

DFS PORTION of FCC 47 CFR PART 15 SUBPART E DFS PORTION of ISED CANADA RSS-247 ISSUE 2

TEST REPORT

FOR

802.11 a/b/g/n/ac/ax 2x2 Client Device with BT and BLE

MODEL NUMBER: S39

FCC ID: SBVRM039 ISED: 5373A-RM039

REPORT NUMBER: 14093504-E9V2

ISSUE DATE: 2022-10-07

Prepared for SONOS INC. 614 CHAPALA ST. SANTA BARBARA, CA, 93101, U.S.A.

Prepared by UL VERIFICATION SERVICES INC. 47173 BENICIA STREET FREMONT, CA 94538, U.S.A. TEL: (510) 319-4000 FAX: (510) 661-0888



Revision History

| Rev. | lssue Date | Revisions | Revised By |
|------|---------------|-----------------------|----------------|
| V1 | 2022-10-05 | Initial Issue | |
| V2 | 2022-10-07 | Updated Section 7.1.6 | Edgard Rincand |

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1. ATTESTATION OF TEST RESULTS

| COMPANY NAME: | SONOS INC. 614 CHAPALA ST. SANTA BARBARA, CA, 93101, U.S.A. |
|------------------|---|
| EUT DESCRIPTION: | 802.11 a/b/g/n/ac/ax 2x2 Client Device with BT and BLE |
| MODEL: | S39 |
| SERIAL NUMBER: | F0-F6-C1-A0-09-7E |
| DATE TESTED: | August 15, 2022 |
| | |

| APPLICABLE STANDARDS | | | |
|--|----------|--|--|
| STANDARD TEST RESULTS | | | |
| DFS Portion of CFR 47 Part 15 Subpart E | Complies | | |
| DFS Portion of ISED CANADA RSS-247 Issue 2 | Complies | | |

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document.

Approved & Released For UL Verification Services Inc. By:

Coloro Minero

Edgard Rincand Operations Leader CONSUMER TECHNOLOGY DIVISION UL Verification Services Inc.

Prepared By:

Steven North Test Engineer CONSUMER TECHNOLOGY DIVISION UL Verification Services Inc.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the DFS portion of FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC KDB 789033, KDB 905462 D02 and D03 and RSS-247 Issue 2.

3. SUMMARY OF TEST RESULTS

| Requirement Description | Result | Remarks |
|---|----------|---------|
| DFS Portion of FCC 47 CFR PART 15 SUBPART E | Complies | None |
| DFS Portion of ISED CANADA RSS-247 ISSUE 2 | Complies | None |

4. REFERENCE DOCUMENTS

Measurements of transmitter parameters as referenced in this report and all other manufacturer's declarations relevant to the RF test requirements are documented in UL Verification Services report number 14093504-E3V2.

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

5. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number 0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

| | Address | ISED CABID | ISED Company Number | FCC Registration |
|---|-------------------------------------|---------------|---------------------|------------------|
| X | Building 1: 47173 Benicia Street, | US0104 | 2324A | 550739 |
| | Fremont, California, USA | | | |
| | Building 2: 47266 Benicia Street, | US0104 | 2324A | 550739 |
| | Fremont, California, USA | | | |
| | Building 4: 47658 Kato Rd, Fremont, | US0104 | 2324A | 550739 |
| | California, USA | | | |

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6. DECISION RULES AND MEASUREMENT UNCERTAINTY

6.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

6.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement).

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7. DYNAMIC FREQUENCY SELECTION

7.1. OVERVIEW

7.1.1. LIMITS

INNOVATION, SCIENCE and ECONOMIC DEVELOPMENT CANADA (ISED)

ISED RSS-247 is closely harmonized with FCC Part 15 DFS rules. The deviations are as follows:

RSS-247 Issue 2

Note: For the band 5600–5650 MHz, no operation is permitted.

Until further notice, devices subject to this annex shall not be capable of transmitting in the band 5600–5650 MHz. This restriction is for the protection of Environment Canada weather radars operating in this band.

FCC

§15.407 (h), FCC KDB 905462 D02 "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION" and KDB 905462 D03 "U-NII CLIENT DEVICES WITHOUT RADAR DETECTION CAPABILITY".

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Table 1: Applicability of DFS requirements prior to use of a channel

| Requirement | Operational Mode | | | |
|---------------------------------|------------------|----------------------------------|-------------------------------|--|
| | Master | Client (without radar detection) | Client (with radar detection) | |
| Non-Occupancy Period | Yes | Not required | Yes | |
| DFS Detection Threshold | Yes | Not required | Yes | |
| Channel Availability Check Time | Yes | Not required | Not required | |
| U-NII Detection Bandwidth | Yes | Not required | Yes | |

