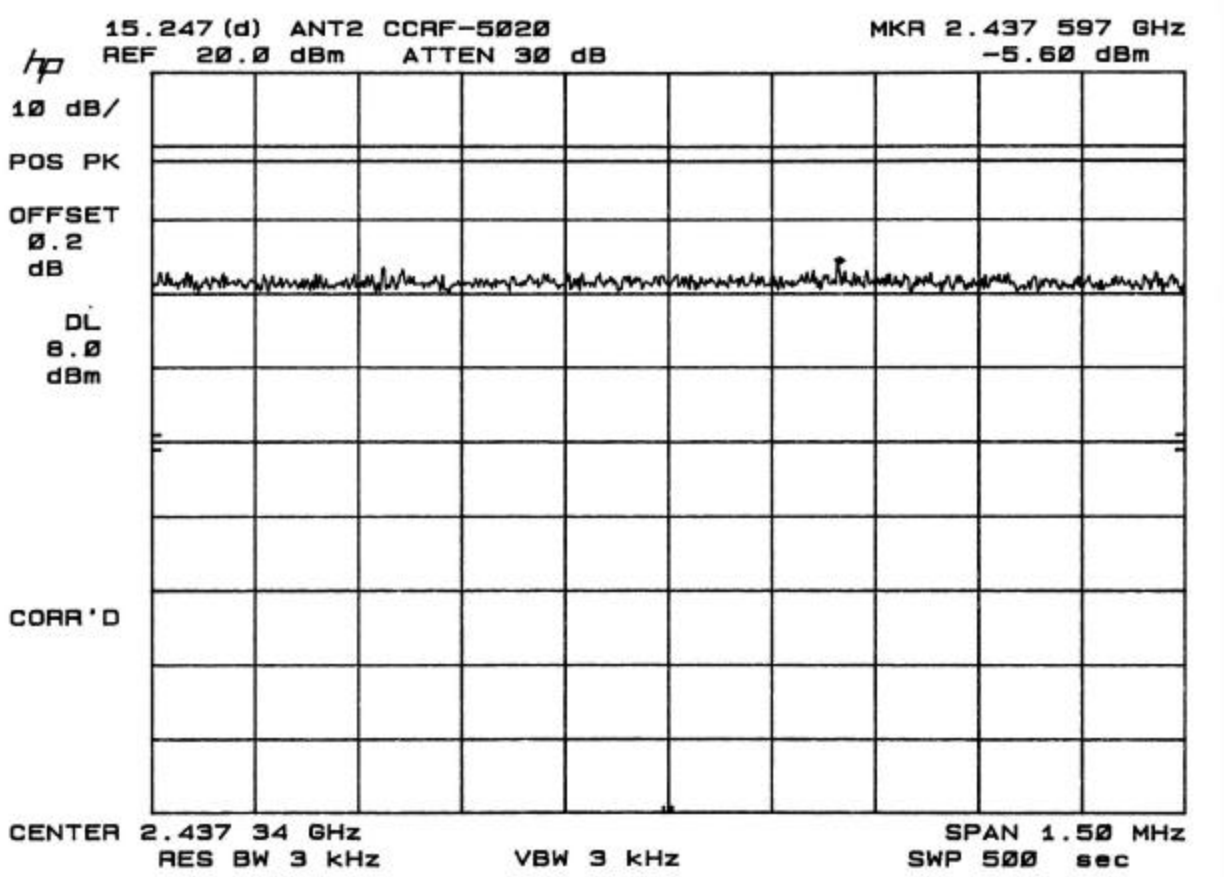
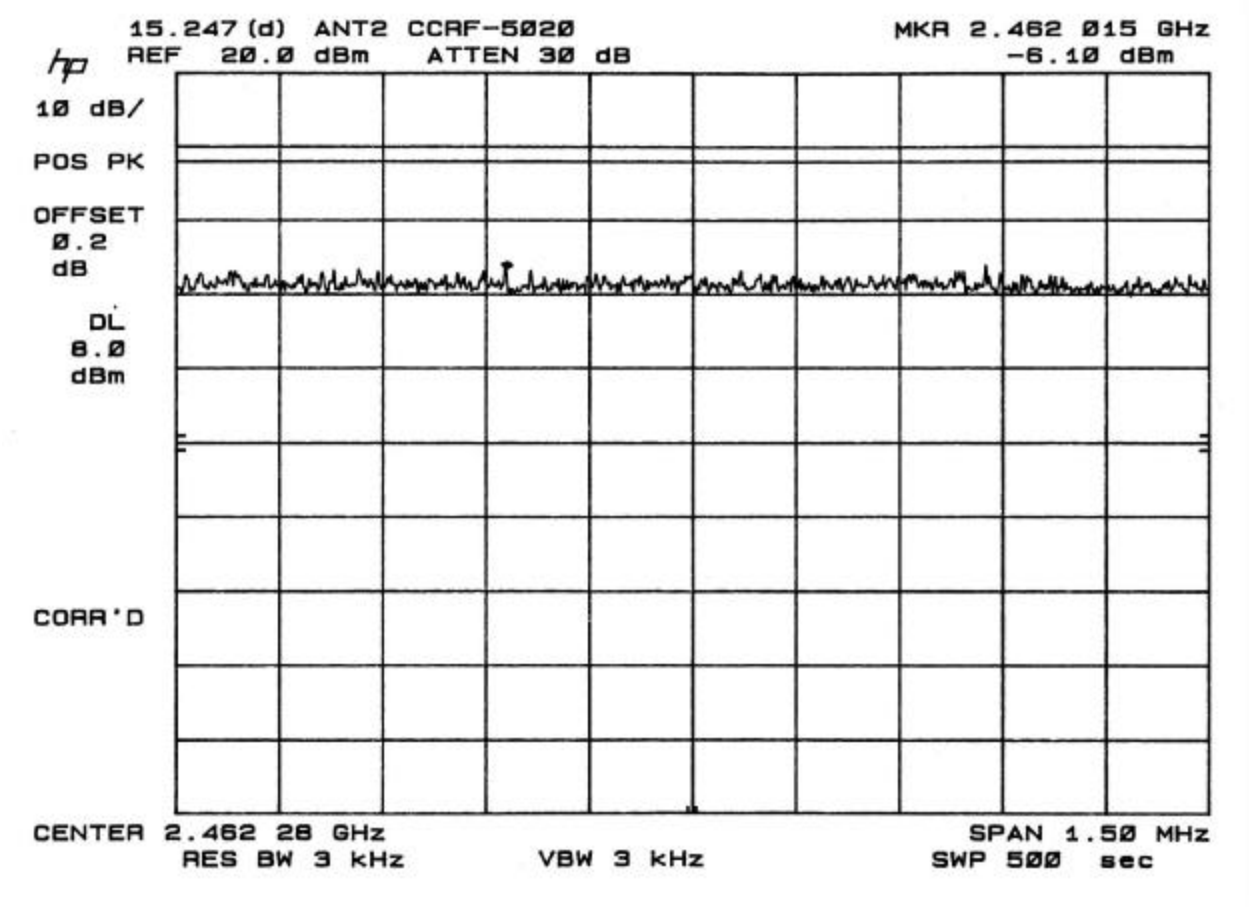
ANTENNA 2 MID CHANNEL



ANTENNA 2 HIGH CHANNEL

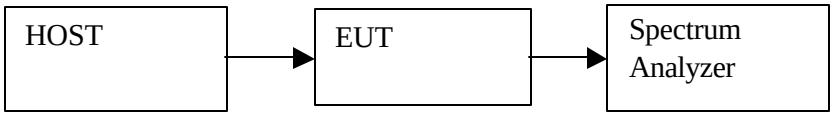


9.5. RESTRICTED BAND EDGE MEASUREMENT

TEST SETUP

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak ☐ Average	☒ 100 KHz ☐ 1 MHz	☒ 100 KHz ☐ 10 Hz



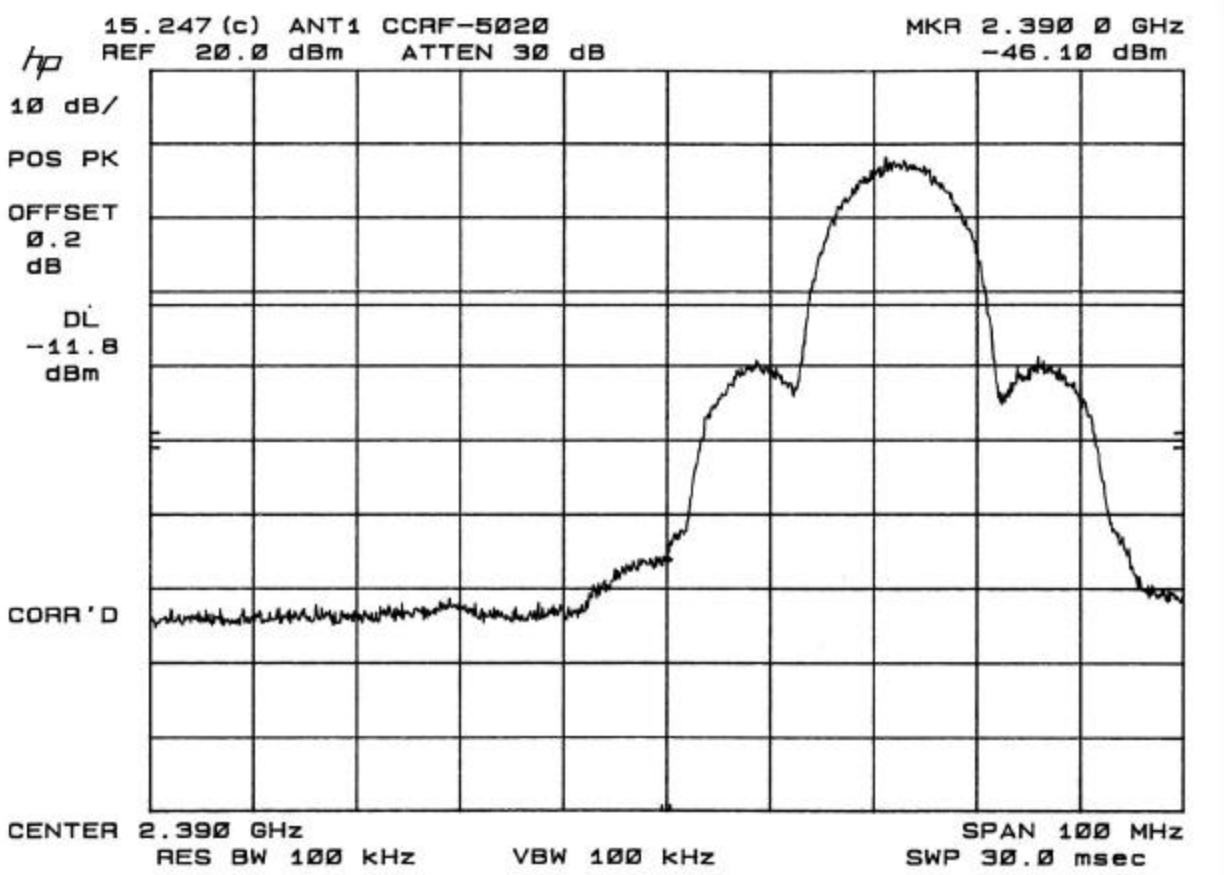
TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator; the lower and upper band edge of the EUT is investigated.
The resolutions and video bandwidth were set to 100kHz.

