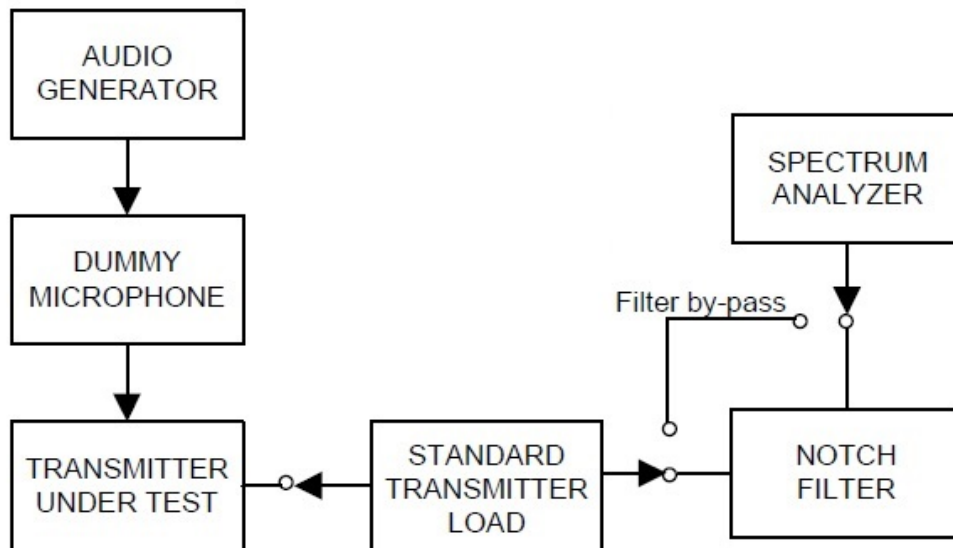


## 7.8 Unwanted Emissions : Conducted Spurious Emission

### ■ Definition

Conducted spurious emissions are emissions at the antenna terminals on a frequency or frequencies that are outside a band sufficient to ensure transmission of information of required quality for the class of communication desired.

### ■ TEST CONFIGURATION



### ■ TEST PROCEDURE

According to 2.2.13 in TIA-603-D Standard.

- e) Connect the equipment as illustrated, with the notch filter by-passed.
- f) Set the center frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line.
- g) Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation. The input level shall be established at the frequency of maximum response of the audio modulation circuit.
- h) Adjust the spectrum analyzer for the following settings:
  - 1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz.
  - 2) Video Bandwidth  $\geq 3$  times the resolution bandwidth.
  - 3) Sweep Speed  $\leq 2000$  Hz per second.
  - 4) Detector Mode = mean or average power.
- e) Adjust the center frequency of the spectrum analyzer for incremental coverage of the range from:
  - 1) The lowest radio frequency generated in the equipment to the carrier frequency minus the test bandwidth (see 1.3.4.4).
  - 2) The carrier frequency plus the test bandwidth to a frequency less than 2 times the carrier frequency.

- f) Record the frequencies and levels of spurious emissions from step e).
- g) Unkey the transmitter. Replace the transmitter under test with the signal generator and adjust the signal level to reproduce the frequencies and levels of every spurious emission recorded in step f). Record the signal generator levels in dBm.
- h) Insert the notch filter.
- i) Adjust the spectrum analyzer for the following settings:
  - 1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz.
  - 2) Video Bandwidth  $\geq 3$  times the resolution bandwidth.
  - 3) Sweep Speed  $\leq 2000$  Hz per second.
  - 4) Detector Mode = mean or average power.
- j) Key the transmitter. Adjust the center frequency of the spectrum analyzer for incremental coverage of the range from a frequency equal to 2 times the carrier frequency and to the tenth harmonic of the carrier frequency.

#### **■ LIMIT**

| Frequency Band (MHz) | Channel bandwidth (kHz) | Limit (dB)           |
|----------------------|-------------------------|----------------------|
| 138- 174             | 12.5                    | 50+10Log(P) or 70 dB |
|                      | 6.25                    | 55+10Log(P) or 65 dB |
|                      | 25                      | 43+10Log(p)          |

#### **Note**

1. Correct Level (dBm) : Substitute SG Level (dBm)
2. Emission Level (dBc) : Correct Level – 10Log(P\*1000)
3. P = Carrier Output Power(W)  
( P value, please refer to Section 7.1)

■TEST RESULTS For ONLY FCC

7K60FXD/7K60FXE

| Frequency (MHz) | Channel | Power Mode | Spurious Frequency (MHz) | Correct Level (dBm) | Emission Level (dBc) | Limit (dBc) | Margin (dB) |
|-----------------|---------|------------|--------------------------|---------------------|----------------------|-------------|-------------|
| 150.05          | Low     | High Power | 0.010                    | -45.875             | -82.925              | -57.050     | 25.875      |
|                 |         |            | 0.150                    | -47.903             | -84.953              | -57.050     | 27.903      |
|                 |         |            | 299.660                  | -42.526             | -79.576              | -57.050     | 22.526      |
|                 |         |            | 5331.981                 | -35.423             | -72.473              | -57.050     | 15.423      |
| 150.05          | Low     | Low Power  | 0.010                    | -46.410             | -77.040              | -50.630     | 26.410      |
|                 |         |            | 0.160                    | -48.761             | -79.391              | -50.630     | 28.761      |
|                 |         |            | 299.660                  | -39.491             | -70.121              | -50.630     | 19.491      |
|                 |         |            | 5389.488                 | -36.167             | -66.797              | -50.630     | 16.167      |

11K0F3E

| Frequency (MHz) | Channel | Power Mode | Spurious Frequency (MHz) | Correct Level (dBm) | Emission Level (dBc) | Limit (dBc) | Margin (dB) |
|-----------------|---------|------------|--------------------------|---------------------|----------------------|-------------|-------------|
| 150.05          | Low     | High Power | 0.020                    | -47.716             | -84.700              | -56.984     | 27.716      |
|                 |         |            | 0.150                    | -47.531             | -84.515              | -56.984     | 27.531      |
|                 |         |            | 299.660                  | -39.257             | -76.241              | -56.984     | 19.257      |
|                 |         |            | 5360.985                 | -35.791             | -72.775              | -56.984     | 15.791      |
| 150.05          | Low     | Low Power  | 0.010                    | -46.788             | -76.605              | -49.817     | 26.788      |
|                 |         |            | 0.150                    | -47.589             | -77.406              | -49.817     | 27.589      |
|                 |         |            | 299.660                  | -40.600             | -70.417              | -49.817     | 20.600      |
|                 |         |            | 5424.992                 | -36.004             | -65.821              | -49.817     | 16.004      |

# ■TEST RESULTS For FCC AND IC

7K60FXD/7K60FXE

| Frequency<br>(MHz) | Channel | Power Mode | Spurious<br>Frequency<br>(MHz) | Correct<br>Level<br>(dBm) | Emission<br>Level<br>(dBc) | Limit<br>(dBc) | Margin<br>(dB) |
|--------------------|---------|------------|--------------------------------|---------------------------|----------------------------|----------------|----------------|
| 162.05             | Middle  | High Power | 0.009                          | -45.469                   | -82.062                    | -56.593        | 25.469         |
|                    |         |            | 0.150                          | -46.014                   | -82.607                    | -56.593        | 26.014         |
|                    |         |            | 323.910                        | -41.538                   | -78.131                    | -56.593        | 21.538         |
|                    |         |            | 5473.997                       | -35.301                   | -71.894                    | -56.593        | 15.301         |
| 173.95             | High    |            | 0.009                          | -45.677                   | -81.871                    | -56.194        | 25.677         |
|                    |         |            | 0.150                          | -48.274                   | -84.468                    | -56.194        | 28.274         |
|                    |         |            | 348.160                        | -41.149                   | -77.343                    | -56.194        | 21.149         |
|                    |         |            | 5492.999                       | -35.643                   | -71.837                    | -56.194        | 15.643         |
| 162.05             | Middle  | Low Power  | 0.010                          | -48.330                   | -78.003                    | -49.673        | 28.330         |
|                    |         |            | 0.150                          | -47.295                   | -76.968                    | -49.673        | 27.295         |
|                    |         |            | 323.910                        | -48.460                   | -78.133                    | -49.673        | 28.460         |
|                    |         |            | 5436.493                       | -34.591                   | -64.264                    | -49.673        | 14.591         |
| 173.95             | High    |            | 0.010                          | -47.065                   | -76.650                    | -49.585        | 27.065         |
|                    |         |            | 0.160                          | -47.701                   | -77.286                    | -49.585        | 27.701         |
|                    |         |            | 37.760                         | -42.973                   | -72.558                    | -49.585        | 22.973         |
|                    |         |            | 5493.999                       | -34.537                   | -64.122                    | -49.585        | 14.537         |

11K0F3E

| Frequency<br>(MHz) | Channel | Power Mode | Spurious<br>Frequency<br>(MHz) | Correct<br>Level<br>(dBm) | Emission<br>Level<br>(dBc) | Limit<br>(dBc) | Margin<br>(dB) |
|--------------------|---------|------------|--------------------------------|---------------------------|----------------------------|----------------|----------------|
| 162.05             | Middle  | High Power | 0.010                          | -44.468                   | -81.202                    | -56.734        | 24.468         |
|                    |         |            | 0.150                          | -48.917                   | -85.651                    | -56.734        | 28.917         |
|                    |         |            | 323.910                        | -39.196                   | -75.930                    | -56.734        | 19.196         |
|                    |         |            | 5410.990                       | -35.465                   | -72.199                    | -56.734        | 15.465         |
| 173.95             | High    |            | 0.009                          | -47.201                   | -83.827                    | -56.626        | 27.201         |
|                    |         |            | 0.150                          | -48.285                   | -84.911                    | -56.626        | 28.285         |
|                    |         |            | 348.160                        | -40.386                   | -77.012                    | -56.626        | 20.386         |
|                    |         |            | 5394.988                       | -35.604                   | -72.230                    | -56.626        | 15.604         |
| 162.05             | Middle  | Low Power  | 0.009                          | -47.051                   | -76.495                    | -49.444        | 27.051         |
|                    |         |            | 0.170                          | -48.685                   | -78.129                    | -49.444        | 28.685         |
|                    |         |            | 323.910                        | -41.948                   | -71.392                    | -49.444        | 21.948         |
|                    |         |            | 5359.484                       | -34.625                   | -64.069                    | -49.444        | 14.625         |
| 173.95             | High    |            | 0.010                          | -46.251                   | -76.051                    | -49.800        | 26.251         |
|                    |         |            | 0.150                          | -47.851                   | -77.651                    | -49.800        | 27.851         |
|                    |         |            | 37.760                         | -41.792                   | -71.592                    | -49.800        | 21.792         |
|                    |         |            | 5359.984                       | -35.687                   | -65.487                    | -49.800        | 15.687         |

■TEST RESULTS For ONLY IC

7K60FXD/7K60FXE

| Frequency<br>(MHz) | Channel | Power Mode | Spurious<br>Frequency<br>(MHz) | Correct<br>Level<br>(dBm) | Emission<br>Level<br>(dBc) | Limit<br>(dBc) | Margin<br>(dB) |
|--------------------|---------|------------|--------------------------------|---------------------------|----------------------------|----------------|----------------|
| 138.05             | Low     | High Power | 0.010                          | -45.537                   | -82.352                    | -56.815        | 25.537         |
|                    |         |            | 0.165                          | -50.041                   | -86.856                    | -56.815        | 30.041         |
|                    |         |            | 276.380                        | -35.880                   | -72.695                    | -56.815        | 15.880         |
|                    |         |            | 5456.995                       | -35.023                   | -71.838                    | -56.815        | 15.023         |
| 138.05             | Low     | Low Power  | 0.010                          | -44.533                   | -74.782                    | -50.249        | 24.533         |
|                    |         |            | 0.155                          | -49.445                   | -79.694                    | -50.249        | 29.445         |
|                    |         |            | 276.380                        | -36.428                   | -66.677                    | -50.249        | 16.428         |
|                    |         |            | 5447.494                       | -35.830                   | -66.079                    | -50.249        | 15.830         |

11K0F3E

| Frequency<br>(MHz) | Channel | Power Mode | Spurious<br>Frequency<br>(MHz) | Correct<br>Level<br>(dBm) | Emission<br>Level<br>(dBc) | Limit<br>(dBc) | Margin<br>(dB) |
|--------------------|---------|------------|--------------------------------|---------------------------|----------------------------|----------------|----------------|
| 138.05             | Low     | High Power | 0.009                          | -45.160                   | -82.246                    | -57.086        | 25.160         |
|                    |         |            | 0.150                          | -49.648                   | -86.734                    | -57.086        | 29.648         |
|                    |         |            | 276.380                        | -35.651                   | -72.737                    | -57.086        | 15.651         |
|                    |         |            | 5461.496                       | -35.147                   | -72.233                    | -57.086        | 15.147         |
| 138.05             | Low     | Low Power  | 0.012                          | -46.839                   | -77.066                    | -50.227        | 26.839         |
|                    |         |            | 0.155                          | -47.730                   | -77.957                    | -50.227        | 27.730         |
|                    |         |            | 276.380                        | -38.383                   | -68.610                    | -50.227        | 18.383         |
|                    |         |            | 5439.493                       | -35.761                   | -65.988                    | -50.227        | 15.761         |

■TEST RESULTS For ONLY IC

16K0F3E

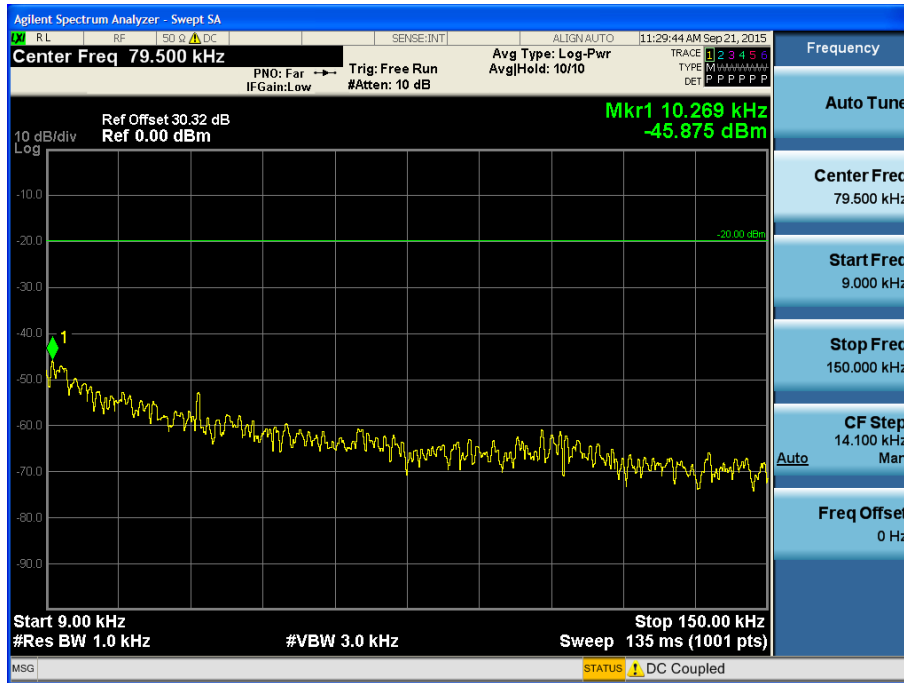
| Frequency<br>(MHz) | Channel | Power Mode | Spurious<br>Frequency<br>(MHz) | Correct<br>Level<br>(dBm) | Emission<br>Level<br>(dBc) | Limit<br>(dBc) | Margin<br>(dB) |
|--------------------|---------|------------|--------------------------------|---------------------------|----------------------------|----------------|----------------|
| 138.05             | Low     | High Power | 0.009                          | -46.387                   | -83.477                    | -57.090        | 26.387         |
|                    |         |            | 0.150                          | -50.797                   | -87.887                    | -57.090        | 30.797         |
|                    |         |            | 276.380                        | -35.684                   | -72.774                    | -57.090        | 15.684         |
|                    |         |            | 5377.986                       | -35.007                   | -72.097                    | -57.090        | 15.007         |
| 162.05             | Middle  |            | 0.011                          | -46.238                   | -82.998                    | -56.760        | 26.238         |
|                    |         |            | 0.155                          | -48.660                   | -85.420                    | -56.760        | 28.660         |
|                    |         |            | 323.910                        | -39.992                   | -76.752                    | -56.760        | 19.992         |
|                    |         |            | 5462.996                       | -35.885                   | -72.645                    | -56.760        | 15.885         |
| 173.95             | High    |            | 0.011                          | -47.165                   | -83.790                    | -56.625        | 27.165         |
|                    |         |            | 0.150                          | -44.976                   | -81.601                    | -56.625        | 24.976         |
|                    |         |            | 348.160                        | -40.372                   | -76.997                    | -56.625        | 20.372         |
|                    |         |            | 5450.494                       | -36.339                   | -72.964                    | -56.625        | 16.339         |
| 138.05             | Low     | Low Power  | 0.009                          | -47.282                   | -77.469                    | -50.187        | 27.282         |
|                    |         |            | 0.150                          | -47.919                   | -78.106                    | -50.187        | 27.919         |
|                    |         |            | 276.380                        | -38.453                   | -68.640                    | -50.187        | 18.453         |
|                    |         |            | 5423.992                       | -35.037                   | -65.224                    | -50.187        | 15.037         |
| 162.05             | Middle  |            | 0.010                          | -47.103                   | -76.422                    | -49.319        | 27.103         |
|                    |         |            | 0.150                          | -48.830                   | -78.149                    | -49.319        | 28.830         |
|                    |         |            | 323.910                        | -41.615                   | -70.934                    | -49.319        | 21.615         |
|                    |         |            | 2619.180                       | -36.117                   | -65.436                    | -49.319        | 16.117         |
| 173.95             | High    |            | 0.009                          | -47.733                   | -77.452                    | -49.719        | 27.733         |
|                    |         |            | 0.155                          | -47.057                   | -76.776                    | -49.719        | 27.057         |
|                    |         |            | 37.760                         | -41.144                   | -70.863                    | -49.719        | 21.144         |
|                    |         |            | 5424.992                       | -35.932                   | -65.651                    | -49.719        | 15.932         |

■TEST PLOT

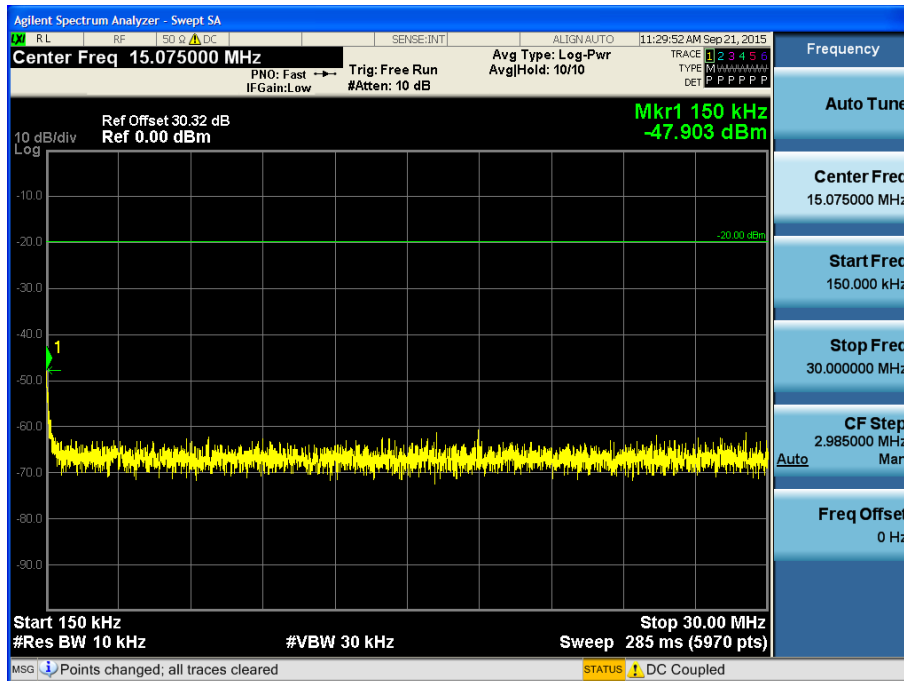
7K60FXD/7K60FXE For ONLY FCC

HIGH POWER\_ 7K60FXD/7K60FXE \_150.05 MHz

(9 kHz ~ 150 kHz)

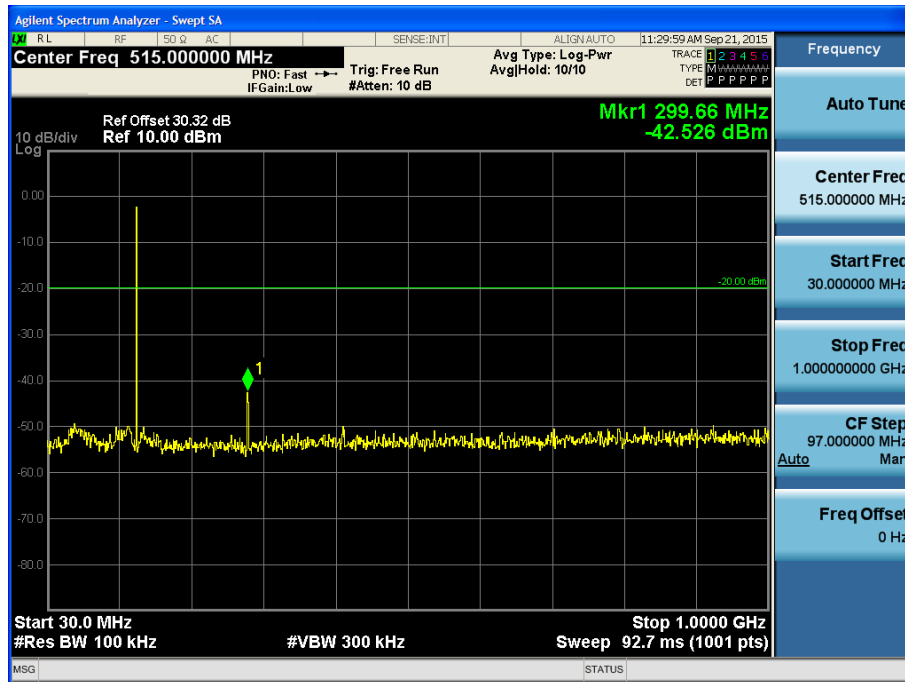


(150 kHz ~ 30 MHz)

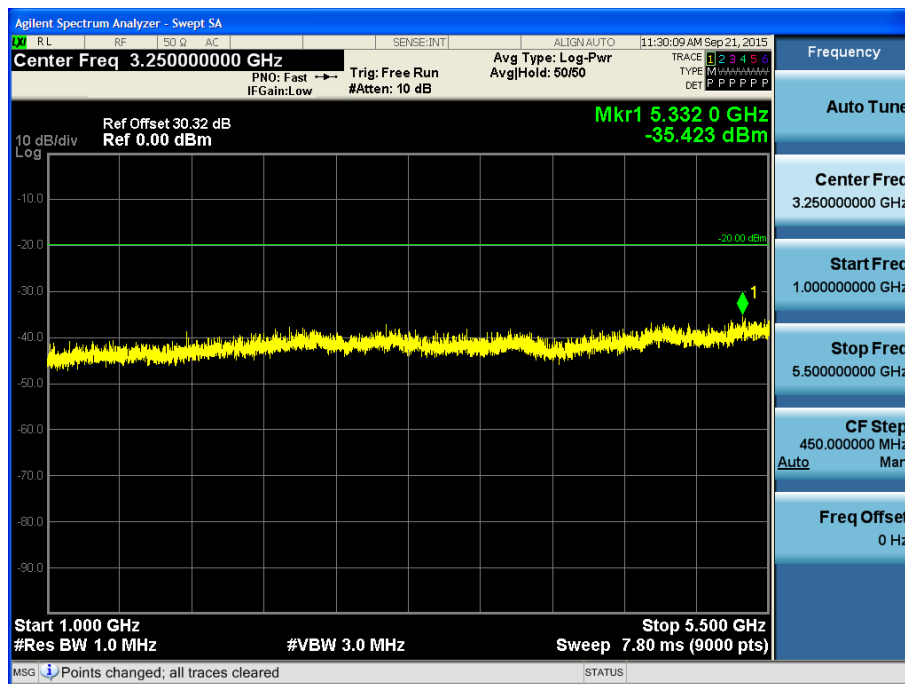




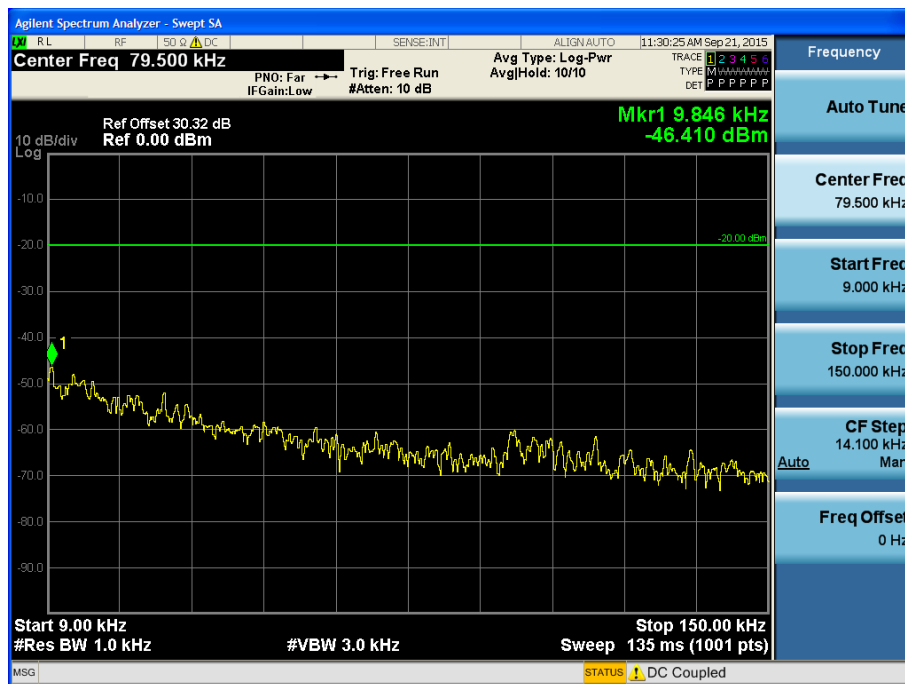
(30 MHz ~ 1 GHz)



