CONFORMANCE TEST REPORT
FOR
FCC 47 CFR, Part 15 Subpart C

Report No.: ET93S-09-024-03

Client:	TYNTEK CORPORATION
Product:	2-WAY Transceiver
Model:	TR1
FCC ID:	SPP9500TR1
Manufacturer/supplier:	TYNTEK CORPORATION

Date test item received:	2004/08/16
Date test campaign completed:	2004/09/04
Date of issue:	2004/12/02

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Total number of pages of this test report: 28 pages

Total number of pages of photos: External photos 1 pages
Internal photos 2 pages
Setup photos 1 pages

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TEST REPORT CERTIFICATION

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Manufacturer	: TYNTEK CORPORATION
Address	: 1387 Ren-Ay Rd. Chunan-Jenn , Miaulih 350 , Taiwan , R.O.C
EUT	: 2-WAY Transceiver
Trade name	: TYNTEK
Model No.	: TR1
Power Source	: 5 VDC
Regulations applied	: FCC 47 CFR, Part 15 Subpart C (2003)

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1. GENERAL INFORMATION

1.1 Product Description

a) Type of EUT	: 2-WAY Transceiver
b) Model No.	: TR1
c) Serial No.	: ----
d) FCC ID	: SPP9500TR1
e) Working Frequency	: 433.92 MHz
f) Power Supply	: 5 VDC

1.2 Characteristics of Device:

TR1 is a transceiver which is stuck on the front glass of the vehicle. TR1 functions as the bridge to transmit the signals between RC1 and MB1. There is one LED indication on TR1 to indicate alarm status. When alarm is in arm mode, the LED is flashing slowly. On the other hand, if the LED doesn't shine, the alarm system is in disarming mode. Press the button on the TR1, the TR calls RC1 immediately.

1.3 Test Methodology

Both Conducted and radiated testing were performed according to the procedures in chapter 13 of ANSI C63.4.
The equipment under test was operated continuously in its normal operating mode for the purpose of the measurements. In order to secure the continuous operation of the device under test, the circuit rewired by the manufacturer to affect its intended operation. The receiving antenna was varied from 1 to 4 meters and the wooden turntable was rotated through 360 degrees to obtain the highest reading on the field strength meter or on the display of the spectrum analyzer. And also, each emission was to be maximized by changing the orientation of the equipment under test.

1.4 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data are located inside the Building at No.8, Lane 29, Wen-ming Road, Lo-shan Tsun, Kweishan Hsiang, Taoyuan, Taiwan, R.O.C.
This site has been accreditation as a FCC filing site.

2. DEFINITION AND LIMITS

2.1 Definition

Intentional radiator:
A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

Remark “**” : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.3 Limitation

(1) Conducted Emission Limits :

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the conducted limit is the following:

Frequency MHz	**Quasi Peak dB μV**	**Average dB μV**
0.15 - 0.5	66-56	56-46
0.5 - 5.0	56	46
5.0 - 30.0	60	50

(2) Radiated Emission Limits :

According to 15.231 ,Periodic operation in the band 40.66-40.70 MHz and above 70 MHz, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Frequency Band (MHz)	Field strength of Fundamental (uV/m)	Field strength of Spurious (uV/m)
40.66-40.70	2250	225
70-130	1250	125
130-174	*1,250 to 3,750	*125 to 375
174-260	3750	375
260-470	*3,750 to 12,500	*375 to 1250
Above 470	12500	1250

* Linear interpolations.

Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209,as following table:

Other Frequencies (MHz)	Field Strength of Fundamental μV/meter	dBμV/meter
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

(3) Limit of transmission time

a) A manually operated transmitter shall employ a switch that will automatically deactivate the equipment Transmitter within not more than 5 seconds of being released.

b) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

2.4 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.

2.5 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 periodic operation intentional radiator, the radiated emission shall comply with § 15.231(b).

3.2 Measurement Procedure

A.Preliminary Measurement For Portable Devices.

For portable devices, the following procedure was performed to determine the maximum emission axis of EUT:

1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antennna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

B. Final Measurement

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively. Turn on EUT and make sure that it is in continuous operating function.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a semi-anechoic chamber to determine the accurate frequencies of higher emissions and then each selected frequency is precisely measured. As the same purpose, for emission measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission measured below and above 1 GHz, set the spectrum analyzer on a 120 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.

Figure 1 : Frequencies measured below 1 GHz configuration

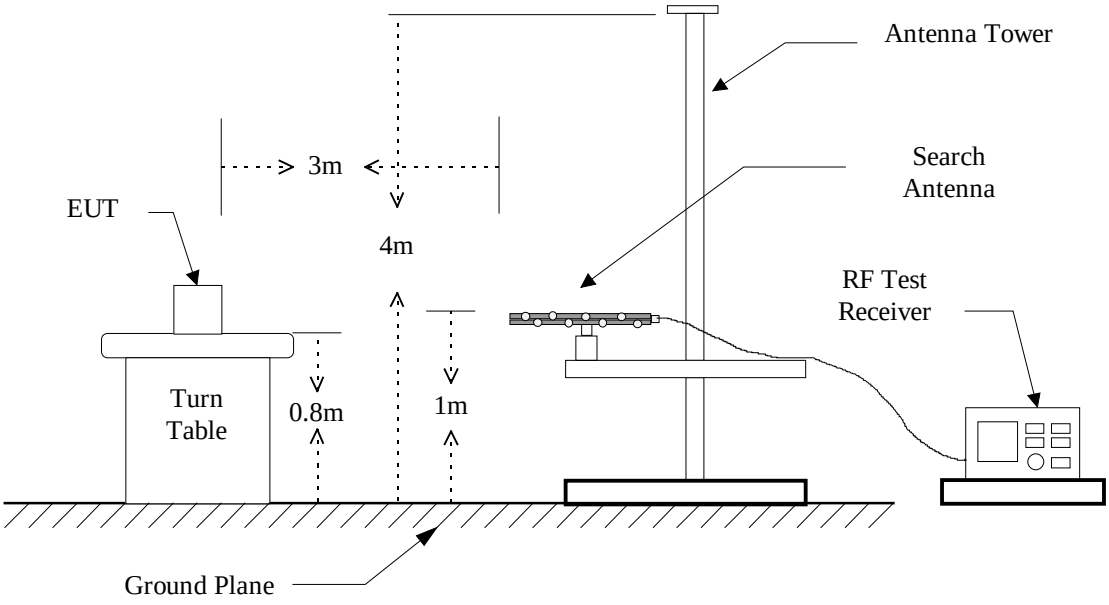
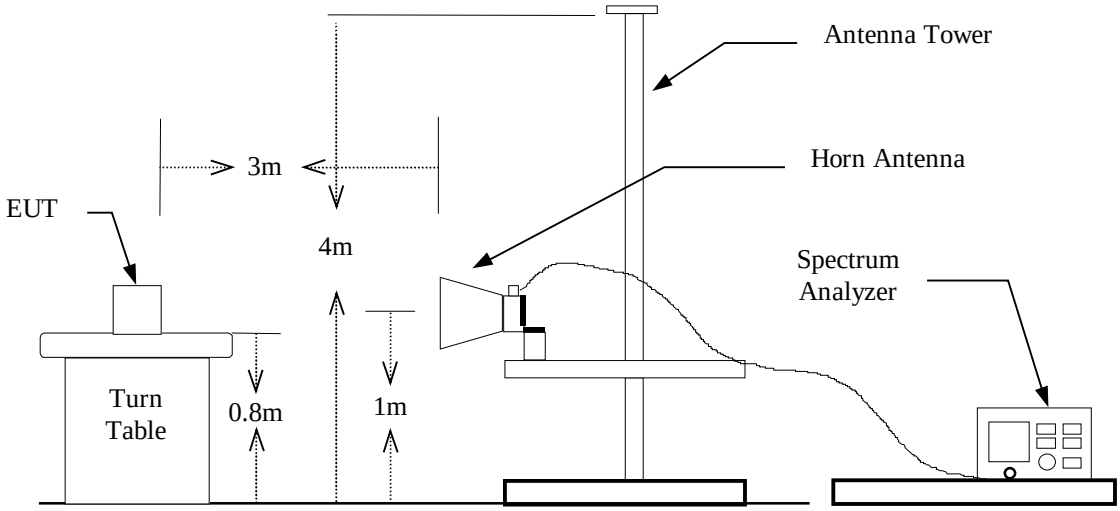


