

# 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**

<b>FCC Rule(s):</b>	<u>FCC Part 15 Subpart B</u>
<b>Product Description:</b>	<u>GPS product</u>
<b>Tested Model:</b>	<u>MDT7P</u>
<b>Report No.:</b>	<u>STR16018178I-4</u>
<b>Tested Date:</b>	<u>2016-01-22 to 2016-03-18</u>
<b>Issued Date:</b>	<u>2016-03-18</u>
<b>Tested By:</b>	<u>Jong Wang / Engineer</u> <i>Jong Wang</i>
<b>Reviewed By:</b>	<u>Silin Chen / EMC Manager</u> <i>Silin Chen</i>
<b>Approved &amp; Authorized By:</b>	<u>Jandy so / PSQ Manager</u> <i>Jandyso</i>
<b>Prepared By:</b>	

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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
Software Version:	Microlise_2.8-5-g3e0cc3a-dirty
Hardware Version:	MDT720_V40
<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:	AC 120V; Adapter: DC 5V
Rated Current:	2A
Rated Power:	10W
Power Adapter Model:	K-E30502000E1
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 2<sup>nd</sup> 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	Unshielded	Without Ferrite

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Notebook	Lenovo	E10	LR-63C8R

## 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	2015-06-17	2016-06-16
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2015-06-17	2016-06-16
Amplifier	Agilent	8447F	3113A06717	2015-06-17	2016-06-16
Amplifier	C&D	PAP-1G18	2002	2015-06-17	2016-06-16
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086197	2015-06-17	2016-06-16
Loop Antenna	Schwarz beck	FMZB 1516	9773	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2015-06-17	2016-06-16
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2015-06-17	2016-06-16
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2015-06-17	2016-06-16

## 2. SUMMARY OF TEST RESULTS

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

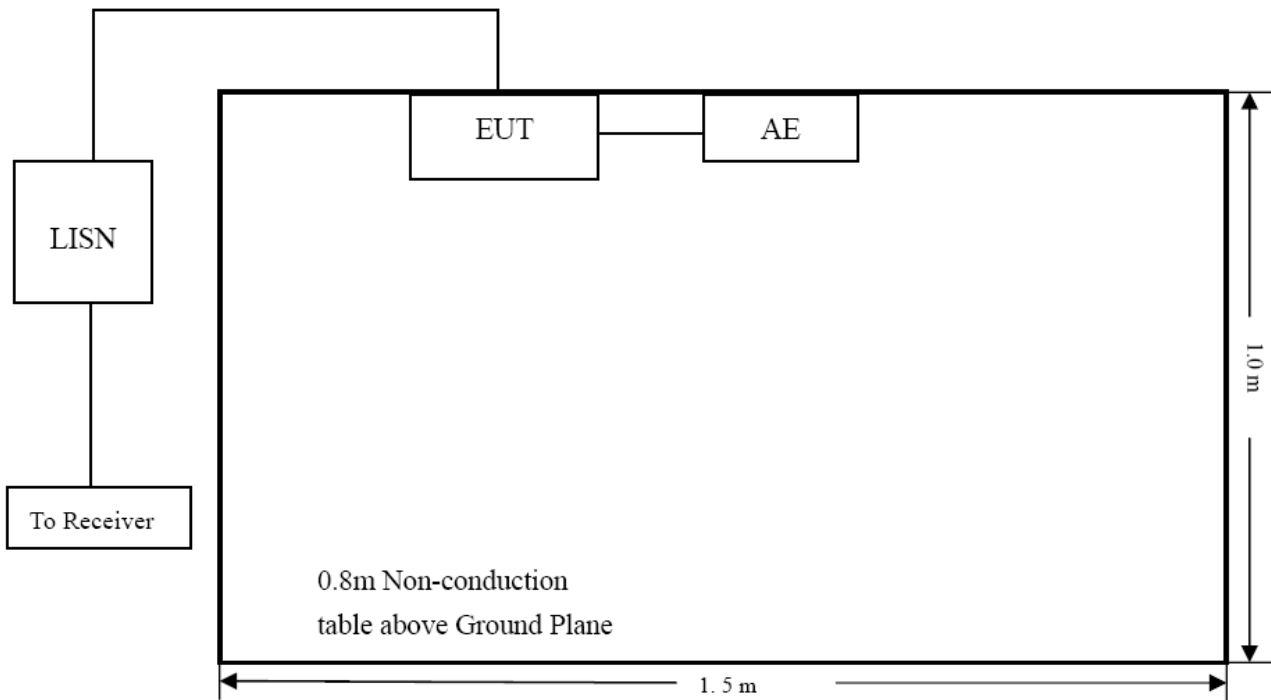
N/A: not applicable

### 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 3.6, the EUT complied with the FCC Part 15.107(a) Conducted margin for a Class B device, with the *worst* margin reading of:

