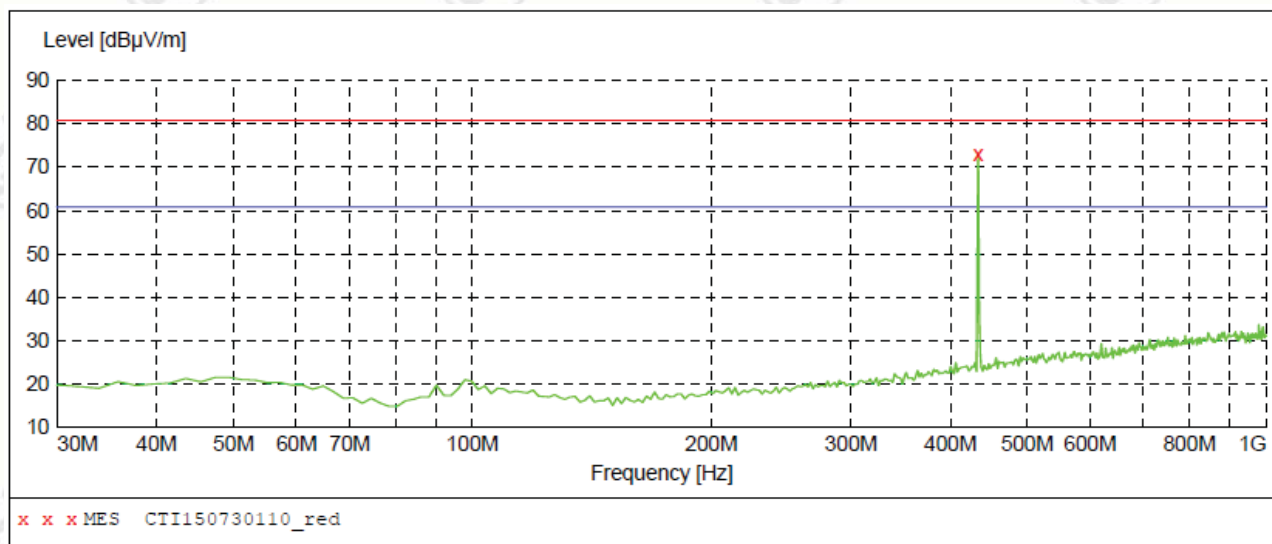
##### 30MHz ~ 1GHz:



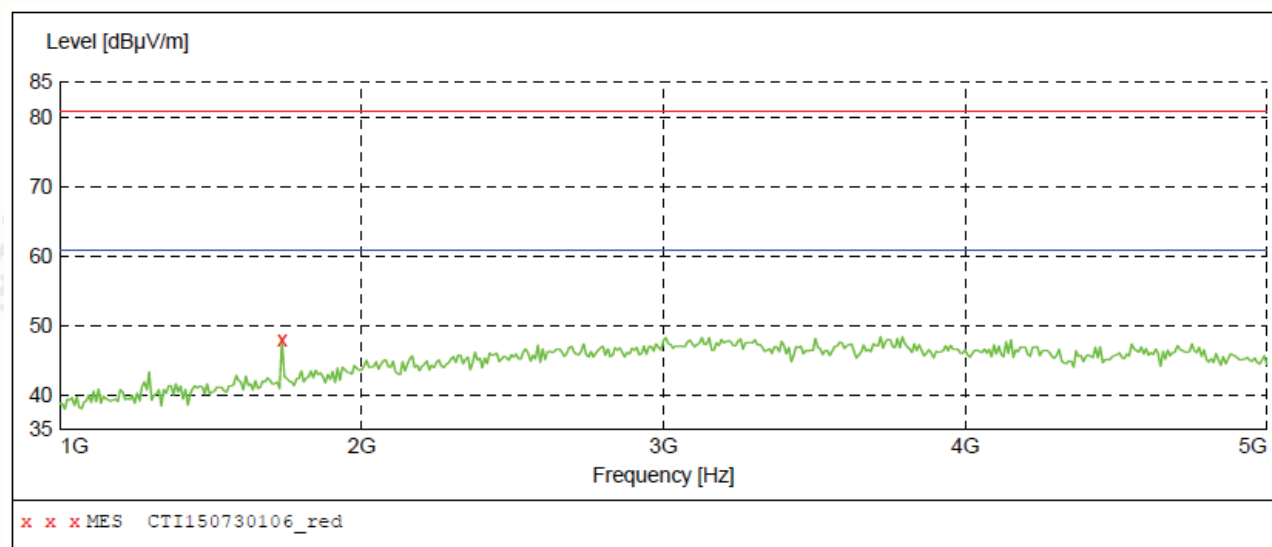
##### Above 1GHz:



