

REPORT ON THE CERTIFICATION TESTING OF AN GN NETCOM A/S JABRA PRO 9400 SERIES HEADSET WITH RESPECT TO FCC RULES CFR 47, PART 15D July 2008 INTENTIONAL RADIATOR SPECIFICATION

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	TEST DATE:	17 th February – 22 nd May 2009	
	testi	ng regulatory and compliance	
TESTED BY:			D WINSTANLEY
APPROVED BY:			J CHARTERS RADIO PRODUCT MANAGER
DATE:	9 th July 2009		

Distribution:

GN NETCOM A/S

FCC EVALUATION LABORATORIES

TRaC Telecoms & Radio

THIS DOCUMENT MAY BE REPRODUCED ONLY IN ITS ENTIRETY AND WITHOUT CHANGE

The results herein relate only to the sample tested. Full results are contained in the relevant works order file.

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Notes: 1. Component failure during test	YES []	NO	[X]

- 2. If Yes, details of failure:
- 3. The facilities used for the testing of the product contain in this report are FCC Listed.
- 4. The contents of the attached applicants declarations and other supplied information are not covered by the scope of this laboratory's UKAS or FCC accreditations' and is provided in good faith.



CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	BCE-9400	
PURPOSE OF TEST:	Certification	
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15D July 2008	
TEST RESULT:	Compliant to Specification	
EQUIPMENT UNDER TEST:	Jabra PRO 9400 series Headset	
EQUIPMENT TYPE:	UPCS Transceiver	
PRODUCT USE:	Personal communications	
CARRIER POWER:	19.60 dBm (Conducted)	
ANTENNA TYPE:	Integral	
ALTERNATIVE ANTENNA:	Not Applicable	
BAND OF OPERATION:	1920 MHz – 1930 MHz	
CHANNEL SPACING:	1.728 MHz	
NUMBER OF CHANNELS:	5 frequencies, 12 single time slots per frequ	uency giving 60 channels
FREQUENCY GENERATION: testing	SAW Resonator d [] Crystal []	Synthesiser [X]
MODULATION METHOD:	Amplitude [] Digital [X]	Angle []
POWER SOURCE(s):	+3.7Vdc	
TEST DATE(s):	17 th February – 22 nd May 2009	
ORDER No(s):	2008/11/18-TR001	
APPLICANT:	GN Netcom A/S	
ADDRESS:	Lautrupbjerg 7 DK-2750 Ballerup Denmark	
TESTED BY:		DWINSTANLEY
APPROVED BY:		J CHARTERS RADIO PRODUCT MANAGER

8F1722WUS1

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	Jabra PRO 9400 series Headset		
EQUIPMENT TYPE:	UPCS Transceiver		
PURPOSE OF TEST:	Certification		
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15D July 2008		
TEST RESULT:	COMPLIANT Yes [X] No []		
APPLICANT'S CATEGORY:	MANUFACTURER[X]IMPORTER[DISTRIBUTOR[TEST HOUSE[AGENT[
APPLICANT'S ORDER No(s):	2008/11/18-TR001		
APPLICANT'S CONTACT PERSON(s):	Mr Tom Ringtved		
E-mail address:	tringtved@gn.com		
APPLICANT:	GN Netcom A/S		
ADDRESS:	Lautrupbjerg 7 DK-2750 Ballerup Denmark		
TEL:	+45 45 75 88 88		
FAX:	+45 45 75 00 09		
TEST LABORATORY:	TRaC Telecoms & Radio, Up Holland		
TEST DATE(s):	17 th February – 22 nd May 2009		
TEST REPORT No:	8F1722WUS1		

T APPLICABILITY
No Note 1
Yes
Yes Note 2
Yes
2) Yes
l) Yes
7) Yes
6) No Note 2
3) Yes
i) Yes
5) Yes
3) Yes
I0) Yes
I1) No Note 3
12) Yes
Yes
Yes
Yes
d) e)) 05- 8F on. ithi

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.

2.	Product Use:	Personal Communicat	tions
3.	Duty Cycle:		8.33%
4.	Transmitter bit or pulse rate and level:		2Mbps
5.	Temperatures:	Ambient (Tnom)	22°C
6.	Supply Voltages:	Vnom	+3.7Vdc

Note: Vnom voltages are as stated above unless otherwise shown on the test report page

7.	Equipment Category:	Single channel Two channel Multi-channel	[] [] [X]
8.	Channel spacing:	Narrowband Wideband	[] [X]

9. System Description:

The system is made up of two parts, a fixed part and a portable part. The portable part is a cordless headset device. The portable part is capable of operating on a maximum of 60 channels (time spectrum windows). The fixed part is a desktop transmitters connected to an exchange.

The system operates in the 1920MHz -1930MHz band. The system use 5 different frequency channels 1.728MHz apart using MC/TDMA/TDD (Multi Carrier / Time Division Multiple Access / Time Division Duplex) using QPSK modulation.

The system employs a 10ms frame, divided into 24 equal timeslots, numbered 0-23. The system uses singleslots. The Base station always transmits in the first half of the frame, and the Portable always transmits on the duplex mate in the second half of the frame. A physical bearer is composed of a transmit single-slot and a receive single-slot. The two halves of a given bearer are always exactly half a frame (5ms, 12 slots) apart.

During the testing frequency administration was utilised to allow operation on only certain channels during the tests. The frequency administration was performed using a software interface. A portable part was supplied with a temporary antenna connector to allow conducted measurements where applicable.

CROSS REFERENCE TO SUBPART B - PART 15.309 (b)

The unit contains digital circuitry, which is not directly related to the radio transmitter. See emissions outside the sub-band for results.

LABELLING INFORMATION - PART 15.311 & 15.19 (a)(3)

This information is contained in a separate document. See attached exhibit.

ANTENNA REQUIREMENTS – PART 15.317

The unit employs an integral antenna arrangement.

MODULATION TECHNIQUES – PART 15.319 (b)

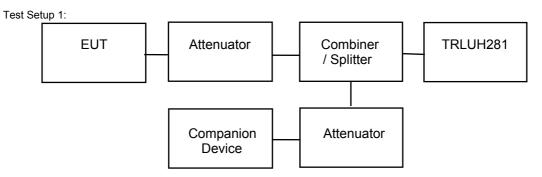
The GN Netcom A/S Jabra PRO 9400 series Headset is an isochronous device operating in the 1920 MHz – 1930 MHz frequency band.

The GN Netcom A/S Jabra PRO 9400 series Headset modulation technique is based on DECT technology as described in European standards EN 300 175-2 and EN 300 175-3.

The GN Netcom A/S Jabra PRO 9400 series Headset modulation techniques are MC/TDMA/TDD (Multi Carrier / Time Division Multiple Access / Time Division Duplex) using QPSK modulation.

TRANSMITTER EMISSION BANDWIDTH - PART 15.323 (a)

The emission bandwidth is measured in accordance with ANSI C63.17 sub-clause 6.1.3 using the setup below



f _x = 1921.536 MHz				
Δ P (dBc)	fl (MHz)	fh (MHz)	Δf (MHz)	Limit
-26	1920.814086	1922.241971	1.427	50 kHz> Δf > 2.5MHz
-12	1920.948702	1922.121778	1.173	N/A
-6	1921.184278	1921.900625	0.716	N/A

f _x = 1924.992 MHz	:			
Δ P (dBc)	fl (MHz)	fh (MHz)	Δf (MHz)	Limit
-26	1924.263622	1925.705929	1.442	50 kHz> Δf > 2.5MHz
-12	1924.403045	1925.576122	1.173	N/A
-6	1924.609776	1925.388622	0.778	N/A

f _x = 1928.448 MHz				
Δ P (dBc)	fl (MHz)	fh (MHz)	Δf (MHz)	Limit
-26	1927.727564	1929.150641	1.423	50 kHz> Δf > 2.5MHz
-12	1927.857372	1929.030449	1.173	N/A
-6	1928.097756	1928.794872	0.697	N/A

Notes: 1 See emission bandwidth plots in Annex D.

2 Emission bandwidth rounded up.

PEAK TRANSMIT POWER - PART 15.319 (c)

The peak transmit power is measured in accordance with ANSI C63.17 sub-clause 6.1.2 using test setup 1 (page 9).

