Exhibit #11

Conducted RF and spectral etiquette measurements to support the certification of the CA12CDSX Base and CA12CDSY Remote, AL8-CA12CDSXand AL8-CA12CDSY.

Plantronics, Jim Cook, March 18, 2014 – updated by Alvin 6/17/2014

Contents

I) Background

I-A. EUT Description

The Plantronics Model CA12CD-S is a cordless push-to-talk (PTT) headset adapter made to provide wireless communications and PTT functionality for dispatch operations. The system consists of a base unit that interfaces to a dispatch console communication system, and a remote unit with PTT that communicates with the base station. The remote unit has an "Ultra" style, quick disconnect connector, which attaches to a Plantronics "H" top headset that is worn by the user. The base unit provides a docking cradle for charging the remote unit and a spare battery, and is provided with an AC power adapter. Both the remote unit and the base unit are intentional radiators, designed in accordance with the requirements of 47CFR15 subpart D.

The specific units tested were base unit #31 and headset #32.

I-B. Manufacturer's Attestations, Mandatory Declarations and Descriptions

The CA12CD-S Remote Unit and CA12CD-S Base Station Unit both use digital modulation.

Clause 4.11 in C63.17-2006 requires the following declarations to be made by the manufacturer. These declarations are used in demonstrating compliance with certain sections of 47CFR15 subpart D, and in support of test parameters within C63.17-2006.

The channel plan.
Five RF carriers are used, as follows:
1928.448 MHz.
1926.720 MHz.
1924.992 MHz.
1923.264 MHz.
1921.536 MHz.

Maximum EUT antenna gain GA (dBi), and orientation and polarization for maximum gain.
The maximum remote EUT antenna gain is 0dBi. The antenna is elliptically polarized with the major axis of polarization normal to the top external surface of the remote disposed away from the user's hand and/or body, and with the minor axis of polarization parallel to the length of the major axis of the remote. Two identical collocated antennas are provided for the base EUT, within the definition of C63.17-2006. The maximum base EUT antenna gain is 3dBi. The antennas are elliptically polarized with the major axis of polarization vertical from the top left and right corners of the base, and with the minor axis of polarization normal to the front and back surfaces of the base for left and right antennas.

Maximum peak power level
Maximum specified peak conducted power level for both the remote EUT and the base EUT is +8dBm.

Emission bandwidth
Emission bandwidth measured according to the procedures of C63.17-2006 clause 6.1.3 for the base EUT is 1.49MHz.

Emission bandwidth measured according to the procedures of C63.17-2006 clause 6.1.3 for the remote unit EUT is 1.49MHz.

Nominal receive bandwidth
Nominal receive bandwidth is +/-500kHz.

Frame period and time slot plan, if TDMA techniques are used
The EUT system is a TDMA system which "further divides access in time" in the context of clause 6.2.2 of C63.17-2006. Frame period is 10mS. There are 24 timeslots per frame, with one of the first 12 timeslots used for the remote transmissions and one of the last 12 timeslots used for the base transmissions. Transmit and receive timeslots are 5mS apart in time. Transient events occur during which two non-adjacent timeslots may be in use by the base during the setup of the communications channel, or by both the base and the remote EUT as the system does a soft handoff in response to interference.

Minimum and maximum burst length, if TDMA techniques are used
Minimum burst length is 90uS, the beacon transmissions from the base when a communications channel is not open. Maximum burst length is 390uS, transmissions from the remote when a communications channel is open.

Minimum and maximum operating temperature range declared to the end-user
The minimum operating temperature is +4C.
The maximum operating temperature is +44C.

Whether a system built with the EUT does or does not operate under the provisions of 47CFR15.323(c)(10) to test for deferral only in conjunction with a companion device
The EUT system does not use the provisions of 47CFR15.323(c)(10) to enable testing for access criteria only in one element of the system. Both the base and the remote EUTs implement the access criteria tests.

Whether a system built with the EUT does or does not implement the provisions of 47CFR15.323(c)(5)
The EUT system does implement the provisions of 47CFR15.323(c)(5).

The nominal value of the deferral threshold
Deferral threshold not used. The EUT uses the provisions of 47CFR15.323(c)(5) for access.

Whether a system built using the EUT does or does not operate under the provisions of 47CFR15.323(c)(6) incorporating provisions for waiting for a channel to go clear
The EUT system does not use the provisions of 47CFR15.323(c)(6) to enable access to a particular channel when that channel goes clear.

Whether a system built using the EUT does or does not operate under the provisions of 47CFR15.323(c)(11) enabling the access criteria check on the receive channel while in the presence of collocated interferers
The EUT system does not use the provisions of 47CFR15.323(c)(11) to enable the monitoring of a time and spectrum window blocked by a co-located transmitter.

The provisions within the EUT for self-check, by which compliance with 47CFR15.319(f) is obtained
The headset EUT incorporates the following provisions by which compliance with 47CFR15.319(f) is obtained:

a. On power-up the unit will perform a self-test of permanent storage memory (ROM) by means of a sum/checksum validation.
b. On power-up the unit will perform a self-test of critical EEPROM settings (those which if in error could result in performance outside the UPCS specification limits) by means of a sum/checksum validation.
c. On power-up the unit will perform a self-test of RAM by means of a memory field write/readback/invert/write/readback validation.
d. The controller for the unit will be provided with a watchdog circuit and mainline watchdog service routine which, if the controller operations fail, results in a reset of the controller within 5 seconds of failure.
e. The controller for the unit will be provided with a supply voltage monitoring circuit which resets the controller if the measured operating voltage is below the limit for which functionality is guaranteed.
f. The unit will be provided with a supply voltage monitoring circuit which disconnects the supply if the measured operating voltage is above the limit for which functionality is guaranteed.

The base EUT incorporates the following provisions by which compliance with 47CFR15.319(f) is obtained:

a. On power-up of an element of the system (base unit, or remote unit) the unit will perform a self-test of permanent storage memory (ROM) by means of a sum/checksum validation.

b. On power-up the unit will perform a self-test of critical EEPROM settings (those which if in error could result in performance outside the UPCS specification limits) by means of a sum/checksum validation.
c. On power-up the unit will perform a self-test of RAM by means of a memory field write/readback/invert/write/readback validation.
d. The controller for the unit will be provided with a watchdog circuit and mainline watchdog service routine which, if the controller operations fail, results in a reset of the controller within 5 seconds of failure.
e. The controller for the unit will be provided with a supply voltage monitoring circuit which resets the controller if the measured operating voltage is below the limit for which functionality is guaranteed.

The base unit incorporates a primary and a secondary regulator in tandem; if the mains supply increases, multi-point failures would be necessary before an out-of-condition voltage could be applied to the transmit lineup.

Whether the EUT does or does not have the monitoring made through the radio receiver used for communication
Both the base and the headset EUTs monitor through the radio receiver also used for communication.

Whether the EUT does or does not transmit control and signaling channel(s)
The base EUT transmits a control and signaling channel, in accordance with the definition of C63.17-2006.
The headset EUT does not transmit a signaling and control channel.

Nominal mains and battery voltage
The nominal mains voltage for the base EUT is 120V at the AC adapter, corresponding to 9V at the EUT input connection.
The nominal battery voltage for the headset EUT is 3.7V.

I-C. Standard test configurations

The tests of C63.17-2006 clauses 6.2, 7 and 8 are each done with the following test platform configurations:

1) **Conducted emissions tests, base EUT.**
2) **Conducted emissions tests, remote EUT.**
3) **Standard-specific tester, base EUT.**
4) **Standard-specific tester, remote EUT.**
5) **With companion device and interference blocking, base EUT.**
6) **With companion device and interference blocking, remote EUT.**

The configurations and setup instructions preparatory to executing the tests for each setup are as follows:

1) Conducted emissions tests, base EUT.

For this configuration, the base EUT is removed from its housing and an SMA connector mounted directly (or on a small semi-rigid feed-line) in place of antenna 0 at the 50-ohm feed point. The base EUT is then directly connected to the input of the E4407B spectrum analyzer. The base EUT's normal AC adapter is used as a power source. The base EUT is connected to a serial control bus by which means a testing user-interface is provided, so that RF carrier can be selected by means of administrative commands; administrative commands are also used to cause the base EUT to use only antenna 0. The base EUT otherwise operates in normal functional mode. The companion device remote unit is configured according to Figure 3 of C63.17-2006, with radiated coupling into the base EUT so that the base EUT may be measured while a communications channel is active but without the requirement for conducted coupling of the remote companion device.

2) Conducted emissions tests, Remote EUT.

For this configuration, the remote EUT is removed from its housing and an SMA connector mounted in place of the antenna at the 50-ohm feedpoint. The remote EUT is then directly connected to the input of the E4407B spectrum analyzer. The remote EUT's is powered from a laboratory power supply for testing. The base companion device is connected to a serial control bus by which means a testing user-interface is provided, so that the RF carrier for the base companion device (and thus the headset EUT) can be selected by means of administrative commands if necessary. The remote EUT operates in normal functional mode. The base companion device is configured according to Figure 3 of C63.17-2006, with radiated coupling into the headset EUT so that the headset EUT may be measured while a communications channel is active but without the requirement for conducted coupling of the base companion device.

3) Standard-specific tester, Base EUT.

For this configuration, a standard-specific tester (the Rohde and Schwarz CMD60, for DECT with frequency extensions) is used both as a companion device and as a measuring instrument. This instrument measures a variety of radio parameters; it is used for the tests of clause 6.2 to measure timing and carrier frequency.

The tests for test platform configuration #1 will be performed with the EUT in a communications link with the CMD60 operating on 1924.992MHz. The base is connected to a serial control bus by which means a testing user-interface is provided, so that channel and slot selection is possible.

The EUT is removed from its housing, and placed within the Tenney Jr. or equivalent computer-controlled temperature chamber. The EUT's test communications bus is brought out through a 4-wire cable to the controlling PC. An external 9V power supply feeds the normal DC power supply cable in place of the AC adapter, and is brought into the temperature chamber to supply the base EUT through its normal DC power supply jack.

The CMD60 RFIN/RFOUT port is connected to port 3 of a wideband 6dB resistive splitter, Weinschel model 1515 serial number MF536. Connection is made through a 48" RG142LL SMA-M/SMA-M cable. Port 2 of the splitter is connected to an E4407B spectrum analyzer (for monitoring) through a 36" cable and an 18" cable in tandem each an RG142LL SMA-M/SMA-M cable, with an SMA F/F adapter interposed between the cables. Port 1 of the splitter is connected to the EUT through a 36" RG142LL SMA-M/SMA-M cable passing through the temperature chamber's access port and connected to a 20dB attenuator attached to an SMA-F/semi-rigid pigtail soldered directly to the EUT at the 50-ohm match feedpoint in place of antenna 0.

The CMD60 is configured to send a message to the EUT to cause it to freeze the EUT diversity on ANTENNA 0. The CMD60 is configured emulate a remote headset unit, and to establish the communications channel on slot 0.

The output level from the CMD60 is set to -40dBm.
The CMD60 has an offset loaded of -18, to set the channel used to 1924.992MHz.
Using “Plt-tool 1.25.17” running on the controlling PC and communicating with the base EUT over the aforementioned serial control bus, the base EUT is set up to bring up a beacon on channel 1924.992MHz, and slot 0, and to enable connection to the CMD60.

The communications channel is started using the CMD60’s “SETUP CONNECT” soft-key, and the test proceeds according to the specific clause of C63.17-2006.
The CMD60 is under GPIB control by means of a LabVIEW vi running on the controller PC, for the repetitive measurement of transmit parameters.

4) Standard-specific tester, Remote EUT
For this case, a standard-specific tester (the Rohde and Schwarz CMD60, for DECT with frequency extensions) is used both as a companion device and as a measuring instrument. This instrument measures a variety of radio parameters; it is used for the tests of clause 6.2 to measure timing and carrier frequency.

The tests for test platform configuration #2 will be performed with the EUT in a communications link with the CMD60 operating on 1921.536MHz. The remote is connected to a serial control bus by which a testing user-interface is provided. Channel and slot selection are made by means of the settings applied to the CMD60 in its role as companion device.

The EUT is removed from its housing, and placed within a computer-controlled temperature chamber. The EUT’s serial test communications bus is brought out through a 4-wire cable to the controlling PC. An external 3.70V power supply supplies the headset EUT through one dedicated signal plus a shared ground, of this 4-wire cable, the signal and ground connecting to the EUT in place of the battery. The CMD60 RFIN/RFOUT port is connected to port 3 of a wideband 6dB resistive splitter, Weinschel model 1515 serial number MF536. Connection is made through a 48” RG142LL SMA-M/SMA-M cable. Port 2 of the splitter is connected to an E4407B spectrum analyzer (for monitoring) through a 36” and an 18” cable in tandem, each RG142LL and each an SMA-M/SMA-M cable, with an SMA F/F adapter interposed between the cables. Port 1 of the splitter is connected to the EUT through a 36” RG142LL SMA-M/SMA-M cable passing through the temperature chamber’s access port and connected to a 20dB attenuator attached to an SMA-F/semi-rigid pigtail soldered directly to the EUT at the 50-ohm match feedpoint to the antenna, with the antenna removed.

The CMD60 is configured to emulate a base unit, providing a beacon on slot 0 with proper identifier for the headset EUT, in this case 005F8754E0.
The CMD60 is configured to establish the communications channel on slot 2.
The output level from the CMD60 is set to -40dBm.
The CMD60 has an offset loaded of -18, to set the channel used to 1921.536MHz.

Using “Plt-tool 1.25.17” running on the controlling PC and communicating with the headset EUT, the headset EUT is set up to enable connection to the CMD60.

The communications channel is started using the CMD60’s “SETUP CONNECT” soft-key, and the test proceeds according to the specific clause.
The CMD60 is under GPIB control by means of a LabVIEW vi running on the controller PC, for the repetitive measurement of transmit parameters.

5) With companion device and interference blocking, base EUT

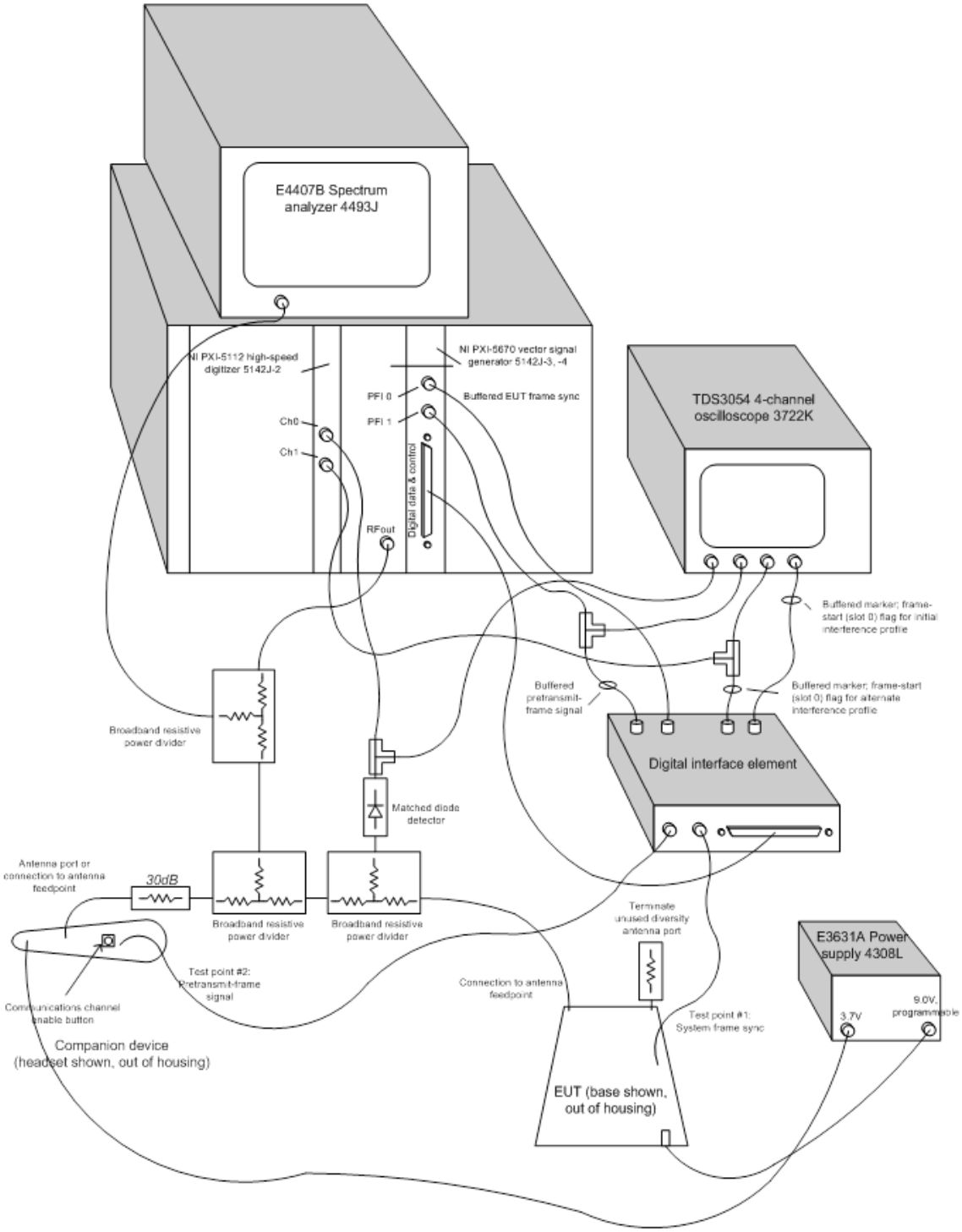


Fig. 1 - Detail of connections to Base EUT for the tests of clause 7 and clause 8 of C63.17-2013. All RF cables are RG142LL.

6) With companion device and interference blocking, Remote EUT

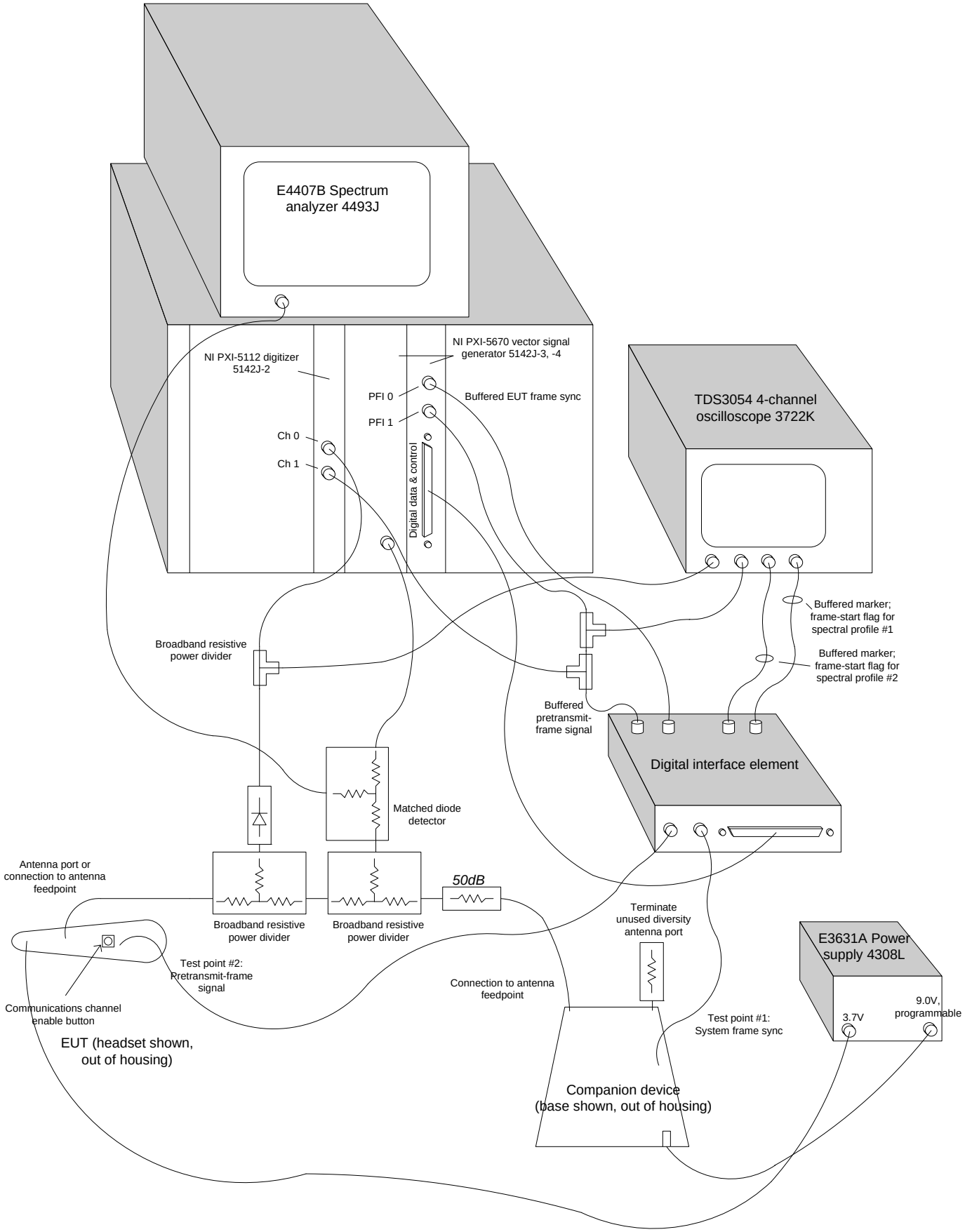


Fig. 2 - Detail of connections to Remote (headset) EUT for the tests of clause 7 and clause 8 of C63.17-2103, for configuration 6**, With companion device and interference blocking, headset EUT.** All RF cables are RG142LL or equivalent .

I-D. Calibration

Test instrumentation used for measurements, and the corresponding calibration certificates are as follows. All calibrations are NIST traceable.

1) CMD60 Digital Radiocommunication Tester asset 5212J. Rohde and Schwarz, Inc.
Calibration by Valutronics on 01/21/14 due 01/31/15.

2) TDS3014B 4-channel oscilloscope asset 3722K. Tektronix.
Calibration by Micro-Precision 01/21/14 due 01/31/15.

3) E4418B Power Meter asset 5334H, Agilent.
Calibration by Agilent 01/21/14 due 01/31/15.

4) E9301A Power sensor asset 3645J, Agilent
Calibration by Agilent 01/21/14 due 01/31/15.

5) E4407B spectrum analyzer asset 4357J, Agilent
Calibration by Micro-Precision 01/21/14 due 01/31/15.

6) DSO7034A Digital Storage Oscilloscope asset 5673G. Agilent.
Calibration by Micro-Precision 8/20/2013 due 08/31/14.

I-E Auxiliary Equipment

Test Instrumentation used for measurements calibrated with above equipment where applicable for power level setting.

1) E3631A power supply asset 4308L, Agilent

2) PXI-5670 (PXI-5610/5421 composite instrument) vector signal generator asset 5142J-3, -4, National Instruments

3) PXI-5112 high-speed digitizer asset 5142J-2, National Instruments

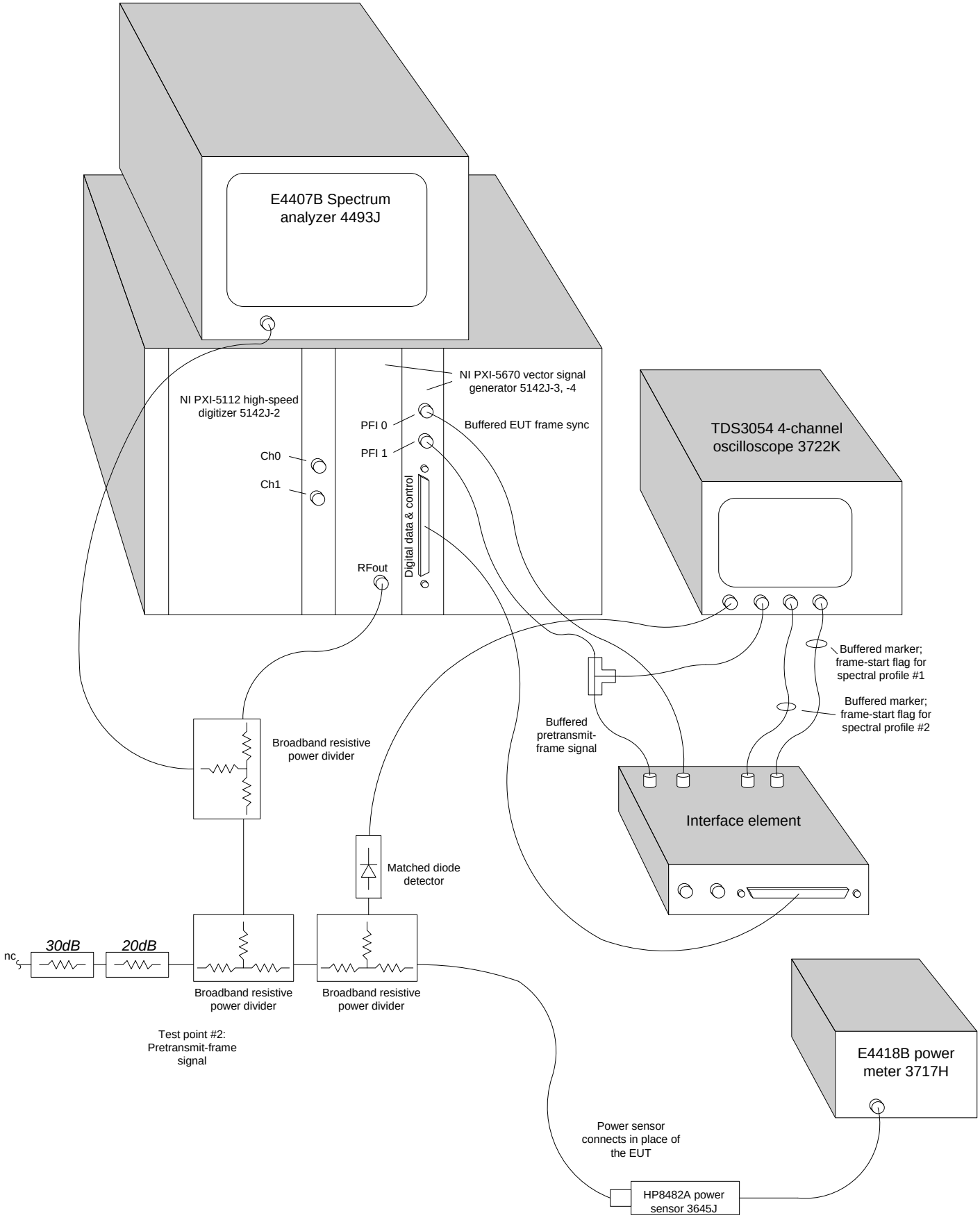


Fig. 3 - Detail of test system of clauses 7 and 8 of C63.17-2013, configured for calibration. All RF cables are RG142LL.

The splitter/combiner coupling network is transfer-calibrated integrated with the PXI-5670 vector RF signal generator. Calibration is a two-step process:

1) The PXI-5670 generator and coupling network output level and flatness are calibrated for accuracy using values measured using the E4418B power meter and HP8482A power sensor.
2) The resulting single-carrier and all-carrier output levels are measured using the E4418B power meter and HP8482A power sensor, as a check on the calibration.

Step 1, flatness and output level correction at -40 dBm.

E4418B settings:
E-Series Power Sensor
Frequency 1.925GHz.

Frequency of carrier	Level delivered to power meter connected in place of EUT
1928.448 MHz	-29.93 dBm
1926.720 MHz	-30.08 dBm
1924.992 MHz	-30.10 dBm
1923.264 MHz	-30.01 dBm
1921.536 MHz	-30.00 dBm

All carriers enabled -23.4 dBm (target is 7.0 dB higher for 5 carriers at -40dBm, relative to a single carrier; actual is 6.6 dB)

Calibration measurements were taken as described on February 24, 2014 by Jim Cook. All carriers measured February 24, 2014.

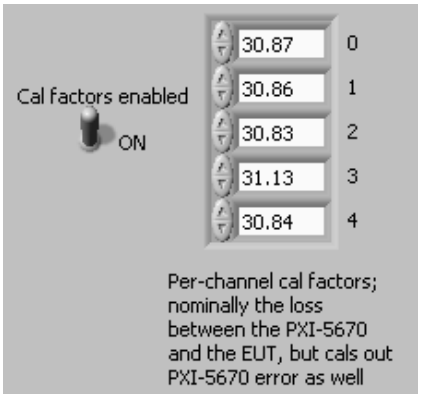


Fig. 4 - Screenshot from the control panel of the PXI-5670 with diagnostics enabled, showing the cal factors by channel.
The top cal factor is for the top channel, 1928.448MHz, and the bottom cal factor is for the bottom channel, 1921.536MHz.

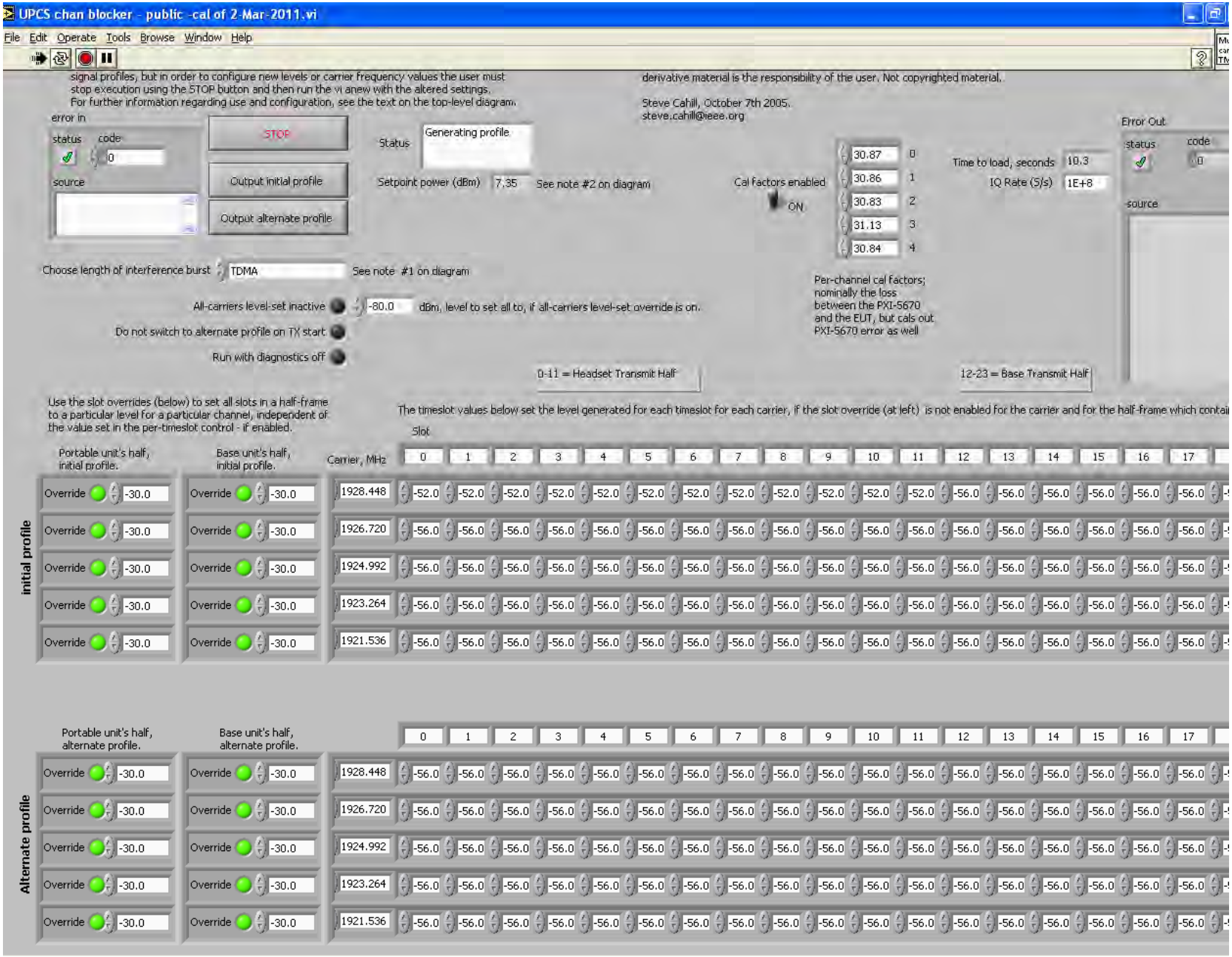


Fig. 5 - Screenshot of control VI for PXI-5670 taken with all carriers enabled, for -30dBm calibration accuracy test.

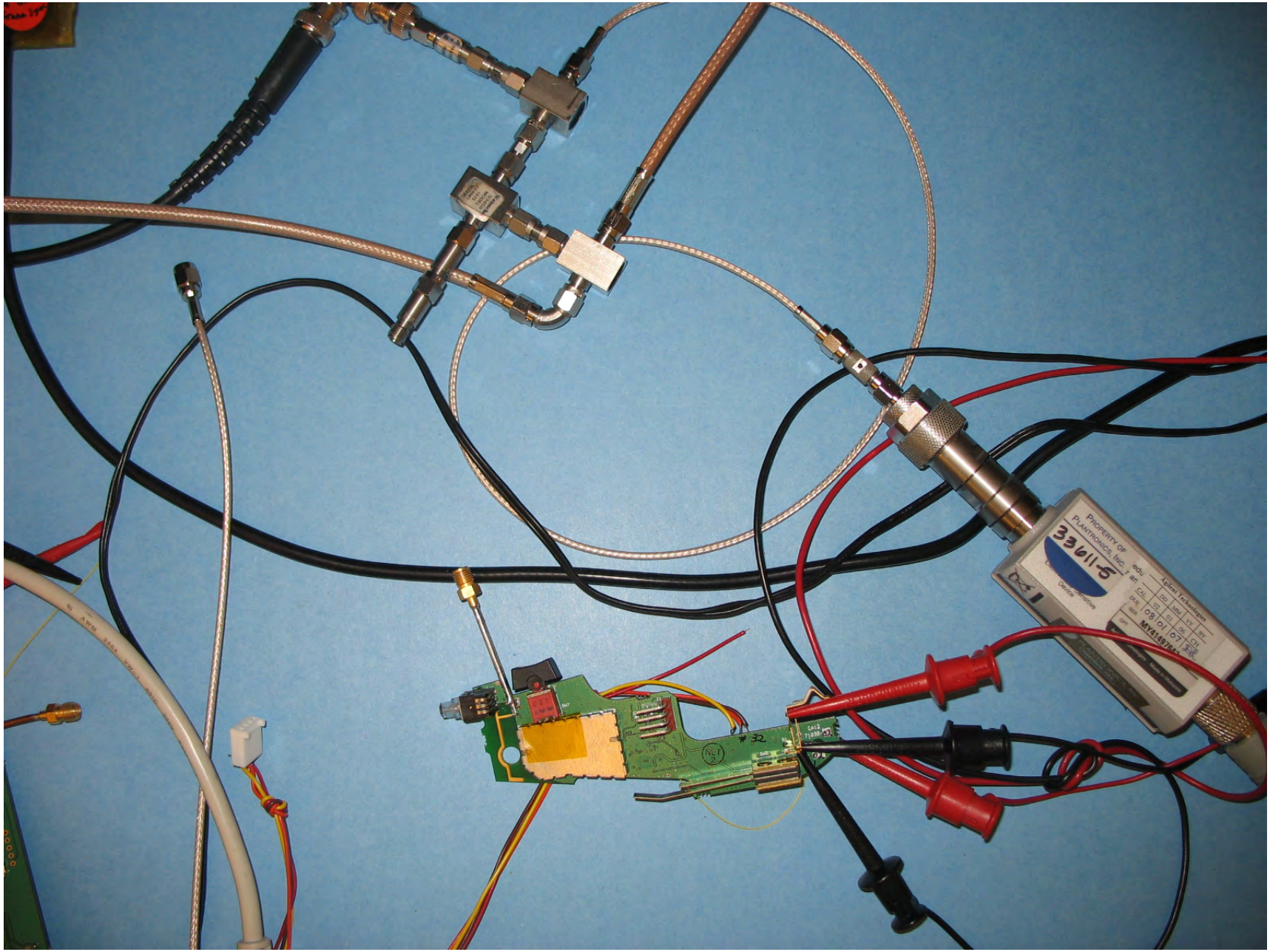


Fig. 6 - Detail of test system configured for calibration of the PXI-5670 and coupling network. Power sensor connects in place of the EUT. The companion device port is terminated with an additional 20dB attenuator and 30dB attenuator in tandem.

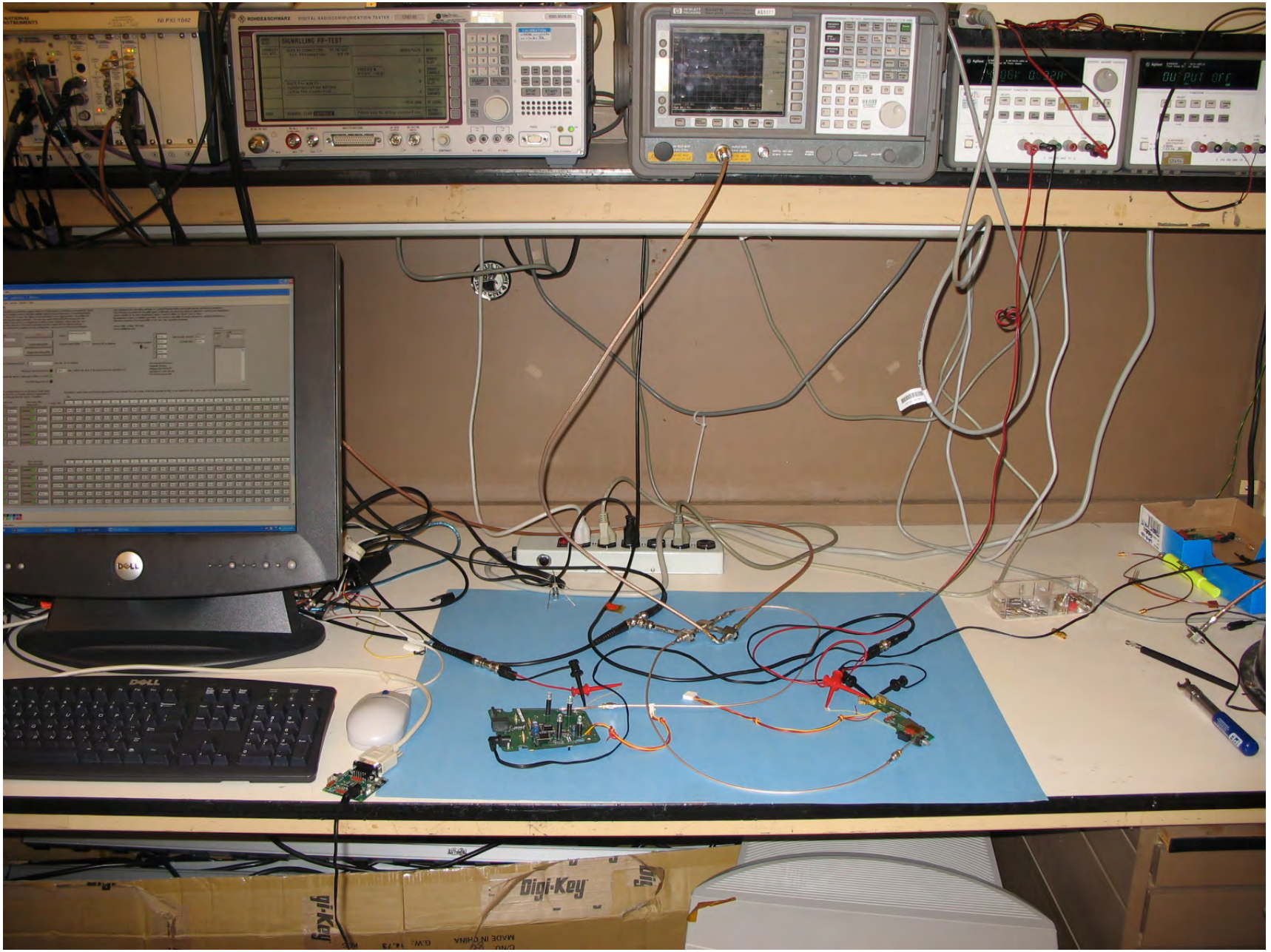


Fig. 7 - Test bench configured for calibration of the PXI-5670 and coupling network; general view.

II) Test results summary

II-A. Base EUT

Following the format of Annex A of C63.17-2006:

Type	47CFR15, Subpart D Unlicensed PCS Devices, as of December 29, 2004	Reference within C63.17-2006 (except as noted)	Test report pages	Test result	Margin
Scope	15.301 This subpart sets out the regulations for unlicensed personal communications services (PCS) devices operating in the 1910-1930 MHz frequency band.	Information			
Emission bandwidth	15.303(c) **emission bandwidth**: For purposes of this subpart, the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the EUT under measurement.	Subclause 6.1.3			
Peak transmit power	15.303(f) **peak transmit power**: The peak power output as measured over an interval of time equal to the frame rate or transmission burst of the EUT under all conditions of modulation. Usually this parameter is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the EUT cannot be connected directly, alternative techniques acceptable to the Commission may be used.	Subclause 6.1.2			
PCS Devices	15.303(g) **personal communications service (PCS) devices [unlicensed]:** Intentional radiators operating in the frequency band 1920-1930 MHz that provide a wide array of mobile and ancillary fixed communication services to individuals and businesses.	Definition			
Spectrum Window	15.303(h) **spectrum window**: An amount of spectrum equal to the intended emission bandwidth in which operation is desired.	Definition			
Thermal noise power	15.303(j) **thermal noise power**: The noise power in watts defined by the formula N=*kTB* where N is the noise power in watts, *k* is Boltzmann's constant, *T* is the absolute temperature in degrees Kelvin (e.g., 295K), and *B* is the emission bandwidth of the EUT in hertz.	Definition			
Time window	15.303(k) **time window**: An interval of time in which transmission is desired.	Definition			

Equipment Authorization	15.305 Equipment authorization requirement. UPCS devices operating under this subpart shall be certificated by the Commission under the procedures in Subpart J of Part 2 of this Chapter before marketing. The application for certification must contain sufficient information to demonstrate compliance with the requirements of this subpart.	Information		Applicable	
Coordination	15.307 Coordination with fixed microwave service.	UTAM test		Coordination not required beginning April 2005	
UTAM Certification	15.307 Each application for certification of equipment operating under the provisions of this Subpart must be accompanied by an affidavit from UTAM, Inc., certifying that the applicant is a participating member of UTAM, Inc. In the event a grantee fails to fulfill the obligations attendant to participation in UTAM, Inc., the Commission may invoke administrative sanctions as necessary to preclude continued marketing and installation of devices covered by the grant of certification, including but not limited to revoking certification.	UTAM Certification		Affidavit supplied – see Exhibit #12	
Cross Reference	15.309 Cross reference				
	15.309(a) The provisions of Subpart A of this Part apply to unlicensed PCS devices, except where specific provisions are contained in Subpart D.	Subclause 6.1.6			
	15.309(b) The requirements of Subpart D apply only to the radio transmitter contained in the UPCS device. Other aspects of the operation of a UPCS device may be subject to requirements contained elsewhere in this Chapter. In particular, a UPCS device that includes digital circuitry not directly associated with the radio transmitter also is subject to the requirements for unintentional radiators in Subpart B.	Subclause 6.1.6		See Exhibits #10a, #10b, tests performed by Elliott Labs	Base EUT passes Class B digital device test, 30 MHz to 1000MHz

Labeling	15.19(a) (3) All other devices shall bear the following statement in a conspicuous location on the device: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit. (5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.	Labels		See Exhibit #2, User Guide, which includes the required text.	Required text is included
Measurement Procedures	15.313 Measurement procedures. Measurements must be made in accordance with Subpart A, except where specific procedures are specified in Subpart D. If no guidance is provided, the measurement procedure must be in accordance with good engineering practice.	ANSI C63.17-2006 (general)		AC line measurements and digital device measurements made at Elliott Labs; conducted RF measurements made at Plantronics	
Conducted limits	15.315 Conducted limits. An unlicensed PCS device that is designed to be connected to the public utility (AC) power line must meet the limits specified in 47CFR 15.207.	ANSI C63.4-2003		See Exhibits #10a, #10b, tests performed by Elliott Labs	Base EUT passes the AC line conducted emissions test
Antenna requirement	15.317 Antenna requirement. An unlicensed PCS device must meet the antenna requirement of 47CFR15.203.	Information		Base EUT uses internal and non-removable antenna	Base EUT meets the antenna requirements
General Technical Requirements	15.319 General technical requirements				
Frequency of operation	15.319(a) [reserved]				

Digital modulation	15.319(b) All transmissions must use only digital modulation techniques.	Subclause 6.1.4	P4-6	Plantronics declares that the CA12CD-S Base EUT uses digital modulation only	Base EUT meets the requirement that only digital modulation may be used
Peak transmit power	15.319(c) Peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission bandwidth in hertz. Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited RBW capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.	Subclause 6.1.2	P39 - 40	Maximum measured power is +5 dBm. Rated power is +8 dBm. Legal maximum is +20.8dBm	15.8 dB
Power spectral density	15.319(d) Power spectral density shall not exceed 3 milliwatts in any 3 kHz bandwidth as measured with a spectrum analyzer having a RBW of 3 kHz.	Subclause 6.1.5	P46 - 51	Maximum measured power spectral density is -22.07dBm, Legal maximum is 3mW, +4.77dBm	26.84 dB
Antenna gain	15.319(e) The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.	Subclause 4.3.1		Maximum antenna gain is declared to be less than +3dBi	Requirement is met
Operational failure requirement	15.319(f) The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.	Declaration with explanation	P4 - 5	Base EUT incorporates a number of protection features – see section I-B of this document.	Requirement is met
Spurious emission	15.319(g) Notwithstanding other technical requirements specified in this subpart, attenuation of emissions below the general emission limits in 47CFR15.209 is not required.	Subclause 6.1.6			
Spurious emission transition limits	15.319(h) Where there is a transition between limits, the tighter limit shall apply at the transition point.	Information			

Safety exposure levels	15.319(i) Unlicensed PCS devices are subject to the radiofrequency radiation exposure requirements specified in §§1.1307(b), 2.1091 and 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.	Refer to IEEE 1528-2003		See Exhibit #7a, base SAR test report	SAR is well under the allowed maximum
UPCS Device	15.323 Specific requirements for devices operating in the UPCS band.				
Emission bandwidth and power level	15.323(a) Operation shall be contained within the 1920-1930 MHz band. The emission bandwidth shall be less then 2.5 MHz. The power level shall be as specified in 47CFR15.319(c), but in no event shall the emission bandwidth be less than 50 kHz.	Subclause 6.1.3 and 6.1.2	P42 - 44	Base EUT emissions bandwidth is 1.49MHz.	Within the 2.5MHz to 50kHz limits
Channel packing	15.323(b) [removed and reserved]				
Listen before transmit (LBT)	15.323(c) Devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:				
Monitoring Time	15.323(c)(1) Immediately prior to initiating transmission, devices must monitor the combined time and spectrum windows in which they intend to transmit for a period of at least 10 milliseconds for systems designed to use a 10 millisecond or shorter frame period or at least 20 milliseconds for systems designed to use a 20 millisecond frame period.	Subclause 7.3.3	P85	Tested in the remote section	Requirement is met
Monitoring Threshold	15.323(c)(2) The monitoring threshold must not be more than 30 dB above the thermal noise power for a bandwidth equivalent to the emission bandwidth of the device.	Subclause 7.3.1		Base EUT uses the provisions of 47CFR15.323(c)(5) to monitor spectrum prior to access. The Monitoring Threshold is not used.	Not applicable
Maximum transmit period	15.323(c)(3) If no signal above the threshold level is detected, transmission may commence and continue with the same emission bandwidth in the monitored time and spectrum windows without further monitoring. However, occupation of the same combined time and spectrum windows by a device or group of cooperating devices continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.	Subclause 8.2.2	P104	Base EUT verifies the channel access criteria every 4 hours when a communications channel is active	Requirement is met

System Acknowledgement	15.323(c)(4) Once access to specific combined time and spectrum windows is obtained an acknowledgement from a system participant must be received by the initiating transmitter within one second or transmission must cease. Periodic acknowledgements must be received at least every 30 seconds or transmission must cease. Channels used exclusively for control and signaling information may transmit continuously for 30 seconds without receiving an acknowledgement, at which time the access criteria must be repeated.	Subclause 8.1 or 8.2	P92 - 103	Base EUT tests the channel access criteria every 1.28 seconds when transmitting control and signaling information.	Requirement is met
Least Interfered Channel, LIC	15.323(c)(5)				
LIC selection	15.323(c)(5).1 If access to spectrum is not available as determined by the above and a minimum of 20 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level may be accessed.	Subclause 7.3.3	P85	The system defines 60 duplex channels	Requirement is met
LIC confirmation	15.323(c)(5).2 A device utilizing the provisions of this paragraph must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 millisecond frame period) immediately preceding actual channel access, that the detected power of the selected time and spectrum windows is no higher than the previously detected value.	Subclause 7.3.2 and 7.3.3	P81 - 85	The base EUT monitors the usable access channels at a refresh rate of less than 10 seconds, and then tests the access criteria for the intended communications channel in the frame prior to first transmission	Requirement is met
Power measurement resolution	15.323(c)(5).3 The power measurement resolution for this comparison must be accurate to within 6 dB.	Subclause 7.3.2	P81	The base EUT's access resolution is tested at -6dB and +1dB for correct selection.	Requirement is met
Maximum spectrum occupancy	15.323(c)(5).4 No device or group of co-operating devices located within 1 meter of each other shall, during any frame period, occupy more than 6 MHz of aggregate bandwidth, or alternatively, more than one third of the time and spectrum windows defined by the system.	Declaration		The base EUT and a headset companion device use 1/12th of 1.728MHz bandwidth, and do not use bandwidth in further cooperation with other devices at any range	Requirement is met

Random waiting	15.323(c)(6) If the selected combined time and spectrum windows are unavailable, the device may either select and monitor different windows or seek to use the same windows after waiting an amount of time, randomly chosen from a uniform random distribution between 10 and 150 milliseconds, commencing when the channel becomes available.	Subclause 8.1.3		The base EUT implements the LIC algorithm and offers at least 20 duplex communications channels.	Not Applicable.
Monitoring Requirements	15.323(c)(7)				
Monitoring Bandwidth	15.323(c)(7).1 The monitoring system bandwidth must be equal to or greater than the emission bandwidth of the intended transmission.	Subclause 7.4		Base EUT uses the same receiver pathway for monitoring as for communication	Requirement is met
Monitoring reaction time	15.323(c)(7).2 The monitoring system shall have a maximum reaction time less than 50xSQRT(2.5/emission bandwidth in MHz) μs for signals at the applicable threshold level but shall not be required to be less than 50 μs. If a signal is detected that is 6 dB or more above the applicable threshold level, the maximum reaction time shall be 35xSQRT(2.5/emission bandwidth in MHz) μs but shall not be required to be less than 35 μs.	Subclause 7.5	P86 - 92	Base EUT meets the required 50uS pulse detection, and the 35uS pulse +6dB detection.	Requirement is met
Monitoring Antenna	15.323(c)(8) The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.	Clause 4		Base EUT uses the same antennas for transmission and reception as for monitoring	Requirement is met
Monitoring threshold relaxation	15.323(c)(9) Devices that have a power output lower than the maximum permitted under the rules may increase their monitoring detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.	Clause 4		Base EUT uses a 12.8dB increase in threshold based on a maximum rated transmit power of +8dBm and permitted legal maximum of +20.8dBm	Requirement is met

Duplex system LBT	15.323(c)(10) An initiating device may attempt to establish a duplex connection by monitoring both its intended transmit and receive time and spectrum windows. If both the intended transmit and receive time and spectrum windows meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window. If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device.	Subclause 8.3		The base EUT does not take advantage of this option	
Co-located device LBT	15.323(c)(11) An initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one meter) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 milliseconds. The monitored time and spectrum window must total at least 50 percent of the 10 millisecond frame interval and the monitored spectrum must be within 1.25 MHz of the center frequency of channel(s) already occupied by that device or co-located co-operating devices. If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in the intended transmit window by the initiating device may commence.	Subclause 8.4		The base EUT does not take advantage of this option	
Fair access	15.323(c)(12) The provisions of (c)(10) or (c)(11) shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.	Information			
Adjacent emissions	15.323(d)				
Out-of-band emissions	15.323(d).1 Emissions shall be attenuated below a reference power of 112 milliwatts as follows: 30 dB between the band edge and 1.25 MHz above or below the band; 50 dB between 1.25 and 2.5 MHz above or below the band; and 60 dB at 2.5 MHz or greater above or below the band.	Subclause 6.1.6.2	P71	The base EUT worst-case out-of-band emissions are at the 3rd harmonic, transmitting on the high carrier, at -66.11dBm. The legal maximum is -39.5dBm	26.61 dB

In-band unwanted emissions	15.323(d).2 Emissions inside the band must comply with the following emission mask: In the bands between 1B and 2B measured from the center of the emission bandwidth, the total power emitted by the device shall be at least 30 dB below the transmit power permitted for that device; in the bands between 2B and 3B measured from the center of the emission bandwidth, the total power emitted by an intentional radiator shall be at least 50 dB below the transmit power permitted for that radiator; in the bands between 3B and the band edge, the total power emitted by an intentional radiator in the measurement bandwidth shall be at least 60 dB below the transmit power permitted for that radiator. "B" is defined as the emission bandwidth of the device in hertz. Compliance with the emission limits is based on the use of measurement instrumentation employing peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.	Subclause 6.1.6.1	P52 - 55	The base EUT worst-case in-band emissions are for the transmitter on the middle carrier, in the 3***B*** region, at not worse than -66.83dBm. 60dB below the permitted maximum (+20.8dBm) or -39.2dBm is allowed.	24.91dB
Frame Requirement	15.323(e)				
Frame period	15.323(e).1 The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in this band shall be 20 milliseconds or 10 milliseconds/X where *X* is a positive whole number.	Subclause 6.2.3		The base EUT uses a 10mS frame time	Requirement is met
Frame repetition stability	15.323(e).2 Each device that implements time division for the purposes of maintaining a duplex connection on a given frequency carrier shall maintain a frame-repetition rate with a frequency stability of at least 50 parts per millions (ppm).	Subclause 6.2.2		The base EUT is part of a TDMA system, and so 15.323(e)(3) applies rather than 15.323(e)(2)	
TDMA repetition stability	15.323(e).3 Each device which further divides access in time in order to support multiple communication links on a given frequency carrier shall maintain a frame-repetition rate with a frequency stability of at least 10 ppm.	Subclause 6.2.2	P80	The base EUT frame rate stability is measured at 0.01216ppm Allowed frame rate stability is 10ppm	Requirement is met
Jitter	15.323(e).4 The jitter (time-related, abrupt, spurious variations in the duration of the frame interval) introduced at the two ends of such a communication link shall not exceed 25 μs for any two consecutive transmissions.	Subclause 6.2.3	P80	The base EUT has measured total jitter and offset of 0.01075uS Allowed jitter and offset is 25uS	Requirement is met

Continuous transmit during frame	15.323(e).5 Transmissions shall be continuous in every time and spectrum window during the frame period defined for the device.	Subclause 6.2.3		The base EUT does not use discontinuous transmission	Requirement is met
Carrier Stability	15.323(f)				
Carrier frequency stability (<10 ppm)	15.323(f).1 The frequency stability of the carrier frequency of the intentional radiator shall be maintained within ± 10 ppm over 1 hour or over the interval between channel access monitoring, whichever is shorter.	Subclause 6.2.1.1	P77	The base EUT measured carrier frequency maximum and minimum deviations were +0.48 and -0.69 ppm over one hour. +/-10ppm is allowed	Requirement is met
Carrier frequency stability (extreme conditions)	15.323(f).2 The frequency stability shall be maintained over a temperature variation of -20° C to +50° C at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of 20° C.	Subclause 6.2.1.3	P78	The base EUT measured carrier frequency stability over rated temperature was +0ppm and -1.06ppm. +/-10ppm is allowed	The requirements are met
Carrier frequency stability (battery)	15.323(f).3 For equipment that is capable only of operating from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.	Subclause 6.2.1.2	P78	The base EUTU measured carrier frequency stability over voltage was -0.93 and -0.86ppm. +/-10ppm is allowed	Requirement is met

II-B. Remote EUT

Following the format of Annex A of C63.17-2006:

Type	47CFR15, Subpart D Unlicensed PCS Devices, as of December 29, 2004	Reference within C63.17-2006 (except as noted)	Test report pages	Test result	Margin
Scope	15.301 This subpart sets out the regulations for unlicensed personal communications services (PCS) devices operating in the 1910-1930 MHz frequency band.	Information			
Emission bandwidth	15.303(c) **emission bandwidth**: For purposes of this subpart, the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the EUT under measurement.	Subclause 6.1.3			
Peak transmit power	15.303(f) **peak transmit power**: The peak power output as measured over an interval of time equal to the frame rate or transmission burst of the EUT under all conditions of modulation. Usually this parameter is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the EUT cannot be connected directly, alternative techniques acceptable to the Commission may be used.	Subclause 6.1.2			
PCS Devices	15.303(g) **personal communications service (PCS) devices [unlicensed]:** Intentional radiators operating in the frequency band 1920-1930 MHz that provide a wide array of mobile and ancillary fixed communication services to individuals and businesses.	Definition			
Spectrum Window	15.303(h) **spectrum window**: An amount of spectrum equal to the intended emission bandwidth in which operation is desired.	Definition			
Thermal noise power	15.303(j) **thermal noise power**: The noise power in watts defined by the formula N=*kTB* where N is the noise power in watts, *k* is Boltzmann's constant, *T* is the absolute temperature in degrees Kelvin (e.g., 295K), and *B* is the emission bandwidth of the EUT in hertz.	Definition			
Time window	15.303(k) **time window**: An interval of time in which transmission is desired.	Definition			
Equipment Authorization	15.305 Equipment authorization requirement. UPCS devices operating under this subpart shall be certificated by the Commission under the procedures in Subpart J of Part 2 of this Chapter before marketing. The application for certification must contain sufficient information to demonstrate compliance with the requirements of this subpart.	Information		Applicable	

Coordination	15.307 Coordination with fixed microwave service.	UTAM test		Coordination not required beginning April 2005	
UTAM Certification	15.307 Each application for certification of equipment operating under the provisions of this Subpart must be accompanied by an affidavit from UTAM, Inc. certifying that the applicant is a participating member of UTAM, Inc. In the event a grantee fails to fulfill the obligations attendant to participation in UTAM, Inc., the Commission may invoke administrative sanctions as necessary to preclude continued marketing and installation of devices covered by the grant of certification, including but not limited to revoking certification.	UTAM Test		Affidavit supplied – see Exhibit #12	
Cross Reference	15.309 Cross reference				
	15.309(a) The provisions of Subpart A of this Part apply to unlicensed PCS devices, except where specific provisions are contained in Subpart D.	Subclause 6.1.6			
	15.309(b) The requirements of Subpart D apply only to the radio transmitter contained in the UPCS device. Other aspects of the operation of a UPCS device may be subject to requirements contained elsewhere in this Chapter. In particular, a UPCS device that includes digital circuitry not directly associated with the radio transmitter also is subject to the requirements for unintentional radiators in Subpart B.	Subclause 6.1.6		See Exhibit #10a, #10b, reports of tests performed by Elliott Labs	Remote EUT passes Class B digital device emissions test, 30 MHz to 1000MHz
Labeling	15.19(a) (3) All other devices shall bear the following statement in a conspicuous location on the device: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit. (5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.	Labels		See Exhibit #2, User Guide, which includes the required text.	Required text is included

Measurement Procedures	15.313 Measurement procedures. Measurements must be made in accordance with Subpart A, except where specific procedures are specified in Subpart D. If no guidance is provided, the measurement procedure must be in accordance with good engineering practice.	ANSI C63.17-2006 (general)		AC line measurements and digital device measurements made at Elliott Labs; conducted RF measurements made at Plantronics	Requirement is met
Conducted limits	15.315 Conducted limits. An unlicensed PCS device that is designed to be connected to the public utility (AC) power line must meet the limits specified in 47CFR 15.207.	ANSI C63.4-2003		See Exhibits #10a, #10b, reports of tests performed by Elliott Labs	Remote EUT passes the AC line conducted emissions test
Antenna requirement	15.317 Antenna requirement. An unlicensed PCS device must meet the antenna requirement of 47CFR15.203.	Information		Remote EUT uses internal and non-removable antenna	Remote EUT meets the antenna requirements
General Technical Requirements	15.319 General technical requirements				
Frequency of 40operation	15.319(a) [reserved]				
Digital modulation	15.319(b) All transmissions must use only digital modulation techniques.	Subclause 6.1.4	P125	Plantronics declares that the CA12CD-S Remote EUT uses digital modulation only	Remote EUT meets the requirement that only digital modulation may be used
Peak transmit power	15.319(c) Peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission bandwidth in hertz. Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited RBW capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.	Subclause 6.1.2	P119 - 121	Maximum measured power is +6.52dBm. Rated power is +8dBm. Legal maximum is +20.8dBm	14.38 dB

Power spectral density	15.319(d) Power spectral density shall not exceed 3 milliwatts in any 3 kHz bandwidth as measured with a spectrum analyzer having a RBW of 3 kHz.	Subclause 6.1.5	P125 - 130	Maximum measured power spectral density is -22.81 dBm, Legal maximum is 3mW, +4.77dBm	25.71 dB
Antenna gain	15.319(e) The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.	Subclause 4.3.1		Maximum antenna gain is declared to be less than +3dBi	Requirement is met
Operational failure requirement	15.319(f) The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.	Declaration with explanation	P4 - 5	Remote EUT incorporates a number of protection features – see section I-B of this document.	Requirement is met
Spurious emission	15.319(g) Notwithstanding other technical requirements specified in this subpart, attenuation of emissions below the general emission limits in 47CFR15.209 is not required.	Subclause 6.1.6			
Spurious emission transition limits	15.319(h) Where there is a transition between limits, the tighter limit shall apply at the transition point.	Information			
Safety exposure levels	15.319(i) Unlicensed PCS devices are subject to the radiofrequency radiation exposure requirements specified in §§1.1307(b), 2.1091 and 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.	Refer to IEEE 1528-2003		See Exhibit #7b, SAR test report	SAR is under the allowed maximum
UPCS Device	15.323 Specific requirements for devices operating in the UPCS band.				
Emission bandwidth and power level	15.323(a) Operation shall be contained within the 1920-1930 MHz band. The emission bandwidth shall be less then 2.5 MHz. The power level shall be as specified in 47CFR15.319(c), but in no event shall the emission bandwidth be less than 50 kHz.	Subclause 6.1.3 and 6.1.2	P111	Remote EUT emissions bandwidth is 1.49MHz.	Within the 2.5MHz to 50kHz limits

Channel packing	15.323(b) [removed and reserved]				
Listen before transmit (LBT)	15.323(c) Devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:				
Monitoring Time	15.323(c)(1) Immediately prior to initiating transmission, devices must monitor the combined time and spectrum windows in which they intend to transmit for a period of at least 10 milliseconds for systems designed to use a 10 millisecond or shorter frame period or at least 20 milliseconds for systems designed to use a 20 millisecond frame period.	Subclause 7.3.3	P150	Remote EUT tests access criteria in the frame prior to initiation of transmission	Requirement is met
Monitoring Threshold	15.323(c)(2) The monitoring threshold must not be more than 30 dB above the thermal noise power for a bandwidth equivalent to the emission bandwidth of the device.	Subclause 7.3.1		Remote EUT uses the provisions of 47CFR15.323(c)(5) to monitor spectrum prior to access. The Monitoring Threshold is not used.	Not applicable
Maximum Transmit period	15.323(c)(3) If no signal above the threshold level is detected, transmission may commence and continue with the same emission bandwidth in the monitored time and spectrum windows without further monitoring. However, occupation of the same combined time and spectrum windows by a device or group of cooperating devices continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.	Subclause 8.2.2	P164	Remote EUT verifies the channel access criteria every 4 hours when a communications channel is active	Requirement is met
System acknowledgement	15.323(c)(4) Once access to specific combined time and spectrum windows is obtained an acknowledgement from a system participant must be received by the initiating transmitter within one second or transmission must cease. Periodic acknowledgements must be received at least every 30 seconds or transmission must cease. Channels used exclusively for control and signaling information may transmit continuously for 30 seconds without receiving an acknowledgement, at which time the access criteria must be repeated.	Subclause 8.1 or 8.2		Remote EUT does not transmit channels used exclusively for control and signaling	Not applicable
Least Interfered Channel, LIC	15.323(c)(5)				
LIC selection	15.323(c)(5).1 If access to spectrum is not available as determined by the above and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed.	Subclause 7.3.3	Pxxx	The system defines 60 duplex channels	Requirement is met

LIC confirmation	15.323(c)(5).2 A device utilizing the provisions of this paragraph must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 millisecond frame period) immediately preceding actual channel access, that the detected power of the selected time and spectrum windows is no higher than the previously detected value.	Subclause 7.3.2 and 7.3.3	P146	The remote EUT monitors the usable access channels at a refresh rate of less than 10 seconds, and then tests the access criteria for the intended communications channel in the frame prior to first transmission	Requirement is met
Power measurement resolution	15.323(c)(5).3 The power measurement resolution for this comparison must be accurate to within 6 dB.	Subclause 7.3.2	P146	The remote EUT's access resolution is tested at -6dB and +1dB for correct selection	Requirement is met
Maximum spectrum occupancy	15.323(c)(5).4 No device or group of co-operating devices located within 1 meter of each other shall, during any frame period, occupy more than 6 MHz of aggregate bandwidth, or alternatively, more than one third of the time and spectrum windows defined by the system.	Declaration		The remote EUT and a base companion device use 1/12th of 1.728MHz bandwidth, and do not use bandwidth in further cooperation with other devices at any range	Requirement is met
Random waiting	15.323(c)(6) If the selected combined time and spectrum windows are unavailable, the device may either select and monitor different windows or seek to use the same windows after waiting an amount of time, randomly chosen from a uniform random distribution between 10 and 150 milliseconds, commencing when the channel becomes available.	Subclause 8.1.3		The remote EUT implements the LIC algorithm and offers at least 20 duplex communications channels.	Not Applicable.
Monitoring Requirements	15.323(c)(7)				
Monitoring Bandwidth	15.323(c)(7).1 The monitoring system bandwidth must be equal to or greater than the emission bandwidth of the intended transmission.	Subclause 7.4		Remote EUT uses the same receiver pathway for monitoring as for communication	Requirement is met

Monitoring reaction time	15.323(c)(7).2 The monitoring system shall have a maximum reaction time less than 50xSQRT(2.5/emission bandwidth in MHz) μs for signals at the applicable threshold level but shall not be required to be less than 50 μs. If a signal is detected that is 6 dB or more above the applicable threshold level, the maximum reaction time shall be 35xSQRT(2.5/emission bandwidth in MHz) μs but shall not be required to be less than 35 μs.	Subclause 7.5	P151	Remote EUT meets the required 50uS pulse detection and the 35uS pulse +6dB detection.	Requirement is met
Monitoring Antenna	15.323(c)(8) The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.	Clause 4		Remote EUT uses the same antennas for transmission and reception as for monitoring	Requirement is met
Monitoring threshold relaxation	15.323(c)(9) Devices that have a power output lower than the maximum permitted under the rules may increase their monitoring detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.	Clause 4		Remote EUT uses a 15.8dB increase in threshold based on a maximum rated transmit power of +5dBm and permitted legal maximum of +20.8dBm	The requirement is met
Duplex system LBT	15.323(c)(10) An initiating device may attempt to establish a duplex connection by monitoring both its intended transmit and receive time and spectrum windows. If both the intended transmit and receive time and spectrum windows meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window. If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device.	Subclause 8.3		The remote EUT does not take advantage of this option	
Co-located device LBT	15.323(c)(11) An initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one meter) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 milliseconds. The monitored time and spectrum window must total at least 50 percent of the 10 millisecond frame interval and the monitored spectrum must be within 1.25 MHz of the center frequency of channel(s) already occupied by that device or co-located co-operating devices. If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in the intended transmit window by the initiating device may commence.	Subclause 8.4		The remote EUT does not take advantage of this option	

Fair access	15.323(c)(12) The provisions of (c)(10) or (c)(11) shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.	Information			
Adjacent emissions	15.323(d)				
Out-of-band emissions	15.323(d).1 Emissions shall be attenuated below a reference power of 112 milliwatts as follows: 30 dB between the band edge and 1.25 MHz above or below the band; 50 dB between 1.25 and 2.5 MHz above or below the band; and 60 dB at 2.5 MHz or greater above or below the band.	Subclause 6.1.6.2	P138	The remote EUT worst-case out-of-band emissions are at the 2nd harmonic, transmitting on the low carrier, at -60.5 dBm. The legal maximum is -39.5dBm	21.08 dB
In-band unwanted emissions	15.323(d).2 Emissions inside the band must comply with the following emission mask: In the bands between 1B and 2B measured from the center of the emission bandwidth, the total power emitted by the device shall be at least 30 dB below the transmit power permitted for that device; in the bands between 2B and 3B measured from the center of the emission bandwidth, the total power emitted by an intentional radiator shall be at least 50 dB below the transmit power permitted for that radiator; in the bands between 3B and the band edge, the total power emitted by an intentional radiator in the measurement bandwidth shall be at least 60 dB below the transmit power permitted for that radiator. "B" is defined as the emission bandwidth of the device in hertz. Compliance with the emission limits is based on the use of measurement instrumentation employing peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.	Subclause 6.1.6.1	P131 - 134	The remote EUT worst-case in-band emissions are for the transmitter on the middle carrier, in the 3***B*** region, at not worse than -63.64 dBm. 60dB below the permitted maximum (+20.8dBm) or -39.2dBm is allowed.	25.12 dB
Frame Requirement	15.323(e)				
Frame period	15.323(e).1 The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in this band shall be 20 milliseconds or 10 milliseconds/X where *X* is a positive whole number.	Subclause 6.2.3		The remote EUT uses a 10mS frame time	Requirement is met

Frame repetition stability	15.323(e).2 Each device that implements time division for the purposes of maintaining a duplex connection on a given frequency carrier shall maintain a frame-repetition rate with a frequency stability of at least 50 parts per millions (ppm).	Subclause 6.2.2		The remote EUT is part of a TDMA system, and so 15.323(e)(3) applies rather than 15.323(e)(2)	
TDMA repetition stability	15.323(e).3 Each device which further divides access in time in order to support multiple communication links on a given frequency carrier shall maintain a frame-repetition rate with a frequency stability of at least 10 ppm.	Subclause 6.2.2	P144	The remote EUT frame rate stability is measured at 0.292 ppm Allowed frame rate stability is 10ppm	Requirement is met
Jitter	15.323(e).4 The jitter (time-related, abrupt, spurious variations in the duration of the frame interval) introduced at the two ends of such a communication link shall not exceed 25 μs for any two consecutive transmissions.	Subclause 6.2.3	P145	The remote EUT has measured total jitter and offset of 1.236uS Allowed jitter and offset is 25uS	Requirement is met
Continuous transmit during frame	15.323(e).5 Transmissions shall be continuous in every time and spectrum window during the frame period defined for the device.	Subclause 6.2.3		The remote EUT does not use discontinuous transmission	Requirement is met
Carrier Stability	15.323(f)				
Carrier frequency stability (<10 ppm)	15.323(f).1 The frequency stability of the carrier frequency of the intentional radiator shall be maintained within ± 10 ppm over 1 hour or over the interval between channel access monitoring, whichever is shorter.	Subclause 6.2.1.1	P142	The remote EUT measured carrier frequency maximum and minimum deviations were +0.48 and -0.69ppm over one hour. +/-10ppm is allowed	Requirement is met

Carrier frequency stability (extreme conditions)	15.323(f).2 The frequency stability shall be maintained over a temperature variation of -20° C to +50° C at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of 20° C.	Subclause 6.2.1.3	P157	The remote EUT measured carrier frequency stability over rated temperature was +0.25ppm and -0.32ppm +/-10ppm is allowed	The requirements are met
Carrier frequency stability (battery)	15.323(f).3 For equipment that is capable only of operating from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.	Subclause 6.2.1.2	P156	The remote EUT is battery-powered and so no stability test is required.	

