FCC Certification Test Report

FCC Certification Test Report
for
Adtran, Inc.
FCC ID: HDCTRC4108

September 17, 2003

Prepared for:

Adtran, Inc.
901 Explorer Blvd
Huntsville, AL 35806

Prepared By:

Washington Laboratories, Ltd.
7560 Lindbergh Drive
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FCC Certification Test Report
for the
Adtran, Inc.
TRACER 4108 DSSS
FCC ID: HDCTRC4108

WLL JOB# 7693

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Reviewed by: Michael F. Violette
President

Abstract

This report has been prepared on behalf of Adtran, Inc. to support the attached Application for Equipment Authorization. The test report and application are submitted for a Spread Spectrum Transceiver under Part 15.247 of the FCC Rules and Regulations. This Federal Communication Commission (FCC) Certification Test Report documents the test configuration and test results for a Adtran, Inc. TRACER 4108.

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

The Adtran, Inc. TRACER 4108 DSSS complies with the limits for a Spread Spectrum Transceiver device under Part 15.247 of the FCC Rules and Regulations.

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1 Introduction

1.1 Compliance Statement

The Adtran, Inc. TRACER 4108 DSSS Spread Spectrum System complies with the limits for a Spread Spectrum Transceiver device under Part 15.247 of the FCC Rules and Regulations.

1.2 Test Scope

Tests for radiated and conducted emissions were performed. All measurements were performed according to the 2001 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

1.3 Contract Information

Customer:	Adtran, Inc. 901 Explorer Blvd Huntsville, AL 35806
Quotation Number:	60886

1.4 Test Dates

Testing was performed from July 29 to July 31, 2003.

1.5 Test and Support Personnel

Washington Laboratories, LTD	Greg Snyder

1.6 Abbreviations

A	Ampere
Ac	alternating current
AM	Amplitude Modulation
Amps	Amperes
b/s	bits per second
BW	Bandwidth
CE	Conducted Emission
cm	centimeter
CW	Continuous Wave
dB	decibel
dc	direct current
EMI	Electromagnetic Interference
EUT	Equipment Under Test
FM	Frequency Modulation
G	giga - prefix for 10^9 multiplier
Hz	Hertz
IF	Intermediate Frequency
k	kilo - prefix for 10^3 multiplier
M	Mega - prefix for 10^6 multiplier
m	Meter
μ	micro - prefix for 10^{-6} multiplier
NB	Narrowband
LISN	Line Impedance Stabilization Network
RE	Radiated Emissions
RF	Radio Frequency
rms	root-mean-square
SN	Serial Number
S/A	Spectrum Analyzer
V	Volt

2 Equipment Under Test

2.1 EUT Identification & Description

ADTRAN Part #	Product Name/Description
12804108L1A	TRACER 4108 Plan A
12804108L1B	TRACER 4108 Plan B

Top Assembly #:	12804108L1A and B
Sub Assembly #(s):	2280003-28, 2280018-10
Circuit Board #(s):	5280003-28, 2280018-10

I/O Ports and Cables available on the TRACER 4108 DS3 Radio:

#	Signal/ Port Name	Signal/ Port Type	Cable Type	NOTES
1	RS232	Control	Shielded 25 wire	VT100/modem port
2	TEST	I/O	Unshielded TP	¼ inch stereo jack, I/Q Constellation plot
3	T1A	I/O	Unshielded	100 ohm impedance
4	T1B	I/O	Unshielded	100 ohm impedance
5	T1C	I/O	Unshielded	100 ohm impedance
6	T1D	I/O	Unshielded	100 ohm impedance
7	T1E	I/O	Unshielded	100 ohm impedance
8	T1F	I/O	Unshielded	100 ohm impedance
9	T1G	I/O	Unshielded	100 ohm impedance
10	T1H	I/O	Unshielded	100 ohm impedance
11	ALARM	Control	Unshielded TP	Major and minor alarm contacts
12	DC Power	Power	Unshielded pair	DC Power input, 21-60 VDC
13	ANTENNA	I/O	Shielded Coax	Connection to 2.4GHz antenna, 50 ohm
14	RSSI	I/O	Unshielded wire	Mono jack, Receive Signal Strength
15	TX PWR	I/O	Unshielded wire	Mono jack, Transmit Power
16	GND	Output	Unshielded wire	Mono jack, Circuit ground
EX:	HDSL Loop 1	Span Pwr-I/O	Twisted Pair	137V Span Voltage

The 12804108L1 (TRACER 4108 Radio) is a digital radio device that accepts eight 1.544 Mb/sec T1 signals and transports them over a wireless carrier. A pair of these radios forms a wireless transport for T1 digital services in the 2.4 GHz Industrial, Scientific, and Medical (ISM) radio band. The 12804108L1 provides the network, antenna, and control/status interface to the customer. The T1 interfaces are network timed. No internal timing is available.

The TRACER 4108 operates in the 2416-2468 MHz band using direct sequence spread spectrum transmission. Two channels are available: "A" and "B". The channels are determined by internal cable routing on the transmit module during manufacture.

Table 1. Device Summary

ITEM	DESCRIPTION
Manufacturer:	Adtran, Inc.
FCC ID Number	HDCTRC4108
EUT Name:	Spread Spectrum Transceiver
Model:	TRACER 4108
FCC Rule Parts:	§15.247
Frequency Range:	2416 –2468 MHz
Maximum Output Power:	100mW (20.1dBm conducted at antenna terminal)
Modulation:	Digital (QPSK)
Necessary Bandwidth:	N/A
Keying:	Automatic
Type of Information:	Data
Number of Channels:	3 on Band A and 3 on Band B
Antenna Type	Parabolic, Yagi, and Flat Panel types
Frequency Tolerance:	N/A
Emission Type(s):	N/A
Power Source & Voltage:	21-60 VDC

The TRACER 4108 DSSS contains the following sources:

Frequency (MHz)	Description
51.536	Master clock of digital transmit and receive (XO)
1.544	T1 rate clock for framer operation (XO)
12	RF reference XO
280	IF XO
2422	RF channel A frequency
2462	RF channel B frequency
2282	RF channel A RX IF
2142	RF channel A TX IF
2322	RF channel B RX IF
2182	RF channel B TX IF
2XXX	Another frequency 140 MHz below and 280 MHz below all RF center frequencies

2.2 Test Configuration

The EUT was configured with the following support equipment:

- ITE Model PW102 Power Supply
- HP Pavilion Laptop PC S/N: TW02810306

and the following antennas:

Table 2. Antennas Tested

Antenna	Type	Gain (dBi)
Radio Waves Model SP2 2.4	2.4 GHz Parabolic	21.3
Avitronics Model AVFP 18	Flat Panel	18
Cushcraft Model PC 2415N	Yagi	15

The EUT was configured with an external power adapter, loop-back connections on Plans A and B, unshielded wires connected to the alarm I/O, and a 50 Ohm coaxial cable connected to the antenna port.

The EUT firmware was set up to provide continuous random data for Direct Sequence modulation to the output connector.

Two channels are available: Plans “A” and “B”. Each Plan has three Bands, or frequencies. Changing between the plans is accomplished by switching the internal cables. The bands are then programmed within the plan.

2.3 Testing Algorithm

The TRACER 4108 DSSS was operated continuously by firmware test sequence that provided a modulated RF data stream to the output port.

2.4 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

2.5 Measurements

2.5.1 References

ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

Land Mobile FM or PM Communications Equipment Measurement and Performance Standards (ANSI/TIA/EIA-603-93)

2.6 Measurement Uncertainty

All results reported herein relate only to the equipment tested. The measurement uncertainty of the data contained herein is ±2.3 dB.

For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ±2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

Total Uncertainty = $(A^2 + B^2 + C^2)^{1/2}/(n-1)$

where:

A = Antenna calibration uncertainty, in dB = 2 dB

B = Spectrum Analyzer uncertainty, in dB = 1 dB

C = Site uncertainty, in dB = 4 dB

n = number of factors in uncertainty calculation = 3

Thus, total uncertainty = $0.5\ (2^2 + 1^2 + 4^2)^{1/2}$ = ±2.3 dB.

3 Test Equipment

Table 3 shows a list of the test equipment used for measurements along with the calibration information.

Table 3: Test Equipment List

Equipment	Serial Number	Calibration Due
ARA BiconiLog Antenna: LPB-2520	1044	6/20/04
Hewlett-Packard Spectrum Analyzer: HP 8568B (Site 1)	2928A04750	7/02/04
Hewlett-Packard Quasi-Peak Adapter: HP 85650A (Site 1)	3303A01786	7/08/04
Hewlett-Packard RF Preselector: HP 85685A (Site 1)	3146A01296	7/02/04
Solar Electronics LISN 8012-50-R-24-BNC	8379493	8/20/03
A.R.A DRG-118/A Horn Antenna	1236	8/29/03
Hewlett-Packard Spectrum Analyzer: HP 8593	3009A00739	6/25/04
Hewlett-Packard Pre Amplifier: HP 8449B	3008A00729	2/11/04
ARA Horn Antenna: DRG-118/A	1236	4/17/04
Hewlett-Packard Spectrum Analyzer: HP 8564E	3643A00657	5/22/04
Hewlett-Packard Signal Generator: HP 8548C	0075	4/30/04
Tektronix Oscilloscope TDS-540	0142	8/29/04
Hewlett-Packard Power Meter 438A	0394	3/10/04

4 Test Results

4.1 RF Power Output

For devices within the scope of FCC §15.247, the peak power conducted from the intentional radiator to the antenna shall not be greater than one watt (30 dBm).

The diode detector substitution method for measuring peak power was used since the spectrum analyzer used for testing does not have a measurement bandwidth greater than the 6dB bandwidth of the EUT.

The output from the transmitter was connected to a diode detector and oscilloscope. The peak deflection was measured on the oscilloscope and recorded. A signal generator was then substituted in place of EUT and set to the same frequency as the transmitter. The CW output of the signal generator was increased until the same deflection was noted on the oscilloscope. A power meter was then connected to the output of the signal generator to determine the output power of the signal generator. This level is then recorded as the output power of the EUT at the specified frequency.

The EUT carrier was modulated during this test.

Table 4. RF Power Output

Frequency	Level	Limit	Pass/Fail
Plan A			
Band 1 2416.00 MHz	19.8 dBm	30 dBm	Pass
Band 2 2422.00 MHz	19.8 dBm	30 dBm	Pass
Band 3 2428.00 MHz	19.9 dBm	30 dBm	Pass
Plan B			
Band 1 2456.00 MHz	20.5 dBm	30 dBm	Pass
Band 2 2462.00 MHz	20.6 dBm	30 dBm	Pass
Band 3 2468.00 MHz	20.0 dBm	30 dBm	Pass

4.2 RF Peak Power Spectral Density

For DSSS devices, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band.

The output from the transmitter was connected to an attenuator and then to the input of the RF Spectrum Analyzer. The analyzer offset was adjusted to compensate for the attenuator and other losses in the system.

The carrier was modulated.

Table 5. Power Spectral Density

Frequency	Level	Limit	Pass/Fail
Plan A			
Band 1 2416.00 MHz	-2.0 dBm	8 dBm	Pass
Band 2 2422.00 MHz	-2.3 dBm	8 dBm	Pass
Band 3 2428.00 MHz	-2.8 dBm	8 dBm	Pass
Plan B			
Band 1 2456.00 MHz	-2.8 dBm	8 dBm	Pass
Band 2 2462.00 MHz	-2.8 dBm	8 dBm	Pass
Band 3 2468.00 MHz	-2.5 dBm	8 dBm	Pass

