

FCC Part 15B

Measurement and Test Report

For

TOPICON HK LTD

**Room 2113-2114, Tower C, Huangdu Plaza, Yitian Road, Futian District,
Shenzhen, China**

FCC ID: 2AHAF-MDT7P

FCC Rule(s):	<u>FCC Part 15 Subpart B</u>
Product Description:	<u>GPS product</u>
Tested Model:	<u>MDT7P</u>
Report No.:	<u>STR16108158I-4</u>
Tested Date:	<u>2016-10-28 to 2016-11-16</u>
Issued Date:	<u>2016-11-17</u>
Tested By:	<u>Neil Wong / Engineer</u> <i>Neil Wong</i>
Reviewed By:	<u>Silin Chen / EMC Manager</u> <i>Silin Chen</i>
Approved & Authorized By:	<u>Jandy so / PSQ Manager</u> <i>Jandyso</i>
Prepared By:	

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM.Test Technology Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: TOPICON HK LTD
Address of applicant: Room 2113-2114, Tower C, Huangdu Plaza, Yitian Road, Futian District, Shenzhen, China

Manufacturer: TOPICON HK LTD
Address of manufacturer: Room 2113-2114, Tower C, Huangdu Plaza, Yitian Road, Futian District, Shenzhen, China

General Description of EUT	
Product Name:	GPS product
Trade Name:	CalAmp
Model No.:	MDT7P
Adding Model(s):	MDT7PXXX(XXX=0-100), MDT720, MDT730, MDT7P-D, MDT7P2, MDT7P3
Software Version:	Calamp_3.3.4
Hardware Version:	MDT720_V70
<i>Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model MDT7P, but the circuit and the electronic construction do not change, declared by the manufacturer.</i>	

Technical Characteristics of EUT	
Rated Voltage:	DC 3.7V
Rated Current:	2A
Rated Power:	10W
Power Adapter Model:	K-E30502000E1 I/P: AC 120V/60Hz; O/P: DC 5V/2A
Lowest Internal Frequency:	32.768KHz
Highest Internal Frequency:	1GHz
Classification of ITE:	Class B

1.2 Test Standards

The following report is prepared on behalf of the TOPICON HK LTD in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart B, and section 15.205, 15.107, and 15.109 rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, 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.

1.4 Test Facility

FCC – Registration No.: 934118

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101).

1.5 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List:

Test Mode	Description	Remark
TM1	Charging & Playing	AC Adapter, Connect to Charger
TM2	Charging & Playing	AC Adapter, Connect to EUT
TM3	Camera ON	/
TM4	Downloading	Connected to PC

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB Cable	0.8	Shielded	With Core

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E10	/
TF card	Kingston	Class 10	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
Conducted Emissions	Conducted	$\pm 2.88\text{dB}$
Transmitter Spurious Emissions	Radiated	$\pm 5.1\text{dB}$

1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	MY41440400	2016-06-04	2017-06-03
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2016-06-04	2017-06-03
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2016-06-04	2017-06-03
Amplifier	Agilent	8447F	3113A06717	2016-06-04	2017-06-03
Amplifier	C&D	PAP-1G18	2002	2016-06-04	2017-06-03
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2016-06-04	2017-06-03
Horn Antenna	ETS	3117	00086197	2016-06-04	2017-06-03
Loop Antenna	Schwarz beck	FMZB 1516	9773	2016-06-04	2017-06-03
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2016-06-04	2017-06-03
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2016-06-04	2017-06-03
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2016-06-04	2017-06-03

2. SUMMARY OF TEST RESULTS

Description of Test	Result
§15.107 (a) Conducted Emission	Compliant
§15.109(a) Radiated Emission	Compliant

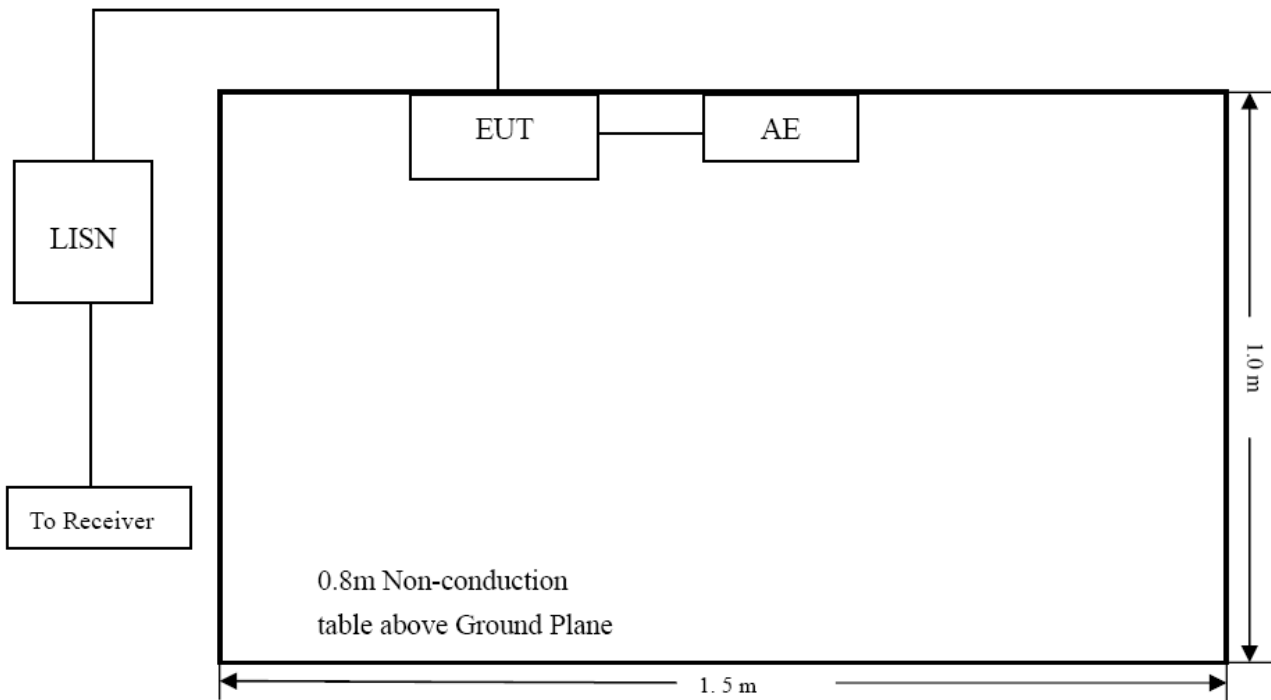
This report is completed test.

3. Conducted Emissions

3.1 Test Procedure

Test is conducting under the description of ANSI C63.4-2014, 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.

3.2 Basic Test Setup Block Diagram



3.3 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

3.4 Summary of Test Results/Plots

According to the data in section 3.5, the EUT complied with the FCC Part 15.107(a) Conducted margin for a Class B device, with the *worst* margin reading of:

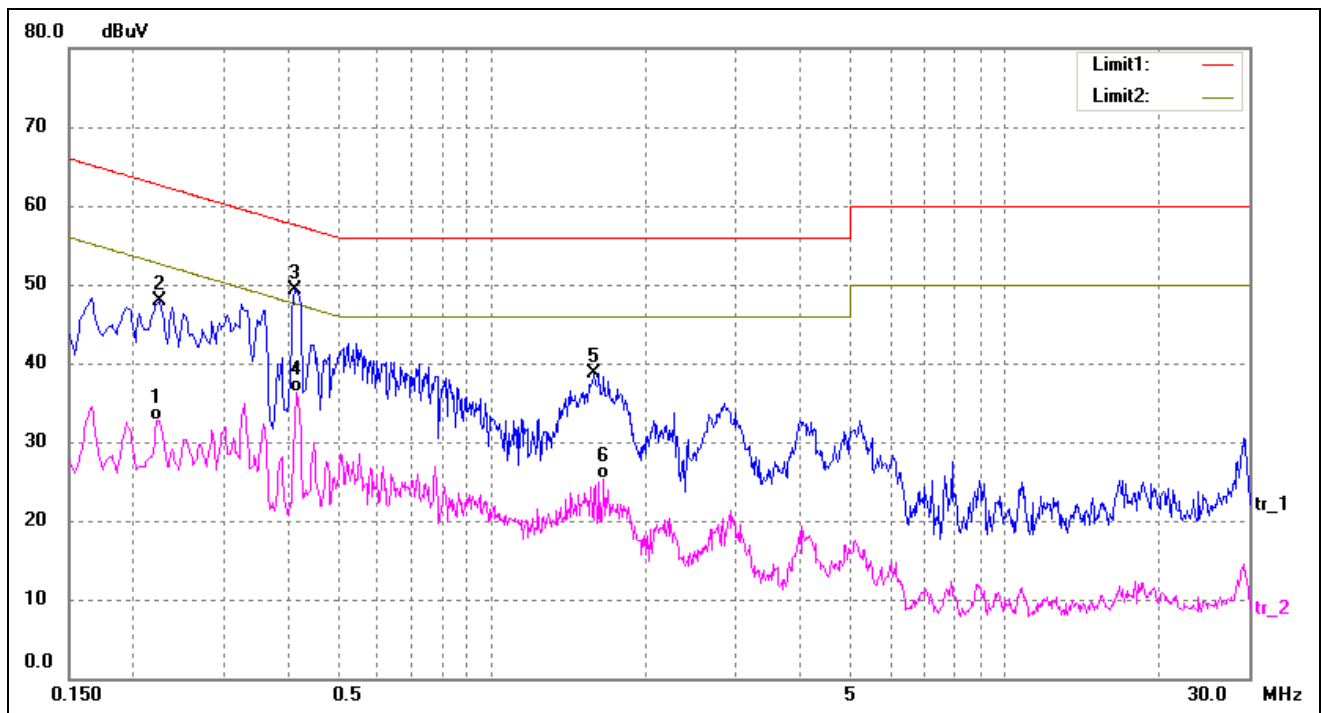
-8.62 dB at 4.1500 MHz in the Line, QP detector, 0.15-30MHz