III) Tests of clause 6 performed by the manufacturer, for the CA12CD-S Base EUT

III-A. Clause 6.1 Emissions tests for the base EUT

For the tests of clause 6.1 of C63.17-2006, the test platform and base EUT are configured according to test configuration #1, **Conducted emissions tests, base EUT**, of section (I) of this document. The base EUT is established in a communications channel with the headset companion device by means of a radiative-coupled connection, though the base EUT is in conducted connection to the spectrum analyzer, per figure 3 of C63.17-2006 in clause 6.1.1. Administrative commands are used to set the base to the desired carrier for the test.

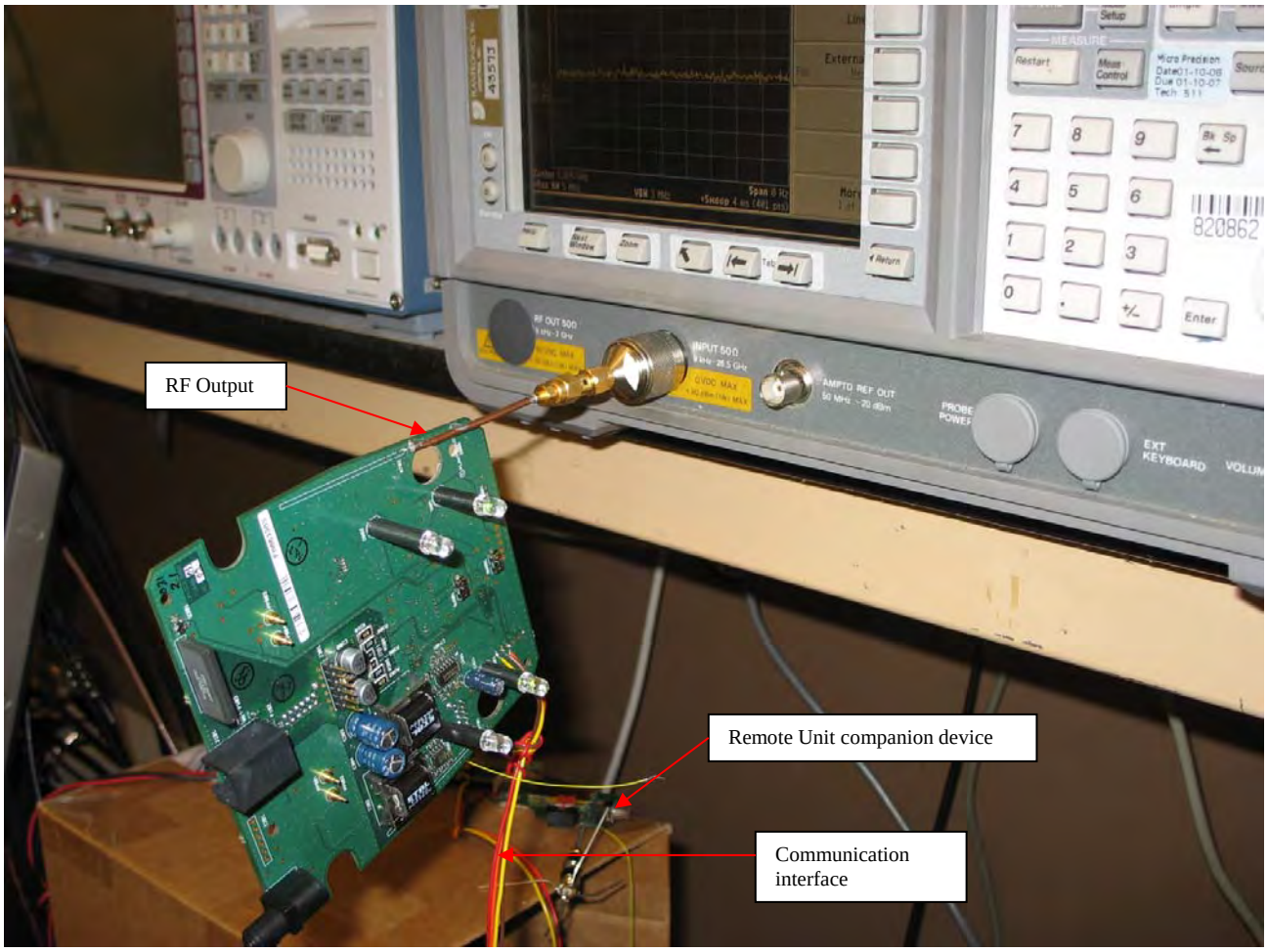


Fig. 8 - Base EUT conducted connection to spectrum analyzer for tests of clause 6.1, with labeled functions.

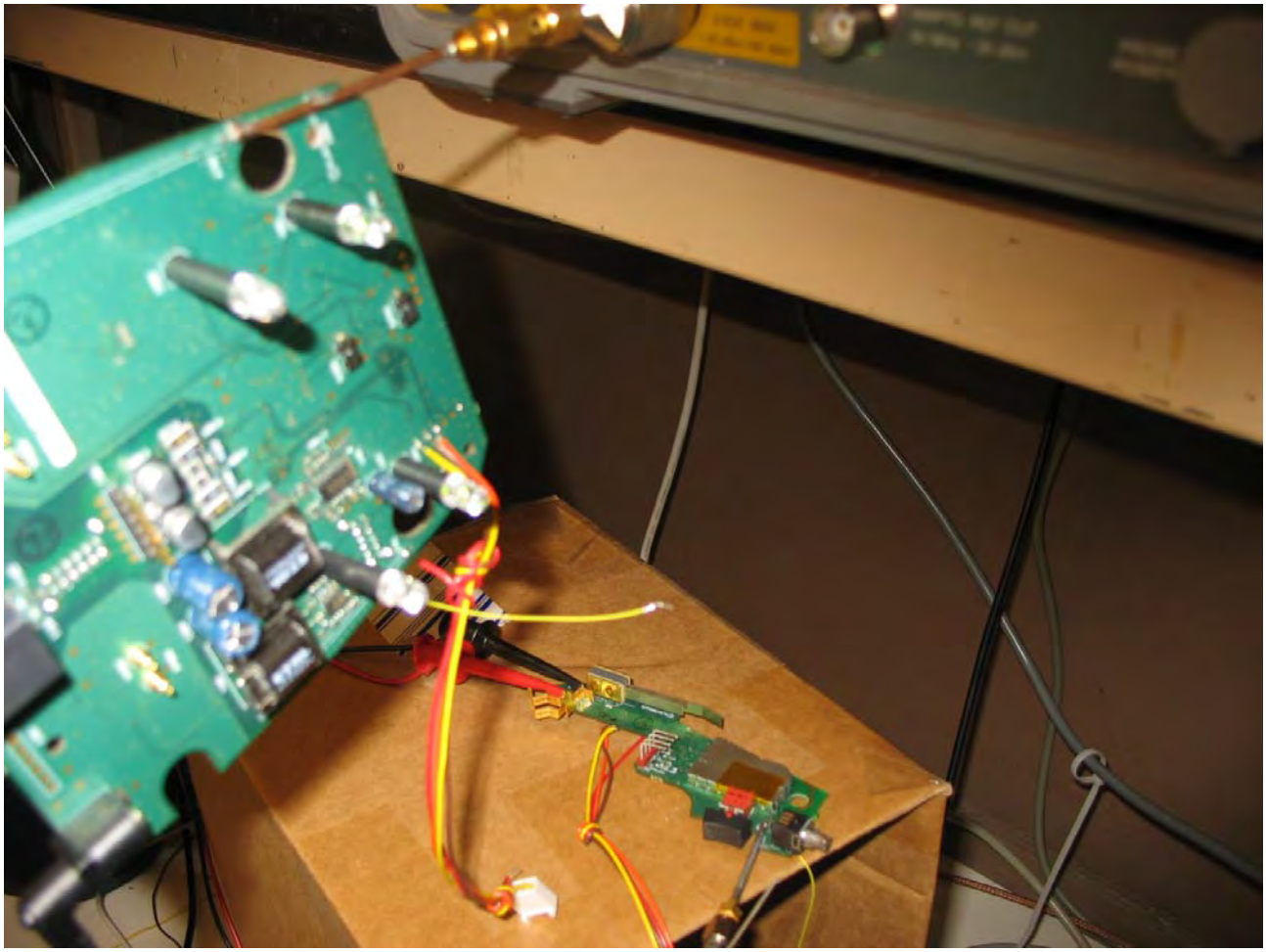


Fig. 9 - Detail of base EUT conducted connection, with companion device in the background. Base EUT and remote companion device have established a communications channel.

6.1.2 Peak transmit power, base EUT

The base EUT is configured as described in the introduction for the tests of clause 6.1. First the low, then the mid, then the high carrier are selected, and the peak power is observed for the base EUT transmit burst for each carrier.

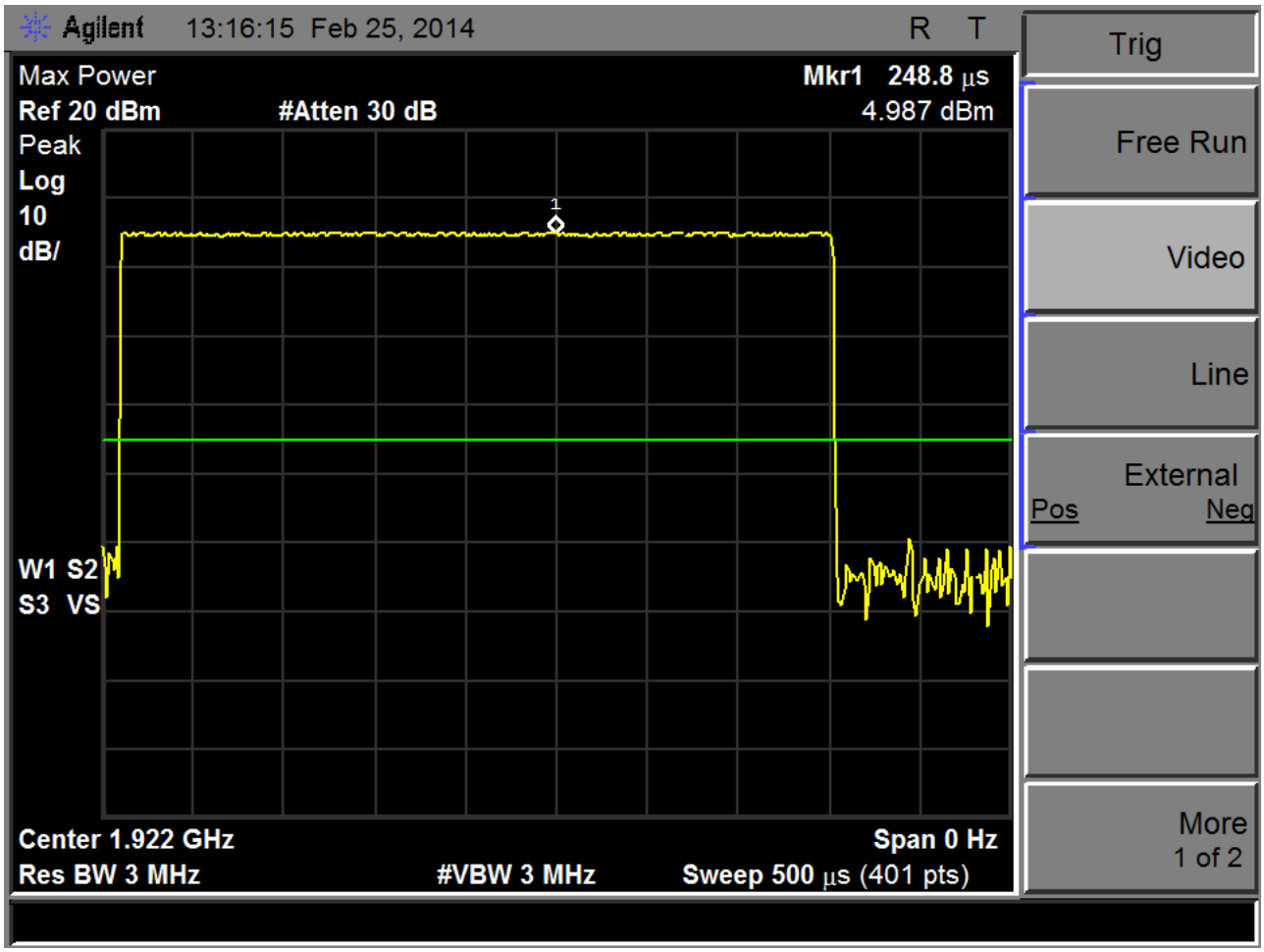


Fig. 10 Base EUT transmit power received by spectrum analyzer configured according to the requirements of clause 6.1.2 of of C63.17-2006, low carrier. Maximum observed transmit power is 4.98dBm.

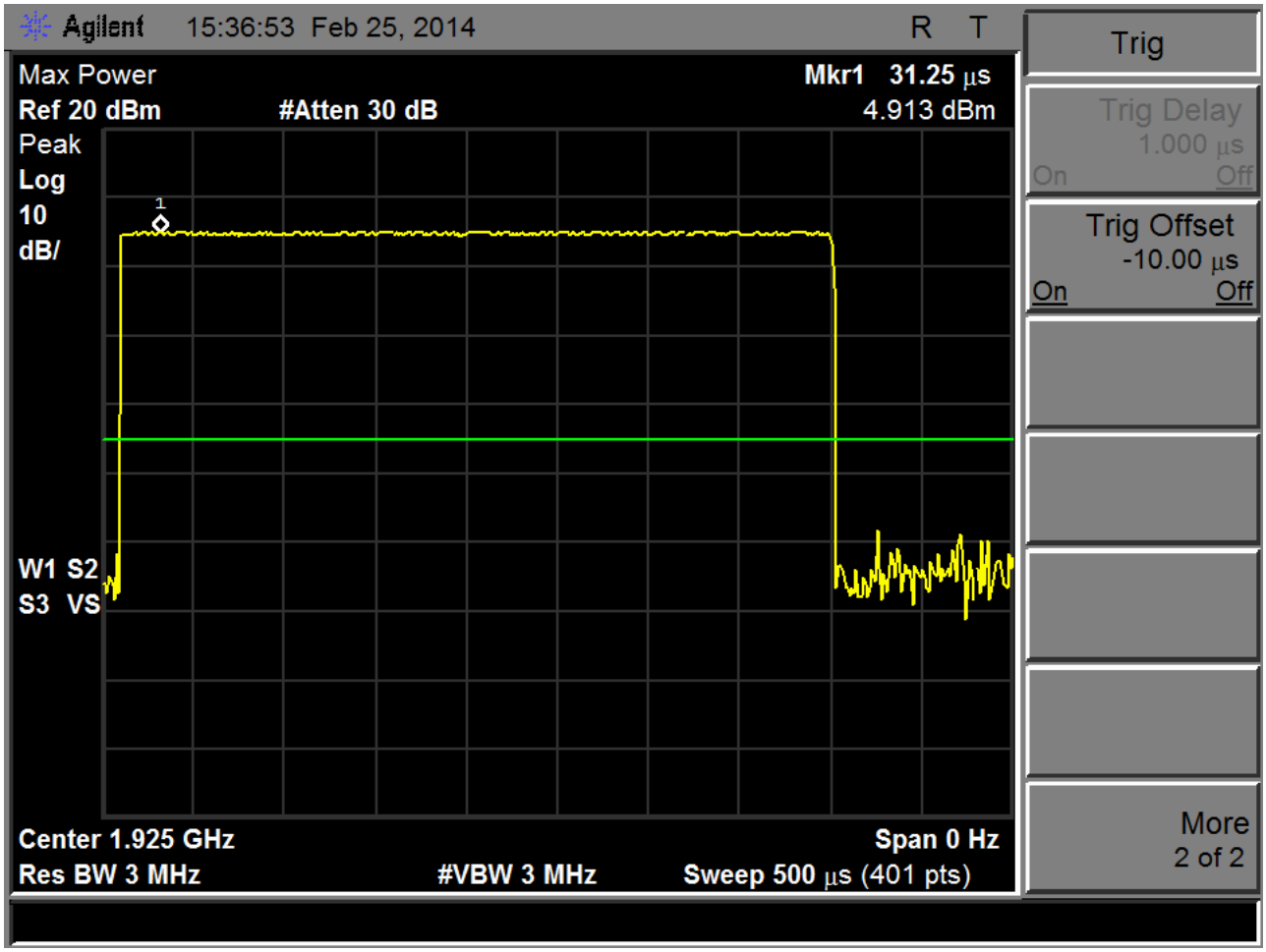


Fig. 11- Base EUT transmit power received by spectrum analyzer configured according to the requirements of clause 6.1.2 of of C63.17-2006, mid carrier. Maximum observed transmit power is 4.91dBm.

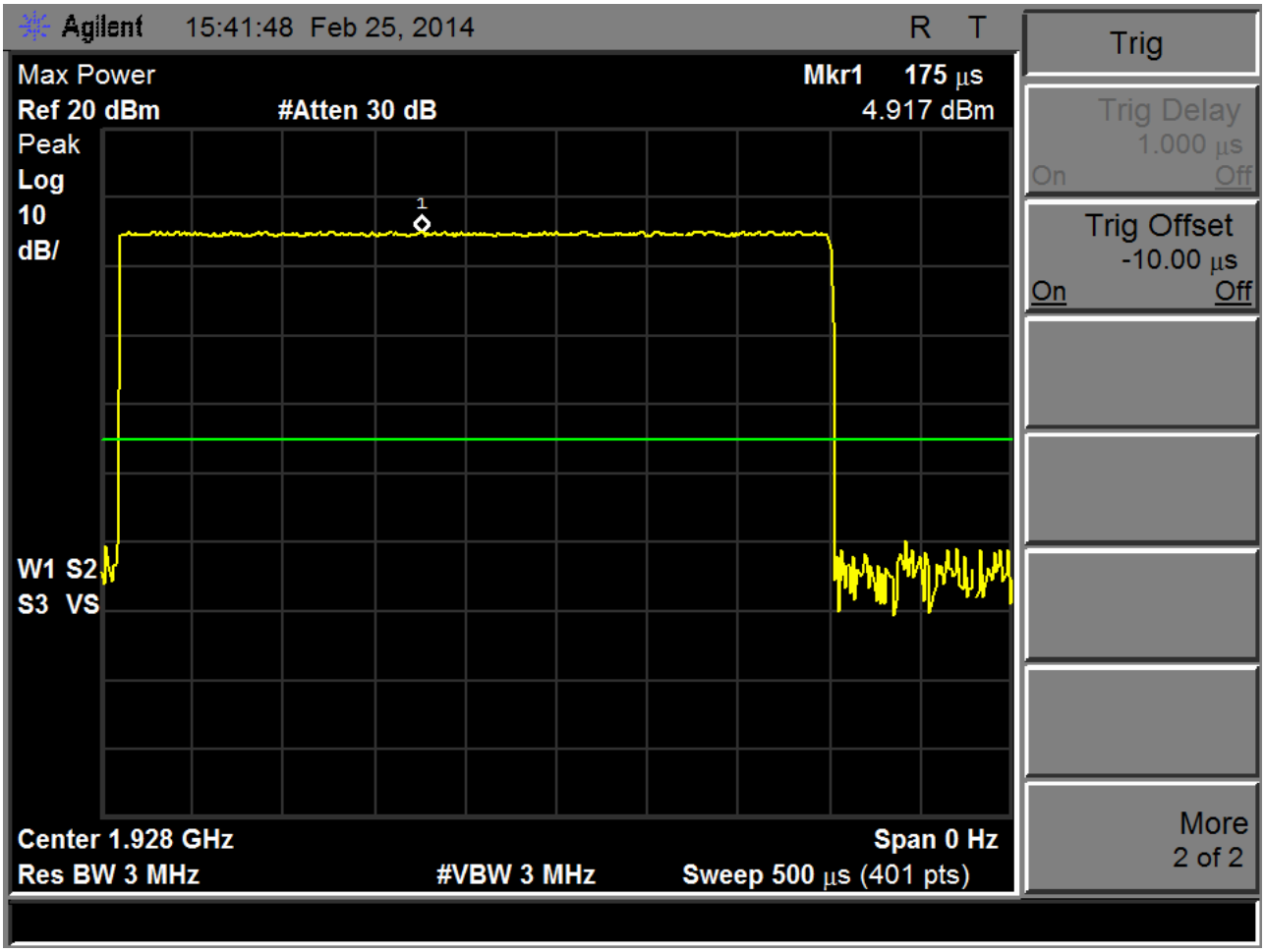


Fig. 12 - Base EUT transmit power received by spectrum analyzer configured according to the requirements of clause 6.1.2 of of C63.17-2006, high carrier. Maximum observed transmit power is 4.91dBm.

The maximum allowed transmit power is *Plimit*, which is, from clause 4.3.1 of of C63.17-2006,

Plimit = 5(log***B***) – 10dBm,

for an EUT with maximum antenna gain not more than 3dBi (the maximum antenna gain for the base EUT is 3dBi) and where ***B*** is the emissions bandwidth, 1.44 MHz for the base EUT (see the measurements following for clause 6.1.3).

Solving for *Plimit* we obtain +20.8dBm.

The base EUT has maximum observed transmit power of 4.98dBm, and meets the required limit of less than *Plimit*, passing the requirements of C63.17-2006 clause 6.1.2 with 15.8dB of margin.

6.1.3 Emission bandwidth ***B,*** base EUT

The base EUT is configured as described in the introduction for the tests of clause 6.1. First the low, then the mid, then the high carrier are selected, and the emission bandwidth is observed for the base EUT transmit burst for each carrier.

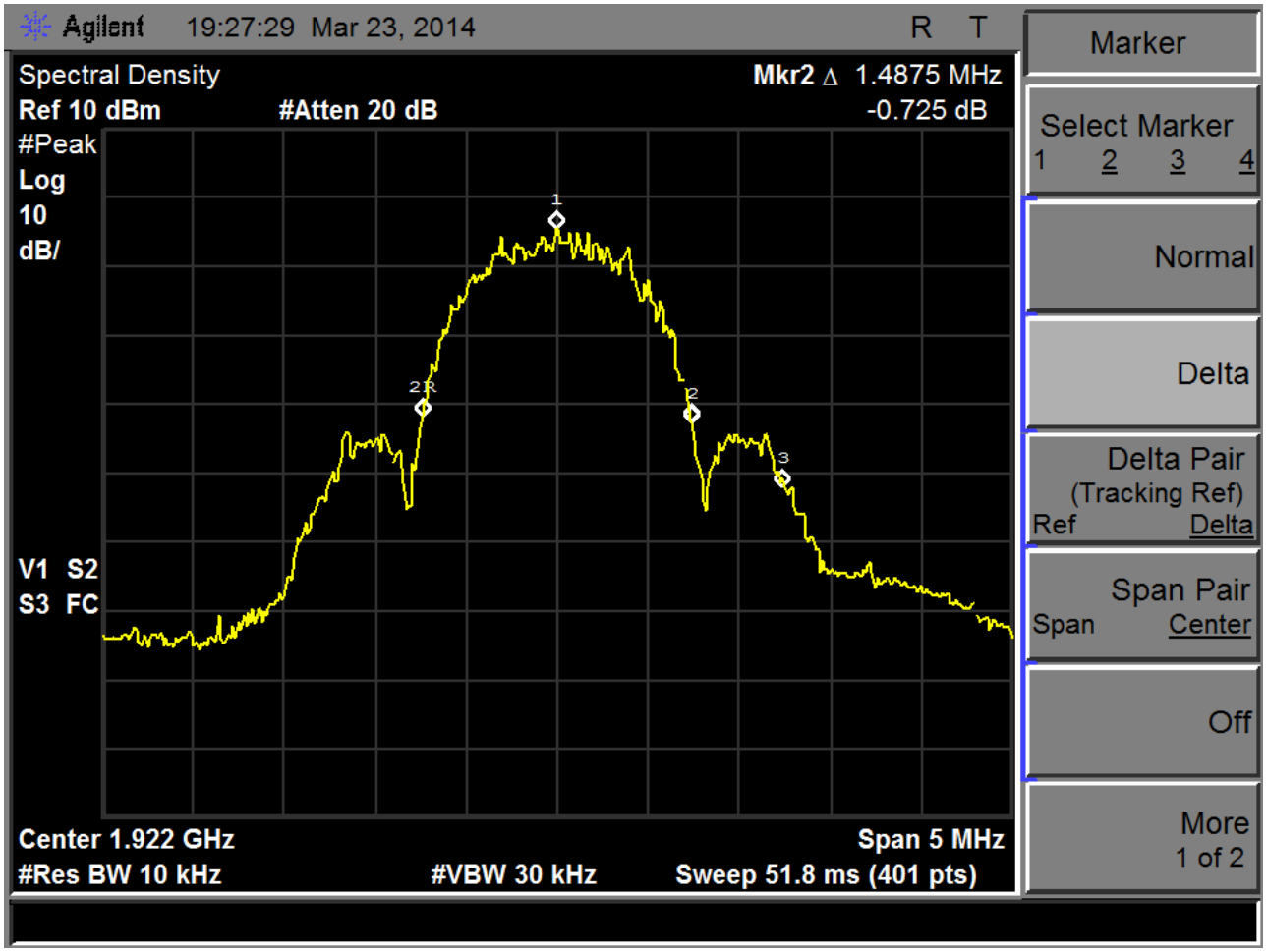


Fig. 13 - Base EUT, 1.49MHz emissions bandwidth on low carrier.

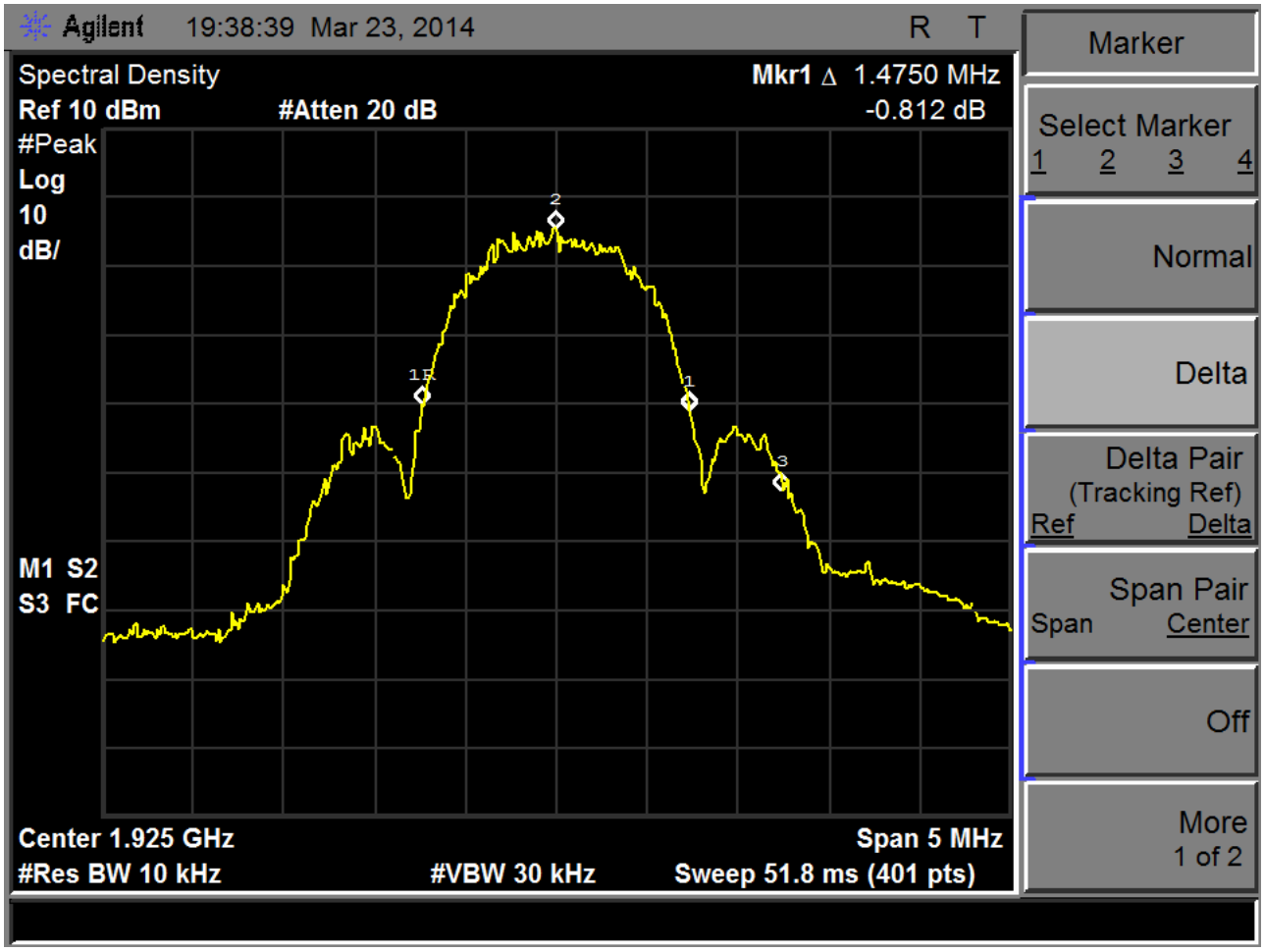


Fig. 14 - Base EUT, 1.47MHz emissions bandwidth on middle carrier.

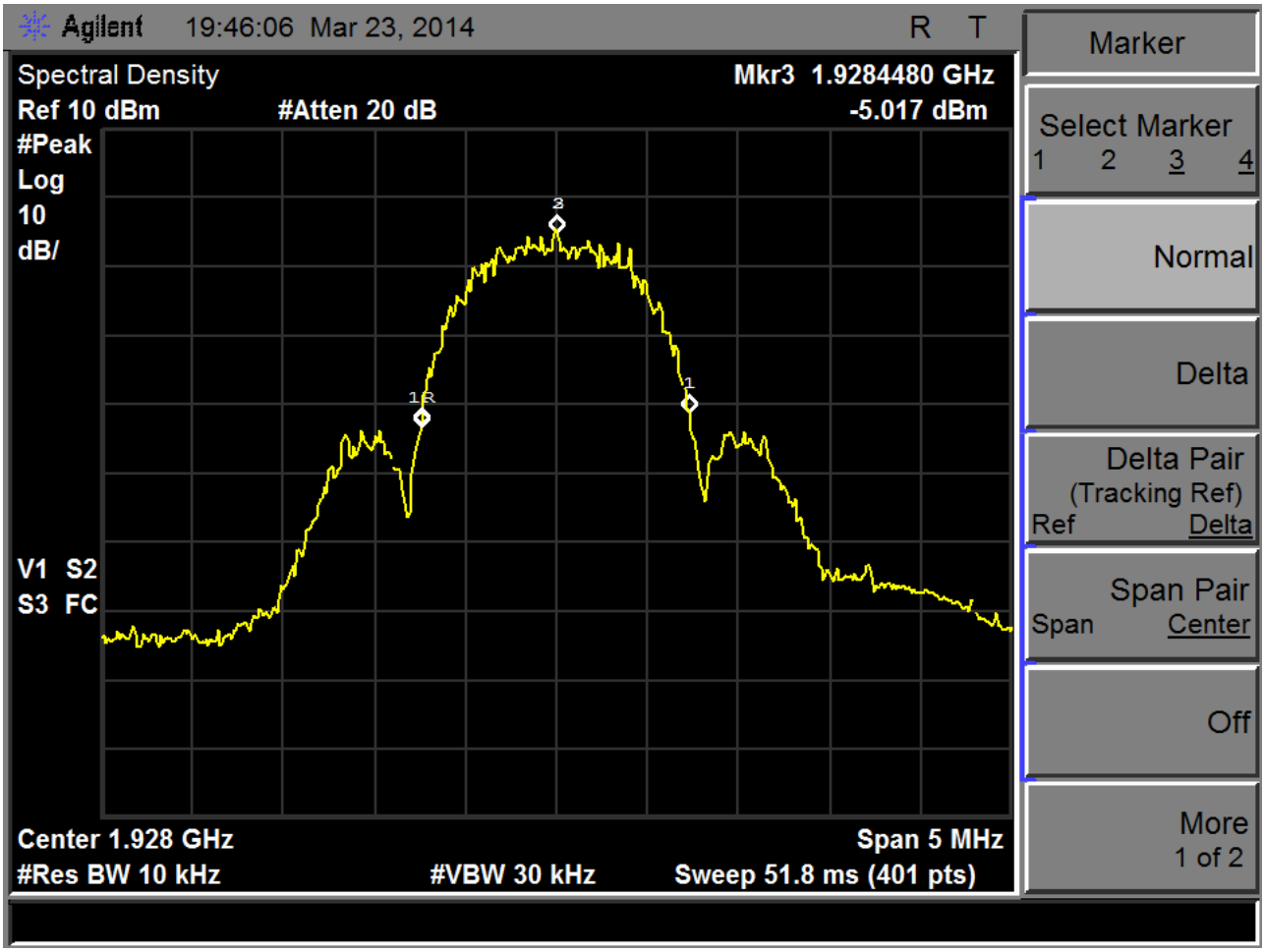


Fig. 15 - Base EUT, 1.48MHz emission bandwidth on high carrier.

The bandwidth ***B*** for the base EUT used in further calculations according to the UPCS standard, from the center carrier, is then 1.49MHz.

The maximum allowed emission bandwidth *BlimitU* is 2.5MHz.
The minimum allowed emission bandwidth *BlimitL* is 50kHz,

The maximum observed emission bandwidth was 1.49MHz. The minimum observed emission bandwidth was 1.48MHz, so the base EUT passes the test of clause 6.1.3 of C63.17-2006.

6.1.4 Modulation, base EUT

Per the attestation in section I-B, the base uses digital modulation and so meets the requirement of C63.17-2006

6.1.5 Power spectral density using the measured maximum method, base EUT

The base EUT is configured as described in the introduction for the tests of clause 6.1. First the low, then the mid, then the high carrier are selected, and the zero-span spectrum analyzer sweep is captured with the spectrum analyzer configured according to the requirements of 6.1.5 for each carrier.

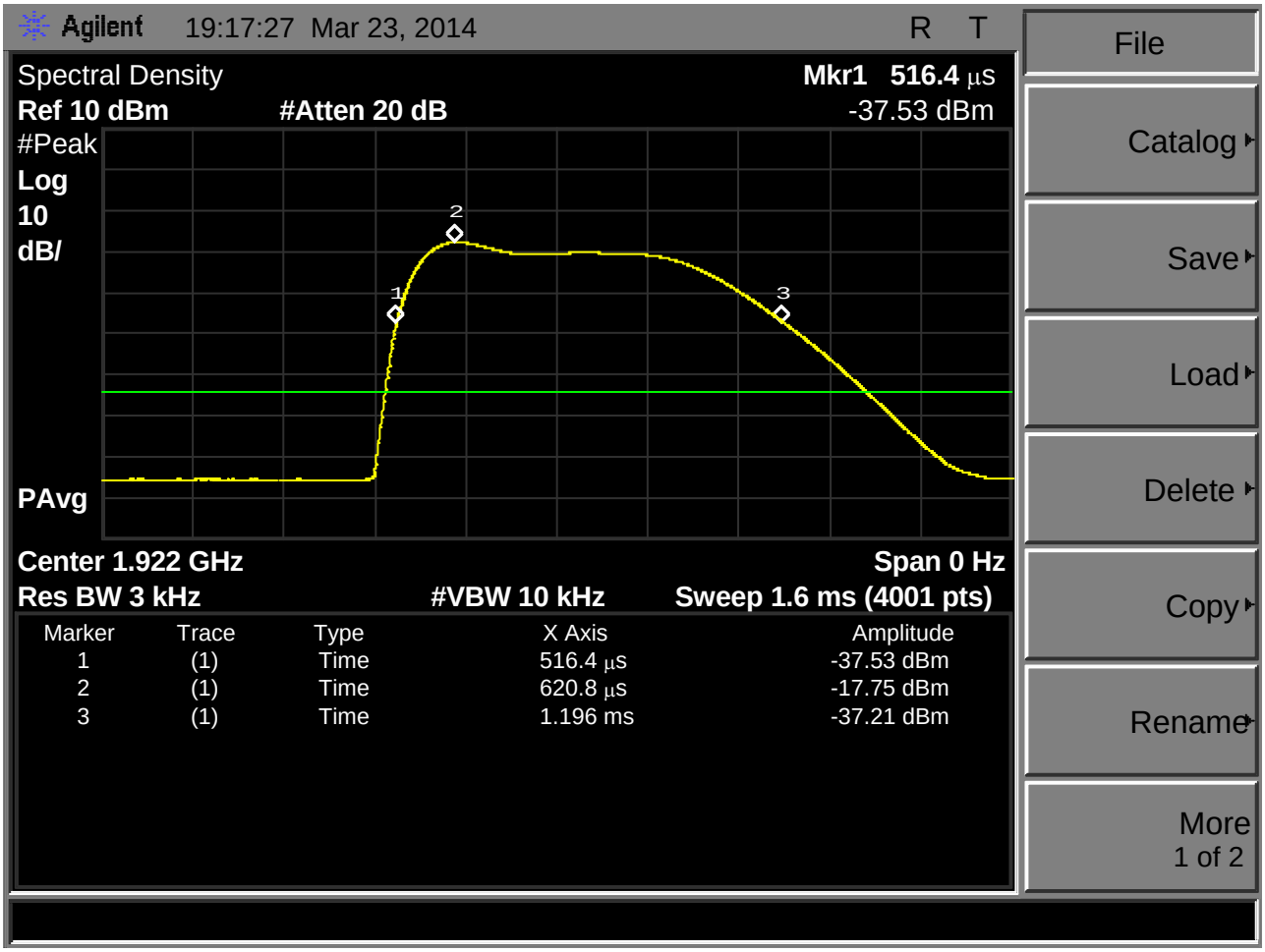


Fig. 16 – Zero-span sweep for base EUT, low carrier, for 3kHz maximum power spectral density.
The peak level is at -17.75Bm, and the interval between samples at the -20dB points is 680uS.

The data points for this trace were saved, and the power spectral density computed according to the requirements of 6.1.5, and per figure 4 of C63.17-2006, using an Excel spreadsheet,
“Clause 6_1_5 3kHz base EUT lowch.xls”

Integrated maximum 3kHz-bandwidth transmit power for the base EUT on the low channel was -22.7dBm.

02/26/14 15:09:47	C:\TRACE079.CSV				
Title:					
Model:	E4407B				
Serial Number:	MY45105325				
Center Frequency:	1921536000	Hz			
Span:	0	Hz			
Resolution Bandwidth:	3000	Hz			
Video Bandwidth:	30000	Hz			
Reference Level:	1.00E+01	dBm			
Sweep Time:	2.00E-03	Sec			
Num Points:	4001				
Sample frequency:	2500000	Hz			
	Trace 1				
Sec	dBm	power, W		Power summed:	
6.08E-04	-3.84E+01	1.46E-07		8.57E-03	
6.08E-04	-3.80E+01	1.58E-07			
6.09E-04	-3.77E+01	1.70E-07		Total pulse energy in 3kHz BW, Joules:	
6.09E-04	-3.74E+01	1.83E-07		3.43E-09	
6.10E-04	-3.71E+01	1.97E-07			
6.10E-04	-3.67E+01	2.13E-07		Pulse length (-20dBc), seconds	
6.11E-04	-3.64E+01	2.28E-07		0.00064	
6.11E-04	-3.61E+01	2.44E-07			
6.12E-04	-3.58E+01	2.61E-07		Average pulse power, W	
6.12E-04	-3.55E+01	2.79E-07		5.38E-06	
6.13E-04	-3.53E+01	2.98E-07			
6.13E-04	-3.50E+01	3.16E-07		Average pulse power, dBm	
6.14E-04	-3.47E+01	3.36E-07		-22.70	
6.14E-04	-3.45E+01	3.58E-07			
6.15E-04	-3.42E+01	3.81E-07			
1.24E-03	-3.83E+01	1.48E-07			
1.24E-03	-3.83E+01	1.46E-07			
1.24E-03	-3.84E+01	1.45E-07			
1.24E-03	-3.84E+01	1.43E-07			
1.25E-03	-3.85E+01	1.42E-07			

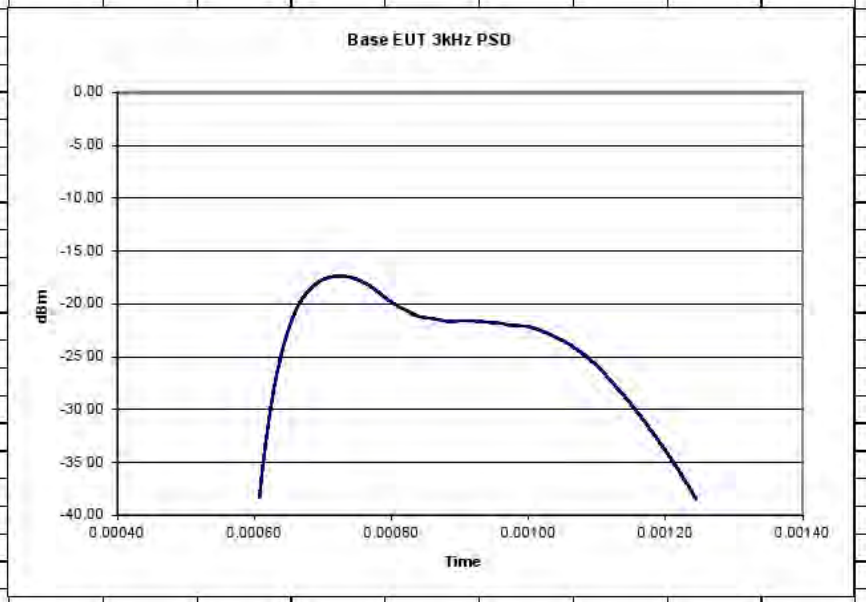


Fig. 17 – Screenshot of Excel file showing *PSDlimit* calculations for base EUT, low carrier; -22.70dBm.

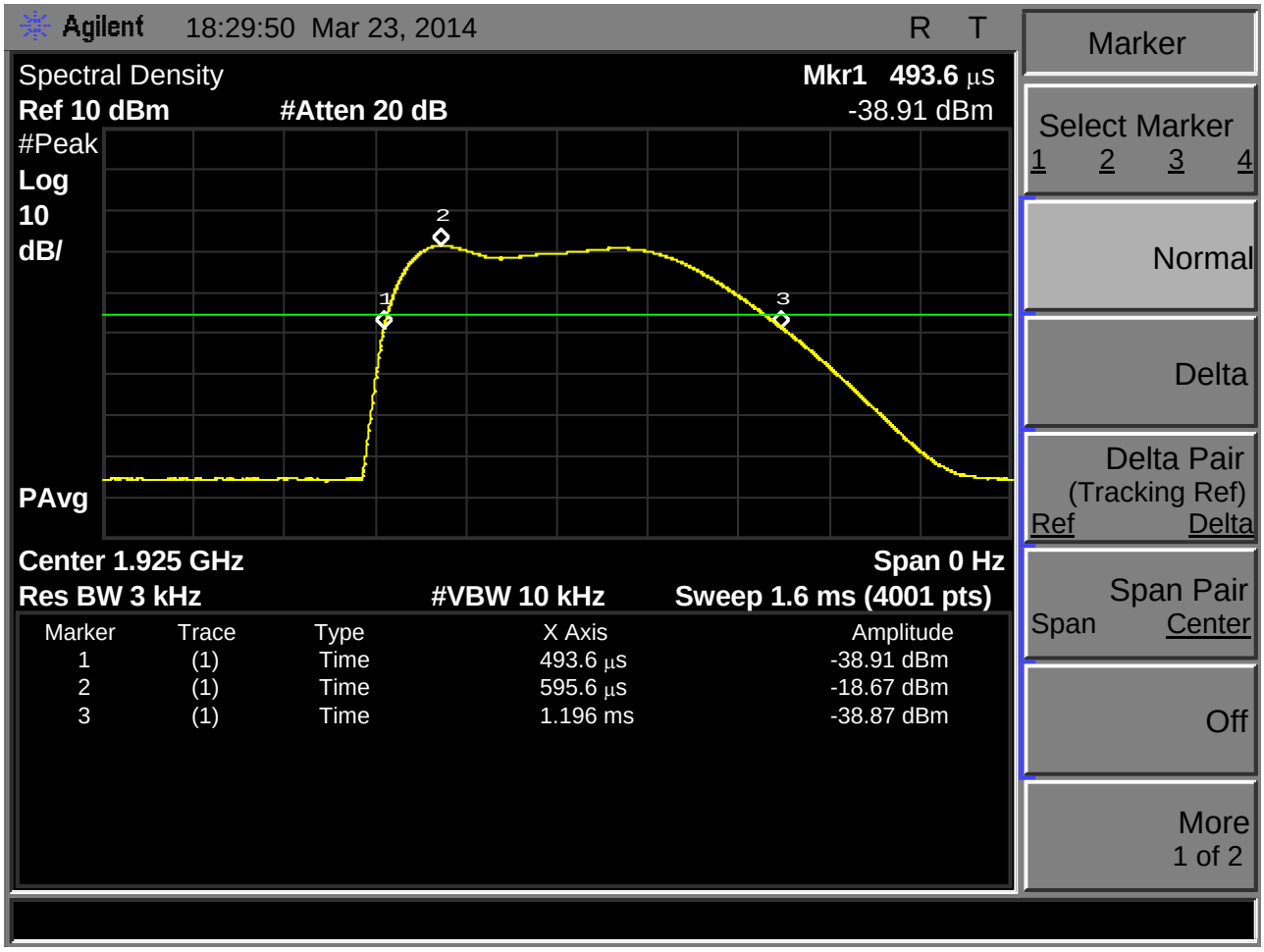


Fig. 18 – Zero-span sweep for base EUT, middle carrier, for 3kHz maximum power spectral density.
The peak level is at -18.67dBm, and the interval between samples at the -20dB points is 702.4uS.

The data points for this trace were saved, and the power spectral density computed according to the requirements of 6.1.5, and per figure 4 of C63.17-2006, using an Excel spreadsheet,
“Clause 6_1_5 3kHz base EUT midch.xls”.

Integrated maximum 3kHz-bandwidth transmit power for the base EUT on the mid channel was -22.07dBm.

02/26/14 15:20:31	C:\TRACE080.CSV			
Title:				
Model:	E4407B			
Serial Number:	MY45105325			
Center Frequency:	1924992000	Hz		
Span:	0	Hz		
Resolution Bandwidth:	3000	Hz		
Video Bandwidth:	30000	Hz		
Reference Level:	1.00E+01	dBm		
Sweep Time:	2.00E-03	Sec		
Num Points:	4001			
Sample frequency:	2500000	Hz		
1311				
	Trace 1			
Sec	dBm	power, W		Power summed:
6.10E-04	-3.68E+01	2.11E-07		1.00E-02
6.11E-04	-3.64E+01	2.27E-07		
6.11E-04	-3.62E+01	2.43E-07		Total pulse energy in 3kHz BW, Joules:
6.12E-04	-3.59E+01	2.60E-07		4.02E-09
6.12E-04	-3.55E+01	2.79E-07		
6.13E-04	-3.53E+01	2.98E-07		Pulse length (-20dBc), seconds
6.13E-04	-3.50E+01	3.16E-07		0.00065
6.14E-04	-3.47E+01	3.36E-07		
6.14E-04	-3.44E+01	3.59E-07		Average pulse power, W
6.15E-04	-3.42E+01	3.82E-07		6.20E-06
6.15E-04	-3.39E+01	4.07E-07		
6.16E-04	-3.36E+01	4.33E-07		Average pulse power, dBm
6.16E-04	-3.34E+01	4.59E-07		-22.07
6.17E-04	-3.31E+01	4.87E-07		
6.17E-04	-3.29E+01	5.15E-07		
1.26E-03	-3.66E+01	2.20E-07		
1.26E-03	-3.66E+01	2.17E-07		
1.26E-03	-3.67E+01	2.15E-07		
1.26E-03	-3.67E+01	2.13E-07		
1.26E-03	-3.68E+01	2.09E-07		

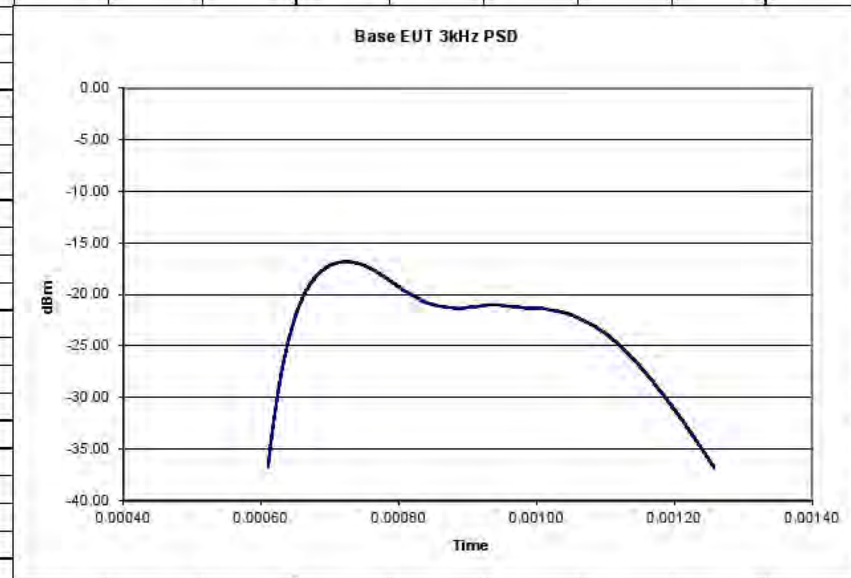


Fig. 19 – Screenshot of Excel file showing PSDlimit calculations for base EUT, mid carrier; -22.07dBm.

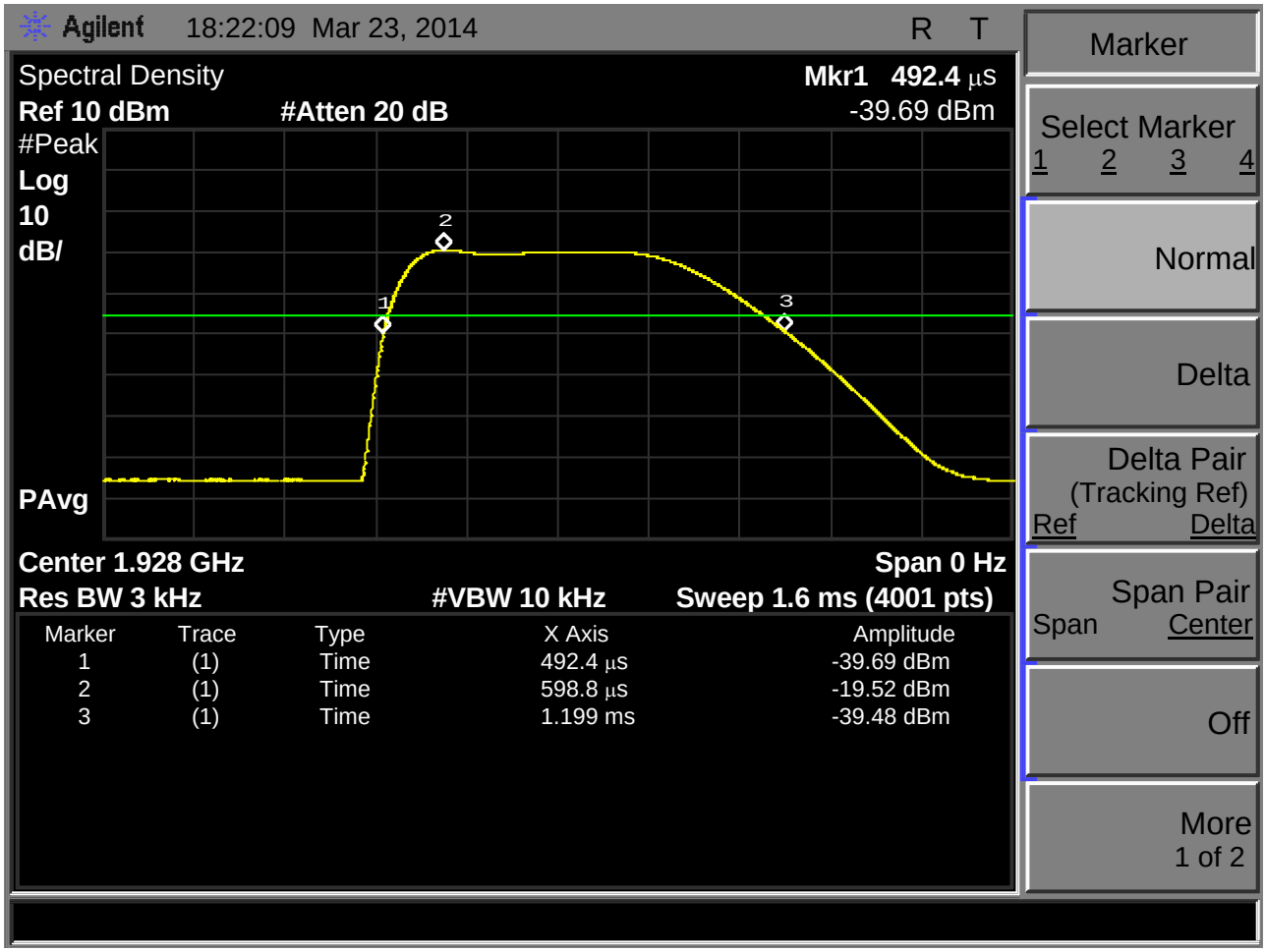


Fig. 20 – Zero-span sweep for base EUT, high carrier, for 3kHz maximum power spectral density.
The peak level is at -19.52dBm, and the interval between samples at the -20dB points is 706.6uS.

The data points for this trace were saved, and the power spectral density computed according to the requirements of 6.1.5, and per figure 4 of C63.17-2006, using an Excel spreadsheet,
“Clause 6_1_5 3kHz base EUT highch.xls”.

Integrated maximum 3kHz-bandwidth transmit power for the base EUT on the high channel was –22.48dBm,

02/26/14 15:25:44	C:\TRACE081.CSV																						
Title:																							
Model:	E4407B																						
Serial Number:	MY45105325																						
Center Frequency:	1928448000	Hz																					
Span:	0	Hz																					
Resolution Bandwidth:	3000	Hz																					
Video Bandwidth:	30000	Hz																					
Reference Level:	1.00E+01	dBm																					
Sweep Time:	2.00E-03	Sec																					
Num Points:	4001																						
Sample frequency:	2500000	Hz																					
	Trace 1																						
Sec	dBm	power, W		Power summed:																			
6.10E-04	-37.09	1.95E-07		8.80E-03																			
6.11E-04	-36.78	2.10E-07																					
6.11E-04	-36.51	2.24E-07		Total pulse energy in 3kHz BW, Joules:																			
6.12E-04	-36.22	2.39E-07		3.52E-09																			
6.12E-04	-35.94	2.55E-07																					
6.13E-04	-35.66	2.72E-07		Pulse length (-20dBc), seconds																			
6.13E-04	-35.38	2.90E-07		0.00062																			
6.14E-04	-35.15	3.05E-07																					
6.14E-04	-34.89	3.25E-07		Average pulse power, W																			
6.15E-04	-34.64	3.43E-07		5.65E-06																			
6.15E-04	-34.38	3.65E-07																					
6.16E-04	-34.12	3.87E-07		Average pulse power, dBm																			
6.16E-04	-33.88	4.10E-07		-22.48																			
6.17E-04	-33.63	4.33E-07																					
6.17E-04	-33.40	4.57E-07																					
1.23E-03	-36.83	2.07E-07																					
1.23E-03	-36.88	2.05E-07																					
1.23E-03	-36.94	2.02E-07																					
1.23E-03	-36.99	2.00E-07																					
1.23E-03	-37.05	1.97E-07																					

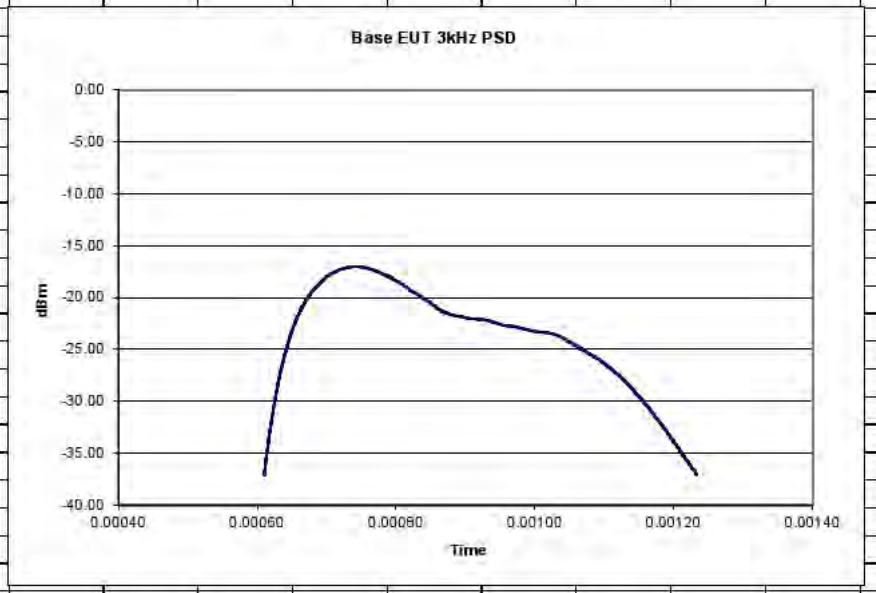


Fig. 21 – Screenshot of Excel file showing *PSDlimit* calculations for base EUT, high carrier; -22.48dBm.

The maximum allowed PSD, *PSDlimit*, is 3mW in any 3kHz bandwidth, or 4.77dBm.
The maximum observed PSD for the base EUT is -22.07dBm, meeting the requirements according to clause 6.1.5 of C63.17-2006 with 26.84dB of margin.

6.1.6 Emissions, base EUT

The base EUT is configured as described in the introduction for the tests of clause 6.1.

6.1.6.1 In-band unwanted emissions, base EUT
For spectrum analyzer settings, 6.1.6.1 requires that the sweep time be no faster than one RBW (10kHz) every three transmit bursts (30mS, for this implementation). The in-band swept span is 10MHz, (1920MHz to 1930MHz) from the requirement that the swept span cover 3.5***B*** and where ***B*** = 1.48 MHz, and to display the whole 10MHz in-band region. Accordingly, for a 10kHz resolution bandwidth, the sweep time is 30 seconds.

Tests are performed at low, mid and high carriers, 1921.536MHz, 1924.992MHz, and 1928.448MHz respectively.

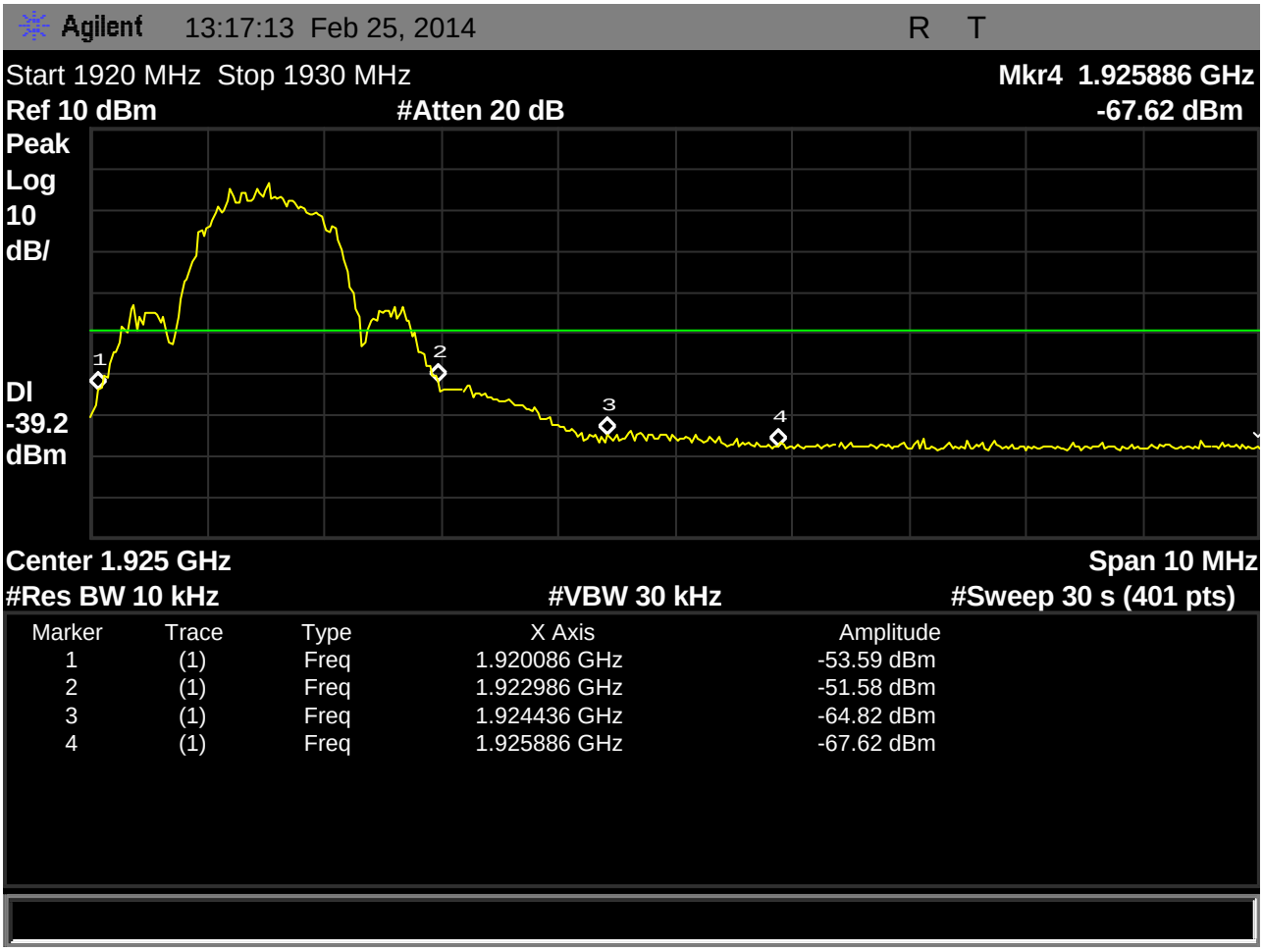


Fig. 22 - Spectrum analyzer screenshot for transmit emissions showing inband unwanted emissions with the base EUT transmitter at the lowest carrier, 1921.536MHz, according to the requirements of 6.1.6.1.

The green line is the -60dB level for unwanted emissions relative to the maximum allowed transmit signal level; -60dB emissions are required for in-band frequency separations from the carrier of 3***B*** and above, where ***B*** is the base EUT emissions bandwidth. The markers are placed at 1***B***, 2***B*** and 3***B*** separations from the carrier, where the allowed limits are:

A) 1***B*** to 2***B*** separation: at least 30dB below the permitted level.
B) 2***B*** to 3***B*** separation: at least 50dB below the permitted level.
C) 3***B*** to in-band edge: at least 60dB below the permitted level

For region A (double sided in-band), the worst-case marker at 1920.086 MHz is at -53.59dBm, and 30dB below 20.8dBm, or -9.2dBm is allowed, margin is 44.39dB.

For region B (single-sided in-band), the marker at 1924.36MHz is at -64.82dBm, and 50dB below 20.8dBm, or -29.2dBm is allowed, margin is 35.62dB.

For region C (single-sided in-band), the marker at 1925.88MHz is at -67.62dBm, and 60dB below 20.8dBm, or -39.2dBm is allowed, margin is 28.42dB.

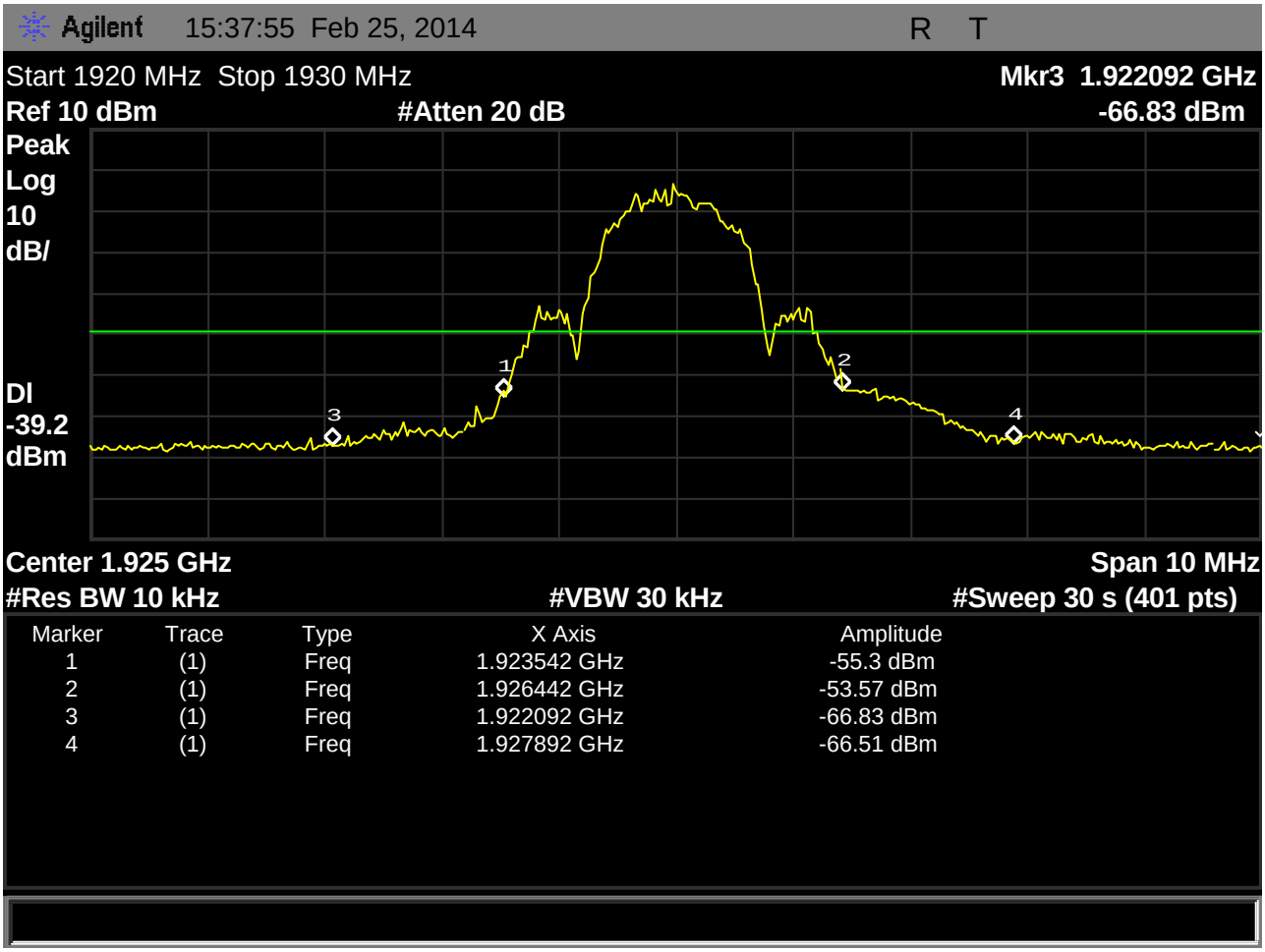


Fig. 23 - Spectrum analyzer screenshot for transmit emissions showing inband unwanted emissions with the base EUT transmitter at the middle carrier, 1924.992MHz, according to the requirements of 6.1.6.1.

The green line is the -60dB level for unwanted emissions relative to the maximum allowed transmit signal level; -60dB emissions are required for in-band frequency separations from the carrier of 3***B*** and above, where ***B*** is the base EUT emissions bandwidth. The markers are placed at 1***B***, 2***B*** and 3***B*** separations from the carrier, where the allowed limits are:

A) 1***B*** to 2***B*** separation: at least 30dB below the permitted level.
B) 2***B*** to 3***B*** separation: at least 50dB below the permitted level.
C) 3***B*** to in-band edge: at least 60dB below the permitted level

For region A (double-sided in-band), the worst-case marker at 1923.54MHz is at -55.30dBm, and 30dB below 20.8dBm, or -9.2dBm is allowed, margin is 46.1dB.

For region B (double-sided in-band), the worst-case marker at 1922.09MHz is at -66.83dBm, and 50dB below 20.8dBm, or -29.2dBm is allowed, margin is 37.63dB.

For region C, markers are not shown, but the emissions are not worse than the case for region B, and so, with 60dB below 20.8dBm, or -39.2dBm allowed, margin is at least 24.91dB.

