

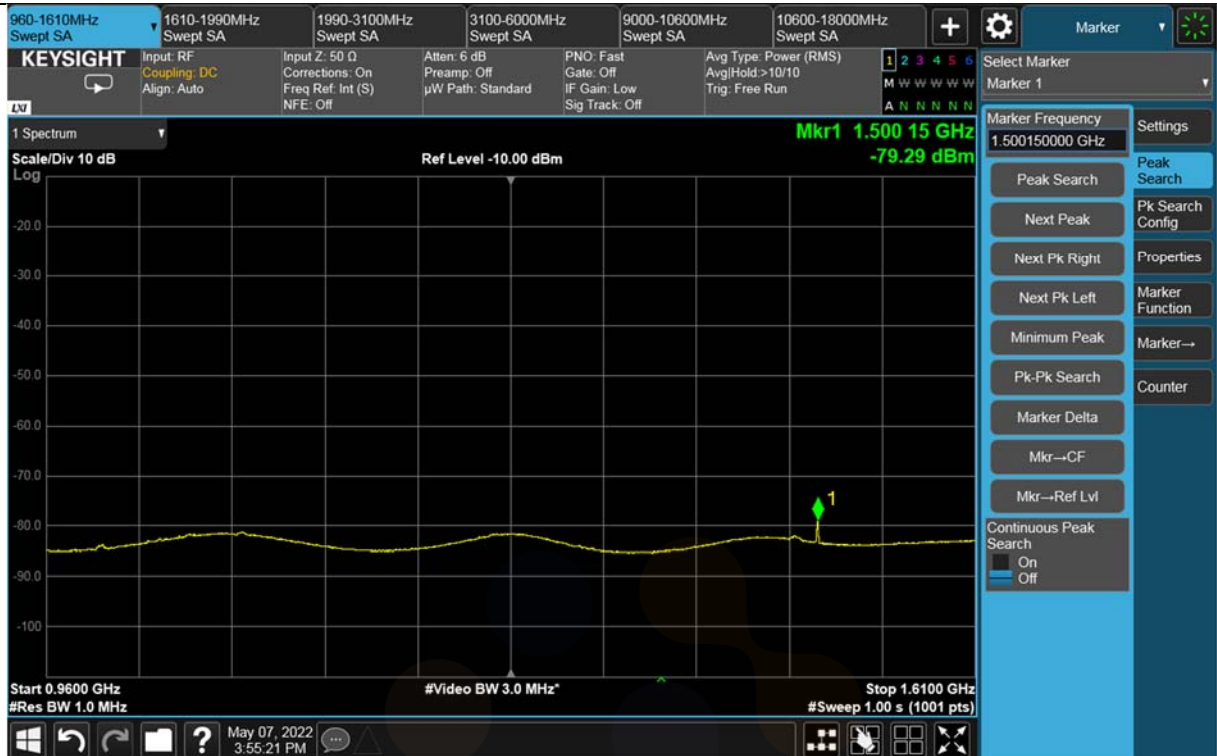
# KCTL Inc.

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TEL: 82-31-285-0894 FAX: 82-505-299-8311  
[www.kctl.co.kr](http://www.kctl.co.kr)

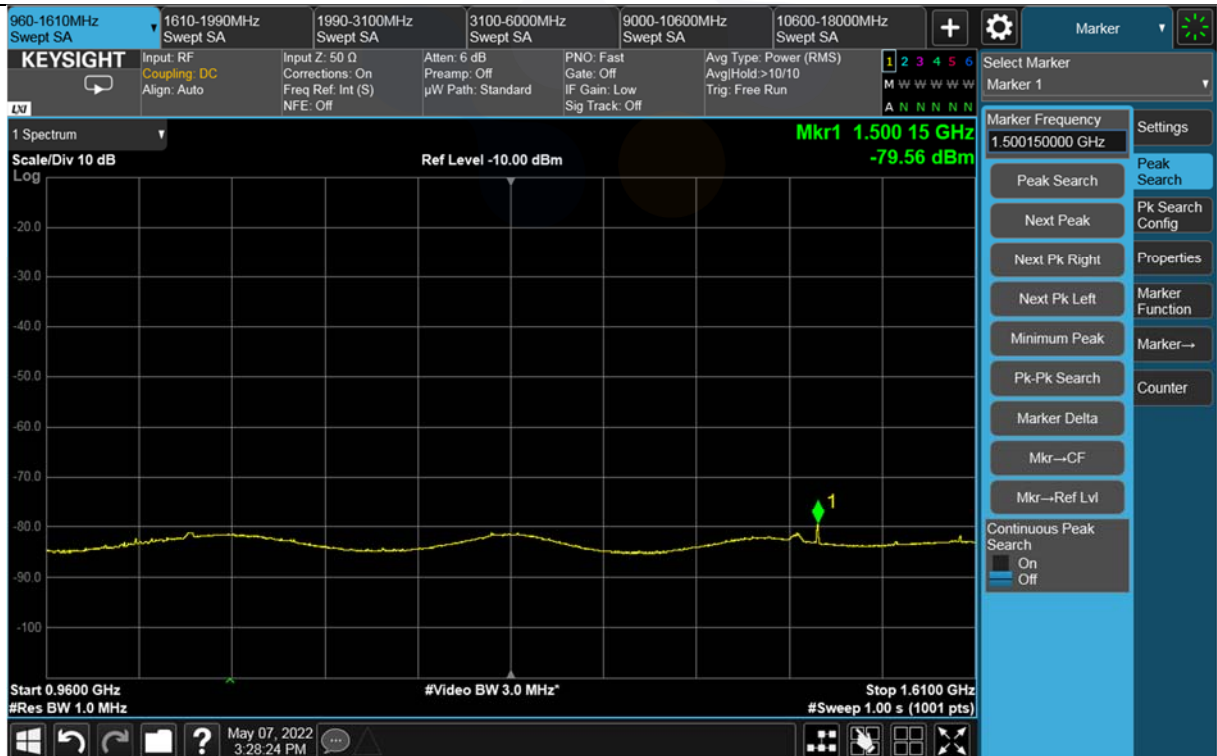
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## 960 MHz ~ 1 610 MHz Horizontal



## 960 MHz ~ 1 610 MHz Vertical



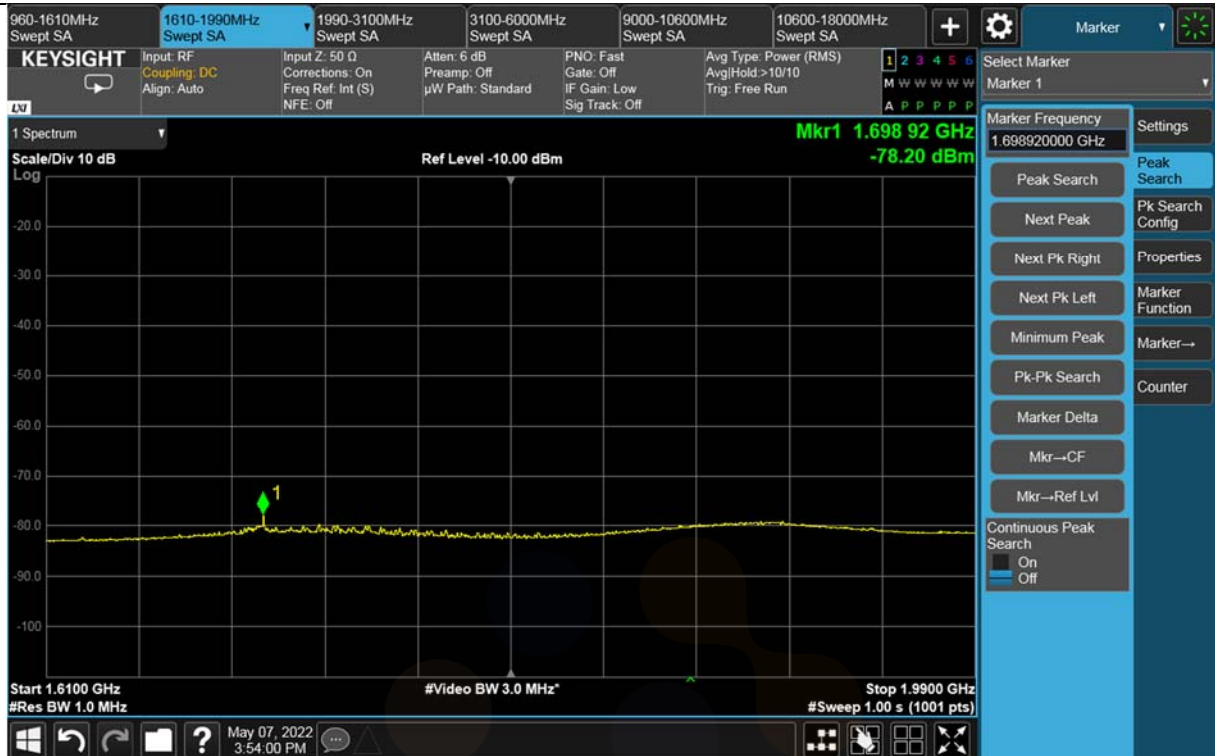
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## 1 610 MHz ~ 1 990 MHz Horizontal



