LTA
Laboratory for Test & Approval Co.,Ltd.

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YOKOHAMA

Dates of Tests: May 17 ~ 24, 2010
Test Report S/N: LR500191005E
Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID **UNK-FW02**

APPLICANT **The Yokohama Rubber Company, Limited**

TEST REPORT

FCC Classification	**:**	**Part 15 Security/Remote Control Transmitter**
Manufacturing Description	**:**	**Air pressure transmitter**
Manufacturer	**:**	**Fuji Electric Systems Co., Ltd.**
Model name	**:**	**FW02**
Test Device Serial No.:	**:**	**Identification**
FCC Rule Part(s)	**:**	**FCC Part 15 Subpart C ; ANSI C-63.4-2003**
Frequency Range	**:**	**433.25 MHz**
Data of issue	**:**	**May 25, 2010**

This test report is issued under the authority of:

Kyung-Taek LEE, Technical Manager

The test was supervised by:

Hyun-Chae You, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. This report must not be used by the applicant to claim product endorsement by any agency.

NVLAP

NVLAP LAB Code.: 200723-0

TABLE OF CONTENTS

1. General information's

1-1 Test Performed

Company name	:	LTA Co., Ltd.
Address	:	243, Jubug-ri,Yangji-Myeon,Youngin-Si, Kyunggi-Do, Korea. 449-822
Web site	:	http://www.ltalab.com
E-mail	:	chahn@ltalab.com
Telephone	:	+82-31-323-6008
Facsimile		+82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competents of calibration and testing laboratory".

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2010-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2011-06-20	EMC accredited Lab.
FCC	U.S.A	610755	2011-04-22	FCC filing
VCCI	JAPAN	R2133, C2307	2011-06-21	VCCI registration
IC	CANADA	IC5799	2012-05-14	IC filing

2. Information's about test item

2-1 Client & Manufacturer

Company name	:	The Yokohama Rubber Company, Limited
Address	:	2-1 Oiwake, Hiratsuka Kanagawa 254-8601, Japan
Telephone	:	+81-463-35-9701

2-2 Equipment Under Test (EUT)

Trade name	:	Air pressure transmitter
Model name	:	FW02
Serial number	:	Identification
Date of receipt	:	May 17, 2010
EUT condition	:	Pre-production, not damaged
Frequency Range	:	433.25 MHz
RF Output Power	:	Below 70dBuV/m
Type of Modulation	:	FSK
Power Source	:	DC 3V by Battery

2-3 Tested frequency

Frequency	TX	RX
Low	-	-
Mid	433.25 MHz	-
High	-	-

Note: Measurements were performed top and bottom location in the frequency range of operation according to the section 15.31(m)

2-4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
-	-	-	-
-	-	-	-

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Status (note 1)
FCC Part 15.231(e)/209(a)	Radiated emission, Spurious Emission and Field Strength of Fundamental	C
FCC Part 15.231 c)	Bandwidth of Operation frequency	C
FCC Part 15.231 a)	Transmission Time	C
FCC Part 15.231 e)	Limit of Transmission Time	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

A sample calculation:

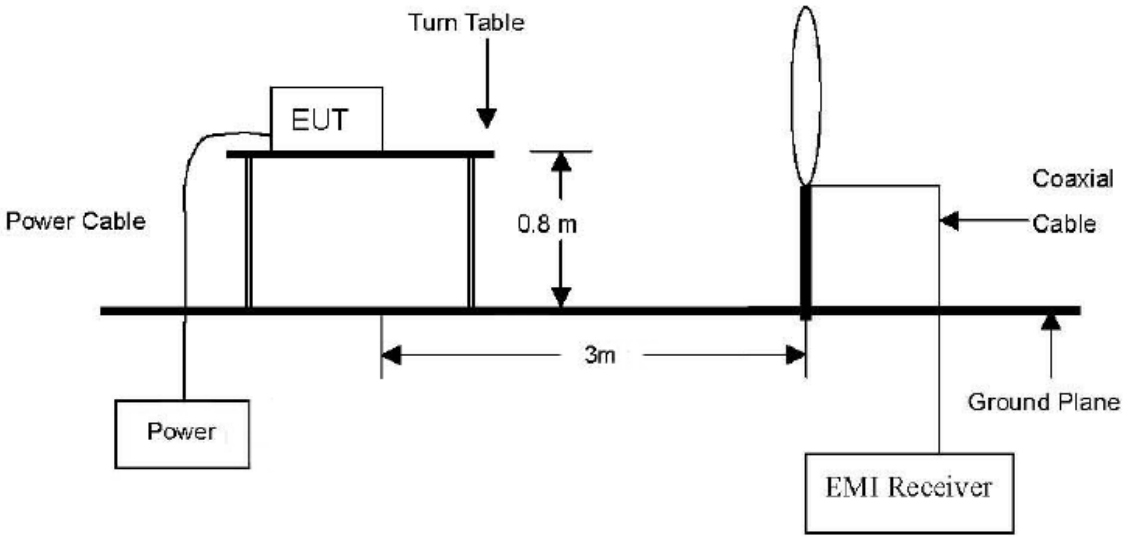
COR. F (correction factor)= Antenna factor + Cable loss- Amp.gain- Distance correction

