Exhibit #11

Conducted RF and spectral etiquette measurements to support the certification of the CS55/CS55 Micro base and headset, AL8CS55XXXX and AL8CS55YYYY.

Plantronics, S. Cahill, October 28 2005.

Contents:

NOTE: pages 1 – 81 of this document are in Exhibit #11aa, pages 82 – 104 are in Exhibit #11ab, and pages 105 – 182 are in Exhibit #11b. Document was partitioned for ease of transfer.

I) Background

I-A. EUT description

The CS55 and CS55 Micro are headset telephone adapter devices. The devices comprise a wireless headset typically worn by the user, and a base unit which replaces a telephone handset in connection to a standard telephone. The telephone's handset then plugs into the base unit. The base unit provides a docking cradle for charging the headset, and is provided with an AC power adapter. Other accessories (on-line indicator, telephone handset lifter) may be connected to the base unit at the end-user's discretion. Both the headset and the base unit are intentional radiators, designed in accordance with the requirements of 47CFR15 subpart D.

The CS55 and CS55 Micro headsets are essentially identical, differing in the headset only in cosmetics in the length of the boom, and placement and pattern of the microphone; the CS55 uses a directional noise-canceling microphone and the CS55 Micro uses an omni microphone. In the base, the CS55 and CS55 Micro differ only in the cosmetics of the cradle in which the headset is docked and charges.

The specific units tested were base unit #185 and headset #1-5.

I-B. Manufacturer's attestations, mandatory declarations and descriptions

The CS55/CS55 Micro base and CS55/CS55 Micro headset use digital modulation.

Clause 4.11 in V3.3 of (draft) C63.17-2005 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 V3.3 of (draft) C63.17-2005.

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 headset EUT antenna gain is 3dBi. The antenna is elliptically polarized with the major axis of polarization normal to the external surface of the headset disposed away from the user's head, and with the minor axis of polarization parallel to the length of the major axis of the headset. Two identical collocated antennas are provided for the base EUT, within the definition of V3.3 of (draft) C63.17-2005. 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 base and the headset EUTs is +10dBm.

Emission bandwidth
Emission bandwidth measured according to the procedures of V3.3 (draft) C63.17-2005 clause 6.1.3 for the base EUT is 1.48MHz.

Emission bandwidth measured according to the procedures of V3.3 (draft) C63.17-2005 clause 6.1.3 for the headset 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 V3.3 (draft) C63.17-2005. Frame period is 10mS. There are 24 timeslots per frame, with one of the first 12 timeslots used for the headset 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 headset 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 headset 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 headset 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) enabling the use of the upper threshold for deferral
The EUT system does implement the provisions of 47CFR15.323(c)(5), and uses the upper threshold for deferral.

The nominal value of the deferral threshold
The nominal value of the deferral threshold implemented in both the base and the headset EUTs is -51.5dBm. This is obtained from clause 4.3.3 of V3.3 (draft) C63.17-2005, where
B = 1.48 MHz as declared for the base,
B = 1.49 MHz as declared for the headset,
P_{max} (from clause 4.3.1) is 20.8dBm, and
P_{EUT} is 10dBm, maximum, as declared.

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 powerup the unit will perform a self-test of permanent storage memory (ROM) by means of a sum/checksum validation.
b. On powerup 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 powerup 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 powerup 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 powerup 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 powerup 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 V3.3 (draft) C63.17-2005.
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 C63.17-2005 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, headset EUT.**
3) **Standard-specific tester, base EUT.**
4) **Standard-specific tester, headset EUT.**
5) **With companion device and interference blocking, base EUT.**
6) **With companion device and interference blocking, headset 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 feedline) in place of antenna 0 at the 50-ohm feedpoint. 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 headset is configured according to Figure 3 of V3.3 of (draft) C63.17-2005, 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 headset companion device.

2) Conducted emissions tests, headset EUT.

For this configuration, the headset EUT is removed from its housing and an SMA connector mounted in place of the antenna at the 50-ohm feedpoint. The headset EUT is then directly connected to the input of the E4407B spectrum analyzer. The headset EUT's normal battery is used as a power source. 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. The headset EUT operates in normal functional mode. The base companion device is configured according to Figure 3 of V3.3 of (draft) C63.17-2005, 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. 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 headset, 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 V3.3 of (draft) C63.17-2005.
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, headset 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 headset 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 008C2ED550.
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

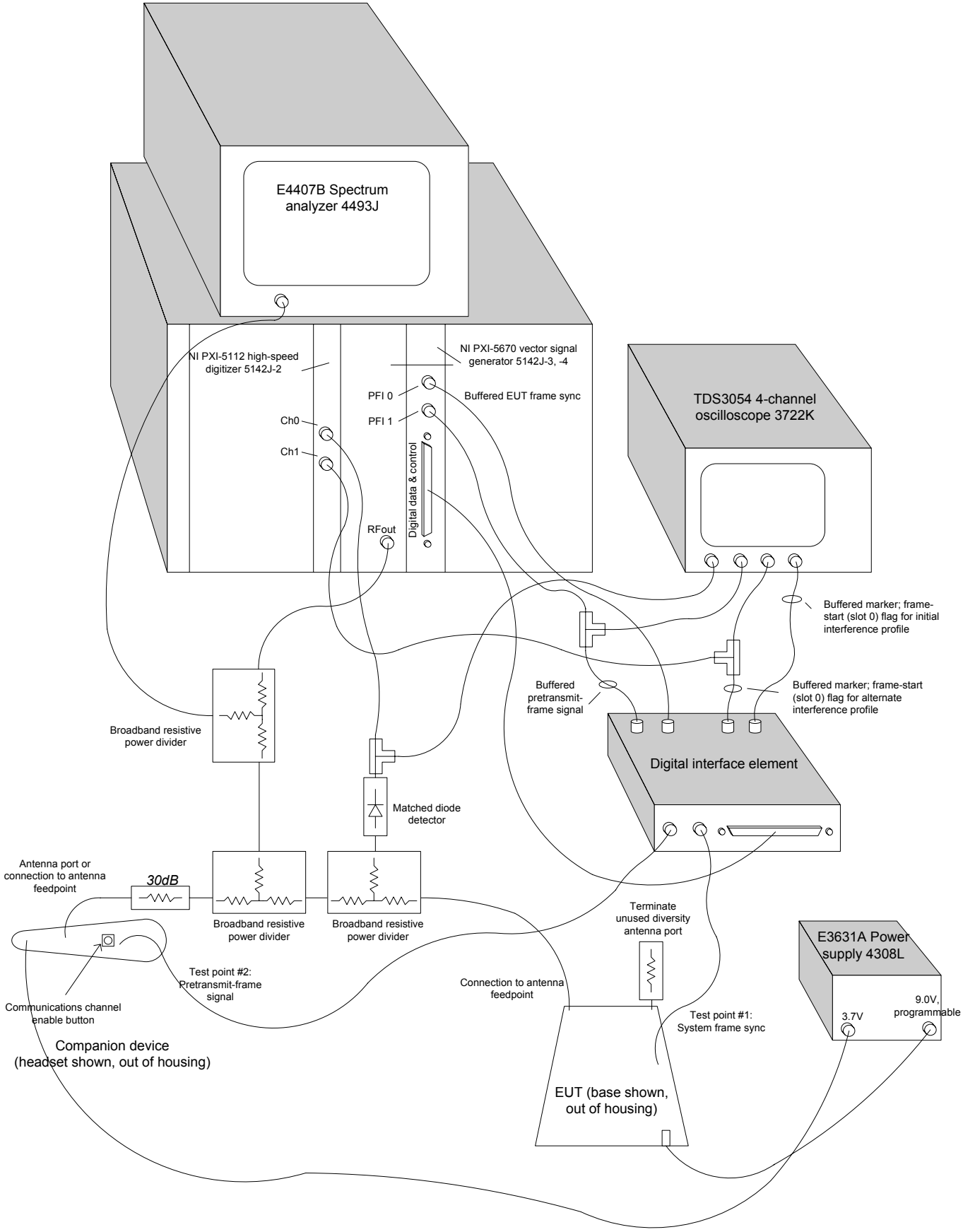


Fig. 1 - Detail of connections to base EUT for the tests of clause 7 and clause 8 of V3.3 (draft) C63.17-2005. All RF cables are RG142LL.

6) With companion device and interference blocking, headset EUT

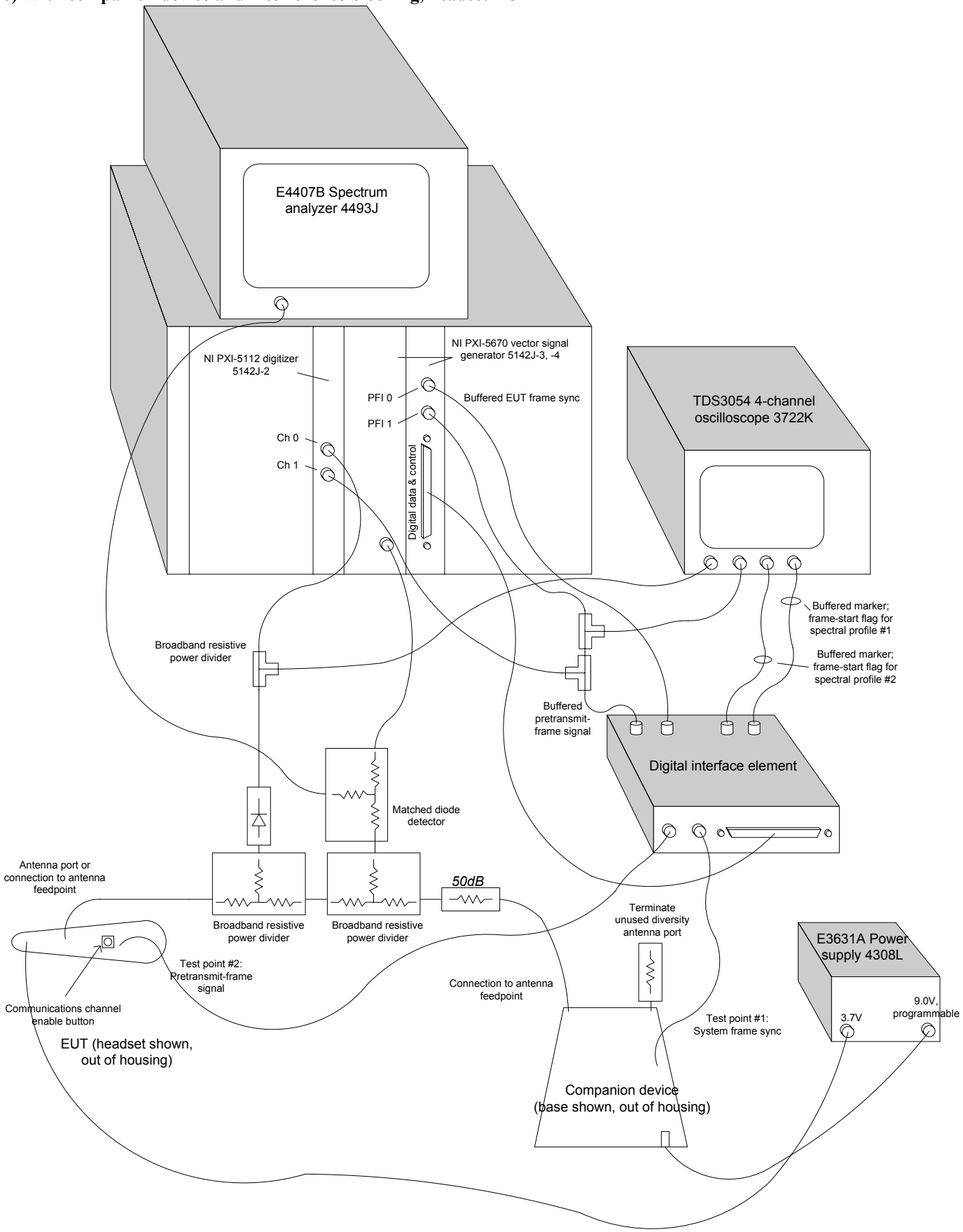


Fig. 2 - Detail of connections to headset EUT for the tests of clause 7 and clause 8 of V3.3 (draft) C63.17-2005, for configuration 6, **With companion device and interference blocking, headset EUT.** All RF cables are RG142LL.

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 4047J. Rohde and Schwarz, Inc.
Calibration certification 4314/2004 issued by Rohde and Schwarz on 2004-11-19 due 2005-11-19.

2) TDS3054 4-channel oscilloscope asset 3722K. Tektronix.
Calibration certification 840292-1-TDS3054-B011719-1 issued 16-Dec-2004 by TEKTRONIX INC BVTN SVC CENTER due 16-Dec-2005.

3) Tenney Jr temperature chamber asset 4046E. Tenney Environmental.
Calibration certification 190189A issued 12-Aug-2005 by Thermotron due 12-Aug-2006.

4) E4418B power meter asset 3717H, Agilent.
Calibration certificate 391726 issued 07-20-05 by Micro Precision due 07-20-06.

5) HP8482A power sensor asset 3645J, Hewlett-Packard
Calibration certificate 391956 issued 07-21-05 by Micro Precision due 07-21-06.

6) E4407B spectrum analyzer asset 4493J, Agilent
Calibration certificate 367893 issued 01-11-05 by Micro Precision due 01-11-06.

7) E3631A power supply asset 4308L, Agilent
Calibration certificate 368014 issued 01-13-05 by Micro Precision due 01-13-06.

8) PXI-5670 (PXI-5610/5421 composite instrument) vector signal generator asset 5142J-3, -4, National Instruments
Calibration certificate 761684 (PXI-5610 card) issued 06-JAN-05 by National Instruments due 06-JAN-06
Calibration certificate 744291 (PXI-5421 card) issued 28-OCT-04 by National Instruments due 28-OCT-06

9) PXI-5112 high-speed digitizer asset 5142J-2, National Instruments
Calibration certificate 271736 issued 22-FEB-05 by National Instruments due 22-FEB-06

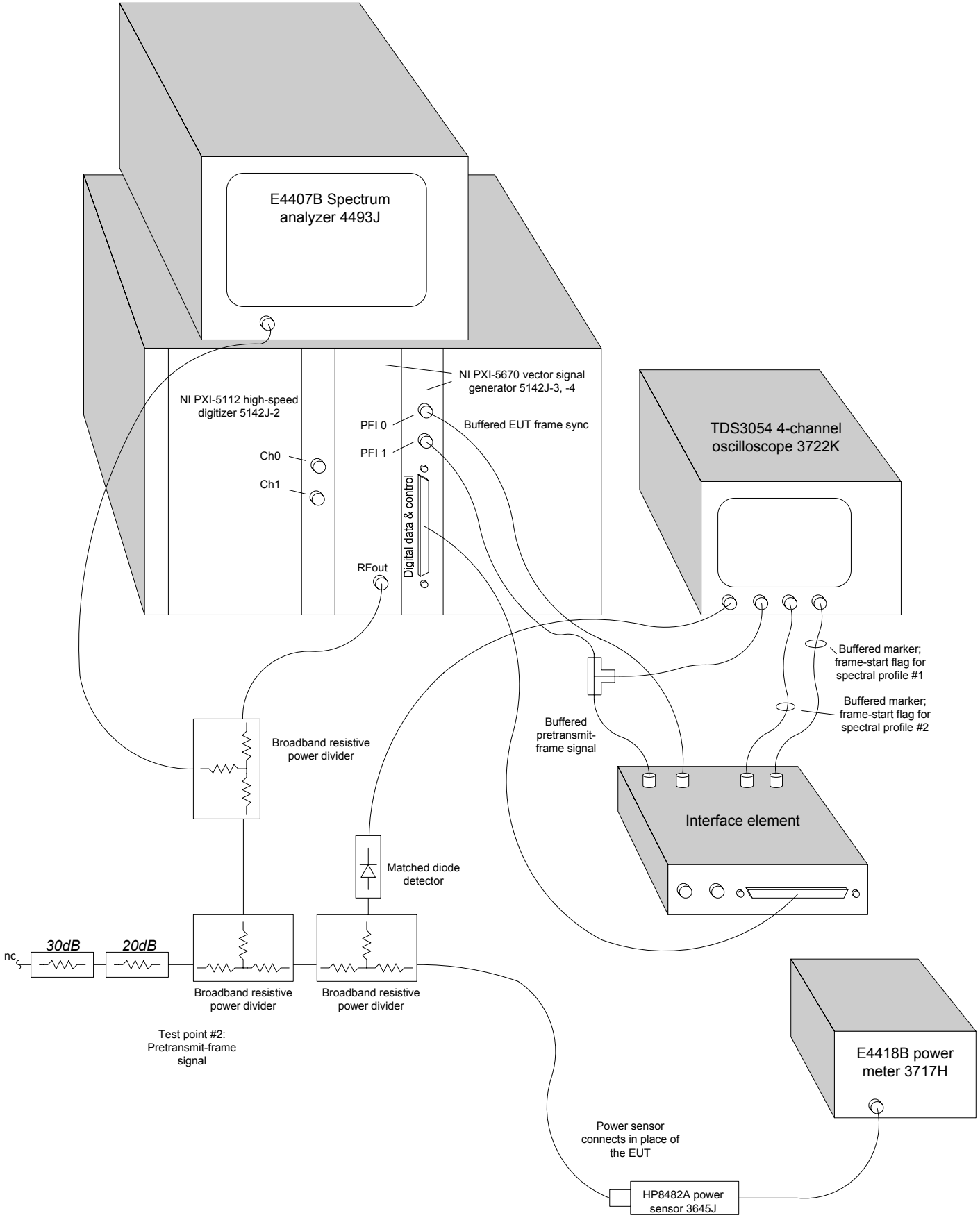


Fig. 3 - Detail of test system of clauses 7 and 8 of V3.3 (draft) C63.17-2005, configured for calibration. All RF cables are RG142LL.

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 -30 dBm.

E4418B settings:
Cal factor 97.1% for HP8482A #3545J at 2.0GHz.
Freq 1.925GHz.

The multi-carrier interference generator is set to a desired level of -30dBm for each carrier alone in turn, and the actual interference power is observed at the output of the cable connection to the EUT with the power meter and power head. The cal factors on the front panel of the controlling VI are then set to correct each carrier's level for PXI-5670 output error and the coupling network's loss.

Step 2, check of measured output levels for single carriers and all carriers together, with cal factors in place.

The PXI-5670 with fixed cal factors is set to make single carriers, each to measure alone, and then all carriers together. We observe the resulting calibrated interference power on a per-carrier basis, and then for all carriers together:

Frequency of carrier	Level delivered to power meter connected in place of EUT	
1928.448 MHz	-30.04 dBm	
1926.720 MHz	-30.08 dBm	
1924.992 MHz	-30.01 dBm	
1923.264 MHz	-30.07 dBm	
1921.536 MHz	-30.01 dBm	
All carriers enabled	-22.91 dBm	(target is 7.0 dB higher for 5 carriers at -30dBm, relative to a single carrier; actual is 7.1 dB)

Measurements taken as described, on 6:16pm August 30, 2005 by S. Cahill.

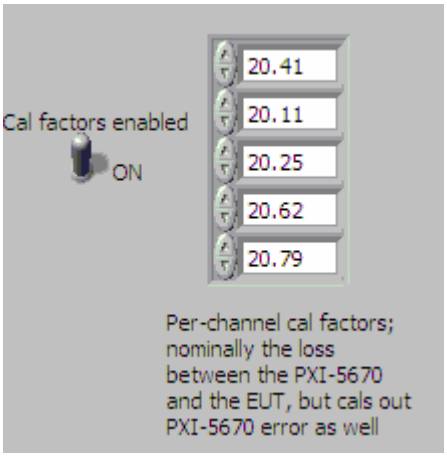


Fig. 4 - Screenshot from the control panel of the PXI-5670 with diagnostics enabled, showing the cal factors by channel. The top cal factor is for the top channel, 1928.448MHz, and the bottom cal factor is for the bottom channel, 1921.536MHz.

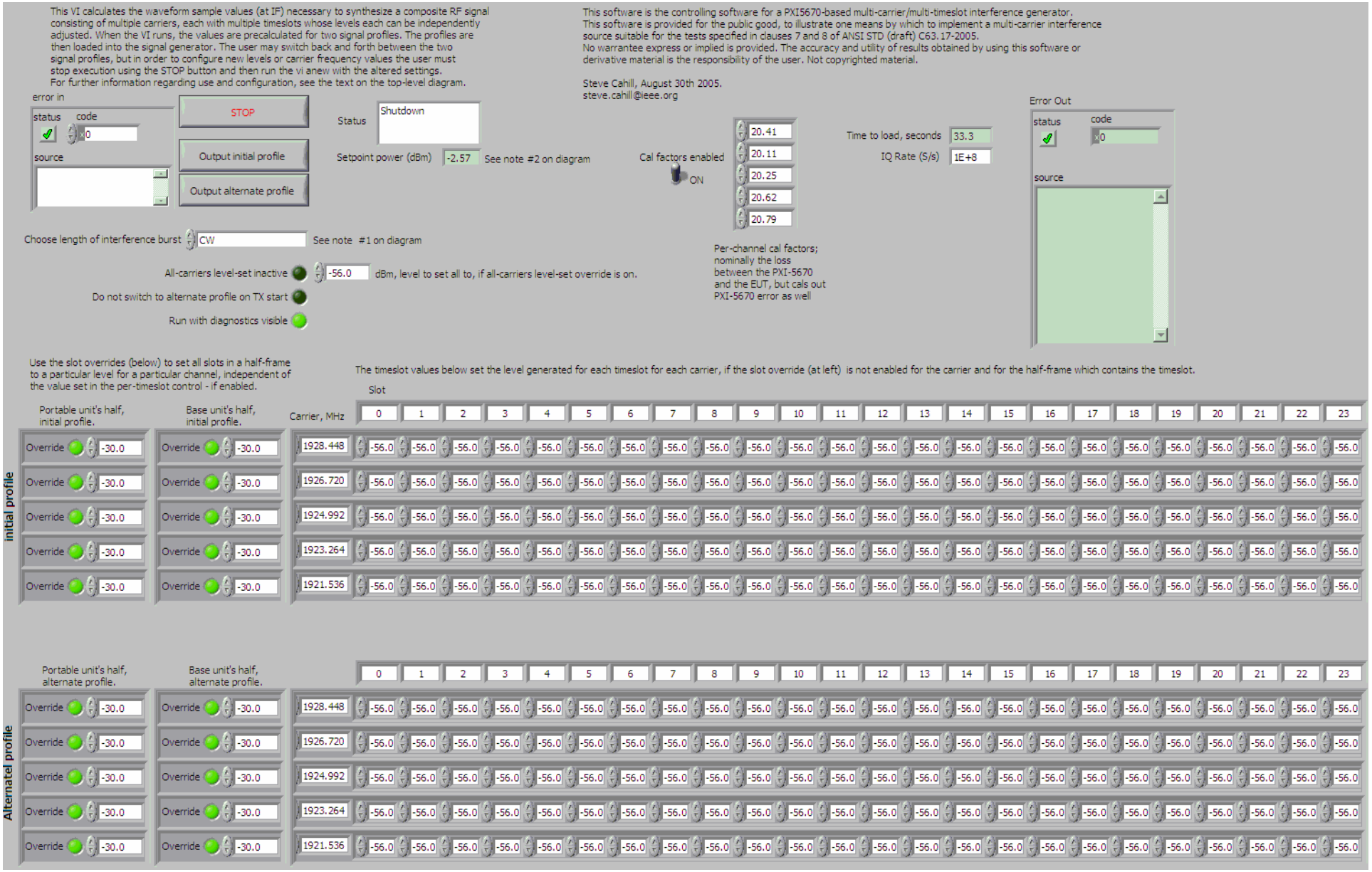


Fig. 5 - Screenshot of control VI for PXI-5670 taken with all carriers enabled, for -30dBm calibration accuracy test.

