

# FCC Part 90& Part 22 Rules Test Report

Report No.: AGC01039170302FE10A

FCC ID : POD-DMR1

**PRODUCT DESIGNATION**: DMR Digital Transceiver

BRAND NAME : TYT

**MODEL NAME** : MD-280, MD-280A, MD-280B, MD-280C, MD-280D

**APPLICANT**: TYT ELECTRONICS CO., LTD

**DATE OF ISSUE** : Sep. 14, 2020

STANDARD(S) : FCC Part 90 Rules FCC Part 22 Rules

**REPORT VERSION** : V 1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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# **Report Revise Record**

| Report Version | Revise Time | Issued Date   | Valid Version | Notes                      |
|----------------|-------------|---------------|---------------|----------------------------|
| V1.0           | 1           | Sep. 14, 2020 | Valid         | Class II Permissive Change |

**Note:** The original test report Ref. No. (AGC01039170302FE10) (dated 2017-06-29), was modified on 2020-09-14 to include the following changes and additions for:

- -Updated serial model name.
- -Update the appearance of the series model, the components on the PCB.

For the above described changes, update Spurious Ratiated Emission and EUT PHOTOs

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#### 1. VERIFICATION OF COMPLIANCE

| TYT ELECTRONICS CO., LTD  |  |  |
|---|--|--|
|   |  |  |
| Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujiar China.  |  |  |
| TYT ELECTRONICS CO., LTD  |  |  |
| Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian, China. |  |  |
| TYT ELECTRONICS CO., LTD  |  |  |
| Block 39-1, Optoelectronics-information industry base, Nan'an, Quanzhou, Fujian, China. |  |  |
| DMR Digital Transceiver   |  |  |
| TYT   |  |  |
| MD-280  |  |  |
| MD-280A, MD-280B, MD-280C, MD-280D  |  |  |
| Only the model and product appearance line design are different                         |  |  |
| Jul. 31, 2020~Sep. 14, 2020   |  |  |
|   |  |  |

#### WE HEREBY CERTIFY THAT:

The above equipment was tested by Shenzhen Attestation of Global Compliance Science & Technology Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI/TIA-603-E (2016). The sample tested as described in this report is in compliance with the FCC Rules Part 90 and FCC Rules Part 22 requirements

The test results of this report relate only to the tested sample identified in this report.

| Prepared By | Calin Lin                         |               |
|-------------|-----------------------------------|---------------|
| NGC -       | Calvin Liu<br>(Project Engineer)  | Sep. 14, 2020 |
| Reviewed By | Max Zlang                         |               |
| P.G.        | Max Zhang<br>(Reviewer)           | Sep. 14, 2020 |
| Approved By | Forrest les                       |               |
| io loc      | Forrest Lei<br>Authorized Officer | Sep. 14, 2020 |

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# 2. GENERAL INFORMATION

#### 2.1PRODUCT DESCRIPTION

The EUT is a **DMR Digital Transceiver** designed for voice/data communication. It is designed by way of utilizing the FM/4FSK modulation achieves the system operating.

A major technical description of EUT is described as following:

| Communication Type                       | Voice / Data   |  |  |  |
|--|--|--|--|--|
| Hardware Version                         | V2.2   |  |  |  |
| Software Version                         | MD-280-d12.32  |  |  |  |
| Modulation                               | FM/4FSK  |  |  |  |
| Emission Type                            | 7K60FXD/7K60FXE/11K0F3E  |  |  |  |
| Output power Modification                | 5W/1W (It was fixed by the manufacturer, any individual can't arbitrarily change it.)                    |  |  |  |
| Data Rate                                | 9600bps/12.5KHz(Channel Spacing)   |  |  |  |
| Antenna Designation                      | Detachable   |  |  |  |
| Antenna Gain                             | 1.2dBi   |  |  |  |
| Antenna Length                           | 9.5 cm   |  |  |  |
| Power Supply                             | DC 7.4V  |  |  |  |
| Adapter Parameter                        | INPUT: 100V-240V , 50HZ , 0.2A<br>OUTPUT: 12V , 0.5A   |  |  |  |
| Limiting Voltage                         | DC 6.00 V~ 8.51V   |  |  |  |
| 5  | Frequency Range: 400 MHz to 480 MHz (UHF) Channel Separation: 12.5KHz(Digital/ Analog)                   |  |  |  |
| Operation Frequency<br>Range and Channel | Bottom Channel: 400.025MHz Middle Channel: 453.225MHz Middle Channel: 454.025MHz Top Channel: 479.975MHz |  |  |  |

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| Transmit Mod | le/Emission | Designator |  |
|--------------|-------------|------------|--|

|    | Frequency Range<br>(MHz) | Rated Transmit Power(W)(Conducted) | Transmit Mode/Emission Designator          |
|----|--------------------------|------------------------------------|--|
| 3) | 400-480                  | 5W/1W                              | 11K0F3E(Analog Vioce;NB)                   |
|    | 400-480                  | 5W/1W                              | 7K60FXD/7K60FXW(9600Data/Digital Voice NB) |
|    |                          |                                    |  |

| Channel No.<br>(6.25KHz) | Channel No.<br>(12.5KHz) | 12.5KHz Channel Spaced 400MHz Band<br>Plan(MHz) |  |
|--------------------------|--------------------------|---|--|
| 2                        | 1-2                      | 400.025   |  |
| 3                        | 3-4                      | 440.025   |  |
| 4                        | 3-4                      | 440.025   |  |
| 5                        | 5-6                      | 479.975   |  |
| 6                        | 3-0                      | 479.975   |  |

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FCC Rules and Regulations Part 2.202: Necessary Bandwidth and Emission Bandwidth

#### For FM Mode (ChannelSpacing: 12.5kHz)

Emission Designator 11K0F3E

In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation.