Figure 2 : Frequencies measured above 1 GHz configuration



3.3 Test Data

3.3.1

Operated mode : Transmitting

Test Date : Aug. 30, 2004 Temperature : 25 ℃ Humidity : 57 %

Frequency (MHz)	Ant Pol H / V	Reading (dBuV) Peak	Reading (dBuV) QP	Correct Factor (dB)	Duty Factor (dB)	Result @3m (dBuV/m) Peak	Result @3m (dBuV/m) QP	Result @3m (dBuV/m) AVG	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) QP	Limit @3m (dBuV/m) AVG	Table Degree (Deg.)	Ant. High (m)
Fundamental													
433.963	H	66.2	----	20.1	-5.7	86.3	----	80.6	100.8	----	80.8	0	1.0
433.963	V	56.3	----	20.1	-5.7	76.4	----	70.7	100.8	----	80.8	0	1.0
Harmonic													
*867.926	H	21.3	16.2	28.4	-5.7	49.7	44.6	44.0	80.8	46.0	60.8	92	1.0
*867.926	V	22.2	16.9	28.4	-5.7	50.6	45.3	44.9	80.8	46.0	60.8	92	1.0
*1301.889	H	57.0	----	-14.9	-5.7	42.1	----	36.4	74.0	----	54.0	90	1.0
*1301.889	V	56.0	----	-14.9	-5.7	41.1	----	35.4	74.0	----	54.0	90	1.0
*1735.852	H/V	----	----	----	-5.7	----	----	----	74.0	----	54.0	----	----
2169.815	H/V	----	----	----	-5.7	----	----	----	80.8	----	60.8	----	----
2603.778	H	49.7	----	-9.5	-5.7	40.2	----	34.5	80.8	----	60.8	0	1.0
2603.808	V	----	----	----	-5.7	----	----	----	80.8	----	60.8	----	----
3037.741	H/V	----	----	----	-5.7	----	----	----	80.8	----	60.8	----	----
3471.704	H	49.2	----	-6.7	-5.7	42.5	----	36.8	80.8	----	60.8	0	1.0
3471.704	V	----	----	----	-5.7	----	----	----	80.8	----	60.8	----	----
*3905.667	H/V	----	----	----	-5.7	----	----	----	74.0	----	54.0	----	----
*4339.630	H/V	----	----	----	-5.7	----	----	----	74.0	----	54.0	----	----
Other Spurious													
31.940	H	20.3	----	13.1	-5.7	33.4	----	27.7	80.8	----	60.8	92	1.0
48.430	V	19.6	----	13.6	-5.7	33.2	----	27.5	80.8	----	60.8	92	1.0

Note:

1. Peak Result =Peak Reading + Correct Factor

2. AVG Result = Peak Result + Duty Factor

3.If the result of peak value is under the limit of average, the average value doesn't need to be measured.

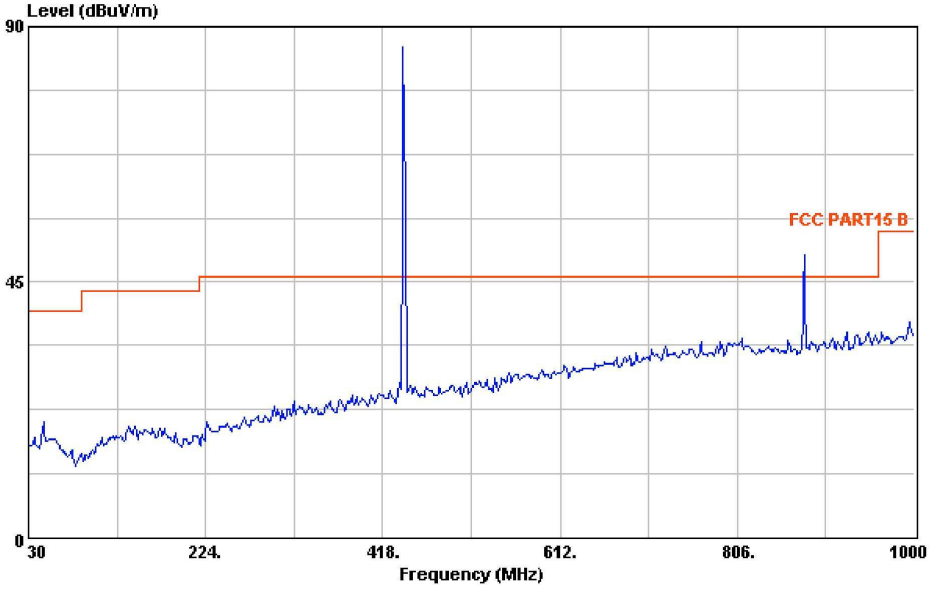
4."" means the frequency is in the Restricted Bands.*

5. Please refer to page 11 to page 14 for chart

Horizontal

ETC TEST LABORTARY

Data#: 1133 File#: C:\Program Files\e3\TestHsu.emi



Site : MOO SITE
Condition : FCC PART15 B 3m HORIZONTAL
EUT : base
Model :
Memo : Tx