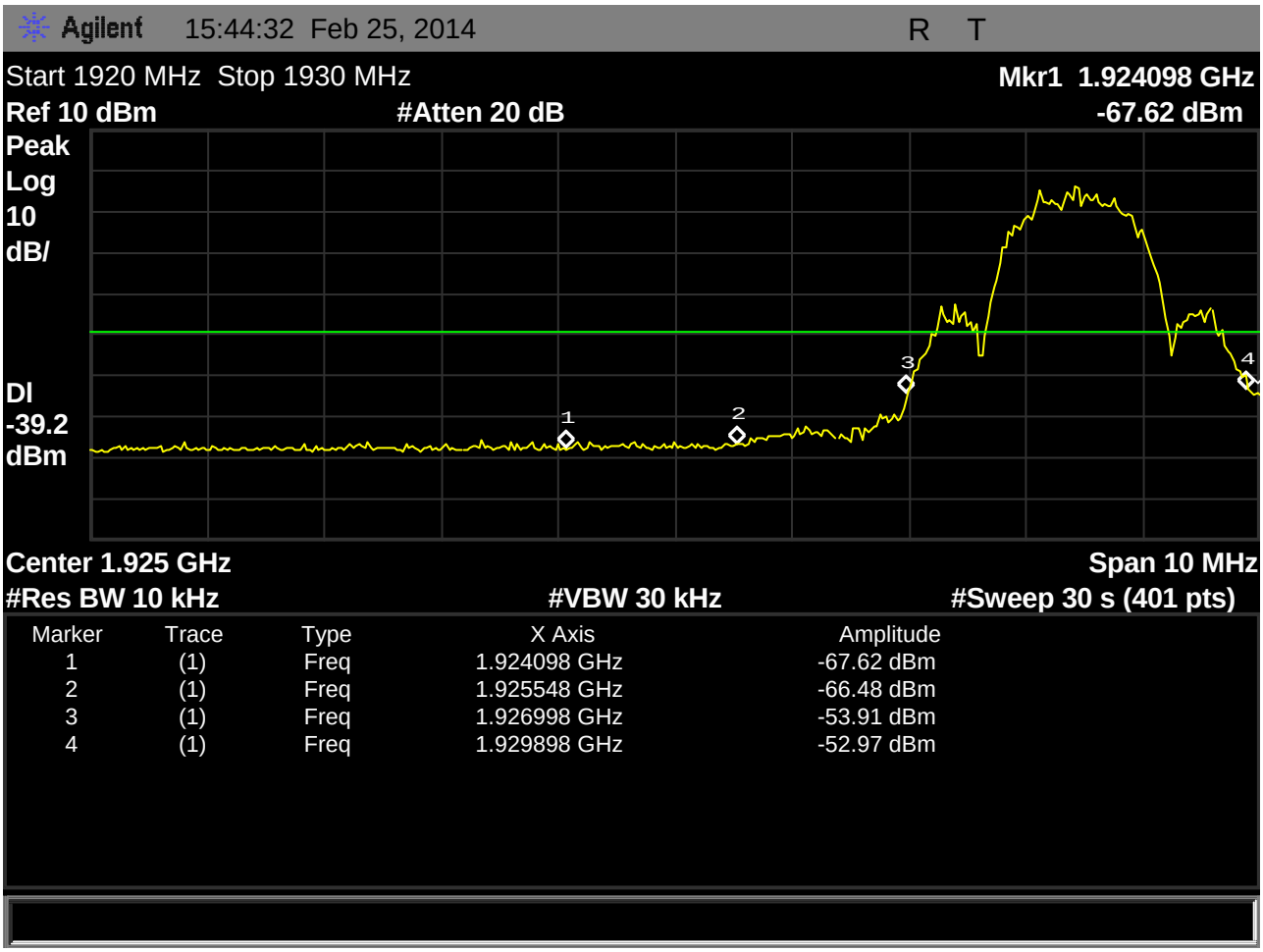


Fig. 24 - Spectrum analyzer screenshot for transmit emissions showing inband unwanted emissions with the base EUT transmitter at the highest carrier, 1928.448MHz, according to the requirements of 6.1.6.1.

The green line is the -60dB level for unwanted emissions relative to the maximum allowed transmit signal level; -60dB emissions are required for in-band frequency separations from the carrier of 3B and above, where B is the base EUT emissions bandwidth. The markers are placed at 1B, 2B and 3B separations from the carrier, where the allowed limits are:

A) 1B to 2B separation: at least 30dB below the permitted level.
B) 2B to 3B separation: at least 50dB below the permitted level.
C) 3B to in-band edge: at least 60dB below the permitted level

For region A (double sided in-band), the worst-case marker at 1927.00 MHz is at -53.91dBm, and 30dB below 20.8dBm, or -9.2dBm is allowed, margin is 44.71dB.

For region B (single-sided in-band), the marker at 1925.55MHz is at -66.48dBm, and 50dB below 20.8dBm, or -29.2dBm is allowed, margin is 37.28dB.

For region C (single-sided in-band), the marker at 1924.09MHz is at -67.62dBm, and 60dB below 20.8dBm, or -39.2dBm is allowed, margin is 28.42dB.

The tests of in-band unwanted emissions for the base EUT at low, mid and high carrier show that the base EUT meets the requirements of 6.1.6.1 with not less than 24.91dB of margin.

6.1.6.2 Out-of-band emissions, base EUT

6.1.6.2 requires measurements be made adjacent to the band for the regions from bandedge to 1.25MHz separation and also from 1.25MHz to 2.5MHz separation. Then for frequencies separated from the band by more than 2.5MHz, the test can be made either (from paragraph c of 6.1.6.2) as a conducted test against an emissions limit of -39.5dBm, or (from paragraph d of 6.1.6.2) as a radiated test according to the requirements of 47CFR15.209. Plantronics elects to use paragraph c, the conducted test.

The measurements are made at low (1921.536MHz) and then high (1928.448MHz) carrier, with the results presented in sections. Spectrum analyzer screenshots are presented as follows:

- For the region from 0 to 5MHz, to resolve low frequencies and differentiate the spectrum analyzer's DC response from an emissions peak, for paragraph c.
- For the region from 5MHz to 1915MHz, for paragraph c.
- For the region 5MHz region below the bandedge (1915 to 1920MHz) to cover the requirements of paragraphs a and b.
- For the region 5MHz above the bandedge (1930 to 1935MHz) to cover the requirements of paragraphs a and b.

The regions are measured according to the requirements for spectrum analyzer settings form 6.1.6.1 except as follows:

- The region from 5MHz to 1915MHz is measured in a 100kHz resolution bandwidth and 300kHz video bandwidth to achieve an improvement in test time without compromising accuracy – the wider bandwidth passes more potential emissions simultaneously and thus over-reports the emissions value for a spectral peak, but the EUT has sufficient margin in this region that the test conclusions are not affected. This allows a sweep time of only 573 seconds.

- The region above the band and up to the 10^{th} harmonic (19.3GHz) is measured in a 300kHz resolution bandwidth and 1MHz video bandwidth to achieve an improvement in test time again without compromising accuracy – the wider bandwidth allows a sweep time of only 1736.5 seconds.

The emissions peaks noted at the 2^{nd}, 3^{rd} and 4^{th} harmonics are then measured in the resolution bandwidth according to the text of 6.1.6.2, for an accurate measurement of the margin to the specification.

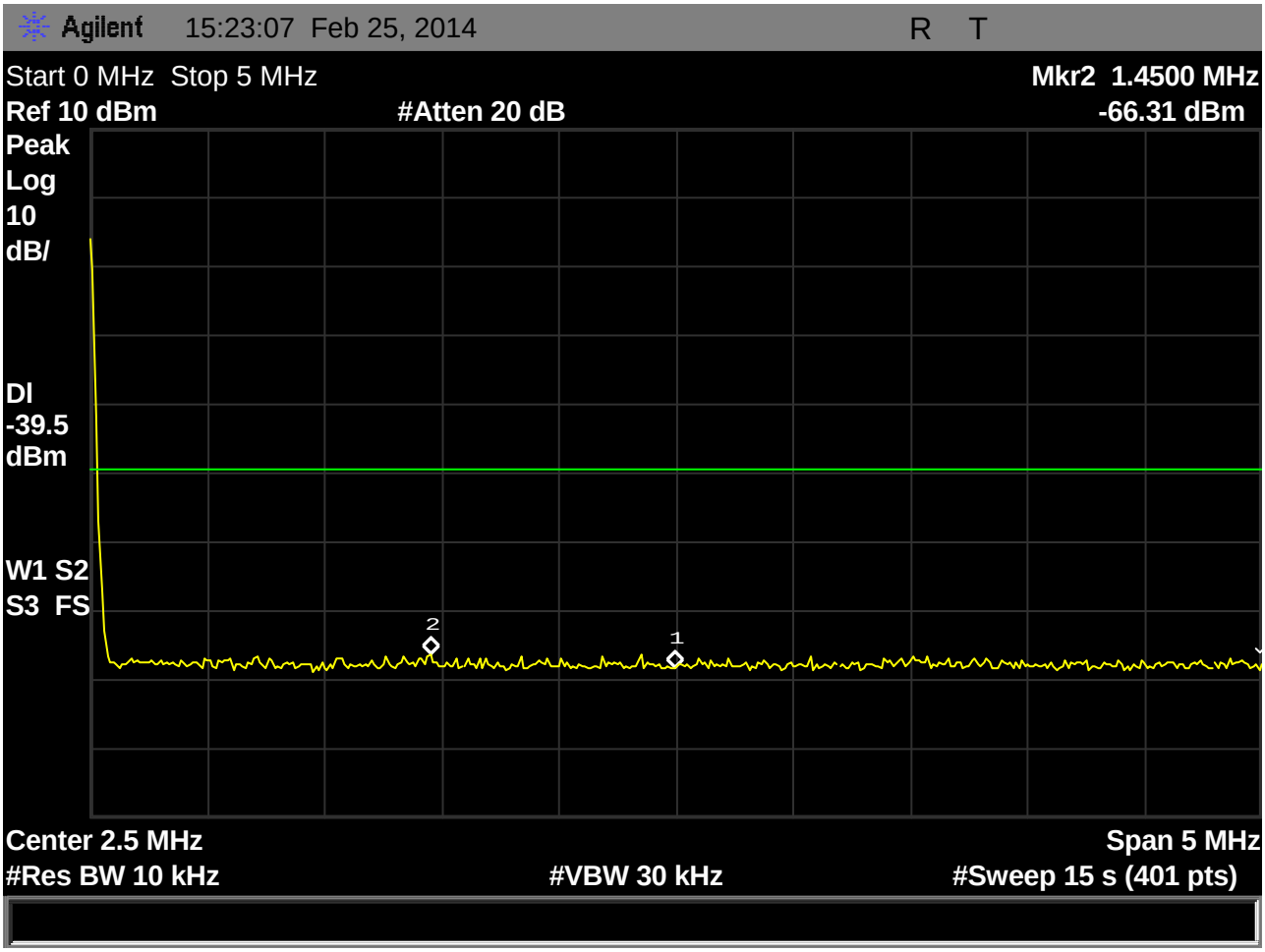


Fig. 25 – base EUT out-of-band emissions showing the regions from DC to 5MHz, with the transmitter using the lowest carrier, 1921.536MHz.

This screenshot resolves the contribution made by the spectrum analyzer's DC response. Base EUT margin to the -39.5dBm out-of-band emissions specification exceeds 25dB in this region.

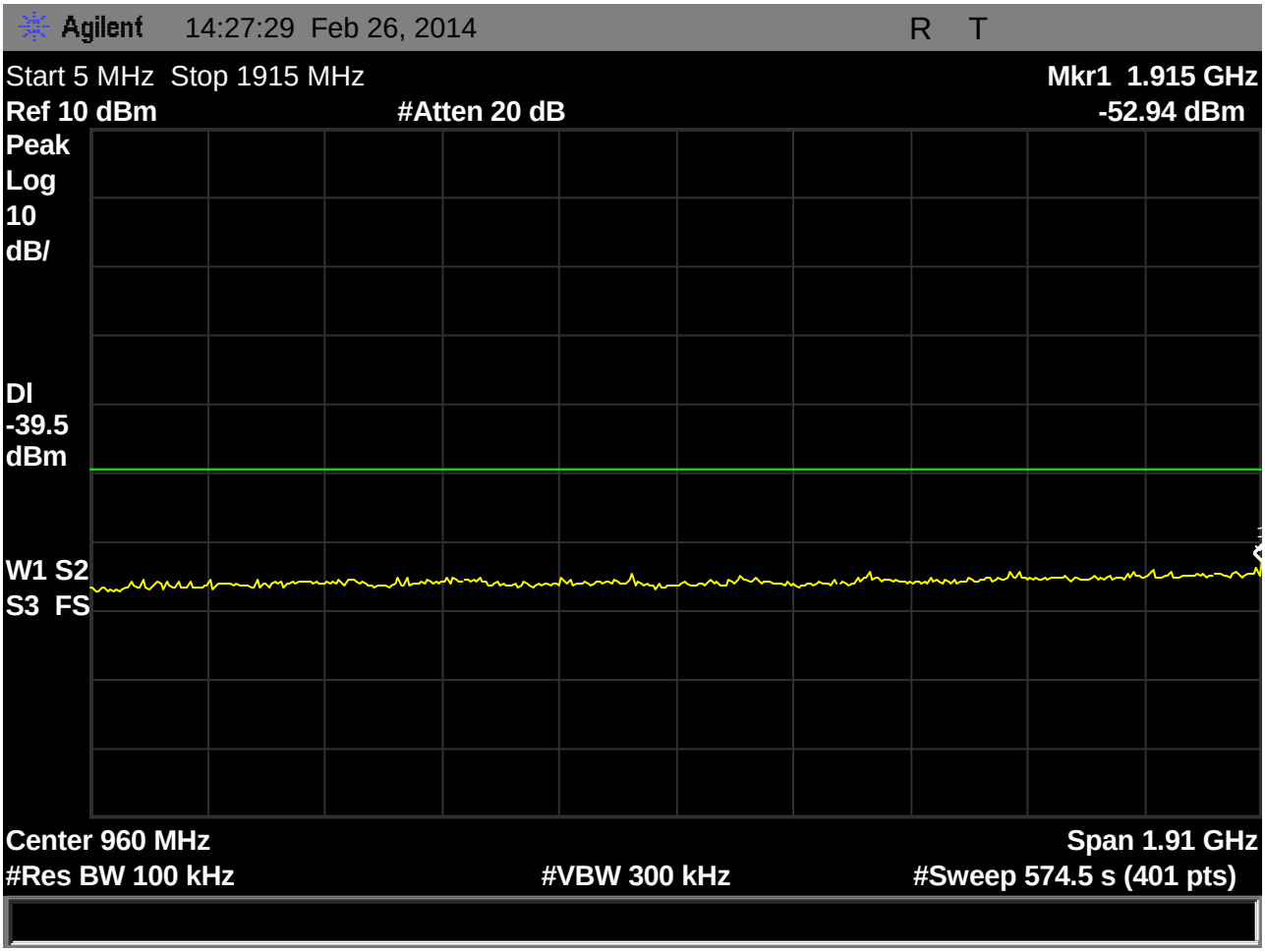


Fig. 26 – base EUT out-of-band emissions showing the region from 5MHz to 1915MHz, with the transmitter using the lowest carrier, 1921.536MHz.

This screenshot shows a sweep made with resolution bandwidth increased to 100kHz to improve sweep time. Base EUT margin to the -39.5dBm out-of-band emissions specification in this spectral region is 13.44dB in this region, even measured in the 10x-wider bandwidth than is in the text of the test procedure of 6.1.6.

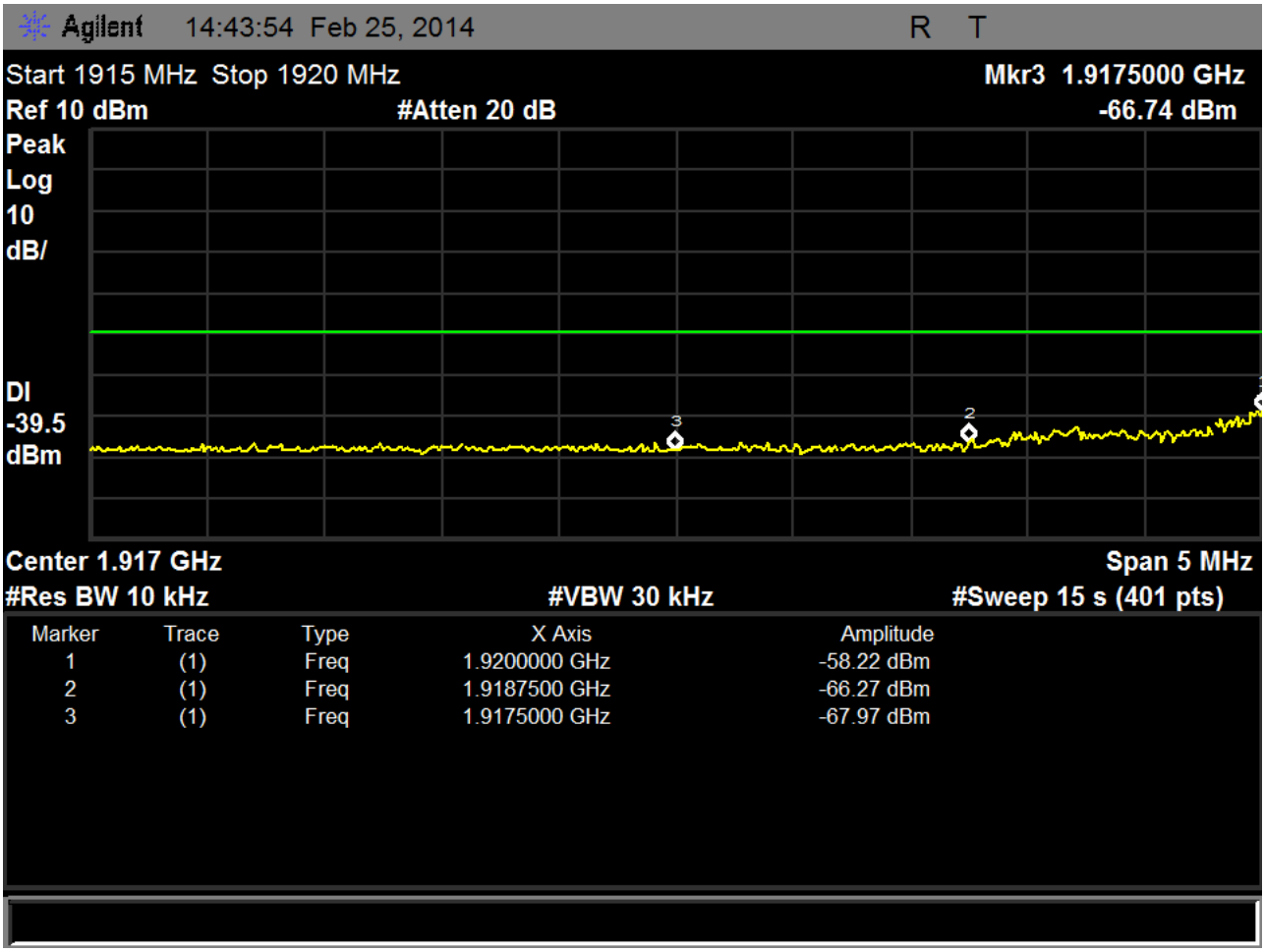


Fig. 27 – base EUT out-of-band emissions showing the regions from bandedge to -1.25MHz, and from -1.25MHz to -2.5MHz, with the base EUT transmitting on the lowest carrier, 1921.536MHz.

Margin to the specification of -9.5dBm in the region from bandedge to -1.25MHz is found at marker 1, at -58.22dBm, and is 48.72dBm.

Margin to the specification of -29.5dBm in the region from -1.25MHz to -2.5MHz is found at marker 2, at -66.27dBm, and is 36.77dB.

Margin to the specification of -39.5dBm in the region outside -2.5MHz from the bandedge exceeds 25dB.

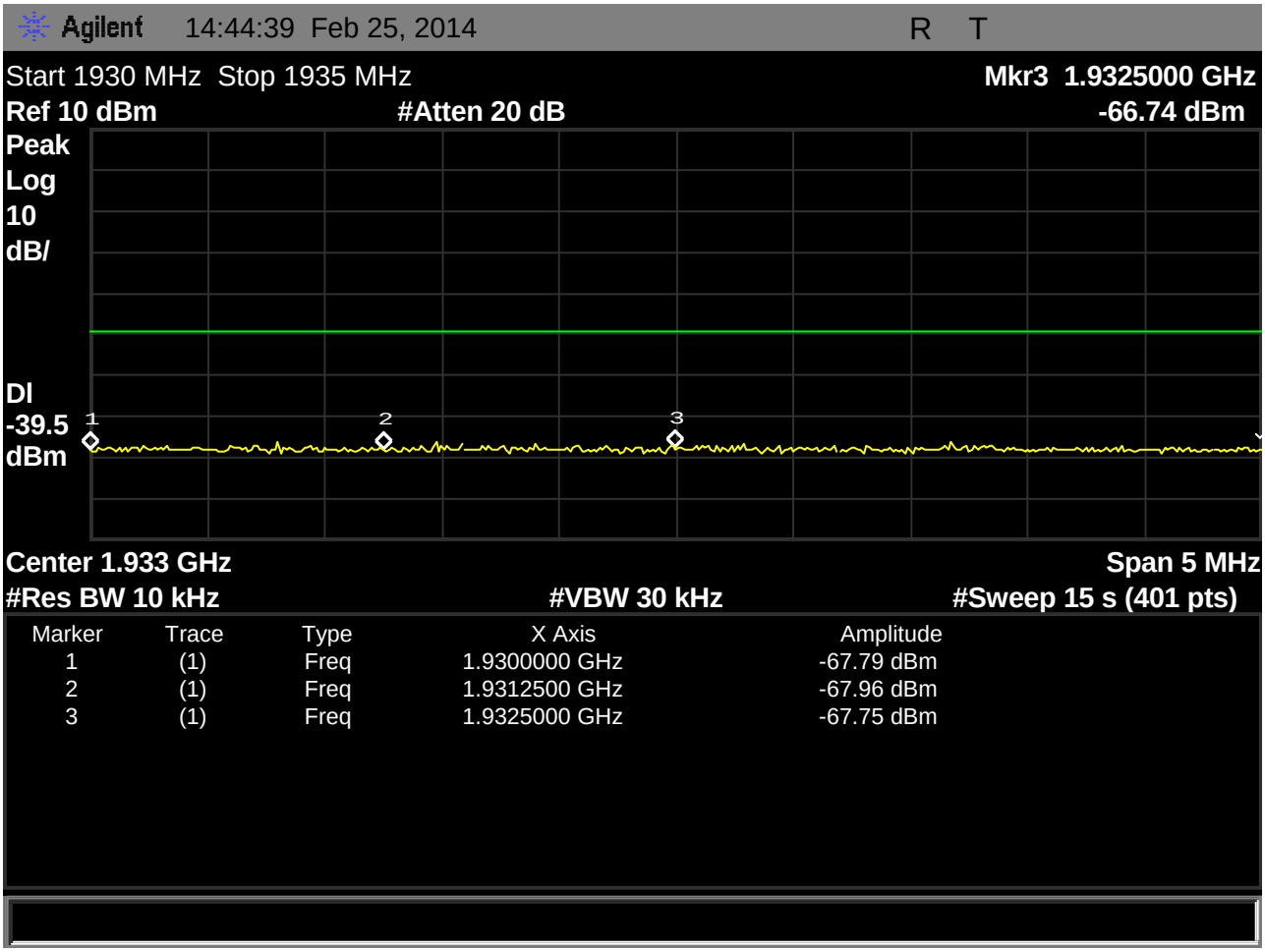


Fig. 28 – base EUT out-of-band emissions including the regions from bandedge to +1.25MHz, and from +1.25MHz to +2.5MHz, with the base EUT transmitting on the lowest carrier, 1921.536MHz

Least margin is for the -39.5dBm specification outside the +2.5MHz boundary and is 28.25dB.

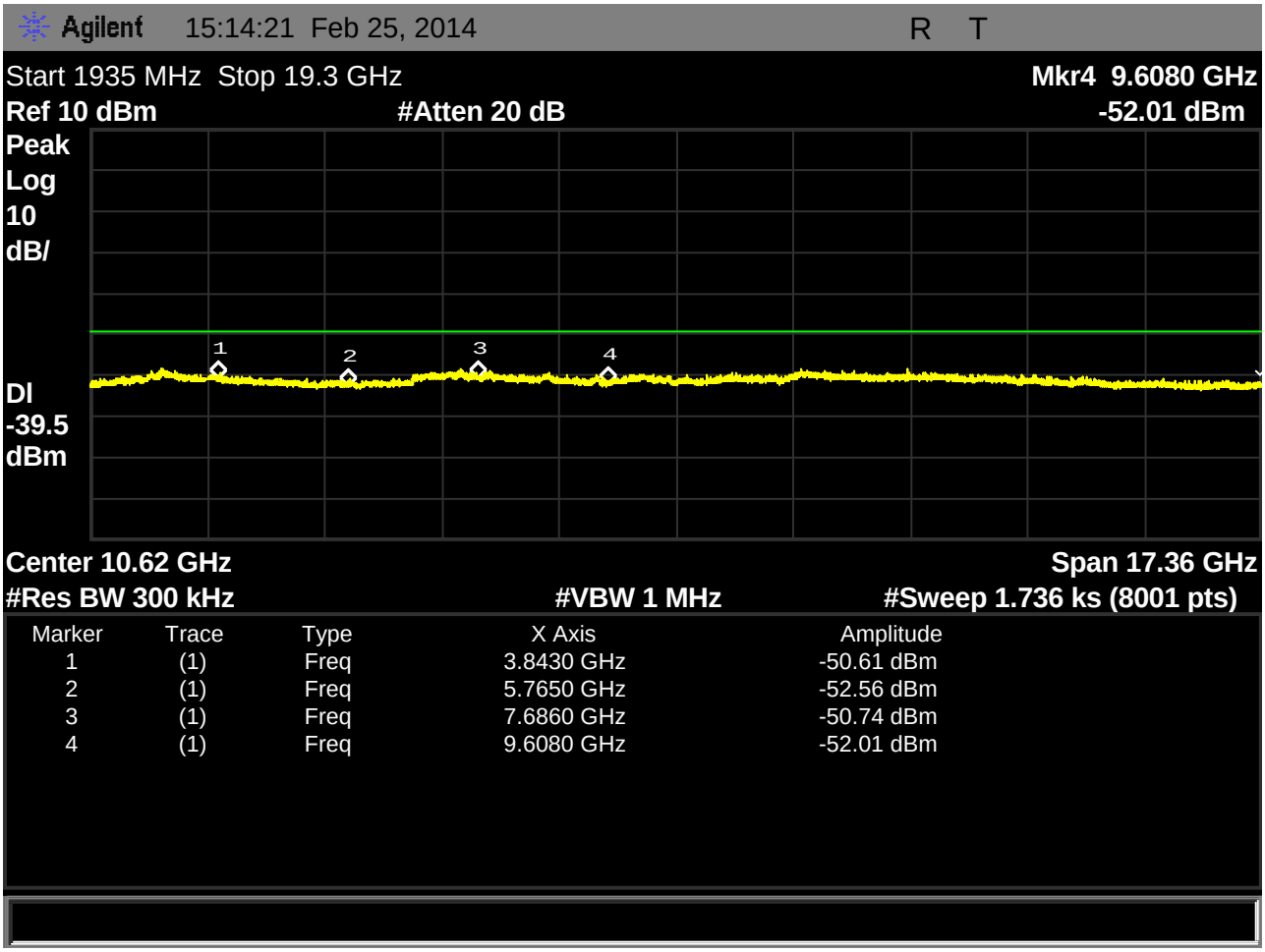


Fig. 29 – base EUT out-of-band emissions including the regions from 1935MHz to 19.3GHz with the base EUT transmitting on the lowest carrier, 1921.536MHz.

The least margin is at the 3nd harmonic of the transmitter. This measurement is made using a 300kHz resolution bandwidth in the interests of getting a manageable sweep time, 1736.5 seconds, but the 300kHz bandwidth passes considerably more unwanted emissions than the 10kHz obtained from the text of C63.17-2006 clause 6.1.6. Even so, the margin to specification is 11.11dB. We can then re-do the test using narrow scans according to the requirements of 6.1.6 to resolve the margin in the proper measurement bandwidth.

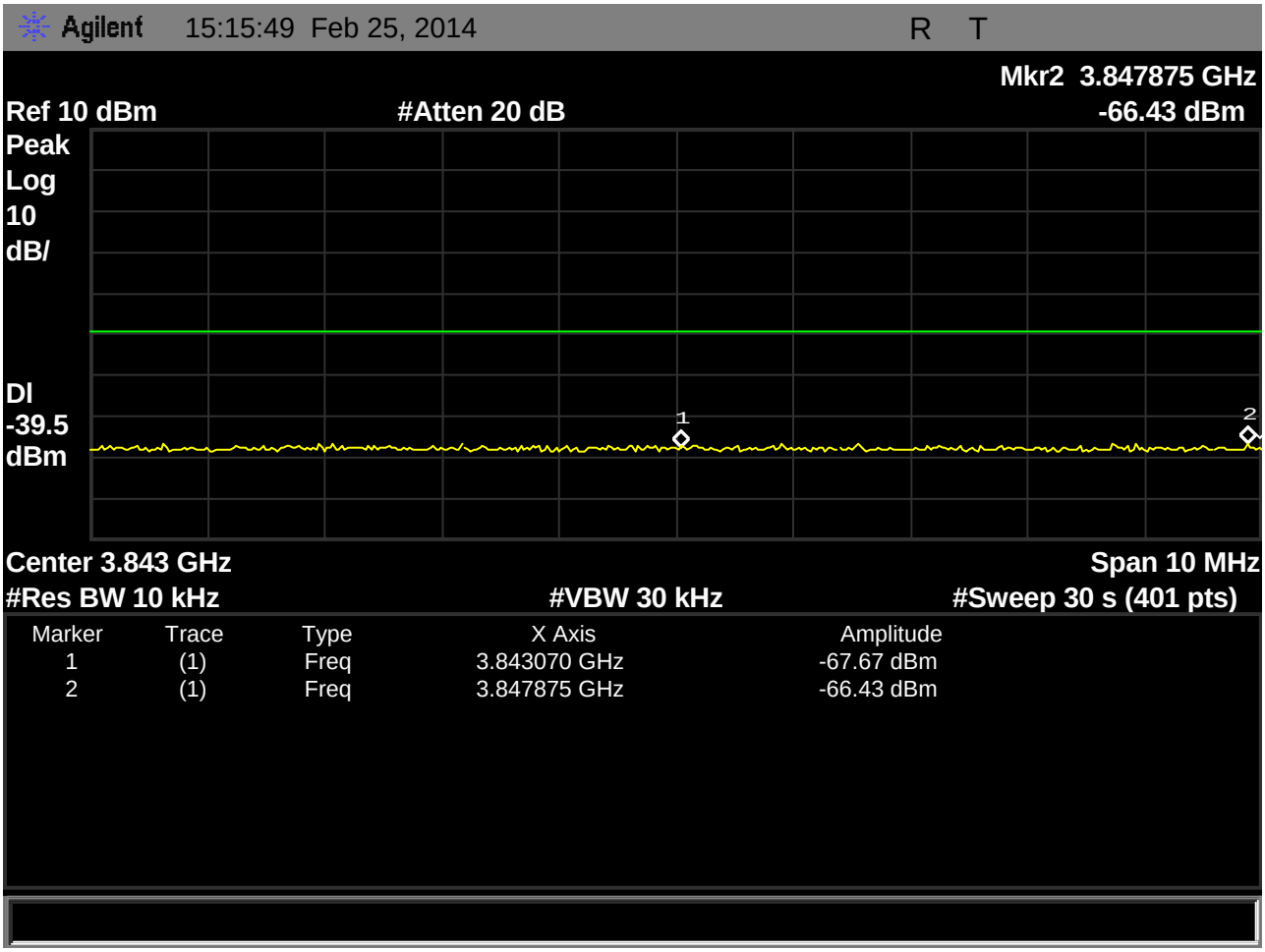


Fig. 30 – base EUT out-of-band emissions in the region around the 2nd harmonic, with the base EUT transmitting on the lowest carrier, 1921.536MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at –66.43dB, shows margin to the -39.5dBm specification of 26.93dB.

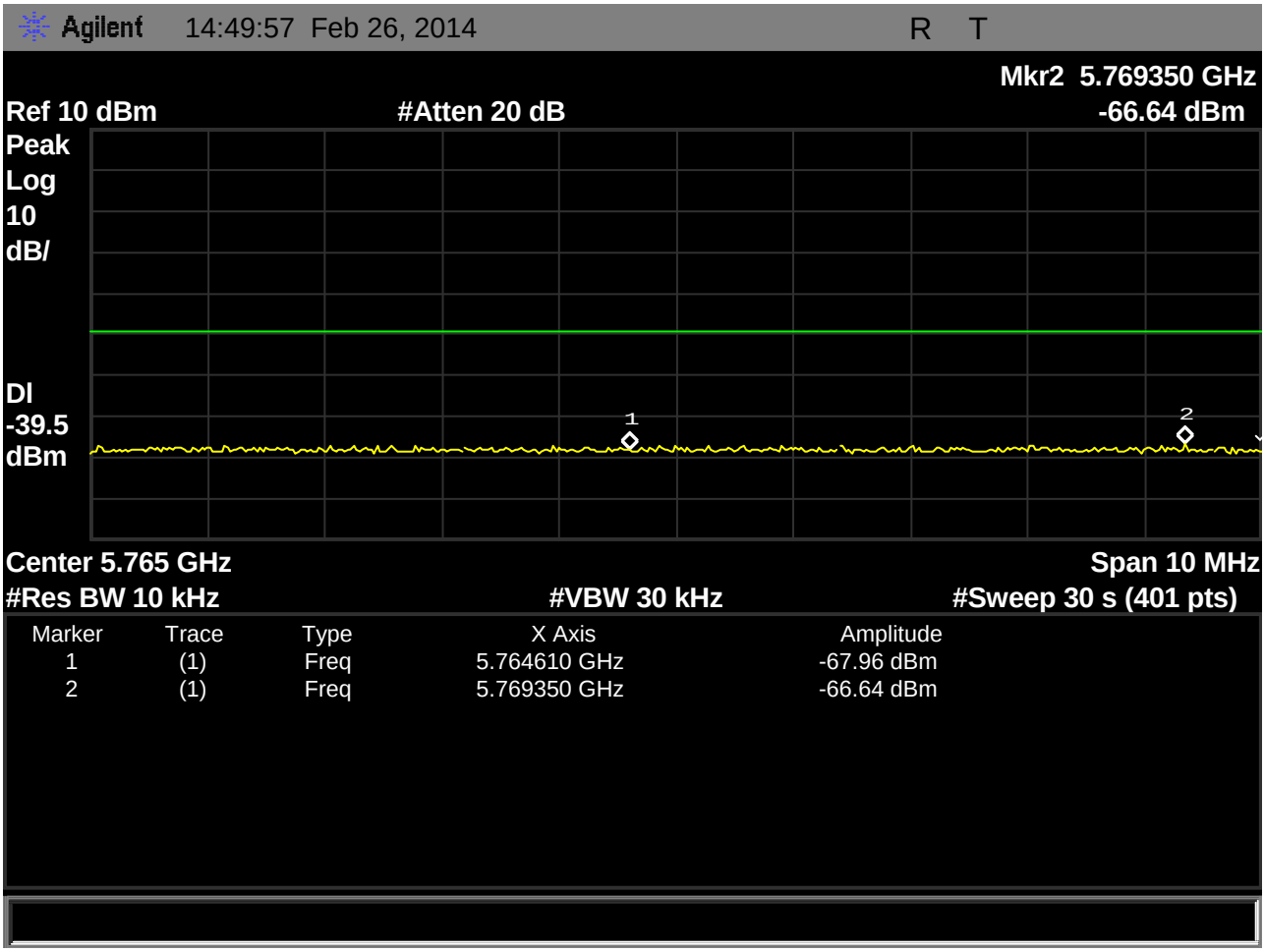


Fig. 31 – base EUT out-of-band emissions in the region around the 3rd harmonic, with the base EUT transmitting on the lowest carrier, 1921.536MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at -66.64dB, shows margin to the -39.5dBm specification of 27.14dB.

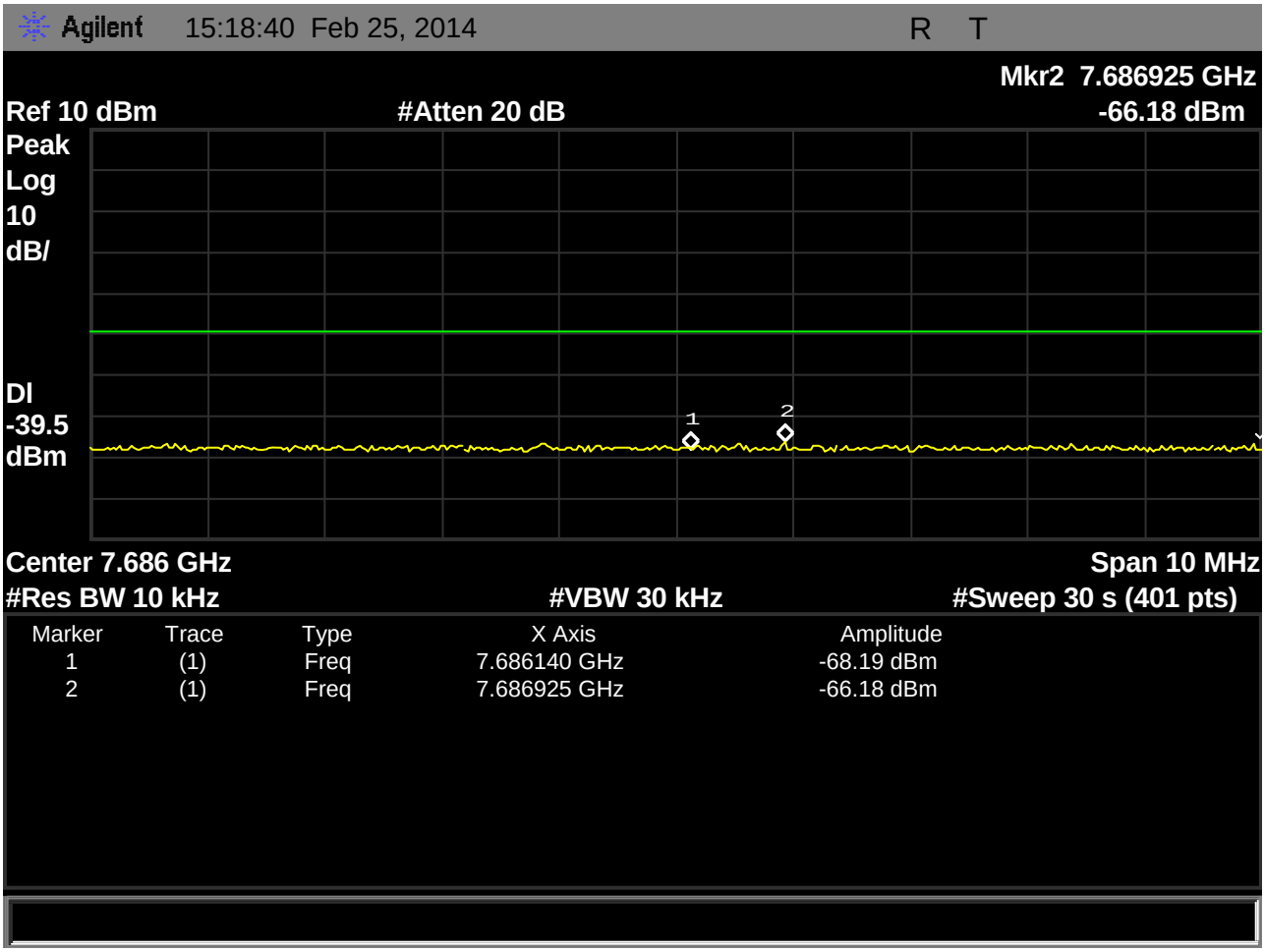


Fig. 32 – base EUT out-of-band emissions in the region around the 4th harmonic, with the base EUT transmitting on the lowest carrier, 1921.536MHz.

This measurement was made for completeness, the emissions are at the noise floor.

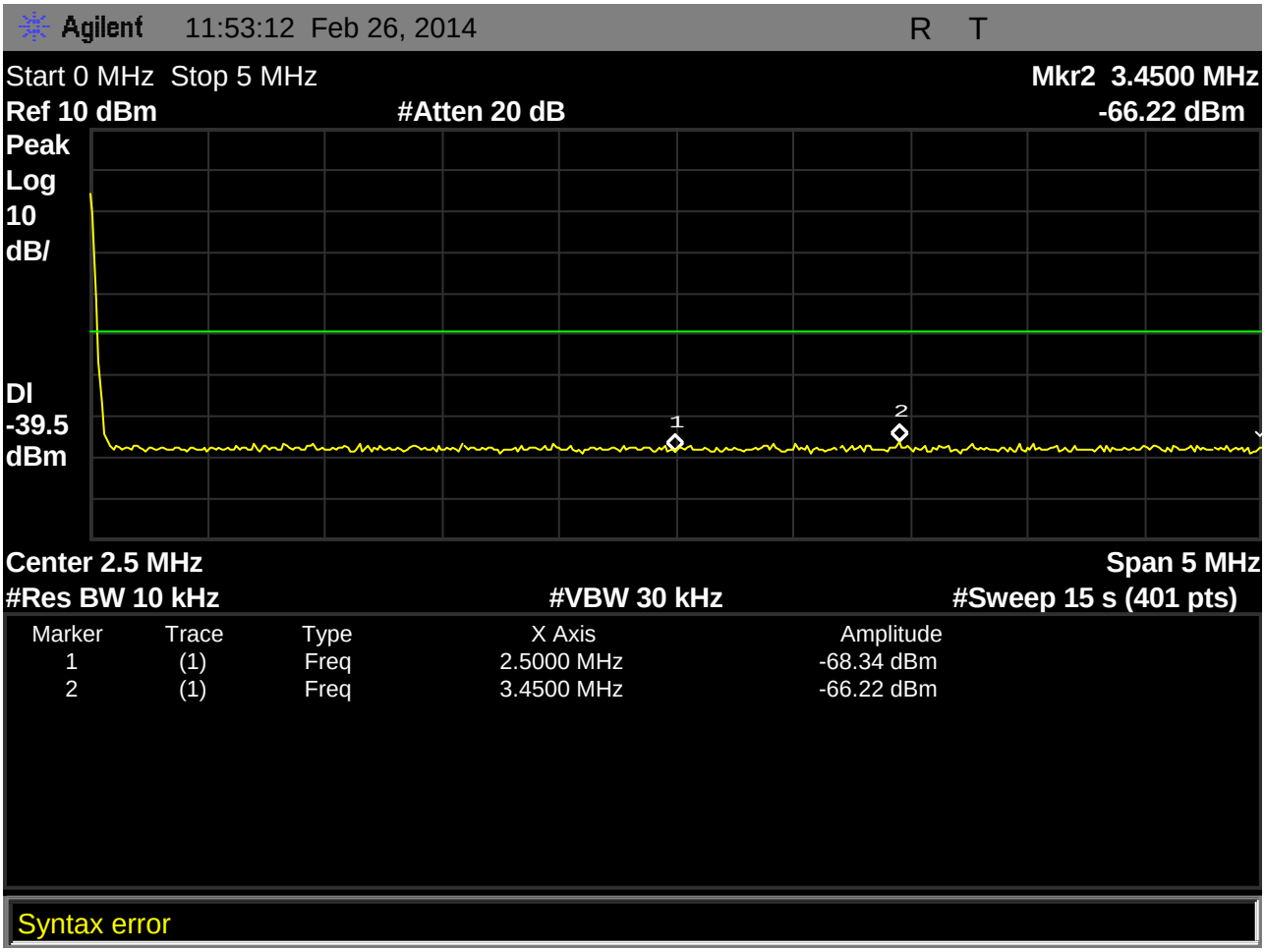


Fig. 33 – base EUT out-of-band emissions showing the regions from DC to 5MHz, with the transmitter using the highest carrier, 1928.448MHz.

This screenshot resolves the contribution made by the spectrum analyzer's DC response. Base EUT margin to the -39.5dBm out-of-band emissions specification exceeds 25dB in this region.

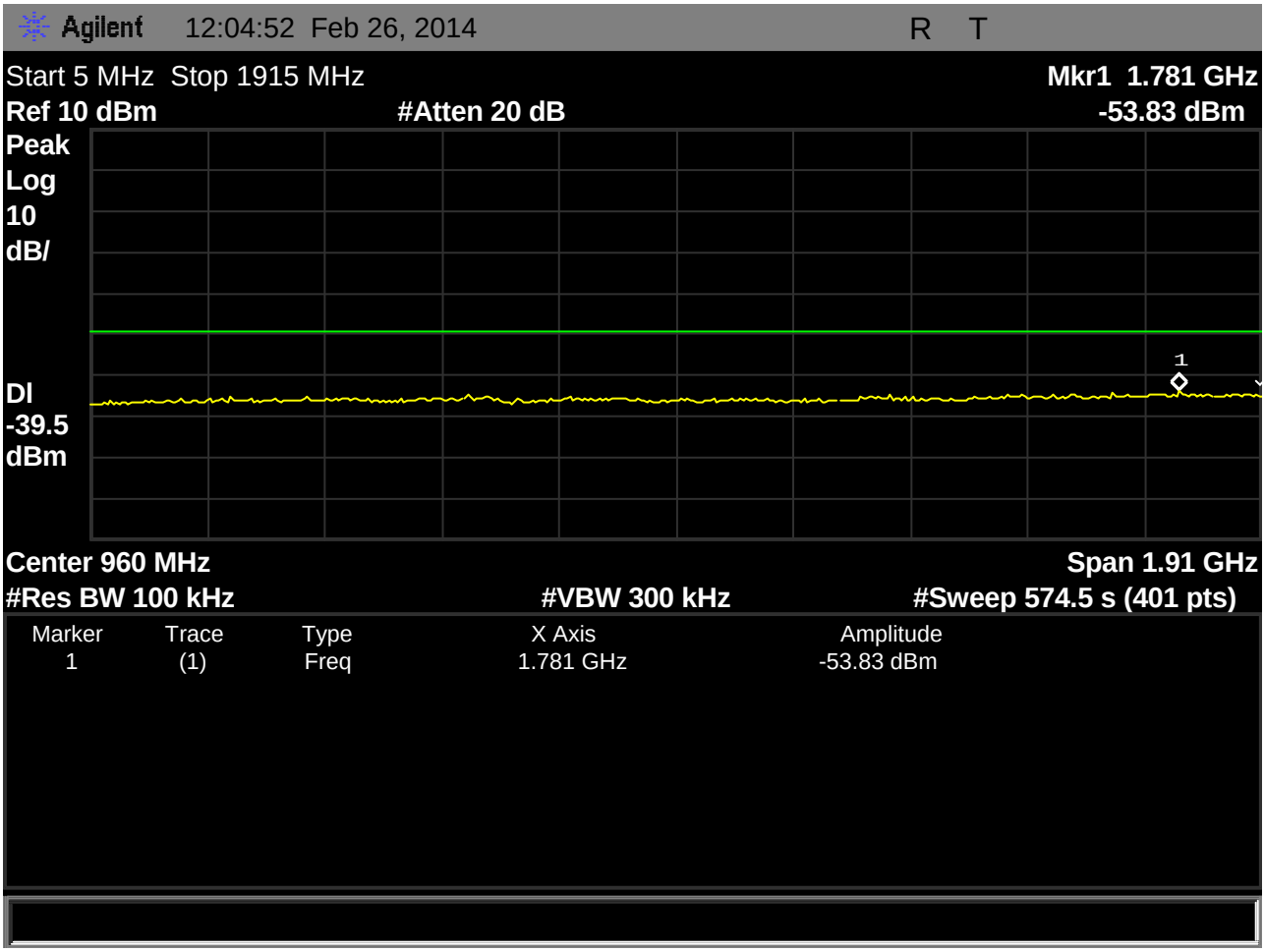


Fig. 34 – base EUT out-of-band emissions showing the region from 5MHz to 1915MHz, with the transmitter using the highest carrier, 1928.448MHz.

This screenshot shows a sweep made with resolution bandwidth increased to 100kHz to improve sweep time. Base EUT margin to the -39.5dBm out-of-band emissions specification in this spectral region is 14.33dB in this region, even measured in the 10x-wider bandwidth than is in the text of the test procedure in clause 6.1.6.

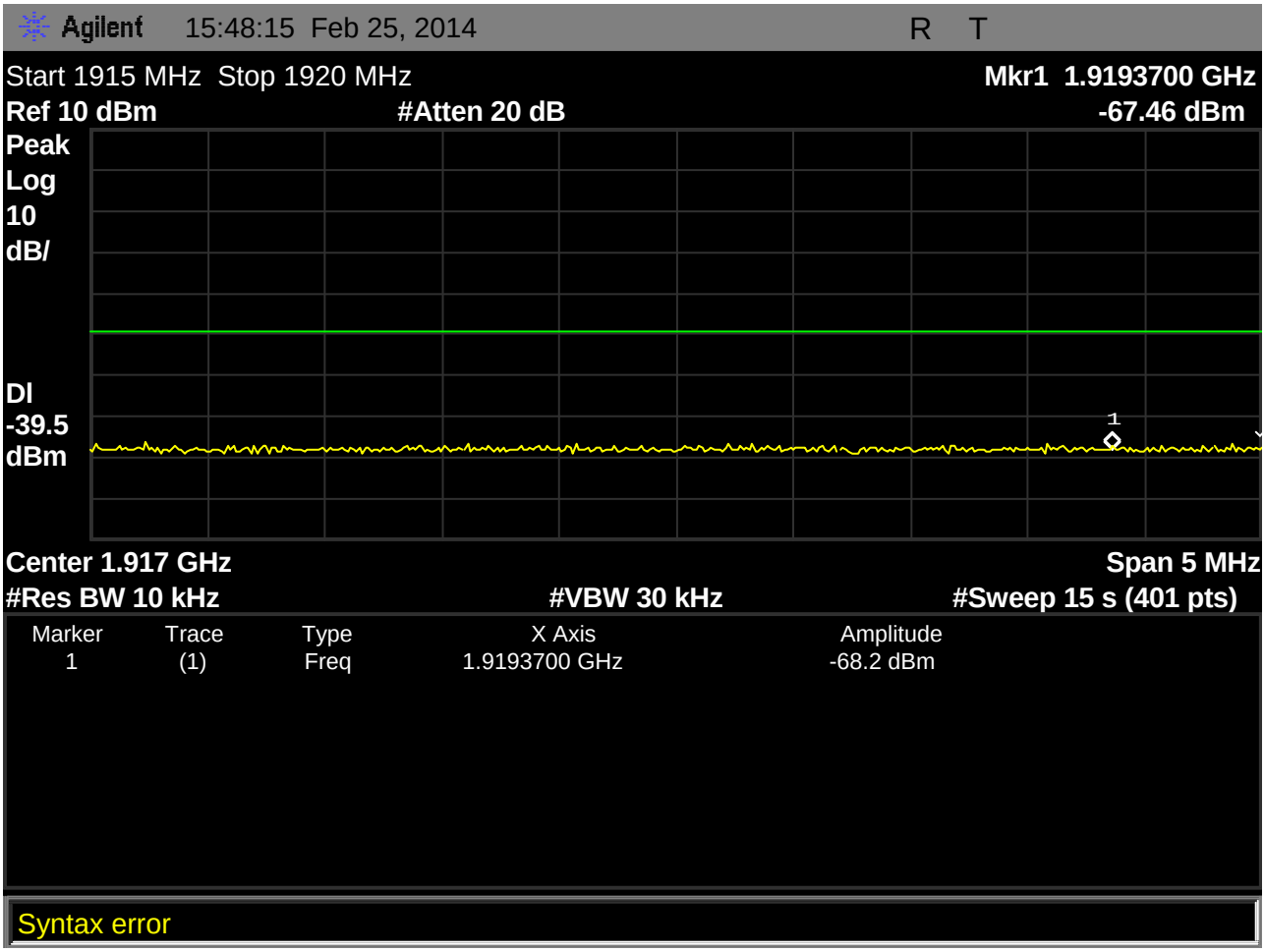


Fig. 35 – base EUT out-of-band emissions showing the regions from bandedge to -1.25MHz, and from -1.25MHz to -2.5MHz, with the base EUT transmitting on the highest carrier, 1928.448MHz.

Margins to the specification of -9.5dBm in the region from bandedge to -1.25MHz, to the specification of -29.5dBm in the region from -1.25MHz to -2.5MHz, and to the specification of -39.5dBm in the region outside -2.5MHz from the bandedge all exceed 25dB.

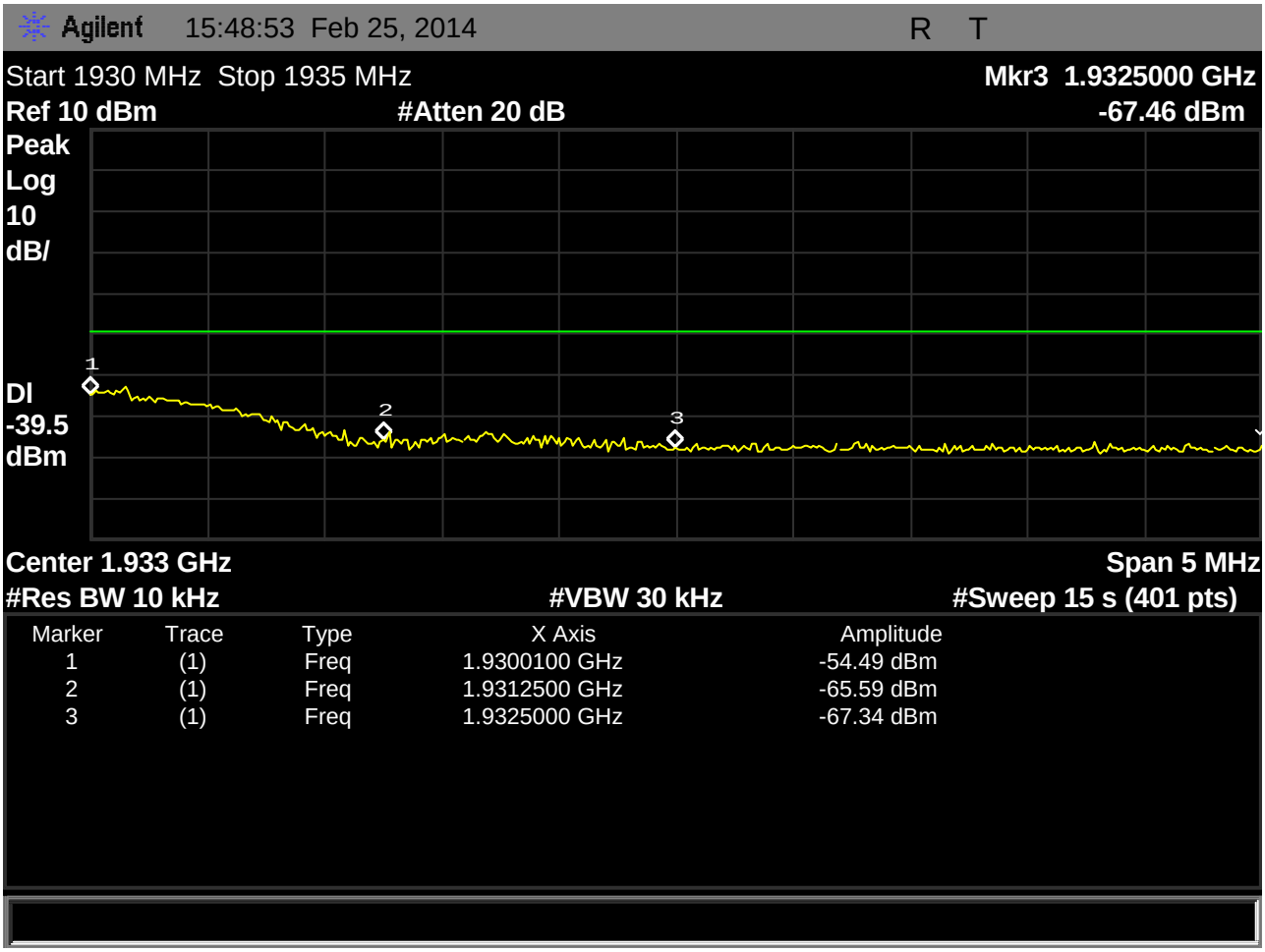


Fig. 36 – base EUT out-of-band emissions showing the regions from bandedge to +1.25MHz, and from +1.25MHz to +2.5MHz, with the base EUT transmitting on the highest carrier, 1928.448MHz.

Margin to the specification of -9.5dBm in the region from bandedge to +1.25MHz is found at marker 1, at -54.49dBm, and is 44.99.

Margin to the specification of -29.5dBm in the region from +1.25MHz to +2.5MHz is found at markers 2, at –65.59dBm, and is 36.09dB.

Margin to the specification of -39.5dBm in the region outside +2.5MHz from the bandedge exceeds 25dB

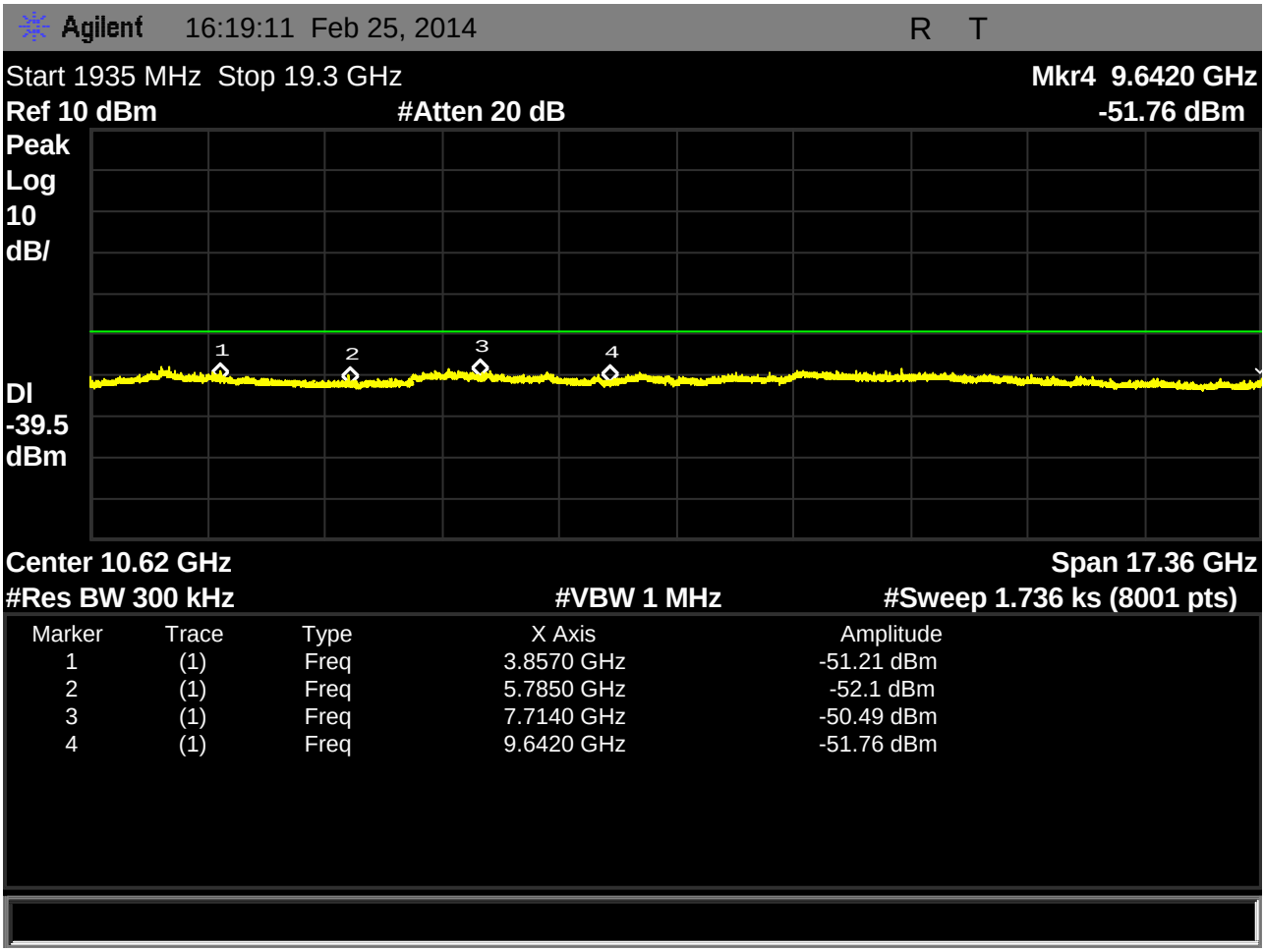


Fig. 37 – base EUT out-of-band emissions including the regions from 1935MHz to 19.3GHz with the base EUT transmitting on the highest carrier, 1928.448MHz.

The least margin is at the 3nd harmonic of the transmitter. This measurement is made using a 300kHz resolution bandwidth in the interests of getting a manageable sweep time, 1736.5 seconds; the 300kHz bandwidth over tests in that it passes considerably more unwanted emissions than the 10kHz obtained from the text of C63.17-2006 clause 6.1.6. Even so, the margin to specification is 10.49dB. We can then re-do the test using narrow scans according to the requirements of 6.1.6 to resolve the margin in the proper measurement bandwidth.

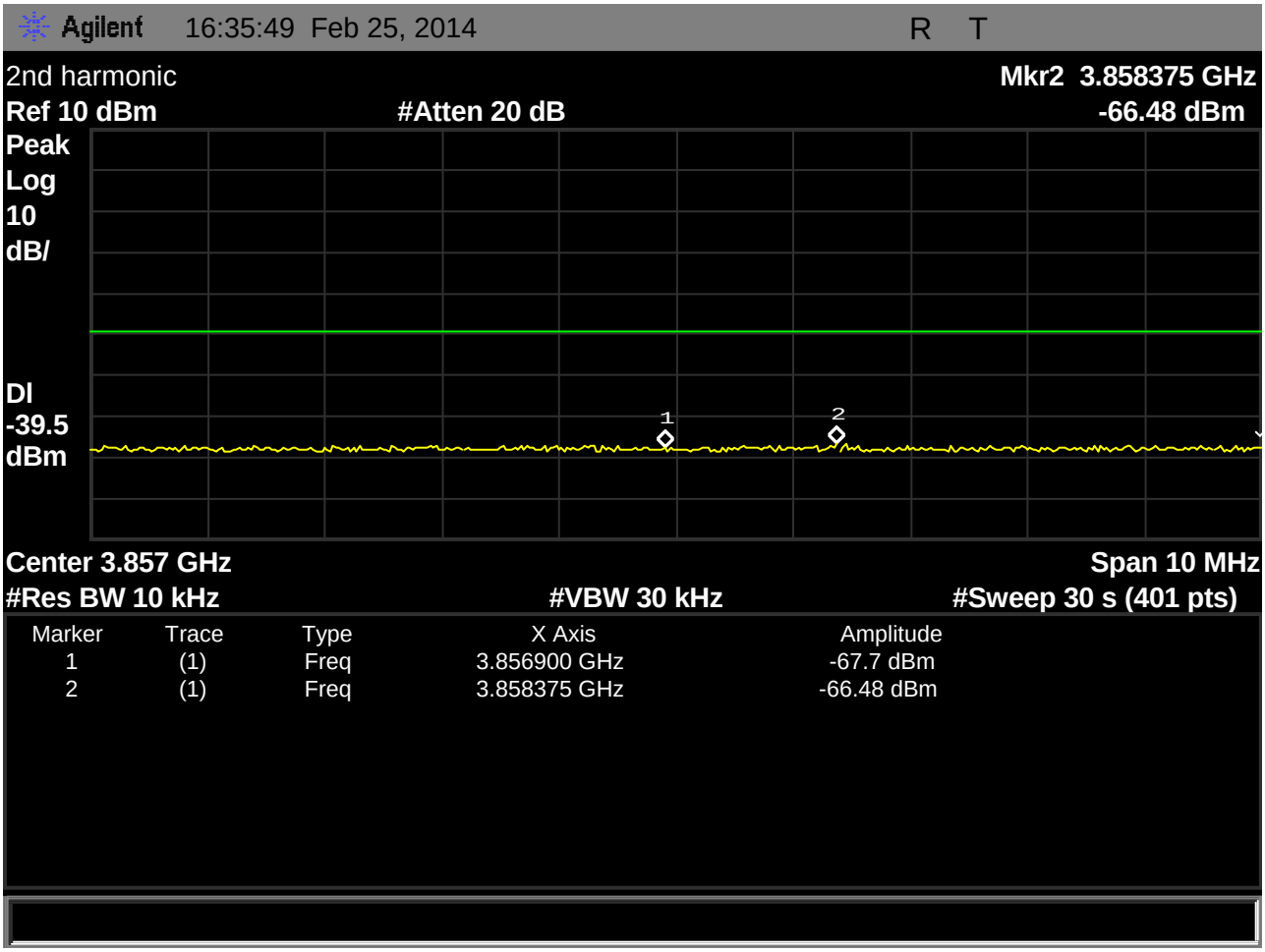


Fig. 38 – base EUT out-of-band emissions in the region around the 2nd harmonic, with the base EUT transmitting on the highest carrier, 1928.448MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at –66.48dBm, shows margin to the -39.5dBm specification of 26.98dB.

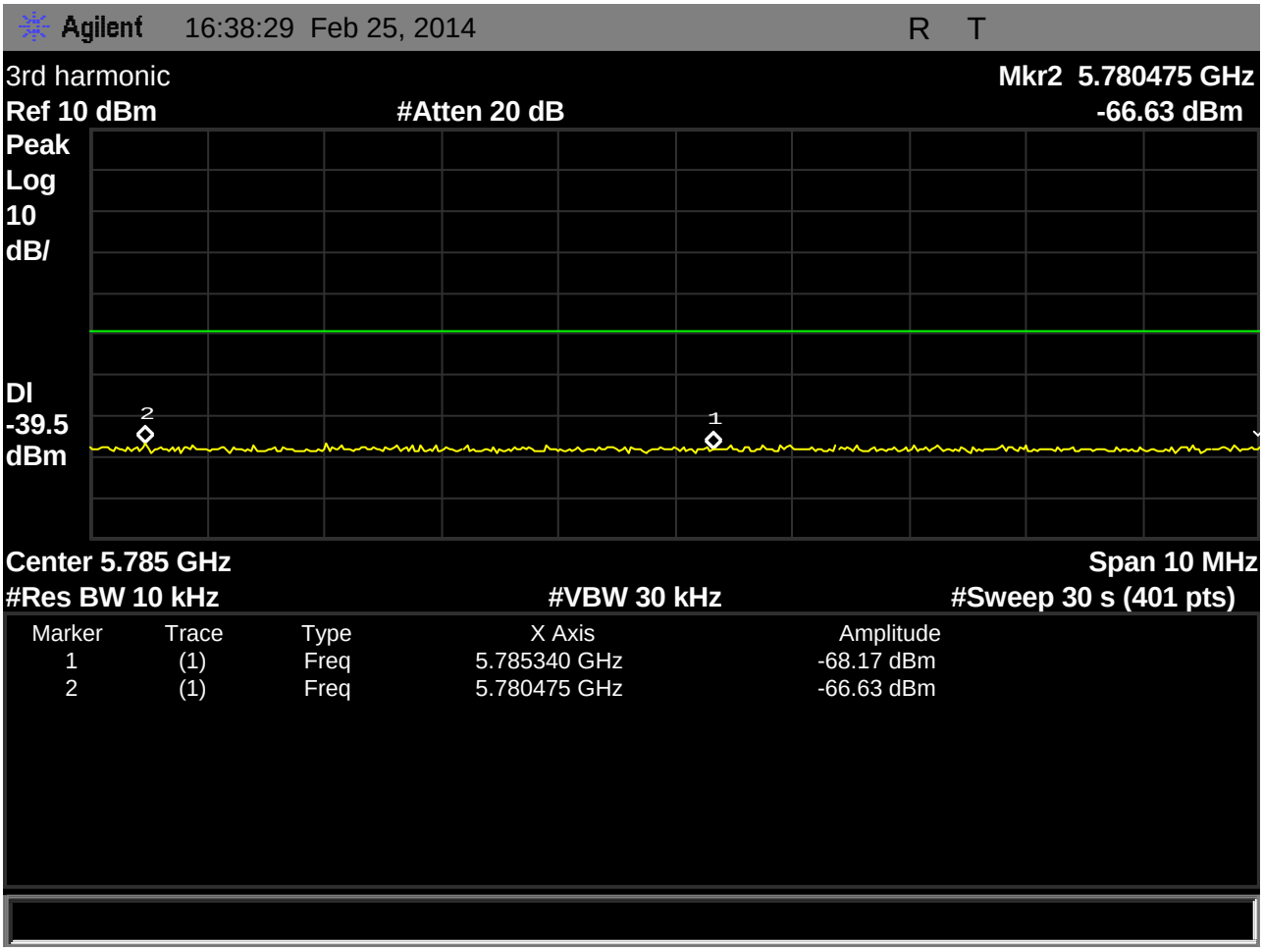


Fig. 39 – base EUT out-of-band emissions in the region around the 3rd harmonic, with the base EUT transmitting on the highest carrier, 1928.448MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at -66.63dB, shows margin to the -39.5dBm specification of 27.13dB.

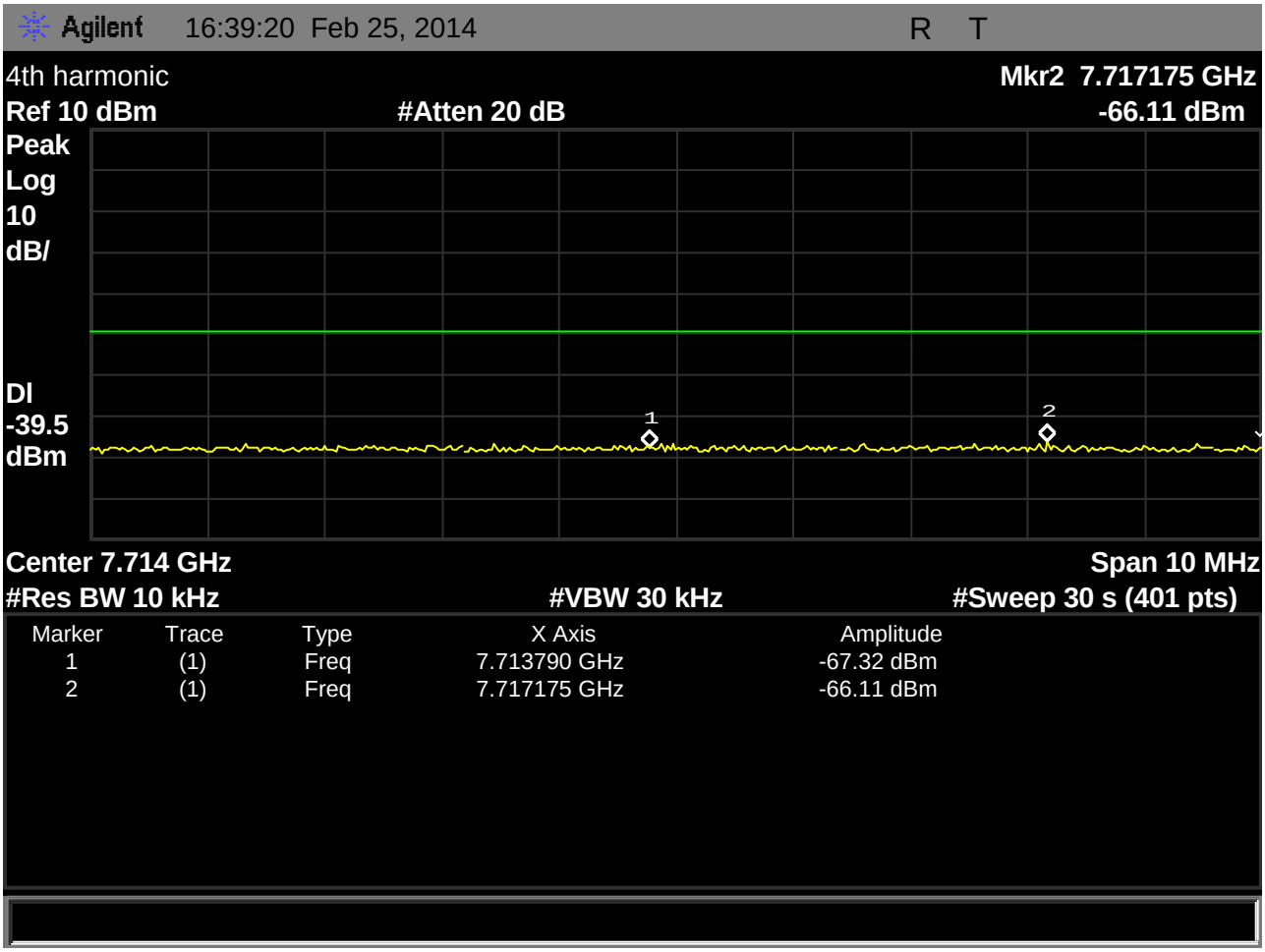


Fig. 40 – base EUT out-of-band emissions in the region around the 4th harmonic, with the base EUT transmitting on the highest carrier, 1928.448MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at -66.11dB, shows margin to the -39.5dBm specification of 26.61dB.

The base EUT meets the various out-of-band emissions requirements of clause 6.1 with worst-case margin of 26.61dB, under the worst-case conditions of transmitting on the high carrier, at the 3nd harmonic of the transmit signal.

III-B. Clause 6.2 Tests of frequency and time stability for the base EUT

The test configuration for the tests of C63.17-2006 clauses 6.2.1.1 through 6.2.1.3 and 6.2.1 through 6.2.3 is as follows:

The test platform and base EUT are configured according to test configuration #3, **Standard-specific tester, base EUT**, of section (I) of this document. The CMD60 is configured to report frequency offset with modulation removed, per the general requirements of 6.2.1. The number of transmit slots over which the measurement is made by the CMD60 is adjusted using the CONFIG MENU/TX TEST/MODULATION keystroke path. Set the number to 100 slots (bursts) to capture one second of signal, since there are 100 bursts per second, to generate one measurement of the mean value of the carrier frequency. The CMD60 measurement system calculates the mean value over each 100-slot measurement. The fixed channel used during the tests is the middle carrier, 1924.992MHz.

The particularities associated with the tests for each clause are discussed in the specific test report sections, following.

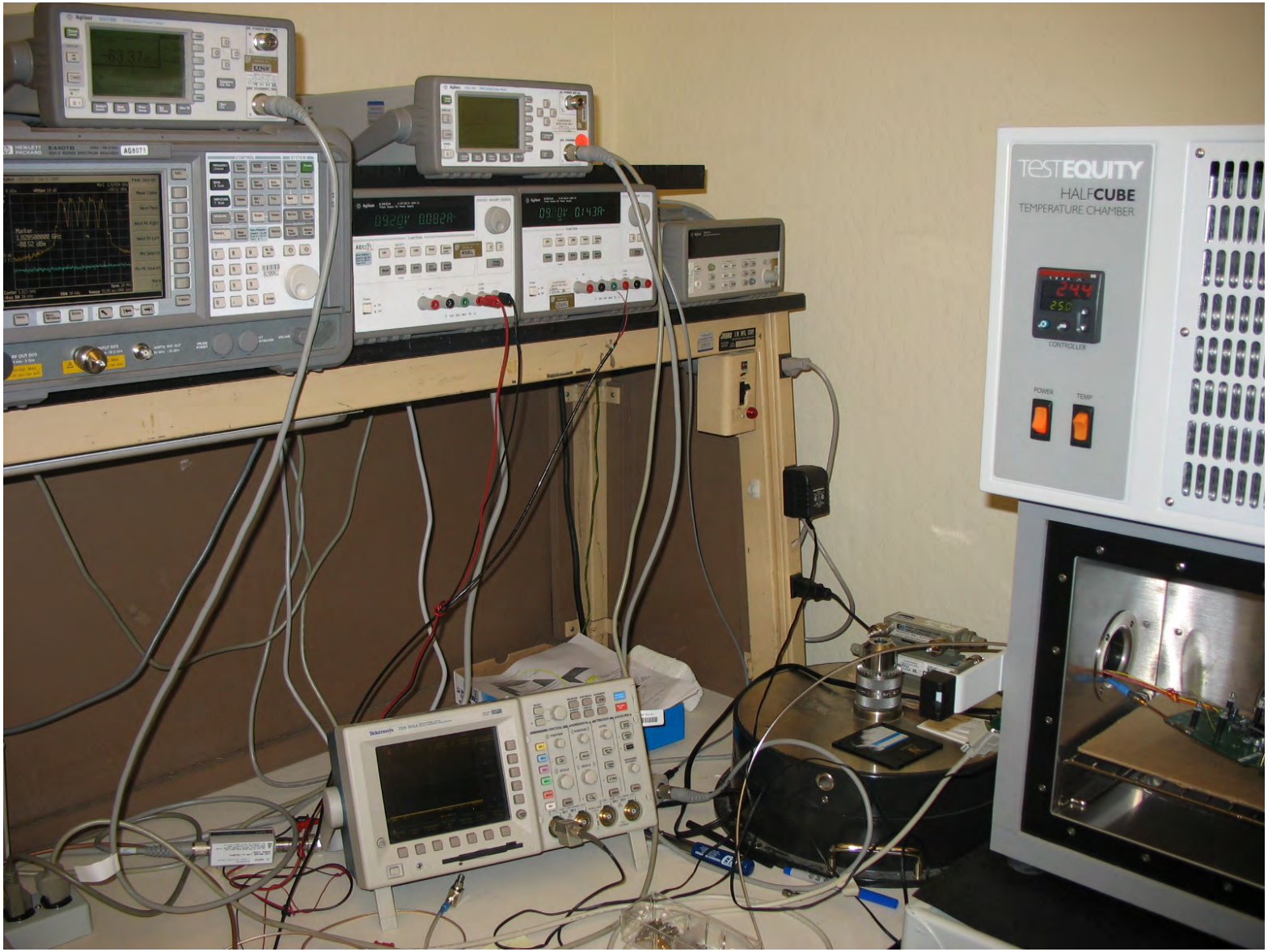
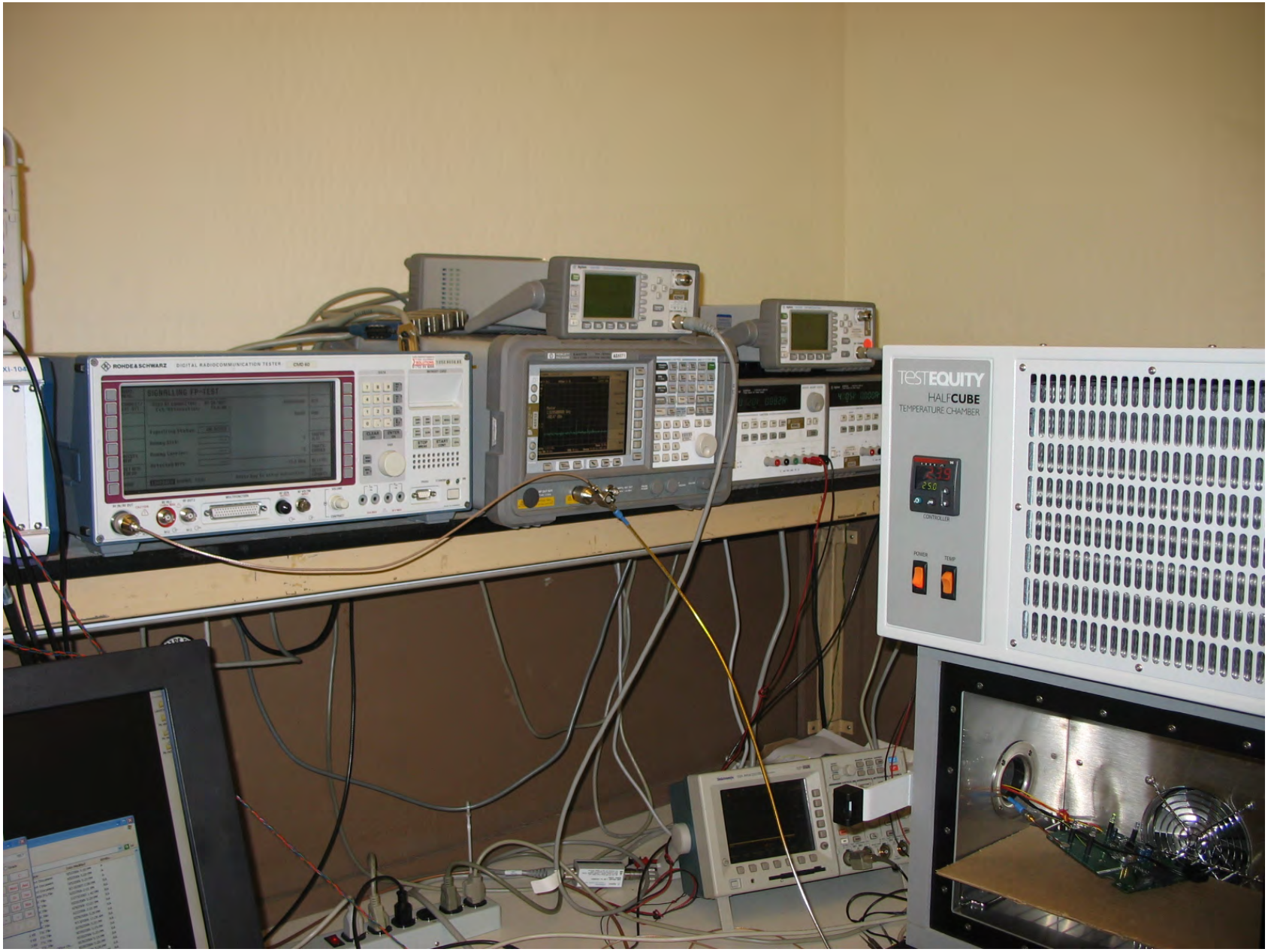


Fig. 41 - View of test system configured for the tests of clause 6.2.1 for the base EUT. EUT is in the temperature chamber at right. EUT power supply is top right-center. EUT RF cabling is connected as described in the text, to the CMD60 analyzer and the E4407B spectrum analyzer. The controller interface circuit (RS232 to CMOS levels) is directly outside the chamber egress.


RHODE&SCHWARZ
DIGITAL RADIOCOMMUNICATION TESTER
SIGNALLING FP-TEST
testEQUITY
HALFCUBE
TEMPERATURE CHAMBER
CONTROLLER
POWER
TEMP

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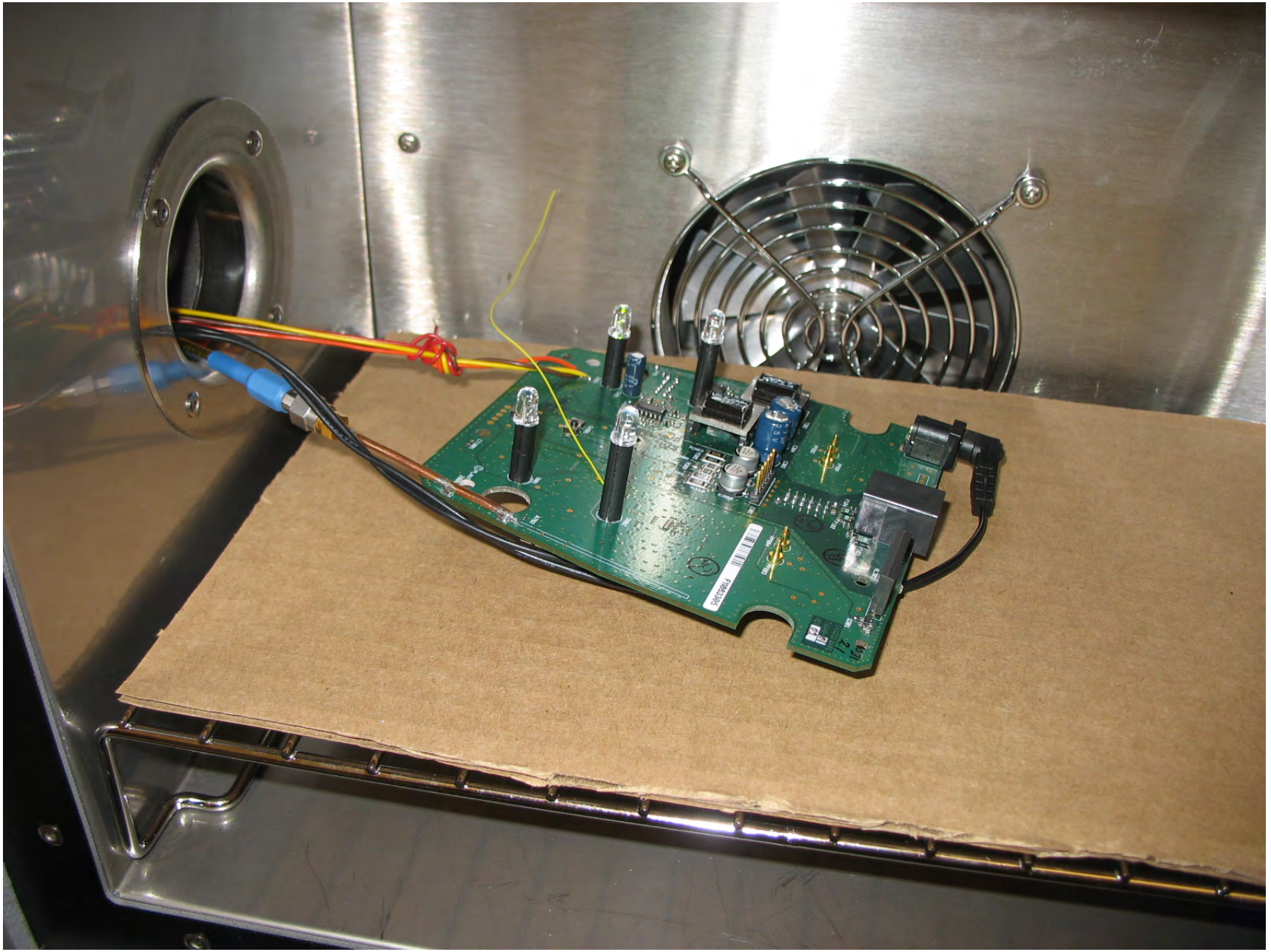


Fig. 43 - Interconnection between the base EUT and the test system; RF conducted connection, DC power supply, and control/communications bus for administrative commands

6.2.1 Carrier frequency stability, base EUT.

6.2.1.1 for the base EUT; mean carrier frequency drift with time.
The base EUT is configured as described in the introduction for the tests of clause 6.2. The EUT power supply voltage is set to 9.00V. Ambient for the EUT is set to 20C. The data collection system runs for one hour, collecting mean carrier frequency measurements and recording the peak and mean values.

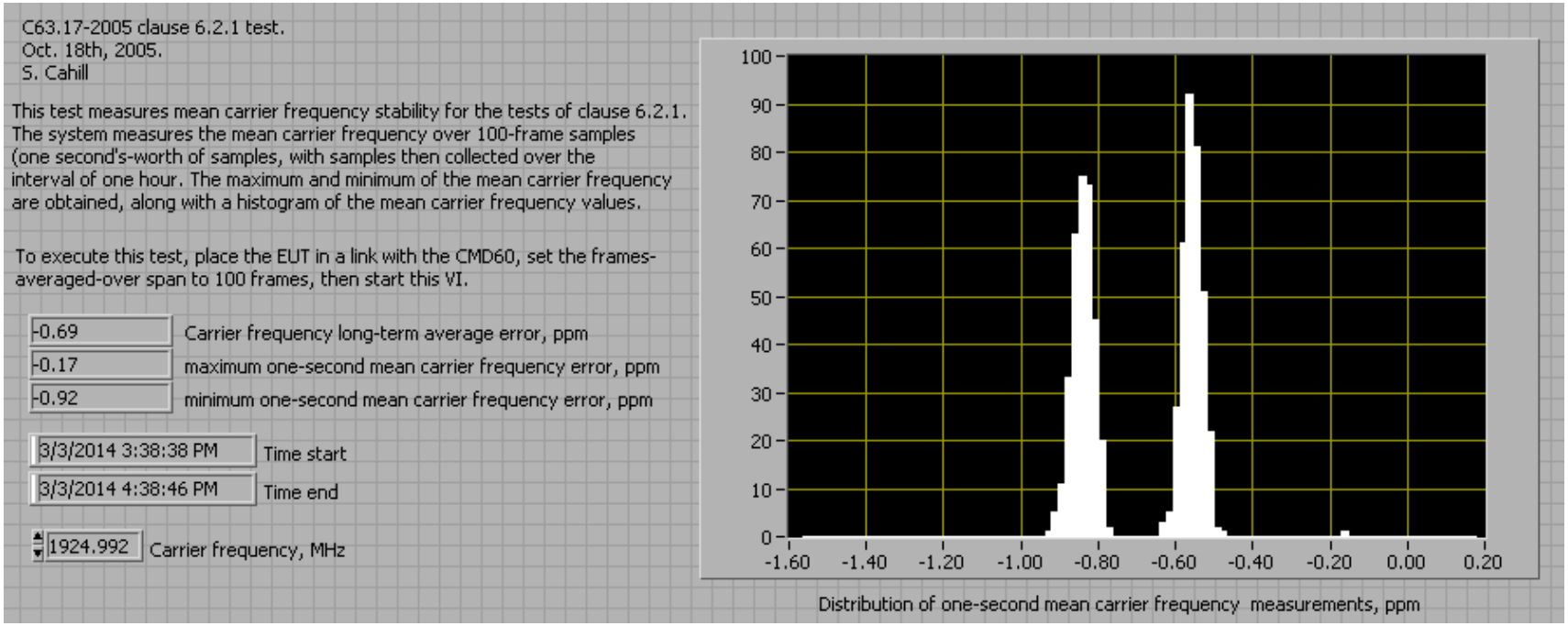


Fig. 44 - Measured one-second mean carrier frequency, base EUT, and observed maximum, average value and observed minimum of the mean carrier frequency.

The nominal mean carrier frequency error relative to 1924.992MHz is -0.69ppm.
The observed maximum is -0.17ppm, for a change relative to nominal of +0.52ppm.
The observed minimum is -0.92ppm, for a change relative to nominal of -0.23ppm.

The base EUT passes the test of clause 6.2.1.1; the mean carrier frequency is allowed to vary +/-10ppm over a one-hour test interval.

6.2.1.2 for the base EUT; mean carrier frequency change with supply voltage.
The base EUT is configured as described in the introduction for the tests of clause 6.2. The EUT ambient is set to 20C. The EUT's mean carrier frequency is measured with the power supply set to 7.65V, 9.00V, and 10.35V, 85% of nominal, nominal, and 115% of nominal.

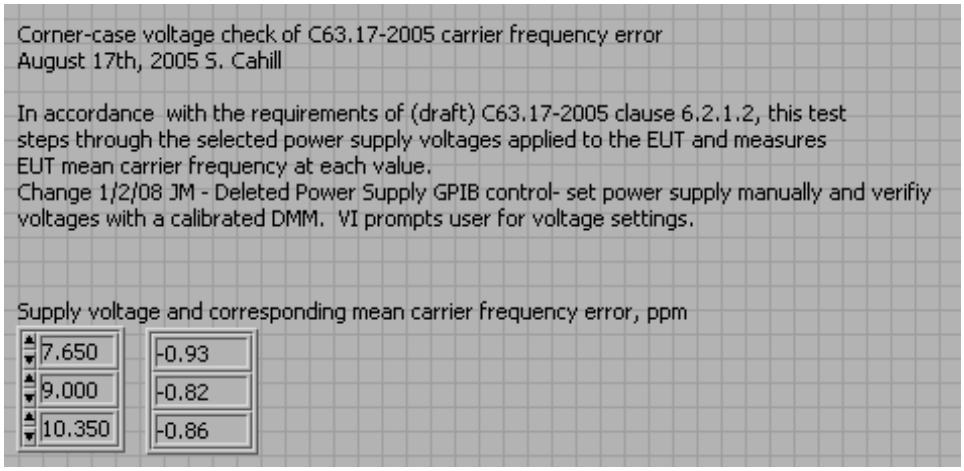


Fig. 45 - Measured mean carrier frequency, base EUT , at 85% of nominal supply voltage, nominal supply voltage, and 115% supply voltage.

The mean carrier frequency error for nominal supply voltage, relative to 1924.992MHz, is -0.82ppm.
The observed value for the error at 85% of nominal supply voltage is -0.93ppm, for a change relative to nominal supply voltage of -0.11ppm.
The observed value for the error at 115% of nominal supply voltage is -0.86ppm, for a change relative to nominal supply voltage of -0.04ppm.

The base EUT nominal carrier frequency error is insensitive to supply voltage changes over the range of 85% to 115% of nominal, and so the base EUT passes the test of clause 6.2.1.3; the mean carrier frequency is allowed to vary +/- 10ppm over the supply voltage range from 85% to 115% of nominal.

6.2.1.3 for the base EUT; mean carrier frequency change with temperature.
The base EUT is configured as described in the introduction for the tests of clause 6.2. The EUT power supply voltage is set to 9.00V. The EUT's mean carrier frequency is measured at the declared rated extremes (+4C, then +44C) and at 20C, after a 60 minute soak at each temperature.

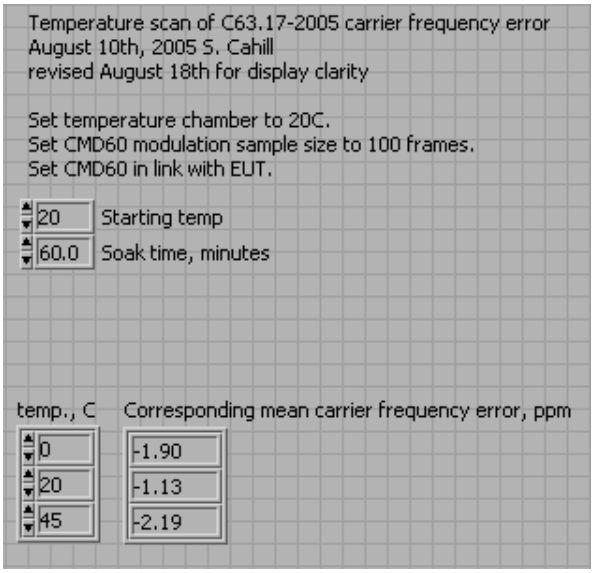


Fig. 46 - Measured mean carrier frequency, base EUT , at +4C, +20C, +44C.

The nominal mean carrier frequency error relative to 1924.992MHz is -1.13ppm.
The observed value at +4C is -1.90ppm, for a change relative to 20C ambient of -0.77ppm.
The observed value at +44C is -2.19ppm, for a change relative to 20C ambient of -1.06ppm.

The base EUT passes the test of clause 6.2.1.3; the mean carrier frequency is allowed to vary +/-10ppm over the declared rated temperature.

6.2.2 Frame repetition stability test for the base EUT:

The base EUT is configured as described in the introduction for the tests of clause 6.2.

The text of table 8 of 6.2.2 specifies the interval of each measurement (X, in the nomenclature used in C63.17-2006) to be as long as 1000 frames, and specifies measurements to be collected repetitively over an interval of at least one hour. For the test of 6.2.2, we obtain mean frame-repetition error measurements each over 1000 frames by configuring the CMD60 to report mean frame repetition error over 100 frames; each set of 10 responses is then averaged to derive a mean over 1000 frames, so to obtain one 1000-frame mean frame repetition error measurement. The data collection from the CMD60 is under the control of the controller PC. The data collection system runs until one hour has elapsed. From the frame repetition stability measurements the standard deviation of the frequency stability is calculated.

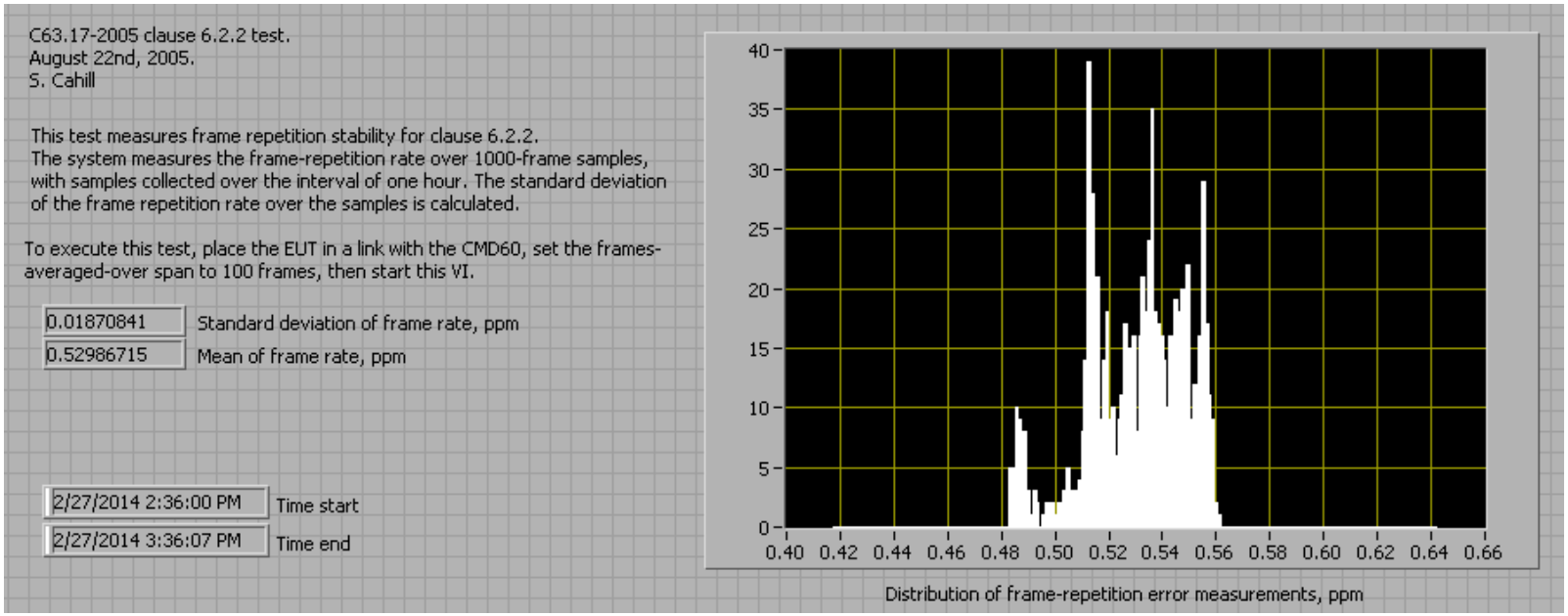


Fig. 47 - Test of base EUT according to the conditions of clause 6.2.2 for frame repetition rate stability

The measured standard deviation of the frame rate or repetition period according to the requirements of clause 6.2.2 for the base EUT is 0.01870841ppm.

The base EUT passes clause 6.2.2; the standard deviation of the frequency stability is to be such that three standard deviations of the frequency stability as measured through the error in the frame repetition rate shall not exceed 10ppm, and three standard deviations of the frequency stability for the base EUT is measured to be 0.056ppm.

6.2.3 Frame period and jitter test for the base EUT:

The base EUT is configured as described in the introduction for the tests of clause 6.2.

For the test of 6.2.3, the CMD60 is queried to report maximum and minimum frame length for two frames, for each measurement. In this way the lengths of individual frames are obtained; one is the maximum, the other is the minimum. The measurement of frame length is executed for 100,000 frames under the control of the data collection system, which runs for approximately 2 hours for each test. From the measured frame length data the standard deviation of the jitter and the maximum and minimum frame lengths are calculated according to the requirements of 6.2.3.

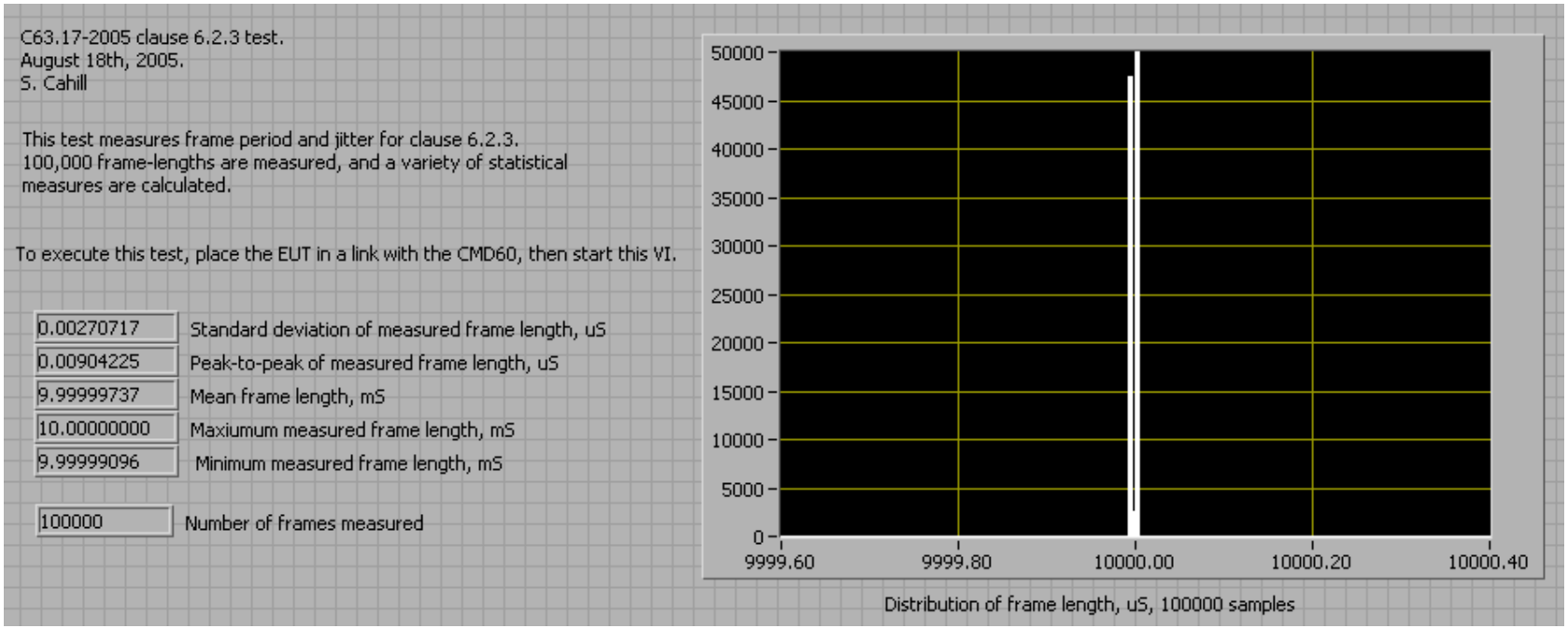


Fig. 48 - Test of base EUT according to the conditions of clause 6.2.3 for frame period and jitter.

The measured mean value of the frame period is 9.99999737mS, which is 10mS with jitter offset of 0.00263uS and three standard deviations of 0.00812151uS, totaling 0.01075uS.

The base EUT passes clause 6.2.3; the mean frame period is to be 10mS with jitter (three standard deviations) and offset totaling less than 25uS.

IV) Tests of clause 7, Base EUT

FCC rule changes have created a situation where there is no viable test in ANSI C63.17-2006 for Clause 7 and Clause 8. ANSI C63.17-2013 has incorporated the latest FCC rule changes and makes it possible to properly test devices to the current requirements of 47cfr15.323(c). ANSI C63.17-2013 procedures will be used for Clause 7 and Clause 8 tests.

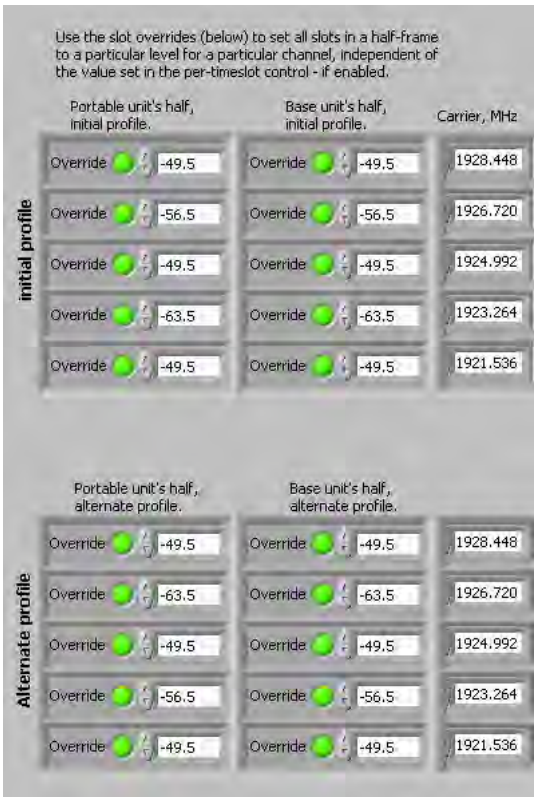
IV-A. Clause 7.3.2 LIC procedure Test, base EUT

A practical implementation of ordering LICs is to group them in bins according to measured signal strength, with generally a maximum difference between individual bin limits chosen to meet the 6 dB resolution requirement of 47CFR15.323(c)(5). With such an implementation, ordering within a bin for the lowest interference is not required, and all channels in a bin are considered equally good. The lowest bin may be the bin for "quiet" channels, and by exception has no lower bin limit, and an upper bin limit that must only be below the calculated limiting threshold. "Quiet" channels may be accessed without any LIC ordering; the limit for unordered channels must only be below the limiting threshold. The test platform uses the multi-carrier interference generator (PXI-5670), see test configuration #5.

The LIC test procedure is as follows:
a) Allow EUT transmission on only two carrier frequencies, which will be designated *f*1 and *f*2 (f_1 = 1926.720MHz and f_2 = 1923.264MHz). This limitation to carriers *f*1 and *f*2 is performed by applying by a multicarrier interference generator uniform interference on all system carriers except *f*1 and *f*2, at an in-band per-carrier level of:

1) *TL* + *UM* + 14dB for the following tests b) and c), (-49.5dBm)
2) *TL* + *UM* + 8dB for the following tests d) and e), (-55.5dBm)

b) Apply interference to the EUT on *f*1 at a level of *TL* + *UM* + 7 dB; (-56.5dBm) and on *f*2 at a level of *TL* + *UM*; (-63.5dBm). Initiate transmission. The EUT beacon should transmit on *f*2. Terminate the connection. Repeat five times.



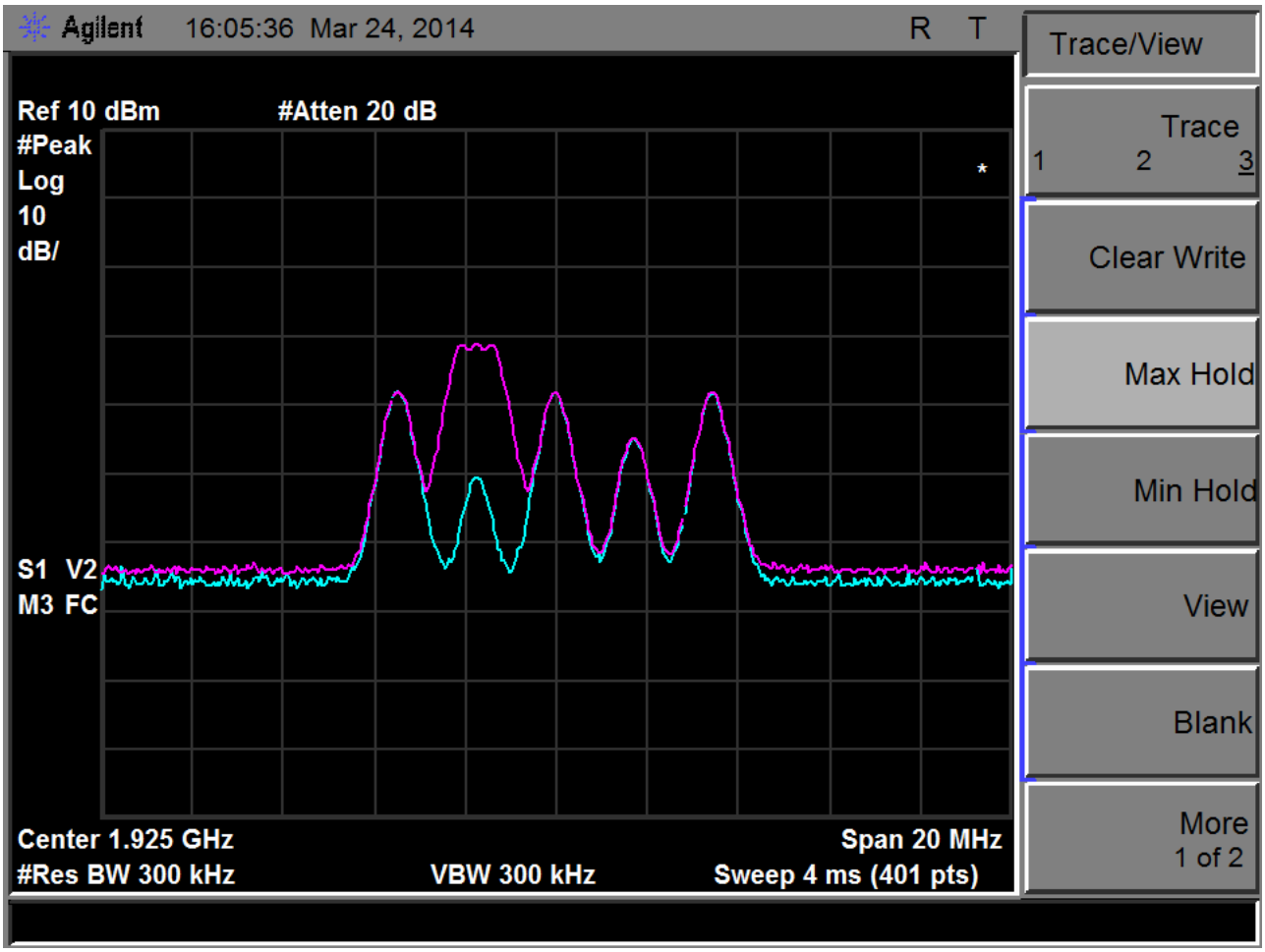


Fig. 49 - Base EUT, test 7.3.2(b). The EUT transmits only on *f*2, hence the EUT passes

Note that absolute level at the spectrum analyzer and displayed above is a consequence of the relative losses between the EUT port of the combining network and the spectrum analyzer port, relative to the multi-carrier generator port.

c) Interference applied to the EUT on *f*1 at a level of *TL* + *UM*; (-63.5dBm) and on *f*2 at a level of *TL* + *UM* + 7 dB (-56.5dBm). Initiate transmission. The EUT should transmit on *f*1. Terminate the connection. Repeat five times.

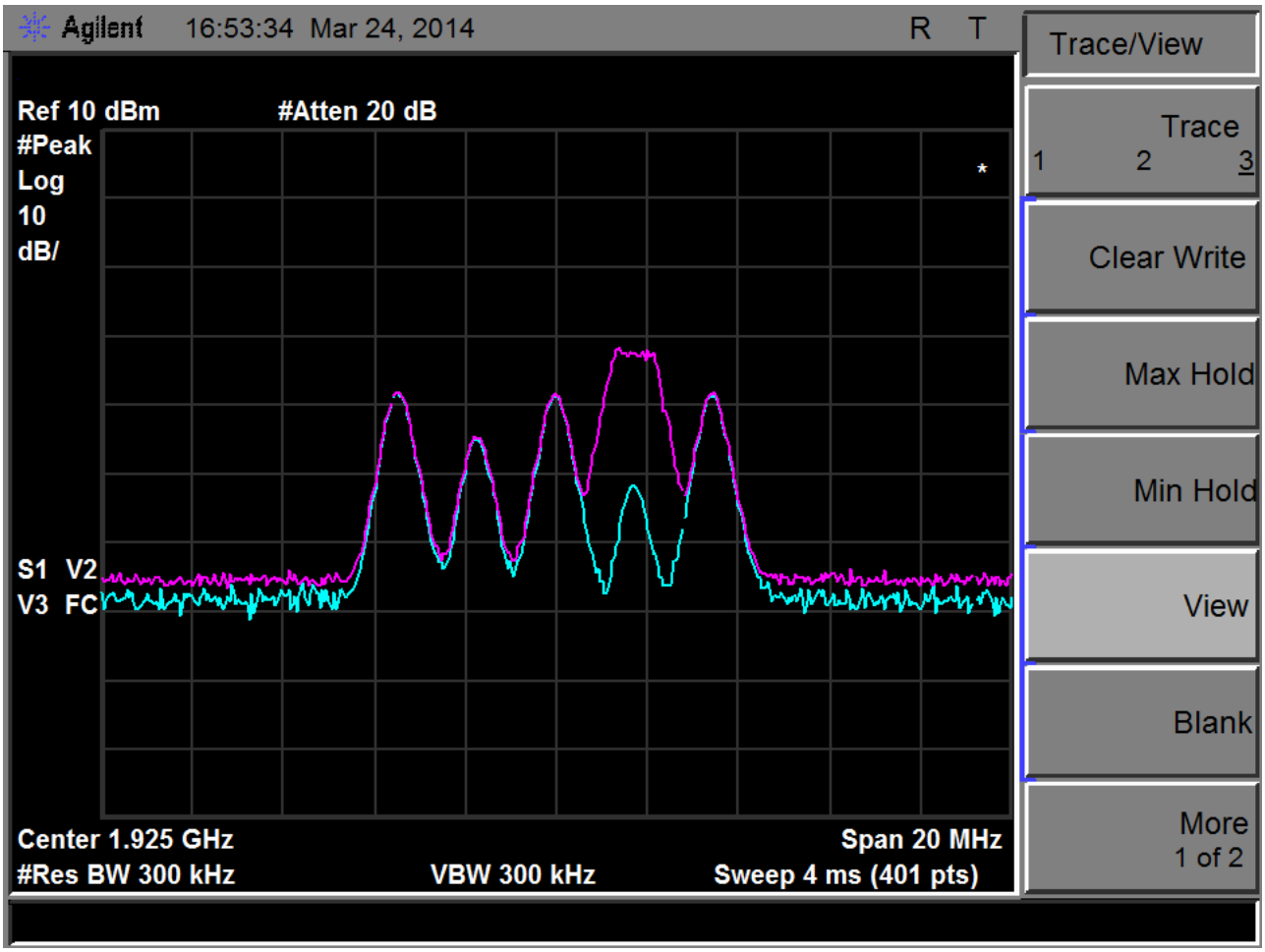


Fig. 50 - Base EUT, test 7.3.2(c). The EUT transmits only on *f*1, hence the EUT passes

d) Interference applied to the EUT on *f*1 at a level of *TL* + *UM* + 1 dB; (-62.5dBm) and on *f*2 at a level of *TL* + *UM* - 6 dB; (-69.5dBm). Initiate transmission. If the EUT transmits on *f*2, terminate the connection. Repeat five times.

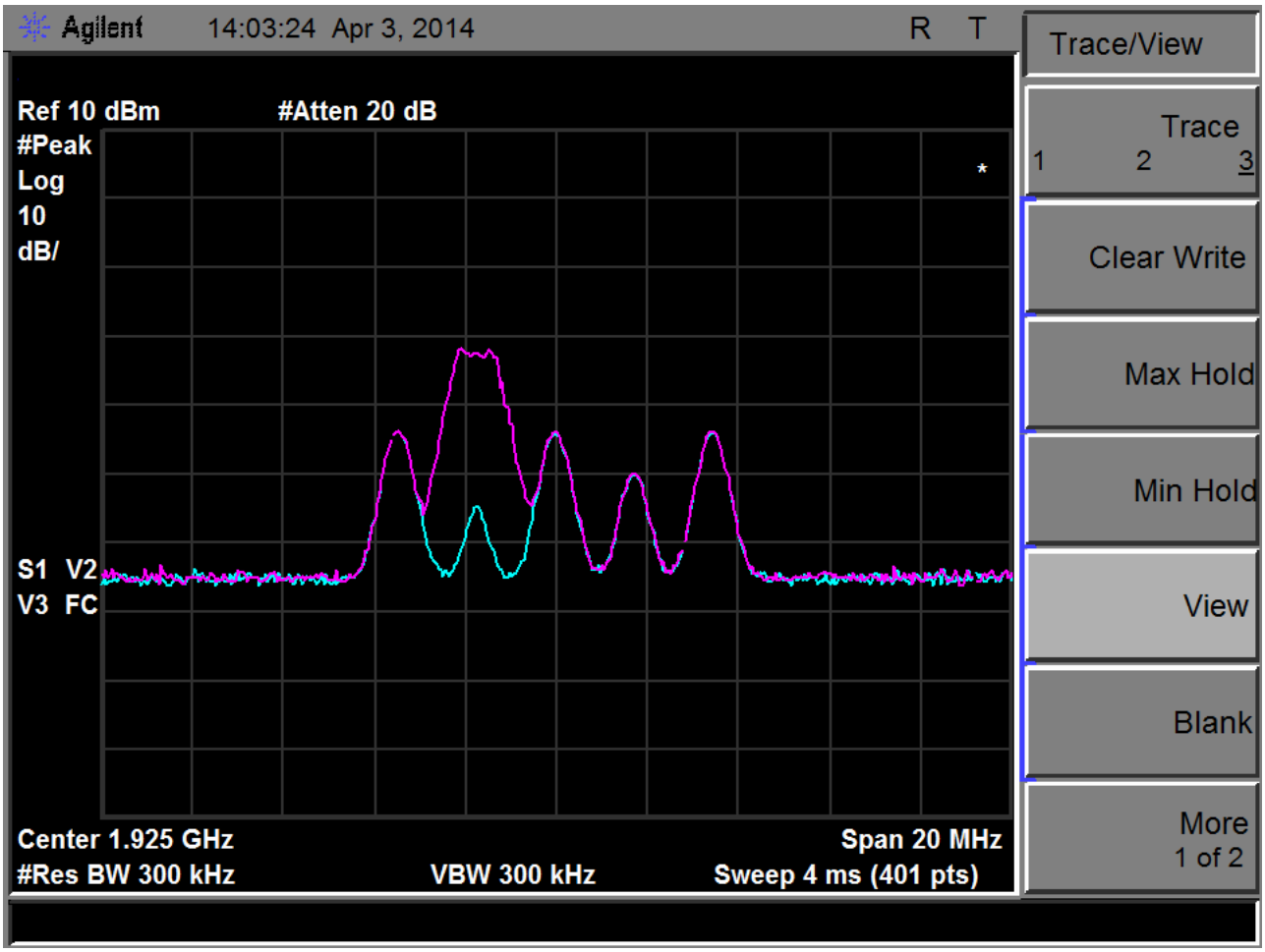


Fig. 51 - Base EUT, test 7.3.2(d). The EUT transmits only on *f*2, hence the EUT passes

e) Apply interference to the EUT on *f*1 at a level of *TL* + *UM* - 6 dB; (-69.5dBm). and on *f*2 at a level of *TL* + *UM* + 1 dB; (-62.5dBm). Initiate transmission. If the EUT transmits on *f*1, terminate the connection. Repeat five times.

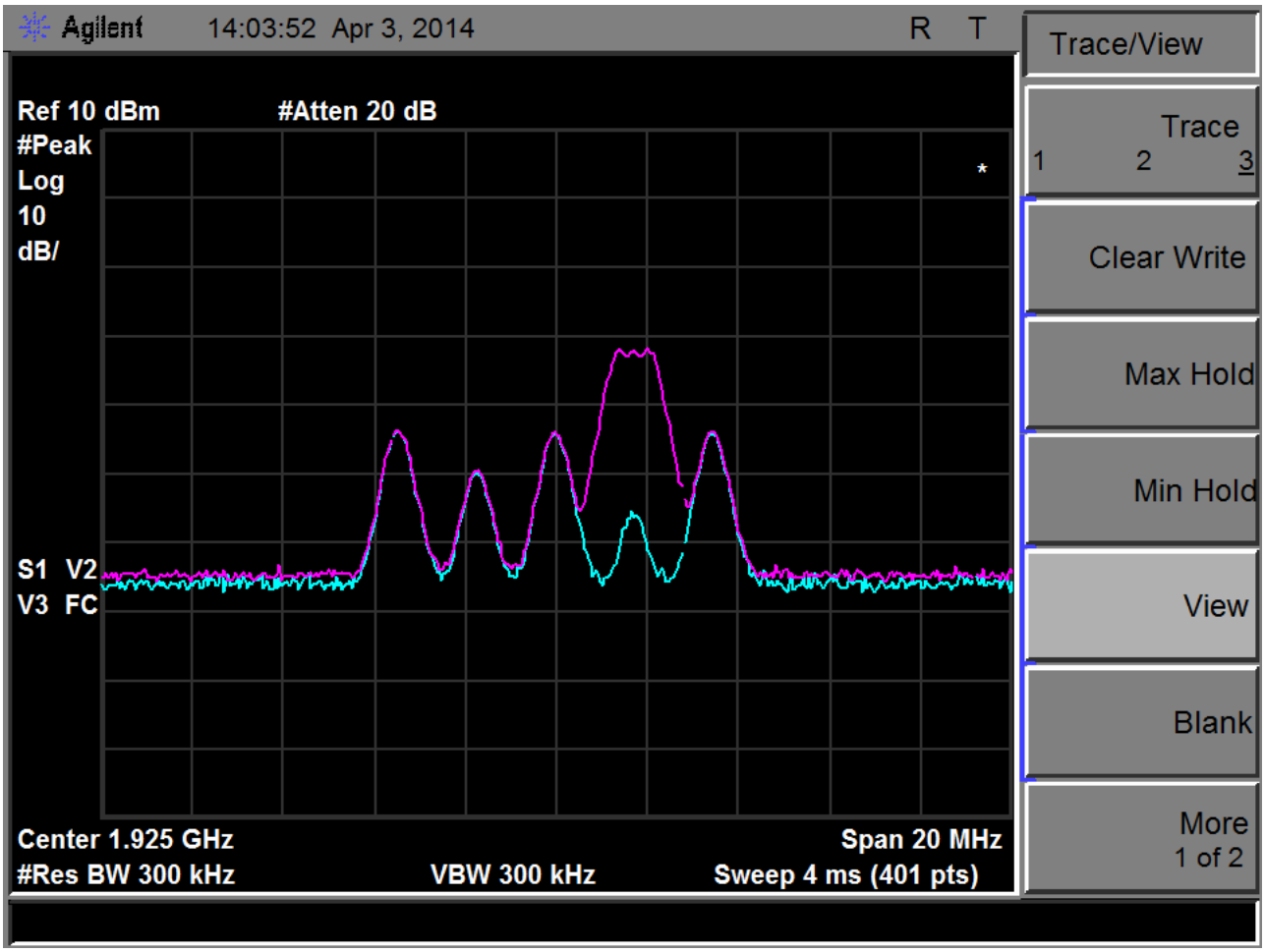


Fig. 52 - Base EUT, test 7.3.2(e). The EUT transmits only on *f*1, hence the EUT passes

IV-B. Clause 7.3.3 Selected channel confirmation, base EUT

Test is not required for the base EUT, LIC channel selection is a function of the remote EUT.
Selected channel confirmation is tested in the remote EUT section of this test record.

IV-C Clause 7.4 Threshold monitoring bandwidth Base EUT
The threshold monitoring is made through the radio receiver used by the EUT for communication, met by manufacturer declaration.

IV-D. Clause 7.5 Reaction time and monitoring interval, base EUT

The test platform, base EUT and companion remote unit are configured according to the requirements for implementing the test of 7.5(c) by means of test configuration #3, **With companion device and interference blocking, base EUT**, of section (I) of this document.

a) The multi-carrier interference generator (PXI-5670) is set to interference pulse transmissions of 50uS length, synchronized with the frame and slot timing of the base companion device and so (since the remote EUT in turn synchronizes with the base unit) with the timing of the remote EUT. Allow EUT transmission on only two carrier frequencies, which will be designated *f*1 and *f*2 with f_1 = 1926.720MHz and f_2 = 1923.264MHz. This limitation to carriers *f*1 and *f*2 is performed by applying by a multicarrier interference generator uniform interference on all system carriers except *f*1 and *f*2, at a level of *TL* + *UM* + 20 dB; (-43.5dBm) in-band per carrier. Verify that the EUT can establish a connection either *f*1 or *f*2 with no interference applied on *f*1 or *f*2.

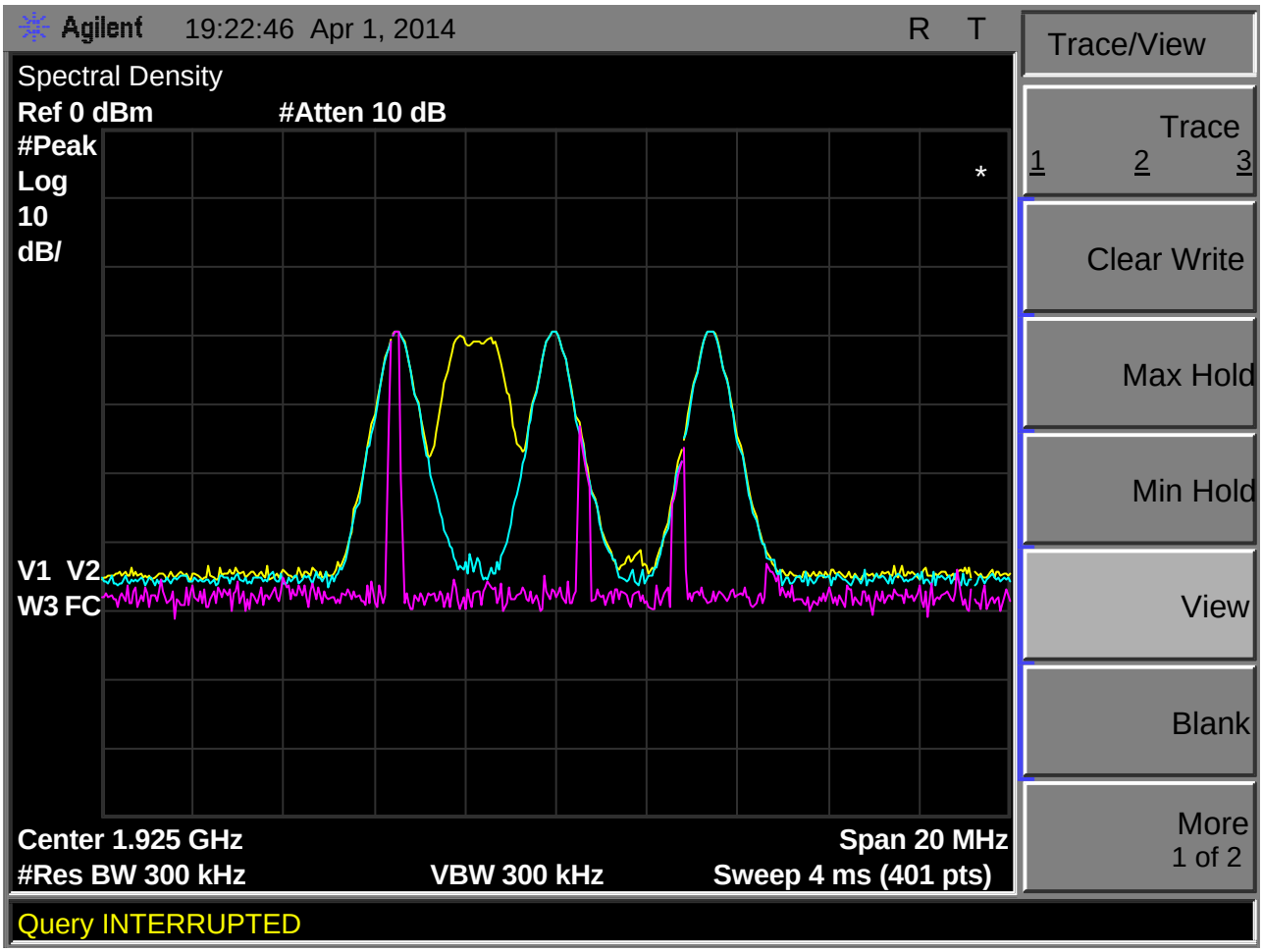


Fig. 59 – Clause 7.5(a) Reaction time.
The EUT establishes a connection on *f*1 or *f*2, and so passes the requirement of 7.5(a).

The blue trace is the max-hold capture over multiple sweeps of the initial interference spectrum without EUT transmissions. The yellow trace is a max-hold capture of the interference and the remote EUT's successful transmission when the interference is present. The purple trace is a single sweep of the spectrum with the pulsed interference, and the EUT transmission active.

b) Apply time-synchronized, pulsed interference on *f*1 at the pulsed level *TL* + *UM*; (-63.5dBm) to the receive port of the EUT. For a system with 10 ms frame time and N timeslots per frame, the channel interference should be pulsed with

N pulses in a 10 ms repetition period (the accuracy of the repetition rate to be ± 10 ppm or better) with a common variable pulse width. The rise and fall times of the interference bursts shall be less than 1 uS from the 10% to 90% of the final amplitude. The interference pulse shall be of constant amplitude during its burst (± 5%).

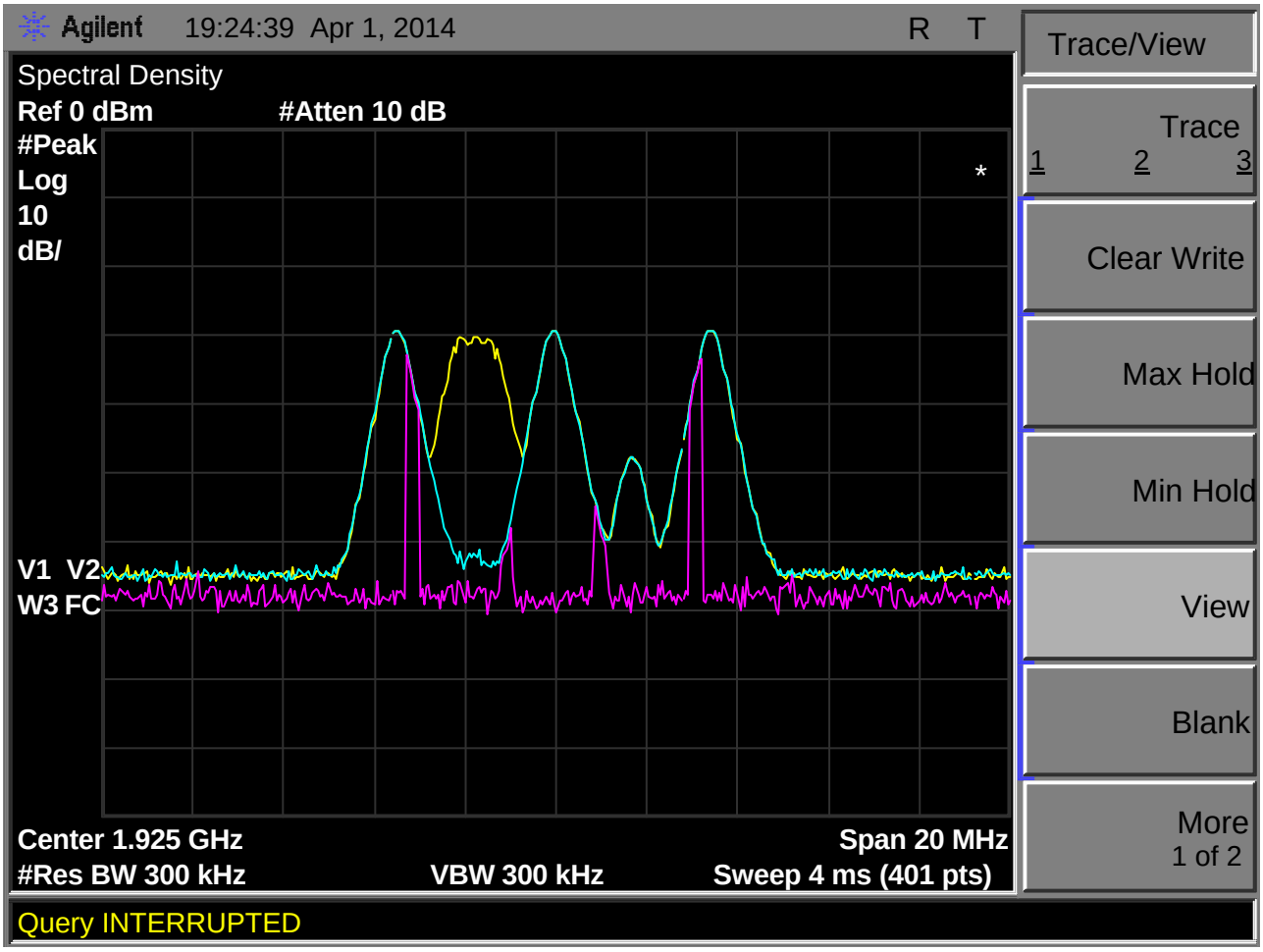


Fig. 60 – Clause 7.5(b) Reaction time.
The EUT establishes a connection only on *f*2, and so passes the requirement of 7.5(b).

c) Additionally apply a CW signal on *f*2 at the level *TL* (-69.5) to the receive port of the EUT. Verify that the EUT establishes a connection only on *f*2 when the width of the interference pulse is equal to 50 µS (the allowed longer of the alternatives 50uS and 50*((1.25/B)^0.5), where B = 1.49MHz)

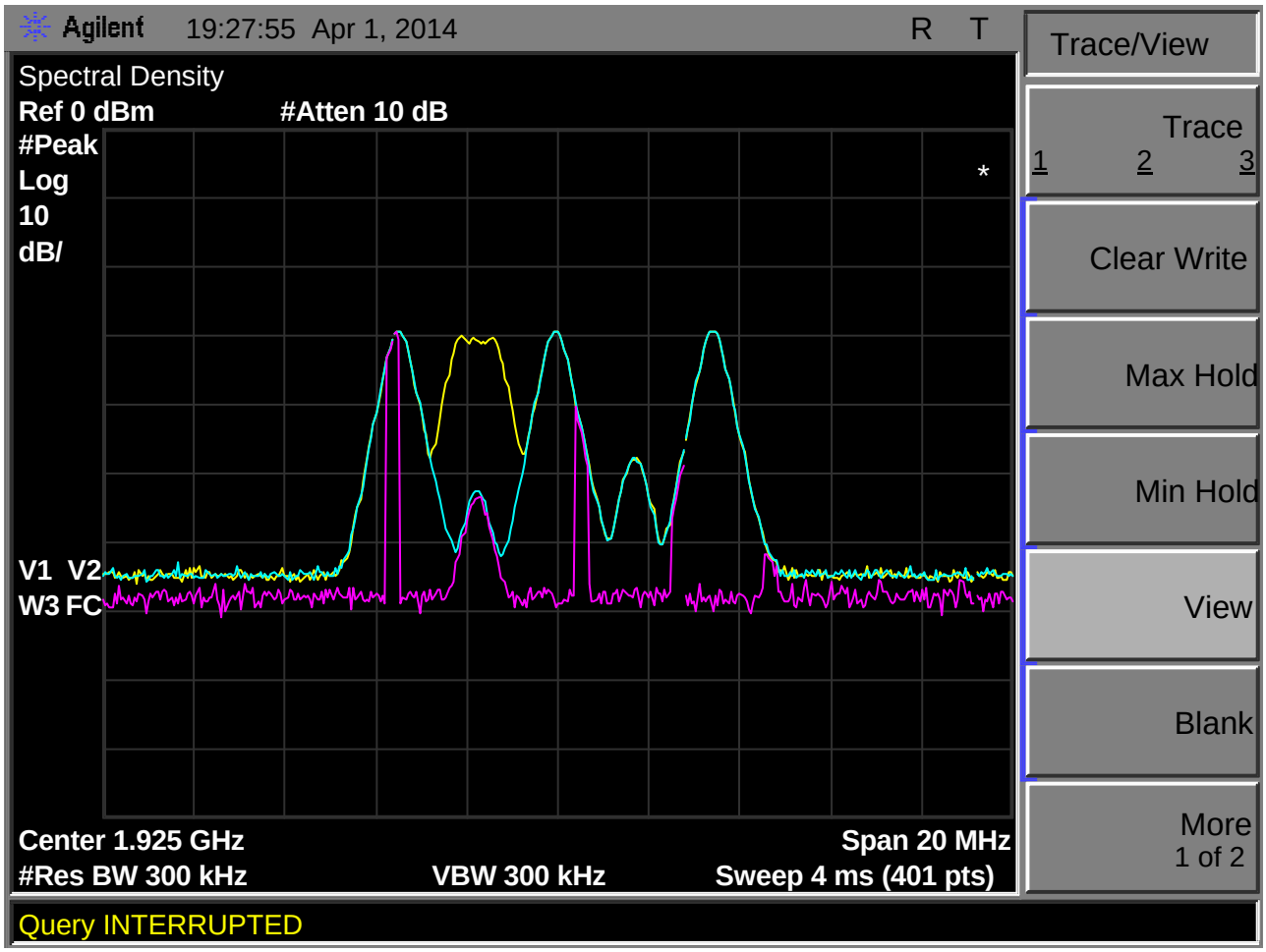


Fig. 61 – Clause 7.5(c) Reaction time.
The EUT establishes a connection only on *f*2, and so passes the requirement of 7.5(c).

d) Change the time-synchronized, pulsed interference on *f*1 to the level *TL* + *UM* + 6 dB: (-63.5dBm). Verify that the EUT establishes a connection only on *f*2 when the width of the interference pulse is equal to 35 μS (the allowed longer of the alternatives 35uS and 35*((1.25/B)^0.5), where B = 1.49MHz)

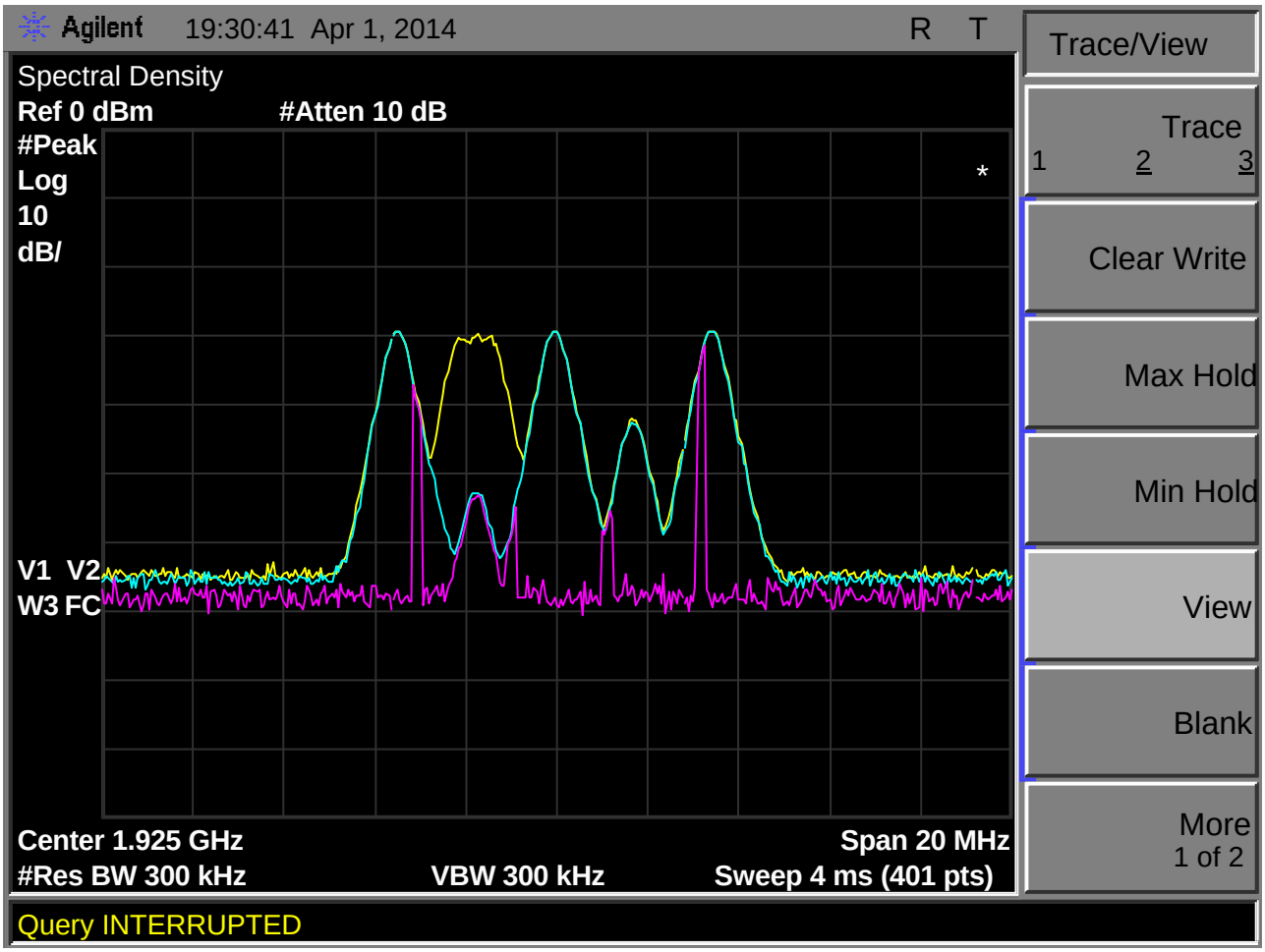


Fig. 62 – Clause 7.5(d) Reaction time.
The EUT establishes a connection only on *f*2, and so passes the requirement of 7.5(d).

The blue trace is the max-hold capture over multiple sweeps of the initial interference spectrum without EUT transmissions. The yellow trace is a max-hold capture of the interference and the remote EUT's successful transmission when the interference is present. The purple trace is a single sweep of the spectrum with the pulsed and CW interference, and the EUT transmission active.

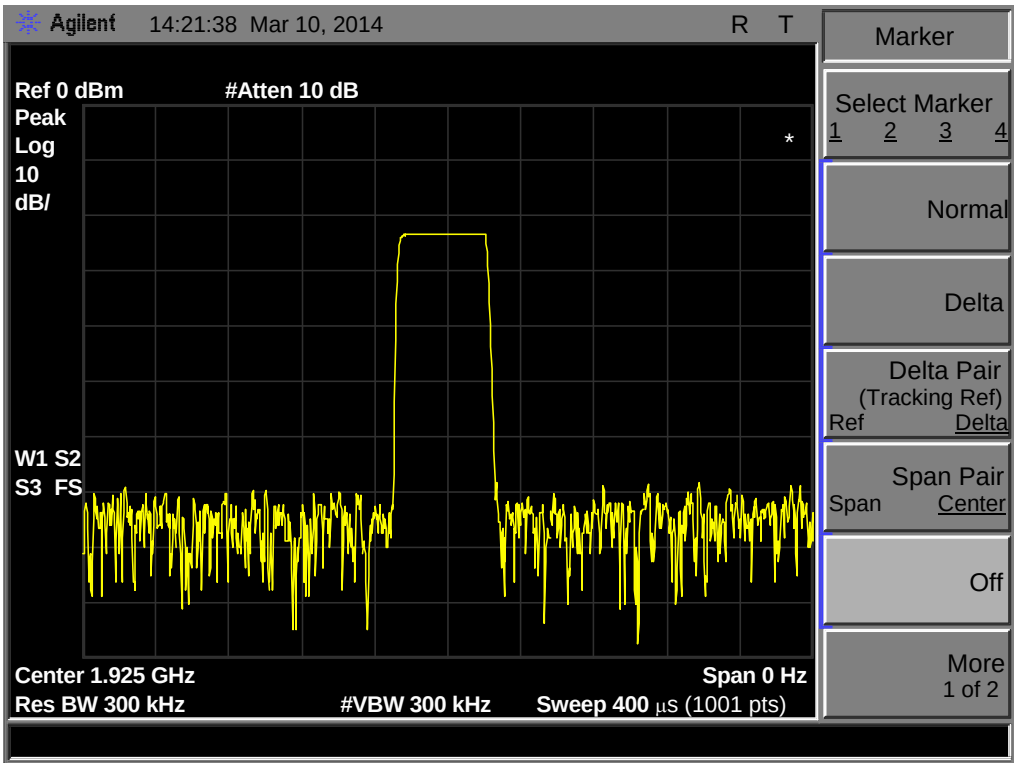


Fig. 63 - Interference pulse, one frame shown, for the test of 7.5(c).

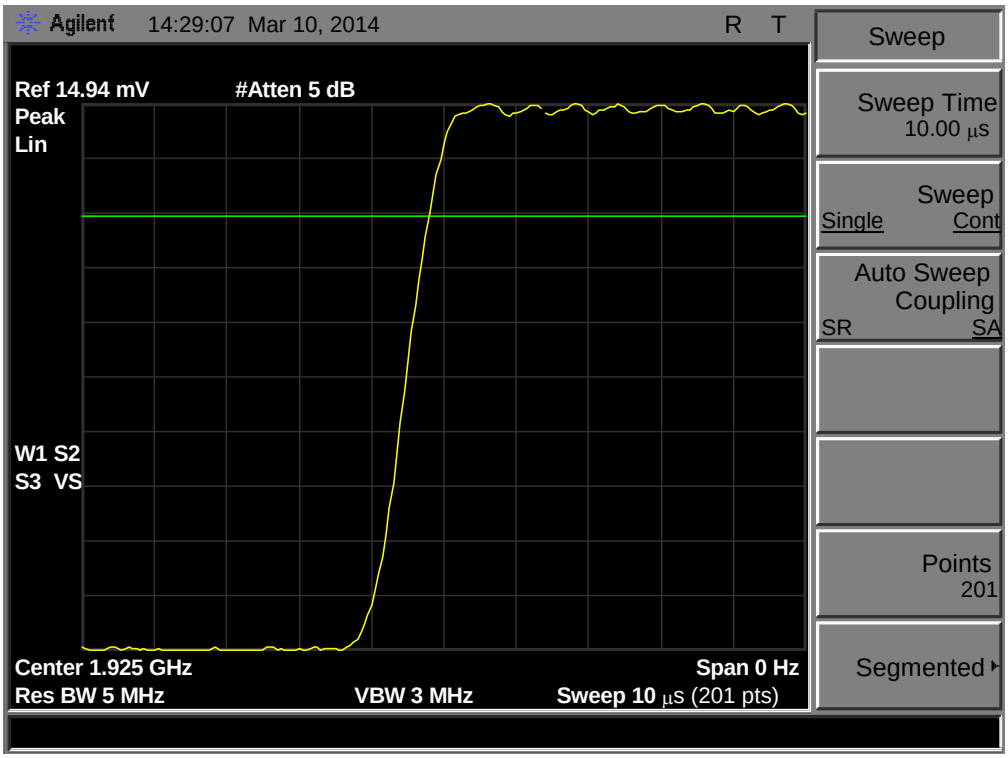


Fig. 64 - Rise time of interference pulse, per the requirements of 7.5 for less than 1uS for 10% to 90% transition. Spectrum analyzer is set to linear response and the reference level adjusted so that 10% and 90% scale points can be observed. Fall time (not shown) is symmetrical.

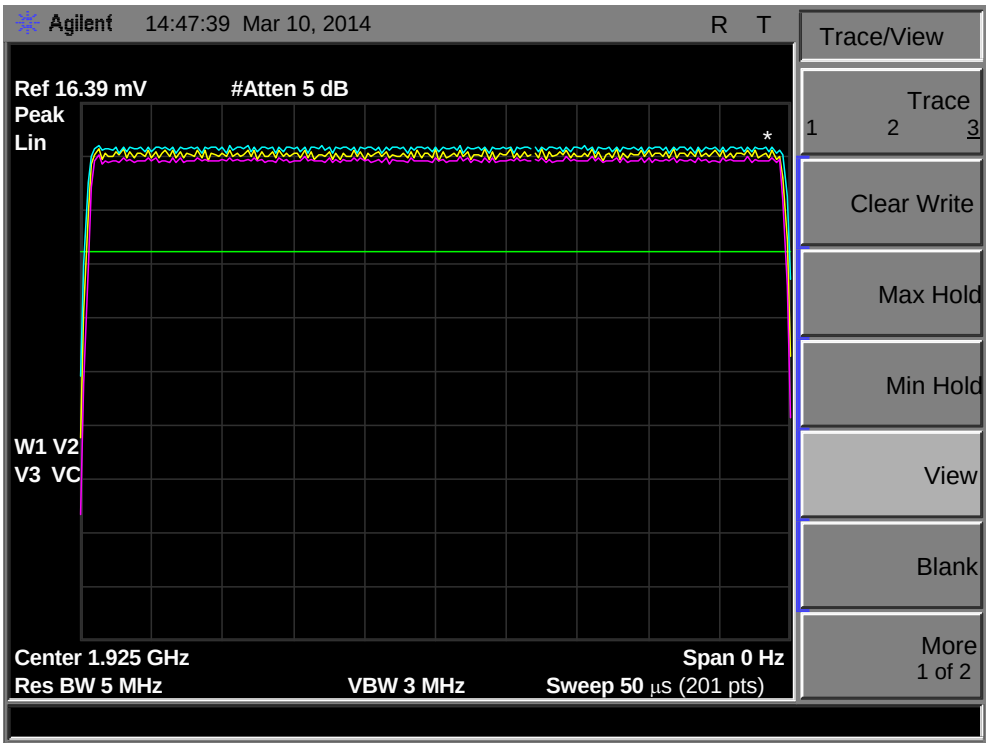


Fig. 65 – 50uS interference pulse for 7.5(c), duration and amplitude variation
over the duration of the 50 uS pulse and over multiple pulses. Spectrum analyzer is set to linear response.

The requirement of 7.5 is for the pulse to be of constant amplitude (+/-5%) during the pulse. The top trace is a max-hold over 60 seconds, the bottom trace is a min-hold over 60 seconds, and the center trace is one pulse; total scale displayed is approximately 110% of the pulse amplitude. Pulse length is just under 50uS to ensure that the worst-case (minimum pulse length) test condition is exceeded. Note that the level as is measured by the spectrum analyzer connected to its port on the splitter/combiner interface to the EUT, and not as at the EUT.

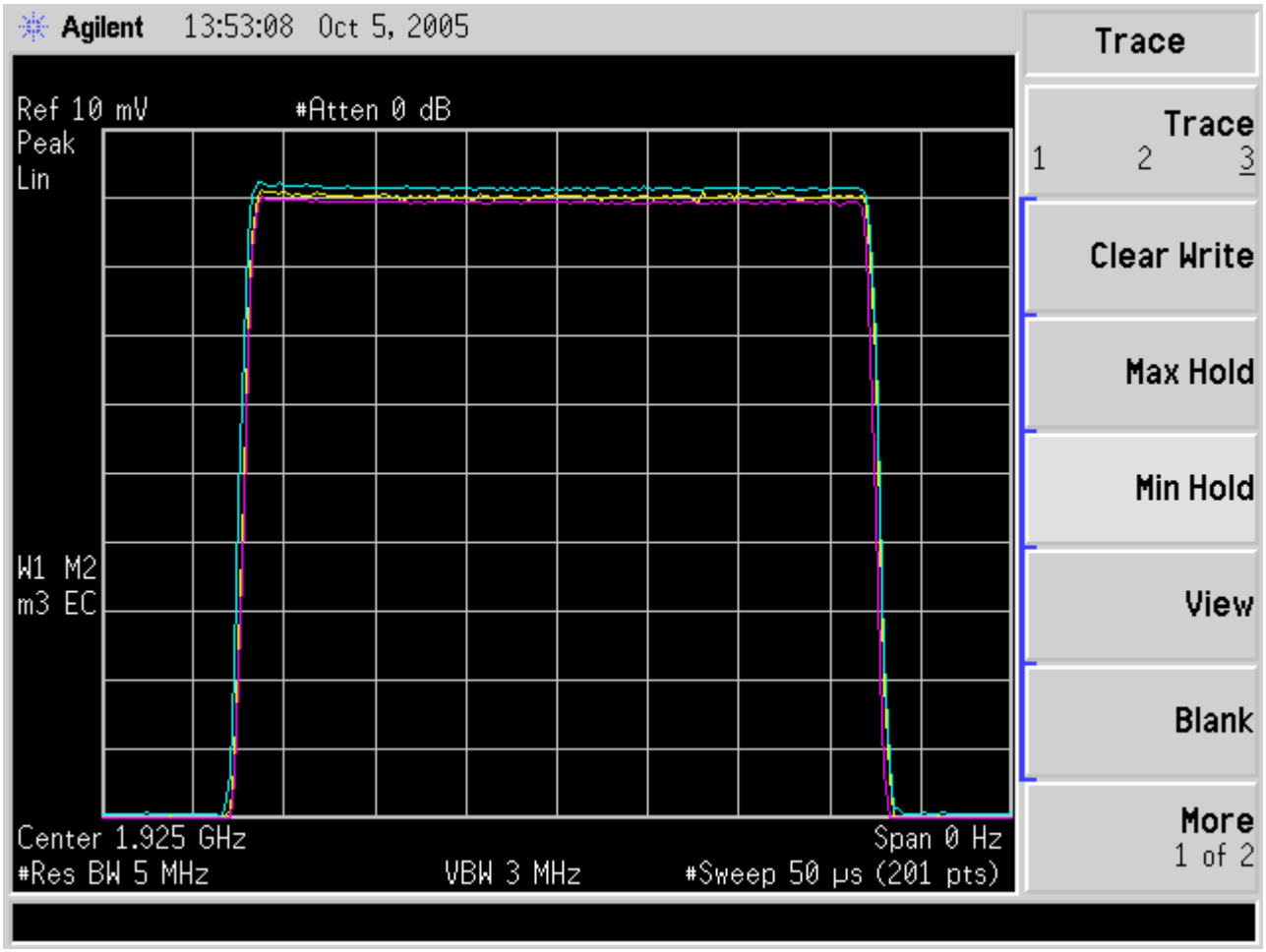


Fig. 66 - 35uS interference pulse for 7.5(d), duration and amplitude variation
over the duration of the pulse and over multiple pulses. Spectrum analyzer is set to linear response.

V) Tests of clause 8, base EUT

V-A. Clause 8.1.1 Access criteria test interval, base EUT

The test platform, base EUT and companion remote unit are configured according to the requirements for implementing the test of 8.1.1(b) by means of test configuration #5, **With companion device and interference blocking, base EUT**, of section (I) of this document. The multi-carrier interference generator (PXI-5670) is set to TDMA mode (timeslot-synchronized with the base EUT). The transmit spectrum and interference spectrum are observed using the E4407B spectrum analyzer. Trigger is external, synchronized with the base EUT frame sync pulse.

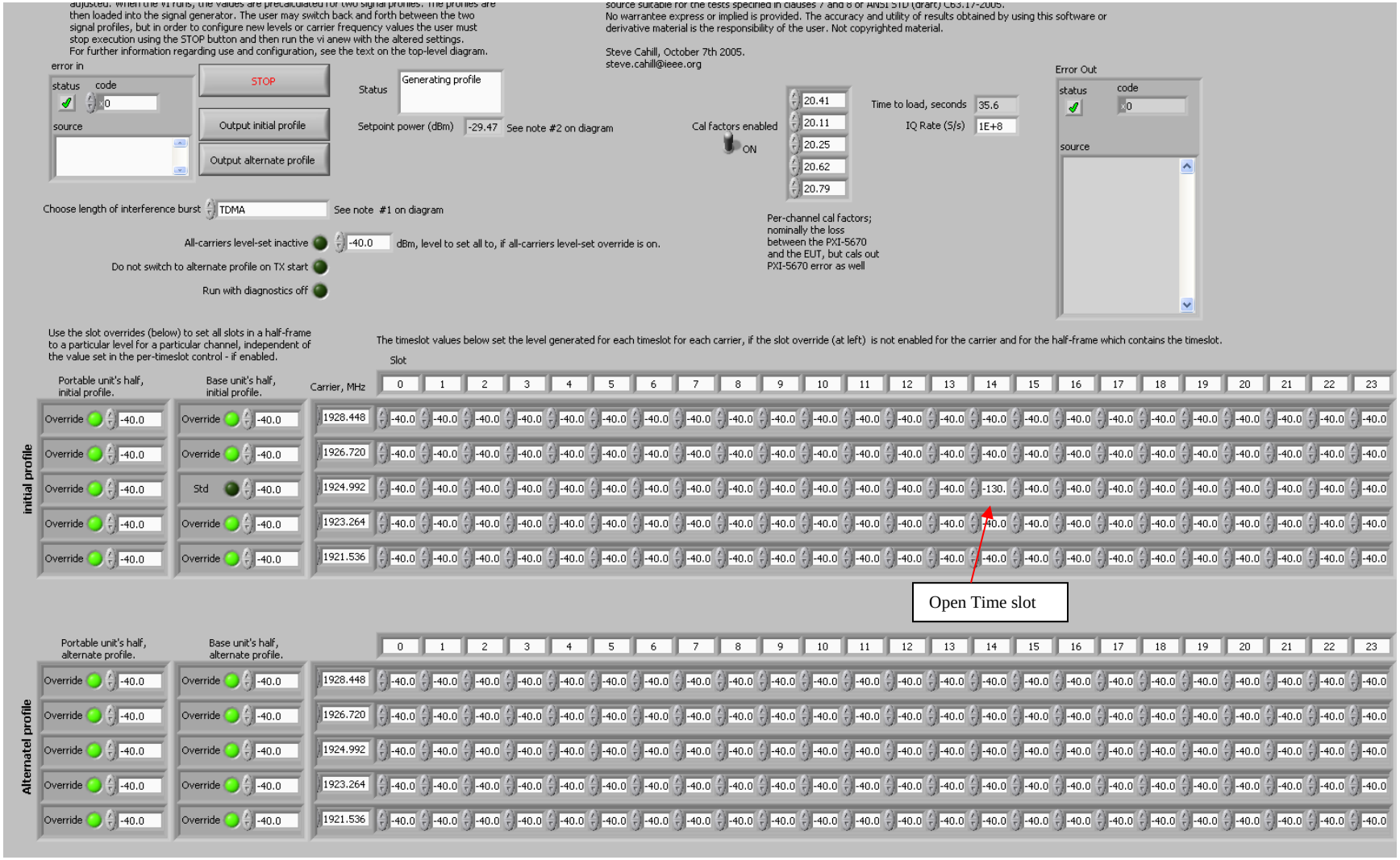


Fig. 66 - Control panel for multi-carrier interference generator configured with initial interference profile blocking all carriers and timeslots except slot 14 of 1924.992MHz.

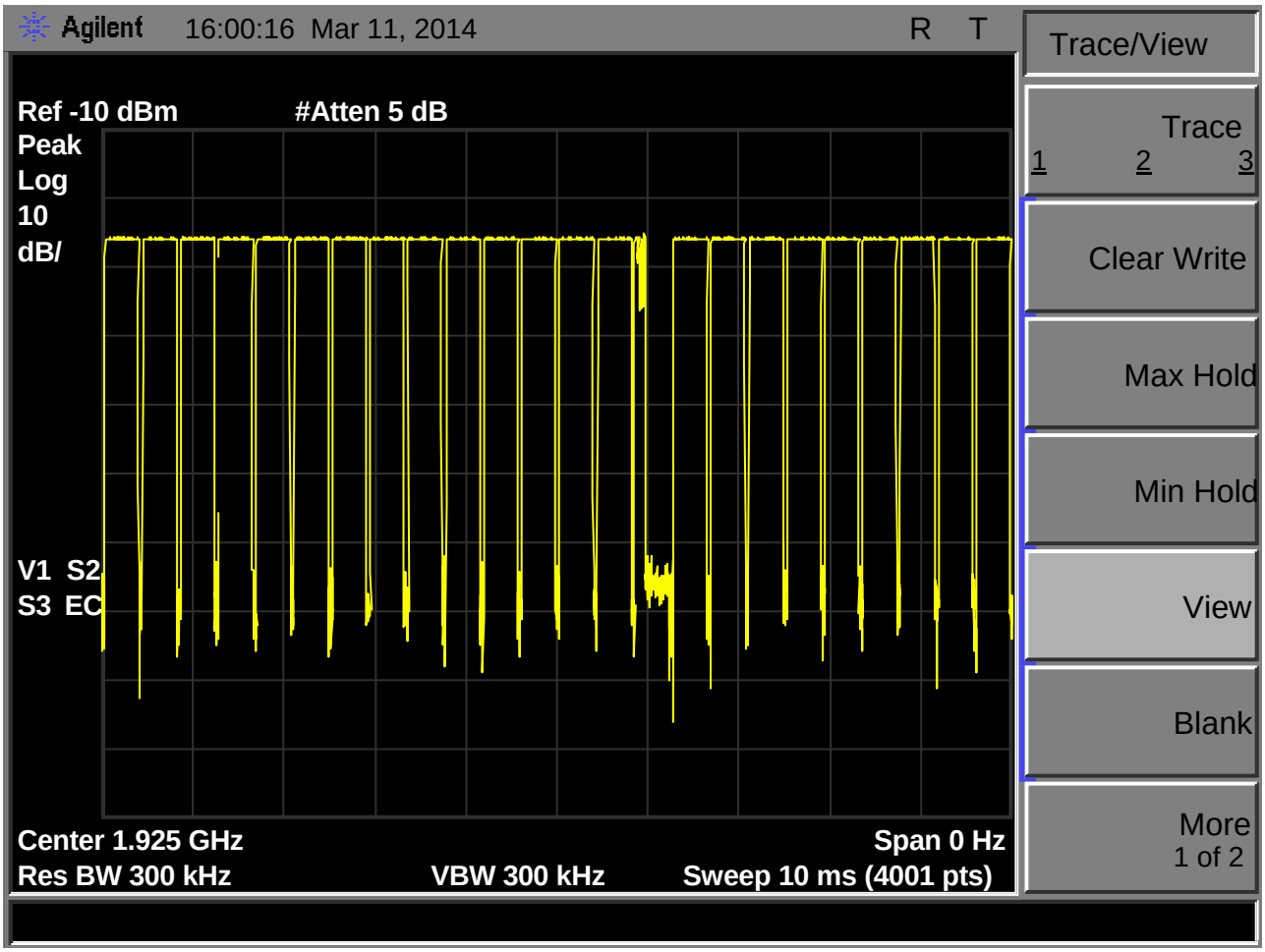


Fig. 67 - Zero-span (single frequency receiver mode) sweep of TDMA interference on carrier at 1924.992MHz, f_1, with base EUT transmission in single open timeslot.

Carrier has -40.0 dBm signal present in all TDMA timeslots on all carriers except slot 14 of 1924.992MHz. The base EUT has found this single open timeslot and is using it to transmit its signaling beacon.

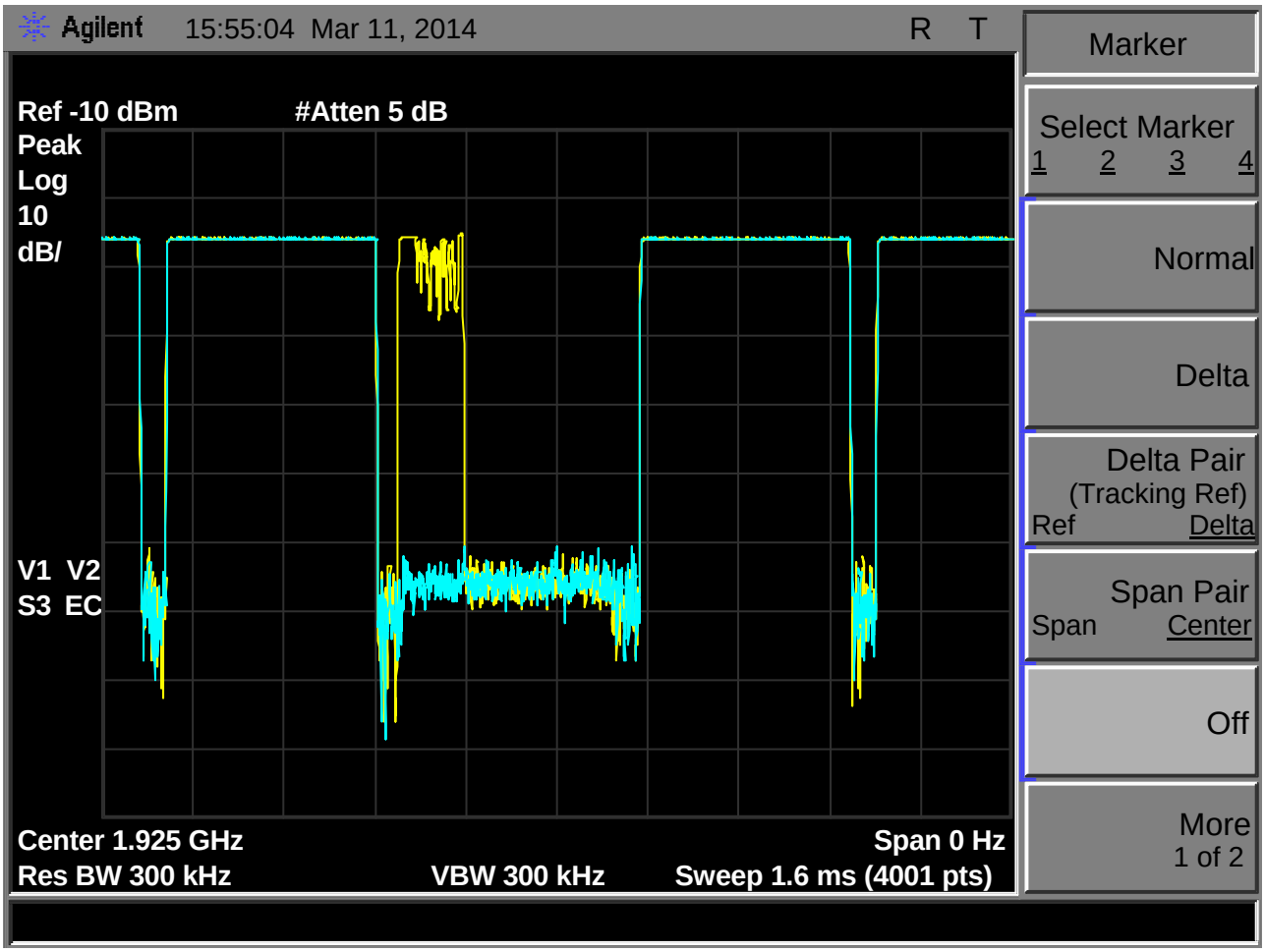


Fig. 68 - Zero-span (single frequency receiver mode) sweep of TDMA interference on carrier at 1924.992MHz, f_1, with base EUT transmission in single open timeslot, detail of open timeslot and transmission.

The yellow (upper) trace is the interference and the base EUT transmission in the interference-free timeslot. The blue trace is the interference in the absence of the base EUT transmissions, showing the open timeslot. The sweep images the open timeslot, the two timeslots on either side of it, and portions of the next adjacent timeslots.

The base EUT transmits only on the unblocked timeslot on f_1, as required.

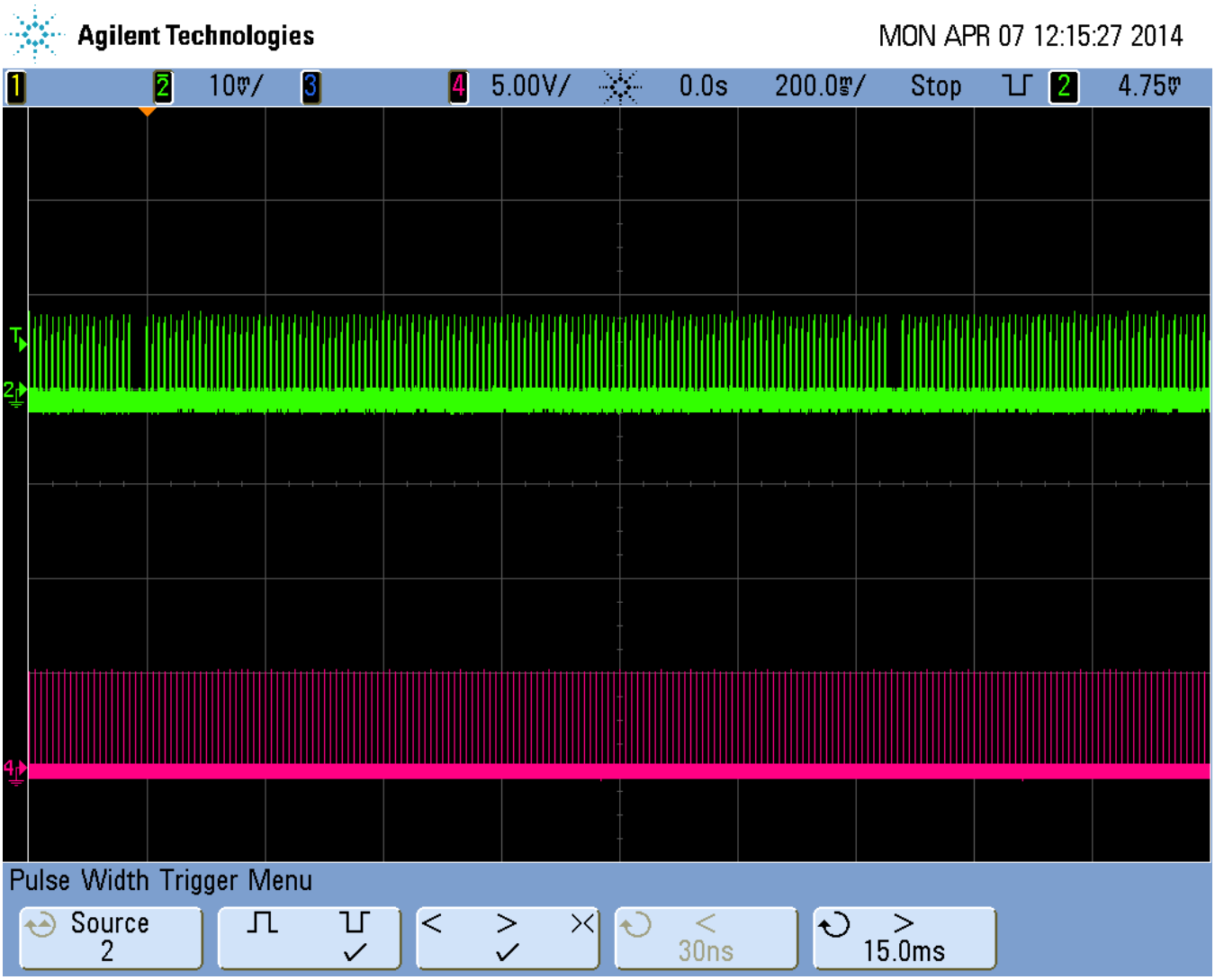


Fig. 69 - Capture of demodulated transmissions of base EUT control and signaling transmissions; the signal present at the RF detector output.
The interval between pauses by the base EUT to repeat the access criteria check requirement of 8.1.1. The interval between pauses is then 1.28 seconds

- The base EUT uses for transmissions of the control and signaling channel the only open timeslot on f_1 when all other timeslots on f_1 and the other carriers are blocked.
- The base EUT pauses in its transmissions of the control and signaling channel to repeat the access criteria every 1.28 seconds, meeting the requirement that it do so at least as often as every 30 seconds.

Accordingly, the base EUT meets the requirements of 8.1.1.

V-B. Clause 8.1.2 Access criteria functional test (47CFR15.323(c)(6) not implemented), base EUT

This test is for devices which do not take advantage of the option to implement 47CFR15.323(c)(6). The purpose of this test is to demonstrate that the base EUT moves the signaling and control transmissions to a new carrier meeting the access criteria, if the access criteria are no longer met when the base EUT pauses and checks the access criteria on the current time and frequency combination.
The test platform, base EUT and companion remote unit are configured according to the requirements for implementing the test of 8.1.2(b) by means of test configuration #5, **With companion device and interference blocking, base EUT**, of section (I) of this document.

The multi-carrier interference generator (PXI-5670) is set to TDMA mode (timeslot-synchronized with the base EUT) with initial interference profile active, with all carriers at level -40.0 dBm except 1923.264MHz, f_1 and 1924.992MHz, f_2 which are unblocked. The alternate interference profile has all carriers at level -40.0 dBm except 1923.264MHz, f_1, which is unblocked.

The base EUT is then powered up. The transmit spectrum and interference spectrum are observed using the E4407B spectrum analyzer. Trigger is free run.

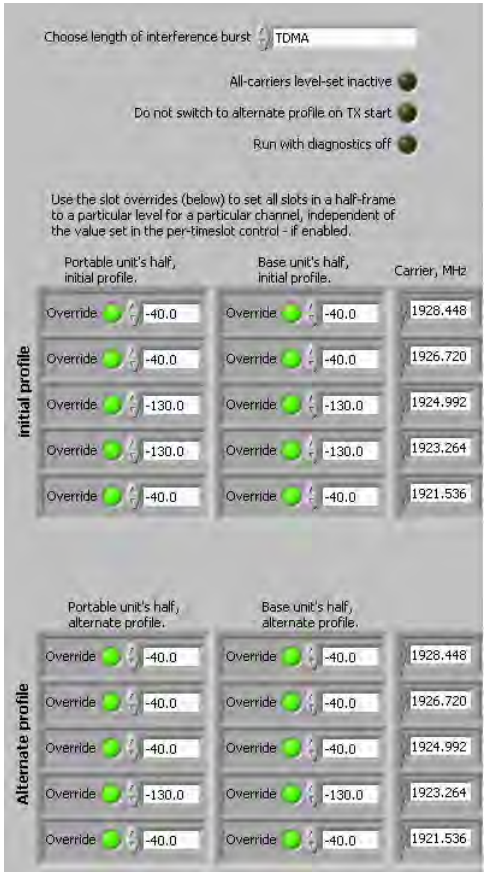


Fig. 70 - Control panel for the multi-carrier interference generator for the test of 8.1.2.

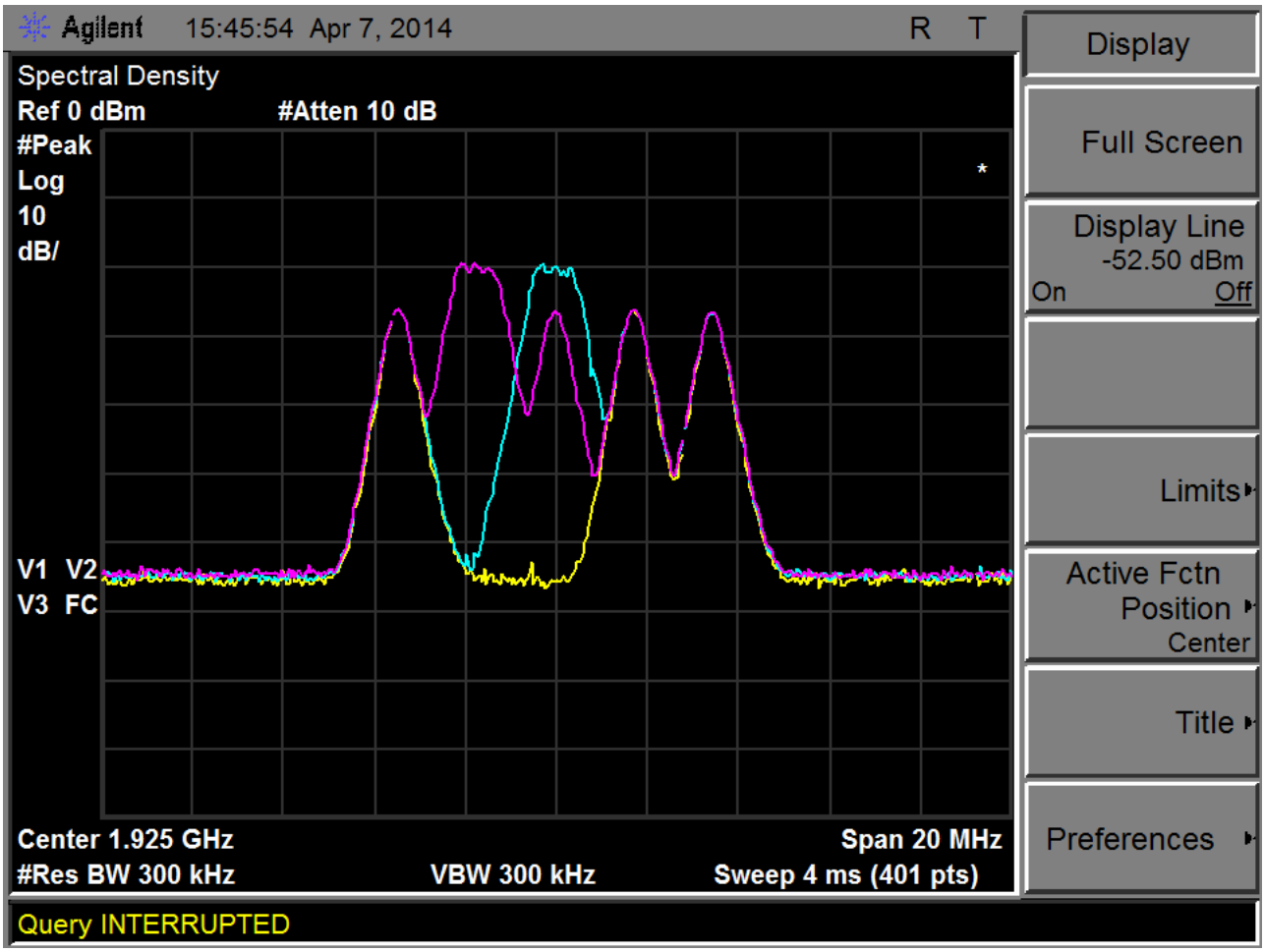


Fig. 71 - Zero-span spectrum analyzer display of base EUT pausing the transmission of control and signaling to check access criteria, finding that the channel no longer meets the access criteria, and resuming transmissions on an alternate carrier.

The yellow trace shows the initial interference profile with f_1 and f_2 unblocked. The blue trace shows the EUT after power-up transmitting on f_2. The purple trace shows the application of the alternate interference profile and the EUT having moved its transmission to f_1 in response to the alternate interference profile.

In response to interference, the EUT selects the other open channel. Accordingly, the base EUT meets the requirements of 8.1.2.

V-C. Clause 8.2.1 Acknowledgements, base EUT

This test is to demonstrate that the base EUT stops communications channel transmissions if acknowledgements stop. The base EUT does not start the activation of the communications channel (the remote companion unit does so, it has the TALK button and brings up the link) so the portion of the 8.2.1 test that applies is only 8.2.1(c), in which transmissions should cease within 30 seconds if the base stops receiving transmissions from the headset.

The test platform, base EUT and companion headset are configured according to the requirements for implementing the test of 8.2.1(c) by means of test configuration #5, **With companion device and interference blocking, base EUT**, of section (I) of this document, except modified in two ways:

1) The attenuation between the headset (the companion device) and the combining network is 70dB instead of 30dB.
2) The trigger input to the spectrum analyzer is changed from the base's frame sync signal to the alternate-waveform marker out of the multi-carrier signal generator.

The multi-carrier interference generator (PXI-5670) is set to TDMA mode (timeslot-synchronized with the base EUT) with initial interference profile active, with all carriers at level -40.0dBm except the carrier at 1924.992MHz, f_1, which is set to -130dBm. The alternate interference profile has all carriers at level -40.0dBm except the carrier at f_1, which is set to -52.0dBm. The initial profile ensures that the system timing can be monitored by a zero-span sweep of the spectrum analyzer at f_1 and that the base EUT can hear the remote, there being no interference on f_1. The alternate profile has interference on f_1 that is still below the threshold, but is high enough to prevent the base EUT from hearing the attenuated headset transmissions when the alternate interference profile becomes active.

The base EUT is then powered up. The transmit spectrum and interference spectrum are observed using the E4407B spectrum analyzer. Trigger is external, the alternate-waveform marker. The trigger offset is set to -1 seconds so that the transition from unblocked to blocked can be observed.

The TALK button on the headset is pressed and a communications channel established on f_1. Then the multi-carrier generator is switched to the alternate interference profile, and the base is observed to terminate the communications channel prior to the 30 seconds allowed.

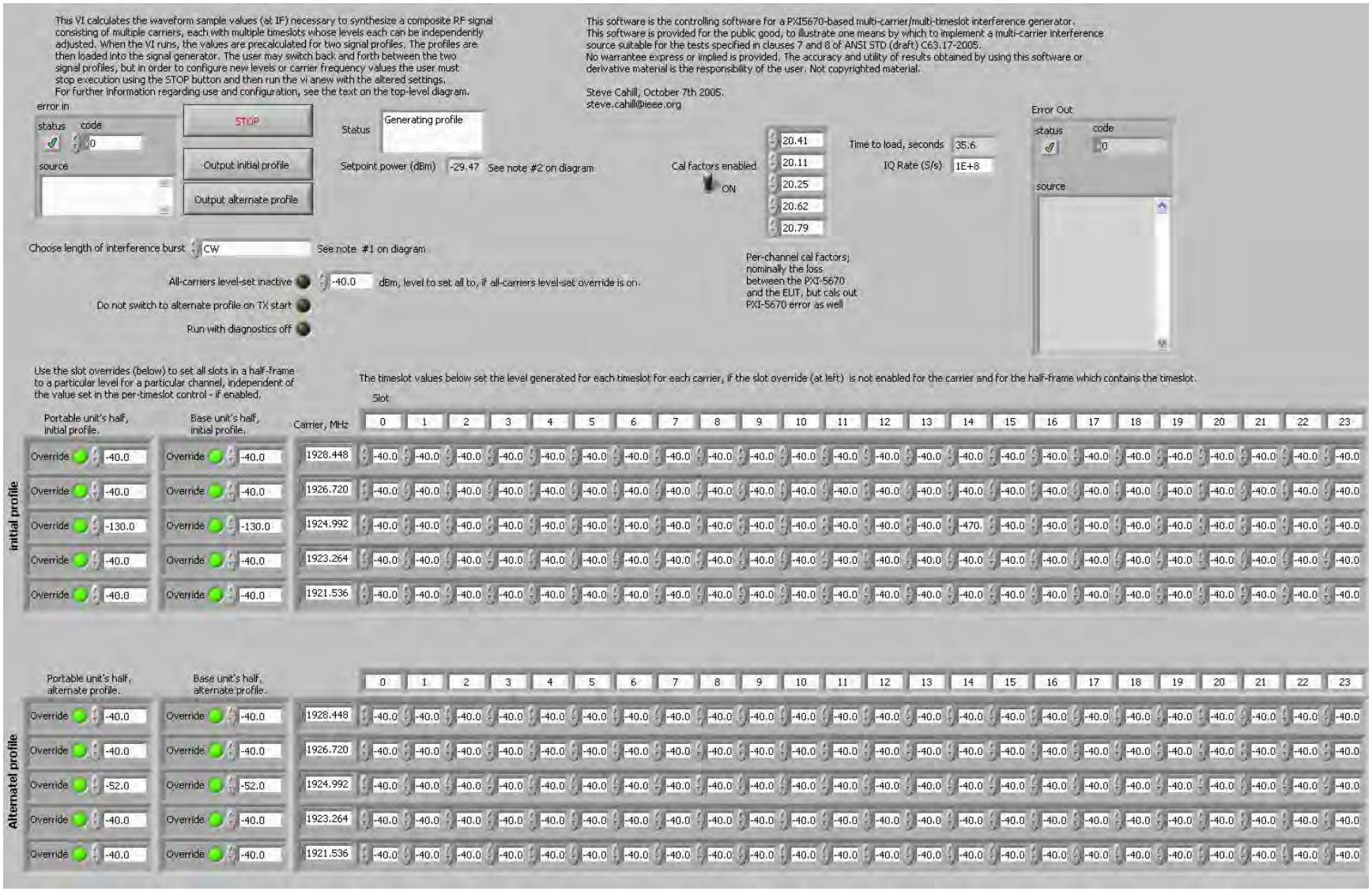


Fig. 72 - Control panel for the multi-carrier interference generator for the test of 8.2.1(c).

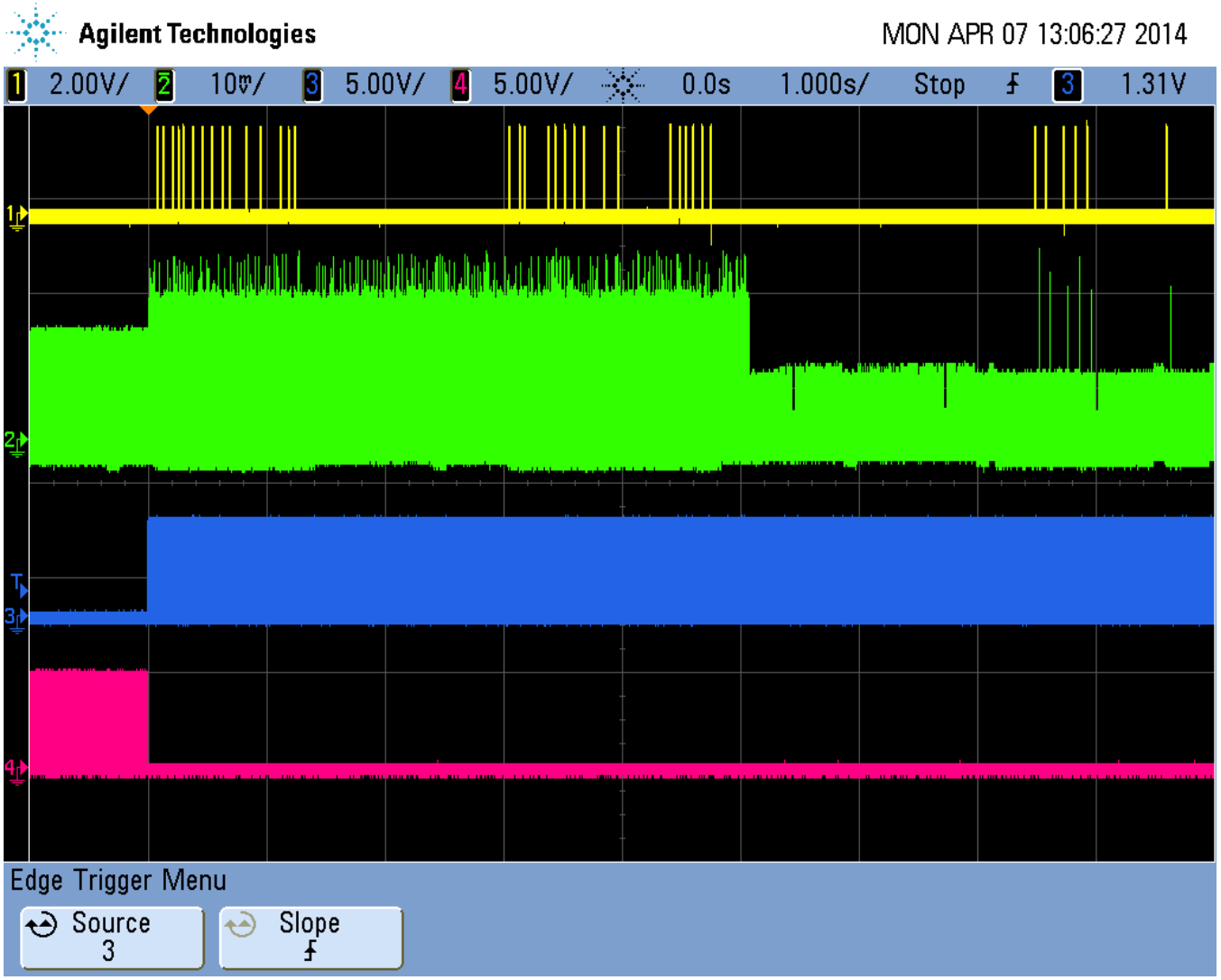


Fig. 73 - Capture of demodulated transmissions of base EUT control and signaling transmissions.

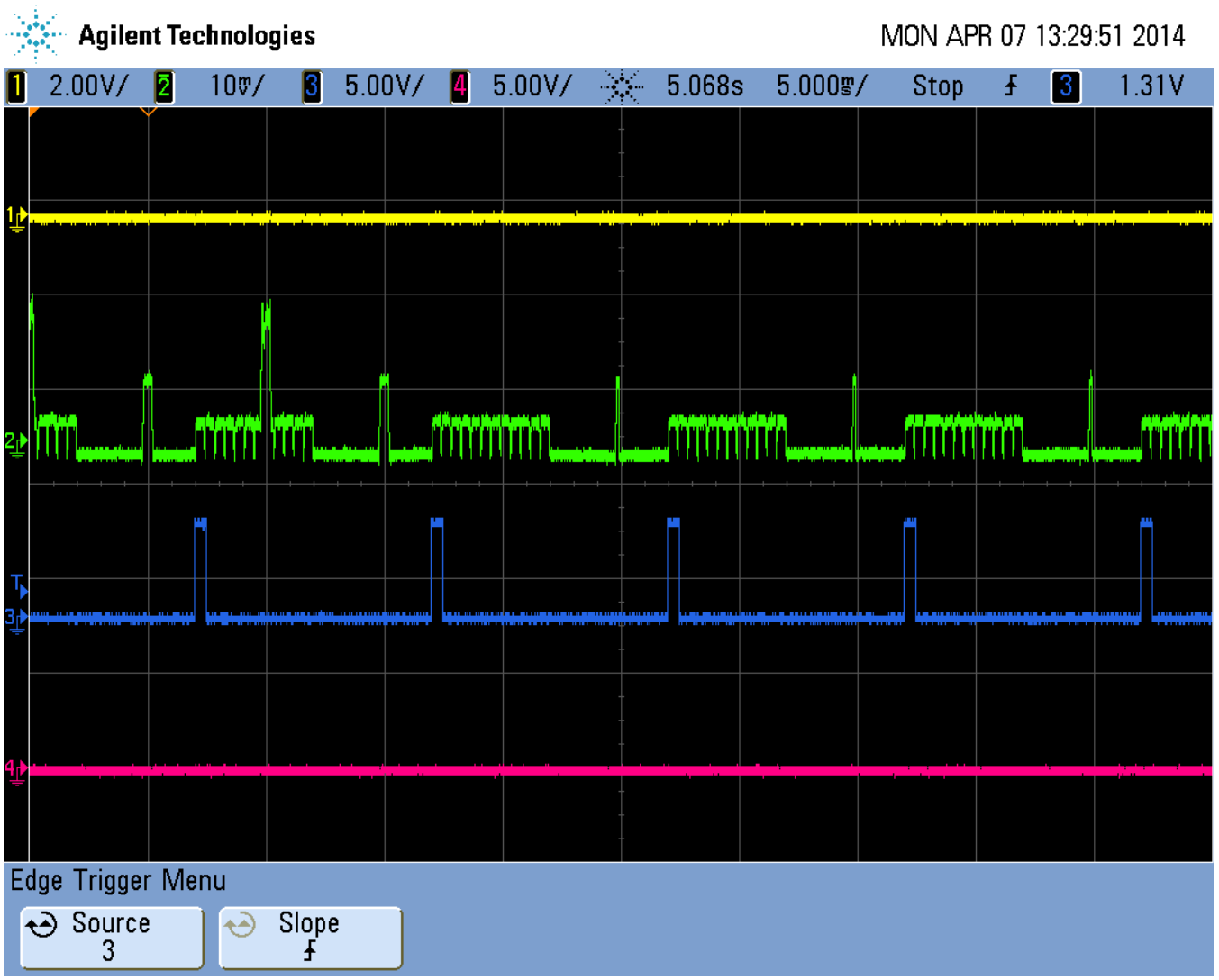


Fig. 74 Zoom-in of Fig 76

Figure 76 shows that upon switching to the alternate profile, the communication channel is terminated at 5.087s and the base reverts to a beacon signal.
A zoom-in at 5.087s shows the transmission channel termination and the base reverting back to a beacon signal.

The base EUT must cease communications channel transmissions within 30 seconds if acknowledgements from the companion device are lost, for an established communications channel. In the test shown, the base ceases communications channel transmissions at 5.087 seconds after acknowledgements from the companion device are lost., and so the base EUT meets the requirements of 8.2.1(c).

V-D. Clause 8.2.2 Transmission duration, base EUT

This test is to demonstrate that the base EUT does not use the same channel continuously without executing the access criteria at least as often as every 8 hours.

Setup for 8.2.2 for the base EUT: transmission duration
The test platform, base EUT and companion headset are configured according to the requirements for implementing the test of 8.2.2 by means of test configuration #5, **With companion device and interference blocking, base EUT**, of section (I) of this document.

The multi-carrier interference generator (PXI-5670) is set to TDMA mode (timeslot-synchronized with the base EUT) with initial interference profile active, with all carriers at level -40.0 dBm except the carrier at 1924.992MHz, f_1, which is set to -130dBm. The alternate interference profile has all carriers at level -40.0 dBm including the carrier at f_1. The initial profile ensures that the system timing can be monitored by a zero-span sweep of the spectrum analyzer at f_1, there being no interference on f_1. The alternate profile has interference on all channels that is high enough to prevent the base EUT from finding a channel in which the access criteria test permits transmissions, when the alternate interference profile becomes active.

The base EUT and companion remote device are then powered up. The output of the RF detector in the RF splitter/combiner matrix is monitored with a digital storage oscilloscope capturing timed traces. The TALK button on the headset is pressed and a communications channel established on f_1. The trace and time at which the communications channel is established is captured. Then the multi-carrier generator is switched to the alternate interference profile. The trace in which the base ceases transmissions due to the test and failure of the access criteria on all channels is then captured when the access criteria test is executed by the base EUT.

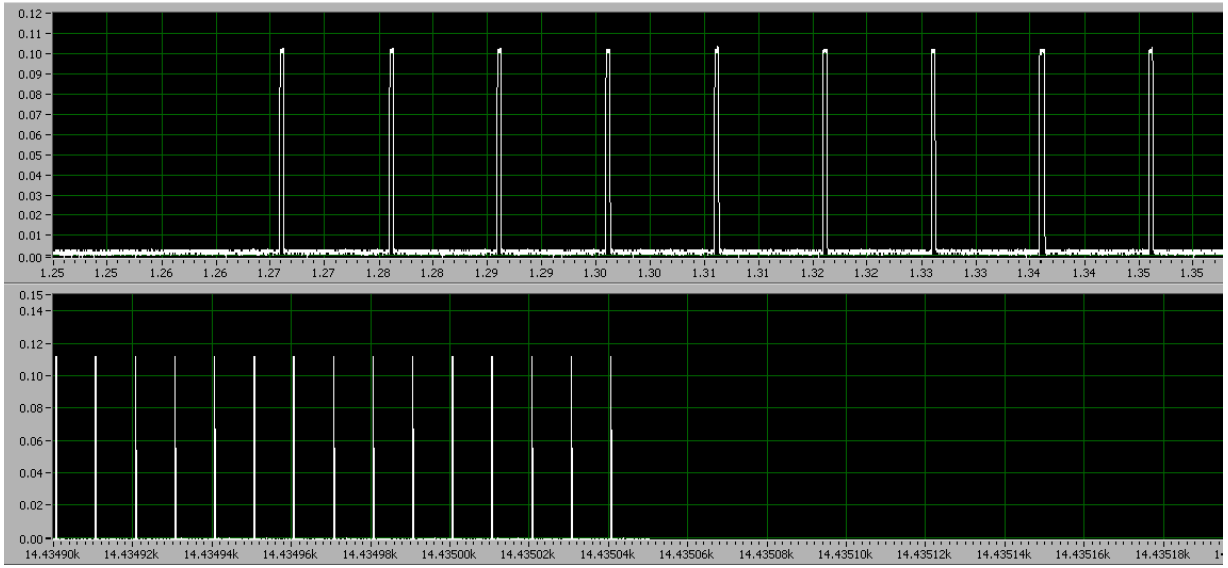


Fig. 75 – Clause 8.2.2. Two traces are shown here, both being the output of the RF detector in the splitter/combiner matrix, but at different times; one showing the initiation of the transmissions on the communications channel, and the 2nd showing termination at access criteria check failure.
The base EUT terminates transmissions after 14435 seconds, meeting 8.2.2; the base must execute the access criteria test at least as often as every 28800 seconds.

VI) Tests of clause 6, CA12CD-S Remote EUT

VI-A. Clause 6.1 Emissions tests for the headset EUT

For the tests of clause 6.1 of C63.17-2006, the test platform and remote EUT are configured according to test configuration #2, **Conducted emissions tests, headset EUT**, of section (I) of this document. The remote EUT is established in a communications channel with the base companion device by means of a radiative-coupled connection, though the remote EUT is in conducted connection to the spectrum analyzer, per figure 3 of C63.17-2006 in clause 6.1.1. Administrative commands are used to set the base to the desired carrier for the test, and so the remote EUT is constrained to use those carriers, since it uses the carriers that the base is constrained to.

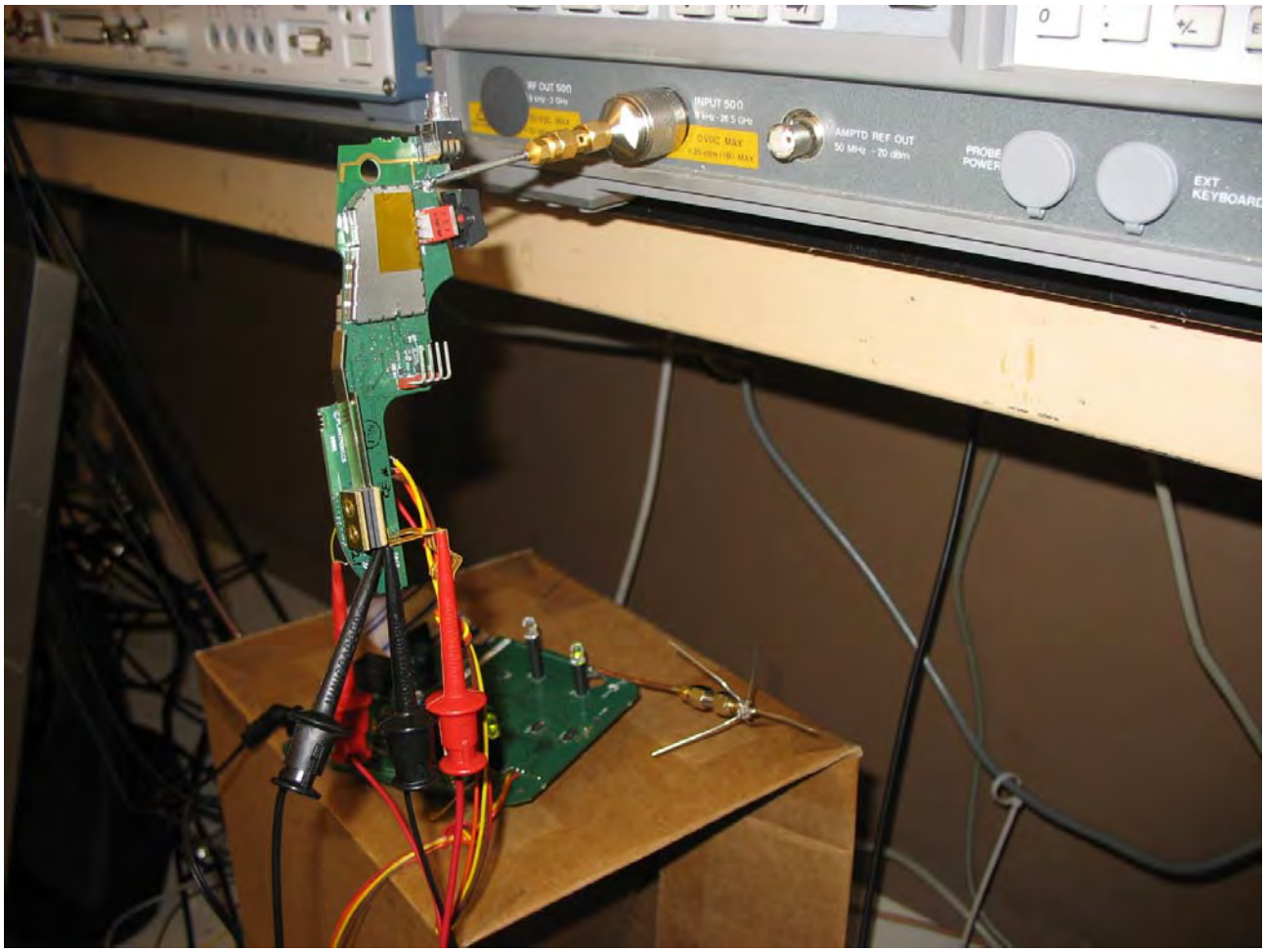


Fig. 78 - Remote EUT in direct connection with spectrum analyzer and radiated connection with base companion device, for the tests of clause 6.1.

Fig. 79 – Remote EUT- Detail of the attachment of the RF connection for conducted measurements.

6.1.2 Peak transmit power, Remote unit EUT

The remote unit EUT is configured as described in the introduction for the tests of clause 6.1. First the low, then the mid, then the high carrier are selected, and the peak power is observed for the headset EUT transmit burst for each carrier.

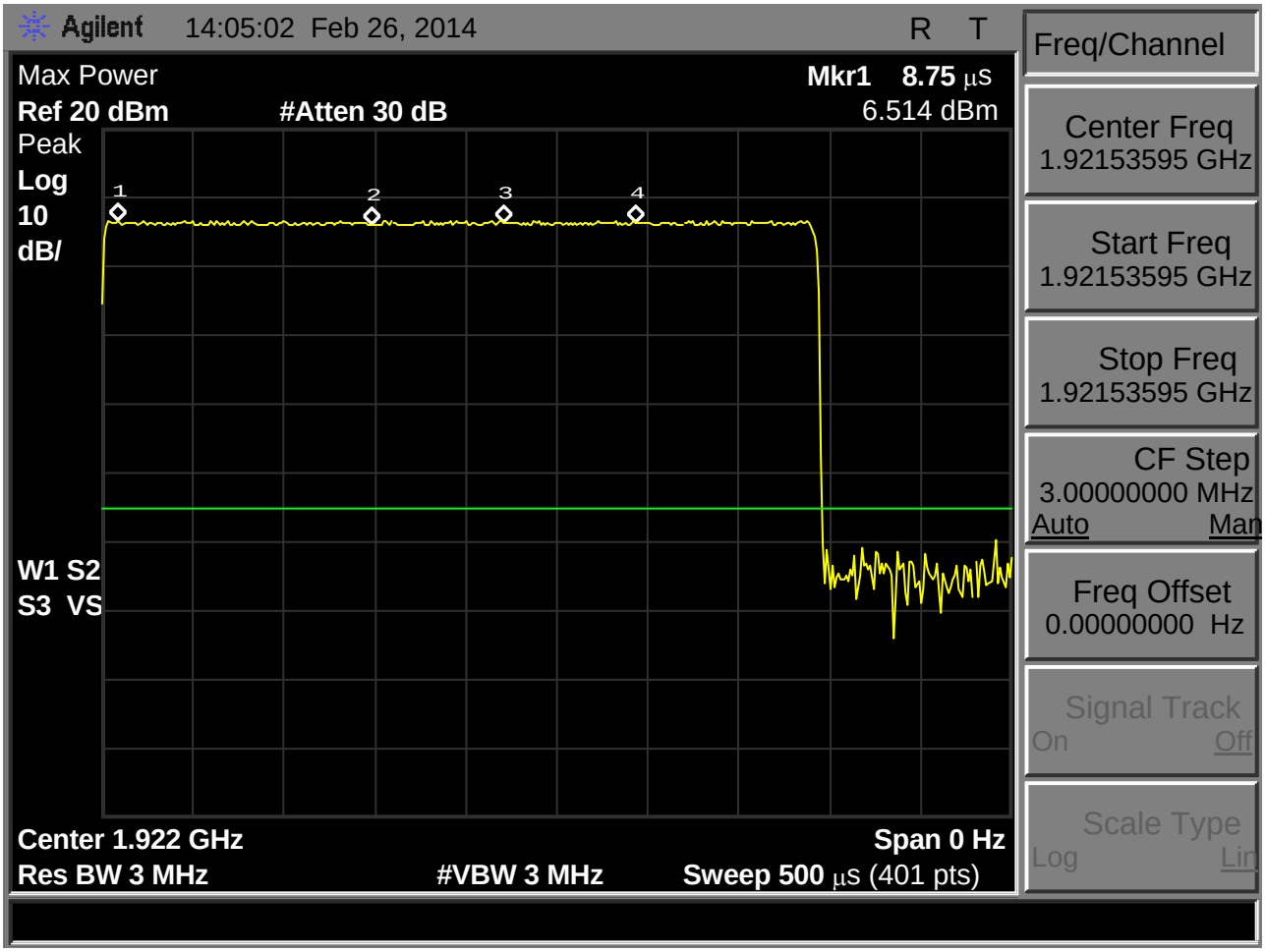


Fig. 80 - Remote EUT transmit power received by spectrum analyzer configured according to the requirements of clause 6.1.2 of of C63.17-2006, low carrier. Maximum observed transmit power is 6.51dBm.

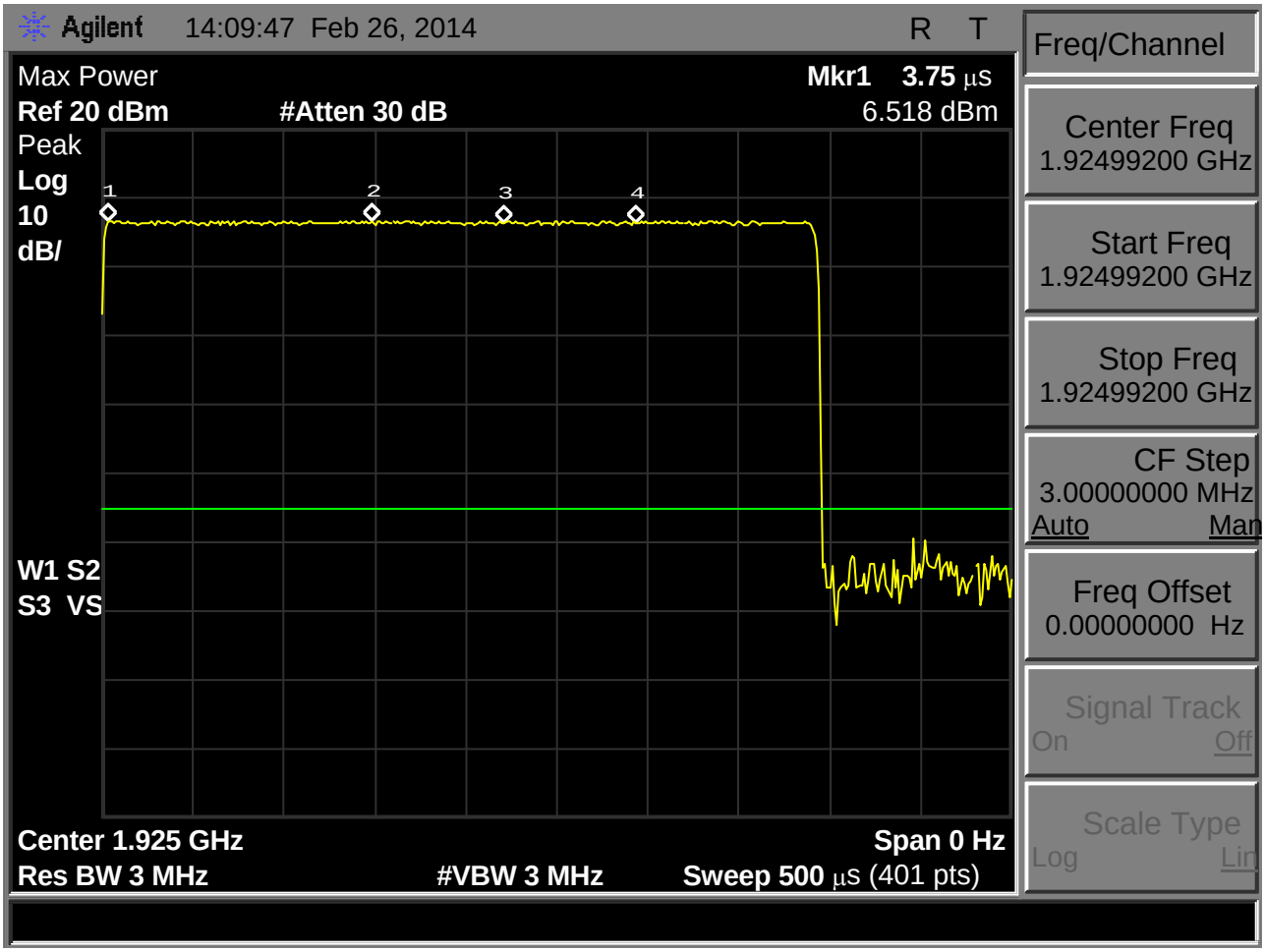


Fig. 81 - Remote EUT transmit power received by spectrum analyzer configured according to the requirements of clause 6.1.2 of of C63.17-2006, mid carrier. Maximum observed transmit power is 6.52dBm

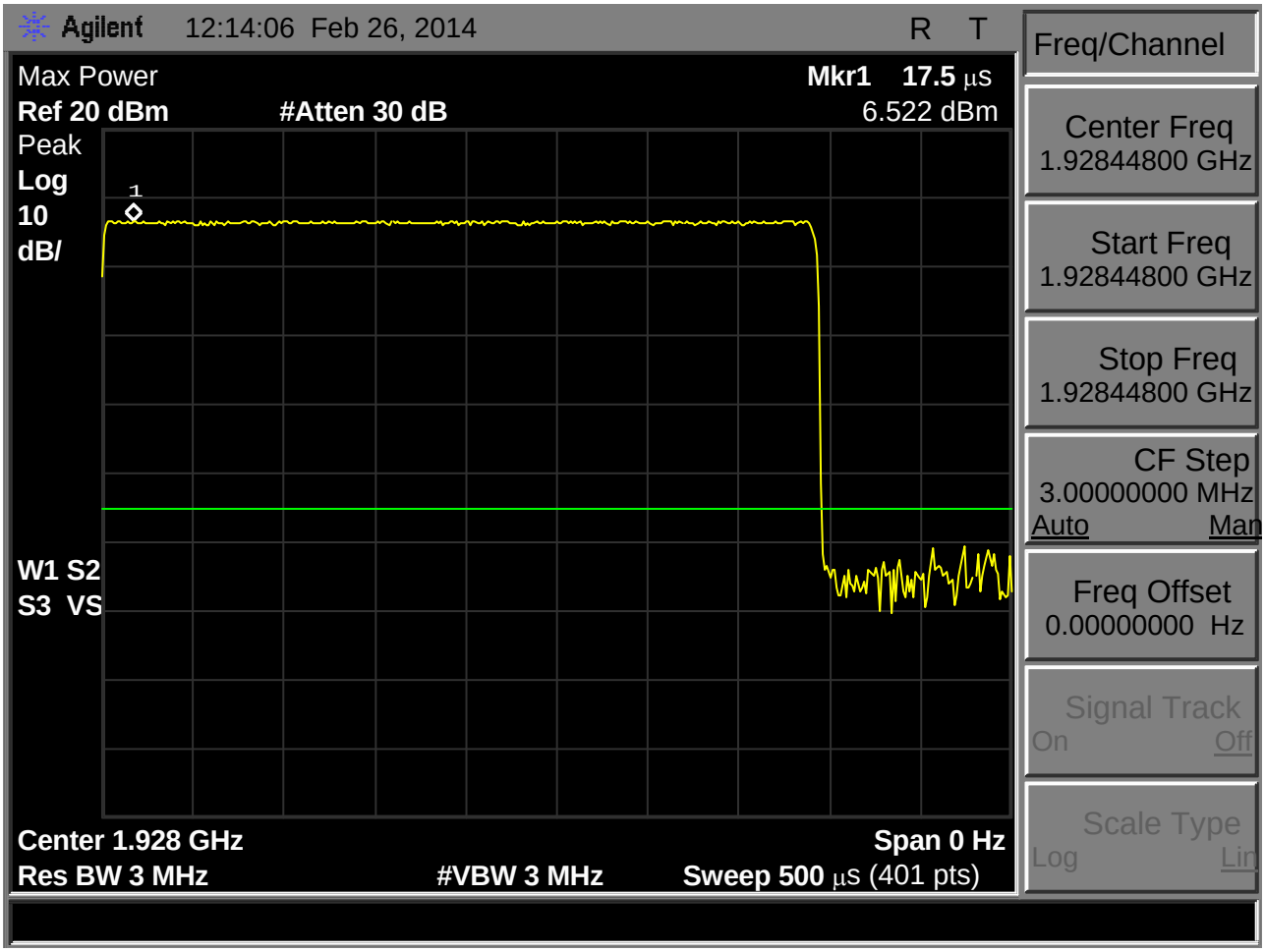


Fig. 82 -Remote EUT transmit power received by spectrum analyzer configured according to the requirements of clause 6.1.2 of of C63.17-2006, high carrier. Maximum observed transmit power is 6.52dBm.

The maximum allowed transmit power is *Plimit*, which is, from clause 4.3.1 of of C63.17-2006,

Plimit = 5(log***B***) – 10dBm,

for an EUT with maximum antenna gain not more than 3dBi (the maximum antenna gain for the headset EUT is 3dBi) and where ***B*** is the emissions bandwidth, 1.48 MHz for the headset EUT (see the measurements following for clause 6.1.3).

Solving for *Plimit* we obtain +20.9dBm.

The headset EUT has maximum observed transmit power of 6.52dBm, and meets the required limit of less than *Plimit*, passing the requirements of C63.17-2006 clause 6.1.2 with 14.38dB of margin.

