

## **FCC 15.231 Test Report**

**for**

**Chungear Industrial Co., Ltd**

**12 Jingke 8th Rd Nantun District Taichung 40852 Taiwan**

**Product Name : Ceiling Fan Remote Controller  
(Transmitter)**

**Model Name : TR123B**

**FCC ID : KUJCE10901**

**Prepared by: : AUDIX Technology Corporation,  
EMC Department**



The statement is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. Government.

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## TEST REPORT CERTIFICATION

Applicant : Chungear Industrial Co., Ltd  
Manufacturer #1 : Chungear Industrial Co., Ltd  
Manufacturer #2 : Satellite Electronic (Zhongshan) Ltd.  
Manufacturer #3 : Zhongshan Amity Electronic Ltd.  
EUT Description  
(1) Product : Ceiling Fan Remote Controller (Transmitter)  
(2) Model : TR123B  
(3) Power Supply : DC 12V

Applicable Standards:

Title 47CFR FCC Part 15 Subpart C  
ANSI C63.10:2013

**Audix Technology Corp.** tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

**Audix Technology Corp.** does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

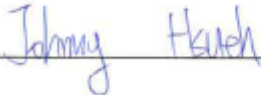
Date of Report: 2020. 08. 28

Reviewed by:



(Sabrina Wang/Administrator)

Approved by:



(Johnny Hsueh/Section Manager)



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## 1. REVISION RECORD OF TEST REPORT

| Edition No | Issued Date  | Revision Summary | Report Number |
|------------|--------------|------------------|---------------|
| 0          | 2020. 08. 28 | Original Report  | EM-F200378    |

## 2. SUMMARY OF TEST RESULTS

| Rule                                                                                                                                                          | Description                                          | Results     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-------------|
| 15.207                                                                                                                                                        | Conducted Emission                                   | N/A, Note 2 |
| 15.209/15.231(b)                                                                                                                                              | Radiated Spurious Emission and Fundamental Frequency | PASS        |
| 15.231(c)                                                                                                                                                     | Emission Bandwidth                                   | PASS        |
| 15.231(a)(1)                                                                                                                                                  | Periodic Operated                                    | PASS        |
| 15.203                                                                                                                                                        | Antenna Requirement                                  | Compliance  |
| Note: 1. The uncertainties value is not used in determining the result.<br>2. The EUT only employs battery power for operation, so it is unnecessary to test. |                                                      |             |

### 3. GENERAL INFORMATION

#### 3.1. Description of Application

|             |                                                                                                                                                                                                                                                                                                                                                             |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant   | Chungear Industrial Co., Ltd<br>12 Jingke 8th Rd Nantun District Taichung 40852 Taiwan                                                                                                                                                                                                                                                                      |
| Manufacture | #1 Chungear Industrial Co., Ltd<br>12 Jingke 8th Rd Nantun District Taichung 40852 Taiwan<br>#2 Satellite Electronic (Zhongshan) Ltd.<br>8 CHUANG YE RD.TORCH DEVELOPMENT<br>ZONE..ZHONGSHAN.GUANGDONG.528437 CHINA<br>#3 Zhongshan Amity Electronic Ltd.<br>No. 16 Torch Hi-Tech Industrial Development Zone, Zhong<br>Shan City Guangdong Province China. |
| Product     | Ceiling Fan Remote Controller (Transmitter)                                                                                                                                                                                                                                                                                                                 |
| Model       | TR123B                                                                                                                                                                                                                                                                                                                                                      |

#### 3.2. Description of EUT

|                        |              |
|------------------------|--------------|
| Test Model             | TR123B       |
| Serial Number          | N/A          |
| Power Rating           | DC 12V       |
| RF Features            | ASK          |
| Transmit Type          | 1T           |
| Sample Status          | Production   |
| Date of Receipt        | 2020. 08. 14 |
| Date of Test           | 2020. 08. 25 |
| Interface Ports of EUT | N/A          |
| Accessories Supplied   | N/A          |

### 3.3. Antenna Information

| No. | Antenna Part Number | Manufacture | Antenna Type | Frequency (MHz) | Max Gain (dBi) |
|-----|---------------------|-------------|--------------|-----------------|----------------|
| 1   | ---                 | ---         | PCB          | ---             | ---            |

### 3.4. EUT Specifications Assessed in Current Report

| Modulation | Fundamental Range (MHz) | Channel Number |
|------------|-------------------------|----------------|
| ASK        | 304.17                  | 1              |