## 1 610 MHz ~ 1 990 MHz Vertical



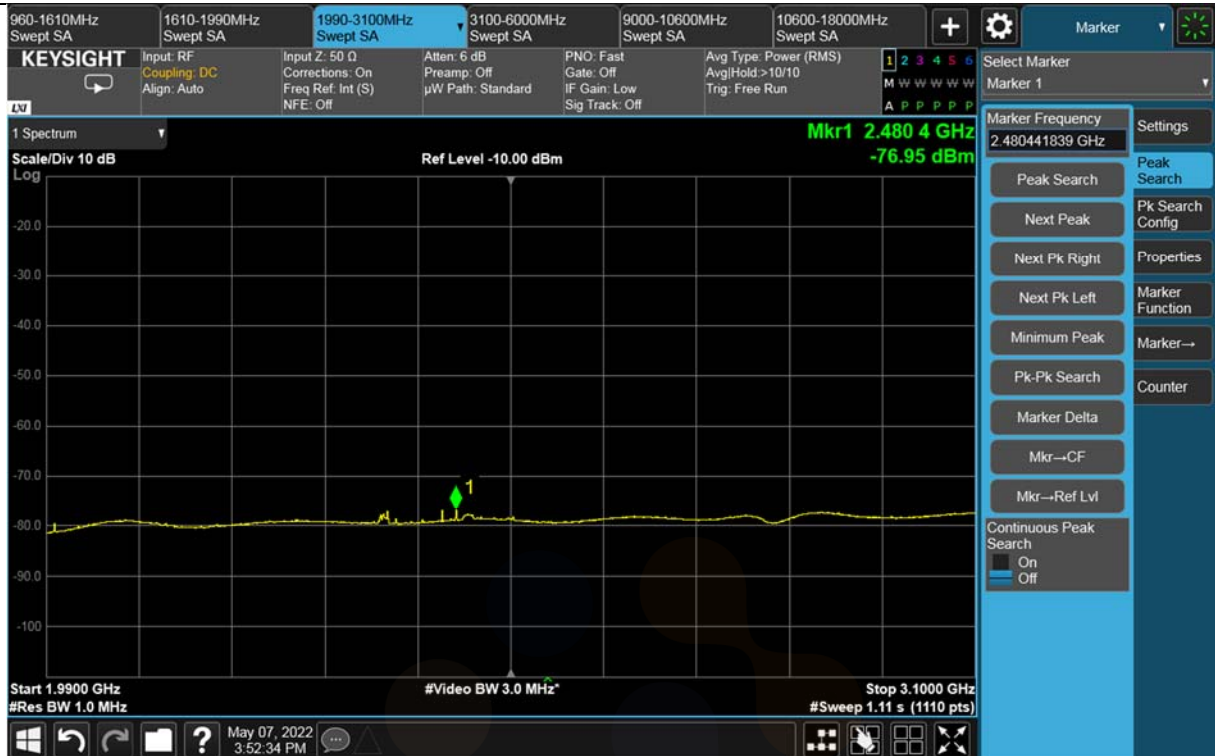
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TEL: 82-31-285-0894 FAX: 82-505-299-8311  
[www.kctl.co.kr](http://www.kctl.co.kr)

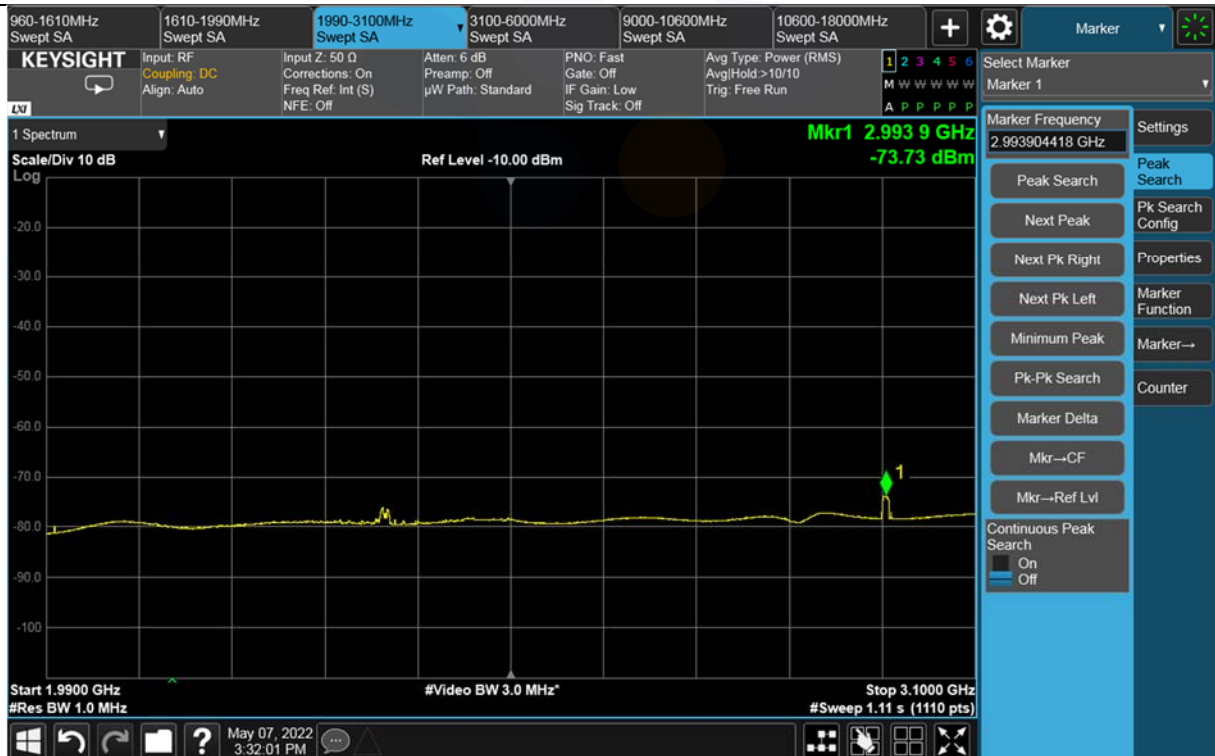
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## 1 990 MHz ~ 3 100 MHz Horizontal



