FCC TEST REPORT

REPORT NO.: RF951124L01A

MODEL NO.: DCMA-82, DCMA-82 High Power, DCMA-IHP, DCMA-HP, CM11, CM10-HI, CM10-H, DCMA-SPI

RECEIVED: May 24, 2007

TESTED: June 06 to 27, 2007

ISSUED: July 04, 2007

APPLICANT: Wistron NeWeb Corp.

ADDRESS: No. 10-1, Li-hsin Road I, Hsinchu Science Park, Hsinchu 300, Taiwan, R.O.C.

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: No. 81-1, Lu Liao Keng, 9 Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien, Taiwan, R.O.C.

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1 CERTIFICATION

PRODUCT :	High Powered 802.11a/g WLAN Mini-PCI 3A, Industry High Powered 802.11a/g WLAN Mini-PCI 3A Commercial High Powered 802.11a/g WLAN Mini-PCI 3A High Powered 802.11a/b/g WLAN Mini-PCI Module (Industrial Grade) High Powered 802.11a/b/g WLAN Mini-PCI Module Industry High-Power Safety-802.11p WLAN
BRAND NAME :	WNC
MODEL NO. :	DCMA-82, DCMA-82 High Power, DCMA-IHP, DCMA-HP, CM11, CM10-HI, CM10-H, DCMA-SPI
TESTED:	June 06 to 27, 2007
APPLICANT :	Wistron NeWeb Corp.
TEST ITEM:	ENGINEERING SAMPLE
STANDARDS :	47 CFR Part 90, Subpart Y ANSI C63.4-2003

The above equipment (Model: DCMA-82) has been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Carol Liao , **DATE:** July 04, 2007
(Carol Liao, Specialist)

TECHNICAL ACCEPTANCE : , **DATE:** July 04, 2007
Responsible for RF
(Hank Chung, Deputy Manager)

APPROVED BY : , **DATE:** July 04, 2007
(May Chen, Deputy Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 90, Subpart Y			
Standard Section	**Test Type and Limit**	**Result**	**REMARK**
90.210(l)	RADIATED EMISSION MEASUREMENT	PASS	Meet the requirement of limit Minimum passing margin is –1.06 dB at 4800.00 MHz
-	EMISSION BANDWIDTH MEASUREMENT	N/A	For reporting purposes only
90.1215(a)	MAXIMUM PEAK OUTPUT POWER	PASS	Meet the requirement of limit
-	AVERAGE POWER MEASUREMENT	N/A	For reporting purposes only
90.1215(a)	POWER SPECTRAL DENSITY MEASUREMENT Limit: max. 21dBm/MHz	PASS	Meet the requirement of limit
90.210(l)	EMISSION MASK AND CONDUCTED SPURIOUS MEASUREMENT	PASS	Meet the requirement of limit
90.213	FREQUENCY STABILITY	N/A	For reporting purposes only

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Radiated emissions (30MHz-1GHz)	3.89 dB
Radiated emissions (1GHz ~18GHz)	2.21 dB
Radiated emissions (18GHz ~40GHz)	1.88 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	High Powered 802.11a/g WLAN Mini-PCI 3A, Industry High Powered 802.11a/g WLAN Mini-PCI 3A Commercial High Powered 802.11a/g WLAN Mini-PCI 3A High Powered 802.11a/b/g WLAN Mini-PCI Module (Industrial Grade) High Powered 802.11a/b/g WLAN Mini-PCI Module Industry High-Power Safety-802.11p WLAN
MODEL NO.	DCMA-82, DCMA-82 High Power, DCMA-IHP, DCMA-HP, CM11, CM10-HI, CM10-H, DCMA-SPI
FCC ID	NKRDCMA82
POWER SUPPLY	DC 3.3V from host equipment
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b:11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11a: 54/48/36/24/18/12/9/6Mbps 802.11j: 54/48/36/24/18/12/9/6Mbps (Turbo mode: up to 108Mbps *see Note 2)
FREQUENCY RANGE	802.11b & 802.11g: 2412 ~ 2462MHz 802.11a: 5.15 ~ 5.25GHz and 5.725 ~ 5.850GHz 802.11j: 4940 ~ 4990MHz
NUMBER OF CHANNEL	802.11b & 802.11g: 11 (1 for 802.11g Turbo mode) 802.11a: 9 (3 for 802.11a Turbo mode) 802.11j: 18 (5 for 10MHz System;3 for 20MHz System;10 for 5MHz System)
CHANNEL SPACING	802.11b & 802.11g: 5MHz 802.11a: 20MHz for Normal mode 802.11j: 5MHz, 5MHz and 15MHz
OUTPUT POWER	Please see note 6 (on next page)
ANTENNA TYPE	Please see note 4 (on next page)

NOTE:

1. This report is prepared for FCC class II permissive change. The difference compared with the Report No.:RF951124L01 design is as the following:

   u 802.11j add 5MHz bandwidth channel.

2. The EUT operates in 4.9GHz and both the 5GHz and 2.4GHz Bands and compatibility with 802.11a and 802.11b, 802.11g technology.

3. This EUT is capable of providing data rates of up to 108 Mbps in 802.11a and 802.11g Turbo mode depending upon reception quality.

4. There are three antennas provided to this EUT, please refer to the following table:

For 4.9GHz							
No.	Brand Name	Model No.	Gain (dBi)	Cable Loss (dB)	Net Gain (dB)	Antenna Type	Connector
A	Wistron Neweb Corp.	DBA-SSMA-01	2.06	0.9	1.16	dipole	RSMA
B	CUSHCRUFT	SRSM5150MRA	2	0.9	1.1	dipole	RSMA
C	** HUBER+ SUHNER	SPA 5500/40/14/O/V_C	13.5	0.9	12.6	panel	SMA
Note: 1. For 4.9GHz antennas, **antenna A and C** were selected as representative antennas for the test. 2. "**" is an Outdoor Antenna it can only be used in point-to-point applications.							

5. Peak output power (Unit : mW) :

No.	Model No.	Operating Frequency (MHz)
		4942.5 ~ 4987.5
A	DBA-SSMA-01	157.036
B	SRSM5150MRA	179.061
C	SPA 5500/40/14/O/V_C	172.982

6. The EUT has two samples, one is for MMCX connector the other is for U.FL. connector.

7. The two samples were pre-tested in chamber, EUT with MMCX connector, the worse case one, was chosen for final test.

8. The EUT has eight product names and model names, which are identical to each other in all aspects except for the followings:

Product name	Model name	Description
High Powered 802.11a/g WLAN Mini-PCI 3A	DCMA-82	for market
High Powered 802.11a/g WLAN Mini-PCI 3A	DCMA-82 High Power	
Industry High Powered 802.11a/g WLAN Mini-PCI 3A	DCMA-IHP	
Commercial High Powered 802.11a/g WLAN Mini-PCI 3A	DCMA-HP	
High Powered 802.11a/g WLAN Mini-PCI 3A	CM11	
High Powered 802.11a/b/g WLAN Mini-PCI Module (Industrial Grade)	CM10-HI	
High Powered 802.11a/b/g WLAN Mini-PCI Module	CM10-H	
Industry High-Power Safety-802.11p WLAN	DCMA-SPI	

From the above models, model: **DCMA-82** was selected as representative model for the test and its data was recorded in this report.

9. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Operated in 4940 ~ 4990MHz band:

For normal mode: Ten channels are provided to this EUT.

Frequency	Channel Bandwidth
4942.5MHz	5MHz
4947.5MHz	5MHz
4952.5MHz	5MHz
4957.5MHz	5MHz
4962.5MHz	5MHz
4967.5MHz	5MHz
4972.5MHz	5MHz
4977.5MHz	5MHz
4982.5MHz	5MHz
4987.5MHz	5MHz

3.3 TEST MODE APPLICABLITY AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to				Description
	MPOP	PSD	RE	EM&CE	
-	√	√	√	√	NA

Where MPOP: Maximum Peak Output Power PSD: Power Spectrum Density
RE: Radiated Emission EM&CE: Emission Mask and Conducted Emission Measurement

Radiated Emission Test :

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Channel Bandwidth	Total Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
10	5	3	OFDM	BPSK	1.5

MAXIMUM PEAK OUTPUT POWER:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Channel Bandwidth	Total Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
10	5	3	OFDM	BPSK	1.5

POWER SPECTRAL DENSITY :

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Channel Bandwidth	Total Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
10	5	3	OFDM	BPSK	1.5

EMISSION MASK AND CONDUCTED SPURIOUS MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Channel Bandwidth	Total Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
10	5	3	OFDM	BPSK	1.5

3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a High Powered 802.11a/g WLAN Mini-PCI 3A. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

47 CFR Part 90, Subpart Y
ANSI C63.4 : 2003

All tests have been performed and recorded as per the above standards.