The limit for Peak Transmit Power (PTP) is calculated using the following formula:

 $PTP = 5 Log_{10} EBW - 10 dBm$

This limit must be corrected to take into account any gain of the antenna greater than 3dBi. Where: EBW is the transmitter emission bandwidth in Hz as determined in the previous test.

Limit EBW = 1.442 MHz PTP = 5 Log₁₀ 1.442MHz - 10 dBm PTP = 20.79 dBm

Results

Frequency (MHz)	Peak Transmit Power (dBm)	Limit (dBm)
1921.536	18.60	20.79
1924.992	18.89	20.79
1928.448	19.42	20.79

Note: 1. Permanent antenna was replaced with temporary antenna connector to enable conducted measurement.
 2. Antenna gain < 3dBi and so correction of the limit is not required.

See Annex E for Peak Transmit Power Plots.

POWER SPECTRAL DENSITY - PART 15.319 (d)

The power spectral density is measured using test setup 1, (page 9).

Limit

The power spectral density shall not exceed 3mW in any 3 kHz bandwidth as measured with a spectrum analyser having a resolution bandwidth of 3 kHz.

Results

Frequency (MHz)	Power Spectral Density (mW/3kHz)	Limit (mW/3kHz)
1921.536	1.77	3
1924.992	0.91	3
1928.448	2.39	3

Note: 1. See Annex F for Power Spectral Density Plots.

ANTENNA GAIN – PART 15.319 (e)

Any directional gain of the antenna exceeding 3dBi has an effect on the limit applied to the measurements taken for the peak transmit power test. If the directional gain of the antenna is less than 3dBi it is not required to be taken into account.

Maximum Antenna Gain	Exceeds 3dBi by
+1.5dBi	N/A

Note: Statement by manufacturer declaring maximum antenna gain. See attached exhibit.

AUTOMATIC DISCONTINUATION OF TRANSMISSION – PART 15.319 (f)

Automatic discontinuation of transmission means break off of transmissions that are not control and signalling information.

This test is monitored using the test setup 1(page 9) as per transmitter emission bandwidth and an active channel.

The BCE-9400 is a Portable part and as such does not transmit control and signalling information the counter part device is a fixed part device and does transmit control and signalling information.

Part	Transmits Control and Signaling Information	Equipment Under Test
Fixed Part	Х	
Portable Part		Х

Results

The following tests were performed after a connection had been established with the counter part device

Number	Test	Reaction of EUT	Pass / Fail
1	Power removed from EUT	С	Pass
2	EUT Powered Down	С	Pass
3	Power Removed From Companion Device	A	Pass
4	Companion Device powered Down	N/A	Pass
5	EUT Mounted on Companion device	С	Pass

A – Connection breakdown, Cease of all transmissions.

B – Connection breakdown, EUT transmits control and signalling information.

C – Connection breakdown, Counterpart transmits control and signalling information.

RADIO FREQUENCY RADIATION EXPOSURE – PART 15.319 (i)

This information is contained is a separate document

MONITORING THRESHOLDS - PART 15.323 (c)(2); (c)(9)

The monitoring threshold calculations are carried out in accordance with ANSI C63.17 sub-clause 7.2.1 using the calculations laid out in ANSI C63.17 sub-clauses 4.3.3 and 4.3.4

Calculation of monitoring threshold limits for isochronous devices:

Lower threshold: $T_L = -174 + 10Log_{10}B + M_U + P_{MAX} - P_{EUT} (dBm)$

Upper threshold: $T_U = -174 + 10Log_{10}B + M_U + P_{MAX} - P_{EUT} (dBm)$

Where:

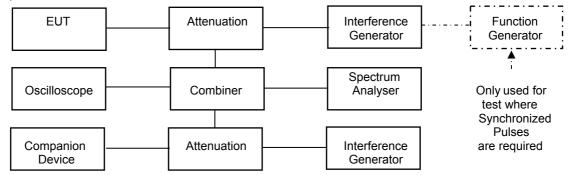
 $\begin{array}{l} B = Emission \ bandwidth \ (Hz) \\ M_U = dBs \ the \ threshold \ may \ exceed \ thermal \ noise \ (30 \ for \ T_L \ \& \ 50 \ for \ T_U) \\ P_{MAX} = Output \ Power \ Limit \ (dBm) \\ P_{EUT} = Transmitted \ power \ (dBm) \end{array}$

Monitor Threshold	B (MHz)	M _U (dB)	P _{MAX} (dBm)	P _{EUT} (dBm)	Threshold (dBm)
TL	1.442	30	20.79	19.42	-61.0
Τυ	1.442	50	20.79	19.42	-81.0

Note: 1. The upper threshold (T_U) is only applicable for systems with a minimum of 40 channels.

The monitoring threshold tests are carried out in accordance with ANSI C63.17 sub-clause 7.3 using the test setup 2. The lower threshold level was determined following the procedure as laid out in ANSI C63.17 sub-clause 7.3.2 (a) Frequency administration was used to allow operation on the carrier closest to the centre of the band.

Test Setup 2:



Limits

The EUT must not transmit until the interference level is less than or equal to:

Measured Threshold Level $\leq T_U + U_M$

Where: T_U = Calculated Upper threshold level U_M = Margin of uncertainty in threshold measurements (6dB)

Results

Monitor threshold	Measured Threshold Level	Limit	Pass/Fail
Lower Threshold (dBm)	N/A	N/A	Pass
Upper threshold (dBm)	-59 dBm	-55.0 dBm	Pass

Notes:

1. The upper threshold is applicable as the EUT utilizes more than 40 system channels.

MONITORING OF INTENDED TRANSMIT WINDOW AND MAXIMUM REACTION TIME - PART 15.323 (c)(1)

The monitoring of intended transmit window was carried out in accordance with ANSI C63.17 sub-clause 7.5 using test setup 2 (page 12).

The EUT was frequency administered to only one operating frequency channel and only one of the interference generators in the test setup was utilized. The interference generator was fed pulses from the function generator to produce a pulsed carrier of the specified time length and the output of the interference generator was set to the required level. The pulse generator and companion device were synchronized so the position of the pulses corresponded to the time-slot pattern in the frame of the EUT. The test is performed with the unit frequency administered to operate only on bottom, middle or top frequency.

For each of the required tests the pulse width and interference level are as below:

Test c)

With the interference generator output set at the calculated threshold level (upper) plus measurement uncertainty (U_M) and the width of the pulse interference exceeds the largest of 50 µs and 50 $\sqrt{1.25/B}$ µs verify that the EUT does not establish a connection.

Test d)

With the interference generator output set at 6dB above the calculated threshold level (upper) plus measurement uncertainty (U_M) and the width of the pulse interference exceeds the largest of 35µs and $35\sqrt{1.25/B}$ µs verify that the EUT does not establish a connection.

Where B = Emission bandwidth of the EUT in MHz

Results

Test Equation	Pulse	Interferer Level		Pulse Interferer Level Connection Made		lade	Pass/Fail
(µs)	(µs)	(dBm)	FL	F _M	F _H	1 855/1 811	
$50\sqrt{1.25/B}$	50	T _U + U _m	No	No	No	Pass	
$35\sqrt{1.25/B}$	35	T _U + U _m + 6	No	No	No	Pass	
Notes: 1. Tu is the calculated upper threshold.							

1. T_U is the calculated upper threshold.

2. U_M is Margin of uncertainty in threshold measurements (6dB).

MONITORING BANDWIDTH - PART 15.323 (c)(7)

The monitoring bandwidth test was carried out in accordance with ANSI C63.17 sub-clause 7.4.

ANSI C63.17 sub-clause 7.4 states that if the monitoring is made through the radio receiver used by the EUT for communication the intended bandwidth requirements for the monitoring system are met.

As declared by the manufacturer the EUT uses the radio receiver used for communication for monitoring therefore the intended bandwidth requirements for the monitoring system are met of ANSI C63.17 sub-clause 7.4 are met.

