Advanced
Compliance Laboratory

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# Electromagnetic Emission Compliance Test Report

| | |
|---|---|
| **Equipment Under Test (EUT)** | **Fiber to Antenna System/ Booster FTA-DL002** |
| **Applicant** | CellGain Wireless |
| **In Accordance With** | FCC Part 90 ( /Part 2) |
| **Test by** | Advanced Compliance Laboratory, Inc.<br>210 Cougar Court<br>Hillsborough, New Jersey 08844 |
| **Authorized by** | Wei Li<br>Lab Manager<br>Signature |
| **Date** | May 9, 2019 |
| **AC Lab Report Number** | 0048-181017-01 |

Testing
Lab Code:200101-0

**The test result in this report is supported and covered by the NVLAP accreditation.**

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# Section 1. Summary of Test Results

| | |
|---|---|
| Manufacturer: | CellGain Wireless |
| Product Name: | Fiber to Antenna System/ Booster |
| Model No.: | FTA-DL002 |
| Sample No.: | PT002 |

General: **All measurements are traceable to national standards**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 2& Part 90.

☒New Submission ☐Production Unit

☐Class II Permissive Change ☒Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

"See Summary of Test Data"

**NVLAP LAB CODE: 200101-0**

## Summary of Test Data

The measurement methodology shall compliance with the requirements in *ANSI C63.26-2015 & FCC KDB 935210 D05 Industrial Booster Basic Measurement v01r02 (2017).*

| FCC Requirements | FCC Rule Part | Result |
|---|---|---|
| **AGC Threshold** | 935210 D05, Sec. 3.2 | Complies |
| **Out of-Band Rejection** | 935210 D05, Sec. 3.3 | Complies |
| **Input-versus-output signal comparison** | 935210 D05, Sec. 3.4 | Complies |
| **Input/output power and amplifier/booster gain** | 935210 D05, Sec. 3.5 | Complies |
| **Band Noise** | 935210 D05, Sec. 3.6 | Complies |
| **Measuring out-of-band/out-of-block and Spurious Emissions** | 935210 D05, Sec. 3.7 Part 90.210 | Complies |
| **Frequency Stability Measurements** | 935210 D05, Sec. 3.8 Part 90.219 | Complies |
| **Field Strength of Spurious** | 935210 D05, Sec. 3.9 Part 2.1053 | Complies |

The estimated uncertainty of the test result is given as following. The method of uncertainty calculation is provided in Advanced Compliance Lab. Doc. No. 0048-01-01.

| | Prob. Dist. | Uncertainty(dB) | Uncertainty(dB) | Uncertainty(dB) |
|---|---|---|---|---|
| | | 30-1000MHz | 1-6.5GHz | Conducted |
| Combined Std. Uncertainty $u_c$ | norm. | ±2.36 | ±2.99 | ±1.83 |

Wei Li
Lab Manager
Advanced Compliance Lab

Date: May 9, 2019


Advanced Compliance Laboratory, Inc. 210 Cougar Court, Hillsborough, NJ 08844, Tel: (908) 927 9288

# Section 2. General Equipment Specification

<table>
<tr><td>Supply Voltage</td><td colspan="6">Nominal +48Vdc</td></tr>
<tr><td>Frequency Range</td><td colspan="6">Pass Band I: 151.115MHz ~196.2MHz<br>Pass Band II: 337.5MHz~564.0MHz<br>Pass Band III: 658.0MHz~1119.0MHz<br><br>FCC Part 90 Frequency List for certification<br><br>For Pass Band I. | For Pass Band II | For Pass Band III<br><br>151.115-156.2475 MHz | 406.1-454 MHz | 758-775 MHz<br>157.1875-161.575 MHz | 456-462.5375 MHz | 788-805 MHz<br>161.775-161.9625 MHz | 462.7375-467.5375 MHz | 806-849 MHz<br>162.0375-173.4 MHz | 467.7375-512 MHz | 851-894 MHz<br>. | | 896-901 MHz<br>902-930 MHz<br>935-940 MHz</td></tr>
<tr><td>Modulations</td><td>Per KDB 935210 D05, Sec. 4.4 Table1</td><td>Digital FM (16K0F3E) ☒</td><td>Digital FM (11K3F3E) ☒</td><td>Digital FM (4K00F3E) ☒</td><td>CW ☒</td><td></td></tr>
<tr><td>Rated Operational Power</td><td colspan="6">0dBm<br>(Tolerance ±3dB)</td></tr>
<tr><td>Output Impedance</td><td colspan="6">50ohm</td></tr>
<tr><td rowspan="2">Frequency Translation</td><td rowspan="2">All Bands</td><td>F1-F1 ☒</td><td>F1-F2 ☐</td><td colspan="2">N/A ☐</td></tr>
<tr><td>Software ☐</td><td>Duplexer Change ☐</td><td colspan="2">Full Band Coverage ☒</td></tr>
</table>

**DC voltages and DC currents per 2.1033(c)(8)**

The input supply to the RF Circuitry was set as followings: 48Vdc, 150mA

**Tune-up procedure per 2.1033(c) (9)**

There are no user accessible adjustments or tuning in this Transmitter. All necessary adjustments and tuning are performed during manufacture of the product. Any adjustments or tuning after service or repair are done as part of that process as special equipment is required to perform such adjustments.

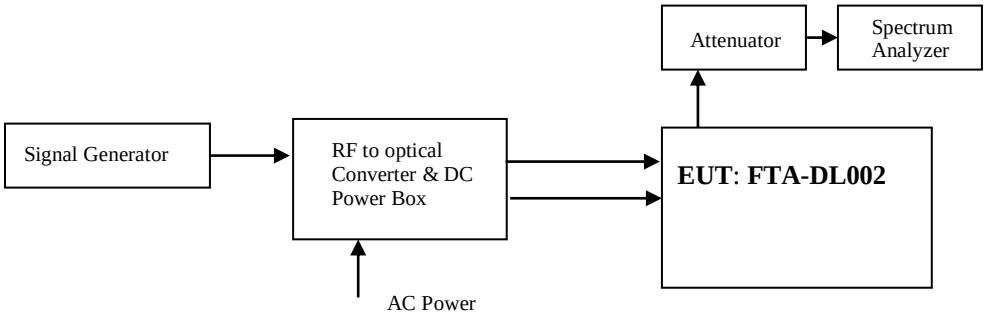
## Description of Operation

A signal generator was connected to the RF In of the RF to Fiber Optic converter (support equipment, which also provides DC power to the EUT). This RF signal was converted internally to a fiber optic interface and the fiber optic cable was connected to the Fiber Optical In port of the EUT. The RF output port of the EUT was connected to the spectrum analyzer.

## System Diagram

See Attachment.

## General EUT Setup




## System Configurations

| Device | Reference | Description | Mfr. P/N |
|---|---|---|---|
| **FTA System** | EUT | Fiber to Antenna System/Booster | FTA-DL002 |
| **Power Box & Converter** | Accessory | RF to Fiber Optical Converter | NA |

## Cable List

| Reference | Port Name | Start | End | Cable Length(m) | w/ Ferrite | Sjielded |
|---|---|---|---|---|---|---|
| 1 | DC Input | EUT | 48 V DC supply from Power Box | >3 | No | No |
| 2 | Coaxial Cable | EUT | Test Equipment | Depends on test | No | Coax |
| 3 | Fiber optic cable | EUT | RF-Optical Converter | >3 | No | No |
| 4 | Coaxial Cable | Sig Gen (test equipment) | RF-Optical Converter | Depends on test | No | Coax |

# Section 3. AGC Threshold

| Name of Test: | *AGC Threshold* | Test Standard: | *KDB 935210 D05* |
|---|---|---|---|
| Tested By: | WEI LI | Test Date: | 10/17/2018-01/18/2019 |

**Minimum Standard:** per KDB 935210 D05 Indus Booster Basic Meas v01r02, Section 4.2

**Method of Measurement:**

The AGC threshold was determined as follows
a) Connect a signal generator to the input of the EUT (i.e. the RF input of support equipment).
b) Connect a spectrum analyzer or power meter to the output of the EUT using appropriate attenuation as necessary.
c) The signal generator was configured to produce a CW signal.
d) Set the signal generator frequency to the center frequency of the EUT operating band.
e) While monitoring the output power of the EUT, increase the input level until a 1 dB increase in the input signal power no longer causes a 1 dB increase in the output signal power.
f) Record this level as the AGC threshold level.
g) Repeat the procedure with the remaining test signal.

**Test Result:** **Complies***

**Test Data:**

* AGC function shall be provided by external device which will limit the EUT input up to AGC Threshold level.

| Frequency, MHz | Gain (dB) | AGC Threshold Level |
|---|---|---|
| 160.1 | 48.1 | -48.1 dBm |
| 412.0 | 47.3 | -47.3 dBm |
| 760.0 | 45.6 | -45.6 dBm |
| | | |

# Section 4. Out of-Band Rejection

| Name of Test: | *Out of-Band Rejection* | Test Standard: | *KDB 935210 D05* |
|---|---|---|---|
| Tested By: | WEI LI | Test Date: | 10/17/2018-01/18/2019 |

**Minimum Standard:** per KDB 935210 D05 Indus Booster Basic Meas v01r02, Section 4.3

**Method of Measurement:** Adjust the internal gain control of the EUT to the maximum gain for which equipment certification is sought.

a) Connect a signal generator (network analyzer output) to the input of the EUT.

b) Configure a swept CW signal with the following parameters:

1) Frequency range = ± 250 % of the manufacturer's specified pass band.

2) The CW amplitude shall be 3 dB below the AGC threshold (see 4.2), and shall not activate the AGC threshold throughout the test.

3) Dwell time = approximately 10 ms.

4) Frequency step = 50 kHz.

c) Connect a spectrum analyzer to the output of the EUT using appropriate attenuation.

d) Set the RBW of the spectrum analyzer to between 1 % and 5 % of the manufacturer's rated passband, and VBW = 3 × RBW.

e) Set the detector to Peak and the trace to Max-Hold.

f) After the trace is completely filled, place a marker at the peak amplitude, which is designated as f0, and with two additional markers (use the marker-delta method) at the 20 dB bandwidth (i.e., at the points where the level has fallen by 20 dB).

g) Capture the frequency response plot for inclusion in the test report.

**Test Result:** **Complies**

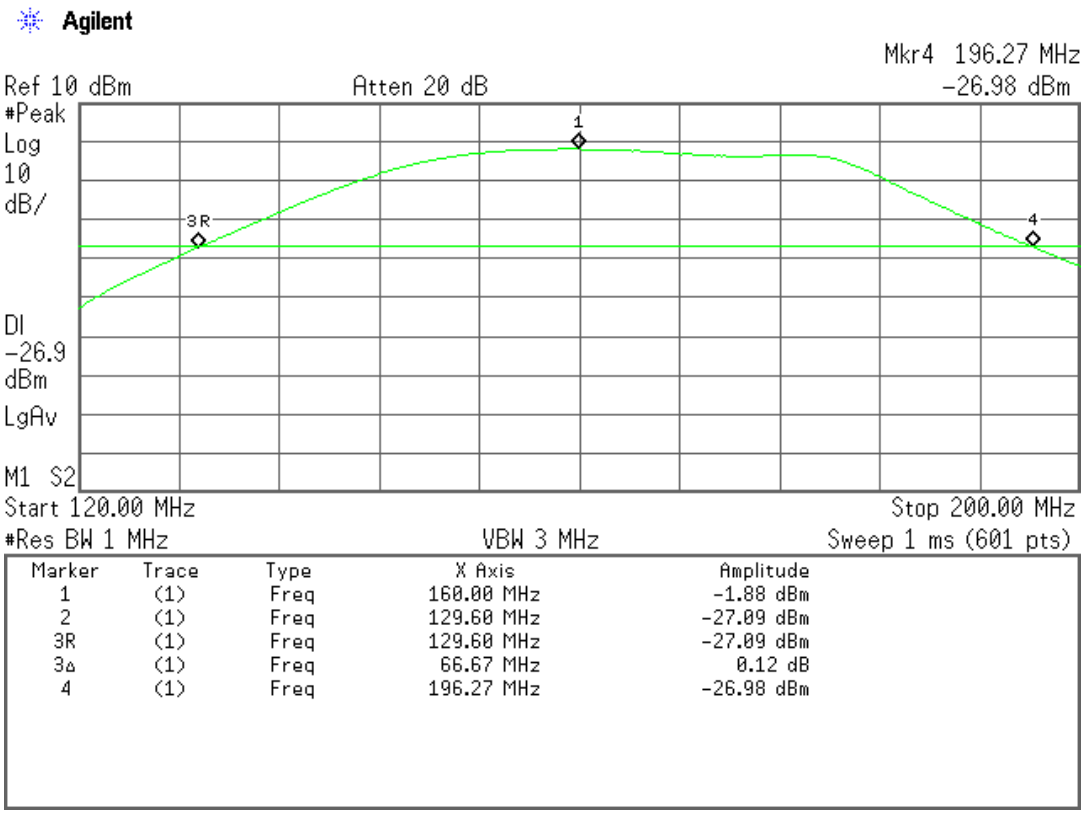
**Test Data:** Attached Plots

| Frequency, MHz | F-low, MHz | F-high, MHz | -20dBBandwidth, MHz |
|---|---|---|---|
| 160.1 | 129.6* | 196.27 | 66.67 |
| 412.0 | 337.5 | 564.0 | 226.5 |
| 760.0 | 658.0 | 1119.0 | 461.0 |

* Signal below 150MHz for booster Band I shall be limited by external PLMRS licensed Station with its authorized service band. Set for 151.115MHz as lowest frequency per FCC filter input to the FTA.

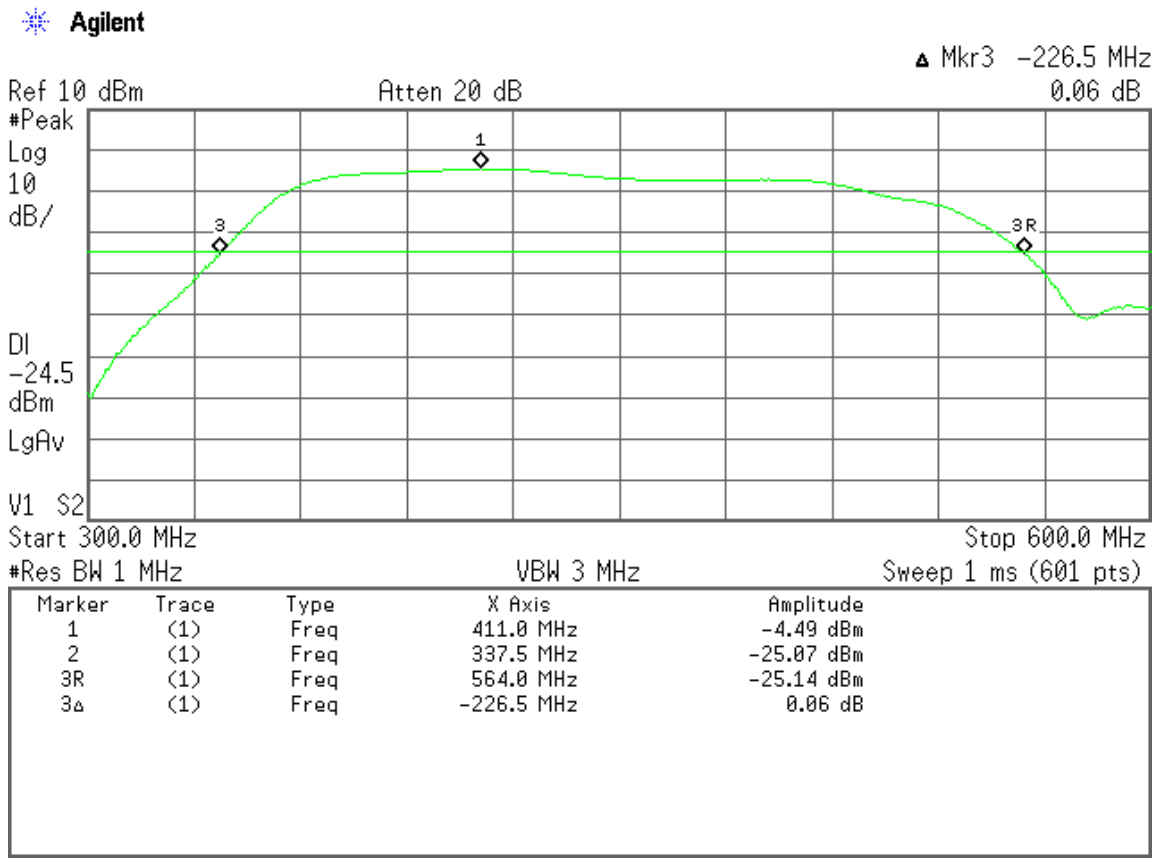
| | |
|---|---|
| **Project Number:** | 0048-181017-01 |
| **EUT:** | Fiber to Antenna System/ Booster FTA-DL002 |
| **SN:** | PT002 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Pass Band I Out of-Band Rejection** |
| **Plot Name:** | **-20dB Bandwidth** |
| **Configuration:** | Input: CW. Output Port: EUT |



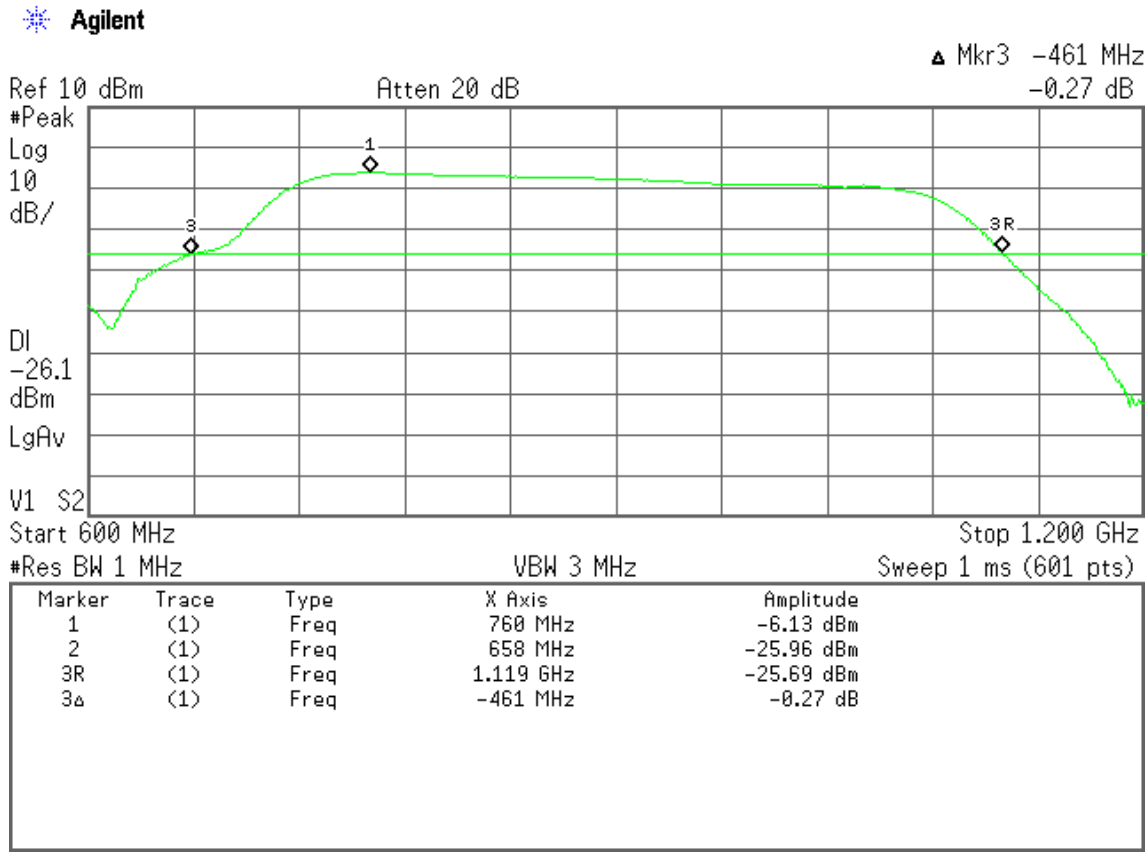
| | |
|---|---|
| **Project Number:** | 0048-181017-01 |
| **EUT:** | Fiber to Antenna System/ Booster FTA-DL002 |
| **SN:** | PT002 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Pass Band II Out of-Band Rejection** |
| **Plot Name:** | **-20dB Bandwidth** |
| **Configuration:** | Input: CW. Output Port: EUT |



| | |
|---|---|
| **Project Number:** | 0048-181017-01 |
| **EUT:** | Fiber to Antenna System/ Booster FTA-DL002 |
| **SN:** | PT002 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Pass Band III Out of-Band Rejection** |
| **Plot Name:** | **-20dB Bandwidth** |
| **Configuration:** | Input: CW. Output Port: EUT |



# Section 5. Input-versus-output signal comparison

| Name of Test: | *Input-versus-output signal comparison* | Test Standard: | *KDB 935210 D05* |
|---|---|---|---|
| Tested By: | WEI LI | Test Date: | 10/17/2018-01/18/2019 |