## 1 990 MHz ~ 3 100 MHz Vertical



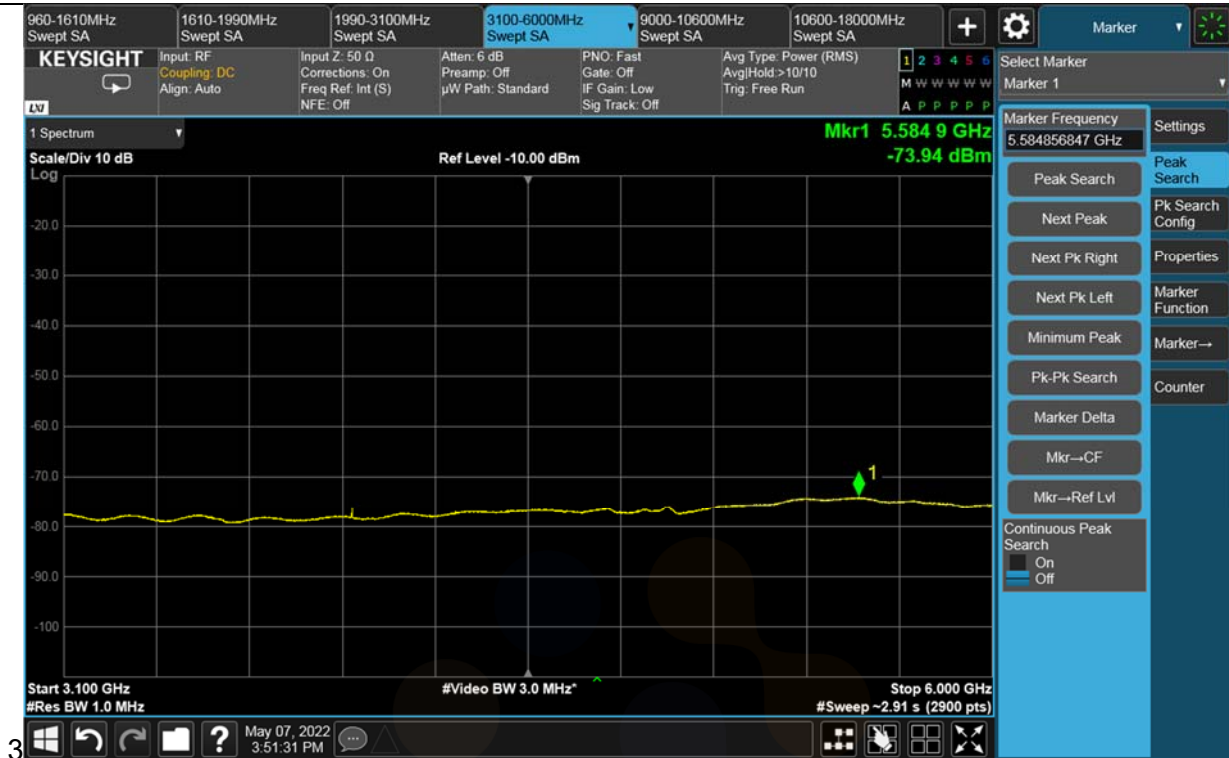
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## 3 100 MHz ~ 6 000 MHz Horizontal



## 3 100 MHz ~ 6 000 MHz Vertical



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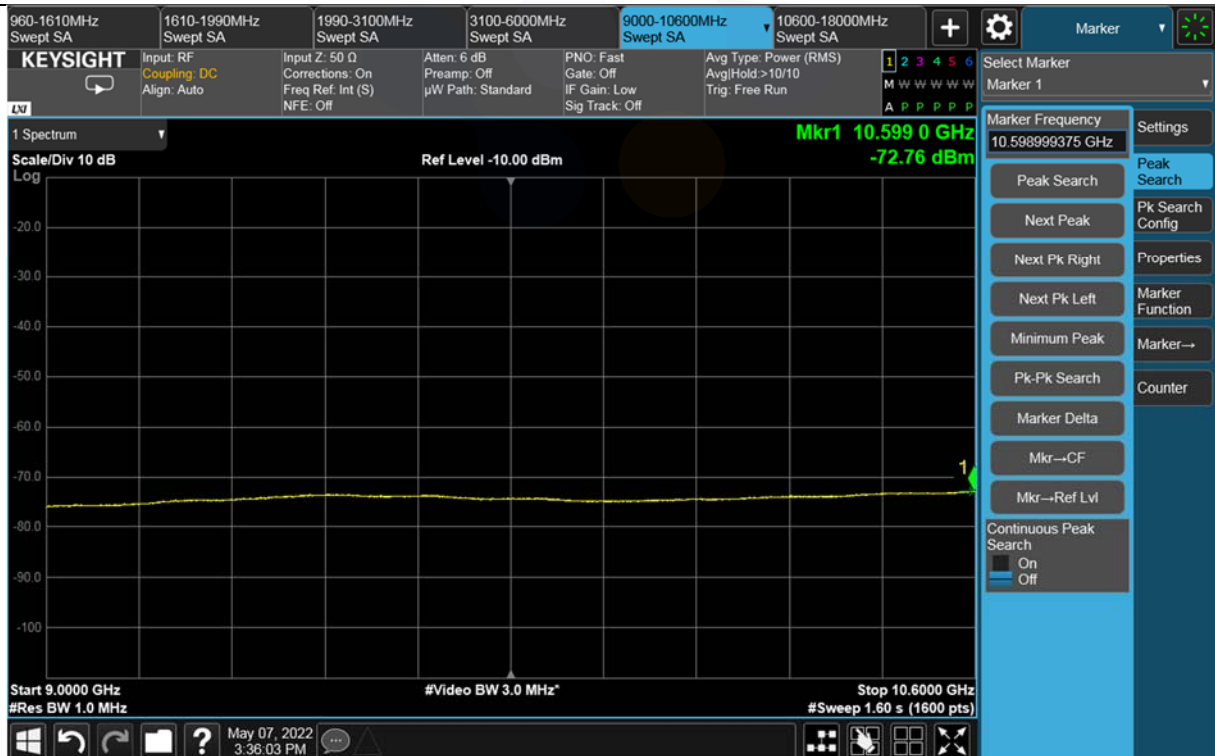
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## 9 000 MHz ~ 10 600 MHz Horizontal



## 9 000 MHz ~ 10 600 MHz Vertical



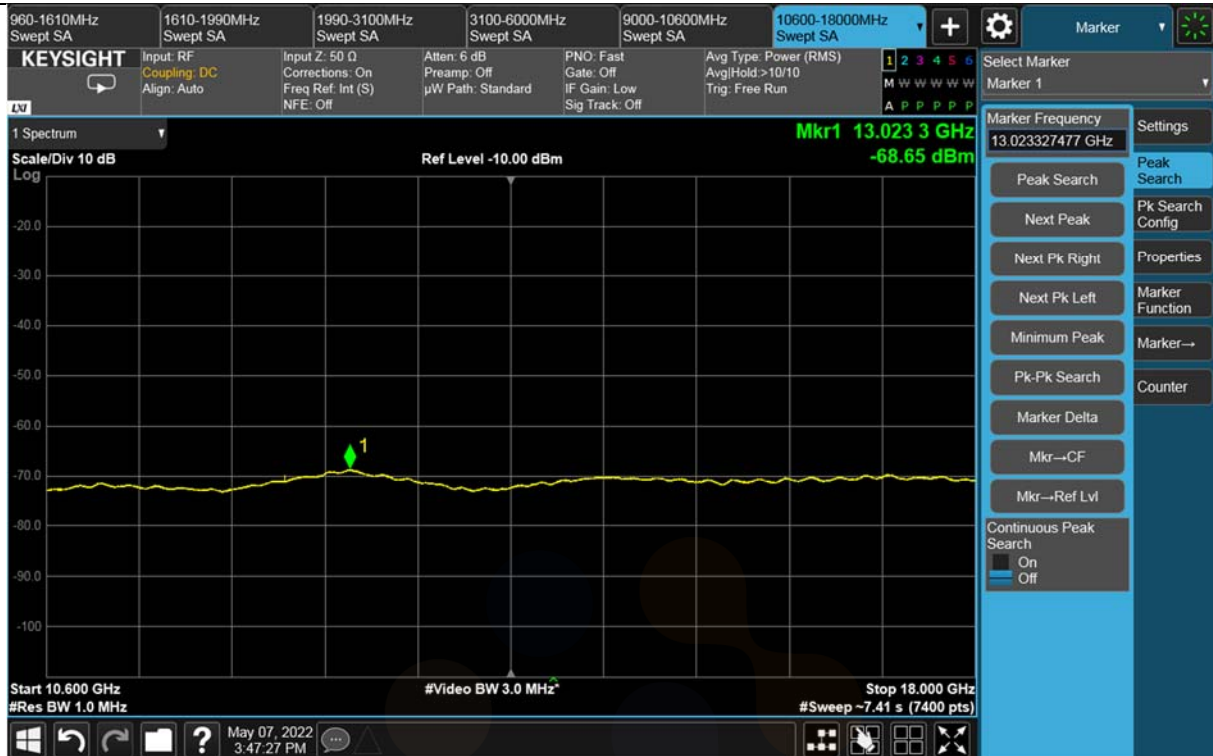
# KCTL Inc.