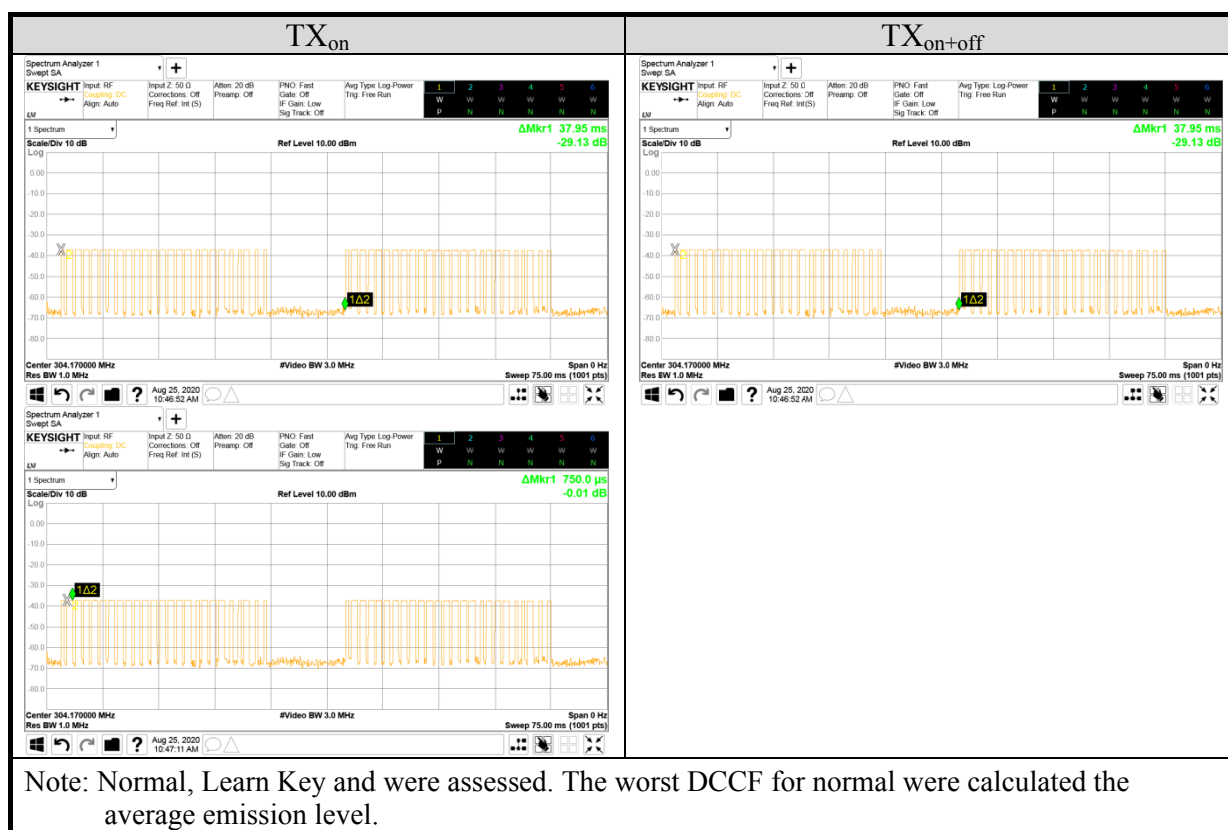
### 3.5. Description of Key Components

None

### 3.6. Test Configuration

#### Duty Cycle

| TX <sub>on</sub> (ms)                                               | TX <sub>on+off</sub> (ms) | Duty Cycle Factor (dB) |
|---------------------------------------------------------------------|---------------------------|------------------------|
| 0.375*6+0.750*19= 16.50                                             | 37.95                     | -7.23                  |
| Duty Cycle Factor = 20log (TX <sub>on</sub> /TX <sub>on+off</sub> ) |                           |                        |



| Item                                                 | Test Frequency |
|------------------------------------------------------|----------------|
| Radiated Spurious Emission and Fundamental Frequency | 304.17MHz      |
| Emission Bandwidth                                   | 304.17MHz      |
| Periodic Operated                                    | 304.17MHz      |

Note 1: ☐ Mobile Device

☒ Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow: ☒ Lie ☐ Side ☐ Stand

### 3.7. Tested Supporting System List

None

### 3.8. Setup Configuration

#### 3.8.1. EUT Configuration for Radiated Emission



#### 3.8.2. EUT Configuration for RF Conducted Test Items



### 3.9. Operating Condition of EUT

To press the button of EUT is used for enabling EUT RF function under continues transmitting.

### 3.10. Description of Test Facility

|                   |                                                                                                                                                                                                                                             |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name of Test Firm | Audix Technology Corporation / EMC Department<br>No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan<br>Tel: +886-2-26092133<br>Fax: +886-2-26099303<br>Website : www.audixtech.com<br>Contact e-mail: attemc_report@audixtech.com |
| Accreditations    | The laboratory is accredited by following organizations under ISO/IEC 17025:2017<br>(1) NVLAP(USA)<br>NVLAP Lab Code 200077-0<br>(2) TAF(Taiwan)<br>No. 1724                                                                                |
| Test Facilities   | FCC OET Designation Number under APEC MRA by NCC is : TW1724<br>ISED CAB Identifier Number under APEC TEL MRA by NCC is TW1724<br>(1) No.1 3m Semi Anechoic Chamber<br>(2) Fully Anechoic Chamber                                           |

### 3.11.Measurement Uncertainty

| Test Items/Facilities |                                     |                               | Frequency Range                | Uncertainty |
|-----------------------|-------------------------------------|-------------------------------|--------------------------------|-------------|
| Conduction Test       |                                     |                               | 9kHz-150kHz                    | ±3.7dB      |
|                       |                                     |                               | 150kHz-30MHz                   | ±3.5dB      |
| Radiation Test        | <input checked="" type="checkbox"/> | No.1 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal   | ±4.1dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Horizontal | ±3.9dB      |
|                       |                                     |                               | 30MHz-200MHz, 3m, Vertical     | ±4.2dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Vertical   | ±4.1dB      |
|                       |                                     |                               | 1GHz-6GHz, 3m                  | ±4.2dB      |
|                       |                                     |                               | 6GHz-18GHz, 3m                 | ±4.6dB      |
|                       | <input type="checkbox"/>            | No.3 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal   | ±3.9dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Horizontal | ±3.9dB      |
|                       |                                     |                               | 30MHz-200MHz, 3m, Vertical     | ±4.4dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Vertical   | ±4.1dB      |
|                       | <input type="checkbox"/>            | No.4 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal   | ±4.3dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Horizontal | ±4.0dB      |
|                       |                                     |                               | 30MHz-200MHz, 3m, Vertical     | ±4.3dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Vertical   | ±4.4dB      |
|                       |                                     |                               | 1GHz-6GHz, 3m                  | ±4.5dB      |
|                       |                                     |                               | 6GHz-18GHz, 3m                 | ±4.6dB      |
|                       | <input type="checkbox"/>            | No.5 3m Semi Anechoic Chamber | 30MHz-200MHz, 3m, Horizontal   | ±4.0dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Horizontal | ±3.9dB      |
|                       |                                     |                               | 30MHz-200MHz, 3m, Vertical     | ±4.2dB      |
|                       |                                     |                               | 200MHz-1000MHz, 3m, Vertical   | ±4.3dB      |
|                       |                                     |                               | 1GHz-6GHz, 3m                  | ±4.3dB      |
|                       |                                     |                               | 6GHz-18GHz, 3m                 | ±4.7dB      |
|                       | <input checked="" type="checkbox"/> | Fully Anechoic Chamber        | 30MHz~1000MHz                  | ±4.7dB      |
|                       |                                     |                               | 1GHz~18GHz                     | ±5.3dB      |

