Test report No:

NIE: 02515BRCB.004

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	EG7010C-M11
Other identification of the product	FCC ID: 2AG32EG7010CM11
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

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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 Nº	Description	Model	Serial Nº	Date of reception
2515b.02	CPE-CBSD	EG7010C-M11	1203000039192TP0950	2019-Dec-17
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-17
Date (finish)	2019-Dec-19

Document history

Report number	Date	Description
02515bRCB.004	2019-Dec-26	First release

Remarks and comments

Testing performed by Gonzalo Casado

Antenna gain is 11dBi

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

Domain Proxy Configuration
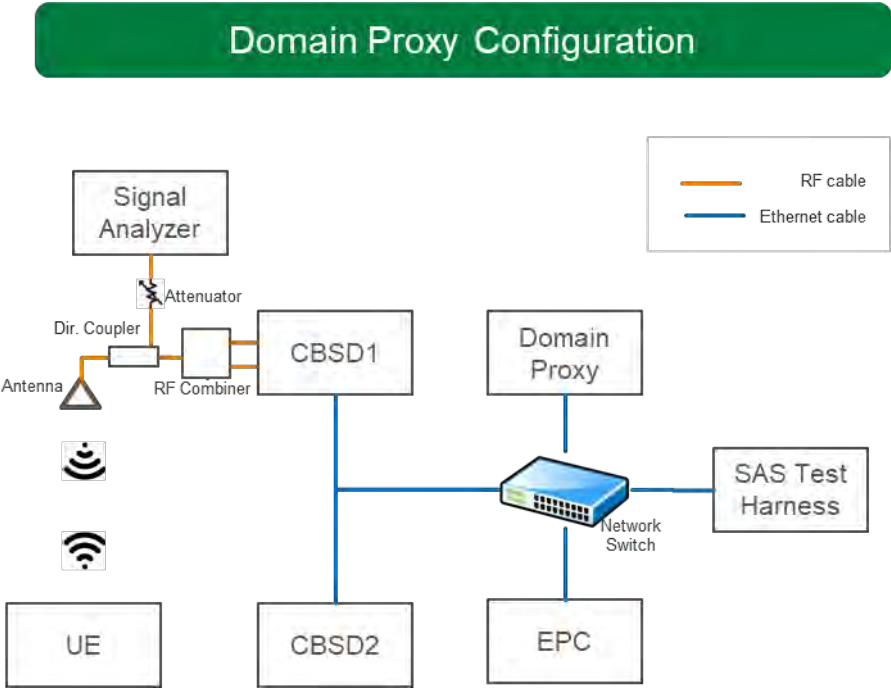
Testing verdicts

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	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	2019-12-18	M/01
CPE.KDB.2	Verify that the CPE-CBSD register with SAS even with transmit power level below 23dBm EIRP	P	2019-12-18	M/01

Notes:

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

Appendix C: Test Cases Details

- 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

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	0.37	PASS
300	10	1.96	PASS
3600	20	5.16	PASS