6.1.3 Emission bandwidth ***B***, Remote EUT

The remote EUT is configured as described in the introduction for the tests of clause 6.1. First the low, then the mid, then the high carrier are selected, and the emission bandwidth is observed for the remote EUT transmit burst for each carrier.

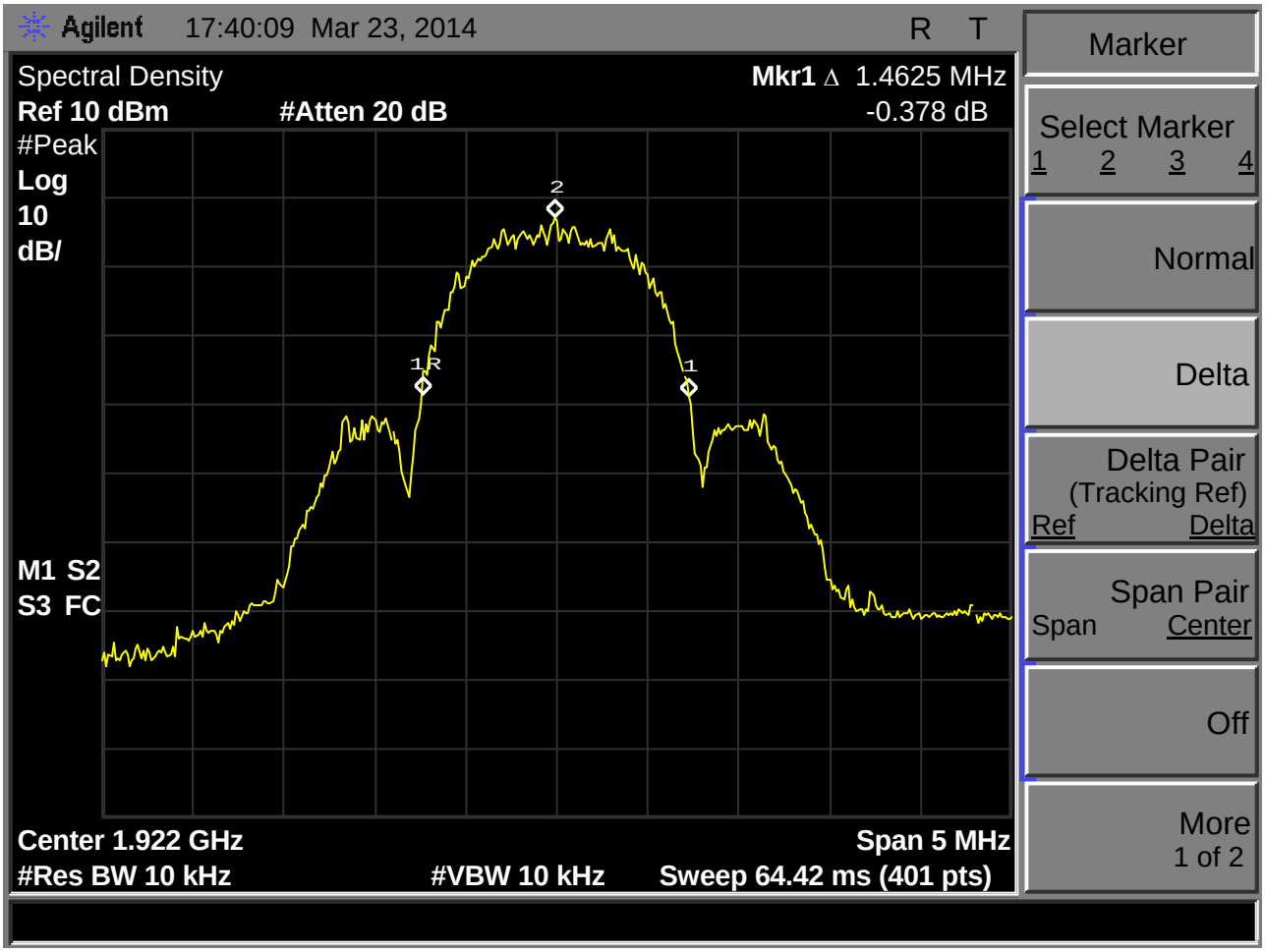


Fig. 83 - Remote EUT, 1.47MHz emissions bandwidth on low carrier.

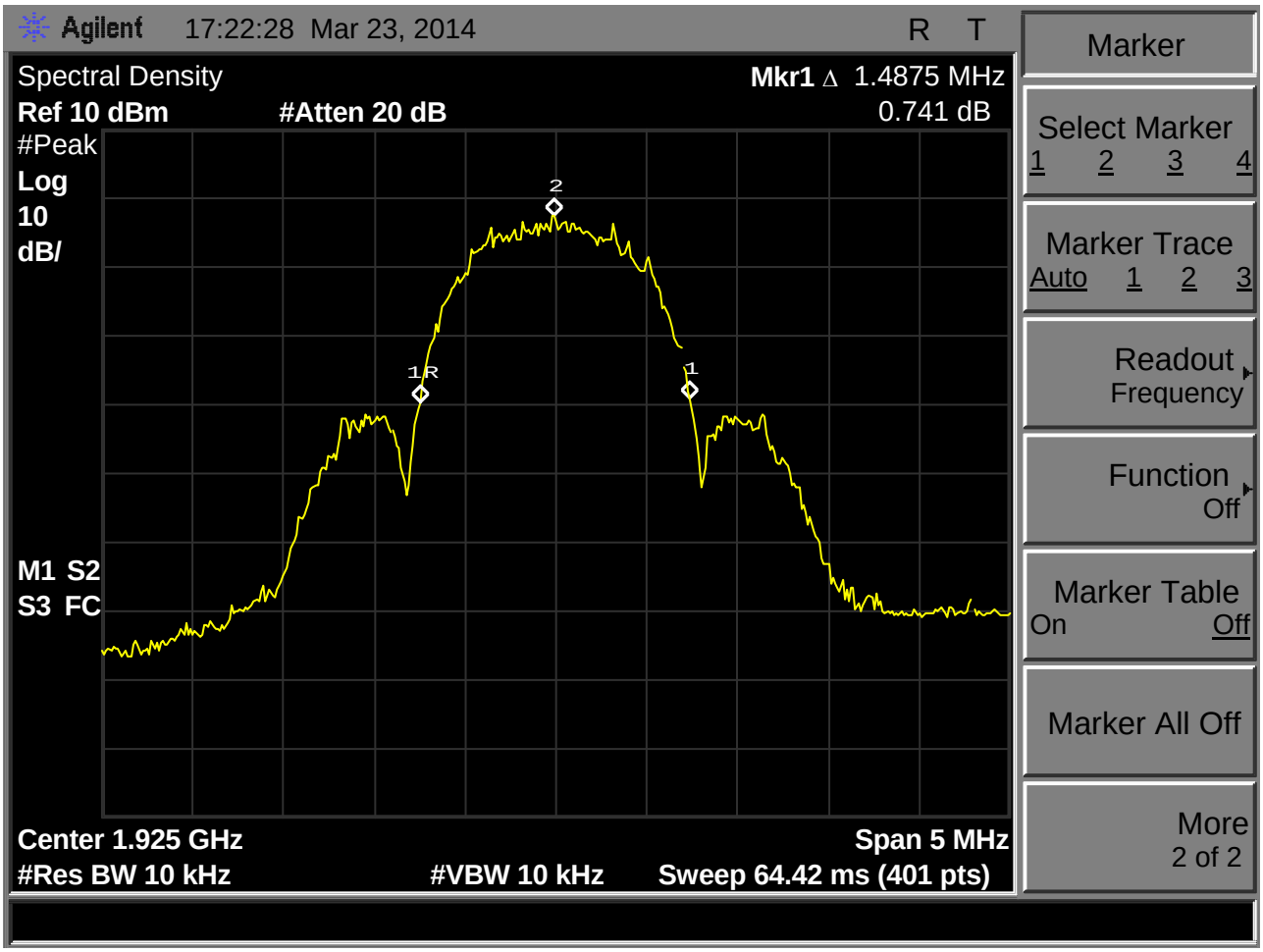


Fig. 84 - Remote EUT, 1.49MHz emissions bandwidth on middle carrier.

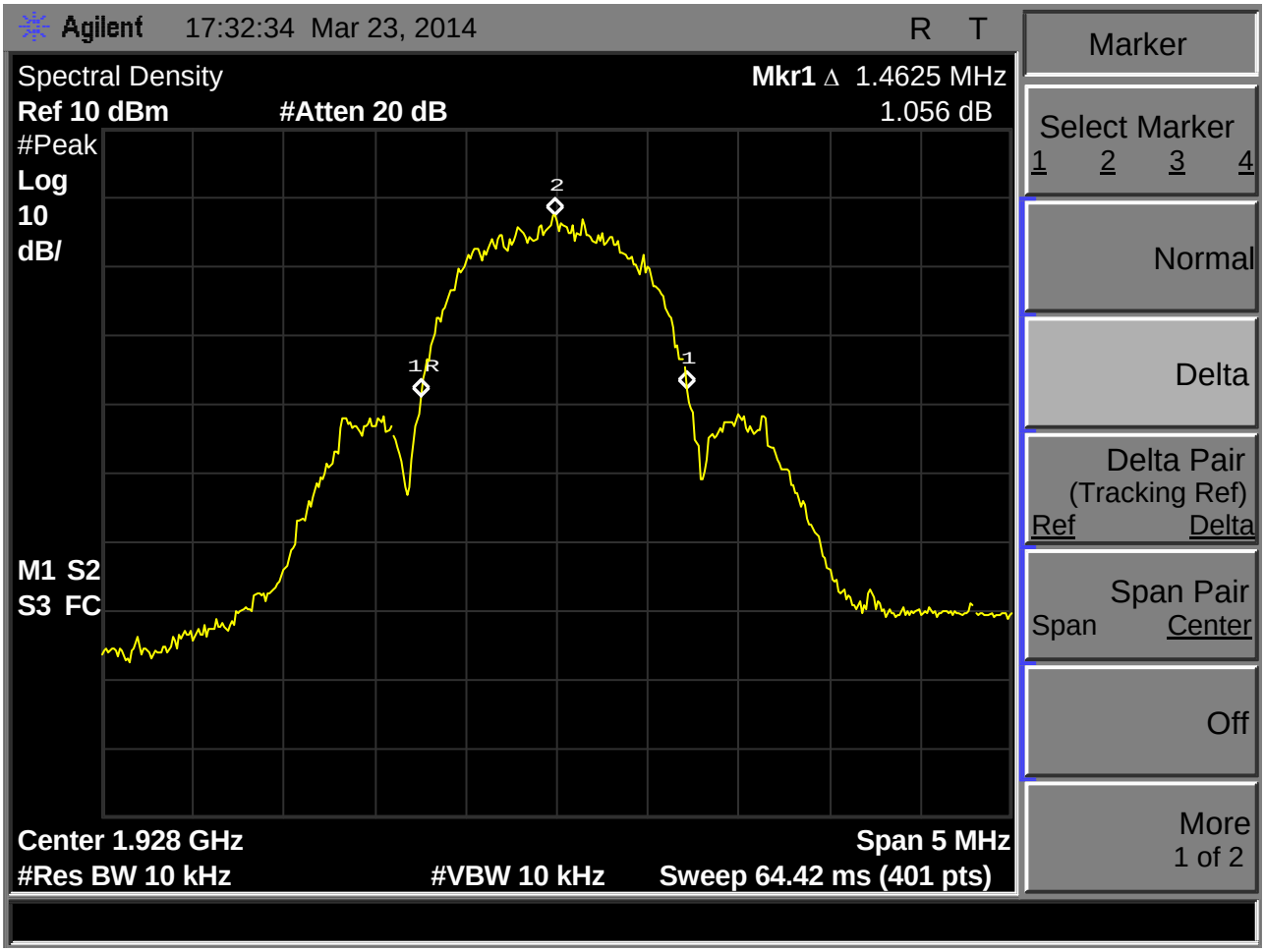


Fig. 85 - Remote EUT, 1.46MHz emissions bandwidth on high carrier.

The bandwidth ***B*** for the headset EUT used in further calculations according to the UPCS standard, from the center carrier, is then 1.49MHz.

The maximum allowed emission bandwidth *BlimitU* is 2.5MHz.
The minimum allowed emission bandwidth *BlimitL* is 50kHz,

The maximum observed emission bandwidth was 1.49MHz. The minimum observed emission bandwidth was 1.46MHz, so the remote EUT passes the test of clause 6.1.3 of C63.17-2006.

6.1.4 Modulation, Remote EUT

Per the attestation in section I-B, the companion remote device uses digital modulation and so meets the requirement of C63.17-2006

6.1.5 Power spectral density using the measured maximum method, remote EUT

The remote EUT is configured as described in the introduction for the tests of clause 6.1. First the low, then the mid, then the high carrier are selected, and the zero-span spectrum analyzer sweep is captured with the spectrum analyzer configured according to the requirements of 6.1.5 for each carrier.

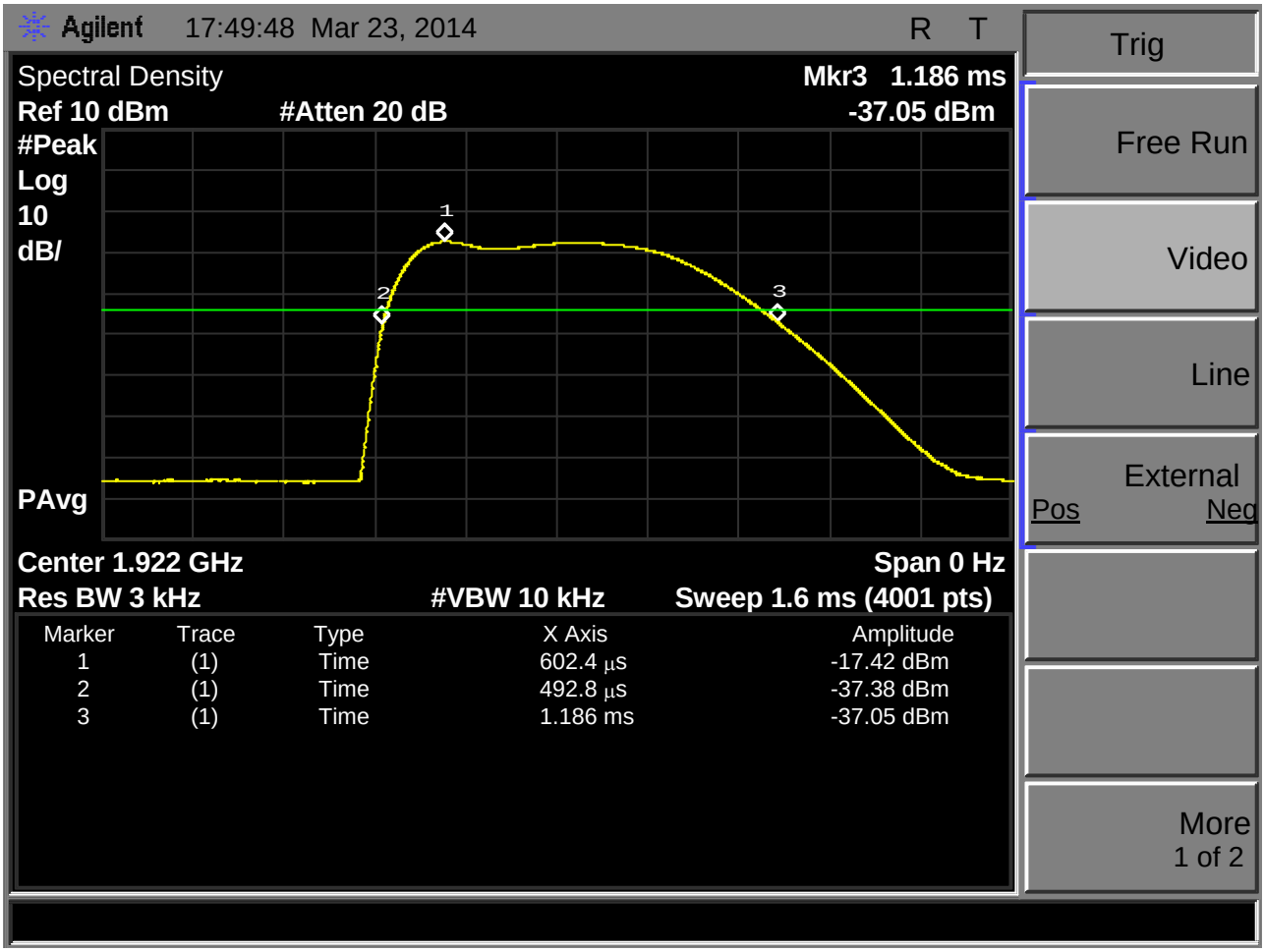


Fig. 86 – Zero-span sweep for remote EUT, low carrier, for 3kHz maximum power spectral density. The peak level is at –21.4dBm, and the interval between samples at the -20dB points is from 492uS to 1186uS, or 694uS.

The data points for this trace were saved, and the power spectral density computed according to the requirements of 6.1.5, and per figure 4 of C63.17-2006, using an Excel spreadsheet,
“Clause 6_1_5 3kHz headset EUT lowch.xls”

Integrated maximum 3kHz-bandwidth transmit power for the remote EUT on the low channel was -21.89dBm, a margin of 26.6dB to the specification for maximum power spectral density.

02/26/14 15:33:31	C:\TRACE084.CSV					
Title:						
Model:	E4407B					
Serial Number:	MY45105325					
Center Frequency:	1921536000	Hz				
Span:	0	Hz				
Resolution Bandwidth:	3000	Hz				
Video Bandwidth:	30000	Hz				
Reference Level:	1.00E+01	dBm				
Sweep Time:	2.00E-03	Sec				
Num Points:	4001					
Sample frequency:	2500000	Hz				
	Trace 1					
Sec	dBm	power, W		Power summed:		
6.10E-04	-3.72E+01	1.93E-07		1.10E-02		
6.10E-04	-3.68E+01	2.07E-07				
6.11E-04	-3.65E+01	2.22E-07		Total pulse energy in 3kHz BW, Joules:		
6.11E-04	-3.62E+01	2.37E-07		4.42E-09		
6.12E-04	-3.59E+01	2.54E-07				
6.12E-04	-3.56E+01	2.73E-07		Pulse length (-20dBc), seconds		
6.13E-04	-3.54E+01	2.91E-07		0.00068		
6.13E-04	-3.51E+01	3.07E-07				
6.14E-04	-3.48E+01	3.28E-07		Average pulse power, W		
6.14E-04	-3.46E+01	3.47E-07		6.47E-06		
6.15E-04	-3.43E+01	3.68E-07				
6.15E-04	-3.41E+01	3.93E-07		Average pulse power, dBm		
6.16E-04	-3.38E+01	4.19E-07		-21.89		
6.16E-04	-3.35E+01	4.44E-07				
6.17E-04	-3.33E+01	4.69E-07				
1.29E-03	-3.71E+01	1.96E-07				
1.29E-03	-3.71E+01	1.93E-07				
1.29E-03	-3.72E+01	1.91E-07				
1.29E-03	-3.73E+01	1.88E-07				
1.29E-03	-3.73E+01	1.86E-07				

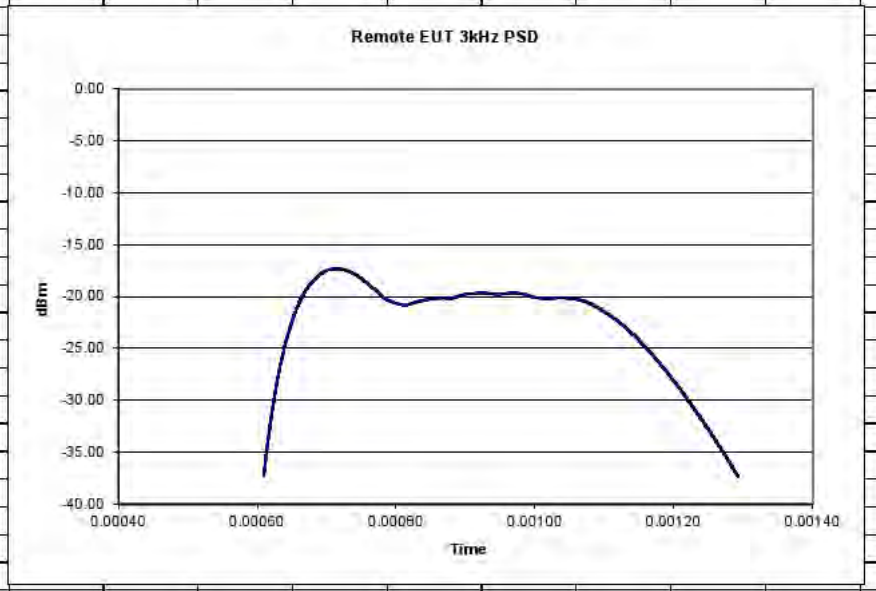


Fig. 87 – Screenshot of Excel file showing PSDlimit calculations for remote EUT, low carrier; -21.89dBm.

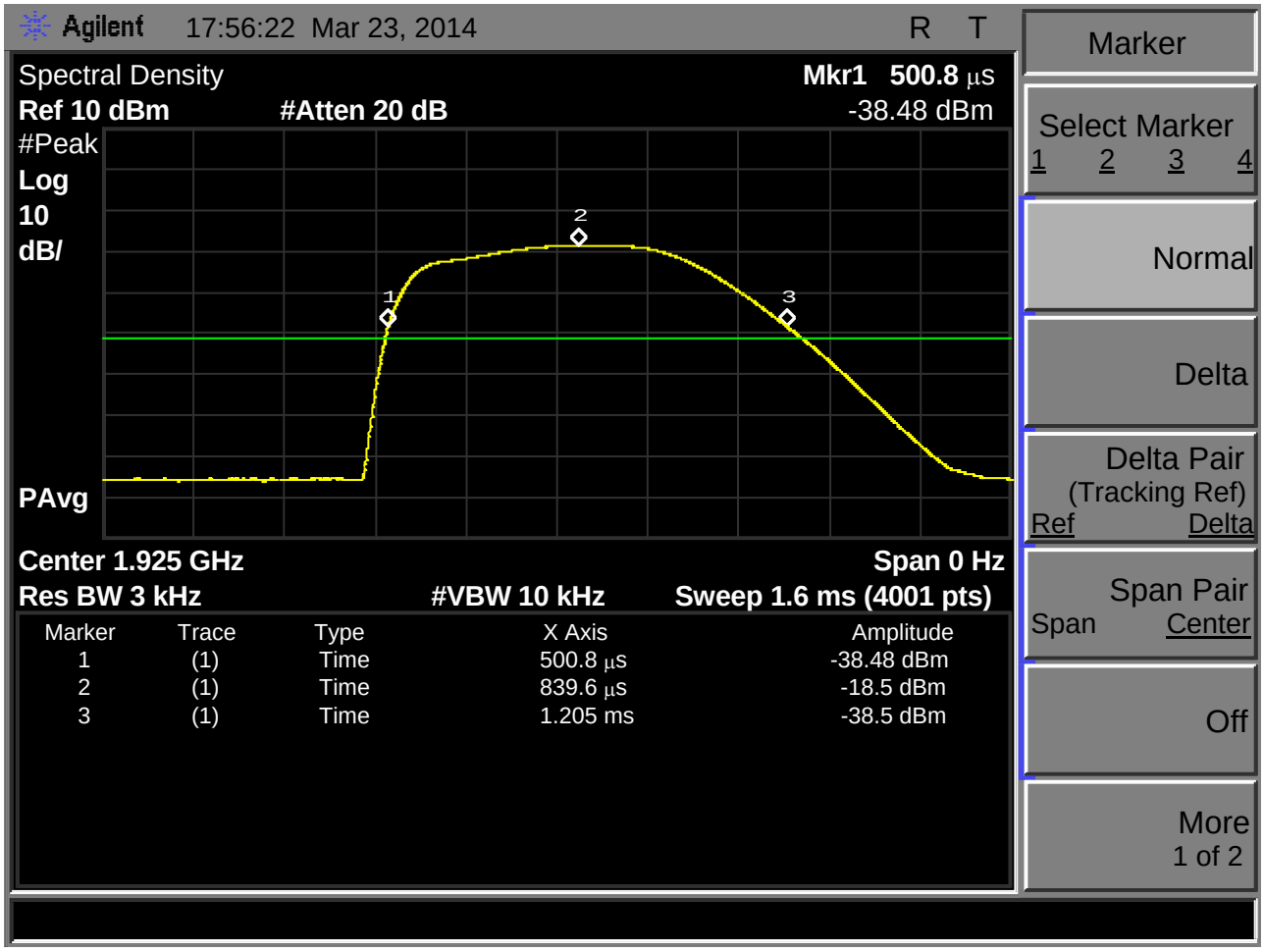


Fig. 88 – Zero-span sweep for remote EUT, middle carrier, for 3kHz maximum power spectral density. The peak level is at -21.25dBm, and the interval between samples at the -20dB points spans 500uS to 11205uS, or 705uS.

The data points for this trace were saved, and the power spectral density computed according to the requirements of 6.1.5, and per figure 4 of C63.17-2006, using an Excel spreadsheet,
“Clause 6_1_5 3kHz headset EUT midch.xls”

Integrated maximum 3kHz-bandwidth transmit power for the remote EUT on the mid channel was -21.87dBm, a margin of 26.64dB to the specification for maximum power spectral density.

02/26/14 15:31:29	C:\TRACE083.CSV				
Title:					
Model:	E4407B				
Serial Number:	MY45105325				
Center Frequency:	1924992000	Hz			
Span:	0	Hz			
Resolution Bandwidth:	3000	Hz			
Video Bandwidth:	30000	Hz			
Reference Level:	1.00E+01	dBm			
Sweep Time:	2.00E-03	Sec			
Num Points:	4001				
Sample frequency:	2500000	Hz			
	Trace 1				
Sec	dBm	power, W		Power summed:	
6.10E-04	-3.70E+01	2.00E-07		1.11E-02	
6.10E-04	-3.67E+01	2.15E-07			
6.11E-04	-3.64E+01	2.30E-07		Total pulse energy in 3kHz BW, Joules:	
6.11E-04	-3.61E+01	2.47E-07		4.42E-09	
6.12E-04	-3.58E+01	2.62E-07			
6.12E-04	-3.55E+01	2.80E-07		Pulse length (-20dBc), seconds	
6.13E-04	-3.52E+01	3.00E-07		0.00068	
6.13E-04	-3.50E+01	3.18E-07			
6.14E-04	-3.47E+01	3.36E-07		Average pulse power, W	
6.14E-04	-3.44E+01	3.59E-07		6.50E-06	
6.15E-04	-3.42E+01	3.84E-07			
6.15E-04	-3.39E+01	4.07E-07		Average pulse power, dBm	
6.16E-04	-3.37E+01	4.31E-07		-21.87	
6.16E-04	-3.34E+01	4.58E-07			
6.17E-04	-3.31E+01	4.86E-07			
1.29E-03	-3.68E+01	2.07E-07			
1.29E-03	-3.69E+01	2.06E-07			
1.29E-03	-3.69E+01	2.03E-07			
1.29E-03	-3.70E+01	2.00E-07			
1.29E-03	-3.70E+01	1.98E-07			
1.29E-03	-3.71E+01	1.96E-07			

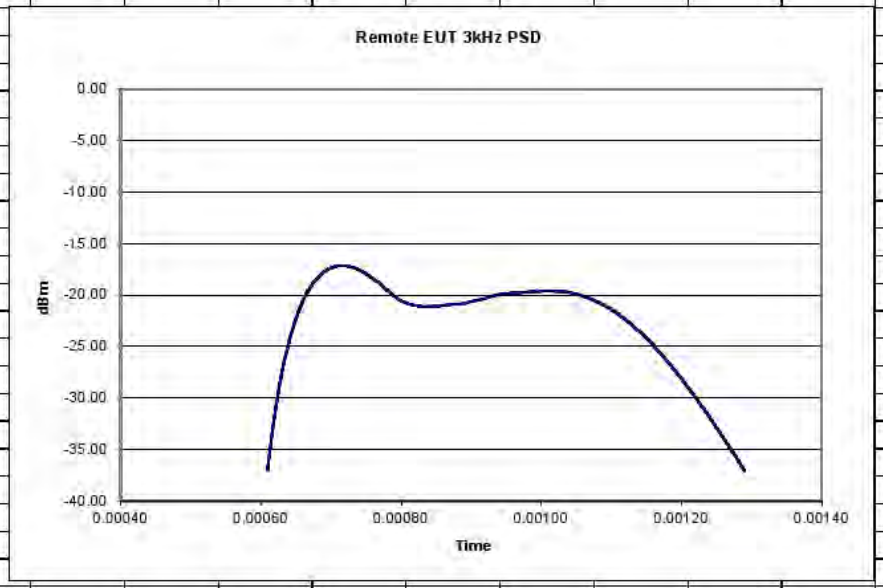


Fig. 89 – Screenshot of Excel file showing *PSDlimit* calculations for remote EUT, mid carrier; -21.87dBm.

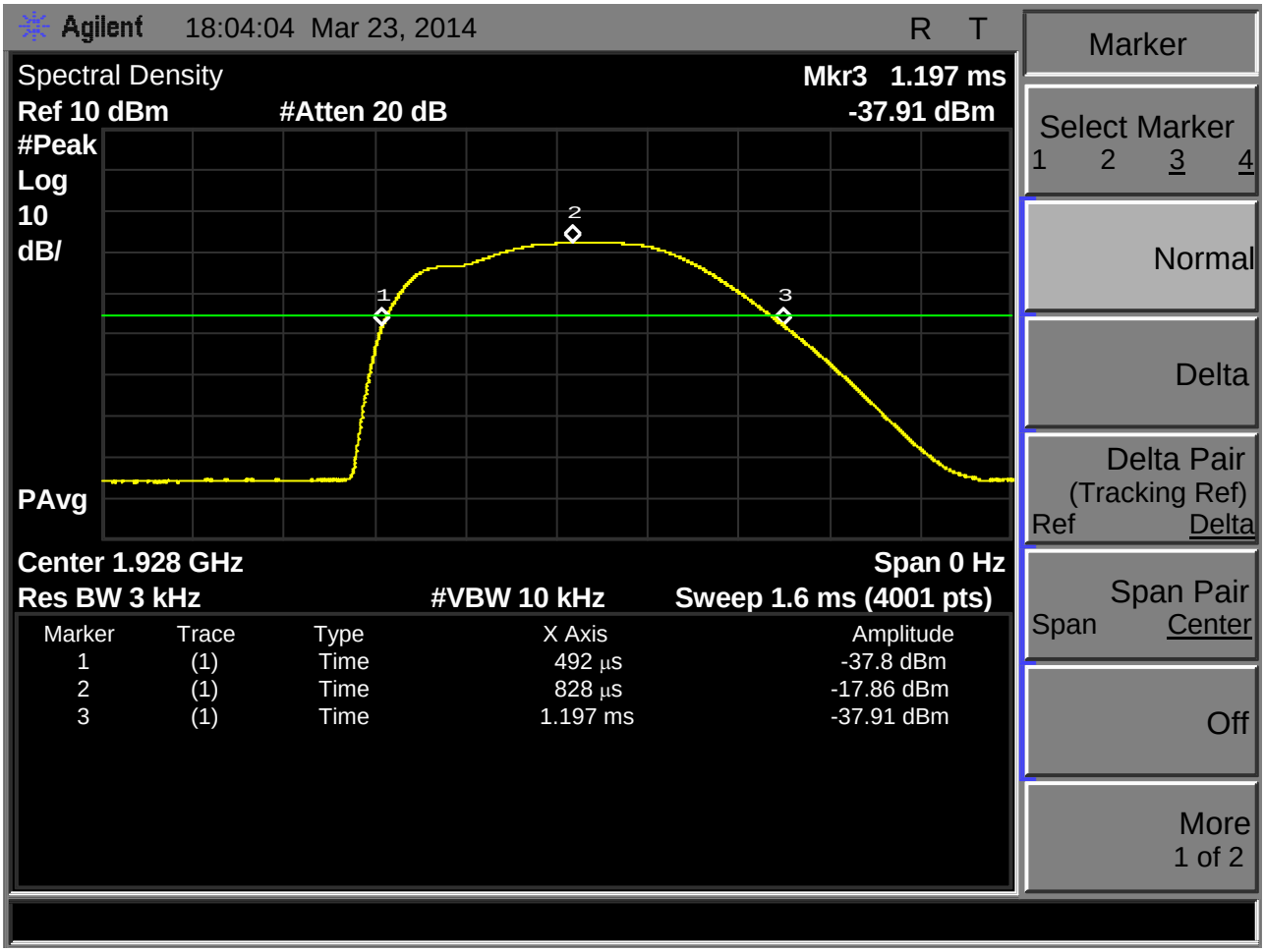


Fig. 90 – Zero-span sweep for remote EUT, high carrier, for 3kHz maximum power spectral density. The peak level is at -21.12dBm, and the interval between samples at the -20dB points is from 492.4uS to 1197uS, or 705uS.

The data points for this trace were saved, and the power spectral density computed according to the requirements of 6.1.5, and per figure 4 of C63.17-2006, using an Excel spreadsheet,
“Clause 6_1_5 3kHz headset EUT highch.xls”.

Integrated maximum 3kHz-bandwidth transmit power for the remote EUT on the low channel was –22.81dBm, a margin of 27.58dB to the specification for maximum power spectral density.

02/26/14 15:28:53	C:\TRACE082.CSV		
Title:			
Model:	E4407B		
Serial Number:	MY45105325		
Center Frequency:	1928448000	Hz	
Span:	0	Hz	
Resolution Bandwidth:	3000	Hz	
Video Bandwidth:	30000	Hz	
Reference Level:	1.00E+01	dBm	
Sweep Time:	2.00E-03	Sec	
Num Points:	4001		
Sample frequency:	2500000	Hz	
1403	1.38E+03		
	Trace 1		
Sec	dBm	power, W	Power summed:
6.08E-04	-3.85E+01	1.40E-07	1.05E-02
6.09E-04	-3.82E+01	1.50E-07	
6.09E-04	-3.79E+01	1.61E-07	Total pulse energy in 3kHz BW, Joules:
6.10E-04	-3.76E+01	1.73E-07	4.19E-09
6.10E-04	-3.74E+01	1.84E-07	
6.11E-04	-3.71E+01	1.97E-07	Pulse length (-20dBc), seconds
6.11E-04	-3.68E+01	2.11E-07	0.00069
6.12E-04	-3.65E+01	2.25E-07	
6.12E-04	-3.62E+01	2.38E-07	Average pulse power, W
6.13E-04	-3.60E+01	2.54E-07	6.05E-06
6.13E-04	-3.57E+01	2.68E-07	
6.14E-04	-3.54E+01	2.86E-07	Average pulse power, dBm
6.14E-04	-3.52E+01	3.03E-07	-22.18
6.15E-04	-3.50E+01	3.20E-07	
6.15E-04	-3.47E+01	3.36E-07	
1.30E-03	-3.85E+01	1.43E-07	
1.30E-03	-3.85E+01	1.40E-07	
1.30E-03	-3.86E+01	1.39E-07	
1.30E-03	-3.87E+01	1.36E-07	
1.30E-03	-3.87E+01	1.35E-07	

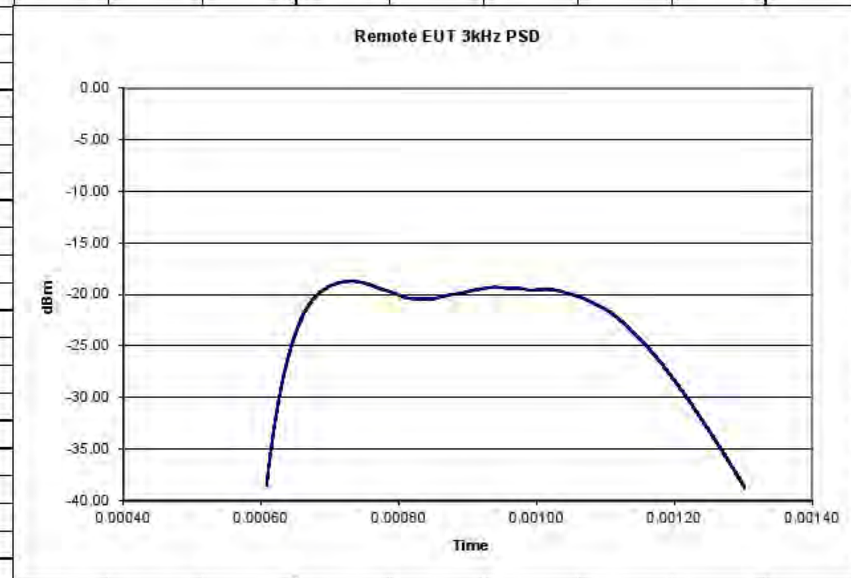


Fig. 91 – Screenshot of Excel file showing *PSDlimit* calculations for remote EUT, high carrier; -22.18dBm.

The maximum allowed PSD, *PSDlimit*, is 3mW in any 3kHz bandwidth, or 4.77dBm. The maximum observed PSD for the remote EUT is -21.87dBm, meeting the requirements according to clause 6.1.5 of C63.17-2006 with 26.64dB of margin.

6.1.6 Emissions, Remote EUT

The remote EUT is configured as described in the introduction for the tests of clause 6.1.

6.1.6.1 In-band unwanted emissions, remote EUT

For spectrum analyzer settings, 6.1.6.1 requires that the sweep time be no faster than one RBW (10kHz) every three transmit bursts (30mS, for this implementation). The in-band swept span is 10MHz, (1920MHz to 1930MHz) from the requirement that the swept span cover 3.5***B*** and where ***B*** = 1.49MHz, and to display the whole 10MHz in-band region. Accordingly, for a 10kHz resolution bandwidth, the sweep time is 30 seconds.

Tests are performed at low, mid and high carriers, 1921.536MHz, 1924.992MHz, and 1928.448MHz respectively.

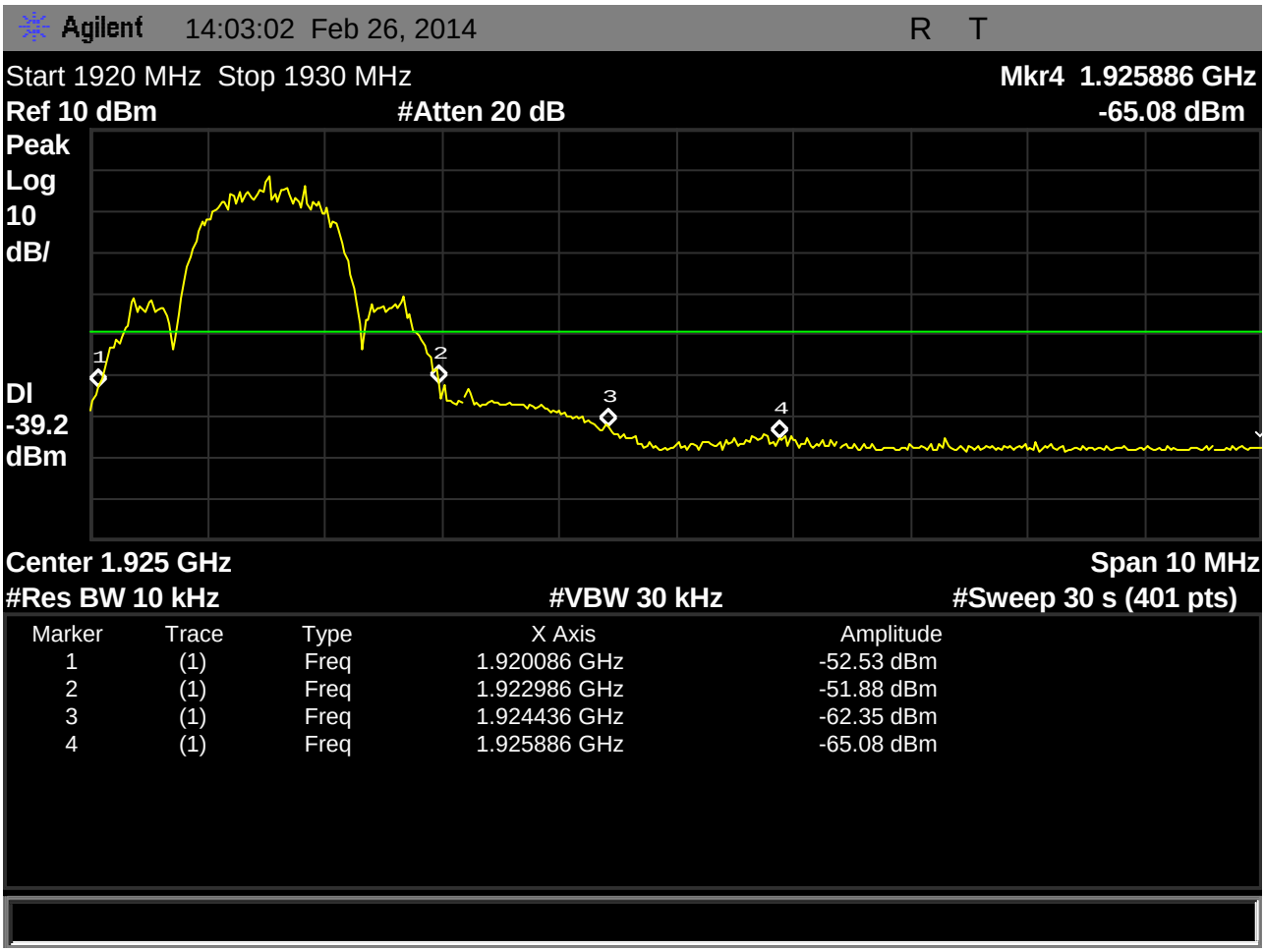


Fig. 92 - Spectrum analyzer screenshot for transmit emissions showing inband unwanted emissions with the remote EUT transmitter at the lowest carrier, 1921.536MHz, according to the requirements of 6.1.6.1.

The green line is the -60dB level for unwanted emissions relative to the maximum allowed transmit signal level; -60dB emissions are required for in-band frequency separations from the carrier of 3B and above, where B is the remote EUT emissions bandwidth. The markers are placed at 1B, 2B and 3B separations from the carrier, where the allowed limits are:

A) 1B to 2B separation: at least 30dB below the permitted level.
B) 2B to 3B separation: at least 50dB below the permitted level.
C) 3B to in-band edge: at least 60dB below the permitted level

For region A (double sided inband), the worst-case marker at 1920.08 MHz is at -52.53dBm, and 30dB below 20.8dBm, or -9.2dBm is allowed, margin is 43.33dB.

For region B (single-sided inband), the marker at 1924.43MHz is at -62.53dBm, and 50dB below 20.8dBm, or -29.2dBm is allowed, margin is 32.85dB.

For region C (single-sided inband), the marker at 1925.88MHz is at -65.08dBm, and 60dB below 20.8dBm, or -39.2dBm is allowed, margin is 25.58dB.

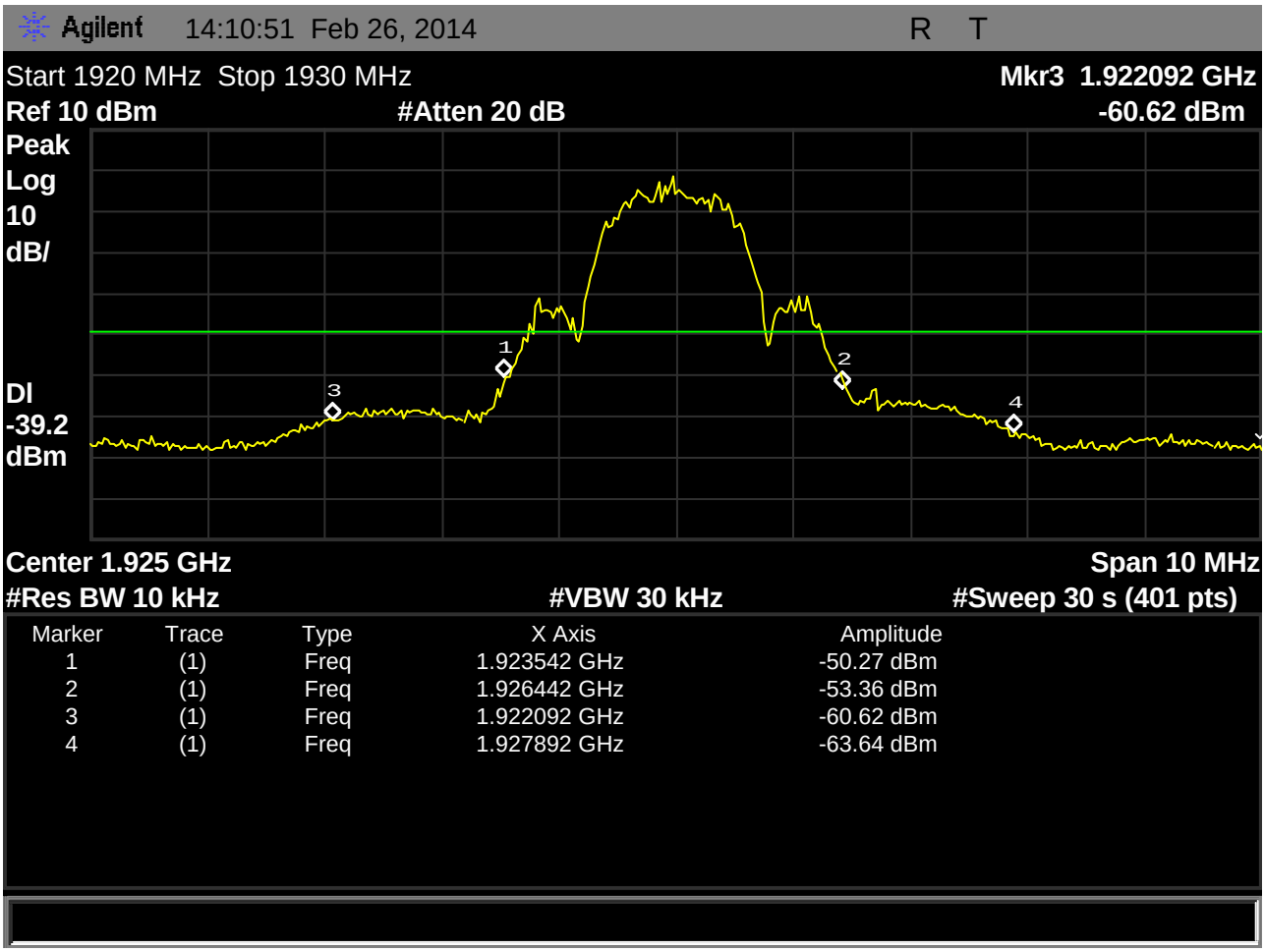


Fig. 93 - Spectrum analyzer screenshot for transmit emissions showing in-band unwanted emissions with the remote EUT transmitter at the middle carrier, 1924.992MHz, according to the requirements of 6.1.6.1.

The green line is the -60dB level for unwanted emissions relative to the maximum allowed transmit signal level; -60dB emissions are required for in-band frequency separations from the carrier of 3B and above, where B is the remote EUT emissions bandwidth. The markers are placed at 1B, 2B and 3B separations from the carrier, where the allowed limits are:

A) 1B to 2B separation: at least 30dB below the permitted level.
B) 2B to 3B separation: at least 50dB below the permitted level.
C) 3B to in-band edge: at least 60dB below the permitted level.

For region A (double-sided in-band), the worst-case marker at 1923.54MHz is at -50.27dBm, and 30dB below 20.8dBm, or -9.2dBm is allowed, margin is 41.07dB.

For region B (double-sided in-band), the worst-case marker at 1927.89MHz is at -63.64dBm, and 50dB below 20.8dBm, or -29.2dBm is allowed, margin is 34.44dB.

For region C, markers are not shown, but the emissions are not worse than the case for region B, and so, with 60dB below 20.8dBm, or -39.2dBm allowed, margin is at least 25.12dB.

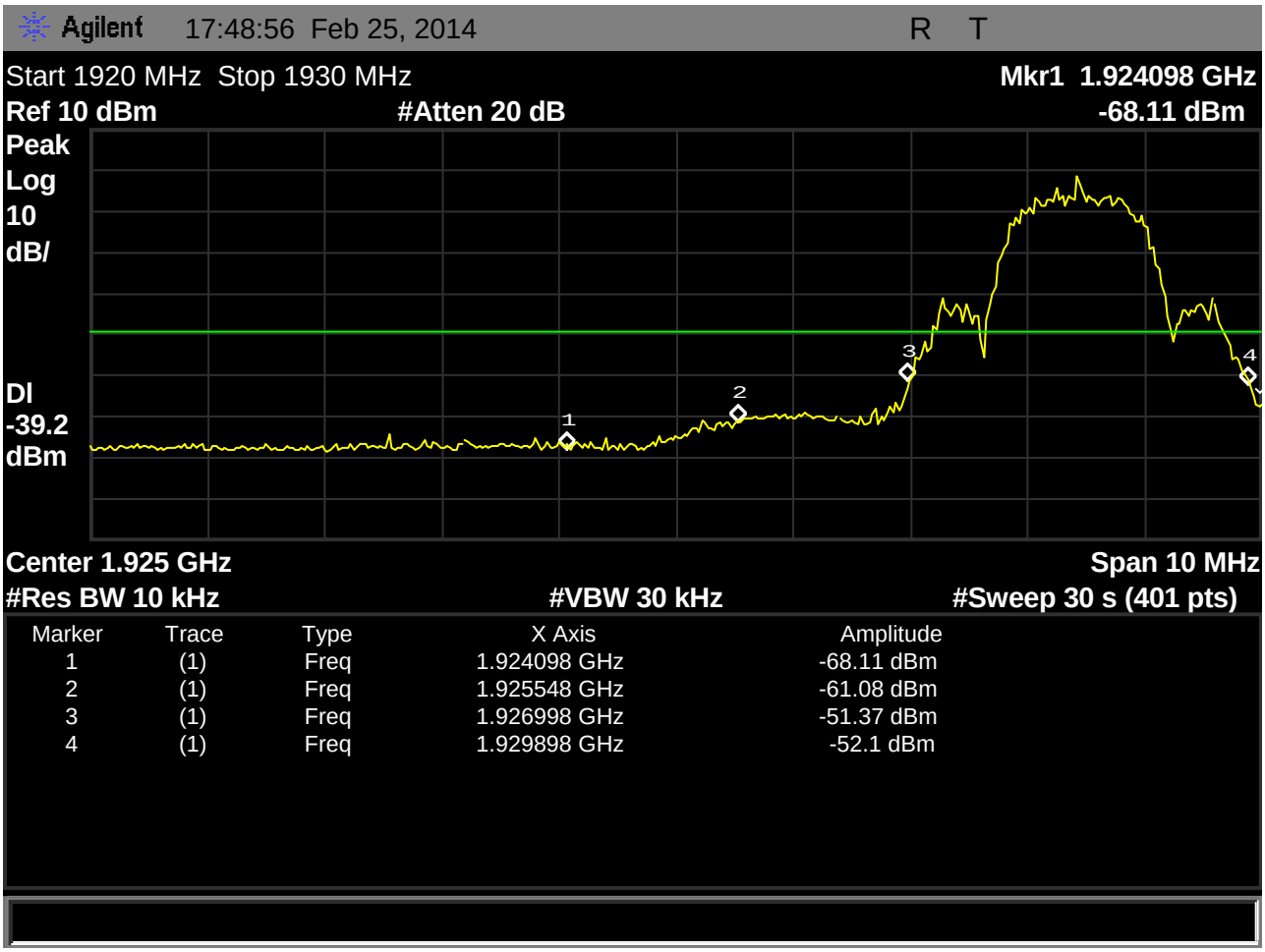


Fig. 94 - Spectrum analyzer screenshot for transmit emissions showing in-band unwanted emissions with the remote EUT transmitter at the highest carrier, 1928.448MHz, according to the requirements of 6.1.6.1.

The green line is the -60dB level for unwanted emissions relative to the maximum allowed transmit signal level; -60dB emissions are required for in-band frequency separations from the carrier of 3B and above, where B is the remote EUT emissions bandwidth. The markers are placed at 1B, 2B and 3B separations from the carrier, where the allowed limits are:

A) 1B to 2B separation: at least 30dB below the permitted level.
B) 2B to 3B separation: at least 50dB below the permitted level.
C) 3B to in-band edge: at least 60dB below the permitted level.

For region A (double sided in-band), the worst-case marker at 1926.99 MHz is at -51.37dBm, and 30dB below 20.8dBm, or -9.2dBm is allowed, margin is 42.17dB.

For region B (single-sided in-band), the marker at 1925.54MHz is at -61.08dBm, and 50dB below 20.8dBm, or -29.2dBm is allowed, margin is 31.88dB.

For region C (single-sided in-band), the marker at 1924.09MHz is at -68.11dBm, and 60dB below 20.8dBm, or -39.2dBm is allowed, margin is 28.91dB.

The tests of in-band unwanted emissions for the base EUT at low, mid and high carrier show that the remote EUT meets the requirements of 6.1.6.1 with not less than 25.12dB of margin.

6.1.6.2 Out-of-band emissions, Remote EUT

6.1.6.2 requires measurements be made adjacent to the band for the regions from band edge to 1.25MHz separation and also from 1.25MHz to 2.5MHz separation. Then for frequencies separated from the band by more than 2.5MHz, the test can be made either (from paragraph c of 6.1.6.2) as a conducted test against an emissions limit of -39.5dBm, or (from paragraph d of 6.1.6.2) as a radiated test according to the requirements of 47CFR15.209. Plantronics elects to use paragraph c, the conducted test.

The measurements are made at low (1921.536MHz) and then high (1928.448MHz) carrier, with the results presented in sections. Spectrum analyzer screenshots are presented as follows:

- For the region from 0 to 5MHz, to resolve low frequencies and differentiate the spectrum analyzer's DC response from an emissions peak, for paragraph c.
- For the region from 5MHz to 1915MHz, for paragraph c.
- For the region 5MHz region below the band edge (1915 to 1920MHz) to cover the requirements of paragraphs a and b.
- For the region 5MHz above the band edge (1930 to 1935MHz) to cover the requirements of paragraphs a and b.

The regions are measured according to the requirements for spectrum analyzer settings form 6.1.6.1 except as follows:

- The region from 5MHz to 1915MHz is measured in a 100kHz resolution bandwidth and 300kHz video bandwidth to achieve an improvement in test time without compromising accuracy – the wider bandwidth passes more potential emissions simultaneously and thus over-reports the emissions value for a spectral peak, but the EUT has sufficient margin in this region that the test conclusions are not affected. This allows a sweep time of only 573 seconds.

- The region above the band and up to the 10th harmonic (19.3GHz) is measured in a 300 kHz resolution bandwidth and 1MHz video bandwidth to achieve an improvement in test time again without compromising accuracy – the wider bandwidth allows a sweep time of only 1736.5 seconds.

The emissions peaks noted at the 2nd, 3rd and 4th harmonics are then measured in the resolution bandwidth according to the text of 6.1.6.2, for an accurate measurement of the margin to the specification.

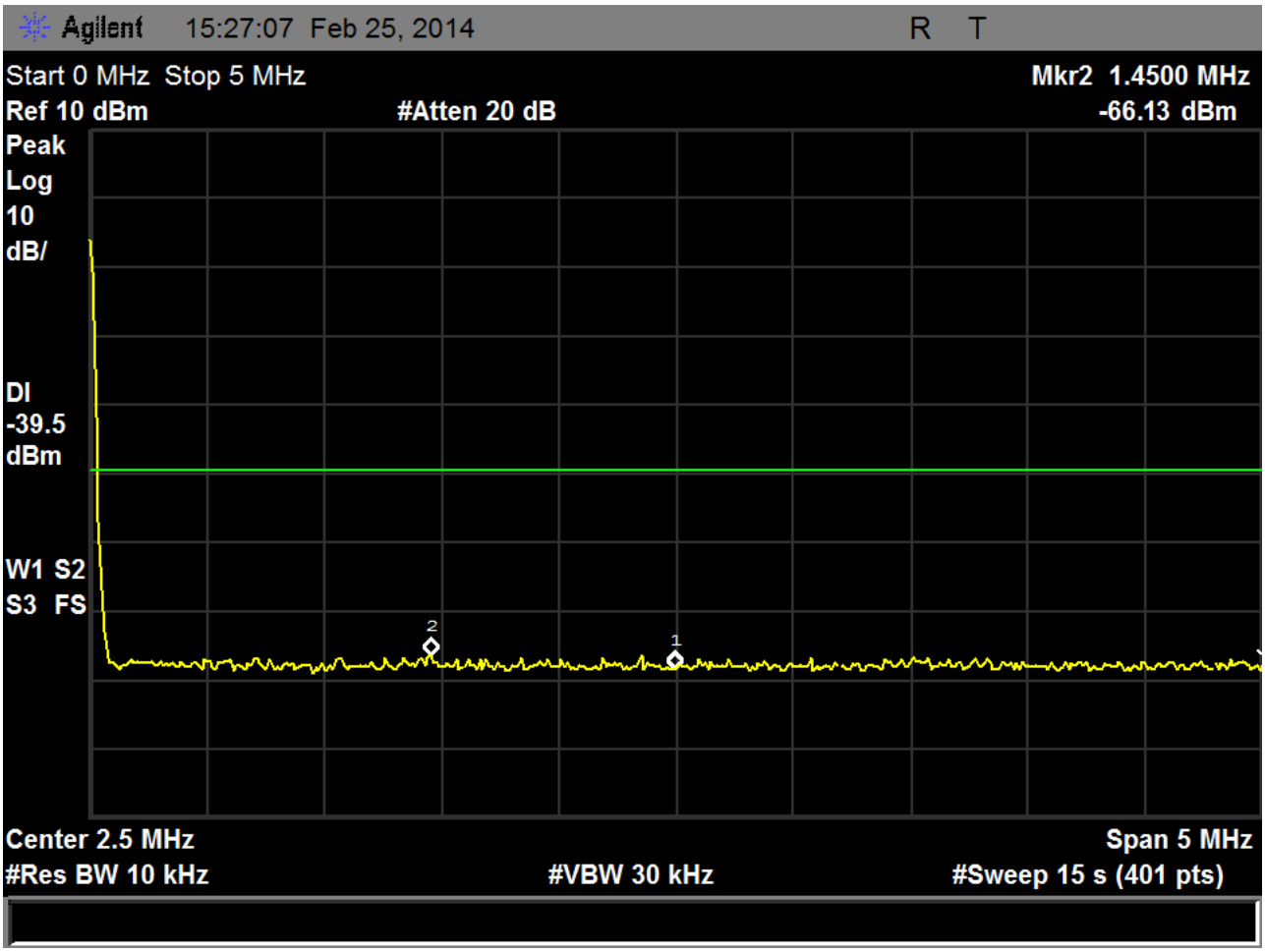


Fig. 95 – Remote EUT out-of-band emissions showing the regions from DC to 5MHz, with the transmitter using the lowest carrier, 1921.536MHz.

This screenshot resolves the contribution made by the spectrum analyzer's DC response. Remote EUT margin to the -39.5dBm out-of-band emissions specification exceeds 25dB in this region

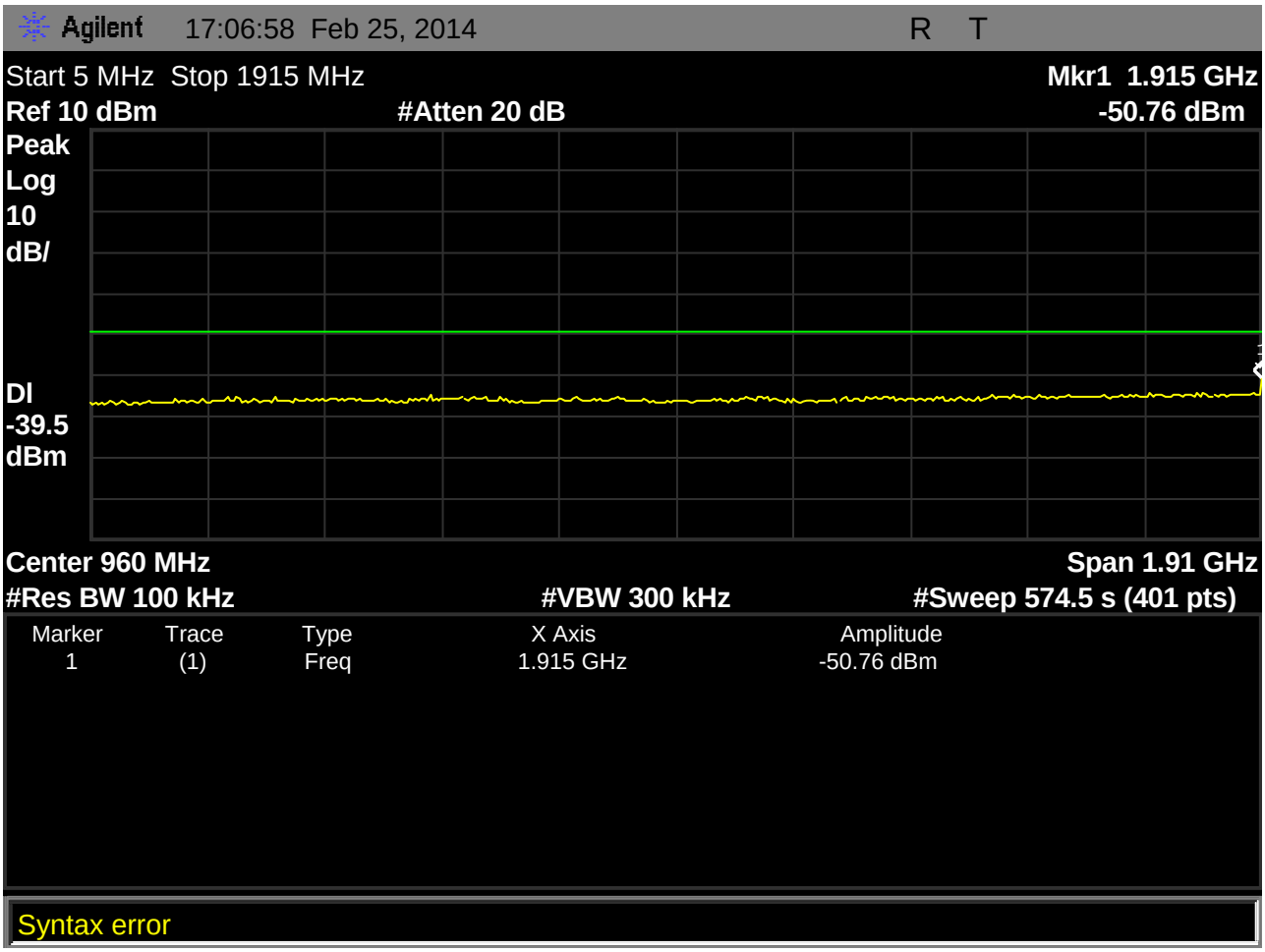


Fig. 96 – Remote EUT out-of-band emissions showing the region from 5MHz to 1915MHz, with the transmitter using the lowest carrier, 1921.536MHz.

This screenshot shows a sweep made with resolution bandwidth increased to 100 kHz to improve sweep time. Remote EUT emissions at -50.76dB have margin to the -39.5dBm out-of-band emissions specification in this spectral region of 11.26dB in this region, even measured in a 10x-wider bandwidth than that in the test procedure of clause 6.1.6.

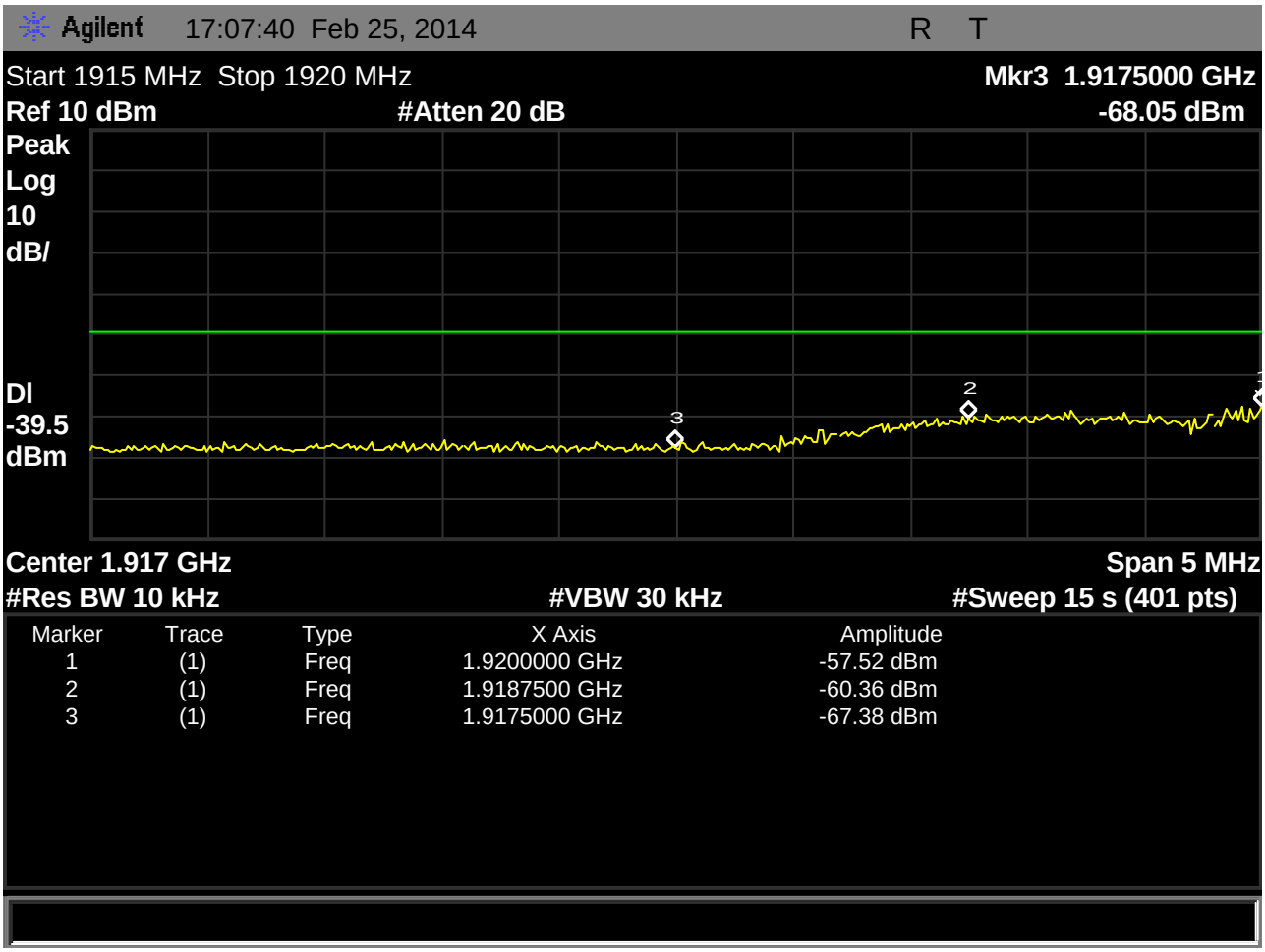


Fig. 97 – Remote EUT out-of-band emissions showing the regions from band edge to -1.25MHz, and from -1.25MHz to -2.5MHz, with the headset EUT transmitting on the lowest carrier, 1921.536MHz.

Margin to the specification of -9.5dBm in the region from band edge to -1.25MHz is found at marker 1, at -57.52dBm, and is 48.02dBm.

Margin to the specification of -29.5dBm in the region from -1.25MHz to -2.5MHz is found at marker 2, at -60.36dBm, and is 30.86dB.

Margin to the specification of -39.5dBm in the region outside -2.5MHz from the band edge exceeds 25dB.

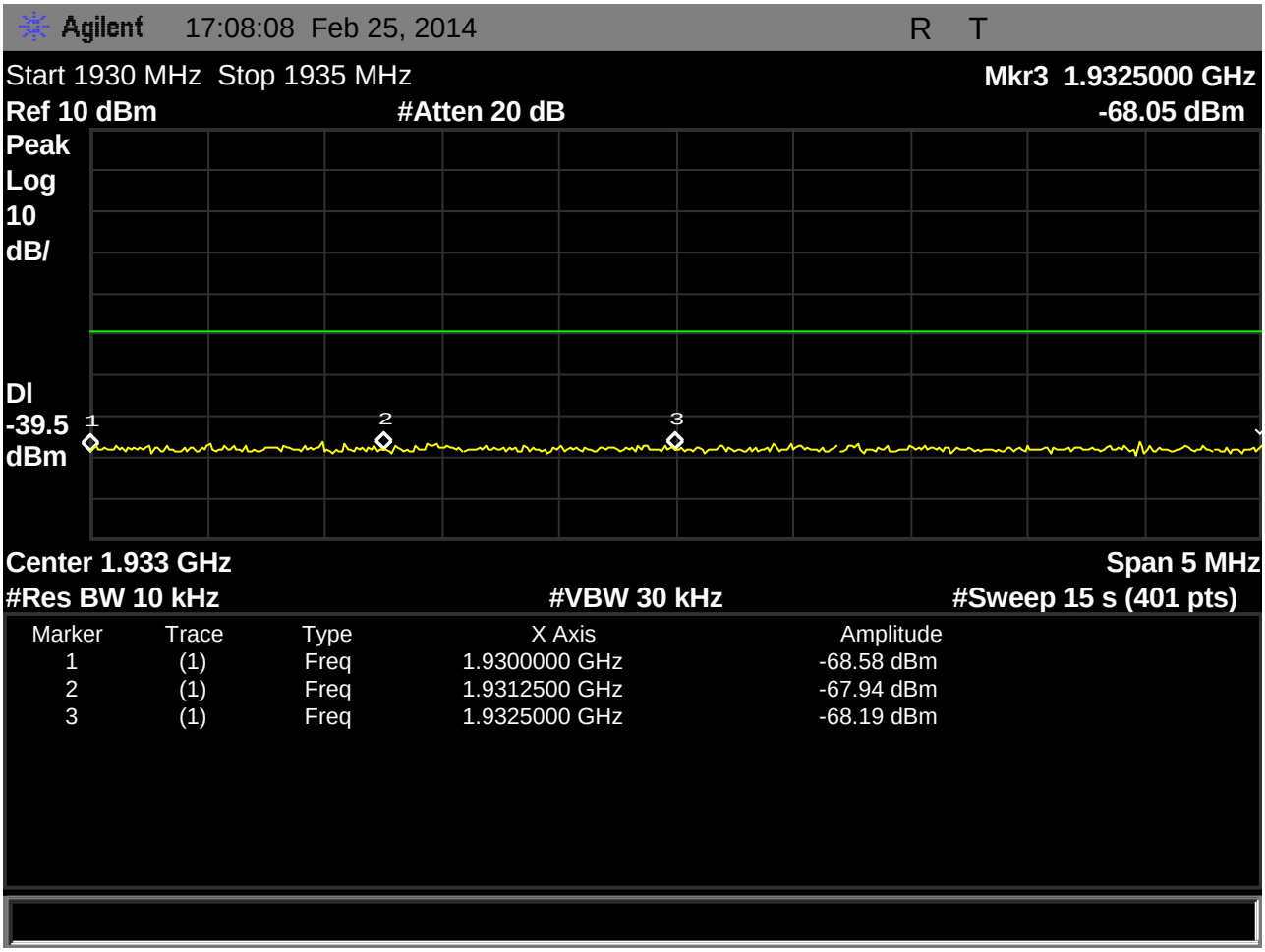


Fig. 98 – Remote EUT out-of-band emissions showing the regions from band edge to +1.25 MHz, and from +1.25MHz to +2.5MHz, with the headset EUT transmitting on the lowest carrier, 1921.536MHz.