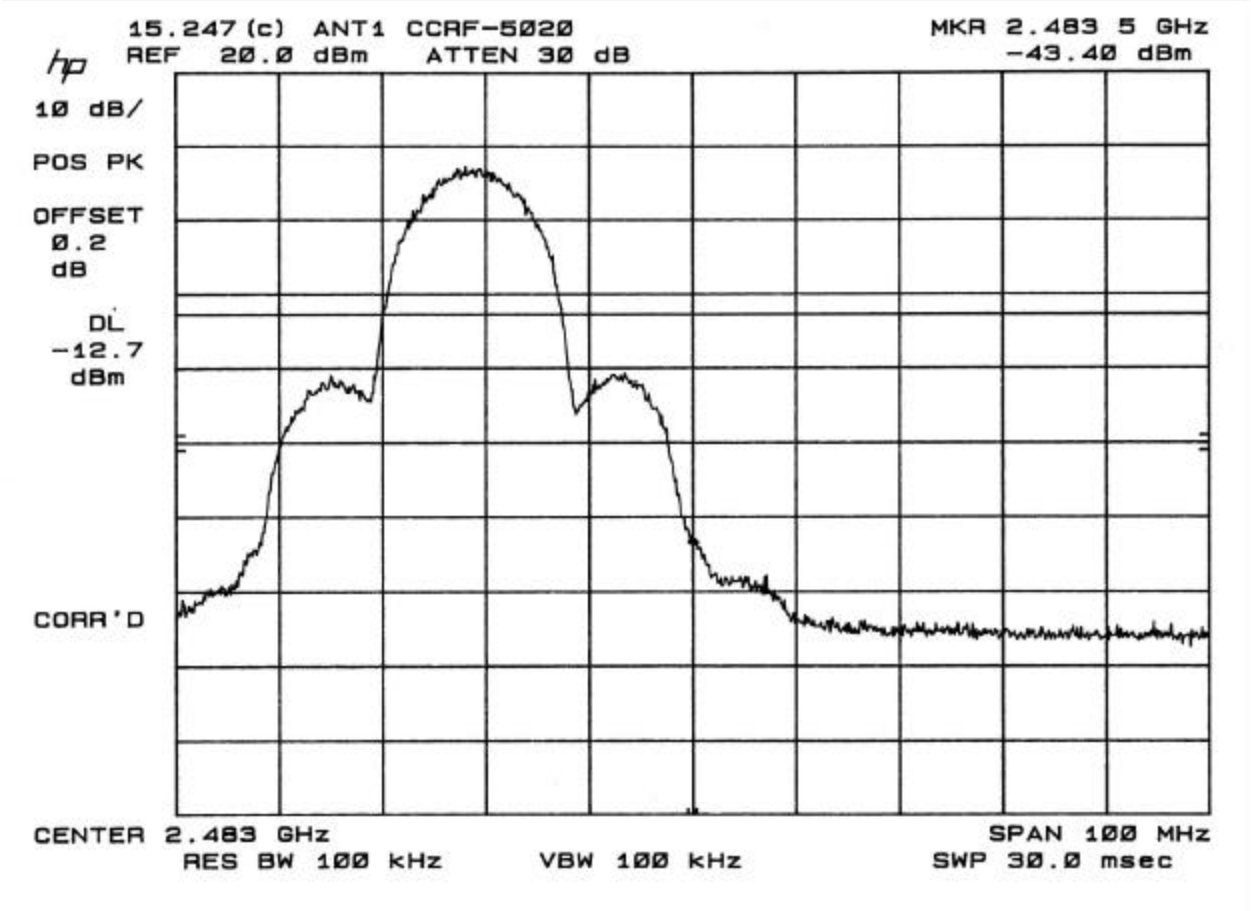
RESULT

No non-compliance noted. See below plots for ANTENNA 1 and 2; LOW and HIGH channels

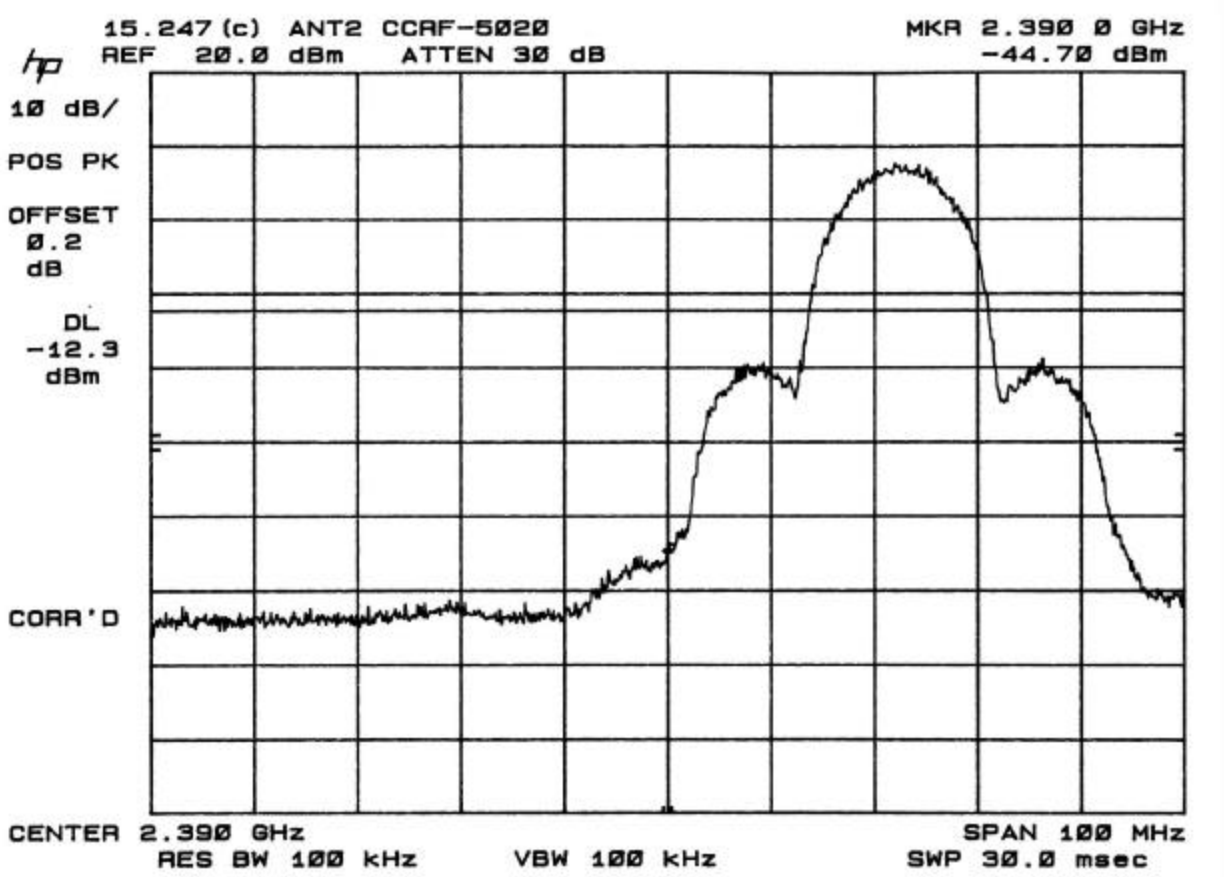
BANDEDGE @ ANTENNA 1 LOW CHANNEL



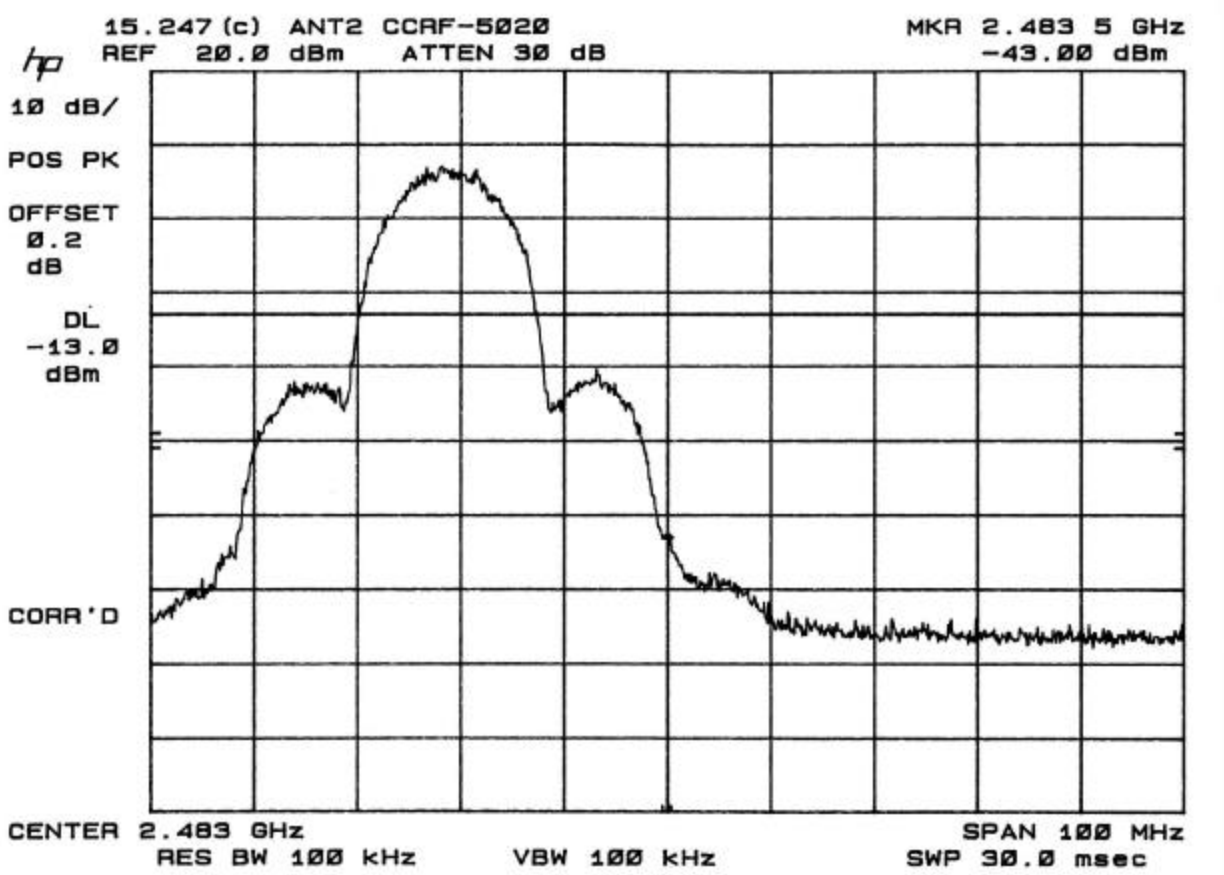
BANDEDGE @ ANTENNA 1 HIGH CHANNEL



BANDEDGE @ ANTENNA 2 LOW CHANNEL



BANDEDGE @ ANTENNA 2 HIGH CHANNEL



9.6. RADIATED EMISSION

9.6.1. RADIATED EMISSION AND RESTRICTED BANDS

TEST SETUP

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	☒ Peak ☒ Quasi Peak	☒ 100 KHz ☒ 1 MHz	☒ 100 KHz ☒ 1 MHz
Above 1000	☒ Peak ☒ Average	☒ 1 MHz ☒ 1 MHz	☒ 1 MHz ☒ 10 Hz

