

TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Remote Diagnostic Technologies Ltd, Tempus IC 00-1001

To: 47CFR15.107 and 47CFR15.109

Test Report Serial No: RFI-EMC-RP87862JD01A V3.0

Version 3.0 supersedes all previous versions

This Test Report Is Issued Under the Authority of John Newell, Group Quality Manager	
Checked By:	Andy Graham
Signature:	
Date of Issue:	29 April 2013

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1. CUSTOMER DETAILS

Company Name:	Remote Diagnostic Technologies Ltd
Address:	The Old Coach House The Avenue Farleigh Wallop Hampshire RG25 2HT United Kingdom

2. SUMMARY OF TESTING

2.1. Test Specification

Reference:	47CFR15.107 and 47CFR15.109
Title:	Code of Federal Regulations - Title 47 (Telecommunication) 2010: Part 15 (Radio Frequency Devices) - Subpart B (Unintentional Radiators) - Sections 15.107 and 15.109
Site Reference:	209735

2.2. Summary of Test Results

Clause	Measurement Type	Applicability	Result
15.109	Radiated Emissions (Enclosure)	Y	
15.107	Conducted Emissions (AC Mains Input / Output Ports)	Y	

KEY: = Complied = Did not comply

2.3. Location of Testing

All the measurements described in this report were performed at the premises of RFI Global Services Ltd, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire RG24 8AH.

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above, nor from the requirements defined in the basic standards called up within it.

3. EQUIPMENT UNDER TEST (EUT)

3.1. Description of EUT

The EUT was a Patient Monitoring System incorporating GSM, Wi-Fi and *Bluetooth* connectivity.

3.2. Identification of Equipment under Test (EUT)

ID#	Description	Brand Name	Model No	Serial No	IMEI
1	Patient Monitor	Tempus IC	00-1001	000673	353681045991114
2	AC Charger	Cincon Electronics	TR60M12	60120-0015024	Not Applicable

3.3. Port Identification

Port	Description	Type
1	Enclosure	-
2	USB	USB Type B
3	Headset Audio In/Out	2.5mm Audio/Mic Jack
4	Ethernet	RJ45
5	Patient Monitoring Interface (Cardio)	Proprietary
6	Patient Monitoring Interface (Respiratory)	Proprietary
7	Patient Monitoring Interface (Pulse Oximeter)	Proprietary
8	DC Power	Barrel

3.4. Operating Modes

Mode Reference	Definition
Normal Operation	The EUT was powered on and running patient monitoring software. It was connected to a module designed to simulate the electrical properties of a typical human body. The internal GSM, <i>Bluetooth</i> and Wi-Fi modules were powered on and searching for available networks.

3.5. Modifications

NOTE: No modifications were made to the EUT during the course of testing.

3.6. Additional Information Related to Testing

Equipment Category:	Medical
Intended Operating Environment:	Medical (Theatre, Field, Vehicular)
Cycle Time:	< 1 s
Power Supply Requirement(s):	7.4 VDC (internal battery); 12 VDC (via AC charger)
Weight:	2.8 kg
Dimensions:	250 x 200 x 90 mm
Antenna Type	Integral
Hardware Version Number:	DMRI issue 59 (with AmbiCom WiFi card)
Software Version Number:	V 02.07.005
FCC ID Number:	GSM Module: ROSTEMPUSIC-2 WLAN Module: P5T-WL54SDIO <i>Bluetooth</i> Module: ROSTEMPUSIC-BT
Highest Internally Generated Operating Frequency:	2.484 GHz

4. SUPPORT EQUIPMENT

4.1. Identification of Support Equipment

Description	Manufacturer	Model No	Serial No
EMC Test Patient Load	Not Applicable	Not Stated	Not Stated
USB Flash Drive	Not Stated	Not Stated	Not Stated
LoFlo Sidestream Caponometer	Tempus IC	Not Stated	Not Stated
Headset	Not Stated	Not Stated	Not Stated
Network Switch	FireBrick	WFI1740	1740-1395-0162

4.2. Interconnecting Cables

Cable Type	Shielded	Length	Ferrite	Connection 1	Connection 2
Multi-core	No	0.25 m	No	EUT	LoFlo Sidestream Caponometer
Multi-core	No	1.35 m	No	EUT	EMC Test Patient Load
Multi-core Audio	Yes	1.30 m	No	EUT	Headset
Ethernet	No	1.80 m	Yes	EUT	Network Switch

5. MONITORING PERFORMANCE

5.1. Overview

No immunity testing was performed; therefore performance criteria were not applicable.

5.2. Monitoring EUT Performance during Testing

For the purposes of testing, the term “<i>operate as intended</i>” was defined as:	The EUT was powered on and running patient monitoring software. It was connected to a module designed to simulate the electrical properties of a typical human body. The internal GSM, <i>Bluetooth</i> and Wi-Fi modules were powered and searching for available networks
For the purposes of testing, an “<i>unintentional response</i>” was defined as:	Not Applicable
Method used to determine whether user control functions and stored data were lost after the EMC exposure:	Not Applicable
Method used to verify that a communications link was established and maintained (if appropriate):	Not Applicable
Method of assessment of level of performance or degradation of performance during and/or after EMC exposure:	Not Applicable

6. MEASUREMENT UNCERTAINTY

6.1. Overview

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement regarding the uncertainty of approximation.

The measurement uncertainty may need to be taken into account when interpreting the test results included within this test report.

6.2. Method of calculation

The methods used to calculate the uncertainties included within this test report are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the United Kingdom Accreditation Service (UKAS) is followed.

7. MEASUREMENTS, EXAMINATIONS AND DERIVED RESULTS

7.1. General Comments

7.1.1. This section contains the test result sheets for the measurements listed in Section 2.2. *Summary of Test Results* (above).

7.1.2. The measurement uncertainties stated in the test result sheets were calculated in accordance with documented best practice and represent a confidence level of 95%. Where only confidence level is given, it has been demonstrated that the relevant items of test equipment used meet the specified requirements in the standard with at least this level of confidence.

7.1.3. Please refer to Section 6. *Measurement Uncertainty* on page 10 for details of our treatment of measurement uncertainty.

RADIATED EMISSIONS - TEST RESULTS

This test is covered by the scope of RFI's UKAS Accreditation under ISO/IEC 17025: 2005.

