

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 $50 \times \text{SQRT}(1.25/\text{emission band width in MHz})$ 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 $35 \times \text{SQRT}(1.25/\text{emission band width in MHz})$ microseconds but shall not be required to be less than 35 microseconds.

RSS-213 4.3.4 (b)(7)

The monitoring system bandwidth must be equal to or greater than the occupied bandwidth of the intended transmission. **Note:** Testing of the monitoring system bandwidth is not required if the designed bandwidth from the manufacturer is available and given in the test report.

The monitor shall have a maximum reaction time less than $50\sqrt{1.25/\text{occupied bandwidth in MHz}}$ microseconds for signals at the applicable threshold level but shall not be required to be less than 50 microseconds.

If a signal is detected that is 6 dB or more above the threshold level, the maximum reaction time shall be $35\sqrt{1.25/\text{occupied bandwidth in MHz}}$ 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 width and maximum reaction time:

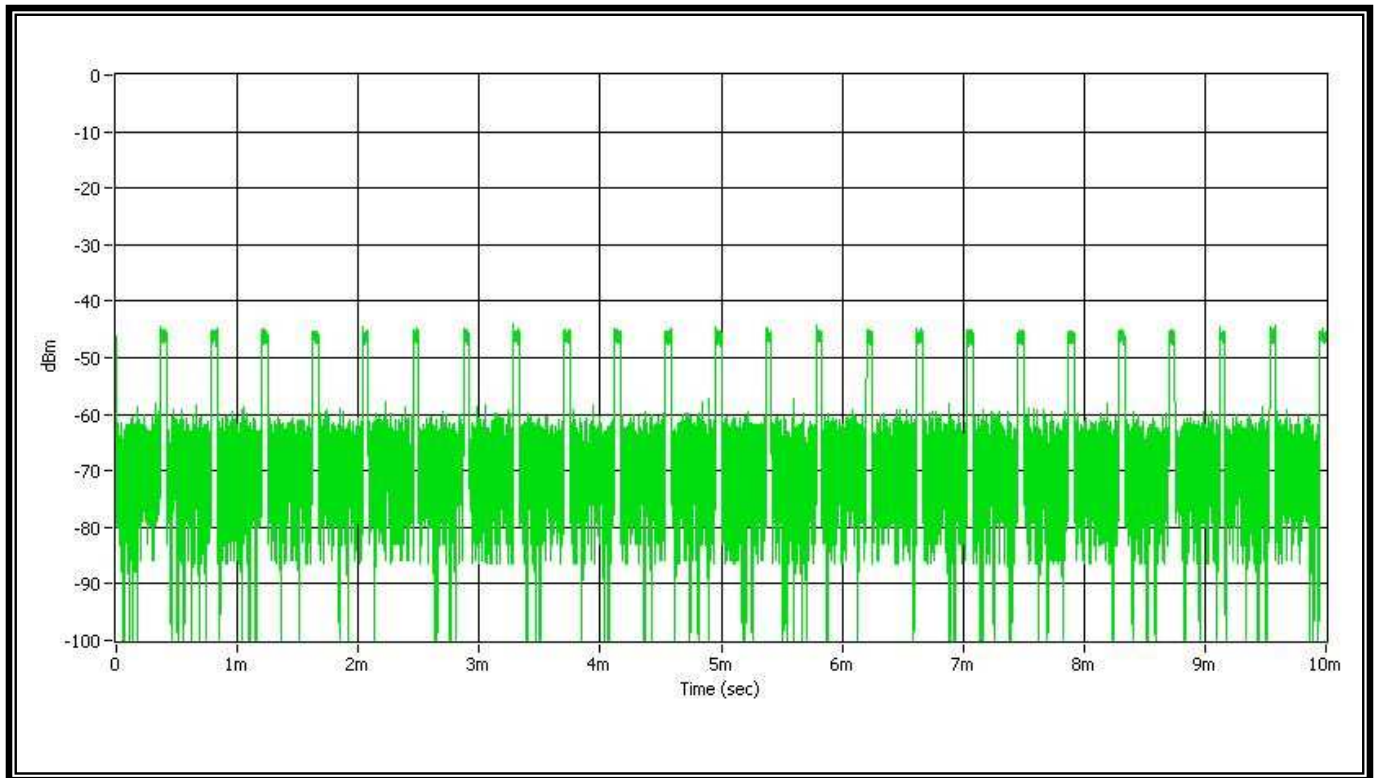
For emission bandwidth > 1.25MHz, the pulse width is always 35us and 50us.

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

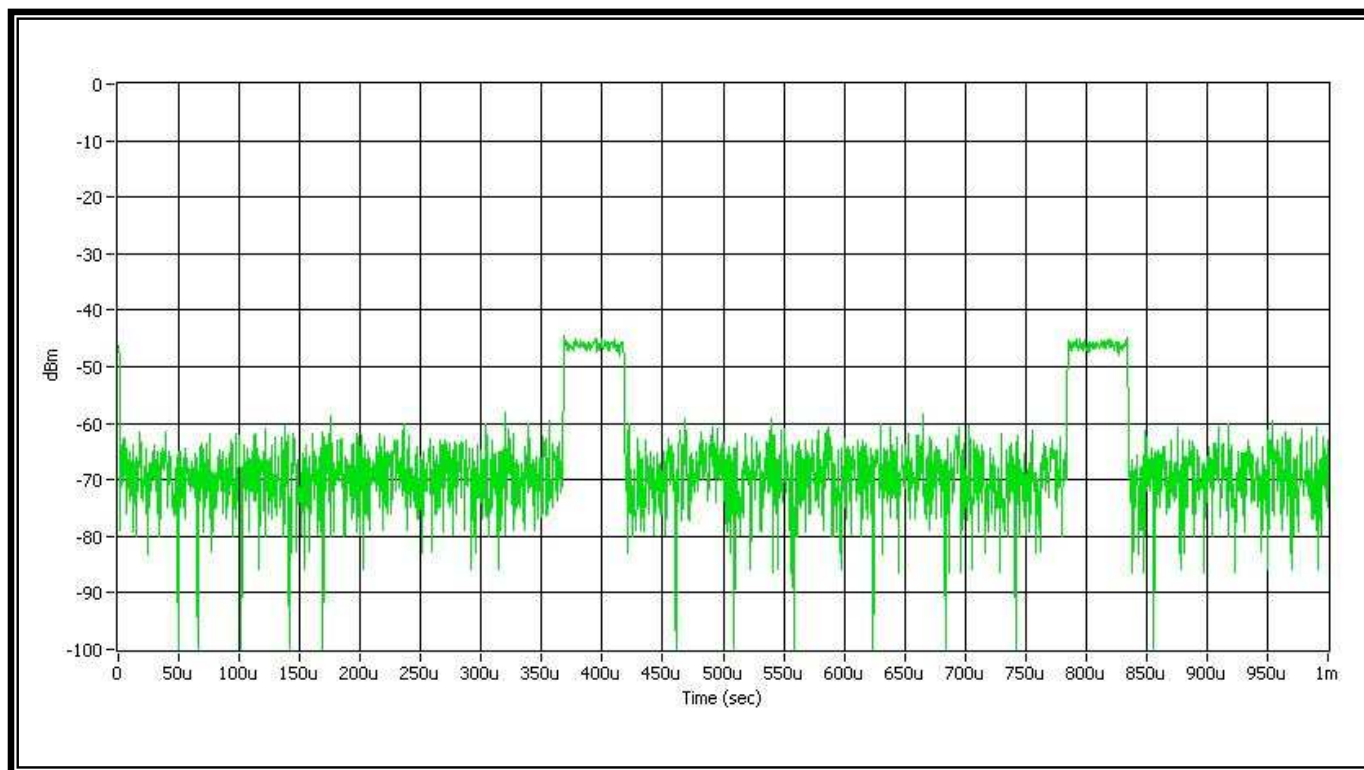
Result:

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

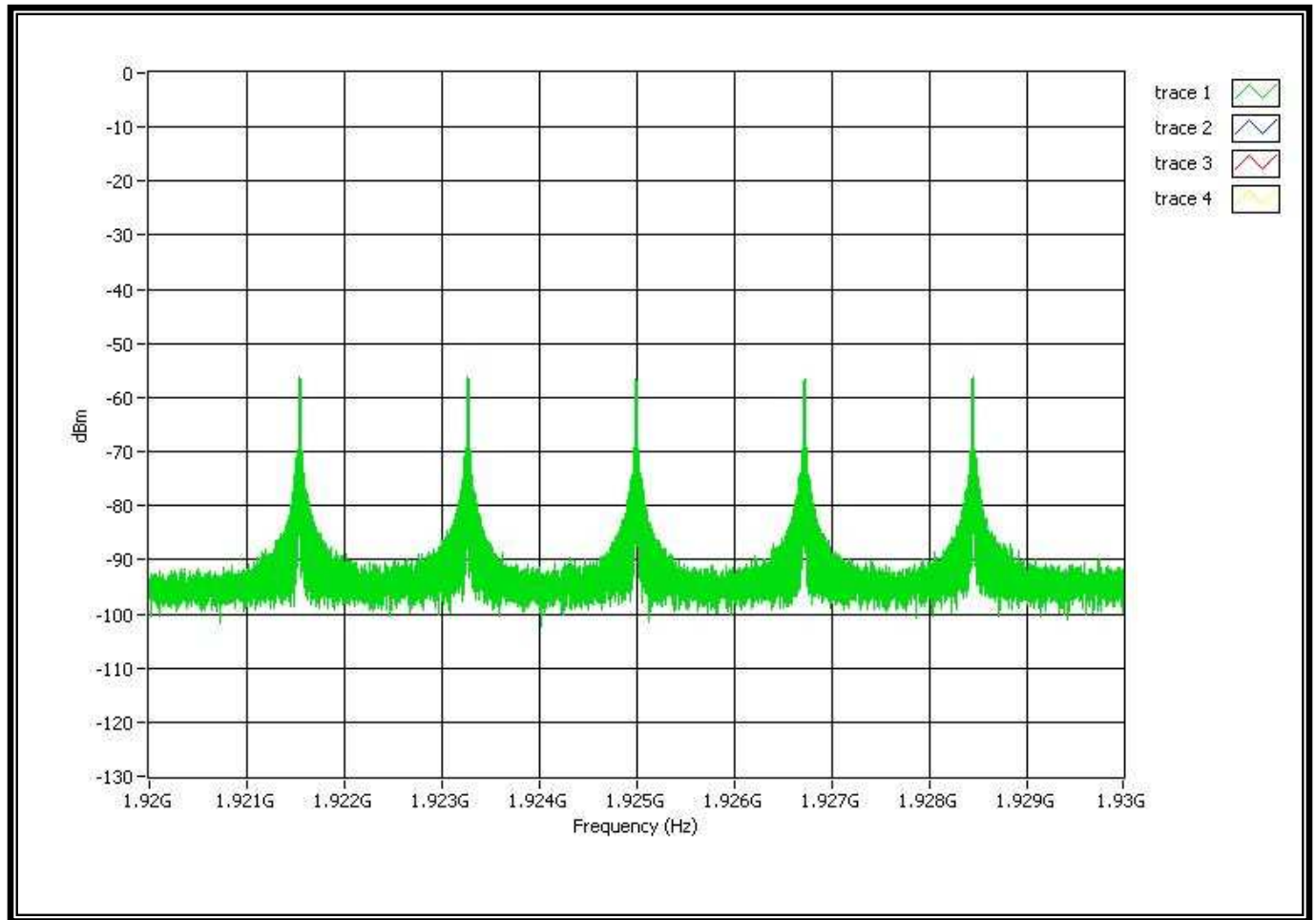
Comment: 50us



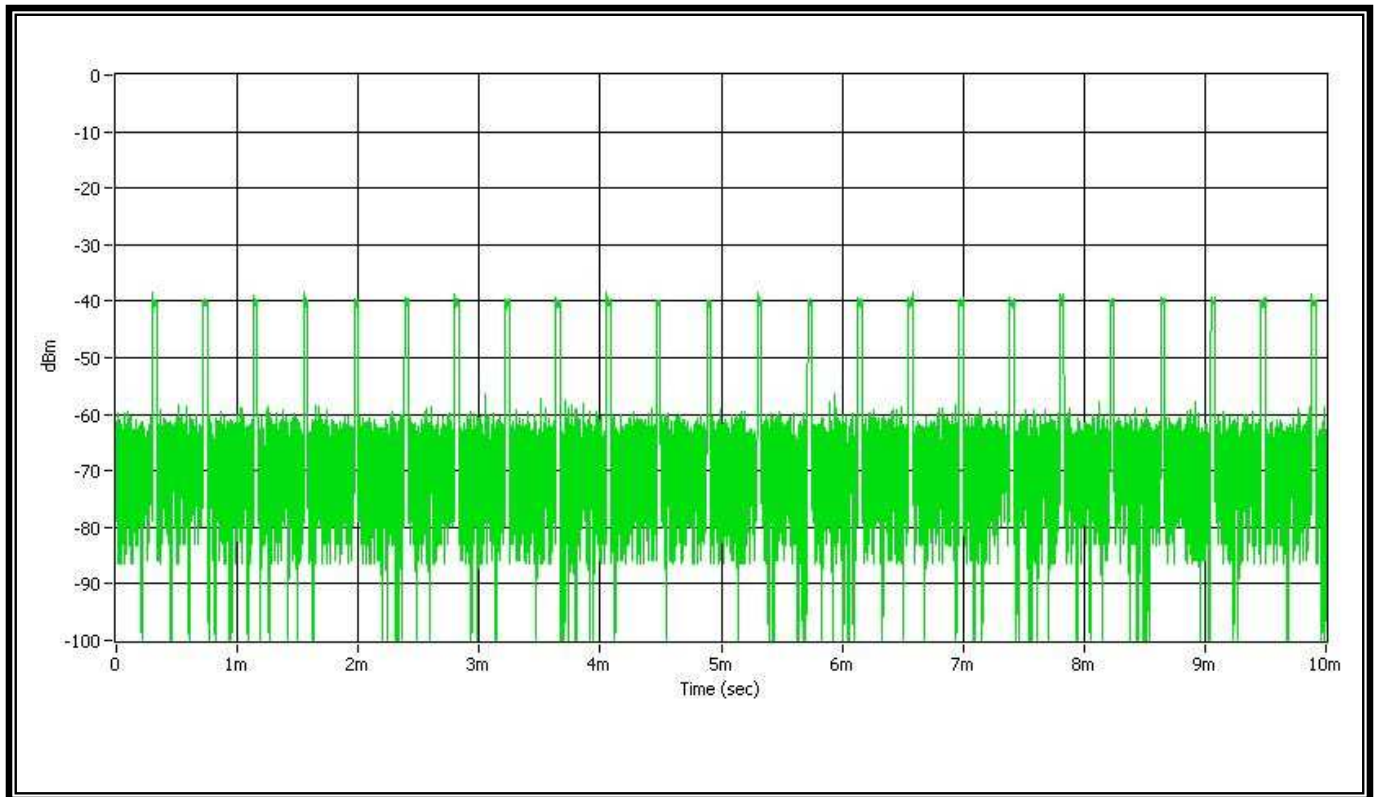
Comment: 50us (Zoom in)



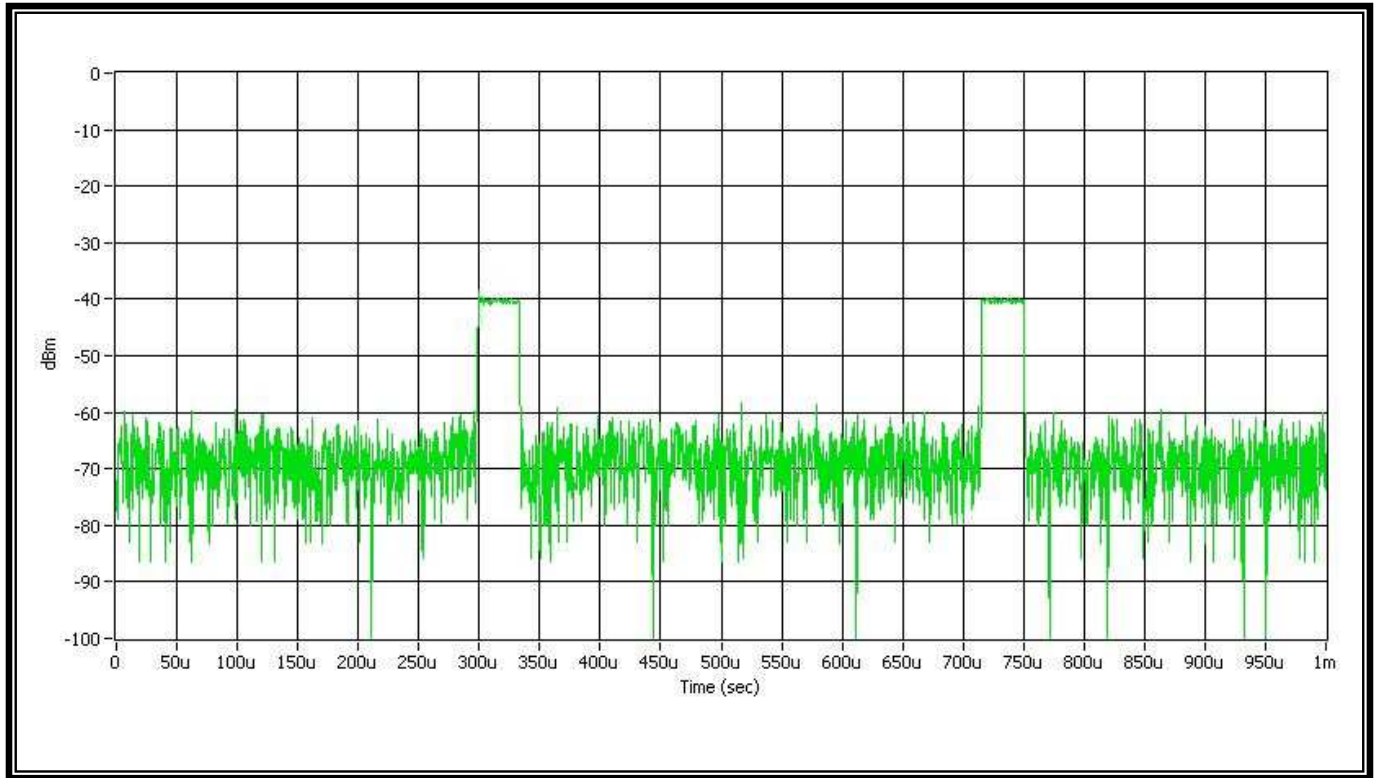
Comment: 50us (5 carriers)



