
FCC Test Report

Report No.: AGC03762160801FE04

FCC ID : 2ADUB-ROAMWIFIR9
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : LTE Wireless Data Terminal
BRAND NAME : RoamWiFi
MODEL NAME : RoamWiFi R9
CLIENT : Tianjin RoamWiFi Technology Co., Ltd.
DATE OF ISSUE : Jan. 19,2017
STANDARD(S) : FCC Part 15.247
TEST PROCEDURE(S) : KDB 558074 v03r02
REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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Report Revise Record

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|----------------|-------------|-------------|---------------|-----------------|
| V1.0 | / | Jan.19,2017 | Valid | Original Report |

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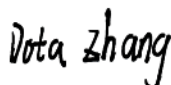
1. VERIFICATION OF CONFORMITY

| | |
|---------------------------------|--|
| Applicant | Tianjin RoamWiFi Technology Co., Ltd. |
| Address | 2018 Zhong Tian Road , Block 16 Unit 429, Ready built office, Tianjin Eco-city, Tianjin, China |
| Manufacturer | Tianjin RoamWiFi Technology Co., Ltd. |
| Address | 2018 Zhong Tian Road , Block 16 Unit 429, Ready built office, Tianjin Eco-city, Tianjin, China |
| Product Designation | LTE Wireless Data Terminal |
| Brand Name | RoamWiFi |
| Test Model | RoamWiFi R9 |
| Date of test | Nov.03,2016 to Jan.18,2017 |
| Deviation | None |
| Condition of Test Sample | Normal |
| Report Template | AGCRT-US-BGN/RF |

We hereby certify that:

The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with requirement of FCC Part 15 Rules requirement.

Tested By



Dota Zhang(Zhang Jianfeng)

Jan.18,2017

Reviewed By



Bart Xie(Xie Xiaobin)

Jan.19,2017

Approved By



Solger Zhang(Zhang Hongyi)
Authorized Officer

Jan.19,2017

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as “LTE WIRELESS DATA TERMINAL”. It is designed by way of utilizing the DSSS and OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

| | |
|----------------------------|--|
| Operation Frequency | 2.412 GHz~2.462GHz |
| Output Power | IEEE 802.11b: 11.67 dBm; IEEE 802.11g: 10.63 dBm; IEEE 802.11n(20): 10.29 dBm; |
| Modulation | DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM) |
| Number of channels | 11 |
| Hardware Version | SP941-V |
| Software Version | RoamWiFi_4.00.016 |
| Antenna Designation | Integrated Antenna |
| Antenna Gain | 0.8dBi |
| Power Supply | DC3.7V by Built-in Li-ion Battery |

2.2. TABLE OF CARRIER FREQUENCIES

| Frequency Band | Channel Number | Frequency |
|----------------|----------------|-----------|
| 2400~2483.5MHZ | 1 | 2412 MHZ |
| | 2 | 2417 MHZ |
| | 3 | 2422 MHZ |
| | 4 | 2427 MHZ |
| | 5 | 2432 MHZ |
| | 6 | 2437 MHZ |
| | 7 | 2442 MHZ |
| | 8 | 2447 MHZ |
| | 9 | 2452 MHZ |
| | 10 | 2457 MHZ |
| | 11 | 2462 MHZ |

Note: For 20MHZ bandwidth system use Channel 1 to Channel 11

2.3. IEEE 802.11N MODULATION SCHEME

| MCS Index | Nss | Modulation | R | NBPSC | NCBPS | NDBPS | Data rate(Mbps) |
|-----------|-----|------------|-----|-------|-------|-------|-----------------|
| | | | | | | | 800nsGI |
| | | | | | 20MHz | 20MHz | 20MHz |
| 0 | 1 | BPSK | 1/2 | 1 | 52 | 26 | 6.5 |
| 1 | 1 | QPSK | 1/2 | 2 | 104 | 52 | 13.0 |
| 2 | 1 | QPSK | 3/4 | 2 | 104 | 78 | 19.5 |
| 3 | 1 | 16-QAM | 1/2 | 4 | 208 | 104 | 26.0 |
| 4 | 1 | 16-QAM | 3/4 | 4 | 208 | 156 | 39.0 |
| 5 | 1 | 64-QAM | 2/3 | 6 | 312 | 208 | 52.0 |
| 6 | 1 | 64-QAM | 3/4 | 6 | 312 | 234 | 58.5 |
| 7 | 1 | 64-QAM | 5/6 | 6 | 312 | 260 | 65.0 |

| Symbol | Explanation |
|--------|---|
| NSS | Number of spatial streams |
| R | Code rate |
| NBPSC | Number of coded bits per single carrier |
| NCBPS | Number of coded bits per symbol |
| NDBPS | Number of data bits per symbol |
| GI | Guard interval |

2.4. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2ADUB-ROAMWIFIR9** filing to comply with the FCC Part 15 requirements.

2.5. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013).

Radiated testing was performed at an antenna to EUT distance 3 meters.

Others testing (listed at item 5.3) was performed according to the procedures in FCC Part 15.247 rules KDB 558074 D01 DTS Meas Guidance v03r02.

2.6. SPECIAL ACCESSORIES

Refer to section 5.2.

2.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 2.75dB

Radiated measurement: +/- 3.2dB

4. DESCRIPTION OF TEST MODES

| NO. | TEST MODE DESCRIPTION |
|-----|-----------------------|
| 1 | Low channel TX |
| 2 | Middle channel TX |
| 3 | High channel TX |
| 4 | Normal operating |

Note:

Transmit by 802.11b with Data rate (1/2/5.5/11)

Transmit by 802.11g with Data rate (6/9/12/18/24/36/48/54)

Transmit by 802.11n (20MHz) with Data rate (6.5/13/19.5/26/39/52/58.5/65)

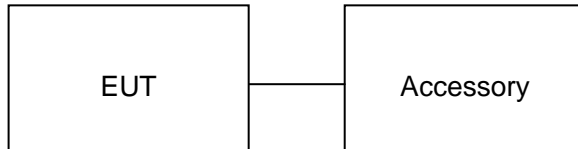
Note:

1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the eut is operating at its maximum duty cycle>or equal 98%
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.
3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure:



5.2. EQUIPMENT USED IN EUT SYSTEM

| Item | Equipment | Model No. | ID or Specification | Remark |
|------|----------------------------|-------------|-----------------------------|-----------|
| 1 | LTE Wireless Data Terminal | RoamWiFi R9 | FCC ID: 2ADUB-ROAMWIFIR9 | EUT |
| 2 | Battery | 6858102PL | DC3.7V/ 5000 mAh | Accessory |

Note: All the accessories have been used during the test in conduction emission test.

5.3. SUMMARY OF TEST RESULTS

| FCC RULES | DESCRIPTION OF TEST | RESULT |
|-----------|---|-----------|
| §15.247 | Output Power | Compliant |
| §15.247 | 6 dB Bandwidth | Compliant |
| §15.247 | Conducted Spurious Emission | Compliant |
| §15.247 | Maximum Conducted Output Power SPECTRAL Density | Compliant |
| §15.209 | Radiated Emission | Compliant |
| §15.247 | Band Edges | Compliant |

Note: The EUT received power from DC3.7V lithium battery.

6. TEST FACILITY

| | |
|-----------------------------|---|
| Site | Dongguan Precise Testing Service Co., Ltd. |
| Location | Building D,Baoding Technology Park,Guangming Road2,Dongcheng District, Dongguan, Guangdong, China, |
| FCC Registration No. | 371540 |
| Description | The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.10:2013. |

ALL TEST EQUIPMENT LIST

FOR RADIATED EMISSION TEST (BELOW 1GHZ)

| Radiated Emission Test Site | | | | | |
|-------------------------------------|-----------------|--------------|---------------|------------------|-----------------|
| Name of Equipment | Manufacturer | Model Number | Serial Number | Last Calibration | Due Calibration |
| EMI Test Receiver | Rohde & Schwarz | ESCI | 101417 | July 3, 2016 | July 2, 2017 |
| Trilog Broadband Antenna (25M-1GHz) | SCHWARZBECK | VULB9160 | 9160-3355 | July 3, 2016 | July 2, 2017 |
| Signal Amplifier | SCHWARZBECK | BBV 9475 | 9745-0013 | July 3, 2016 | July 2, 2017 |
| RF Cable | SCHWARZBECK | AK9515E | 96221 | July 3, 2016 | July 2, 2017 |
| 3m Anechoic Chamber | CHENGYU | 966 | PTS-001 | June 5, 2016 | June 4, 2017 |
| MULTI-DEVICE Positioning Controller | Max-Full | MF-7802 | MF780208339 | N/A | N/A |
| Active loop antenna (9K-30MHz) | Schwarzbeck | FMZB1519 | 1519-038 | June 5, 2016 | June 4, 2017 |
| Spectrum analyzer | Agilent | E4407B | MY46185649 | June 5, 2016 | June 4, 2017 |
| Power Probe | R&S | NRP-Z23 | 100323 | July 24,2016 | July 23,2017 |
| RF attenuator | N/A | RFA20db | 68 | N/A | N/A |

FOR RADIATED EMISSION TEST (1GHZ ABOVE)

| Radiated Emission Test Site | | | | | |
|-------------------------------------|-----------------|--------------|---------------|------------------|-----------------|
| Name of Equipment | Manufacturer | Model Number | Serial Number | Last Calibration | Due Calibration |
| EMI Test Receiver | Rohde & Schwarz | ESCI | 101417 | July 3, 2016 | July 2, 2017 |
| Horn Antenna (1G-18GHz) | SCHWARZBECK | BBHA9120D | 9120D-1246 | July 10, 2016 | July 9, 2017 |
| Spectrum Analyzer | Agilent | E4411B | MY4511453 | July 3, 2016 | July 2, 2017 |
| Signal Amplifier | SCHWARZBECK | BBV 9718 | 9718-269 | July 6, 2016 | July 5, 2017 |
| RF Cable | SCHWARZBECK | AK9515H | 96220 | July 7, 2016 | July 6, 2017 |
| 3m Anechoic Chamber | CHENGYU | 966 | PTS-001 | June 5, 2016 | June 4, 2017 |
| MULTI-DEVICE Positioning Controller | Max-Full | MF-7802 | MF780208339 | N/A | N/A |

| | | | | | |
|----------------------|-------------|-----------|----------|--------------|--------------|
| Horn Ant (18G-40GHz) | Schwarzbeck | BBHA 9170 | 9170-181 | June 5, 2016 | June 4, 2017 |
| Power Probe | R&S | NRP-Z23 | 100323 | July 24,2016 | July 23,2017 |
| RF attenuator | N/A | RFA20db | 68 | N/A | N/A |

7. OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

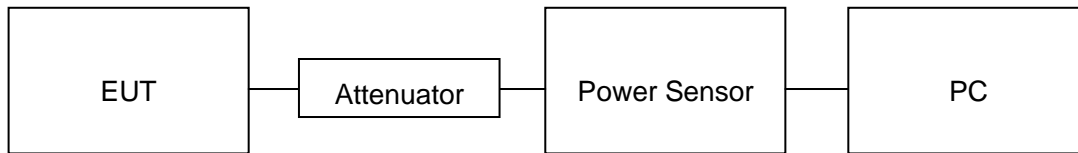
For max average conducted output power test:

1. Connect EUT RF output port to power probe through an RF attenuator.
2. Connect the power probe to the PC.
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Record the maximum power from the software.

Note : The EUT was tested according to KDB 558074v03r02 for compliance to FCC 47CFR 15.247 requirements.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

AVERAGE POWER SETUP



7.3. LIMITS AND MEASUREMENT RESULT

| | |
|------------------|--------------------------|
| TEST ITEM | OUTPUT POWER |
| TEST MODE | 802.11b with data rate 1 |

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|-----------------|---------------------|-------------------------|--------------|
| 2.412 | 11.67 | 30 | Pass |
| 2.437 | 11.56 | 30 | Pass |
| 2.462 | 11.51 | 30 | Pass |

| | |
|------------------|--------------------------|
| TEST ITEM | OUTPUT POWER |
| TEST MODE | 802.11g with data rate 6 |

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|-----------------|---------------------|-------------------------|--------------|
| 2.412 | 10.63 | 30 | Pass |
| 2.437 | 10.52 | 30 | Pass |
| 2.462 | 10.55 | 30 | Pass |

| | |
|------------------|-------------------------------|
| TEST ITEM | OUTPUT POWER |
| TEST MODE | 802.11n 20 with data rate 6.5 |

| Frequency (GHz) | Average Power (dBm) | Applicable Limits (dBm) | Pass or Fail |
|-----------------|---------------------|-------------------------|--------------|
| 2.412 | 10.29 | 30 | Pass |
| 2.437 | 10.24 | 30 | Pass |
| 2.462 | 10.23 | 30 | Pass |

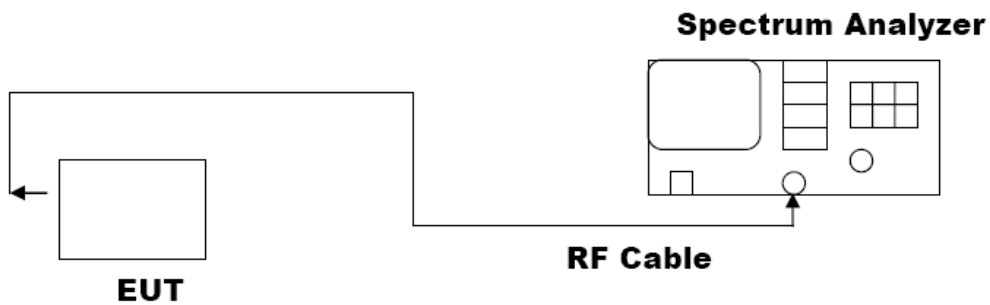
8. 6DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW $\geq 3 \times$ RBW.
4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

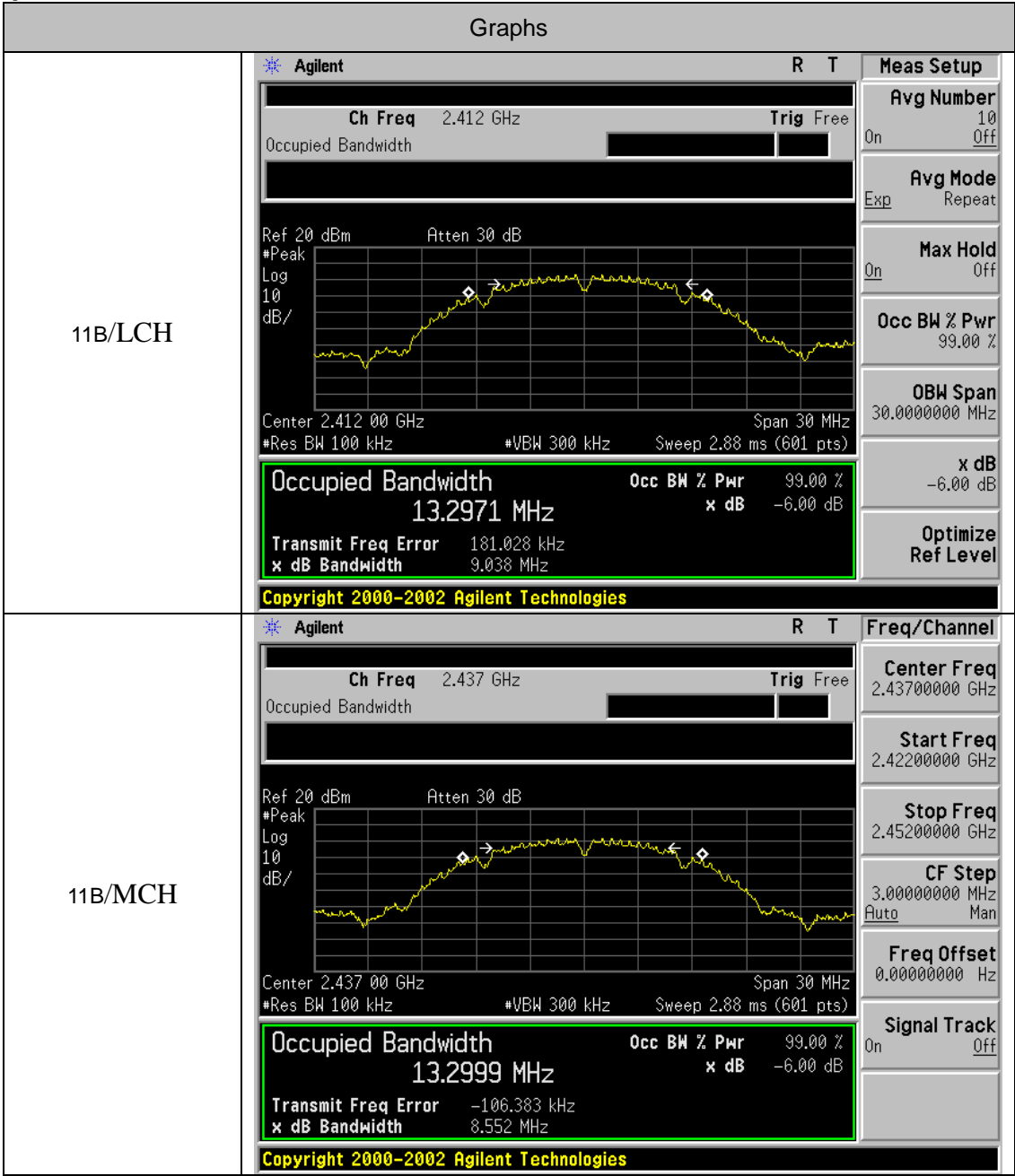
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



8.3. LIMITS AND MEASUREMENT RESULTS

| Mode | Channel | 6dB Bandwidth [MHz] | OBW [MHz] | Verdict |
|-----------|---------|---------------------|-----------|---------|
| 11B | LCH | 9.038 | 13.2971 | PASS |
| 11B | MCH | 8.552 | 13.2999 | PASS |
| 11B | HCH | 8.129 | 13.0608 | PASS |
| 11G | LCH | 16.363 | 16.5304 | PASS |
| 11G | MCH | 16.387 | 16.5324 | PASS |
| 11G | HCH | 16.347 | 16.4660 | PASS |
| 11N20SISO | LCH | 17.267 | 17.6993 | PASS |
| 11N20SISO | MCH | 17.642 | 17.7120 | PASS |
| 11N20SISO | HCH | 17.355 | 17.6319 | PASS |

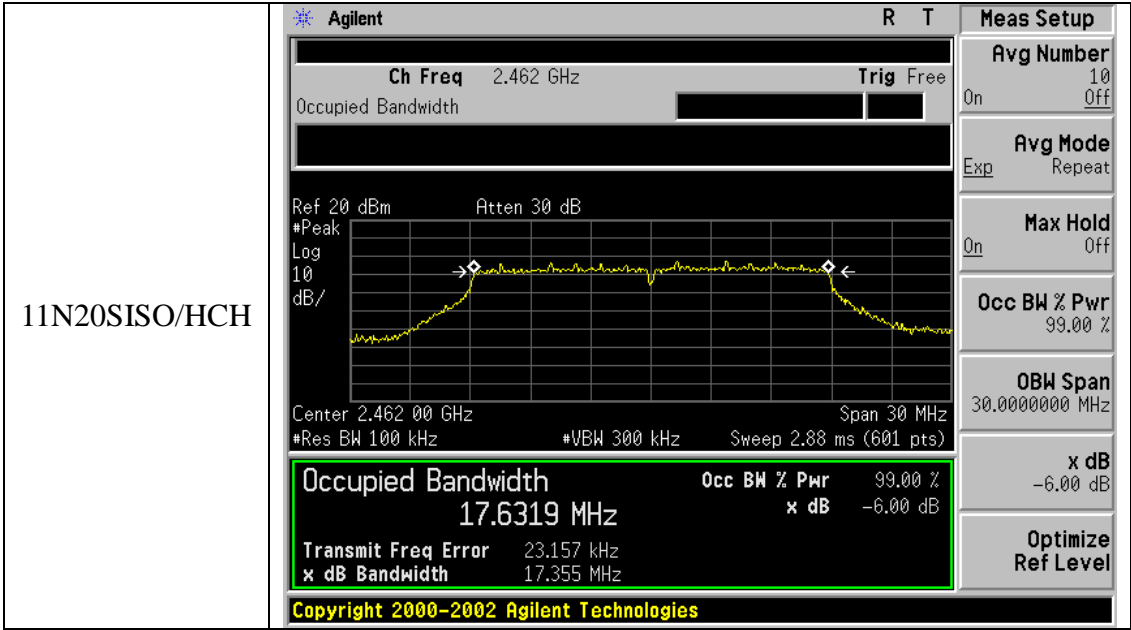
Test Graph



| | |
|---------|--|
| 11B/HCH | <div><div>Agilent</div><div>R T</div><div>Freq/Channel</div><div>Ch Freq 2.462 GHz</div><div>Trig Free</div><div>Occupied Bandwidth</div><div><div>Ref 20 dBm</div><div>Atten 30 dB</div><div>#Peak</div><div>Log</div><div>10</div><div>dB/</div><div>Center 2.462 00 GHz</div><div>Span 30 MHz</div><div>#Res BW 100 kHz</div><div>#VBW 300 kHz</div><div>Sweep 2.88 ms (601 pts)</div></div><div><div>Occupied Bandwidth</div><div>13.0608 MHz</div><div>Occ BW % Pwr</div><div>99.00 %</div><div>x dB</div><div>-6.00 dB</div><div>Transmit Freq Error</div><div>77.429 kHz</div><div>x dB Bandwidth</div><div>8.129 MHz</div></div><div>Copyright 2000-2002 Agilent Technologies</div><div>Freq/Channel</div><div>Center Freq 2.46200000 GHz</div><div>Start Freq 2.44700000 GHz</div><div>Stop Freq 2.47700000 GHz</div><div>CF Step 3.00000000 MHz</div><div>Auto Man</div><div>Freq Offset 0.00000000 Hz</div><div>Signal Track On Off</div></div> |
| 11G/LCH | <div><div>Agilent</div><div>R T</div><div>Meas Setup</div><div>Ch Freq 2.412 GHz</div><div>Trig Free</div><div>Occupied Bandwidth</div><div><div>Ref 20 dBm</div><div>Atten 30 dB</div><div>#Peak</div><div>Log</div><div>10</div><div>dB/</div><div>Center 2.412 00 GHz</div><div>Span 30 MHz</div><div>#Res BW 100 kHz</div><div>#VBW 300 kHz</div><div>Sweep 2.88 ms (601 pts)</div></div><div><div>Occupied Bandwidth</div><div>16.5304 MHz</div><div>Occ BW % Pwr</div><div>99.00 %</div><div>x dB</div><div>-6.00 dB</div><div>Transmit Freq Error</div><div>43.498 kHz</div><div>x dB Bandwidth</div><div>16.363 MHz</div></div><div>Copyright 2000-2002 Agilent Technologies</div><div>Meas Setup</div><div>Avg Number 10</div><div>On Off</div><div>Avg Mode Exp Repeat</div><div>Max Hold On Off</div><div>Occ BW % Pwr 99.00 %</div><div>OBW Span 30.00000000 MHz</div><div>x dB -6.00 dB</div><div>Optimize Ref Level</div></div> |

| | |
|---------|---|
| 11G/MCH | <div><div><div>Agilent</div><div>R T</div></div><div><div>Ch Freq 2.437 GHz</div><div>Trig Free</div></div><div>Occupied Bandwidth</div><div><div>Ref 20 dBm</div><div>Atten 30 dB</div><div>#Peak</div><div>Log</div><div>10</div><div>dB/</div></div><div><div>Center 2.437 00 GHz</div><div>Span 30 MHz</div><div>#Res BW 100 kHz</div><div>#VBW 300 kHz</div><div>Sweep 2.88 ms (601 pts)</div></div><div><div>Occupied Bandwidth</div><div>16.5324 MHz</div><div>Occ BW % Pwr 99.00 %</div><div>x dB -6.00 dB</div><div>Transmit Freq Error -33.298 kHz</div><div>x dB Bandwidth 16.387 MHz</div></div><div>Copyright 2000-2002 Agilent Technologies</div></div> <div><div>Meas Setup</div><div>Avg Number 10</div><div>On Off</div><div>Avg Mode Repeat</div><div>Exp</div><div>Max Hold Off</div><div>On</div><div>Occ BW % Pwr 99.00 %</div><div>OBW Span 30.0000000 MHz</div><div>x dB -6.00 dB</div><div>Optimize Ref Level</div></div> |
|---------|---|

| | |
|---------------|--|
| 11N20SISO/LCH | <div><div>Agilent</div><div><div>Ch Freq2.412 GHz</div><div>TrigFree</div></div><div>Occupied Bandwidth</div><div><div>Ref 20 dBm</div><div>Atten 30 dB</div><div>#Peak</div><div>Log</div><div>10</div><div>dB/</div><div><div>Center 2.412 00 GHz</div><div>Span 30 MHz</div><div>#Res BW 100 kHz</div><div>#VBW 300 kHz</div><div>Sweep 2.88 ms (601 pts)</div></div><div><div>Occupied Bandwidth</div><div>17.6993 MHz</div><div>Occ BW % Pwr99.00 %</div><div>x dB-6.00 dB</div><div>Transmit Freq Error50.176 kHz</div><div>x dB Bandwidth17.267 MHz</div></div><div>Copyright 2000-2002 Agilent Technologies</div></div><div><div>Meas Setup</div><div><div>Avg Number</div><div>10</div><div>On</div><div>Off</div></div><div><div>Avg Mode</div><div>Exp</div><div>Repeat</div></div><div><div>Max Hold</div><div>On</div><div>Off</div></div><div><div>Occ BW % Pwr</div><div>99.00 %</div></div><div><div>OBW Span</div><div>30.0000000 MHz</div></div><div><div>x dB</div><div>-6.00 dB</div></div><div><div>Optimize</div><div>Ref Level</div></div></div></div> |
| 11N20SISO/MCH | <div><div>Agilent</div><div><div>Ch Freq2.437 GHz</div><div>TrigFree</div></div><div>Occupied Bandwidth</div><div><div>Ref 20 dBm</div><div>Atten 30 dB</div><div>#Peak</div><div>Log</div><div>10</div><div>dB/</div><div><div>Center 2.437 00 GHz</div><div>Span 30 MHz</div><div>#Res BW 100 kHz</div><div>#VBW 300 kHz</div><div>Sweep 2.88 ms (601 pts)</div></div><div><div>Occupied Bandwidth</div><div>17.7120 MHz</div><div>Occ BW % Pwr99.00 %</div><div>x dB-6.00 dB</div><div>Transmit Freq Error-28.611 kHz</div><div>x dB Bandwidth17.642 MHz</div></div><div>Copyright 2000-2002 Agilent Technologies</div></div><div><div>Meas Setup</div><div><div>Avg Number</div><div>10</div><div>On</div><div>Off</div></div><div><div>Avg Mode</div><div>Exp</div><div>Repeat</div></div><div><div>Max Hold</div><div>On</div><div>Off</div></div><div><div>Occ BW % Pwr</div><div>99.00 %</div></div><div><div>OBW Span</div><div>30.0000000 MHz</div></div><div><div>x dB</div><div>-6.00 dB</div></div><div><div>Optimize</div><div>Ref Level</div></div></div></div> |



9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW > RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW > RBW) are conform to the requirement.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2.

