-Exhibit #11

Conducted RF and Spectral Etiquette Measurements to support the Certification of the Wireless Office Headset WH200, FCC ID AL8-WH200.

Plantronics, John Mihelic, September 17 2008.

I. Background

EUT description

The Wireless Headset WH200, is a headset which can receive and transmit audio to/from its companion Base assembly, WO1 (FCC ID AL8WO1). This document reports compliance of the headset to the test parameters of C63.17-2006. The headset EUT is capable of initiating a link in a normal mode of 60 channels and a Wide Band Audio Mode (WBM) which only supports 30 channels. This main sections of the report documents the normal mode operation in the high power setting. Appendix A documents the WBM compliance testing for any tests that do or may operate differently from the normal mode.

The headset EUT also is capable of RF power control. Compliance to C63.17-2006 is documented in Appendix B which repeats any testing that may operate differently from maximum power mode, or affect the access threshold. The power control modes are fixed, or adaptive. Adaptive power control will allow the RF transmitter to adjust the output power from a maximum of 19dBm to a minimum of 1dBm in four 5-7dB steps. Fixed power mode does not allow power control. The user can select between adaptive or fixed but can not set the power range, this is done during EUT factory set up.

The specific unit tested is headset SN: C4.

Manufacturer's attestations, mandatory declarations and descriptions

The Wireless Headset WH200 uses digital modulation.

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

The channel plan.

Five RF carriers are used, as follows:

1928.448 MHz.
1926.720 MHz.
1924.992 MHz.
1923.264 MHz.
1921.536 MHz.

Maximum EUT antenna gain GA (dBi), and orientation and polarization for maximum gain.

The maximum headset EUT antenna gain is 3dBi. The antenna is elliptically polarized with the major axis of polarization parallel to the headband portion of the headset disposed away from the user's head, and with the minor axis of polarization on the same plane as the electrical board and perpendicular headband portion of the headset.

Maximum peak power level

Maximum specified peak conducted power level for the headset EUT is +19dBm.

Minimum peak power level

The maximum power level at the minimum RF power setting is specified peak conducted power level for the headset EUTs is +1dBm.

Emission bandwidth

Emission bandwidth measured according to the procedures of C63.17-2006 clause 6.1.3 for the headset EUT is 1.45MHz.

Nominal receive bandwidth

Nominal receive bandwidth is +/-500kHz.

Frame period and time slot plan, if TDMA techniques are used

The EUT system is a TDMA system which "further divides access in time" in the context of clause 6.2.2 of C63.17-2006. Frame period is 10mS. There are 24 timeslots per frame, with one of the first 12 timeslots used for the headset transmissions and one of the last 12 timeslots used for the base transmissions. Transmit and receive timeslots are 5mS apart in time. The headset can also be set to wideband audio mode (WBM) which uses 2 of the 12 timeslots for headset transmissions and 2 of the timeslots for headset receipt. 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 390uS, transmissions from the headset when a communications channel is open.
Maximum burst length is 780uS, 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 use the provisions of 47CFR15.323(c)(10) to enable testing for access criteria only in one element of the system. The headset EUT implement the access criteria tests for initiation of a traffic link.

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 in normal mode operation, but uses the lower threshold for deferral in the wideband audio mode.

The nominal value of the deferral threshold

The lowest value of the deferral threshold implemented in the headset EUTs in normal mode is -60.6dBm, and -80.6dBm in WBM. This is obtained from clause 4.3.3 of C63.17-2006, where

B = 1.45 MHz as declared for the headset,

P_{max} (from clause 4.3.1) is 20.8dBm, and

P_{EUT} is 19dBm, maximum, as declared.

The highest value of the deferral threshold implemented in the headset EUTs in normal mode is-42.6dBm and -62.6dBm in WBM.

B = 1.45 MHz as declared for the headset,

P_{max} (from clause 4.3.1) is 20.8dBm, and

P_{EUT} is 1dBm, maximum, as declared (equipment in minimum output power setting).

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 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 2.5 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.

Whether the EUT does or does not have the monitoring made through the radio receiver used for communication

The headset EUT monitors through the radio receiver that is also used for communication.

Whether the EUT does or does not transmit control and signaling channel(s)

The headset EUT does transmit a signaling heartbeat.

Nominal mains and battery voltage

The nominal battery voltage for the headset EUT is 3.7V.

Standard test configurations

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

1) Conducted emissions tests, headset EUT

2) Standard-specific tester, headset EUT.

3) With companion device and interference blocking, headset EUT.

In all of the testing, the base companion device is a WO1 base (FCC ID AL8WO1), which is certified under test parameters of C63.17-2006. The configurations and setup instructions preparatory to executing the tests for each setup are as follows:

1) 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 C63.17-2006, with radiated coupling into the headset EUT so that the headset EUT may be measured while a communications channel is active but without the requirement for conducted coupling of the base companion device.

2) 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 0000000010.

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 "Service Tool3" Version 3.5 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.

3) With companion device and interference blocking, headset EUT

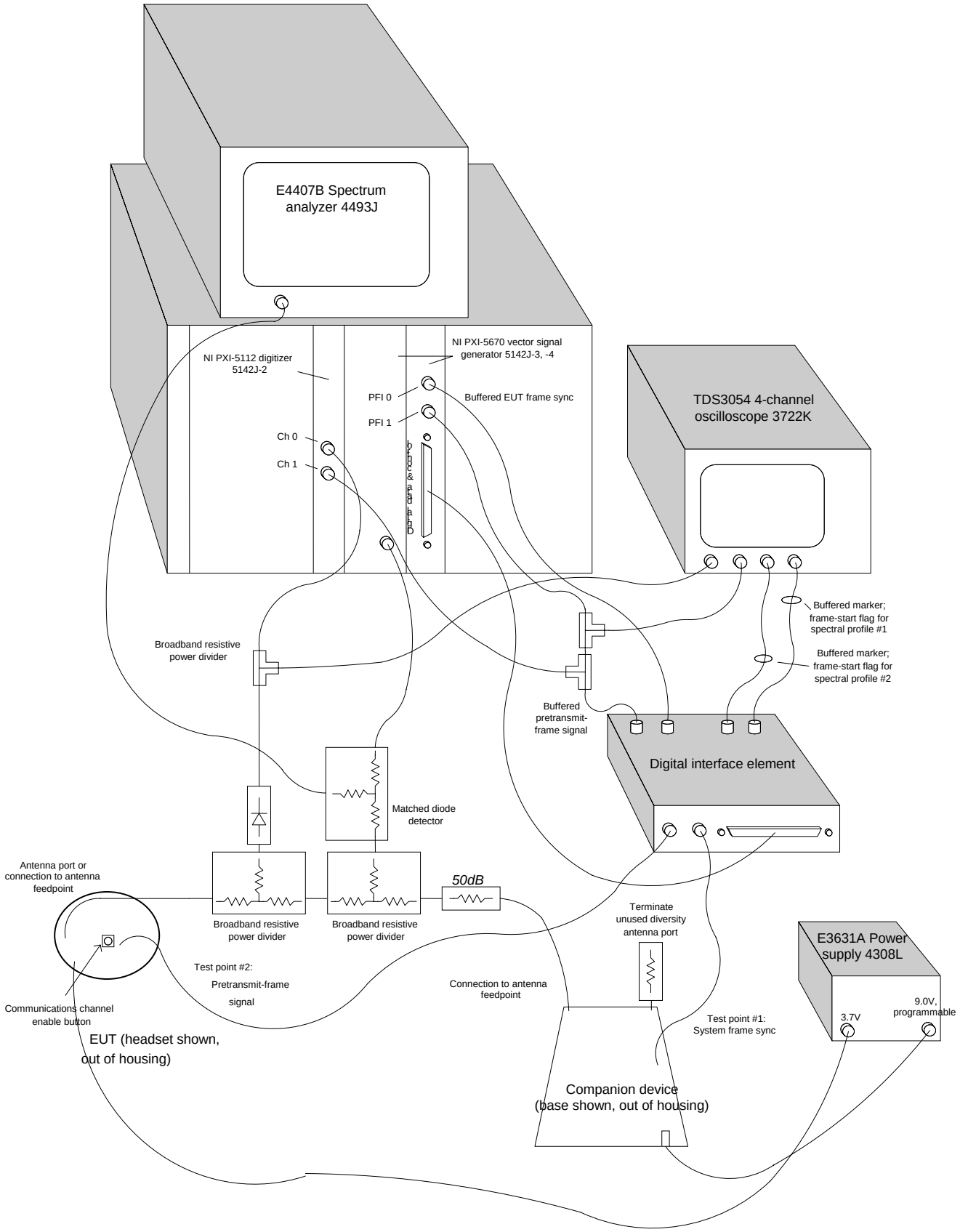

Fig. 1 - Detail of connections to headset EUT for the tests of clause 7 and clause 8 of C63.17-2006, for configuration 3, **With companion device and interference blocking, headset EUT.**

Calibration

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

1) CMD60 Digital Radio communication Tester asset 5372J. Rohde and Schwarz, Inc.
Calibration certification 224540 issued by Micro Precision on 15-Jan-2008 due 15-Jan-2009.

2) TDS3014B 4-channel oscilloscope asset 4309K. Tektronix.
Calibration certification 224711 issued 15-Jan-2008 by Micro Precision due 15-Jan-2009.

3) Thermal Couple/Meter asset 3565R. Omega.
Calibration certification 360917 issued 8-Jul-2008 by Micro Precision due 8-Jul-2009.

4) E4418B power meter asset 5333H, Agilent.
Calibration certificate 224526 issued 01-15-08 by Micro Precision due 15-Jan-09.

5) HP9301A power sensor asset 5337J, Hewlett-Packard
Calibration certificate 224510 issued 01-15-08 by Micro Precision due 15-Jan-09.

6) E4407B spectrum analyzer asset 5336J, Agilent
Calibration certificate 224503 issued 15-Jan-08 by Micro Precision due 15-Jan-09.

7) E3631A power supply asset 4308L, Agilent
Calibration certificate 224750 issued 15-Jan-08 by Micro Precision due 15-Jan-09.

8) 34401A digital multimeter asset 5339H, Agilent
Calibration certificate 224751 issued 15-Jan-08 by Micro Precision due 15-Jan-09.

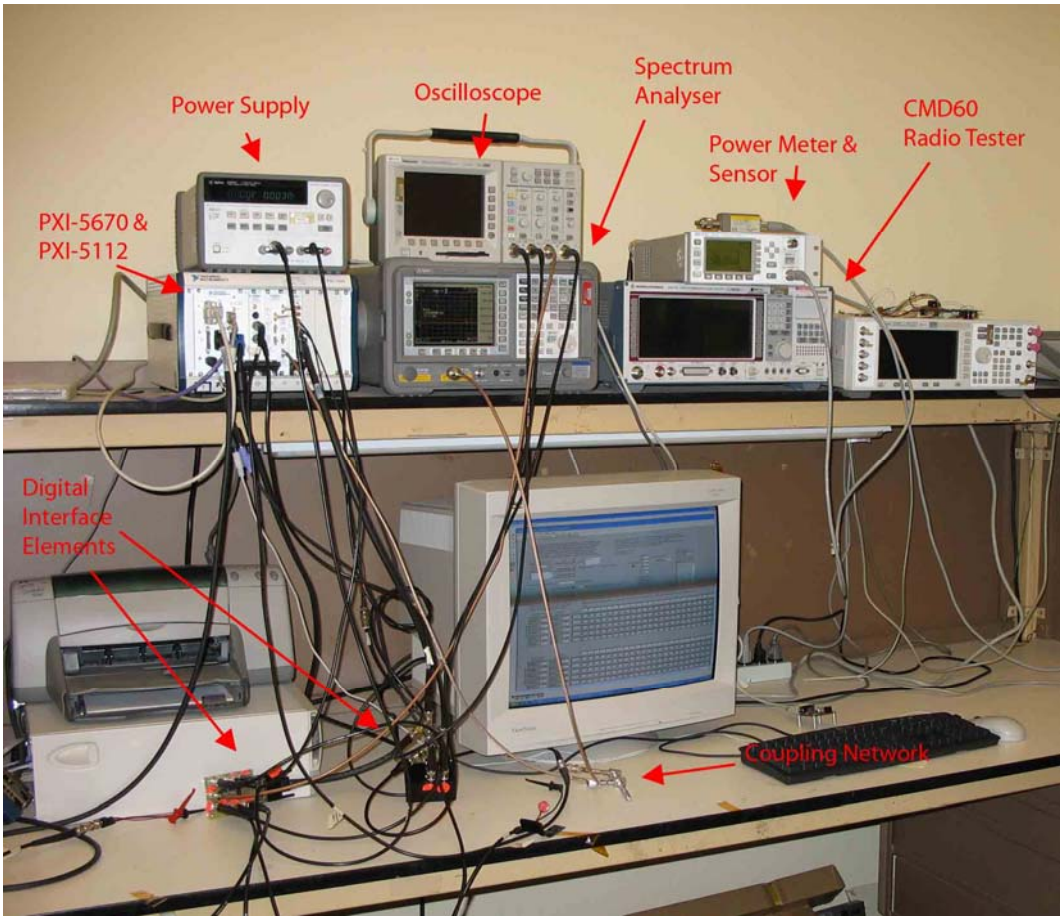

Fig. 2 – Test Bench with calibrated equipment configured with coupling network and digital interface elements

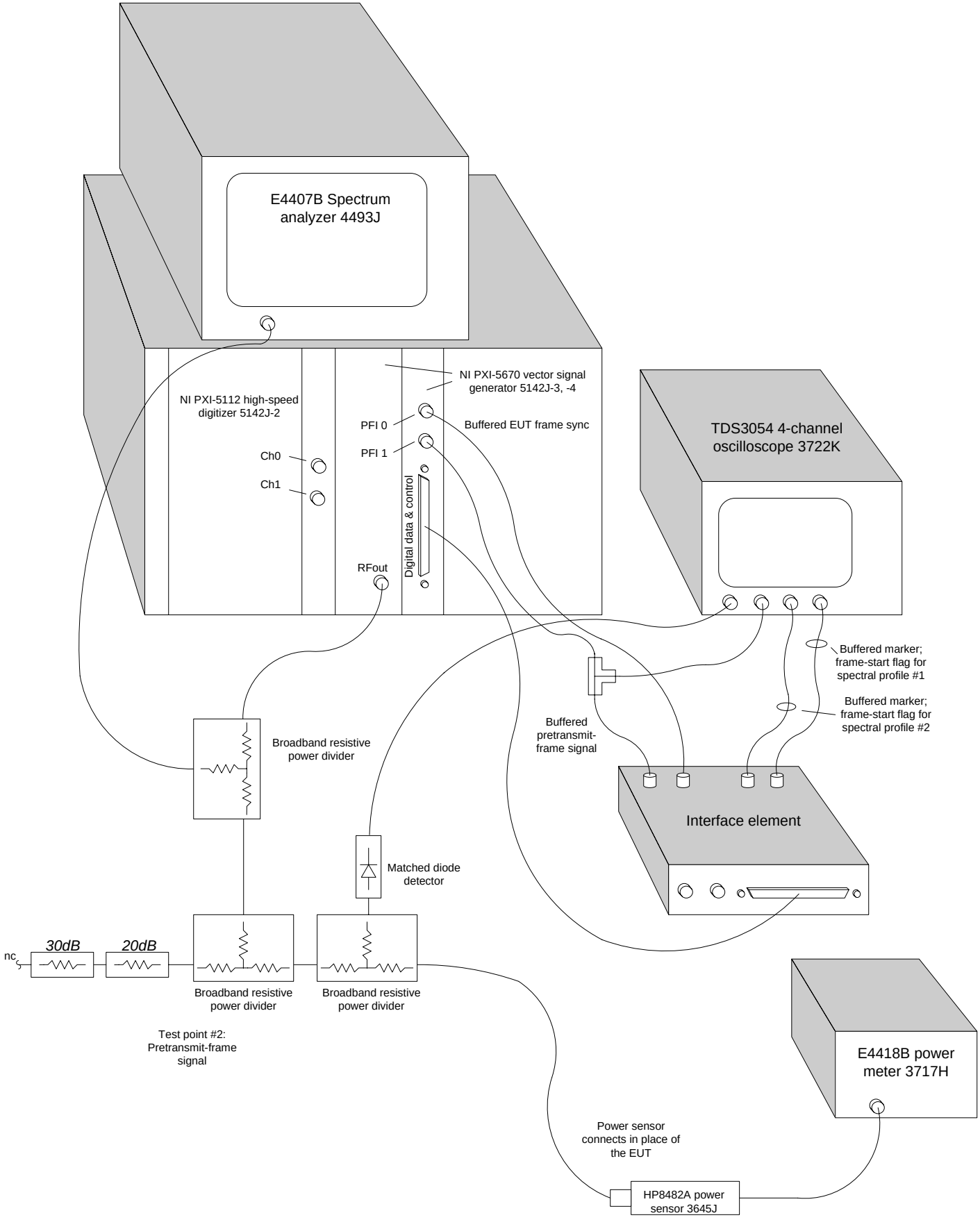

Fig. 3 - Detail of test system of clauses 7 and 8 of C63.17-2006, configured for calibration.

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 E9301A power sensor.

2) The resulting single-carrier and all-carrier output levels are measured using the E4418B power meter and E9301A 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. -30dBm +/- 0.1dB was measured at each of the five frequencies

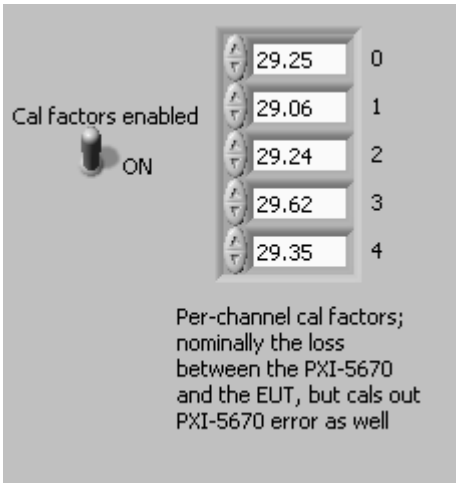

Fig. 4 - Screenshot from the control panel of the PXI-5670 with diagnostics enabled, showing the cal factors by channel. The top cal factor is for the top channel, 1928.448MHz, and the bottom cal factor is for the bottom channel, 1921.536MHz.

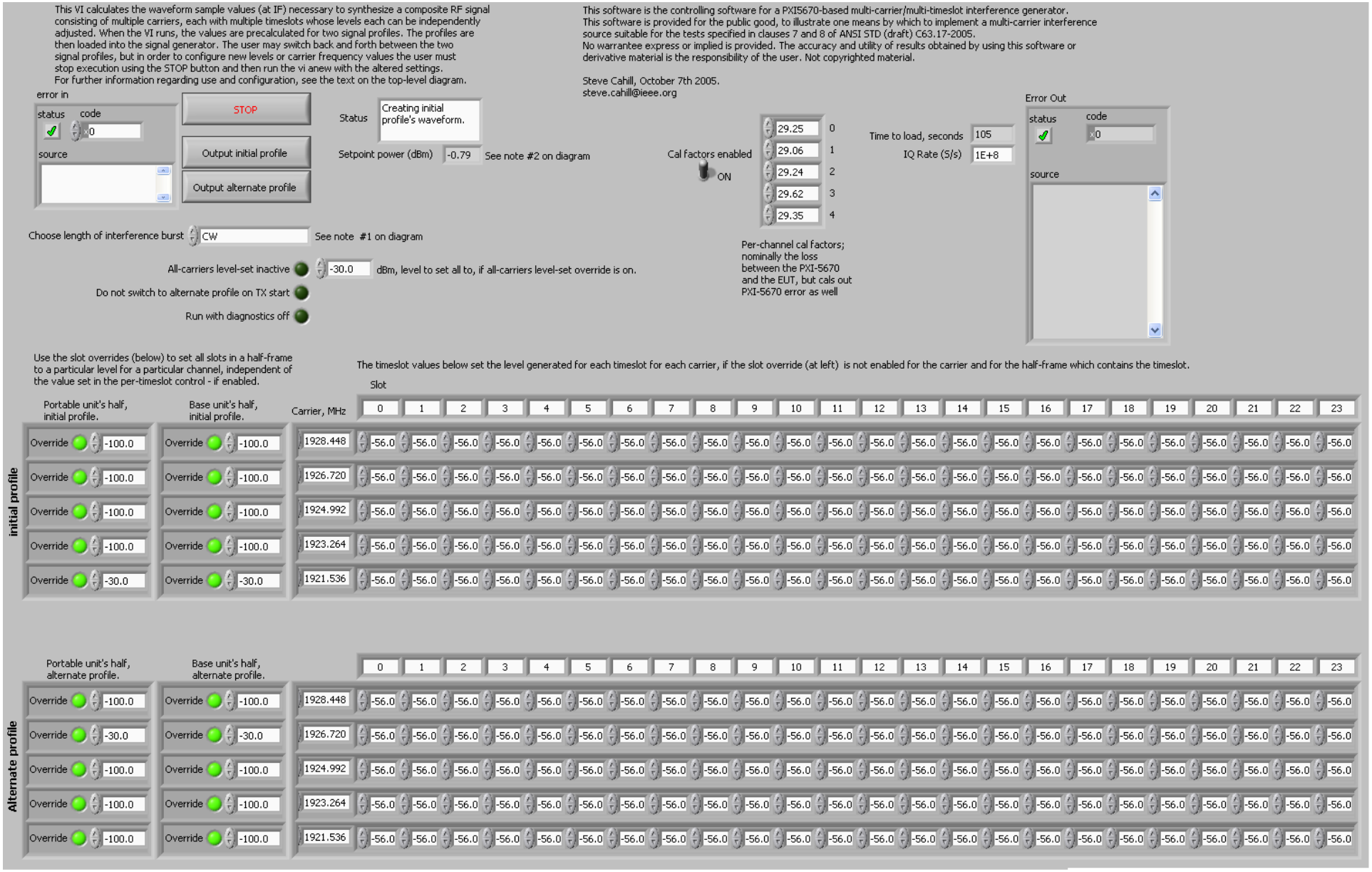

Fig. 5 - Screenshot of control VI for PXI-5670 taken with all carriers enabled, for -30dBm calibration accuracy test.

II. Test Results Summary Headset EUT

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

Type	47CFR15 Subpart D section	Reference within C63.17-2006	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	15.317Antenna 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	P32	Plantronics declares that the WH200 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	P26	Maximum measured power is +17.60dBm. Rated power is +19dBm. Legal maximum is +20.8dBm	3.2dB
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	P32	Maximum measured power spectral density is –7.95dBm, Legal maximum is 3mW, +4.77dBm	12.72dB
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	P3	Headset EUT incorporates a number of protection features – see section 0 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, #7b, #7c, 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	P26	Headset EUT emissions bandwidth is 1.45MHz.	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	P74	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 in normal mode, and uses the lower threshold in wideband mode.	Requirement is met

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	P98	Headset EUT verifies the channel access criteria every 4 hours when a communications channel is active, and will bring down the communications channel in 7:50 (hours:min) if access criteria is not met for a handover	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 will only transmit the heartbeat if in idle lock with the companion device and the access criteria is met.	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 in normal mode and 30 channels in wideband mode (WBM), see appendix A for WBM test results using TL 30 dB above the thermal noise power.	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	p70	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	p70	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 or 1/6th of 1.728MHz bandwidth depending on the mode of operation, 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	P77	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 1.8dB increase in threshold based on a maximum rated transmit power of +19dBm 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 is always the initiating device, even when the companion Base talk button is pressed. The Base EUT is only a request and the headset EUT will decide whether to act upon the request and begin link initiation.	
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	p38	The headset EUT worst-case out-of-band emissions are at the 3rd harmonic, transmitting on the high carrier, at –52.31dBm. The legal maximum is -39.5dBm	12.81dB

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	p38	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 20dB to spec. 60dB below the permitted maximum (+20.8dBm) or -39.2dBm is allowed.	20.0dB
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	p66	The headset EUT frame rate stability is measured at 0.01968ppm 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	p67	The headset EUT has measured total jitter and offset of 0.00414us 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	p64	The headset EUT measured carrier frequency maximum and minimum deviations were +0.36 and -0.49ppm 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 +4C° C to +44° C at normal supply voltage.	Subclause 6.2.1.3	p65	The headset EUT measured carrier frequency stability over rated temperature was -2.60ppm and +2.614ppm +/-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		The headset EUT is battery-powered and so no stability test is required	

Clause 6.1.2 Peak transmit power, headset EUT

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

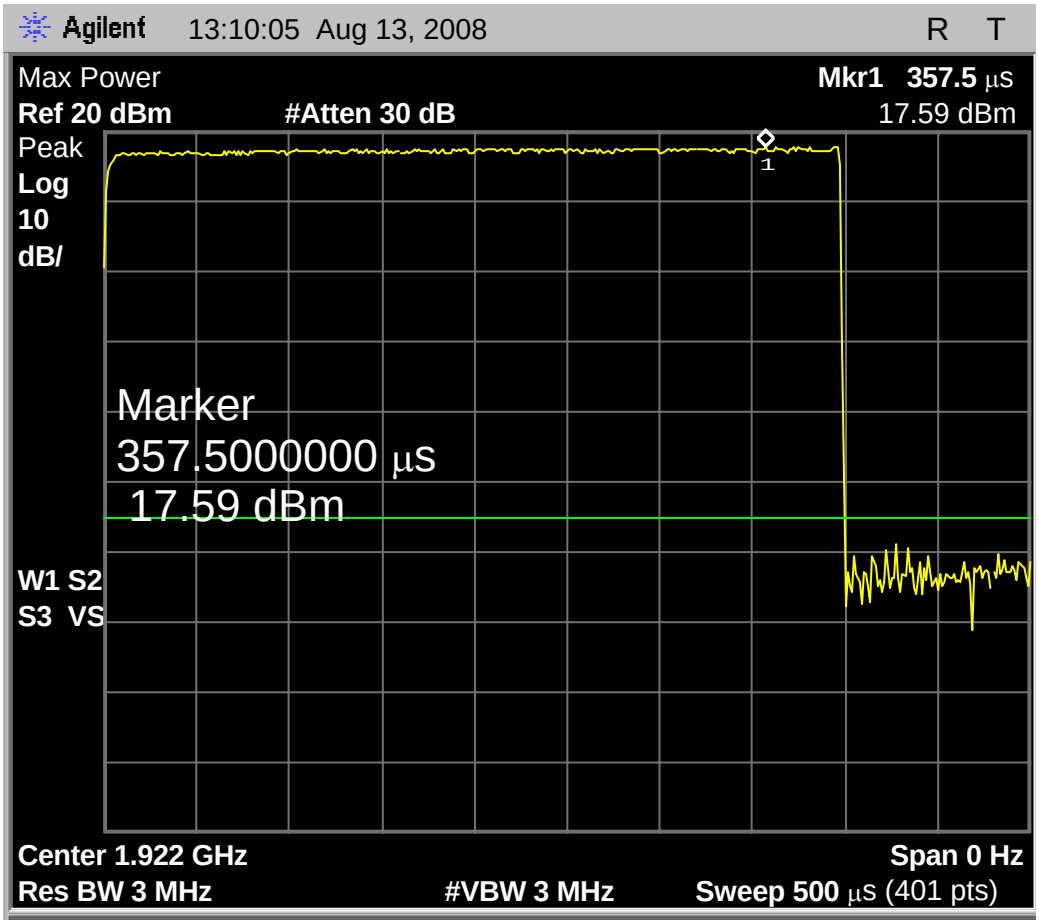

Fig. 8 - Headset EUT transmit power received by spectrum analyzer configured according to the requirements of clause 6.1.2 of C63.17-2006, low carrier. Maximum observed transmit power is 17.59 dBm.

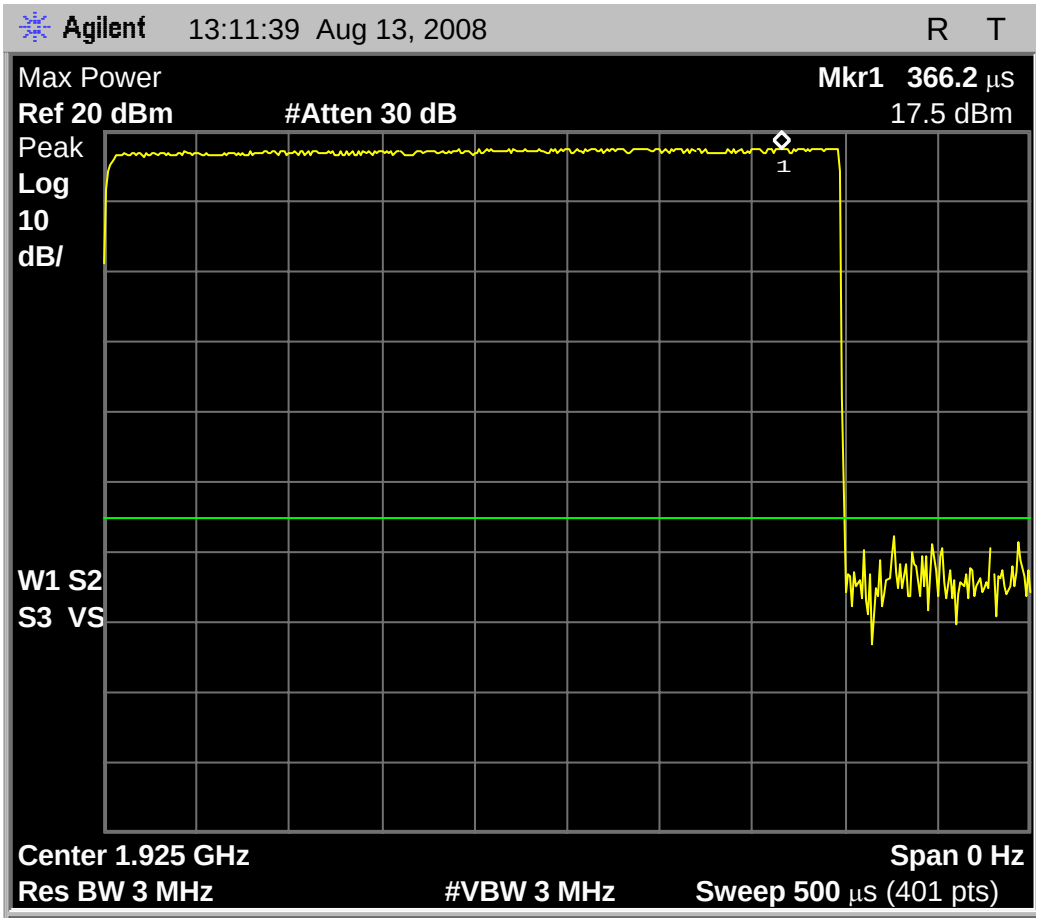

Fig. 9 - Headset EUT transmit power received by spectrum analyzer configured according to the requirements of clause 6.1.2 of C63.17-2006, mid carrier. Maximum observed transmit power is 17.50 dBm

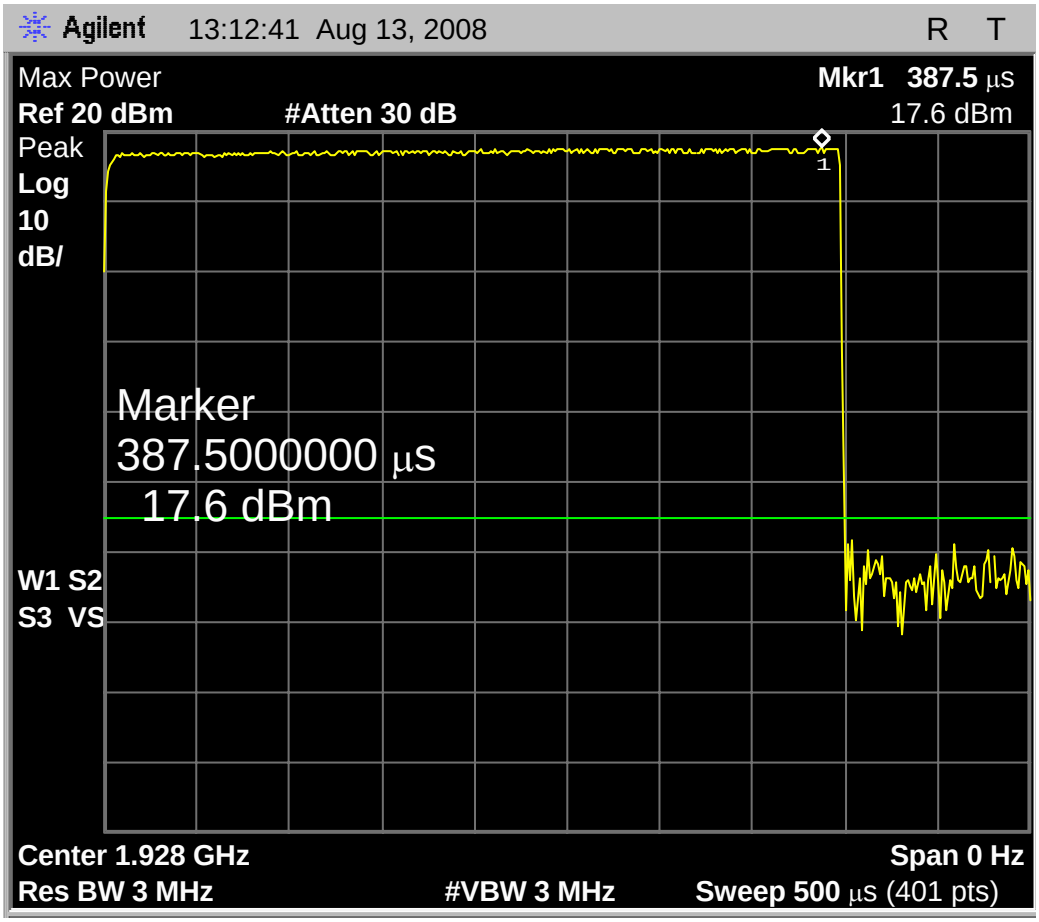

Fig. 10 - Headset EUT transmit power received by spectrum analyzer configured according to the requirements of clause 6.1.2 of C63.17-2006, high carrier. Maximum observed transmit power is 17.60 dBm.

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

Plimit = 5(log***B***) – 10dBm,

for an EUT with maximum antenna gain not more than 3dBi (the maximum antenna gain for the headset EUT is 3dBi) and where ***B*** is the emissions bandwidth, 1.45 MHz for the headset EUT (see the measurements following for clause 6.1.3).

Solving for *Plimit* we obtain +20.8dBm.

The headset EUT has maximum observed transmit power of 17.60dBm, and meets the required limit of less than *Plimit*, passing the requirements of C63.17-2006 clause 6.1.2 with 3.20dB of margin.

*Clause 6.1.3 Emission bandwidth **B**, headset EUT*

The headset 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 headset EUT transmit burst for each carrier.

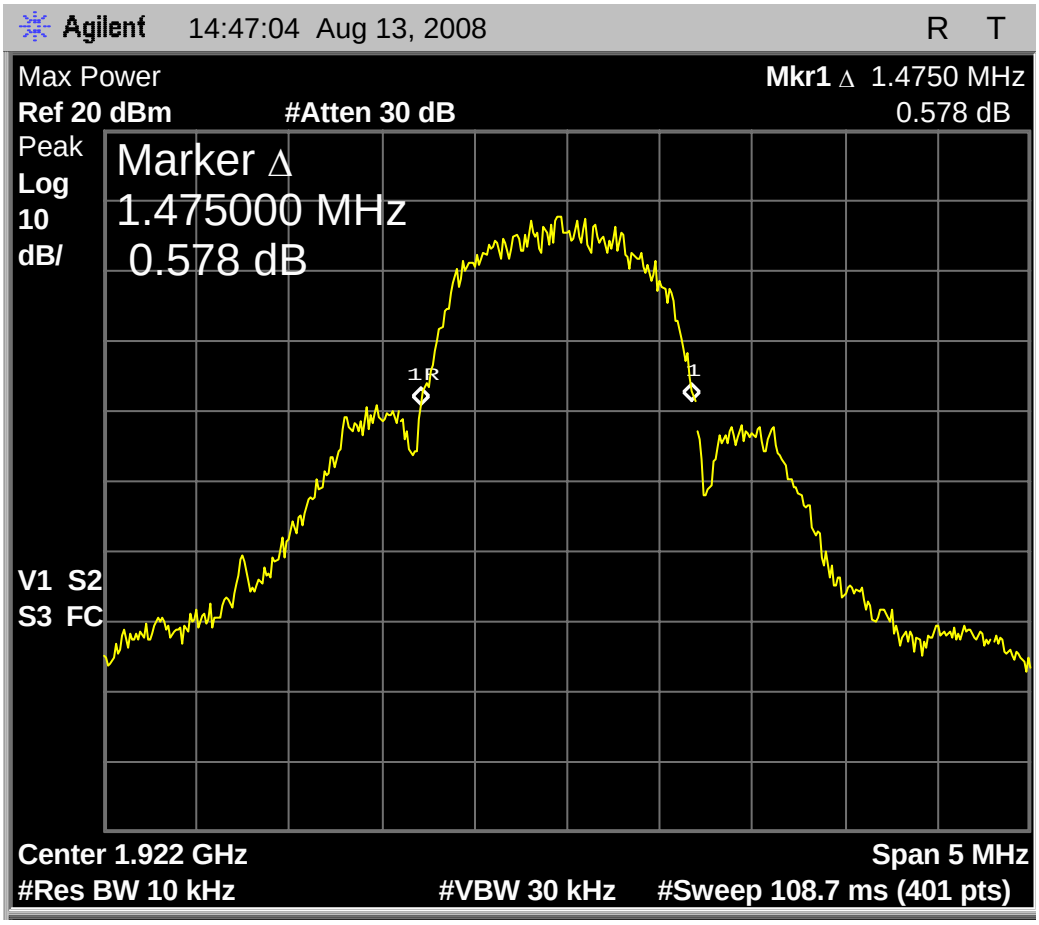

Fig. 11 - headset EUT, 1.48MHz emissions bandwidth on low carrier.

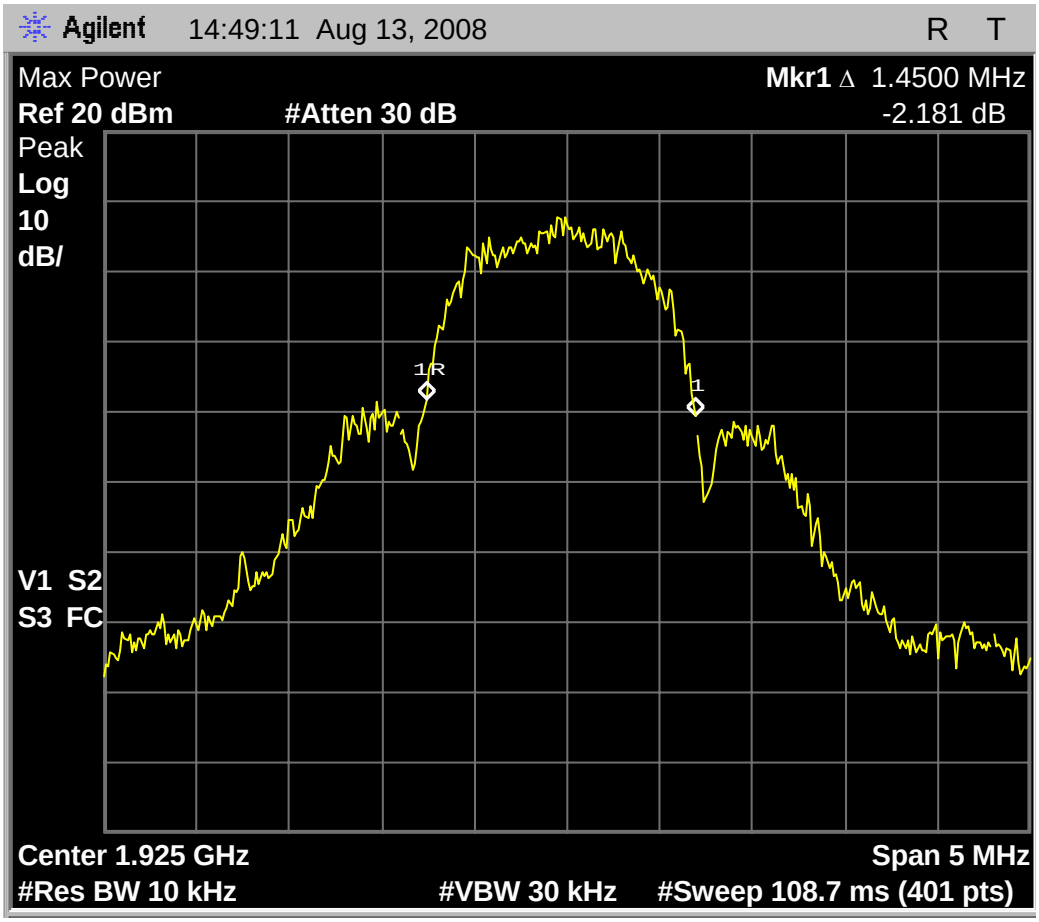

Fig. 12 - Headset EUT, 1.45MHz emissions bandwidth on middle carrier.

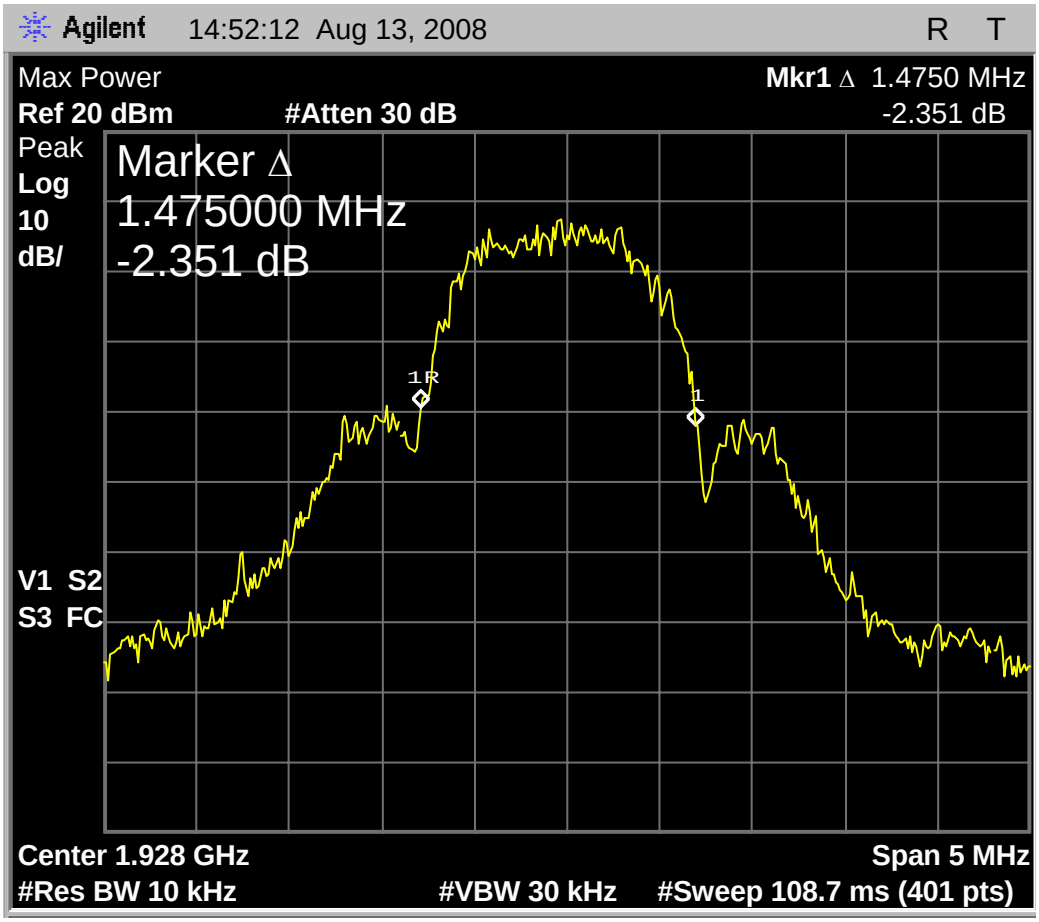

Fig. 13 - Headset EUT, 1.48MHz emissions bandwidth on high carrier.

The bandwidth ***B*** for the headset EUT used in further calculations according to the UPCS standard, from the center carrier, is then 1.45MHz.

The maximum allowed emission bandwidth *BlimitU* is 2.5MHz.

The minimum allowed emission bandwidth *BlimitL* is 50kHz,

The maximum observed emission bandwidth was 1.48MHz. The minimum observed emission bandwidth was 1.45MHz, so the headset EUT passes the test of clause 6.1.3 of C63.17-2006.

Clause 6.1.4 Modulation, headset EUT

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

Clause 6.1.5 Power spectral density using the measured maximum method, headset EUT

The headset 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.

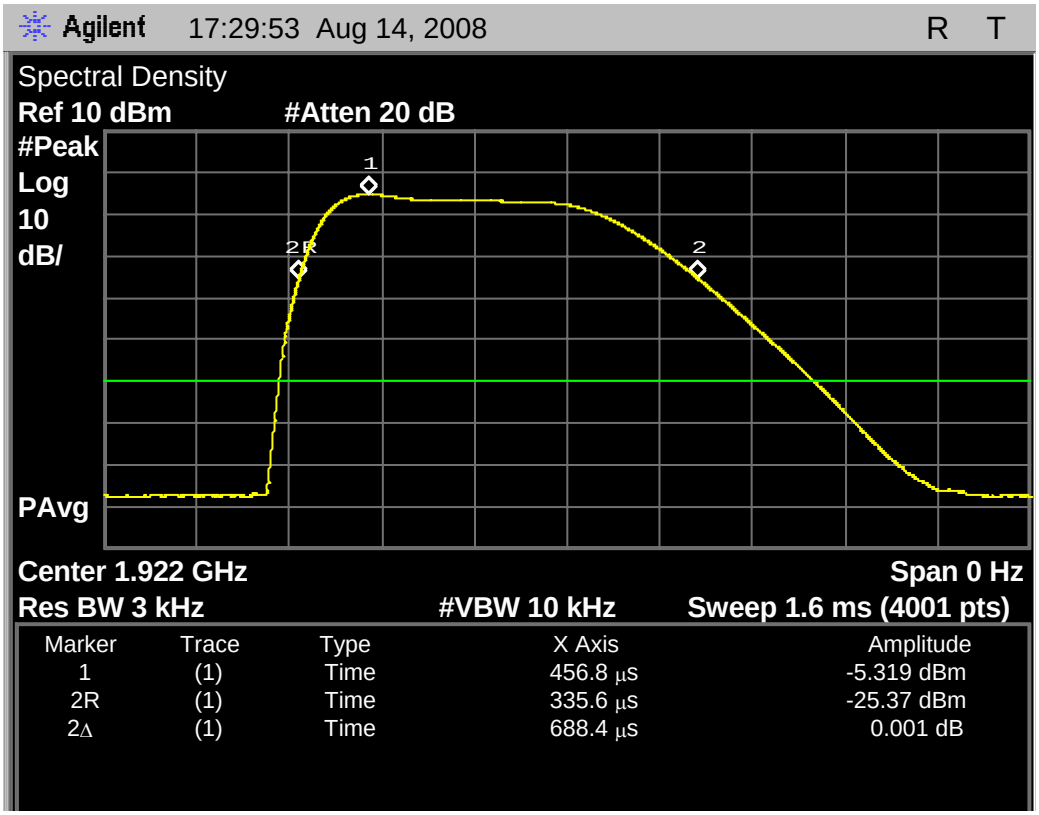

Fig. 14 – Zero-span sweep for headset EUT, low carrier, for 3kHz maximum power spectral density. The peak level is at –5.319 dBm, and the interval between samples at the -20dB points is from 383.6us to 1050.0us, or 666.4us.