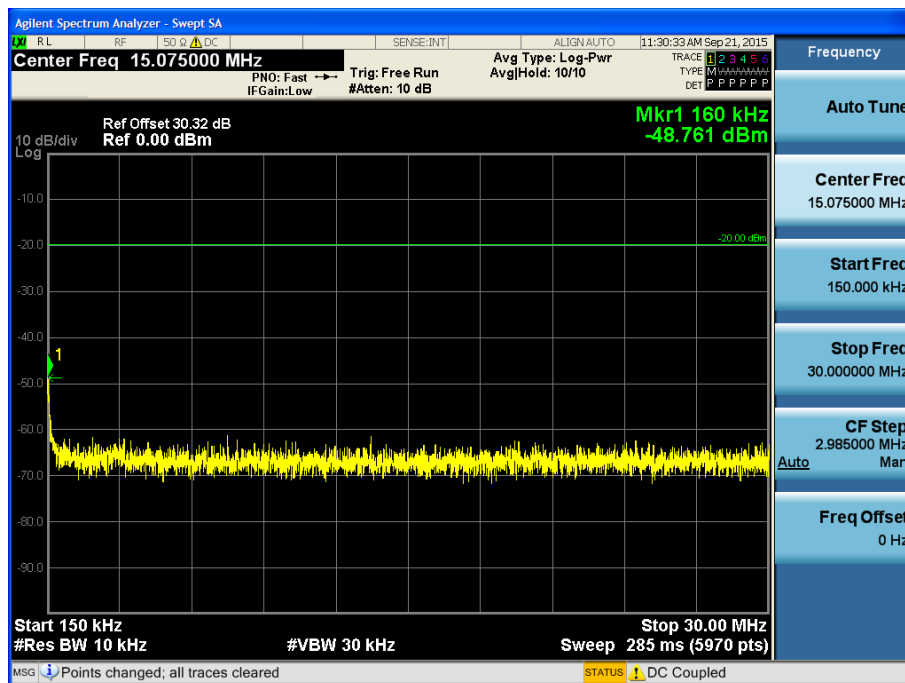
(1 GHz ~ 5.5 GHz)



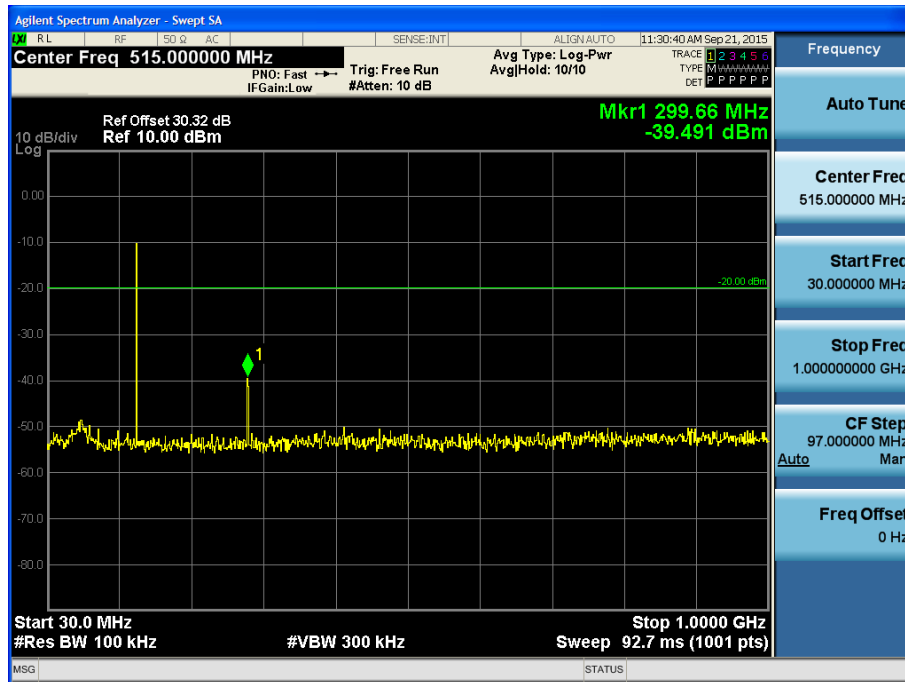
LOW POWER\_ 7K60FXD/7K60FXE \_150.05 MHz  
(9 kHz ~ 150 kHz)



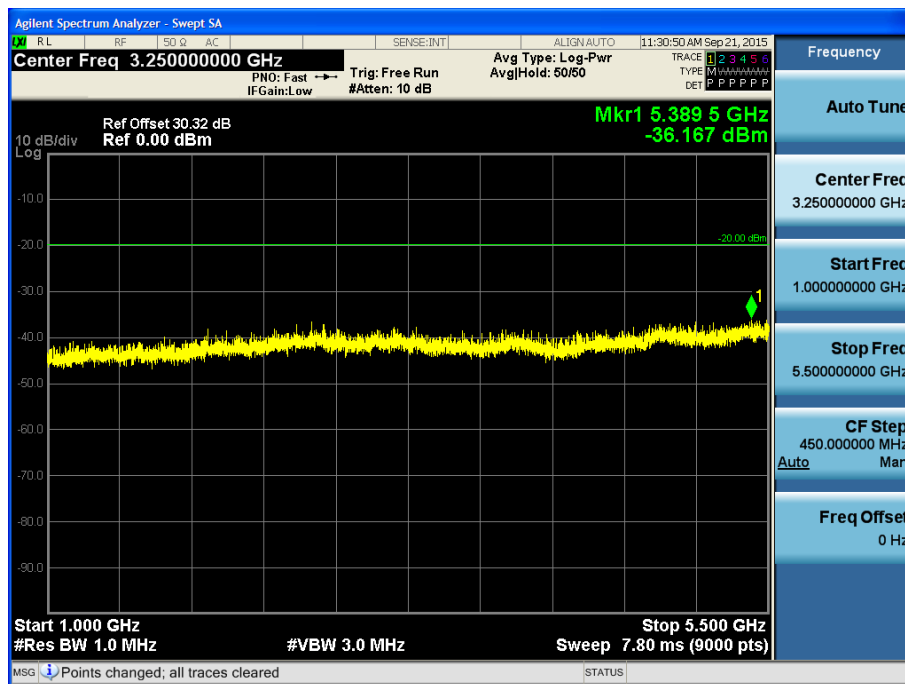
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)



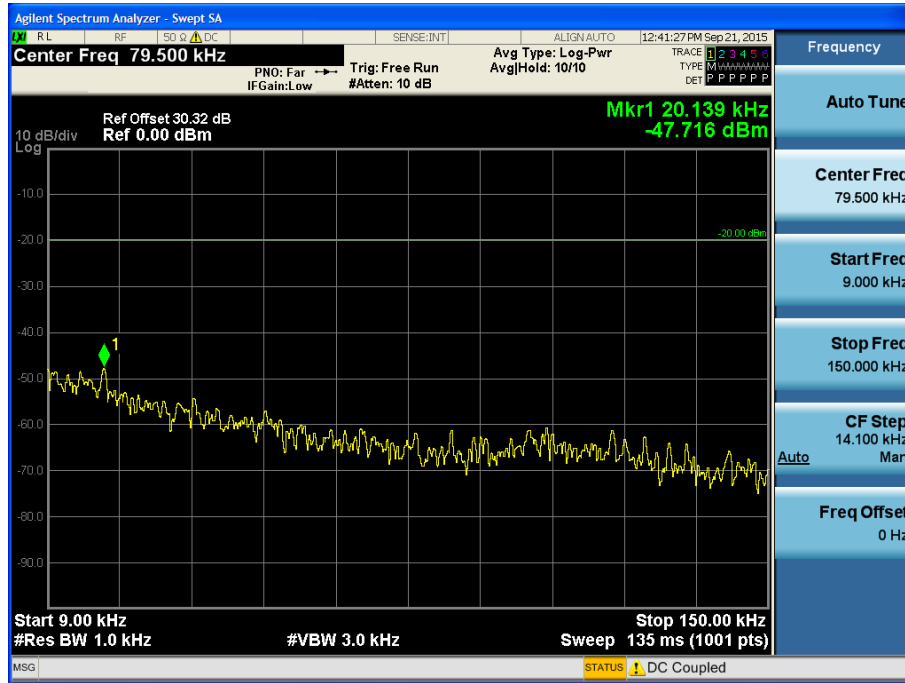
(1 GHz ~ 5.5 GHz)



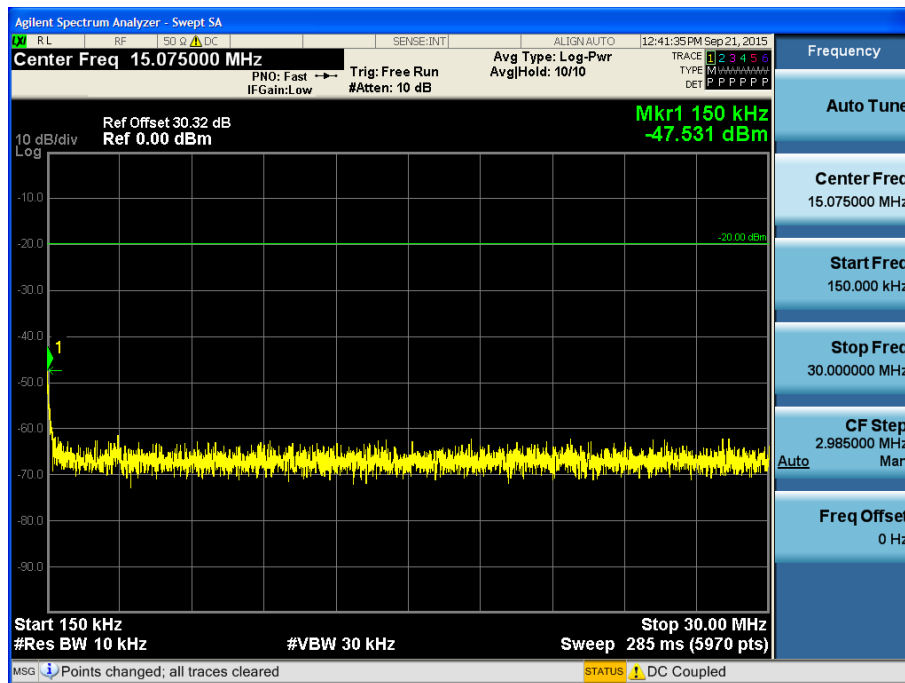
# 11K0F3E For ONLY FCC

HIGH POWER\_11K0F3E\_150.05 MHz

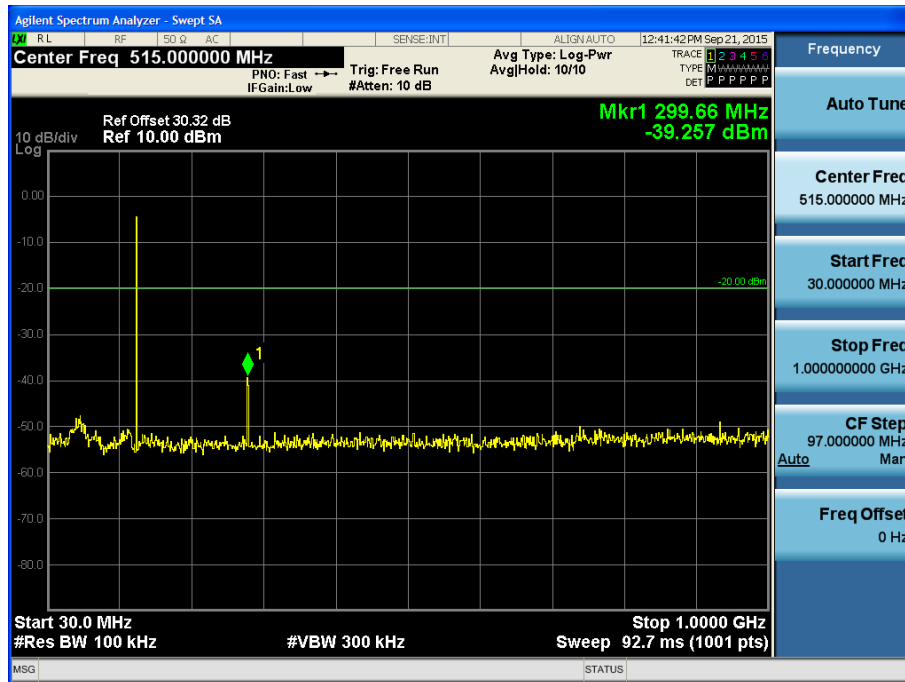
(9 kHz ~ 150 kHz)



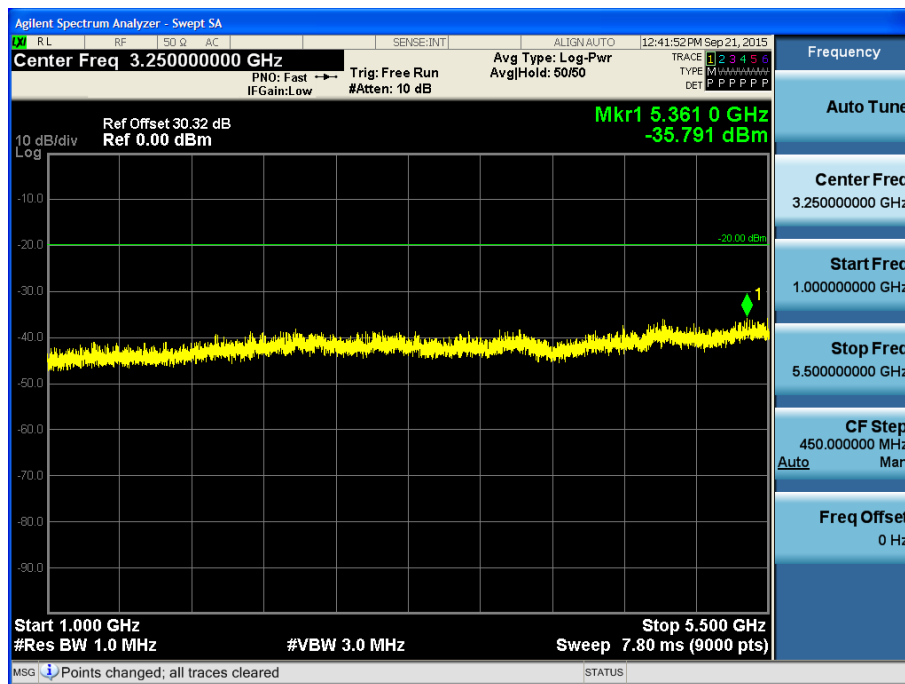
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)

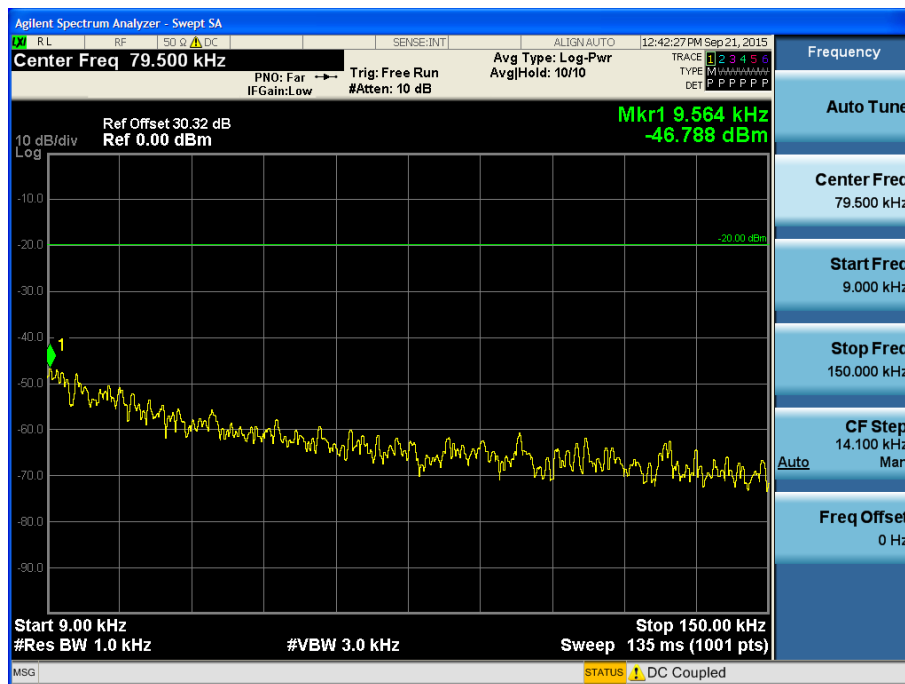


(1 GHz ~ 5.5 GHz)

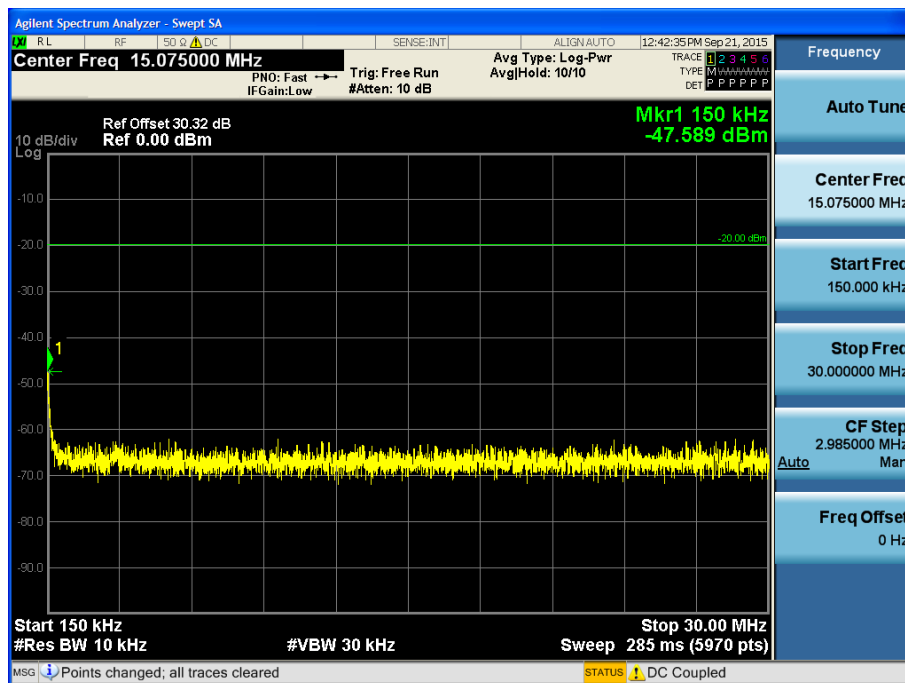


LOW POWER\_11K0F3E \_150.05 MHz

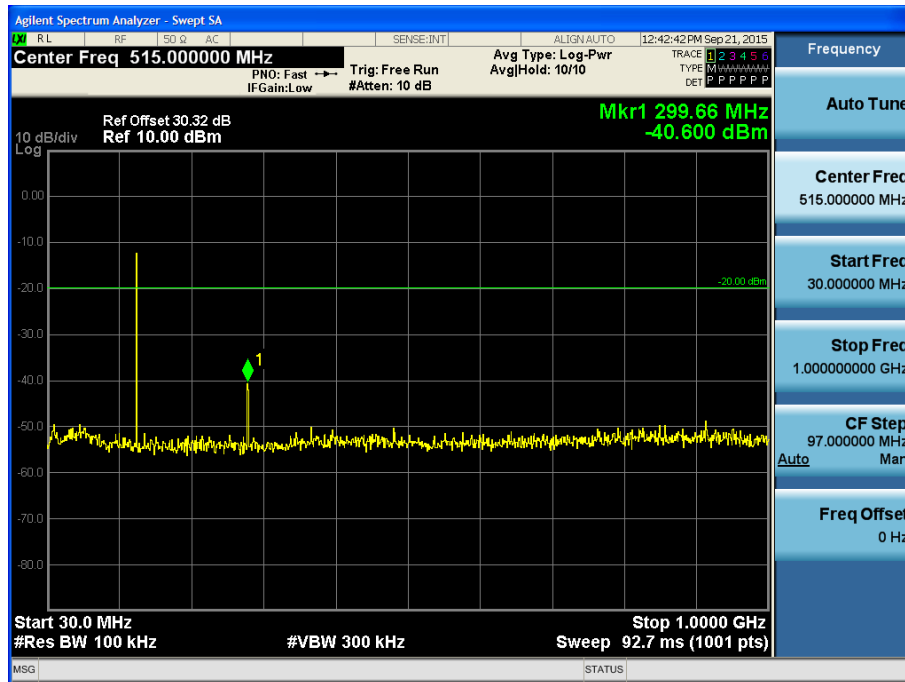
(9 kHz ~ 150 kHz)



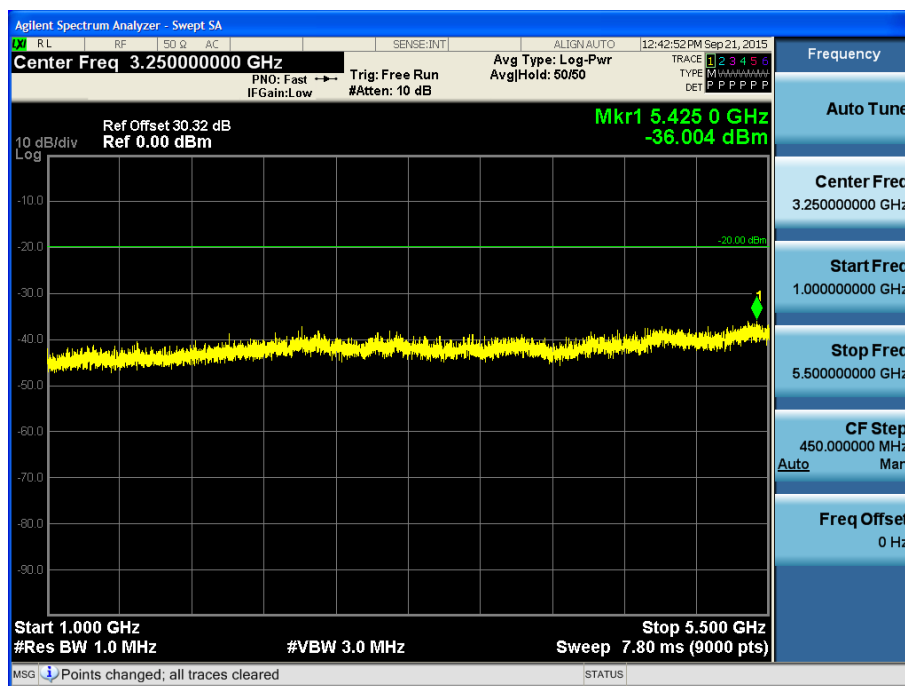
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)



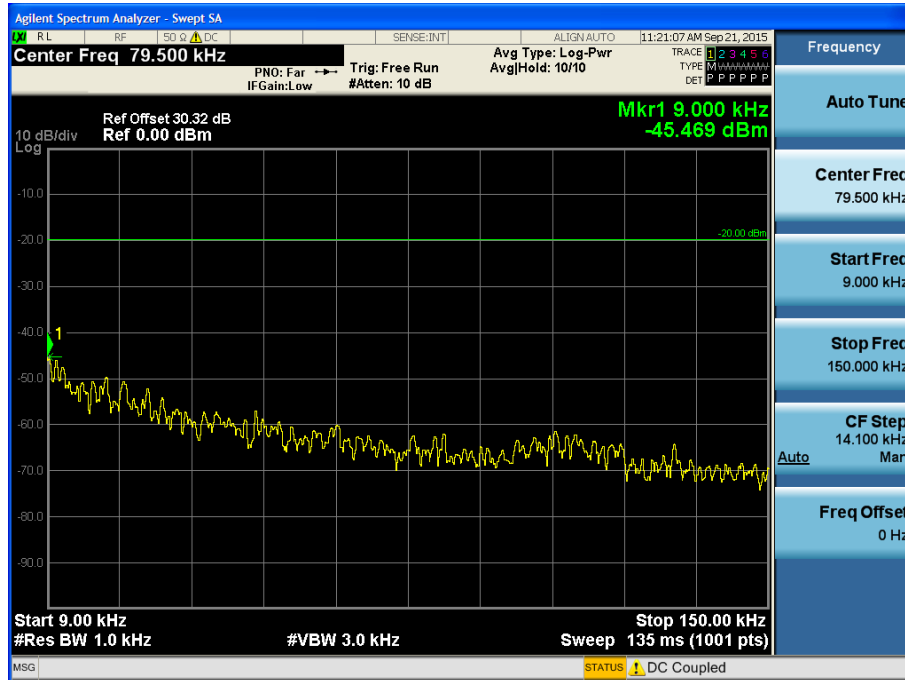
(1 GHz ~ 5.5 GHz)



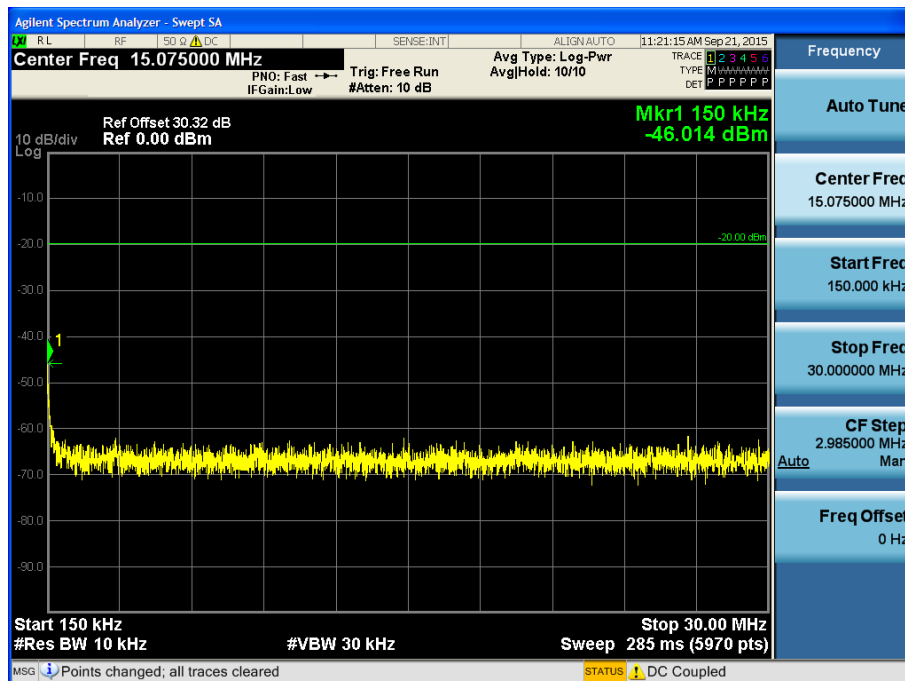
**7K60FXD/7K60FXE For FCC AND IC**

HIGH POWER\_ 7K60FXD/7K60FXE \_162.05 MHz

(9 kHz ~ 150 kHz)

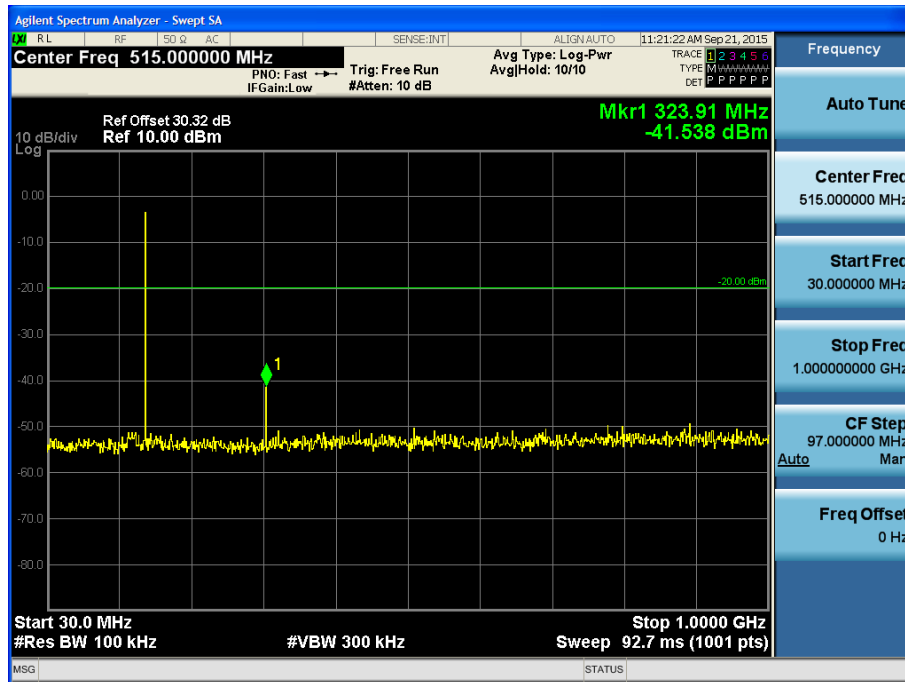


(150 kHz ~ 30 MHz)