GENERAL INFORMATION

RFI JOB NUMBER:	87862JD01	TEST SITE ID:	Site 1
EUT:	Tempus IC 00-1001	TEMPERATURE:	27 °C to 28 °C
TEST ENGINEER:	Graeme Morris	RELATIVE HUMIDITY:	30 % to 30 %
DATE OF TEST:	25 May 2012	ATMOSPHERIC PRESSURE:	1022mb to 1021 mb
FIELD TYPE:	Electric Field	MEASUREMENT DISTANCE:	3 Metres
UNCERTAINTY:	< 1 GHz: ± 4.78 dB > 1 GHz: ± 4.37 dB	EQUIPMENT CLASS:	Class B
MEASUREMENT UNITS:	dB μ V/m	TEST ENVIRONMENT:	Test Site

TEST SPECIFICATION DETAILS

The EUT has been configured and tested in accordance with the methods and procedures detailed within the following basic standard:

REFERENCE:	ANSI C63.4:2009
TITLE:	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

COMMENTS

Measurements below 1 GHz were performed in a semi-anechoic chamber at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

Pre-scans and final measurements above 1 GHz were performed in a semi-anechoic chamber at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

DEVIATIONS FROM TEST SPECIFICATION

There were no deviations from the test configuration and measurement arrangements defined in the test specification (identified above).

EUT RELATED

OPERATING MODE:	Normal Operation
FUNCTION(S) MONITORED:	Not Applicable

MEASUREMENT RESULTS

No.	Frequency (MHz)	Polarity	Detector	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Graph No.	Result
1	78.005	Vertical	Quasi-Peak	27.3	40.0	12.7	003	Complied
2	120.001	Horizontal	Quasi-Peak	29.6	43.5	13.9	003	Complied
3	155.982	Vertical	Quasi-Peak	22.7	43.5	20.8	003	Complied
4	180.011	Horizontal	Quasi-Peak	25.0	43.5	18.5	003	Complied
5	257.737	Horizontal	Quasi-Peak	23.9	46.0	22.1	003	Complied
6	364.007	Vertical	Quasi-Peak	37.0	46.0	9.0	003	Complied
7	470.228	Vertical	Quasi-Peak	26.2	46.0	19.8	003	Complied
8	935.992	Horizontal	Quasi-Peak	36.2	46.0	9.8	003	Complied
9	1000 to 12750	Refer to Note 1					004 to 007	Complied

NOTES

1	No emissions were noted above the noise floor of the measurement system. Therefore no further measurements were made.
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TEST EQUIPMENT USED

RFID	INSTRUMENT DESCRIPTION	MODEL NUMBER	CALIBRATION DUE	INTERVAL
K0001	5 m Semi-Anechoic Chamber	Not Applicable	29 May 2012	12
A2105	Single Control Unit	SCU	Calibration not required	
A2102	Multiple Control Device	NCD	Calibration not required	
M1273	EMI Test Receiver	ESIB 26	03 Feb 2013	12
C1410	RF cable	239-0088-1000	09 Nov 2012	12
A1834	N-Type Attenuator	8491B	29 Jan 2013	12
G0543	Amplifier	310N	13 Jul 2012	03
A1227	Pre Amp	8449B	13 Jul 2012	03
C1415	RF cable	239-0088-3000	09 Nov 2012	12
A2107	Positioning Controller	RSC	Calibration not required	
A2106	Site 1 Turntable	TT 3.0-3t	Calibration not required	
A553	Bi-log Antenna	CBL6111A	15 Feb 2013	12
C1303	Rosenberger Cable	FA210A1080005050	13 Apr 2013	12
A2103	Tilt Antenna Mast	TAM 4.0-E	Calibration not required	
A1817	Horn Antenna	3115	12 May 2013	12
C1409	RF cable	239-0088-5000	09 Nov 2012	12

CONDUCTED EMISSIONS - TEST RESULTS

This test is covered by the scope of RFI's UKAS Accreditation under ISO/IEC 17025: 2005.

GENERAL INFORMATION

RFI JOB NUMBER:	87862JD01	TEST SITE ID:	Site 8
EUT:	Tempus IC 00-1001	TEMPERATURE:	24 °C to 24 °C
TEST ENGINEER:	Graeme Morris	RELATIVE HUMIDITY:	46 % to 46 %
DATE OF TEST:	25 May 2012	ATMOSPHERIC PRESSURE:	1023 mb to 1023 mb
UNCERTAINTY:	± 4.17 dB	EQUIPMENT CLASS:	Class B
CATEGORY:	Not Applicable	MEASUREMENT METHOD:	LISN (AC)

TEST SPECIFICATION DETAILS

The EUT has been configured and tested in accordance with the methods and procedures detailed within the following basic standard:

REFERENCE:	ANSI C63.4:2009
TITLE:	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

COMMENTS

None

DEVIATIONS FROM TEST SPECIFICATION

There were no deviations from the test configuration and measurement arrangements defined in the test specification (identified above).

EUT RELATED

OPERATING MODE:	Normal Operation
FUNCTION(S) MONITORED:	Not Applicable

MEASUREMENT RESULTS

No.	Frequency (MHz)	Line	Detector	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Graph No.	Result
1	0.186	Live 1	Quasi-Peak	50.3	64.2	13.9	001	Complied
2	0.375	Live 1	Quasi-Peak	46.6	58.4	11.8	001	Complied
3	0.843	Live 1	Quasi-Peak	46.3	56.0	9.7	001	Complied
4	1.127	Live 1	Quasi-Peak	45.4	56.0	10.6	001	Complied
5	1.595	Live 1	Quasi-Peak	45.9	56.0	10.1	001	Complied
6	2.625	Live 1	Quasi-Peak	45.9	56.0	10.1	001	Complied
7	3.093	Live 1	Quasi-Peak	46.2	56.0	9.8	001	Complied
8	4.781	Live 1	Quasi-Peak	46.3	56.0	9.7	001	Complied
9	14.055	Live 1	Quasi-Peak	37.5	60.0	22.5	001	Complied
10	0.186	Live 1	Average (CISPR)	48.2	54.2	6.0	001	Complied
11	0.375	Live 1	Average (CISPR)	46.1	48.4	2.3	001	Complied
12	0.843	Live 1	Average (CISPR)	45.7	46.0	0.3	001	Complied
13	1.127	Live 1	Average (CISPR)	45.5	46.0	0.5	001	Complied
14	1.595	Live 1	Average (CISPR)	45.0	46.0	1.0	001	Complied
15	2.625	Live 1	Average (CISPR)	44.7	46.0	1.3	001	Complied