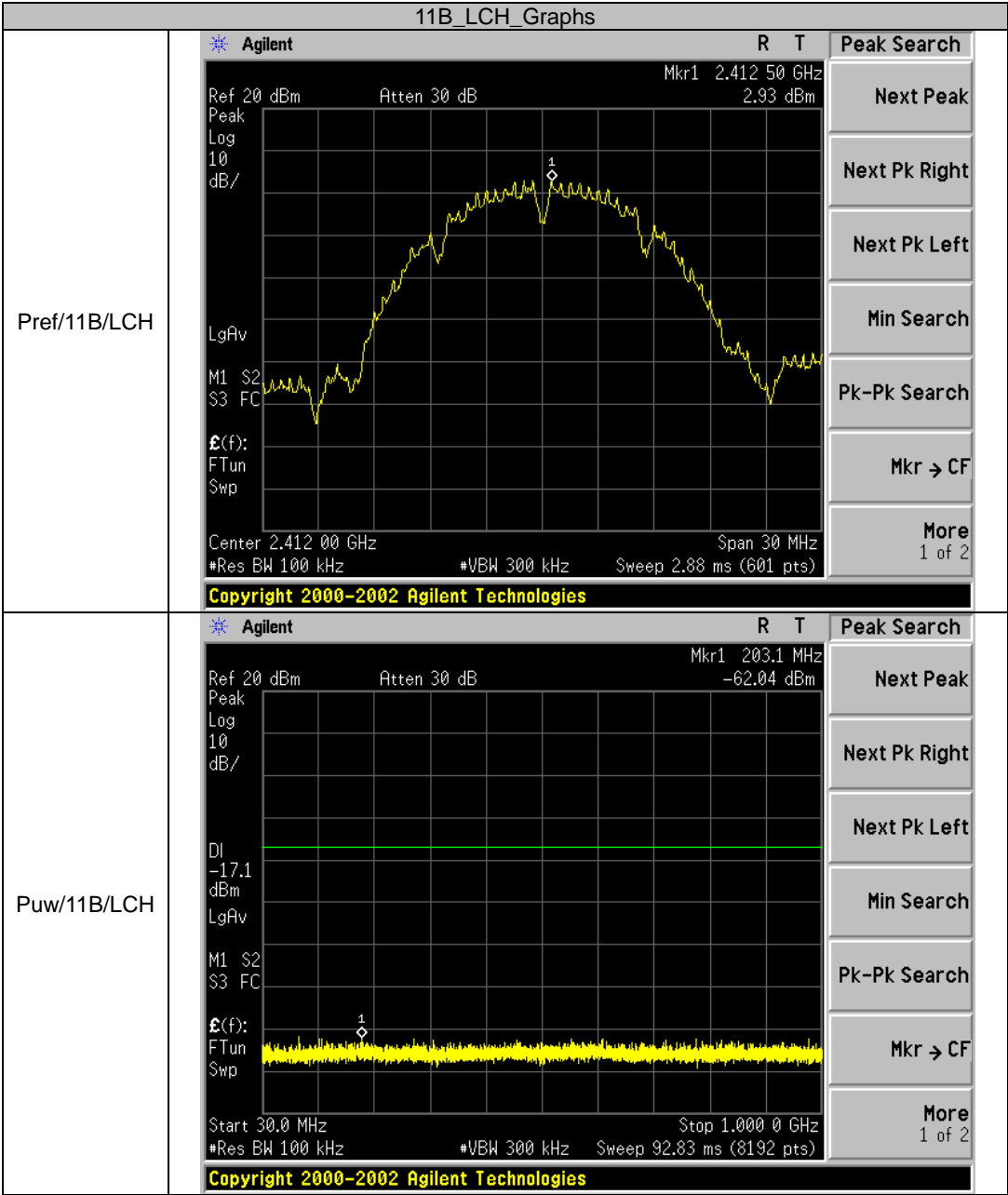
9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

9.4. LIMITS AND MEASUREMENT RESULT

| LIMITS AND MEASUREMENT RESULT | | |
|---|--|----------|
| Applicable Limits | Measurement Result | |
| | Test Data | Criteria |
| In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a)) | At least -20dBc than the limit Specified on the BOTTOM Channel | PASS |
| | At least -20dBc than the limit Specified on the TOP Channel | PASS |

Test Graph



Peak Search

Next Peak

Next Pk Right

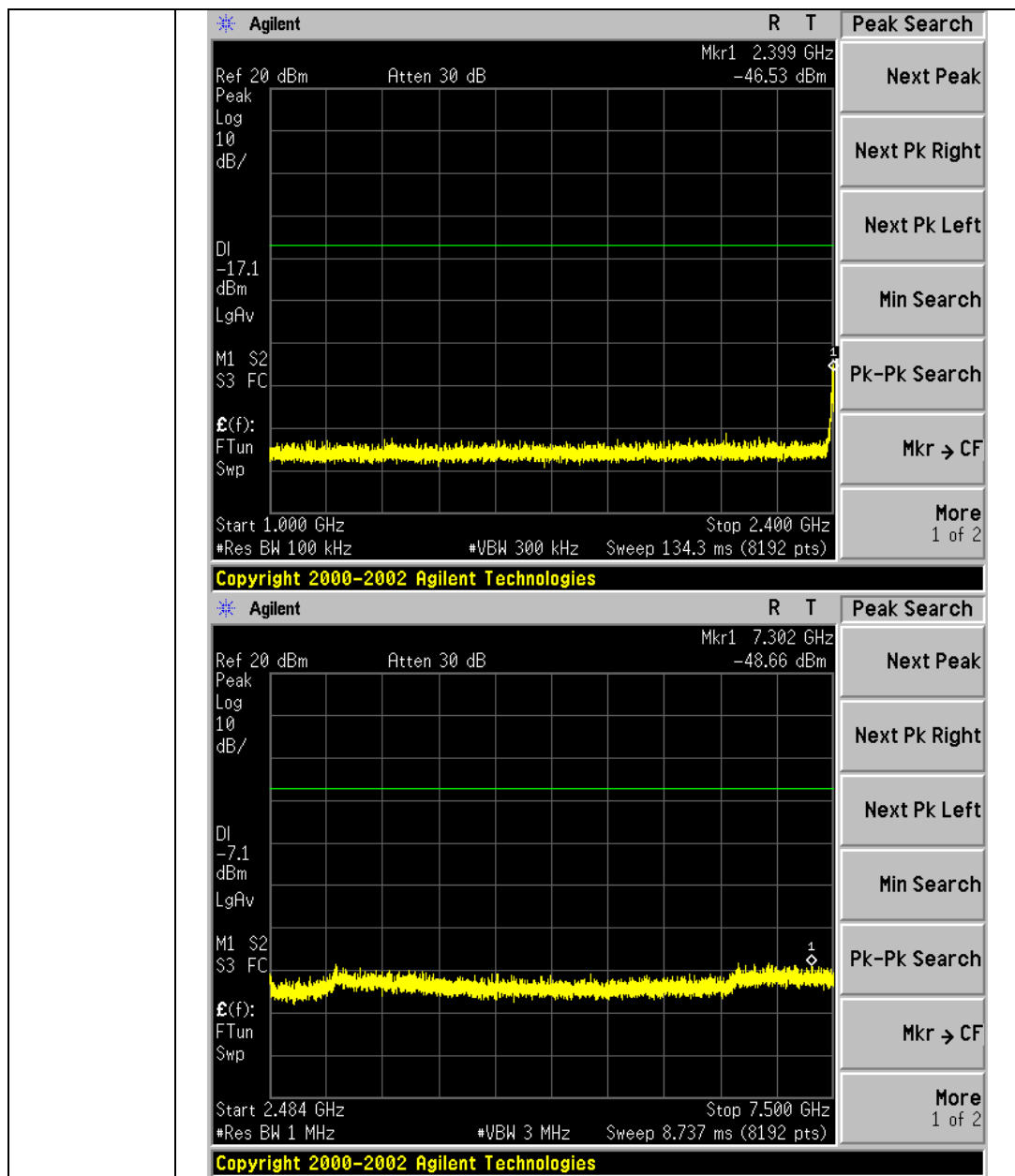
Next Pk Left

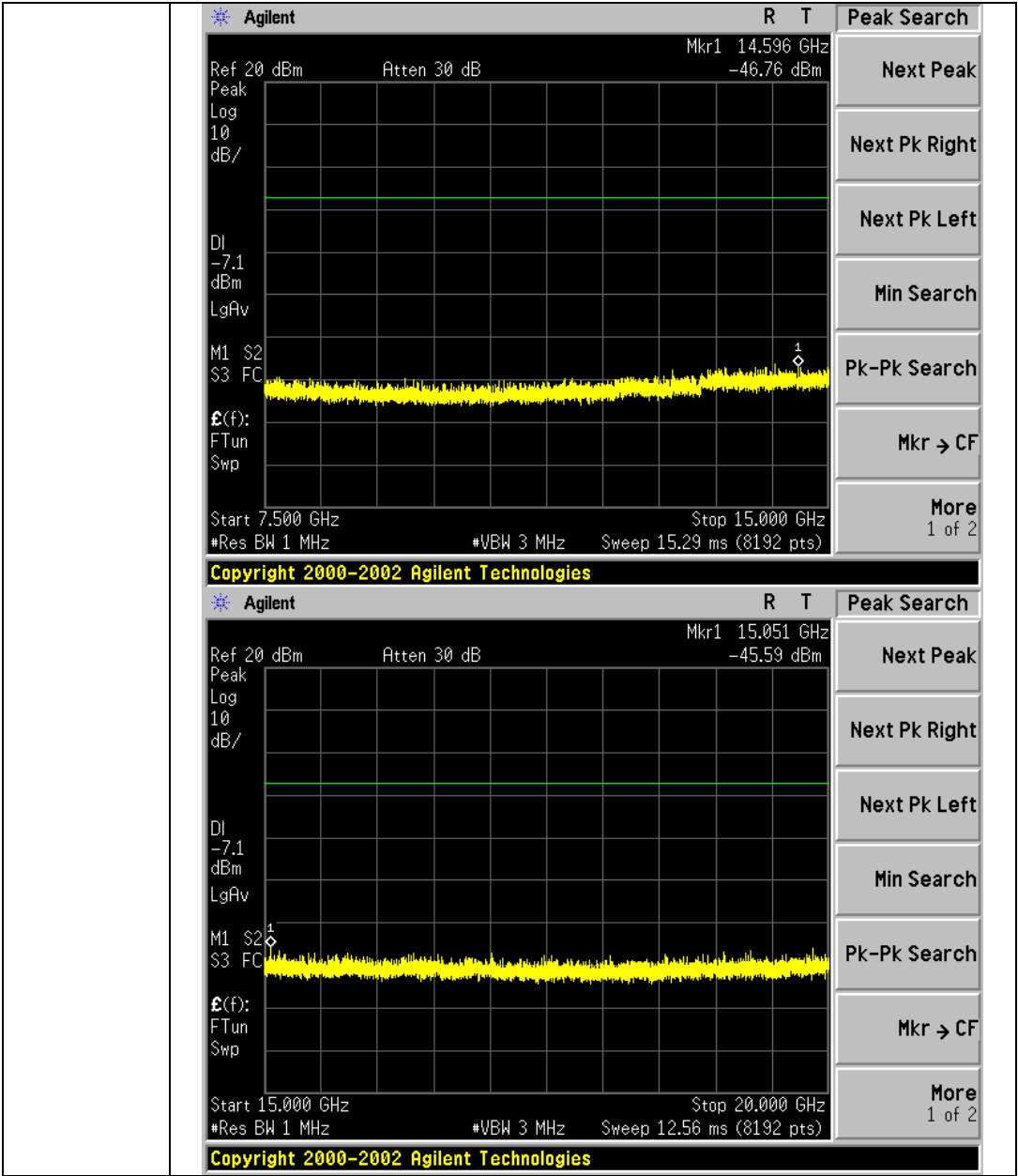
Min Search

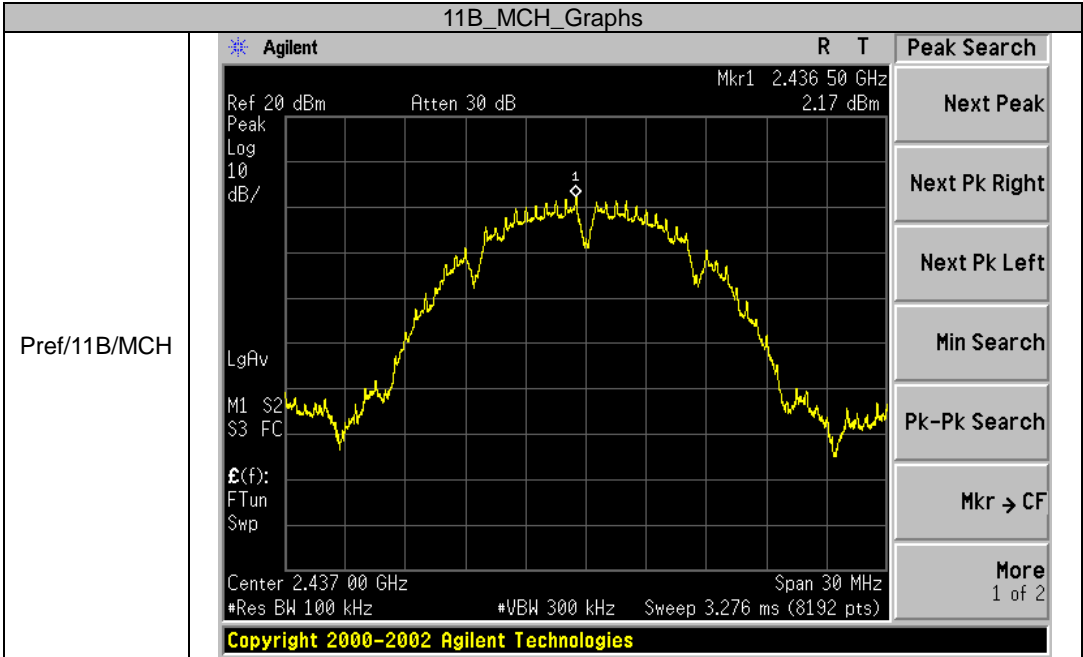
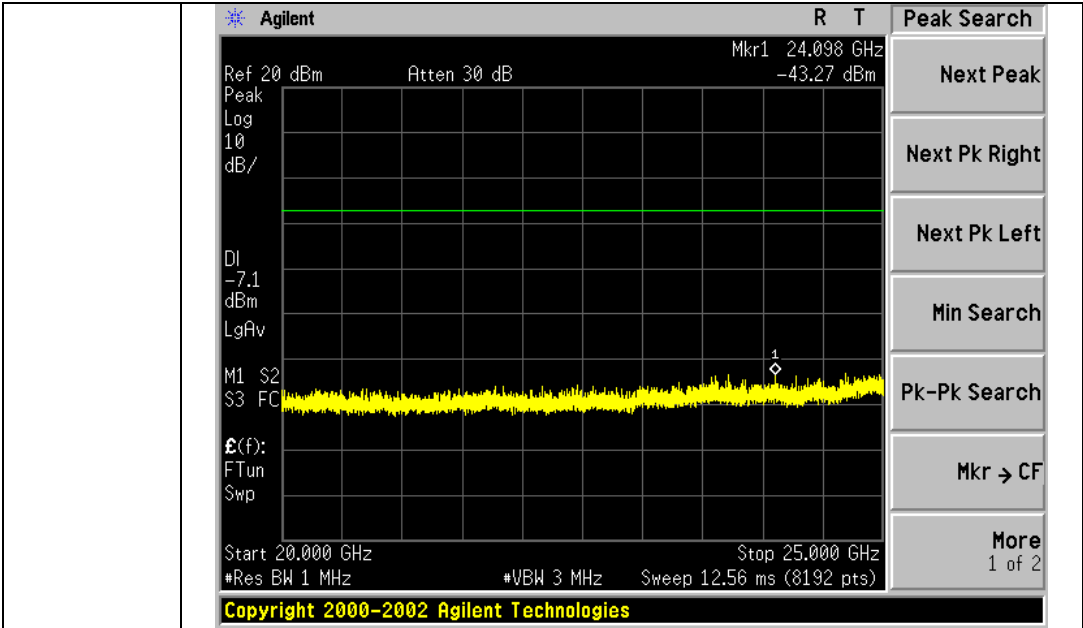
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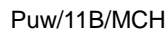
Mkr → CF

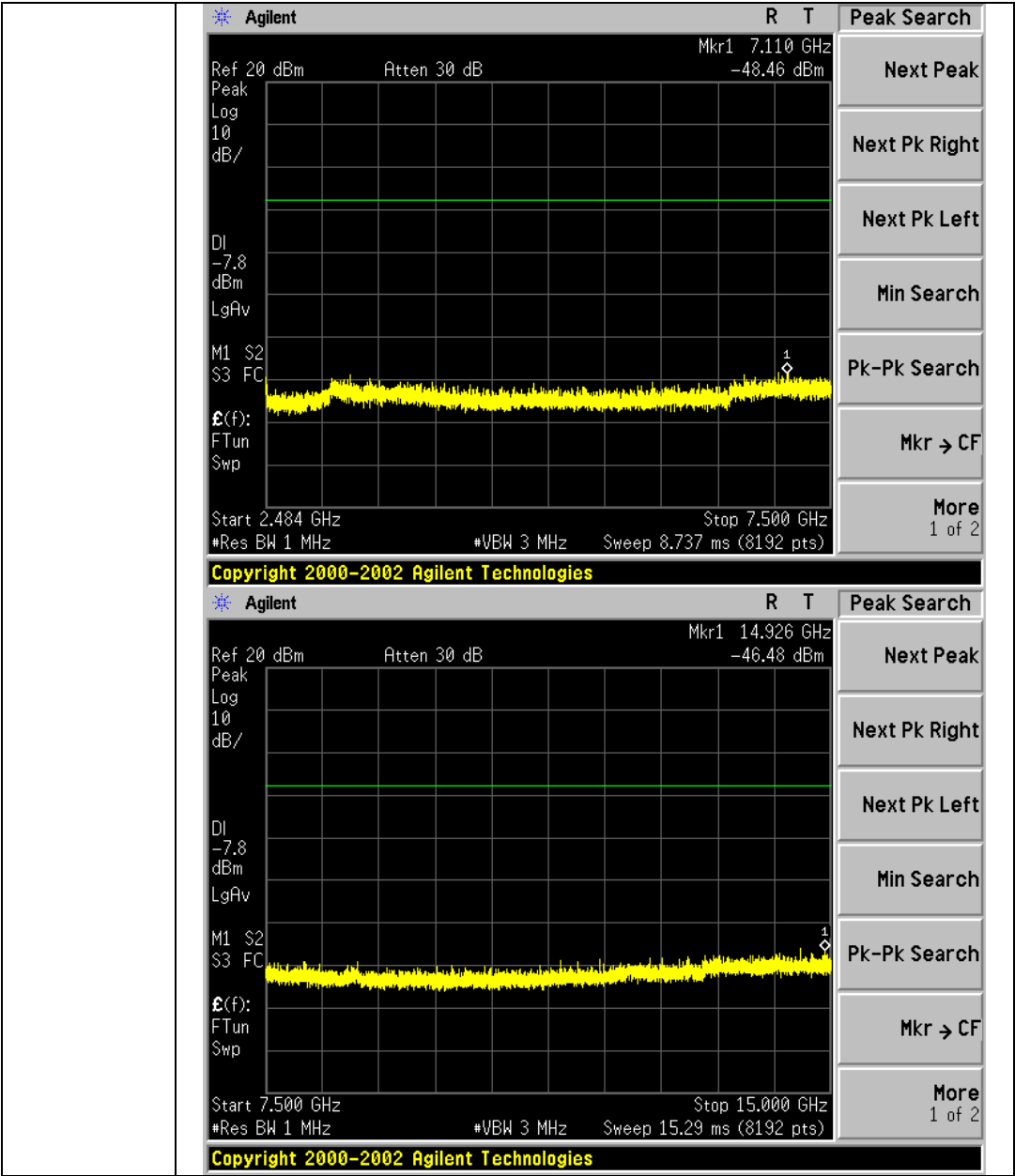
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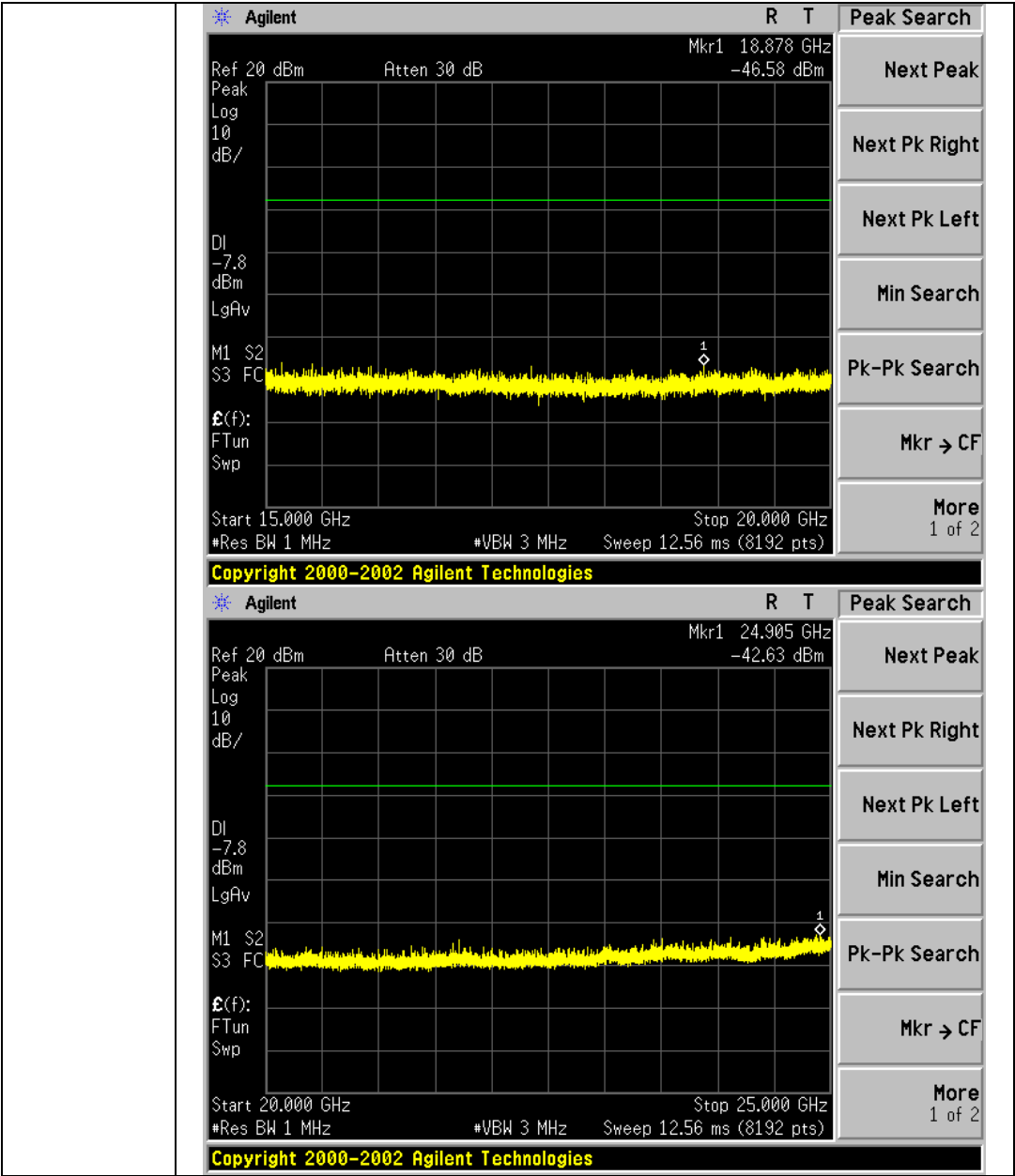