**Minimum Standard:** per KDB 935210 D05 Indus Booster Basic Meas v01r02, Section 4.4

**Method of Measurement:** The signals were adjusted according to Table 1.

**Table 1—Test signals for PLMRS devices**

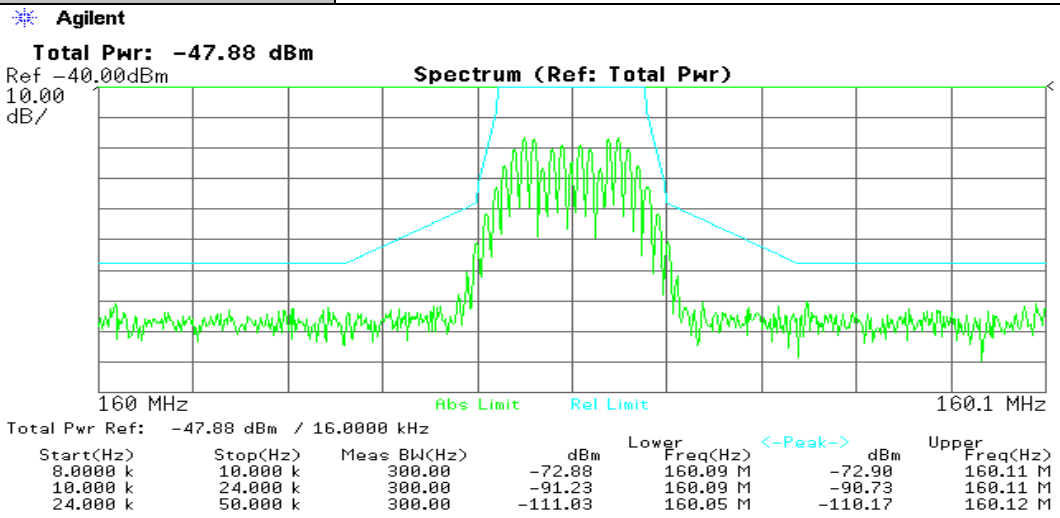
| Emission Designator | Modulation | Occupied Bandwidth | Channel Bandwidth | Audio Frequency |
|---|---|---|---|---|
| 16K0F3E | FM | 16 kHz | 25 kHz | 1 kHz |
| 11K3F3E | FM | 11.3 kHz | 12.5 kHz | 1 kHz |
| 4K00F1E | FM | 4 kHz | 6.25 kHz | 1 kHz |
| N/A | CW | N/A | N/A | N/A |

**Test Result:** **Complies**

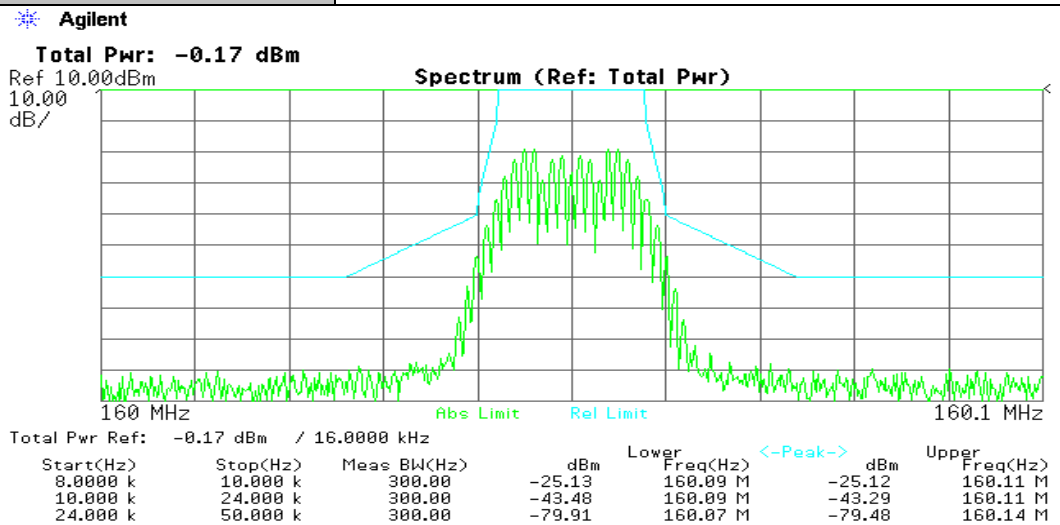
**Test Data:** Attached Plots

| | |
|---|---|
| **Project Number:** | 0048-181017-01 |
| **EUT:** | Fiber to Antenna System/ Booster FTA-DL002 |
| **SN:** | PT002 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

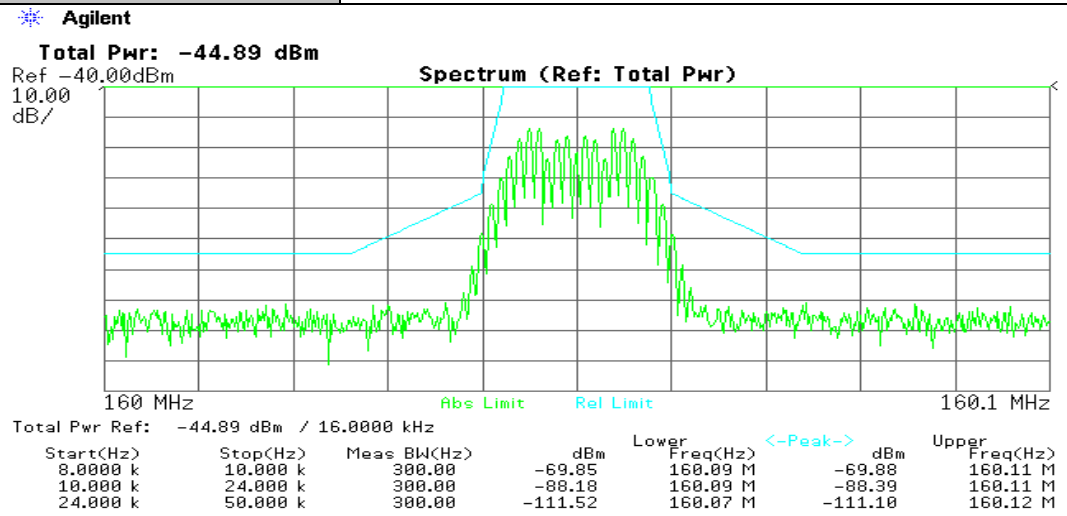
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 16K0F3E at AGC level |
| Configuration: | Input: 16K0F3E at AGC level |



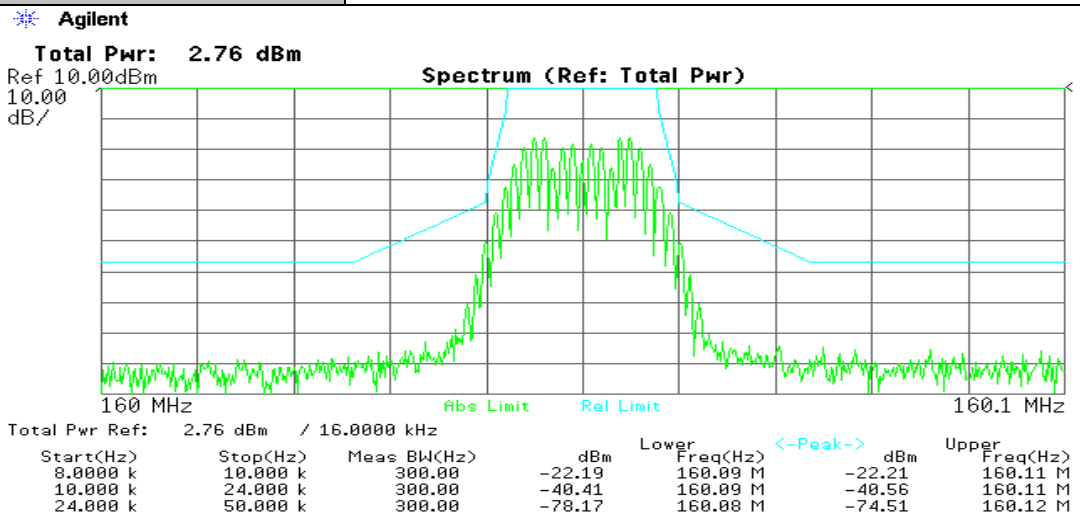

| Configuration: | Output Port: EUT |
|---|---|



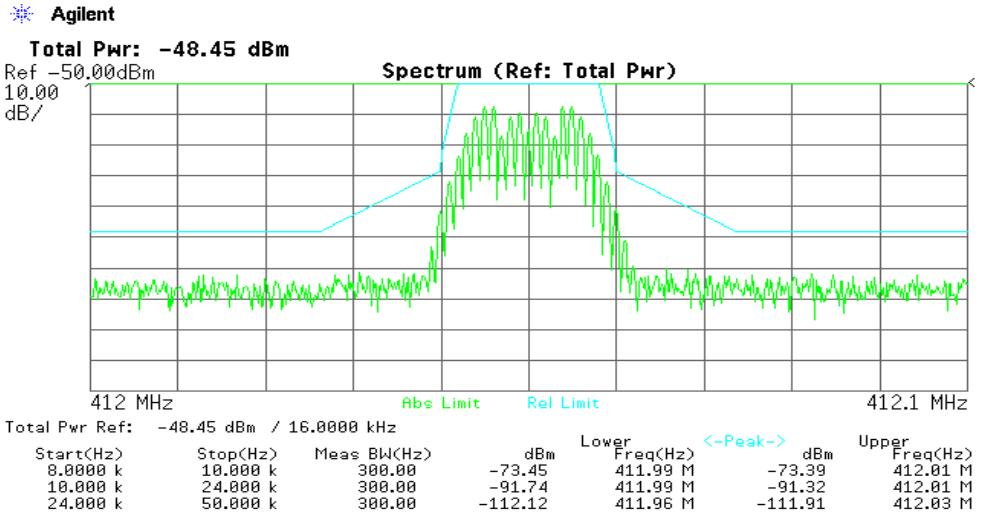
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 16K0F3E at AGC+3dB level |
| Configuration: | Input: 16K0F3E at AGC+3dB level |




| Configuration: | Output Port: EUT |
|---|---|



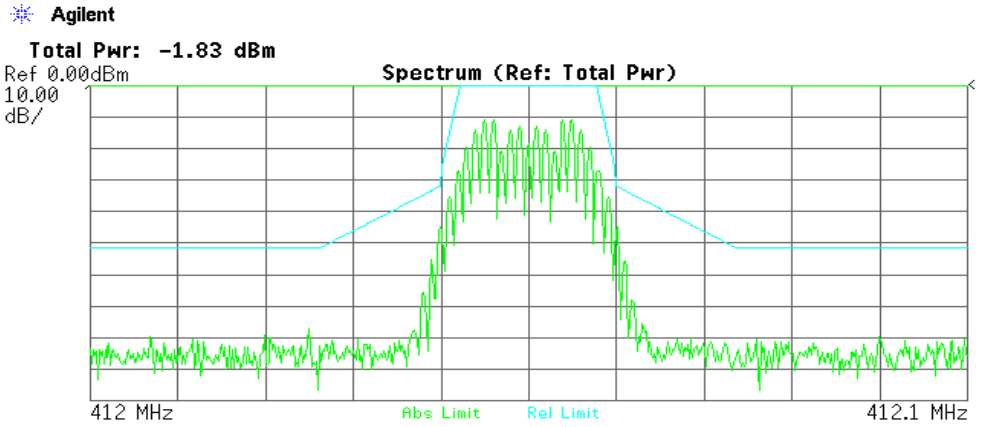
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 16K0F3E at AGC level |
| Configuration: | Input: 16K0F3E at AGC level |




Total Pwr Ref: -48.45 dBm / 16.0000 kHz

| | | | Lower | | <-Peak-> | | Upper | |
|---|---|---|---|---|---|---|---|---|
| Start(Hz) | Stop(Hz) | Meas BW(Hz) | dBm | Freq(Hz) | | dBm | Freq(Hz) | |
| 8.0000 k | 10.000 k | 300.00 | -73.45 | 411.99 M | | -73.39 | 412.01 M | |
| 10.000 k | 24.000 k | 300.00 | -91.74 | 411.99 M | | -91.32 | 412.01 M | |
| 24.000 k | 50.000 k | 300.00 | -112.12 | 411.96 M | | -111.91 | 412.03 M | |

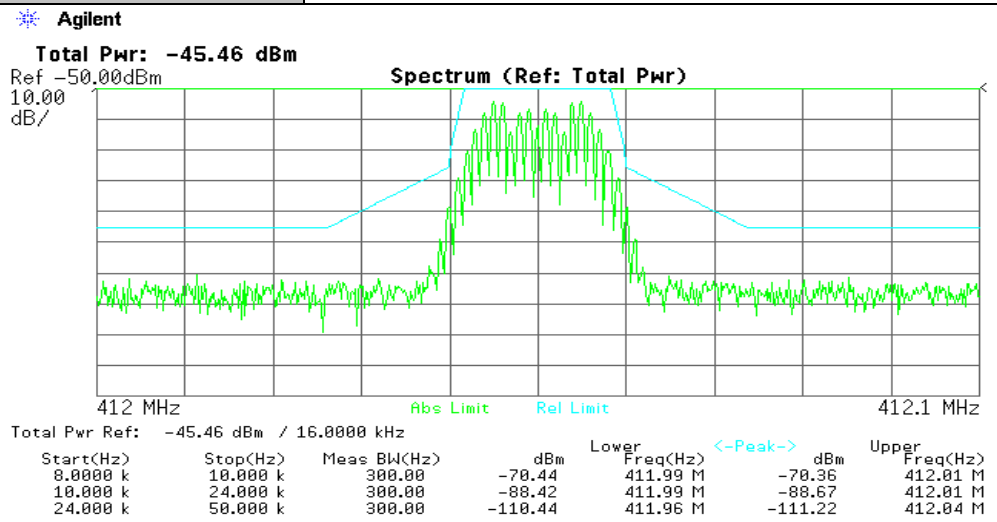
| Configuration: | Output Port: EUT |
|---|---|




Total Pwr Ref: -1.83 dBm / 25.0000 kHz

| | | | Lower | | <-Peak-> | | Upper | |
|---|---|---|---|---|---|---|---|---|
| Start(Hz) | Stop(Hz) | Meas BW(Hz) | dBm | Freq(Hz) | | dBm | Freq(Hz) | |
| 8.0000 k | 10.000 k | 300.00 | -26.84 | 411.99 M | | -26.82 | 412.01 M | |
| 10.000 k | 24.000 k | 300.00 | -45.16 | 411.99 M | | -45.06 | 412.01 M | |
| 24.000 k | 50.000 k | 300.00 | -77.36 | 411.97 M | | -79.63 | 412.04 M | |

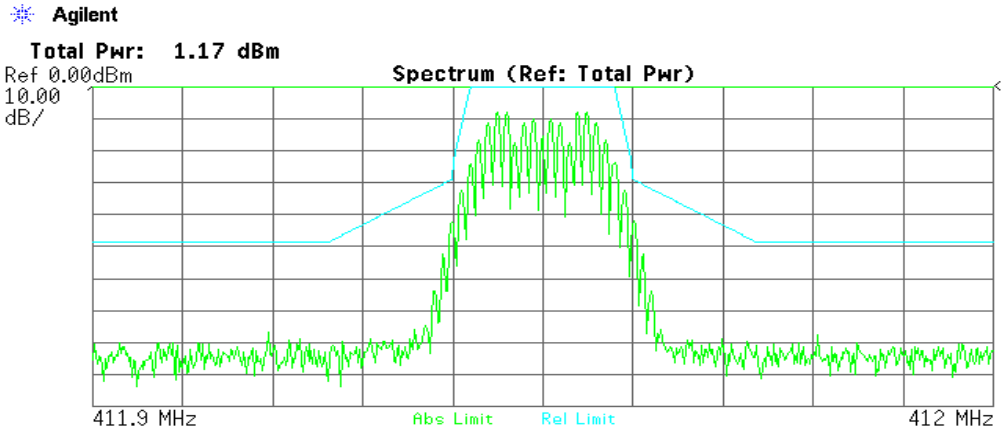
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 16K0F3E at AGC+3dB level |
| Configuration: | Input: 16K0F3E at AGC+3dB level |




Total Pwr Ref: -45.46 dBm / 16.0000 kHz

| Start(Hz) | Stop(Hz) | Meas BW(Hz) | Lower dBm | Lower Freq(Hz) | <-Peak-> dBm | Upper Freq(Hz) |
|---|---|---|---|---|---|---|
| 8.0000 k | 10.000 k | 300.00 | -70.44 | 411.99 M | -70.36 | 412.01 M |
| 10.000 k | 24.000 k | 300.00 | -88.42 | 411.99 M | -88.67 | 412.01 M |
| 24.000 k | 50.000 k | 300.00 | -110.44 | 411.96 M | -111.22 | 412.04 M |

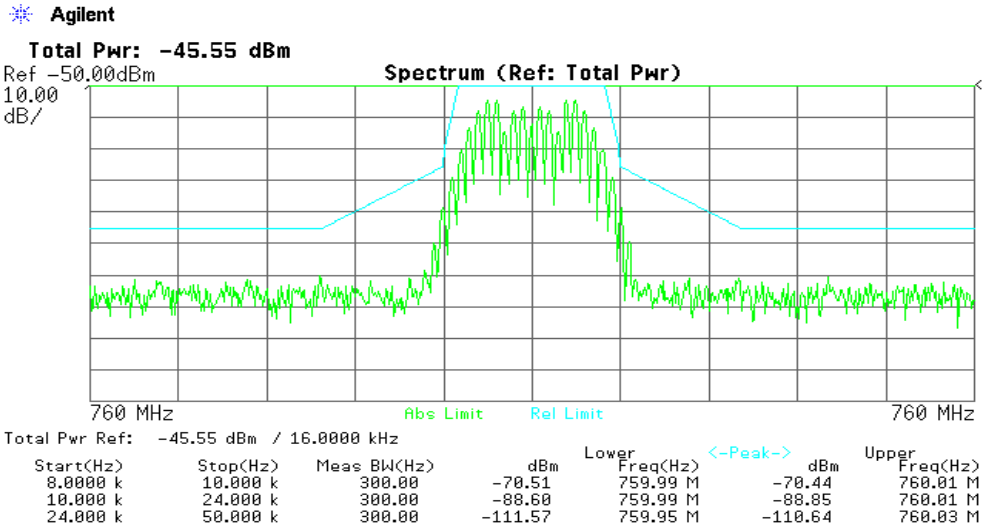
| Configuration: | Output Port: EUT |
|---|---|




Total Pwr Ref: 1.17 dBm / 25.0000 kHz

| Start(Hz) | Stop(Hz) | Meas BW(Hz) | Lower dBm | Lower Freq(Hz) | <-Peak-> dBm | Upper Freq(Hz) |
|---|---|---|---|---|---|---|
| 8.0000 k | 10.000 k | 300.00 | -23.86 | 411.99 M | -23.83 | 412.01 M |
| 10.000 k | 24.000 k | 300.00 | -42.16 | 411.99 M | -42.04 | 412.01 M |
| 24.000 k | 50.000 k | 300.00 | -76.58 | 411.97 M | -77.62 | 412.03 M |

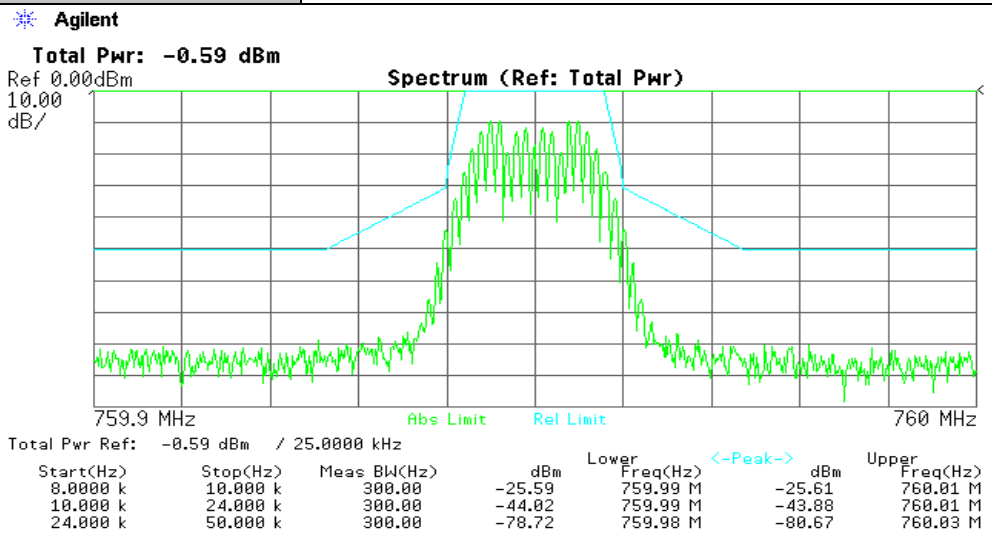
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 16K0F3E at AGC level |
| Configuration: | Input: 16K0F3E at AGC level |




Total Pwr Ref: -45.55 dBm / 16.0000 kHz

| Start(Hz) | Stop(Hz) | Meas BW(Hz) | Lower dBm | Lower Freq(Hz) | <-Peak-> dBm | Upper Freq(Hz) |
|---|---|---|---|---|---|---|
| 8.0000 k | 10.000 k | 300.00 | -70.51 | 759.99 M | -70.44 | 760.01 M |
| 10.000 k | 24.000 k | 300.00 | -88.60 | 759.99 M | -88.85 | 760.01 M |
| 24.000 k | 50.000 k | 300.00 | -111.57 | 759.95 M | -110.64 | 760.03 M |