BW = 2(M+D) = 2\*(3.0 kHz + 2.5 kHz) = 11 kHz = 11K0

F3E portion of the designator represents an FM voice transmission

Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 11K0F3E.

# For FM Mode (Channel Spacing: 25kHz)

Emission Designator 16K0F3E

In this case, the maximum modulating frequency is 3.0 kHz with a 5.0 kHz deviation.

BW = 2(M+D) = 2\*(3.0 kHz + 5.0 kHz) = 16 kHz = 16K0

F3E portion of the designator represents an FM voice transmission

Therefore, the entire designator for 25 kHz channel spacing FM mode is 16K0F3E.

#### For Digital Mode (Channel Spacing: 12.5 kHz)

Emission Designator 7K60F1D and

7K60F1E

The 99% energy rule was used for digital mode. It basically states that 99% of the modulation energy falls within X kHz, in this case, 7.60 kHz.

F1D and F1E portion of the designator indicates digital information.

Therefore, the entire designator for 12.5 kHz channel spacing digital mode is 7K60F1D and 7K60F1E.

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# 2.2RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: **POD-DMR1**, filing to comply with Part 2, Part 22, and Part 90 of the Federal Communication Commission rules.

#### 2.3 TEST METHODOLOGY

The radiated emission testing was performed according to the procedures of ANSI/TIA-603-E (2016).

#### 2.4 TEST FACILITY

| Test Site                         | Attestation of Global Compliance (Shenzhen) Co., Ltd   |  |  |
|-----------------------------------|--|--|--|
| Location                          | 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China |  |  |
| Designation Number                | CN1259   |  |  |
| FCC Test Firm Registration Number | 975832   |  |  |
| A2LA Cert. No.                    | 5054.02  |  |  |
| Description                       | Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA  |  |  |

#### 2.5 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

#### 2.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

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#### 3. SYSTEM TEST CONFIGURATION

#### **3.1EUT CONFIGURATION**

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

#### 3.2 EUT EXERCISE

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

#### 3.3 GENERAL TECHNICAL REQUIREMENTS

For FCC Part 90& Part 22 requirements:

- (1). Section 90.205 &22.565: RF Output Power
- (2). Section 90.207: Modulation Characteristic
- (3). Section 90.209 &22.359: Occupied Bandwidth
- (4). Section 90.210&22.359: Emission Mask
- (5). Section 90.213&22.355: Frequency Tolerance
- (6). Section 90.214: Transient Frequency Behavior
- (7). Section 90.210&22.359: Spurious Emission on Antenna Port
- (8). Section 90.210&22.359: Spurious Ratiated Emission

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#### 3.4CONFIGURATION OF TESTED SYSTEM

Fig. 2-1 Configuration of Tested System



Table 2-1 Equipment Used in Tested System

| Item                | Equipment               | Model No. | Identifier       | Note |
|---------------------|-------------------------|-----------|------------------|------|
| <ul><li>1</li></ul> | DMR Digital Transceiver | MD-280    | FCC ID: POD-DMR1 | EUT  |

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# 4. SUMMARY OF TEST RESULTS

| FCC Rules                  | Description Of Test        | Result    |
|----------------------------|----------------------------|-----------|
| §90.210& 22.359<br>§2.1053 | Spurious Ratiated Emission | Compliant |



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#### LIST OF EQUIPMENTS USED

| Equipment                        | Manufacturer   | Model       | S/N           | Cal. Date     | Cal. Due      |
|----------------------------------|----------------|-------------|---------------|---------------|---------------|
| TEST RECEIVER                    | R&S            | ESCI        | 10096         | May 15, 2020  | May 14, 2021  |
| EXA Signal<br>Analyzer           | Aglient        | N9020A      | W1312-60196   | Oct. 08, 2019 | Oct. 07, 2020 |
| EXA Signal<br>Analyzer           | Aglient        | N9020A      | MY52090123    | Oct. 08, 2019 | Oct. 07, 2020 |
| Horn antenna                     | SCHWARZBECK    | BBHA 9170   | #768          | Sep.16, 2019  | Sep.15, 2021  |
| preamplifier                     | ChengYi        | EMC184045SE | 980508        | Oct.29, 2019  | Oct 28, 2020  |
| Double-Ridged<br>Waveguide Horn  | ETS LINDGREN   | 3117        | 00034609      | May. 17, 2019 | May. 16, 2021 |
| Broadband<br>Preamplifier        | SCHWARZBECK    | BBV 9718    | 9718-205      | Jun. 09, 2020 | Jun. 08, 2021 |
| HORN ANTENNA                     | EM             | EM-AH-10180 | /             | Feb.28, 2020  | Feb.27, 2021  |
| SIGNAL<br>GENERATOR              | AGILENT        | E4421B      | MY43351603    | Jun. 09, 2020 | Jun. 08, 2021 |
| SIGNAL<br>GENERATOR              | R&S            | SMT03       | A0304261      | Jun. 09, 2020 | Jun. 08, 2021 |
| ANTENNA                          | SCHWARZBECK    | VULB9168    | VULB9168-494  | Jan. 09, 2019 | Jan. 08, 2021 |
| ANTENNA                          | SCHWARZBECK    | VULB9168    | D69250        | Sep.26, 2018  | Sep.25, 2020  |
| Modulation<br>Domain Analyzer    | HP             | 53310A      | 3121A02467    | Oct. 30, 2019 | Oct. 29, 2020 |
| Small<br>environmental<br>tester | ESPEC          | SH-242      | 30 <u></u> 60 | Feb. 25, 2019 | Feb. 24, 2020 |
| RF<br>Communication<br>Test Set  | HP             | 8920B       | 8             | Jun. 09, 2020 | Jun. 08, 2021 |
| Attenuator                       | Weinachel Corp | 58-30-33    | ML030         | Oct. 28, 2019 | Oct. 27, 2020 |
| RF Cable                         | R&S            | 1#          |               | Each time     | N/A           |
| RF Cable                         | R&S            | 2#          | 2.0           | Each time     | N/A           |
| Fliter-UHF                       | Microwave      | N25155M2    | 498705        | May. 11, 2020 | May. 10, 2021 |
| Fliter-VHF                       | Microwave      | N26460M1    | 498703        | May. 11, 2020 | May. 10, 2021 |

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# 5. DESCRIPTION OF TEST MODES

#### **RF TEST MODES**

The EUT (**DMR Digital Transceiver**) has been tested under normal operating condition. (The top channel, the middle channel and the bottom channel) are chosen for testing at each channel separation.