**-5.92 dB** at **0.2620 MHz** in the **Line, Peak** detector, 0.15-30MHz

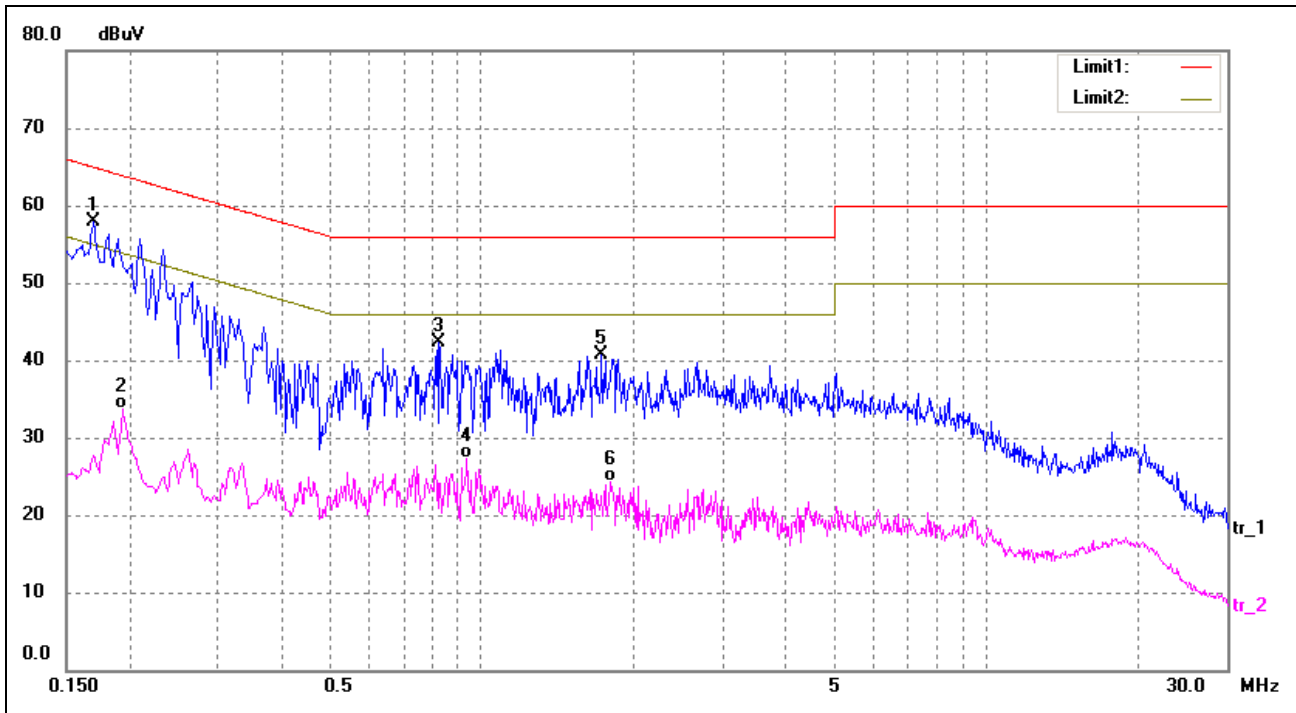


### 3.5 Conducted Emissions Test Data

**Plot of Conducted Emissions Test Data**

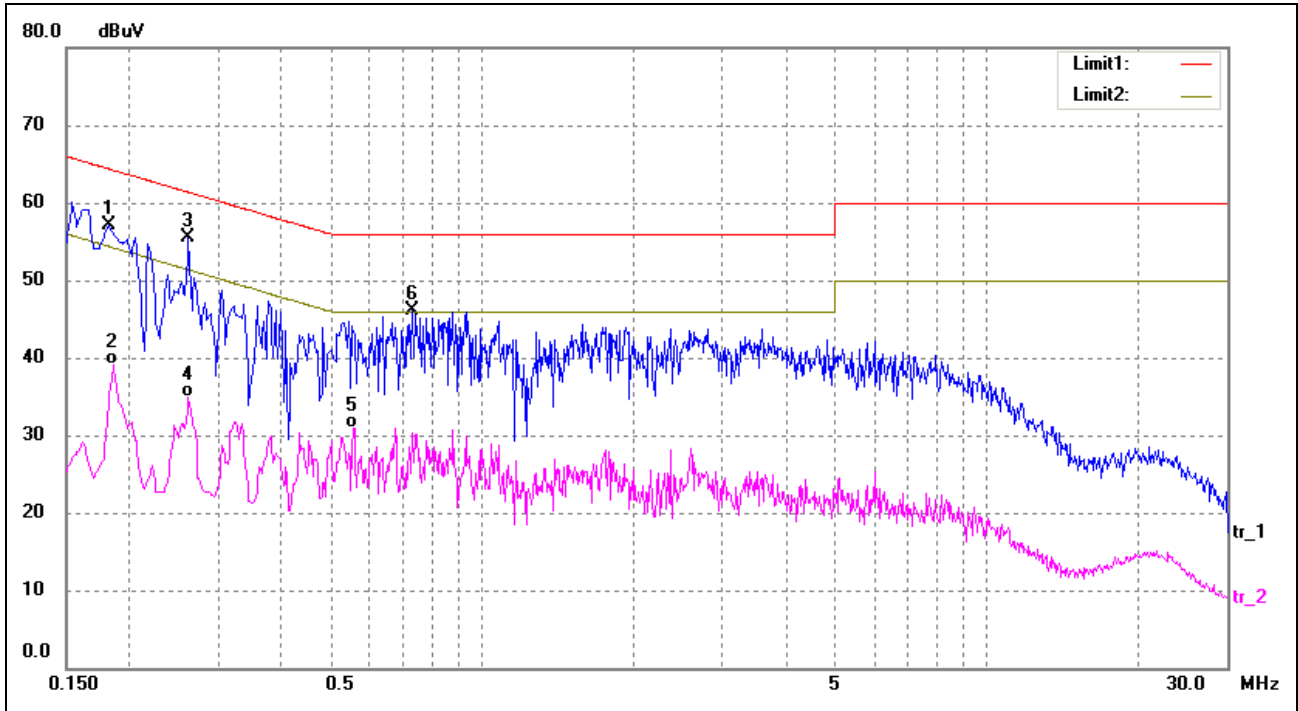
EUT: GPS product  
 Tested Model: MDT7P  
 Operating Condition: TM1  
 Comment: AC 120V/60Hz

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1700	48.35	9.50	57.85	64.96	-7.11	peak
2	0.1940	24.25	9.50	33.75	53.86	-20.11	AVG
3	0.8220	32.67	9.64	42.31	56.00	-13.69	peak
4	0.9340	17.62	9.66	27.28	46.00	-18.72	AVG
5	1.7340	30.90	9.78	40.68	56.00	-15.32	peak
6	1.8060	14.61	9.79	24.40	46.00	-21.60	AVG

Test Specification: Line

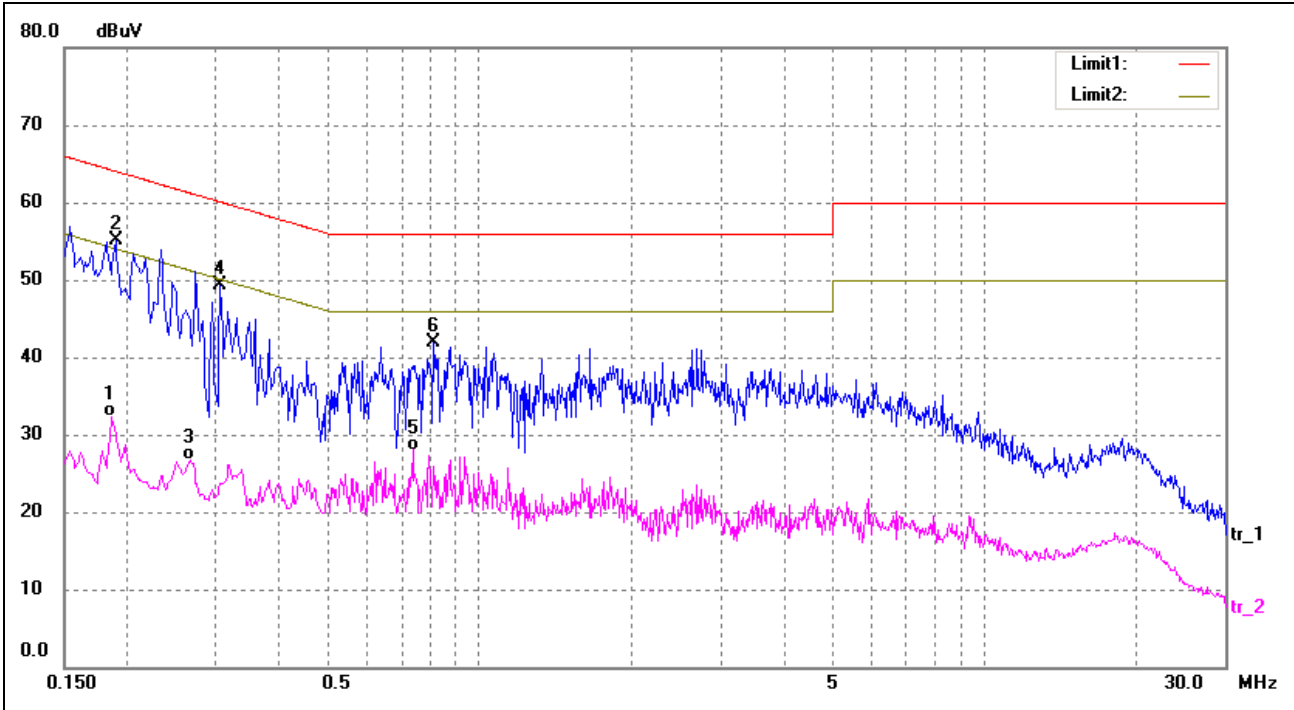


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1820	47.61	9.50	57.11	64.39	-7.28	peak
2	0.1860	29.61	9.50	39.11	54.21	-15.10	AVG
3*	0.2620	45.95	9.50	55.45	61.37	-5.92	peak
4	0.2620	25.42	9.50	34.92	51.37	-16.45	AVG
5	0.5580	21.42	9.57	30.99	46.00	-15.01	AVG
6	0.7300	36.48	9.62	46.10	56.00	-9.90	peak