3.5 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

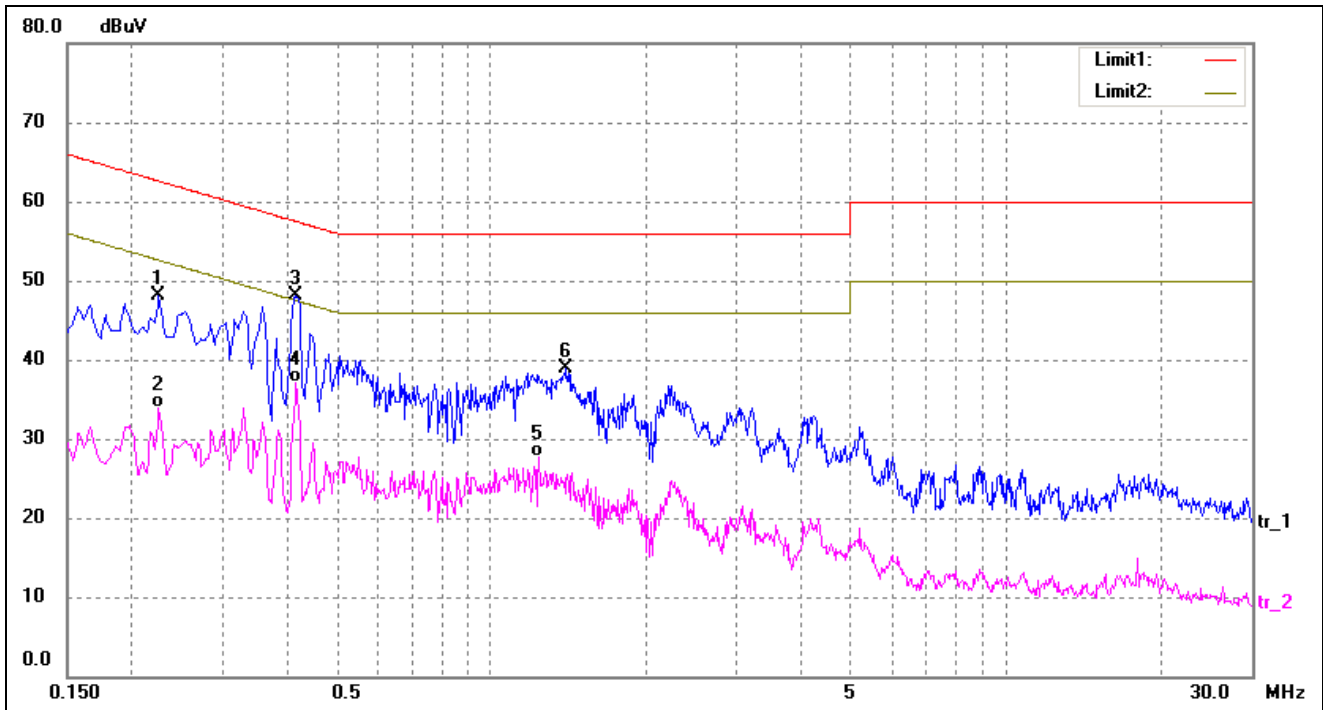
EUT: *GPS product*
 Tested Model: *MDT7P*
 Operating Condition: *TM1*
 Comment: *AC 120V/60Hz; Adapter DC 5V*

Test Specification: *Neutral*



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2220	22.99	9.80	32.79	52.74	-19.95	AVG
2	0.2260	38.13	9.80	47.93	62.59	-14.66	peak
3*	0.4140	39.55	9.80	49.35	57.57	-8.22	peak
4	0.4180	26.42	9.80	36.22	47.49	-11.27	AVG
5	1.5900	28.93	9.75	38.68	56.00	-17.32	peak
6	1.6540	15.55	9.74	25.29	46.00	-20.71	AVG

Test Specification: Line

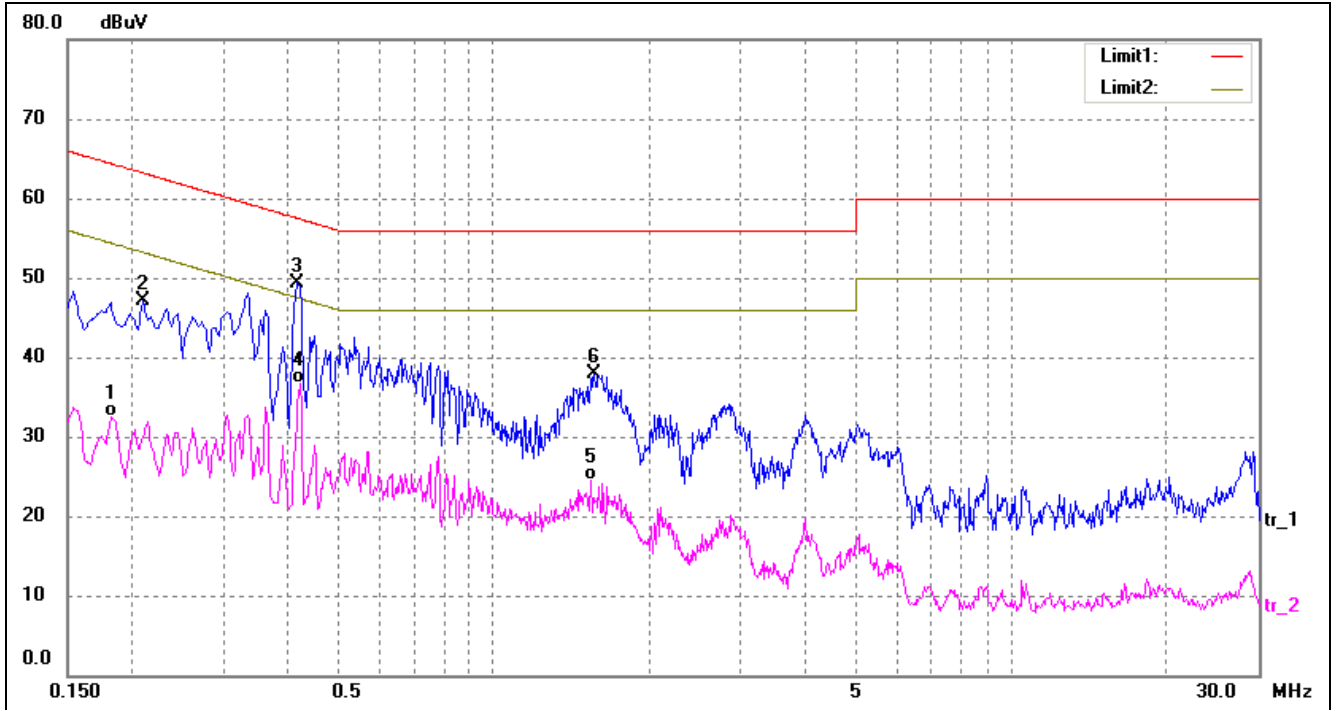


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2260	38.23	9.80	48.03	62.59	-14.56	peak
2	0.2260	24.11	9.80	33.91	52.59	-18.68	AVG
3*	0.4180	38.28	9.80	48.08	57.49	-9.41	peak
4	0.4180	27.24	9.80	37.04	47.49	-10.45	AVG
5	1.2420	18.05	9.75	27.80	46.00	-18.20	AVG
6	1.4020	29.17	9.75	38.92	56.00	-17.08	peak