MEASUREMENT RESULTS

No.	Frequency (MHz)	Line	Detector	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Graph No.	Result
16	3.093	Live 1	Average (CISPR)	44.9	46.0	1.1	001	Complied
17	4.781	Live 1	Average (CISPR)	42.4	46.0	3.6	001	Complied
18	14.150	Live 1	Average (CISPR)	34.5	50.0	15.5	001	Complied
19	0.186	Neutral	Quasi-Peak	48.6	64.2	15.6	002	Complied
20	1.127	Neutral	Quasi-Peak	39.4	56.0	16.6	002	Complied
21	2.157	Neutral	Quasi-Peak	40.9	56.0	15.1	002	Complied
22	2.625	Neutral	Quasi-Peak	42.2	56.0	13.8	002	Complied
23	4.124	Neutral	Quasi-Peak	45.4	56.0	10.6	002	Complied
24	4.313	Neutral	Quasi-Peak	46.0	56.0	10.0	002	Complied
25	4.970	Neutral	Quasi-Peak	46.0	56.0	10.0	002	Complied
26	13.961	Neutral	Quasi-Peak	40.0	60.0	20.0	002	Complied
27	0.186	Neutral	Average (CISPR)	44.5	54.2	9.7	002	Complied
28	1.127	Neutral	Average (CISPR)	41.3	46.0	4.7	002	Complied
29	2.157	Neutral	Average (CISPR)	40.3	46.0	5.7	002	Complied
30	2.625	Neutral	Average (CISPR)	40.2	46.0	5.8	002	Complied
31	4.124	Neutral	Average (CISPR)	43.5	46.0	2.5	002	Complied
32	4.313	Neutral	Average (CISPR)	42.6	46.0	3.4	002	Complied
33	4.965	Neutral	Average (CISPR)	43.0	46.0	3.0	002	Complied
34	14.244	Neutral	Average (CISPR)	41.8	50.0	8.2	002	Complied

NOTES

N/A	During measurement the engineer did not record any specific notes relevant to report.
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TEST EQUIPMENT USED

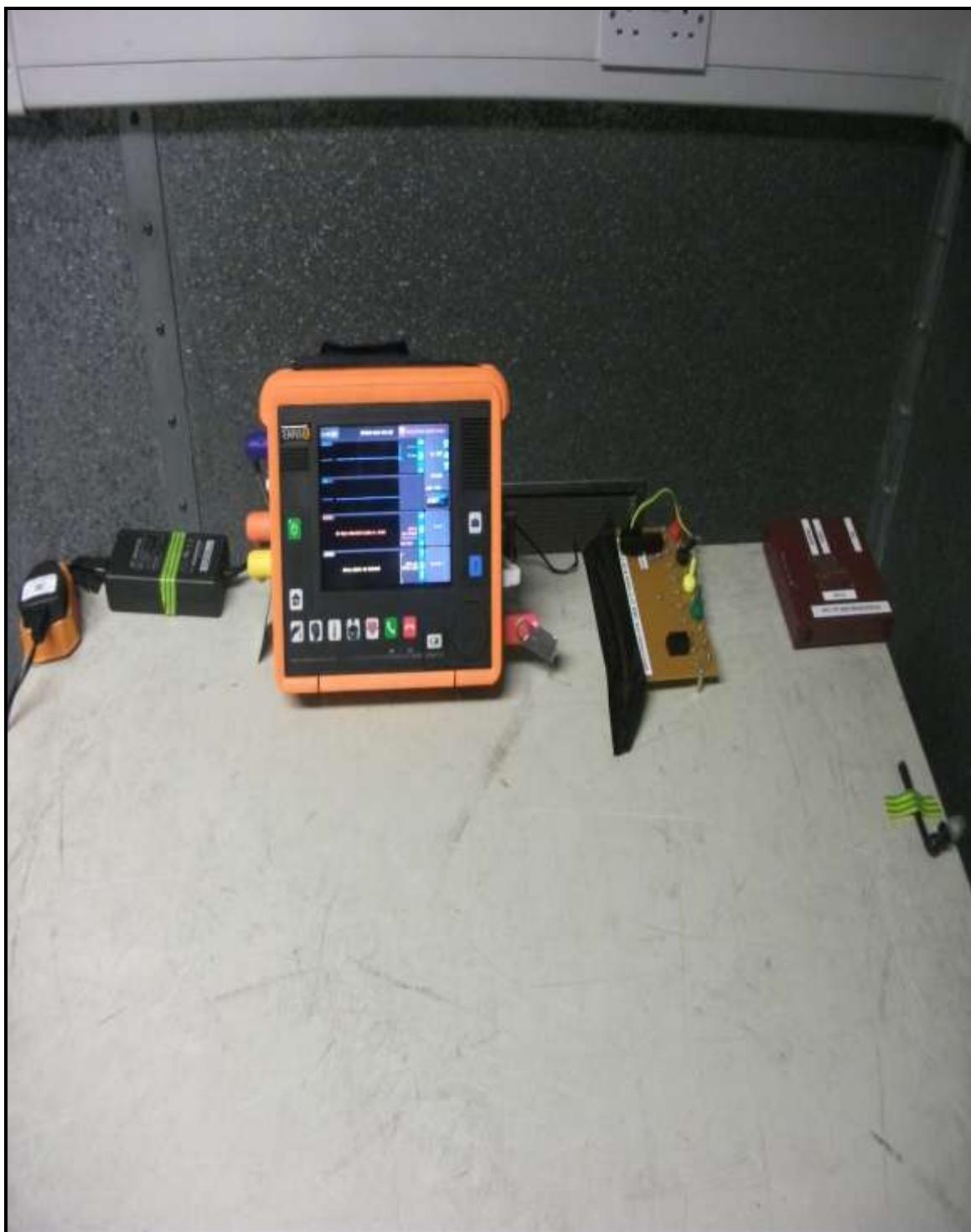
RFI ID	INSTRUMENT DESCRIPTION	MODEL NUMBER	CALIBRATION DUE	INTERVAL
K0008	Conducted Emissions / RF immunity Laboratory	Not Applicable	Calibration not required	
M1379	Test Receiver	ESIB7	20 Sep 2012	12
A067	Line Impedance Stabilization Network	ESH3-Z5	02 Jun 2012	12
C455	Cable	RG142XX-001-RFIB	13 Feb 2013	12
A1830	N-Type Pulse Limiter	ESH3-Z2	25 Feb 2013	12
A2026	Comparison Noise Emitter	CNE V	30 Sep 2012	12

