

FCC Part 15 Subpart B

EMI TEST REPORT

of

E.U.T. : Tone Pager

FCC ID. : LEATP20-PS4-OPQ01

MODEL : TP20-PS4

Working Frequency : 450 - 470 MHz

for

APPLICANT : Unication Co., Ltd.

ADDRESS : 3F., No. 6, Wu-Kung 5 Rd., Hsinchuang City, Taipei,
Taiwan, R.O.C.

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN

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Report Number : ET88R-11-044

TEST REPORT NOTIFICATION

Applicant : Unication Co., Ltd.
3F., No. 6, Wu-Kung 5 Rd., Hsinchuang City, Taipei, Taiwan, R.O.C.

Manufacturer : Unication Co., Ltd.
3F., No. 6, Wu-Kung 5 Rd., Hsinchuang City, Taipei, Taiwan, R.O.C.

Description of EUT :

- a) Type of EUT : Tone Pager
- b) Trade Name : ----
- c) Model No. : TP20-PS4
- d) FCC ID : LEATP20-PS4-OPQ01
- e) Working Frequency : 450 - 470 MHz
- f) Power Supply : DC 1.5V Battery

Regulation Applied : FCC Rules and Regulations Part 15 Subpart B (1998)

I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Note : 1. The results of the testing report relate only to the items tested.
2. The testing report shall not be reproduced except in full, without the written approval of ETC.

Issued Date : NOV. 23, 1999

Test Engineer : Jeff Chuang
(Jeff Chuang)

Approve & Authorized Signer : Will Yauo
Will Yauo, Supervisor
EMI Test Site of ELECTRONICS
TESTING CENTER, TAIWAN

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1. GENERAL INFORMATION

1.1 Product Description

- a) Type of EUT : Tone Pager
- b) Trade Name : ----
- c) Model No. : TP20-PS4
- d) FCC ID : LEATP20-PS4-OPQ01
- e) Working Frequency : 450 - 470 MHz
- f) Power Supply : DC 1.5V Battery

1.2 Characteristics of Device

The Pager Modulation is FSK-NRZ ± 4.5 MHz. CHANNEL Spacking 25 KHz. I_f is 21.4 MHz working frequency is 450-470 MHz.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in section 12.1 of ANSI C63.4(1992).

For detail procedures, please see each measuring item.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the roof top of Building at No.34, Lin 5, Ding Fu Tsun, Linkou Hsiang, Taipei Hsien, Taiwan, R.O.C.

This site has been fully described in a report submitted to your office, and accepted in a letter dated Feb. 10 , 1997.

2. DEFINITION AND LIMITS

2.1 Definition

Unintentional radiator:

A device that intentionally generates and radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

2.2 Limitation

(1) Conducted Emission Limits :

According to 15.107 , Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 450 kHz to 30 MHz shall not exceed 250 microvolts. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

Class B Line Conducted Emission Limits :

Frequency MHz	Emissions V	Emissions dB V
0.45 - 30.0	250	48.0

(2) Radiated Emission Limits :

According to 15.109 ,Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Class B Radiated Emission Limits :

Frequency MHz	Distance Meters	Radiated dB V/m	Radiated V/m
30 - 88	3	40.0	100
88 - 216	3	43.5	150
216 - 960	3	46.0	200
above 960	3	54.0	500

2.3 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions : (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.4 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3. RADIATED EMISSION MEASUREMENT

3.1 Applicable Standard

For unintentional radiator, the radiated emission shall comply with §15.109(a).

3.2 Measurement Procedure

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test. For super-regeneration receiver, there is tow mode of measurement, one is stand-by without a TX signal (CW), and the other is receiving a proper TX signal.
3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 to 360 with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.
5. Repeat step 4 until all frequencies need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.
7. Check the three frequencies of highest emission with varying the placement of cables associated with EUT to obtain the worse case and record the result.

Figure 1 : Frequencies measured below 1 GHz configuration

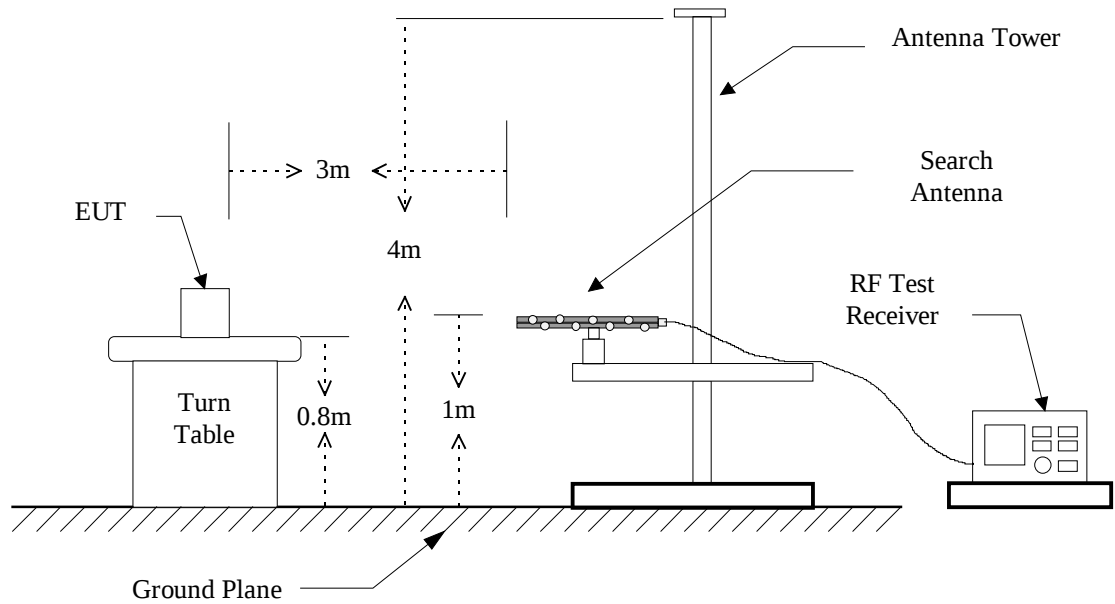
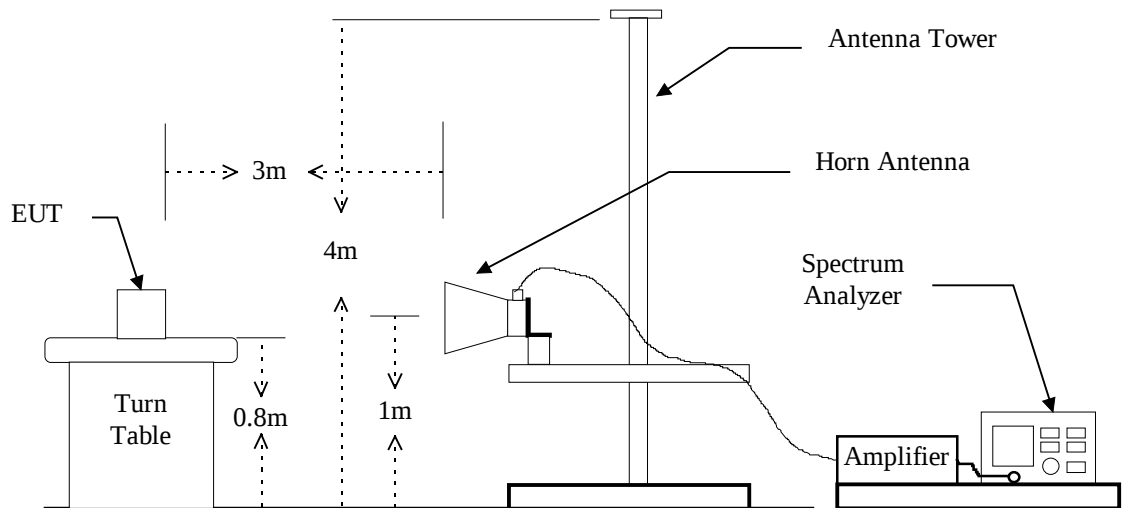


Figure 2 : Frequencies measured above 1 GHz configuration



3.3 Radiated Emission Data**A1.**Operation Mode : RX (CH UP)Test Date : AUG. 23, 1999 Temperature : 23 Humidity : 50 %

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
428.610	V	40.9	-5.5	35.4	46.0	-10.6	218	1.30

A2.Operation Mode : RX (CH UP)Test Date : AUG. 23, 1999 Temperature : 23 Humidity : 50 %

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
142.870	H	42.6	-10.6	32.0	43.5	-11.5	180	1.50
857.220	H/V	---	2.3	---	46.0	---	---	---
1285.830	H/V	---	-8.4	---	54.0	---	---	---
1714.440	H/V	---	-6.3	---	54.0	---	---	---
2143.050	H/V	---	-4.1	---	54.0	---	---	---
2571.660	H/V	---	-2.5	---	54.0	---	---	---
3000.270	H/V	---	-1.2	---	54.0	---	---	---
3428.880	H/V	---	-0.2	---	54.0	---	---	---
3857.490	H/V	---	1.4	---	54.0	---	---	---
4286.100	H/V	---	2.0	---	54.0	---	---	---

VRemark “---” means that the emission level is too low to be measured.

B1.Operation Mode : RX (CH MID)Test Date : AUG. 23, 1999 Temperature : 23 Humidity : 50 %

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
438.600	H	39.0	-5.6	33.4	46.0	-12.6	208	1.50

B2.Operation Mode : RX (CH MID)Test Date : AUG. 23, 1999 Temperature : 23 Humidity : 50 %

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
146.200	V	41.7	-10.3	31.4	43.5	-12.1	185	1.40
877.200	H/V	---	2.4	---	46.0	---	---	---
1315.800	H/V	---	-8.3	---	54.0	---	---	---
1754.400	H/V	---	-6.0	---	54.0	---	---	---
2193.000	H/V	---	-3.9	---	54.0	---	---	---
2631.600	H/V	---	-2.3	---	54.0	---	---	---
3070.200	H/V	---	-1.0	---	54.0	---	---	---
3508.800	H/V	---	0.0	---	54.0	---	---	---
3947.400	H/V	---	1.8	---	54.0	---	---	---
4386.000	H/V	---	2.0	---	54.0	---	---	---

Remark “---” means that the emission level is too low to be measured.

C1.Operation Mode : RX (CH LOW)Test Date : AUG. 23, 1999 Temperature : 23 Humidity : 50 %

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
448.590	V	36.6	-5.6	31.0	46.0	-15.0	252	1.30

C2.Operation Mode : RX (CH LOW)Test Date : AUG. 23, 1999 Temperature : 23 Humidity : 50 %

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
149.530	V	41.8	-10.0	31.8	43.5	-11.7	163	1.30
897.180	H/V	---	2.1	---	46.0	---	---	---
1345.770	H/V	---	-8.2	---	54.0	---	---	---
1794.360	H/V	---	-5.8	---	54.0	---	---	---
2242.950	H/V	---	-3.7	---	54.0	---	---	---
2691.540	H/V	---	-2.1	---	54.0	---	---	---
3140.130	H/V	---	-0.9	---	54.0	---	---	---
3588.720	H/V	---	0.4	---	54.0	---	---	---
4037.310	H/V	---	2.0	---	54.0	---	---	---
4485.900	H/V	---	2.0	---	54.0	---	---	---

VRemark “---” means that the emission level is too low to be measured.

3.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$\text{RESULT} = \text{READING} + \text{CORR. FACTOR}$$

where CORR. FACTOR = Antenna FACTOR + Cable FACTOR

Assume a receiver reading of 22.5 dB V is obtained. The Antenna Factor of 14.5 and a Cable Factor of 1.5 is added . The total of field strength is 38.5 dB V/m.

$$\text{RESULT} = 22.5 + 14.5 + 1.5 = 38.5 \text{ dB V/m}$$

$$\begin{aligned} \text{Level in V/m} &= \text{Common Antilogarithm}[(38.5 \text{ dB V/m})/20] \\ &= 84.14 \text{ V/m} \end{aligned}$$

3.5 Radiated Emission Measuring Equipment

The following test equipment are used during the radiated test .

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Hewlett-Packard	8568B	12/02/1999
Pre-selector	Hewlett-Packard	85685A	12/07/1999
Quasi Peak Detector	Hewlett-Packard	85650A	12/02/1999
Spectrum Analyzer	Adventest	R3271	08/24/2000
RF Test Receiver	Rohde & Schwarz	ESVS 30	01/10/2000
Horn Antenna	EMCO	3115	05/11/2000
Log periodic Antenna	EMCO	3146	09/15/2000
Biconical Antenna	EMCO	3110	09/15/2000
Preamplifier	Hewlett-Packard	8449B	06/20/2000
Preamplifier	Hewlett-Packard	8447D	11/30/1999

3.6 Radiated Measurement Photos

Please see setup photos in Exhibit-F

4. CONDUCTED EMISSION MEASUREMENT

4.1 Standard Applicable

This EUT is excused from investigation of conducted emission, for it is powered by battery only. According to §15.207 (d), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.