Vertical

ETC TEST LABORTARY

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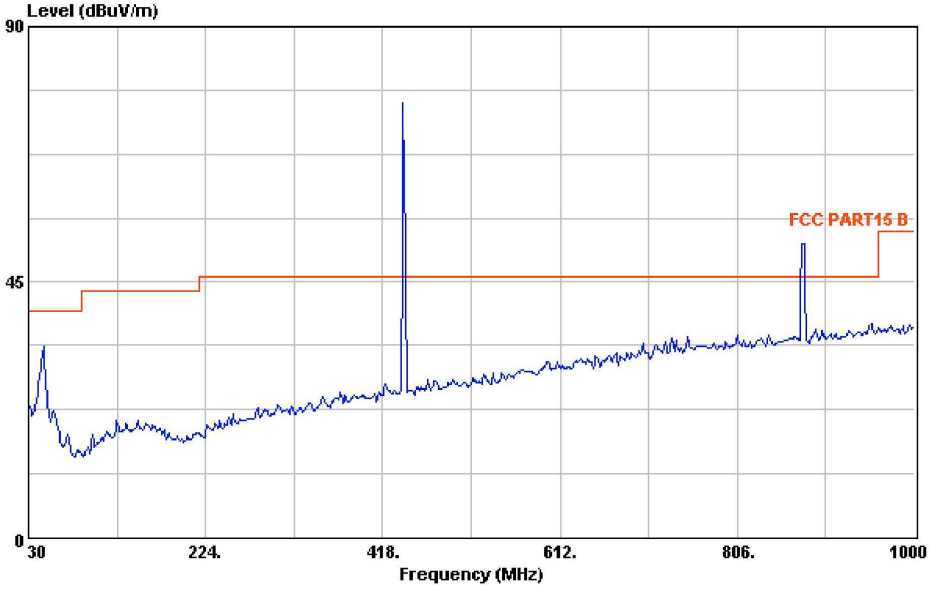
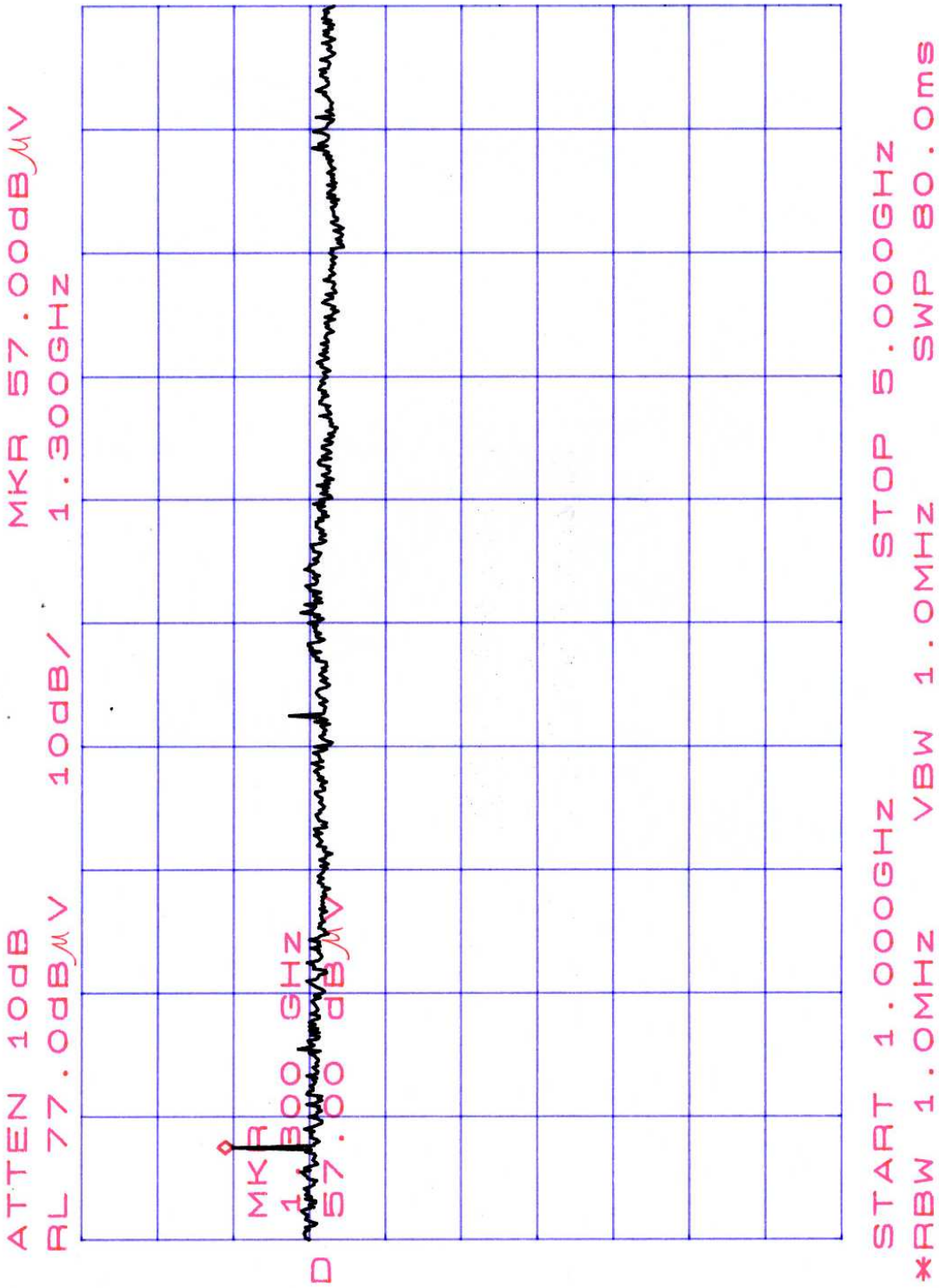
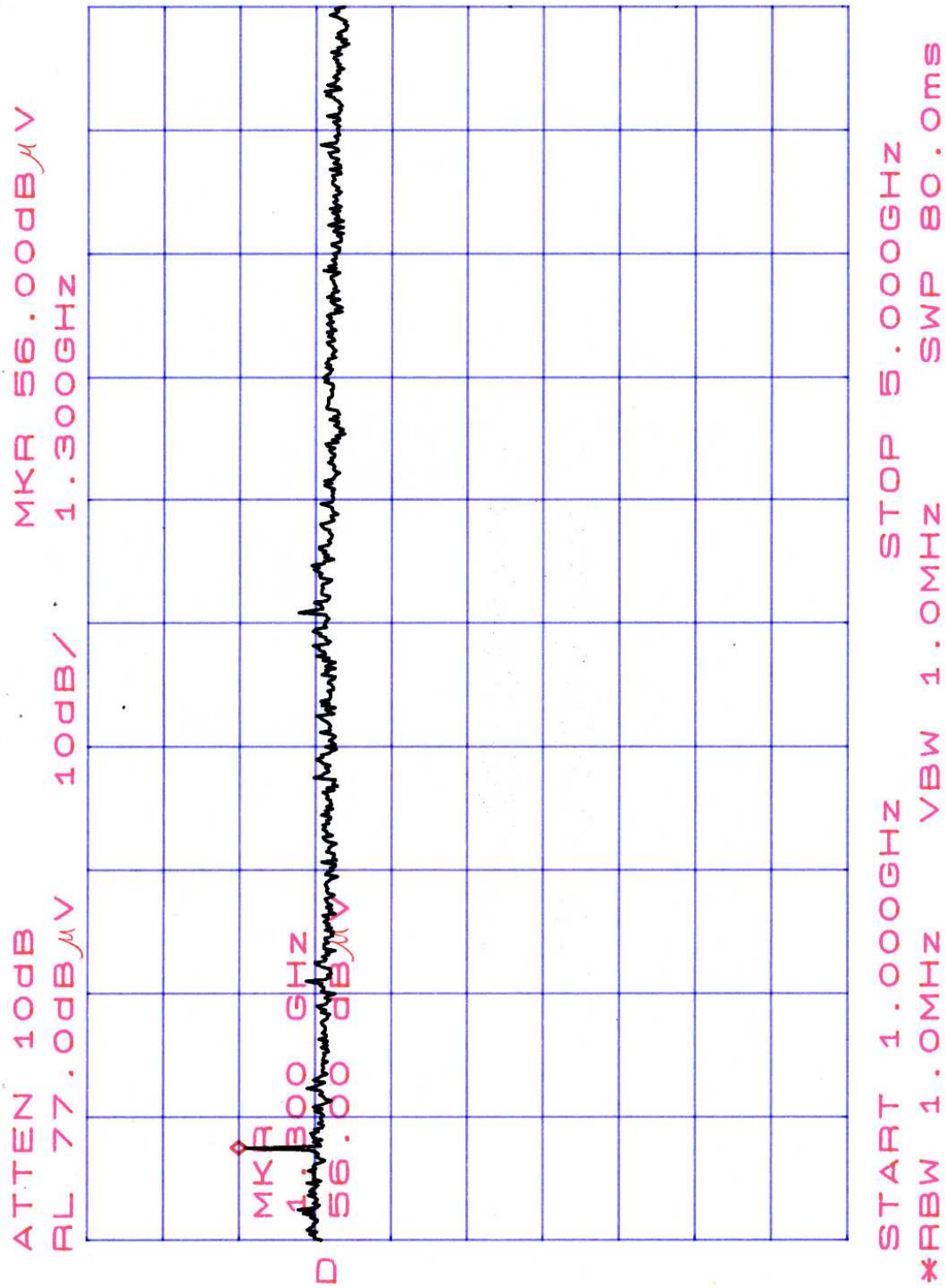