**Plot of Conducted Emissions Test Data**

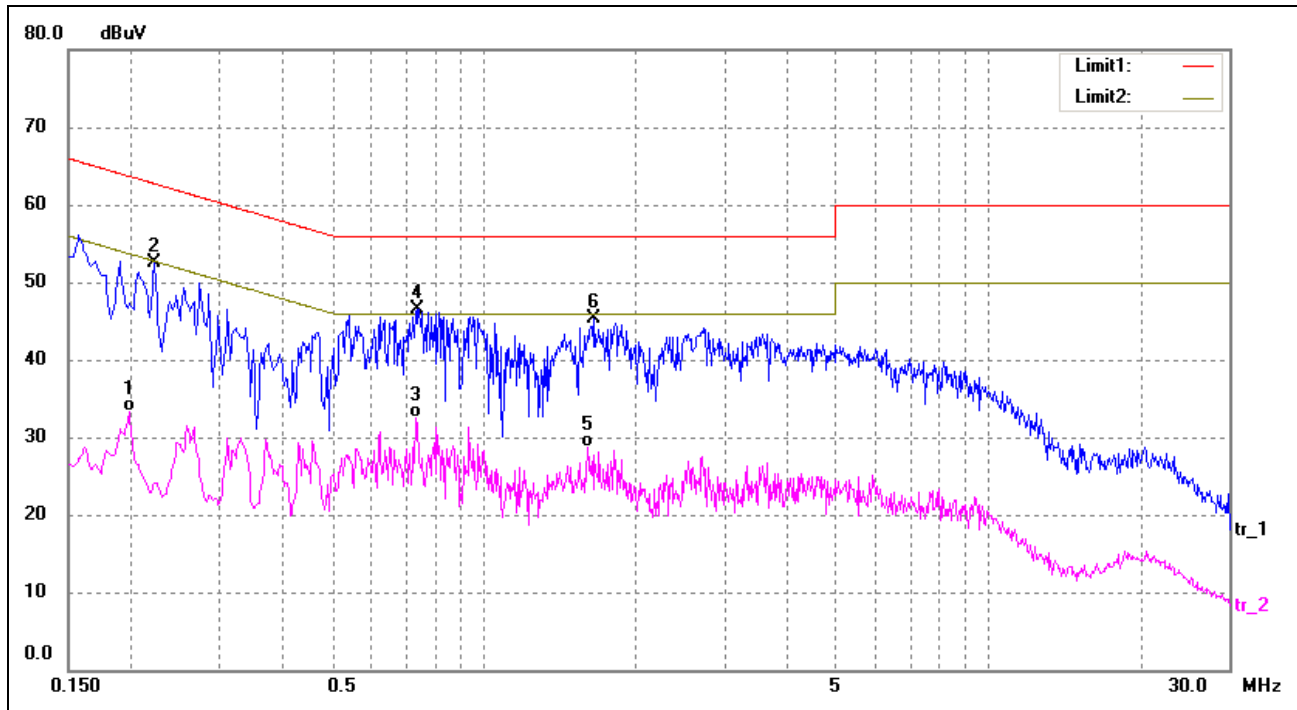
EUT: GPS product  
 Tested Model: MDT7P  
 Operating Condition: TM2  
 Comment: AC 120V/60Hz

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1860	22.77	9.50	32.27	54.21	-21.94	AVG
2*	0.1900	45.63	9.50	55.13	64.04	-8.91	peak
3	0.2660	17.18	9.50	26.68	51.24	-24.56	AVG
4	0.3060	39.87	9.50	49.37	60.08	-10.71	peak
5	0.7380	18.38	9.62	28.00	46.00	-18.00	AVG
6	0.8100	32.26	9.63	41.89	56.00	-14.11	peak

Test Specification: Line

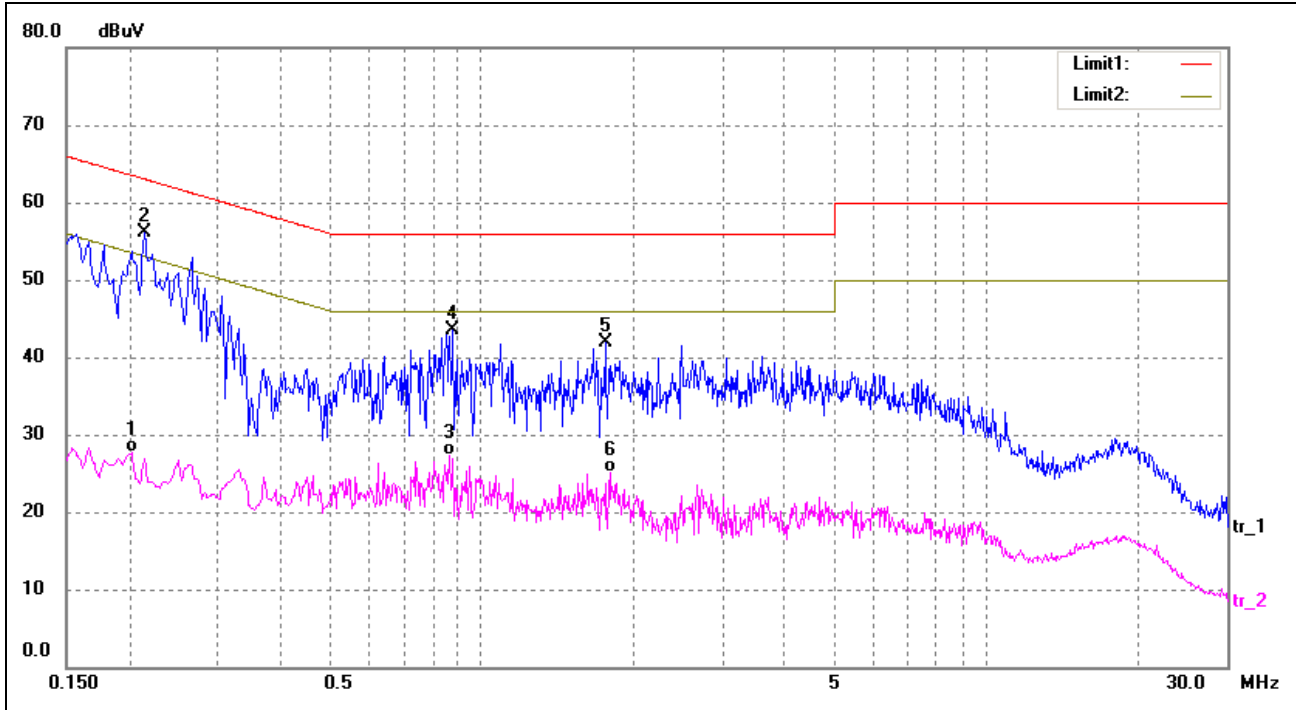


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1980	23.83	9.50	33.33	53.69	-20.36	AVG
2	0.2220	42.96	9.50	52.46	62.74	-10.28	peak
3	0.7340	22.81	9.62	32.43	46.00	-13.57	AVG
4*	0.7380	36.90	9.62	46.52	56.00	-9.48	peak
5	1.6020	19.01	9.76	28.77	46.00	-17.23	AVG
6	1.6620	35.51	9.77	45.28	56.00	-10.72	peak

**Plot of Conducted Emissions Test Data**

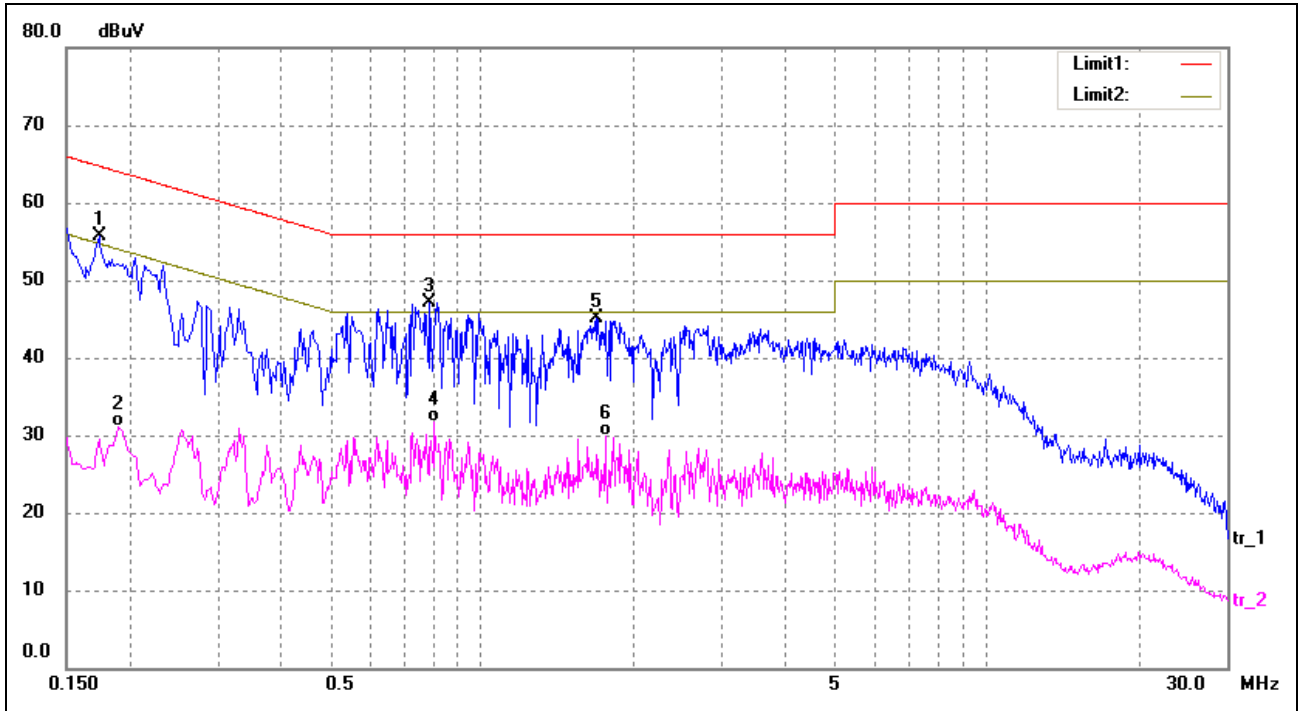
EUT: *GPS product*  
 Tested Model: *MDT7P*  
 Operating Condition: *TM3*  
 Comment: *AC 120V/60Hz*

Test Specification: *Neutral*



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2020	18.24	9.50	27.74	53.53	-25.79	AVG
2*	0.2140	46.67	9.50	56.17	63.05	-6.88	peak
3	0.8620	17.59	9.65	27.24	46.00	-18.76	AVG
4	0.8780	33.79	9.65	43.44	56.00	-12.56	peak
5	1.7620	32.03	9.79	41.82	56.00	-14.18	peak
6	1.7940	15.25	9.79	25.04	46.00	-20.96	AVG

Test Specification: Line

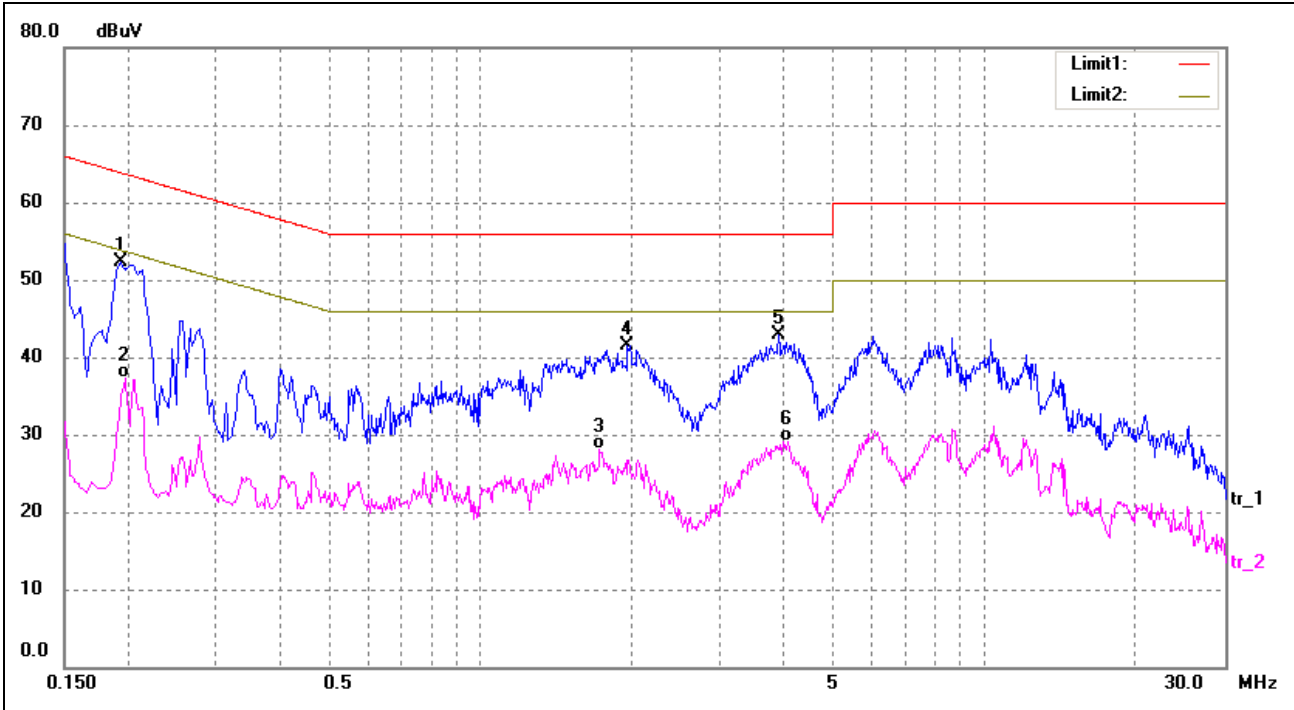


No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1740	46.26	9.50	55.76	64.77	-9.01	peak
2	0.1900	21.70	9.50	31.20	54.04	-22.84	AVG
3*	0.7900	37.43	9.63	47.06	56.00	-8.94	peak
4	0.8060	22.10	9.63	31.73	46.00	-14.27	AVG
5	1.6940	35.24	9.78	45.02	56.00	-10.98	peak
6	1.7620	20.14	9.79	29.93	46.00	-16.07	AVG

**Plot of Conducted Emissions Test Data**

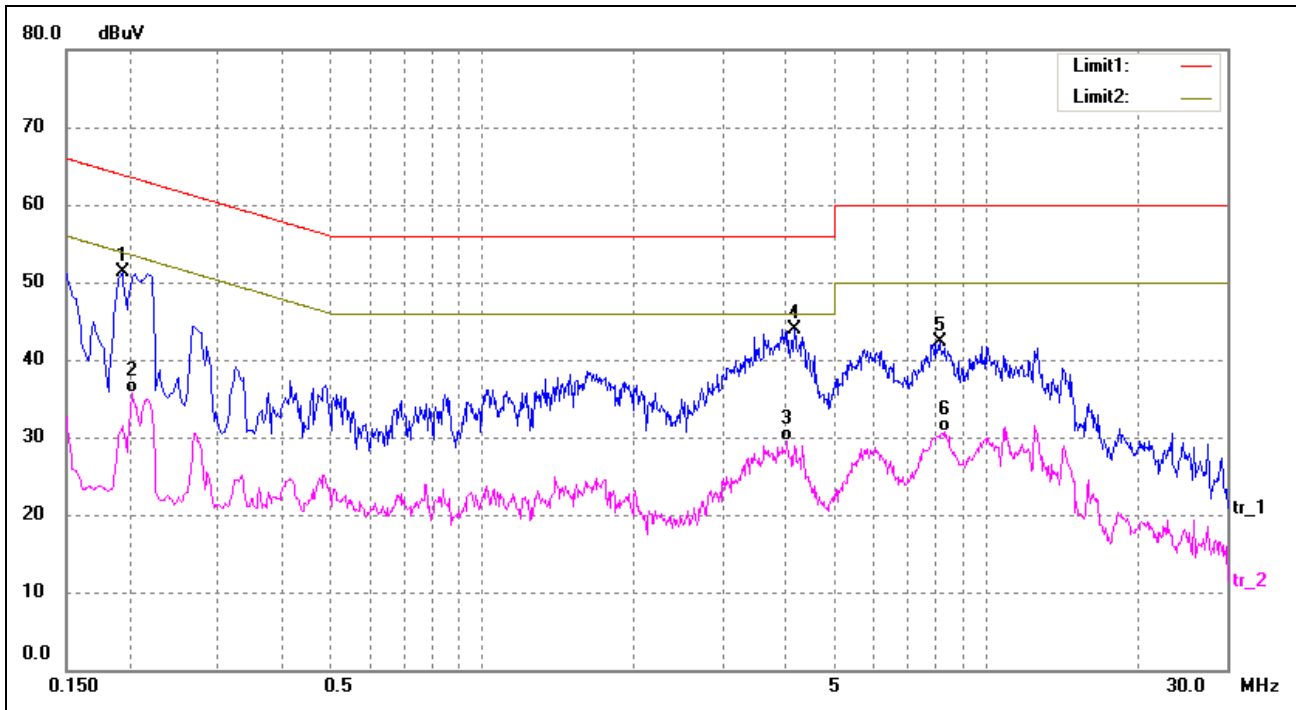
EUT: GPS product  
 Tested Model: MDT7P  
 Operating Condition: TM4  
 Comment: AC 120V/60Hz

Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1940	42.84	9.50	52.34	63.86	-11.52	peak
2	0.1980	27.89	9.50	37.39	53.69	-16.30	AVG
3	1.7260	18.32	9.78	28.10	46.00	-17.90	AVG
4	1.9660	31.77	9.82	41.59	56.00	-14.41	peak
5	3.9020	32.73	10.09	42.82	56.00	-13.18	peak
6	4.0740	19.00	10.11	29.11	46.00	-16.89	AVG

