

**ELECTROMAGNETIC EMISSIONS
COMPLIANCE REPORT**

Applicant: SUPER POWER TOOLS CO., LTD.
NO.62, LN. 5, SHENAN ST., SHENGANG DIST. TAICHUNG
CITY, TAIWAN 42944

Manufacturer: SUPER POWER TOOLS CO., LTD.
NO.62, LN. 5, SHENAN ST., SHENGANG DIST. TAICHUNG
CITY, TAIWAN 42944

Product Name: Transmitter for Remote Control Starter Switch

Brand Name: O'SKOOL

Model No.: PTA09-A

Model Difference: N/A

Report Number: TERF2205000630ER

FCC ID 2A7E6PTA2201

Date of EUT Received: May 13, 2022

Date of Test: June 6, 2022 ~ June 20, 2022

Issue Date: July 22, 2022

Approved By

Jim Chang

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT comply with FCC rule part §15.231.

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

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Revision History

| Report Number | Revision | Description | Issue Date | Revised By | Remark |
|------------------|----------|---|---------------|------------|--------|
| TERF2205000630ER | 00 | Original | July 8, 2022 | Yuri Tsai | |
| TERF2205000630ER | 01 | Updated duty cycle & radiated test result | July 22, 2022 | Yuri Tsai | * |
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Note:

- 1、The remark "*" indicates modification of the report upon requests from certification body.

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Contents

| | | |
|----|--|----|
| 1 | GENERAL INFORMATION | 4 |
| 2 | SYSTEM TEST CONFIGURATION | 6 |
| 3 | SUMMARY OF TEST RESULTS..... | 9 |
| 4 | DESCRIPTION OF TEST MODES | 10 |
| 5 | MEASUREMENT UNCERTAINTY | 11 |
| 6 | MEASUREMENT EQUIPMENT USED..... | 12 |
| 7 | CONDUCTED EMISSIONS TEST | 13 |
| 8 | DUTY CYCLE MEASUREMENT | 15 |
| 9 | EMISSION BANDWIDTH | 17 |
| 10 | TRANSMISSION CEASED TIME MEASUREMENT:..... | 19 |
| 11 | RADIATED EMISSION TEST | 20 |
| 12 | ANTENNA REQUIREMENT | 30 |

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1 GENERAL INFORMATION

1.1 Product Description

| | |
|---------------------------------|---|
| Product Name: | Transmitter for Remote Control Starter Switch |
| Brand Name: | O'SKOOL |
| Model No.: | PTA09-A |
| Model Difference: | N/A |
| Hardware Version: | N/A |
| Firmware Version: | N/A |
| EUT Series No.: | PTA09-A0001 |
| Power Supply: | 3Vdc |
| Test Software (Name/Version) | N/A |

1.2 RF specification

| | |
|----------------------|---------------------|
| Radio Technology: | Short Range Radio |
| Operating Frequency | 433.9MHz |
| Transmit Power | ≤ 81.46 dBuV/m Max. |
| Modulation Technique | ASK |
| Number of Channels | 1 Channel |
| Antenna Type | PCB |

Note: Antenna information is provided by the applicant.

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1.3 Test Methodology

FCC Part 15, Subpart C §15.231
ANSI C63.10:2013

1.4 Test Facility

| Laboratory | Test Site Address | Test Site Name | FCC Designation number | IC CAB identifier |
|---|---|----------------|------------------------|-------------------|
| SGS Taiwan Ltd. Central RF Lab. (TAF code 3702) | No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan. | SAC 1 | TW0027 | TW3702 |
| | | SAC 3 | | |
| | | Conduction 1 | | |
| | | Conducted 1 | | |
| | | Conducted 2 | | |
| | | Conducted 3 | | |
| | | Conducted 4 | | |
| | | Conducted 5 | | |
| | | Conducted 6 | | |
| | No.2, Keji 1st Rd., Guishan District, Taoyuan City, Taiwan 333 | Conduction C | TW0028 | |
| | | SAC C | | |
| | | SAC D | | |
| | | SAC G | | |
| | | Conducted A | | |
| | | Conducted B | | |
| | | Conducted C | | |
| | | Conducted D | | |
| | | Conducted E | | |
| | | Conducted F | | |
| | | Conducted G | | |

Note: Test site name is remarked on the equipment list in each section of this report as an indication where measurements occurred in specific test site and address.

1.5 Special Accessories

There are no special accessories used while test was conducted.

1.6 Equipment Modifications

There was no modification incorporated into the EUT.

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2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

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

2.2 EUT Exercise

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

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

2.3.2 Radiated Emissions

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

2.4 Measurement Results Explanation Example

2.4.1 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*6m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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2.4.2 For all conducted test items:



The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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2.5 Test Configuration

| Conducted Setup | Radiated Setup |
|---|--|
|  |  |

2.6 Control Unit(s)

| Conducted Emission Test Site: Conducted 2 | | | | | |
|---|-------|--------------|---------------|-----------|----------|
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. |
| H-Loop Near Field Antenna | EMCI | LF-R 400 | 02-1637 | N/A | N/A |
| Radiated Emission Test Site: SAC 3 | | | | | |
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. |
| Test Software | audix | e3 | Ver. 9 210322 | N.C.R | N.C.R |

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3 SUMMARY OF TEST RESULTS

| FCC Rules | Description Of Test | Result |
|---------------|---|-----------|
| §15.207 | AC Power Line Conducted Emission | N/A |
| §15.231(e) | Radiated Emission | Compliant |
| §15.231(c) | Emission Bandwidth | Compliant |
| §15.35 (c) | Duty Cycle Test (Determining average factor from a complete pulse train) | Compliant |
| §15.231(a)(1) | Transmission Ceased Time | Compliant |
| §15.203 | Antenna Requirement | Compliant |

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4 DESCRIPTION OF TEST MODES

4.1 Operating Frequencies

| FREQUENCY |
|-----------|
|-----------|

| |
|----------|
| 433.9MHZ |
|----------|

4.2 The Worst Test Modes and Channel Details

The field strength of radiated emission was measured as the EUT positioned in different orthogonal planes (E1/E2/H) based on actual usage of the EUT to pre-scan the emissions for determining the worst case scenario.