8. PHOTOGRAPHS OF EUT

This section contains the following photographs:

Photo Reference Number	Title
PHT\87862JD01\001	Test Configuration Photograph - FCC Conducted 001
PHT\87862JD01\002	Test Configuration Photograph - FCC Conducted 002
PHT\87862JD01\003	Test Configuration Photograph - FCC Conducted 003
PHT\87862JD01\004	Test Configuration Photograph - FCC Radiated 001
PHT\87862JD01\005	Test Configuration Photograph - FCC Radiated 002

PHT\87862JD01\001 - Test Configuration Photograph - FCC Conducted 001



PHT\87862JD01\002 - Test Configuration Photograph - FCC Conducted 002



PHT\87862JD01\003 - Test Configuration Photograph - FCC Conducted 003



PHT\87862JD01\004 - Test Configuration Photograph - FCC Radiated 001



PHT\87862JD01\005 - Test Configuration Photograph - FCC Radiated 002



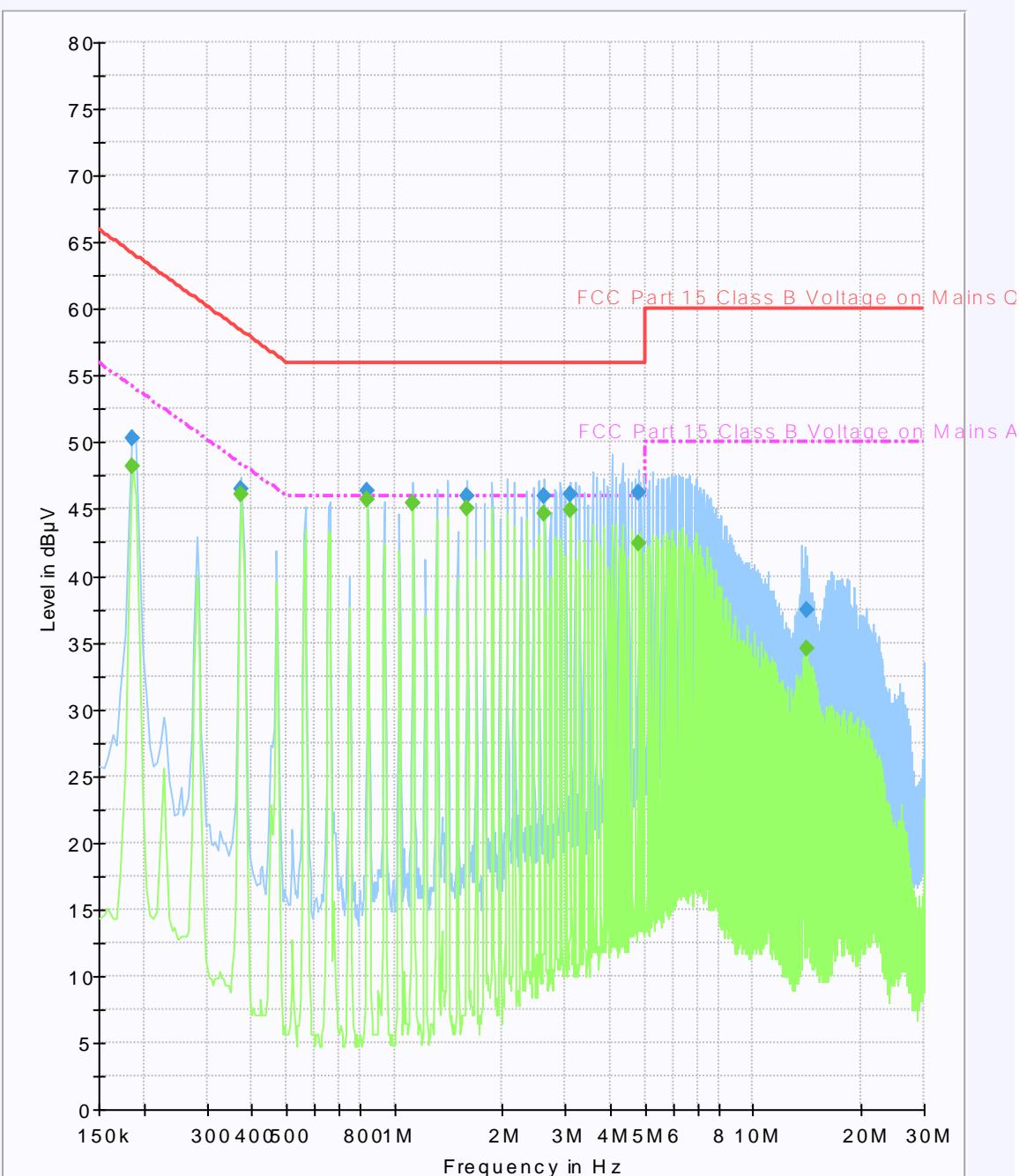
9. GRAPHICAL TEST RESULTS

9.1. This section contains the graphical results for the measurements listed in Section 2.2. *Summary of Test Results* (above).

Graph Reference Number	Title
GPH\87862JD01\001	Conducted Emissions - Live Line Pre-Scan (150 kHz to 30 MHz)
GPH\87862JD01\002	Conducted Emissions - Neutral Line Pre-Scan (150 kHz to 30 MHz)
GPH\87862JD01\003	Radiated Emissions Pre-Scan (30 MHz to 1000 MHz)
GPH\87862JD01\004	Radiated Emissions Pre-Scan (1000 MHz to 4000 MHz)
GPH\87862JD01\005	Radiated Emissions Pre-Scan (4000 MHz to 7000 MHz)
GPH\87862JD01\006	Radiated Emissions Pre-Scan (7000 MHz to 10000 MHz)
GPH\87862JD01\007	Radiated Emissions Pre-Scan (10000 MHz to 12750 MHz)