Emission Level= meter reading + COR.F

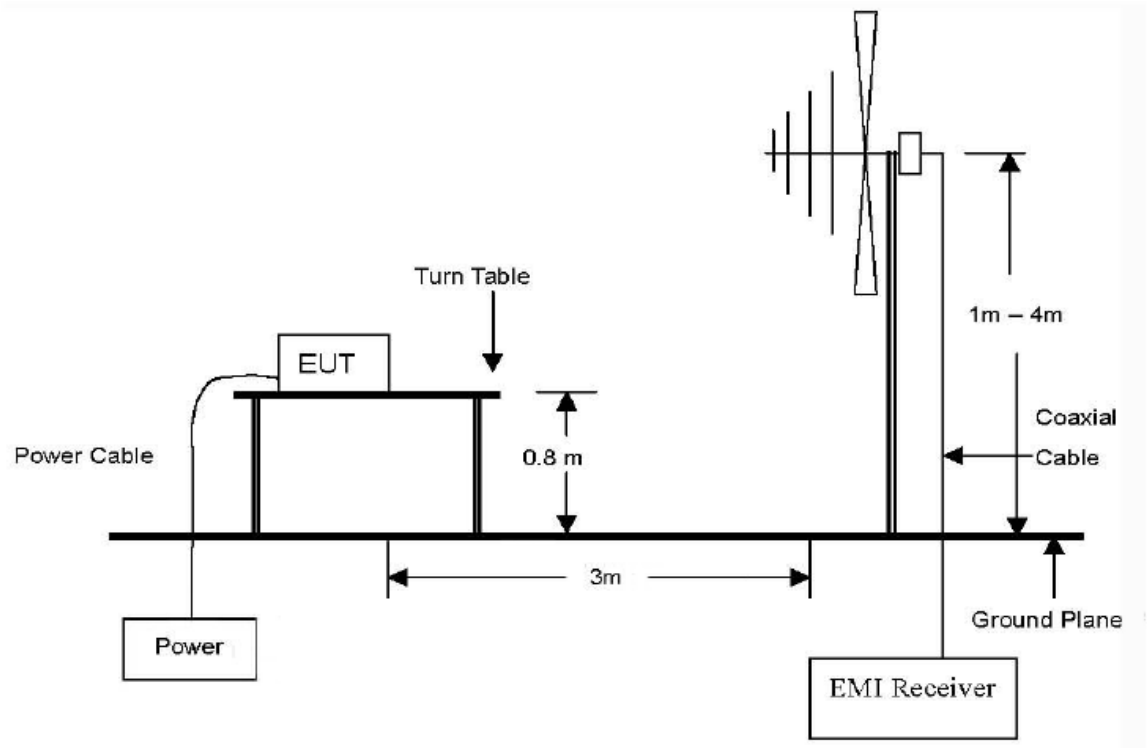
4. Field Strength of Fundamental

4.1 Test Setup

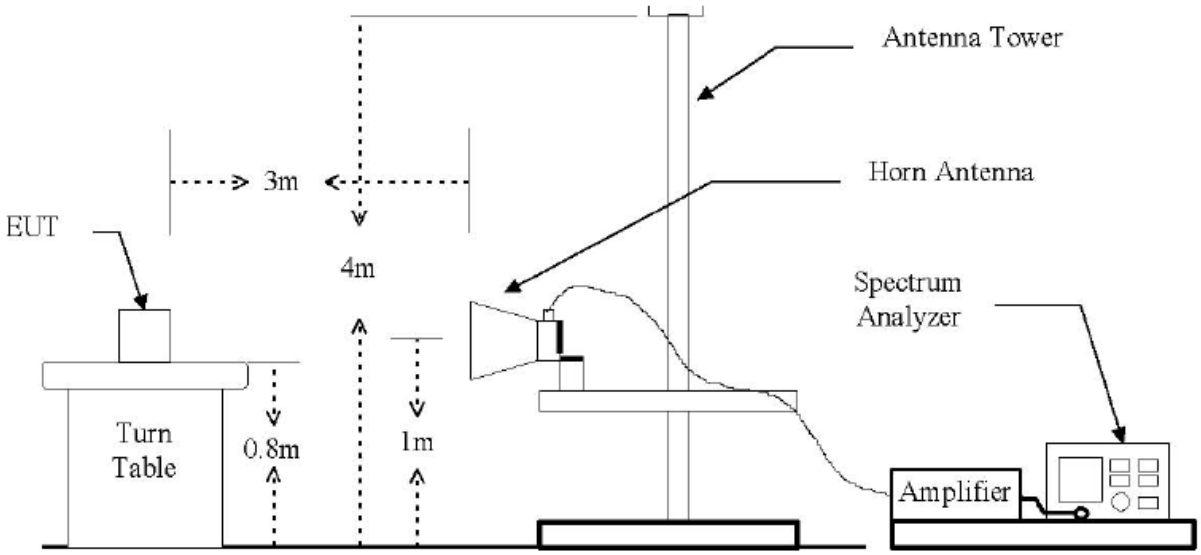
The diagram below shows the test setup that is utilized to make the measurements for emission from 9kHz to 30MHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30MHz to 1GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1GHz to 18GHz Emissions.



4.2 Limit

4.2.1. Radiated emission limits, general requirements

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meter)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	2400/F(kHz)	30
1.705 – 30.0	30	30
30 -88	100**	3
88 -216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806

MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241

4.2.2. Periodic operation in the band 40.66-40.70 MHz and above 70 MHz

According to 15.231(e), intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) and may be employed for any type of operation, including operation prohibited in paragraph (a), provided the intentional radiator complies with the provisions of paragraph (b) through (d) of this Section, except the field strength table in paragraph (b) is replaced by the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 – 47.70	1,000	100
70 - 130	500	50
130 – 174	500 to 1,500 **	50 to 150 **
174 – 260	1,500	150
260 – 470	1,500 to 5,000 **	150 to 500 **
Above 470	5,000	500

** 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 = 22.72727(F)-2454.545; for the band 260-470 MHz, uV/m at 3 meters = 16.6667(F)-2833.333. The maximum permitted unwanted emission

level is 20 dB below the maximum permitted fundamental level.

4.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

4.3.1. Test Procedures for emission from 9 kHz to 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
b. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
c. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
d. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

4.3.2. Test Procedures for emission from 30 MHz to 1000 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
b. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 3 meter away from the interference-receiving antenna.
c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

4.4 Test Result

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical

Freq. (MHz)	Ant. Pol	Reading (Peak) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Duty Cycle Correction Factor (dBuV)	Result (Average/ Quasi-peak) (dBuV/m)	Limit (Average/ Quasi-peak) (dBuV/m)	Margin (dB)
433.25	H	65.34	20.8	86.14	-38.71	47.43	72.87	25.44

Remark:

To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes. The worst case is XY.