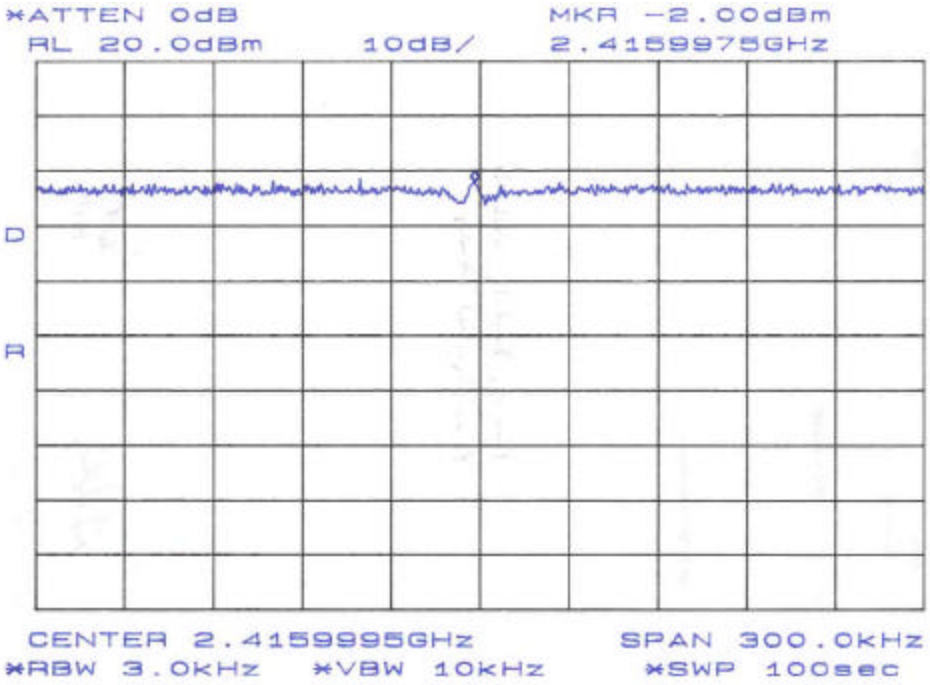

Figure 1. PSD, Plan A Band 1

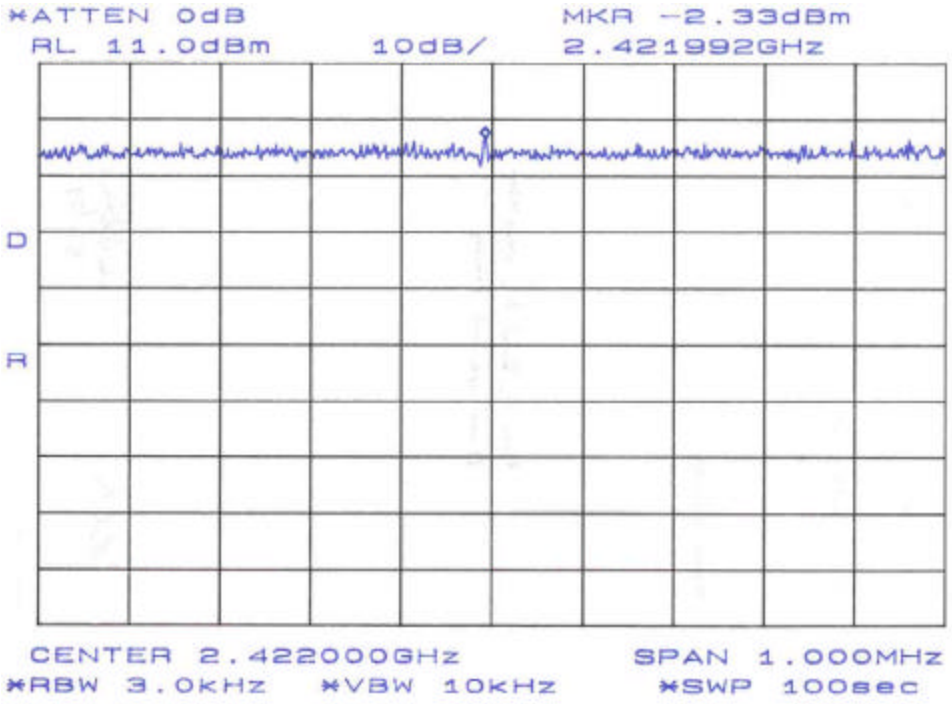

Figure 2. PSD, Plan A Band 2

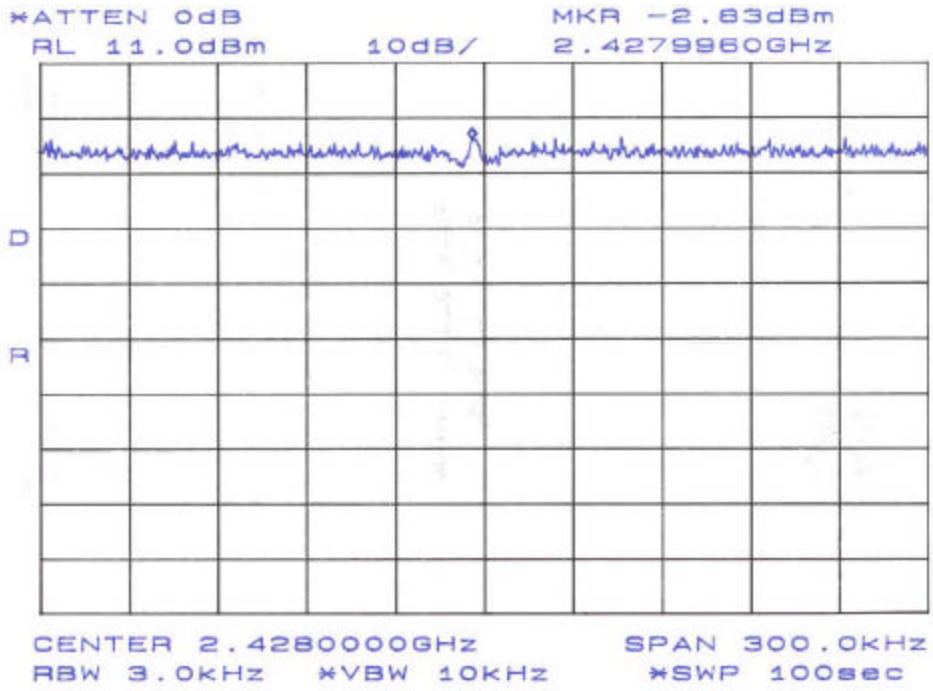

Figure 3. PSD, Plan A Band 3

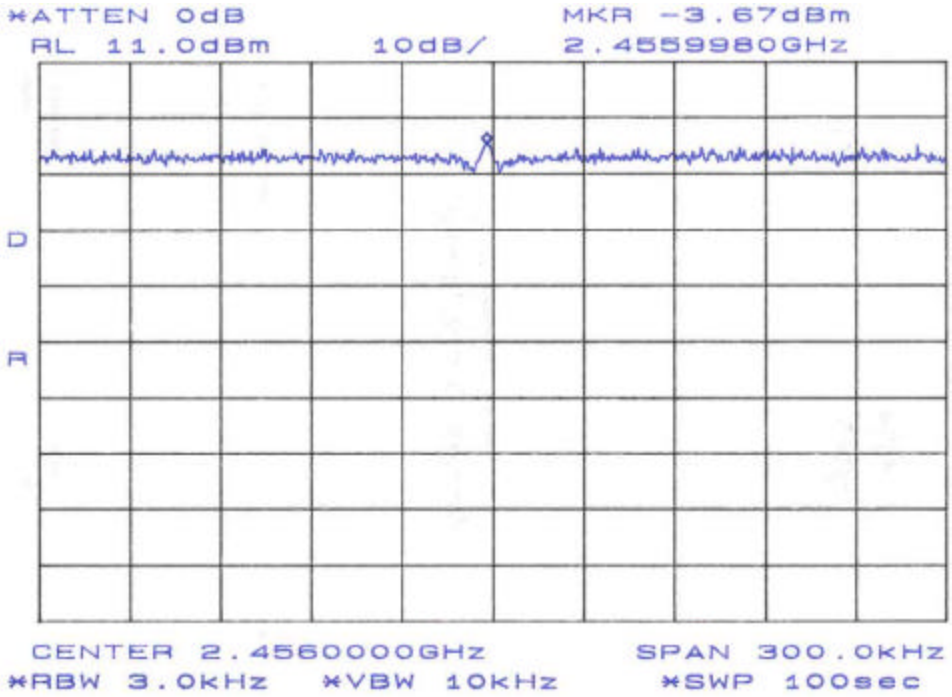

Figure 4. PSD, Plan B Band 1

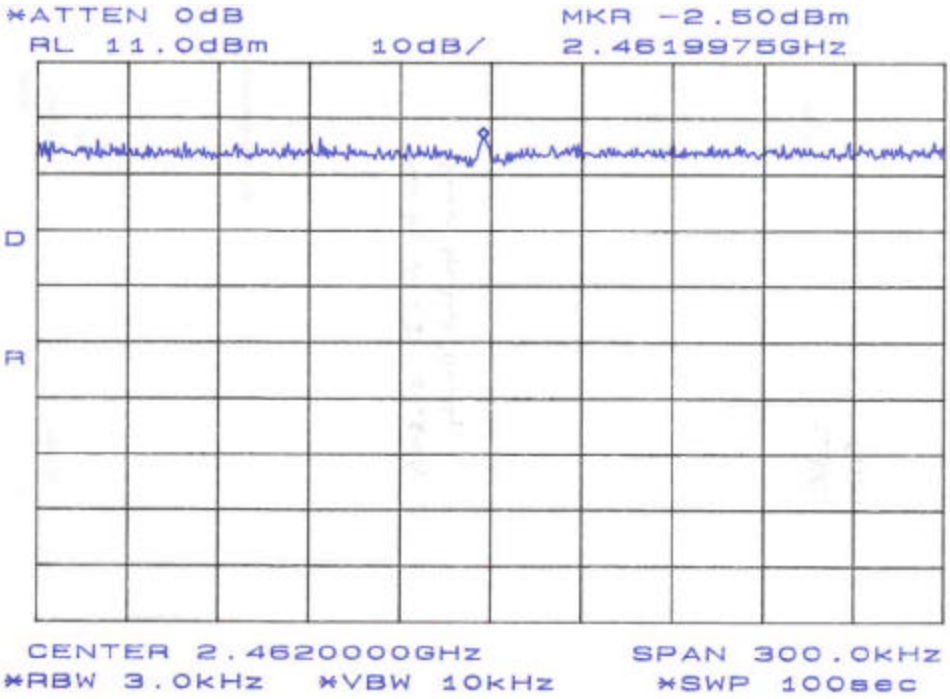

Figure 5. PSD, Plan B Band 2

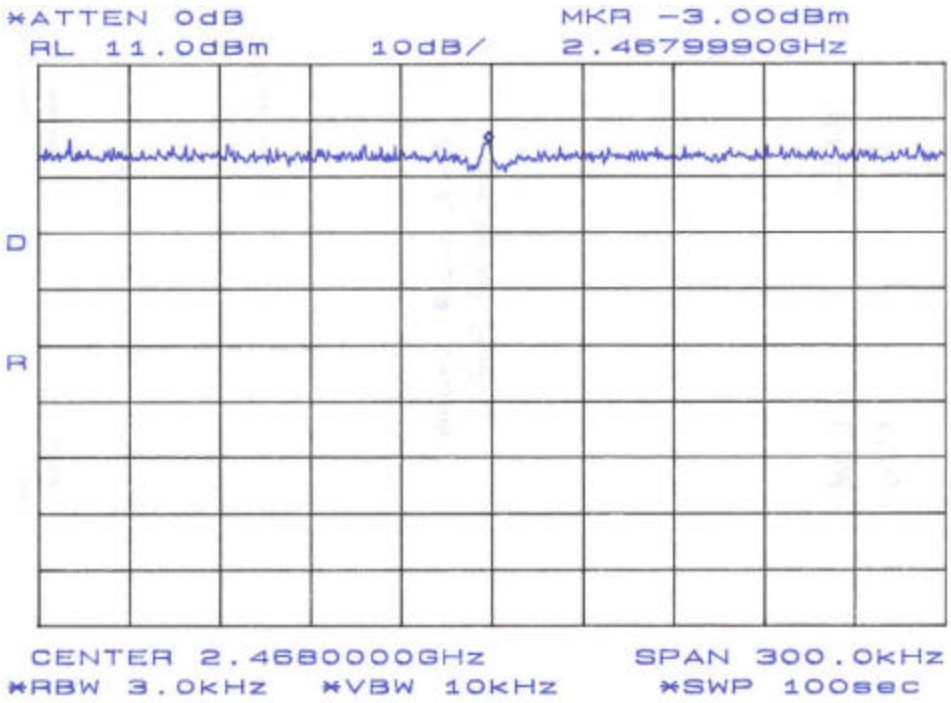

Figure 6. PSD, Plan B Band 3

4.3 Occupied Bandwidth

Occupied bandwidth was performed by coupling the output of the EUT to the input of a spectrum analyzer.

For Direct Sequence Spread Spectrum Systems, FCC Part 15.247 requires that the minimum 6 dB bandwidth be at least 500 kHz.

Table 6 provides a summary of the Occupied Bandwidth Results.

Table 6. Occupied Bandwidth Results

Frequency	Bandwidth	Limit	Pass/Fail
Plan A			
Band 1 2416 MHz	11.58 MHz	> 500 kHz	Pass
Band 2 2422 MHz	11.0 MHz		
Band 3 2428 MHz	11.0 MHz		
Plan B			
Band 1 2456 MHz	11.58 MHz	> 500 kHz	Pass
Band 2 2462 MHz	11.42 MHz		
Band 3 2468 MHz	12.42 MHz		