The data points for this trace were saved, and the power spectral density computed according to the requirements of 6.1.5, and per figure 4 of C63.17-2006, using an Excel spreadsheet

Integrated maximum 3kHz-bandwidth transmit power for the headset EUT on the low channel was –8.21dBm, a margin of 12.98dB to the specification for maximum power spectral density.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	08/14/08 17:30:58	A:\F86SDL2.CSV														
2	Title:	Spectral Density														
3	Model:	E4407B														
4	Serial Number:	MY45105325														
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	3.36E-04	-2.54E+01	2.91E-06		2.61E-01											
17	3.36E-04	-2.52E+01	3.04E-06													
18	3.36E-04	-2.50E+01	3.16E-06		Total pulse energy in 3kHz BW, Joules:											
19	3.37E-04	-2.48E+01	3.30E-06		1.04E-07											
20	3.37E-04	-2.46E+01	3.44E-06													
21	3.38E-04	-2.44E+01	3.59E-06		Pulse length (-20dBc), seconds											
22	3.38E-04	-2.43E+01	3.74E-06		0.00069	0.00069										
23	3.38E-04	-2.41E+01	3.90E-06													
24	3.39E-04	-2.39E+01	4.07E-06		Average pulse power, W											
25	3.39E-04	-2.37E+01	4.23E-06		1.51E-04											
26	3.40E-04	-2.36E+01	4.41E-06													
27	3.40E-04	-2.34E+01	4.59E-06		Average pulse power, dBm											
28	3.40E-04	-2.32E+01	4.78E-06		-8.21											
29	3.41E-04	-2.30E+01	5.00E-06													
30	3.41E-04	-2.28E+01	5.20E-06													
31	3.42E-04	-2.27E+01	5.42E-06													
32	3.42E-04	-2.25E+01	5.65E-06													
33	3.42E-04	-2.23E+01	5.87E-06													
34	3.43E-04	-2.21E+01	6.12E-06													
35	3.43E-04	-2.20E+01	6.36E-06													
36	3.44E-04	-2.18E+01	6.63E-06													
1732	1.02E-03	-2.51E+01	3.06E-06													
1733	1.02E-03	-2.52E+01	3.03E-06													
1734	1.02E-03	-2.52E+01	3.00E-06													
1735	1.02E-03	-2.53E+01	2.98E-06													
1736	1.02E-03	-2.53E+01	2.93E-06													
1737	1.02E-03	-2.54E+01	2.91E-06													
1738	1.02E-03	-2.54E+01	2.87E-06													
1739	1.02E-03	-2.54E+01	2.85E-06													
1740																

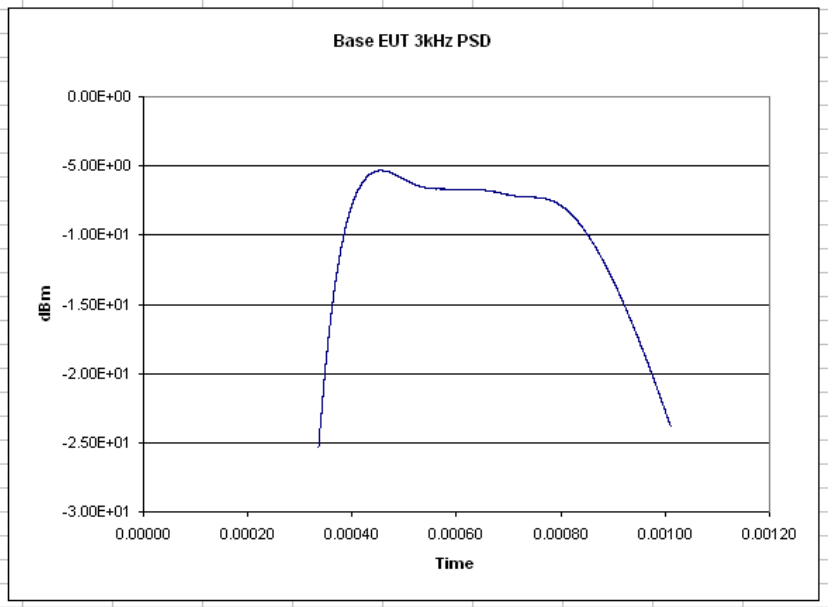

Fig. 15 – Screenshot of Excel file showing *PSDlimit* calculations for headset EUT, low carrier; -8.21dBm

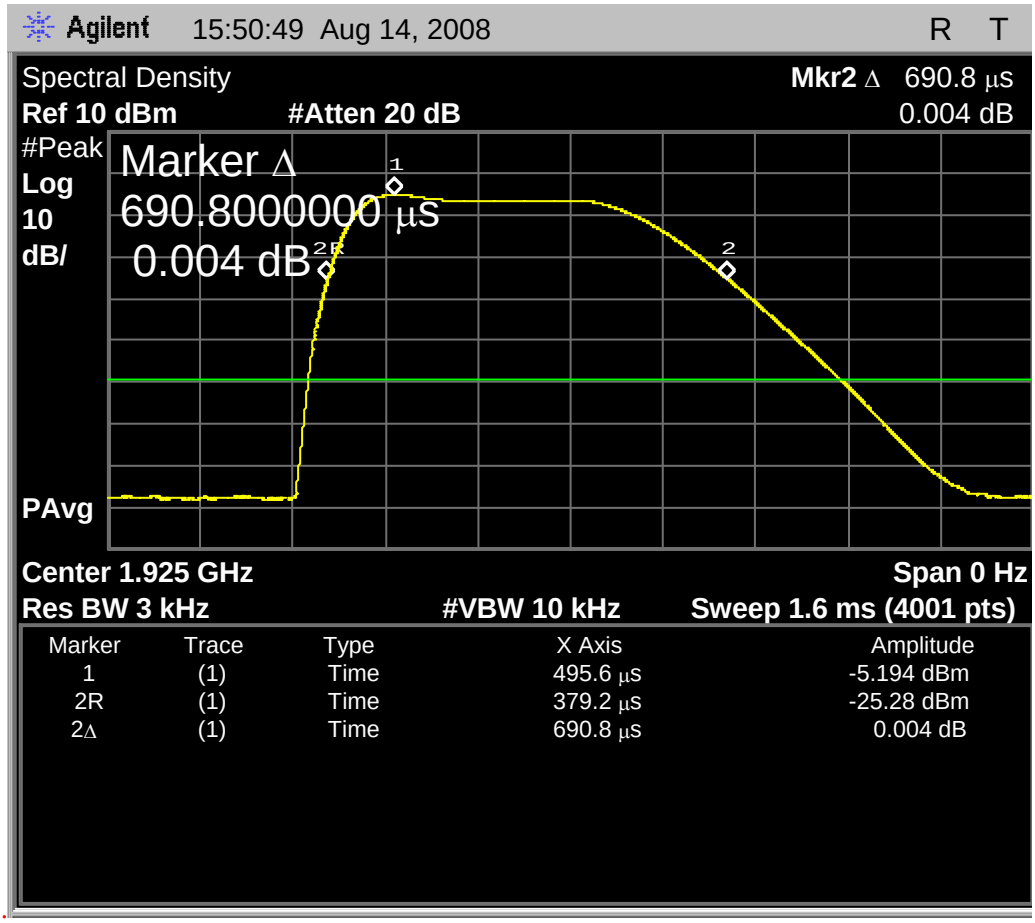

Fig. 16 – Zero-span sweep for headset EUT, middle carrier, for 3kHz maximum power spectral density. The peak level is at –5.194dBm, and the interval between samples at the -20dB points spans 379.2us to 1070.0us, or 690.8us.

The data points for this trace were saved, and the power spectral density computed according to the requirements of 6.1.5, and per figure 4 of C63.17-2006, using an Excel spreadsheet.

Integrated maximum 3kHz-bandwidth transmit power for the headset EUT on the mid channel was –7.95dBm, a margin of 12.72 to the specification for maximum power spectral density.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	08/14/08 15:51:40	A:\F87SDM.CSV														
2	Title:	Spectral Density														
3	Model:	E4407B														
4	Serial Number:	MY45105325														
5	Center Frequency:	1924992000	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	3.79E-04	-2.53E+01	2.97E-06		2.77E-01											
17	3.80E-04	-2.51E+01	3.11E-06													
18	3.80E-04	-2.49E+01	3.24E-06		Total pulse energy in 3kHz BW, Joules:											
19	3.80E-04	-2.47E+01	3.39E-06		1.11E-07											
20	3.81E-04	-2.45E+01	3.53E-06													
21	3.81E-04	-2.43E+01	3.69E-06		Pulse length (-20dBc), seconds											
22	3.82E-04	-2.42E+01	3.84E-06		0.0006900	0.00069										
23	3.82E-04	-2.40E+01	4.01E-06													
24	3.82E-04	-2.38E+01	4.18E-06		Average pulse power, W											
25	3.83E-04	-2.36E+01	4.35E-06		1.60E-04											
26	3.83E-04	-2.34E+01	4.54E-06													
27	3.84E-04	-2.33E+01	4.73E-06		Average pulse power, dBm											
28	3.84E-04	-2.31E+01	4.92E-06		-7.95											
29	3.84E-04	-2.29E+01	5.15E-06													
30	3.85E-04	-2.27E+01	5.37E-06													
31	3.85E-04	-2.25E+01	5.59E-06													
32	3.86E-04	-2.23E+01	5.83E-06													
1735	1.07E-03	-2.49E+01	3.21E-06													
1736	1.07E-03	-2.50E+01	3.18E-06													
1737	1.07E-03	-2.50E+01	3.16E-06													
1738	1.07E-03	-2.51E+01	3.12E-06													
1739	1.07E-03	-2.51E+01	3.08E-06													
1740	1.07E-03	-2.52E+01	3.05E-06													
1741	1.07E-03	-2.52E+01	3.02E-06													
1742	1.07E-03	-2.53E+01	2.99E-06													
1743	1.07E-03	-2.53E+01	2.97E-06													
1744	1.07E-03	-2.53E+01	2.93E-06													
1745																
1746																

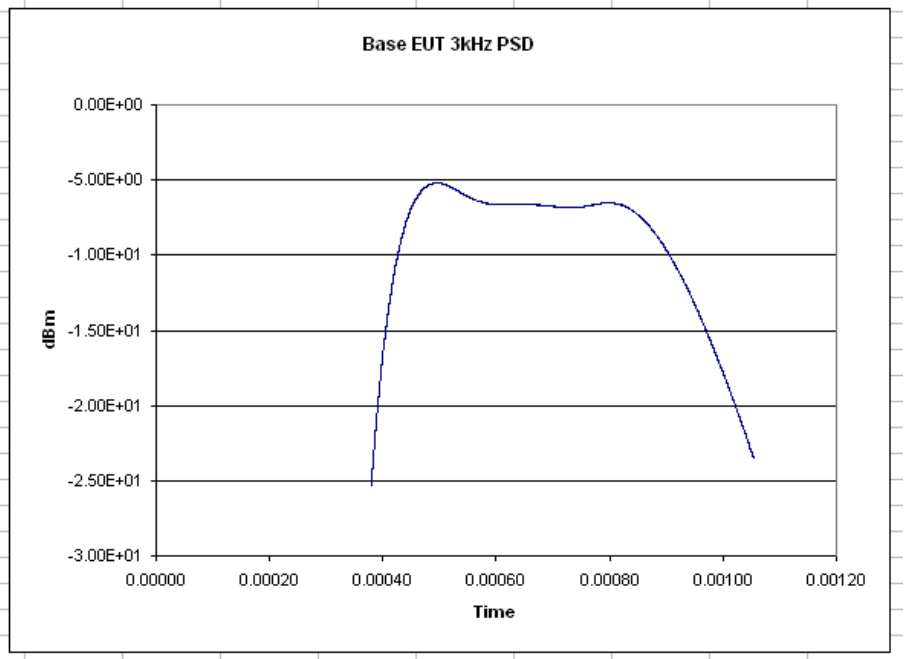

Fig. 17 – Screenshot of Excel file showing *PSDlimit* calculations for headset EUT, mid carrier; -7.95dBm.

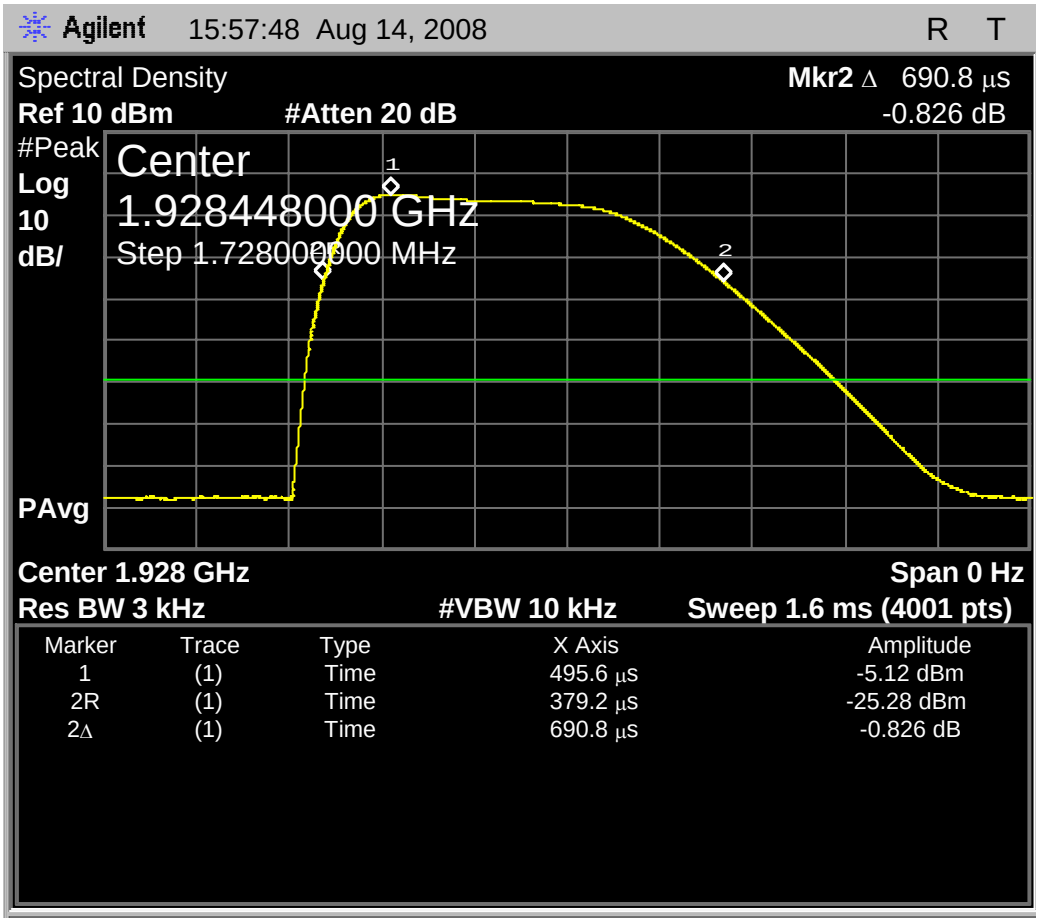

Fig. 18 – Zero-span sweep for headset EUT, high carrier, for 3kHz maximum power spectral density. The peak level is at –5.12dBm, and the interval between samples at the -20dB points is from 379.2us to 1070.0us, or 690.8us.

The data points for this trace were saved, and the power spectral density computed according to the requirements of 6.1.5, and per figure 4 of C63.17-2006, using an Excel spreadsheet.

Integrated maximum 3kHz-bandwidth transmit power for the headset EUT on the high channel was –8.09dBm, a margin of 12.86dB to the specification for maximum power spectral density.

1	08/14/08 15:58:35	A:\F88SDH.CSV			
2	Title:	Spectral Density			
3	Model:	E4407B			
4	Serial Number:	MY45105325			
5	Center Frequency:	1928448000	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	3.79E-04	-2.53E+01	2.97E-06	2.64E-01	
17	3.80E-04	-2.51E+01	3.11E-06		
18	3.80E-04	-2.49E+01	3.25E-06	Total pulse energy in 3kHz BW, Joules:	
19	3.80E-04	-2.47E+01	3.38E-06	1.06E-07	
20	3.81E-04	-2.45E+01	3.53E-06		
21	3.81E-04	-2.43E+01	3.69E-06	Pulse length (-20dBc), seconds	
22	3.82E-04	-2.42E+01	3.84E-06	0.00068	0.00068
23	3.82E-04	-2.40E+01	3.99E-06		
24	3.82E-04	-2.38E+01	4.17E-06	Average pulse power, W	
25	3.83E-04	-2.36E+01	4.36E-06	1.55E-04	
26	3.83E-04	-2.34E+01	4.54E-06		
27	3.84E-04	-2.33E+01	4.73E-06	Average pulse power, dBm	
28	3.84E-04	-2.31E+01	4.93E-06	-8.09	
29	3.84E-04	-2.29E+01	5.15E-06		
30	3.85E-04	-2.27E+01	5.36E-06		
31	3.85E-04	-2.25E+01	5.58E-06		
32	3.86E-04	-2.23E+01	5.83E-06		
33	3.86E-04	-2.22E+01	6.08E-06		
34	3.86E-04	-2.20E+01	6.32E-06		
35	3.87E-04	-2.18E+01	6.59E-06		
36	3.87E-04	-2.16E+01	6.86E-06		
1717	1.06E-03	-2.50E+01	3.20E-06		
1718	1.06E-03	-2.50E+01	3.17E-06		
1719	1.06E-03	-2.50E+01	3.14E-06		
1720	1.06E-03	-2.51E+01	3.11E-06		
1721	1.06E-03	-2.51E+01	3.07E-06		
1722	1.06E-03	-2.52E+01	3.05E-06		
1723	1.06E-03	-2.52E+01	3.01E-06		
1724	1.06E-03	-2.52E+01	2.99E-06		
1725	1.06E-03	-2.53E+01	2.95E-06		
1726					

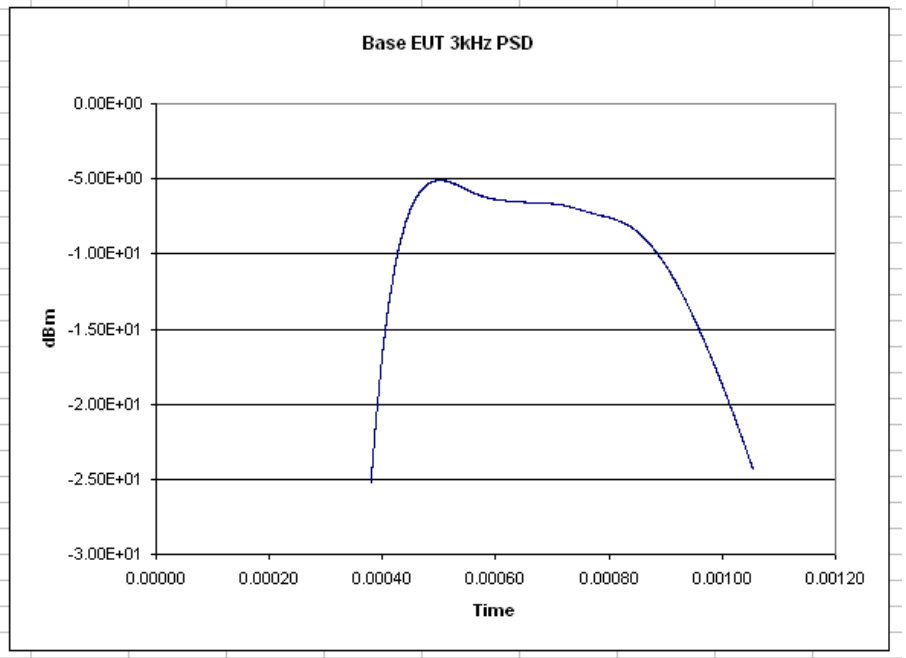

Fig. 19 – Screenshot of Excel file showing *PSDlimit* calculations for headset EUT, high carrier; -8.09dBm.

The maximum allowed PSD, *PSDlimit*, is 3mW in any 3kHz bandwidth, or 4.77dBm. The maximum observed PSD for the headset EUT is –7.95dBm, meeting the requirements according to clause 6.1.5 of C63.17-2006 with 12.72dB of margin.

Clause 6.1.6 Emissions, headset EUT

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

6.1.6.1 In-band unwanted emissions, headset 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*** = 1.45MHz, 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. 20 - Spectrum analyzer screenshot for transmit emissions showing inband unwanted emissions with the headset 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 headset 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 1920.8 MHz is at -36.8dBm, and 30dB below +20.8dBm= -9.2dBm is allowed, margin is 27.60dB.

For region B (single-sided inband), the marker at 1924.4MHz is at –55.92dBm, and 50dB below +20.8dBm=-29.2dBm is allowed, margin is 26.72dB.

For region C (single-sided inband), the marker at 1925.9MHz is at –60dBm, and 60dB below +20.8dBm=-39.2dBm is allowed, margin is 20.8dB.

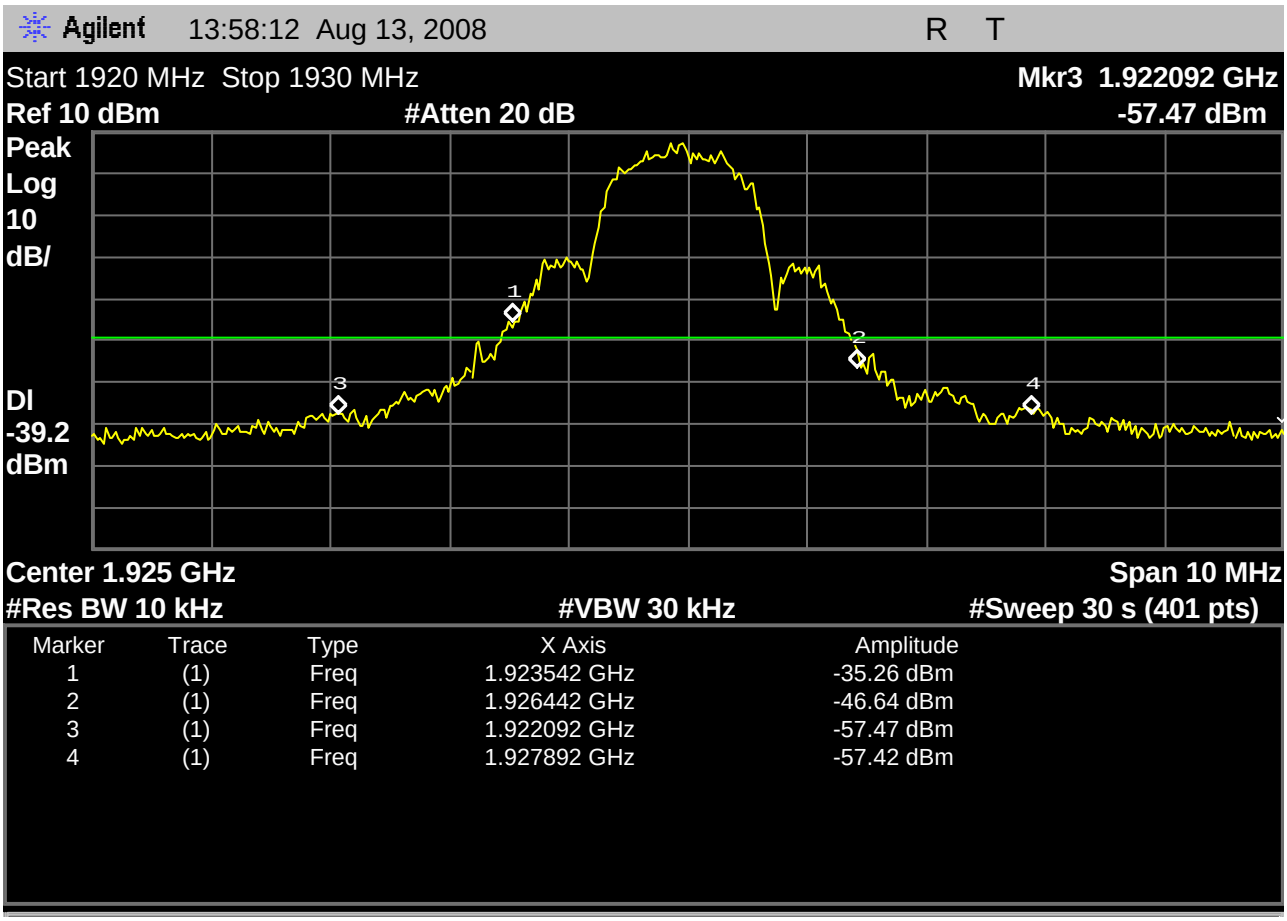

Fig. 21 - Spectrum analyzer screenshot for transmit emissions showing inband unwanted emissions with the headset EUT transmitter at the middle carrier, 1924.992MHz, according to the requirements of 6.1.6.1.

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 headset 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 1923.54MHz is at –35.26dBm, and 30dB below +20.8dBm=-9.2dBm is allowed, margin is 26.06dB.

For region B (double-sided inband), the worst-case marker at 1927.89MHz is at –57.4dBm, and 50dB below +20.8dBm=-29.2dBm is allowed, margin is 28.20dB.

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= -39.2dBm is allowed, margin is at least 20.0dB.

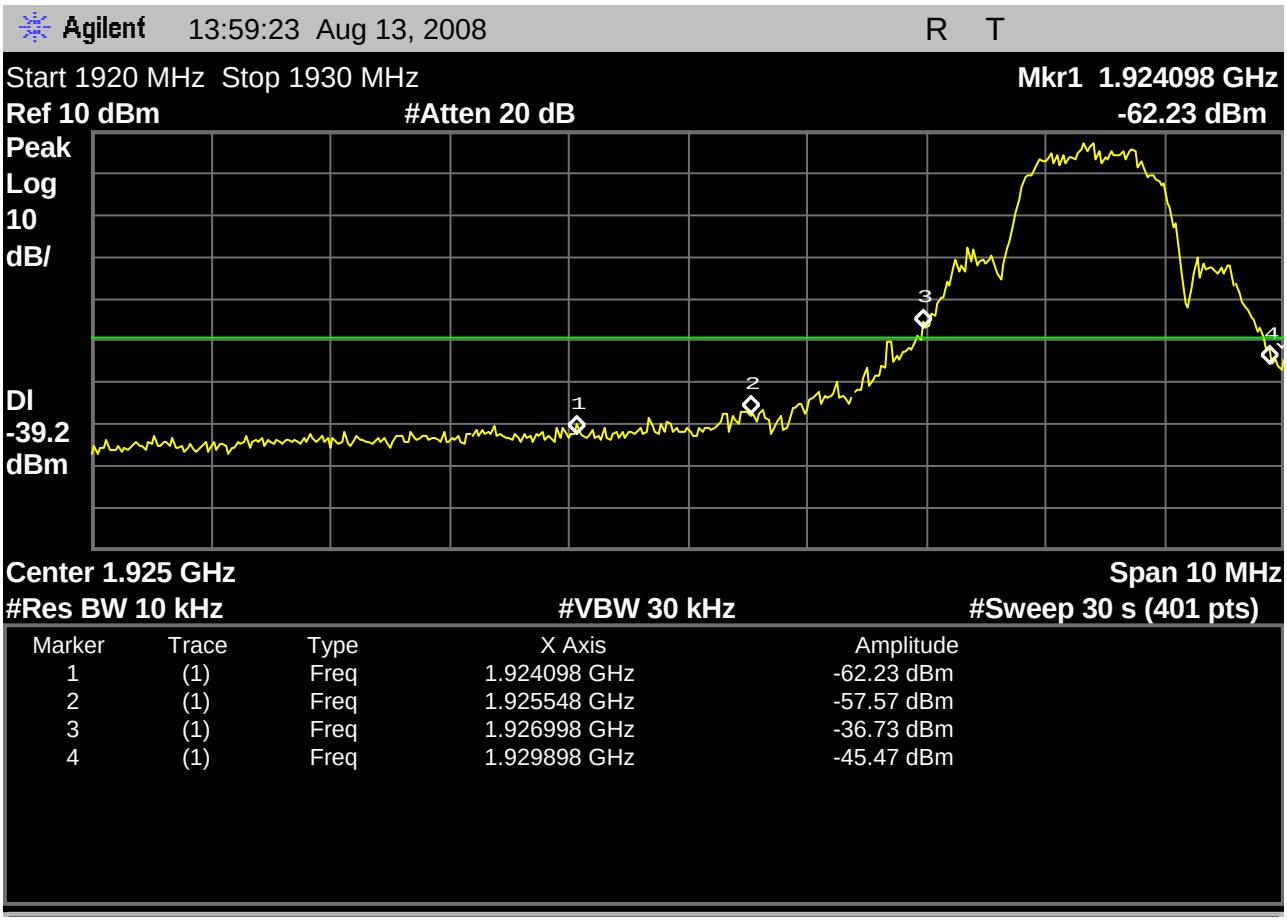

Fig. 22 - Spectrum analyzer screenshot for transmit emissions showing inband unwanted emissions with the headset EUT transmitter at the highest carrier, 1928.448MHz, according to the requirements of 6.1.6.1.

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 headset 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 1926.99 MHz is at –36.73, and 30dB below +20.8dBm= -9.2dBm is allowed, margin is 27.53dB.

For region B (single-sided inband), the marker at 1925.55MHz is at –57.57dBm, and 50dB below +20.8dBm=-29.2dBm is allowed, margin is 28.37dB.

For region C (single-sided inband), the marker at 1924.09MHz is at –62.23dBm, and 60dB below +20.8dBm=-39.2dBm is allowed, margin is 23.03dB.

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 20.0dB of margin.

Clause 6.1.6.2 Out-of-band emissions, headset 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}, 4^{th} , 5^{th}, and 9^{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.

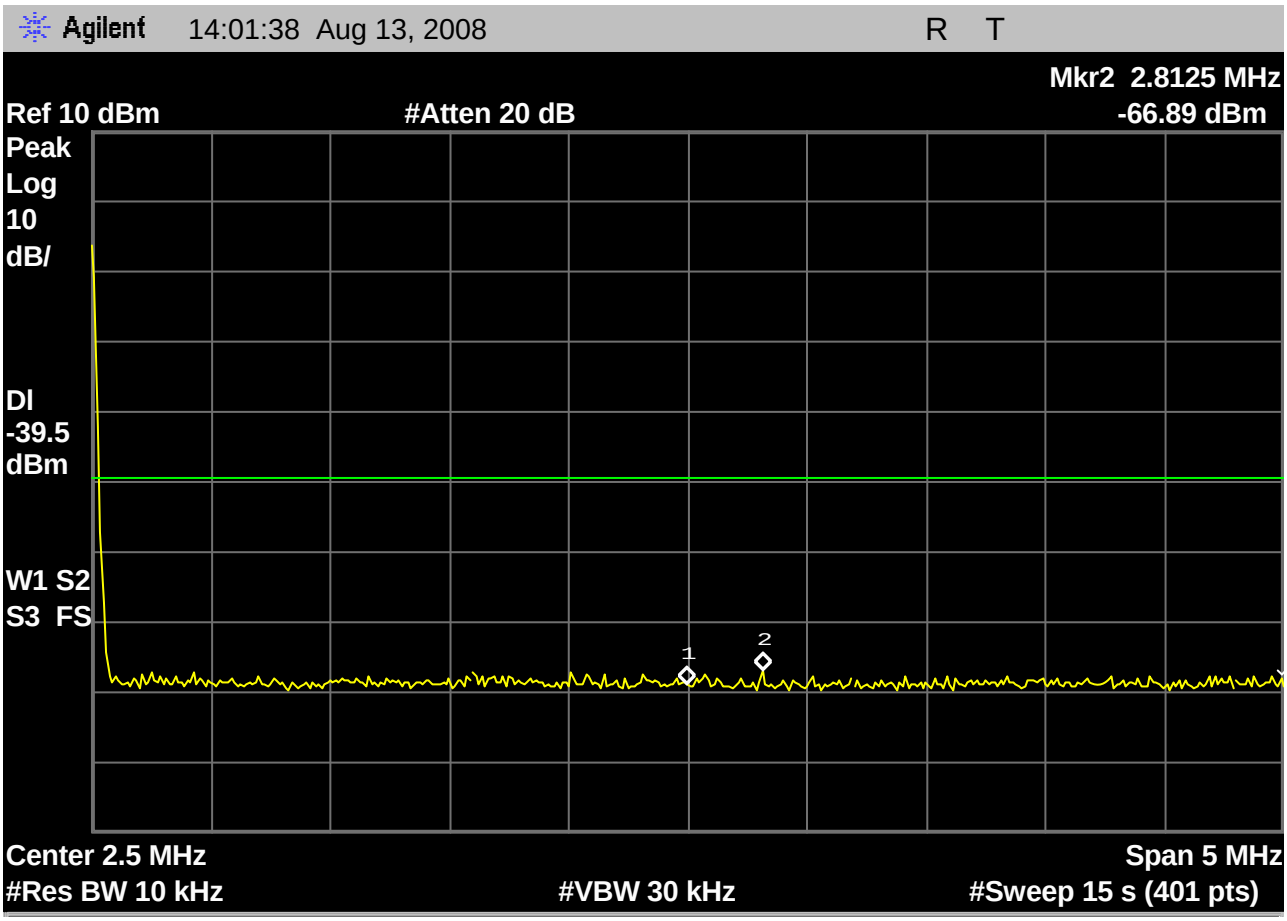

Fig. 23 – headset EUT out-of-band emissions showing the regions from DC to 5MHz, with the transmitter using the lowest carrier, 1921.536MHz.

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

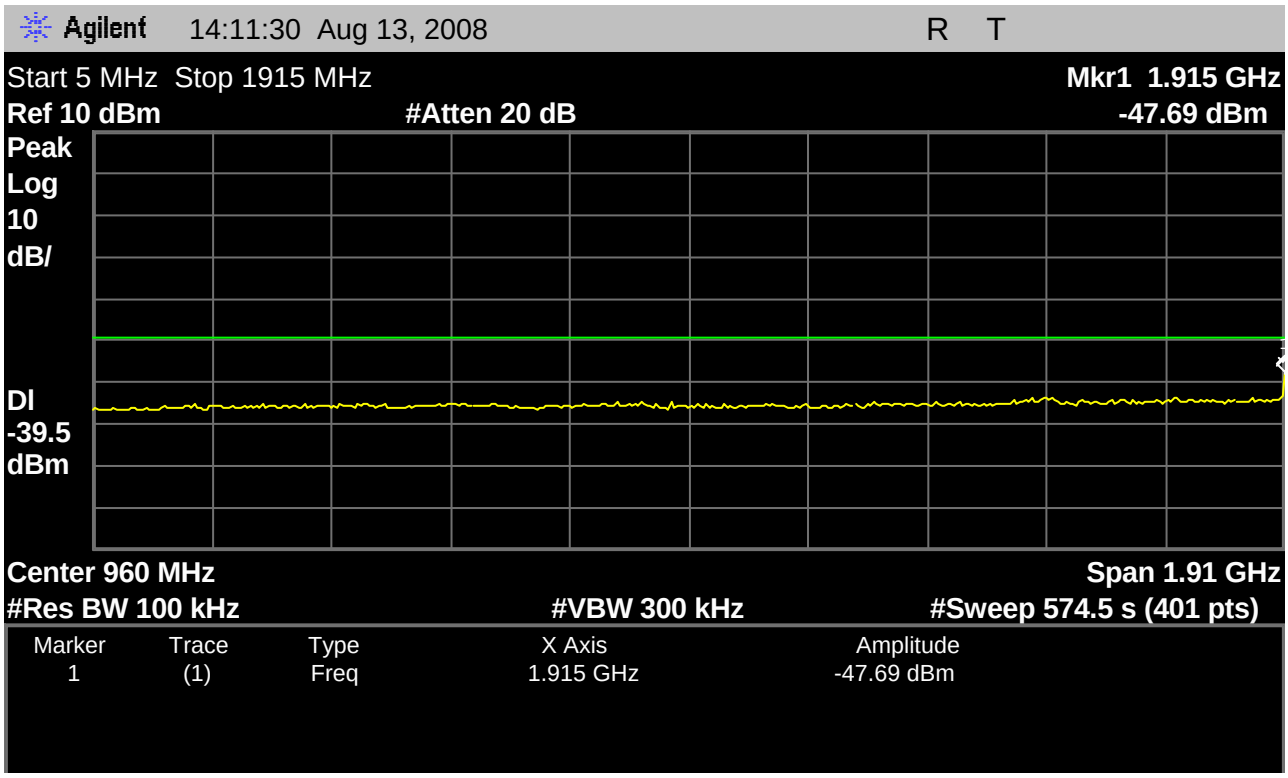

Fig. 24 – headset EUT out-of-band emissions showing the region from 5MHz to 1915MHz, with the transmitter using the lowest carrier, 1921.536MHz.

This screenshot shows a sweep made with resolution bandwidth increased to 100kHz to improve sweep time. Headset EUT emissions at approximately -47.69dB have margin to the -39.5dBm out-of-band emissions specification in this spectral region of 8dB in this region, even measured in a 10x-wider bandwidth than that in the test procedure of clause 6.1.6.

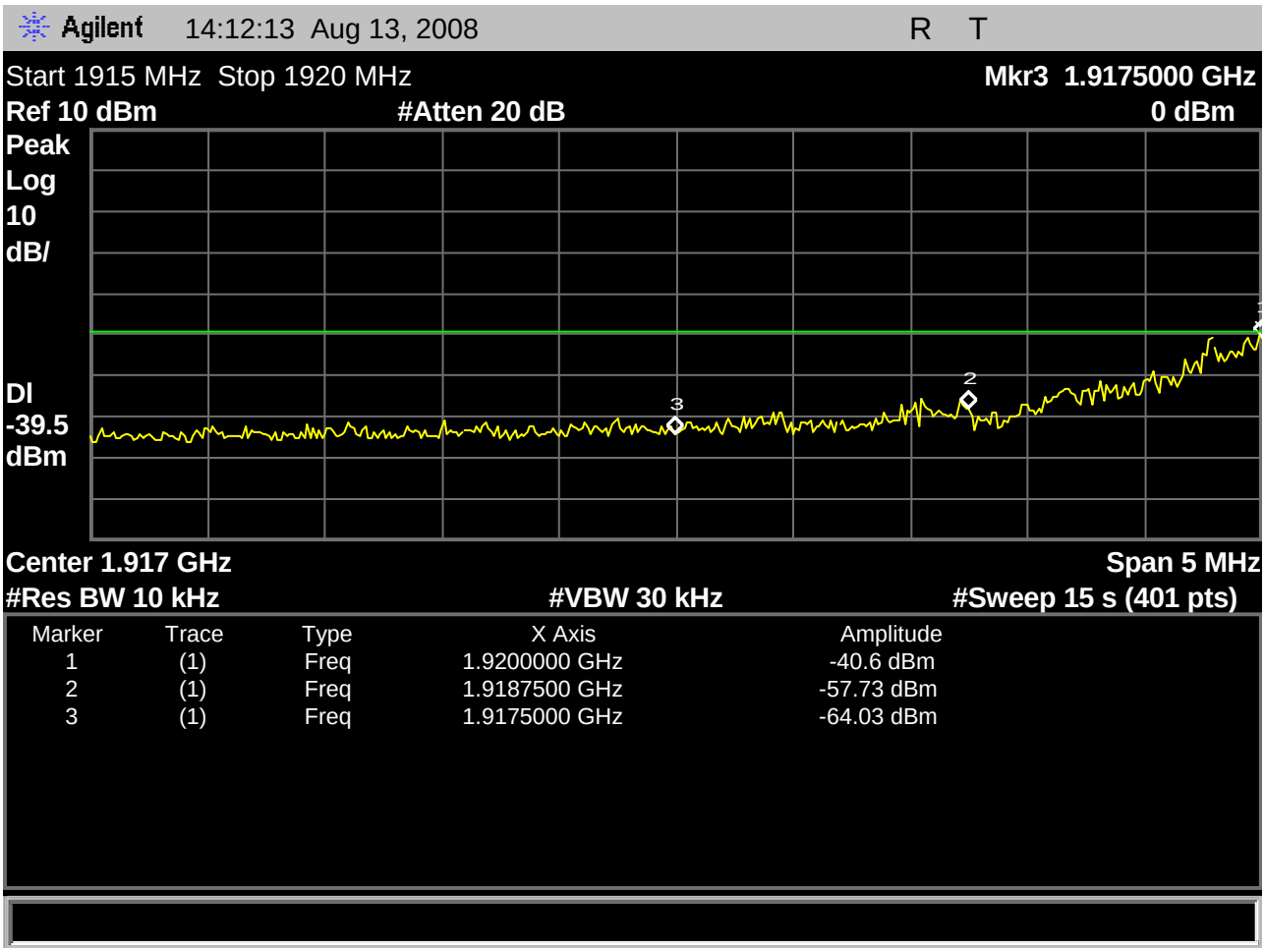

Fig. 25 – Headset EUT out-of-band emissions showing the regions from bandedge to -1.25MHz, and from -1.25MHz to -2.5MHz, with the headset EUT transmitting on the lowest carrier, 1921.536MHz.

Margin to the specification of -9.5dBm in the region from bandedge to -1.25MHz is found at marker 1, at –40.60dBm, and is 31.10dBm.

Margin to the specification of -29.5dBm in the region from -1.25MHz to -2.5MHz is found to the left of marker 2, at –55dBm, and is 25.5dB.

Margin to the specification of -39.5dBm in the region outside -2.5MHz from the bandedge exceeds 20dB.

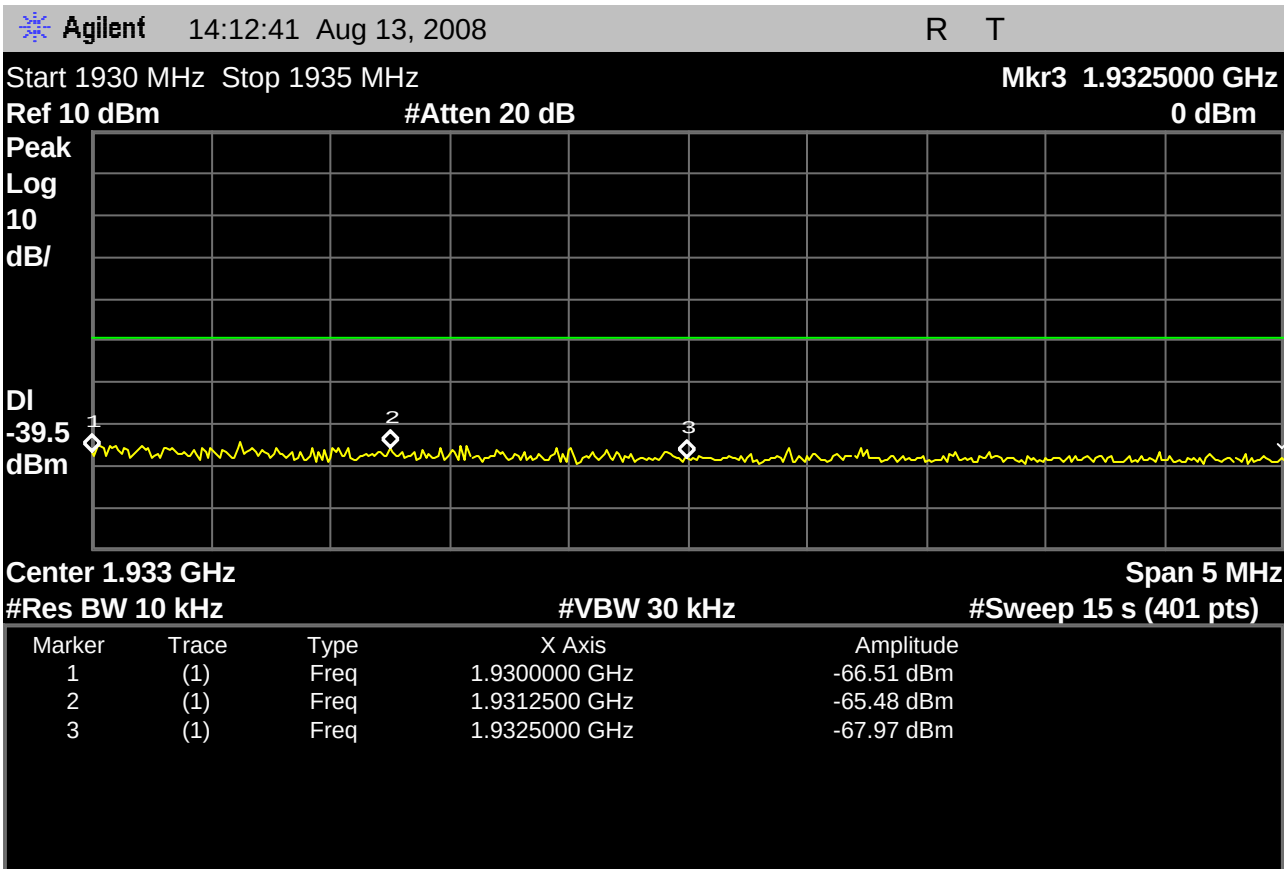

Fig. 26 – Headset EUT out-of-band emissions showing the regions from bandedge to +1.25MHz, and from +1.25MHz to +2.5MHz, with the headset EUT transmitting on the lowest carrier, 1921.536MHz.

Margins to the specification of -9.5dBm in the region from 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 20dB.

