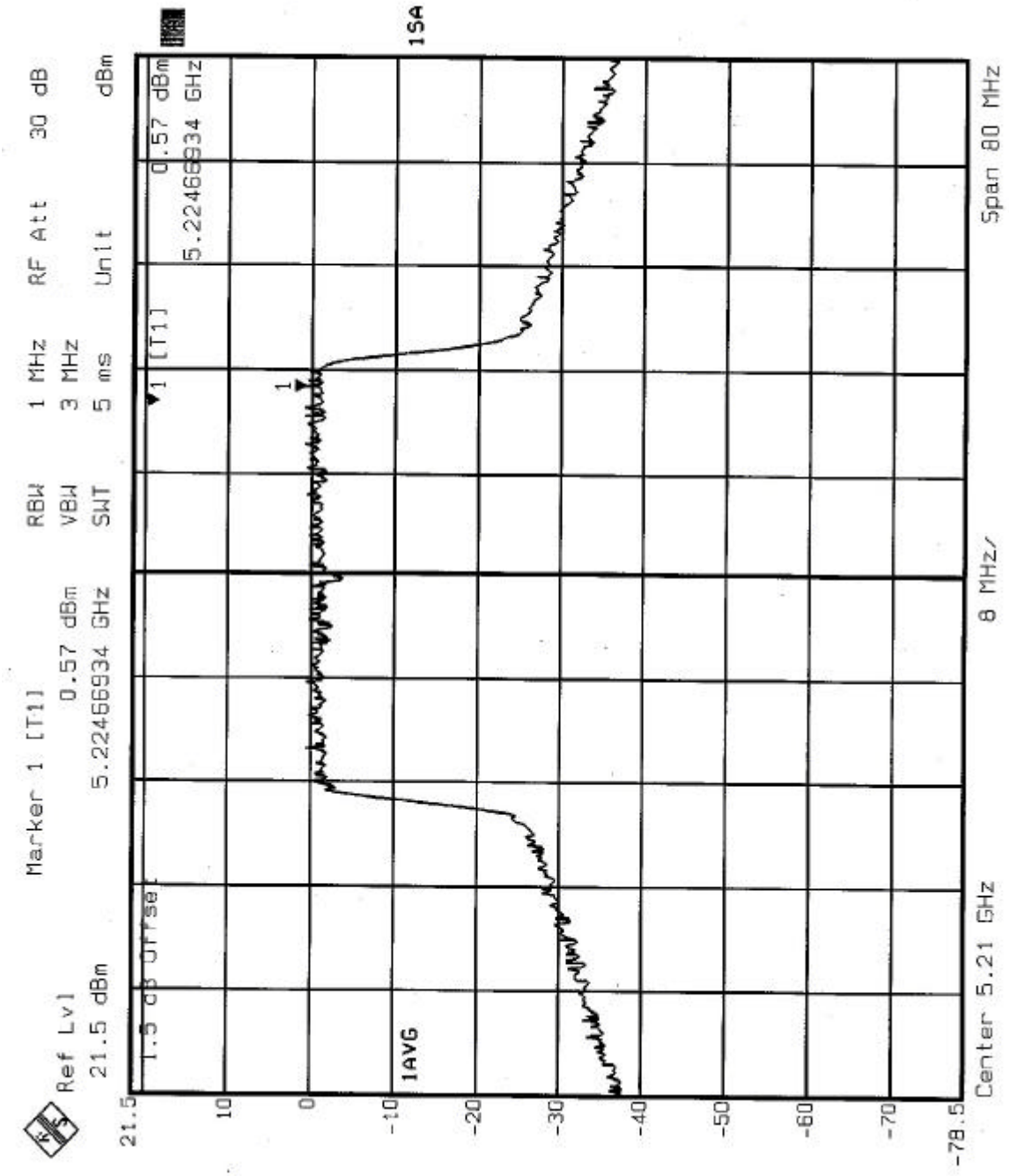
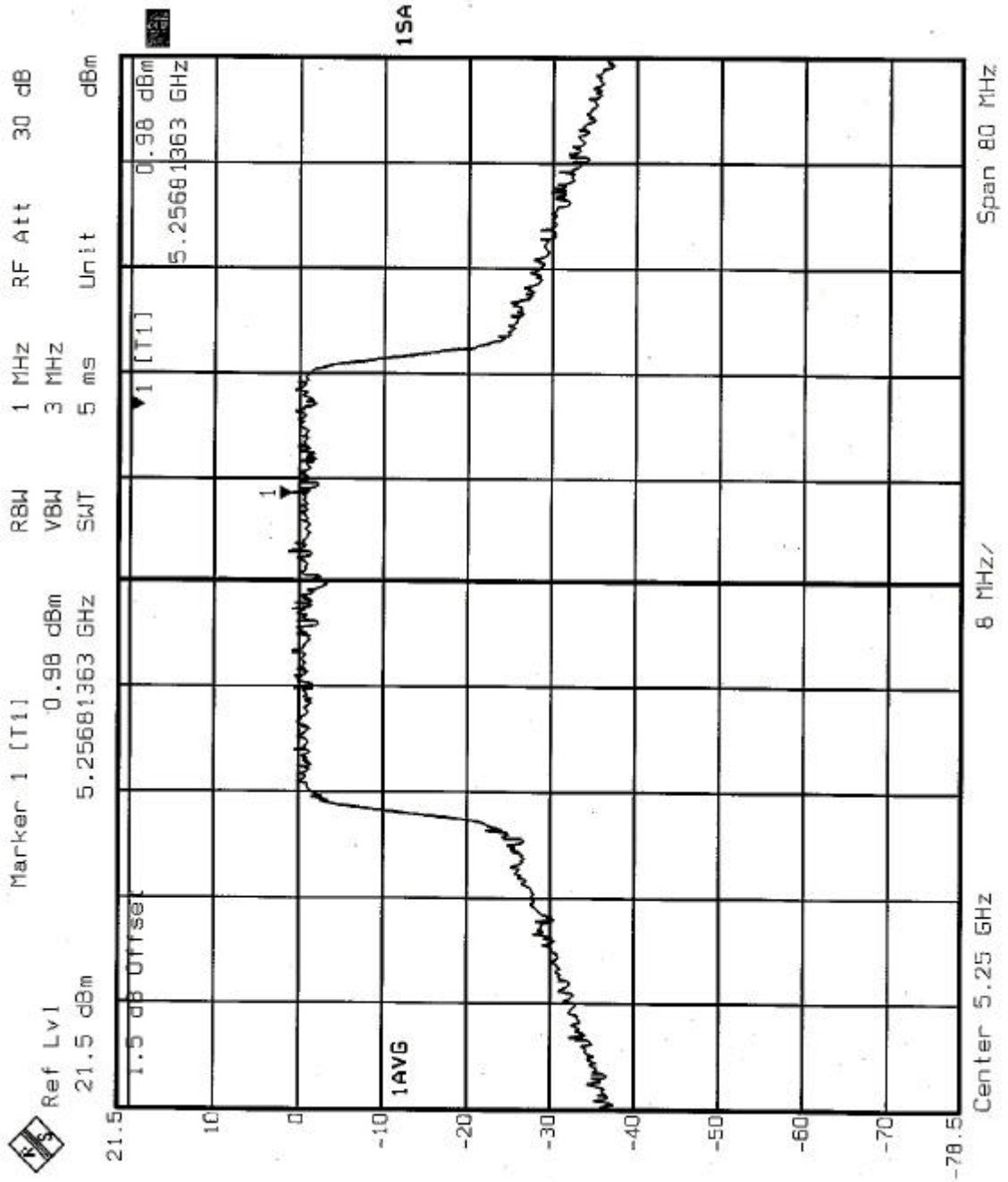
| | | | |
|---|---|---|---|
| **EUT** | WLAN Access Point 2220 | **MODEL** | WLAN Access Point 2220 |
| **MODE** | Turbo | **INPUT POWER (SYSTEM)** | 120Vac, 60 Hz |
| **ENVIRONMENTAL CONDITIONS** | 20eg. C, 60RH, 976 hPa | **TESTED BY** | Hank Chung |