Note:

1. A Peak limit is 20 dB above the average limit.
2. 3m Limit(dBuV/m) = 20log[16.6667($F_{(MHz)}$)-2833.3333] = 72.87
3. Average Reading = Peak Reading + Duty Cycle Correction
   - Duty Cycle Correction Factor : 20log(T_{on} / T_{on+off}) = 20log(0.0058/0.5) = -38.71
   - Please refer to captured images on page 15.
4. Correction Factor = Antenna Factor + Cable Loss

5. Spurious Emission

5.1. Test Setup

Same as section 4.1 of this report

5.2. Limit

Same as section 4.2 of this report

5.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

5.3.1. Test Procedures for emission from 9 kHz to 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.

b. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.

c. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.

d. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.3.2. Test Procedures for emission from 30 MHz to 1000 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.

b. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 3 meter away from the interference-receiving antenna.

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

5.4 Test Result

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical

Freq. (MHz)	Ant. Pol	Reading (Peak) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Duty Cycle Correction Factor	Result (Average/ Quasi-peak)	Limit (Average/ Quasi-peak)	Margin (dB)
No emissions were detected at a level greater than 20dB below limit.								

- Correction Factor = Antenna Factor + Cable Loss – AMP gain

Remark:

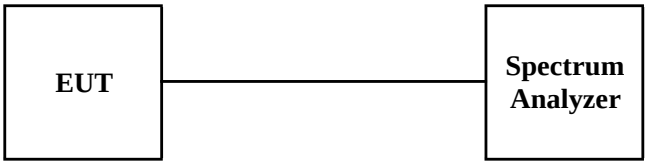
To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes. The worst case is XY.

Note:

1. A Peak limit is 20 dB above the average limit.
2. Other Spurious Frequencies were not detected up to 5000 MHz.

6. Bandwidth of Operation Frequency

6.1. Test Setup



6.2. Limit

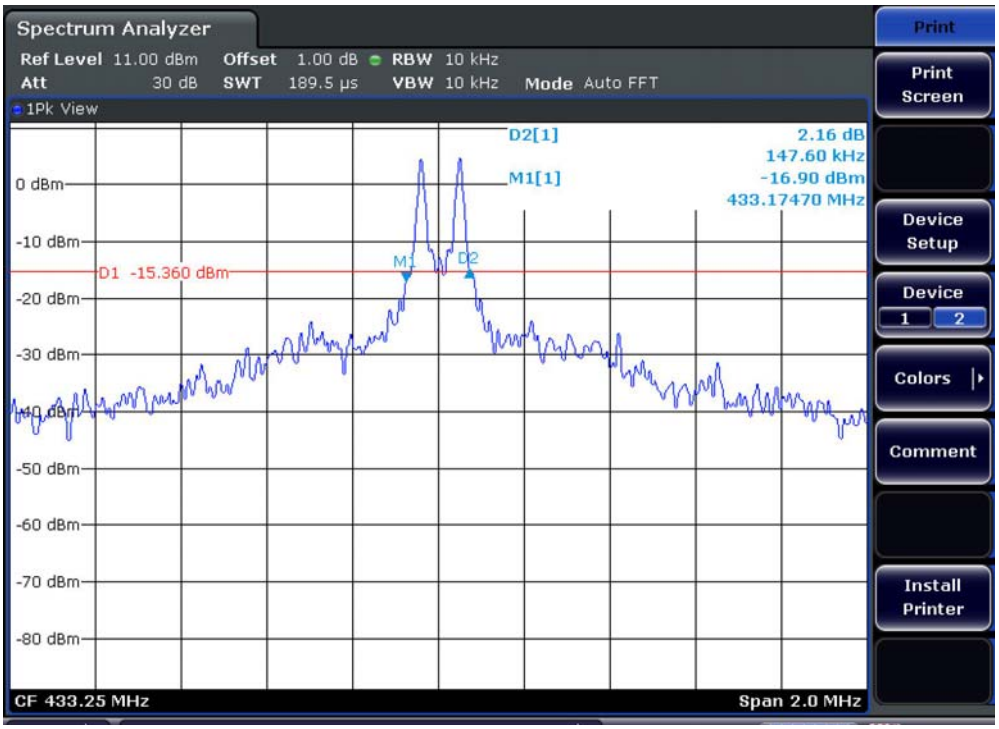
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