DURATION OF TRANSMISSION - PART 15.323 (c)(3)

The duration of transmission test was carried out in accordance with ANSI C63.17 sub-clause 8.2.2 using test setup 2.(page 12) (No interference generators were active during this test).

The time/spectrum window occupied by the connection was monitored using a spectrum analyzer for the spectrum window and an oscilloscope for the time slot. The connection was watched over a period of over 6 hours during this time the access criteria was repeated several times.

Result

Repetition of	Maximum	Maximum Transmission	Pass/Fail
Access Criteria	Transmission Time	Time Limit	
Period	<3.5 Hours	<8 Hours	Pass

Notes: 1. The portable part is the initiating device that repeats the access criteria.

CONNECTION ACKNOWLEDGEMENT - PART 15.323 (c)(4)

The connection acknowledgement test was carried out in accordance with ANSI C63.17 sub-clause 8.2.1 using test setup 2. (Page 12)(No interference generators were active during this test).

The test was carried out in two parts. The first was to verify that with the companion device off the EUT does not transmit on the same time/spectrum window for more than the limit. The second was to verify that after a connection is broken the EUT terminates its transmission on the current communication channel within 30 seconds or less.

Result

Test	Time Taken (seconds)	Limit (seconds)	Pass/Fail
Transmission on communications channel no acknowledgement received (note 1)	0.452	1	Pass
Established communication channel termination, acknowledgements blocked during communication (note 1)	6.314	30	Pass

Note: 1. The companion device transmits a beacon signal when acknowledgements are blocked.

2. The EUT does not transmit a control channel.

3. See Annex G for Acknowledgement plots.

UPPER THRESHOLD SELECTED CHANNEL, POWER ACCURACY, SEGMENT OCCUPANCY – PART 15.323 (c)(5)

Least interfered Channel

The EUT utilizes more than 40 channels the least interfered channel testing is applicable. This test was carried out in accordance with ANSI C63.17 sub-clause 7.3.3 using test setup 2 (page 12).

The EUT was frequency administered to operating on two frequencies only, f1 and f2.

f1 = 1924.992 MHz f2 = 1926.720 MHz

Test b)

Interference on f1 was set at $T_L + U_M + 7dB$ and at $T_L + U_M$ on f2. Initiate communication. The EUT should transmit on f2. Repeat 5 times. If the EUT transmits on f1 the test is failed.

Test c)

Interference on f1 was set at $T_L + U_M$ and at $T_L + U_M + 7$ dB on f2. Initiate communication. The EUT should transmit on f1. Repeat 5 times. If the EUT transmits on f2 the test is failed.

Test d)

Interference on f1 was set at $T_L + U_M + 1dB$ and at $T_L + U_M - 6dB$ on f2. Initiate communication. The EUT should transmit on f2. Repeat 5 times. If the EUT transmits on f1 the test is failed.

Test e)

Interference on f1 was set at $T_L + U_M$ - 6dB and at $T_L + U_M + 7dB$ on f2. Initiate communication. The EUT should transmit on f1. Repeat 5 times. If the EUT transmits on f2 the test is failed.

Result

Test	Transmit on f1	Transmit on f2	Wanted Transmit Channel	Pass/Fail
b	No	Yes	f2	Pass
С	Yes	No	f1	Pass
d	No	Yes	f2	Pass
е	Yes	No	f1	Pass

Note:

1. All tests were repeated 5 times.

Selected Channel Confirmation

This test was carried out in accordance with ANSI C63.17 sub-clause 7.3.4 using test setup 2 (page 12). The test is to ensure the EUT monitors the time/spectrum window immediately prior to transmission.

The EUT was frequency administered to operating on two frequencies only, f1 and f2.

f1 = 1924.992 MHz f2 = 1923.264 MHz

Test a)

Interference is applied on f1 at a level of T_U + U_M. Verify a connection is established on f2.

Any connection is terminated.

Test b)

Interference is applied on f2 at a level of $T_U + U_M$ and immediately removed from f1 and the EUT is immediately caused to attempt transmission. In this case the EUT should transmit on f1

Result

Test	Transmit on f1	Transmit on f2	Wanted Transmit Channel	Pass/Fail
а	No	Yes	f2	Pass
b	Yes	No	f1	Pass

Power Accuracy

The power measurement resolution for the previous comparison must be accurate to within 6dB. The monitoring threshold test covered in Part 15.323 (c)(2) automatically proves that this requirement is met.

Segment Occupancy

This section is not applicable as no units will be located within 1 metre of each other.

MONITORING ANTENNA – PART 15.323 (c)(8)

The antenna of the EUT used for transmitting is the same antenna that is used for monitoring.

DUPLEX CONNECTIONS – PART 15.323 (c)(10)

The tests laid out in this section verify that the access criteria is met by two devices communicating over a duplex connection. For the purposes of this testing the EUT is the initiating device and the companion is the responding device. These tests are carried out in accordance with ANSI C63.17 sub-clause 8.3.2 using test setup 2 (page 12)

Before all tests are carried out any connection is terminated.

Test b)

The system is restricted to operation on one frequency (1924.992 MHz) using administration. Verify that a connection between the EUT and its companion device can be made.

Test c) & d)

Apply interference at a level $T_L + U_M$ to all transmit time slots except one which has interference at least 10dB below T_L . Apply interference at a level $T_L + U_M + 10dB$ to all receive time slots except one which has interference at least 10dB below T_L . The interference free receive timeslot should not be the duplex mate of the interference free transmit timeslot. The EUT should establish a connection on the interference free receive slot and its duplex mate.

Test e) & f)

Apply interference at a level $T_L + U_M$ to all receive time slots except one which has interference at least 10dB below T_L . Apply interference at a level $T_L + U_M + 10dB$ to all transmit time slots except one which has interference at least 10dB below T_L . The interference free transmit timeslot should not be the duplex mate of the interference free receive timeslot. The EUT should establish a connection on the interference free transmit slot and its duplex mate.

Test g)

Apply interference at a level $T_U + U_M$ to all receive and transmit time slots except one which has interference at least 10dB below T_L . The interference free transmit and receive time slots shall not constitute a duplex pair. The EUT should not transmit or establish a connection.

Result

Test	Connection Made	Time Slot Selected	Required Time Slot	Pass/Fail
b	Yes	N/A	Any	Pass
c & d	Yes	Interference Free Receive Slot and Duplex Mate	Interference Free Receive Slot and Duplex Mate	Pass
e & f	Yes	Interference Free Transmit Slot and Duplex Mate	Interference Free Transmit Slot and Duplex Mate	Pass
g	No	None	None	Pass

ALTERNATIVE MONITORING INTERVAL FOR CO-LOCATED DEVICES – PART 15.323 (c)(11)

This test is carried out in accordance with ANSI C63.17 sub-clause 8.4.

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

FAIR ACCESS TO SPECTRUM RELATED TO (c)(10) & (c)(11) - PART 15.323 (c)(12)

The provisions of (c)(10) & (c)(11) shall not be used to extend the range of spectrum occupied over space or time for the purposes of denying fair access to the spectrum to other devices.

The manufacturer declares that this device does not work in a mode, which denies fair access to the spectrum to others.

EMISSIONS INSIDE AND OUTSIDE THE SUB-BAND - CONDUCTED - PART 15.323 (d)

RF carrier set to the lowest carrier defined by the EUT.

Out-of-Band Emissions from UPCS bandedge	FREQ. (MHz)	MEAS. Rx. (dBm)	CABLE & LOS (dE	SS	EMISSION LEVEL (dBm)	LIMIT (dBm)	
> - 2.5MHz	1756.346 1838.910	-74.92 -69.72	23.7 23.2		-51.22 -46.52	-39.5 -39.5	
- 1.25 MHz – 2.5 MHz	1000.010	00.12			Note 10	-29.5	
- 1.25 MHz					Note 10	-9.5	
+ 1.25 MHz					Note 10	-9.5	
+ 1.25 MHz – 2.5 MHz					Note 10	-29.5	
> + 2.5MHz	1953.557 2004.807 3841.346	-76.89 -72.59 -70.11	23. 24. 24.	.1	-53.59 -48.49 -45.31	-39.5 -39.5 -39.5	
		Band Emissions JPCS bandedge		Attenuation (dB) required below Reference power of 112mW			
	±	1.25MHz			30		
	±1.25	MHz – 2.5 MHz		50			
1 institu	>	±2.5MHz		60			
Limits		nd Emissions of emission bandv	vidth	Attenuation (dB) required below permitted peak power for the EUT			
	1B – 2B			30			
		2B – 3B		50			
	3B – U	PCS band edge		60			

These measurements are carried out in accordance with ANSI C63.17 sub-clause 6.1.6.