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TEL: 82-31-285-0894 FAX: 82-505-299-8311  
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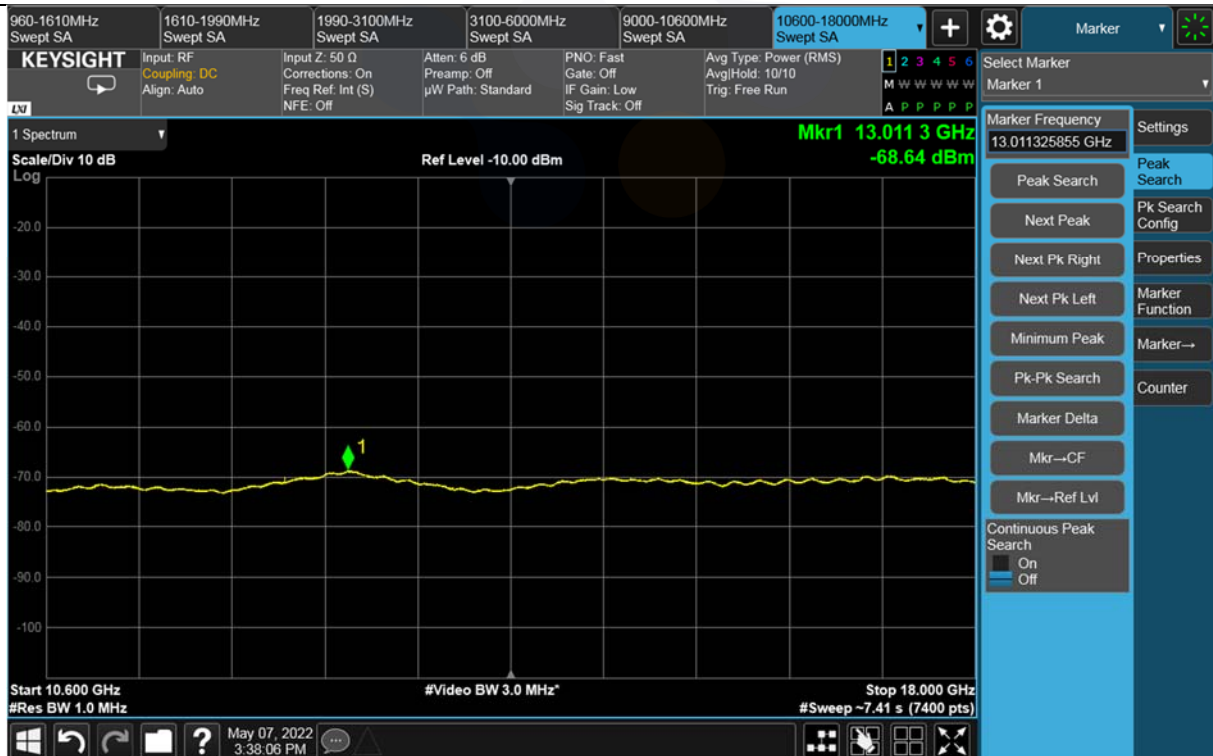
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## 10 600 MHz ~ 18 000 MHz Horizontal



## 10 600 MHz ~ 18 000 MHz Vertical



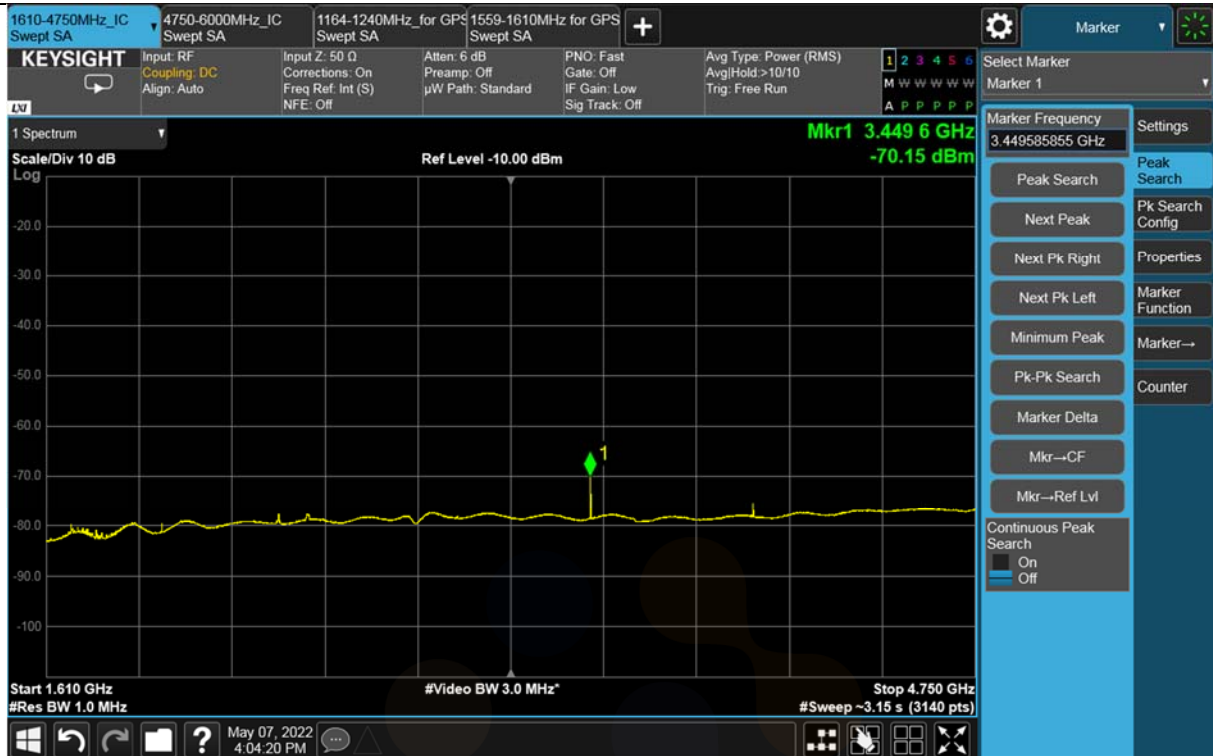
# KCTL Inc.