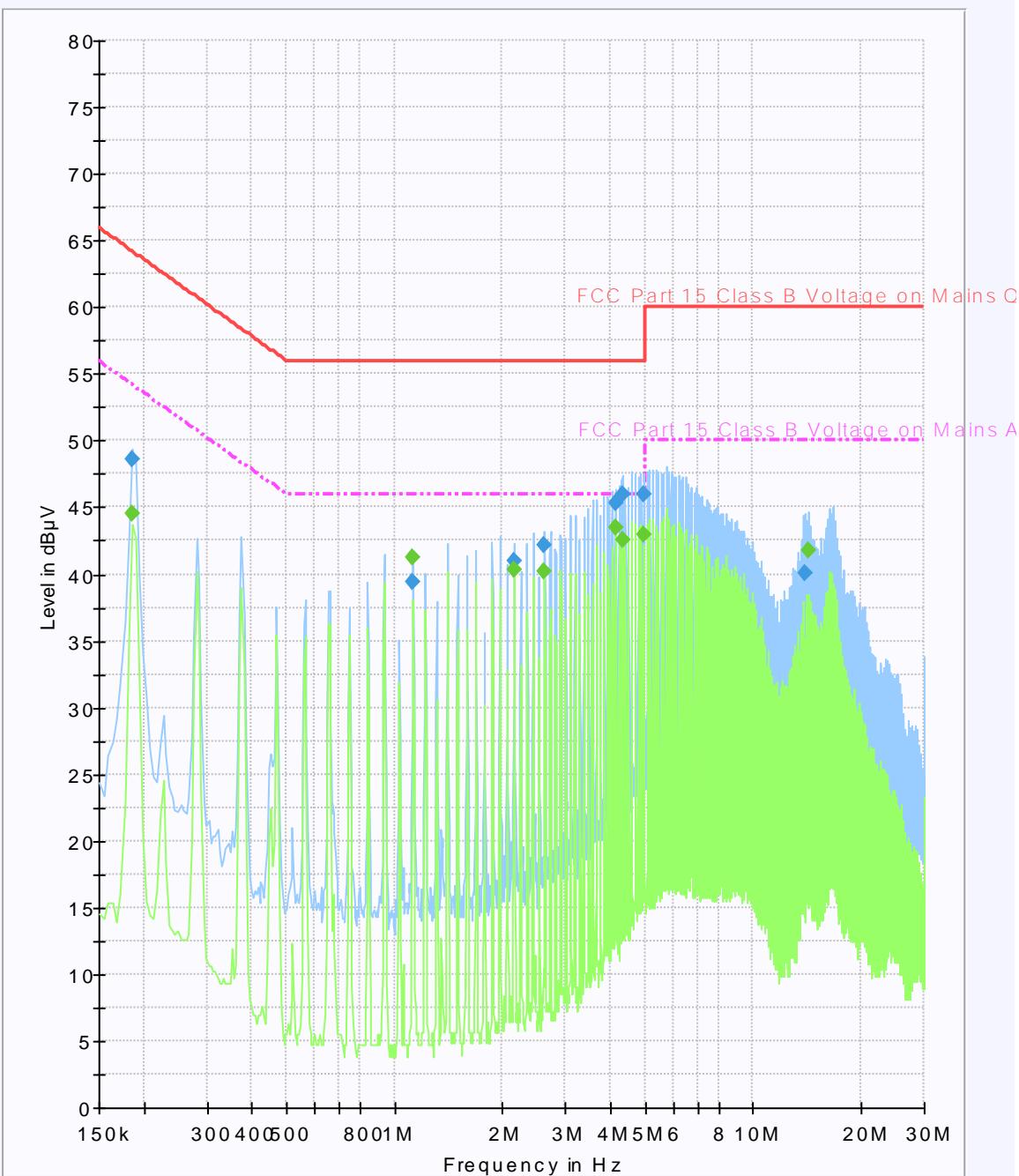
GPH\87862JD01\001

FCC Part 15 Class B Voltage with 2-Line-LISN Live



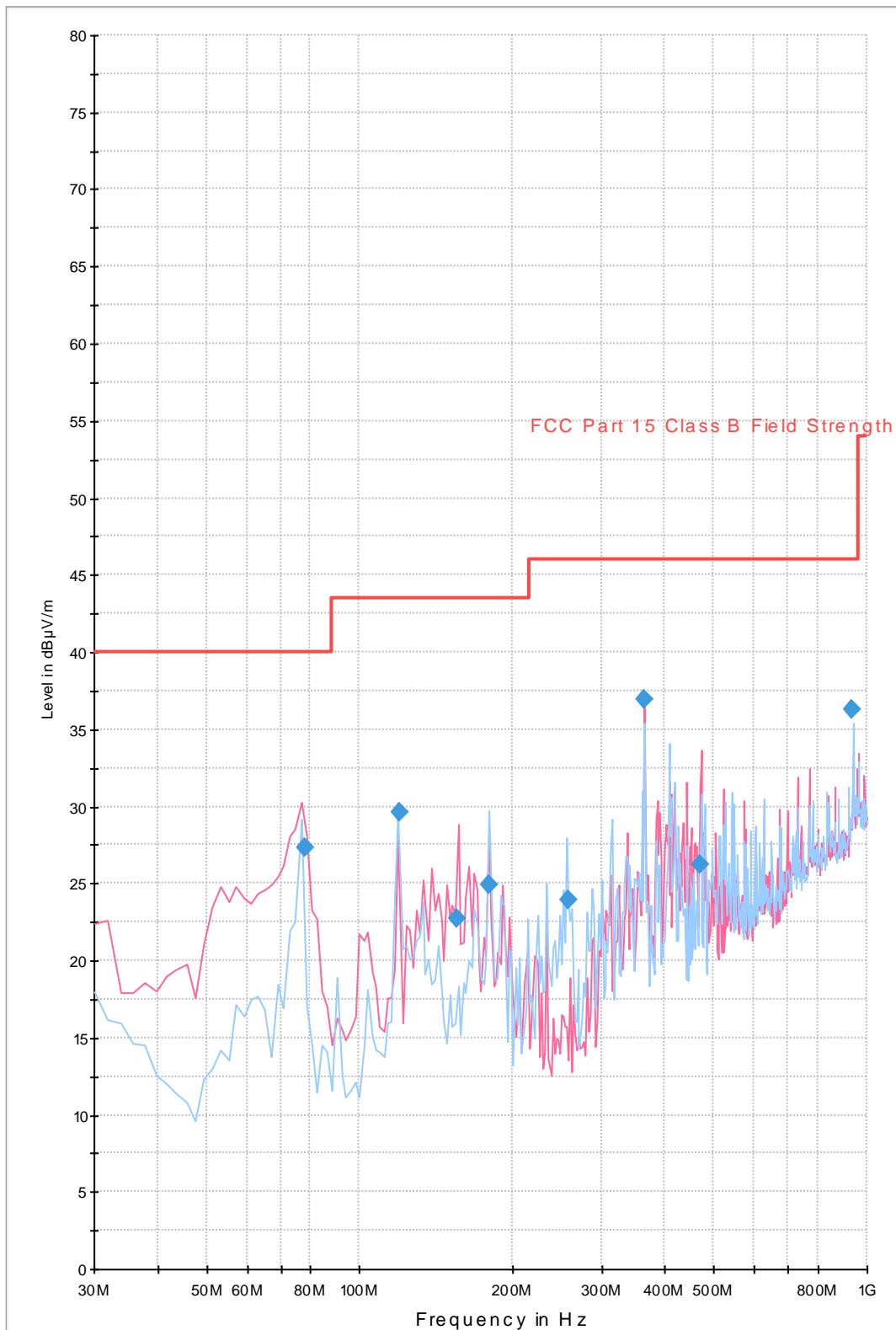
GPH\87862JD01\002

FCC Part 15 Class B Voltage with 2-Line-LISN Neutral