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5 MEASUREMENT UNCERTAINTY

| Test Items | Uncertainty |
|----------------------------------|-------------|
| AC Power Line Conducted Emission | +/- 2.34 dB |
| Frequency Stability | +/- 1.53 Hz |
| Emission Bandwidth | +/- 1.53 Hz |
| Temperature | +/- 0.4 °C |
| Humidity | +/- 3.5 % |
| DC / AC Power Source | +/- 1 % |

| Radiated Spurious Emission Measurement Uncertainty | | | |
|--|-----|---------|-----------------|
| Polarization: Vertical | +/- | 2.57 dB | 9kHz~30MHz |
| | +/- | 4.85 dB | 30MHz - 1000MHz |
| | +/- | 4.45 dB | 1GHz - 18GHz |
| | +/- | 4.24 dB | 18GHz - 40GHz |
| Polarization: Horizontal | +/- | 2.57 dB | 9kHz~30MHz |
| | +/- | 4.37 dB | 30MHz - 1000MHz |
| | +/- | 4.45 dB | 1GHz - 18GHz |
| | +/- | 4.24 dB | 18GHz - 40GHz |

Note:

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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6 MEASUREMENT EQUIPMENT USED

6.1 Emission from AC power line

N/A

6.2 Radio Emissions Measurement

| Conducted Emission Test Site: Conducted 2 | | | | | |
|---|----------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. |
| EXA Spectrum Analyzer | KEYSIGHT | N9010B | MY60242081 | 09/30/2021 | 09/29/2022 |

6.3 Radiated Measurement

| Radiated Emission Test Site: SAC 3 | | | | | |
|------------------------------------|-----------------|--------------------|---------------|------------|------------|
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. |
| Horn Antenna | SCHWARZBECK | BBHA9170 | 184 | 12/16/2021 | 12/15/2022 |
| Horn Antenna | SCHWARZBECK | BBHA9120D | 1441 | 09/27/2021 | 09/26/2022 |
| Bi-log Antenna | SCHWARZBECK | VULB9168 | 378 | 08/20/2021 | 08/19/2022 |
| Loop Antenna | ETS.LINDGREN | 6502 | 148045 | 09/29/2021 | 09/28/2022 |
| PXA Spectrum Analyzer | Agilent | N9030A | MY53120760 | 04/27/2022 | 04/26/2023 |
| EMI Test Receiver | R&S | ESCI 7 | 100759 | 08/26/2021 | 08/25/2022 |
| Pre-Amplifier | HP | 8449B | 3008A00578 | 12/16/2021 | 12/15/2022 |
| Pre-Amplifier | EMC Instruments | EMC184045B | 980135 | 10/27/2021 | 10/26/2022 |
| Pre-Amplifier | HP | 8447D | 2944A07676 | 12/16/2021 | 12/15/2022 |
| Attenuator | Mini-Circuit | BW-S10W2+ | 4 | 12/14/2021 | 12/13/2022 |
| Bandreject Filter 430-436 | Titan | T04H86002600060S01 | 210619-2-6 | 12/14/2021 | 12/13/2022 |
| Coaxial Cable | Huber Suhner | SUCOFLEX 102 | MY2636/2 | 12/16/2021 | 12/15/2022 |
| Coaxial Cable | Huber Suhner | SUCOFLEX 104 | 340057/4 | 12/16/2021 | 12/15/2022 |
| Coaxial Cable | Huber Suhner | SUCOFLEX 104PEA | 800052/2 | 12/16/2021 | 12/15/2022 |
| Coaxial Cable | Huber Suhner | SUCOFLEX 102 | MY2621/2 | 12/16/2021 | 12/15/2022 |
| Coaxial Cable | Huber Suhner | SUCOFLEX 102 | MY2617/2 | 12/16/2021 | 12/15/2022 |
| Site Cal | SGS | SAC 3 | N/A | 01/01/2022 | 12/31/2022 |

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7 CONDUCTED EMISSIONS TEST

7.1 Standard Applicable

According to §15.207, frequency within 150 kHz to 30MHz shall not exceed the limit table as below.

| Frequency range MHz | Limits (dBuV) | |
|------------------------|------------------|----------|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

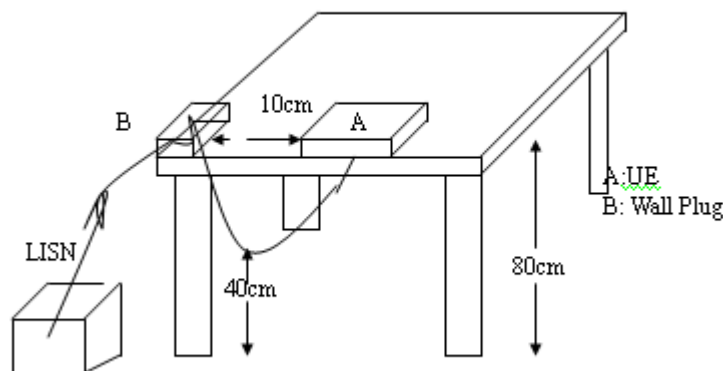
Note

- 1.The lower limit shall apply at the transition frequencies
- 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

7.2 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

7.3 Test Set-up:



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7.4 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

7.5 Measurement Result

N/A; Powered from battery.

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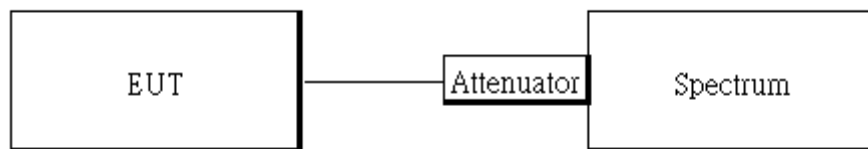
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8 DUTY CYCLE MEASUREMENT

8.1 Applicable Standard

According to 15. 35(c), the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification.

8.2 Test Setup



8.3 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT normal operating mode.
3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 100kHz, Span =0 Hz. Adjacent sweep.
4. Set SPA View. Mark delta.