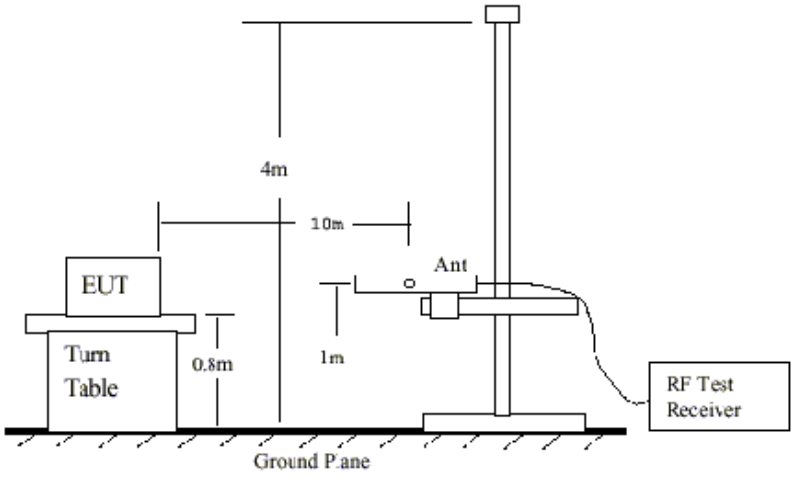


Fig 1: Radiated Emission Measurement 30 to 1000 MHz

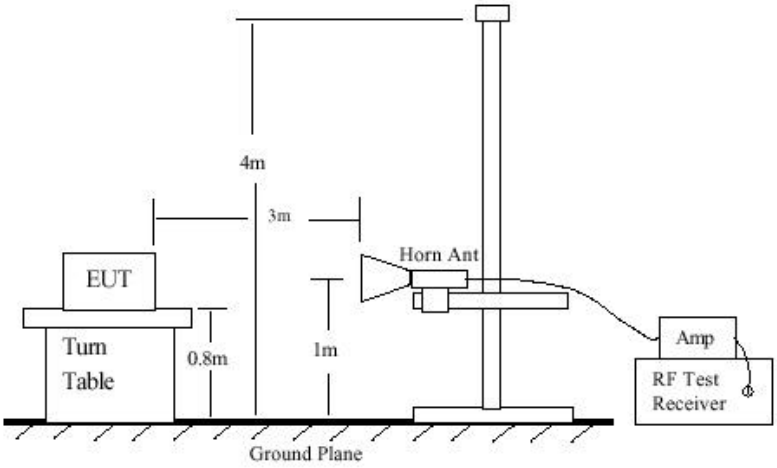


Fig 2: Radiated Emission Above 1000 MHz

TEST PROCEDURE

1. The EUT was placed on the turntable 0.8 meter above ground in 3 meter open area test site.
2. Set the resolution bandwidth to 100KHz 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 turntable 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 (3)~(6). 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 (3)~(6) 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 10Hz. Repeat procedures (3)~(6). If the maximum reading is lower than Average limit, then this reading should be recorded. If it is higher, then the test is fail.

RESULT

No non-compliance noted. See data below.

EUT with power supply model 4001, S/N: A02126015000069

COMPLIANCE Certification Services

FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #:	02U1260-1
Report #:	020430B1
Date& Time:	04/30/02 3:53 PM
Test Engr:	KERWIN CORPUZ
Company:	SYMBOL TECHNOLOGIES, INC.
EUT Description:	802.11b WLAN RF Port "Butterfly" (M/N: CCRF-5020)
Test Configuration :	EUT/PowerDsine 4001 S/N: A02126012000069
Type of Test:	FCC 15.209
Mode of Operation:	Rx

<< Main Sheet

Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
500.00	52.30	17.32	5.24	29.76	45.10	46.00	-0.90	3mV	180.00	1.00	QP
500.00	48.00	17.32	5.24	29.76	40.80	46.00	-5.20	3mH	90.00	1.70	P
450.00	47.10	16.59	4.90	29.55	39.04	46.00	-6.96	3mH	90.00	1.70	P
220.00	54.50	10.11	3.13	29.05	38.70	46.00	-7.30	3mV	80.00	1.00	P
220.00	53.30	10.11	3.13	29.05	37.50	46.00	-8.50	3mH	270.00	1.70	P
400.00	45.90	15.85	4.56	29.34	36.97	46.00	-9.03	3mH	90.00	1.70	P
6 Worst Data											

EUT with power supply model 6012, S/N: S02116416504675

COMPLIANCE Certification Services

FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #:	02U1260-1
Report #:	020430B1
Date& Time:	04/30/02 3:53 PM
Test Engr:	KERWIN CORPUZ

Company:	SYMBOL TECHNOLOGIES, INC.
EUT Description:	802.11b WLAN RF Port "Butterfly" (M/N: CCRF-5020)
Test Configuration :	EUT/PowerDsine 6012 S/N: S02116416504675
Type of Test:	FCC 15.209
Mode of Operation:	Rx

<< Main Sheet

Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
500.00	52.30	17.32	5.24	29.76	45.10	46.00	-0.90	3mV	180.00	1.00	QP
500.00	48.00	17.32	5.24	29.76	40.80	46.00	-5.20	3mH	90.00	1.70	P
115.95	52.50	11.53	2.33	29.51	36.85	43.50	-6.65	3mV	0.00	1.00	P
110.98	52.80	11.10	2.29	29.52	36.67	43.50	-6.83	3mV	0.00	1.00	P
113.93	52.40	11.35	2.31	29.52	36.55	43.50	-6.95	3mV	0.00	1.00	P
450.00	47.10	16.59	4.90	29.55	39.04	46.00	-6.96	3mH	90.00	1.70	P
6 Worst Data											

COMPLIANCE CERTIFICATION SERVICES, INC.

Radiated Emissions 04/18/02
FCC 15.205 Kerwin Corpuz
A-site (1.0 Meter)

SYMBOL TECHNOLOGIES,INC.
802.11b WLAN RF Port "Butterfly" (M/N: CCRF-5020)

fo = 2412 MHz (low channel) ***TX mode with ANTENNA 1***

FREQ (MHz)	READING (dBuV)		AF (dB)	CL (dB)	AMP (dB)	DIST (dB)	HPF (dB)	TOTAL (dBuV/m)		LIMIT (dBuV/m)		MARGIN (dB)	
	Pk	Avg						Pk	Avg	Pk	Avg	Pk	Avg
4824V	56.4	44	33.4	4	36.1	9.54	1	49.16	36.76	74	54	-24.8	-17.2
4824H	60.6	48.3	33.4	4	36.1	9.54	1	53.36	41.06	74	54	-20.6	-12.9
7236*	48.1	36.6	37	5	36.4	9.54	1	45.16	33.66	74	54	-28.8	-20.3
9648*	47.6	36.4	38.4	5.9	35.5	9.54	1	47.86	36.66	74	54	-26.1	-17.3
12060*	47.6	36	39.3	6.5	36.3	9.54	1	48.56	36.96	74	54	-25.4	-17
14472*	49.9	38.9	41.2	7.5	38	9.54	1	52.06	41.06	74	54	-21.9	-12.9
16884*	50	39	41.5	8.5	38.9	9.54	1	52.56	41.56	74	54	-21.4	-12.4
19296*	52.8	42.8	31.9	9.4	39.3	9.54	1	46.26	36.26	74	54	-27.7	-17.7
21708*	53.1	42.8	32.5	10.2	38.1	9.54	1	49.16	38.86	74	54	-24.8	-15.1
24120*	40.9	31.3	32.5	2.52	0	20	1	56.92	47.32	74	54	-17.1	-6.68

fo = 2437 MHz (mid channel) ***TX mode with ANTENNA 1***

FREQ (MHz)	READING (dBuV)		AF (dB)	CL (dB)	AMP (dB)	DIST (dB)	HPF (dB)	TOTAL (dBuV/m)		LIMIT (dBuV/m)		MARGIN (dB)	
	Pk	Avg						Pk	Avg	Pk	Avg	Pk	Avg
4874V	57.6	45	33.4	4	36.1	9.54	1	50.36	37.76	74	54	-23.6	-16.2
4874H	60.9	48.5	33.4	4	36.1	9.54	1	53.66	41.26	74	54	-20.3	-12.7
7311*	48.1	36.6	37	5	36.4	9.54	1	45.16	33.66	74	54	-28.8	-20.3
9748*	47.6	36.4	38.4	5.9	35.5	9.54	1	47.86	36.66	74	54	-26.1	-17.3
12185*	47.6	36	39.3	6.5	36.3	9.54	1	48.56	36.96	74	54	-25.4	-17
14622*	49.9	38.9	41.2	7.5	38	9.54	1	52.06	41.06	74	54	-21.9	-12.9
17059*	50	39	41.5	8.5	38.9	9.54	1	52.56	41.56	74	54	-21.4	-12.4
19496*	52.8	42.8	31.9	9.4	39.3	9.54	1	46.26	36.26	74	54	-27.7	-17.7
21933*	53.1	42.8	32.5	10.2	38.1	9.54	1	49.16	38.86	74	54	-24.8	-15.1
24370*	40.9	31.3	32.5	2.52	0	20	1	56.92	47.32	74	54	-17.1	-6.68

