CONFORMANCE TEST REPORT
FOR

FCC Part 15, subpart D

Report No.: 06-06-MAS-178-01

Client:	Suncorp Communications Limited
Product:	DECT PHONE (PP)
Model:	DECT64-S64
FCC ID:	S9ADECT64-S64
Manufacturer/supplier:	Shenzhen Guo Wei Electronics Co., Ltd

Date test item received:	2006/06/21
Date test campaign completed:	2006/08/10
Date of issue:	2006/08/15

The test result only corresponds to the tested sample. It is not permitted to copy this report, in part or in full, without the permission of the test laboratory.

Total number of pages of this test report: 78 pages

Total number of pages of photos: External photos 1 pages
Internal photos 3 pages
Setup photos 2 pages

Test Engineer	Checked By	Approved By
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Table of Contents Page

1 GENARAL INFORMATION 4

1.1 Testing Laboratory 4
1.2 Client Information 4
1.3 Manufacturer 4

2 TEST INFORMATION 5

2.1 Description of Tested Device(s) 5
2.2 Test Environment 5

3 TEST REPORT SUMMARY 6

3.1 Test Summary 6
3.2 Other Comments 7

4 TEST SETUP 8

4.1 Frequency and Timing Measurements 8
4.2 Conducted Emission Tests 8
4.3 Radiated Emission Tests 9
4.4 Power line Conducted Tests 9
4.5 Monitoring Tests 10

5 TEST EQUIPMENT LIST 11

6 TEST RESULT 12

6.1 Coordination with fixed microwave 12
6.2 Cross Reference 13
6.3 Labeling Requirements 14
6.4 Power line Conducted Emissions 15
6.5 Antenna Requirement 16
6.6 Digital Modulation Techniques 16
6.7 Peak Transmit Power 17
6.8 Power Spectral Density 21
6.9 Antenna Gain 25
6.10 Automatic discontinuation of transmission 25
6.11 Safety exposure levels 26
6.12 Emission Bandwidth B 27
6.13 Monitoring time 31
6.14 Monitoring threshold 31
6.15 Maximum transmit period 32
6.16 System Acknowledgement 34

6.17 Least Interfered Channel, LIC 39
6.18 Random waiting 48
6.19 Monitoring bandwidth and reaction time 49
6.20 Monitoring antenna 56
6.21 Monitoring threshold relaxation 57
6.22 Duplex system LBT 58
6.23 Co-located device LBT 59
6.24 Fair Access 60
6.25 Emissions inside and outside the subband 61
6.26 Frame period and jitter 75
6.27 Carrier frequency stability 77

1 GENARAL INFORMATION

1.1 Testing Laboratory

Name:	Electronic Testing Center, Taiwan
Address:	No. 8, Lane 29, Wenming Rd., Leshan Tsuen, Guishan Shiang, Taoyuan Country, 33383, Taiwan, R.O.C.
Telephone:	886-3-3280026
Fax:	886-3-3276188
NVLAP lab registration #:	200133-0
IC OATS registration #:	IC 2949-1

1.2 Client Information

Name:	Suncorp Communications Limited
Address:	Room 1907-08, Harcourt House, 39 Gloucester Road, Wanchai Hong Kong
Telephone:	(852) 2572 6111
Contact person:	CW Cheung

1.3 Manufacturer

Name:	Shenzhen Guo Wei Electronics Co., Ltd
Address:	No.68 Guowei Road, Liantang Industrial District, Shenzhen, P.R.C.

2 TEST INFORMATION

2.1 Description of Tested Device(s)

The tested equipment is a DECT PHONE which complies with ETSI EN 300175. The frequencies have been reprogrammed to comply with the FCC requirements to an Isochronous UPCS device after FCC Part 15D.

The EUT is an initiating device as described in ANSI C63.17 and is designed to operate together with a DECT base station, which is then the responding device.

Frequency Channel	Frequency	Test Frequency
CH4	1921.536 MHz	F_L
CH3	1923.264 MHz	-
CH2	1924.992 MHz	F_M
CH1	1926.720 MHz	-
CH0	1928.448 MHz	F_H

2.2 Test Environment

Normal test condition

Temperature:	20 - 25 °C
Relative humidty:	55 - 75%

Extreme test condition (declared by manufacturer)

Please see the manufacturer declaration form.

3 TEST REPORT SUMMARY

3.1 Test Summary

Requirement	FCC Paragraph #	Required	Customer Declaration	Test Pass
Coordination with fixed microwave	15.307(b)	☒	☒	☐
Cross Reference	15.309(b)	☐	☐	☐
Labeling requirements	15.311,15.19(a)(3)	☒	☒	☐
Power line Conducted Emission	15.315,15.207	☐	☐	☐
Antenna Requirement	15.317, 15.203	☒	☒	☐
Digital Modulation Techniques	15.319(b)	☒	☐	☐
Peak Transmit Power	15.319(c)	☒	☐	☒
Power Spectral Density	15.319(d)	☒	☐	☒
Antenna gain	15.319(e)	☒	☒	☐
Automatic discontinuation of transmission	15.319(f)	☒	☒	☐
Safety exposure levels	15.319(i)	☒	☐	☒
Emission Bandwidth	15.323(a)	☒	☐	☒
Monitoring time	15.323(c)(1)	☒	☐	☒
Monitoring threshold	15.323(c)(2)	☒	☒	☐
Maximum transmit period	15.323(c)(3)	☒	☐	☒
System acknowledgement	15.323(c)(4)	☒	☐	☒
Least Interfered Channel, LIC	15.323(c)(5)	☒	☐	☒
Random waiting	15.323(c)(6)	☒	☒	☐
Monitoring bandwidth and reaction time	15.323(c)(7)	☒	☐	☒
Monitoring antenna	15.323(c)(8)	☒	☒	☐
Monitoring threshold relaxation	15.323(c)(9)	☒	☐	☒
Duplex system LBT	15.323(c)(10)	☒	☒	☐
Co-located device LBT	15.323(c)(11)	☒	☒	☐
Fair access	15.323(c)(12)	☒	☒	☐
Emissions inside and outside the subband	15.323(d)	☒	☐	☒
Frame period and jitter	15.323(e)	☒	☐	☒
Carrier frequency stability	15.323(f)	☒	☐	☒

3.2 Other Comments

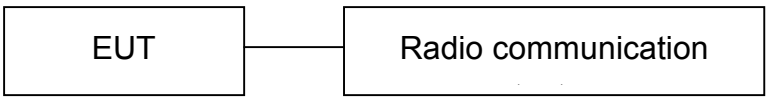
All measurements are traceable to national standards.

The tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC CFR47 Part 15, Paragraph 15.323 for Isochronous UPCS Devices and Industry Canada RSS-213 Issue 2.

The conducted test methods have been in accordance with ANSI C63.17-1998 and ANSI C63.17-2006 Draft where applicable. Radiated tests were conducted is accordance with ANSI C63.4-2003.

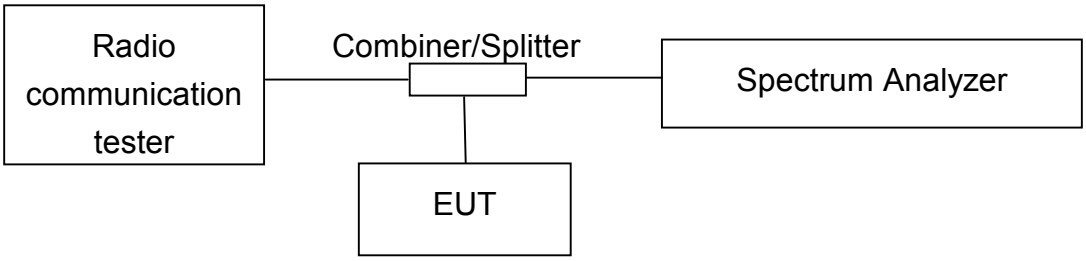
4 TEST SETUP

4.1 Frequency and Timing Measurements



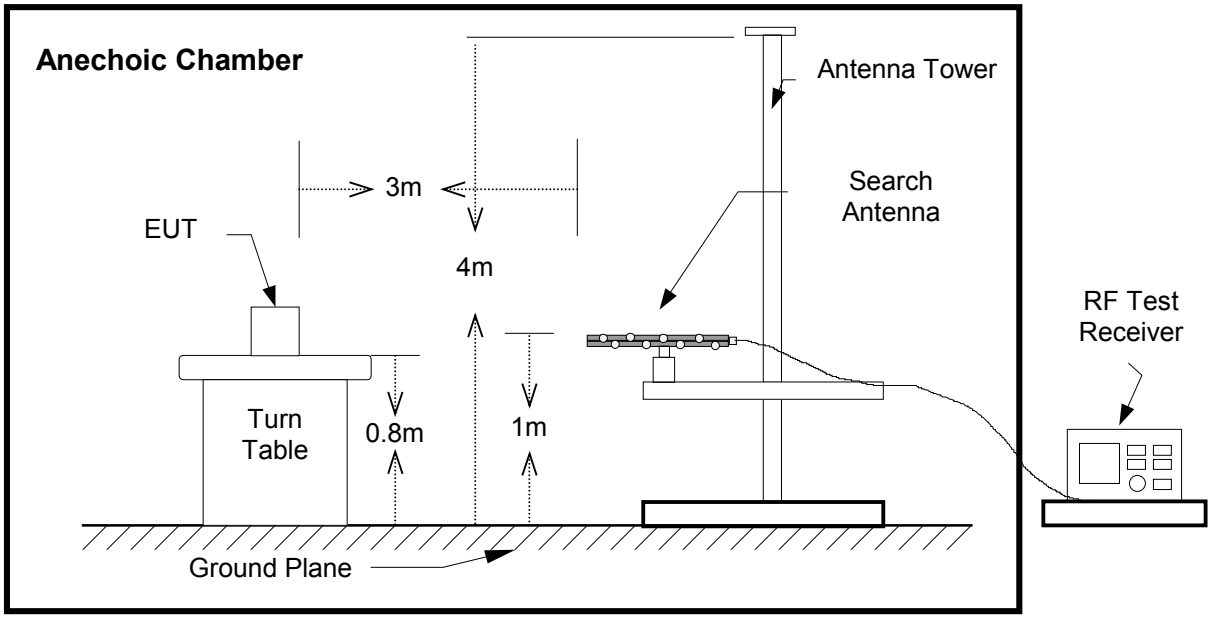
Test Set-up 1
This setup is used for measuring Frame repetition stability, Jitter, Carrier frequency stability at normal and extreme temperatures.

4.2 Conducted Emission Tests



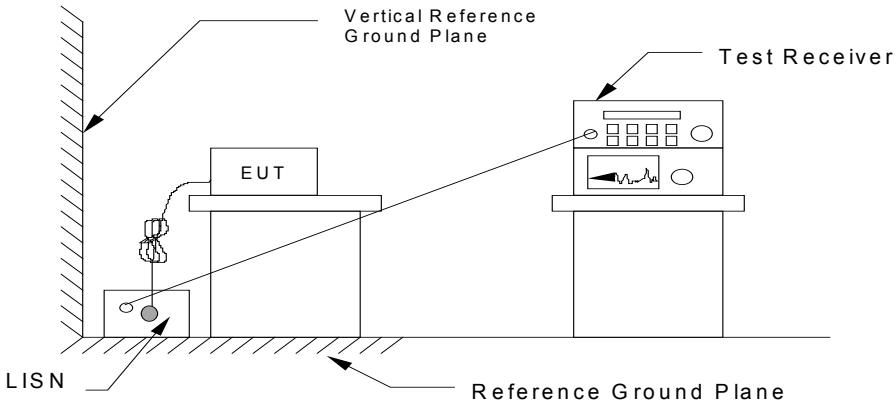
Test Set-up 2
This setup is used for all conducted emission tests.

4.3 Radiated Emission Tests



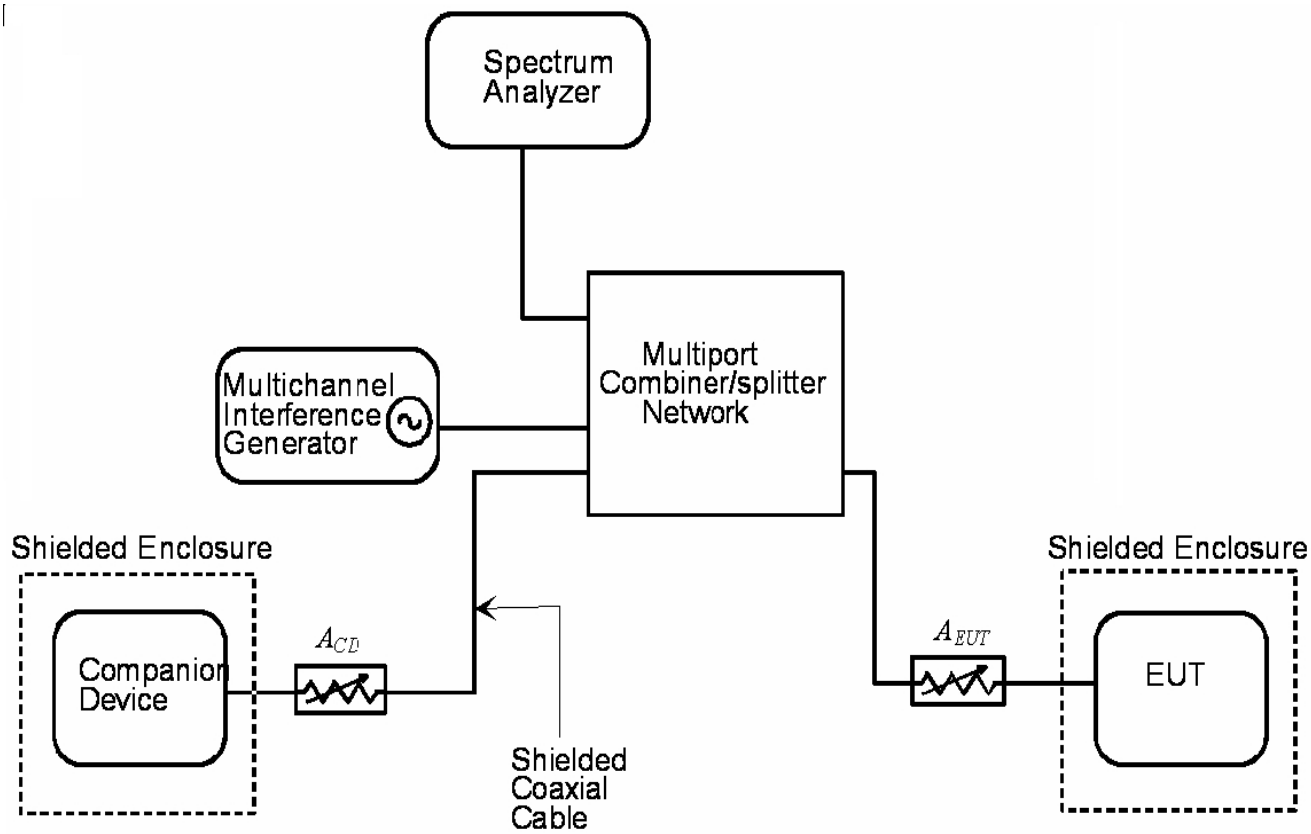
Test Set-Up 3
This test setup is used for all radiated emissions tests. For frequencies below 30 MHz the measuring distance is 10 m, for all other frequencies it is 3 m. Emissions above 1 GHz were measured with the Spectrum Analyzer, Horn Antenna and the preamplifier after the antenna.

4.4 Power line Conducted Tests



Test Set-Up 4

4.5 Monitoring Tests



Test Set-Up 5

This test setup is used for all Monitoring and Time and Spectrum Access Procedure tests.

Companion Device	A_{CD} (dB)	EUT	A_{EUT} (dB)
Base	50	Handset	0
Handset	30	Base	0

5 TEST EQUIPMENT LIST

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Test Laboratory.

Equipment	Manufacturer	Model No.	Next Cal. Due
EMI Test Receiver	Hewlett-Packard	8546A	09/06/2006
LogBicone Antenna	Schwarzbeck	9160	11/24/2006
Horn Antenna	EMCO	3115	06/04/2007
Horn Antenna	EMCO	3116	07/23/2008
Preamplifier	Hewlett-Packard	8449B	09/19/2006
Spectrum Analyzer	Hewlett-Packard	8564EC	09/23/2006
Spectrum Analyzer	Rohde & Schwarz	FSU46	11/02/2006
LISN	EMCO	3825/2	11/20/2006
Test Receiver	Rohde & Schwarz	ESCS30	05/29/2007
Radio commun. tester	Rohde & Schwarz	CTS65	10/24/2006
Vec. Signal generator	National Instruments	PXI-5670	03/08/2007
Spectrum Analyzer	National Instruments	PXI-5660	03/07/2007
Spectrum Analyzer	National Instruments	PXI-5660	09/17/2006
Scope	National Instruments	PXI-5114	03/24/2008
Scope	National Instruments	PXI-5114	03/24/2008

6 TEST RESULT

6.1 Coordination with fixed microwave

6.1.1 Standard Applicable: FCC 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.

Result

The affidavit from UTAM, Inc. is included in the documentation supplied by the applicant:

☒**Yes**

☐**No**

6.2 Cross Reference

6.2.1 Standard Applicable:

15.309(b)
The requirements of Subpart D apply only to the radio transmitter contained in the PCS device. Other aspects of the operation of a PCS device may be subject to requirements contained else where in this Chapter. In particular, a PCS device that includes digital circuitry not direct associated with the radio transmitter also is subject to the requirements for unintentional radiators in Subpart B.

15.109(a)
For unintentional device, according to **FCC §15.109(a)**, the field strength of radiated emissions from unintentional except for class A digital device radiators at a distance of 3 meters shall not exceed the following values:

Frequency MHz	Distance Meters	Radiated μV/m	Radiated dBμV/m
30 - 88	3	100	40.0
88 - 216	3	150	43.5
216 - 960	3	200	46.0
above 960	3	500	54.0

6.2.2 Test Results:

This requirement is not applicable because test sample do not include digital circuitry which is not direct associated with the radio transmitter	☒
For test results according to FCC 15 subpart B, see the EMC report as attached	☐
For test results according to FCC 15 subpart B, see the measurement data as follow	☐
This requirement is covered by results of power line conducted emission test according to FCC 15.315	☐

Note: For radiated test, if EUT is a handset, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission as a worse case.

6.3 Labeling Requirements

6.3.1 Standard Applicable: FCC 15.19

The FCC Identifier shall be displayed on the label, and the device(s) shall bear the following statement in a conspicuous location on the device or in the user manual if the device is too small:

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.

The label itself shall be of a permanent type, not a paper label, and shall last the lifetime of the equipment.

6.3.2 Result

See separate documents showing the label design and the placement of the label on the EUT.

6.4 Power line Conducted Emissions

6.4.1 Standard Applicable:

15.315
An unlicensed PCS device that is designed to be connected to the public utility (AC) power line must meet the limits specified in Section 15.207.

15.207(a)
For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency MHz	Quasi Peak dB µV	Average dB µV
0.15 - 0.5	66-56*	56-46*
0.5 - 5.0	56	46
5.0 - 30.0	60	50

*Decreases with the logarithm of the frequency.

6.4.2 Measurement procedure

ANSI C63.4-2003 using 50 µH/50 ohms LISN.

6.4.3 Test Results: Complies

Measurement Data: See attached graph, (Peak detector).

Highest measured value (L1 and L2):
All emissions were below the QP and Average limits when measured with Peak detector.
The test was performed with the EUT in standby charging and repeated with the EUT transmitting in speakerphone mode and charging.

6.5 Antenna Requirement

6.5.1 Standard Applicable: FCC 15.317, 15.203.

Does the EUT have detachable antenna?

☐**Yes**

☒**No**

If detachable, is the antenna connector non-standard?

☐**Yes**

☐**No**

The tested equipment has only integral antennas. The conducted tests were performed on a sample with a temporary antenna connector.

6.6 Digital Modulation Techniques

6.6.1 Standard Applicable: FCC 15.319(b)

All transmissions must use only digital modulation techniques.

6.6.2 Result: Meets the requirement

Please see the declaration provided by applicant.

6.7 Peak Transmit Power

6.7.1 Standard Applicable: FCC 15.319(c) (f)

Peak transmit power shall not exceed 100 microwatts multiplied by the square root of the emission bandwidth in Hz.
The peak transmit power shall be reduced by the amount in decibels that the maximum directional gain of the antenna exceeds 3 dBi.