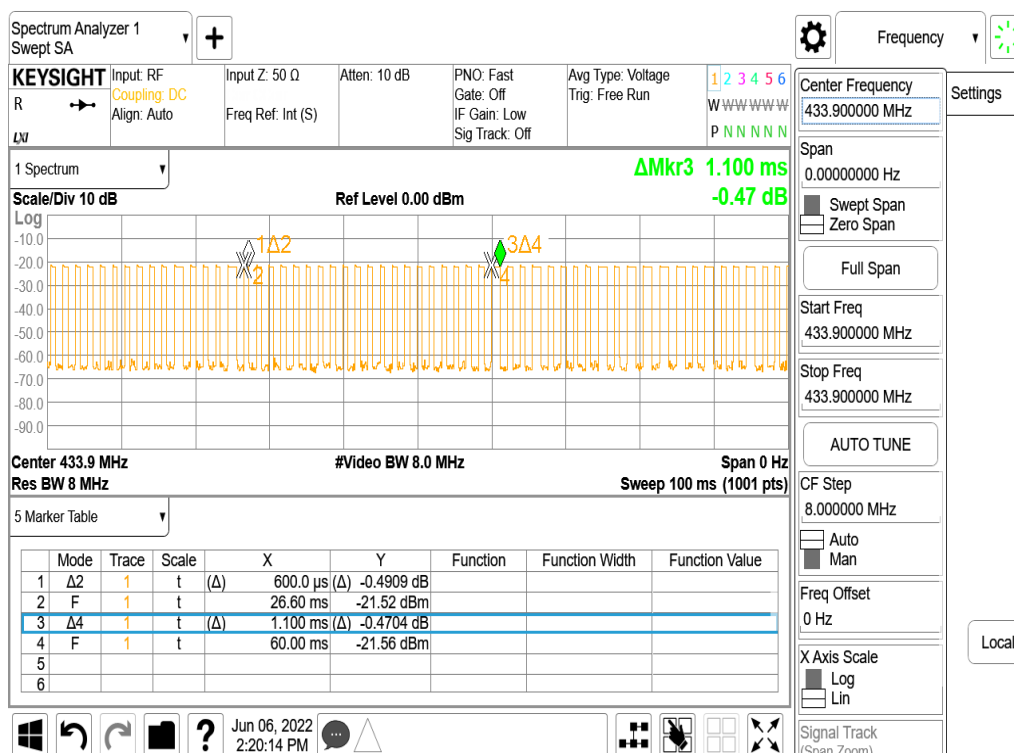
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8.4 Measurement Results:

| Ton (ms) | TP=Ton+Toff (ms) | Avg correction factor(dB) = 20log(Ton/TP) |
|-----------------|-------------------------|--|
| 39.1 | 100 | -8.16 |



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9 EMISSION BANDWIDTH

9.1 Applicable Standard

According to 15.231 (c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

9.2 Test Setup

Refer to section 8.2 of this report.

9.3 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as transmitting mode.
3. Set SPA Center Frequency = fundamental frequency, RBW=1% to 5% OBW, VBW= 3 x RBW, Span = large enough to capture all products of the modulation process.
4. Set SPA -20dB Occupied bandwidth.

9.4 Measurement Results

The center frequency f_c is **433.9MHz**, according to the Rules, section 15.231(C), the Bandwidth of Center Frequency at -20dB should be calculated as following:

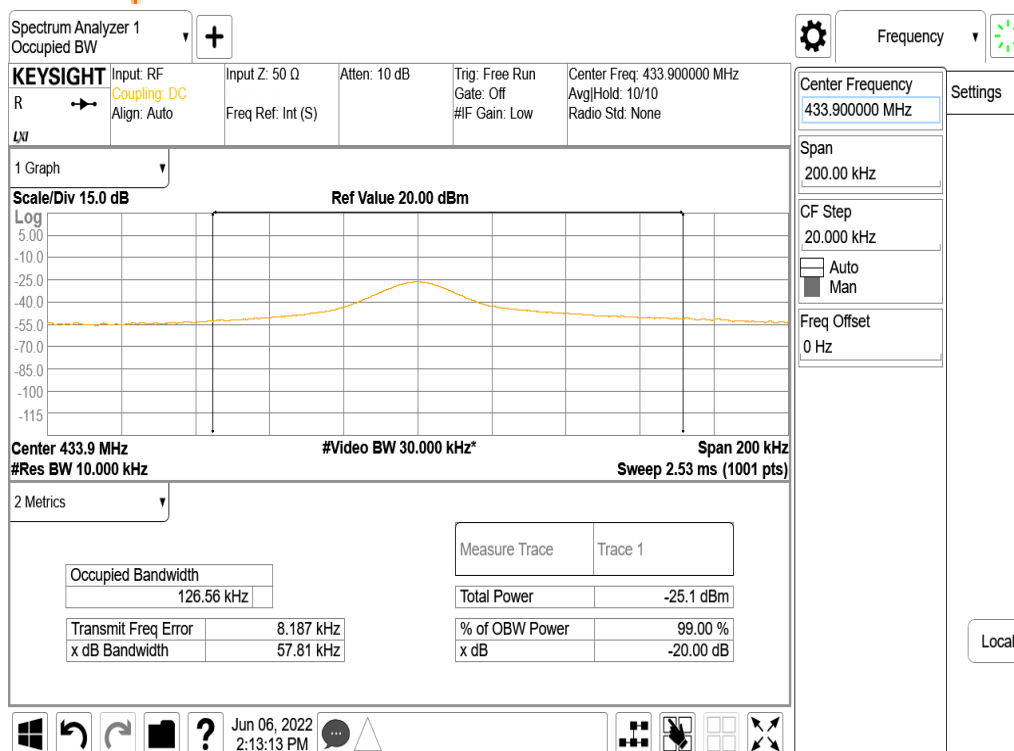
$$433.9 \times 0.0025 = 1.08475 \text{ (MHz)}$$

| Frequency(MHz) | OBW (MHz) | Limit (MHz) | Result |
|----------------|-----------|-------------|--------|
| 433.9 | 0.12656 | 1.08475 | Pass |

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10 TRANSMISSION CEASED TIME MEASUREMENT:

15.231 (a) (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

10.1 Test Setup

Refer to 8.2 of this report.

10.2 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set SPA Center Frequency = fundamental frequency, RBW=100kHz, VBW=100kHz, Span =0Hz. Sweep Time= 5s.
3. Set EUT as normal operation and press Transmitter bottom for 2 s approximately,
4. Set SPA Max hold. Delta Mark.

10.3 Measurement Results

The release time is less than 5 s.



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11 RADIATED EMISSION TEST

11.1 Standard Applicable

According to 15.231(b), the field strength of emissions from Intentional Radiators operated under this section shall not exceed the following:

| Fundamental Frequency (MHz) | Field Strength of Fundamental | | Field Strength of Spurious | |
|-----------------------------|-------------------------------|------------------|----------------------------|---------------|
| | (dBuV/m) | (uV/m) | (dBuV/m) | (uV/m) |
| 40.66 - 40.70 | 67.04 | 2,250 | 47 | 225 |
| 70 - 130 | 61.94 | 1,250 | 41.9 | 125 |
| 130 - 174 | * 61.94 - 71.48 | * 1,250 - 3,750 | * 41.9 - 51.48 | * 125 to 375 |
| 174 - 260 | 71.48 | 3,750 | 51.48 | 375 |
| 260 - 470 | * 71.48 - 81.94 | * 3,750 - 12,500 | * 51.48 - 61.94 | * 375 to 1250 |
| above 470 | 81.94 | 12,500 | 61.94 | 1250 |

11.2 Remark:

1. Emission level in dBuV/m = $20 \log(uV/m)$
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205
4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of §15.205, then the general radiated emission limits in § 15.209 apply.
5. For the band 130-174MHz, uV/m at 3meters = $56.81818(F) - 6136.3636$;
For the band 260-470MHz uV/m at 3meters = $41.6667(F) - 7083.3333$;
Where F is the frequency in MHz.

| Fundamental Frequency (MHz) | 41.6667(F) – 7083.3333 (uV/m) | Limit (dBuV/m) |
|-----------------------------|-------------------------------|----------------|
| 433.9 | 10995.8478 | 80.82 |

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11.3 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency of the interest measured were complete.

11.4 Auxiliary Procedure (Setting on Spectrum to capture the reading of emission level):

- (1) Span = wide enough to fully capture the emission being measured
- (2) RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
- (3) For average measurement: use duty cycle correction factor method per 15.35(c)
Duty Cycle = On time/100 milliseconds
On time = $N1 \cdot L1 + N2 \cdot L2 + \dots + N(n-1) \cdot L(n-1) + N(n) \cdot L(n)$
Where N1 is number of type 1 pulses, L1 is length of type 1 pulses, etc.
Average Emission Level = Peak Emission Level + $20 \cdot \log(\text{duty Cycle})$

Test was measured starting from 9kHz to 10th harmonic of the fundamental frequency, and data containing the worst result above 30MHz are shown on the test report.

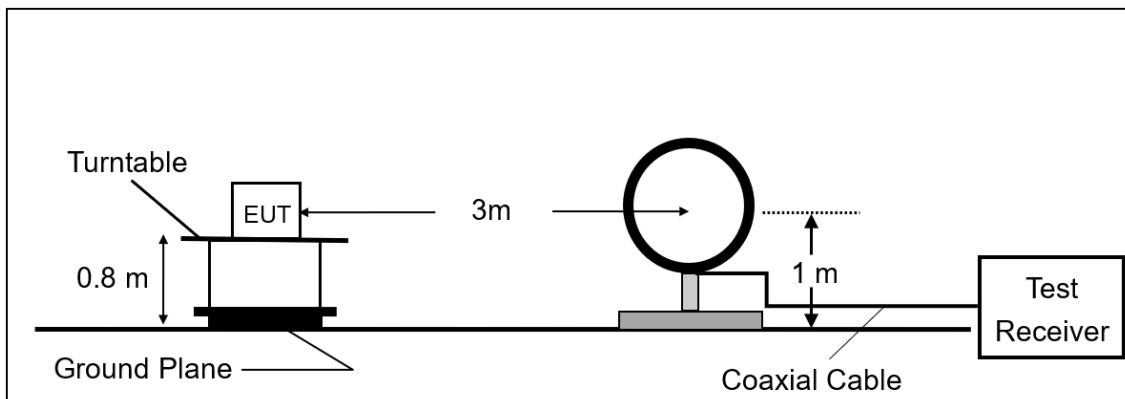
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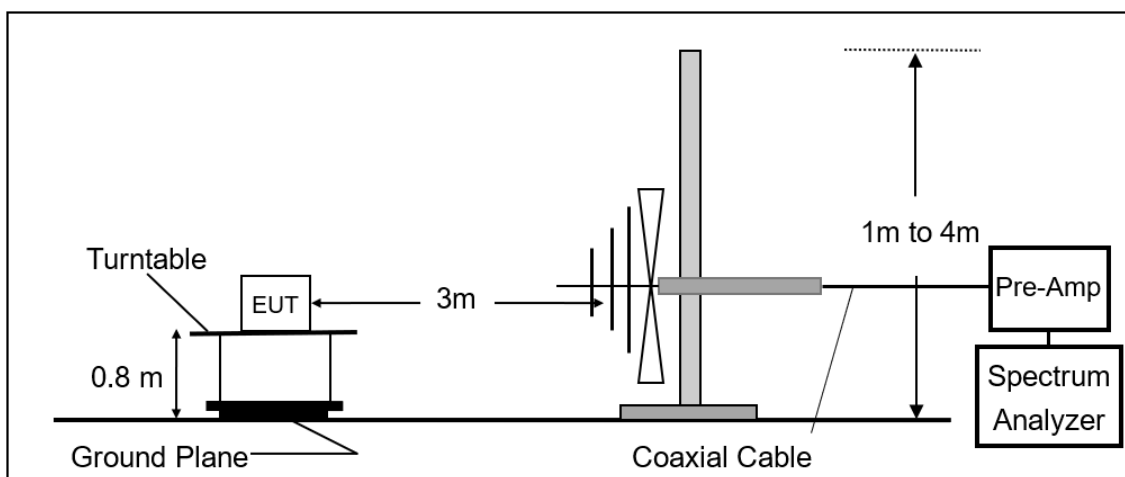
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11.5 Test Setup

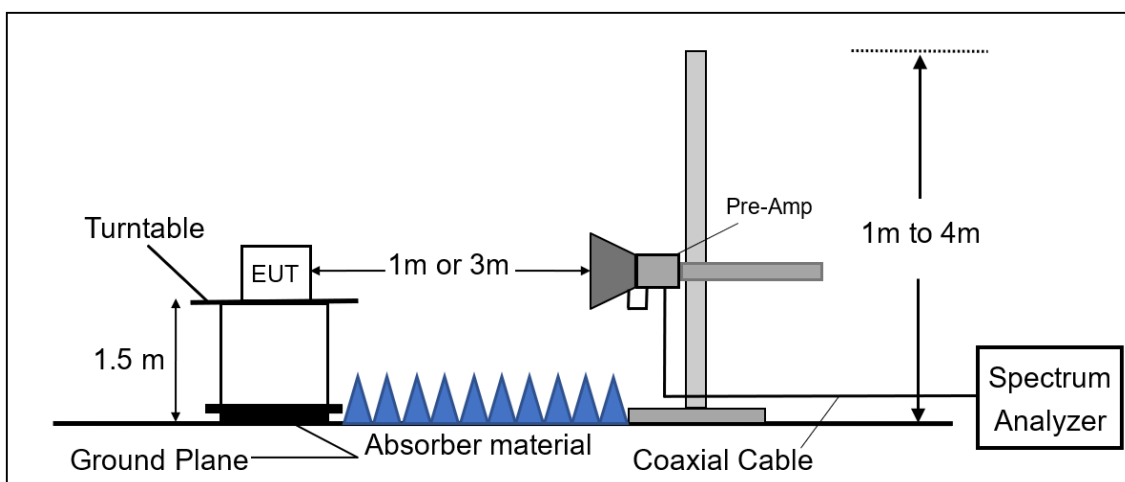
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz.



(B) Radiated Emission Test Set-Up, Frequency From 30MHz to 1000MHz.



(C) Radiated Emission Test Set-Up, Frequency Above 1GHz.



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11.6 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

| | |
|---------------------------|--|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude | AG = Amplifier Gain |
| AF = Antenna Factor | |

Remark:

The limit of the emission level is expressed in dBuV/m, which converts $20 \cdot \log(\mu\text{V/m})$

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

11.7 Measurement Results of Radiated Spurious Emissions from 9 kHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

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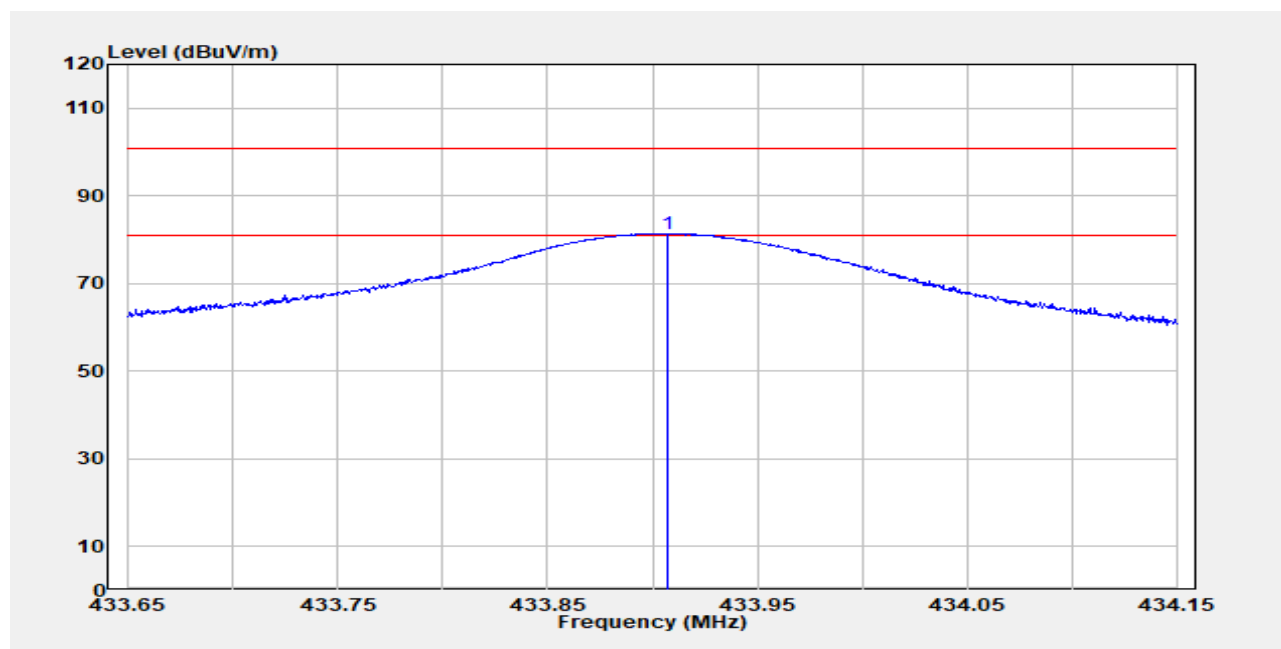
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11.8 Measurement Result

11.8.1 Field Strength of Fundamental

Report Number :TERF2205000630ER
 Operation Mode :433M
 Test Frequency :433.9 MHz
 Test Mode :Main
 EUT Pol :H Plane

Test Site :SAC 3
 Test Date :2022-06-20
 Temp./Humi. :24.5/65
 Antenna Pol. :VERTICAL
 Engineer :Nick Lin



| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Reading Level dBuV | Factor dB | Actual FS dBuV/m | Limit @3m dBuV/m | Margin dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 433.907 | Peak | 84.75 | -3.29 | 81.46 | 100.82 | -19.36 |
| 433.907 | Average | --- | -8.16 | 73.30 | 80.82 | -7.52 |

