FCC RADIO TEST REPORT

according to

47 CFR FCC Part 90

Equipment	:	**data transceiver (data radio)**
Model No.	:	**52-7085UE2**
Brand Name	:	**AES Corporation**
Filing Type	:	**New Application**
Applicant	:	**AES Corporation** 285 Newburv Street Peabodv Massachusetts 01960 USA
FCC ID	:	**L9N-7085UE2**
Manufacturer	:	**Hermes Electronics Co., Ltd** No 185-1, 4th FL,38th Road, Taichung Industrial Park (407) Taiwan
Received Date	:	Aug. 15, 2008
Final Test Date	:	Oct. 03, 2008

Statement

The test result in this report refers exclusively to the presented test model / sample.
Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI / TIA 603-C:2004, 47 CFR FCC Part 90, ANSI C63.4-2003**.
The test equipment used to perform the test is calibrated and traceable to NML/ROC.

Lab Code: 200079-0

SPORTON International Inc.

6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

Table of Contents

History of this test report

Original Issue Date: Sep. 09, 2008

Report No.: FH870318

■ No additional attachment.

□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

according to

47 CFR FCC Part 90

Equipment : data transceiver (data radio)

Model No. : 52-7085UE2

Brand Name : AES Corporation

Applicant : AES Corporation
285 Newburv Street Peabodv Massachusetts 01960
USA

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Aug. 15, 2008 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

1 General Description of Equipment under Test

1.1 Basic Description of Equipment under Test

This product is a FM UHF PTT Transceiver radio . It is used to wireless voice transceiver. The used modulation technique is FM. For other technique information, please reference section " Features of Equipment under Test ".

1.2 Features of Equipment under Test

ITEMS	DESCRIPTION
Type of Modulation	FM (Max deviation 5kHz / 2.5 kHz)
Type of Equipment	Fixed
Type of Emission	16K0F3E (25kHz mode) , 11K0F3E (12.5kHz mode)
Operating Frequency	450.025 ~ 469.9875MHz
Channel Space Bandwidth	25kHz / 12.5kHz
ERP Output Power	0.234 W
Function Type	Transceiver
Power Rating (DC/AC, Voltage)	DC12V
Consumption	1A
Temperature Range (Operating)	-20 ~ 50℃

1.3 Teat Antenna of EUT

Ant.	Brand Name	Model No.	Antenna Type	Connector	Gain (dBi)
A	AUTO LTD.	73-0053NX	Dipole Antenna	BNC	4.80

Note:
According FCC KDB license modular approval notice: EUT is generic licensed modules without specific antennas as certified for use only in final products operating in fixed. Maximum antenna gain is 4.8dBi to ensure compliance with RF exposure limits and radio service-rule ERP limits.

2 Test Configuration of the Equipment under Test

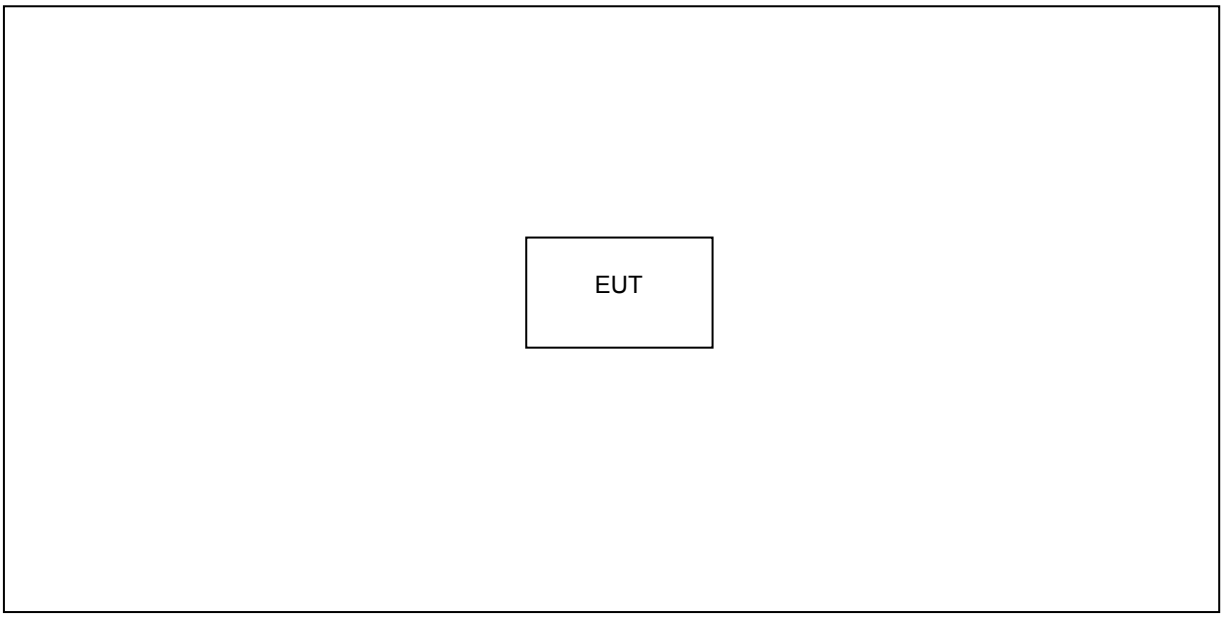
2.1 Description of the Test

a. During testing, the equipment was placed on a non-conducting support.
b. The following test modes were performed:
c. 450.025MHz / 460.025MHz / 469.9875MHz
d. The EUT has been programmed to continuously transmit or receive during testing. The used peripherals as well as the configuration fulfill the requirements of ANSI C63.4:2003.
e. The configuration is operated in a manner which tends to maximize its emission characteristics in a typical application.
f. 3 meters measurement distance of semi-fully chamber was used in this test.
g. For all test, the following modes were tested:
   Mode 1 is 25 kHz bandwidth
   Mode 2 is 12.5 kHz bandwidth

2.2 Frequency Range Investigated

a. Radiated emission test: from 30 MHz to 10^{th} harmonic of the highest operating frequency or 40GHz, whichever is lower

2.3 Connection Diagram of Test System



2.4 Test Software

Test software for frequency control was provided. Before testing, the notebook computer was used to control frequency of EUT. Then leave away notebook computer during test.

3 Test Location and Standards

3.1 Test Location

Test Location : Sporton Hwa Ya Testing Building

Address : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
Tel: +886 3 327 3456 Fax: +886 3 318 0055

Test Site No. : TH01-HY, 03CH03-HY

3.2 Test Conditions

Normal Voltage	: 12VDC from DC Power Supply
Extreme Voltage	: NA
Normal Temperature	: 20 ℃
Extreme Temperature	: -20 ℃ and 50 ℃

3.3 Standards for Methods of Measurement

Here is the list of the standards followed in this test report.

ANSI C63.4-2003

TIA/EIA-603-C:2004

47 CFR Part 90

4 List of Measurements

4.1 Summary of the Test Results

Applied Standard: 47 CFR Part 90, Part 2			
Paragraph	**FCC Rule**	**Description of Test**	**Result**
5.1	2.1047(a)(b) 2.1033(c)	Modulation Characteristics	Pass
5.2	90.213	Transmitter Frequency Stability	Pass
5.3	90.205	Transmitter Output Power	Pass
5.4	90.210	Transmitter Spectrum Mask	Pass
5.5	90.210	Transmitter Spurious Radiated Emission	Pass
5.6	90.210	Transmitter Spurious Conducted Emission	Pass
5.7	90.214	Transient Frequency Behavior of Transmitter	Pass
5.8	FCC 15B	Receiver Radiated Spurious Emission	Pass

5 Test Result

5.1 Modulation Characteristics

5.1.1 Audio Frequency Response

Rule Part No.: Part 2.1047(a)(b)

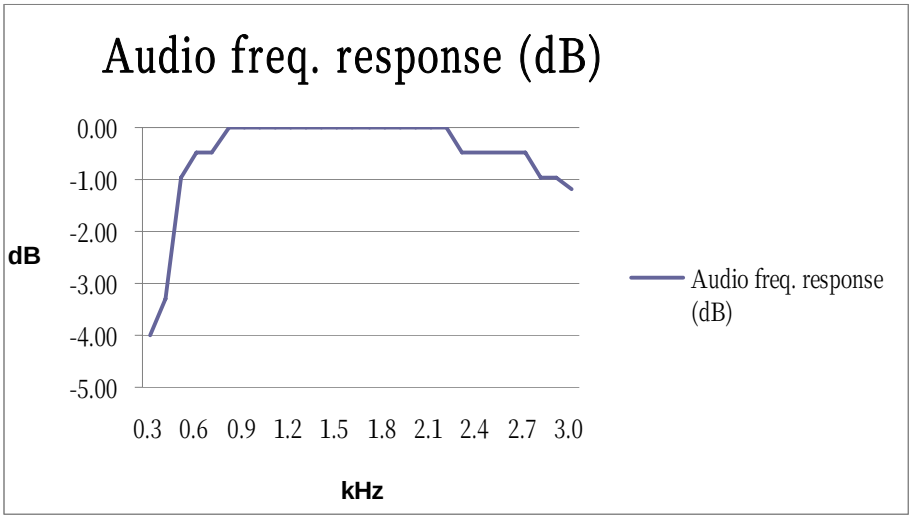
Method of Measurement:

The audio frequency response was measured in accordance with TIA/EIA Specification 603 with no exception. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 300 – 3000Hz shall be submitted. The audio frequency response curve is shown below.

Test Audio level (1kHz and 20% max. deviation): 30mV

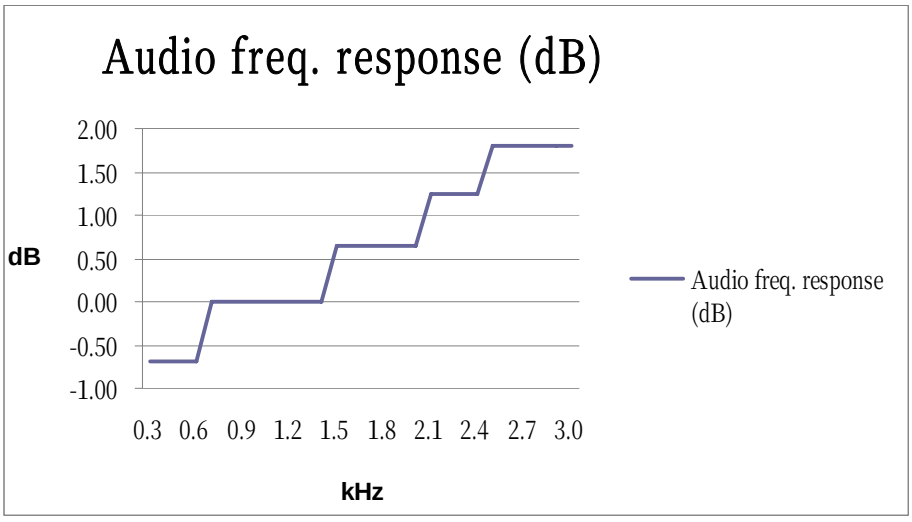
Mode 1

Freq (kHz)	Freq. Dev. (kHz)	1kHz Ref. Dev. (kHz)	Audio freq. response (dB)
0.30	0.60	0.95	-3.99
0.40	0.65	0.95	-3.30
0.50	0.85	0.95	-0.97
0.60	0.90	0.95	-0.47
0.70	0.90	0.95	-0.47
0.80	0.95	0.95	0.00
0.90	0.95	0.95	0.00
1.00	0.95	0.95	0.00
1.10	0.95	0.95	0.00
1.20	0.95	0.95	0.00
1.30	0.95	0.95	0.00
1.40	0.95	0.95	0.00
1.50	0.95	0.95	0.00
1.60	0.95	0.95	0.00
1.70	0.95	0.95	0.00
1.80	0.95	0.95	0.00
1.90	0.95	0.95	0.00
2.00	0.95	0.95	0.00
2.10	0.95	0.95	0.00
2.20	0.95	0.95	0.00
2.30	0.90	0.95	-0.47
2.40	0.90	0.95	-0.47
2.50	0.90	0.95	-0.47
2.60	0.90	0.95	-0.47
2.70	0.90	0.95	-0.47
2.80	0.85	0.95	-0.97
2.90	0.85	0.95	-0.97
3.00	0.83	0.95	-1.17



Mode 2

Freq (kHz)	Freq. Dev. (kHz)	1kHz Ref. Dev. (kHz)	Audio freq. response (dB)
0.30	0.60	0.65	-0.70
0.40	0.60	0.65	-0.70
0.50	0.60	0.65	-0.70
0.60	0.60	0.65	-0.70
0.70	0.65	0.65	0.00
0.80	0.65	0.65	0.00
0.90	0.65	0.65	0.00
1.00	0.65	0.65	0.00
1.10	0.65	0.65	0.00
1.20	0.65	0.65	0.00
1.30	0.65	0.65	0.00
1.40	0.65	0.65	0.00
1.50	0.70	0.65	0.64
1.60	0.70	0.65	0.64
1.70	0.70	0.65	0.64
1.80	0.70	0.65	0.64
1.90	0.70	0.65	0.64
2.00	0.70	0.65	0.64
2.10	0.75	0.65	1.24
2.20	0.75	0.65	1.24
2.30	0.75	0.65	1.24
2.40	0.75	0.65	1.24
2.50	0.80	0.65	1.80
2.60	0.80	0.65	1.80
2.70	0.80	0.65	1.80
2.80	0.80	0.65	1.80
2.90	0.80	0.65	1.80
3.00	0.80	0.65	1.80



5.1.2 AUDIO INPUT VERSUS MODULATION

Rule Part No.: Part 2.1047(b) & 90

Test Requirements: Modulation cannot exceed 100%

Method of Measurement: The audio input level needed for a particular percentage of modulation was measured in accordance with TIA/EIA Specification 603. The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 3000 Hz.

EUT Max deviation: 5kHz

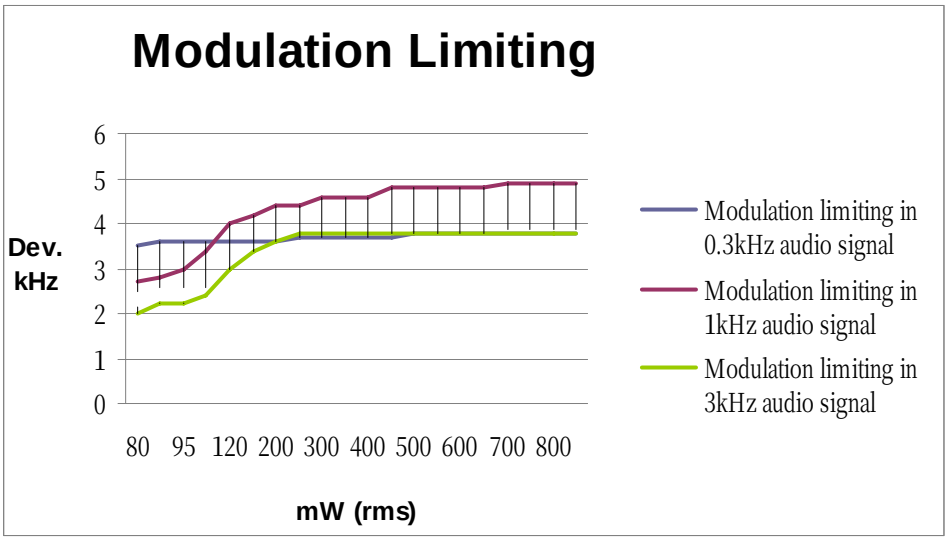
60% EUT Max deviation: 3kHz

Test Min. Audio level (1kHz and 60% max. deviation): 80mV

Test Max. Audio level (Min Level 20dB): 800mV

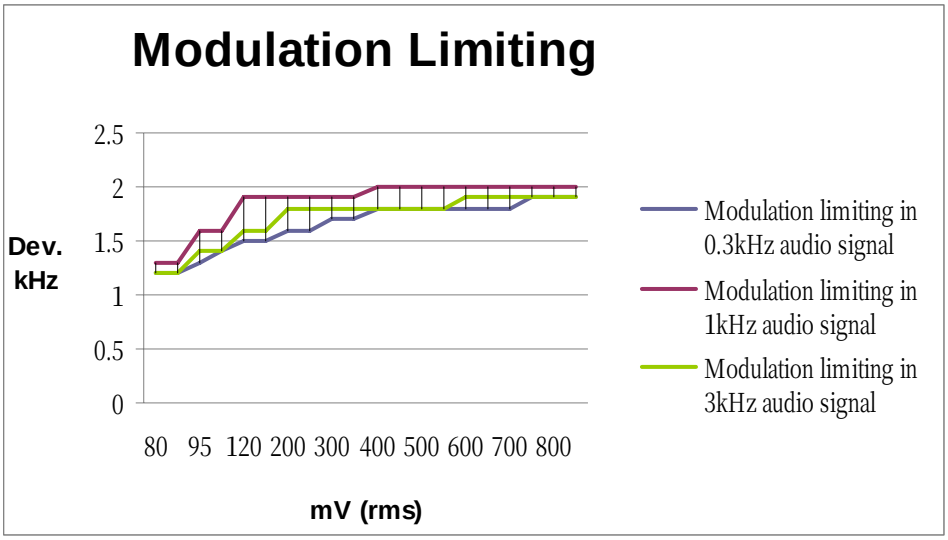
Mode 1

Audio signal level (mV rms)	Audio Frequency (kHz)			Deviation limits (kHz)
	0.3	1	3	
	Peak frequency deviation (kHz)			
80	3.5	2.7	2	5
85	3.6	2.8	2.2	5
95	3.6	3	2.2	5
100	3.6	3.4	2.4	5
120	3.6	4	3	5
150	3.6	4.2	3.4	5
200	3.6	4.4	3.6	5
250	3.7	4.4	3.8	5
300	3.7	4.6	3.8	5
350	3.7	4.6	3.8	5
400	3.7	4.6	3.8	5
450	3.7	4.8	3.8	5
500	3.8	4.8	3.8	5
550	3.8	4.8	3.8	5
600	3.8	4.8	3.8	5
650	3.8	4.8	3.8	5
700	3.8	4.9	3.8	5
750	3.8	4.9	3.8	5
800	3.8	4.9	3.8	5
850	3.8	4.9	3.8	5



Mode 2

Audio signal level (mV rms)	Audio Frequency (kHz)			Deviation limits (kHz)
	0.3	1	3	
	Peak frequency deviation (kHz)			
80	1.2	1.3	1.2	2.5
85	1.2	1.3	1.2	2.5
95	1.3	1.6	1.4	2.5
100	1.4	1.6	1.4	2.5
120	1.5	1.9	1.6	2.5
150	1.5	1.9	1.6	2.5
200	1.6	1.9	1.8	2.5
250	1.6	1.9	1.8	2.5
300	1.7	1.9	1.8	2.5
350	1.7	1.9	1.8	2.5
400	1.8	2	1.8	2.5
450	1.8	2	1.8	2.5
500	1.8	2	1.8	2.5
550	1.8	2	1.8	2.5
600	1.8	2	1.9	2.5
650	1.8	2	1.9	2.5
700	1.8	2	1.9	2.5
750	1.9	2	1.9	2.5
800	1.9	2	1.9	2.5
850	1.9	2	1.9	2.5



5.1.3 Necessary Bandwidth

25kHz Mode

Part 2.1033(c) (4) Type of Emission: 16K0F3E
Part 90.209
Part 90.207 Bn = 2M + 2DK
M = 3000
D = 5000
K=1
Bn = 2(3000)+2(5000) = 16k

12.5kHz Mode

Part 2.1033(c) (4) Type of Emission: 11K0F3E
Part 90.209
Part 90.207 Bn = 2M + 2DK
M = 3000
D = 2500
K=1
Bn = 2(3000)+2(2500) = 11k

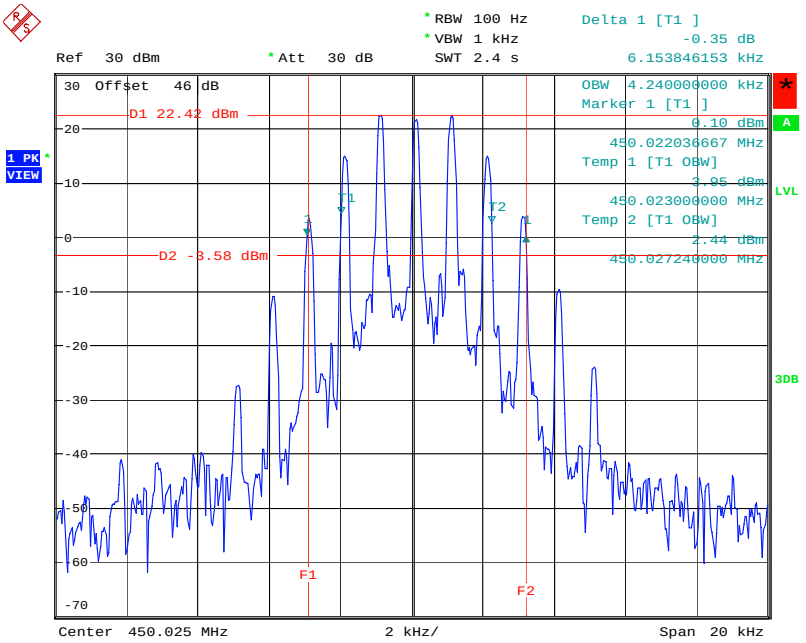
25kHz mode

Frequency	26dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	Max. Limit (kHz)	Test Result
450.0250	6.15	4.24	20	**Complies**
460.0250	6.15	4.16	20	**Complies**
469.9875	6.02	4.16	20	**Complies**

12.5kHz mode

Frequency	26dB Bandwidth (kHz)	99% Occupied Bandwidth (kHz)	Max. Limit (kHz)	Test Result
450.0250	6.15	4.20	11.25	**Complies**
460.0250	6.12	4.20	11.25	**Complies**
469.9875	6.08	4.16	11.25	**Complies**

25kHz Mode 26 dB Bandwidth Plot on Low Channel



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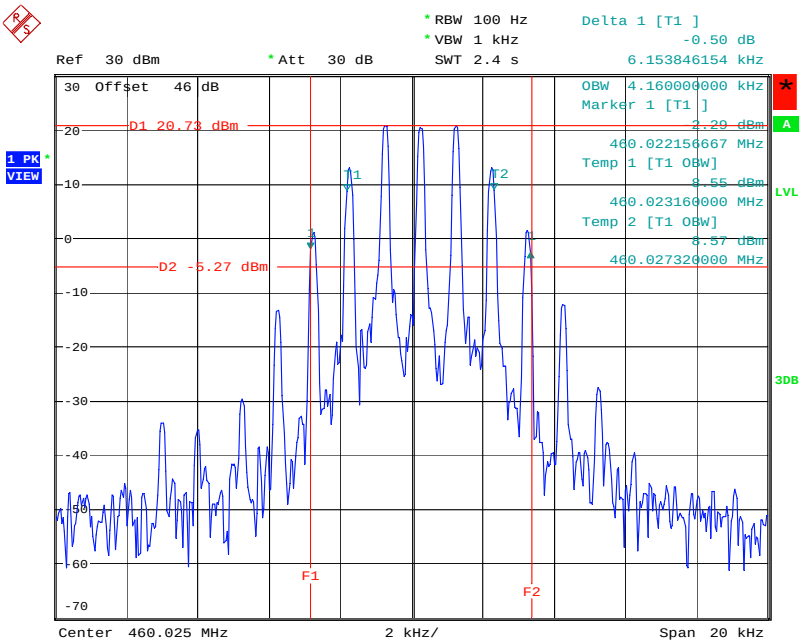
25kHz Mode 26 dB Bandwidth Plot on Middle Channel



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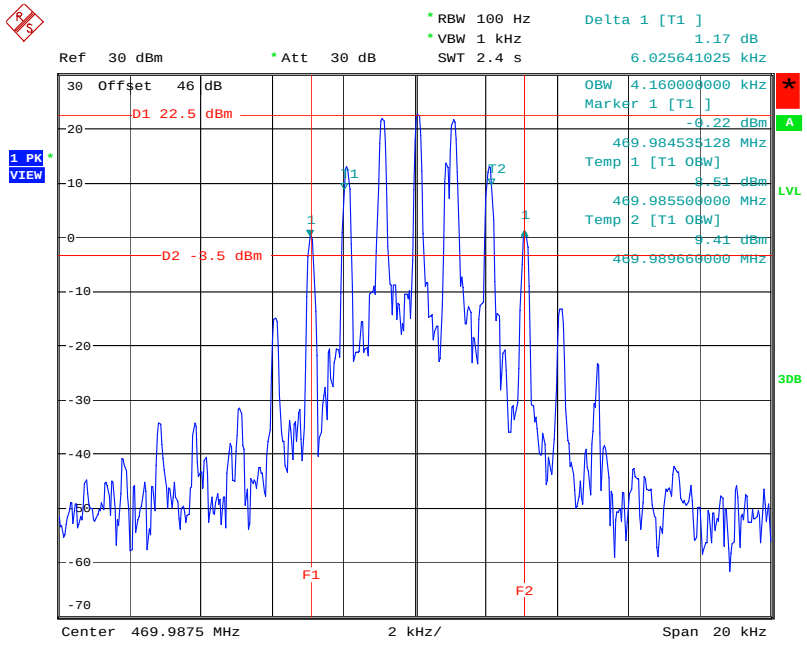
25kHz Mode 26 dB Bandwidth Plot on High Channel



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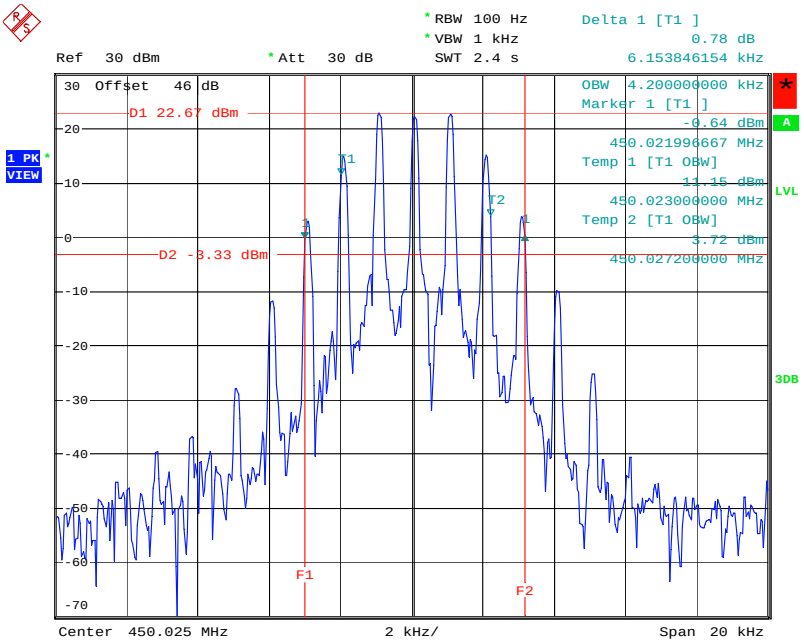
12.5kHz Mode 26 dB Bandwidth Plot on Low Channel



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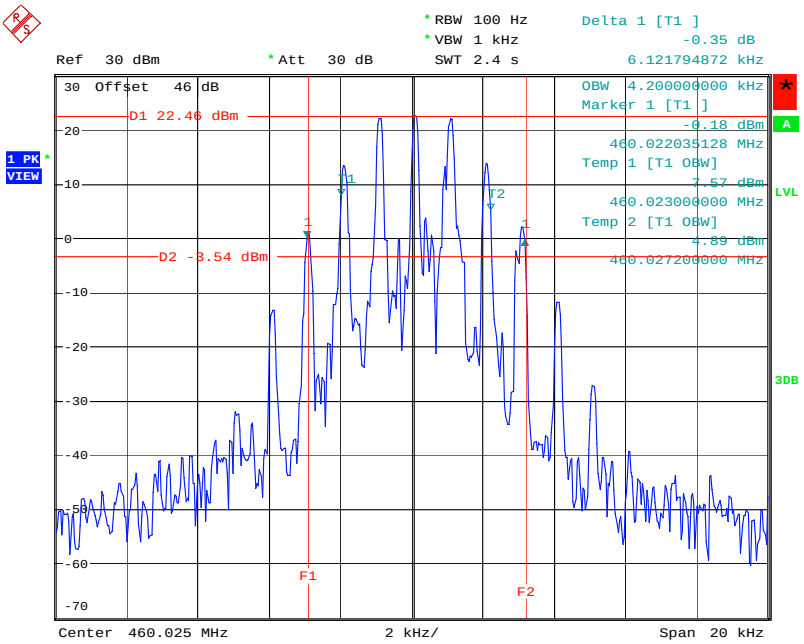
12.5kHz Mode 26 dB Bandwidth Plot on Middle Channel



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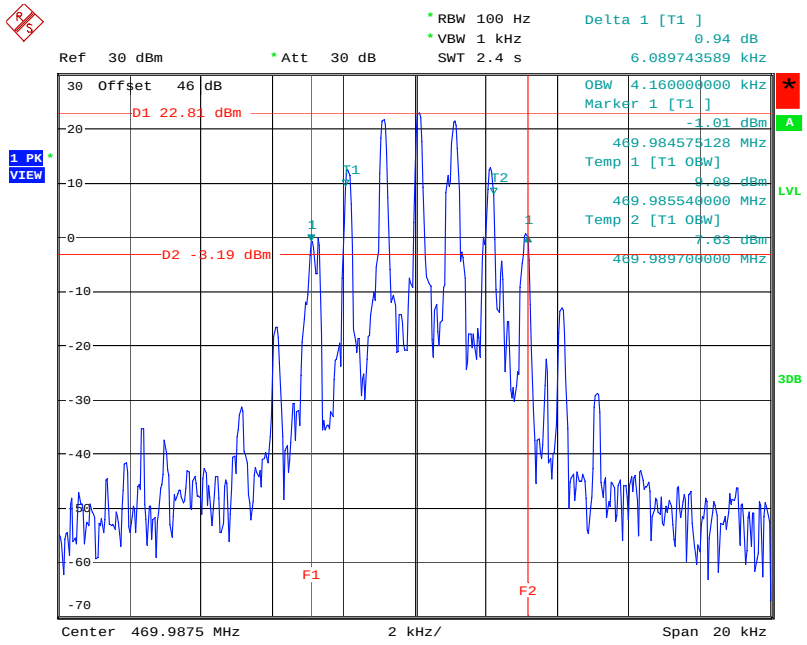
12.5kHz Mode 26 dB Bandwidth Plot on High Channel

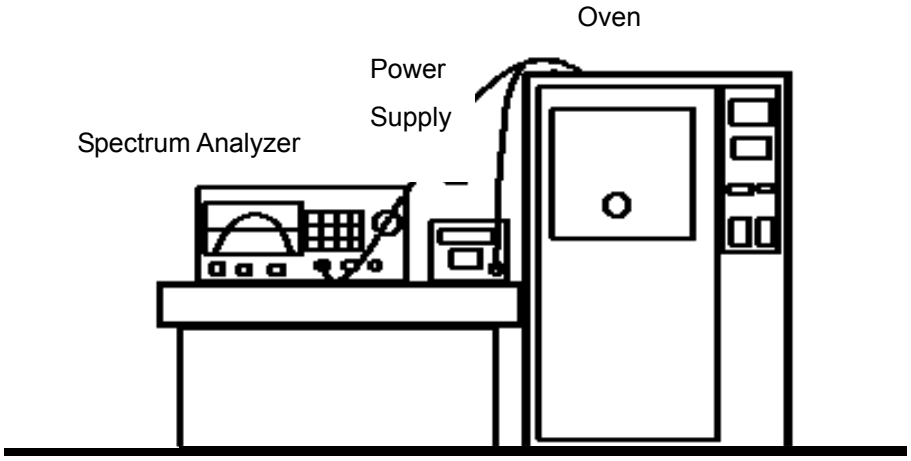


5.2 Transmitter Frequency Stability

5.2.1 Test Procedures

1. The transmitter output is connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 1kHz and VBW to 1kHz.
3. Use peak detector mode, Max-hold and search the peak of trace 1.
4. According to the part 2.1055(d)(1), the supply voltage has to be changed from 85 to 115 percent of the nominal value.
5. According to the part 2.1055(a)(1), extreme temperature has to be changed from -20℃ to 50℃.
6. Read the frequency of the carrier and calculate the deviation.

5.2.2 Test Setup Layout



5.2.3 Test Result

- Modulation Type: Un-Modulated Carrier (CW)
- Temperature: 28°C
- Relative Humidity: 58 %

Mode 1 and Mode 2

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)
(V)	**460.025**
13.8	460.024474
10.2	460.024850
Max. Deviation (MHz)	**0.000526**
Max. Deviation (ppm)	**1.14**
Limit (ppm)	**2.5 (Fixed ; Authorized Bandwidth 20kHz)**

Temperature vs. Frequency Stability

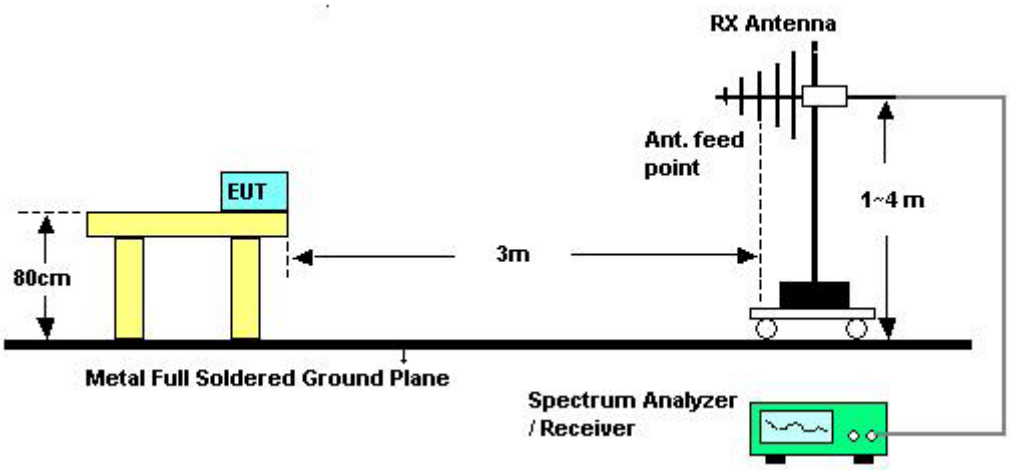
Temperature	Measurement Frequency (MHz)
(℃)	**460.025**
-20	460.024431
-10	460.024165
0	460.024253
10	460.024288
20	460.024347
30	460.024854
40	460.024949
50	460.024271
Max. Deviation (MHz)	**0.000835**
Max. Deviation (ppm)	**1.82**
Limit (ppm)	**2.5 (Fixed ; Authorized Bandwidth 20kHz)**

5.3 Transmitter Output Power

5.3.1 Test Procedures

1. The EUT was placed on the top of the turntable in semi-anechoic chamber.
2. The test shall be made in the transmitting mode. Antenna tower was scan (from 1 M to 4 M) and the turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The receiving Horn antenna was placed 0.5 meters far away from the turntable.
4. The receiving antenna was fixed on the same height with the EUT to find maximum suspected emissions. Recorded suspected value is indicated as Read Level (Raw).
5. Replace the EUT by standard antenna and feed the RF port by signal generator.
6. Adjust the frequency of the signal generator to the suspected emission and slightly rotate the turntable to locate the position with maximum reading.
7. Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
8. The level of the spurious emission is the power level of (7) plus the gain of the standard antenna in dBd and minus the loss of the cable used between the signal generator and the standard antenna.

5.3.2 Test Setup Layout



5.3.3 Test Result

- Modulation Type: FM
- Temperature: 29.9°C
- Relative Humidity: 53 %

Mode 1

Frequency (MHz)	ERP Output Power (W)	Limits (W)
450.0250	0.234	Power limit FCC90.261 20 watts
460.0250	0.126	Power limit FCC90.261 20 watts
469.9875	0.178	Power limit FCC90.261 20 watts

- Modulation Type: FM
- Temperature: 28.5°C
- Relative Humidity: 54 %

Mode 2

Frequency (MHz)	ERP Output Power (W)	Limits (W)
450.0250	0.103	Power limit FCC90.261 20 watts
460.0250	0.110	Power limit FCC90.261 20 watts
469.9875	0.105	Power limit FCC90.261 20 watts

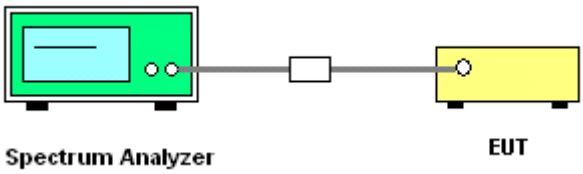
Note: ERP = EIRP Output Power – 2.14dB

5.4 Transmitter Spectrum Mask

5.4.1 Test Procedures

1. The transmitter output is connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 300Hz and VBW to 1kHz.
3. Mark the frequency with maximum peak power as the center of the display of the spectrum
4. Set the span to 120kHz and the sweep time to Auto.
5. Record the power spectral and compare to the Mask.

5.4.2 Test Setup Layout



5.4.3 Test Result：See spectrum analyzer plots below

- Modulation Type: FM
- Temperature: 28°C
- Relative Humidity: 58 %

Mode 1

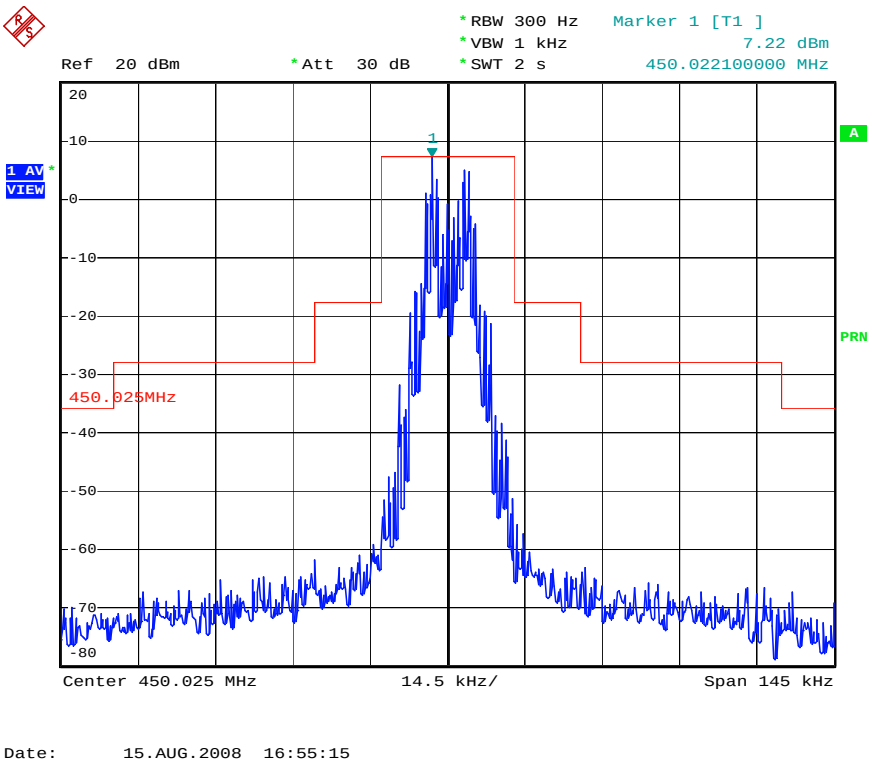
Frequency (MHz)	Result	Limits Mask
450.0250	Pass	B
460.0250	Pass	B
469.9875	Pass	B

Mode 2

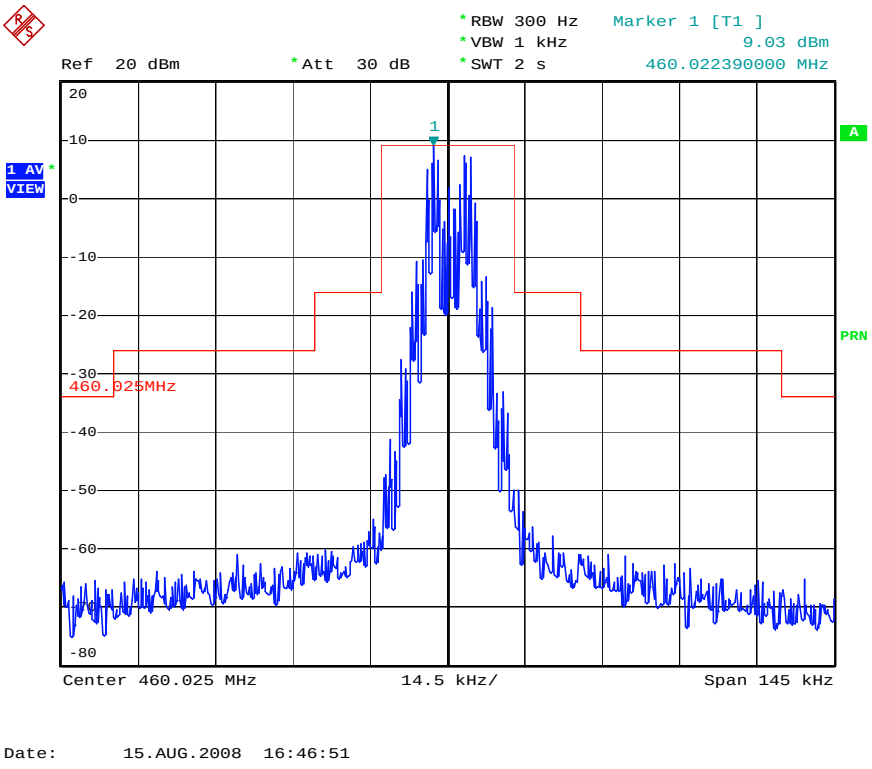
Frequency (MHz)	Result	Limits Mask
450.0250	Pass	D
460.0250	Pass	D
469.9875	Pass	D

Mode 1

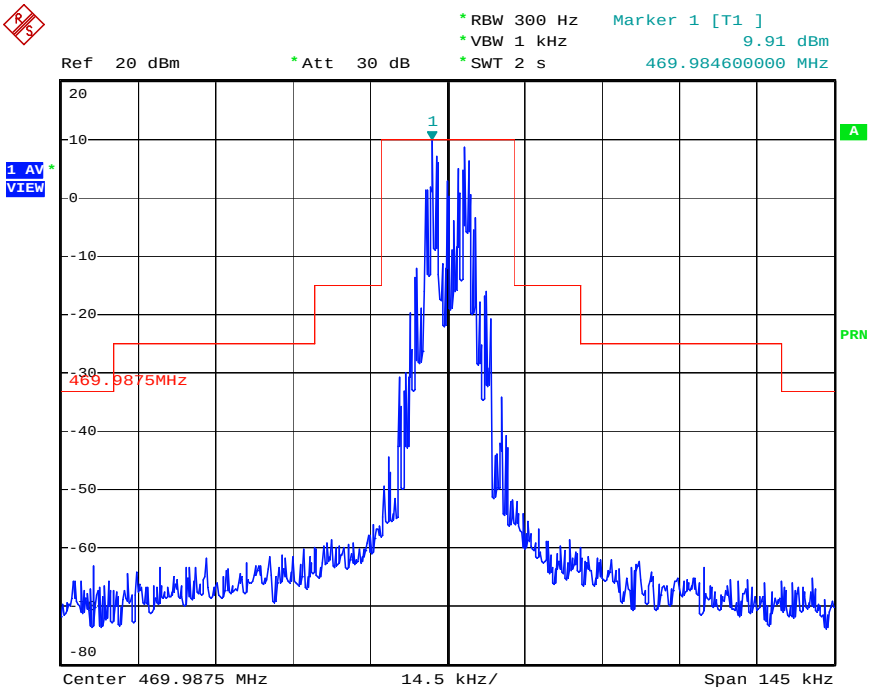
Modulation Type: FM (450.025MHz)：



Modulation Type: FM (460.025MHz)：

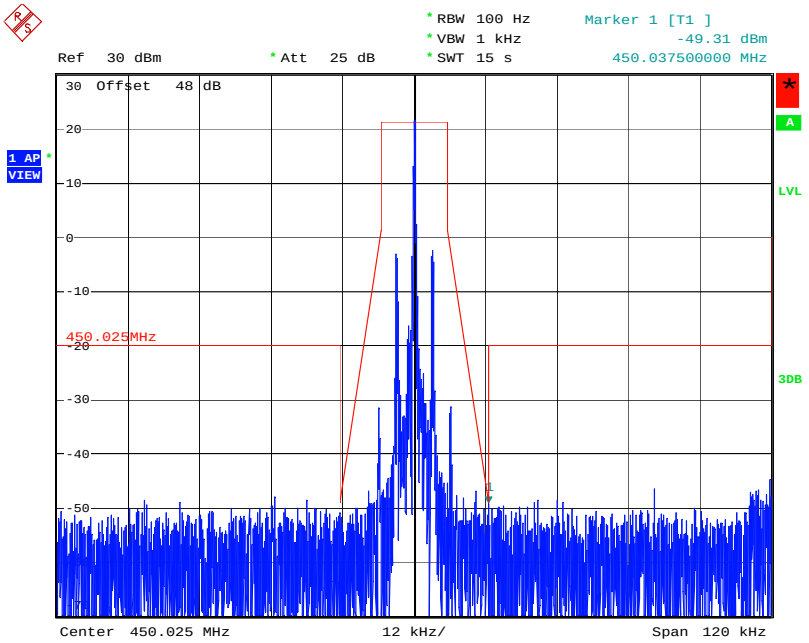


Modulation Type: FM (469.9875MHz)：



Mode 2

Modulation Type: FM (450.025MHz)：



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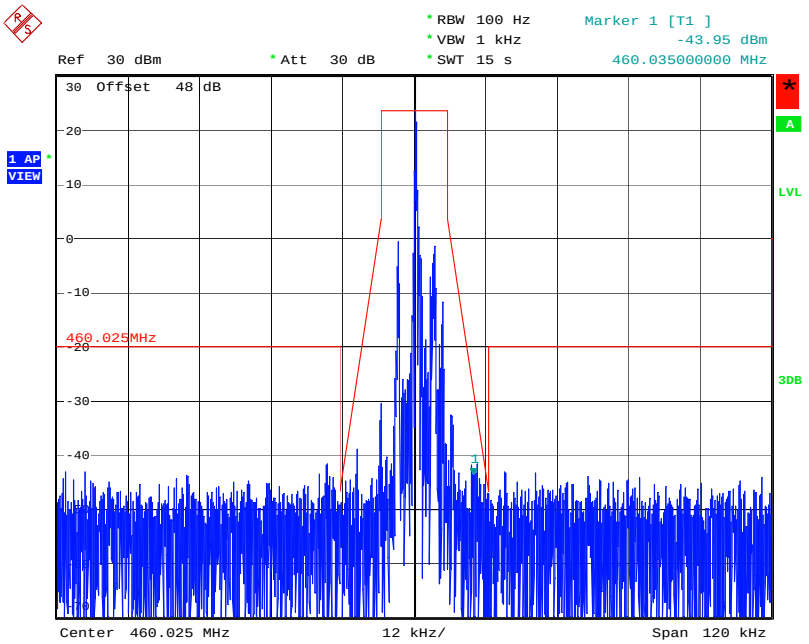
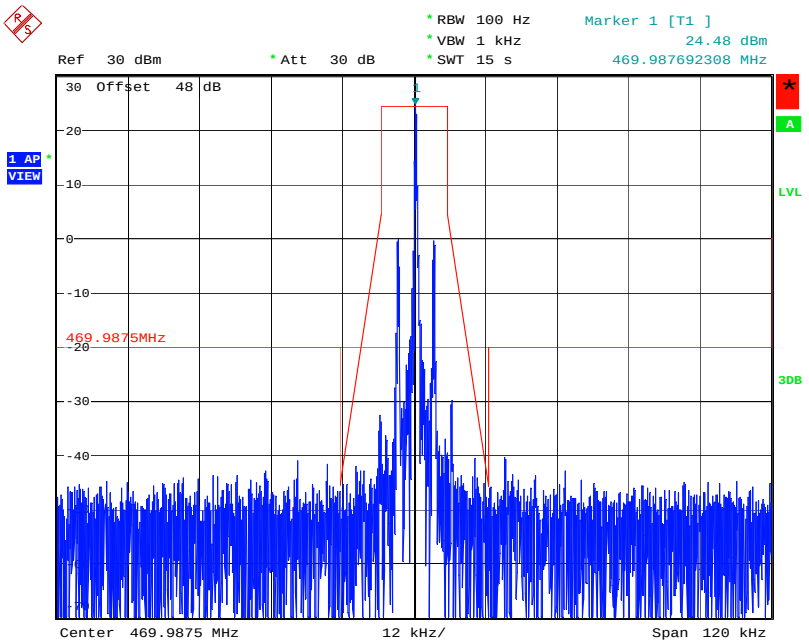
Modulation Type: FM (460.025MHz)：



Date: 3.OCT.2008 10:13:11

Modulation Type: FM (469.9875MHz)：



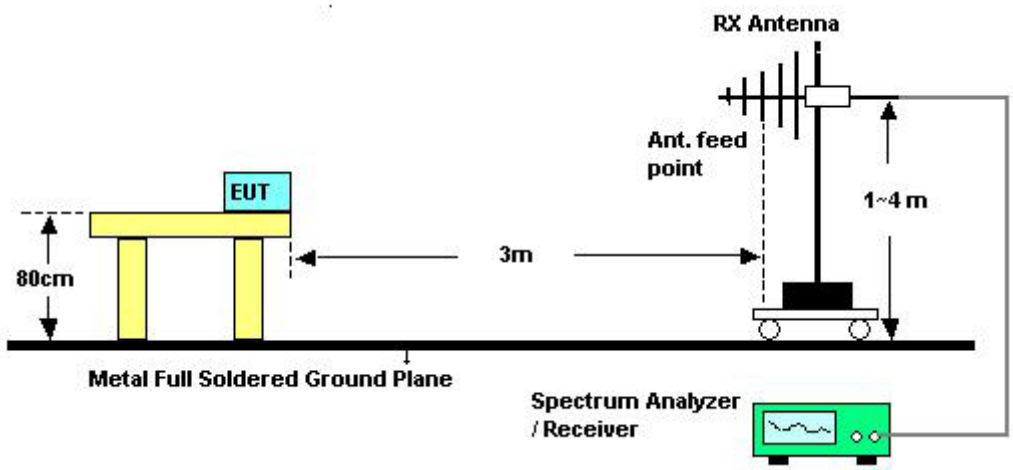
Date: 3.OCT.2008 10:04:13

5.5 Transmitter Spurious Radiated Emission

5.5.1 Test Procedures

1. Configure the EUT according to ANSI C63.4.
2. The EUT was placed on the top of the turn table 0.8 meter above ground.
3. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turn table.
4. Power on the EUT and all the supporting units.
5. The turn table was rotated 360 degrees to determine the position of the highest radiation.
6. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
7. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
8. Adjust the spectrum analyzer for the following settings:
   1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz and 1 MHz for spurious emissions above 1GHz.
   2) Video Bandwidth = 300 kHz for spurious emissions below 1 GHz, and 3 MHz for spurious emissions above 1 GHz.
   3) Sweep Speed slow enough to maintain measurement calibration.
   4) Detector Mode = Positive Peak.
9. Remove the transmitter and replace it with a broadband substitution antenna.
10. With the substitution antennas at 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 (item 7) . This should be done carefully repeating the adjustment of the test antenna and generator output.
11. Pd(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi). Pd is the dipole equivalent power and Pg is the generator output power into the substitution antenna.
12. Radiated spurious emissions attenuation in dB 43 + 10 $\log_{10}$ (power out in Watts).

5.5.2 Test Setup Layout



5.5.3 Test Results and Limit

Mode 1

Test Mode	450.025MHz.	**Temperature**	29.9 deg. C	**Tested By**	Murphy
ERP Power (P)	0.234 W	**Humidity**	53%		

Radiated spurious emissions attenuation limit is 36.69 dB below fundamental carrier power (43 + 10 $\log_{10}$ (0.234))

Emission Frequency MHz	Ant. Polarity	Attenuation below fundamental carrier (dB)	Limit below fundamental carrier power (dB)
900.0500	V	69.58	36.69
1350.0750	H	74.12	36.69
1800.1000	H	79.56	36.69
2250.1250	V	80.17	36.69
2700.1500	H	72.64	36.69
3150.1750	H	77.88	36.69
3600.2000	V	76.26	36.69
4050.2250	H	68.59	36.69
4500.2500	V	73.56	36.69

Test Mode	460.025MHz.	**Temperature**	29.9 deg. C	**Tested By**	Murphy
ERP Power (P)	0.126 W	**Humidity**	53%		

Radiated spurious emissions attenuation limit is 34.00 dB below fundamental carrier power (43 + 10 $\log_{10}$ (0.126))

Emission Frequency MHz	Ant. Polarity	Attenuation below fundamental carrier (dB)	Limit below fundamental carrier power (dB)
920.0500	H	84.04	34.00
1380.0750	H	80.52	34.00
1840.1000	V	78.65	34.00
2300.1250	H	76.59	34.00
2760.1500	V	81.46	34.00
3220.1750	V	69.58	34.00
3680.2000	H	71.64	34.00
4140.2250	V	76.59	34.00
4600.2500	V	79.52	34.00

Test Mode	469.9875MHz.	**Temperature**	29.9 deg. C	**Tested By**	Murphy
ERP Power (P)	0.105 W	**Humidity**	53%		

Radiated spurious emissions attenuation limit is 40.21 dB below fundamental carrier power (43 + 10 $\log_{10}$ (0.105))

Emission Frequency MHz	Ant. Polarity	Attenuation below fundamental carrier (dB)	Limit below fundamental carrier power (dB)
939.9750	V	71.59	40.21
1409.9625	V	73.25	40.21
1879.9500	H	79.48	40.21
2349.9375	V	81.54	40.21
2819.9250	H	76.35	40.21
3289.9125	V	78.46	40.21
3759.9000	V	71.49	40.21
4229.8875	H	73.94	40.21
4699.8750	V	80.12	40.21

Mode 2

Test Mode	450.025MHz.	**Temperature**	28.5 deg. C	**Tested By**	Murphy
ERP Power (P)	0.234 W	**Humidity**	53%		

Radiated spurious emissions attenuation limit is 36.69 dB below fundamental carrier power (43 + 10 $\log_{10}$ (0.234))

Emission Frequency MHz	Ant. Polarity	Attenuation below fundamental carrier (dB)	Limit below fundamental carrier power (dB)
900.0500	H	75.73	36.69
1350.0750	H	74.89	36.69
1800.1000	V	76.35	36.69
2250.1250	H	81.33	36.69
2700.1500	V	73.56	36.69
3150.1750	V	74.41	36.69
3600.2000	H	78.59	36.69
4050.2250	V	80.49	36.69
4500.2500	H	78.63	36.69

Test Mode	460.025MHz.	**Temperature**	28.5 deg. C	**Tested By**	Murphy
ERP Power (P)	0.126 W	**Humidity**	54%		

Radiated spurious emissions attenuation limit is 34.00 dB below fundamental carrier power (43 + 10 $\log_{10}$ (0.126))

Emission Frequency MHz	Ant. Polarity	Attenuation below fundamental carrier (dB)	Limit below fundamental carrier power (dB)
920.0500	H	71.58	34.00
1380.0750	H	79.86	34.00
1840.1000	V	78.59	34.00
2300.1250	H	81.46	34.00
2760.1500	V	74.16	34.00
3220.1750	H	78.77	34.00
3680.2000	H	81.41	34.00
4140.2250	V	76.24	34.00
4600.2500	H	80.59	34.00

Test Mode	469.9875MHz.	**Temperature**	28.5 deg. C	**Tested By**	Murphy
ERP Power (P)	0.178 W	**Humidity**	54%		

Radiated spurious emissions attenuation limit is 35.50 dB below fundamental carrier power 43 + 10 $\log_{10}$ (0.178) dB

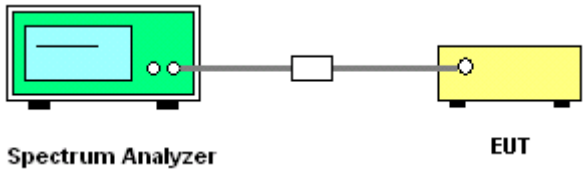
Emission Frequency MHz	Ant. Polarity	Attenuation below fundamental carrier (dB)	Limit below fundamental carrier power (dB)
939.9750	V	71.59	35.50
1409.9625	V	73.25	35.50
1879.9500	H	79.48	35.50
2349.9375	V	81.54	35.50
2819.9250	H	76.35	35.50
3289.9125	V	78.46	35.50
3759.9000	V	71.49	35.50
4229.8875	H	73.94	35.50
4699.8750	V	80.12	35.50

5.6 Transmitter Spurious Conducted Emission

5.6.1 Test Procedures

1. The transmitter output is connected to the spectrum analyzer through an attenuator
2. Adjust the spectrum analyzer for the following settings:
   1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz,
      and 1 MHz for spurious emissions above 1GHz.
   2) Video Bandwidth = 300 kHz for spurious emissions below 1 GHz, and
      3 MHz for spurious emissions above 1 GHz.
   3) Sweep Speed slow enough to maintain measurement calibration. Detector Mode = Positive Peak.
3. Limits=P (dBm)+10log(P(W)) = -13dBm

5.6.2 Test Setup Layout



5.6.3 Test Results and Limit

Mode 1

Test Mode	450.025MHz.	**Temperature**	29.9 °C	**Tested By**	Murphy
Limit	-13 dBm	**Humidity**	53%		

Emission Frequency (MHz)	Worst Spurious Emission (dBm)	Limit (dBm)
3534.72	-19.08	-13

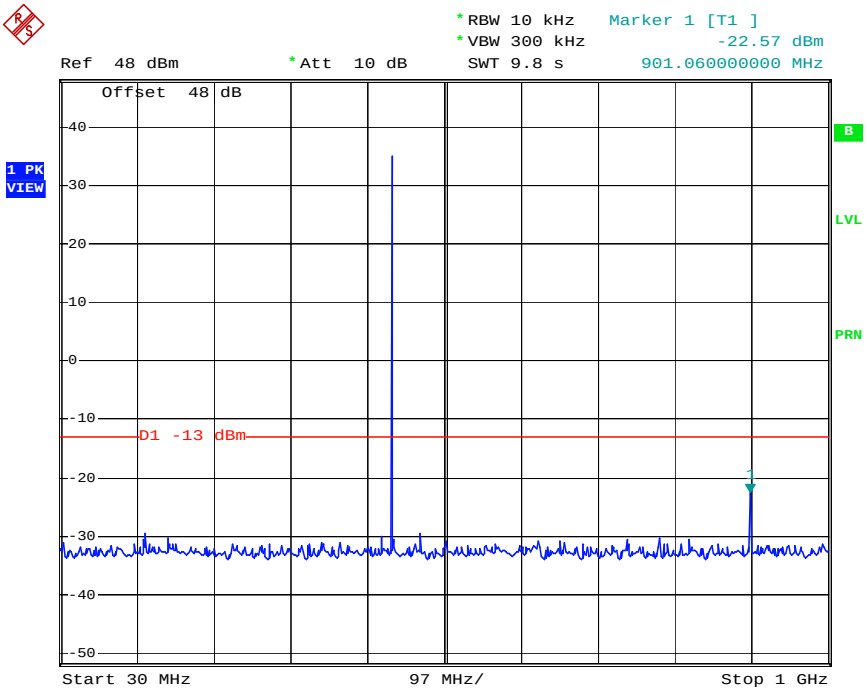
Test Mode	460.025MHz.	**Temperature**	29.9 °C	**Tested By**	Murphy
Limit	-13 dBm	**Humidity**	53%		

Emission Frequency (MHz)	Worst Spurious Emission (dBm)	Limit (dBm)
4190.48	-19.18	-13

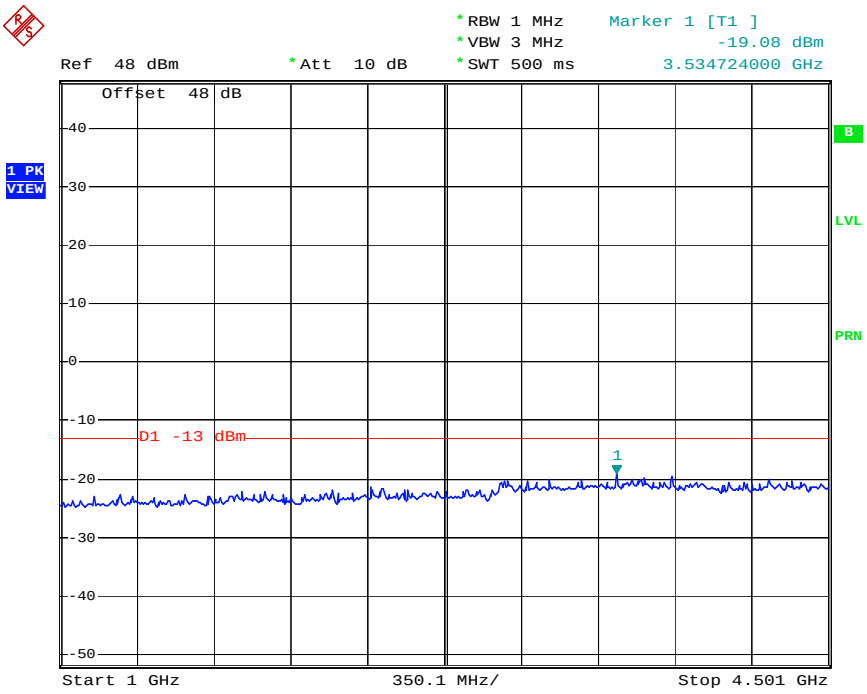
Test Mode	469.9875MHz.	**Temperature**	29.9 °C	**Tested By**	Murphy
Limit	-13 dBm	**Humidity**	53%		

Emission Frequency (MHz)	Worst Spurious Emission (dBm)	Limit (dBm)
4692.60	-19.48	-13

Modulation Type: FM (450.025MHz)：

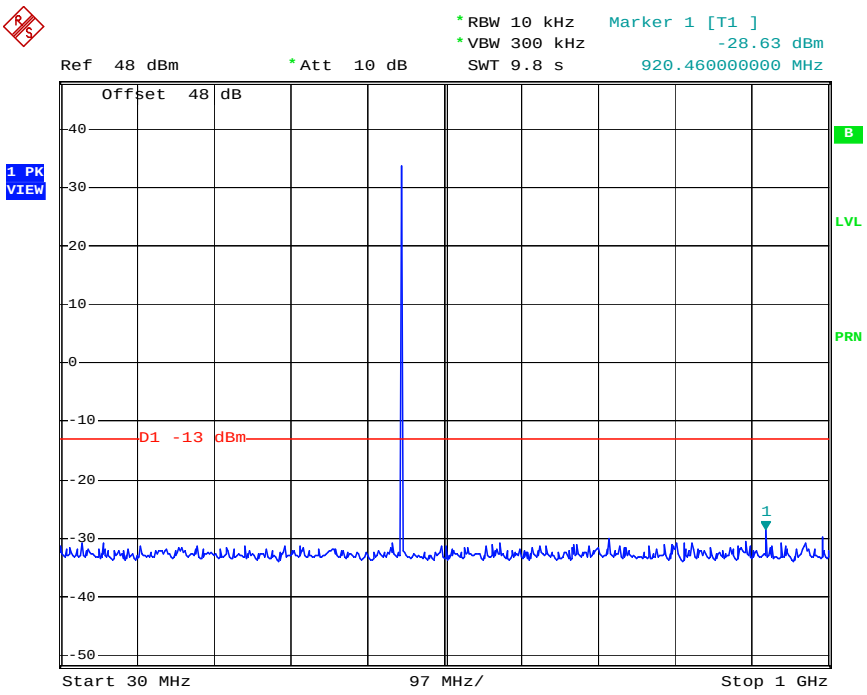


Date: 26.AUG.2008 18:15:20

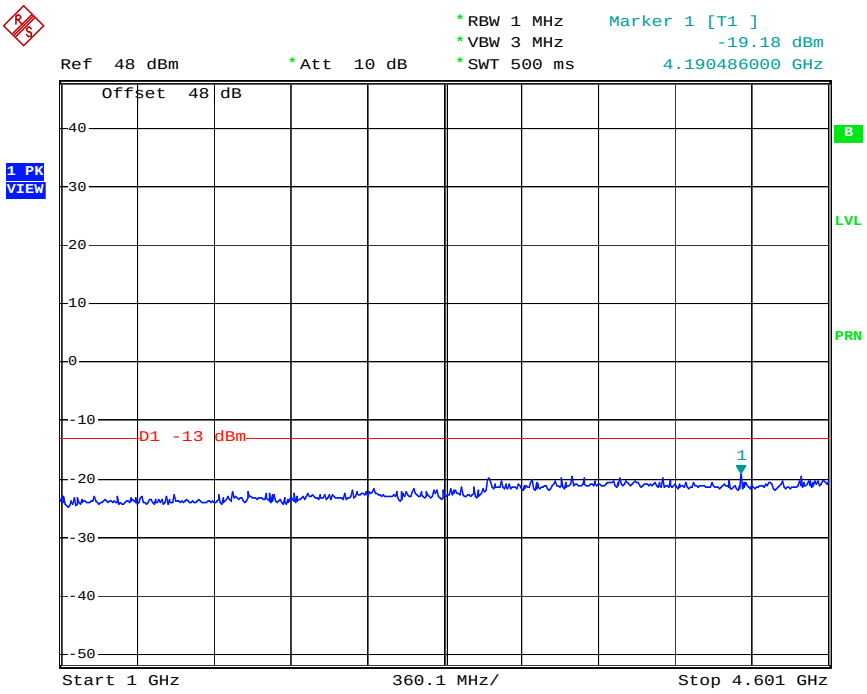


Date: 26.AUG.2008 18:17:07

Modulation Type: FM (460.025MHz)：

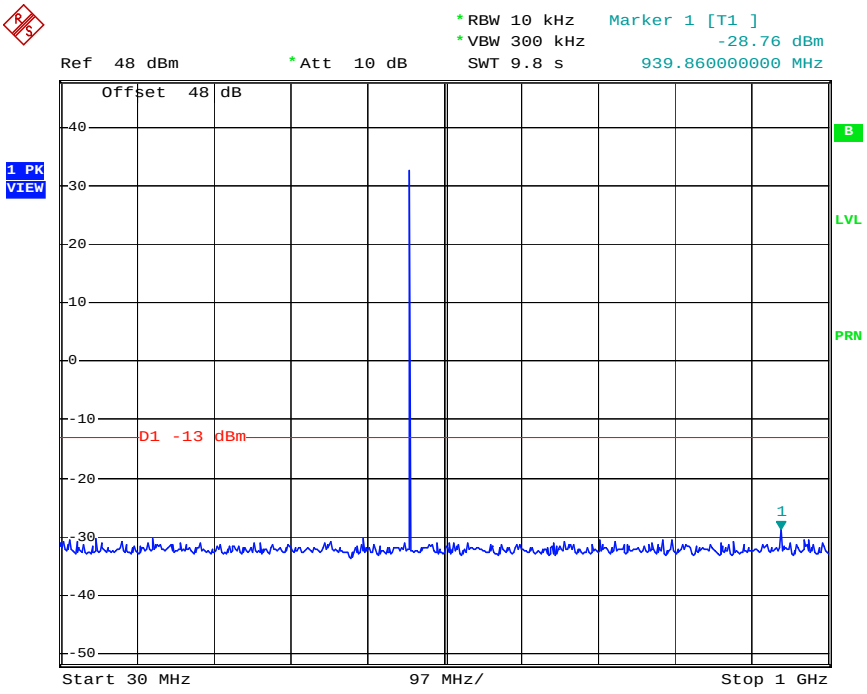


Date: 26.AUG.2008 18:11:11

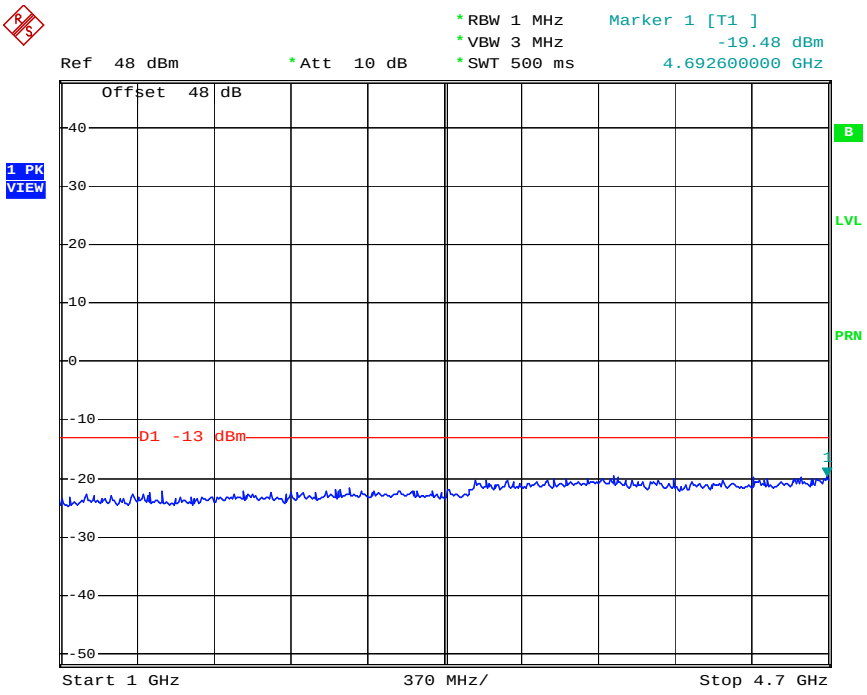


Date: 26.AUG.2008 18:09:19

Modulation Type: FM (469.7985MHz)：



Date: 26.AUG.2008 18:00:39



Date: 26.AUG.2008 18:02:26

Mode 2

Test Mode	450.025MHz.	**Temperature**	28.5 °C	**Tested By**	Murphy
Limit	-13 dBm	**Humidity**	54%		

Emission Frequency (MHz)	Worst Spurious Emission (dBm)	Limit (dBm)
3457.43	-19.17	-13

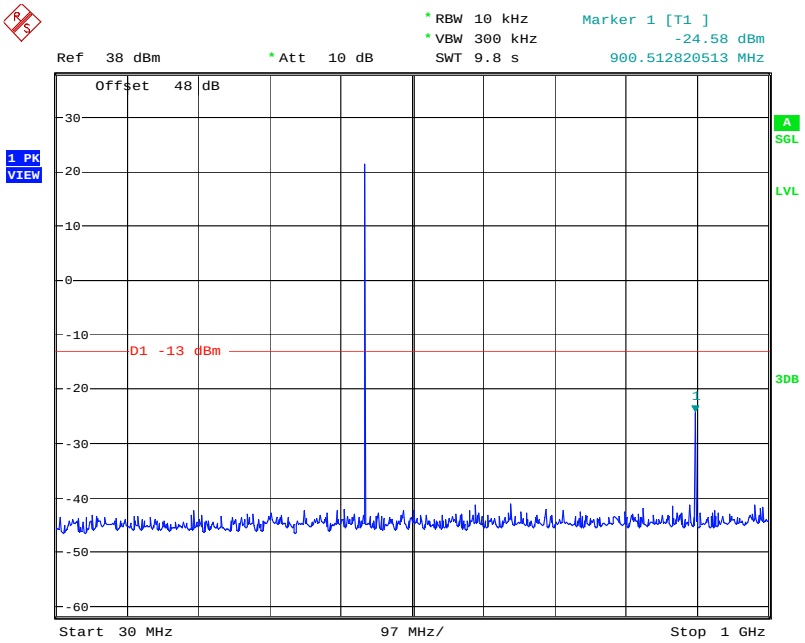
Test Mode	460.025MHz.	**Temperature**	28.5 °C	**Tested By**	Murphy
Limit	-13 dBm	**Humidity**	54%		

Emission Frequency (MHz)	Worst Spurious Emission (dBm)	Limit (dBm)
2927.45	-18.51	-13

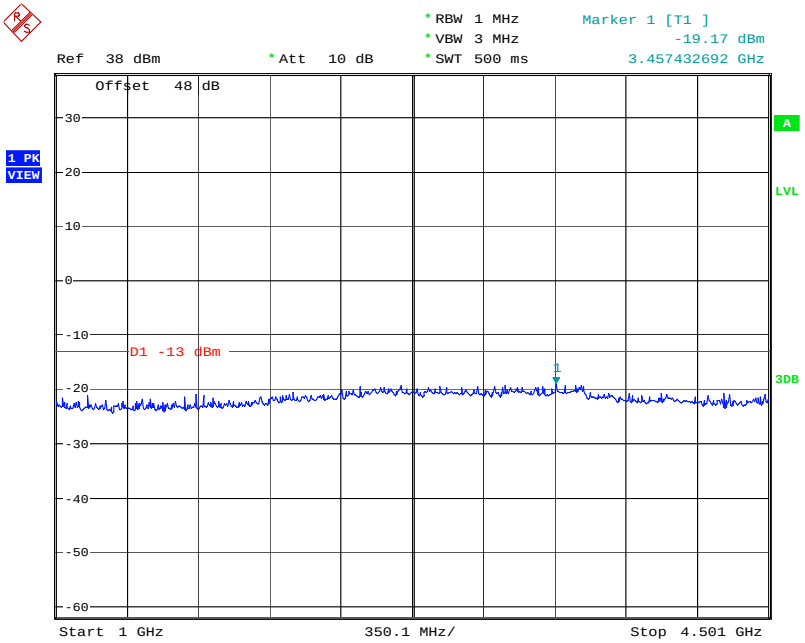
Test Mode	469.9875MHz.	**Temperature**	28.5 °C	**Tested By**	Murphy
Limit	-13 dBm	**Humidity**	54%		

Emission Frequency (MHz)	Worst Spurious Emission (dBm)	Limit (dBm)
2612.82	-18.92	-13

Modulation Type: FM (450.025MHz)：

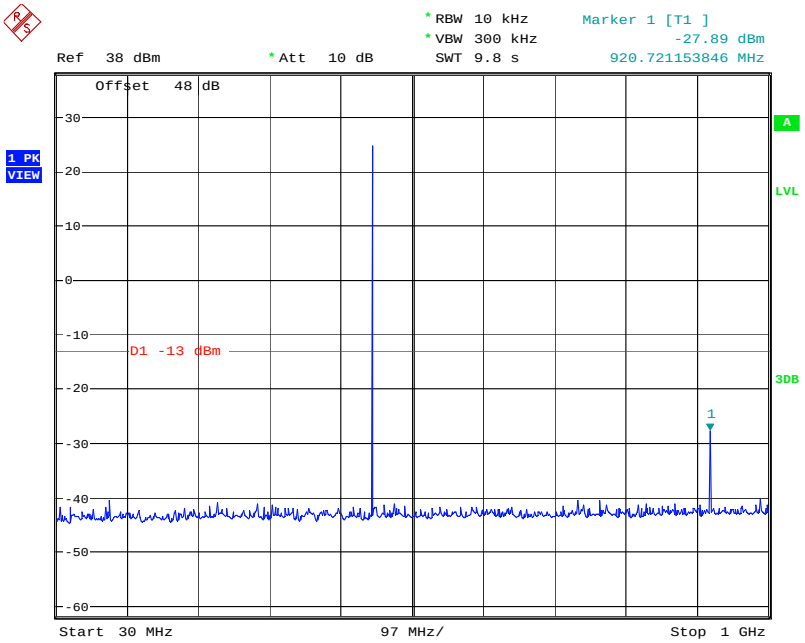


Date: 2.OCT.2008 20:47:55

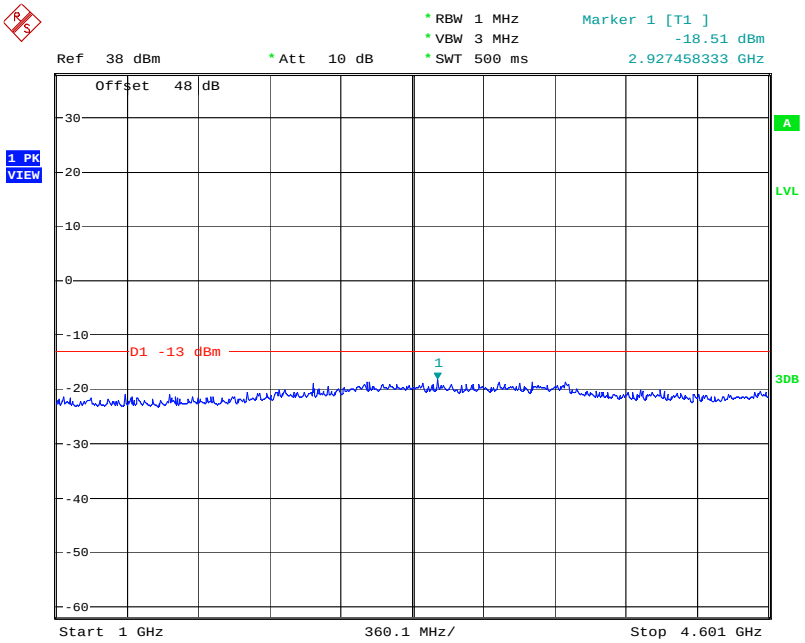


Date: 2.OCT.2008 20:49:59

Modulation Type: FM (460.025MHz)：

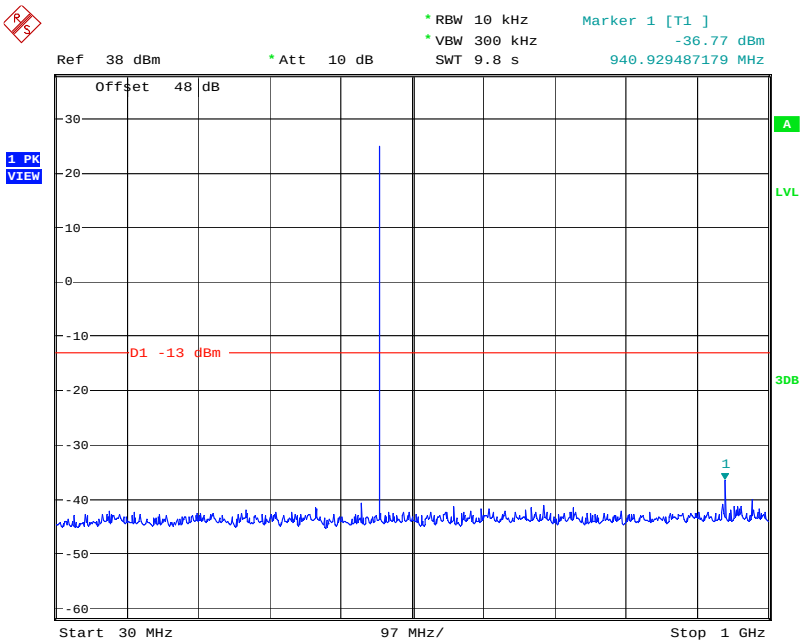


Date: 2.OCT.2008 21:05:45

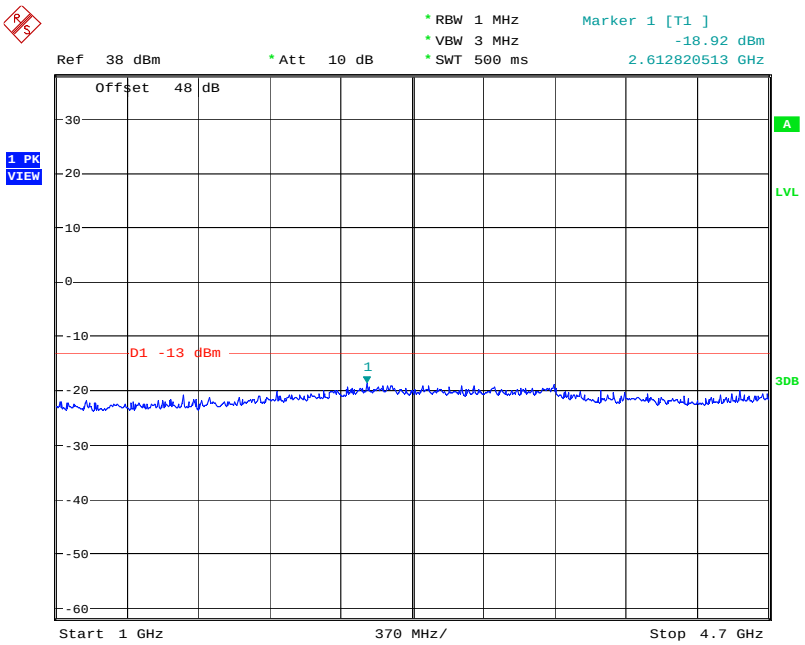


Date: 2.OCT.2008 20:59:31

Modulation Type: FM (469.7985MHz)：



Date: 2.OCT.2008 21:15:22



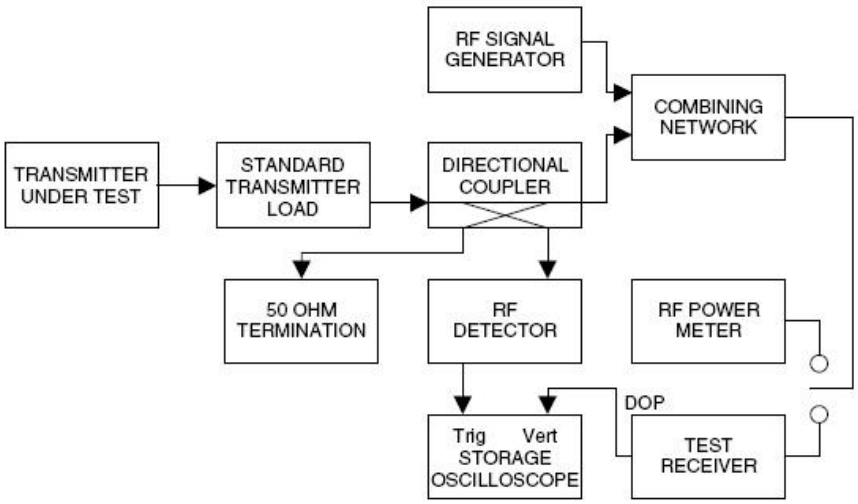
Date: 2.OCT.2008 21:17:14

5.7 Transient Frequency Behavior of Transmitter

5.7.1 Test Procedures

1. SG to the assigned transmitter frequency and modulate it with a 1 kHz tone at ±25 kHz deviation and set its output level to below 30dB of EUT signal level to receiver.
2. Set the horizontal sweep rate on the storage oscilloscope to 10 ms per division and adjust the display to continuously view the 1000 Hz tone from the DOP. Adjust the vertical amplitude control of the oscilloscope to display the 1000 Hz at ±4 divisions vertically centered on the display.
3. Transmitter on and observe the stored display. The output at the DOP, due to the change in the ratio of power between the signal generator input power and the transmitter output power will, because of the capture effect of the test receiver, produce a change in display: For the first part of the sweep it will show the 1 kHz test signal. Then once the receiver's demodulator has been captured by the transmitter power, the display will show the frequency difference from the assigned frequency to the actual transmitter frequency versus time. The instant when the 1 kHz test signal is completely suppressed (including any capture time due to phasing) is considered to be *ton* . The trace should be maintained within the allowed divisions during the period *t*1 and *t*2 . See the figure in the appropriate standards section.
4. During the time from the end of *t*2 to the beginning of t3 the frequency difference should not exceed the limits set by the FCC in 47 CFR 90.214 and outlined in 3.2.2. The allowed limit is equal to the transmitter frequency times its FCC frequency tolerance times ±4 display divisions divided by 25 kHz. For example, at a transmitter assigned frequency of 500 MHz and a frequency tolerance of 5 ppm. This would be 500 MHz times 5 ppm times ±4 divisions divided by 25 kHz. This equals ±0.4 divisions in this example. Greater vertical sensitivity may be required to view this accurately
5. Adjust the oscilloscope trigger controls so it will trigger on a decreasing magnitude from the RF peak detector, at 1 division from the right side of the display, when the transmitter is turned off. Set the controls to store the display. The moment when the 1 kHz test signal starts to rise is considered to provide *toff*

5.7.2 Test Setup Layout

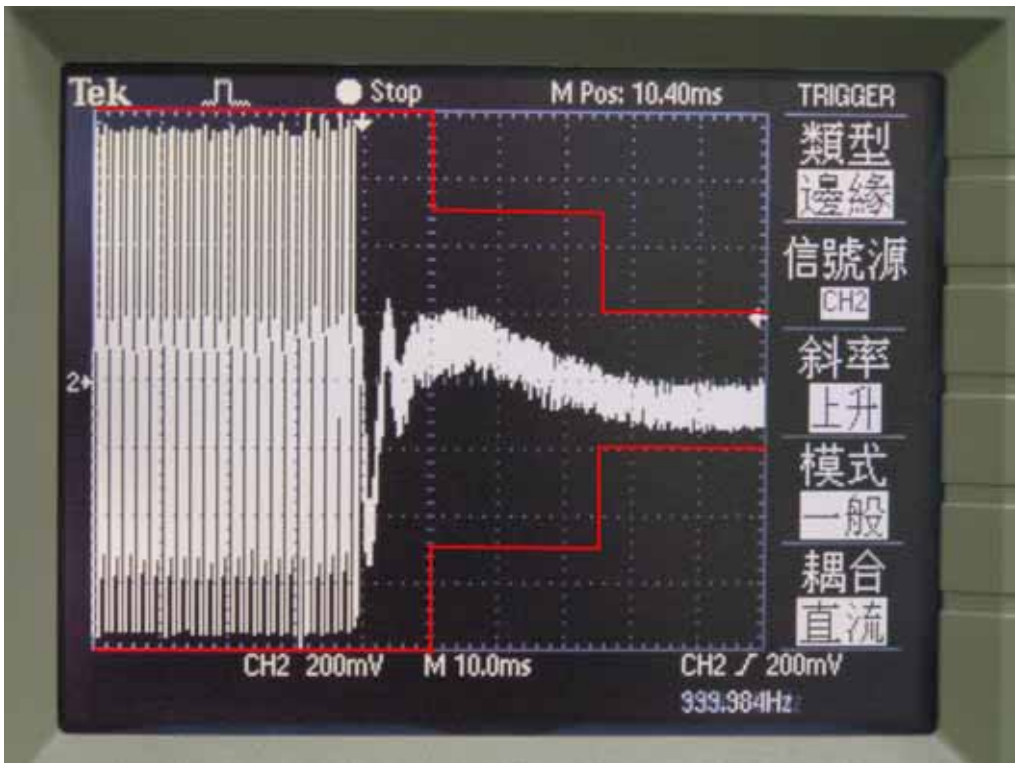


5.7.3 Test Result : please see the spectrum plot after the table

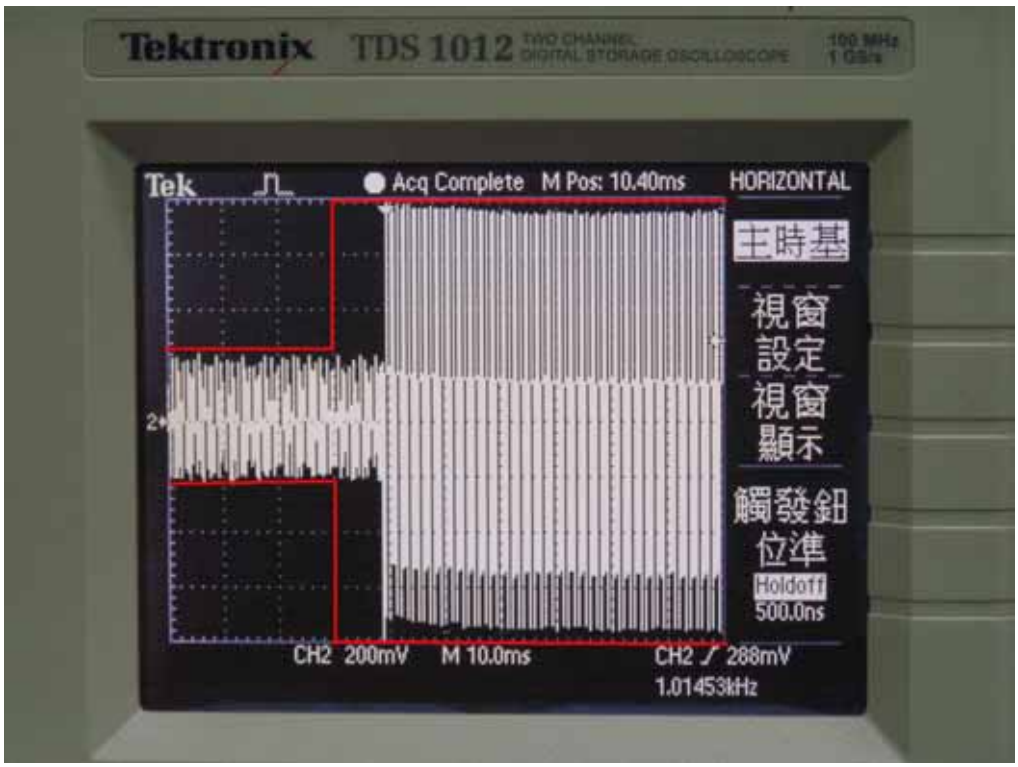
- Modulation Type: FM
- Temperature: 28°C
- Relative Humidity: 58 %

Time Interval (ms)	Deviation (kHz)	Frequency Stability ppm	Result
10 (t1)	25	-	Pass
25 (t2)	12.5	-	Pass
10 (t3)	25	-	Pass
t_{on}	default	5	Pass

Mode 1: t1, t2



Mode 1 t3

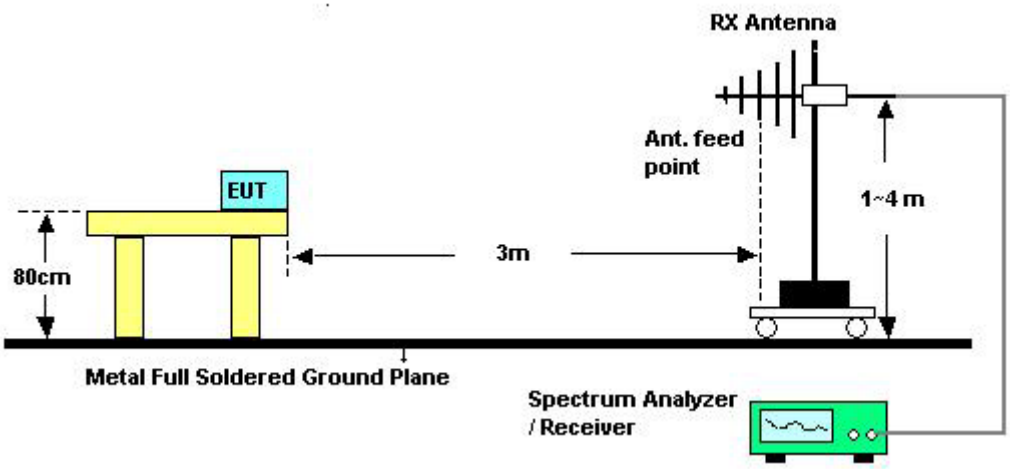


5.8 Receiver Radiated Spurious Emission

5.8.1 Test Procedures

1. Configure the EUT according to ANSI C63.4.
2. The EUT was placed on the top of the turn table 0.8 meter above ground.
3. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turn table.
4. Power on the EUT and all the supporting units.
5. The turn table was rotated 360 degrees to determine the position of the highest radiation.
6. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
7. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
8. Adjust the spectrum analyzer for the following settings:
   1) Resolution Bandwidth = 100 kHz for spurious emissions below 1 GHz and 1 MHz for spurious emissions above 1GHz.
   2) Video Bandwidth = 300 kHz for spurious emissions below 1 GHz, and 3 MHz for spurious emissions above 1 GHz.
   3) Sweep Speed slow enough to maintain measurement calibration.
   4) Detector Mode = Positive Peak.

5.8.2 Test Setup Layout



5.8.3 Test Results and Limit

Test results in different receiver frequency are not deviation. Therefore we only record low channel data in this report.

Mode 1

Test Mode	450.025MHz.	**Temperature**	29.9 deg. C	**Tested By**	Murphy
Limit	FCC 15.105/ RSS-GEN	**Humidity**	53%		

Emission Frequency MHz	Ant. Polarity	Field strength dBuV/m	Limit dBuV/m
427.7	V	24.9	46
427.7	H	29.91	46
858.38	V	28.66	46
858.38	H	32.59	46
1284	V	37.11	54
1284	H	38.9	54
1710	V	38.6	54
1710	H	39.03	54
2142	V	51.35	54
2142	H	47.2	54

Mode 2

Test Mode	450.025MHz.	**Temperature**	28.5 deg. C	**Tested By**	Murphy
Limit	FCC 15.105/ RSS-GEN	**Humidity**	54%		

Emission Frequency MHz	Ant. Polarity	Field strength dBuV/m	Limit dBuV/m
425.36	V	24.98	46
425.36	H	28.54	46
863.44	V	28.56	46
863.44	H	32.49	46
1311	V	37.26	54
1311	H	38.25	54
1648	V	37.49	54
1648	H	38.79	54
2148	V	49.58	54
2148	H	48.76	54

6 List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP30	100023	9kHz ~ 30GHz	Jan. 10, 2008	Conducted (TH01-HY)
Power Meter	R&S	NRVS	100444	DC ~ 40GHz	Jul. 11, 2008	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z51	100458	DC ~ 30GHz	Jul. 11, 2008	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Jul. 11, 2008	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Mar. 13, 2008	Conducted (TH01-HY)
Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Jul. 18, 2008	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 01, 2007	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 01, 2007	Conducted (TH01-HY)
Vector Signal Generator	R&S	SMU200A	102098	100kHz ~ 6GHz	Nov. 14, 2007	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Mar. 10, 2008	Conducted (TH01-HY)
oscilloscope	Tektonix	TDS 1012	E-C93000005	100 MHz 1GS/S	Jun. 27, 2008	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz - 1 GHz 3m	Jun. 14, 2008	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	COA9231A	18667	9 kHz - 2 GHz	Jan. 14, 2008	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz - 26.5 GHz	Jul. 21, 2008	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP40	100004	9 kHz - 40 GHz	Jan. 10, 2008	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30 MHz – 1 GHz	Jul. 12, 2008	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	Apr. 04, 2008	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz - 40 GHz	Jan.18, 2008	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz - 1 GHz	Dec. 03, 2007	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz - 40 GHz	Dec. 03, 2007	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 – 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5 GHz - 40 GHz	Jan. 22, 2007*	Radiation (03CH03-HY)
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	May 30, 2008*	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is two year.

7 TEST LOCATION

SHIJR	ADD	:	6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C.
	TEL	:	886-2-2696-2468
	FAX	:	886-2-2696-2255
HWA YA	ADD	:	No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
	TEL	:	886-3-327-3456
	FAX	:	886-3-318-0055
LINKOU	ADD	:	No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C
	TEL	:	886-2-2601-1640
	FAX	:	886-2-2601-1695
DUNGHU	ADD	:	No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C.
	TEL	:	886-2-2631-4739
	FAX	:	886-2-2631-9740
JUNGHE	ADD	:	7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C.
	TEL	:	886-2-8227-2020
	FAX	:	886-2-8227-2626
NEIHU	ADD	:	4Fl., No. 339, Hsin Hu 2nd Rd., Taipei 114, Taiwan, R.O.C.
	TEL	:	886-2-2794-8886
	FAX	:	886-2-2794-9777
JHUBEI	ADD	:	No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.
	TEL	:	886-3-656-9065
	FAX	:	886-3-656-9085

8 NVLAP Certificate of Accreditation

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 200079-0

Sporton International, Inc. Hwa Ya EMC Laboratory
Tao Yuan Hsien 333
TAIWAN

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated 18 June 2005).

2008-01-01 through 2008-12-31
Effective dates

DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

Sally S. Bruce
For the National Institute of Standards and Technology

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