TESTING LABORATORY
CERTIFICATE #4820.01

# FCC PART 22, 74 and 90

# TEST REPORT

For

## Hytera Communications Corporation Limited

Hytera Tower, Hi-Tech Industrial Park North, 9108# Beihuan Road, Nanshan District, Shenzhen, 518057 China

**FCC ID: YAMPT350PF8**

| **Report Type:** | **Product Type:** |
|---|---|
| Original Report | TETRA PORTABLE TERMINAL |

| | |
|---|---|
| **Report Number:** | RDG180926001-00C |
| **Report Date:** | 2019-03-11 |
| **Reviewed By:** | Dean Lau<br>RF Supervisor |
| **Test Laboratory:** | Bay Area Compliance Laboratories Corp. (Dongguan)<br>No.69 Pulongcun, Puxinhu Industrial Zone,<br>Tangxia, Dongguan, Guangdong, China<br>Tel: +86-769-86858888<br>Fax: +86-769-86858891<br>www.baclcorp.com.cn |

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# GENERAL INFORMATION

## Product Description for Equipment under Test (EUT)

| | | |
|---|---|---|
| **EUT Name:** | | TETRA PORTABLE TERMINAL |
| **EUT Model:** | | PT350 F8 |
| **Multiple Model:** | | PT310 F8 |
| **FCC ID:** | | YAMPT350PF8 |
| **Rated Input Voltage:** | | 3.85V DC from battery |
| **Adapter Information** | **P/N:** | PS2019 |
| | **Model:** | S024AZM1200200 |
| | **Input:** | AC 100-240V, 50/60Hz, 600mA |
| | **Output:** | DC 12V, 2000mA |
| **External Dimension:** | | 123.5mm(L)*55.5mm(W)*32.5mm(H) |
| **Serial Number:** | | 180926001 |
| **EUT Received Date:** | | 2018-10-10 |

*Note: The series products models PT350 F8, PT310 F8 are electrically identical, we selected PT350 F8 for fully testing, the details of the difference between them were explained in the attached declaration letter.*

## Objective

This test report is prepared on behalf of *Hytera Communications Corporation Limited* in accordance with Part 2, and Part 90 of the Federal Communication Commission rules.

## Related Submittal(s)/Grant(s)

FCC Part 15C DSS submissions with FCC ID: YAMPT350PF8.
FCC Part 15C DTS submissions with FCC ID: YAMPT350PF8.

## Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Part 22 – Public Mobile Service
Part 74 – Experimental Radio, Auxiliary, Special Broadcast and other Program Distributonal Service
Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA 603-D

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Dongguan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Measurement Uncertainty

| Parameter | Measurement Uncertainty |
|---|---|
| Occupied Channel Bandwidth | ±5 % |
| RF output power, conducted | ±0.61dB |
| Unwanted Emissions, radiated | 30MHz ~ 1GHz:5.85 dB<br>1G~26.5GHz: 5.23 dB |
| Unwanted Emissions, conducted | ±1.5 dB |
| Temperature | ±1℃ |
| Humidity | ±5% |
| DC and low frequency voltages | ±0.4% |
| Duty Cycle | 1% |

## Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218,the FCC Designation No. : CN1220.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

# SYSTEM TEST CONFIGURATION

## Description of Test Configuration

The system was configured for testing in a test mode which has been done in the factory.

## Equipment Modifications

No modification was made to the EUT tested.

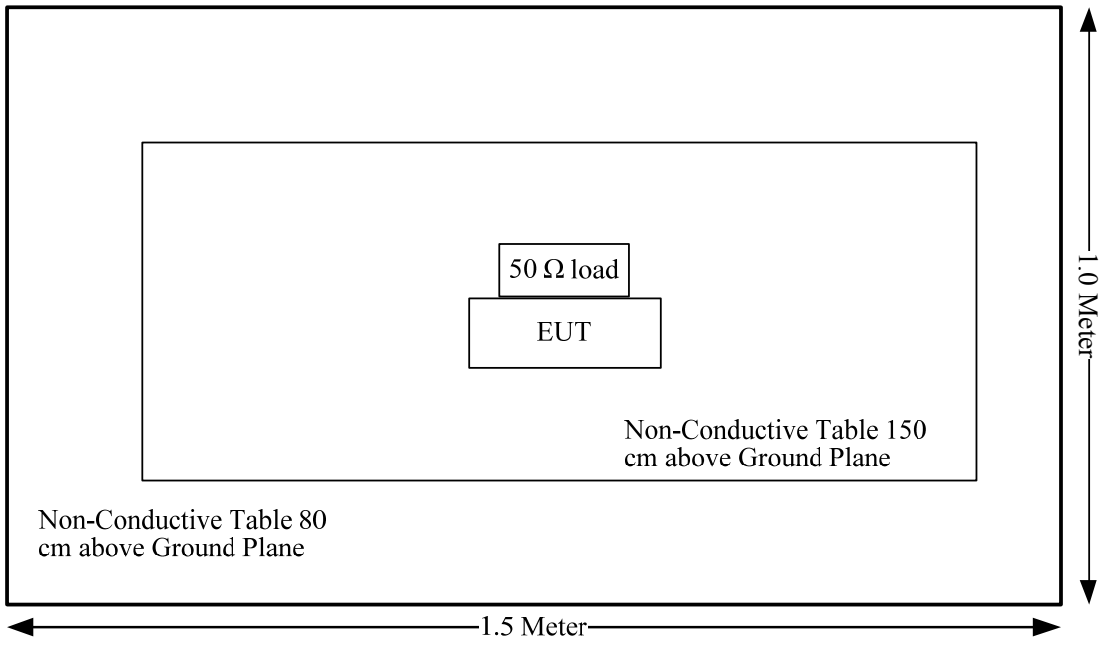
## Support Equipment List and Details

| Manufacturer | Description | Model | Serial Number |
|---|---|---|---|
| Unknown | 50 Load Teminal | 100W | / |

## External I/O Cable

| Cable Description | Shielding Type | Ferrite Core | Length (m) | From Port | To |
|---|---|---|---|---|---|
| / | / | / | / | / | / |

## Block Diagram of Test Setup



# SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Results |
|---|---|---|
| §1.1310 and §2.1093 | RF Exposure | Compliance |
| §2.1046; § 22.727; §74.461; §90.205 | RF Output Power | Compliance |
| §90.210; §90.221 | Adjacent Channel Power | Compliance |
| §2.1047;§90.207 | Modulation Characteristic | Not Applicable* |
| §2.1049;§22.357;§ 22.731; §74.462; §90.209; §90.210 | Occupied Bandwidth | Compliance |
| §2.1051; §22.861; §74.462; §90.210 | Spurious Emission at Antenna Terminal | Compliance |
| §2.1053;§22.861; §74.462;§90.210 | Spurious Radiated Emissions | Compliance |
| §2.1055; § 22.355; §74.464;§90.213 | Frequency Stability | Compliance |
| §90.214 | Transient Frequency Behavior | Not Applicable* |

Not applicable*: It is not required for tetral device

# TEST EQUIPMENT LIST

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| **Radiated Emission Test** | | | | | |
| R&S | EMI Test Receiver | ESCI | 100224 | 2017-12-11 | 2018-12-11 |
| Sunol Sciences | Antenna | JB3 | A060611-1 | 2017-11-10 | 2020-11-10 |
| EMCO | Adjustable Dipole Antenna | 3121C | 9109-753 | N/A | N/A |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0400-01 | 2018-09-05 | 2019-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0075-01 | 2018-09-05 | 2019-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-1000-01 | 2018-09-05 | 2019-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0200-02 | 2018-09-05 | 2019-09-05 |
| HP | Amplifier | 8447D | 2727A05902 | 2018-09-05 | 2019-09-05 |
| Agilent | Signal Generator | E8247C | MY43321350 | 2017-12-11 | 2018-12-11 |
| Agilent | Spectrum Analyzer | E4440A | SG43360054 | 2018-01-04 | 2019-01-04 |
| TDK RF | Horn Antenna | HRN-0118 | 130 084 | 2016-01-05 | 2019-01-04 |
| ETS-Lindgren | Horn Antenna | 3115 | 000 527 35 | 2016-01-05 | 2019-01-04 |
| Unknown | Coaxial Cable | C-SJSJ-50 | C-0800-01 | 2018-09-05 | 2019-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0200-02 | 2018-09-05 | 2019-09-05 |
| MITEQ | Amplifier | AFS42-00101800-25-S-42 | 2001271 | 2018-09-05 | 2019-09-05 |
| **RF Conducted Test** | | | | | |
| R&S | Spectrum Analyzer | FSU 26 | 200256 | 2018-01-04 | 2019-01-04 |
| Unknown | Coaxial Cable | C-SJ00-0010 | C0010/01 | Each time | N/A |
| E-Microwave | Coaxial Attenuators | EMCA10-5RN-6 | OE01203239 | 2018-09-06 | 2019-09-06 |
| Weinschel | Coaxial Attenuators | 53-20-34 | LN749 | 2018-09-06 | 2019-09-06 |
| HP | RF Communications Test Set | 8920A | 00 235 | 2018-07-11 | 2019-07-11 |
| Dongzhixu | High Temperature Test Chamber | DP1000 | 201105083-4 | 2018-08-25 | 2019-08-25 |
| UNI-T | Multimeter | UT39A | M130199938 | 2018-07-24 | 2019-07-24 |
| Pro instrument | DC Power Supply | pps3300 | 3300012 | N/A | N/A |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

# FCC §1.1310 & §2.1093 - RF EXPOSURE

## Applicable Standard

FCC§1.1310 and §2.1093.

