RF MEASUREMENT REPORT

CERIFICATION OF COMPLIANCE

PRODUCT	:	**ReFlex Telemetry Device**
MODEL/TYPE NO	:	**PT100**
FCC ID	:	**RNGPT100RX**
TRADE NAME	:	HuneTec Human Network Technology
APPLICANT NAME	:	**Hunetec Co., Ltd.** RM 612, Starwood Plaza, 5439-1 Sangdaewon-Dong, Jungwon-Gu, Sungnam-City, Kyunggi-Do, Korea(ZIP CODE : 462- 120) **Attn. : David Kim**
FCC CLASSIFICATION	:	**PCB Part 24D PCS Licensed Transmitter** **LMS Part 90 Location & Monitoring Transmitter**
FCC RULE PART(S)	:	**FCC Part 24D & 90**
FCC PROCEDURE	:	**Certification**
DATES OF TEST	:	**June 25, 2007 ~ July 3, 2007**
DATES OF ISSUE	:	**July 9, 2007**
TEST REPORT No.	:	**BWS-07-EF-0035**
TEST LAB.	:	**BWS TECH Inc. (Registration No. : 553281)**

This Digital Transmission System has been tested in accordance with the measurement procedures specified in ANSI C63.4-2003 at the BWS TECH/EMC Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part 24D & 90.
I attest to the accuracy of data. All measurement herein was performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. The results of testing in this report apply to the product/system, which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

(Date)

Tested by **ChangYoung, Choi**

(Date)

Reviewed by **TaeHvun, Nam**

BWS TECH Inc.
www.bws.co.kr
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FCC TEST REPORT

Scope – *Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)*

1. General Information

Applicant

Company Name :	Hunetec Co., Ltd.
Company Address :	RM 612, Starwood Plaza, 5439-1 Sangdaewon-Dong, Jungwon-Gu, Sungnam-City, Kyunggi-Do, Korea
Phone/Fax :	+82-31-737-0850 / +82-31-737-0851

Manufacturer

Company Name :	Hunetec Co., Ltd.
Company Address :	RM 612, Starwood Plaza, 5439-1 Sangdaewon-Dong, Jungwon-Gu, Sungnam-City, Kyunggi-Do, Korea
Phone/Fax :	+82-31-737-0850 / +82-31-737-0851

● **EUT Type :**	ReFlex Telemetry Device
● **Model Number :**	PT100
● **FCC Identifier :**	RNGPT100RX
● **S/N :**	Prototype
● **Freq. Range :**	24D / 901.0 MHz ~ 902.0 MHz 90 / 896.0 MHz ~ 901.0 MHz
● **Modulation Method :**	4level FSK
● **FCC Rule Part(s) :**	Part 24D PCS Licensed Transmitter Part 90 Location & Monitoring Transmitter
● **Test Procedure :**	ANSI C63.4-2003
● **Dates of Tests :**	June 25, 2007 ~ July 3, 2007 BWS TECH Inc.
● **Place of Tests :**	EMC Testing Lab (FCC Registration Number : 553281) #611-1 Maesan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 449-853, Korea TEL: +82 31 333 5997 FAX: +82 31 333 0017
● **Test Report No. :**	BWS-07-EF-0035

2. Description of Test Facility

The measurement for radiated emission test were practiced at the open area test site of BWS TECH Inc. Measurement for conducted emission test were practiced at the semi EMC Anechoic Chamber test site of BWS TECH Inc. facility located at #611-1 Maesan-Ri, Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 449-853, Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-2003 and CISPR Publication 16. The BWS TECH measurement facility has been filed to the Commission with the FCC for 3 and 10-meter site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-1993 and registered to the Federal Communications Commission (Registration Number : 553281).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C.63.4-2003) was used in determining radiated emissions from the Hunetec Co., Ltd. Model :PT100.

3. Product Information

3.1 Equipment Description

The Equipment Under Test (EUT) is RF transmitter by the Hunetec Co., Ltd. Model :PT100. (FCC ID : RNGPT100RX).
The purpose of this project is to invent a new generation of a mobile tracking device for pets. A H/W structure of the new device will be similar to a typical pet collar so that pets can wear it comfortably. More importantly, the new pet collar device provides a location-based service over the ReFLEX network and also run more than 6 months without recharging a battery.

3.2 General Specification

Item	Specification
Transmitter	
Frequency Range	896~902MHz
Channel Spacing	12.5KHz/10KHz
Bit Rate	800~9600bps
Signaling Modulation	4Level FSK
Frequency Deviation	800Hz and 2400Hz
Frequency Accuracy	-2.5ppm < X < 2.5ppm
Frequency Stability	-1.0ppm < X < 1.0ppm
Output Power	0.75W into Antenna
ERP	0.2W minimum over 8 positions
Spurious Emission	< -50dB
Occupied Bandwidth	8.5KHz
Receiver	
Frequency	929~932MHz, 935~942MHz
Channel Spacing	12.5KHz / 10KHz
Bit Rate	1600~6400bps
Signaling Modulation	2 or 4 Level FSK
Frequency Deviation	800Hz and 2400Hz
Receiver Sensitivity	20uV/M with 80 char(TBD)
Frequency Accuracy	1ppm
Adjacent Channel Rejection	> 50dB from Sensitivity to -80dBm > 40dB at -70dB Signal Level > 30dB at -60dB Signal Level
Co-Channel Rejection	< 15dB at -105dBm < 10dB at -102dBm < 6dB at -95dBm
Spurious Response Rejection	> 55dB at -105dBm
Image Rejection	> 55dB at -105dBm
Inter-Modulation Distortion Rejection	> 50dB from Sensitivity to -80dBm > 40dB at -70dB Signal Level > 30dB at -60dB Signal Level
Simulcast Delay Spread Tolerance	> 1/4 symbol width at -105dBm and 15dB C/I > 1/4 Symbol width at -102dBm and 10dB C/I > 1/4 Symbol width at -55dBm and 6dB C/I

4. Description of Tests

4.1 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with section 11, "Measurement of Information Technology Equipment" of ANSI C63.4-2003. The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50Ω/50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" within a bandwidth of 9KHz.

The line-conducted emission test is conducted inside a shielded anechoic chamber room with 1m x 1.5m x 0.8m wooden table, which is placed 40cm away from the vertical wall, and 1.5m away from the sidewall of the chamber room. Two LISNs are bonded to the shielded room. The EUT is powered from the PMM LISN and the support equipment is powered from the LISN. Power to the LISNs is filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and these supply lines will be connected to the LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling (serpentine fashion) to a 1m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the Spectrum Analyzer to determine the frequency producing the max. Emission from the EUT. The frequency producing the max. Level was reexamined using the detector function set to the CISPR Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.45 to 30MHz. The bandwidth of the Spectrum Analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was maximized by switching power lines, varying the mode of operation or resolution, clock or data exchange speed, if applicable, whichever determined the worst-case emission. Each emission reported was calibrated using self-calibrating mode.

Photographs of the worst-case emission can be seen in photographs of conducted emission test setup.

4.2 Radiated Emission Measurement

Preliminary measurements were made at indoors 3-meter semi EMC Anechoic Chamber using broadband antennas, broadband amplifier, and spectrum analyzer to determine the emission frequencies producing the maximum EME.

Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configurations, mode of operation, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 1000MHz using bi-log antenna and above 1000MHz, linearly polarized double ridge horn antennas were used. Above 1GHz, linearly polarized double ridge horn antennas were used. The measurements were performed with three frequencies, which were selected as bottom, middle, and top frequency in the operating band. Emission level from the EUT with various configurations was examined on the spectrum analyzer connected with the RF amplifier and plotted graphically.

Final measurements were made outdoors open site at 3-meter test range using biconical and log periodic, Horn antenna. The output from the antenna was connected, via a preselector or a preamplifier, to the input of the EMI Measuring Receiver and Spectrum analyzer (for above 25GHz). The detector function was set to the quasi-peak or peak mode as appropriate. The measurement bandwidth on the Field strength receiver was set to at least 120kHz (1MHz for measurement above 1GHz), with all post-detector filtering no less than 10 times the measurement bandwidth. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during preliminary measurement was examined and investigated as the same set up and configuration which produced the maximum emission The EUT, support equipment and interconnecting cables were configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1m x 1.5 meter table. The turntable containing the system was rotated and the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission.

Varying the mode of operating frequencies of the EUT maximized each emission. The system was tested in all the three orthogonal planes and changing the polarity of the antenna. The worst-case emissions are recorded in the data tables. If necessary, the radiated emission measurement could be performed at a closer distance to ensure higher accuracy and the results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20dB/decade) as per section 15.31(f).

5. Test Condition

5.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the EUT and the supported equipments were installed to meet FCC requirement and operated in a manner, which tends to maximize its emission level in a typical application.

Radiated Emission Test

Preliminary radiated emission tests were conducted using the procedure in ANSI C63.4/2003 Clause 8.3.1.1 to determine the worst operating condition. Final radiated emission tests were measured at 3-meter open field test site. To complete the test configuration required by the FCC, the EUT was tested in all three orthogonal planes.

5.2 EUT operation

EUT was tested according to the operation modes provided by the specifications given by the manufacturer, and reported the worst emissions.

6. TEST RESULTS

Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

APPLIED STANDARD : 47 CFR Part 24D & 90			
FCC Rule	**Description of Test**	**Limit**	**Result**
2.1046	RF Power Output	750 mW	Pass
2.1049	Occupied Bandwidth	Mask	Pass
2.1051	Spurious Emission at Antenna Terminals	-13 dBm	Pass
2.1053	Field Strength of Spurious Radiation	-13 dBm	Pass
2.1055	Frequency Stability	1 ppm	Pass
15.209	Field Strength of Spurious Radiation in Receiving Mode	Variation	Pass
15.207	Conducted Emission	Variation	N/A(1)
1.1307 1.1310 2.1091 2.1093	RF Exposure Requirement	20 Cm	Pass

(1) The EUT used external battery.

The data collected shows that the product complies with technical requirements of the Part 24D & 90 of the FCC Rules.

Note : Modification to EUT

The device tested is not modified anything, mechanical or circuits to improve EMI status during a measurement. No EMI suppression device(s) was added and/or modified.

6.1 RF Power Output

EUT	:	PT100
Test Date	:	June 26, 2007
Operating Condition	:	Continues TX
Environment Condition	:	24 °C/ 42 %
Result	:	362.2 mW

6.1.1 Definition

The conducted carrier power output rating for a transmitter is the power available at the output terminals of the transmitter when the output terminals are connected to the standard transmitter load.

6.1.2 Specification

FCC Rules Part 2, Section 2.1046
FCC Rules Part 24, Section 24.132
FCC Rules Part 90, Section 90.635

6.1.3 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.1

6.1.4 Measurement Set-Up

Fig-1

6.1.5 Test Equipment List

Equipment	Model Name	Manufacture
EUT	PT100	HUNETEC
Attenuator	33-30-33	WEINSCHEL
Spectrum Analyzer	FSP7	ROHDE & SCHWARZ

6.1.6 Test Procedure

① Connect the equipment as Fig-1.
② Measure the transmitter output power.
③ RBW 1MHz, VBW 1MHz, Max Hold

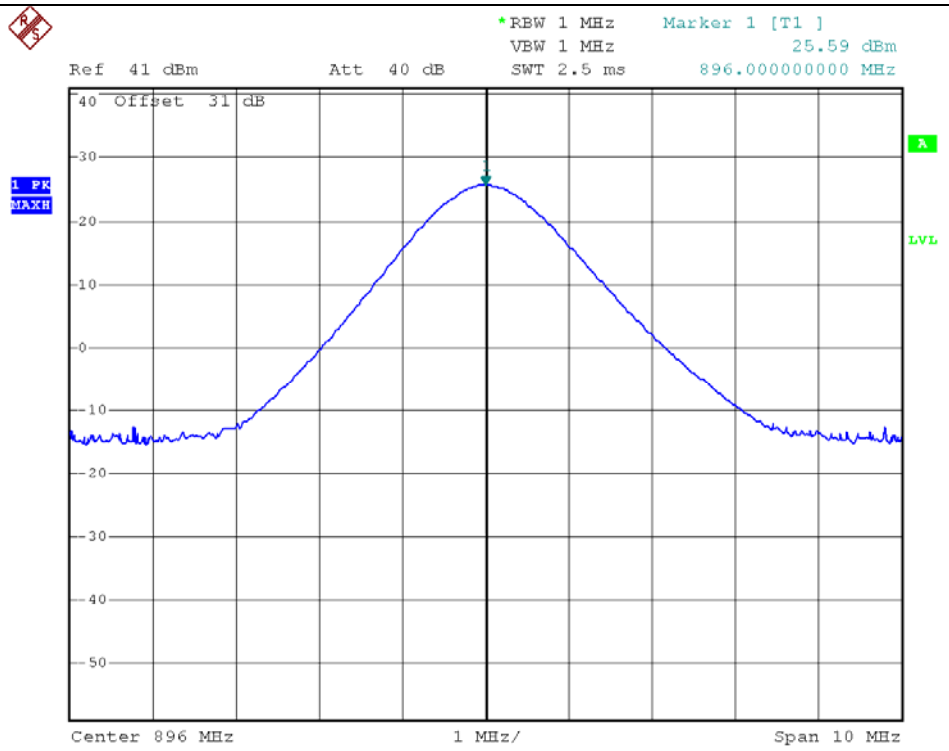
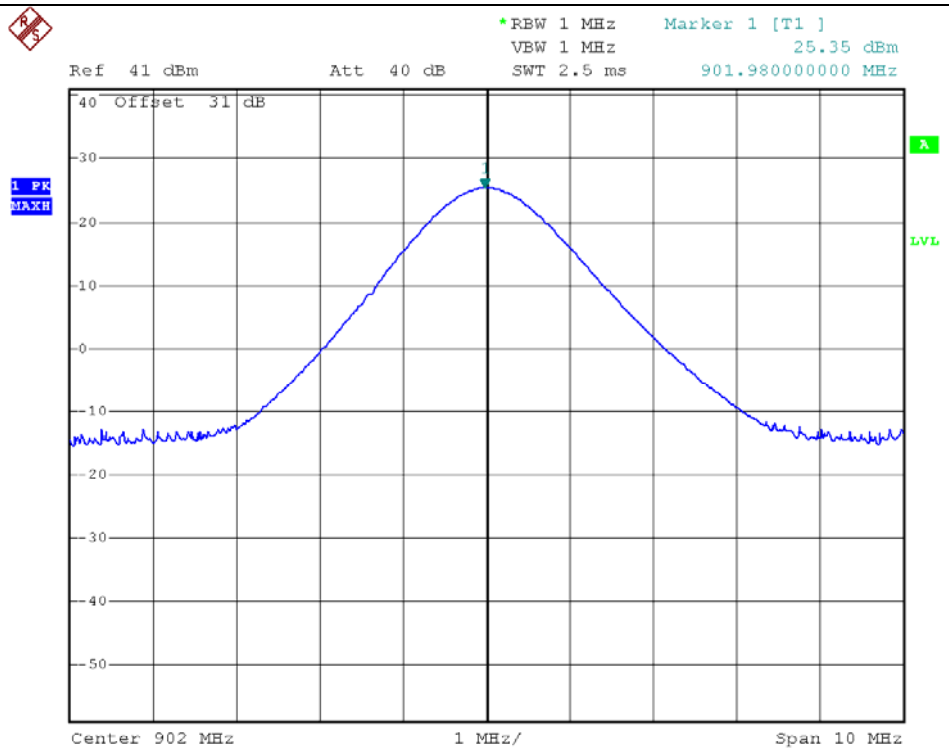
6.1.7 Limit