3.5 DESCRIPTION OF SUPPORT UNITS

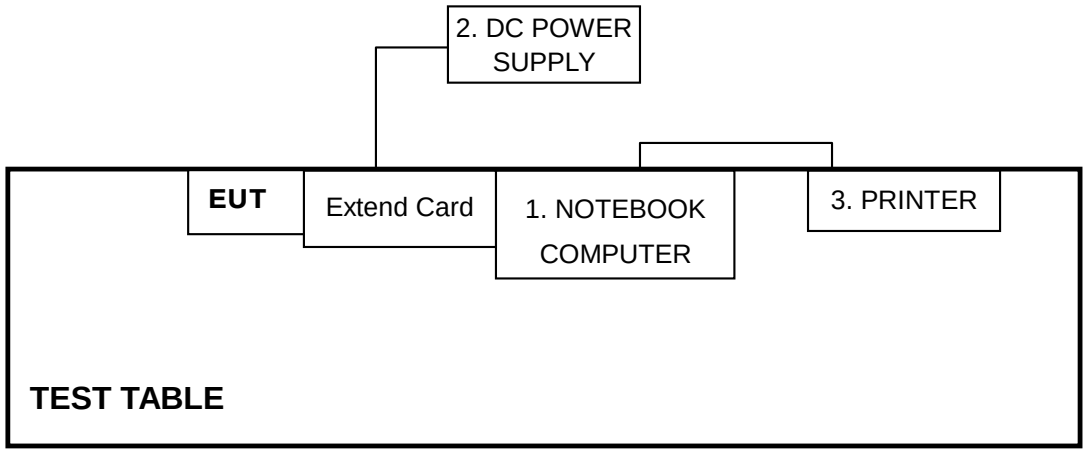
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	DELL	C600	6DRV601	FCC DoC
2	DC POWER SUPPLY	GOOD WILL INSTRUMENT CO., LTD.	GPC-3030D	7700087	B94C2642X
3	PRINTER	EPSON	LQ-300+	DCGY047261	B94C2642X
4	Extend Card	ADT	NA	NA	NA

No.	Signal cable description
1	NA
2	NA
3	1.8m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core
4	NA

Note: 1. All power cords of the above support units are unshielded (1.8m).

3.6 CONFIGURATION OF SYSTEM UNDER TEST



4 TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

§90.210(M) Emission Mask M. For high power transmitters (greater that 20 dBm) operating in the 4940-4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:
On any frequency removed from the assigned frequency above 150 % of the authorized bandwidth: 50 dB or 55 + 10 log (P) dB, whichever is the lesser attenuation.

The Radiated Spurious Emission Limit is obtained by the following:

Channel 4942.5MHz: Measured Average Power Output of EUT:13.25dBm
Spur limit=13.25dBm-50dB=-36.75dBm

Channel 4967.5MHz: Measured Average Power Output of EUT:13.47dBm
Spur limit=13.47dBm-50dB =-36.53dBm

Channel 4987.5MHz: Measured Average Power Output of EUT:13.66dBm
Spur limit=13.66dBm-50dB=-36.34dBm

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	R3271A	85060311	July 03, 2007
HP Pre_Amplifier	8449B	3008A01922	Sep. 18, 2007
ROHDE & SCHWARZ Test Receiver	ESCS30	100375	Sep. 20, 2007
CHASE Broadband Antenna	VULB 9168	138	July 17, 2007
Schwarzbeck Horn_Antenna	BBHA9120	D124	Jan. 01, 2008
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 05, 2008
SCHWARZBECK Biconical Antenna	VHBA9123	459	Jun. 08, 2009
SCHWARZBECK Periodic Antenna	UPA6108	1148	Jun. 08, 2009
R&S Loop Antenna	HFH2-Z2	881058/15	Nov. 29, 2007
RF Switches (ARNITSU)	CS-201	1565157	NA
RF CABLE (Chaintek)	SF102	22054-2	Nov. 14. 2007
RF Cable(RICHTEC)	9913-30M N-N Cable	STCCAB-30M-1 GHz	Jul. 15, 2007
Software	ADT_Radiated_V 7.6.15.7	NA	NA
CHANCE MOST Antenna Tower	AT-100	0203	NA
CHANCE MOST Turn Table	TT-100	0203	NA

Note: 1. The calibration interval of the above test instruments is 12 months (36 months for Biconical and Periodic Antenna)and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: R3271A) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in ADT Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 4824A-3.

4.1.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

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.

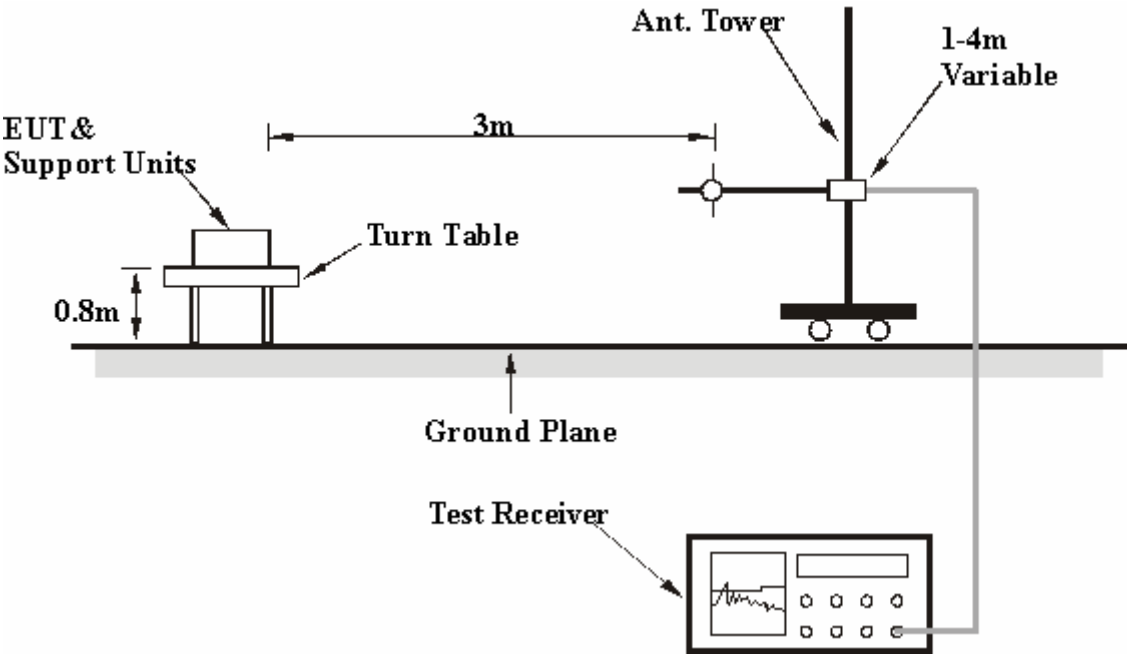
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10^{th}or40GHz,which ever was the lesser, were investigated.

NOTE:

1.The resolution bandwidth of at least one percent of the occupied bandwidth of the fundamental emission and a video bandwidth of 30 kHz.

4.1.4 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.5 EUT OPERATING CONDITIONS

a. Connect the EUT with the support unit 1 (Notebook computer) which placed on a testing table.

b. The support unit 1 (Notebook computer) ran a test program “Art 53 b 5” to enable EUT under transmission condition continuously.

c. Notebook computer sends "H" messages to printer, and the printer prints them on paper.

4.1.6 TEST RESULTS - ANTENNA A

MODE	Channel Frequency 4942.5MHz	**FREQUENCY RANGE**	1000~40000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION & BANDWIDTH**	Peak (PK) 300KHz/30KHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 66%RH, 960 hPa	**TESTED BY**	Wen Yu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Raw Value (dBm)	Correction Factor (dBm)
1	4800.00	-48.98	-36.75	-12.23	-84.62	35.64
2	6590.00	-44.69	-36.75	-7.94	-85.00	40.31
3	14827.50	-47.13	-36.75	-10.38	-96.92	49.79

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Raw Value (dBm)	Correction Factor (dBm)
1	4800.00	-42.10	-36.75	-5.35	-77.74	35.64
2	6590.00	-41.40	-36.75	-4.65	-81.71	40.31
3	14827.50	-46.04	-36.75	-9.29	-95.83	49.79

REMARKS:
1. Emission level(dBm)<EIRP>=SG reading-CL+Gain(dBi)
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.
4. The limit value is defined as per 90.210
5. " * " : Fundamental frequency

MODE	Channel Frequency 4967.5MHz	**FREQUENCY RANGE**	1000~40000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION & BANDWIDTH**	Peak (PK) 300KHz/30KHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 66%RH, 960 hPa	**TESTED BY**	Wen Yu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Raw Value (dBm)	Correction Factor (dBm)
1	4800.00	-47.78	-36.53	-11.25	-83.42	35.64
2	6623.30	-45.02	-36.53	-8.49	-85.42	40.40
3	14902.50	-46.48	-36.53	-9.95	-96.38	49.90

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Raw Value (dBm)	Correction Factor (dBm)
1	4800.00	-40.95	-36.53	-4.42	-76.59	35.64
2	6623.30	-41.83	-36.53	-5.30	-82.23	40.40
3	14902.50	-45.40	-36.53	-8.87	-95.30	49.90

