

Test report No:
NIE: 02515BRCB.003

Test report

Test and Certification for Citizens Broadband Radio Service (CBRS): 940660 D02 CPE-CBSD Handshake Procedures

| | |
|---|--|
| Identification of item tested | CBRS CPE-CBSD |
| Trademark | Baicells |
| Model and /or type reference | EG7010A-M11 |
| Other identification of the product | FCC ID: 2AG32EG7010AM11 |
| Features | CPE-CBSD with Domain Proxy |
| Final HW Version: | A |
| Final SW Version: | Domain Proxy: BaiOMC Rev-18822 CPE-CBSD: BaiCE_BG_1.2.1 |
| Manufacturer | Baicells Technologies Co., Ltd. 3F, Hui Yuan Development Building, No.1 Shangdi Information Industry Base, Haidian Dist., Beijing, PR China, 100085. |
| Test method requested, standard | 940660 D02 CPE-CBSD Handshake Procedures |
| Approved by (name / position & signature) | Gonzalo Casado (Lab Manager) |
| Date of issue | 2019-Dec-26 |
| Report template No | FDT08_22 |

Index

| | |
|---|----|
| Competences and guarantees | 3 |
| General conditions..... | 3 |
| Abbreviations..... | 4 |
| Data provided by the client..... | 4 |
| Usage of samples..... | 4 |
| Identification of the client..... | 4 |
| Testing period and place..... | 4 |
| Document history | 4 |
| Remarks and comments | 5 |
| List of equipment used during the test | 6 |
| Test Setup Diagram | 7 |
| Testing verdicts..... | 7 |
| Test Results Summary | 7 |
| Appendix A: Test results | 8 |
| Appendix B: Photographs..... | 9 |
| Appendix C: Test Cases Details | 9 |
| Appendix D: Spectrum Analyzer Screenshots | 11 |

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Abbreviations

| Abbreviation | Meaning |
|--------------|---|
| CBRS | Citizens Broadband Radio Services |
| CBSD | Citizens Broadband Radio Service Device |
| DP | Domain Proxy |
| DUT | Device Under Test |
| SAS | Spectrum Access System |
| UUT | Unit Under Test |
| CPI | Certified Professional Installer |
| N/A | Not Applicable |
| SA | Spectrum Analyzer |

Data provided by the client

DEKRA declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Information provided by the client: HW and SW versions of the equipment under test.

Usage of samples

Samples undergoing test have been selected by: the client

Sample M/01 is composed of the following elements:

| Control N° | Description | Model | Serial N° | Date of reception |
|------------|-----------------------|-------------|---------------------|-------------------|
| 2515b.01 | CPE-CBSD | EG7010A-M11 | 1203000039192TP0950 | 2019-Dec-12 |
| NA | Domain Proxy Software | BaiOMC | Not Applicable | Not Applicable |

1. Sample M/01 has undergone the test(s) specified in subclause “Test method requested”.

Identification of the client

Same as manufacturer

Testing period and place

| | |
|---------------|--|
| Test Location | DEKRA Certification Inc 405 Glenn Drive, Suite 12, Sterling, Virginia, USA, 20164 |
| Date (start) | 2019-Dec-18 |
| Date (finish) | 2019-Dec-21 |

Document history

| Report number | Date | Description |
|---------------|-------------|---------------|
| 02515bRCB.003 | 2019-Dec-26 | First release |

Remarks and comments

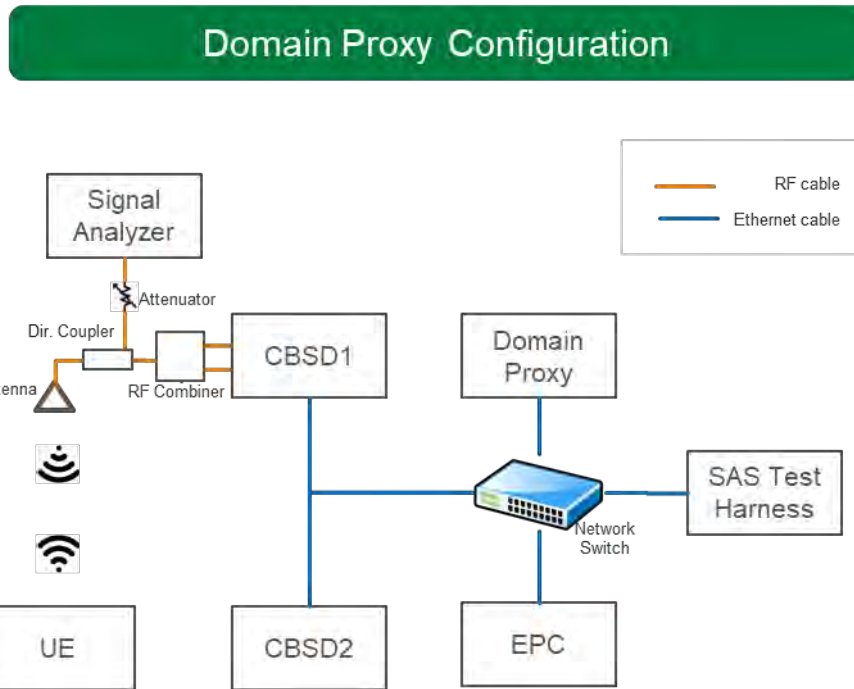
Testing performed by Gonzalo Casado

Antenna gain is 14dBi

List of equipment used during the test

| Test Equipment | | | | |
|------------------|--|----------------|----------------------------|---------------|
| Description | Model | Control Number | SW Version | Serial Number |
| Signal Analyzer | N9010A Agilent EXA | 0018 | A.12.13 | MY47191206 |
| Test SAS Harness | Test SAS harness WInnForum software Test Harness for CBSD | - | V1.0.03 | N/A |
| BTS-CBSD | mBS31001 | - | BaiBS_QRTBA_0.3.1_rf_ready | 191000004 |

Test Setup Diagram



Testing verdicts

| | |
|------------------|-----|
| Not applicable : | N/A |
| Pass : | P |
| Fail : | F |
| Not measured : | N/M |

Test Results Summary

| Test Cases Verdicts | Number of Test Cases |
|----------------------------|----------------------|
| Not applicable : | 0 |
| Pass : | 2 |
| Fail : | 0 |
| Not measured : | 0 |
| Total Number of Test Cases | 2 |