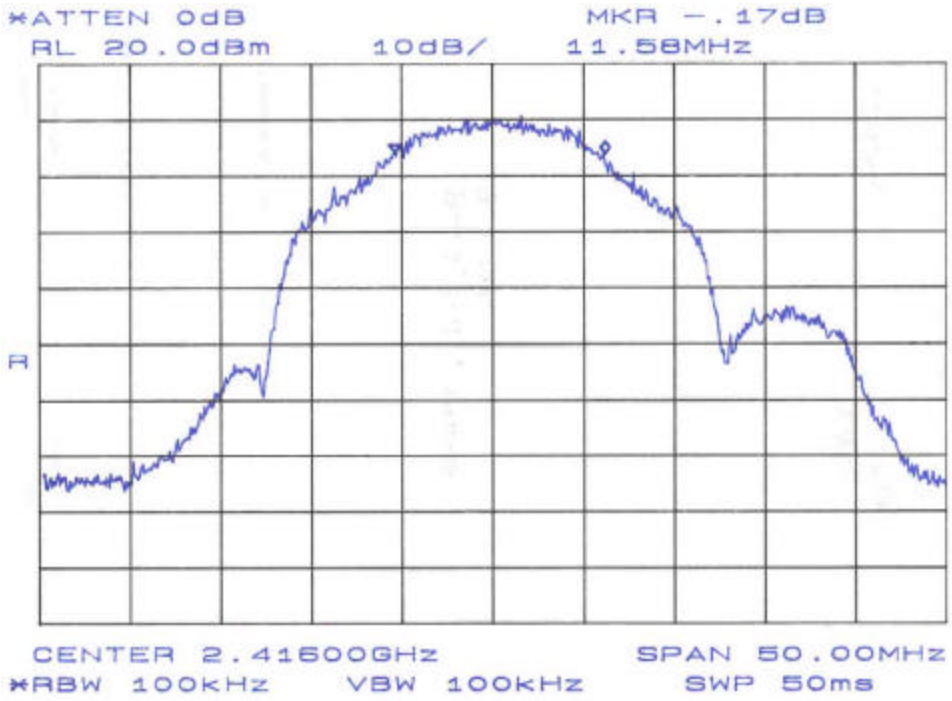

Figure 7. Occupied Bandwidth, Plan A Band 1

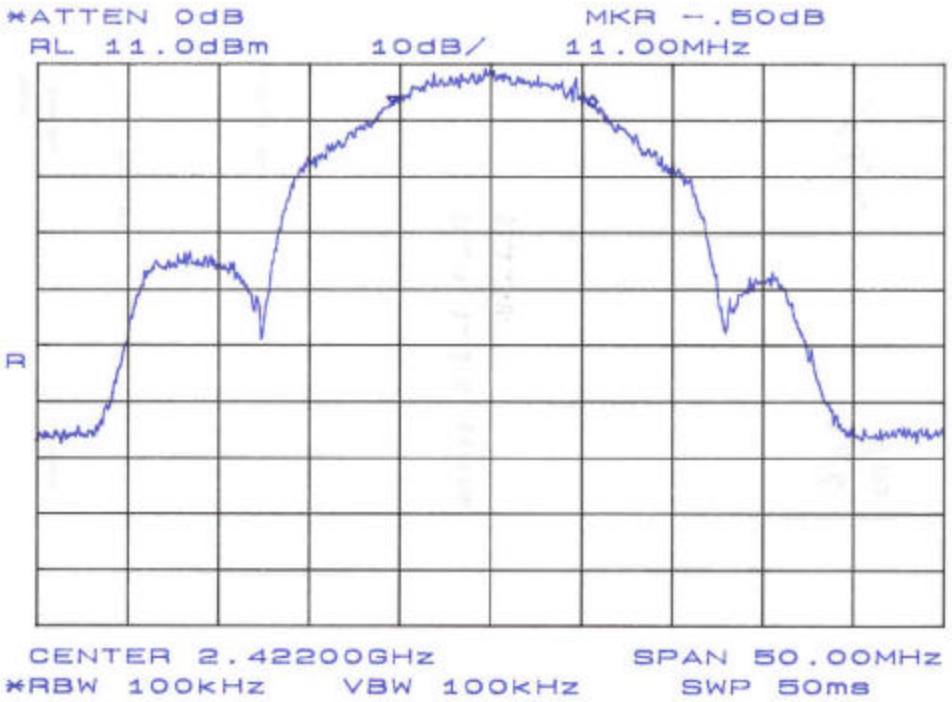

Figure 8. Occupied Bandwidth, Plan A Band 2

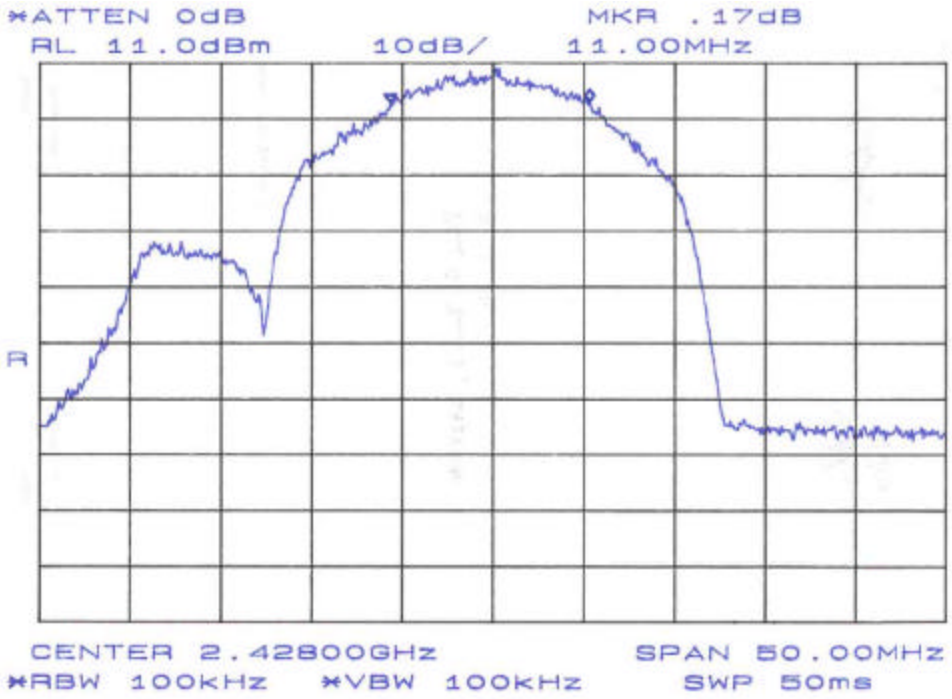

Figure 9. Occupied Bandwidth, Plan A Band 3

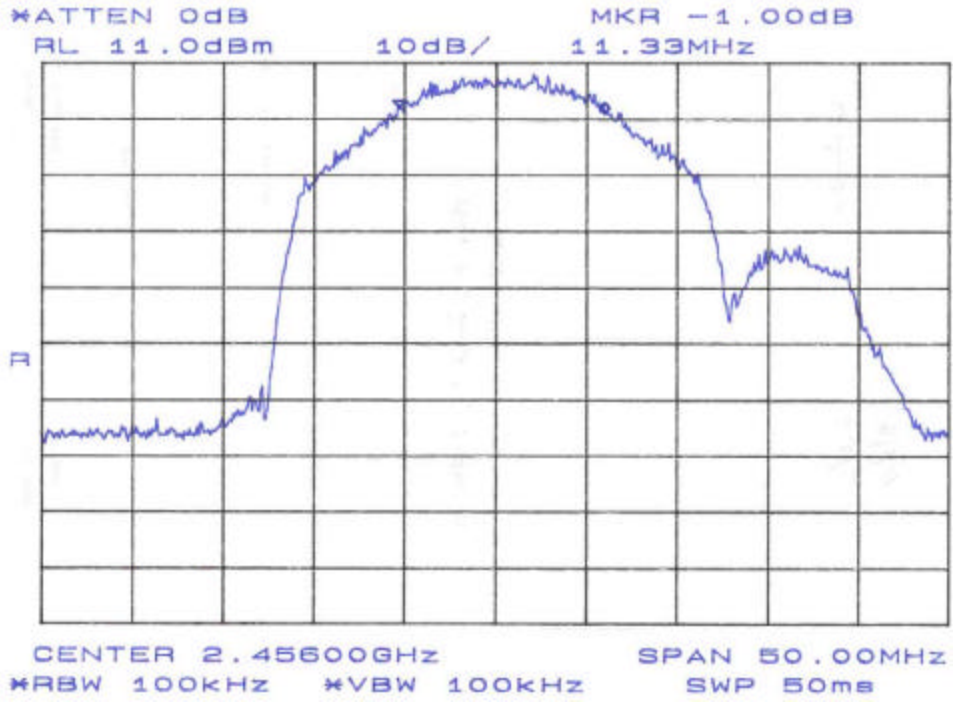

Figure 10. Occupied Bandwidth, Plan B Band 1

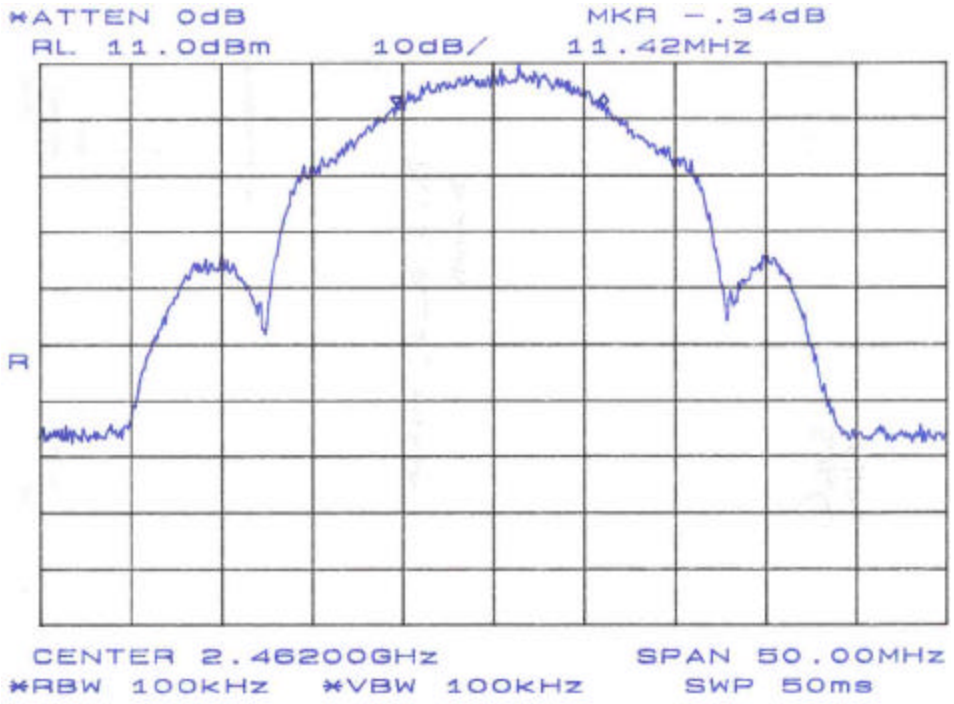

Figure 11. Occupied Bandwidth, Plan B Band 2

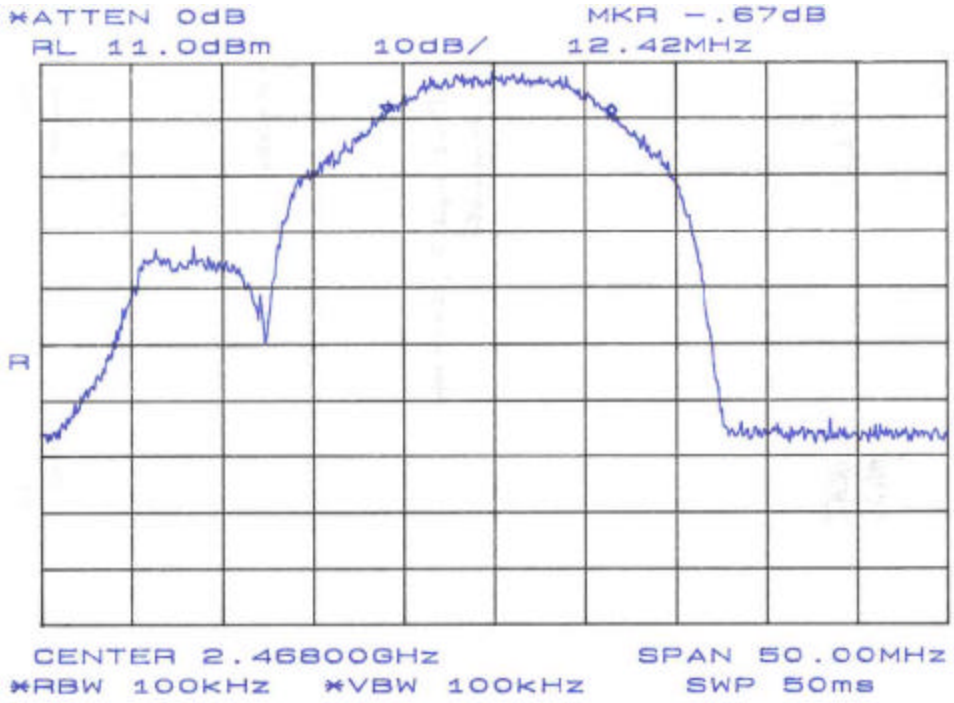

Figure 12. Occupied Bandwidth, Plan B Band 3

4.4 Spurious Emissions at Antenna Terminals (FCC Part §15.247(b))

In any 100 kHz band outside the frequency band in which the system is operating, the RF power shall be at least 20dB below that in the 100 kHz bandwidth that contain the highest level of the desired power.

Figure 13 through Figure 34 are plots of the conducted spurious emissions as measured at the antenna terminal. Band edge plots are included for Plan A, Band 1 and Plan B, Band 3 as these are the frequencies which fall closest to the frequency band of 15.247.

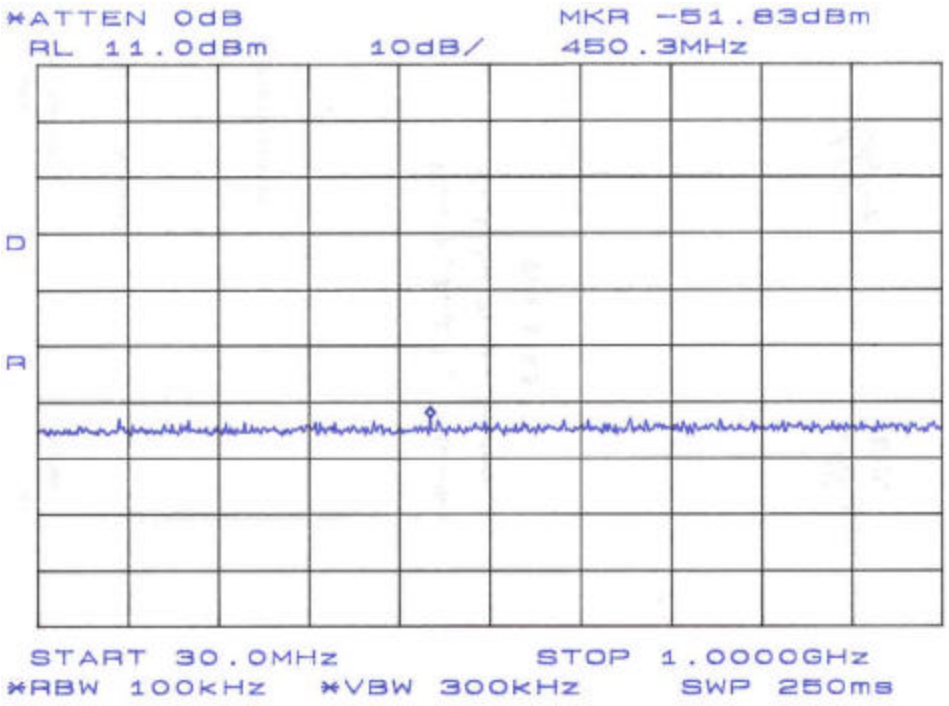

Figure 13. Conducted Spurious: Plan A Band 1 30MHz – 1GHz

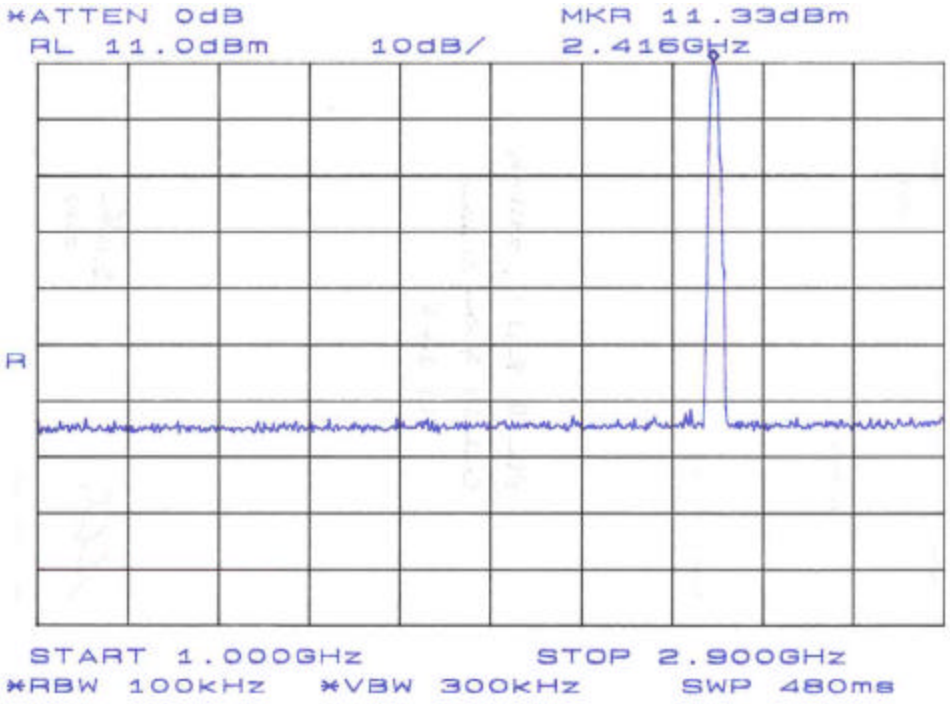

Figure 14. Conducted Spurious: Plan A Band 1 1GHz – 2.9GHz

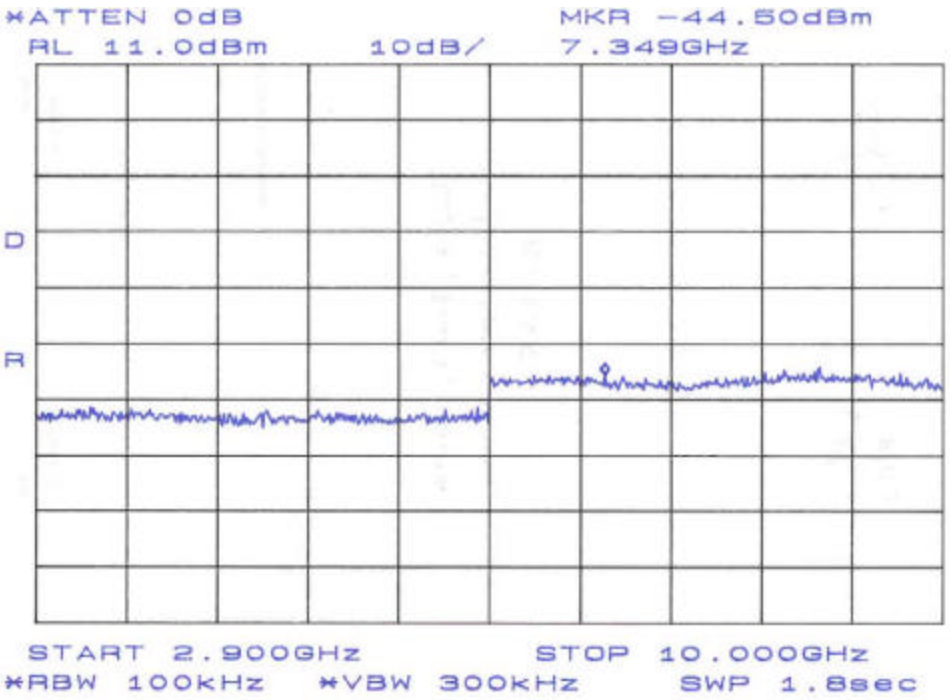

Figure 15. Conducted Spurious: Plan A Band 1 2.9GHz – 10GHz

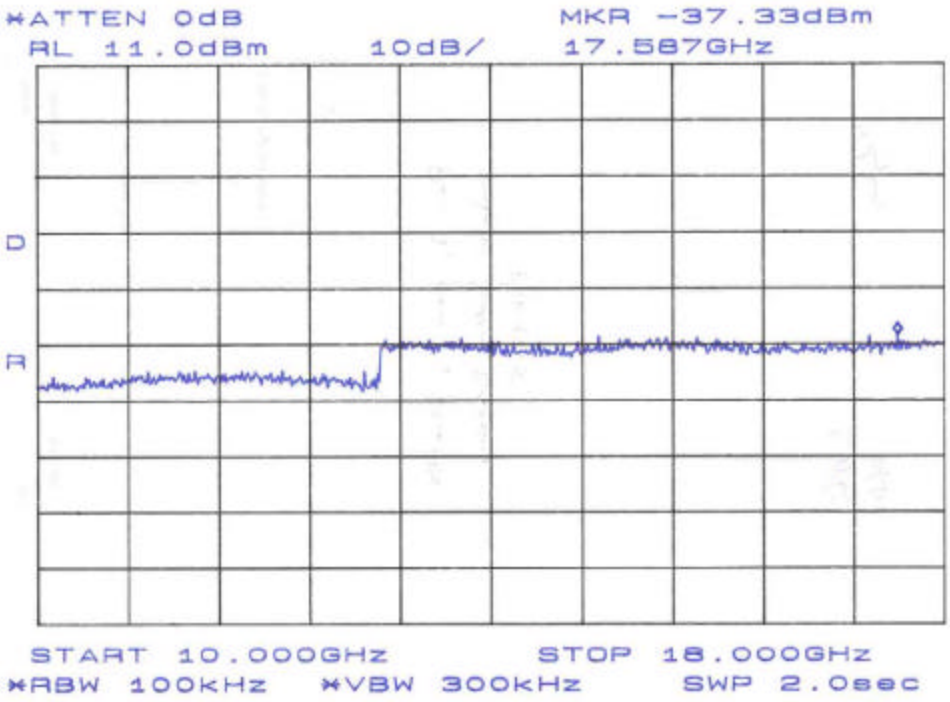

Figure 16. Conducted Spurious: Plan A Band 1 10GHz – 18GHz

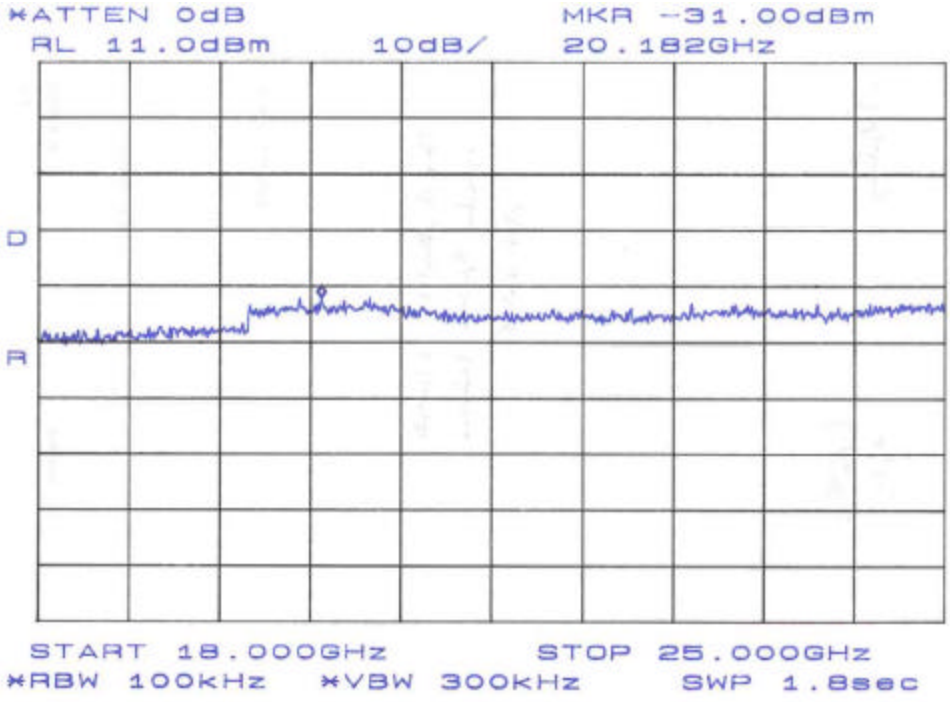

Figure 17. Conducted Spurious: Plan A Band 1 18GHz – 25GHz

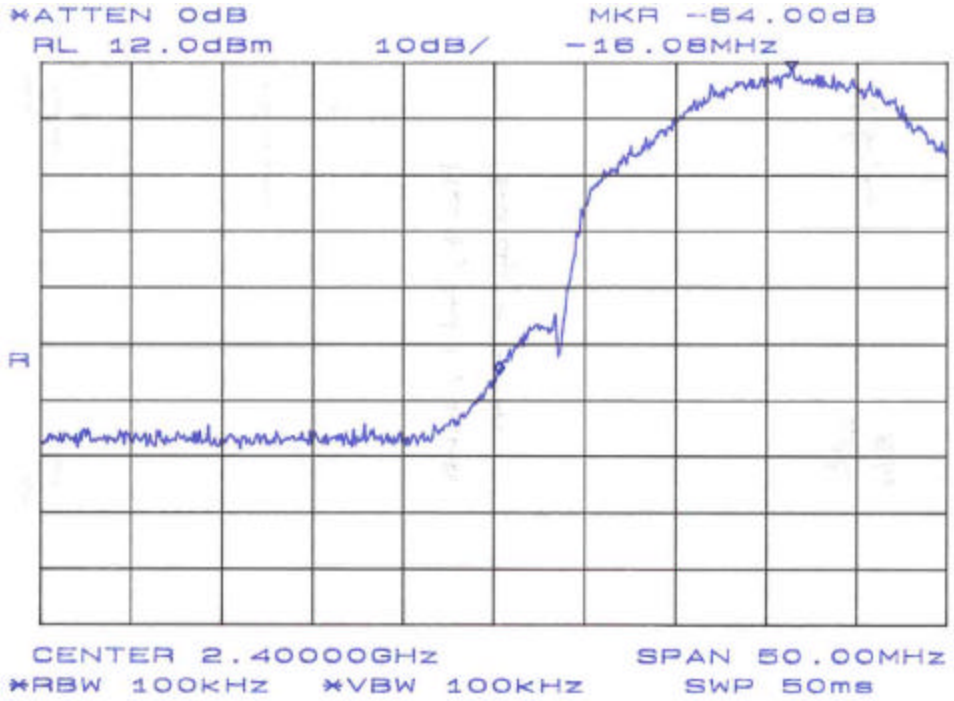

Figure 18. Conducted Spurious Emissions - Band Edge Plot – Plan A Band 1

(Marker at 2400MHz)