## Test Result

Compliance, please refer to the SAR report: RDG180926001-20A.

# FCC §2.1046 & § 22.727 & §74.461 & §90.205- RF OUTPUT POWER

## Applicable Standard

FCC §2.1046, § 22.727, §74.461 and §90.205

## Test Procedure

Conducted RF Output Power:

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer Setting:

| RBW | VBW |
|---|---|
| 100 kHz | 300 kHz |

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 27.5℃ |
| **Relative Humidity:** | 46 % |
| **ATM Pressure:** | 100.7 kPa |

*The testing was performed by Tiago Huang on 2018-10-24.*

*Test Mode: Transmitting*

**Test Result:** Compliance. Please refer to following table.

| Frequency (MHz) | Mode | Output Power (dBm) | Note |
|---|---|---|---|
| 350.0125 | DMO | 32.56 | **For Federal** |
| 453.2125 | | 32.80 | **FCC Part 90** |
| 454.0125 | | 32.73 | **FCC Part 22** |
| 455.0125 | | 32.53 | **FCC Part 74** |
| 474.9875 | | 32.59 | **FCC Part 90** |
| 350.0125 | TMO | 32.83 | **For Federal** |
| 453.2125 | | 32.63 | **FCC Part 90** |
| 454.0125 | | 32.79 | **FCC Part 22** |
| 455.0125 | | 32.74 | **FCC Part 74** |
| 474.9875 | | 32.41 | **FCC Part 90** |

Note: The rated power is 32.5 dBm.

# FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

# FCC §90.210& §90.221- ADJACENT CHANNEL POWER

## Applicable Standard

FCC §2.1046, §90.210& §90.221

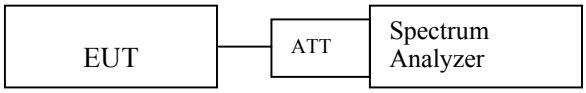
According to FCC§90.221 (b) (1), Maximum adjacent power levels for frequencies in the 450-470 MHz band:

| Frequency offset | Maximum ACP (dBc) for devices 1 watt and less | Maximum ACP (dBc) for devices above 1 watt |
|---|---|---|
| 25 kHz | −55 dBc | −60 dBc |
| 50 kHz | −70 dBc | −70 dBc |
| 75 kHz | −70 dBc | −70 dBc |

(2) In any case, no requirement in excess of −36 dBm shall apply

## Test Procedure

The EUT was connected to the Spectrum Analyzer with a suitable attenuator.




## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 27 ℃ |
| **Relative Humidity:** | 56% |
| **ATM Pressure:** | 100.5 kPa |

*The testing was performed by Tiago Huang on 2019-03-07.*

*Test Mode: DMO & TMO Transmitting*

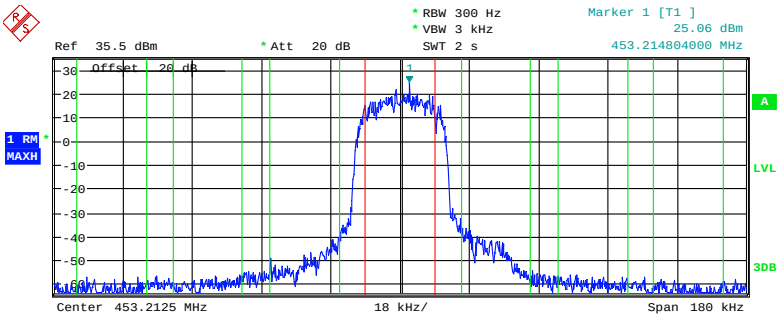
**Test Result:** Compliance. Please refer to following table and plots.

| Mode | Frequency (MHz) | Frequency offset (KHz) | Adjacent Channel Ratio(dB) | Limit (dB) |
|---|---|---|---|---|
| DMO | 453.2125 | -75 | -78.95 | -70 |
| | | -50 | -77.33 | -70 |
| | | -25 | -66.65 | -60 |
| | | 25 | -61.22 | -60 |
| | | 50 | -77.17 | -70 |
| | | 75 | -79.50 | -70 |
| | 455.0125 | -75 | -80.01 | -70 |
| | | -50 | -77.26 | -70 |
| | | -25 | -66.71 | -60 |
| | | 25 | -61.90 | -60 |
| | | 50 | -77.50 | -70 |
| | | 75 | -79.74 | -70 |

| Mode | Frequency (MHz) | Frequency offset (KHz) | Adjacent Channel Ratio(dB) | Limit (dB) |
|---|---|---|---|---|
| TMO | 453.2125 | -75 | -79.62 | -70 |
| | | -50 | -76.79 | -70 |
| | | -25 | -65.18 | -60 |
| | | 25 | -60.15 | -60 |
| | | 50 | -76.64 | -70 |
| | | 75 | -80.02 | -70 |
| | 455.0125 | -75 | -79.53 | -70 |
| | | -50 | -76.81 | -70 |
| | | -25 | -67.85 | -60 |
| | | 25 | -60.90 | -60 |
| | | 50 | -77.02 | -70 |
| | | 75 | -79.39 | -70 |

DMO:

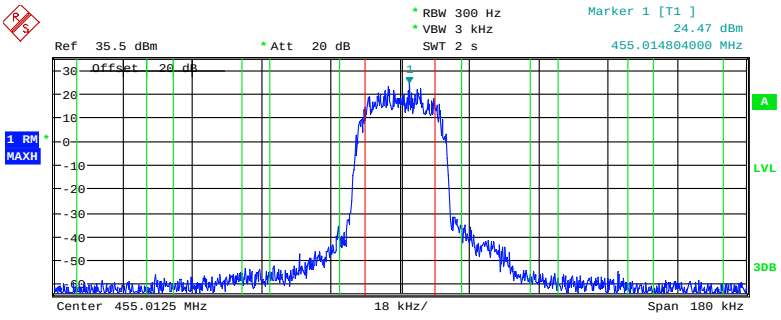
**Frequency 453.2125 MHz**




| | | | |
|---|---|---|---|
| **Tx Channel** | | | |
| Bandwidth | 18 kHz | Power | 34.24 dBm |
| **Adjacent Channel** | | | |
| Bandwidth | 18 kHz | Lower | -66.65 dB |
| Spacing | 25 kHz | Upper | -61.22 dB |
| **Alternate Channel** | | | |
| Bandwidth | 18 kHz | Lower | -77.33 dB |
| Spacing | 50 kHz | Upper | -77.17 dB |
| **2nd Alternate Channel** | | | |
| Bandwidth | 18 kHz | Lower | -78.95 dB |
| Spacing | 75 kHz | Upper | -79.50 dB |

Date: 7.MAR.2019 16:50:21

**Frequency 455.0125 MHz**

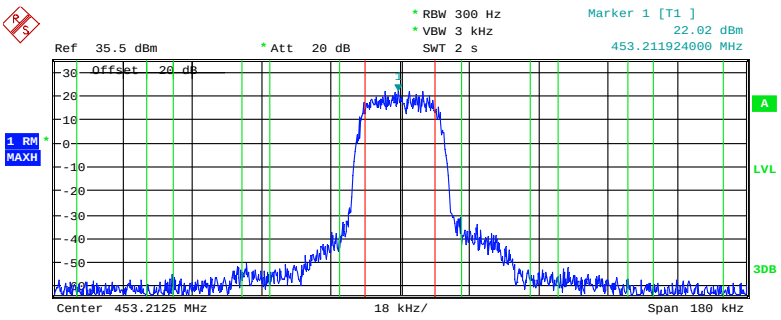



| | | | |
|---|---|---|---|
| **Tx Channel** | | | |
| Bandwidth | 18 kHz | Power | 34.91 dBm |
| **Adjacent Channel** | | | |
| Bandwidth | 18 kHz | Lower | -66.71 dB |
| Spacing | 25 kHz | Upper | -61.90 dB |
| **Alternate Channel** | | | |
| Bandwidth | 18 kHz | Lower | -77.26 dB |
| Spacing | 50 kHz | Upper | -77.50 dB |
| **2nd Alternate Channel** | | | |
| Bandwidth | 18 kHz | Lower | -80.01 dB |
| Spacing | 75 kHz | Upper | -79.74 dB |

Date: 7.MAR.2019 16:54:21

TMO

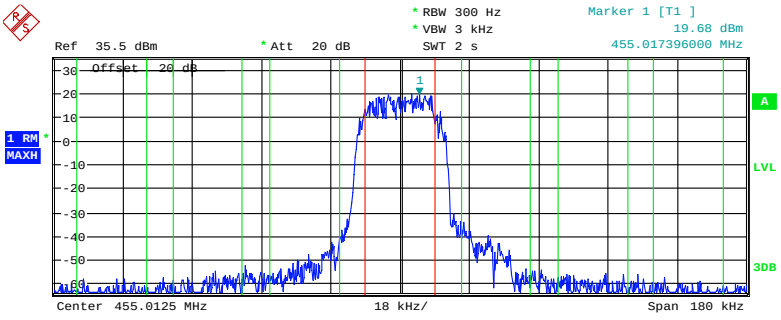
**Frequency 453.2125 MHz**




| | | | |
|---|---|---|---|
| **Tx Channel** | | | |
| Bandwidth | 18 kHz | Power | 35.08 dBm |
| **Adjacent Channel** | | | |
| Bandwidth | 18 kHz | Lower | -65.18 dB |
| Spacing | 25 kHz | Upper | -60.15 dB |
| **Alternate Channel** | | | |
| Bandwidth | 18 kHz | Lower | -76.79 dB |
| Spacing | 50 kHz | Upper | -76.64 dB |
| **2nd Alternate Channel** | | | |
| Bandwidth | 18 kHz | Lower | -79.62 dB |
| Spacing | 75 kHz | Upper | -80.02 dB |