Site : MOO SITE
Condition : FCC PART15 B 3m VERTICAL
EUT : base
Model :
Memo : Tx

Horizontal


ATTEN 10dB
RL 77.0dBμV
10dB/
MKR 57.00dBμV
1.300GHz
MKR
1.300 GHz
57.00 dBμV
D
START 1.000GHz
*RBW 1.0MHz
VBW 1.0MHz
STOP 5.000GHz
SWP 80.0ms

Vertical


ATTEN 10dB
RL 77.0dBμV
10dB/
MKR 56.00dBμV
1.300GHz
MKR
1.300 GHz
56.00 dBμV
D
START 1.000GHz
*RBW 1.0MHz
VBW 1.0MHz
STOP 5.000GHz
SWP 80.0ms

3.3.2

Operation Mode: Receving Mode

Test Date : Sep. 04 2004 Temperature : 23 ℃ Humidity : 59 %

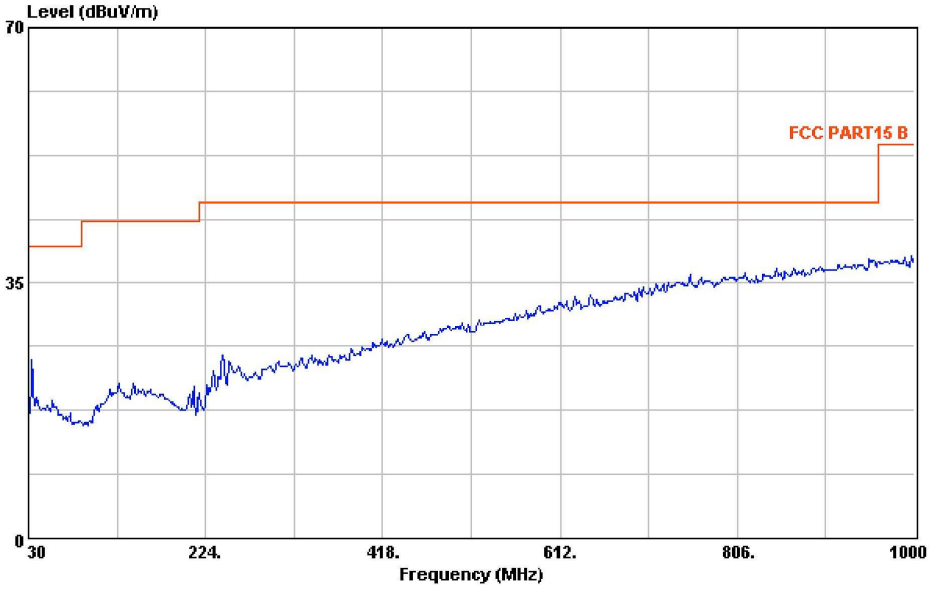
Emission **Frequency** (MHz)	**Meter Reading** (dBuV)		CORR'd **Factor** (dB)	**Results** (dBuV/m)		**Limit** (3m) (dBuV/m)	**Margins** (dB)	**Table Degree** (deg)		**Ant. High** (m)	
	HOR.	**VERT.**		**HOR.**	**VERT.**			**HOR.**	**VERT.**	**HOR.**	**VERT.**
33.880	11.3	11.2	13.1	24.4	24.3	40.0	-15.6	0	0	1.0	1.0
561.560	7.5	***	22.9	30.4	***	46.0	-15.6	0	***	1.0	***
594.540	***	7.6	23.8	***	31.4	46.0	-14.6	***	0	***	1.0

Note :
1. Remark "***" means that the emissions level is too low to be measured.
2. Item "Margin" referred to Q.P. limit while there is only peak result.
3.The estimated measurement uncertainty of the result measurement is:
   ±4.6dB(30MHz≦f≦300MHz)
   ±4.4dB(300MHz≦f≦1GHz)
4. Please refer to page 16 to page 19 for chart