6.7.2 Measurement procedure

Measurement method according to ANSI C63.17 2006 paragraph 6.1.2

6.7.3 Test Results: Complies

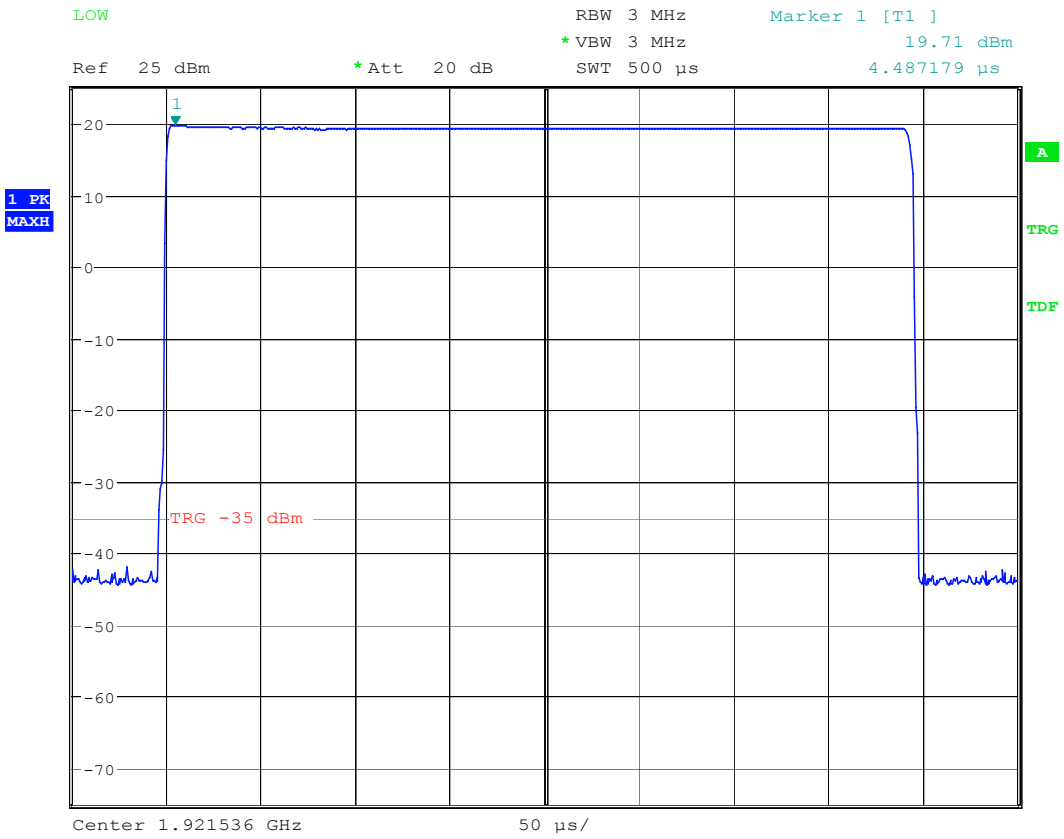
Measurement Data:

Channel	Frequency (MHz)	Maximum Peak Output Power (dBm)	FCC Limit (dBm)
F_L	1921.536	19.71	20.87
F_M	1924.992	19.52	20.87
F_H	1928.448	19.33	20.87

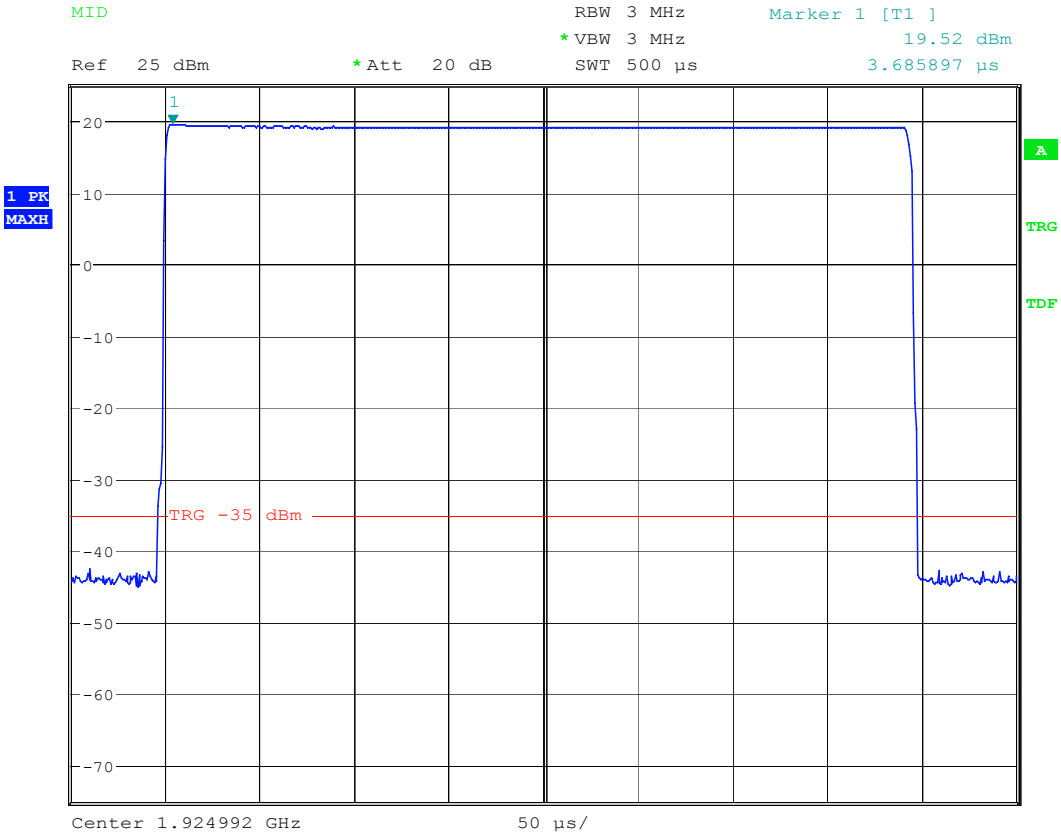
Limit:

Conducted: 5 log (B) – 10 = 5 log (1490000) – 10 = 20.87 dBm, where B is the measured emission bandwidth in Hz

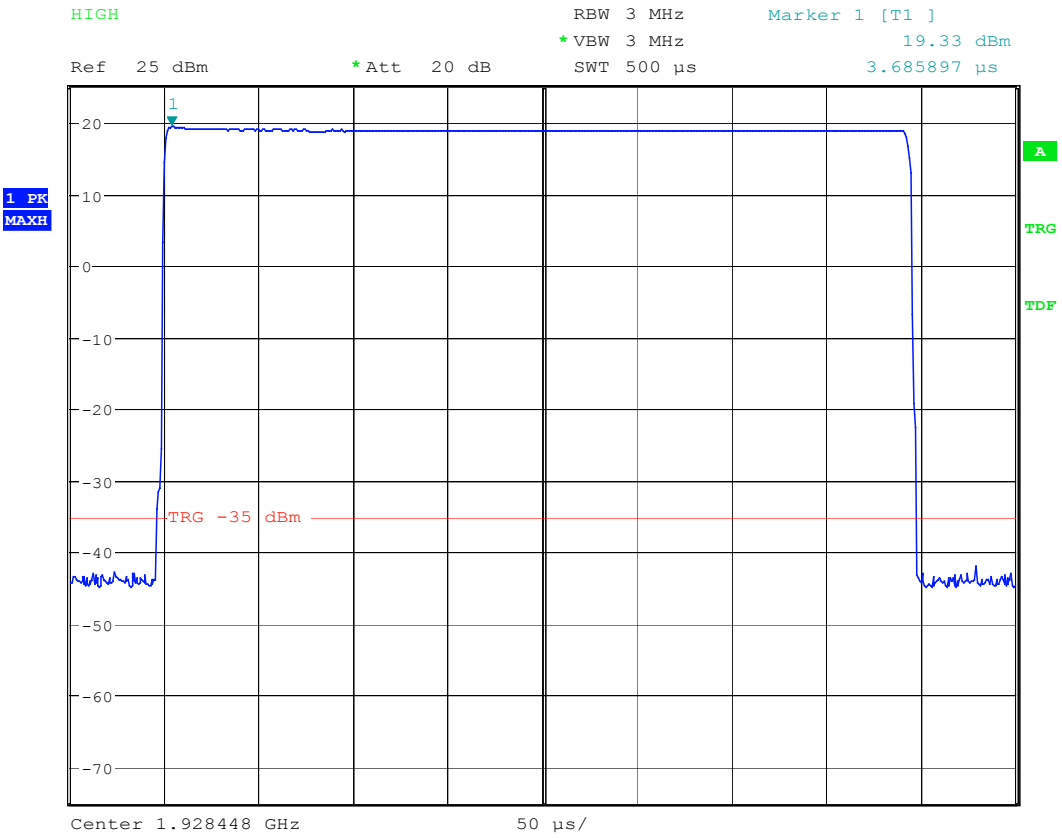
Maximum Peak Output Power: CH FL



Maximum Peak Output Power: CH Fm



Maximum Peak Output Power: CH FH



6.8 Power Spectral Density

6.8.1 Standard Applicable: FCC 15.319(d)

Power spectral density shall not exceed 3 milliwatts in any 3 kHz bandwidth as measured with a spectrum analyzer having a resolution bandwidth of 3 kHz.

6.8.2 Measurement procedure

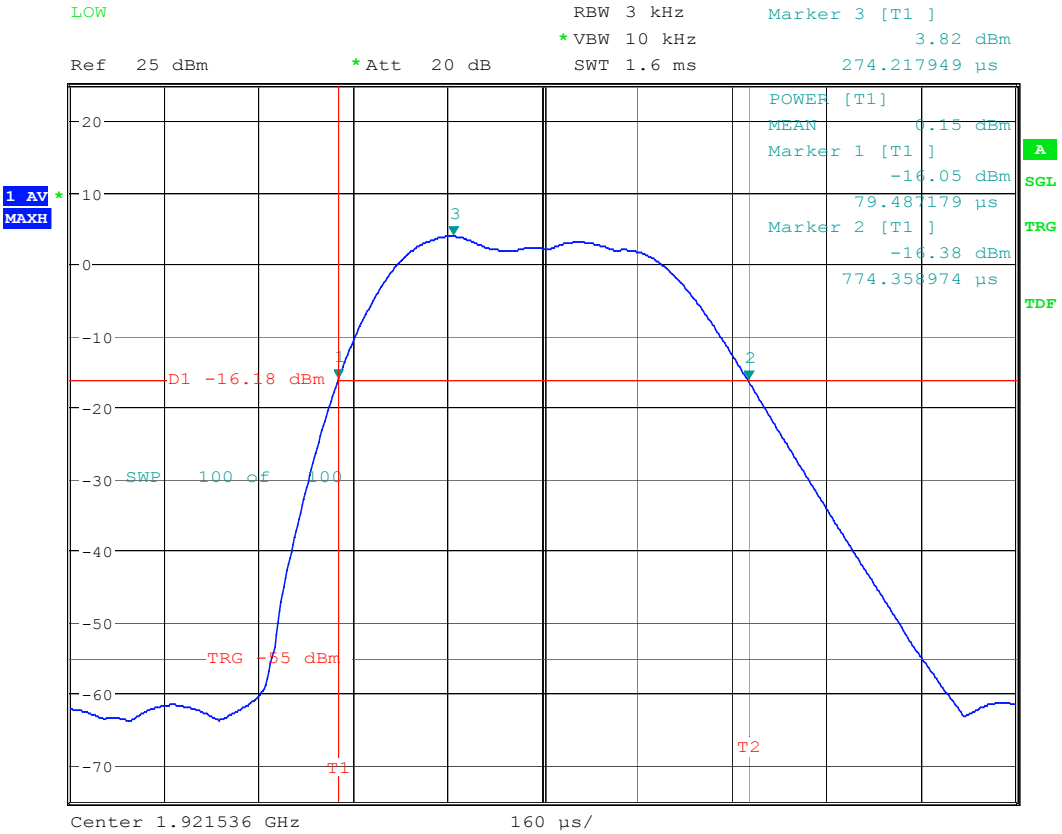
Measurement method according to ANSI C63.17 2006 paragraph 6.1.5

6.8.3 Test Results: Complies

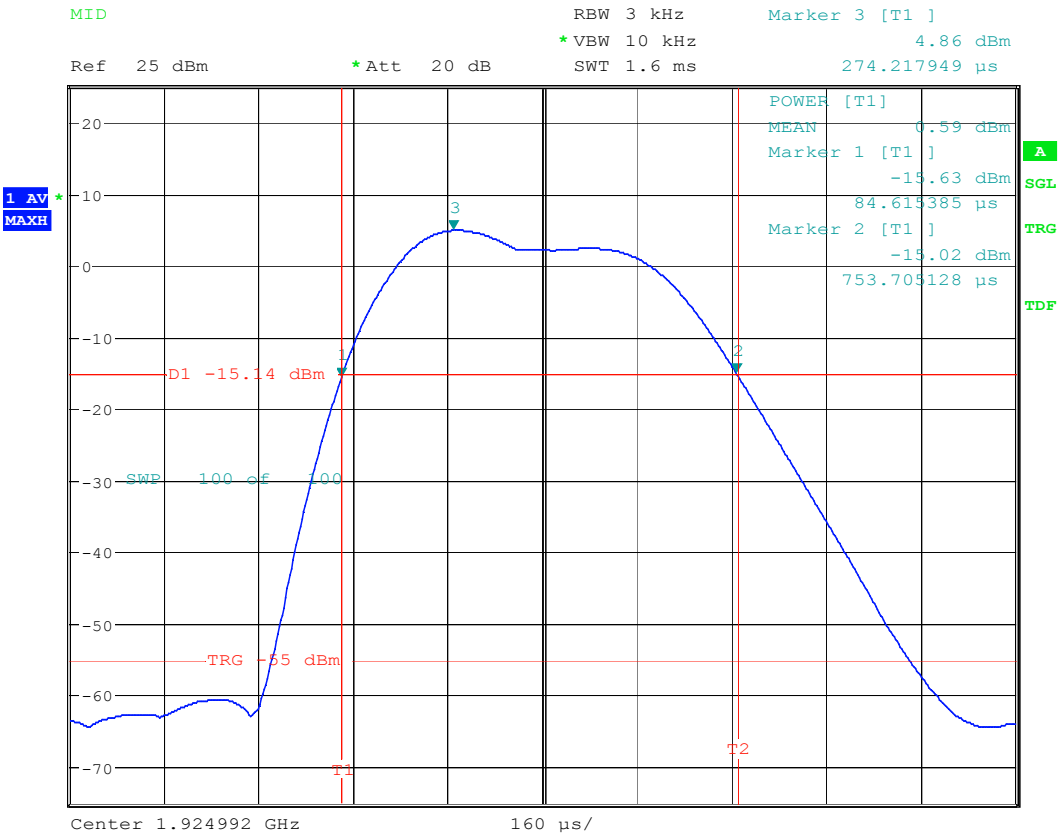
Measurement Data:

Channel	Frequency (MHz)	Power Spectral Density (dBm)	FCC Limit (dBm)
FL	1921.536	0.15	4.77
FM	1924.992	0.59	4.77
FH	1928.448	-0.17	4.77

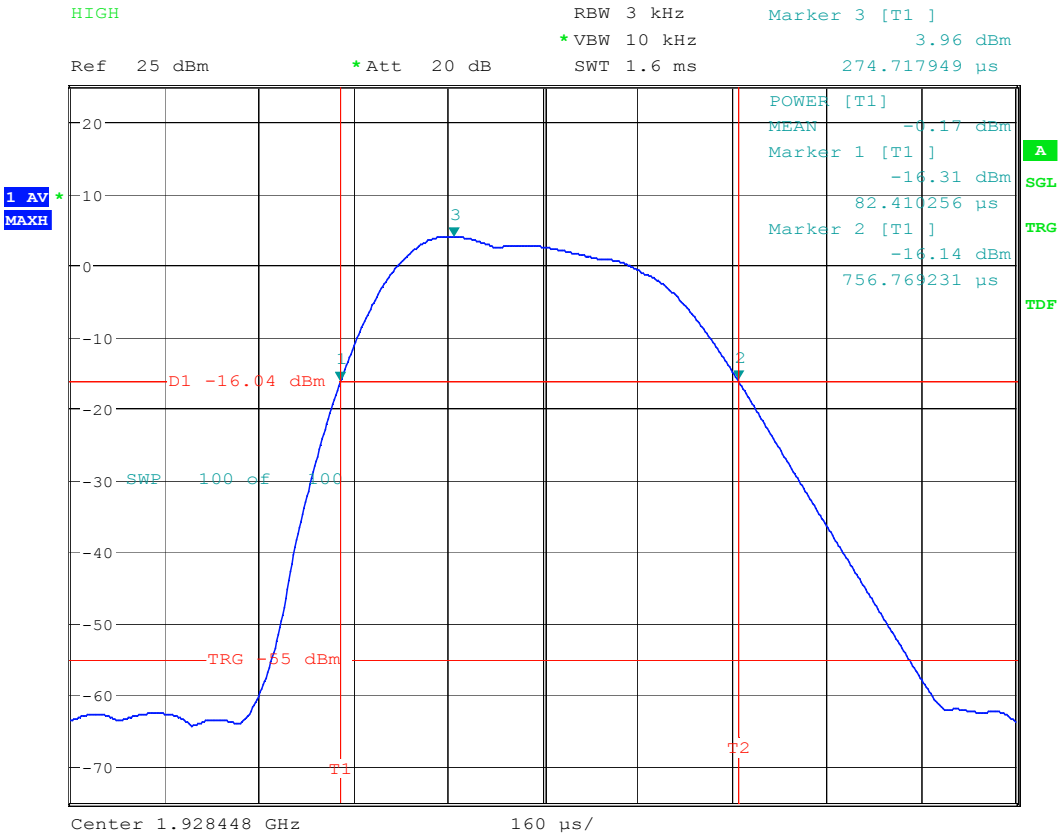
Power Spectral Density: CH FL



Power Spectral Density: CH FM



Power Spectral Density: CH FH



6.9 Antenna Gain

6.9.1 Standard Applicable: FCC 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.

6.9.2 Results: Meets the requirement

The antenna gain value provided by manufacturer is 3 dBi.

6.10 Automatic discontinuation of transmission

6.10.1 Standard Applicable: FCC 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.

6.10.2 Procedure

Please see the declaration provided by applicant.

6.10.3 Results: Meets the requirement

6.11 Safety exposure levels

6.11.1 Standard Applicable: FCC 15.319(i)

UPCS devices are subject to the radio frequency radiation exposure requirements specified in FCC parts 1.1307 (b), 2.1091 and 2.1093, as appropriate. All equipment shall be considered to operate in a “general population / uncontrolled environment. For portable devices tests according to IEEE 1528 are requested, if applicable.

6.11.2 Measurement procedure

Consideration of radio frequency radiation exposure for EUT is done as

SAR test according IEEE1528 (for PP)	☒
MPE calculation as below (for FP, Repeater)	☐

SAR test results: See SAR test report.

MPE calculation: not applicable

The EUT is considered as a mobile device according to OET Bulletin 65, Edition -97-01. Therefore distance to human body of min. 20 cm is determined.

The limit of Power density for General Population / Umcontrolled Exposure is 1.0 mW/cm².
Formula:

$S = EIRP / 4\pi R^2$
EIRP = Output power + Ant. gain

Calculation:

EIRP	Radiated Power (dBm)	n.a.
EIRP	Radiated Power (mW)	n.a.
R	Distance (cm)	n.a.
S	Power Density (mW/cm²)	n.a.

6.11.3 Results： Complies

6.12 Emission Bandwidth B

6.12.1 Standard Applicable: FCC 15.323(a)

The 26 dB Bandwidth B shall be larger than 50 kHz and less than 2.5 MHz.