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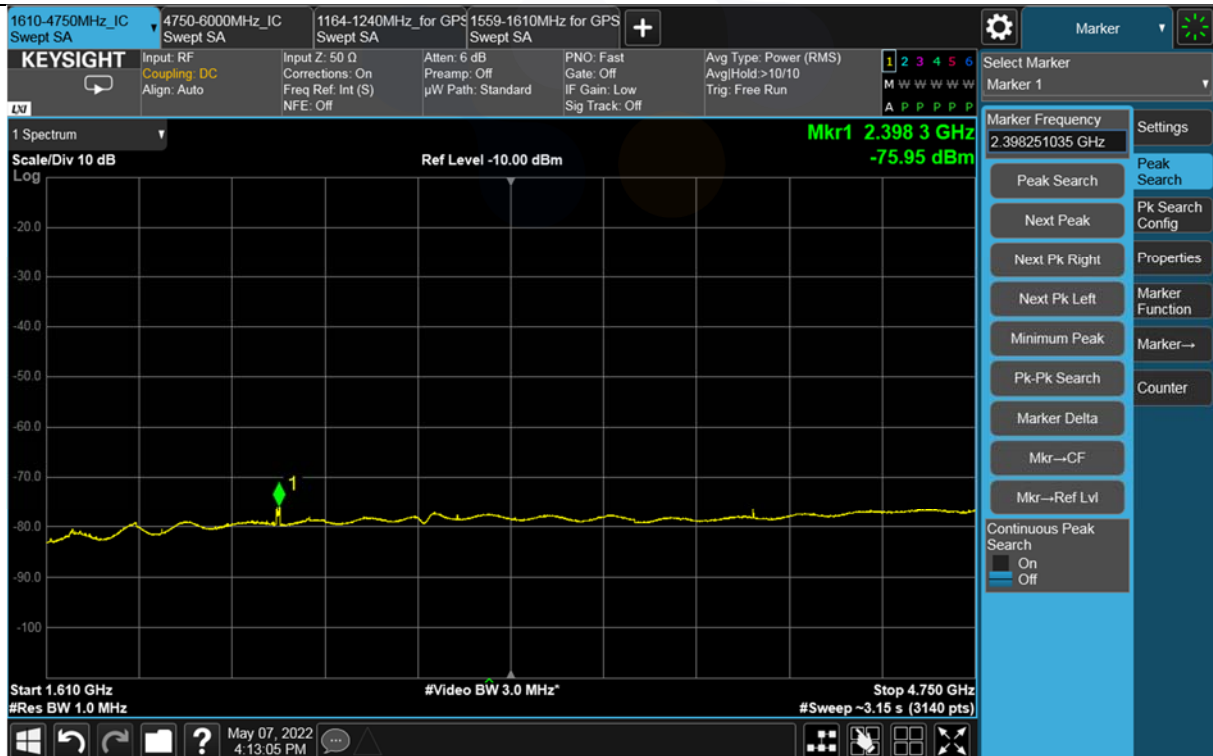
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## 1 610 MHz ~ 4 750 MHz Horizontal



## 1 610 MHz ~ 4 750 MHz Vertical



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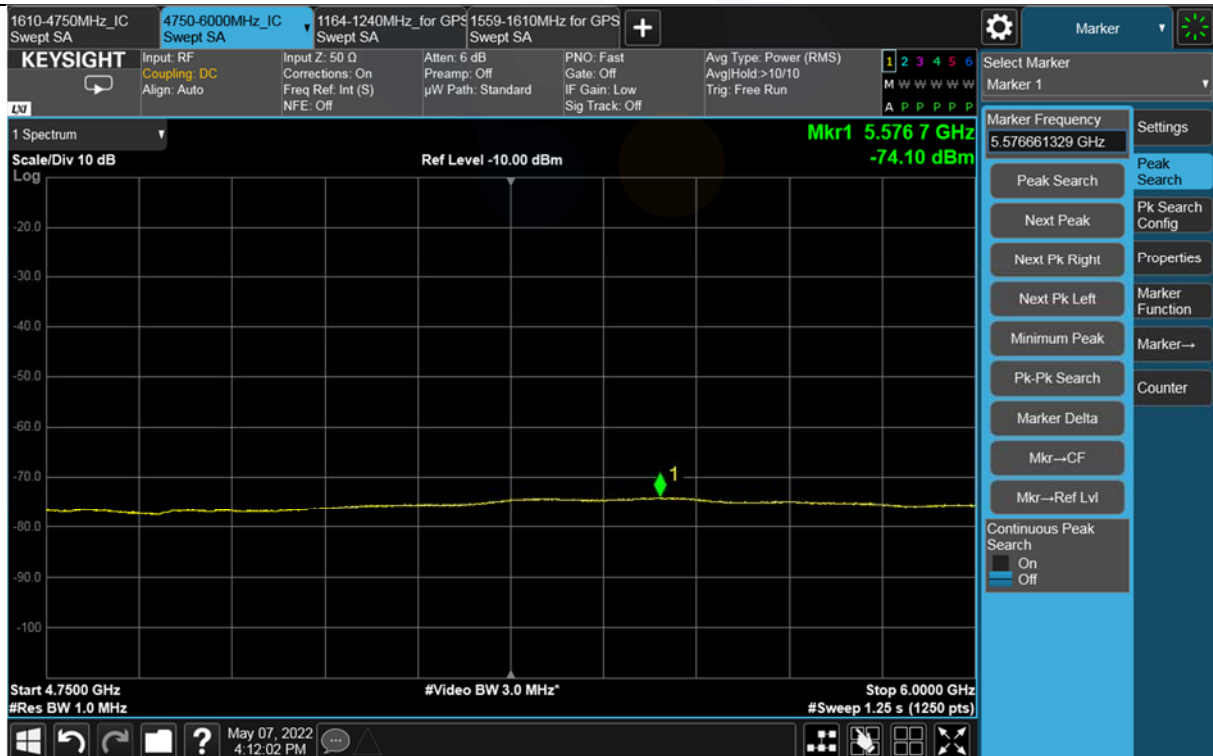
Report No.:  
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## 4 750 MHz ~ 6 000 MHz Horizontal



## 4 750 MHz ~ 6 000 MHz Vertical



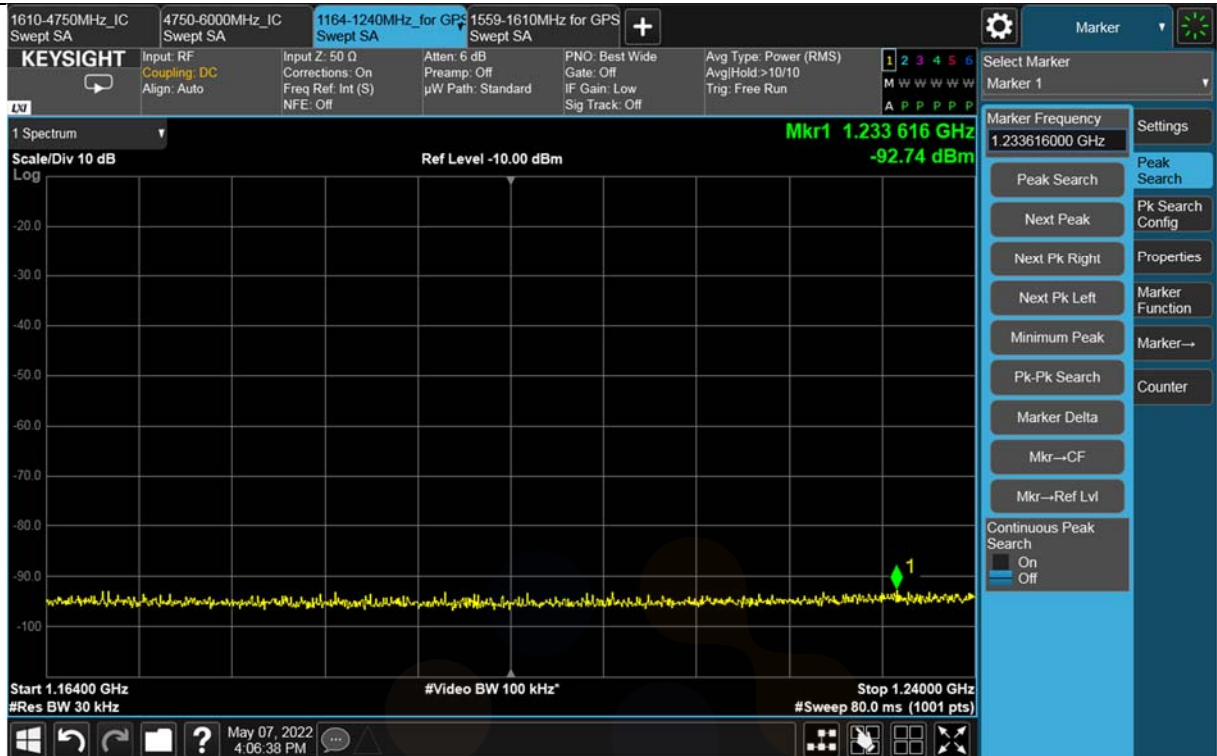
# KCTL Inc.