#### Analog:

| No.              | TEST MODES     | CHANNEL SEPARATION |
|------------------|----------------|--------------------|
| G <sup>O</sup> 1 | Low Channel    | 12.5 KHz           |
| 2                | Middle Channel | 12.5 KHz           |
| 3                | High Channel   | 12.5 KHz           |

#### Digital:

| No. | TEST MODES     | CHANNEL SEPARATION |
|-----|----------------|--------------------|
| 1   | Low Channel    | 12.5 KHz           |
| 2   | Middle Channel | 12.5 KHz           |
| 3   | High Channel   | 12.5 KHz           |

Note: Only the result of the worst case was recorded in the report.

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#### 6. SPURIOUS RATIATED EMISSION

#### **6.1 PROVISIONS APPLICABLE**

According to FCC §2.1053 §22.359 and §90.210, the power of each unwanted emission shall be less than Transmitted Power as specified below for transmitters designed to operate with each channel separation.

Emission Mask D -for 12.5 KHz Channel Separation:

- (1).On any frequency removed from the center of the authorized bandwidth fo to 5.625 KHz removed from fo: Zero dB.
- (2). On any frequency removed from the center of the authorized bandwidth by a displacement Frequency (fd in KHz) fo of more than 5.625 KHz but no more than 12.5 KHz: At least 7.27(fd-2.88 KHz) dB
- (3).On any frequency removed from the center of the authorized bandwidth by a displacement Frequency (fd in KHz)fo of more than 12.5 KHz: At least 50+10 log(P) dB or 70 dB, whichever is lesser attenuation.

According to FCC §22.359:

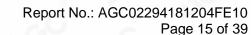
(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

#### **6.2 MEASUREMENT PROCEDURE**

- (1)On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
- (2) The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
- (3) The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
- (4) The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
- (5) The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
- (6) The transmitter shall than be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- (7)The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
- (8) The maximum signal level detected by the measuring receiver shall be noted.
- (9) The measurement shall be repeated with the test antenna set to horizontal polarization.
- (10) Replace the antenna with a proper Antenna (substitution antenna).
- (11)The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
- (12) The substitution antenna shall be connected to a calibrated signal generator.
- (13)If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- (14) The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- (15) The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- (16) The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- (17) The measurement shall be repeated with the test antenna and the substitution antenna oriented for

horizontal polarization.

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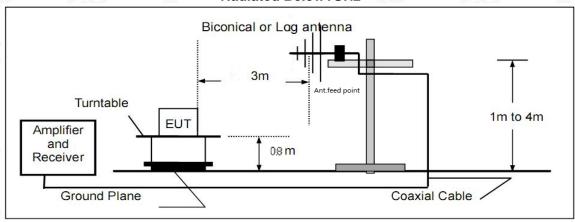


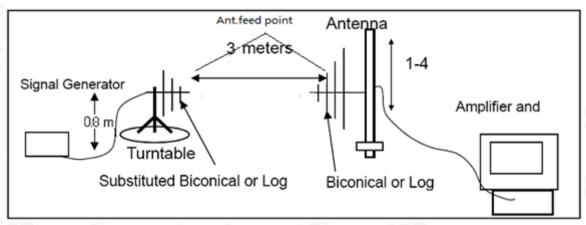


#### **6.3 TEST SETUP BLOCK DIAGRAM**

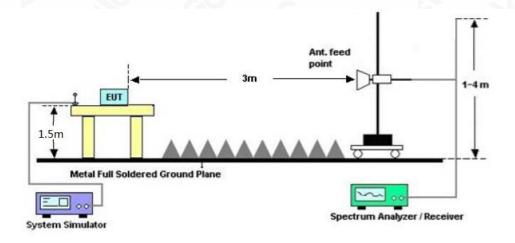
#### **SUBSTITUTION METHOD: (Radiated Emissions)**

#### Radiated Below1GHz





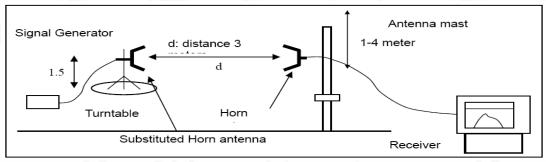
#### **Radiated Above 1 GHz**



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#### **6.4 MEASUREMENT RESULTS:**

#### **Applicable Standard**

FCC §2.1053, §22.359 and §90.210

On any frequency removed from the center of the authorized bandwidth by a displacement

Frequency (fd in KHz)for of more than 12.5 KHz: at least 50+10 log(P) dB or 70 dB, whichever is lesser attenuation.

#### **Test Procedure**

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz for below 1GHz<sup>th</sup> and 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10 harmonic.

In the semi-anechoic chamber, setup as illustrated above the DUT placed on the 0.8m height of Turn Table, rotated the table 45 degree each interval to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power for each degree interval. The "Read Value" is the spectrum reading of maximum power value.

The substitution antenna is substituted for DUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiation power. Record the power level of maximum radiation power from spectrum. So, the Measured substitution value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.

EIRP = "Read Value" + Measured substitution value + 2.15.