6.3. Test Procedure

1. The transmitter output is connected to the spectrum analyzer.
2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW=10 kHz, VBW=10 kHz and Span=1 MHz.
3. The bandwidth of fundamental frequency was measured and recorded.

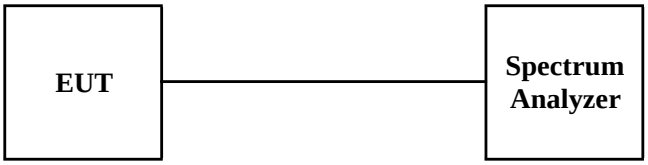
4.4. Test Result

Carrier Frequency (MHz)	Bandwidth of the emission (kHz)	Limit (kHz)	Remark
433.25	147.60	1083.12	The point 20 dB down from the modulated carrier



7. Limit of Transmission Time

7.1. Test Setup



7.2. Limit

Devices Operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

7.3. Test Procedure

1. The transmitter output is connected to the spectrum analyzer.
2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW=1 MHz, VBW=1 MHz, Span=0 Hz.
3. The bandwidth of fundamental frequency was measured and recorded.

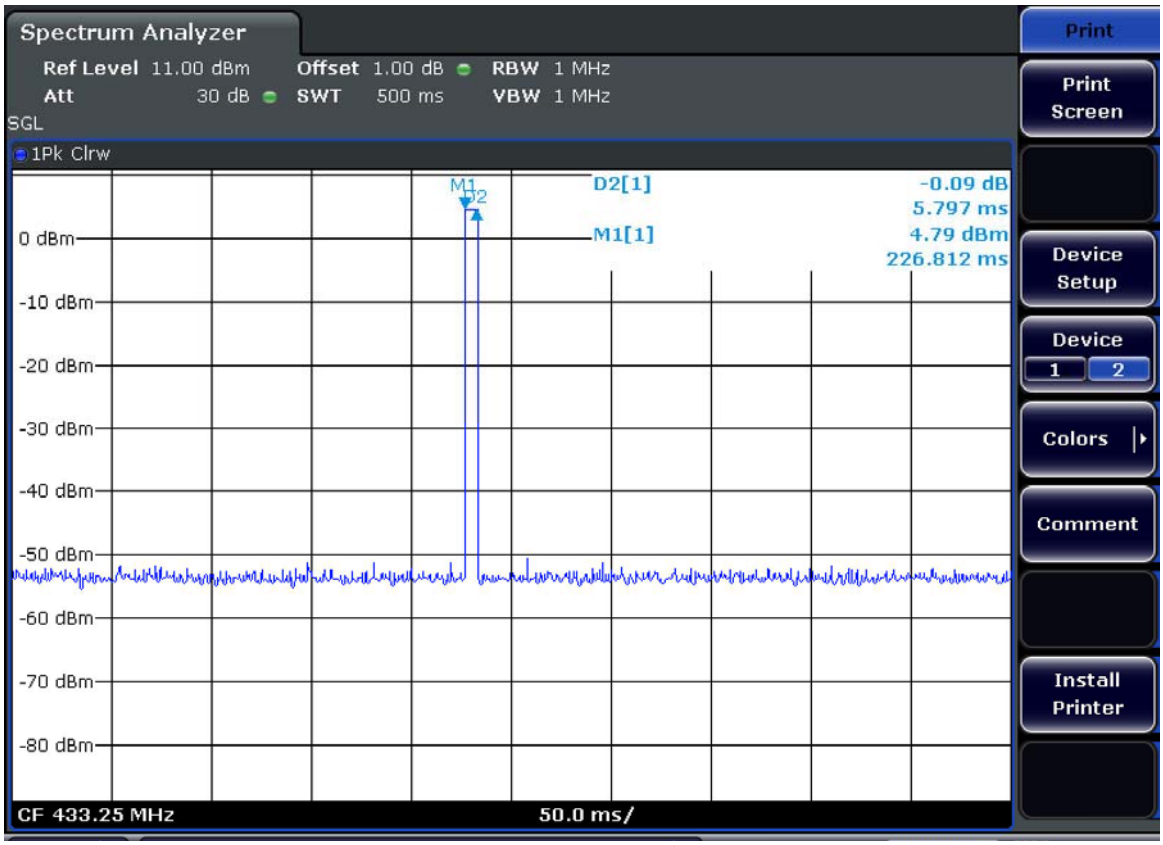
7.4. Test Result

Frequency (MHz)	Transmission Time (s)		Silent Duration (s)		Silent Period Versus		Result
	Measured	Limit	Measured	Limit	Measured	Limit	
433.25	0.0058	Same or less than 1 s	14.058	Same or greater than 10 s	2423.8	At least 30 times	Pass

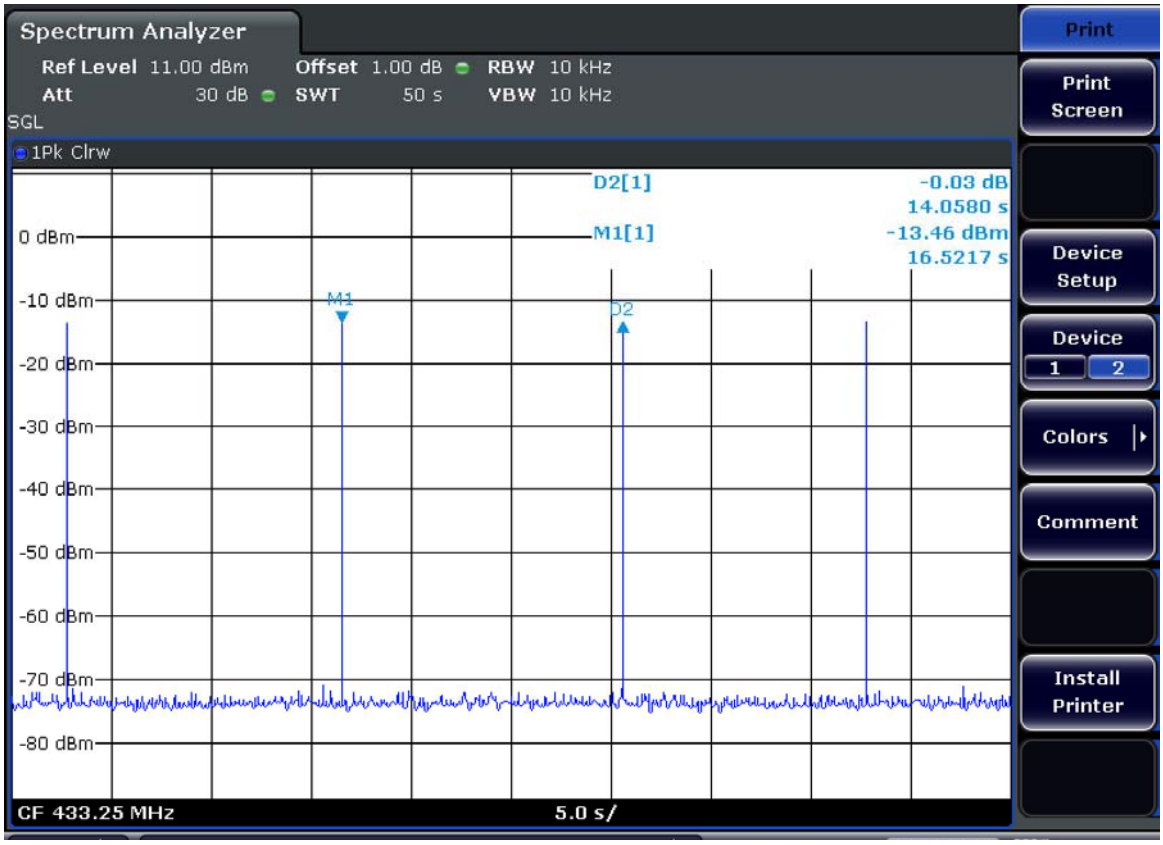
Note:

1. Silent Period Versus Transmission Time Ratio
   - Silent Period : 14.058 s
   - Transmission Time : 0.0058 s
   - Ratio : Silent Period / (Transmission Time* frame No.)
     = 14.058 (s) / 0.0058 (s) = 2423.8

Transmission Time



Silent Duration



APPENDIX 1

TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Next Cal. Date
1	Spectrum Analyzer	FSV-30	100757	R&S	Feb-11
2	Spectrum Analyzer	8563E	3425A02505	HP	Mar-11
3	Spectrum Analyzer	8594E	3710A04074	HP	Oct-10
4	Signal Generator	8648C	3623A02597	HP	Mar-11
5	Signal Generator	83711B	US34490456	HP	Mar-11
6	Attenuator (3dB)	8491A	37822	HP	Oct-10
7	Attenuator (10dB)	8491A	63196	HP	Oct-10
8	Attenuator (30dB)	8498A	1801A06689	HP	Oct-10
9	EMI Test Receiver	ESVD	843748/001	R&S	Mar-11
10	Horn Antenna(18 ~ 40GHz)	SAS-574	154	Schwarzbeck	Nov-10
11	Horn Antenna(18 ~ 40GHz)	SAS-574	155	Schwarzbeck	Nov-10
12	RF Amplifier	8447D	2949A02670	HP	Oct-10
13	RF Amplifier	8449B	3008A02126	HP	Mar-11
14	Test Receiver	ESHS10	828404/009	R&S	Mar-11
15	TRILOG Antenna	VULB 9160	9160-3212	SCHWARZBECK	Apr-11
16	Log.-Per. Antenna	VULP 9118	9118 A 401	SCHWARZBECK	Apr-11
17	Biconical Antenna	BBA 9106	VHA 9103-2315	SCHWARZBECK	Apr-11
18	Horn Antenna	3115	00055005	ETS LINDGREN	Mar-11
19	Horn Antenna	BBHA 9120D	9120D122	SCHWARZBECK	Dec-11
20	Dipole Antenna	VHA9103	2116	SCHWARZBECK	Nov-10
21	Dipole Antenna	VHA9103	2117	SCHWARZBECK	Nov-10
22	Dipole Antenna	VHA9105	2261	SCHWARZBECK	Nov-10
23	Dipole Antenna	VHA9105	2262	SCHWARZBECK	Nov-10
24	Hygro-Thermograph	THB-36	0041557-01	ISUZU	Mar-11
25	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-
26	RF Switch	MP59B	6200414971	ANRITSU	-
27	Power Divider	11636A	6243	HP	Oct-10
28	DC Power Supply	6622A	3448A03079	HP	Oct-10
29	Frequency Counter	5342A	2826A12411	HP	Mar-11
30	Power Meter	EPM-441A	GB32481702	HP	Mar-11
31	Power Sensor	8481A	2702A64048	HP	Mar-11
32	Audio Analyzer	8903B	3729A18901	HP	Oct-10
33	Modulation Analyzer	8901B	3749A05878	HP	Oct-10
34	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	Oct-10
35	LOOP-ANTENNA	FMZB 1516	151602/94	SCHWARZBECK	Mar-11
36	Stop Watch	HS-3	601Q09R	CASIO	Mar-11
37	LISN	ENV216	100408	R&S	Oct-10