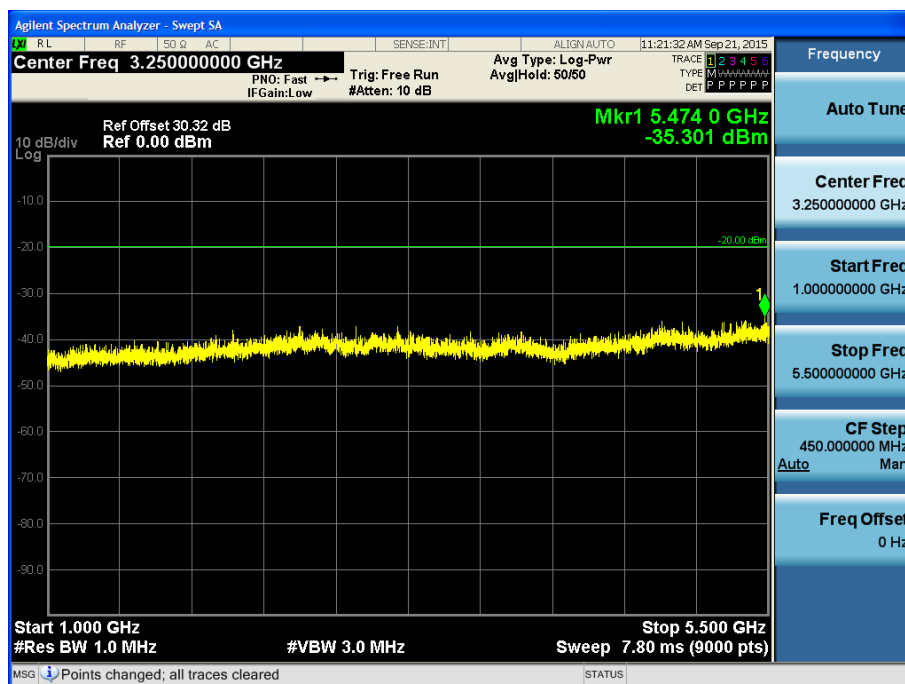




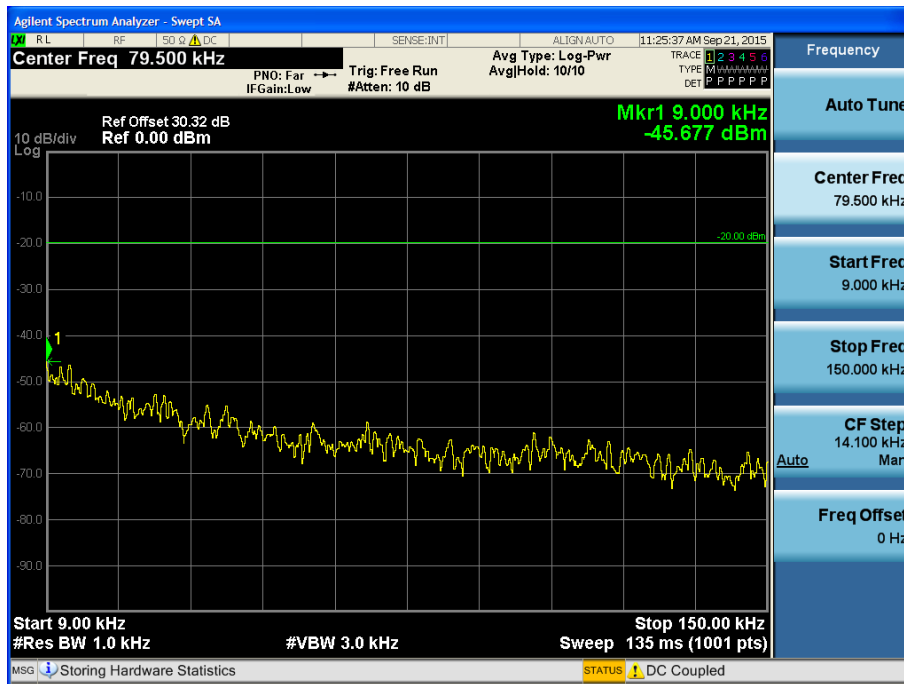
(30 MHz ~ 1 GHz)



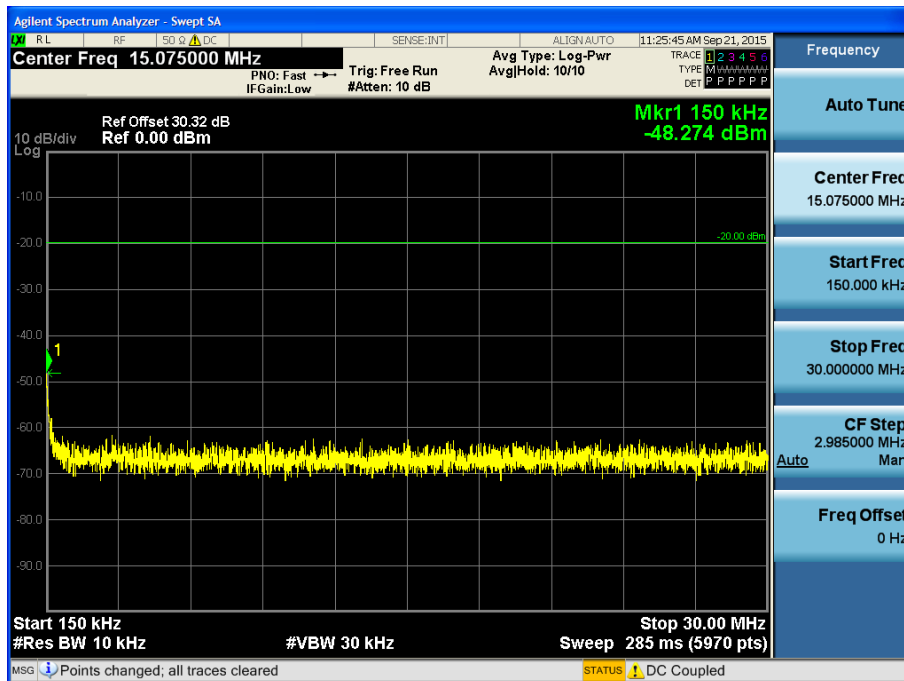
(1 GHz ~ 5.5 GHz)



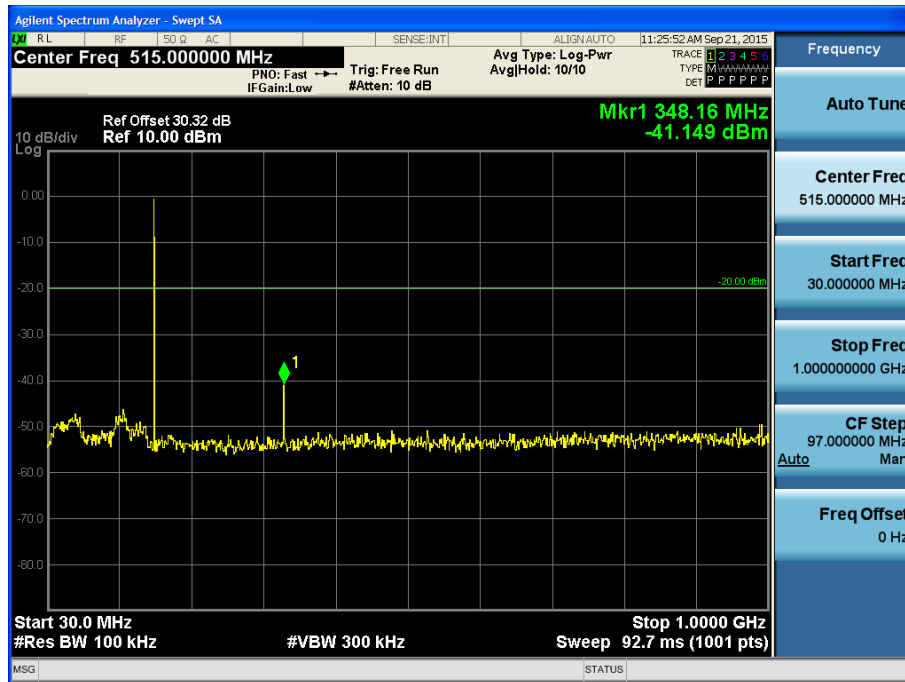
HIGH POWER\_ 7K60FXD/7K60FXE \_173.95 MHz  
(9 kHz ~ 150 kHz)



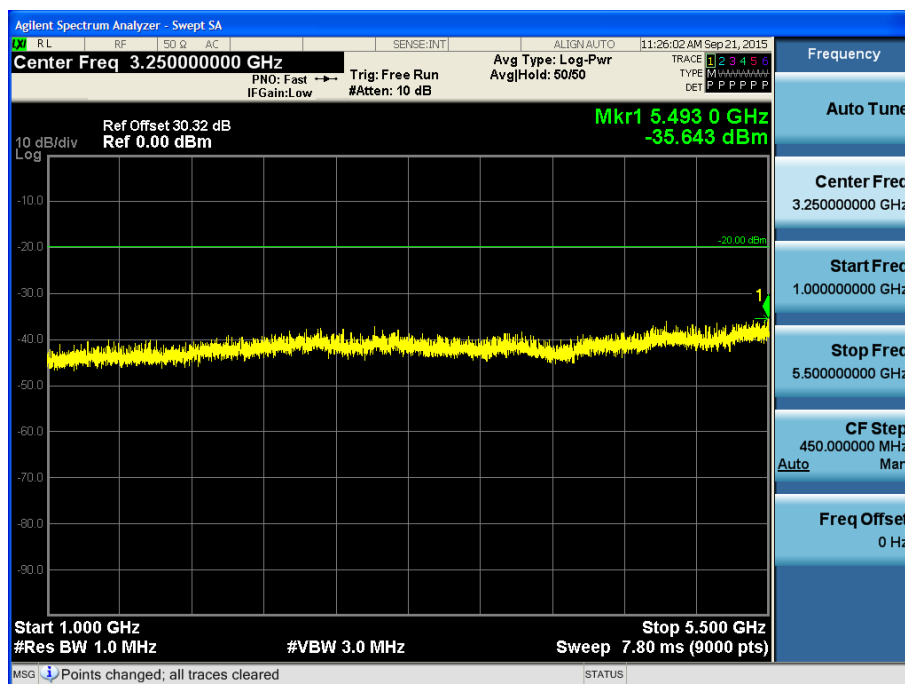
(150 kHz ~ 30 MHz)



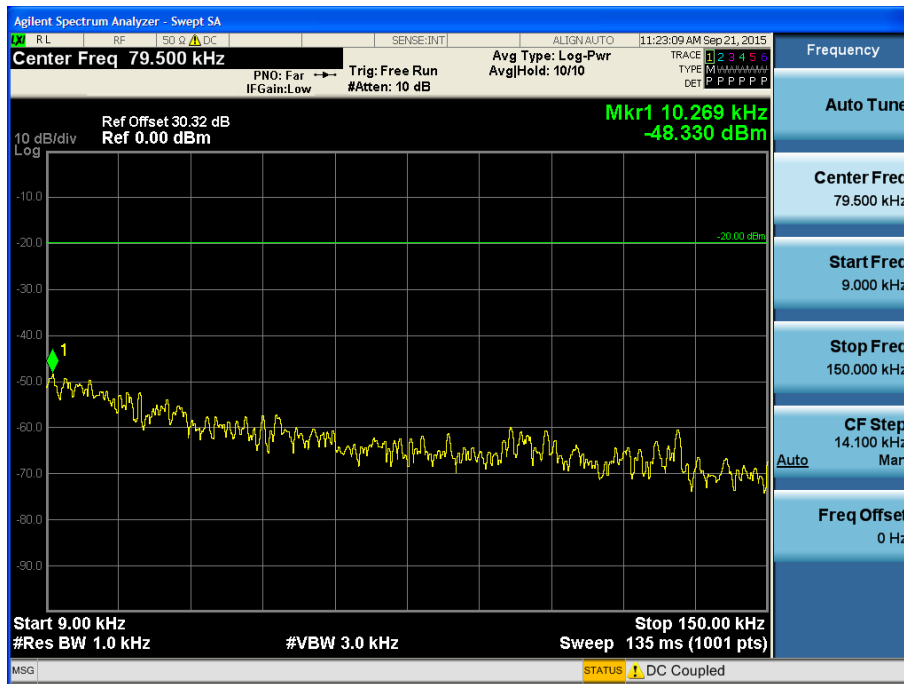
(30 MHz ~ 1 GHz)



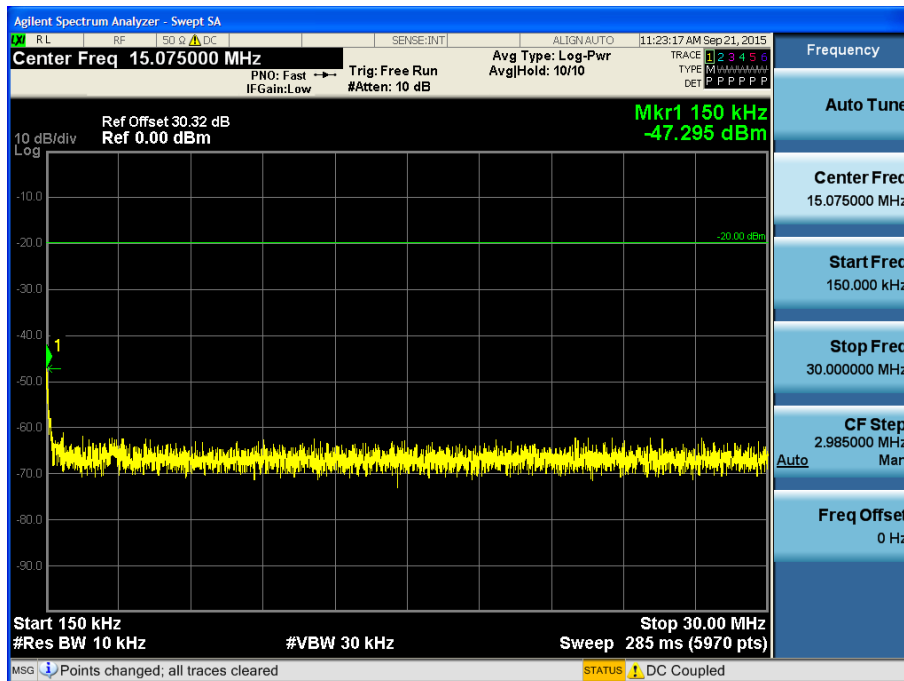
(1 GHz ~ 5.5 GHz)



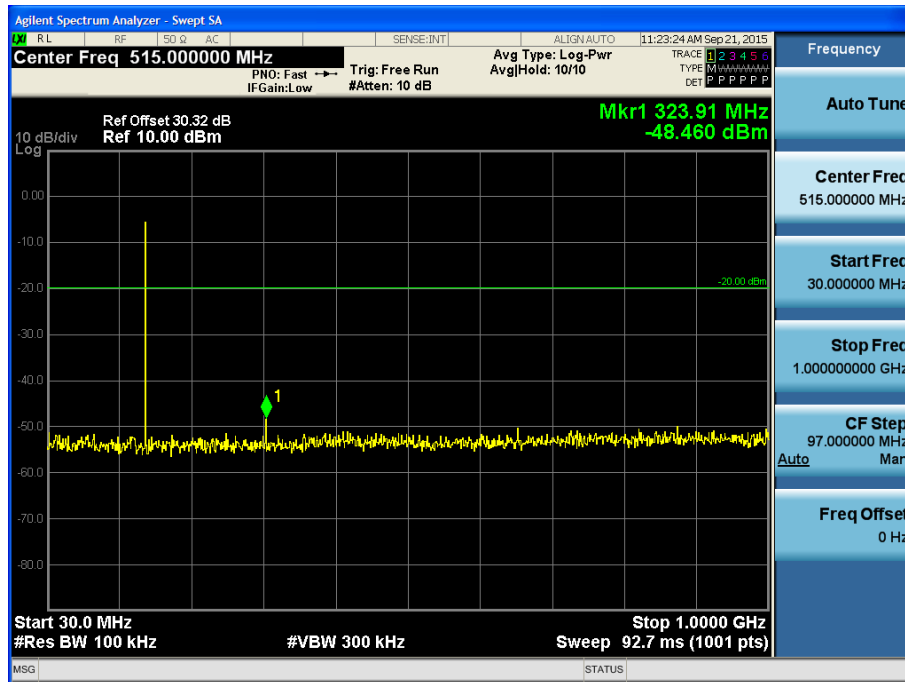
LOW POWER\_ 7K60FXD/7K60FXE \_162.05 MHz  
(9 kHz ~ 150 kHz)



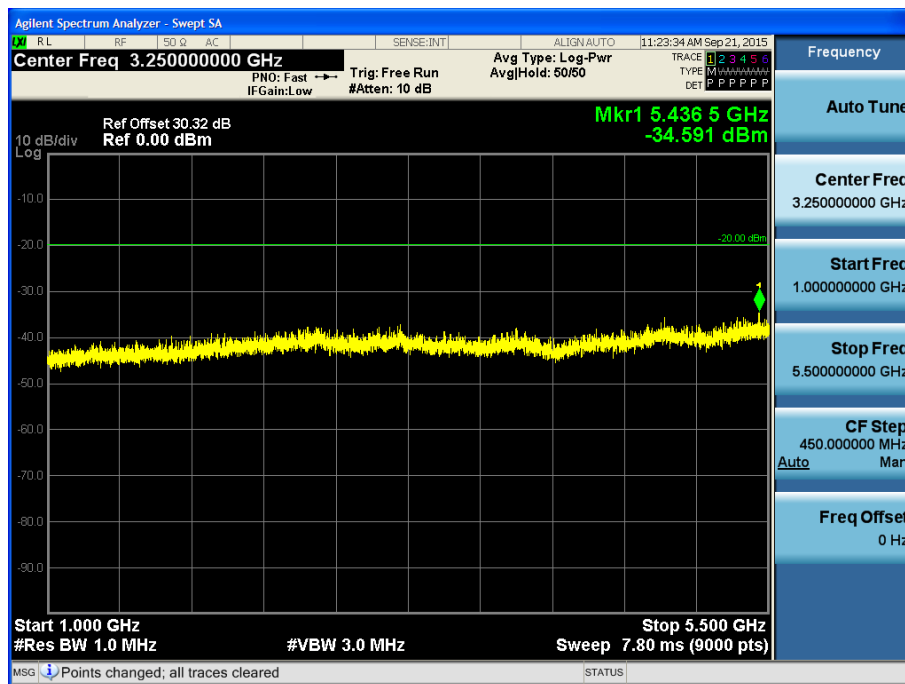
(150 kHz ~ 30 MHz)



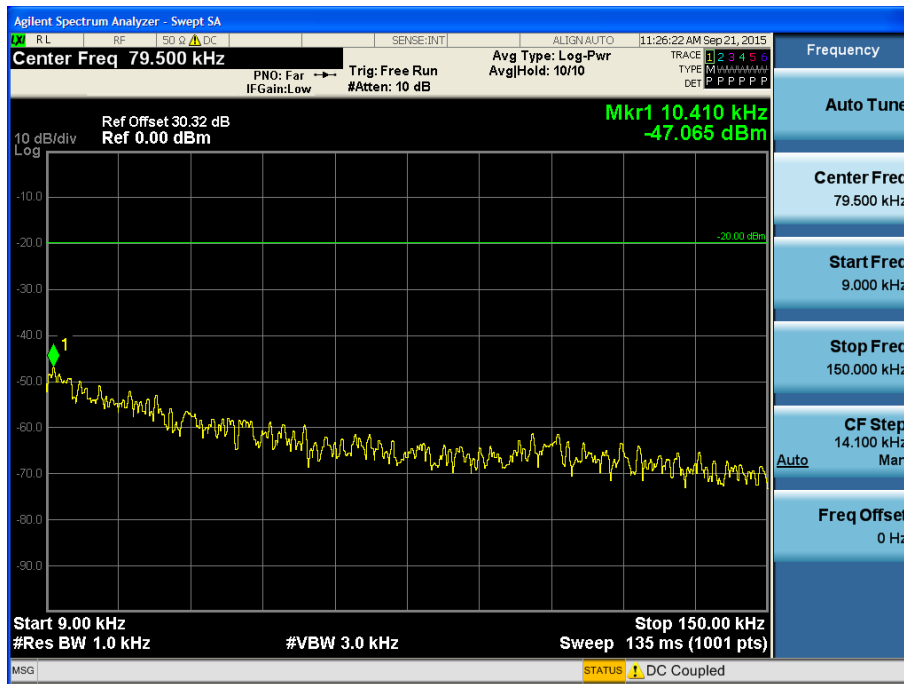
(30 MHz ~ 1 GHz)



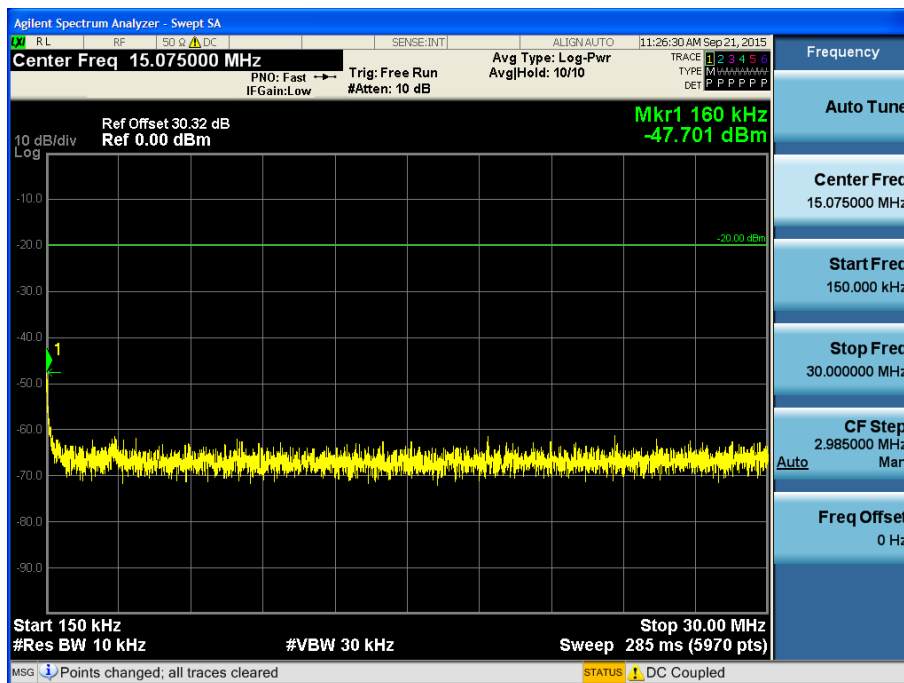
(1 GHz ~ 5.5 GHz)



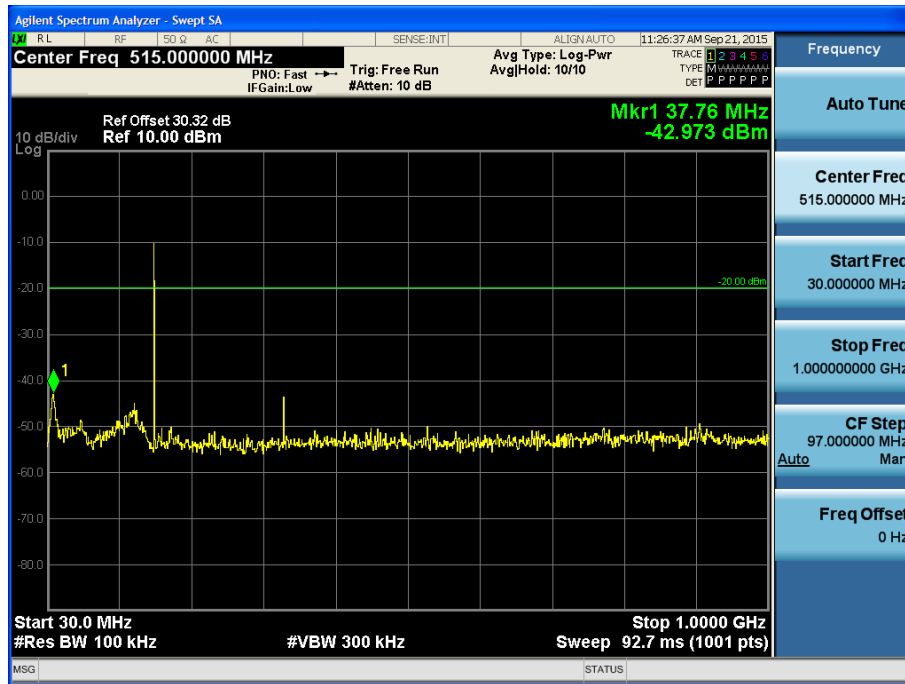
LOW POWER\_ 7K60FXD/7K60FXE \_173.95 MHz  
(9 kHz ~ 150 kHz)



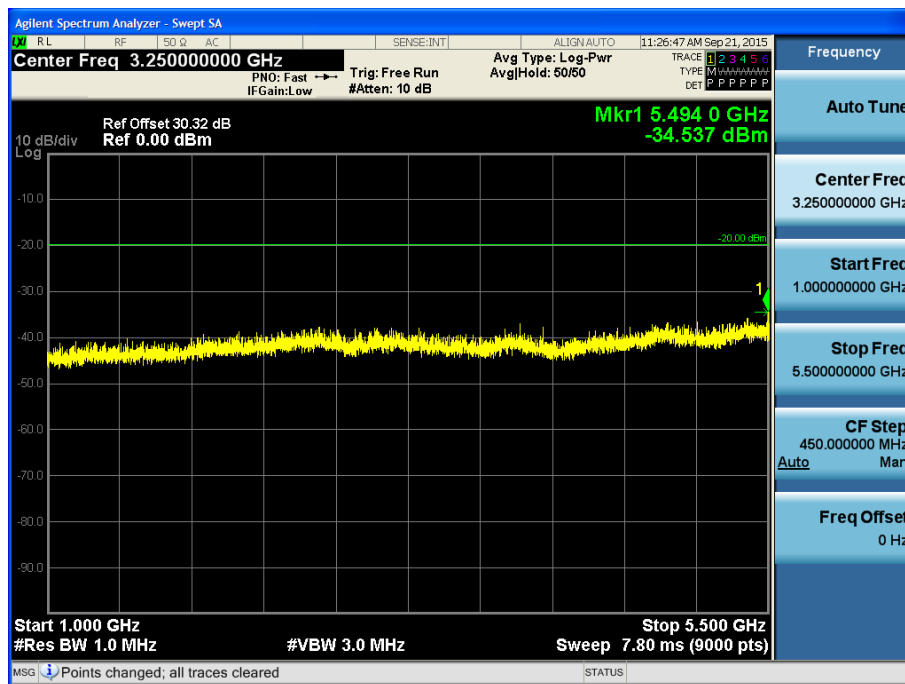
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)