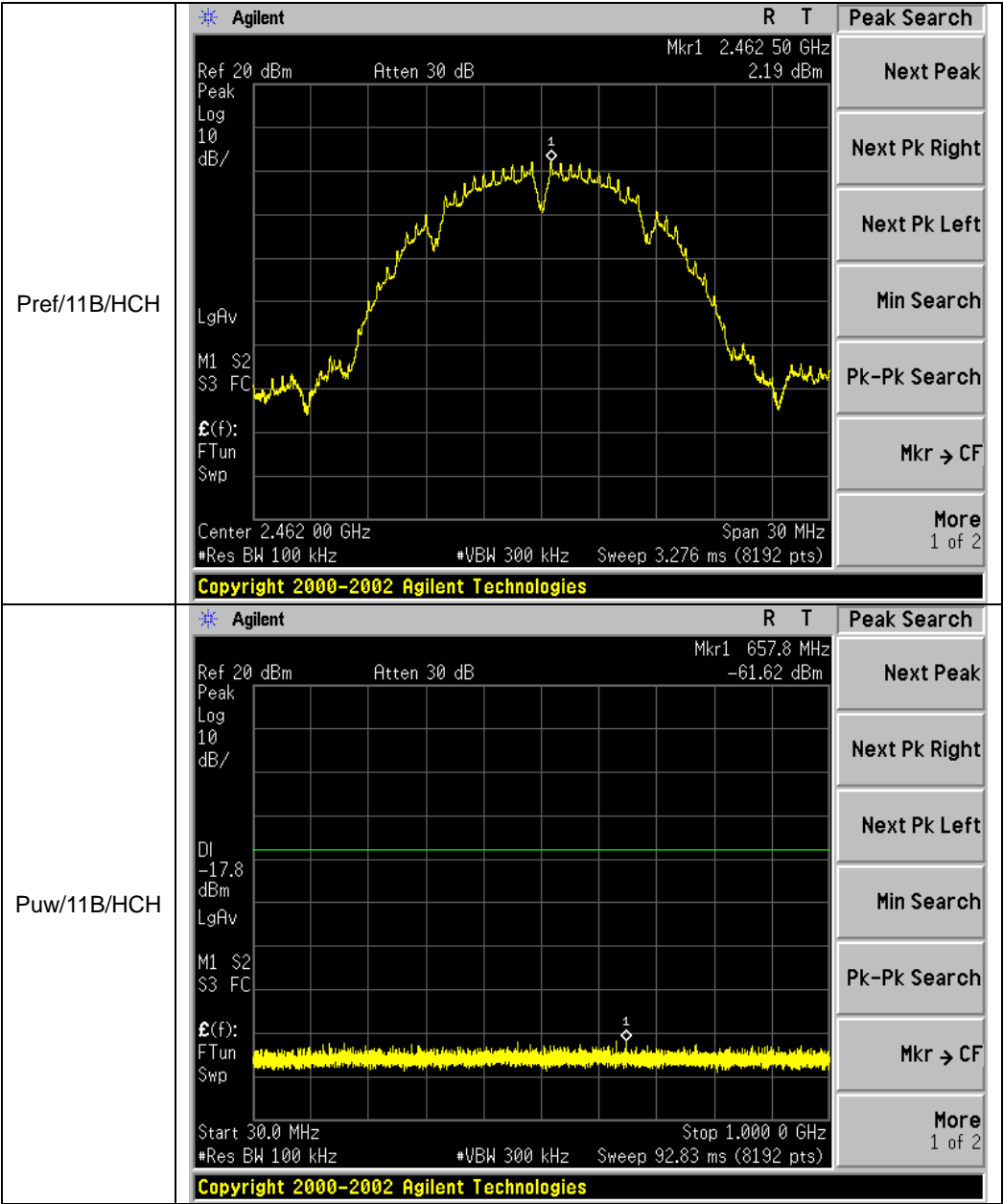


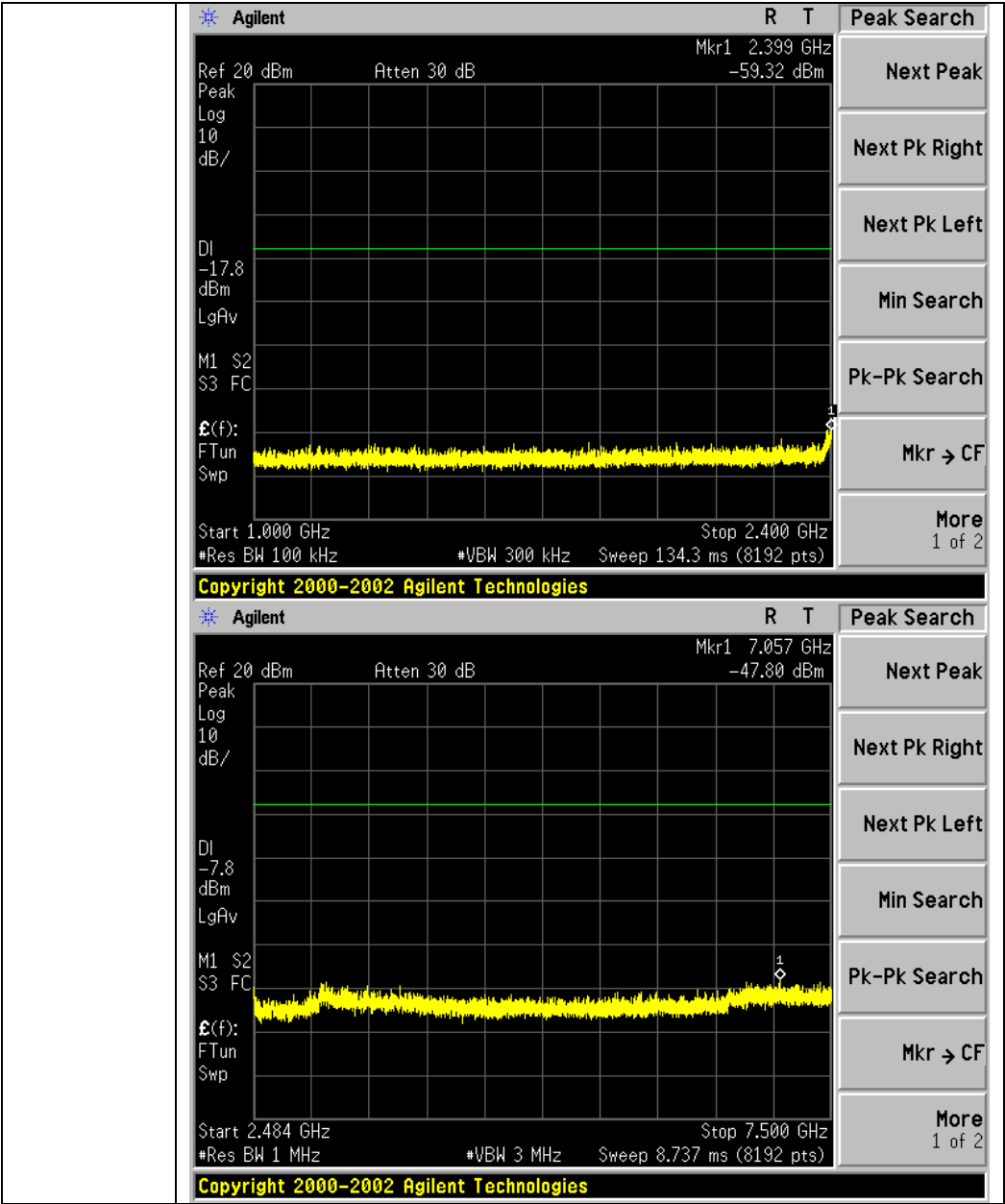


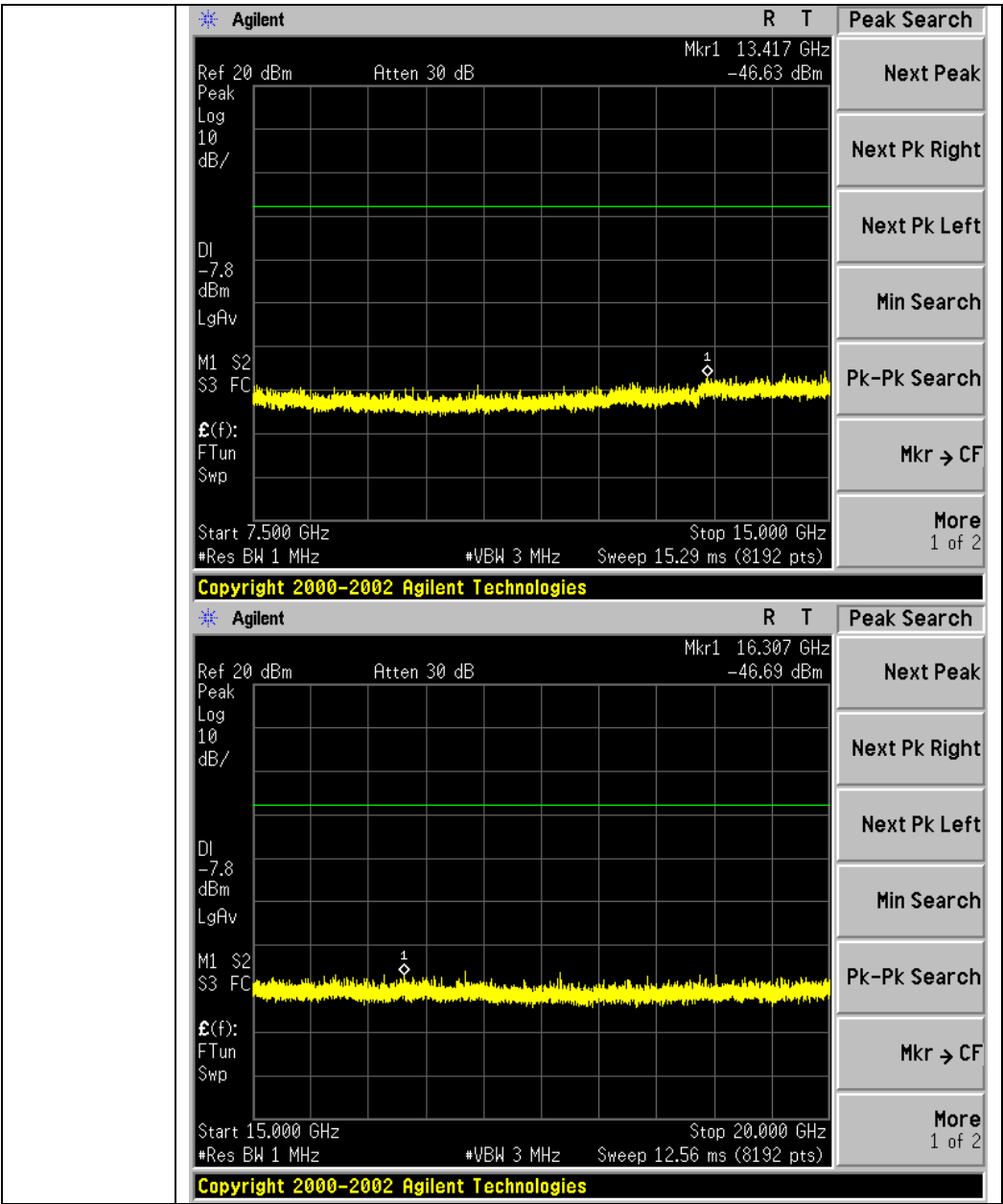


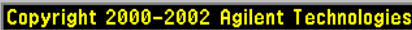


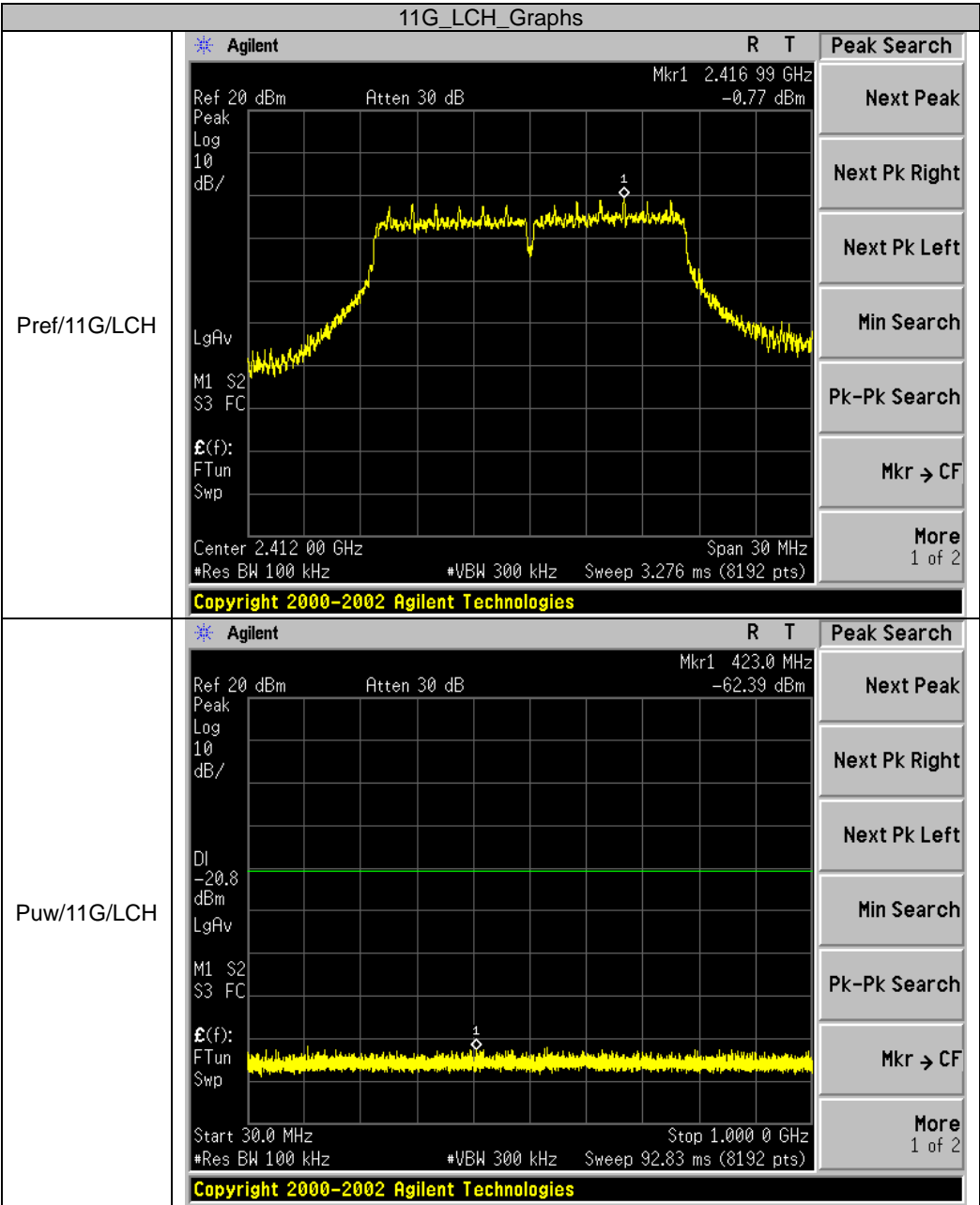


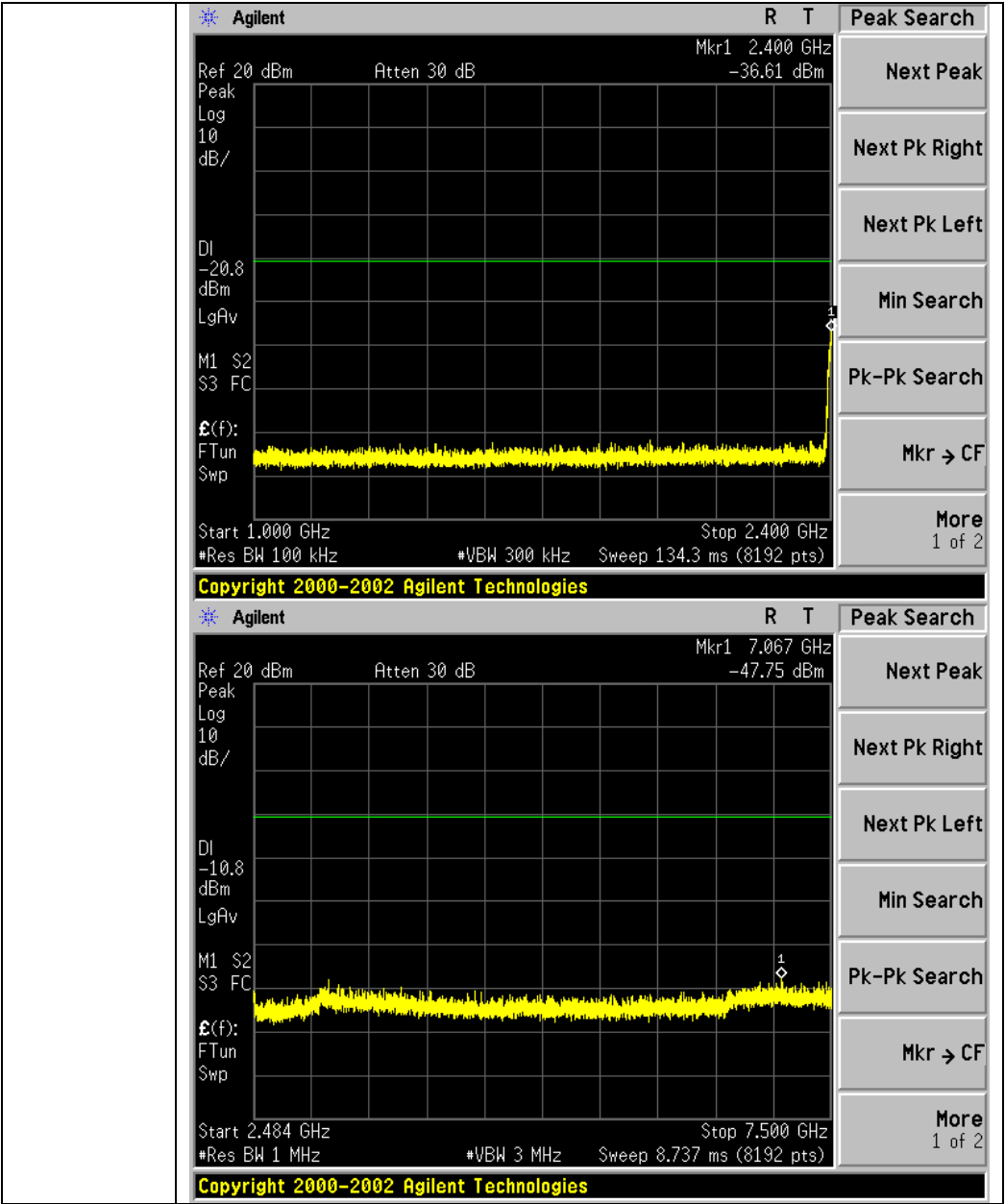


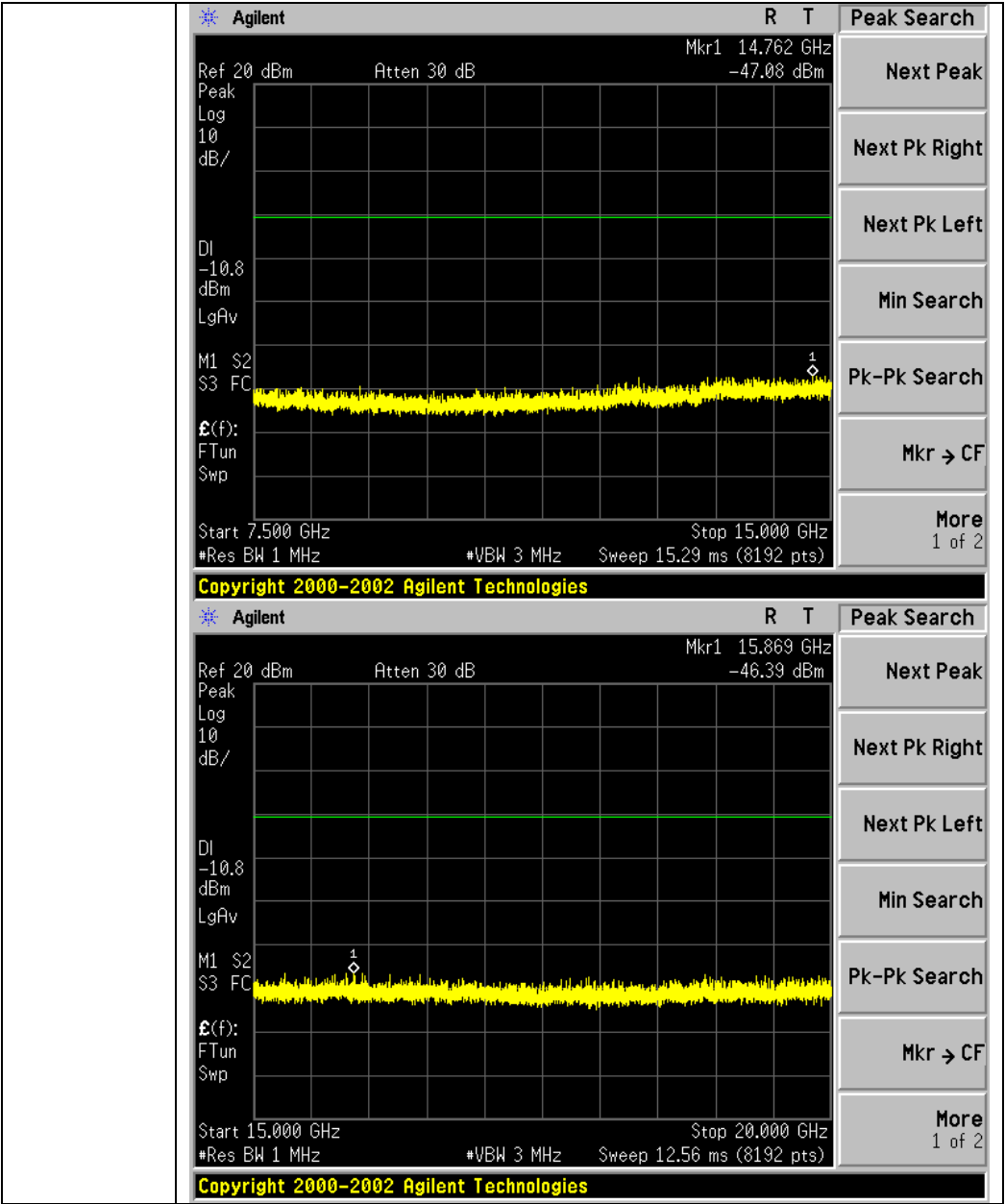


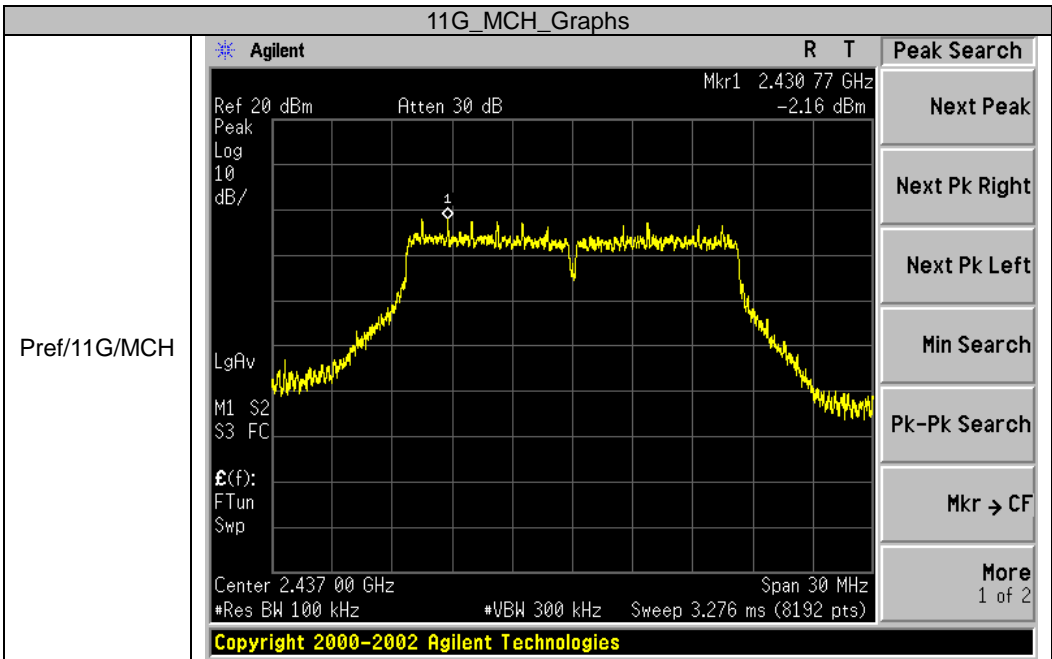
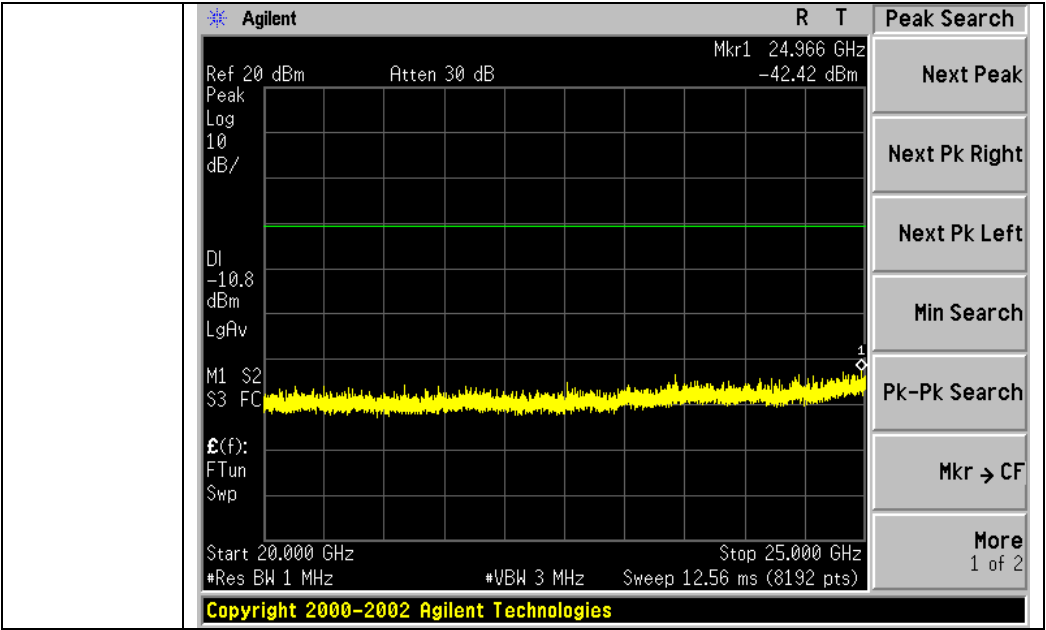


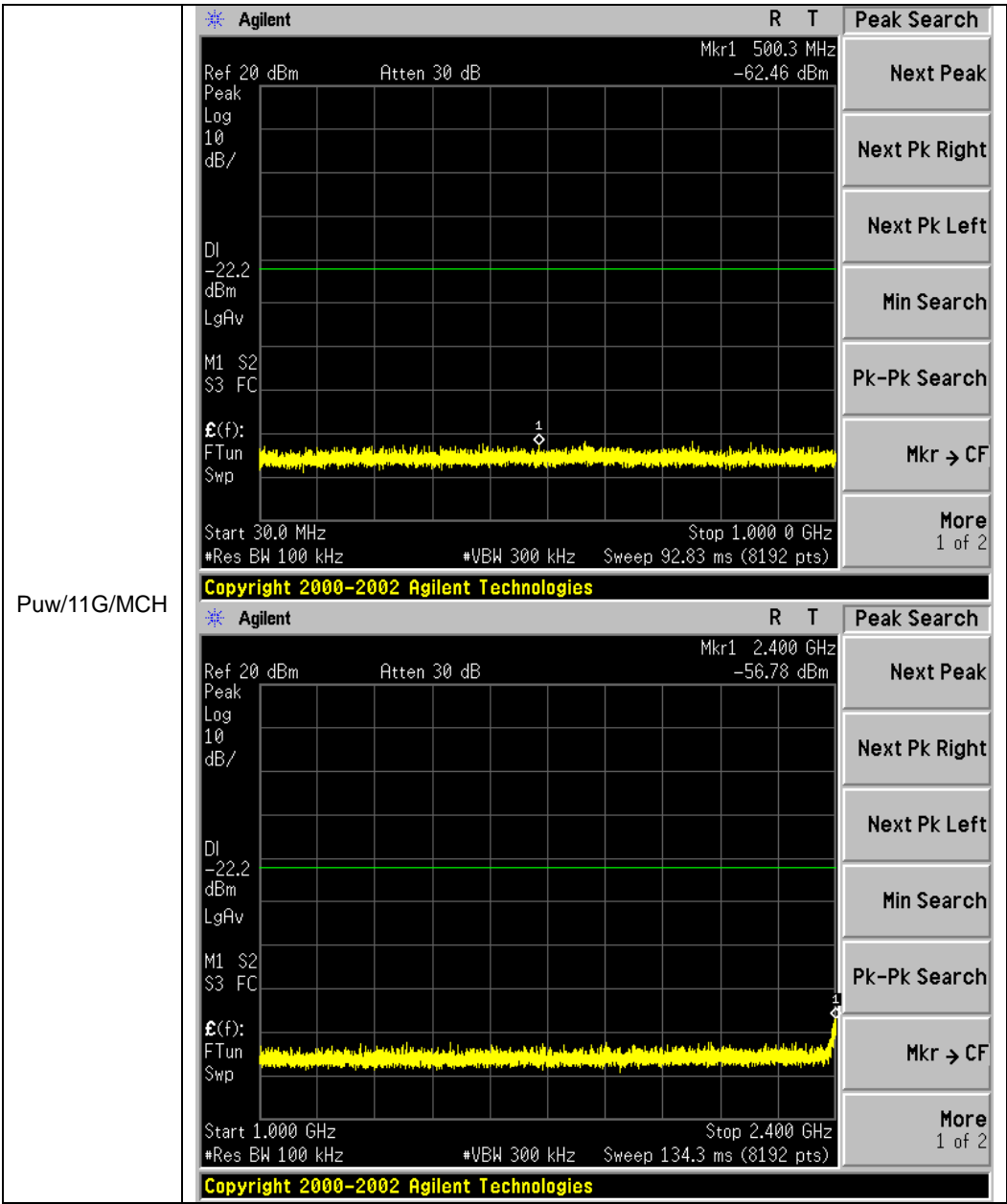


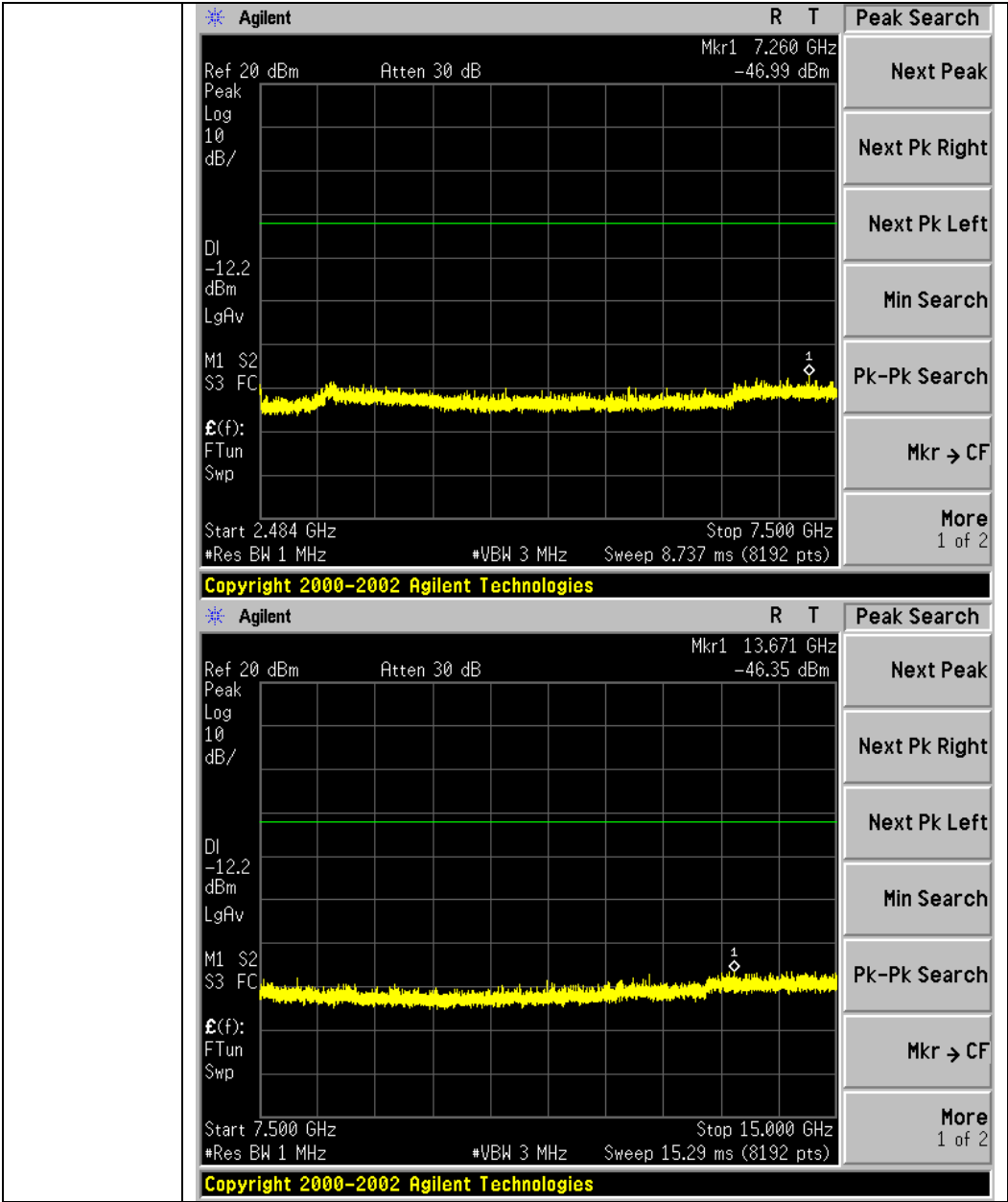


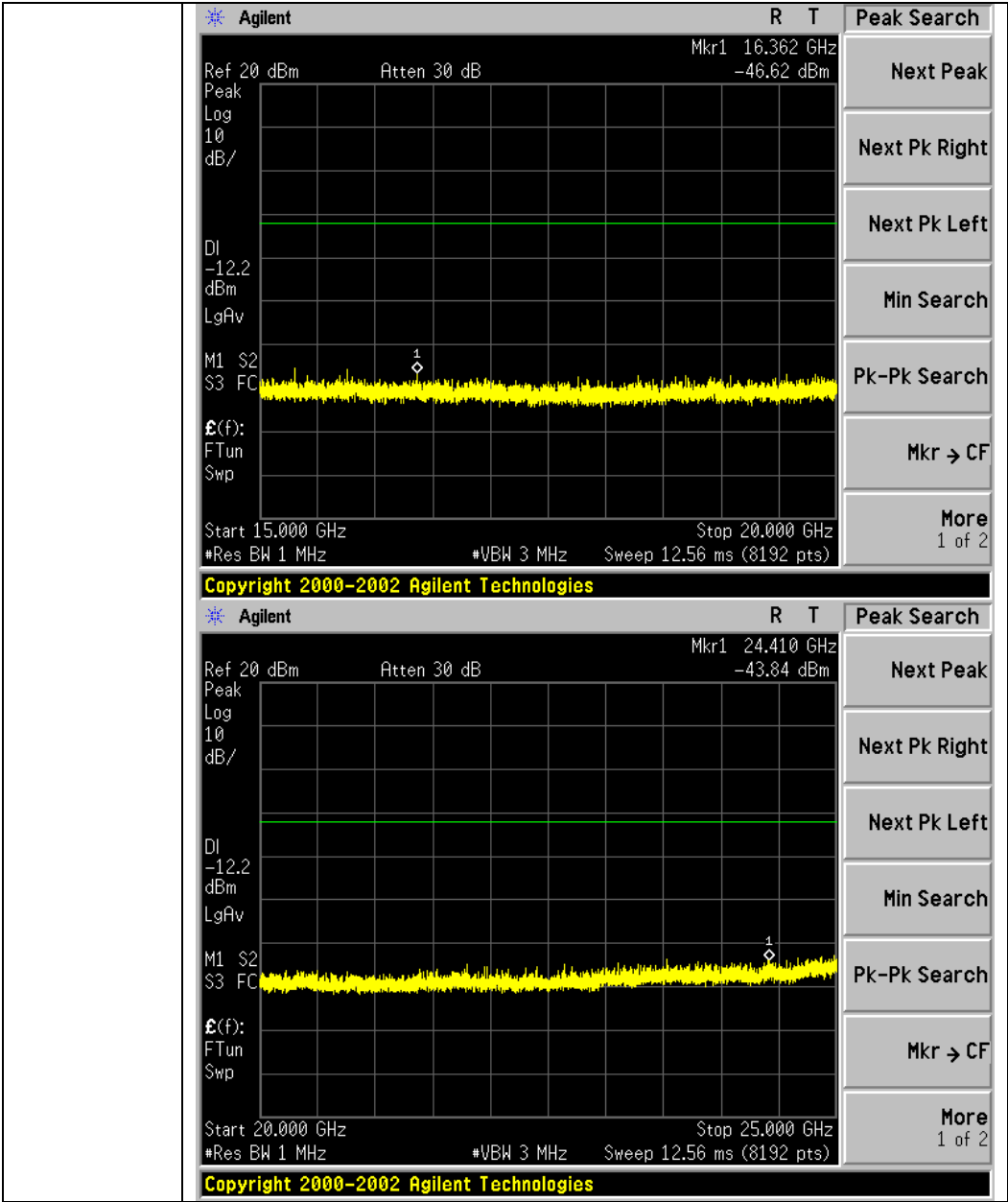




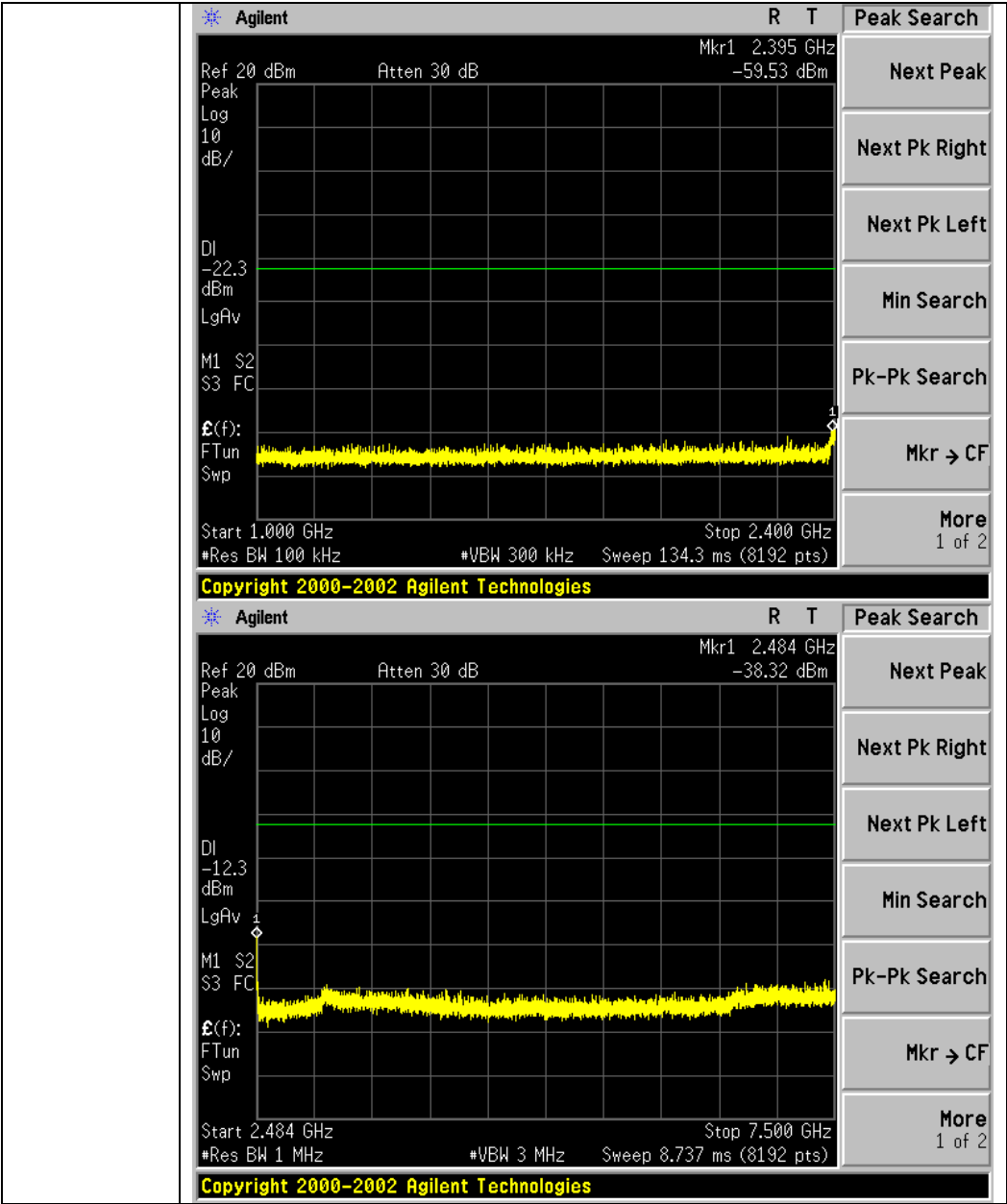


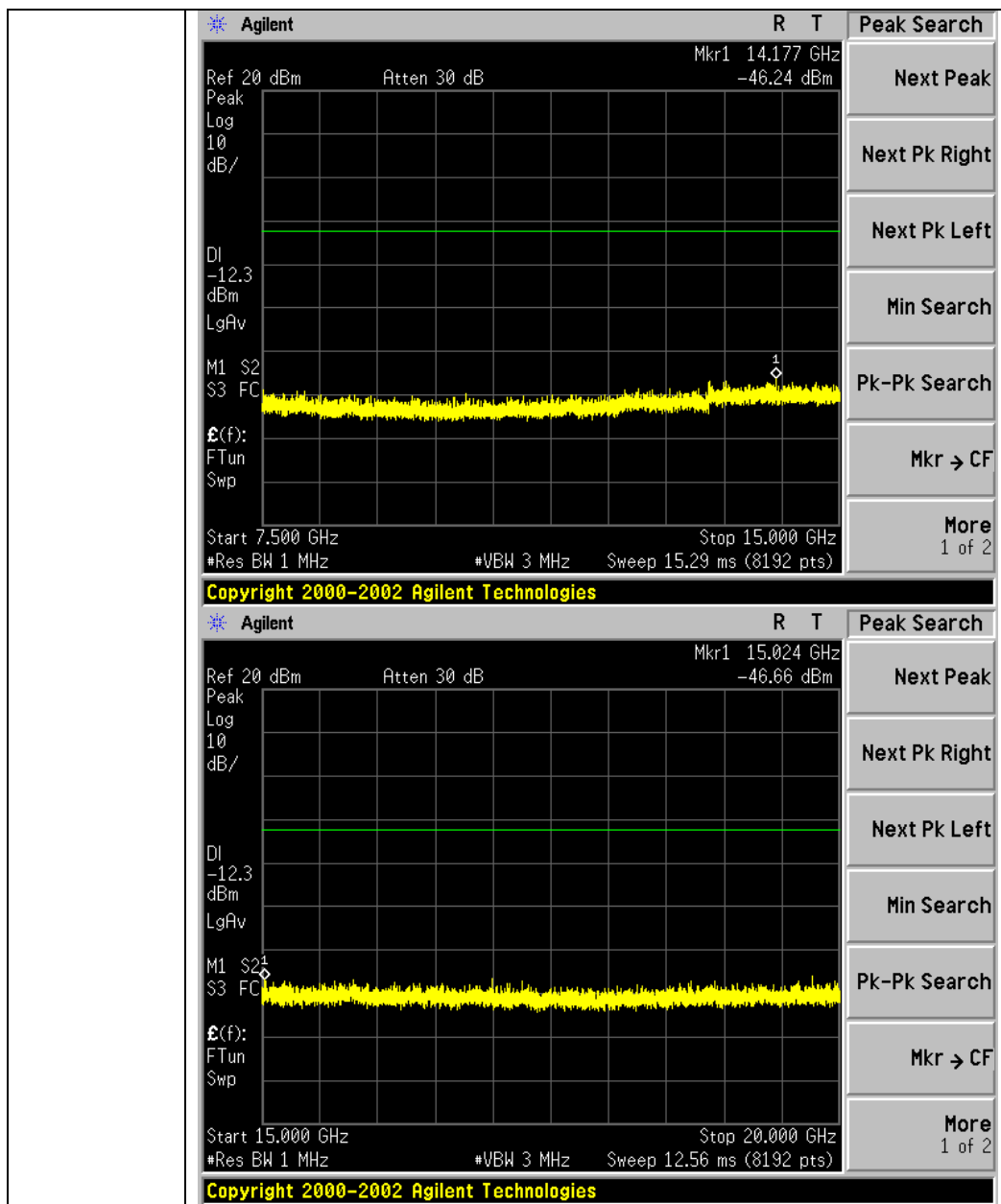


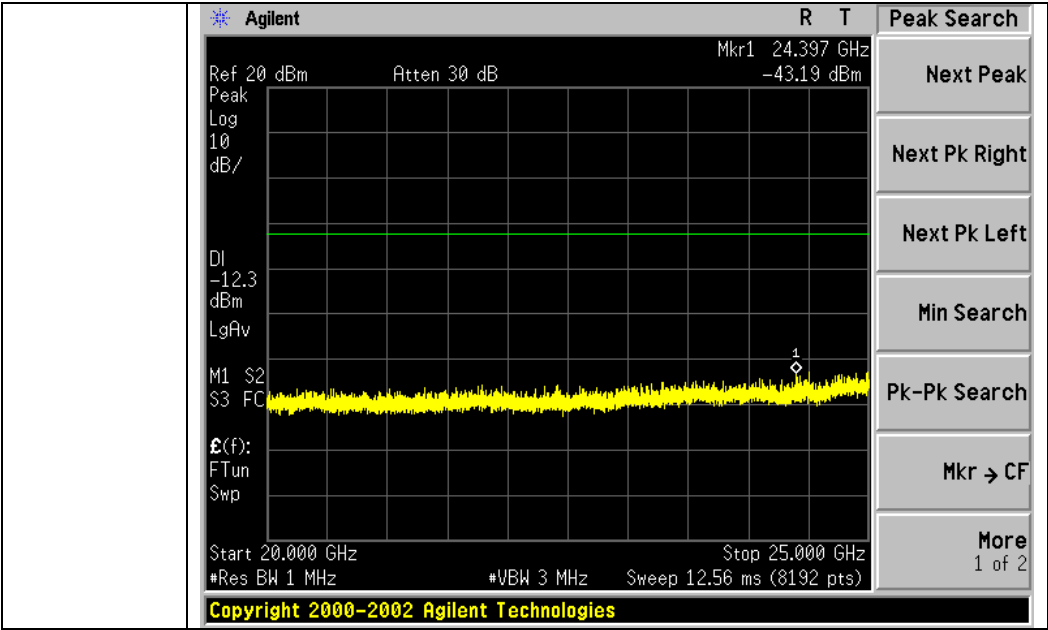


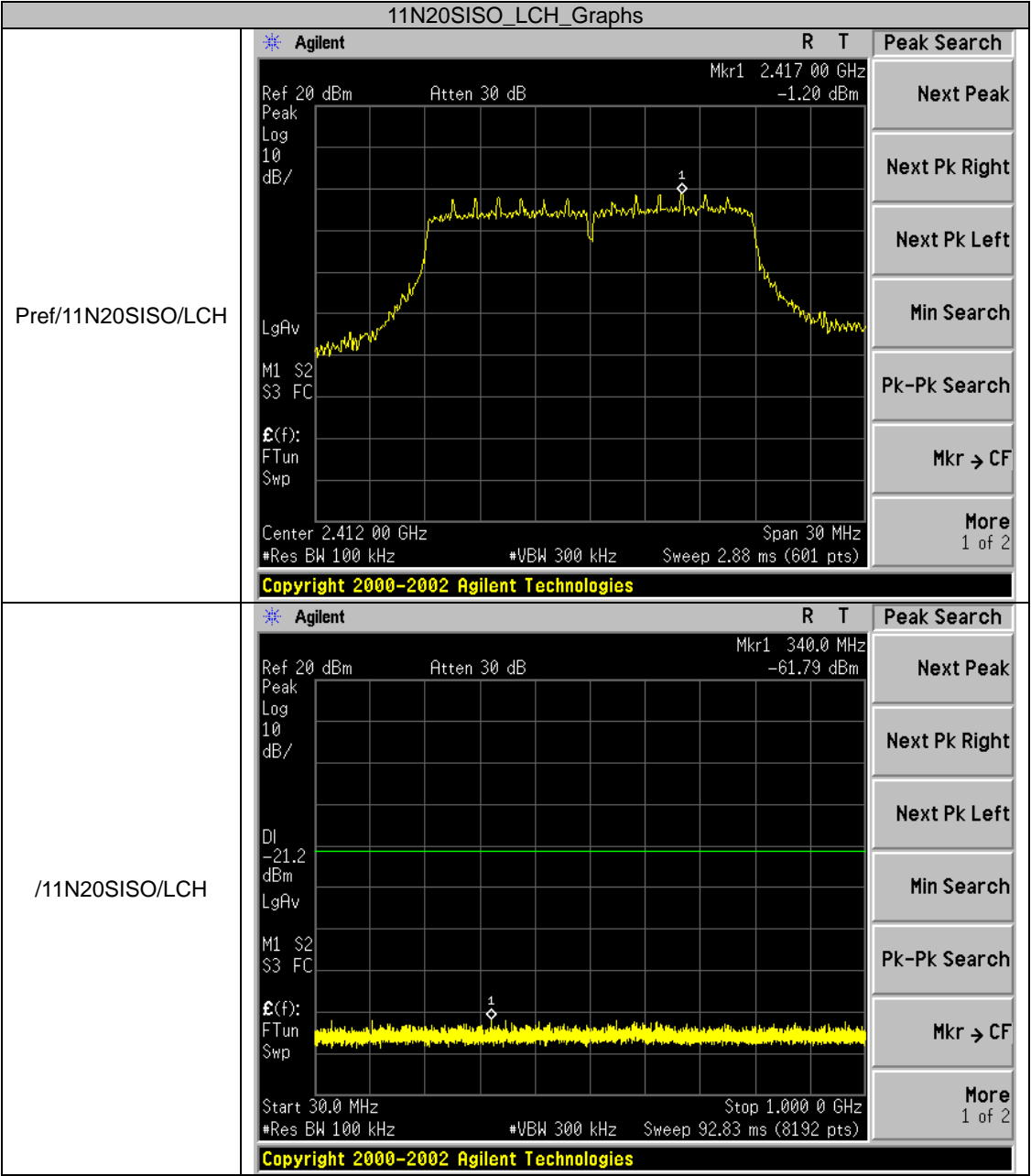


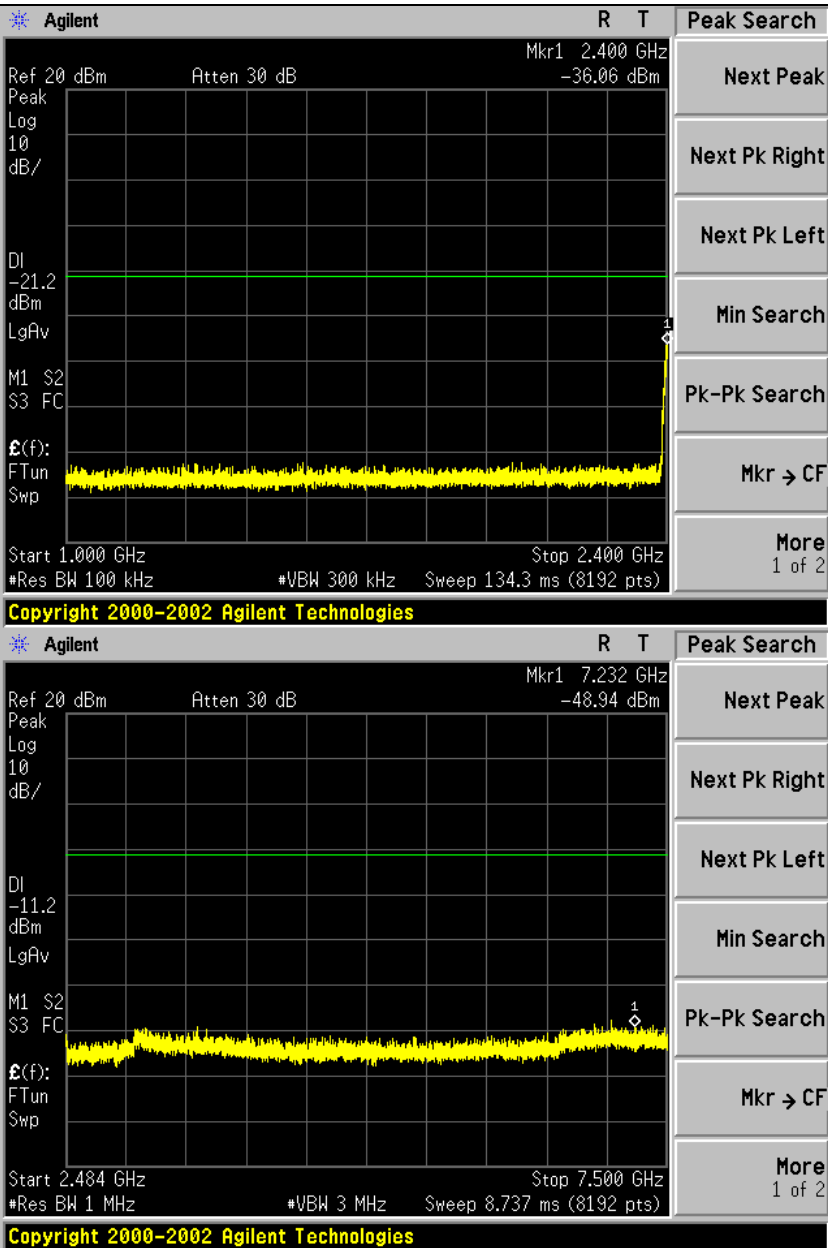
| | |
|--------------|---|
| Pref/11G/HCH | <div><div><div>Agilent</div><div>R T</div><div>Peak Search</div></div><div><div>Ref 20 dBm</div><div>Atten 30 dB</div><div>Mkr1 2.466 98 GHz</div><div>-2.26 dBm</div></div><div><div>Peak</div><div>Log</div><div>10</div><div>dB/</div></div><div><div>LgAv</div><div>M1 S2</div><div>S3 FC</div><div>$\mathcal{E}(f)$:</div><div>FTun</div><div>Swp</div></div><div><div>Center 2.462 00 GHz</div><div>Span 30 MHz</div><div>#Res BW 100 kHz</div><div>#VBW 300 kHz</div><div>Sweep 3.276 ms (8192 pts)</div></div><div>Copyright 2000-2002 Agilent Technologies</div></div> <div><div>Next Peak</div><div>Next Pk Right</div><div>Next Pk Left</div><div>Min Search</div><div>Pk-Pk Search</div><div>Mkr → CF</div><div>More 1 of 2</div></div> |
| Puw/11G/HCH | <div><div><div>Agilent</div><div>R T</div><div>Peak Search</div></div><div><div>Ref 20 dBm</div><div>Atten 30 dB</div><div>Mkr1 162.5 MHz</div><div>-61.69 dBm</div></div><div><div>Peak</div><div>Log</div><div>10</div><div>dB/</div></div><div><div>DI</div><div>-22.3</div><div>dBm</div><div>LgAv</div><div>M1 S2</div><div>S3 FC</div><div>$\mathcal{E}(f)$:</div><div>FTun</div><div>Swp</div></div><div><div>Start 30.0 MHz</div><div>Stop 1.000 0 GHz</div><div>#Res BW 100 kHz</div><div>#VBW 300 kHz</div><div>Sweep 92.83 ms (8192 pts)</div></div><div>Copyright 2000-2002 Agilent Technologies</div></div> <div><div>Next Peak</div><div>Next Pk Right</div><div>Next Pk Left</div><div>Min Search</div><div>Pk-Pk Search</div><div>Mkr → CF</div><div>More 1 of 2</div></div> |

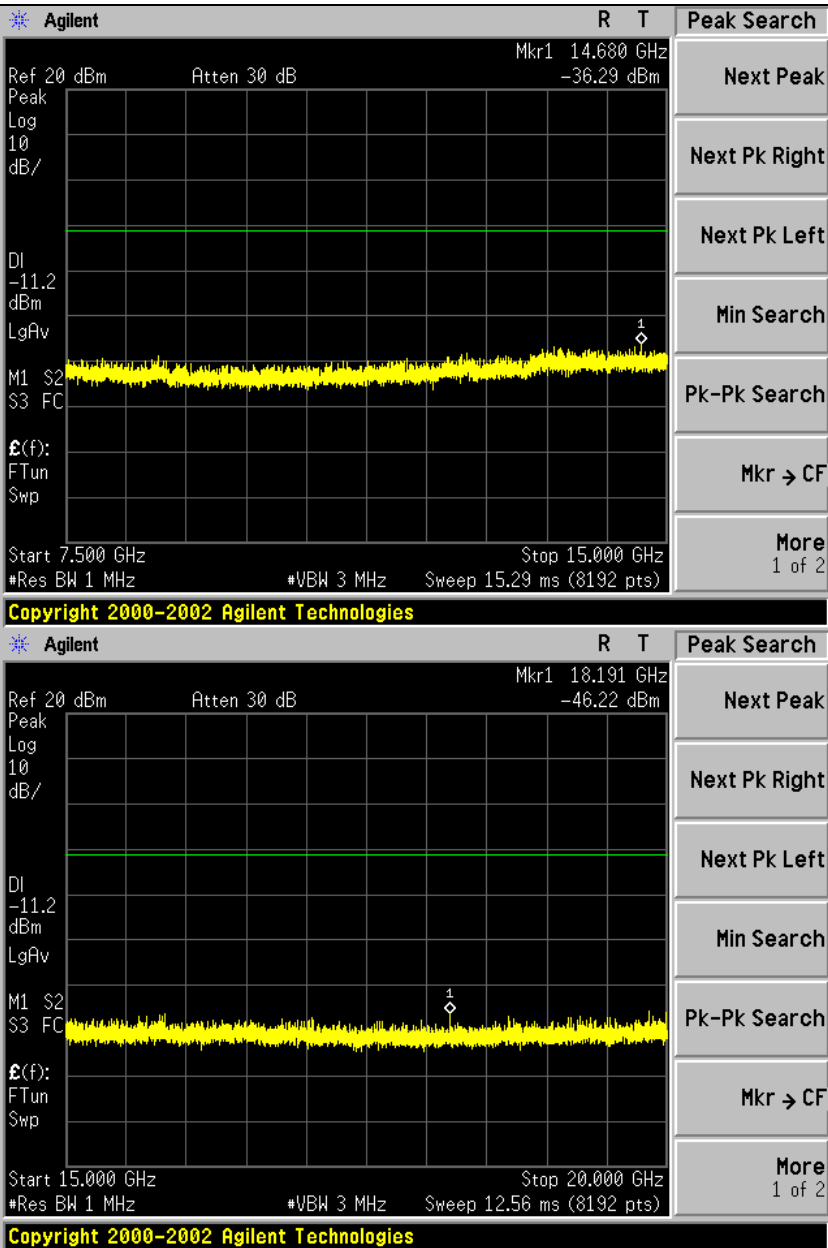


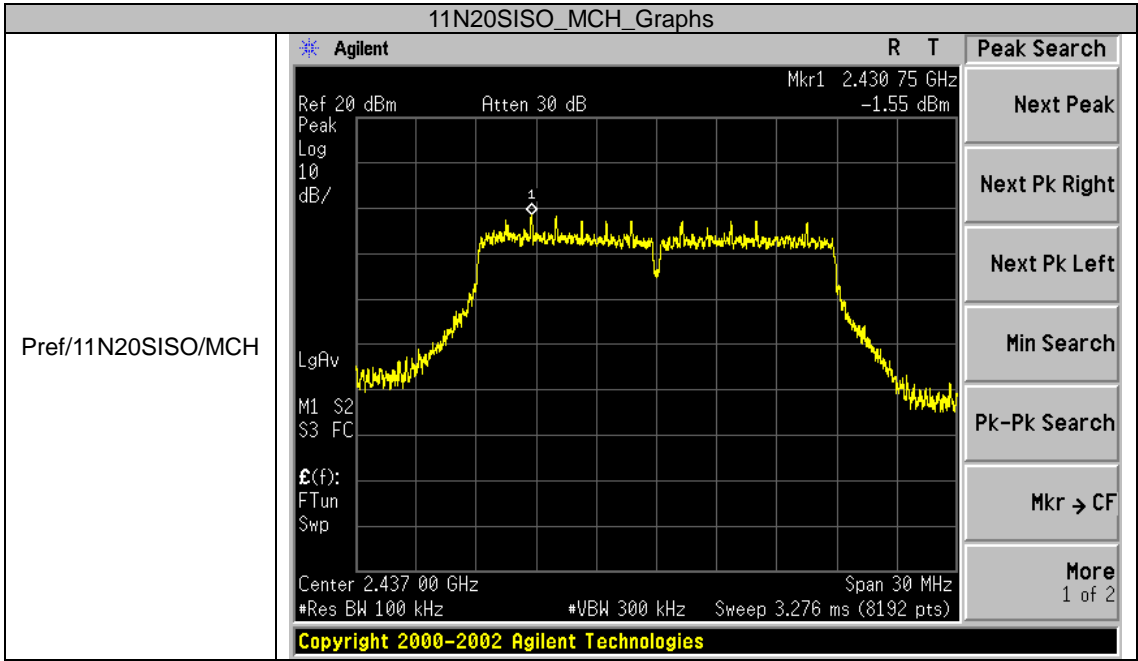
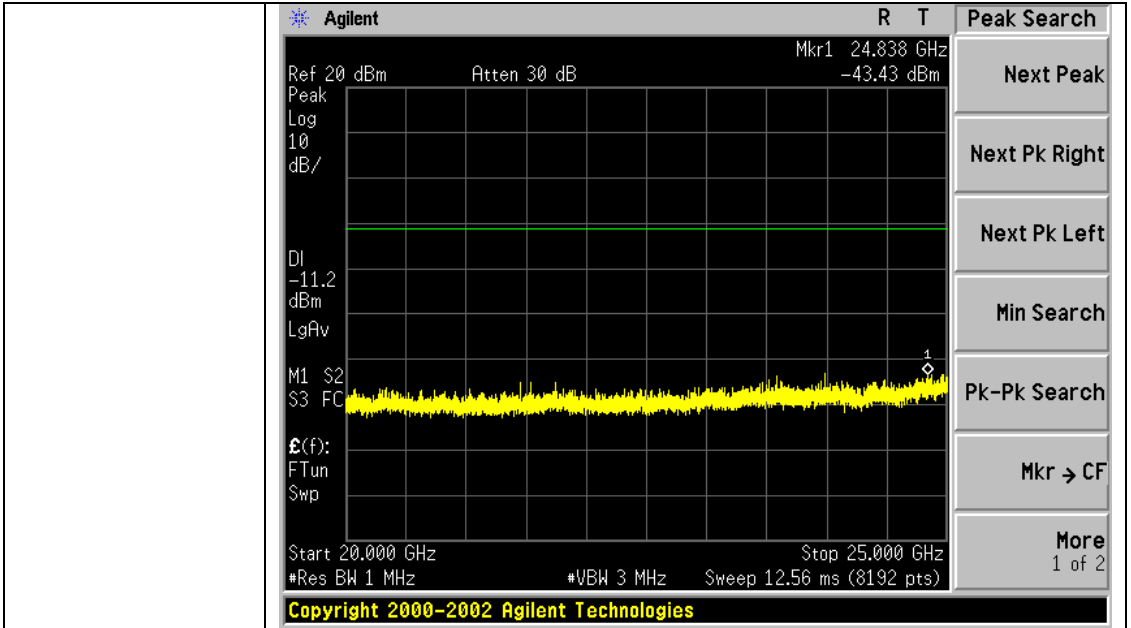


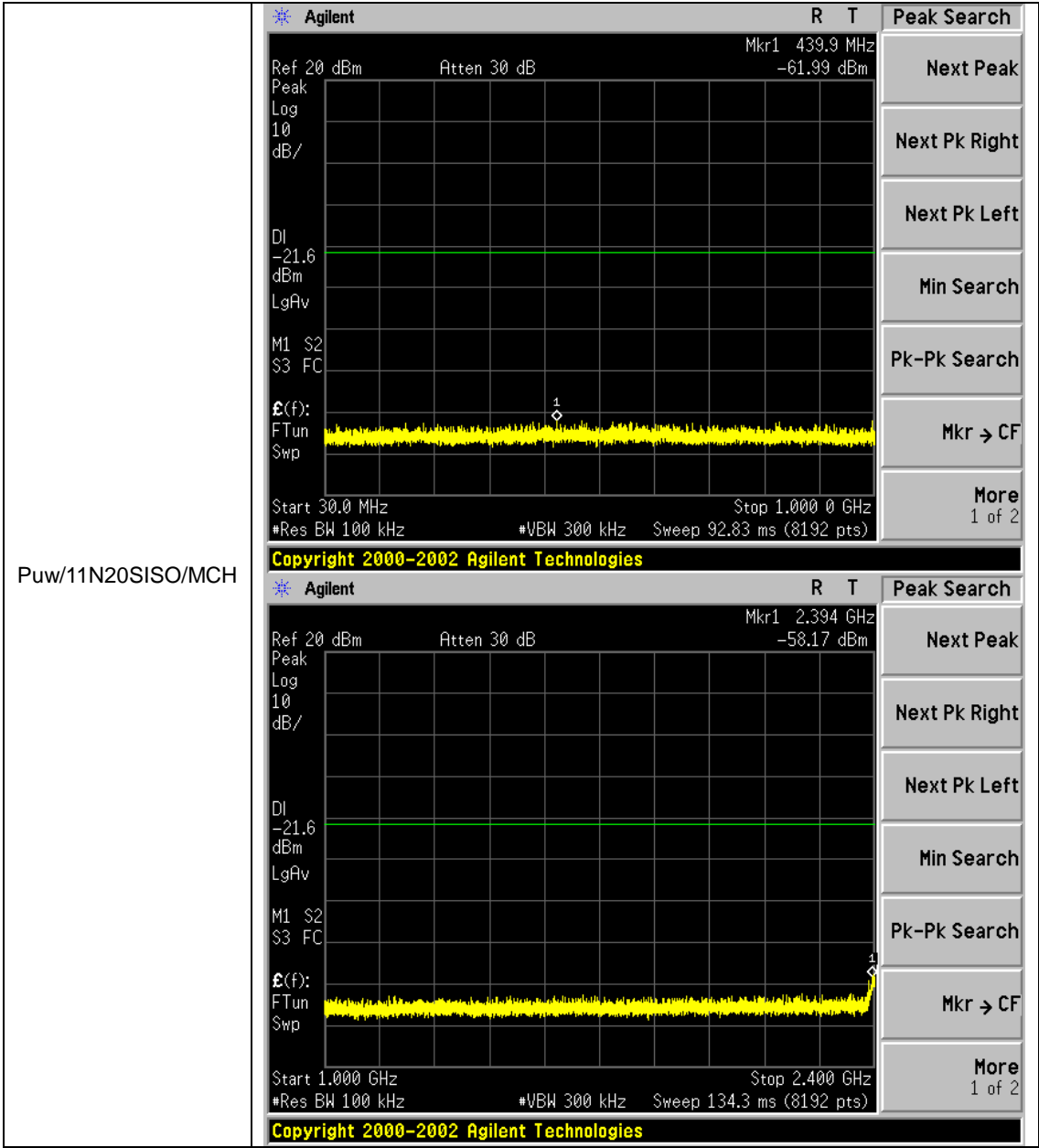


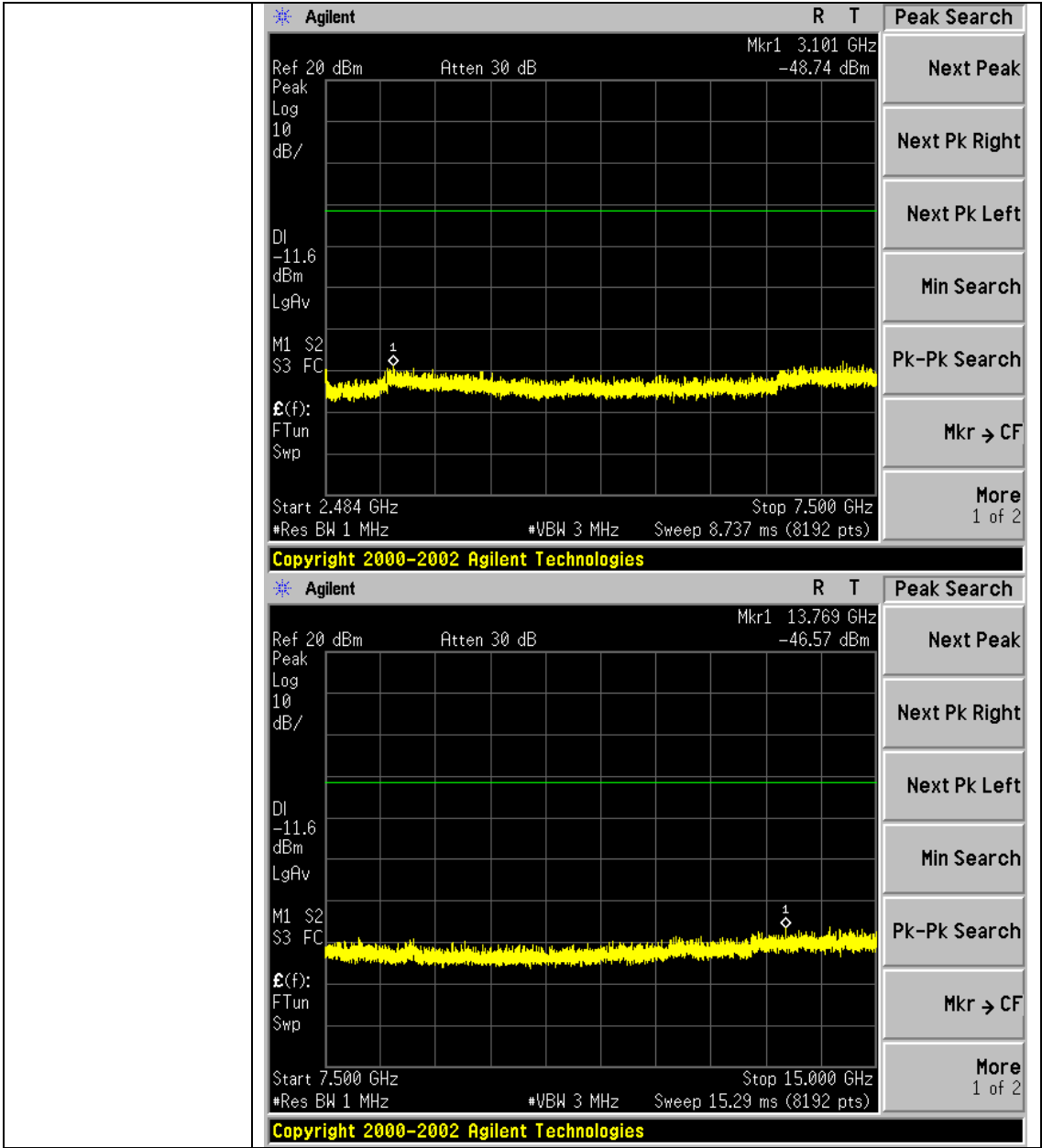


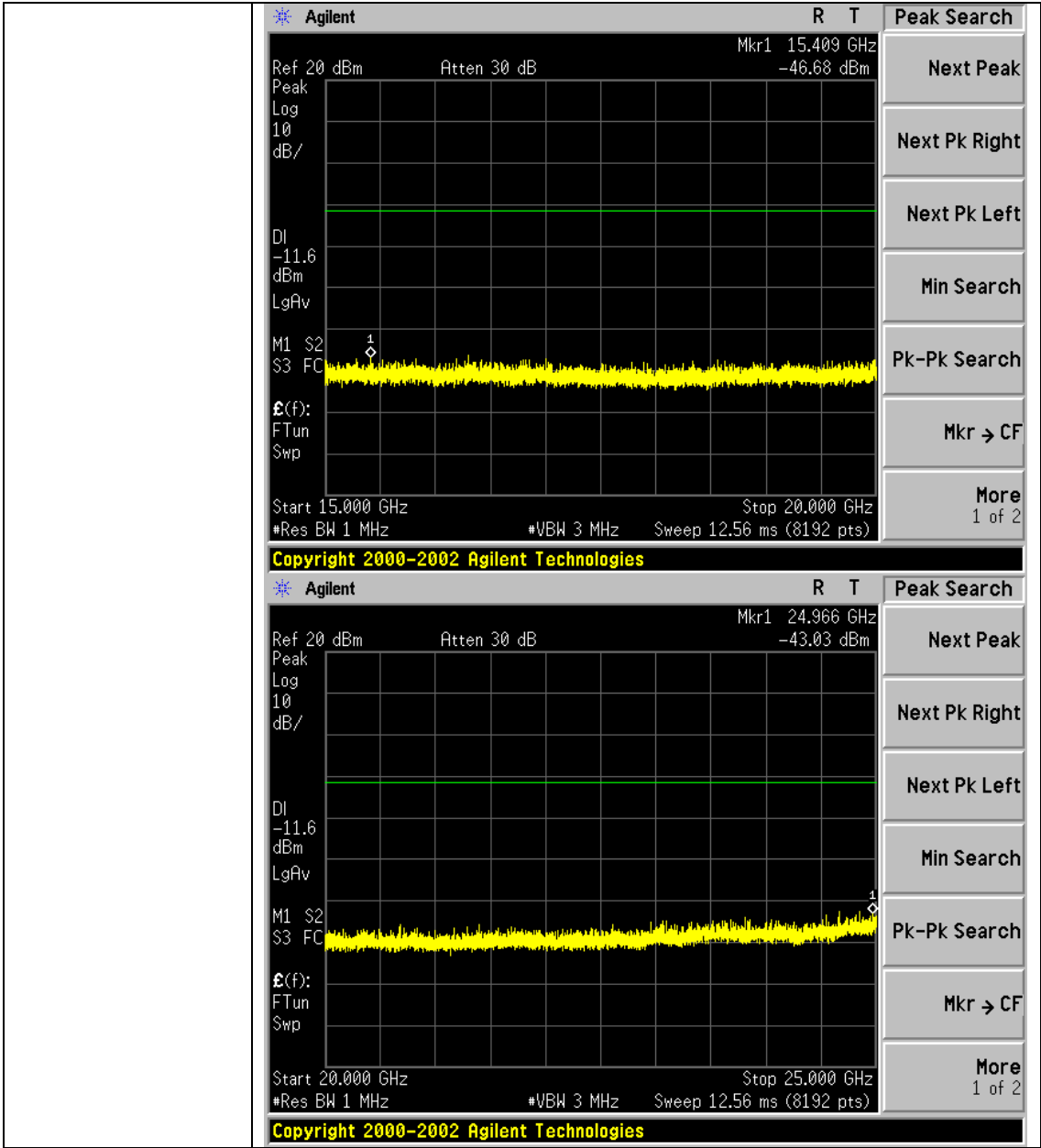


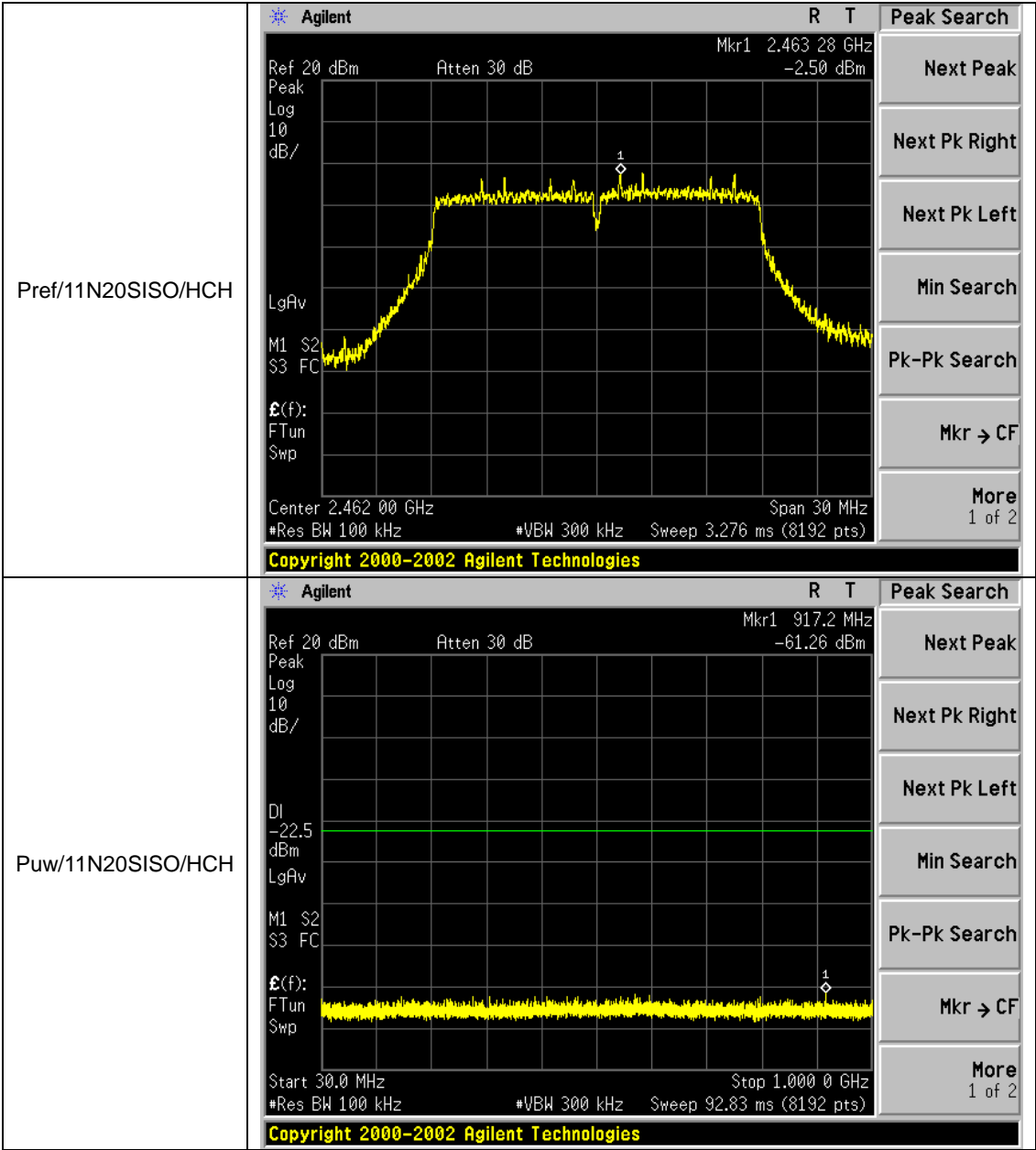


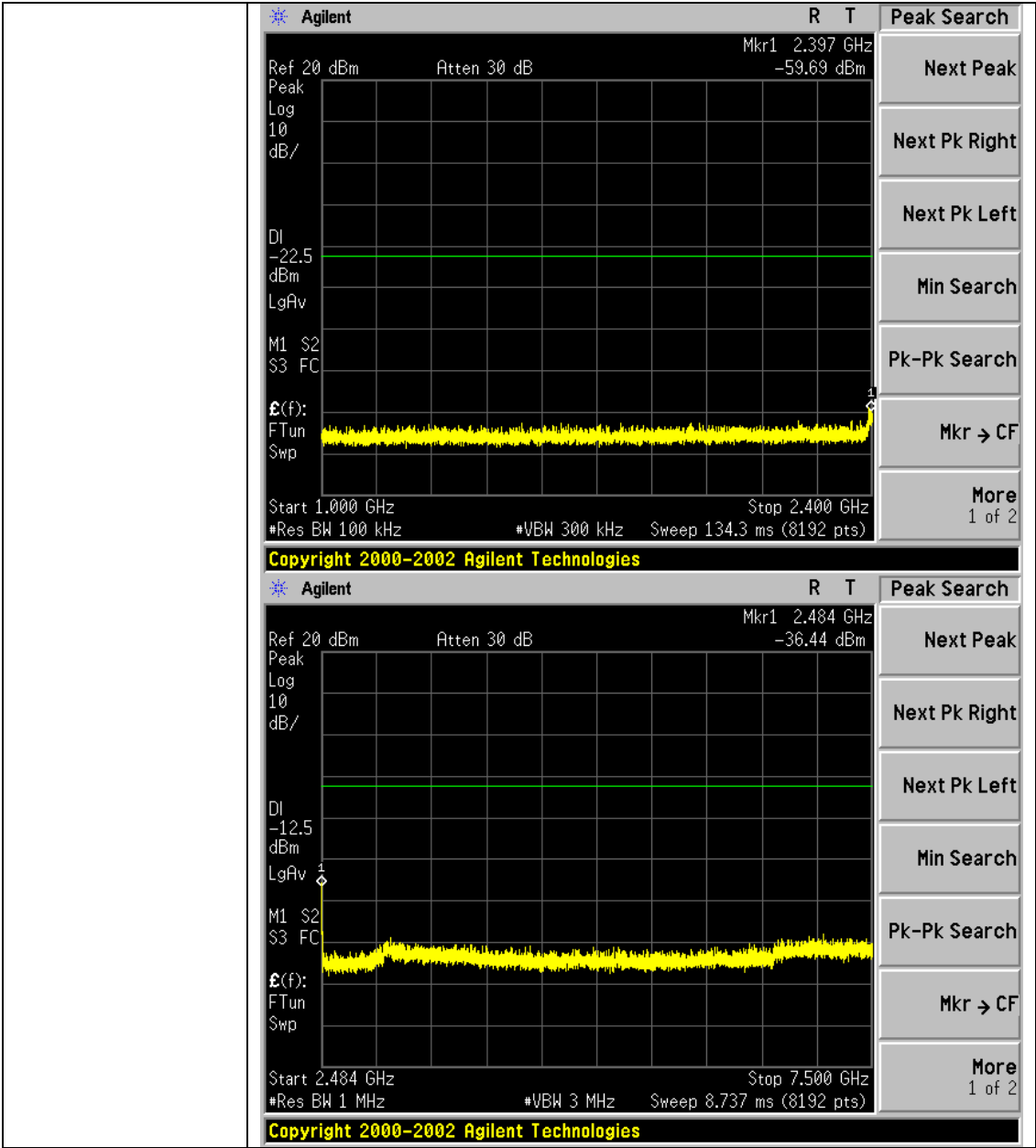


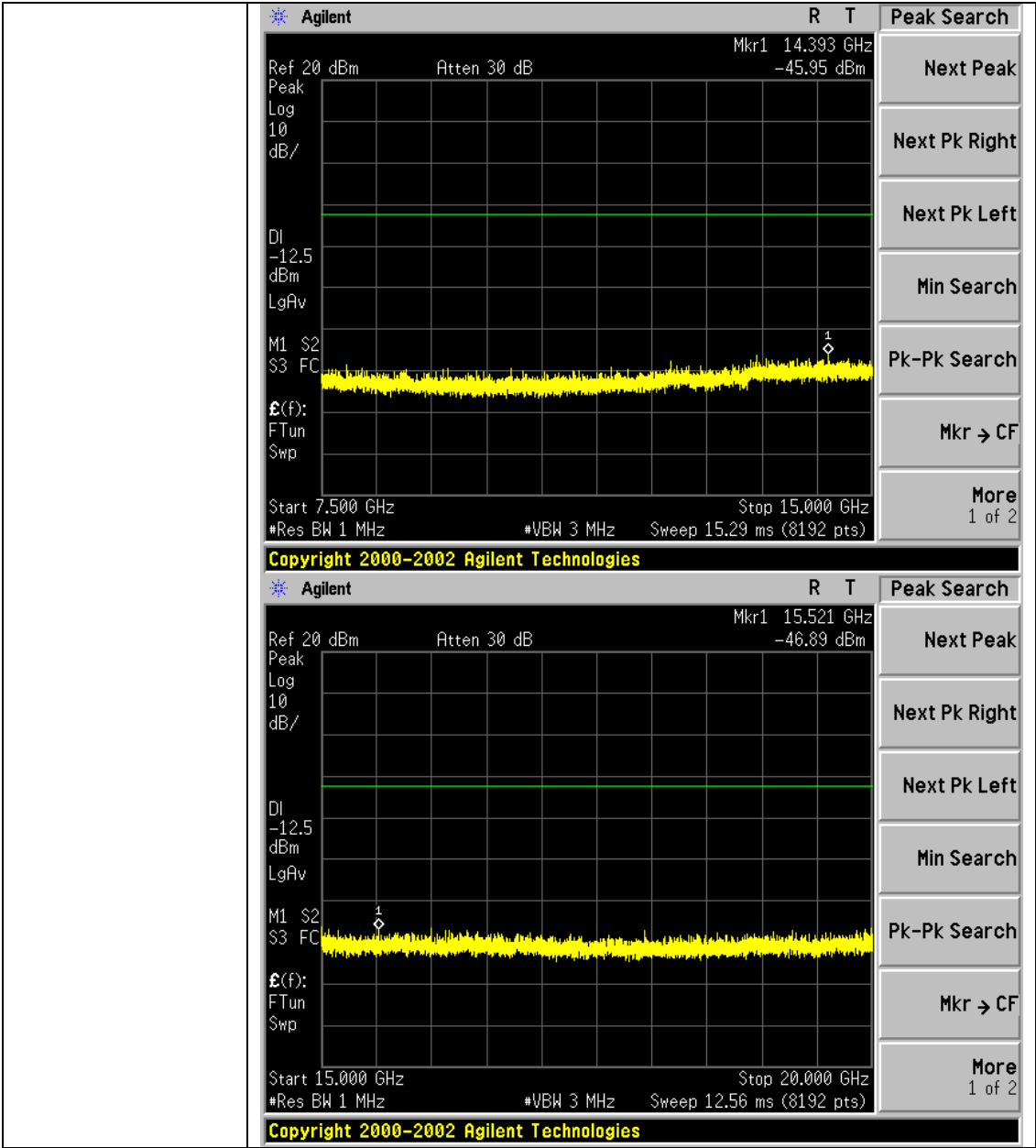


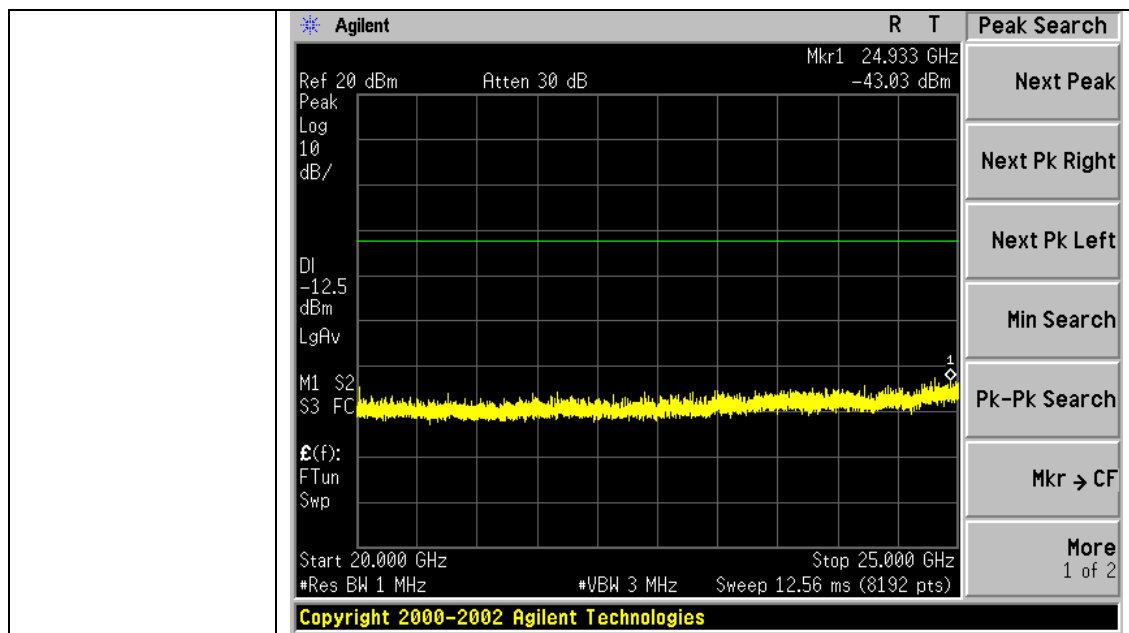












10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

10.1 MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set SPA Trace 1 Max hold, then View.

Note: The method of AVGPSD in the KDB 558074 item 10.3 was used in this testing.

10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 8.2.

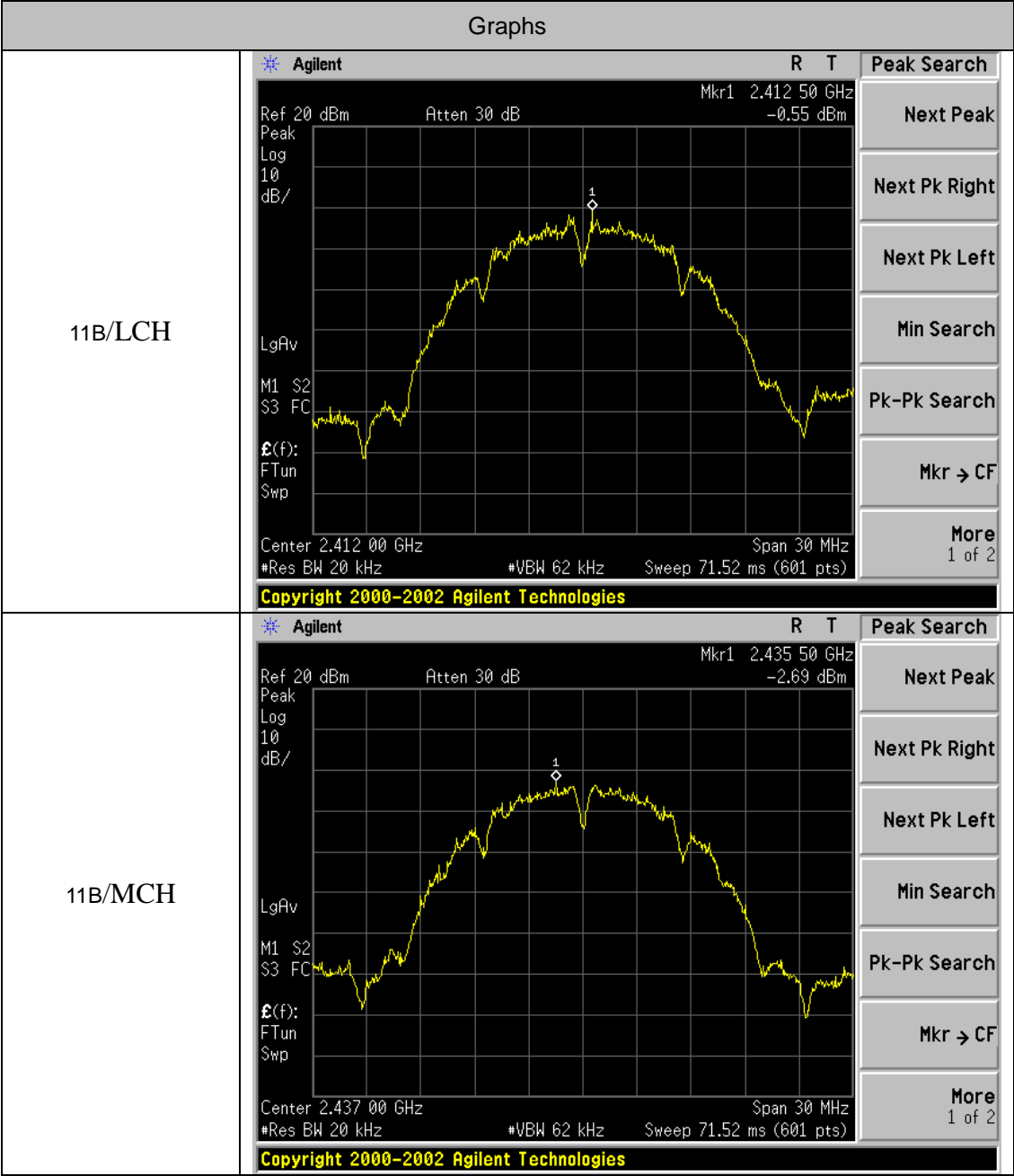
10.3 MEASUREMENT EQUIPMENT USED

Refer To Section 6.

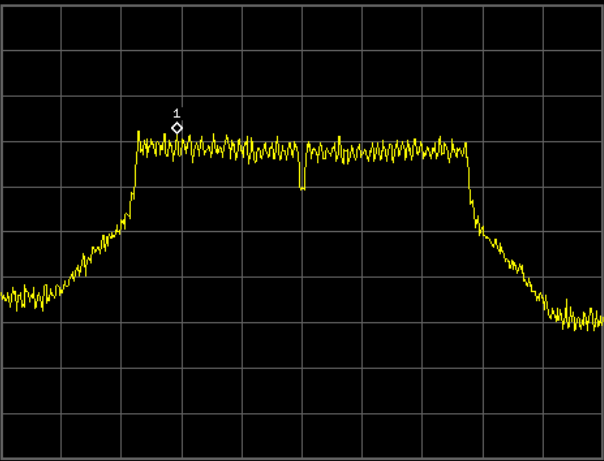
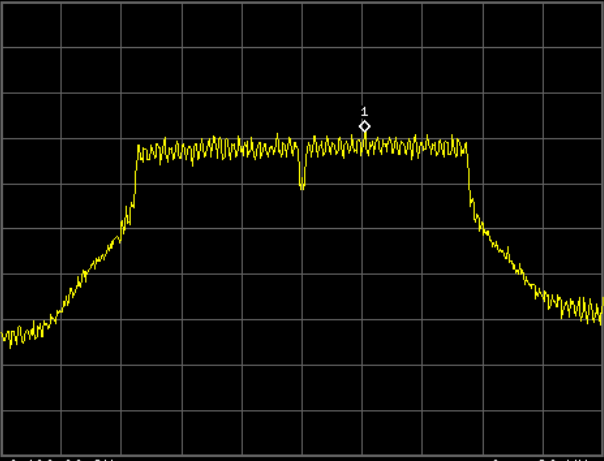
10.4 LIMITS AND MEASUREMENT RESULT

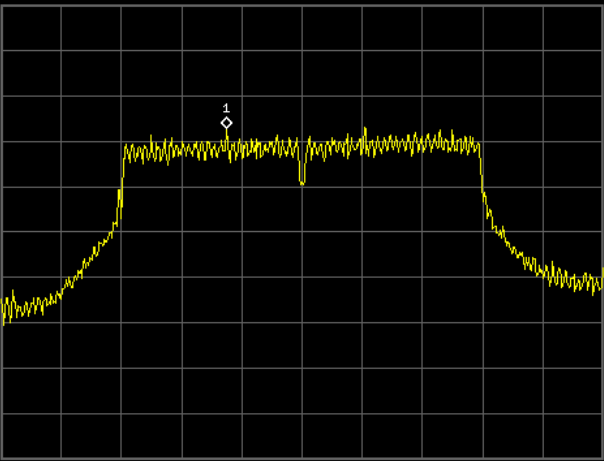
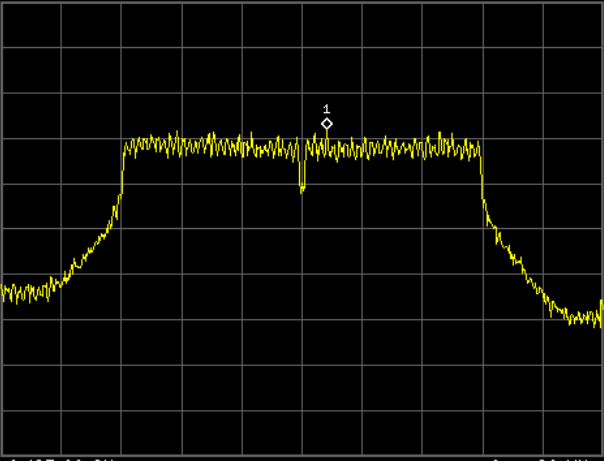
| Mode | Channel | Av.PSD [dBm/20kHz] | Limit[dBm/3kHz] | Verdict |
|-----------|---------|--------------------|-----------------|---------|
| 11B | LCH | -0.55 | 8 | PASS |
| 11B | MCH | -2.69 | 8 | PASS |
| 11B | HCH | -3.47 | 8 | PASS |
| 11G | LCH | -8.30 | 8 | PASS |
| 11G | MCH | -8.42 | 8 | PASS |
| 11G | HCH | -8.70 | 8 | PASS |
| 11N20SISO | LCH | -7.32 | 8 | PASS |
| 11N20SISO | MCH | -8.21 | 8 | PASS |
| 11N20SISO | HCH | -8.88 | 8 | PASS |

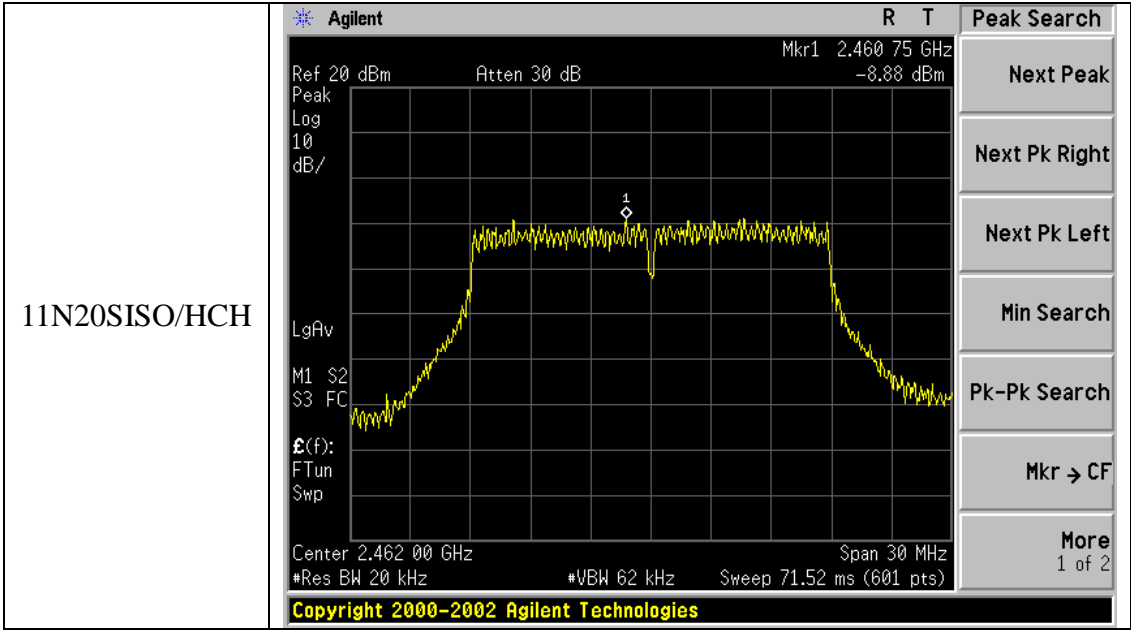
Test Graph



| | |
|--------------------|--|
| <div>11B/HCH</div> | <div><div><div>Agilent</div><div>R T</div><div>Ref 20 dBm Atten 30 dB Mkr1 2.463 00 GHz -3.47 dBm</div><div>Peak Log 10 dB/</div><div>LgAv</div><div>M1 S2 S3 FC</div><div>$\mathcal{E}(f)$: FTun Swp</div><div>Center 2.462 00 GHz Span 30 MHz #Res BW 20 kHz #VBW 62 kHz Sweep 71.52 ms (601 pts)</div><div>Copyright 2000-2002 Agilent Technologies</div></div><div><div>Peak Search</div><div>Next Peak</div><div>Next Pk Right</div><div>Next Pk Left</div><div>Min Search</div><div>Pk-Pk Search</div><div>Mkr → CF</div><div>More 1 of 2</div></div></div> |
| <div>11G/LCH</div> | <div><div><div>Agilent</div><div>R T</div><div>Ref 20 dBm Atten 30 dB Mkr1 2.420 10 GHz -8.30 dBm</div><div>Peak Log 10 dB/</div><div>LgAv</div><div>M1 S2 S3 FC</div><div>$\mathcal{E}(f)$: FTun Swp</div><div>Center 2.412 00 GHz Span 30 MHz #Res BW 20 kHz #VBW 62 kHz Sweep 71.52 ms (601 pts)</div><div>Copyright 2000-2002 Agilent Technologies</div></div><div><div>Peak Search</div><div>Next Peak</div><div>Next Pk Right</div><div>Next Pk Left</div><div>Min Search</div><div>Pk-Pk Search</div><div>Mkr → CF</div><div>More 1 of 2</div></div></div> |

| | |
|---------|--|
| 11G/MCH | <div><div><div>Agilent</div><div><div>R</div><div>T</div></div><div>Ref 20 dBm Atten 30 dB Mkr1 2.430 75 GHz -8.42 dBm</div><div>Peak Log 10 dB/</div><div>LgAv</div><div>M1 S2 S3 FC</div><div>$\mathcal{E}(f)$: FTun Swp</div><div></div><div>Center 2.437 00 GHz Span 30 MHz *Res BW 20 kHz #VBW 62 kHz Sweep 71.52 ms (601 pts)</div><div>Copyright 2000-2002 Agilent Technologies</div></div><div><div>Peak Search</div><div>Next Peak</div><div>Next Pk Right</div><div>Next Pk Left</div><div>Min Search</div><div>Pk-Pk Search</div><div>Mkr → CF</div><div>More 1 of 2</div></div></div> |
| 11G/HCH | <div><div><div>Agilent</div><div><div>R</div><div>T</div></div><div>Ref 20 dBm Atten 30 dB Mkr1 2.465 10 GHz -8.70 dBm</div><div>Peak Log 10 dB/</div><div>LgAv</div><div>M1 S2 S3 FC</div><div>$\mathcal{E}(f)$: FTun Swp</div><div></div><div>Center 2.462 00 GHz Span 30 MHz *Res BW 20 kHz #VBW 62 kHz Sweep 71.52 ms (601 pts)</div><div>Copyright 2000-2002 Agilent Technologies</div></div><div><div>Peak Search</div><div>Next Peak</div><div>Next Pk Right</div><div>Next Pk Left</div><div>Min Search</div><div>Pk-Pk Search</div><div>Mkr → CF</div><div>More 1 of 2</div></div></div> |

| | |
|---------------|--|
| 11N20SISO/LCH | <div><div><div>Agilent</div><div><div>R</div><div>T</div></div><div>Ref 20 dBm Atten 30 dB Mkr1 2.408 25 GHz -7.32 dBm</div><div>Peak Log 10 dB/</div><div></div><div>LgAv</div><div>M1 S2 S3 FC</div><div>$\mathcal{E}(f)$: FTun Swp</div><div>Center 2.412 00 GHz Span 30 MHz *Res BW 20 kHz #VBW 62 kHz Sweep 71.52 ms (601 pts)</div><div>Copyright 2000-2002 Agilent Technologies</div></div><div><div>Peak Search</div><div>Next Peak</div><div>Next Pk Right</div><div>Next Pk Left</div><div>Min Search</div><div>Pk-Pk Search</div><div>Mkr → CF</div><div>More 1 of 2</div></div></div> |
| 11N20SISO/MCH | <div><div><div>Agilent</div><div><div>R</div><div>T</div></div><div>Ref 20 dBm Atten 30 dB Mkr1 2.438 25 GHz -8.21 dBm</div><div>Peak Log 10 dB/</div><div></div><div>LgAv</div><div>M1 S2 S3 FC</div><div>$\mathcal{E}(f)$: FTun Swp</div><div>Center 2.437 00 GHz Span 30 MHz *Res BW 20 kHz #VBW 62 kHz Sweep 71.52 ms (601 pts)</div><div>Copyright 2000-2002 Agilent Technologies</div></div><div><div>Peak Search</div><div>Next Peak</div><div>Next Pk Right</div><div>Next Pk Left</div><div>Min Search</div><div>Pk-Pk Search</div><div>Mkr → CF</div><div>More 1 of 2</div></div></div> |



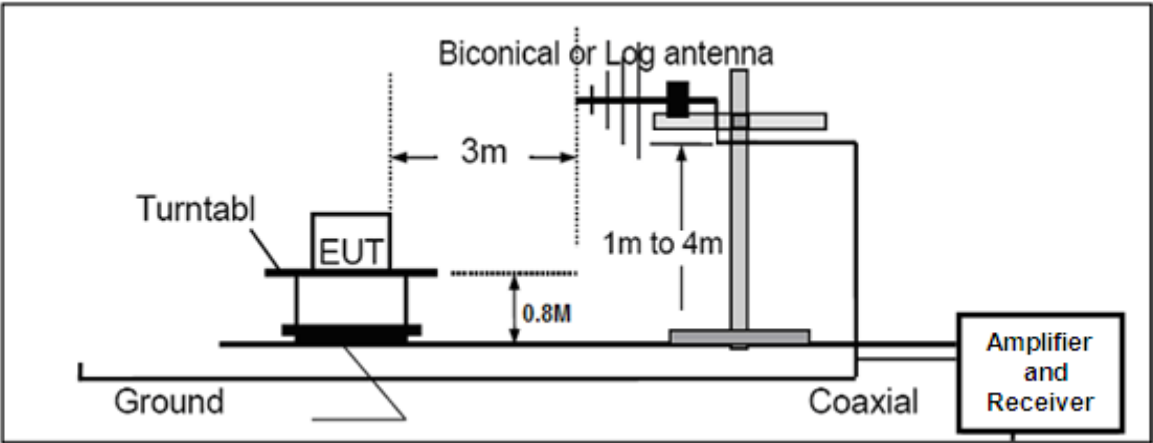
11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

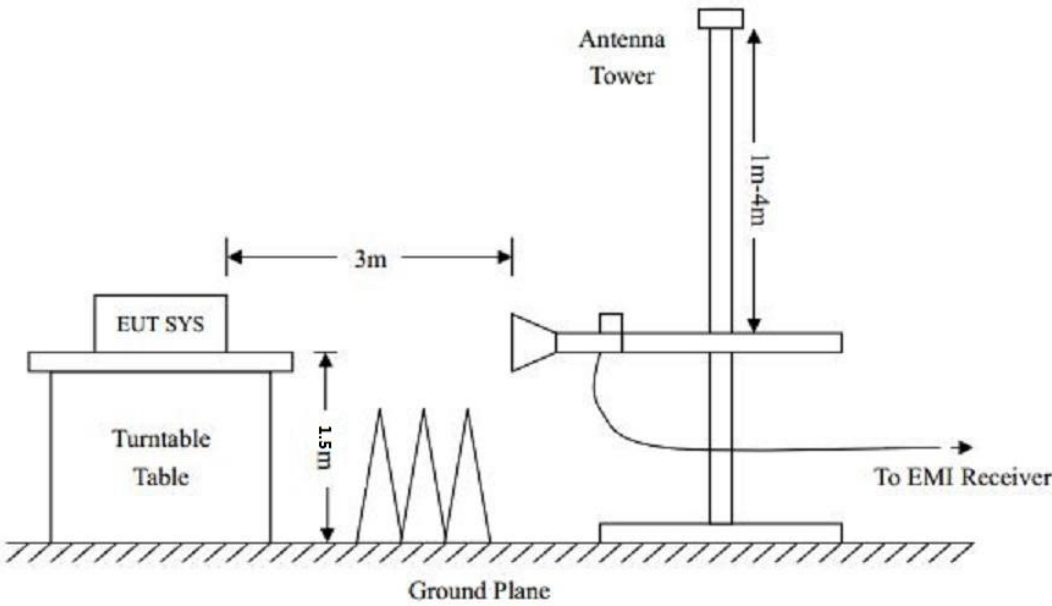
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

11.2. TEST SETUP

RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|----------------------|--------------------------------------|----------------------------------|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

Note: All modes were tested For restricted band radiated emission,
the test records reported below are the worst result compared to other modes.

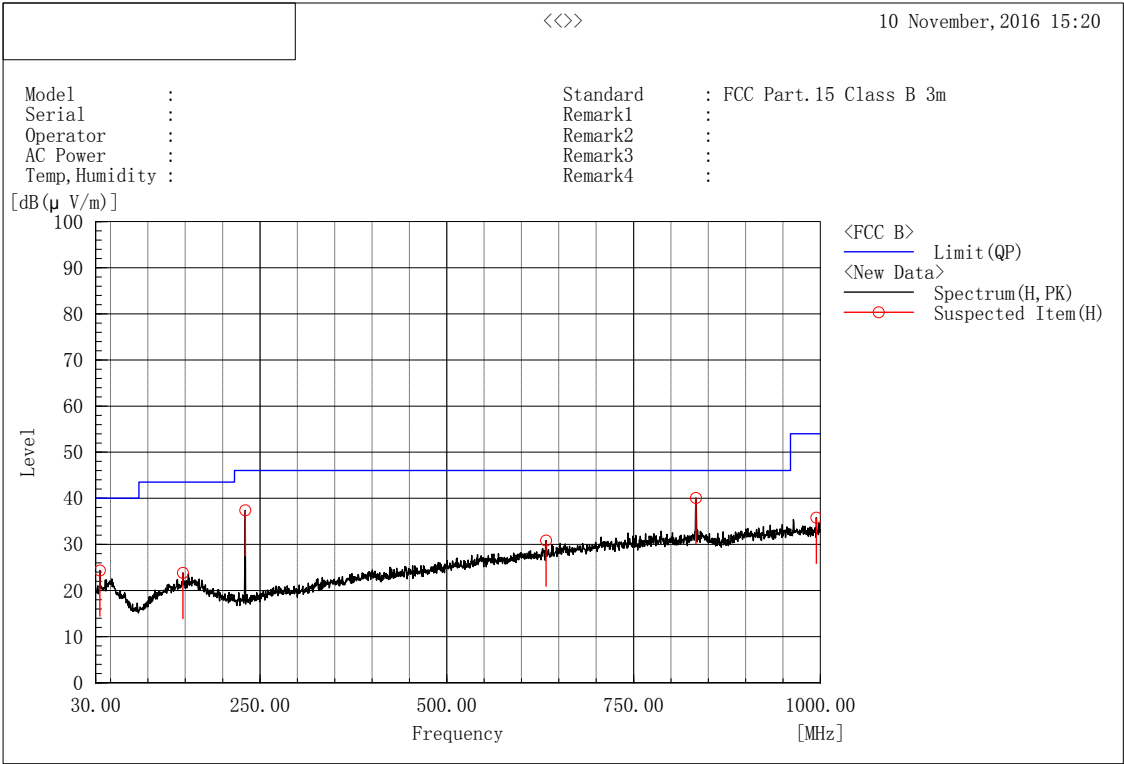
11.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

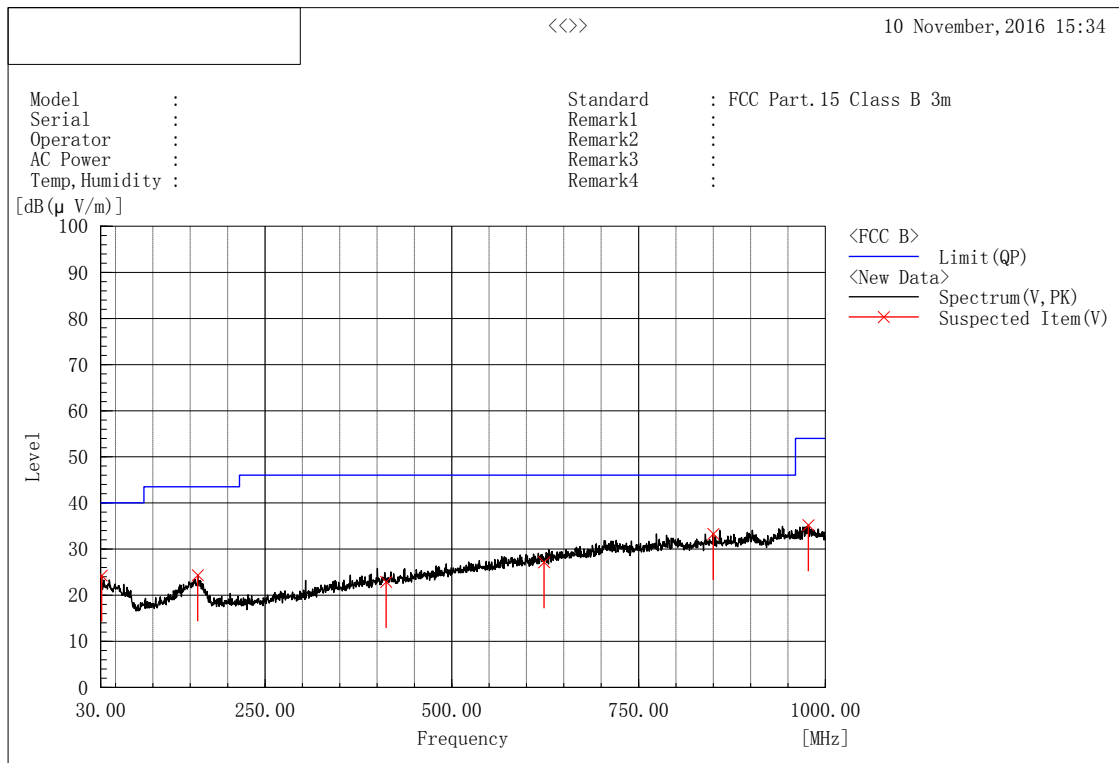
| | | | |
|-------------|-------------------------------------|-------------------|----------------|
| EUT | LTE WIRELESS DATA TERMINAL | Model Name | ROAMWIFI R9 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with date rate 1 2412MHZ | Antenna | Horizontal |



| Frequency MHz | Polarization | Reading dB(uV) | Factor dB (1/m) | Level dB(uV/m) PK | Limit dB(uV/m) QP | Margin dB | Pass/Fail | Height cm | Angle deg |
|------------------|--------------|-------------------|-----------------------|-------------------------|-------------------------|--------------|-----------|--------------|--------------|
| 35.820 | H | 9.3 | 15.0 | 24.3 | 40.0 | 15.7 | Pass | 100.0 | 16.6 |
| 146.885 | H | 7.1 | 16.7 | 23.8 | 43.5 | 19.7 | Pass | 100.0 | 16.6 |
| 230.305 | H | 23.6 | 13.8 | 37.4 | 46.0 | 8.6 | Pass | 200.0 | 3.9 |
| 833.645 | H | 12.9 | 27.2 | 40.1 | 46.0 | 5.9 | Pass | 200.0 | 82.8 |
| 994.665 | H | 7.4 | 28.4 | 35.8 | 54.0 | 18.2 | Pass | 200.0 | 168.7 |
| 632.855 | H | 7.5 | 23.3 | 30.8 | 46.0 | 15.2 | Pass | 200.0 | 207.7 |

RESULT: PASS

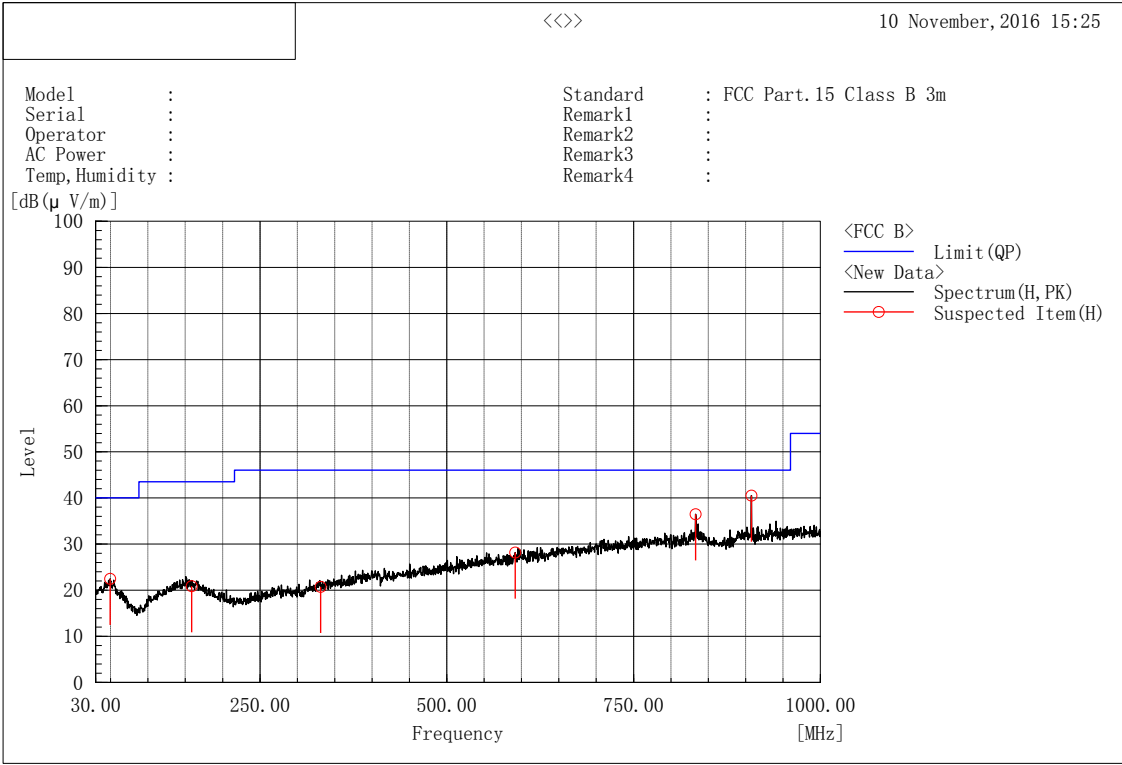
| | | | |
|--------------------|-------------------------------------|--------------------------|----------------|
| EUT | LTE WIRELESS DATA TERMINAL | Model Name | ROAMWIFI R9 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with data rate 1 2412MHZ | Antenna | Vertical |



| Frequency MHz | Polarization | Reading dB(uV) | Factor dB (1/m) | Level dB(uV/m) PK | Limit dB(uV/m) QP | Margin dB | Pass/Fail | Height cm | Angle deg |
|------------------|--------------|-------------------|-----------------------|-------------------------|-------------------------|--------------|-----------|--------------|--------------|
| 31.455 | V | 7.1 | 17.2 | 24.3 | 40.0 | 15.7 | Pass | 200.0 | 34.0 |
| 159.980 | V | 6.0 | 18.4 | 24.4 | 43.5 | 19.1 | Pass | 100.0 | 123.2 |
| 977.205 | V | 6.1 | 29.1 | 35.2 | 54.0 | 18.8 | Pass | 100.0 | 57.0 |
| 412.180 | V | 3.9 | 19.0 | 22.9 | 46.0 | 23.1 | Pass | 100.0 | 170.4 |
| 623.640 | V | 3.5 | 23.6 | 27.1 | 46.0 | 18.9 | Pass | 200.0 | 313.9 |
| 850.135 | V | 6.4 | 26.9 | 33.3 | 46.0 | 12.7 | Pass | 200.0 | 191.8 |

RESULT: PASS

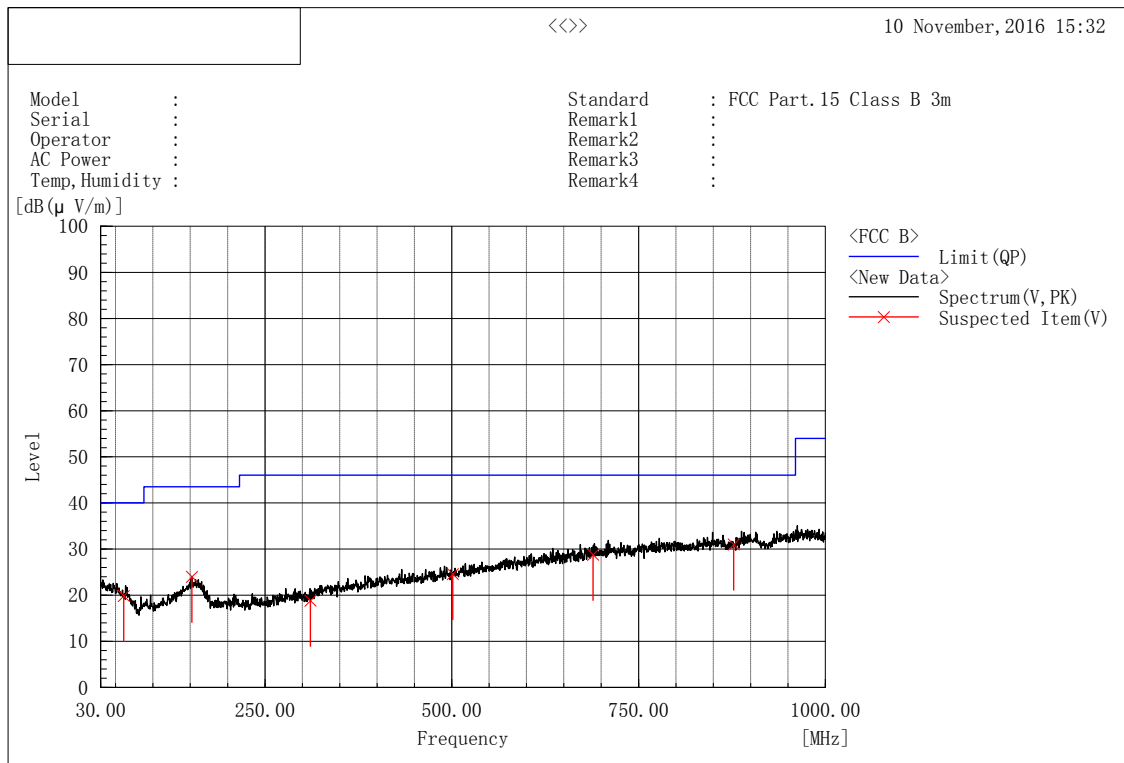
| | | | |
|-------------|-------------------------------------|-------------------|----------------|
| EUT | LTE WIRELESS DATA TERMINAL | Model Name | ROAMWIFI R9 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with data rate 1 2437MHZ | Antenna | Horizontal |



| Frequency MHz | Polarization | Reading dB(uV) | Factor dB (1/m) | Level dB(uV/m) PK | Limit dB(uV/m) QP | Margin dB | Pass/Fail | Height cm | Angle deg |
|------------------|--------------|-------------------|-----------------------|-------------------------|-------------------------|--------------|-----------|--------------|--------------|
| 49.400 | H | 5.9 | 16.6 | 22.5 | 40.0 | 17.5 | Pass | 200.0 | 87.8 |
| 158.525 | H | 3.9 | 17.0 | 20.9 | 43.5 | 22.6 | Pass | 200.0 | 107.8 |
| 331.185 | H | 3.7 | 17.0 | 20.7 | 46.0 | 25.3 | Pass | 200.0 | 339.6 |
| 591.630 | H | 5.7 | 22.5 | 28.2 | 46.0 | 17.8 | Pass | 100.0 | 315.0 |
| 833.160 | H | 9.3 | 27.2 | 36.5 | 46.0 | 9.5 | Pass | 200.0 | 41.4 |
| 907.850 | H | 12.9 | 27.6 | 40.5 | 46.0 | 5.5 | Pass | 100.0 | 341.2 |

RESULT: PASS

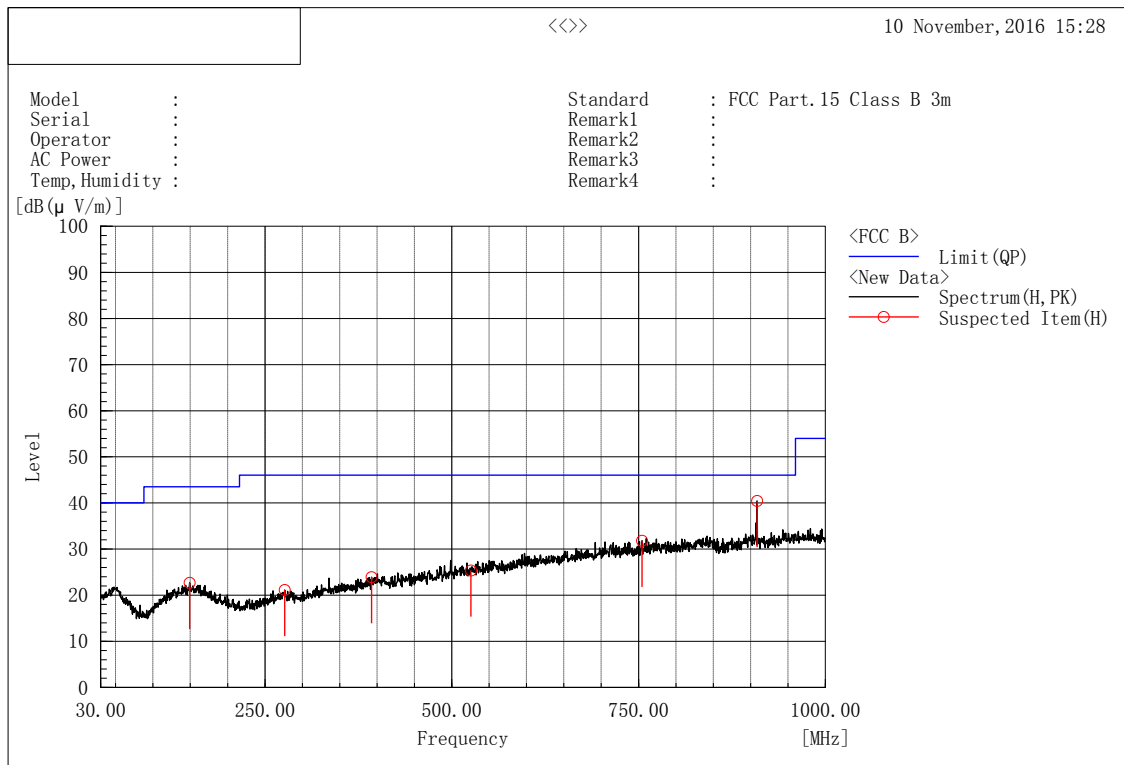
| | | | |
|-------------|-------------------------------------|-------------------|----------------|
| EUT | LTE WIRELESS DATA TERMINAL | Model Name | ROAMWIFI R9 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with data rate 1 2437MHZ | Antenna | Vertical |



| Frequency MHz | Polarization | Reading dB(μV) | Factor dB (1/m) | Level dB(μV/m) PK | Limit dB(μV/m) QP | Margin dB | Pass/Fail | Height cm | Angle deg |
|------------------|--------------|-------------------|-----------------------|-------------------------|-------------------------|--------------|-----------|--------------|--------------|
| 152.220 | V | 6.1 | 17.9 | 24.0 | 43.5 | 19.5 | Pass | 100.0 | 68.6 |
| 61.040 | V | 4.5 | 15.4 | 19.9 | 40.0 | 20.1 | Pass | 100.0 | 317.4 |
| 310.815 | V | 2.8 | 16.0 | 18.8 | 46.0 | 27.2 | Pass | 100.0 | 184.1 |
| 501.420 | V | 3.7 | 20.9 | 24.6 | 46.0 | 21.4 | Pass | 100.0 | 41.2 |
| 689.115 | V | 3.9 | 24.9 | 28.8 | 46.0 | 17.2 | Pass | 100.0 | 182.0 |
| 877.295 | V | 4.1 | 26.9 | 31.0 | 46.0 | 15.0 | Pass | 100.0 | 247.5 |

RESULT: PASS

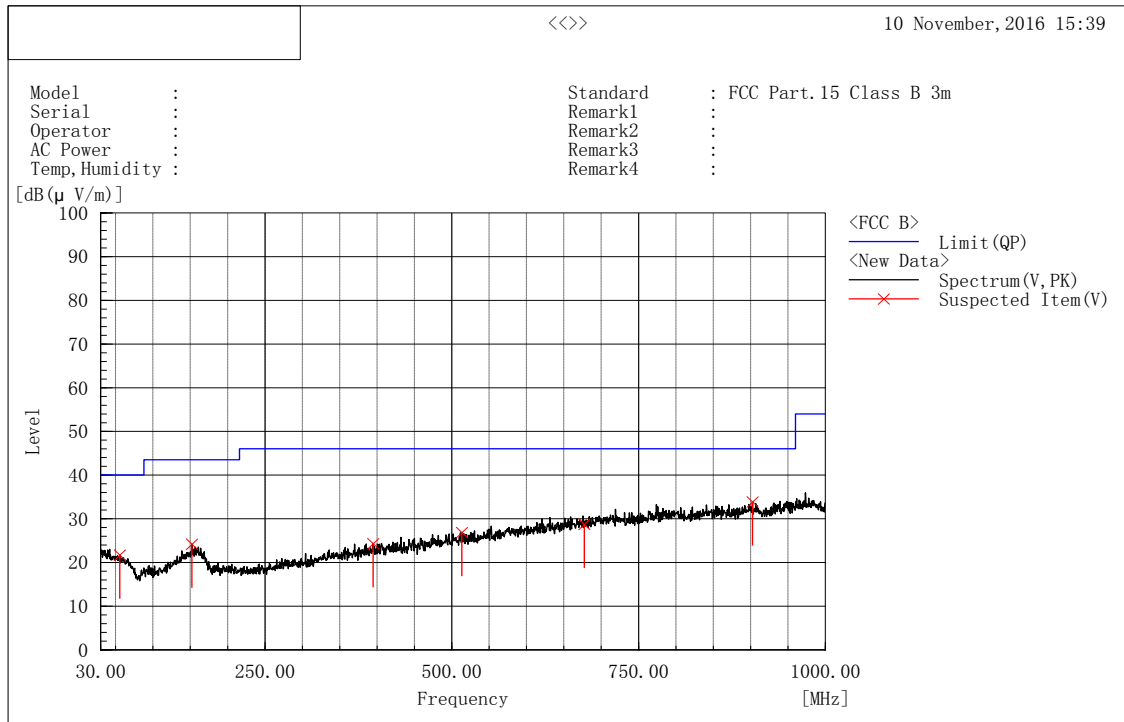
| | | | |
|-------------|-------------------------------------|-------------------|----------------|
| EUT | LTE WIRELESS DATA TERMINAL | Model Name | ROAMWIFI R9 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with date rate 1 2462MHZ | Antenna | Horizontal |



| Frequency MHz | Polarization | Reading dB(μV) | Factor dB (1/m) | Level dB(μV/m) PK | Limit dB(μV/m) QP | Margin dB | Pass/Fail | Height cm | Angle deg |
|------------------|--------------|-------------------|-----------------------|-------------------------|-------------------------|--------------|-----------|--------------|--------------|
| 149.310 | H | 5.9 | 16.8 | 22.7 | 43.5 | 20.8 | Pass | 100.0 | 131.6 |
| 276.380 | H | 5.5 | 15.6 | 21.1 | 46.0 | 24.9 | Pass | 100.0 | 228.6 |
| 392.780 | H | 5.0 | 18.9 | 23.9 | 46.0 | 22.1 | Pass | 100.0 | 284.6 |
| 525.670 | H | 4.1 | 21.3 | 25.4 | 46.0 | 20.6 | Pass | 200.0 | 42.1 |
| 754.590 | H | 5.9 | 25.9 | 31.8 | 46.0 | 14.2 | Pass | 100.0 | 274.1 |
| 908.820 | H | 12.8 | 27.6 | 40.4 | 46.0 | 5.6 | Pass | 100.0 | 166.6 |

RESULT: PASS

| | | | |
|--------------------|-------------------------------------|--------------------------|----------------|
| EUT | LTE WIRELESS DATA TERMINAL | Model Name | ROAMWIFI R9 |
| Temperature | 25°C | Relative Humidity | 55.4% |
| Pressure | 960hPa | Test Voltage | Normal Voltage |
| Test Mode | 802.11b with data rate 1 2462MHZ | Antenna | Vertical |



| Frequency MHz | Polarization | Reading dB(uV) | Factor dB (1/m) | Level dB(uV/m) PK | Limit dB(uV/m) QP | Margin dB | Pass/Fail | Height cm | Angle deg |
|---------------|--------------|----------------|-----------------|-------------------|-------------------|-----------|-----------|-----------|-----------|
| 394.720 | V | 5.5 | 18.8 | 24.3 | 46.0 | 21.7 | Pass | 200.0 | 190.1 |
| 152.220 | V | 6.3 | 17.9 | 24.2 | 43.5 | 19.3 | Pass | 200.0 | 312.6 |
| 55.705 | V | 5.7 | 16.0 | 21.7 | 40.0 | 18.3 | Pass | 100.0 | 328.1 |
| 513.545 | V | 5.8 | 21.1 | 26.9 | 46.0 | 19.1 | Pass | 200.0 | 194.4 |
| 677.475 | V | 4.2 | 24.6 | 28.8 | 46.0 | 17.2 | Pass | 100.0 | 295.7 |
| 902.515 | V | 5.8 | 28.1 | 33.9 | 46.0 | 12.1 | Pass | 200.0 | 274.6 |

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin= Result -Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

3. 30MHz~1GHz:(Scan with 11b,11g,11n, the worst case is 11b Mode)

RADIATED EMISSION ABOVE 1GHZ

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector | Comment |
|----------------|---------------|--------|----------------|----------|--------|----------|------------|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | Type | |
| TX 11b 2412MHz | | | | | | | |
| 4824.092 | 41.27 | 10.44 | 51.71 | 74 | -22.29 | Pk | Horizontal |
| 4824.092 | 33.55 | 10.44 | 43.99 | 54 | -10.01 | AV | Horizontal |
| 7236.127 | 43.16 | 10.39 | 53.55 | 74 | -20.45 | pk | Horizontal |
| 7236.127 | 33.29 | 10.39 | 43.68 | 54 | -10.32 | AV | Horizontal |
| 4824.098 | 49.42 | 10.39 | 59.81 | 74 | -14.19 | Pk | Vertical |
| 4824.082 | 31.65 | 10.39 | 42.04 | 54 | -11.96 | AV | Vertical |
| 7236.110 | 42.57 | 10.68 | 53.25 | 74 | -20.75 | Pk | Vertical |
| 7236.054 | 32.53 | 10.68 | 43.21 | 54 | -10.79 | AV | Vertical |
| TX 11b 2437MHz | | | | | | | |
| 4874.072 | 43.28 | 10.39 | 53.67 | 74 | -20.33 | Pk | Horizontal |
| 4874.108 | 31.06 | 10.39 | 41.45 | 54 | -12.55 | AV | Horizontal |
| 7311.092 | 42.05 | 12.68 | 54.73 | 74 | -19.27 | Pk | Horizontal |
| 7311.131 | 31.37 | 12.68 | 44.05 | 54 | -9.95 | AV | Horizontal |
| 4874.098 | 46.25 | 10.39 | 56.64 | 74 | -17.36 | Pk | Vertical |
| 4874.044 | 32.69 | 10.39 | 43.08 | 54 | -10.92 | AV | Vertical |
| 7311.145 | 43.24 | 12.68 | 55.92 | 74 | -18.08 | Pk | Vertical |
| 7311.104 | 36.54 | 12.68 | 49.22 | 54 | -4.78 | AV | Vertical |
| TX 11b 2462MHz | | | | | | | |
| 4924.128 | 42.98 | 10.39 | 53.37 | 74 | -20.63 | pk | Horizontal |
| 4924.083 | 33.11 | 10.39 | 43.5 | 54 | -10.5 | AV | Horizontal |
| 7386.071 | 42.45 | 12.68 | 55.13 | 74 | -18.87 | pk | Horizontal |
| 7386.134 | 36.29 | 12.68 | 48.97 | 54 | -5.03 | AV | Horizontal |
| 4924.042 | 45.22 | 10.39 | 55.61 | 74 | -18.39 | pk | Vertical |
| 4924.060 | 31.39 | 10.39 | 41.78 | 54 | -12.22 | AV | Vertical |
| 7386.051 | 42.67 | 12.68 | 55.35 | 74 | -18.65 | pk | Vertical |
| 7386.054 | 31.13 | 12.68 | 43.81 | 54 | -10.19 | AV | Vertical |

RESULT: PASS

Note: 1~25GHz scan with 11b. No recording in the test report at least have 20dB margin.

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Meter Reading + Factor

Margin = Emission Level - Limit

12. BAND EDGE EMISSION

12.1. MEASUREMENT PROCEDURE

1) Radiated restricted band edge measurements

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting

2) Conducted Emissions at the bang edge

a) The transmitter output was connected to the spectrum analyzer

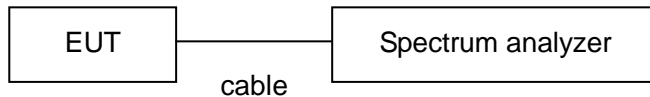
b) Set RBW=100kHz, VBW=300kHz

c) Suitable frequency span including 100kHz bandwidth from band edge

12.2. TEST SET-UP

Radiated same as 11.2

Conducted set up



12.3. Radiated Test Result

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector | Comment |
|----------------|---------------|--------|----------------|----------|--------|----------|------------|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | Type | |
| TX 11b 2412MHz | | | | | | | |
| 2399.9 | 74.25 | -13 | 61.25 | 74 | -12.75 | peak | Horizontal |
| 2399.9 | 56.33 | -13 | 43.33 | 54 | -10.67 | AVG | Horizontal |
| 2400 | 71.23 | -12.99 | 58.24 | 74 | -15.76 | peak | Horizontal |
| 2400 | 52.47 | -12.99 | 39.48 | 54 | -14.52 | AVG | Horizontal |
| 2399.9 | 73.35 | -12.97 | 60.38 | 74 | -13.62 | peak | Vertical |
| 2399.9 | 51.34 | -12.97 | 38.37 | 54 | -15.63 | AVG | Vertical |
| 2400 | 72.22 | -12.94 | 59.28 | 74 | -14.72 | peak | Vertical |
| 2400 | 51.69 | -12.94 | 38.75 | 54 | -15.25 | AVG | Vertical |
| TX 11b 2462MHz | | | | | | | |
| 2483.5 | 71.46 | -12.78 | 58.68 | 74 | -15.32 | peak | Horizontal |
| 2483.5 | 52.05 | -12.78 | 39.27 | 54 | -14.73 | AVG | Horizontal |
| 2483.6 | 74.67 | -12.77 | 61.9 | 74 | -12.1 | peak | Horizontal |
| 2483.6 | 53.06 | -12.77 | 40.29 | 54 | -13.71 | AVG | Horizontal |
| 2483.5 | 70.24 | -12.76 | 57.48 | 74 | -16.52 | peak | Vertical |
| 2483.5 | 52.25 | -12.76 | 39.49 | 54 | -14.51 | AVG | Vertical |
| 2483.6 | 71.17 | -12.72 | 58.45 | 74 | -15.55 | peak | Vertical |
| 2483.6 | 56.23 | -12.72 | 43.51 | 54 | -10.49 | AVG | Vertical |

RESULT: PASS

Note: Scan with 11b,11g,11n, the worst casw is 11b Mode

Factor=Antenna Factor + Cable loss - Amplifier gain,

Emission Level = Meter Reading + Factor

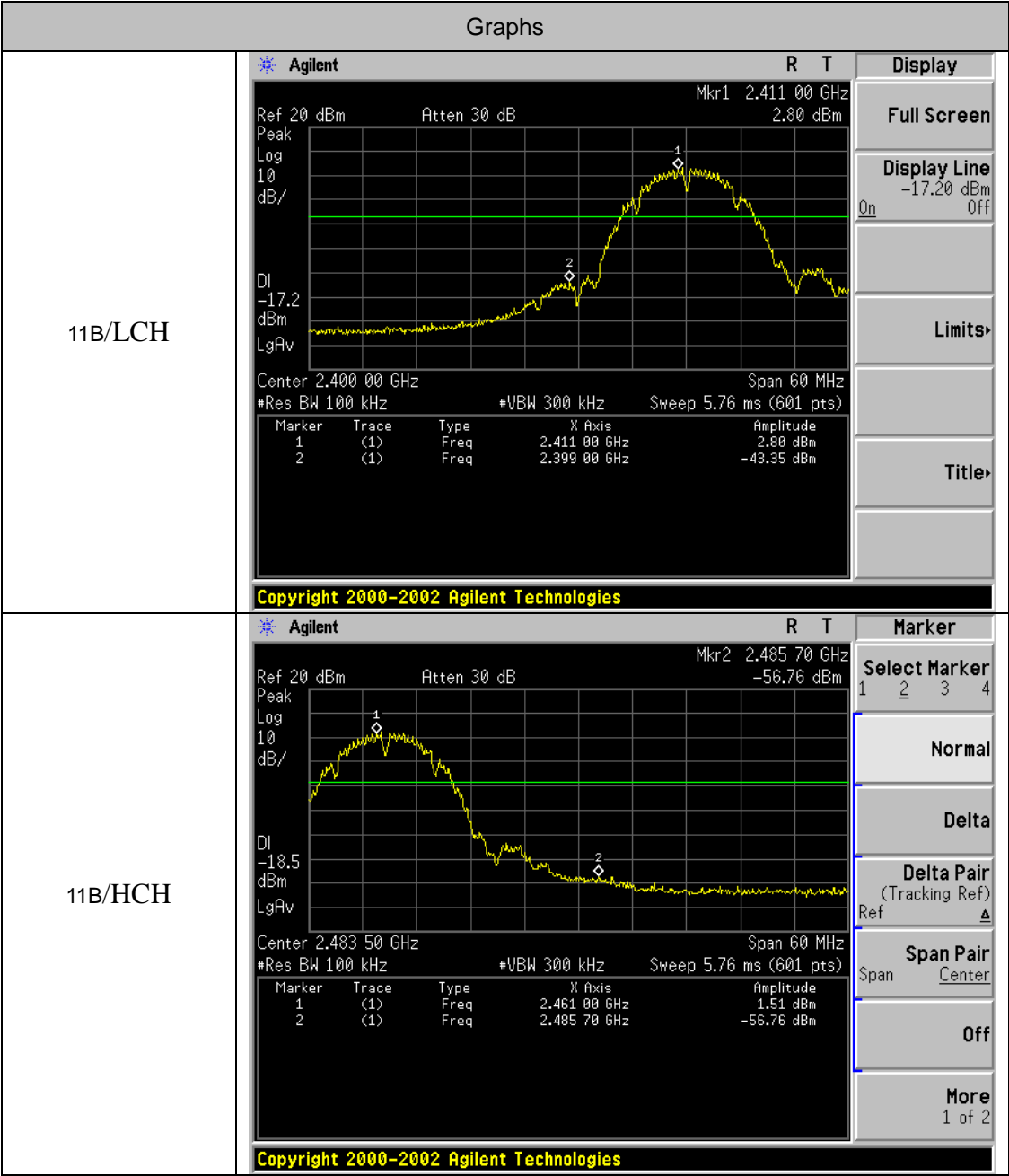
Margin= Emission Level -Limit.

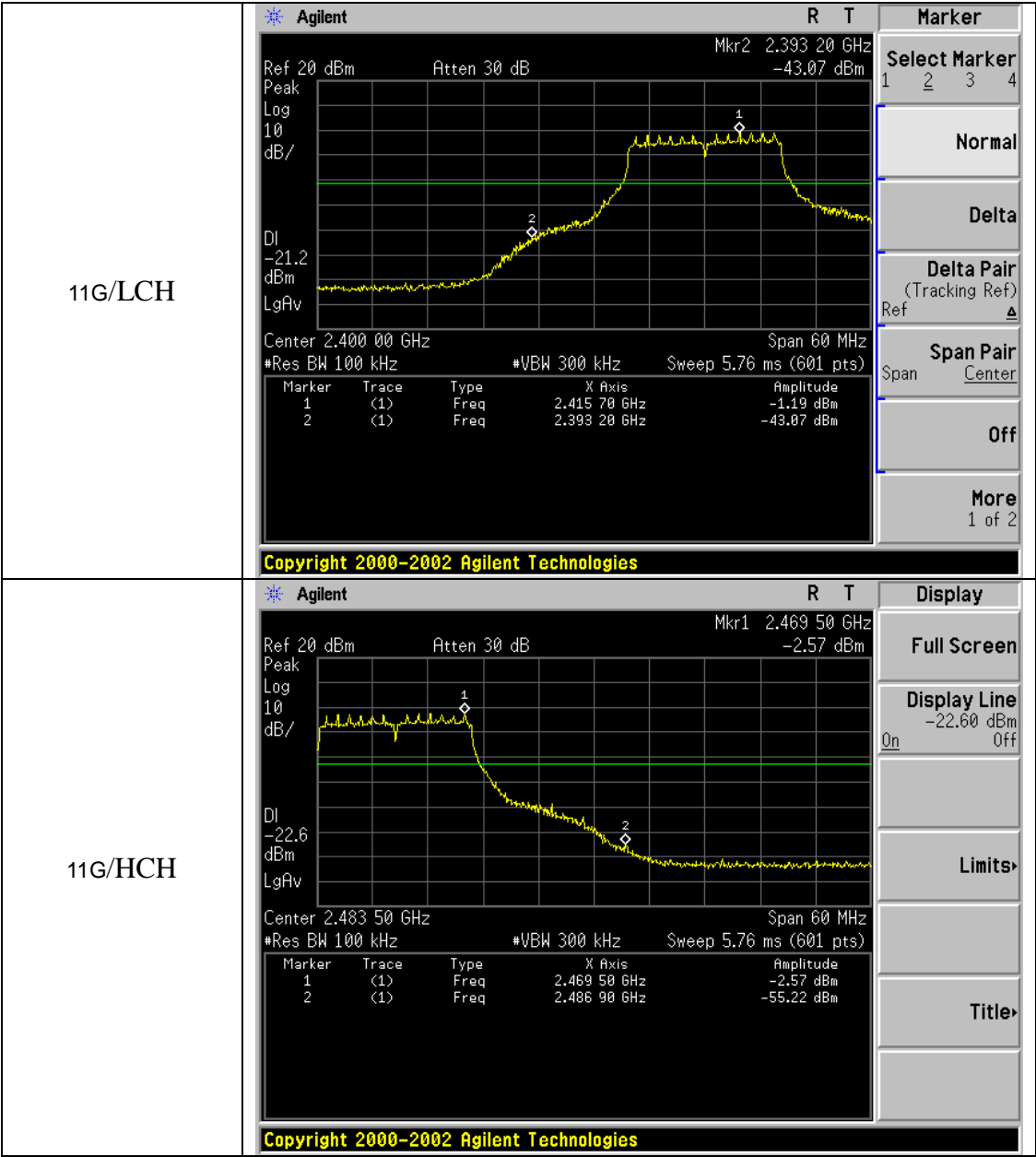
The "Factor" value can be calculated automatically by software of measurement system.

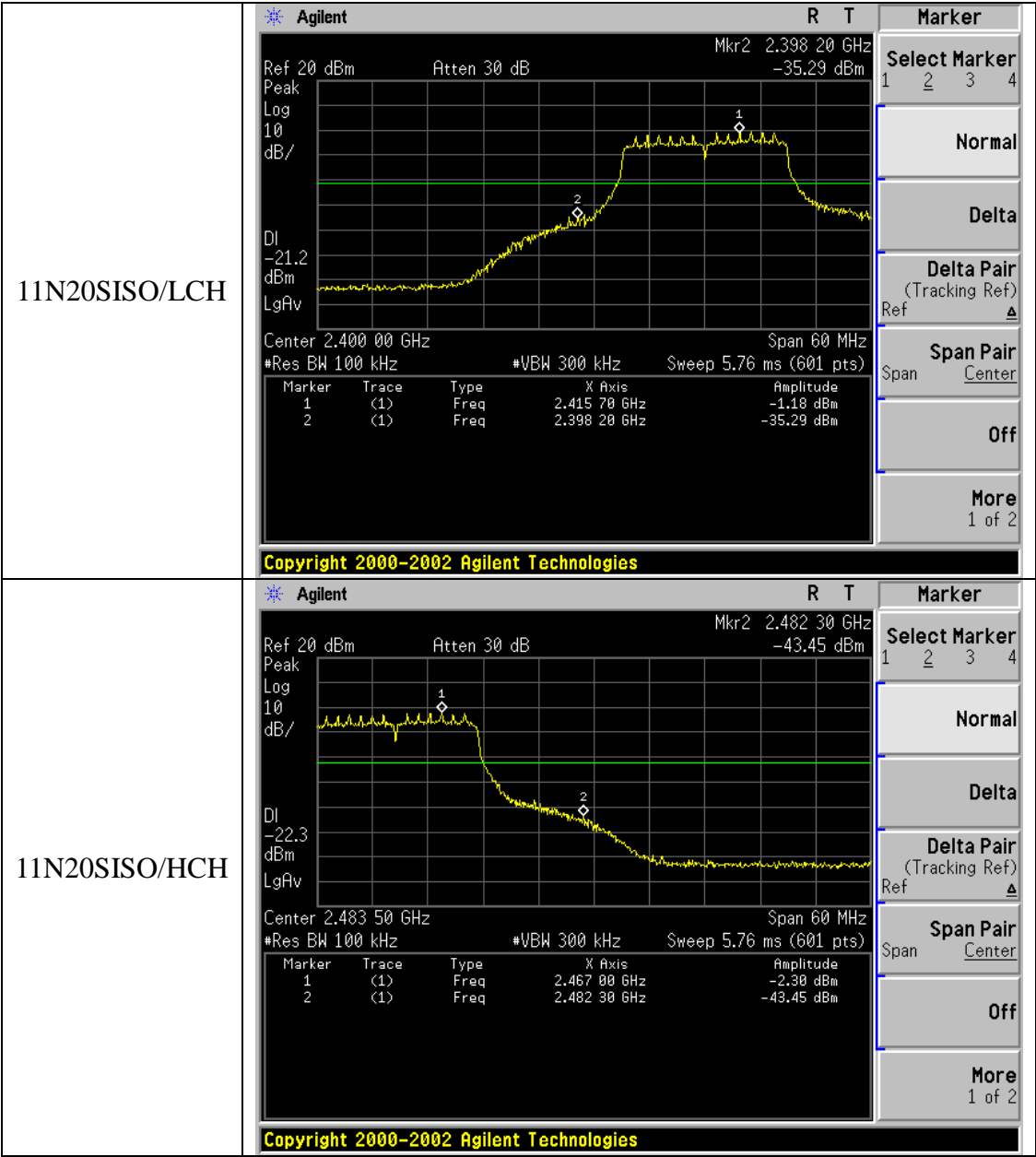
12.4. Conducted Test Result

| Mode | Channel | Carrier Power[dBm] | Max.Spurious Level [dBm] | Limit [dBm] | Verdict |
|-----------|---------|--------------------|--------------------------|-------------|---------|
| 11B | LCH | 2.80 | -43.35 | -17.20 | PASS |
| 11B | HCH | 1.51 | -56.76 | -18.50 | PASS |
| 11G | LCH | -1.19 | -43.07 | -21.20 | PASS |
| 11G | HCH | -2.57 | -55.22 | -22.60 | PASS |
| 11N20SISO | LCH | -1.18 | -35.29 | -21.20 | PASS |
| 11N20SISO | HCH | -2.30 | -43.45 | -22.30 | PASS |

Test Graph







13. FCC LINE CONDUCTED EMISSION TEST

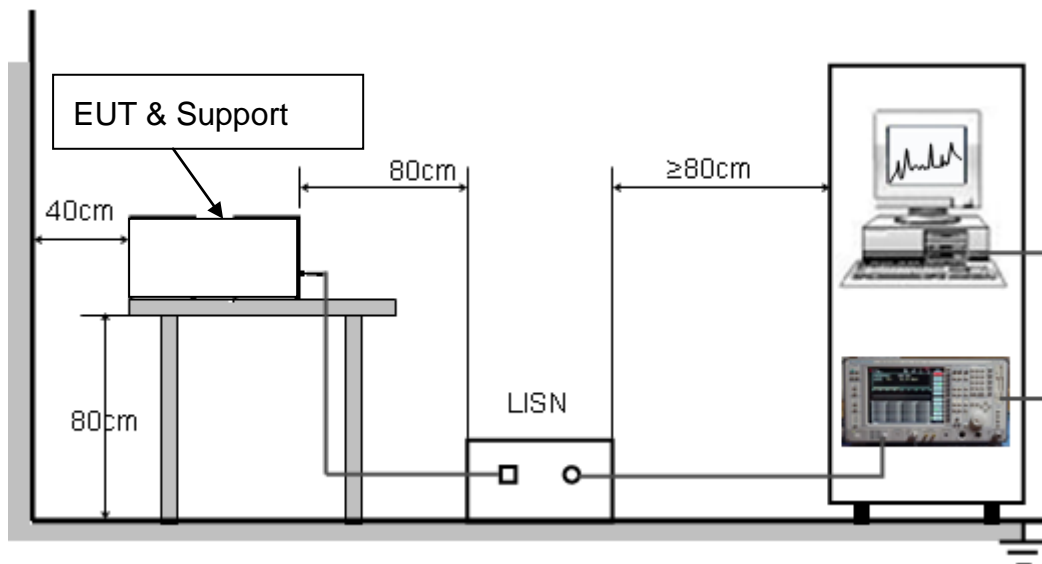
13.1. LIMITS OF LINE CONDUCTED EMISSION TEST

| Frequency | Maximum RF Line Voltage | |
|---------------|-------------------------|----------------|
| | Q.P.(dBuV) | Average(dBuV) |
| 150kHz~500kHz | 66-56 | 56-46 |
| 500kHz~5MHz | 56 | 46 |
| 5MHz~30MHz | 60 | 50 |

Note:

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

13.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



13.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received charging voltage by adapter which received 120V/60Hz power by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

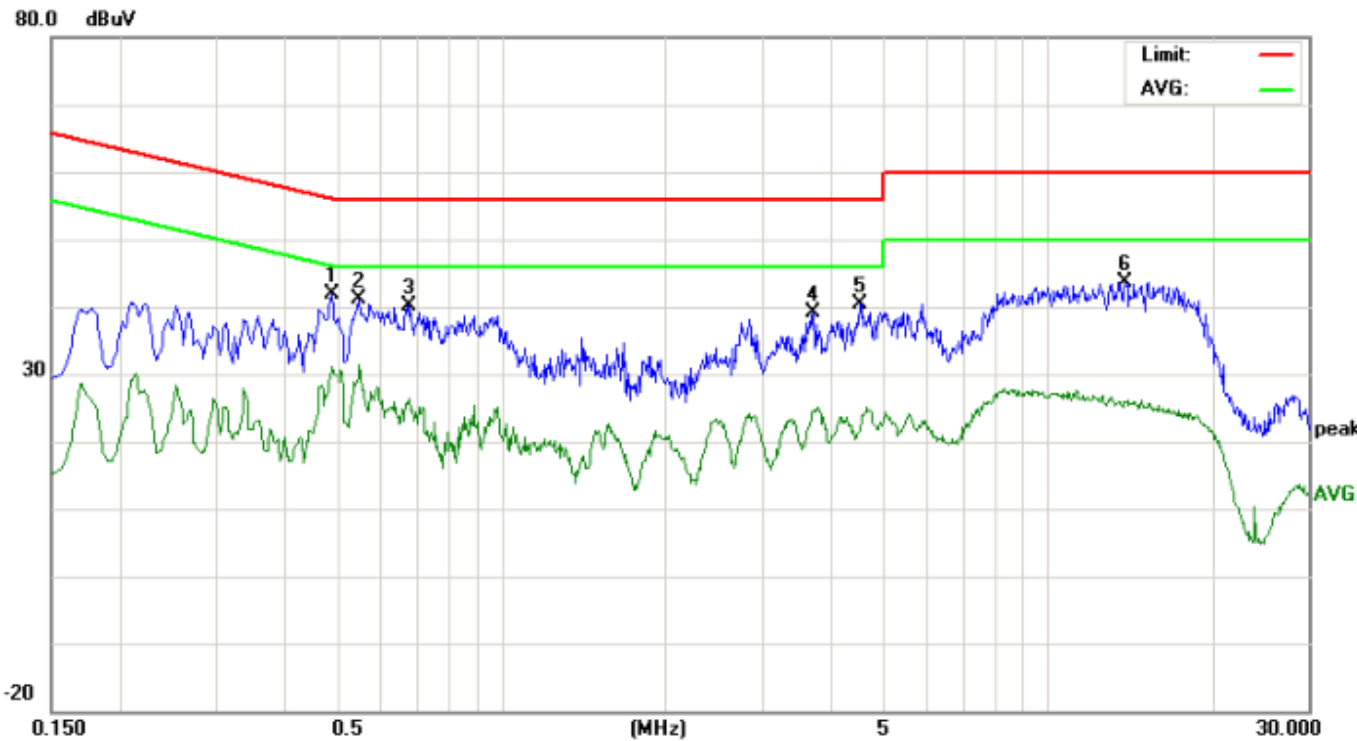
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

13.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

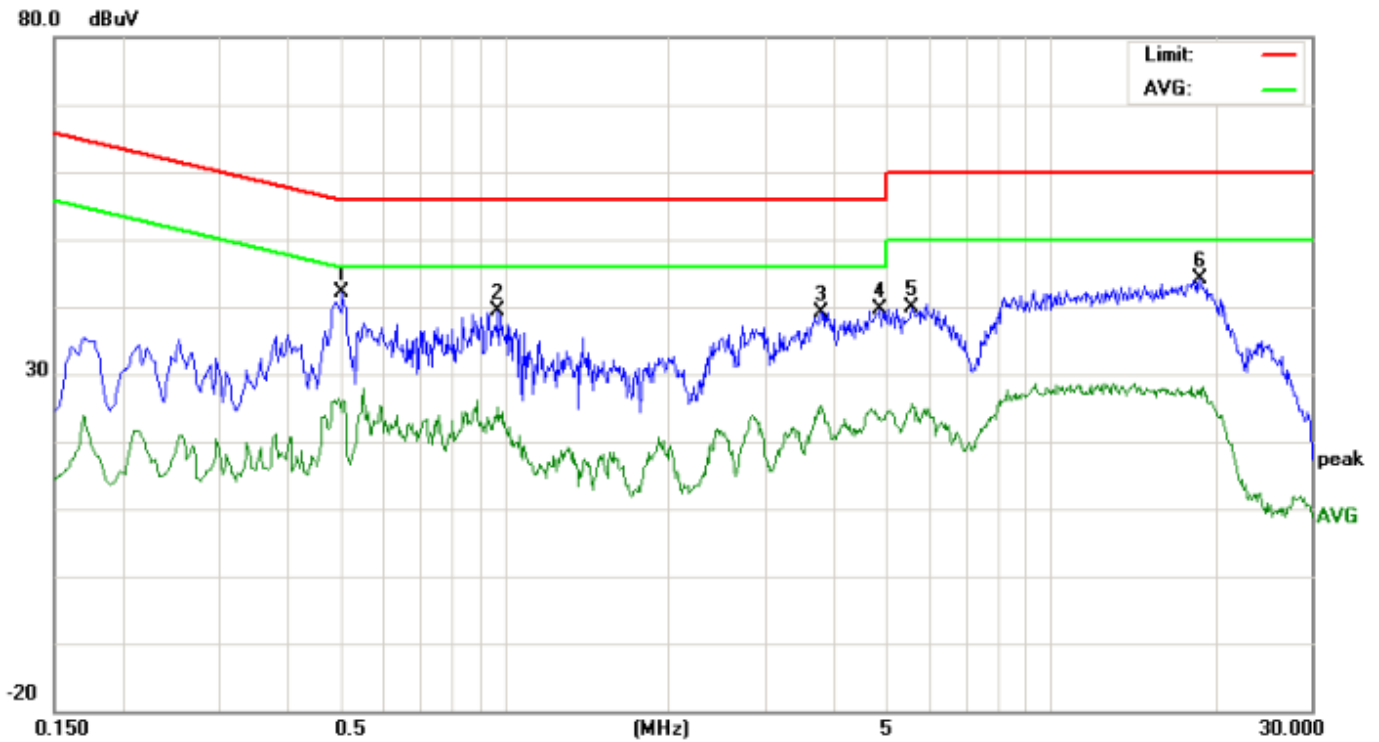
13.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST LINE 1-L



| No. | Freq. (MHz) | Reading_Level (dBuV) | | | Correct Factor | Measurement (dBuV) | | | Limit (dBuV) | | Margin (dB) | | P/F | Comment |
|-----|----------------|-------------------------|----|-------|-------------------|-----------------------|----|-------|-----------------|-------|----------------|--------|-----|---------|
| | | Peak | QP | AVG | | Peak | QP | AVG | QP | AVG | QP | AVG | | |
| 1 | 0.4900 | 41.80 | | 31.13 | 0.00 | 41.80 | | 31.13 | 56.17 | 46.17 | -14.37 | -15.04 | P | |
| 2 | 0.5500 | 41.08 | | 31.49 | 0.00 | 41.08 | | 31.49 | 56.00 | 46.00 | -14.92 | -14.51 | P | |
| 3 | 0.6820 | 40.16 | | 26.44 | 0.00 | 40.16 | | 26.44 | 56.00 | 46.00 | -15.84 | -19.56 | P | |
| 4 | 3.7260 | 39.20 | | 24.53 | 0.00 | 39.20 | | 24.53 | 56.00 | 46.00 | -16.80 | -21.47 | P | |
| 5 | 4.5460 | 40.44 | | 21.56 | 0.00 | 40.44 | | 21.56 | 56.00 | 46.00 | -15.56 | -24.44 | P | |
| 6 | 13.8980 | 43.74 | | 25.82 | 0.00 | 43.74 | | 25.82 | 60.00 | 50.00 | -16.26 | -24.18 | P | |

Line Conducted Emission Test Line 2-N



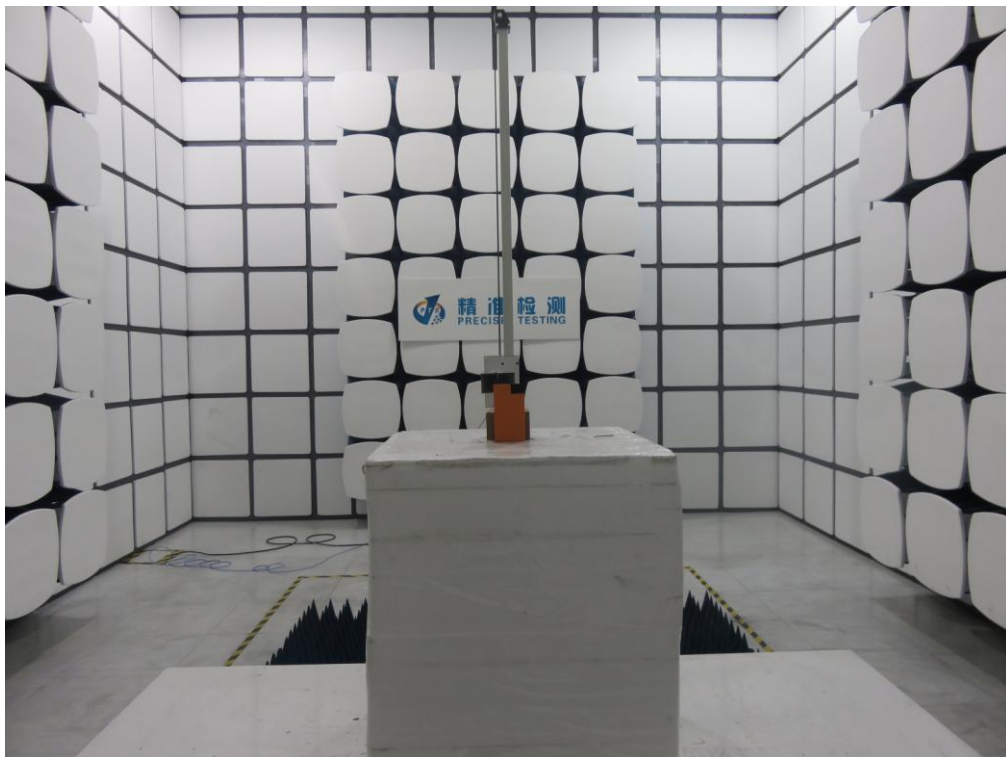
| No. | Freq. (MHz) | Reading_Level (dBuV) | | | Correct Factor | Measurement (dBuV) | | | Limit (dBuV) | | Margin (dB) | | P/F | Comment |
|-----|-------------|----------------------|----|-------|----------------|--------------------|----|-------|--------------|-------|-------------|--------|-----|---------|
| | | Peak | QP | AVG | | Peak | QP | AVG | QP | AVG | QP | AVG | | |
| 1 | 0.5060 | 42.19 | | 25.21 | 0.00 | 42.19 | | 25.21 | 56.00 | 46.00 | -13.81 | -20.79 | P | |
| 2 | 0.9780 | 39.27 | | 25.03 | 0.00 | 39.27 | | 25.03 | 56.00 | 46.00 | -16.73 | -20.97 | P | |
| 3 | 3.8140 | 39.24 | | 25.48 | 0.00 | 39.24 | | 25.48 | 56.00 | 46.00 | -16.76 | -20.52 | P | |
| 4 | 4.8859 | 39.57 | | 23.66 | 0.00 | 39.57 | | 23.66 | 56.00 | 46.00 | -16.43 | -22.34 | P | |
| 5 | 5.5820 | 39.94 | | 25.72 | 0.00 | 39.94 | | 25.72 | 60.00 | 50.00 | -20.06 | -24.28 | P | |
| 6 | 18.7380 | 44.09 | | 27.54 | 0.00 | 44.09 | | 27.54 | 60.00 | 50.00 | -15.91 | -22.46 | P | |

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP



APPENDIX B: PHOTOGRAPHS OF EUT

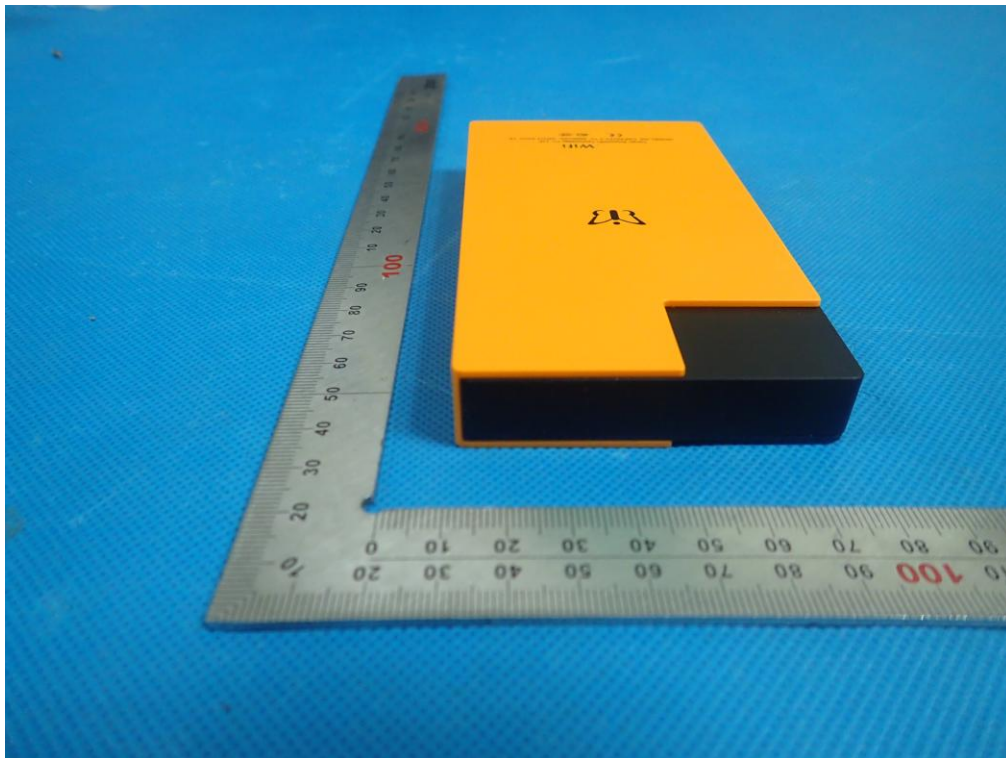
TOTAL VIEW OF EUT



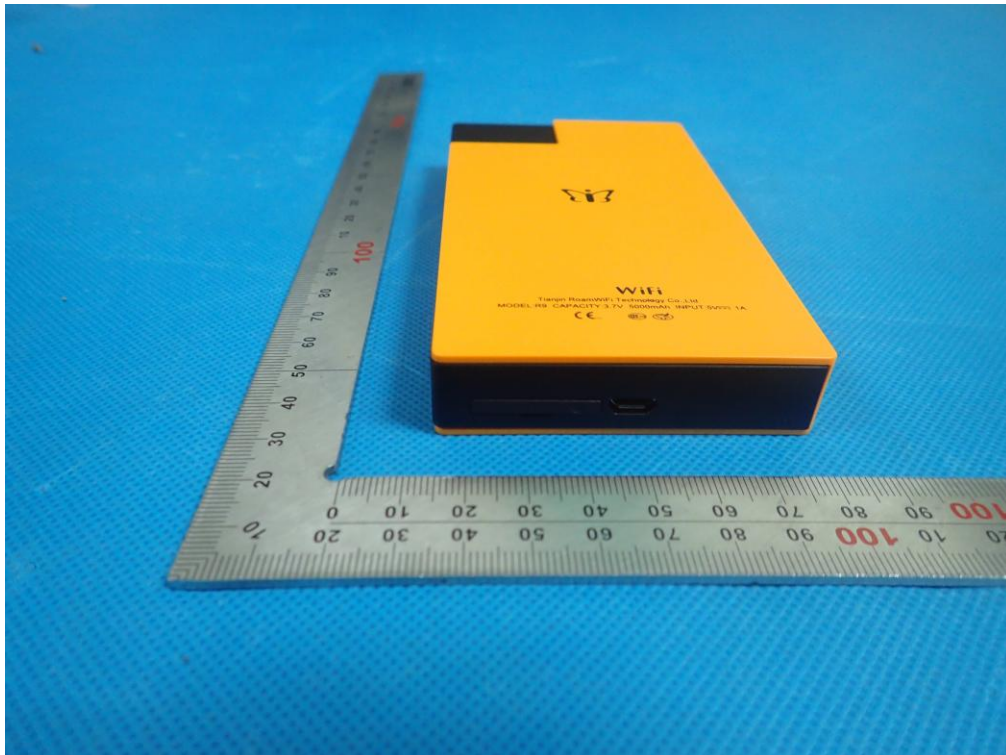
THE LABEL OF BATTERY



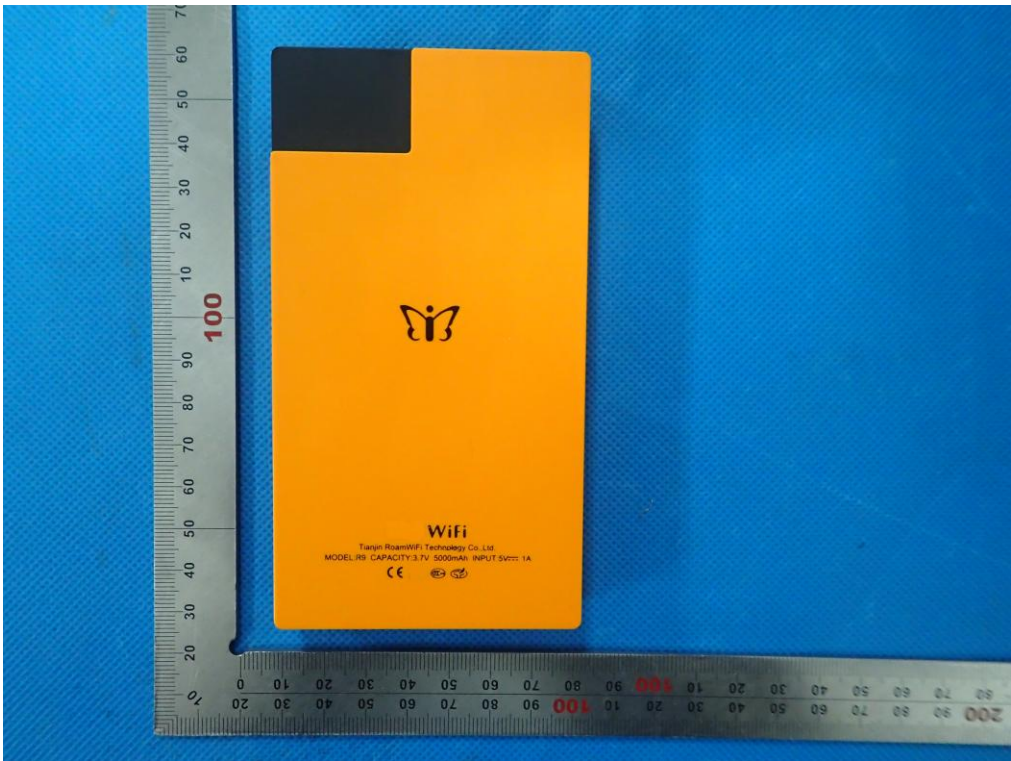
TOP VIEW OF EUT



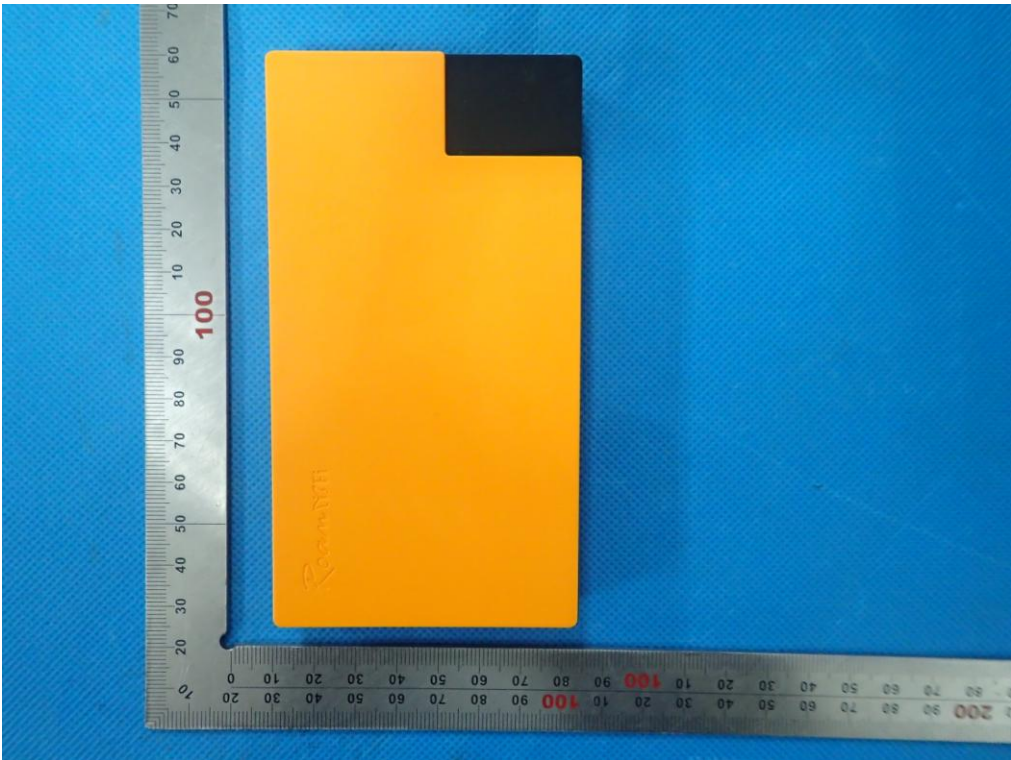
BOTTOM VIEW OF EUT



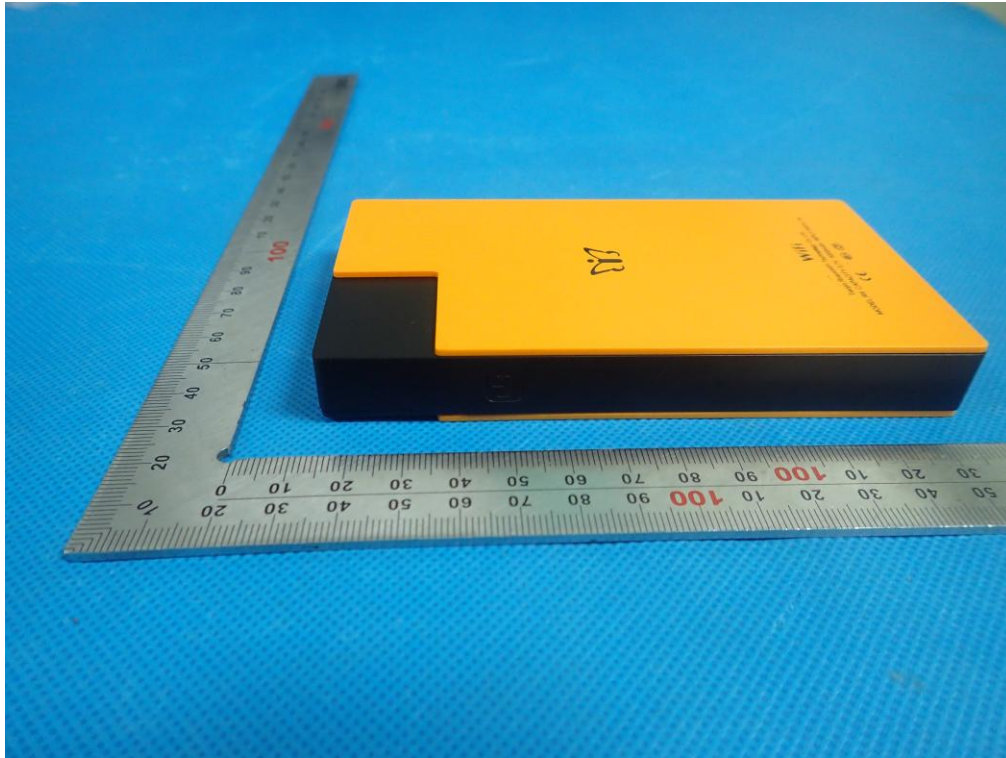
FRONT VIEW OF EUT



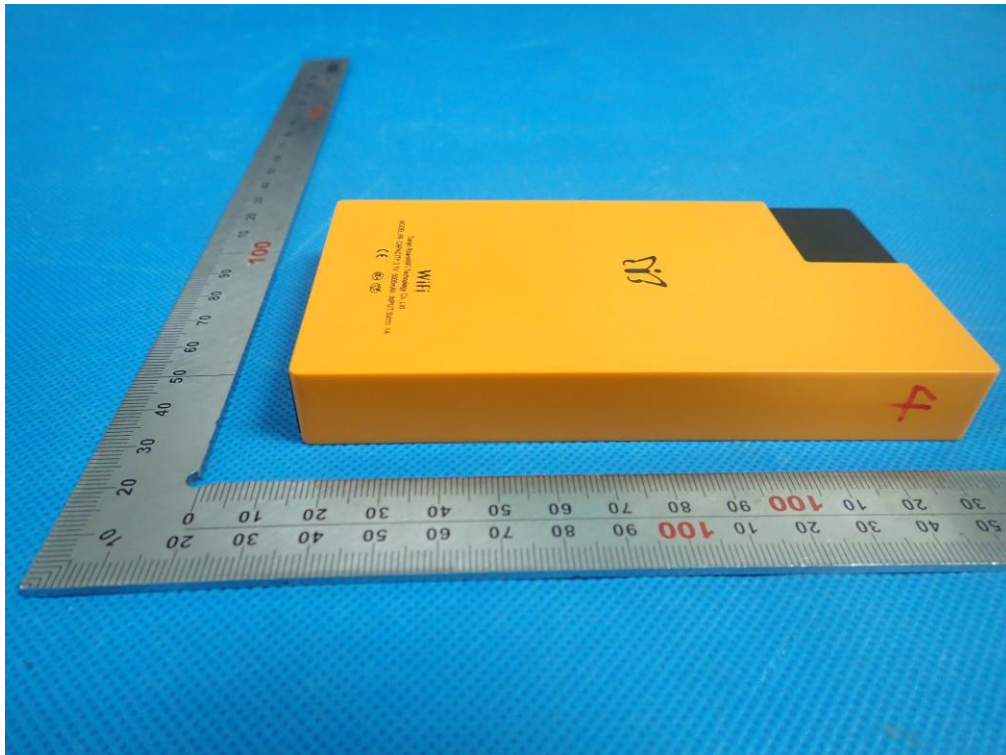
BACK VIEW OF EUT



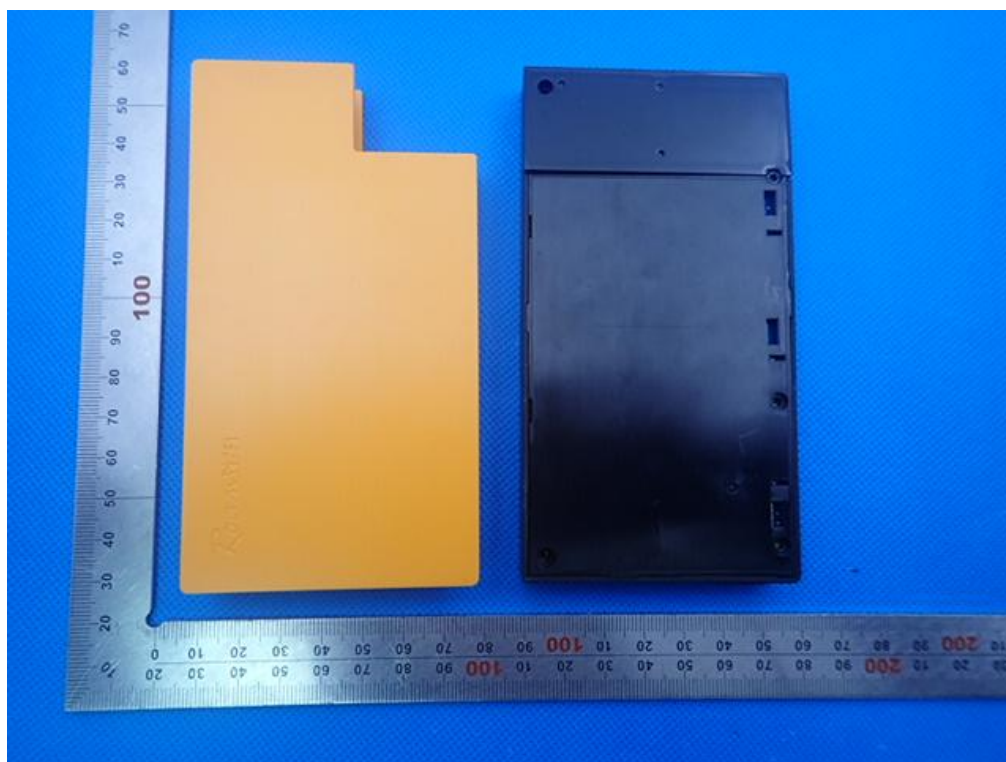
LEFT VIEW OF EUT



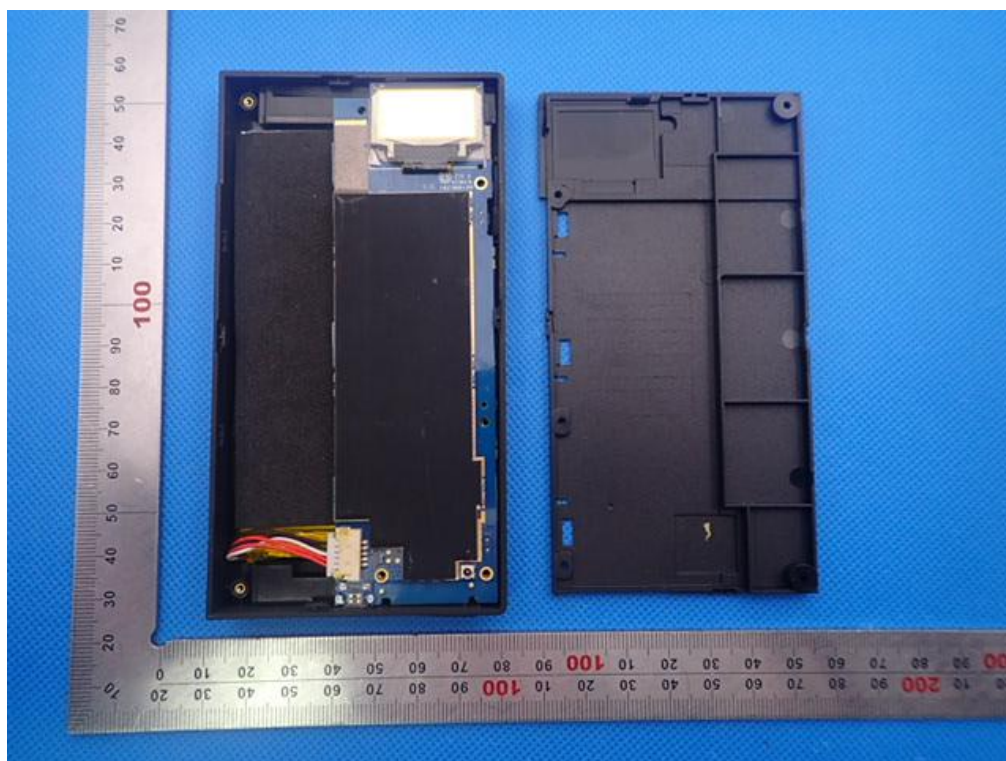
RIGHT VIEW OF EUT



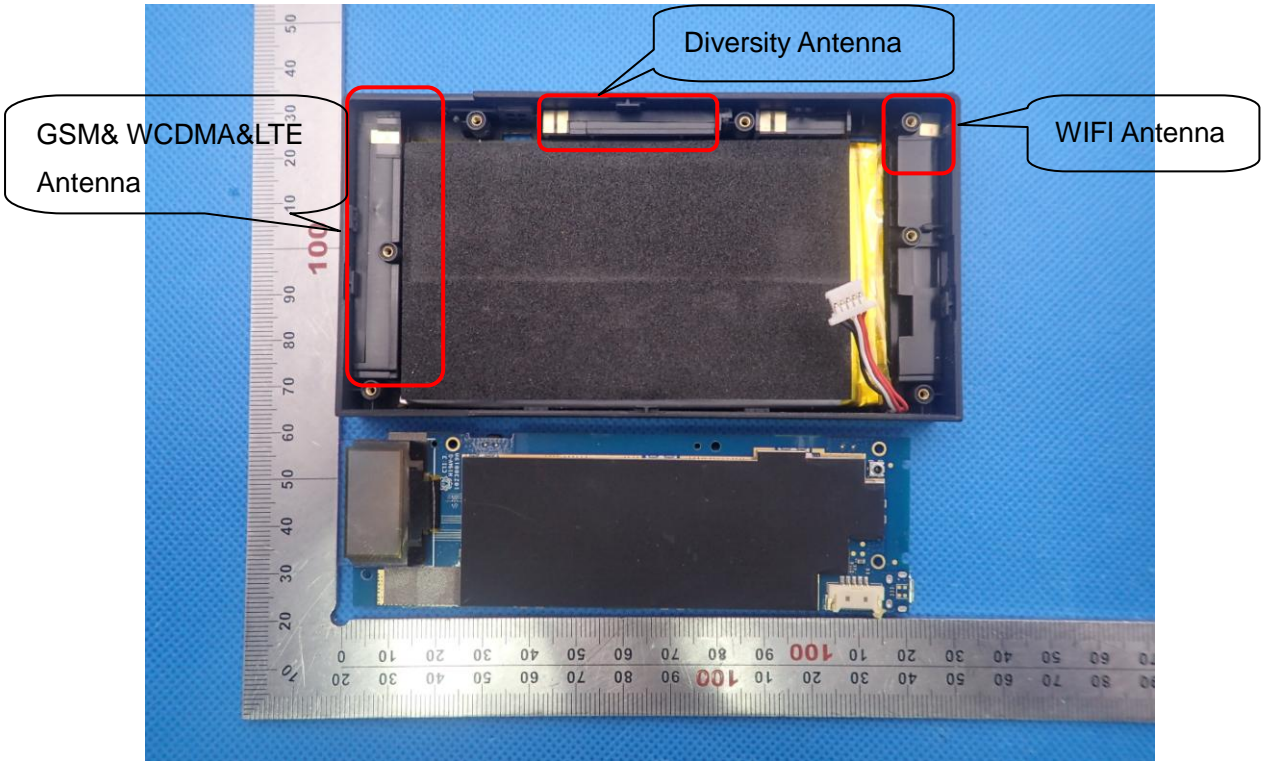
OPEN VIEW OF EUT-1



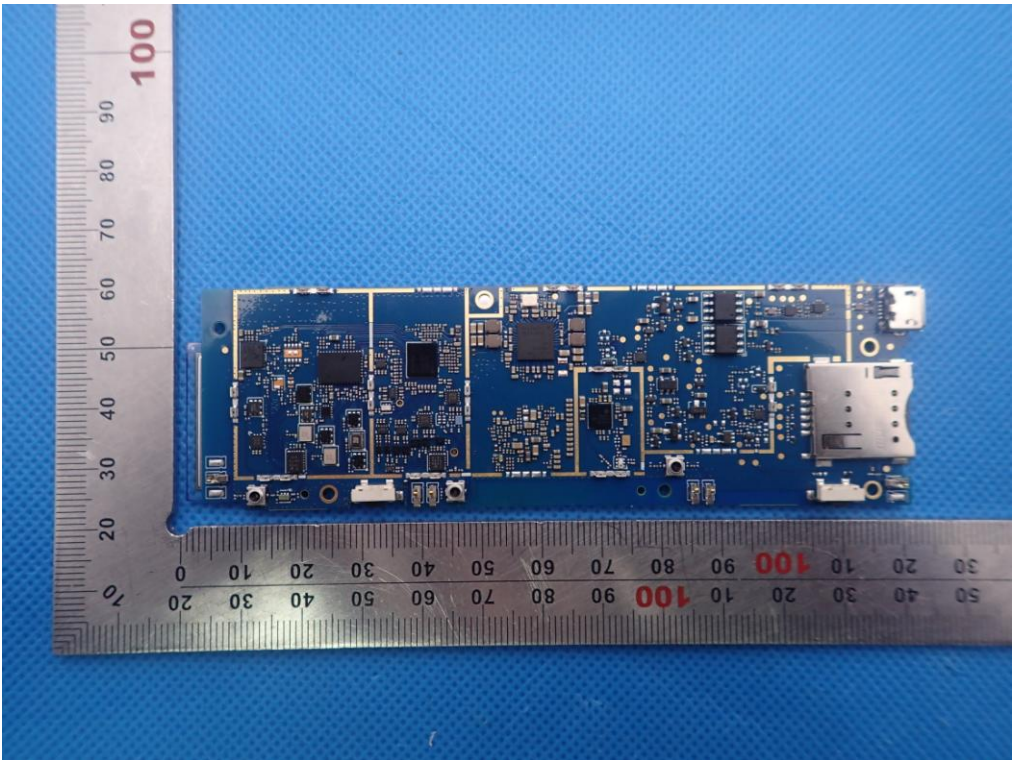
OPEN VIEW OF EUT-2



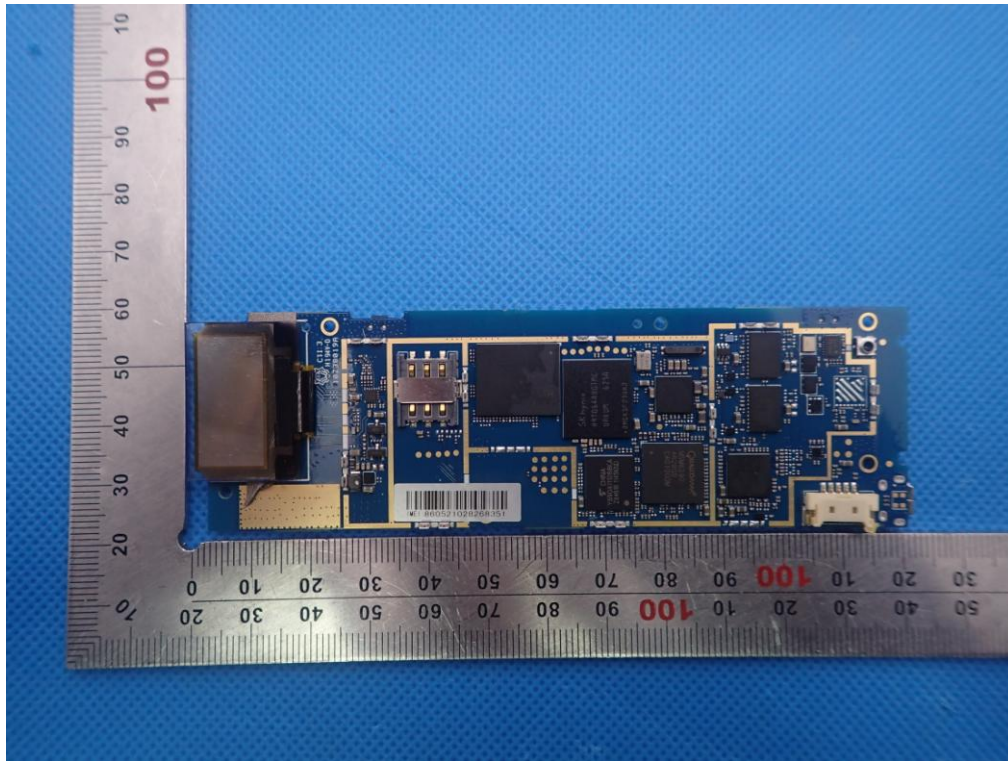
OPEN VIEW OF EUT-3



INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



-----END OF REPORT-----