6.12.2 Measurement procedure

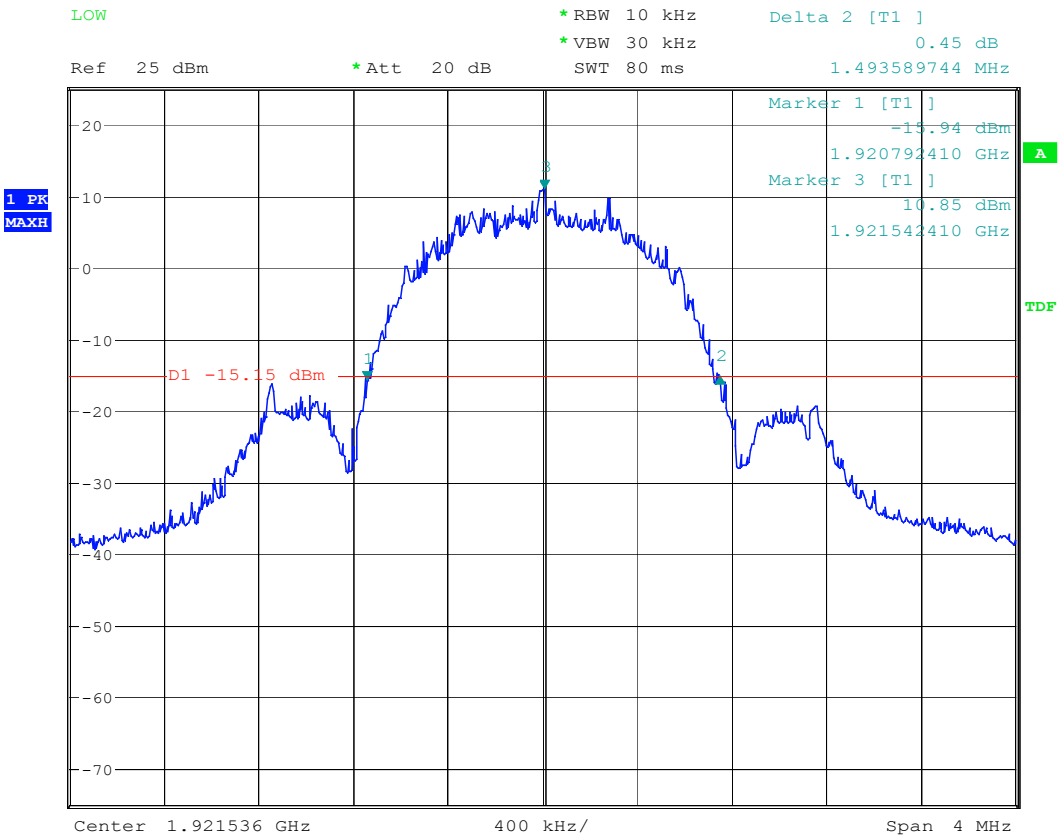
Measurement method according to ANSI C63.17 2006 paragraph 6.1.3

6.12.2 Results: Complies

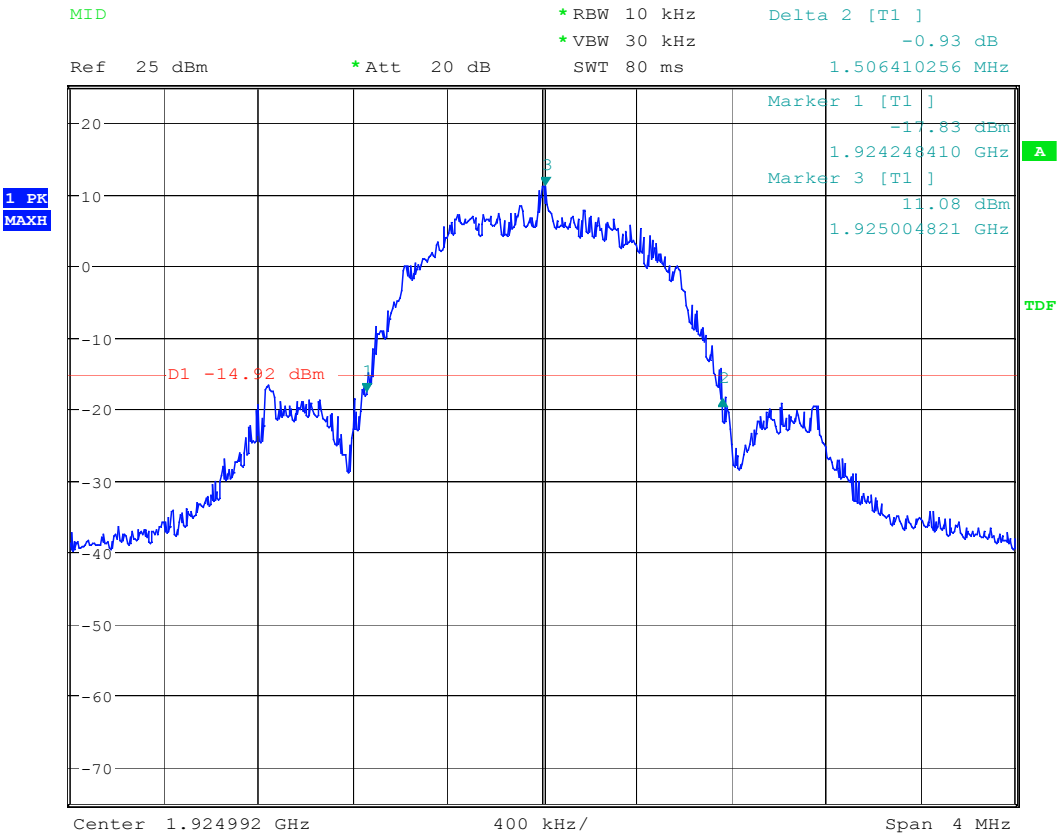
Measurement Data:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
FL	1921.536	1.49
FM	1924.992	1.51
FH	1928.448	1.51

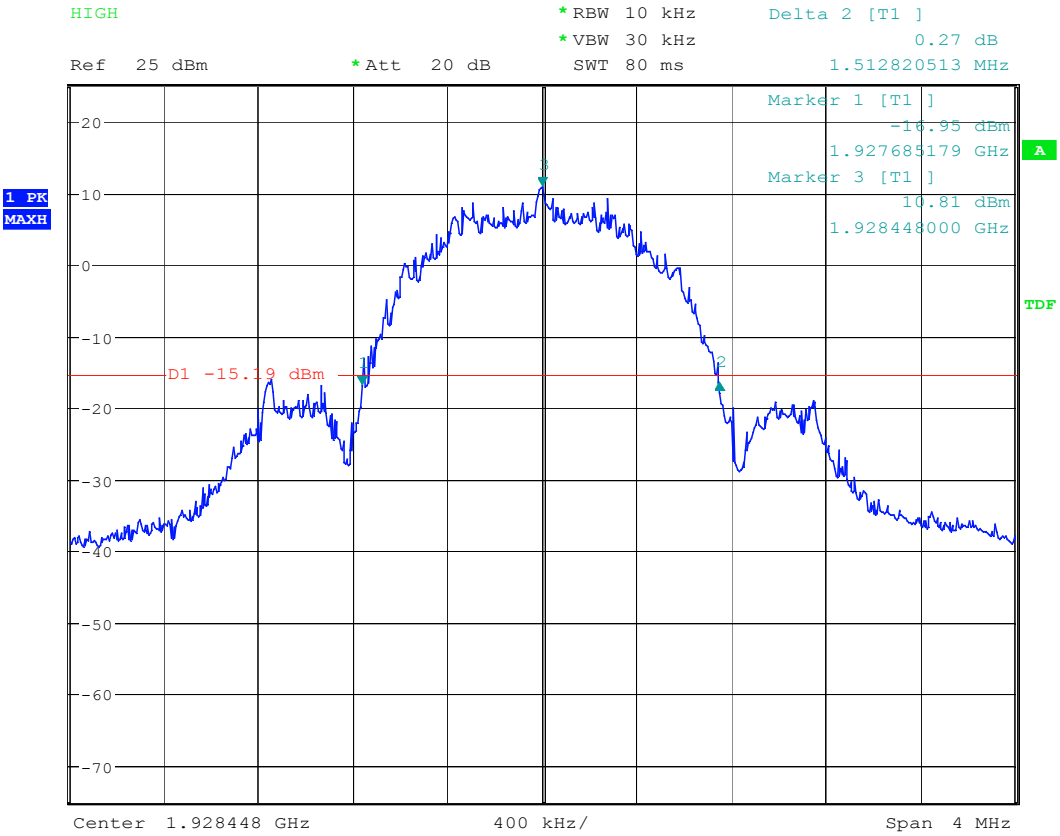
26 dB Bandwidth B: CH FL



26 dB Bandwidth B: CH FM



26 dB Bandwidth B: CH F_H



6.13 Monitoring time

6.13.1 Standard Applicable: FCC 15.323(c) (1)

Immediately prior to initiating transmission, devices must monitor the combined time and spectrum window 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.

6.13.2 Measurement procedure

Measurement method according to ANSI C63.17 2006 paragraph 7.3.4

6.13.2 Results: Complies

EUT monitors the combined time and spectrum window prior to initiation of transmission.

Measurement Data:

This requirement is covered by results of Least Interfered Channel (LIC) test according to FCC 15.323(c) (5)	☒

6.14 Monitoring threshold

6.14.1 Standard Applicable: FCC 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.

6.14.2 Measurement procedure

Measurement method according to ANSI C63.17 2006 paragraph 7.3.1

6.14.3 Result: Not applicable

6.15 Maximum transmit period

6.15.1 Standard Applicable: FCC 15.323(C) (3)

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.

6.15.2 Measurement procedure

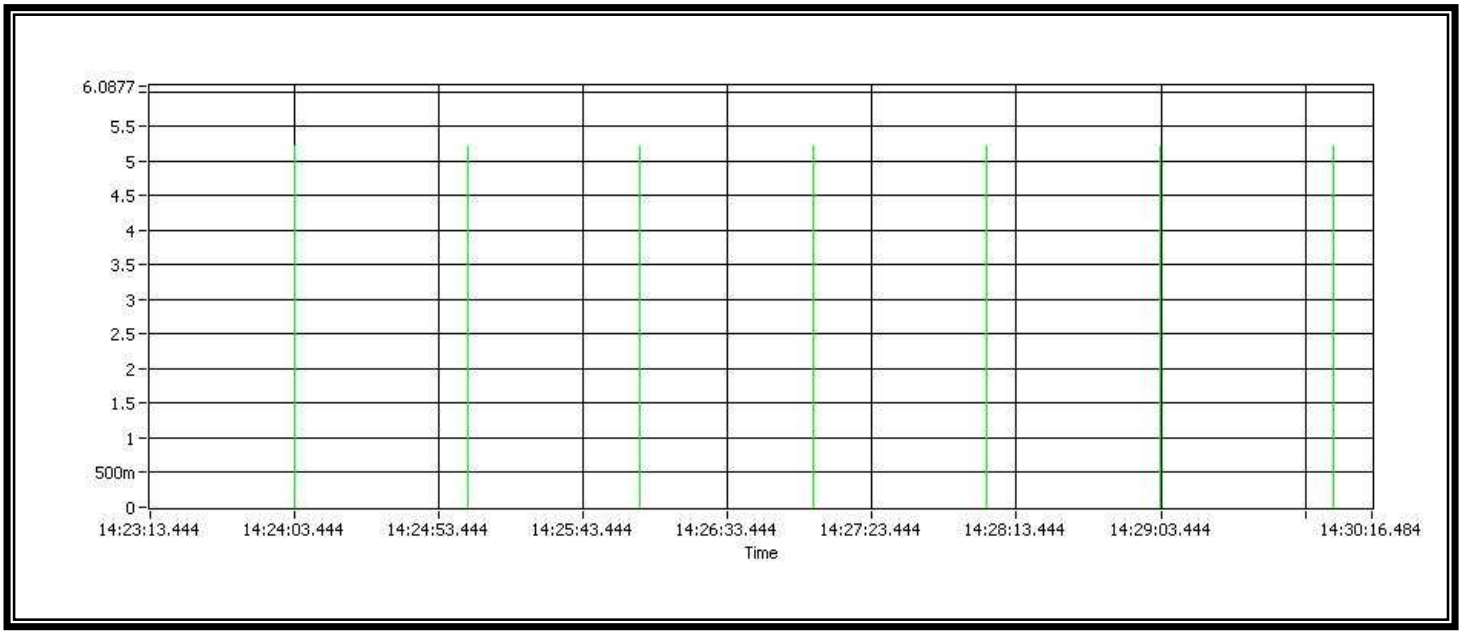
Measurement method according to ANSI C63.17 2006 paragraph 8.2.2

6.15.3 Test Results: Complies

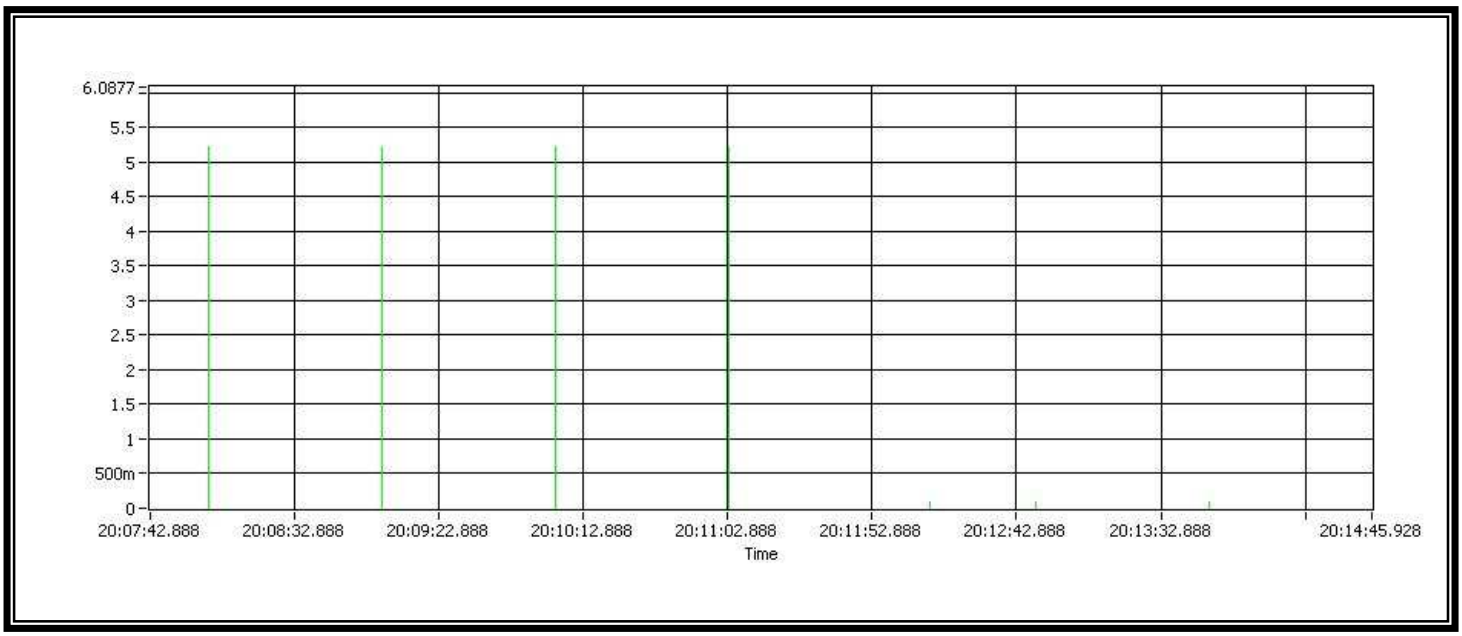
Measurement Data:

	Observation	**Limit**
Maximum transmission time	5 hours 47 minutes	8 hours

Start to transmission time:



Cease of transmission time:



6.16 System Acknowledgement

6.16.1 Standard Applicable: FCC 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.

6.16.2 Measurement procedure

Measurement method according to ANSI C63.17 2006 paragraph 8

6.16.3 Results: Complies

Measurement Data

Unacknowledged transmission:

Limit:

Requirement	Value
Change of access criteria for control information	30 s
Pause length	> 10 ms
Change of access channel	mandatory

Result:

Requirement	Time	Verdict
Change of access criteria for control information	----	n.a.
Pause length	----	n.a.
Change of access channel	----	n.a.

Connection acknowledgement:

Limit:

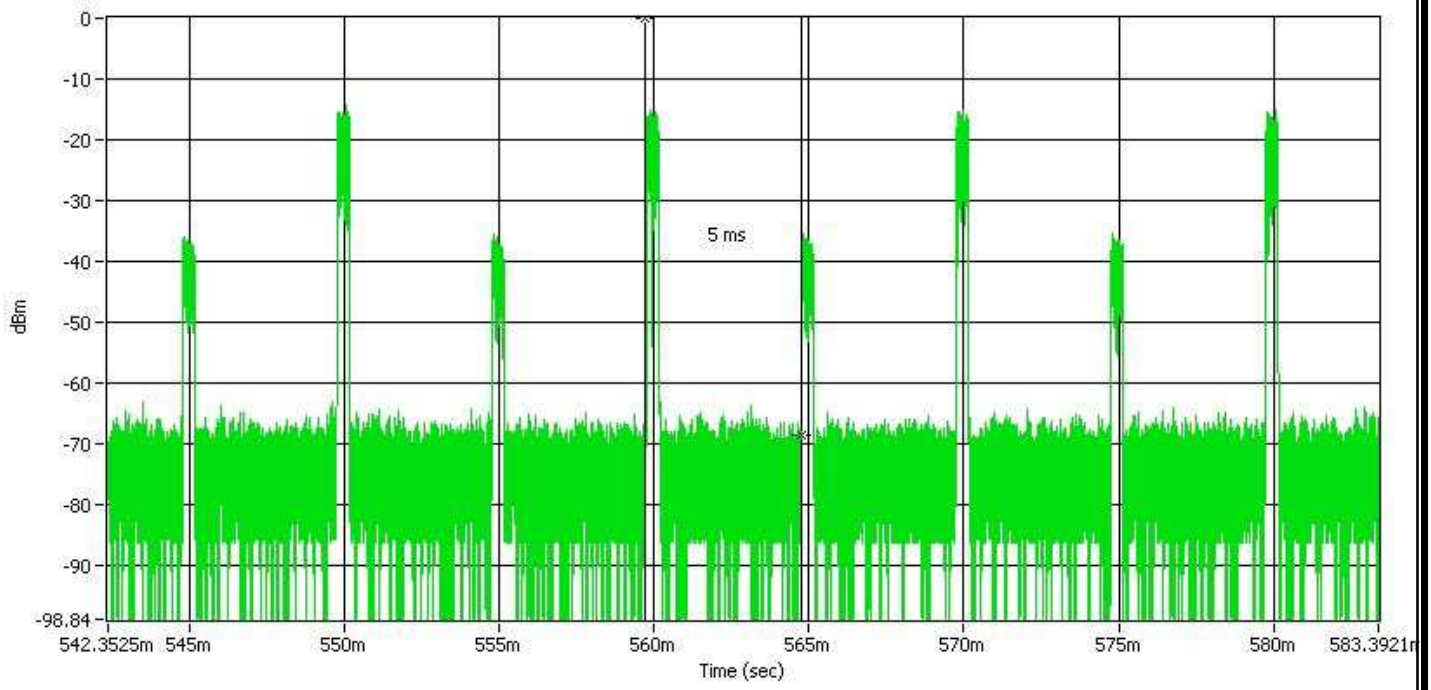
Requirement	Value
Connection acknowledgement	1 s
Termination of transmission	30 s

Result:

Requirement	Time observed	Verdict
Connection acknowledgement	5 ms	Pass
Termination of transmission	6 s	Pass

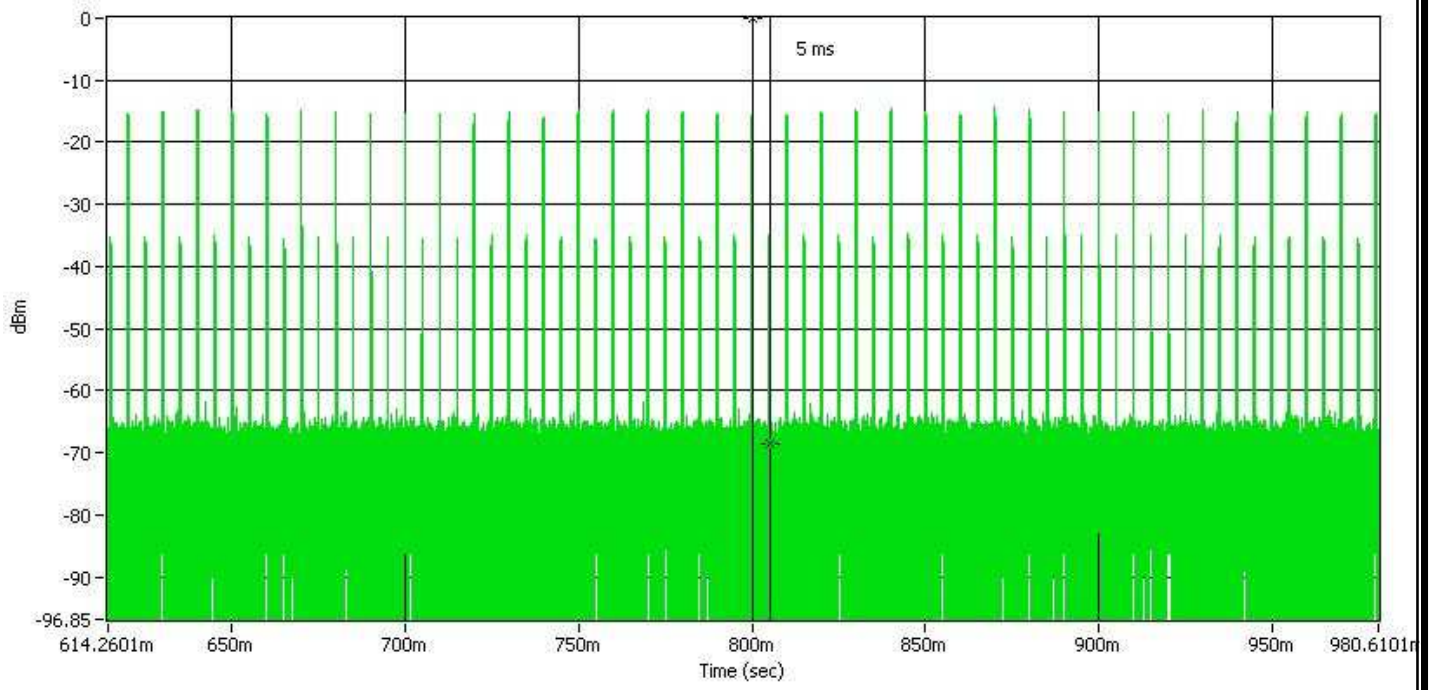
Comment: Connection acknowledgement

Period (Zoom in):

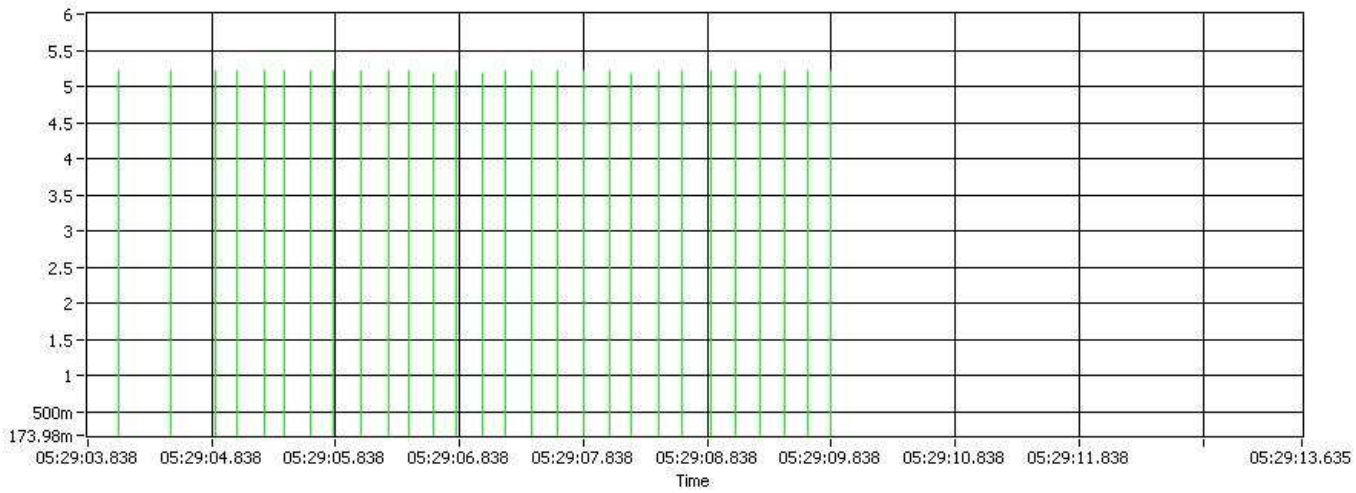


Comment: Connection acknowledgement

Period:



Comment: Termination of transmission



6.17 Least Interfered Channel, LIC

6.17.1 Standard Applicable: FCC 15.323(c) (5)

If a minimum of 40 duplex system access channels are defined, the system 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 milliseconds 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. The power measurement resolution for this comparison must be accurate within 6 dB. 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 band width, or alternatively, more than one third of the time and spectrum windows defined by the system.