Appendix A: Test results

| ID | Requirement Description | Verdict | Date | Sample |
|-----------|---|---------|------------|--------|
| CPE.KDB.1 | CPE Handshake transmissions are limited in duration and duty cycle to the minimum time necessary to get a grant from the SAS; this time should not exceed 1 second within any 10-second period, 10seconds within any 300-second period, or 20 seconds within any 3600-second period | P | 2019-12-19 | M/01 |
| CPE.KDB.2 | Verify that the CPE-CBSD register with SAS even with transmit power level below 23dBm EIRP | P | 2019-12-21 | M/01 |

Notes:

- Signal Analyzer Screenshots included in appendix D
- Test cases steps described in appendix C

Appendix B: Photographs



Figure B1. Top View of DUT

Appendix C: Test Cases Details

- CPE.KDB.1: Verify that CPE Handshake transmissions are limited in duration and duty cycle to the minimum time necessary to get a grant from the SAS; this time should not exceed 1 second within any 10-second period, 10seconds within any 300-second period, or 20 seconds within any 3600-second period

Test Case applicable only to CPE-CBSD

| # | Test Execution Steps |
|---|--|
| 1 | Verify that CPE-CBSD doesn't have any active grant |
| 2 | Measure CPE-CBSD transmission durations |
| 3 | Verify that CPE-CBDS transmission duration doesn't exceed 1 second within 10seconds, 10 seconds within 300seconds and 20seconds within 3600seconds |

- CPE.KDB.2: Verify that the CPE-CBSD register with SAS even with transmit power level below 23dBm EIRP

Test Case applicable only to CPE-CBSD

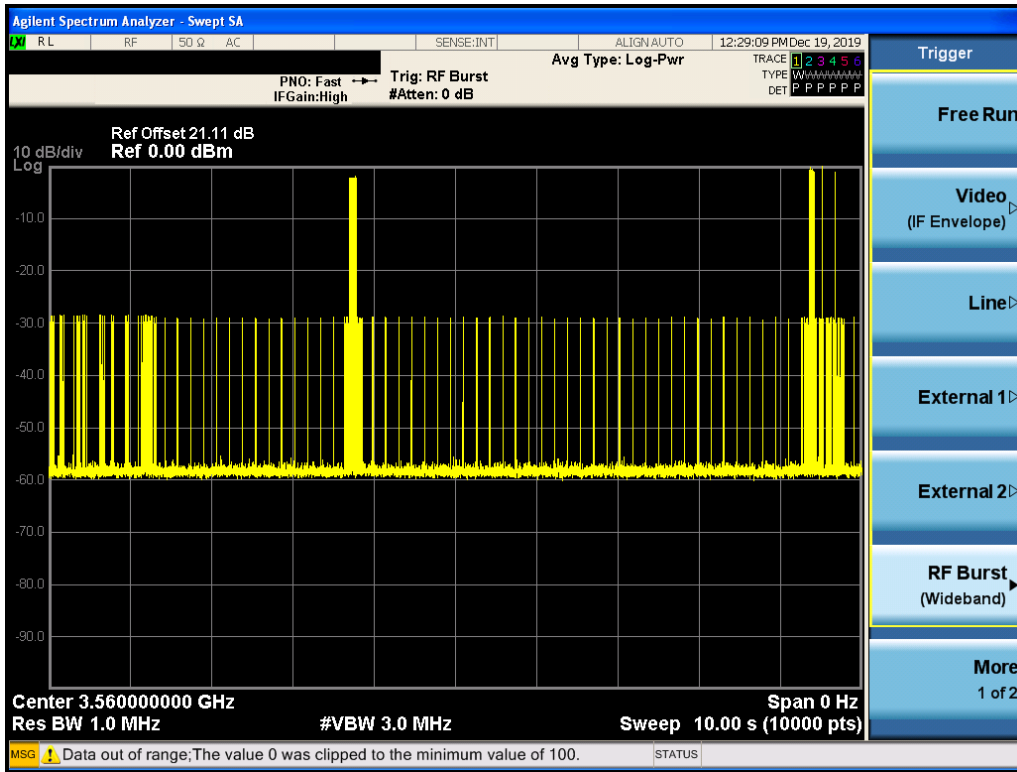
| # | Test Execution Steps |
|---|---|
| 1 | Adjust RF path attenuation between CPE-CBSD and CBSD so that the CPE-CBSD transmit power is below 23dBm EIRP |
| 2 | Execute Power Measurement script from WinnForum software Test Harness for CBSD package |
| 3 | Trigger CPE-CBSD request to register to test SAS |
| 4 | Verify that CPE-CBSD is registered successfully with test SAS and CPE-CBSD transmit power is below 23dBm EIRP using rf equipment. |
| 5 | Trigger CPE-CBSD request to request grant to test SAS |
| 6 | Verify that CPE-CBSD is receives grant successfully from test SAS and CPE-CBSD transmit power is below 23dBm EIRP using rf equipment. |
| 7 | Start Uplink traffic to occupy channel |
| 8 | Measure Uplink Channel Power and verify that it doesn't exceed maxEIRP indicated in grant |

Appendix D: Spectrum Analyzer Screenshots

1. CPE.KDB1: Results for CPE-CBSD transmission duty cycle without grant

| Time Period (s) | Time Limit (s) | DUT Tx Duration Measured (s) | Result |
|-----------------|----------------|------------------------------|--------|
| 10 | 1 | 0.47 | PASS |
| 300 | 10 | 2.19 | PASS |
| 3600 | 20 | 5.39 | PASS |

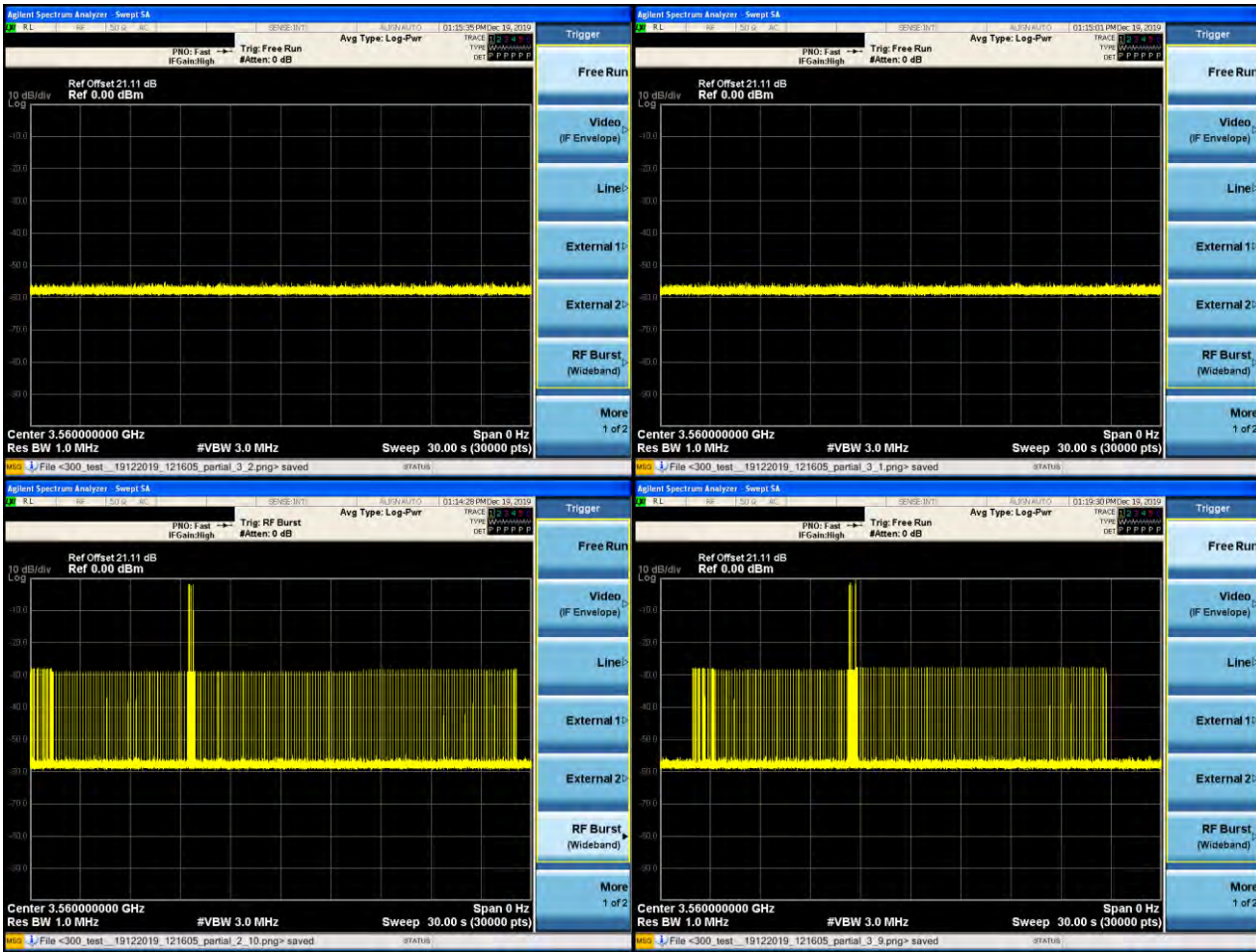
1.1. 1 seconds within 10 second period



1.2. 10 seconds within 300 second period

Note: The 300-period test was measured by doing 10 consecutive automatic sweeps of 30seconds. The value reported is the aggregated time of all the sweeps where signal was detected by the signal analyzer



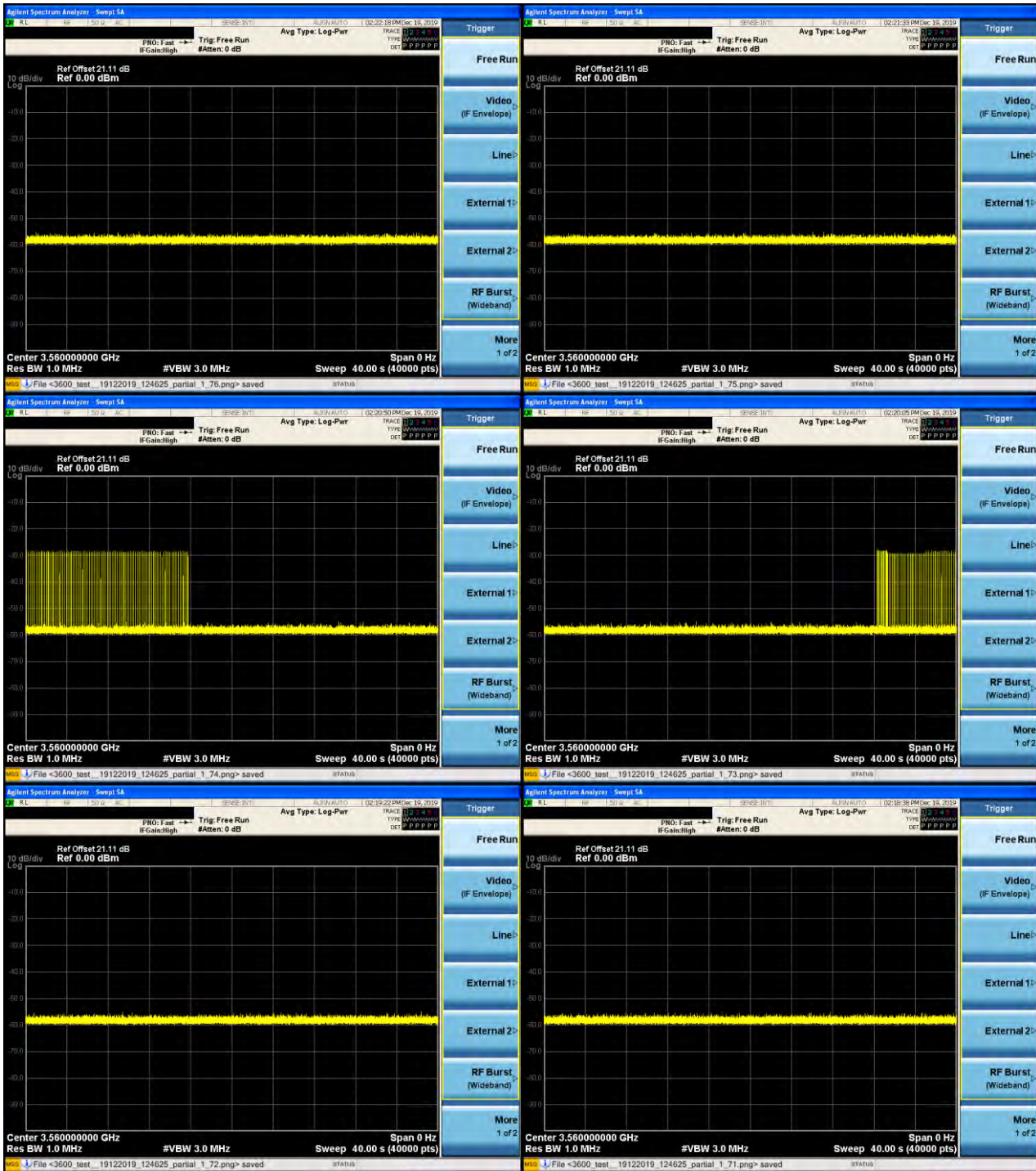


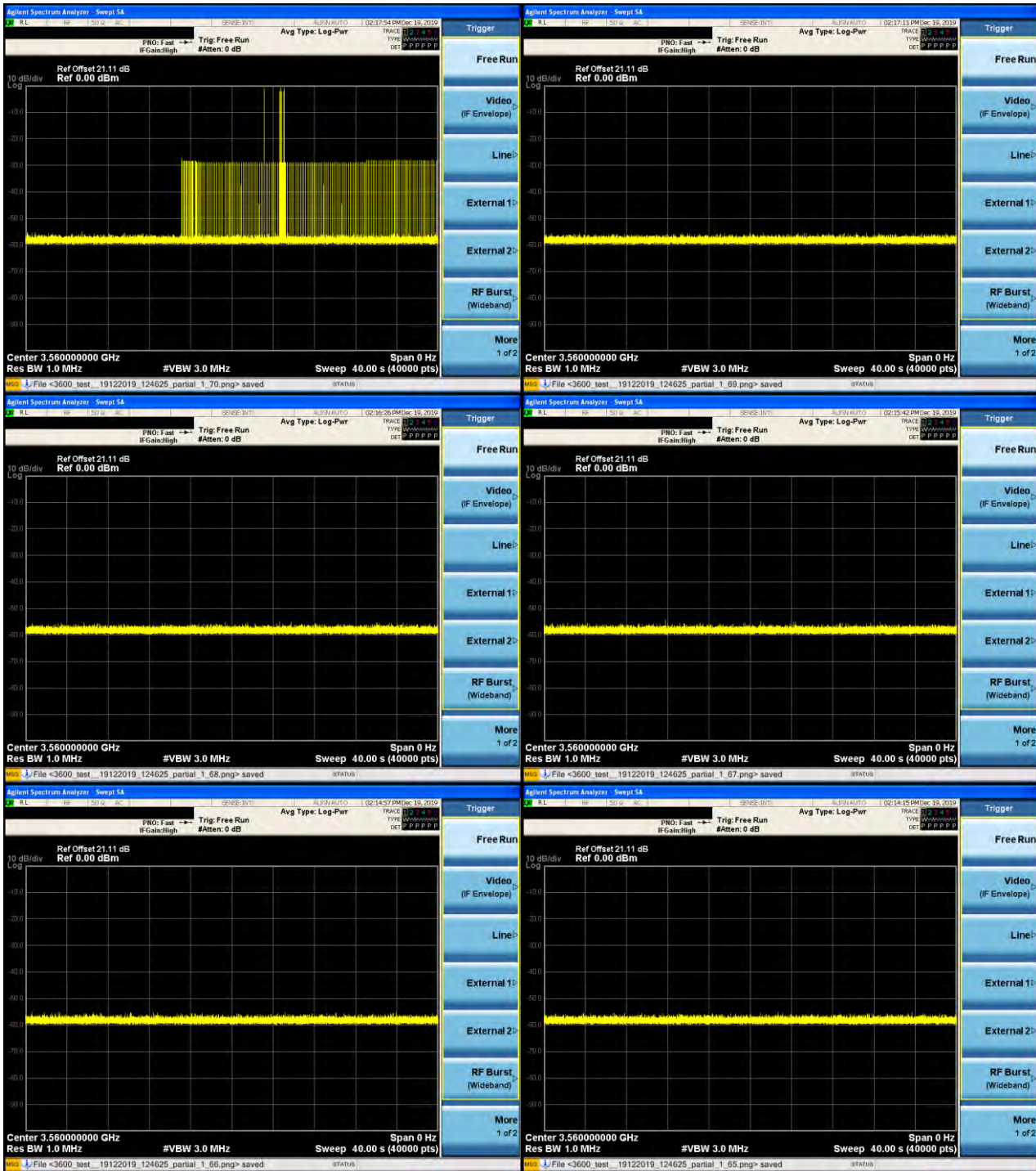
1.3. 20 seconds within 3600 second period

Note: The 3600-period test was measured by doing 90 consecutive automatic sweeps of 40seconds and 40000 points with a measurement time resolution of 1ms . The value reported is the aggregated time of all the sweeps where signal was detected by the signal analyzer

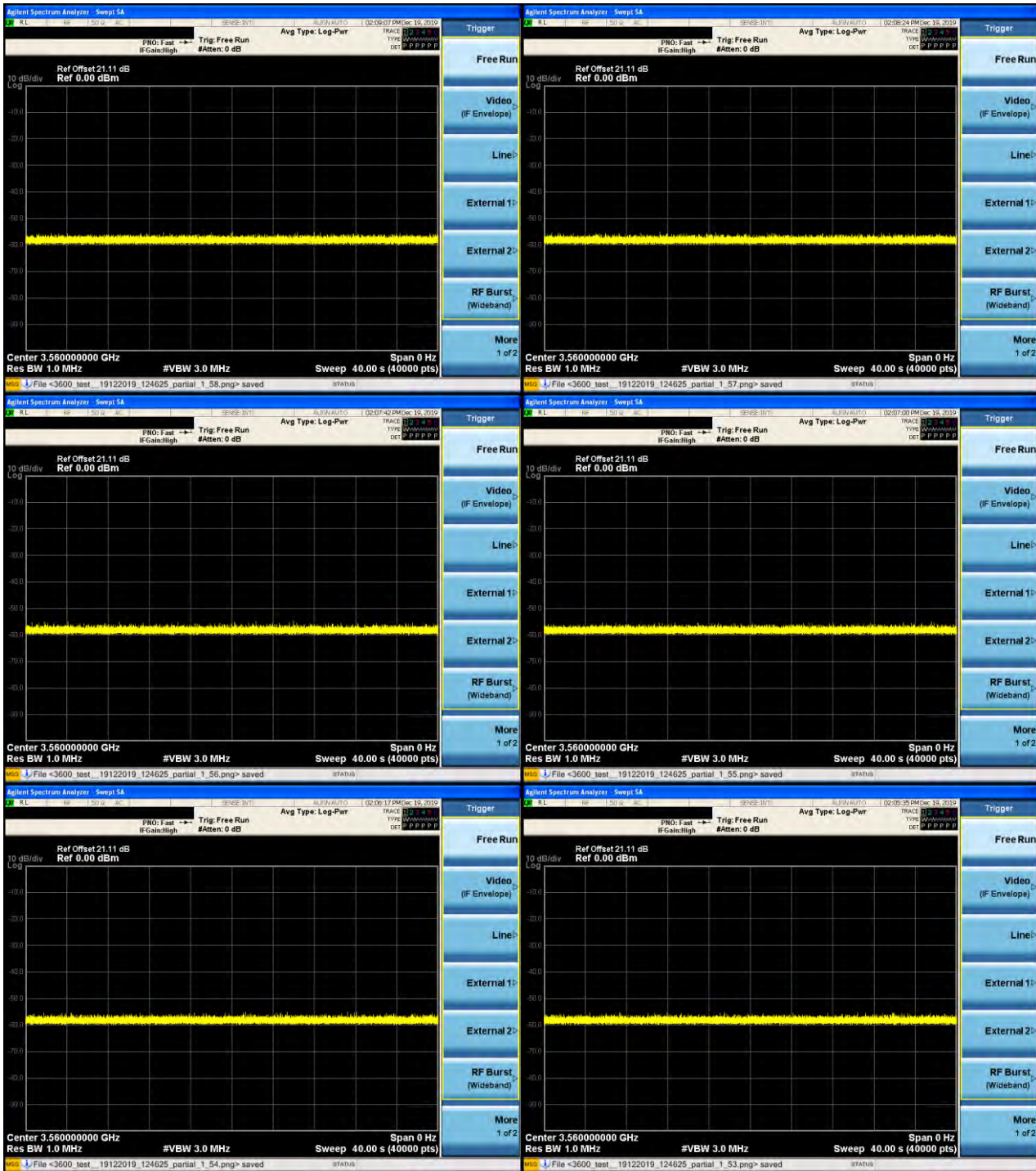




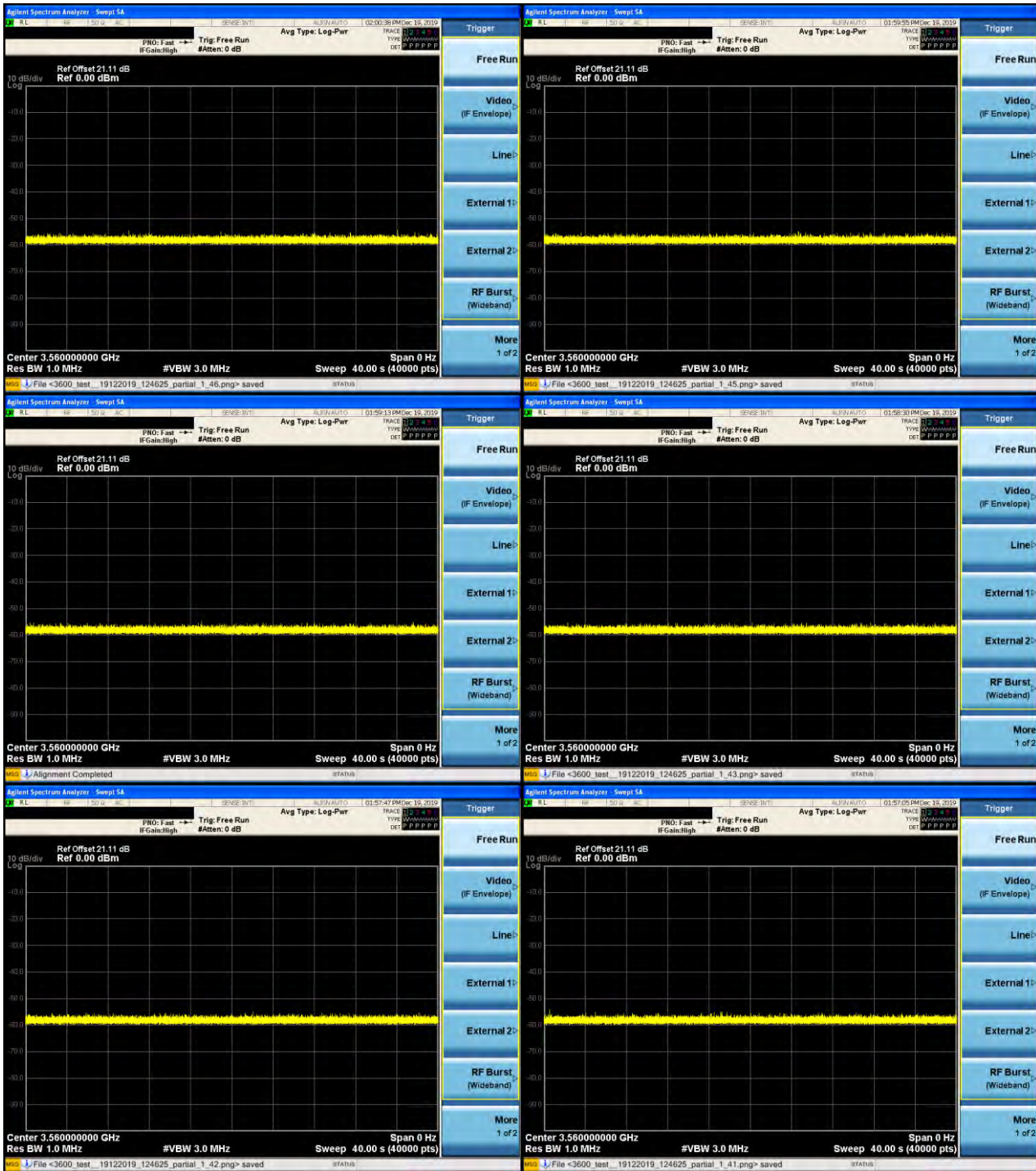




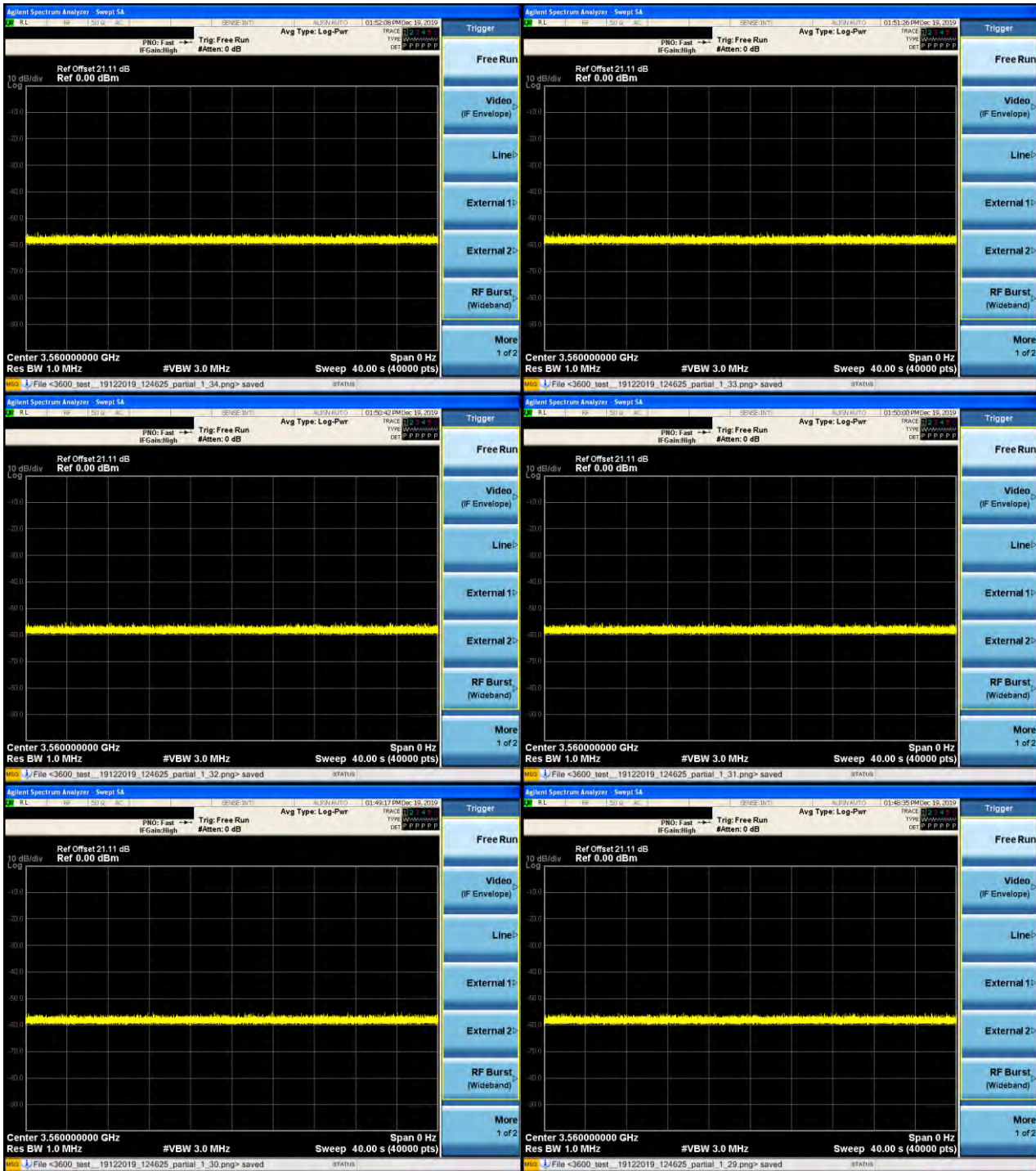






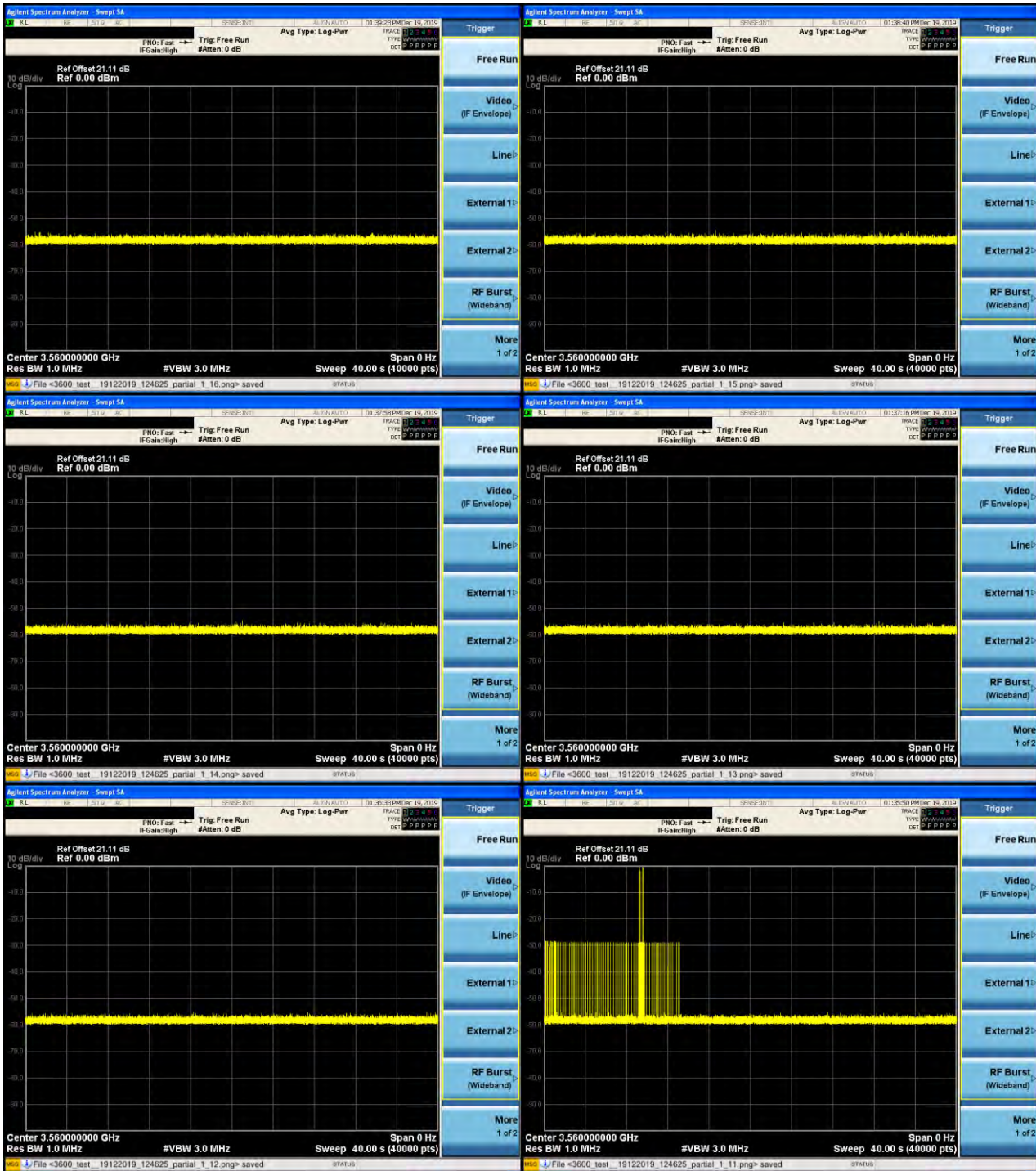


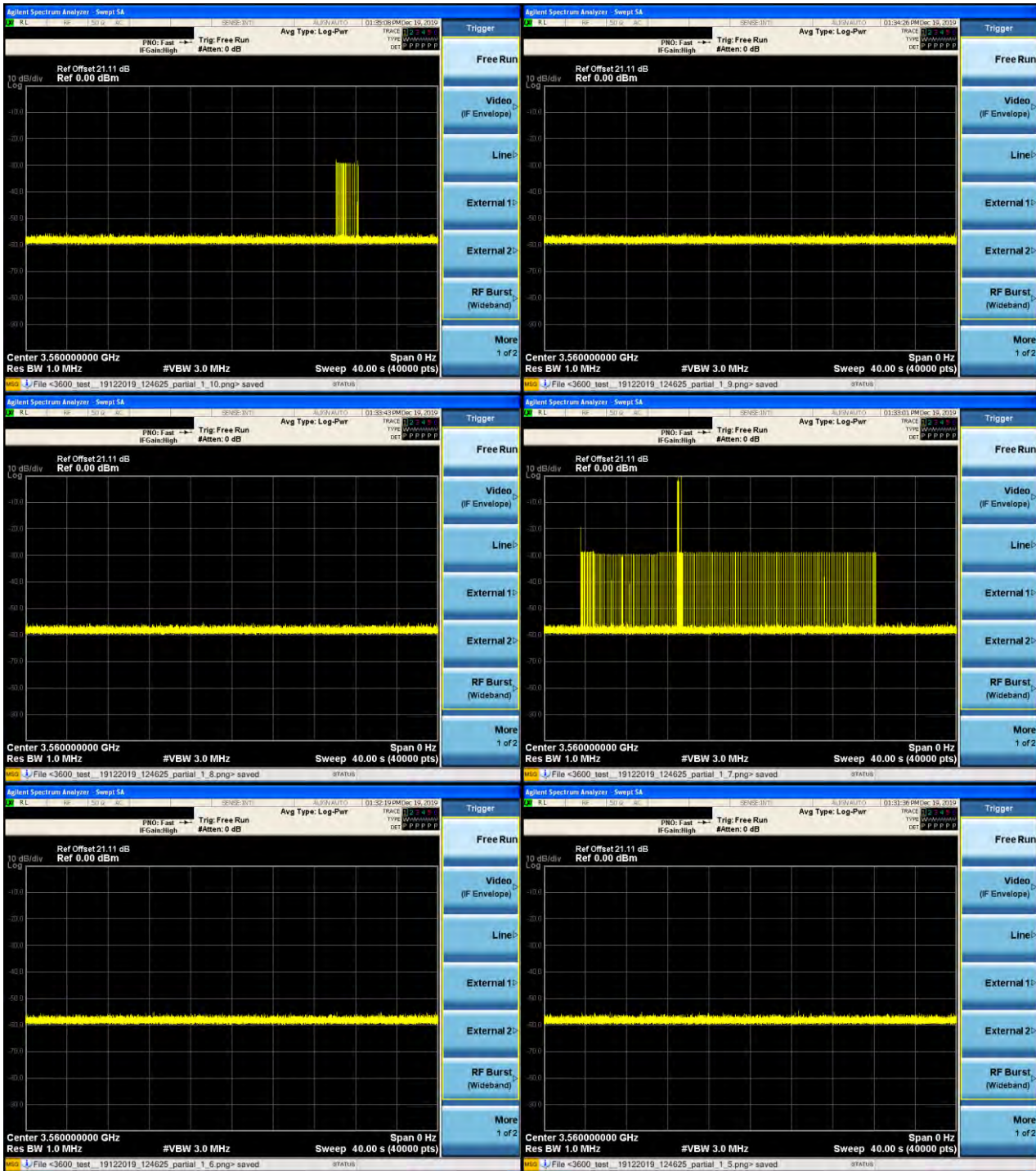


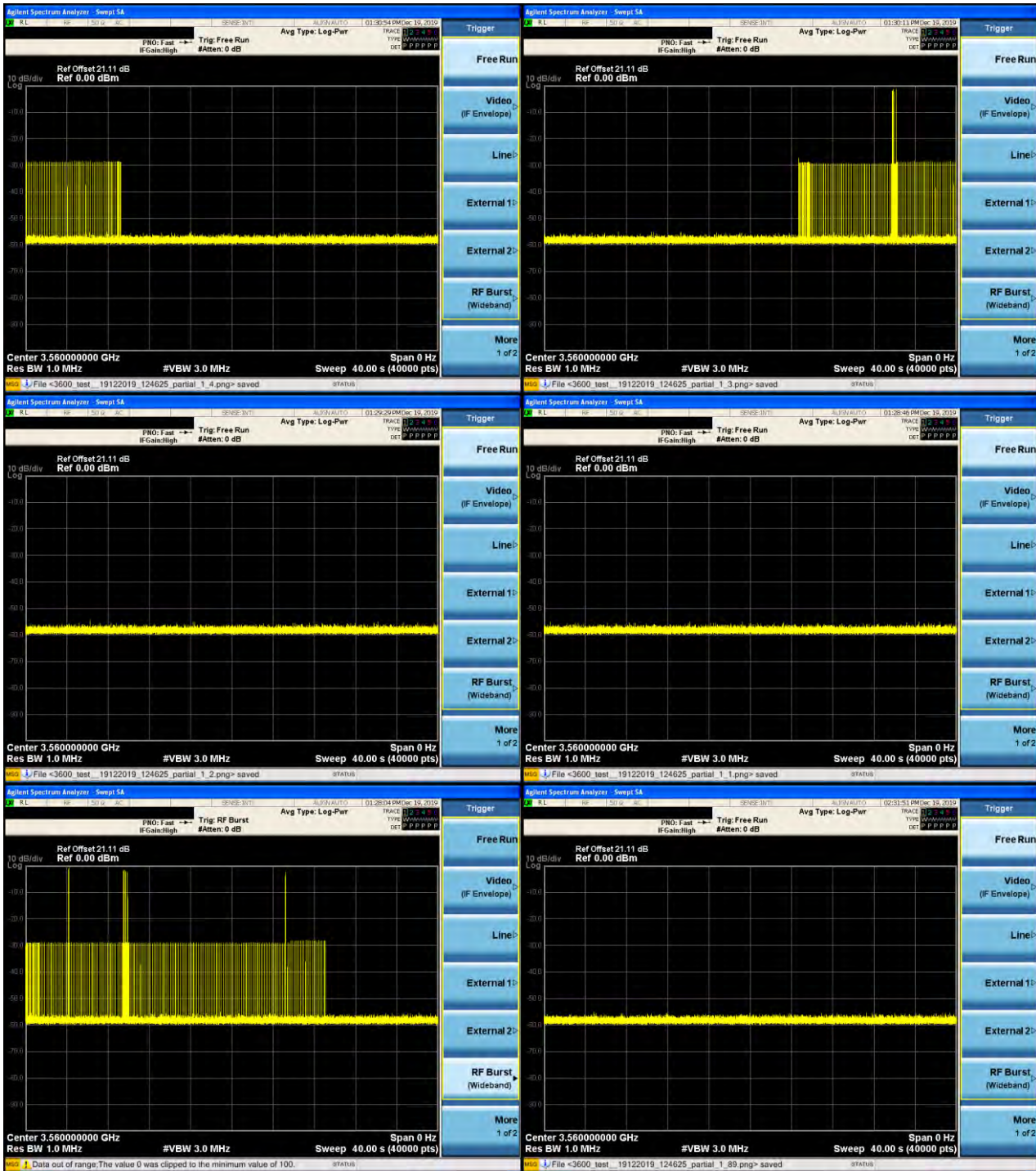












2. CPE.KDB.2: Verify CPE-CBSD can register with SAS with transmit power below 23dBm EIRP



Figure CPE.KDB.2 A: MaxHold trace capture during registration and grant request procedure. This plot shows that the CPE-CBSD was able to register with test-SAS and obtain a grant operating at transmit power below 23dBm/10MHz EIRP.

MaxHold transmit power measured while obtaining grant is 16.99dBm/10MHz EIRP

Peak Power Spectral Density EIRP detected during grant request procedure was 6.99 dBm/MHz EIRP

Notes

$$\text{Peak PSD EIRP (dBm/MHz)} = \text{Antenna Gain (14dB)} + \text{Conducted Peak PSD (-7.006 dBm/MHz)}$$

$$\text{Transmit power EIRP (dBm/10MHz)} = \text{Antenna Gain (14dB)} + \text{Conducted Channel Power (2.99 dBm/10MHz)}$$

$$\text{RF Path loss} = 21.11 \text{ dB (Already considered in rf equipment measurement)}$$

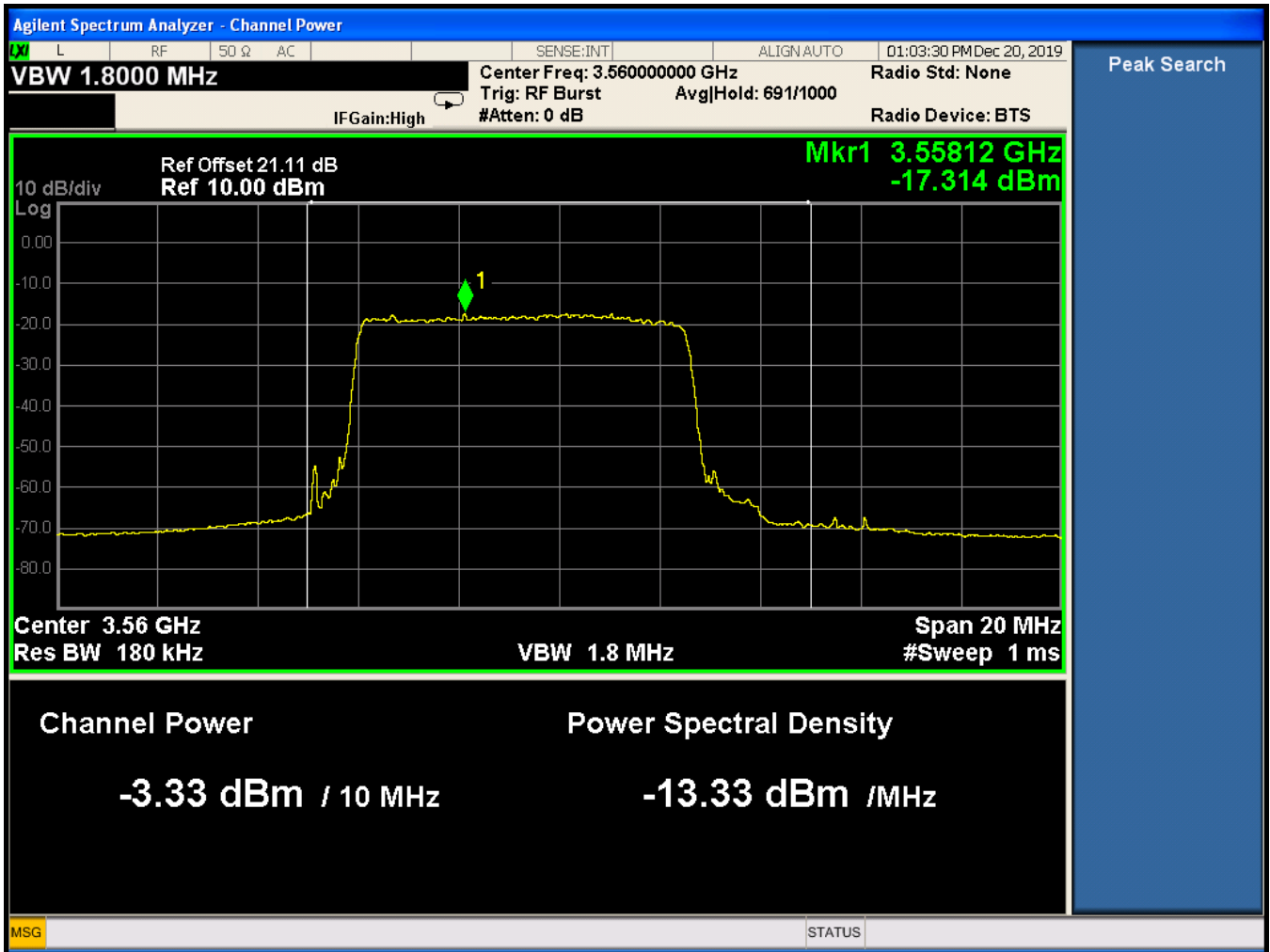


Figure CPE.KDB.2s B: CPE-CBSD EIRP transmit channel power measurement after CPE-CBSD has obtained a grant from test SAS and it is fully utilizing the channel with user data traffic. This plot shows CPE-CBSD obtains connection and can operate at below 23dBm/10MHz EIRP

Measured CPE-CBSD transmit power is 10.67 (dBm/10MHz) EIRP

Note: Channel Power calculated as:

$$\text{EIRP (dBm/10MHz)} = \text{Antenna Gain (14dB)} + \text{Conducted Tx. Power (-3.33 dBm/10 MHz)}$$

$$\text{RF Path loss} = 21.11\text{dB (Already considered in rf equipment measurement)}$$