Date: 7.MAR.2019 16:35:55

**Frequency 455.0125 MHz**




| | | | |
|---|---|---|---|
| **Tx Channel** | | | |
| Bandwidth | 18 kHz | Power | 33.49 dBm |
| **Adjacent Channel** | | | |
| Bandwidth | 18 kHz | Lower | -67.85 dB |
| Spacing | 25 kHz | Upper | -60.90 dB |
| **Alternate Channel** | | | |
| Bandwidth | 18 kHz | Lower | -76.81 dB |
| Spacing | 50 kHz | Upper | -77.02 dB |
| **2nd Alternate Channel** | | | |
| Bandwidth | 18 kHz | Lower | -79.53 dB |
| Spacing | 75 kHz | Upper | -79.39 dB |

Date: 7.MAR.2019 16:47:31

# FCC §2.1049 & §22.357 & § 22.731 & §74.462& §90.209 & §90.210 – OCCUPIED BANDWIDTH

## Applicable Standard

FCC §2.1049, §22.357, § 22.731, §74.462, §90.209 and §90.210

## Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 300 Hz.

## Test Data

### Environmental Conditions

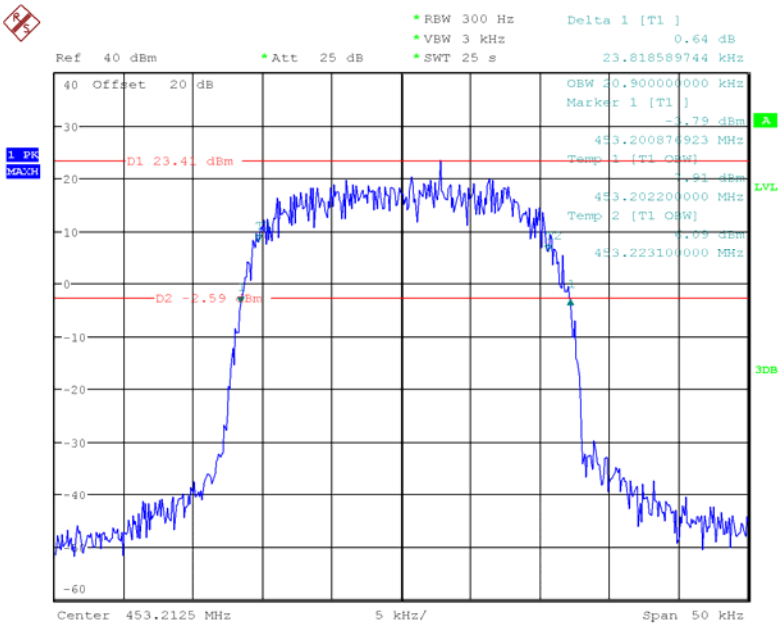
| | |
|---|---|
| **Temperature:** | 27~27.5℃ |
| **Relative Humidity:** | 46~56 % |
| **ATM Pressure:** | 100.7~100.9 kPa |

*The testing was performed by Tiago Huang on 2018-10-24 & 2018-11-06.*

| Mode | $f_c$ | 99% Occupied Bandwidth | 26 dB Bandwidth | Note |
|---|---|---|---|---|
| | MHz | kHz | kHz | |
| DMO | 453.2125 | 20.900 | 23.818 | FCC part 90 |
| | 454.0125 | 21.100 | 23.899 | FCC Part 22 |
| | 455.0125 | 20.900 | 23.397 | FCC Part 74 |
| TMO | 453.2125 | 21.300 | 23.501 | FCC part 90 |
| | 454.0125 | 21.000 | 23.237 | FCC Part 22 |
| | 455.0125 | 20.900 | 23.517 | FCC Part 74 |

***Occupied Bandwidth:***
***DMO:***

**Occupied Bandwidth –453.2125 MHz**

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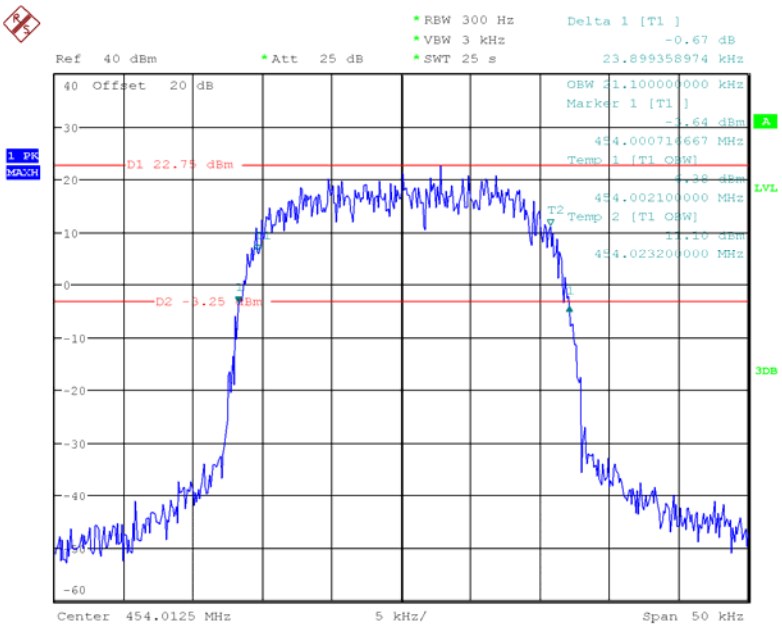
**Occupied Bandwidth –454.0125 MHz**

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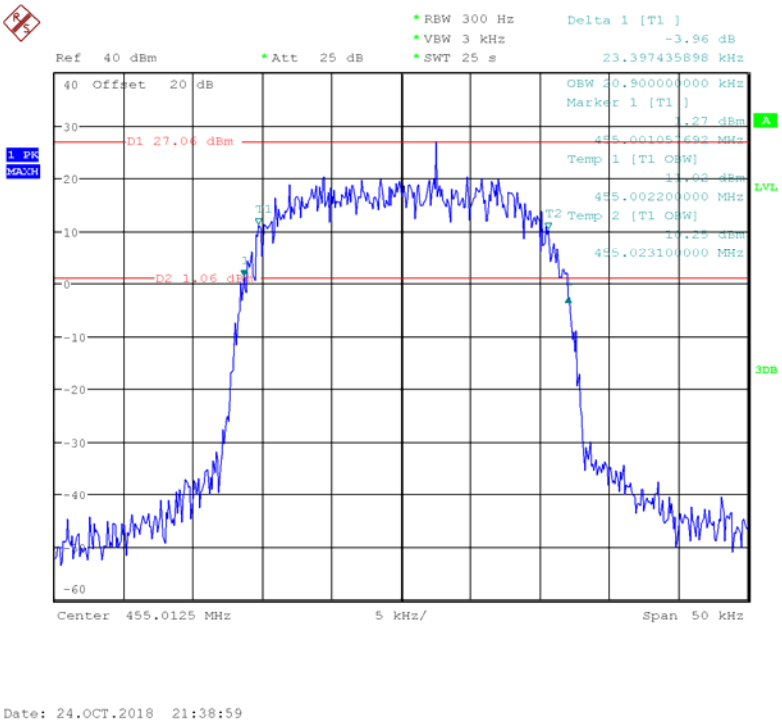
**Occupied Bandwidth –455.0125 MHz**

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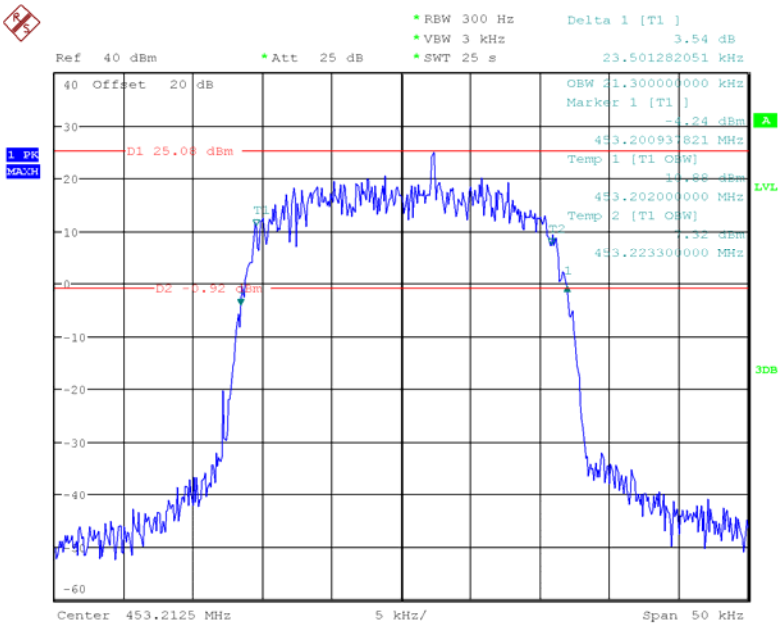
***TMO:***