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1940	41.75	9.50	51.25	63.86	-12.61	peak
2	0.2020	26.20	9.50	35.70	53.53	-17.83	AVG
3	4.0300	19.42	10.10	29.52	46.00	-16.48	AVG
4*	4.1780	33.83	10.12	43.95	56.00	-12.05	peak
5	8.0940	32.08	10.31	42.39	60.00	-17.61	peak
6	8.2900	20.45	10.32	30.77	50.00	-19.23	AVG



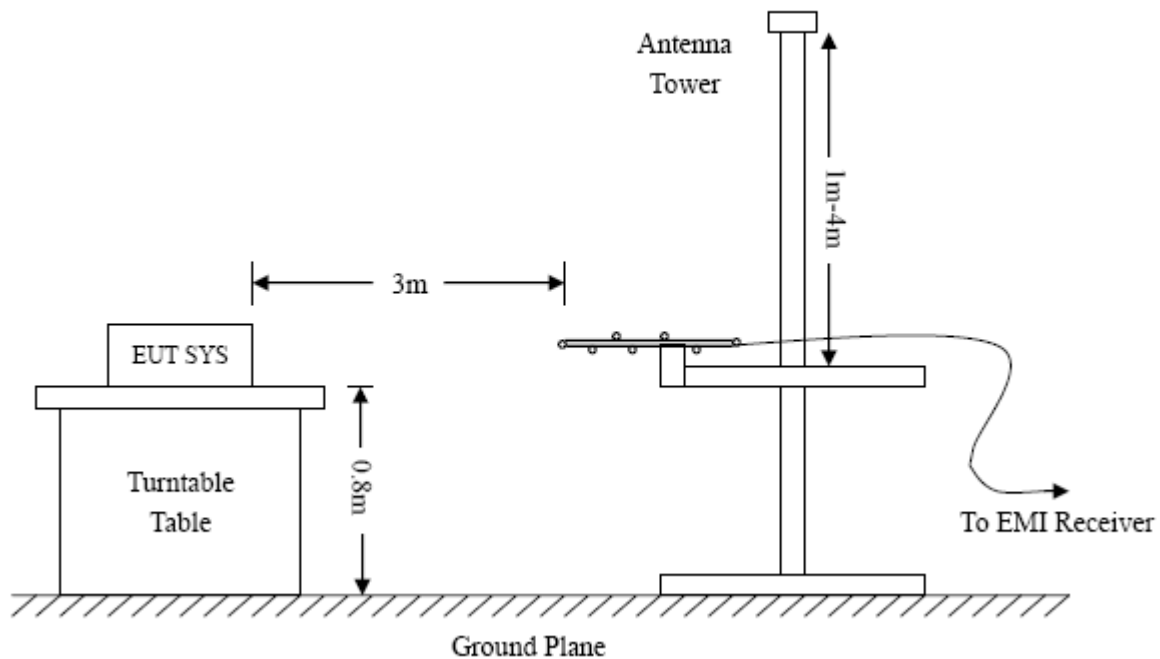
## 4. RADIATED EMISSION

### 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 $\mu$ V means the emission is 6dB $\mu$ 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

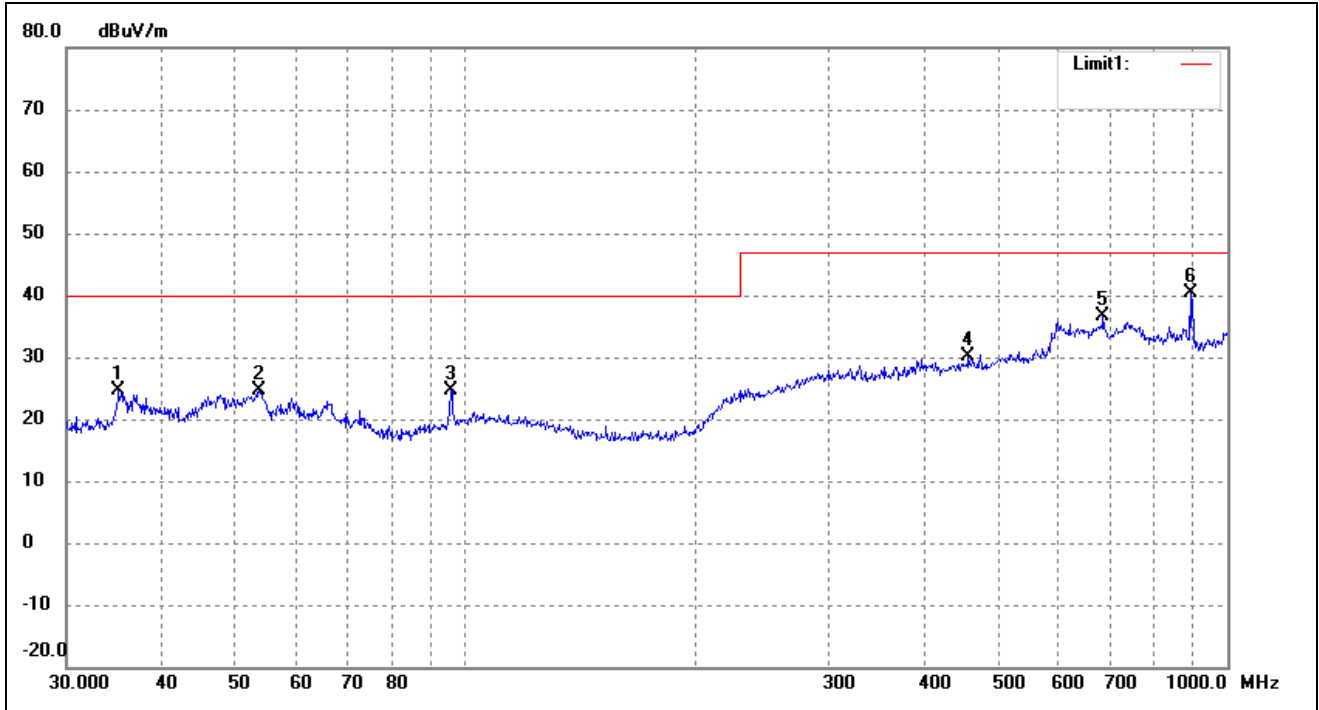
According to the data, the EUT complied with the FCC Part 15.109(a) rule, and had the worst margin of:

**-1.08 dB at 323.3204 MHz in the Horizontal polarization, 30 MHz to 1 GHz, 3Meters**

**Plot of Radiated Emissions Test Data**

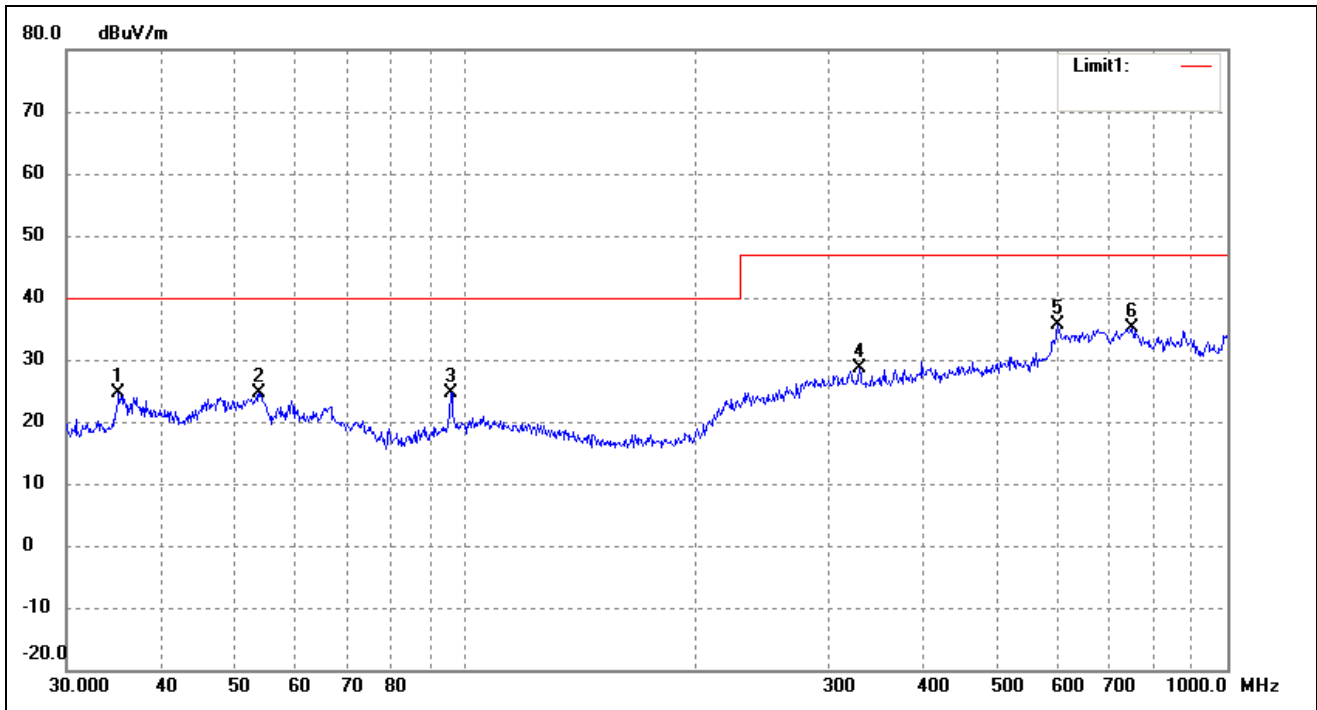
EUT: *GPS product*  
 Tested Model: *MDT7P*  
 Operating Condition: *TM1*  
 Comment: *AC 120V/60Hz*

Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	35.1278	20.30	4.41	24.71	40.00	-15.29	35	200	peak
2	53.6932	19.39	5.31	24.70	40.00	-15.30	69	200	peak
3	95.7622	20.17	4.48	24.65	40.00	-15.35	29	100	peak
4	457.5073	16.57	13.50	30.07	47.00	-16.93	209	100	peak
5	687.1507	17.86	18.72	36.58	47.00	-10.42	58	200	peak
6	893.8567	23.18	17.16	40.34	47.00	-6.66	326	100	peak

Test Specification: Vertical

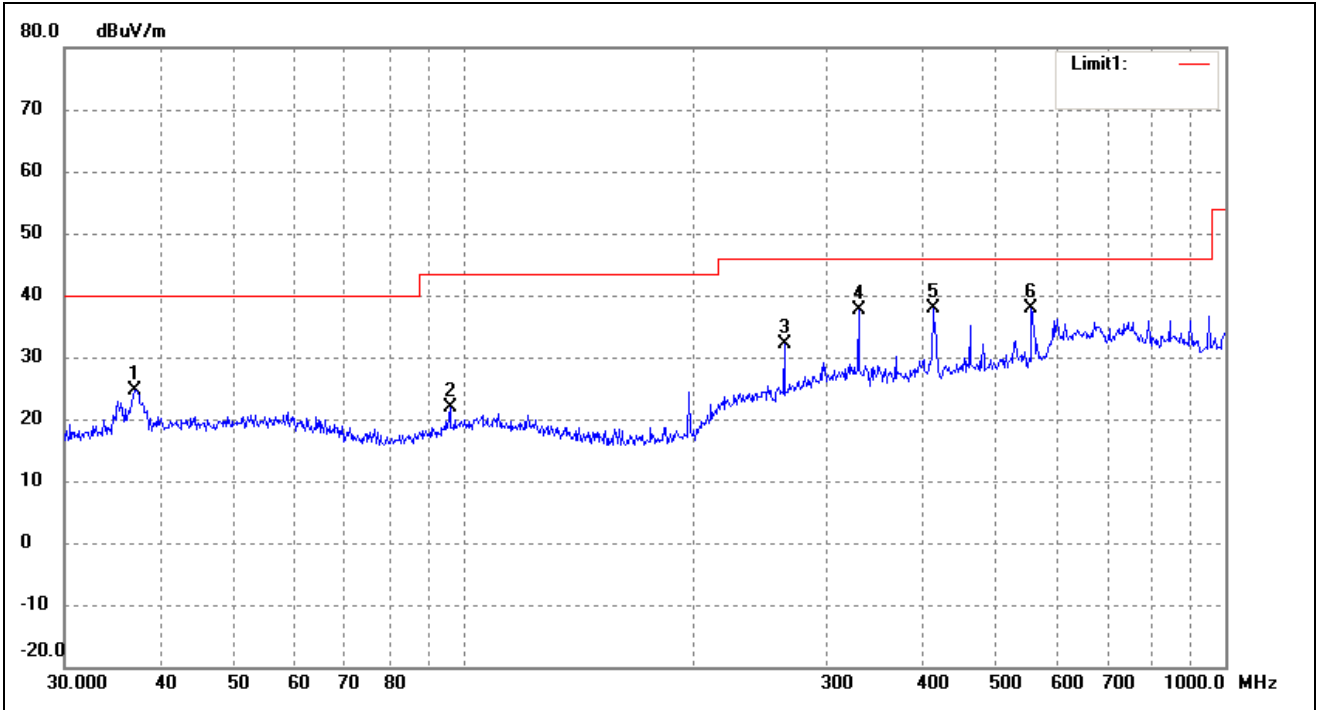


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	35.1278	20.30	4.41	24.71	40.00	-15.29	51	100	peak
2	53.6932	19.39	5.31	24.70	40.00	-15.30	87	100	peak
3	95.7622	20.17	4.48	24.65	40.00	-15.35	102	100	peak
4	329.0390	16.57	12.03	28.60	47.00	-18.40	359	100	peak
5	599.3213	16.48	19.19	35.67	47.00	-11.33	308	100	peak
6	750.1083	15.94	19.09	35.03	47.00	-11.97	120	100	peak

**Plot of Radiated Emissions Test Data**

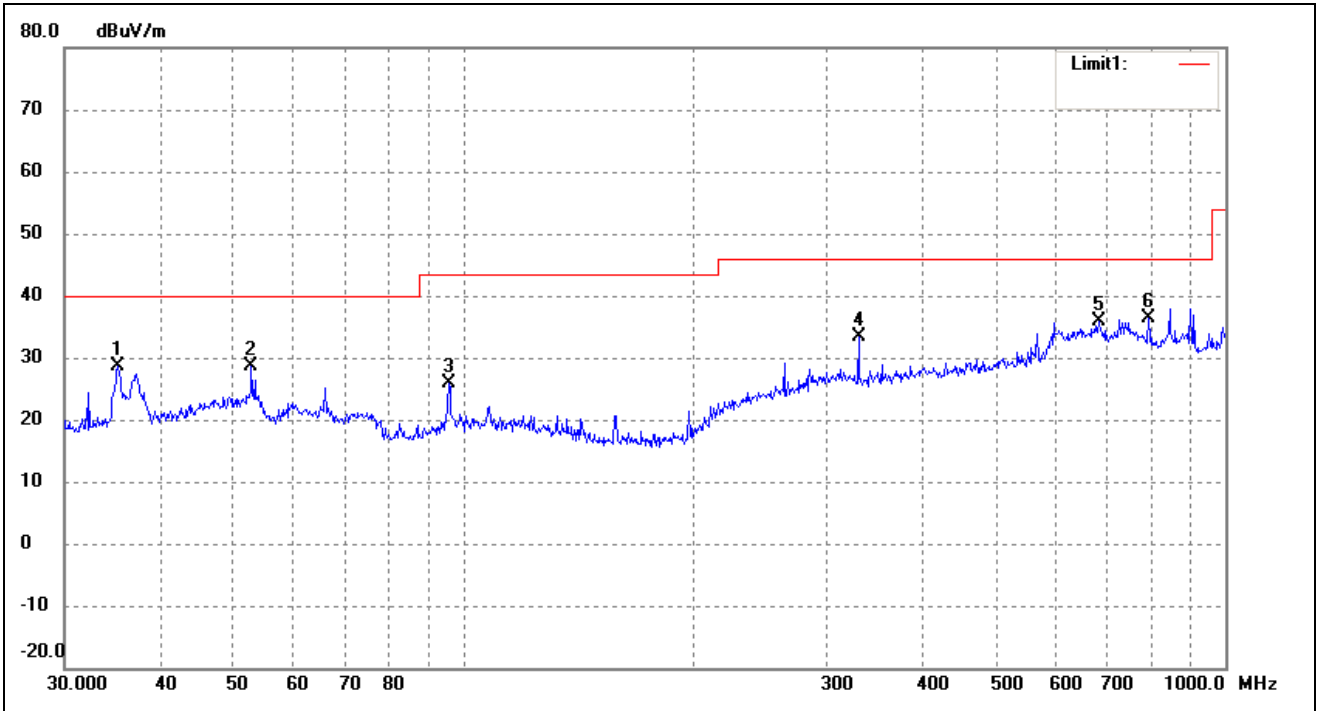
EUT: *GPS product*  
 Tested Model: *MDT7P*  
 Operating Condition: *TM2*  
 Comment: *AC 120V/60Hz*

Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	37.0249	19.98	4.74	24.72	40.00	-15.28	46	200	peak
2	96.0986	17.43	4.53	21.96	43.50	-21.54	98	200	peak
3	263.8190	21.76	10.29	32.05	46.00	-13.95	135	100	peak
4	330.1949	25.67	12.00	37.67	46.00	-8.33	167	100	peak
5	413.2706	25.17	12.63	37.80	46.00	-8.20	215	200	peak
6	556.7744	23.34	14.49	37.83	46.00	-8.17	269	100	peak

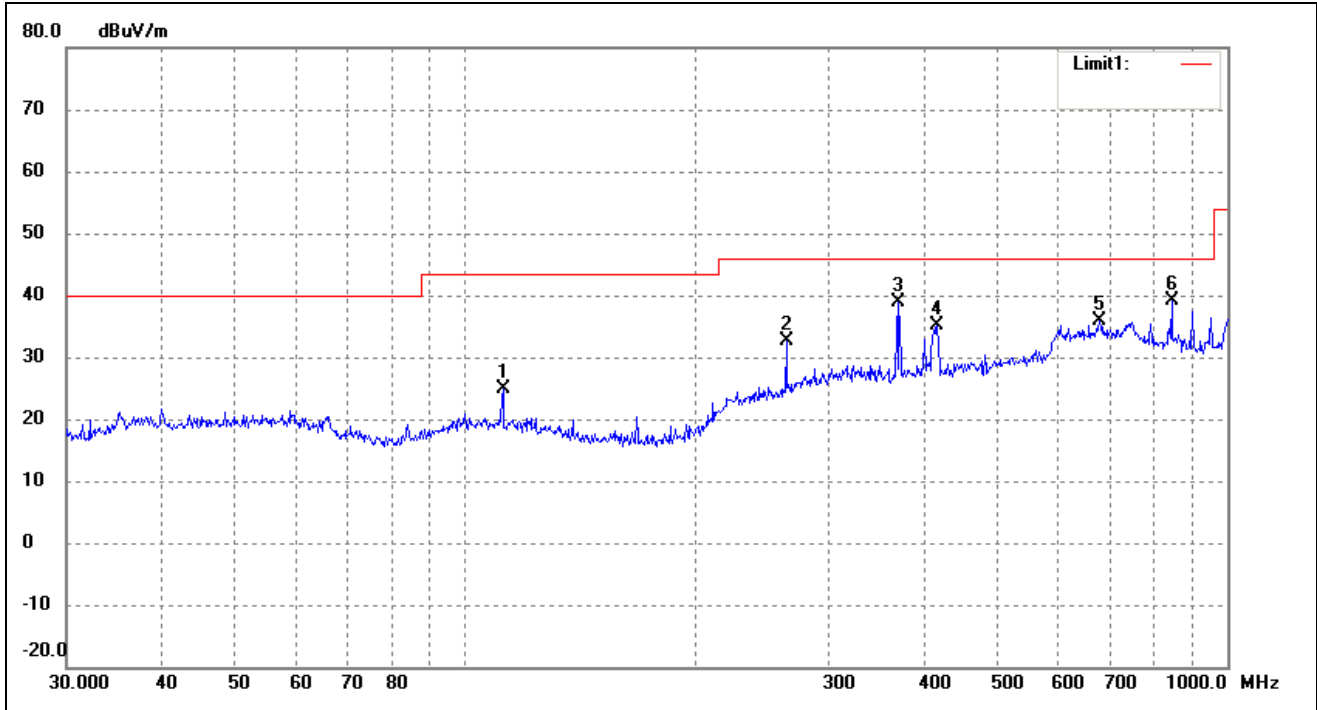
Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	35.2512	24.21	4.44	28.65	40.00	-11.35	44	100	peak
2	52.7600	23.30	5.30	28.60	40.00	-11.40	73	100	peak
3	95.7622	21.36	4.48	25.84	43.50	-17.66	114	100	peak
4	330.1949	21.39	12.00	33.39	46.00	-12.61	158	100	peak
5	682.3485	16.72	19.08	35.80	46.00	-10.20	197	100	peak
6	793.3960	19.13	17.37	36.50	46.00	-9.50	238	100	peak

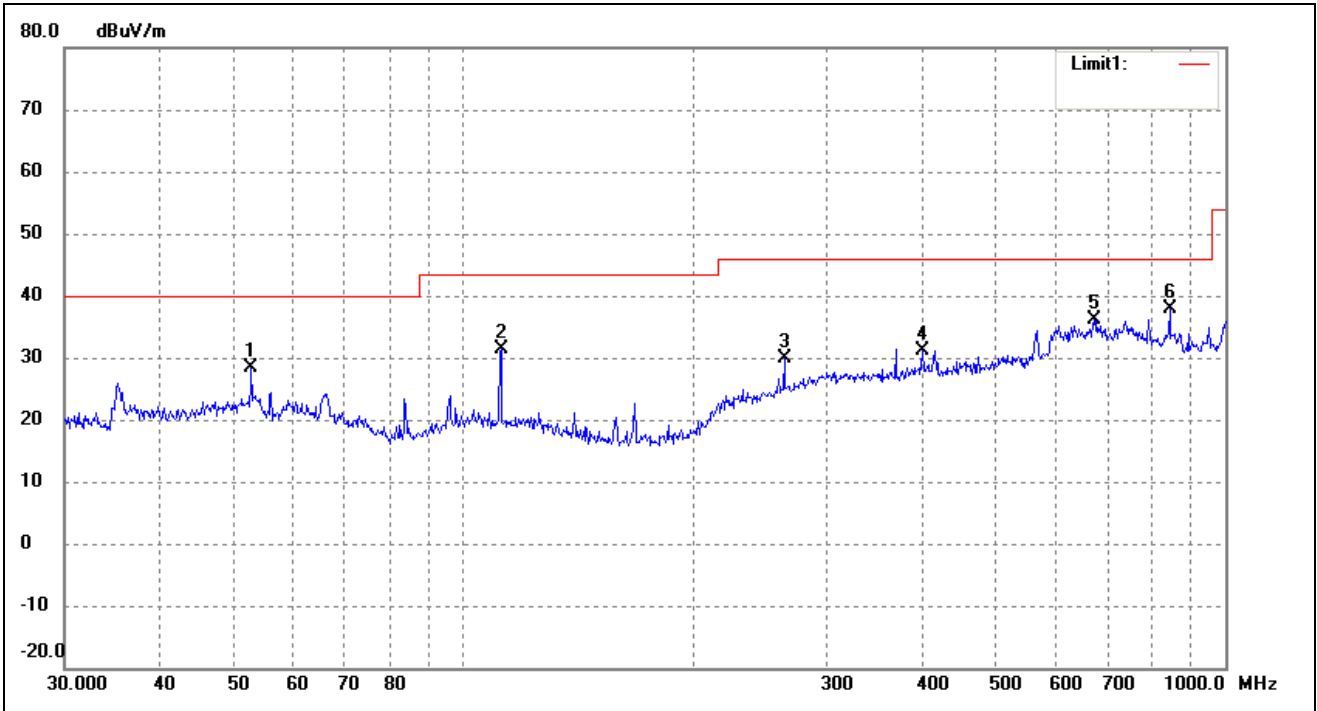
**Plot of Radiated Emissions Test Data**

EUT: *GPS product*  
 Tested Model: *MDT7P*  
 Operating Condition: *TM3*  
 Comment: *AC 120V/60Hz*  
  
 Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	35.1278	20.30	4.41	24.71	40.00	-15.29	35	200	peak
2	53.6932	19.39	5.31	24.70	40.00	-15.30	69	200	peak
3	95.7622	20.17	4.48	24.65	40.00	-15.35	29	100	peak
4	457.5073	16.57	13.50	30.07	47.00	-16.93	209	100	peak
5	687.1507	17.86	18.72	36.58	47.00	-10.42	58	200	peak
6	893.8567	23.18	17.16	40.34	47.00	-6.66	326	100	peak

Test Specification: Vertical



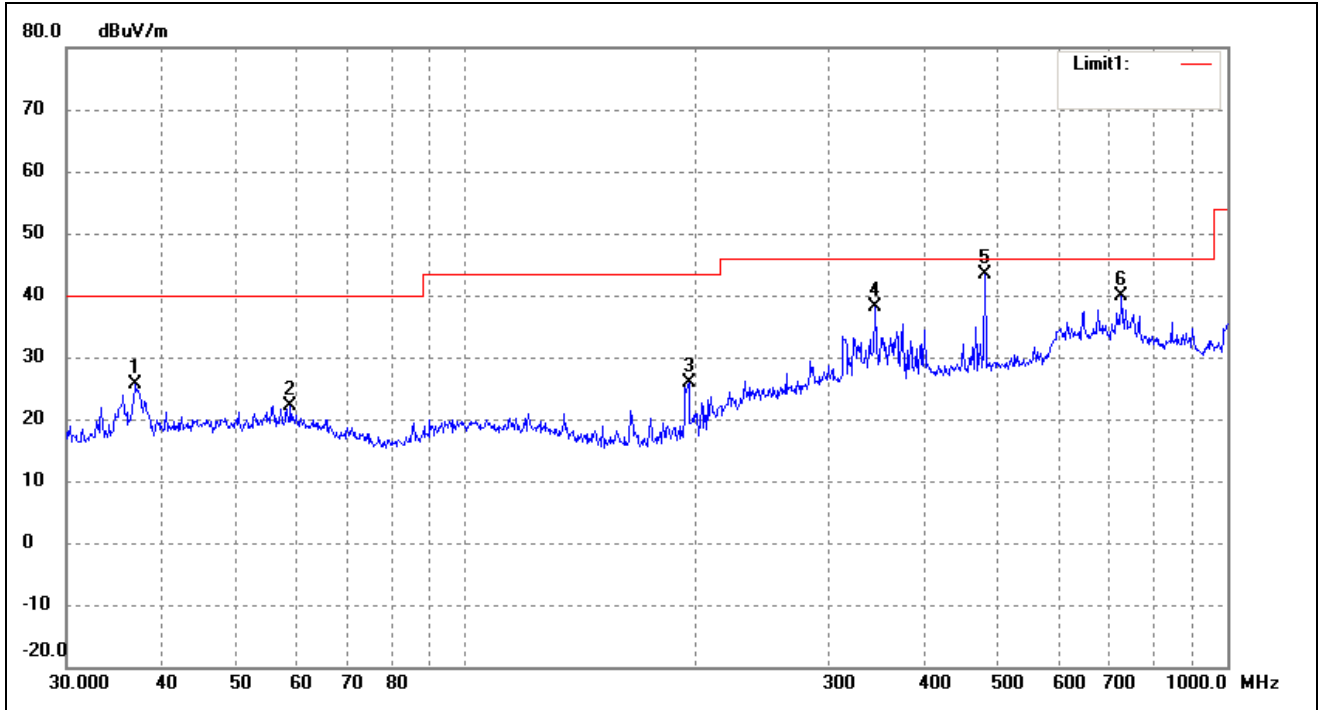
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	52.7600	23.01	5.30	28.31	40.00	-11.69	36	100	peak
2	112.1305	26.32	5.06	31.38	43.50	-12.12	69	100	peak
3	263.8190	19.52	10.29	29.81	46.00	-16.19	125	100	peak
4	400.4319	18.09	13.12	31.21	46.00	-14.79	167	100	peak
5	672.8444	17.19	18.87	36.06	46.00	-9.94	206	100	peak
6	845.0878	20.29	17.49	37.78	46.00	-8.22	239	100	peak



**Plot of Radiated Emissions Test Data**

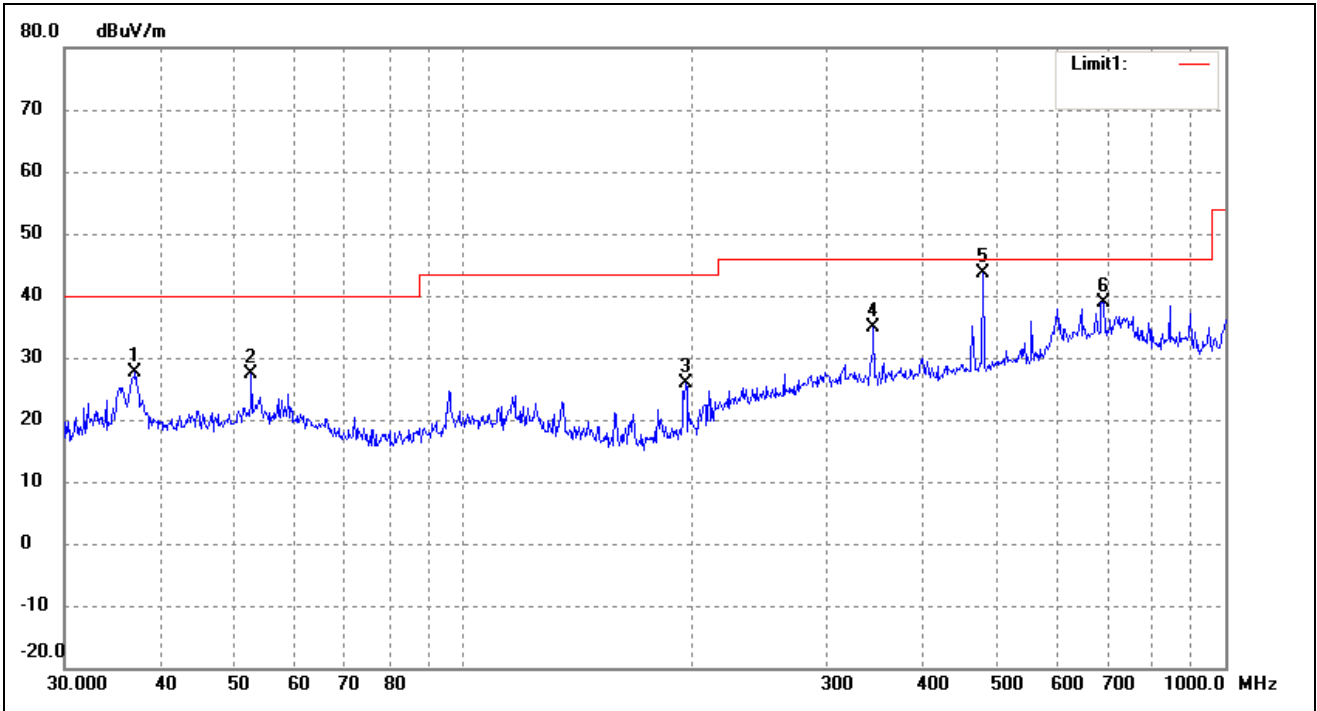
EUT: *GPS product*  
 Tested Model: *MDT7P*  
 Operating Condition: *TM4*  
 Comment: *AC 120V/60Hz*

Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	36.8953	20.85	4.72	25.57	40.00	-14.43	40	200	peak
2	59.0251	16.75	5.37	22.12	40.00	-17.88	152	200	peak
3	196.5098	22.28	3.52	25.80	43.50	-17.70	90	100	peak
4	345.5952	26.35	11.87	38.22	46.00	-7.78	137	100	peak
5	480.5276	30.16	13.12	43.28	46.00	-2.72	180	200	peak
6	726.8052	21.14	18.77	39.91	46.00	-6.09	264	100	peak

Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	37.1550	22.80	4.76	27.56	40.00	-12.44	36	100	peak
2	52.7599	22.04	5.30	27.34	40.00	-12.66	83	100	peak
3	195.8220	22.39	3.47	25.86	43.50	-17.64	139	100	peak
4	345.5951	22.92	11.87	34.79	46.00	-11.21	182	100	peak
5	480.5276	30.44	13.12	43.56	46.00	-2.44	243	100	peak
6	691.9867	20.54	18.37	38.91	46.00	-7.09	281	100	peak

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