



4.2 Radiated Emission Measurement

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

For intentional radiator device, per § 15.249(a), the field strength of emissions shall comply with the following:

Frequency MHz	Distance Meters	Fundamental		Harmonic	
		dB μ V/m	mV/m	dB μ V/m	μ V/m
902 – 928	3	94	50	54	500
2400 – 2483	3	94	50	54	500
5725 – 5875	3	94	50	54	500
24000 - 24250	3	108	250	68	2500

Note: In accordance with § 15.249(d), limits shown in above table are based on average limits for frequencies above 1000MHz, and frequencies below 1000MHz are based on quasi peak. However, the peak field strength of any emission shall not exceed the maximum permitted average limits by more than 20dB.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Spectrum Analyzer	8590L	3544A01176	Apr. 18, 2001
HP Preamplifier	8447D	2944A08485	Apr. 27, 2001
HP Preamplifier	8347A	3307A01088	Sep. 04, 2001
ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Aug. 3, 2001
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	N/A
CHASE BILOG Antenna	CBL6112A	2221	Aug. 4, 2001
SCHWARZBECK Horn Antenna	BBHA9120-D	D130	Jul. 9, 2001
SCHWARZBECK Horn Antenna	BBHA9170	123	Jan. 30, 2001
EMCO Turn Table	1060	1115	N/A
SHOSHIN Tower	AP-4701	A6Y005	N/A
Open Field Test Site	Site 5	ADT-R05	Aug. 08, 2001

Notes:

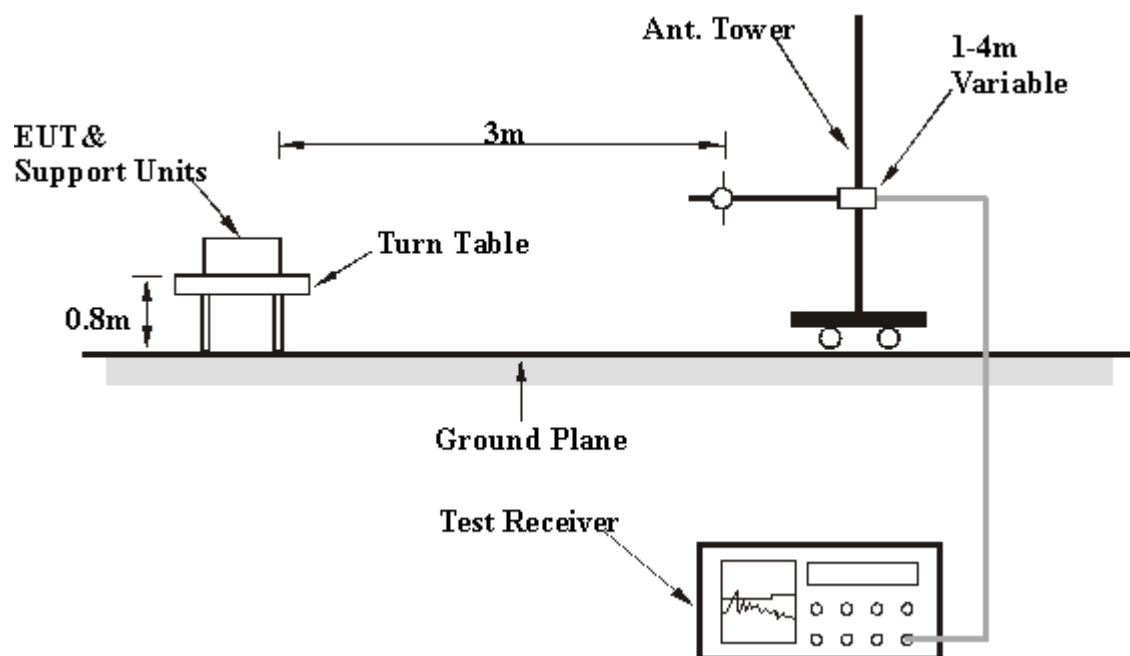
- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
- 2.The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.2.3 TEST PROCEDURES

1. The EUT was placed on the turn table 0.8 meter above ground in 3 meter open area test site.
2. Set the resolution bandwidth to 120KHz in the test receiver and select Peak function to scan the frequency below 1 GHz.
3. Shift the interference-receiving antenna located in antenna tower upwards and downwards between 1 and 4 meters above ground and find out the local peak emission on frequency domain.
4. Locate the interference-receiving antenna at the position where the local peak reach the maximum emission.
5. Rotate the turn table and stop at the angle where the measurement device has maximum reading
6. Shift the interference-receiving antenna again to detect the maximum emission of the local peak
7. If the reading of the local peak under Peak function is lower than limit by 6dB, then Quasi Peak detection is not needed and this reading should be recorded. And if it is higher than Peak limit, then the test is fail. Others, switch the receiver to Quasi Peak function, set the resolution bandwidth to 100kHz and repeat the procedures C ~ F. If the reading is lower than limit, this reading should be recorded, otherwise, the test is fail.
8. Set the resolution and video bandwidth of the spectrum analyzer to 1MHz and repeat procedures C ~ F for frequency band from 1 GHz to 10 times carrier frequency.
9. If the reading for the local peak is lower than the Average limit, no further testing is needed in this local peak and this reading should be recorded. If it is higher than Average limit but lower than Peak limit, then set the resolution bandwidth to 1MHz and video bandwidth to 300Hz. Repeat procedures C ~ F. If the maximum reading is lower than Average limit, then this reading should be recorded. If it is higher, then the test is fail.

Note:1. The frequency range of verification is either from 30 MHz to 1GHz or from 30 MHz up to 10 times carrier frequency of EUT (whichever is the highest frequency range).
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for frequency below 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 Hz for frequency above 1GHz.

4.2.4 TEST SETUP



For the actual test configuration, please refer to the related Item in this test report (**Photographs of the Test Configuration**).

4.2.5 TEST RESULTS

Digital Portion

EUT	Wireless Video Camera	Model	MVW9C
Mode	Channel 1	Detector Function	Quasi-Peak
Frequency Range	30-1000 MHz	Test Distance	3M
Environmental Conditions	20°C , 70% RH	Tested By	Steven Lu

ANTENNA POLARITY: VERTICAL							
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
160.40	15.29	15.41	30.7	43.5	-12.8	105	360
328.00	10.49	14.51	25.0	46.0	-21.0	120	224
356.00	9.67	14.03	23.7	46.0	-22.3	105	169
557.00	20.82	5.48	26.3	46.0	-19.7	216	211
633.50	5.66	20.54	26.2	46.0	-19.8	139	246
857.00	23.92	3.58	27.5	46.0	-18.5	193	177

ANTENNA POLARITY: HORIZONTAL							
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
161.50	15.29	8.01	23.3	43.5	-20.2	209	143
337.50	10.20	10.10	20.3	46.0	-25.7	104	359
338.00	10.20	10.10	20.3	46.0	-25.7	158	359
344.00	16.95	8.05	25.0	46.0	-21.0	104	260
557.50	6.16	17.44	23.6	46.0	-22.4	142	126
858.20	3.05	22.65	25.7	46.0	-20.3	209	18

- Notes: 1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (dBuV).
2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

RF Portion

EUT	Wireless Video Camera	Model	MVW9C
Mode	Channel 1	Detector Function	PK Average
Frequency Range	Above 1000 MHz	Test Distance	3M
Environmental Conditions	20°C, 70%RH	Tested By	Steven Lu

ANTENNA POLARITY: Vertical		Detector Function :				6dB Bandwidth: 1MHz				Frequency Range : 30 – 1000 MHz.	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
*2415.1	36.18	51.5	44.5	87.7	80.7	114	94	-26.3	-13.3	106	130
4829.6	43.95	8.4	-	52.3	-	74.0	54.0	-21.7	-	110	130

ANTENNA POLARITY: Horizontal		Detector Function :				6dB Bandwidth: 1MHz				Frequency Range : 30 – 1000 MHz.	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
*2414.9	36.09	54.4	47.4	90.5	83.5	114	94	-23.5	-10.5	127	326
4829.6	43.95	8.2	-	52.1	-	74.0	54.0	-21.9	-	115	292

- Notes:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (dBuV).
 2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. The limit value is defined as per 15.249
 6. “ * “ : Fundamental frequency

EUT	Wireless Video Camera	Model	MVW9C
Mode	Channel 2	Detector Function	PK Average
Frequency Range	Above 1000 MHz	Test Distance	3M
Environmental Conditions	20°C , 70%RH	Tested By	Steven Lu

ANTENNA POLARITY: Vertical		Detector Function :				6dB Bandwidth: 1MHz				Frequency Range : 30 – 1000 MHz.	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
*2432.7	36.28	55.3	48.3	91.6	84.6	114	94	-22.4	-9.4	99	156
4863.5	44.08	7.3	-	51.4	-	74.0	54.0	-22.6	-	99	255

ANTENNA POLARITY: Horizontal		Detector Function :				6dB Bandwidth: 1MHz				Frequency Range : 30 – 1000 MHz.	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
*2433.9	36.28	55.6	48.6	91.9	84.9	114	94	-22.1	-9.1	126	75
4866.3	43.75	7.5	-	51.2	-	74.0	54.0	-22.8	-	117	155

- Notes:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (dBuV).
 2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. The limit value is defined as per 15.249
 6. “ * “ : Fundamental frequency

EUT	Wireless Video Camera	Model	MVW9C
Mode	Channel 4	Detector Function	PK Average
Frequency Range	Above 1000 MHz	Test Distance	3M
Environmental Conditions	20°C , 70%RH	Tested By	Steven Lu

ANTENNA POLARITY: Vertical		Detector Function :				6dB Bandwidth: 1MHz				Frequency Range : 30 – 1000 MHz.	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
*2471.2	36.42	58.3	51.3	94.7	87.7	114	94	-19.3	-6.3	111	201
4939.0	43.78	7.1	-	50.9	-	74.0	54.0	-23.1	-	108	117

ANTENNA POLARITY: Horizontal		Detector Function :				6dB Bandwidth: 1MHz				Frequency Range : 30 – 1000 MHz.	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
*2466.8	36.42	56.3	49.3	92.7	85.7	114	94	-21.3	-8.3	121	343
4939.0	43.78	7.3	-	51.1	-	74.0	54.0	-22.9	-	119	333

- Notes:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (dBuV).
 2. Correction Factor (dB) = Ant. Factor (dB) + Cable loss (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. The limit value is defined as per 15.249
 6. “ * “ : Fundamental frequency

4.3 BAND EDGES MEASUREMENT

4.3.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100KHz RB).

4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ TEST RECEIVER	ESMI	848926/005 846839/018	Dec 03, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	7475A	2641V27755	N/A

Notes:

- 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.

4.3.3 TEST PROCEDURE

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



4.3.4 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

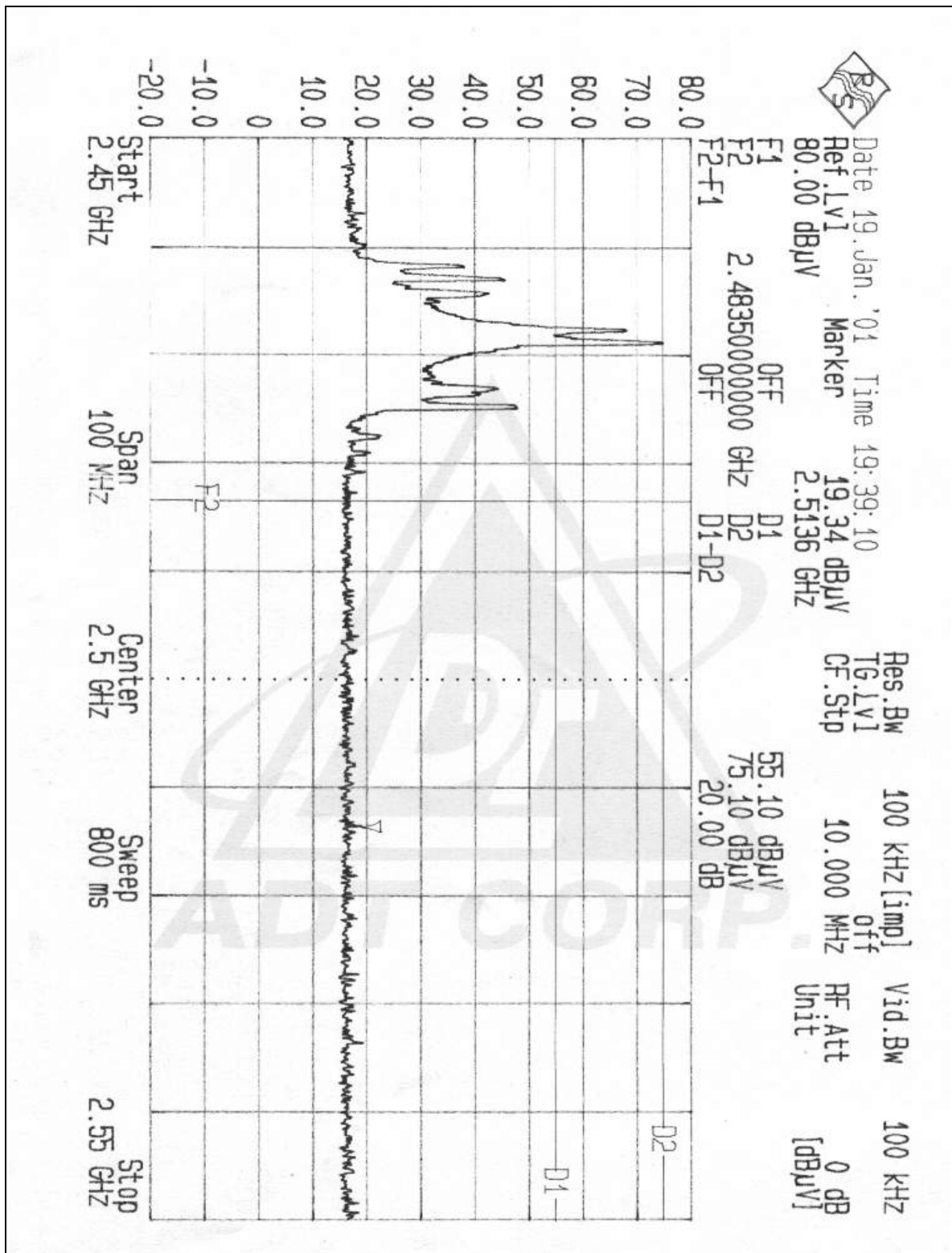
4.3.5 TEST RESULTS

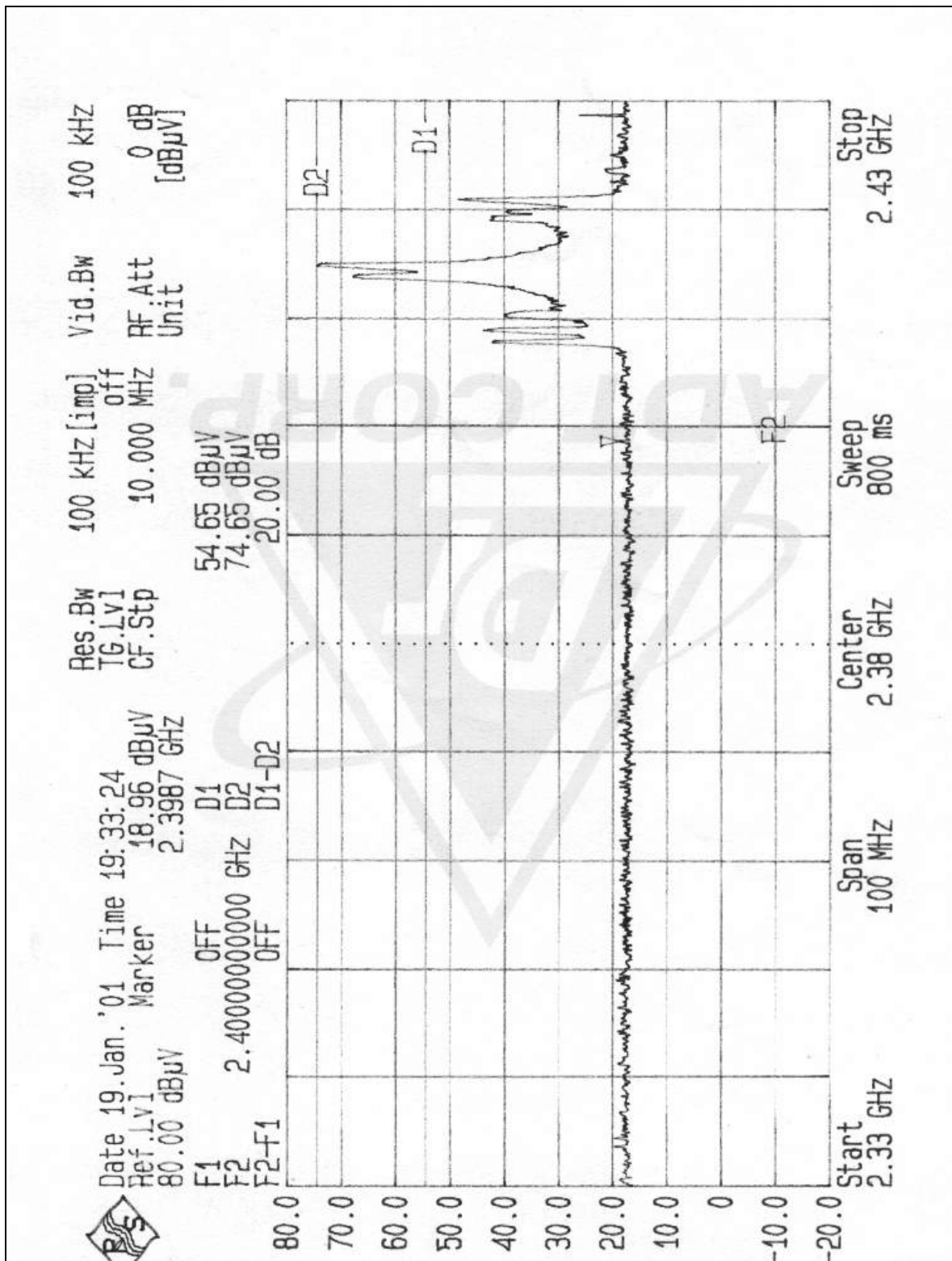
The spectrum plots are attached below. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.249(C).



4.3.6 NOTE ON BAND EDGE EMISSION

The band edge emission plot on page 27 shows 55.8dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in table of page 23 is 94.7dB μ V/m, so the maximum field strength in restrict band is $94.7 - 55.8 = 38.9$ dB μ V/m which is under 54 dB μ V/m limit.





5 PHOTOGRAPHS OF THE TEST CONFIGURATION CONDUCTED EMISSION TEST



RADIATED EMISSION TEST





6 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 by the following approval agencies according to ISO/IEC Guide 25 or EN 45001:

USA	FCC, NVLAP
Germany	TUV Rheinland
Japan	VCCI
New Zealand	RFS
Norway	NEMKO, DNV
U.K.	INCHCAPE
R.O.C.	BSMI

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:

Tel: 886-2-26052180

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

Design Center:

Tel: 886-2-26093195

Fax: 886-2-26093184

Email: service@mail.adt.com.tw

Web Site: www.adt.com.tw