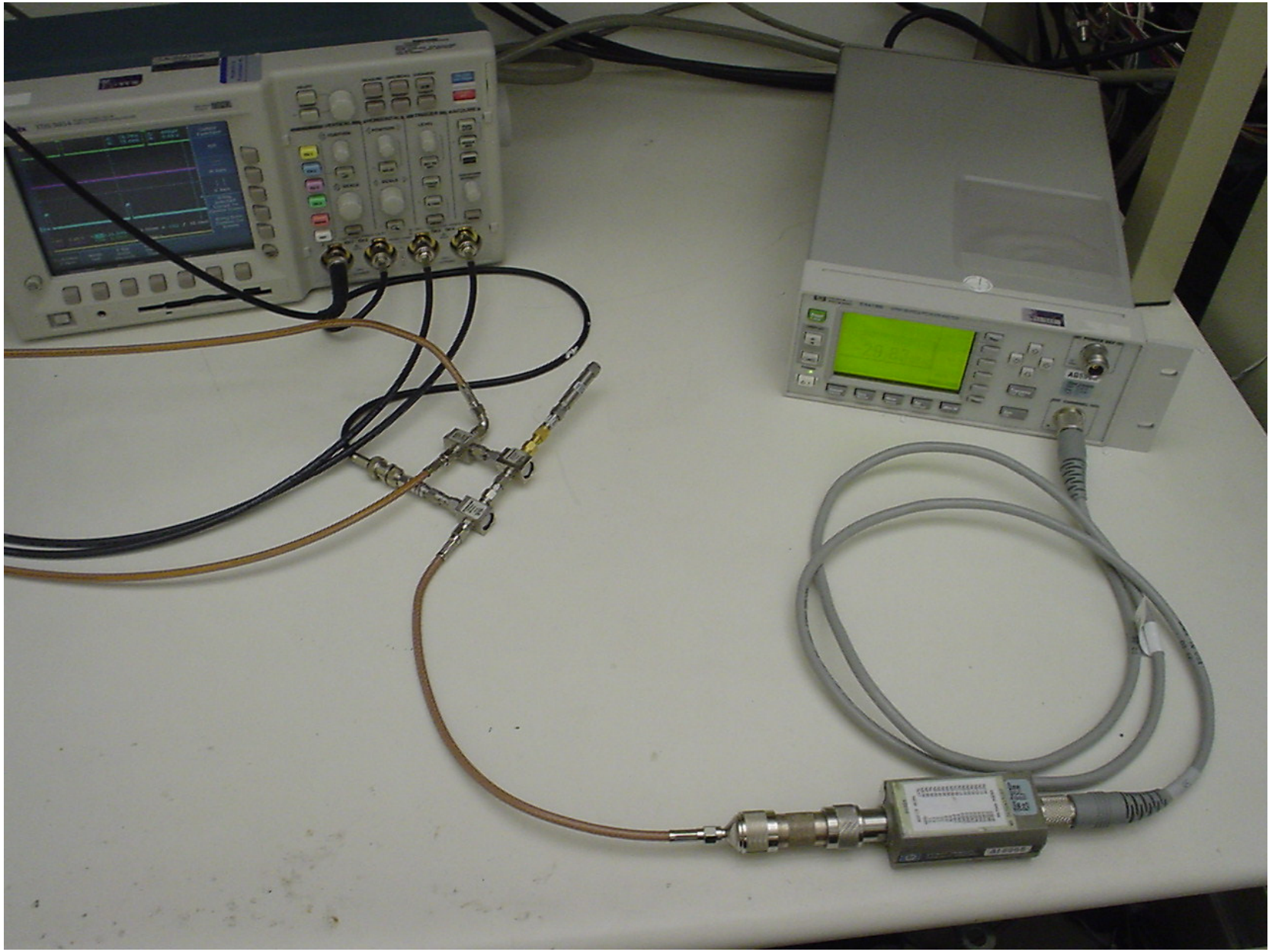


Fig. 6 - Detail of test system configured for calibration of the PXI-5670 and coupling network. Power sensor connects in place of the EUT. The companion device port is terminated with an additional 20dB attenuator and 30dB attenuator in tandem.

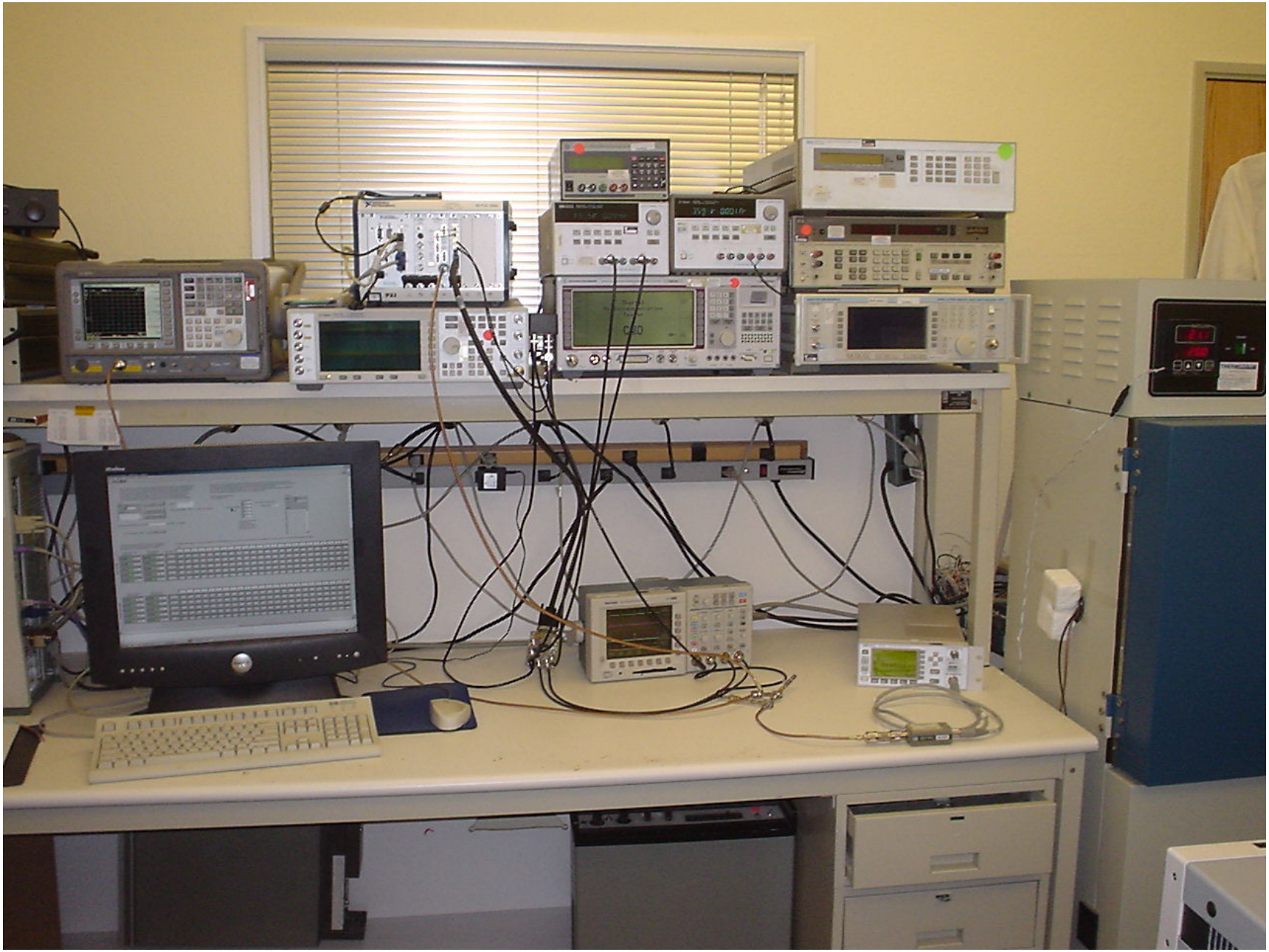


Fig. 7 - Test bench configured for calibration of the PXI-5670 and coupling network; general view.

III) Test results summary

III-A. Base EUT

Following the format of Annex A of V3.3 (draft) C63.17-2005:

Type	47CFR15 Subpart D section	Reference within V3.3 (draft) C63.17-2005	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 Role	15.307(a) UTAM, Inc., is designated to coordinate and manage the transition of the 1910-1930 MHz band from private operational-fixed microwave service (OFS) operating under Part 94 of this Chapter to unlicensed PCS operations, conditioned upon submittal to and acceptance by the Commission of:(1) a funding plan that is equitable to all prospective manufacturers of unlicensed PCS devices; and (2) a plan for "band clearing" that will permit the implementation of noncoordinatable (nomadic) devices and, in particular, noncoordinatable data PCS devices, as promptly as possible. The responsibilities of UTAM, Inc. include, but are not limited to, relocation of existing OFS microwave stations pursuant to requirements established in ET Docket No. 92-9, negotiating costs of relocation, ensuring that comparable facilities are provided, and resolving any disputes of interference to OFS microwave operations from unlicensed PCS operations. These responsibilities shall terminate upon a determination by the Commission that interference to OFS microwave operations from unlicensed PCS operations is no longer a concern.	UTAM test		Coordination not required beginning April 2005	
UTAM Certification	15.307(b) 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 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 (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	P46	Plantronics declares that the CS55/CS55 Micro 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	P40 - 42	Maximum measured power is +8.37dBm. Rated power is +10dBm. Legal maximum is +20.8dBm	12.43dB
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 -14.26dBm, Legal maximum is 3mW, +4.77dBm	19.03dB
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	P43 - 45	Base EUT emissions bandwidth is 1.48MHz.	Within the 2.5MHz to 50kHz limits
Channel packing	15.323(b) [removed and reserved]				
Listen before transmit (LBT)	15.323(c) Isochronous 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 7.3.4	P88 - 94	Base 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		Base EUT uses the provisions of 47CFR15.323(c)(5) to enable the upper threshold, the lower 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	P116	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	P109 - 112	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)				
Least Interfered Channel 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 7.3.2 and 7.3.3		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 7.3.3 and 7.3.4	P84 - 94	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 7.3.3	P84 - 87	The base EUT's threshold for access 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 always defers if the access criteria is not met, and does not take advantage of the option offered by 47CFR15.323(c)(6)	
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	P95 - 104	Base EUT meets the required 50uS pulse detection threshold, and the 35uS pulse +6dB detection threshold	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 **Error! Reference source not found.**		Base EUT uses a 10.8dB increase in threshold based on a maximum rated transmit power of +10dBm 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	P56 - 72	The base EUT worst-case out-of-band emissions are at the 2nd harmonic, transmitting on the high carrier, at -52.02dBm. The legal maximum is -39.5dBm	12.52dB
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	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 -63.71dBm. 60dB below the permitted maximum (+20.8dBm) or -39.2dBm is allowed.	24.51dB
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 0.03444ppm 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	P81	The base EUT has measured total jitter and offset of 0.03465uS 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 +0.54 and -0.68ppm 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	P79	The base EUT measured carrier frequency stability over rated temperature was +5.26ppm and -7.70ppm. +/-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 and -0.06ppm. +/-10ppm is allowed	Requirement is met

III-B. Headset EUT

Following the format of Annex A of V3.3 (draft) C63.17-2005:

Type	47CFR15 Subpart D section	Reference within V3.3 (draft) C63.17-2005	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 Role	15.307(a) UTAM, Inc., is designated to coordinate and manage the transition of the 1910-1930 MHz band from private operational-fixed microwave service (OFS) operating under Part 94 of this Chapter to unlicensed PCS operations, conditioned upon submittal to and acceptance by the Commission of:(1) a funding plan that is equitable to all prospective manufacturers of unlicensed PCS devices; and (2) a plan for "band clearing" that will permit the implementation of noncoordinatable (nomadic) devices and, in particular, noncoordinatable data PCS devices, as promptly as possible. The responsibilities of UTAM, Inc. include, but are not limited to, relocation of existing OFS microwave stations pursuant to requirements established in ET Docket No. 92-9, negotiating costs of relocation, ensuring that comparable facilities are provided, and resolving any disputes of interference to OFS microwave operations from unlicensed PCS operations. These responsibilities shall terminate upon a determination by the Commission that interference to OFS microwave operations from unlicensed PCS operations is no longer a concern.	UTAM test		Coordination not required beginning April 2005	
UTAM Certification	15.307(b) 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	Headset 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 (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	Headset 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		Headset EUT uses internal and non-removable antenna	Headset 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	P125	Plantronics declares that the CS55/ CS55Micro headset EUT uses digital modulation only	Headset 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 +7.72dBm. Rated power is +10dBm. Legal maximum is +20.8dBm	13.08dB
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 -14.26dBm, Legal maximum is 3mW, +4.77dBm	19.03dB
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	Headset 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	P122 - 124	Headset 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) Isochronous 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 7.3.4	P166 - 168	Headset 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		Headset EUT uses the provisions of 47CFR15.323(c)(5) to enable the upper threshold, lower 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	P182	Headset 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		Headset EUT does not transmit channels used exclusively for control and signaling	Not applicable
Least Interfered Channel, LIC	15.323(c)(5)				
Least Interfered Channel 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 7.3.2 and 7.3.3		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 7.3.3 and 7.3.4	P162 - 168	The headset 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 7.3.3	P162 - 165	The headset EUT's threshold for access 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 headset 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 headset EUT always defers if the access criteria is not met, and does not take advantage of the option offered by 47CFR15.323(c)(6)	
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		Headset 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	P169 - 172	Headset EUT meets the required 50uS pulse detection threshold, and the 35uS pulse +6dB detection threshold	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		Headset 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		Headset EUT uses a 10.8dB increase in threshold based on a maximum rated transmit power of +10dBm 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 headset 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 headset 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	P135 - 150	The headset EUT worst-case out-of-band emissions are at the 2nd harmonic, transmitting on the low carrier, at -58.98dBm. The legal maximum is -39.5dBm	19.48dB
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	P131 - 134	The headset EUT worst-case in-band emissions are for the transmitter on the middle carrier, in the 3***B*** region, at not worse than -66.86dBm. 60dB below the permitted maximum (+20.8dBm) or -39.2dBm is allowed.	27.66dB
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 headset 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 headset 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	P158	The headset EUT frame rate stability is measured at 0.07923ppm 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	P159	The headset EUT has measured total jitter and offset of 0.22257uS 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 headset 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	P155	The headset EUT measured carrier frequency maximum and minimum deviations were +0.74 and -0.90ppm 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 headset EUT measured carrier frequency stability over rated temperature was +3.08ppm and -1.88ppm +/-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 headset EUT is battery-powered and so no stability test is required, but measured performance at 85% and 115% of 3.7V is +0.13 and +0.94ppm	

III) Tests of clause 6 performed by the manufacturer, for the base EUT

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

For the tests of clause 6.1 of V3.3 (draft) C63.17-2005, 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 v3.3 (draft) C63.17-2005 in clause 6.1.1. Administrative commands are used to set the base to the desired carrier for the test.

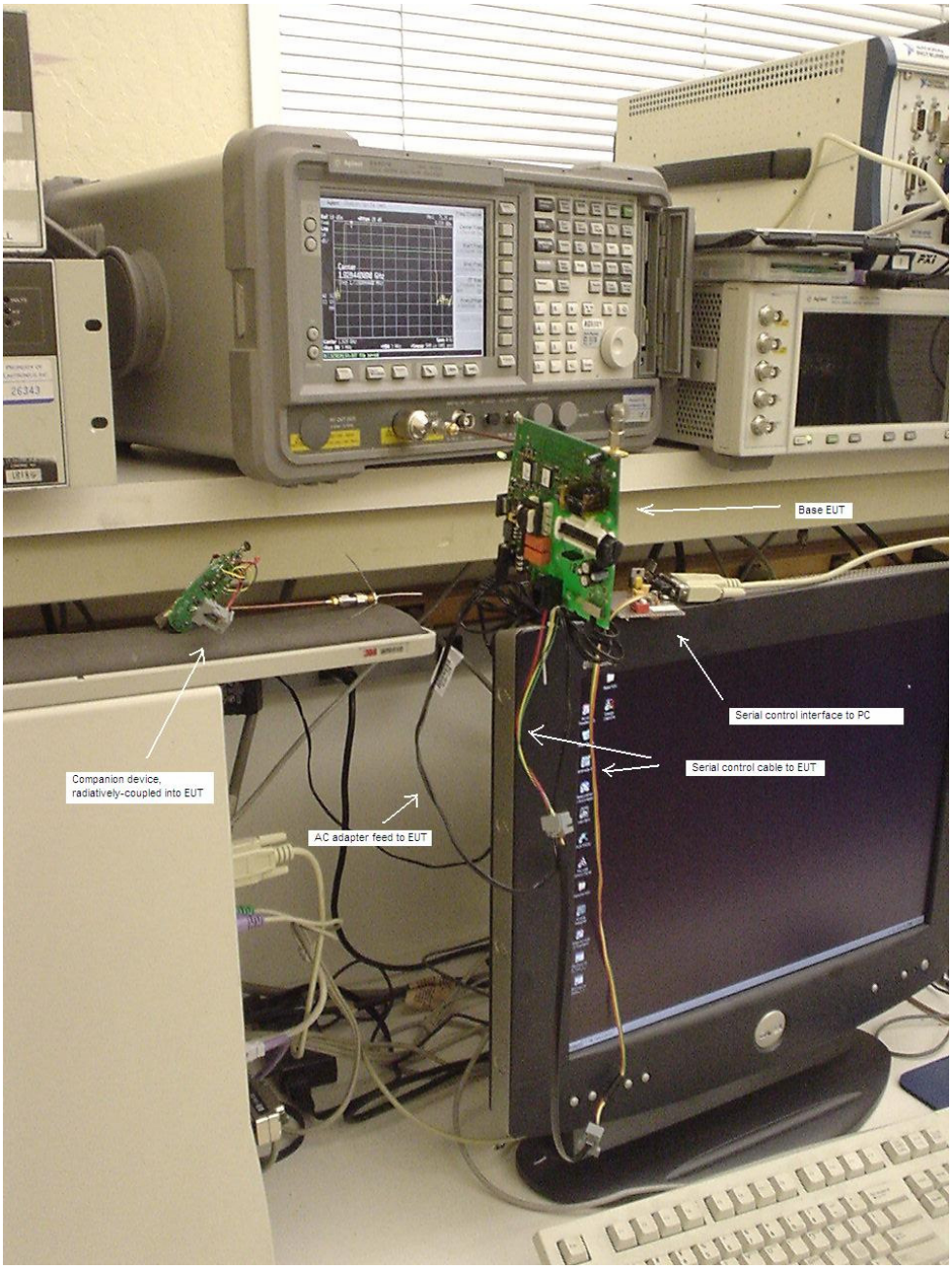


Fig. 8 - Base EUT conducted connection to spectrum analyzer for tests of clause 6.1, with labeled functions.

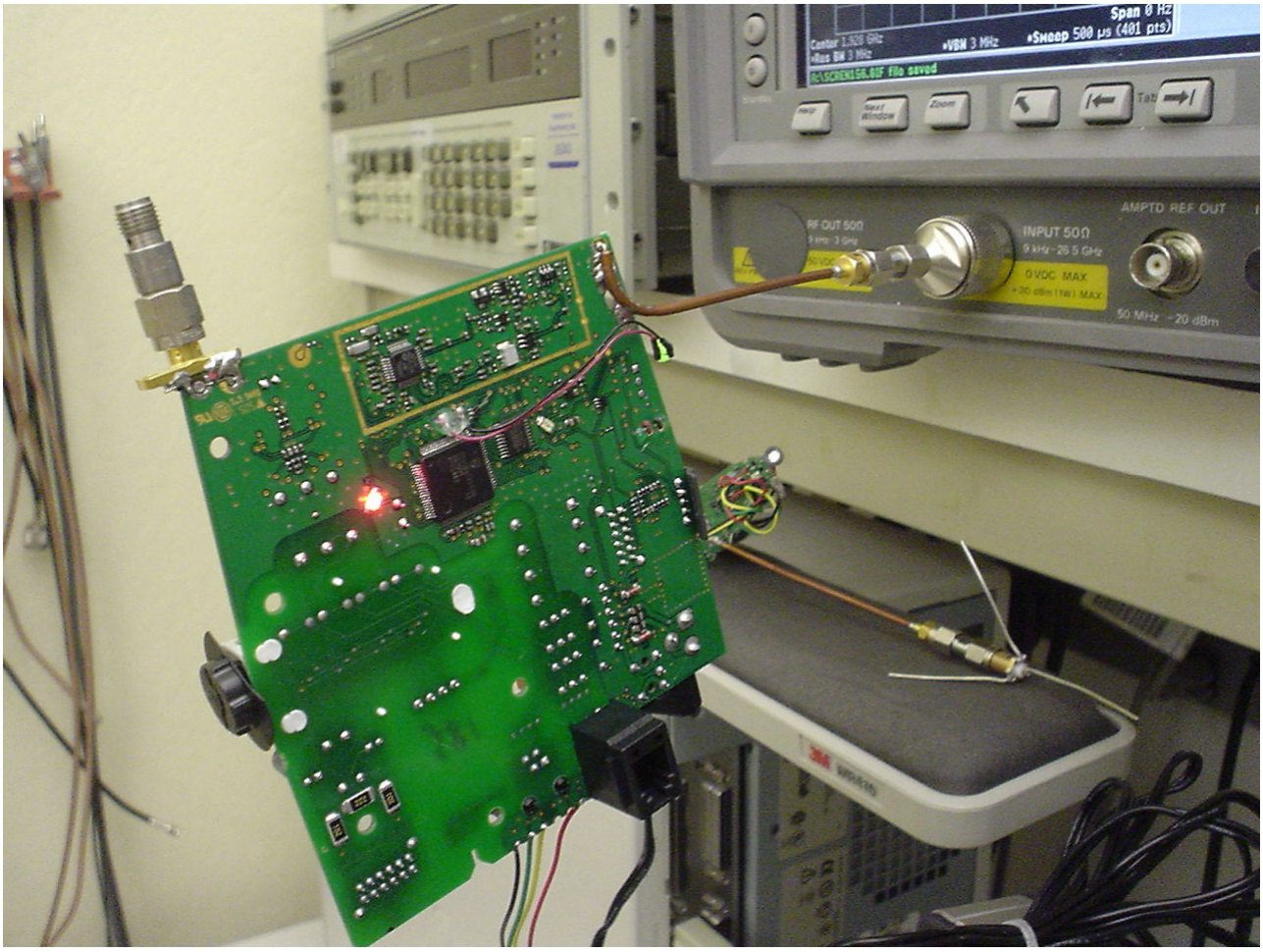


Fig. 9 - Detail of base EUT conducted connection, with companion device in the background. Base EUT and headset companion device have established a communications channel.

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.

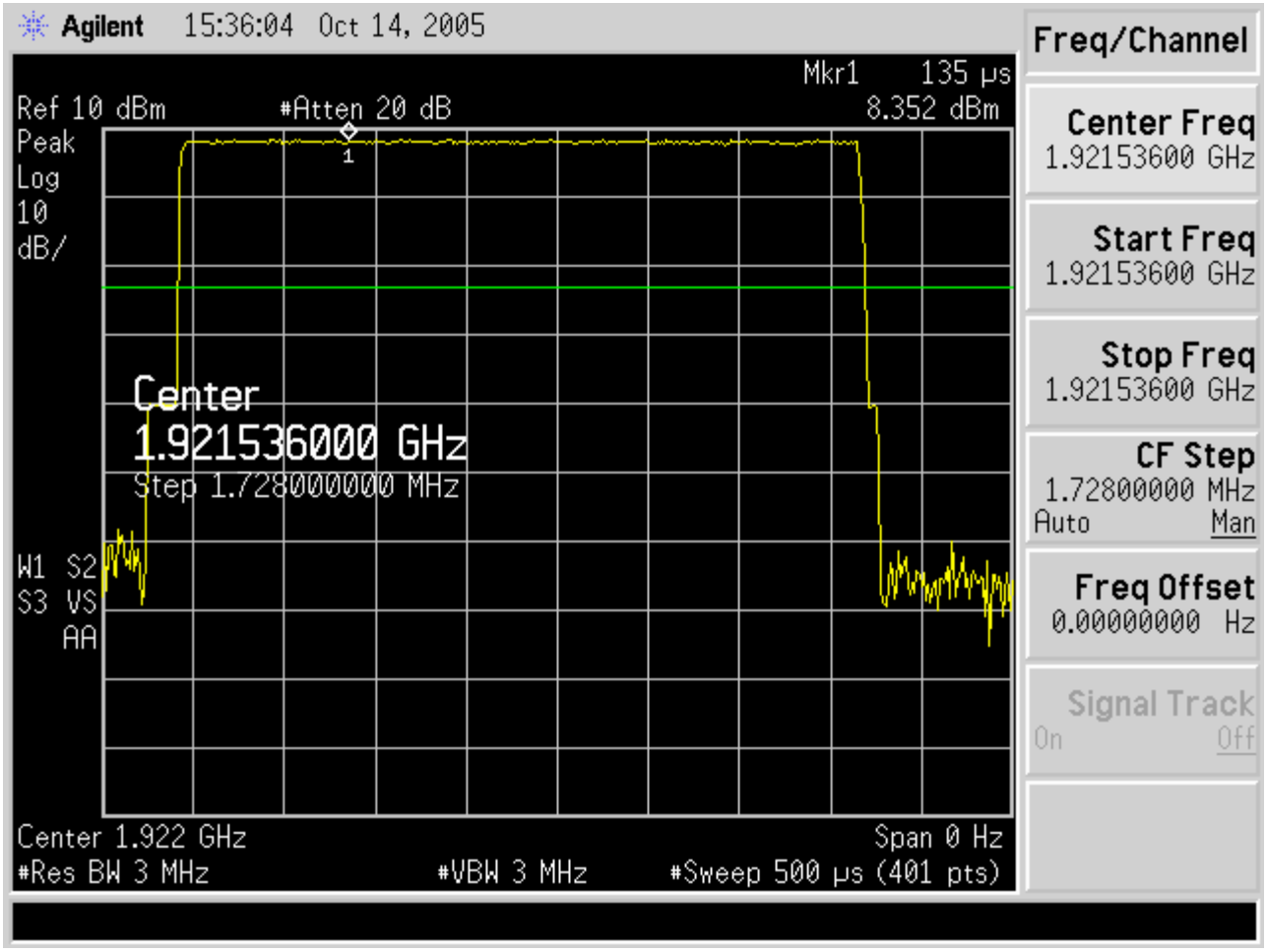


Fig. 10 - Base EUT transmit power received by spectrum analyzer configured according to the requirements of clause 6.1.2 of V3.3 of (draft) C63.17-2005, low carrier. Maximum observed transmit power is 8.35dBm.

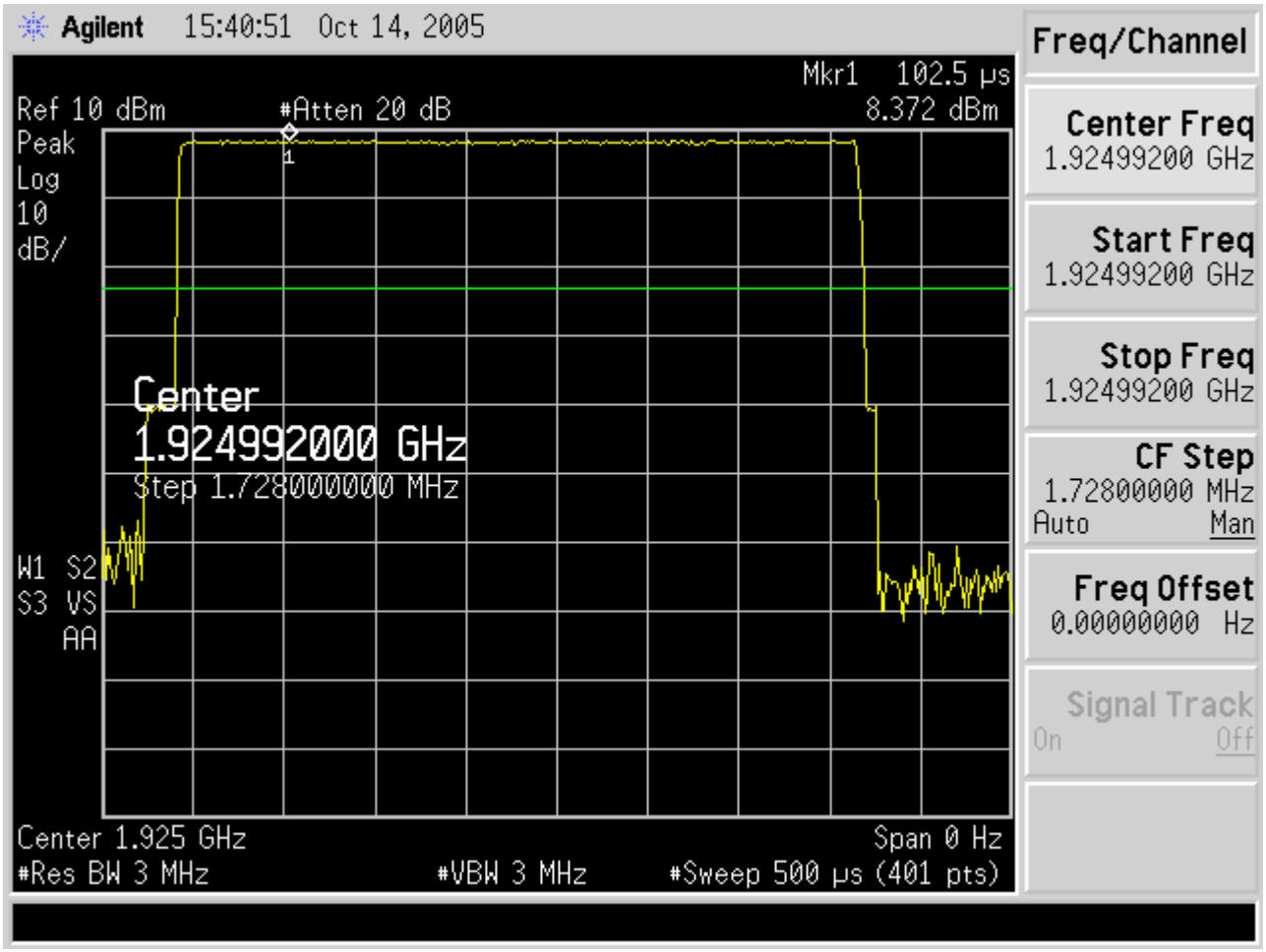


Fig. 11- Base EUT transmit power received by spectrum analyzer configured according to the requirements of clause 6.1.2 of V3.3 of (draft) C63.17-2005, mid carrier. Maximum observed transmit power is 8.37dBm.

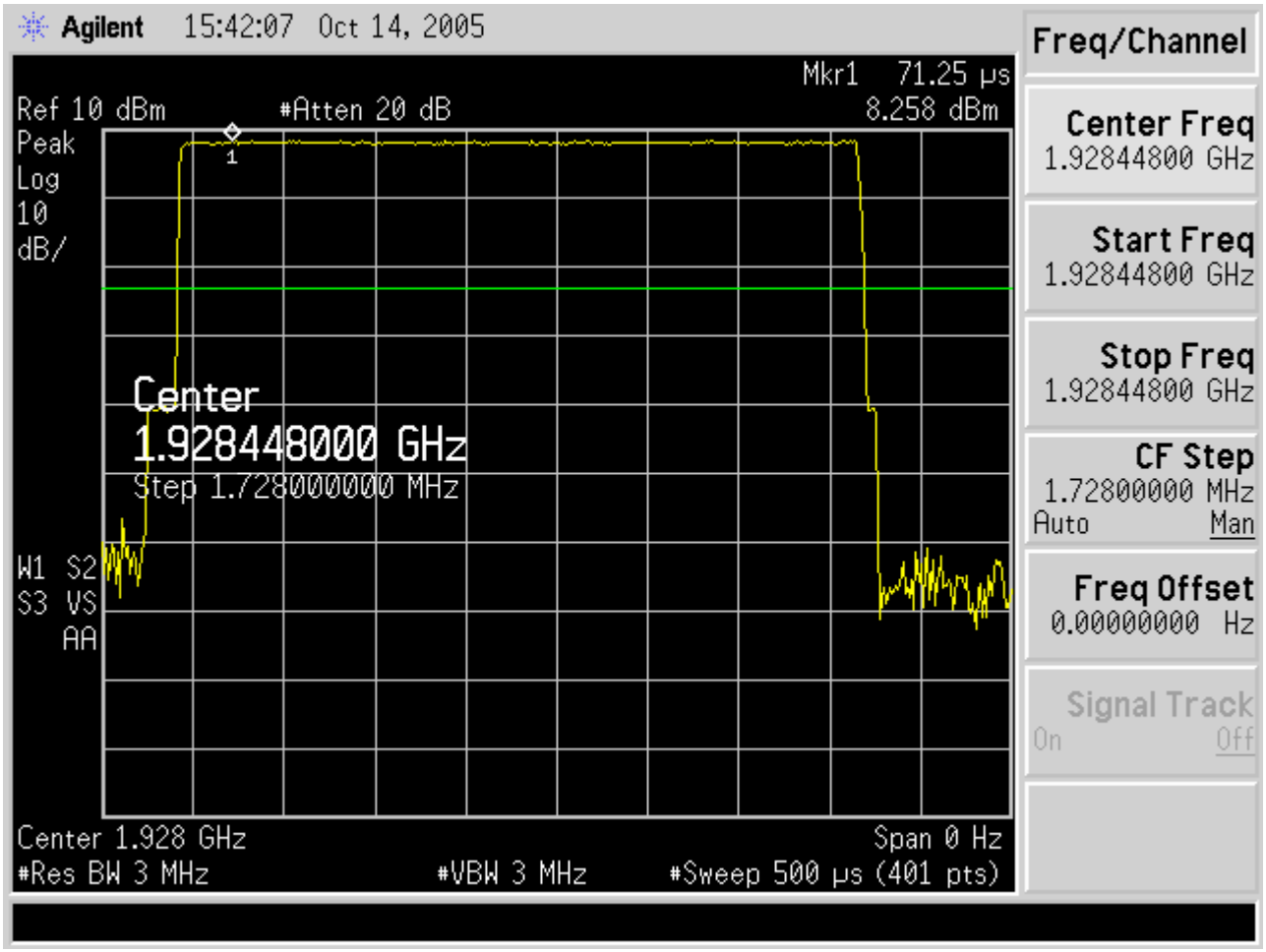


Fig. 12 - Base EUT transmit power received by spectrum analyzer configured according to the requirements of clause 6.1.2 of V3.3 of (draft) C63.17-2005, high carrier. Maximum observed transmit power is 8.26dBm.

The maximum allowed transmit power is *Plimit*, which is, from clause 4.3.1 of V3.3 of (draft) C63.17-2005,

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, 1.48 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 8.37dBm, and meets the required limit of less than *Plimit*, passing the requirements of V3.3 (draft) C63.17-2005 clause 6.1.2 with 12.43dB 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.

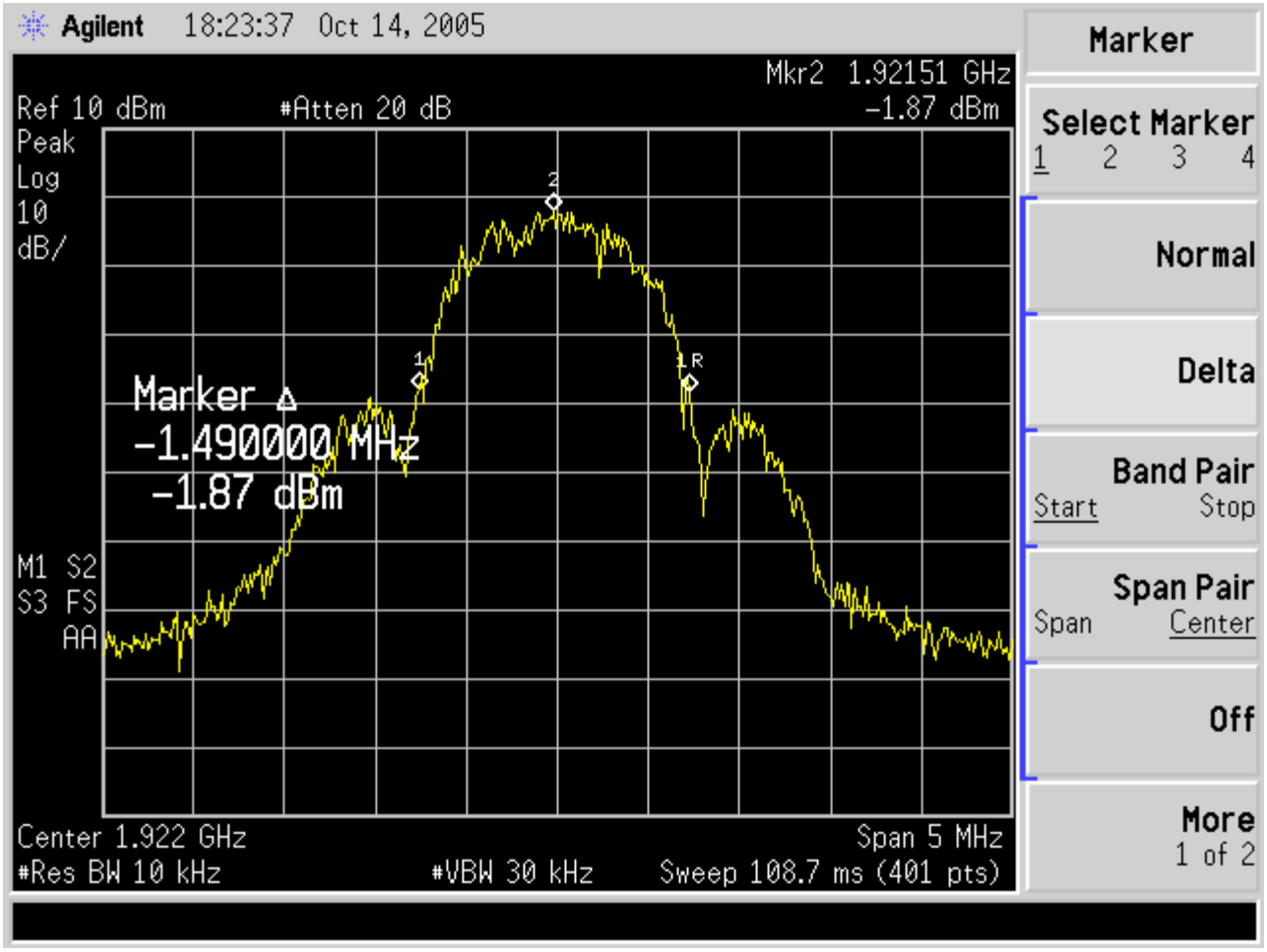


Fig. 13 - Base EUT, 1.49MHz emissions bandwidth on low carrier.

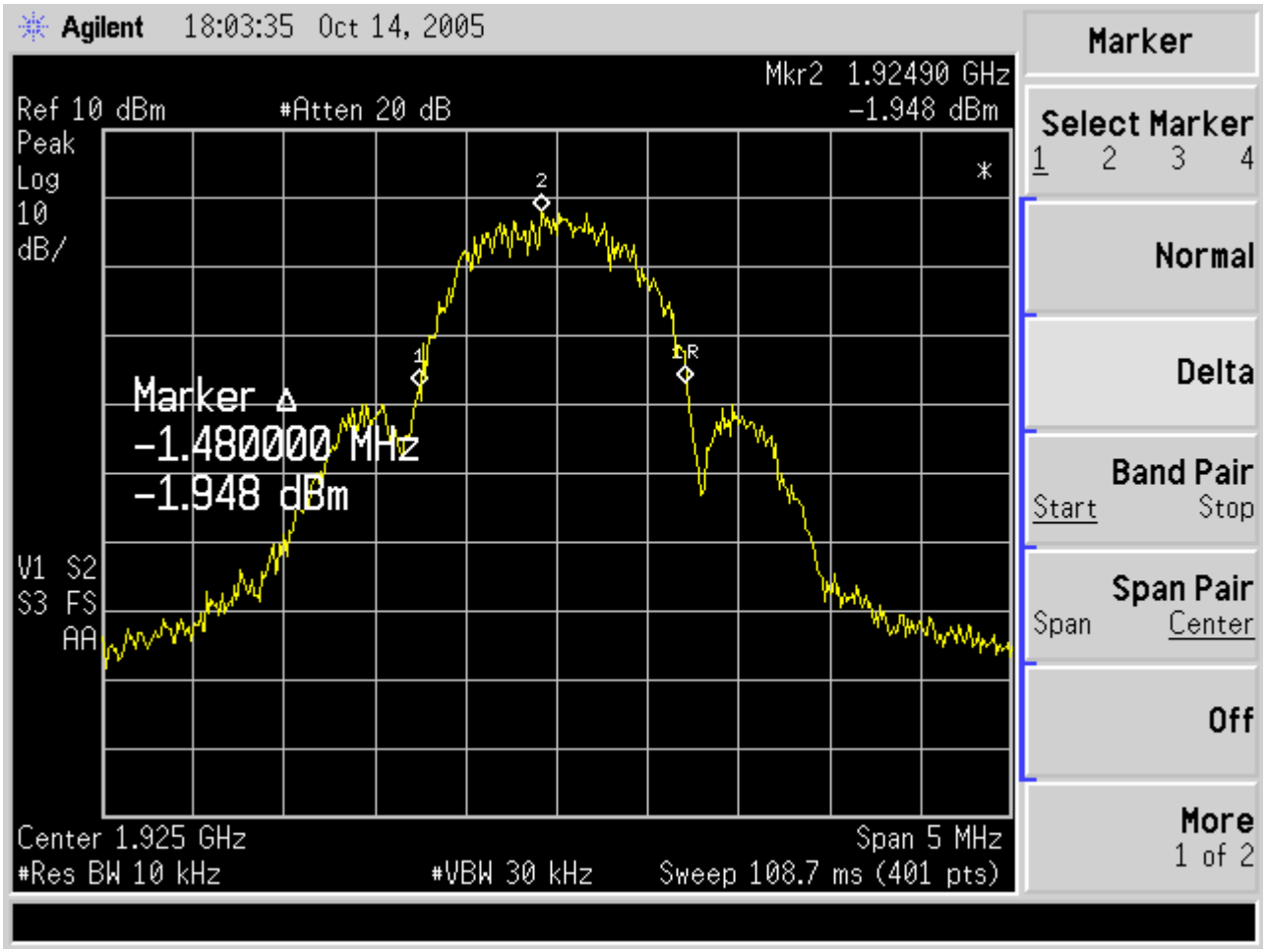


Fig. 14 - Base EUT, 1.48MHz emissions bandwidth on middle carrier.

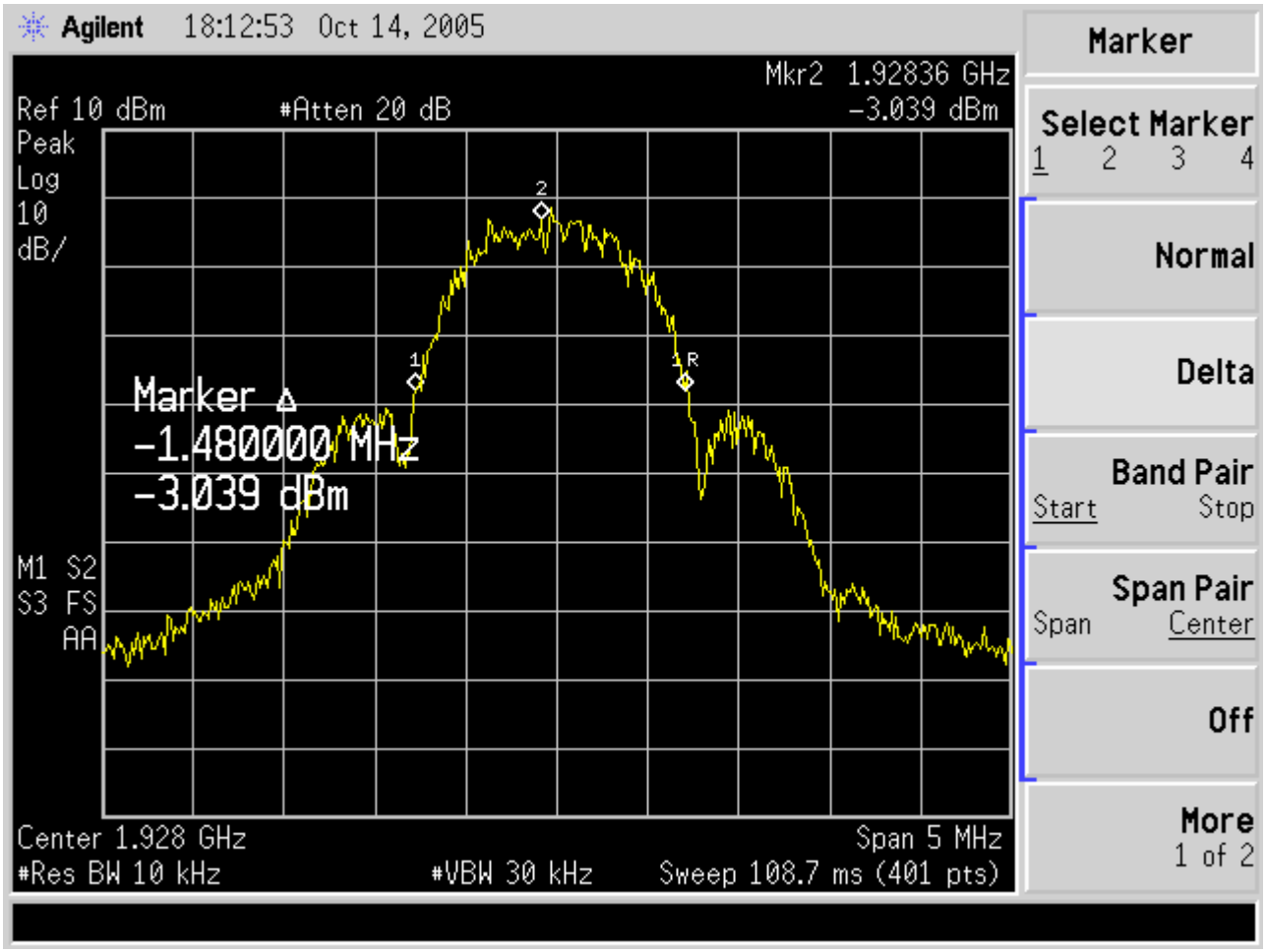


Fig. 15 - Base EUT, 1.48MHz emission bandwidth on high carrier.

The bandwidth ***B*** for the base EUT used in further calculations according to the UPCS standard, from the center carrier, is then 1.48MHz.

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 V3.3 (draft) C63.17-2005.

6.1.4 Modulation, base EUT

Per the attestation in section I-B, the base uses digital modulation and so meets the requirement of V3.3 (draft) C63.17-2005

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.

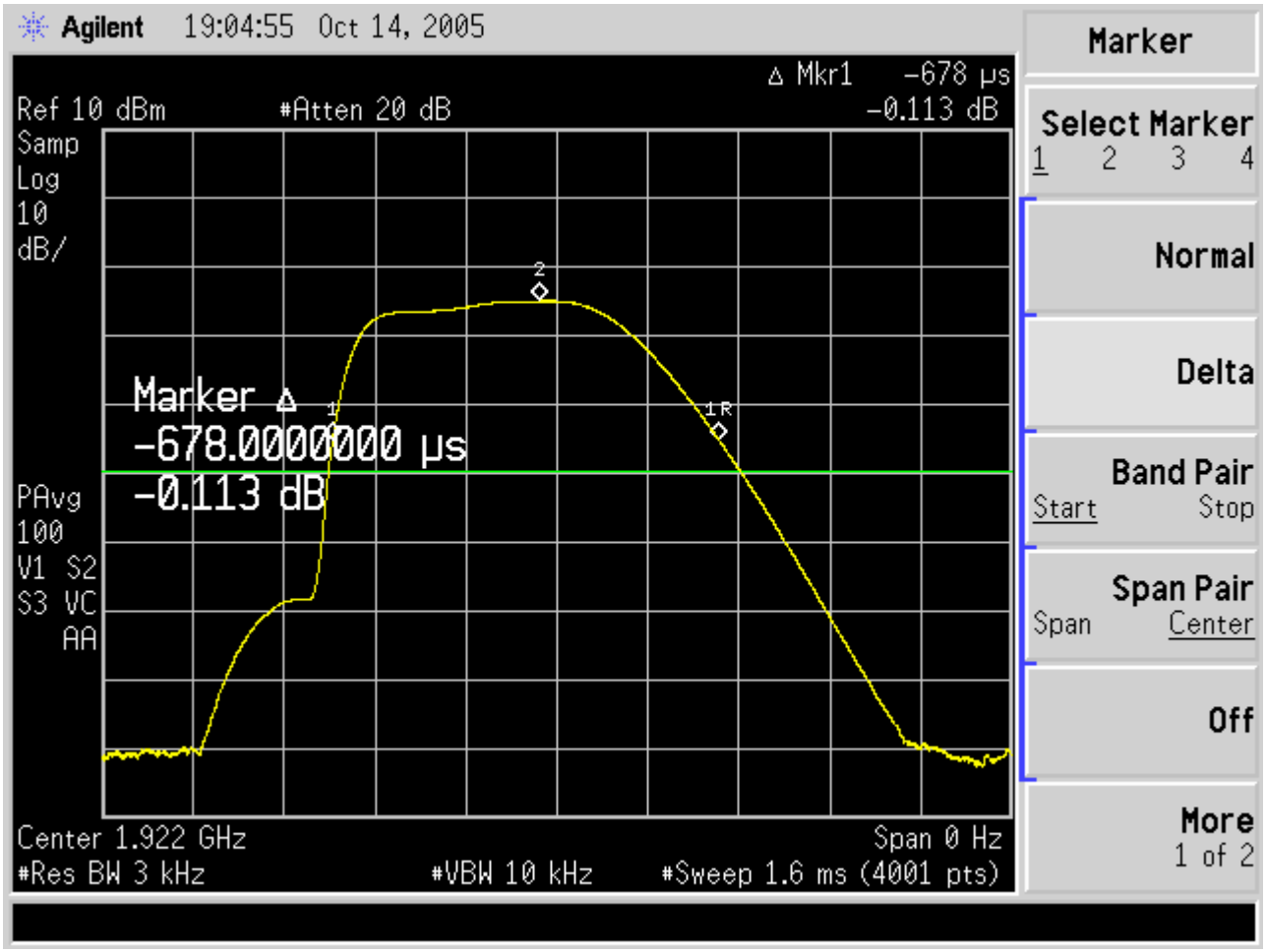
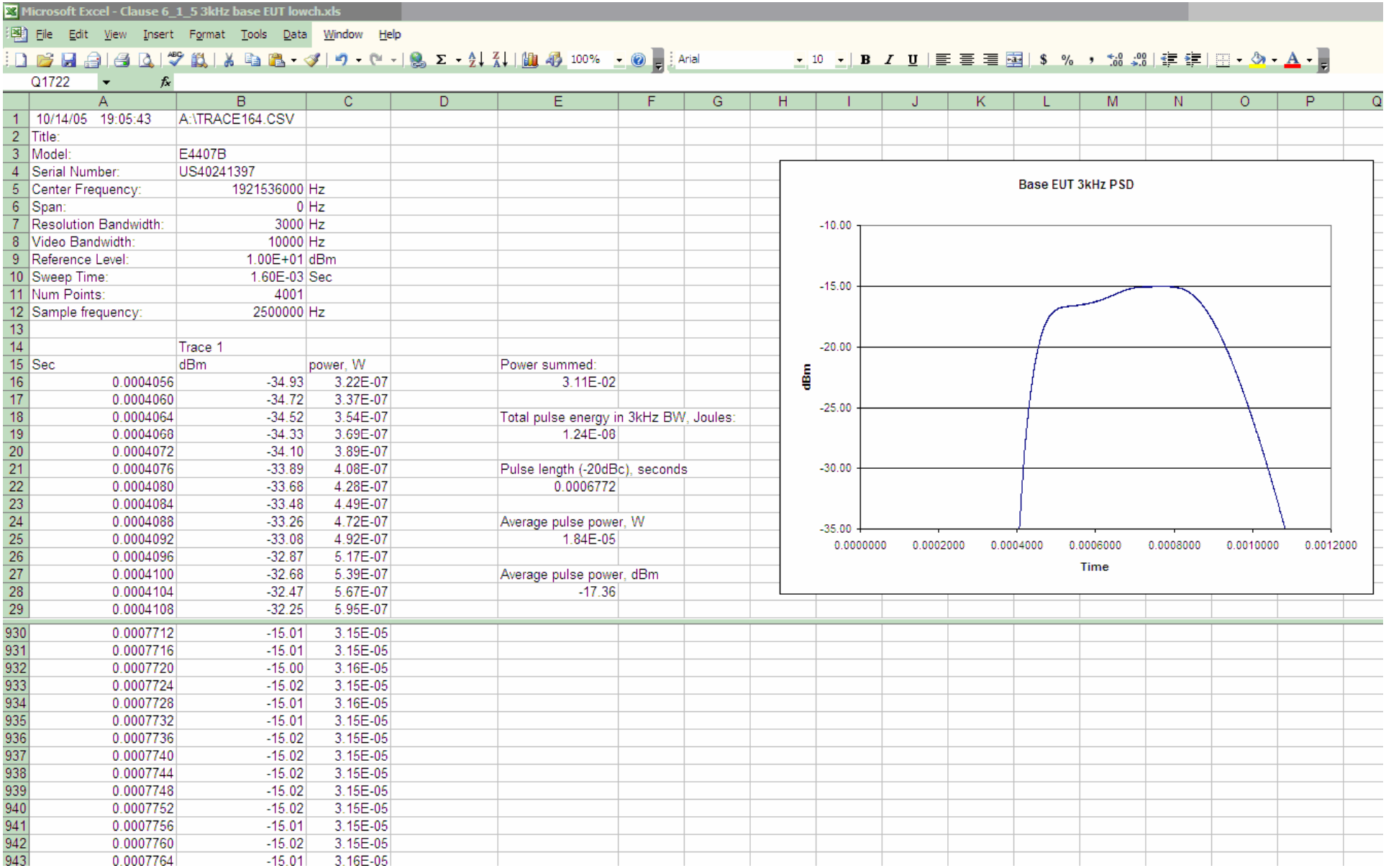


Fig. 16 – Zero-span sweep for base EUT, low carrier, for 3kHz maximum power spectral density. The peak level is at -15.0dBm, and the interval between samples at the -20dB points is 677.2uS.