Remark : Uncertainty =  $ku_c(y)$

| Test Item                 | Uncertainty |
|---------------------------|-------------|
| Emission Bandwidth (20dB) | ± 0.2kHz    |
| 99% Occupied Bandwidth    | ± 0.38%     |
| Periodic Operated         | ± 0.05s     |

## 4. MEASUREMENT EQUIPMENT LIST

### 4.1. Radiated Emission Measurement

| Item | Type                       | Manufacturer | Model No.  | Serial No.  | Cal. Date  | Cal. Interval |
|------|----------------------------|--------------|------------|-------------|------------|---------------|
| 1.   | Spectrum Analyzer          | Agilent      | N9010A-526 | MY53400071  | 2019.09.11 | 1 Year        |
| 2.   | Spectrum Analyzer          | Agilent      | N9030A-526 | MY53310269  | 2020.01.16 | 1 Year        |
| 3.   | Test Receiver              | R&S          | ESCS30     | 100338      | 2020.06.10 | 1 Year        |
| 4.   | Amplifier                  | HP           | 8447D      | 2944A06305  | 2020.01.16 | 1 Year        |
| 5.   | Amplifier                  | HP           | 8449B      | 3008A02678  | 2020.02.27 | 1 Year        |
| 6.   | Loop Antenna               | R&S          | HFH2-Z2    | 891847/27   | 2019.12.26 | 2 Years       |
| 7.   | Bilog Antenna              | TESEQ        | CBL6112D   | 33821       | 2020.01.17 | 1 Year        |
| 8.   | Horn Antenna               | EMCO         | 3117       | 00135902    | 2020.03.20 | 1 Year        |
| 9.   | Digital Thermo-Hygro Meter | iMax         | HTC-1      | No.1 3m A/C | 2020.04.17 | 1 Year        |
| 10.  | Digital Thermo-Hygro Meter | EVERY DAY    | E-512      | RF-02       | 2020.04.17 | 1 Year        |
| 11.  | Test Software              | Audix        | e3         | V6.120619c  | N.C.R.     | N.C.R.        |
| 12.  | Test Software              | Audix        | e3         | V6.110601   | N.C.R.     | N.C.R.        |

### 4.2. RF Conducted Measurement

| Item | Type                       | Manufacturer                 | Model No.  | Serial No. | Cal. Date  | Cal. Interval |
|------|----------------------------|------------------------------|------------|------------|------------|---------------|
| 1.   | Spectrum Analyzer          | Keysight                     | N9020B-544 | MY57120357 | 2020.01.10 | 1 Year        |
| 2.   | Wide Band Antenna          | Diamond                      | RH799      | N/A        | N.C.R.     | N.C.R.        |
| 3.   | Digital Thermo-Hygro Meter | Shenzhen Datronn Electronics | KT-905     | RF         | 2020.04.17 | 1 Year        |



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## 5. CONDUCTED EMISSION

【The EUT only employs Batteries power for operation, no conductive emission limits are required according to FCC Part 15 Section §15.207】