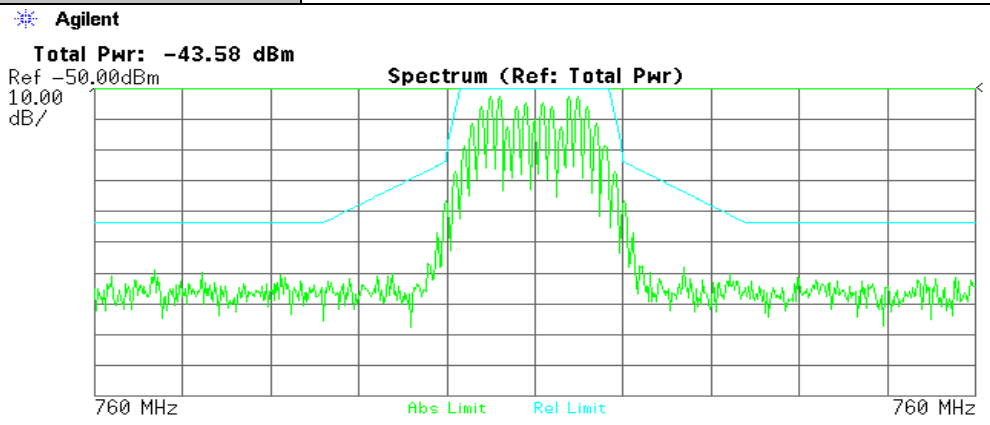
| Configuration: | Output Port: EUT |
|---|---|




Total Pwr Ref: -0.59 dBm / 25.0000 kHz

| Start(Hz) | Stop(Hz) | Meas BW(Hz) | Lower dBm | Lower Freq(Hz) | <-Peak-> dBm | Upper Freq(Hz) |
|---|---|---|---|---|---|---|
| 8.0000 k | 10.000 k | 300.00 | -25.59 | 759.99 M | -25.61 | 760.01 M |
| 10.000 k | 24.000 k | 300.00 | -44.02 | 759.99 M | -43.88 | 760.01 M |
| 24.000 k | 50.000 k | 300.00 | -78.72 | 759.98 M | -80.67 | 760.03 M |

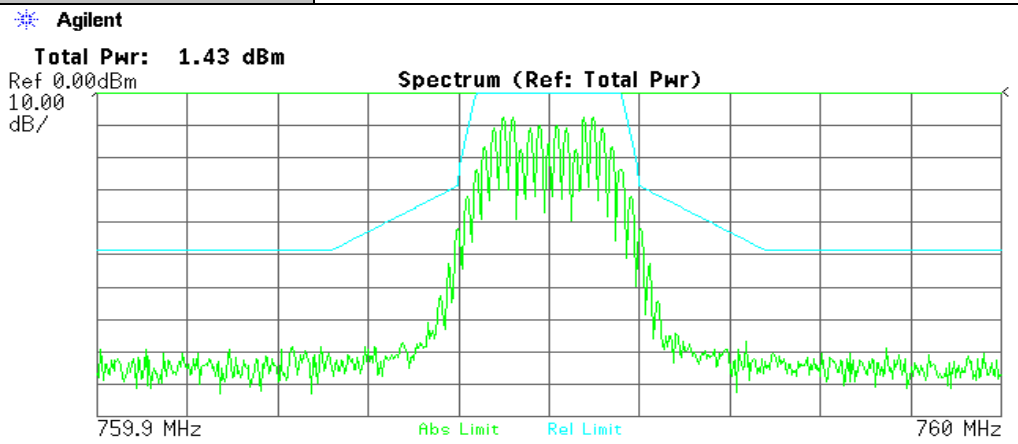
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 16K0F3E at AGC+3dB level |
| Configuration: | Input: 16K0F3E at AGC+3dB level |




Total Pwr Ref: -43.58 dBm / 16.0000 kHz

| Start(Hz) | Stop(Hz) | Meas BW(Hz) | Lower dBm | Lower Freq(Hz) | <-Peak-> dBm | Upper Freq(Hz) |
|---|---|---|---|---|---|---|
| 8.0000 k | 10.000 k | 300.00 | -68.57 | 759.99 M | -68.54 | 760.01 M |
| 10.000 k | 24.000 k | 300.00 | -86.66 | 759.99 M | -86.63 | 760.01 M |
| 24.000 k | 50.000 k | 300.00 | -108.99 | 759.96 M | -111.21 | 760.03 M |

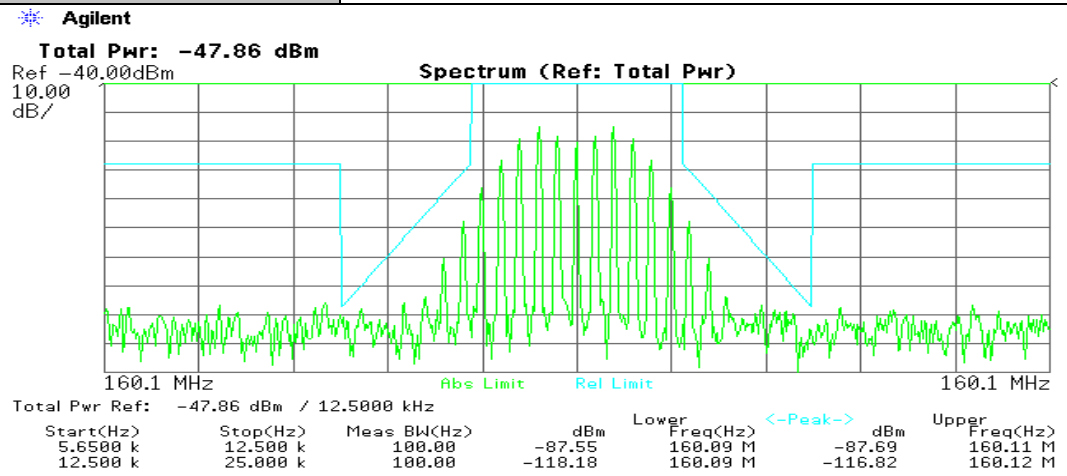
| Configuration: | Output Port: EUT |
|---|---|



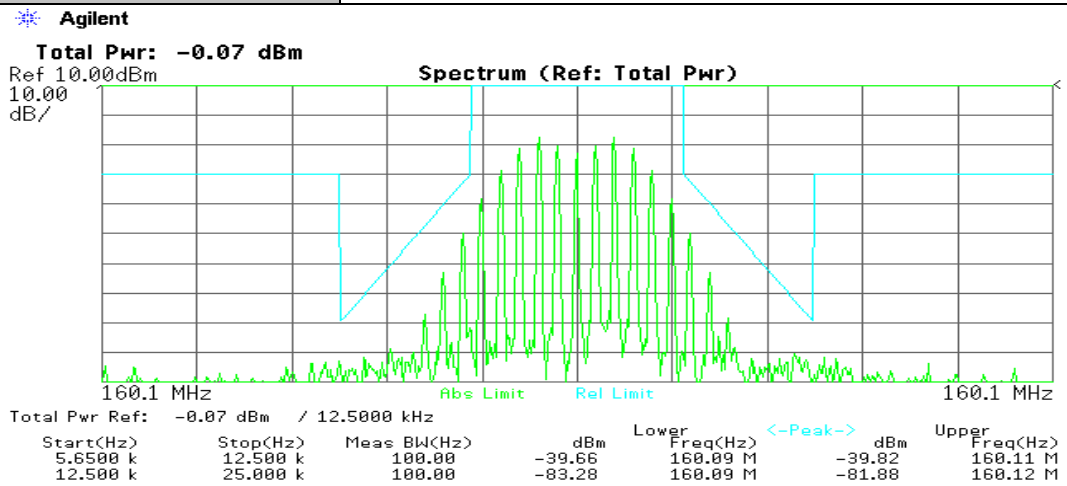

Total Pwr Ref: 1.43 dBm / 25.0000 kHz

| Start(Hz) | Stop(Hz) | Meas BW(Hz) | Lower dBm | Lower Freq(Hz) | <-Peak-> dBm | Upper Freq(Hz) |
|---|---|---|---|---|---|---|
| 8.0000 k | 10.000 k | 300.00 | -23.58 | 759.99 M | -23.60 | 760.01 M |
| 10.000 k | 24.000 k | 300.00 | -41.97 | 759.99 M | -41.77 | 760.01 M |
| 24.000 k | 50.000 k | 300.00 | -78.24 | 759.97 M | -78.90 | 760.04 M |

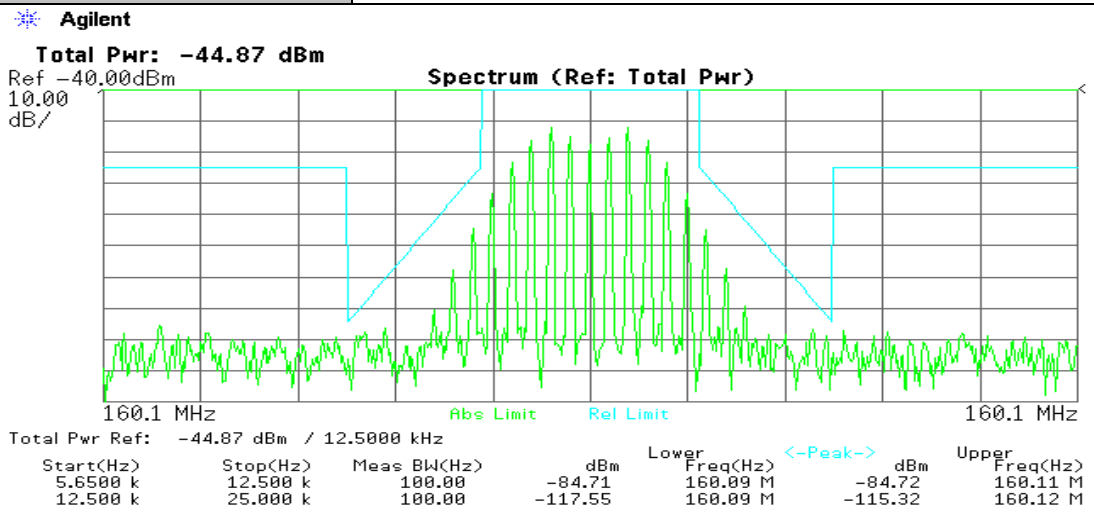
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 11K3F3E at AGC level |
| Configuration: | Input: 11K3F3E at AGC level |



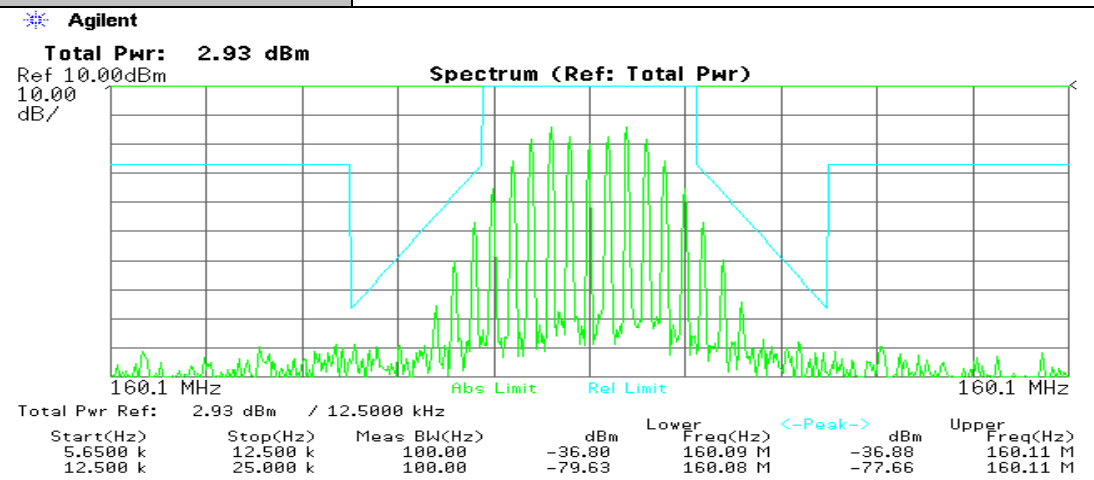

| Configuration: | Output Port: EUT |
|---|---|



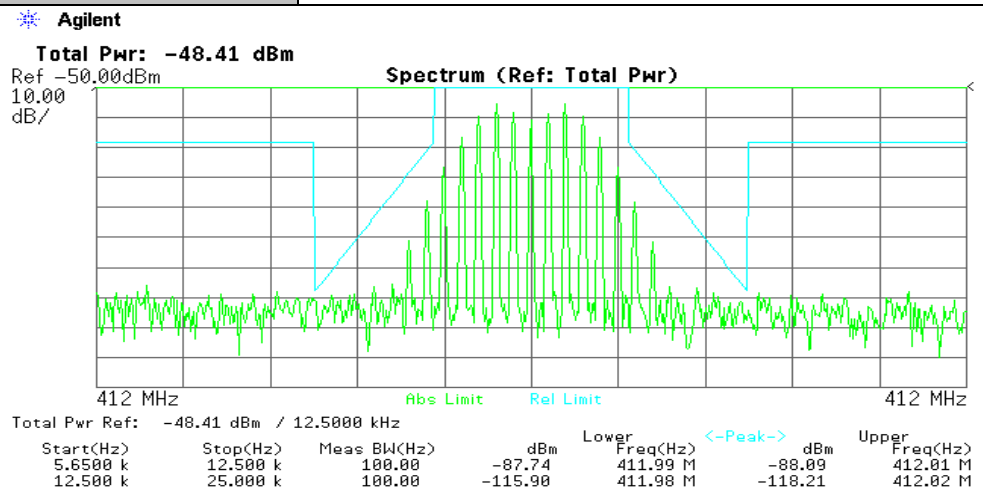
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 11K3F3E at AGC+3dB level |
| Configuration: | Input: 11K3F3E at AGC+3dB level |




| Configuration: | Output Port: EUT |
|---|---|



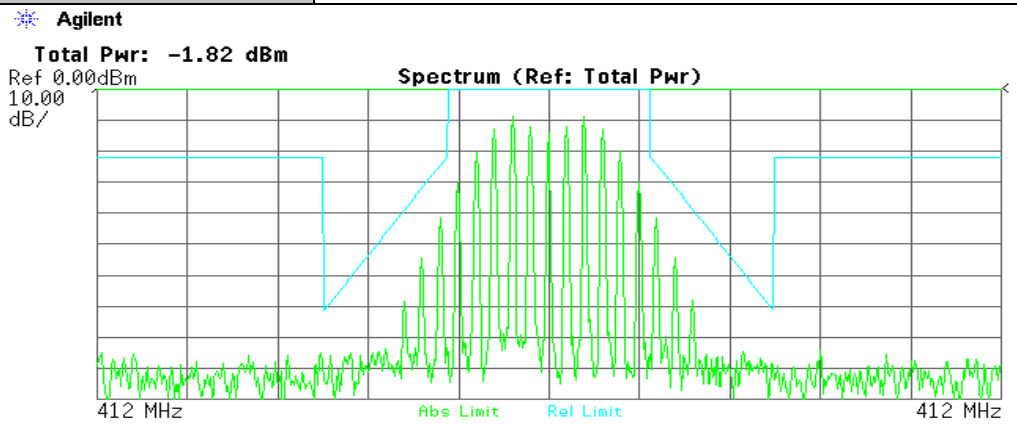
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 11K3F3E at AGC level |
| Configuration: | Input: 11K3F3E at AGC level |




Total Pwr Ref: -48.41 dBm / 12.5000 kHz

| Start(Hz) | Stop(Hz) | Meas BW(Hz) | Lower dBm | Lower Freq(Hz) | <-Peak-> dBm | Upper Freq(Hz) |
|---|---|---|---|---|---|---|
| 5.6500 k | 12.500 k | 100.00 | -87.74 | 411.99 M | -88.09 | 412.01 M |
| 12.500 k | 25.000 k | 100.00 | -115.90 | 411.98 M | -118.21 | 412.02 M |

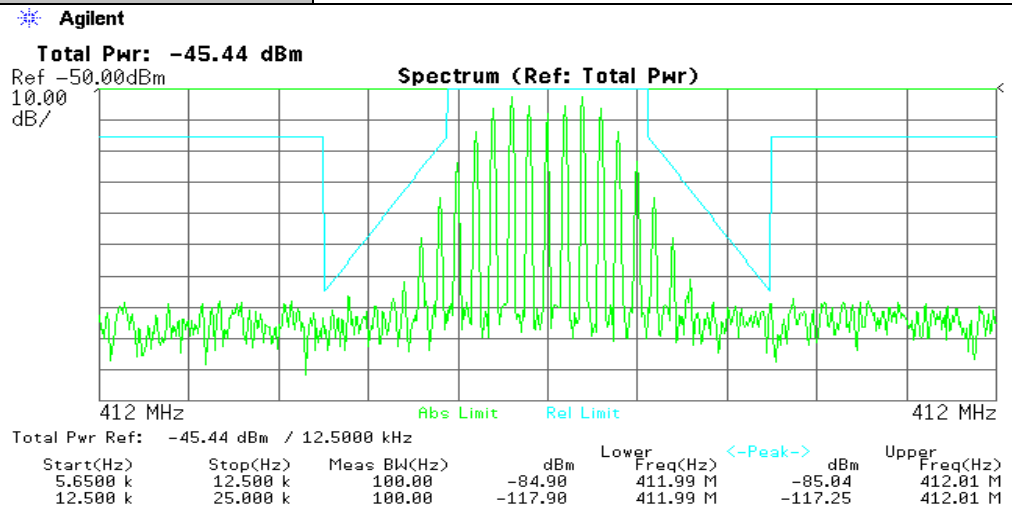
| Configuration: | Output Port: EUT |
|---|---|




Total Pwr Ref: -1.82 dBm / 12.5000 kHz

| Start(Hz) | Stop(Hz) | Meas BW(Hz) | Lower dBm | Lower Freq(Hz) | <-Peak-> dBm | Upper Freq(Hz) |
|---|---|---|---|---|---|---|
| 5.6500 k | 12.500 k | 100.00 | -41.33 | 411.99 M | -41.42 | 412.01 M |
| 12.500 k | 25.000 k | 100.00 | -85.08 | 411.99 M | -84.36 | 412.02 M |

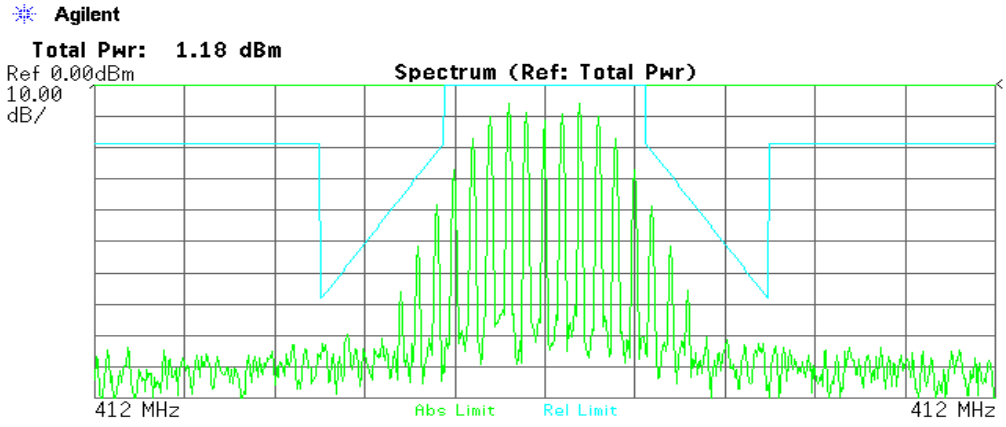
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 11K3F3E at AGC+3dB level |
| Configuration: | Input: 11K3F3E at AGC+3dB level |




Total Pwr Ref: -45.44 dBm / 12.5000 kHz

| Start(Hz) | Stop(Hz) | Meas BW(Hz) | Lower dBm | Lower Freq(Hz) | <-Peak-> dBm | Upper Freq(Hz) |
|---|---|---|---|---|---|---|
| 5.6500 k | 12.500 k | 100.00 | -84.90 | 411.99 M | -85.04 | 412.01 M |
| 12.500 k | 25.000 k | 100.00 | -117.90 | 411.99 M | -117.25 | 412.01 M |