Plot of Conducted Emissions Test Data

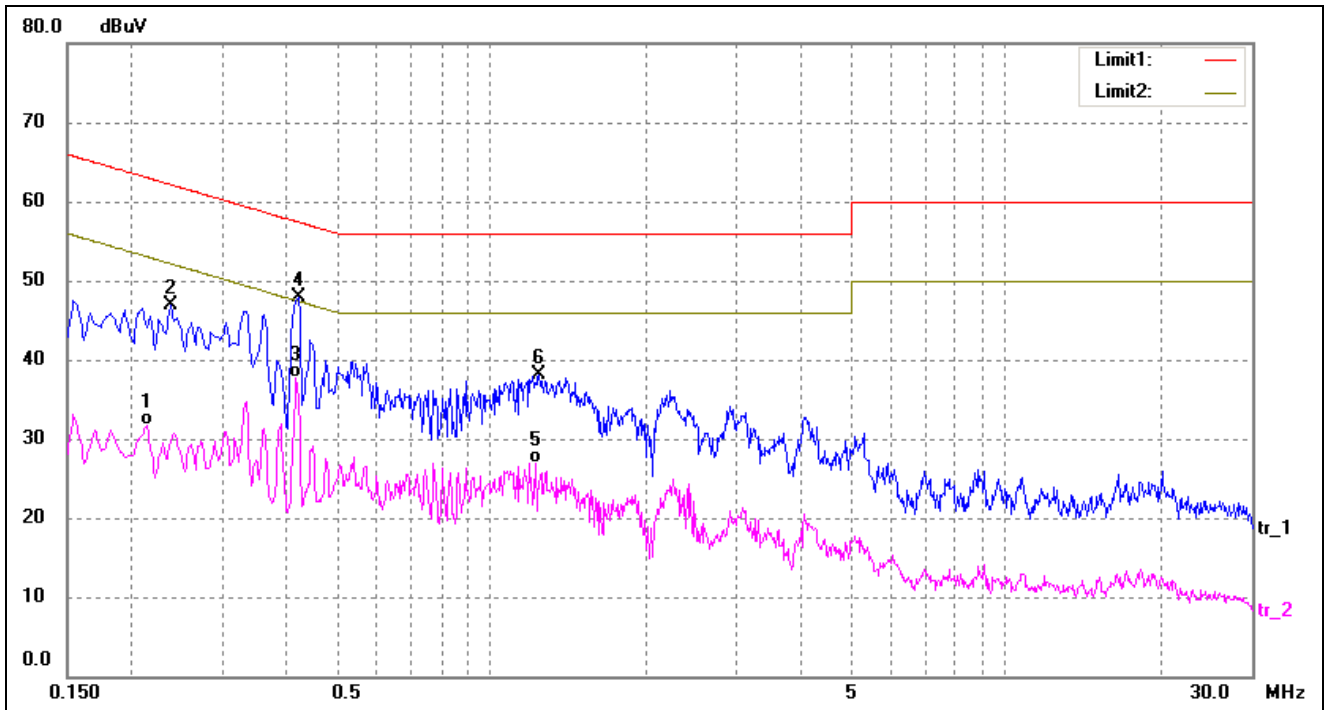
EUT: GPS product
 Tested Model: MDT7P
 Operating Condition: TM2
 Comment: AC 120V/60Hz; Adapter DC 5V

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1819	22.67	9.82	32.49	54.39	-21.90	AVG
2	0.2100	37.26	9.80	47.06	63.20	-16.14	peak
3*	0.4180	39.60	9.80	49.40	57.49	-8.09	peak
4	0.4220	26.99	9.80	36.79	47.41	-10.62	AVG
5	1.5380	14.73	9.75	24.48	46.00	-21.52	AVG
6	1.5660	28.10	9.75	37.85	56.00	-18.15	peak

Test Specification: Line

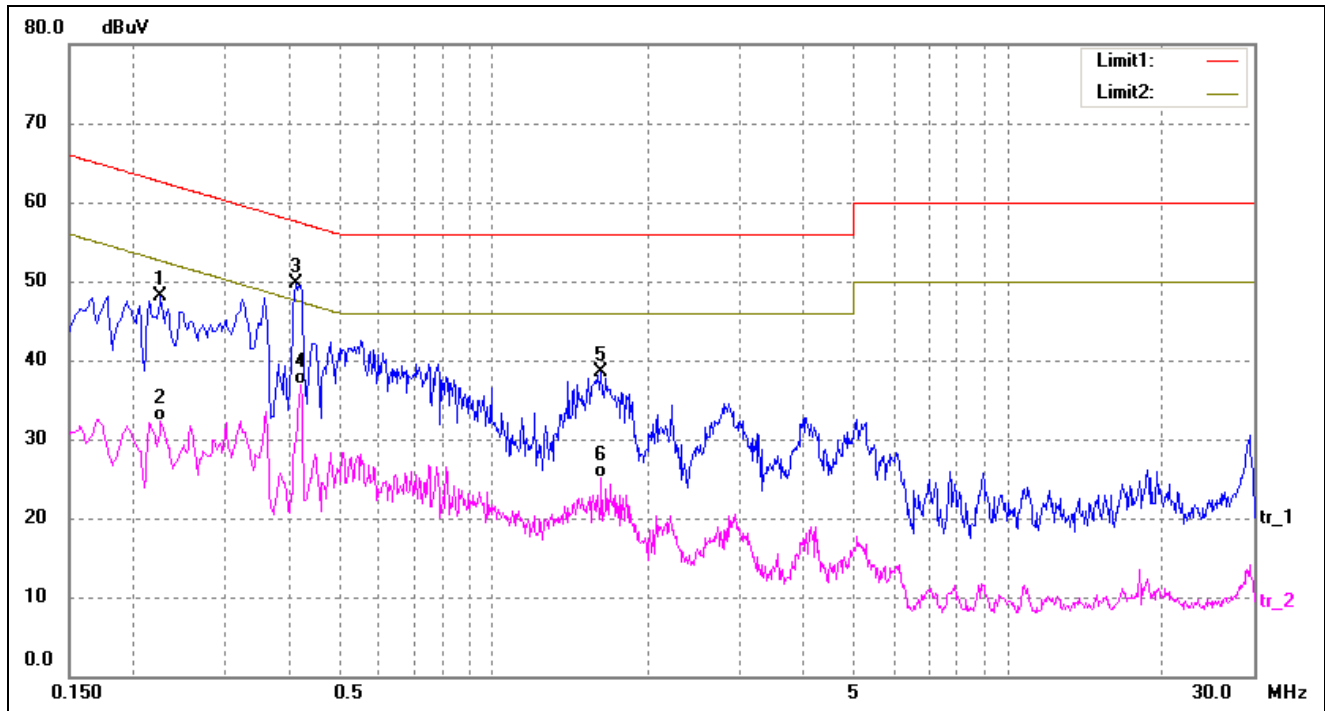


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2140	22.00	9.80	31.80	53.04	-21.24	AVG
2	0.2380	37.01	9.80	46.81	62.16	-15.35	peak
3	0.4180	27.95	9.80	37.75	47.49	-9.74	AVG
4*	0.4220	38.07	9.80	47.87	57.41	-9.54	peak
5	1.2180	17.19	9.75	26.94	46.00	-19.06	AVG
6	1.2420	28.43	9.75	38.18	56.00	-17.82	peak