Horizontal

ETC TEST LABORTARY

Data#: 1131 File#: C:\Program Files\e3\TestHsu.emi



Site : MOO SITE
Condition : FCC PART15 B 3m HORIZONTAL
EUT : BASE
Model :
Memo : RX MODE

Vertical

ETC TEST LABORTARY

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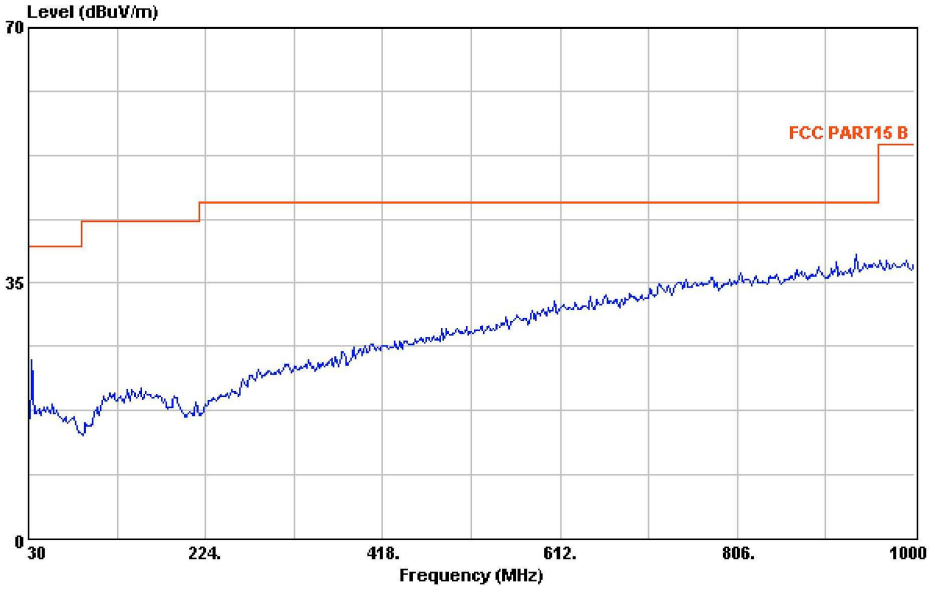
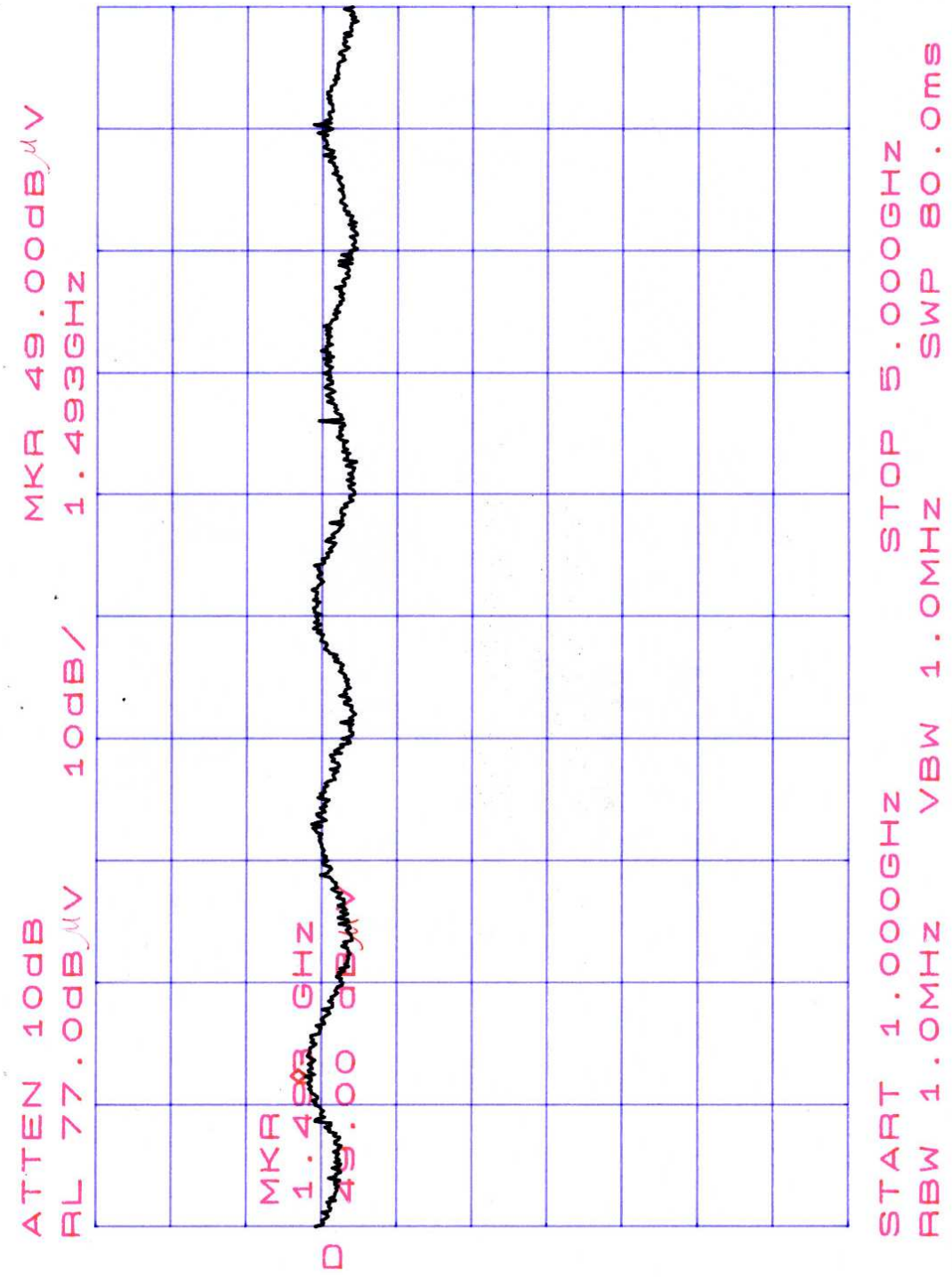
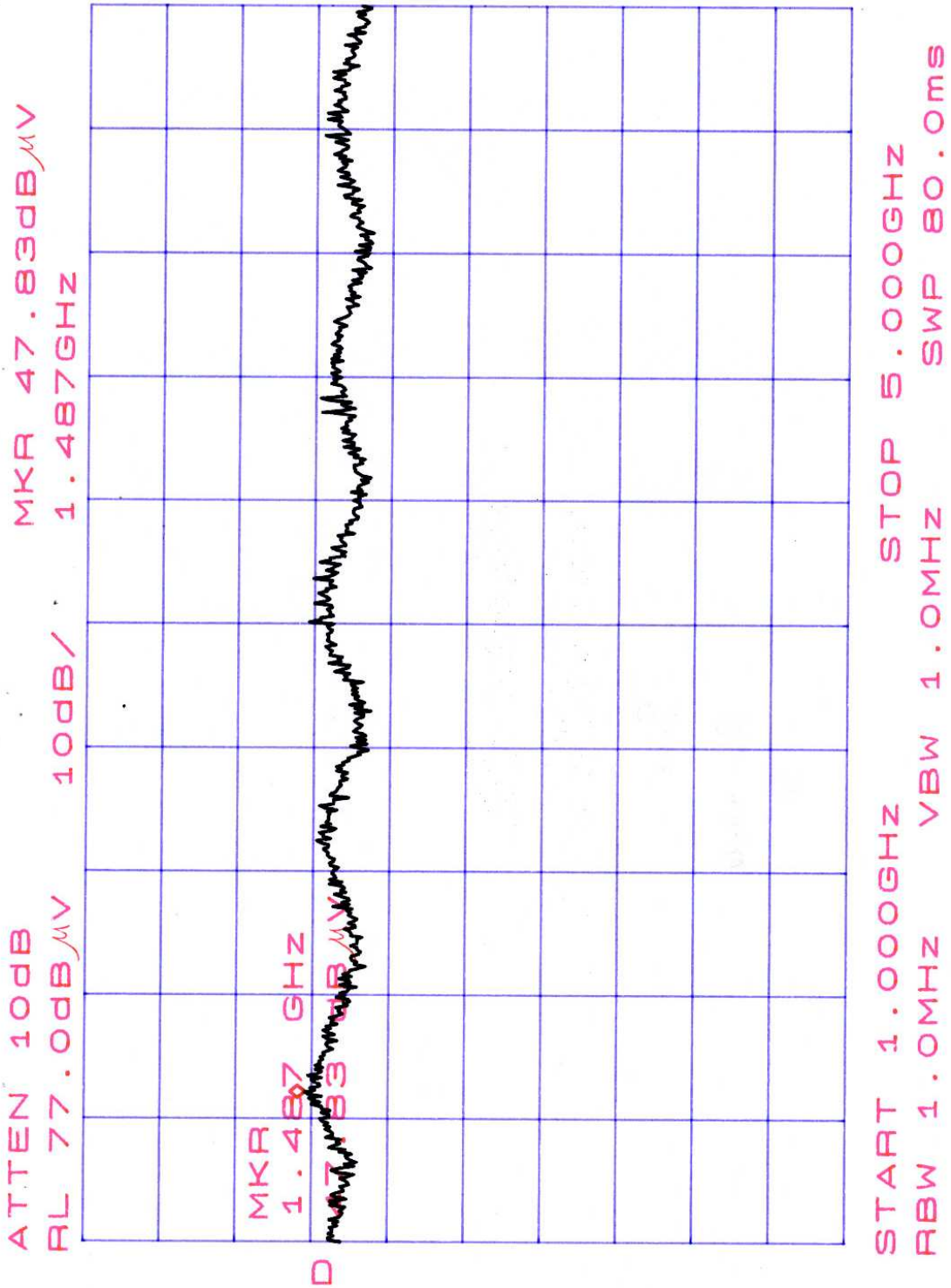