**Limit: FCC PART 90:** 

At least 50+10 log (P) =50+10log (5) =56.99 (dB)—5W 36.99-56.99=-20dBm At least 50+10 log (P) =50+10log (1) =50 (dB)—1W 30-50=-20dBm

**FCC PART 22:** 

At least 43+10 log (P) =43+10log (5) =49.99 (dB)—5W 36.99-49.99=-13dBm At least 43+10 log (P) =43+10log (1) =43 (dB)—1W 30-43=-13dBm

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# Analog:

Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz-5W

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 400.025                        | Н                     |                                       | <del>-</del> ®                 | pass        |
| 800.050                        | ⊗ H                   | 71.46                                 | 57                             | pass        |
| 1200.075                       | H                     | 73.18                                 | 57                             | pass        |
| 1600.100                       | H                     | 74.98                                 | 57                             | pass        |
| 2000.125                       | Н                     | 76.42                                 | 57                             | pass        |
| 2400.150                       | ◎ H                   | 75.85                                 | 57                             | pass        |
| 2800.175                       | Н                     | 78.70                                 | 57                             | pass        |
| 3200.200                       | Н                     | 80.02                                 | 57                             | pass        |
| 3600.225                       | Н                     | 78.42                                 | 57                             | pass        |
| 4000.250                       | Н                     | 81.52                                 | 57                             | pass        |

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 400.025                        | V                     |                                       | 9 - 20                         | pass        |
| 800.050                        | V                     | 71.41                                 | 57                             | pass        |
| 1200.075                       | V                     | 71.62                                 | 57                             | pass        |
| 1600.100                       | V                     | 73.13                                 | 57                             | pass        |
| 2000.125                       | V                     | 73.37                                 | 57                             | pass        |
| 2400.150                       | V                     | 74.40                                 | 57                             | pass        |
| 2800.175                       | V                     | 74.18                                 | 57                             | pass        |
| 3200.200                       | V                     | 80.12                                 | 57                             | pass        |
| 3600.225                       | V                     | 80.76                                 | 57                             | pass        |
| 4000.250                       | V                     | 79.26                                 | 57                             | pass        |



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# Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz-5W

| 100                            |                       |                                       | 189                            |             |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
| 454.025                        | Н                     | 0 - 6                                 | · -                            | pass        |
| 908.050                        | Н                     | 69.14                                 | 57                             | pass        |
| 1362.075                       | ® H                   | 69.03                                 | 57                             | pass        |
| 1816.100                       | - C H                 | 71.74                                 | 57                             | pass        |
| 2270.125                       | H                     | 74.37                                 | 57                             | pass        |
| 2724.150                       | Н                     | 74.16                                 | 57                             | pass        |
| 3178.175                       | Н                     | 75.89                                 | 57                             | pass        |
| 3632.200                       | H                     | 77.65                                 | 57                             | pass        |
| 4086.225                       | H                     | 78.78                                 | 57                             | pass        |
| 4540.250                       | Н                     | 81.39                                 | 57                             | pass        |

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 454.025                        | V                     | (-)                                   | - °                            | pass        |
| 908.050                        | V                     | 71.21                                 | 57                             | pass        |
| 1362.075                       | V                     | 70.36                                 | 57                             | pass        |
| 1816.100                       | V                     | 73.51                                 | 57                             | pass        |
| 2270.125                       | V                     | 74.38                                 | 57                             | pass        |
| 2724.150                       | V                     | 76.49                                 | 57                             | pass        |
| 3178.175                       | V                     | 75.36                                 | 57                             | pass        |
| 3632.200                       | V                     | 78.59                                 | 57                             | pass        |
| 4086.225                       | V                     | 78.26                                 | 57                             | pass        |
| 4540.250                       | V                     | 80.42                                 | 57                             | pass        |



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# Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz-5W

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 479.975                        | Н                     | 0 - ~                                 | <u>-</u>                       | pass        |
| 959.950                        | Н                     | 70.49                                 | 57                             | pass        |
| 1439.925                       | В                     | 68.95                                 | 57                             | pass        |
| 1919.900                       | H                     | 71.24                                 | 57                             | pass        |
| 2399.875                       | H                     | 71.53                                 | 57                             | pass        |
| 2879.850                       | Н                     | 73.41                                 | 57                             | pass        |
| 3359.825                       | ® H                   | 74.94                                 | 57                             | pass        |
| 3839.800                       | H                     | 77.43                                 | 57                             | pass        |
| 4319.775                       | Н                     | 79.33                                 | 57                             | pass        |
| 4799.750                       | Н                     | 79.57                                 | 57                             | pass        |

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 479.975                        | V                     | (6)                                   | - ®                            | pass        |
| 959.950                        | V                     | 66.41                                 | 57                             | pass        |
| 1439.925                       | V                     | 68.45                                 | 57                             | pass        |
| 1919.900                       | V                     | 69.24                                 | © 57                           | pass        |
| 2399.875                       | V                     | 75.61                                 | 57                             | pass        |
| 2879.850                       | V                     | 74.98                                 | 57                             | pass        |
| 3359.825                       | V                     | 77.73                                 | 57                             | pass        |
| 3839.800                       | V                     | 79.62                                 | 57                             | pass        |
| 4319.775                       | V                     | 79.99                                 | 57                             | pass        |
| 4799.750                       | V                     | 80.18                                 | 57                             | pass        |



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# Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz-1W

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 400.025                        | Н                     | 0 - ~                                 | <u>-</u>                       | pass        |
| 800.050                        | Н                     | 71.24                                 | 50                             | pass        |
| 1200.075                       | ВН                    | 72.04                                 | 50                             | pass        |
| 1600.100                       | - C H                 | 72.45                                 | 50                             | pass        |
| 2000.125                       | H                     | 75.62                                 | 50                             | pass        |
| 2400.150                       | Н                     | 76.75                                 | 50                             | pass        |
| 2800.175                       | Н                     | 75.97                                 | 50                             | pass        |
| 3200.200                       | Н                     | 81.47                                 | 50                             | pass        |
| 3600.225                       | Н                     | 81.66                                 | 50                             | pass        |
| 4000.250                       | Н                     | 80.68                                 | 50                             | pass        |