**V:**  
**30MHz ~ 1GHz:**



**Above 1GHz:**



**Test data:**

| Frequency (MHZ) | Polarization (H/V) | Emission PK (dBμV/m) | Duty Cycle Correction Factor (dB) | Emission AV (dBμV/m) | Limit (dBμV/m) |      | Result (P/F) |
|-----------------|--------------------|----------------------|-----------------------------------|----------------------|----------------|------|--------------|
|                 |                    |                      |                                   |                      | PK             | AV   |              |
| 433.92.0*       | H                  | 76.7                 | -3.6                              | 73.1                 | 100.8          | 80.8 | P            |
| 433.92.0*       | V                  | 73.3                 | -3.6                              | 69.7                 | 100.8          | 80.8 | P            |
| 1735.68         | H                  | 44.9                 | -3.6                              | 41.3                 | 80.8           | 60.8 | P            |
| 1735.68         | V                  | 48.1                 | -3.6                              | 44.5                 | 80.8           | 60.8 | P            |

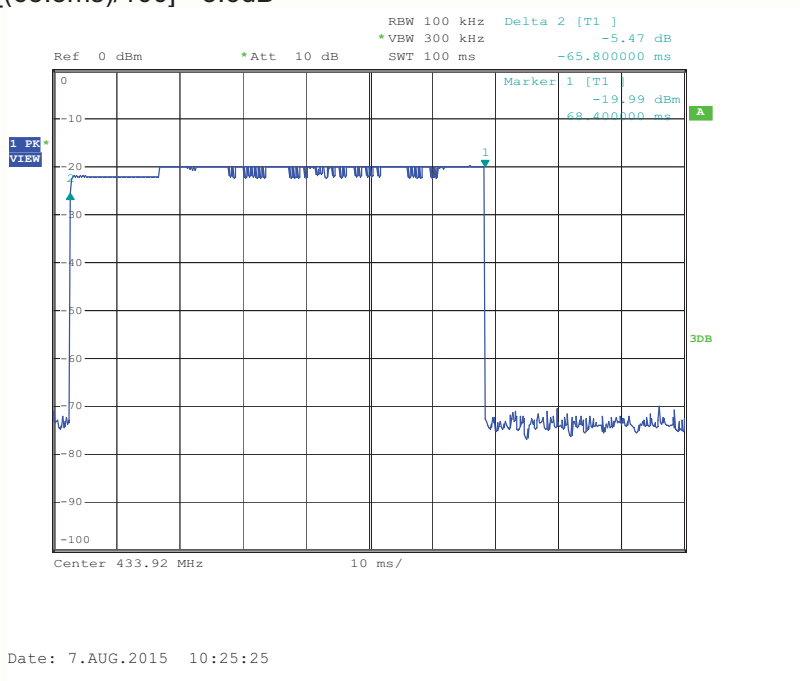
\*: Fundamental Frequency

\*\*: Restriction bands.

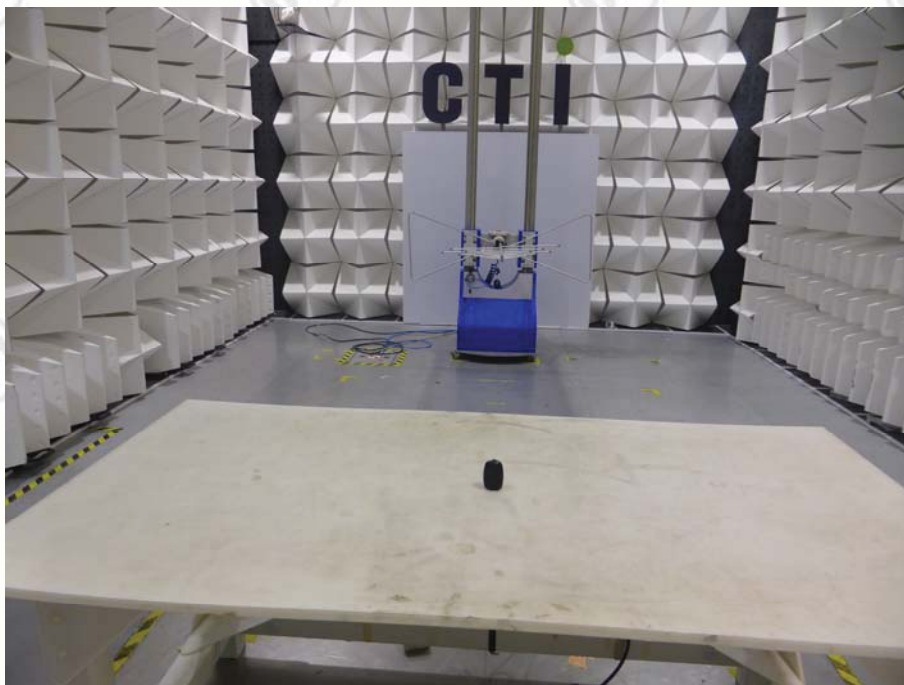
Duty Cycle Correction Factor is calculated by averaging the sum of the pulse train. Correction factor is measured as follows:

Keep the EUT in continuous transmission mode (modulated), and set the spectrum to the fundamental frequency and set the span width to 0 Hz. Then connect a storage oscilloscope to the video output of the spectrum that is used to detect the pulse train. Adjust the oscilloscope settings to observe the pulse train and determine the number and width of the pulses, as well as the period of the train. Duty Cycle Correction Factor at its minimum value (Worst case): -3.6dB

Duty Cycle=  $20\log[(65.8\text{ms})/100]=-3.6\text{dB}$



## APPENDIX 1 PHOTOGRAPHS OF TEST SETUP



**TEST SETUP OF RADIATED EMISSION (30MHz-1GHz)**



**TEST SETUP OF RADIATED EMISSION (above 1GHz)**

## APPENDIX 2 EXTERNAL PHOTOGRAPHS OF PRODUCT



External View of product-1

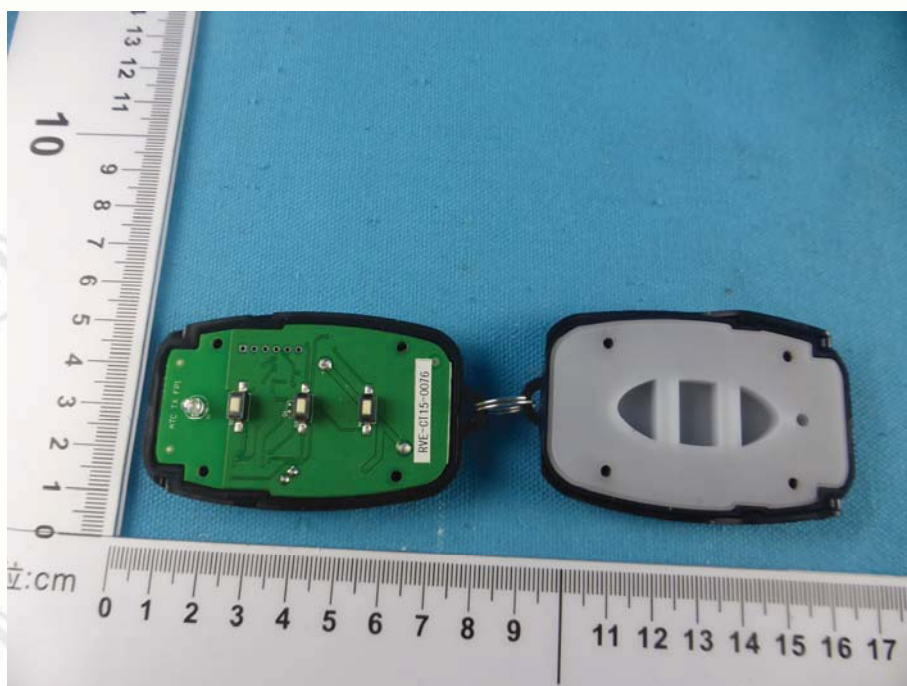


External View of product-2

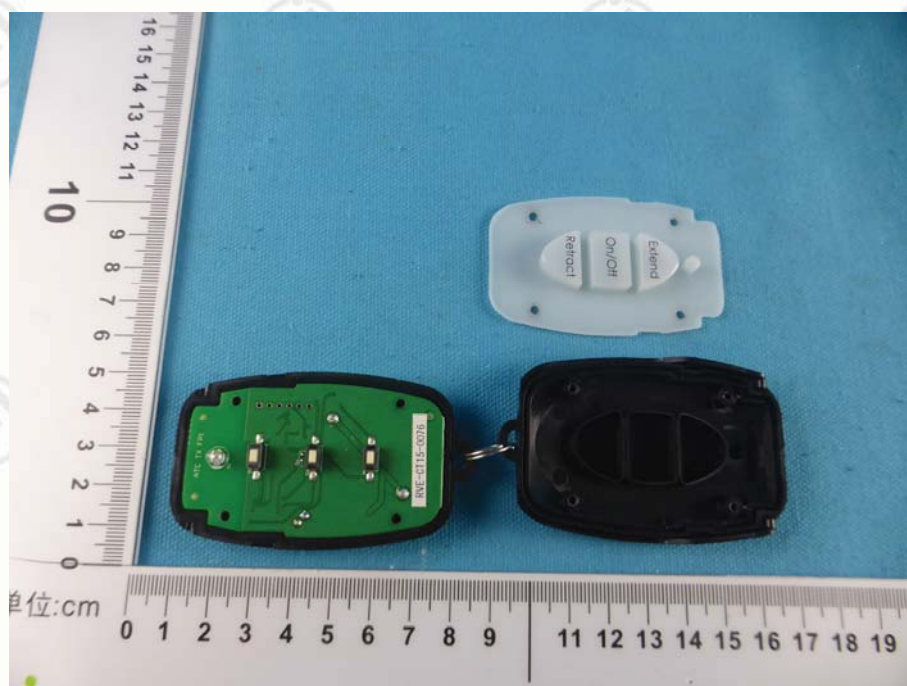
### APPENDIX 3 INTERNAL PHOTOGRAPHS OF PRODUCT