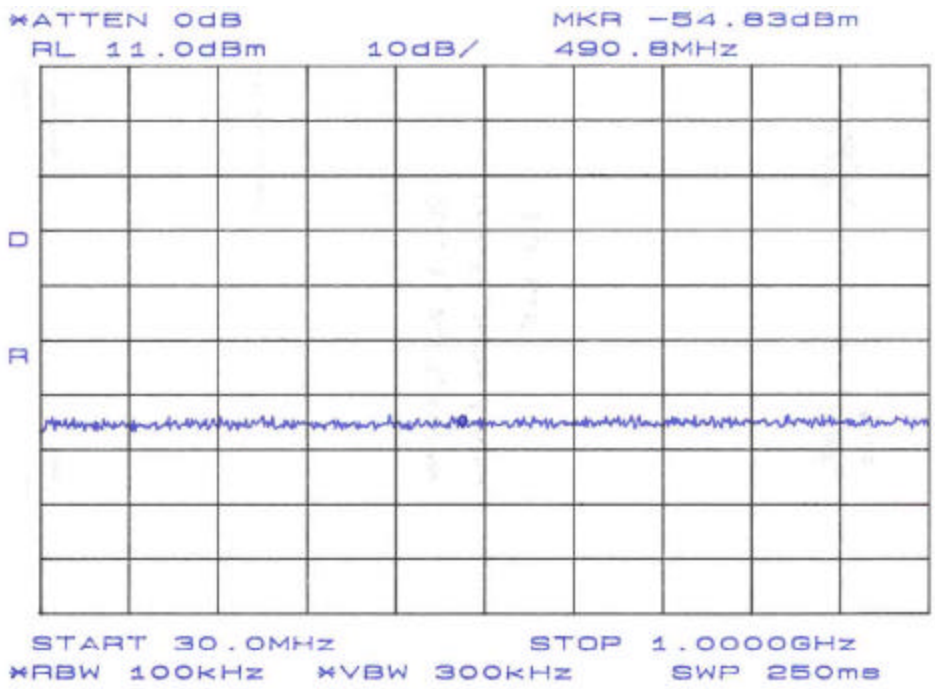

Figure 19. Conducted Spurious: Plan A Band 3 30MHz – 1GHz

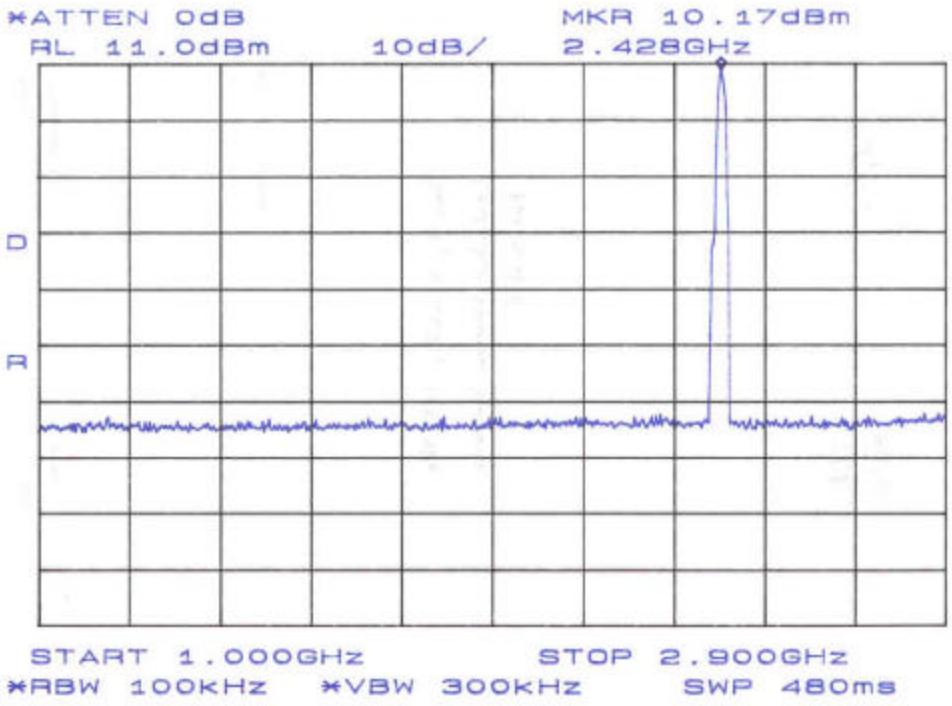

Figure 20. Conducted Spurious: Plan A Band 3 1GHz – 2.9GHz

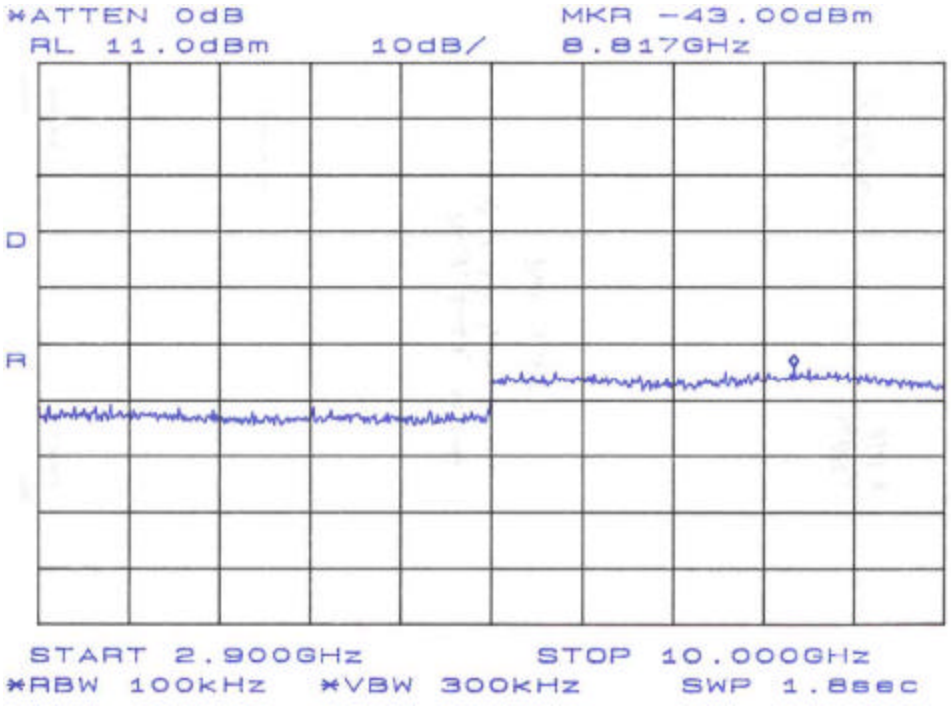

Figure 21. Conducted Spurious: Plan A Band 3 2.9GHz – 10GHz

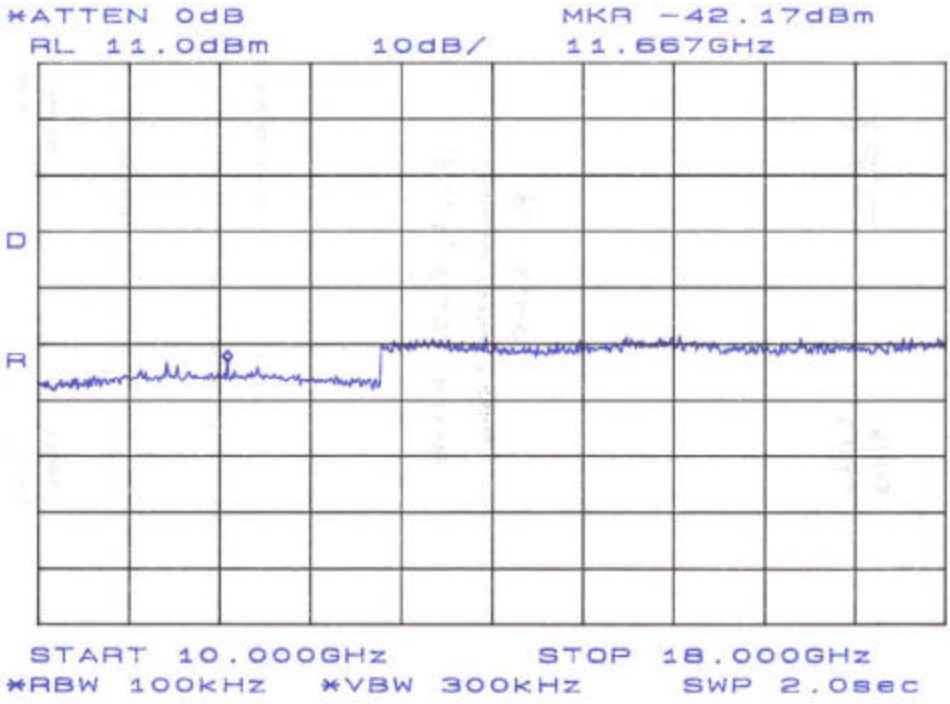

Figure 22. Conducted Spurious: Plan A Band 3 10GHz – 18GHz

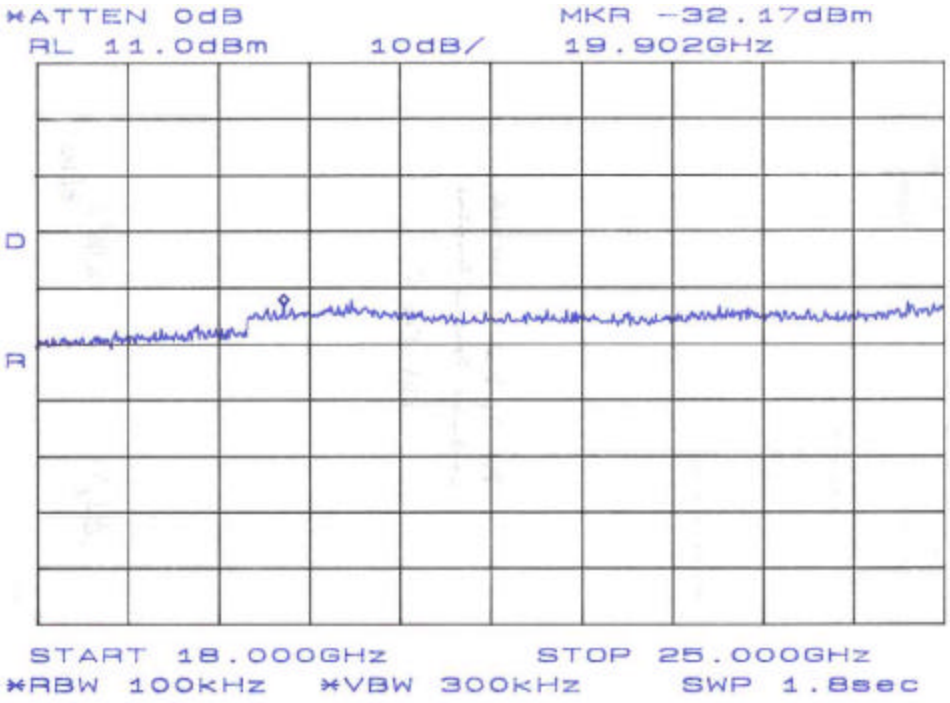

Figure 23. Conducted Spurious: Plan A Band 3 18GHz – 25GHz

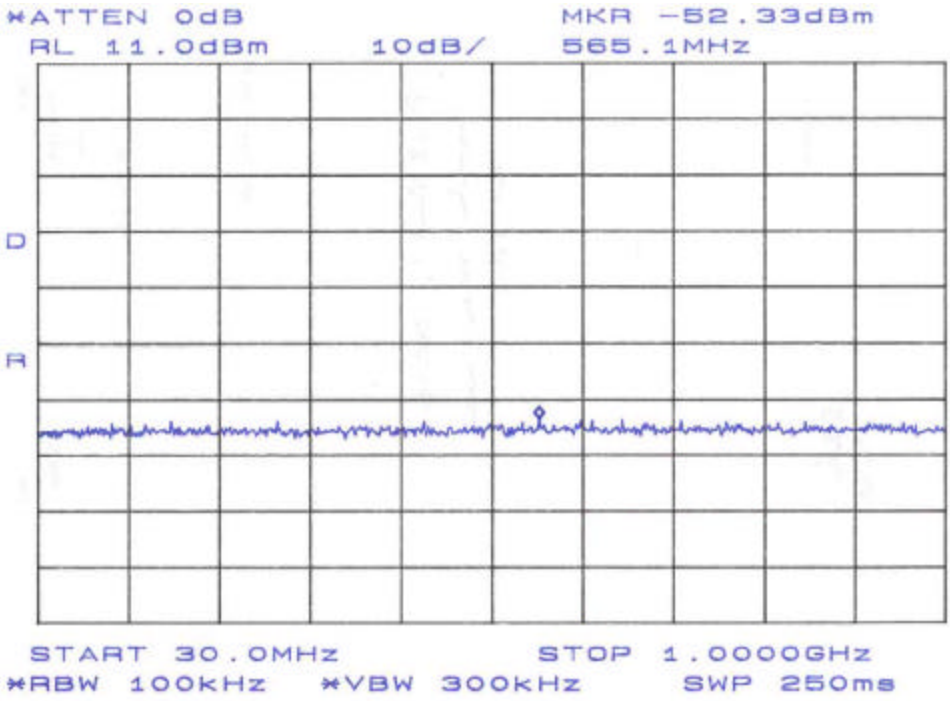

Figure 24. Conducted Spurious: Plan B Band 1 30MHz – 1GHz

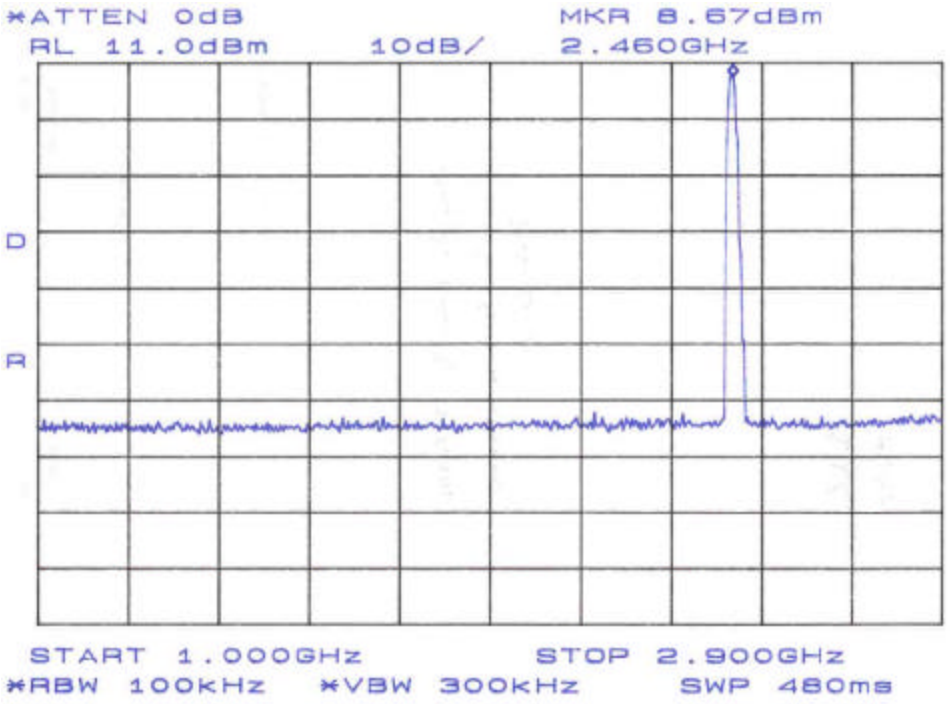

Figure 25. Conducted Spurious: Plan B Band 1 1GHz – 2.9GHz

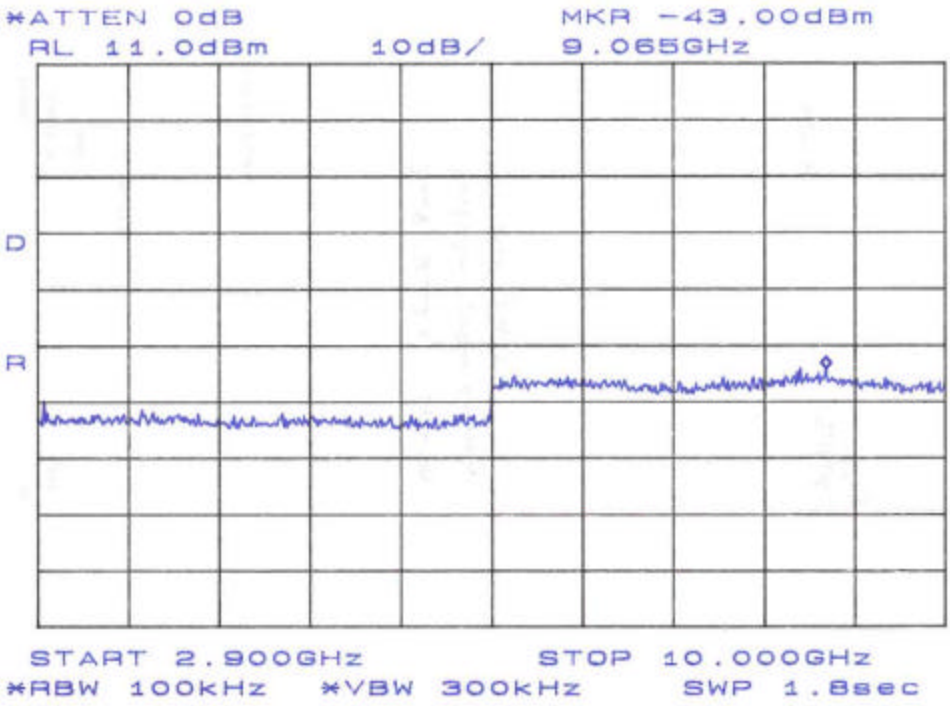

Figure 26. Conducted Spurious: Plan B Band 1 2.9GHz – 10GHz

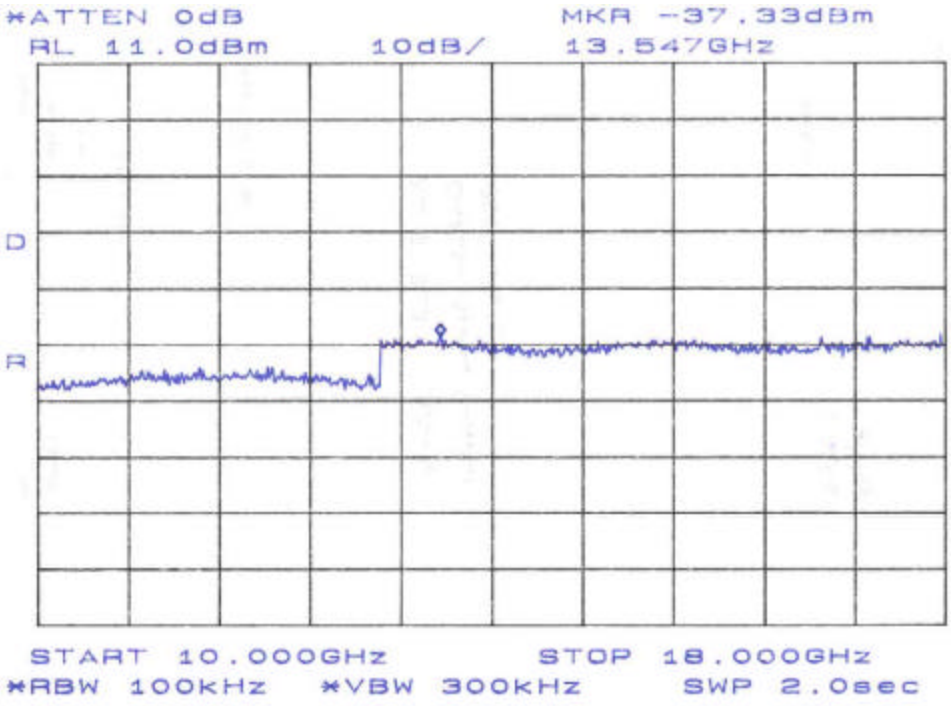

Figure 27. Conducted Spurious: Plan B Band 1 10GHz – 18GHz

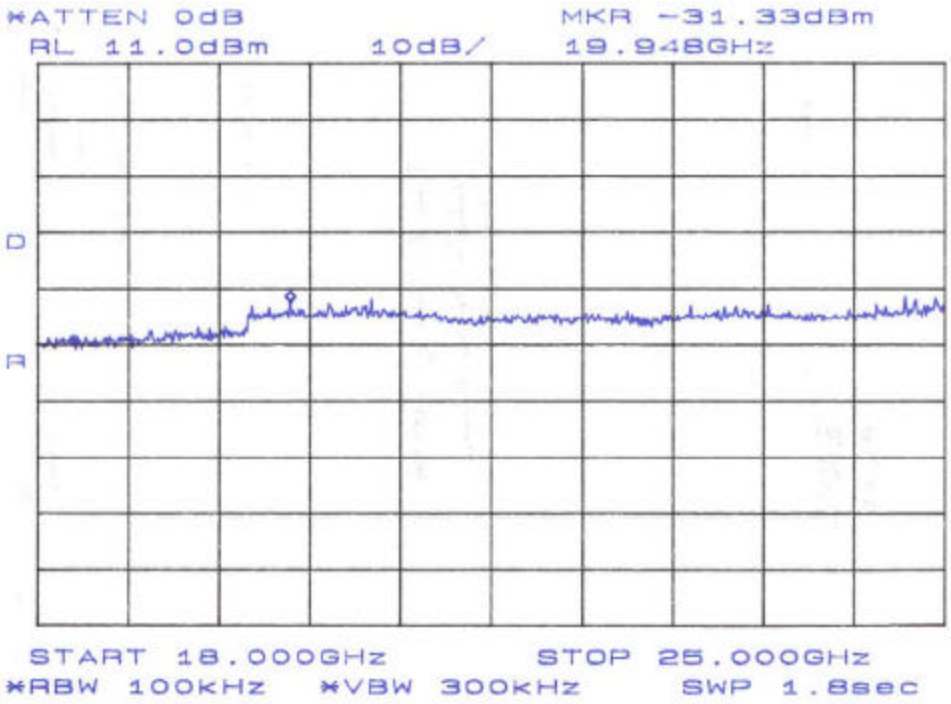

Figure 28. Conducted Spurious: Plan B Band 1 18GHz – 25GHz

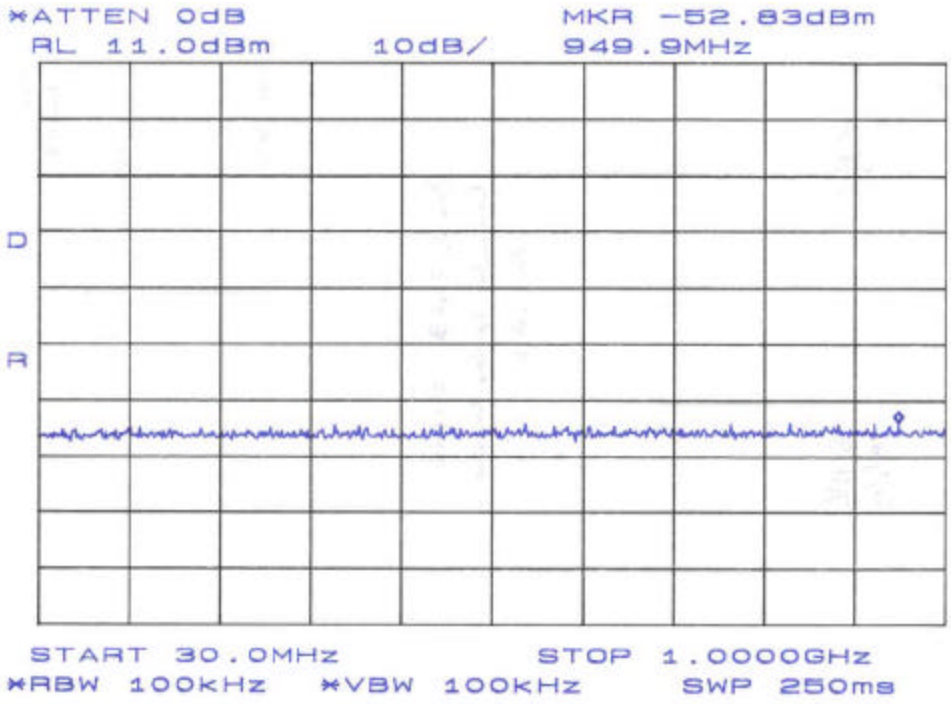

Figure 29. Conducted Spurious: Plan B Band 3 30MHz – 1GHz

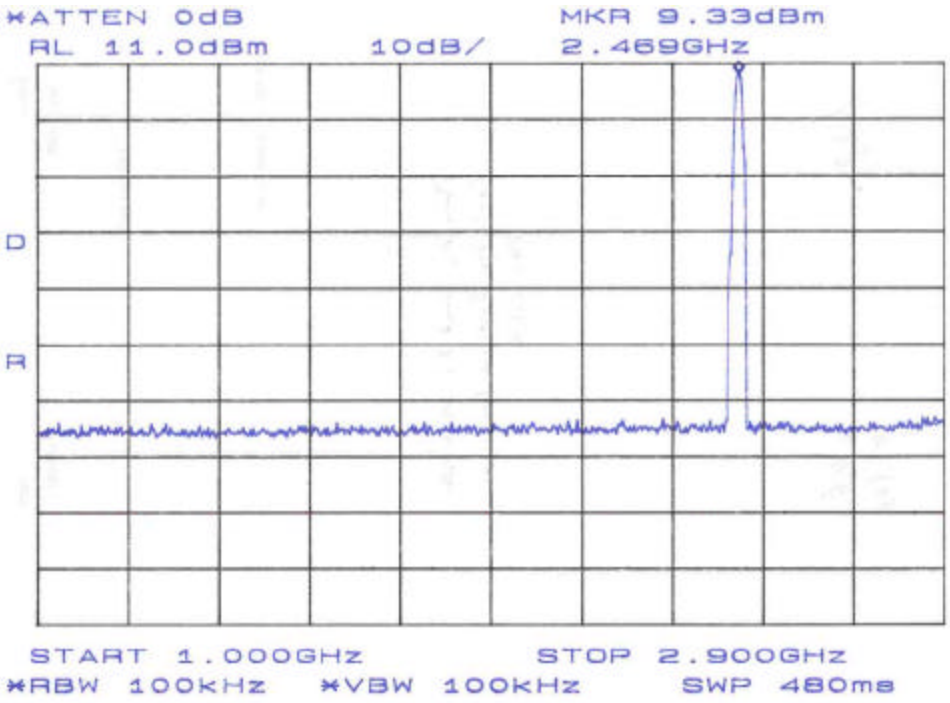

Figure 30. Conducted Spurious: Plan B Band 3 1GHz – 2.9GHz

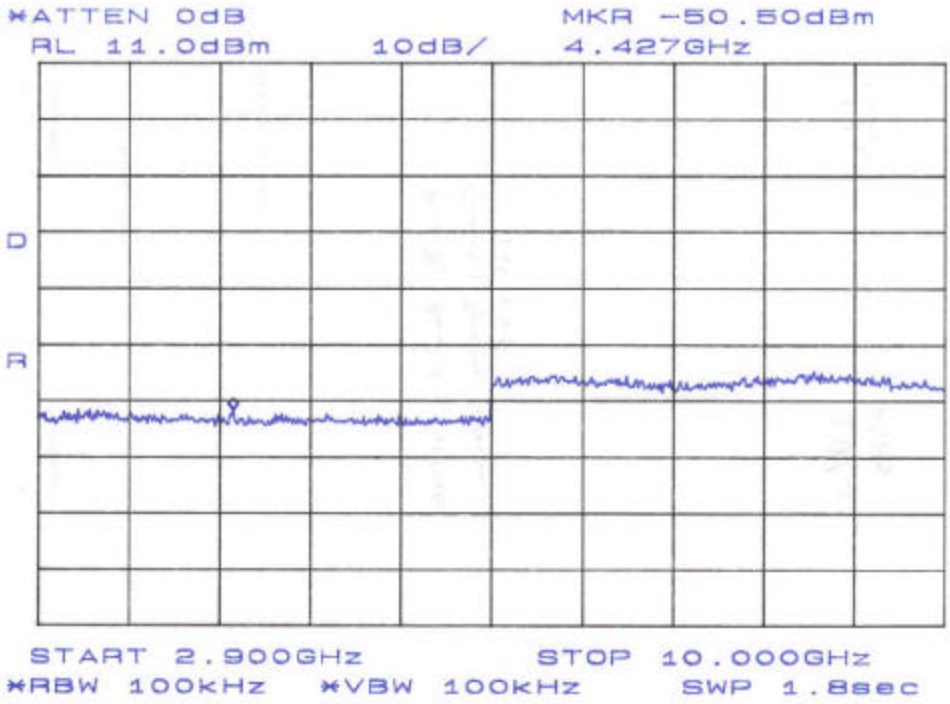

Figure 31. Conducted Spurious: Plan B Band 3 2.9GHz – 10GHz

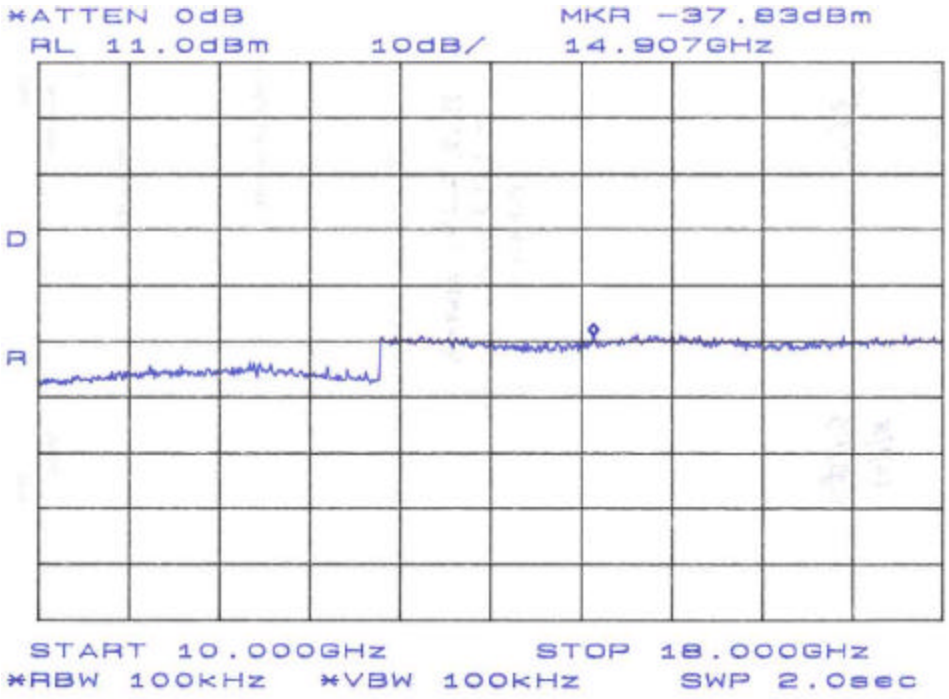

Figure 32. Conducted Spurious: Plan B Band 3 10GHz – 18GHz

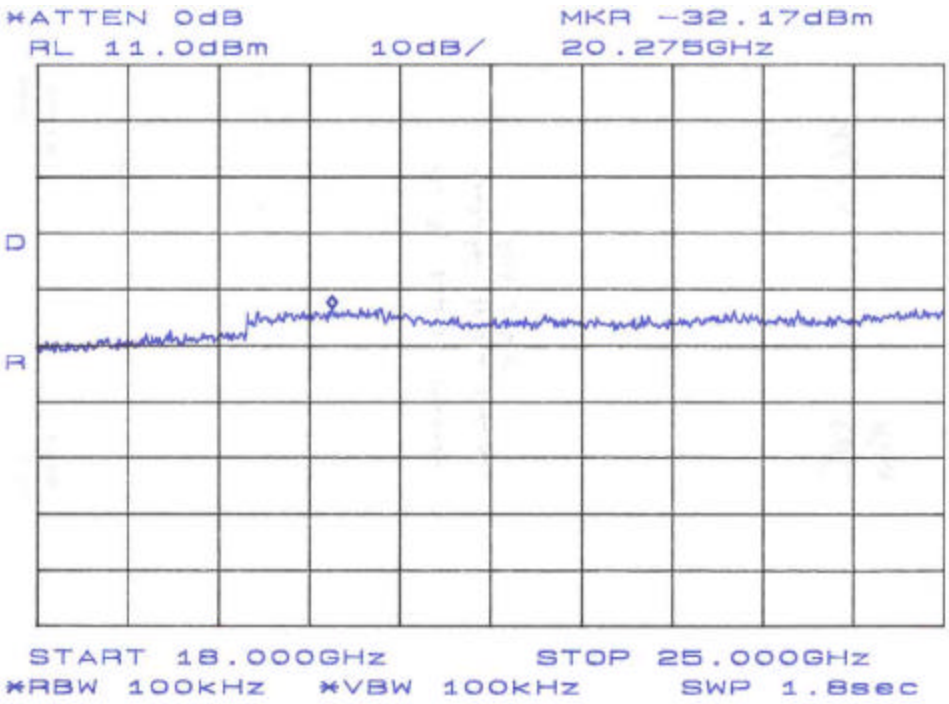

Figure 33. Conducted Spurious: Plan B Band 3 18GHz – 25GHz

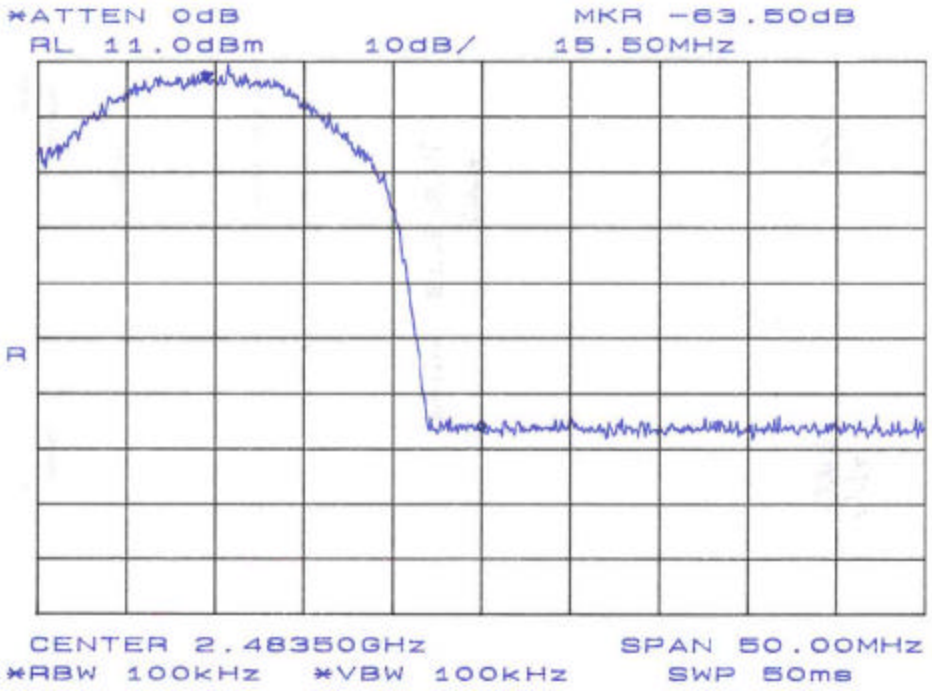

Figure 34. Conducted Spurious Emissions - Band Edge Plot – Plan B Band 3

4.5 Radiated Spurious Emissions: (FCC Part §15.247(c))

Radiated emissions that fall in the restricted bands must comply with the general emissions limits in 15.209(a).

The emissions were measured using the following resolution bandwidths:

Frequency Range	Resolution Bandwidth	Video Bandwidth
30MHz-1000 MHz	120kHz	>30 kHz
>1000 MHz	1 MHz	<30 Hz

Harmonic and Spurious emissions that were identified as coming from the EUT were checked in Peak and in Average Mode. It was verified that the peak-to-average ratio did not exceed 20dB.

Peak measurements and average measurements are made. All emissions were determined to have a peak-to-average ratio of less than 20 dB.

4.5.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-1992. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The EUT was tested in the following configurations and modes:

Antenna	Plan
Dish	A (bands 1 & 3), B (bands 1 & 3)
Flat Panel	A (bands 1 & 3), B (bands 1 & 3)
Yagi	A (bands 1 & 3), B (bands 1 & 3)

Emissions were scanned up to 40GHz.

The following is a sample calculation used in the data tables for calculating the final field strength of spurious emissions and comparing these levels to the specified limits.

Sample Calculation:

Spectrum Analyzer Voltage (SA Level): VdBµV
Antenna Factor (Ant Corr): AFdB/m
Cable Loss Correction (Cable Corr): CCdB
Amplifier Gain: GdB
Electric Field (Corr Level): EdBµV/m = VdBµV + AFdB/m + CCdB - GdB
To convert to linear units: EµV/m = antilog (EdBµV/m/20)

Table 7. Radiated Emissions Test Data Below 1GHz - Dish Antenna

CLIENT:	Adtran	DATE:	7/31/03
TESTER:	Greg Snyder	JOB #:	7693
EUT Information:		**Test Requirements:**	