Notes:

1 EUT fitted with temporary antenna connector.

- 2 Emissions were searched to: (x) 1000MHz inclusive, as per Part 15.33a.
- 3 New / Fully Charged batteries used for battery powered products.
- 4 See Annex H for out of band emissions compliance plots.
- 5 See Annex I for in band emissions compliance plots.
- 6 As per 15.323(g) attenuation to the requirements of 15.209 is not required.
- 7 Resolution bandwidth approximately 1% of emissions bandwidth.
- 8 Video bandwidth 3 x Resolution bandwidth.
- 9 Receiver detector = Peak detector, Max Hold Enabled.
- 10 Only emissions within 20 dB of the limit are recorded.

Test Method:

- 1 The EUT was connected to a spectrum analyser via suitable attenuation or filter.
 - 2 The Spectrum analyser was tuned across the required frequency range in steps.
 - 3 Any emissions found were measured with the required analyser settings.

EMISSIONS INSIDE AND OUTSIDE THE SUB-BAND - CONDUCTED - PART 15.323 (d)

RF carrier set to the highest carrier defined by the EUT.

Out-of-Band Emissions from UPCS bandedge	FREQ. (MHz)	MEAS. Rx. (dBm)	CABLE & LOS (dE	SS	EMISSION LEVEL (dBm)	LIMIT (dBm)
> - 2.5MHz	1741.602 1762.243	-79.51 -77.40	23. 23.		-56.01 -53.70	-39.5 -39.5
	1846.282	-68.08	23.	2	-44.86	-39.5
- 1.25 MHz – 2.5 MHz					Note 10	-29.5
- 1.25 MHz					Note 10	-9.5
+ 1.25 MHz					Note 10	-9.5
+ 1.25 MHz – 2.5 MHz					Note 10	-29.5
> + 2.5MHz	2011.546 3856.251	-67.62 -65.64	24. 24.	-	-43.32 -40.74	-39.5 -39.5
		Band Emissions PCS bandedge		Attenuation (dB) required below reference power of 112mW		
	±	1.25MHz			30	
	±1.25	MHz – 2.5 MHz		50		
Limits	>	±2.5MHz		60		
Limits		nd Emissions f emission bandv	width	Attenuation (dB) required below permitted peak power for the EUT		
		1B – 2B		30		
		2B – 3B		50		
	3B – U	PCS band edge	60			

These measurements are carried out in accordance with ANSI C63.17 sub-clause 6.1.6.

Notes:

1 EUT fitted with temporary antenna connector.

- 2 Emissions were searched to: (x) 1000MHz inclusive, as per Part 15.33a.
- 3 New / Fully Charged batteries used for battery powered products.
- 4 See Annex H for out of band emissions compliance plots.
- 5 See Annex I for in band emissions compliance plots.
- 6 As per 15.323(g) attenuation to the requirements of 15.209 is not required.
- 7 Resolution bandwidth approximately 1% of emissions bandwidth.
- 8 Video bandwidth 3 x Resolution bandwidth.
- 9 Receiver detector = Peak detector, Max Hold Enabled.
- 10 Only emissions within 20 dB of the limit are recorded.

Test Method:

- 1 The EUT was connected to a spectrum analyser via suitable attenuation or filter.
 - 2 The Spectrum analyser was tuned across the required frequency range in steps.
 - 3 Any emissions found were measured with the required analyser settings.

EMISSIONS OUTSIDE THE SUB-BAND - RADIATED - PART 15.109 & PART 15.209

RF carrier set to the lowest carrier defined by the EUT.

	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	PRE AMP (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	FIELD STRENGTH (µV/m)	LIMIT (µV/m)	
1.705MHz - 30MHz							Note 9	30	
30MHz - 88MHz							Note 9	100	
88MHz - 216MHz							Note 9	150	
216MHz - 960MHz							Note 9	200	
960MHz - 1GHz							Note 9	500	
1GHz - 20GHz	3843.000	17.7	3.1	-	32.1	52.9	441.57	500	
	1.705MHz to 30MHz			30µV/m @ 30m					
	30MHz to 88MHz			100µV/m @ 3m					
1 : :4	88MHz to 216MHz			150µV/m @ 3m					
Limits	216MHz to 960MHz		200µV/m @ 3m						
	9601	/IHz to 1GI	Ηz	500µV/m @ 3m					
	1GHz to 20GHz		500µV/m @ 3m						
Notes [.] 1 R	esults quotec	l aro ovtrar	olated as	indicated					

These measurements are carried out in accordance with ANSI C63.17 sub-clause 6.1.6

Notes:

Emissions were searched to: (x) 1000MHz inclusive, as per Part 15.33a.
Emission due to digital circuitry not directly accession with the second s Emission due to digital circuitry not directly associated with the radio transmitter.

Measurements >1GHz @ 3m as per Part 15.31f(1). 4

5 Receiver detector <1GHz = CISPR, Quasi-Peak, 120kHz bandwidth.

- 6 Receiver detector >1GHz = Peak Hold, 1MHz resolution bandwidth.
 - 7 New / Fully Charged batteries used for battery powered products.
 - See Annex J for scan plot 30MHz 1GHz. 8
 - 9 No significant emissions within 20 dB of the limit due to digital circuitry.

Test Method:

- As per Radio Noise Emissions, ANSI C63.4: 2003. 1 Measuring distances as Notes 1 to 4 above. 2
- 3 EUT 0.8 metre above ground plane.
- 4 Emissions maximised by rotation of EUT, on an automatic turntable. Raising and lowering the receiver antenna between 1m & 4m. Horizontal and vertical polarisations, of the receive antenna. EUT orientation in three orthagonal planes. Maximum results recorded.

The test equipment used for the Spurious Emissions - Radiated - Part 15.109 tests is shown overleaf:

EMISSIONS OUTSIDE THE SUB-BAND - RADIATED - PART 15.109 & PART 15.209

RF carrier set to the highest carrier defined by the EUT.

	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	PRE AMP (dB)	ANT FACTOR	FIELD STRENGTH (dBµV/m)	FIELD STRENGTH (µV/m)	LIMIT (µV/m)	
1.705MHz - 30MHz							Note 9	30	
30MHz - 88MHz							Note 9	100	
88MHz - 216MHz							Note 9	150	
216MHz - 960MHz							Note 9	200	
960MHz - 1GHz							Note 9	500	
1GHz - 20GHz	3856.000	17.9	3.2	-	32.2	53.3	462.38	500	
	1.705MHz to 30MHz			30µV/m @ 30m					
	30MHz to 88MHz			100μV/m @ 3m					
1.1.11	88MHz to 216MHz			150µV/m @ 3m					
Limits	216MHz to 960MHz			200µV/m @ 3m					
	960MHz to 1GHz			500µV/m @ 3m					
	1GHz to 20GHz			500µV/m @ 3m					

These measurements are carried out in accordance with ANSI C63.17 sub-clause 6.1.6

Notes:

1 Results quoted are extrapolated as indicated.

2 Emissions were searched to: (x) 1000MHz inclusive, as per Part 15.33a.

3 Emission due to digital circuitry not directly associated with the radio transmitter.

4 Measurements >1GHz @ 3m as per Part 15.31f(1).

5 Receiver detector <1GHz = CISPR, Quasi-Peak, 120kHz bandwidth.

- 6 Receiver detector >1GHz = Peak Hold, 1MHz resolution bandwidth.
 - 7 New / Fully Charged batteries used for battery powered products.
 - 8 See Annex J for scan plot 30MHz 1GHz.
 - 9 No significant emissions within 20 dB of the limit due to digital circuitry.