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 V3.3 (draft) C63.17-2005, 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 -17.36dBm, a margin of 22.13dB to the specification for maximum power spectral density.



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2	Title:																
3	Model:	E4407B															
4	Serial Number:	US40241397															
5	Center Frequency:	1921536000	Hz														
6	Span:	0	Hz														
7	Resolution Bandwidth:	3000	Hz														
8	Video Bandwidth:	10000	Hz														
9	Reference Level:	1.00E+01	dBm														
10	Sweep Time:	1.60E-03	Sec														
11	Num Points:	4001															
12	Sample frequency:	2500000	Hz														
13																	
14		Trace 1															
15	Sec	dBm	power, W		Power summed:												
16	0.0004056	-34.93	3.22E-07		3.11E-02												
17	0.0004060	-34.72	3.37E-07														
18	0.0004064	-34.52	3.54E-07		Total pulse energy in 3kHz BW, Joules:												
19	0.0004068	-34.33	3.69E-07		1.24E-08												
20	0.0004072	-34.10	3.89E-07														
21	0.0004076	-33.89	4.08E-07		Pulse length (-20dBc), seconds												
22	0.0004080	-33.68	4.28E-07		0.0006772												
23	0.0004084	-33.48	4.49E-07														
24	0.0004088	-33.26	4.72E-07		Average pulse power, W												
25	0.0004092	-33.08	4.92E-07		1.84E-05												
26	0.0004096	-32.87	5.17E-07														
27	0.0004100	-32.68	5.39E-07		Average pulse power, dBm												
28	0.0004104	-32.47	5.67E-07		-17.36												
29	0.0004108	-32.25	5.95E-07														
930	0.0007712	-15.01	3.15E-05														
931	0.0007716	-15.01	3.15E-05														
932	0.0007720	-15.00	3.16E-05														
933	0.0007724	-15.02	3.15E-05														
934	0.0007728	-15.01	3.16E-05														
935	0.0007732	-15.01	3.15E-05														
936	0.0007736	-15.02	3.15E-05														
937	0.0007740	-15.02	3.15E-05														
938	0.0007744	-15.02	3.15E-05														
939	0.0007748	-15.02	3.15E-05														
940	0.0007752	-15.02	3.15E-05														
941	0.0007756	-15.01	3.15E-05														
942	0.0007760	-15.02	3.15E-05														
943	0.0007764	-15.01	3.16E-05														

Fig 17 – Screenshot of Excel file showing *PSDlimit* calculations for base EUT, low carrier; -17.36dBm.

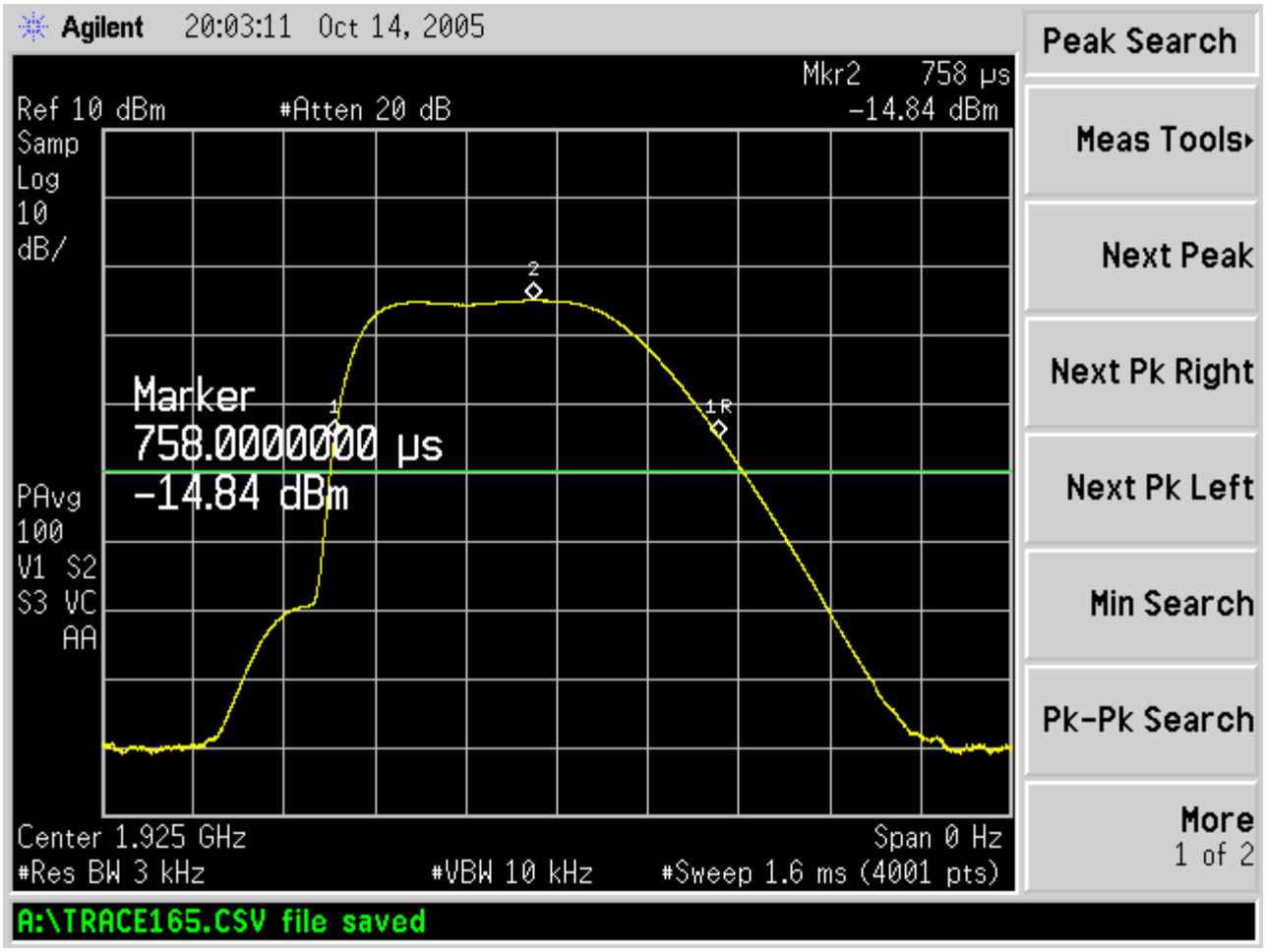

Fig. 18 – Zero-span sweep for base EUT, middle carrier, for 3kHz maximum power spectral density. The peak level is at -14.84dBm, and the interval between samples at the -20dB points is 677.2uS; note that the 758uS shown in the screenshot is the absolute time of the peak, relative to the sweep start.

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 V3.3 (draft) C63.17-2005, 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 -16.99dBm, a margin of 21.76dB to the specification for maximum power spectral density.

Microsoft Excel - Clause 6_1_5 3kHz base EUT midch.xls

File Edit View Insert Format Tools Data Window Help

E28 =(10*LOG10(E25))+30

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2	Title:																
3	Model:	E4407B															
4	Serial Number:	US40241397															
5	Center Frequency:	1921536000	Hz														
6	Span:	0	Hz														
7	Resolution Bandwidth:	3000	Hz														
8	Video Bandwidth:	10000	Hz														
9	Reference Level:	1.00E+01	dBm														
10	Sweep Time:	1.60E-03	Sec														
11	Num Points:	4001															
12	Sample frequency:	2500000	Hz														
13																	
14		Trace 1															
15	Sec	dBm	power, W		Power summed:												
16	4.08E-04	-34.89	3.24E-07		3.39E-02												
17	4.09E-04	-34.68	3.40E-07														
18	4.09E-04	-34.49	3.56E-07		Total pulse energy in 3kHz BW, Joules:												
19	4.10E-04	-34.28	3.74E-07		1.35E-08												
20	4.10E-04	-34.07	3.92E-07														
21	4.10E-04	-33.84	4.13E-07		Pulse length (-20dBc), seconds												
22	4.11E-04	-33.63	4.34E-07		0.0006772												
23	4.11E-04	-33.42	4.55E-07														
24	4.12E-04	-33.21	4.77E-07		Average pulse power, W												
25	4.12E-04	-33.00	5.01E-07		2.00E-05												
26	4.12E-04	-32.82	5.23E-07														
27	4.13E-04	-32.59	5.51E-07		Average pulse power, dBm												
28	4.13E-04	-32.39	5.76E-07		-16.99												
29	4.14E-04	-32.17	6.07E-07														
30	4.14E-04	-31.97	6.35E-07														
886	7.56E-04	-14.85	3.27E-05														
887	7.57E-04	-14.86	3.27E-05														
888	7.57E-04	-14.86	3.27E-05														
889	7.58E-04	-14.85	3.27E-05														
890	7.58E-04	-14.84	3.28E-05														
891	7.58E-04	-14.85	3.27E-05														
892	7.59E-04	-14.84	3.28E-05														
893	7.59E-04	-14.86	3.27E-05														
894	7.60E-04	-14.84	3.28E-05														
895	7.60E-04	-14.85	3.27E-05														
896	7.60E-04	-14.85	3.27E-05														
897	7.61E-04	-14.85	3.27E-05														
898	7.61E-04	-14.84	3.28E-05														
899	7.62E-04	-14.87	3.26E-05														
900	7.62E-04	-14.85	3.27E-05														
901	7.62E-04	-14.86	3.27E-05														
902	7.63E-04	-14.85	3.27E-05														

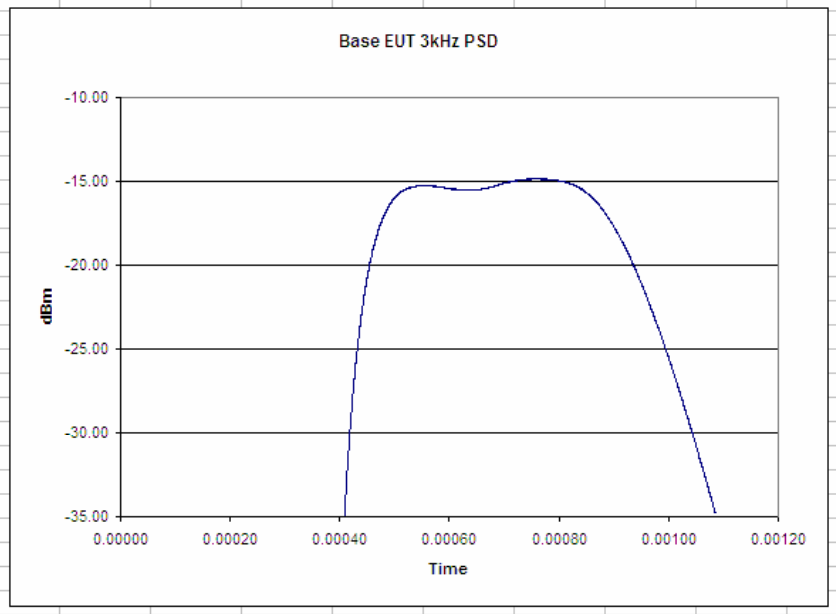

Fig 19 – Screenshot of Excel file showing *PSDlimit* calculations for base EUT, mid carrier; -16.99dBm.

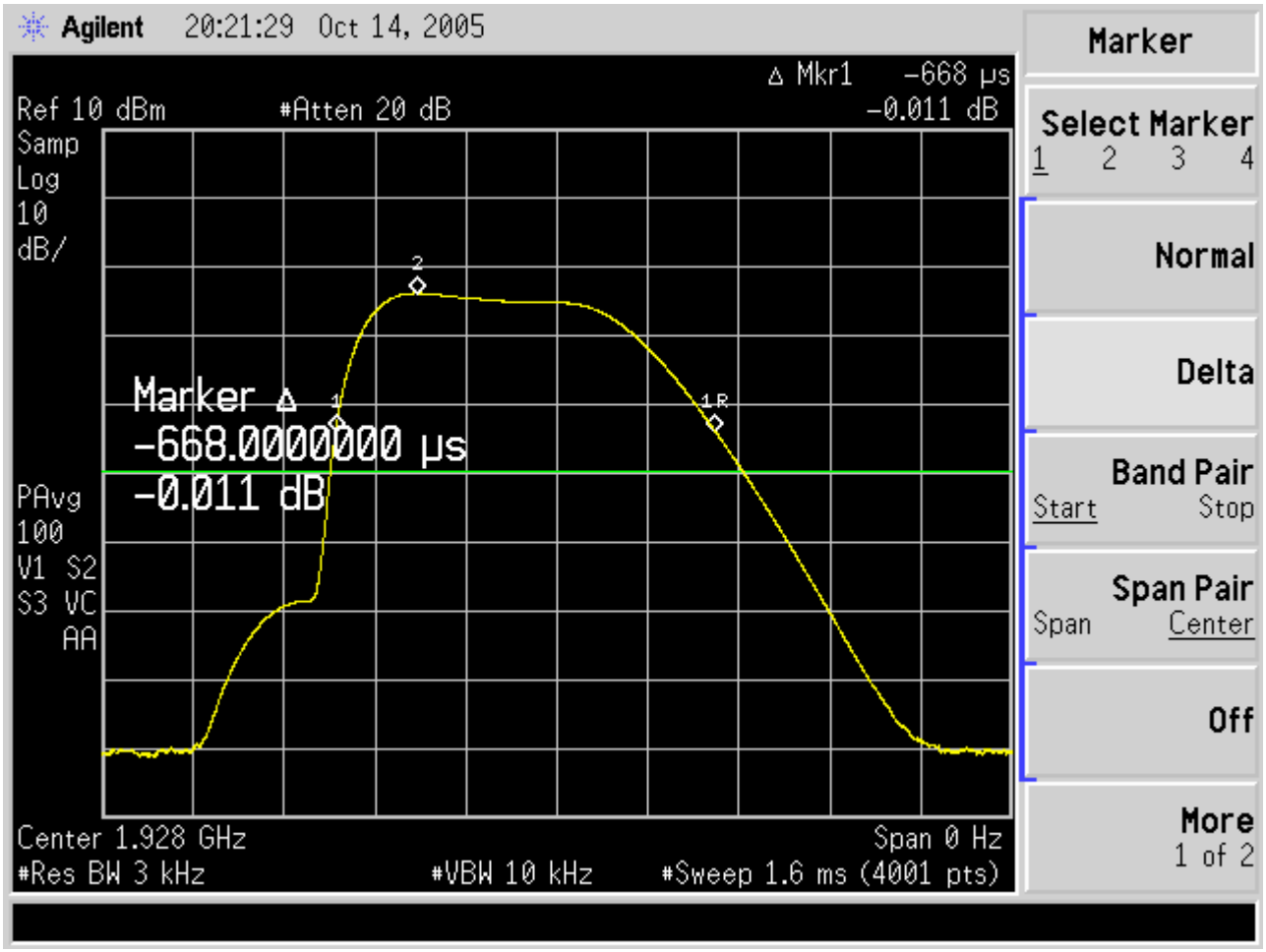

Fig. 20 – Zero-span sweep for base EUT, high carrier, for 3kHz maximum power spectral density. The peak level is at -13.87dBm, and the interval between samples at the -20dB points is 667.2uS.

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 V3.3 (draft) C63.17-2005, 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 -14.26dBm, a margin of 22.25dB to the specification for maximum power spectral density.

Microsoft Excel - Clause 6_1_5 3kHz base EUT highch.xls

File Edit View Insert Format Tools Data Window Help

E28 =(10*LOG10(E25))+30

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2	Title:																
3	Model:	E4407B															
4	Serial Number:	US40241397															
5	Center Frequency:	1921536000	Hz														
6	Span:	0	Hz														
7	Resolution Bandwidth:	3000	Hz														
8	Video Bandwidth:	10000	Hz														
9	Reference Level:	1.00E+01	dBm														
10	Sweep Time:	1.60E-03	Sec														
11	Num Points:	4001															
12	Sample frequency:	2500000	Hz														
13																	
14		Trace 1															
15	Sec	dBm	power, W		Power summed:												
16	4.11E-04	-33.69	4.27E-07		6.25E-02												
17	4.11E-04	-33.49	4.48E-07														
18	4.12E-04	-33.28	4.70E-07		Total pulse energy in 3kHz BW, Joules:												
19	4.12E-04	-33.07	4.94E-07		2.50E-08												
20	4.12E-04	-32.87	5.16E-07														
21	4.13E-04	-32.67	5.41E-07		Pulse length (-20dBc), seconds												
22	4.13E-04	-32.45	5.69E-07		0.0006672												
23	4.14E-04	-32.23	5.98E-07														
24	4.14E-04	-32.02	6.27E-07		Average pulse power, W												
25	4.14E-04	-31.85	6.53E-07		3.75E-05												
26	4.15E-04	-31.66	6.83E-07														
27	4.15E-04	-31.47	7.14E-07		Average pulse power, dBm												
28	4.16E-04	-31.28	7.44E-07		-14.26												
29	4.16E-04	-31.09	7.78E-07														
30	4.16E-04	-30.90	8.14E-07														
373	5.54E-04	-13.89	4.09E-05														
374	5.54E-04	-13.88	4.09E-05														
375	5.54E-04	-13.89	4.09E-05														
376	5.55E-04	-13.87	4.10E-05														
377	5.55E-04	-13.88	4.09E-05														
378	5.56E-04	-13.89	4.09E-05														
379	5.56E-04	-13.89	4.08E-05														
380	5.56E-04	-13.89	4.09E-05														
381	5.57E-04	-13.89	4.08E-05														
382	5.57E-04	-13.89	4.08E-05														
383	5.58E-04	-13.89	4.08E-05														
384	5.58E-04	-13.89	4.08E-05														
385	5.58E-04	-13.90	4.08E-05														

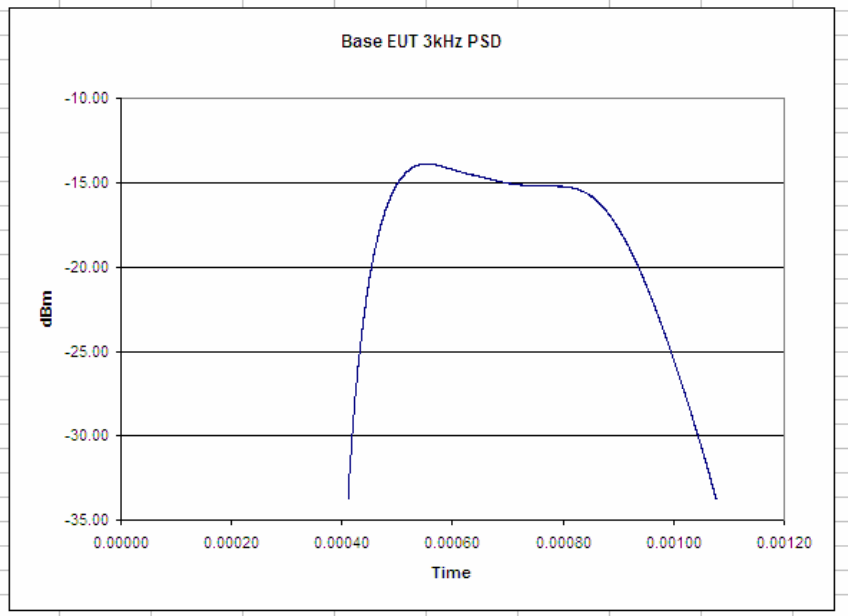

Fig 21 – Screenshot of Excel file showing *PSDlimit* calculations for base EUT, high carrier; -14.26dBm.

The maximum allowed PSD, *PSDlimit*, is 3mW in any 3kHz bandwidth, or 4.77dBm. The maximum observed PSD for the base EUT is -14.26dBm, meeting the requirements according to clause 6.1.5 of V3.3 (draft) C63.17-2005 with 19.03dB 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 inband swept span is 10MHz, (1920MHz to 1930MHz) from the requirement that the swept span cover 3.5***B*** and where ***B*** = 1.48MHz, 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.

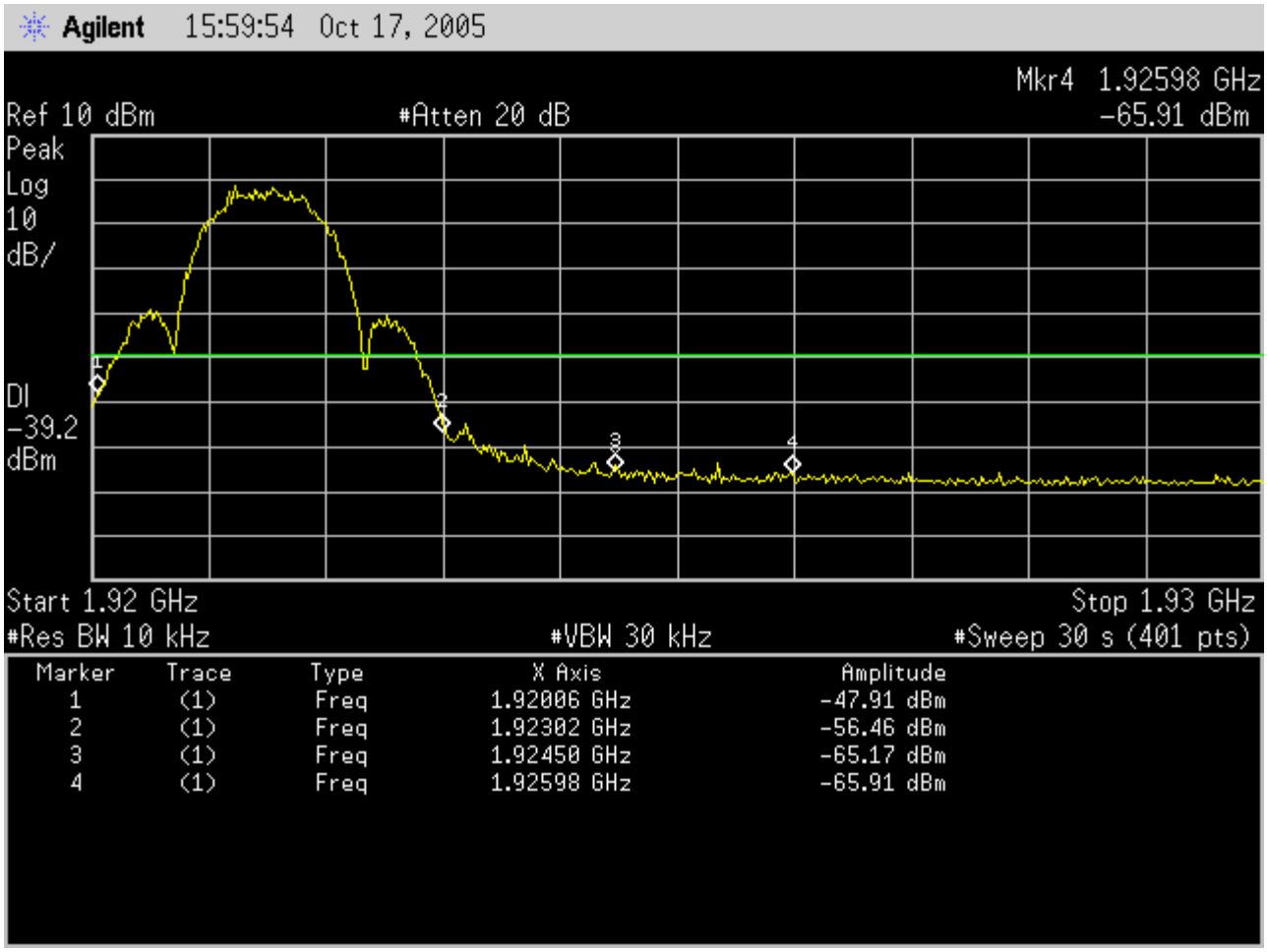

Fig 22 - Spectrum analyzer screenshot for transmit emissions showing inband unwanted emissions with the base EUT transmitter at the lowest carrier, 1921.536MHz, according to the requirements of 6.1.6.1.

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 inband), the worst-case marker at 1920.06 MHz is at -47.91dBm, and 30dB below 20.8dBm, or -9.2dBm is allowed, margin is 38.71dB.

For region B (single-sided inband), the marker at 1924.50MHz is at -65.17dBm, and 50dB below 20.8dBm, or -29.2dBm is allowed, margin is 35.97dB.

For region C (single-sided inband), the marker at 1925.98MHz is at -65.91dBm, and 60dB below 20.8dBm, or -39.2dBm is allowed, margin is 26.71dB.

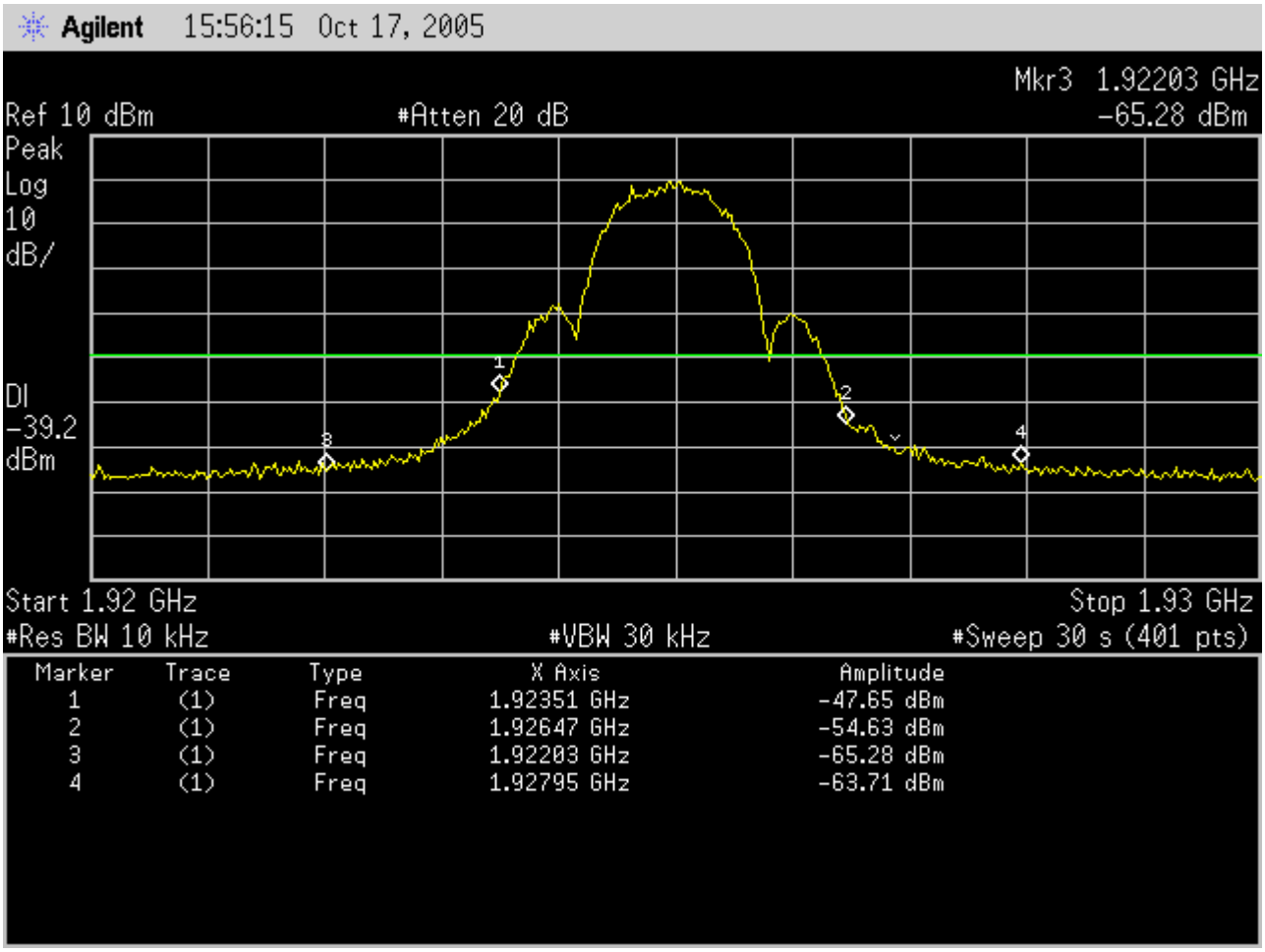

Fig. 23 - Spectrum analyzer screenshot for transmit emissions showing inband unwanted emissions with the base EUT transmitter at the middle carrier, 1924.992MHz, according to the requirements of 6.1.6.1.

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 inband), the worst-case marker at 1923.51MHz is at -47.65dBm, and 30dB below 20.8dBm, or -9.2dBm is allowed, margin is 38.45dB.

For region B (double-sided inband), the worst-case marker at 1927.95MHz is at -63.71dBm, and 50dB below 20.8dBm, or -29.2dBm is allowed, margin is 34.51dB.

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 24.51dB.

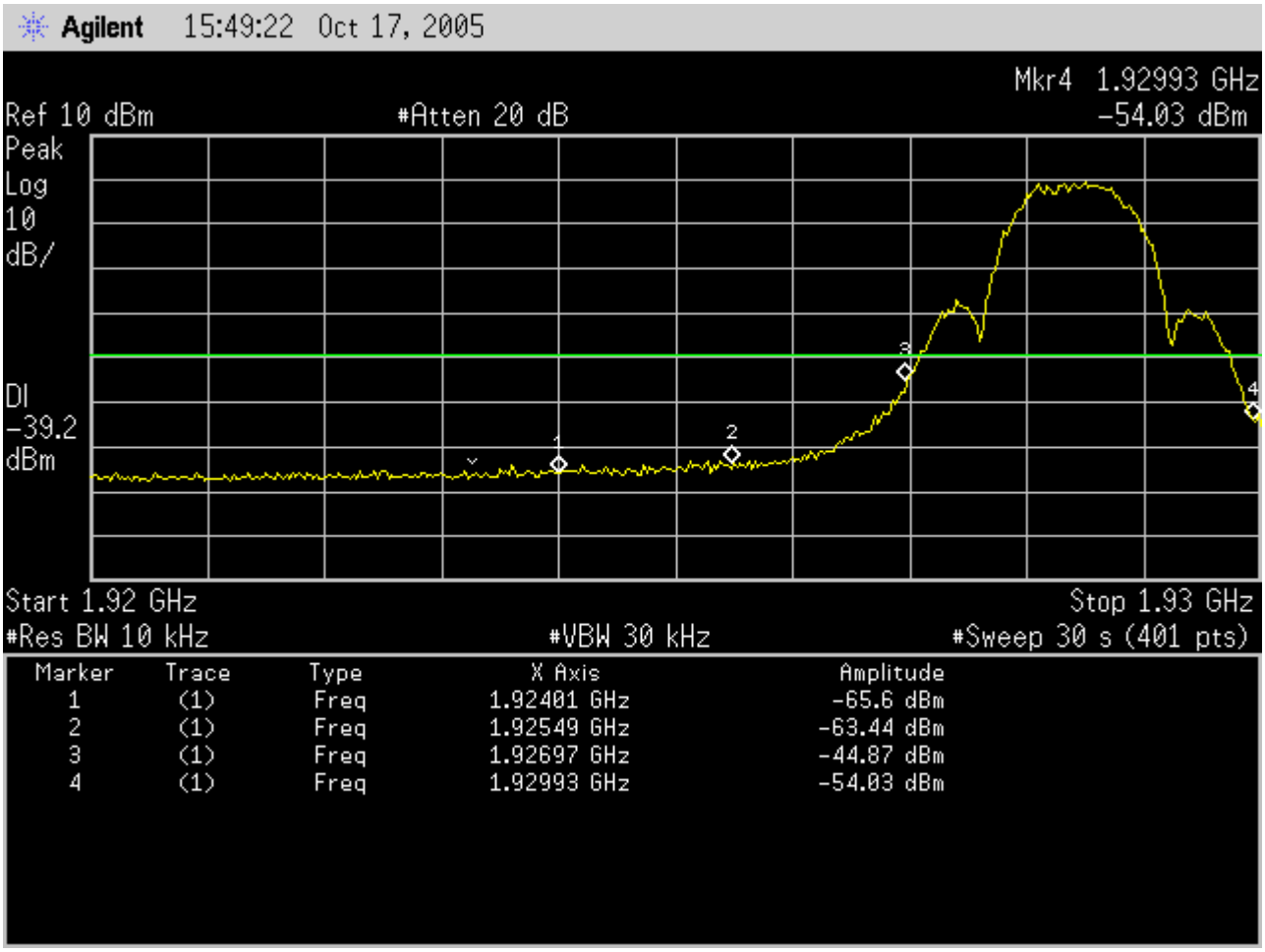

Fig. 24 - Spectrum analyzer screenshot for transmit emissions showing inband unwanted emissions with the base EUT transmitter at the highest carrier, 1928.448MHz, according to the requirements of 6.1.6.1.

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 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 inband), the worst-case marker at 1926.97 MHz is at -44.87dBm, and 30dB below 20.8dBm, or -9.2dBm is allowed, margin is 35.67dB.

For region B (single-sided inband), the marker at 1925.49MHz is at -63.44dBm, and 50dB below 20.8dBm, or -29.2dBm is allowed, margin is 34.24dB.

For region C (single-sided inband), the marker at 1924.01MHz is at -65.60dBm, and 60dB below 20.8dBm, or -39.2dBm is allowed, margin is 26.40dB.

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 24.51dB 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.

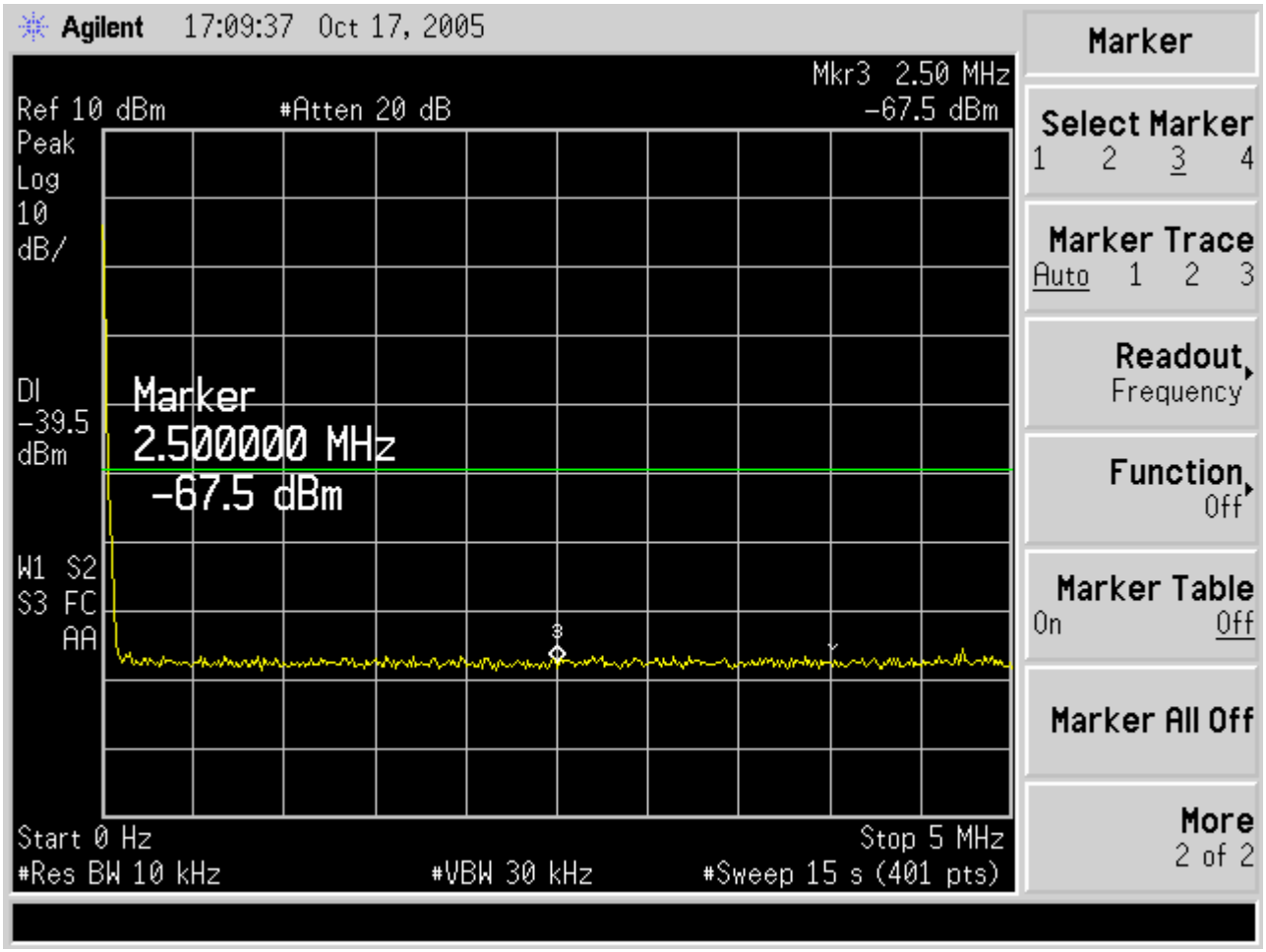

Fig. 25 – base EUT out-of-band emissions showing the regions from DC to 5MHz, with the transmitter using the lowest carrier, 1921.536MHz.

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.

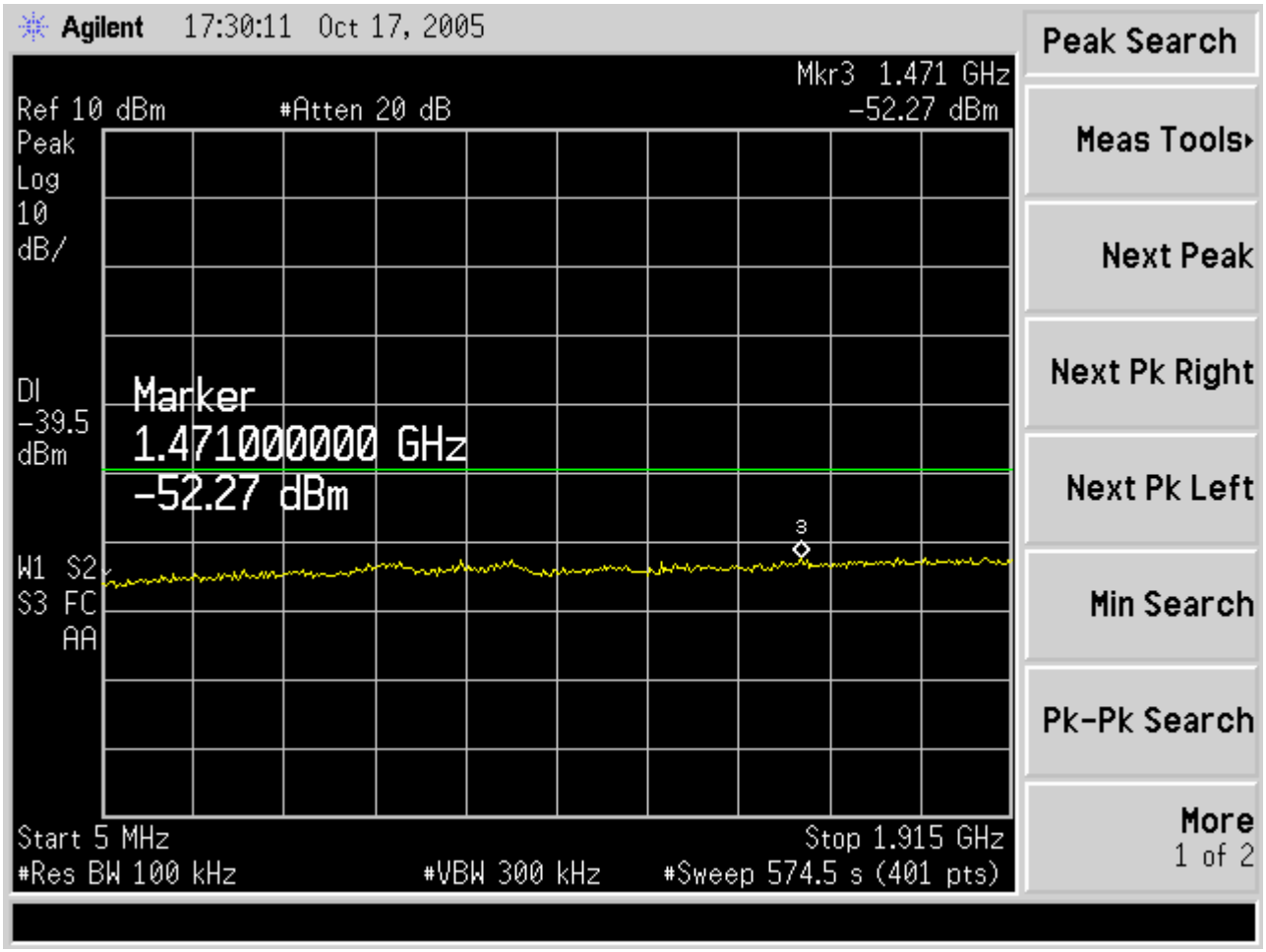

Fig. 26 – base EUT out-of-band emissions showing the region from 5MHz to 1915MHz, with the transmitter using the lowest carrier, 1921.536MHz.

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 12.77dB in this region, even measured in the 10x-wider bandwidth than is in the text of the test procedure of 6.1.6.

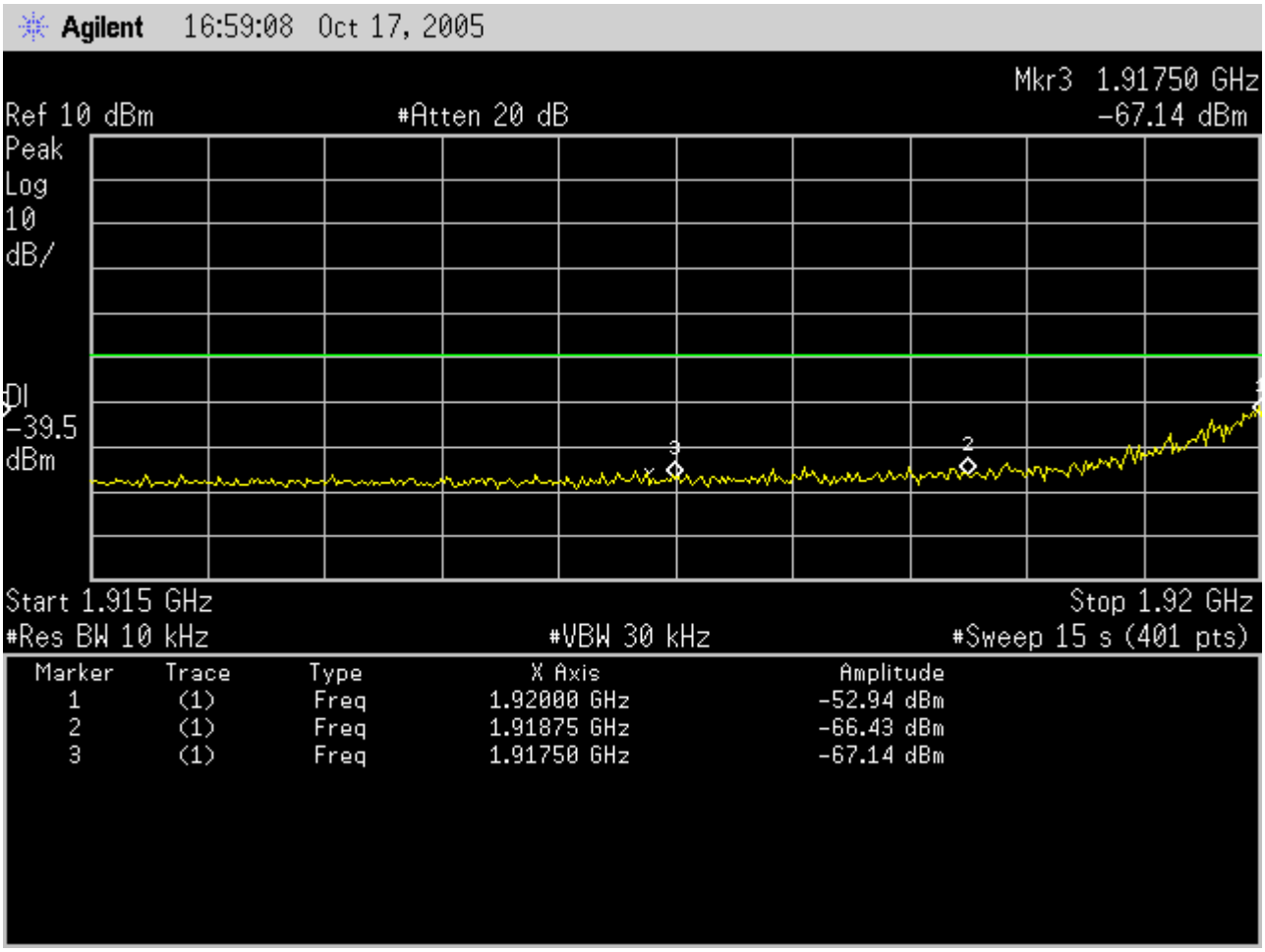

Fig. 27 – base EUT out-of-band emissions showing the regions from bandedge to -1.25MHz, and from -1.25MHz to -2.5MHz, with the base EUT transmitting on the lowest carrier, 1921.536MHz.

Margin to the specification of -9.5dBm in the region from bandedge to -1.25MHz is found at marker 1, at -52.94dBm, and is 43.44dBm.

Margin to the specification of -29.5dBm in the region from -1.25MHz to -2.5MHz is found at marker 2, at -66.43dBm, and is 36.93dB.

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

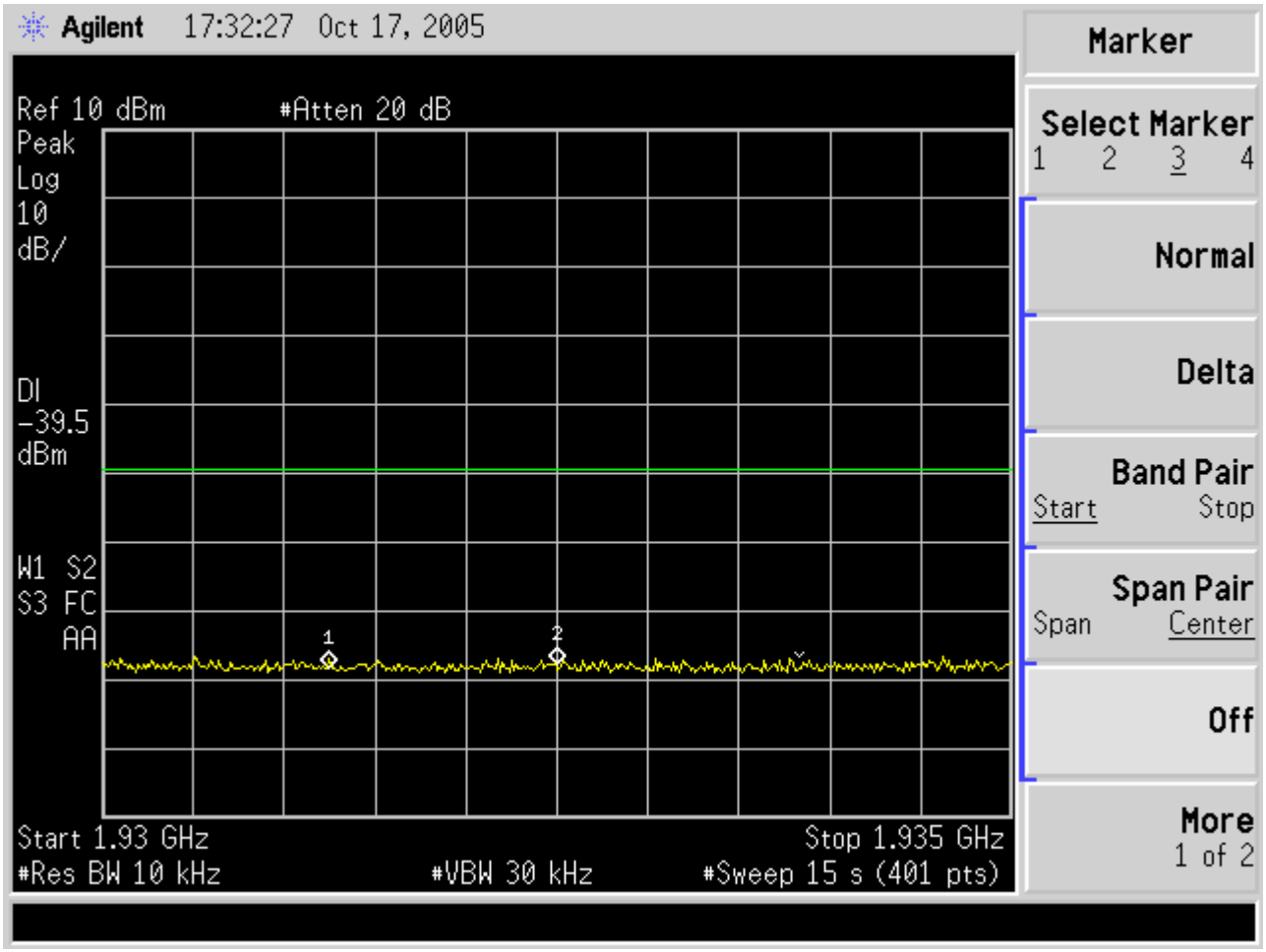

Fig. 28 – base EUT out-of-band emissions including the regions from bandedge to +1.25MHz, and from +1.25MHz to +2.5MHz, with the base EUT transmitting on the lowest carrier, 1921.536MHz

Least margin is for the -39.5dBm specification outside the +2.5MHz boundary and is 26.44dB.

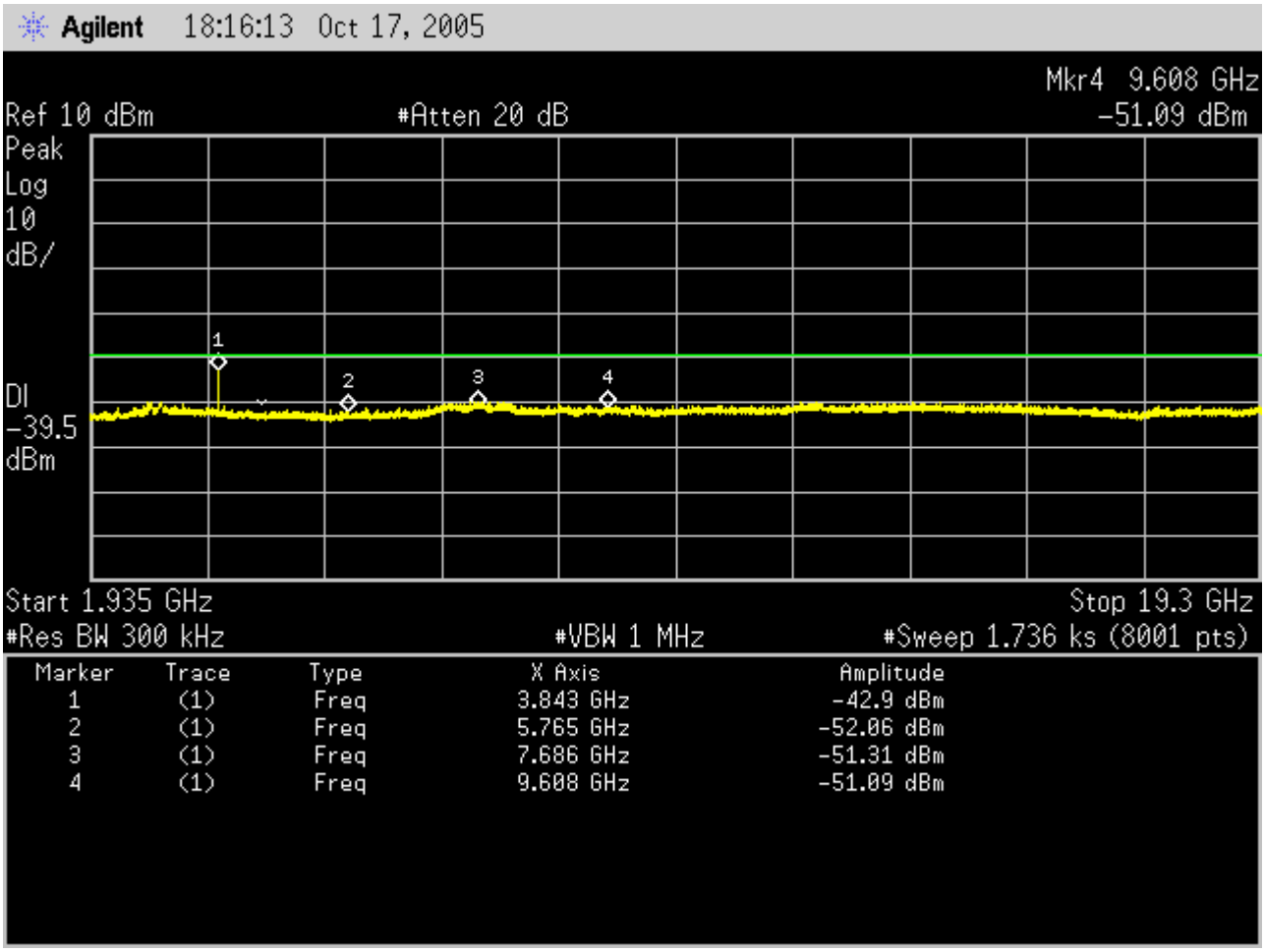

Fig. 29 – base EUT out-of-band emissions including the regions from 1935MHz to 19.3GHz with the base EUT transmitting on the lowest carrier, 1921.536MHz.

The least margin is at the 2nd 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 v3.3 (draft) C63.17-2005 clause 6.1.6. Even so, the margin to specification is 3.4dB. 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.

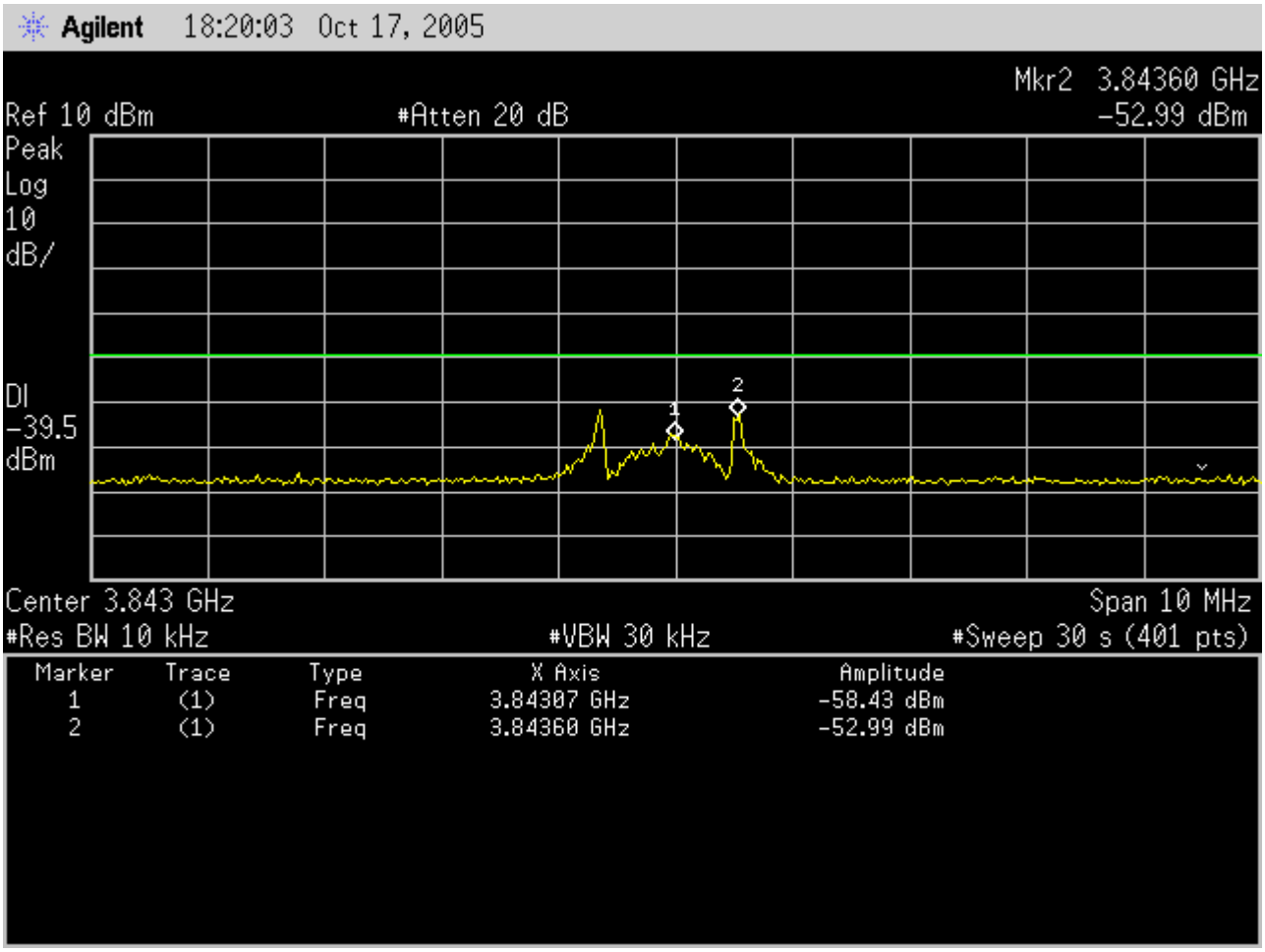

Fig. 30 – base EUT out-of-band emissions in the region around the 2nd harmonic, with the base EUT transmitting on the lowest carrier, 1921.536MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at -52.99dB, shows margin to the -39.5dBm specification of 13.49dB.

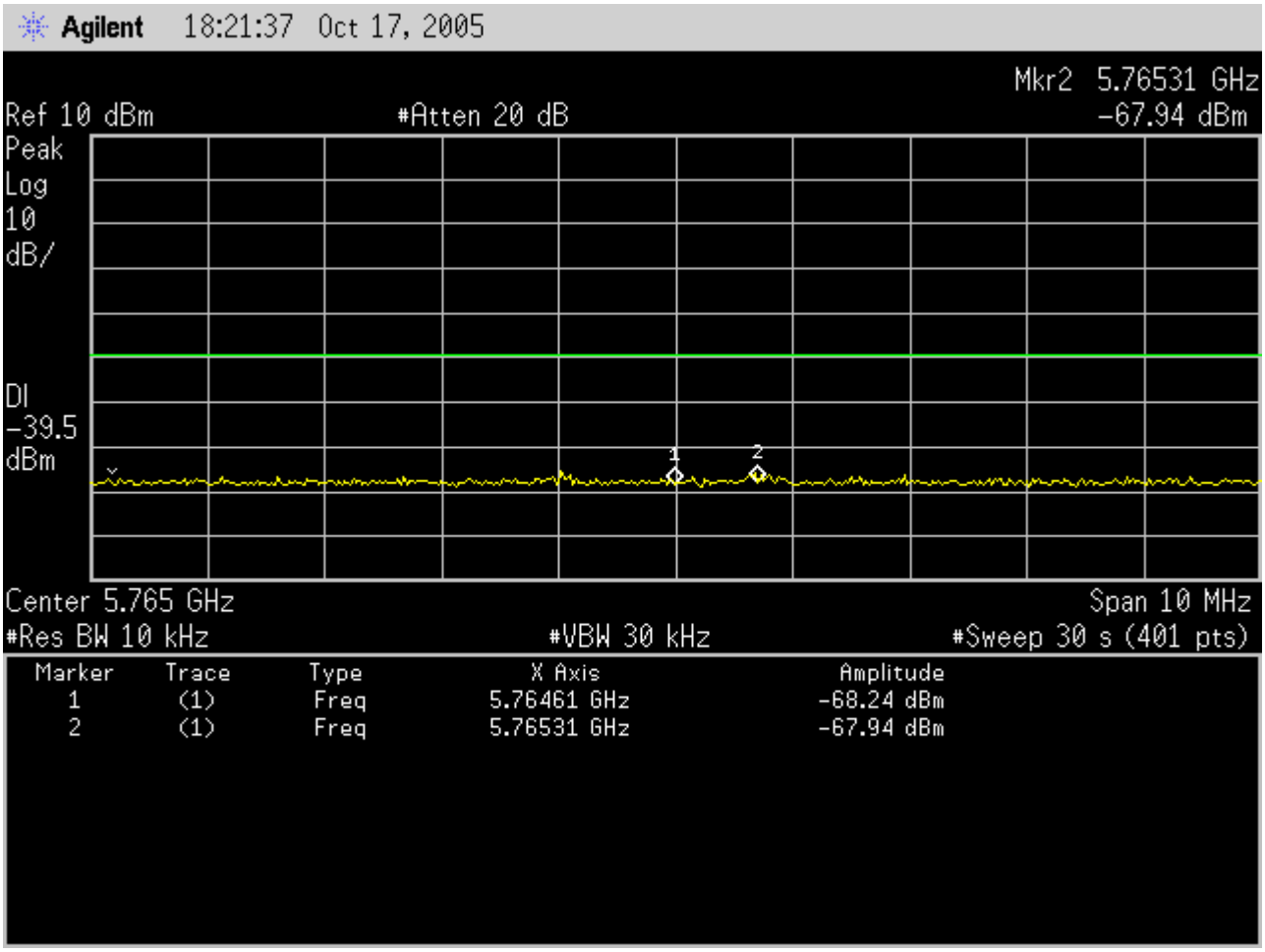

Fig. 31 – base EUT out-of-band emissions in the region around the 3rd harmonic, with the base EUT transmitting on the lowest carrier, 1921.536MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at -67.94dB, shows margin to the -39.5dBm specification of 28.44dB.

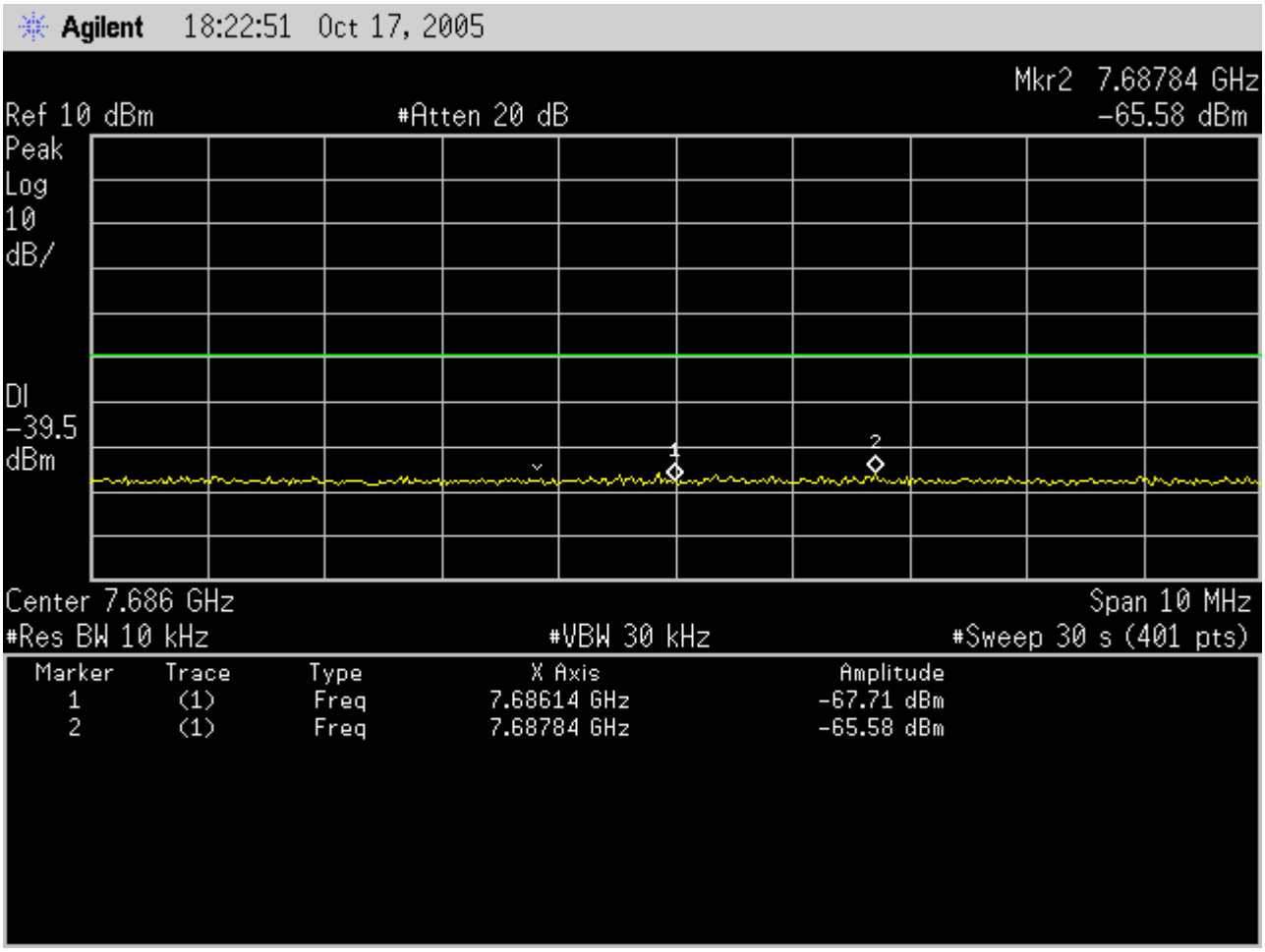

Fig. 32 – base EUT out-of-band emissions in the region around the 4th harmonic, with the base EUT transmitting on the lowest carrier, 1921.536MHz.

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

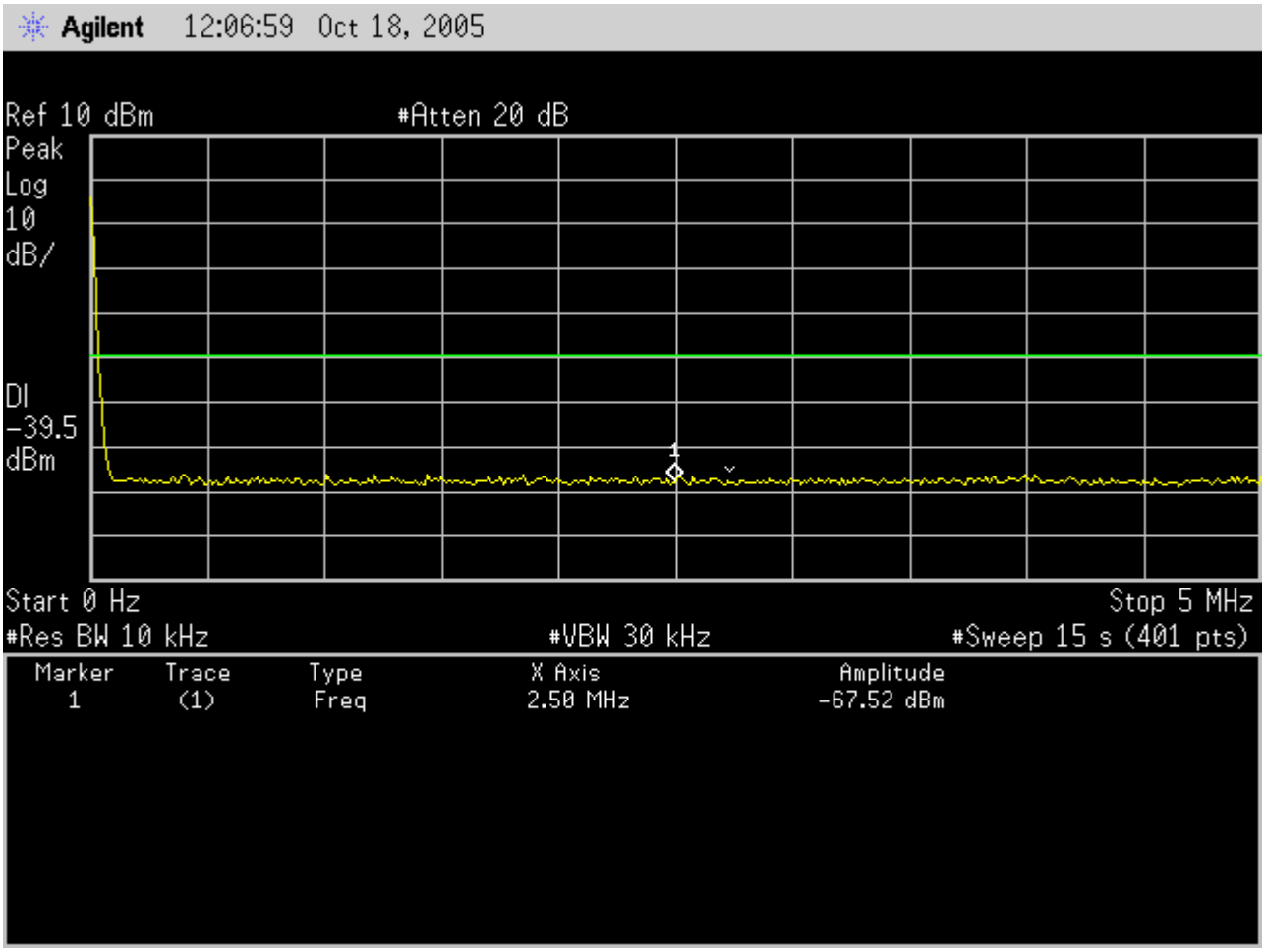

Fig. 33 – base EUT out-of-band emissions showing the regions from DC to 5MHz, with the transmitter using the highest carrier, 1928.448MHz.

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.

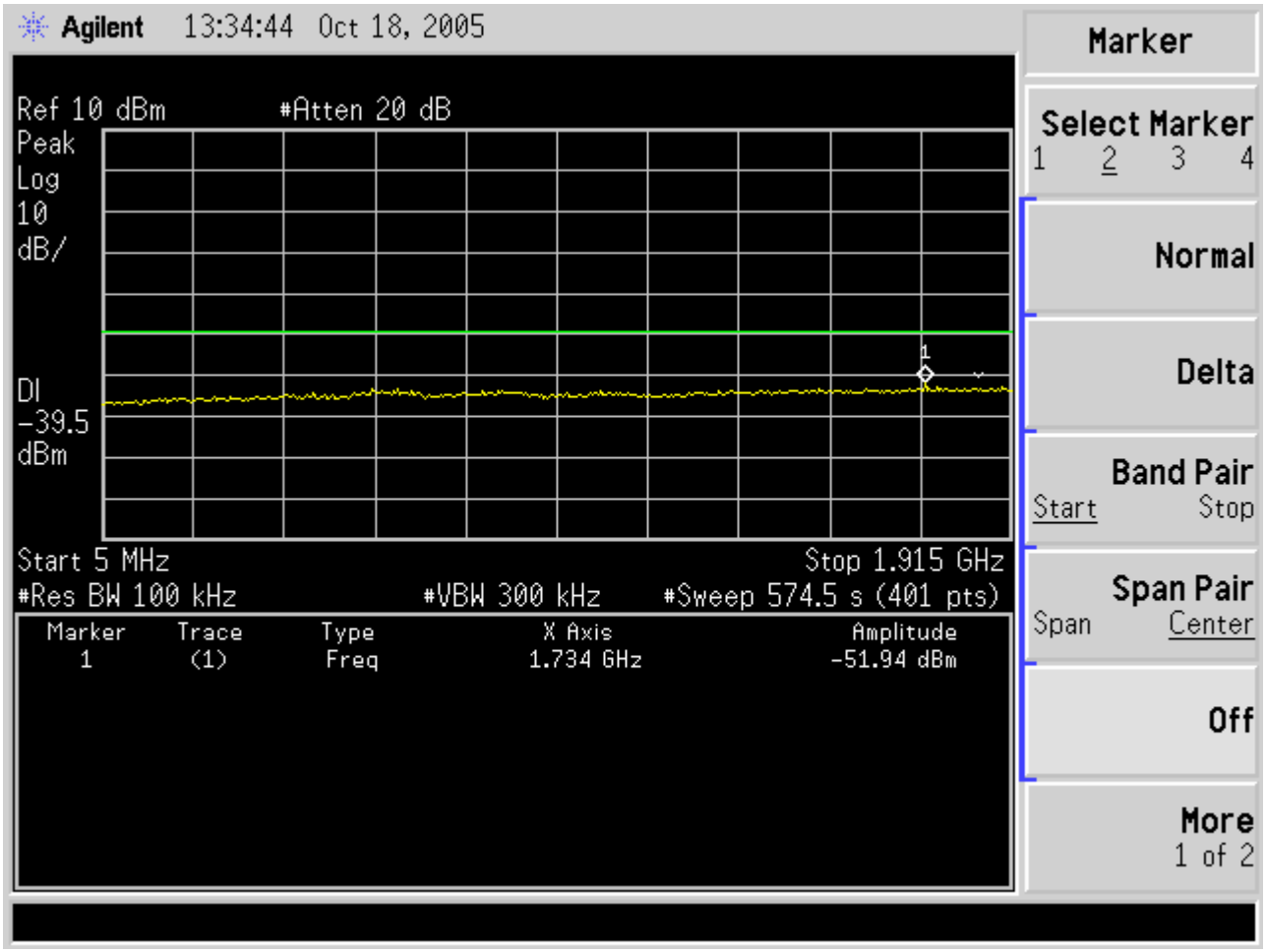

Fig. 34 – base EUT out-of-band emissions showing the region from 5MHz to 1915MHz, with the transmitter using the highest carrier, 1928.448MHz.

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 12.44dB in this region, even measured in the 10x-wider bandwidth than is in the text of the test procedure in clause 6.1.6.

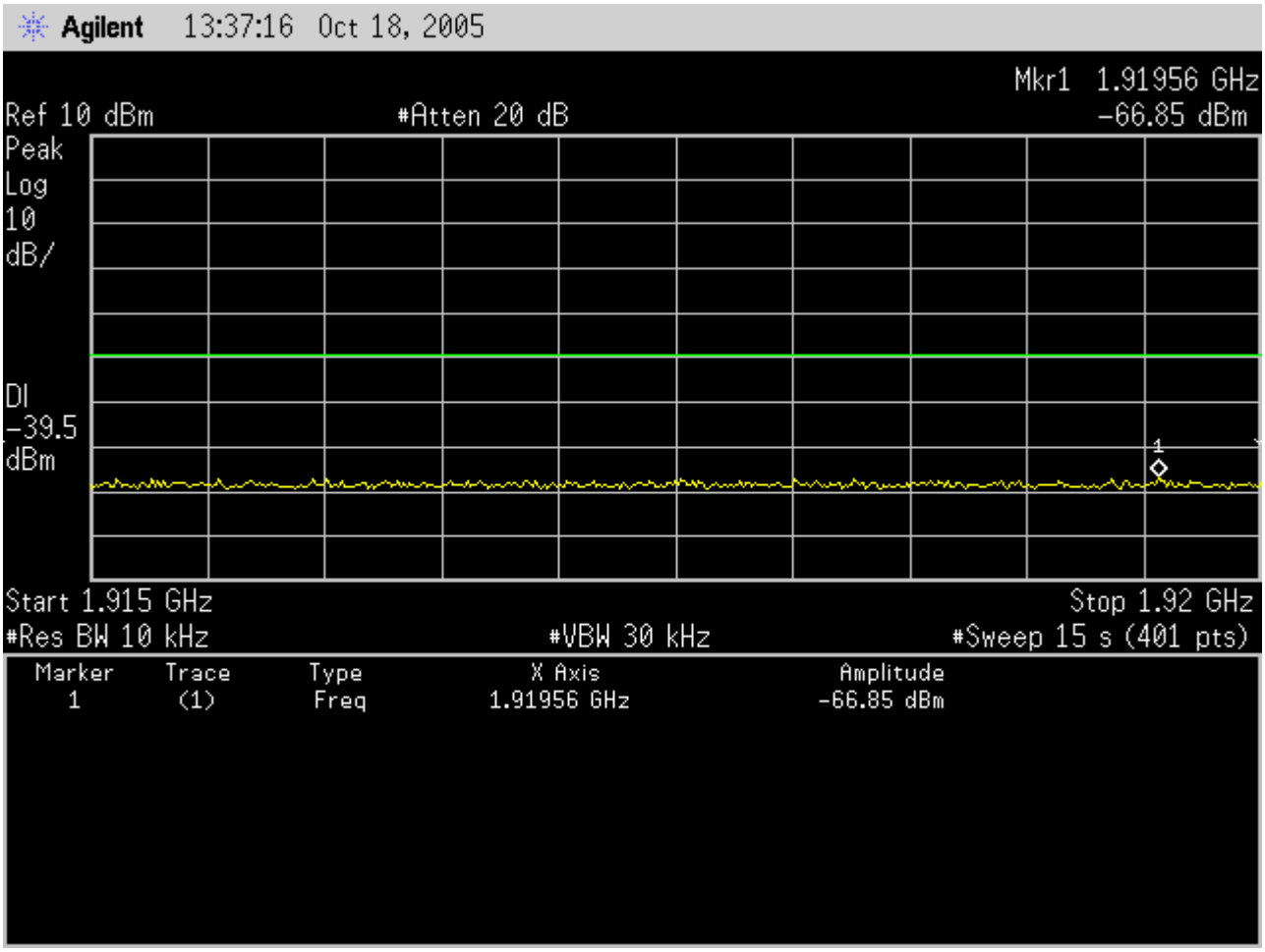

Fig. 35 – base EUT out-of-band emissions showing the regions from bandedge to -1.25MHz, and from -1.25MHz to -2.5MHz, with the base EUT transmitting on the highest carrier, 1928.448MHz.

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.

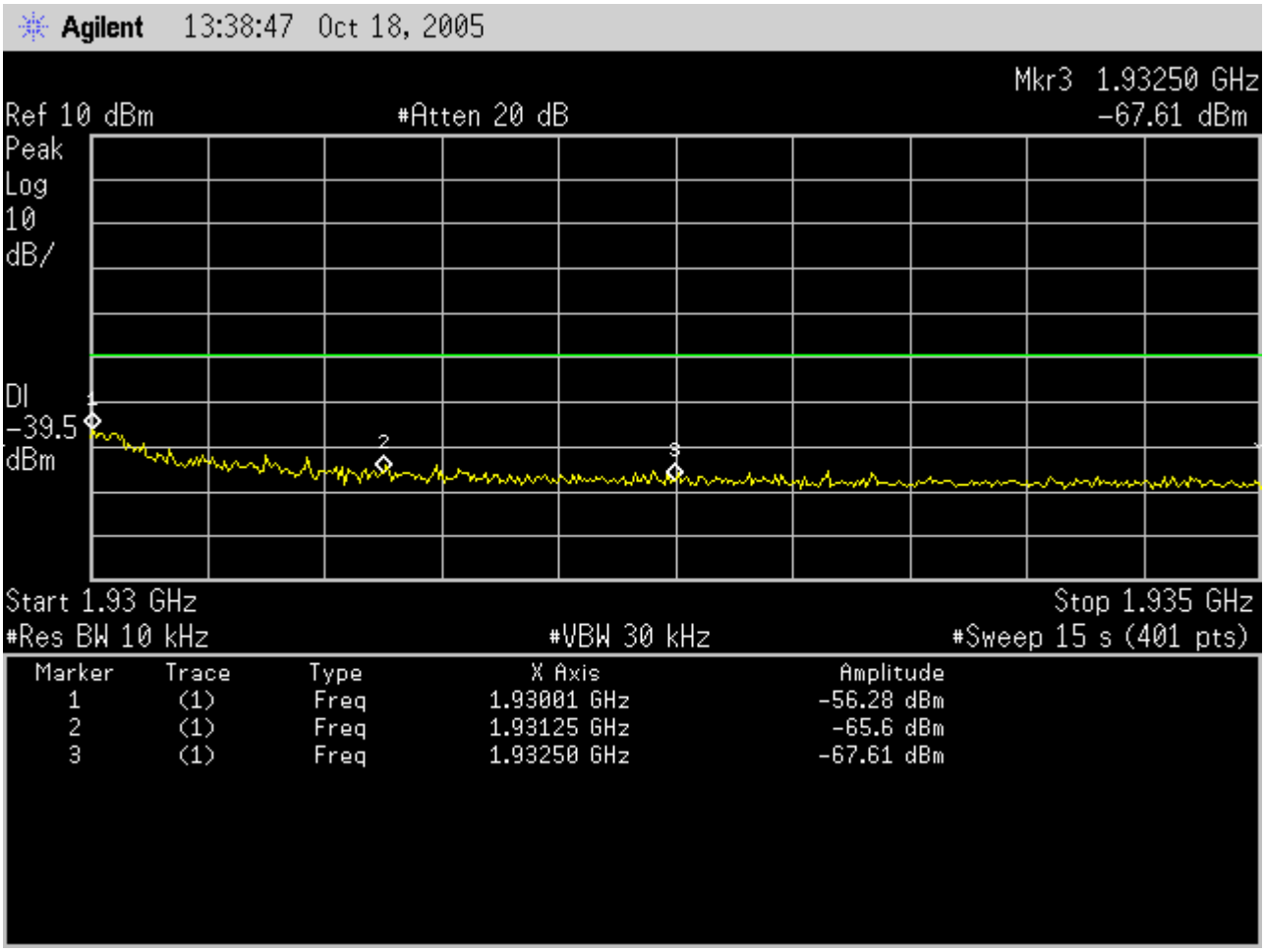

Fig. 36 – base EUT out-of-band emissions showing the regions from bandedge to +1.25MHz, and from +1.25MHz to +2.5MHz, with the base EUT transmitting on the highest carrier, 1928.448MHz.

Margin to the specification of -9.5dBm in the region from bandedge to +1.25MHz is found at marker 1, at -56.28dBm, and is 46.78dBm.

Margin to the specification of -29.5dBm in the region from +1.25MHz to +2.5MHz is found at marker 2, at -65.60dBm, and is 36.10dB.

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

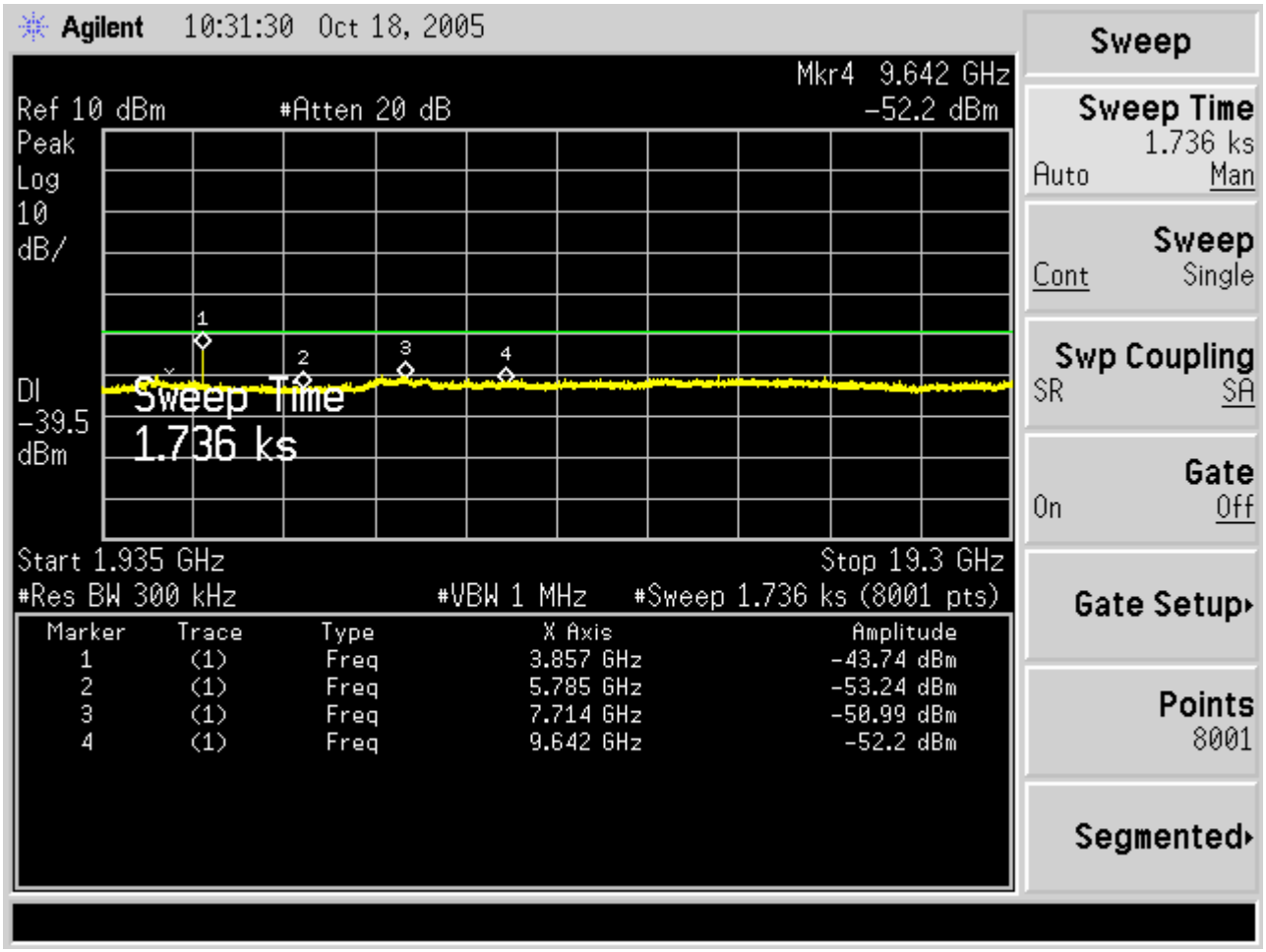

Fig. 37 – base EUT out-of-band emissions including the regions from 1935MHz to 19.3GHz with the base EUT transmitting on the highest carrier, 1928.448MHz.

The least margin is at the 2nd 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 overtests in that it passes considerably more unwanted emissions than the 10kHz obtained from the text of v3.3 (draft) C63.17-2005 clause 6.1.6. Even so, the margin to specification is 4.2dB. 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.

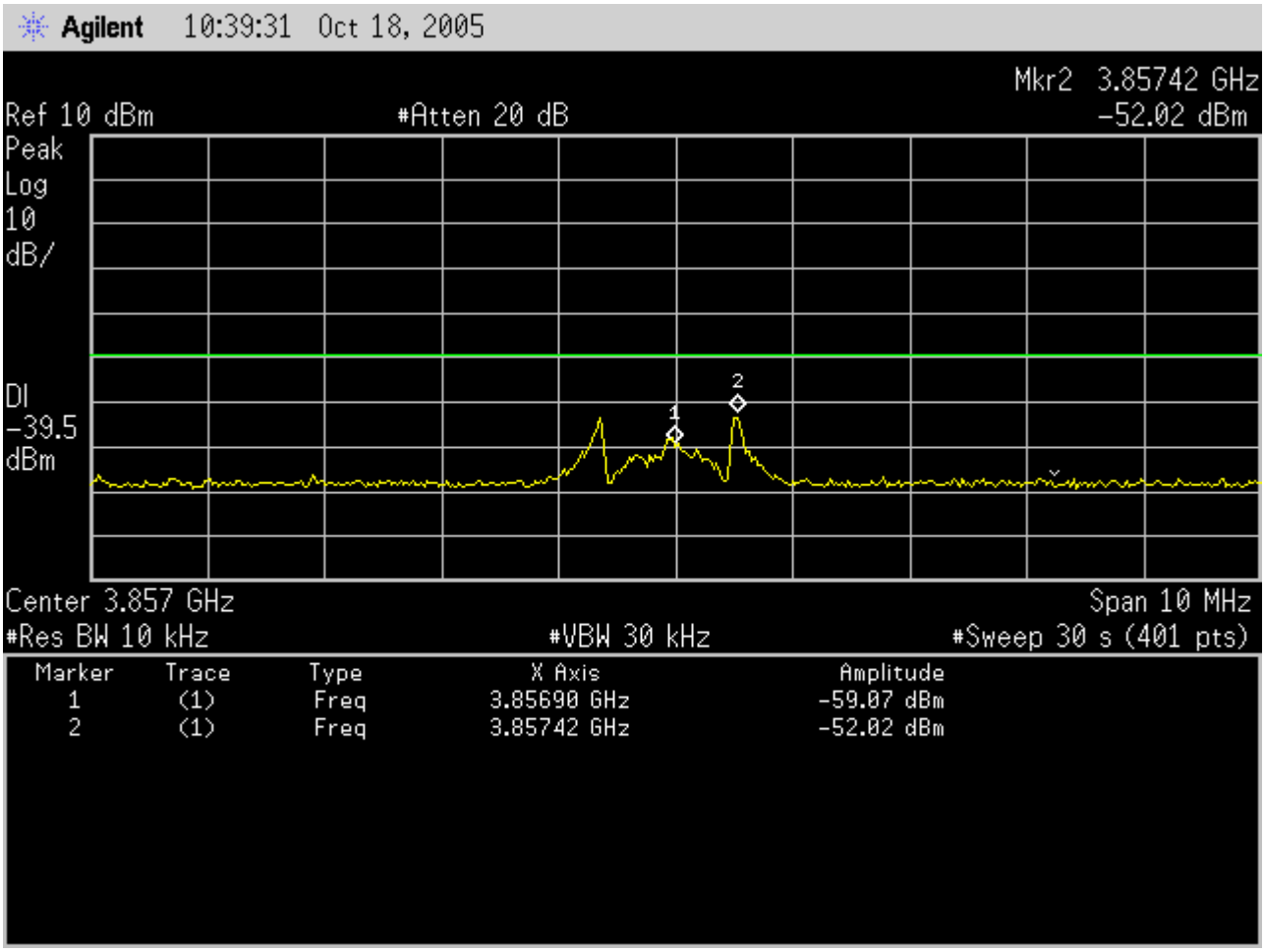

Fig. 38 – base EUT out-of-band emissions in the region around the 2nd harmonic, with the base EUT transmitting on the highest carrier, 1928.448MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at -52.02dBm, shows margin to the -39.5dBm specification of 12.52dB.

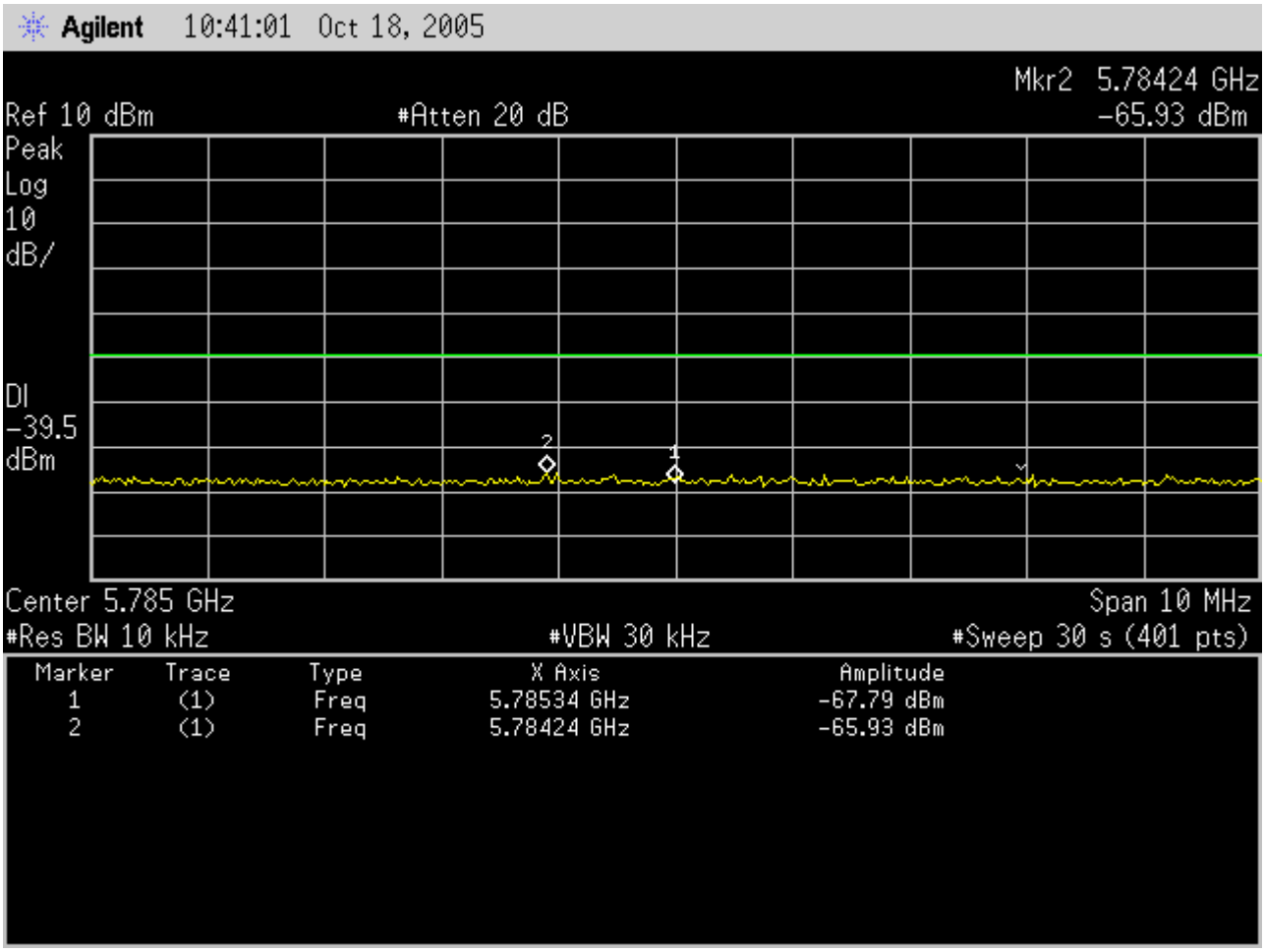

Fig. 39 – base EUT out-of-band emissions in the region around the 3rd harmonic, with the base EUT transmitting on the highest carrier, 1928.448MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at -65.93dB, shows margin to the -39.5dBm specification of 26.43dB.

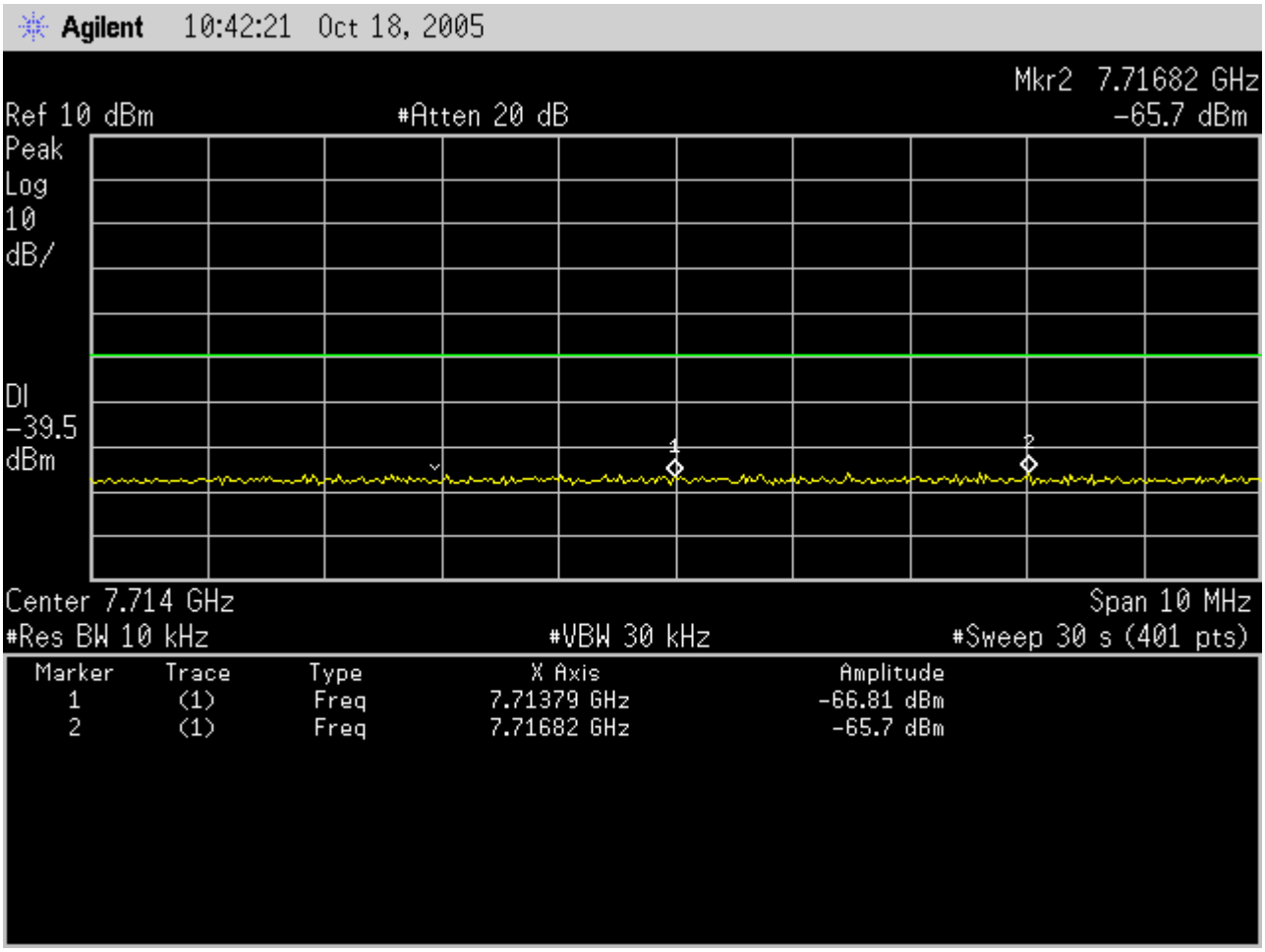

Fig. 40 – base EUT out-of-band emissions in the region around the 4th harmonic, with the base EUT transmitting on the highest carrier, 1928.448MHz.

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

The base EUT meets the various out-of-band emissions requirements of clause 6.1 with worst-case margin of 12.52dB, under the worst-case conditions of transmitting on the high carrier, at the 2nd 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 V3.3 (draft) C63.17-2005 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.

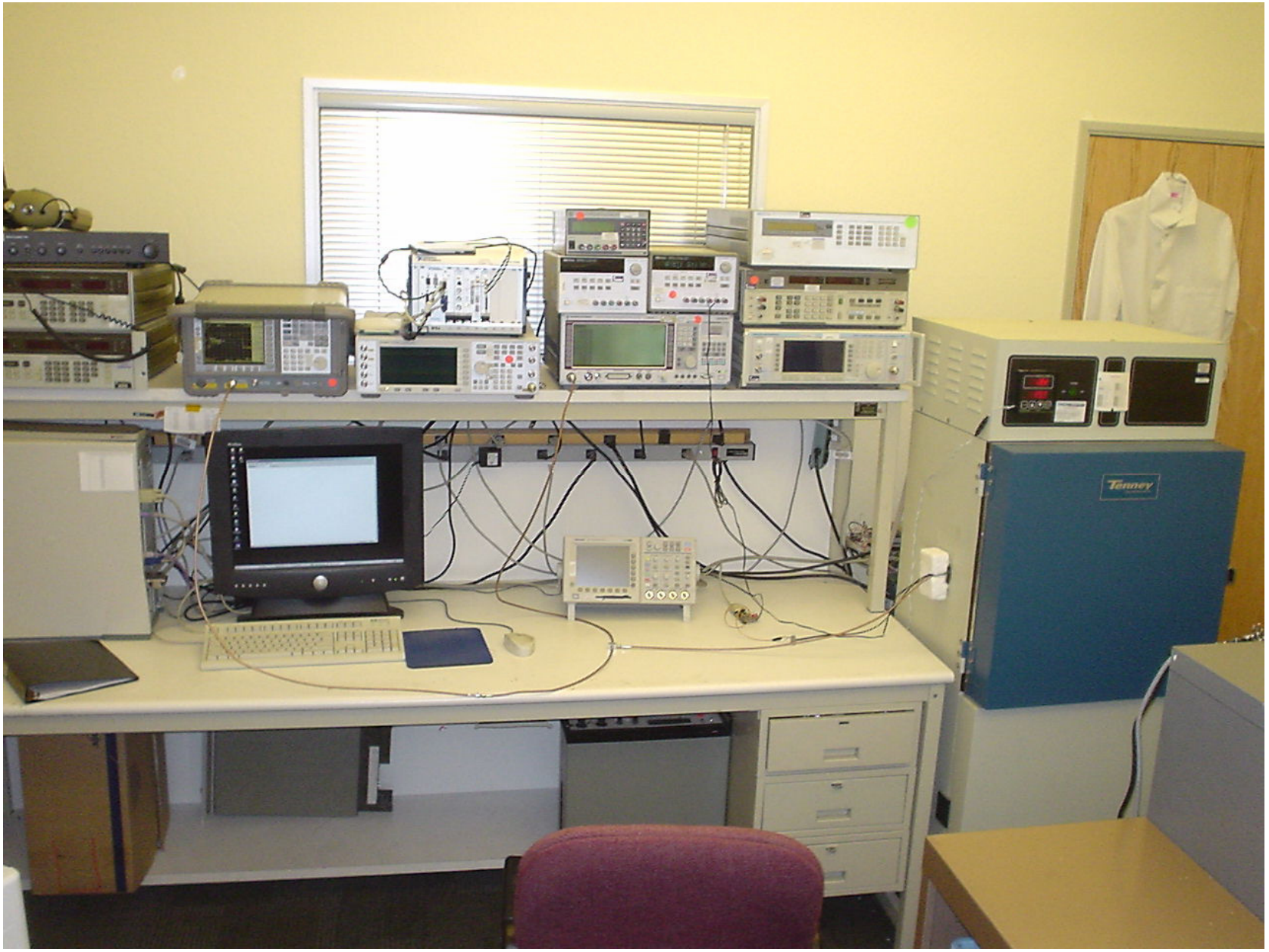

Fig. 41 - View of test system configured for the tests of clause 6.2.1 for the base EUT. EUT is in the temperature chamber at right. EUT power supply is top right-center. EUT RF cabling is connected as described in the text, to the CMD60 analyzer and the E4407B spectrum analyzer. The controller interface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

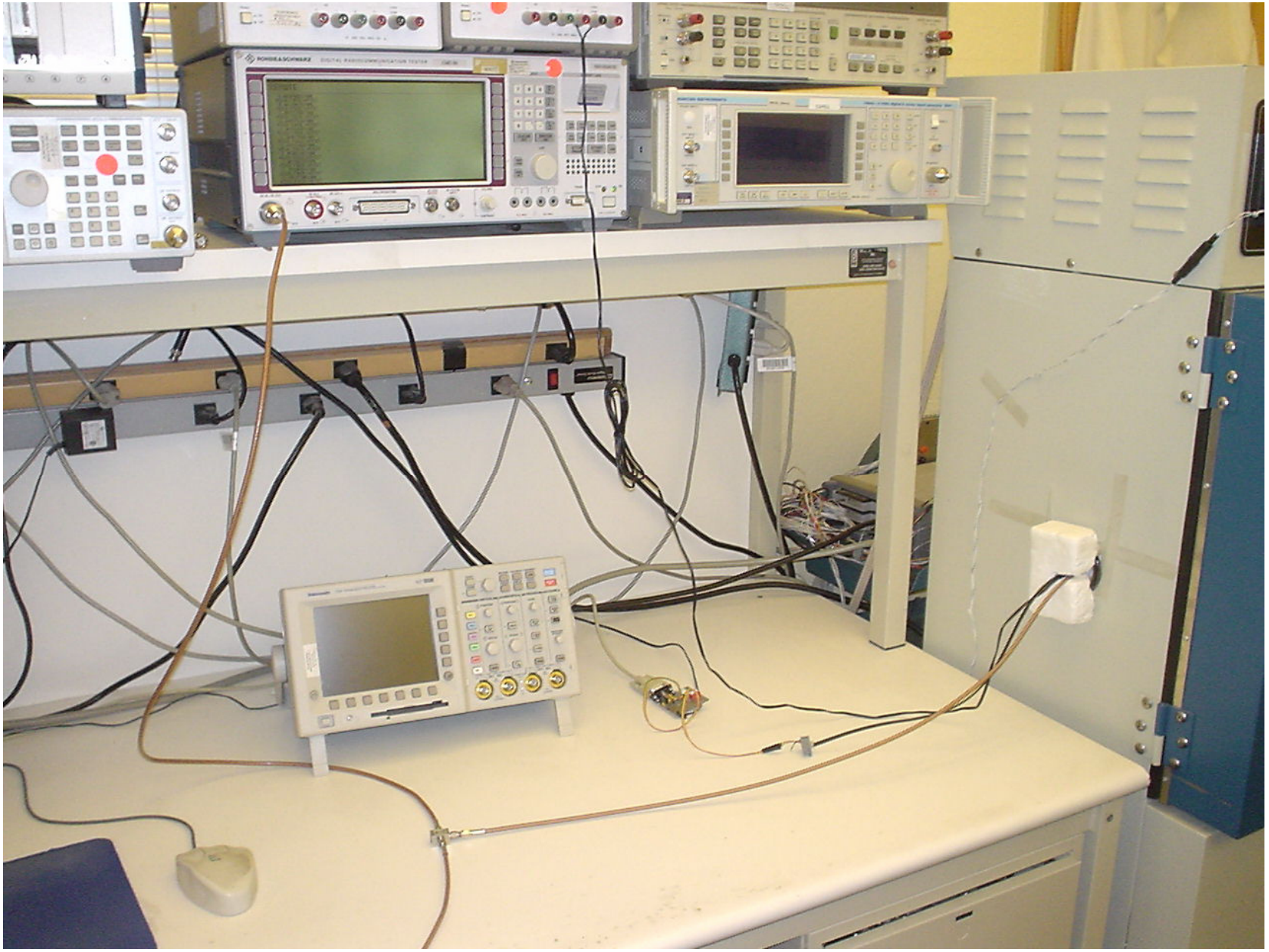

Fig. 42 - Detail of base EUT interconnection for the tests of clause 6.2.1.

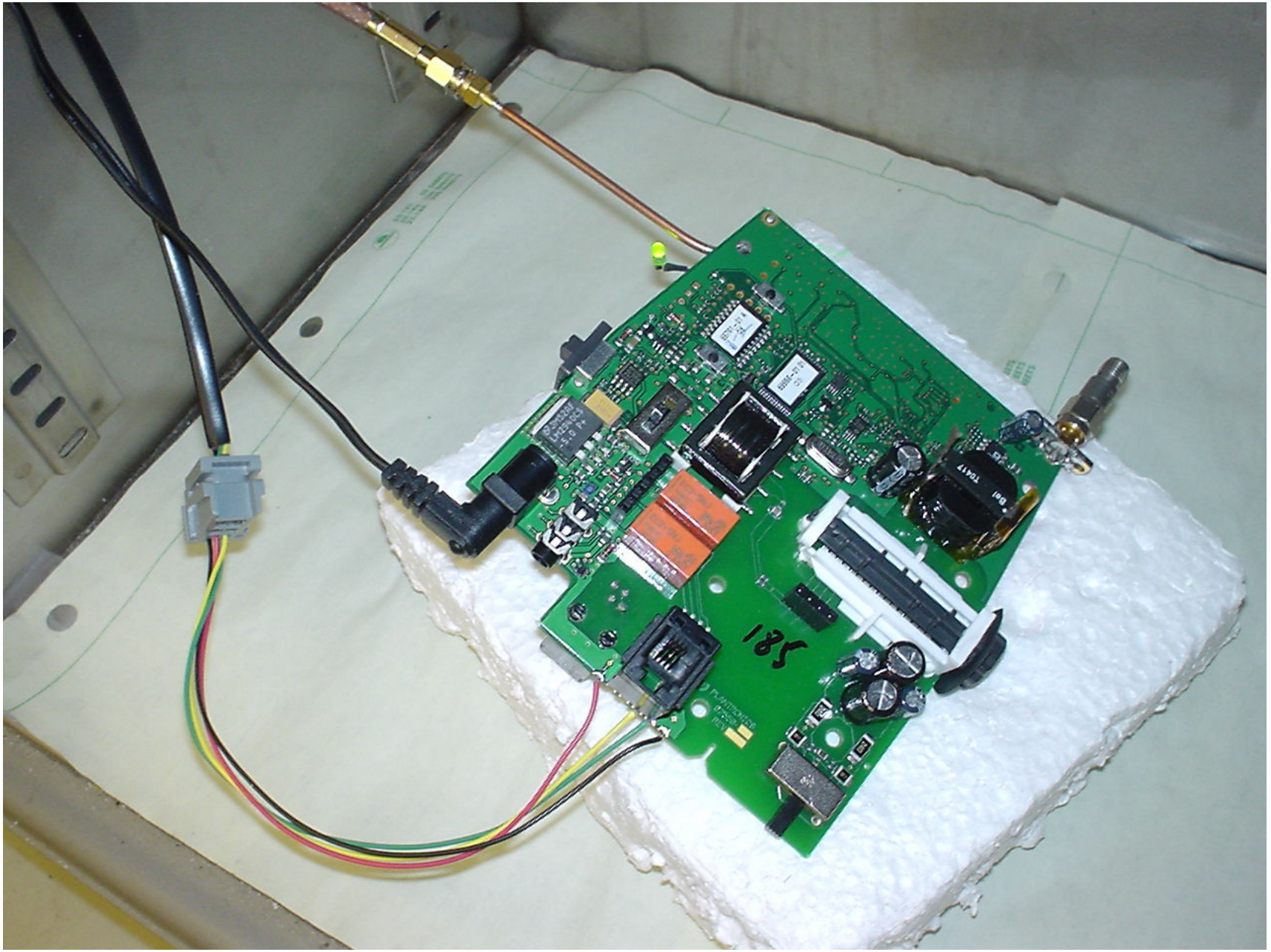

Fig. 43 - Interconnection between the base EUT and the test system; RF conducted connection, DC power supply, and control/communications bus for administrative commands

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.

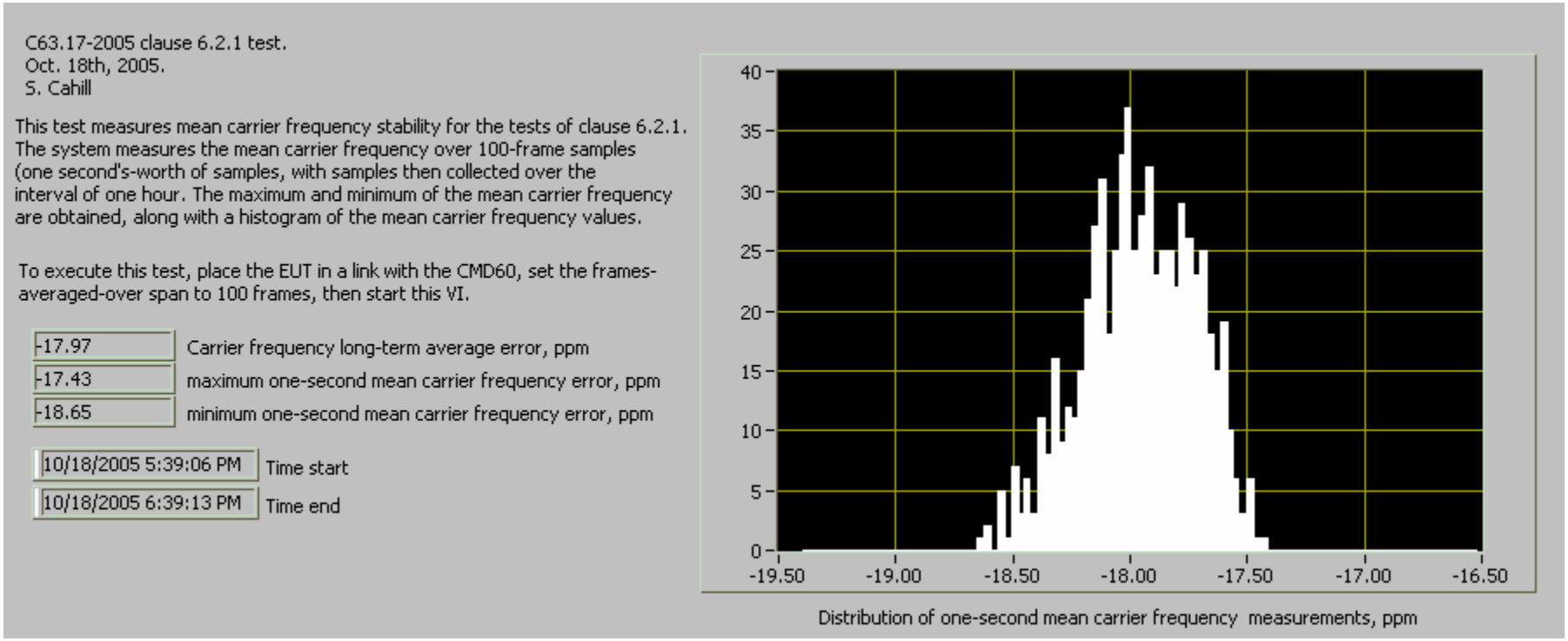

Fig. 44 - Measured one-second mean carrier frequency, base EUT, and observed maximum, average value and observed minimum of the mean carrier frequency.

The nominal mean carrier frequency error relative to 1924.992MHz is -17.97ppm.
The observed maximum is -17.43ppm, for a change relative to nominal of +0.54ppm.
The observed minimum is -18.65ppm, for a change relative to nominal of -0.68ppm.

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.

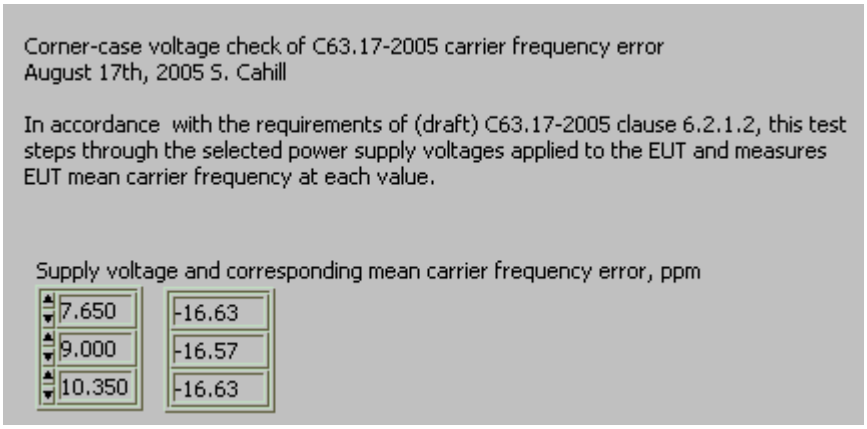

Fig. 45 - Measured mean carrier frequency, base EUT , at 85% of nominal supply voltage, nominal supply voltage, and 115% supply voltage.

The mean carrier frequency error for nominal supply voltage, relative to 1924.992MHz, is -16.57ppm.
The observed value for the error at 85% of nominal supply voltage is -16..63ppm, for a change relative to nominal supply voltage of -0.06ppm.
The observed value for the error at 115% of nominal supply voltage is also -16.63ppm, for a change relative to nominal supply voltage of -0.06ppm.

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.

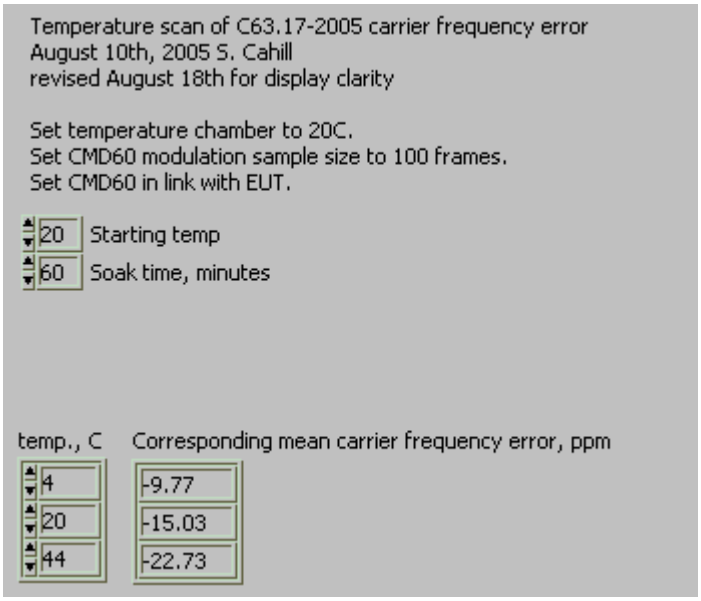

Fig. 46 - Measured mean carrier frequency, base EUT , at +4C, +20C, +44C.

The nominal mean carrier frequency error relative to 1924.992MHz is -15.03ppm.
The observed value at +4C is -9.77ppm, for a change relative to 20C ambient of +5.26ppm.
The observed value at +44C is -22.73ppm, for a change relative to 20C ambient of -7.70ppm.

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 V3.3 (draft) C63.17-2005) 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.

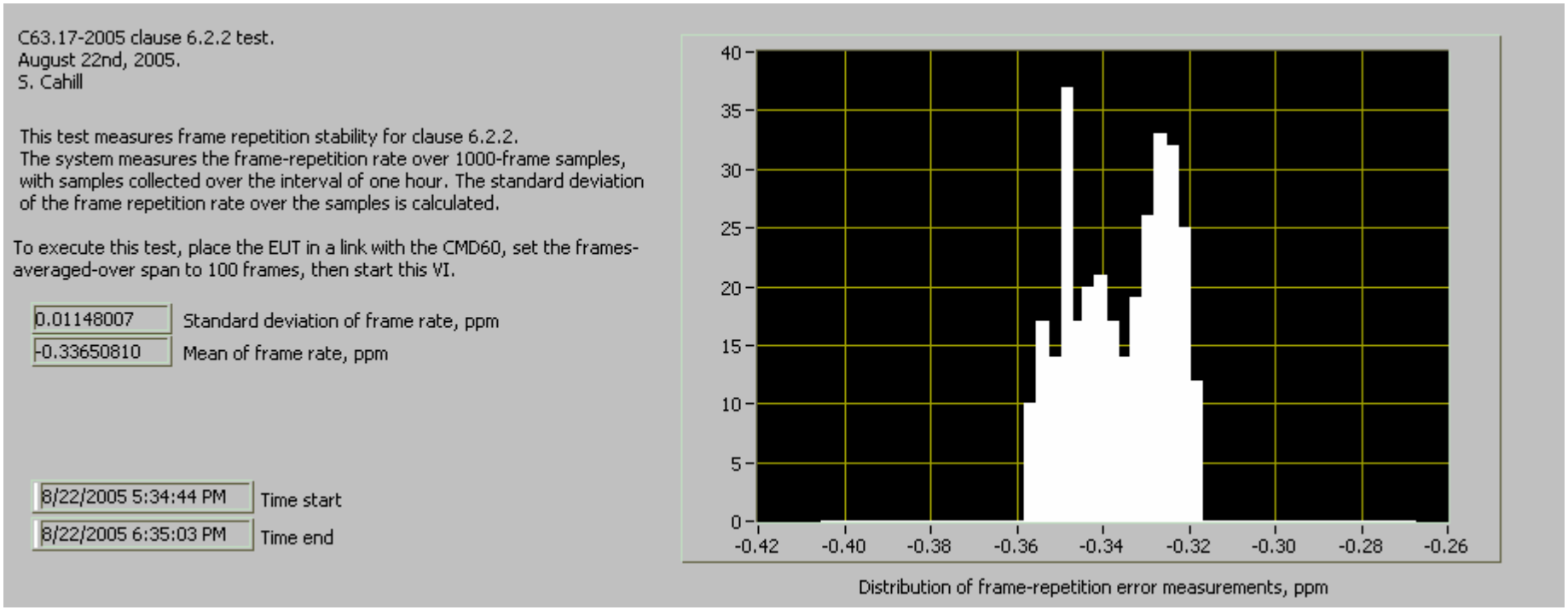

Fig. 47 - Test of base EUT according to the conditions of clause 6.2.2 for frame repetition rate stability

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 0.01148ppm.

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 0.03444ppm.

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.

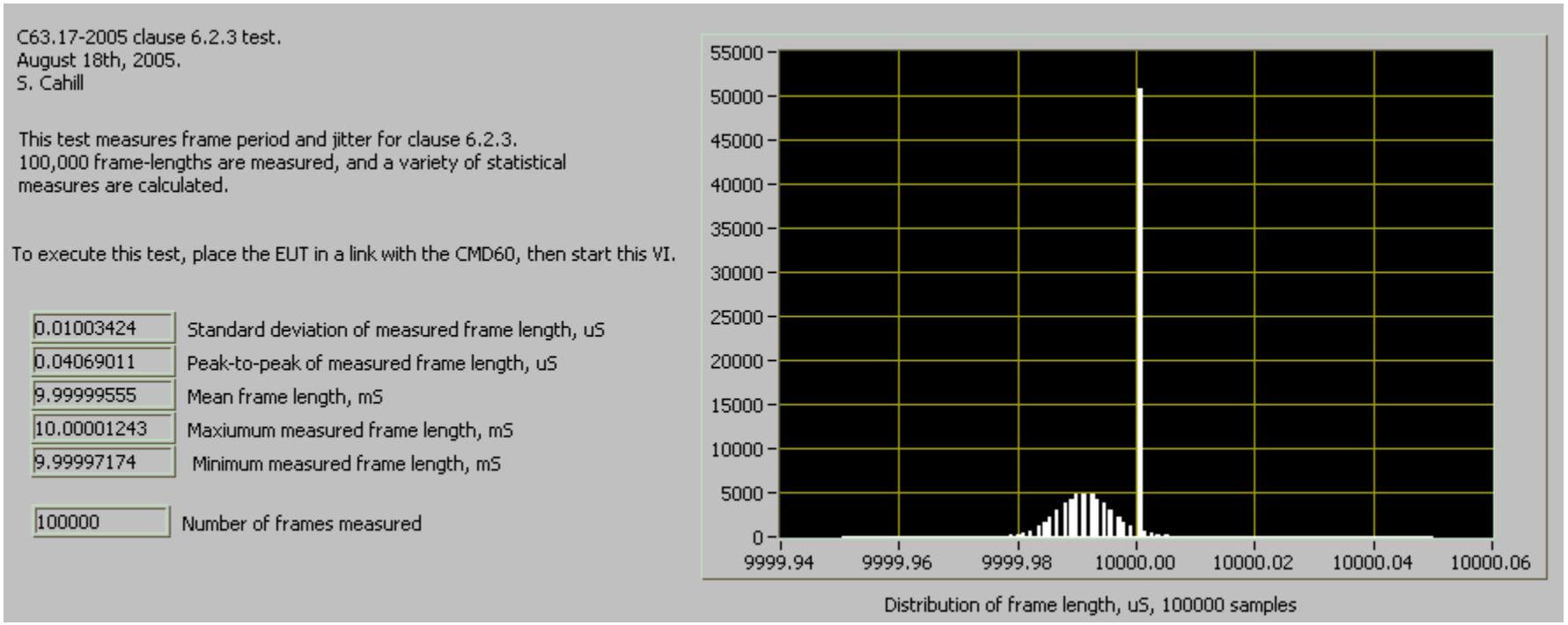

Fig. 48 - Test of base EUT according to the conditions of clause 6.2.3 for frame period and jitter.

The measured mean value of the frame period is 9.99999555mS, which is 10mS with jitter offset of 0.00455uS and three standard deviations of 0.03010uS, totaling 0.03465uS.

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.

NOTE: pages 1 – 81 of this document are in Exhibit #11aa, pages 82 – 104 are in Exhibit #11ab, and pages 105 – 182 are in Exhibit #11b. Document was partitioned for ease of transfer.