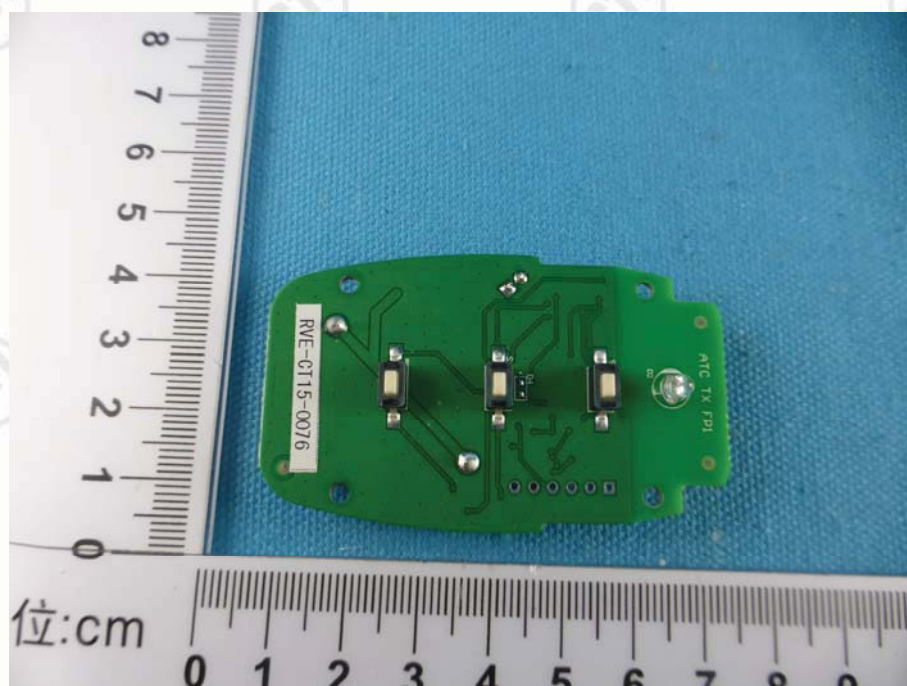
Internal View of product-1



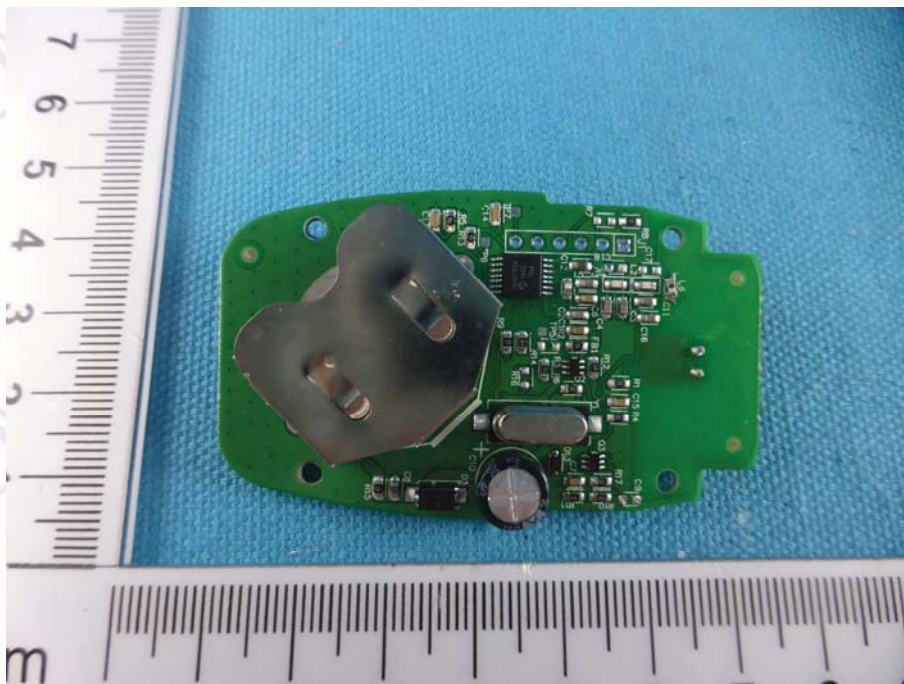
Internal View of product-2



Internal View of product-3



Internal View of product-4



Internal View of product-5

\*\*\* End of Report \*\*\*

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