Margins to the specification of -9.5dBm in the region from band edge to -1.25 MHz , to the specification of -29.5dBm in the region from -1.25MHz to -2.5MHz, and to the specification of -39.5dBm in the region outside -2.5MHz from the band edge all exceed 25dB.

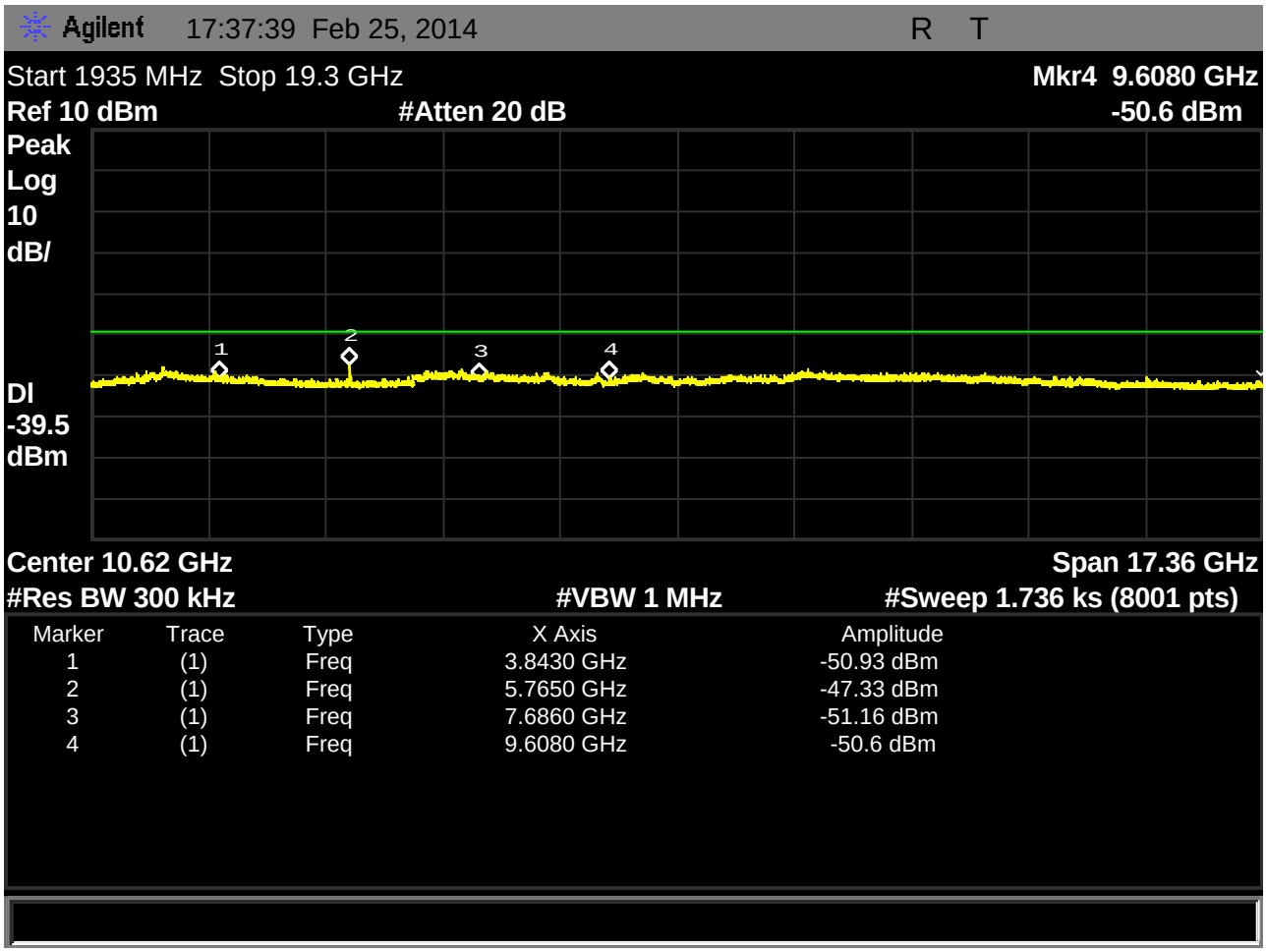


Fig. 99 – Remote EUT out-of-band emissions including the regions from 1935MHz to 19.3GHz with the headset EUT transmitting on the lowest carrier, 1921.536MHz.

The least margin is at the 2nd harmonic of the transmitter. This measurement is made using a 300 kHz resolution bandwidth in the interests of getting a manageable sweep time, 1736.5 seconds, but the 300kHz bandwidth passes considerably more unwanted emissions than the 10kHz obtained from the text of C63.17-2006 clause 6.1.6.
Even so, the margin to specification is 7.81dB, from the limit at -39.5dBm and the measured emission in 300kHz resolution bandwidth at -47.33 dBm . We can then re-do the test using narrow scans according to the requirements of 6.1.6 to resolve the margin in the proper measurement bandwidth.

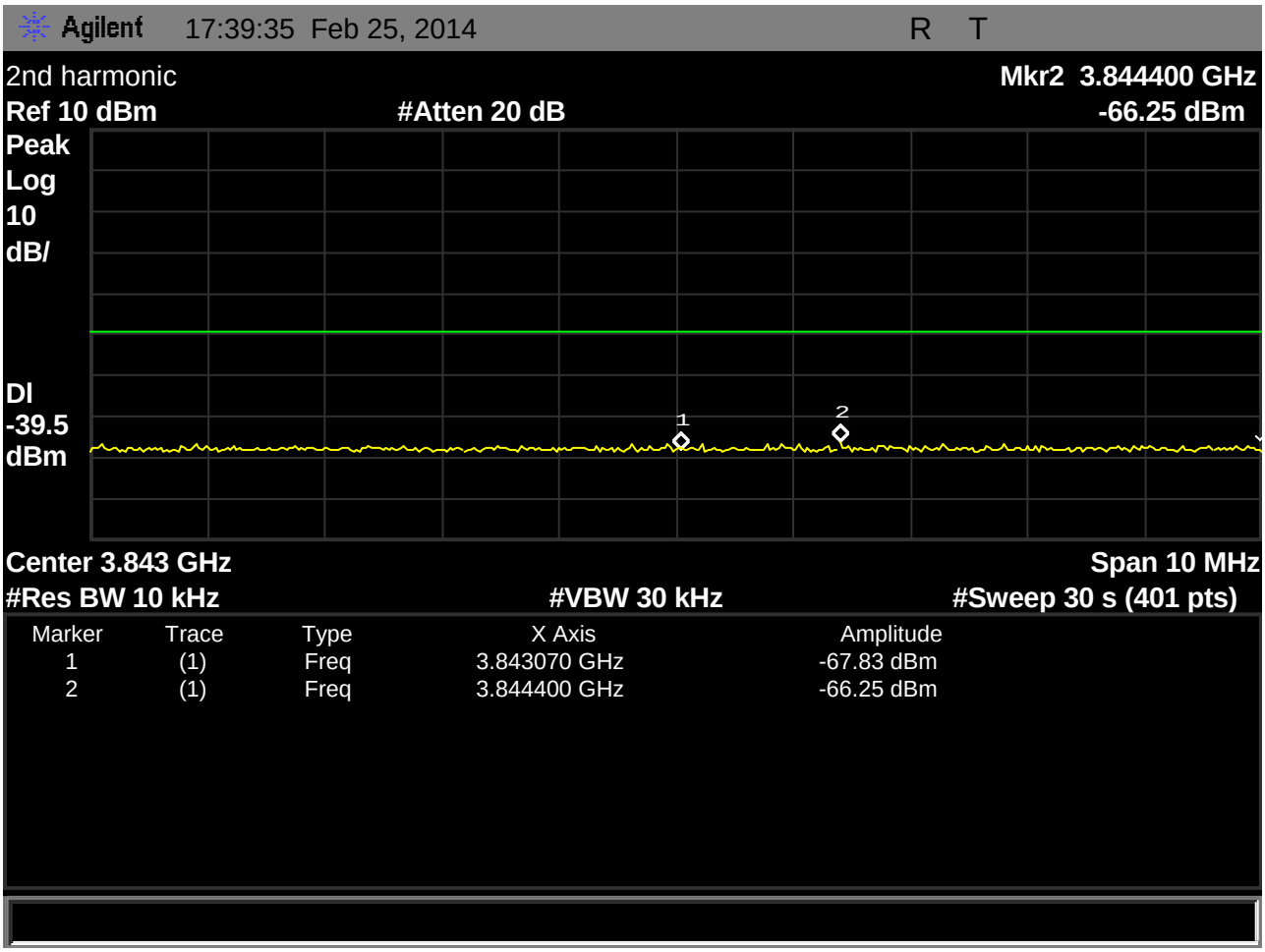


Fig. 100 –Remote EUT out-of-band emissions in the region around the 2nd harmonic, with the remote EUT transmitting on the lowest carrier, 1921.536MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at -66.25dBm, shows margin to the -39.5dBm specification of 26.75dB.

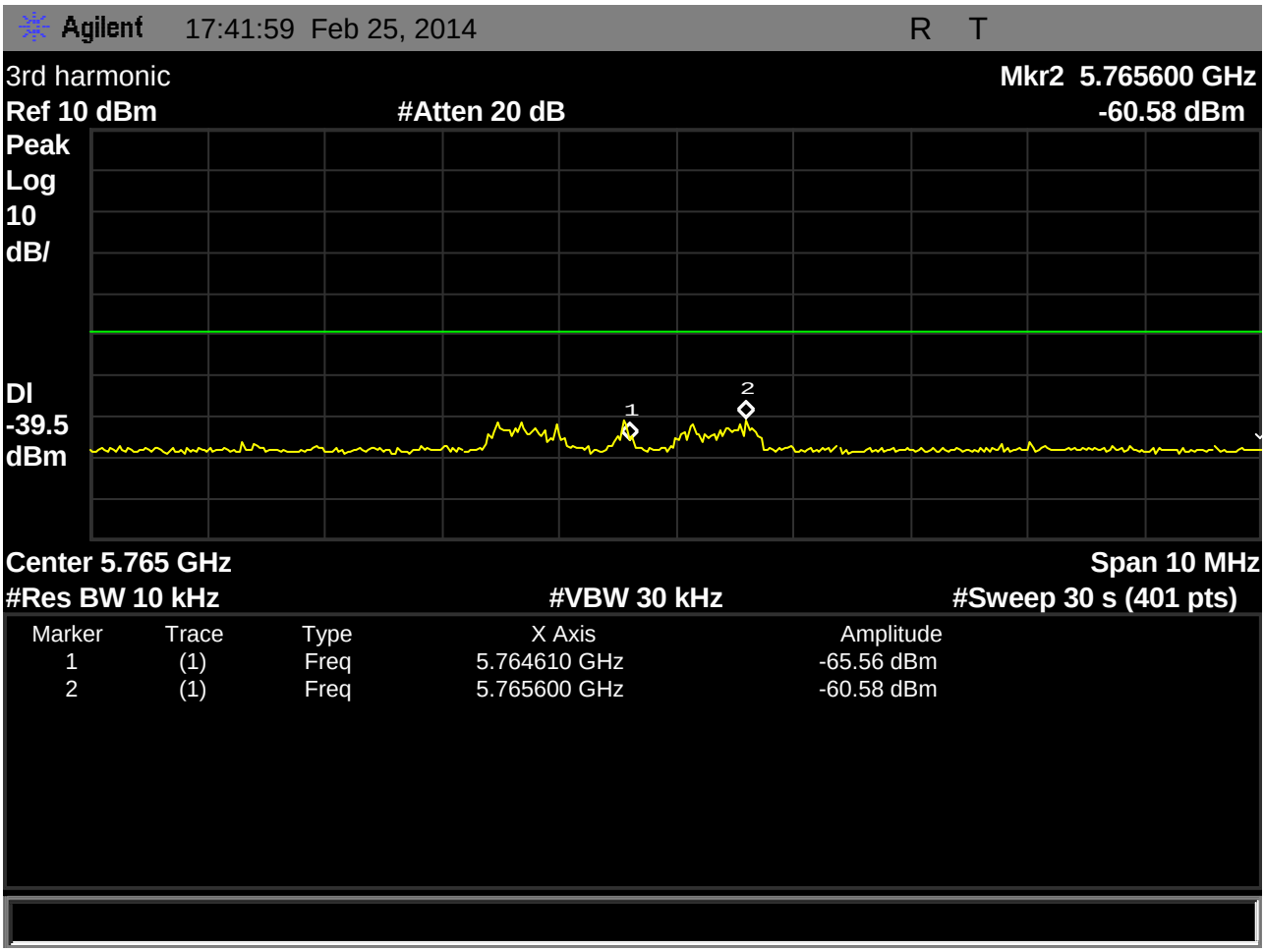


Fig. 101 – remote EUT out-of-band emissions in the region around the 3rd harmonic, with the remote EUT transmitting on the lowest carrier, 1921.536MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at -60.58dB, shows margin to the -39.5dBm specification of 21.08dB.

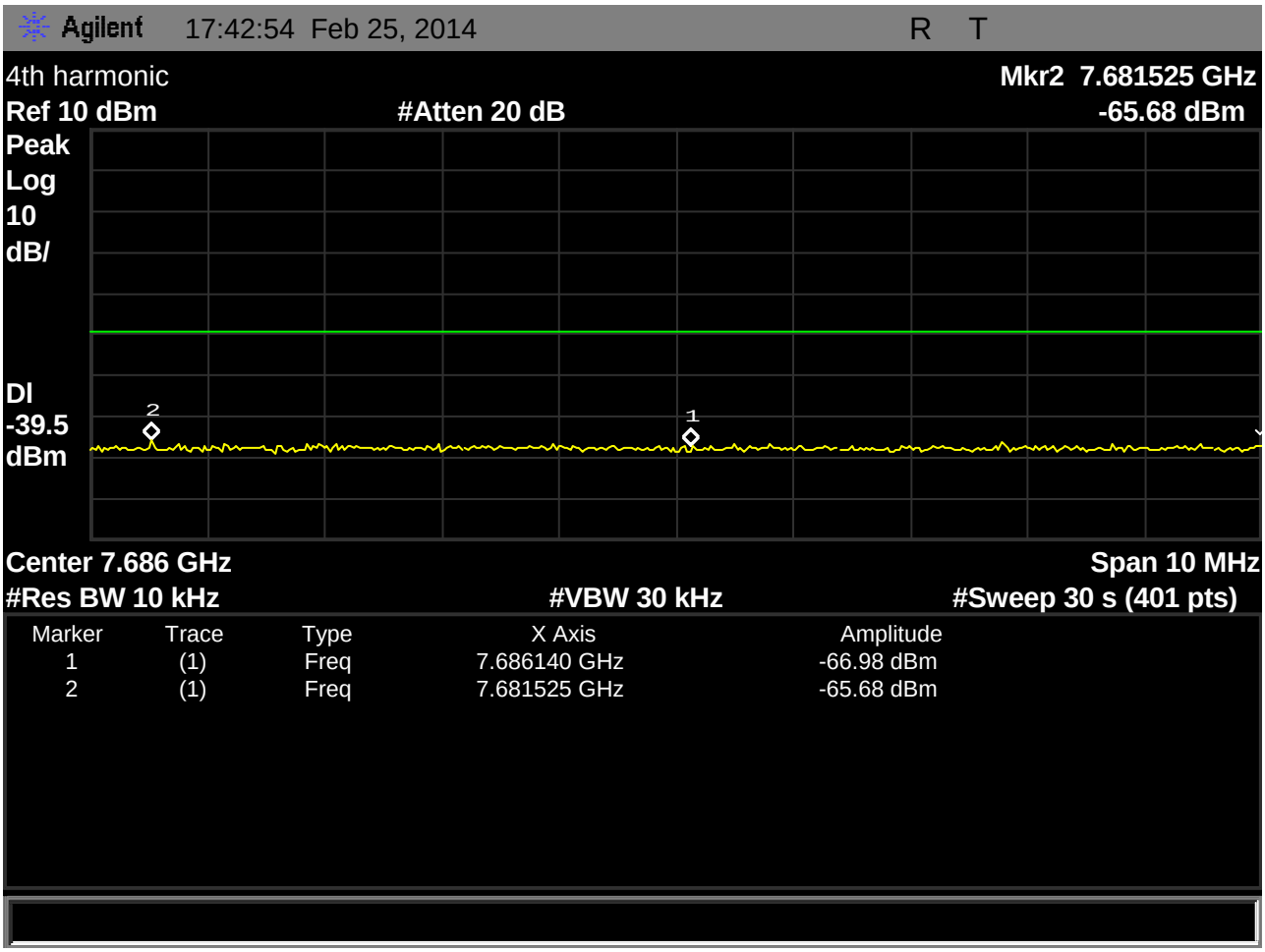


Fig. 102 –Remote EUT out-of-band emissions in the region around the 4th harmonic, with the remote EUT transmitting on the lowest carrier, 1921.536MHz.

This measurement was made for test completeness, the emissions are at the noise floor.

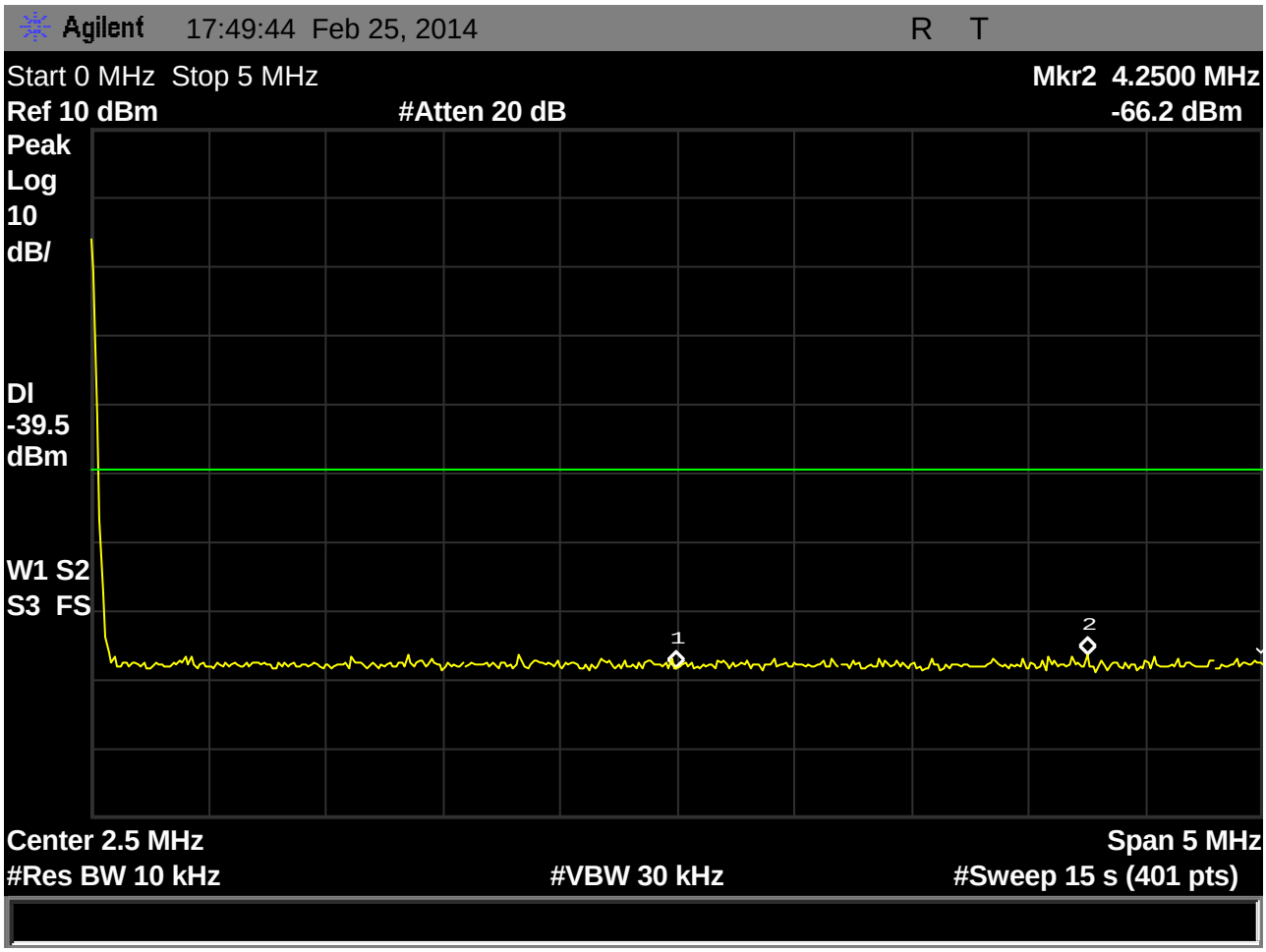


Fig. 103 – Remote EUT out-of-band emissions showing the regions from DC to 5MHz, with the transmitter using the highest carrier, 1928.448MHz.

This screenshot resolves the contribution made by the spectrum analyzer's DC response. Remote EUT margin to the -39.5dBm out-of-band emissions specification exceeds 25dB in this region

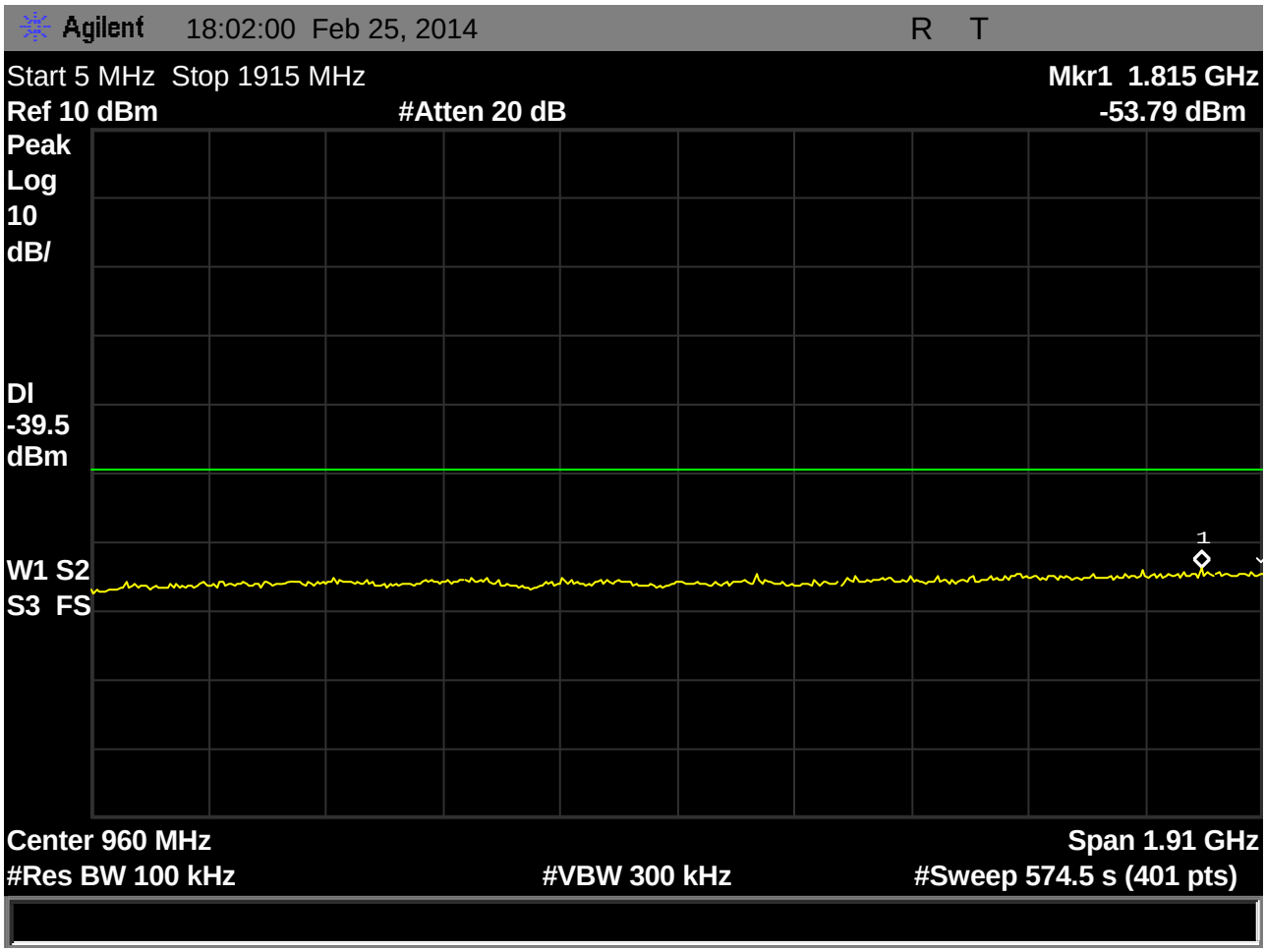


Fig. 104 – Remote EUT out-of-band emissions showing the region from 5MHz to 1915MHz, with the transmitter using the highest carrier, 1928.448MHz.

This screenshot shows a sweep made with resolution bandwidth increased to 100 kHz to improve sweep time. Remote EUT emissions at -53.79dB have margin to the -39.5dBm out-of-band emissions specification in this spectral region of 14.29dB in this region, even measured in a 10x-wider bandwidth than that of the text of the test procedure in clause 6.1.6.

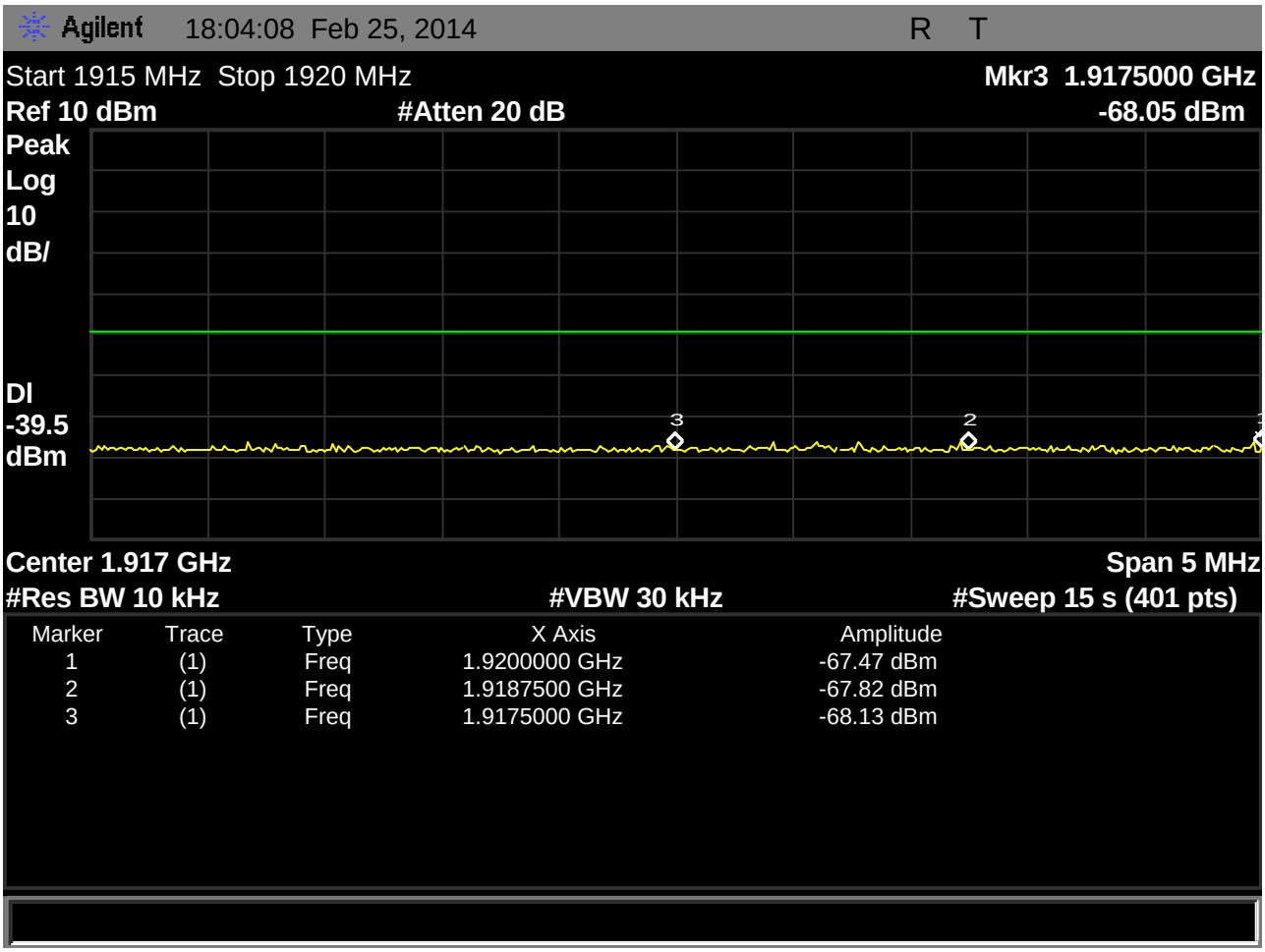


Fig. 105 –Remote EUT out-of-band emissions showing the regions from band edge to -1.25MHz, and from -1.25MHz to -2.5MHz, with the remote EUT transmitting on the highest carrier, 1928.448MHz.

Margins to the specification of -9.5dBm in the region from band edge to -1.25MHz, to the specification of -29.5dBm in the region from -1.25MHz to -2.5MHz, and to the specification of -39.5dBm in the region outside -2.5MHz from the bandedge all exceed 25dB.

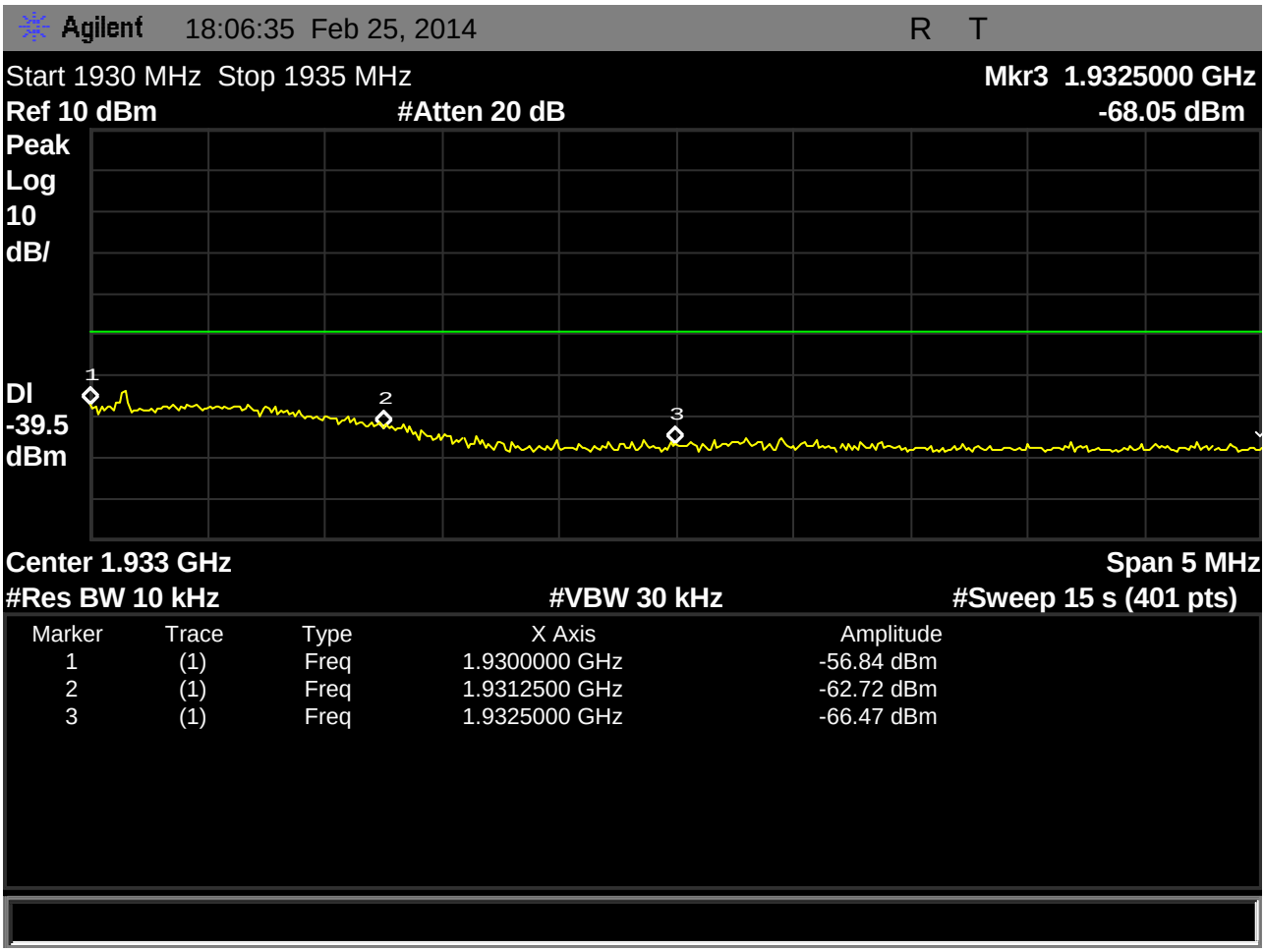


Fig. 106 – Remote EUT out-of-band emissions showing the regions from band edge to +1.25MHz, and from +1.25MHz to +2.5MHz, with the remote EUT transmitting on the highest carrier, 1928.448MHz.

Margin to the specification of -9.5dBm in the region from band edge to +1.25MHz is found at marker 1, at -53dBm, and is 43.5dBm.

Margin to the specification of -29.5dBm in the region from +1.25MHz to +2.5MHz is found at marker 2, at -62.72dBm, and is 39.59dB.

Margin to the specification of -39.5dBm in the region outside +2.5MHz from the band edge exceeds 25dB

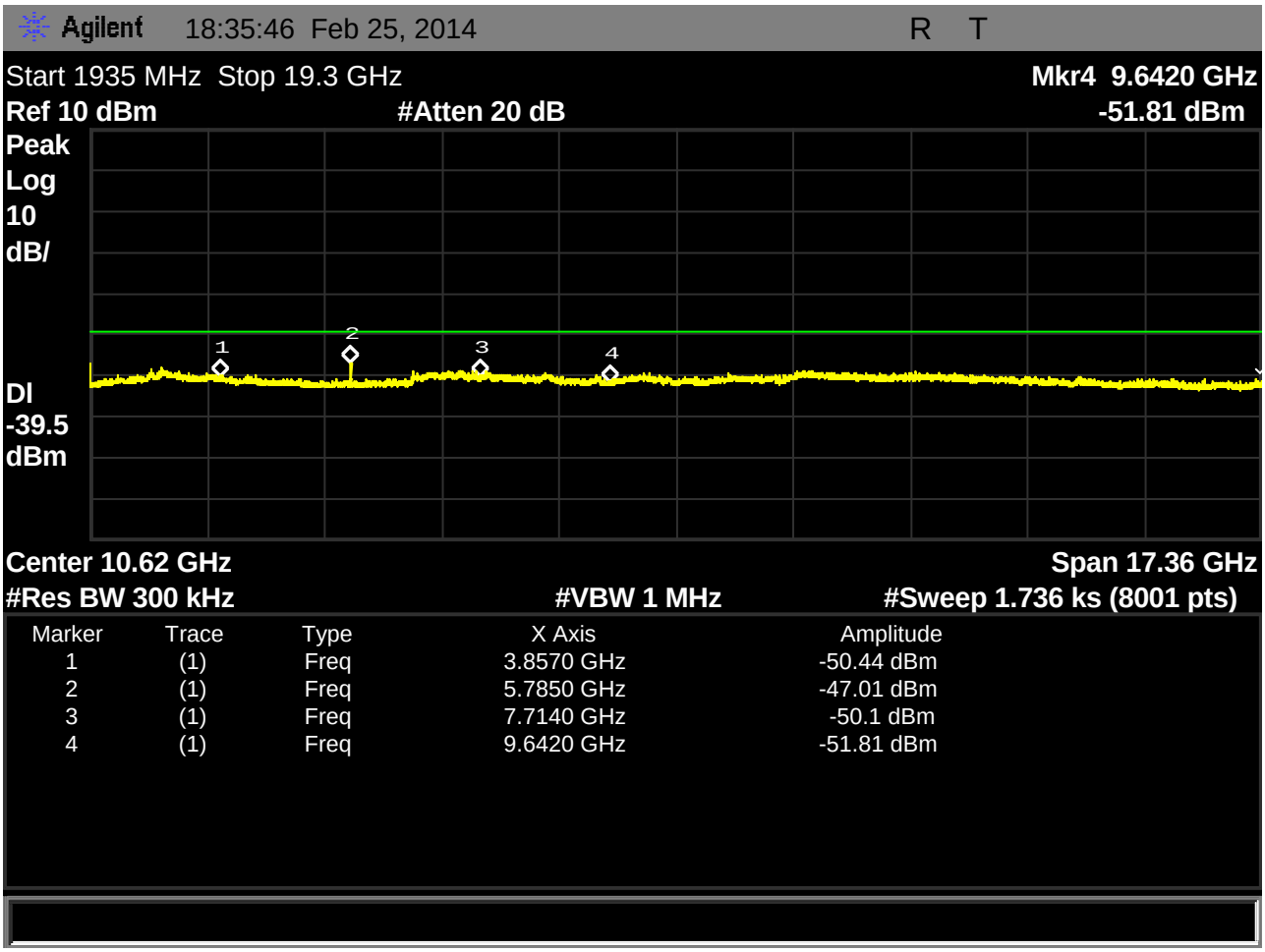


Fig. 107 – Remote EUT out-of-band emissions including the regions from 1935MHz to 19.3GHz with the remote EUT transmitting on the highest carrier, 1928.448MHz.

The measurement is noise-limited. This measurement is made using a 300kHz resolution bandwidth in the interests of getting a manageable sweep time, 1736.5 seconds, but the 300kHz bandwidth passes considerably more unwanted emissions than the 10kHz obtained from the text of C63.17-2006 clause 6.1.6.
Even so, the margin to specification for the noise-limited peak is 7.51dB. We then re-do the test using narrow scans according to the requirements of 6.1.6 to resolve the margin in the proper measurement bandwidth.

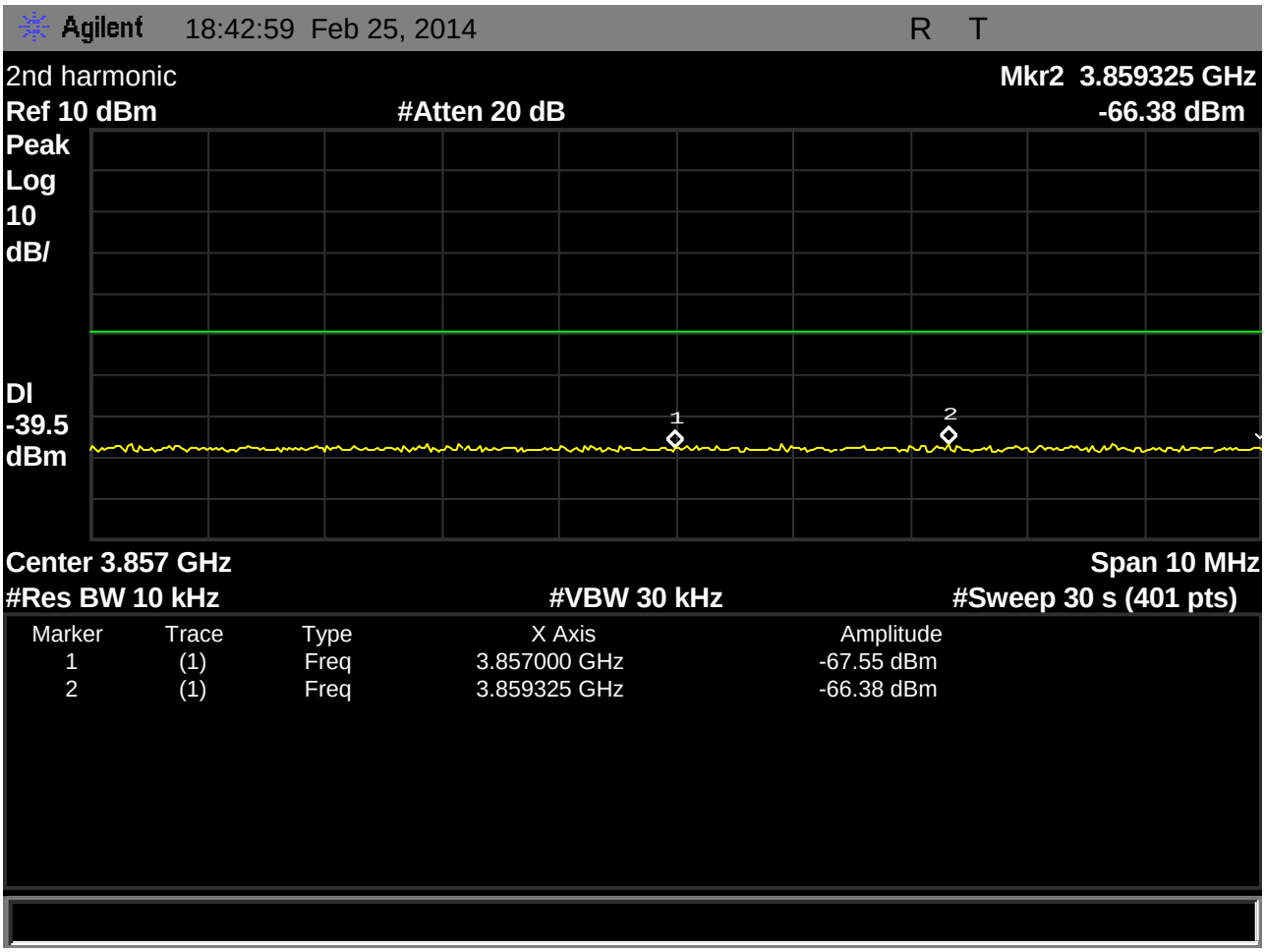


Fig. 108 –Remote EUT out-of-band emissions in the region around the 2nd harmonic, with the remote EUT transmitting on the highest carrier, 1928.448MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at -66.38dBm, shows margin to the -39.5dBm specification of 26.88dB.

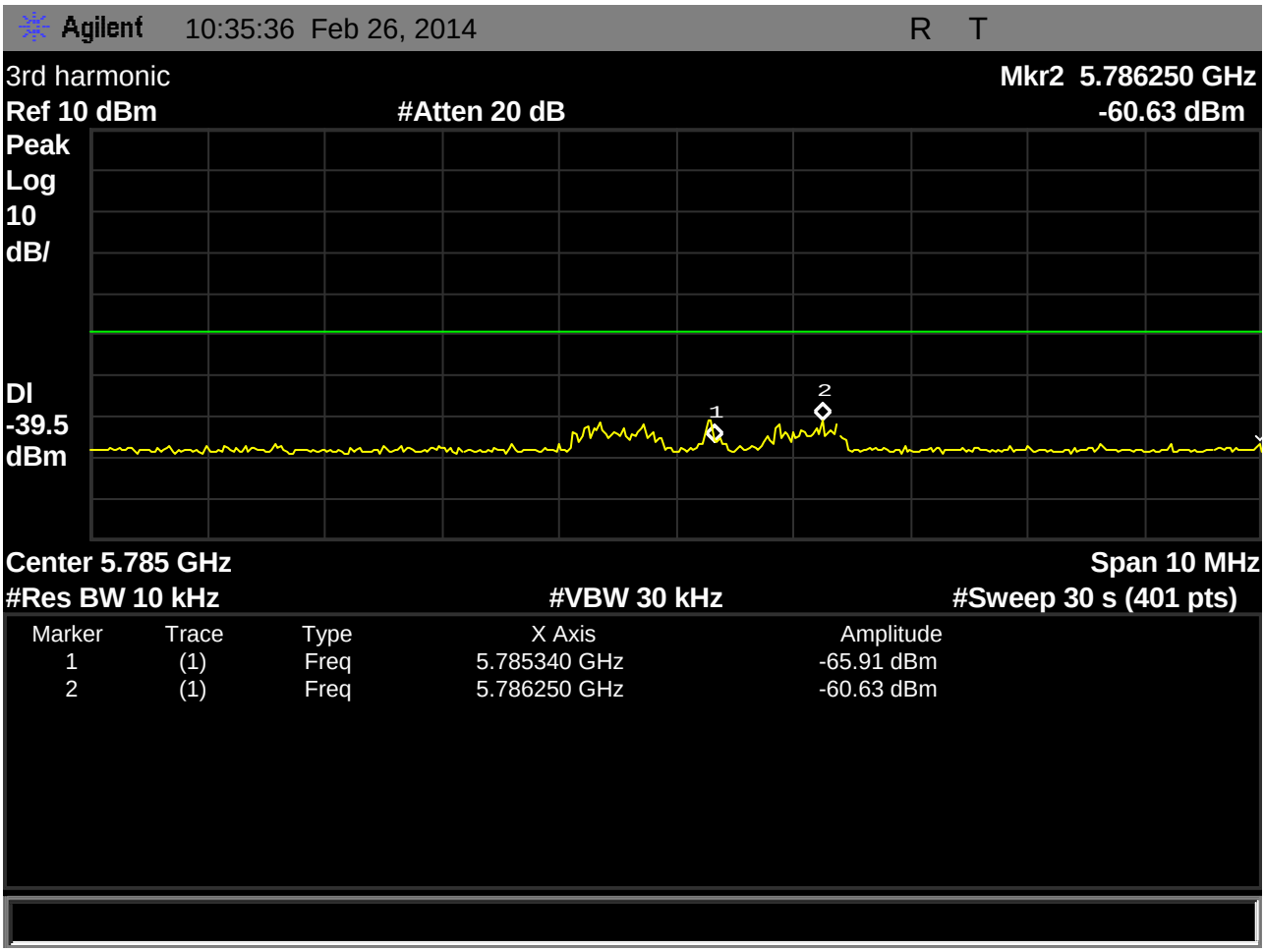


Fig. 109 – Remote EUT out-of-band emissions in the region around the 3nd harmonic, with the remote EUT transmitting on the highest carrier, 1928.448MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at –60.63dBm, shows margin to the -39.5dBm specification of 21.13dB.

The remote EUT meets the various out-of-band emissions requirements of clause 6.1 with worst-case margin of 21.08dB, under the worst-case conditions of transmitting on the low carrier, at the 3rd harmonic of the transmit signal.

VI-B. Clause 6.2 Tests of frequency and time stability for the remote EUT

The test configuration for the tests of C63.17-2006 clauses 6.2.1.1 through 6.2.1.3 and 6.2.1 through 6.2.3 for the remote EUT is as follows:

The test platform and remote EUT are configured according to test configuration #4, **Standard-specific tester, headset EUT**, of section (I) of this document. The CMD60 is configured to report frequency offset with modulation removed, per the general requirements of 6.2.1. The number of transmit slots over which the measurement is made by the CMD60 is adjusted using the CONFIG MENU/TX TEST/MODULATION keystroke path. Set the number to 100 slots (bursts) to capture one second of signal, since there are 100 bursts per second, to generate one measurement of the mean value of the carrier frequency. The CMD60 measurement system calculates the mean value over each 100-slot measurement. The fixed channel used during the tests is the middle carrier, 1924.992MHz.

The particularities associated with the tests for each clause are discussed in the specific test report sections, following.

Fig. 110 - View of test system configured for the tests of clause 6.2.1 for the headset EUT.
EUT is in the temperature chamber at right. EUT power supply is top right. EUT RF cabling is connected as described in the text, to the CMD60 analyzer and the E4407B spectrum analyzer. The controller interface circuit (RS232 to CMOS levels) is directly outside the chamber egress.

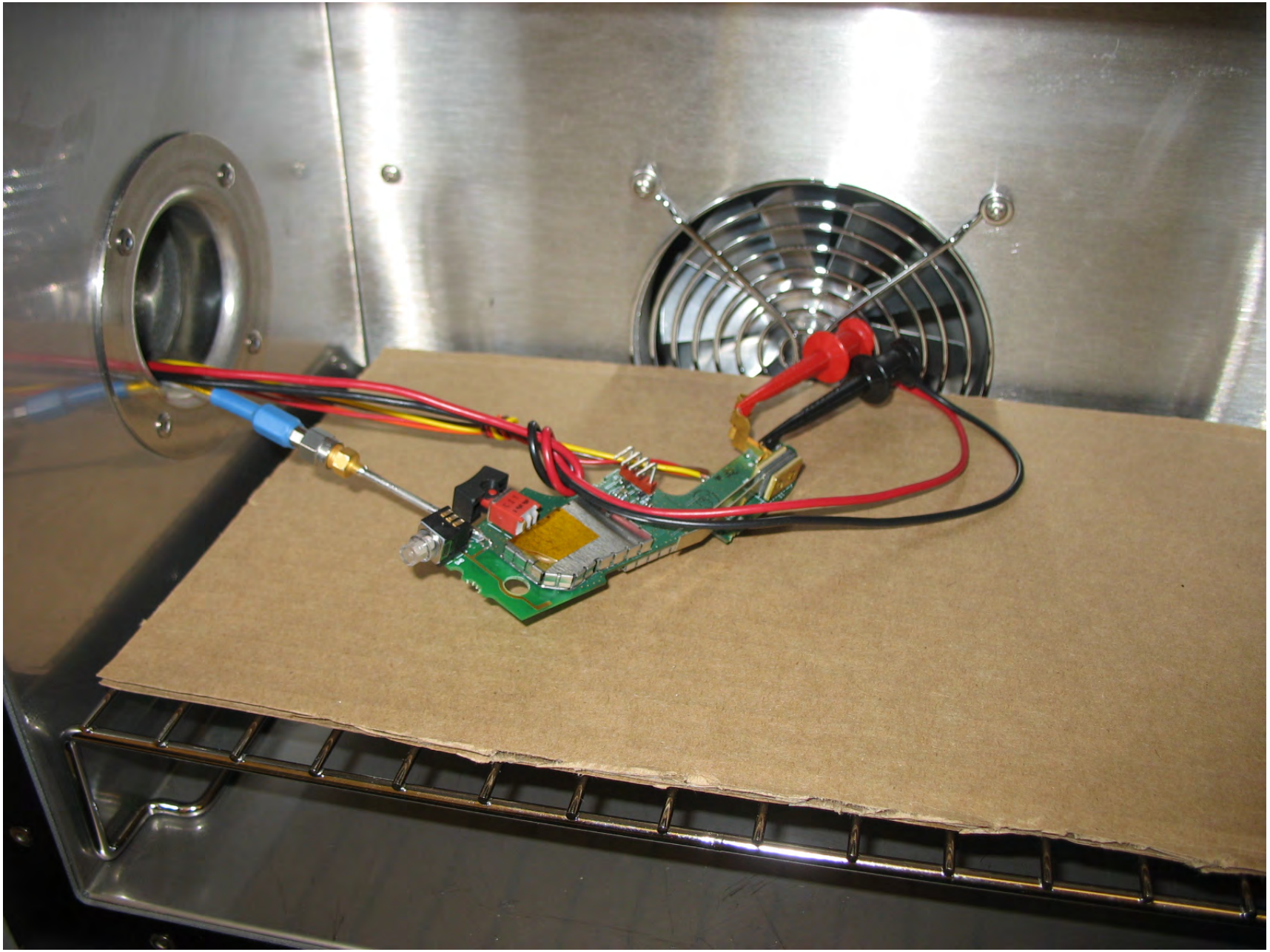


Fig. 111 - Remote EUT within the temperature chamber, with RF connection to EUT and with power/control cable connection to EUT.

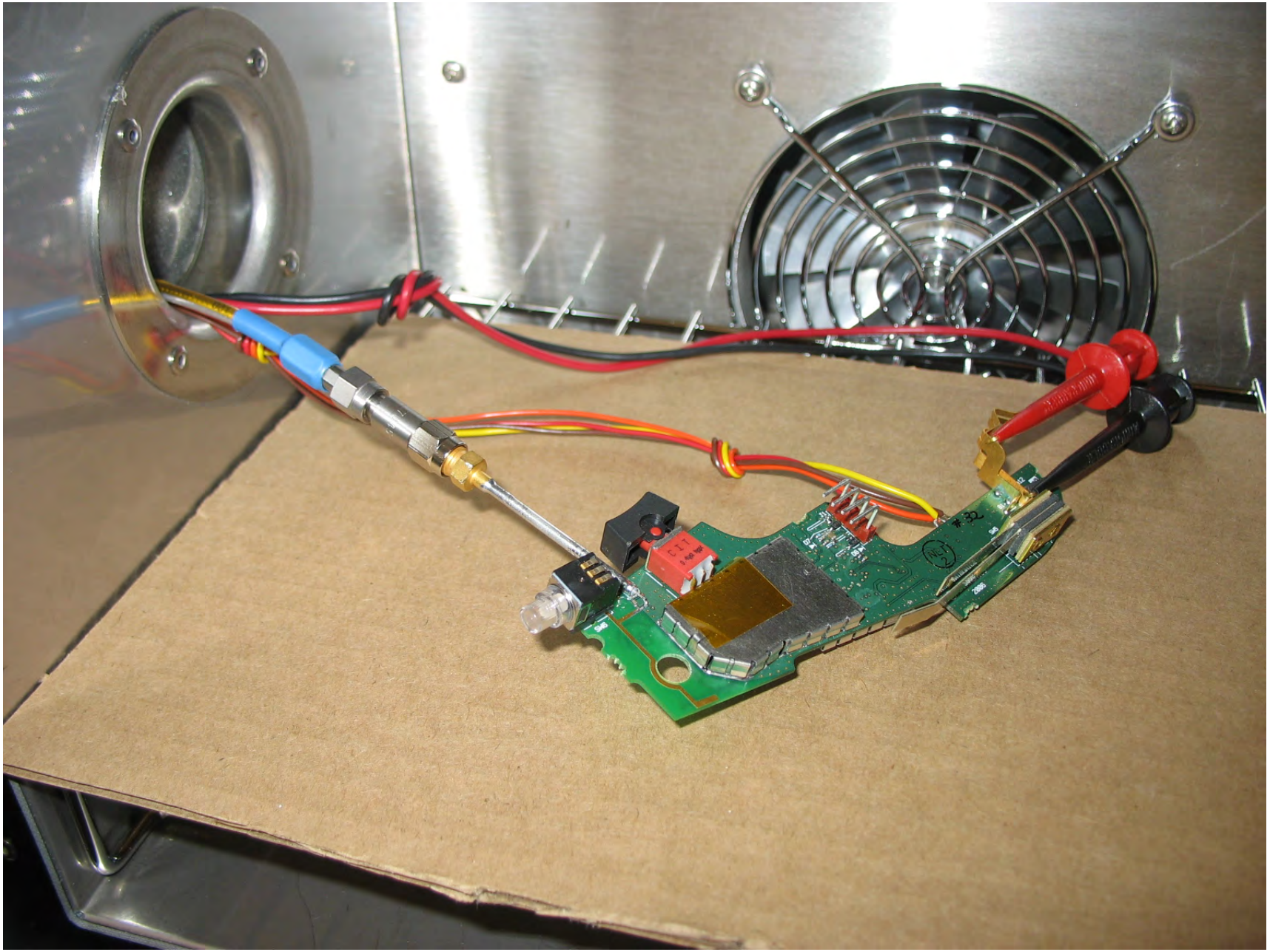


Fig. 112 - Detail of remote EUT as tested within the temperature chamber for the tests of clause 6.2.

VI-C. Clause 6.2.1 Carrier frequency stability, Remote EUT.

6.2.1.1 for the remote EUT; mean carrier frequency drift with time.
The remote EUT is configured as described in the introduction for the tests of clause 6.2. The EUT power supply voltage is set to 3.70V. Ambient for the EUT is set to 20C. The data collection system runs for one hour, collecting mean carrier frequency measurements and recording the peak and mean values.

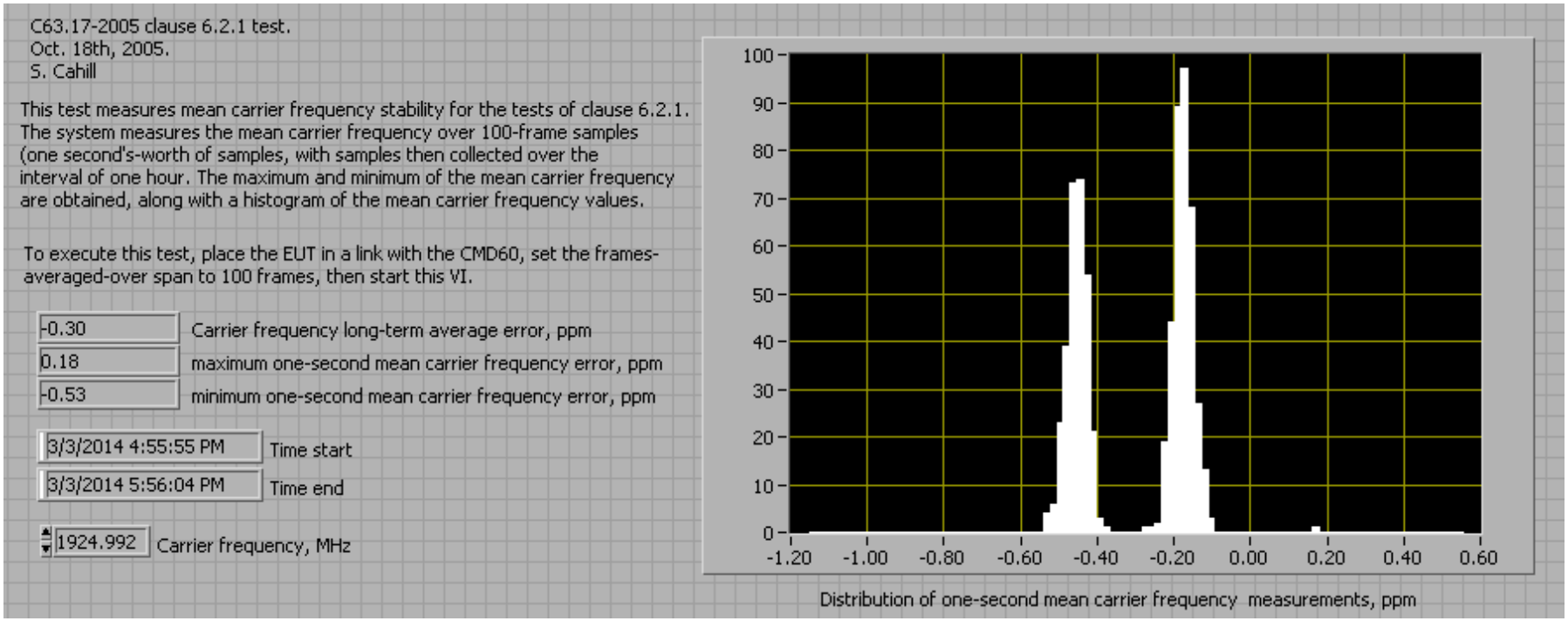


Fig. 113 - Measured one-second mean carrier frequency, remote EUT, and observed maximum, average value and observed minimum of the mean carrier frequency.

The nominal mean carrier frequency error relative to 1924.992MHz is -0.30ppm.
The observed maximum is 0.18ppm, for a maximum relative to nominal of 0.48ppm.
The observed minimum is 0.53ppm, for a change relative to nominal of -0.69ppm.

The headset EUT passes the test of clause 6.2.1.1; the mean carrier frequency is allowed to vary +/-10ppm over a one-hour test interval.

6.2.1.2 for the remote EUT, mean carrier frequency error over voltage:

This test is not applicable for battery powered devices C63.17-2006

6.2.1.3 for the remote EUT; mean carrier frequency change with temperature.
The remote EUT is configured as described in the introduction for the tests of clause 6.2. The EUT power supply voltage is set to 3.70V. The EUT's mean carrier frequency is then measured at the declared rated extremes (+4C, then +44C) and at 20C, after a 60 minute soak at each temperature.

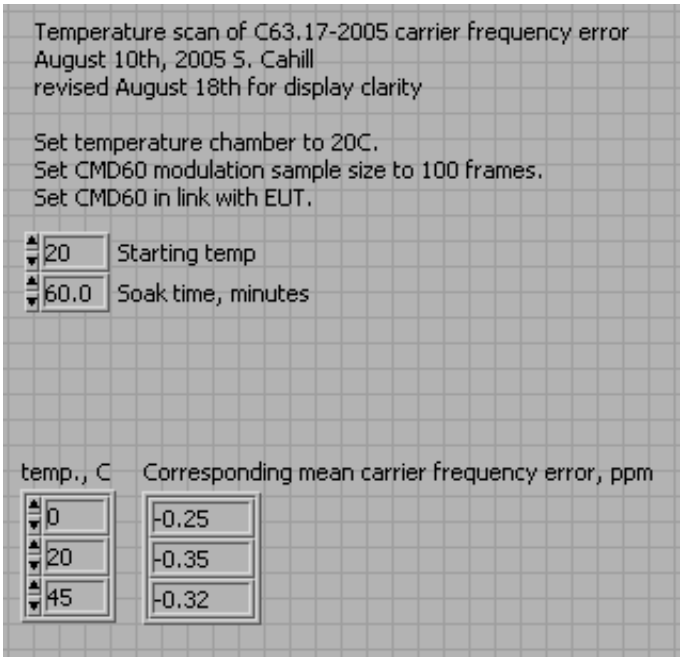


Fig. 115 - Measured mean carrier frequency, headset EUT , at +4C, +20C, +44C.

The nominal mean carrier frequency error relative to 1924.992MHz is –0.35ppm.
The observed value at +4C is -0.25ppm, for a change relative to 20C ambient of -0.10ppm.
The observed value at +44C is -0.32ppm, for a change relative to 20C ambient of +0.03ppm.

The remote EUT passes the test of clause 6.2.1.3; the mean carrier frequency is allowed to vary +/-10ppm over the declared rated temperature.

6.2.2 Frame repetition stability test for the remote EUT:

The remote EUT is configured as described in the introduction for the tests of clause 6.2.

The text of table 8 of 6.2.2 specifies the interval of each measurement (X, in the nomenclature used in C63.17-2006) to be as long as 1000 frames, and specifies measurements to be collected repetitively over an interval of at least one hour. For the test of 6.2.2, we obtain mean frame-repetition error measurements each over 1000 frames by configuring the CMD60 to report mean frame repetition error over 100 frames; each set of 10 responses is then averaged to derive a mean over 1000 frames, so to obtain one 1000-frame mean frame repetition error measurement. The data collection from the CMD60 is under the control of the controller PC. The data collection system runs until one hour has elapsed. From the frame repetition stability measurements the standard deviation of the frequency stability is calculated.

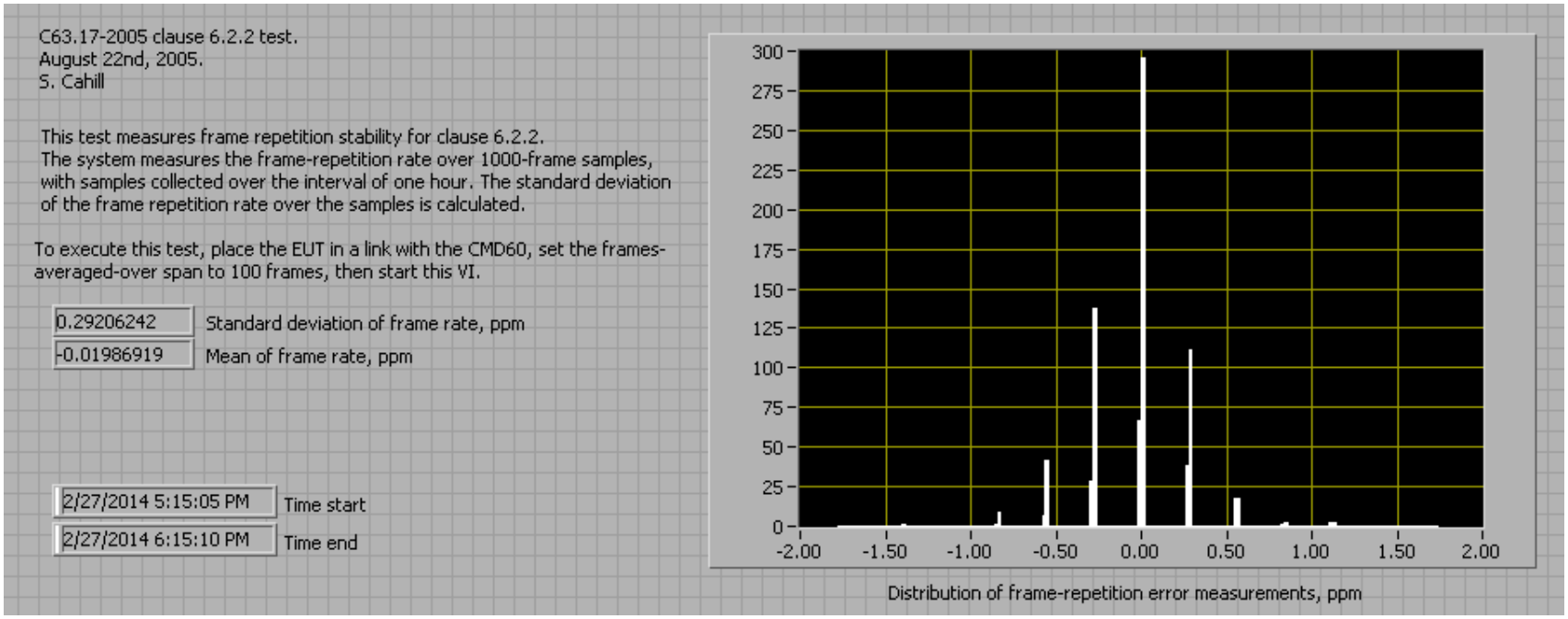


Fig. 116 - Test of remote EUT according to the conditions of clause 6.2.2 for frame repetition rate stability

The measured standard deviation of the frame rate or repetition period according to the requirements of clause 6.2.2 for the headset EUT is 0.29206ppm.

The remote EUT passes the test of clause 6.2.2; the standard deviation of the frequency stability is to be such that three standard deviations of the frequency stability as measured through the error in the frame repetition rate shall not exceed 10ppm, and three standard deviations of the frequency stability for the base EUT is measured to be 0.8618ppm.

6.2.3 Frame period and jitter test for the remote EUT:

The remote EUT is configured as described in the introduction for the tests of clause 6.2.

For the test of 6.2.3, the CMD60 is queried to report maximum and minimum frame length for two frames, for each measurement. In this way the lengths of individual frames are obtained; one is the maximum, the other is the minimum. The measurement of frame length is executed for 100,000 frames under the control of the data collection system, which runs for approximately 2 hours for each test. From the measured frame length data the standard deviation of the jitter and the maximum and minimum frame lengths are calculated according to the requirements of 6.2.3.

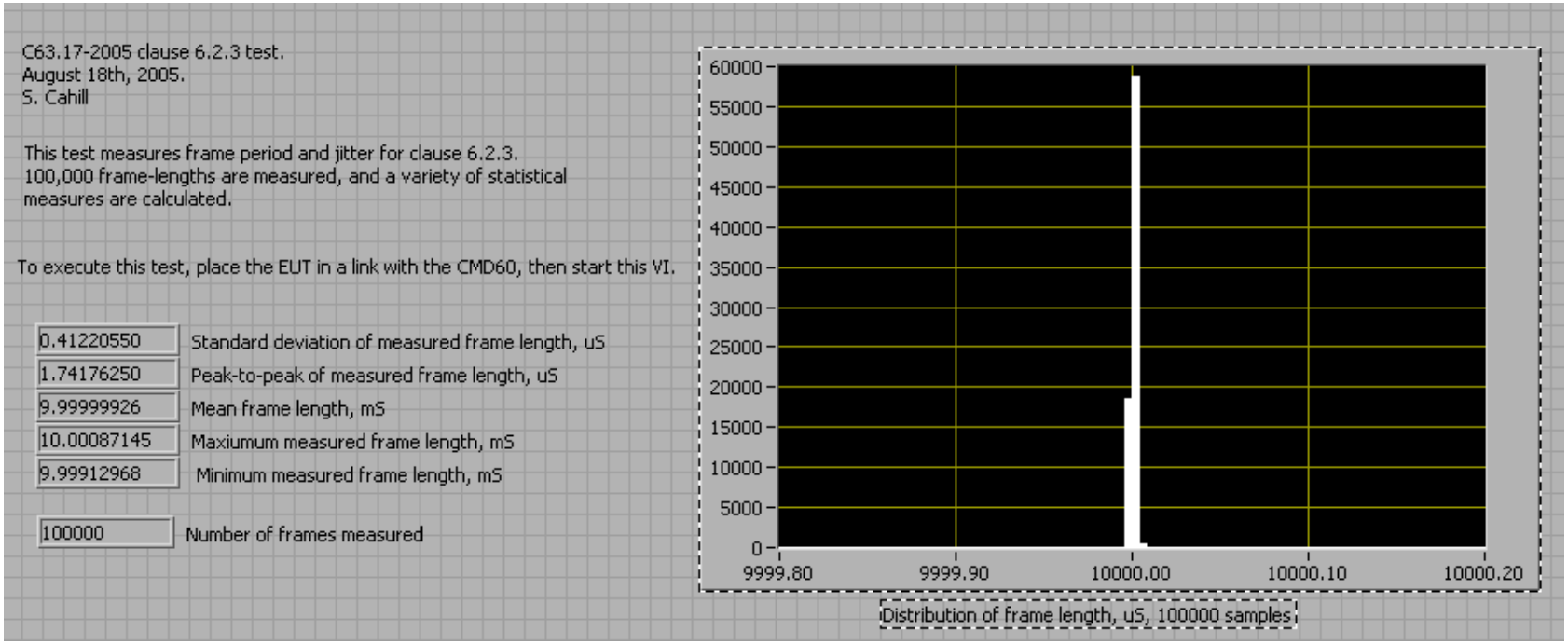


Fig. 117 - Test of remote EUT for frame period and jitter, according to the requirements of clause 6.2.3.

The measured mean value of the frame period is 10.00087145mS, which is 10mS with jitter offset of 0.87uS and three standard deviations of 1.236uS, totaling 0.2170uS.

The remote EUT passes clause 6.2.3; the mean frame period is to be 10mS with jitter (three standard deviations) and offset totaling less than 25uS.