Site : site
Condition : FCC PART15 B 3m VERTICAL
EUT : BASE
Model :
Memo : RX MODE

Horizontal


ATTEN 10dB
RL 77.0dBμV
10dB/
MKR 49.00dBμV
1.493GHz
MKR
1.488 GHz
49.00 dBμV
D
START 1.000GHz
RBW 1.0MHz
VBW 1.0MHz
STOP 5.000GHz
SWP 80.0ms

Vertical


ATTEN 10dB
RL 77.0dBμV
10dB/
MKR 47.83dBμV
1.487GHz
MKR
1.487 GHz
47.83dBμV
D
START 1.000GHz
RBW 1.0MHz
VBW 1.0MHz
STOP 5.000GHz
SWP 80.0ms

3.4 Field Strength Calculation

(a) Field Strength:

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:

RESULT = READING + CORR. FACTOR

where CORR. FACTOR = Antenna FACTOR + Cable FACTOR

Assume a receiver reading of 62.4 dB μ V is obtained. The Antenna Factor of 14.1 and a Cable Factor of 3.4 is added. The total of field strength is 79.9 dB μ V/m.

RESULT = 62.4 + 14.1 + 3.4 = 79.9 dB μ V/m
Level in μ V/m = Common Antilogarithm[(79.9 dB μ V/m)/20] = 9885.5 μ V/m

(b) Duty Factor:

$$20\log\frac{37.0(ms)}{71.6667(ms)} = -5.7 \text{ dB}$$

The plotted graph of Duty Factor please see page 21 ~ 22.