REMARKS:
1. Emission level(dBm)<EIRP>=SG reading-CL+Gain(dBi)
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.
4. The limit value is defined as per 90.210
5. " * " : Fundamental frequency

MODE	Channel Frequency 4987.5MHz	**FREQUENCY RANGE**	1000~40000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION & BANDWIDTH**	Peak (PK) 300KHz/30KHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 66%RH, 960 hPa	**TESTED BY**	Wen Yu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Raw Value (dBm)	Correction Factor (dBm)
1	4800.00	-50.77	-36.34	-14.43	-86.41	35.64
2	6650.00	-47.21	-36.34	-10877	-87.67	40.46
3	14962.50	-46.61	-36.34	-10.27	-96.60	49.99

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Raw Value (dBm)	Correction Factor (dBm)
1	4800.00	-44.06	-36.34	-7.72	-79.70	35.64
2	6650.00	-44.23	-36.34	-7.89	-84.69	40.46
3	14962.50	-46.00	-36.34	-9.66	-95.99	49.99

REMARKS:
1. Emission level(dBm)<EIRP>=SG reading-CL+Gain(dBi)
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.
4. The limit value is defined as per 90.210
5. " * " : Fundamental frequency

4.1.7 TEST RESULTS - ANTENNA C

MODE	Channel Frequency 4942.5MHz	**FREQUENCY RANGE**	1000~40000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION & BANDWIDTH**	Peak (PK) 300KHz/30KHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 66%RH, 960 hPa	**TESTED BY**	Wen Yu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Raw Value (dBm)	Correction Factor (dBm)
1	4800.00	-45.61	-36.75	-8.86	-81.25	35.64
2	6590.00	-42.55	-36.75	-5.80	-82.86	40.31
3	14827.50	-43.60	-36.75	-6.85	-93.39	49.79

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Raw Value (dBm)	Correction Factor (dBm)
1	4800.00	-37.88	-36.75	-1.13	-73.52	35.64
2	6590.00	-40.15	-36.75	-3.40	-80.46	40.31
3	14827.50	-44.97	-36.75	-8.22	-94.76	49.79

REMARKS:
1. Emission level(dBm)<EIRP>=SG reading-CL+Gain(dBi)
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.
4. The limit value is defined as per 90.210
5. " * " : Fundamental frequency

MODE	Channel Frequency 4967.5MHz	**FREQUENCY RANGE**	1000~40000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION & BANDWIDTH**	Peak (PK) 300KHz/30KHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 66%RH, 960 hPa	**TESTED BY**	Wen Yu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Raw Value (dBm)	Correction Factor (dBm)
1	4800.00	-45.36	-36.53	-8.83	-81.00	35.64
2	6623.30	-43.52	-36.53	-6.99	-83.92	40.40
3	14902.50	-43.71	-36.53	-7.18	-93.61	49.90

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	Freq. (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Raw Value (dBm)	Correction Factor (dBm)
1	**4800.00**	**-37.59**	**-36.53**	**-1.06**	**-73.23**	**35.64**
2	6623.30	-42.98	-36.53	-6.45	-83.38	40.40
3	14902.50	-44.30	-36.53	-7.77	-94.20	49.90

REMARKS:
1. Emission level(dBm)<EIRP>=SG reading-CL+Gain(dBi)
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.
4. The limit value is defined as per 90.210
5. " * " : Fundamental frequency

MODE	Channel Frequency 4987.5MHz	**FREQUENCY RANGE**	1000~40000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION & BANDWIDTH**	Peak (PK) 300KHz/30KHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 66%RH, 960 hPa	**TESTED BY**	Wen Yu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Raw Value (dBm)	Correction Factor (dBm)
1	4800.00	-45.82	-36.34	-9.48	-81.46	35.64
2	6650.00	-44.18	-36.34	-7.84	-84.64	40.46
3	14962.50	-45.06	-36.34	-8.72	-95.05	49.99

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Raw Value (dBm)	Correction Factor (dBm)
1	4800.00	-38.03	-36.34	-1.69	-73.67	35.64
2	6650.00	-43.36	-36.34	-7.02	-83.82	40.46
3	14962.50	-45.21	-36.34	-8.87	-95.20	49.99

REMARKS:
1. Emission level(dBm)<EIRP>=SG reading-CL+Gain(dBi)
2. The other emission levels were very low against the limit.
3. Margin value = Emission level – Limit value.
4. The limit value is defined as per 90.210
5. " * " : Fundamental frequency

4.2 EMISSION BANDWIDTH MEASUREMENT

4.2.1 LIMITS OF 26dB BANDWIDTH MEASUREMENT

For reporting purposes only.

4.2.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007

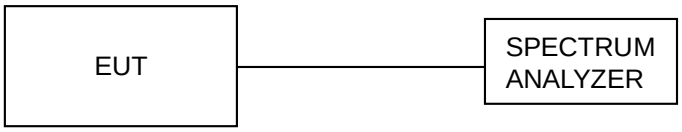
NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.2.3 TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 26dB bandwidth and /or the 99% bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

4.2.4 TEST SETUP



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

4.2.5 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at channel frequencies individually.

4.2.6 TEST RESULTS

INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25 deg. C, 67%RH, 960 hPa
TESTED BY	Wen Yu		

26dB Bandwidth

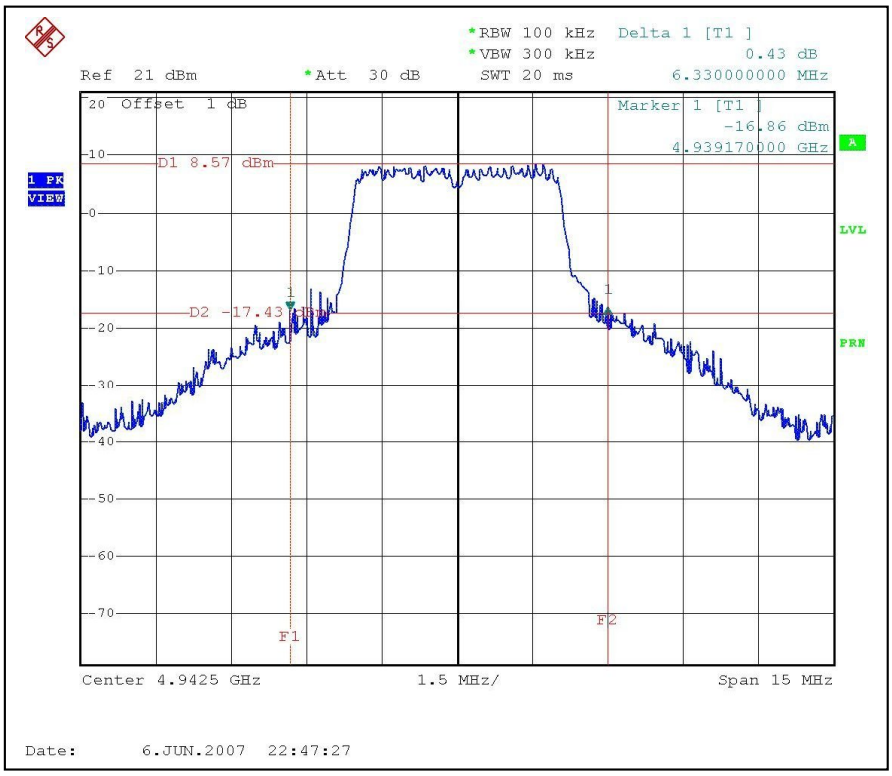
CHANNEL FREQUENCY (MHz)	26 dB BANDWIDTH (MHz)	10 Log B (dB)
4942.5	6.33	8.01
4967.5	6.27	7.97
4987.5	6.30	7.99