| CHANNEL NUMBER | CHANNEL FREQUENCY (MHz ) | RF POWER LEVEL IN 1 MHz BW (dBm) | MAXIMUM LIMIT (dBm) | PASS/FAIL |
|---|---|---|---|---|
| 1 | 5210 | 0.57 | 4 | PASS |
| 2 | 5250 | 0.98 | 4 | PASS |
| 3 | 5290 | 3.13 | 11 | PASS |
| 4 | 5760 | 3.55 | 17 | PASS |
| 5 | 5800 | 2.92 | 17 | PASS |

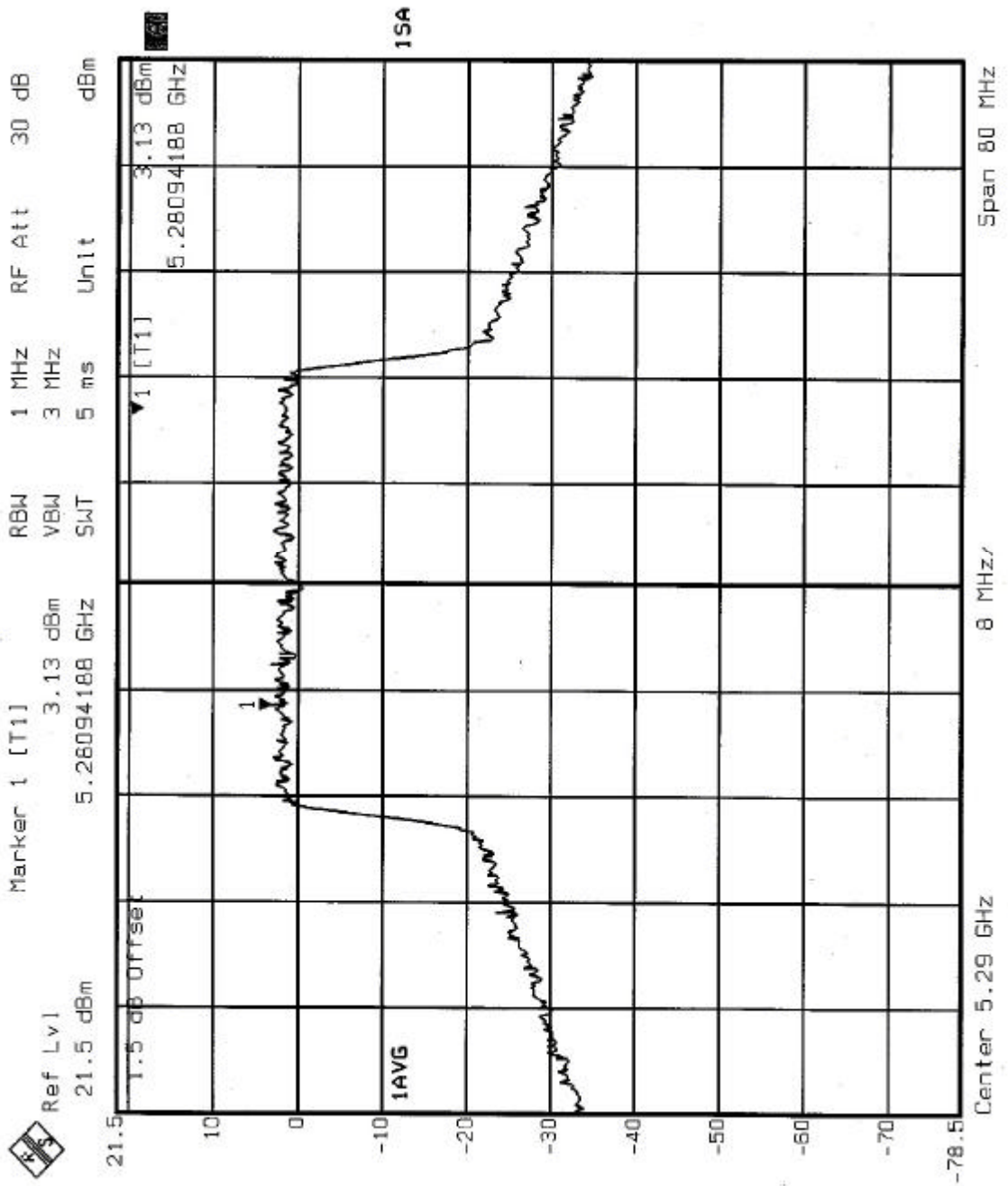
CHANNEL 1


Ref Lvl
21.5 dBm
1.5 dB Offset
Marker 1 [T1]
0.57 dBm
5.22466934 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
1 [T1]
0.57 dBm
5.22466934 GHz
1SA
1AVG
Center 5.21 GHz
8 MHz/
Span 80 MHz
21.5
10
0
-10
-20
-30
-40
-50
-60
-70
-78.5

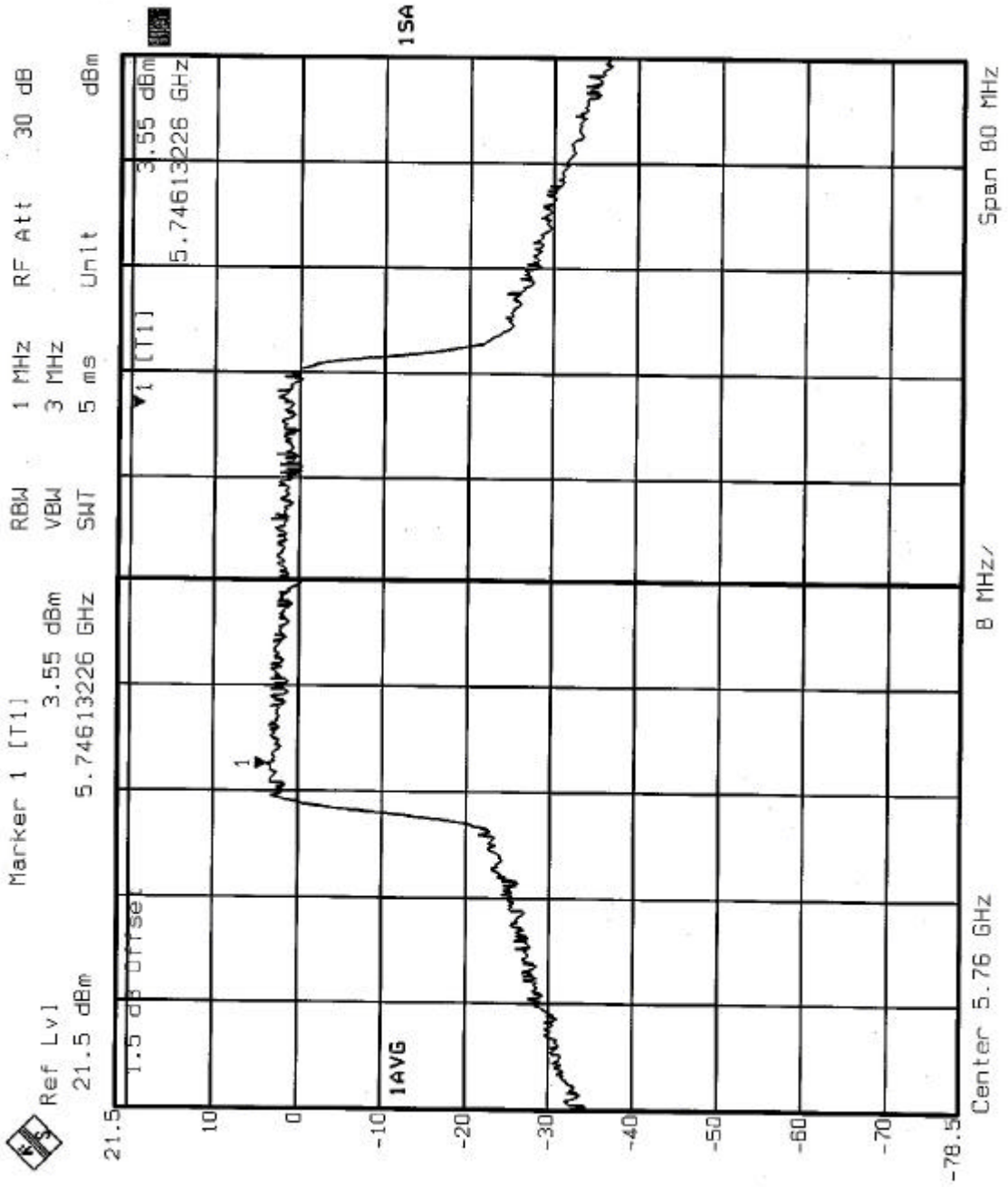
CHANNEL 2


Ref Lvl
21.5 dBm
1.5 dB Offset
Marker 1 [T1]
0.98 dBm
5.25681363 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
1 [T1]
0.98 dBm
5.25681363 GHz
1SA
1AVG
21.5
10
0
-10
-20
-30
-40
-50
-60
-70
-78.5
Center 5.25 GHz
8 MHz/
Span 80 MHz

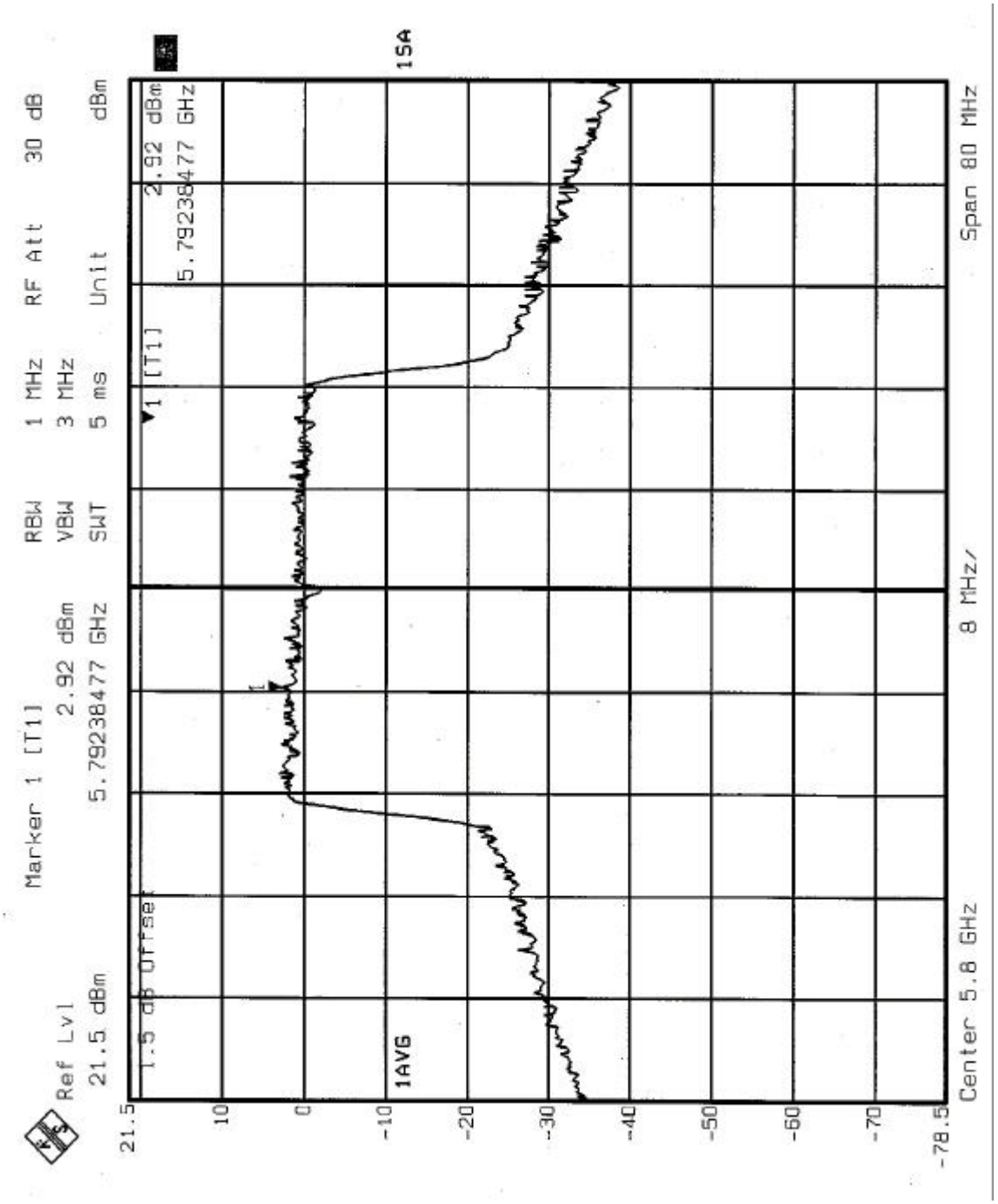
CHANNEL 3


Ref Lvl
21.5 dBm
1.5 dB Offset
Marker 1 [T1]
3.13 dBm
5.28094188 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
1 [T1]
3.13 dBm
5.28094188 GHz
1SA
1AVG
21.5
10
0
-10
-20
-30
-40
-50
-60
-70
-78.5
Center 5.29 GHz
8 MHz/
Span 80 MHz

CHANNEL 4


Ref Lvl
21.5 dBm
1.5 dB Offset
Marker 1 [T1]
3.55 dBm
5.74613226 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
1 [T1]
3.55 dBm
5.74613226 GHz
1SA
1AVG
21.5
10
0
-10
-20
-30
-40
-50
-60
-70
-78.5
Center 5.76 GHz
8 MHz/
Span 80 MHz

CHANNEL 5


Ref Lvl
21.5 dBm
1.5 dB Offset
Marker 1 [T1]
2.92 dBm
5.79238477 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
1 [T1]
2.92 dBm
5.79238477 GHz
1SA
1AVG
21.5
10
0
-10
-20
-30
-40
-50
-60
-70
-78.5
Center 5.8 GHz
8 MHz/
Span 80 MHz

## 5.6 FREQUENCY STABILITY

### 5.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within +/- 0.02% of the operating frequency over a temperature variation of –30 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

### 5.6.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|---|---|---|---|
| SPECTRUM ANALYZER | FSEK30 | 100049 | July 24, 2003 |

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

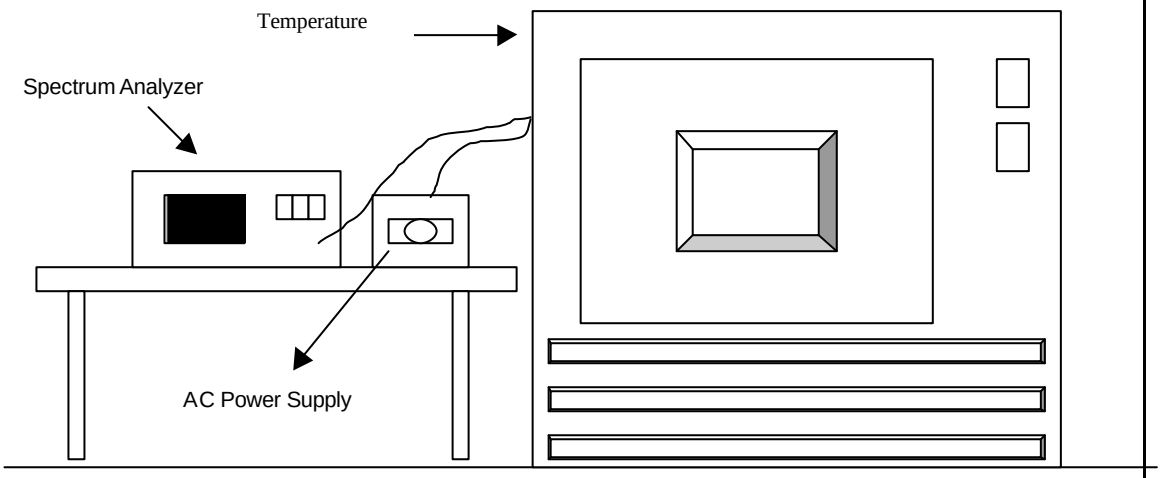
### 5.6.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal AC 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.

### 5.6.4 DEVIATION FROM TEST STANDARD

No deviation

## 5.6.5 TEST SETUP




## 5.6.6 EUT OPERATING CONDITION

Same as Item 4.1.6

## 5.6.7 TEST RESULTS

| Operating frequency: 5320MHz | | | | | | Limit : ± 0.02% | |
|---|---|---|---|---|---|---|---|
| Temp. (°C) | Power supply (VAC) | 2 minute | | 5 minute | | 10 minute | |
| | | (MHz) | (%) | (MHz) | (%) | (MHz) | (%) |
| 50 | 126.5 | 5319.9916 | -0.000158% | 5319.9915 | -0.000160% | 5319.9911 | -0.000167% |
| | 110.0 | 5319.9918 | -0.000154% | 5319.9917 | -0.000156% | 5319.9914 | -0.000162% |
| | 93.5 | 5319.9916 | -0.000158% | 5319.9915 | -0.000160% | 5319.9911 | -0.000167% |
| 40 | 126.5 | 5319.9881 | -0.000224% | 5319.9976 | -0.000045% | 5319.9973 | -0.000051% |
| | 110.0 | 5319.9882 | -0.000222% | 5319.9976 | -0.000045% | 5319.9975 | -0.000047% |
| | 93.5 | 5319.9981 | -0.000036% | 5319.9979 | -0.000039% | 5319.9972 | -0.000053% |
| 30 | 126.5 | 5319.9922 | -0.000147% | 5319.9919 | -0.000152% | 5319.9917 | -0.000156% |
| | 110.0 | 5319.9922 | -0.000147% | 5319.9921 | -0.000148% | 5319.9918 | -0.000154% |
| | 93.5 | 5319.9922 | -0.000147% | 5319.9919 | -0.000152% | 5319.9916 | -0.000158% |
| 20 | 126.5 | 5320.0071 | 0.000133% | 5320.0068 | 0.000128% | 5320.0065 | 0.000122% |
| | 110.0 | 5320.0072 | 0.000135% | 5320.0072 | 0.000135% | 5320.0069 | 0.000130% |
| | 93.5 | 5320.0071 | 0.000133% | 5320.0068 | 0.000128% | 5320.0065 | 0.000122% |
| 10 | 126.5 | 5320.0124 | 0.000233% | 5320.0122 | 0.000229% | 5320.0119 | 0.000224% |
| | 110.0 | 5320.0124 | 0.000233% | 5320.0122 | 0.000229% | 5320.0121 | 0.000227% |
| | 93.5 | 5320.0124 | 0.000233% | 5320.0121 | 0.000227% | 5320.0118 | 0.000222% |
| 0 | 126.5 | 5320.023 | 0.000432% | 5320.0180 | 0.000338% | 5320.0180 | 0.000338% |
| | 110.0 | 5320.023 | 0.000432% | 5320.0210 | 0.000395% | 5320.0190 | 0.000357% |
| | 93.5 | 5320.021 | 0.000395% | 5320.0180 | 0.000338% | 5320.0180 | 0.000338% |
| -10 | 126.5 | 5320.0306 | 0.000575% | 5320.0290 | 0.000545% | 5320.0270 | 0.000508% |
| | 110.0 | 5320.0304 | 0.000571% | 5320.0310 | 0.000583% | 5320.0290 | 0.000545% |
| | 93.5 | 5320.0304 | 0.000571% | 5320.0280 | 0.000526% | 5320.0270 | 0.000508% |
| -20 | 126.5 | 5320.0300 | 0.000564% | 5320.0250 | 0.000470% | 5320.0210 | 0.000395% |
| | 110.0 | 5320.0300 | 0.000564% | 5320.0280 | 0.000526% | 5320.0240 | 0.000451% |
| | 93.5 | 5320.0300 | 0.000564% | 5320.0240 | 0.000451% | 5320.0220 | 0.000414% |
| -30 | 126.5 | 5320.0116 | 0.000218% | 5320.0111 | 0.000209% | 5320.0108 | 0.000203% |
| | 110.0 | 5320.0116 | 0.000218% | 5320.0113 | 0.000212% | 5320.0111 | 0.000209% |
| | 93.5 | 5320.0116 | 0.000218% | 5320.0111 | 0.000209% | 5320.0108 | 0.000203% |

## 5.7 BAND EDGES MEASUREMENT

### 5.7.1 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|---|---|---|---|
| SPECTRUM ANALYZER | FSEK30 | 100049 | July 24, 2003 |

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

### 5.7.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set RBW of spectrum analyzer to 1MHz and VBW of spectrum analyzer to 300Hz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

### 5.7.3 EUT OPERATING CONDITION

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

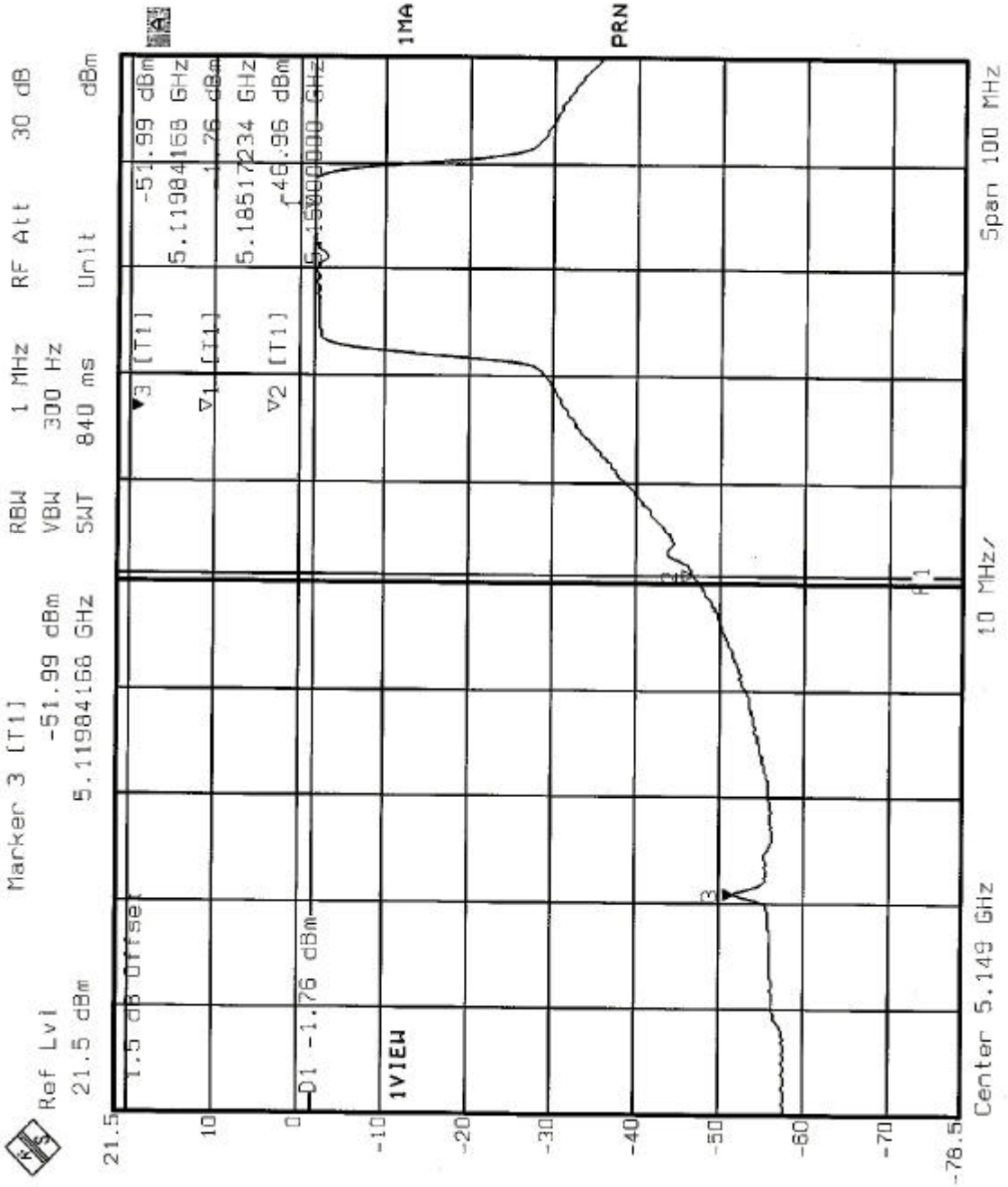
### 5.7.4 TEST RESULTS

For signals in the restricted bands above and below the 5.15 to 5.35 GHz allocated band a measurement was made of the amplitude of the spurious emissions with respect to the intentional signals. The relative amplitude, in dBc, was applied to the average and peak filed strength of the intentional signal made on the OATS to calculate the field strength of the unintentional signals.

The spectrum plots (Average RBW=1MHz, VBW=300Hz) are attached on the following 8 pages.

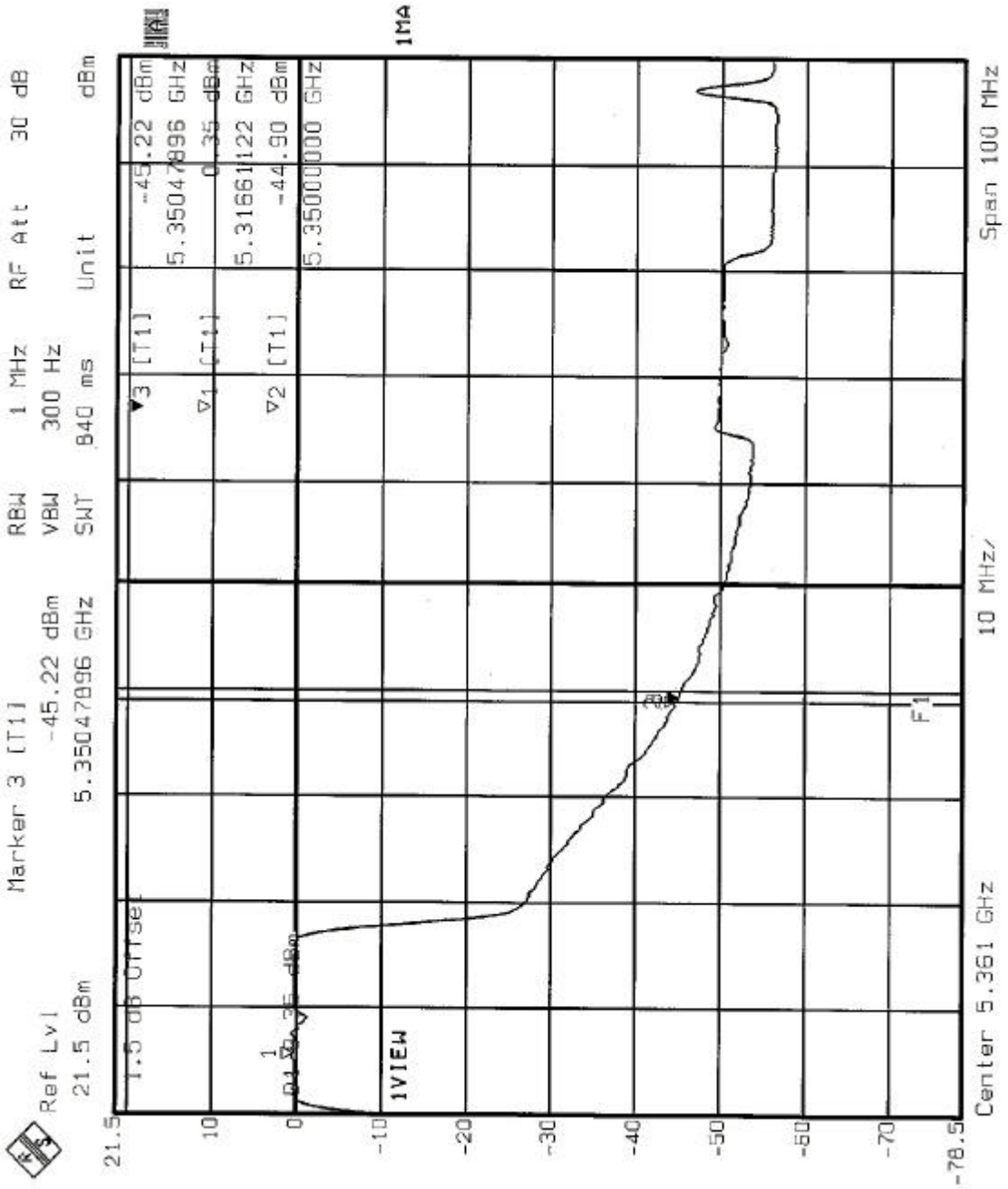
Normal Mode: Channel 1 (5180 MHz)

The band edge emission plot on the following 2 pages shows 45.2dBc (Average) between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 1 (normal mode) is 94.3dBuV/m, so the maximum field strength in restrict band is 94.3- 45.2=49.1dBuV/m which is under 54dBuV/m limit.



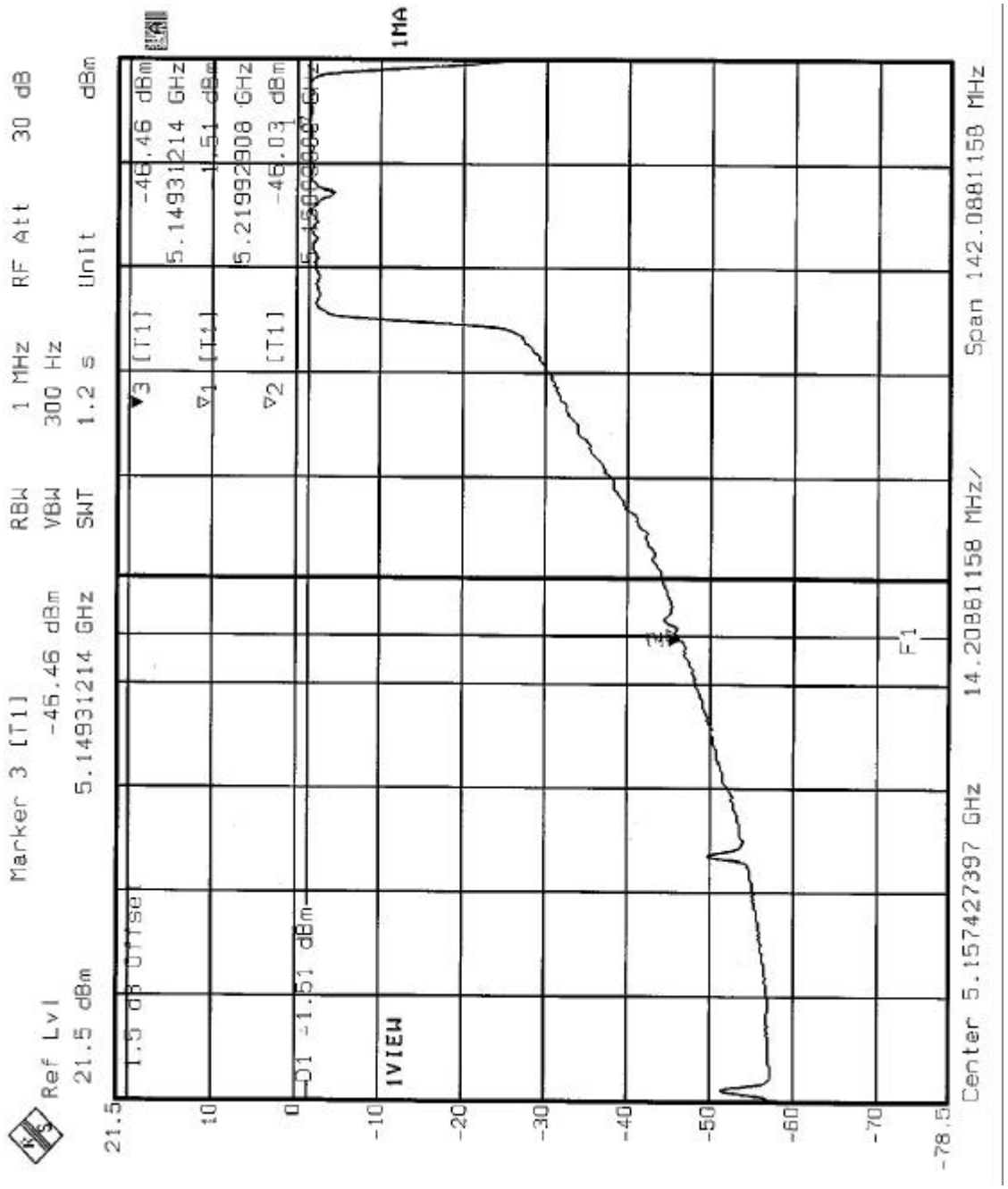
Normal Mode: Channel 8 (5320 MHz)

The band edge emission plot on the following 2 pages shows 45.57dBc (Average) between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 8 (normal mode) is 97.0dBuV/m, so the maximum field strength in restrict band is 97.0-45.57=48.87dBuV/m which is under 54dBuV/m limit.



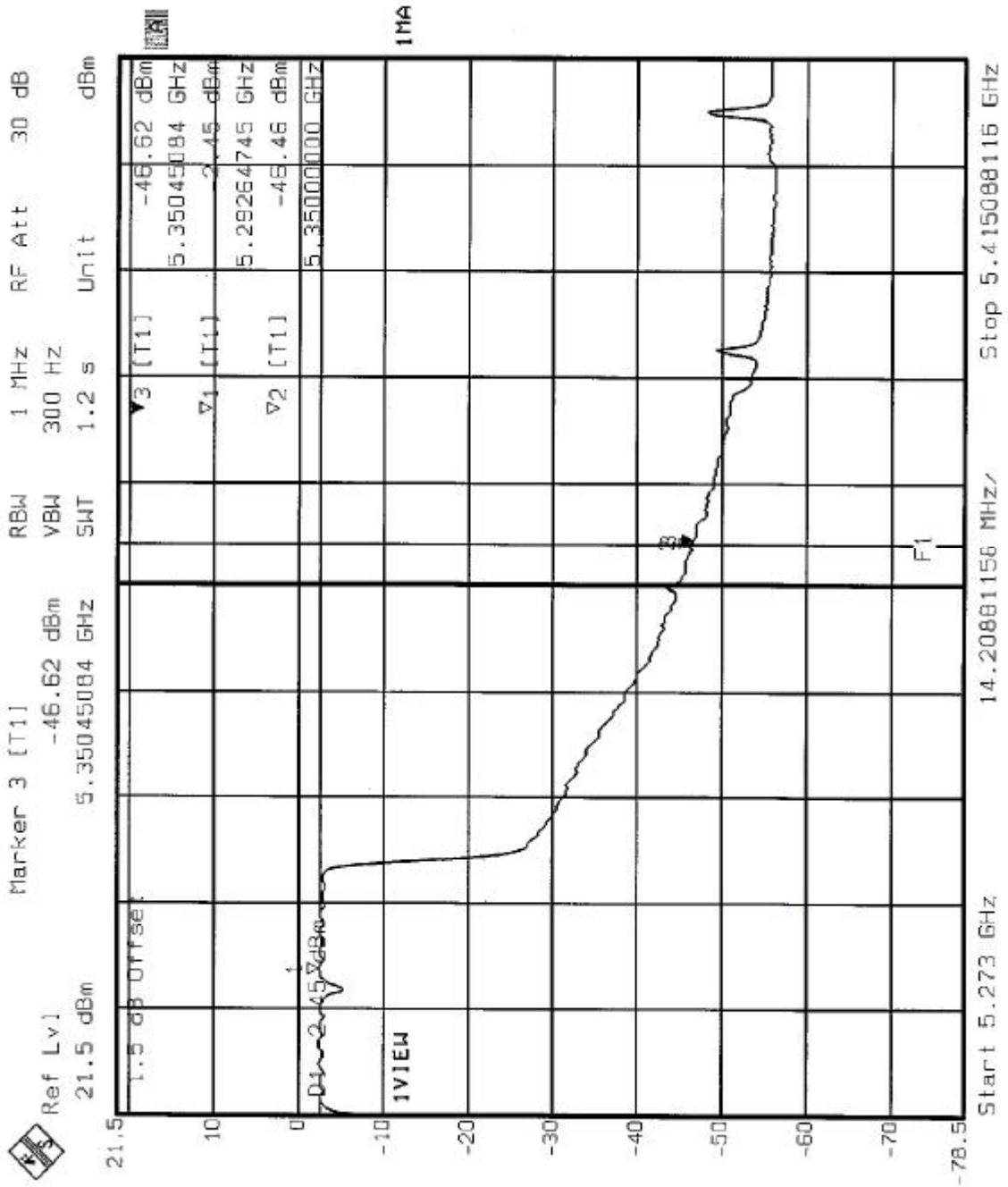
Turbo Mode: Channel 1 (5210 MHz)

The band edge emission plot on the following 2 pages shows 44.95dBc (Average) between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 1 (turbo mode) is 96.8dBuV/m, so the maximum field strength in restrict band is 96.8- 44.95=51.85dBuV/m which is under 54dBuV/m limit.



Turbo Mode: Channel 3 (5290 MHz)

The band edge emission plot on the following 2 pages shows 44.17dBc (Average) between carrier maximum power and local maximum emission in restrict band. The emission of carrier strength list in the test result of channel 8 (turbo mode) is 97.0dBuV/m, so the maximum field strength in restrict band is 97.0-44.17=52.83dBuV/m which is under 54dBuV/m limit.



## 5.8 ANTENNA REQUIREMENT

### 5.8.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

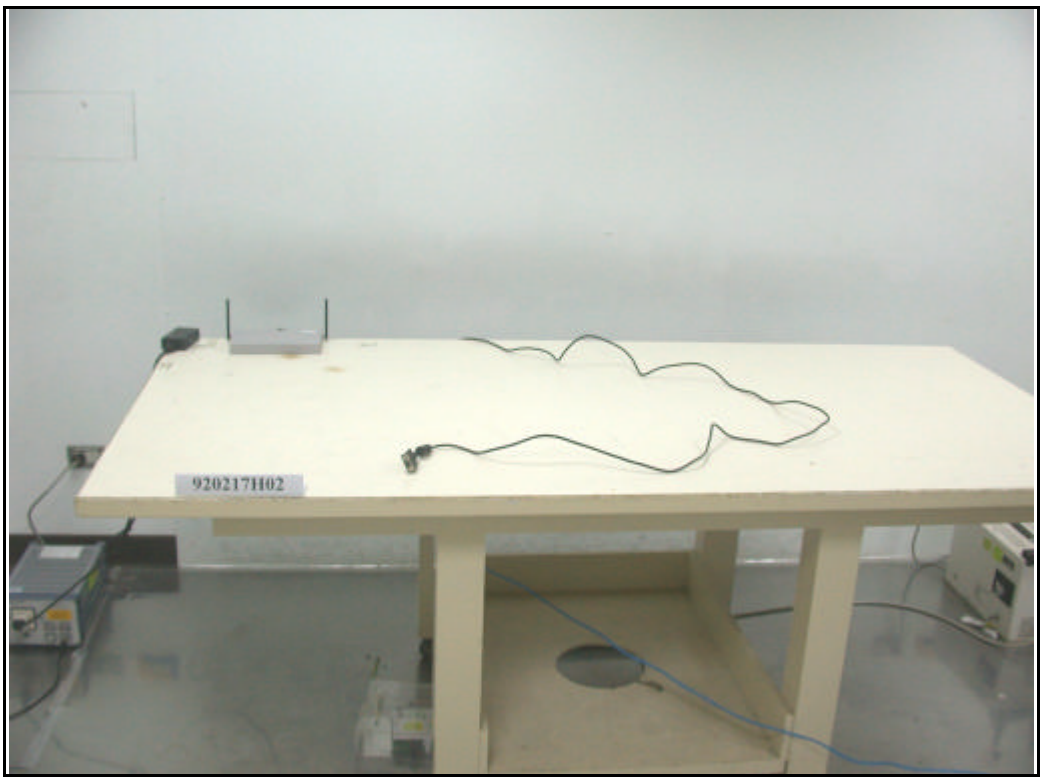
And according to FCC 47 CFR Section 15.407(a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### 5.8.2 ANTENNA CONNECTED CONSTRUCTION

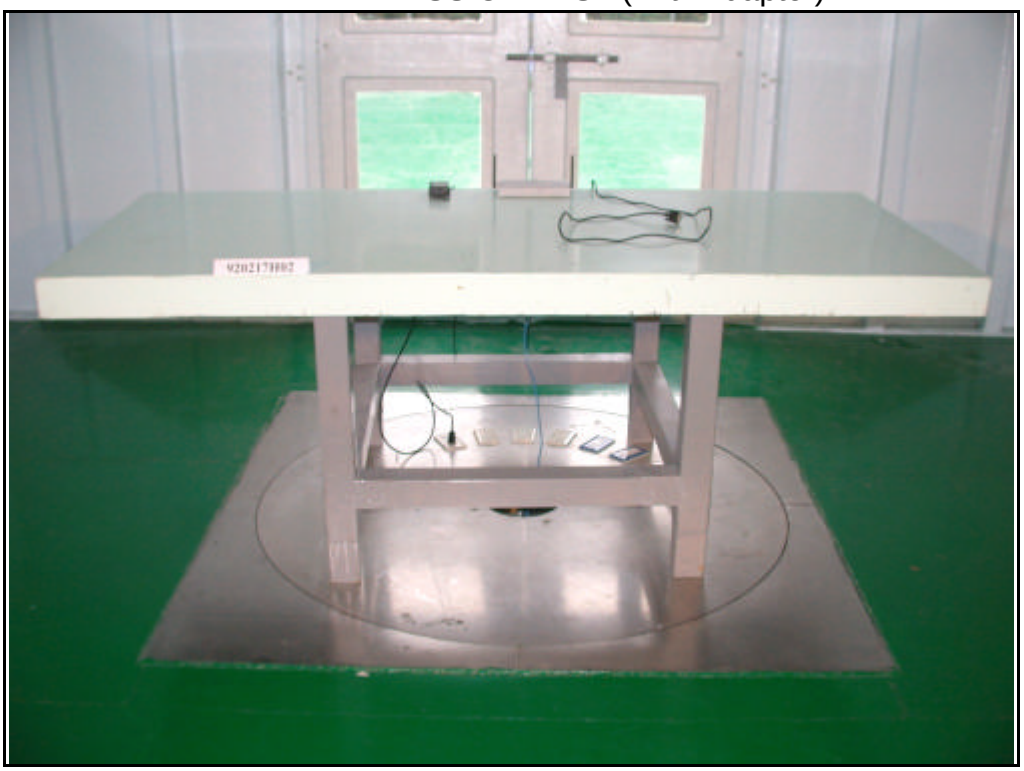
The antenna used in this product is Integral antenna with MMCX connector. The maximum Gain of the antenna is 4.5dBi

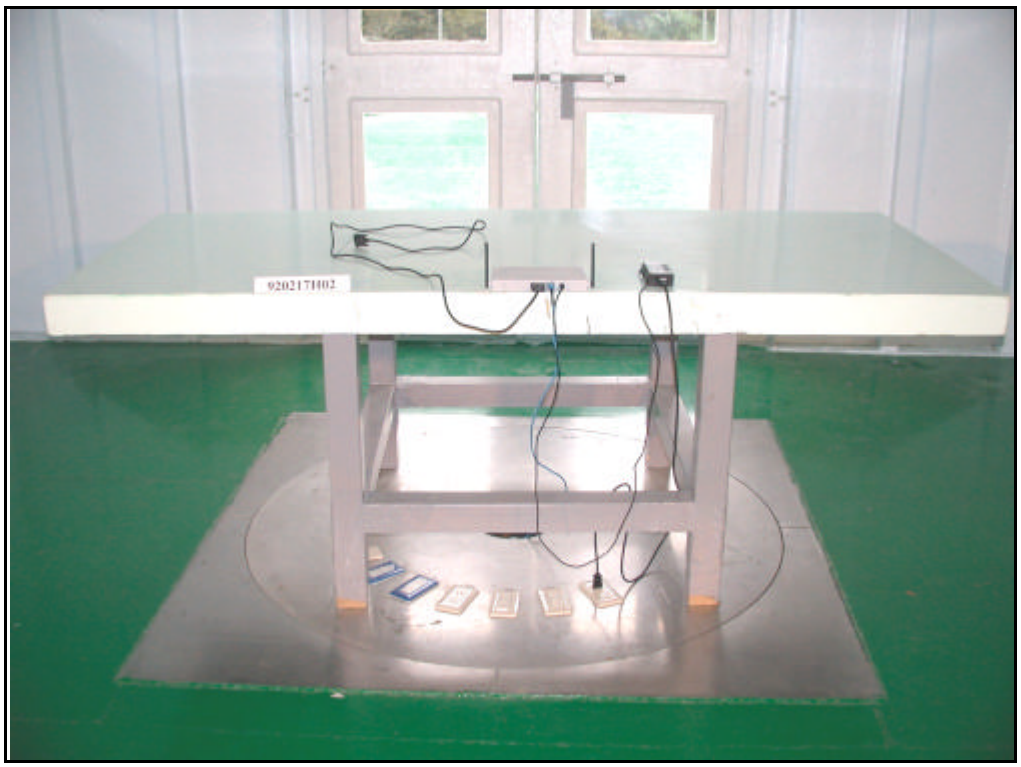
# 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

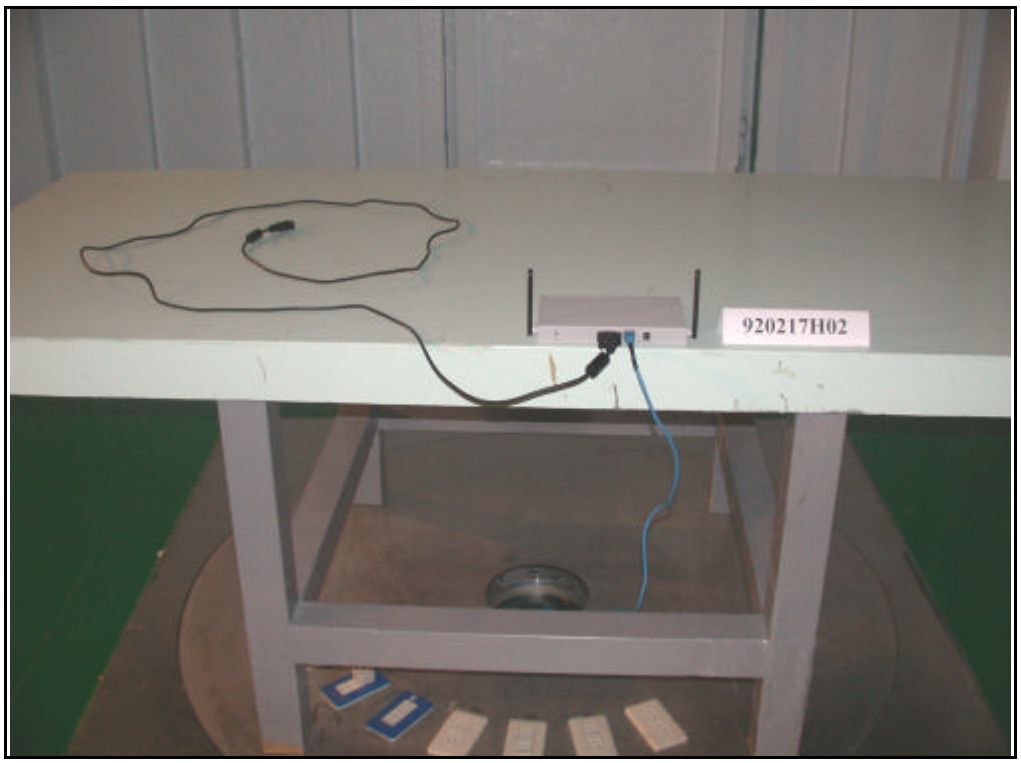


RADIATED EMISSION TEST (With Adapter)





RADIATED EMISSION TEST (With POE)



# 7. INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

| | |
|---|---|
| **USA** | FCC, NVLAP, UL |
| **Germany** | TUV Rheinland |
| **Japan** | VCCI |
| **New Zealand** | MoC |
| **Norway** | NEMKO |
| **R.O.C.** | BSMI, DGT, CNLA |

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:

**Lin Kou EMC Lab**:
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Fax: 886-2-26052943

**Hsin Chu EMC Lab**:
Tel: 886-35-935343
Fax: 886-35-935342

**Lin Kou Safety Lab**:
Tel: 886-2-26093195
Fax: 886-2-26093184

**Lin Kou RF&Telecom Lab**
Tel: 886-3-3270910
Fax: 886-3-3270892

**Email**: service@mail.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.