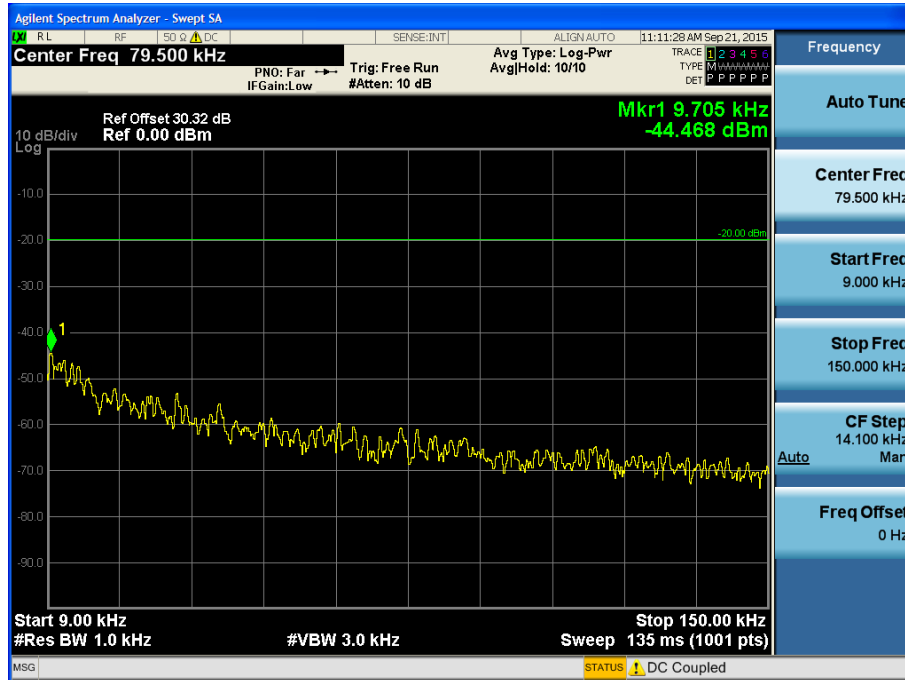
(1 GHz ~ 5.5 GHz)



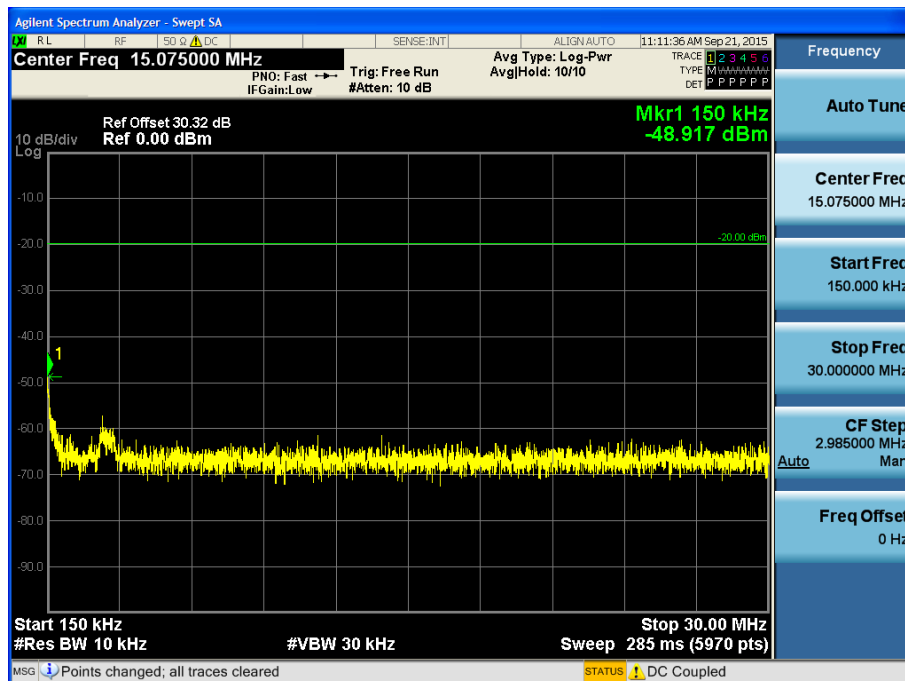
## 11K0F3E For FCC AND IC

HIGH POWER\_11K0F3E\_162.05 MHz

(9 kHz ~ 150 kHz)

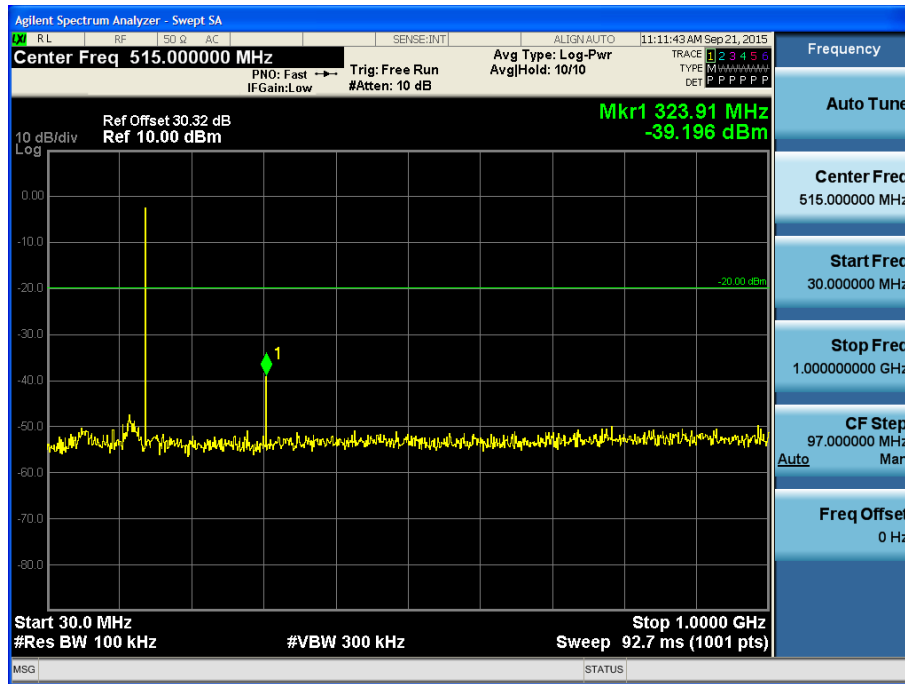


(150 kHz ~ 30 MHz)

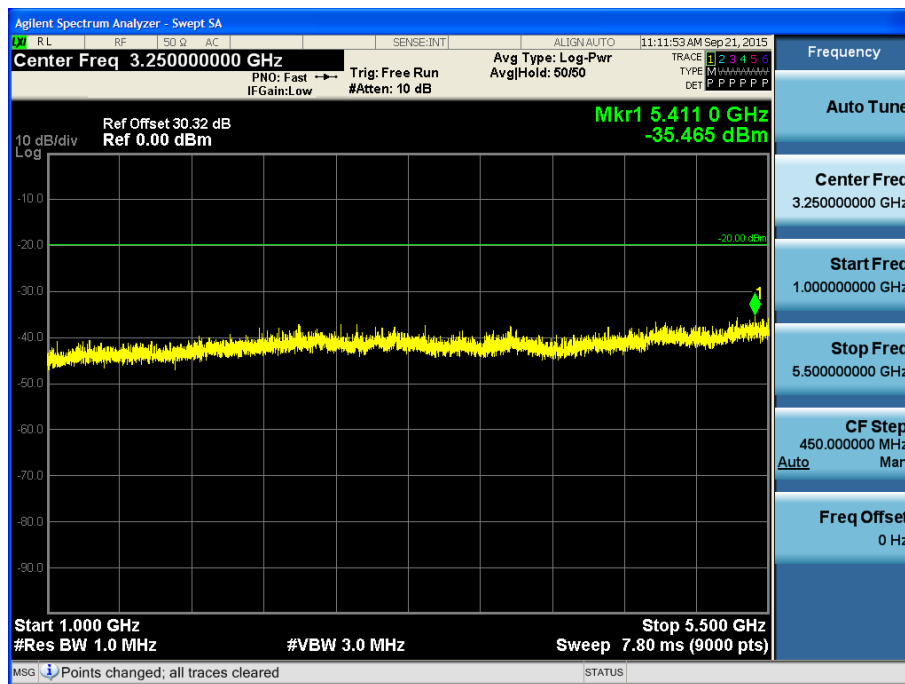




(30 MHz ~ 1 GHz)

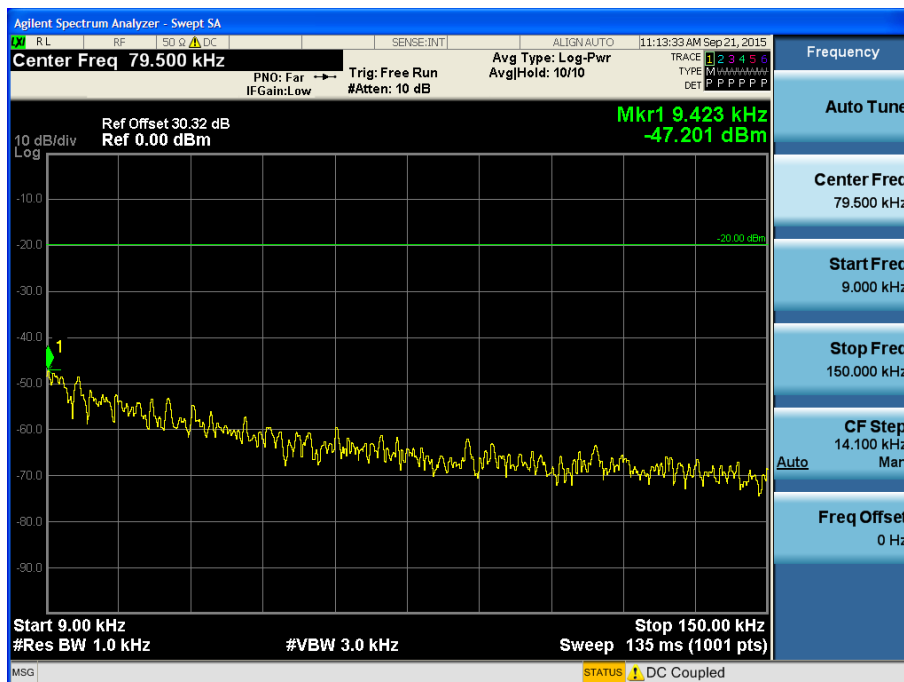


(1 GHz ~ 5.5 GHz)

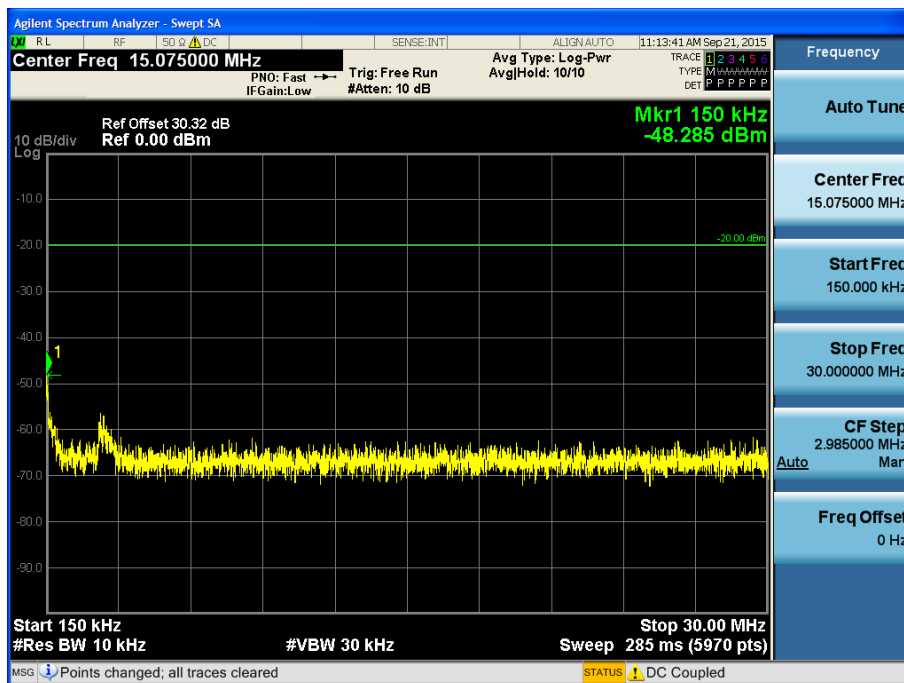


HIGH POWER\_11K0F3E\_173.95 MHz

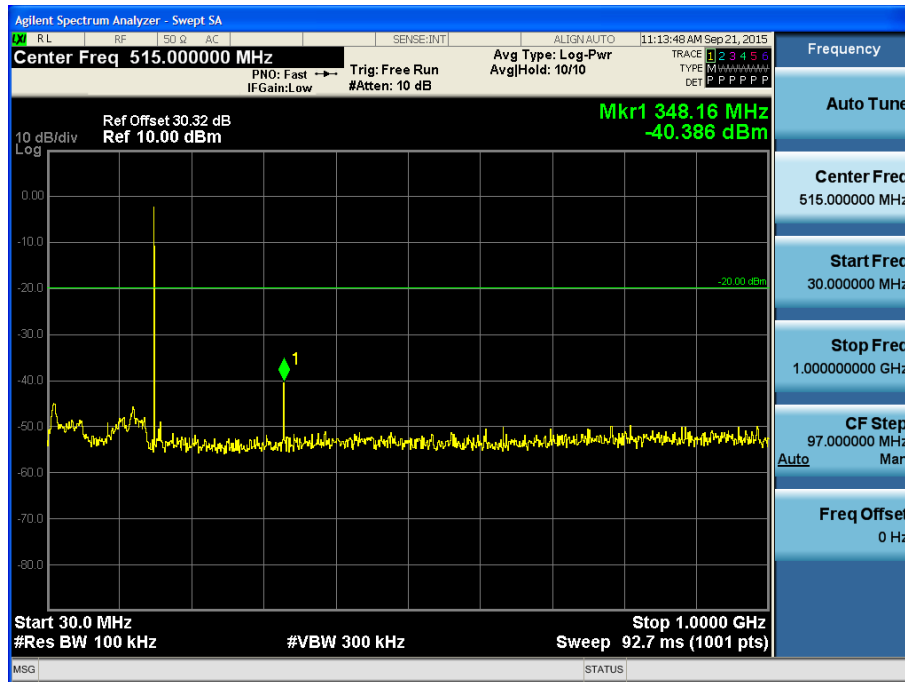
(9 kHz ~ 150 kHz)



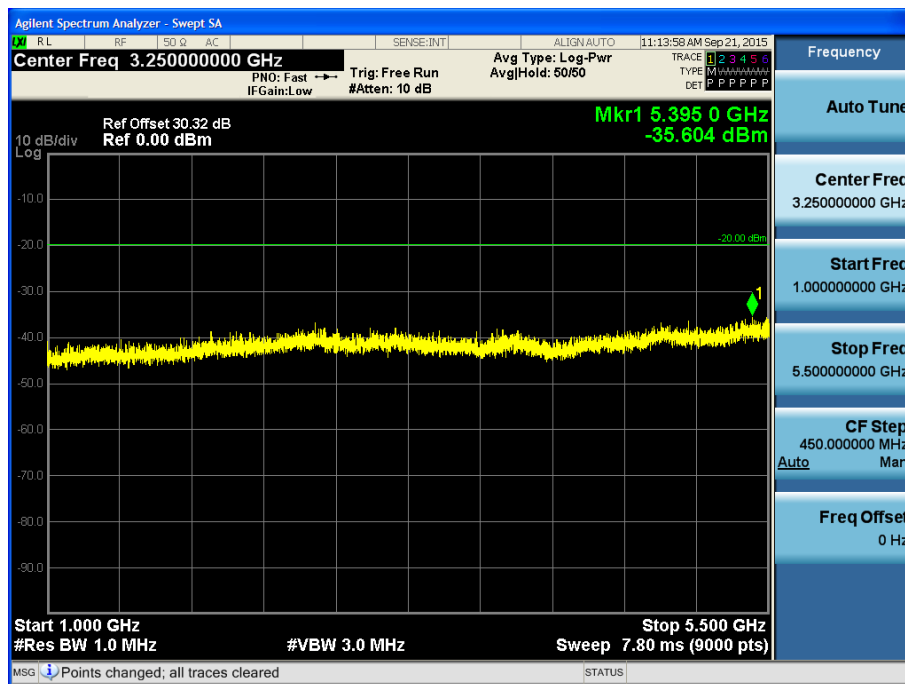
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)

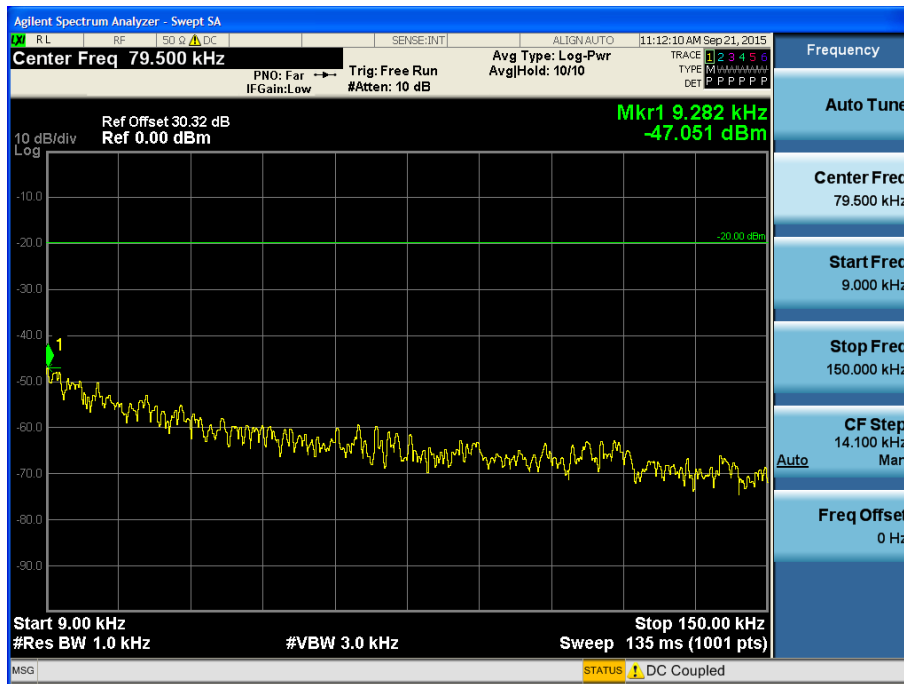


(1 GHz ~ 5.5 GHz)

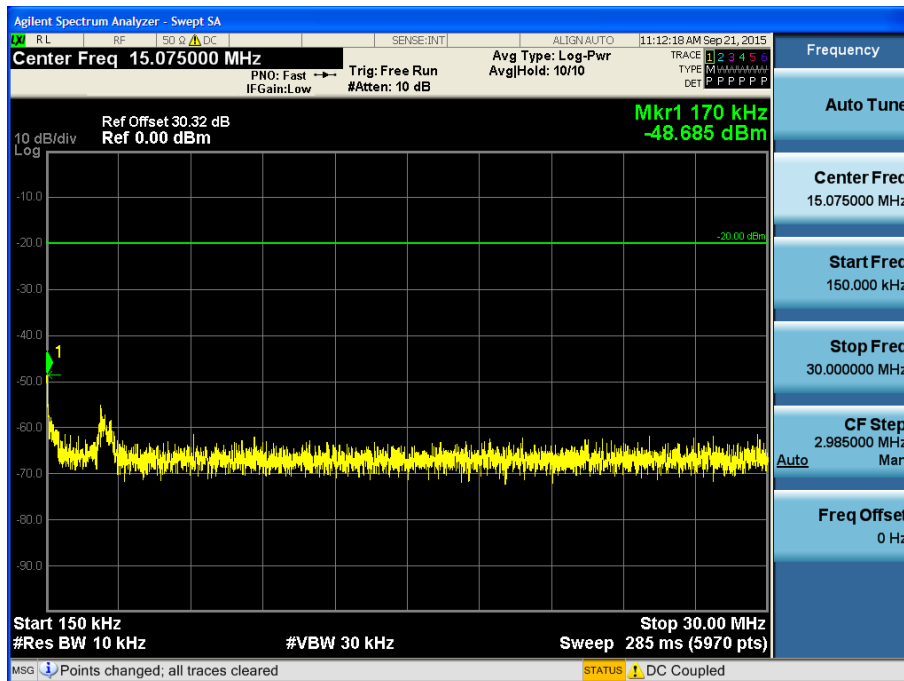


LOW POWER\_11K0F3E \_162.05 MHz

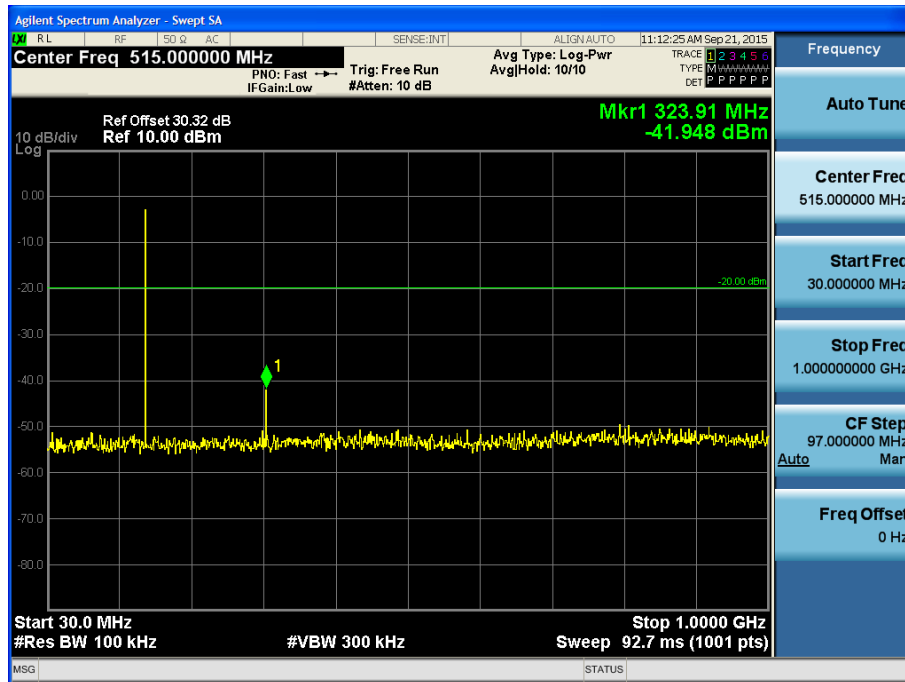
(9 kHz ~ 150 kHz)



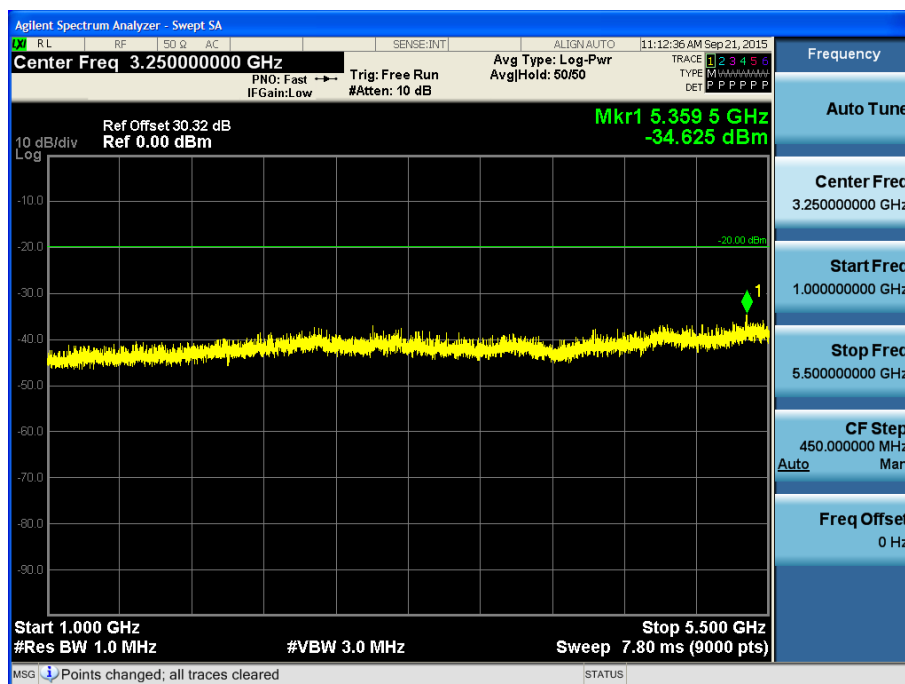
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)

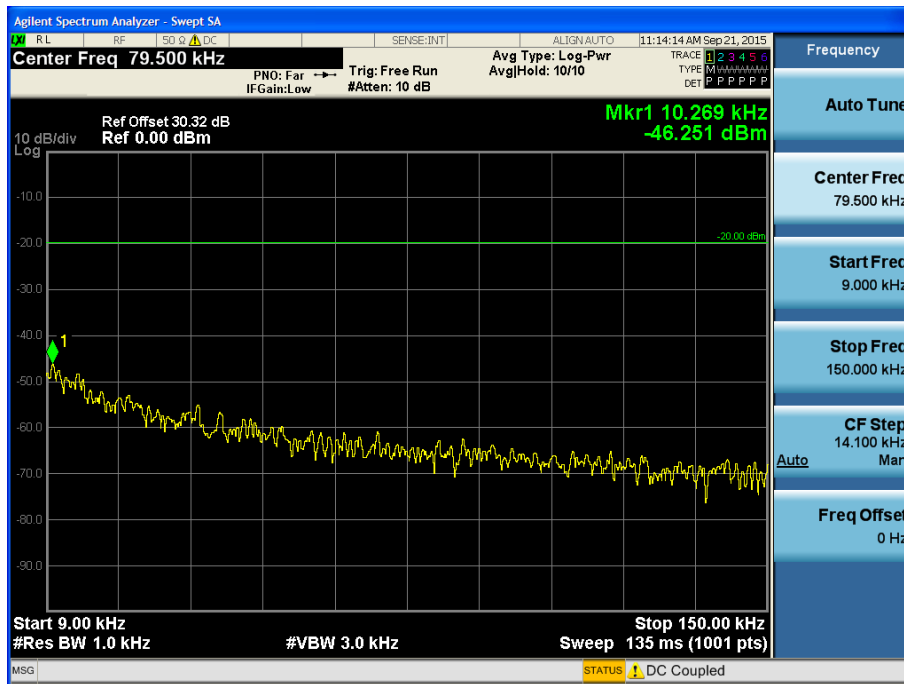


(1 GHz ~ 5.5 GHz)