Plot of Conducted Emissions Test Data

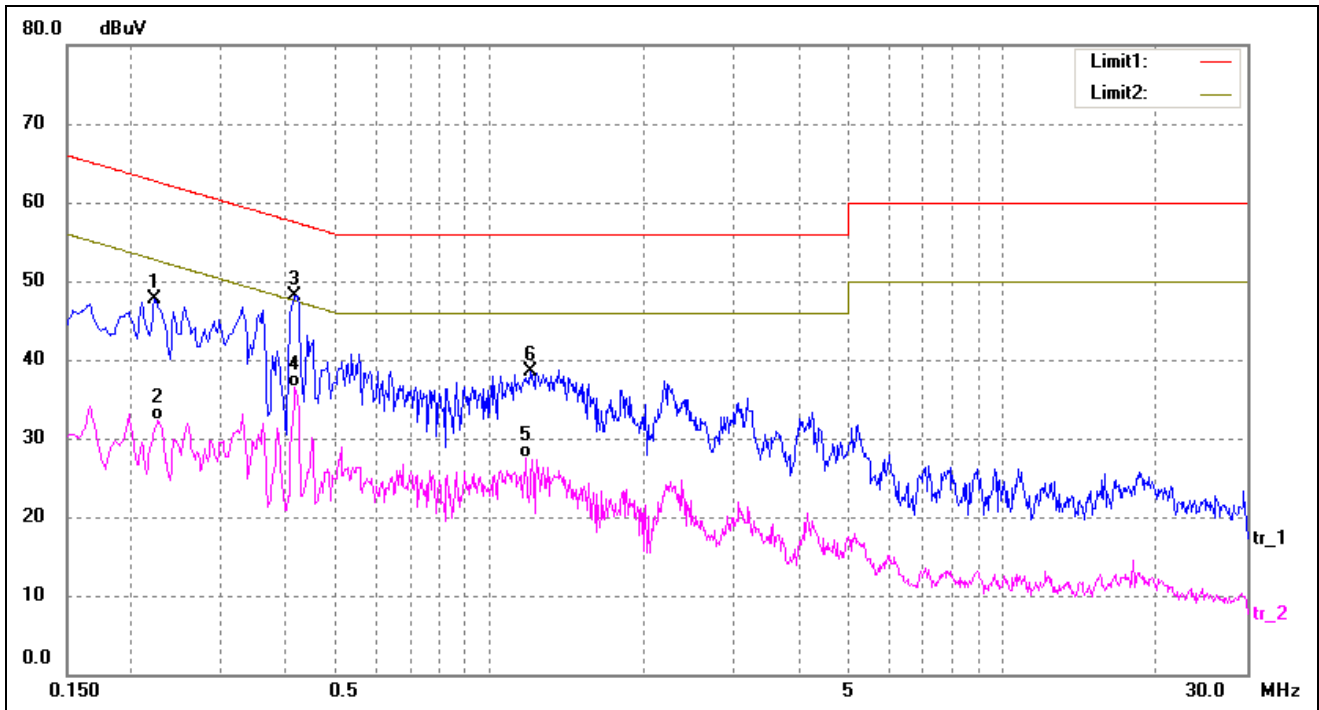
EUT: *GPS product*
 Tested Model: *MDT7P*
 Operating Condition: *TM3*
 Comment: *AC 120V/60Hz; Adapter DC 5V*

Test Specification: *Neutral*



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2260	38.34	9.80	48.14	62.59	-14.45	peak
2	0.2260	22.41	9.80	32.21	52.59	-20.38	AVG
3*	0.4140	39.92	9.80	49.72	57.57	-7.85	peak
4	0.4220	27.07	9.80	36.87	47.41	-10.54	AVG
5	1.6180	28.78	9.74	38.52	56.00	-17.48	peak
6	1.6260	15.39	9.74	25.13	46.00	-20.87	AVG

Test Specification: Line

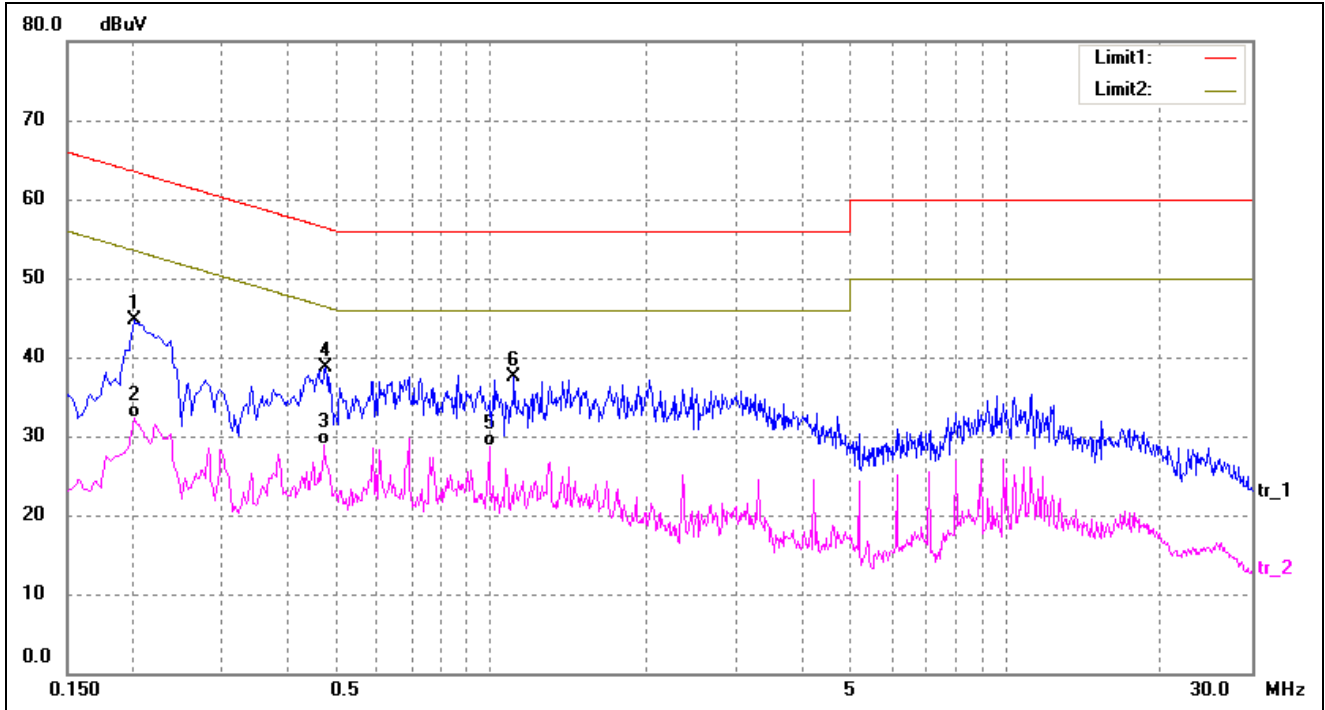


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2220	37.97	9.80	47.77	62.74	-14.97	peak
2	0.2260	22.49	9.80	32.29	52.59	-20.30	AVG
3*	0.4180	38.36	9.80	48.16	57.49	-9.33	peak
4	0.4180	26.75	9.80	36.55	47.49	-10.94	AVG
5	1.1820	17.76	9.76	27.52	46.00	-18.48	AVG
6	1.1980	28.79	9.75	38.54	56.00	-17.46	peak

Plot of Conducted Emissions Test Data

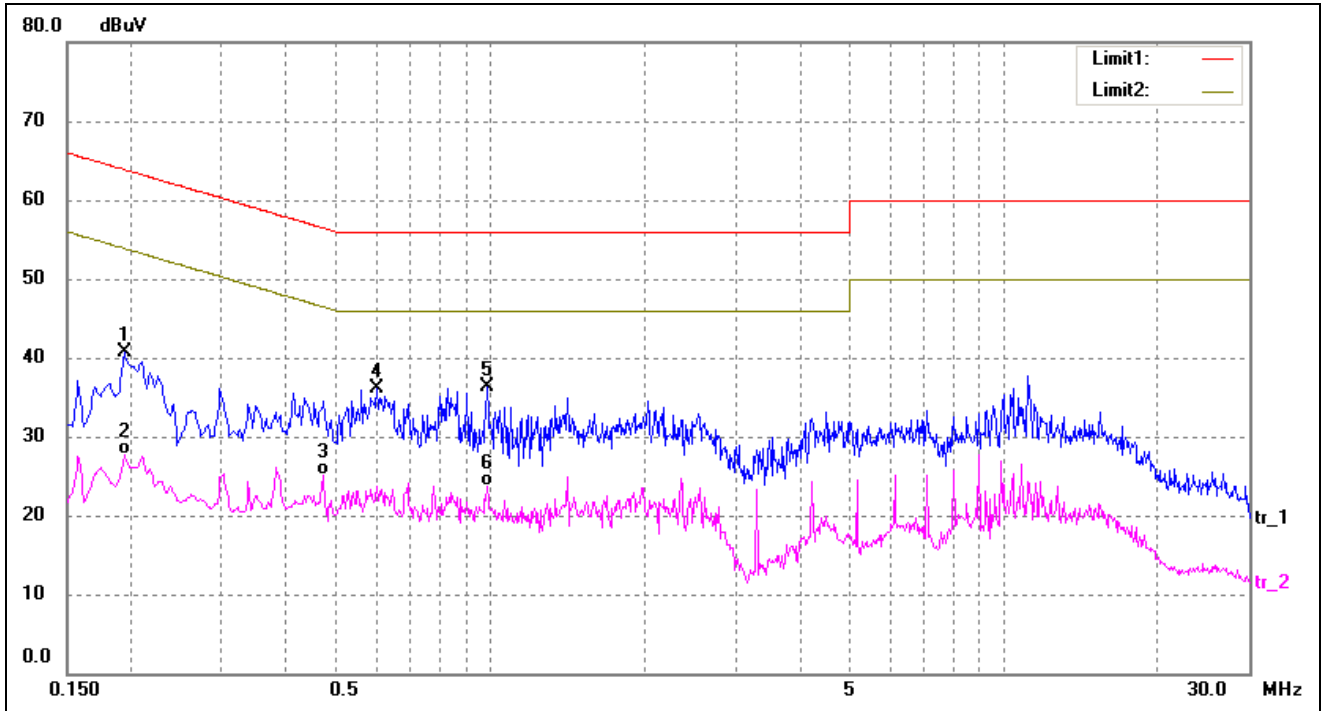
EUT: *GPS product*
 Tested Model: *MDT7P*
 Operating Condition: *TM4*
 Comment: *AC 120V/60Hz; Adapter DC 5V*