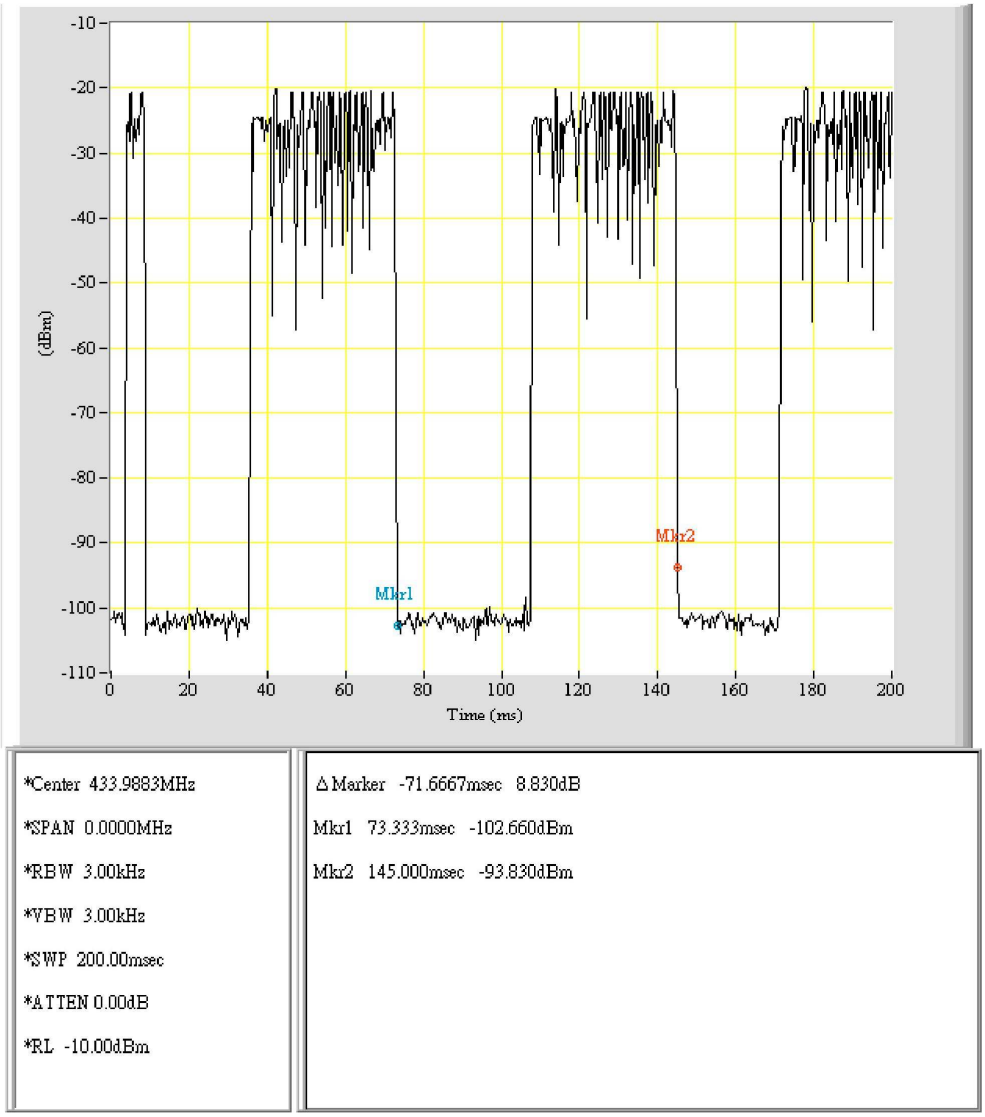
3.5 Radiated Test Equipment

The following instrument are used for radiated emissions measurement :

Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
EMI Test Receiver	HP	8546A	13054404-001	Sep. 06, 2005
BiconiLog Antenna	Schwarzbeck	VULB 9160	13057310-001	Oct. 26,2005
Horn Antenna	EMCO	3115	9107-3729	Jun. 11, 2005

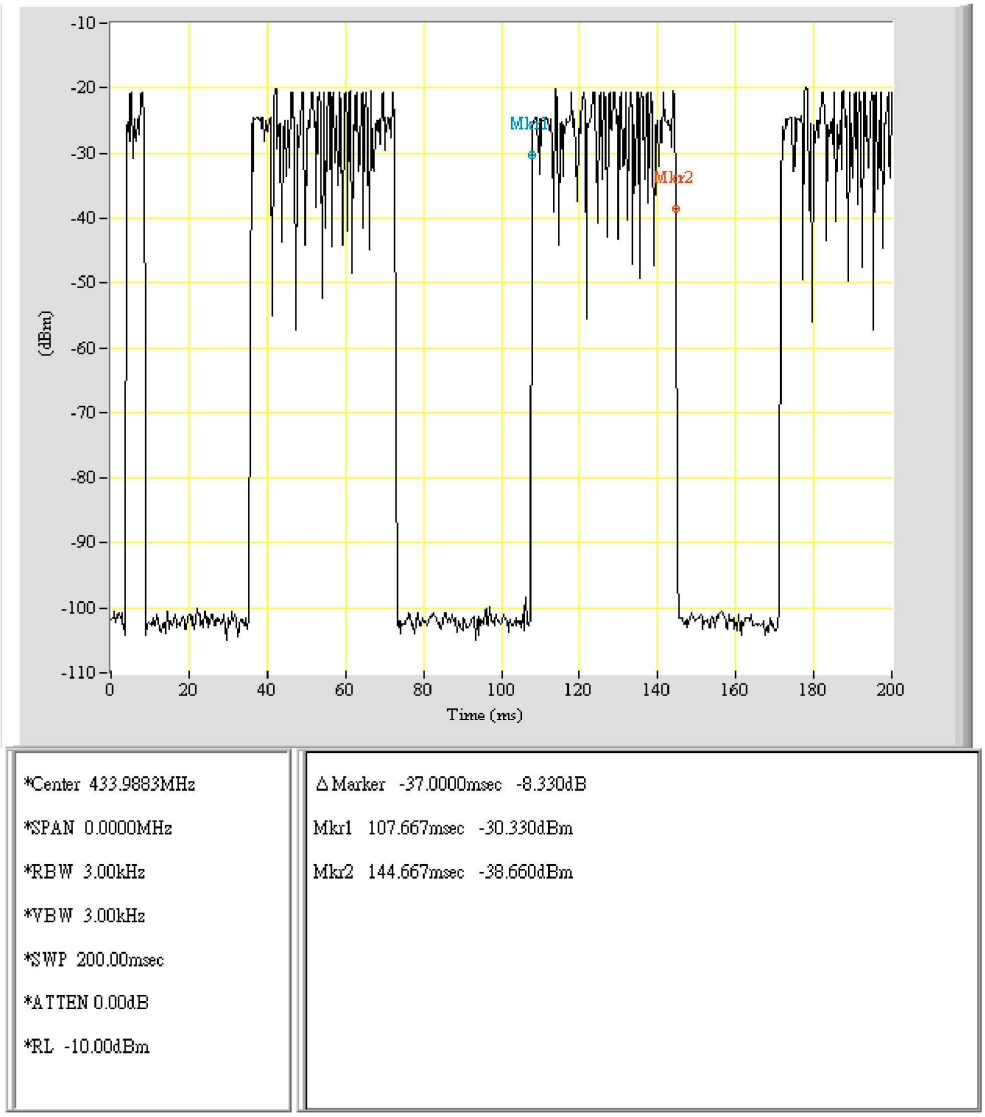
Note: The standards used to perform this calibration are traceable to NML/ROC, NIST/USA and NPL.

Plotted graph 1 of Duty Factor



EUT: REMOTE_RX
Purpose: DUTY_CYCLE
Condition: 01
Note:

Plotted graph 2 of Duty Factor



EUT: REMOTE_RX
Purpose: DUTY_CYCLE
Condition: 02
Note:

3.6 Measuring Instrument Setup

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	EMI Test Receiver	Peak	120 kHz	300 kHz
1000 to 5000	EMI Test Receiver	Peak	1 MHz	1 MHz

4. BANDWIDTH OF EMISSION

4.1 Applicable Standard Plot Graphic of Bandwidth

Per FCC rule §15.231(c), the permitted emission bandwidth is no wider than 0.25%of the center frequency for devices operating above 70 MHz and below 900 MHz.