Note: Average Actual = Peak Actual + Average Factor

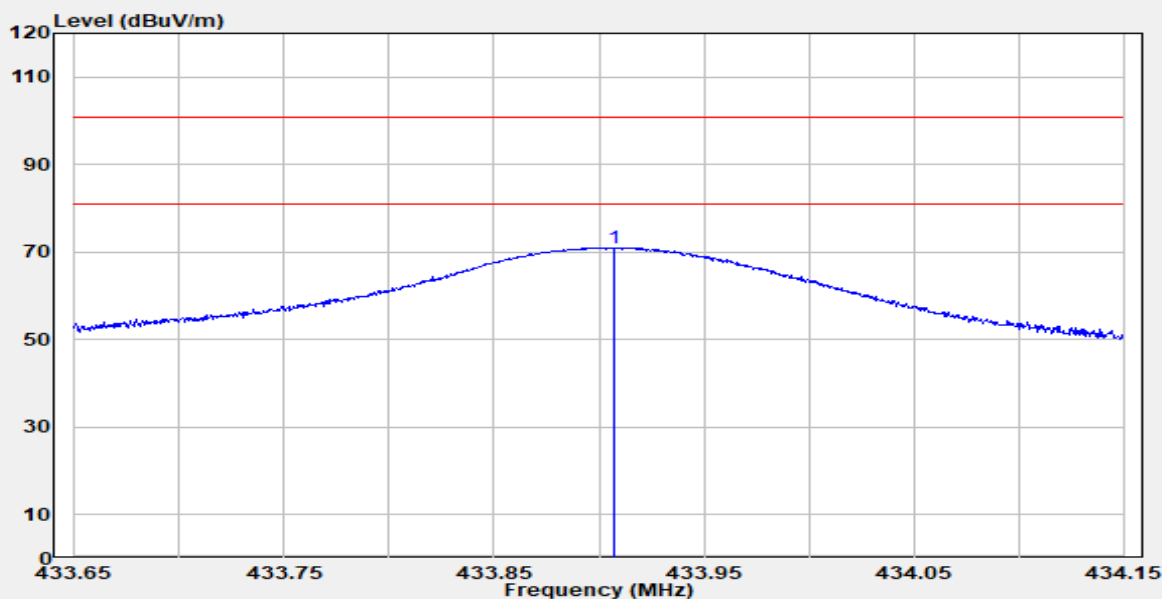
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Report Number :TERF2205000630ER
 Operation Mode :433M
 Test Frequency :433.9 MHz
 Test Mode :Main
 EUT Pol :H Plane

Test Site :SAC 3
 Test Date :2022-06-20
 Temp./Humi. :24.5/65
 Antenna Pol. :Horizontal
 Engineer :Nick Lin



| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Reading Level dBμV | Factor dB | Actual FS dBUV/m | Limit @3m dBUV/m | Margin dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 433.907 | Peak | 74.27 | -3.29 | 70.98 | 100.82 | -29.84 |
| 433.907 | Average | --- | -8.16 | 62.82 | 80.82 | -18.00 |

Note: Average Actual = Peak Actual + Average Factor

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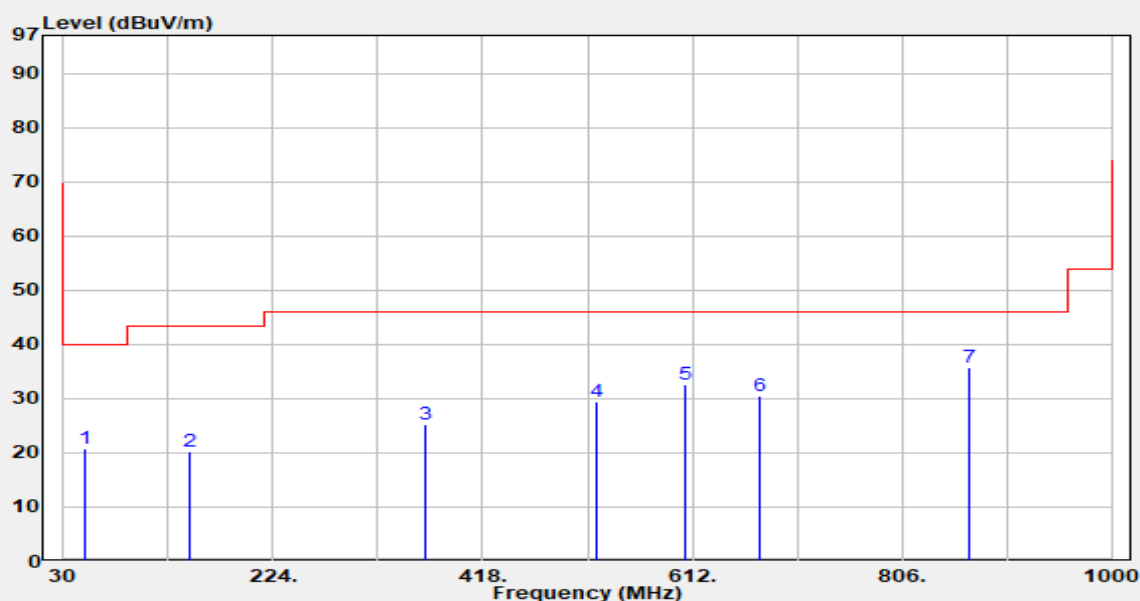
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11.8.2 Field Strength of Spurious Emission

Report Number :TERF2205000630ER
Operation Mode :433M
Test Frequency :433.9 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 3
Test Date :2022-06-20
Temp./Humi. :24.5/65
Antenna Pol. :Vertical
Engineer :Nick Lin



| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Reading Level dBμV | Factor dB | Actual FS dBμV/m | Limit @3m dBμV/m | Margin dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 50.370 | Peak | 28.93 | -8.04 | 20.89 | 40.00 | -19.11 |
| 147.370 | Peak | 27.34 | -7.02 | 20.32 | 43.50 | -23.18 |
| 365.620 | Peak | 27.72 | -2.55 | 25.18 | 46.00 | -20.82 |
| 523.730 | Peak | 28.88 | 0.57 | 29.45 | 46.00 | -16.55 |
| 605.210 | Peak | 30.99 | 1.58 | 32.58 | 46.00 | -13.42 |
| 674.080 | Peak | 28.67 | 1.86 | 30.53 | 46.00 | -15.47 |
| 867.800 | QP | 32.15 | 3.64 | 35.79 | 46.00 | -10.21 |