1.1. One second within 10 second period
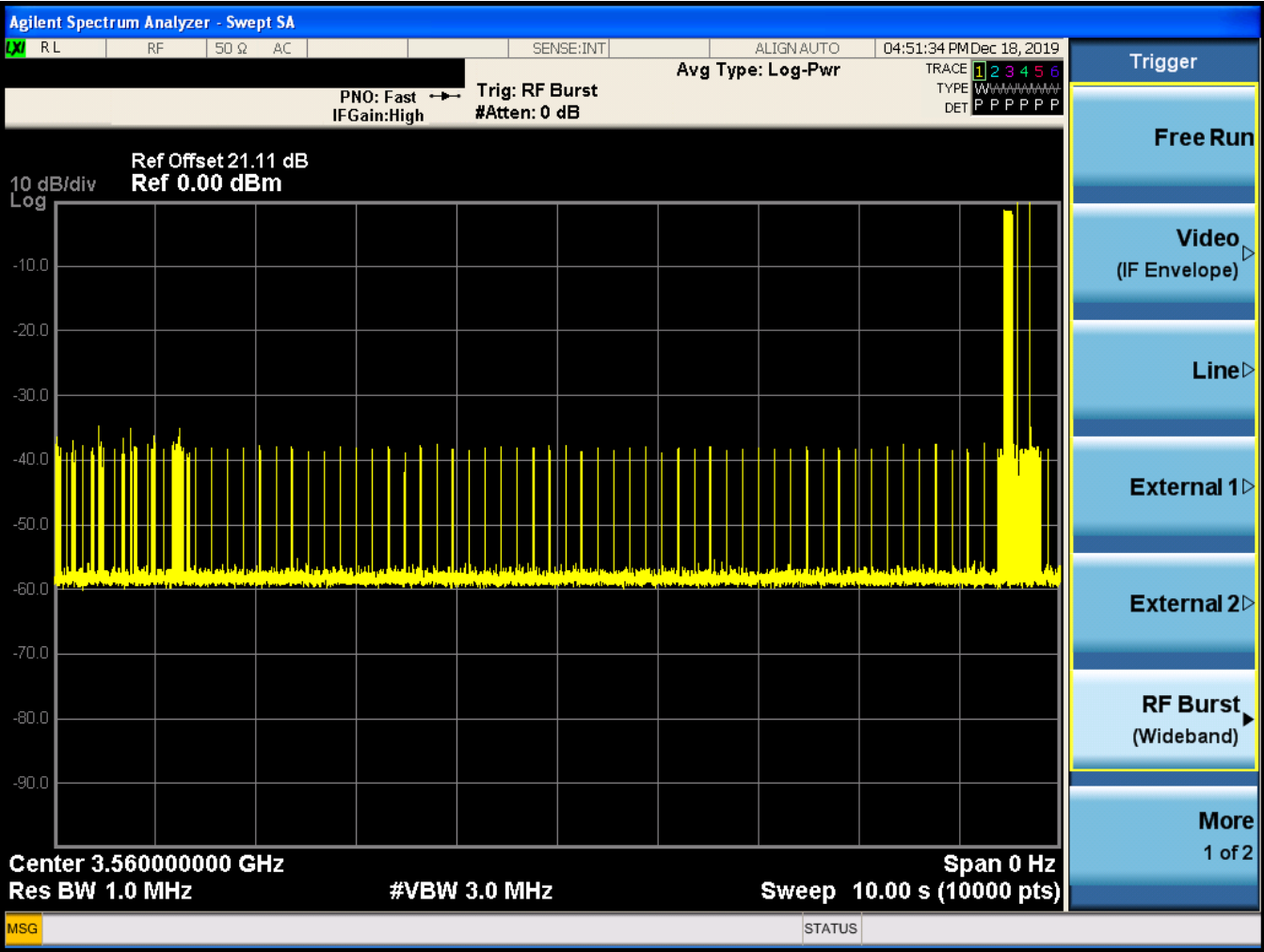
1.2. 10 seconds within 300 second period