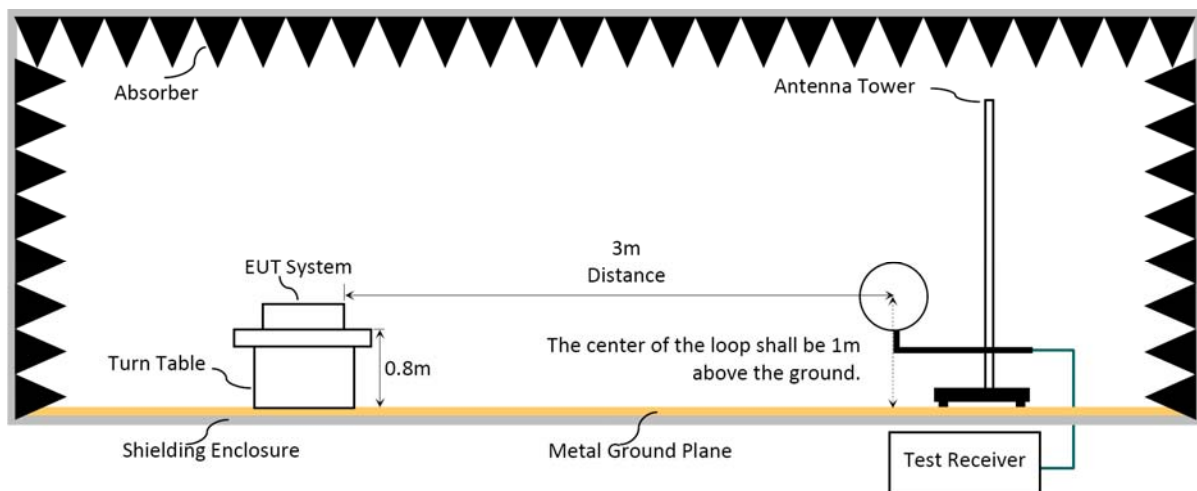
## 6. RADIATED SPURIOUS EMISSION

### 6.1. Block Diagram of Test Setup

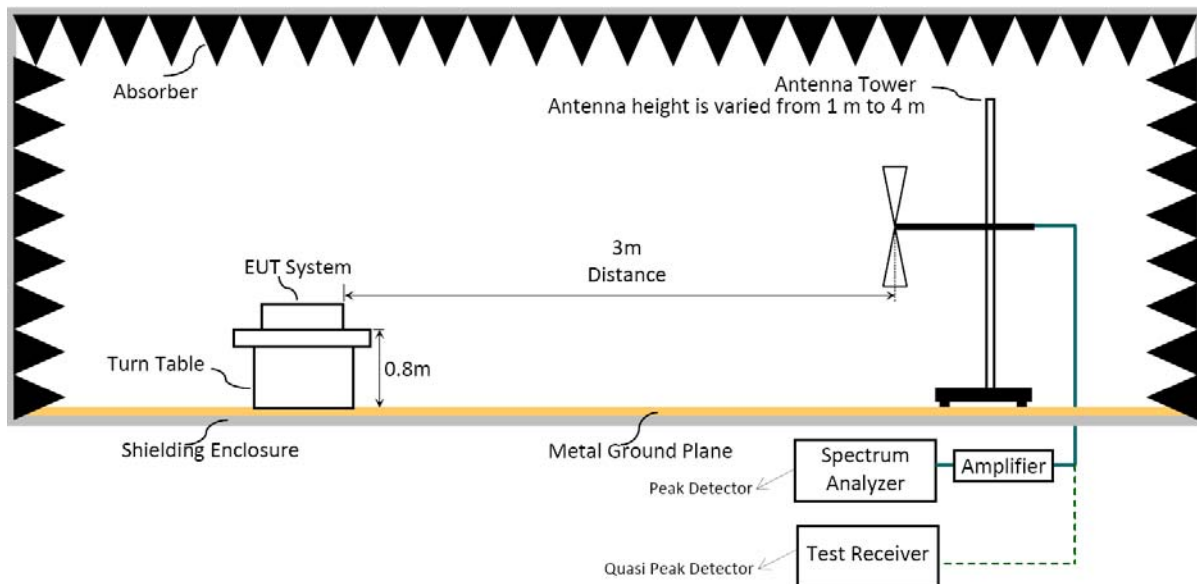
#### 6.1.1. Block Diagram of EUT

Indicated as section 3.8

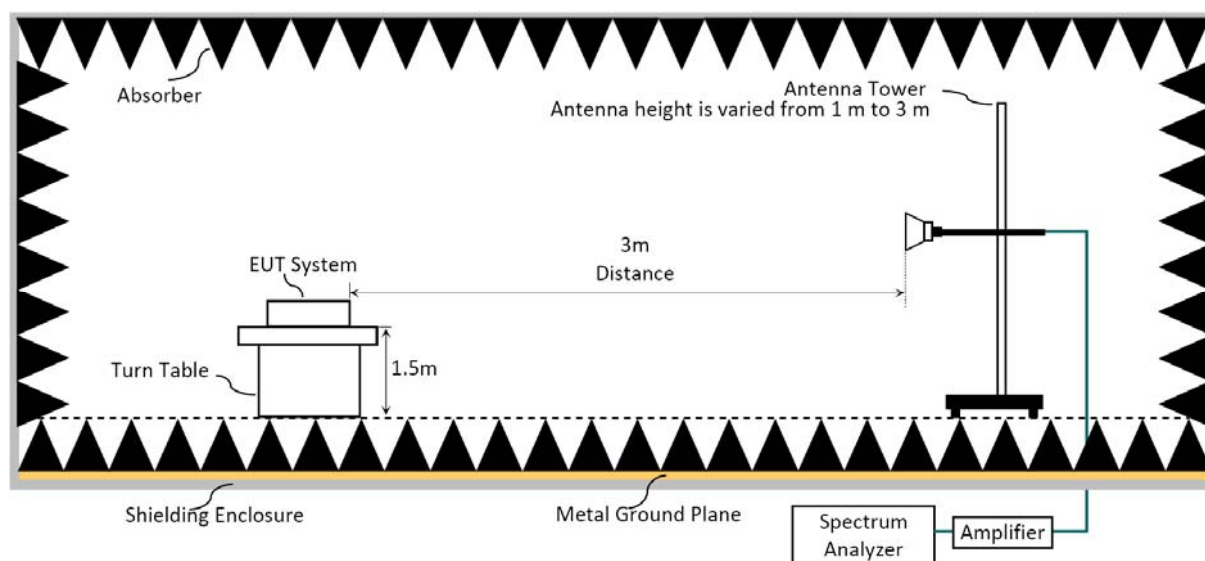
#### 6.1.2. Setup Diagram for 9kHz-30MHz



#### 6.1.3. Setup Diagram for 30MHz-1000MHz



#### 6.1.4. Setup Diagram for above 1GHz



## 6.2. Radiated Emission Limits

### 6.2.1. General Limit

Radiated emissions which fall in restricted bands, as defined in Section 15.205 must also comply with the radiated emission limits specified as below.

| Frequency (MHz) | Distance (m) | Limits                                                  |             |
|-----------------|--------------|---------------------------------------------------------|-------------|
|                 |              | dB $\mu$ V/m                                            | $\mu$ V/m   |
| 0.009 - 0.490   | 300          | 67.6-20 log f(kHz)                                      | 2400/f kHz  |
| 0.490 - 1.705   | 30           | 87.6-20 log f(kHz)                                      | 24000/f kHz |
| 1.705 - 30      | 30           | 29.5                                                    | 30          |
| 30 - 88         | 3            | 40.0                                                    | 100         |
| 88- 216         | 3            | 43.5                                                    | 150         |
| 216- 960        | 3            | 46.0                                                    | 200         |
| Above 960       | 3            | 54.0                                                    | 500         |
| Above 1000      | 3            | 74.0 dB $\mu$ V/m (Peak)<br>54.0 dB $\mu$ V/m (Average) |             |

Remark : (1) dB $\mu$ V/m = 20 log ( $\mu$ V/m)

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

### 6.2.2. Limite for Fundamental Frequency

In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

| Fundamental frequency (MHz)          | Field strength of fundamental (microvolts/meter) | Field strength of spurious emissions (microvolts/meter) |
|--------------------------------------|--------------------------------------------------|---------------------------------------------------------|
| 40.66-40.70                          | 2,250                                            | 225                                                     |
| 70-130                               | 1,250                                            | 125                                                     |
| 130-174                              | <sup>1</sup> 1,250 to 3,750                      | <sup>1</sup> 125 to 375                                 |
| 174-260                              | 3,750                                            | 375                                                     |
| 260-470                              | <sup>1</sup> 3,750 to 12,500                     | <sup>1</sup> 375 to 1,250                               |
| Above 470                            | 12,500                                           | 1,250                                                   |
| <sup>1</sup> : Linear Interpolations |                                                  |                                                         |

Remark : (1)  $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$

(2) The tighter limit applies to the edge between two frequency bands.

(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

(4) Where limit of Fundamental Freq. is calculated by:

$$41.6667 \times 304.17 - 7083.3333 = 5590.51839 \mu\text{V/m} = 74.95 \text{dB}\mu\text{V/m}$$

(5) The limits in this table are based on CFR 47 Part 15.231(b).

## 6.3. Test Procedure

### Frequency Range 9kHz~30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level.

In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

(1) RBW = 9kHz with peak and average detector.

(2) Detector: average and peak (9kHz-490kHz)

Q.P. (490kHz-30MHz)

### Frequency Range 30MHz to 10th harmonic:

The EUT setup on the turn table which has 80 cm (for 30-1000 MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

**Frequency below 1 GHz:**

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120KHz
- (2) VBW  $\geq 3 \times$  RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

**Frequency above 1GHz to 10th harmonic:****Peak Detector:**

- (1) RBW = 1MHz
- (2) VBW  $\geq 3 \times$  RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

**Average Detector:****■ Option 1:**

- (1) RBW = 1MHz
- (2) VBW  $\geq 1/T$ .
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

**□ Option 2:**

Average Emission Level = Peak Emission Level + D.C.C.F.

## 6.4. Measurement Result Explanation

■ Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading (including Preamp factor if test used)

■ Average Emission Level = Antenna Factor + Cable Loss + Meter Reading (including Preamp factor if test used)

□ Average Emission Level = Peak Emission Level + DCCF

Duty Cycle Correction Factor (DCCF) =  $20\log(TX_{on}/TX_{on+off})$  presented in section 3.6

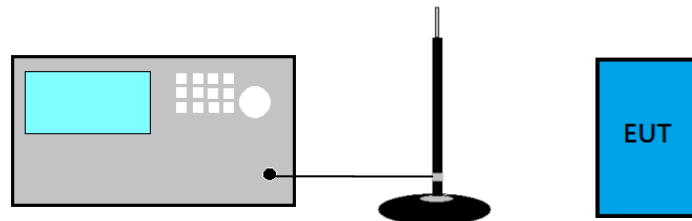
□ ERP = Peak Emission Level - 95.2dB - 2.14dB

## 6.5. Test Results

Please refer to Appendix A.

## 7. EMISSION BANDWIDTH MEASUREMENT

### 7.1. Block Diagram of Test Setup



### 7.2. Specification Limits

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

### 7.3. Test Procedure

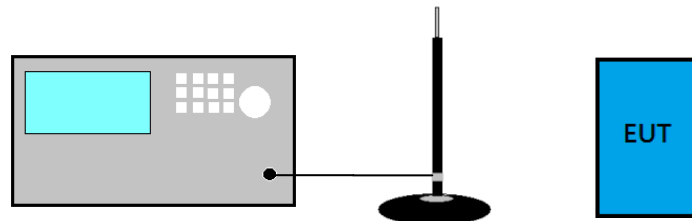
- (1) Set RBW close to 1-5 % of OBW.
- (2) Set  $VBW \geq RBW$ .
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -20 dB to record the final bandwidth.

### 7.4. Test Results

Please refer to Appendix A

## 8. PERIODIC OPERATED MEASUREMENT

### 8.1. Block Diagram of Test Setup



### 8.2. Specification Limits

The operation of this device is manually operated transmitter that is automatically deactivated the transmitter within not more than 5 seconds of being released

### 8.3. Test Procedure

- (1) Span = zero
- (2)  $RBW \geq 100\text{kHz}$
- (3)  $VBW \geq RBW$
- (4) Sweep = 5s
- (5) Detector function = peak
- (6) Trace = single sweep

### 8.4. Test Results

Please refer to Appendix A



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## 9. DEVIATION TO TEST SPECIFICATIONS

【NONE】



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# APPDNDIX A

## TEST DATA AND PLOTS

(Model: TR123B)

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## A.1 RADIATED SPURIOUS EMISSION

|              |            |            |             |
|--------------|------------|------------|-------------|
| Test Date    | 2020/08/25 | Temp./Hum. | 25°C/46%    |
| Test Voltage | DC 12V     | Tested By  | Martin Chen |

### A.1.1 Emissions Applied to General Requirement

#### A.1.1.1 Frequency 9kHz~30MHz

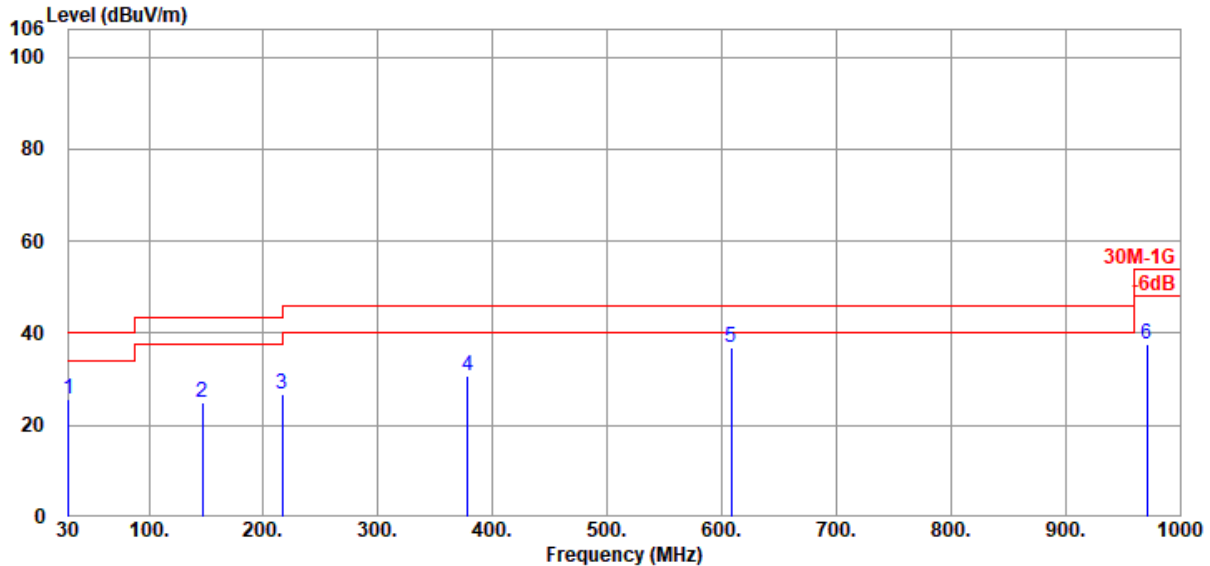
**The emissions (9kHz~30MHz) not reported for there is no emission be found.**

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### A.1.1.2 Frequency Below 1 GHz

|                |              |            |        |
|----------------|--------------|------------|--------|
| Test Frequency | TX 304.17MHz | Test Model | TR123B |
|----------------|--------------|------------|--------|



### Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|------------------------|-------------------|-------------------------|-----------------|-------------|----------|
| 30.000                   | 24.20                 | 1.20            | 26.53                  | 26.84             | 25.71                   | 40.00           | 14.29       | Peak     |
| 146.400                  | 17.55                 | 3.02            | 26.07                  | 30.46             | 24.96                   | 43.50           | 18.54       | Peak     |
| 216.240                  | 16.49                 | 3.70            | 25.83                  | 32.57             | 26.93                   | 46.00           | 19.07       | Peak     |
| 378.230                  | 21.35                 | 5.71            | 26.39                  | 30.22             | 30.89                   | 46.00           | 15.11       | Peak     |
| 608.120                  | 24.82                 | 7.08            | 27.48                  | 32.60             | 37.02                   | 46.00           | 8.98        | Peak     |
| 970.900                  | 27.25                 | 9.03            | 26.92                  | 28.31             | 37.67                   | 54.00           | 16.33       | Peak     |

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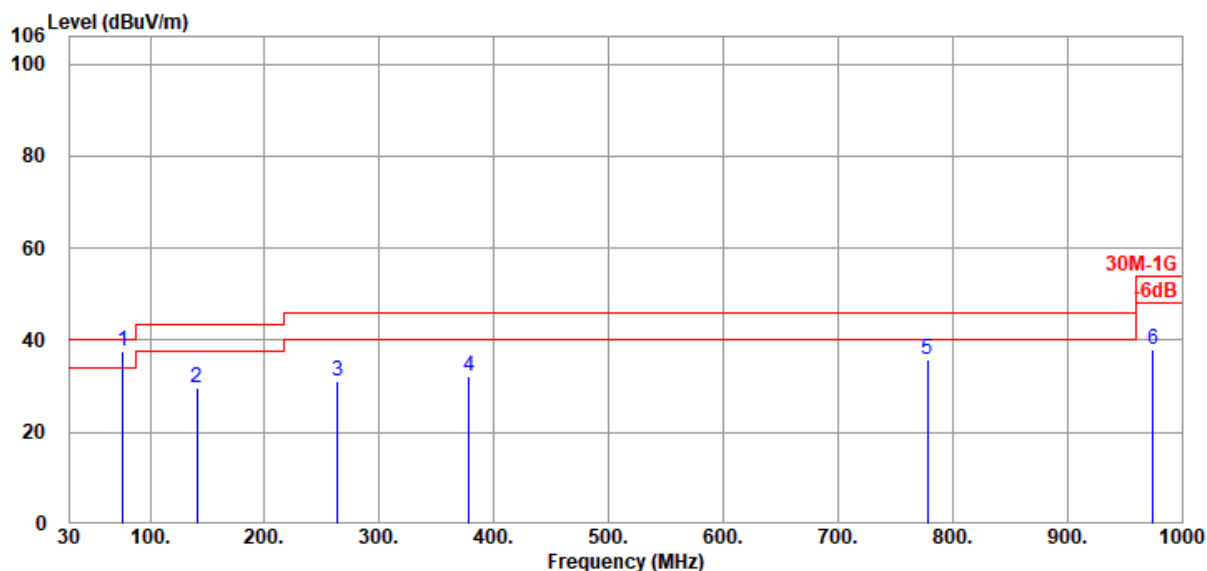
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|                |              |            |        |
|----------------|--------------|------------|--------|
| Test Frequency | TX 304.17MHz | Test Model | TR123B |
|----------------|--------------|------------|--------|



#### Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamplifier Gain (dB) | Read Level (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|------------------------|-------------------|-------------------------|-----------------|-------------|----------|
| 76.560                   | 12.92                 | 2.12            | 26.39                  | 48.82             | 37.47                   | 40.00           | 2.53        | Peak     |
| 140.580                  | 18.04                 | 2.95            | 26.10                  | 34.93             | 29.82                   | 43.50           | 13.68       | Peak     |
| 263.770                  | 18.86                 | 4.17            | 25.75                  | 33.99             | 31.27                   | 46.00           | 14.73       | Peak     |
| 378.230                  | 21.35                 | 5.71            | 26.39                  | 31.42             | 32.09                   | 46.00           | 13.91       | Peak     |
| 777.870                  | 25.86                 | 8.02            | 27.43                  | 29.40             | 35.85                   | 46.00           | 10.15       | Peak     |
| 974.780                  | 27.26                 | 9.05            | 26.90                  | 28.76             | 38.17                   | 54.00           | 15.83       | Peak     |

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|                |              |            |        |
|----------------|--------------|------------|--------|
| Test Frequency | TX 304.17MHz | Test Model | TR123B |
|----------------|--------------|------------|--------|

**Antenna at Horizontal Polarization**

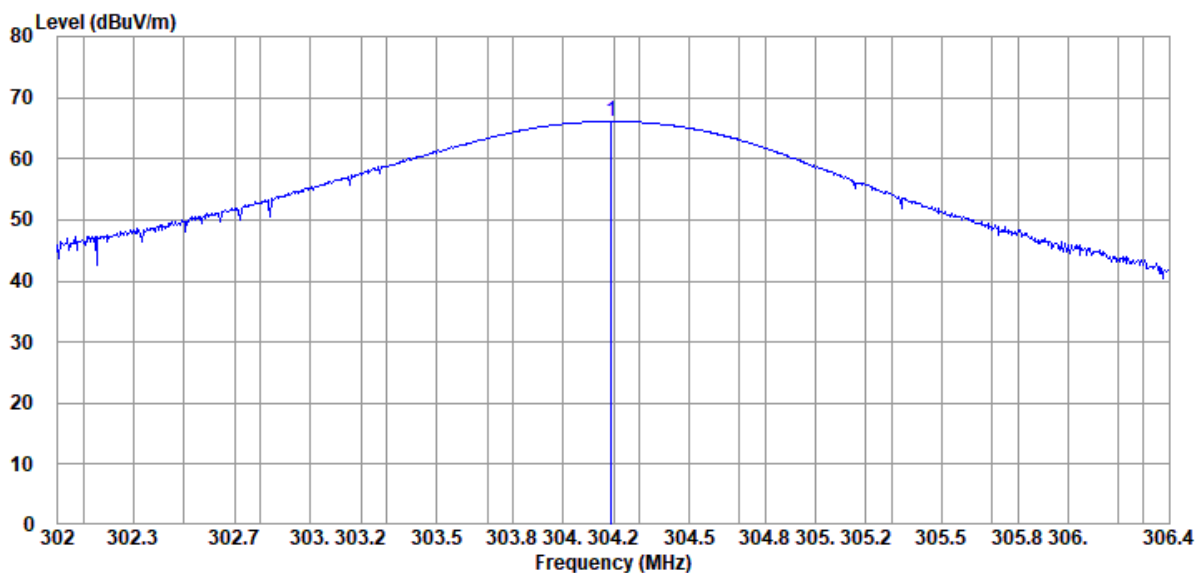
| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dB $\mu$ V) | Emission<br>Level<br>(dB $\mu$ V/m) | Limits<br>(dB $\mu$ V/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------------|-------------------------------------|--------------------------|----------------|----------|
| 1208.000                       | 28.74                       | 6.82                  | 35.06                  | 38.17                         | 38.67                               | 54.00                    | 15.33          | Peak     |

**Antenna at Vertical Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Preamp<br>Gain<br>(dB) | Read<br>Level<br>(dB $\mu$ V) | Emission<br>Level<br>(dB $\mu$ V/m) | Limits<br>(dB $\mu$ V/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|------------------------|-------------------------------|-------------------------------------|--------------------------|----------------|----------|
| 1208.000                       | 28.74                       | 6.82                  | 35.06                  | 36.74                         | 37.24                               | 54.00                    | 16.76          | Peak     |

### A.1.2 Fundamental Frequency

|                |              |            |        |
|----------------|--------------|------------|--------|
| Test Frequency | TX 304.17MHz | Test Model | TR123B |
|----------------|--------------|------------|--------|



#### Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Gain (dB) | Read Level (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|------------------|-------------------|-------------------------|-----------------|-------------|----------|
| 304.191                  | 19.40                 | 4.62            | 25.75            | 67.86             | 66.13                   | 94.95           | 28.82       | Peak     |

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 304.191                  | 66.13                        | -7.23     | 58.90                           | 74.95           | 16.05       | Average |

Remark: Horizontal is the strongest polarization and peak value has complied with average limit, so vertical won't be listed in test report.

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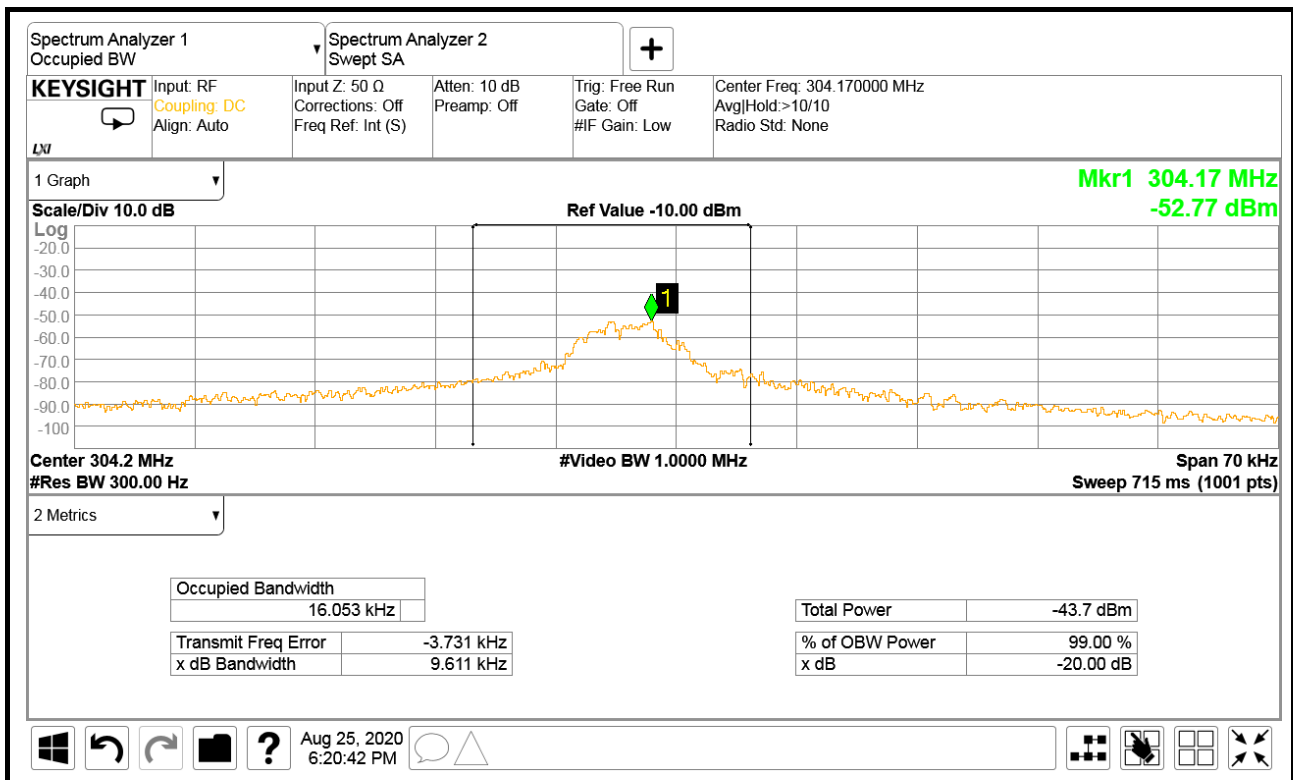
## A.2 EMISSION BANDWIDTH MEASUREMENT

|                |              |            |             |
|----------------|--------------|------------|-------------|
| Test Date      | 2020/08/25   | Temp./Hum. | 25°C/52%    |
| Test Voltage   | DC 12V       | Tested By  | Martin Chen |
| Test Frequency | TX 304.17MHz | Test Model | TR123B      |

### A.2.1 Emission Bandwidth

| Center Frequency (MHz) | 20dB Occupied Bandwidth (MHz) | 99% Occupied Bandwidth (MHz) | Tolerance (%) | Tolerance Limit (%) |
|------------------------|-------------------------------|------------------------------|---------------|---------------------|
| 304.17                 | 0.009611                      | 0.016053                     | 0.003         | 0.25                |

### A.2.2 Measurement Plots



## A.3 PERIODIC OPERATED MEASUREMENT

|                |              |            |             |
|----------------|--------------|------------|-------------|
| Test Date      | 2020/08/25   | Temp./Hum. | 25°C/52%    |
| Test Voltage   | DC 12V       | Tested By  | Martin Chen |
| Test Frequency | TX 304.17MHz | Test Model | TR123B      |

### A.3.1 Periodic Operated

|                        |             |              |
|------------------------|-------------|--------------|
| Center Frequency (MHz) | Time (Sec.) | Limit (Sec.) |
| 304.17                 | 0.300       | < 5          |

### A.3.2 Measurement Plots