99% Bandwidth

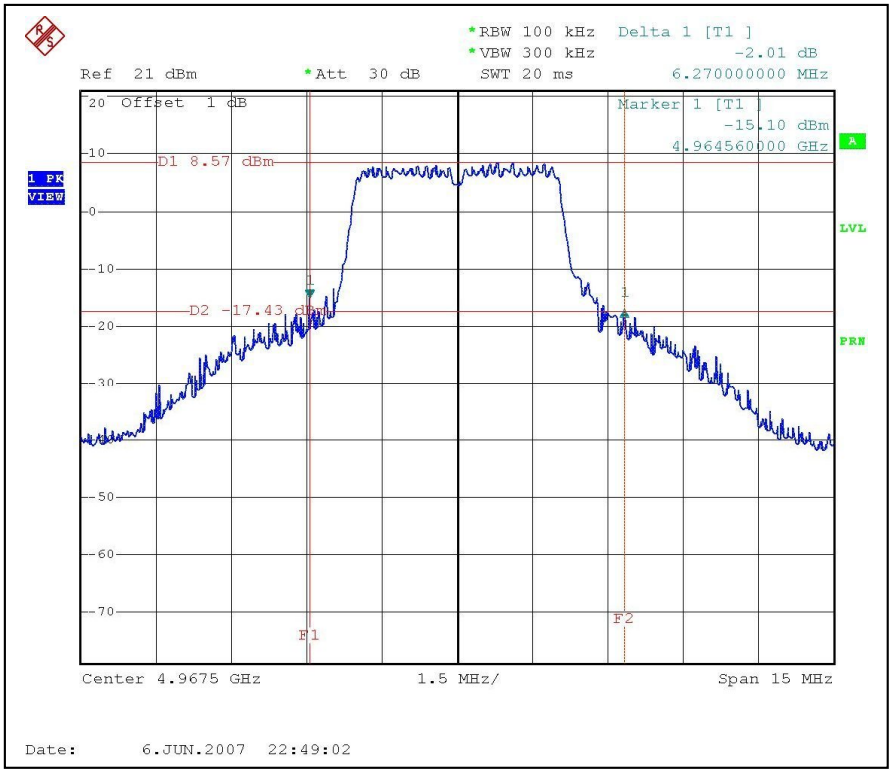
CHANNEL FREQUENCY (MHz)	99% BW (MHz)
4942.5	4.23
4967.5	4.23
4987.5	4.23

26dB Bandwidth

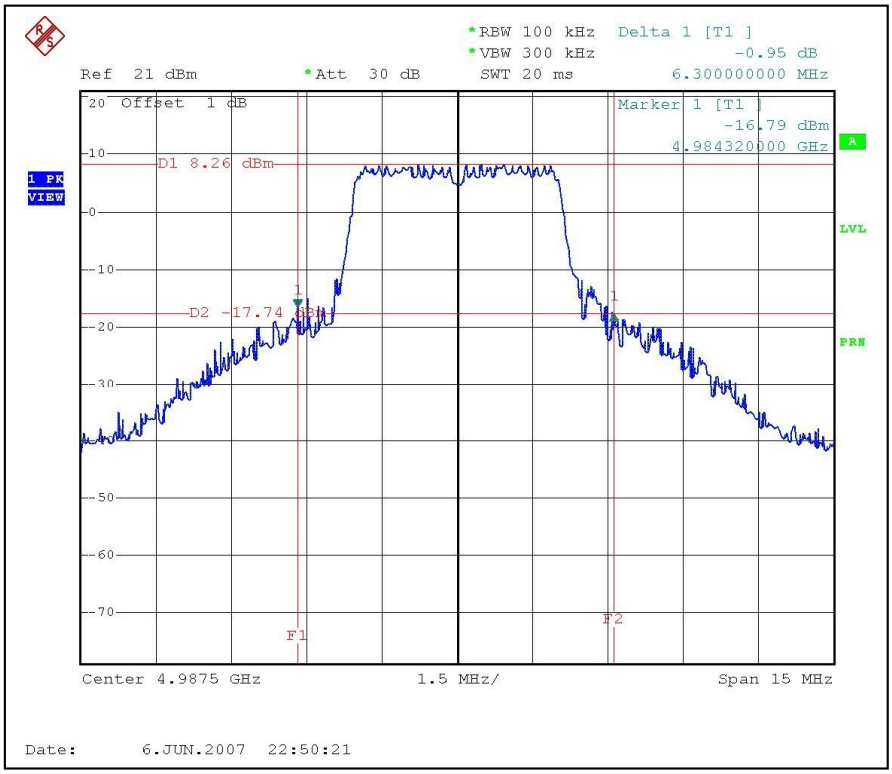
Channel Frequency: 4942.5 MHz



Channel Frequency: 4967.5 MHz

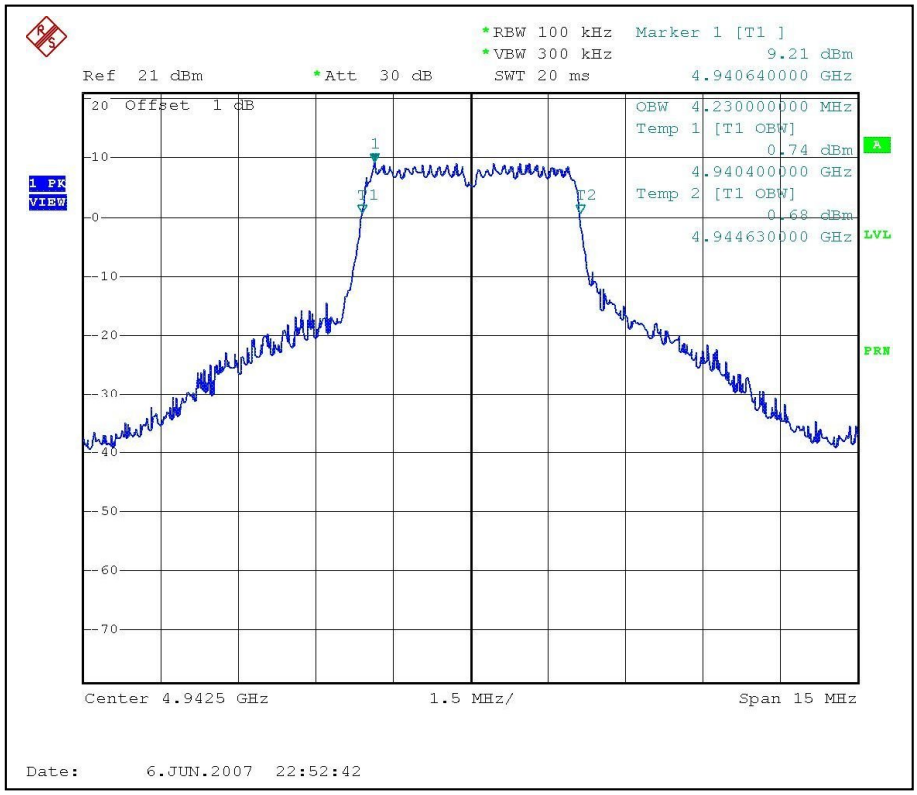


Channel Frequency: 4987.5 MHz

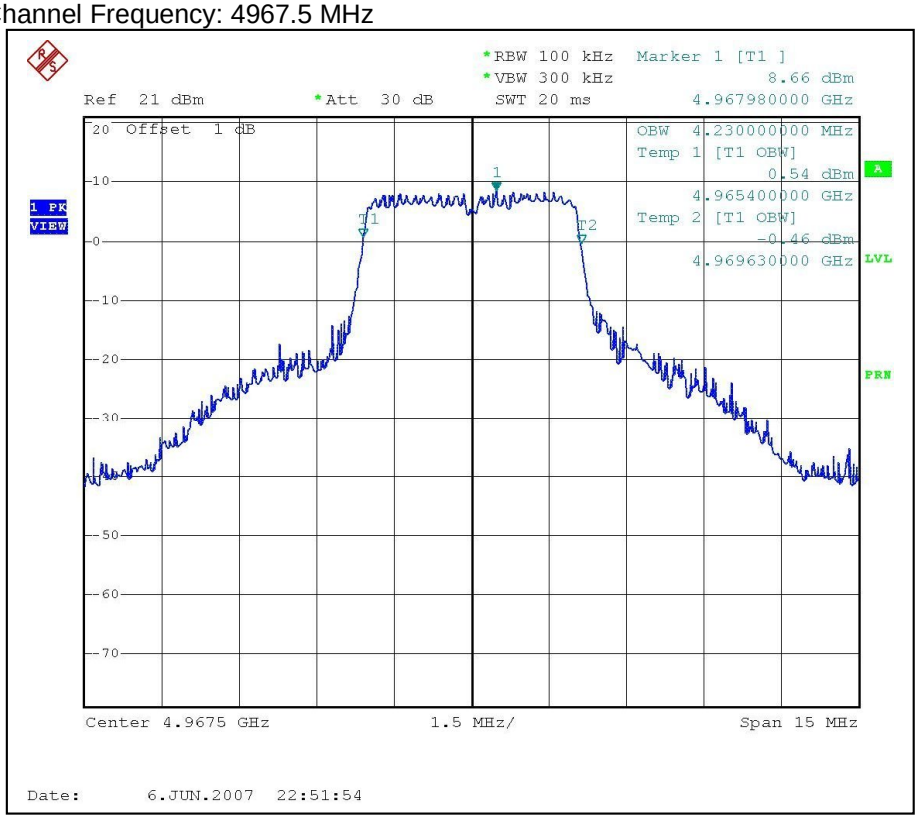


99% Bandwidth

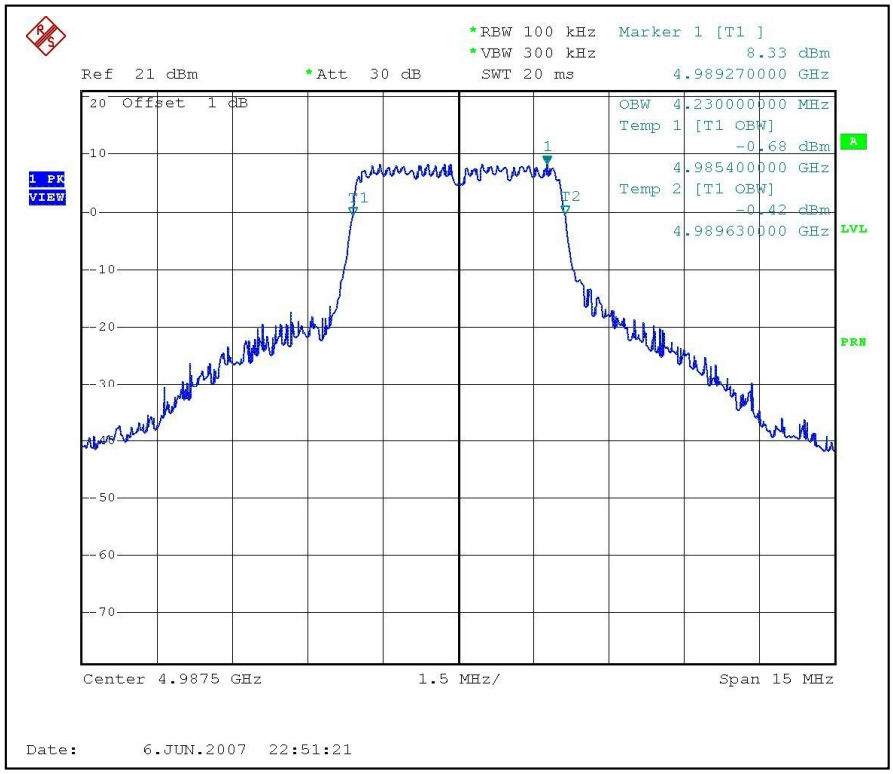
Channel Frequency: 4942.5 MHz



Channel Frequency: 4967.5 MHz



Channel Frequency: 4987.5 MHz



4.3 MAXIMUM PEAK OUTPUT POWER

4.3.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

§90.1215 The transmitting power of stations operating in the 4940-4990 MHz band must not exceed the maximum limits in this section.

(a) The peak transmit power should not exceed:

Channel bandwidth (MHz)	Low power device peak transmitter power (dBm)	High power device peak transmitter power (dBm)
1	7	20
5	14	27
10	17	30
15	18.8	31.8
20	20	33

4.3.2 TEST INSTRUMENTS

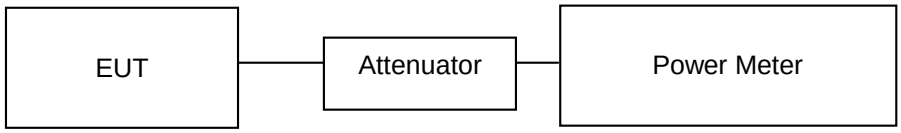
Description & Manufacturer	Model No.	Serial No.	Calibrated Until
Power Meter	ML2487A	6K00001472	Jan. 18, 2008
Power Meter Sensor (Wide Bandwidth Sensor)	MA2491A	030951	Jan. 18, 2008

NOTE:
The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.3.3 TEST PROCEDURES

1. An attenuator was used on the output port of the EUT. Power meter was used and set peak function to measurement the Peak power.
2. The EUT power was adjusted maximum output power.
3. The output power was then recorded with peak reading.

4.3.4 TEST SETUP



4.3.5 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at channel frequencies individually and power was adjusted Maximum output power by software.

4.3.6 TEST RESULTS – ANTENNA A

INPUT POWER (SYSTEM)	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25 deg. C, 67%RH, 960 hPa
TESTED BY	Wen Yu		

CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
4942.5	157.036	21.96	27	PASS
4967.5	179.061	22.53	27	PASS
4987.5	172.982	22.38	27	PASS

4.3.7 TEST RESULTS – Antenna C

INPUT POWER (SYSTEM)	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25 deg. C, 67%RH, 960 hPa
TESTED BY	Wen Yu		

CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
4942.5	157.036	21.96	27	PASS
4967.5	179.061	22.53	27	PASS
4987.5	172.982	22.38	27	PASS

4.4 AVERAGE POWER

4.4.1 LIMITS OF AVERAGE POWER MEASUREMENT

None; for reporting purposes only.

4.4.2 TEST INSTRUMENTS

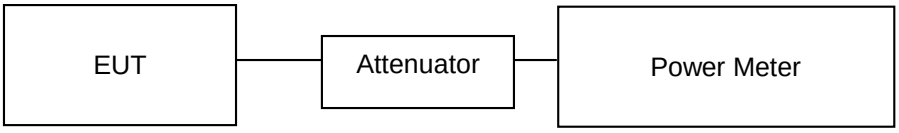
Description & Manufacturer	Model No.	Serial No.	Calibrated Until
Power Meter	ML2487A	6K00001472	Jan. 18, 2008
Power Meter Sensor (Wide Bandwidth Sensor)	MA2491A	030951	Jan. 18, 2008

NOTE:
The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.4.3 TEST PROCEDURES

1.An attenuator was used on the output port of the EUT. Power meter was used and set average function to measurement the Average power.
2.The EUT power was adjusted maximum output power.
3.The output power was then recorded with peak and average reading.

4.4.4 TEST SETUP



4.4.5 EUT OPERATING CONDITIONS

Same as Item 4.3.5

4.4.6 TEST RESULTS – ANTENNA A

INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25 deg. C, 67%RH, 960 hPa
TESTED BY	Wen Yu		

CHANNEL FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
4942.5	21.135	13.25
4967.5	22.233	13.47
4987.5	23.227	13.66

4.4.7 TEST RESULTS – Antenna C

INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25 deg. C, 67%RH, 960 hPa
TESTED BY	Wen Yu		

CHANNEL FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
4942.5	21.135	13.25
4967.5	22.233	13.47
4987.5	23.227	13.66

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

Complies § 90.1215 (a) High power devices.

System	Limit
For high power device	21dBm/MHz

Note:
If transmitting antennas of directional gain greater than 9dBi are used, both the peak transmit power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to point or point-to-multipoint operation (both fixed and temporary-fixed rapid deployment) may employ transmitting antennas with directional gain up to 26dBi without any corresponding reduction in the transmitter power or spectral density. Corresponding reduction in the peak transmit power and peak power spectral density should be the amount in decibels that the directional gain of the antenna exceeds 26dBi.

4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007

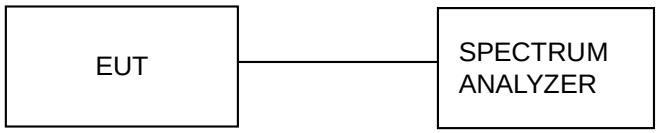
NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.5.3 TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The measured with the spectrum analyzer using RBW=1MHz and VBW 1MHz. The EUT power was adjusted at the maximum output power level. Set max hold to capture the modulated envelope of the EUT. The peak power spectrum density was recorded.

4.5.4 TEST SETUP



4.5.5 EUT OPERATING CONDITIONS

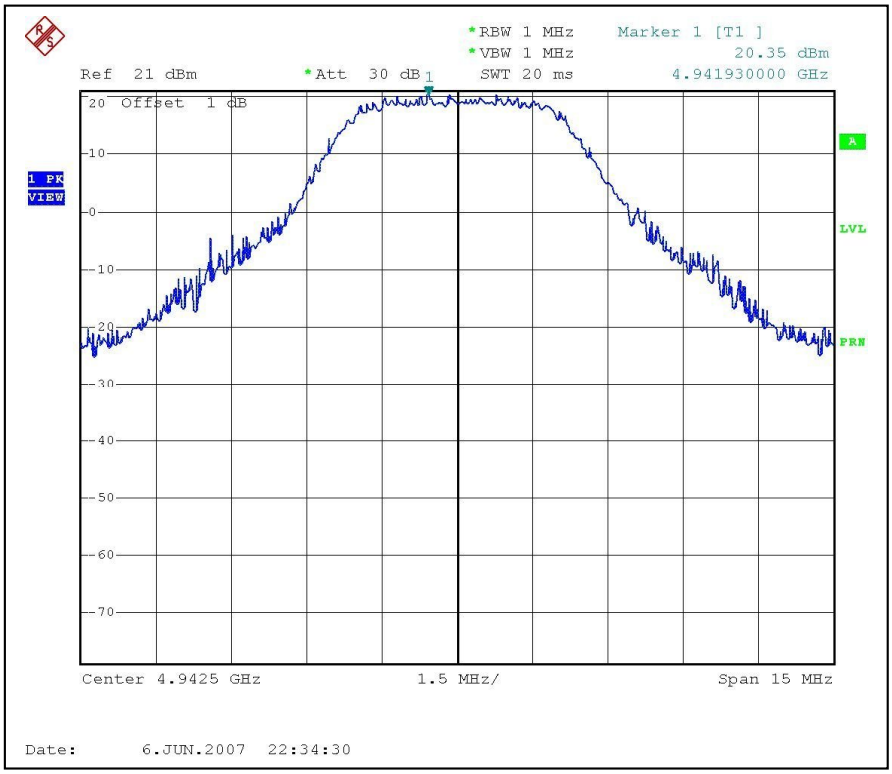
Same as 4.2.5

4.5.6 TEST RESULTS

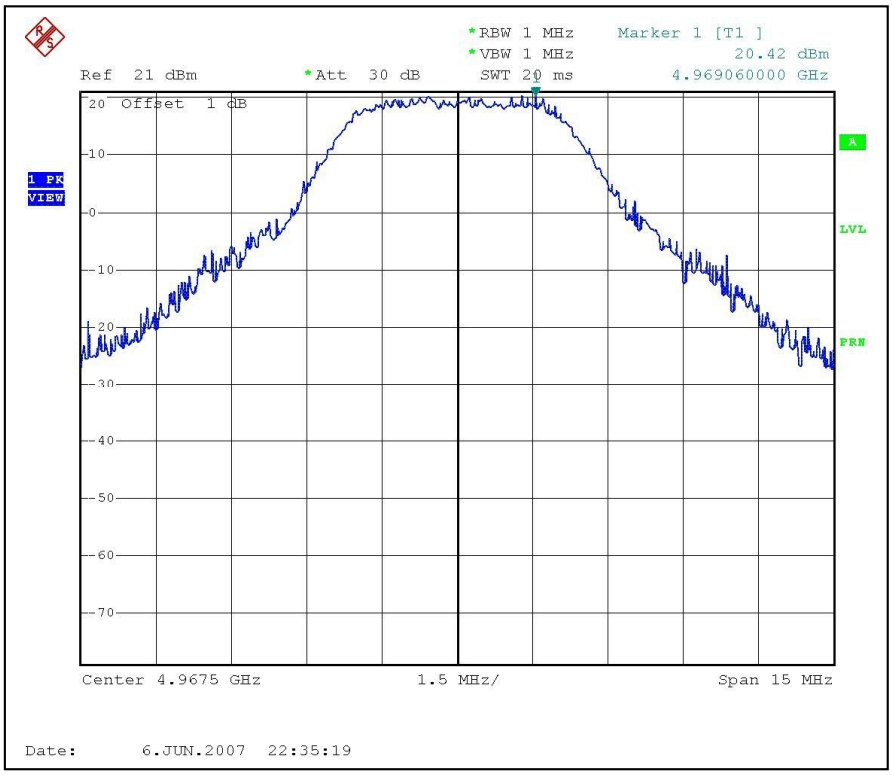
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	25 deg. C, 67%RH, 960 hPa
TESTED BY	Wen Yu		

CHANNEL FREQUENCY (MHz)	POWER SPECTRAL DENSIYT (dBm/MHz)	MAXIMUM LIMIT (dBm/MHz)	PASS/FAIL
4942.5	20.35	21	PASS
4967.5	20.42	21	PASS
4987.5	20.42	21	PASS

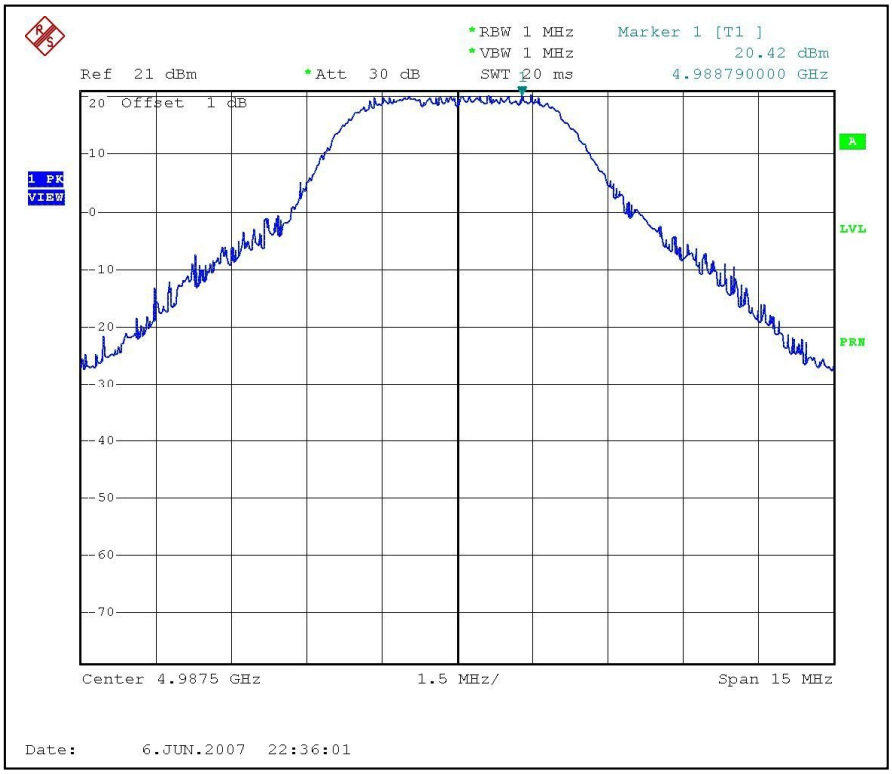
Channel Frequency: 4942.5 MHz



Channel Frequency: 4967.5 MHz



Channel Frequency: 4987.5 MHz



4.6 EMISSION MASK AND CONDUCTED SPURIOUS MEASUREMENT

4.6.1 LIMITS OF EMISSION MASK MEASUREMENT

Compliance §90.210(M) Emission Mask M (For High power device) .
PSD of the emission on any frequency removed from the assigned frequency must be attenuated below the output power of the transmitter as follows:

Authorized bandwidth(BW)	Limit
0-45%	0dB
45-50%	568 log (% of (BW) / 45) dB
50-55%	26 + 145 log (% of BW / 50) dB
55-100%	32 + 31 log (% of (BW) / 55) dB
100-150%	40 + 57 log (% of (BW) / 100) dB
Above 150%	50 dB or 55 + 10 log (P) dB, whichever is the lesser attenuation.

Note: The zero dB reference is measured relative to the highest average power of the fundamental emission measured across the designated channel bandwidth using a resolution bandwidth of at least one percent of the occupied bandwidth of the fundamental emission and a video bandwidth of 30 kHz.

4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007

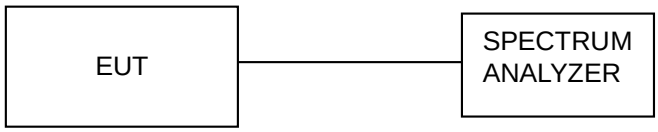
NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.6.3 TEST PROCEDURE

The EUT is connected to the spectrum analyzer. The measured highest Average Power was set relative to zero dB reference. The RBW was set to at least 1% of the channel bandwidth with a VBW set to 30kHz. The EUT power was adjusted at the maximum output power level. Set max hold to capture the modulated envelope of the EUT. The Emission Mask was recorded.

4.6.4 TEST SETUP



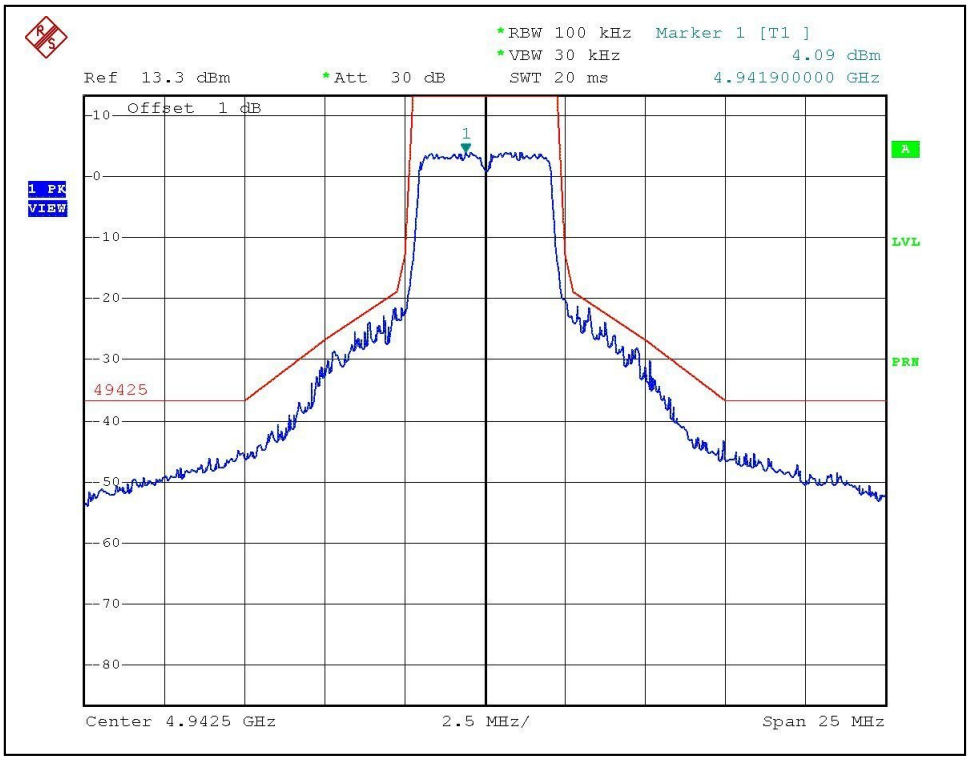
4.6.5 EUT OPERATING CONDITIONS

Same as 4.2.5

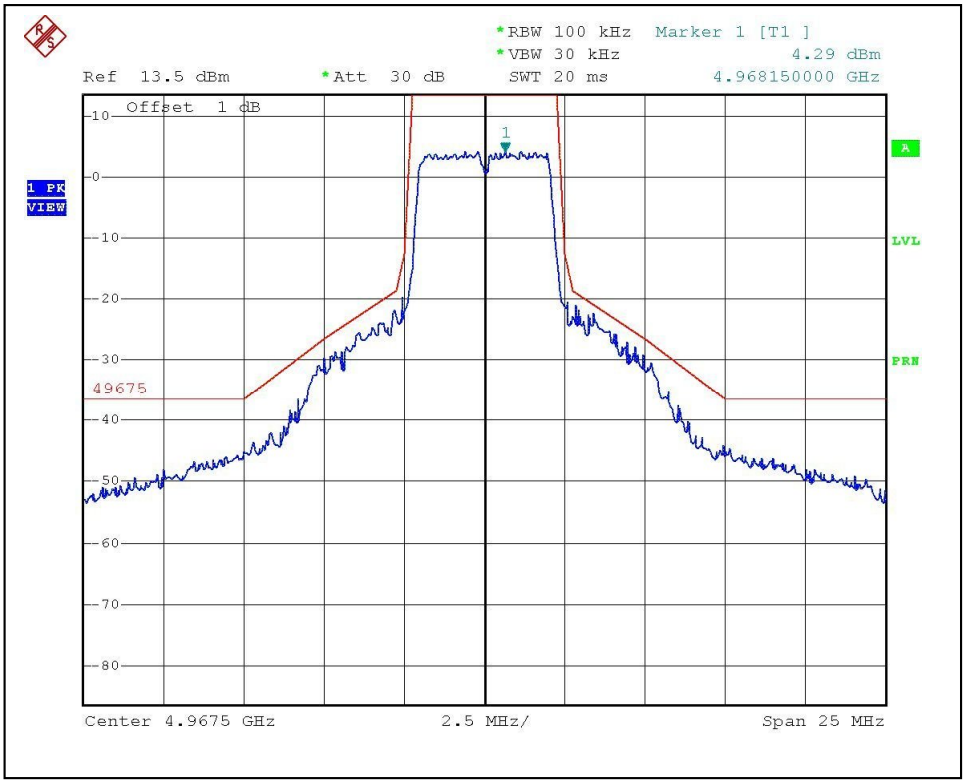
4.6.6 TEST RESULTS

EMISSION MASK：

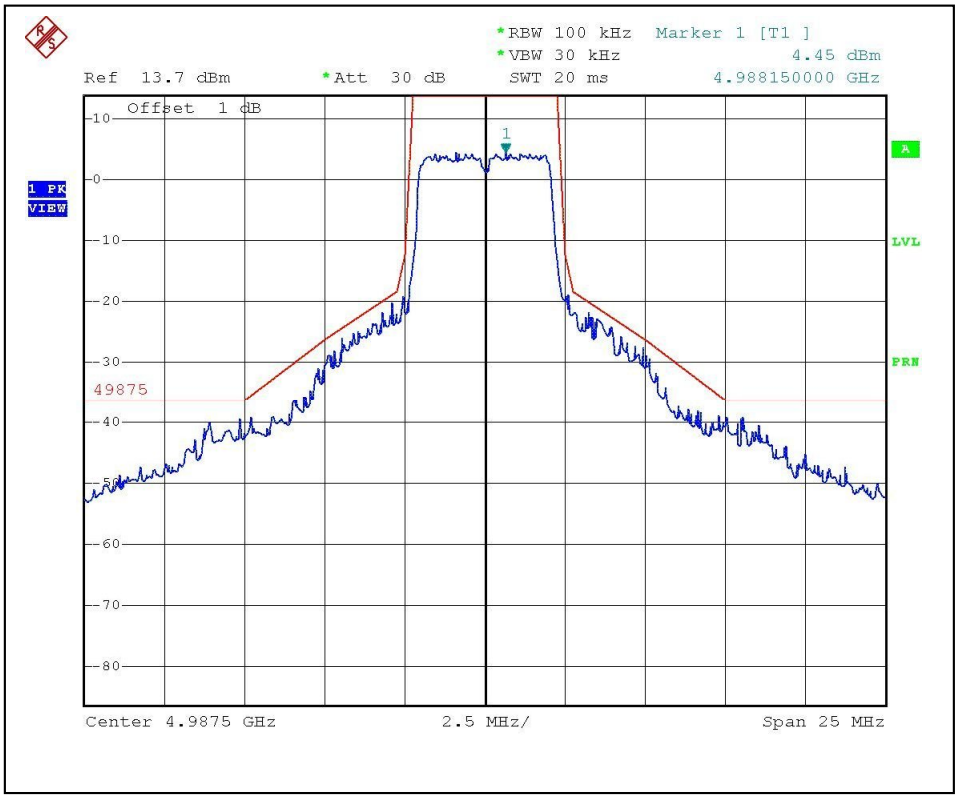
Channel Frequency: 4942.5 MHz



Channel Frequency: 4967.5 MHz

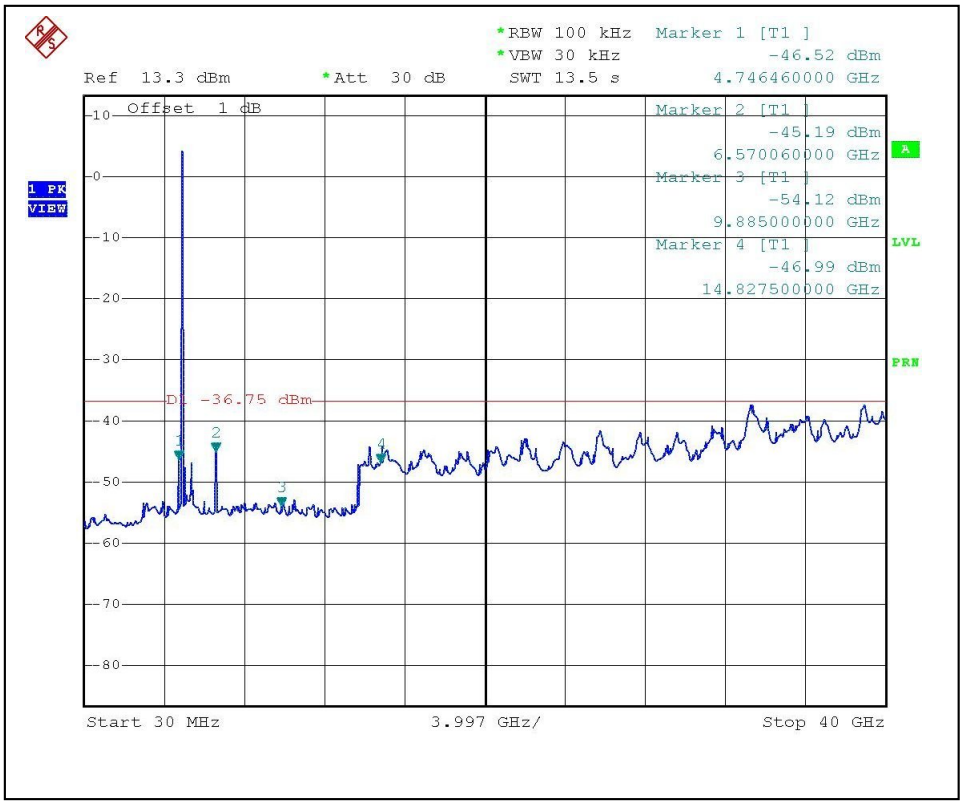


Channel Frequency: 4987.5 MHz

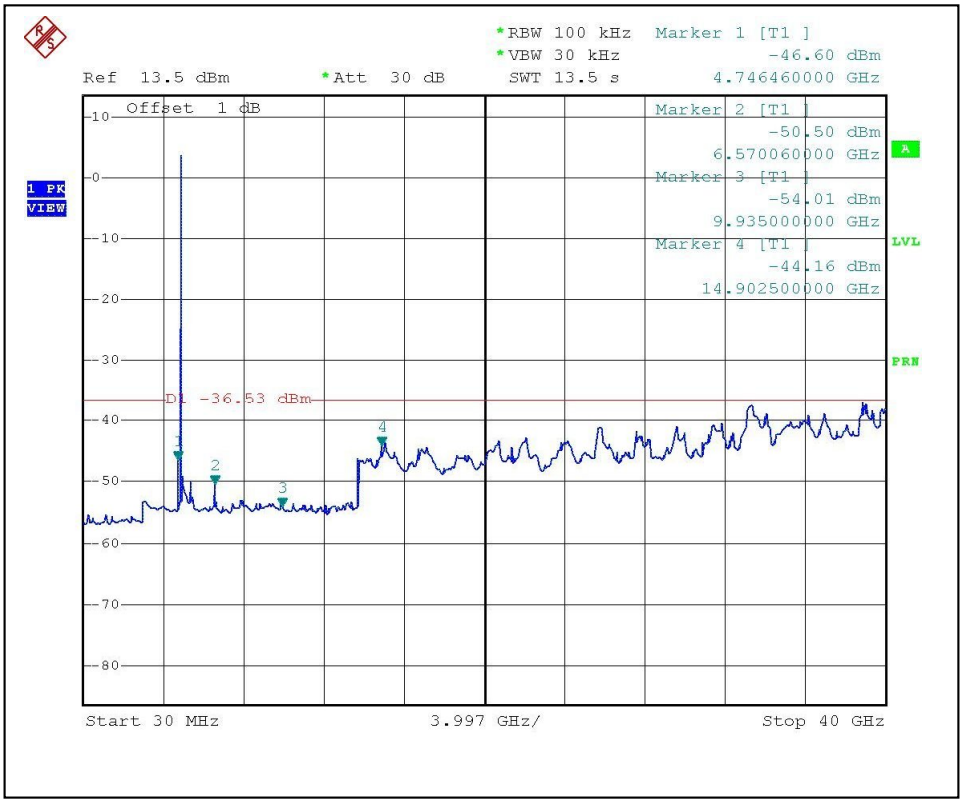


CONDUCTED SPURIOUS:

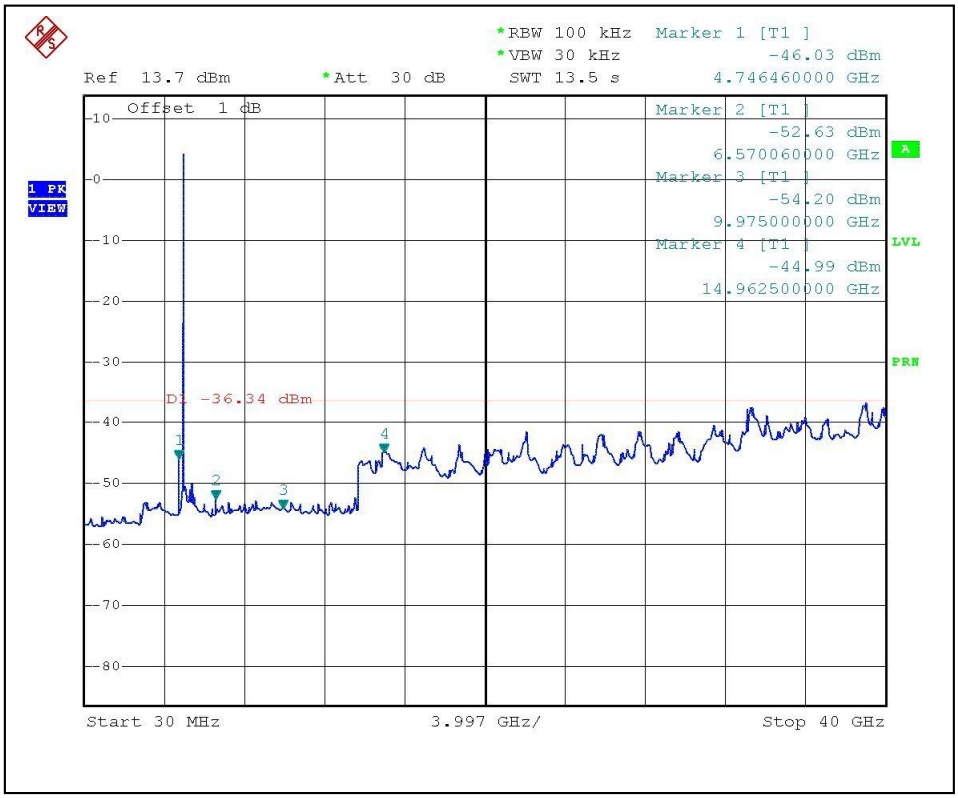
Channel Frequency: 4942.5 MHz



Channel Frequency: 4967.5 MHz



Channel Frequency: 4987.5 MHz



4.7 FREQUENCY STABILITY

4.7.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

For reporting purposes only.

4.7.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 15, 2007

NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

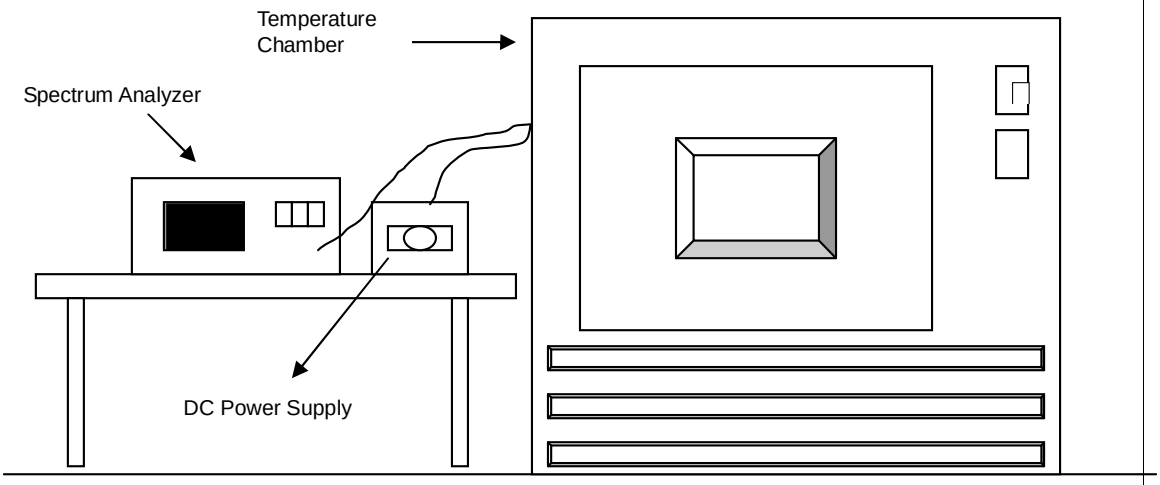
4.7.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



4.7.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.7.7 TEST RESULTS

OPERATING FREQUENCY: 4967.5MHZ							
Temp. (℃)	**Power supply (VAC)**	**2 minute**		**5 minute**		**10 minute**	
		(MHz)	**(%)**	**(MHz)**	**(%)**	**(MHz)**	**(%)**
50	138	4967.4811	0.000380	4967.4811	0.000380473	4967.4821	0.000360
	120	4967.481	0.000382	4967.481	0.000382486	4967.4820	0.000362
	102	4967.4809	0.000384	4967.481	0.000382486	4967.4818	0.000366
40	138	4967.4802	0.000399	4967.4812	0.00037846	4967.4812	0.000378
	120	4967.48	0.000403	4967.481	0.000382486	4967.4811	0.000381
	102	4967.4799	0.000405	4967.48106	0.000381278	4967.4808	0.000387
30	138	4967.479547	0.000412	4967.48105	0.00038148	4967.4805	0.000393
	120	4967.47927	0.000417	4967.481124	0.00037999	4967.4802	0.000399
	102	4967.478992	0.000423	4967.481124	0.00037999	4967.4799	0.000405
20	138	4967.478715	0.000428	4967.481135	0.000379768	4967.4796	0.000411
	120	4967.478438	0.000434	4967.481025	0.000381983	4967.4793	0.000417
	102	4967.478161	0.000440	4967.481174	0.000378983	4967.4790	0.000422
10	138	4967.477884	0.000445	4967.481156	0.000379345	4967.4787	0.000428
	120	4967.477607	0.000451	4967.481171	0.000379034	4967.4784	0.000434
	102	4967.47733	0.000456	4967.481187	0.000378723	4967.4782	0.000440
0	138	4967.477052	0.000462	4967.481202	0.000378412	4967.4779	0.000446
	120	4967.476775	0.000468	4967.481218	0.000378101	4967.4776	0.000452
	102	4967.476498	0.000473	4967.481233	0.00037779	4967.4773	0.000457
-5	138	4967.476221	0.000479	4967.481249	0.000377479	4967.4770	0.000463
	120	4967.475944	0.000484	4967.481264	0.000377168	4967.4767	0.000469
	102	4967.475667	0.000490	4967.48128	0.000376856	4967.4764	0.000475

5 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:

USA	FCC, NVLAP, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA, CSA
R.O.C.	CNLA, BSMI, NCC
Netherlands	Telefication
Singapore	PSB, GOST-ASIA (MOU)
Russia	CERTIS (MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml.
If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3185050

Email: service@adt.com.tw
Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.

6 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.