EUT:	Tracer 4108	TEST STANDARD:	FCC Part 15
CONFIGURATION:	Cont Tx w/ Dish Antenna	DISTANCE:	3m
CLOCKS:	IF= Tx-280MHz	CLASS:	B
Test Equipment/Limit:			
ANTENNA:	00007	LIMIT:	FCC B
CABLE:	Site 2, 3m	AMPLIFIER (dB)	None

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (QP) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
84.78	H	270.0	2.0	11.3	7.3	2.0	20.6	10.7	100.0	-19.4
84.78	V	0.0	1.0	10.8	7.3	2.0	20.1	10.1	100.0	-19.9
115.90	H	270.0	2.0	10.5	10.8	2.4	23.6	15.2	150.0	-19.9
117.97	H	270.0	2.0	7.6	11.0	2.4	21.0	11.2	150.0	-22.5
121.65	H	292.5	3.0	8.4	11.1	2.4	22.0	12.5	150.0	-21.6
147.45	H	180.0	2.5	19.1	8.7	2.7	30.5	33.4	150.0	-13.1
147.45	V	0.0	1.0	10.8	8.7	2.7	22.2	12.8	150.0	-21.4
154.60	V	22.5	1.0	11.6	8.6	2.7	22.9	14.0	150.0	-20.6
154.60	H	180.0	1.5	15.2	8.6	2.7	26.5	21.2	150.0	-17.0
154.83	H	292.5	2.5	18.5	8.6	2.7	29.8	31.0	150.0	-13.7
154.83	V	0.0	1.0	12.6	8.6	2.7	23.9	15.7	150.0	-19.6
162.17	H	0.0	2.5	17.8	9.5	2.7	30.0	31.6	150.0	-13.5
162.17	V	22.5	1.0	14.7	9.5	2.7	26.9	22.1	150.0	-16.6
180.36	V	180.0	1.0	17.5	9.4	2.9	29.8	31.0	150.0	-13.7
193.26	H	90.0	2.0	22.4	9.8	3.1	35.3	58.4	150.0	-8.2
193.26	V	180.0	1.0	13.8	9.8	3.1	26.7	21.7	150.0	-16.8
257.68	H	90.0	1.5	15.2	12.4	3.5	31.1	36.0	200.0	-14.9
257.68	V	90.0	1.5	10.9	12.4	3.5	26.8	22.0	200.0	-19.2
280.00	V	90.0	1.0	6.5	13.2	3.7	23.4	14.8	200.0	-22.6
280.00	H	90.0	1.5	10.5	13.2	3.7	27.4	23.5	200.0	-18.6
309.21	V	180.0	1.0	7.4	13.8	3.9	25.1	17.9	200.0	-21.0
309.21	H	180.0	1.5	12.4	13.8	3.9	30.1	31.9	200.0	-16.0

Table 8: Radiated Emission Test Data Above 1GHz - Dish Antenna

Plan A – Band 1

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
				Peak							
2276.00	H	180.0	1.0	56.4	29.7	3.2	34.2	55.1	569.7	5000.0	-18.9
4632.30	H	225.0	1.0	47.4	32.8	3.9	34.5	49.6	302.2	5000.0	-24.4
4832.00	H	0.0	1.0	48.6	33.3	4.2	34.5	51.6	380.8	5000.0	-22.4 **a**
12080.00	H	0.0	1.0	45.2	41.4	5.2	32.2	59.6	960.2	5000.0	-14.3 **a**
14496.00	H	0.0	1.0	42.2	40.9	7.6	32.5	58.2	808.3	5000.0	-15.8 **a**
19328.00	H	0.0	1.0	41.5	39.9	2.4	32.1	51.7	386.3	5000.0	-22.2 **a**
2276.00	V	202.5	1.0	60.8	29.7	3.2	34.2	59.5	945.5	5000.0	-14.5
4632.30	V	180.0	1.0	50.4	32.8	3.9	34.5	52.6	426.8	5000.0	-21.4
4832.00	V	0.0	1.0	47.6	33.3	4.2	34.5	50.6	339.4	5000.0	-23.4 **a**
12080.00	V	0.0	1.0	44.9	41.4	5.2	32.2	59.3	927.6	5000.0	-14.6 **a**
14496.00	V	0.0	1.0	41.7	40.9	7.6	32.5	57.7	763.1	5000.0	-16.3 **a**
19328.00	V	0.0	1.0	41.0	39.9	2.4	32.1	51.2	364.7	5000.0	-22.7 **a**
				Avg							
2276.00	H	180.0	1.0	48.8	29.7	3.2	34.2	47.5	237.5	500.0	-6.5
4632.30	H	225.0	1.0	39.1	32.8	3.9	34.5	41.3	116.2	500.0	-12.7
4832.00	H	0.0	1.0	33.2	33.3	4.2	34.5	36.2	64.7	500.0	-17.8 **a**
12080.00	H	0.0	1.0	31.2	41.4	5.2	32.2	45.6	191.6	500.0	-8.3 **a**
14496.00	H	0.0	1.0	32.0	40.9	7.6	32.5	48.0	249.8	500.0	-6.0 **a**
19328.00	H	0.0	1.0	33.0	39.9	2.4	32.1	43.2	145.2	500.0	-10.7 **a**
2276.00	V	202.5	1.0	50.2	29.7	3.2	34.2	48.9	279.0	500.0	-5.1
4632.30	V	180.0	1.0	40.6	32.8	3.9	34.5	42.8	138.1	500.0	-11.2
4832.00	V	0.0	1.0	34.0	33.3	4.2	34.5	37.0	70.9	500.0	-17.0 **a**
12080.00	V	0.0	1.0	32.1	41.4	5.2	32.2	46.5	212.5	500.0	-7.4 **a**
14496.00	V	0.0	1.0	31.7	40.9	7.6	32.5	47.7	241.3	500.0	-6.3 **a**
19328.00	V	0.0	1.0	32.0	39.9	2.4	32.1	42.2	129.4	500.0	-11.7 **a**

a = ambient

Plan A - Band 3

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