**Occupied Bandwidth – 453.2125 MHz**

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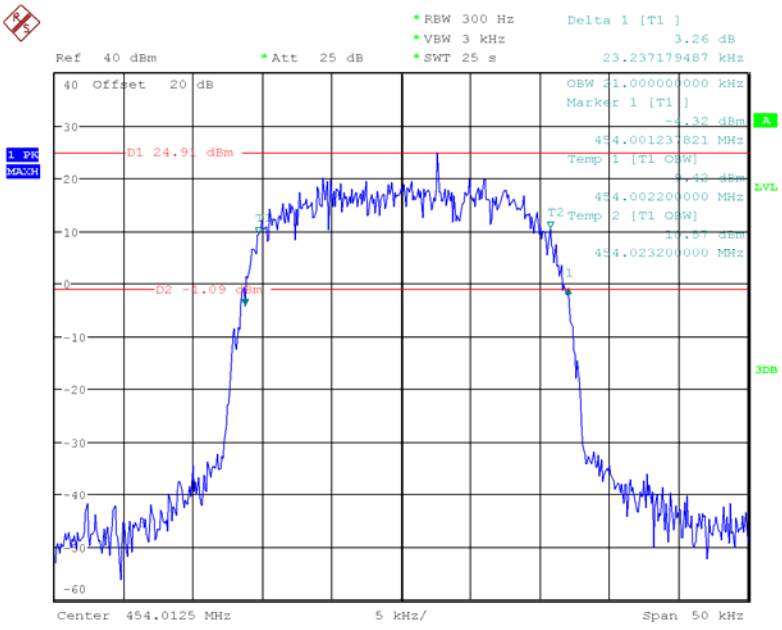
**Occupied Bandwidth –454.0125 MHz**

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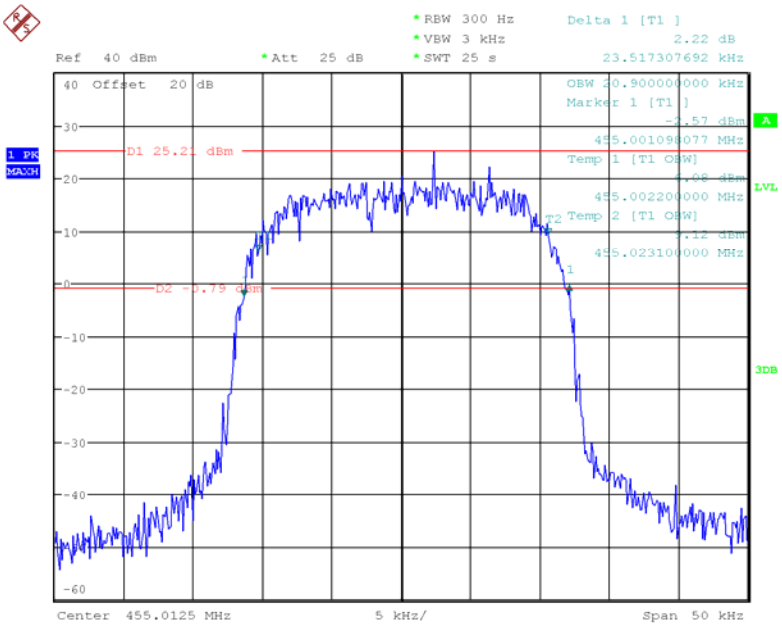
**Occupied Bandwidth –455.0125 MHz**

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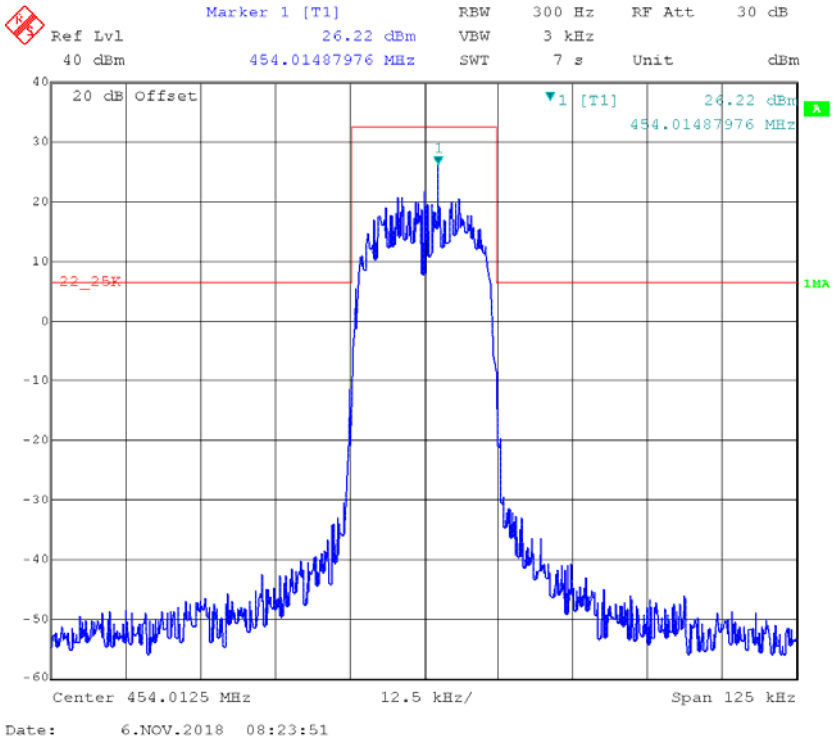
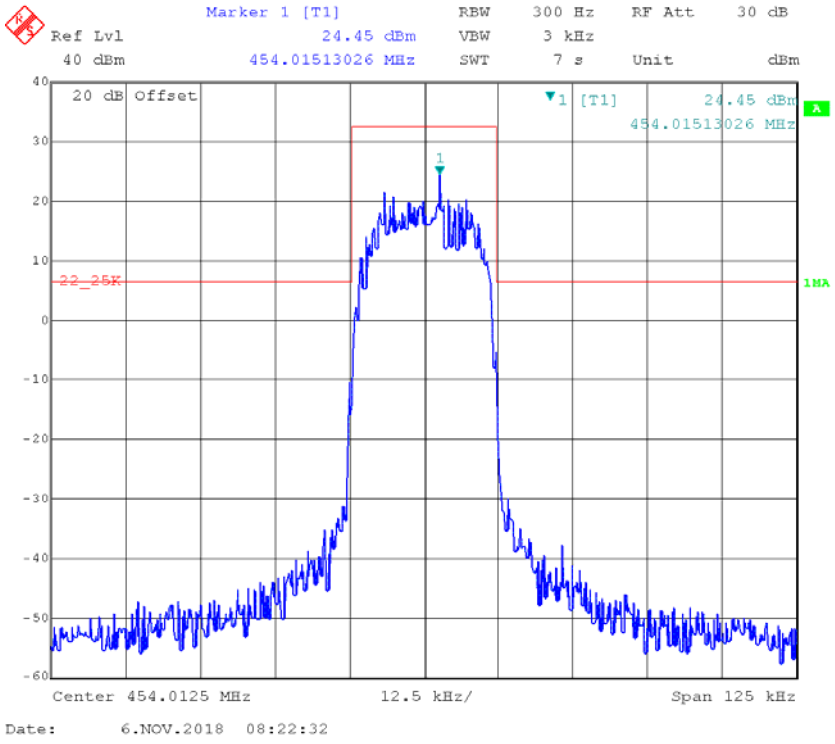
***Emission Mask:***
***DMO:***

**Emission Mask –454.0125 MHz**




***TMO:***

**Emission Mask –454.0125 MHz**



# FCC §2.1051 & §22.861 & §74.462 & §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

## Applicable Standard

FCC §2.1051, §22.861, §74.462 and §90.210

## 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 100kHz for below 1GHz, and 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10$^{th}$ harmonic.

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 27.5℃ |
| **Relative Humidity:** | 46 % |
| **ATM Pressure:** | 100.7 kPa |

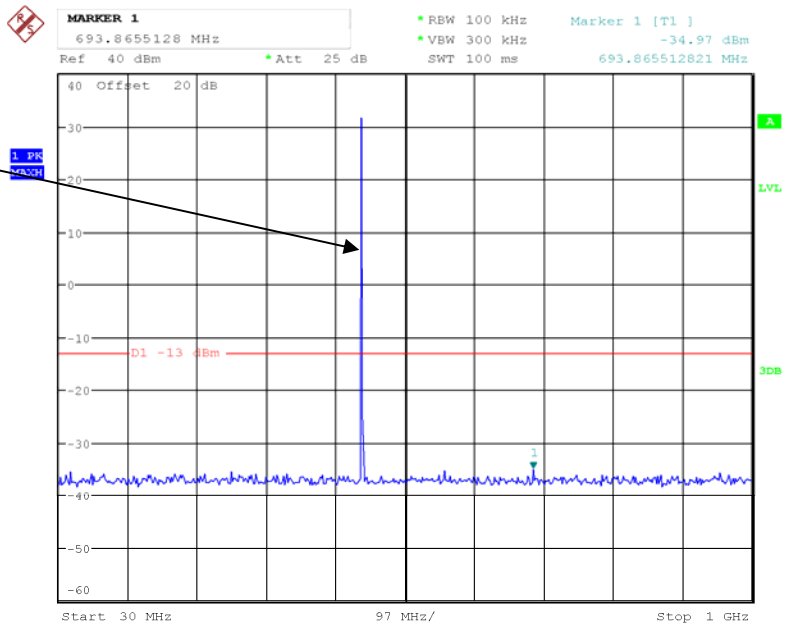
*The testing was performed by Tiago Huang on 2018-10-24.*

*Test Mode: DMO&TMO Transmitting*

**DMO**

**453.2125 MHz-FCC part 90**

Fundamental

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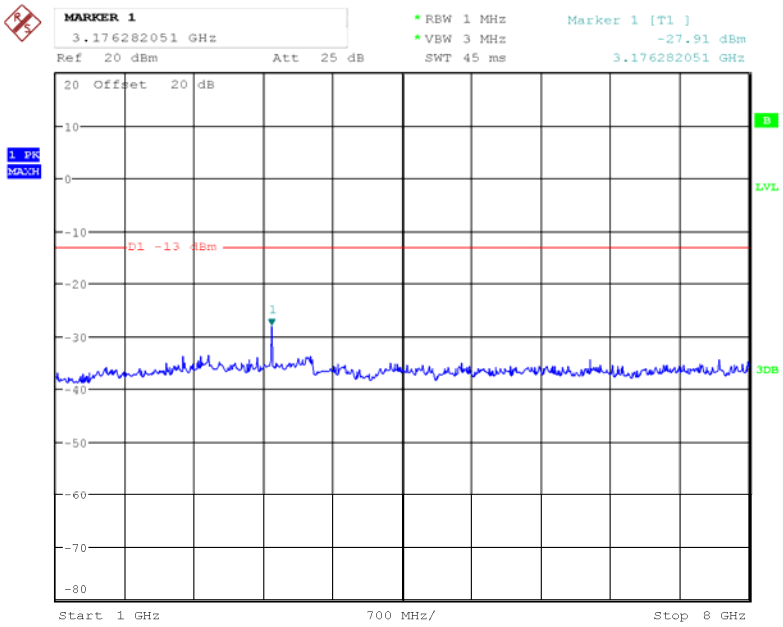


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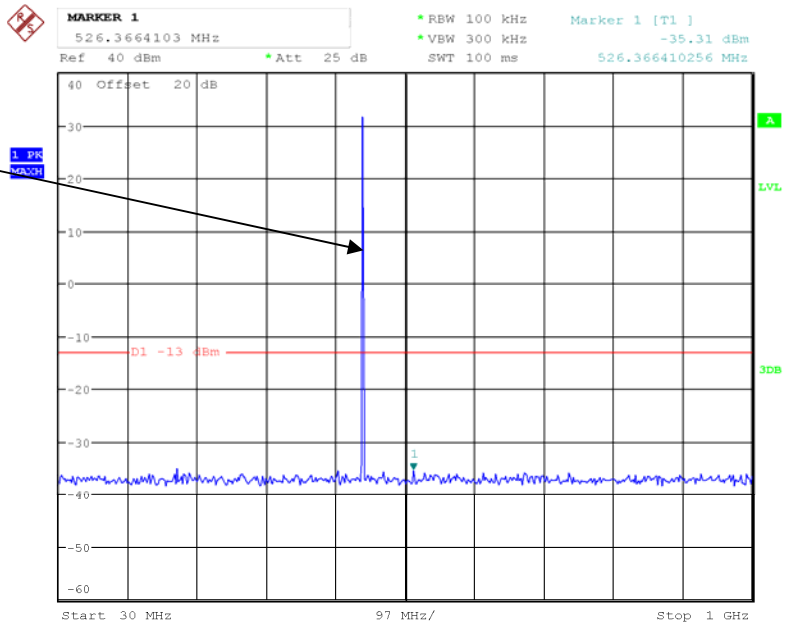
**454.0125 MHz-FCC part 22**

Fundamental

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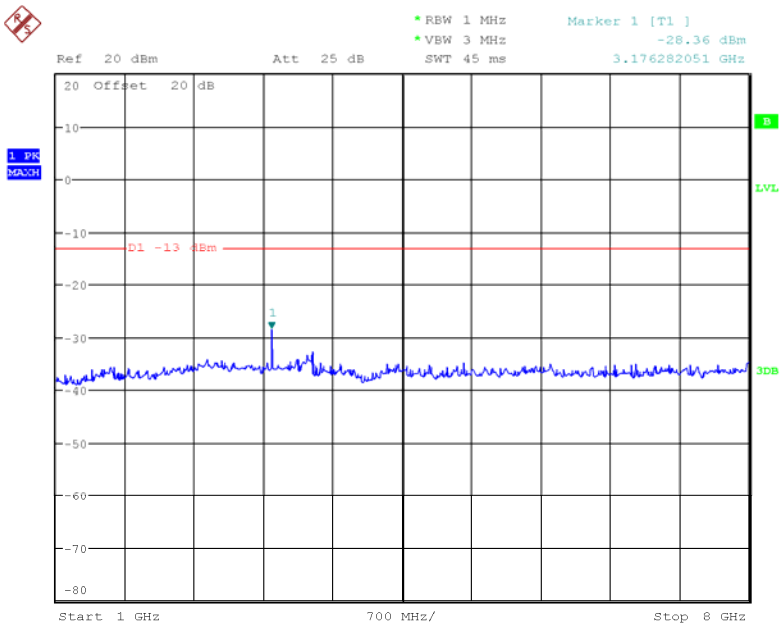


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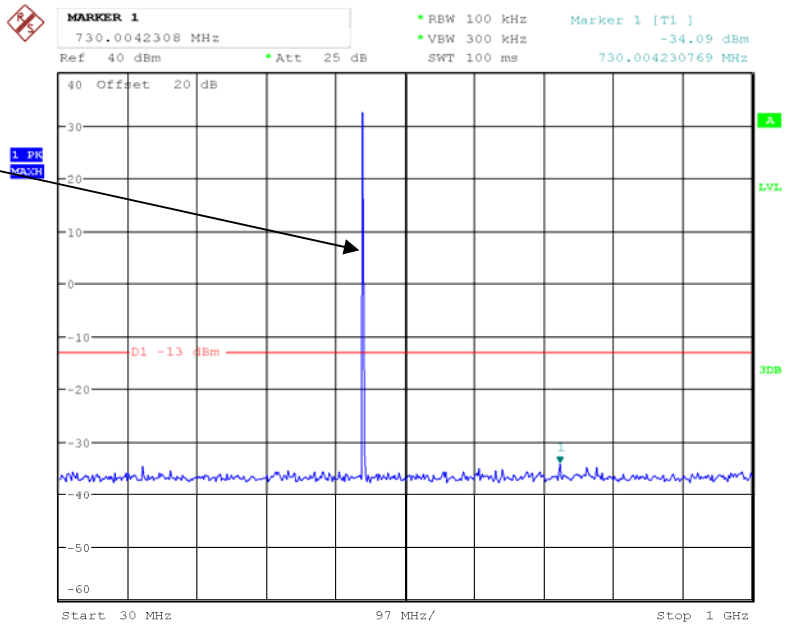
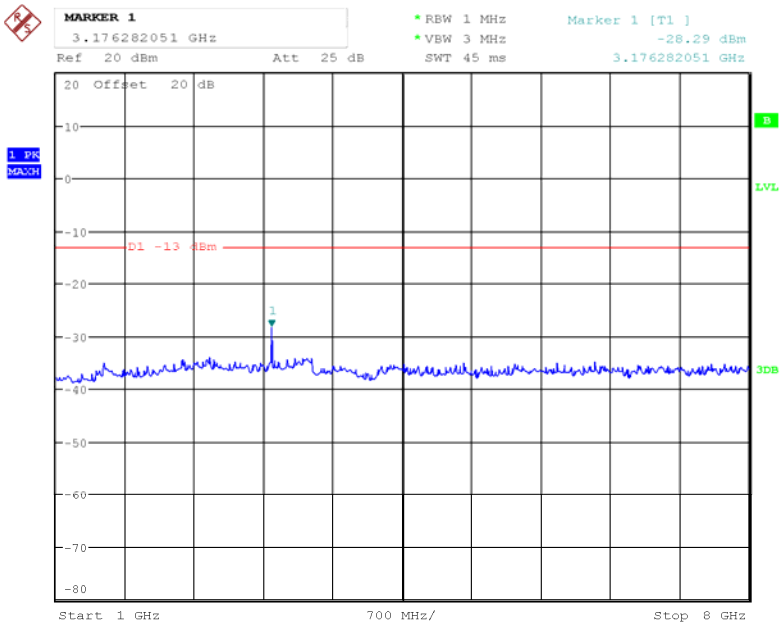
**454.0125 MHz-FCC part 74**

Fundamental




Date: 24.OCT.2018 22:23:34

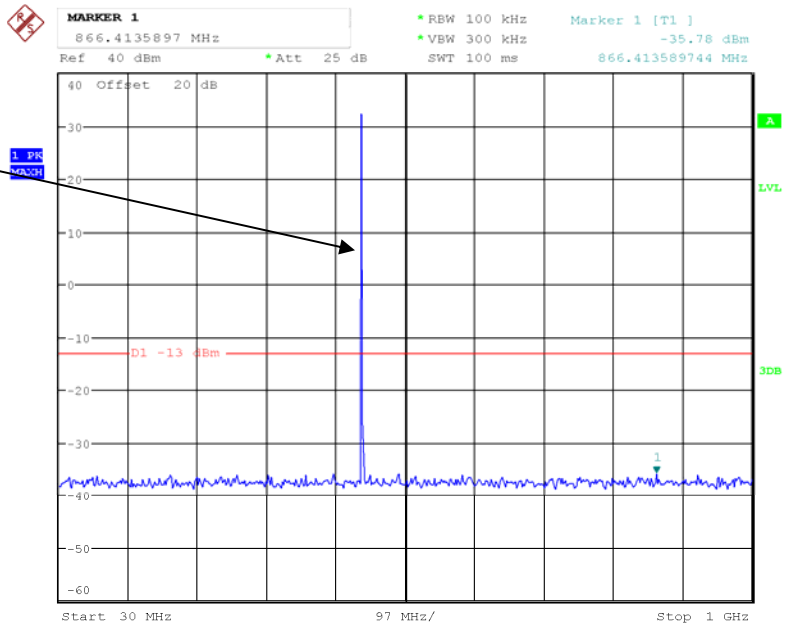



Date: 24.OCT.2018 22:21:57

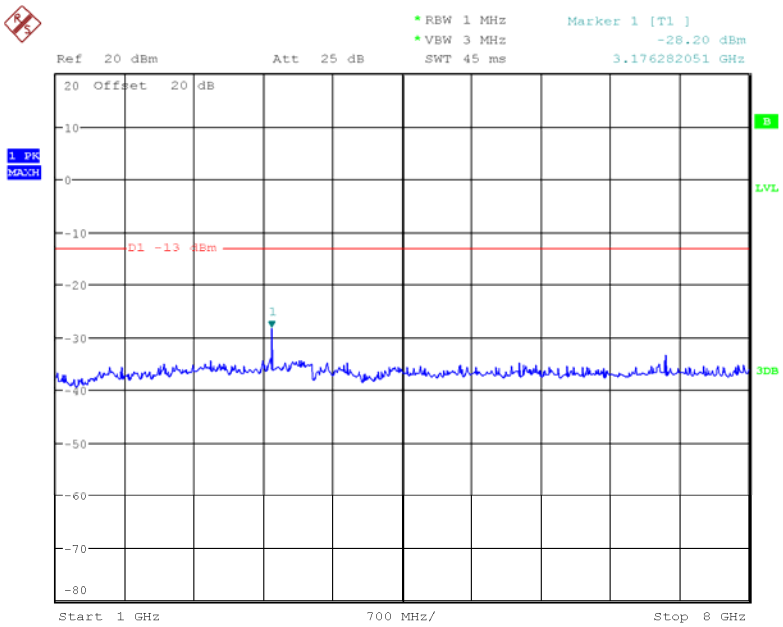
**TMO**

**453.2125 MHz-FCC part 90**

Fundamental



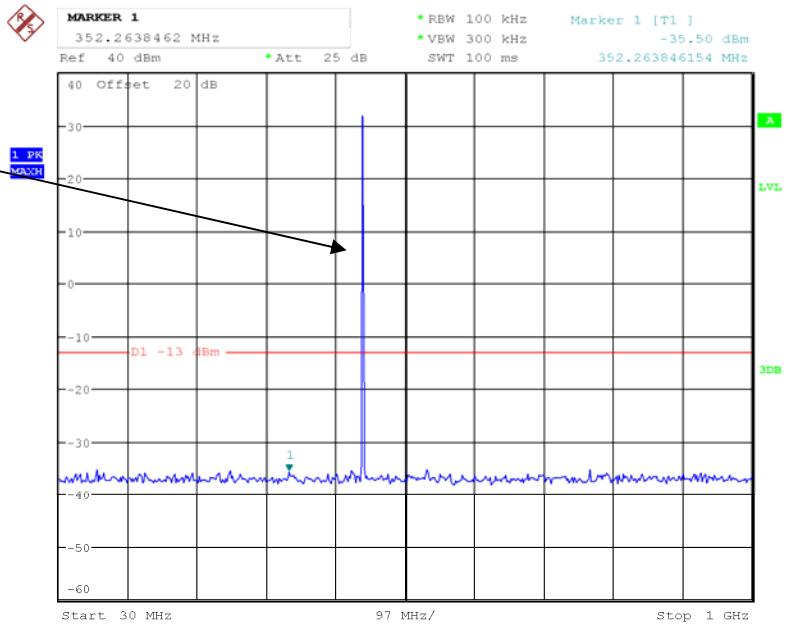

Date: 24.OCT.2018 22:24:55



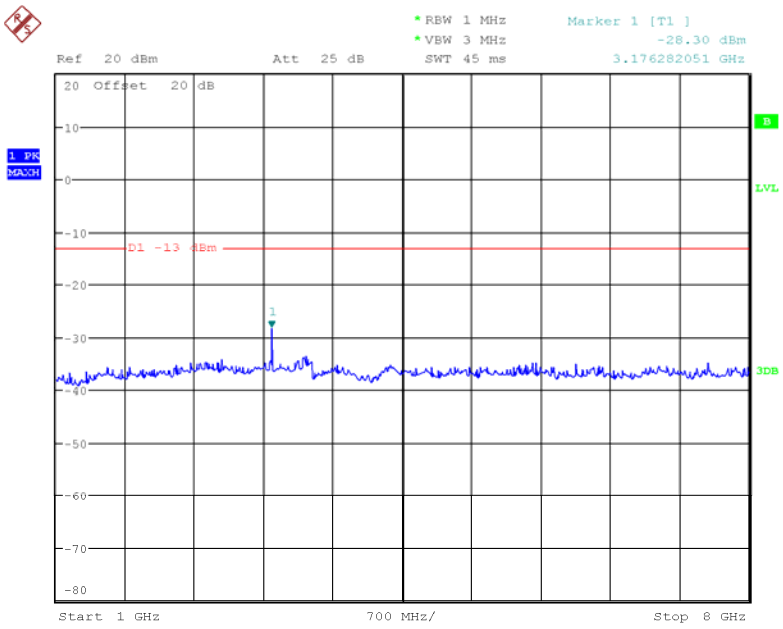

Date: 24.OCT.2018 22:28:15

**454.0125 MHz-FCC part 22**

Fundamental



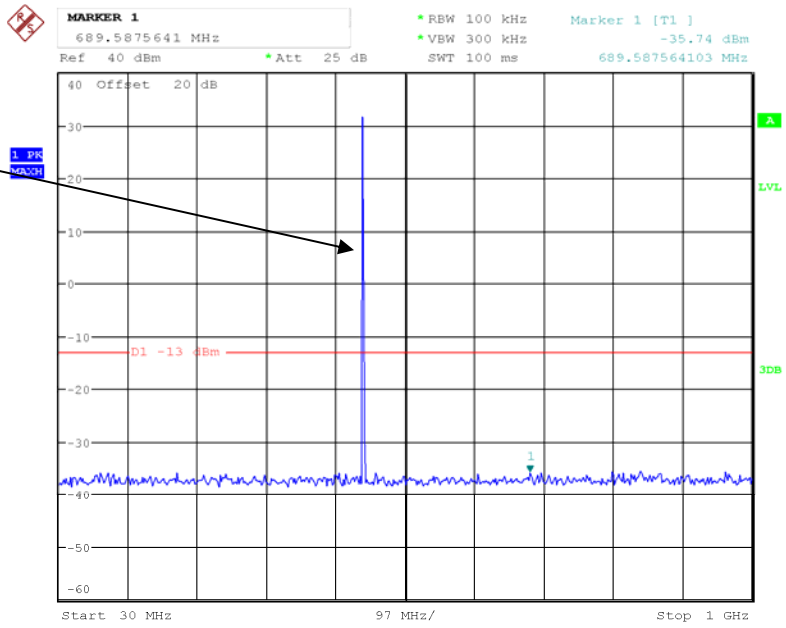

Date: 24.OCT.2018 22:19:59



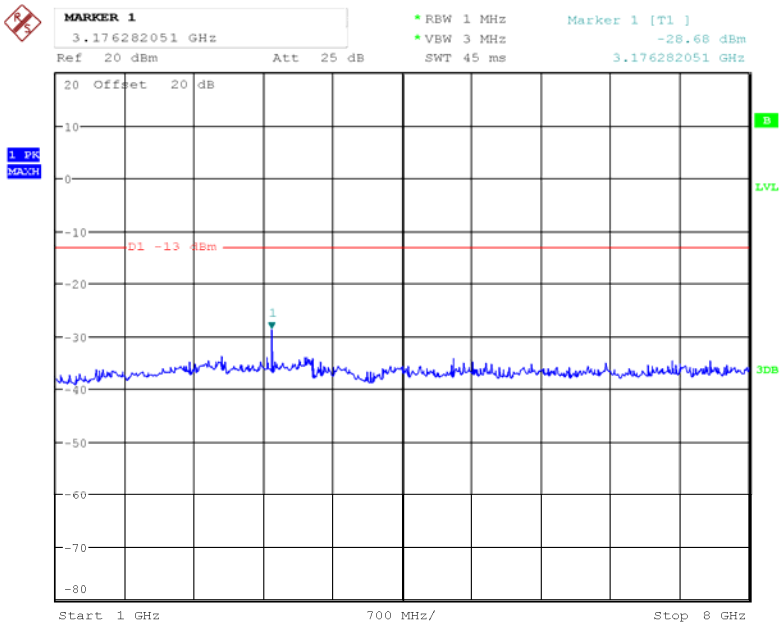

Date: 24.OCT.2018 22:28:40

**455.0125 MHz-FCC part 74**

Fundamental




Date: 24.OCT.2018 22:23:55




Date: 24.OCT.2018 22:22:08

# FCC §2.1053; §22.861; §74.462 & §90.210 - RADIATED SPURIOUS EMISSIONS

## Applicable Standard

FCC §2.1053, §90.210

## Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT .The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =10 1g (TXpwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB =43+10 $Log_{10}$ (power out in Watts) for EUT with a 12.5 kHz channel bandwidth.