Table 2: Applicability of DFS requirements during normal operation

| Requirement | Operational Mode | | | |
|-----------------------------------|------------------|---------------|------------|--|
| | Master | Client | Client | |
| | | (without DFS) | (with DFS) | |
| DFS Detection Threshold | Yes | Not required | Yes | |
| Channel Closing Transmission Time | Yes | Yes | Yes | |
| Channel Move Time | Yes | Yes | Yes | |
| U-NII Detection Bandwidth | Yes | Not required | Yes | |

| Additional requirements for | Master Device or Client with | Client | | | | |
|---|----------------------------------|-------------------|--|--|--|--|
| devices with multiple bandwidth | Radar DFS | (without DFS) | | | | |
| modes | | | | | | |
| U-NII Detection Bandwidth and | All BW modes must be | Not required | | | | |
| Statistical Performance Check | tested | | | | | |
| Channel Move Time and | Test using widest BW mode | Test using the | | | | |
| Channel Closing Transmission | available | widest BW mode | | | | |
| Time | | available for the | | | | |
| | | link | | | | |
| All other tests | Any single BW mode | Not required | | | | |
| Note: Frequencies selected for statistical performance check (Section 7.8.4) should | | | | | | |
| include several frequencies within the radar detection bandwidth and frequencies near the | | | | | | |
| edge of the radar detection bandwidth. For 802.11 devices it is suggested to select | | | | | | |
| frequencies in all 20 MHz channel bl | ocks and a null frequency betwee | en the bonded 20 | | | | |

MHz channel blocks.

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Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

| Maximum Transmit Power | Value | | | |
|--|-------------------------|--|--|--|
| | (see notes) | | | |
| E.I.R.P. ≥ 200 mill watt | -64 dBm | | | |
| E.I.R.P. < 200 mill watt and | -62 dBm | | | |
| power spectral density < 10 dBm/MHz | | | | |
| E.I.R.P. < 200 mill watt that do not meet power spectral | -64 dBm | | | |
| density requirement | | | | |
| Note 1: This is the level at the input of the receiver assuming | a 0 dBi receive antenna | | | |
| Note 2: Throughout these test procedures an additional 1 dB has been added to the | | | | |
| amplitude of the test transmission waveforms to account for variations in measurement | | | | |
| equipment. This will ensure that the test signal is at or above the detection threshold level to | | | | |
| trigger a DFS response. | | | | |
| Note 3: E.I.R.P. is based on the highest antenna gain. For MIMO devices refer to KDB | | | | |
| publication 662911 D01. | | | | |

Table 4: DFS Response requirement values

| Value |
|---|
| 30 minutes |
| 60 seconds |
| 10 seconds (See Note 1) |
| 200 milliseconds + approx. 60 milliseconds over remaining 10 second period. (See Notes 1 and 2) |
| Minimum 100% of the U- NII 99% transmission power bandwidth. (See Note 3) |
| |

Note 1: *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.

Note 2: The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate a *Channel* move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the *U-NII Detection Bandwidth* detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

Table 5 – Short Pulse Radar Test Waveforms

| Radar | Pulse | PRI | Pulses | Minimum | Minimum | | | |
|--------|--|------------------------|---|---------------|----------|--|--|--|
| Туре | Width | (usec) | | Percentage | Trials | | | |
| | (usec) | | | of Successful | | | | |
| | | | | Detection | | | | |
| 0 | 1 | 1428 | 18 | See Note 1 | See Note | | | |
| | | | | | 1 | | | |
| 1 | 1 | Test A: 15 unique | | 60% | 30 | | | |
| | | PRI values randomly | | | | | | |
| | | selected from the list | Roundup: | | | | | |
| | | of 23 PRI values in | {(1/360) x (19 x 10 ⁶ PRI _{usec})} | | | | | |
| | | table 5a | | | | | | |
| | | Test B: 15 unique | | | | | | |
| | | PRI values randomly | | | | | | |
| | | selected within the | | | | | | |
| | | range of 518-3066 | | | | | | |
| | | usec. With a | | | | | | |
| | | minimum increment | | | | | | |
| | | of 1 usec, excluding | | | | | | |
| | | PRI values selected | | | | | | |
| | | in Test A | | | | | | |
| 2 | 1-5 | 150-230 | 23-29 | 60% | 30 | | | |
| 3 | 6-10 | 200-500 | 16-18 | 60% | 30 | | | |
| 4 | 11-20 | 200-500 | 12-16 | 60% | 30 | | | |
| | Aggregate (Radar Types 1-4) 80% 120 | | | | | | | |
| | Note 1: Short Pulse Radar Type 0 should be used for the <i>Detection Bandwidth</i> test, <i>Channel</i> | | | | | | | |
| Move T | Move Time, and Channel Closing Time tests. | | | | | | | |

Table 6 – Long Pulse Radar Test Signal

| Radar | Pulse | Chirp | PRI | Pulses | Number | Minimum | Minimum |
|----------|--------|-------|--------|--------|--------|---------------|---------|
| Waveform | Width | Width | (µsec) | per | of | Percentage | Trials |
| Туре | (µsec) | (MHz) | | Burst | Bursts | of Successful | |
| | | | | | | Detection | |
| 5 | 50-100 | 5-20 | 1000- | 1-3 | 8-20 | 80% | 30 |
| | | | 2000 | | | | |