				Peak							
2328.20	H	180.0	1.0	52.0	29.8	3.2	34.2	50.7	343.9	5000.0	-23.3
4656.30	H	180.0	1.0	46.3	32.9	3.9	34.5	48.6	269.3	5000.0	-25.4
4856.00	H	0.0	1.0	47.4	33.4	4.3	34.5	50.5	335.3	5000.0	-23.5 **a**
7284.00	H	0.0	1.0	44.8	37.7	4.6	34.8	52.2	408.6	5000.0	-21.8 **a**
12140.00	H	0.0	1.0	41.3	41.3	5.3	32.2	55.8	616.9	5000.0	-18.2 **a**
19424.00	H	0.0	1.0	41.3	39.9	2.4	32.1	51.5	377.5	5000.0	-22.4 **a**
2328.20	V	180.0	1.0	53.4	29.8	3.2	34.2	52.1	404.0	5000.0	-21.9
4656.30	V	180.0	1.0	46.7	32.9	3.9	34.5	49.0	282.0	5000.0	-25.0
4856.00	V	0.0	1.0	47.0	33.4	4.3	34.5	50.1	320.2	5000.0	-23.9 **a**
7284.00	V	0.0	1.0	42.5	37.7	4.6	34.8	49.9	313.6	5000.0	-24.1 **a**
12140.00	V	0.0	1.0	40.6	41.3	5.3	32.2	55.1	569.2	5000.0	-18.9 **a**
19424.00	V	0.0	1.0	40.9	39.9	2.4	32.1	51.1	360.5	5000.0	-22.8 **a**
				Avg							
2328.20	H	180.0	1.0	44.3	29.8	3.2	34.2	43.0	141.7	500.0	-11.0
4656.30	H	180.0	1.0	37.4	32.9	3.9	34.5	39.7	96.6	500.0	-14.3
4856.00	H	0.0	1.0	33.0	33.4	4.3	34.5	36.1	63.9	500.0	-17.9 **a**
7284.00	H	0.0	1.0	32.0	37.7	4.6	34.8	39.4	93.6	500.0	-14.6 **a**
12140.00	H	0.0	1.0	32.2	41.3	5.3	32.2	46.7	216.4	500.0	-7.3 **a**
19424.00	H	0.0	1.0	33.0	39.9	2.4	32.1	43.2	145.2	500.0	-10.7 **a**
2328.20	V	180.0	1.0	48.7	29.8	3.2	34.2	47.4	235.2	500.0	-6.6
4656.30	V	180.0	1.0	41.1	32.9	3.9	34.5	43.4	148.0	500.0	-10.6
4856.00	V	0.0	1.0	33.4	33.4	4.3	34.5	36.5	66.9	500.0	-17.5 **a**
7284.00	V	0.0	1.0	32.5	37.7	4.6	34.8	39.9	99.2	500.0	-14.1 **a**
12140.00	V	0.0	1.0	32.2	41.3	5.3	32.2	46.7	216.4	500.0	-7.3 **a**
19424.00	V	0.0	1.0	32.8	39.9	2.4	32.1	43.0	141.9	500.0	-10.9 **a**

a = ambient

Plan B – Band 1

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
				Peak							
1608.30	H	180.0	1.0	55.8	27.2	2.7	34.1	51.6	380.8	5000.0	-22.4
4912.00	H	0.0	1.0	49.7	33.5	4.4	34.5	53.1	450.7	5000.0	-20.9 **a**
7368.00	H	0.0	1.0	44.0	38.1	4.6	34.8	51.9	392.6	5000.0	-22.1 **a**
12280.00	H	0.0	1.0	44.0	41.0	5.6	32.1	58.4	832.3	5000.0	-15.6 **a**
19648.00	H	0.0	1.0	42.2	40.5	2.4	32.1	53.0	445.1	5000.0	-21.0 **a**
22104.00	H	0.0	1.0	41.5	39.9	2.5	32.1	51.8	390.7	5000.0	-22.1 **a**
1608.30	V	180.0	1.0	61.1	27.2	2.7	34.1	56.9	700.9	5000.0	-17.1
4912.00	V	0.0	1.0	48.6	33.5	4.4	34.5	52.0	398.8	5000.0	-22.0 **a**
7368.00	V	0.0	1.0	44.4	38.1	4.6	34.8	52.3	411.8	5000.0	-21.7 **a**
12280.00	V	0.0	1.0	42.1	41.0	5.7	32.1	56.6	677.5	5000.0	-17.4 **a**
19648.00	V	0.0	1.0	41.3	40.5	2.4	32.1	52.1	401.3	5000.0	-21.9 **a**
22104.00	V	0.0	1.0	41.0	39.9	2.5	32.1	51.3	368.9	5000.0	-22.6 **a**
				Avg							
1608.30	H	180.0	1.0	50.6	27.2	2.7	34.1	46.4	209.3	500.0	-7.6
4912.00	H	0.0	1.0	38.9	33.5	4.4	34.5	42.3	130.0	500.0	-11.7 **a**
7368.00	H	0.0	1.0	33.2	38.1	4.6	34.8	41.1	113.2	500.0	-12.9 **a**
12280.00	H	0.0	1.0	32.2	41.0	5.6	32.1	46.6	213.9	500.0	-7.4 **a**
19648.00	H	0.0	1.0	32.5	40.5	2.4	32.1	43.3	145.7	500.0	-10.7 **a**
22104.00	H	0.0	1.0	32.9	39.9	2.5	32.1	43.2	145.2	500.0	-10.7 **a**
1608.30	V	180.0	1.0	52.7	27.2	2.7	34.1	48.5	266.5	500.0	-5.5
4912.00	V	0.0	1.0	37.6	33.5	4.4	34.5	41.0	112.4	500.0	-13.0 **a**
7368.00	V	0.0	1.0	35.4	38.1	4.6	34.8	43.3	146.1	500.0	-10.7 **a**
12280.00	V	0.0	1.0	31.9	41.0	5.7	32.1	46.4	209.4	500.0	-7.6 **a**
19648.00	V	0.0	1.0	32.1	40.5	2.4	32.1	42.9	139.1	500.0	-11.1 **a**
22104.00	V	0.0	1.0	31.8	39.9	2.5	32.1	42.1	127.9	500.0	-11.8 **a**

