

Nemko Test Report: 129544-1TRFWL

Applicant: DAP Technologies
875 Charest Boulevard West,
suite 200,
Québec City, QC
G1N 2C9 Canada

Apparatus: Handheld Computer 3000B5 series

FCC ID: T5M3000B5

In Accordance With: FCC Part 15 Subpart C, 15.225
Operation within the band 13.110–14.010 MHz

Authorized By: 
Sim Jagpal, Production Manager

Date: August 10, 2009

Total Number of Pages: 19

TABLE OF CONTENTS

Section 1 : Report Summary	3
Section 2 : Equipment Under Test.....	4
2.1 Identification of Equipment Under Test (EUT).....	4
2.2 Accessories	4
2.3 EUT Description.....	4
2.4 Technical Specifications of the EUT	5
2.5 EUT Setup diagram	5
2.6 Operation of the EUT during testing	5
2.7 Modifications incorporated in the EUT	5
Section 3 : Test Conditions.....	6
3.1 Specifications	6
3.2 Deviations From Laboratory Test Procedures	6
3.3 Test Environment	6
3.4 Measurement Uncertainty.....	6
3.5 Test Equipment.....	7
Section 4 : Results Summary	8
4.1 FCC Part 15 Subpart C : Test Results	8
Appendix A : Test Results.....	9
Clause 15.207(a) Powerline Conducted Emissions	9
Clause 15.215(c) 20 dB Bandwidth	13
Clause 15.225(a) Field Strength in the 13.553–13.567 MHz band.....	14
Clause 15.225(b) Field Strength in the 13.410–13.553 MHz and 13.567–13.710 MHz bands	14
Clause 15.225(c) Field Strength in the 13.110–13.410 MHz and 13.710–14.010 MHz bands.....	14
Clause 15.225(d) Field Strength of any emissions appearing outside of the 13.110–14.010 MHz band.....	15
Clause 15.225(e) Frequency tolerance of the carrier signal.....	16
Appendix B : Setup Photographs	17
Appendix C : Block Diagram of Test Setups.....	18

Section 1 : Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C. Radiated tests were conducted in accordance with ANSI C63.4-2003.

The assessment summary is as follows:

Apparatus Assessed:	Handheld Computer 3000B5 series
Specification:	FCC Part 15 Subpart C, 15.225
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release
Test Location:	Nemko Canada Inc. 303 River Road Ottawa, Ontario K1V 1H2
Registration Number:	176392 (3 m Semi-Anechoic Chamber)
Tests Performed By:	Andrey Adelberg, EMC/Wireless Specialist
Test Dates:	August 7, 2009

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

Nemko Canada Inc. authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Section 2 : Equipment Under Test

2.1 Identification of Equipment Under Test (EUT)

The following information identifies the EUT under test:

Type of Equipment:	Identity Verification Handheld Computer
Brand Name:	Microflex
Model Name or Number:	3000B5-1
Serial Number:	GF01337
Nemko Sample Number:	14
FCC ID:	T5M3000B5
Date of Receipt:	June 17, 2009

2.2 Accessories

The following information identifies accessories used to exercise the EUT during testing:

Description:	Charger / Cradle
Brand Name:	Microflex
Model Name or Number:	None
Serial Number:	03414456CBCE340:0017
Nemko Sample Number:	3
Connection Port:	Direct connection
Cable Length and Type:	None

Description:	AC Adapter for charger
Brand Name:	CINCON Electronics Co., Ltd.
Model Name or Number:	TR36A-15
Serial Number:	0750
Nemko Sample Number:	4
Connection Port:	DC Jack to charger
Cable Length and Type:	1.5 m DC cable

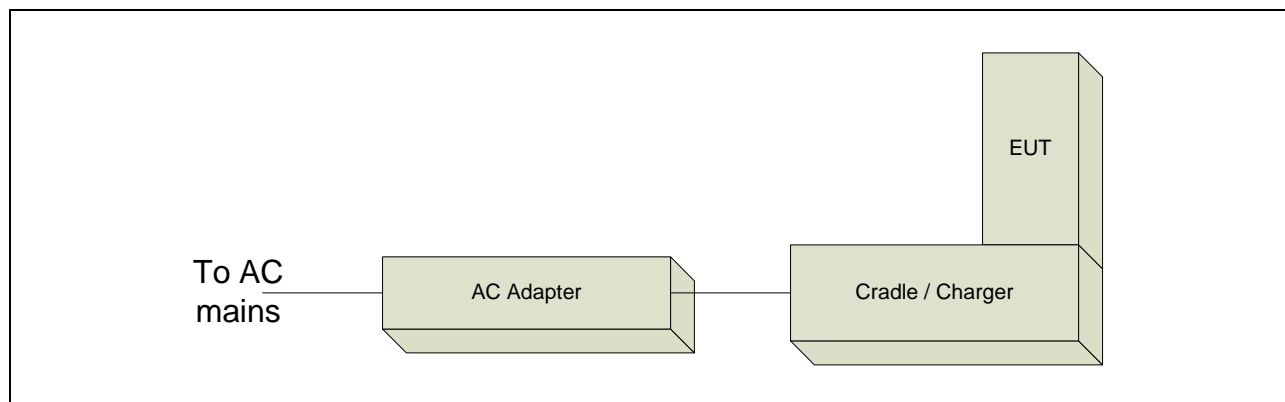
2.3 EUT Description

The EUT is Identity Verification Handheld Computer with RFID.

2.4 Technical Specifications of the EUT

Operating Band:	13.553–13.567 MHz
Operating Frequency:	13.56 MHz
Modulation:	On/Off Keying
Antenna Data:	Integral
Power Supply Requirements:	120 VAC, 60 Hz

2.5 EUT Setup diagram



2.6 Operation of the EUT during testing

The EUT continuously transmits with power applied.

2.7 Modifications incorporated in the EUT

No modifications were made to the EUT during the assessment.

Section 3 : Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.225
Operation within the band 13.110–14.010 MHz

3.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15–30 °C
Humidity range	:	20–75 %
Pressure range	:	86–106 kPa
Power supply range	:	±5 % of rated voltages

3.4 Measurement Uncertainty

Nemko Canada measurement uncertainty has been calculated using guidance of UKAS LAB 34:2003 and TIA-603-B Nov 7, 2002. All calculations have been performed to provide a confidence level of 95 % and can be found in Nemko Canada document MU-003.

3.5 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Cal. Date	Next Cal.
Active Loop Antenna	EMCO	6502	FA001686	July 23/09	July 23/10
Spectrum Analyzer	Rohde & Schwarz	FSP40	FA001920	April 14/09	April 14/10
Temperature Chamber	Thermotron	SM-16C	FA001030	NCR	NCR
Multimeter	Fluke	16	FA001831	Jan 14/09	Jan 14/10
Air probe	Fluke	None	FA001248	NCR	NCR
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU40	FA002071	Nov. 14/08	Nov. 14/09
Bilog	Schaffner	CBL6112B	FA001504	July 25/09	July 25/10
LISN	Rohde & Schwarz	ENV216	FA002023	Sept. 02/08	Sept. 02/09
50 Coax cable	HUBER + SUHNER	None	FA002015	Aug. 05/09	Aug. 05/10
International Power Supply	California Inst.	3001i	FA001021	Jan. 16/09	Jan. 16/10

COU – Calibrate on Use

NCR – No Calibration Required

Section 4 : Results Summary

This section contains the following:

FCC Part 15 Subpart C : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No : not applicable / not relevant.

Y Yes : Mandatory i.e. the apparatus shall conform to these tests.

N/T Not Tested, mandatory but not assessed. (See Report Summary)

4.1 FCC Part 15 Subpart C : Test Results

Part 15	Test Description	Required	Result
15.31(e)	Variation of power supply	Y	PASS
15.207(a)	Powerline Conducted Emissions	Y	PASS
15.215(c)	20 dB Bandwidth	Y	PASS
15.225(a)	Field Strength in the 13.553–13.567 MHz band	Y	PASS
15.225(b)	Field Strength in the 13.410–13.553 MHz and 13.567–13.710 MHz bands	Y	PASS
15.225(c)	Field Strength in the 13.110–13.410 MHz and 13.710–14.010 MHz bands	Y	PASS
15.225(d)	Field Strength of any emissions appearing outside of the 13.110–14.010 MHz band	Y	PASS
15.225(e)	Frequency tolerance of the carrier signal	Y	PASS
15.225(f)	Radio frequency powered tags	N	

Appendix A : Test Results

Clause 15.207(a) Powerline Conducted Emissions

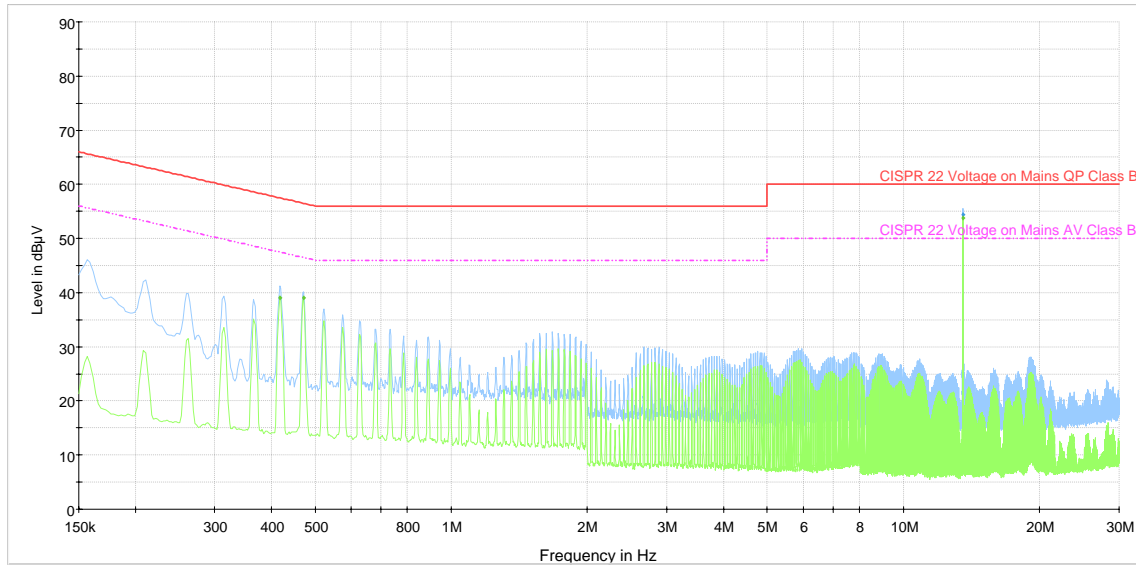
Frequency of Conducted limit (dB μ V)		
Emission (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

Test Results: Pass

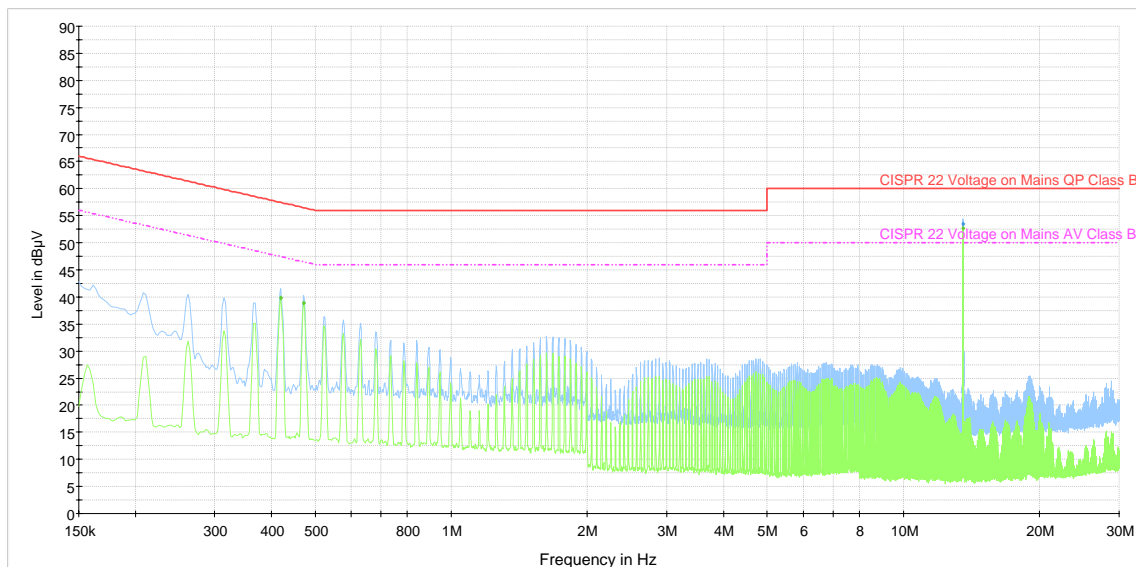
Additional Observations:

All plots were obtained using a sweeping receiver with an IF of 9 kHz using a Peak and Average detector. The plots have been corrected with the cable loss and LISN loss to show compliance.

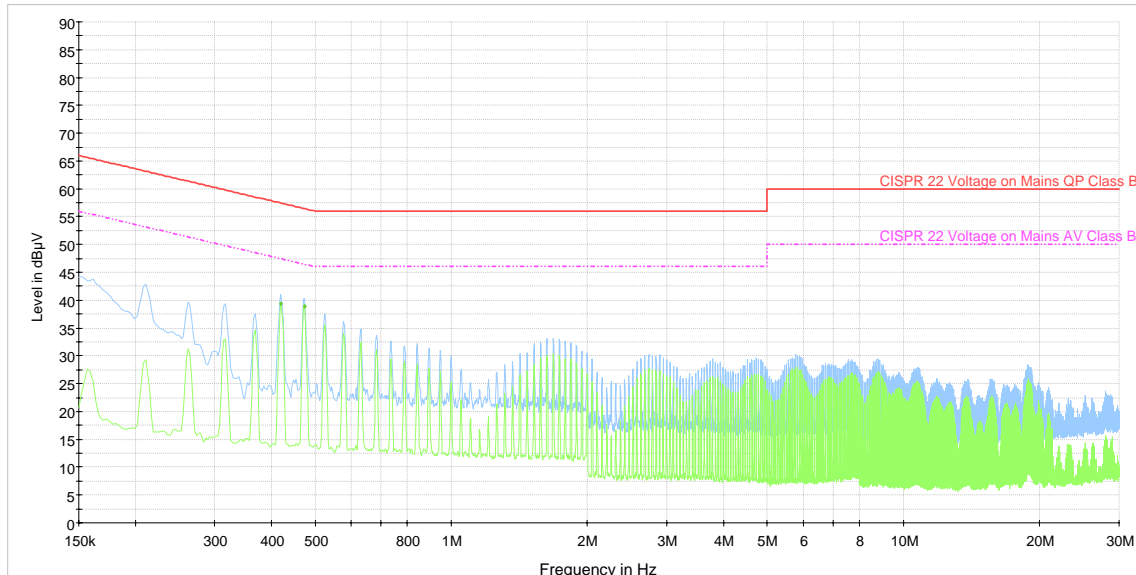
Phase with antenna on



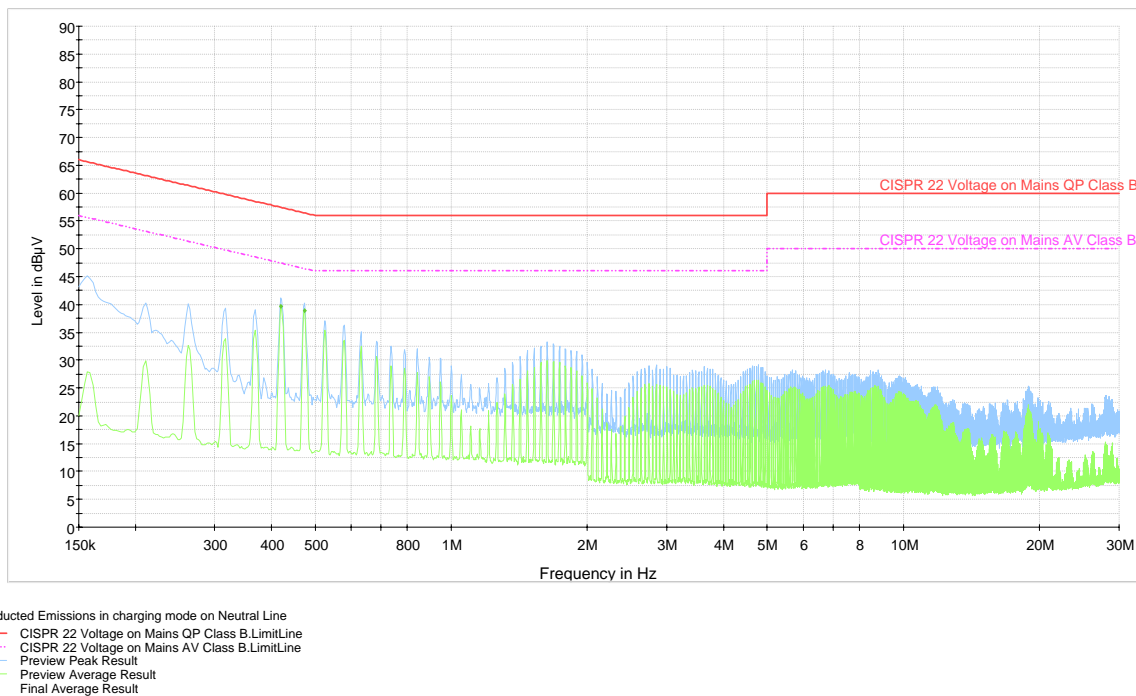
Neutral with antenna on



Phase with antenna off



Neutral with antenna off



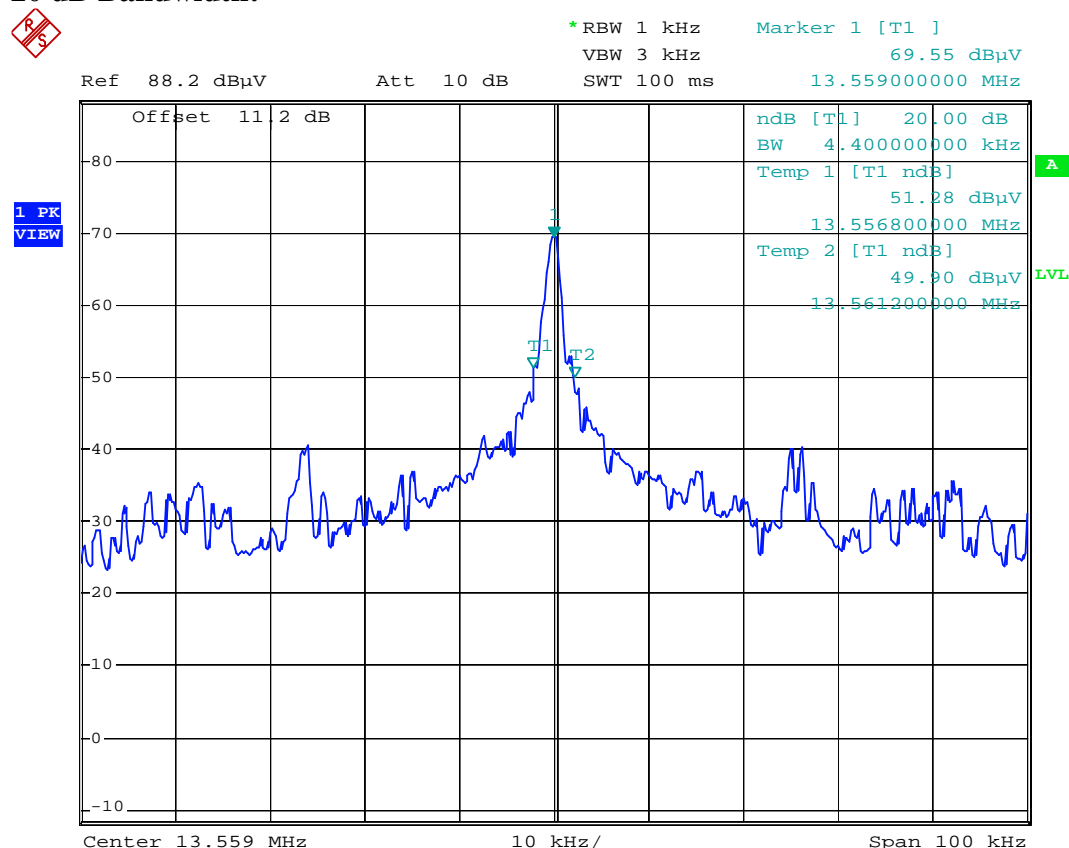
Antenna on								
Frequency (MHz)	Q-Peak Result (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Conductor	Correction (dB)	Margin (dB)	Limit (dBμV)
13.559500	54.5	100.000	9.000	On	Phase	10.4	5.6	60.0
Frequency (MHz)	Average Result (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Conductor	Correction (dB)	Margin (dB)	Limit (dBμV)
0.417750	39.1	100.000	9.000	On	Phase	10.0	8.4	47.5
0.471750	39.0	100.000	9.000	On	Phase	10.1	7.5	46.5
13.559500	53.8	100.000	9.000	On	Phase	10.4	-3.8	50.0
Frequency (MHz)	Q-Peak Result (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Conductor	Correction (dB)	Margin (dB)	Limit (dBμV)
13.559500	53.4	100.000	9.000	On	Neutral	10.5	6.6	60.0
Frequency (MHz)	Average Result (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Conductor	Correction (dB)	Margin (dB)	Limit (dBμV)
0.420000	39.8	100.000	9.000	On	Neutral	10.0	7.6	47.4
0.471750	38.9	100.000	9.000	On	Neutral	10.0	7.6	46.5
13.559500	52.7	100.000	9.000	On	Neutral	10.5	-2.7	50.0
Antenna terminated								
Frequency (MHz)	Average Result (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Conductor	Correction (dB)	Margin (dB)	Limit (dBμV)
0.420000	39.3	100.000	9.000	On	Phase	10.0	8.1	47.4
0.474000	39.0	100.000	9.000	On	Phase	10.1	7.4	46.4
Frequency (MHz)	Average Result (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Conductor	Correction (dB)	Margin (dB)	Limit (dBμV)
0.420000	39.6	100.000	9.000	On	Neutral	10.0	7.8	47.4
0.474000	38.9	100.000	9.000	On	Neutral	10.0	7.5	46.4
Note: Correction factor includes cable loss, LISN, and attenuator.								

Clause 15.215(c) 20 dB Bandwidth

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80 % of the permitted band in order to minimize the possibility of out-of-band operation.

Test Results: Pass

20 dB Bandwidth:



Date: 7.AUG.2009 10:50:03

Clause 15.225(a) Field Strength in the 13.553–13.567 MHz band

The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

Clause 15.225(b) Field Strength in the 13.410–13.553 MHz and 13.567–13.710 MHz bands

Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

Clause 15.225(c) Field Strength in the 13.110–13.410 MHz and 13.710–14.010 MHz bands

Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

Test Results: Pass

Frequency (MHz)	Rcvd Level @ 3m (dBμV)	Ant. Factor (dB)	Cable loss (dB)	Emission @ 3m (dBμV/m)	Distance Corr. (dB)	Emission @ 30m (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Axis
13.353	30.99	11.2	0.2	42.39	40.0	2.39	40.5	38.11	Stand
13.480	28.17	11.2	0.2	39.57	40.0	-0.43	50.5	50.93	Stand
13.560	55.93	11.2	0.2	67.33	40.0	27.33	84.0	56.67	Side
13.560	56.88	11.2	0.2	68.28	40.0	28.28	84.0	55.72	Stand
13.560	40.52	11.2	0.2	51.92	40.0	11.92	84.0	72.08	Flat
13.978	28.17	11.2	0.2	39.57	40.0	-0.43	40.5	40.93	Stand

Additional Observations:

Measurements were made using a 10 kHz/30 kHz RBW/VBW Peak detector @ 3 m.

The EUT was rotated 360° and measured on three orthogonal axis with the loop antenna.

Clause 15.225(d) Field Strength of any emissions appearing outside of the 13.110–14.010 MHz band

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209

15.209(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Results: Pass

No emissions were detected within 20 dB below the limit.

Additional Observations:

The Spectrum was searched from 30 MHz to the 10th Harmonic using Peak Detector with 10 kHz/30 kHz RBW/VBW below 30 MHz, 120 kHz /300 kHz RBW/VBW in 30–1000 MHz range and 1 MHz/3 MHz above 1 GHz.

The EUT was measured on three orthogonal axis.

All measurements were performed at 3 m.

Clause 15.225(e) Frequency tolerance of the carrier signal

The frequency tolerance of the carrier signal shall be maintained within ± 0.01 % of the operating frequency over a temperature variation of -20 °C to $+50$ °C at normal supply voltage, and for a variation in the primary supply voltage from 85 % to 115 % of the rated supply voltage at a temperature of 20 °C. For battery-operated equipment, the equipment tests shall be performed using a new battery.

Test Results: Pass

Conditions	Frequency (Hz)	Frequency error (Hz)	Frequency error (%)	Limit (%)	Margin (%)
+50 °C, Nominal power	13559381	-23	-0.000170	± 0.01	0.009830
+40 °C, Nominal power	13559369	-11	-0.000081	± 0.01	0.009919
+30 °C, Nominal power	13559365	-7	-0.000052	± 0.01	0.009948
+20 °C, +15 % power	13559331	27	0.000199	± 0.01	0.009801
+20 °C, Nominal power	13559358	Reference	Reference	Reference	Reference
+20 °C, -15 % power	13559345	13	0.000096	± 0.01	0.009904
+10 °C, Nominal power	13558998	360	0.002655	± 0.01	0.007345
0 °C, Nominal power	13558832	526	0.003879	± 0.01	0.006121
-10 °C, Nominal power	13559121	237	0.001748	± 0.01	0.008252
-20 °C, Nominal power	13559027	331	0.002441	± 0.01	0.007559

Appendix B : Setup Photographs

Conducted Emissions Setup:

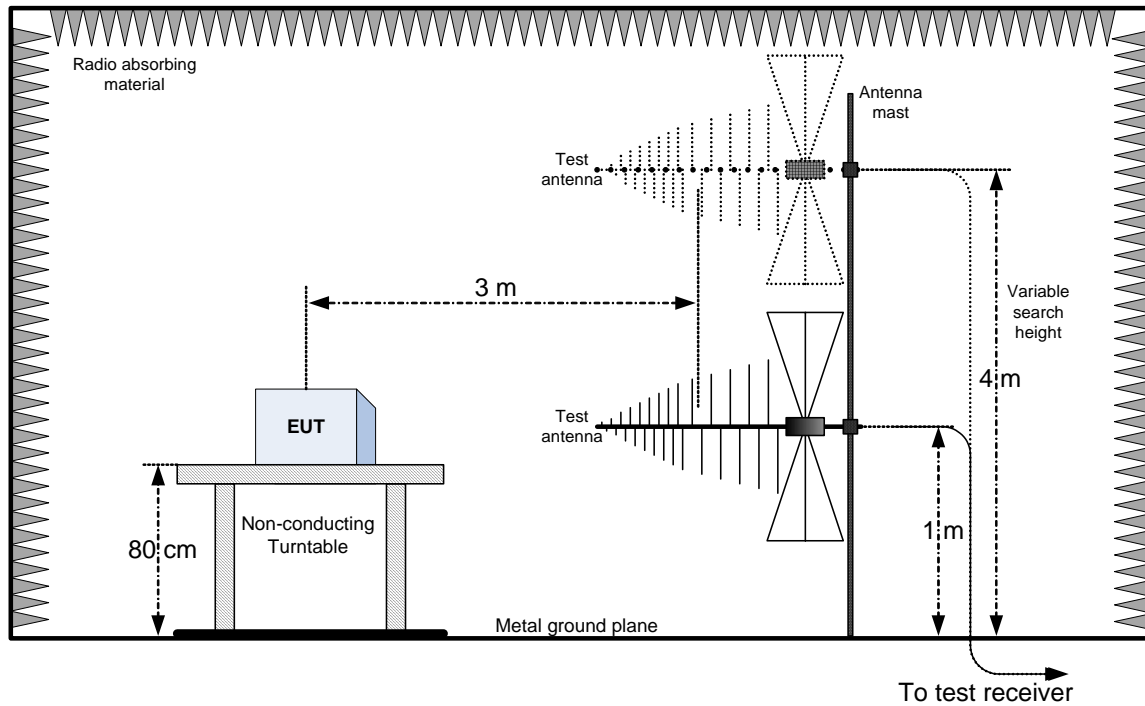


Spurious Emissions Setup:

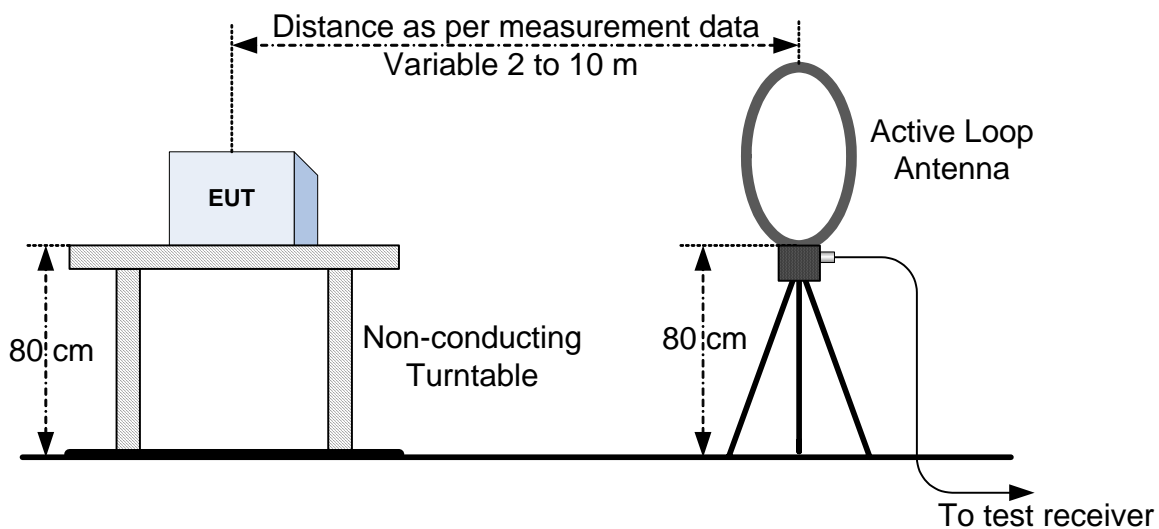


Appendix C : Block Diagram of Test Setups

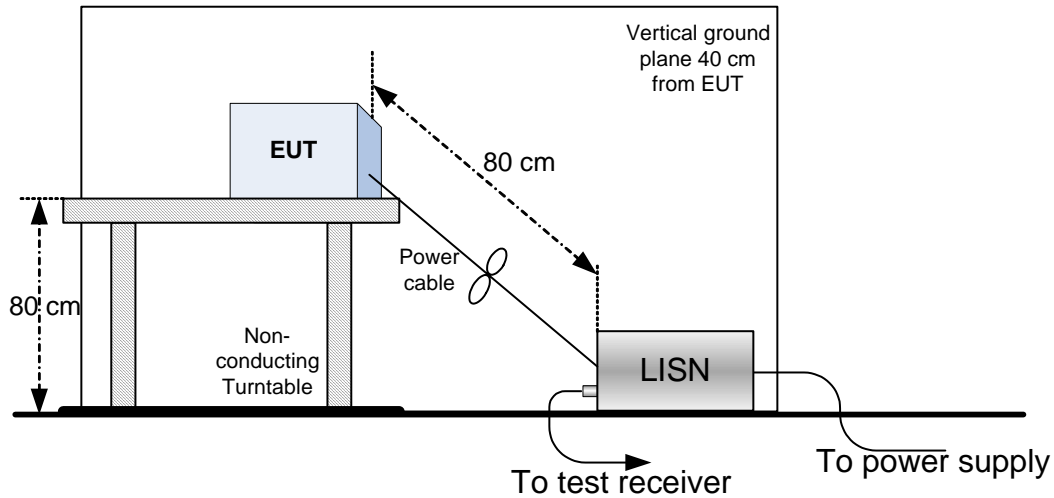
Radiated Emissions above 30 MHz Test Site



Radiated Emissions below 30 MHz Test Site



Conducted Emissions Test Site



Frequency Stability