VII) Tests of clause 7, Remote Unit EUT

FCC rule changes have created a situation where there is no viable test in ANSI C63.17-2006 for Clause 7 and Clause 8. ANSI C63.17-2013 has incorporated the latest FCC rule changes and makes it possible to properly test devices to the current requirements of 47cfr15.323(c). ANSI C63.17-2013 procedures will be used for Clause 7 and Clause 8 tests.

VII-A. Clause 7.3.2 LIC procedure Test, remote EUT

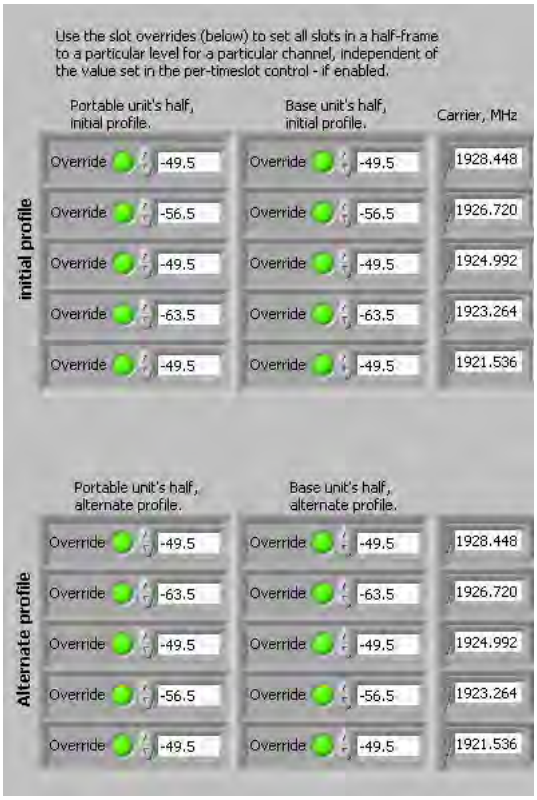
The test platform uses the multi-carrier interference generator (PXI-5670), see test configuration #5.

The LIC test procedure is as follows:

a) Allow EUT transmission on only two carrier frequencies, which will be designated *f*1 and *f*2 (f_1 = 1926.720MHz and f_2 = 1923.264MHz). This limitation to carriers *f*1 and *f*2 is performed by applying by a multicarrier interference generator uniform interference on all system carriers except *f*1 and *f*2, at an in-band per-carrier level of:

1) *TL* + *UM* + 14dB for the following tests b) and c), (-49.5dBm)
2) *TL* + *UM* + 8dB for the following tests d) and e), (-55.5dBm)

b) Apply interference to the EUT on *f*1 at a level of *TL* + *UM* + 7 dB; (-56.5dBm) and on *f*2 at a level of *TL* + *UM*; (-63.5dBm). Initiate transmission. The EUT should transmit on *f*2. Terminate the connection. Repeat five times



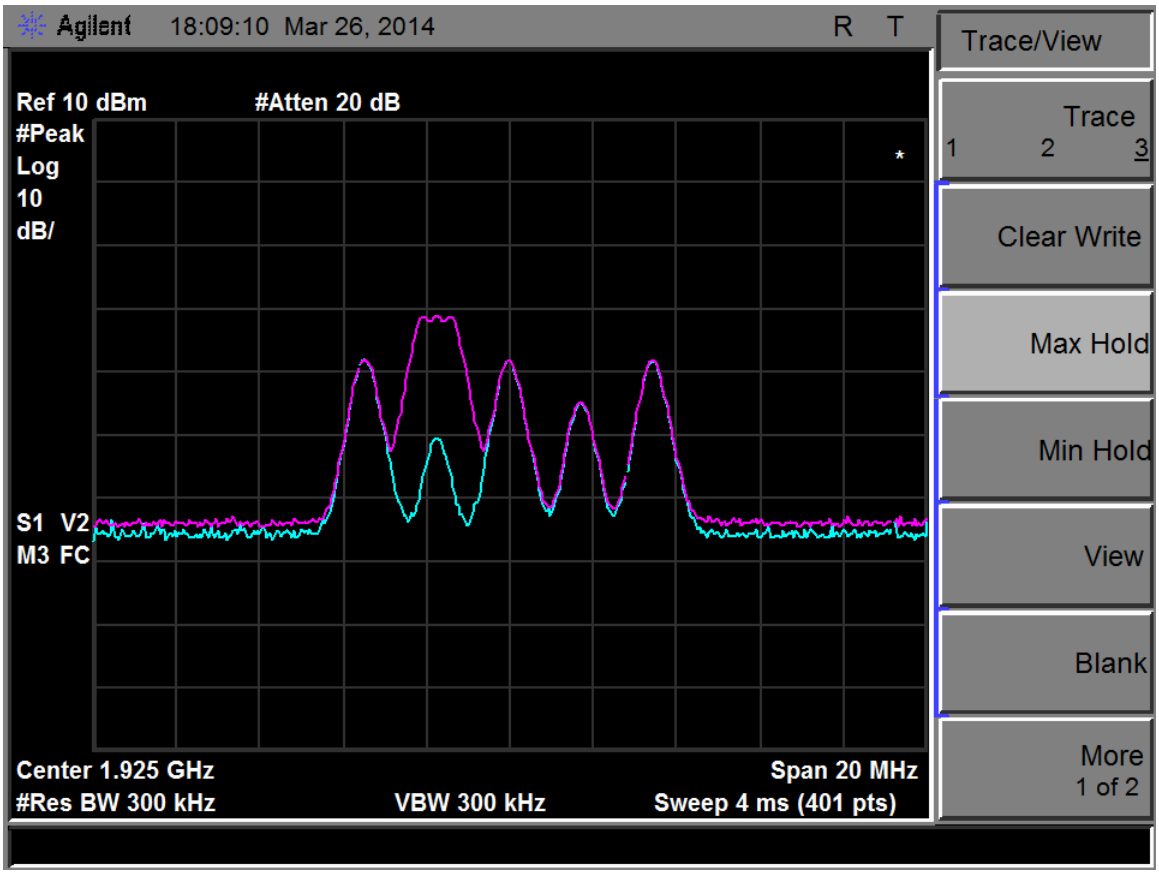


Fig. 118 - Clause 7.3.2(b) Remote LIC procedure
The EUT correctly selects the Least Interfered Channel.

c) Interference applied to the EUT on *f*1 at a level of *TL* + *UM*; (-63.5dBm) and on *f*2 at a level of *TL* + *UM* + 7 dB (-56.5dBm). Initiate transmission. The EUT should transmit on *f*1. Terminate the connection. Repeat five times.

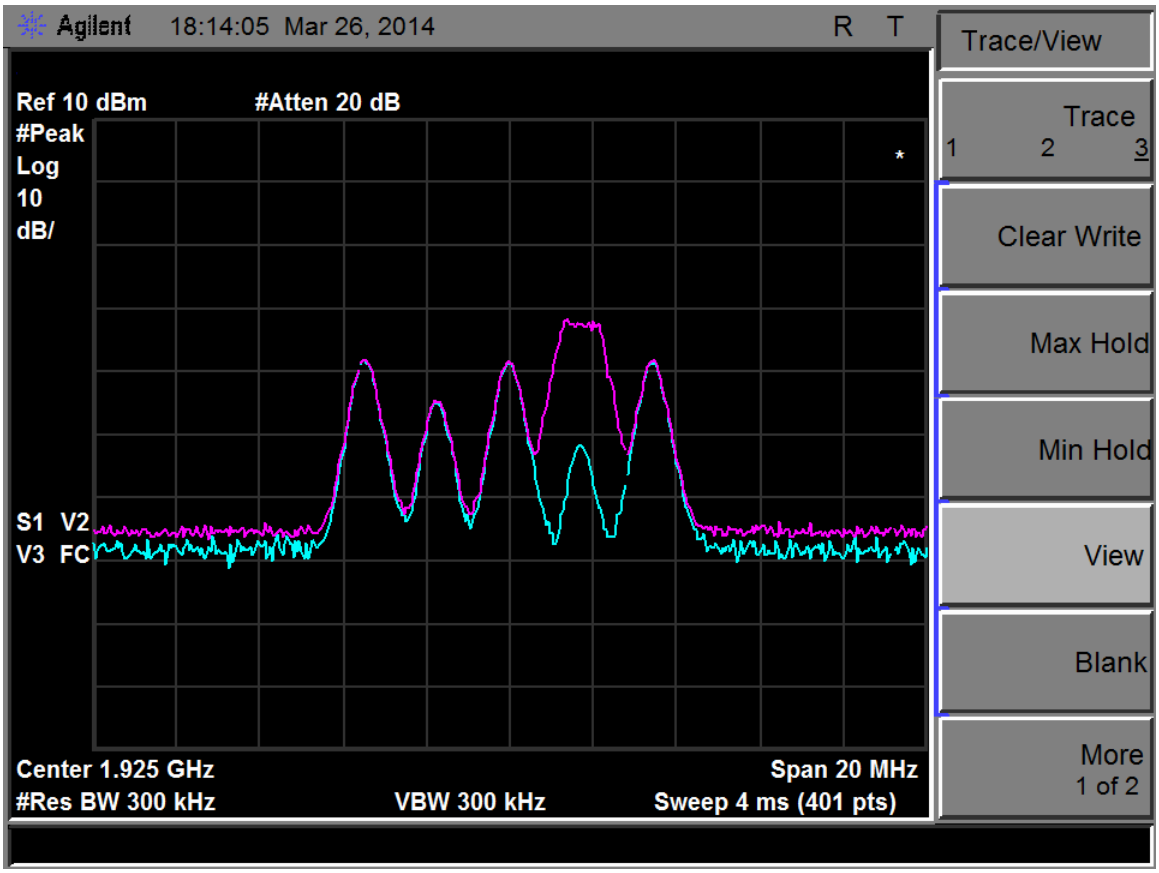


Fig. 119 - Clause 7.3.2(c) Remote LIC procedure
The EUT correctly selects the Least Interfered Channel.

d) Interference applied to the EUT on *f*1 at a level of *TL* + *UM* + 1 dB; (-62.5dBm) and on *f*2 at a level of *TL* + *UM* - 6 dB; (-69.5dBm). Initiate transmission. If the EUT transmits on *f*2, terminate the connection. Repeat five times.

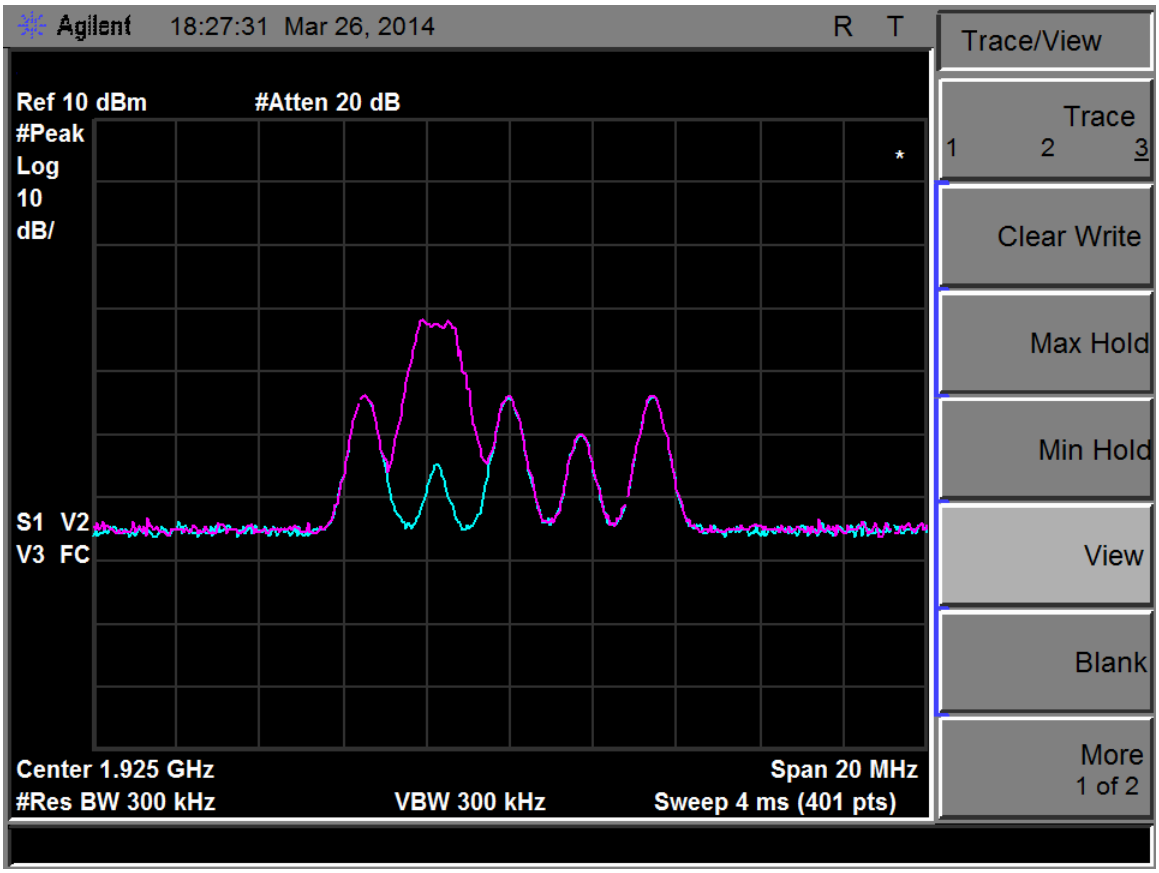


Fig. 120 - Clause 7.3.2(d) Remote LIC procedure
The EUT correctly selects the Least Interfered Channel.

e) Apply interference to the EUT on *f*1 at a level of *TL* + *UM* - 6 dB; (-69.5dBm). and on *f*2 at a level of *TL* + *UM* + 1 dB; (-62.5dBm). Initiate transmission. If the EUT transmits on *f*1, terminate the connection. Repeat five times. If the EUT transmits once or more on any of the system carriers other than *f*1, the test failed.

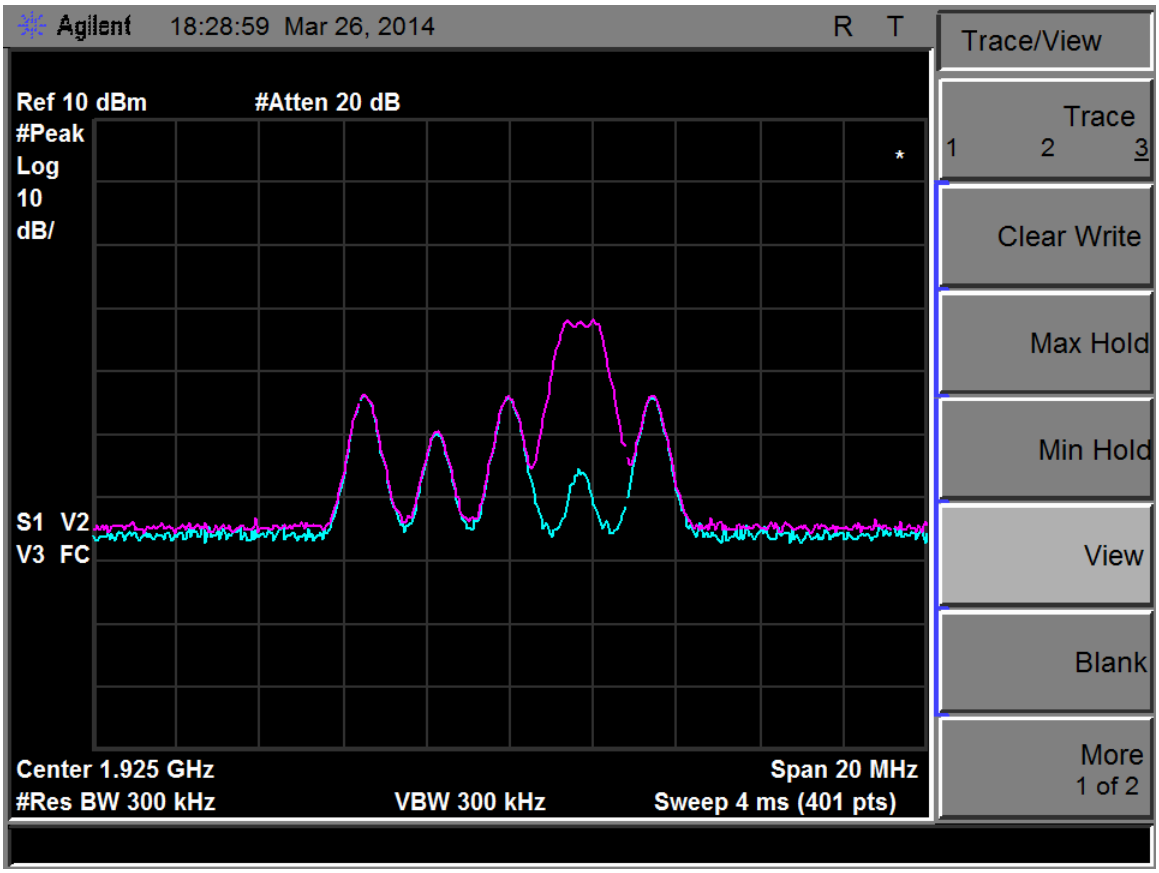


Fig. 121 - Clause 7.3.2(e) Remote LIC procedure
The EUT correctly selects the Least Interfered Channel.

VII-B. Clause 7.3.3 Selected channel confirmation, remote EUT

The test platform, remote EUT and companion base unit are configured according to the requirements for implementing the test of 7.3.3 by means of test configuration #6, **With companion device and interference blocking, headset EUT**, of section (I) of this document. The test described as follows is intended to verify that the EUT makes its channel selection decision on the
basis of a recent power level reading:

a) Allow EUT transmission on only two carrier frequencies, which will be designated *f*1 and *f*2. This limitation to carriers *f*1 and *f*2 is performed by applying by a multicarrier interference generator uniform interference on all system carriers except *f*1 and *f*2, at a level of *TL* + *UM* + 20 dB; (-43.5dBm) in-band per carrier. Set the interference level to the EUT on *f*1 to a level of *TL* + *UM* + 20dB; (-43.5dBm) , and let there be no interference applied on *f*2.
f_1 = 1926.720MHz and f_2 = 1923.264MHz

b) Initiate transmission and verify that the EUT transmits on *f*2. If a connection was made, terminate it.

c) Apply interference on *f*2 at a level of *TL* + *UM* + 20 dB; (-43.5dBm) in-band, and immediately remove all interference from *f*1 and immediately (but not sooner than 20 ms after the interference on *f*2 is applied) cause the EUT to attempt transmission. The EUT should now transmit on *f*1, if it transmits.

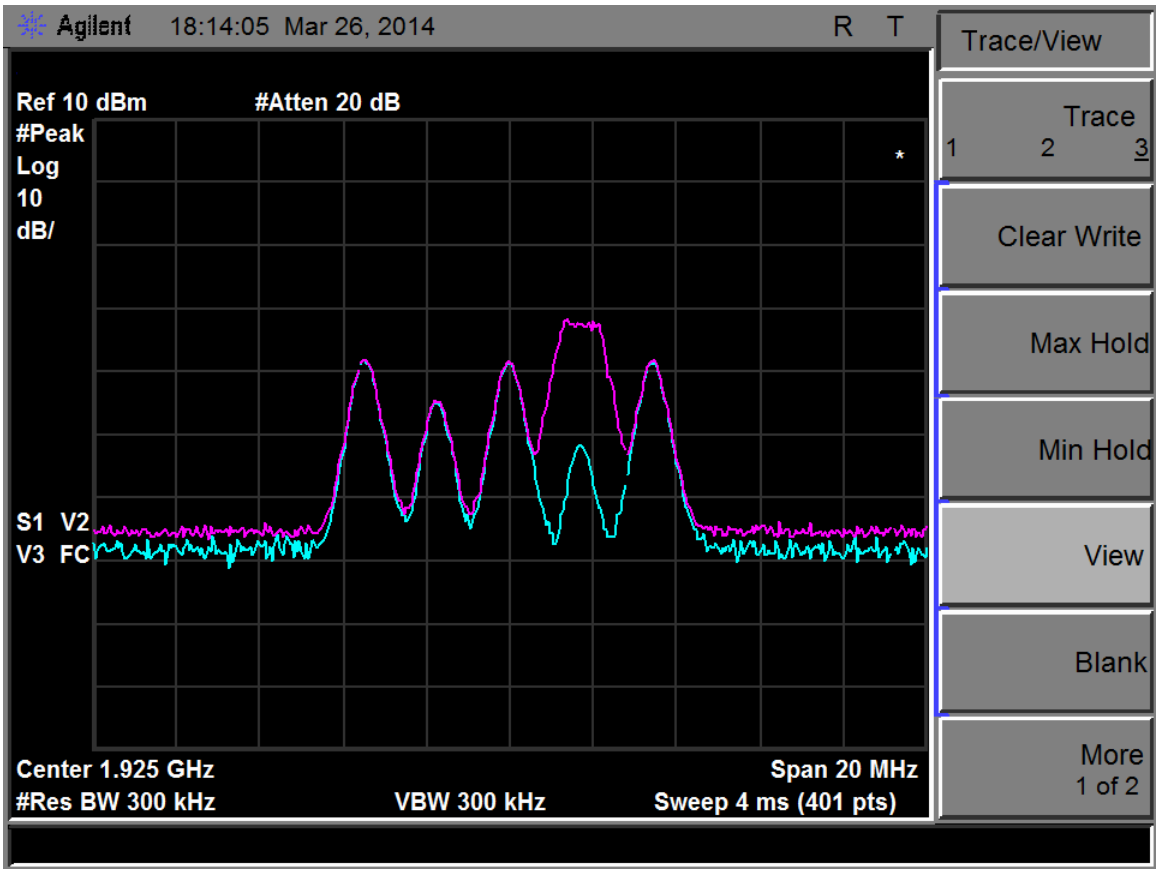


Fig. 122 - Clause 7.3.3(c) Remote Selected channel confirmation
The EUT correctly transmits on *f*1.

A max-hold signal (purple, top) captures the trace showing where in the spectrum EUT transmissions are occurring. A trace (blue, bottom) shows the interference profile. The remote EUT always transmits on f_1 (the carrier with the lower interference level) and so meets the requirement of not transmitting on f_2.

VII -C Clause 7.4 Threshold monitoring bandwidth Remote EUT
The threshold monitoring is made through the radio receiver used by the EUT for communication, met by manufacturer declaration.

VII-D. Clause 7.5 Reaction time and monitoring interval, remote EUT

The test platform, remote EUT and companion base unit are configured according to the requirements for implementing the test of 7.5 by means of test configuration #6, **With companion device and interference blocking, remote EUT**, of section (I) of this document.

a) The multi-carrier interference generator (PXI-5670) is set to interference pulse transmissions of 50uS length, synchronized with the frame and slot timing of the base companion device and so (since the remote EUT in turn synchronizes with the base unit) with the timing of the remote EUT. Allow EUT transmission on only two carrier frequencies, which will be designated *f*1 and *f*2 with f_1 = 1926.720MHz and f_2 = 1923.264MHz. This limitation to carriers *f*1 and *f*2 is performed by applying by a multicarrier interference generator uniform interference on all system carriers except *f*1 and *f*2, at a level of *TL* + *UM* + 20 dB; (-43.5dBm) in-band per carrier. Verify that the EUT can establish a connection either *f*1 or *f*2 with no interference applied on *f*1 or *f*2.

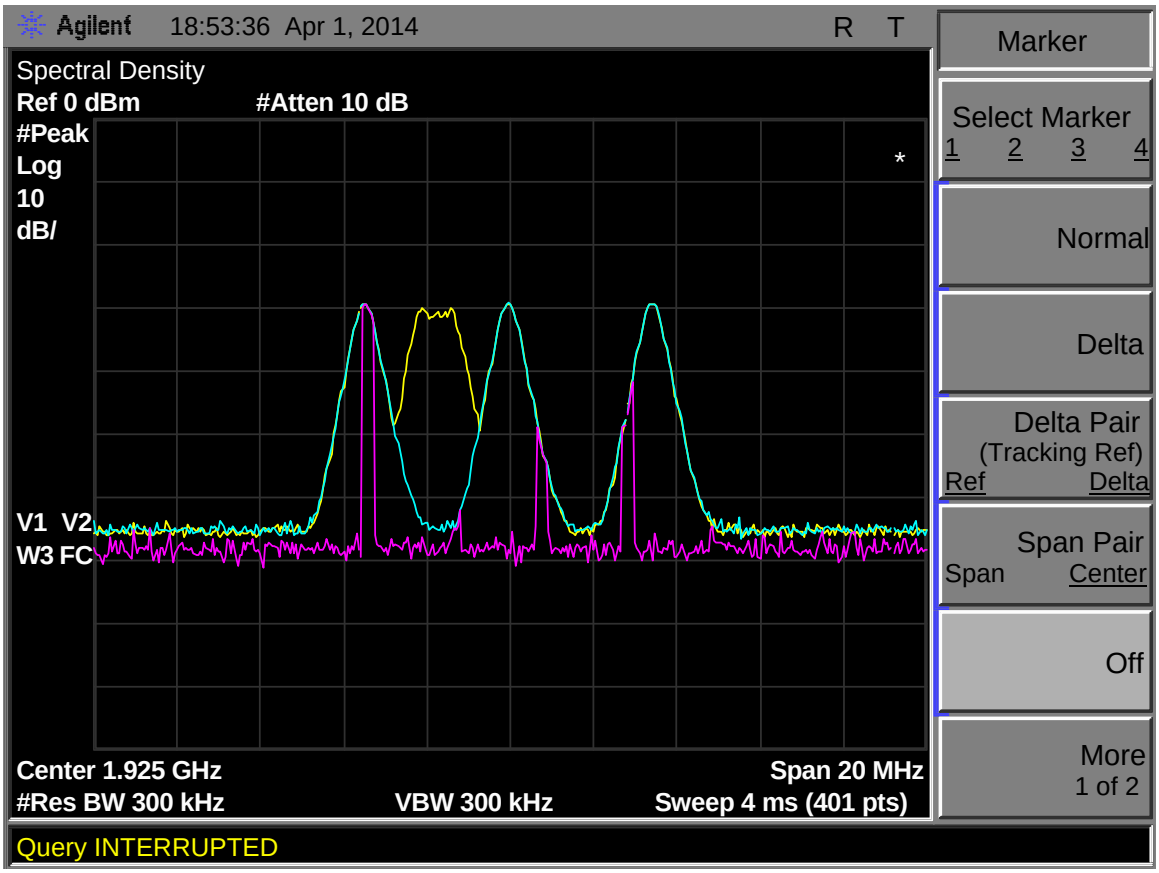


Fig. 123 – Clause 7.5(a) Reaction time.
The EUT establishes a connection on *f*1 or *f*2, and so passes the requirement of 7.5(a).

The blue trace is the max-hold capture over multiple sweeps of the initial interference spectrum without EUT transmissions. The yellow trace is a max-hold capture of the interference and the remote EUT's successful transmission when the interference is present. The purple trace is a single sweep of the spectrum with the pulsed interference, and the EUT transmission active.

b) Apply time-synchronized, pulsed interference on *f*1 at the pulsed level *TL* + *UM*; (-63.5dBm) to the receive port of the EUT. For a system with 10 ms frame time and N timeslots per frame, the channel interference should be pulsed with N pulses in a 10 ms repetition period (the accuracy of the repetition rate to be ± 10 ppm or better) with a common variable pulse width. The rise and fall times of the interference bursts shall be less than 1 uS from the 10% to 90% of the final amplitude. The interference pulse shall be of constant amplitude during its burst (± 5%).

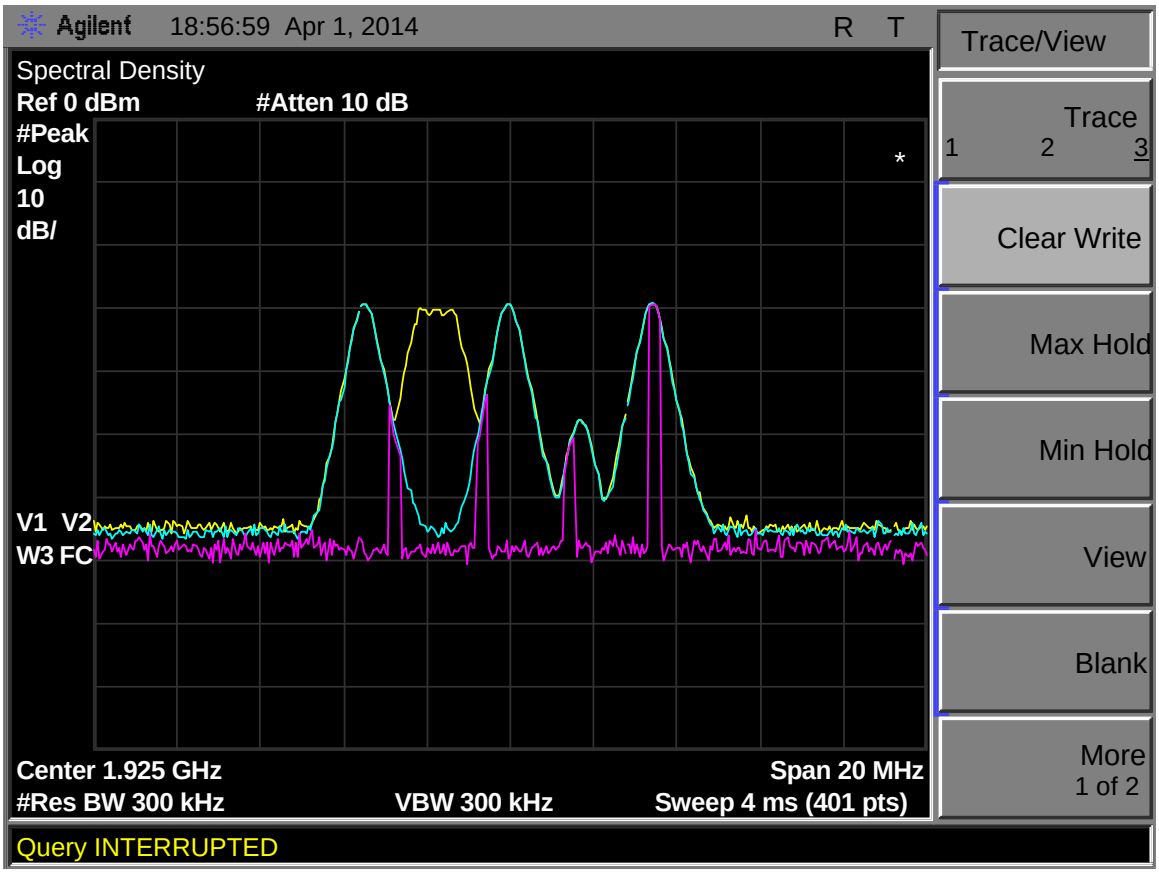


Fig. 124 – Clause 7.5(b) Reaction time.
The EUT establishes a connection only on *f*2, and so passes the requirement of 7.5(b).

The blue trace is the max-hold capture over multiple sweeps of the initial interference spectrum without EUT transmissions. The yellow trace is a max-hold capture of the interference and the remote EUT's successful transmission when the interference is present. The purple trace is a single sweep of the spectrum with the pulsed interference, and the EUT transmission active.

c) Additionally apply a CW signal on *f*2 at the level *TL* (-69.5) to the receive port of the EUT. Verify that the EUT establishes a connection only on *f*2 when the width of the interference pulse is equal to 50 µS (the allowed longer of the alternatives 50uS and 50*((1.25/B)^0.5), where B = 1.49MHz)

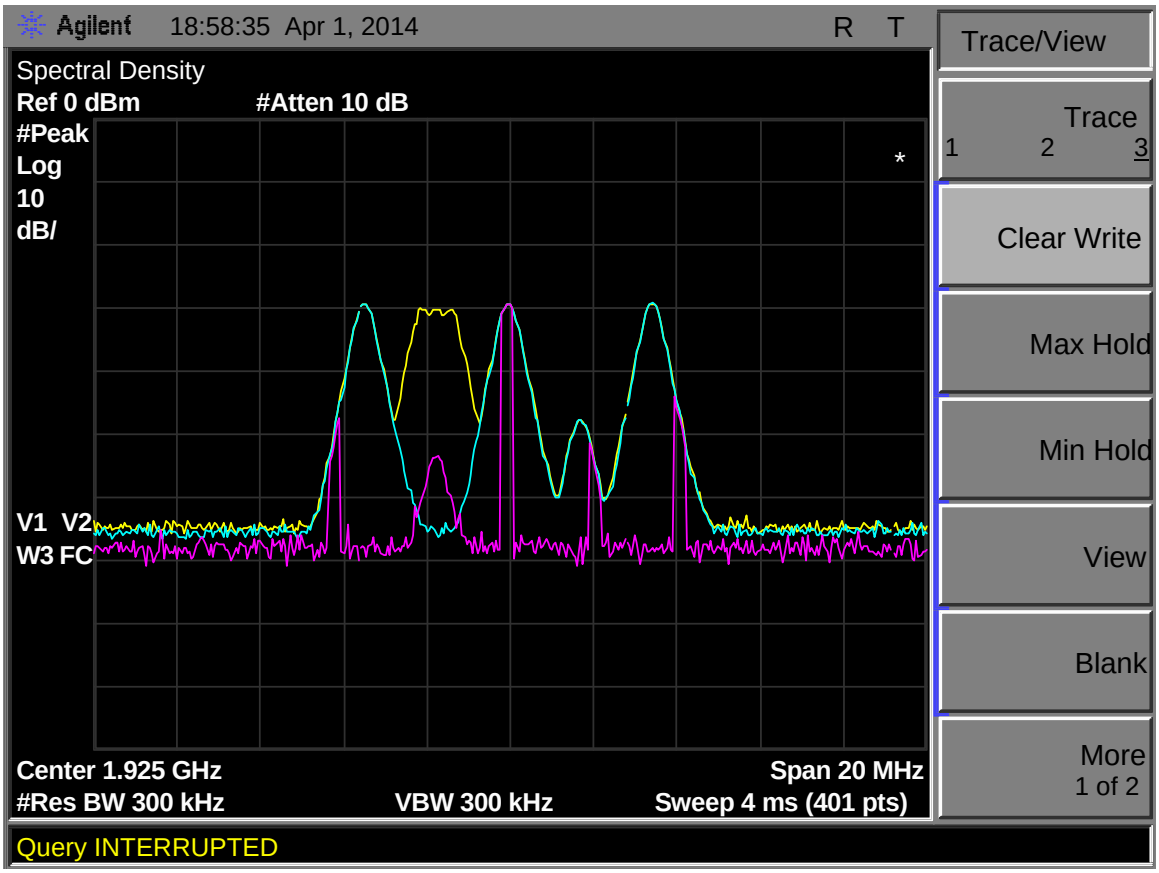


Fig. 125 – Clause 7.5(c) Reaction time.
The EUT establishes a connection only on *f*2, and so passes the requirement of 7.5(c).

The blue trace is the max-hold capture over multiple sweeps of the initial interference spectrum without EUT transmissions. The yellow trace is a max-hold capture of the interference and the remote EUT's successful transmission when the interference is present. The purple trace is a single sweep of the spectrum with the pulsed and CW interference, and the EUT transmission active.

d) Change the time-synchronized, pulsed interference on *f*1 to the level *TL* + *UM* + 6 dB: (-63.5dBm). Verify that the EUT establishes a connection only on *f*2 when the width of the interference pulse is equal to 35 μS (the allowed longer of the alternatives 35uS and 35*((1.25/B)^0.5), where B = 1.49MHz)

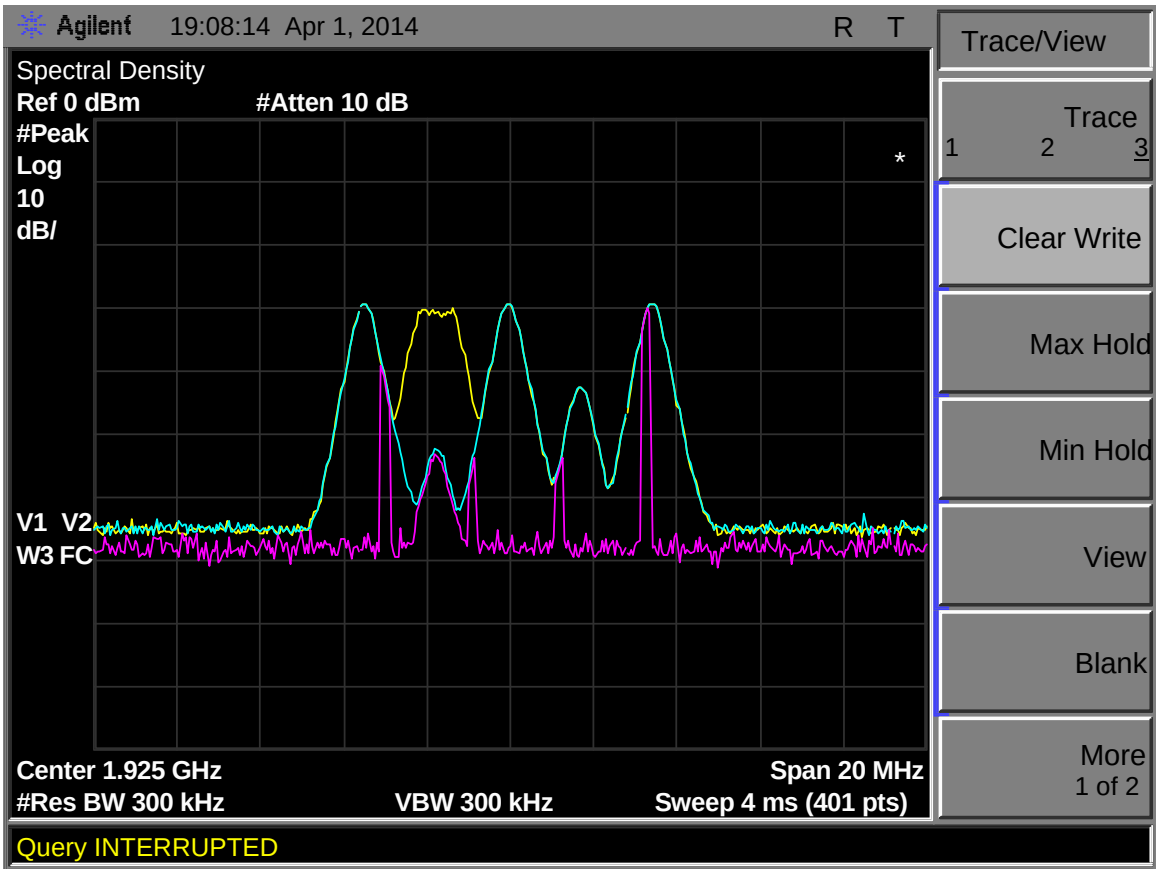


Fig. 126 – Clause 7.5(d) Reaction time.
The EUT establishes a connection only on *f*2, and so passes the requirement of 7.5(d).

The blue trace is the max-hold capture over multiple sweeps of the initial interference spectrum without EUT transmissions. The yellow trace is a max-hold capture of the interference and the remote EUT's successful transmission when the interference is present. The purple trace is a single sweep of the spectrum with the pulsed and CW interference, and the EUT transmission active.

VIII) Tests of clause 8, Remote EUT

VIII-A. Clause 8.1 Timing for EUTs using control and signaling channel type transmissions

The remote EUT does not transmit unacknowledged transmit control and signaling information, and so clause 8.1 does not apply.

VIII-B. Clause 8.2.1 Acknowledgements, Remote EUT

8.2.1(a) is for EUT devices that can initiate transmission. This test is to demonstrate that the remote EUT stops communications channel transmissions within one second if an initial acknowledgement is not received. This test requires that, for the test case, the remote EUT hears the base companion device's transmissions but that the base companion device not hear the remote EUT's transmissions and so not generate an acknowledgement. This requirement is met by means of a timed application of interference beginning in exactly the frame that the remote EUT attempts to start a communications channel. The interference is at sufficient level that the base companion device cannot receive the remote EUT's transmission, and so does not transmit an acknowledgement. The timing of the generation of the interference is such that the remote EUT's test of the communications channel in the frame prior to the first transmit frame finds the interference not present, and transmission is permitted. This ensures that any necessary communications between the remote EUT and the base companion device may occur in the absence of interference, so as to ensure that

the remote EUT's tested response is to the lack of an acknowledgement on the attempt to establish a communications channel, and not rather due to the lack of an initial mutual synchronization.

To ensure that the response of the remote EUT is to the lack of acknowledgement and not to the lack of the beacon signal from the base companion device, it is further necessary that the blocking by means of a high interference level is only during the remote EUT's transmit half of the frame. To accomplish this, the multi-carrier interference generator is operated in TDMA mode, synchronized with the frame timing of the base companion device and the remote EUT, and the multi-carrier interference generator is configured (when obstructing the acknowledgements) to apply the interference only in timeslots 0 – 11, the headset EUT's transmit timeslots; timeslots 12 – 23 (the base companion device's transmit timeslots) are left unobstructed.

This test requires that neither the base companion device nor the remote EUT be blocked from transmitting by the interference being at sufficient level that the access criteria is not met, but yet it requires that the base companion device not receive the remote EUT's transmit burst, and so does not generate an acknowledgement. To achieve this, the interference applied to block the remote-to-base timeslots must be received at the remote at a low enough level that the access criteria is still met. To do this, the test platform, remote EUT and companion base unit are configured according to the requirements for implementing the test of 8.2.1(a) by means of test configuration #6, **With companion device and interference blocking, remote (headset) EUT**, of section (I) of this document, modified with the addition of (nominally) 26dB of attenuation between the remote EUT and the splitter/combiner, and by changing the (nominal) 50dB of attenuation between the base companion device and the splitter/combiner to (nominal) 40dB. In this way the interference necessary to block reception by the base companion device of the remote transmissions is reduced to a level meeting the access criteria for both the remote EUT and the companion device.

Levels analysis:
- For the test, we set the PXI-5670 multi-carrier interference source to -26 dBm per carrier, referenced to the input to the EUT without the extra 26dB of input attenuation described above.
- Actual delivered input interference to the headset EUT is -52.0dBm, due to the added 26dB of attenuation.
- The base transmit signal arriving at the remote EUT sees 79dB of loss through the splitter/combiner and attenuators, nominally, which allows reliable communication in the absence of interference.
- The headset transmit signal arriving at the base companion device sees the same 79dB of loss, and again reliable communication is possible in the absence of interference.

When -26 dBm of per-carrier interference is applied in the timeslots used by the headset to transmit to the base, the interference level received at the base is -65dBm. -65dBm interference received at the base during the headset EUT's transmit timeslots blocks the reception of the headset EUT's transmission, which will be at -69dBm received at the base for a headset transmitting at the specified maximum +10dBm.

The multi-carrier interference generator (PXI-5670) is set to TDMA mode (timeslot-synchronized with the base EUT) with initial interference profile active, with all carriers at level -22.5dBm except the carrier at 1924.992MHz, f_1, which is set to -130dBm for all slots. The alternate interference profile has all carriers at level -22.5dBm except the carrier at f_1, which is set to -31.5dBm for slots 0 – 11 and -130dBm for slots 12 - 23. The initial profile ensures that the base and remote will be restricted by the LIC algorithm to using the carrier at f_1 so that system timing can be monitored by a zero-span sweep of the spectrum analyzer at f_1. The alternate profile has interference on f_1 that is high enough to prevent the base EUT from hearing the remote transmissions. The test configuration is validated by powering up the remote EUT and the base companion device and verifying that the remote EUT can initiate a communications channel with the base companion device if the multi-carrier interference generator is prevented from switching to the alternate interference profile when the remote initiated the communications channel.

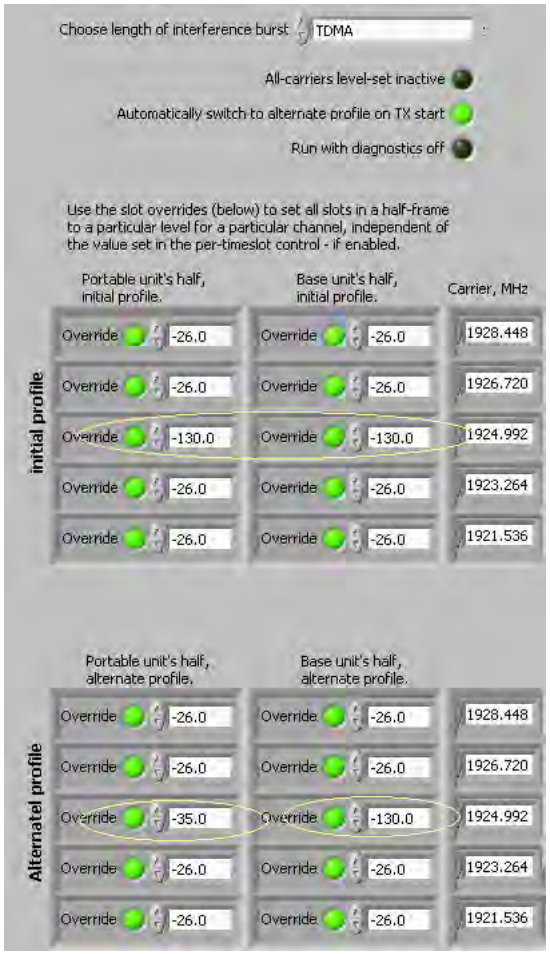


Fig. 129 - Multi-carrier interference generator configured according to the requirements for testing the remote EUT per 8.2.1(a), with automatic switching to the alternate interference profile enabled.

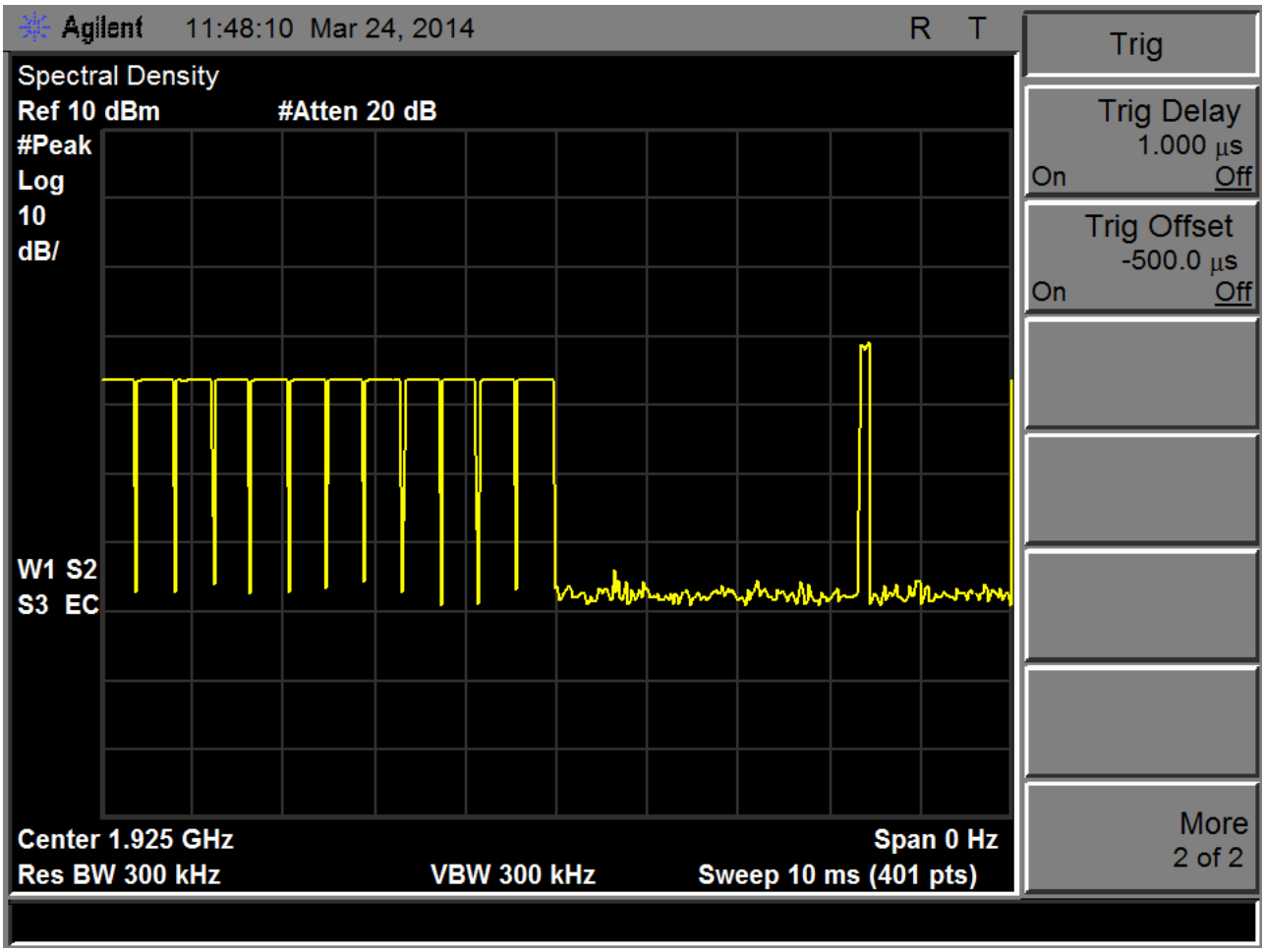


Fig. 130 - One frame of transmissions for a remote EUT and base companion device with a beacon present, interference present and high enough to block remote-to-base communications. Slots 0 – 11 have the interference present and slot 16 has the base companion device transmit beacon signal.

The remote EUT and the base companion device are powered up, and an interval of time is allowed to permit the remote EUT to synchronize to the base companion device's transmitted beacon, and to establish a normal idling mode, waiting for the user to establish a communications link by pressing the TALK button. The multi-carrier interference generator is then configured to enable the transition to the alternate profile when the remote EUT attempts to establish a communications channel, and the TALK button on the remote is pressed.

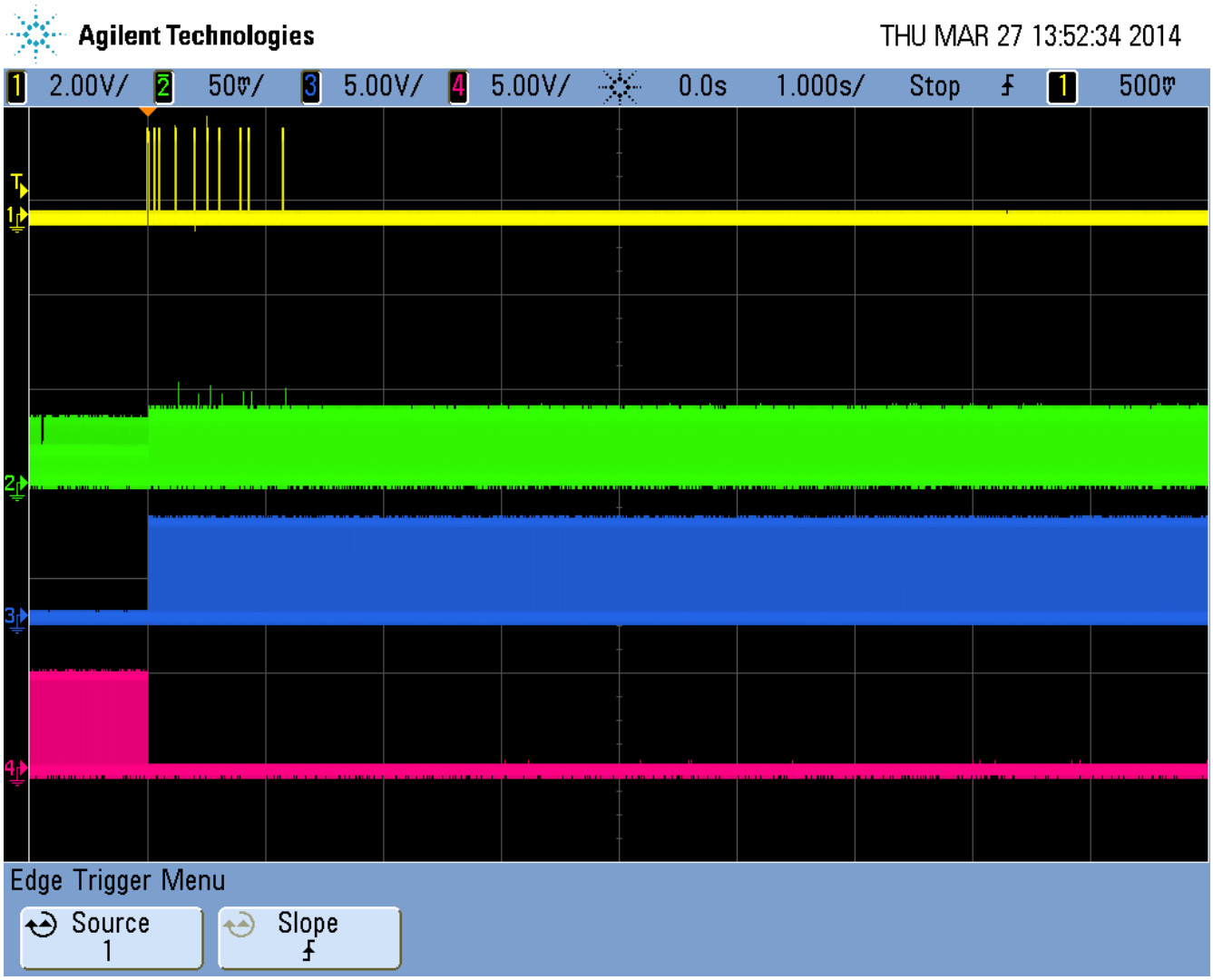


Fig. 131 – Clause 8.2.1(a) The yellow trace is the Pre-transmit Flag showing link activation attempt at t=0 (TALK button is pressed). The green trace is the RF detector output (top trace) vs. time showing the initial interference profile prior to t=0 with the alternate interference profile present after t=0 blocking the base from hearing the remote EUT and so generating an acknowledgement. When the TALK button is pressed at t = 0 seconds, with the remote EUT idle but locked to the base companion device's beacon transmissions. The high "noise floor" on the upper trace is due to the RF detector's demodulation of the multi-carrier interference on all carriers. The purple and blue traces show the frame sync signals from the EUT, purple is initial profile, blue is the alternate profile.

The remote does not transmit for more than 1 s, and so meets the requirements of 8.2.1(a) limiting transmissions on the communications channel to 1 second or less, in the absence of an initial acknowledgement.

8.2.1(b) for the remote EUT requires that, after the test of 8.2.1(a) , we unblock the acknowledgements from the base companion device to the remote EUT and validate that the remote EUT can establish a communications channel with the base companion device.

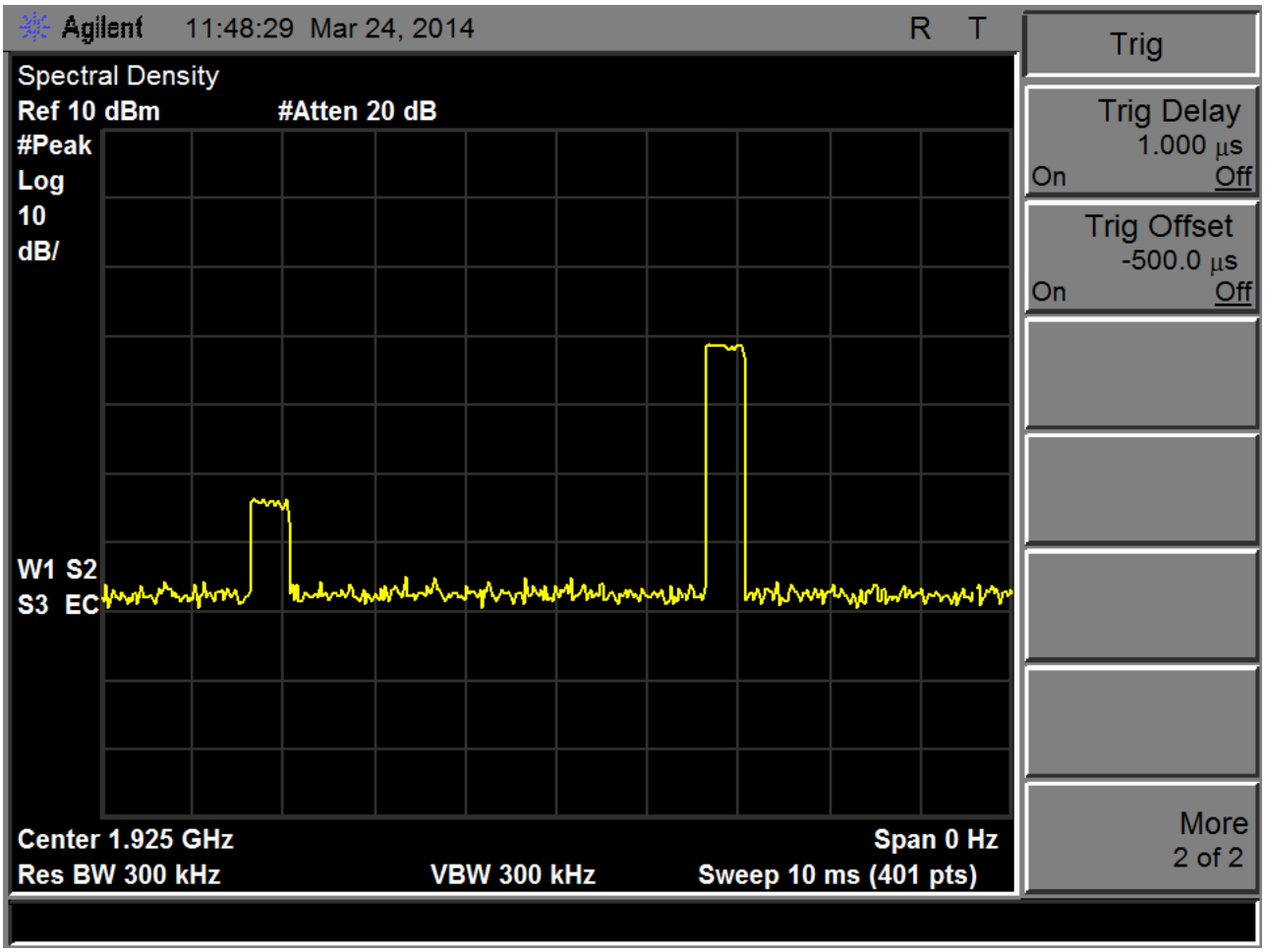


Fig. 134 – Clause 8.2.1(b). Screenshot of spectrum analyzer showing one frame of the channel with the initial interference profile present, which does not block the reception by the base EUT of the remote EUT's transmissions; an acknowledgement is generated when the remote EUT attempts to initiate the communications channel when the TALK button is pressed, and the communications channel is established, so the remote EUT meets the requirements of 8.2.1(b) for proper operation of the test setup when the acknowledgements are unblocked.

8.2.1(c) for the remote EUT is identical to the test of 8.2.1(a) except that the PXI-5670 multi-carrier interference generator is configured not to automatically switch to the alternate interference profile; rather, instead, the remote EUT and the base companion device are established in a communications channel, and then the multi-carrier interference generator is manually switched to the alternate profile. In addition, since it is not necessary to restrict the remote EUT to the use of a single RF carrier, and since the RF detector output can be used to show the timing between the onset of the blocking interference and the cessation of transmissions by the remote EUT, we configure all RF carriers with the interference profile used on f_1 for the test of 8.2.1(a); -130dBm for all timeslots for the initial interference profile, and -31.5dBm in timeslots 0 – 11 for all carriers and -130dBm in timeslots 12 – 23 for all carriers for the alternate profile.

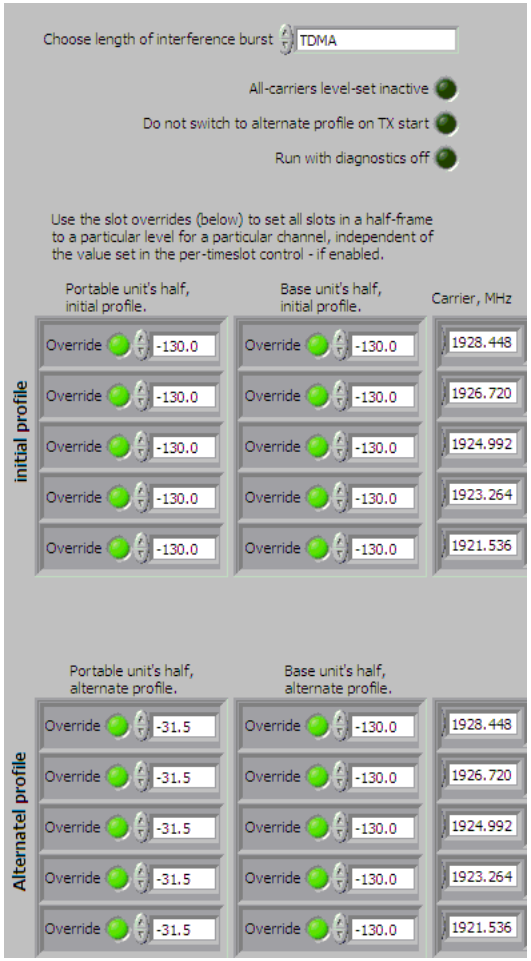


Fig. 135 – Setup of PXI-5670 multi-carrier interference generator control panel for the test of 8.2.1(c), for the remote EUT.

The remote EUT and base companion device are powered up and a period of time is allowed for the remote to enter idle but locked state, with the base companion device. The TALK button is then pressed, and the remote EUT establishes a communications channel with the base companion device. The multi-carrier interference generator is then switched to the alternate profile, which blocks the continuing acknowledgements transmitted from the base companion device to the remote EUT.

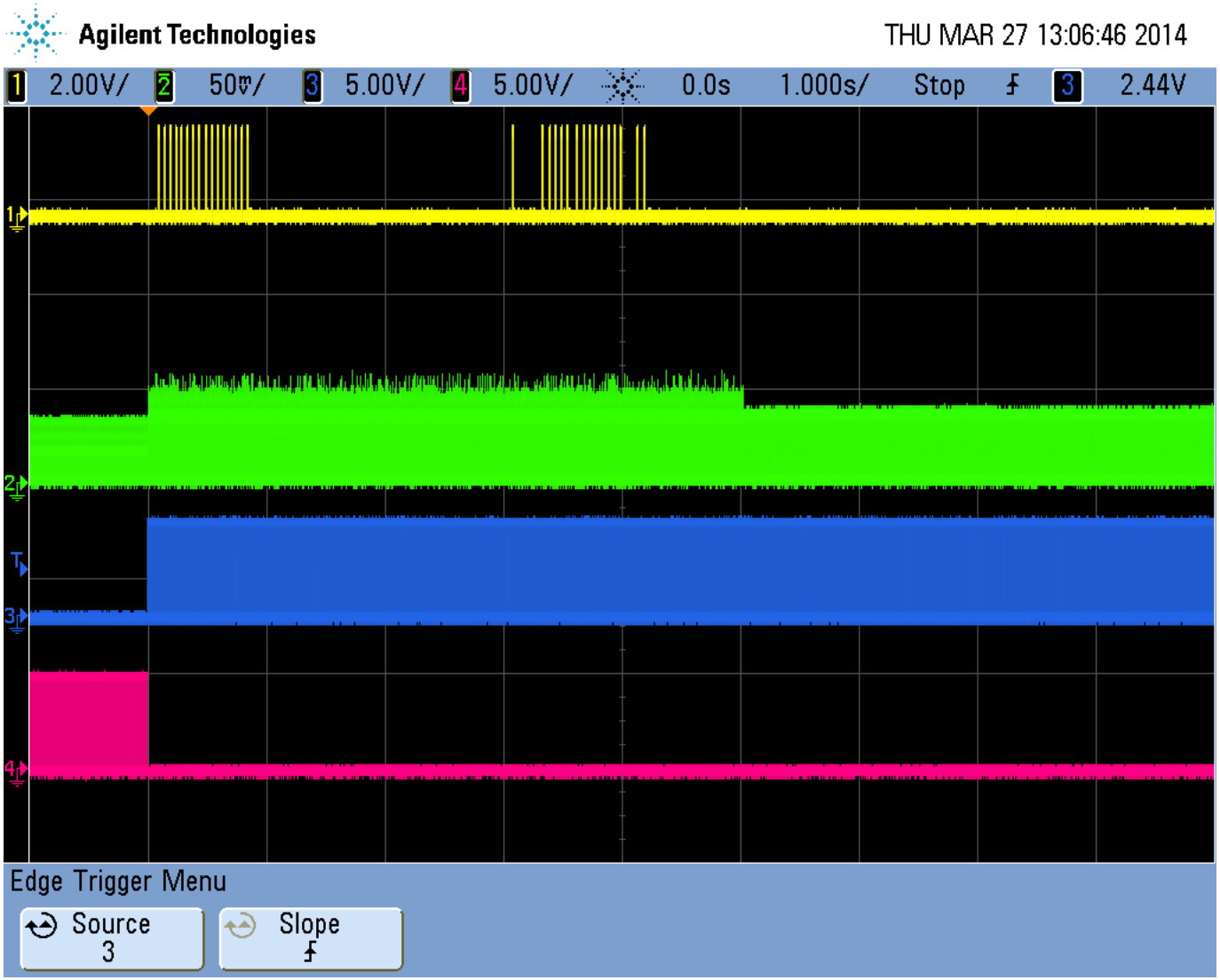


Fig. 136 - Clause 8.2.1(a). The yellow trace is the Pre-transmit Flag. The green trace is the RF detector output (top trace) vs. time showing the active communication channel and initial interference profile prior to t=0 with the alternate interference profile present after t=0 blocking the base from hearing the remote EUT and so generating an acknowledgement. When the alternate profile is activated at t = 0 seconds, with the remote EUT idle but locked to the base companion device's beacon transmissions. The purple and blue traces show the frame sync signals from the EUT, purple is initial profile, blue is the alternate profile.

1) Starting with an established communications channel prior to t=0.
2) At t = 0 seconds, apply interference that blocks reception at the base companion device of remote EUT transmissions. Base companion device immediately stops acknowledging transmissions. Remote responds by trying to establish another communications channel on an un-interfered timeslot and carrier. All timeslot and carriers are blocked, though.
3) At t = 5.2 seconds, remote EUT stops communications channel transmissions on the original, now blocked, communications channel.
All remote EUT transmissions cease within 5.2 seconds of the loss of continuing acknowledgements from the base companion device, so meeting the requirement of 8.2.1(c) that transmissions cease within 30 seconds of the loss of acknowledgements.

VIII-C. Clause 8.2.2 Transmission duration, Remote EUT

This test is to demonstrate that the remote EUT executes the access criteria test at least as often as every 8 hours.

The test platform, remote EUT and companion base unit are configured according to the requirements for implementing the test of 8.2.2 by means of test configuration #6, **With companion device and interference blocking, headset EUT**, of section (I) of this document.

The multi-carrier interference generator (PXI-5670) is set to TDMA mode (timeslot-synchronized with the base companion device) with initial interference profile active, with all carriers at level -40.0dBm except the carrier at 1924.992MHz, f_1, which is set to -130dBm. The alternate interference profile has all carriers at level -40.0dBm including the carrier at f_1. The initial profile ensures that the system timing can be monitored by a zero-span sweep of the spectrum analyzer at f_1, there being no interference on f_1. The alternate profile has interference on all carriers, so blocking all channels when the alternate interference profile becomes active.

The remote EUT and base companion device are then powered up. The output of the RF detector in the RF splitter/combiner matrix is monitored with a digital storage oscilloscope capturing timed traces. The TALK button on the remote is pressed and a communications channel established on f_1. The trace and time at which the communications channel is established is captured. Then the multi-carrier generator is switched to the alternate interference profile. The trace and time at which the remote EUT ceases transmissions due to the test and failure of the access criteria on all channels is then captured.

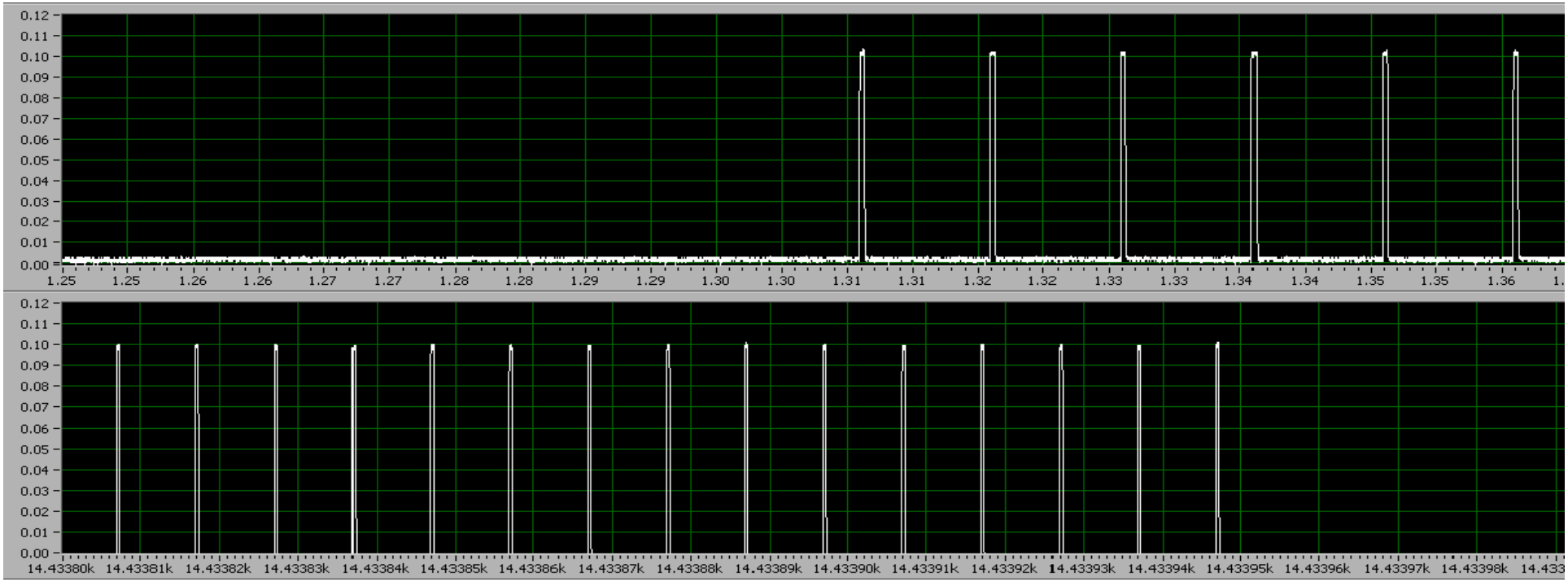


Fig. 137 – Clause8.2.2. RF detector output showing timed initiation of remote EUT transmissions (top trace), then termination (bottom trace) when the remote EUT finds no channels passing the access criteria test. The remote EUT terminates transmissions at 14433 seconds, 14432 seconds after the start of transmissions, so meeting the requirement of 8.2.2 that the headset execute the access criteria test at least as often as every 28800 seconds.