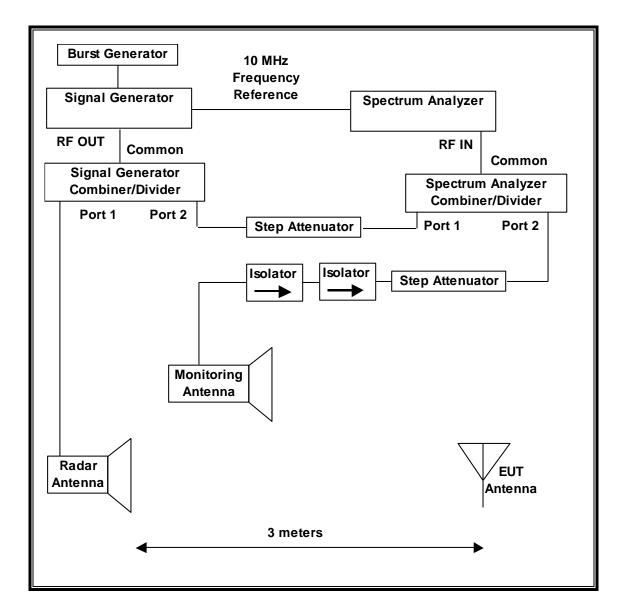
Table 7 – Frequency Hopping Radar Test Signal

| | | / | <u> </u> | U | | | |
|----------|--------|--------|----------|---------|----------|---------------|---------|
| Radar | Pulse | PRI | Pulses | Hopping | Hopping | Minimum | Minimum |
| Waveform | Width | (µsec) | per | Rate | Sequence | Percentage of | Trials |
| Туре | (µsec) | | Hop | (kHz) | Length | Successful | |
| | | | • | . , | (msec) | Detection | |
| 6 | 1 | 333 | 9 | 0.333 | 300 | 70% | 30 |

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7.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



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SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 1, 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Frequency Hopping Radar Waveform Generating Subsystem of KDB 905462 D02. The frequency of the signal generator is incremented in 1 MHz steps from F_L to F_H for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. The Reference Level Offset of the spectrum analyzer is adjusted so that the displayed amplitude of the signal is –64 dBm.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

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ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the distance between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. Traffic that meets or exceed the minimum loading requirement is streamed from the Master device to the Slave Device. The monitoring antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| TEST EQUI | PMENT LIST | | | |
|--|--------------|---------|--------|----------|
| Description | Manufacturer | Model | ID No. | Cal Due |
| Spectrum Analyzer, PXA, 3Hz to 8.4GHz | Keysight | N9030A | 150667 | 01/27/23 |
| Signal Generator, MXG X-Series RF Vector | Keysight | N5182B | 215999 | 02/08/23 |
| Frequency Extender | Keysight | N5182BX | 213906 | 12/29/22 |
| Arbitrary Waveform Generator | Agilent / HP | 33220A | 80815 | 01/24/23 |

7.1.3. TEST AND MEASUREMENT SOFTWARE

The following test and measurement software was utilized for the tests documented in this report:

Slave Device Testing

| - | TEST SOF | TWARE LIST |
|--------------------|----------|--|
| Name | Version | Test / Function |
| Aggregate Time-PXA | 3.1 | Channel Loading and Aggregate Closing Time |
| PXA Read | 3.1 | Signal Generator Screen Capture |
| SGXProject.exe | 1.7 | Radar Waveform Generation and Download |

7.1.4. TEST ROOM ENVIRONMENT

The test room temperature and humidity shall be maintained within normal temperature of 15~35 °C and normal humidity 20~75% (relative humidity).

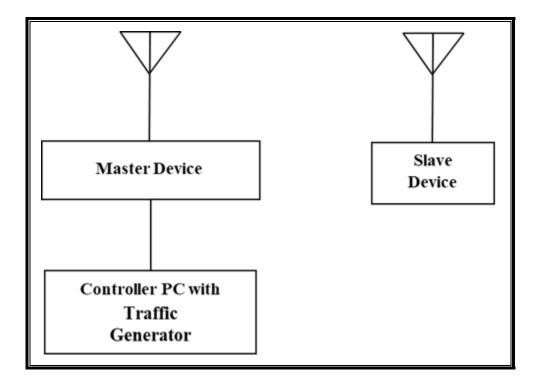
ENVIRONMENT CONDITION

| Parameter | Value |
|-------------|---------|
| Temperature | 21.7 °C |
| Humidity | 55 % |

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7.1.5. SETUP OF EUT

RADIATED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

The following support equipment was utilized for the tests documented in this report:

| P | ERIPHERAL SU | JPPORT EQUIPME | INT LIST | |
|-------------------------------|--------------|-----------------|--------------------|-----------|
| Description | Manufacturer | Model | Serial Number | FCC ID |
| 802.11ac Dual Band Wireless | | AIR-CAP3702E-A- | | |
| Access Point | Cisco | K9 | FTX181570A6 | LDK102087 |
| P.O.E. Injector | Phihong | POE30U-560(G) | PHI170102N2 | DoC |
| Notebook PC | | | | |
| (Controller/Server) | Lenovo | Туре 4236-В92 | PB-HEX04 12/05 | DoC |
| AC Adapter (Controller/Server | | | 11S42T4418Z1ZGWG08 | |
| PC) | Lenovo | 42T4418 | R90M | DoC |

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7.1.6. DESCRIPTION OF EUT

For FCC the EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges.