a = ambient

Plan B - Band 3

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
				Peak							
1608.30	H	180.0	1.0	56.0	27.2	2.7	34.1	51.8	389.7	5000.0	-22.2
4576.25	H	0.0	1.0	48.3	32.7	3.8	34.5	50.2	324.8	5000.0	-23.7 **a**
4936.00	H	0.0	1.0	49.2	33.5	4.4	34.5	52.6	427.4	5000.0	-21.4 **a**
7404.00	H	0.0	1.0	43.1	38.1	4.6	34.8	51.0	355.2	5000.0	-23.0 **a**
12340.00	H	0.0	1.0	43.8	41.0	5.7	32.1	58.3	825.0	5000.0	-15.6 **a**
19744.00	H	0.0	1.0	40.1	40.5	2.4	32.1	50.9	348.7	5000.0	-23.1 **a**
22212.00	H	0.0	1.0	41.0	39.9	2.5	32.1	51.3	367.0	5000.0	-22.7 **a**
1608.30	V	180.0	1.0	58.7	27.2	2.7	34.1	54.5	531.7	5000.0	-19.5
4576.25	V	180.0	1.0	51.2	32.7	3.8	34.5	53.1	453.5	5000.0	-20.8
4936.00	V	0.0	1.0	42.8	33.5	4.4	34.5	46.2	204.6	5000.0	-27.8 **a**
7404.00	V	0.0	1.0	44.3	38.1	4.6	34.8	52.2	407.8	5000.0	-21.8 **a**
12340.00	V	0.0	1.0	43.5	41.0	5.7	32.1	58.0	797.0	5000.0	-15.9 **a**
19744.00	V	0.0	1.0	40.0	40.5	2.4	32.1	50.8	344.8	5000.0	-23.2 **a**
22212.00	V	0.0	1.0	41.3	39.9	2.5	32.1	51.6	379.9	5000.0	-22.4 **a**
				Avg							
1608.30	H	180.0	1.0	49.7	27.2	2.7	34.1	45.5	188.7	500.0	-8.5
4576.25	H	0.0	1.0	42.1	32.7	3.8	34.5	44.0	159.1	500.0	-9.9 **a**
4936.00	H	0.0	1.0	39.6	33.5	4.4	34.5	43.0	141.5	500.0	-11.0 **a**
7404.00	H	0.0	1.0	32.9	38.1	4.6	34.8	40.8	109.8	500.0	-13.2 **a**
12340.00	H	0.0	1.0	34.2	41.0	5.7	32.1	48.7	273.2	500.0	-5.2 **a**
19744.00	H	0.0	1.0	29.7	40.5	2.4	32.1	40.5	105.3	500.0	-13.5 **a**
22212.00	H	0.0	1.0	33.3	39.9	2.5	32.1	43.6	151.2	500.0	-10.4 **a**
1608.30	V	0.0	1.0	52.7	27.2	2.7	34.1	48.5	266.5	500.0	-5.5
4576.25	V	180.0	1.0	46.7	32.7	3.8	34.5	48.6	270.1	500.0	-5.3
4936.00	V	0.0	1.0	38.4	33.5	4.4	34.5	41.8	123.3	500.0	-12.2 **a**
7404.00	V	0.0	1.0	33.8	38.1	4.6	34.8	41.7	121.7	500.0	-12.3 **a**
12340.00	V	0.0	1.0	34.0	41.0	5.7	32.1	48.5	267.0	500.0	-5.4 **a**
19744.00	V	0.0	1.0	29.2	40.5	2.4	32.1	40.0	99.4	500.0	-14.0 **a**
22212.00	V	0.0	1.0	33.0	39.9	2.5	32.1	43.3	146.1	500.0	-10.7 **a**

Table 9: Radiated Emission Test Data Above 1GHz - Flat Panel Antenna

Plan A – Band 1

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
				Peak							
2276.00	H	180.0	1.0	56.4	29.7	3.2	34.2	55.1	569.7	5000.0	-18.9
4632.30	H	225.0	1.0	47.4	32.8	3.9	34.5	49.6	302.2	5000.0	-24.4
4832.00	H	0.0	1.0	48.6	33.3	4.2	34.5	51.6	380.8	5000.0	-22.4 **a**
12080.00	H	0.0	1.0	45.2	41.4	5.2	32.2	59.6	960.2	5000.0	-14.3 **a**
14496.00	H	0.0	1.0	42.2	40.9	7.6	32.5	58.2	808.3	5000.0	-15.8 **a**
19328.00	H	0.0	1.0	41.5	39.9	2.4	32.1	51.7	386.3	5000.0	-22.2 **a**
2276.00	V	202.5	1.0	60.8	29.7	3.2	34.2	59.5	945.5	5000.0	-14.5
4632.30	V	180.0	1.0	50.4	32.8	3.9	34.5	52.6	426.8	5000.0	-21.4
4832.00	V	0.0	1.0	47.6	33.3	4.2	34.5	50.6	339.4	5000.0	-23.4 **a**
12080.00	V	0.0	1.0	44.9	41.4	5.2	32.2	59.3	927.6	5000.0	-14.6 **a**
14496.00	V	0.0	1.0	41.7	40.9	7.6	32.5	57.7	763.1	5000.0	-16.3 **a**
19328.00	V	0.0	1.0	41.0	39.9	2.4	32.1	51.2	364.7	5000.0	-22.7 **a**
				Avg							
2276.00	H	180.0	1.0	48.8	29.7	3.2	34.2	47.5	237.5	500.0	-6.5
4632.30	H	225.0	1.0	39.1	32.8	3.9	34.5	41.3	116.2	500.0	-12.7
4832.00	H	0.0	1.0	33.2	33.3	4.2	34.5	36.2	64.7	500.0	-17.8 **a**
12080.00	H	0.0	1.0	31.2	41.4	5.2	32.2	45.6	191.6	500.0	-8.3 **a**
14496.00	H	0.0	1.0	32.0	40.9	7.6	32.5	48.0	249.8	500.0	-6.0 **a**
19328.00	H	0.0	1.0	33.0	39.9	2.4	32.1	43.2	145.2	500.0	-10.7 **a**
2276.00	V	202.5	1.0	50.2	29.7	3.2	34.2	48.9	279.0	500.0	-5.1
4632.30	V	180.0	1.0	40.6	32.8	3.9	34.5	42.8	138.1	500.0	-11.2
4832.00	V	0.0	1.0	34.0	33.3	4.2	34.5	37.0	70.9	500.0	-17.0 **a**
12080.00	V	0.0	1.0	32.1	41.4	5.2	32.2	46.5	212.5	500.0	-7.4 **a**
14496.00	V	0.0	1.0	31.7	40.9	7.6	32.5	47.7	241.3	500.0	-6.3 **a**
19328.00	V	0.0	1.0	32.0	39.9	2.4	32.1	42.2	129.4	500.0	-11.7 **a**

a = ambient

Plan A - Band 3

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
				Peak							
2328.20	H	180.0	1.0	52.0	29.8	3.2	34.2	50.7	343.9	5000.0	-23.3
4656.30	H	180.0	1.0	46.3	32.9	3.9	34.5	48.6	269.3	5000.0	-25.4
4856.00	H	0.0	1.0	47.4	33.4	4.3	34.5	50.5	335.3	5000.0	-23.5 **a**
7284.00	H	0.0	1.0	44.8	37.7	4.6	34.8	52.2	408.6	5000.0	-21.8 **a**
12140.00	H	0.0	1.0	41.3	41.3	5.3	32.2	55.8	616.9	5000.0	-18.2 **a**
19424.00	H	0.0	1.0	41.3	39.9	2.4	32.1	51.5	377.5	5000.0	-22.4 **a**
2328.20	V	180.0	1.0	53.4	29.8	3.2	34.2	52.1	404.0	5000.0	-21.9
4656.30	V	180.0	1.0	46.7	32.9	3.9	34.5	49.0	282.0	5000.0	-25.0
4856.00	V	0.0	1.0	47.0	33.4	4.3	34.5	50.1	320.2	5000.0	-23.9 **a**
7284.00	V	0.0	1.0	42.5	37.7	4.6	34.8	49.9	313.6	5000.0	-24.1 **a**
12140.00	V	0.0	1.0	40.6	41.3	5.3	32.2	55.1	569.2	5000.0	-18.9 **a**
19424.00	V	0.0	1.0	40.9	39.9	2.4	32.1	51.1	360.5	5000.0	-22.8 **a**
				Avg							
2328.20	H	180.0	1.0	44.3	29.8	3.2	34.2	43.0	141.7	500.0	-11.0
4656.30	H	180.0	1.0	37.4	32.9	3.9	34.5	39.7	96.6	500.0	-14.3
4856.00	H	0.0	1.0	33.0	33.4	4.3	34.5	36.1	63.9	500.0	-17.9 **a**
7284.00	H	0.0	1.0	32.0	37.7	4.6	34.8	39.4	93.6	500.0	-14.6 **a**
12140.00	H	0.0	1.0	32.2	41.3	5.3	32.2	46.7	216.4	500.0	-7.3 **a**
19424.00	H	0.0	1.0	33.0	39.9	2.4	32.1	43.2	145.2	500.0	-10.7 **a**
2328.20	V	180.0	1.0	48.7	29.8	3.2	34.2	47.4	235.2	500.0	-6.6
4656.30	V	180.0	1.0	41.1	32.9	3.9	34.5	43.4	148.0	500.0	-10.6
4856.00	V	0.0	1.0	33.4	33.4	4.3	34.5	36.5	66.9	500.0	-17.5 **a**
7284.00	V	0.0	1.0	32.5	37.7	4.6	34.8	39.9	99.2	500.0	-14.1 **a**
12140.00	V	0.0	1.0	32.2	41.3	5.3	32.2	46.7	216.4	500.0	-7.3 **a**
19424.00	V	0.0	1.0	32.8	39.9	2.4	32.1	43.0	141.9	500.0	-10.9 **a**

a = ambient

Plan B – Band 1

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
				Peak							
1608.30	H	180.0	1.0	55.8	27.2	2.7	34.1	51.6	380.8	5000.0	-22.4
4912.00	H	0.0	1.0	49.7	33.5	4.4	34.5	53.1	450.7	5000.0	-20.9 **a**
7368.00	H	0.0	1.0	44.0	38.1	4.6	34.8	51.9	392.6	5000.0	-22.1 **a**
12280.00	H	0.0	1.0	44.0	41.0	5.6	32.1	58.4	832.3	5000.0	-15.6 **a**
19648.00	H	0.0	1.0	42.2	40.5	2.4	32.1	53.0	445.1	5000.0	-21.0 **a**
22104.00	H	0.0	1.0	41.5	39.9	2.5	32.1	51.8	390.7	5000.0	-22.1 **a**
1608.30	V	180.0	1.0	61.1	27.2	2.7	34.1	56.9	700.9	5000.0	-17.1
4912.00	V	0.0	1.0	48.6	33.5	4.4	34.5	52.0	398.8	5000.0	-22.0 **a**
7368.00	V	0.0	1.0	44.4	38.1	4.6	34.8	52.3	411.8	5000.0	-21.7 **a**
12280.00	V	0.0	1.0	42.1	41.0	5.7	32.1	56.6	677.5	5000.0	-17.4 **a**
19648.00	V	0.0	1.0	41.3	40.5	2.4	32.1	52.1	401.3	5000.0	-21.9 **a**
22104.00	V	0.0	1.0	41.0	39.9	2.5	32.1	51.3	368.9	5000.0	-22.6 **a**
				Avg							
1608.30	H	180.0	1.0	50.6	27.2	2.7	34.1	46.4	209.3	500.0	-7.6
4912.00	H	0.0	1.0	38.9	33.5	4.4	34.5	42.3	130.0	500.0	-11.7 **a**
7368.00	H	0.0	1.0	33.2	38.1	4.6	34.8	41.1	113.2	500.0	-12.9 **a**
12280.00	H	0.0	1.0	32.2	41.0	5.6	32.1	46.6	213.9	500.0	-7.4 **a**
19648.00	H	0.0	1.0	32.5	40.5	2.4	32.1	43.3	145.7	500.0	-10.7 **a**
22104.00	H	0.0	1.0	32.9	39.9	2.5	32.1	43.2	145.2	500.0	-10.7 **a**
1608.30	V	180.0	1.0	52.7	27.2	2.7	34.1	48.5	266.5	500.0	-5.5
4912.00	V	0.0	1.0	37.6	33.5	4.4	34.5	41.0	112.4	500.0	-13.0 **a**
7368.00	V	0.0	1.0	35.4	38.1	4.6	34.8	43.3	146.1	500.0	-10.7 **a**
12280.00	V	0.0	1.0	31.9	41.0	5.7	32.1	46.4	209.4	500.0	-7.6 **a**
19648.00	V	0.0	1.0	32.1	40.5	2.4	32.1	42.9	139.1	500.0	-11.1 **a**
22104.00	V	0.0	1.0	31.8	39.9	2.5	32.1	42.1	127.9	500.0	-11.8 **a**

a = ambient

Plan B - Band 3

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
				Peak							
1608.30	H	180.0	1.0	56.0	27.2	2.7	34.1	51.8	389.7	5000.0	-22.2
4576.25	H	0.0	1.0	48.3	32.7	3.8	34.5	50.2	324.8	5000.0	-23.7 **a**
4936.00	H	0.0	1.0	49.2	33.5	4.4	34.5	52.6	427.4	5000.0	-21.4 **a**
7404.00	H	0.0	1.0	43.1	38.1	4.6	34.8	51.0	355.2	5000.0	-23.0 **a**
12340.00	H	0.0	1.0	43.8	41.0	5.7	32.1	58.3	825.0	5000.0	-15.6 **a**
19744.00	H	0.0	1.0	40.1	40.5	2.4	32.1	50.9	348.7	5000.0	-23.1 **a**
22212.00	H	0.0	1.0	41.0	39.9	2.5	32.1	51.3	367.0	5000.0	-22.7 **a**
1608.30	V	180.0	1.0	58.7	27.2	2.7	34.1	54.5	531.7	5000.0	-19.5
4576.25	V	180.0	1.0	51.2	32.7	3.8	34.5	53.1	453.5	5000.0	-20.8
4936.00	V	0.0	1.0	42.8	33.5	4.4	34.5	46.2	204.6	5000.0	-27.8 **a**
7404.00	V	0.0	1.0	44.3	38.1	4.6	34.8	52.2	407.8	5000.0	-21.8 **a**
12340.00	V	0.0	1.0	43.5	41.0	5.7	32.1	58.0	797.0	5000.0	-15.9 **a**
19744.00	V	0.0	1.0	40.0	40.5	2.4	32.1	50.8	344.8	5000.0	-23.2 **a**
22212.00	V	0.0	1.0	41.3	39.9	2.5	32.1	51.6	379.9	5000.0	-22.4 **a**
				Avg							
1608.30	H	180.0	1.0	49.7	27.2	2.7	34.1	45.5	188.7	500.0	-8.5
4576.25	H	0.0	1.0	42.1	32.7	3.8	34.5	44.0	159.1	500.0	-9.9 **a**
4936.00	H	0.0	1.0	39.6	33.5	4.4	34.5	43.0	141.5	500.0	-11.0 **a**
7404.00	H	0.0	1.0	32.9	38.1	4.6	34.8	40.8	109.8	500.0	-13.2 **a**
12340.00	H	0.0	1.0	34.2	41.0	5.7	32.1	48.7	273.2	500.0	-5.2 **a**
19744.00	H	0.0	1.0	29.7	40.5	2.4	32.1	40.5	105.3	500.0	-13.5 **a**
22212.00	H	0.0	1.0	33.3	39.9	2.5	32.1	43.6	151.2	500.0	-10.4 **a**
1608.30	V	0.0	1.0	52.7	27.2	2.7	34.1	48.5	266.5	500.0	-5.5
4576.25	V	180.0	1.0	46.7	32.7	3.8	34.5	48.6	270.1	500.0	-5.3
4936.00	V	0.0	1.0	38.4	33.5	4.4	34.5	41.8	123.3	500.0	-12.2 **a**
7404.00	V	0.0	1.0	33.8	38.1	4.6	34.8	41.7	121.7	500.0	-12.3 **a**
12340.00	V	0.0	1.0	34.0	41.0	5.7	32.1	48.5	267.0	500.0	-5.4 **a**
19744.00	V	0.0	1.0	29.2	40.5	2.4	32.1	40.0	99.4	500.0	-14.0 **a**
22212.00	V	0.0	1.0	33.0	39.9	2.5	32.1	43.3	146.1	500.0	-10.7 **a**

a = ambient

Table 10: Radiated Emission Test Data Above 1GHz - Yagi Antenna

Plan A – Band 1

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
				Peak							
2276.00	H	180.0	1.0	56.4	29.7	3.2	34.2	55.1	569.7	5000.0	-18.9
4632.30	H	225.0	1.0	47.4	32.8	3.9	34.5	49.6	302.2	5000.0	-24.4
4832.00	H	0.0	1.0	48.6	33.3	4.2	34.5	51.6	380.8	5000.0	-22.4 **a**
12080.00	H	0.0	1.0	45.2	41.4	5.2	32.2	59.6	960.2	5000.0	-14.3 **a**
14496.00	H	0.0	1.0	42.2	40.9	7.6	32.5	58.2	808.3	5000.0	-15.8 **a**
19328.00	H	0.0	1.0	41.5	39.9	2.4	32.1	51.7	386.3	5000.0	-22.2 **a**
2276.00	V	202.5	1.0	60.8	29.7	3.2	34.2	59.5	945.5	5000.0	-14.5
4632.30	V	180.0	1.0	50.4	32.8	3.9	34.5	52.6	426.8	5000.0	-21.4
4832.00	V	0.0	1.0	47.6	33.3	4.2	34.5	50.6	339.4	5000.0	-23.4 **a**
12080.00	V	0.0	1.0	44.9	41.4	5.2	32.2	59.3	927.6	5000.0	-14.6 **a**
14496.00	V	0.0	1.0	41.7	40.9	7.6	32.5	57.7	763.1	5000.0	-16.3 **a**
19328.00	V	0.0	1.0	41.0	39.9	2.4	32.1	51.2	364.7	5000.0	-22.7 **a**
				Avg							
2276.00	H	180.0	1.0	48.8	29.7	3.2	34.2	47.5	237.5	500.0	-6.5
4632.30	H	225.0	1.0	39.1	32.8	3.9	34.5	41.3	116.2	500.0	-12.7
4832.00	H	0.0	1.0	33.2	33.3	4.2	34.5	36.2	64.7	500.0	-17.8 **a**
12080.00	H	0.0	1.0	31.2	41.4	5.2	32.2	45.6	191.6	500.0	-8.3 **a**
14496.00	H	0.0	1.0	32.0	40.9	7.6	32.5	48.0	249.8	500.0	-6.0 **a**
19328.00	H	0.0	1.0	33.0	39.9	2.4	32.1	43.2	145.2	500.0	-10.7 **a**
2276.00	V	202.5	1.0	50.2	29.7	3.2	34.2	48.9	279.0	500.0	-5.1
4632.30	V	180.0	1.0	40.6	32.8	3.9	34.5	42.8	138.1	500.0	-11.2
4832.00	V	0.0	1.0	34.0	33.3	4.2	34.5	37.0	70.9	500.0	-17.0 **a**
12080.00	V	0.0	1.0	32.1	41.4	5.2	32.2	46.5	212.5	500.0	-7.4 **a**
14496.00	V	0.0	1.0	31.7	40.9	7.6	32.5	47.7	241.3	500.0	-6.3 **a**
19328.00	V	0.0	1.0	32.0	39.9	2.4	32.1	42.2	129.4	500.0	-11.7 **a**

a = ambient

Plan A - Band 3

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
				Peak							
2328.20	H	180.0	1.0	52.0	29.8	3.2	34.2	50.7	343.9	5000.0	-23.3
4656.30	H	180.0	1.0	46.3	32.9	3.9	34.5	48.6	269.3	5000.0	-25.4
4856.00	H	0.0	1.0	47.4	33.4	4.3	34.5	50.5	335.3	5000.0	-23.5 **a**
7284.00	H	0.0	1.0	44.8	37.7	4.6	34.8	52.2	408.6	5000.0	-21.8 **a**
12140.00	H	0.0	1.0	41.3	41.3	5.3	32.2	55.8	616.9	5000.0	-18.2 **a**
19424.00	H	0.0	1.0	41.3	39.9	2.4	32.1	51.5	377.5	5000.0	-22.4 **a**
2328.20	V	180.0	1.0	53.4	29.8	3.2	34.2	52.1	404.0	5000.0	-21.9
4656.30	V	180.0	1.0	46.7	32.9	3.9	34.5	49.0	282.0	5000.0	-25.0
4856.00	V	0.0	1.0	47.0	33.4	4.3	34.5	50.1	320.2	5000.0	-23.9 **a**
7284.00	V	0.0	1.0	42.5	37.7	4.6	34.8	49.9	313.6	5000.0	-24.1 **a**
12140.00	V	0.0	1.0	40.6	41.3	5.3	32.2	55.1	569.2	5000.0	-18.9 **a**
19424.00	V	0.0	1.0	40.9	39.9	2.4	32.1	51.1	360.5	5000.0	-22.8 **a**
				Avg							
2328.20	H	180.0	1.0	44.3	29.8	3.2	34.2	43.0	141.7	500.0	-11.0
4656.30	H	180.0	1.0	37.4	32.9	3.9	34.5	39.7	96.6	500.0	-14.3
4856.00	H	0.0	1.0	33.0	33.4	4.3	34.5	36.1	63.9	500.0	-17.9 **a**
7284.00	H	0.0	1.0	32.0	37.7	4.6	34.8	39.4	93.6	500.0	-14.6 **a**
12140.00	H	0.0	1.0	32.2	41.3	5.3	32.2	46.7	216.4	500.0	-7.3 **a**
19424.00	H	0.0	1.0	33.0	39.9	2.4	32.1	43.2	145.2	500.0	-10.7 **a**
2328.20	V	180.0	1.0	48.7	29.8	3.2	34.2	47.4	235.2	500.0	-6.6
4656.30	V	180.0	1.0	41.1	32.9	3.9	34.5	43.4	148.0	500.0	-10.6
4856.00	V	0.0	1.0	33.4	33.4	4.3	34.5	36.5	66.9	500.0	-17.5 **a**
7284.00	V	0.0	1.0	32.5	37.7	4.6	34.8	39.9	99.2	500.0	-14.1 **a**
12140.00	V	0.0	1.0	32.2	41.3	5.3	32.2	46.7	216.4	500.0	-7.3 **a**
19424.00	V	0.0	1.0	32.8	39.9	2.4	32.1	43.0	141.9	500.0	-10.9 **a**

a = ambient

Plan B – Band 1

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
				Peak							
1608.30	H	180.0	1.0	55.8	27.2	2.7	34.1	51.6	380.8	5000.0	-22.4
4912.00	H	0.0	1.0	49.7	33.5	4.4	34.5	53.1	450.7	5000.0	-20.9 **a**
7368.00	H	0.0	1.0	44.0	38.1	4.6	34.8	51.9	392.6	5000.0	-22.1 **a**
12280.00	H	0.0	1.0	44.0	41.0	5.6	32.1	58.4	832.3	5000.0	-15.6 **a**
19648.00	H	0.0	1.0	42.2	40.5	2.4	32.1	53.0	445.1	5000.0	-21.0 **a**
22104.00	H	0.0	1.0	41.5	39.9	2.5	32.1	51.8	390.7	5000.0	-22.1 **a**
1608.30	V	180.0	1.0	61.1	27.2	2.7	34.1	56.9	700.9	5000.0	-17.1
4912.00	V	0.0	1.0	48.6	33.5	4.4	34.5	52.0	398.8	5000.0	-22.0 **a**
7368.00	V	0.0	1.0	44.4	38.1	4.6	34.8	52.3	411.8	5000.0	-21.7 **a**
12280.00	V	0.0	1.0	42.1	41.0	5.7	32.1	56.6	677.5	5000.0	-17.4 **a**
19648.00	V	0.0	1.0	41.3	40.5	2.4	32.1	52.1	401.3	5000.0	-21.9 **a**
22104.00	V	0.0	1.0	41.0	39.9	2.5	32.1	51.3	368.9	5000.0	-22.6 **a**
				Avg							
1608.30	H	180.0	1.0	50.6	27.2	2.7	34.1	46.4	209.3	500.0	-7.6
4912.00	H	0.0	1.0	38.9	33.5	4.4	34.5	42.3	130.0	500.0	-11.7 **a**
7368.00	H	0.0	1.0	33.2	38.1	4.6	34.8	41.1	113.2	500.0	-12.9 **a**
12280.00	H	0.0	1.0	32.2	41.0	5.6	32.1	46.6	213.9	500.0	-7.4 **a**
19648.00	H	0.0	1.0	32.5	40.5	2.4	32.1	43.3	145.7	500.0	-10.7 **a**
22104.00	H	0.0	1.0	32.9	39.9	2.5	32.1	43.2	145.2	500.0	-10.7 **a**
1608.30	V	180.0	1.0	52.7	27.2	2.7	34.1	48.5	266.5	500.0	-5.5
4912.00	V	0.0	1.0	37.6	33.5	4.4	34.5	41.0	112.4	500.0	-13.0 **a**
7368.00	V	0.0	1.0	35.4	38.1	4.6	34.8	43.3	146.1	500.0	-10.7 **a**
12280.00	V	0.0	1.0	31.9	41.0	5.7	32.1	46.4	209.4	500.0	-7.6 **a**
19648.00	V	0.0	1.0	32.1	40.5	2.4	32.1	42.9	139.1	500.0	-11.1 **a**
22104.00	V	0.0	1.0	31.8	39.9	2.5	32.1	42.1	127.9	500.0	-11.8 **a**

a = ambient

Plan B - Band 3

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Hght (m)	SA Level (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin dB
				Peak							
1608.30	H	180.0	1.0	56.0	27.2	2.7	34.1	51.8	389.7	5000.0	-22.2
4576.25	H	0.0	1.0	48.3	32.7	3.8	34.5	50.2	324.8	5000.0	-23.7 **a**
4936.00	H	0.0	1.0	49.2	33.5	4.4	34.5	52.6	427.4	5000.0	-21.4 **a**
7404.00	H	0.0	1.0	43.1	38.1	4.6	34.8	51.0	355.2	5000.0	-23.0 **a**
12340.00	H	0.0	1.0	43.8	41.0	5.7	32.1	58.3	825.0	5000.0	-15.6 **a**
19744.00	H	0.0	1.0	40.1	40.5	2.4	32.1	50.9	348.7	5000.0	-23.1 **a**
22212.00	H	0.0	1.0	41.0	39.9	2.5	32.1	51.3	367.0	5000.0	-22.7 **a**
1608.30	V	180.0	1.0	58.7	27.2	2.7	34.1	54.5	531.7	5000.0	-19.5
4576.25	V	180.0	1.0	51.2	32.7	3.8	34.5	53.1	453.5	5000.0	-20.8
4936.00	V	0.0	1.0	42.8	33.5	4.4	34.5	46.2	204.6	5000.0	-27.8 **a**
7404.00	V	0.0	1.0	44.3	38.1	4.6	34.8	52.2	407.8	5000.0	-21.8 **a**
12340.00	V	0.0	1.0	43.5	41.0	5.7	32.1	58.0	797.0	5000.0	-15.9 **a**
19744.00	V	0.0	1.0	40.0	40.5	2.4	32.1	50.8	344.8	5000.0	-23.2 **a**
22212.00	V	0.0	1.0	41.3	39.9	2.5	32.1	51.6	379.9	5000.0	-22.4 **a**
				Avg							
1608.30	H	180.0	1.0	49.7	27.2	2.7	34.1	45.5	188.7	500.0	-8.5
4576.25	H	0.0	1.0	42.1	32.7	3.8	34.5	44.0	159.1	500.0	-9.9 **a**
4936.00	H	0.0	1.0	39.6	33.5	4.4	34.5	43.0	141.5	500.0	-11.0 **a**
7404.00	H	0.0	1.0	32.9	38.1	4.6	34.8	40.8	109.8	500.0	-13.2 **a**
12340.00	H	0.0	1.0	34.2	41.0	5.7	32.1	48.7	273.2	500.0	-5.2 **a**
19744.00	H	0.0	1.0	29.7	40.5	2.4	32.1	40.5	105.3	500.0	-13.5 **a**
22212.00	H	0.0	1.0	33.3	39.9	2.5	32.1	43.6	151.2	500.0	-10.4 **a**
1608.30	V	0.0	1.0	52.7	27.2	2.7	34.1	48.5	266.5	500.0	-5.5
4576.25	V	180.0	1.0	46.7	32.7	3.8	34.5	48.6	270.1	500.0	-5.3
4936.00	V	0.0	1.0	38.4	33.5	4.4	34.5	41.8	123.3	500.0	-12.2 **a**
7404.00	V	0.0	1.0	33.8	38.1	4.6	34.8	41.7	121.7	500.0	-12.3 **a**
12340.00	V	0.0	1.0	34.0	41.0	5.7	32.1	48.5	267.0	500.0	-5.4 **a**
19744.00	V	0.0	1.0	29.2	40.5	2.4	32.1	40.0	99.4	500.0	-14.0 **a**
22212.00	V	0.0	1.0	33.0	39.9	2.5	32.1	43.3	146.1	500.0	-10.7 **a**

a = ambient

4.6 AC Powerline Conducted Emissions: (FCC Part §15.207)

The EUT was placed on an 80 cm high 1 x 1.5 m non-conductive table above a ground plane. Power to the EUT was provided through a Solar Corporation 50 Ω/50 μH Line Impedance Stabilization Network bonded to a 3 x 2 meter ground plane. The LISN has its AC input supplied from a filtered AC power source. Power and data cables were moved about to obtain maximum emissions.

The 50Ω output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 150 kHz to 30 MHz were measured. The detector function was set to quasi-peak or peak, as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth.

Data is recorded in Table 11.

Table 11: Conducted Emissions Test Data; 15.207

CLIENT: Adtran DATE: 7/31/03
TESTER: Greg Snyder JOB #: 7693
EUT: Tracer 4108 TEST STANDARD: FCC B
CLASS: CIS22_B VOLTAGE: 120 VAC
CONFIGURATION: Plan B, Band 3, Tx = 2468 MHz

LINE 1 - NEUTRAL

Frequency MHz	Level QP dBuV	Cable Loss dB	Limit QP dBuV	Margin QP dB	Level AVG dBuV	Cable Loss dB	Limit AVG dBuV	Margin AVG dB
0.15	31.5	10.7	66.0	-23.8	24.0	10.7	56.0	-21.3
0.30	31.5	10.7	60.1	-17.9	30.9	10.7	50.1	-8.5
0.48	28.2	10.7	56.3	-17.4	27.2	10.7	46.3	-8.4
1.00	28.7	11.0	56.0	-16.3	27.6	11.0	46.0	-7.4
2.27	27.3	11.3	56.0	-17.4	24.7	11.3	46.0	-10.0
6.50	15.5	11.6	60.0	-32.9	15.5	11.6	50.0	-22.9
15.66	22.3	12.4	60.0	-25.3	22.3	12.4	50.0	-15.3
24.00	21.2	12.8	60.0	-26.0	21.2	12.8	50.0	-16.0

LINE 2 - PHASE

Frequency MHz	Level QP dBuV	Cable Loss dB	Limit QP dBuV	Margin QP dB	Level AVG dBuV	Cable Loss dB	Limit AVG dBuV	Margin AVG dB
0.15	31.9	10.7	65.9	-23.3	17.4	10.7	55.9	-27.8
0.31	31.4	10.7	60.0	-17.9	30.6	10.7	50.0	-8.7
0.48	28.2	10.7	56.3	-17.4	27.3	10.7	46.3	-8.3
1.00	28.7	11.0	56.0	-16.3	27.7	11.0	46.0	-7.3
2.22	27.2	11.3	56.0	-17.5	24.6	11.3	46.0	-10.1
6.50	16.3	11.6	60.0	-32.1	16.3	11.6	50.0	-22.1
15.67	22.2	12.4	60.0	-25.4	22.2	12.4	50.0	-15.4
24.00	18.4	12.8	60.0	-28.8	18.4	12.8	50.0	-18.8