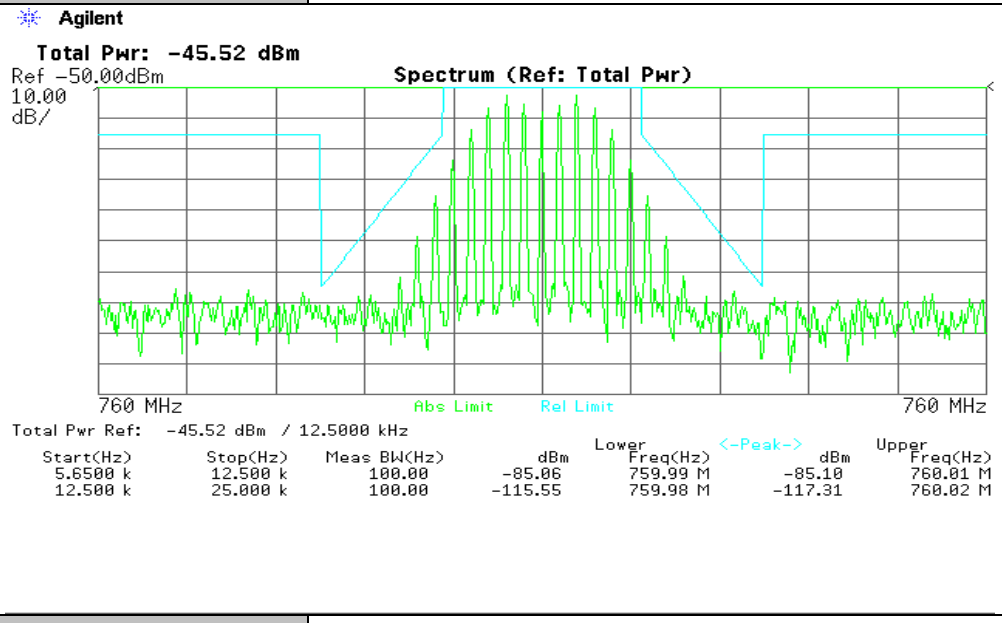
| Configuration: | Output Port: EUT |
|---|---|



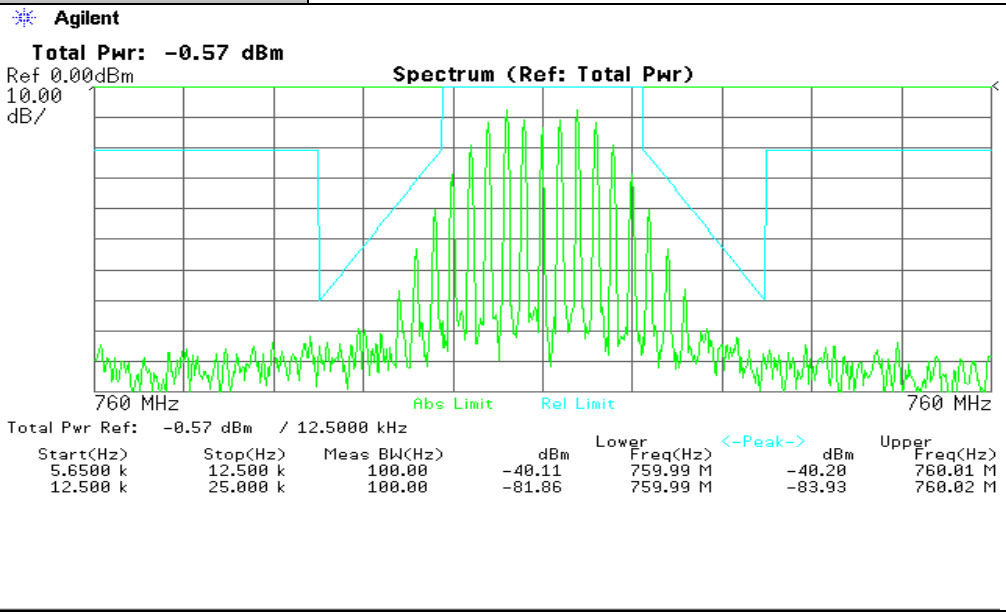

Total Pwr Ref: 1.18 dBm / 12.5000 kHz

| Start(Hz) | Stop(Hz) | Meas BW(Hz) | Lower dBm | Lower Freq(Hz) | <-Peak-> dBm | Upper Freq(Hz) |
|---|---|---|---|---|---|---|
| 5.6500 k | 12.500 k | 100.00 | -38.32 | 411.99 M | -38.40 | 412.01 M |
| 12.500 k | 25.000 k | 100.00 | -83.75 | 411.99 M | -83.62 | 412.01 M |

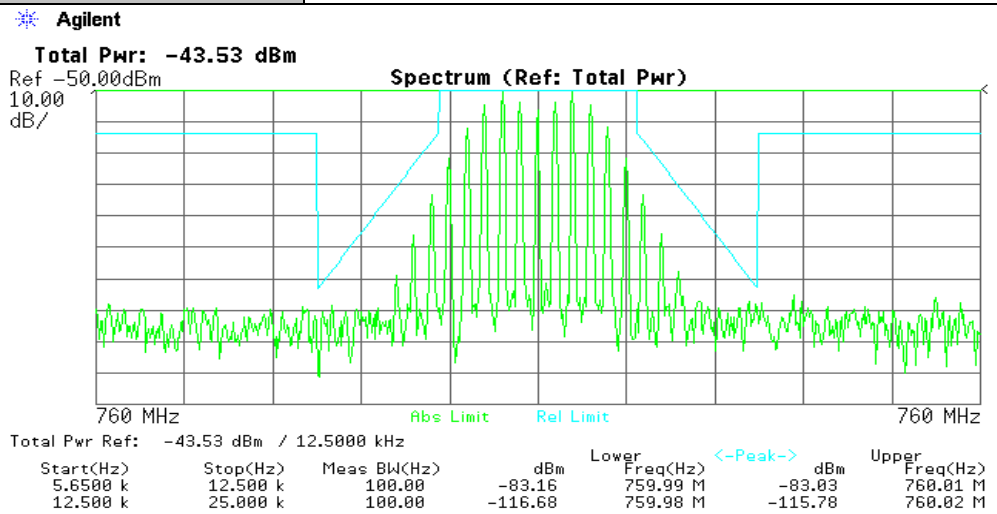
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 11K3F3E at AGC level |
| Configuration: | Input: 11K3F3E at AGC level |



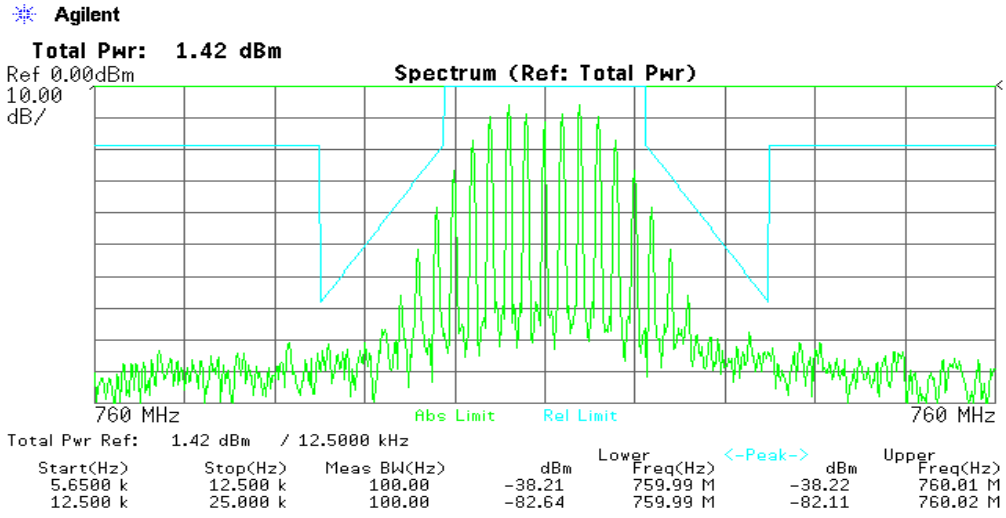

| Configuration: | Output Port: EUT |
|---|---|



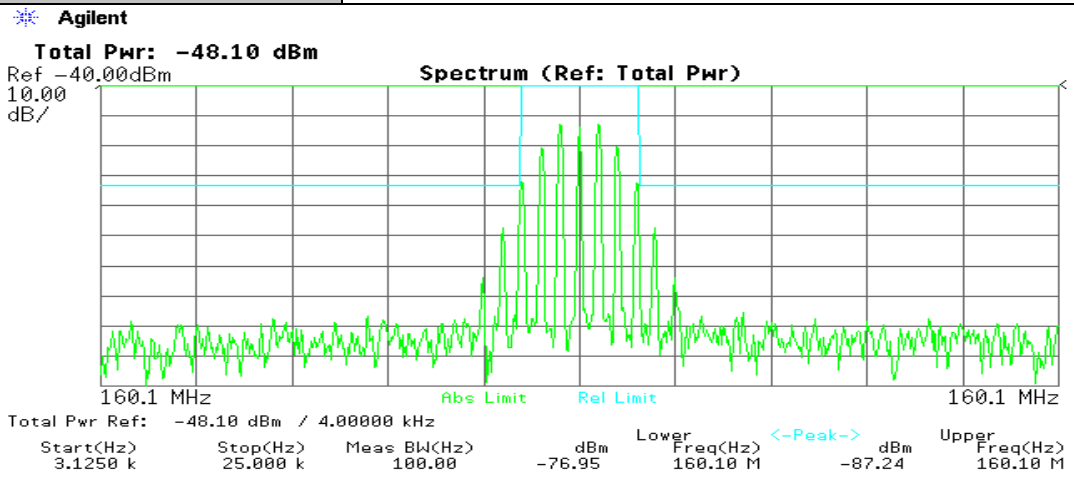
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 11K3F3E at AGC+3dB level |
| Configuration: | Input: 11K3F3E at AGC+3dB level |



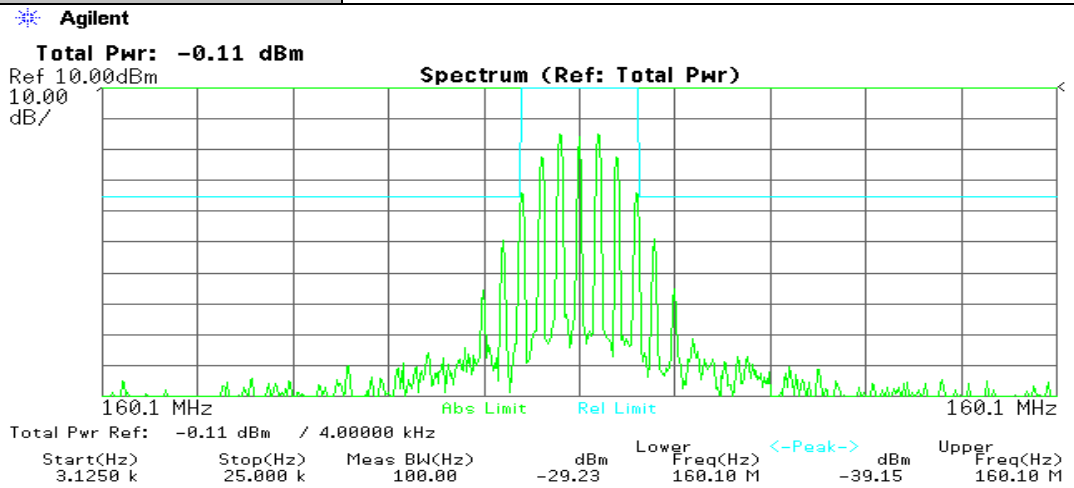

| Configuration: | Output Port: EUT |
|---|---|



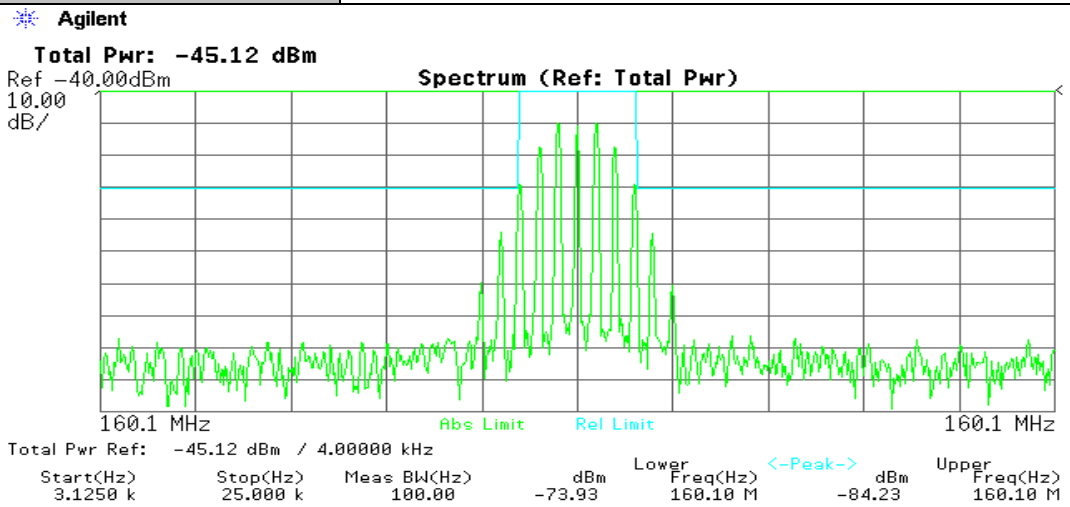
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 4k00F3E at AGC level |
| Configuration: | Input: 4k00F3E at AGC level |



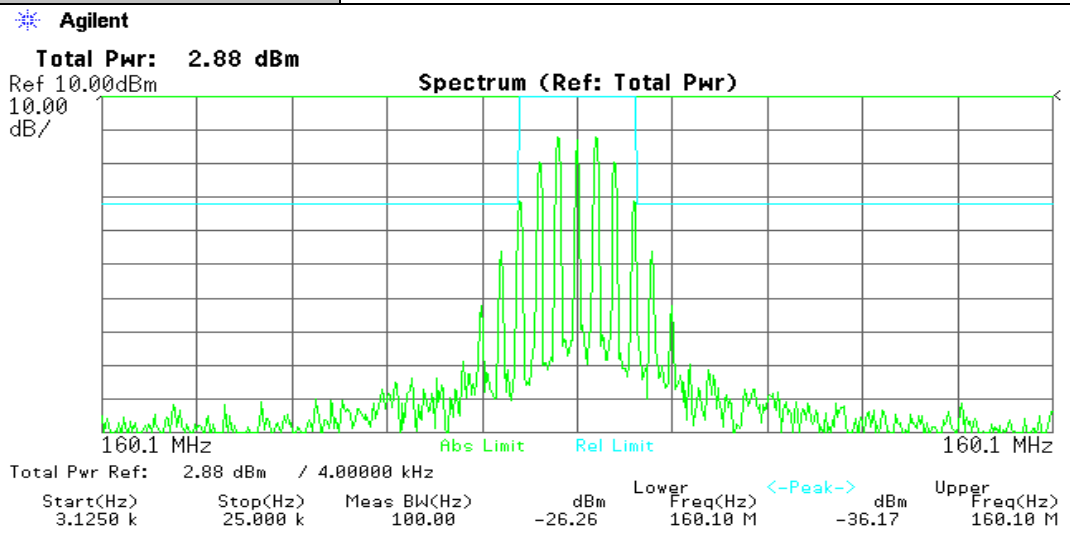

| Configuration: | Output Port: EUT |
|---|---|



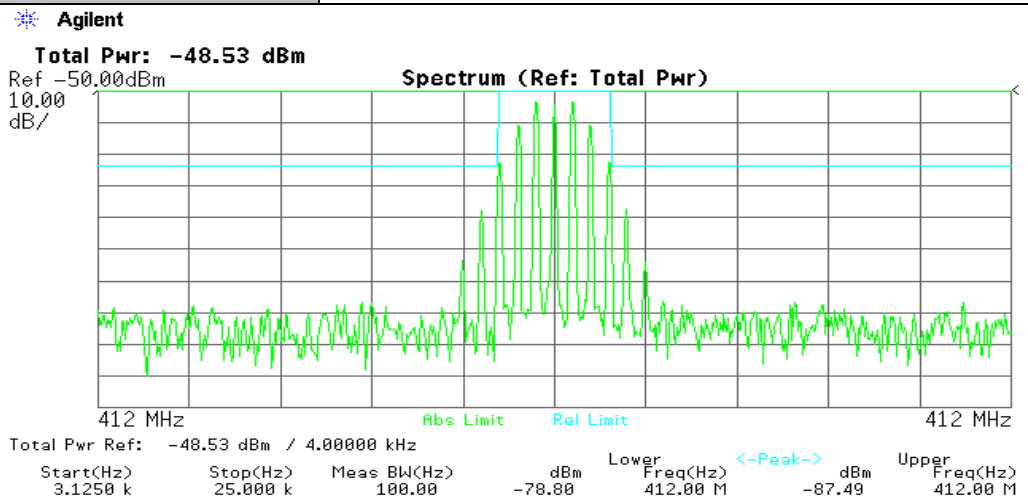
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 4k00F3E at AGC+3dB level |
| Configuration: | Input: 4k00F3E at AGC+3dB level |



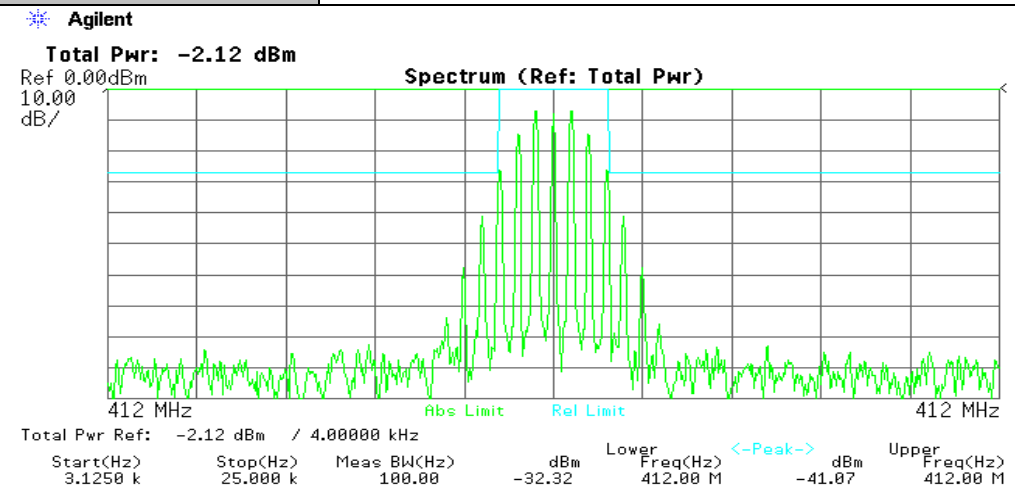

| Configuration: | Output Port: EUT |
|---|---|



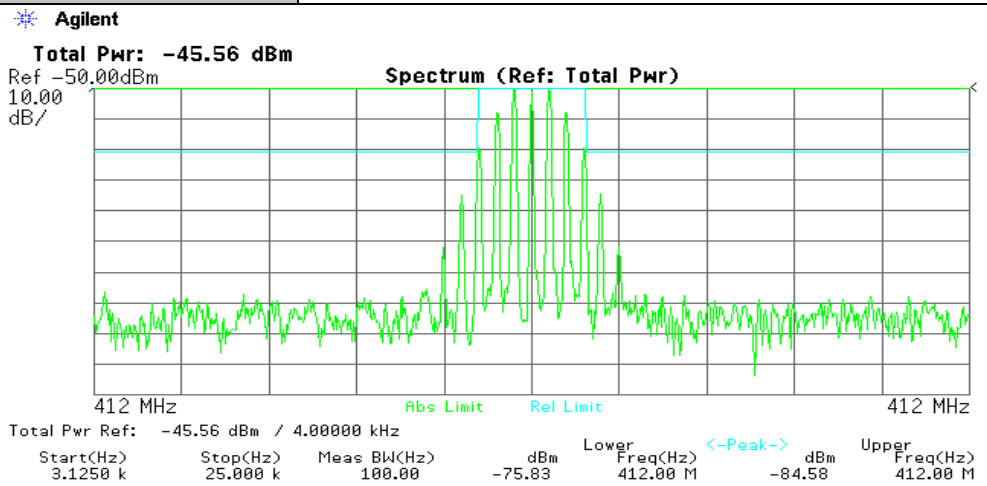
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 4k00F3E at AGC level |
| Configuration: | Input: 4k00F3E at AGC level |



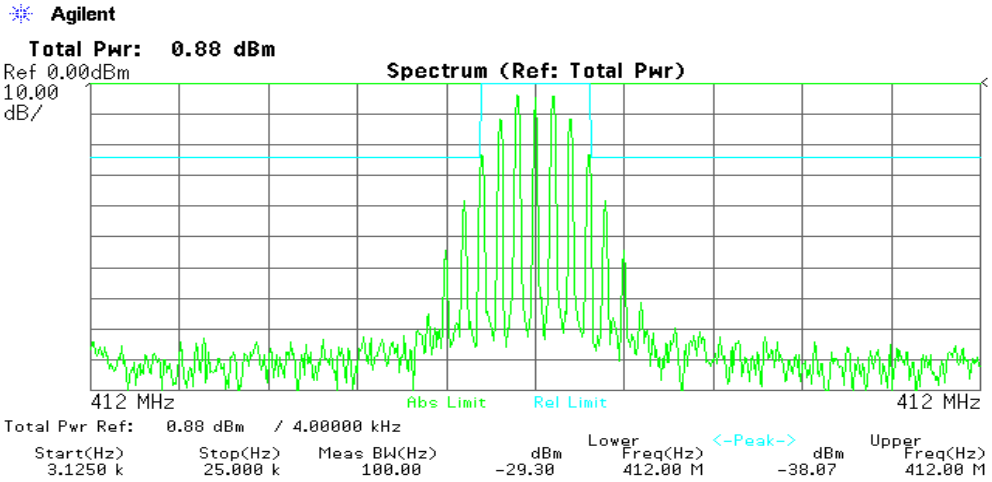

| Configuration: | Output Port: EUT |
|---|---|



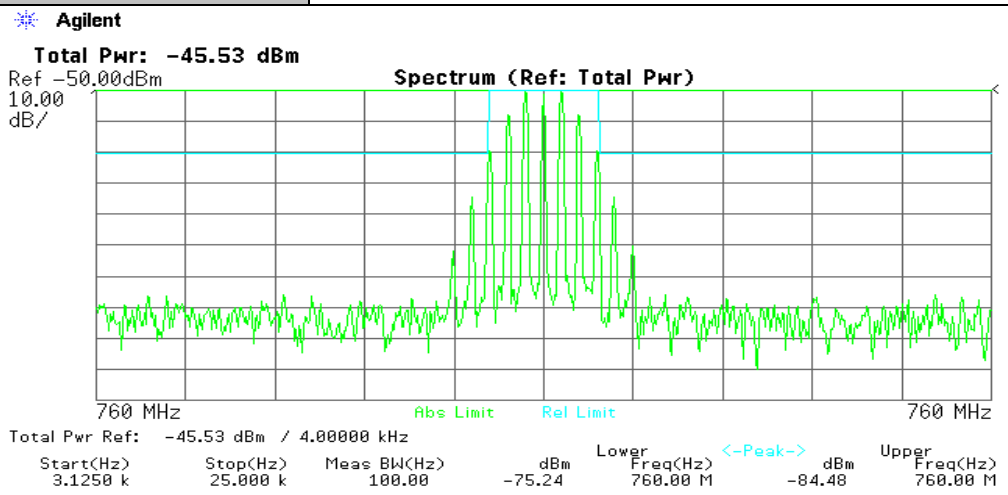
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 4k00F3E at AGC+3dB level |
| Configuration: | Input: 4k00F3E at AGC+3dB level |



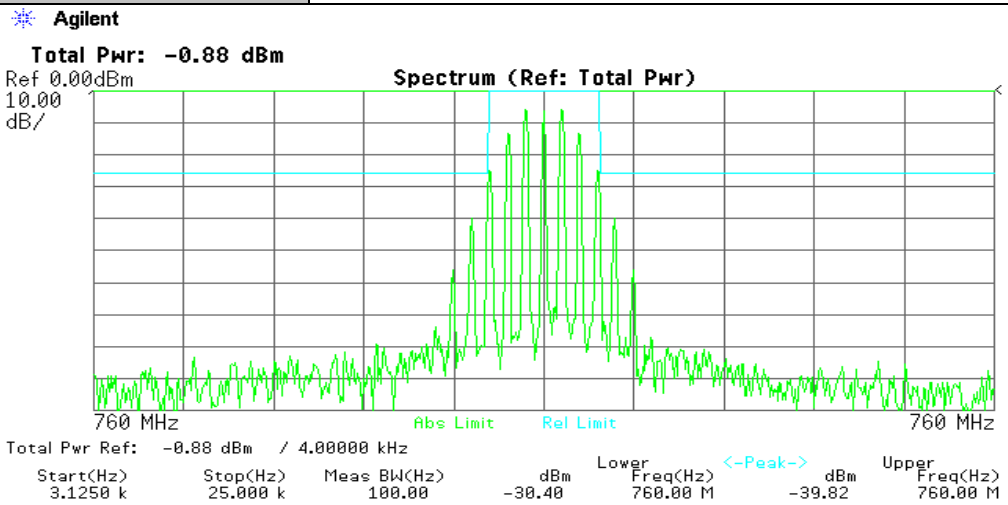

| Configuration: | Output Port: EUT |
|---|---|



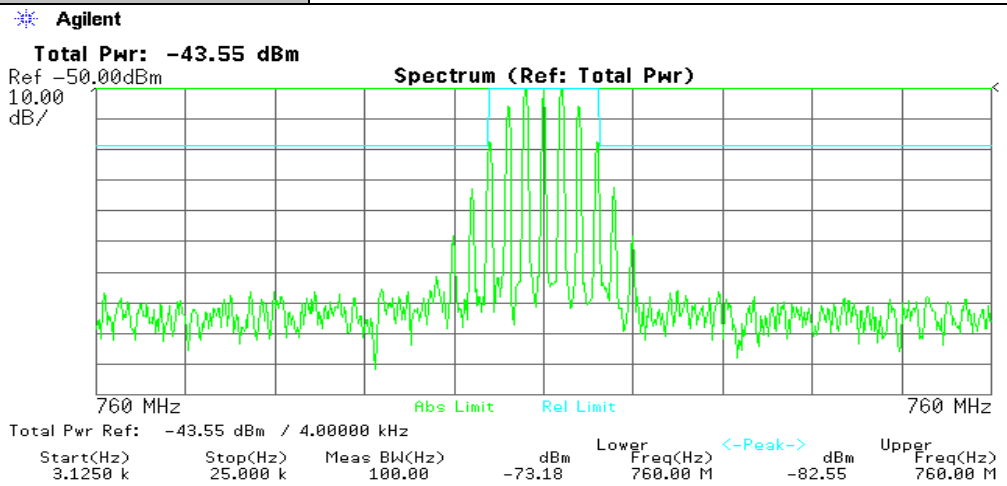
| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 4k00F3E at AGC level |
| Configuration: | Input: 4k00F3E at AGC level |



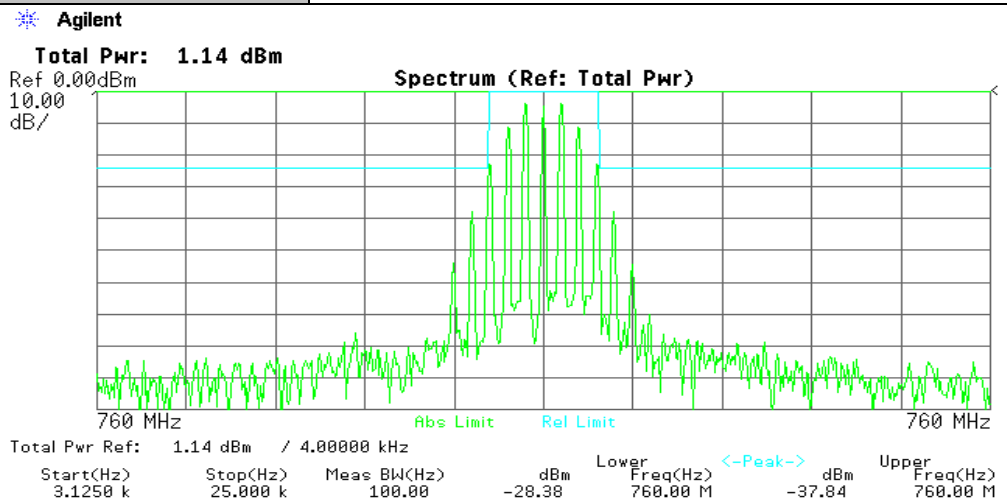

| Configuration: | Output Port: EUT |
|---|---|



| Section: | Input-versus-output signal comparison |
|---|---|
| Plot Name: | Input/Output Signal for Signal 4k00F3E at AGC+3dB level |
| Configuration: | Input: 4k00F3E at AGC+3dB level |




| Configuration: | Output Port: EUT |
|---|---|



# Section 6. Input/output power and amplifier/booster gain

| Name of Test: | *Input/output power and amplifier/booster gain* | Test Standard: | *KDB 935210 D05* |
|---|---|---|---|
| Tested By: | WEI LI | Test Date: | 10/17/2018-01/18/2019 |

**Minimum Standard:** per KDB 935210 D05 Indus Booster Basic Meas v01r02, Section 4.5

**Method of Measurement:**

Input power levels (uplink and downlink) should be set to maximum input ratings, while confirming that the device is not capable of operating in saturation (non-linear mode) at the rated input levels, including during the performance of the input/output power measurements.

a. Power measurement Method 1: using a spectrum or signal analyzer

a) Set the frequency span to at least 1 MHz.

b) Set RBW = 100 kHz.

c) Set VBW ≥ 3 × RBW.

d) Set the detector to PEAK, and trace mode to MAX HOLD.

e) Place a marker on the peak of the signal, and record the value as the maximum power.

f) Repeat step e) but with the EUT in place.

b. Power measurement Method 2: using a power meter

As an alternative to measuring the input and output power levels with a spectrum or signal analyzer, a broadband RF power meter may be used with an appropriate detector.

c. Calculating amplifier, repeater, or industrial booster gain

Gain (dB) = output power (dBm) − input power (dBm).

**Test Result:** **Complies**

**Test Data:**

| Frequency, MHz | Input Power,dBm | Output Power, dBm | Max. Gain for each Band*, dB |
|---|---|---|---|
| 160.1 in Band I | -48.1 | 0 | 48.1 |
| 412.0 in Band II | -47.3 | 0 | 47.3 |
| 760.0 in Band III | -45.6 | 0 | 45.6 |

* all cable loss and attenuation factors were taken in account.

# Section 7. Band Noise

| Name of Test: | *Band Noise* | Test Standard: | *KDB 935210 D05 90.219(e)(2)* |
|---|---|---|---|
| Tested By: | WEI LI | Test Date: | 10/17/2018-01/18/2019 |

**Minimum Standard:** per KDB 935210 D05 v01r02, Sec. 4.6.

**Method of Measurement:** In accordance with 935210 D02 Signal Boosters Certification v04, Section V, paragraph (j)(5): For the remote unit of a conventional fiber-connected host/remote DAS booster system, it is acceptable to submit compliance information and test data consistent with Section 90.219(d)(6)(ii) (i.e., ERP of noise ≤ −43 dBm in 10 kHz RBW) for the downlink path only, in place of Section 90.219(e)(2) noise figure test data (i.e., NF ≤ 9 dB for both UL and DL). Test reports must provide explicit details about the instrumentation and test procedure used for Section 90.219(d)(6)(ii) testing.

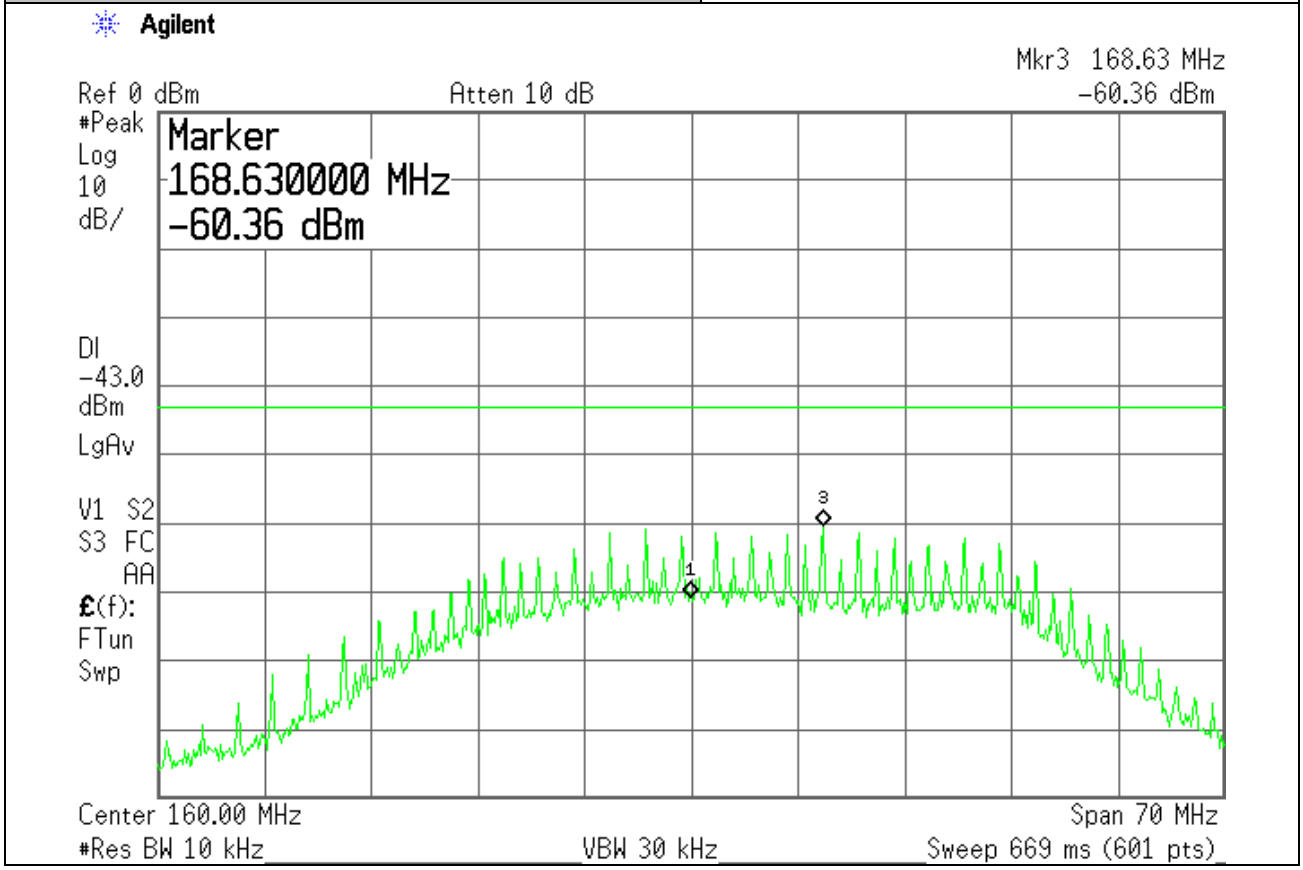
**Test Result:** **Complies**

**Test Data:** Attached Plots

| Frequency, MHz | Noise, dBm | Limit, dBm | Result | Allowed Antenna Gain less than,dBd |
|---|---|---|---|---|
| 168.63 in Band I | -60.36 | -43 | Complies | 17.36 |
| 420.25 in Band II | -58.90 | -43 | Complies | 15.90 |
| 773.45 in Band III | -64.49 | -43 | Complies | 21.49 |

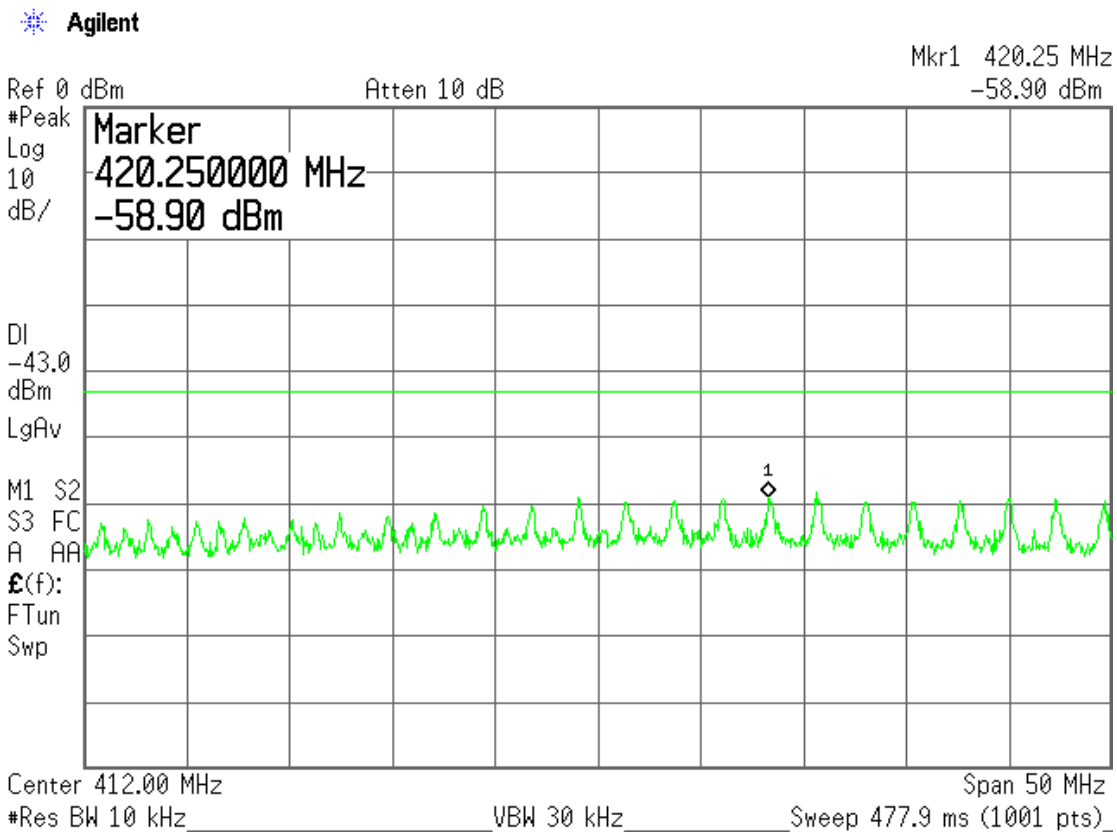
| | |
|---|---|
| **Project Number:** | 0048-181017-01 |
| **EUT:** | Fiber to Antenna System/ Booster FTA-DL002 |
| **SN:** | PT002 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Band Noise** |
| **Plot Name:** | **Pass Band I Noise** |
| **Configuration:** | Input: None. Output Port: EUT |



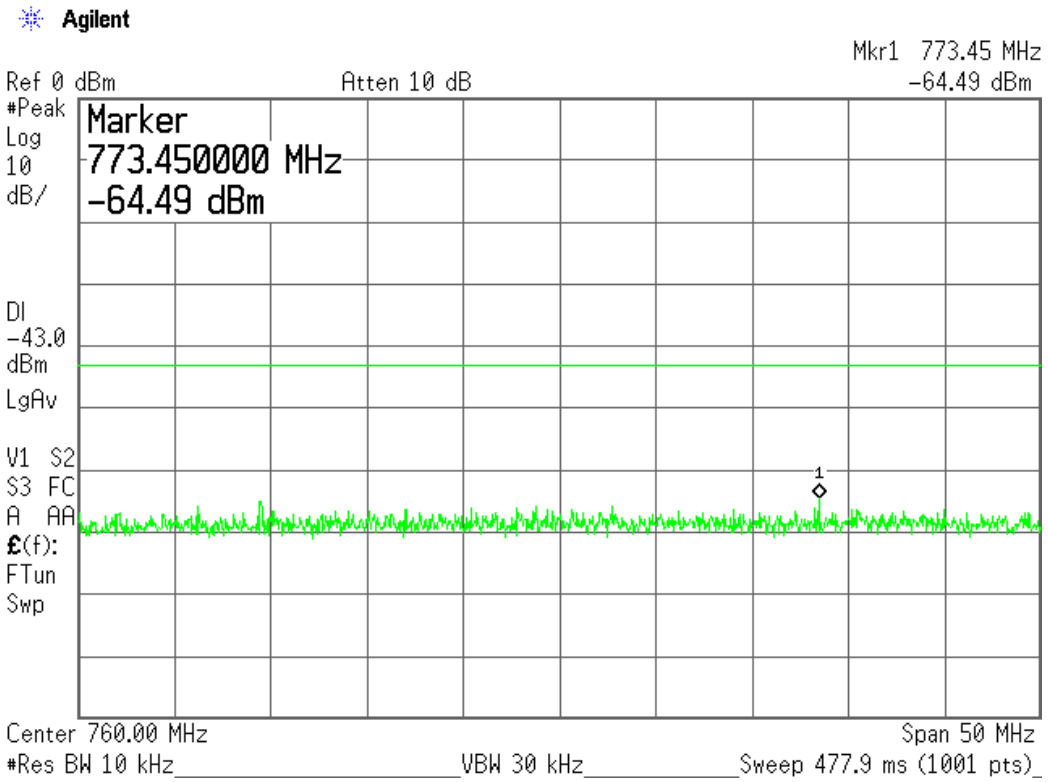
| | |
|---|---|
| **Project Number:** | 0048-181017-01 |
| **EUT:** | Fiber to Antenna System/ Booster FTA-DL002 |
| **SN:** | PT002 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Band Noise** |
| **Plot Name:** | **Pass Band II Noise** |
| **Configuration:** | Input: None. Output Port: EUT |



| | |
|---|---|
| **Project Number:** | 0048-181017-01 |
| **EUT:** | Fiber to Antenna System/ Booster FTA-DL002 |
| **SN:** | PT002 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Band Noise** |
| **Plot Name:** | **Pass Band III Noise** |
| **Configuration:** | Input: None. Output Port: EUT |



# Section 8. Measuring out-of-band/out-of-block and Spurious Emissions

(including intermodulation)

| Name of Test: | *Measuring out-of-band/out-of-block and Spurious Emissions (including intermodulation)* | Test Standard: | *KDB 935210 D05 90.210* |
|---|---|---|---|
| Tested By: | WEI LI | Test Date: | 10/17/2018-01/18/2019 |

**Minimum Standard:** per KDB 935210 D05 Indus Booster Basic Meas v01r02, Section 4.7

**Method of Measurement:**

**Out-of-band/out-of-block emissions conducted measurements**

a) Connect a signal generator to the input of the EUT.

If the signal generator is not capable of producing two independent modulated carriers simultaneously, then two discrete signal generators can be connected, with an appropriate combining network to support the two-signal test.

b) Configure the two signal generators to produce CW on frequencies spaced consistent with 4.7.1, with amplitude levels set to just below the AGC threshold.

c) Connect a spectrum analyzer to the EUT output.

d) Set the span to 100 kHz.

e) Set RBW = 300 Hz with VBW ≥ 3 × RBW.

f) Set the detector to power averaging (rms).

g) Place a marker on highest intermodulation product amplitude.

h) Capture the plot for inclusion in the test report.

i) Repeat steps c) to h) with the composite input power level set to 3 dB above the AGC threshold.

j) Repeat steps b) to i) for all operational bands.