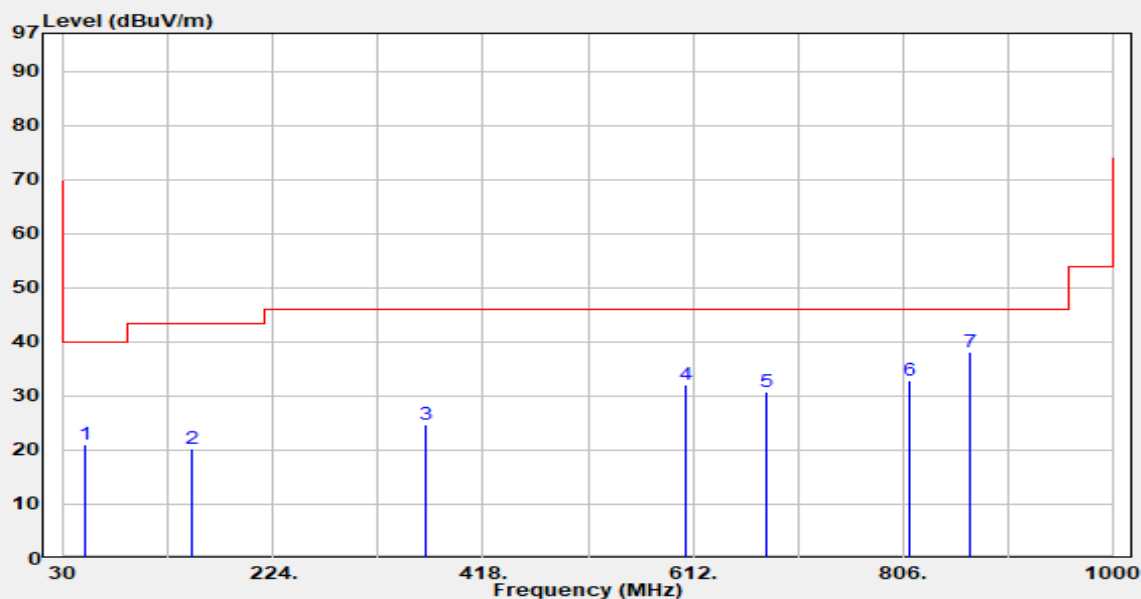
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Report Number :TERF2205000630ER
Operation Mode :433M
Test Frequency :433.9 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 3
Test Date :2022-06-20
Temp./Humi. :24.5/65
Antenna Pol. :Horizontal
Engineer :Nick Lin



| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Reading Level dBμV | Factor dB | Actual FS dBμV/m | Limit @3m dBμV/m | Margin dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 50.370 | Peak | 29.02 | -8.04 | 20.98 | 40.00 | -19.02 |
| 148.340 | Peak | 27.28 | -6.96 | 20.32 | 43.50 | -23.18 |
| 365.620 | Peak | 27.24 | -2.55 | 24.70 | 46.00 | -21.30 |
| 605.210 | Peak | 30.56 | 1.58 | 32.14 | 46.00 | -13.86 |
| 679.900 | Peak | 28.70 | 1.96 | 30.66 | 46.00 | -15.34 |
| 811.820 | Peak | 28.45 | 4.36 | 32.81 | 46.00 | -13.19 |
| 867.800 | QP | 34.40 | 3.64 | 38.04 | 46.00 | -7.96 |

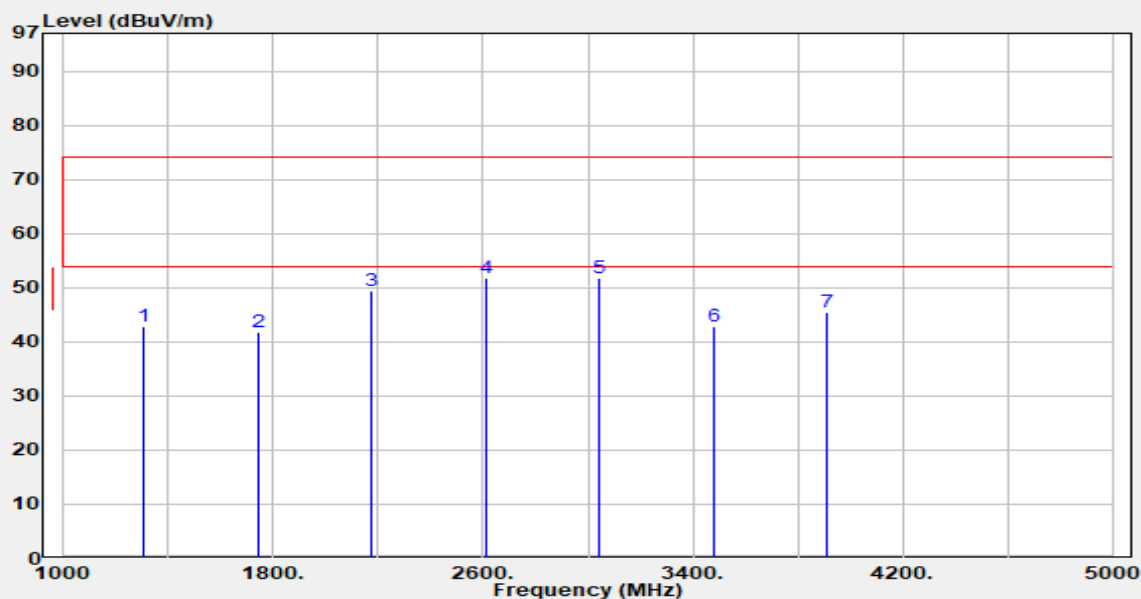
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Report Number :TERF2205000630ER
Operation Mode :433M
Test Frequency :433.9 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 3
Test Date :2022-06-20
Temp./Humi. :24.5/65
Antenna Pol. :Vertical
Engineer :Nick Lin



| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Reading Level dBμV | Factor dB | Actual FS dBμV/m | Limit @3m dBμV/m | Margin dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 1304.7 | Peak | 46.16 | -3.18 | 42.98 | 74.00 | -31.02 |
| 1304.7 | Average | --- | -8.16 | 34.82 | 54.00 | -19.18 |
| 1739.6 | Peak | 44.55 | -2.76 | 41.79 | 74.00 | -32.21 |
| 1739.6 | Average | --- | -8.16 | 33.63 | 54.00 | -20.37 |
| 2174.5 | Peak | 48.83 | 0.60 | 49.43 | 74.00 | -24.57 |
| 2174.5 | Average | --- | -8.16 | 41.27 | 54.00 | -12.73 |
| 2609.4 | Peak | 50.98 | 0.86 | 51.84 | 74.00 | -22.16 |
| 2609.4 | Average | --- | -8.16 | 43.68 | 54.00 | -10.32 |
| 3044.3 | Peak | 49.37 | 2.45 | 51.82 | 74.00 | -22.18 |
| 3044.3 | Average | --- | -8.16 | 43.66 | 54.00 | -10.34 |
| 3479.2 | Peak | 39.29 | 3.52 | 42.81 | 74.00 | -31.19 |
| 3479.2 | Average | --- | -8.16 | 34.65 | 54.00 | -19.35 |
| 3914.1 | Peak | 40.61 | 4.80 | 45.41 | 74.00 | -28.59 |
| 3914.1 | Average | --- | -8.16 | 37.25 | 54.00 | -16.75 |

Note: Average Actual = Peak Actual + Average Factor

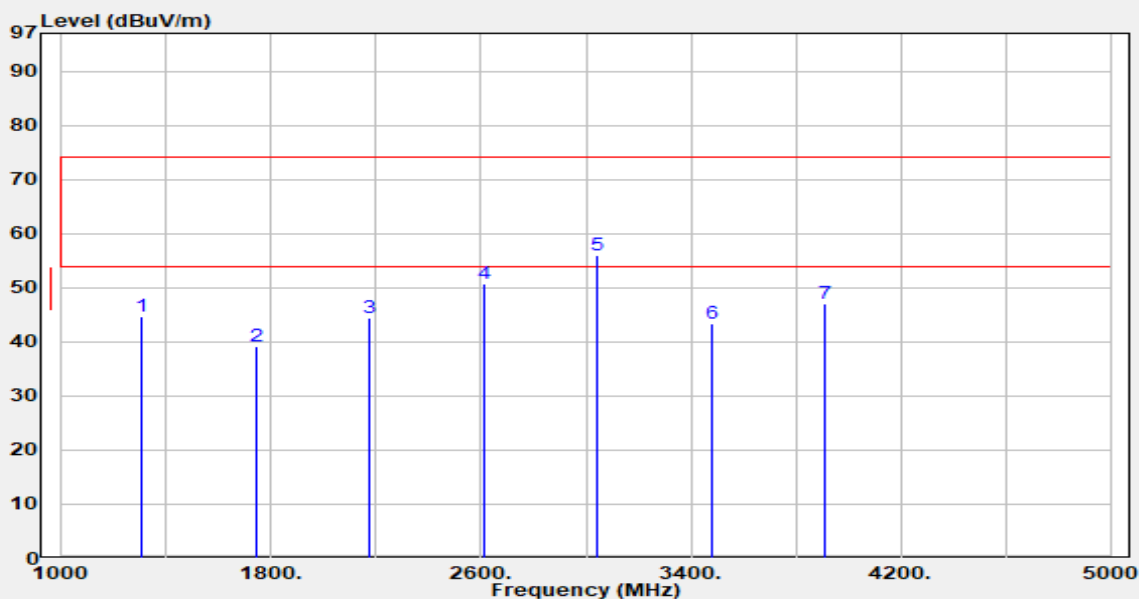
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Report Number :TERF2205000630ER
Operation Mode :433M
Test Frequency :433.9 MHz
Test Mode :Tx
EUT Pol :H Plane

Test Site :SAC 3
Test Date :2022-06-20
Temp./Humi. :24.5/65
Antenna Pol. :Horizontal
Engineer :Nick Lin



| Freq. MHz | Detector Mode PK/QP/AV | Spectrum Reading Level dBμV | Factor dB | Actual FS dBμV/m | Limit @3m dBμV/m | Margin dB |
|--------------|------------------------------|-----------------------------------|--------------|------------------------|------------------------|--------------|
| 1304.7 | Peak | 47.86 | -3.18 | 44.68 | 74.00 | -29.32 |
| 1304.7 | Average | --- | -8.16 | 36.52 | 54.00 | -17.48 |
| 1739.6 | Peak | 41.94 | -2.76 | 39.17 | 74.00 | -34.83 |
| 1739.6 | Average | --- | -8.16 | 31.01 | 54.00 | -22.99 |
| 2174.5 | Peak | 43.87 | 0.60 | 44.47 | 74.00 | -29.53 |
| 2174.5 | Average | --- | -8.16 | 36.31 | 54.00 | -17.69 |
| 2609.4 | Peak | 49.99 | 0.86 | 50.85 | 74.00 | -23.15 |
| 2609.4 | Average | --- | -8.16 | 42.69 | 54.00 | -11.31 |
| 3044.3 | Peak | 53.63 | 2.45 | 56.08 | 74.00 | -17.92 |
| 3044.3 | Average | --- | -8.16 | 47.92 | 54.00 | -6.08 |
| 3479.2 | Peak | 39.77 | 3.52 | 43.29 | 74.00 | -30.71 |
| 3479.2 | Average | --- | -8.16 | 35.13 | 54.00 | -18.87 |
| 3914.1 | Peak | 42.17 | 4.80 | 46.97 | 74.00 | -27.03 |
| 3914.1 | Average | --- | -8.16 | 38.81 | 54.00 | -15.19 |

Note: Average Actual = Peak Actual + Average Factor

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12 ANTENNA REQUIREMENT

12.1 Standard Applicable:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

12.2 Antenna Connected Construction:

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~

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