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement<br>Result<br>Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---|--------------------------------|-------------|
| 400.025                        | V                     | (-)   | - C - ®                        | pass        |
| 800.050                        | V                     | 70.62                                       | 50                             | pass        |
| 1200.075                       | V                     | 72.11                                       | 50                             | pass        |
| 1600.100                       | V                     | 74.36                                       | 50                             | pass        |
| 2000.125                       | V                     | 75.48                                       | 50                             | pass        |
| 2400.150                       | V                     | 74.01                                       | 50                             | pass        |
| 2800.175                       | V                     | 74.65                                       | 50                             | pass        |
| 3200.200                       | V                     | 79.02                                       | 50                             | pass        |
| 3600.225                       | V                     | 80.03                                       | 50                             | pass        |
| 4000.250                       | V                     | 80.43                                       | 50                             | pass        |



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# Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz-1W

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 454.025                        | Н                     | U - ~                                 | · -                            | pass        |
| 908.050                        | Н                     | 67.72                                 | 50                             | pass        |
| 1362.075                       | ® Н                   | 69.34                                 | 50                             | pass        |
| 1816.100                       | Н                     | 72.14                                 | 50                             | pass        |
| 2270.125                       | H                     | 74.72                                 | 50                             | pass        |
| 2724.150                       | Н                     | 75.18                                 | 50                             | pass        |
| 3178.175                       | В                     | 74.27                                 | 50                             | pass        |
| 3632.200                       | H                     | 76.12                                 | 50                             | pass        |
| 4086.225                       | H                     | 78.73                                 | 50                             | pass        |
| 4540.250                       | Н                     | 79.66                                 | 50                             | pass        |

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 454.025                        | V                     | (6)                                   | - °                            | pass        |
| 908.050                        | V                     | 68.03                                 | 50                             | pass        |
| 1362.075                       | V                     | 68.80                                 | 50                             | pass        |
| 1816.100                       | V                     | 69.62                                 | 50                             | pass        |
| 2270.125                       | V                     | 71.81                                 | 50                             | pass        |
| 2724.150                       | V                     | 75.82                                 | 50                             | pass        |
| 3178.175                       | V                     | 78.44                                 | 50                             | pass        |
| 3632.200                       | V                     | 78.32                                 | 50                             | pass        |
| 4086.225                       | V                     | 78.18                                 | 50                             | pass        |
| 4540.250                       | V                     | 79.01                                 | 50                             | pass        |



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# Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz-1W

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 479.975                        | Н                     | U - ~                                 | · -                            | pass        |
| 959.950                        | Н                     | 71.27                                 | 50                             | pass        |
| 1439.925                       | • Н                   | 74.86                                 | 50                             | pass        |
| 1919.900                       | H                     | 73.37                                 | 50                             | pass        |
| 2399.875                       | H                     | 75.57                                 | 50                             | pass        |
| 2879.850                       | Н                     | 76.32                                 | 50                             | pass        |
| 3359.825                       | Н                     | 78.94                                 | 50                             | pass        |
| 3839.800                       | J H                   | 79.73                                 | 50                             | pass        |
| 4319.775                       | Н                     | 80.17                                 | 50                             | pass        |
| 4799.750                       | Н                     | 82.44                                 | 50                             | pass        |

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement<br>Result<br>Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---|--------------------------------|-------------|
| 479.975                        | V                     | (-)   | - C - ®                        | pass        |
| 959.950                        | V                     | 70.15                                       | 50                             | pass        |
| 1439.925                       | V                     | 67.34                                       | 50                             | pass        |
| 1919.900                       | V                     | 80.87                                       | 50                             | pass        |
| 2399.875                       | V                     | 79.77                                       | 50                             | pass        |
| 2879.850                       | V                     | 78.60                                       | 50                             | pass        |
| 3359.825                       | V                     | 80.64                                       | 50                             | pass        |
| 3839.800                       | V                     | 81.86                                       | 50                             | pass        |
| 4319.775                       | V                     | 80.97                                       | 50                             | pass        |
| 4799.750                       | V                     | 81.92                                       | 50                             | pass        |



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# Digital:

Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz-5W

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement<br>Result<br>Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---|--------------------------------|-------------|
| 400.025                        | Н                     |   | - 0                            | pass        |
| 800.050                        | ® H                   | 67.56                                       | 57                             | pass        |
| 1200.075                       | Н 🕲                   | 68.24                                       | 57                             | pass        |
| 1600.100                       | H                     | 69.85                                       | 57                             | pass        |
| 2000.125                       | Н                     | 71.98                                       | 57                             | pass        |
| 2400.150                       | © H                   | 80.71                                       | 57                             | pass        |
| 2800.175                       | Н                     | 82.15                                       | 57                             | pass        |
| 3200.200                       | Н                     | 81.21                                       | 57                             | pass        |
| 3600.225                       | Н                     | 80.41                                       | 57                             | pass        |
| 4000.250                       | Н                     | 80.24                                       | 57                             | pass        |

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 400.025                        | V                     | -                                     | 9 - 20                         | pass        |
| 800.050                        | V                     | 71.41                                 | 57                             | pass        |
| 1200.075                       | V                     | 69.33                                 | 57                             | pass        |
| 1600.100                       | V                     | 66.48                                 | 57                             | pass        |
| 2000.125                       | V                     | 67.73                                 | 57                             | pass        |
| 2400.150                       | V                     | 73.72                                 | 57                             | pass        |
| 2800.175                       | V                     | 73.40                                 | 57                             | pass        |
| 3200.200                       | V                     | 75.81                                 | 57                             | pass        |
| 3600.225                       | V                     | 80.19                                 | 57                             | pass        |
| 4000.250                       | V                     | 81.56                                 | 57                             | pass        |

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# Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz-5W

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 454.025                        | Н                     | 0 - 6                                 | · -                            | pass        |
| 908.050                        | Н                     | 70.33                                 | 57                             | pass        |
| 1362.075                       | Н                     | 70.25                                 | 57                             | pass        |
| 1816.100                       | H H                   | 72.01                                 | 57                             | pass        |
| 2270.125                       | H                     | 73.32                                 | 57                             | pass        |
| 2724.150                       | Н                     | 75.33                                 | 57                             | pass        |
| 3178.175                       | ® H                   | 77.49                                 | 57                             | pass        |
| 3632.200                       | Н                     | 78.62                                 | 57                             | pass        |
| 4086.225                       | Н                     | 79.93                                 | 57                             | pass        |
| 4540.250                       | Н                     | 80.50                                 | 57                             | pass        |

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement<br>Result<br>Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---|--------------------------------|-------------|
| 454.025                        | V                     | -   | · · ·                          | pass        |
| 908.050                        | V                     | 69.95                                       | 57                             | pass        |
| 1362.075                       | V                     | 70.77                                       | 57                             | pass        |
| 1816.100                       | V                     | 71.33                                       | 57                             | pass        |
| 2270.125                       | V                     | 73.01                                       | 57                             | pass        |
| 2724.150                       | V                     | 73.73                                       | 57                             | pass        |
| 3178.175                       | V                     | 73.63                                       | 57                             | pass        |
| 3632.200                       | V                     | 75.48                                       | 57                             | pass        |
| 4086.225                       | V                     | 77.23                                       | 57                             | pass        |
| 4540.250                       | V                     | 78.06                                       | 57                             | pass        |



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# Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz-5W

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 479.975                        | Н                     | 0 - 6                                 | · -                            | pass        |
| 959.950                        | Н                     | 67.82                                 | 57                             | pass        |
| 1439.925                       | ВН                    | 68.22                                 | 57                             | pass        |
| 1919.900                       | H H                   | 69.66                                 | 57                             | pass        |
| 2399.875                       | H                     | 72.08                                 | 57                             | pass        |
| 2879.850                       | Н                     | 73.25                                 | 57                             | pass        |
| 3359.825                       | В                     | 75.32                                 | 57                             | pass        |
| 3839.800                       | H                     | 77.98                                 | 57                             | pass        |
| 4319.775                       | Н                     | 80.43                                 | 57                             | pass        |
| 4799.750                       | Н                     | 81.28                                 | 57                             | pass        |

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement<br>Result<br>Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---|--------------------------------|-------------|
| 479.975                        | V                     | -   | · · ·                          | pass        |
| 959.950                        | V                     | 69.70                                       | 57                             | pass        |
| 1439.925                       | V                     | 68.14                                       | 57                             | pass        |
| 1919.900                       | V                     | 72.12                                       | 57                             | pass        |
| 2399.875                       | V                     | 74.89                                       | 57                             | pass        |
| 2879.850                       | V                     | 76.72                                       | 57                             | pass        |
| 3359.825                       | V                     | 80.96                                       | 57                             | pass        |
| 3839.800                       | V                     | 80.69                                       | 57                             | pass        |
| 4319.775                       | V                     | 82.37                                       | 57                             | pass        |
| 4799.750                       | V                     | 81.53                                       | 57                             | pass        |



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# Measurement Result for 12.5 KHz Channel Separation @ 400.025MHz-1W

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 400.025                        | Н                     | 0 - 6                                 | · -                            | pass        |
| 800.050                        | Н                     | 68.03                                 | 50                             | pass        |
| 1200.075                       | ® H                   | 70.69                                 | 50                             | pass        |
| 1600.100                       | - C H                 | 72.98                                 | 50                             | pass        |
| 2000.125                       | H                     | 74.56                                 | 50                             | pass        |
| 2400.150                       | Н                     | 74.78                                 | 50                             | pass        |
| 2800.175                       | Н                     | 76.32                                 | 50                             | pass        |
| 3200.200                       | Н                     | 77.57                                 | 50                             | pass        |
| 3600.225                       | H                     | 79.59                                 | 50                             | pass        |
| 4000.250                       | Н                     | 80.72                                 | 50                             | pass        |

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 400.025                        | V                     | (-)                                   | - °                            | pass        |
| 800.050                        | V                     | 69.81                                 | 50                             | pass        |
| 1200.075                       | V                     | 71.36                                 | 50                             | pass        |
| 1600.100                       | V                     | 71.66                                 | 50                             | pass        |
| 2000.125                       | V                     | 73.33                                 | 50                             | pass        |
| 2400.150                       | V                     | 73.46                                 | 50                             | pass        |
| 2800.175                       | V                     | 75.74                                 | 50                             | pass        |
| 3200.200                       | V                     | 77.00                                 | 50                             | pass        |
| 3600.225                       | V                     | 78.07                                 | 50                             | pass        |
| 4000.250                       | V                     | 79.31                                 | 50                             | pass        |



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# Measurement Result for 12.5 KHz Channel Separation @ 454.025MHz-1W

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 454.025                        | Н                     | 0 - 6                                 | · -                            | pass        |
| 908.050                        | Н                     | 70.00                                 | 50                             | pass        |
| 1362.075                       | Н                     | 73.36                                 | 50                             | pass        |
| 1816.100                       | H H                   | 73.66                                 | 50                             | pass        |
| 2270.125                       | H                     | 73.88                                 | 50                             | pass        |
| 2724.150                       | Н                     | 73.43                                 | 50                             | pass        |
| 3178.175                       | Н                     | 75.75                                 | 50                             | pass        |
| 3632.200                       | H                     | 78.33                                 | 50                             | pass        |
| 4086.225                       | Н                     | 79.80                                 | 50                             | pass        |
| 4540.250                       | Н                     | 80.13                                 | 50                             | pass        |

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement<br>Result<br>Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---|--------------------------------|-------------|
| 454.025                        | V                     | -   | · · ·                          | pass        |
| 908.050                        | V                     | 68.33                                       | 50                             | pass        |
| 1362.075                       | V                     | 69.82                                       | 50                             | pass        |
| 1816.100                       | V                     | 70.07                                       | 50                             | pass        |
| 2270.125                       | V                     | 70.99                                       | 50                             | pass        |
| 2724.150                       | V                     | 73.19                                       | 50                             | pass        |
| 3178.175                       | V                     | 74.63                                       | 50                             | pass        |
| 3632.200                       | V                     | 75.64                                       | 50                             | pass        |
| 4086.225                       | V                     | 78.64                                       | 50                             | pass        |
| 4540.250                       | V                     | 79.39                                       | 50                             | pass        |



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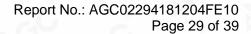
Measurement Result for 12.5 KHz Channel Separation @ 479.975MHz-1W

| Emission<br>Frequency<br>(MHz) | Ant.<br>Polarity(H/V) | Measurement Result Below carrier(dBc) | Limit<br>below<br>carrier(dBc) | Result(P/F) |
|--------------------------------|-----------------------|---------------------------------------|--------------------------------|-------------|
| 479.975                        | Н                     | 0 - 6                                 | · -                            | pass        |
| 959.950                        | Н                     | 71.15                                 | 50                             | pass        |
| 1439.925                       | ® Н                   | 69.44                                 | 50                             | pass        |
| 1919.900                       | Н                     | 73.26                                 | 50                             | pass        |
| 2399.875                       | H                     | 74.84                                 | 50                             | pass        |
| 2879.850                       | Н                     | 75.13                                 | 50                             | pass        |
| 3359.825                       | В                     | 77.31                                 | 50                             | pass        |
| 3839.800                       | H                     | 78.15                                 | 50                             | pass        |
| 4319.775                       | H                     | 80.26                                 | 50                             | pass        |
| 4799.750                       | Н                     | 79.53                                 | 50                             | pass        |

| Emission  | Ant.          | Measurement        | Limit        |             |
|-----------|---------------|--------------------|--------------|-------------|
| Frequency | Polarity(H/V) | Result             | below        | Result(P/F) |
| (MHz)     |               | Below carrier(dBc) | carrier(dBc) |             |
| 479.975   | V             | •                  | -G - °       | pass        |
| 959.950   | V             | 68.36              | 50           | pass        |
| 1439.925  | V             | 68.32              | 50           | pass        |
| 1919.900  | V             | 70.45              | 50           | pass        |
| 2399.875  | V             | 70.29              | 50           | pass        |
| 2879.850  | V             | 74.65              | 50           | pass        |
| 3359.825  | V             | 76.03              | 50           | pass        |
| 3839.800  | V             | 76.88              | 50           | pass        |
| 4319.775  | V             | 76.87              | 50           | pass        |
| 4799.750  | V             | 77.84              | 50           | pass        |

**Note:** In this case, Part 22 (-13 dBm) is less than the limit of Part 90 (-20 dBm), so we do not need to test Part 22, which meets the spurious limits of PART 90+22.

Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the Bedicated Residual Any report having not been stamped by the Bedicated Residual Any Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written appropriation of AGC where the test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15day after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.

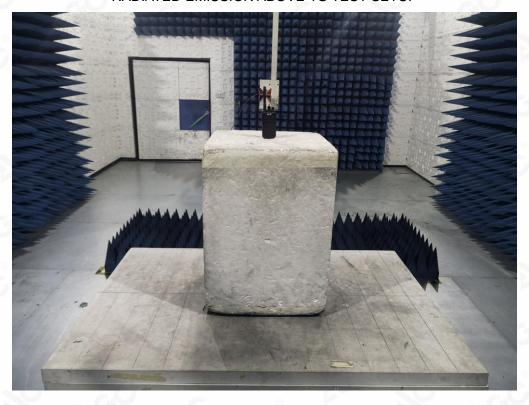




APPENDIX I: PHOTOGRAPHS OF SETUP



RADIATED EMISSION ABOVE 1G TEST SETUP



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# **APPENDIX II: EXTERNAL VIEW OF EUT**

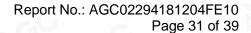
ALL VIEW OF SERIAL MODEL



ALL VIEW OF SERIAL MODEL-BACK VIEW



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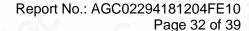
#### WHOLE VIEW OF EUT



TOP VIEW OF EUT



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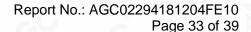
# **BOTTOM VIEW OF EUT**



FRONT VIEW OF EUT



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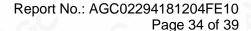
# **BACK VIEW OF EUT**



LEFT VIEW OF EUT



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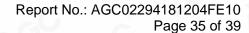
#### **RIGHT VIEW OF EUT**



**OPEN VIEW-1 OF EUT** 

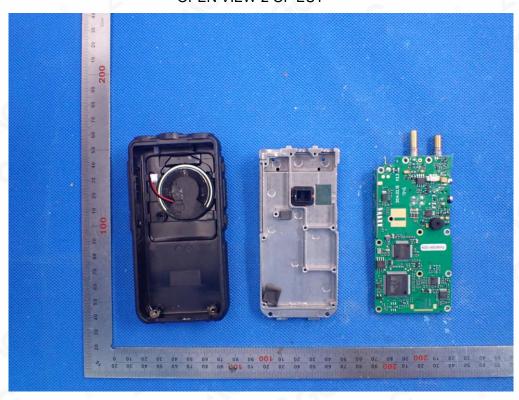


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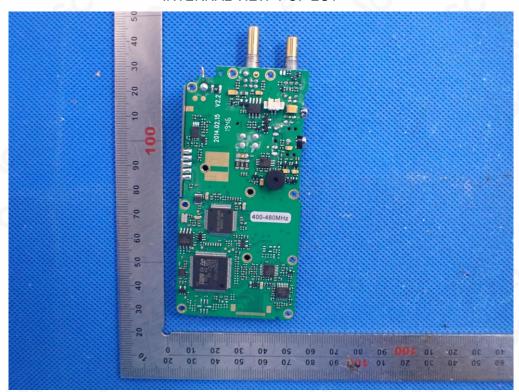




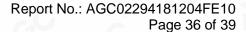
#### **OPEN VIEW-2 OF EUT**



**INTERNAL VIEW-1 OF EUT** 

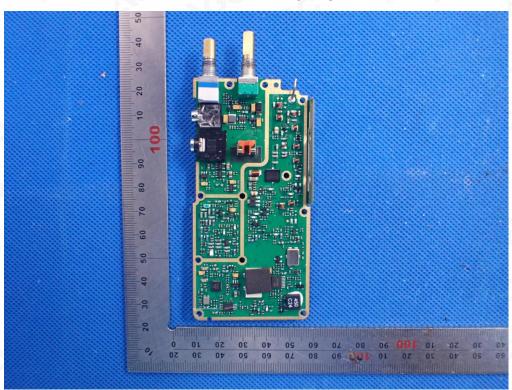


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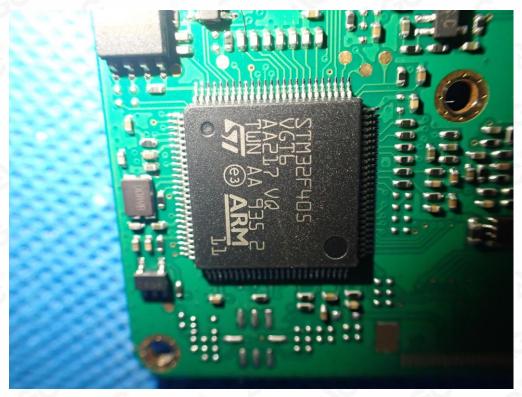




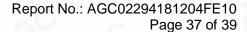
#### **INTERNAL VIEW-2 OF EUT**



**INTERNAL VIEW-3 OF EUT** 

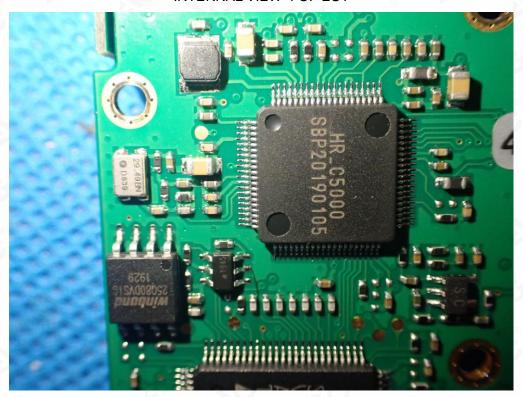


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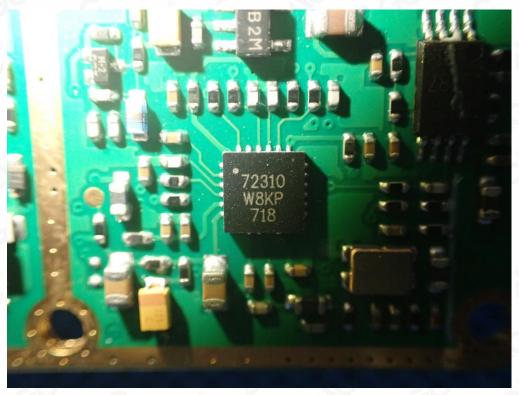




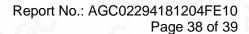
#### **INTERNAL VIEW-4 OF EUT**



**INTERNAL VIEW-5 OF EUT** 



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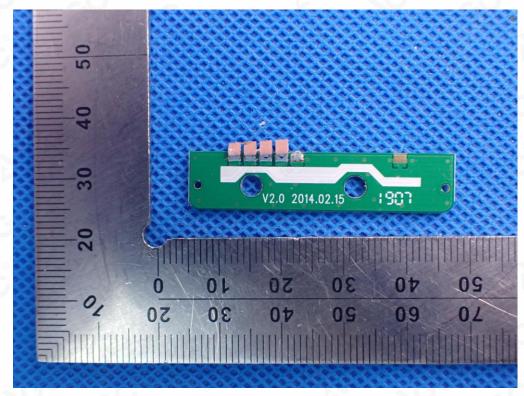




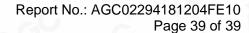
# **INTERNAL VIEW-6 OF EUT**



**INTERNAL VIEW-7 OF EUT** 

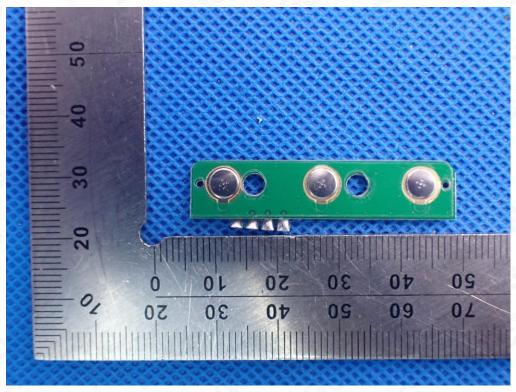


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# **INTERNAL VIEW-8 OF EUT**



----END OF REPORT----

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