



CTK Co., Ltd.
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TEST REPORT

According to : FCC 47CFR part 15 subpart C § 15.231

Test Report No. : CTK-2012-01172
Date of Issue : November 09, 2012
FCC ID : TRKHP-1500T
Equipment Under Test : HP-1500T
Kind of Product : Digital Guest Pager
Applicant : Dae Myung Electronics Co., LTD
Applicant Address : 29-1, SongPa-Dong, SongPa-Ku, Seoul, 138-170 South Korea
Manufacturer : Dae Myung Electronics Co., LTD
Manufacturer Address : 29-1, SongPa-Dong, SongPa-Ku, Seoul, 138-170 South Korea
Contact Person : In-Seob Hwang / President
Telephone : +82-2-419-7576
Received Date : May 22, 2012
Test period : Start : July 11, 2012 End : October 16, 2012
Test Results : ☒ In Compliance ☐ Not in Compliance

The test results presented in this report relate only to the object tested.

Tested by

Y. T. Lee

Young-taek Lee
Test Engineer
Date: November 09, 2012

Reviewed by

Y. J. Park

Young-Joon, Park
Technical Manager
Date: November 09, 2012



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REPORT REVISION HISTORY

Date	Revision	Page No
November 09, 2012	Issued (CTK-2012-01172)	All

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1.0 General Product Description

Type of equipment	DIGITAL GUEST PAGER
Equipment model name	HP-1500T
Frequency Range	915.0 MHz
Type of Modulation	Frequency Shift Keying
Number of channels	1
Antenna type	WHIP antenna
Power Source	DC 12 V

1.1 Model Differences

Not applicable

1.2 Device Modifications

The following modifications were necessary for compliance:

Not applicable

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
-	-	-	-	-
-	-	-	-	-

1.4 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.



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1.5 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea.

1.6 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 m & 10 m OATS, 3 m & 10 m SAC and Conducted Test Site to perform FCC Part 15/18 measurements	 805871
JAPAN	VCCI	10 m OATS, 3 m & 10 m SAC and Conducted Test Site	 R-948, C-986 T-1843
KOREA	KCC	EMI (10 m OATS, 10 m SAC and Conducted Test Site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and Interruptions)	 No. 51, KR0025
International	KOLAS	EMC	



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2.0 Summary of tests

FCC Part Section(s)	Parameter	Status (note 1)
15.203	Antenna requirement	N/A
15.204	External radio frequency power amplifier and antenna modifications	N/A
15.207	Conducted emissions	Complies
15.231(a)	Transmission requirement	Complies
15.231(b)	Radiated emissions	Complies
15.231(c)	Occupied bandwidth	Complies
15.231(d)	Frequency tolerance	N/A
15.231(e)	Periodic alternate field strength requirements	N/A

- FCC Part 15, Subpart C, 15.231

For low Power transmitters operating periodically in the band 40.66 - 40.70 MHz and above 70 MHz

Footnotes for N/A's:

- § 15.203 is not applicable because the transmitter is provided with an integral antenna.
- § 15.204 is not applicable because the transmitter is provided with an integral antenna.
- § 15.231(d) has not been tested, because the Equipment Under Test does not operate within the frequency band 40.66 – 40.70 MHz.
- § 15.231(e) has not been tested, because the Equipment Under Test complies with § 15.231(a)



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2.1.1 Power line conducted emissions (Section 15.207)

Test Location

Shielded Room

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

* Measurement procedures was In accordance with ANSI C63.4-2009 7.3.3, 7.3.4

Limit

-15.207(a)

Frequency (MHz)	Conducted Limit (dBuV)	
	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

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
0.6045	41.1	4.9	Average



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Test Data

[HOT]

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.204000	44.9	1000.0	9.000	On	L1	10.0	18.5	63.4
0.469500	41.1	1000.0	9.000	On	L1	10.2	15.4	56.5
0.537000	40.6	1000.0	9.000	On	L1	10.2	15.4	56.0
0.672000	39.6	1000.0	9.000	On	L1	10.1	16.4	56.0
1.207500	38.9	1000.0	9.000	On	L1	9.9	17.1	56.0
1.545000	38.9	1000.0	9.000	On	L1	9.9	17.1	56.0
2.013000	38.2	1000.0	9.000	On	L1	9.9	17.8	56.0
3.421500	39.5	1000.0	9.000	On	L1	9.8	16.5	56.0
3.624000	36.7	1000.0	9.000	On	L1	9.8	19.3	56.0
19.500000	44.0	1000.0	9.000	On	L1	10.0	16.0	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.469500	40.4	1000.0	9.000	On	L1	10.2	6.1	46.5
0.604500	41.1	1000.0	9.000	On	L1	10.1	4.9	46.0
0.672000	39.7	1000.0	9.000	On	L1	10.1	6.3	46.0
1.140000	38.9	1000.0	9.000	On	L1	9.9	7.1	46.0
1.477500	37.5	1000.0	9.000	On	L1	9.9	8.5	46.0
1.545000	38.9	1000.0	9.000	On	L1	9.9	7.1	46.0
2.013000	38.2	1000.0	9.000	On	L1	9.9	7.8	46.0
2.886000	37.2	1000.0	9.000	On	L1	9.9	8.8	46.0
3.354000	38.5	1000.0	9.000	On	L1	9.8	7.5	46.0
19.500000	44.0	1000.0	9.000	On	L1	10.0	6.0	50.0

[NEUTRAL]

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.267000	42.0	1000.0	9.000	On	N	10.1	19.2	61.2
0.469500	41.1	1000.0	9.000	On	N	10.2	15.4	56.5
0.604500	40.9	1000.0	9.000	On	N	10.2	15.1	56.0
0.672000	39.7	1000.0	9.000	On	N	10.1	16.3	56.0
1.207500	39.0	1000.0	9.000	On	N	10.0	17.0	56.0
1.477500	38.1	1000.0	9.000	On	N	9.9	17.9	56.0
1.612500	39.4	1000.0	9.000	On	N	9.9	16.6	56.0
2.080500	38.0	1000.0	9.000	On	N	9.9	18.0	56.0
3.358500	40.3	1000.0	9.000	On	N	9.9	15.7	56.0
19.500000	44.4	1000.0	9.000	On	N	10.1	15.6	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.469500	40.5	1000.0	9.000	On	N	10.2	6.0	46.5
0.604500	40.9	1000.0	9.000	On	N	10.2	5.1	46.0
0.672000	39.8	1000.0	9.000	On	N	10.1	6.2	46.0
1.140000	38.8	1000.0	9.000	On	N	10.0	7.2	46.0
1.477500	37.5	1000.0	9.000	On	N	9.9	8.5	46.0
1.612500	39.4	1000.0	9.000	On	N	9.9	6.6	46.0
2.013000	37.9	1000.0	9.000	On	N	9.9	8.1	46.0
2.485500	36.9	1000.0	9.000	On	N	9.9	9.1	46.0
3.358500	39.9	1000.0	9.000	On	N	9.9	6.1	46.0
19.500000	44.3	1000.0	9.000	On	N	10.1	5.7	50.0



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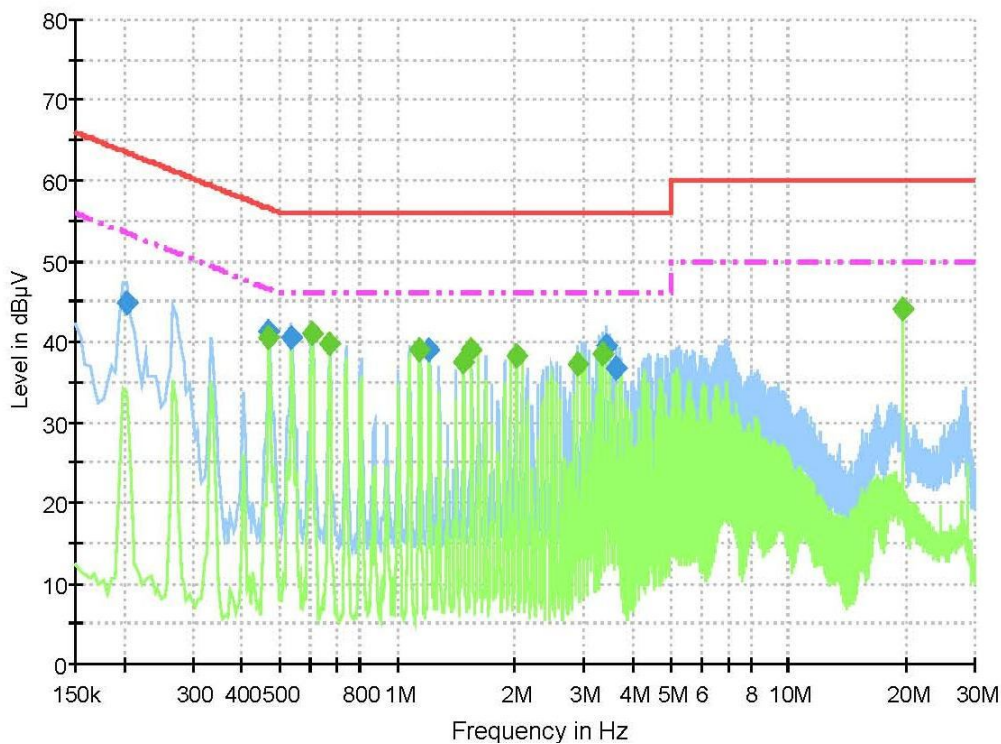
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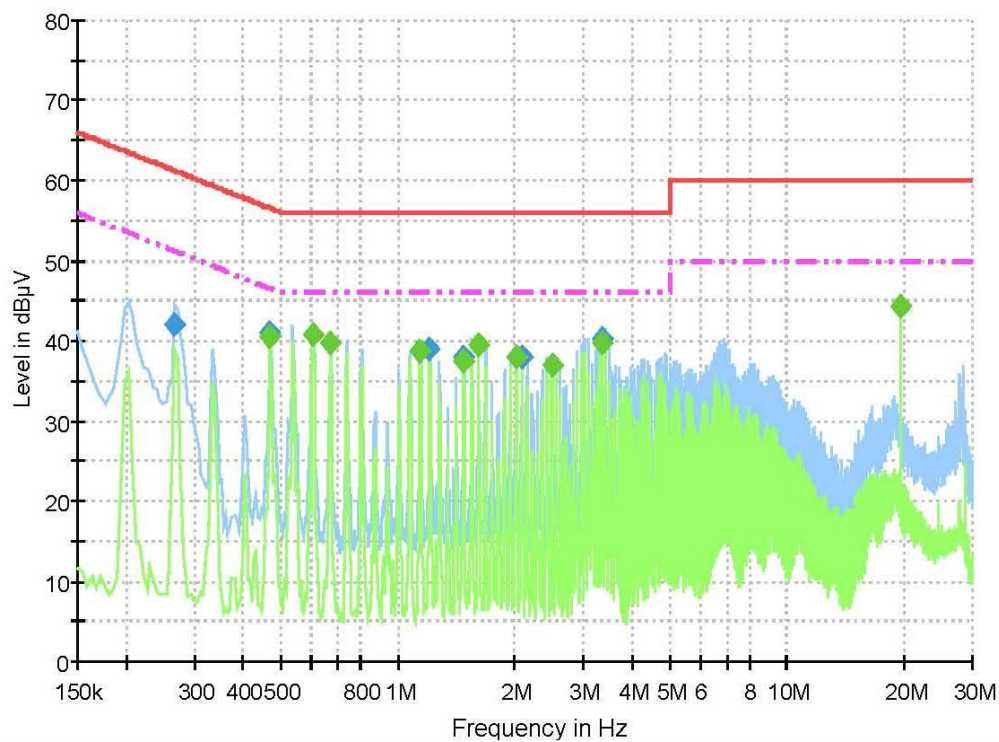
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[HOT]



[NEUTRAL]



2.1.2 Transmission requirement (Section 15.231(a))

Minimum Standard : 15.231(a) Continuous transmissions such as voice, video or data transmissions are not permitted.

15.231(a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds after being released.

15.231(a)(2) A transmitter activated automatically shall cease transmission within 5 seconds of activation.

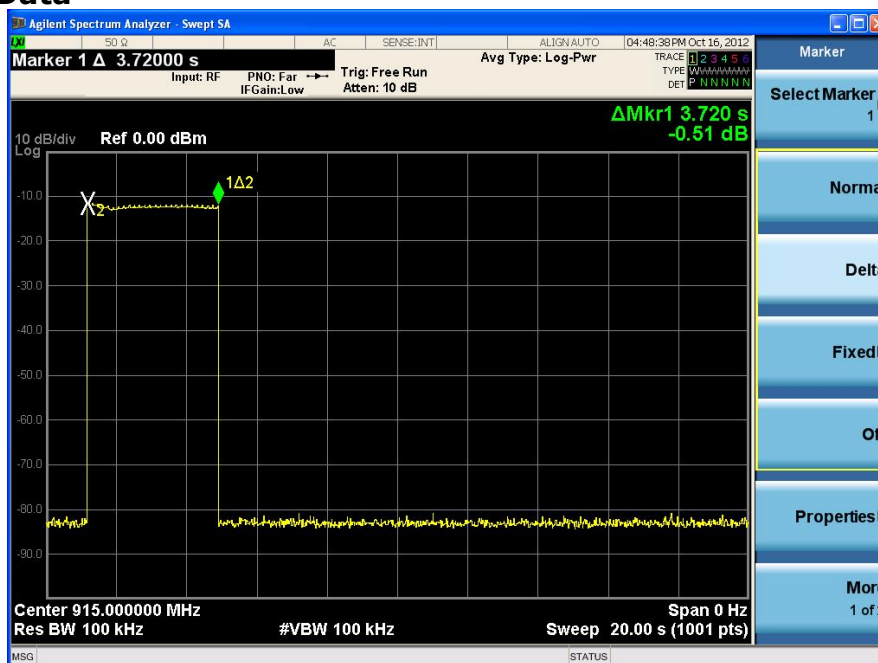
15.231(a)(3) Periodic transmissions at regular predetermined intervals are not permitted. However polling or supervisory transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

15.231(a)(4) Intentional radiators, which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm.

Test Results

☒ Complies

Test Data





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Rationale for compliance with transmission requirements

15.231(a) : complies

15.231(a)(1) : complies, deactivation within 5 seconds after release

15.231(a)(2) : not applicable

15.231(a)(3) : not applicable

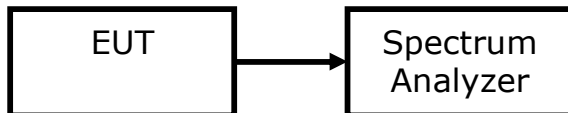
15.231(a)(4) : not applicable

2.1.3 Duty Cycle

Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Set center frequency of spectrum analyzer = Operating frequency
3. Set the spectrum analyzer as RBW, VBW = 100 kHz, Span = 0 Hz

Test Configuration



Limit

Nil (No dedicated limit specified in the Rules)

Test Results

No non-compliance noted

Test Data

T on + T off = 234 ms

T on = 145.5 ms

Duty Cycle Correction Factor = $20 * \log(T \text{ on} / (T \text{ on} + T \text{ off})) = 20 * \log(145.5 / 234)$
= -4.12 dB



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2.1.4 Radiated emissions (Section 15.231(b))

Test Location

- ☒ 10 m SAC (test distance : ☐ 10 m, ☒ 3 m)
☒ 3 m SAC (test distance : 3 m)

Test Procedures

- 1) In the frequency range above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

The spectrum analyzer is set to:

Frequency Range = 30 MHz ~ 10 GHz (10th harmonic)

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW \geq RBW

Sweep = auto

* Measurement procedures was In accordance with ANSI C63.4-2009 8.3.1.1, 8.3.1.2, 8.3.2.1, 8.3.2.2

Limit

Fundamental Frequency(MHz)	Field Strength of Fundamental(uV/m@3m)	Field Strength of Unwanted Emissions (uV/m@3m)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750**	125 to 375**
174-260	3,750	375
260-470	3,750 to 12,500**	375 to 1,250**
Above 470	12,500	1,250

**Linear interpolations

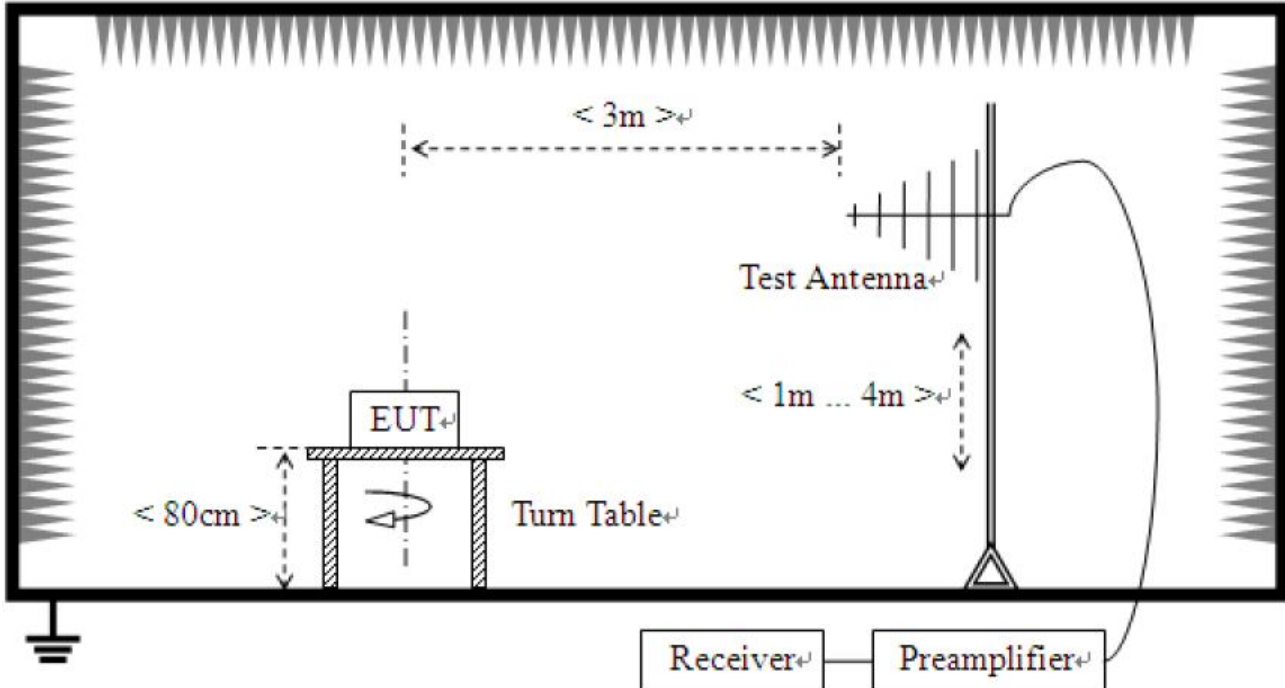
[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = $56.81818(F) - 6136.3636$; for the band 260-470 MHz, uV/m at 3 meters = $41.6667(F) - 7083.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

Any emissions that fall within the restricted bands of 15.205 shall exceed the following limits.

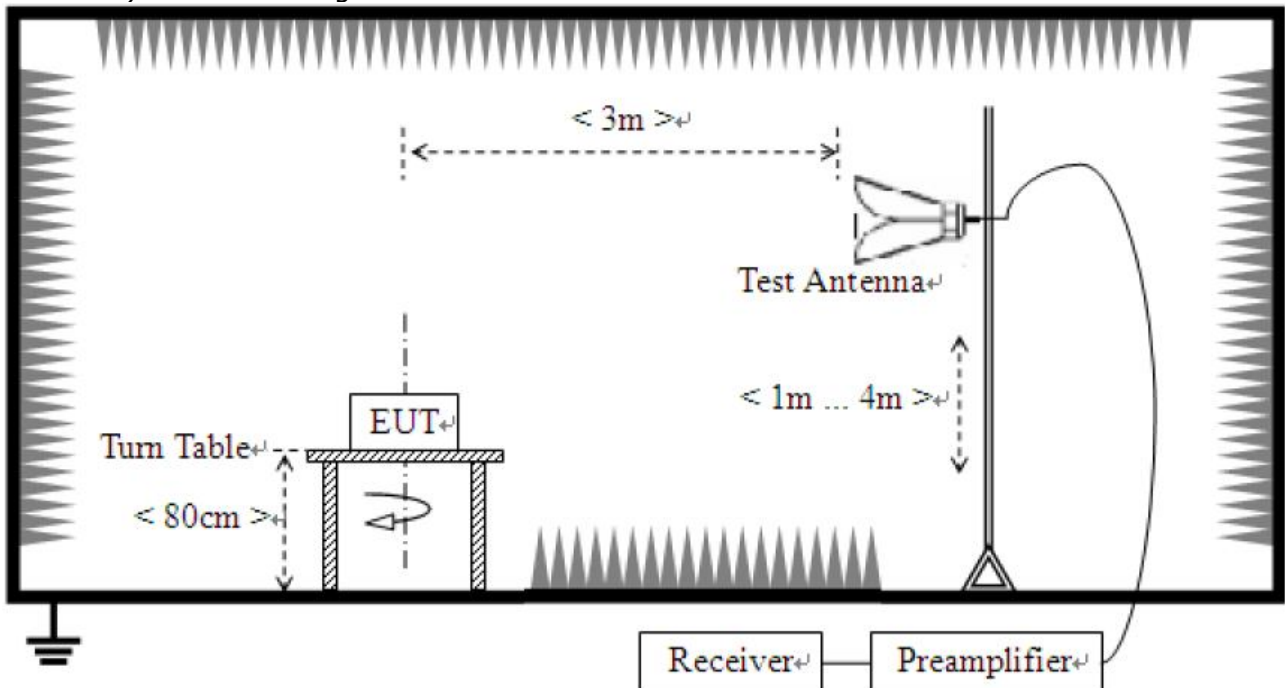
Frequency(MHz)	Field Strength (uV/m@3m)	Field Strength (dBuV/m@3m)
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

Test Setup:

1) For field strength of emissions from 30 MHz to 1 GHz



2) For field strength of emissions above 1 GHz





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Test Results

EUT	Digital Guest Pager	Measurement Detail	
Model	HP-1500T	Frequency Range	30 MHz ~ 10 GHz
Test mode	TX	-	-

The requirements are:

☒ Complies

Test Data

Fundamental :

Freq. (MHz)	Reading (Peak) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Duty Cycle Correction Factor (dB)	Result (Average) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pol (H/V)	Remark
915	68.3	4.2	72.5	-	-	102.0	29.5	V	Peak
915	68.3	4.2	72.5	-4.12	68.38	82.0	13.62	V	Average
915	74.3	4.2	78.5	-	-	102.0	23.5	H	Peak
915	74.3	4.2	78.5	-4.12	74.38	82.0	7.62	H	Average

Remark : Average = Peak result + Duty cycle correction factor

Spurious Emissions :

Freq. (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Duty Cycle Correction Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pol (H/V)	Remark
1830	53.8	1.7	55.5	-	-	82.0	23.80	H	Peak
1830	53.8	1.7	55.5	-4.12	51.38	62.0	10.62	H	Average
2745*	50.4	4.6	55.0	-	-	74.0	19.00	V	Peak
2745*	50.4	4.6	55.0	-4.12	50.38	54.0	3.62	V	Average
3660*	48.6	7.7	56.3	-	-	74.0	17.70	V	Peak
3660*	48.6	7.7	56.3	-4.12	52.18	54.0	1.820	V	Average
5490	35.4	13.8	55.7	-	-	82.0	26.30	V	Peak
5490	35.4	13.8	55.7	-4.12	51.58	62.0	10.42	V	Average

* - Denotes restricted bands

[Restricted bands]

MHz	MHz	MHz	MHz	MHz	GHz
0.09-0.11	8.37626-8.38675	73-74.6	399.9-410	2690-2900	10.6-12.7
0.495-0.505	8.41425-8.41475	74.8-75.2	608-614	3260-3267	13.25-13.4
2.1735-2.1905	12.29-12.293	108-121.94	960-1240	3332-3339	14.47-14.5
4.125-4.128	12.51975-12.52025	123-138	1300-1427	3345.8-3358	15.35-16.2
4.17725-4.17775	12.57675-12.57725	149.9-150.05	1435-1626.5	3600-4400	17.7-21.4
4.20725-4.20775	13.36-13.41	156.52475-156.52525	1645.5-1646.5	4500-5150	22.01-23.12
6.215-6.218	16.42-16.423	156.7-156.9	1660-1710	5350-5460	23.6-24
6.26775-6.26825	16.69475-16.69525	162.0125-167.17	1718.8-1722.2	7250-7750	31.2-31.8
6.31175-6.31225	16.80425-16.80475	167.72-173.2	2200-2300	8025-8500	36.43-36.5
8.291-8.294	25.5-25.67	240-285	2310-2390	9000-9200	Above 38.6
8.362-8.366	37.5-38.25	322-335.4	2483.5-2500	9300-9500	



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APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Signal Analyzer	Agilent	N9020A	MY48011598	2012-11-10
2	Spectrum Analyzer	Rohde & Schwarz	FSP-30	100994	2012-11-10
3	EMI Test Receiver	Rohde & Schwarz	ESCI7	100814	2012-12-13
4	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	100203	2013-07-05
5	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-125	2014-06-06
6	Attenuator	HP	8494A	3308A33351	2012-11-14
7	EPM Series Power Meter	HP	E4418A	GB38272734	2012-11-10
8	Power Sensor	HP	8487A	3318A03524	2013-07-10
9	Audio Analyzer	HP	8903B	2747A03432	2012-11-10
10	ESG-D Series Signal Generator	Agilent	E4432B	US40054094	2012-11-21
11	SYNTHESIZED SWEEPER	HP	8341B	2819A01563	2012-11-10
12	Modulation Analyzer	HP	8901B	3438A05228	2012-11-18
13	Attenuator	BIRD	1000-WA-MFN-30	236	2012-11-14
14	Temp&Humi Chamber	Kunpoong	JT-TH-556-1	9QE5-002	2013-01-12
15	DC POWER SUPPLY	Agilent	E3632A	MY40011638	2012-11-10
16	EMC Analyzer	Agilent	E7405A	MY45110859	2013-02-13
17	Horn Antenna	ETS-Lindgren	3115	00078894	2013-03-22
18	Horn Antenna	ETS-Lindgren	3115	00078895	2013-03-22
19	Trilog Broadband Antenna	Rohde & Schwarz	VULB 9161 SE	9161-4133	2014-06-11
20	6dB Attenuator	Rohde & Schwarz	DNF	272.4110.50	2012-11-14
21	OPT H64 AMPLIFIER	HP	8447F	3113A06814	2013-03-27
22	PREAMPLIFIER	Agilent	8449B	3008A02307	2012-11-17
23	Radio Communication Tester	Rohde & Schwarz	CMU200	106765	2013-02-09
24	LISN	Rohde & Schwarz	ENV216	101235	2013-08-18
25	LISN	Rohde & Schwarz	ENV216	101236	2013-08-06
26	DC POWER SUPPLY	Agilent	E3632A	MY40011638	2012-11-10
27	EMI Test Receiver	Rohde & Schwarz	ESCI3	100032	2013-02-09
28	AMPLIFIER	Sonoma Instrument Co.	310	291721	2013-03-27
29	EMI Test Receiver	Rohde & Schwarz	ESU40	100336	2013-06-29