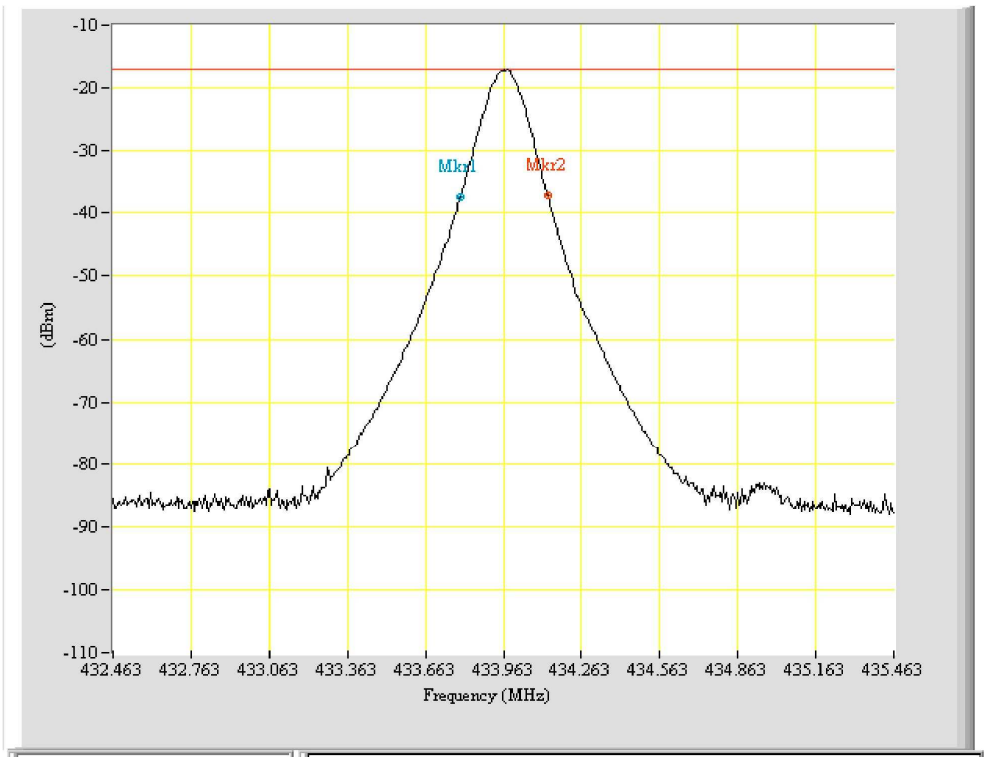
4.2 Test Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
Test Receiver	Agilent	8564EC	Sep. 16,2005

4.3 Test Result

Test Date : Aug. 30, 2004 Temperature : 25℃ Humidity : 57%

Center Frequency	433.963 MHz
FCC Limit	433.963 MHz ×0.25% = 1084.908 kHz
Bandwidth of Emission	335 kHz
Chart	P25
Result	PASS



*Center 433.9633MHz	Display Line -17.000dBm
*SPAN 3.0000MHz	ΔMarker -0.3350MHz 0.170dB
*RBW 100.00kHz	Mkr1 433.798MHz -37.330dBm
*VBW 100.00kHz	Mkr2 434.133MHz -37.160dBm
*SWP 50.00msec	
*ATTEN 0.00dB	
*RL -10.00dBm	

EUT: REMOTE_RX
Purpose: 20dB_BW
Condition: Tx
Note:

5. CONDUCTED EMISSION MEASUREMENT

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.

6. LIMIT OF TRANSMISSION TIME

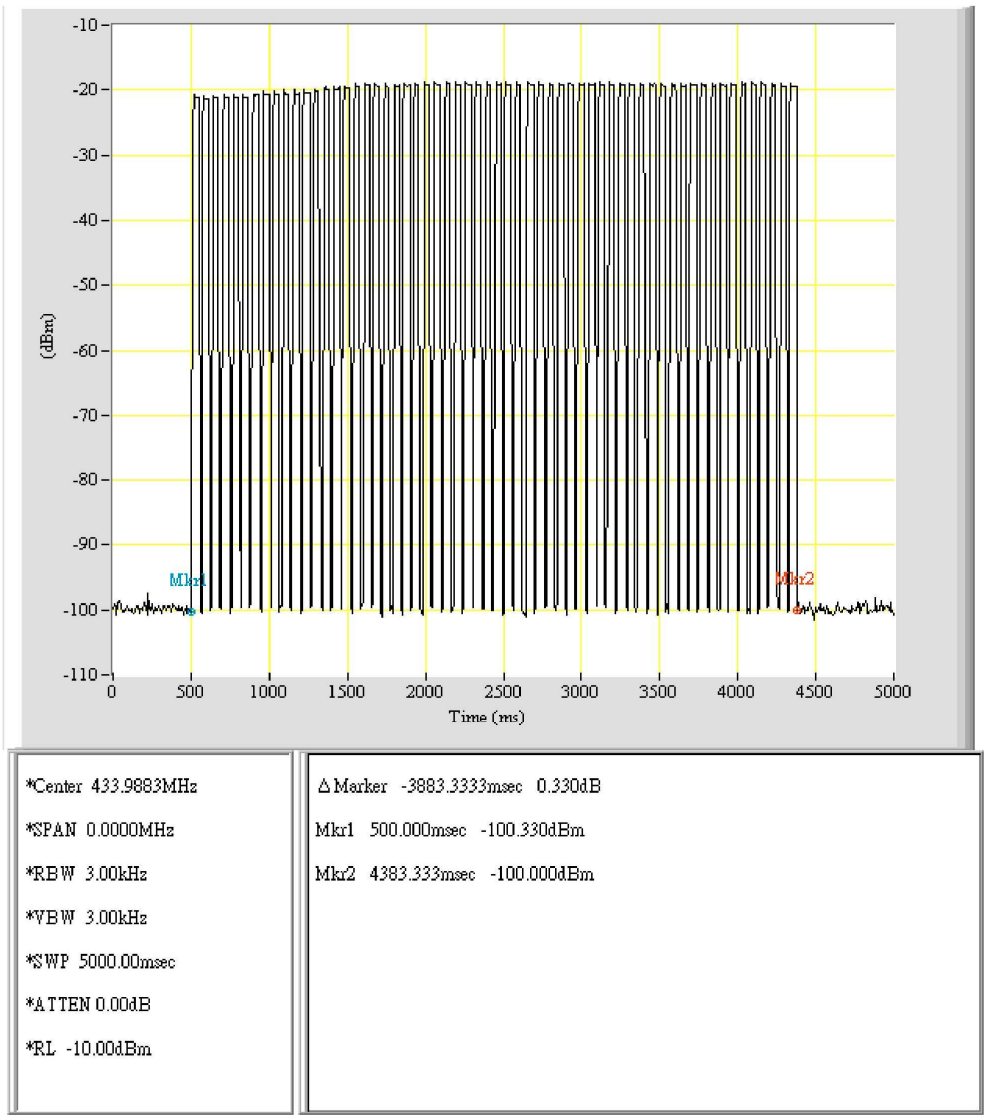
6.1 Applicable Standard

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

6.2 Active Time

This transmitter is operated by manual and active time is less than 3.9 second after being released.

Note : Please refer to page 28 for chart



EUT: REMOTE_RX
Purpose: ACTIVE_TIME
Condition: Tx
Note: