

Test & Certification Center (TCC) - Dallas

Test Report #: **WR 0833.001**
12-Sep-05Accredited Laboratory
Certificate Number: 1819-01

Ver 1.0

Bluetooth Test Report

Test Report Number: **WR 0833.001****Terminal device:**FCC ID: **QMNRM-125** Model: **6165i** Type: **RM-125** HW: **2001** SW: **VAZ100_05w2LI2.ncp**
(Detailed information is listed in section 4).

Originator: Michael Sundstrom
Function: TCC - Dallas – EMC
Version/Status: 1.0 / Approved
Location: QATrax Directories
Date: 12-Sep-05

Change History:

Version	Date	Status	Handled By	Comments
0.1	06 Sep 05	Draft	Michael Sundstrom	
0.2	09 Sep 05	Review	Michael Sundstrom	
1.0	12 Sep 05	Approved	Hai T0	

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For the contents:

Michael Sundstrom
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1. GENERAL

1.1 Quality System

The quality system in place for TCC-Dallas conforms to ISO/IEC 17025 and has been audited to the standard by A2LA (American Association of Laboratory Accreditation). TCC - Dallas has also been audited using the ISO 9000 Quality System, as part of Nokia Mobile Phones, Inc., by ABS (American Bureau of Shipping) Quality Evaluations Inc.

TCC-Dallas is a recognized laboratory with the Federal Communications Commission in filing applications for Certification under Parts 15 and 18, Registration Number 100060, and Industry Canada, Registration Number IC 661.

1.2 Objective

All tests and measurement data shown was performed to determine whether the selected handset was in compliance as specified in FCC: CFR47 Parts 15.207 and 15.247.

1.3 Test Summary

Test Results: *The test result relates only to those tested devices mentioned in Section 4 of this test report.*

Test Performed	CFR 47	RSS-210	Section of Report	Complies / Does not comply / Not Tested
Carrier frequency separation	15.247 (a)(1)	6.2.2 (o), a1	7	Complies
Number of hopping frequencies	15.247 (a)(1)(iii)	6.2.2 (o), a3	8	Complies
Time of occupancy	15.247 (a)(1)(iii)	6.2.2 (o), a3	9	Complies
20dB bandwidth	15.247 (a)(1)	6.2.2 (o), a1	10	Complies
Peak output power	15.247 (b)(1)	6.2.2 (o), a3	11	Complies
Band-edge compliance of RF emissions	15.247 (c)	6.2.2 (o), e1	12	Complies
AC power line conducted emissions	15.207	6.6	13	Complies

2. STANDARDS BASIS

Testing has been carried out in accordance with:

REF.	Code of the standard	Name of the standard
1	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz.
2	FCC: CFR 47 Part 15	Code of Federal Regulations (CFR) Title 47, Part 15 – Radio Frequency Devices: Subpart B – Unintentional Radiators and Subpart C – Intentional Radiators
3	CISPR 22 / EN55022	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.
4	ICES-003	Digital Apparatus, Industry Canada
5	RSS-210	Low Power License-Exempt Radiocommunication Devices (All Frequency Bands)
6	RSS-212	Test Facilities and Test Methods for Radio Equipment, Industry Canada (Provisional)
7	RSP-100	Radio Equipment Certification Procedure

Note: Unless otherwise stated, (by reference to a version number and a publication date), the latest version of the above documents applies.

Deviations:

Not Applicable.

3. LIST OF ABBREVIATIONS, ACRONYMS AND TERMS

3.1 Abbreviations

dB - decibel

dBm - decibels per milliwatt (absolute measurement)

dB μ V - decibel per microvolt

dB μ V/m - decibel of microvolt per meter

GHz - gigahertz or 1000000000 hertz

kHz - kilohertz or 1000 hertz

MHz - megahertz or 1000000 hertz

ms - millisecond or 0.001 second

μ s - microsecond or 0.000001 second

3.2 Acronyms

BT - Bluetooth

EMC - Electromagnetic Compatibility

EMI - Electromagnetic Interference

EUT - Equipment under Test

PRBS - Pseudo Random Bit Sequence

RF - Radio Frequency

3.3 Terms

Base Station Simulator (BSS) - simulates all the necessary signals that a phone would experience while on a live network. There are many types of base station simulators catering for all current protocols, i.e., GSM, AMPS, TDMA, and CDMA.

4. EQUIPMENT-UNDER-TEST (EUT)

The results in this report relate only to the items listed below:

4.1 Description of Tested Device(s):

Test Performed	Mode of Operation	Date of Receipt	Condition of Sample	Item	Identifying Information
FCC 15.247	Analog, CDMA 800/1900	6Sep05	Operational	Phone # 3	IMEI/ESN:033/10858382 FCC ID: QMNRM-125 Type: RM-125 HW: 2001 SW: V/A7100 05w21 12 ncn
FCC 15.247	Analog, CDMA 800/1900	6Sep05	Operational	Phone # 1	IMEI/ESN:033310858283 FCC ID: QMNRM-125 Type: RM-125 HW: 2001 SW: V/A7100 05w21 12 ncn
N/A	N/A	N/A	N/A	Battery	Type: BL-6C Other: 3.7V
N/A	N/A	N/A	N/A	Charger	Type: AC-3U
N/A	N/A	N/A	N/A	Headset	Type: HS-9

5. TEST EQUIPMENT LIST

The listing below indicates the test equipment utilized for the test (s). Calibration interval on all items listed can be obtained from the Engineering Services Group within NMP, Product Creation - Dallas. Where relevant, measuring equipment is subjected to in-service checks between testing. TCC - Dallas shall notify clients promptly, in writing, of identification of defective measuring equipment that casts doubt on the validity of results given in this report.

Section of Report	NMP#	Test Equipment	Mfr. #	Model #	Calibration Due Date	Calibration Interval
13	00133	LISN	EMCO	3816/2	21Sep05	12 months
13	N/A	10dB Attenuator	Weinschel	Model 2	N/A	N/A
7,8,9,10,11,12,13,15	02666	Base Station	R & S	CMU 200	25May06	12 months
13	02665/ 02664	EMI Receiver	Hewlett Packard	8546 / 85460A	09Feb06	12 months
7,8,9,10,11,12,15	02924	Power Splitter (must have 6 dB insertion loss)	Agilent	33120A	N/A	N/A
7,8,9,10,11,12,15	N/A	6dB Attenuator	Weinschel	Model 2	N/A	N/A
7,8,9,10,11,12,15	03462	Spectrum Analyzer	Rhodes & Schwartz	FSP	20Jul06	12 months

6. EUT TEST SETUPS

For each test the EUT was exercised to find out the worst case of operation modes and device configuration.

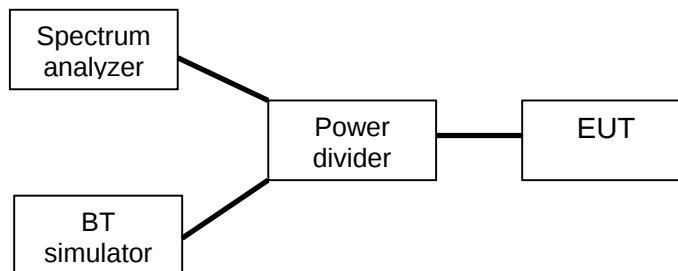
Two different test setups were used: one for conducted measurements, another for radiated measurements. One EUT was equipped with an external antenna connector for conductive measurements.

6.1 EUT test set-up A (conducted measurement)

This setup was used in conducted measurements. The Bluetooth simulator was used to control the following:

- set the EUT channel (0 – 79)
- set the number of EUT TX slots (1, 3, 5)
- set the EUT to TX, RX and TX/RX mode
- enable/disable frequency hopping
- select between several different test modulation patterns

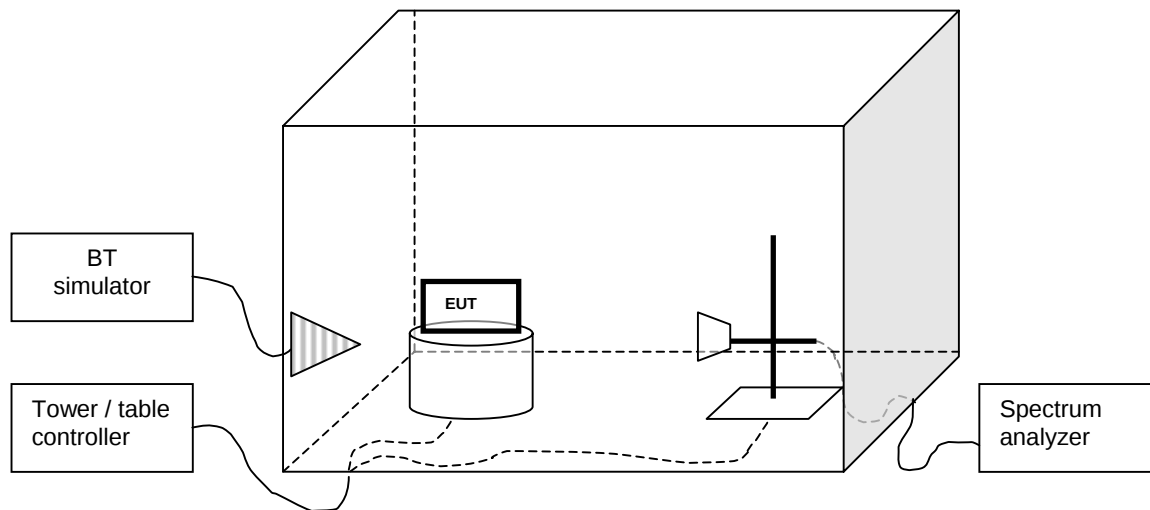
In tests, where absolute level reporting were required, the results were corrected with all applicable factors as detailed in the result section of each measurement.



6.2 EUT test set-up B (radiated measurement)

The EUT was set on a non-conductive turn table in a semi anechoic chamber. In the corner of the chamber there was a communication antenna, which was connected to the BT simulator located outside the chamber. The radiated power from the EUT was measured with an antenna fixed to a antenna tower. The tower and turn table were remotely controlled to turn the EUT and change the antenna polarization. The measured signal was routed from the measuring antenna to the spectrum analyzer. The Bluetooth simulator was used to the same as in conducted measurements.

In tests, where absolute level reporting were required, the results were corrected with all applicable factors as detailed in the result section of each measurement.



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7. CARRIER FREQUENCY SEPARATION

Specification: FCC Part 15.247(a)(1); RSS-210 6.2.2(o), a1

7.1 Setup

Used test set-up: A (see section 6)

7.2 Test Results

Test Operator	Michael Sundstrom
Date of Measurement	06 Sep 05
Temperature	21-24 °C
Humidity	47-60 %RH
Test Result	Complies

7.3 EUT operation mode

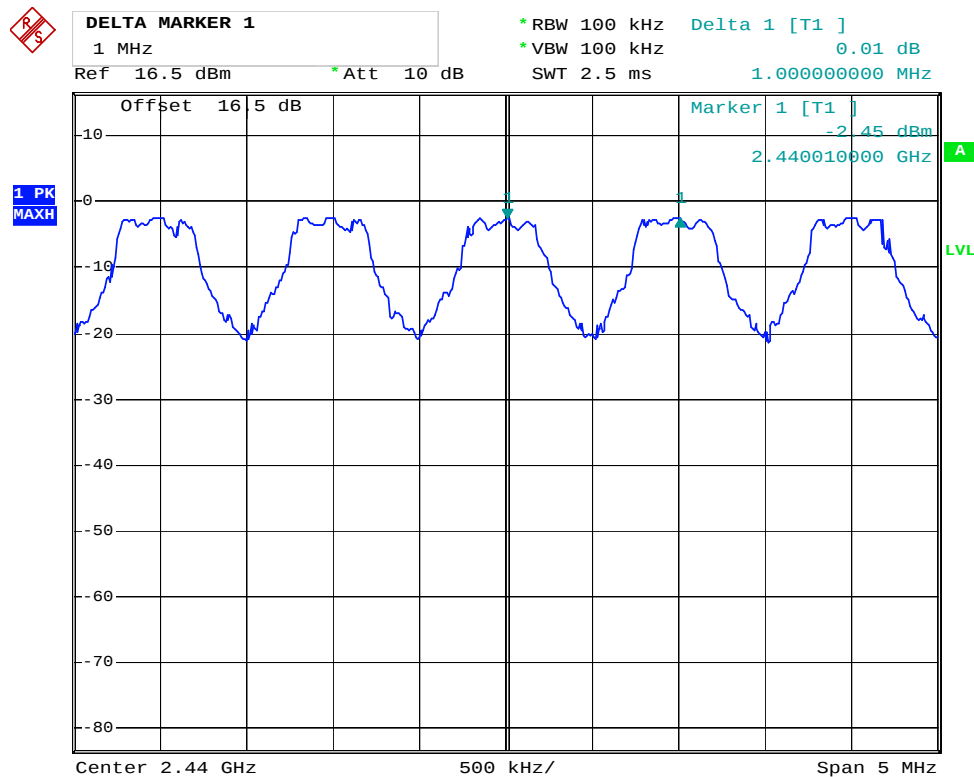
EUT operation mode	Connected, DH5, Static PRBS
EUT channel	Hopping mode (Euro/US)
EUT TX power level	Nominal

7.4 Pass/Fail Criteria

Limit (MHz)	Measured value (MHz)
≥ 0.025 or 20dB	1.0

7.5 Results

Carrier Frequency Separation of Channels 38 and 39



Date: 6.SEP.2005 20:58:10

8. NUMBER OF HOPPING FREQUENCIES

Specification: FCC Part 15.247(a)(1)(iii); RSS-210 6.2.2(o), a3

8.1 Setup

Used test set-up: A (see section 6)

8.2 Test Results

Test Operator	Michael Sundstrom
Date of Measurement	6 Sep 05
Temperature	21-24 °C
Humidity	47-60 %RH
Test Result	Complies

8.3 EUT operation mode

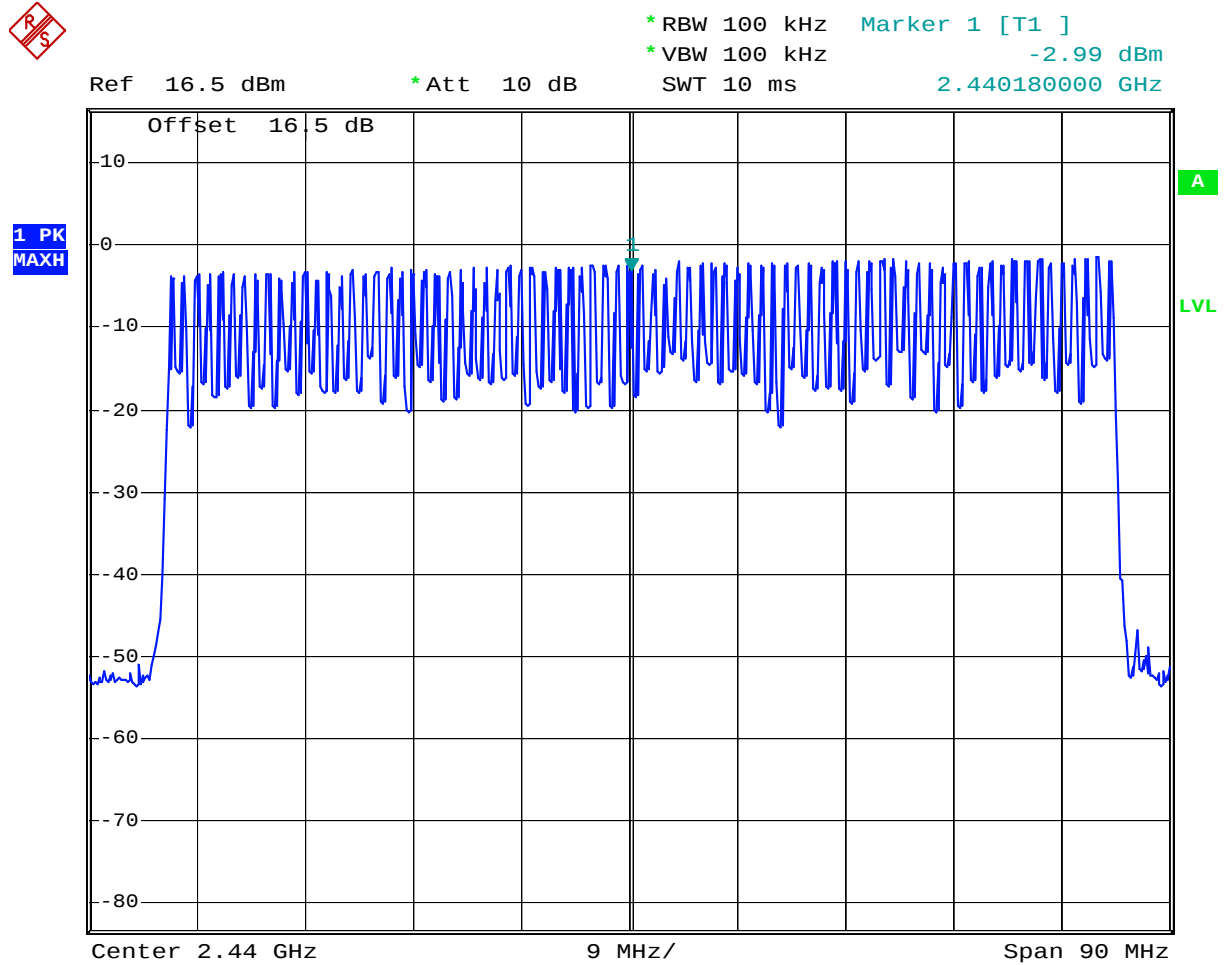
EUT operation mode	Connected, DH5, Static PRBS
EUT channel	Hopping Mode
EUT TX power level	Nominal

8.4 Pass/Fail Criteria

Number	Measured value
≥ 75	79

8.5 Results

Number of Hopping Channels



Date: 6.SEP.2005 21:02:51

9. TIME OF OCCUPANCY

Specification: FCC Part 15.247(a)(1)(iii); RSS-210 6.2.2(o), a3

9.1 Setup

Used test set-up: A (see section 6)

9.2 Test Results

Test Operator	Michael Sundstrom
Date of Measurement	8 Sep 05
Temperature	21-23 °C
Humidity	48-58 %RH
Test Result Connected mode	Complies

9.3 EUT operation mode: Connected mode

EUT operation mode	Connected, DH5, static PRBS
EUT channel	Hopping mode
EUT TX power level	Nominal

9.4 Pass/Fail Criteria

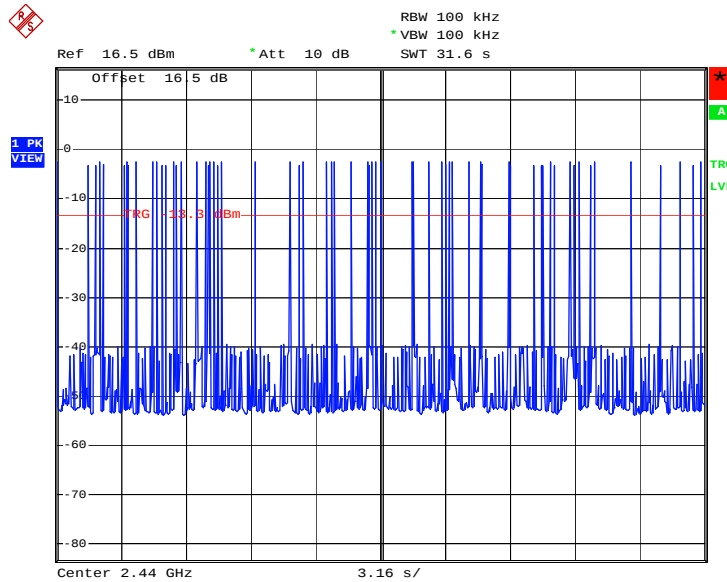
Number of transmissions	Duration of transmissions (ms)	Time of Occupancy (ms)	Limit (ms)
63	2.94	185.2	≤ 400

$$\text{Time of Occupancy} = TX_n * TX_d$$

where: TX_n = Number of transmissions in 31.6 seconds = (0.4 seconds * 79 channels)
 TX_d = Duration of transmission.

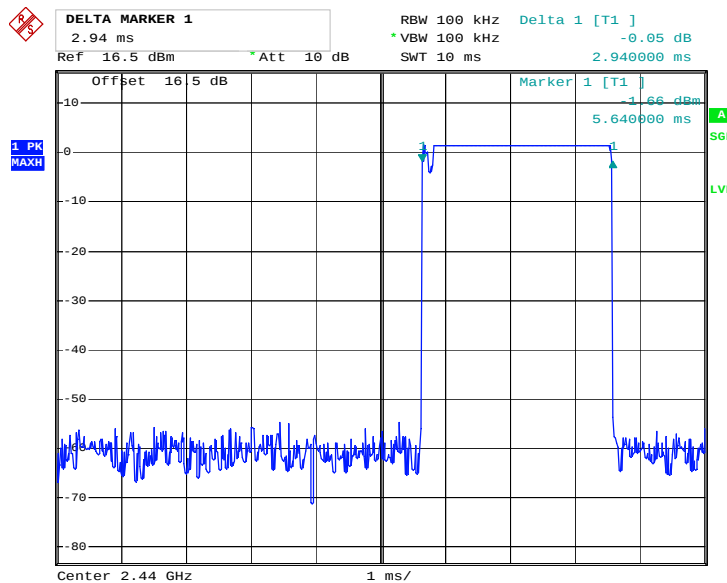
9.5 Results

Number of transmissions on channel 38



Date: 8.SEP.2005 17:34:55

Duration of one transmission, channel 38



Date: 8.SEP.2005 19:11:47

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10. 20dB BANDWIDTH

Specification: FCC Part 15.247(a)(1); RSS-210 6.2.2(o), a1

10.1 Setup

Used test set-up: A (see section 6)

10.2 Test Results

Test Operator	Michael Sundstrom
Date of Measurement	6 Sep 05
Temperature	21-24 °C
Humidity	47-60 %RH
Test Result	Complies

10.3 EUT operation mode

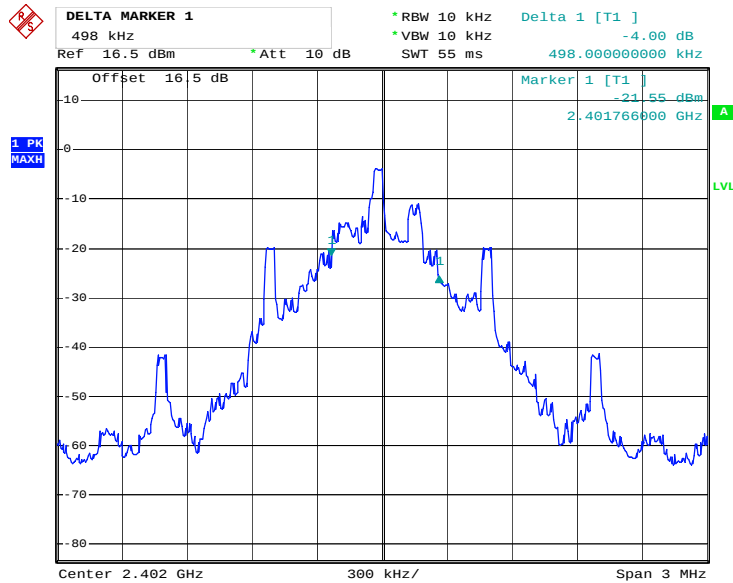
EUT operation mode	Connected, DH5, Static PRBS
EUT channel	0 (2402 MHz), 38 (2440 MHz), 78 (2480MHz)
EUT TX power level	Nominal

10.4 Pass/Fail Criteria

EUT channel	Limit (MHz)	Measured value (kHz)
0	≤ 1.0	498
38		492
78		522

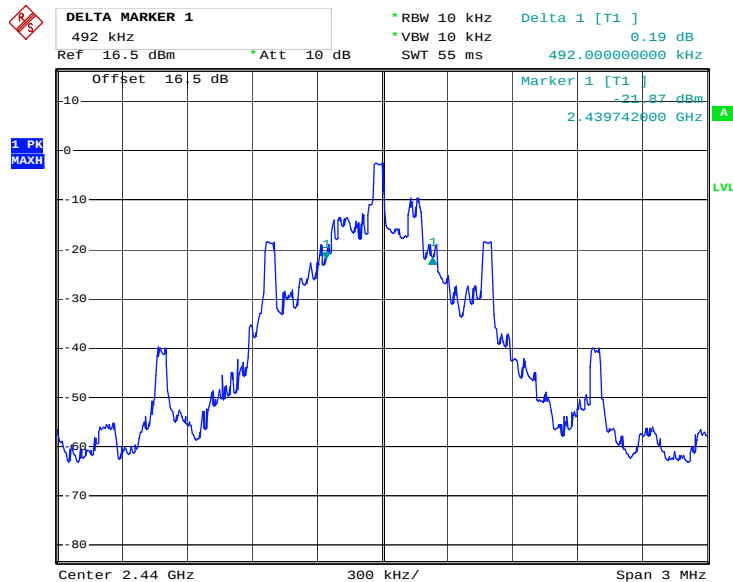
10.5 Results

20dB bandwidth, channel 0



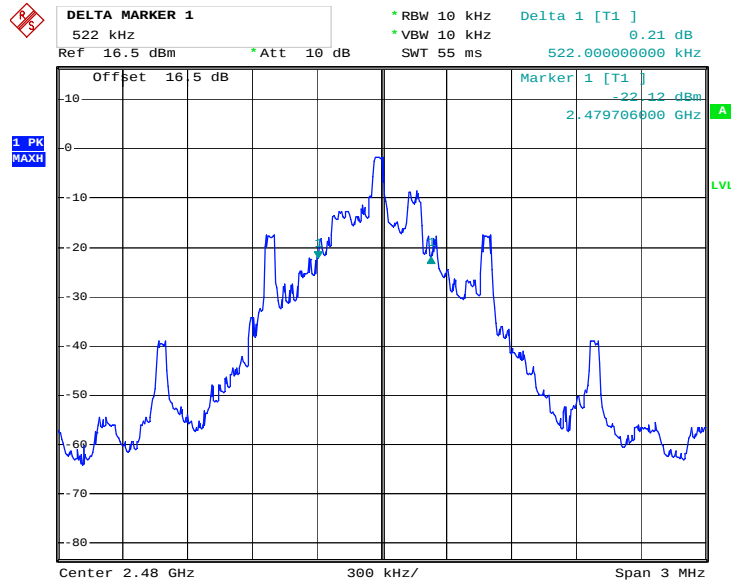
Date: 6.SEP.2005 21:33:00

20dB bandwidth, channel 38



Date: 6.SEP.2005 21:36:17

20dB bandwidth, channel 78



Date: 6.SEP.2005 21:38:17

11. PEAK OUTPUT POWER

Specification: FCC Part 15.247(b)(1); RSS-210 6.2.2(o), a3

11.1 Setup

Used test set-up: A (see section 6)

11.2 Test Results

Test Operator	Michael Sundstrom
Date of Measurement	8 Sep 05
Temperature	21-23 °C
Humidity	48-58 %RH
Test Result	Complies

11.3 EUT operation mode

EUT operation mode	Connected, DH5, Static PRBS
EUT channel	0 (2402 MHz), 38 (2440 MHz), 78 (2480MHz)
EUT TX power level	Nominal

11.4 Pass/Fail Criteria

EUT channel	Limit (mW)	Test result (mW)
0	≤ 1000.0	1.219
38		1.566
78		1.862

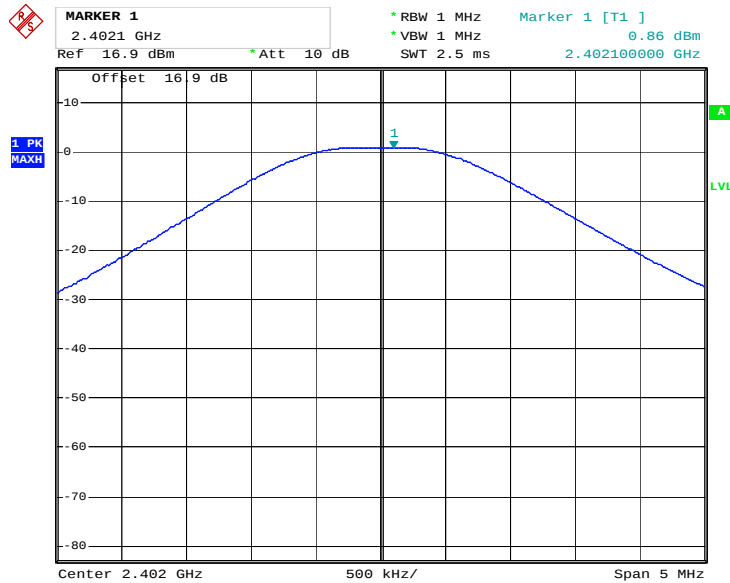
The measured power values were corrected with the attenuation of the cables, attenuator and power divider using the formula:

$$\text{Peak Output Power} = \text{Trace} + \text{Cable Loss} + \text{Divider Loss}$$

EUT channel	Trace value (dBm)	Cable loss (dB)	Divider loss (dB)	Peak output power (dBm)	Peak output power (mW)
0	-16.04	10.9	6	0.86	1.219
38	-14.95	10.9	6	1.95	1.566
78	-14.2	10.9	6	2.7	1.862

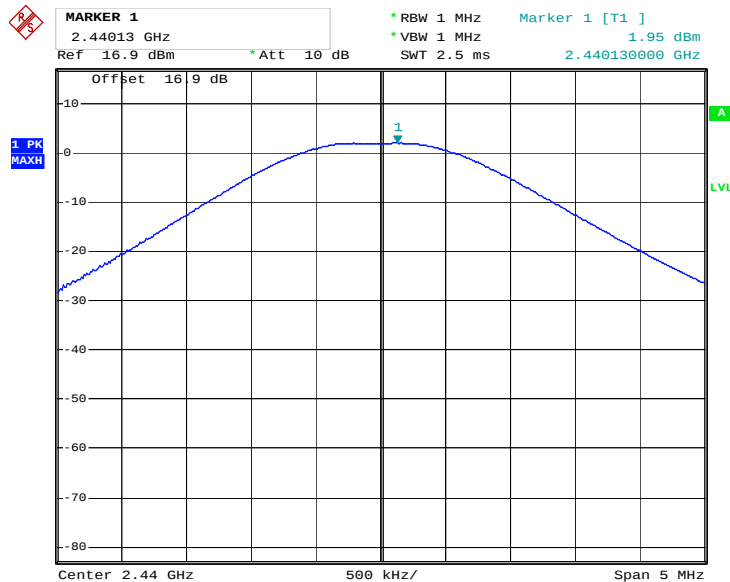
11.5 Results

Peak output power, channel 0



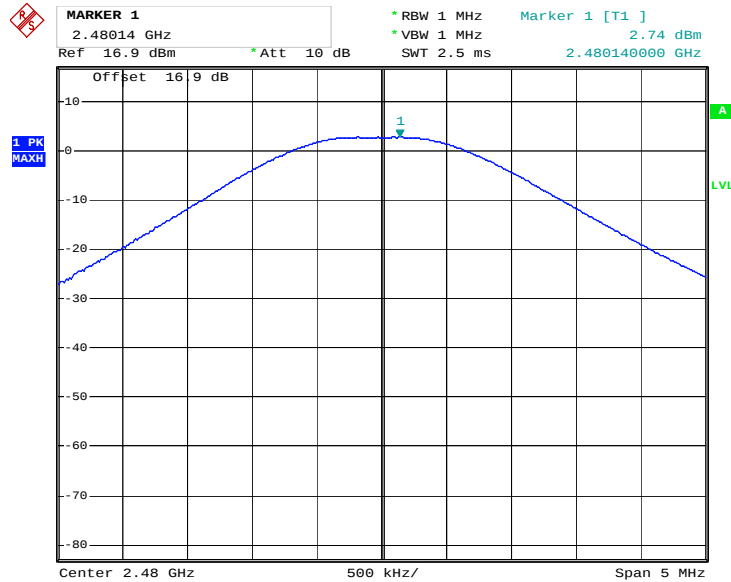
Date: 8.SEP.2005 20:33:05

Peak output power, channel 38



Date: 8.SEP.2005 20:34:20

Peak output power, channel 78



Date: 8.SEP.2005 20:40:31

12. BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

Specification: FCC Part 15.247(c); RSS-210 6.2.2(o), e1

12.1 Setup

Used test set-up: A (see section 6)

12.2 Test Results

Test Operator	Michael Sundstrom
Date of Measurement	7, 6-Sep-05
Temperature	21-24 °C
Humidity	47-60 %RH
Test Result	Complies

12.3 EUT operation mode

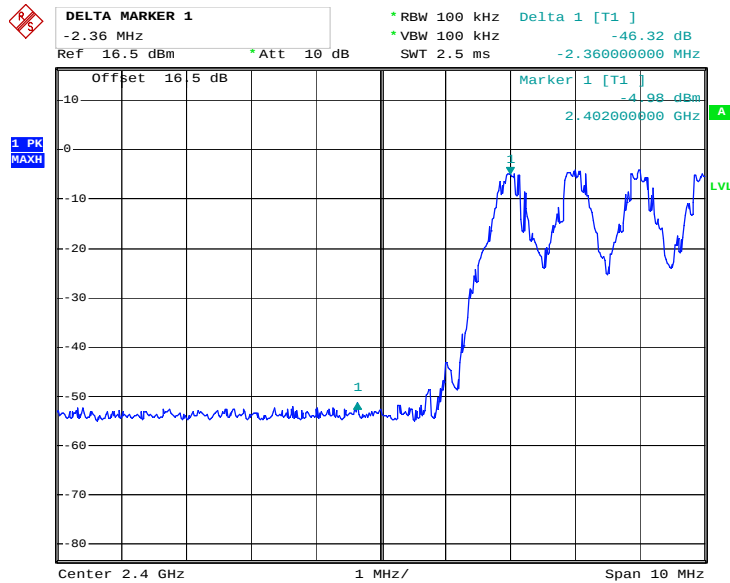
EUT operation mode	Connected, DH5, Static PRBS
EUT channel	Hopping mode, 0 (2402 MHz); 78 (2480 MHz)
EUT TX power level	Nominal

12.4 Pass/Fail Criteria

EUT channel	Limit (dBc)	Measured value (dBc)
Low End, Hopping Mode	≤ -20	-46.3
High End, Hopping Mode		-37.1
0		-36.5
78		-36.8

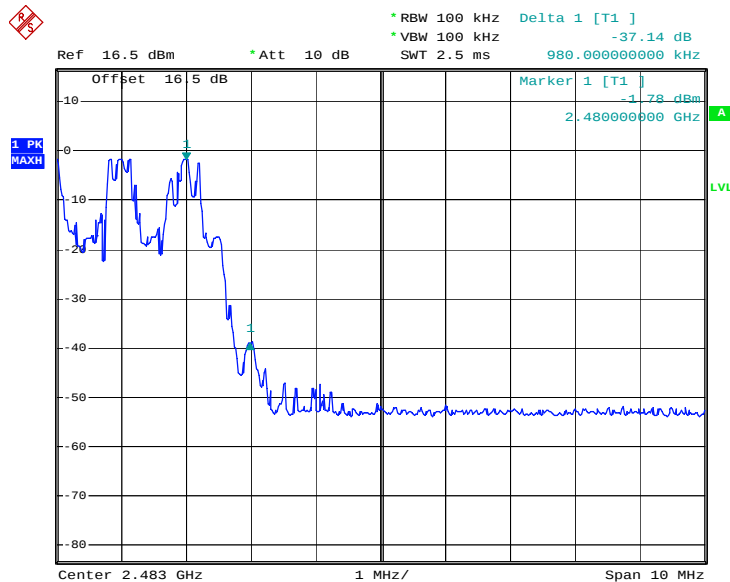
12.5 Results

Bandedge Compliance, Low end, hopping mode



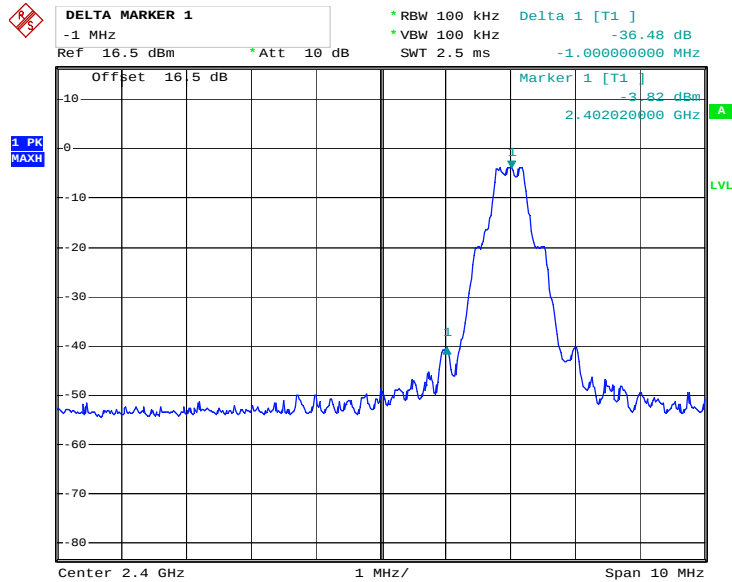
Date: 8.SEP.2005 00:17:53

Bandedge Compliance, High end, hopping mode



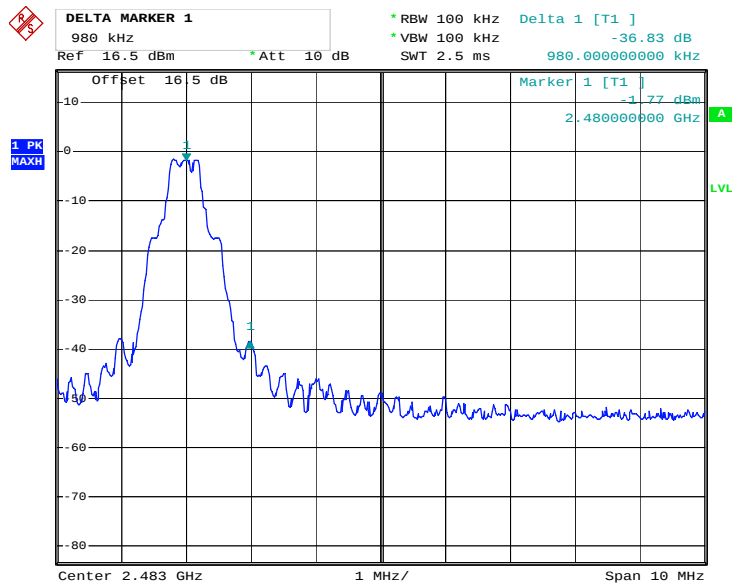
Date: 6.SEP.2005 22:24:50

Bandedge Compliance, Low end, channel 0



Date: 6.SEP.2005 21:44:49

Bandedge Compliance, High end, channel 78



Date: 6.SEP.2005 22:17:29

13. AC CONDUCTED EMISSIONS

Specification: FCC Part 15.207; RSS-210 6.6

13.1 Setup

Testing was performed in accordance with ANSI C63.4, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz.