**EUT spurious emissions conducted measurements**

a) Connect a signal generator to the input of the EUT.

b) Configure the signal generator to produce a CW signal.

c) Set the frequency of the CW signal to the center channel of the EUT passband.

d) Set the output power level so that the resultant signal is just below the

AGC threshold .

e) Connect a spectrum analyzer to the output of the EUT, using appropriate attenuation as necessary.

f) Set the RBW = 100 kHz. (i.e., for 30 MHz to 1 GHz PLMRS and/or PSRS booster devices)

g) Set the VBW = 3 × RBW.

h) Set the Sweep time = auto-couple.

i) Set the detector to PEAK.

j) Set the spectrum analyzer start frequency to 30 MHz (or the lowest radio frequency signal generated in the EUT, without going below 9 kHz if the EUT has additional internal clock frequencies), and the stop frequency to 10 times the highest allowable frequency of the EUT passband.

k) Select MAX HOLD, and use the marker peak function to find the highest emission(s) outside the passband. (This could be either at a frequency lesser or greater than the passband frequencies.)

l) Capture a plot for inclusion in the test report.

m) Repeat steps c) to l) for each authorized frequency band/block of operation.

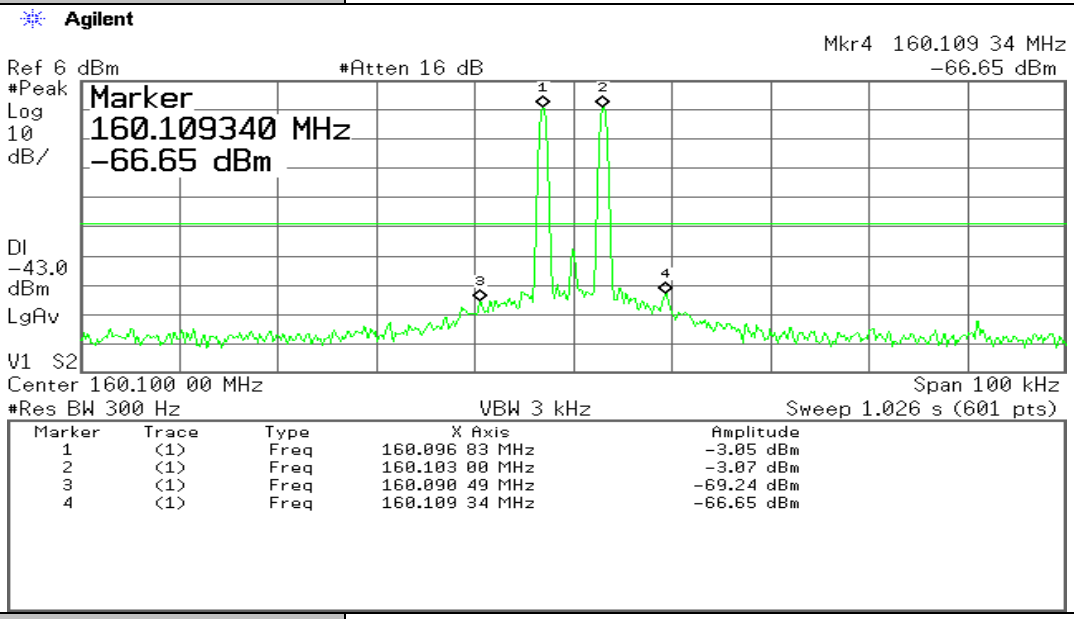
**Test Result:** **Complies**

**Test Data:** Attached Plots

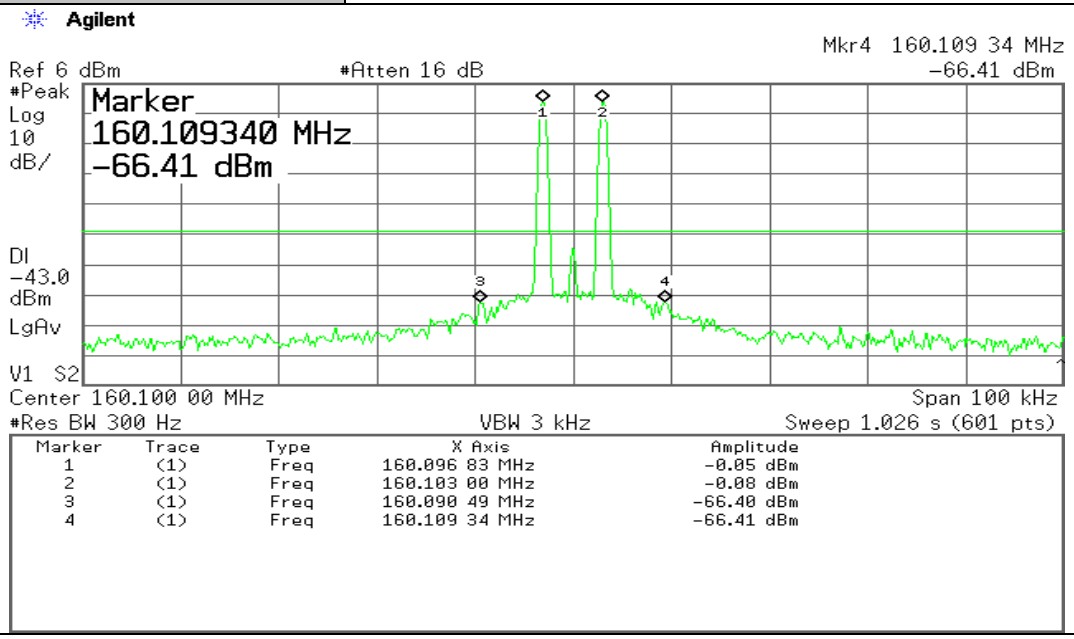
| | |
|---|---|
| **Project Number:** | 0048-181017-01 |
| **EUT:** | Fiber to Antenna System/ Booster FTA-DL002 |
| **SN:** | PT002 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

A. Intermodulation Products with rated input & +3dB input

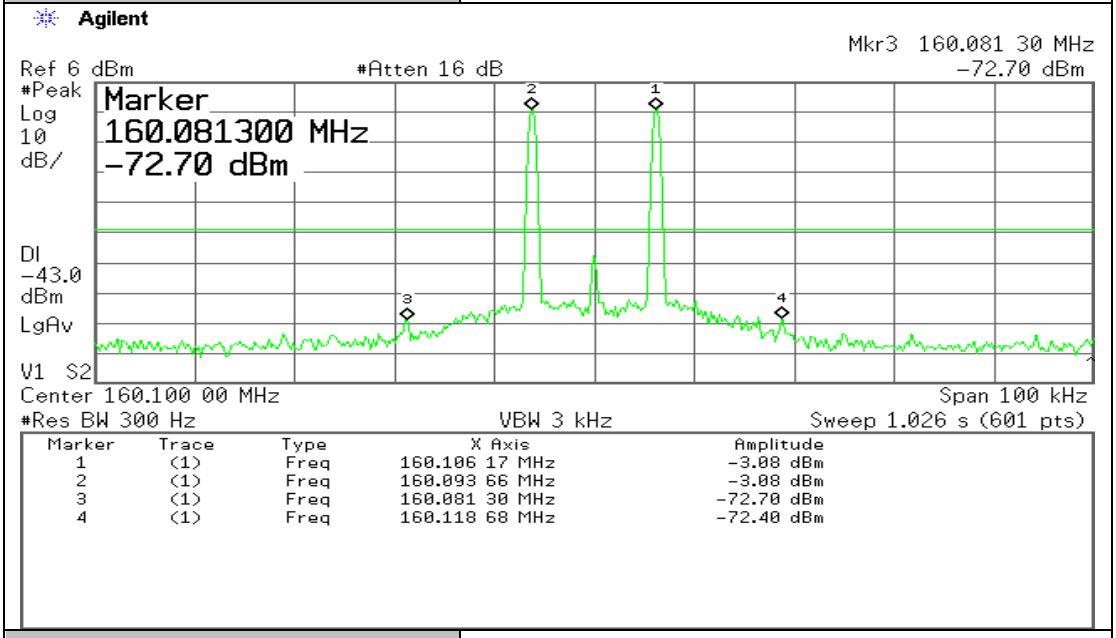
| Section: | Intermodulation Products |
|---|---|
| Plot Name: | Band I, 6.25KHz Channel Spacing |
| Configuration: | Input at AGC level |



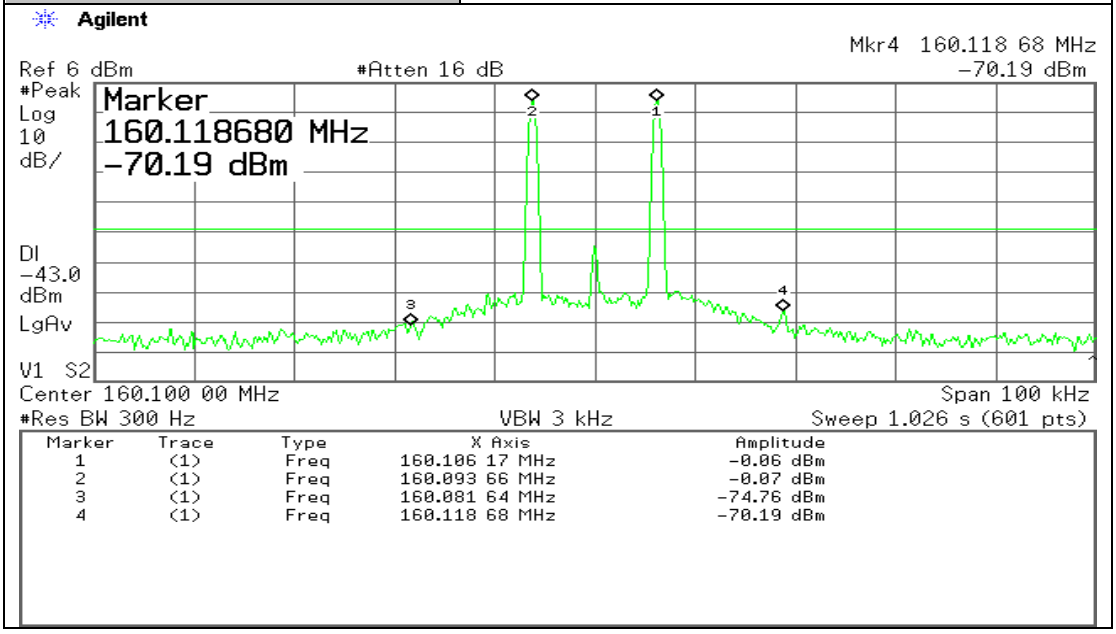

| Configuration: | Input at AGC +3dB level |
|---|---|



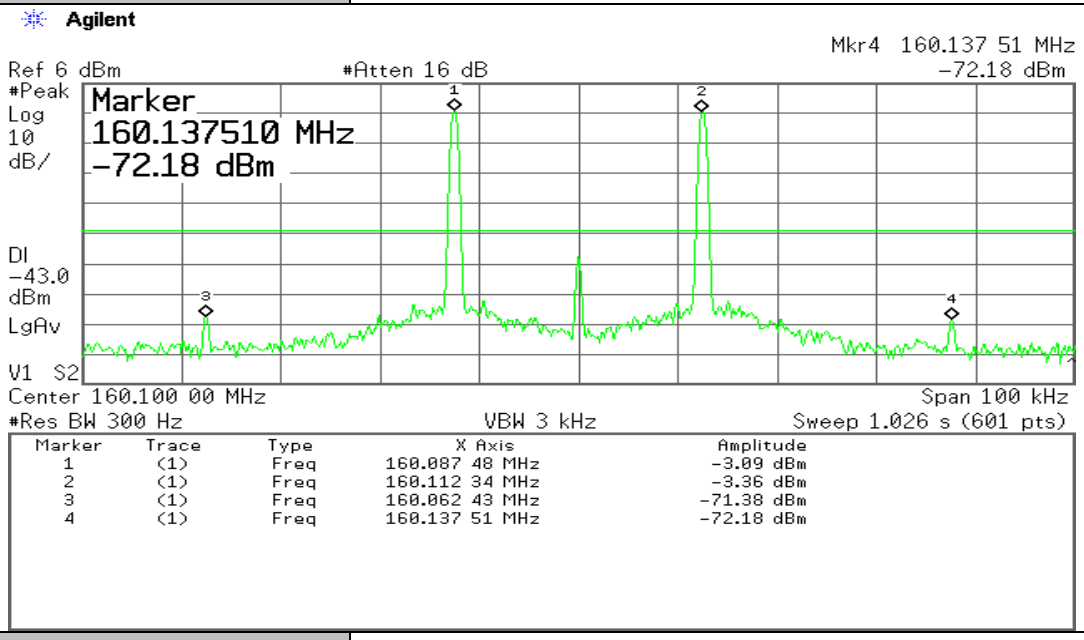
| Section: | Intermodulation Products |
|---|---|
| Plot Name: | Band I, 12.5KHz Channel Spacing |
| Configuration: | Input at AGC level |



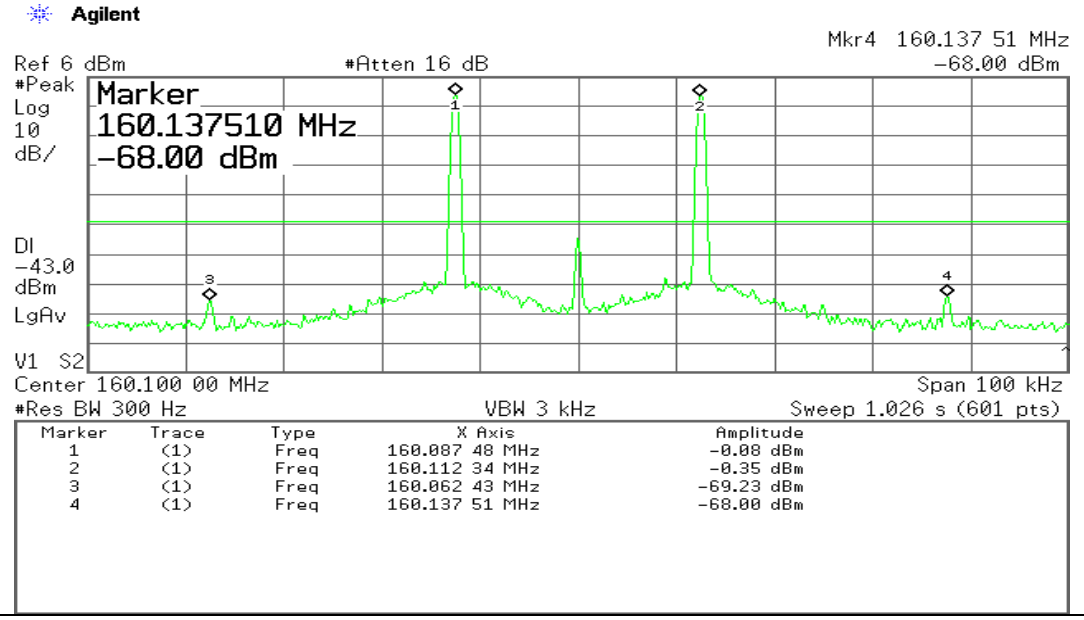

| Configuration: | Input at AGC +3dB level |
|---|---|



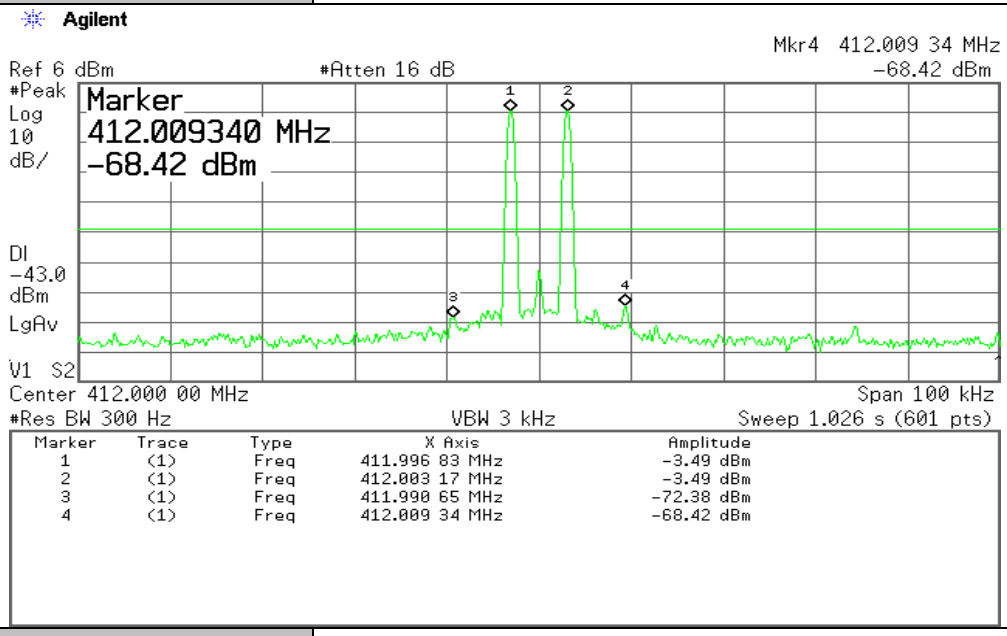
| Section: | Intermodulation Products |
|---|---|
| Plot Name: | Band I, 25KHz Channel Spacing |
| Configuration: | Input at AGC level |



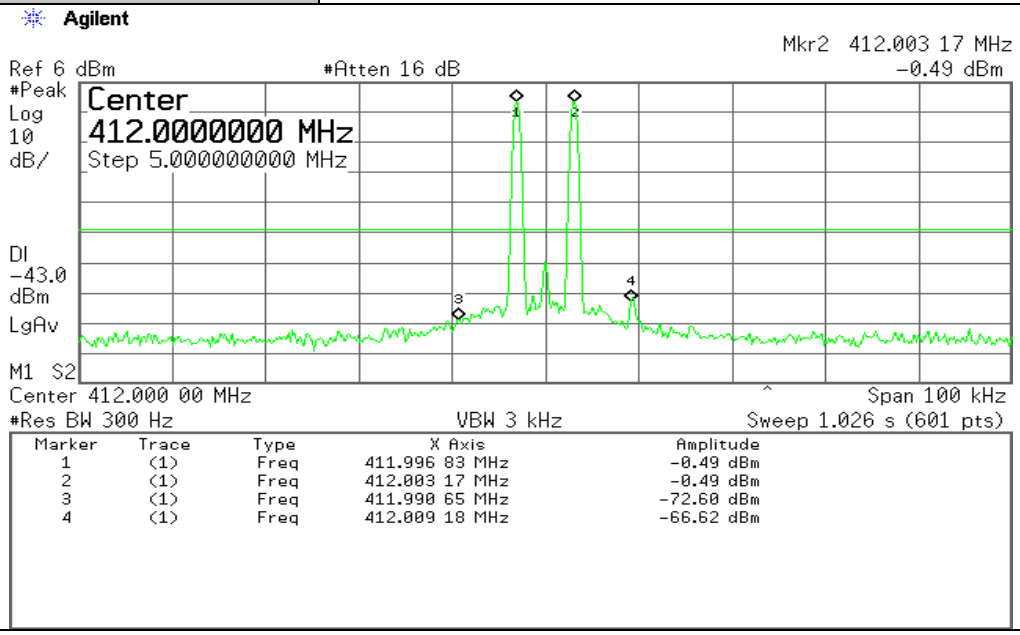

| Configuration: | Input at AGC +3dB level |
|---|---|



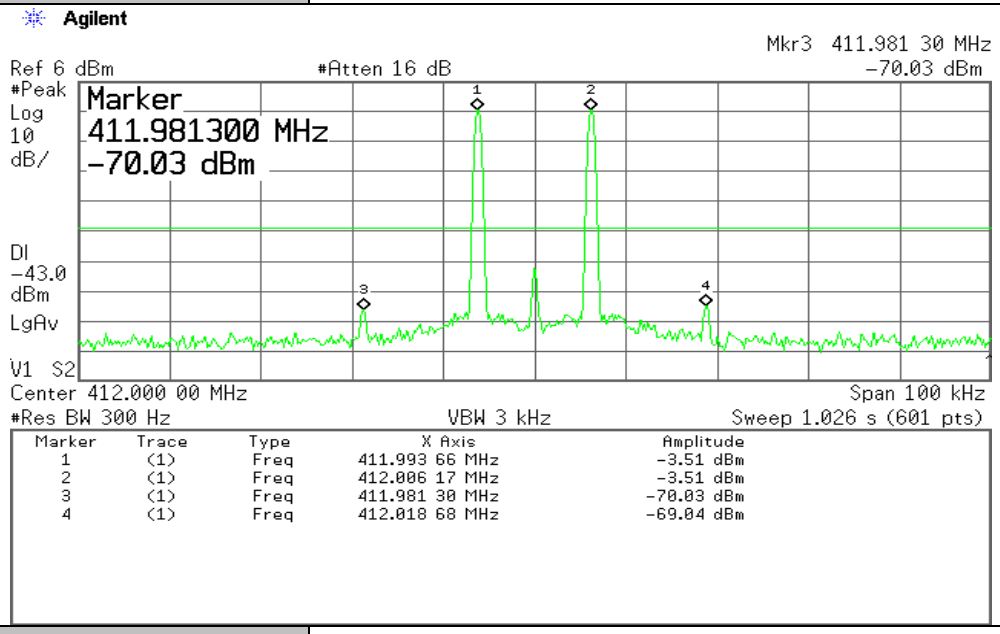
| Section: | Intermodulation Products |
|---|---|
| Plot Name: | Band II, 6.25KHz Channel Spacing |
| Configuration: | Input at AGC level |