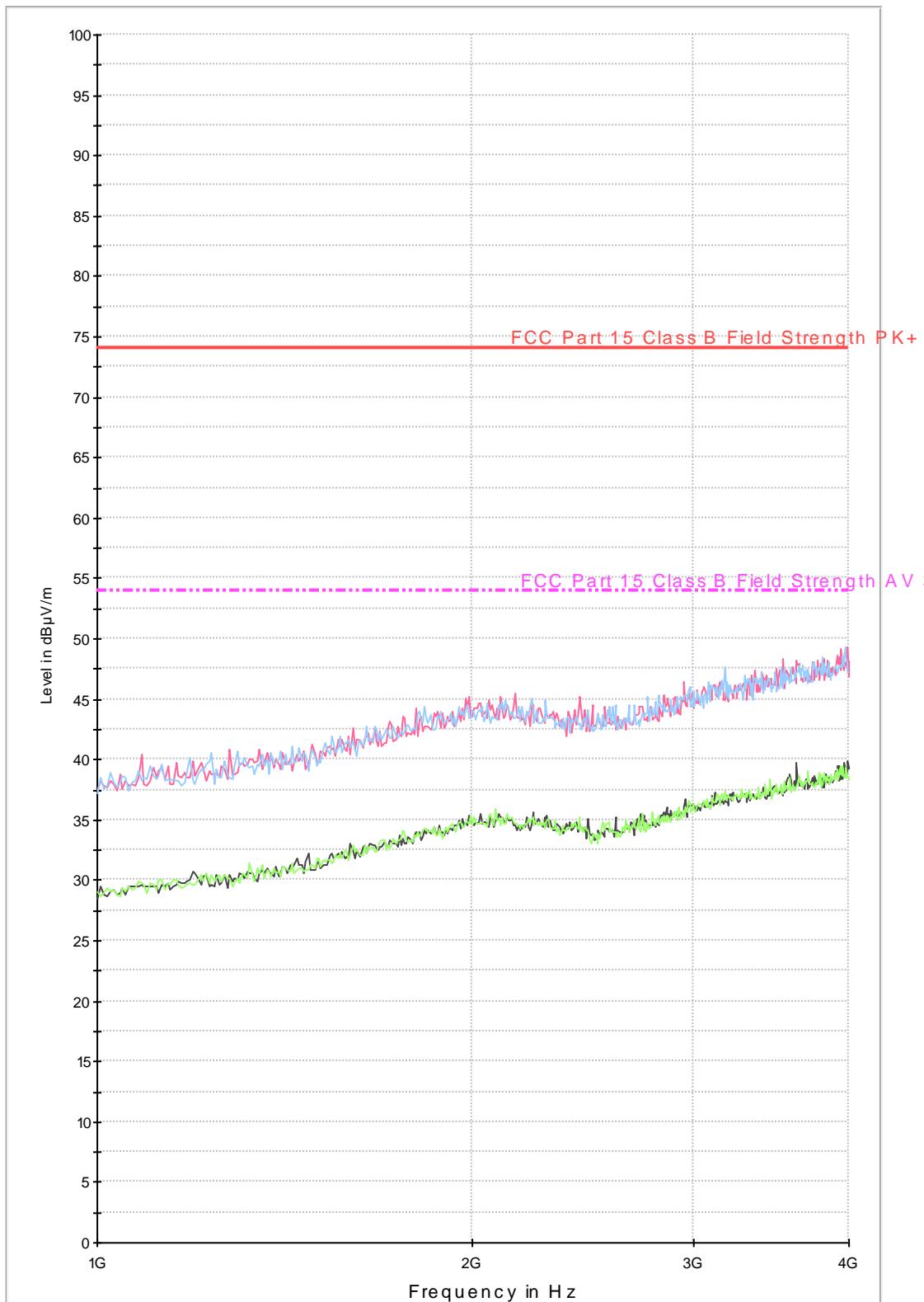
GPH\87862JD01\003

FCC Part 15.109 Radiated Emissions Class B 30MHz-1GHz 3m



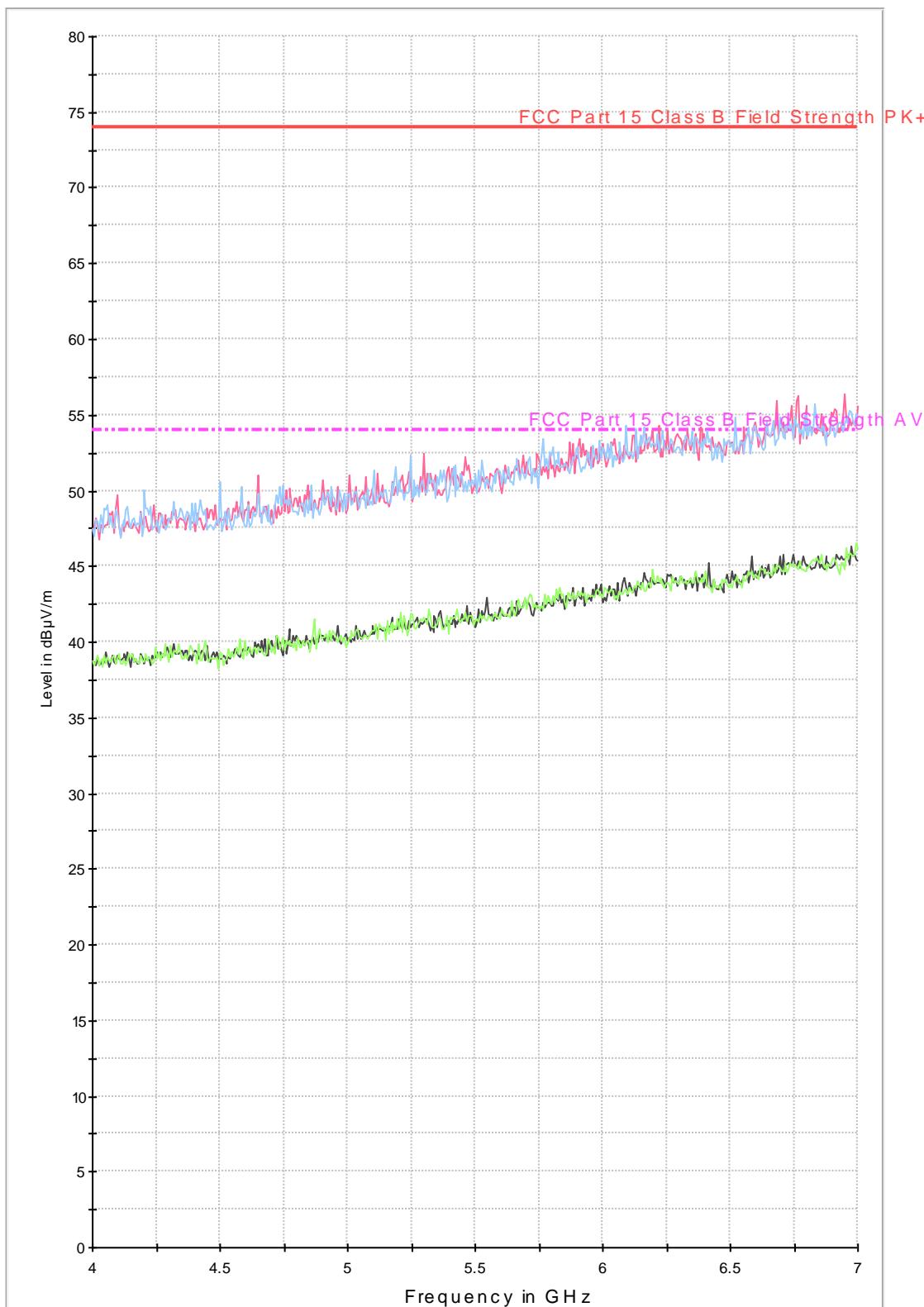
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FCC Part 15.109 Radiated Emissions Class B 1-4GHz