Insert photo of test setup

13.2 Test Results

Test Operator	Michael Sundstrom
Date of Measurement	09Sep05
Temperature	21-22 °C
Humidity	50-53 %RH
Test Result	Complies

13.3 Pass/Fail Criteria

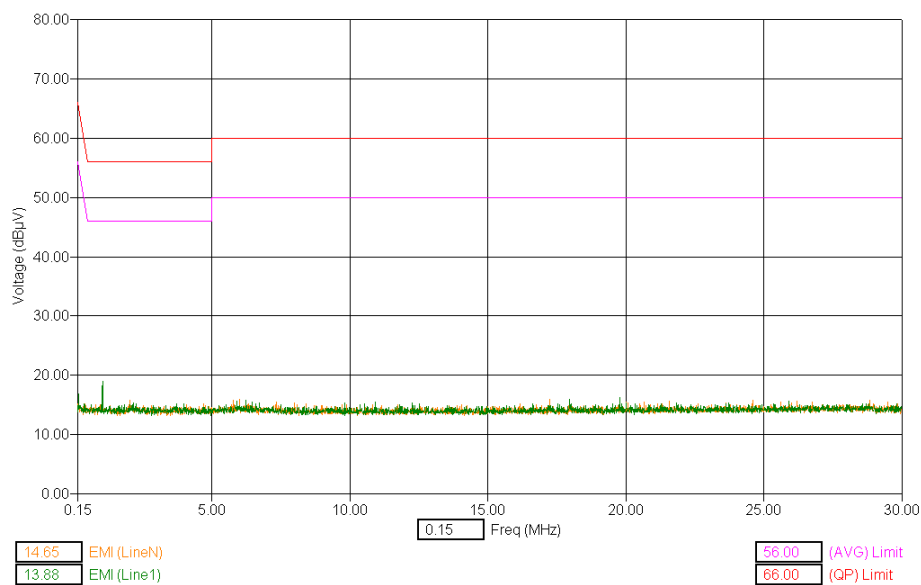
Frequency Range	AC Conducted Emission Limits (CISPR 22)	
	Quasi-peak (dBµV)	Average (dBµV)
0.15MHz - 0.5MHz	66 - 56	56 - 46
0.5MHz - 5MHz -	56	46
5MHz - 30MHz	60	50

13.4 EUT operation mode

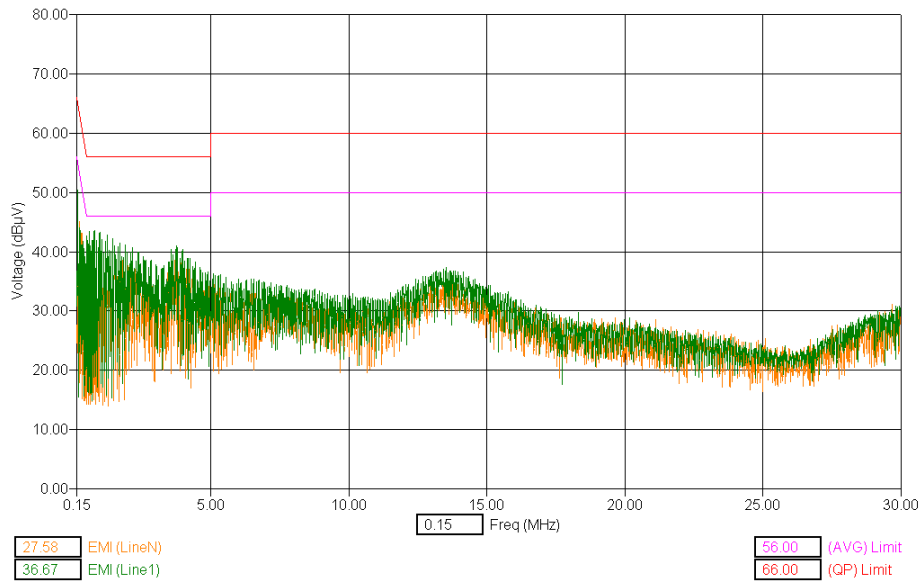
EUT operation mode	Connected, DH5, Static PRBS
EUT channel	0 (2402 MHz), 38 (2440 MHz), 78 (2480MHz)
EUT TX power level	Nominal

13.5 Results

Ambient Scan



Bluetooth Connected (Hopping Mode) Channel 38:



Finals:

Freq [Max] (MHz)	[AVG] Trace (dBµV)	[QP] Trace (dBµV)	Transducer (dB)	Cable (dB)	Line	[AVG] EMI (dBµV)	[QP] EMI (dBµV)	[AVG] Limit (dBµV)	[QP] Limit (dBµV)
0.205	32.3	44.2	0.1	0.1	L1	32.5	44.4	54.2	64.2
0.273	27.6	38.1	0.1	0.1	N	27.8	38.3	51.5	61.5
0.274	27.9	37.1	0.1	0.1	L1	28.1	37.3	51.5	61.5
0.337	32.4	41.0	0.2	0.1	L1	32.7	41.2	49.5	59.5
0.339	30.2	37.9	0.2	0.1	N	30.4	38.1	49.7	59.7
0.412	29.3	38.2	0.2	0.1	N	29.5	38.5	48.0	58.0

14. SPURIOUS RF CONDUCTED EMISSIONS

Specification: FCC Part 15.247(c)(2); RSS-210 6.2.2(o), e1

14.1 Setup

Used test set-up: A (see section 6)

14.2 Test Results

Test Operator	
Date of Measurement	
Temperature	°C
Humidity	%RH
Test Result	Complies/Does Not Comply

14.3 EUT operation mode

EUT operation mode	Connected, DH5, Static PRBS
EUT channel	0 (2402 MHz), 38 (2440 MHz), 78 (2480 MHz) and Hopping mode
EUT TX power level	Nominal

14.4 Pass/Fail Criteria

EUT channel	Limit (dBc)	Measured value (dBc)
0	≤ -20	
38		
78		

Not Tested