fo = 2462 MHz (high channel) ***TX mode with ANTENNA 1***

FREQ (MHz)	READING (dBuV)		AF (dB)	CL (dB)	AMP (dB)	DIST (dB)	HPF (dB)	TOTAL (dBuV/m)		LIMIT (dBuV/m)		MARGIN (dB)	
	Pk	Avg						Pk	Avg	Pk	Avg	Pk	Avg
4924V	58	45.2	33.4	4	36.1	9.54	1	50.76	37.96	74	54	-23.2	-16
4924H	62.9	50.5	33.4	4	36.1	9.54	1	55.66	43.26	74	54	-18.3	-10.7
7386*	48.1	36.6	37	5	36.4	9.54	1	45.16	33.66	74	54	-28.8	-20.3
9848*	47.6	36.4	38.4	5.9	35.5	9.54	1	47.86	36.66	74	54	-26.1	-17.3
12310*	47.6	36	39.3	6.5	36.3	9.54	1	48.56	36.96	74	54	-25.4	-17
14772*	49.9	38.9	41.2	7.5	38	9.54	1	52.06	41.06	74	54	-21.9	-12.9
17234*	50	39	41.5	8.5	38.9	9.54	1	52.56	41.56	74	54	-21.4	-12.4
19696*	52.8	42.8	31.9	9.4	39.3	9.54	1	46.26	36.26	74	54	-27.7	-17.7
22158*	53.1	42.8	32.5	10.2	38.1	9.54	1	49.16	38.86	74	54	-24.8	-15.1
24620*	40.9	31.3	32.5	2.52	0	20	1	56.92	47.32	74	54	-17.1	-6.68

fo = 2412 MHz (low channel) ***TX mode with ANTENNA 2***

FREQ (MHz)	READING (dBuV)		AF (dB)	CL (dB)	AMP (dB)	DIST (dB)	HPF (dB)	TOTAL (dBuV/m)		LIMIT (dBuV/m)		MARGIN (dB)	
	Pk	Avg						Pk	Avg	Pk	Avg	Pk	Avg
4824V	56.1	44	33.4	4	36.1	9.54	1	48.86	36.76	74	54	-25.1	-17.2
4824H	65.1	52.1	33.4	4	36.1	9.54	1	57.86	44.86	74	54	-16.1	-9.14
7236*	48.1	36.6	37	5	36.4	9.54	1	45.16	33.66	74	54	-28.8	-20.3
9648*	47.6	36.4	38.4	5.9	35.5	9.54	1	47.86	36.66	74	54	-26.1	-17.3
12060*	47.6	36	39.3	6.5	36.3	9.54	1	48.56	36.96	74	54	-25.4	-17
14472*	49.9	38.9	41.2	7.5	38	9.54	1	52.06	41.06	74	54	-21.9	-12.9
16884*	50	39	41.5	8.5	38.9	9.54	1	52.56	41.56	74	54	-21.4	-12.4
19296*	52.8	42.8	31.9	9.4	39.3	9.54	1	46.26	36.26	74	54	-27.7	-17.7
21708*	53.1	42.8	32.5	10.2	38.1	9.54	1	49.16	38.86	74	54	-24.8	-15.1
24120*	40.9	31.3	32.5	2.52	0	20	1	56.92	47.32	74	54	-17.1	-6.68

fo = 2437 MHz (mid channel) ***TX mode with ANTENNA 2***

FREQ (MHz)	READING (dBuV)		AF (dB)	CL (dB)	AMP (dB)	DIST (dB)	HPF (dB)	TOTAL (dBuV/m)		LIMIT (dBuV/m)		MARGIN (dB)	
	Pk	Avg						Pk	Avg	Pk	Avg	Pk	Avg
4874V	55.8	43.2	33.4	4	36.1	9.54	1	48.56	35.96	74	54	-25.4	-18
4874H	62.9	49.9	33.4	4	36.1	9.54	1	55.66	42.66	74	54	-18.3	-11.3
7311*	48.1	36.6	37	5	36.4	9.54	1	45.16	33.66	74	54	-28.8	-20.3
9748*	47.6	36.4	38.4	5.9	35.5	9.54	1	47.86	36.66	74	54	-26.1	-17.3
12185*	47.6	36	39.3	6.5	36.3	9.54	1	48.56	36.96	74	54	-25.4	-17
14622*	49.9	38.9	41.2	7.5	38	9.54	1	52.06	41.06	74	54	-21.9	-12.9
17059*	50	39	41.5	8.5	38.9	9.54	1	52.56	41.56	74	54	-21.4	-12.4
19496*	52.8	42.8	31.9	9.4	39.3	9.54	1	46.26	36.26	74	54	-27.7	-17.7
21933*	53.1	42.8	32.5	10.2	38.1	9.54	1	49.16	38.86	74	54	-24.8	-15.1
24370*	40.9	31.3	32.5	2.52	0	20	1	56.92	47.32	74	54	-17.1	-6.68

fo = 2462 MHz (high channel) ***TX mode with ANTENNA 2***

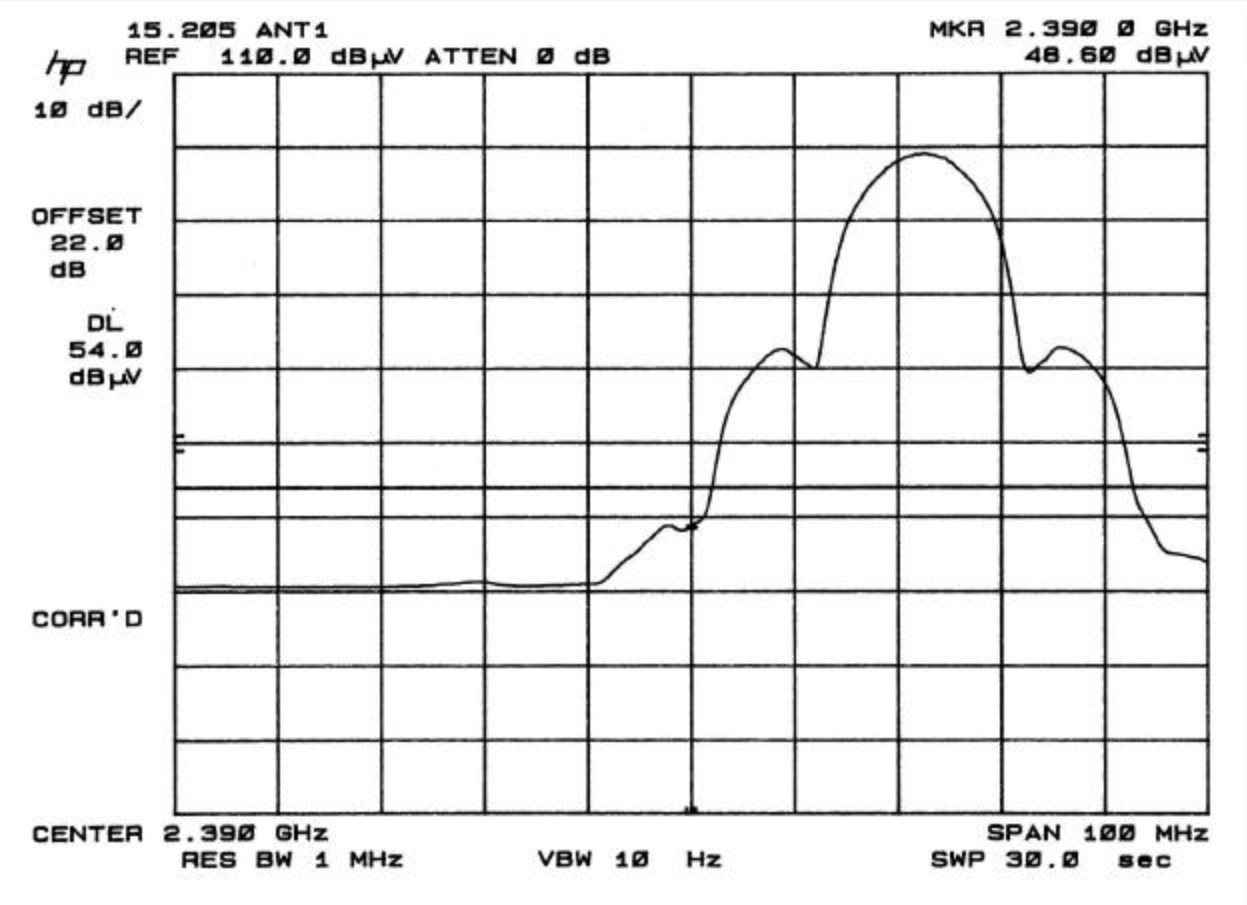
FREQ (MHz)	READING (dBuV)		AF (dB)	CL (dB)	AMP (dB)	DIST (dB)	HPF (dB)	TOTAL (dBuV/m)		LIMIT (dBuV/m)		MARGIN (dB)	
	Pk	**Avg**						**Pk**	**Avg**	**Pk**	**Avg**	**Pk**	**Avg**
4924V	54.6	41.5	33.4	4	36.1	9.54	1	47.36	34.26	74	54	-26.6	-19.7
4924H	61.9	49.8	33.4	4	36.1	9.54	1	54.66	42.56	74	54	-19.3	-11.4
7386*	48.1	36.6	37	5	36.4	9.54	1	45.16	33.66	74	54	-28.8	-20.3
9848*	47.6	36.4	38.4	5.9	35.5	9.54	1	47.86	36.66	74	54	-26.1	-17.3
12310*	47.6	36	39.3	6.5	36.3	9.54	1	48.56	36.96	74	54	-25.4	-17
14772*	49.9	38.9	41.2	7.5	38	9.54	1	52.06	41.06	74	54	-21.9	-12.9
17234*	50	39	41.5	8.5	38.9	9.54	1	52.56	41.56	74	54	-21.4	-12.4
19696*	52.8	42.8	31.9	9.4	39.3	9.54	1	46.26	36.26	74	54	-27.7	-17.7
22158*	53.1	42.8	32.5	10.2	38.1	9.54	1	49.16	38.86	74	54	-24.8	-15.1
24620*	40.9	31.3	32.5	2.52	0	20	1	56.92	47.32	74	54	-17.1	-6.68

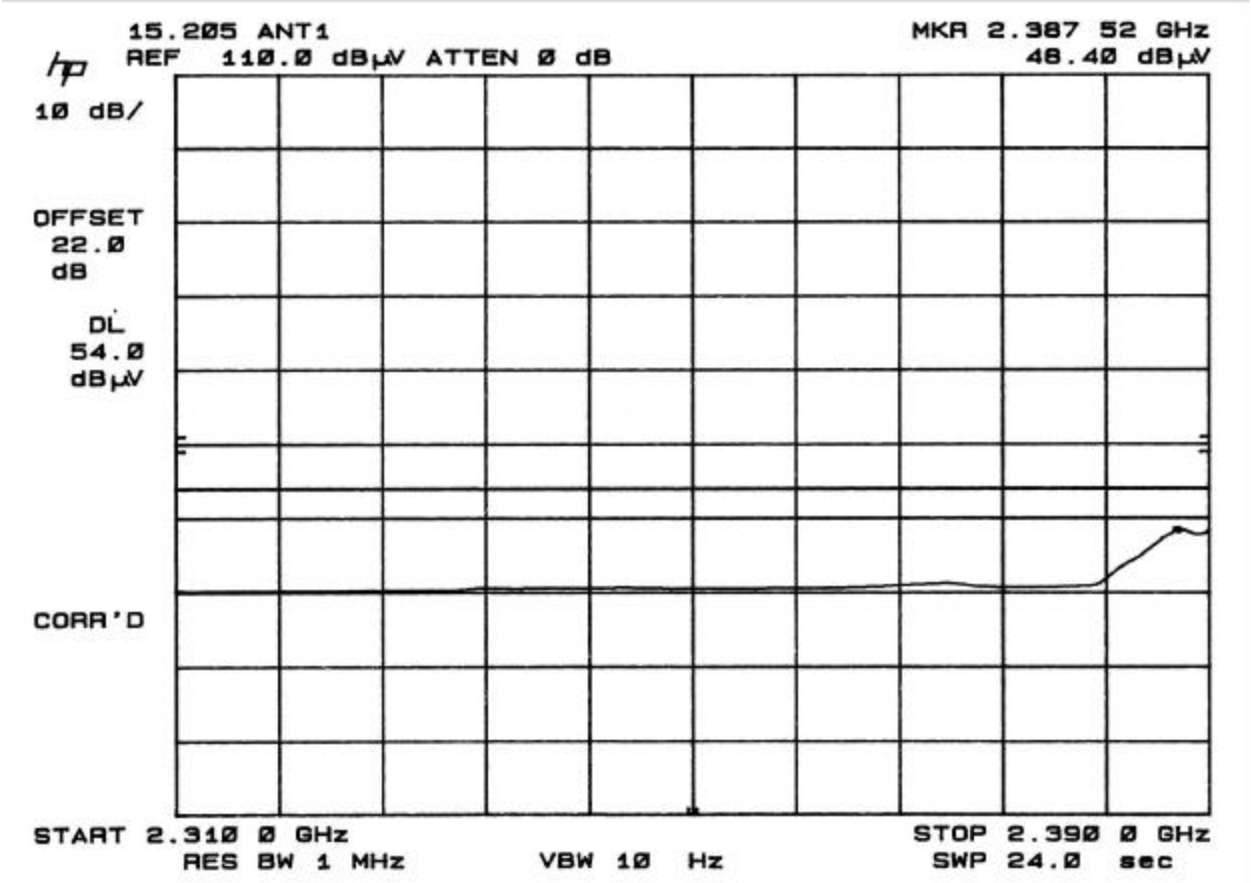
NOTE: * Measured noise floor (worse case vertical), horizontal (H) and vertical (V)
DIST: extrapolate reading from 3m specification distance to 1m measurement distance = **-9.54dB**
extrapolate reading from 3m specification distance to 0.3m measurement distance = **-20dB**
AF: Antenna Factor
AMP: Pre-amp gain
CL: SMA cable loss (13ft up to 24 GHz and 3ft above 24 GHz)
HPF: FSY High pass filter insertion loss (4.57GHz; S/N:003)

ANALYZER SETTINGS	**RES BW**	**AVG BW**
Peak(Pk):	**1MHz**	**1MHz**
Average(Avg):	**1MHz**	**10Hz**

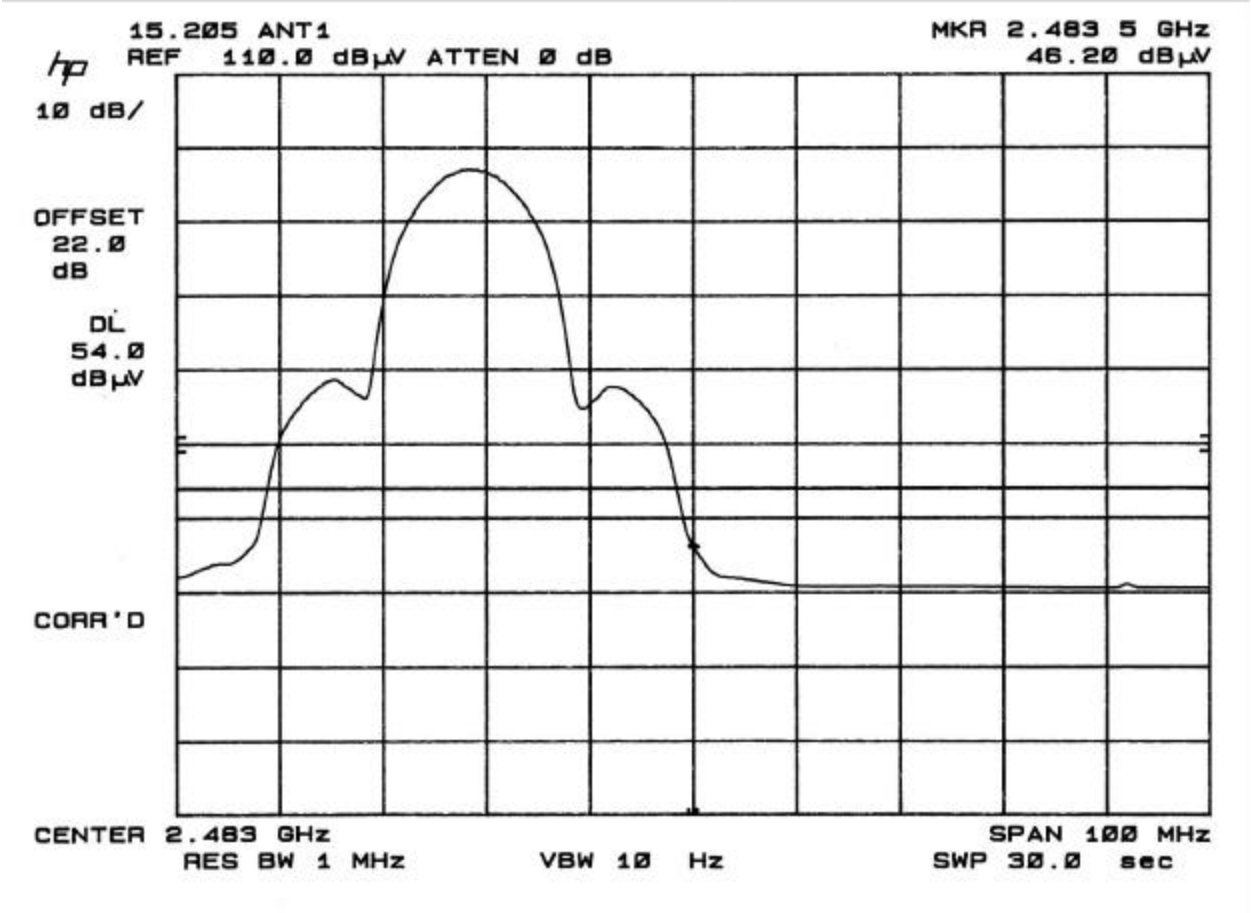
RESTRICTED BANDEDGE: 2310 – 2390 MHz and 2483.5 – 2500 MHz

BOTTOM BANDEDGE @ ANTENNA 1 LOW CHANNEL

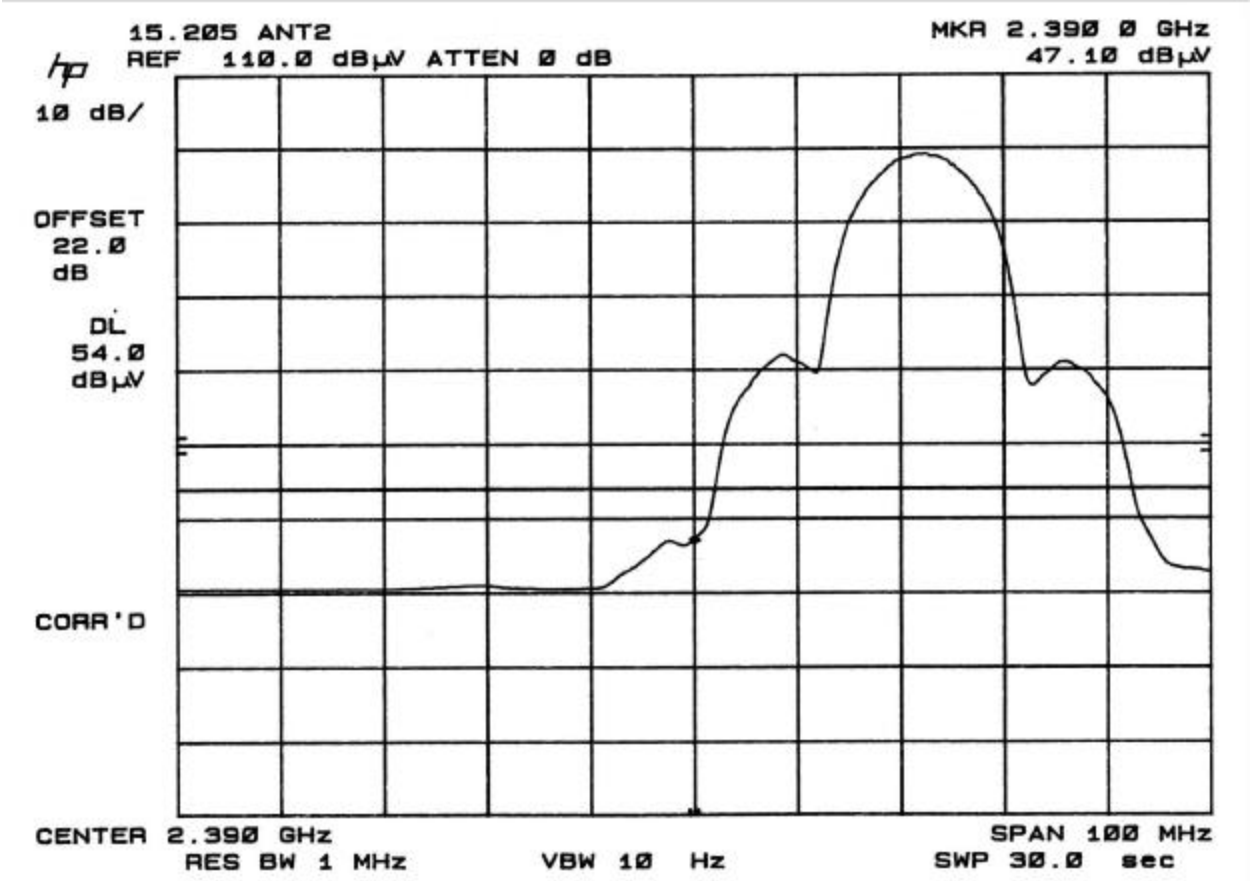


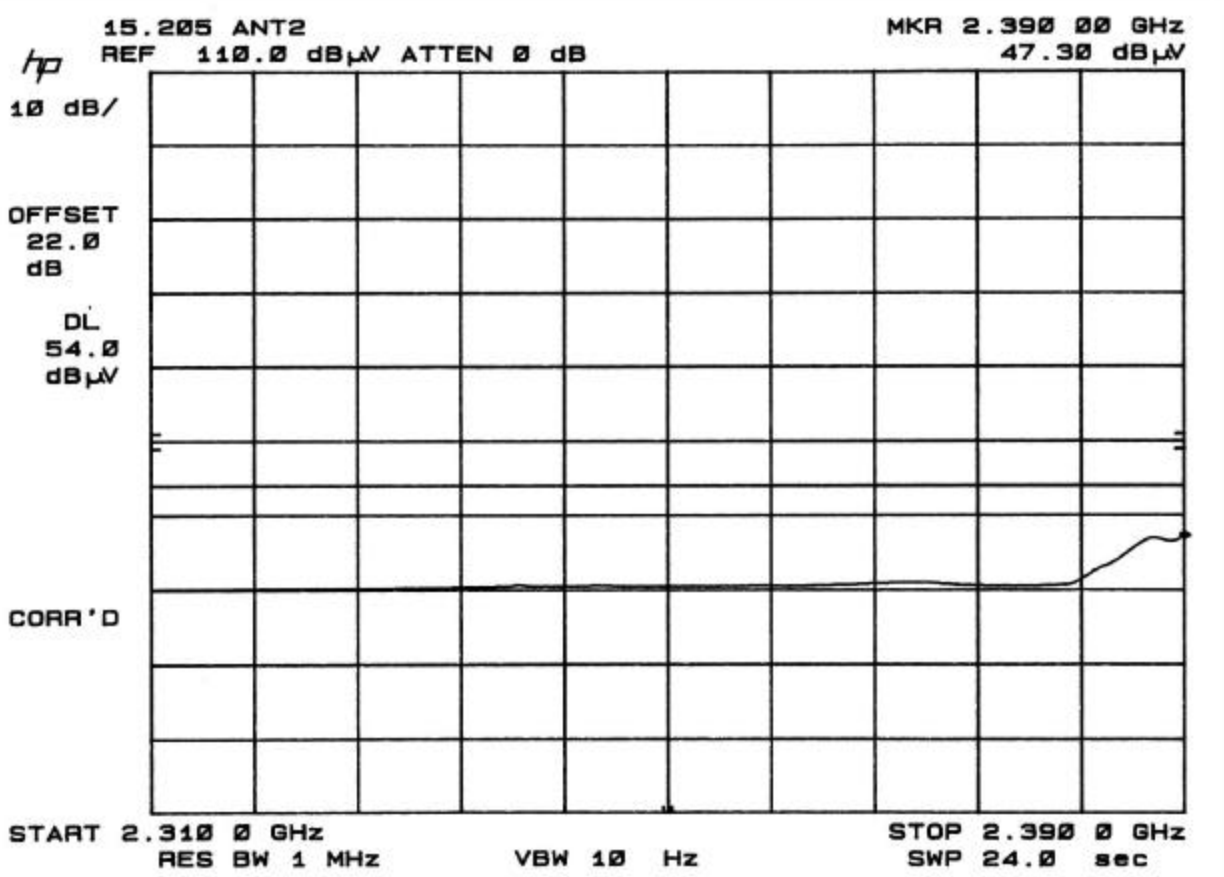


TOP BANDEDGE @ ANTENNA 1 HIGH CHANNEL

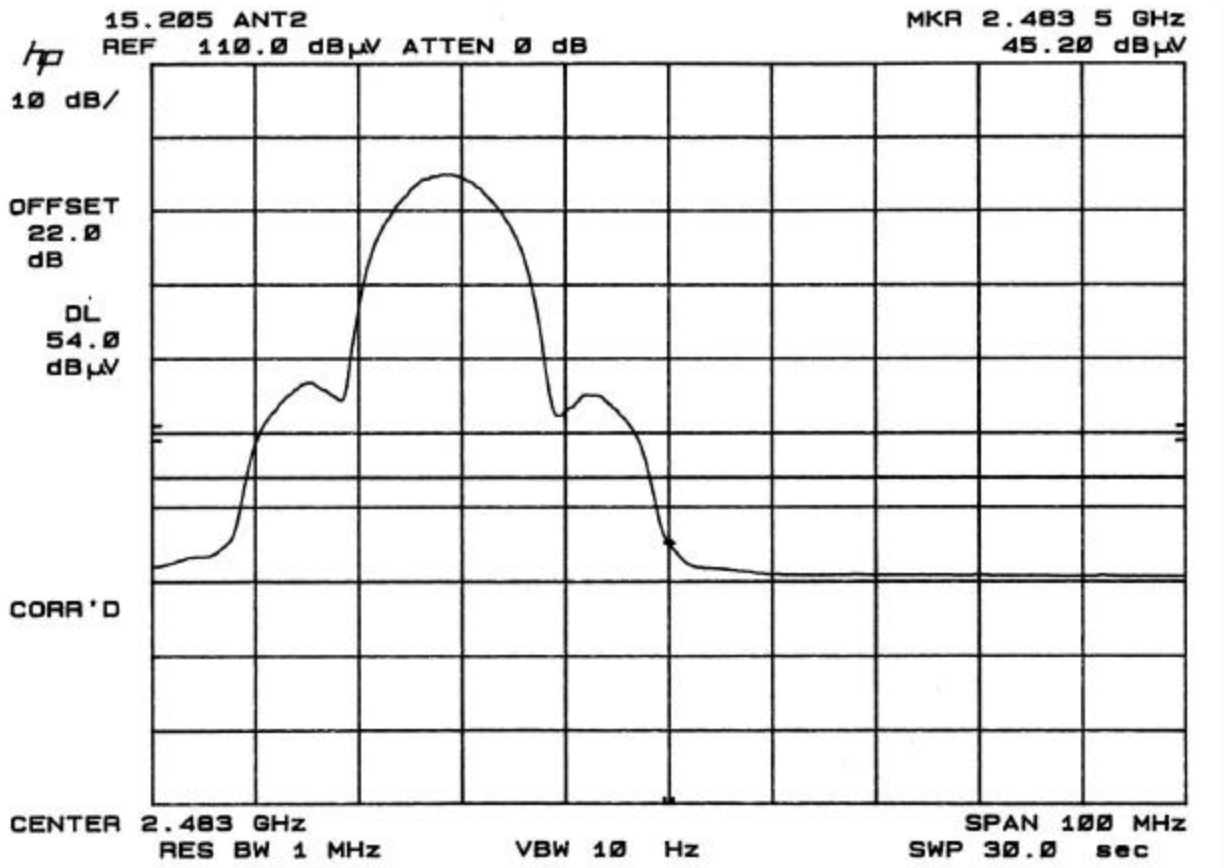


BOTTOM BANDEDGE @ ANTENNA 2 LOW CHANNEL





TOP BANDEDGE @ ANTENNA 2 HIGH CHANNEL

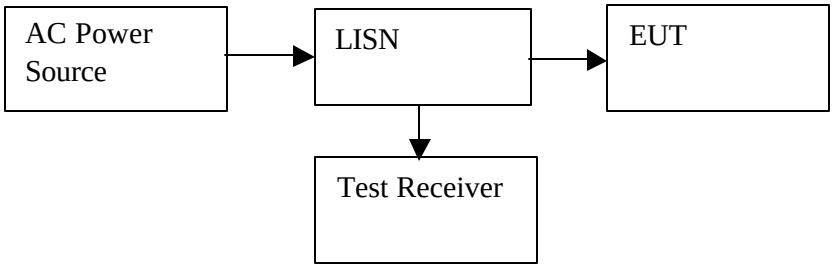


9.7. POWER LINE CONDUCTED EMISSION

TEST SETUP

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
450 KHz to 30 MHz	☐ Peak ☒ Quasi Peak	☒ 9 KHz	☒ 9 KHz



TEST PROCEDURE

1. The EUT was placed on a wooden table 80 cm above the horizontal ground plane and 40 cm away from the vertical ground plane. The EUT was set to transmit / receive in a continuous mode.

2. Conducted disturbance was measured between the phase lead and the ground, and between the neutral lead and the ground. The frequency 0.450 - 30 MHz was investigated.

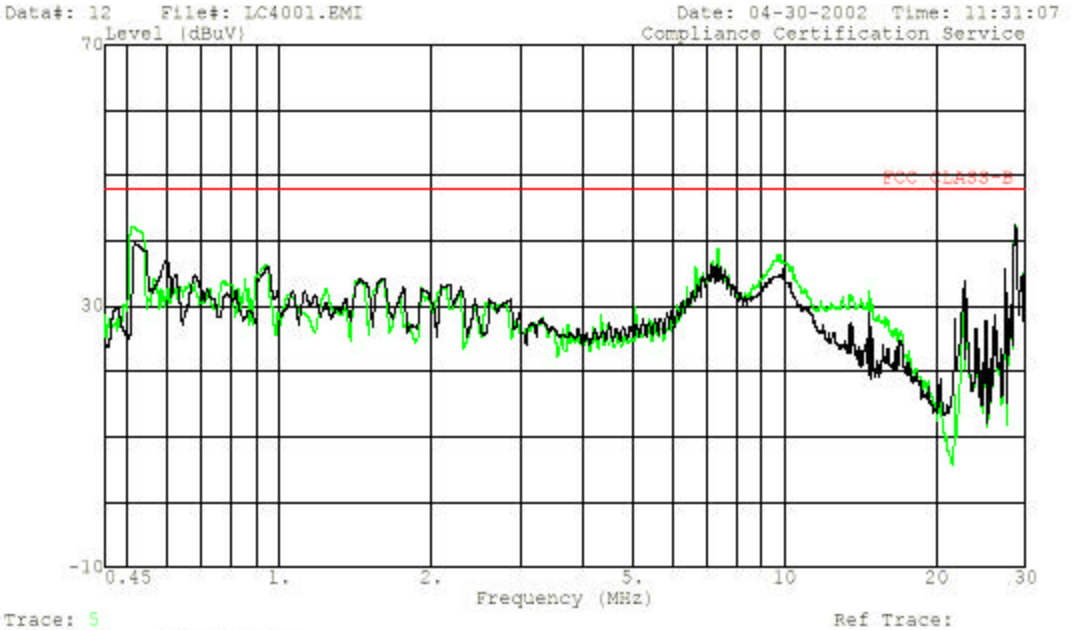
RESULT

No non-compliance noted. See Line Conduction plot

CONDUCTED EMISSIONS DATA (115VAC 60Hz) for model: 4001

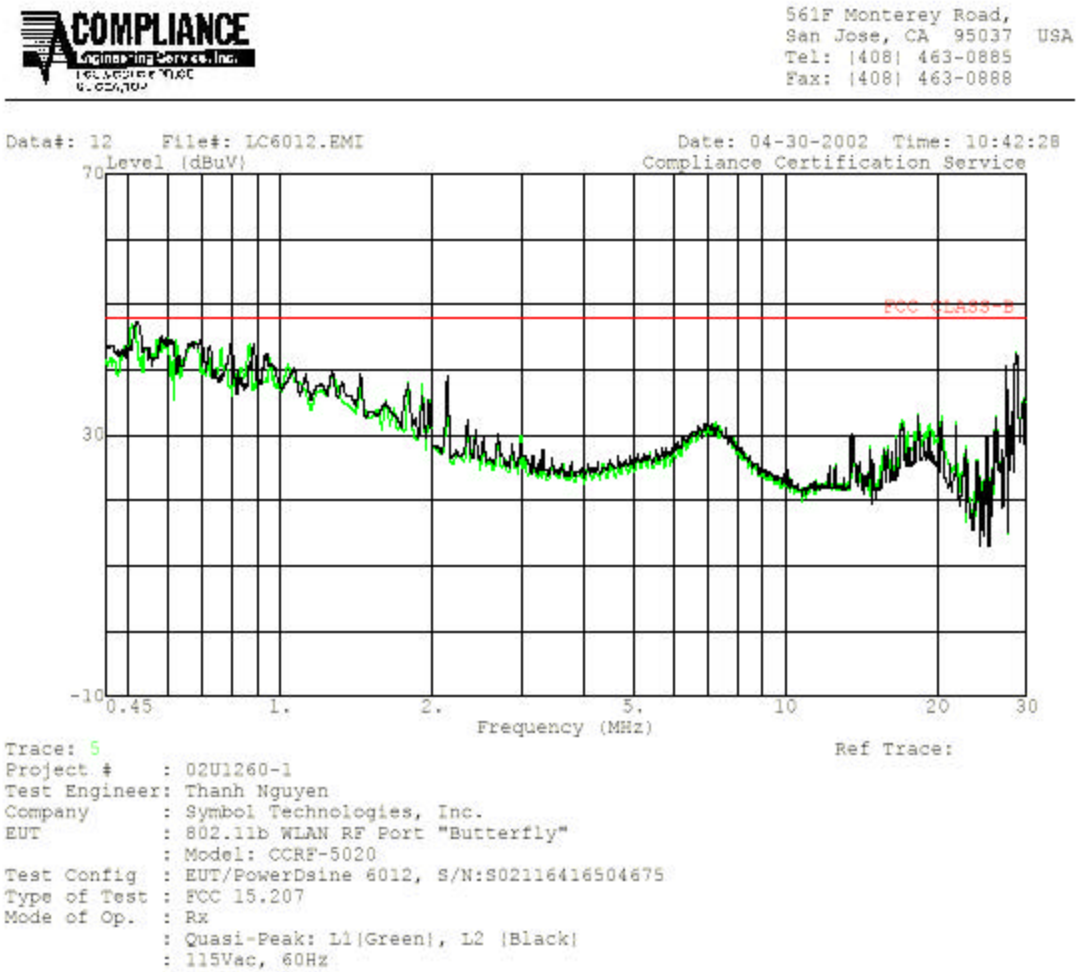
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.51	--	42.27	--	0.00	48.00	--	-5.73	--	L1
7.38	--	38.62	--	0.00	48.00	--	-9.38	--	L1
28.65	--	42.45	--	0.00	48.00	--	-5.55	--	L1
0.52	--	39.55	--	0.00	48.00	--	-8.45	--	L2
7.16	--	36.20	--	0.00	48.00	--	-11.80	--	L2
28.65	--	42.31	--	0.00	48.00	--	-5.69	--	L2
6 Worst Data									

COMPLIANCE Engineering Services, Inc.
561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888



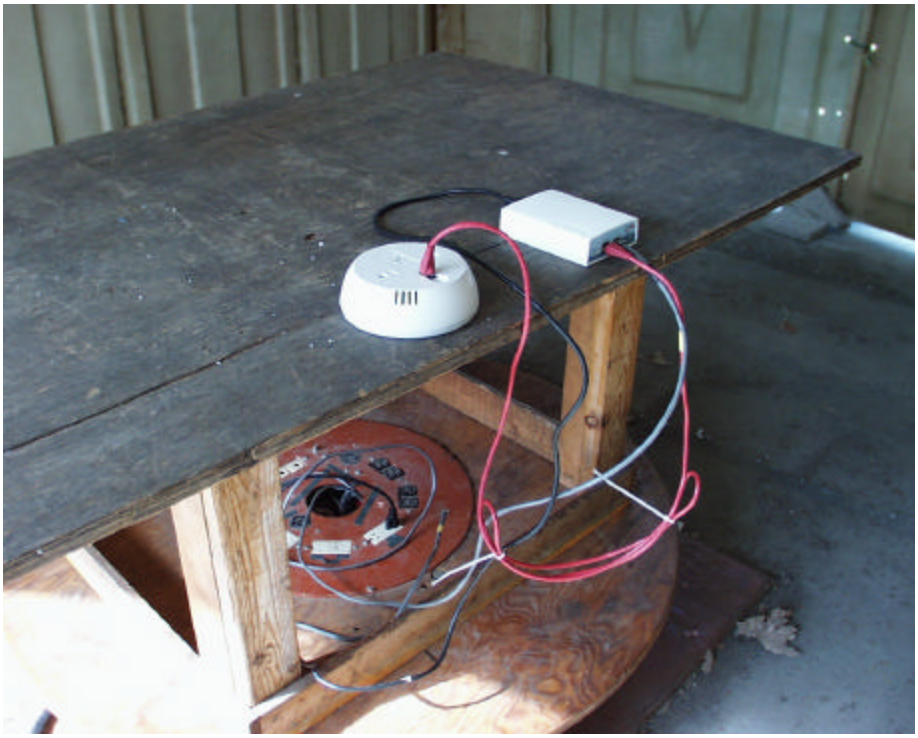
Trace: 5 Ref Trace:
Project # : 02U1260-1
Test Engineer: Thanh Nguyen
Company : Symbol Technologies, Inc.
EUT : 802.11b WLAN RF Port "Butterfly"
: Model: CCRF-5020
Test Config : EUT/PowerDsine 4001, S/N:A02126015000069
Type of Test : FCC 15.207
Mode of Op. : Rx
: Quasi-Peak: L1(Green), L2 (Black)
: 115Vac, 60Hz

CONDUCTED EMISSIONS DATA (115VAC 60Hz) for model: 6012									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.51	--	46.99	--	0.00	48.00	--	-1.01	--	L1
0.60	--	45.03	--	0.00	48.00	--	-2.97	--	L1
0.87	--	44.00	--	0.00	48.00	--	-4.00	--	L1
0.52	--	47.25	--	0.00	48.00	--	-0.75	--	L2
0.58	--	45.05	--	0.00	48.00	--	-2.95	--	L2
0.80	--	44.51	--	0.00	48.00	--	-3.49	--	L2
6 Worst Data									

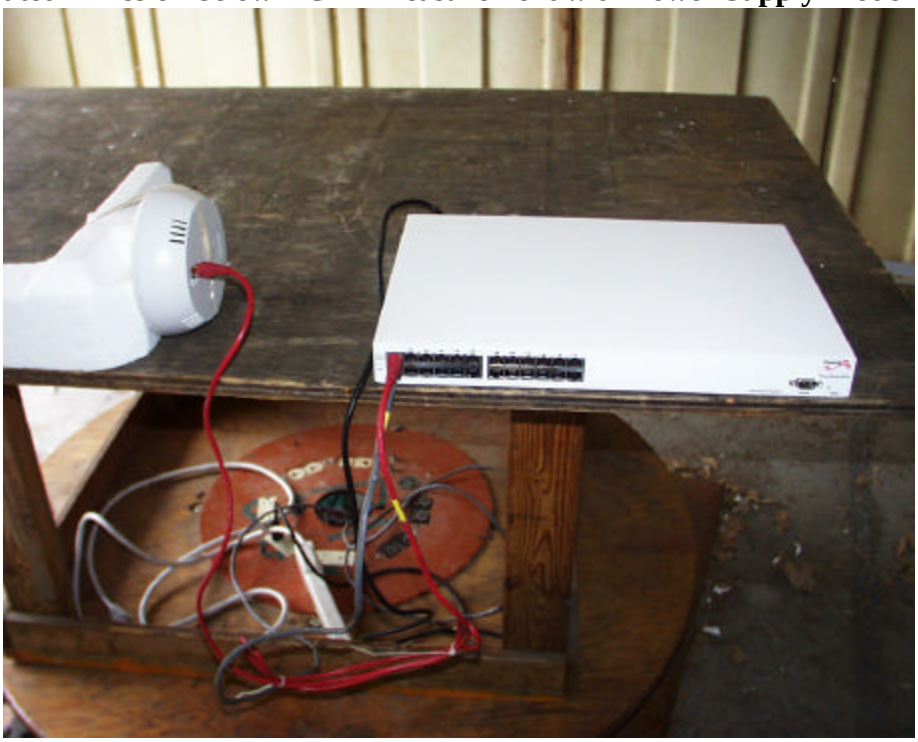


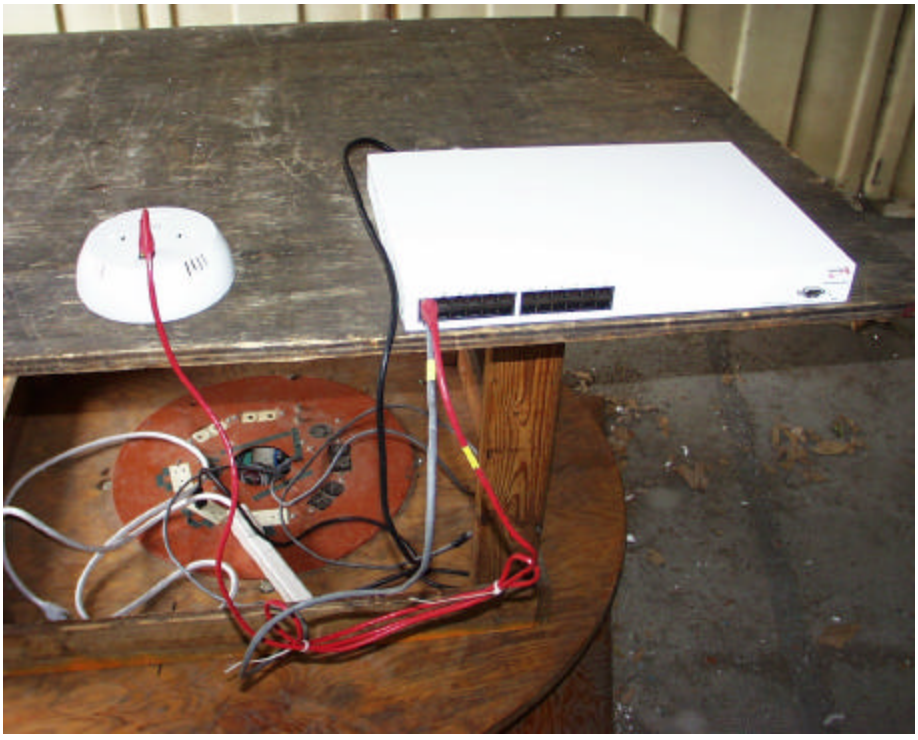
9.8. SETUP PHOTOS

Radiated Emission below 1 GHz Measurement with Power Supply Model 4001

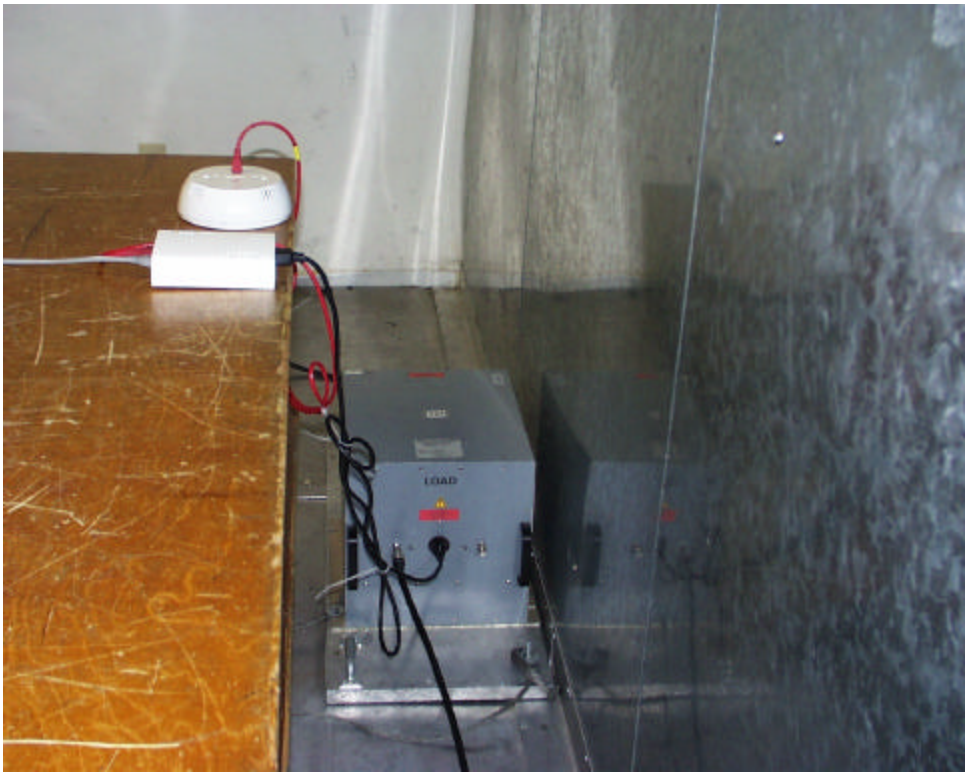


Radiated Emission below 1 GHz Measurement with Power Supply Model 6012





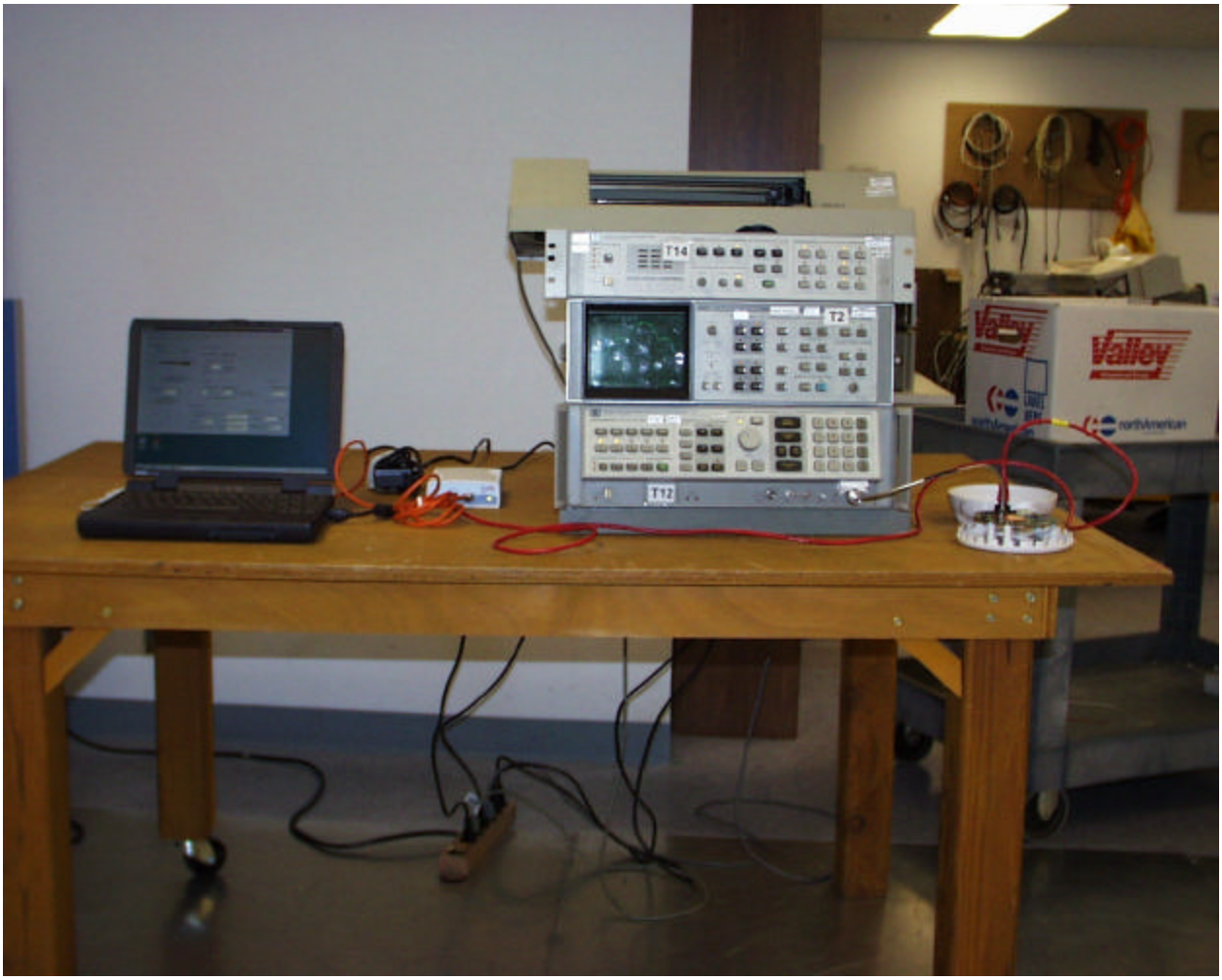
Conducted Emission Measurement with Power Supply Model 4001



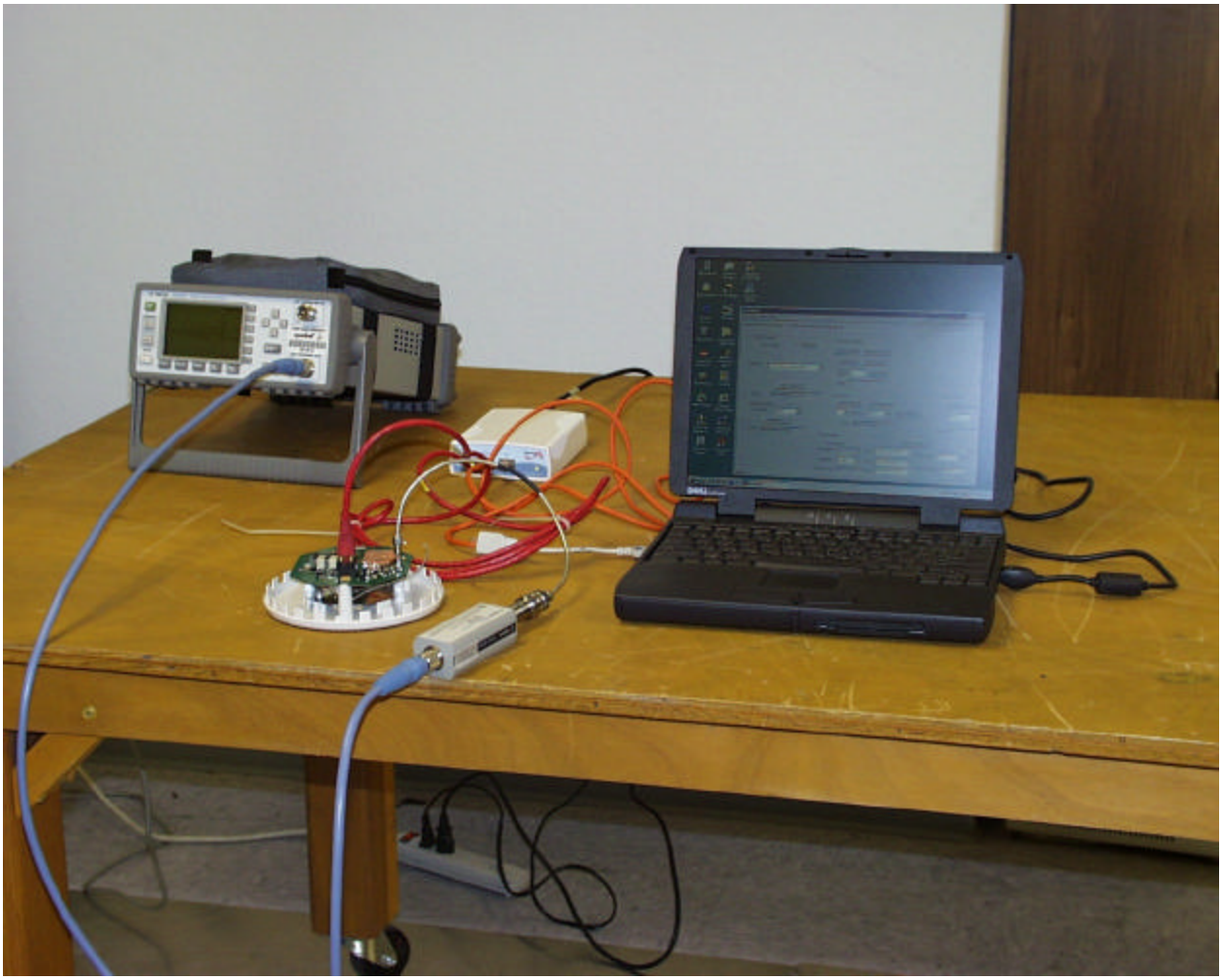
Conducted Emission Measurement with Power Supply Model 6012

Radiated Emission above 1 GHz Measurement

Antenna Port Terminal Measurement



Peak Power Measurement at Antenna Port Terminal



END OF REPORT