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 25.4~26.3℃ |
| **Relative Humidity:** | 31~ 36 % |
| **ATM Pressure:** | 101 kPa |

*The testing was performed by Vern Shen & Blake Yang on 2018-10-29.*

***PT350 F8:***

*Test Mode: Transmitting*

**30MHz - 10GHz:**

*DMO*

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBµV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | S.G. Level (dBm) | Antenna Gain (dB) | Cable Loss (dB) | | | |
| **Frequency:453.2125 MHz-FCC part 90** | | | | | | | | |
| 906.43 | H | 33.60 | -63.27 | 0.00 | 1.03 | -64.30 | -13.00 | 51.30 |
| 906.43 | V | 40.72 | -58.12 | 0.00 | 1.03 | -59.15 | -13.00 | 46.15 |
| 1359.64 | H | 50.68 | -62.68 | 8.72 | 1.20 | -55.16 | -13.00 | 42.16 |
| 1359.64 | V | 55.43 | -58.65 | 8.72 | 1.20 | -51.13 | -13.00 | 38.13 |
| 1812.85 | H | 46.82 | -67.36 | 11.19 | 0.72 | -56.89 | -13.00 | 43.89 |
| 1812.85 | V | 47.25 | -67.49 | 11.19 | 0.72 | -57.02 | -13.00 | 44.02 |
| **Frequency:454.0125 MHz-FCC part 22** | | | | | | | | |
| 908.03 | H | 34.14 | -62.67 | 0.00 | 1.03 | -63.70 | -13.00 | 50.70 |
| 908.03 | V | 42.48 | -56.28 | 0.00 | 1.03 | -57.31 | -13.00 | 44.31 |
| 1362.04 | H | 53.73 | -59.62 | 8.73 | 1.20 | -52.09 | -13.00 | 39.09 |
| 1362.04 | V | 57.62 | -56.45 | 8.73 | 1.20 | -48.92 | -13.00 | 35.92 |
| 1816.05 | H | 46.53 | -67.60 | 11.21 | 0.73 | -57.12 | -13.00 | 44.12 |
| 1816.05 | V | 46.82 | -67.86 | 11.21 | 0.73 | -57.38 | -13.00 | 44.38 |
| **Frequency:455.0125 MHz-FCC part 74** | | | | | | | | |
| 910.03 | H | 35.12 | -61.60 | 0.00 | 1.02 | -62.62 | -13.00 | 49.62 |
| 910.03 | V | 39.68 | -58.98 | 0.00 | 1.02 | -60.00 | -13.00 | 47.00 |
| 1365.04 | H | 52.17 | -61.17 | 8.76 | 1.20 | -53.61 | -13.00 | 40.61 |
| 1365.04 | V | 57.36 | -56.68 | 8.76 | 1.20 | -49.12 | -13.00 | 36.12 |
| 1820.05 | H | 46.53 | -67.53 | 11.24 | 0.75 | -57.04 | -13.00 | 44.04 |
| 1820.05 | V | 46.87 | -67.73 | 11.24 | 0.75 | -57.24 | -13.00 | 44.24 |

Note:
Absolute Level = SG Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

*TMO*

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | S.G. Level (dBm) | Antenna Gain (dB) | Cable Loss (dB) | | | |
| **Frequency:453.2125 MHz-FCC part 90** | | | | | | | | |
| 906.43 | H | 34.15 | -62.72 | 0.00 | 1.03 | -63.75 | -13.00 | 50.75 |
| 906.43 | V | 41.19 | -57.65 | 0.00 | 1.03 | -58.68 | -13.00 | 45.68 |
| 1359.64 | H | 51.15 | -62.21 | 8.72 | 1.20 | -54.69 | -13.00 | 41.69 |
| 1359.64 | V | 55.85 | -58.23 | 8.72 | 1.20 | -50.71 | -13.00 | 37.71 |
| 1812.85 | H | 47.26 | -66.92 | 11.19 | 0.72 | -56.45 | -13.00 | 43.45 |
| 1812.85 | V | 47.66 | -67.08 | 11.19 | 0.72 | -56.61 | -13.00 | 43.61 |
| **Frequency:454.0125 MHz-FCC part 22** | | | | | | | | |
| 908.03 | H | 34.25 | -62.56 | 0.00 | 1.03 | -63.59 | -13.00 | 50.59 |
| 908.03 | V | 42.76 | -56.00 | 0.00 | 1.03 | -57.03 | -13.00 | 44.03 |
| 1362.04 | H | 54.02 | -59.33 | 8.73 | 1.20 | -51.80 | -13.00 | 38.80 |
| 1362.04 | V | 57.86 | -56.21 | 8.73 | 1.20 | -48.68 | -13.00 | 35.68 |
| 1816.05 | H | 46.64 | -67.49 | 11.21 | 0.73 | -57.01 | -13.00 | 44.01 |
| 1816.05 | V | 46.95 | -67.73 | 11.21 | 0.73 | -57.25 | -13.00 | 44.25 |
| **Frequency:455.0125 MHz-FCC part 74** | | | | | | | | |
| 910.03 | H | 35.31 | -61.41 | 0.00 | 1.02 | -62.43 | -13.00 | 49.43 |
| 910.03 | V | 39.94 | -58.72 | 0.00 | 1.02 | -59.74 | -13.00 | 46.74 |
| 1365.04 | H | 52.29 | -61.05 | 8.76 | 1.20 | -53.49 | -13.00 | 40.49 |
| 1365.04 | V | 57.55 | -56.49 | 8.76 | 1.20 | -48.93 | -13.00 | 35.93 |
| 1820.05 | H | 46.78 | -67.28 | 11.24 | 0.75 | -56.79 | -13.00 | 43.79 |
| 1820.05 | V | 47.15 | -67.45 | 11.24 | 0.75 | -56.96 | -13.00 | 43.96 |

Note:
Absolute Level = SG Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

***PT310 F8:***

*Test Mode: Transmitting*

**30MHz - 10GHz:**

*DMO*

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | S.G. Level (dBm) | Antenna Gain (dB) | Cable Loss (dB) | | | |
| **Frequency:453.2125 MHz-FCC part 90** | | | | | | | | |
| 906.43 | H | 33.62 | -63.25 | 0.00 | 1.03 | -64.28 | -13.00 | 51.28 |
| 906.43 | V | 40.81 | -58.03 | 0.00 | 1.03 | -59.06 | -13.00 | 46.06 |
| 1359.64 | H | 50.76 | -62.60 | 8.72 | 1.20 | -55.08 | -13.00 | 42.08 |
| 1359.64 | V | 55.22 | -58.86 | 8.72 | 1.20 | -51.34 | -13.00 | 38.34 |
| 1812.85 | H | 46.68 | -67.50 | 11.19 | 0.72 | -57.03 | -13.00 | 44.03 |
| 1812.85 | V | 47.10 | -67.64 | 11.19 | 0.72 | -57.17 | -13.00 | 44.17 |
| **Frequency:454.0125 MHz-FCC part 22** | | | | | | | | |
| 908.03 | H | 33.90 | -62.91 | 0.00 | 1.03 | -63.94 | -13.00 | 50.94 |
| 908.03 | V | 42.30 | -56.46 | 0.00 | 1.03 | -57.49 | -13.00 | 44.49 |
| 1362.04 | H | 53.78 | -59.57 | 8.73 | 1.20 | -52.04 | -13.00 | 39.04 |
| 1362.04 | V | 57.71 | -56.36 | 8.73 | 1.20 | -48.83 | -13.00 | 35.83 |
| 1816.05 | H | 46.09 | -68.04 | 11.21 | 0.73 | -57.56 | -13.00 | 44.56 |
| 1816.05 | V | 46.82 | -67.86 | 11.21 | 0.73 | -57.38 | -13.00 | 44.38 |
| **Frequency:455.0125 MHz-FCC part 74** | | | | | | | | |
| 910.03 | H | 35.24 | -61.48 | 0.00 | 1.02 | -62.50 | -13.00 | 49.50 |
| 910.03 | V | 39.33 | -59.33 | 0.00 | 1.02 | -60.35 | -13.00 | 47.35 |
| 1365.04 | H | 52.16 | -61.18 | 8.76 | 1.20 | -53.62 | -13.00 | 40.62 |
| 1365.04 | V | 57.30 | -56.74 | 8.76 | 1.20 | -49.18 | -13.00 | 36.18 |
| 1820.05 | H | 46.12 | -67.94 | 11.24 | 0.75 | -57.45 | -13.00 | 44.45 |
| 1820.05 | V | 46.94 | -67.66 | 11.24 | 0.75 | -57.17 | -13.00 | 44.17 |

Note:
Absolute Level = SG Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

*TMO*

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | S.G. Level (dBm) | Antenna Gain (dB) | Cable Loss (dB) | | | |
| **Frequency:453.2125 MHz-FCC part 90** | | | | | | | | |
| 906.43 | H | 33.85 | -63.02 | 0.00 | 1.03 | -64.05 | -13.00 | 51.05 |
| 906.43 | V | 41.1 | -57.74 | 0.00 | 1.03 | -58.77 | -13.00 | 45.77 |
| 1359.64 | H | 50.91 | -62.45 | 8.72 | 1.20 | -54.93 | -13.00 | 41.93 |
| 1359.64 | V | 55.67 | -58.41 | 8.72 | 1.20 | -50.89 | -13.00 | 37.89 |
| 1812.85 | H | 47.35 | -66.83 | 11.19 | 0.72 | -56.36 | -13.00 | 43.36 |
| 1812.85 | V | 47.37 | -67.37 | 11.19 | 0.72 | -56.90 | -13.00 | 43.90 |
| **Frequency:454.0125 MHz-FCC part 22** | | | | | | | | |
| 908.03 | H | 34.07 | -62.74 | 0.00 | 1.03 | -63.77 | -13.00 | 50.77 |
| 908.03 | V | 42.87 | -55.89 | 0.00 | 1.03 | -56.92 | -13.00 | 43.92 |
| 1362.04 | H | 54.03 | -59.32 | 8.73 | 1.20 | -51.79 | -13.00 | 38.79 |
| 1362.04 | V | 57.87 | -56.20 | 8.73 | 1.20 | -48.67 | -13.00 | 35.67 |
| 1816.05 | H | 46.68 | -67.45 | 11.21 | 0.73 | -56.97 | -13.00 | 43.97 |
| 1816.05 | V | 47.1 | -67.58 | 11.21 | 0.73 | -57.10 | -13.00 | 44.10 |
| **Frequency:455.0125 MHz-FCC part 74** | | | | | | | | |
| 910.03 | H | 35.44 | -61.28 | 0.00 | 1.02 | -62.30 | -13.00 | 49.30 |
| 910.03 | V | 39.64 | -59.02 | 0.00 | 1.02 | -60.04 | -13.00 | 47.04 |
| 1365.04 | H | 52.35 | -60.99 | 8.76 | 1.20 | -53.43 | -13.00 | 40.43 |
| 1365.04 | V | 57.53 | -56.51 | 8.76 | 1.20 | -48.95 | -13.00 | 35.95 |
| 1820.05 | H | 46.79 | -67.27 | 11.24 | 0.75 | -56.78 | -13.00 | 43.78 |
| 1820.05 | V | 47.1 | -67.50 | 11.24 | 0.75 | -57.01 | -13.00 | 44.01 |

Note:
Absolute Level = SG Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

# FCC §2.1055 & § 22.355 & §74.464 & §90.213- FREQUENCY STABILITY

## Applicable Standard

FCC §2.1055, § 22.355, §74.464, §90.213

## Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 27.5 ℃ |
| **Relative Humidity:** | 46 % |
| **ATM Pressure:** | 100.7 kPa |

*The testing was performed by Tiago Huang on 2018-10-24.*

*Test Mode: DMO Transmitting*

DMO

FCC Part 90:

| fc =453.2125 MHz, 25 kHz | | | | |
|---|---|---|---|---|
| **Temerature** | **Voltage** | **Reading** | **Frequency Error** | **Limit** |
| **℃** | **Vdc** | **MHz** | **ppm** | **ppm** |
| -30 | 3.85 | 453.21260 | 0.22 | 5 |
| -20 | | 453.21283 | 0.73 | |
| -10 | | 453.21242 | -0.18 | |
| 0 | | 453.21250 | 0.00 | |
| 10 | | 453.21253 | 0.07 | |
| 20 | | 453.21270 | 0.44 | |
| 30 | | 453.21309 | 1.30 | |
| 40 | | 453.21254 | 0.09 | |
| 50 | | 453.21246 | -0.09 | |
| 60 | | 453.21291 | 0.90 | |
| 20 | 3.6 | 453.21256 | 0.13 | |
| 20 | 4.35 | 453.21165 | -1.88 | |

FCC Part 22:

| fc =454.0125 MHz, 25 kHz | | | | |
|---|---|---|---|---|
| **Temerature** | **Voltage** | **Reading** | **Frequency Error** | **Limit** |
| **℃** | **Vdc** | **MHz** | **ppm** | **ppm** |
| -30 | 3.85 | 454.01284 | 0.75 | 5 |
| -20 | | 454.01237 | -0.29 | |
| -10 | | 454.01285 | 0.77 | |
| 0 | | 454.01285 | 0.77 | |
| 10 | | 454.01229 | -0.46 | |
| 20 | | 454.01240 | -0.22 | |
| 30 | | 454.01231 | -0.42 | |
| 40 | | 454.01251 | 0.02 | |
| 50 | | 454.01288 | 0.84 | |
| 60 | | 454.01236 | -0.31 | |
| 20 | 3.6 | 454.01260 | 0.22 | |
| 20 | 4.35 | 454.01262 | 0.26 | |

FCC Part 74:

| fc =455.0125 MHz, 25 kHz | | | | |
|---|---|---|---|---|
| **Temerature** | **Voltage** | **Reading** | **Frequency Error** | **Limit** |
| **℃** | **Vdc** | **MHz** | **ppm** | **ppm** |
| -30 | 3.85 | 455.01251 | 0.02 | 5 |
| -20 | | 455.01222 | -0.62 | |
| -10 | | 455.01221 | -0.64 | |
| 0 | | 455.01288 | 0.84 | |
| 10 | | 455.01254 | 0.09 | |
| 20 | | 455.01242 | -0.18 | |
| 30 | | 455.01212 | -0.84 | |
| 40 | | 455.01214 | -0.79 | |
| 50 | | 455.01267 | 0.37 | |
| 60 | | 455.01262 | 0.26 | |
| 20 | 3.6 | 455.01239 | -0.24 | |
| 20 | 4.35 | 455.01234 | -0.35 | |

TMO:

FCC Part 90:

| fc =453.2125 MHz, 25 kHz | | | | |
|---|---|---|---|---|
| **Temerature** | **Voltage** | **Reading** | **Frequency Error** | **Limit** |
| **℃** | **Vdc** | **MHz** | **ppm** | **ppm** |
| -30 | 3.85 | 453.21242 | -0.18 | 5 |
| -20 | | 453.21243 | -0.15 | |
| -10 | | 453.21253 | 0.07 | |
| 0 | | 453.21248 | -0.04 | |
| 10 | | 453.21289 | 0.86 | |
| 20 | | 453.21298 | 1.06 | |
| 30 | | 453.21285 | 0.77 | |
| 40 | | 453.21286 | 0.79 | |
| 50 | | 453.21284 | 0.75 | |
| 60 | | 453.21271 | 0.46 | |
| 20 | 3.6 | 453.21277 | 0.60 | |
| 20 | 4.35 | 453.21246 | -0.09 | |

FCC Part 22:

| fc =454.0125 MHz, 25 kHz | | | | |
|---|---|---|---|---|
| **Temerature** | **Voltage** | **Reading** | **Frequency Error** | **Limit** |
| **℃** | **Vdc** | **MHz** | **ppm** | **ppm** |
| -30 | 3.85 | 454.01238 | -0.26 | 5 |
| -20 | | 454.01281 | 0.68 | |
| -10 | | 454.01228 | -0.48 | |
| 0 | | 454.01229 | -0.46 | |
| 10 | | 454.01260 | 0.22 | |
| 20 | | 454.01248 | -0.04 | |
| 30 | | 454.01257 | 0.15 | |
| 40 | | 454.01254 | 0.09 | |
| 50 | | 454.01244 | -0.13 | |
| 60 | | 454.01237 | -0.29 | |
| 25 | 3.6 | 454.01243 | -0.15 | |
| 25 | 4.35 | 454.01269 | 0.42 | |

FCC Part 74:

| fc =455.0125 MHz, 25 kHz | | | | |
|---|---|---|---|---|
| **Temerature** | **Voltage** | **Reading** | **Frequency Error** | **Limit** |
| **℃** | **Vdc** | **MHz** | **ppm** | **ppm** |
| -30 | 3.85 | 455.01280 | 0.66 | 5 |
| -20 | | 455.01218 | -0.70 | |
| -10 | | 455.01251 | 0.02 | |
| 0 | | 455.01279 | 0.64 | |
| 10 | | 455.01286 | 0.79 | |
| 20 | | 455.01305 | 1.21 | |
| 30 | | 455.01214 | -0.79 | |
| 40 | | 455.01210 | -0.88 | |
| 50 | | 455.01241 | -0.20 | |
| 60 | | 455.01227 | -0.51 | |
| 25 | 3.6 | 455.01230 | -0.44 | |
| 25 | 4.35 | 455.01237 | -0.29 | |

# FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

There is no required for tetra device.

******* END OF REPORT *******