① 0.75 Watts

6.1.8 Test Result

Channel	Frequency (MHz)	Measured Power (mW)	Rated Power (mW)
Low	896.0	362.2	750.0
High	902.0	342.8	

6.1.9 Plot of RF Power Output

Frequency	RF Power Output
896 MHz	
902 MHz	

6.2 Occupied Bandwidth

EUT	:	PT100
Test Date	:	June 26, 2007
Operating Condition	:	Continues TX
Environment Condition	:	24 °C/ 42 %
Result	:	Met the Mask

6.2.1 Definition

The transmitter sideband spectrum denotes the sideband power produced at a discrete frequency separation from the carrier up to the test bandwidth due to all sources of unwanted noise within the transmitter in a modulated condition.

6.2.2 Specification

FCC Rules Part 2, Section 2.1049
FCC Rules Part 24, Section 24.131
FCC Rules Part 90, Section 90.209
FCC Rules Part 90, Section 90.210

6.2.3 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.11

6.2.4 Measurement Set-Up

Fig-2

6.2.5 Test Equipment List

Equipment	Model Name	Manufacture
EUT	PT100	HUNETEC
Attenuator	33-30-33	WEINSCHEL
Spectrum Analyzer	FSP7	ROHDE & SCHWARZ

6.2.6 Test Procedure

① Connect the equipment as Fig-2.
② The test shall be performed using the modulation of the EUT.

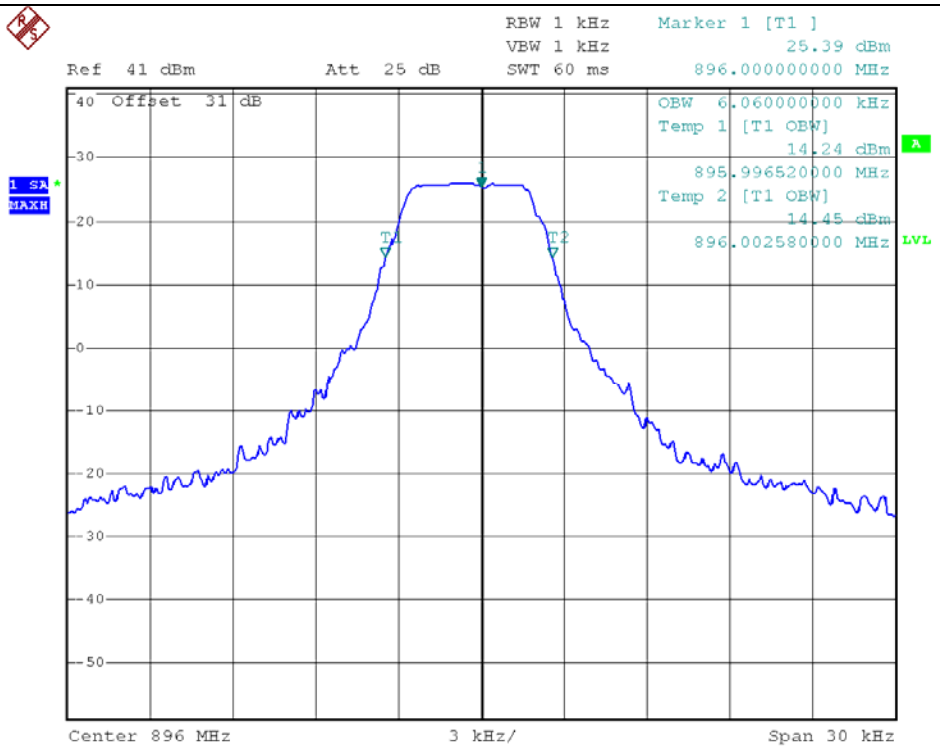
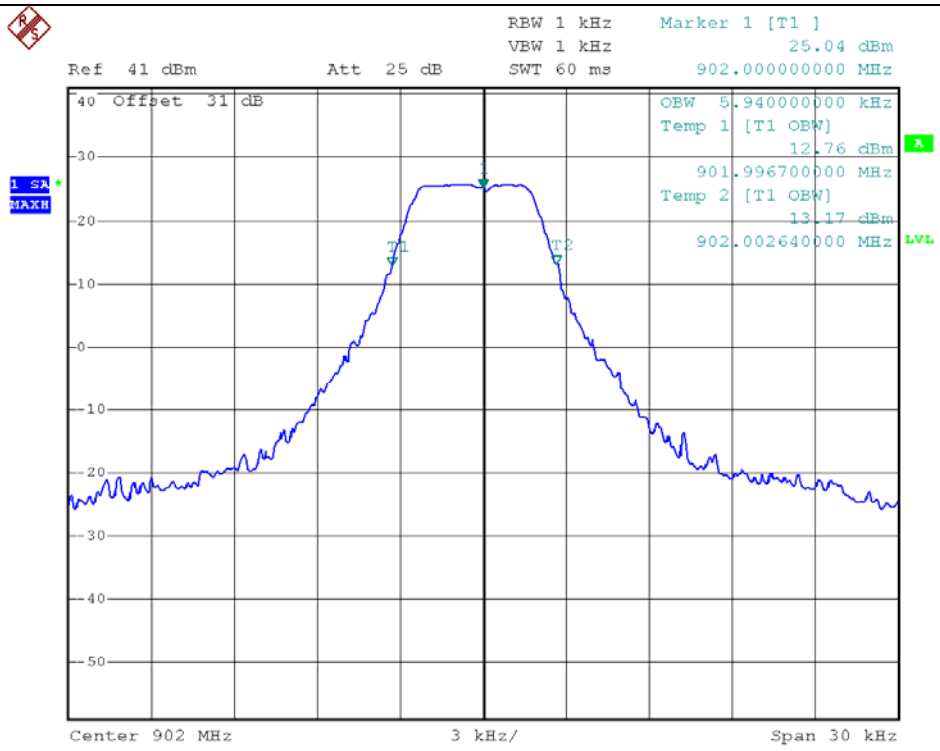
6.2.7 Limit

① Mask J / Authorized bandwidth (13.6 kHz)
② Mask K / Authorized bandwidth (10.0 kHz)

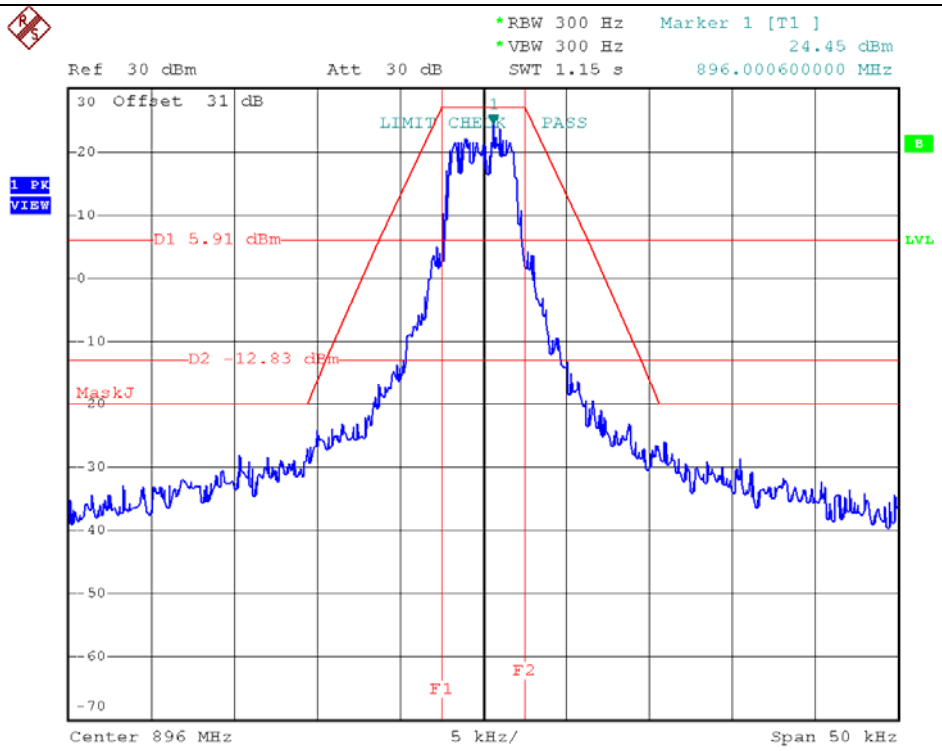
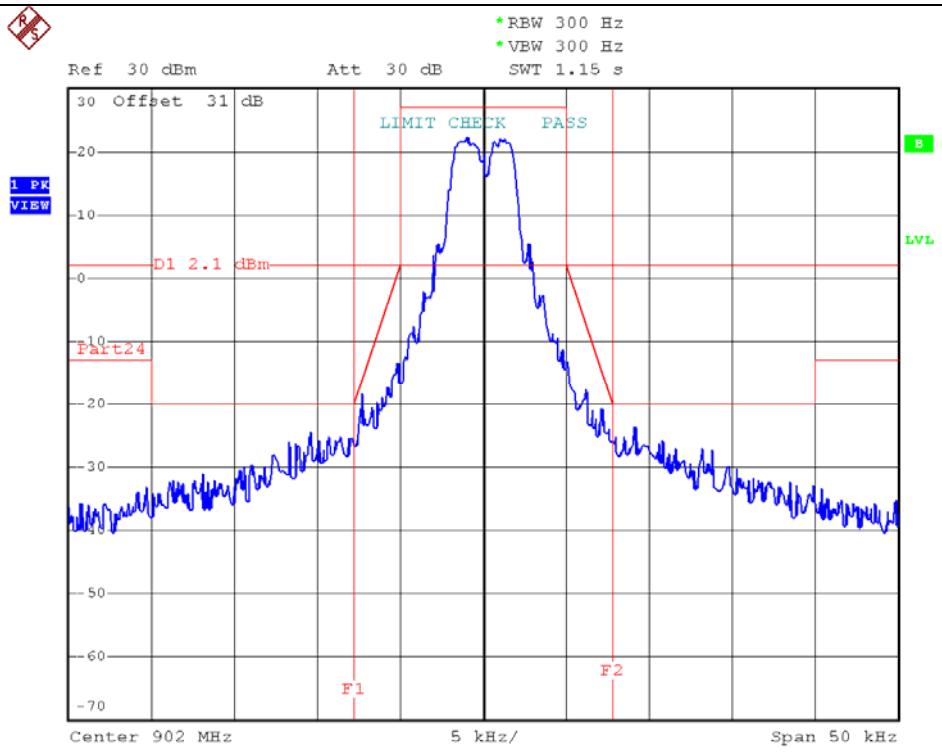
6.1.8 Test Result

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)	Authorized Bandwidth (kHz)
Low	896.0	6.1	13.6
High	902.0	5.9	10.0

6.2.8 Plot of Occupied Bandwidth

Frequency	Occupied Bandwidth
896 MHz	
902 MHz	

6.2.9 Plot of Emission Mask

Frequency	Emission Mask
896 MHz Mask J	
902 MHz Mask K	

6.3 Spurious Emission at Antenna Terminals

EUT	:	PT100
Test Date	:	June 26, 2007
Operating Condition	:	Continues TX
Environment Condition	:	24 °C/ 42 %
Result	:	Passed by -1.6 dB

6.3.1 Definition

Conducted spurious emissions are emissions at the antenna terminals on a frequency or frequencies that are outside a band sufficient to ensure transmission of information of required quality for the class of communication desired.

6.3.2 Specification

FCC Rules Part 2, Section 2.1051
FCC Rules Part 24, Section 24.133
FCC Rules Part 90, Section 90.210

6.3.3 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.13

6.3.4 Measurement Set-Up

Fig-3

6.3.5 Test Equipment List

Equipment	Model Name	Manufacture
EUT	PT100	HUNETEC
Attenuator	33-30-33	WEINSCHEL
Spectrum Analyzer	FSP7	ROHDE & SCHWARZ

6.3.6 Test Procedure

① Connect the equipment as Fig-3.
② Set the center frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line.
③ Measure the spurious emission.
③ RBW 1MHz, VBW 1MHz, Max Hold

6.3.7 Limit

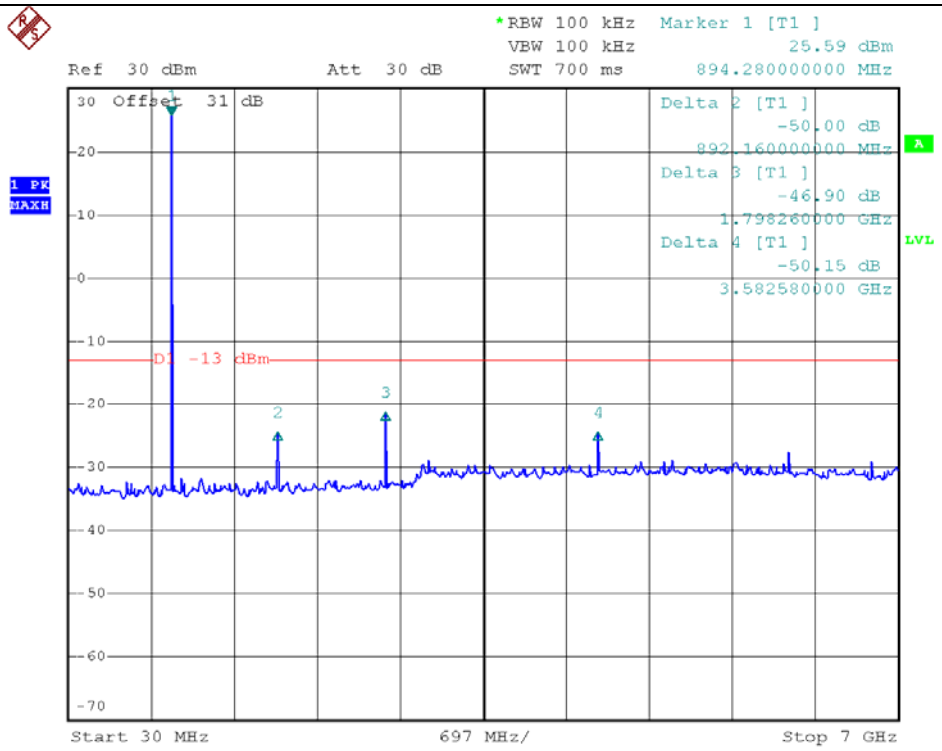
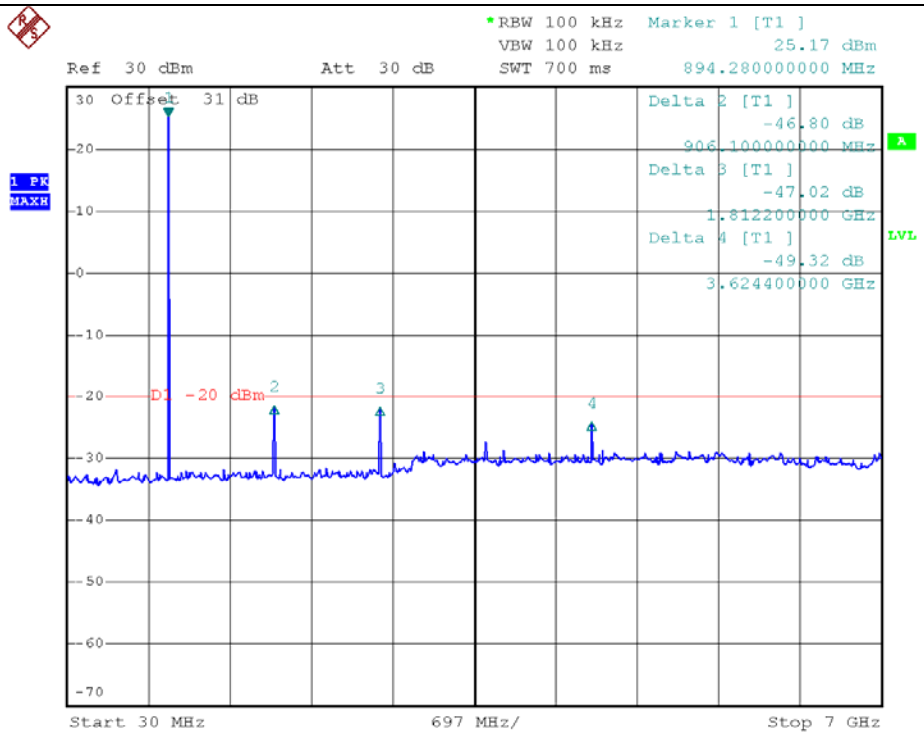
① 896MHz ~ 901MHz / “43+10log(P) dBc = -13 dBm”
② 901MHz ~ 902MHz / “50+10log(P) dBc = -20 dBm”

6.3.8 Test Result

Channel	Frequency (MHz)	Measured Value (dBm)	Limit (dBm)	Magin (dB)
Low	896.0	+25.6	-	-
	1972.0	-24.4	-13.0	-11.4
	2688.0	-21.3		-8.3
	3584.0	-		-
	4480.0	-24.6		-11.6
	5676.0	-		-
	6272.0	-		-
	7168.0	-		-
	8084.0	-		-
	8960.0	-		-
High	902.0	+25.2	-	
	1804.0	-21.6	-20.0	-1.6
	2706.0	-21.9		-1.9
	3608.0	-		-
	4510.0	-24.2		-4.2
	5412.0	-		-
	6314.0	-		-
	7216.0	-		-
	8118.0	-		-
	9020.0	-		-

- The other emissions below noise floor of -30 dBm.

6.3.9 Plot of Spurious Emission at Antenna Terminals

Frequency	Spurious Emission at Antenna Terminals
896 MHz	
902 MHz	

6.4 Field Strength of Spurious Radiation

EUT	:	PT100
Test Date	:	June 28, 2007
Operating Condition	:	Continues TX
Environment Condition	:	27 °C/ 46 %
Result	:	Passed by -4.9 dB

6.4.1 Definition

Radiated spurious emissions are emissions from the equipment when transmitting into a nonradiating load on a frequency or frequencies that are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired.

6.4.2 Specification

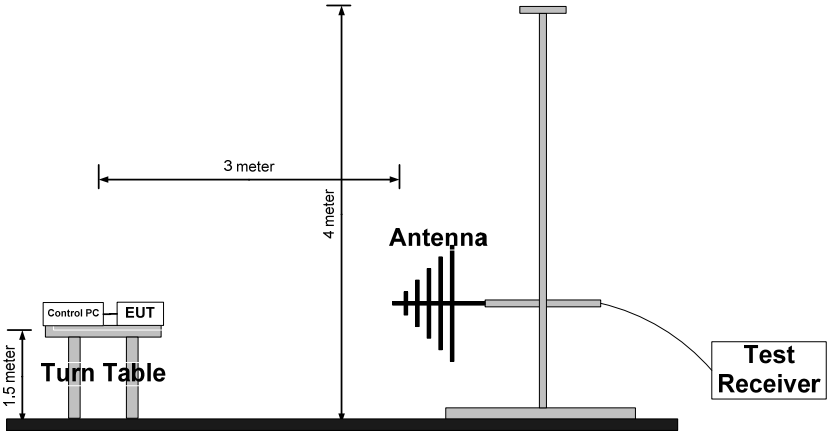
FCC Rules Part 2, Section 2.1053
FCC Rules Part 24, Section 24.133
FCC Rules Part 90, Section 90.210(j)

6.4.3 Method of Measurement

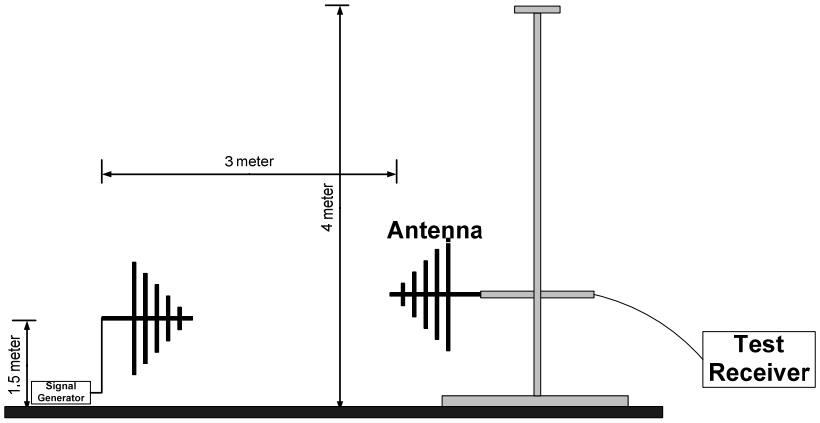
ANSI/TIA-603-B-2002 Section 2.2.12

6.4.4 Measurement Set-Up

Step 1. Measurement of Field Strength (Fig-4.1)



Step 2. Measurement of ERP (Fig-4.2)



6.4.5 Test Equipment List

Equipment	Model Name	Manufacture
EUT	PT100	HUNETEC
Receiver	ESVS 30	ROHDE & SCHWARZ
Receiver	ESPI	ROHDE & SCHWARZ
Signal Generator	GT9000	GIGATRONICS
Bilog Antenna	VULB 9160	SCHWARZBECK
Bilog Antenna	VULB 9160	SCHWARZBECK
Horn Antenna	BBHA 9120	SCHWARZBECK
Horn Antenna	3115	ETS●LINDGREN
Control PC	PCG-9251	SONY

6.4.6 Test Procedure

① Connect the equipment as Fig-4-1.
② Place the transmitter to be tested on the turntable in the standard test site
③ The transmitter is transmitting into a nonradiating load that is placed on the turntable. The RF cable to this load should be of minimum length. For transmitters with integral antennas, the tests are to be run with the unit operating into the integral antenna.
④ For each spurious measurement the test antenna should be adjusted to the correct length for the frequency involved. This length may be determined from a calibration ruler supplied with the equipment. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, except for the region close to the carrier equal to ± the test bandwidth.
⑤ Key the transmitter.
⑥ For each spurious frequency, raise and lower the test antenna from 1 m to 4m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Then the turntable should be rotated 360° to determine the maximum reading. Repeat this procedure to obtain the highest possible reading. Record this maximum reading.
⑦ Repeat step ⑥ for each spurious frequency with the test antenna polarized vertically.
⑧ Reconnect the equipment as Fig-4.2.
⑨ Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.
⑩ Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
⑪ Repeat step ⑩ with both antennas vertically polarized for each spurious frequency.
⑫ Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps ⑩ and ⑪ by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula :

Pd(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dB)

where: **Pd** is the dipole equivalent power and
Pg is the generator output power into the substitution antenna.

6.4.7 Limit

① 896MHz ~ 901MHz / “43+10log(P) dBc = -13 dBm”
② 901MHz ~ 902MHz / “50+10log(P) dBc = -20 dBm”

6.4.8 Test Result

ERP Power Frequency Tuned (MHz)	Max. E-Field of EUT (dBuV/m)	Antenna Polarization (V/H)	Signal GEN. Power (dBm)	Dipole Gain (dBd)	Measured ERP Power (dBm)	Limit (dBc)	Margin (dB)
Low Channel / 896 MHz							
896.0	108.1	H	+24.9	3.8	+28.7	-	-
1972.0	48.3	-	-34.3	7.8	-26.5	-13.0	-13.5
2688.0	50.1	-	-32.9	8.8	-24.1		-11.1
3584.0	Not Found						
4480.0							
5676.0							
6272.0							
7168.0							
8084.0							
8960.0							
High Channel / 902 MHz							
902.0	107.8	H	+24.6	3.8	+28.4	-	-
1804.0	49.2	-	-33.4	7.8	-25.6	-20.0	-5.6
2706.0	49.3	-	-33.7	8.8	-24.9		-4.9
3608.0	Not Found						
4510.0							
5412.0							
6314.0							
7216.0							
8118.0							
9020.0							

6.5 Frequency Stability

EUT	:	PT100
Test Date	:	June 29, 2007
Operating Condition	:	Non-Modulation Mode
Result	:	Passed

6.5.1 Definition

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

6.5.2 Specification

FCC Rules Part 2, Section 2.1055
FCC Rules Part 24, Section 24.135
FCC Rules Part 90, Section 90.213

6.5.3 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.2

6.5.4 Measurement Set-Up

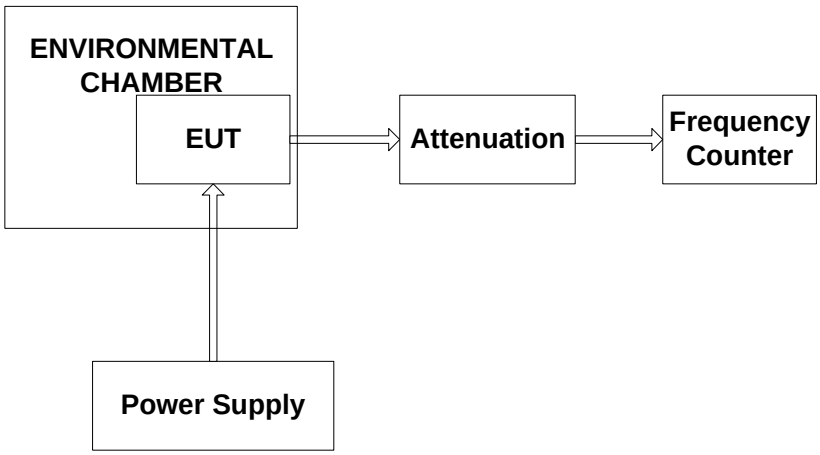


Fig.5

6.5.5 Test Equipment List

Equipment	Model Name	Manufacture
EUT	PT100	HUNETEC
Attenuator	33-30-33	WEINSCHEL
Frequency Counter	R5372	ADVENTEST
Environmental Chamber	EN-GLMP-54	ENEX

6.5.6 Test Procedure

① Connect the equipment as Fig-5.
② Record the carrier frequency of the transmitter as *MCF*MHz.
③ Calculate the ppm frequency error.

6.5.7 Limit

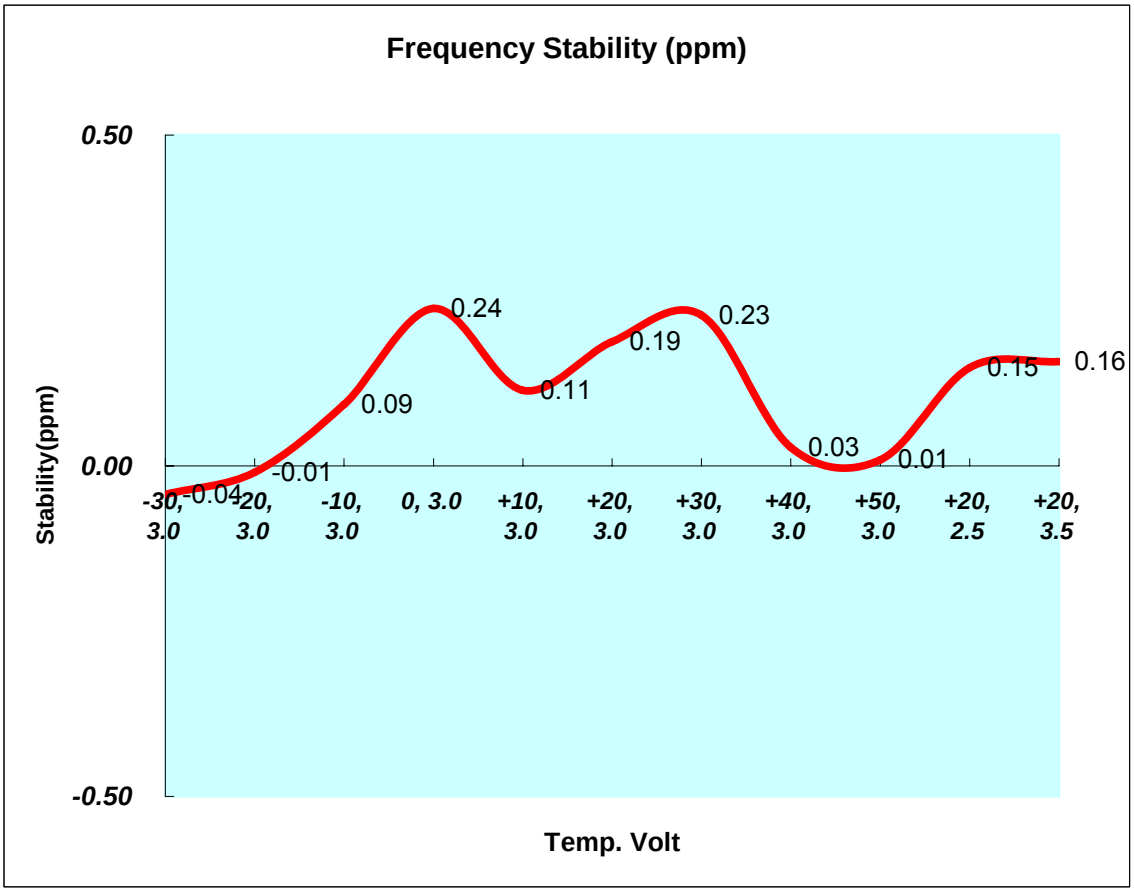
① 1 ppm

6.5.8 Test Result

6.5.8.1 Low Channel (896 MHz) / Data Table

Voltage (%)	Power Supply (Vdc)	Temperature (°C)	Frequency (Hz)	Deviation (ppm)	Limit (ppm)
100%	3.00	-30	895999961	-0.04	1.00
100%		-20	895999991	-0.01	
100%		-10	896000083	+0.09	
100%		0	896000213	+0.24	
100%		+10	896000102	+0.11	
100%		+20	896000168	+0.19	
100%		+30	896000204	+0.23	
100%		+40	896000025	+0.03	
100%		+50	896000008	+0.01	
High 115%	3.45	+20	896000133	+0.15	
Low 85%	2.55	+20	896000141	+0.16	

6.5.8.2 Low Channel (896 MHz) / Gragh

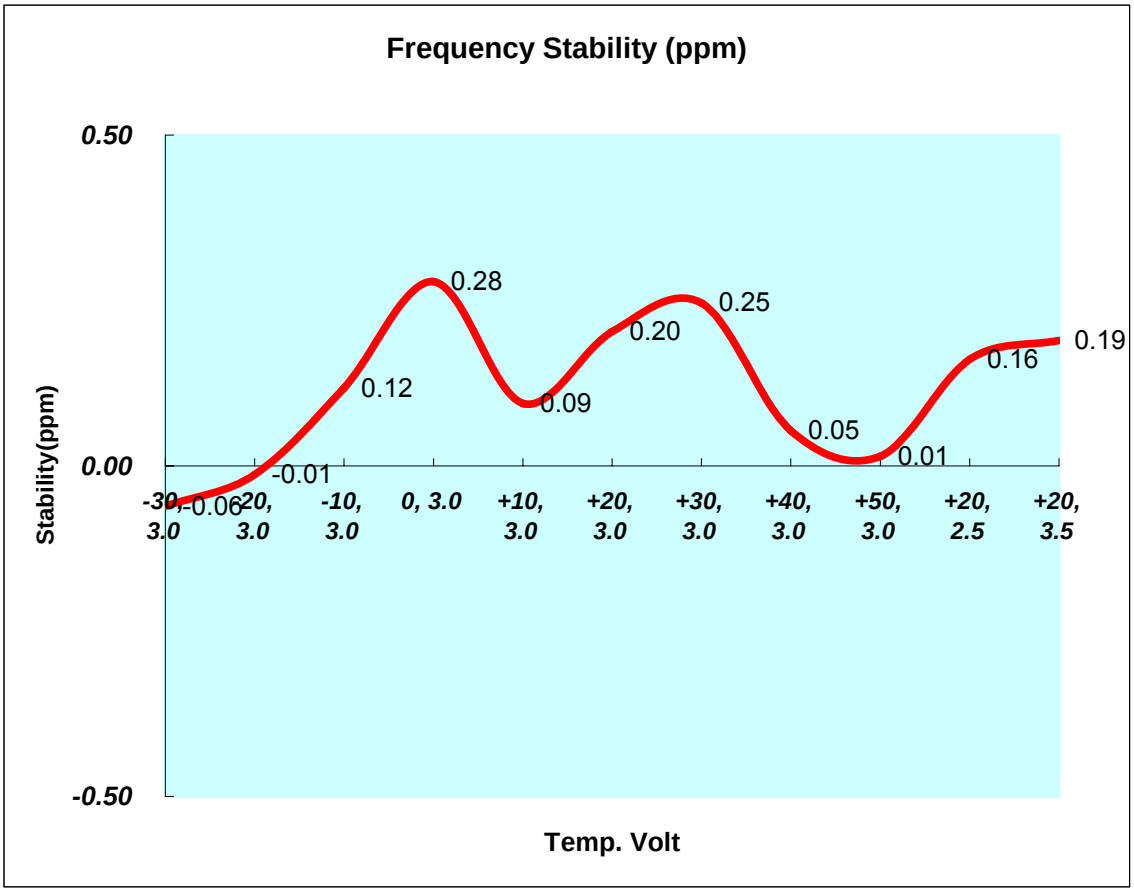


6.5.9 Test Result

6.5.9.1 Low Channel (902 MHz) / Data Table

Voltage (%)	Power Supply (Vdc)	Temperature (ºC)	Frequency (Hz)	Deviation (ppm)	Limit (ppm)
100%	3.00	-30	901999945	-0.06	1.00
100%		-20	901999988	-0.01	
100%		-10	902000106	+0.12	
100%		0	902000251	+0.28	
100%		+10	902000085	+0.09	
100%		+20	902000183	+0.20	
100%		+30	902000222	+0.25	
100%		+40	902000048	+0.05	
100%		+50	902000013	+0.01	
High 115%	3.45	+20	902000145	+0.16	
Low 85%	2.55	+20	902000171	+0.19	

6.5.8.2 Low Channel (902 MHz) / Gragh



6.6 Field Strength of Spurious Radiation in Receiving Mode

EUT	:	PT100
Test Date	:	June 28, 2007
Operating Condition	:	Rx Mode
Environment Condition	:	27 °C/ 46 %
Result	:	Passed by -11.1 dB

6.6.1 Definition

Radiated spurious emissions are emissions from the equipment when transmitting into a nonradiating load on a frequency or frequencies that are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired.

6.6.2 Specification

FCC Rules Part 15, Section 15.209

6.6.3 Method of Measurement

ANSI/TIA-603-B-2002 Section 2.2.12

6.6.4 Measurement Set-Up

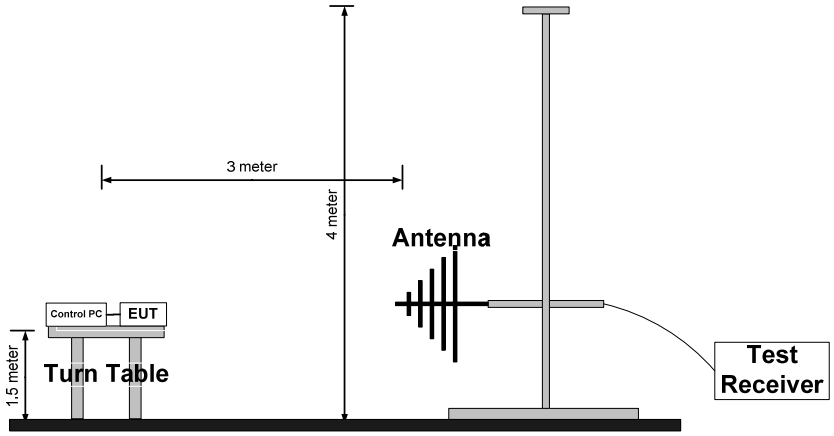


Fig.6

6.6.5 Test Equipment List

Equipment	Model Name	Manufacture
EUT	PT100	HUNETEC
Receiver	ESVS 30	ROHDE & SCHWARZ
Bilog Antenna	VULB 9160	SCHWARZBECK
Horn Antenna	BBHA 9120	SCHWARZBECK
Control PC	PCG-9251	SONY

6.6.6 Test Procedure

① Connect the equipment as Fig-6.
② Place the transmitter to be tested on the turntable in the standard test site
③ The transmitter is transmitting into a nonradiating load that is placed on the turntable. The RF cable to this load should be of minimum length. For transmitters with integral antennas, the tests are to be run with the unit operating into the integral antenna.
④ For each spurious measurement the test antenna should be adjusted to the correct length for the frequency involved. This length may be determined from a calibration ruler supplied with the equipment. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, except for the region close to the carrier equal to ± the test bandwidth.
⑤ Key the transmitter.
⑥ For each spurious frequency, raise and lower the test antenna from 1 m to 4m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Then the turntable should be rotated 360° to determine the maximum reading. Repeat this procedure to obtain the highest possible reading. Record this maximum reading.
⑦ Repeat step ⑥ for each spurious frequency with the test antenna polarized vertically.

6.6.7 Limit

① FCC Rules Part 15, Section 15.209

6.6.8 Test Result

Frequency [MHz]	Reading [dBμV]	Polarization [*H/**V]	Ant.Factor [dB/m]	Cable Loss [dB]	Limit [dBμV/m]	Emission Level [dBμV/m]	Margin [dB]
896.00	5.86	H	23.46	7.13	46.00	36.45	9.55
902.00	5.43	H	23.53	7.16	46.00	36.13	9.87
The other emissions below noise floor.							

6.7 RF Exposure Requirement

6.7.1 Method of Measurement

These devices are not exempted from compliance does not exceed the Commission's RF exposure guidelines. Unless a device operates at substantially low power levels, with a low gain antenna(s), supporting information is generally needed to establish the various potential operating configurations and exposure conditions of a transmitter and its antenna(s) in order to determine compliance with the RF exposure guidelines.

In order to demonstrate compliance with MPE requirements (see Section 2.1091), the following information is typically needed:

Calculation that estimates the minimum separation distance (20 cm or more) between an antenna and persons required to satisfy power density limits defined for free space.

Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement Any caution statements and/or warning labels that are necessary in order to comply with the exposure limits Any other RF exposure related issues that may affect MPE compliance.

6.7.2 Limits

FCC 1.1310:- The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm2)	Average Time (minutes)
(A) Limits for Occupational/Control Exposures				
1500 - 100000	-	-	5	6
(B) Limits for General Population/Uncontrolled Exposure				
1500 - 100000	**-**	**-**	**1.0**	**30**

6.7.3 Result

Frequency [MHz]	EIRP [dBm]	Calculated EIRP [mW]	The time averaged power over 30 minutes (Watt)	Laboratory's Recommended Minimum RF Safety Distance r (Cm)	Power Density in mW/cm2 at Formula When r=20Cm (mW/cm2)
896.00	25.60	363.08	363.08	5.38	0.0722
902.00	25.20	331.13	331.13	5.13	0.0659

Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi r^2} = \frac{EIRP}{4\pi r^2}$$

P : power input to the antenna in mW
EIRP : Equivalent (effective) isotropic radiated power.
S : power density mW/cm2
G : numeric gain of antenna relative to isotropic radiator
R : distance to centre of radiation in cm

FCC radio frequency exposure limits may be exceeded at distances closer than r cm from the antenna of this device

$$r = \sqrt{\frac{PG}{4\pi S}} = \sqrt{\frac{EIRP}{4\pi S}}$$

Note :

1. S = 1.0 mW/cm^2 for Limits for General Population/Uncontrolled Exposures.
2. The time averaged power over 30 minutes will be equaled Output Power.
3. Minimum calculated separation distance between antenna and persons required : 2.94Cm
4. The Power Density at a distance of 20Cm calculated from the formula is far below the limit of 1mW/cm^2.
5. So, RF exposure limit warning or SAR test are not required.

7. TEST EQUIPMENTS LIST

The listing below denotes the test equipments utilized for the test(s).

	EQUIPMENT	MODEL	MANUFACTURE	SERIAL NUMBER	Calibration Due date
1	Receiver	ESVS30	ROHDE & SCHWARZ	832854/010	06/22/08
2	Receiver	ESPI	ROHDE & SCHWARZ	100012	10/19/07
3	Spectrum analyzer	FSP7	ROHDE & SCHWARZ	100001	02/22/08
4	Signal Generator	GT9000	GIGATRONICS	9604010	02/22/08
5	Frequency Counter	R5372	ADVANTEST	41855204	02/22/08
6	Shield Room (7m x 4m x 3m)	N/A	SJEMC	0004	N/A
7	Turn Table	OSC-30	N/A	BWS-01	N/A
8	Antenna Mast	JAC-3	DAIL EMC	N/A	N/A
9	Temperature & Humidity chanber	EN-GLMP-54	ENEX	N/A	03/23/08
10	Bilog Antenna	VULB9160	SCHWARZBECK	VULB9160-3122	12/29/07
11	Bilog Antenna	VULB9161	SCHWARZBECK	VULB9161-4067	12/23/07
12	Bilog Antenna	VULB9161	SCHWARZBECK	VULB9161-4068	12/23/07
13	Horn Antenna	3115	ETS·LINDGREN	00055005	02/07/08
14	Horn Antenna	BBHA 9120 D	SCHWARZBECK	BBHA 9120 D 234	02/07/08
15	Horn Antenna	BBHA 9170	SCHWARZBECK	BBHA9170157	02/07/08
16	Power Meter	E4418A	HP	GB38272621	11/14/07
17	Power Sensor	E9301B	HP	US40010238	11/14/07
18	Power supply	IPS-30B03DD	INTERACT	42052	02/22/08