For ISED the EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges, excluding the 5600-5650 MHz range.

The EUT is a Slave Device without Radar Detection.

The manufacturer has declared that the highest power level within these bands is 20 dBm EIRP in the 5250-5350 MHz band and 20 dBm EIRP in the 5470-5725 MHz band.

The manufacturer has declared that highest gain antenna assembly utilized with the EUT has a gain of 4.4 dBi in the 5250-5350 MHz band and 5.1 dBi in the 5470-5725 MHz band. The manufacturer has declared that lowest gain antenna assembly utilized with the EUT has a gain of 2.9 dBi in the 5250-5350 MHz band and 4.3 dBi in the 5470-5725 MHz band.

Four antennas are utilized to meet the diversity and MIMO operational requirements.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is -64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

The EUT uses two transmitter/receiver chains, each connected to an antenna to perform radiated tests.

WLAN traffic that meets or exceeds the minimum required loading was generated by transferring a data stream from the Master Device to the Slave Device using iPerf version 2.0.5 software package.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm).

The EUT utilizes the 802.11ac and 802.11ax architecture. Three nominal channel bandwidths are implemented: 20 MHz, 40 MHz, 80 MHz.

Channel puncturing is not supported.

The software installed in the EUT is 70.2-32110-main.

The software installed in the access point is AP3G2-K9W7-M Version 15.3(3)JAB.

UNIFORM CHANNEL SPREADING

This is requirement not applicable to Slave Devices.

OVERVIEW OF MASTER DEVICE WITH RESPECT TO §15.407 (h) REQUIREMENTS

The Master Device is a Cisco Access Point, FCC ID: LDK102087. The minimum antenna gain for the Master Device is 6 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is -64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides a margin to the limit.

The software installed in the access point is AP3G2-K9W7-M Version 15.3(3)JAB.

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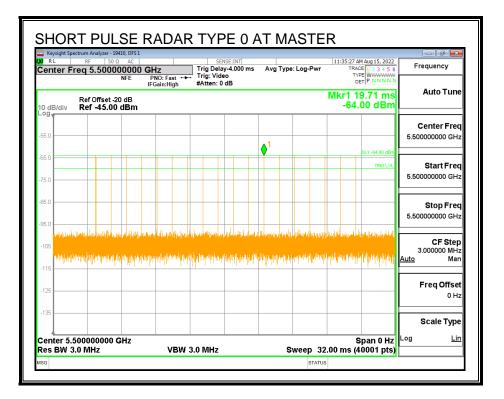
7.2. RESULTS FOR 20 MHz BANDWIDTH

7.2.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5500 MHz.

7.2.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



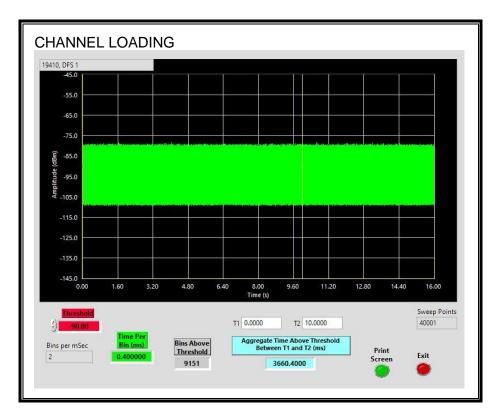
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TRAFFIC

| | ectrum Analyzer - 19410, D | FS1 | | | | | | | - ē 💌 |
|----------|------------------------------------|---|----------------|------|-----------|--------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| enter F | RF 50 Ω A Treq 5.5000000 NFE | 00 GHz | t +++ Trig: Fr | | Avg Type: | Log-Pwr | 11:47:52 AM Aug TRACE 1 TYPE W | 15, 2022 2 3 4 5 6 N N N N N N | Frequency |
| 0 dB/div | Ref Offset -20 dB Ref -45.00 dB | | jh #Atten: | 0 dB | | | Mkr1 4.0 -78.24 | 052 s | Auto Tune |
| .og | | | | | | | | 64.00 dBm | Center Freq 5.50000000 GHz |
| 75.0 | | ↓1 | | | | | | | Start Freq 5.500000000 GHz |
| 95.0 | | | | | | | | | Stop Freq 5.500000000 GHz |
| 105 | | dije se | | | | 991 A. I. M. A. A. M. A. | | Aut | CF Step 3.000000 MHz to Man |
| 125 | | | | | | | | | Freq Offsel 0 Hz |
| 135 | | | | | | | | | Scale Type |
| | 500000000 GHz 3.0 MHz | | BW 3.0 MHz | | | Sween | Spai 16.00 s (4000 | n 0 Hz | g <u>Lin</u> |

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CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 36.60%

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7.2.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

7.2.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time = (Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

<u>RESULTS</u>

| Channel Move Time | Limit |
|-------------------|-------|
| (sec) | (sec) |
| 0.0368 | 10 |

| Aggregate Channel Closing Transmission Time | Limit |
|---|--------|
| (msec) | (msec) |
| 0 | 60 |