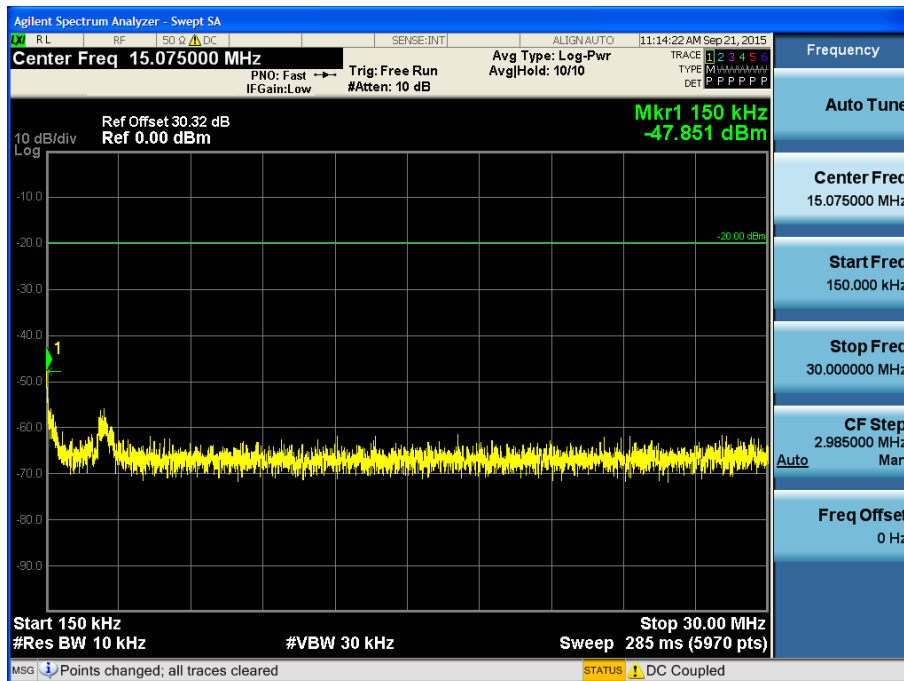


LOW POWER\_11K0F3E \_173.95 MHz

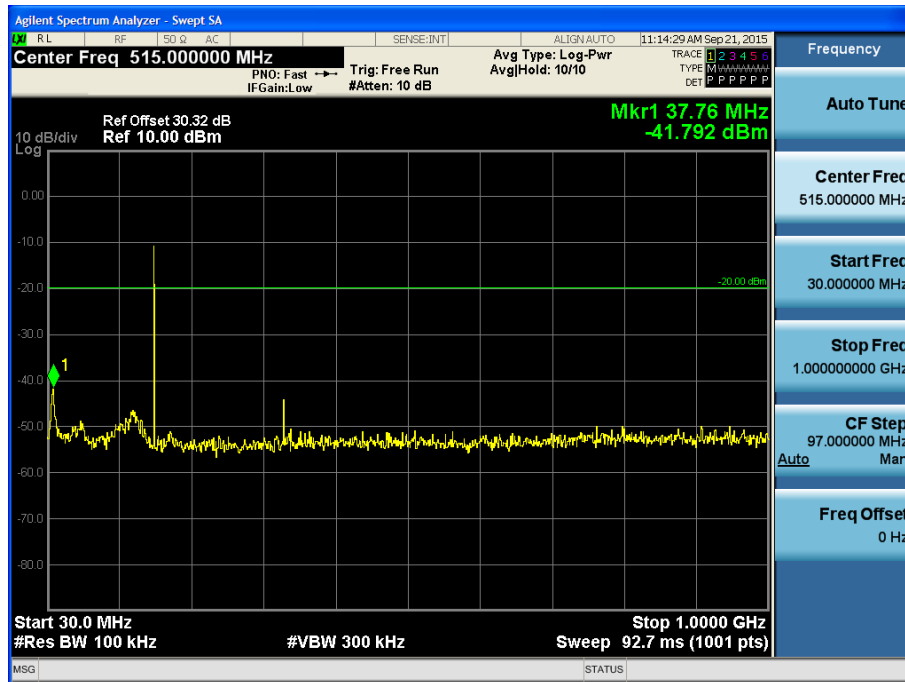
(9 kHz ~ 150 kHz)



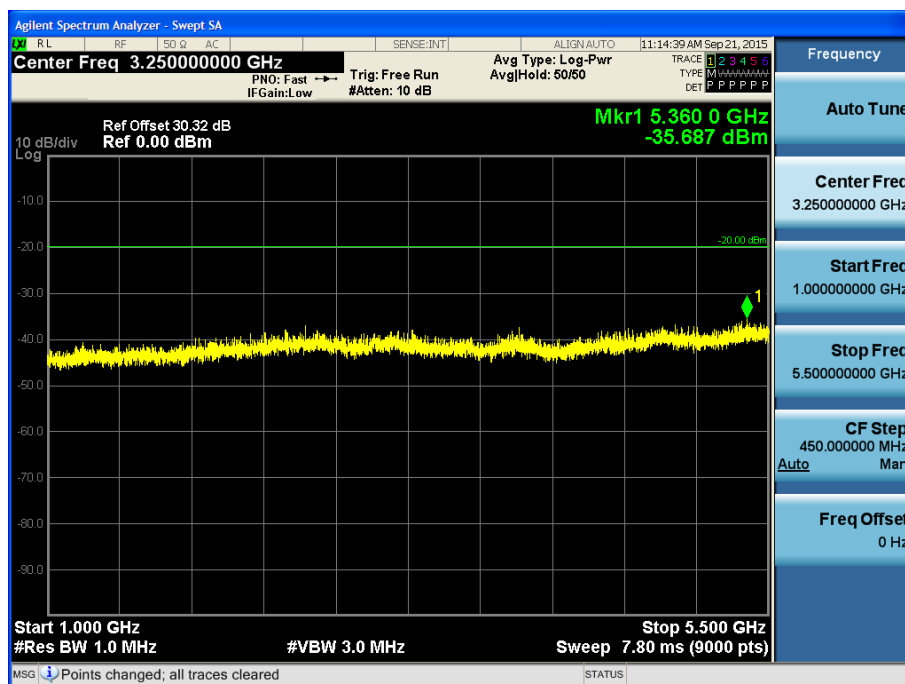
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)



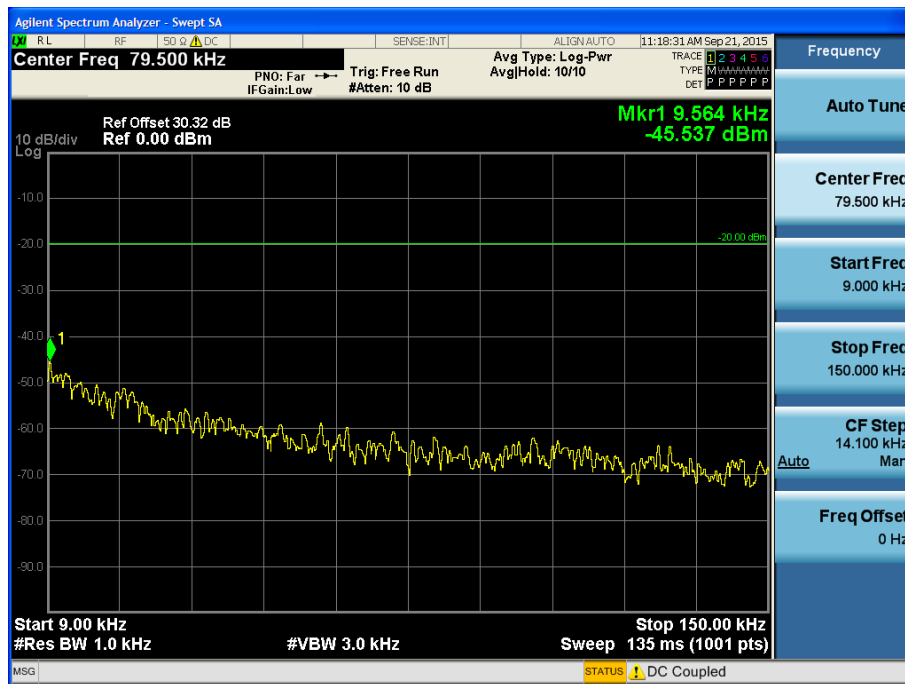
(1 GHz ~ 5.5 GHz)



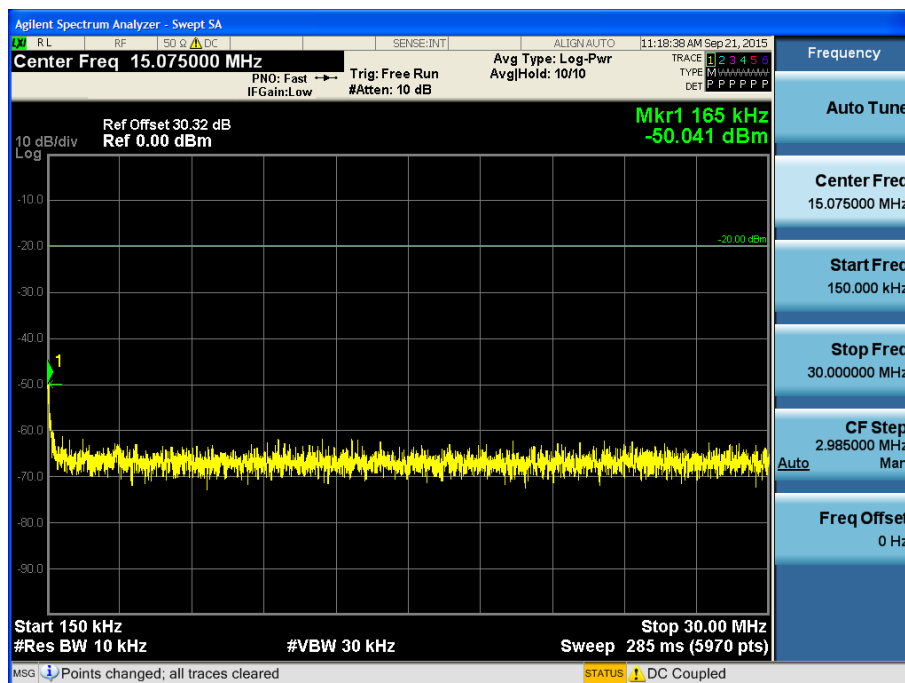
**7K60FXD/7K60FXE For ONLY IC**

HIGH POWER\_ 7K60FXD/7K60FXE \_138.05 MHz

(9 kHz ~ 150 kHz)

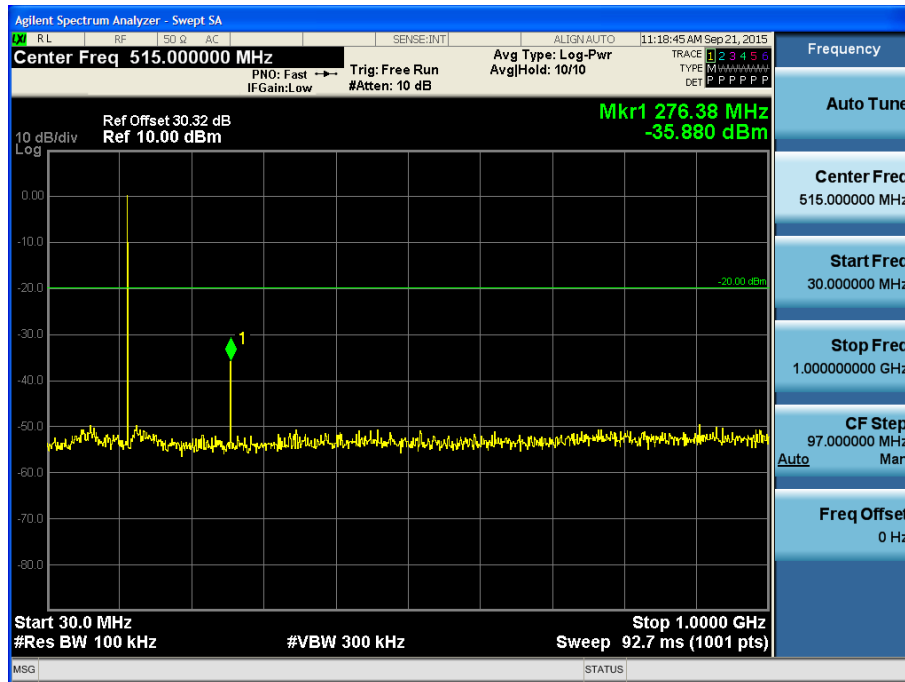


(150 kHz ~ 30 MHz)

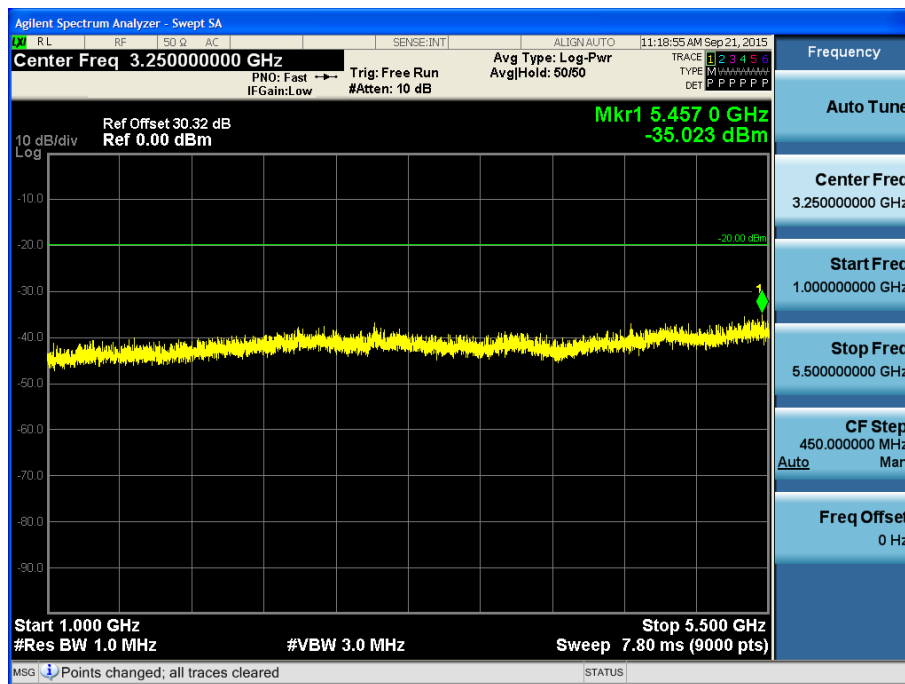




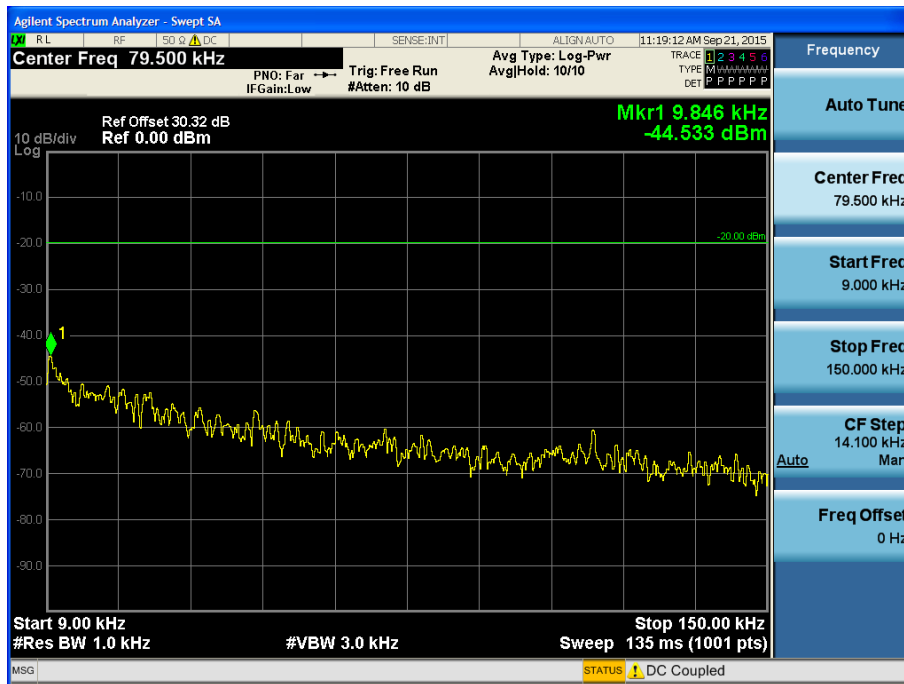
(30 MHz ~ 1 GHz)



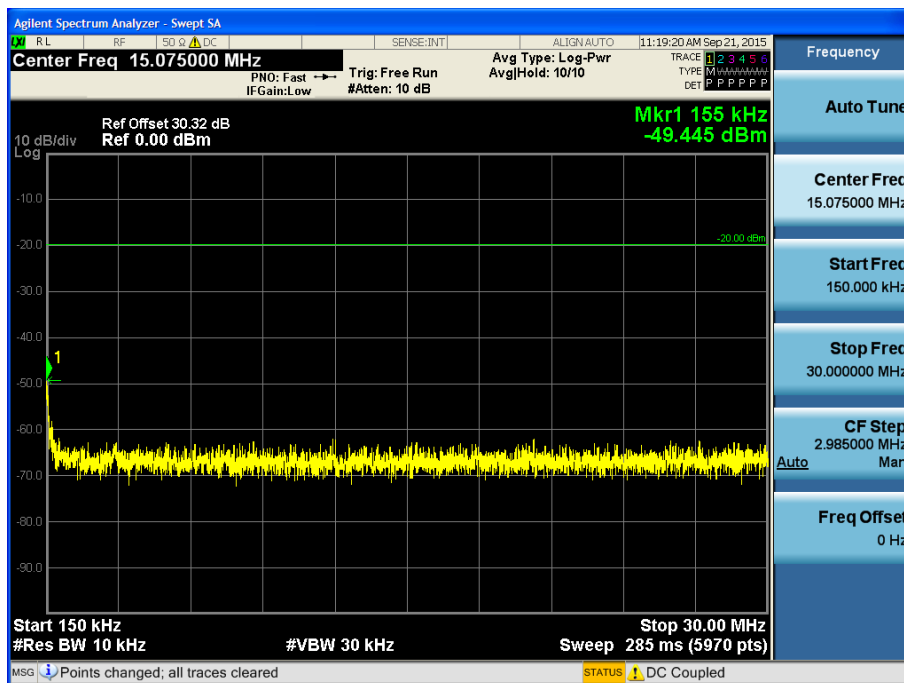
(1 GHz ~ 5.5 GHz)



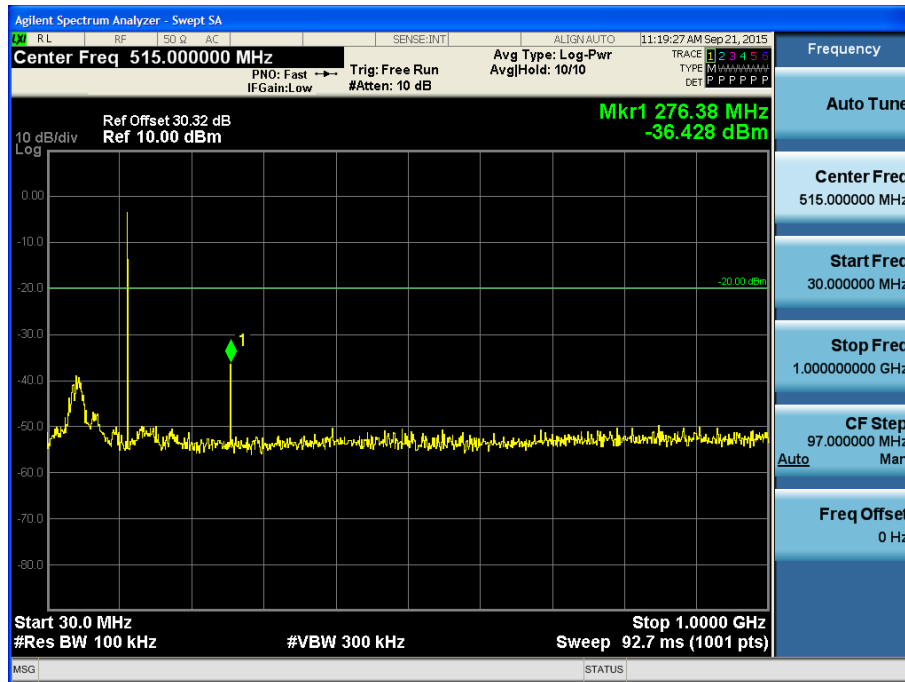
LOW POWER\_ 7K60FXD/7K60FXE \_138.05 MHz  
(9 kHz ~ 150 kHz)



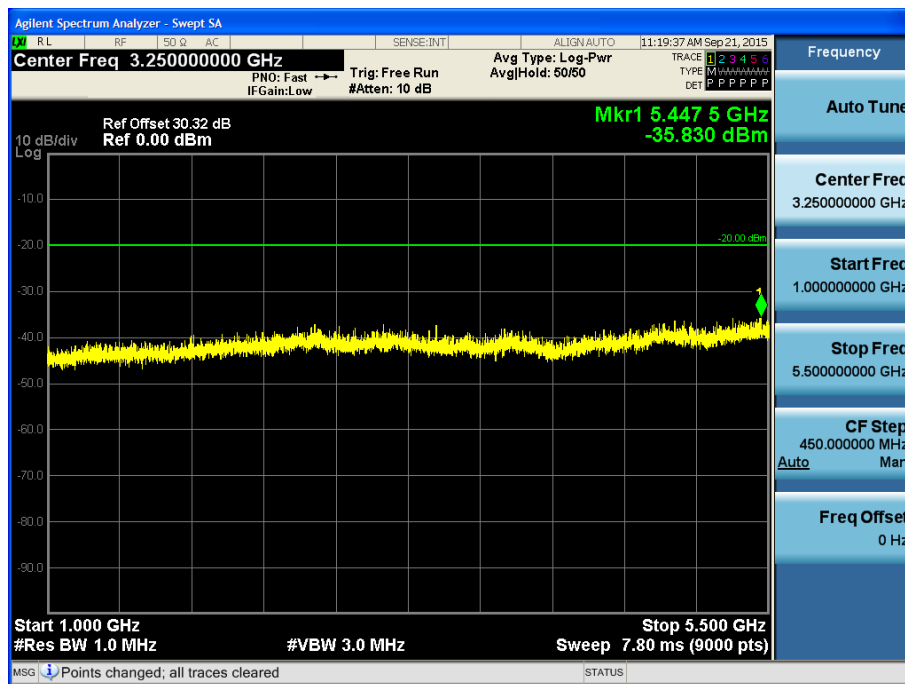
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)



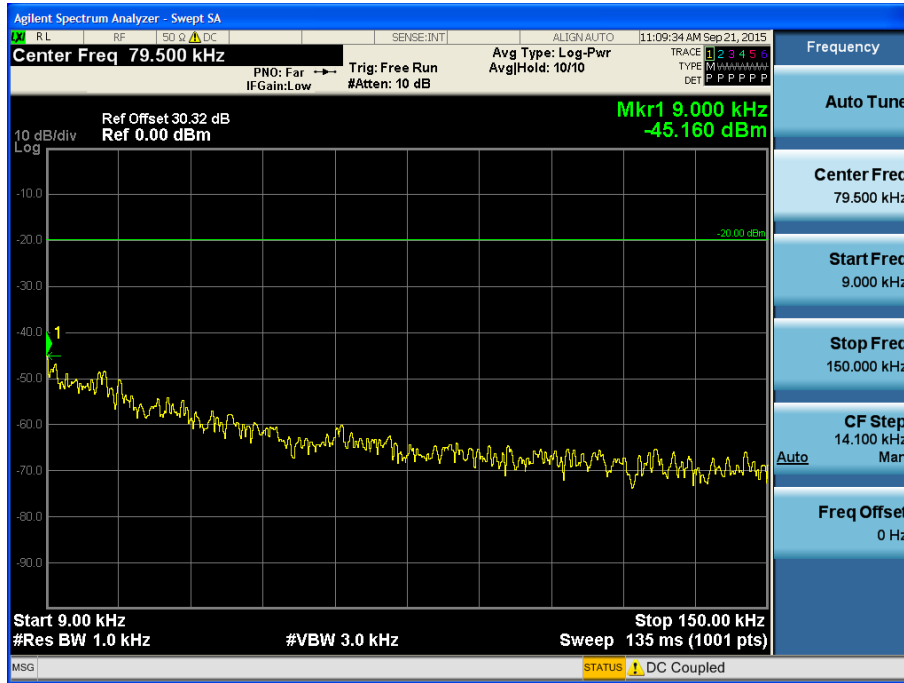
(1 GHz ~ 5.5 GHz)



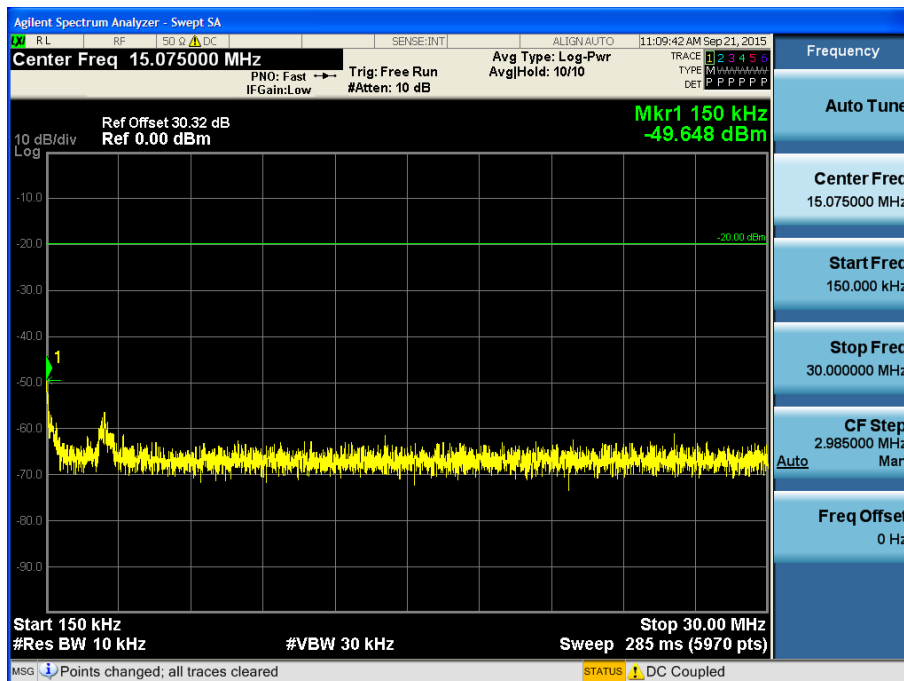
# 11K0F3E For ONLY IC

HIGH POWER\_11K0F3E\_138.05 MHz

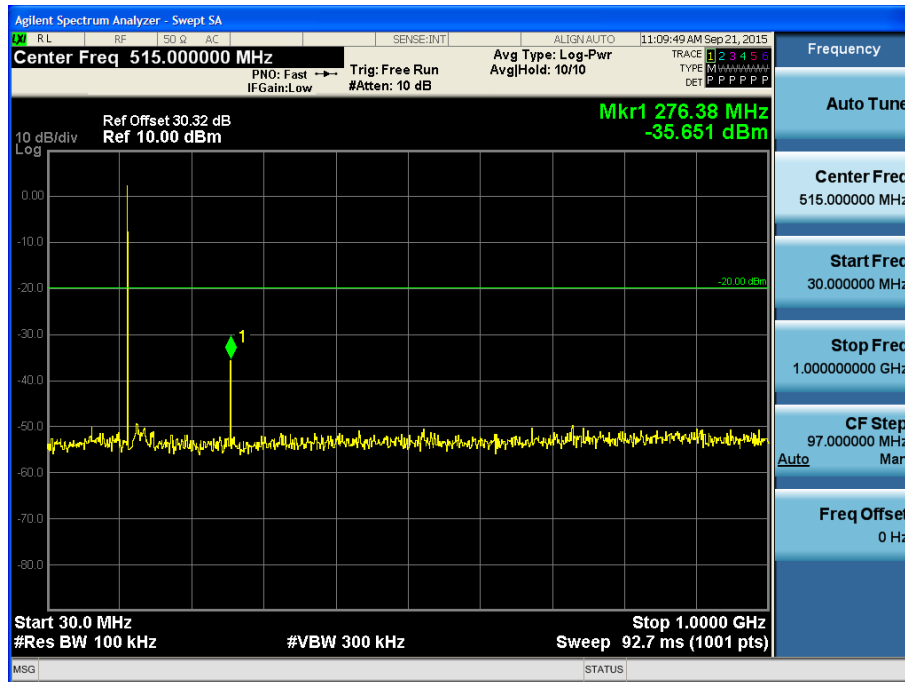
(9 kHz ~ 150 kHz)



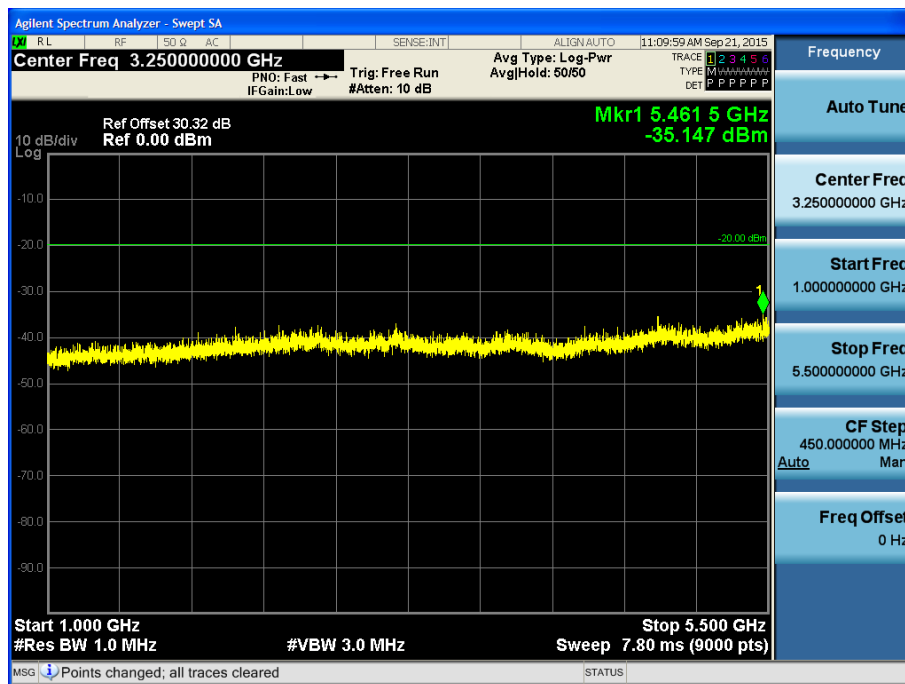
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)

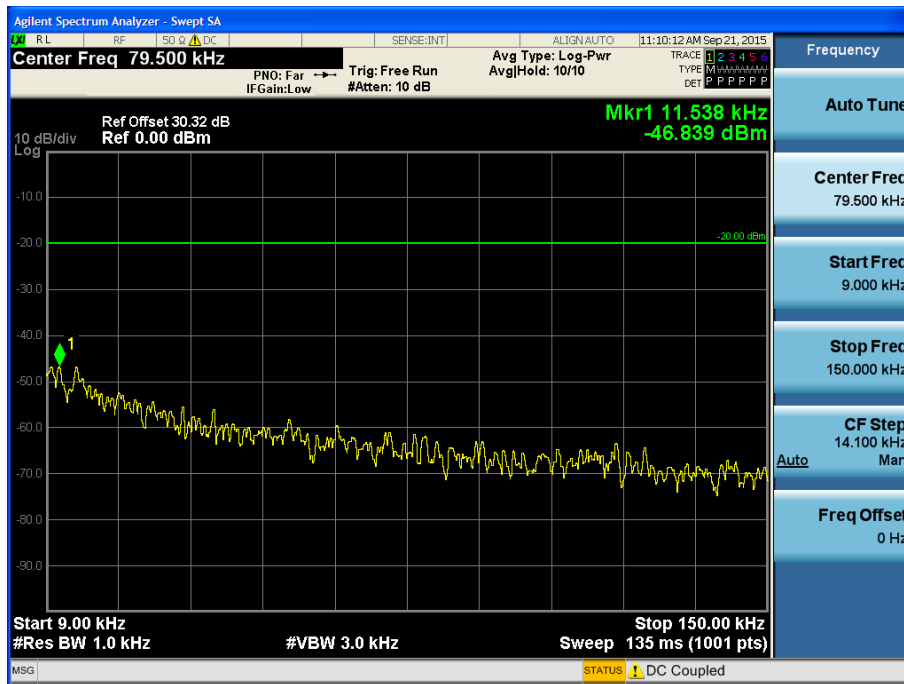


(1 GHz ~ 5.5 GHz)

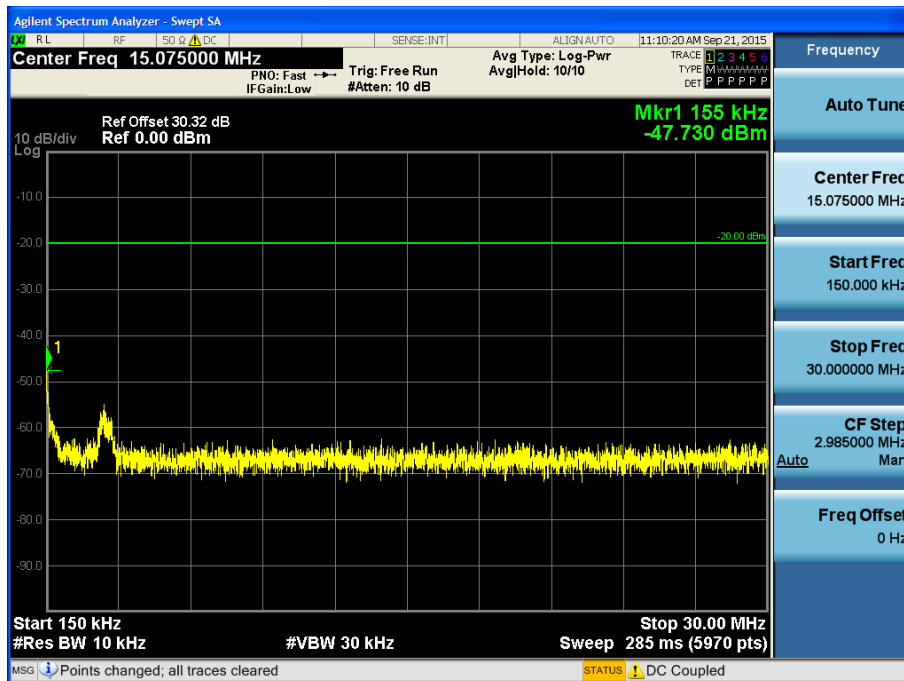


LOW POWER\_11K0F3E \_138.05 MHz

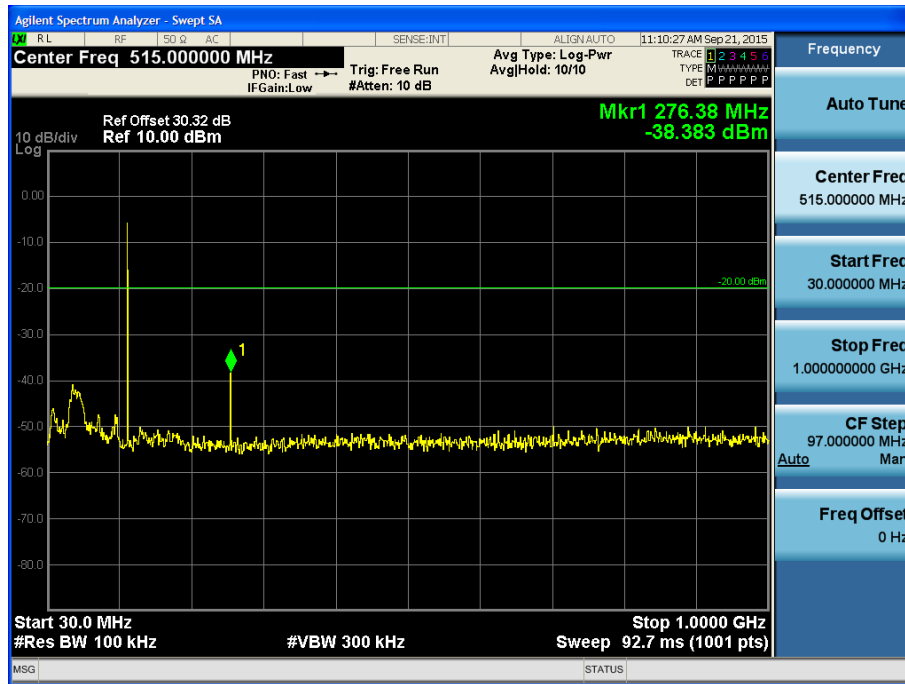
(9 kHz ~ 150 kHz)



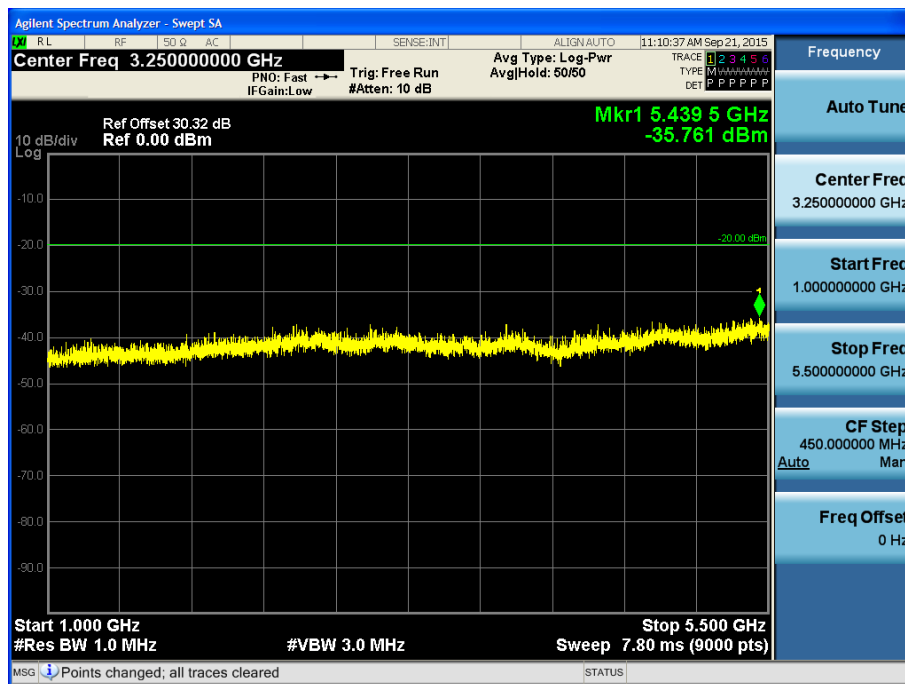
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)



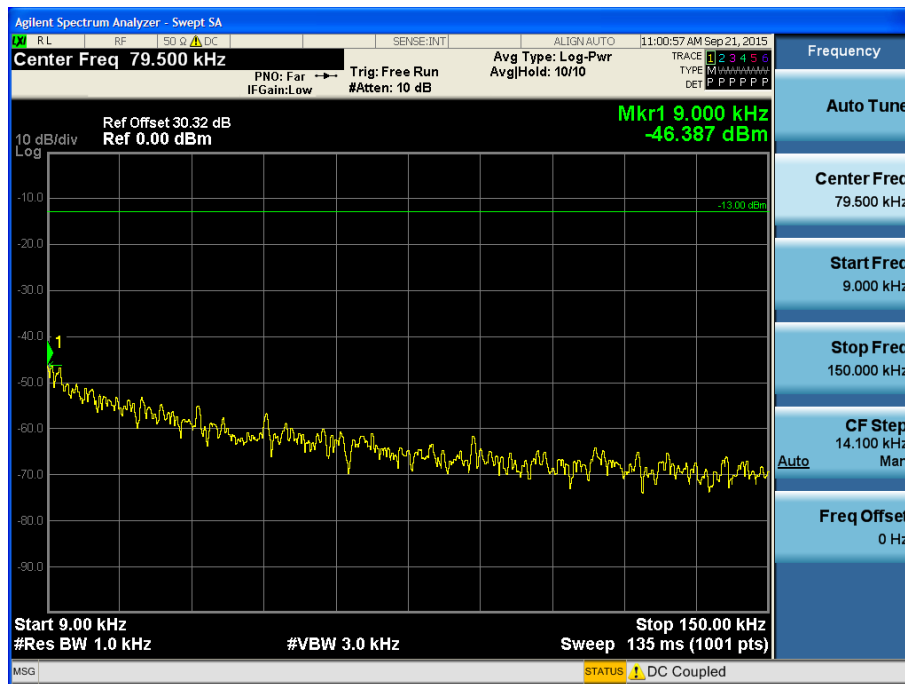
(1 GHz ~ 5.5 GHz)



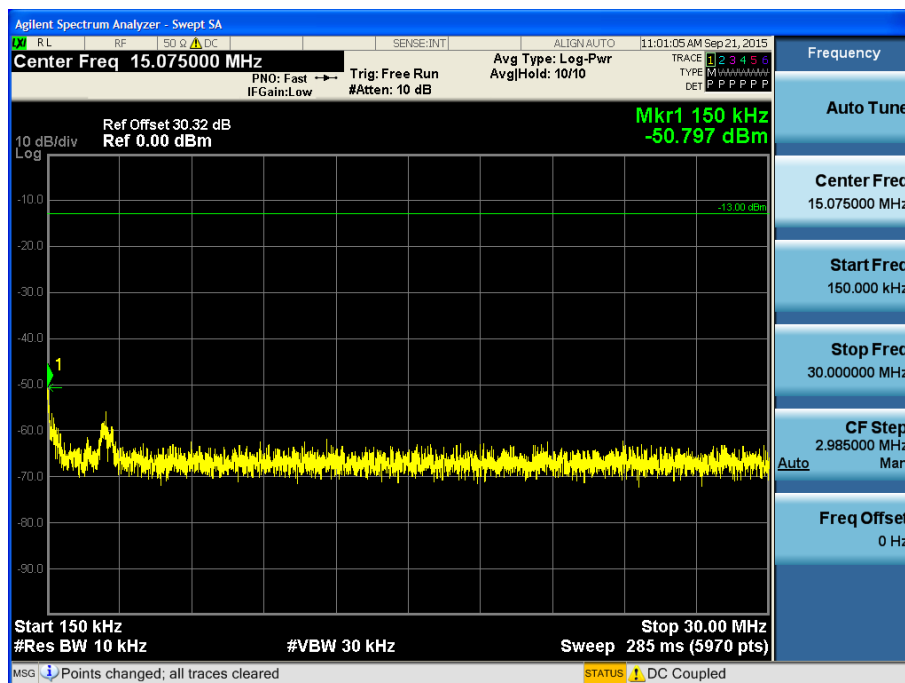
# 16K0F3E For ONLY IC

HIGH POWER\_16K0F3E\_138.05 MHz

(9 kHz ~ 150 kHz)

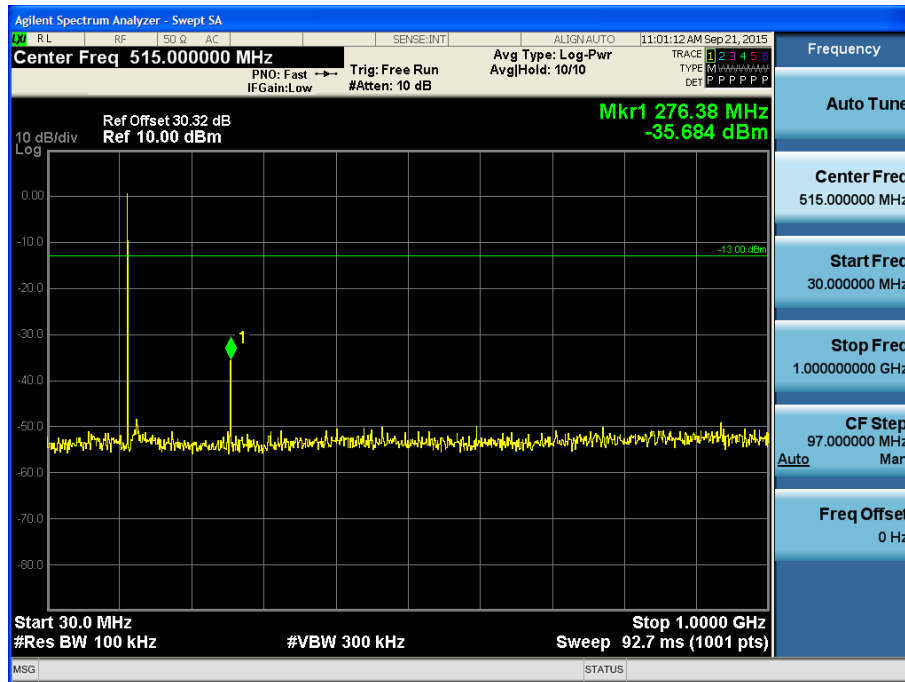


(150 kHz ~ 30 MHz)

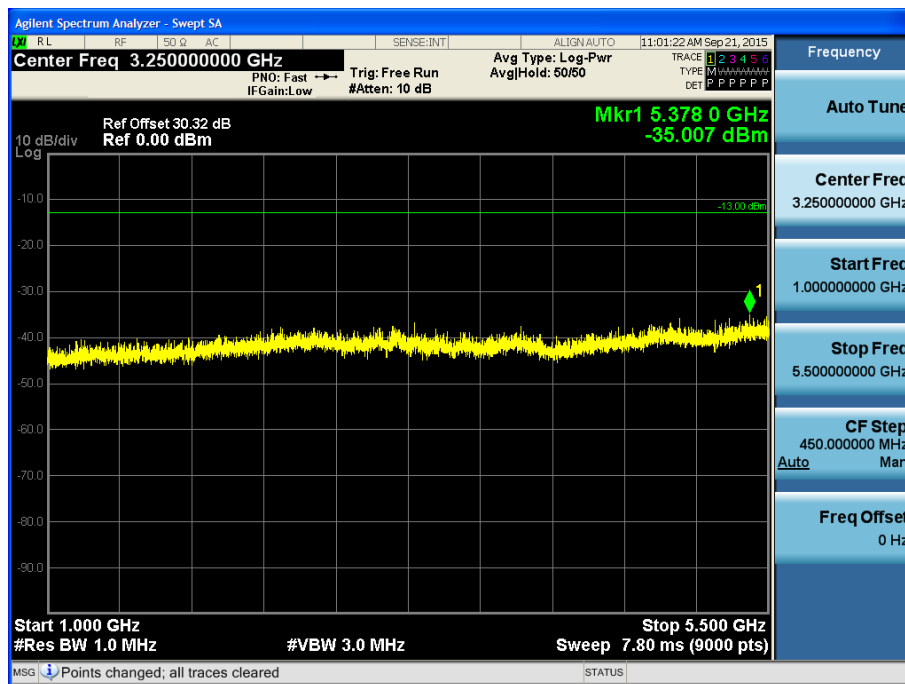




(30 MHz ~ 1 GHz)

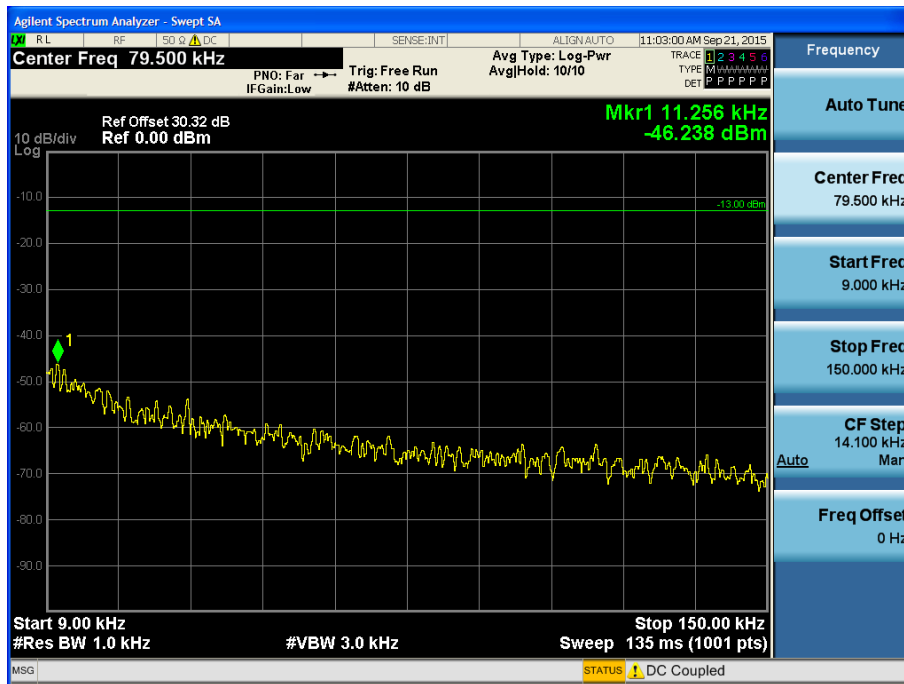


(1 GHz ~ 5.5 GHz)

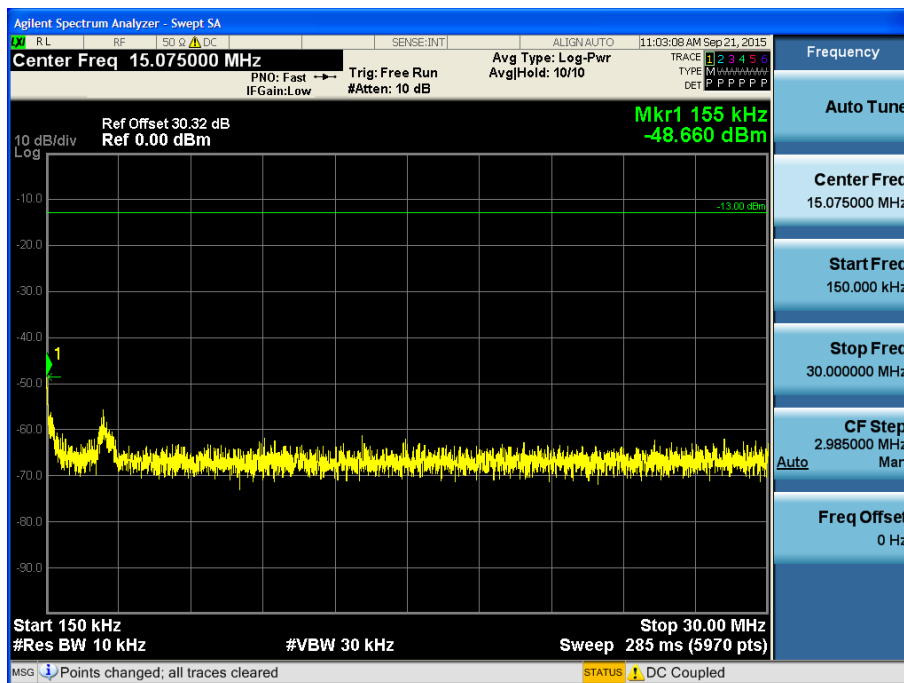


HIGH POWER\_16K0F3E\_162.05 MHz

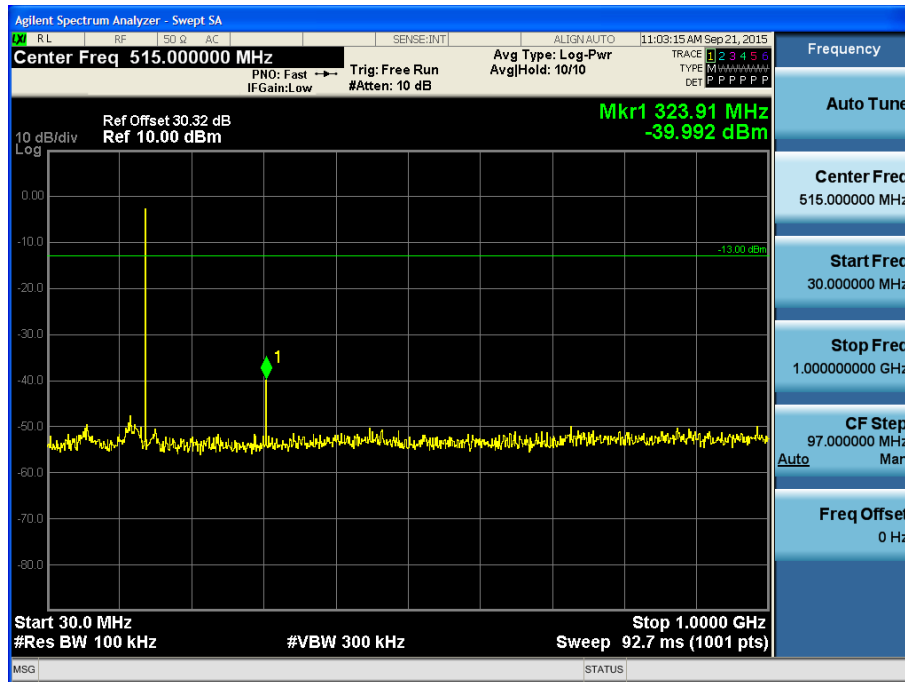
(9 kHz ~ 150 kHz)



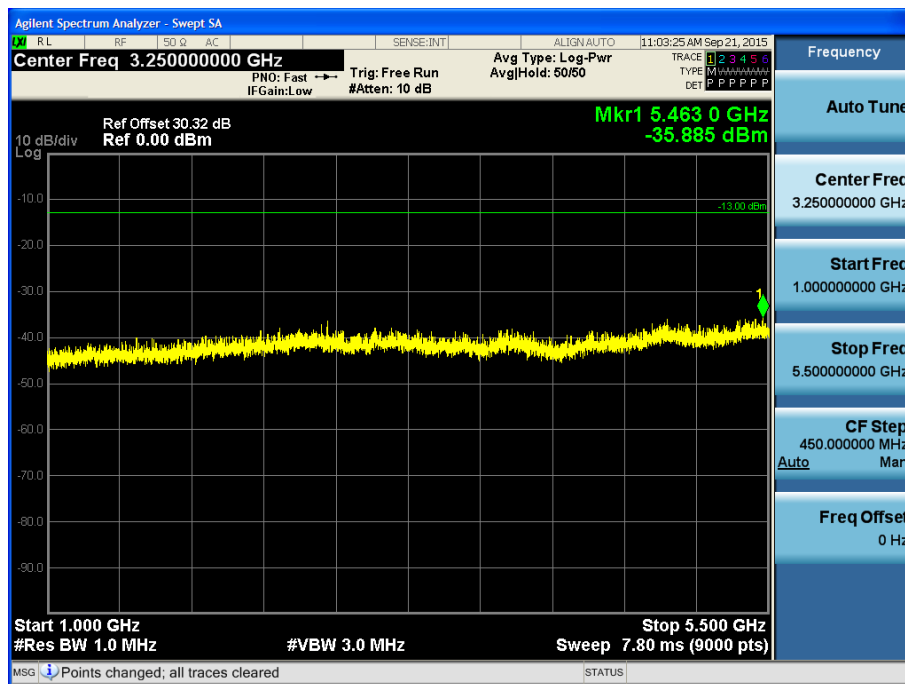
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)

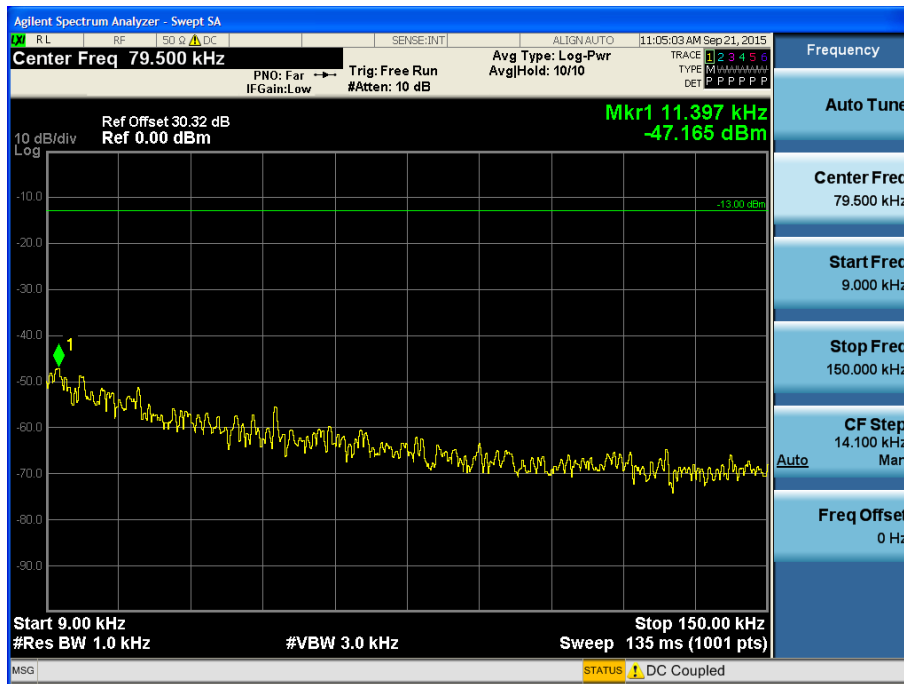


(1 GHz ~ 5.5 GHz)

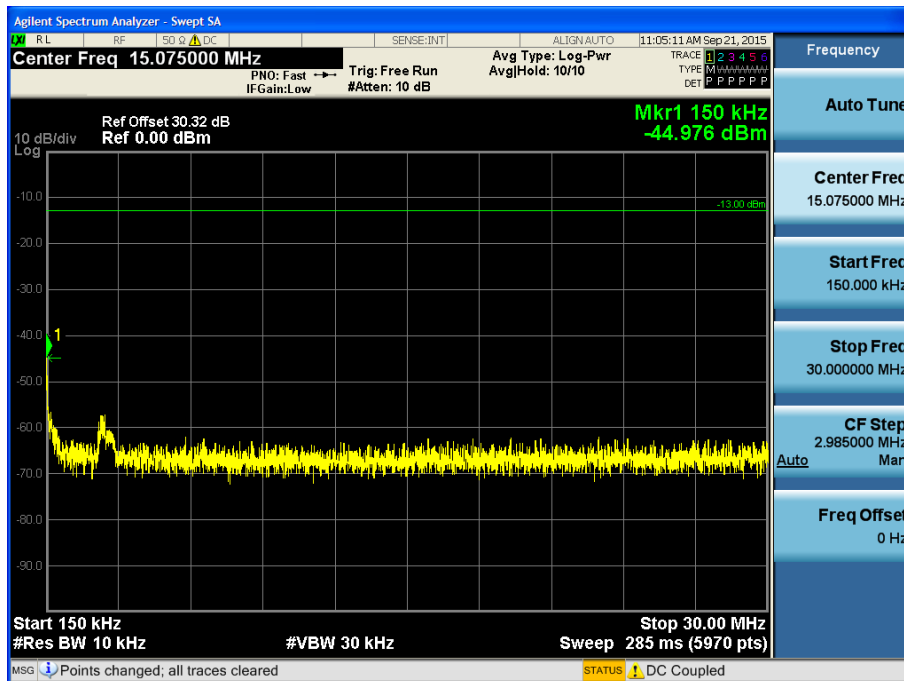


HIGH POWER\_16K0F3E\_173.95 MHz

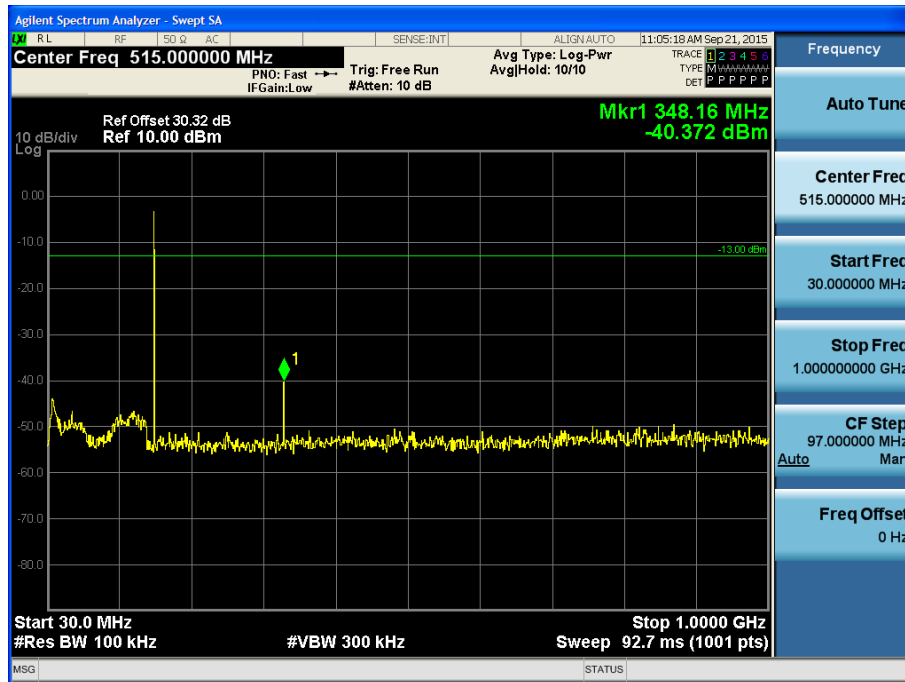
(9 kHz ~ 150 kHz)



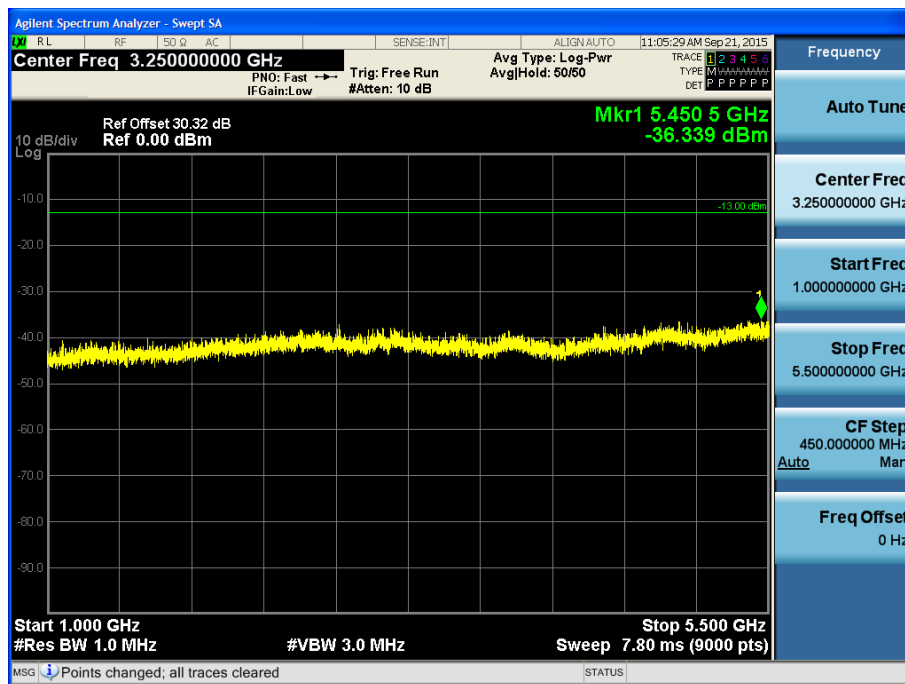
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)

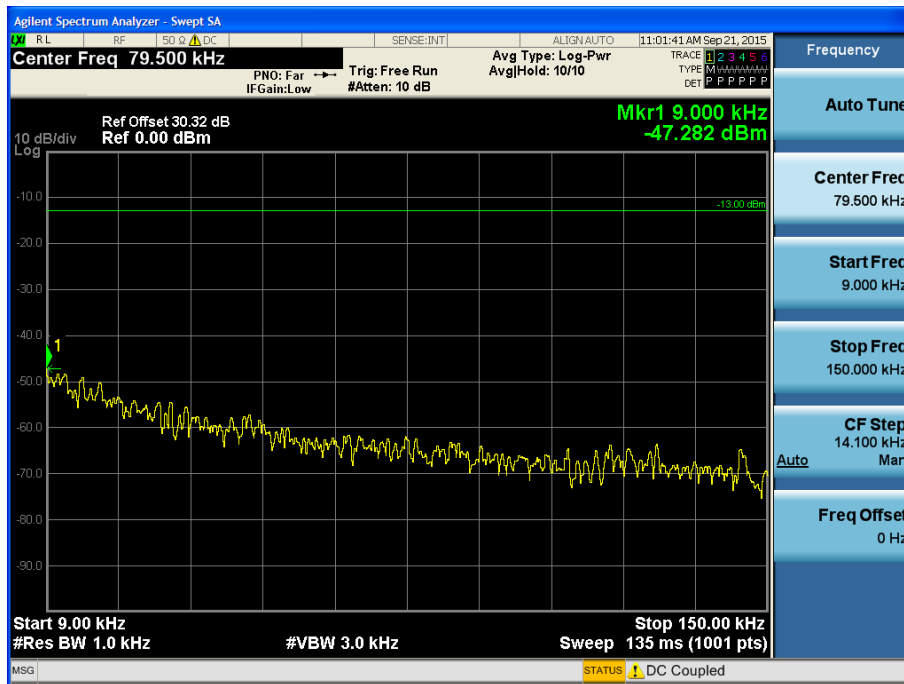


(1 GHz ~ 5.5 GHz)

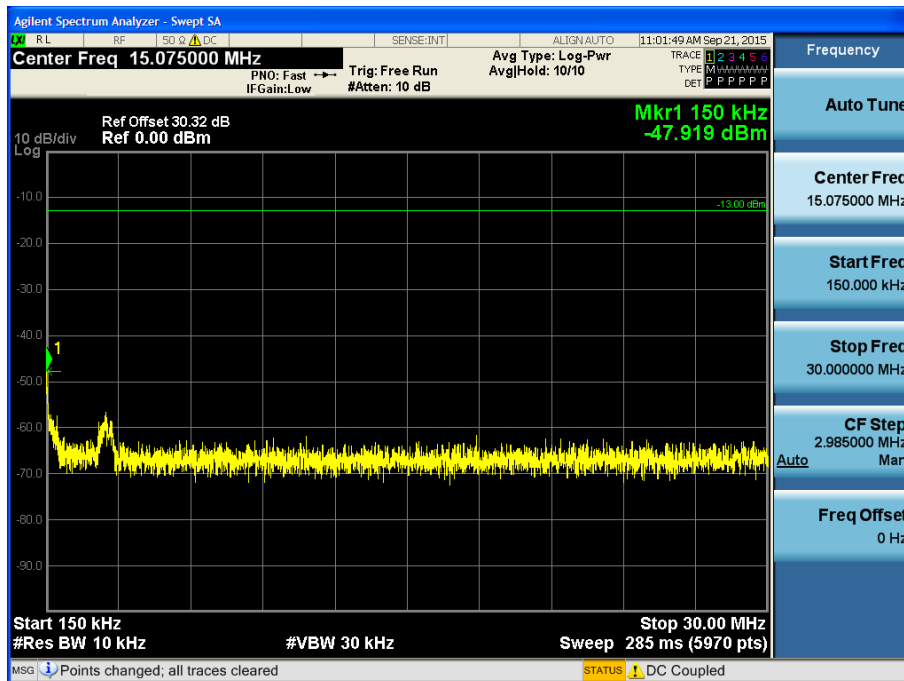


LOW POWER\_16K0F3E \_138.05 MHz

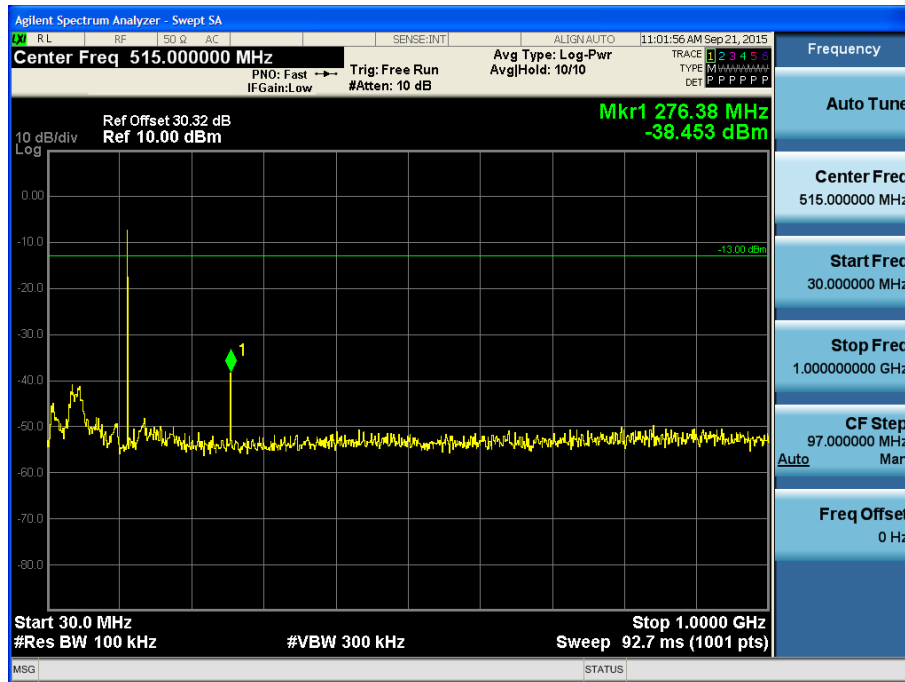
(9 kHz ~ 150 kHz)



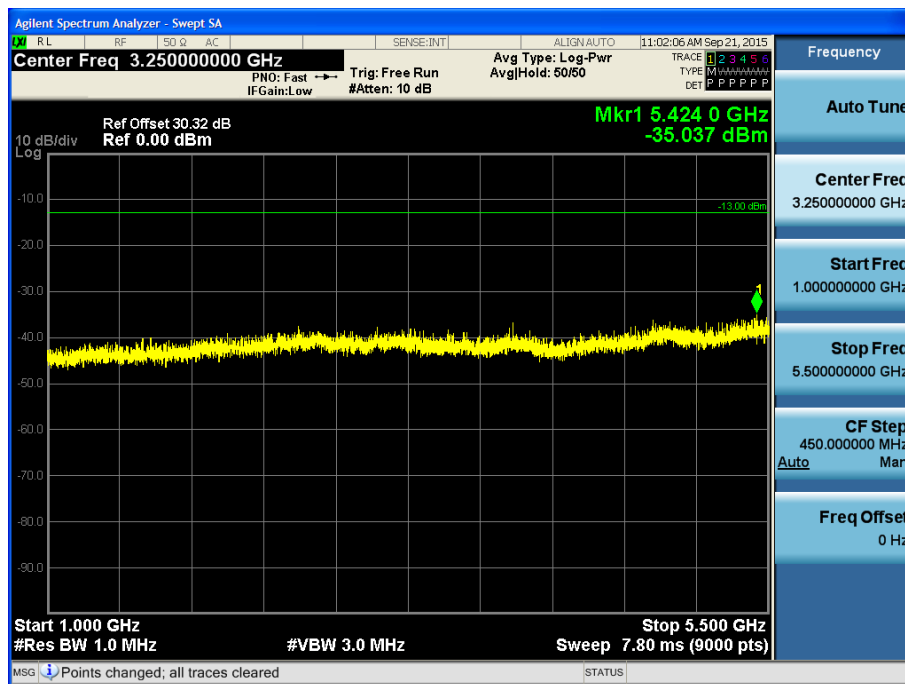
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)

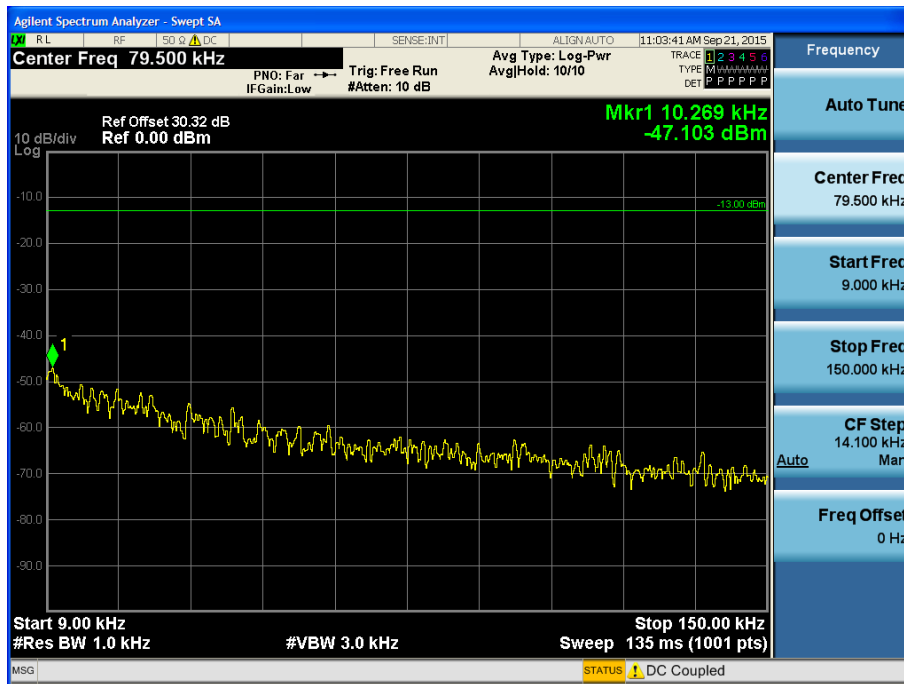


(1 GHz ~ 5.5 GHz)

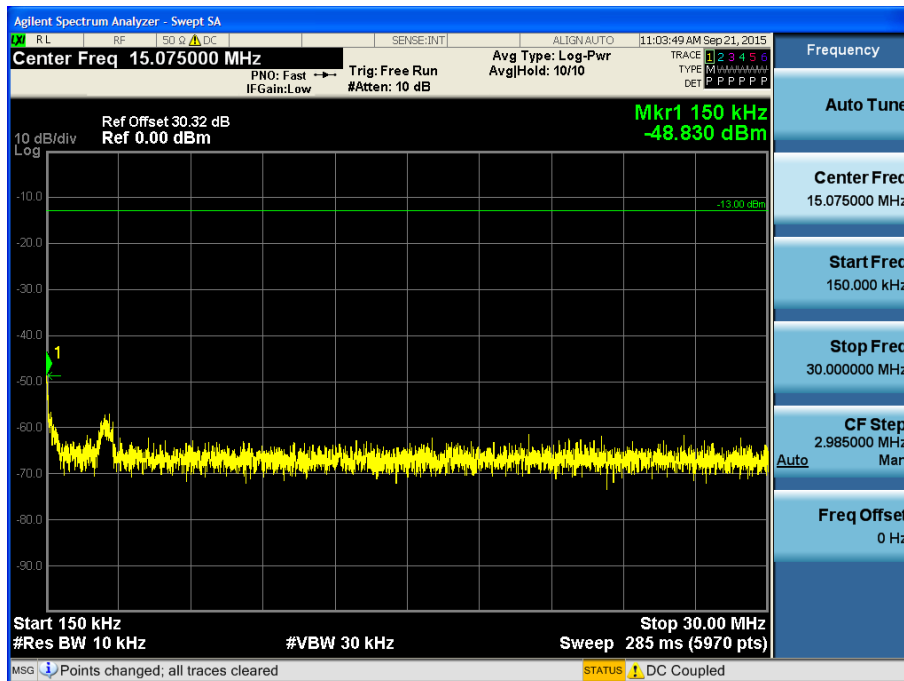


LOW POWER\_16K0F3E \_162.05 MHz

(9 kHz ~ 150 kHz)

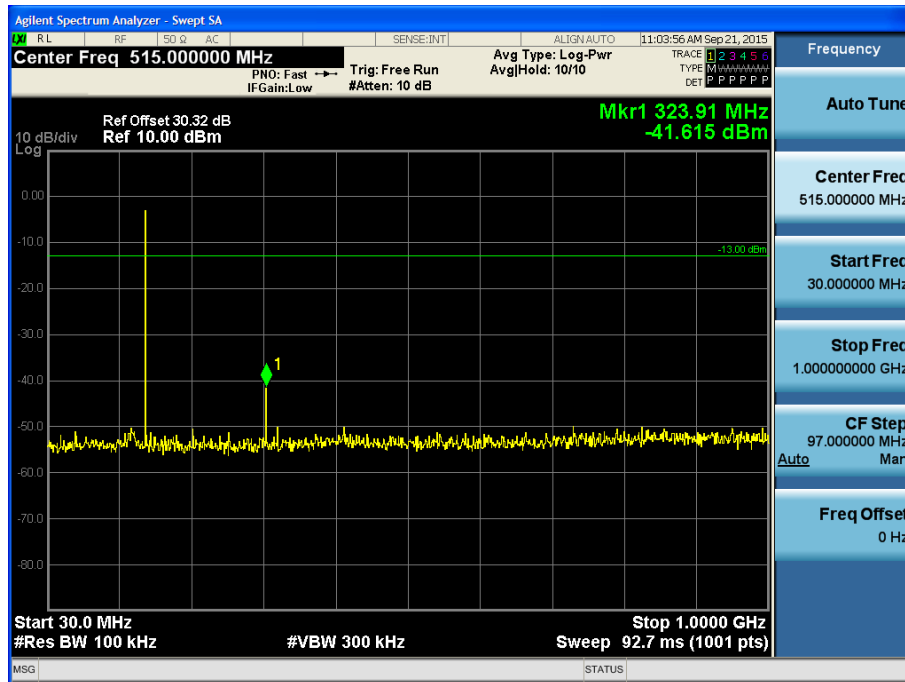


(150 kHz ~ 30 MHz)

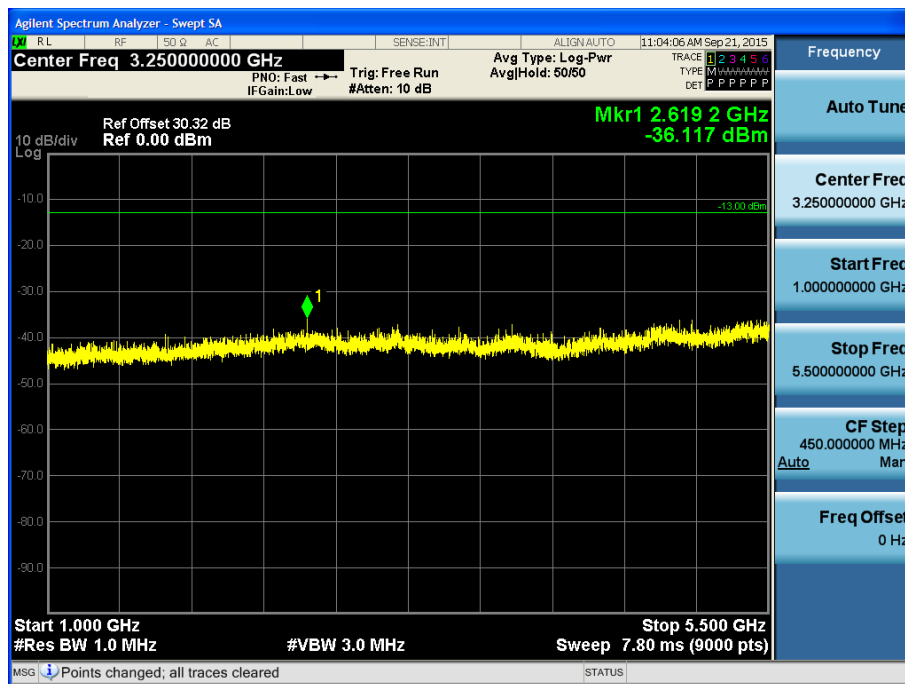




(30 MHz ~ 1 GHz)

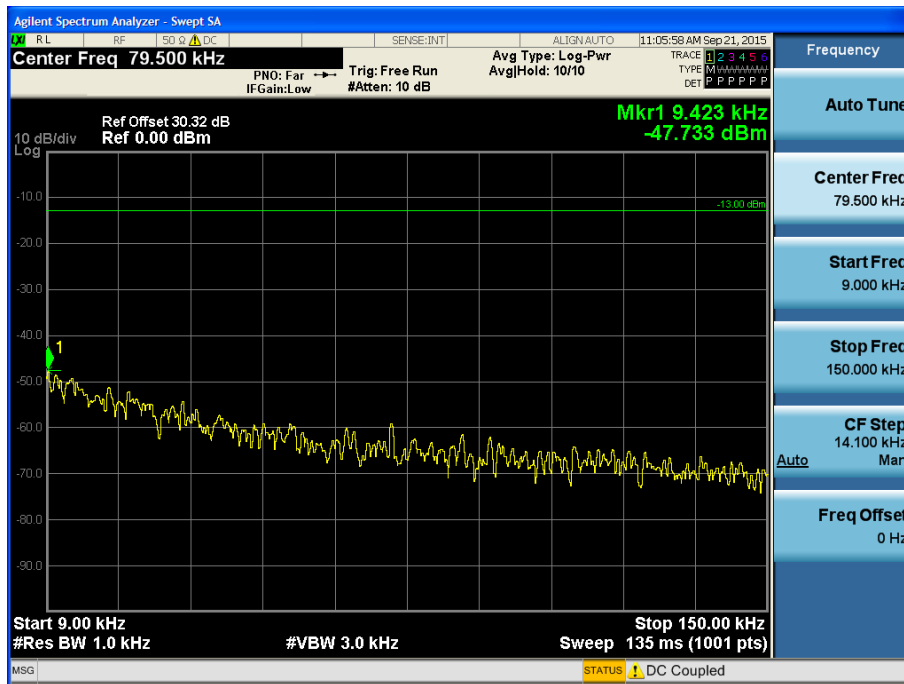


(1 GHz ~ 5.5 GHz)

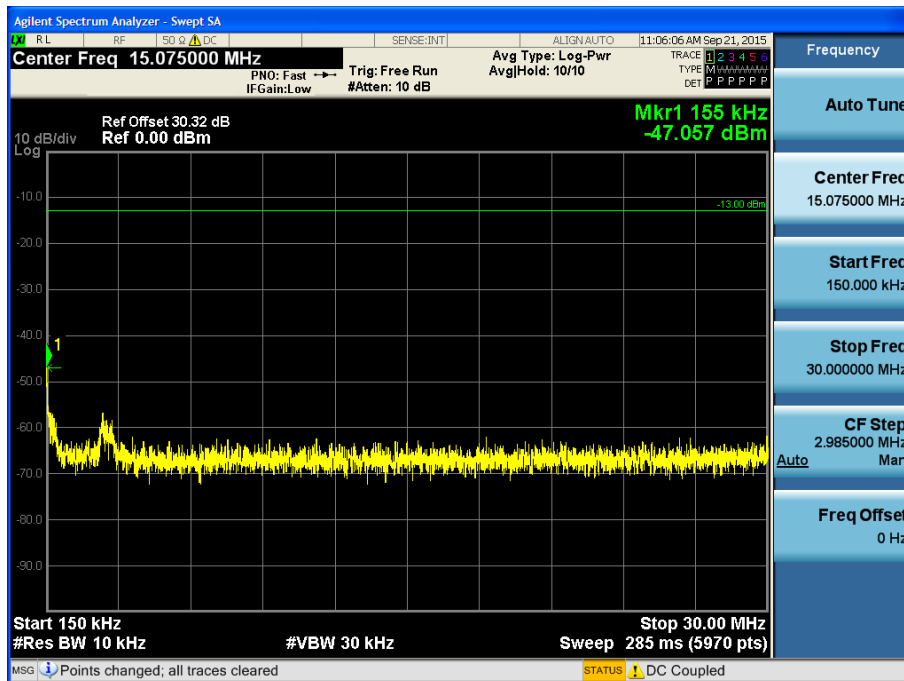


LOW POWER\_16K0F3E \_173.95 MHz

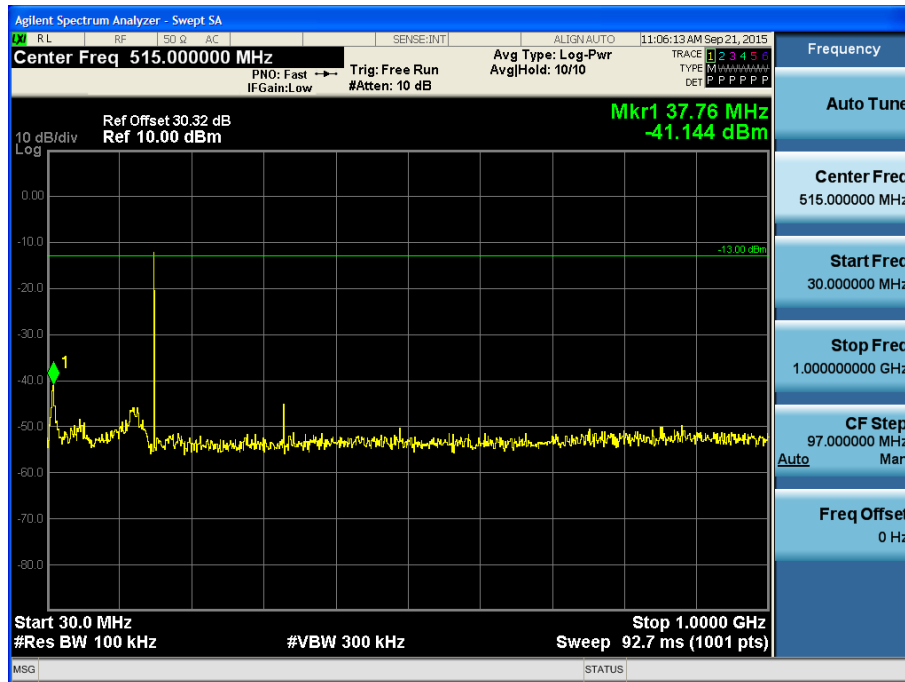
(9 kHz ~ 150 kHz)



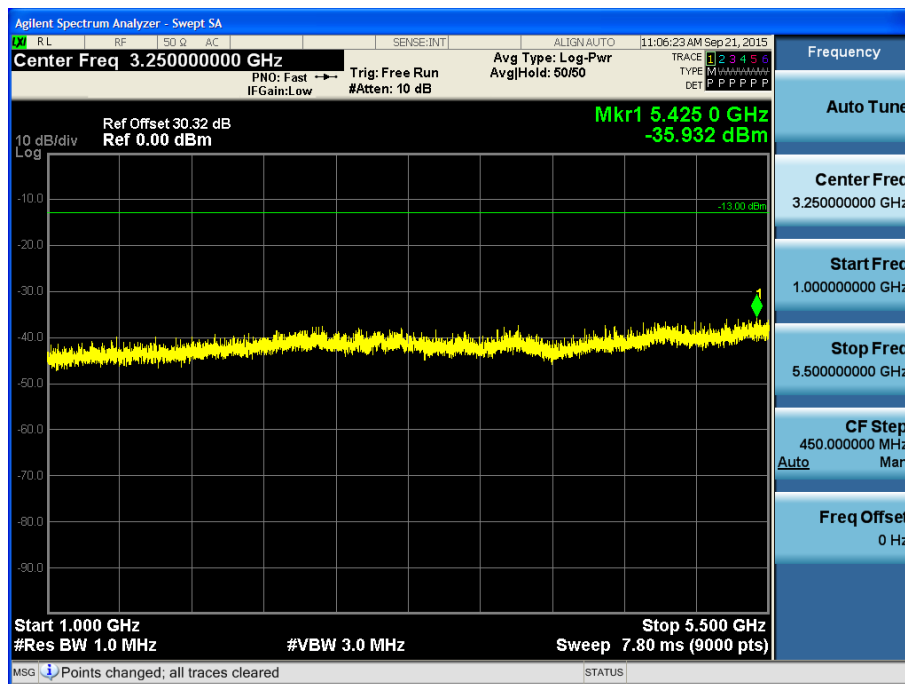
(150 kHz ~ 30 MHz)



(30 MHz ~ 1 GHz)



(1 GHz ~ 5.5 GHz)



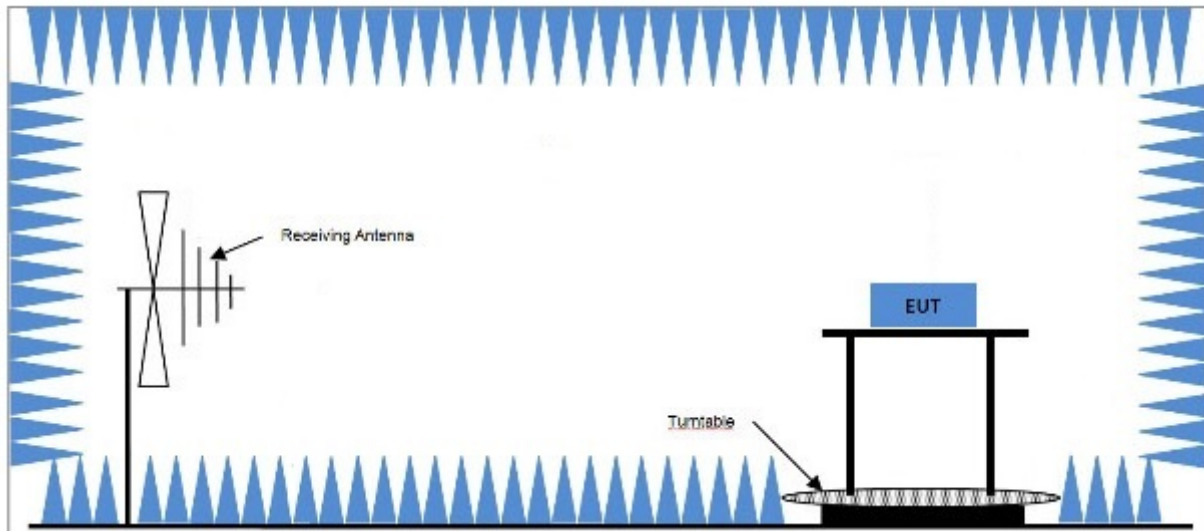
## 7.9 Unwanted Emissions : Radiated Spurious Emission

### ■ Definition

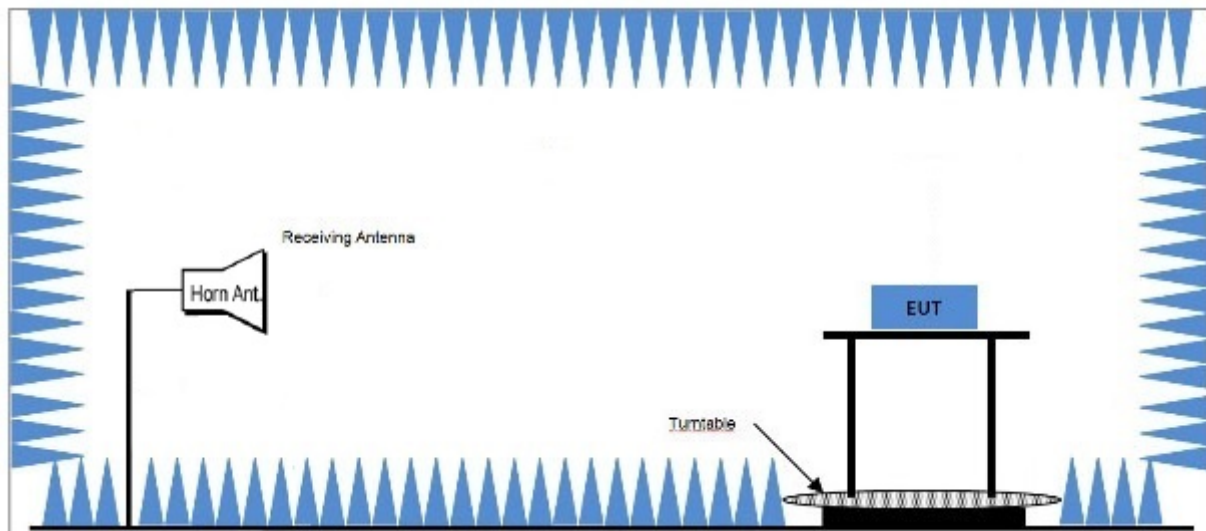
Radiated spurious emissions are emissions from the equipment when transmitting into a non-radiating load on a frequency or frequencies that are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired.

### ■ TEST CONFIGURATION

#### Below 1 GHz



#### Above 1 GHz



### TEST PROCEDURE USED

According to 2.2.12 in TIA-603-D Standard.

- a) Connect the equipment as illustrated.
- b) Adjust the spectrum analyzer for the following settings:
  - 1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1GHz.

- 2) Video Bandwidth = 300 kHz for spurious emissions below 1 GHz, and 3 MHz for spurious emissions above 1 GHz.
- 3) Sweep Speed slow enough to maintain measurement calibration.
- 4) Detector Mode = Positive Peak.
- c) Place the transmitter to be tested on the turntable in the standard test site, or an FCC listed site compliant with ANSI C63.4-2001 clause 5.4. The transmitter is transmitting into a nonradiating load that is placed on the turntable. The RF cable to this load should be of minimum length. For transmitters with integral antennas, the tests are to be run with the unit operating into the integral antenna.
- d) For each spurious measurement the test antenna should be adjusted to the correct length for the frequency involved. This length may be determined from a calibration ruler supplied with the equipment. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, except for the region close to the carrier equal to  $\pm$  the test bandwidth (see 1.3.4.4).
- e) Key the transmitter.
- f) For each spurious frequency, raise and lower the test antenna from 1 m to 4 m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Then the turntable should be rotated 360° to determine the maximum reading.  
Repeat this procedure to obtain the highest possible reading. Record this maximum reading.
- g) Repeat step f) for each spurious frequency with the test antenna polarized vertically.
- h) Reconnect the equipment as illustrated.
- i) Keep the spectrum analyzer adjusted as in step b).
- j) Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.
- k) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
- l) Repeat step k) with both antennas vertically polarized for each spurious frequency.
- m) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps k) and l) by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an

ideal half-wave dipole antenna by the following formula:

$$Pd(\text{dBm}) = Pg(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dB)}$$

where:

$Pd$  is the dipole equivalent power and

$Pg$  is the generator output power into the substitution antenna.

n) The  $Pd$  levels record in step m) are the absolute levels of radiated spurious emissions in dBm.

The radiated spurious emissions in dB can be calculated by the following:

Radiated spurious emissions (dB) =

$$10 \cdot \log_{10}(\text{TX power in watts}/0.001) - \text{the levels in step m)}$$

#### ■ LIMIT

| Frequency Band (MHz)        | Channel bandwidth (kHz) | Limit (dBm) |
|-----------------------------|-------------------------|-------------|
| 150 – 174(FCC)              | 25(only IC)             | -13         |
| 138 – 144 and 148 – 174(IC) | 12.5(FCC and IC)        | -20         |

#### ■ Operating Mode

| EUT Type    | Modulation                                                                  | Battery                                  | Test frequency (MHz) | Antenna  |
|-------------|-----------------------------------------------------------------------------|------------------------------------------|----------------------|----------|
| Stand alone | 16K0F3E(Only IC)<br>11K0F3E(FCC and IC)<br>7K60FXD, 7K60FXE<br>(FCC and IC) | KNB-45L<br>KNB-69L<br>KNB-29N<br>KNB-53N | 138.05(IC)           | KRA-41M3 |
|             |                                                                             |                                          |                      | KRA-22M3 |
|             |                                                                             |                                          |                      | KRA-26M3 |
|             |                                                                             |                                          | 150.05(FCC)          | KRA-41M  |
|             |                                                                             |                                          |                      | KRA-22M  |
|             |                                                                             |                                          |                      | KRA-26M  |
|             |                                                                             |                                          | 162.05(FCC and IC)   | KRA-41M2 |
|             |                                                                             |                                          |                      | KRA-22M2 |
|             |                                                                             |                                          |                      | KRA-26M2 |
|             |                                                                             |                                          | 173.95(FCC and IC)   | KRA-41M2 |
|             |                                                                             |                                          |                      | KRA-22M2 |
|             |                                                                             |                                          |                      | KRA-26M2 |

#### Note

1. It is permissible to use other antennas provided they can be referenced to a dipole.
2. Worst case is red mark.

#### ■ TEST RESULTS

# 11K0F3E

Frequency [MHz] F1 : 138.05  
Battery : KNB-45L Antenna : KRA-26M3

| Frequency<br>(MHz) | Reading<br>[dBm] | Factor<br>(dB) | Pol. | Result<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------|------------------|----------------|------|-----------------|----------------|----------------|
| 138.05             | -0.15            | 26.082         | Y-V  | 25.93           | -              | -              |
| 276.1              | -78.98           | 22.894         | Y-V  | -56.09          | -20            | 36.09          |
| 414.15             | -78.19           | 25.923         | Y-V  | -52.27          | -20            | 32.27          |
| 552.2              | -71.92           | 28.075         | Y-V  | -43.85          | -20            | 23.85          |
| 690.25             | -                | 30.474         | -    | -               | -20            | -              |
| 828.3              | -                | 32.511         | -    | -               | -20            | -              |
| 966.35             | -                | 33.493         | -    | -               | -20            | -              |
| 1104.4             | -52.72           | -6.29          | Y-V  | -59.01          | -20            | 39.01          |
| 1242.45            | -53.77           | -3.736         | Y-V  | -57.51          | -20            | 37.51          |
| 1380.5             | -54.20           | -4.005         | Y-V  | -58.20          | -20            | 38.20          |

\*Note :

$$1. \text{ Limit} = P_{\text{dBm}} - (50 + 10 \log (P_{\text{watt}})) = -20 \text{ dBm}$$

| Frequency [MHz] F2 : 150.05<br>Battery : KNB-45L Antenna : KRA-26M |                  |                |      |                 |                |                |
|--------------------------------------------------------------------|------------------|----------------|------|-----------------|----------------|----------------|
| Frequency<br>(MHz)                                                 | Reading<br>[dBm] | Factor<br>(dB) | Pol. | Result<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
| 150.05                                                             | -1.95            | 26.977         | Y-V  | 25.03           | -              | -              |
| 300.1                                                              | -81.60           | 23.769         | Y-V  | -57.83          | -20            | 37.83          |
| 450.15                                                             | -78.36           | 27.176         | X-H  | -51.18          | -20            | 31.18          |
| 600.2                                                              | -71.19           | 29.291         | Y-V  | -41.90          | -20            | 21.90          |
| 750.25                                                             | -85.33           | 31.644         | Y-V  | -53.69          | -20            | 33.69          |
| 900.3                                                              | -                | 33.017         | -    | -               | -20            | -              |
| 1050.35                                                            | -                | -6.082         | -    | -               | -20            | -              |
| 1200.4                                                             | -52.24           | -5.277         | Y-V  | -57.52          | -20            | 37.52          |
| 1350.45                                                            | -51.58           | -4.195         | Y-V  | -55.77          | -20            | 35.77          |
| 1500.5                                                             | -                | -3.888         | -    | -               | -20            | -              |

\*Note :

$$1. \text{ Limit} = P_{\text{dBm}} - (50 + 10 \log(P_{\text{watt}})) = -20 \text{ dBm}$$



| Frequency [MHz] F3 : 162.05<br>Battery : KNB-45LAntenna : KRA-26M2 |                  |                |      |                 |                |                |
|--------------------------------------------------------------------|------------------|----------------|------|-----------------|----------------|----------------|
| Frequency<br>(MHz)                                                 | Reading<br>[dBm] | Factor<br>(dB) | Pol. | Result<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
| 162.05                                                             | -1.58            | 27.124         | Y-V  | 25.54           | -              | -              |
| 324.1                                                              | -87.30           | 24.267         | Y-V  | -63.03          | -20            | 43.03          |
| 486.15                                                             | -83.83           | 27.254         | Y-V  | -56.58          | -20            | 36.58          |
| 648.2                                                              | -79.53           | 30.039         | Y-V  | -49.49          | -20            | 29.49          |
| 810.25                                                             | -                | 32.202         | -    | -               | -20            | -              |
| 972.3                                                              | -                | 33.629         | -    | -               | -20            | -              |
| 1134.35                                                            | -50.69           | -6.219         | Y-V  | -56.91          | -20            | 36.91          |
| 1296.4                                                             | -54.27           | -3.82          | Y-V  | -58.09          | -20            | 38.09          |
| 1458.45                                                            | -55.27           | -3.216         | X-H  | -58.49          | -20            | 38.49          |
| 1620.5                                                             | -                | -4.39          | -    | -               | -20            | -              |

\*Note :

1. Limit =  $P_{dBm} - (50 + 10 \log (P_{watt})) = -20 \text{ dBm}$

Frequency [MHz] F3 : 173.95  
Battery : KNB-45L Antenna : KRA-26M2

| Frequency<br>(MHz) | Reading<br>[dBm] | Factor<br>(dB) | Pol. | Result<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------|------------------|----------------|------|-----------------|----------------|----------------|
| 173.95             | 8.36             | 25.376         | Y-V  | 33.74           | -              | -              |
| 347.9              | -65.94           | 24.312         | X-H  | -41.63          | -20            | 21.63          |
| 521.85             | -65.52           | 27.446         | X-H  | -38.07          | -20            | 18.07          |
| 695.8              | -85.09           | 30.52          | Y-H  | -54.57          | -20            | 34.57          |
| 869.75             | -84.74           | 32.072         | Y-V  | -52.67          | -20            | 32.67          |
| 1043.7             | -54.48           | -6.284         | Y-V  | -60.76          | -20            | 40.76          |
| 1217.65            | -49.15           | -5.412         | Y-V  | -54.56          | -20            | 34.56          |
| 1391.6             | -54.85           | -3.264         | X-H  | -58.11          | -20            | 38.11          |
| 1565.55            | -52.03           | -4.323         | X-H  | -56.35          | -20            | 36.35          |
| 1739.5             | -                | -4.538         | -    | -               | -20            | -              |

\*Note :

$$1. \text{Limit} = P_{\text{dBm}} - (50 + 10 \log(P_{\text{watt}})) = -20 \text{ dBm}$$

## 7.10 Unwanted Emissions :Receiver Radiated Spurious Emission

IC Rule(s) RSS-GEN  
 Test Requirements: Blow the table  
 Operating conditions: Under normal test conditions  
 Method of testing: Radiated

S/A. Settings: F < 1 GHz: RBW: 120 kHz, VBW: 300 kHz (Quasi Peak)  
 F > 1 GHz: RBW: 1 MHz, VBW: 1 MHz (Peak)  
 Mode of operation: Receive

| Frequency<br>(MHz) | Field Strength<br>(microvolts/m at 3 meters) |
|--------------------|----------------------------------------------|
| 30 – 88            | 100                                          |
| 88 - 216           | 150                                          |
| 216 – 960          | 200                                          |
| Above 960          | 500                                          |

### Operation Mode: Receive:

30 MHz ~ 1 GHz

| Frequency               | Reading    | Ant. factor | Cable loss | Ant. POL | Total        | Limit        | Margin |
|-------------------------|------------|-------------|------------|----------|--------------|--------------|--------|
| MHz                     | dB $\mu$ V | dB /m       | dB         | (H/V)    | dB $\mu$ V/m | dB $\mu$ V/m | dB     |
| No Critical peaks found |            |             |            |          |              |              |        |

Above 1 GHz

| Frequency               | Reading    | Ant. factor | Cable loss | Ant. POL | Total        | Limit        | Margin |
|-------------------------|------------|-------------|------------|----------|--------------|--------------|--------|
| MHz                     | dB $\mu$ V | dB /m       | dB         | (H/V)    | dB $\mu$ V/m | dB $\mu$ V/m | dB     |
| No Critical peaks found |            |             |            |          |              |              |        |

## 7.11 Necessary Bandwidth Calculations

| Modulation = 16K0F3E          |                                        |
|-------------------------------|----------------------------------------|
| Maximum Modulation (M), kHz   | 3                                      |
| Maximum Deviation (D), kHz    | 5                                      |
| Constant Factor (K)           | 1                                      |
| Necessary Bandwidth (BN), kHz | $(2 \times M) + (2 \times D \times K)$ |
| Necessary Bandwidth (BN), kHz | 16.0                                   |

| Modulation = 11K0F3E          |                                        |
|-------------------------------|----------------------------------------|
| Maximum Modulation (M), kHz   | 3                                      |
| Maximum Deviation (D), kHz    | 2.5                                    |
| Constant Factor (K)           | 1                                      |
| Necessary Bandwidth (BN), kHz | $(2 \times M) + (2 \times D \times K)$ |
| Necessary Bandwidth (BN), kHz | 11.0                                   |

| Modulation = 7K60FXD/7K60FXE      |                        |
|-----------------------------------|------------------------|
| Digital information rate (R), bps | 9600                   |
| Maximum Deviation (D), kHz        | 3.391                  |
| Signaling States (S)              | 4                      |
| Constant Factor (K)               | 0.516                  |
| Necessary Bandwidth (BN), kHz     | $(R / \log_2 S) + 2DK$ |
| Necessary Bandwidth (BN), kHz     | 7.60                   |

## 8. LIST OF TEST EQUIPMENT

| Manufacturer      | Model / Equipment                    | Calibration Date | Calibration Interval | Calibration Due | Serial No.               |
|-------------------|--------------------------------------|------------------|----------------------|-----------------|--------------------------|
| Agilent           | N9020A/ SIGNAL ANALYZER              | 06/30/2015       | Annual               | 06/30/2016      | MY51110085               |
| Agilent           | N1911A/Power Meter                   | 07/09/2015       | Annual               | 07/09/2016      | MY45100523               |
| Agilent           | N1921A /POWER SENSOR                 | 07/09/2015       | Annual               | 07/09/2016      | MY45241059               |
| Hewlett Packard   | 8903B/Audio Analyzer                 | 12/16/2014       | Annual               | 12/16/2015      | 3413A13913               |
| Hewlett Packard   | 8901B/Modulation Analyzer            | 04/21/2015       | Annual               | 04/21/2016      | 2406A00169               |
| Tektronix         | RSA3303B/Real Time Spectrum Analyzer | 09/21/2015       | Annual               | 09/21/2016      | B010208                  |
| Agilent           | 8498A/30 dB Attenuator               | 11/04/2014       | Annual               | 11/04/2015      | 51162                    |
| EAGLE             | 220NFNM/Tuneable Notch Filter        | 10/31/2014       | Annual               | 10/31/2015      | H00564-7                 |
| EAGLE             | 220NFNM/Tuneable Notch Filter        | 10/29/2014       | Annual               | 10/29/2015      | H00564-8                 |
| EAGLE             | 230NFNM/Tuneable Notch Filter        | 10/29/2014       | Annual               | 10/29/2015      | H00564-9                 |
| Korea Engineering | KR-1005L / Temperature Chamber       | 11/12/2014       | Annual               | 11/12/2015      | KRAC05063-3CH            |
| CERNEX            | AMPLIFIER_CBLU1183540B               | 05/21/2015       | Annual               | 05/21/2016      | 25540                    |
| Wainwright        | WHKX1.0/15G-12SS                     | 08/12/2015       | Annual               | 08/12/2016      | 42                       |
| Schwarzbeck       | UHAP/ Dipole Antenna                 | 03/23/2015       | Biennial             | 03/23/2017      | 557                      |
| Schwarzbeck       | UHAP/ Dipole Antenna                 | 03/23/2015       | Biennial             | 03/23/2017      | 558                      |
| Schwarzbeck       | BBHA 9120D/ Horn Antenna             | 09/01/2014       | Biennial             | 09/01/2016      | 147                      |
| Schwarzbeck       | BBHA 9120D/ Horn Antenna             | 05/15/2015       | Biennial             | 05/15/2017      | 1299                     |
| ROHDE&SCHWARZ     | FSV40-N/Spectrum Analyzer            | 09/23/2015       | Annual               | 09/23/2016      | 101068-SZ                |
| Inn-co GmbH       | CT 0800/Turn table                   | N/A              | N/A                  | N/A             | AS2000P/034/9740<br>305  |
| Inn-co GmbH       | DE 3260/Ant. Mast                    | N/A              | N/A                  | N/A             | DE3260/005/78605<br>04/L |
| Schwarzbeck       | VULB 9160/ TRILOG Antenna            | 10/10/2014       | Biennial             | 10/10/2016      | 3368                     |