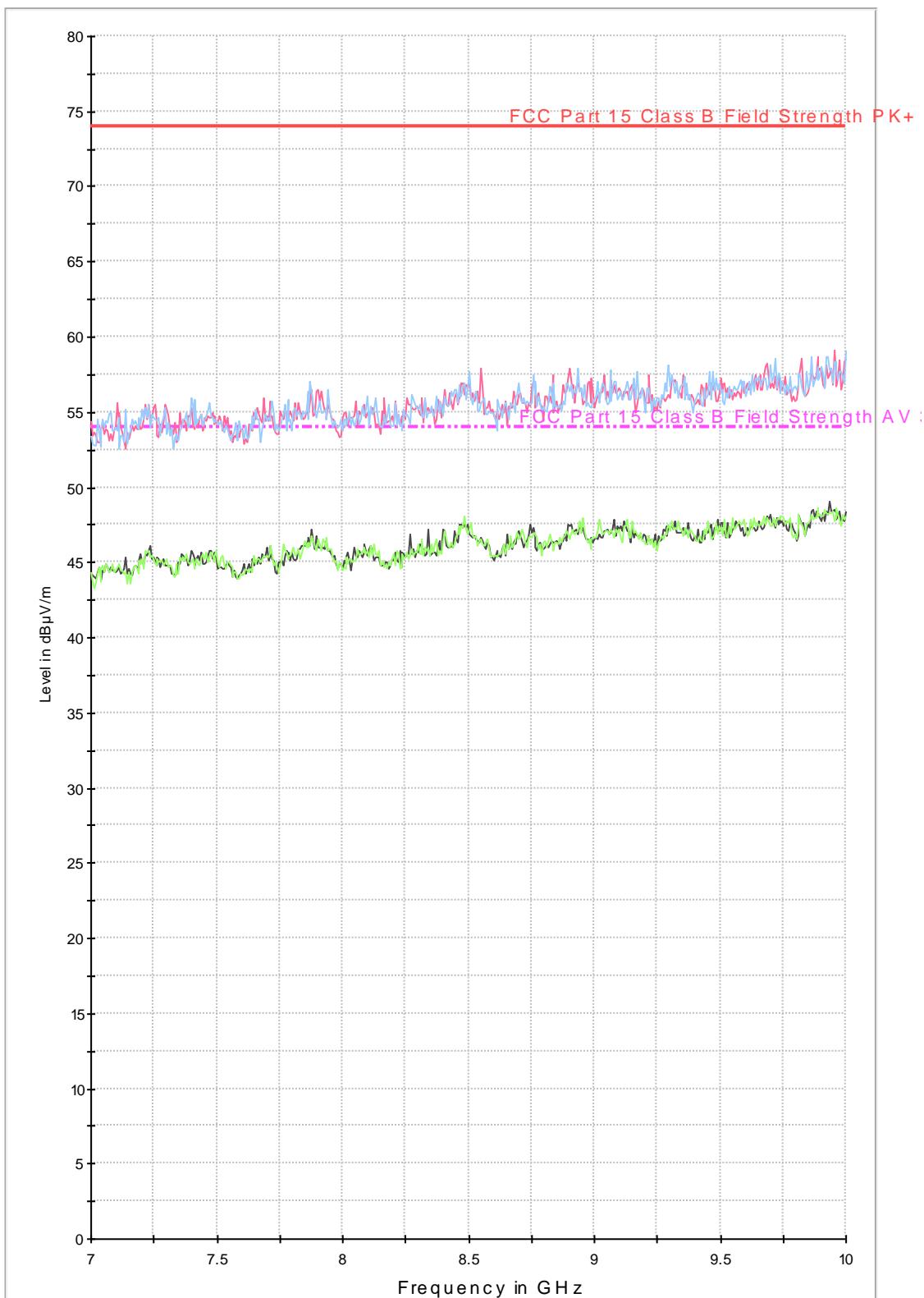
GPH\87862JD01\005

FCC Part 15.109 Radiated Emissions Class B 4-7GHz



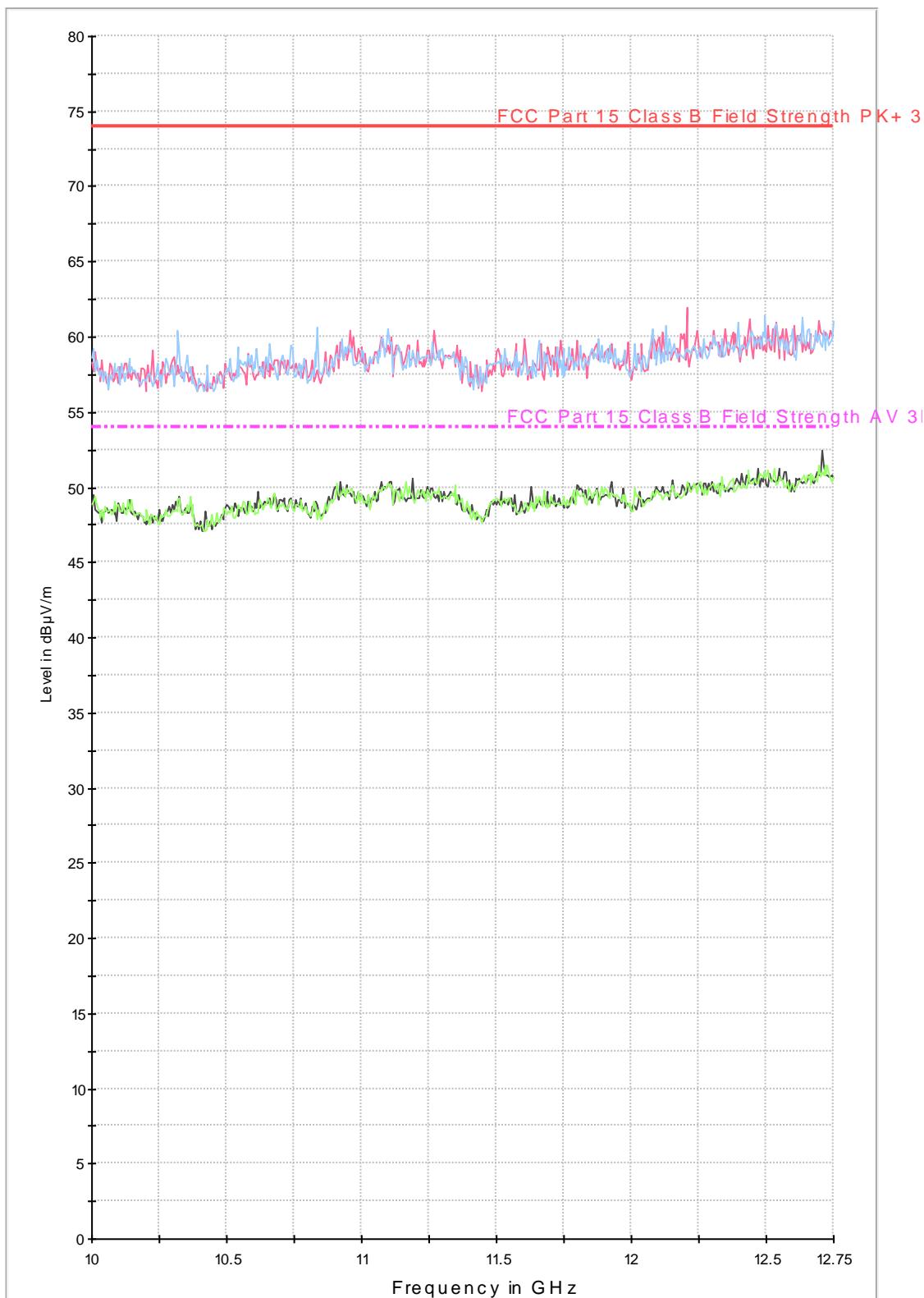
GPH\87862JD01\006

FCC Part 15.109 Radiated Emissions Class B 7-10GHz



GPH\87862JD01\007

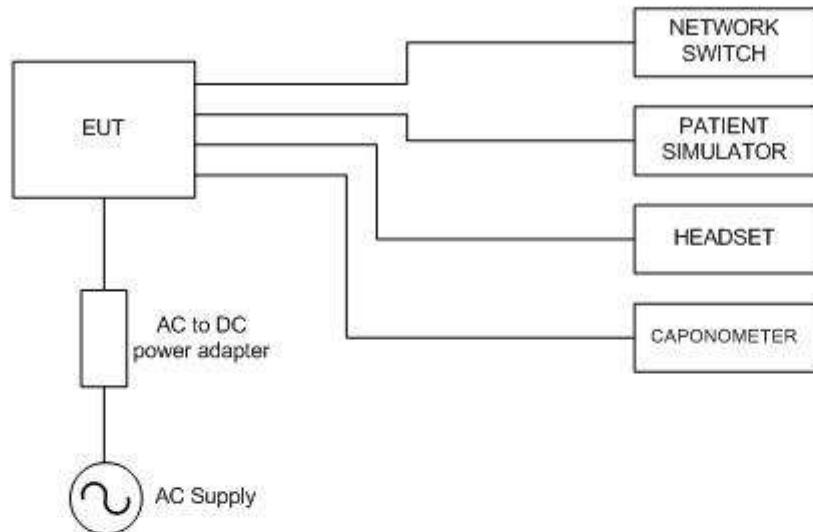
FCC Part 15.109 Radiated Emissions Class B 10-12.75GHz



10. TEST CONFIGURATION DRAWING

10.1. This section contains the Test Configuration Drawings for the measurements listed in Section 7: Measurements, Examinations and Derived Results.

Test Configuration Reference Number	Title
DRG\87862JD01\001	Schematic diagram of the EUT, support equipment and interconnecting cables used for the test

DRG\87862JD01\001 - Schematic diagram of the EUT, support equipment and interconnecting cables used for the test**Configuration of EUT and Local Support Equipment****Configuration of Remote Support Equipment**

11. REPORT REVISION HISTORY

11.1. This section contains the report revision history.

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version.
2.0	7	3.6	Incorrect FCC ID for the Tempus IC amended. ROSTEMPUSIC-1 changed to ROSTEMPUSIC-2 FCC ID for the GSM module deleted.