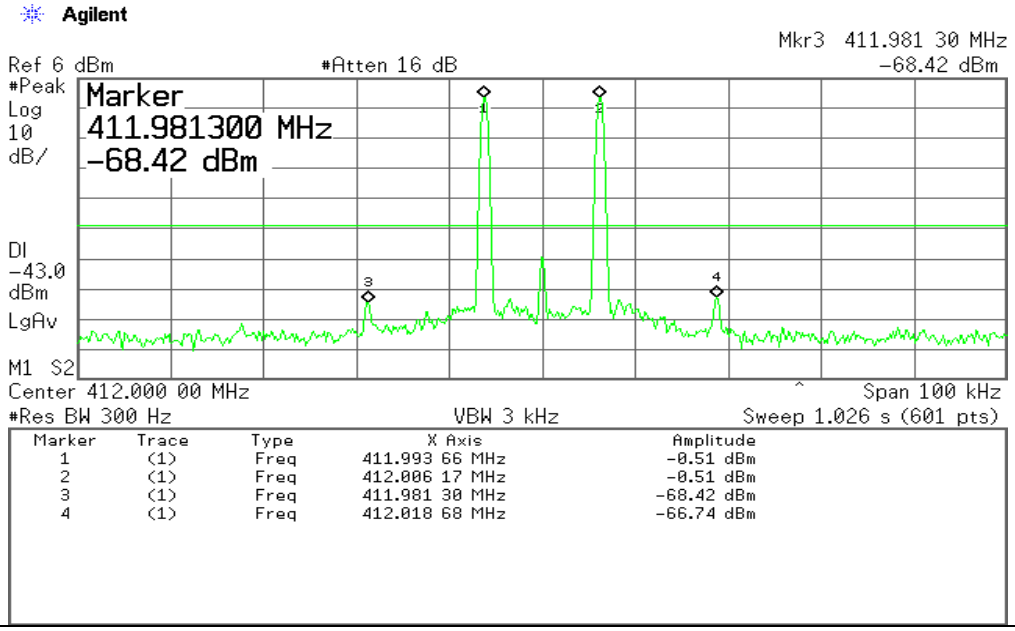

| Configuration: | Input at AGC +3dB level |
|---|---|



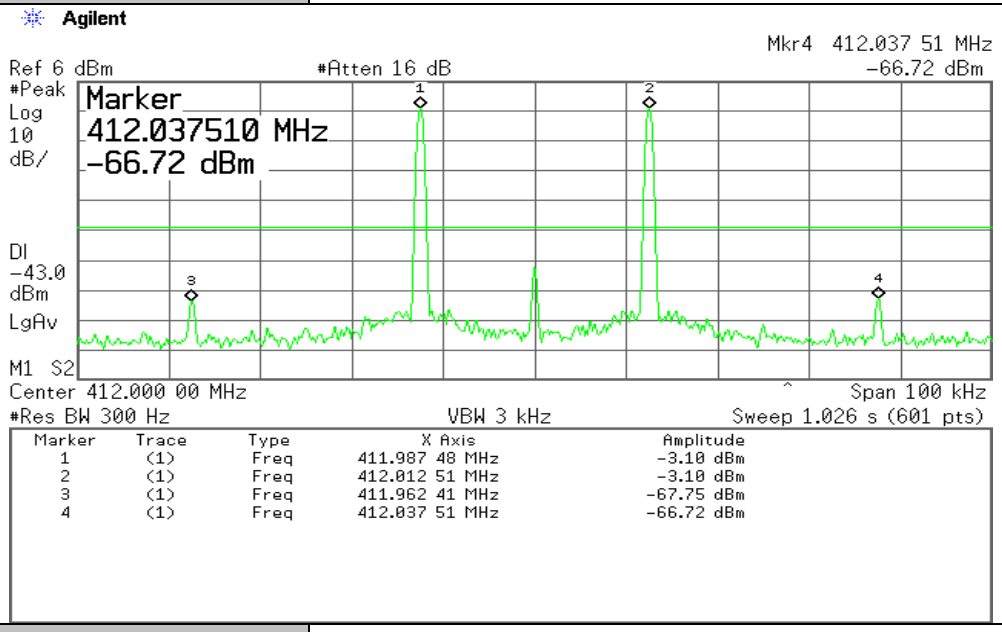
| Section: | Intermodulation Products |
|---|---|
| Plot Name: | Band II, 12.5KHz Channel Spacing |
| Configuration: | Input at AGC level |



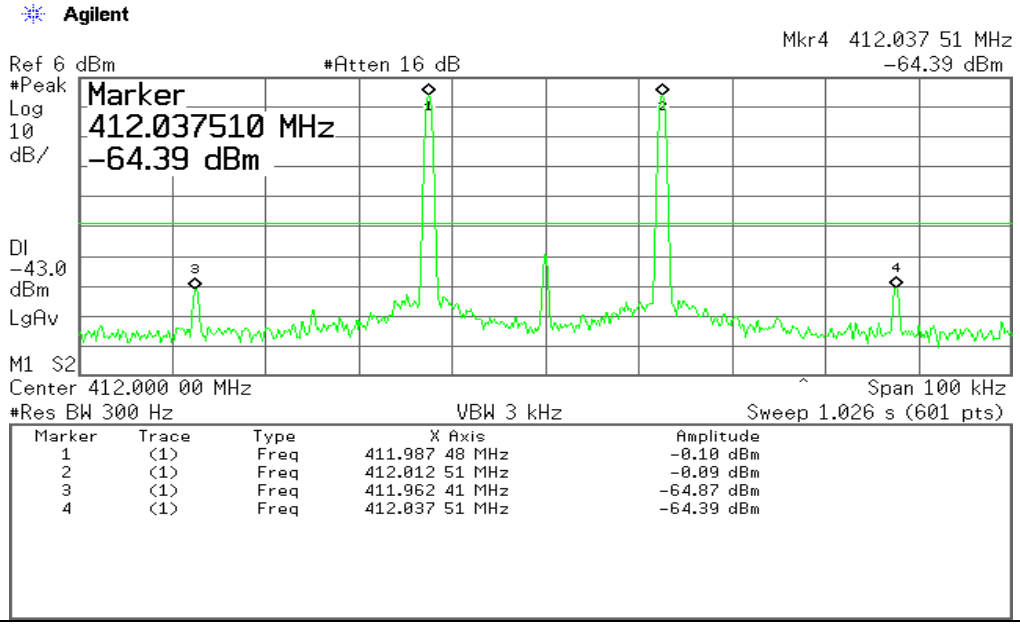

| Configuration: | Input at AGC +3dB level |
|---|---|



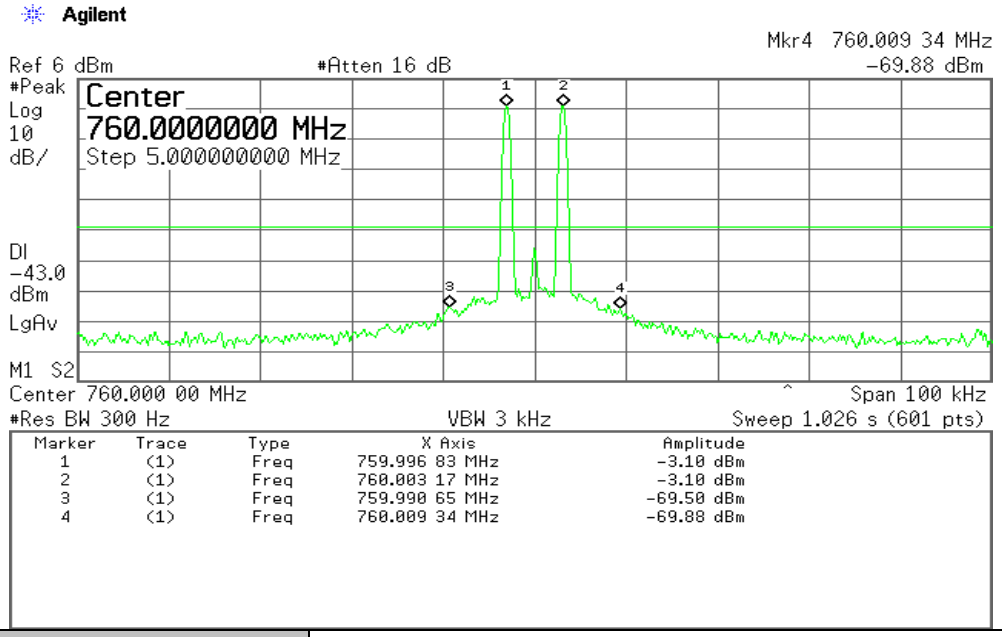
| Section: | Intermodulation Products |
|---|---|
| Plot Name: | Band II, 25KHz Channel Spacing |
| Configuration: | Input at AGC level |



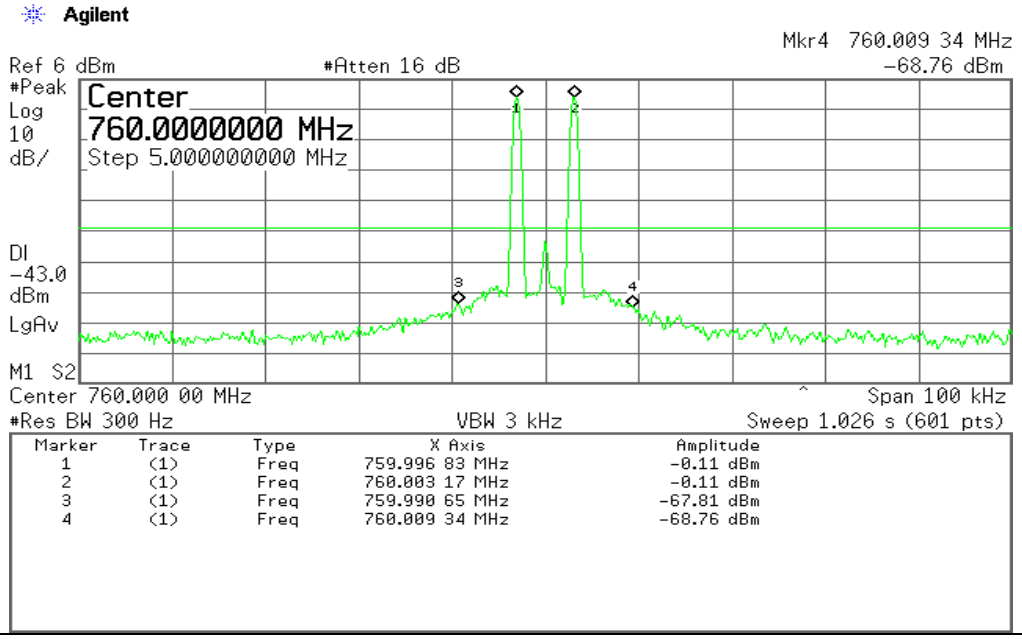

| Configuration: | Input at AGC +3dB level |
|---|---|



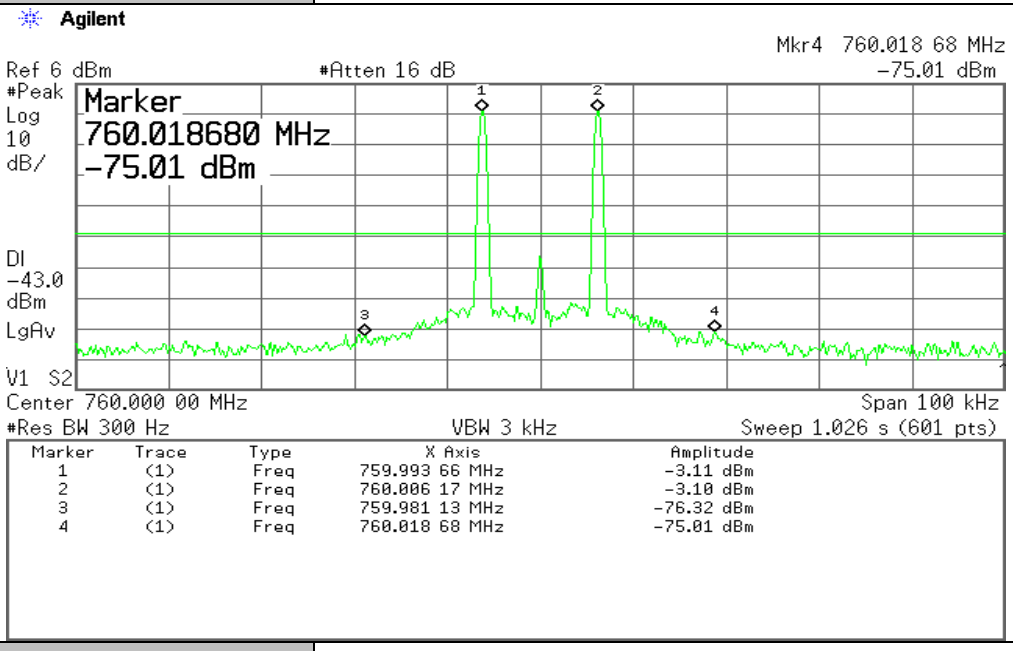
| Section: | Intermodulation Products |
|---|---|
| Plot Name: | Band III, 6.25KHz Channel Spacing |
| Configuration: | Input at AGC level |



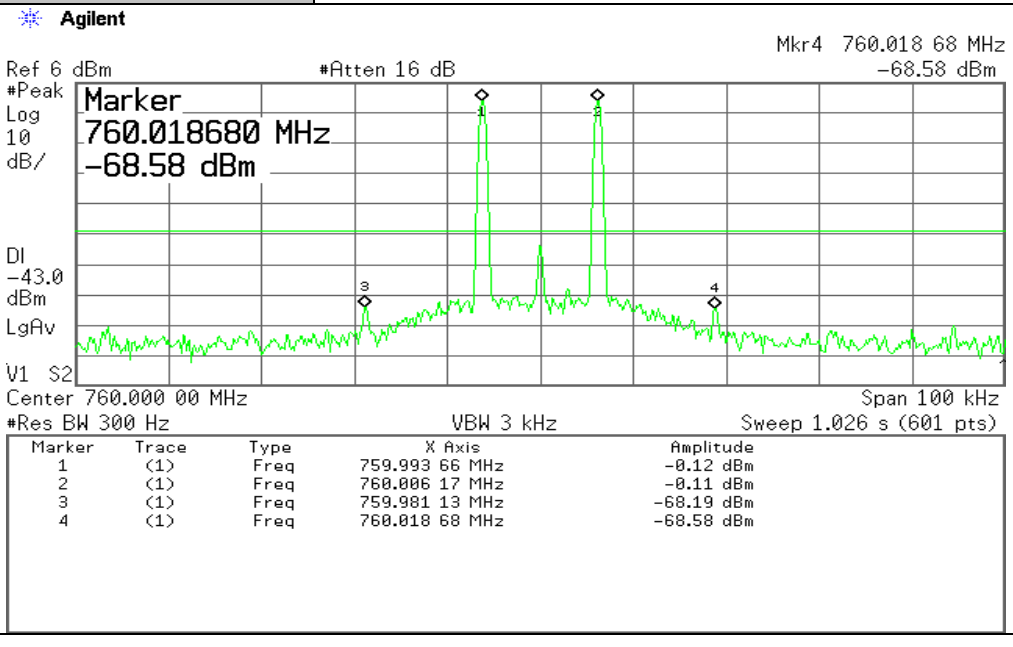

| Configuration: | Input at AGC +3dB level |
|---|---|



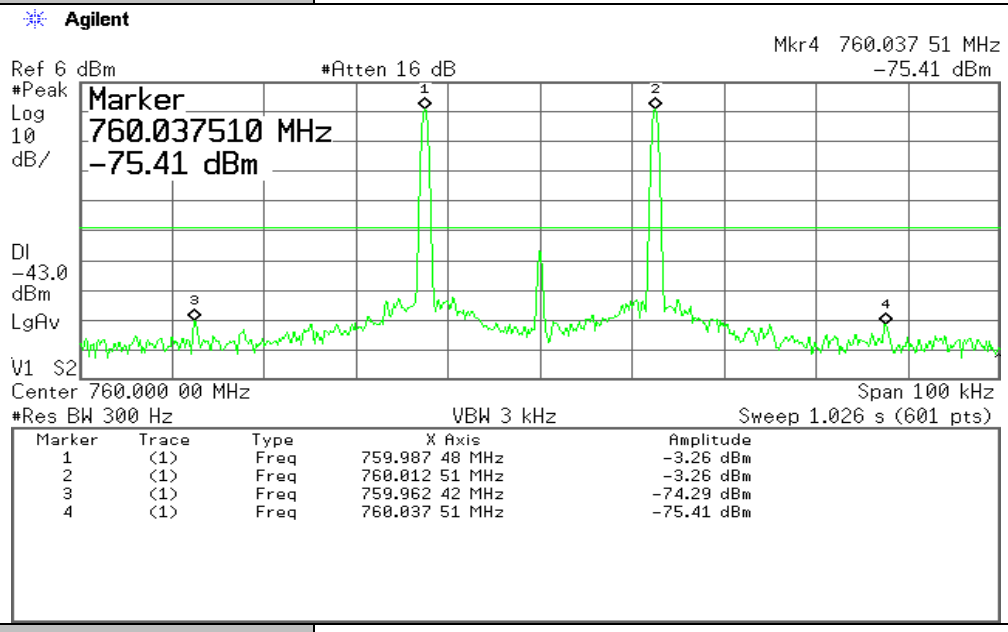
| Section: | Intermodulation Products |
|---|---|
| Plot Name: | Band III, 12.5KHz Channel Spacing |
| Configuration: | Input at AGC level |



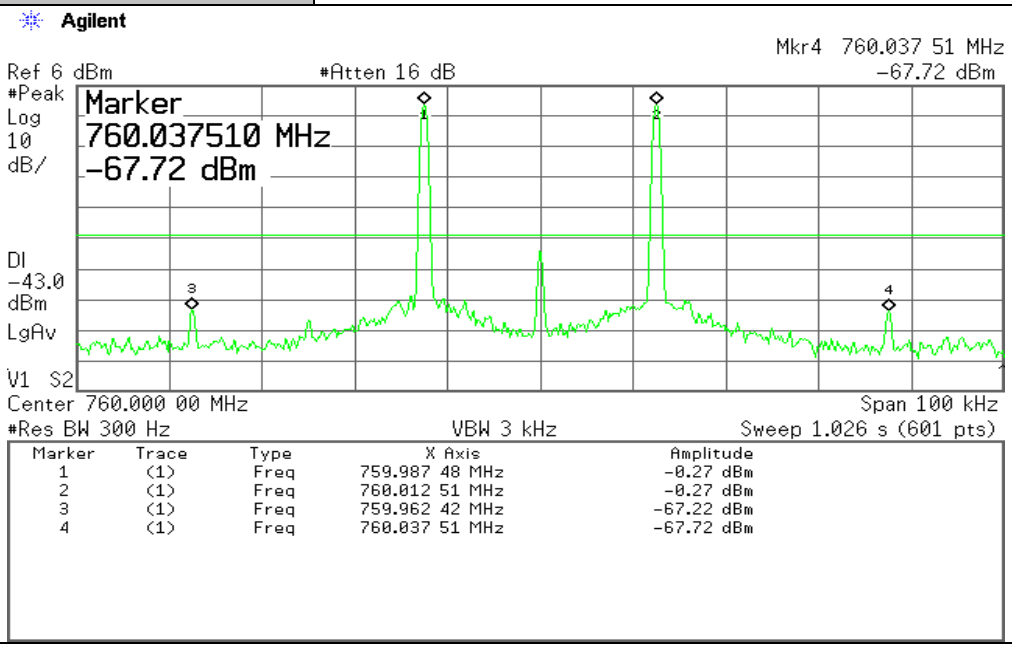

| Configuration: | Input at AGC +3dB level |
|---|---|



| Section: | Intermodulation Products |
|---|---|
| Plot Name: | Band III, 25KHz Channel Spacing |
| Configuration: | Input at AGC level |



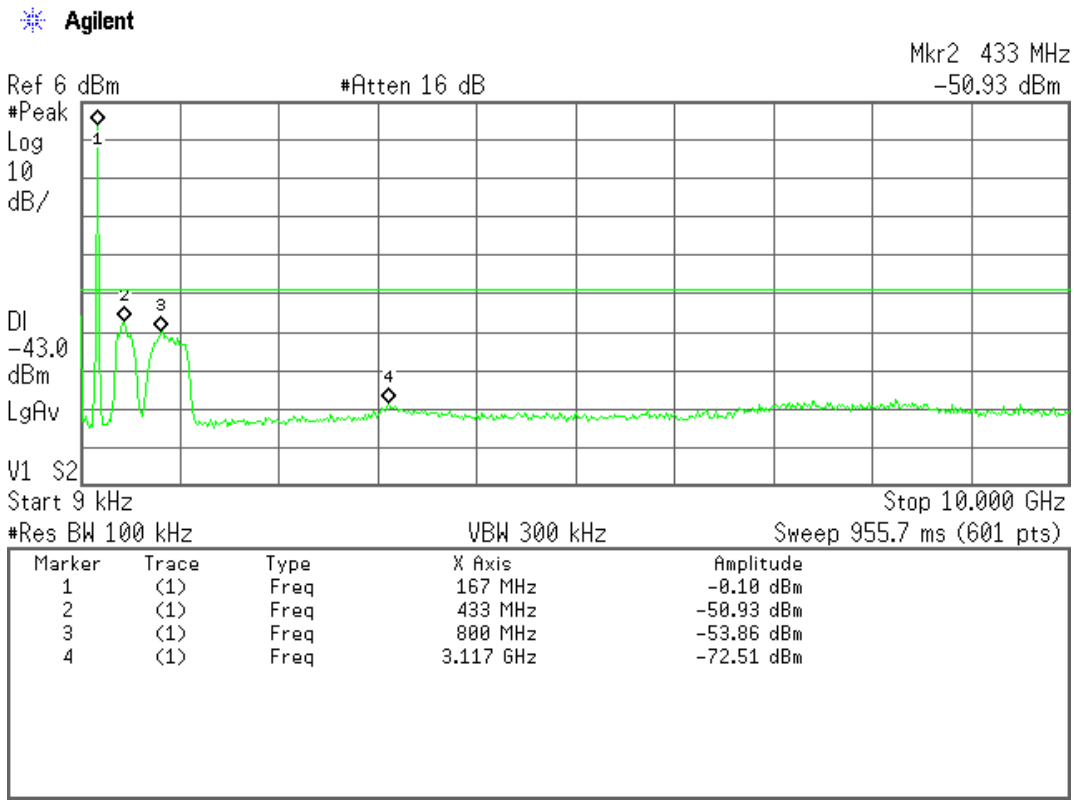

| Configuration: | Input at AGC +3dB level |
|---|---|



B. Conducted Spurious Emissions

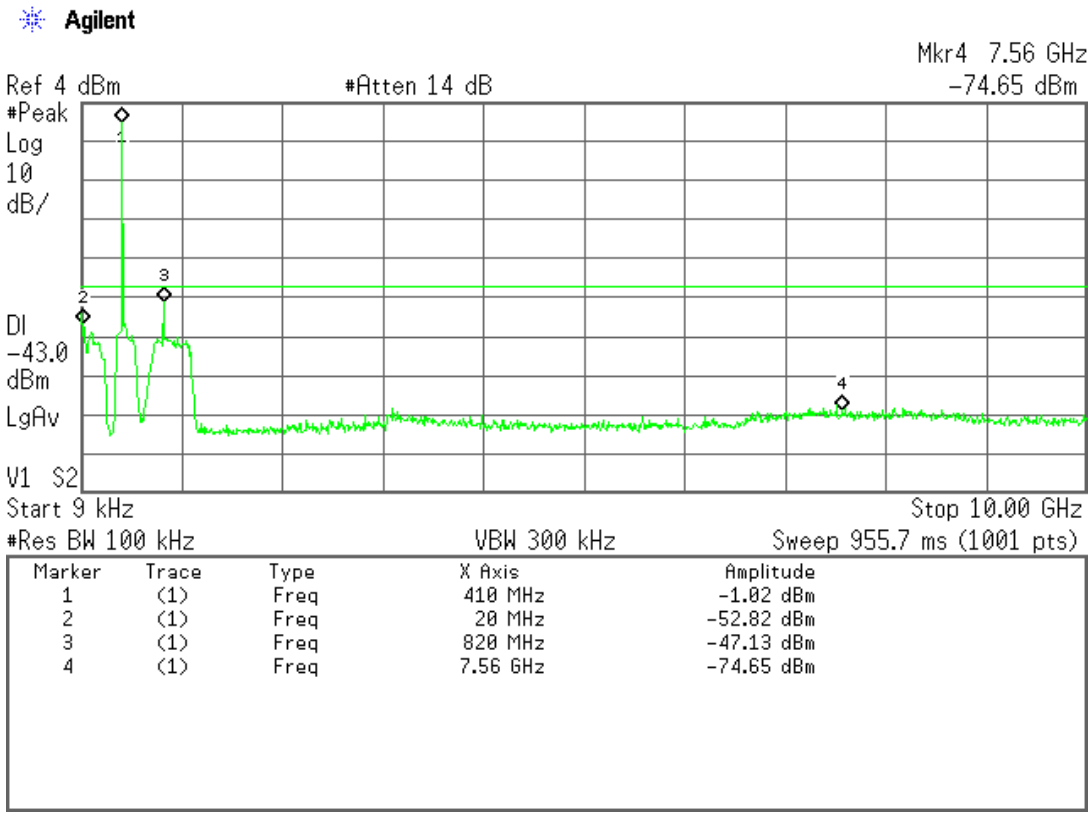
| | |
|---|---|
| **Project Number:** | 0048-181017-01 |
| **EUT:** | Fiber to Antenna System/ Booster FTA-DL002 |
| **SN:** | PT002 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Conducted Spurious Emissions** |
| **Plot Name:** | **Band I Spurious** |
| **Configuration:** | Input: CW. Output Port: EUT |



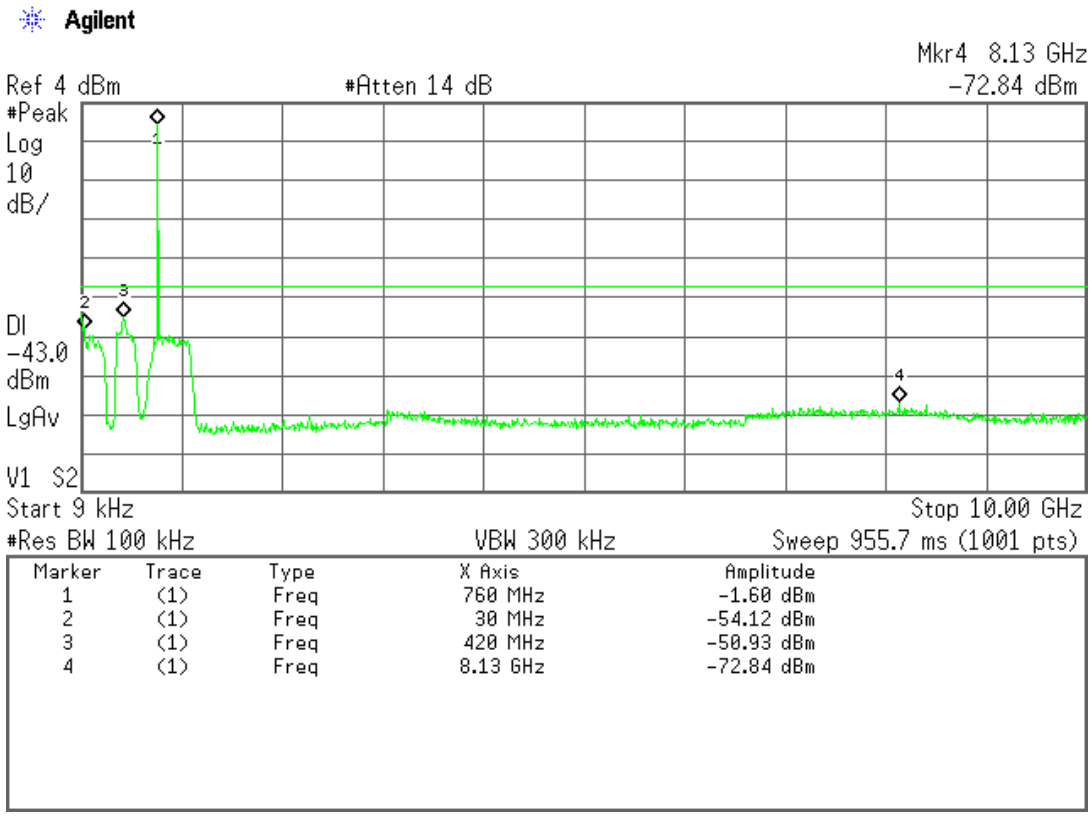
| | |
|---|---|
| **Project Number:** | 0048-181017-01 |
| **EUT:** | Fiber to Antenna System/ Booster FTA-DL002 |
| **SN:** | PT002 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Conducted Spurious Emissions** |
| **Plot Name:** | **Band II Spurious** |
| **Configuration:** | Input: CW. Output Port: EUT |



| | |
|---|---|
| **Project Number:** | 0048-181017-01 |
| **EUT:** | Fiber to Antenna System/ Booster FTA-DL002 |
| **SN:** | PT002 |
| **Tested By:** | Wei Li |
| **Temperature:** | 70°F |
| **Humidity:** | 30% |

| | |
|---|---|
| **Section:** | **Conducted Spurious Emissions** |
| **Plot Name:** | **Band III Spurious** |
| **Configuration:** | Input: CW. Output Port: EUT |



# Section 9. Frequency Stability Measurements

| Name of Test: | *Frequency stability measurements* | Test Standard: | *KDB 935210 D05 Part 90.219(e)(4)(i)* |
|---|---|---|---|
| Tested By: | WEI LI | Test Date: | 10/17/2018-01/18/2019 |

**Minimum Standard:** per KDB 935210 D05 Indus Booster Basic Meas v01r02, Section 4.8

**Method of Measurement:** Refer to FCC Part 90.213 limit
*Frequency Stability vs Temperature Variation and Power Supply Voltage Variation*.

**Test Result:** **Complies**

**Test Data:**

## A. Frequency Stability vs . Voltage

Nominal voltage =120Vac ( provided to Power Box for +48Vdc output), 85% &115% of S.T.V. , T=25C, Choose Nominal Middle channel frequency =412MHz

| | Voltage | Freq-Hz | Error-ppm | Limit(ppm) |
|---|---|---|---|---|
| 85% Nominal | 102 | 411999964 | 0 | 1 |
| Normal | 120 | 411999965 | 0 | 1 |
| 115% Nominal | 138 | 411999965 | 0 | 1 |

## B. Frequency Stability vs. Temperature

Nominal voltage =120Vac (output+48Vdc),
Nominal Middle channel frequency =412MHz

| Temperature © | Measured Frequency (Hz) | Frequency Error ( Hz) | Error in ppm | Limit |
|---|---|---|---|---|
| -30 | 411999970 | 5 | 0.01 | 1 |
| -10 | 411999965 | 0 | 0 | 1 |
| 0 | 411999964 | 1 | 0 | 1 |
| 10 | 411999964 | 1 | 0 | 1 |
| **20** | **411999965** | **0** | **0** | **1** |
| 30 | 411999965 | 0 | 0 | 1 |
| 40 | 411999964 | -1 | 0 | 1 |
| 50 | 411999962 | -3 | 0 | 1 |

# Section 10. Field Strength of Spurious

| Name of Test: | *Field Strength of Spurious* | Test Standard: | *KDB 935210 D05 2.1053* |
|---|---|---|---|
| Tested By: | DAVID TU | Test Date: | 10/17/2018-01/18/2019 |

**Minimum Standard:** per KDB 935210 D05 Indus Booster Basic Meas v01r02, Section 4.9

**Method of Measurement:** Refer to Part 2.1053 & KDB 971168

Limit
-13 dBm = 82.2 dBuV/m at 3 m

**Test Result:** **Complies**

**Test Data:** See Attached Table(s)

* The pre-scan investigation shows that different digital modulation mode has no evident effect on spurious measurements. CW is chosen for final data collection.

**Operation Mode :** SG Frequency at Band I: 160.1MHz (Rated Power)

| Frequency (MHz) | Polarity [H, V] | Height (m) | Amplitude Reading* (dBμV) | -13dBm Limit @3m (dBμV/m) | Difference from limit (dB) |
|---|---|---|---|---|---|
| 137.8 | H | 1.6 | 36.3 | 82.2 | -45.9 |
| 145.7 | H | 1.6 | 36.9 | 82.2 | -45.3 |
| 160.0 | H | 1.6 | 39.5 | 82.2 | -42.7 |
| 177.9 | H | 1.4 | 35.0 | 82.2 | -47.2 |
| 186.2 | H | 1.1 | 32.1 | 82.2 | -50.1 |
| 304 | H | 1.0 | 32.6 | 82.2 | -49.6 |
| 610 | H | 1.0 | 37.5 | 82.2 | -44.7 |
| 880 | H | 1.0 | 42.0 | 82.2 | -40.2 |
| 141.2 | V | 1.3 | 37.7 | 82.2 | -44.5 |
| 159.7 | V | 1.2 | 40.4 | 82.2 | -41.8 |
| 175.4 | V | 1.1 | 38.1 | 82.2 | -44.1 |
| 190.2 | V | 1.2 | 39.2 | 82.2 | -43.0 |
| 220.3 | V | 1.2 | 33.0 | 82.2 | -49.2 |
| 286 | V | 1.1 | 31.9 | 82.2 | -50.3 |
| 310 | V | 1.1 | 32.3 | 82.2 | -49.9 |
| 490 | V | 1.1 | 35.9 | 82.2 | -46.3 |
| 716 | V | 1.1 | 39.8 | 82.2 | -42.4 |
| 840 | V | 1.1 | 40.1 | 82.2 | -42.1 |

*Peak reading. For emissions that have peak values close to ( or over) the specification limit (if any) will be also measured in the quasi-peak or average mode to determine the compliance.
** Quasi-peak or Average Reading at this frequency.

**Operation Mode :** SG Frequency at Band II: 412.0MHz (Rated Power)

| Frequency (MHz) | Polarity [H, V] | Height (m) | Amplitude Reading* (dBμV) | -13dBm Limit @3m (dBμV/m) | Difference from limit (dB) |
|---|---|---|---|---|---|
| 43.6 | H | 1.6 | 33.7 | 82.2 | -48.5 |
| 47.0 | H | 1.6 | 35.8 | 82.2 | -46.4 |
| 50.4 | H | 1.6 | 36.3 | 82.2 | -45.9 |
| 53.8 | H | 1.6 | 34.2 | 82.2 | -48.0 |
| 100.1 | H | 1.8 | 36.2 | 82.2 | -46.0 |
| 115.9 | H | 1.8 | 32.1 | 82.2 | -50.1 |
| 284 | H | 1.2 | 32.8 | 82.2 | -49.4 |
| 334 | H | 1.0 | 34.5 | 82.2 | -47.7 |
| 412 | H | 1.0 | 35.3 | 82.2 | -46.9 |
| 500 | H | 1.0 | 35.9 | 82.2 | -46.3 |
| 534 | H | 1.0 | 36.6 | 82.2 | -45.6 |
| 904 | H | 1.0 | 41.8 | 82.2 | -40.4 |
| 43.2 | V | 1.2 | 41.0 | 82.2 | -41.2 |
| 53.8 | V | 1.2 | 39.5 | 82.2 | -42.7 |
| 92.9 | V | 1.1 | 34.9 | 82.2 | -47.3 |
| 140.1 | V | 1.1 | 39.0 | 82.2 | -43.2 |
| 146.0 | V | 1.1 | 36.2 | 82.2 | -46.0 |
| 186.4 | V | 1.1 | 35.5 | 82.2 | -46.7 |
| 300 | V | 1.1 | 33.9 | 82.2 | -48.3 |
| 334 | V | 1.1 | 33.5 | 82.2 | -48.7 |
| 412 | V | 1.1 | 35.8 | 82.2 | -46.4 |
| 730 | V | 1.1 | 40.9 | 82.2 | -41.3 |
| 870 | V | 1.1 | 41.5 | 82.2 | -40.7 |

*Peak reading. For emissions that have peak values close to ( or over) the specification limit (if any) will be also measured in the quasi-peak or average mode to determine the compliance.
** Quasi-peak or Average Reading at this frequency.

**Operation Mode :** SG Frequency at Band III: 760MHz (Rated Power)

| Frequency (MHz) | Polarity [H, V] | Height (m) | Amplitude Reading* (dBμV) | -13dBm Limit @3m (dBμV/m) | Difference from limit (dB) |
|---|---|---|---|---|---|
| 43.0 | H | 1.6 | 33.7 | 82.2 | -48.5 |
| 47.3 | H | 1.6 | 35.8 | 82.2 | -46.4 |
| 50.4 | H | 1.6 | 36.3 | 82.2 | -45.9 |
| 53.8 | H | 1.6 | 34.2 | 82.2 | -48.0 |
| 100.1 | H | 1.8 | 36.2 | 82.2 | -46.0 |
| 115.9 | H | 1.8 | 32.1 | 82.2 | -50.1 |
| 280 | H | 1.1 | 32.8 | 82.2 | -49.4 |
| 336 | H | 1.0 | 34.3 | 82.2 | -47.9 |
| 416 | H | 1.0 | 35.0 | 82.2 | -47.2 |
| 500 | H | 1.0 | 36.5 | 82.2 | -45.7 |
| 530 | H | 1.0 | 36.1 | 82.2 | -46.1 |
| 760 | V | 1.0 | 41.4 | 82.2 | -40.8 |
| 43.2 | V | 1.2 | 40.9 | 82.2 | -41.3 |
| 53.8 | V | 1.2 | 39.8 | 82.2 | -42.4 |
| 92.9 | V | 1.1 | 35.9 | 82.2 | -46.3 |
| 140.1 | V | 1.1 | 37.8 | 82.2 | -44.4 |
| 146.0 | V | 1.1 | 36.5 | 82.2 | -45.7 |
| 186.4 | V | 1.1 | 34.8 | 82.2 | -47.4 |
| 43.2 | V | 1.2 | 41.0 | 82.2 | -41.2 |
| 300 | V | 1.1 | 33.9 | 82.2 | -48.3 |
| 334 | V | 1.1 | 33.5 | 82.2 | -48.7 |
| 412 | V | 1.1 | 35.8 | 82.2 | -46.4 |
| 760 | V | 1.1 | 43.9 | 82.2 | -38.3 |
| 870 | V | 1.1 | 41.5 | 82.2 | -40.7 |

*Peak reading. For emissions that have peak values close to ( or over) the specification limit (if any) will be also measured in the quasi-peak or average mode to determine the compliance.
** Quasi-peak or Average Reading at this frequency.

# Section 11. Maximum Permissible Exposure

## MPE estimate is given per 2.1091 of FCC Rules:

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E^2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

$d = 0.282 * 10^{((P + G) / 20)} / \sqrt{S}$ Equation (1)

$S = 0.0796 * 10^{((P + G)/10)} / d^2$ Equation (2)

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Equation (1) and the measured peak power is used to calculate the MPE distance.
Equation (2) and the measured peak power is used to calculate the Power density.

**Limit:**

$S=1.0$ mW/cm$^2$ for public ( un-controlled environment)*.
$S=5.0$ mW/cm$^2$ for professional ( controlled environment)

*1mW/ cm$^2$ is the reference level for general public exposure according to the OET Bulletin 65, Edition 97-01 Table 1.

## Results:

This EUT shall comply with RF exposure requirements stated in FCC KDB865664 section 2. and KDB447498 section 7.

No Antenna is included in this application. As reference, typical max. gain of antenna is G=3dBi. With P=+3dBm ( 3dB over rated power), using formula (1) or (2),

Minimum MPE distance d= 1.1 cm.

**The intended and expected application for this product is for installation in a commercial base station ( restricted access).**

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

# Section 12. Test Equipment List

| Manufacturer | Model | Serial No. | Description | Last Cal mm/dd/ yy | Cal Due mm/dd/ yy |
|---|---|---|---|---|---|
| Agilent | E4440A | US40420700 | 3Hz-26.5GHz Spec. Analyzer | 6/06/17 | 6/06/19 |
| R &S | ESPI | 100018 | 9KHz-7GHz EMI Receiver | 8/25/17 | 8/25/19 |
| HP | HP8546A | 3448A00290 | 9kHz to 6.5GHz EMI Receiver | 10/16/17 | 10/16/19 |
| EMCO | 3104C | 9307-4396 | 20-300MHz Biconical Antenna | 10/19/17 | 10/19/19 |
| EMCO | 3146 | 9008-2860 | 200-1000MHz Log-Periodic Antenna | 10/19/17 | 10/19/19 |
| Electro-Meterics | ALR-25M/30 | 289 | 10KHz-30MHz Active Loop Antenna | 8/28/17 | 8/28/19 |
| EMCO | 3115 | 4945 | Double Ridge Guide Horn Antenna | 10/17/17 | 10/17/19 |
| ARA | MWH-1826/B | 1013 | 18-26GHZ Horn Antena | 10/02/17 | 10/2/2019 |
| R&S | SMH | 8942280/010 | Signal Generator | 8/25/17 | 8/25/19 |
| RES-NET | RFA500NFF30 | 0108 | 30dB in-line Power Attenuator | * | |
| Lorch Microwave | 5NF-800/1000-S | AC3 | Notch Filter | * | |
| Lorch Microwave | 5NF-1800/2200-S | AE10 | Notch Filter | * | |
| Narda | 3022 | 80986 | Directional Coupler | * | |
| Lorch Microwave | 5NF-800/1000-S | AC3 | Notch Filter | * | |

All Test Equipment Used are Calibrated Traceable to NIST Standards. Calibration Interval: 2 Year.

* Functional Check and verified before each usage.