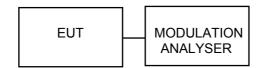
Test Method:

- As per Radio Noise Emissions, ANSI C63.4: 2003.
 Measuring distances as Notes 1 to 4 above.
- 3 EUT 0.8 metre above ground plane.
- 4 Emissions maximised by rotation of EUT, on an automatic turntable. Raising and lowering the receiver antenna between 1m & 4m. Horizontal and vertical polarisations, of the receive antenna. EUT orientation in three orthagonal planes. Maximum results recorded.

The test equipment used for the Spurious Emissions – Radiated – Part 15.109 tests is shown overleaf:

FRAME PERIOD 15.323 (e)

Frame repetition stability is tested according with ANSI C63.17 sub-clause 6.2.2. Frame period and jitter are tested in accordance with ANSI C63.17 sub-clause 6.2.3. The test setup below is used for the above measurements.



Test Setup 3:

Frame Repetition Stability

This is the mean value of the frame repetition rate recorded over 1000 samples. For devices that divide access in time the repetition rate shall not exceed 10ppm.

Result

Frame Repetition Stability (ppm)	Limit (ppm)	Pass/Fail
0.01 ppm	10ppm	Pass

Frame Period and Jitter

Jitter is the difference in time between the rising edges of consecutive pulses.

Result

Maximum Jitter	Jitter 3xSD Jitter Frame period		Liı (µ	Pass/Fail	
(µs)	(µs)	(ms)	Frame Period (ms)	Jitter (µs)	F 855/1 ali
0.92	2.76	10.00276	2 or 10/X	12.5	Pass

Notes: 1. See Annex K for frame period plot.

FREQUENCY STABILITY - PART 15.323 (e)

The frequency stability is tests are carried out according with ANSI C63.17 sub-clause 6.2.1 using test setup number 3(page 23). This testing is carried out with the following conditions over 5000 samples.

Results

Temperature (°C)	Voltage (Vdc)	Fc (MHz)	offset (kHz)	offset (ppm)	Limit (ppm)
+20	Vnom	1924.992	0kHz	+0	±10ppm
-20	Vnom	1924.992	+8.0	+4.2	±10ppm
+55	Vnom	1924.992	+3.0	+1.5	±10ppm

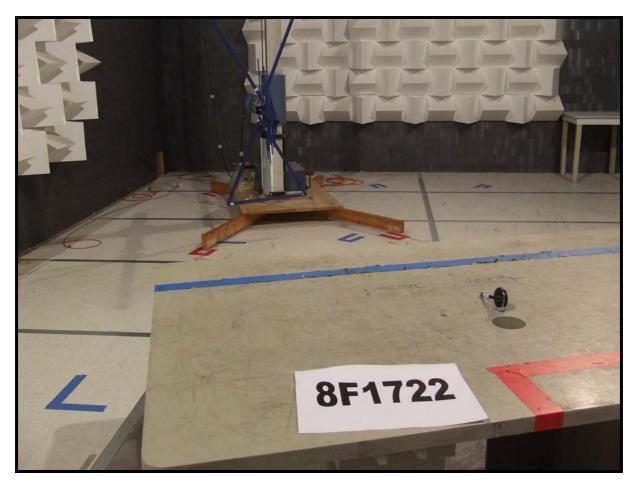
Note: 1. The EUT is battery powered therefore voltage variations are not required.

ANNEX A

PHOTOGRAPHS

PHOTOGRAPH No. 1

RADIATED TEST SETUP



PHOTOGRAPH No. 2

TOP OVERVIEW



PHOTOGRAPH No. 3

BOTTOM OVERVIEW



ANNEX B

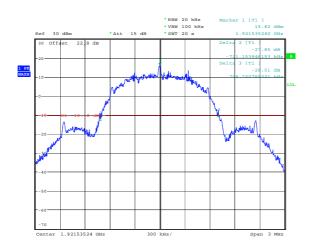
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

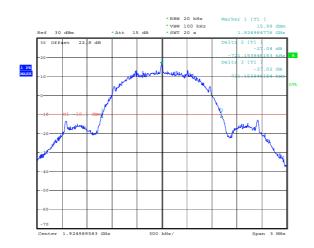
a.	ТСВ	-	APPLICATION FEE	[X] [X]
b.	AGENT'S LETTER OF AUTHORISATION	-		[X]
C.	MODEL(s) vs IDENTITY	-		[]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[]
e.	LABELLING	- -	PHOTOGRAPHS DECLARATION DRAWINGS	[] [] [X]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	- - -	Tx Rx PSU AUX	[X] [] [] []
h.	CIRCUIT DIAGRAMS	- - -	Tx Rx PSU AUX	[X] [] [] []
i.	COMPONENT LOCATION	- - -	Tx Rx PSU AUX	[X] [] [] []
j.	PCB TRACK LAYOUT	- - -	Tx Rx PSU AUX	[X] [] [] []
k.	BILL OF MATERIALS	- - -	Tx Rx PSU AUX	[X] [] [] []
I.	USER INSTALLATION / OPERATING INSTRUCTIONS	-		[X]

ANNEX C

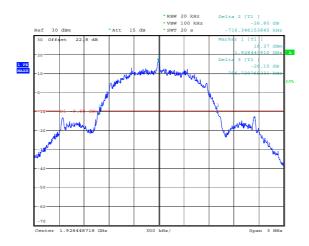
EMISSION BANDWIDTH



Date: 10.MAR.2009 12:14:39



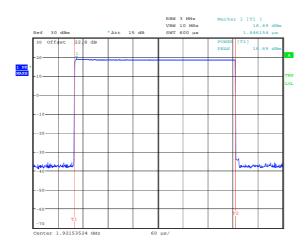
Date: 10.MAR.2009 11:59:07



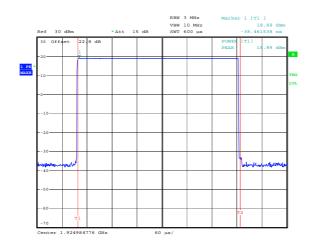
Date: 10.MAR.2009 11:27:53

ANNEX E

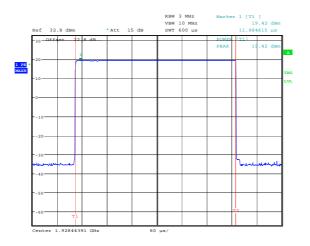
PEAK TRANSMIT POWER



Date: 10.MAR.2009 12:11:00



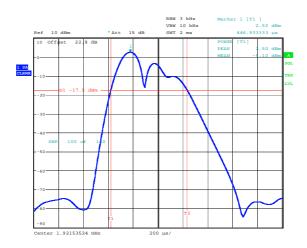
Date: 10.MAR.2009 12:01:25



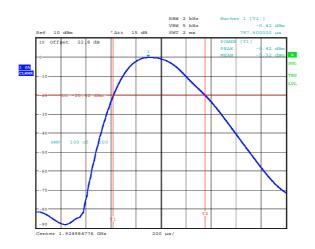
Date: 10.MAR.2009 11:19:11

ANNEX F

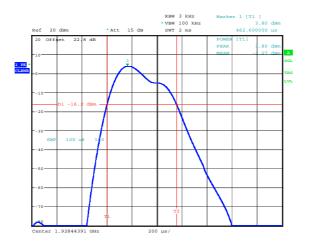
POWER SPECTRAL DENSITY



Date: 10.MAR.2009 12:12:57



Date: 10.MAR.2009 12:03:38



Date: 10.MAR.2009 11:36:35

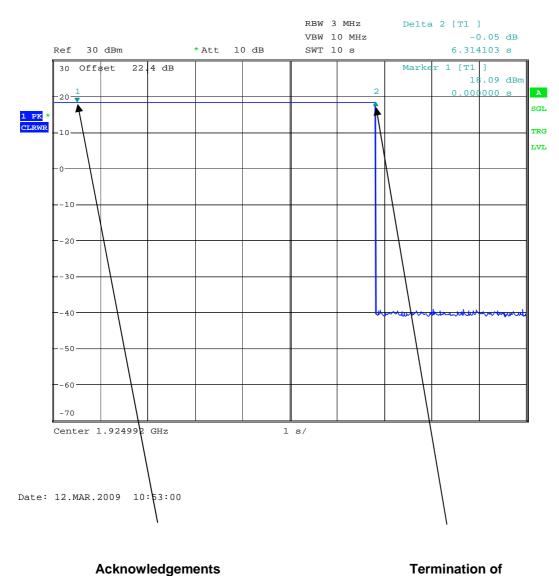
ANNEX G

ACKNOWLEDGEMENTS

RBW 3 MHz Delta 2 [T1] VBW 10 MHz -0.09 dB Ref 30 dBm *Att 10 dB SWT 10 s 452.371795 ms 30 Offset 22.4 dB Marker 1 [T1] 18 .15 dBm A -2.564103 ms 2 20 1 PK * CLRWR TRG LVL - 50 --60 -70 Center 1.924992 GHz 1 s/

Transmissions on Communications Channel Initial Acknowledgement Not Received

Date: 12.MAR.2009 10:45:18

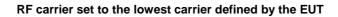


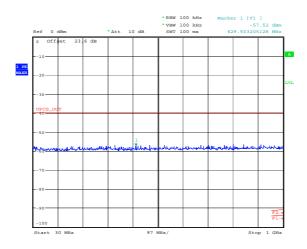
Blocked

Cease Of Transmissions on Communications Channel Acknowledgements Blocked

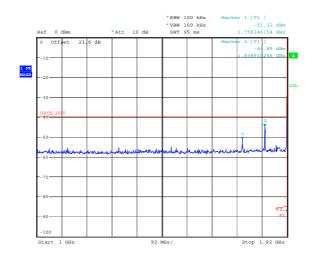
Communications Channel ANNEX H

EMISSIONS OUTSIDE THE SUB-BAND

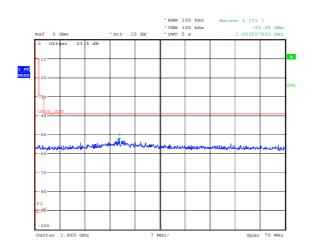




Date: 17.FEB.2009 14:20:07



Date: 17.FEB.2009 14:22:07



Date: 17.FEB.2009 14:49:27

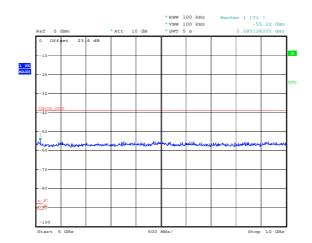
8F1722WUS1

• RBW 100 kHz • VBW 100 kHz • SWT 5 s ter 2 [T1] -48.99 dBm 2.004807692 GHz Ref 0 dBm Att 1.0 1 [T1] -46.51 dB 1 PK MAXH

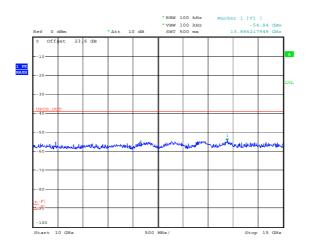


. . بالبعم Stop 5 GHz Start 2 GHz 300 MHz/

Date: 17.FEB.2009 14:51:04

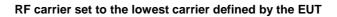


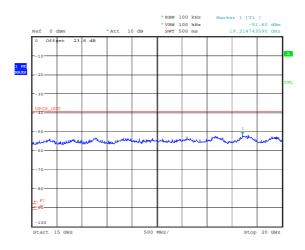
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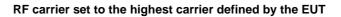
Date: 17.FEB.2009 14:56:03

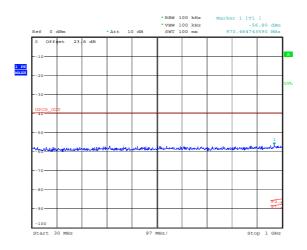
8F1722WUS1



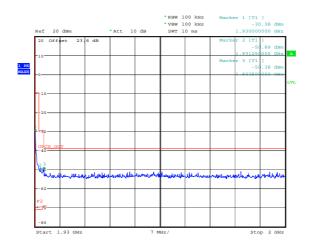


Date: 17.FEB.2009 15:02:16

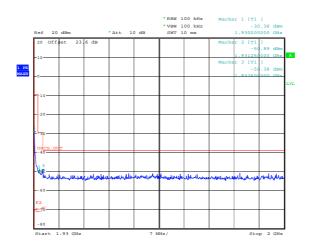




Date: 17.FEB.2009 15:14:37



Date: 17.FEB.2009 15:19:07

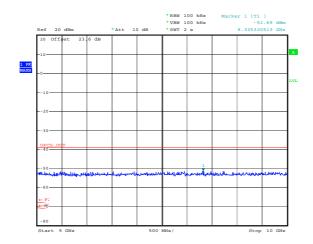


Date: 17.FEB.2009 15:19:07

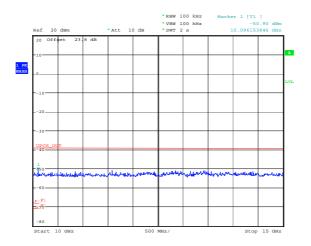
*28 M 100 MB ______ -48.5 dm ref 20 dm *At 10 dB ______ MT 200 ms _______ -48.50 dm 2.0005155 dm 1.0007 223 dm 1.0007 223

RF carrier set to the highest carrier defined by the EUT

Date: 17.FEB.2009 15:19:48

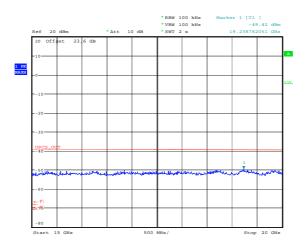


Date: 17.FEB.2009 15:22:47



Date: 17.FEB.2009 15:23:26

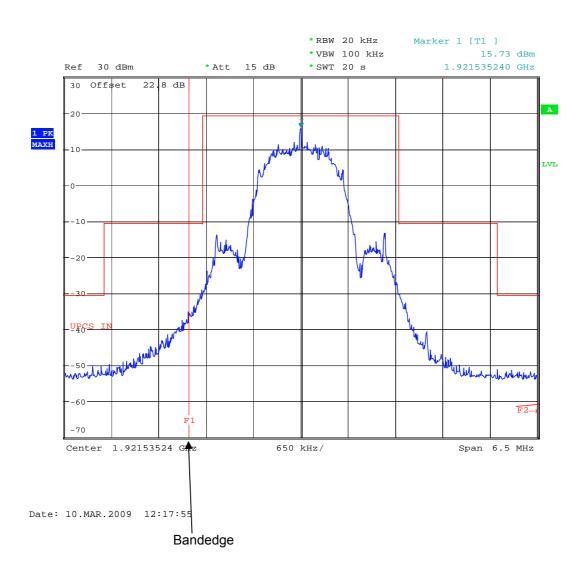
RF carrier set to the highest carrier defined by the EUT



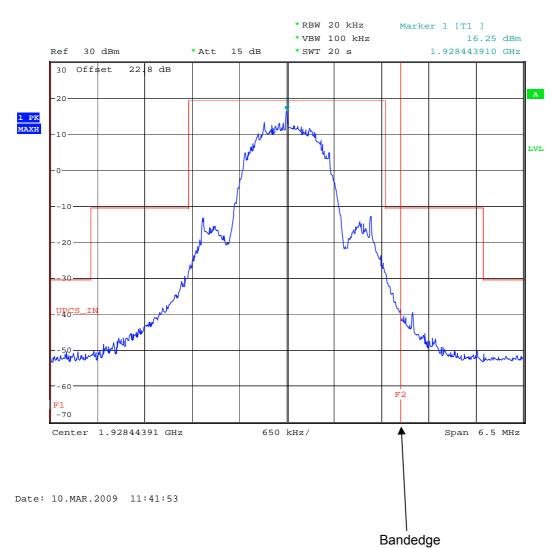
Date: 17.FEB.2009 15:28:07

ANNEX I

EMISSIONS INSIDE THE SUB-BAND – CONDUCTED



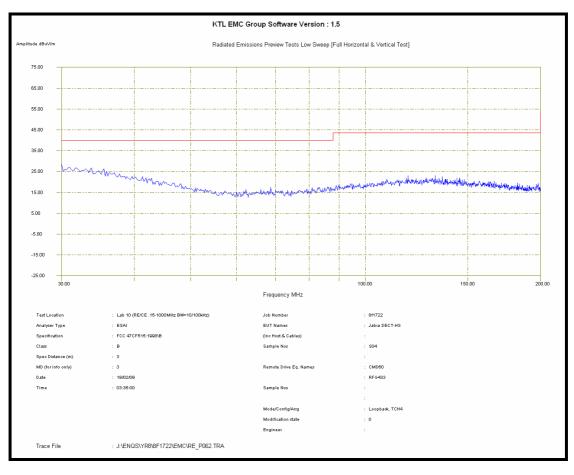
RF carrier set to the lowest carrier defined by the EUT

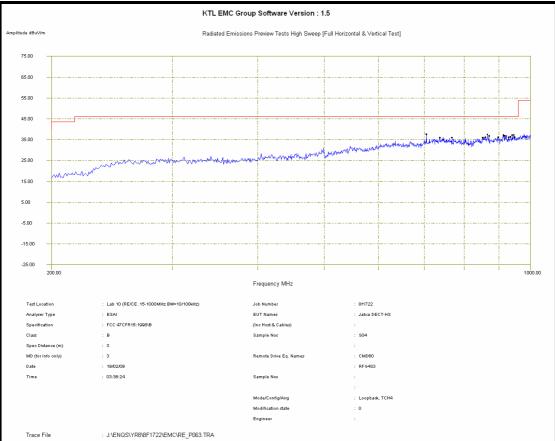


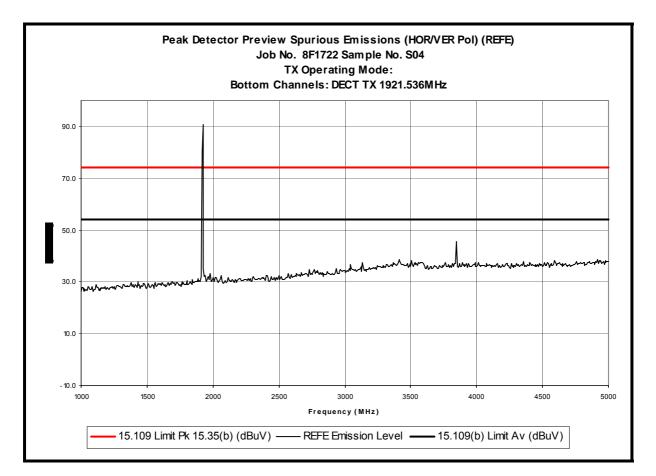
RF carrier set to the highest carrier defined by the EUT

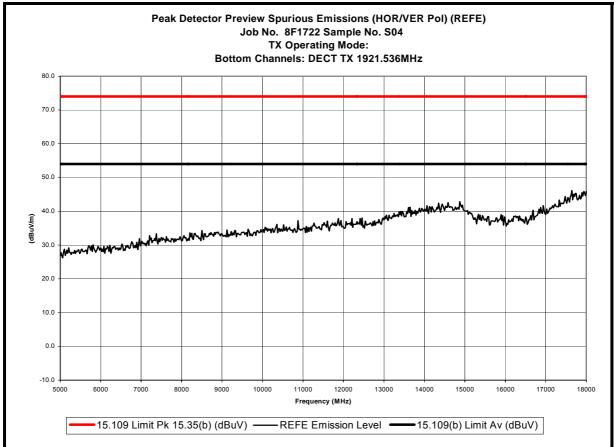
ANNEX J

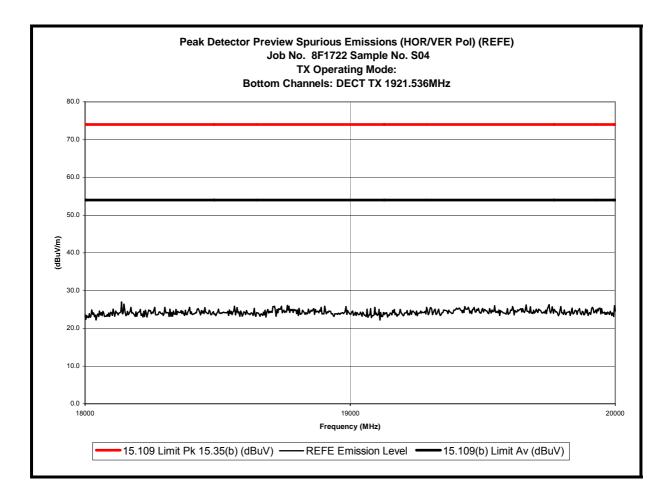
SPURIOUS EMISSIONS – RADIATED

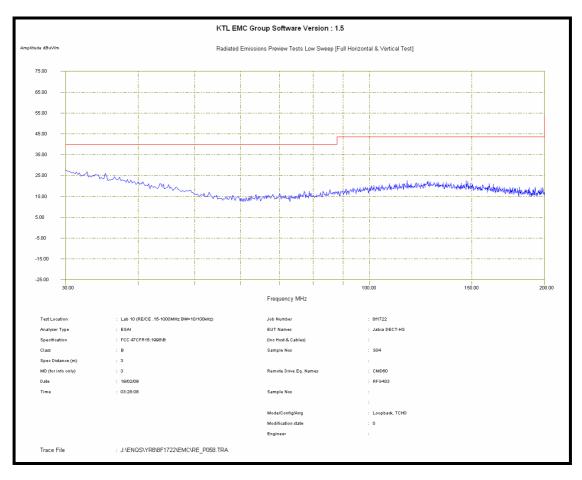


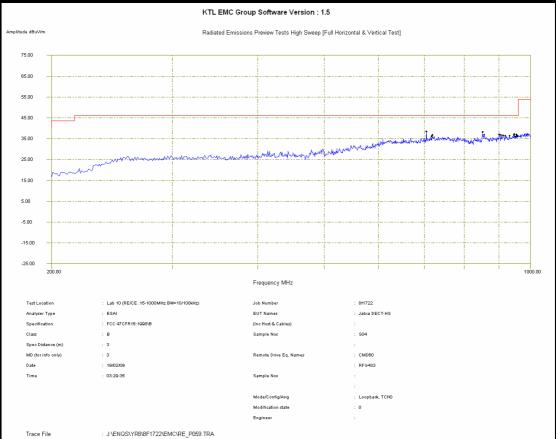


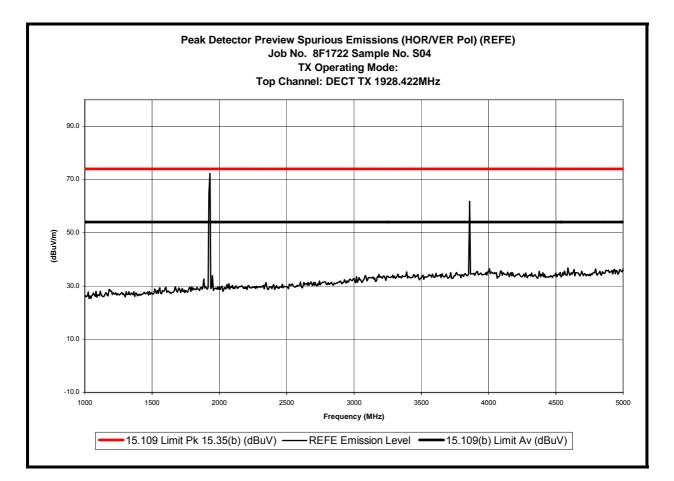


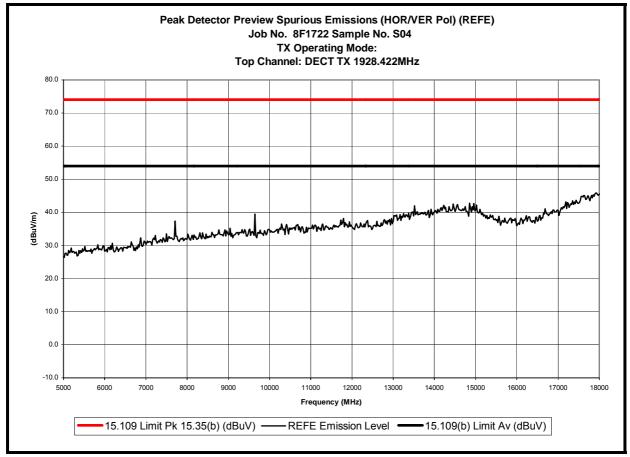




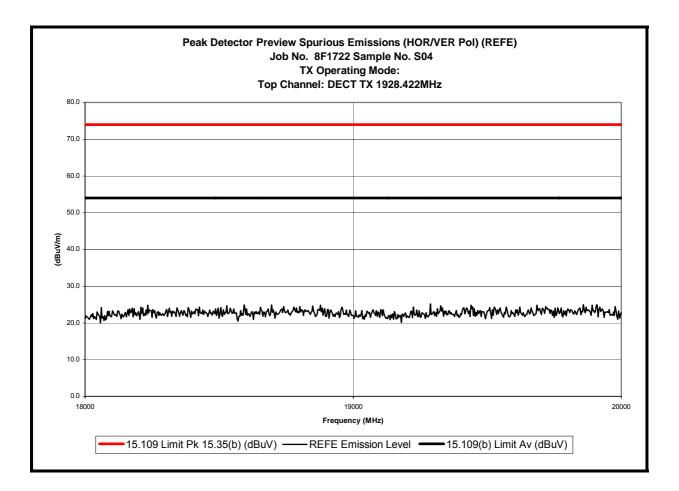






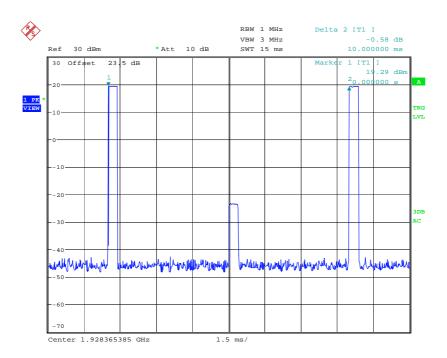


8F1722WUS1



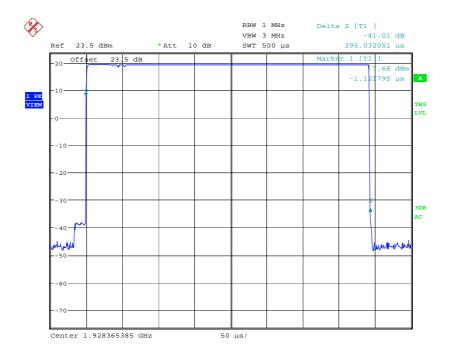
ANNEX K

FRAME PERIOD



TET TYU Date: 26.JUN.2009 12:57:21

T_{Frame} = 10.0ms



TET TYU Date: 26.JUN.2009 12:55:11

ANNEX L

EQUIPMENT DETAILS & CALIBRATION

				1	
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
TEMPERATURE CHAMBER	SHARTREE	TCC 125- 815P	CS 203	11	x
ATTENUATOR	BIRD	8302-060	N/A	106	x
ATTENUATOR	BIRD	8302-100	N/A	173	x
SIGNAL GENERATOR	MARCONI	2042	119388/080	176	x
ATTENUATOR	BIRD	8304-100-N	N/A	222	x
ATTENUATOR	BIRD	8304-0600-N	N/A	246	x
SIGNAL GENERATOR	MARCONI	2042	119562/021	254	x
TEMPERATURE INDICATOR	FLUKE	52 Series II	74700044	426	x
FUNCTION GENERATOR	WAVETEK	178	V644080	638	x
OSCILLOSCOPE	TEKTRONIX	TDS520B	B020491	UH122	x
FUNCTION GENERATOR	WAVETEK	271	C6841078	UH221	x
SPECTRUM ANALYSER	ROHDE & SCHWARZ	FSU 46	200034	UH281	x
POWER SPLITTER/COMBINER	HP	11667A	13723	UH303	x
POWER SPLITTER/COMBINER	HP	11667A	06690	UH305	x
POWER SPLITTER/COMBINER	HP	11667A	332	UH306	x
CRYSTAL DETECTOR	HP	8472A	1822A00897	UH307	x
SIGNAL GENERATOR	HP	83630B	3722A00588	UH340	x
MODULATION ANALYSER	ROHDE & SCHWARZ	CMD 60	N/A	N/A	Х

TRL Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
L011	Temperature chamber	Shartree	Use Calibrated Temperature Indicator		
L106	Attenuator	Bird	Calibrate in use		
L173	Attenuator	Bird	Calibrate in use		
L176	Signal Generator	Marconi			
L222	Attenuator	Bird	Calibrate in use		
L246	Attenuator	Bird			
L254	Signal Generator	Marconi			
L426	Temperature Indicator	Fluke			
L638	Function Generator	Wavetek	Use Calibrated oscilloscope		
UH122	Oscilloscope	Tektronix			
UH221	Function Generator	Wavetek	Use Calibrated oscilloscope		
UH281	Spectrum Analyser	R&S	24/07/2006	12	24/07/2007
UH303	Power Splitter/Combiner	HP			
UH305	Power Splitter/Combiner	HP			
UH306	Power Splitter/Combiner	HP			
UH307	Crystal Detector	HP	For information only		
	CMD 60	R&S			

ANNEX M

MEASUREMENT UNCERTAINTY

Radio Testing – General Uncertainty Schedule

All statements of uncertainty are expanded standard uncertainty using a coverage factor of 1.96 to give a 95% confidence where no required test level exists.

[1] Adjacent Channel Power

Uncertainty in test result = 1.86dB

[2] Carrier Power

Uncertainty in test result (Equipment - TRLUH120) = **2.18dB** Uncertainty in test result (Equipment – TRL05) = **1.08dB** Uncertainty in test result (Equipment – TRL479) = **2.48dB**

[3] Effective Radiated Power

Uncertainty in test result = 4.71dB

[4] Spurious Emissions

Uncertainty in test result = **4.75dB**

[5] Maximum frequency error

Uncertainty in test result (Equipment - TRLUH120) = **119ppm** Uncertainty in test result (Equipment – TRL05) = **0.113ppm** Uncertainty in test result (Equipment – TRL479) = **0.265ppm**

[6] Radiated Emissions, field strength OATS 14kHz-18GHz Electric Field

Uncertainty in test result (14kHz - 30MHz) = 4.8dB, Uncertainty in test result (30MHz - 1GHz) = 4.6dB, Uncertainty in test result (1GHz-18GHz) = 4.7dB

[7] Frequency deviation

Uncertainty in test result = 3.2%

[8] Magnetic Field Emissions

Uncertainty in test result = 2.3dB

[9] Conducted Spurious

Uncertainty in test result (Equipment TRL479) Up to 8.1GHz = **3.31dB** Uncertainty in test result (Equipment TRL479) 8.1GHz – 15.3GHz = **4.43dB** Uncertainty in test result (Equipment TRL479) 15.3GHz – 21GHz = **5.34dB** Uncertainty in test result (Equipment TRLUH120) Up to 26GHz = **3.14dB**

[10] Channel Bandwidth

Uncertainty in test result = 15.5%

[11] Amplitude and Time Measurement – Oscilloscope

Uncertainty in overall test level = 2.1dB, Uncertainty in time measurement = 0.59%, Uncertainty in Amplitude measurement = 0.82%

[11] Power Line Conduction

Uncertainty in test result = 3.4dB

[12] Spectrum Mask Measurements

Uncertainty in test result = 2.59% (frequency) Uncertainty in test result = 1.32dB (amplitude)

[13] Adjacent Sub Band Selectivity

Uncertainty in test result = 1.24dB

[14] Receiver Blocking – Listen Mode, Radiated

Uncertainty in test result = 3.42dB

[15] Receiver Blocking – Talk Mode, Radiated

Uncertainty in test result = 3.36dB

[16] Receiver Blocking – Talk Mode, Conducted

Uncertainty in test result = 1.24dB

[17] Receiver Threshold

Uncertainty in test result = 3.23dB

[18] Transmission Time Measurement

Uncertainty in test result = 7.98%