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MOVE TIME

| Keysight Spi R L | ectrum Analyzer - 19410, RF 50 Ω | DFS1 AC | SENSE:INT | | 11:51:01 AM Aug 15, 2022 | |
|----------------------|-------------------------------------|------------------|-------------------------------|-------------------------|---|-------------------------------------|
| enter F | req 5.500000 | E PNO: Fast ← | Trig: Free Run | Avg Type: Log-Pwr | TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N N | Frequency |
| | Ref Offset -20 c | | #Atten: 0 dB | | ∆Mkr1 36.80 ms -15.97 dB | Auto Tune |
| 0 dB/div | Ref -45.00 dl | 3m | | | -10.57 dB | |
| 55.0 55.0 75.0 | 142 | | | | DL1 -64.00 dBm | Center Fred 5.500000000 GH; |
| 85.0 95.0 | Landhalata an ba | a | ndeleti, ategrideligi eterrit | danaya kata a | di la mana di Mana di dala da | Start Free 5.50000000 GH: |
| -115 -125 -135 | | | | | | Stop Free 5.500000000 GH; |
| les BW 3 | | | 3.0 MHz | Sweep | Span 0 Hz 16.00 s (40001 pts) | CF Step 3.000000 MH; Auto Mar |
| IKR MODE TE | t (Δ) | x 36.80 ms (Δ | | FUNCTION FUNCTION WIDTH | H FUNCTION VALUE | |
| 2 F 1 3 4 5 | t | 1.580 s | -63.47 dBm | | E | Freq Offse 0 Ha |
| 6 7 8 9 | | | | | | Scale Type |
| 9 10 11 | | | | | | Log <u>Lir</u> |

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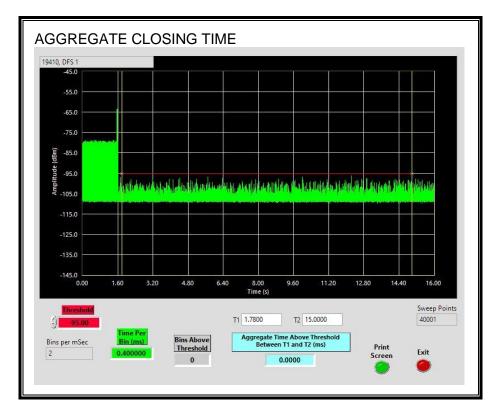
CHANNEL CLOSING TIME

| Frequency | 12:00:57 PM Aug 15, 2022 TRACE 1 2 3 4 5 6 | Type: Log-Pwr | EINT | | Hz | alyzer - 19410, DFS 1 50 Ω AC 50000000 G | RF |
|----------------------------------|--|---|-------------------------|-----------------------------------|-----------------------------|---|---------------------|
| ns Auto Tur | Mkr1 200.0 ms -39.46 dB | ۵ | 3 | ↓ Trig: Vide #Atten: 0 | PNO: Fast ↔ FGain:High | | |
| Center Fre 5.500000000 GH | | | | | | | |
| _ | DL1 -64.00 dBm TRIG LVL | | | | | | ×2 |
| Stop Fre 5.50000000 GH | | | | | | | e e standard yr bly |
| CF Ste 3.000000 MH Auto Ma | essaya (a dina isa di ba <mark>daya) k</mark> iti a postike a Minishi (a postike a dina isa hini di sharata o | Ully of some ways of the set waters , set each of south advect | Alar aller pilos da ana | ∆2 shiin kasan wanalatina wika | landitan <mark>g 1</mark> 2 | | |
| Freq Offs 0 H | | | | | | | |
| Scale Typ | Span 0 Hz | | | | | | er 5.50000 |

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AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

Only intermittent transmissions are observed during the aggregate monitoring period.



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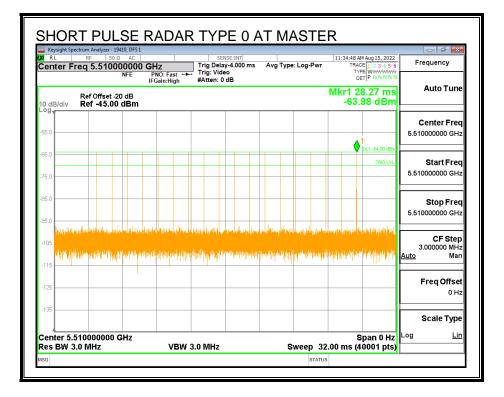
7.3. RESULTS FOR 40 MHz BANDWIDTH

7.3.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5510 MHz.

7.3.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



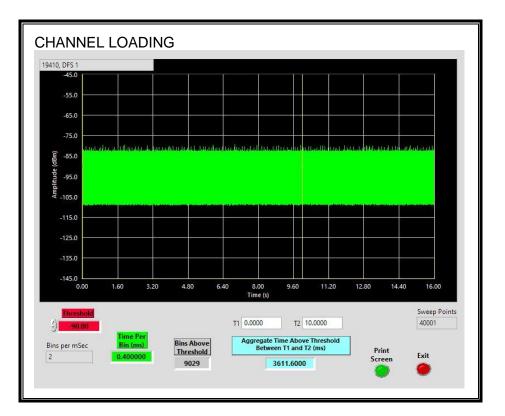
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TRAFFIC

| | pectrum Analyzer - 1 | .9410, DFS 1 | | | | | | | | | d X |
|--|----------------------------|-----------------|---------------------|-------------------------|--------------|----------------|--------------------|------------------|--|--|---|
| enter F | RF 50 | | GHz PNO: Fast ++ | | NSE:INT | Avg Type: | Log-Pwr | TRAC | M Aug 15, 2022 DE 1 2 3 4 5 6 PE W | Frequ | ency |
| 0 dB/div | Ref Offset⊰ Ref -45.00 | 20 dB | IFGain:High | #Atten: 0 | | | | Mkr1 | 6.937 s 44 dBm | Au | to Tune |
| .og | | | | | | | | | DL1 -64.00 dBm | | ter Freq 0000 GHz |
| 65.0 | | - | | | | | | | Del 104.00 della | | art Freq |
| | | | | _ ∮ ¹ | | | | | | 5.510000 | 0000 GHz |
| 85.0 <mark>J. B. J. B. J. B. J. B. B.</mark> | աներուներուներուներուներու | ka ana padal. | utaataaabaa | 1 | Natural tana | an hunada | und, david, da | natanatan | ratikolaroti | | op Freq |
| 35.0 Hittlef 35.0 105 <mark>Hittlef</mark> | diana di Uniona di U | le, la constale | และเสาะสุดภาพที่สาม | 1 | | an daga sa dag | n pelu i na tata t | ti alcalcia da d | | St 5.510000 | op Freq 0000 GHz CF Step 0000 MHz |
| 75.0 4.10 | | | | 1 Jandon polat | | | | | | St 5.510000 3.000 <u>Auto</u> | op Freq 0000 GHz CF Step 0000 MHz Man q Offset |
| 85.0 Jubba 95.0 105 Jubba 115 | | | | | | | | | | St 5.510000 3.000 Auto Fre | op Freq |

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CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 36.11%

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7.3.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

7.3.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time = (Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

<u>RESULTS</u>

| Channel Move Time | Limit |
|-------------------|-------|
| (sec) | (sec) |
| 0.0592 | 10 |

| Aggregate Channel Closing Transmission Time | Limit |
|---|--------|
| (msec) | (msec) |
| 0 | 60 |

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MOVE TIME

| Keysight Spectrum Analyzer - 194 RL RF 50 Ω | 10, DFS1 AC | SENSE:INT | | 11:07:00 AM Aug 15, 2022 | |
|--|-----------------------------|-------------------------------|--|--|-------------------------------------|
| enter Freq 5.51000 | NFE PNO: Fast ++ | Trig: Free Run | Avg Type: Log-Pwr | TRACE 1 2 3 4 5 6 TYPE WWWWW DET P N N N N N | Frequency |
| Ref Offset -20 0 dB/div Ref -45.00 | | #Atten: 0 dB | Δ | Mkr1 59.20 ms -15.83 dB | Auto Tune |
| og 99 | | | | 10.00 02 | |
| 65.0 75.0 | | | | DL1 -64.00 dBm | Center Fred 5.510000000 GHz |
| 95.0 105 | ang na thibhad dan ta alban | nalikola serinta dasartatisen | len kelender gedeste beide verden verden | hanna dallan maddalan. | Start Fred 5.510000000 GHz |
| 115 | | | | | Stop Fred 5.510000000 GHz |
| enter 5.510000000 G es BW 3.0 MHz | VBW | 3.0 MHz | • | Span 0 Hz 6.00 s (40001 pts) | CF Step 3.000000 MHz Auto Mar |
| $\frac{1}{1} \Delta 2 \frac{1}{1} t (\Delta)$ | × 59.20 ms (Δ) | -15.83 dB | JNCTION FUNCTION WIDTH | FUNCTION VALUE | |
| 2 F 1 t 3 4 5 | 1.480 s | -63.81 dBm | | E | Freq Offset 0 Hz |
| 6 7 8 | | | | | Scale Type |
| 9 0 1 | | | | | Log <u>Lir</u> |

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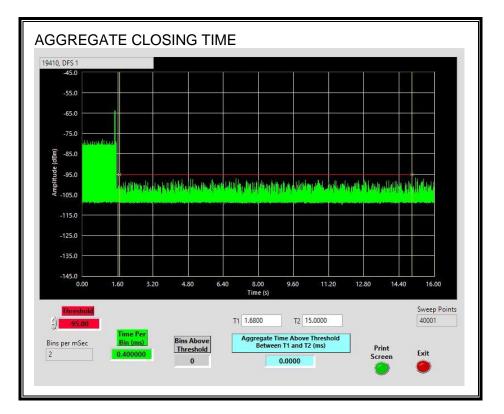
CHANNEL CLOSING TIME

| eysight Spectrum Analyzer - 19410, DFS 1 RL RF 50 Ω AC 1ter Freq 5.510000000 | CHa | SENSE:INT | Avg Type: Log-Pwr | 11:27:34 AM Aug 15, 2022 TRACE 1 2 3 4 5 6 | Frequency |
|--|-----------------------|------------------------------|-------------------|---|-------------------------------|
| NFE | PNO: Fast +++ Trig: \ | Video n: 0 dB | ang type. Log t m | DET P NNNN | |
| Ref Offset -20 dB dB/div Ref -45.00 dBm | | | Δ | Mkr1 200.0 ms -38.32 dB | Auto Tun |
| g | | | | | Center Fre |
| .0 | | | | DL1 -64.00 dBm | 5.510000000 GH |
| .0 | | | | TRIG LVL | Start Fre |
| 5.0 | | | | | 5.510000000 GH |
| | | | | | Stop Fre |
| 5.0 | 142 | | | | 5.510000000 GH |
| n (n. 1937), and a second s Second second | | land, parter educid for each | | n, and - Specific Developer Helper Manual Content of Content and Content | CF Ste |
| 15 | | | | | 3.000000 MH <u>Auto</u> Ma |
| | | | | | Freq Offse |
| 25 | | | | | он |
| 25 | | | | | Scale Typ |
| enter 5.510000000 GHz es BW 3.0 MHz | VBW 3.0 MH | | | Span 0 Hz 0.0 ms (40001 pts) | Log <u>Li</u> |

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AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the aggregate monitoring period.



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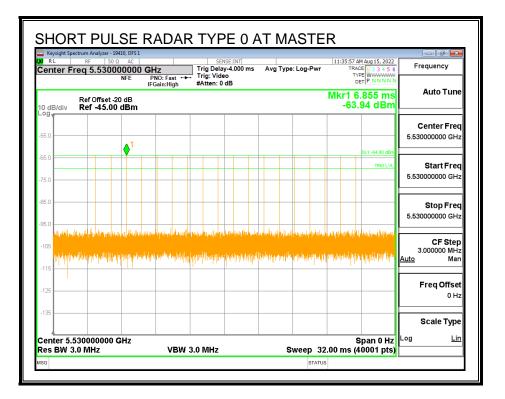
7.4. RESULTS FOR 80 MHz BANDWIDTH

7.4.1. TEST CHANNEL

All tests were performed at a channel center frequency of 5530 MHz.

7.4.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



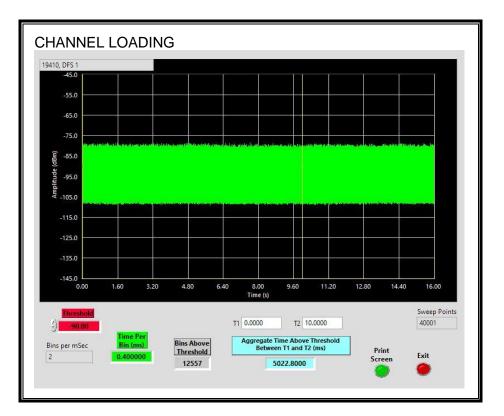
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TRAFFIC

| | pectrum Analyzer - 194 | | | | | | | | | - 0 |
|--------------|--|---------------------|----------------------------------|----------------------|-----------------------|-------------------------------------|-----------------------------------|------------------------|--|--|
| enter F | RF 50 Ω Freq 5.53000 | | PNO: Fast 🔸 | | | Avg Type | : Log-Pwr | TRAC TYL | MAug 15, 2022 DE 1 2 3 4 5 6 DE WWWWWWW T P N N N N N | Frequency |
| 0 dB/div | Ref Offset -20 Ref -45.00 | | IFGain:High | #Atten: 0 | ав | | | Mkr1 | 7.641 s 54 dBm | Auto Tui |
| .og | | | | | | | | | DL1 -64.00 dBm | Center Fr 5.530000000 G |
| 75.0 | aktille, tak basalarada aanti takatari | | | ¹ | | (and a constraint for the second | | | | Start Fr 5.530000000 G |
| 85.0 95.0 | | | | | | | | a ant and a con- | | Stop Fr 5.53000000 G |
| 105 | barrar an abarrar barakan | n de la cel francia | en atter posteren solet på Helft | the last one which a | ulation of the second | in a sha selan it da sa a shi da sa |) / entre all a fin ministrations | t i den skine i De pie | | CF Ste 3.000000 MI <u>Auto</u> M |
| 125 | | | | | | | | | | Freq Offs 0 |
| 135 | | | | | | | | | | Scale Ty |
| _ | .530000000 G | | | | | | | | pan 0 Hz | Log L |

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CHANNEL LOADING



The level of traffic loading on the channel by the EUT is 50.22%

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7.4.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

7.4.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time = (Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

<u>RESULTS</u>

| Channel Move Time | Limit |
|-------------------|-------|
| (sec) | (sec) |
| 0.0636 | 10 |

| Aggregate Channel Closing Transmission Time | Limit |
|---|--------|
| (msec) | (msec) |
| 0 | 60 |

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MOVE TIME

| Keysight Spectrum Analyzer - 194 RL RF 50 Ω | | SENSE:INT | | 02:01:29 PM Aug 15, 2022 | | | | | |
|--|-------------------------|----------------------|--------------------------------|----------------------------------|-------------------------|--|--|--|--|
| enter Freq 5.53000 | | | Avg Type: Log-Pwr | TRACE 1 2 3 4 5 6 | Frequency | | | | |
| | IFGain:High | #Atten: 0 dB | | DET P NNNNN | Auto Tune | | | | |
| Ref Offset -20 dB ΔΜkr1 63.60 ms 0 dB/div Ref -45.00 dBm -16.48 dB | | | | | | | | | |
| og | | | | | Center Fred | | | | |
| 5.0 75.0 1∆2 | | | | DL1 -64.00 dBm | 5.53000000 GH | | | | |
| 5.0 | | | | | Start Free | | | | |
| 95.0 105 | human palanta dan palam | ang allo hay sayshin | ngalaanaydin biy dhaaddalay ar | naata tagang ti Noolij hat dhaty | 5.53000000 GH | | | | |
| 115 | | | | | Stop Fred | | | | |
| 125 | | | | | 5.53000000 GH | | | | |
| enter 5.530000000 C | | 3.0 MHz | Swoon 1 | Span 0 Hz 6.00 s (40001 pts) | CF Step 3.000000 MH; | | | | |
| KR MODE TRC SCL | × | | | FUNCTION VALUE | Auto Mar | | | | |
| 1 Δ2 1 t (Δ) 2 F 1 t | 63.60 ms (Δ) 1.497 s | | | | | | | | |
| 3 4 5 | 1.407 0 | -02.00 0.011 | | E | Freq Offse 0 Ha | | | | |
| 6 7 8 | | | | | Scale Type | | | | |
| 9 0 1 | | | | | Log Lir | | | | |

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CHANNEL CLOSING TIME

| eysight Spectrum Analyzer - 19410, DFS 1 RL RF 50 Ω AC 1ter Freq 5.5300000000 C NFF | GHz | | e: Log-Pwr | 02:05:59 PM Aug 15, 2022 TRACE 1 2 3 4 5 6 TYPE WWWWWW | Frequency |
|--|--|--|------------|--|---------------------------------|
| Ref Offset -20 dB dB/div Ref -45.00 dBm | PNO: Fast +++ Trig: Vic IFGain:High #Atten: (| | | Mkr1 24.24 ms -64.08 dBm | Auto Tune |
| g .0 | | | | | Center Fred 5.530000000 GH; |
| 5.0 | | | | DL1 -64.00 dBm | Start Fred |
| 5.0 | | | | | 5.530000000 GH; |
| | | | | | Stop Fred 5.530000000 GH; |
| UUU (III) Amplitume Arrentation | and been also the television of the provident of the second second second second second second second second s | | | | CF Ster |
| 05 and see and the particular sector and and the sector of | | a ya a kata kata kata kata kata kata kat | | | 3.000000 MH: <u>Auto</u> Mar |
| 25 | | | | | Freq Offse 0 Hi |
| 35 | | | | | Scale Type |
| enter 5.530000000 GHz | | | | Span 0 Hz | Log <u>Lir</u> |

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AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the aggregate monitoring period.



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7.4.5. 30-MINUTE NON-OCCUPANCY PERIOD

RESULTS

No EUT transmissions were observed on the test channel during the 30-minute observation time.

| X/ RL | RF | lyzer - 19410, DFS 1 50 Ω AC | | SEI | NSE:INT | | | 02:48:54 P | M Aug 15, 2022 | - 8 - |
|----------|------------|---------------------------------|--------------------|------------------|-----------|--------------|-----------------------------------|------------|---------------------|-------------------------------|
| Center | Freq 5. | 530000000 NEF | GHz PNO: Fast ↔ | Trig: Free | e Run | Avg Type | : Log-Pwr | TRAI TY | PEWWWWW | Frequency |
| | | | IFGain:High | #Atten: 0 | dB | | | - | | Auto Tune |
| 10 dB/di | | fset -20 dB 15.00 dBm | | | | | | | 1.800 ks 4.74 dB | |
| Log | | | | | | | | | | Center Free |
| -55.0 | | | | | | | | | | 5.530000000 GH |
| -65.0 | ×2 | | | | | | | | DL1 -64.00 dBm | |
| -75.0 | | | | | | | | | | Start Fred 5.530000000 GH; |
| -85.0 | | | | | | | | | [| Stop Fred |
| -95.0 | | | | | | | | | | 5.53000000 GH |
| -105 | ylundiliyu | the Harborn ph | upplanadde | ell-planter phil | had Payme | he apple the | Hillippet | (headhaigh | | CF Step 3.000000 MH |
| -115 | | | | | 1 | | i de la constanti de la constante | | | <u>Auto</u> Mar |
| -125 — | | | | | | | | | | Freq Offse 0 Ha |
| -135 | | | | | | | | | | Scale Type |
| | | 000 GHz | | | | | | <u> </u> | Span 0 Hz | Log <u>Lir</u> |

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