Test Specification: *Neutral*



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2020	34.86	9.80	44.66	63.52	-18.86	peak
2	0.2020	22.58	9.80	32.38	53.52	-21.14	AVG
3	0.4740	19.16	9.80	28.96	46.44	-17.48	AVG
4	0.4780	28.85	9.80	38.65	56.37	-17.72	peak
5*	0.9900	18.95	9.76	28.71	46.00	-17.29	AVG
6	1.1060	27.82	9.76	37.58	56.00	-18.42	peak

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1940	30.91	9.81	40.72	63.86	-23.14	peak
2	0.1940	17.96	9.81	27.77	53.86	-26.09	AVG
3	0.4740	15.33	9.80	25.13	46.44	-21.31	AVG
4	0.6020	26.27	9.79	36.06	56.00	-19.94	peak
5*	0.9860	26.60	9.76	36.36	56.00	-19.64	peak
6	0.9860	13.90	9.76	23.66	46.00	-22.34	AVG

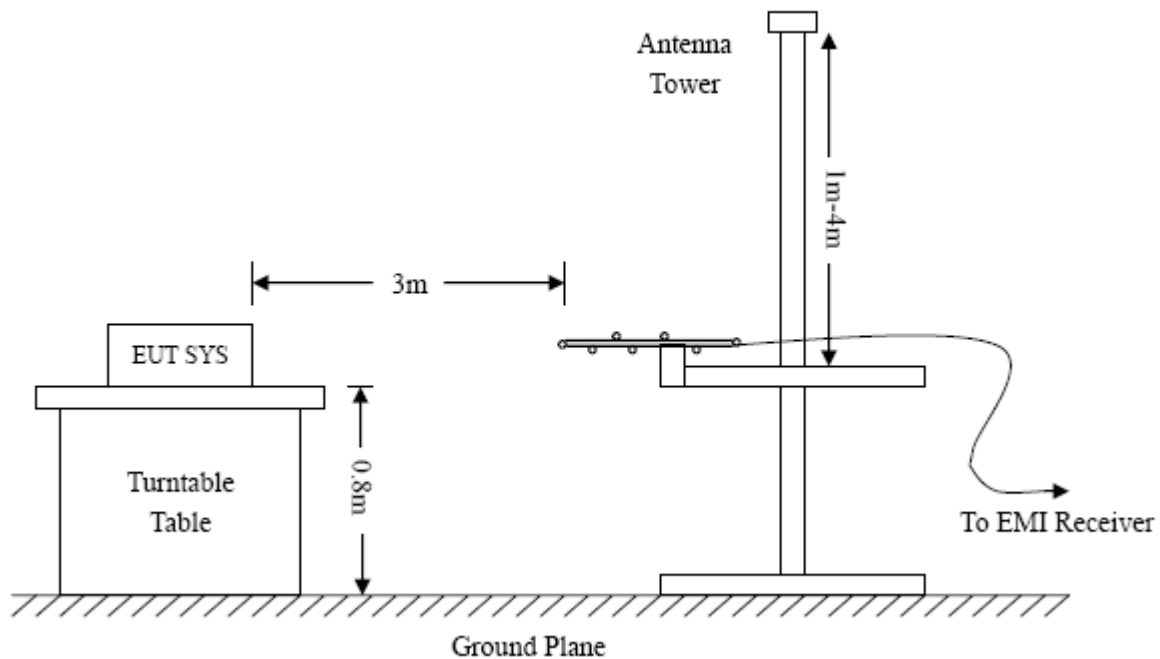
4. RADIATED EMISSION

4.1 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.109 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



4.2 Test Receiver Setup

Frequency :9kHz-30MHz

RBW=10KHz,

VBW =30KHz

Sweep time= Auto

Trace = max hold

Detector function = peak

Frequency :30MHz-1GHz

RBW=120KHz,

VBW=300KHz

Sweep time= Auto

Trace = max hold

Detector function = peak, QP

Frequency :Above 1GHz

RBW=1MHz,

VBW=3MHz(Peak), 10Hz(AV)

Sweep time= Auto

Trace = max hold

Detector function = peak, AV

4.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} - \text{Corr. Factor}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB μ V means the emission is 6dB μ V below the maximum limit for a Class B device. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15.109(a) Limit}$$

4.4 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	55 %
ATM Pressure:	1011 mbar

4.5 Summary of Test Results/Plots

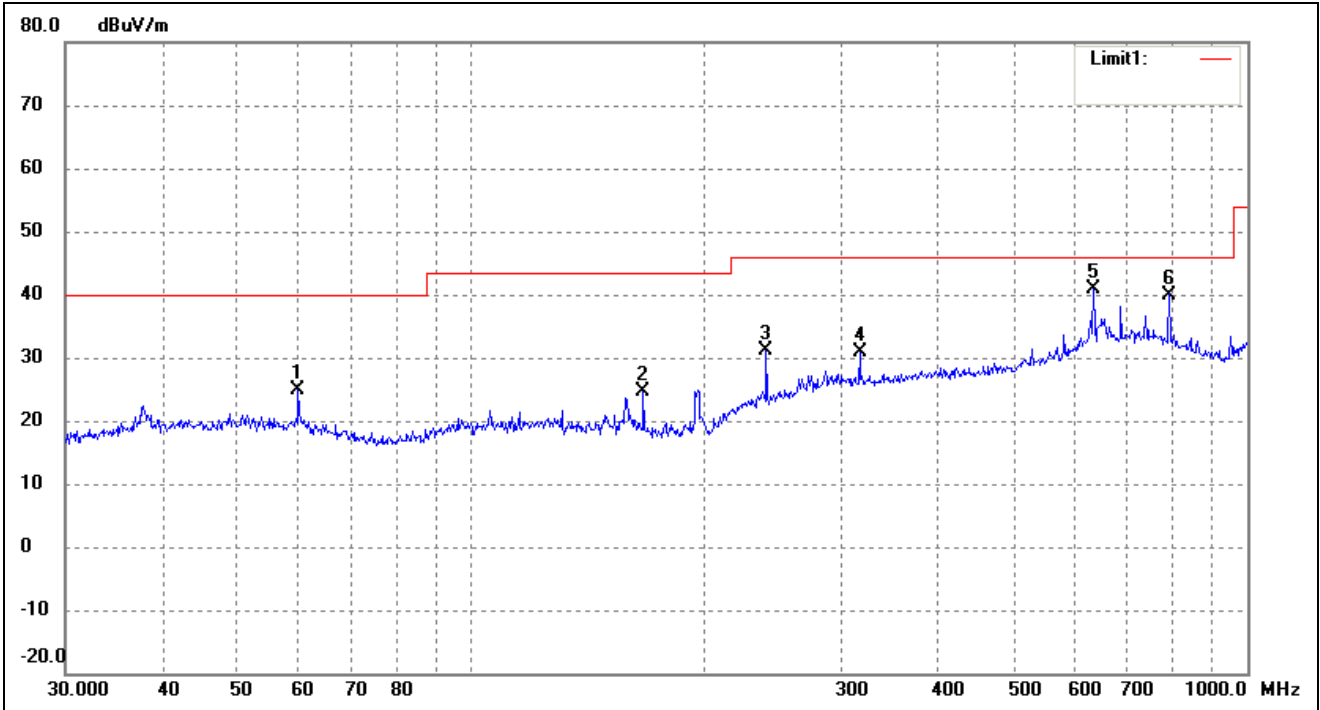
According to the data, the EUT complied with the FCC Part 15.109(a) rule, and had the worst margin of:

-2.55 dB at 633.9073 MHz in the Horizontal polarization, TM2 mode, 9kHz to 12.75 GHz, 3Meters

Plot of Radiated Emissions Test Data

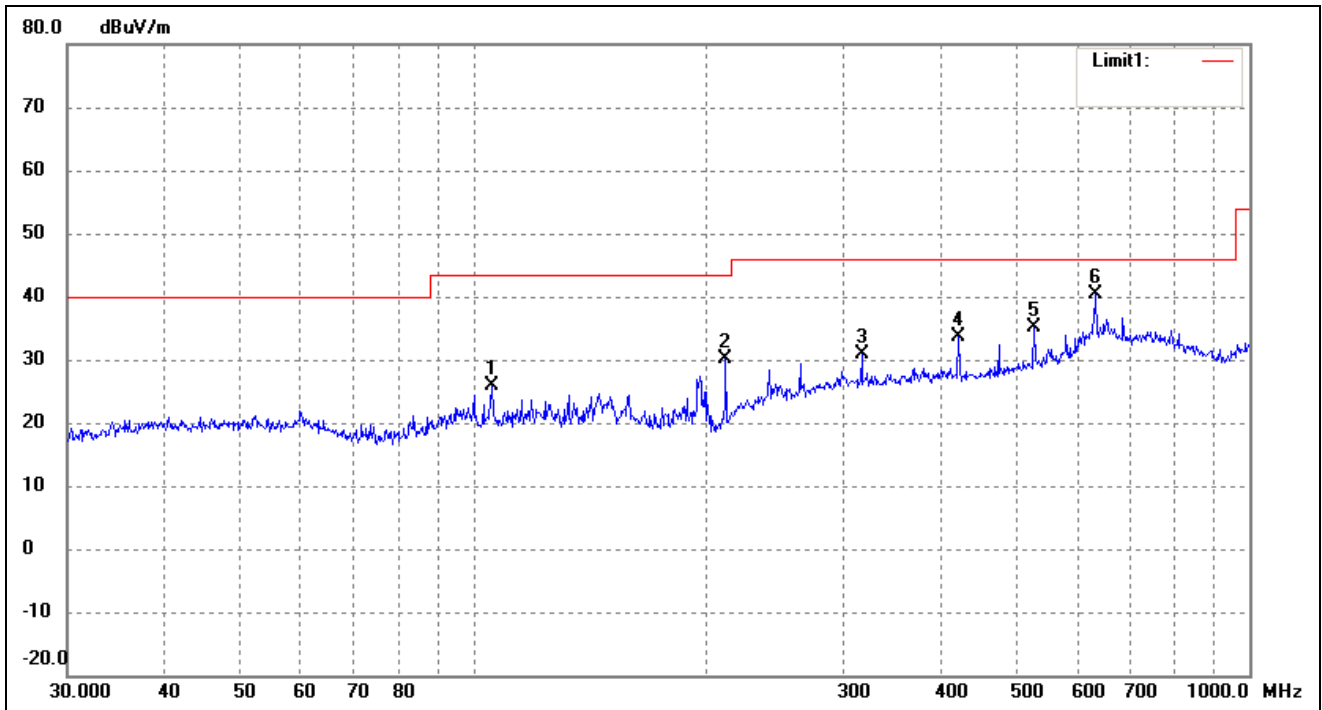
EUT: *GPS product*
 Tested Model: *MDT7P*
 Operating Condition: *TM1*
 Comment: *AC 120V/60Hz; Adapter DC 5V*

Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	59.8588	19.86	5.03	24.89	40.00	-15.11	0	100	peak
2	166.6513	22.27	2.46	24.73	43.50	-18.77	0	100	peak
3	239.9874	22.31	8.93	31.24	46.00	-14.76	0	100	peak
4	316.5889	18.83	11.96	30.79	46.00	-15.21	0	100	peak
5	633.9072	22.96	17.86	40.82	46.00	-5.18	0	100	peak
6	793.3959	23.52	16.48	40.00	46.00	-6.00	0	100	peak

Test Specification: Vertical

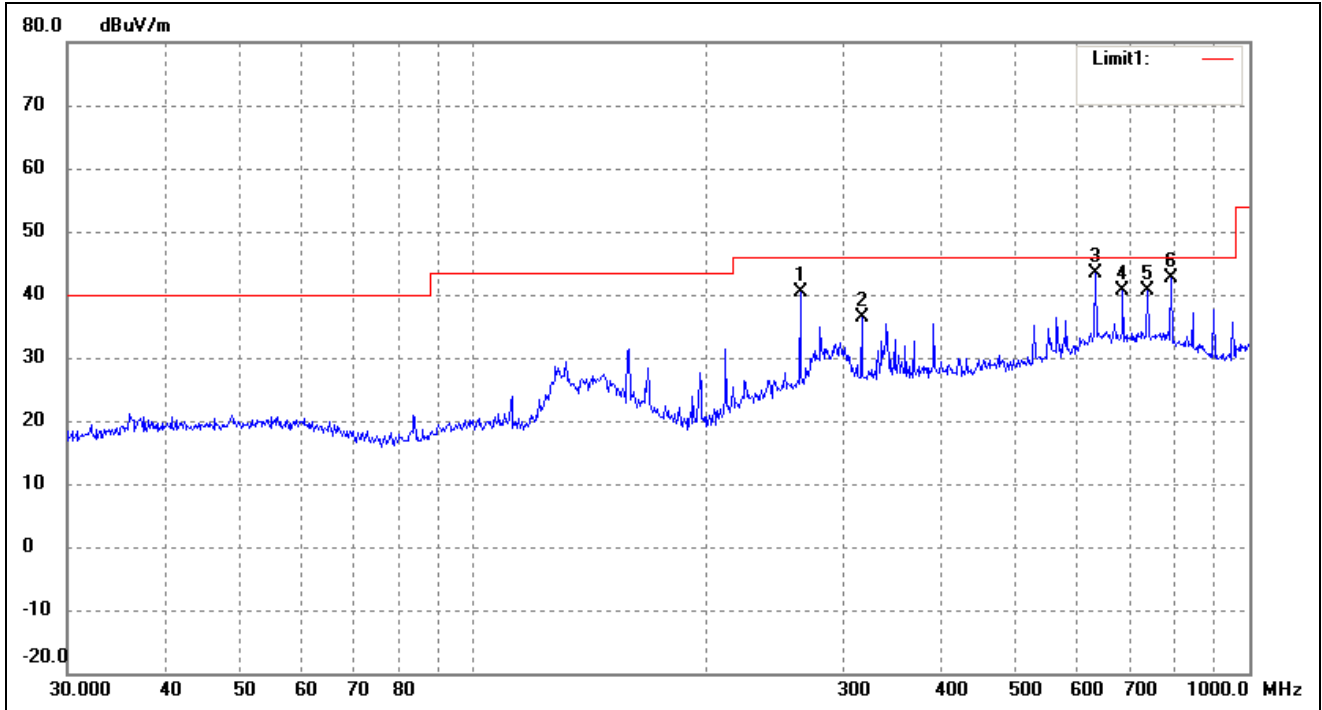


No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	105.6414	20.89	4.88	25.77	43.50	-17.73	0	100	peak
2	211.5263	24.26	5.85	30.11	43.50	-13.39	0	100	peak
3	316.5889	18.84	11.96	30.80	46.00	-15.20	0	100	peak
4	422.0577	21.58	11.95	33.53	46.00	-12.47	0	100	peak
5	528.2458	21.31	13.86	35.17	46.00	-10.83	0	100	peak
6	633.9071	22.56	17.86	40.42	46.00	-5.58	0	100	peak

Plot of Radiated Emissions Test Data

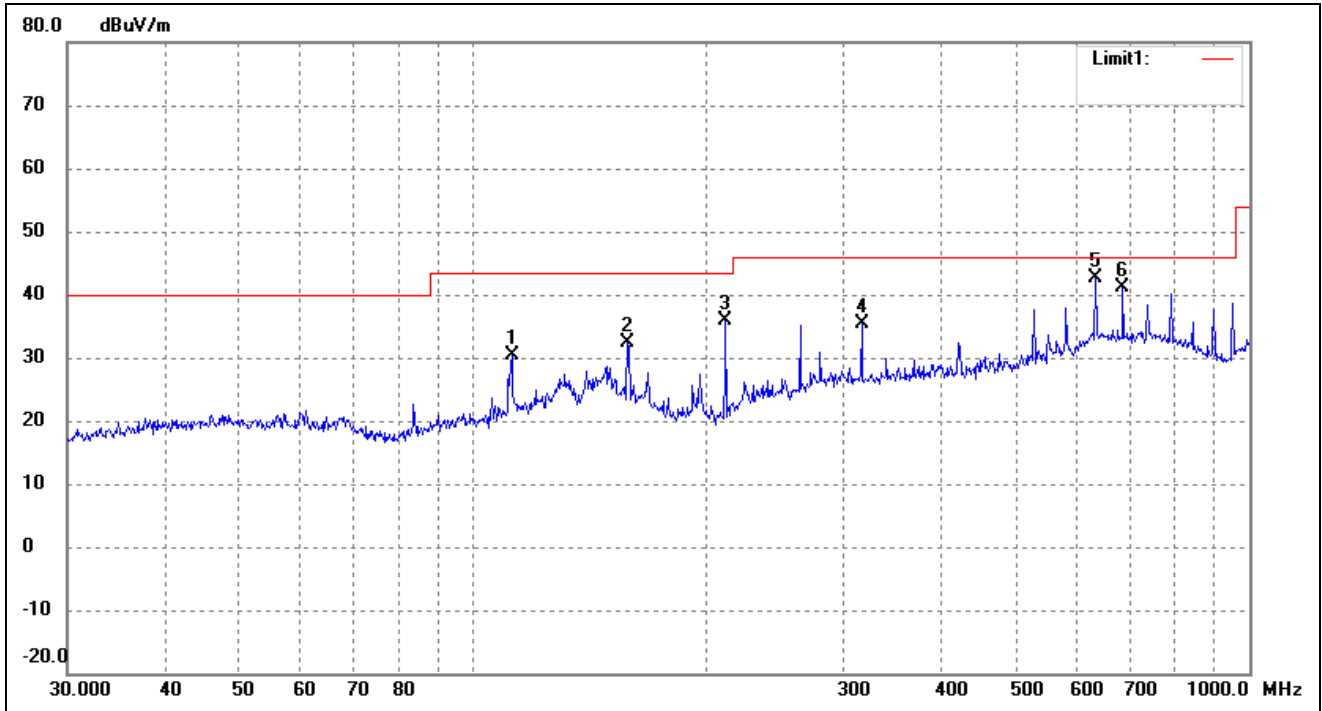
EUT: *GPS product*
 Tested Model: *MDT7P*
 Operating Condition: *TM2*
 Comment: *AC 120V/60Hz; Adapter DC 5V*

Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	263.8190	30.33	9.96	40.29	46.00	-5.71	0	100	peak
2	316.5890	24.35	11.96	36.31	46.00	-9.69	0	100	peak
3	633.9073	25.59	17.86	43.45	46.00	-2.55	0	100	peak
4	687.1507	22.56	18.14	40.70	46.00	-5.30	0	100	peak
5	739.6604	21.65	19.00	40.65	46.00	-5.35	0	100	peak
6	793.3960	26.18	16.48	42.66	46.00	-3.34	0	100	peak

Test Specification: Vertical

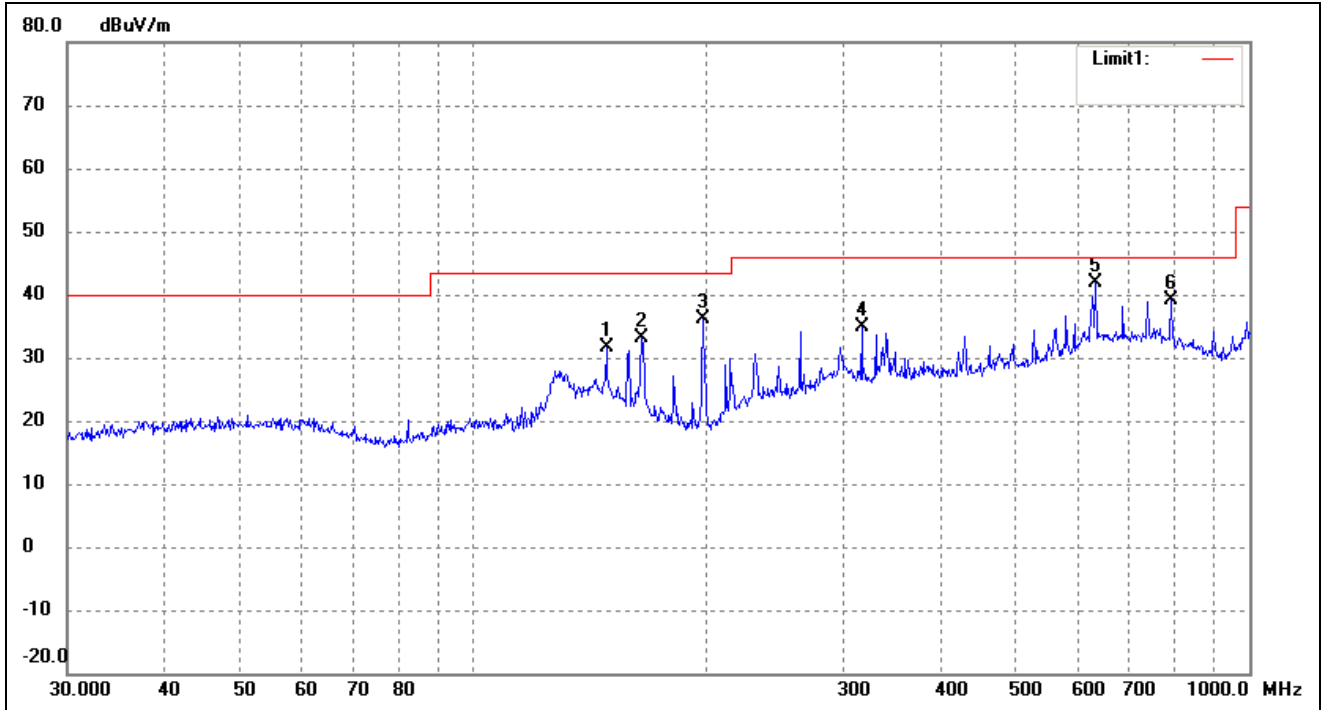


No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	112.1305	25.57	4.86	30.43	43.50	-13.07	0	100	peak
2	158.1123	29.81	2.45	32.26	43.50	-11.24	0	100	peak
3	211.5265	30.14	5.85	35.99	43.50	-7.51	0	100	peak
4	316.5890	23.40	11.96	35.36	46.00	-10.64	0	100	peak
5	633.9073	24.74	17.86	42.60	46.00	-3.40	0	100	peak
6	687.1507	22.92	18.14	41.06	46.00	-4.94	0	100	peak

Plot of Radiated Emissions Test Data

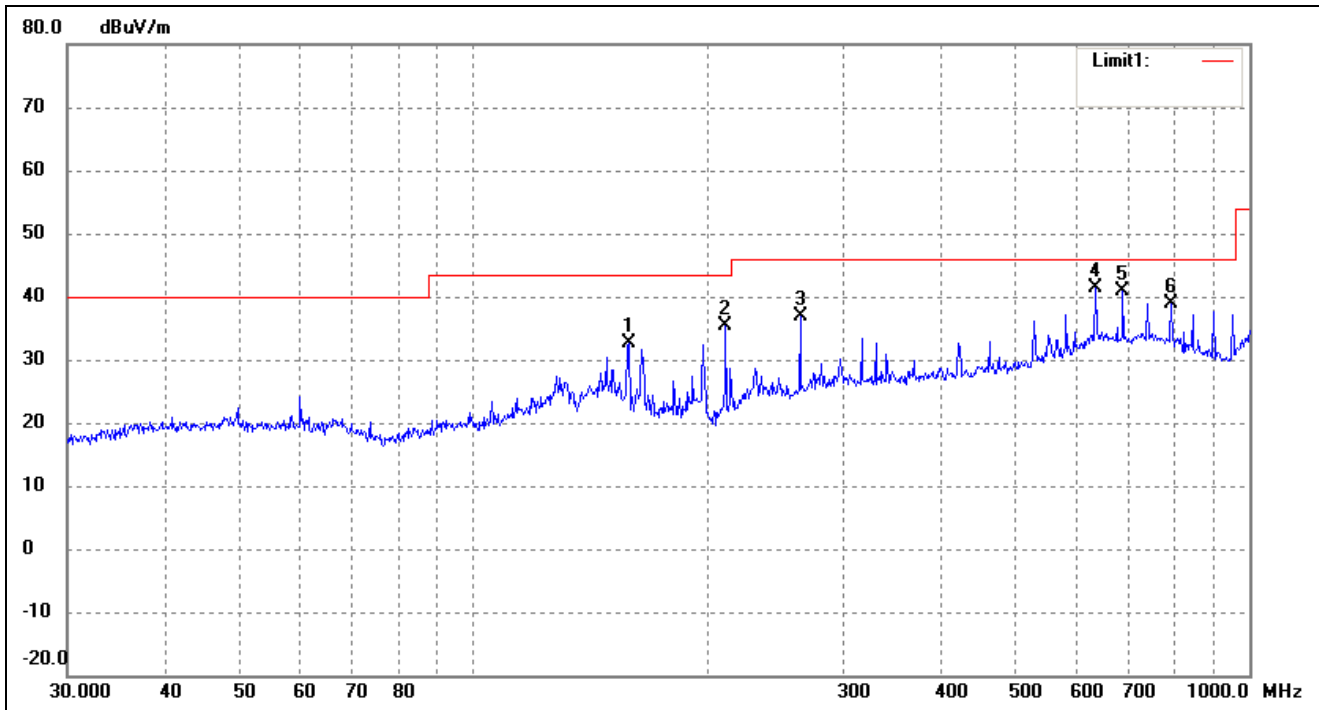
EUT: *GPS product*
 Tested Model: *MDT7P*
 Operating Condition: *TM3*
 Comment: *AC 120V/60Hz; Adapter DC 5V*

Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	148.4410	28.75	2.82	31.57	43.50	-11.93	0	100	peak
2	164.9075	30.66	2.44	33.10	43.50	-10.40	0	100	peak
3	197.8928	32.94	3.26	36.20	43.50	-7.30	0	100	peak
4	316.5890	23.02	11.96	34.98	46.00	-11.02	0	100	peak
5	633.9073	23.95	17.86	41.81	46.00	-4.19	0	100	peak
6	793.3960	22.71	16.48	39.19	46.00	-6.81	0	100	peak

Test Specification: Vertical

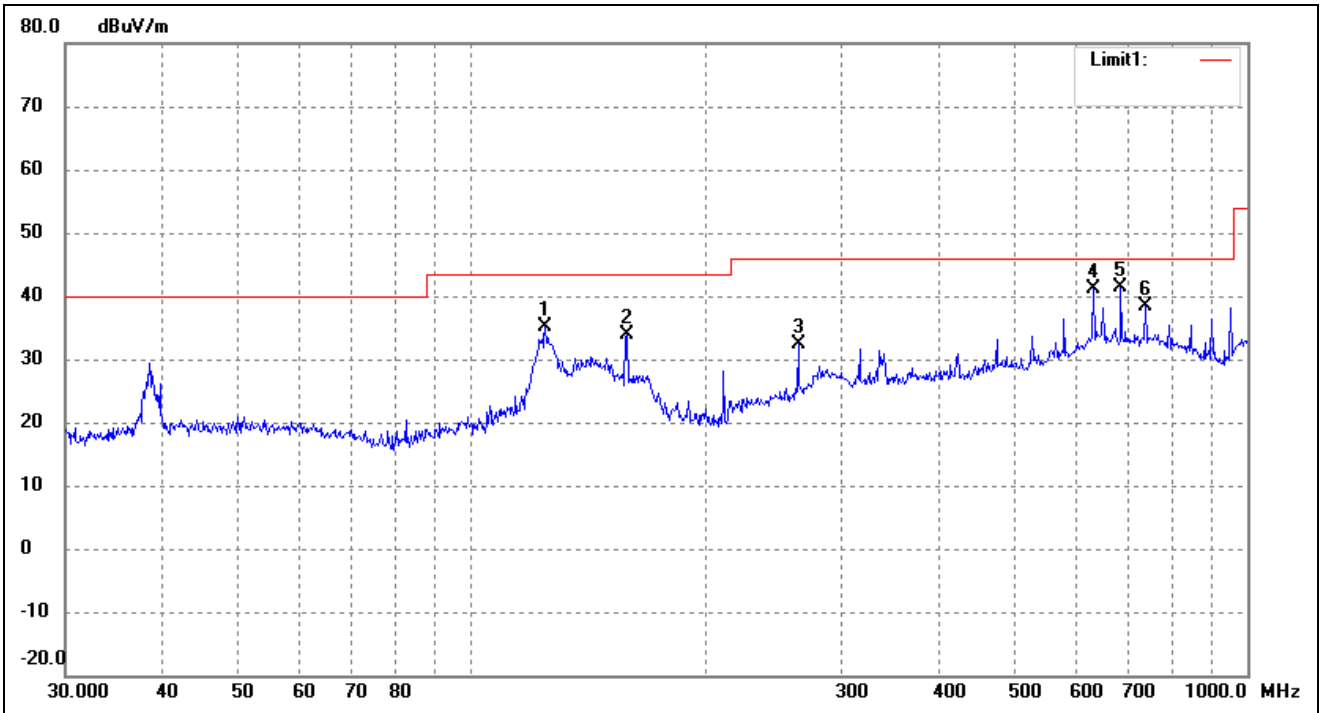


No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	158.6677	30.23	2.44	32.67	43.50	-10.83	0	100	peak
2	211.5265	29.61	5.85	35.46	43.50	-8.04	0	100	peak
3	263.8190	26.82	9.96	36.78	46.00	-9.22	0	100	peak
4	633.9073	23.57	17.86	41.43	46.00	-4.57	0	100	peak
5	687.1507	22.67	18.14	40.81	46.00	-5.19	0	100	peak
6	793.3960	22.51	16.48	38.99	46.00	-7.01	0	100	peak

Plot of Radiated Emissions Test Data

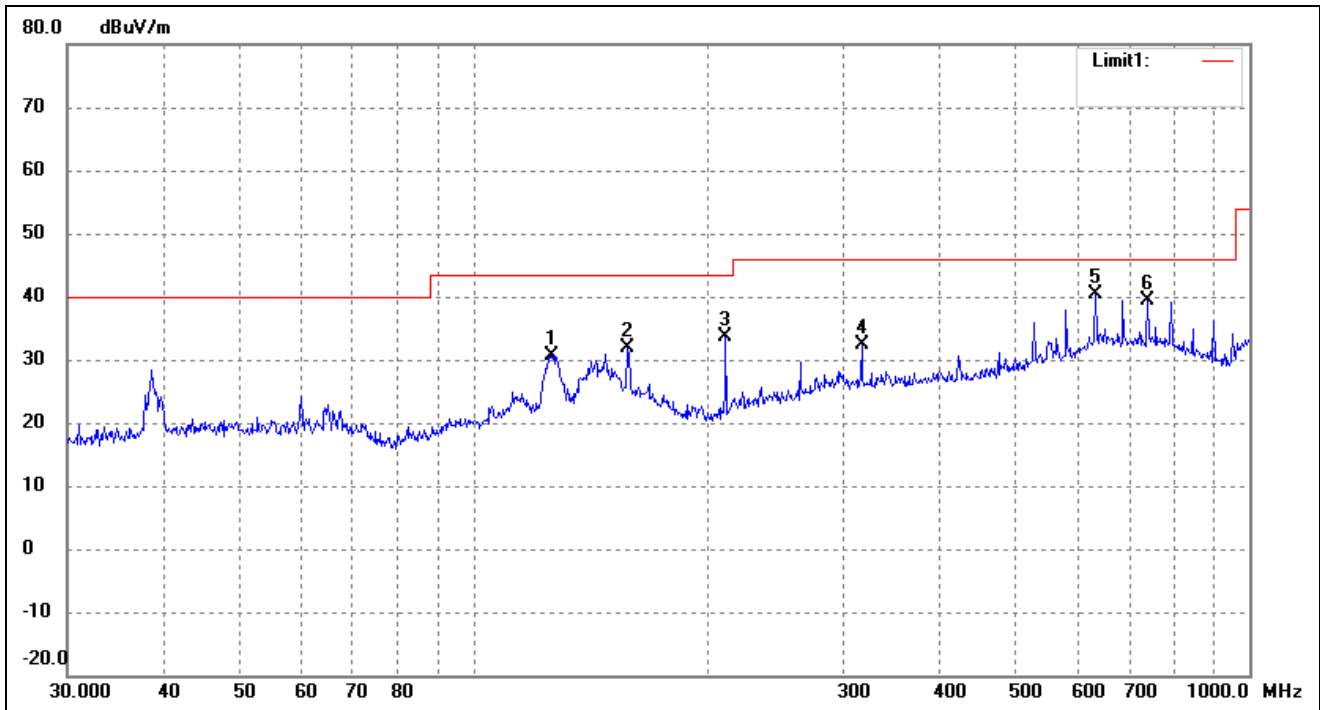
EUT: *GPS product*
 Tested Model: *MDT7P*
 Operating Condition: *TM4*
 Comment: *AC 120V/60Hz; USB 5V*

Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	124.5690	30.61	4.44	35.05	43.50	-8.45	0	100	peak
2	158.6677	31.36	2.44	33.80	43.50	-9.70	0	100	peak
3	263.8190	22.46	9.96	32.42	46.00	-13.58	0	100	peak
4	633.9073	23.17	17.86	41.03	46.00	-4.97	0	100	peak
5	687.1507	23.33	18.14	41.47	46.00	-4.53	0	100	peak
6	739.6605	19.35	19.00	38.35	46.00	-7.65	0	100	peak

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	126.3286	26.34	4.29	30.63	43.50	-12.87	0	100	peak
2	158.1123	29.44	2.45	31.89	43.50	-11.61	0	100	peak
3	211.5265	27.84	5.85	33.69	43.50	-9.81	0	100	peak
4	316.5890	20.33	11.96	32.29	46.00	-13.71	0	100	peak
5	633.9073	22.60	17.86	40.46	46.00	-5.54	0	100	peak
6	739.6605	20.49	19.00	39.49	46.00	-6.51	0	100	peak

Note: Testing is carried out with frequency rang 9kHz to the 12.75GHz, which below 30MHz and above 1GHz are attenuated more than 20 dB below the permissible value and are not showed in the test report.

***** END OF REPORT *****