6.17.2 Measurement procedure

Measurement method according to ANSI C63.17 2006 paragraph 7.3.2, 7.3.3, 7.3.4

6.17.3 Results: Complies

Measurement Data

Calculation of monitoring threshold limits:
Lower threshold: $T_L = 15 \log_{10}B - 184 + 30 - P$ (dBm)
Upper threshold: $T_U = 15 \log_{10}B - 184 + 50 - P$ (dBm)
B = emission bandwidth (Hz)
P = peak transmit power (dBm)

Calculated thresholds:

TL: Lower threshold (dBm)	-81.1
TU: Upper threshold (dBm)	-61.1

Limit:

Used results	Emission bandwidth (MHz)	1.49
	Peak transmit power (dBm)	19.7
Limits	TLR ≦ TL+UM = -81.1 + 6 = -75.1 (dBm)	
	TUR ≦TU+UM = -61.1 + 6 = -55.1 (dBm)	

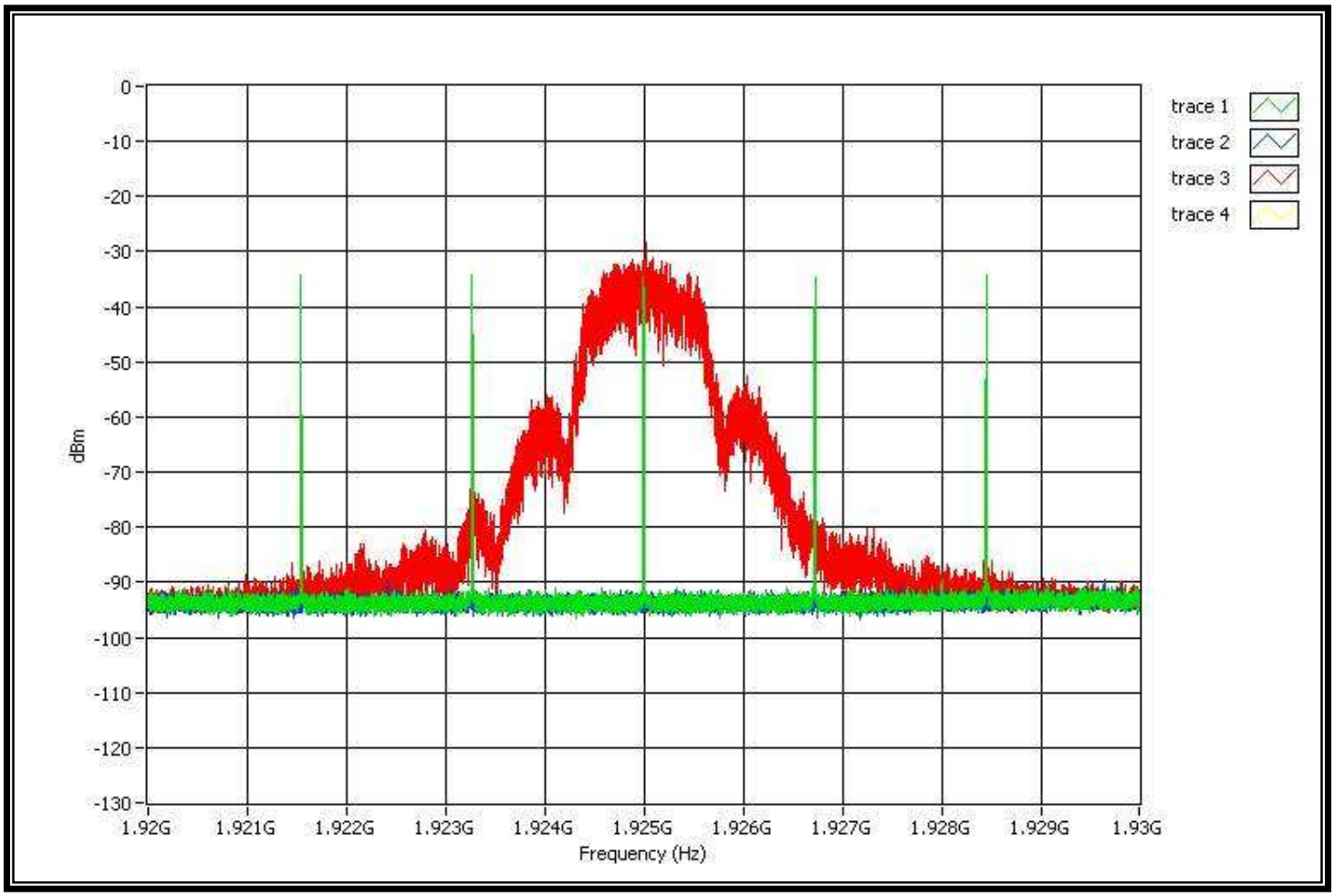
Result:

Least interfered channel	Pass
TLR: Lower threshold (dBm)	n.a.
TUR: Upper threshold (dBm)	-58.3

Note 1: The upper threshold is applicable for systems which have defined a minimum of 40 duplex system access channels.

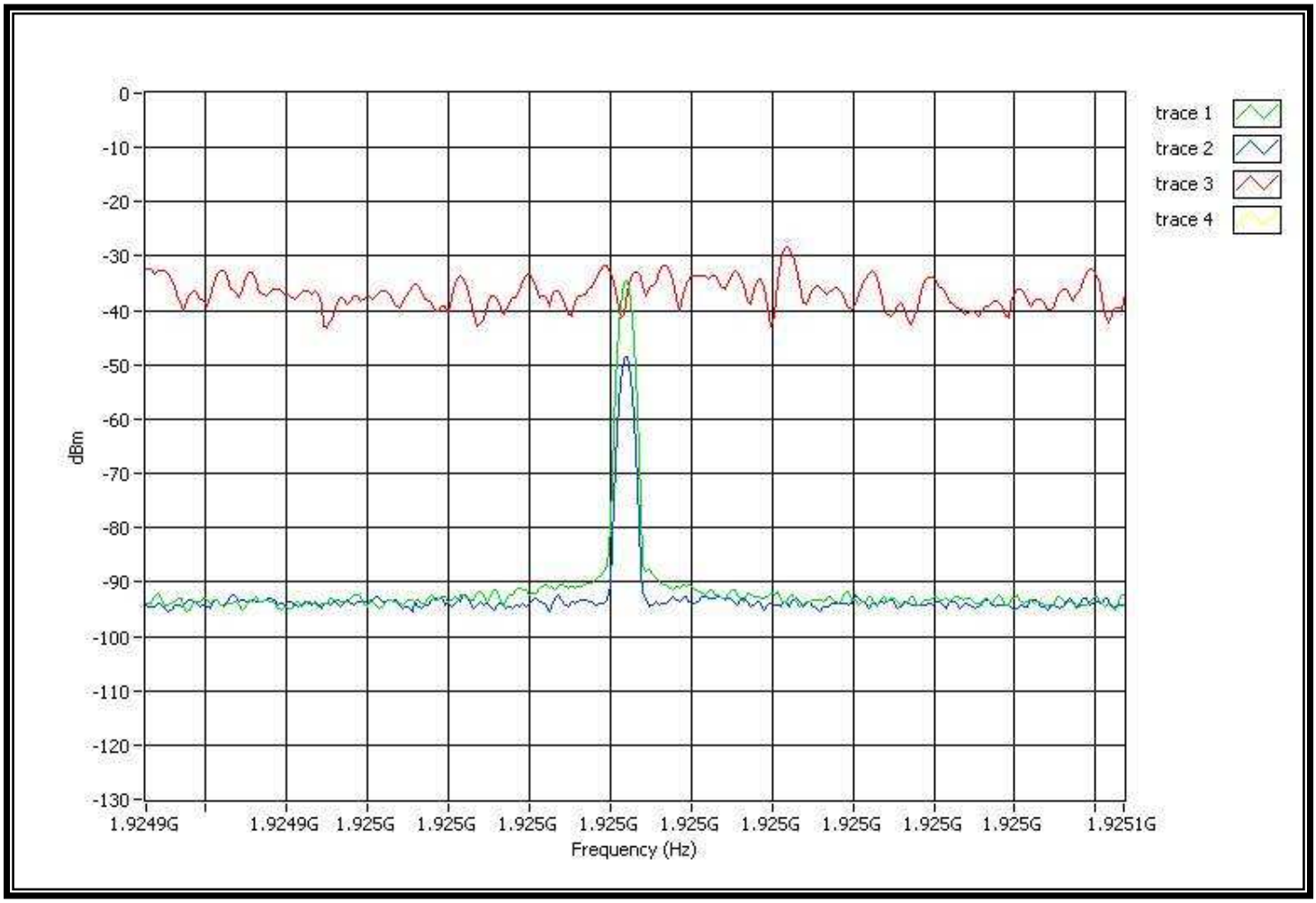
Note 2: f1=1921.536MHz, f2=1928.448MHz

Comment: 7.3.2, initial setup



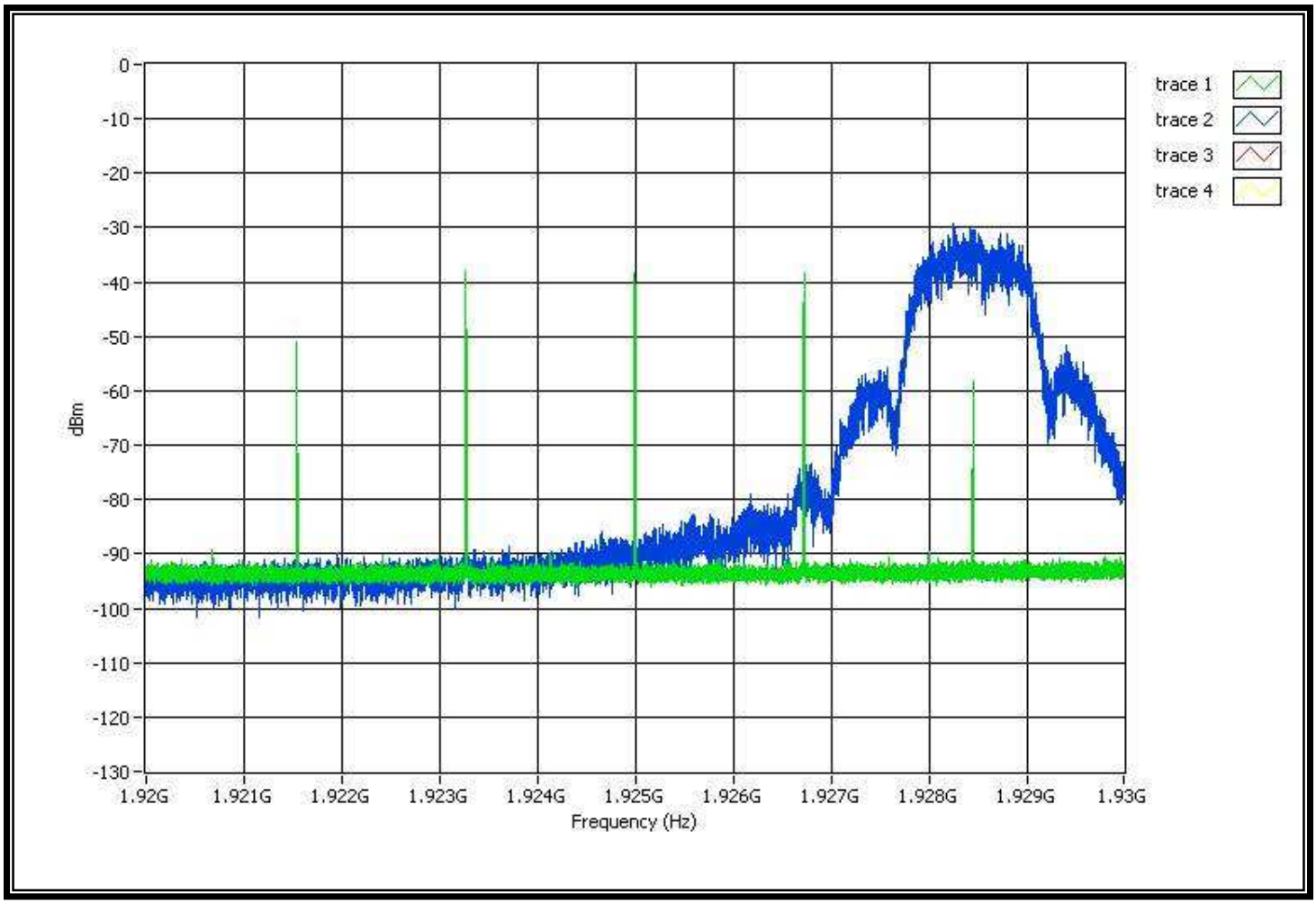
Note1: Trace1 (green) is the interference on all 5 carriers. The level is T_U+U_M+10dB.
Note2: Trace2 (blue) is interference on all 5 carriers. The level is T_{UR}.
Note3: Trace3 (Red) is the transmissions of communications channel begin when interference is T_{UR}.
Note4: The absolute level at the spectrum analyzer and displayed above is a result of the relative losses between the EUT port of the combining network and the spectrum analyzer port, relative to the multi-carrier generator port.

Comment: 7.3.2 (zoom in)



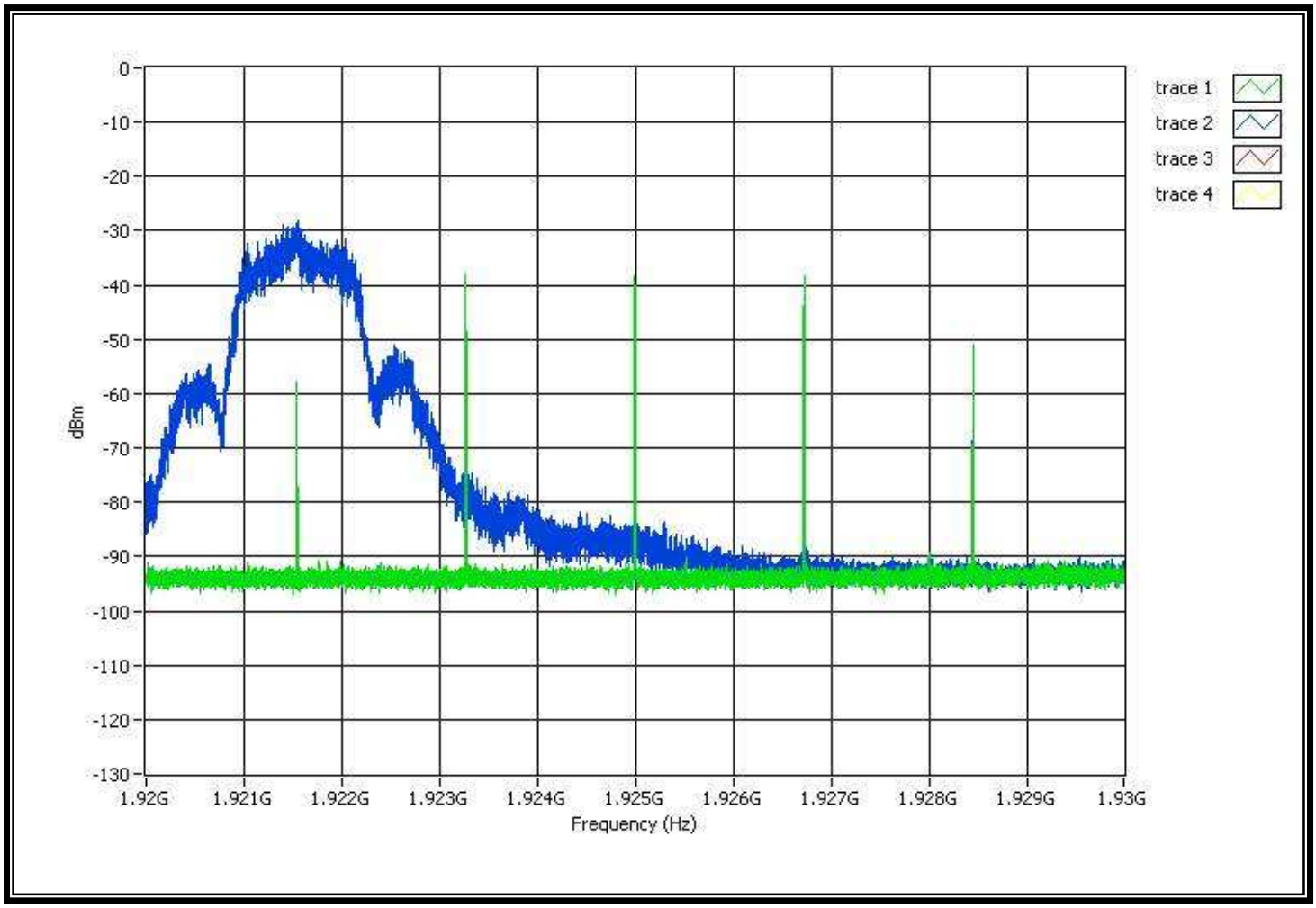
Note1: Trace1 (green) is the interference on all 5 carriers. The level is T_U+U_M+10dB.
Note2: Trace2 (blue) is interference on all 5 carriers. The level is T_{UR}.
Note3: Trace3 (Red) is the transmissions of communications channel begin when interference level is T_{UR}.

Comment: 7.3.3b



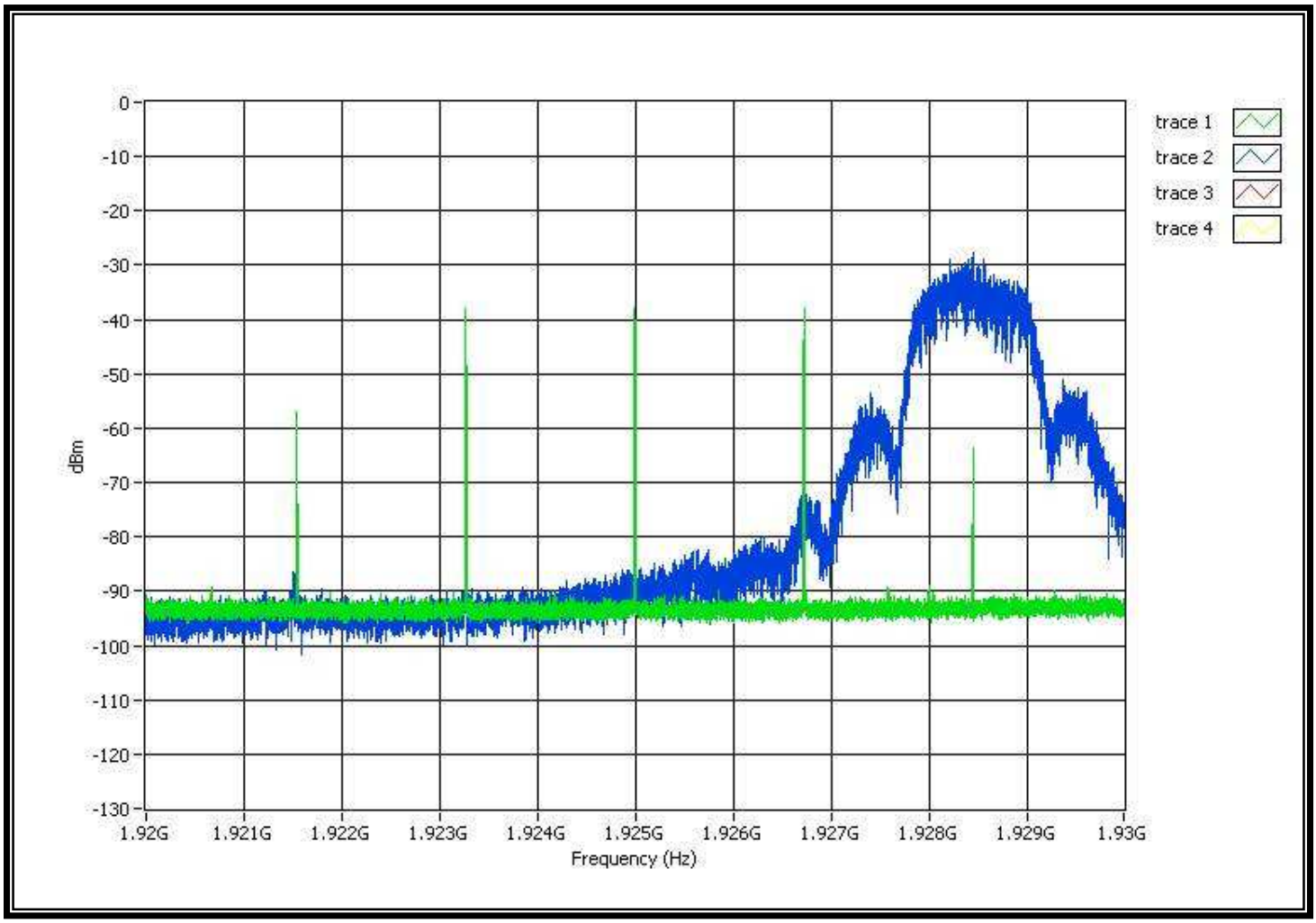
Note1: Trace1 (green) shows the interference profile.
Note2: Trace2 (blue) shows the EUT transmissions are occurring.
Note3: The EUT always transmits on f2 (the carrier with the lower interference level) and so meets the requirement.