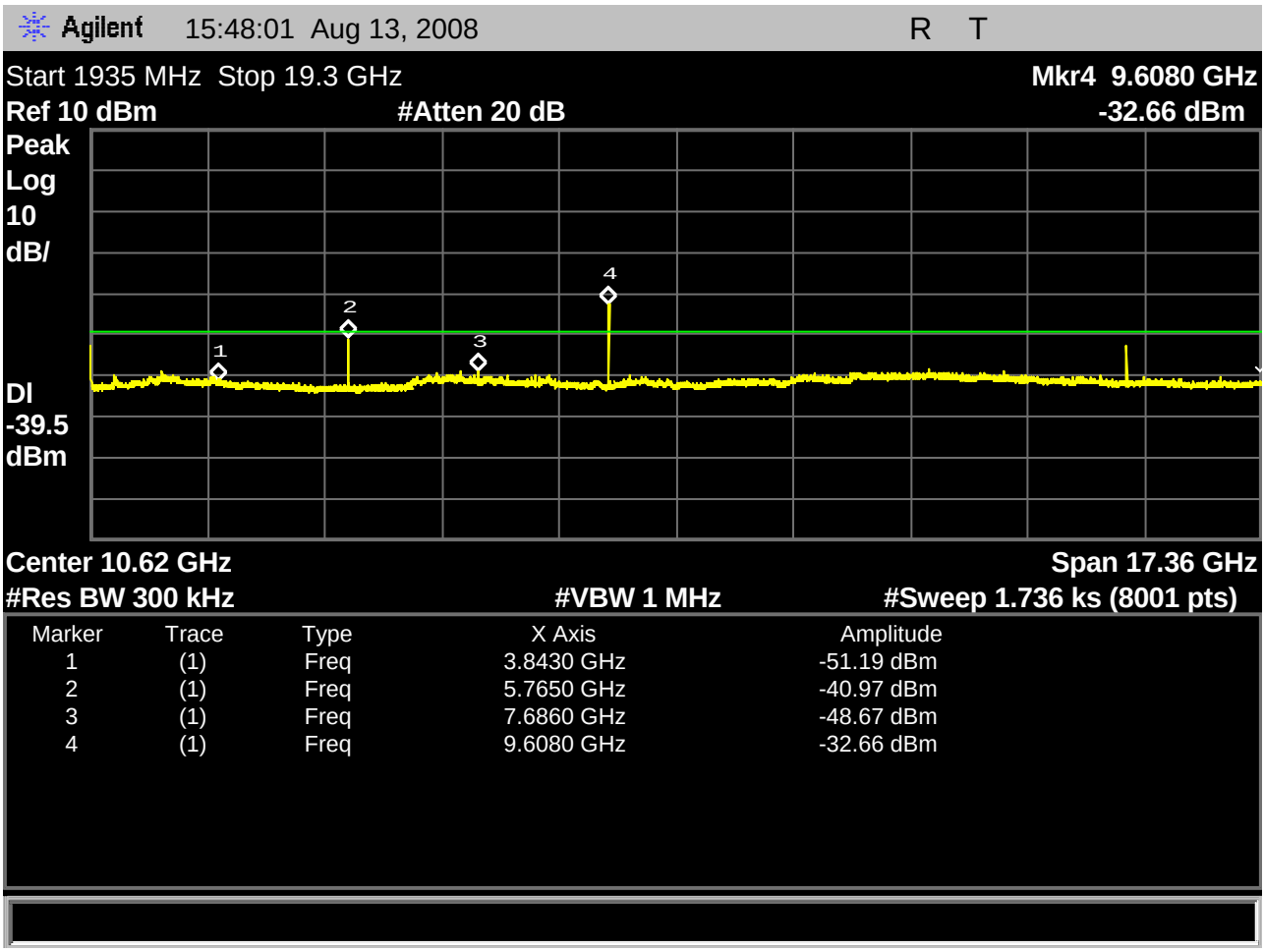

Fig. 27 – headset EUT out-of-band emissions including the regions from 1935MHz to 19.3GHz with the headset EUT transmitting on the lowest carrier, 1921.536MHz.

The least margin is at the 5th harmonic of the transmitter. This measurement is made using a 300kHz resolution bandwidth in the interests of getting a manageable sweep time, 1736.5 seconds, but the 300kHz bandwidth passes considerably more unwanted emissions than the 10kHz obtained from the text of C63.17-2006 clause 6.1.6.

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.

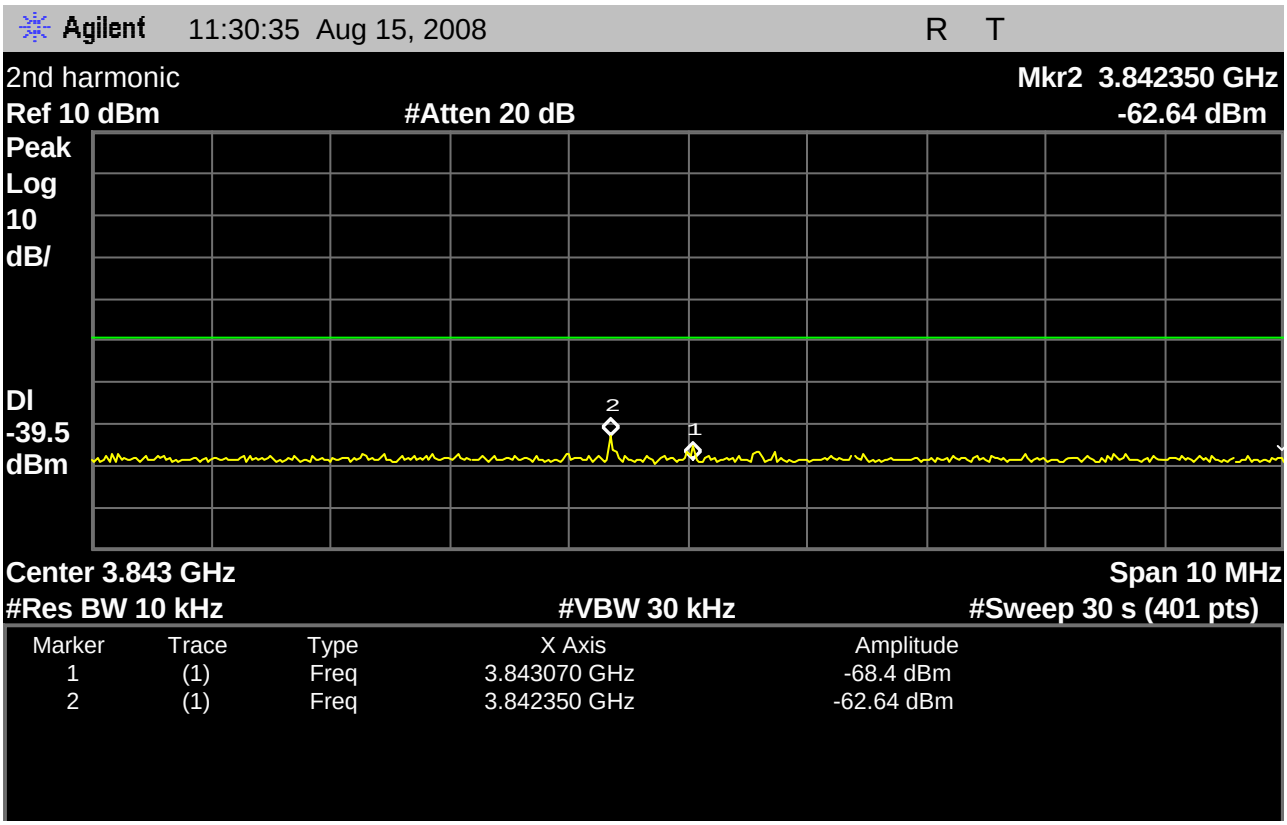

Fig. 28 – headset EUT out-of-band emissions in the region around the 2nd harmonic, with the headset EUT transmitting on the lowest carrier, 1921.536MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at –62.64dBm, shows margin to the -39.5dBm specification of 23.14dB.

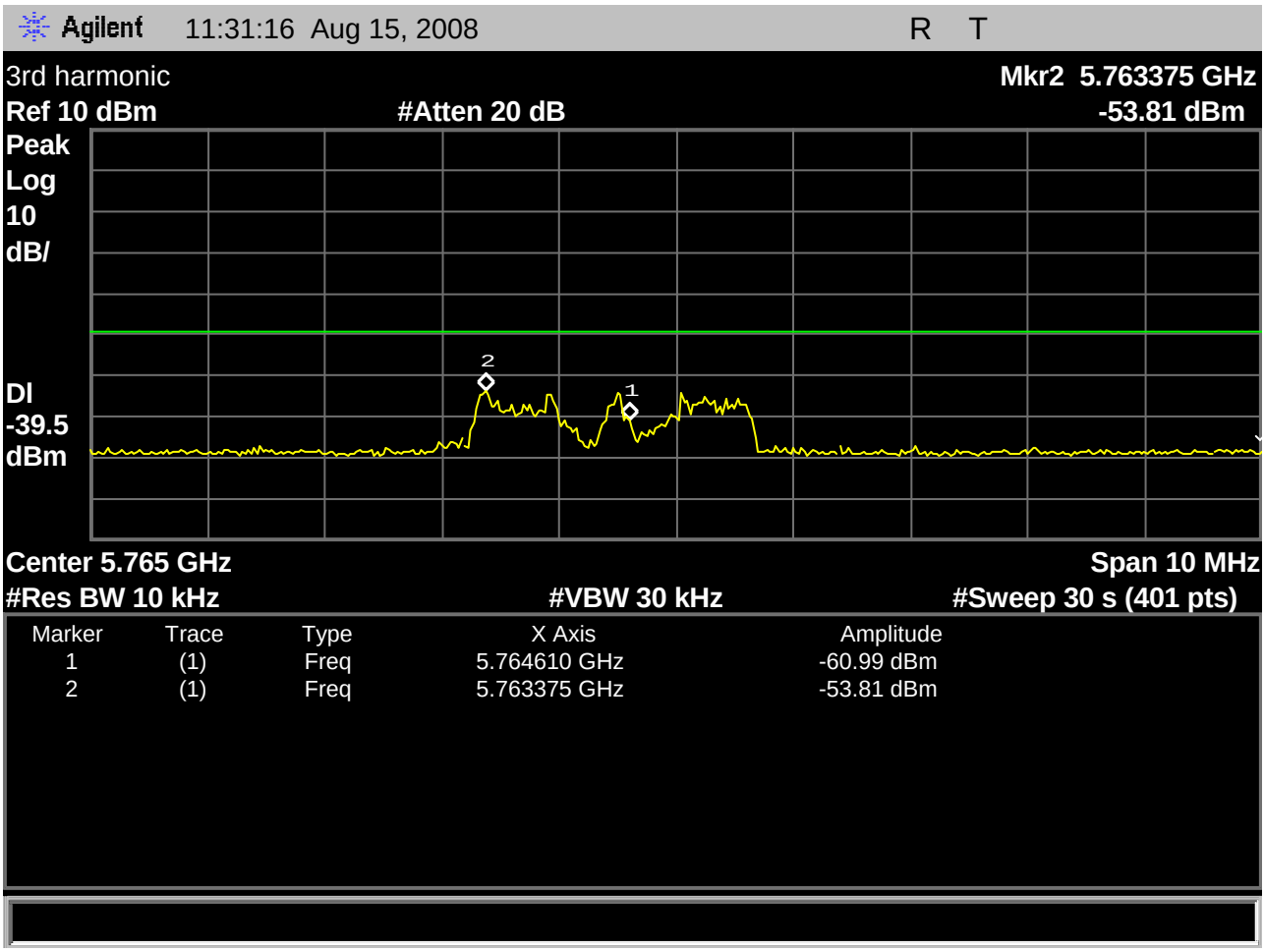

Fig. 29 – headset EUT out-of-band emissions in the region around the 3rd harmonic, with the headset EUT transmitting on the lowest carrier, 1921.536MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at –53.81dBm, shows margin to the -39.5dBm specification of 14.31dB.

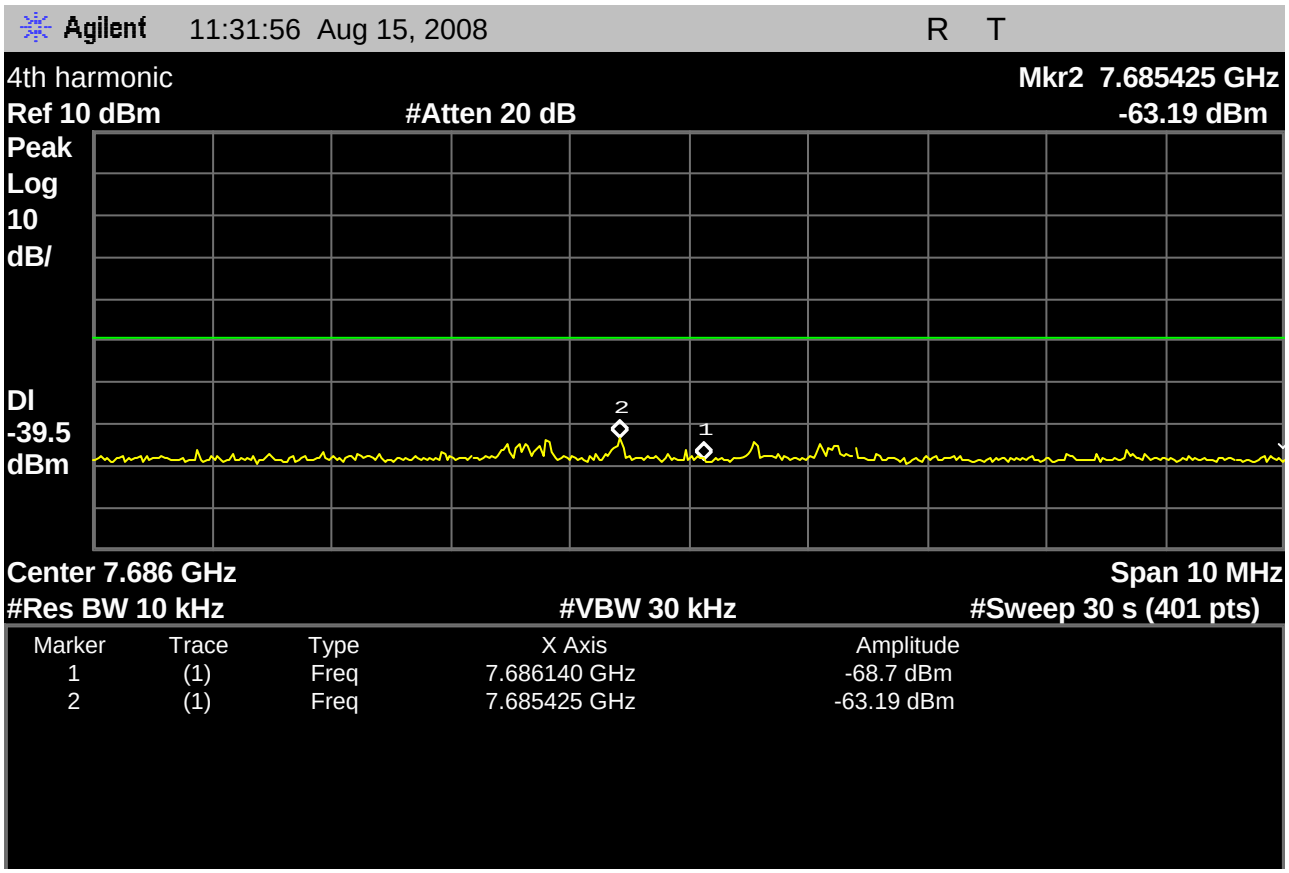

Fig. 30 – headset EUT out-of-band emissions in the region around the 4th harmonic, with the headset EUT transmitting on the lowest carrier, 1921.536MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at –63.19dBm, shows margin to the -39.5dBm specification of 23.69dB.

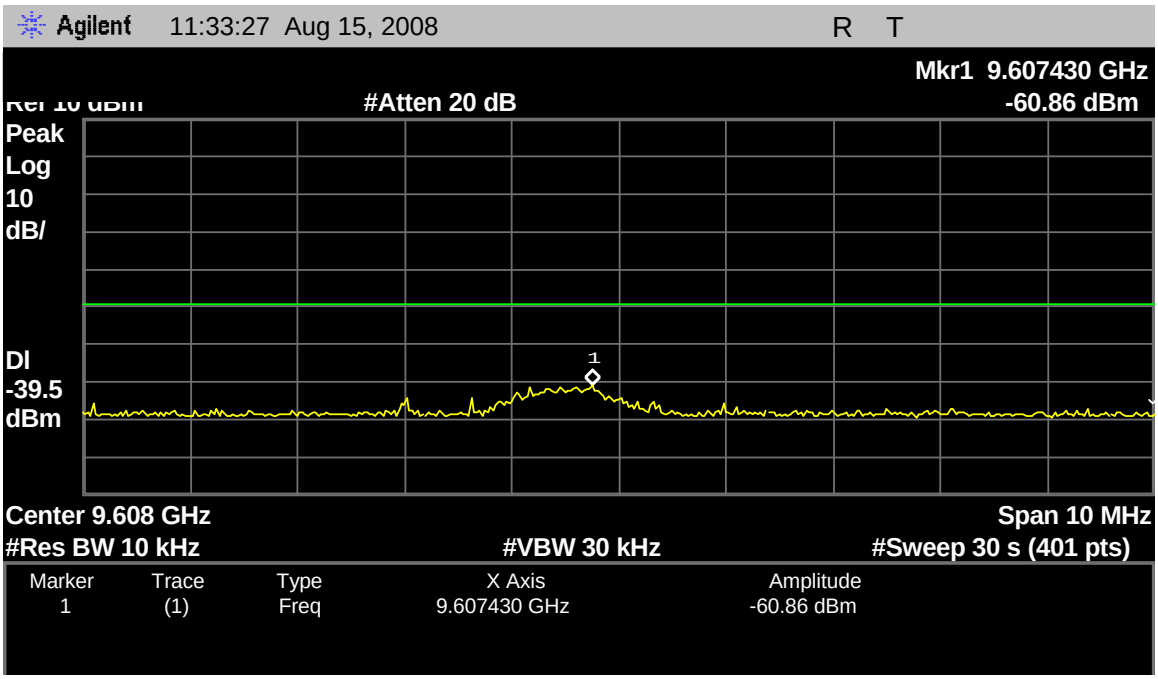

Fig. 31 – headset EUT out-of-band emissions in the region around the 5th harmonic, with the headset EUT transmitting on the lowest carrier, 1921.536MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at –60.86dBm, shows margin to the -39.5dBm specification of 21.36dB.

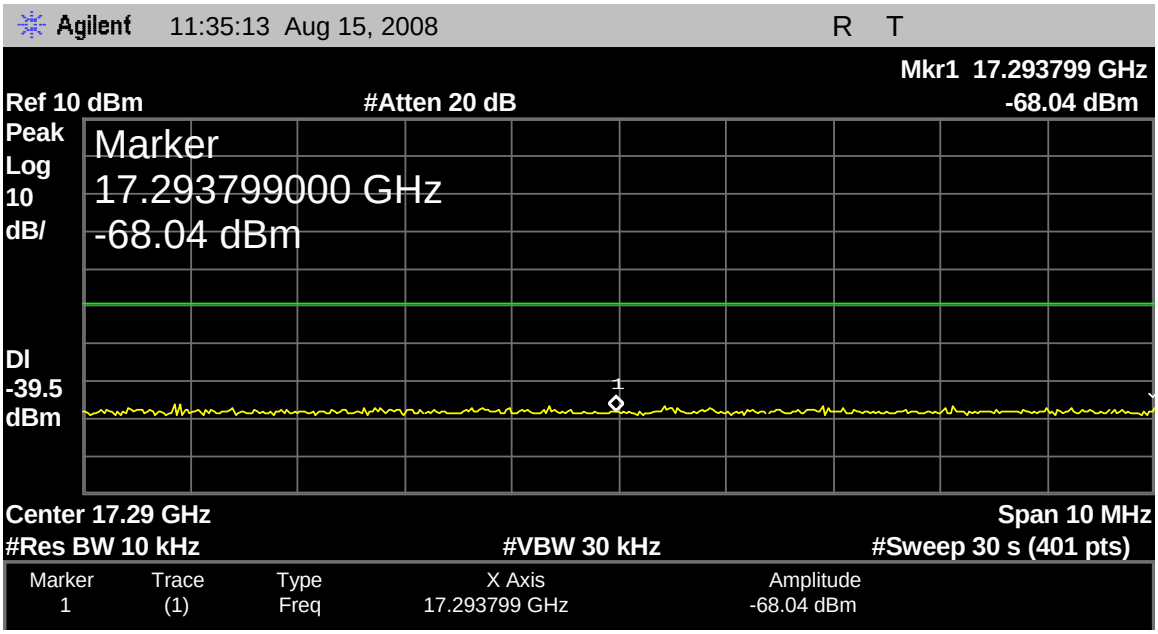

Fig. 32 – headset EUT out-of-band emissions in the region around the 9th harmonic, with the headset EUT transmitting on the lowest carrier, 1921.536MHz.

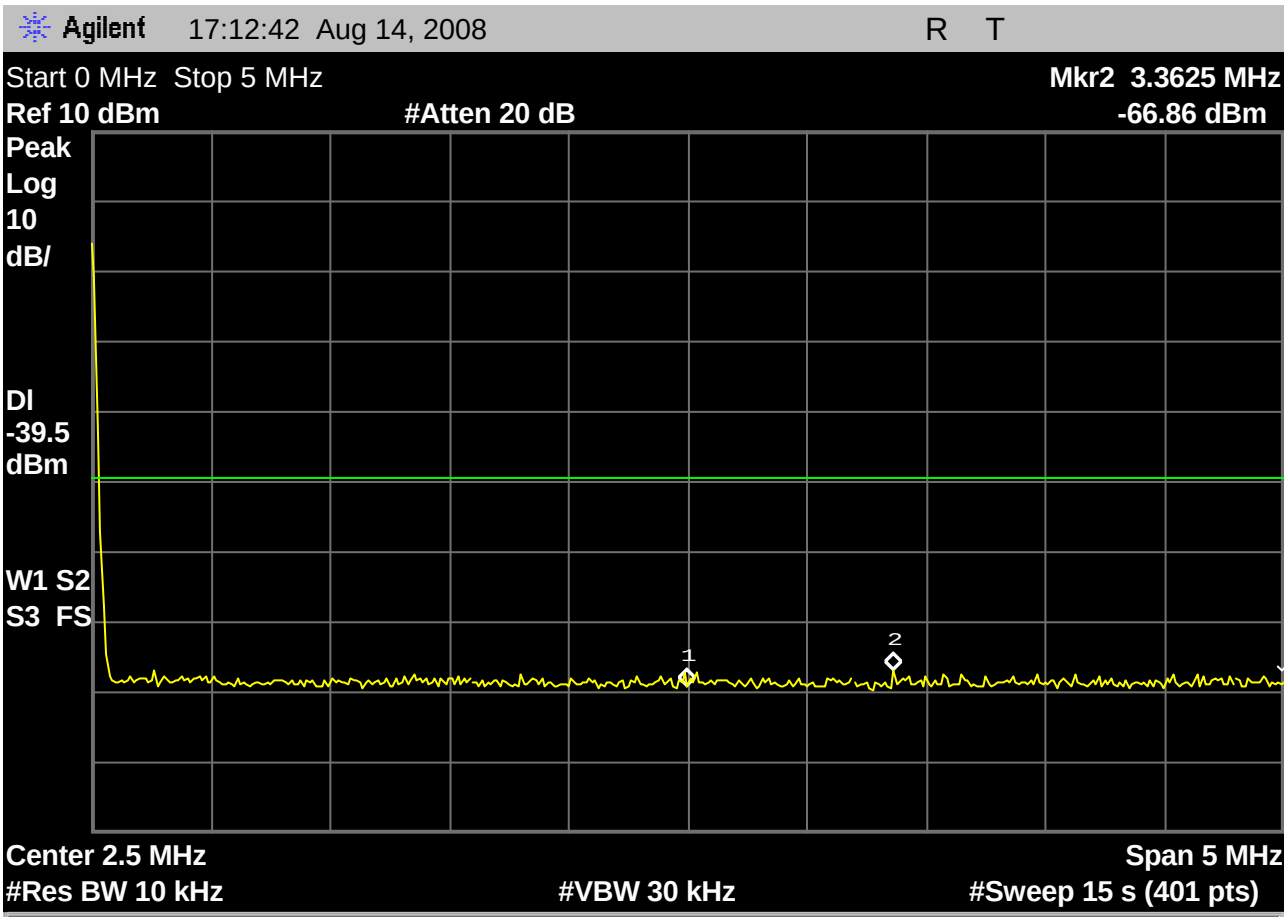

Fig. 33 – headset EUT out-of-band emissions showing the regions from DC to 5MHz, with the transmitter using the highest carrier, 1928.448MHz.

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

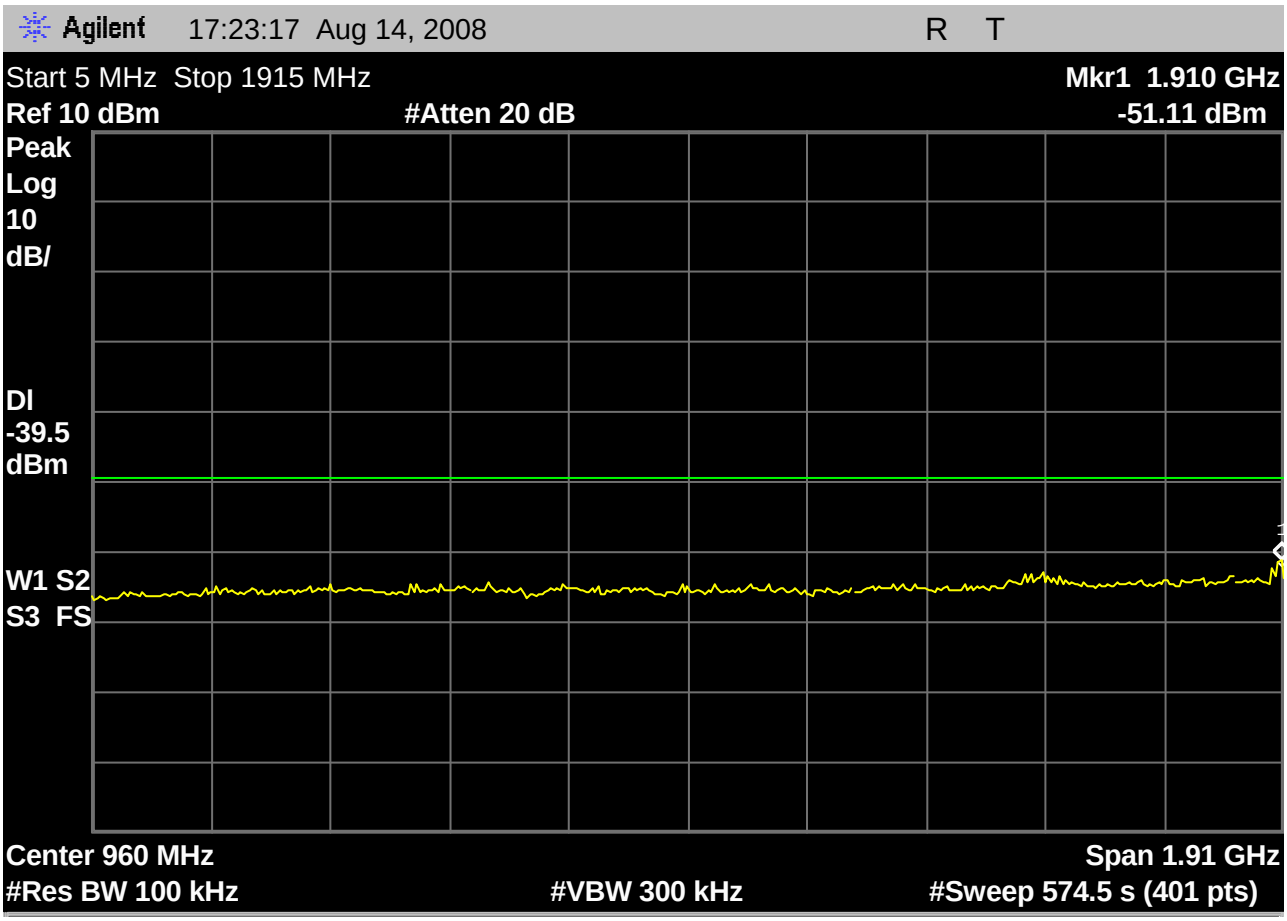

Fig. 34 – headset EUT out-of-band emissions showing the region from 5MHz to 1915MHz, with the transmitter using the highest carrier, 1928.448MHz.

This screenshot shows a sweep made with resolution bandwidth increased to 100kHz to improve sweep time. Headset EUT emissions at –54.5dB have margin to the -39.5dBm out-of-band emissions specification in this spectral region of 12.0dB in this region, even measured in a 10x-wider bandwidth than that of the text of the test procedure in clause 6.1.6.

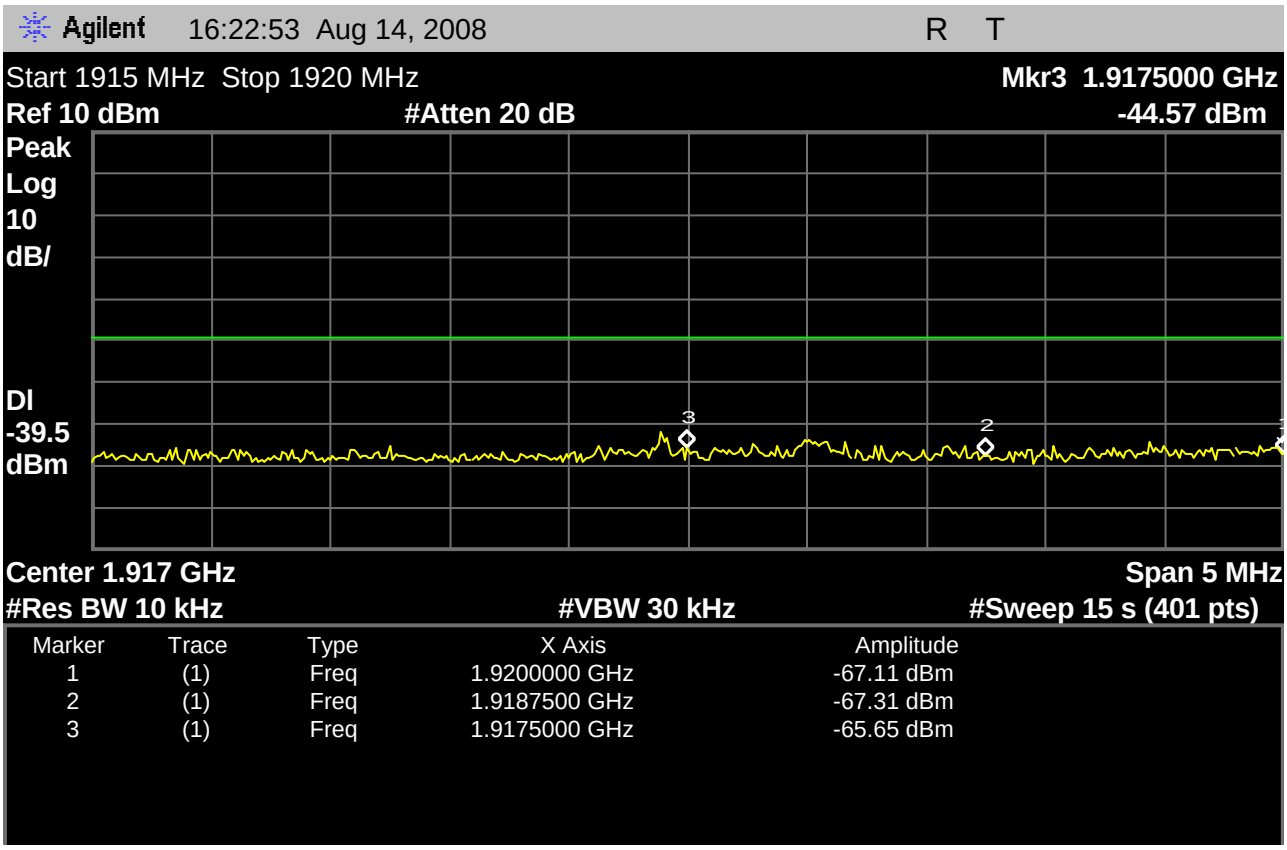

Fig. 35 – headset EUT out-of-band emissions showing the regions from bandedge to -1.25MHz, and from -1.25MHz to -2.5MHz, with the headset EUT transmitting on the highest carrier, 1928.448MHz.

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 20dB.

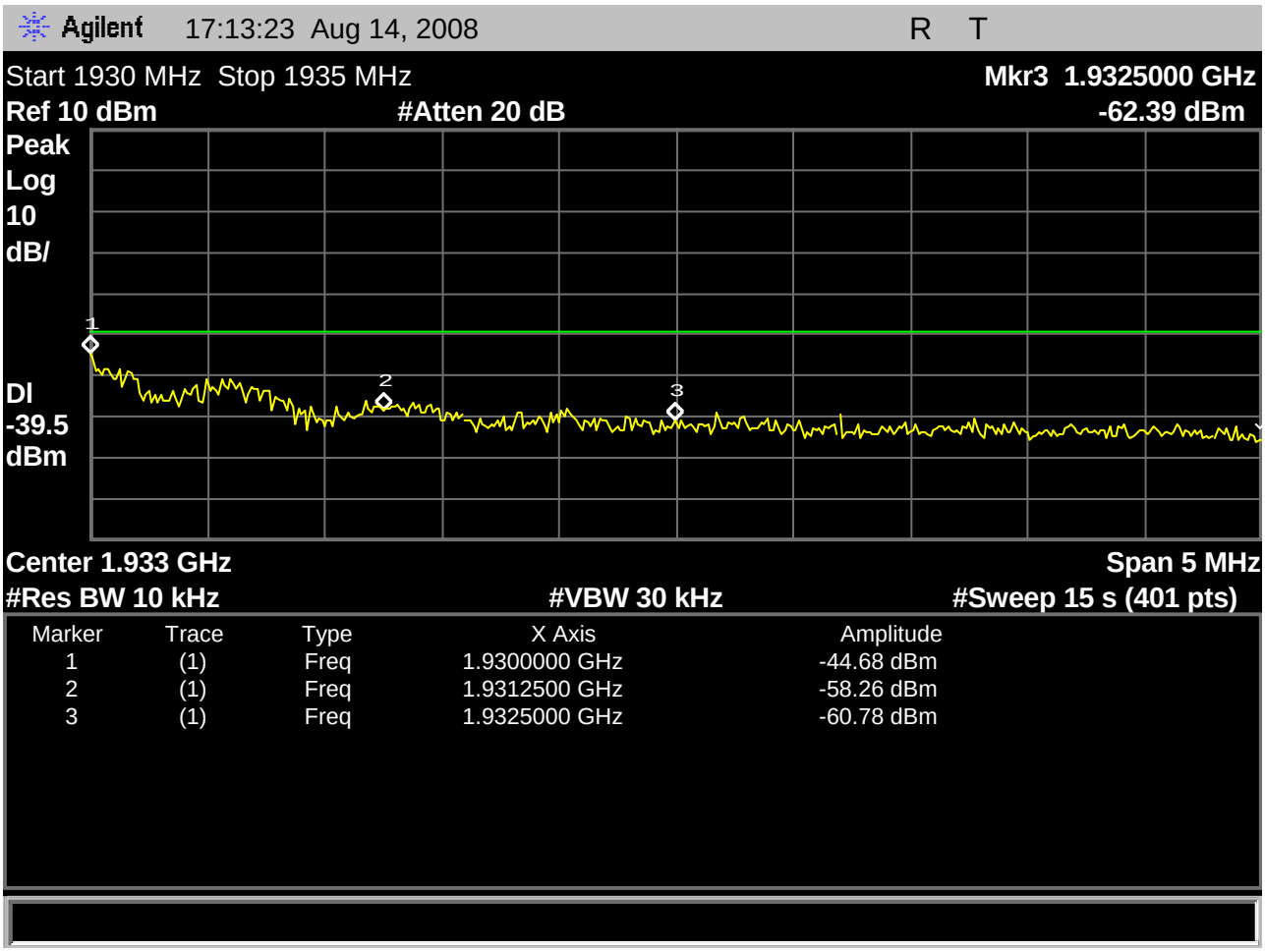

Fig. 36 – headset EUT out-of-band emissions showing the regions from bandedge to +1.25MHz, and from +1.25MHz to +2.5MHz, with the headset EUT transmitting on the highest carrier, 1928.448MHz.

Margin to the specification of -9.5dBm in the region from bandedge to +1.25MHz is found between markers 1 and 2, at –44.68dBm, and is 35.18dBm.

Margin to the specification of -29.5dBm in the region from +1.25MHz to +2.5MHz is found between marker 2 & 3 and is -56dBm, and is 26.5dB.

Margin to the specification of -39.5dBm in the region outside +2.5MHz from the bandedge is approximately -60dBm and is greater than 15.0 dB.

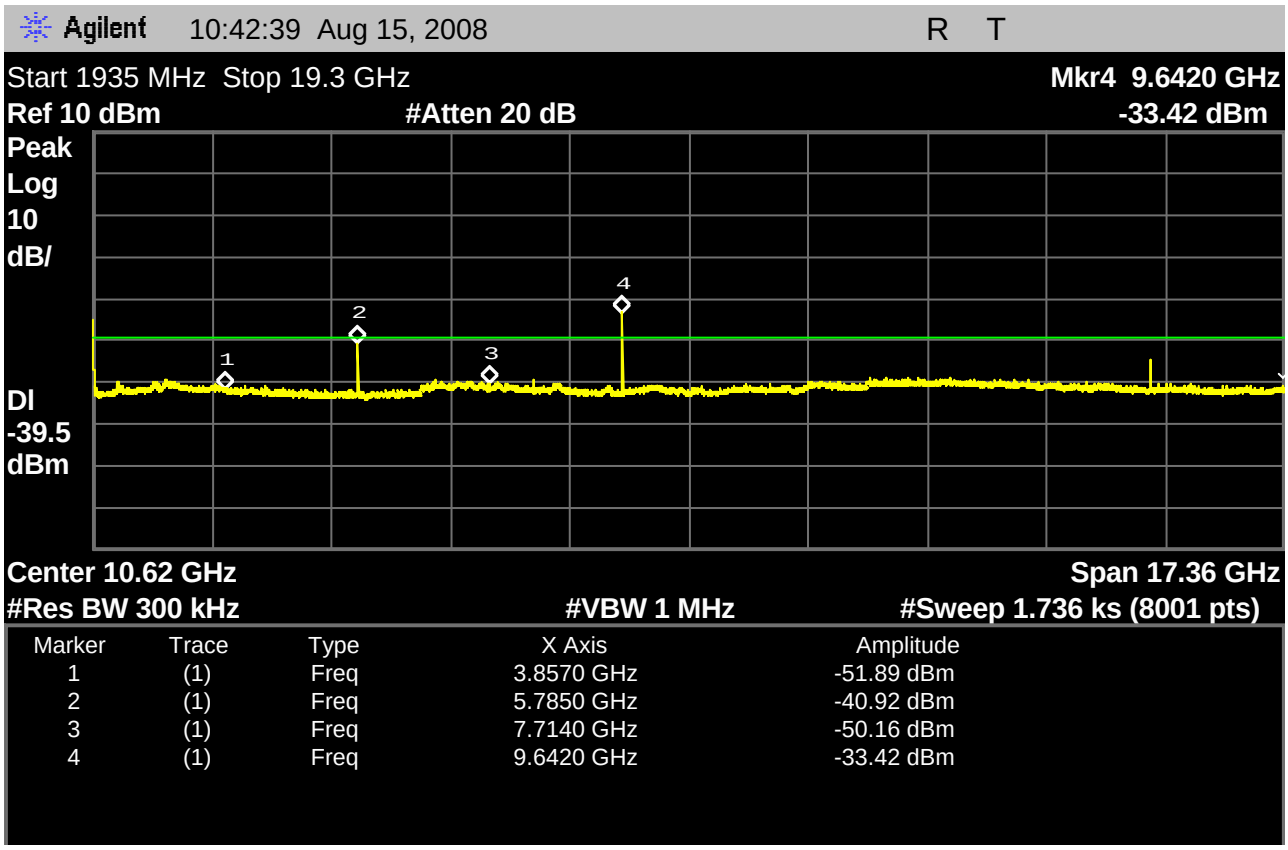

Fig. 37 – headset EUT out-of-band emissions including the regions from 1935MHz to 19.3GHz with the headset EUT transmitting on the highest carrier, 1928.448MHz.

The measurement is noise-limited. This measurement is made using a 300kHz resolution bandwidth in the interests of getting a manageable sweep time, 1736.5 seconds, but the 300kHz bandwidth passes considerably more unwanted emissions than the 10kHz obtained from the text of C63.17-2006 clause 6.1.6.

We then re-do the test using narrow scans according to the requirements of 6.1.6 to resolve the margin in the proper measurement bandwidth.

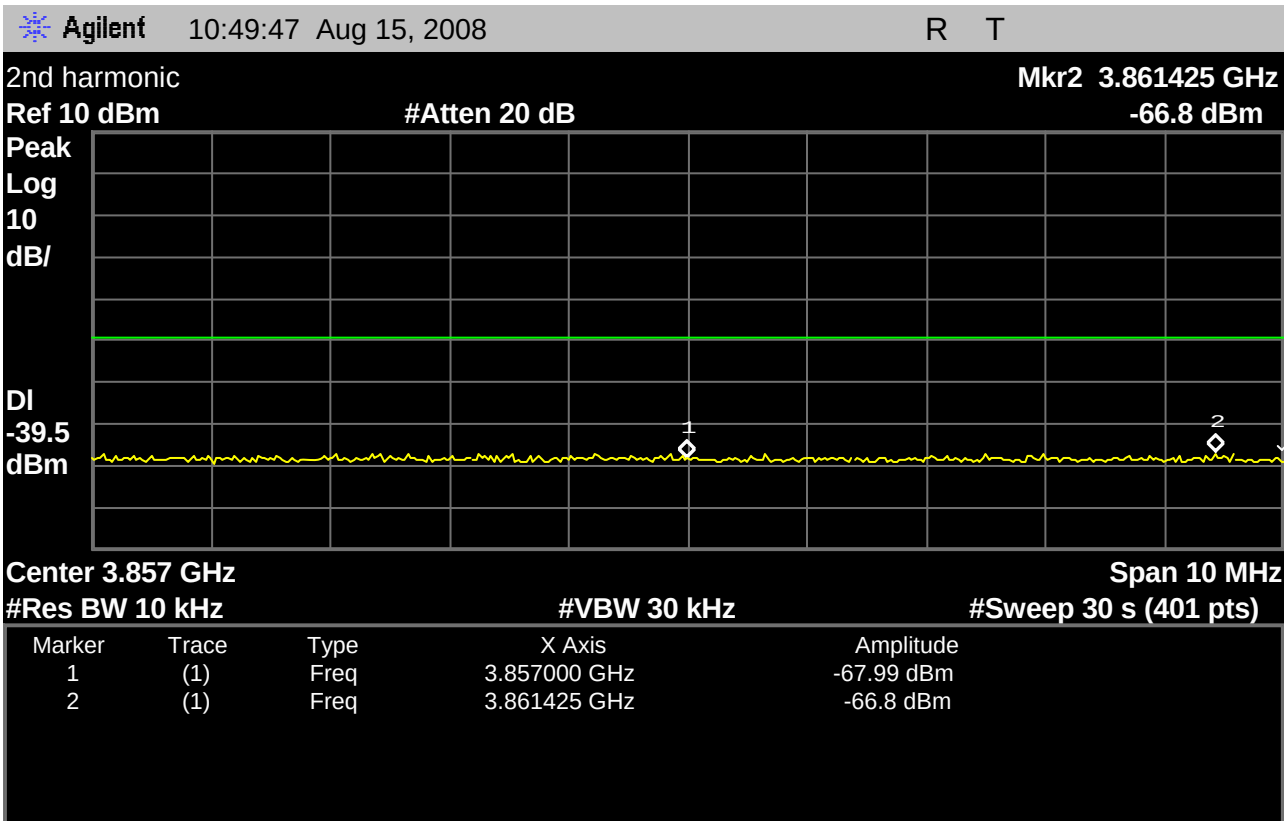

Fig. 38 – headset emissions of 2nd harmonic measured in 10kHz resolution bandwidth shows no response at marker 1; also no response was observed in the 1935MHz to 19.3GHz sweep at 300kHz RBW.

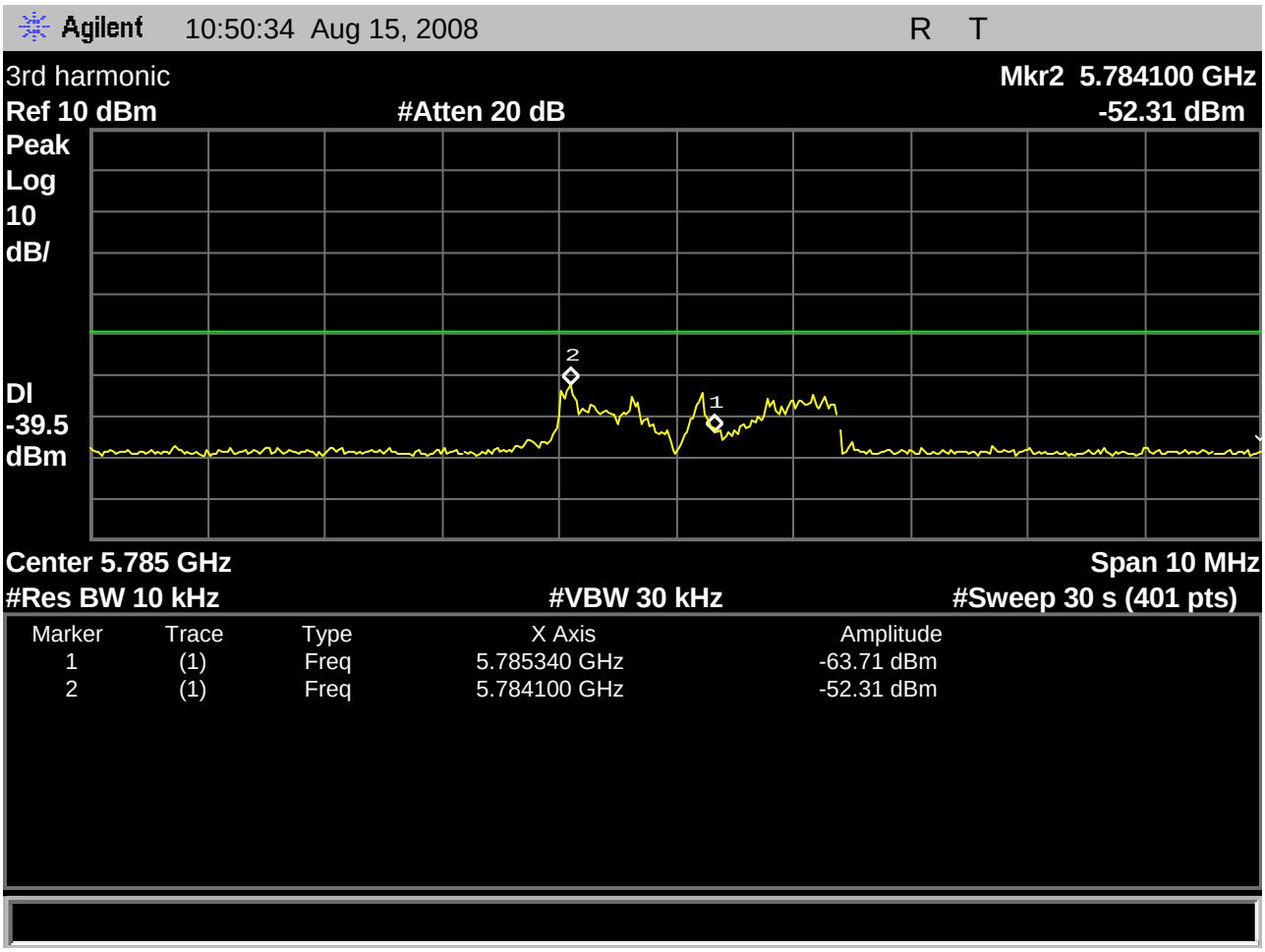

Fig. 39 – headset emissions measured in 10kHz resolution bandwidth in the region where the 1935MHz to 19.3GHz sweep at 300kHz observed a 3rd harmonic response of -52.31dBm, for the headset transmitting on the high carrier, 1928.448MHz. A margin of 12.81dB observed when measured in the specified resolution bandwidth.

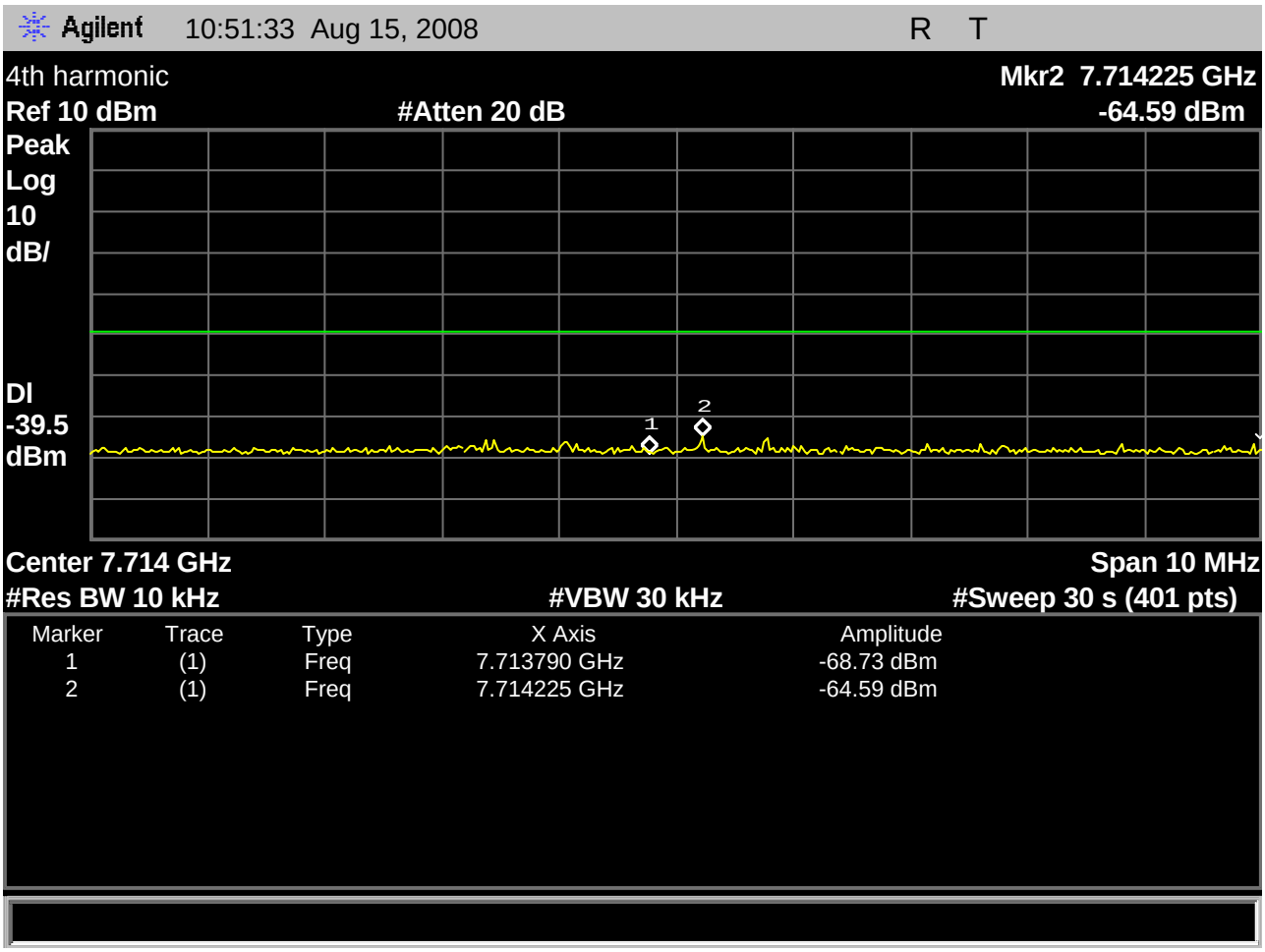

Fig. 40 – headset EUT out-of-band emissions in the region around the 4th harmonic, with the headset EUT transmitting on the highest carrier, 1928.448MHz. A margin of greater than 25dB observed when measured in the specified resolution bandwidth.

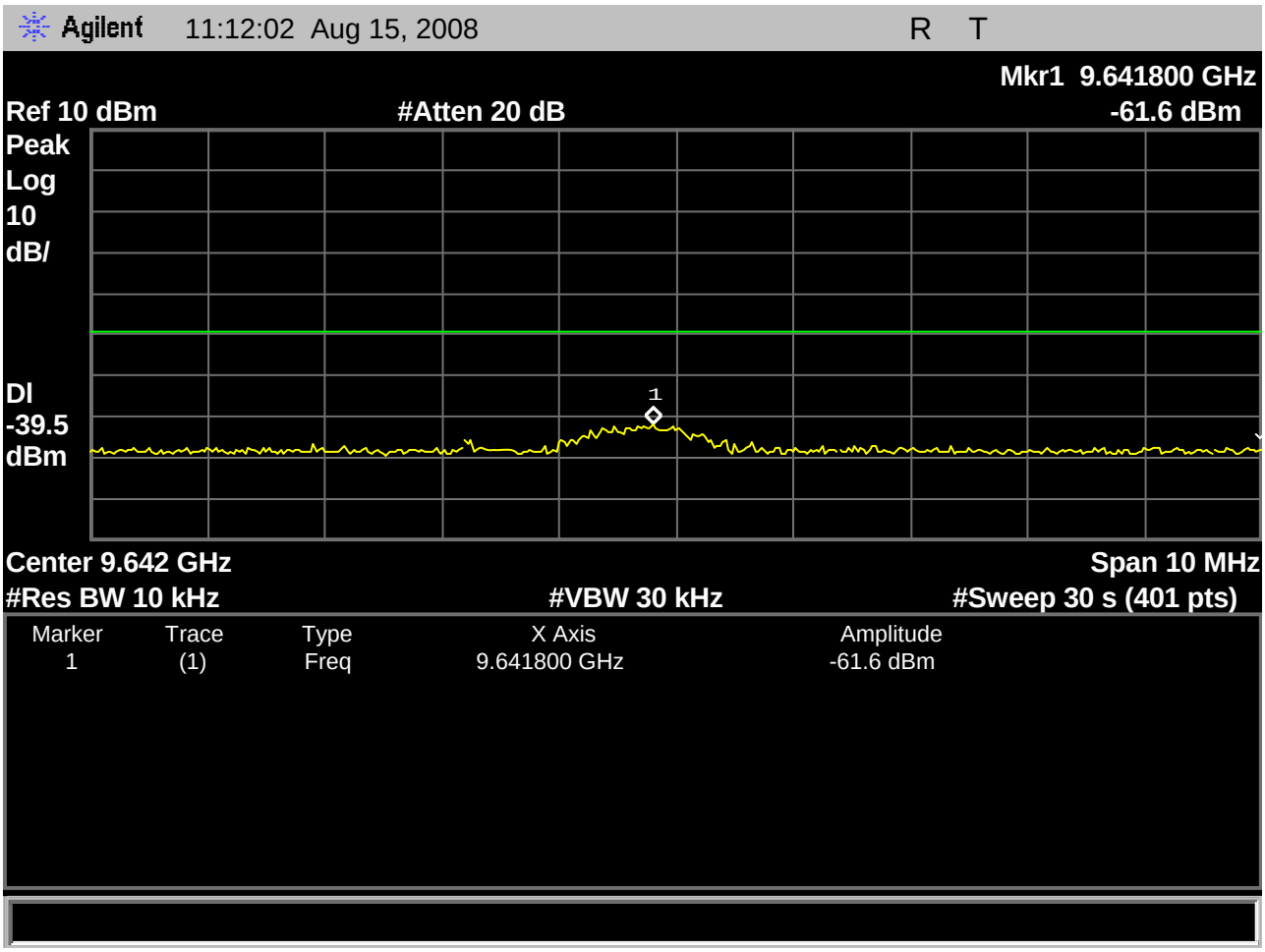

Fig. 41 – headset EUT out-of-band emissions in the region around the 5th harmonic, with the headset EUT transmitting on the highest carrier, 1928.448MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at –61.61dBm, shows margin to the -39.5dBm specification of 22.11dB.

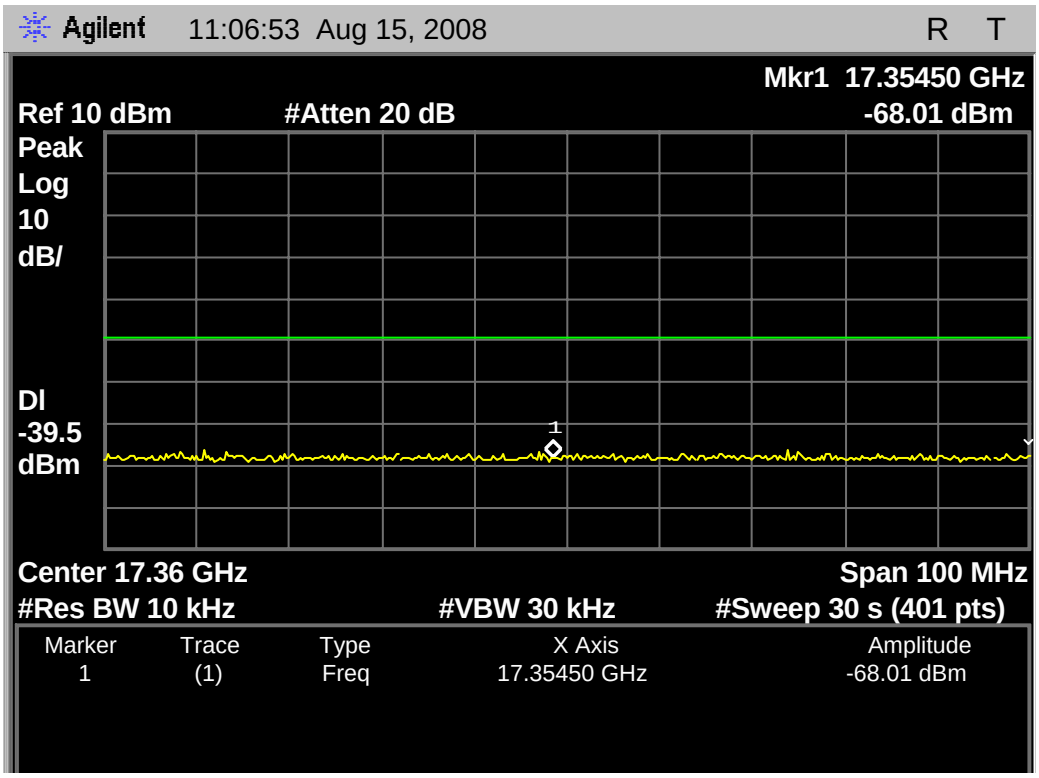

Fig. 42 – headset EUT out-of-band emissions in the region around the 9th harmonic, with the headset EUT transmitting on the highest carrier, 1928.448MHz.

The headset EUT meets the various out-of-band emissions requirements of clause 6.1 with worst-case margin of 12.81dB, under the worst-case conditions of transmitting on the low carrier, at the 3rd harmonic of the transmit signal.

Clause 6.2 Tests of frequency and time stability for the headset EUT

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

The test platform and headset EUT are configured according to test configuration #2, **Standard-specific tester, headset EUT**, of section (I) of this document. The CMD60 is configured to report frequency offset with modulation removed, per the general requirements of 6.2.1. The number of transmit slots over which the measurement is made by the CMD60 is adjusted using the CONFIG MENU/TX TEST/MODULATION keystroke path. Set the number to 100 slots (bursts) to capture one second of signal, since there are 100 bursts per second, to generate one measurement of the mean value of the carrier frequency. The CMD60 measurement system calculates the mean value over each 100-slot measurement. The fixed channel used during the tests is the middle carrier, 1924.992MHz.

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

Clause 6.2.1 Carrier frequency stability, headset EUT.

Clause 6.2.1.1 for the headset EUT; mean carrier frequency drift with time.

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

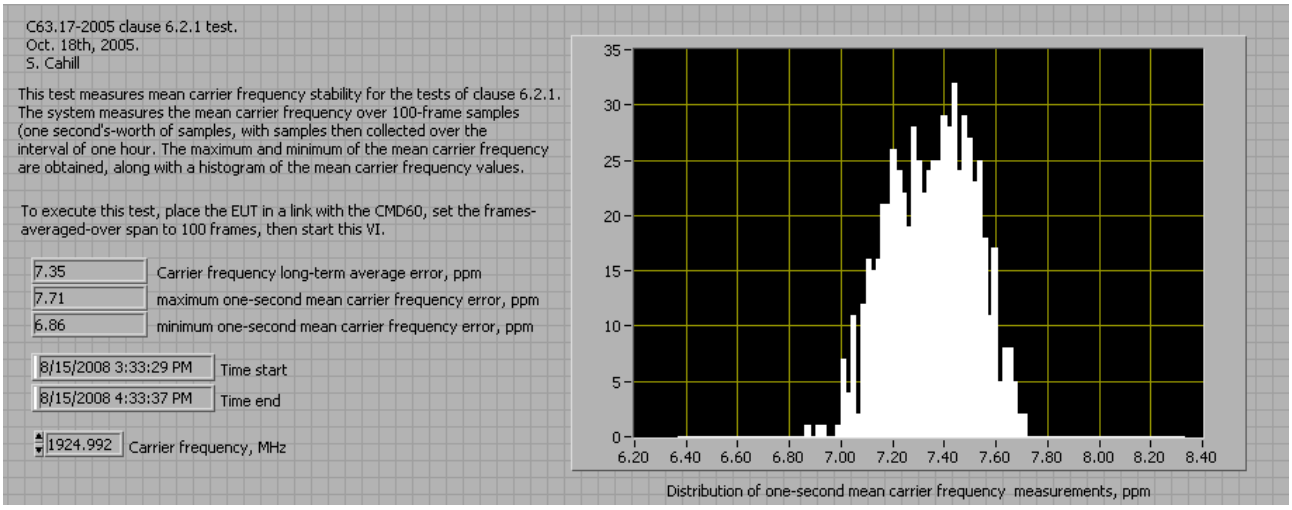

Fig. 44 - Measured one-second mean carrier frequency, headset EUT, and observed maximum, average value and observed minimum of the mean carrier frequency.

The nominal mean carrier frequency error relative to 1924.992MHz is 7.35ppm.

The observed maximum is 7.71ppm, for a maximum relative to nominal of +0.36ppm.

The observed minimum is 6.86ppm, for a change relative to nominal of -0.49ppm.

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

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

Testing for the effects of battery voltage variation is not required for the headset EUT, per the requirements of 47CFR15.323(f) and C63.17-2006. The headset EUT is capable only of operating from a battery.

Clause 6.2.1.3 for the headset EUT; mean carrier frequency change with temperature.

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

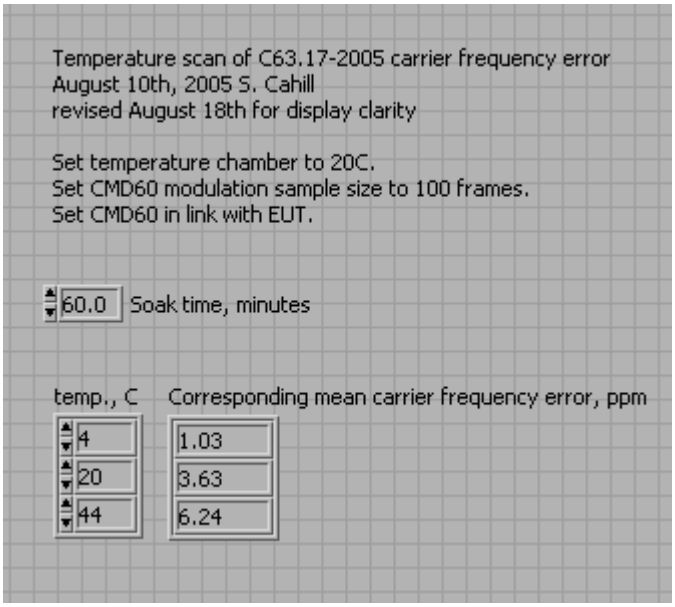

Fig. 45 - Measured mean carrier frequency, headset EUT , at +4C, +20C, +44C.

The nominal mean carrier frequency error relative to 1924.992MHz is 3.63ppm.

The observed value at +4C is 1.03ppm, for a change relative to 20C ambient of -2.60ppm.

The observed value at +44C is 6.24ppm, for a change relative to 20C ambient of +2.61ppm.

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

Clause 6.2.2 Frame repetition stability test for the headset EUT:

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

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

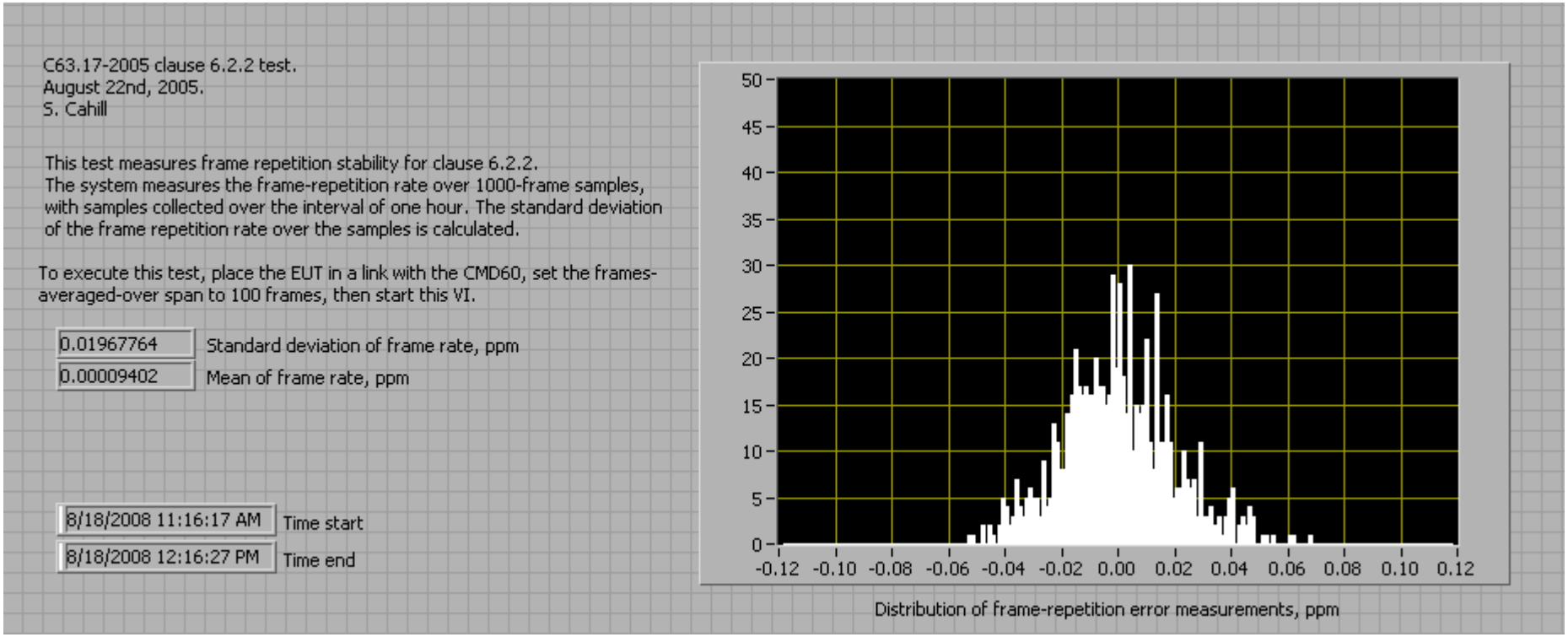

Fig. 46 - Test of headset EUT according to the conditions of clause 6.2.2 for frame repetition rate stability

The measured standard deviation of the frame rate or repetition period according to the requirements of clause 6.2.2 for the headset EUT is 0.01968ppm.

The headset EUT passes the test of clause 6.2.2; the standard deviation of the frequency stability is to be such that three standard deviations of the frequency stability as measured through the error in the frame repetition rate shall not exceed 10ppm, and three standard deviations of the frequency stability for the base EUT is measured to be 0.05903ppm.

Clause 6.2.3 Frame period and jitter test for the headset EUT:

The headset 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.

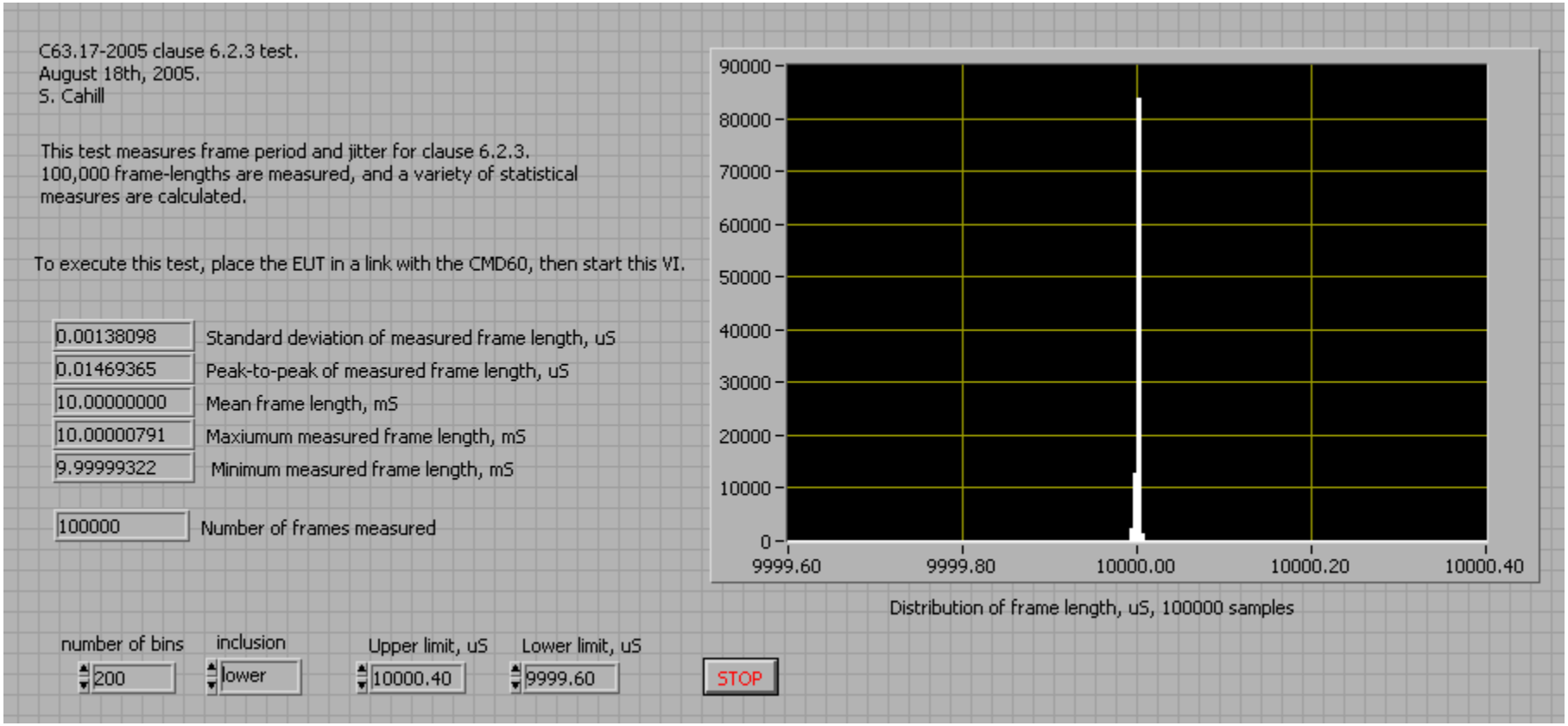

Fig. 47 - Test of headset EUT for frame period and jitter, according to the requirements of clause 6.2.3.

The measured mean value of the frame period is 10.00000000ms, which is 10ms with jitter offset of 0.00000us and three standard deviations of 0.00138us, totaling 0.00414us.

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

IV. Tests of clause 7, headset EUT

Clause 7.3.2 Upper threshold for EUTs which implement the LIC procedure, headset EUT

The test platform, headset EUT and companion base unit are configured according to the requirements for implementing the test of 7.3.2(b) by means of test configuration #3, **With companion device and interference blocking, headset EUT**, of section (I) of this document.

The multi-carrier interference generator (PXI-5670) is set to CW on all 5 carriers, and at level -44.6dBm, which is TU + UM + 10dB, where TU = -60.6dBm from the manufacturer's declarations and the measured emissions bandwidth and UM is defined in C63.17-2006 as 6dB. The transmit spectrum and interference spectrum are observed using the E4407B spectrum analyzer. Trigger is free-run, detection is peak, otherwise spectrum analyzer settings are as shown on the screenshot following. A trace (yellow) is captured and held at the initial interference -44.6dBm setting.

The multi-carrier interference generator level is then reduced incrementally in 1dB steps until the headset EUT responds to the press of the TALK button by initiating a communications channel with the base. A max-hold signal (purple) captures the trace showing when transmissions of the communications channel begin. For each 1dB step, the headset EUT is powered down while the multi-carrier interference generator is set to the new level, then powered up. Each trial includes a delay to allow the headset EUT to locate the beacon transmission from the base companion device. A trace (blue) shows the interference carrier level at the level where headset transmissions first begin. A marker shows the delta between the -44.6dBm level and the level at which headset transmissions first begin.

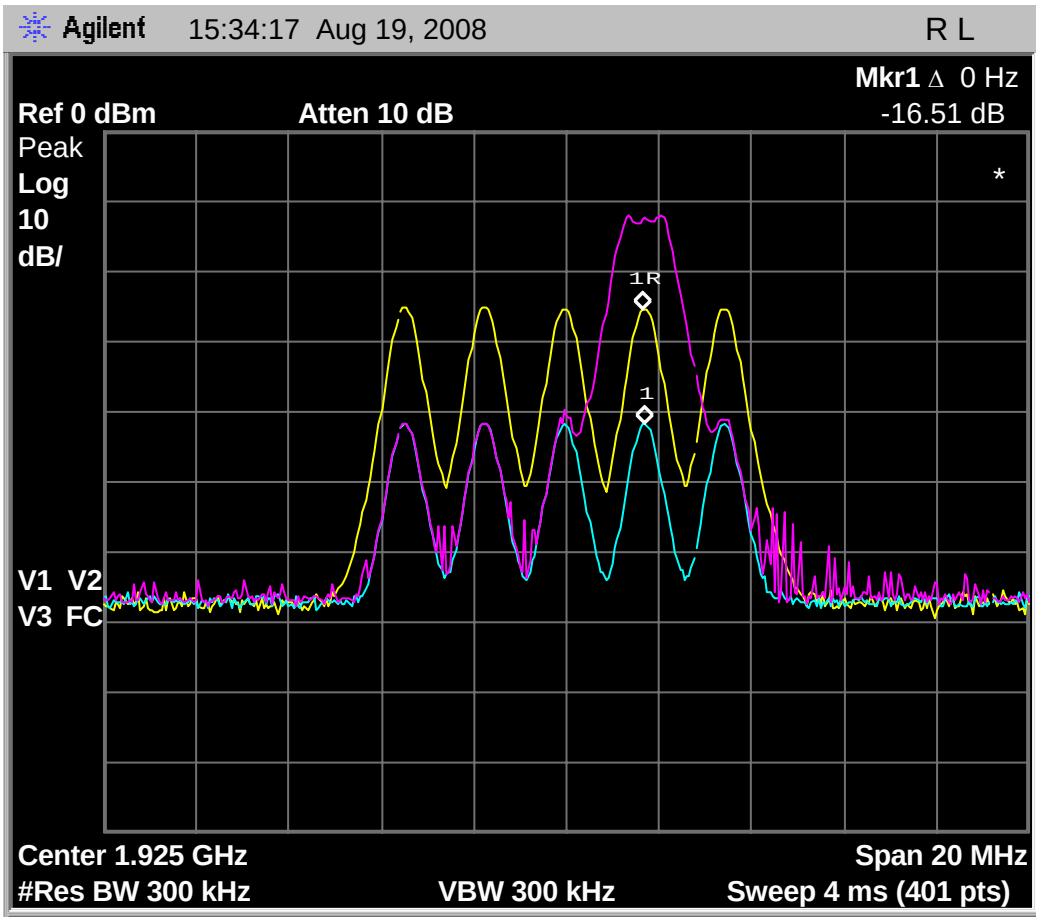

Fig. 48 - Emissions and interference profile spectrum, headset EUT, test 7.3.2.

A trace (yellow, 2nd from top) is captured and held at the initial interference level setting of -44.6dBm. Then the multi-carrier interference generator level is reduced incrementally in 1dB steps until the headset EUT will initiate a communications channel in response to a press of the TALK button. A max-hold signal (purple, top) captures the trace showing when transmissions of the beacon begin. A trace (blue, bottom) shows the interference carrier level at the level where transmissions first begin. A marker shows the delta between the -44.6dBm level and the level at which transmissions first begin.

The first interference level at which the headset EUT transmits is -61.6 dBm. The allowed upper limit is TU + UM = -54.6dBm, the headset EUT passes.

Note that absolute level at the spectrum analyzer and displayed above is a consequence of the relative losses between the EUT port of the combining network and the spectrum analyzer port, relative to the multi-carrier generator port, and does not reflect the signal level at the EUT input.

Clause 7.3.3 Least interfered channel (LIC) procedure test, headset EUT

The test platform, headset EUT and companion base unit are configured according to the requirements for implementing the test of 7.3.3 by means of test configuration #3, **With companion device and interference blocking, headset EUT**, of section (I) of this document.

The multi-carrier interference generator (PXI-5670) is set to CW at $T_U + U_M$ = -54.6dBm on three carriers; at 1928.448MHz, 1924.992MHz, and 1921.536MHz.

Clause 7.3.3(b)

The multi-carrier interference generator is additionally set to generate on f_1 a CW signal of level $T_L + U_M$ +7dB, or -67.6dBm (where $T_L = T_U$ - 20dB) and to generate on f_2 a CW signal of level $T_L + U_M$ = -74.6dBm, where f_1 = 1926.720MHz and f_2 = 1923.264MHz, the remaining two of the system's five carriers.

With this interference profile present, apply power to the headset EUT and the companion base unit. Wait for the headset to detect the base companion device, then press the TALK button on the headset to initiate the communications channel. Repeat the communications channel establishment five times while monitoring the spectrum using the E4407B spectrum analyzer to validate that, when this interference profile is applied to the headset EUT, the headset always chooses f_2 for the communications channel.

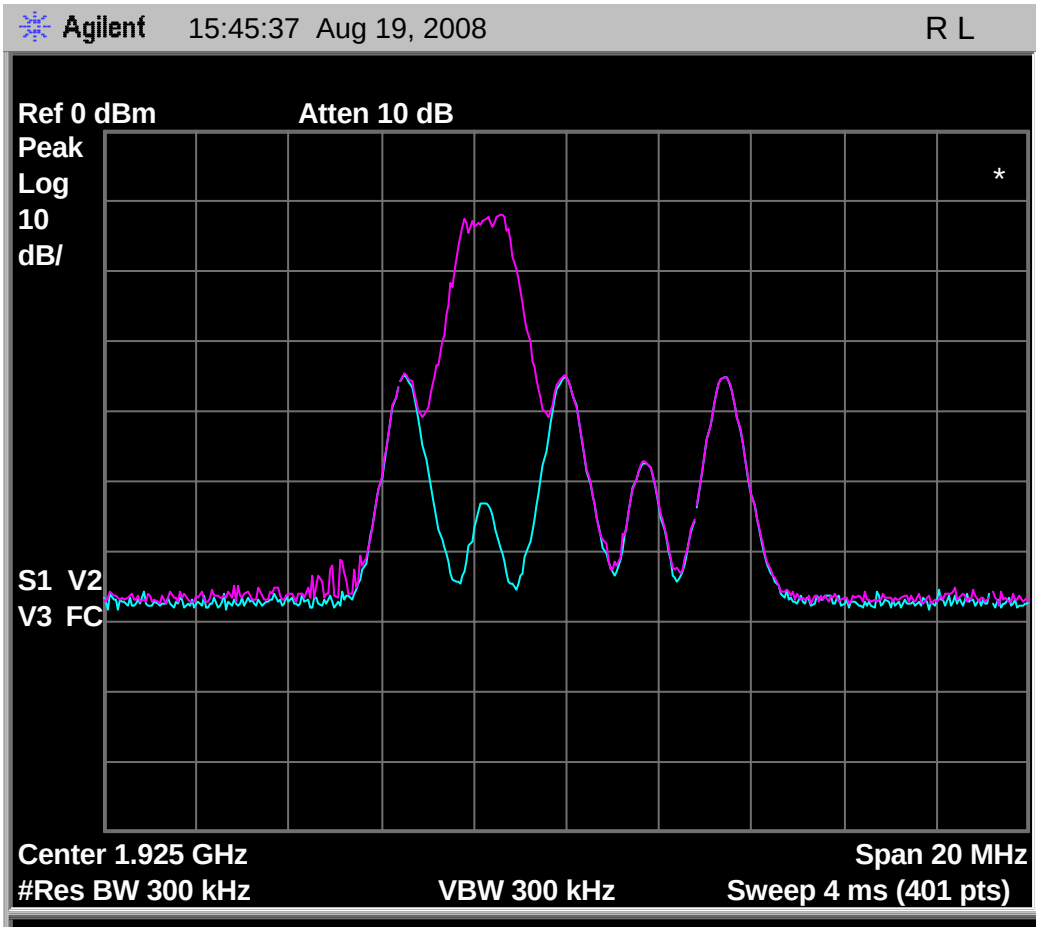

Fig. 49 - Emissions and interference profile spectrum, headset EUT, test 7.3.3(b).

A max-hold signal (purple, top) captures the trace showing where in the spectrum EUT transmissions are occurring. A trace (blue, bottom) shows the interference profile.

The headset EUT always transmits on f_2 (the carrier with the lower interference level) and so meets the requirement of not transmitting on f_1.

Clause 7.3.3(c)

Repeat the test of 7.3.3(b), except reverse the levels on f_1 and f_2. That is, the multi-carrier interference generator is now set to generate on f_1 a CW signal of level $T_L + U_M$, or -74.6dBm and to generate on f_2 a CW signal of level $T_L + U_M$ + 7dB = -67.6dBm, where f_1 = 1926.720MHz and f_2 = 1923.264MHz.

With this interference profile present, apply power to the headset EUT and the companion base unit. Wait for the headset to detect the base unit. Then press the TALK button on the headset to establish a communications channel. Repeat the communications channel establishment five times while monitoring the spectrum using the E4407B spectrum analyzer to validate that, when this interference profile is applied to the headset EUT, the headset EUT always chooses f_1 for the communications channel.

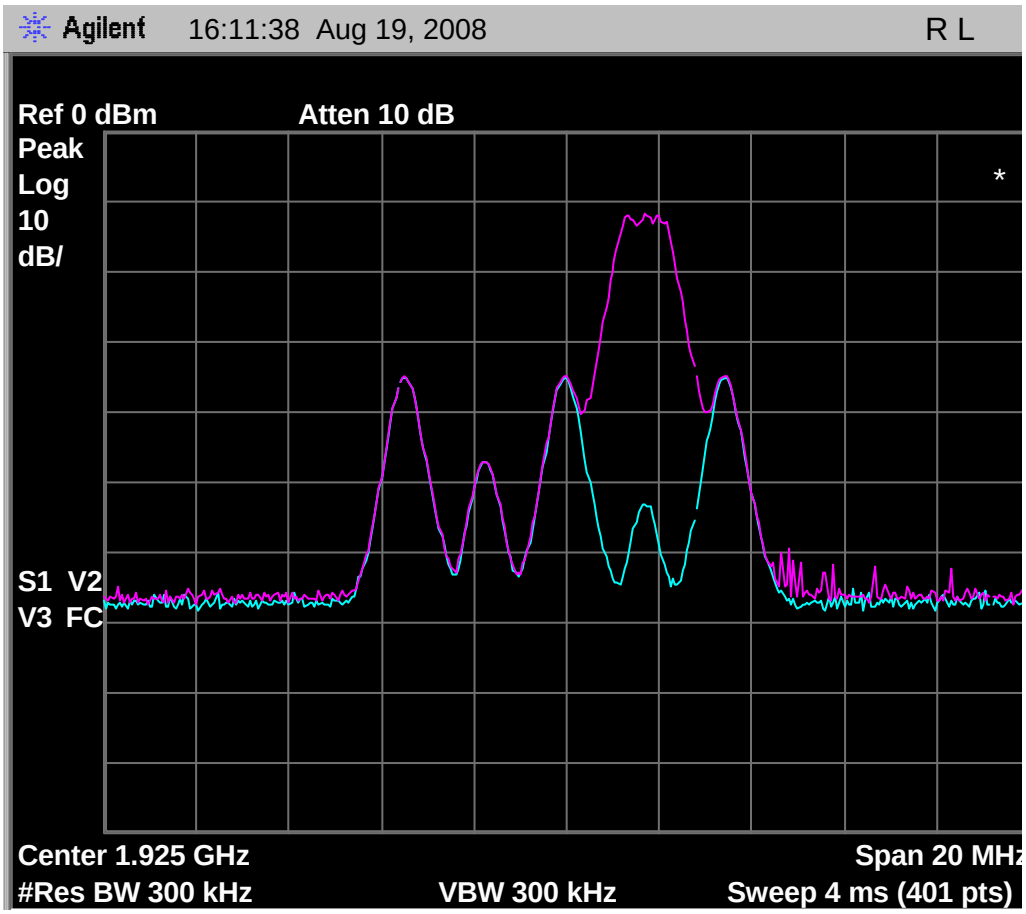

Fig. 50 - Emissions and interference profile spectrum, headset EUT, test 7.3.3(c).

The headset EUT always transmits on f_1 (the carrier with the lower interference level) and so meets the requirement that it never transmit on f_2.

Clause 7.3.3(d)

Repeat the test of 7.3.3(b), except the multi-carrier interference generator is now set to generate on f_1 a CW signal of level $T_L + U_M$ + 1dB or -73.6dBm and to generate on f_2 a CW signal of level $T_L + U_M$ - 6dB = -80.6dBm, where f_1 = 1926.720MHz and f_2 = 1923.264MHz.

With this interference profile present, apply power to the headset EUT and the companion base unit. Wait for the headset EUT to detect the base beacon transmission. Then press the TALK button on the headset to establish a

communications channel. Repeat the communications channel establishment five times while monitoring the spectrum using the E4407B spectrum analyzer to validate that, when this interference profile is applied to the headset EUT, the headset EUT always chooses f_2 for the communications channel.

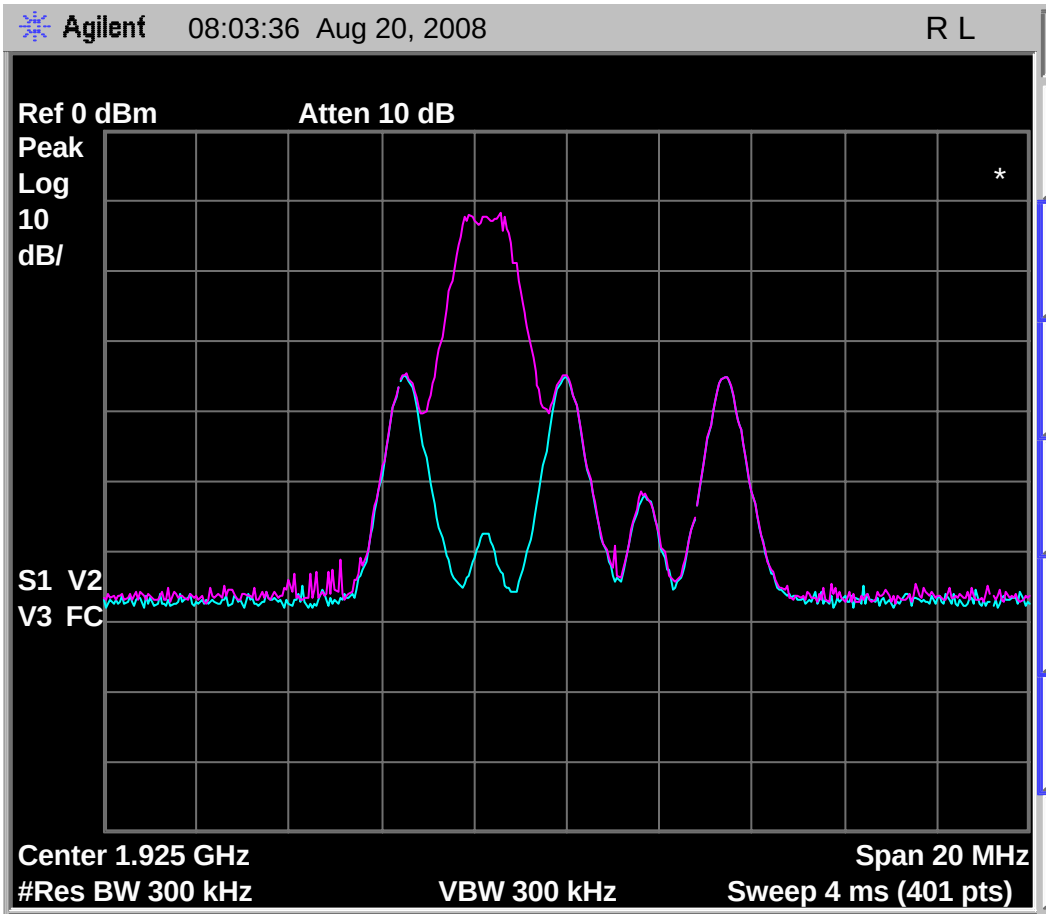

Fig. 51 - Emissions and interference profile spectrum, headset EUT, test 7.3.3(d).

The headset EUT always transmits on f_2 (the carrier with the lower interference level) and so meets the requirement that it never transmit on f_1.

Clause 7.3.3(e).

Repeat the test of 7.3.3(d), except reverse the levels on f_1 and f_2. That is, the multi-carrier interference generator is now set to generate on f_1 a CW signal of level $T_L + U_M$ - 6dB or -80.6dBm and to generate on f_2 a CW signal of level $T_L + U_M$ +1dB = -73.6dBm, where f_1 = 1926.720MHz and f_2 = 1923.264MHz.

With this interference profile present, apply power to the headset EUT and the companion base unit. Wait for the headset EUT to detect the base unit's beacon transmissions. Then press the TALK button on the headset to establish a communications channel. Repeat the communications channel establishment five times while monitoring the spectrum using the E4407B spectrum analyzer to validate that, when this interference profile is applied to the headset EUT, the headset EUT always chooses f_1 for the communications channel.

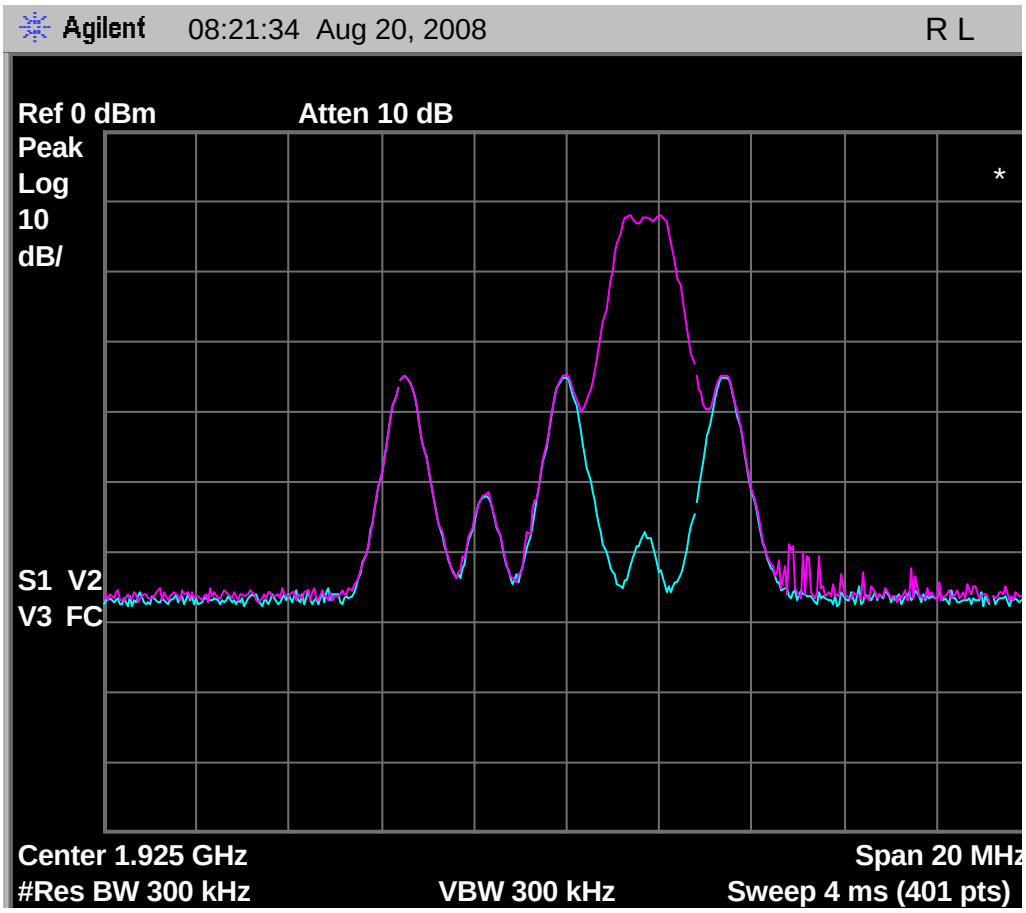

Fig. 52 - Emissions and interference profile spectrum, headset EUT, test 7.3.3(e).

The headset EUT always transmits on f_1 (the carrier with the lower interference level) and so meets the requirement that it never transmit on f_2.

Clause 7.3.4 Selected channel confirmation, headset EUT

The test platform, headset EUT and companion base unit are configured according to the requirements for implementing the test of 7.3.4 by means of test configuration #3, **With companion device and interference blocking, headset EUT**, of section (I) of this document. An example of the headset EUT's selected channel confirmation function is shown below, with the multi-carrier interference generator configured to enable the automatic switch from the initial interference profile to the alternate interference profile based on the reception of the trigger signal generated by the headset in the frame prior to the initiation of transmission of the headset companion device and base EUT transmissions of communications channel signals, but with the alternate interference profile configured so that the access criteria are met and transmission is allowed.

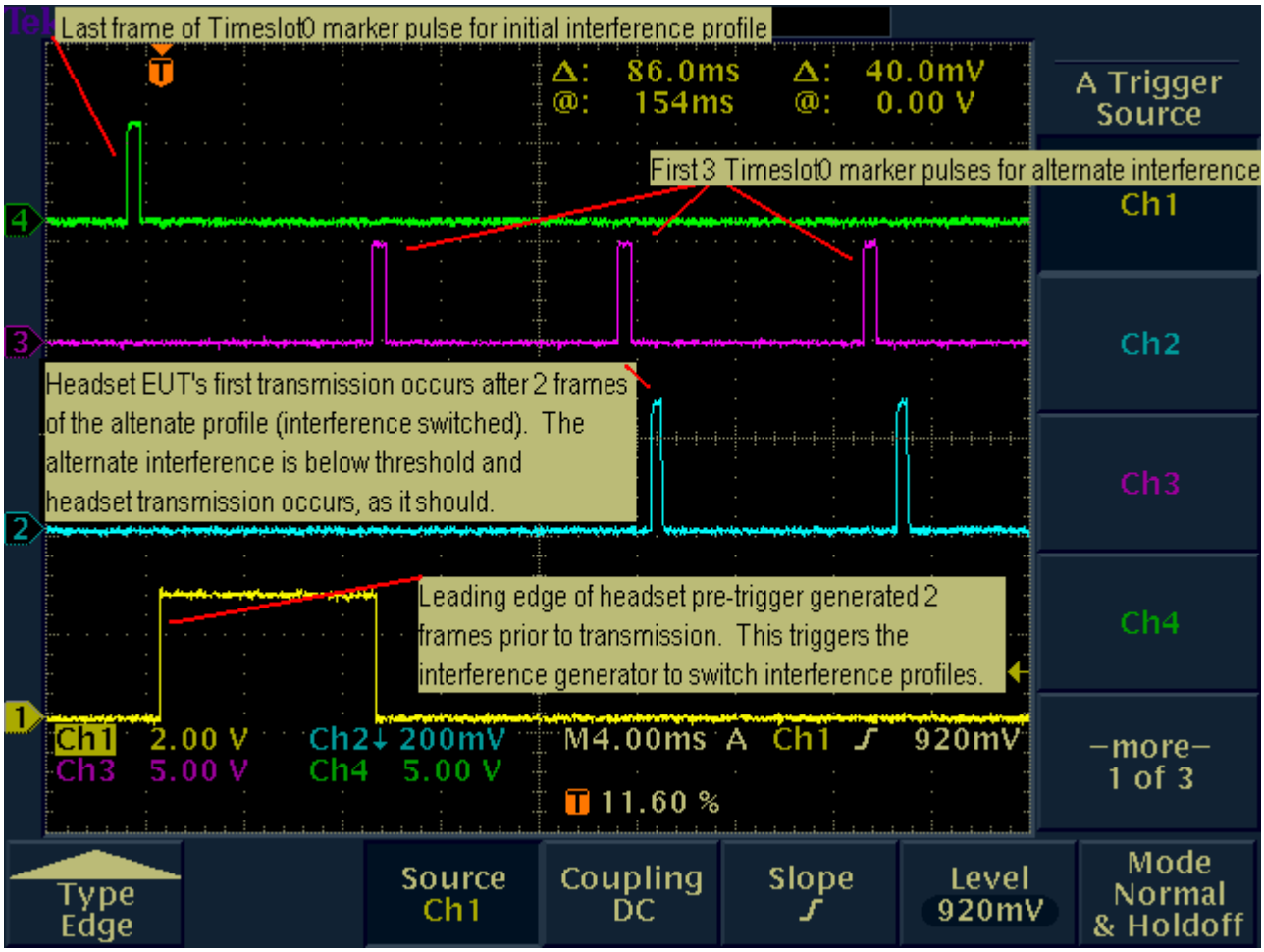

Fig. 53 - Example oscilloscope screenshot showing transition from initial to alternate interference profile in the frame before headset EUT initiation of transmission of the communications channel; for this example the alternate interference profile is configured to meet the access criteria. The text of the notes is best viewed at 150% magnification.

For this example no interference of significant power is present, so headset EUT does not defer. Green (top) trace is marker for slot 0 of initial interference profile. Purple (2nd from top) trace is marker for alternate interference profile. Blue (3rd from top) trace is output of RF detector, showing headset EUT communications channel transmissions. Yellow (bottom) trace is status flag output from the headset, set by the headset in response to the press of the TALK button, in the frame two frames prior to the headset EUT's intended first transmit frame.

For the example above, the multi-carrier interference generator is configured to enable the automatic switch from the initial interference profile to the alternate interference profile based on the reception of the trigger signal generated by the headset in the frame prior to the initiation of transmission of the headset companion device and base EUT

transmissions of communications channel signals. Since both the initial and alternate interference profiles are set to have the same carrier with no interference present; the headset EUT checks the access criteria in the frame prior to the first transmission, but the access criteria test passes and so the headset EUT begins transmissions immediately.

To execute the test with interference present, the multi-carrier interference generator (PXI-5670) initial interference profile is then set to CW at $T_U + U_M$ = -54.6dBm on three carriers; at 1928.448MHz, 1924.992MHz, and 1921.536MHz, and additionally set to generate on f_1 a CW signal of level $T_U + U_M$, or -54.6dBm and to generate no interference on f_2, here f_1 = 1926.720MHz and f_2 = 1923.264MHz, the remaining two of the total system's five carriers.

The multi-carrier interference generator (PXI-5670) alternate interference profile is set to CW at $T_U + U_M$ = -54.6dBm on three carriers; at 1928.448MHz, 1924.992MHz, and 1921.536MHz, and additionally set to generate no interference on f_1, and to generate on f_2 a CW signal of level $T_U + U_M$, or -54.6dBm, where f_1 = 1926.720MHz and f_2 = 1923.264MHz, the remaining two of the total system's five carriers. See section III-C, the tests of 7.3.4 as applied to the base EUT, for documentation of the interference characteristics.

Initially, the multi-carrier generator is configured not to switch to the alternate profile when the EUT begins transmissions. With this interference profile present, apply power to the headset EUT and the companion base unit. Then press the TALK button on the headset to establish a communications channel. Verify that the headset EUT transmits on f_2, then press and release the TALK button on the headset to terminate the communications channel. The multi-carrier interference generator is then configured to enable the automatic switch from the initial interference profile to the alternate interference profile, and the sequence repeated; for this case, the presence of the alternate interference profile beginning in the frame prior to the EUT's intended first transmit frame (and not meeting the access criteria) should be detected, and the EUT should defer, then select a channel for which the access criteria is met.

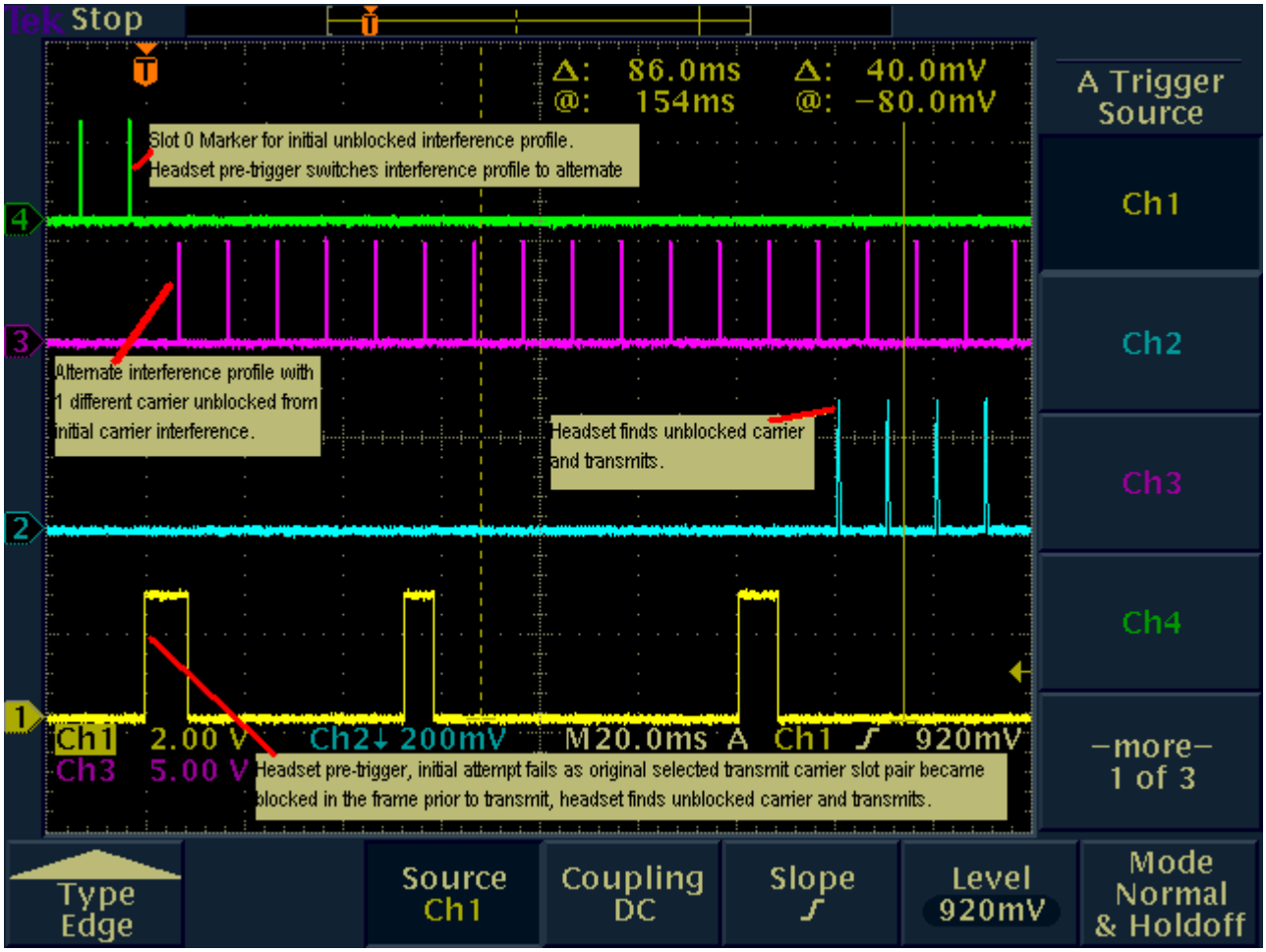

Fig. 54 - Screen shot of oscilloscope showing deferral by the headset EUT in the case where the interference profile changes in the frame previous to intended transmission and the selected time and frequency communications channel becomes blocked; and then later, transmission on unblocked channel.

The headset EUT detects that interference is present in the desired communications channel even when that interference first begins in the frame prior to the first intended transmit frame, and so meets the requirements of 7.3.4, selected channel confirmation.

Clause 7.5 Reaction time and monitoring interval, headset EUT

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

The multi-carrier interference generator (PXI-5670) is set to generate interference pulse transmissions of 50us length, synchronized with the frame and slot timing of the base companion device and so (since the headset EUT in turn synchronizes with the base unit) with the timing of the headset EUT. The interference is present on all 5 carriers, and at level -54.6dBm, which is $T_U + U_M$.

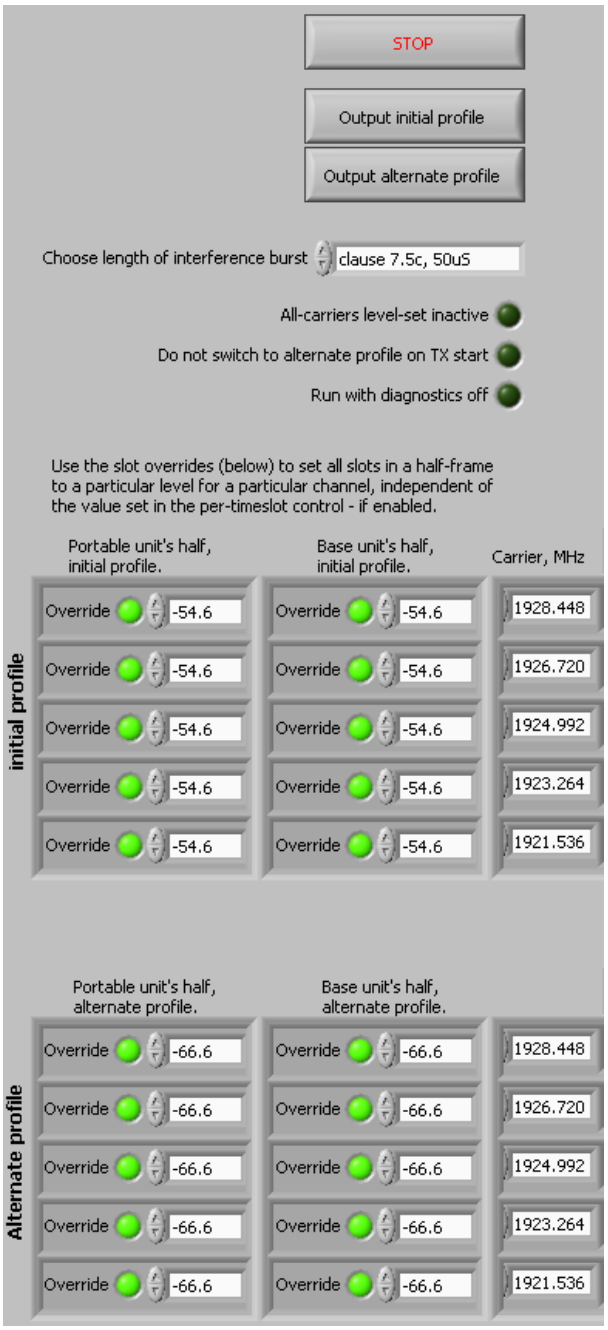

Fig. 55 - Control panel for multi-carrier interference generator, set to 50uS pulses in all timeslots on all carriers, for the test of 7.5(c).

Two interference profiles are loaded; one with all pulses at -54.6dBm, $T_U + U_M$, and the other at -66.6dBm, $T_U - U_M$. The first profile is used to demonstrate deferral for pulses 50uS long above the threshold, and the second profile is used to demonstrate non-deferral for 50uS pulses below the threshold.

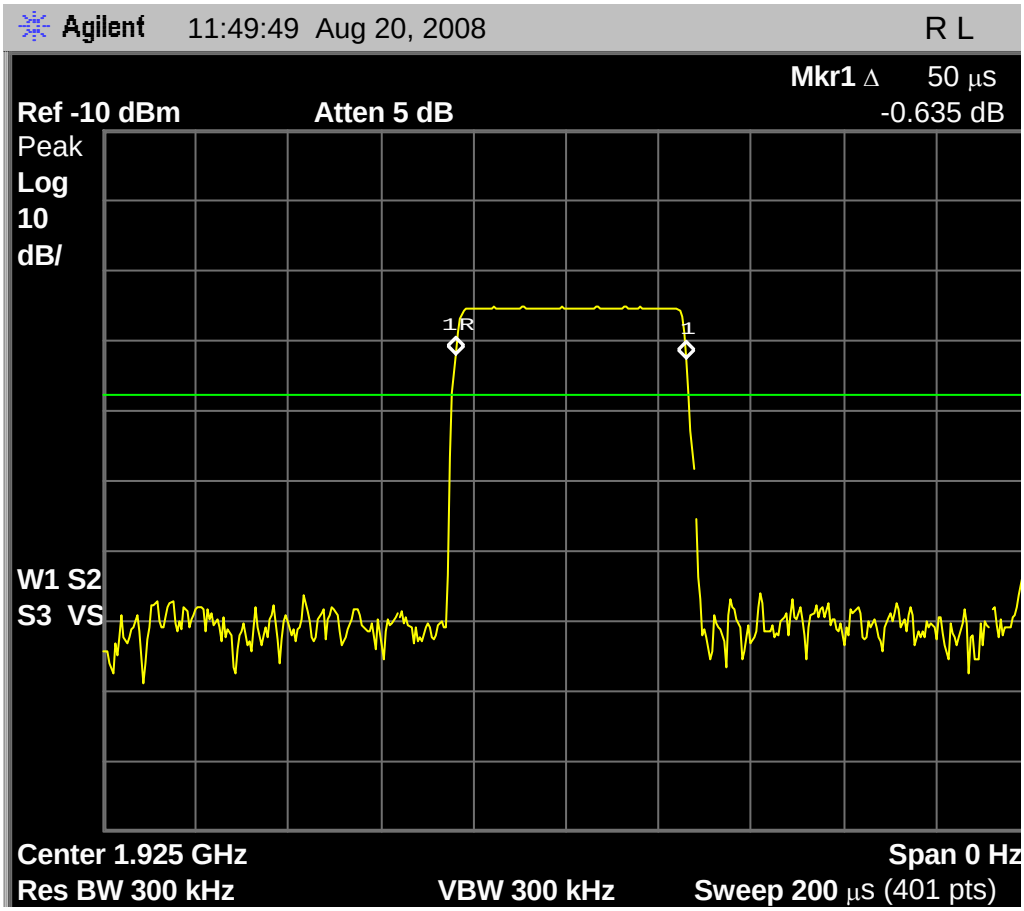

Fig. 56 - Interference pulse, one frame shown, for the test of 7.5(c).

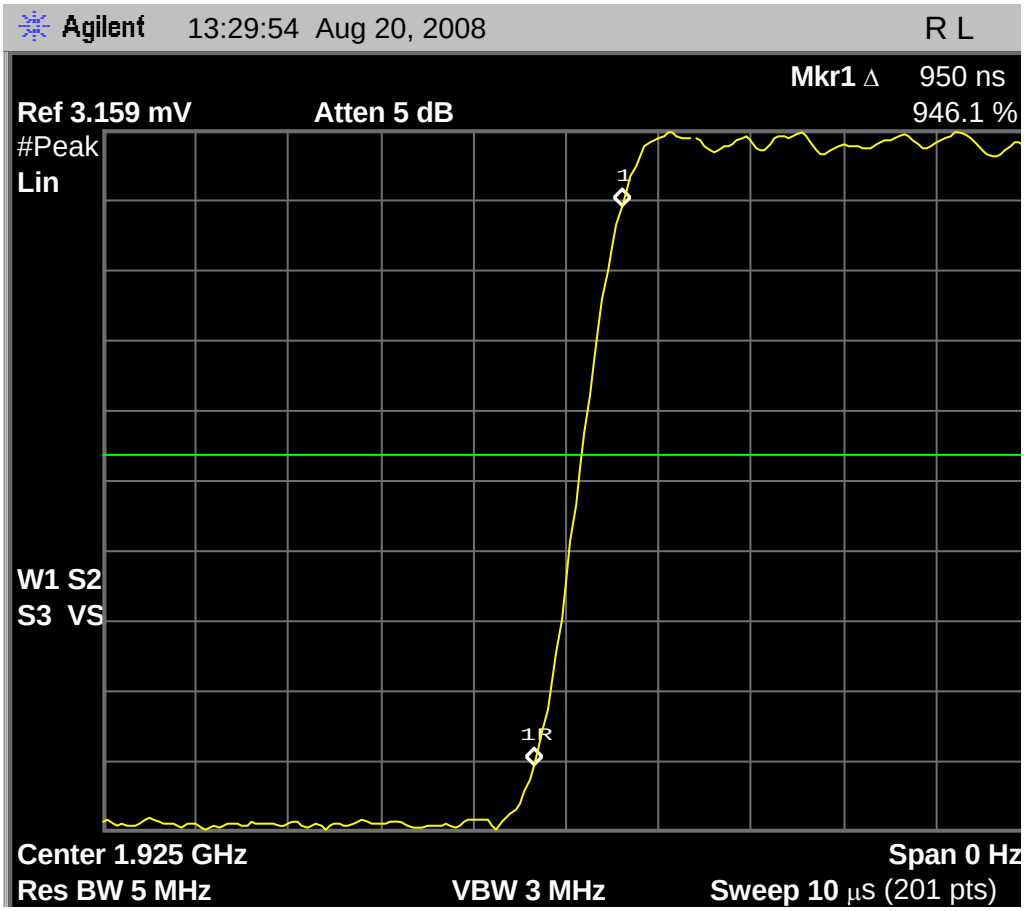

Fig. 57 - Rise time of interference pulse, per the requirements of 7.5 for less than 1uS for 10% to 90% transition.

Spectrum analyzer is set to linear response and the reference level adjusted so that 10% and 90% scale points can be observed. Fall time (not shown) is symmetrical.

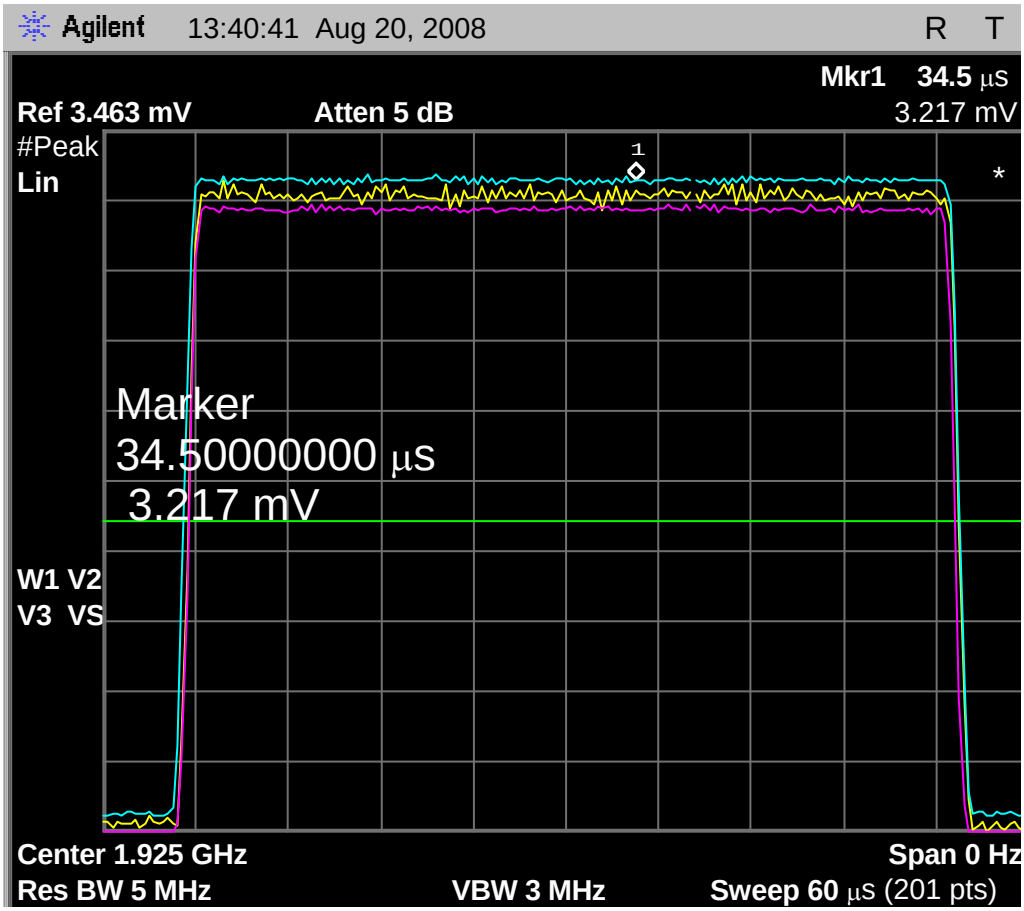

Fig. 58 – 50uS interference pulse for 7.5(c), duration and amplitude variation over the duration of the 50 uS pulse and over multiple pulses. Spectrum analyzer is set to linear response.

The requirement of 7.5 is for the pulse to be of constant amplitude (+/-5%) during the pulse. The top trace is a max-hold over 60 seconds, the bottom trace is a min-hold over 60 seconds, and the center trace is one pulse; total scale displayed is approximately 110% of the pulse amplitude. Pulse length is just under 50uS to ensure that the worst-case (minimum pulse length) test condition is exceeded. The pulse amplitude change from max hold (top trace) to min hold was 4.8%.

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

Clause 7.5(c)

The headset EUT is powered up with the interference conditions of 7.5(c) present. An interval of time is allowed for the headset EUT to find and synchronize to the base companion device. Then the headset EUT TALK button is pressed; the RF detector in the signal combining network is monitored as is the pre-transmission signal generated by the headset EUT when it begins the initiation of transmission. No transmissions from the headset EUT are observed (top trace).

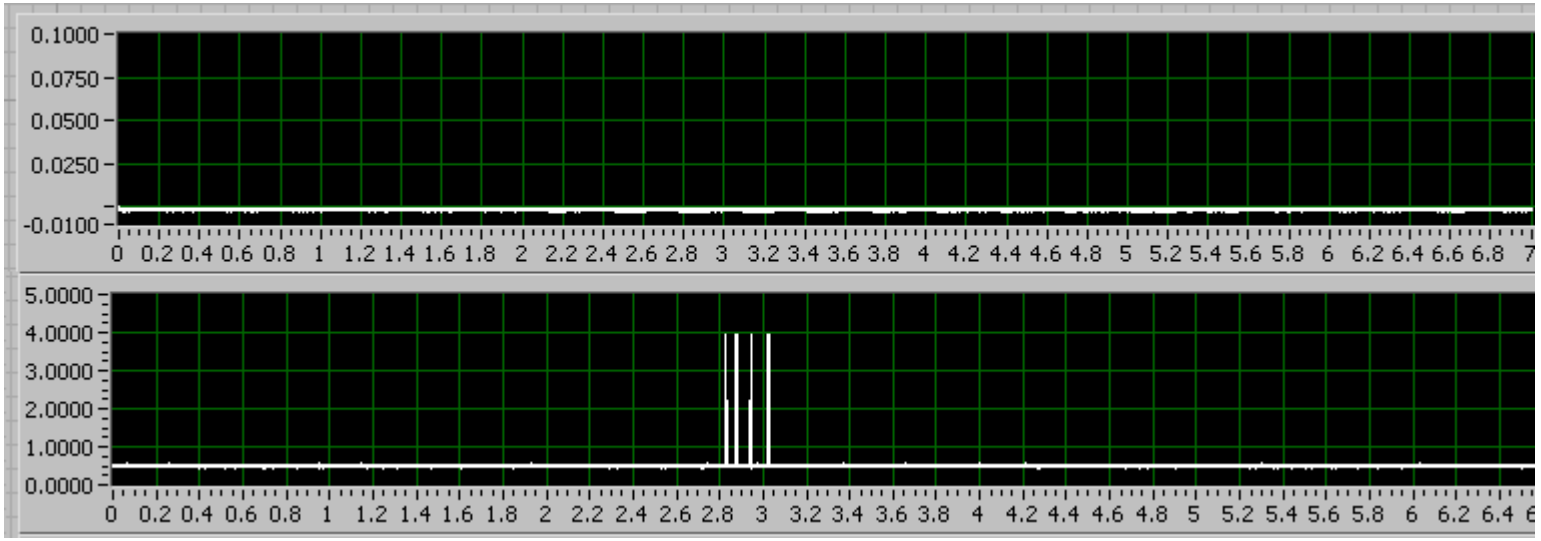

Fig. 59 - Headset EUT shown deferring when all channels are blocked with 50uS pulses at $T_U + U_M$. Top trace is detected RF transmissions (no transmissions are detected), bottom trace is headset EUT transmission setup attempt series (as indicated by the software flag for getting-ready-to-transmit attempts) in response to the press of the TALK button, with each pulse of the software transmission-attempt flag then not being followed by the transmissions, due to the access criteria check failure.

The multi-carrier interference generator is then switched to the alternate interference profile, with pulses of level T_U - U_M, or -66.6dBm.

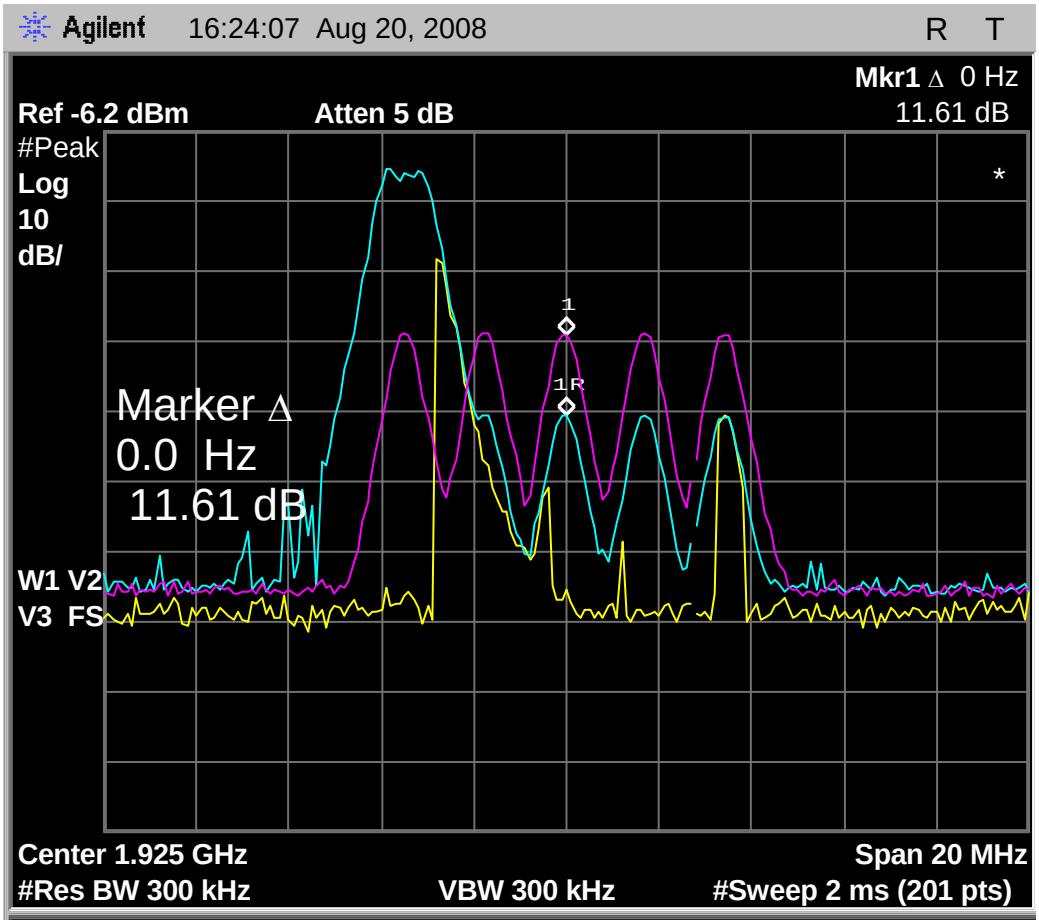

Fig. 60 - Transmit spectrum of 50uS interference pulses, with headset EUT no longer deferring with interference pulses of level T_U - U_M.

The purple (top) trace is the max-hold capture over multiple sweeps of the initial T_U + U_M interference spectrum without EUT transmissions. The blue (middle) trace is a max-hold capture of the interference and the headset EUT's successful transmission when the interference is set to T_U - U_M. The yellow (lowest) trace is a single sweep of the spectrum with the interference at T_U - U_M and headset EUT transmission active.

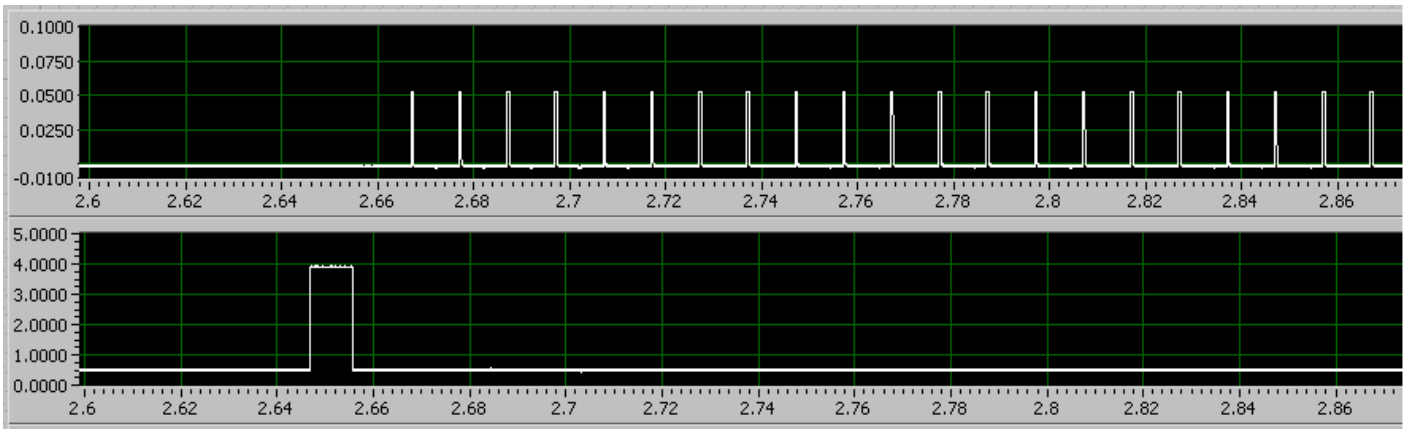

Fig. 61 - Normal initiation of transmissions by the headset EUT in the absence of over-threshold interference; the headset EUT software flags the start of the transmission setup (bottom trace) at t = 2.64 seconds, and transmit emissions are recovered by the RF detector (top trace) in the splitter/combiner network beginning at t = 2.67 seconds. Proper transmission at T_U - U_M is shown, to validate functionality and to illustrate the getting-ready-to-transmit marker, and the RF detector output.

The headset EUT defers transmission when pulses of level $T_U + U_M$ are present with length 50uS, and so meets the requirements of 7.5(c).

Clause 7.5(d)

7.5(d) repeats the deferral test of 7.5(c), except that the transmit pulse length is reduced to 35uS (the allowed longer of the alternatives 35uS and 35*((1.25/B)^0.5), where B = 1.48MHz) and the level is allowed to increase to $T_U + U_M$ + 6dB, or -48.6dBm.

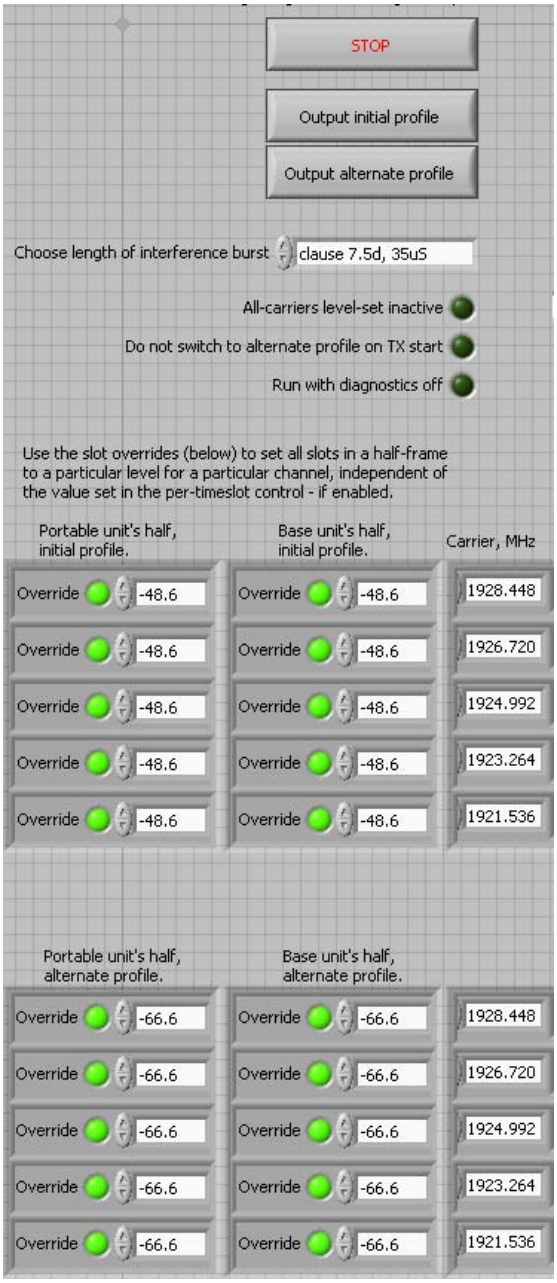

Fig. 62 - The control panel for the multi-carrier interference generator configured to make the interference profile required for 7.5(d).

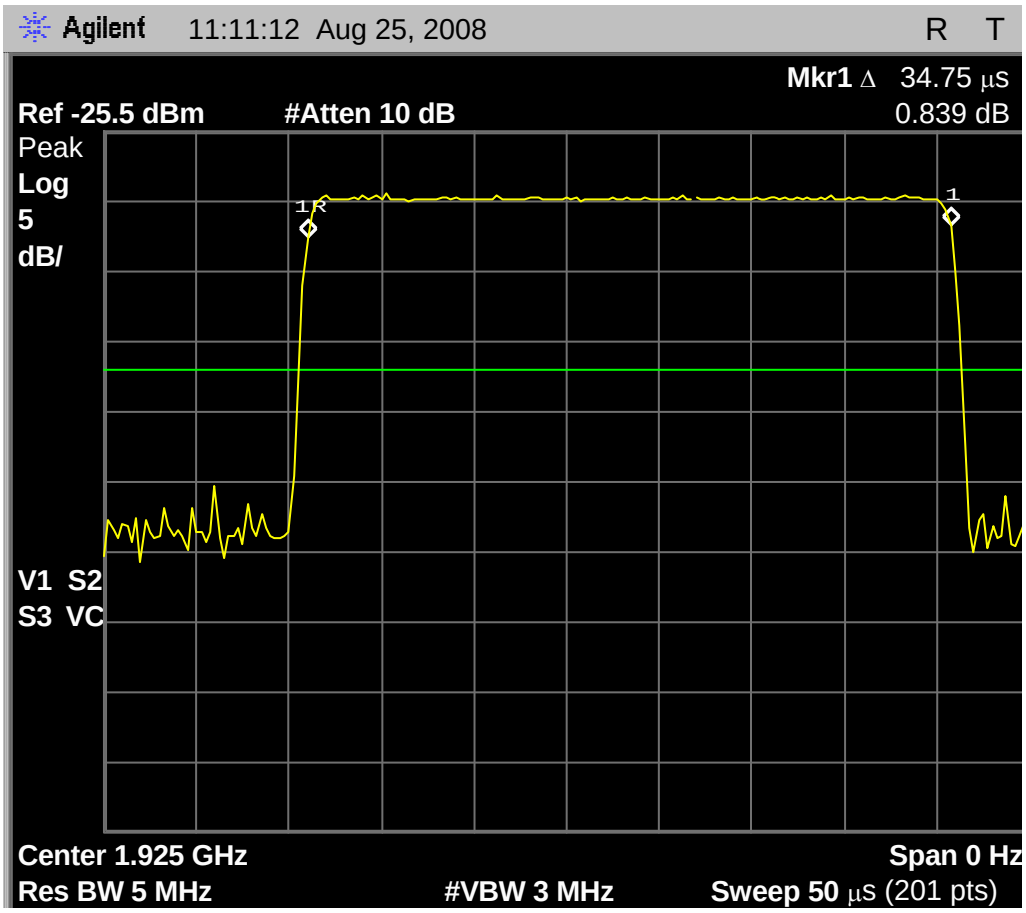

Fig. 63 - 35uS interference pulse for 7.5(d), duration and amplitude variation over the duration of the pulse and over multiple pulses. Spectrum analyzer is set to linear response.

Per-timeslot interference pulse as required for 7.5(d). Note the 6dB increase in level relative to the requirement of 7.5(c), though again level is measured by the spectrum analyzer connected to its port on the splitter/combiner interface to the EUT, and not at the EUT.

The headset EUT is then powered up with the conditions of 7.5(d) present.

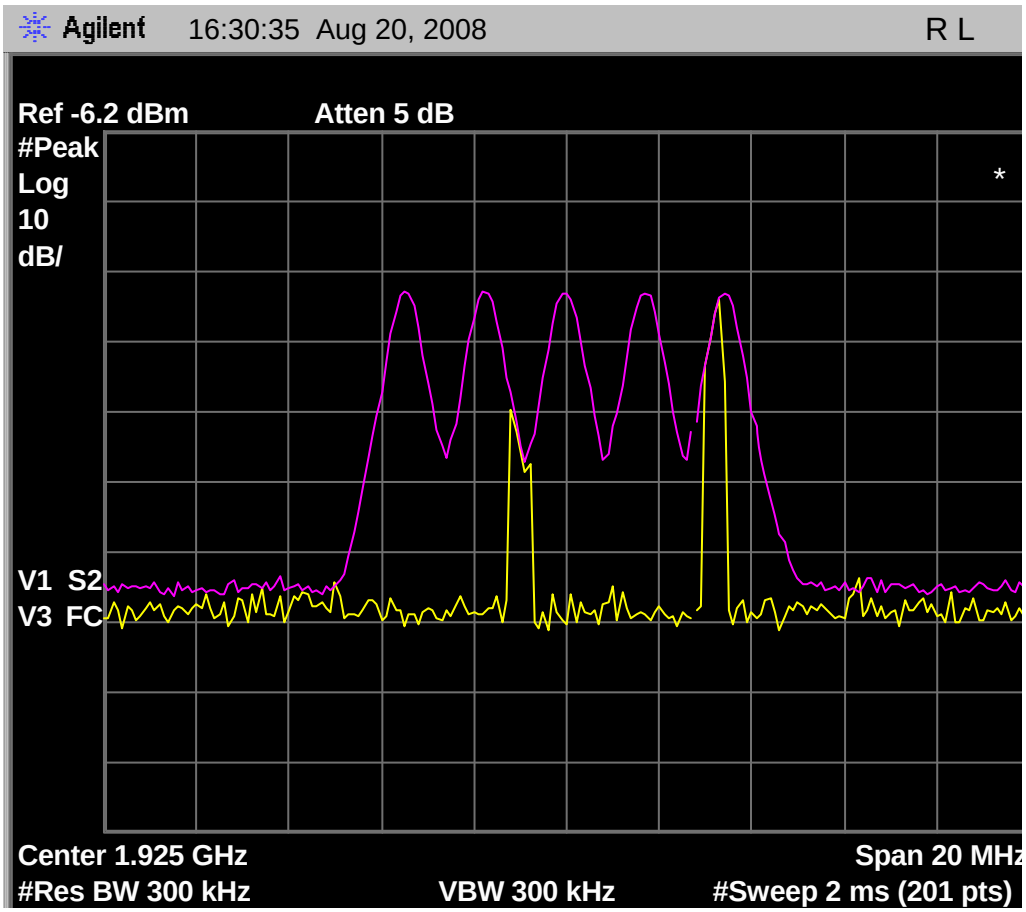

Fig. 64 - Transmit spectrum of 35uS interference pulses in each timeslot for each carrier, with headset EUT deferring due to interference pulses of $T_U + U_M$ + 6dB.

The transmit spectrum and interference spectrum are observed using the E4407B spectrum analyzer. Trigger is free-run, detection is peak, other adjustments are as shown on the screenshot. The purple (top trace) shows the max-hold capture of many pulses as the spectrum analyzer sweeps in free-run, unsynchronized with respect to the multi-carrier generator. The yellow (bottom) trace shows a single sweep of the spectrum analyzer, sweeping past active interference pulses.

No transmissions from the headset EUT are observed; the headset EUT is required to defer when pulses of 35uS are present at level $T_U + U_M$ + 6dB, the headset EUT does defer, and so passes the requirement of 7.5(d).

V. Tests of clause 8, headset EUT

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

Clause 8.2.1 Acknowledgements, headset EUT

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

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

This test requires that neither the base companion device nor the headset EUT be blocked from transmitting by the interference being at sufficient level that the access criteria is not met, but yet it requires that the base companion device not receive the headset EUT's transmit burst, and so does not generate an acknowledgement. To achieve this, the interference applied to block the headset-to-base timeslots must be received at the headset at a low enough level that the access criteria is still met. To do this, the test platform, headset EUT and companion base unit are configured according to the requirements for implementing the test of 8.2.1(a) by means of test configuration #3, **With companion device and interference blocking, headset EUT**, of section (I) of this document, modified with the addition of (nominally) 26dB of attenuation between the headset EUT and the splitter/combiner, and by changing the (nominal) 40dB of attenuation between the base companion device and the splitter/combiner to (nominal) 30dB. In this way the interference necessary to block reception by the base companion device of the headset transmissions is reduced to a level meeting the access criteria for both the headset EUT and the companion device.

Levels analysis:

- For the test, we set the PXI-5670 multi-carrier interference source to -42.6dBm per carrier, referenced to the original calibration, except 30dB more attenuation was added on the headset side of the divider. An interference level of -42.6dBm equates to the previous level of -66.6dBm ($T_U - U_M$); interference access criteria met for the headset EUT.

- The headset always determines if a traffic link can be established. The companion Base EUT only determines if the beacon can be brought up and stay up. In this test case the Base transmit time slots are all unblocked at a -130dBm and thus unblocked for the Base access criteria test.

- The base transmit signal arriving at the headset EUT sees 79dB of loss through the splitter/combiner and attenuators, nominally, which allows reliable communication in the absence of interference.

- The headset transmit signal arriving at the base companion device sees the same 79dB of loss, and again reliable communication is possible in the absence of interference.

When -42.6dBm of per-carrier interference is applied in the timeslots used by the headset to transmit to the base, the interference level received at the Base is -57.6dBm, the headset EUT power which reaches the Base is only -61.6, so the interference level at the Base input is 4dB higher than the headset EUT signal.

The multi-carrier interference generator (PXI-5670) is set to TDMA mode (timeslot-synchronized with the base EUT) with initial interference profile active, with all carriers at level -36.6dBm except the carrier at 1924.992MHz, f_1, which is set to -130dBm for all slots. The alternate interference profile has all carriers at level -36.6dBm except the carrier at f_1, which is set to -42.6dBm for slots 0 – 11 and -130dBm for slots 12 - 23. The initial profile ensures that the base and headset will be restricted by the LIC algorithm to using the carrier at f_1 so that system timing can be monitored by a zero-span sweep of the spectrum analyzer at f_1. The alternate profile has interference on f_1 that is high enough to prevent the base EUT from hearing the headset transmissions. The test configuration is validated by powering up the headset EUT and the base companion device and verifying that the headset EUT can initiate a communications channel with the base companion device if the multi-carrier interference generator is prevented from switching to the alternate interference profile when the headset initiates the communications channel.

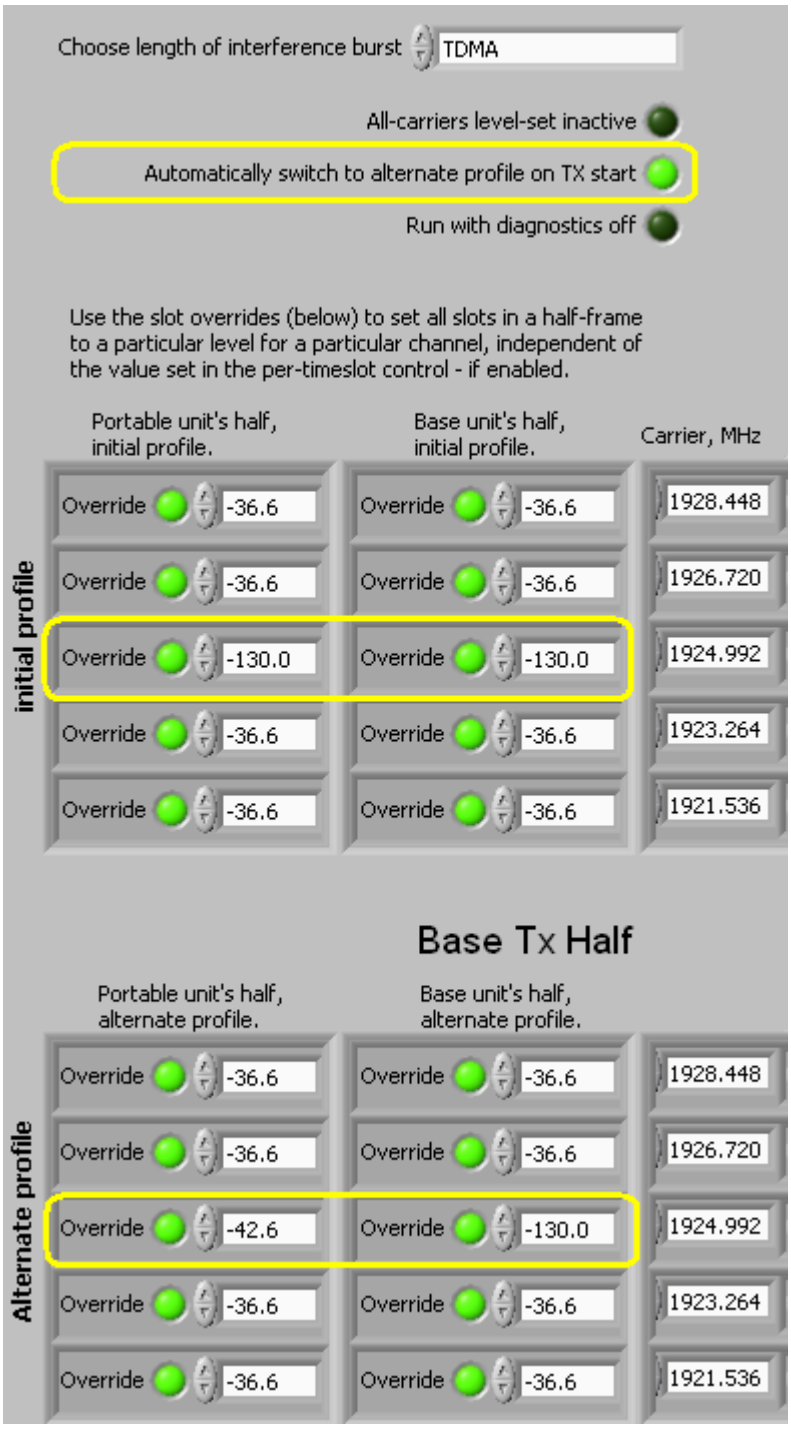

Fig. 65 - Multi-carrier interference generator configured according to the requirements for testing the headset EUT per 8.2.1(a), with automatic switching to the alternate interference profile enabled.

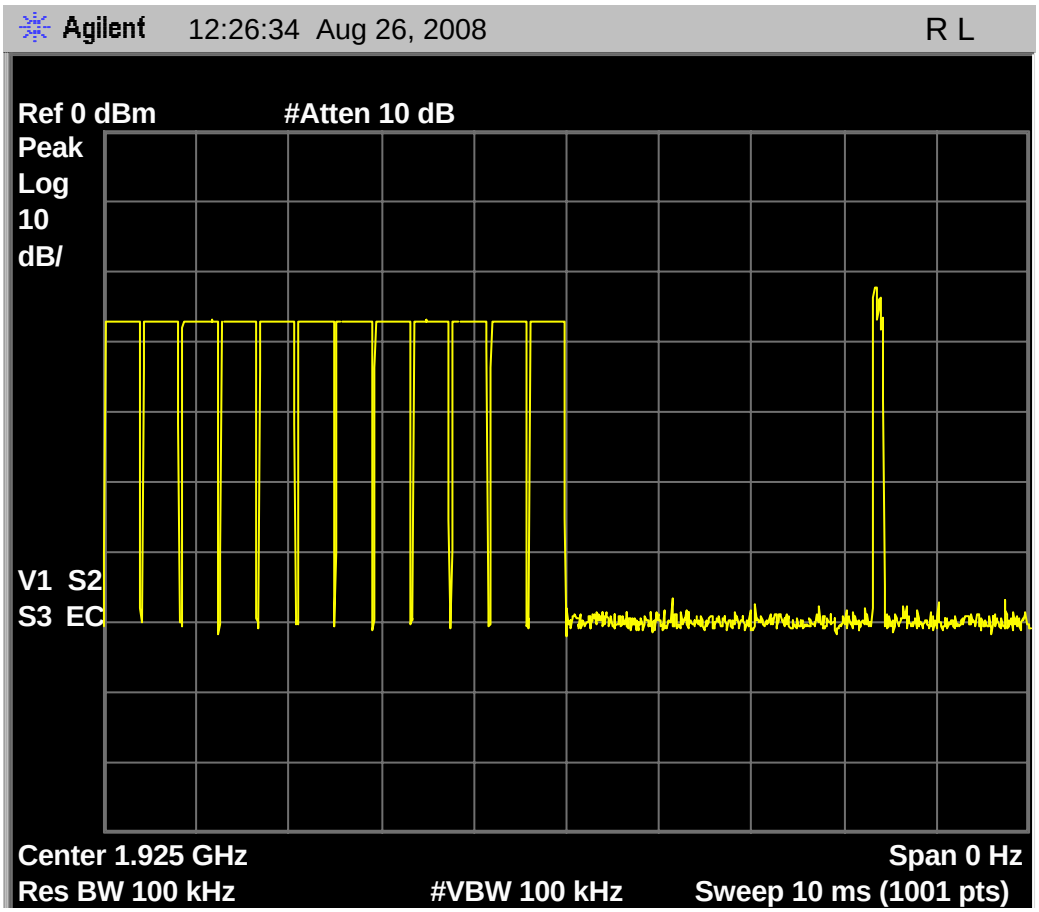

Fig. 66 - One frame of transmissions for a headset EUT and base companion device with a beacon present, interference present and high enough to block headset-to-base communications. Slots 0 – 11 have the interference present and slot 20 has the base companion device transmit beacon signal.

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

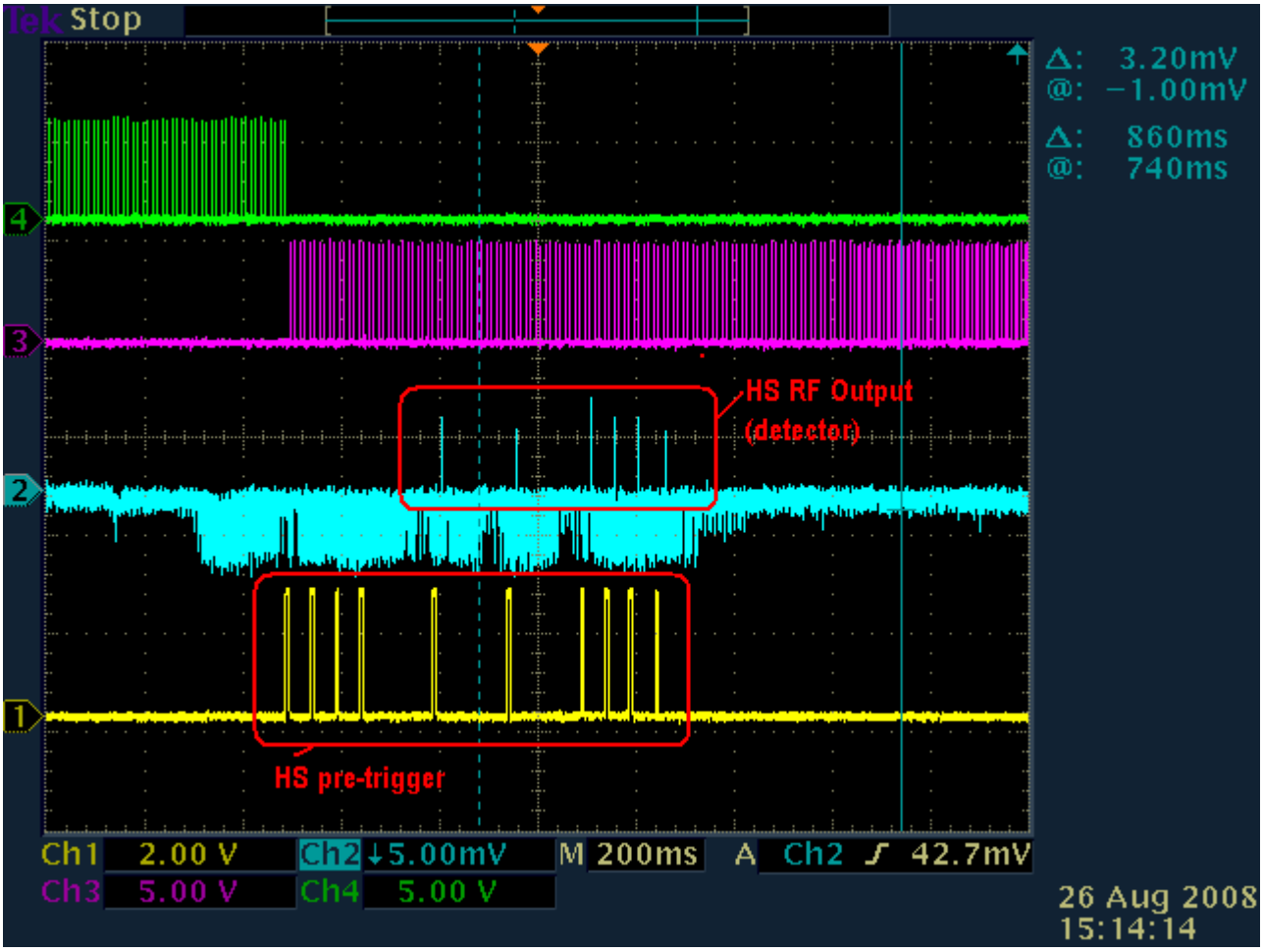

Fig. 67 - Screenshot of headset transmit-attempt flag activity (yellow Ch1 bottom trace) and RF detector output (cyan Ch2 2nd from bottom) vs. time with the interference profiles (Ch4 is the primary interference which has an opened carrier (-130dBm interference level) and allows the headset and companion Base to idle lock to each other. The magenta trace is the Ch3 alternate interference profile which is automatically switched to when the headset TALK button is pressed. The headset tries 10 times to bring up a link without success as shown by (Ch2) RF detector having no signal after the initial attempts. The test was repeated and the RF detector trace monitored for 20 minutes without any further activity. In order to perform this test the headset heartbeat transmissions was disabled (heartbeat occurs every 30 seconds) and the heartbeat would continuously trigger the interference generator as well as have the headset transmit every 30 seconds since the interference is not above the threshold level.

The headset makes multiple attempts to get an acknowledgement from the base over a span of about 200ms. Each transmission is a single frame in a particular timeslot in which a particular communications channel would be established if an acknowledgement were received.

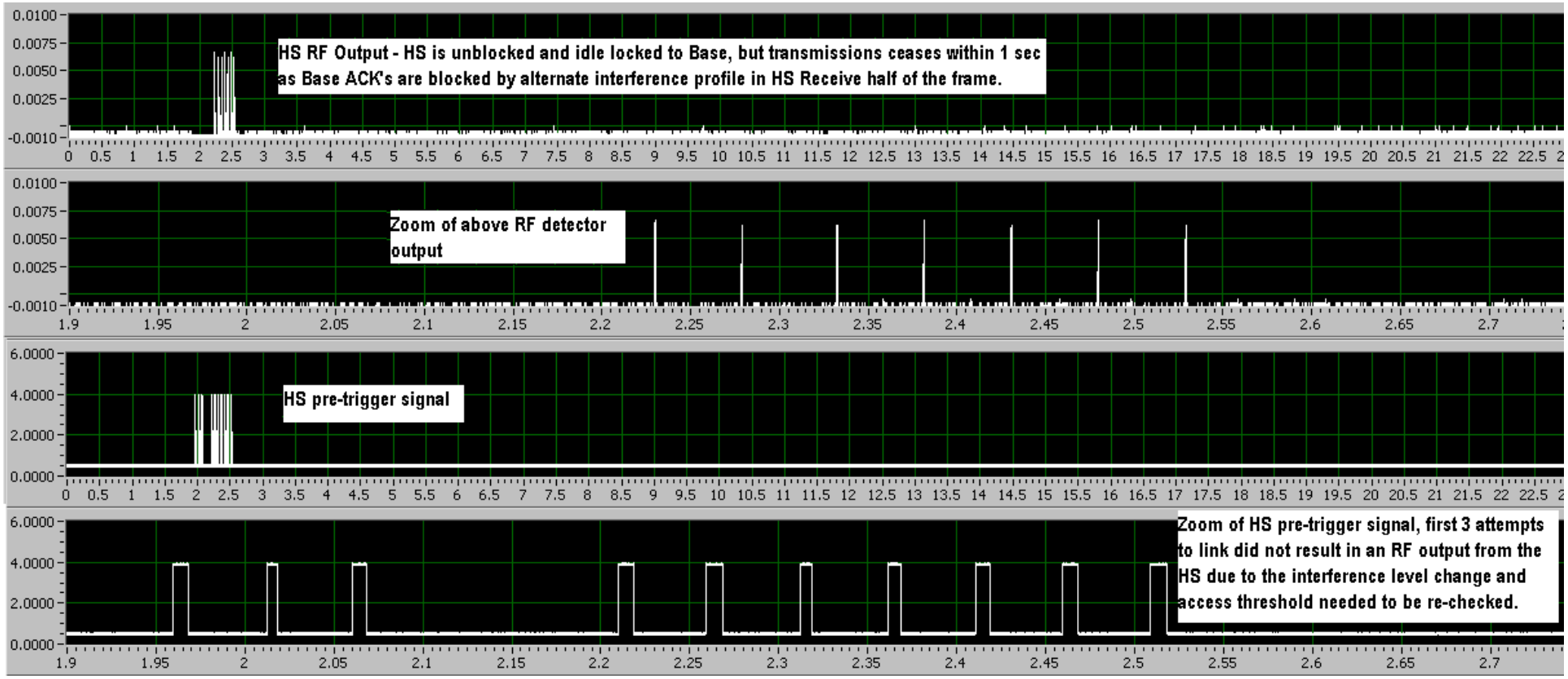

Fig. 68 - Screenshot zoom of the above oscilloscope screen capture. Several attempts to bring up a link were attempted by the headset, none had a successful acknowledgement from the Base; since the Base never heard the headset's request due to the alternate interference level in the headset transmit half of the frames.

Further screenshot zoom of the above 2 figures. This screen capture shows that the first actual attempt to transmit a signal from the headset to the Base wasn't until the forth attempt. The first 3 attempts have no corresponding RF output. The first attempts correctly recognizes that the interference level had changed and thus no RF transmission from Base to headset takes place, and the following two pulses on Ch1 also do not transmit as the RSSI (receive strength indicator) value is too large of a change, by the forth Ch1 pulse the receiver has re-scanned the frequency time slots and found an acceptable (unblocked, and no large RSSI change) place to transmit.

The headset EUT sends a single frame, a single transmission, in each attempt of repetitive attempts to establish a communications channel. In the absence of an acknowledgement from the base companion device, the headset transmits only in this 10mS frame for this communications channel, and so meets the requirements of 8.2.1(a) limiting transmissions on the communications channel to 1 second or less, in the absence of an initial acknowledgement.

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

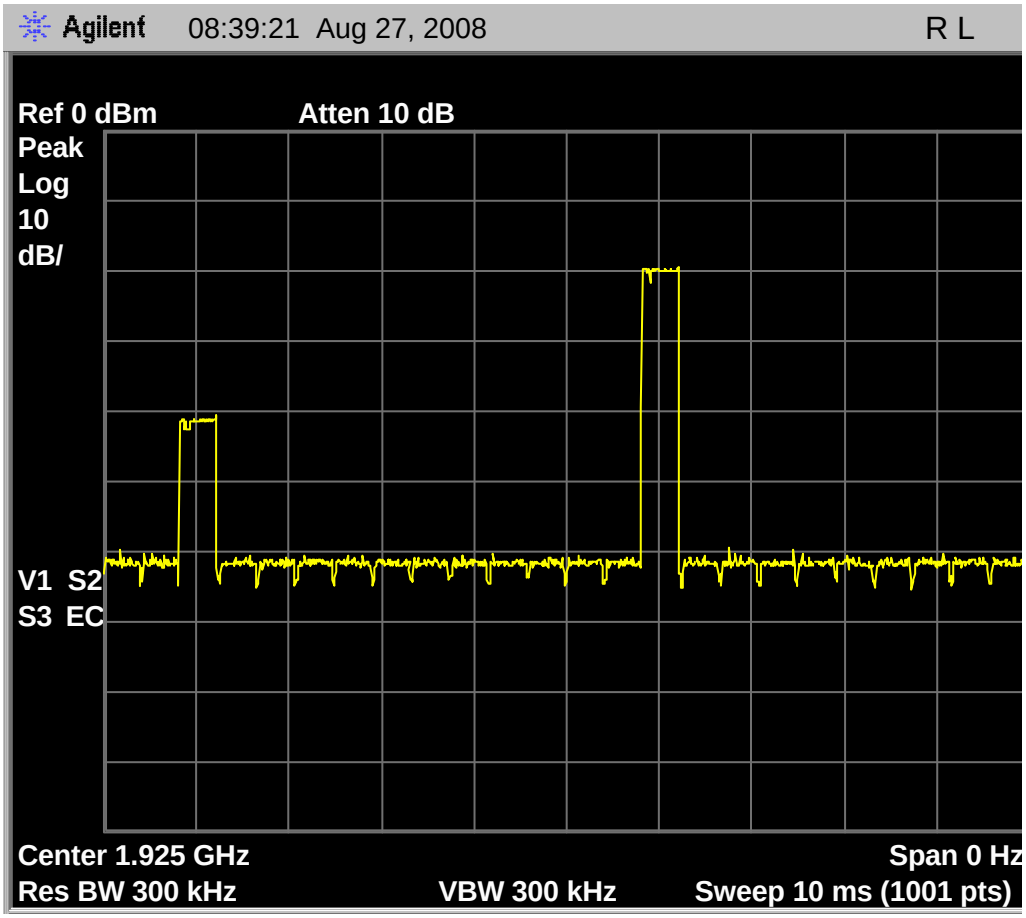

Fig. 69 - Screenshot of spectrum analyzer showing one frame of the channel with the initial interference profile present, which does not block the reception by the base EUT of the headset EUT's transmissions; an acknowledgement is generated when the headset EUT attempts to initiate the communications channel when the TALK button is pressed, and the communications channel is established, so the headset EUT meets the requirements of 8.2.1(b) for proper operation of the test setup when the acknowledgements are unblocked.

8.2.1(c) for the headset EUT is identical to the test of 8.2.1(a) except that the PXI-5670 multi-carrier interference generator is configured not to automatically switch to the alternate interference profile; rather, instead, the headset EUT and the base companion device are established in a communications channel, and then the multi-carrier interference generator is manually switched to the alternate profile.

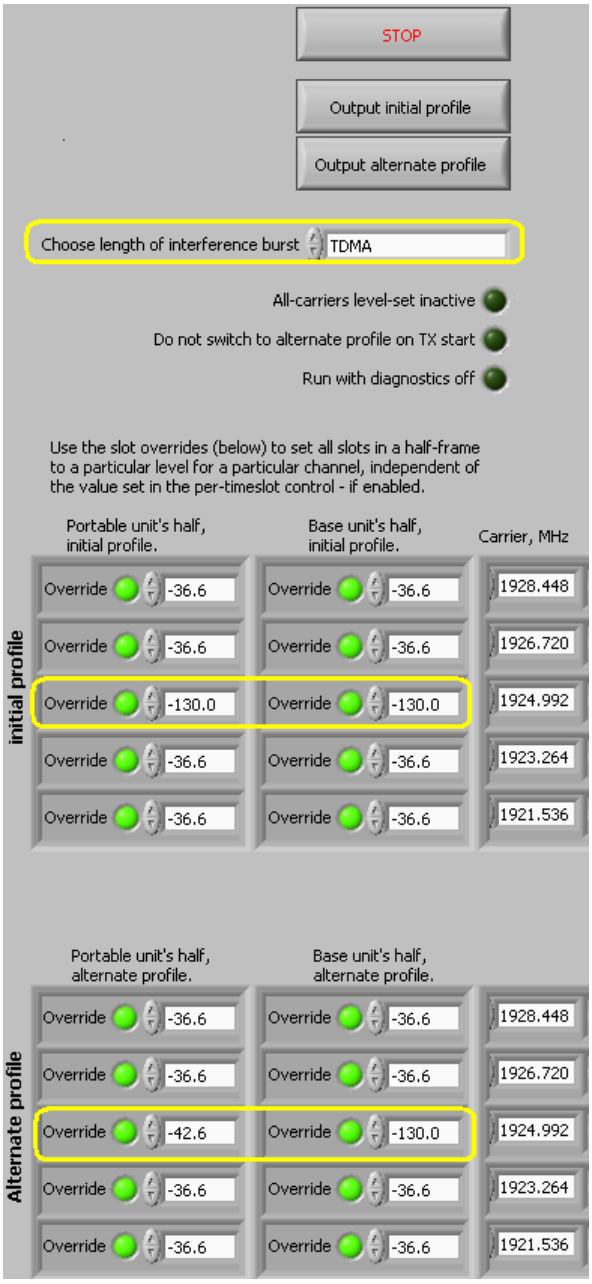

Fig. 70 - PXI-5670 multi-carrier interference generator control panel for the test of 8.2.1(c), for the headset EUT.

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

The following figure shows a time sequence of this event. Top three traces are the output of the RF detector at various times in this sequence of events. The bottom two traces are the alternate profile flag (shows when the alternate profile is output).

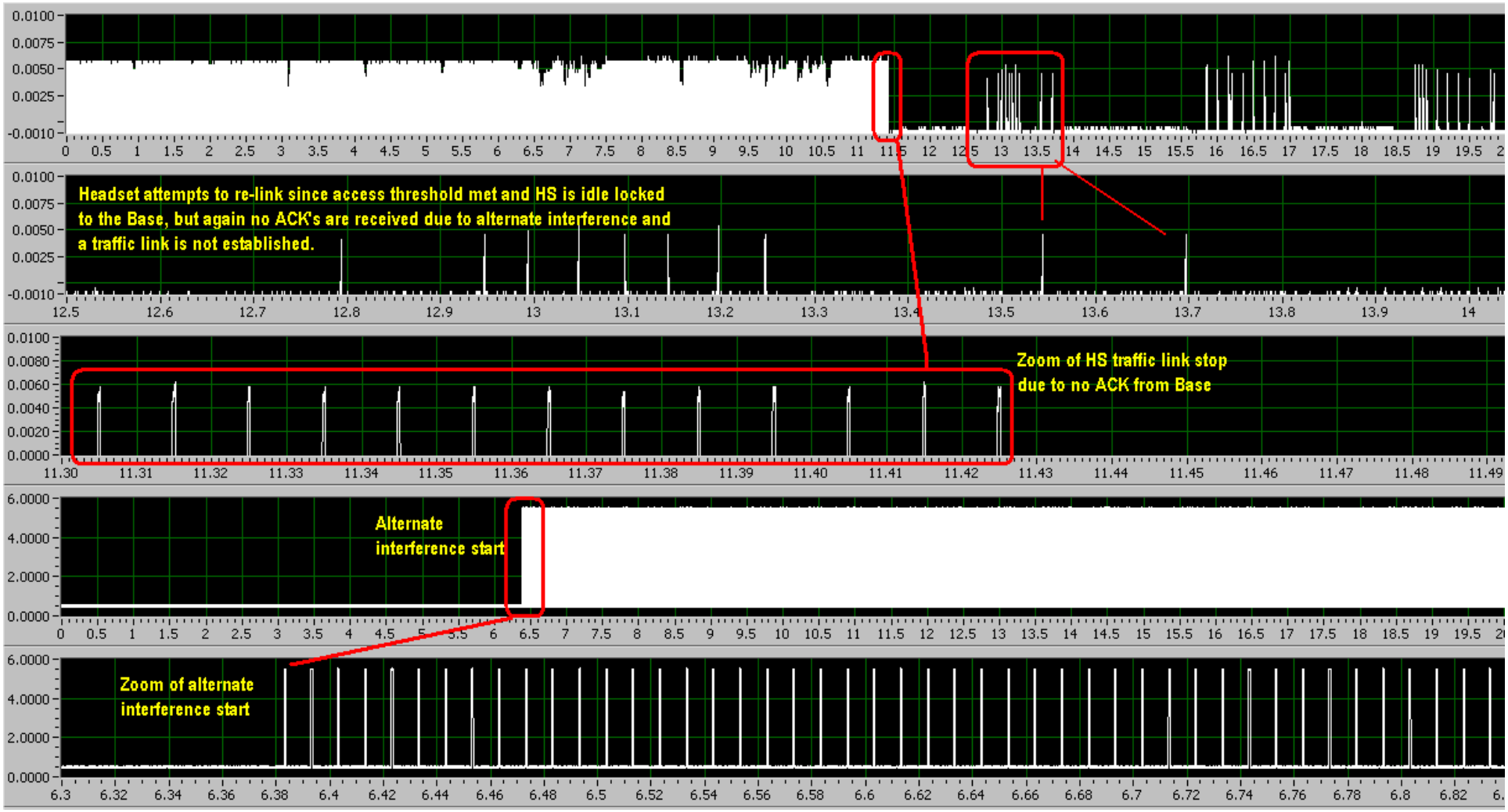

Fig. 71 - RF detector (top three traces) and alternate interference output (bottom trace) as headset EUT transmission goes blocked and transmissions stop.

1) Headset is in a traffic link with the companion device prior to starting the data capture (carrier 2 is not blocked -130dBm)

2) At t = 6.38 seconds, the interference generator is manually switched to the alternate interference profile which blocks reception at the base companion device of the headset EUT transmissions.

3) At t = 11.42 seconds, headset EUT stops communications channel transmissions on the original, now blocked, communications channel.
Note: Base companion device also stops traffic transmission at approx 5 seconds (see Base EUT report section 8.2.1).

4) From t = 6.38 seconds until t = 11.42 seconds, the headset EUT determines there is no Base acknowledgement and brings down the traffic transmissions, however the headset is still idle locked to the Base (as the Base Tx half is unblocked and interference is below the headset threshold of -60.6dBm) and attempts to re-establish a communications channel on an unblocked timeslot and carrier. There are none, so the headset EUT will time out and stop trying.

Headset EUT traffic transmissions cease within 5.1 seconds of the loss of continuing acknowledgements from the base companion device, so meeting the requirement of 8.2.1(c) that transmissions cease within 30 seconds of the loss of acknowledgements.

An additional test was also performed since the headset EUT is capable of transmitting a “heartbeat” message to the companion Base EUT. The set up from 8.2.1 was used to fix the headset EUT and Base companion device to 1924.992MHz (unblocked – initial interference profile), and the headset EUT heartbeat message setting was decreased (via eeprom setting) from 30 seconds to 10 seconds to speed the test. The headset and Base EUT were idle locked (not in a traffic link) and the Base was powered off after 23 seconds.

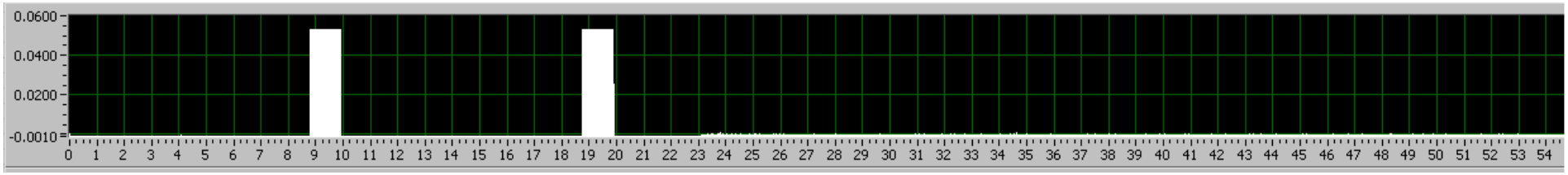

Fig. 72 - RF detector output showing the timed initiation of headset EUT “heartbeat” transmissions to the Base companion device. After 3 “heartbeat” transmissions from the headset EUT to the Base, the Base power was switched off at t=23 seconds, at which time headset “heartbeat” transmissions cease. The detector was monitored with an oscilloscope (detector trigger single shot, oscilloscope was never triggered) for another 15 minutes with out headset transmissions. Headset EUT will not continue to transmit if idle lock is lost with the Base companion device.

Clause 8.2.2 Transmission duration, headset EUT

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

The test platform, headset EUT and companion base unit are configured according to the requirements for implementing the test of 8.2.2 by means of test configuration #3, **With companion device and interference blocking, headset EUT**, of section (I) of this document.

The multi-carrier interference generator (PXI-5670) is set to TDMA mode (timeslot-synchronized with the base companion device) with initial interference profile active, with all carriers at level -54.6dBm ($T_U + U_M$) except the carrier at 1924.992MHz, f_1, which is set to -130dBm. The alternate interference profile has all carriers at level -54.6dBm ($T_U + U_M$) including the carrier at f_1. The initial profile ensures that the system timing can be monitored by a zero-span sweep of the spectrum analyzer at f_1, there being no interference on f_1. The alternate profile has interference on all carriers, so blocking all channels when the alternate interference profile becomes active.

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

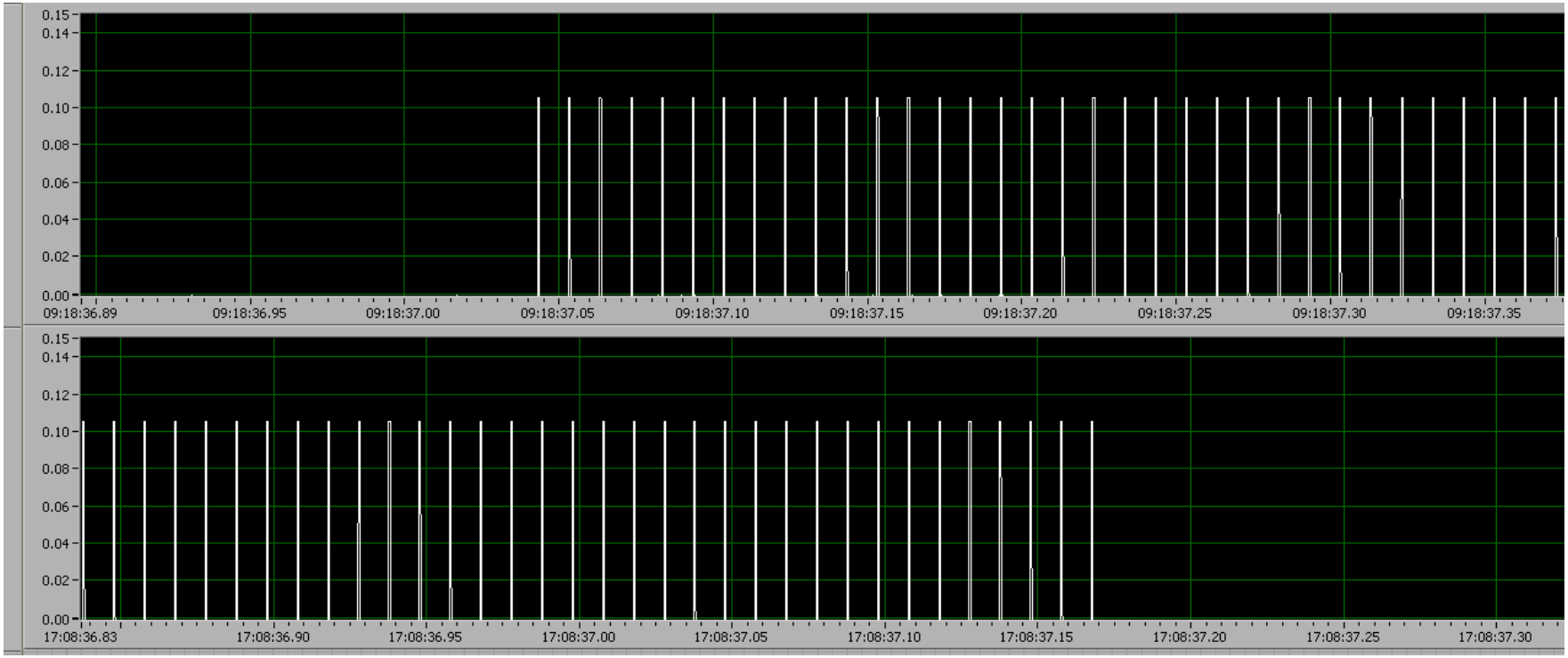

Fig. 73 - RF detector output showing timed initiation of headset EUT transmissions (top trace), then termination (bottom trace) when the headset EUT finds no channels passing the access criteria test. The headset EUT terminates transmissions at 17:08:37 (hour:min:sec), which was 7 hours and 50 minutes from the link initiation time of 9:18:37, so meeting the requirement of 8.2.2 that the headset execute the access criteria test at least as often as every 28800 seconds (or every 8 hours).

Clause 8.3 Duplex connections, headset EUT

This test is to demonstrate that two devices communicating over a duplex connection comply with the access criteria. The headset EUT monitors both it's transmit time/spectrum window and it's receive time spectrum window. This test will vary the receive and transmit time/spectrum windows independently, and verify the headset EUT selects the least interfered channel.

The test platform, headset EUT and companion base unit are configured according to the requirements for implementing the test of 8.2.2 by means of test configuration #3, With companion device and interference blocking, headset EUT, of section (I) of this document.

The multi-carrier interference generator (PXI-5670) is set to TDMA mode (timeslot-synchronized with the base companion device) with initial interference profile active, with all carriers at level -54.6dBm ($T_U + U_M$) except the carrier at 1924.992MHz, f_1, which has 2 opened time slots set to -100dBm (one slot in the headset Tx half and one slot in the headset Rx half), and the remainder of the slots set to below the access threshold headset Tx half set to $T_L + U_M$ and the headset Rx half set to $T_L + U_M$+7dB as shown in the figure below. The alternate interference profile is set up for 8.3.2 e) and is identical except blocks the HS Rx frame half with $T_L + U_M$ and the HS Tx frame half with $T_L + U_M$+7dB.

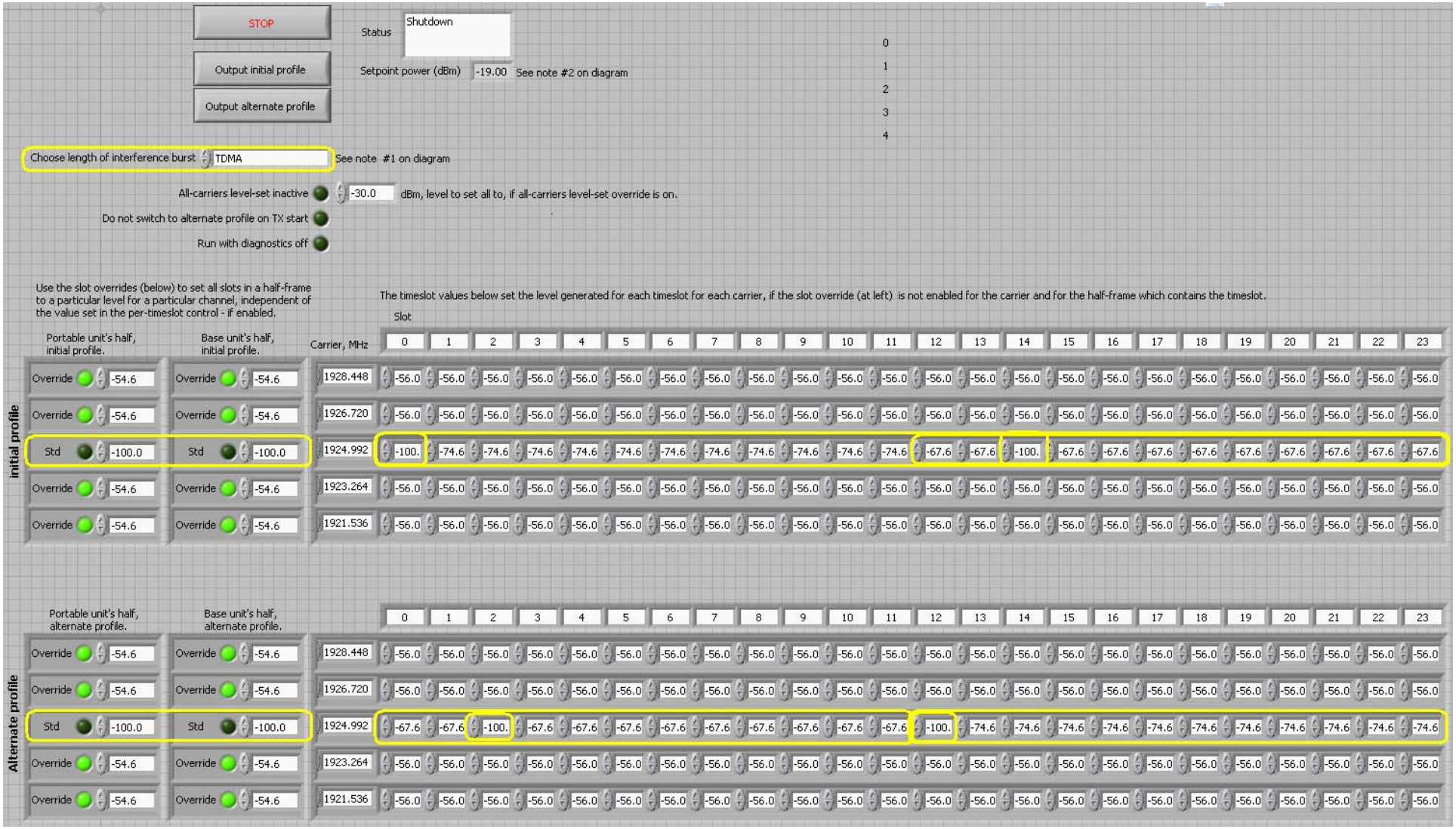

Fig 74 - PXI-5670 multi-carrier interference generator control panel for the test of 8.3.2(c)- Initial profile settings and 8.3.2(e) Alternate profile settings for the headset EUT.

8.3.2 (c and d) Headset EUT least interfered time slot pair should be selected for link (slot 2).

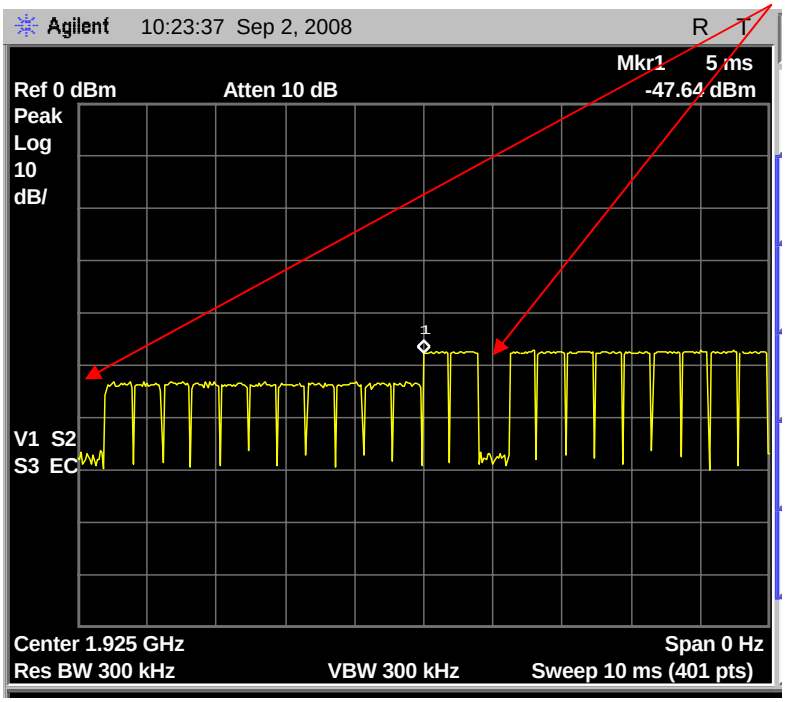

Fig. 75 – Spectrum analyzer screen capture of the interference pattern prior to headset link with companions Base (initial interference profile)

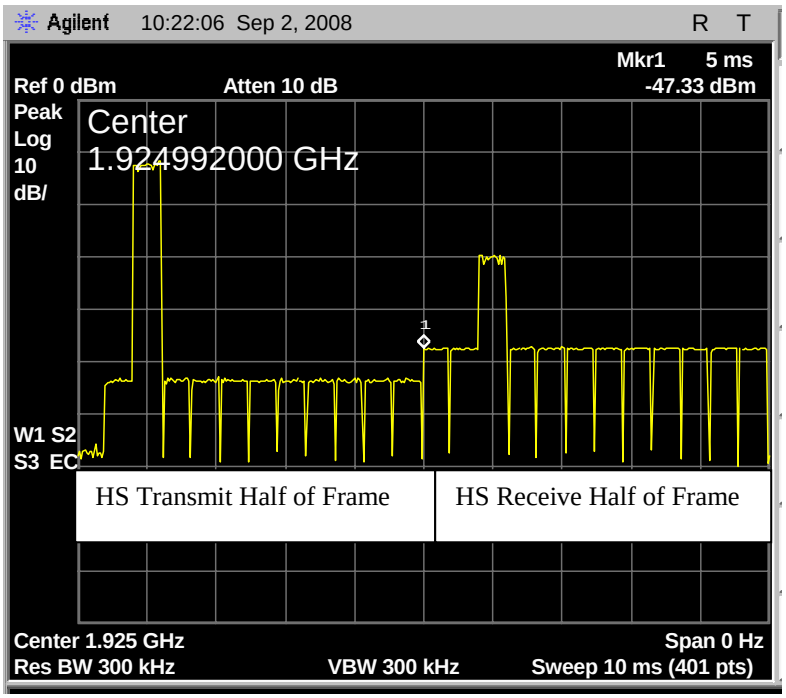

Fig. 76 – Headset EUT selects slot 2 pair which has the lowest maximum level of interference

The headset EUT and base companion device are powered up and a period of time is allowed for the headset to enter idle but locked state, with the base companion device. The TALK button is then pressed, and the headset EUT establishes a communications channel with the base companion device. Although all slots are opened (below the access threshold) the slot2 pair is selected for a communications link as it has the lowest maximum slot pair (-74.6dBm and -100dBm while other slot pairs contain the higher power level setting of -67.6dBm in the headset receive half of the frame).

The lowest slot pair was selected for the communications link and meets the test requirements of 8.3.2 d).

8.3.2 (e and f) Headset EUT least interfered time slot pair should be selected for link (slot 2).

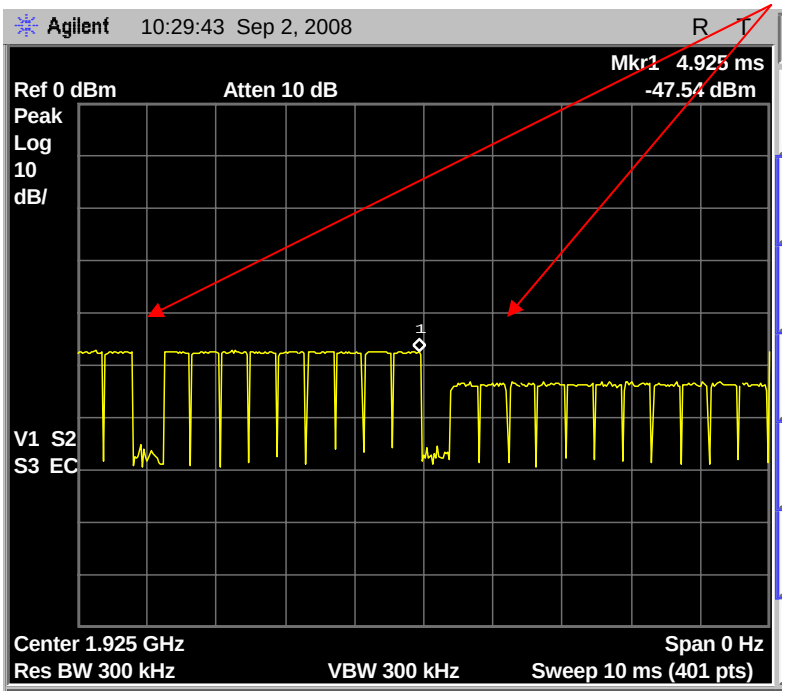

Fig. 77 – Spectrum analyzer screen capture of the interference pattern prior to headset link with companions Base (alternate interference profile from PXI screen capture of Fig 73)

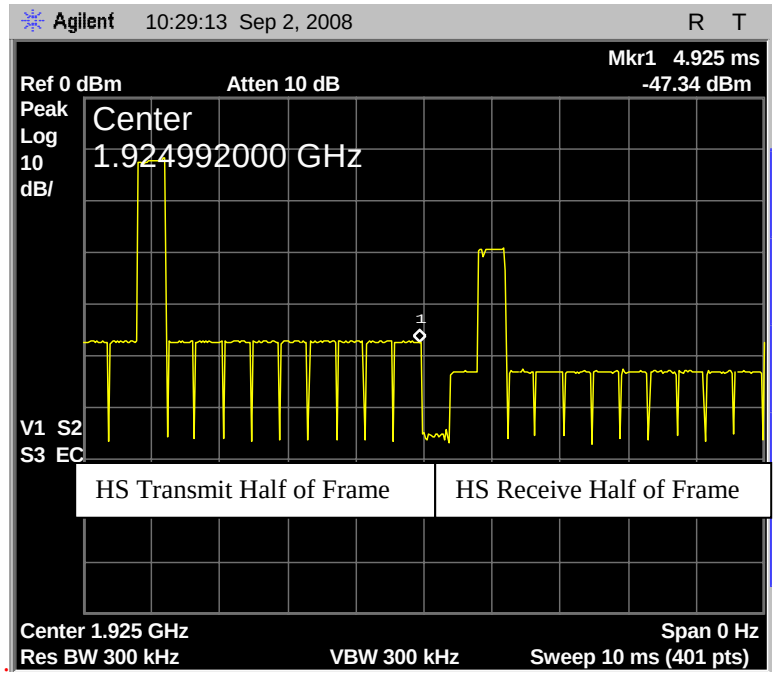

Fig. 78 – Headset EUT selects slot 2 pair which has the lowest maximum level of interference

The headset EUT and base companion device are powered up and a period of time is allowed for the headset to enter idle but locked state, with the base companion device. The TALK button is then pressed, and the headset EUT establishes a communications channel with the base companion device. Although all slots are opened (below the access threshold) the slot2 pair is selected for a communications link as it has the lowest maximum slot pair (-74.6dBm and -100dBm while other slot pairs contain the higher power level setting of -67.6dBm in the headset receive half of the frame).

The lowest slot pair was selected for the communications link and meets the test requirements of 8.3.2 f).

8.3.2 (g) Headset interference above threshold WITH one open slot pair (slot 0) to demonstrate link capability and check proper interference synchronization of the test set up.

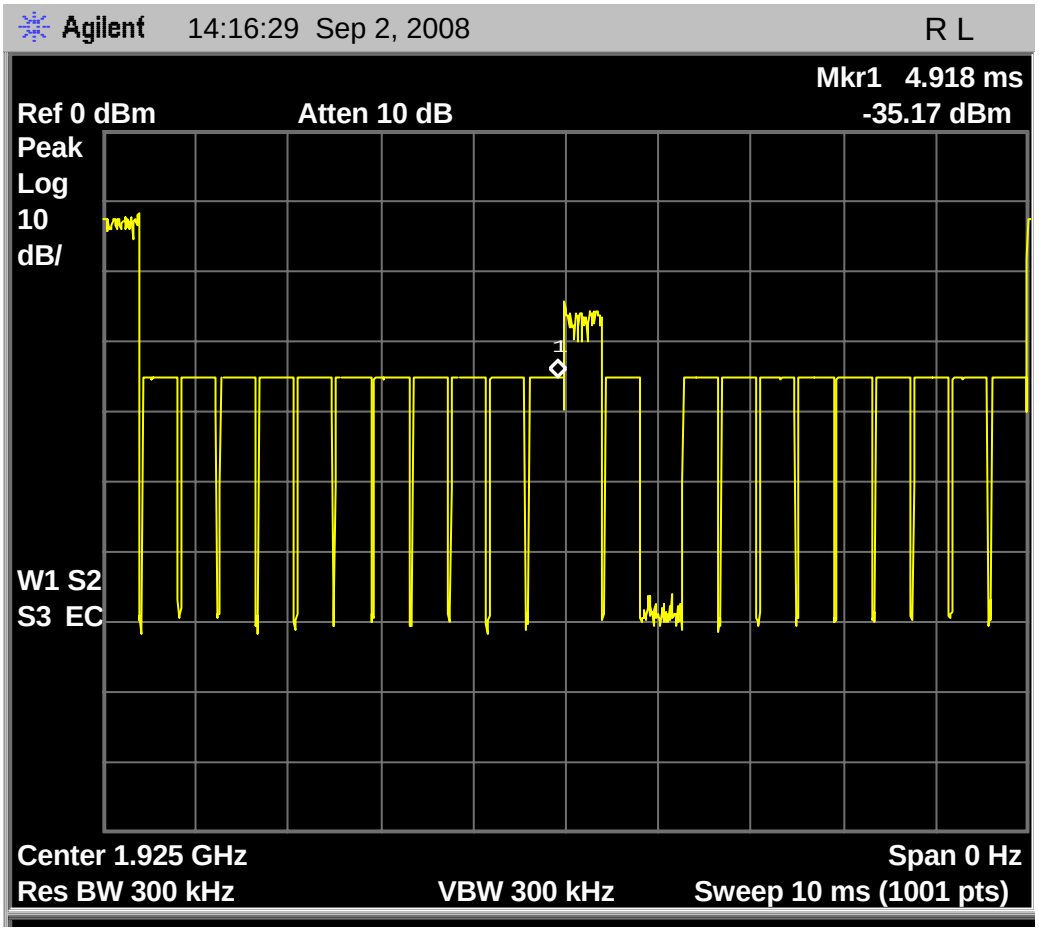

Fig. 79 – Interference profile for the Headset EUT that is above the threshold of -54.6dBm ($T_U + U_M$) WITH an open slot pair to demonstrate a link was possible for the test set up when 8.3.2 g) was performed.

A period of time is allowed for the headset to enter idle but locked state, with the base companion device. The TALK button is then pressed, and the headset EUT establishes a communications channel with the base companion device on the open slot pair. Note the third open slot was needed so the Base beacon could be on the same frequency and be viewable on the spectrum analyzer screen for monitoring which time slot was occupied.

Next the test for 8.3.2 g) can be performed knowing a link would be possible, the beacon will be shown in slot 0 (marker 1's location) and a link must not be established in order to pass.

8.3.2 (g) Validation of dual access criteria check with interference above threshold and WIHTOUT an open slot pair.

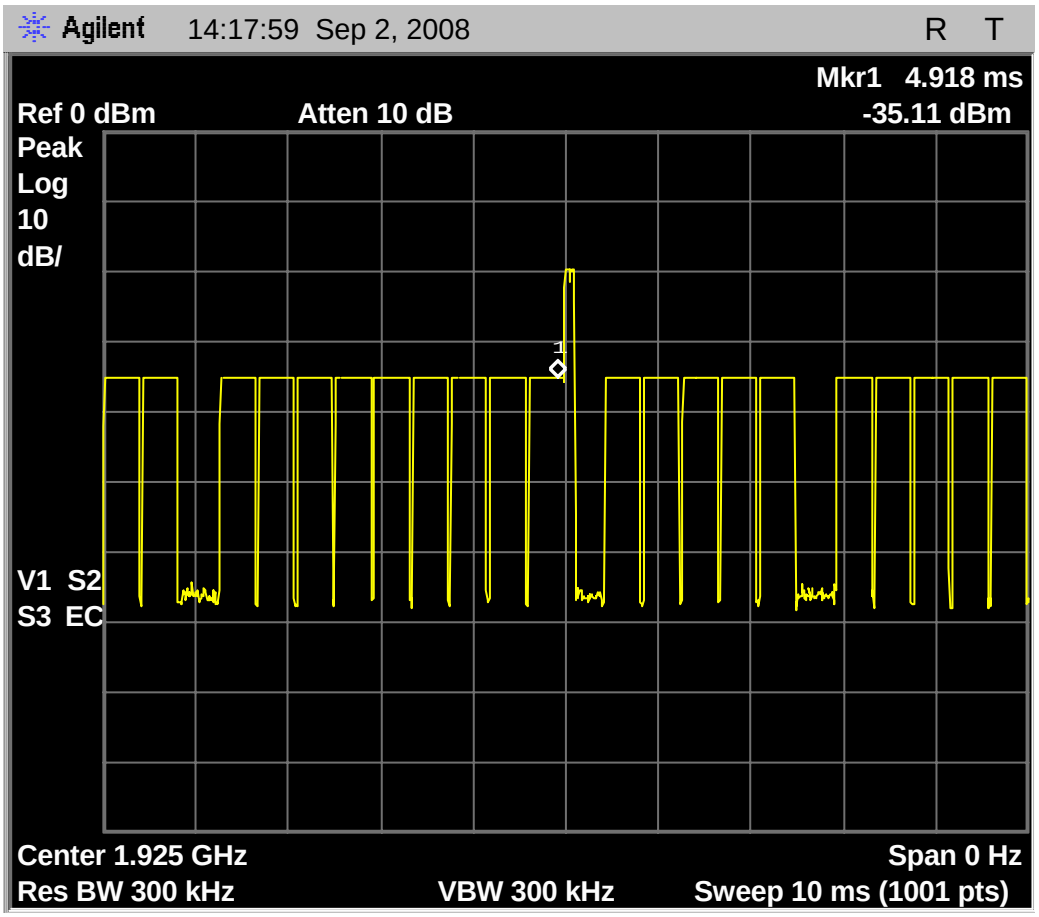

Fig. 80 – Interference profile for the Headset EUT that is above the threshold of -54.6dBm ($T_U + U_M$) without an open time slot pair. Slots that are opened are headset transmit slot 2 and headset receive slot 0 (slot 12). Note an additional time slot was opened to provide a place for the Base beacon of the companion device. If the base beacon was to occupy slot 0 or slot 16 a link could not be established and the test would pass but not be valid. Another option would be to force the Base to another carrier, but could not be monitored at the same time as the interference profile of interest.

A period of time is allowed for the headset to enter idle but locked state, with the base companion device. The TALK button is then pressed, and the headset EUT is not able to establish a communications channel with the base companion device as there is not an open slot pair. The signal shown by marker 1 is the Base companion device beacon.

No link was able to be established since there was not a valid slot pair combination which shows compliance to the requirements of 8.3.2 g).

VI. Appendix A WBM (Wide Band Mode), headset EUT

Additional testing was performed to cover the audio Wide Band Mode (WBM) optional configuration of the "premium" variant of the WH100 and WH200. The WBM allows the headset to establish a link in a wideband audio mode that reduces the number of traffic channels from 60 to 30 (due to the doubling of the timeslot to send a traffic packet from one time slot in normal mode to two timeslots in WBM). This reduction in available traffic channels requires that WBM use T_L for the access criteria check rather than T_U, which changes the interference access threshold from -60.6dBm to -80.6dBm. Note as in normal mode the Base companion device does not initiate traffic links; and only initiates the beacon transmission which does not change operation in WBM. The headset monitors both halves of the timeslot (headset receive and headset transmit) as demonstrated in the testing of 8.3.2 of this report.

The tests that will be repeated to ensure compliance with C63.17-2006 are the ones that require a different access threshold due to the decreased number of channels. The different access criteria thresholds for the two modes are stored in eeprom, and the tests performed ensure the correct eeprom access threshold is selected by the firmware depending on the mode of operation (normal or WBM).

The following tests were used as audits that demonstrate functionality did not change in WBM, and for tests that need verification due to the access criteria change in WBM.

Clause 6 power and emissions bandwidth were spot checked in WBM to ensure near identical performance (since these values are used to calculate the access threshold) between the two modes (normal and WBM).

Clause 7 tests that were repeated were to check the access threshold is changed to the lower access criteria, and to cover the variation in tests that specify the use of T_L rather than T_U.

Clause 8.3.1 was performed "Validation of dual access criteria check for EUT's which do not implement the upper threshold"; since in WBM the lower threshold is required.

Clause 6.1.2 Peak transmit power, headset EUT in WBM

The headset EUT is configured as described in the introduction for the tests of clause 6.1. Only the mid carrier was re-tested in WBM to confirm the output power is the same as normal mode prior to WBM compliance testing. Note the burst time (sweep time of the spectrum analyzer had to be doubled, but the output power difference is within measurement error.

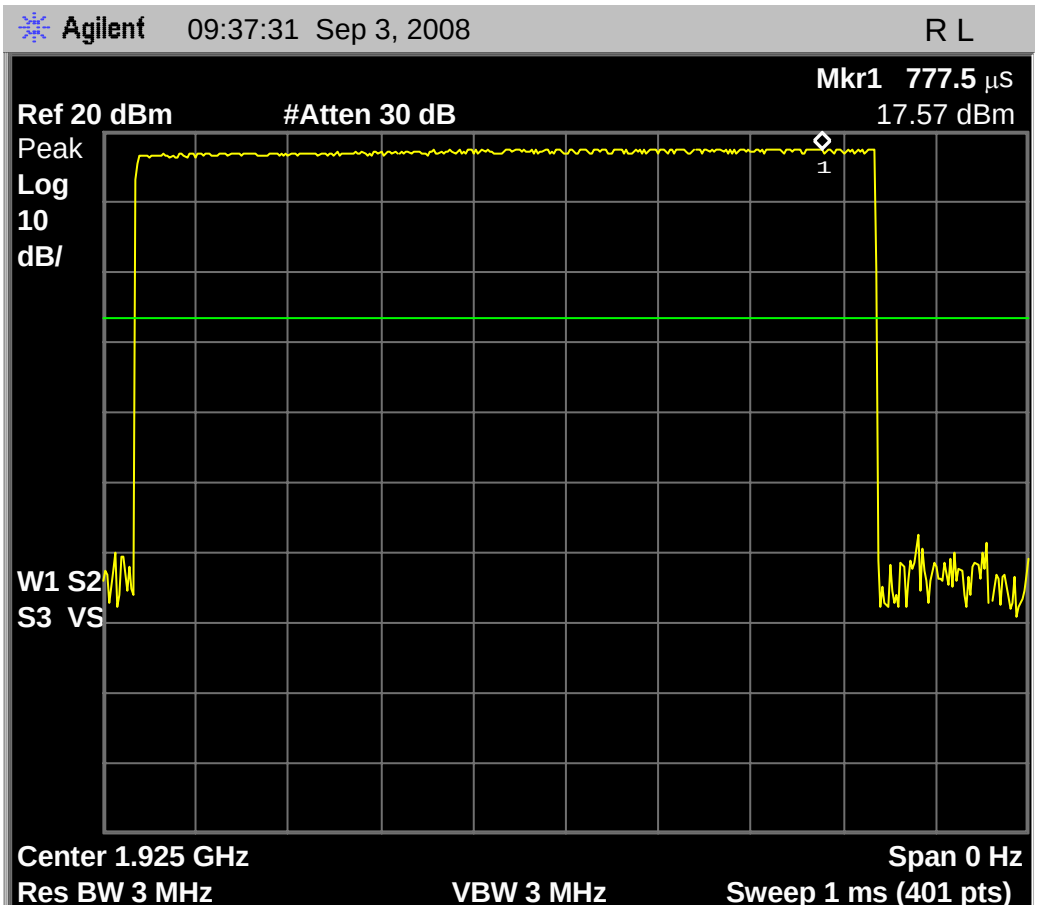

Fig. 81 - Headset EUT transmit power received by spectrum analyzer configured according to the requirements of clause 6.1.2 of C63.17-2006, low carrier. Maximum observed transmit power is 17.57 dBm in WBM; output power for normal mode on mid channel was 17.50dBm.

Clause 6.1.3 Emission bandwidth B, headset EUT in WBM

The headset EUT is configured as described in the introduction for the tests of clause 6.1. Only the mid carrier was re-tested in WBM to confirm the output power is the same as normal mode prior to WBM compliance testing.

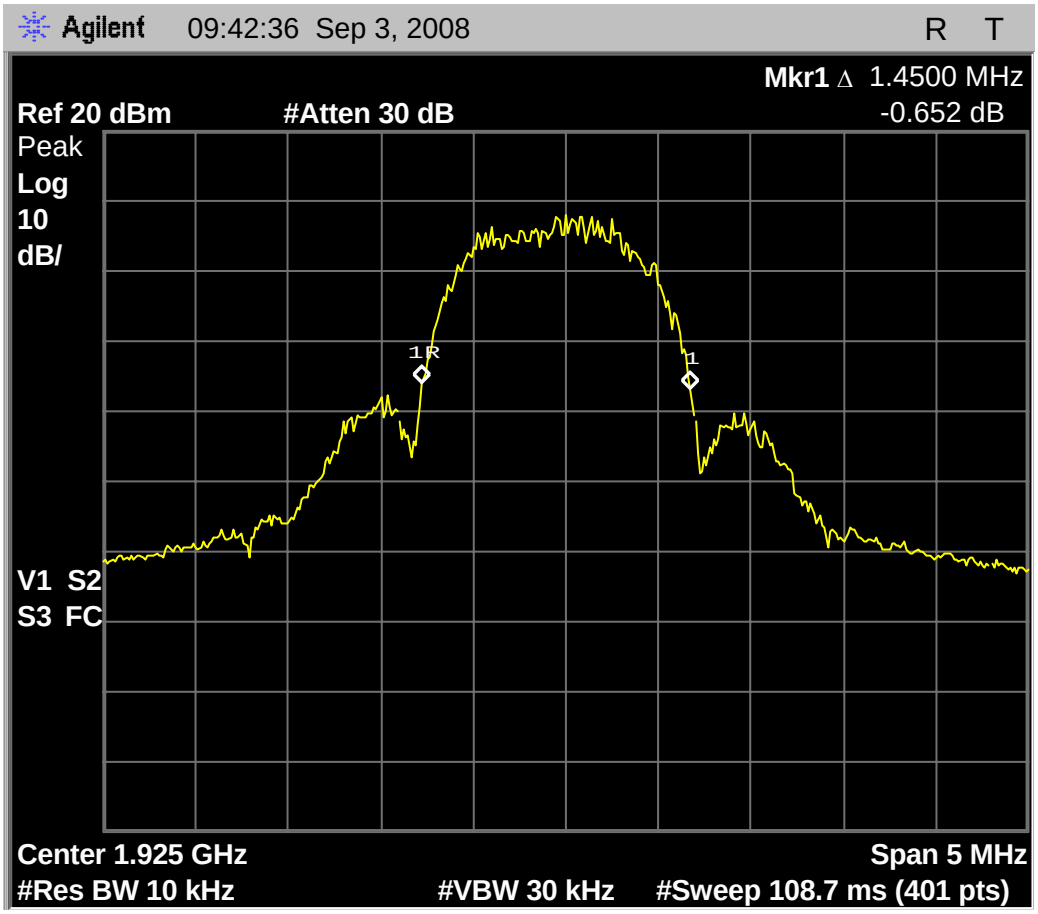

Fig. 82 - Headset EUT in WBM, 1.45MHz emissions bandwidth on mid carrier vs. 1.45MHz in normal mode max power.

Clause 7.3.1 Lower threshold for EUTs which do not implement the LIC procedure, headset EUT in WBM

The headset EUT is set in WBM and must use the T_L threshold since the number of supported traffic channels in this implementation is less than forty. See testing in section 7.3.1 for test set up and a more detailed description.

The multi-carrier interference generator (PXI-5670) is set to CW on all 5 carriers, at level -64.6dBm, which is TL + UM + 10dB, where T_L = -80.6dBm from the manufacturer's declarations and the measured emissions bandwidth and UM is defined in C63.17-2006 as 6dB. A trace (yellow) is captured and held at the initial interference -64.6dBm setting.

The multi-carrier interference generator level is then reduced incrementally in 1dB steps until the headset EUT responds to the press of the TALK button by initiating a communications channel with the base. A max-hold signal (purple) captures the trace showing when transmissions of the communications channel begin. For each 1dB step, the headset EUT is powered down while the multi-carrier interference generator is set to the new level, then powered up. Each trial includes a delay to allow the headset EUT to locate the beacon transmission from the base companion device. A trace (blue) shows the interference carrier level at the level where headset transmissions first begin. A marker shows the delta between the -64.6dBm level and the level at which headset transmissions first begin.

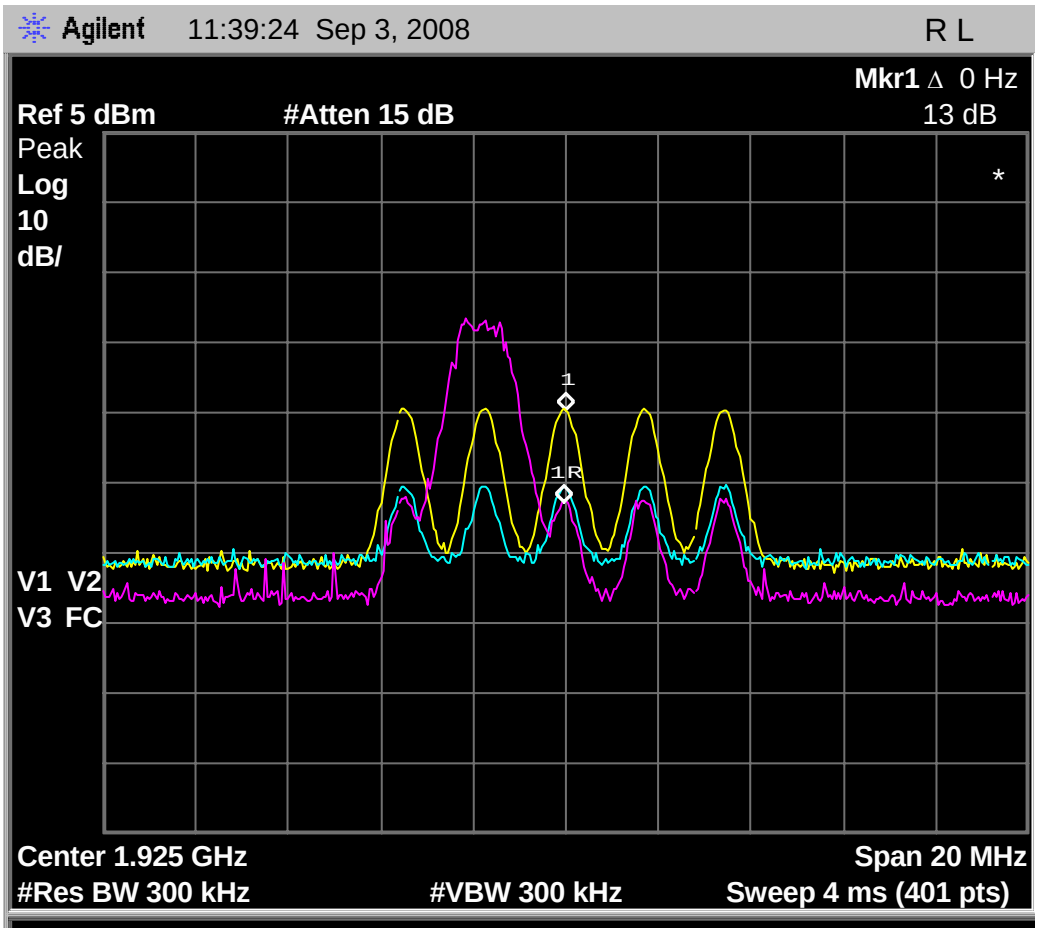

Fig. 83 - Emissions and interference profile spectrum, headset EUT, test 7.3.1 in WBM.

The access criterion is correctly changed when the system was changed to operate in WBM. The traffic link was not able to be initiated until the interference generator level was dropped to -79.0 dBm which is within 6dB (U_M) of the WBM access threshold of -80.6 (T_L)+ U_M, the headset EUT passes.

Clause 7.3.3 Least interfered channel (LIC) procedure test, headset EUT in WBM

This section performed for information only, LIC is no longer a requirement in a WBM traffic link as the T_L access threshold is the requirement, and not T_U with LIC. The test platform, headset EUT and companion base unit are configured according to the requirements for implementing the test of 7.3.3 by means of test configuration #3, with companion device and interference blocking, headset EUT, of section (I) of this document. Although the interference signals shown below are lower than the lower threshold, the LIC algorithm is still active in WBM even though this is no longer a requirement. The headset EUT is able to resolve the signal level differences between the 2 open channels of -81.6dBm and -86.6dBm (less than the 6dB power resolution required).

The multi-carrier interference generator (PXI-5670) is set to CW at $T_L + U_M$ = -74.6dBm (blocked) on three carriers; at 1928.448MHz, 1924.992MHz, and 1921.536MHz, and the open channels below had interference set to -81.6dBm (known level just below T_L that will allow a traffic link, and -87.6dBm ($T_L - U_M$).

Clause 7.3.3(b)

With this interference profile present, apply power to the headset EUT and the companion base unit. Wait for the headset to detect the base companion device, then press the TALK button on the headset to initiate the communications channel. Repeat the communications channel establishment five times while monitoring the spectrum using the E4407B spectrum analyzer to validate that, when this interference profile is applied to the headset EUT, the headset always chooses f_2 for the communications channel.

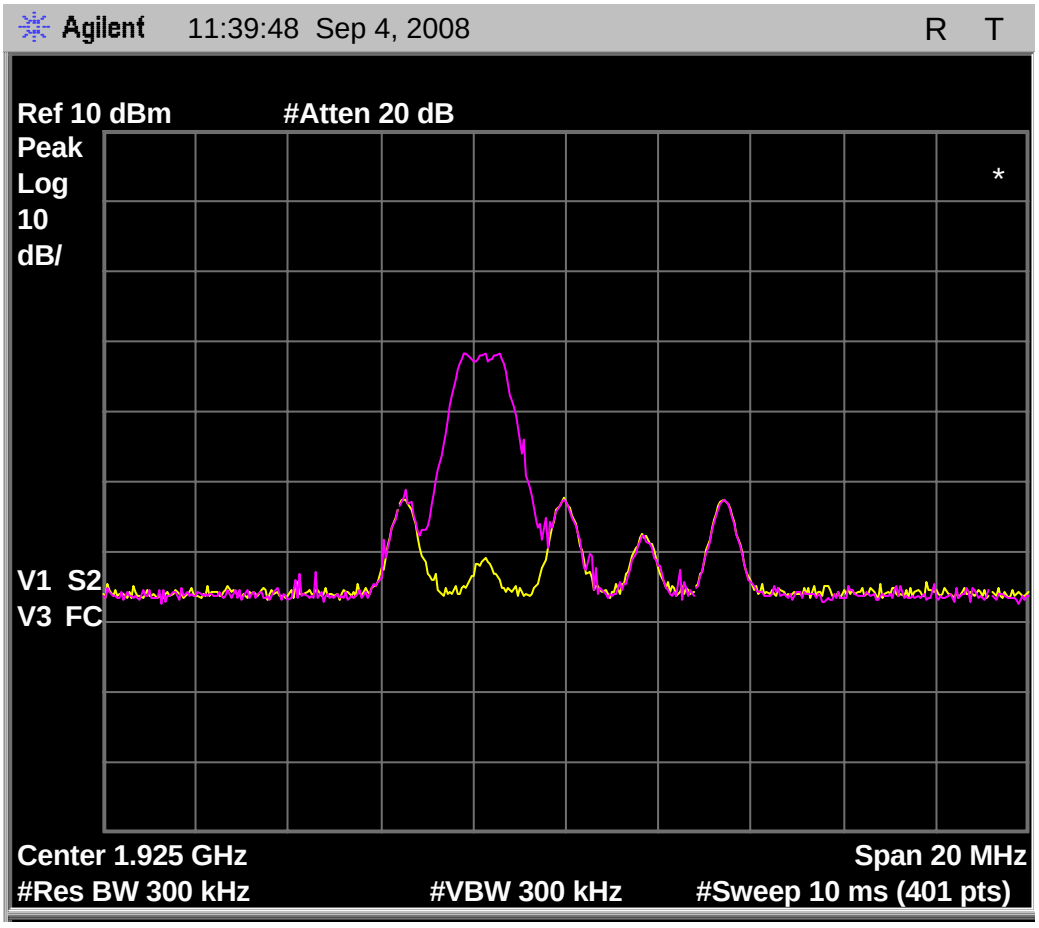

Fig. 84 - Emissions and interference profile spectrum, headset EUT, test 7.3.3(b).

A max-hold signal (purple, top) captures the trace showing where in the spectrum EUT transmissions are occurring. A trace (yellow, bottom) shows the interference profile.

The headset EUT always transmits on f_2 (the carrier with the lower interference level) and so meets the LIC requirement of not transmitting on f_1, although no longer a requirement since T_L is now being used for the access criteria when the headset EUT is in WBM..

Clause 7.3.3(c) in WBM

With this interference profile present, apply power to the headset EUT and the companion base unit. Wait for the headset to detect the base unit. Then press the TALK button on the headset to establish a communications channel. Repeat the communications channel establishment five times while monitoring the spectrum using the E4407B spectrum analyzer to validate that, when this interference profile is applied to the headset EUT, the headset EUT always chooses f_1 for the communications channel.

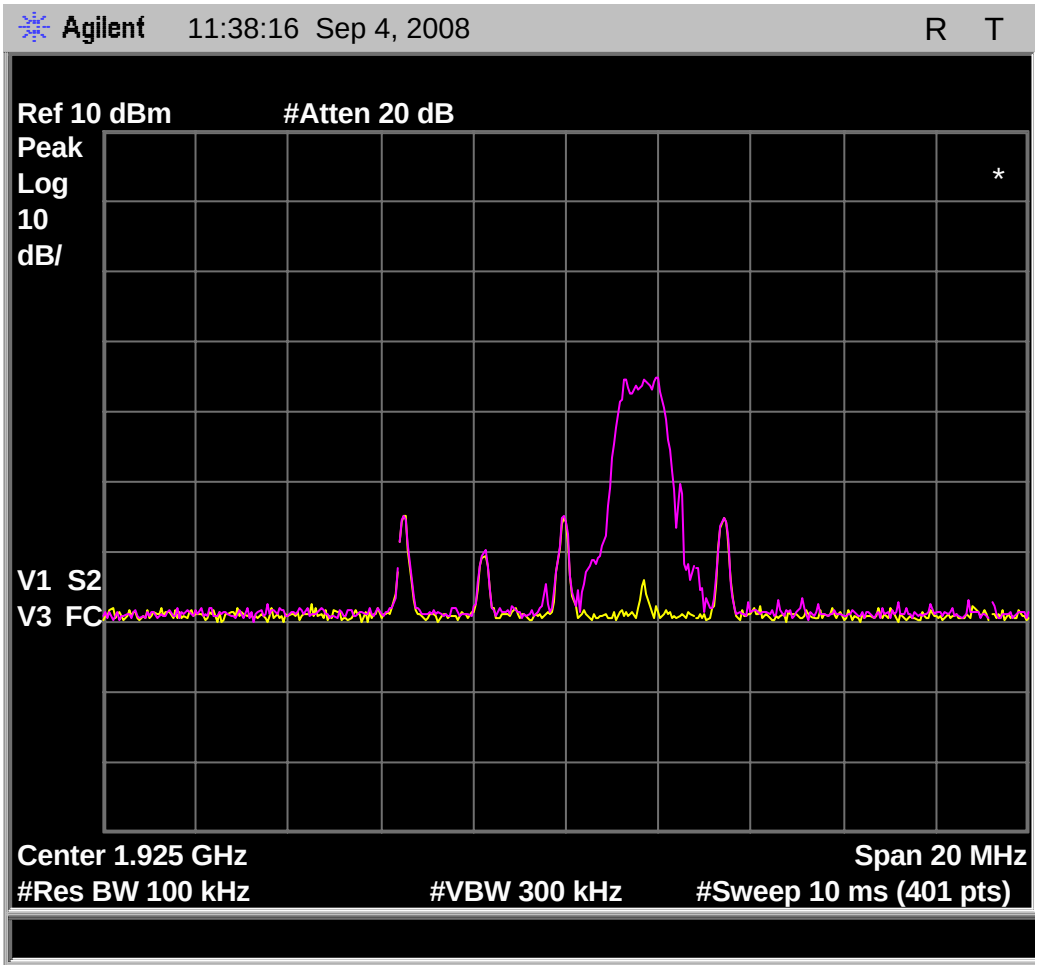

Fig. 85 - Emissions and interference profile spectrum, headset EUT, test 7.3.3(c).

A max-hold signal (purple, top) captures the trace showing where in the spectrum EUT transmissions are occurring. A trace (yellow, bottom) shows the interference profile.

The headset EUT always transmits on f_1 (the carrier with the lower interference level) and so meets the LIC requirement of not transmitting on f_2, although no longer a requirement since T_L is now being used for the access criteria when the headset EUT is in WBM.

Clause 7.5 Reaction time and monitoring interval, headset EUT in WBM

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

The multi-carrier interference generator (PXI-5670) is set to interference pulse transmissions of 50us length, synchronized with the frame and slot timing of the base companion device and so (since the headset EUT in turn synchronizes with the base unit) with the timing of the headset EUT. The interference is present on all 5 carriers, and at level -74.6dBm, which is $T_L + U_M$.

Two interference profiles are loaded; one with all pulses at -74.6dBm, $T_L + U_M$, and the other at -86.6dBm, $T_L - U_M$. The first profile is used to demonstrate deferral for pulses 50uS long above the threshold, and the second profile is used to demonstrate non-deferral for 50uS pulses below the threshold. See section 7.5 in the main report for the detailed procedure and for interference calibration screen captures.

Clause 7.5(c)

The headset EUT is powered up with the interference conditions of 7.5(c) present. An interval of time is allowed for the headset EUT to find and synchronize to the base companion device. Then the headset EUT TALK button is pressed; the RF detector in the signal combining network is monitored as is the pre-transmission signal generated by the headset EUT when it begins the initiation of transmission. No transmissions from the headset EUT are observed.

The multi-carrier interference generator is then switched to the alternate interference profile, with pulses of level $T_L - U_M$, or -86.6dBm.

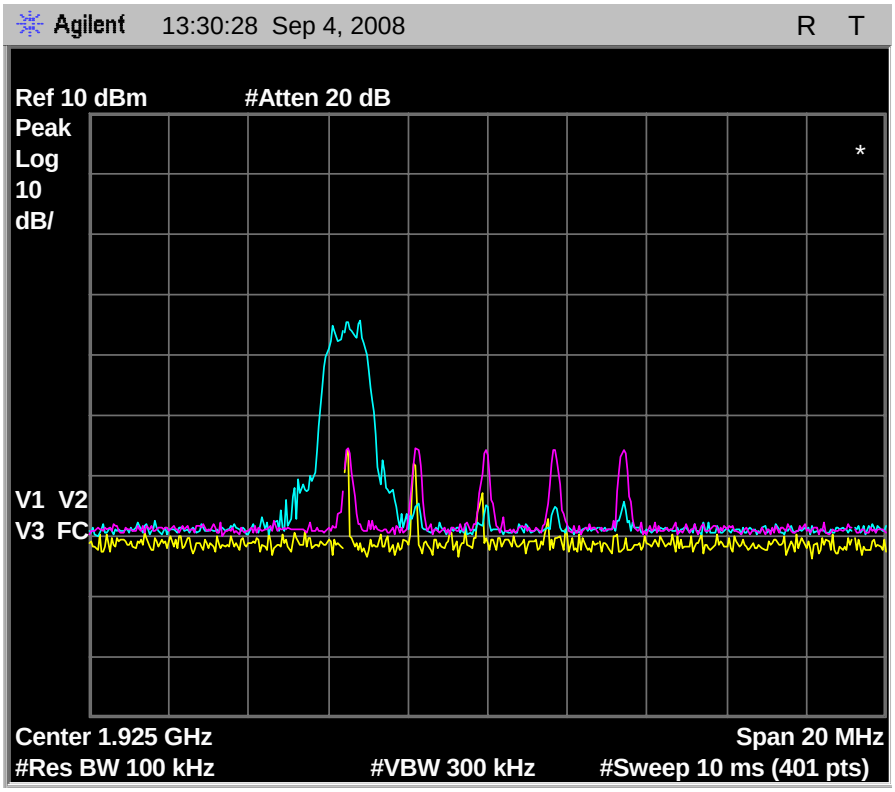

Fig. 86 - Transmit spectrum of 50uS interference pulses, with headset EUT no longer deferring with interference pulses of level $T_L - U_M$.

The purple (top) trace is the max-hold capture over multiple sweeps of the initial $T_L + U_M$ interference spectrum without EUT transmissions. The blue (middle) trace is a max-hold capture of the interference and the headset EUT's successful transmission when the interference is set to $T_L - U_M$. The yellow (lowest) trace is a single sweep of the spectrum with the interference at $T_L - U_M$ and headset EUT transmission active.

The headset EUT defers transmission when pulses of level $T_L + U_M$ are present with length 50uS, and so meets the requirements of 7.5(c).

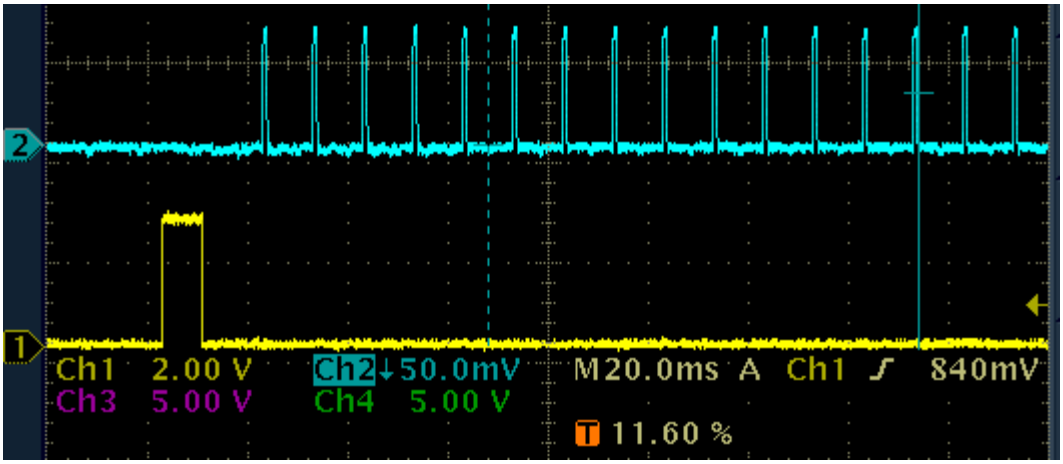

Fig. 87 - Normal initiation of transmissions by the headset EUT in the absence of over-threshold interference; the headset EUT software flags the start of the transmission setup (bottom trace), and transmit emissions are recovered by the RF detector (top trace) in the splitter/combiner network. Proper transmission at T_L - U_M is shown, to validate functionality and to illustrate the getting-ready-to-transmit marker, and the RF detector output.

The headset EUT defers transmission when pulses of level T_L+ U_M are present with length 50uS, and so meets the requirements of 7.5(c).

The multi-carrier interference generator is then switched to the alternate interference profile, with pulses of level T_L- U_M, or -86.6dBm.

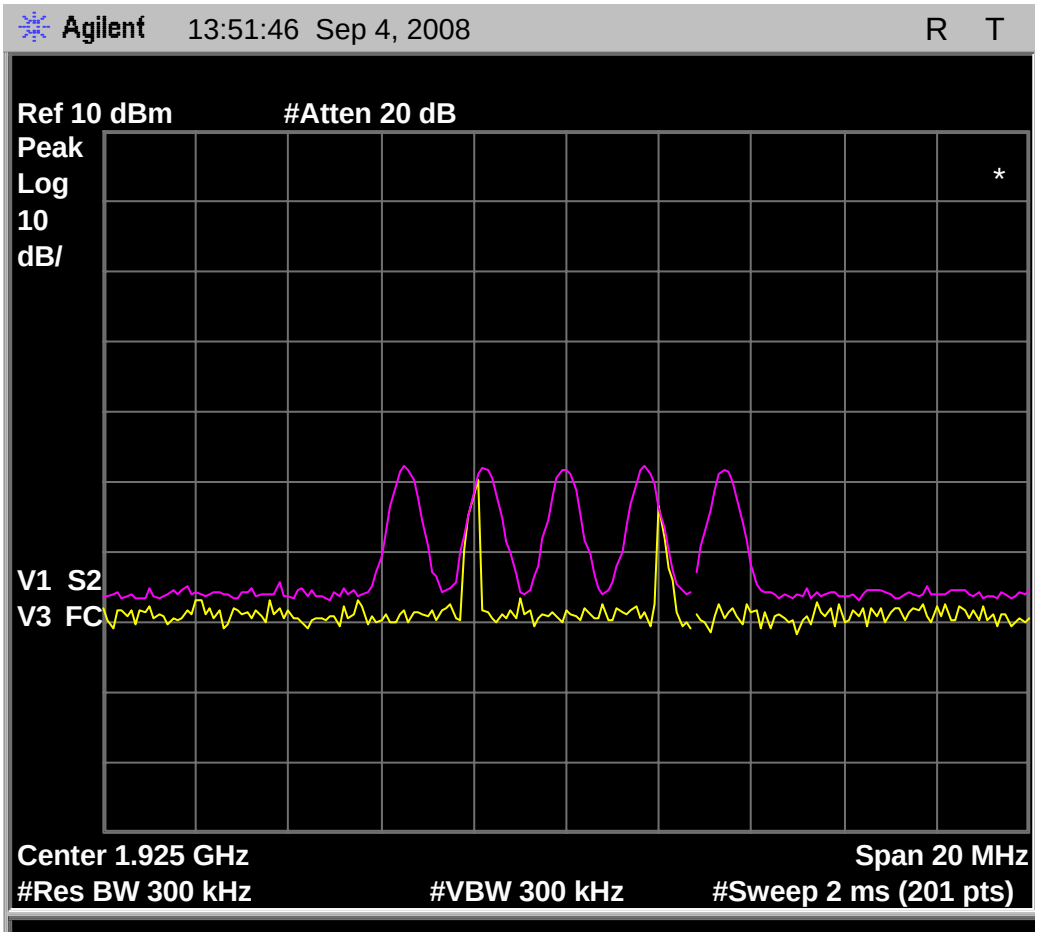

Fig. 88 - Transmit spectrum of 35uS interference pulses in each timeslot for each carrier, with headset EUT deferring due to interference pulses of T_L + U_M + 6dB.

The transmit spectrum and interference spectrum are observed using the E4407B spectrum analyzer. Trigger is free-run, detection is peak, otherwise adjustments are as shown on the screenshot. The purple (top trace) shows the max-hold capture of many pulses as the spectrum analyzer sweeps in free-run, unsynchronized with respect to the multi-carrier generator. The yellow (bottom) trace shows a single sweep of the spectrum analyzer, sweeping past active interference pulses.

No transmissions from the headset EUT are observed; the headset EUT is required to defer when pulses of 35uS are present at level T_L + U_M + 6dB, the headset EUT does defer, and so passes the requirement of 7.5(d).

Clause 8.3 Duplex connections, headset EUT in WBM

Clause 8.3.1 Validation of dual access criteria check for EUT's which do not implement the upper threshold

This test validates proper operation of the headset EUT in WBM which operates according to the provisions of 47CFR15.323(c)(10) using both transmit and receive channels on one end of the link to qualify both ends of the link for transmissions.

The multi-carrier interference generator (PXI-5670) is set to TDMA mode (timeslot-synchronized with the base companion device) with initial interference profile active, with all carriers at level -74.6dBm ($T_L + U_M$) except the carrier at 1924.992MHz, f_1, which has an opened time slot0&1 set to -100dBm (note in WBM one open time slot is equivalent to two opened time slots in the normal 24 slot mode), see figure below for generator settings.

The alternate interference profile is set up to allow a WBM traffic channel to be established to verify the test set up was correct and it is the interference preventing a link deferral for the tests of 8.3.1 c) and e)

Fig 89 - PXI-5670 multi-carrier interference generator control panel for the test of 8.3.1(c)- Initial profile settings to unblock one headset EUT receive slot

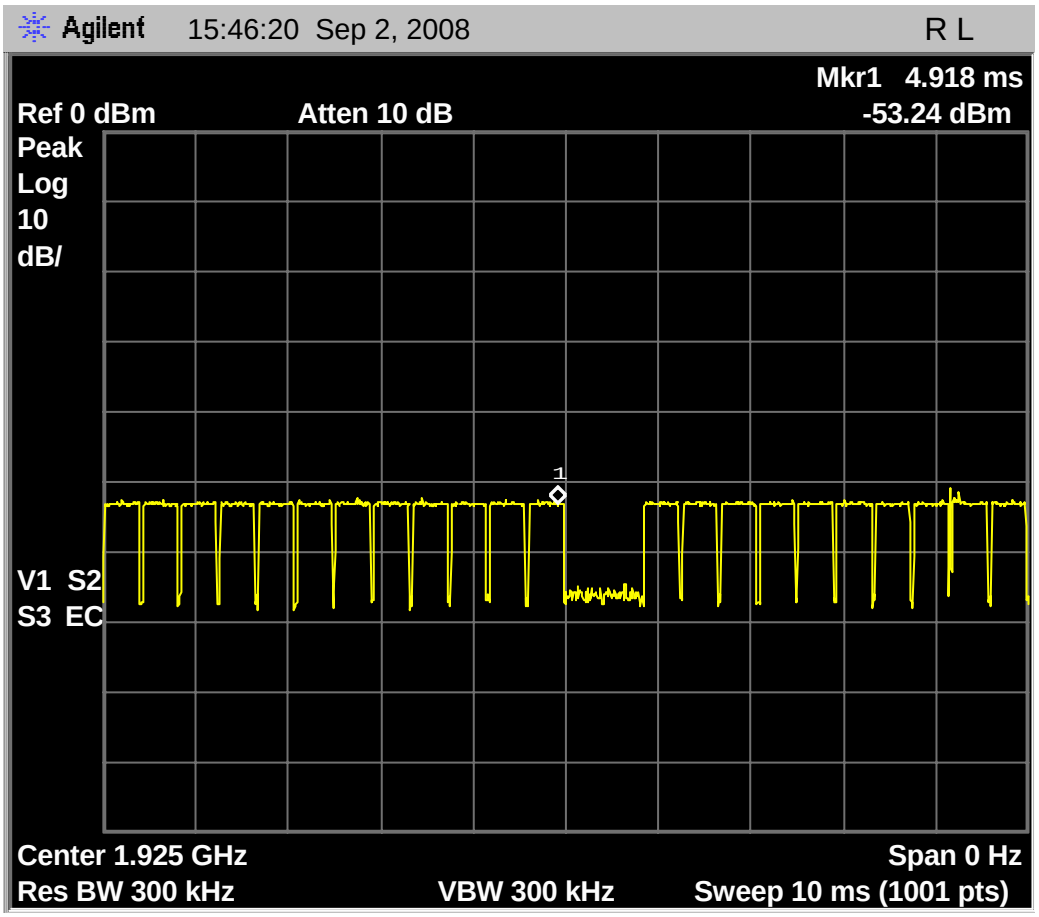

Fig. 90 – Interference profile for the Headset EUT that is above the threshold of -74.6dBm ($T_L + U_M$) without an open time slot pair. Slots that are interference free are headset receive slots 0 and 1 (slot 12 and 13).

The headset idle locked to the companion Base device, and the headset talk button pressed. The headset could not find an opened slot pair and does not transmit or create a traffic link.

The headset EUT does not transmit and passes the requirements of 8.3.1c), d).

Fig 91 - PXI-5670 multi-carrier interference generator control panel for the test of 8.3.1(e)- Initial profile settings to unblock one headset EUT transmit slot, alternate profile to test for link set up (one opened time slot pair).

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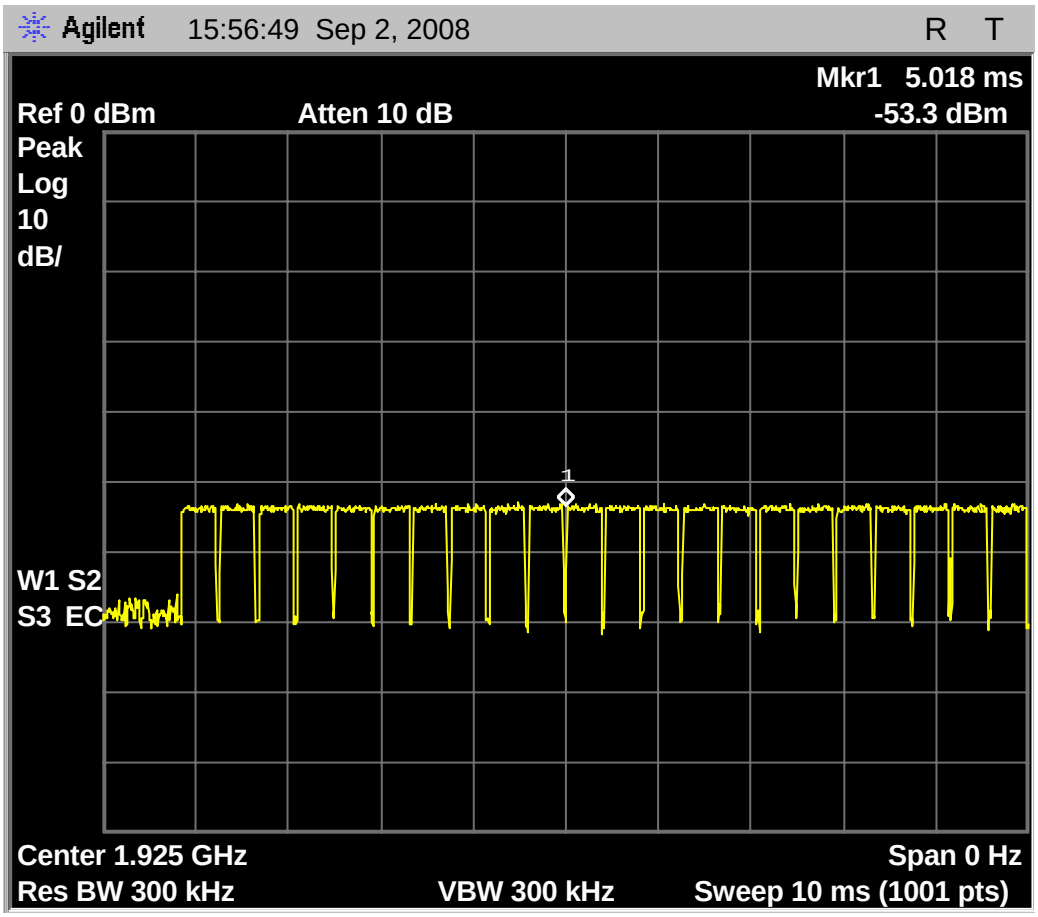

Fig. 92 – Interference profile for the Headset EUT that is above the threshold of -74.6dBm ($T_L + U_M$) without an open time slot pair. Headset EUT transmit slots that are interference free are 0 and 1 (one WBM slot).

The headset idle locked to the companion Base device, and the headset talk button pressed. The headset could not find an opened slot pair and does not transmit or attempt to create a traffic link.

The headset EUT does not transmit and passes the requirements of 8.3.1e), f).

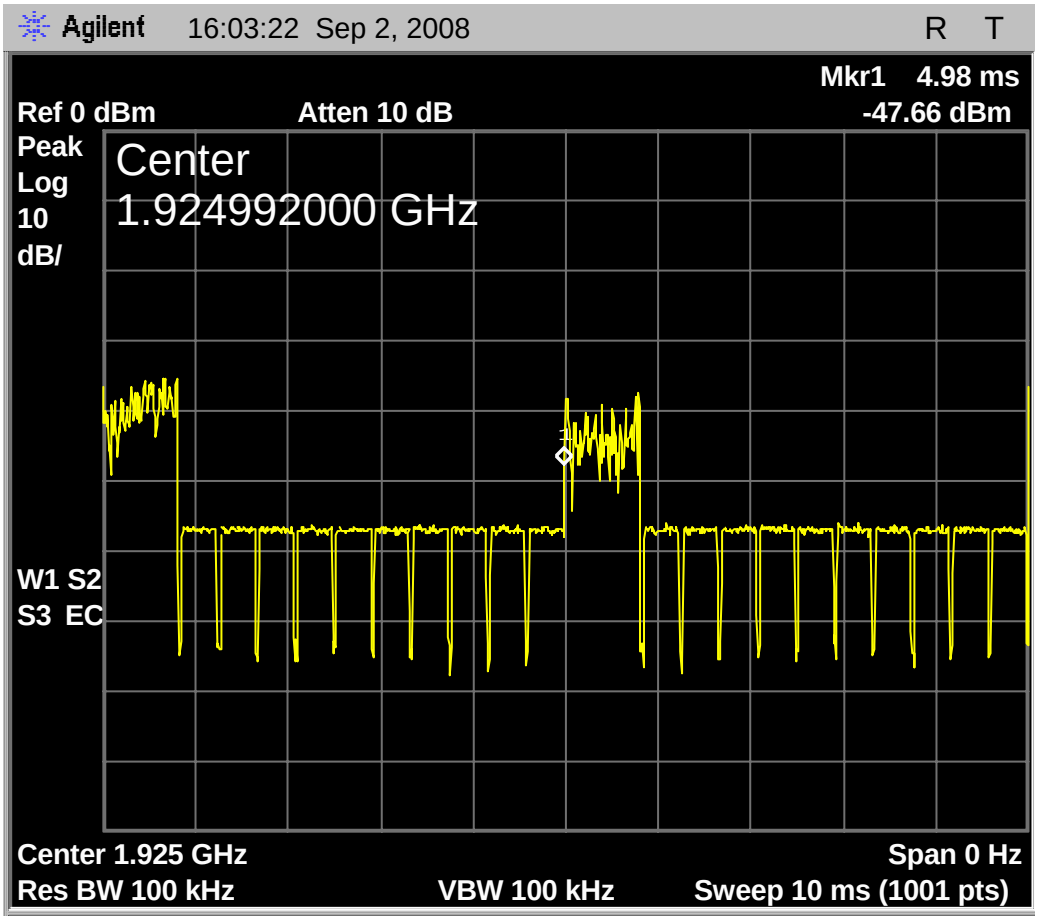

Fig. 93 – Interference profile for the headset EUT that is above the threshold of -74.6dBm ($T_L + U_M$) WITH an open time slot pair, to ensure the test set up interference synchronization are working correctly, and that the link deferral tests above are valid. Slot pair that is interference free is slots 0 and 1. A traffic link was established validating the test set up.

VII. Appendix B Power Control, headset EUT in WBM (Wideband Mode)

Additional testing was performed to cover the ability of the headset EUT to adjust its RF power adaptively as needed to maintain the best possible audio connection while also outputting the least amount of interference for other users. The power control feature is set via the companion Base device to an adaptive maximum, adaptive medium or a fixed power level. The low power settings will be tested in clause 7 testing to ensure that the proper access threshold is utilized prior to headset EUT transmission

The following tests were used as an audit for functionality that should not change in WBM, and for tests that need verification due to the access criteria change required for power setting and for WBM.

Clause 6 - Power and emissions bandwidth were tested in low power mode to capture the lower output number to validate the use of a higher interference level, and to ensure the emissions bandwidth used to calculate the access threshold has not changed from high power mode to low power mode.

Clause 7 tests repeated were to check that the access threshold has changed and the correct threshold level is being utilized.

Clause 8 no additional tests required; see Appendix A for confirmation the headset EUT works properly in WBM.

Clause 6.1.2 Peak transmit power, headset EUT in minimum power mode and WBM

The headset EUT is configured as described in the introduction for the tests of clause 6.1. The headset EUT was placed in low power and wide band audio modes. The maximum observed minimum power across all channels was 1.25dBm.

Clause 6.1.3 Emission bandwidth B, headset EUT, in minimum power mode and WBM

The headset EUT is configured as described in the introduction for the tests of clause 6.1. The headset EUT was placed in low power and wide band audio modes.

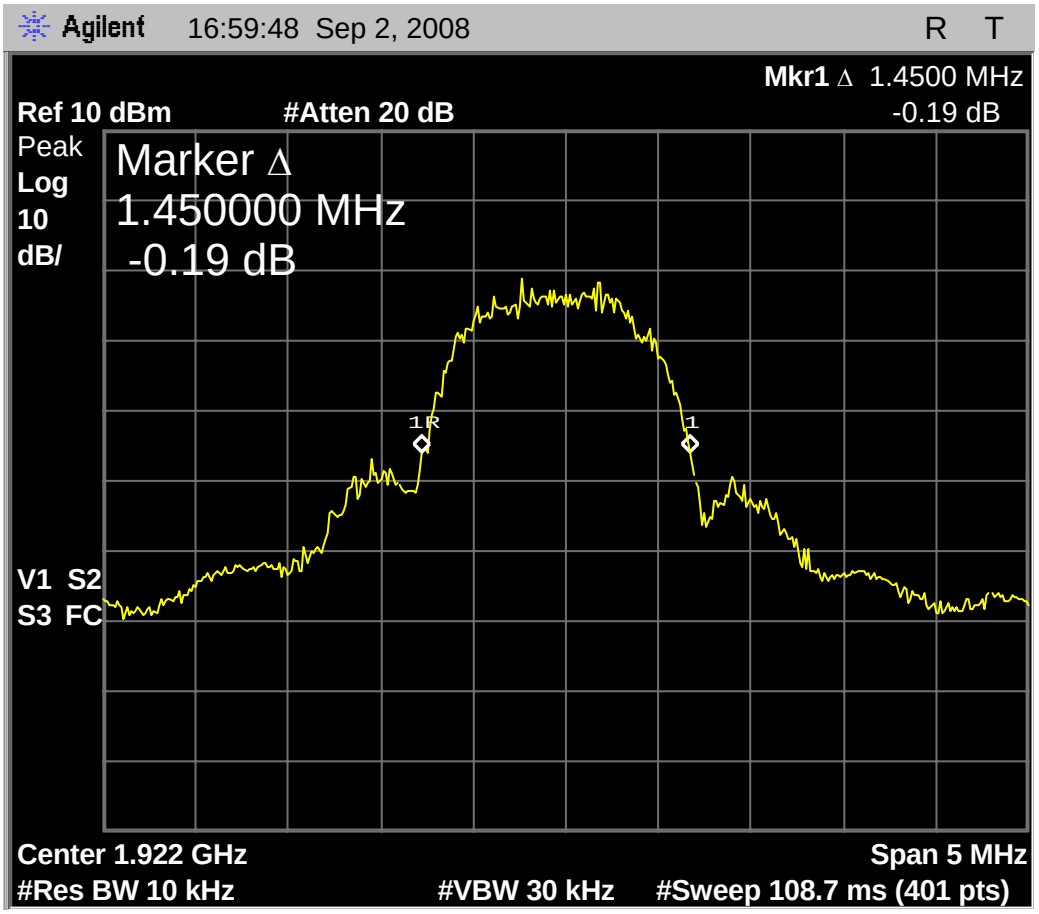

Fig. 94 - Headset EUT in WBM, 1.45MHz emissions bandwidth on low carrier vs. 1.48 MHz in normal mode high power.

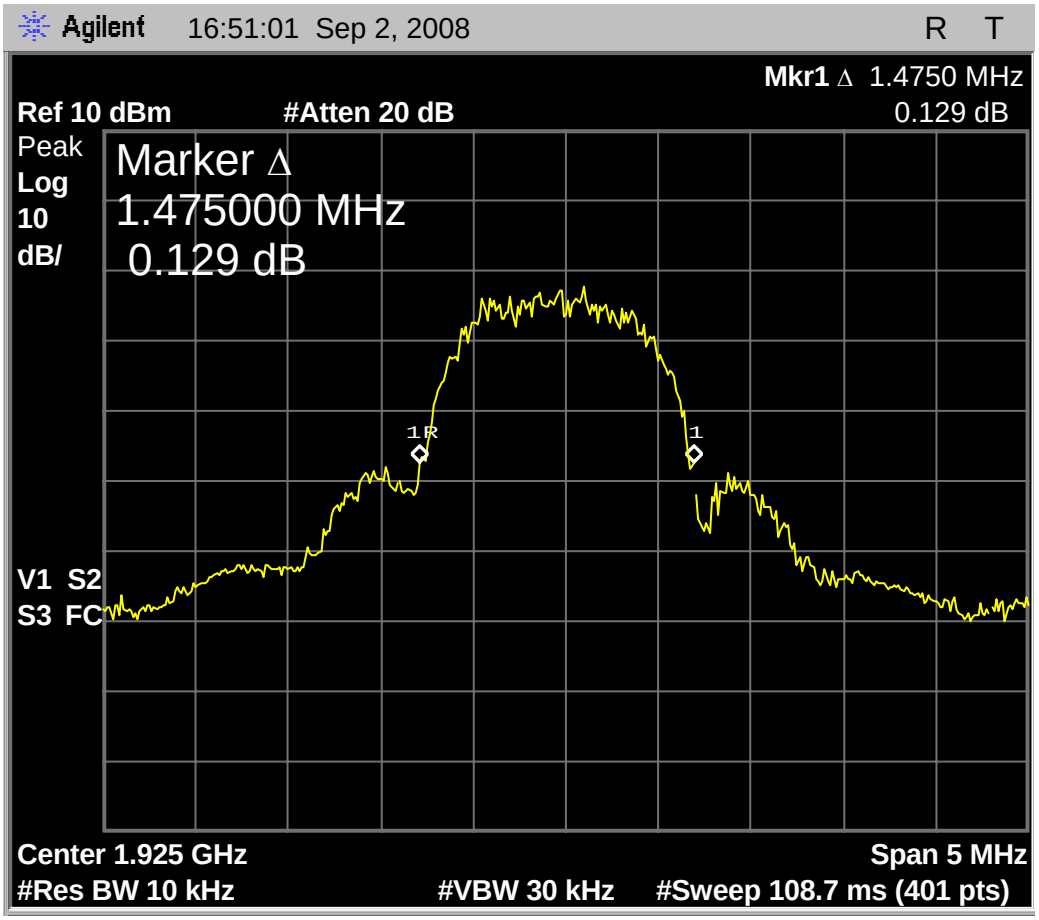

Fig. 95 - Headset EUT in WBM, 1.48MHz emissions bandwidth on mid carrier vs. 1.45MHz in normal mode high power.

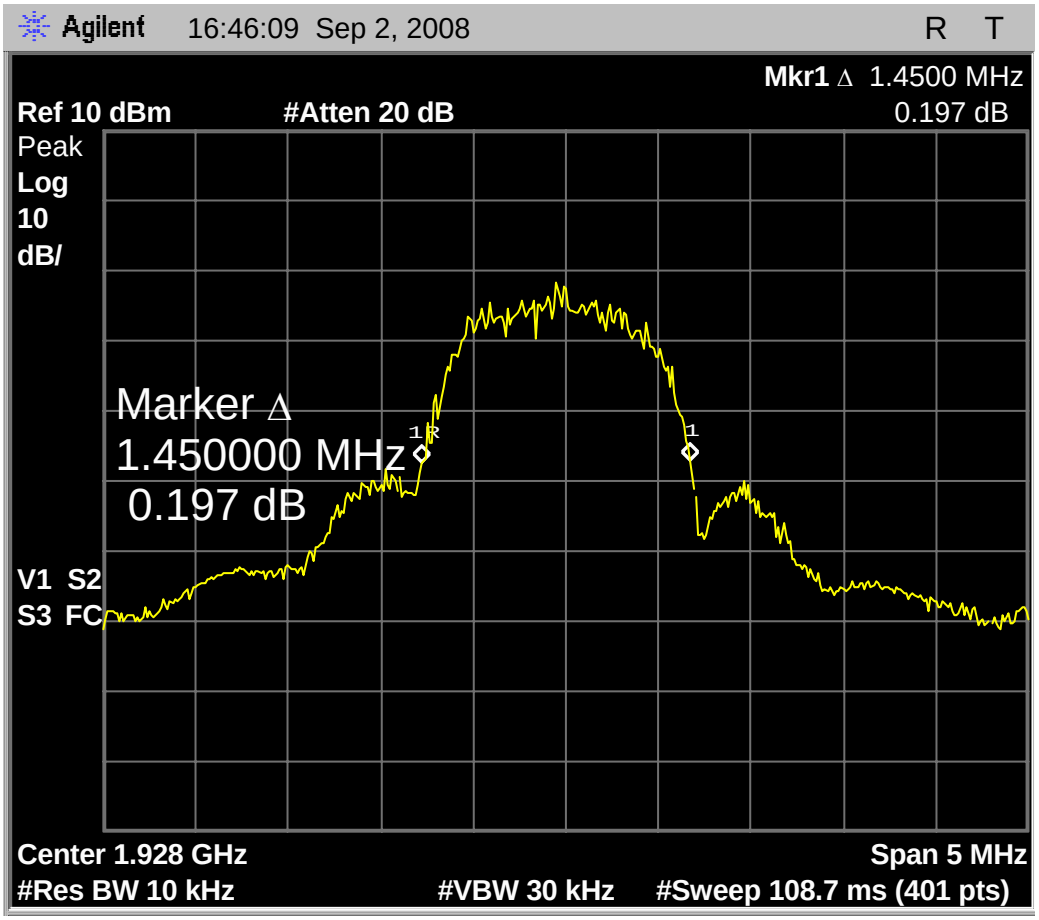

Fig. 96 - Headset EUT in WBM, 1.45MHz emissions bandwidth on high carrier vs. 1.48MHz in normal mode high power.

The difference in the emissions bandwidth measured in low power and WBM of 1.48MHz which results in a 0.03db difference in access threshold.

Clause 6.1.6 Emissions, headset EUT

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

6.1.6.1 Out-of-band emissions, headset EUT was repeated and all harmonics were well below specification even when measured in the increased resolution bandwidth of 300kHz vs. the required 10kHz, see section 6.1.6 of main report.

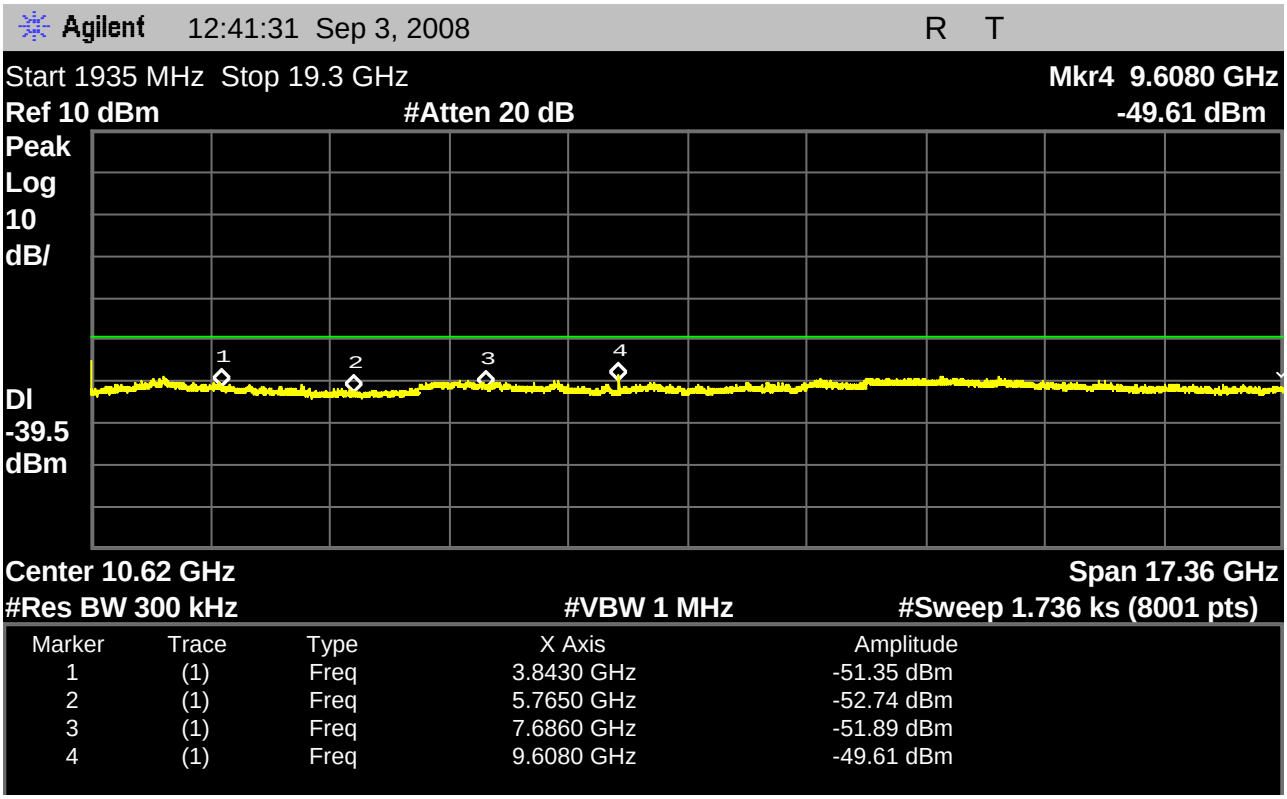

Fig. 97 - headset EUT in minimum power WBM on low carrier, harmonics in this scan are all within specification by 10dB even while measured in the 300kHz and below the harmonics observed in maximum output power mode.

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.

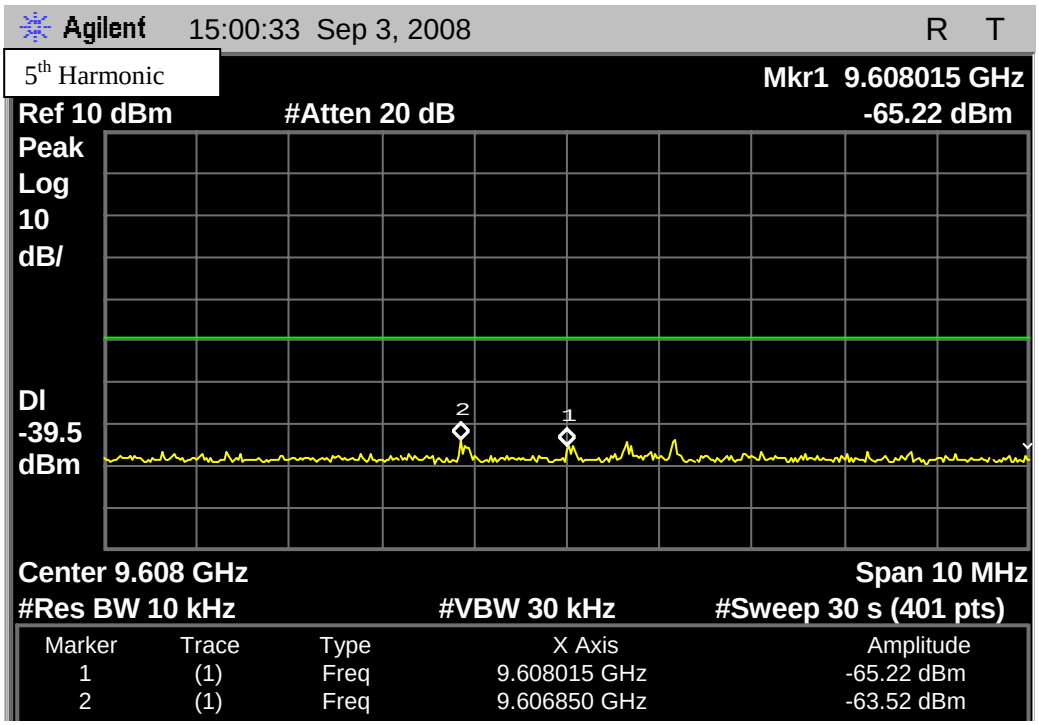

Fig. 98 – headset EUT out-of-band emissions in the region around the 5th harmonic, with the headset EUT transmitting on the lowest carrier, 1921.536MHz.

This measurement was made according to the requirements of the text of 6.1.6, and, with the worst-case peak at –63.52dBm, shows margin to the -39.5dBm specification of 24.02dB.

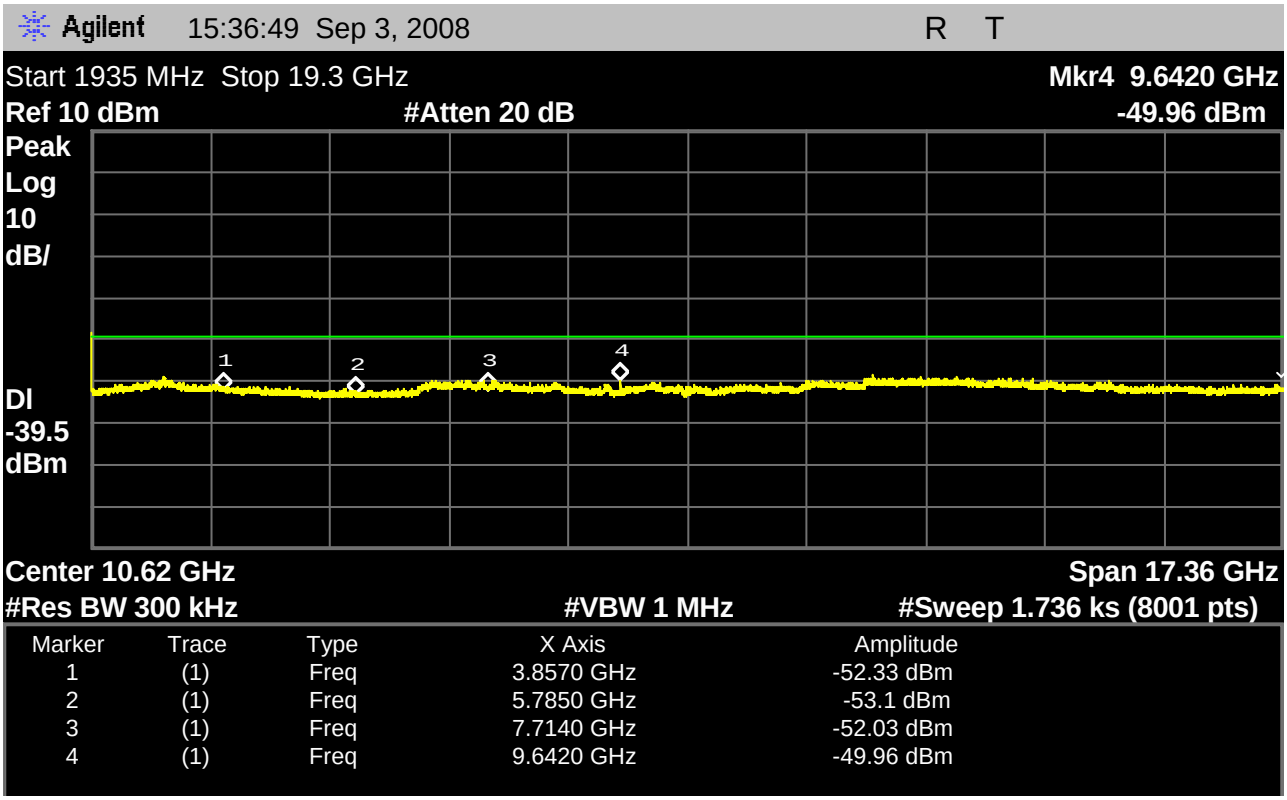

Fig. 99 - headset EUT in minimum power WBM on high carrier, harmonics all below the noise floor in minimum power mode, unlike harmonic level with headset EUT configured for maximum output power, see section 6.1 of main report.

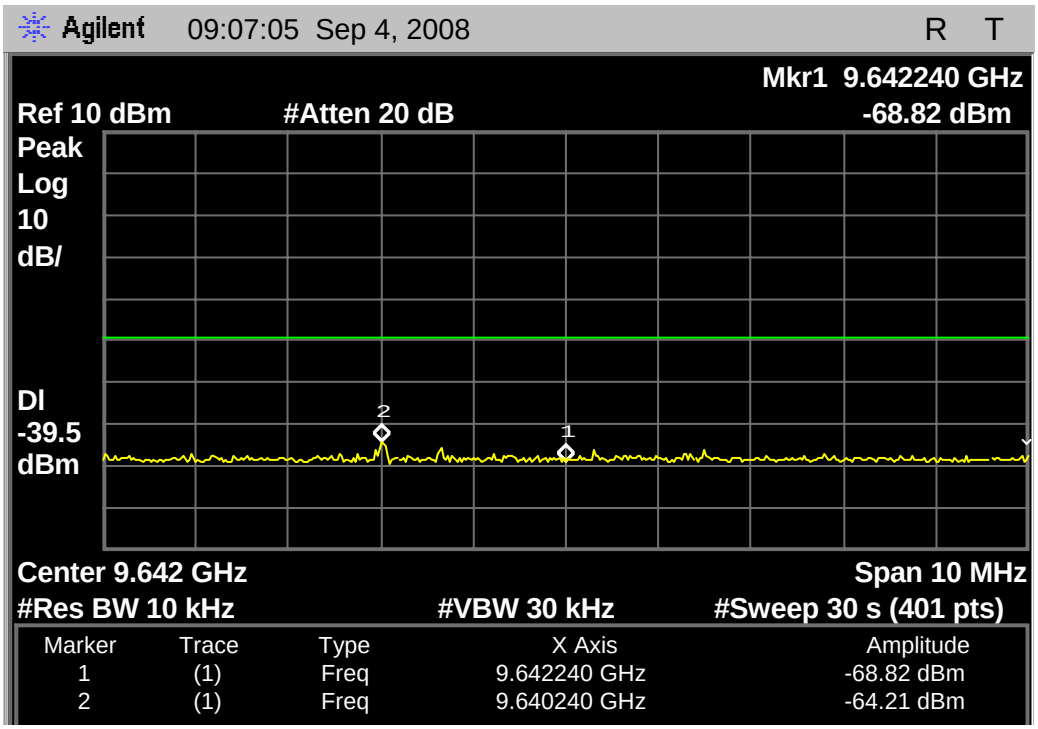

Fig. 100 – headset EUT out-of-band emissions in the region around the 5th harmonic, with the headset EUT transmitting on the lowest carrier, 1921.536MHz.

Clause 7.3.1 Lower threshold for EUTs which do not implement the LIC procedure, headset EUT in minimum power setting (WBM).

The headset EUT is set in WBM and power control is set to the minimum, the headset EUT must use the TL threshold since the number of supported traffic channels in this implementation is less than forty, but the lower threshold is increased (due to the reduction in EUT output power) from -80.6dBm to -62.6dBm. See testing in section 7.3.1 for test set up and a more detailed description. Also reference Appendix A for WBM when set to maximum output power.

The multi-carrier interference generator (PXI-5670) is set to CW on all 5 carriers, and at level -46.6dBm, which is TL + UM + 10dB, where TL = -62.6dBm from the manufacturer's declarations and the measured emissions bandwidth and UM is defined in C63.17-2006 as 6dB. A trace (yellow) is captured and held at the initial interference -46.6dBm setting.

The multi-carrier interference generator level is then reduced incrementally in 1dB steps until the headset EUT responds to the press of the TALK button by initiating a communications channel with the base. A marker shows the delta between the -46.6dBm level and the level at which headset transmissions first begin.

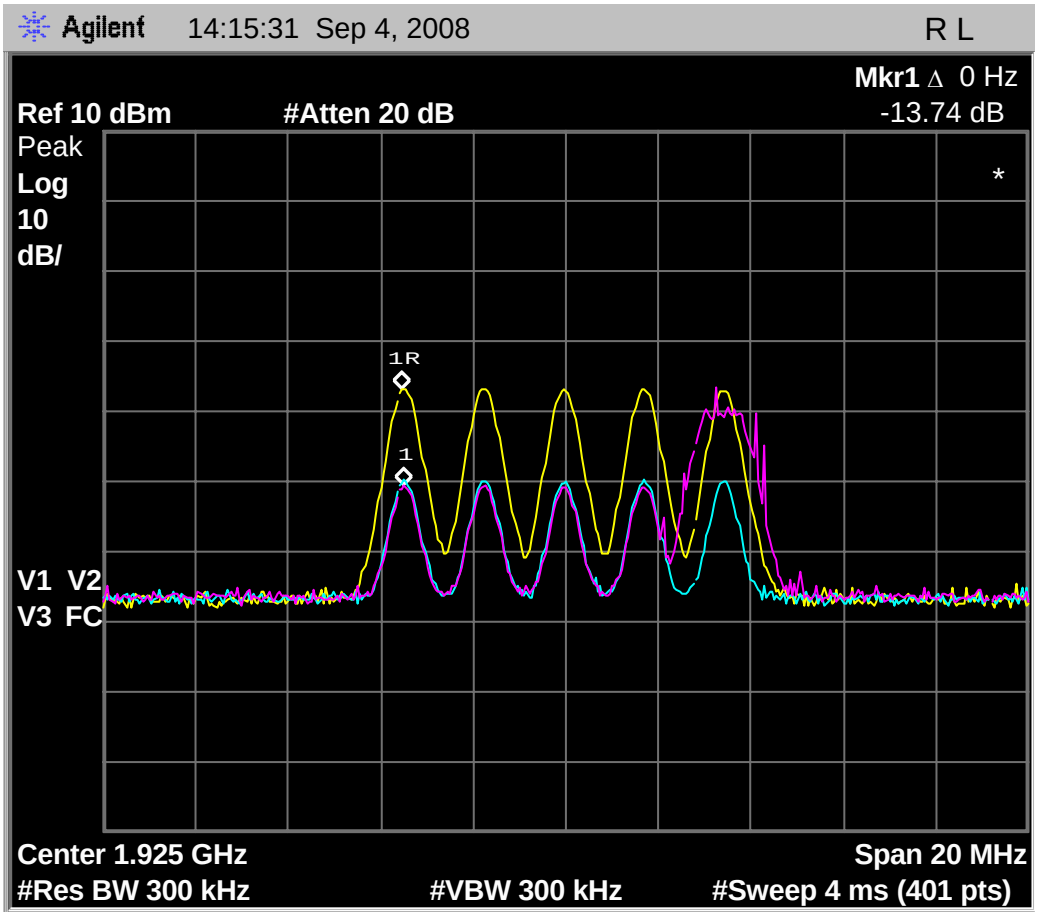

Fig. 101 - Emissions and interference profile spectrum, headset EUT, test 7.3.1 in low power WBM.

The access criterion is correctly changed when the system was changed to operate in low power WBM. The traffic link was not able to be initiated until the interference generator level was dropped to -60.34 dBm which is within 6dB (U_M) of the low power WBM access threshold of -62.6 (T_L)+ U_M, the headset EUT passes.

Clause 7.3.2 Upper threshold for EUTs which implement the LIC procedure, headset EUT, minimum power (normal mode).

The test platform, headset EUT and companion base unit are configured according to the requirements for implementing the test of 7.3.2(b) by means of test configuration #3, **With companion device and interference blocking, headset EUT**, of section (I) of this document.

The multi-carrier interference generator (PXI-5670) is set to CW on all 5 carriers, and at level -26.6dBm, which is TU + UM + 10dB, where TU = -42.6dBm; see section 7.3.2 for further set up detail. A trace (yellow) is captured and held at the initial interference -26.6dBm setting.

The multi-carrier interference generator level is then reduced incrementally in 1dB steps until the headset EUT responds to the press of the TALK button by initiating a communications channel with the base. A max-hold signal (purple) captures the trace showing when transmissions of the communications channel begin. A marker shows the delta between the -26.6dBm level and the level at which headset transmissions first begin.

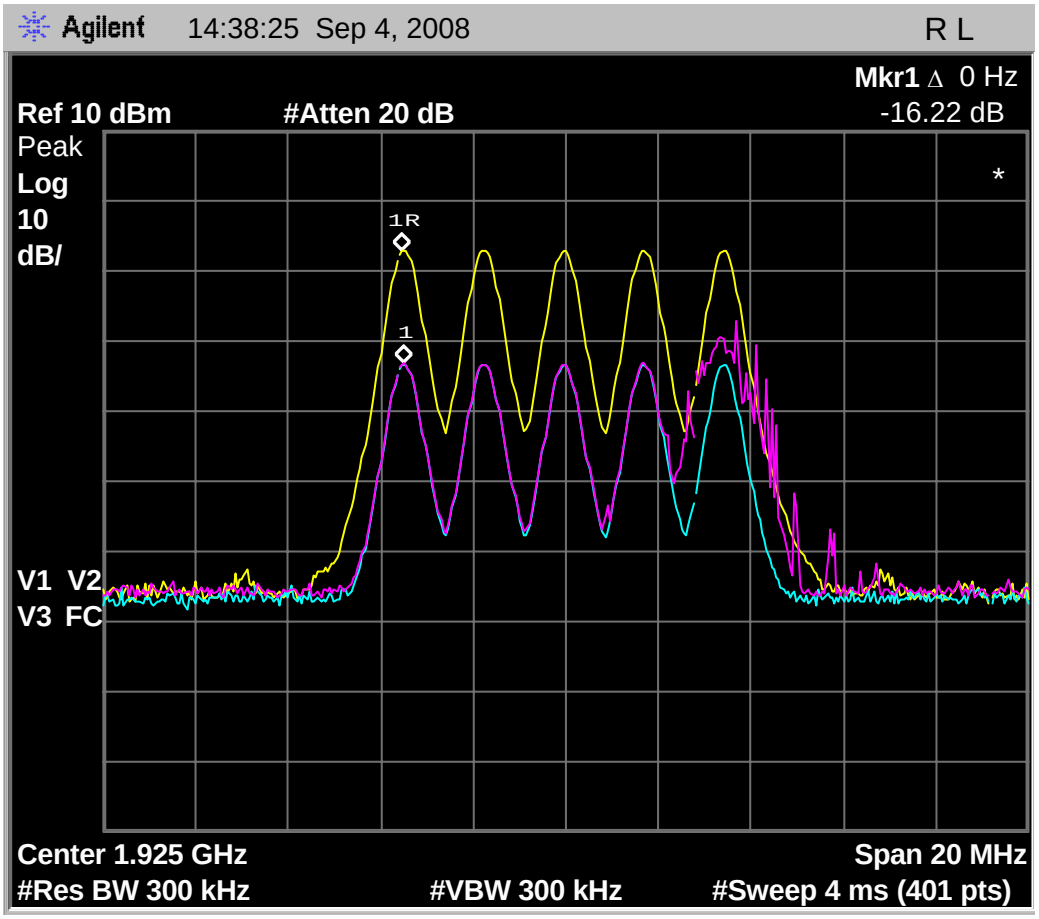

Fig. 102 - Emissions and interference profile spectrum, headset EUT, test 7.3.2.

A trace (yellow, 2nd from top) is captured and held at the initial interference level setting of -26.6dBm. Then the multi-carrier interference generator level is reduced incrementally in 1dB steps until the headset EUT will initiate a communications channel in response to a press of the TALK button. A max-hold signal (purple, top) captures the trace showing when transmissions of the beacon begin. A trace (blue, bottom) shows the interference carrier level at the level where transmissions first begin. A marker shows the delta between the -26.6dBm level and the level at which transmissions first begin.

The first interference level at which the headset EUT transmits is -42.8 dBm. The allowed upper limit is TU + UM = -36.6dBm, the headset EUT passes.

Note that absolute level at the spectrum analyzer and displayed above is a consequence of the relative losses between the EUT port of the combining network and the spectrum analyzer port, relative to the multi-carrier generator port, and does not reflect the signal level at the EUT input.

Clause 7.3.3 Least interfered channel (LIC) procedure test, headset EUT in minimum power (normal mode).

The test platform, headset EUT and companion base unit are configured according to the requirements for implementing the test of 7.3.3 by means of test configuration #3, **With companion device and interference blocking, headset EUT**, of section (I) of this document.

The multi-carrier interference generator (PXI-5670) is set to CW at $T_U + U_M$ = -36.6dBm on three carriers; at 1928.448MHz, 1924.992MHz, and 1921.536MHz.

Clause 7.3.3(b)

The multi-carrier interference generator is additionally set to generate on f_1 a CW signal of level $T_L + U_M$ +7dB, or -49.6dBm (where $T_L = T_U$ - 20dB) and to generate on f_2 a CW signal of level $T_L + U_M$ = -56.6dBm, where f_1 = 1926.720MHz and f_2 = 1923.264MHz, the remaining two of the system's five carriers.

With this interference profile present, apply power to the headset EUT and the companion base unit. Wait for the headset to detect the base companion device, and then press the TALK button on the headset to initiate the communications channel. Repeat the communications channel establishment five times while monitoring the spectrum using the E4407B spectrum analyzer to validate that, when this interference profile is applied to the headset EUT, the headset always chooses f_2 for the communications channel.

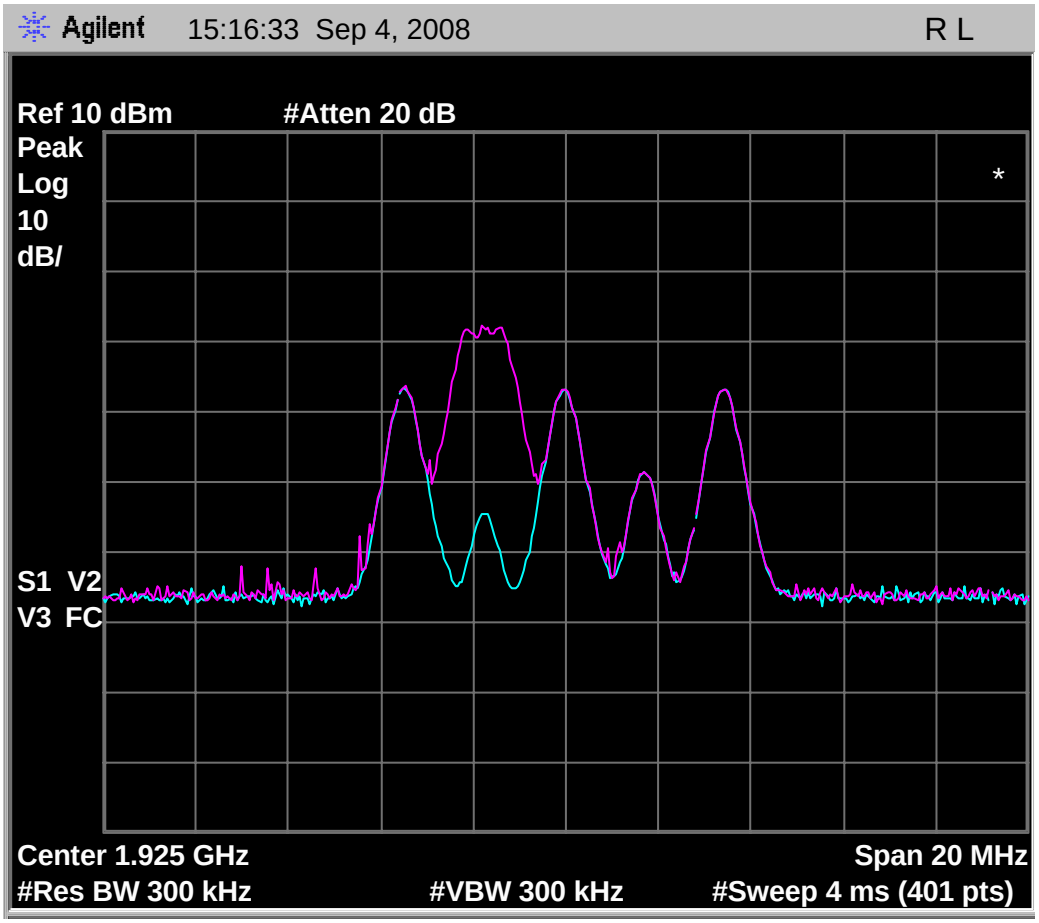

Fig. 103 - Emissions and interference profile spectrum, headset EUT, test 7.3.3(b).

A max-hold signal (purple, top) captures the trace showing where in the spectrum EUT transmissions are occurring. A trace (blue, bottom) shows the interference profile.

The headset EUT always transmits on f_2 (the carrier with the lower interference level) and so meets the requirement of not transmitting on f_1.

Clause 7.3.3(c)

Repeat the test of 7.3.3(b), except reverse the levels on f_1 and f_2. That is, the multi-carrier interference generator is now set to generate on f_1 a CW signal of level $T_L + U_M$, or -56.6dBm and to generate on f_2 a CW signal of level $T_L + U_M$ + 7dB = -49.6dBm, where f_1 = 1926.720MHz and f_2 = 1923.264MHz.

With this interference profile present, apply power to the headset EUT and the companion base unit. Wait for the headset to detect the base unit. Then press the TALK button on the headset to establish a communications channel. Repeat the communications channel establishment five times while monitoring the spectrum using the E4407B spectrum analyzer to validate that, when this interference profile is applied to the headset EUT, the headset EUT always chooses f_1 for the communications channel.

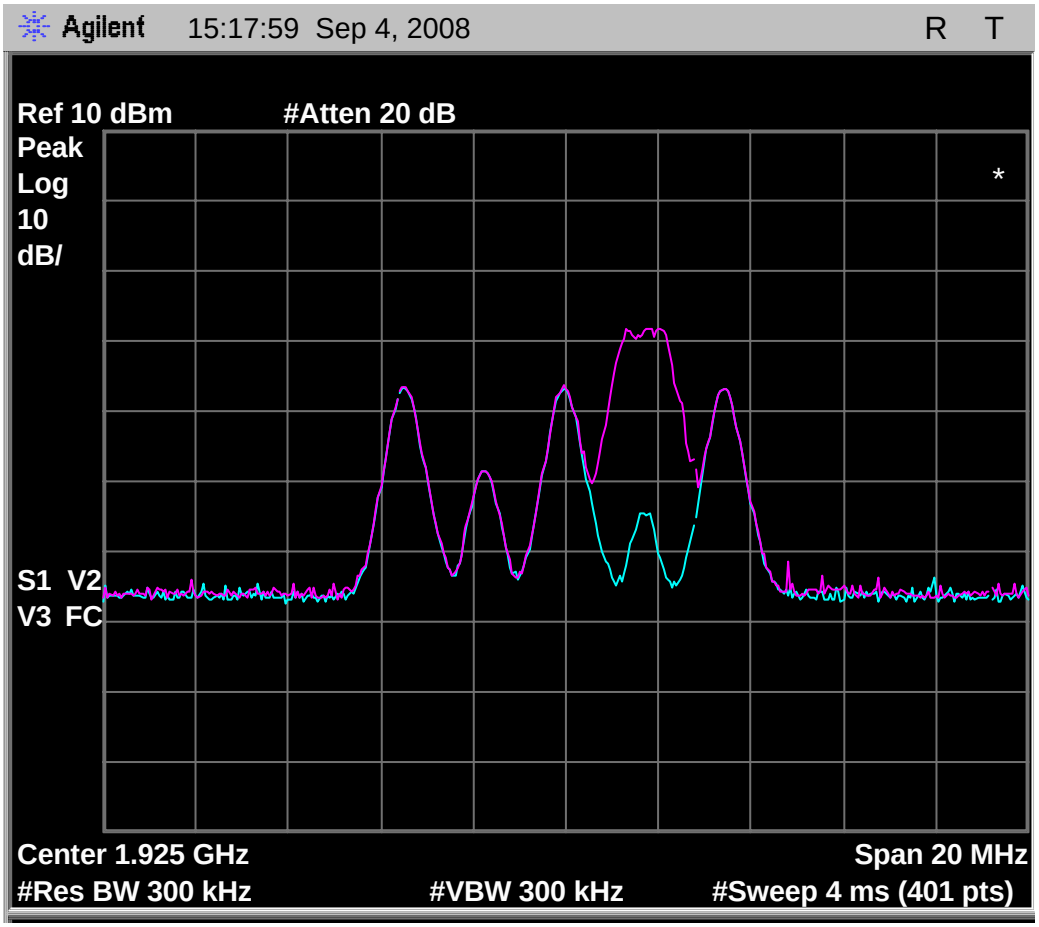

Fig. 104 - Emissions and interference profile spectrum, headset EUT, test 7.3.3(c).

The headset EUT always transmits on f_1 (the carrier with the lower interference level) and so meets the requirement that it never transmit on f_2.