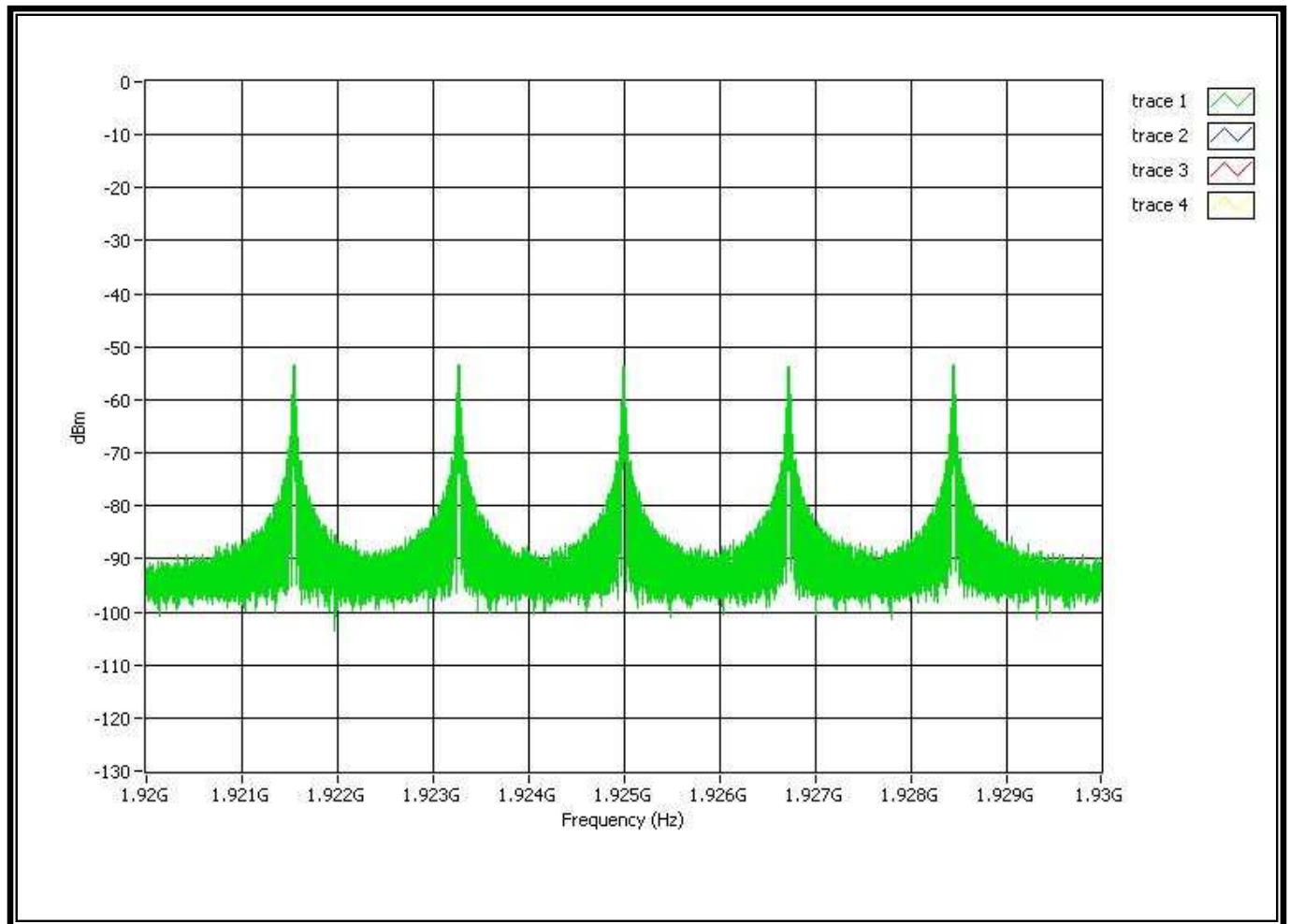
Comment: 35us



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.

RSS-213 4.3.4 (b)(8)

The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location. Note: A monitoring antenna of the same model (and manufacturer) as the transmitting antenna is considered equivalent. An antenna not of the same model but of the same type (e.g. both are horn antennas of different manufacturers) is considered equivalent if the main beam antenna gains are within 3 dB of each other. Both antennas are to be installed to point at the same general coverage area.

6.20.2 Measurement procedure

Measurement method according to ANSI C63.17 2006 paragraph 4

6.20.3 Results: Comply

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.

RSS-213 4.3.4 (b)(9)

Devices that have a power output lower than the maximum permitted under this standard may increase their detection threshold by 1 dB for each 1 dB 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)	☒
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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.

RSS-213 4.3.4 (b)(10)

A device initiating a communication (hereafter called 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.s

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) same as RSS-213 4.3.4 (b)(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) same as RSS-213 (b)(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 same as RSS-213 6.7.2

$B < f \leq 2B$: less than or equal to 30 dB below the maximum permitted peak power level

$2B < f \leq 3B$: less than or equal to 50 dB below the maximum permitted peak power level

$3B < f \leq$ UPCS Band Edge: less than or equal to 60 dB below the maximum permitted peak power level

Where B is the occupied bandwidth in hertz.

Emissions outside the subband same as RSS-213 6.7.1

$f \leq 1.25\text{MHz}$ outside UPCS band : $\leq -9.5\text{dBm}$

$1.25\text{MHz} \leq f \leq 2.5\text{MHz}$ outside UPCS band : $\leq -29.5\text{ dBm}$

$f \geq 2.5\text{MHz}$ outside UPCS band: $\leq -39.5\text{ dBm}$

6.25.2 Measurement procedure

Measurement method according to ANSI C63.17 2006 paragraph 6.1.6

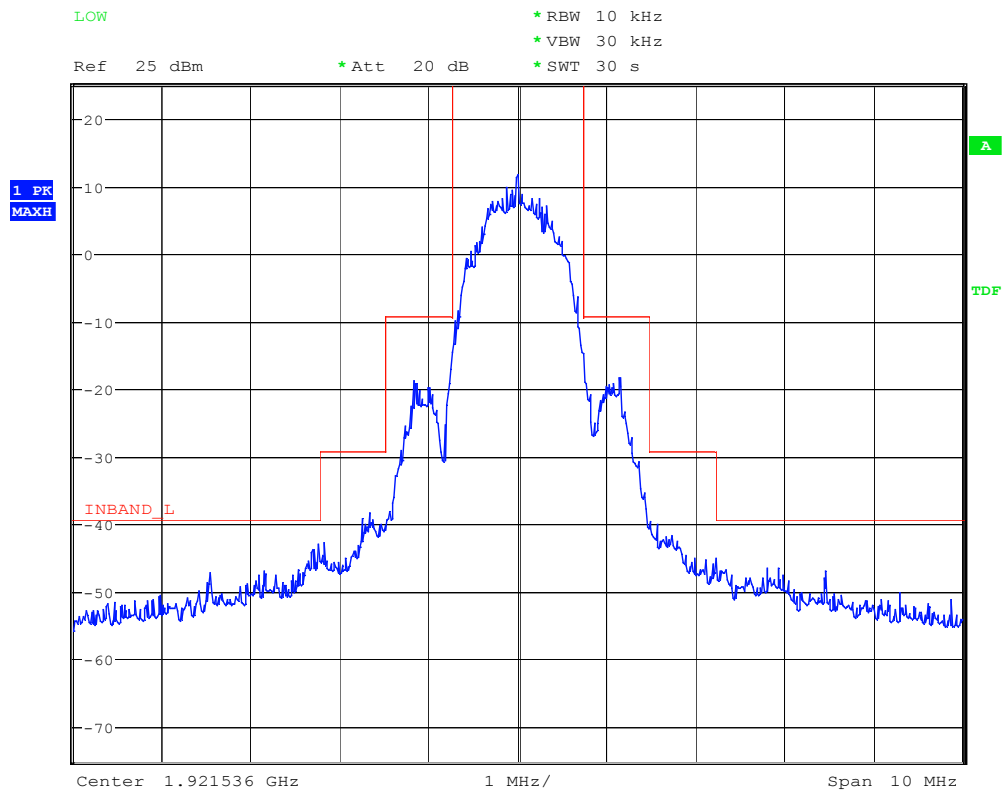
6.25.3 Results: Comply

Measurement Data:

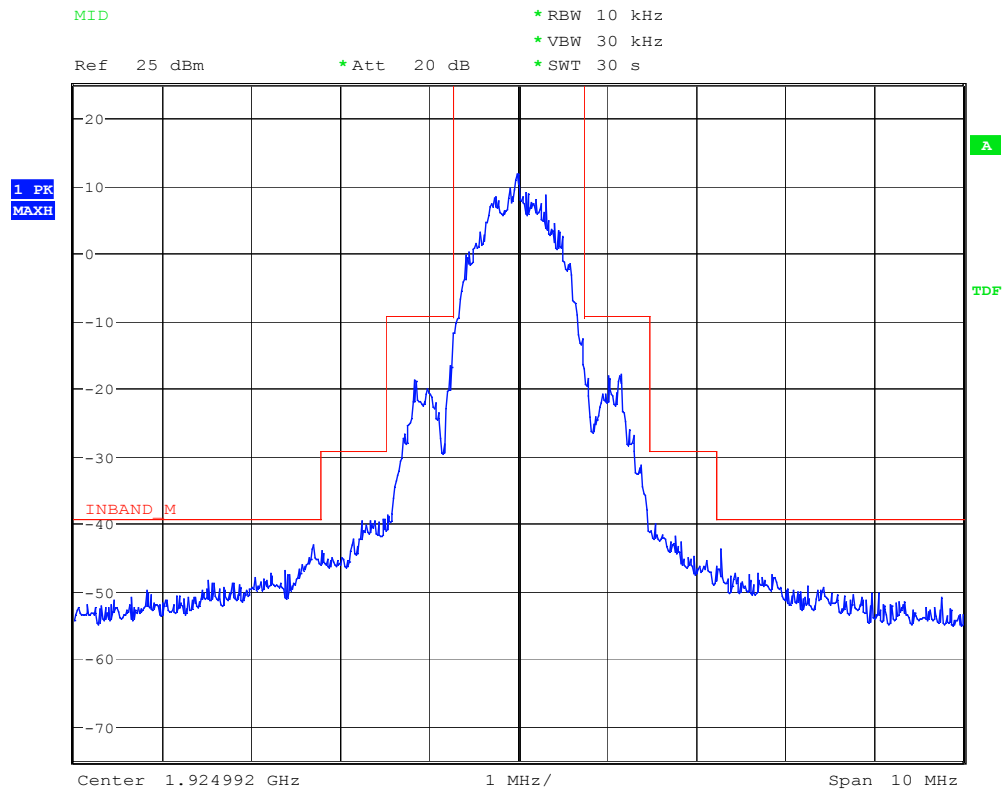
See plots.

Note: Photos of worst-case display follow:

In-band Unwanted Emissions: CH FL



In-band Unwanted Emissions: CH Fm



Center 1.928448 GHz

Span 10 MHz

1 PR MAXH

INBAND_H

Ref 25 dBm

* Att 20 dB

* RBW 10 kHz

* VBW 30 kHz

* SWT 30 s

Out-of-band Unwanted Emission:

a) CH FL

Out-of-band Unwanted Emissions (below 1GHz): CH FL

EUT : 1.9GHz DECT Phone	Model : 64-S96+B11	Status : PP TX CH LOW	
Condition : Horizontal	Date : 2006/8/23	Temp. : 25°C	Humi. : 60%

	Freq (MHz)	QP Level (dBuV)	Factor (dB)	QP Result (dBuV)	QP Limit (dBuV)	QP Margin (dB)
1	31.940	21.5	0.0	21.5	40.0	-18.5
2	125.060	19.0	0.0	19.0	43.5	-24.5
3	188.110	19.0	0.0	19.0	43.5	-24.5
4	397.630	24.6	0.0	24.6	46.0	-21.5
5	431.580	26.3	0.0	26.3	46.0	-19.7
6	459.710	26.2	0.0	26.2	46.0	-19.8

EUT : 1.9GHz DECT Phone	Model : 64-S96+B11	Status : PP TX CH LOW	
Condition : Vertical	Date : 2006/8/23	Temp. : 25°C	Humi. : 60%

	Freq (MHz)	QP Level (dBuV)	Factor (dB)	QP Result (dBuV)	QP Limit (dBuV)	QP Margin (dB)
1	125.060	26.6	0.0	26.6	43.5	-16.9
2	299.660	25.8	0.0	25.8	46.0	-20.2
3	450.980	32.3	0.0	32.3	46.0	-13.7
4	532.460	31.1	0.0	31.1	46.0	-14.9
5	613.940	31.3	0.0	31.3	46.0	-14.8
6	676.020	36.1	0.0	36.1	46.0	-9.9

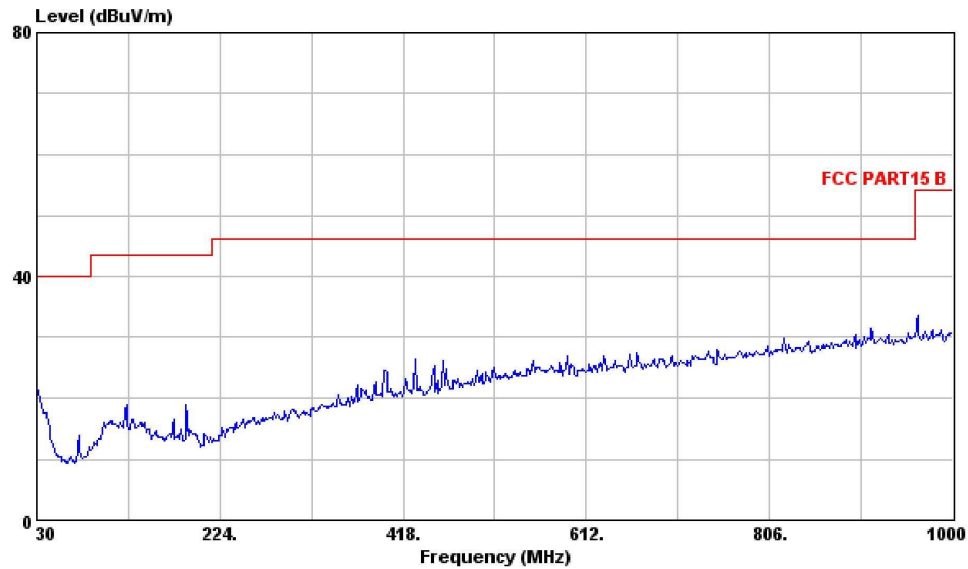
Note:

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).



ETC TEST LABORTARY

Data#: 1044 File#: C:\Program Files\es\769.EMI

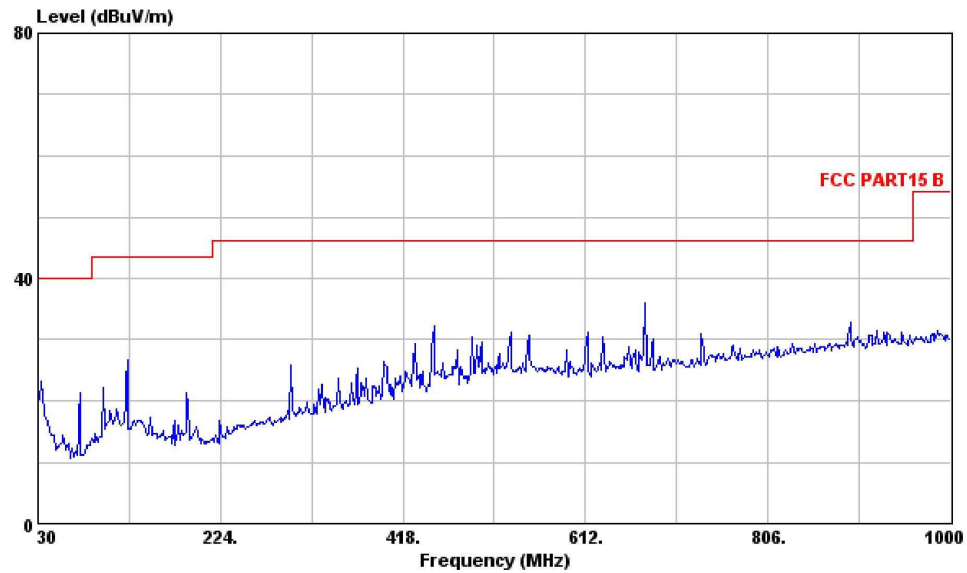


Site : MOO SITE
Condition : FCC PART15 B 3m HORIZONTAL
EUT : 1.9GHz DECT Phone
Model : 64-S96+B11
Memo : PP TX CH Low



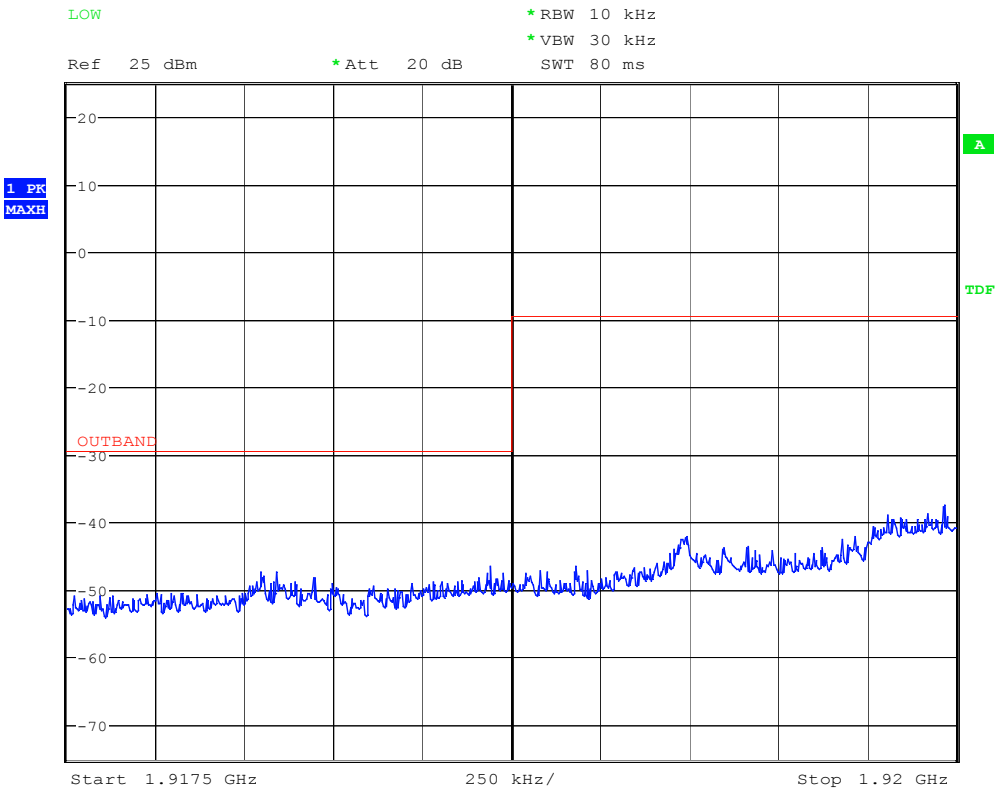
ETC TEST LABORATORY

Data#: 1043 File#: C:\Program Files\769.EMI

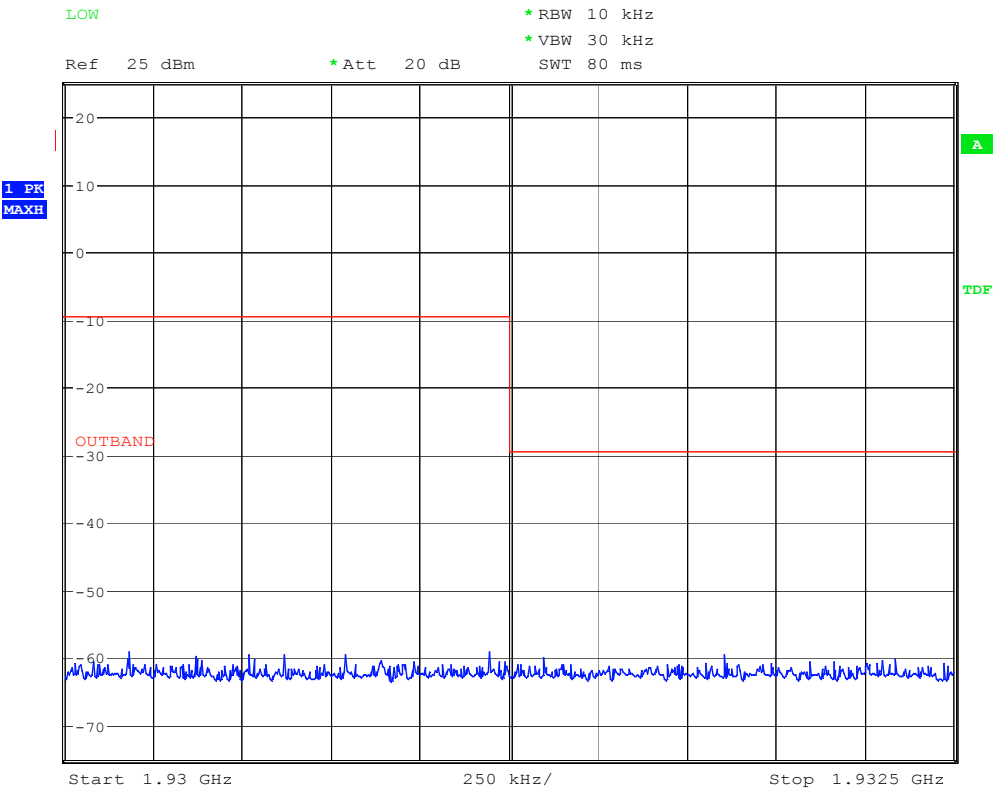


Site : M00 SITE
Condition : FCC PART15 B 3m VERTICAL
EUT : 1.9GHz DECT Phone
Model : 64-S96+B11
Memo : PP TX CH Low

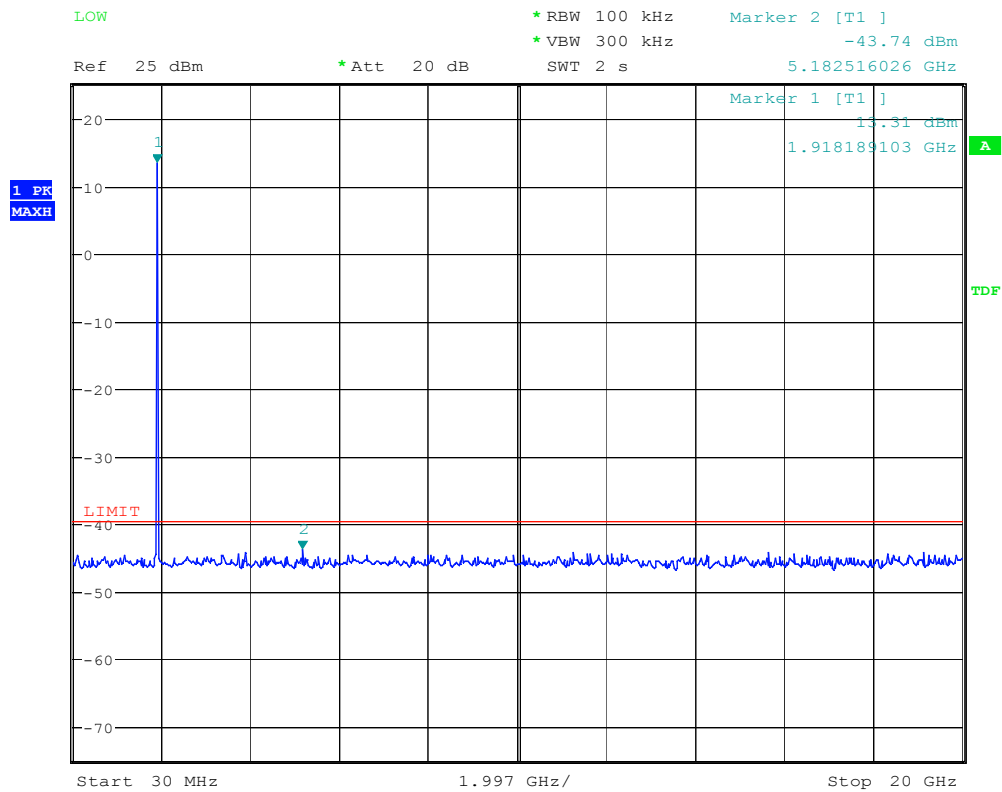
Out-of-band Unwanted Emissions: CH FL



Out-of-band Unwanted Emissions: CH FL

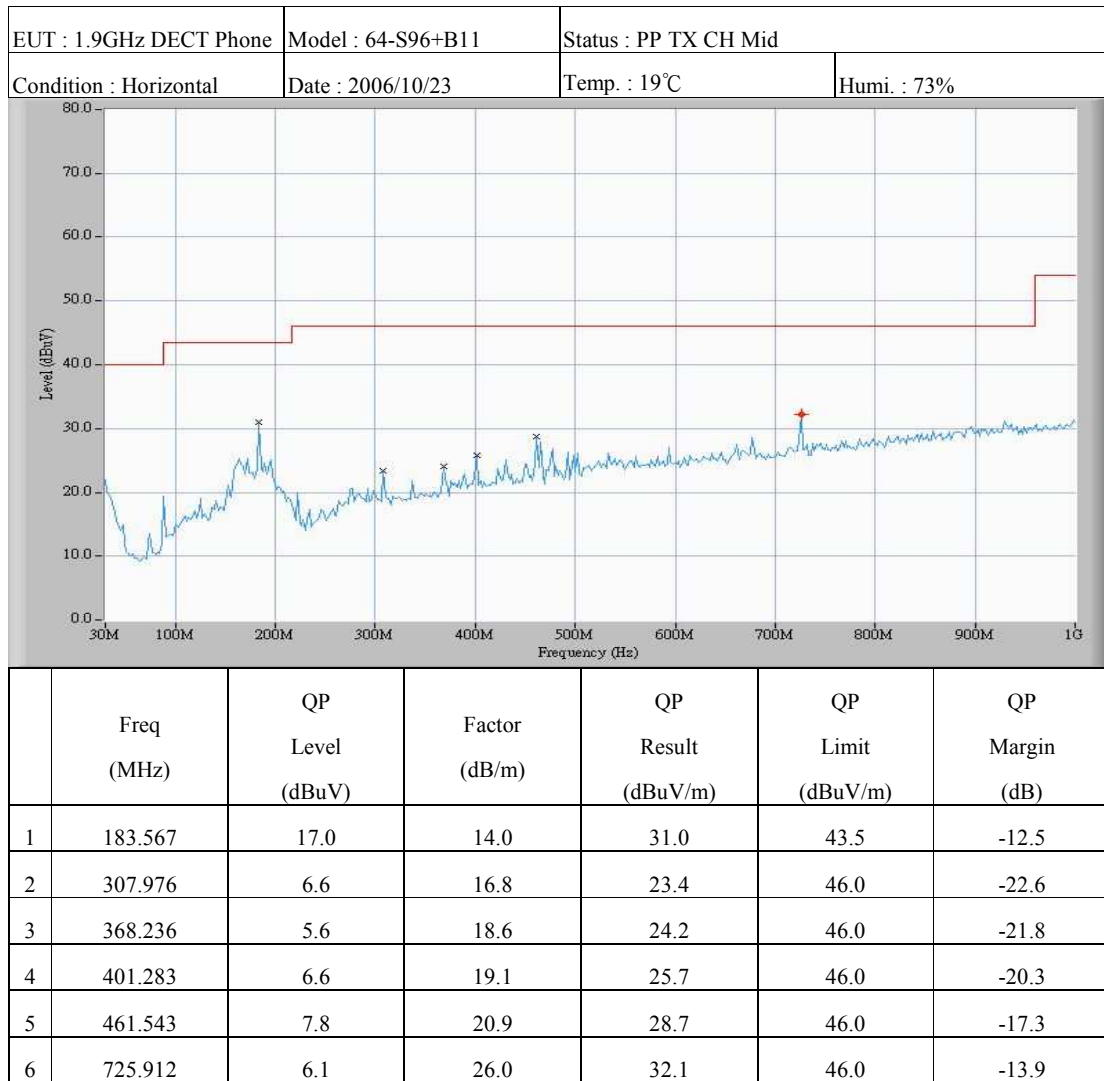


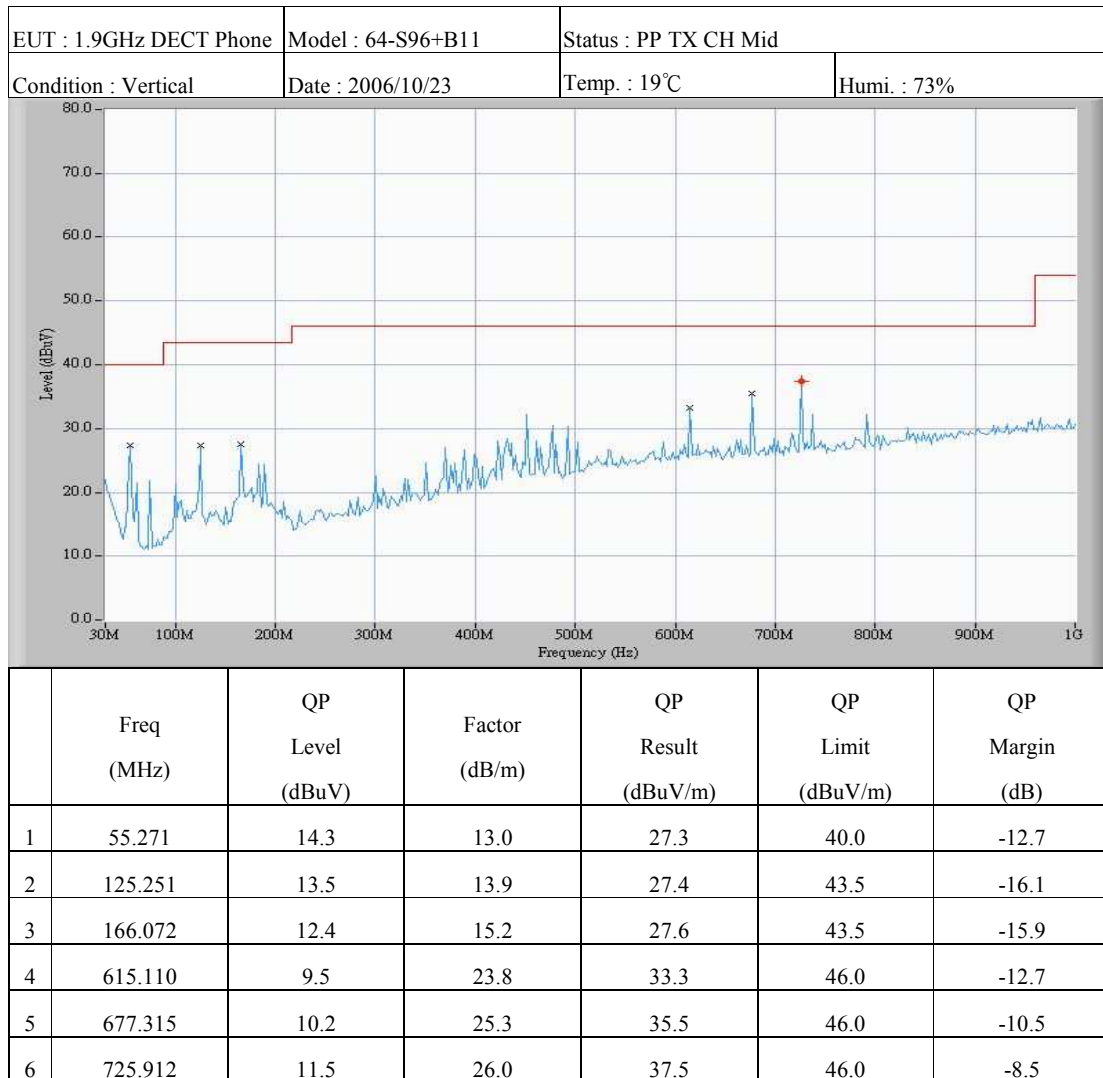
Out-of-band Unwanted Emissions: CH FL



b) CH F_M

Out-of-band Unwanted Emissions (below 1GHz): CH F_M

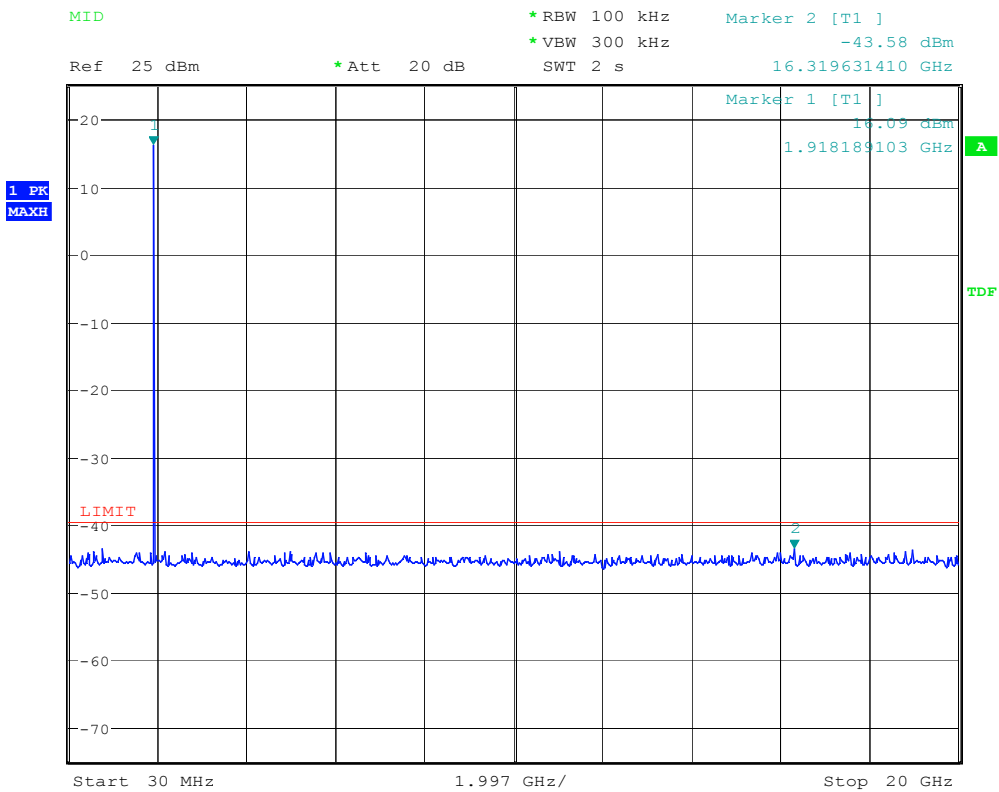




Note:

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 symbol of "#" means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is
 $\pm 4.6\text{dB}$ ($30\text{MHz} \leq f < 300\text{MHz}$).
 $\pm 4.4\text{dB}$ ($300\text{MHz} \leq f \leq 1000\text{MHz}$).

Out-of-band Unwanted Emissions: CH Fm



c) CH FH

Out-of-band Unwanted Emissions (below 1GHz): CH FH

EUT : 1.9GHz DECT Phone	Model : 64-S96+B11	Status : PP TX CH HIGH
Condition : Horizontal	Date : 2006/8/23	Temp. : 25°C Humi. : 60%

	Freq (MHz)	QP Level (dBuV)	Factor (dB)	QP Result (dBuV)	QP Limit (dBuV)	QP Margin (dB)
1	30.000	21.2	0.0	21.2	40.0	-18.9
2	188.110	18.6	0.0	18.6	43.5	-24.9
3	397.630	25.4	0.0	25.4	46.0	-20.6
4	459.710	28.0	0.0	28.0	46.0	-18.0
5	591.630	28.3	0.0	28.3	46.0	-17.7
6	630.430	28.7	0.0	28.7	46.0	-17.3

EUT : 1.9GHz DECT Phone	Model : 64-S96+B11	Status : PP TX CH HIGH
Condition : Vertical	Date : 2006/8/23	Temp. : 25°C Humi. : 60%

	Freq (MHz)	QP Level (dBuV)	Factor (dB)	QP Result (dBuV)	QP Limit (dBuV)	QP Margin (dB)
1	125.060	27.1	0.0	27.1	43.5	-16.4
2	299.660	25.7	0.0	25.7	46.0	-20.3
3	450.980	31.6	0.0	31.6	46.0	-14.5
4	490.750	32.3	0.0	32.3	46.0	-13.8
5	676.020	34.5	0.0	34.5	46.0	-11.6
6	735.190	32.3	0.0	32.3	46.0	-13.7

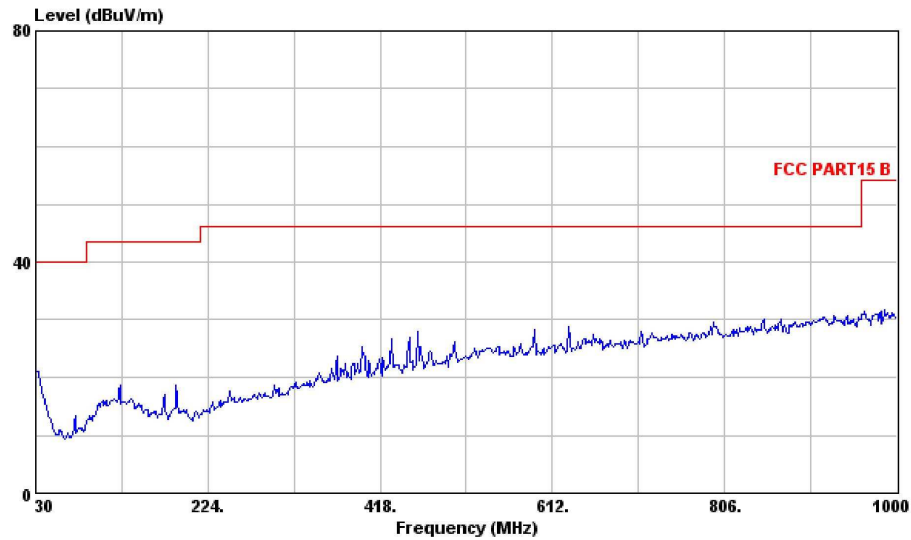
Note:

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 symbol of "#" means the noise was too low, so record the peak value.
4. The estimated measurement uncertainty of the result measurement is
 $\pm 4.6\text{dB}$ ($30\text{MHz} \leq f < 300\text{MHz}$).
 $\pm 4.4\text{dB}$ ($300\text{MHz} \leq f \leq 1000\text{MHz}$).



ETC TEST LABORTARY

Data#: 1045 File#: C:\Program Files\3\769.EMI

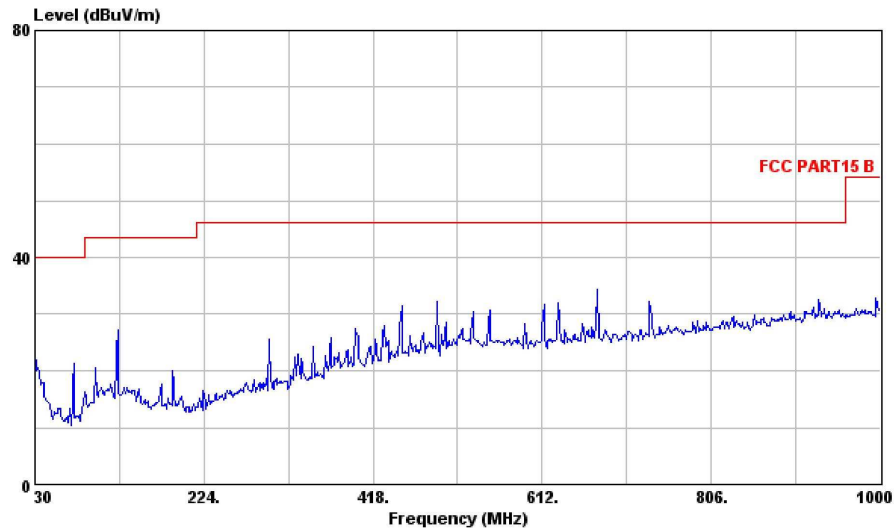


Site : MOO SITE
Condition : FCC PART15 B 3m HORIZONTAL
EUT : 1.9GHz DECT Phone
Model : 64-S96+B11
Memo : PP TX CH High



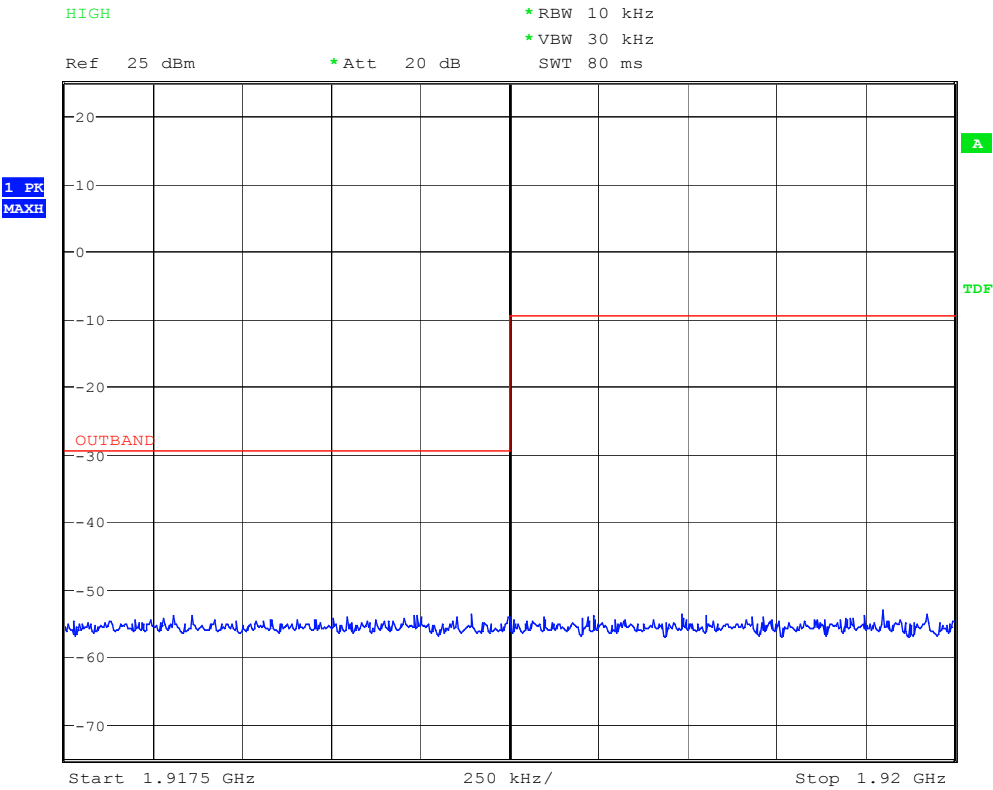
ETC TEST LABORTARY

Data#: 1046 File#: C:\Program Files\es\769.EMI

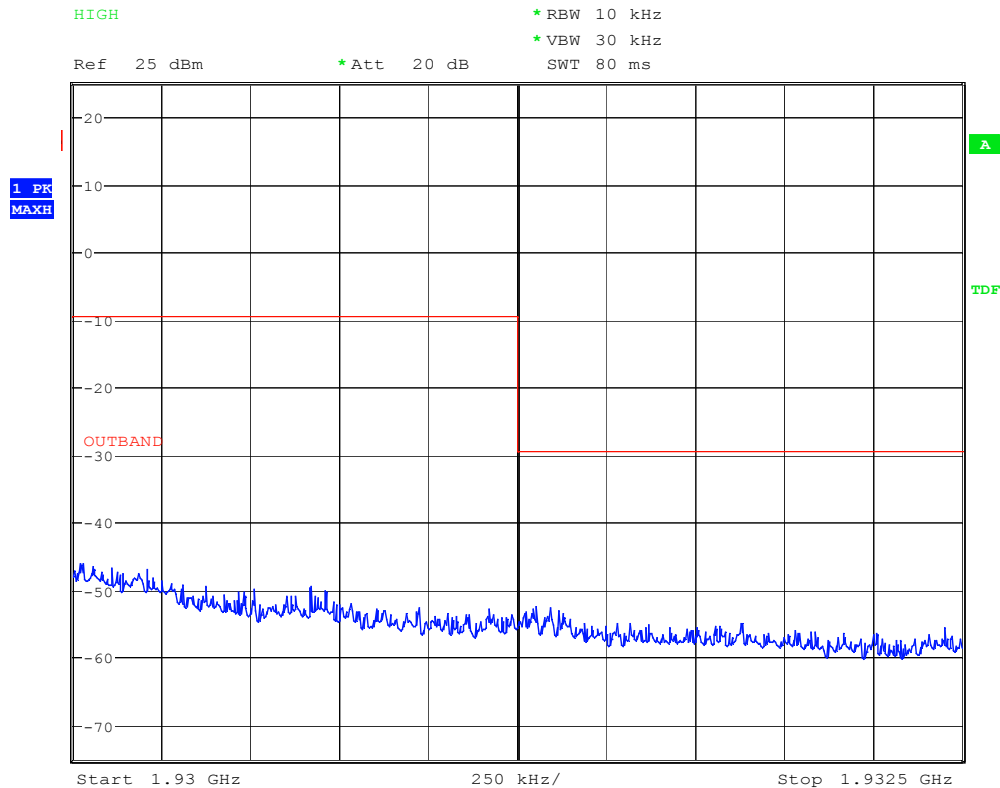


Site : MOO SITE
Condition : FCC PART15 B 3m VERTICAL
EUT : 1.9GHz DECT Phone
Model : 64-S96+B11
Memo : PP TX CH High

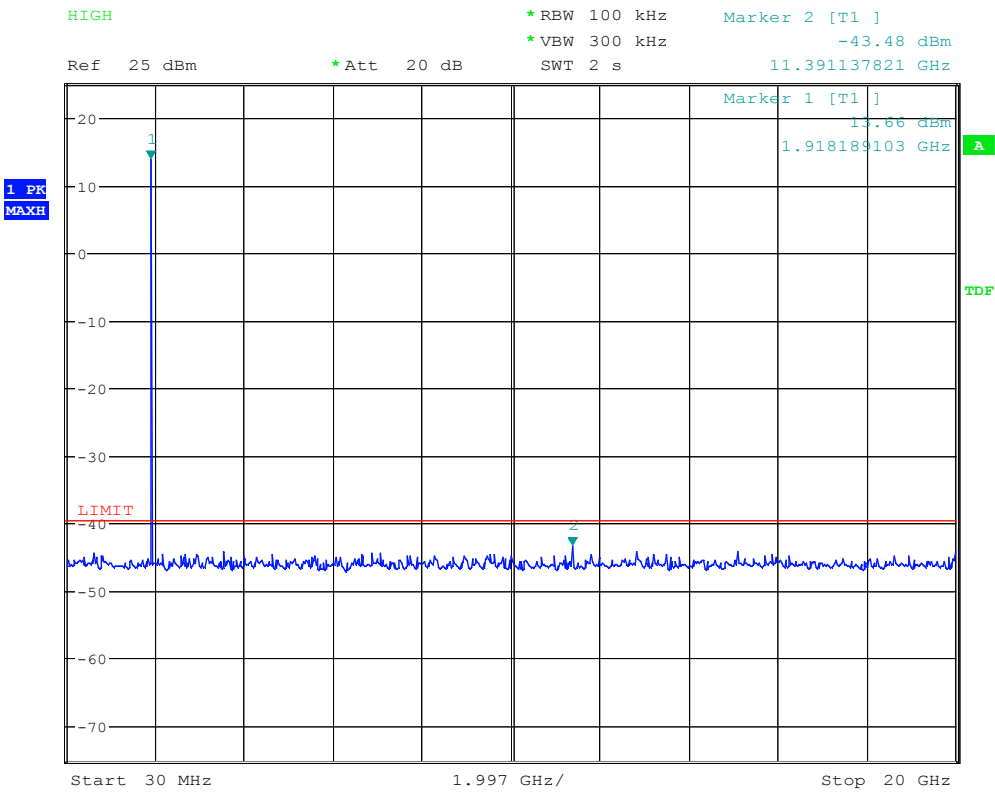
Out-of-band Unwanted Emissions: CH F_H



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) same as RSS-213 4.3.4 (C)

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 of 19.2 kHz/slot for 1920 MHz carrier)
- Frame jitter ≤ 25 μ s

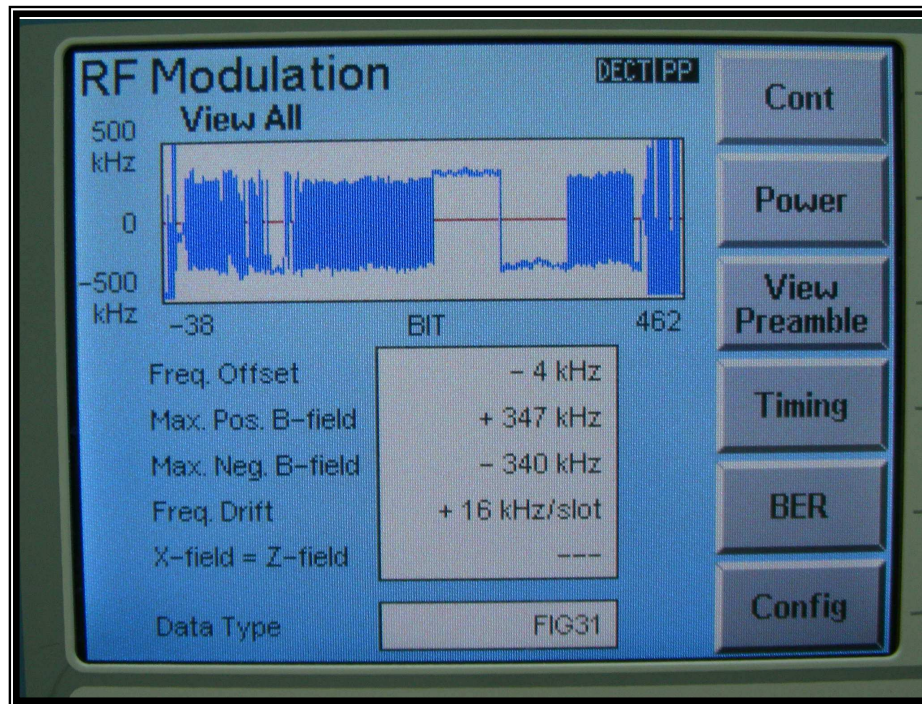
6.26.3 Test Results: Comply

Measurement Data:

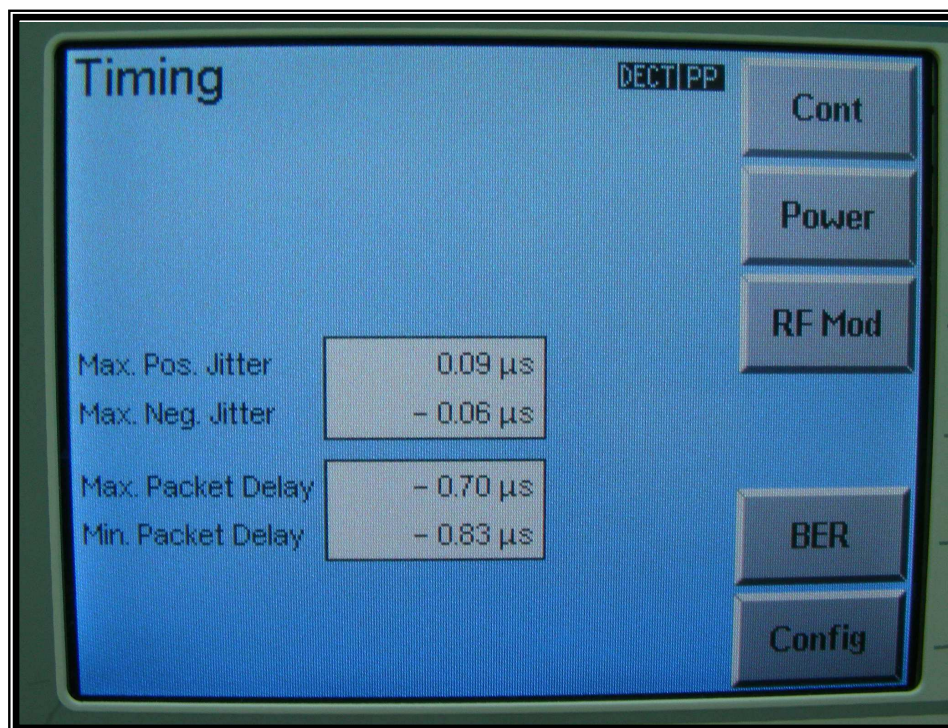
Channel No.	Frequency (KHz/slot)		Jitter (us)	
	Drift	Limit	Result	Limit
F _L	-11	± 19.2	-0.09	± 25
F _M	+13	± 19.2	0.09	± 25
F _H	+16	± 19.2	0.09	± 25

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 $+50^{\circ}$ 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 20° 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.

RSS-213 6.2 Frequency Stability

The carrier frequency stability shall be maintained within ± 10 ppm ($\pm 0.001\%$).

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 of 19.2 kHz for 1920 MHz carrier)
- Carrier frequency stability over -20 to $+50^{\circ}$ 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

b) Carrier Frequency Stability with Temperature and Time

Channel No.	Frequency Offset (kHz)			Limit (kHz)
	0 °C	20 °C	45 °C	
F _L	15	-17	0	±19.2
F _M	7	-13	1	±19.2
F _H	0	-12	2	±19.2

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