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
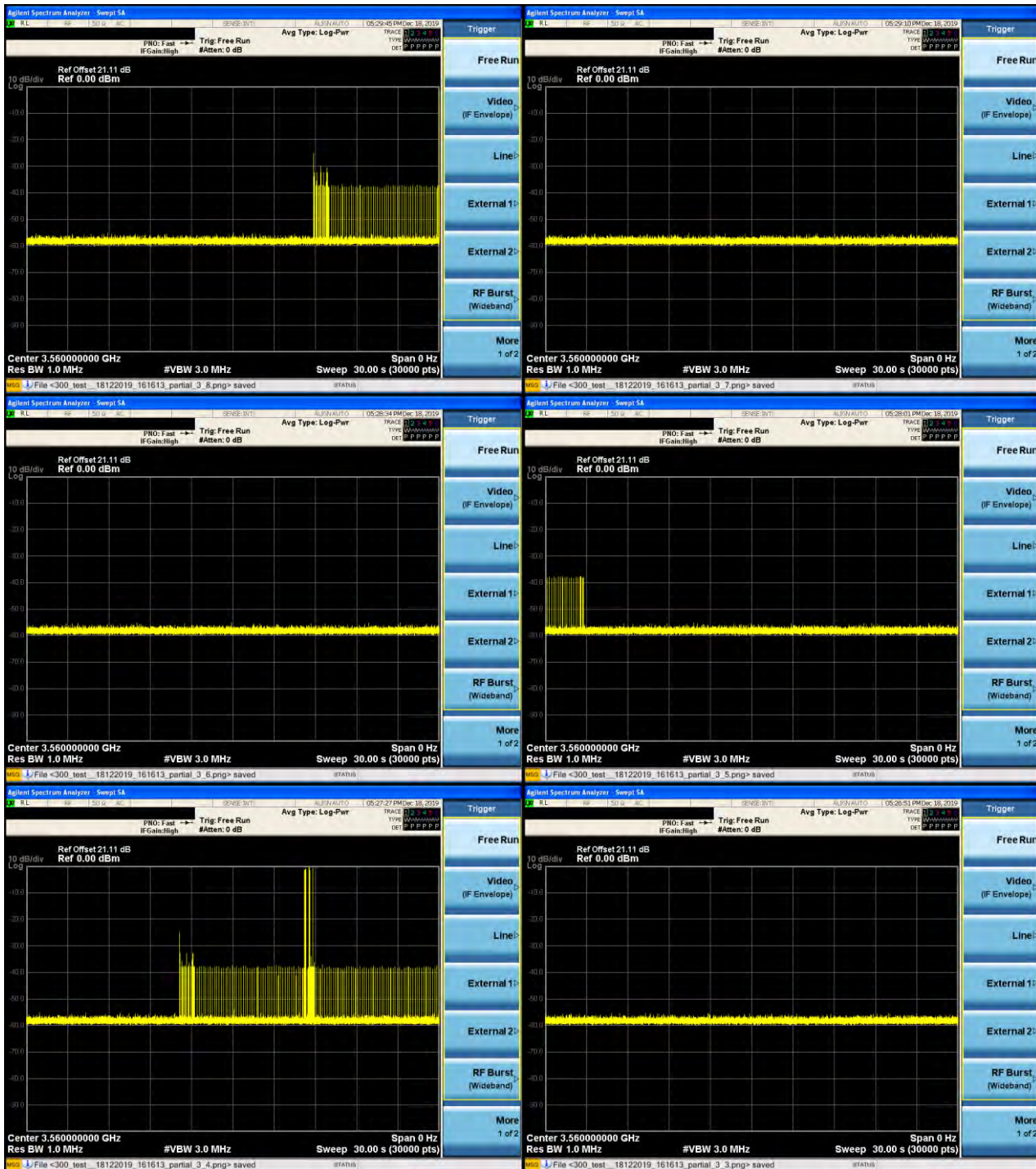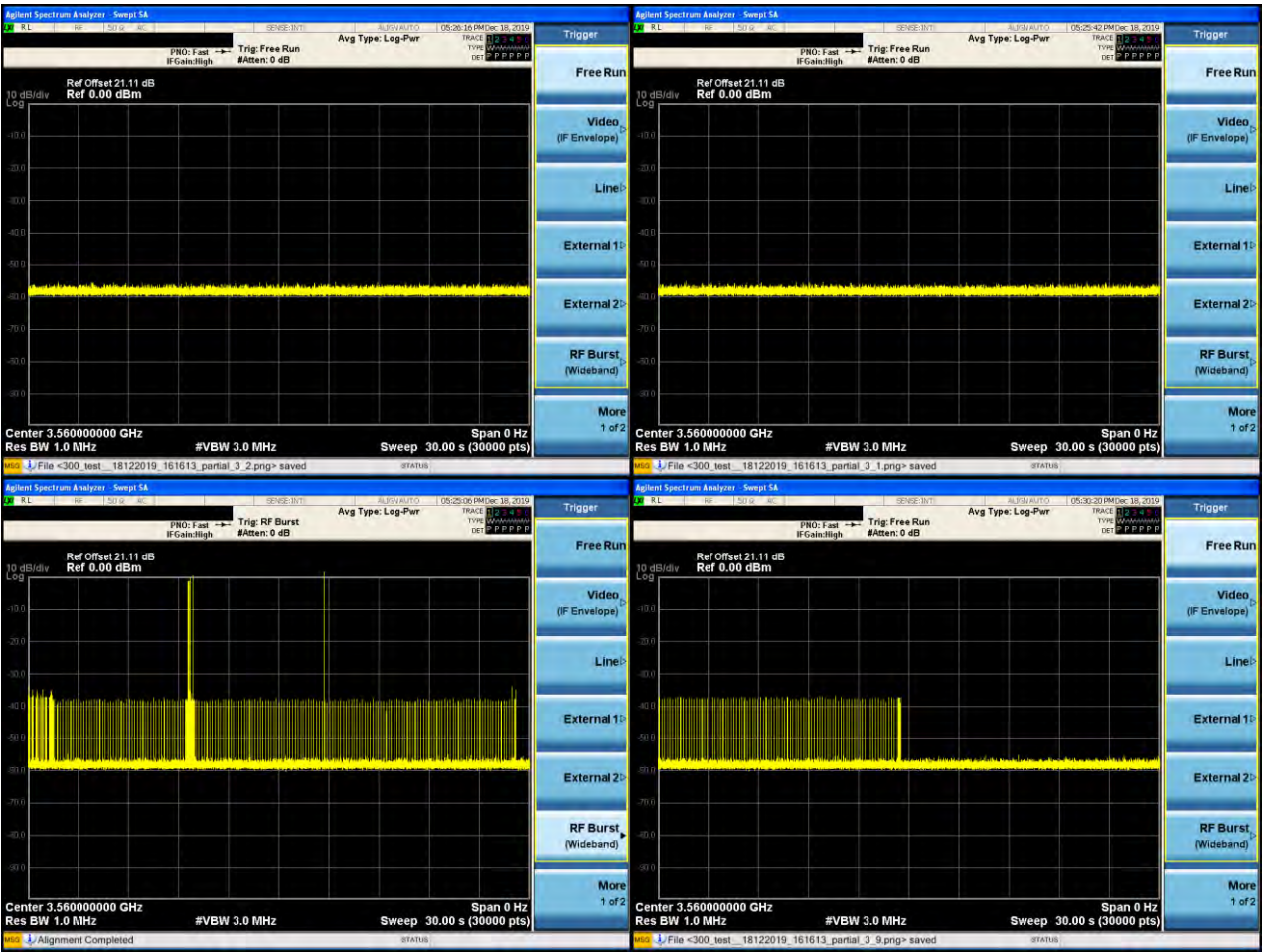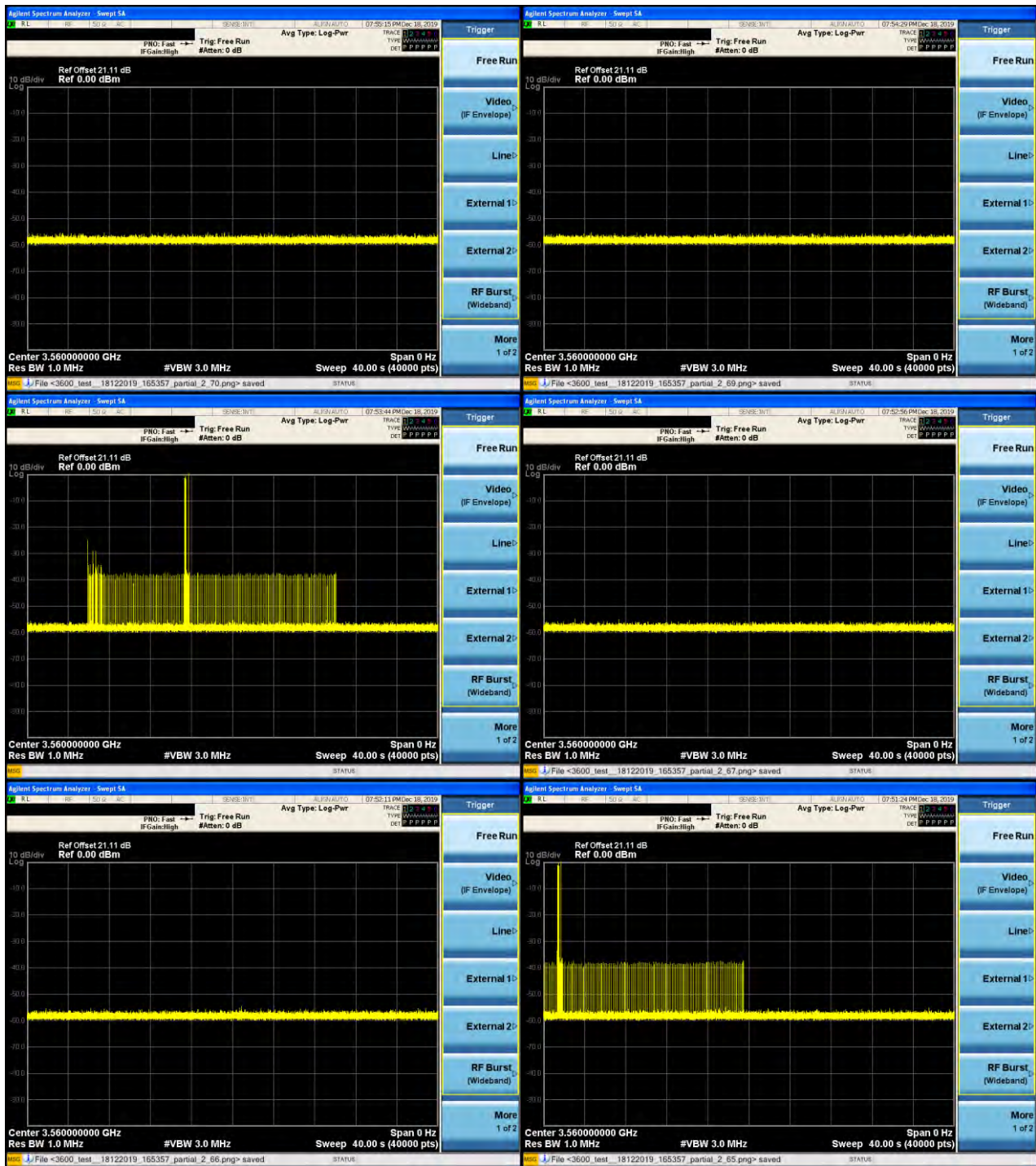
1.3. 20 seconds within 3600 second period

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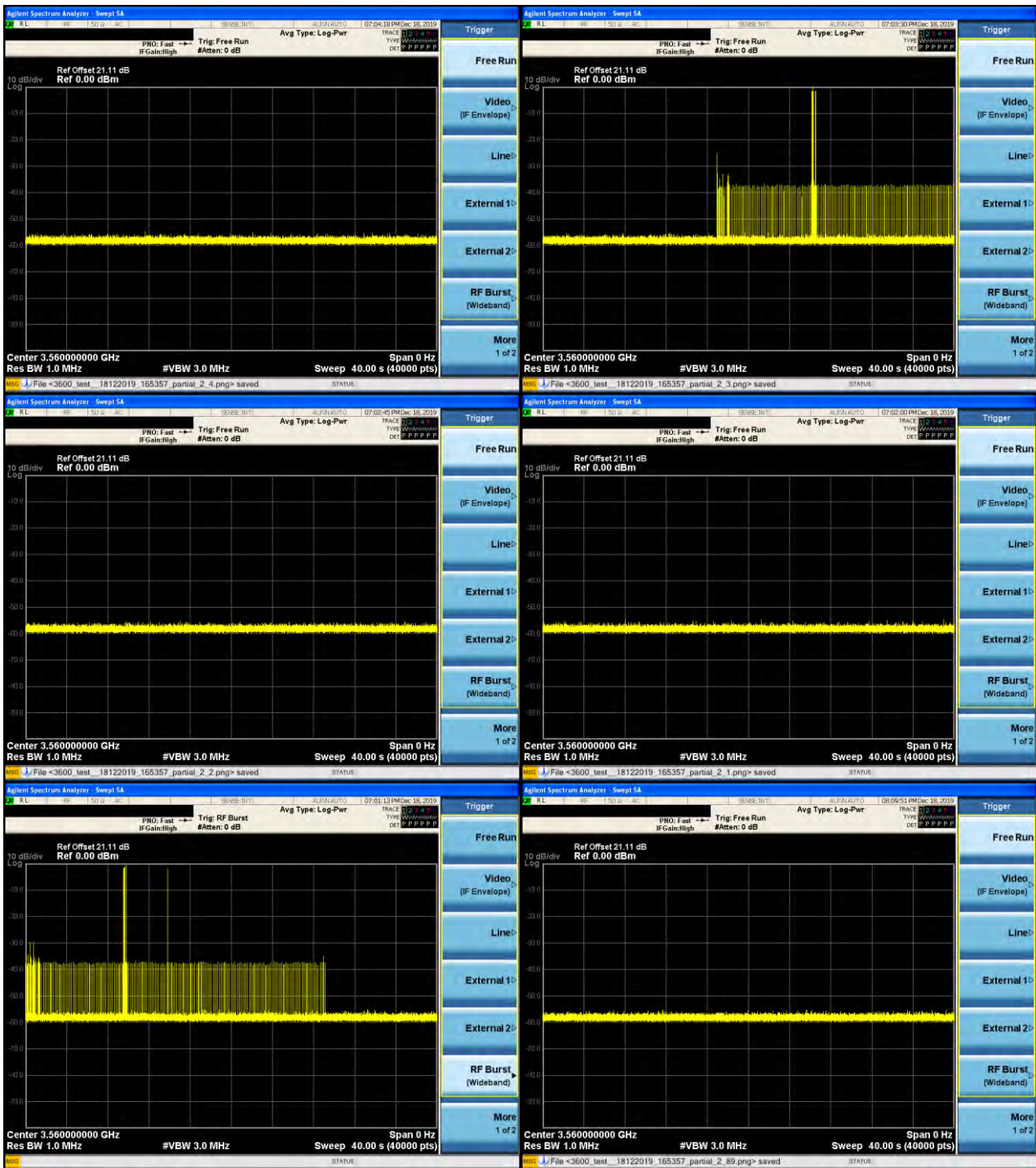
2. CPE.KDB.2: Verify CPE-CBSD can register with SAS with transmit power below 23dBm EIRP

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 13.67dBm/10MHz EIRP

Peak Power Spectral Density EIRP detected during grant request procedure was 3.67 dBm/MHz EIRP

Notes

Peak PSD EIRP (dBm/MHz) = Antenna Gain (11dB) + Conducted Peak PSD (-7.332 dBm/MHz)

Transmit power EIRP (dBm/10MHz) = Antenna Gain (11dB) + Conducted Channel Power (2.57 dBm/10MHz)

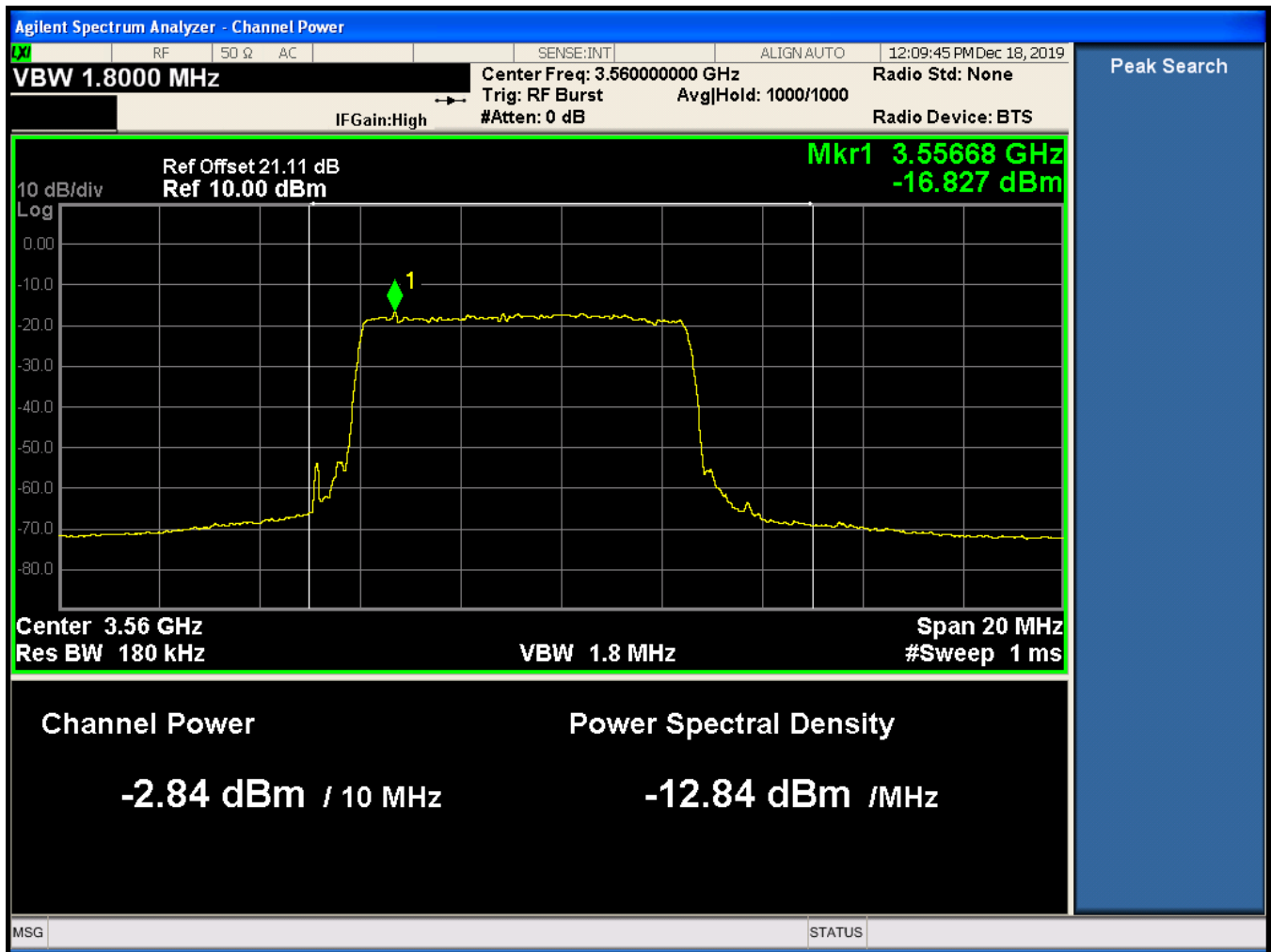RF Path loss = 21.11 dB (Already considered in rf equipment measurement)

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 8.16 (dBm/10MHz) EIRP

Note: Channel Power calculated as:

EIRP (dBm/10MHz) = Antenna Gain (11dB) + Conducted Tx. Power (-2.84 dBm/10 MHz)

RF Path loss = 21.11dB (Already considered in rf equipment measurement)