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Suwon-si, Gyeonggi-do, 16677, Korea  
TEL: 82-31-285-0894 FAX: 82-505-299-8311  
[www.kctl.co.kr](http://www.kctl.co.kr)

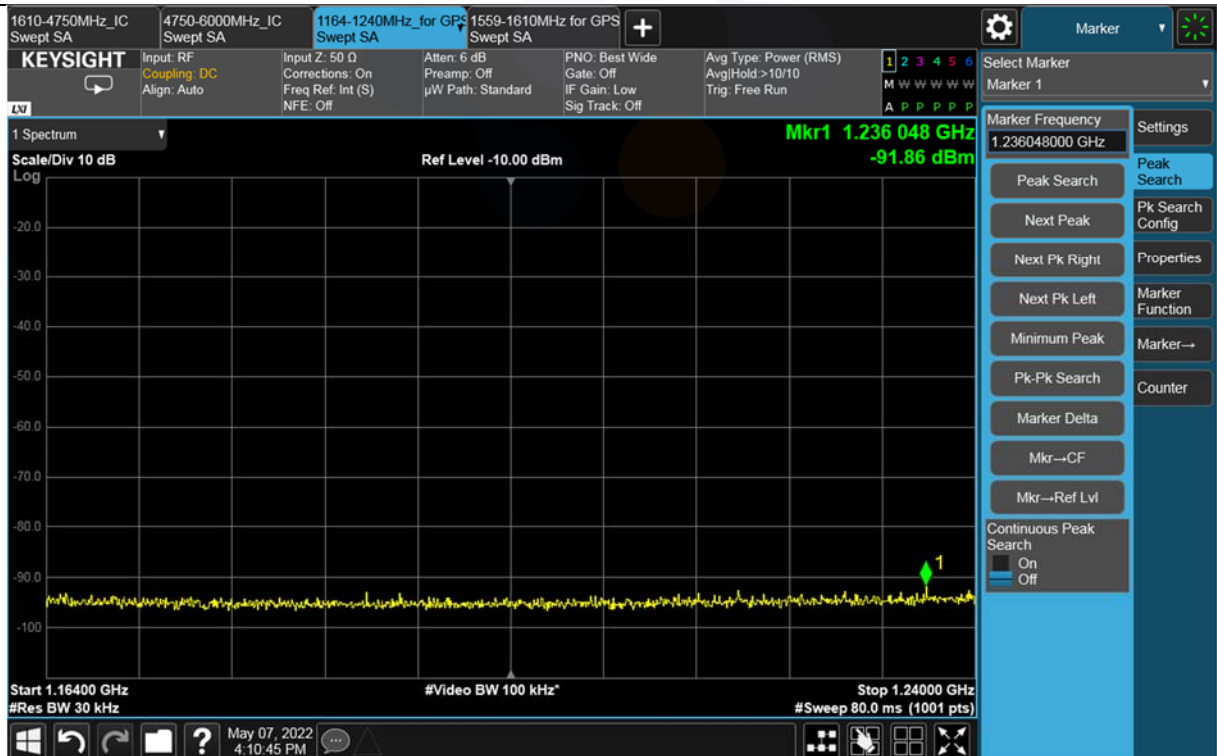
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## 1 164 MHz ~ 1 240 MHz Horizontal



## 1 164 MHz ~ 1 240 MHz Vertical



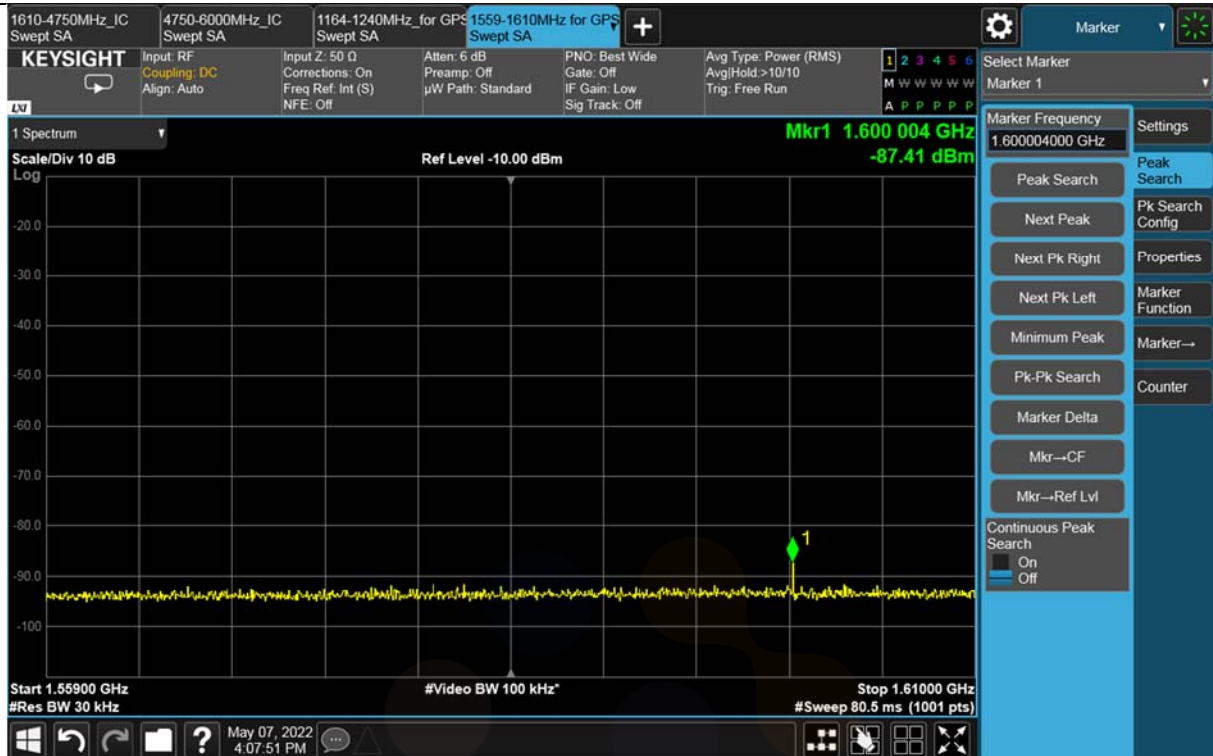
# KCTL Inc.

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Suwon-si, Gyeonggi-do, 16677, Korea  
TEL: 82-31-285-0894 FAX: 82-505-299-8311  
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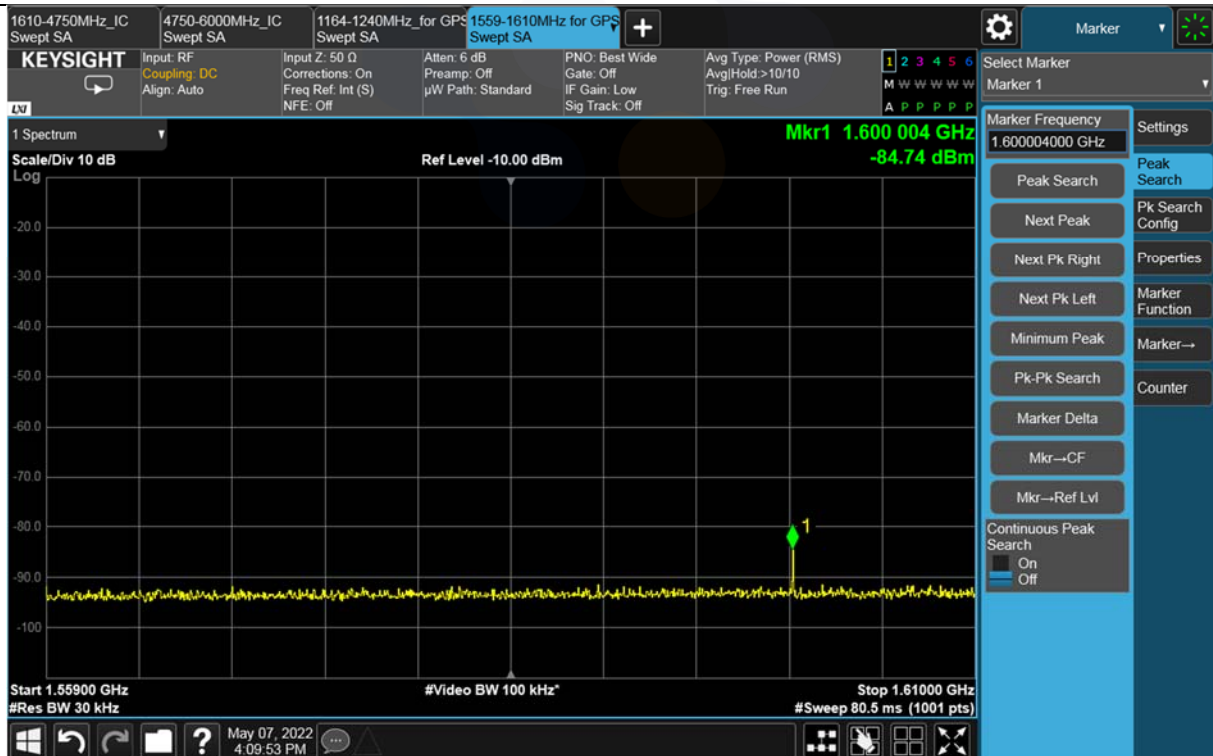
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## 1 559 MHz ~ 1 610 MHz Horizontal



## 1 559 MHz ~ 1 610 MHz Vertical



## 6.4. Radiated Spurious Emission – Below 960 MHz

### Limit

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency[MHz] | Field strength [ $\mu\text{V}/\text{m}$ ] | Measurement distance[m] |
|----------------|-------------------------------------------|-------------------------|
| 0.009-0.490    | 2400/F                                    | 300                     |
| 0.490-1.705    | 24000/F                                   | 30                      |
| 1.705-30.0     | 30                                        | 30                      |
| 30-88          | 100**                                     | 3                       |
| 88-216         | 150**                                     | 3                       |
| 216-960        | 200**                                     | 3                       |
| Above 960      | 500                                       | 3                       |

#### \*Radiated Limit

\*\*Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

### Test procedure

ANSI C63.10-2013

### Test settings

#### **Below 30 MHz**

RBW 120 kHz (for emissions from 30 MHz – 1 GHz)  
 Detector Quasi-peak  
 Trace mode Max-hold  
 Sweep time Auto couple  
 The trace was allowed to stabilize

#### **Below 960 MHz**

RBW 120 kHz (for emissions from 30 MHz – 1 GHz)  
 VBW 300 kHz  
 Detector Peak  
 Trace mode Max-hold  
 Sweep time Auto couple  
 The trace was allowed to stabilize

\*The Limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field Strength levels (as reported in the table) using the free space impedance of  $377\Omega$ . For example, the measurement frequency X kHz resulted in a level of Y dB( $\mu\text{V}/\text{m}$ ), which is equivalent to  $Y-51.5 = Z$  dB( $\mu\text{A}/\text{m}$ ), which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit

## Test results

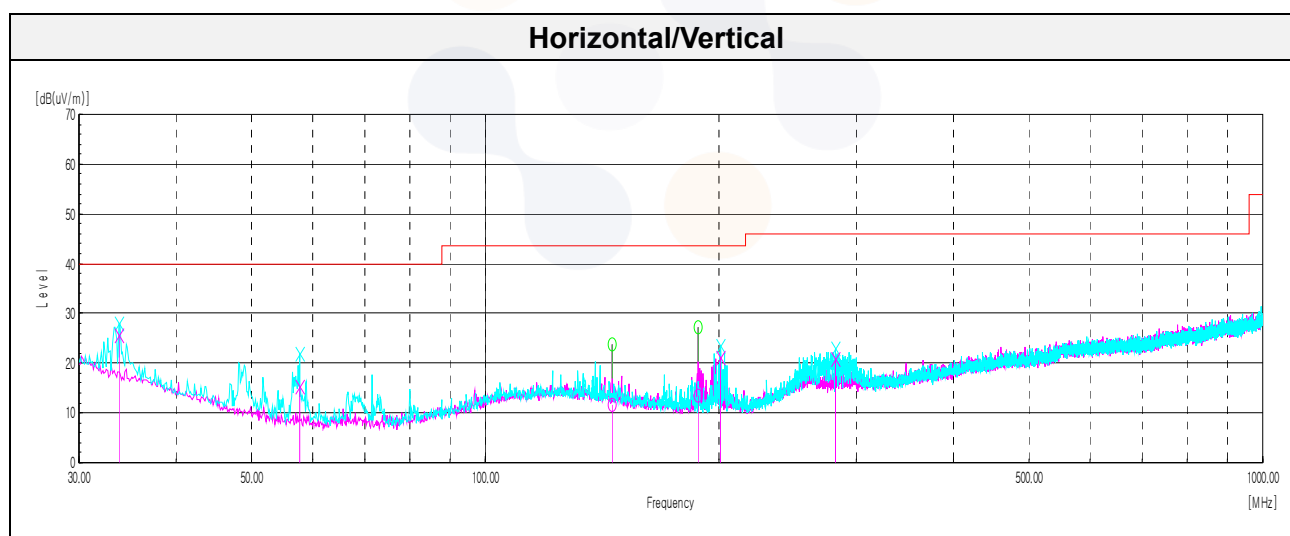
### Worst case(Below 30 MHz) : ANT. A\_CH. 5\_Preamble 9

| Frequency<br>[MHz]                                             | Pol.<br>[V/H] | Reading<br>[dB(μV)] | Ant. Factor<br>[dB] | Amp. + Cable<br>[dB] | Conv. Factor<br>[dB] | Result<br>[dB(μV/m)] | Limit<br>[dB(μV/m)] | Margin<br>[dB] |
|----------------------------------------------------------------|---------------|---------------------|---------------------|----------------------|----------------------|----------------------|---------------------|----------------|
| No spurious emissions were detected within 20 dB of the limit. |               |                     |                     |                      |                      |                      |                     |                |

### Worst case(Below 960 MHz) : ANT. A\_CH. 5\_Preamble 9

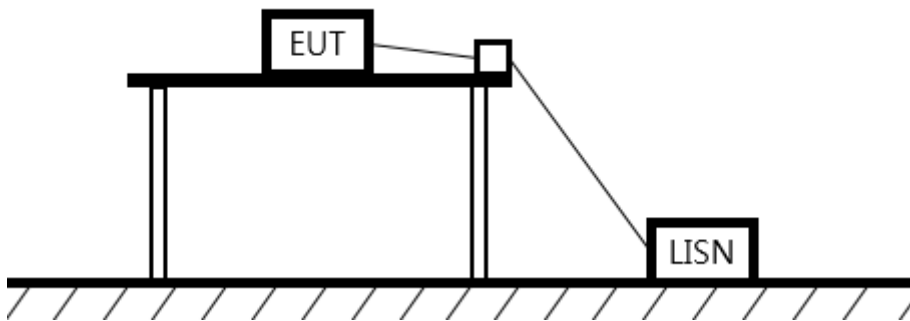
| Frequency<br>[MHz] | Pol.<br>[V/H] | Reading<br>[dB(μV)] | Ant. Factor<br>[dB] | Amp. + Cable<br>[dB] | Conv. Factor<br>[dB] | Result<br>[dB(μV/m)] | Limit<br>[dB(μV/m)] | Margin<br>[dB] |
|--------------------|---------------|---------------------|---------------------|----------------------|----------------------|----------------------|---------------------|----------------|
| 33.76              | V             | 33.40               | 22.52               | -30.44               | -                    | 25.48                | 40.00               | 14.52          |
| 57.65              | V             | 32.80               | 12.68               | -29.82               | -                    | 15.66                | 40.00               | 24.34          |
| 145.55             | H             | 23.20               | 16.87               | -28.37               | -                    | 11.70                | 43.50               | 31.80          |
| 187.75             | H             | 26.50               | 15.02               | -27.88               | -                    | 13.64                | 43.50               | 29.86          |
| 200.96             | V             | 33.70               | 15.26               | -27.69               | -                    | 21.27                | 43.50               | 22.23          |
| 281.84             | V             | 28.90               | 18.85               | -26.76               | -                    | 20.99                | 46.00               | 25.01          |

\*Configuration : 0 / Preamble Length : 256 / Packet Length : 32 as a default setting.



## 6.5. AC Conducted emission

### Test setup



### Limit

According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 $\mu$ H/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

| Frequency of Emission (MHz) | Conducted limit (dB $\mu$ V/m) |          |
|-----------------------------|--------------------------------|----------|
|                             | Quasi-peak                     | Average  |
| 0.15 – 0.50                 | 66 - 56*                       | 56 - 46* |
| 0.50 – 5.00                 | 56                             | 46       |
| 5.00 – 30.0                 | 60                             | 50       |

### Measurement procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50 $\Omega$ /50 $\mu$ H LISN, which is an input transducer to a spectrum analyzer or an EMI/Field Intensity — Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to peak amplitude within a bandwidth of 10 kHz or to quasi-peak and average within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

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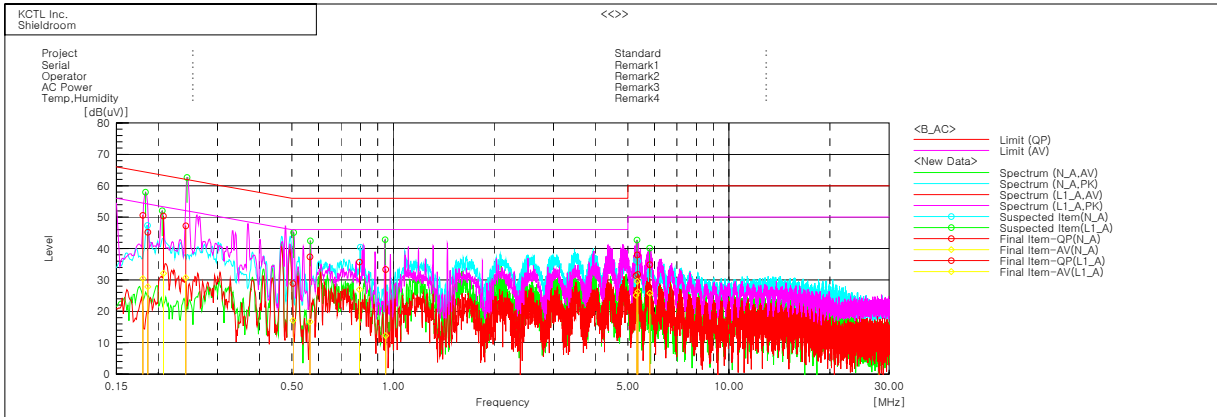
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Suwon-si, Gyeonggi-do, 16677, Korea  
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## Test results

### Worst case: ANT. A CH. 5\_Preamble9



#### Final Result

| --- N_A Phase --- |           |            |             |      |           |            |          |          |           |            |
|-------------------|-----------|------------|-------------|------|-----------|------------|----------|----------|-----------|------------|
| No.               | Frequency | Reading QP | Reading CAV | c.f  | Result QP | Result CAV | Limit QP | Limit AV | Margin QP | Margin CAV |
|                   | [MHz]     | [dB(uV)]   | [dB(uV)]    | [dB] | [dB(uV)]  | [dB(uV)]   | [dB(uV)] | [dB(uV)] | [dB]      | [dB]       |
| 1                 | 0.18616   | 35.1       | 17.7        | 10.1 | 45.2      | 27.8       | 64.2     | 54.2     | 19.0      | 26.4       |
| 2                 | 0.7939    | 25.9       | 17.1        | 9.8  | 35.7      | 26.9       | 56.0     | 46.0     | 20.3      | 19.1       |
| 3                 | 5.28813   | 21.6       | 15.3        | 9.8  | 31.4      | 25.1       | 60.0     | 50.0     | 28.6      | 24.9       |
| 4                 | 5.35198   | 21.9       | 16.4        | 9.8  | 31.7      | 26.2       | 60.0     | 50.0     | 28.3      | 23.8       |

| --- L1_A Phase --- |           |            |             |      |           |            |          |          |           |            |
|--------------------|-----------|------------|-------------|------|-----------|------------|----------|----------|-----------|------------|
| No.                | Frequency | Reading QP | Reading CAV | c.f  | Result QP | Result CAV | Limit QP | Limit AV | Margin QP | Margin CAV |
|                    | [MHz]     | [dB(uV)]   | [dB(uV)]    | [dB] | [dB(uV)]  | [dB(uV)]   | [dB(uV)] | [dB(uV)] | [dB]      | [dB]       |
| 1                  | 0.24155   | 37.5       | 21.0        | 9.7  | 47.2      | 30.7       | 62.0     | 52.0     | 14.8      | 21.3       |
| 2                  | 0.17995   | 40.5       | 20.3        | 10.1 | 50.6      | 30.4       | 64.5     | 54.5     | 13.9      | 24.1       |
| 3                  | 0.20716   | 40.5       | 22.2        | 9.9  | 50.4      | 32.1       | 63.3     | 53.3     | 12.9      | 21.2       |
| 4                  | 0.95031   | 23.6       | 2.5         | 9.8  | 33.4      | 12.3       | 56.0     | 46.0     | 22.6      | 33.7       |
| 5                  | 0.56565   | 27.5       | 6.7         | 9.9  | 37.4      | 16.6       | 56.0     | 46.0     | 18.6      | 29.4       |
| 6                  | 0.50308   | 19.0       | 7.2         | 9.9  | 28.9      | 17.1       | 56.0     | 46.0     | 27.1      | 28.9       |
| 7                  | 5.331     | 28.0       | 19.6        | 9.9  | 37.9      | 29.5       | 60.0     | 50.0     | 22.1      | 20.5       |
| 8                  | 5.81345   | 25.0       | 15.8        | 9.9  | 34.9      | 25.7       | 60.0     | 50.0     | 25.1      | 24.3       |

## 7. Measurement equipment

| Equipment Name           | Manufacturer                | Model No.              | Serial No.  | Next Cal. Date |
|--------------------------|-----------------------------|------------------------|-------------|----------------|
| UXA Signal Analyzer      | KEYSIGHT                    | N9040B                 | US56050101  | 22.07.28       |
| Signal Generator         | R&S                         | SMB100A                | 176206      | 23.01.19       |
| EMI TEST RECEIVER        | R&S                         | ESCI3                  | 101408      | 22.08.19       |
| Bi-Log Antenna           | AMETEK                      | CBL 6112D              | 55545       | 24.04.27       |
| Amplifier                | SONOMA INSTRUMENT           | 310N                   | 284608      | 22.08.19       |
| COAXIAL FIXED ATTENUATOR | Agilent                     | 8491B-003              | 2708A18758  | 24.04.19       |
| Horn antenna             | ETS.lindgren                | 3117                   | 155787      | 22.10.05       |
| Horn antenna             | ETS.lindgren                | 3116                   | 86635       | 23.05.04       |
| Broadband PreAmplifier   | SCHWARZBECK                 | BBV9718                | 216         | 22.07.27       |
| AMPLIFIER                | L-3 Narda-MITEQ             | AMF-7D-01001800-22-10P | 2003683     | 22.08.19       |
| AMPLIFIER                | L-3 Narda-MITEQ             | JS44-18004000-33-8P    | 2000996     | 23.01.21       |
| LOOP Antenna             | R&S                         | HFH2-Z2                | 100355      | 22.08.21       |
| Antenna Mast             | Innco Systems               | MA4640-XP-ET           | -           | -              |
| Turn Table               | Innco Systems               | DT2000                 | 79          | -              |
| Antenna Mast             | Innco Systems               | MA4000-EP              | 303         | -              |
| Turn Table               | Innco Systems               | DT2000                 | 79          | -              |
| High Pass Filter         | Wainwright Instruments GmbH | WHKX6.5/18G-8SS        | 2           | 23.05.03       |
| High Pass Filter         | QOTANA TECHNOLOGIES         | DBHF0508004000A        | 20070100016 | 22.07.09       |
| TWO-LINE V - NETWORK     | R&S                         | ENV216                 | 101358      | 22.09.30       |
| EMI TEST RECEIVER        | R&S                         | ESCI                   | 100001      | 22.08.19       |
| Vector Signal Generator  | R&S                         | SMBV100A               | 257566      | 22.07.09       |

**End of test report**