Comment: 7.3.3c



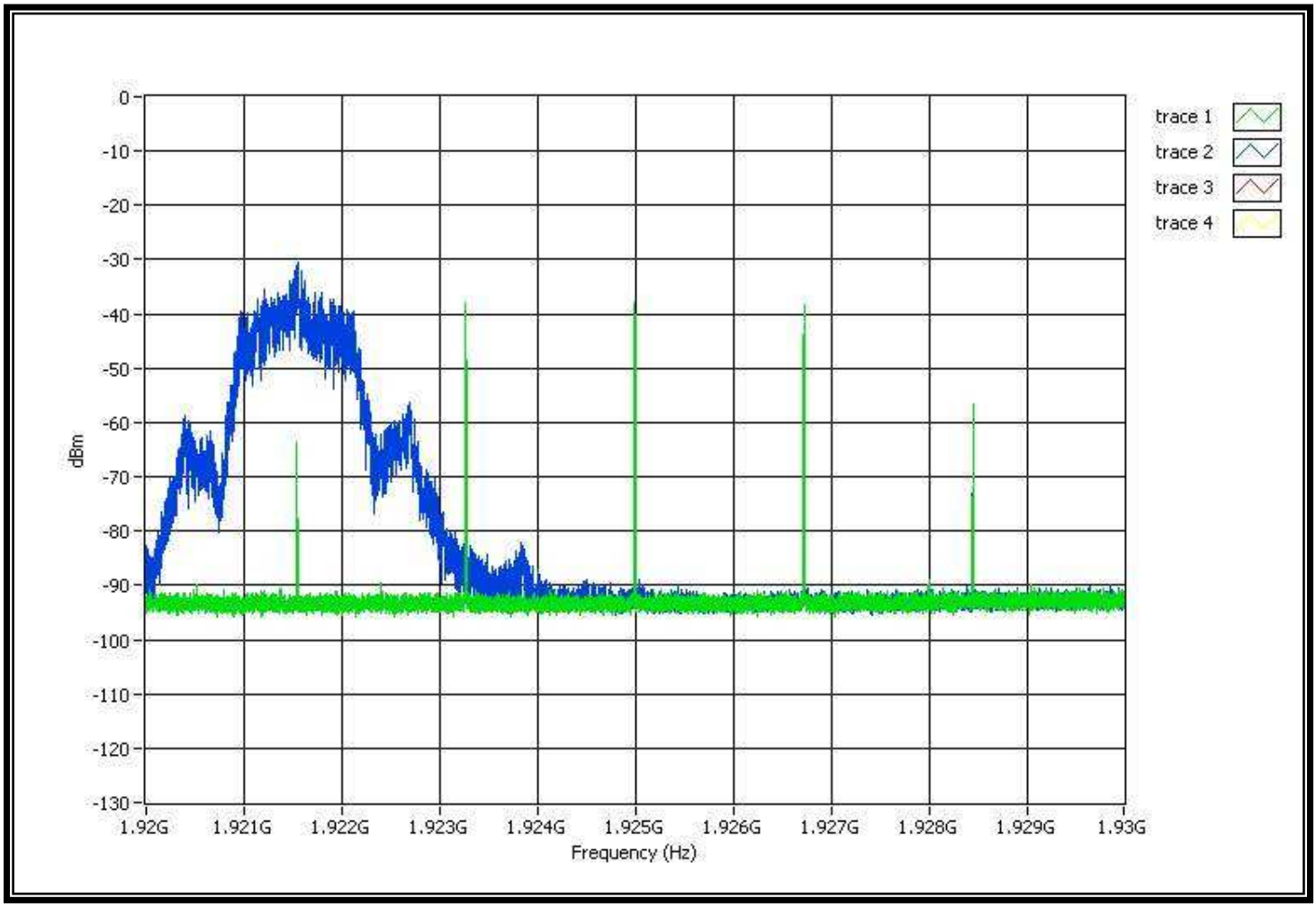
Note1: Trace1 (green) shows the interference profile.
Note2: Trace2 (blue) shows the EUT transmissions are occurring.
Note3: The EUT always transmits on f1 (the carrier with the lower interference level) and so meets the requirement.

Comment: 7.3.3d



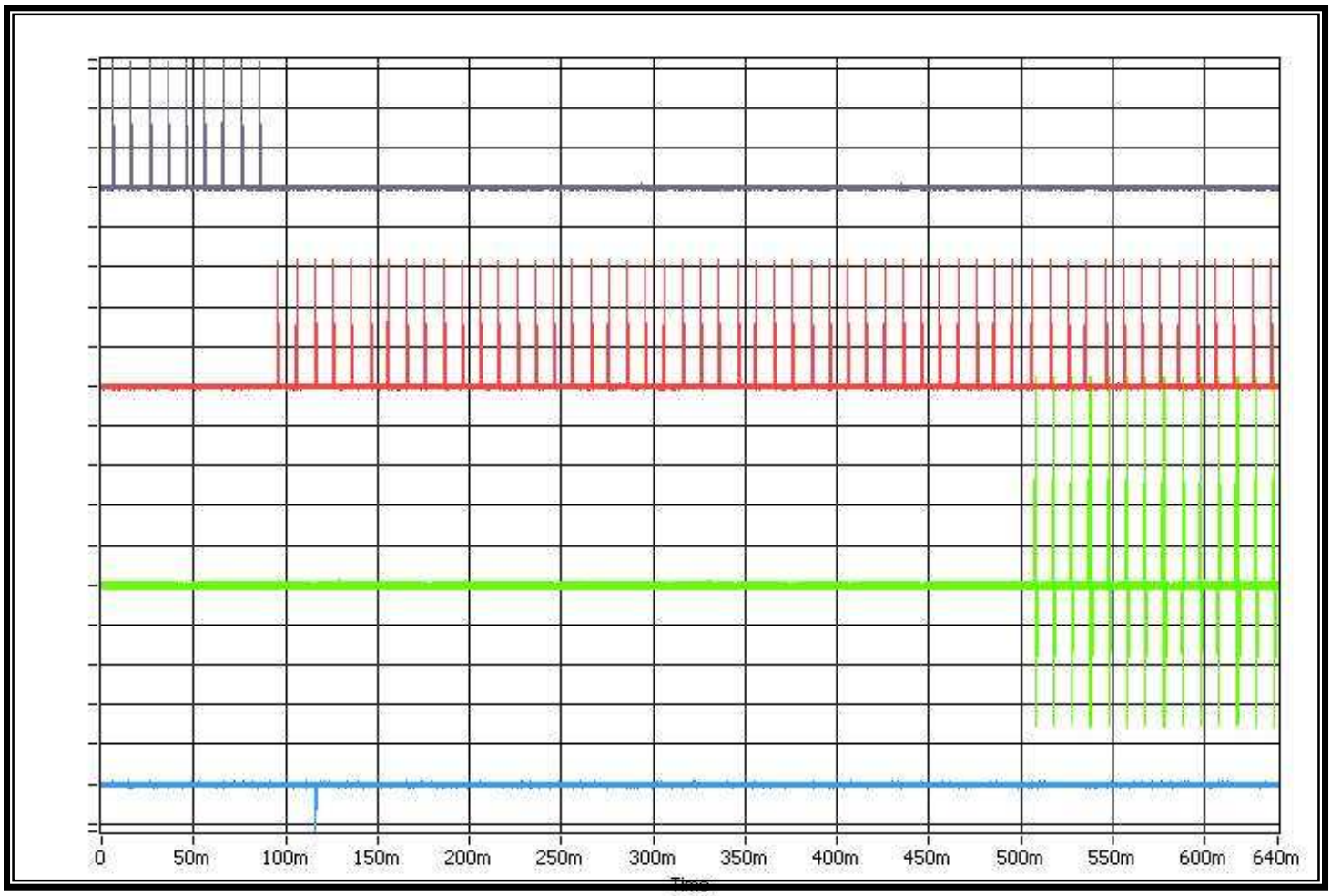
Note1: Trace1 (green) shows the interference profile.
Note2: Trace2 (blue) shows the EUT transmissions are occurring.
Note3: The EUT always transmits on f2 (the carrier with the lower interference level) and so meets the requirement.

Comment: 7.3.3e



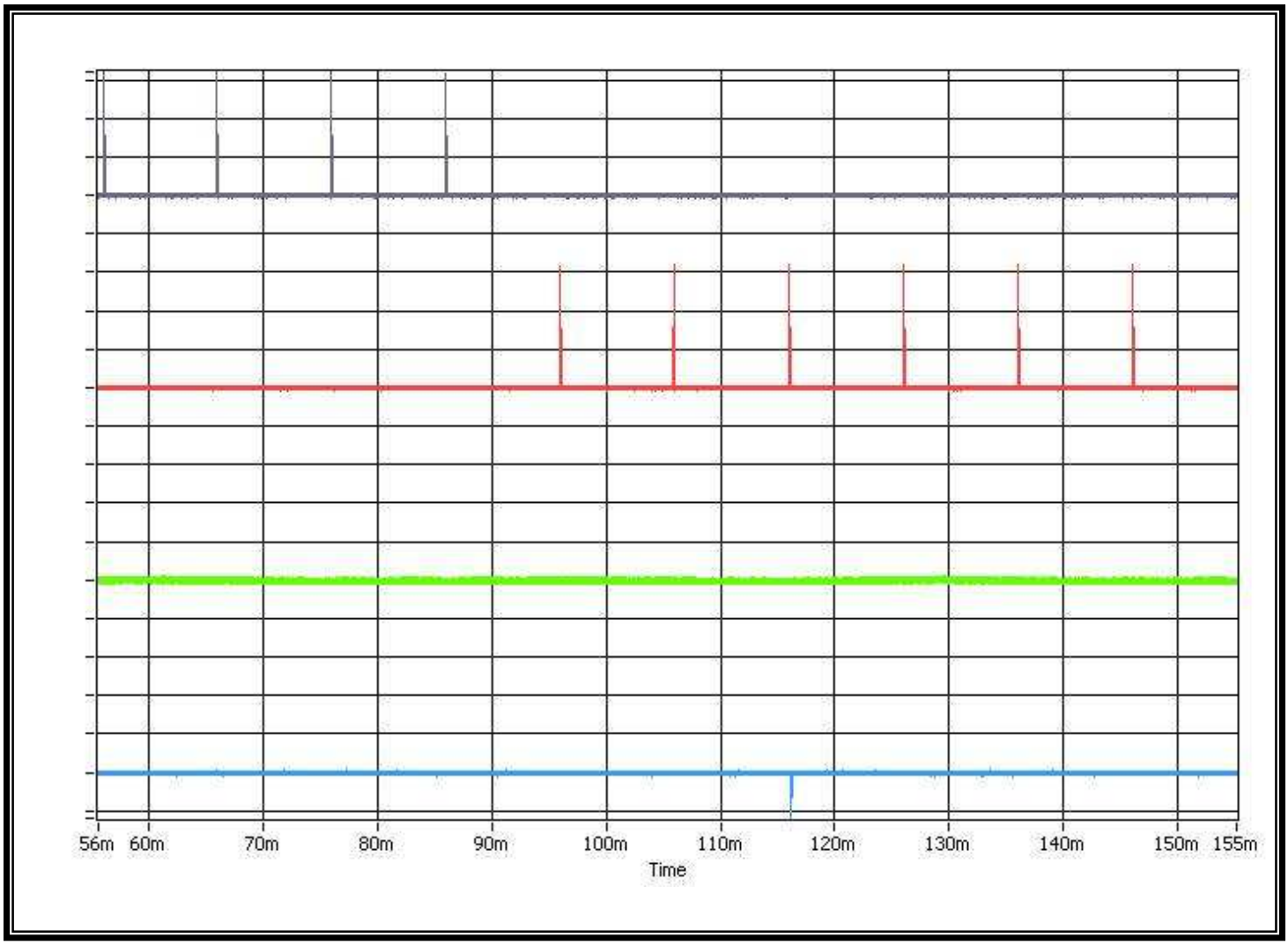
Note1: Trace1 (green) shows the interference profile.
Note2: Trace2 (blue) shows the EUT transmissions are occurring.
Note3: The EUT always transmits on f1 (the carrier with the lower interference level) and so meets the requirement.
.

Comment: 7.3.4



Note1: Trace1 (deep blue, top) shows interference on f1.
Note2: Trace2 (red, 2nd from top) shows the interference on f2.
Note3: Trace3 (green, 3rd from top) shows EUT transmissions on f1.
Note4: Trace4 (light blue, 4th from top) shows the signal to the handset to trigger the transmissions.
Note5: Set interference on all system carriers except f2, at a level of T_U+U_M, in-band per carrier.
Note6: Apply interference on f2 at a level of T_U+U_M, in-band, and immediately remove all interference from f1 and immediately (but not sooner than 20 ms after the interference on f2 is applied) cause the EUT to attempt transmission.
Note7: The EUT transmits on f1 and so meets the requirement.

Comment: 7.3.4 (Zoom in)



Note1: Trace1 (deep blue, top) shows interference on f1.
Note2: Trace2 (red, 2nd from top) shows the interference on f2.
Note3: Trace3 (green, 3rd from top) shows EUT transmissions on f1.
Note4: Trace4 (light blue, 4th from top) shows the signal to the handset to trigger the transmissions.
The signal is not sooner than 20 ms after the interference on f2 is applied.

6.18 Random waiting

6.18.1 Standard Applicable: FCC 15.323(c) (6)

If the selected combined time and spectrum windows are unavailable, the device may either monitor and select different windows or seek to use the same window after waiting an amount of time, randomly chosen from a uniform random distribution between 10 and 150 milliseconds, commencing when the channel becomes available.

6.18.2 Measurement procedure

Measurement method according to ANSI C63.17 2006 paragraph 8.1.3

6.18.3 Results:

The manufacturer declares that this provision is not utilized by the EUT.

6.19 Monitoring bandwidth and reaction time

6.19.1 Standard Applicable: FCC 15.323(c) (7)

The monitoring system band width must be equal to or greater than the emission band width of the intended transmission and have a maximum reaction time less than 50 x SQRT (1.25/emission band width in MHz) microseconds for signals at the applicable threshold level but shall not be required to be less than 50 microsecond. If a signal is detected that is 6 dB or more above the applicable threshold level, the maximum reaction time shall be 35 x SQRT (1.25/emission band width in MHz) microseconds but shall not be required to be less than 35 microseconds.

6.19.2 Measurement procedure

Measurement method according to ANSI C63.17 2006 paragraph 7.5

6.19.3 Results: Meets the requirement

Measurement Data

Calculation of applied pulse eidth and maximum reaction time:

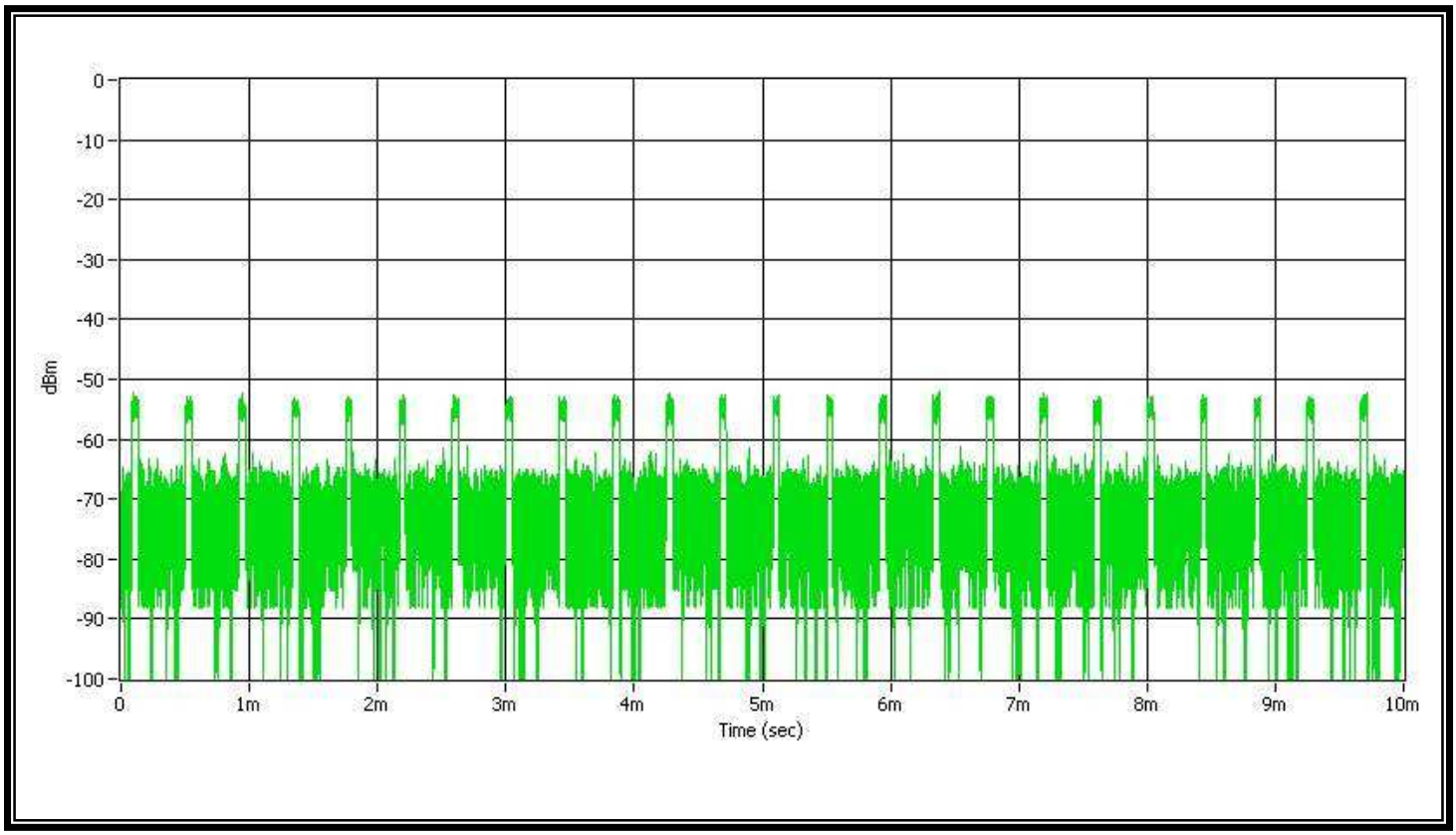
For emission bandwidth > 1.25MHz, the pulse width is always 35us and 50us.

Used results	Emission bandwidth B (MHz)	1.49 MHz	Apply
Maximum reaction time and pulse width	$50\sqrt{1.25/B}$ (μs)	45.8 μs	50 μs
	$35\sqrt{1.25/B}$ (μs)	32.1 μs	35 μs

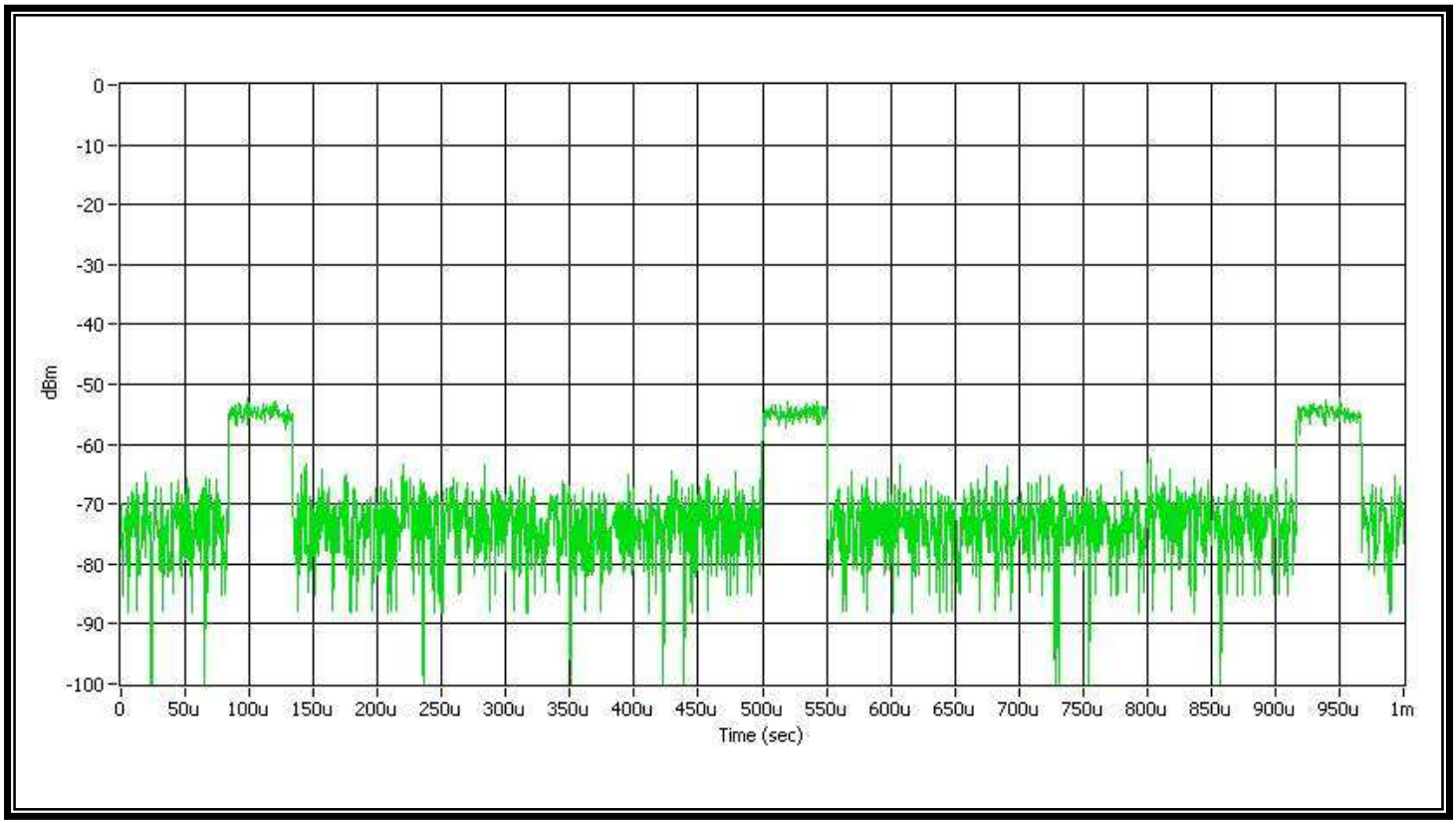
Result:

Pulse width	Connection
50 μs or $50\sqrt{1.25/B}$ μs	no
35 μs or $35\sqrt{1.25/B}$ μs	no

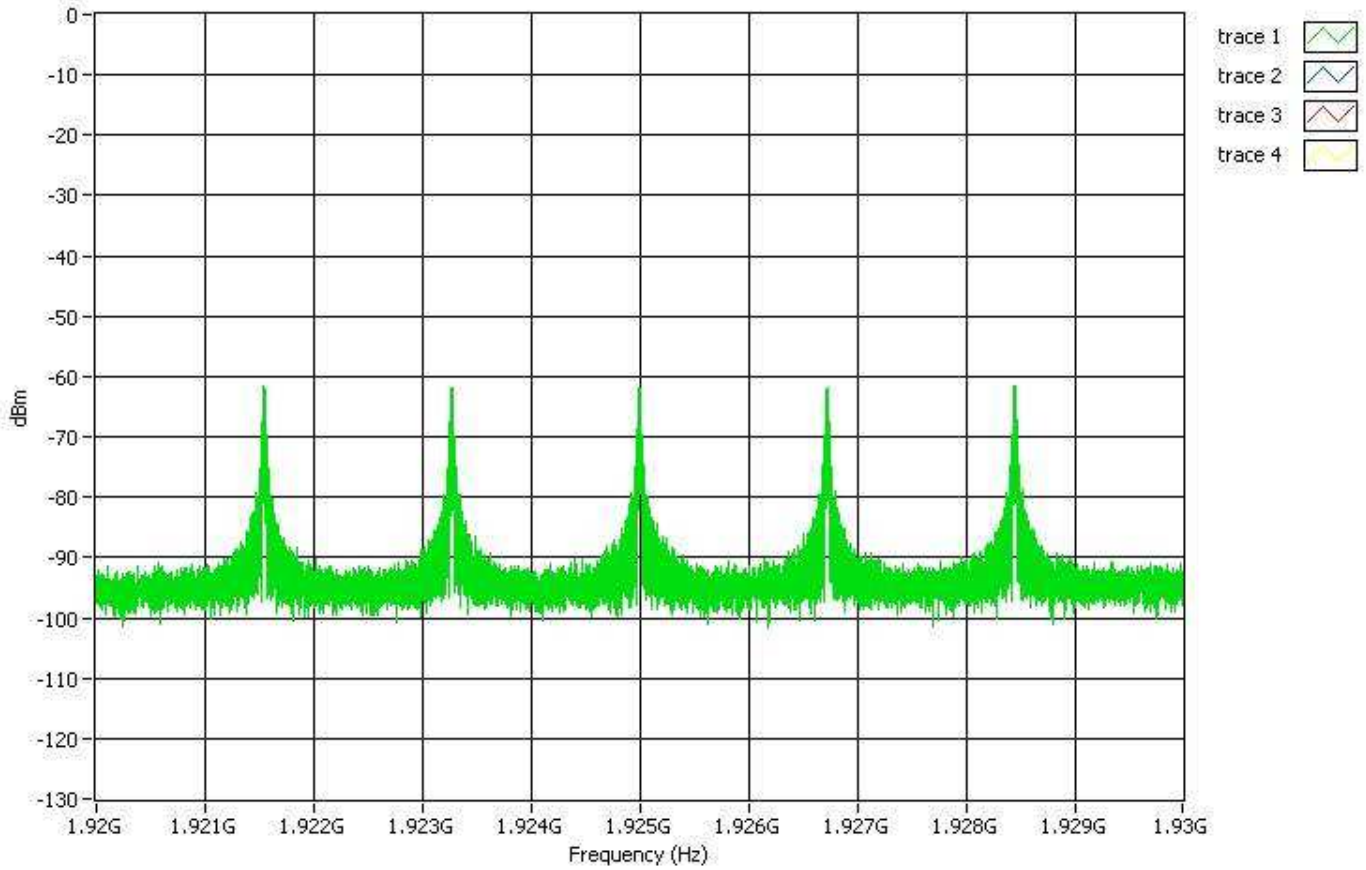
Comment: 50us



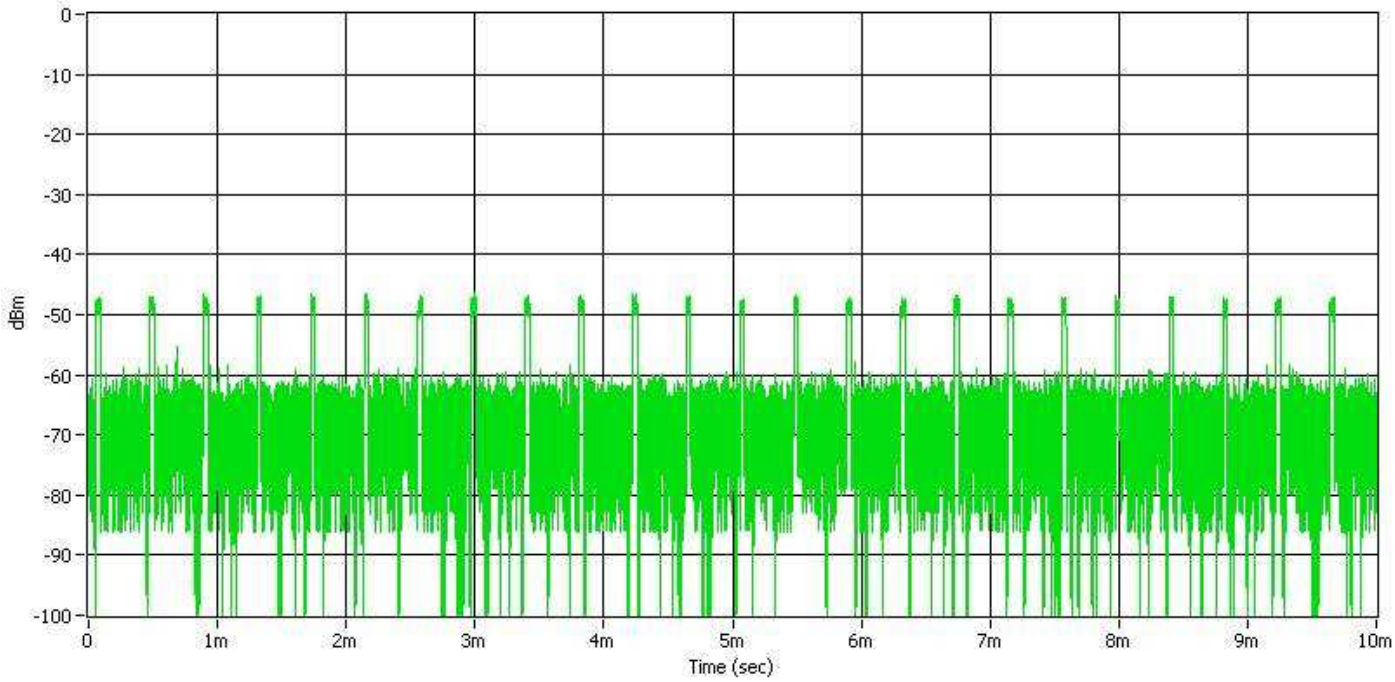
Comment: 50us (Zoom in)



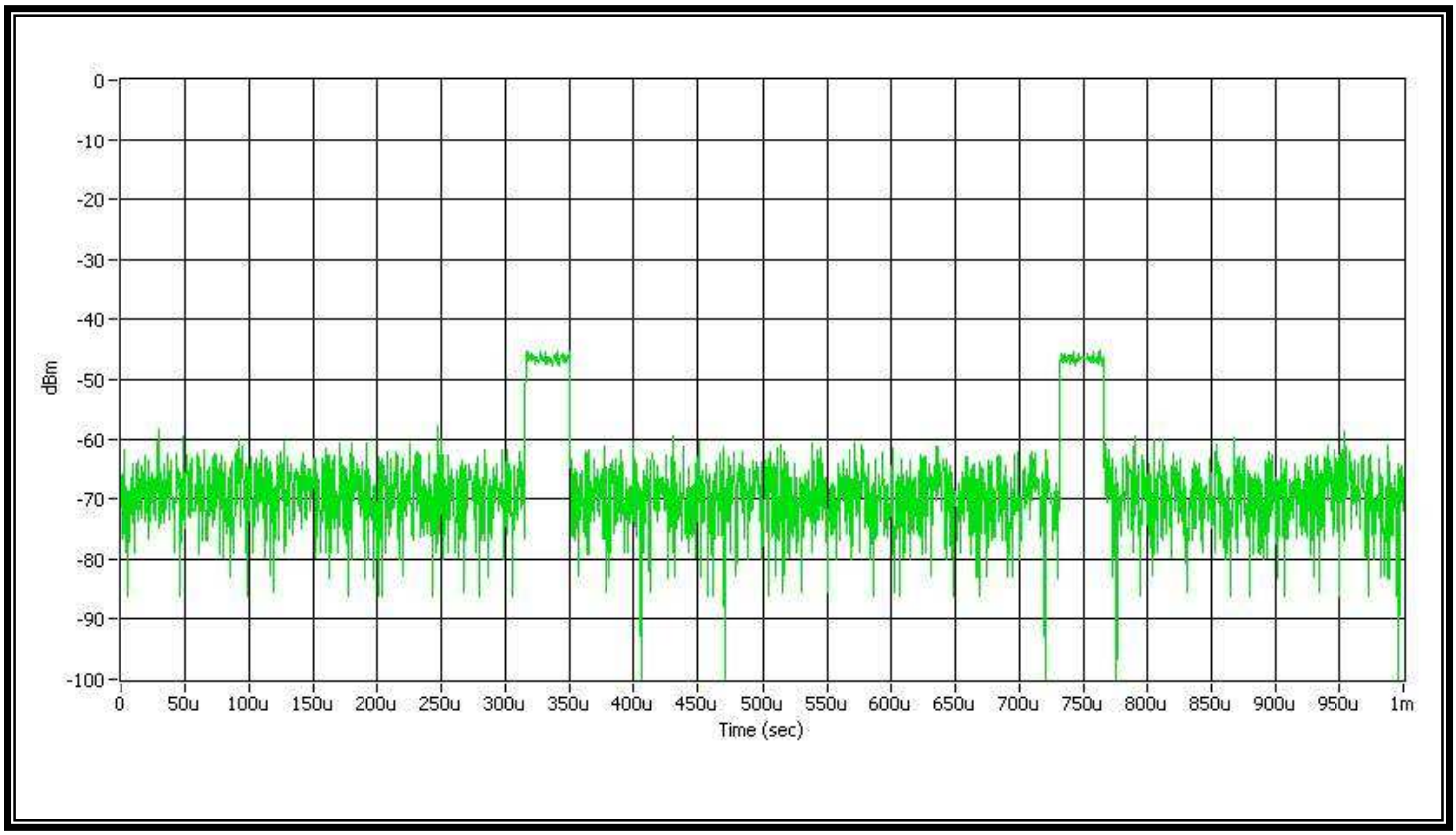
Comment: 50us (5 carriers)



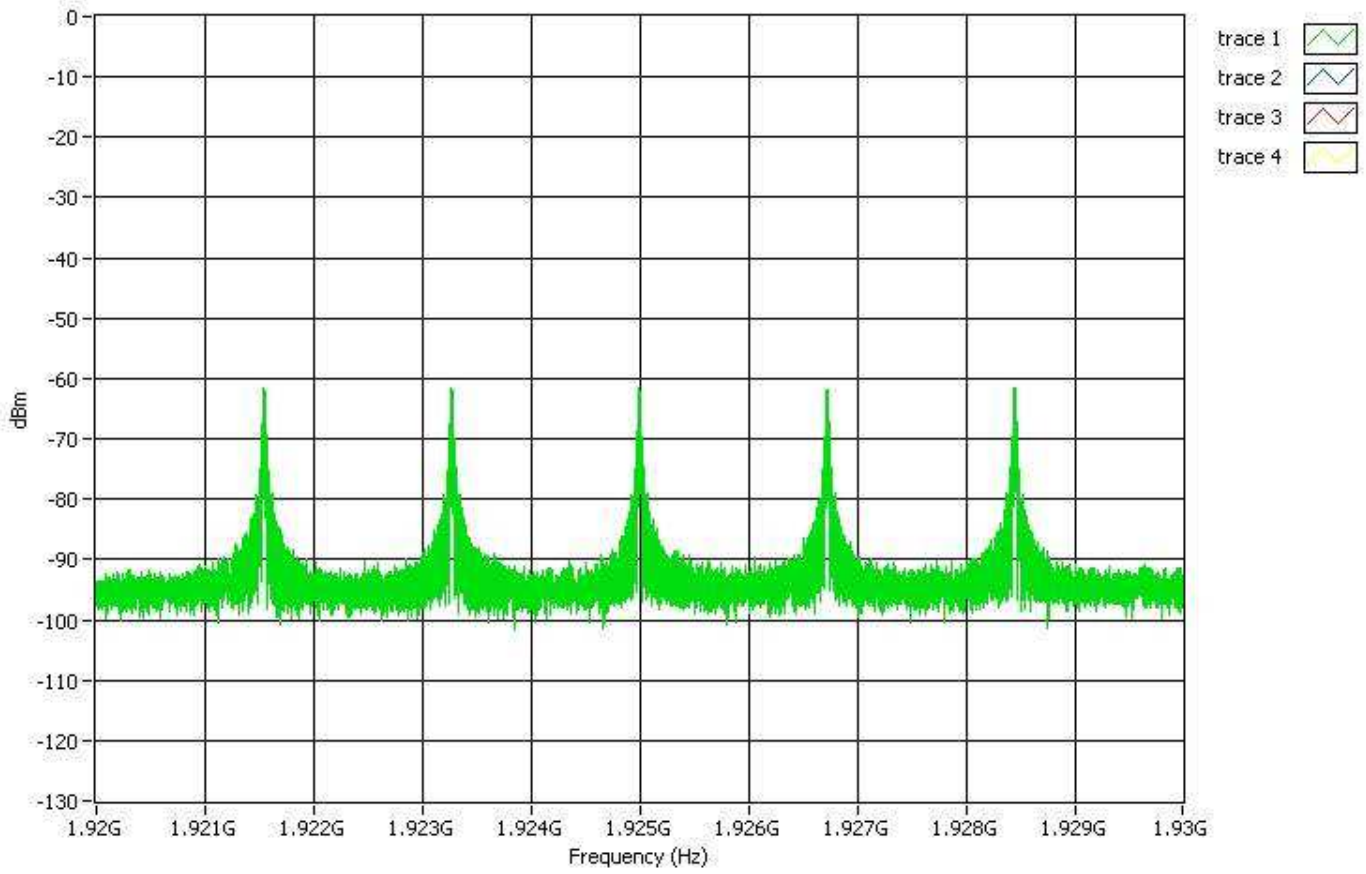
Comment: 35us



Comment: 35us (Zoom in)



Comment: 35us (5 carriers)



6.20 Monitoring antenna

6.20.1 Standard Applicable: FCC 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.

6.20.2 Measurement procedure

Measurement method according to ANSI C63.17 2006 paragraph 4

6.20.3 Results: Complies

The EUT uses the same antennas for transmission and reception as for monitoring.

6.21 Monitoring threshold relaxation

6.21.1 Standard Applicable: FCC 15.323(c) (9)

Devices that have a power output lower than the maximum permitted under the rules can increase their monitoring detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.

6.21.2 Measurement procedure

Measurement method according to ANSI C63.17 2006 paragraph 4

6.21.3 Results: Complies

Measurement Data:

This requirement is covered by results of Least Interfered Channel (LIC) test according to FCC 15.323(c) (5)	☒

6.22 Duplex system LBT

6.22.1 Standard Applicable: FCC 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.

6.22.2 Measurement procedure

Measurement method according to ANSI C63.17, clause 8.3
This test is required for equipment that uses the access criteria in FCC 15.323(c)(10).

6.22.3 Test Results:

The manufacturer declares that this provision is not utilized by the EUT.

6.23 Co-located device LBT

6.23.1 Standard Applicable: FCC 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 device. 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.

6.23.2 Measurement procedure

Measurement method according to ANSI C63.17 2006 paragraph 8.4

6.23.3 Results:

The manufacturer declares that this provision is not utilized by the EUT.

6.24 Fair Access

6.24.1 Standard Applicable: FCC 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 for other devices.

6.24.2 Results:

The manufacturer declares that EUT does not work in a mode which denies fair access to spectrum for other devices.

6.25 Emissions inside and outside the subband

6.25.1 Standard Applicable: FCC 15.323(d)

Emissions inside the subband
$B < f \leq 2B$: less than or equal to 30 dB below max. permitted peak power level
$2B < f \leq 3B$: less than or equal to 50 dB below max. permitted peak power level
$3B < f \leq$ UPCS Band Edge: less than or equal to 60 dB below max. permitted peak power level

Emissions outside the subband

$f \leq$ 1.25MHz outside UPCS band :	$\leq$ -9.5dBm
1.25MHz $\leq f \leq$ 2.5MHz outside UPCS band :	$\leq$ -29.5 dBm
$f \geq$ 2.5MHz outside UPCS band:	$\leq$ -39.5 dBm

6.25.2 Measurement procedure

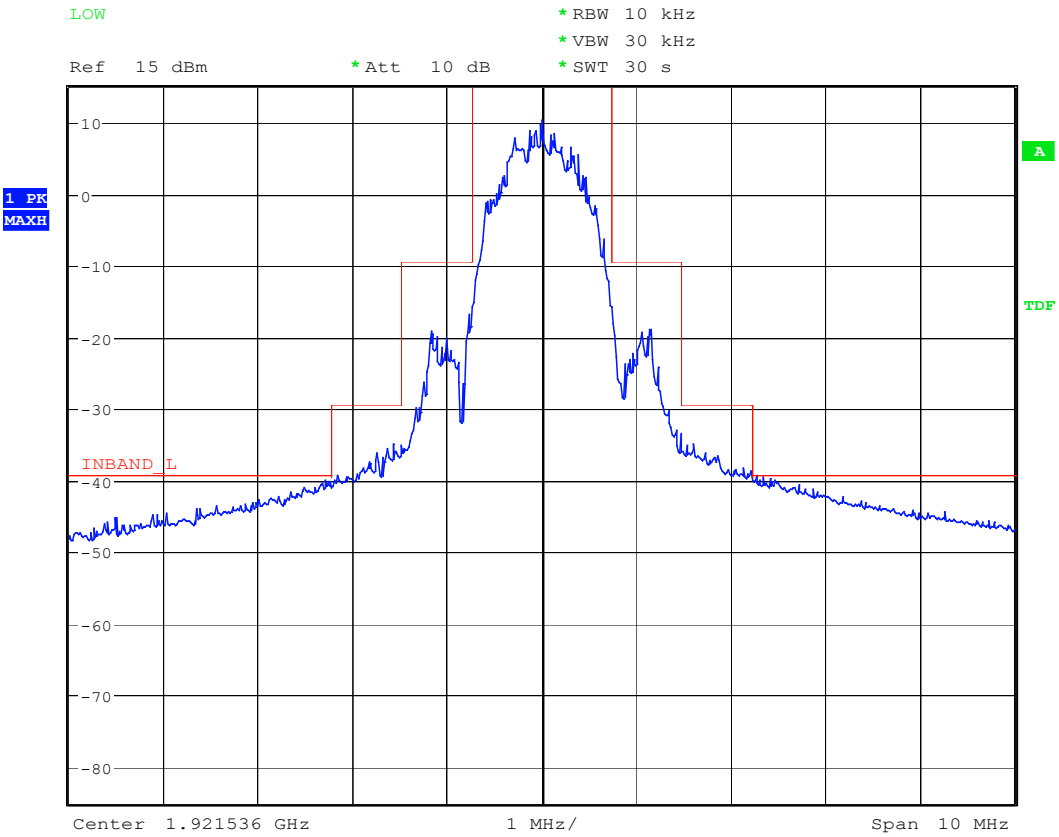
Measurement method according to ANSI C63.17 2006 paragraph 6.1.6

6.25.3 Results: Complies

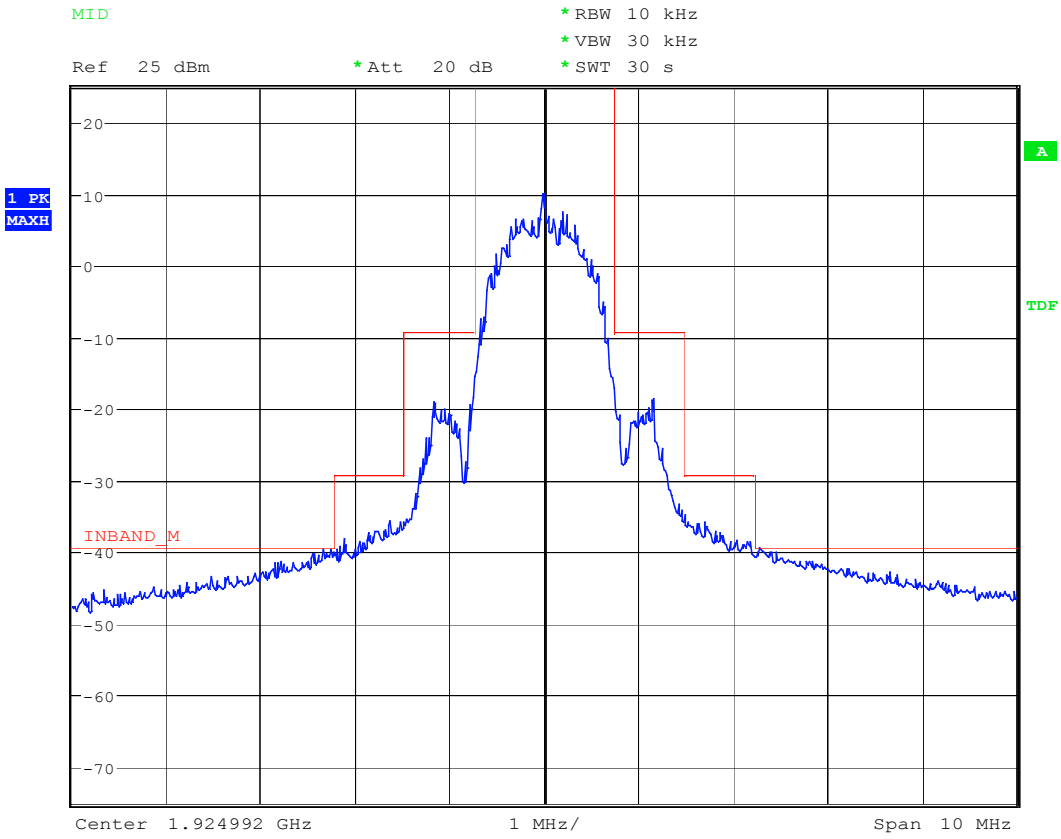
Measurement Data:

See plots.

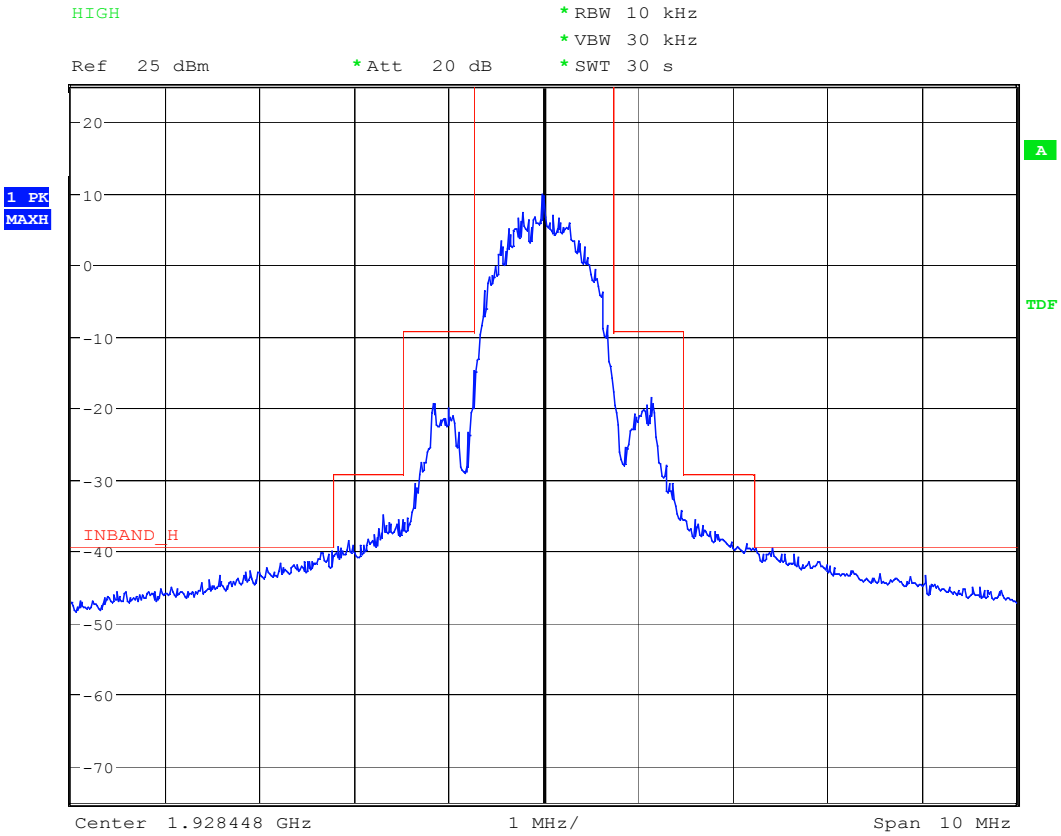
In-band Unwanted Emissions: CH F_L



In-band Unwanted Emissions: CH FM



In-band Unwanted Emissions: CH F_H



Out-of-band Unwanted Emission:

a) CH F_L

1) RF Portion:

Test Date: Aug. 10, 2006 Temperature: 24℃ Humidity: 62%

Frequency (MHz)	Reading (dBm) H Peak	Reading (dBm) V Peak	Factor (dB) Corr.	Result @3m (dBm) Peak (H/V Max.)	Limit @3m (dBm) Peak	Margins (dB)
3843.072	-41.2	-51.9	0.0	-41.2	-39.5	-1.7
5764.608	---	---	4.1	---	-39.5	---
7686.144	-55.1	---	2.6	-52.5	-39.5	-13.0
9607.680	---	---	2.6	---	-39.5	---
11529.216	---	---	0.7	---	-39.5	---
13450.752	---	---	4.8	---	-39.5	---
15372.288	---	---	1.2	---	-39.5	---
17293.824	---	---	6.3	---	-39.5	---
19215.360	---	---	11.2	---	-39.5	---

Note: Remark "---" means that the emissions level is too low to be measured.

2) Other Emission:

Frequency (MHz)	Reading (dBm) H Peak	Reading (dBm) V Peak	Factor (dB) Corr.	Result @3m (dBm) Peak (H/V Max.)	Limit @3m (dBm) Peak	Margins (dB)
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---

Note:
1. Place of Measurement: Measuring site of the ETC.
2. If the data table appeared symbol of "---" means the value was too low to be measured.
3. The estimated measurement uncertainty of the result measurement is
   ±4.6dB (30MHz≦f<300MHz).
   ±4.4dB (300MHz≦f<1000MHz)
   ±4.1dB (1GHz≦f<18GHz).
   ±4.4dB (18GHz≦f≦40GHz).

b) CH F_H

1) RF Portion:

Test Date: Aug. 10, 2006 Temperature: 24℃ Humidity: 62%

Frequency (MHz)	Reading (dBm) H Peak	Reading (dBm) V Peak	Factor (dB) Corr.	Result @3m (dBm) Peak (H/V Max.)	Limit @3m (dBm) Peak	Margins (dB)
3856.896	---	---	0.0	---	-39.5	---
5785.344	---	---	4.1	---	-39.5	---
7713.792	-48.8	---	2.6	-46.2	-39.5	-6.7
9642.240	---	---	2.6	---	-39.5	---
11570.688	---	---	0.7	---	-39.5	---
13499.136	---	---	4.8	---	-39.5	---
15427.584	---	---	1.2	---	-39.5	---
17356.032	---	---	6.3	---	-39.5	---
19284.480	---	---	11.2	---	-39.5	---

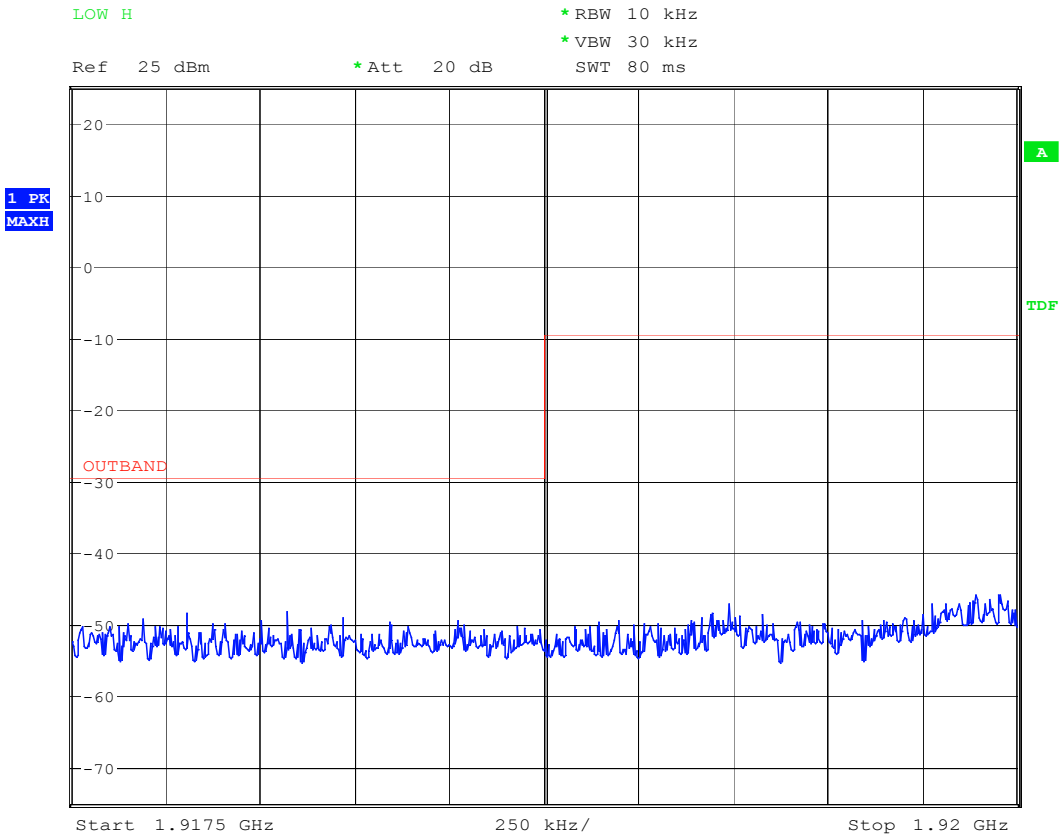
Note: Remark "---" means that the emissions level is too low to be measured.

2) Other Emission:

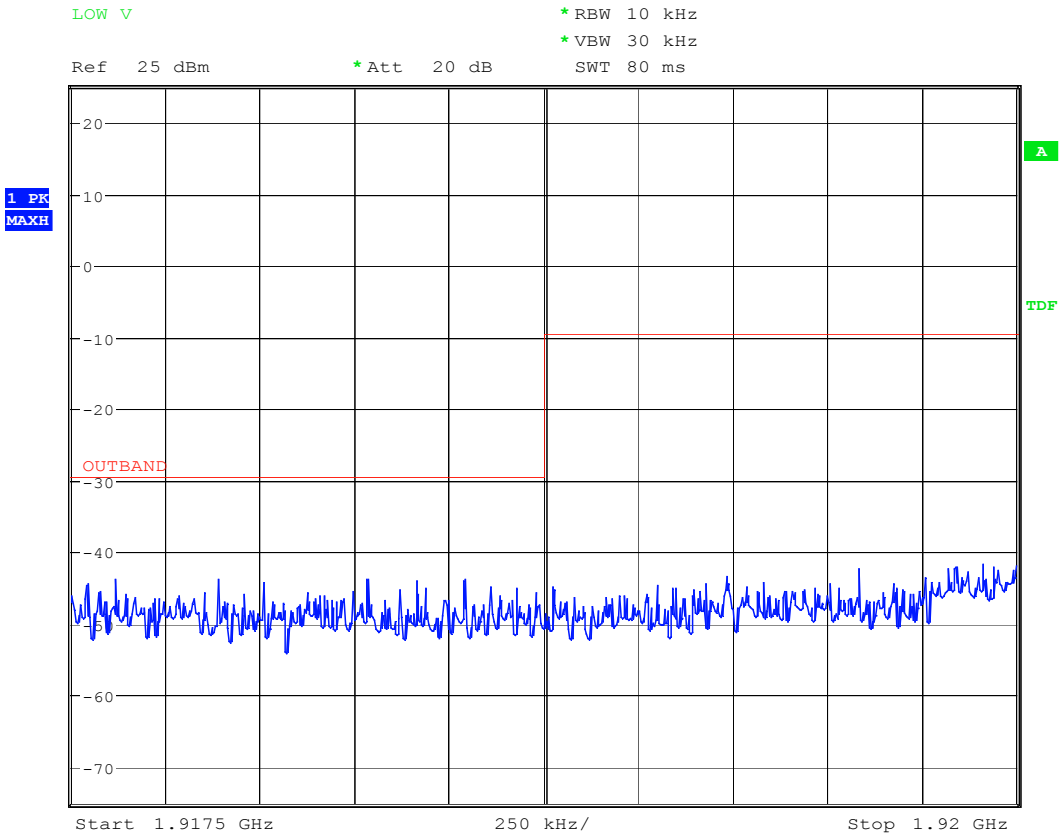
Frequency (MHz)	Reading (dBm) H Peak	Reading (dBm) V Peak	Factor (dB) Corr.	Result @3m (dBm) Peak (H/V Max.)	Limit @3m (dBm) Peak	Margins (dB)
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---
---	---	---	---	---	-39.5	---

Note:
1. Place of Measurement: Measuring site of the ETC.
2. If the data table appeared symbol of "---" means the value was too low to be measured.
3. The estimated measurement uncertainty of the result measurement is
   ±4.6dB (30MHz≦f<300MHz).
   ±4.4dB (300MHz≦f<1000MHz)
   ±4.1dB (1GHz≦f<18GHz).
   ±4.4dB (18GHz≦f≦40GHz).

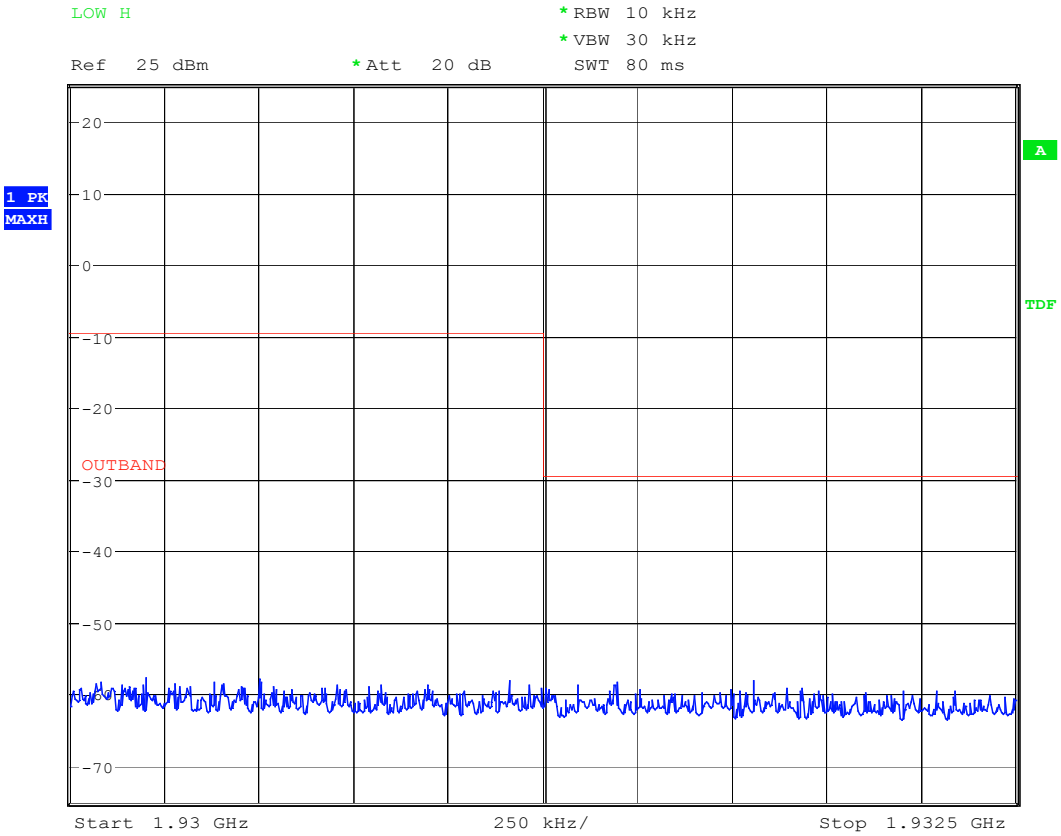
Out-of-band Unwanted Emissions: CH FL



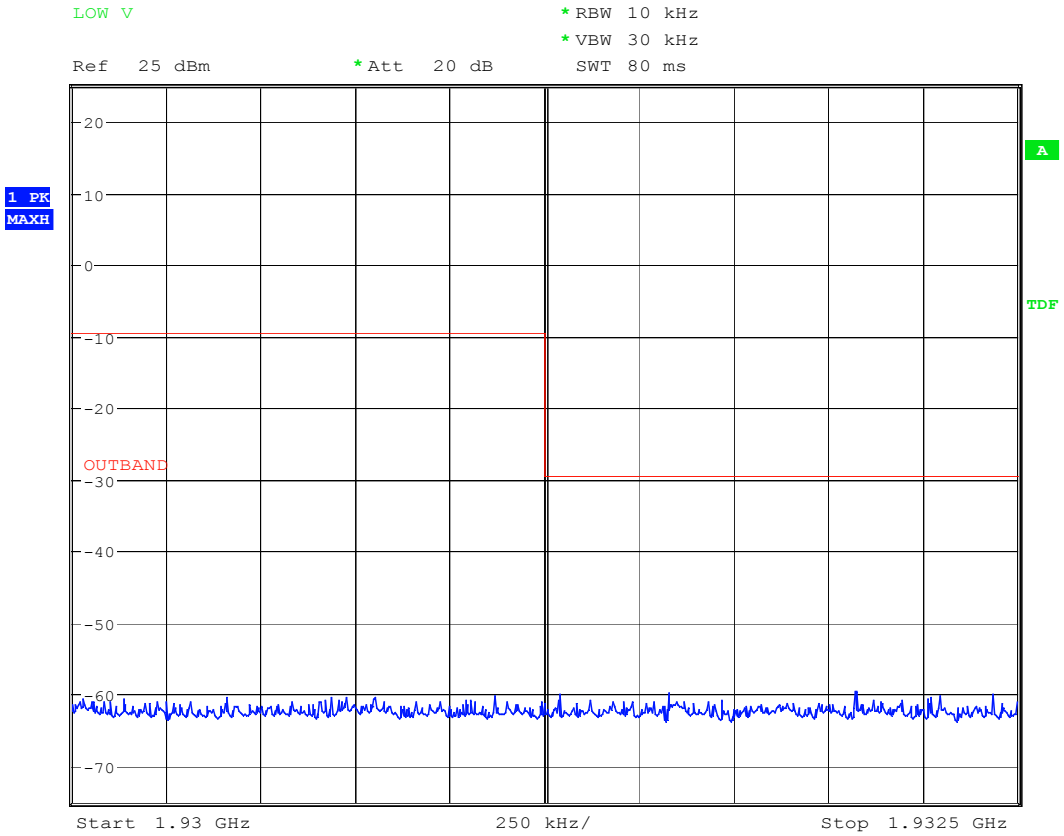
Out-of-band Unwanted Emissions: CH F_L



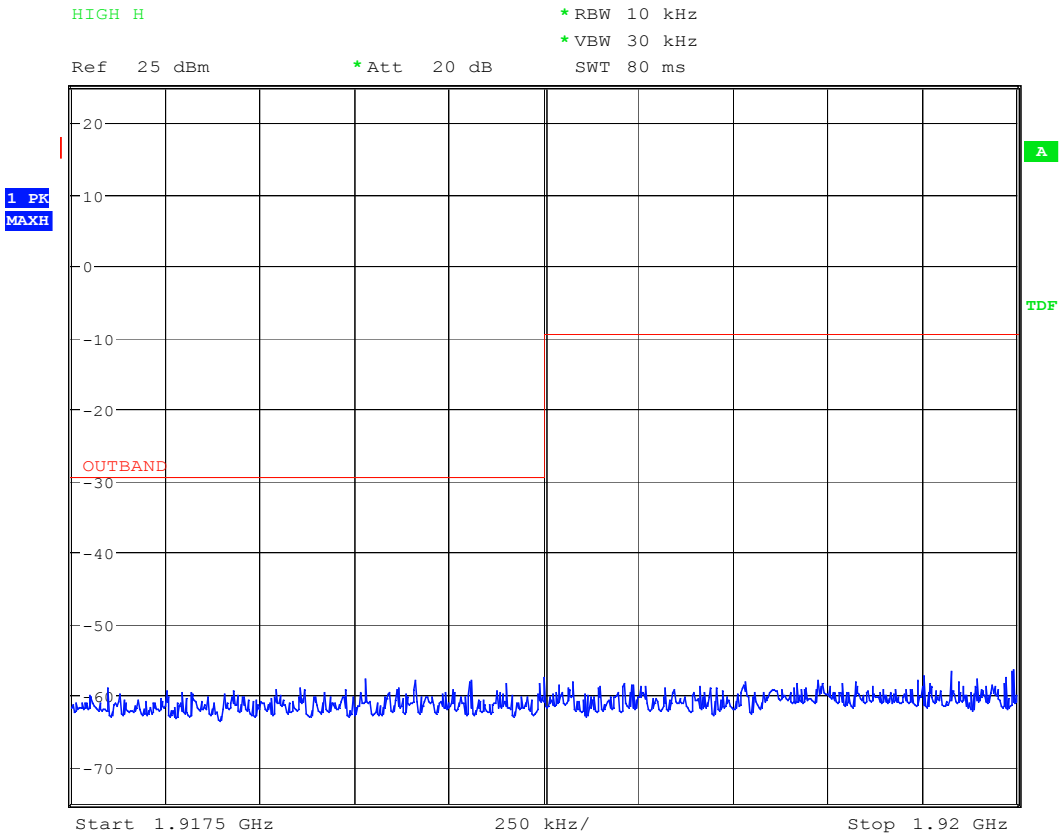
Out-of-band Unwanted Emissions: CH F_L



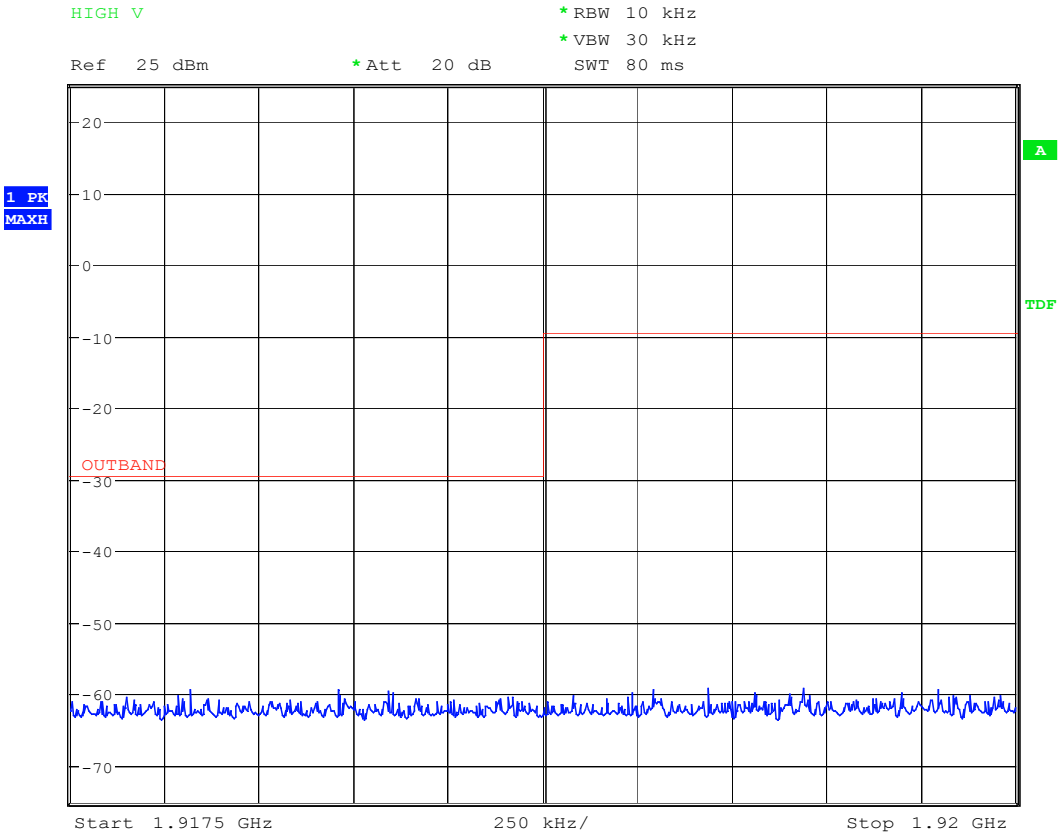
Out-of-band Unwanted Emissions: CH F_L



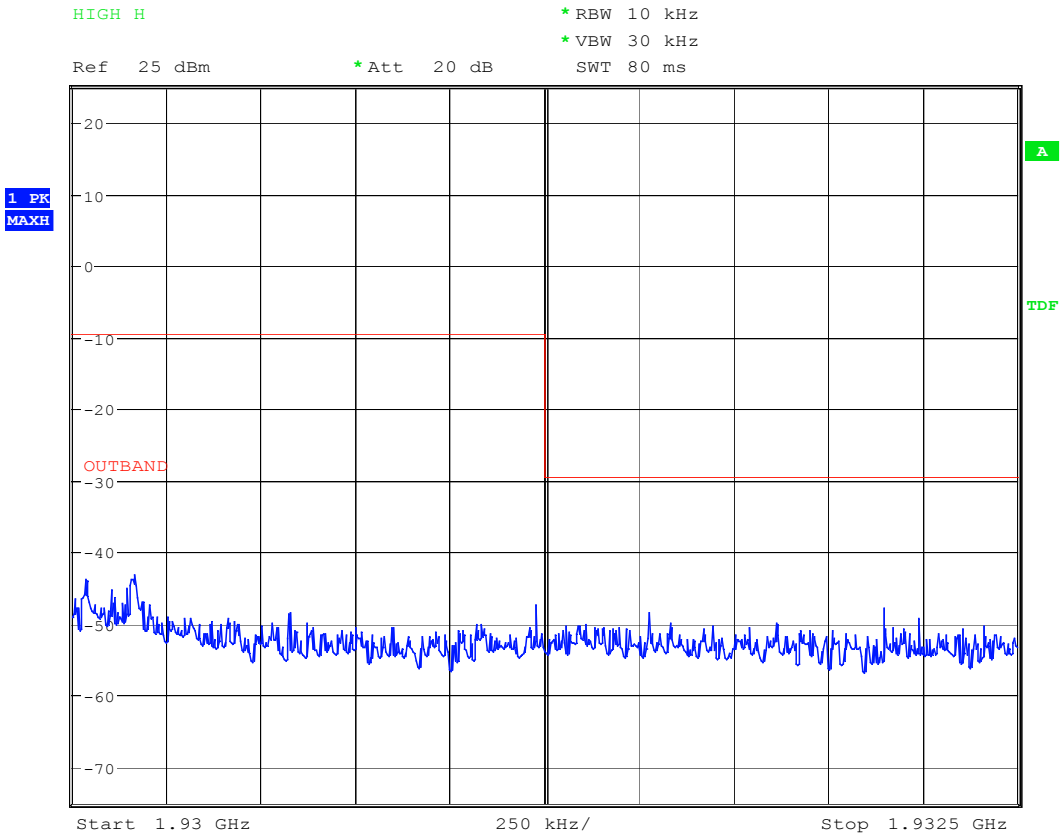
Out-of-band Unwanted Emissions: CH F_H



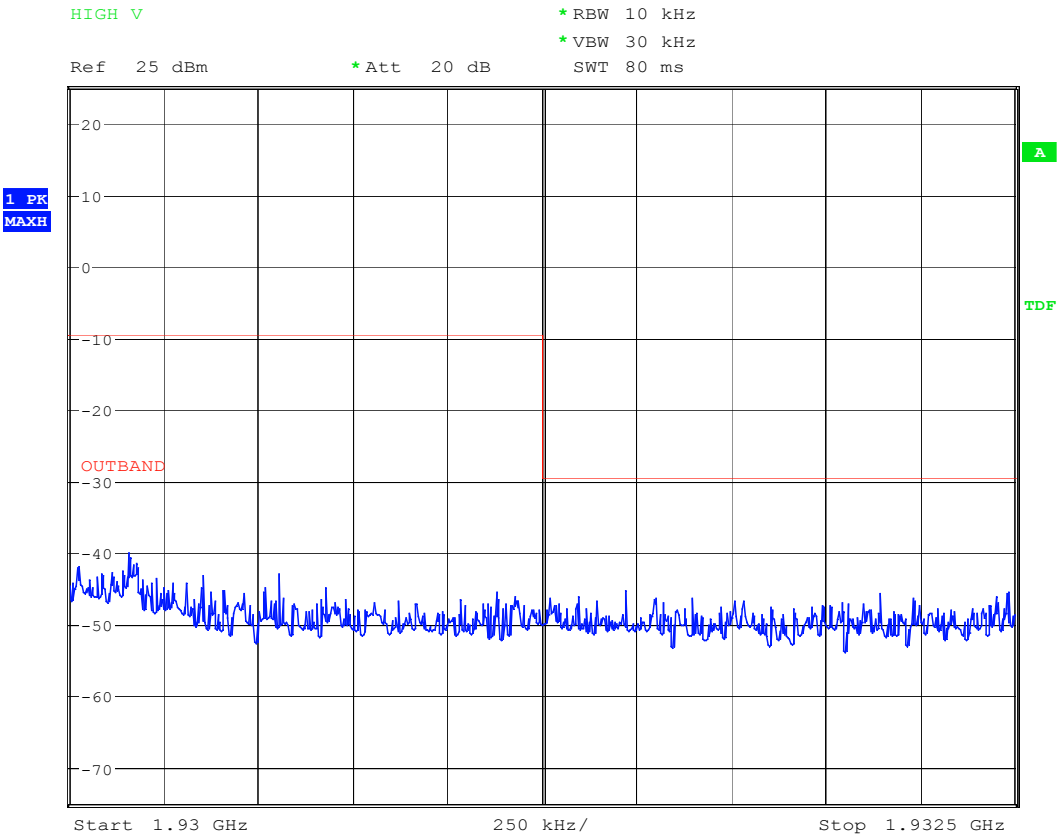
Out-of-band Unwanted Emissions: CH F_H



Out-of-band Unwanted Emissions: CH F_H



Out-of-band Unwanted Emissions: CH F_H



6.26 Frame period and jitter

6.26.1 Standard Applicable: FCC 15.323(e)

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 these subbands shall be 20 milliseconds/X where X is a positive whole number. 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). 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. 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 microseconds for any two consecutive transmissions. Transmissions shall be continuous in every time and spectrum window during the frame period defined for the device.

6.26.2 Measurement Requirement:

- Frame frequency stability ≤ 50 ppm
- TDMA frame frequency stability ≤ 10 ppm (That translates to frequency drift of19.2 kHz/slot for 1920 MHz carrier)
- Frame jitter ≤ 25 μs

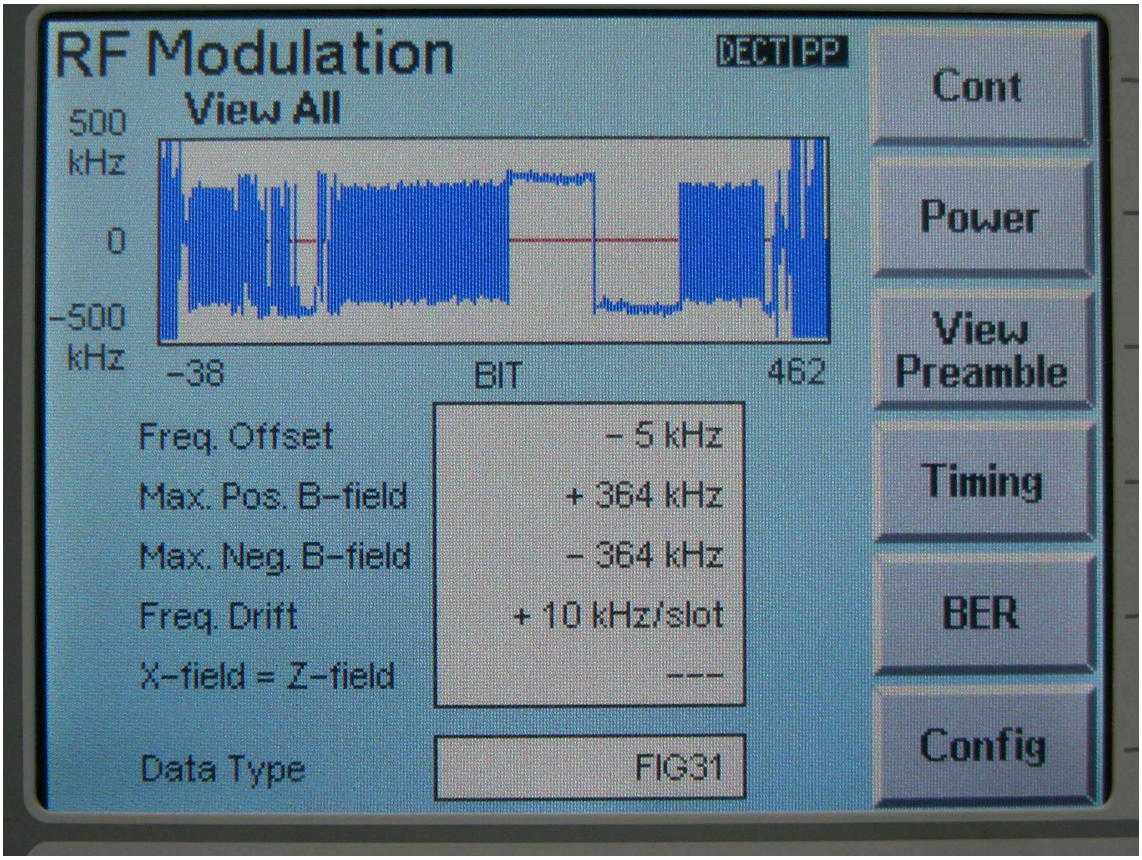
6.26.3 Test Results: Complies

Measurement Data:

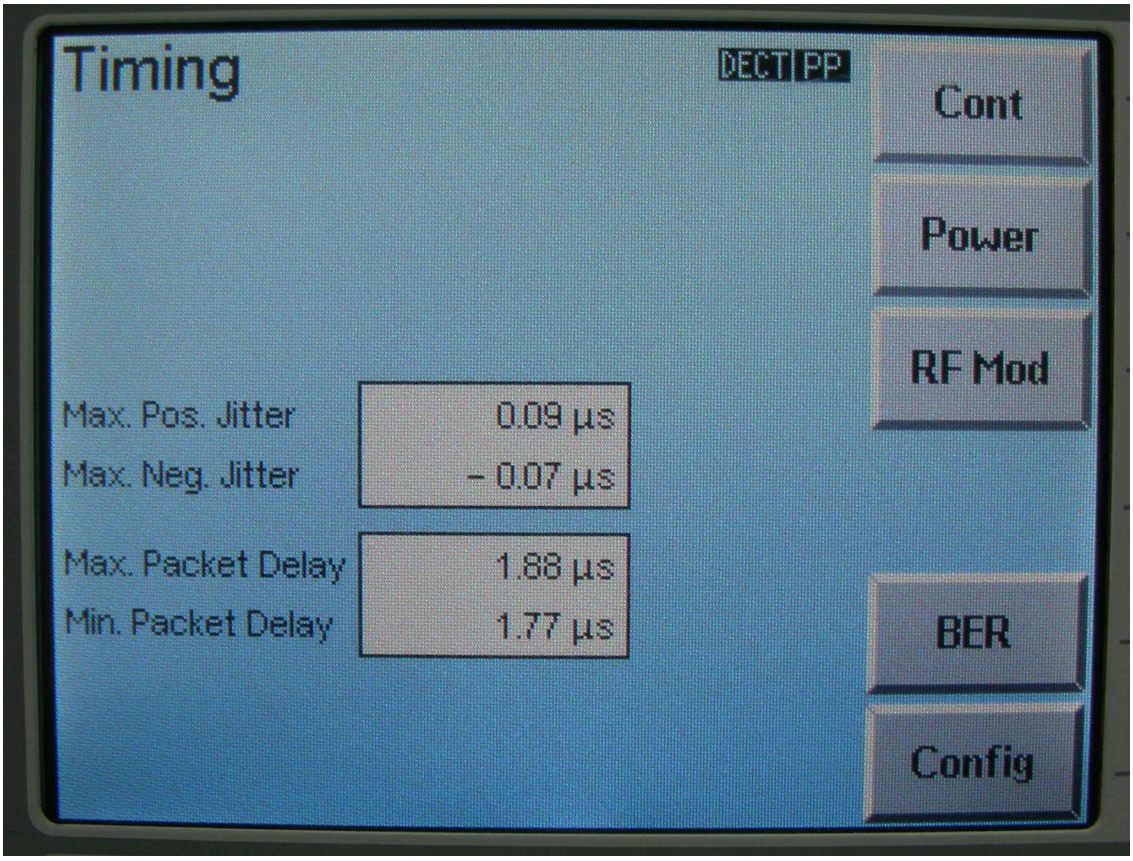
Channel No.	Frequency (KHz/slot)		Jitter (us)	
	Drift	Limit	Result	Limit
F_L	8	19.2	0	25
F_M	10	19.2	0	25
F_H	10	19.2	0	25

Photos of worst-case display follow:

Frequency Drift



TDMA Frame Jitter



6.27 Carrier frequency stability

6.27.1 Standard Applicable: FCC 15.323(f)

The frequency stability of the carrier frequency of the intentional radiator shall be maintained within ± 10 ppm over 1 hour or the interval between channel access monitoring, whichever is shorter. The frequency stability shall be maintained over a temperature variation of -20° to +50° degrees C at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of 20o C. 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.

6.27.2 Measurement Requirement:

- Carrier frequency stability ≤ 10 ppm over 1 hour or interval between channel access monitoring, whichever is shorter (That translates to frequency drift of19.2 kHz for 1920 MHz carrier)
- Carrier frequency stability over –20 to +50 ^{o}C at normal supply voltage, and over 85% to 115% of rated supply voltage (voltage variation not required for battery operated device)

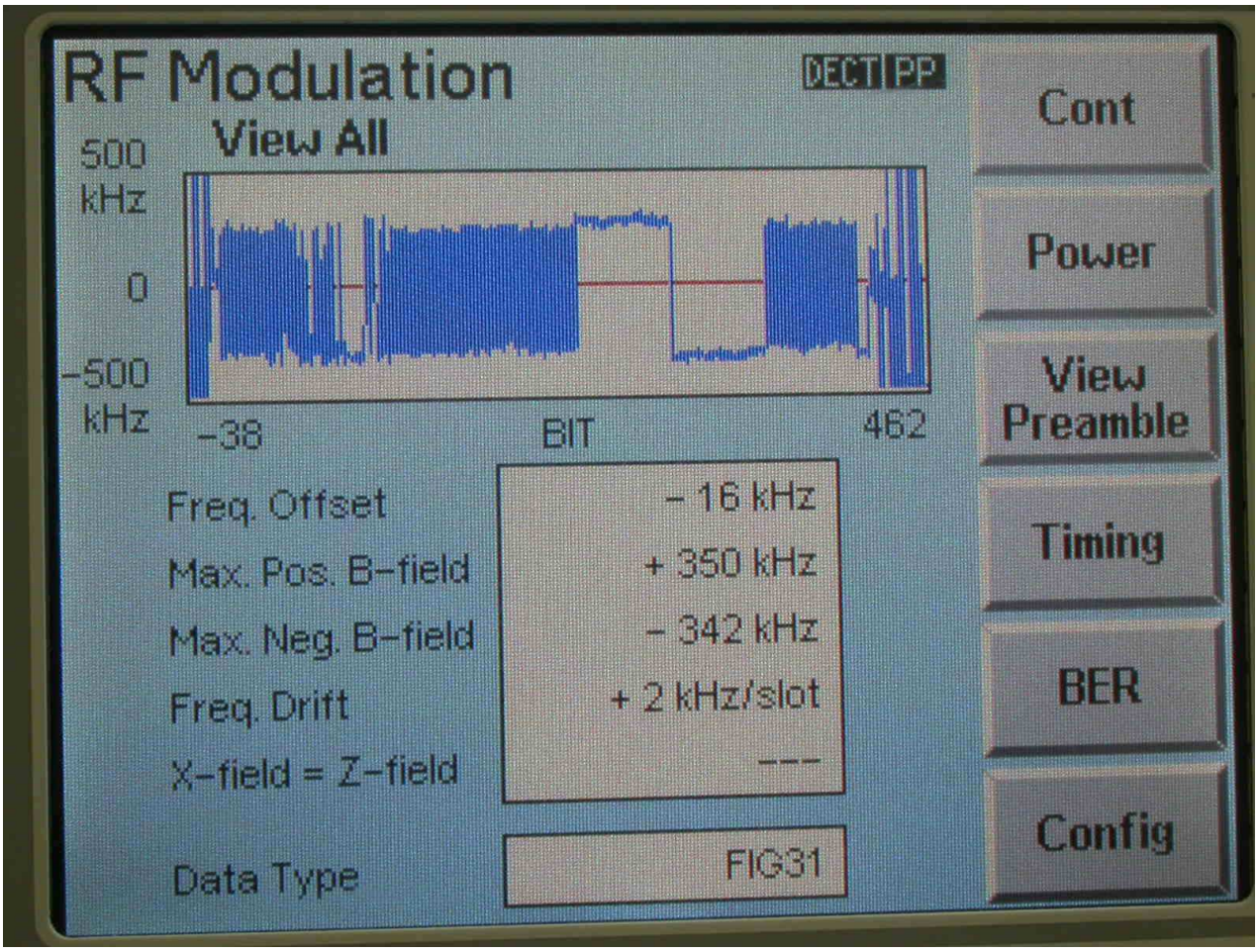
6.27.3 Test Results: Complies

Measurement Data:

a) Carrier Frequency Stability with Supply voltage

Channel No.	Frequency Offset (kHz)			Limit (kHz)
	2.04V (85%)	2.4V (Normal)	2.76V (115%)	
F_L	n/a	n/a	n/a	±19.2
F_M	n/a	n/a	n/a	±19.2
F_H	n/a	n/a	n/a	±19.2

a) Carrier Frequency Stability with Temperature and Time

Channel No.	Frequency Offset (kHz)			Limit (kHz)
	0 ℃	20 ℃	45 ℃	
F_L	-13	-10	10	±19.2
F_M	-16	-14	9	±19.2
F_H	-15	-14	10	±19.2

Test was conducted for duration longer than 1 hour. Photo of worst-case display follows: