ENGINEERING TEST REPORT

LUCENT WAVELAN/IEEE 2.4 GHz (11 Mb/s) DSSS TRANSCEIVER
Model No.: TRX7431

FCC ID: GM3WLPC24H

Applicant: **TEKLOGIX INC.**
2100 Meadowvale Blvd.
Mississauga, Ontario
Canada, L5N 7J9

In Accordance With

FEDERAL COMMUNICATIONS COMMISSION (FCC)
PART 15, SUBPART C, SEC. 15.247
Direct Sequence Spread Spectrum Transmitters operating in the frequency band 2412 - 2462 MHz

UltraTech's File No.: TEK-208FTX

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs …… Date: ……	
Report Prepared by: Dan Huynh ……	Tested by: Hung Trinh, EMI/RFI Technician ……
Issued Date: Nov. 23, 1999	Test Dates: Nov. 15-19, 1999

The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.

UltraTech

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Section 15.247:1998
Title	Telecommunication - Code of Federal Regulations, CFR 47, Part 15
Purpose of Test:	To gain FCC Certification Authorization for Direct Sequence Spread Spectrum Transmitters operating in the Frequency Band 2412 - 2462 MHz .
Test Procedures	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute 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.
Environmental Classification:	• Light-industry, Commercial • Industry

1.2. RELATED SUBMITAL(S)/GRANT(S)

None

1.3. NORMATIVE REFERENCES

Publication	YEAR	Title
FCC CFR Parts 0-19	1998	Code of Federal Regulations – Telecommunication
ANSI C63.4	1992	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
CISPR 22 & EN 55022	1997 1998	Limits and Methods of Measurements of Radio Disturbance Characteristics of Information Technology Equipment
CISPR 16-1		Specification for Radio Disturbance and Immunity measuring apparatus and methods

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT:	
Name:	TEKLOGIX INC.
Address:	2100 Meadowvale Blvd. Mississauga, Ontario Canada, L5N 7J9
Contact Person:	Mr. Sada Dharwarkar Phone #: 905-813-9900 (3358) Fax #: 905-812-6301 Email Address: sdharwar@telogix.com

MANUFACTURER:	
Name:	LUCENT TECHNOLOGIES WCND BV
Address:	3431 JZ Nieuwegein The Netherlands

2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

Brand Name	TEKLOGIX INC.
Product Name	LUCENT WAVELAN/IEEE 2.4 GHz (11 Mb/s) DSSS TRANSCEIVER
Model Name or Number	TRX7431
Serial Number	Pre-production samples
Type of Equipment	Direct Sequence Spread Spectrum Transmitters
External Power Supply	Note 1
Transmitting/Receiving Antenna Type Notes 2 & 3	▪ Teklogix 7035 (Portable): NCC Current fed ½ wave antenna with reversed thrust SMA connector, Model: N2400SM10B, Frequency Range: 2.4-2.5 GHz, Gain: 2dBi. ▪ Teklogix 8255 (Mobile) and 8260 (Mobile): Larsen antenna with reversed thrust SMA connector, Model: KD MUQ 2400 RSM, Frequency Range: 2.4-2.5 GHz, Gain: 0 dBi. ▪ Teklogix 9150 (Base): CushCraft Directlink wall mount antenna, Model S2307AMP10SMF, frequency: 2.3-2.5 GHz, Gain: 7.5 dBi, Standards SMA connector.
Primary User Functions of EUT:	Communicate data among remote terminals: Teklogix 7035 Handheld (portable), 8255 Vehicle mount (mobile), 8260 Vehicle mount (mobile) and 9105 (base)

Notes:

1. All Teklogix Systems 7035, 8255, 8260 and 9150 use the Lucent radio with exactly the same parameters such as output power, data rate, data modem and etc… with the regulated 7.2 Vdc input voltage supply.
2. All Teklogix systems are professional installed by the manufacturer or its trained sub-contractor. Therefore, the applicant wish to apply for exemption of using the special coupling antenna for the base unit (Teklogix 9150)
3. SAR tests are applicable for the Teklogix 7035 Portable Terminal with NCC N2400SM10B ½ wave antenna. Since they use exactly the same radio transceivers, test only needs to be performed on 1 sample.

4. The antenna of Teklogix 8255 and 8260 Mobile Terminals are required to be located at least 20 cm away from the users.
5. The antenna of Teklogix 9150 base is required to be located on the roof of a building or outside antenna tower.

2.3. EUT'S TECHNICAL SPECIFICATIONS

TRANSMITTER	
Equipment Type:	▪ Portable ▪ Mobile ▪ Base station (fixed use)
Intended Operating Environment:	▪ Residential ▪ Commercial, light industry & heavy industry
Power Supply Requirement:	7.2 Vdc regulated voltage from the Teklogix Systems 7035, 8255, 8260 & 9150
RF Output Power Rating:	371.5 mW Peak
Operating Frequency Range:	2412 - 2462 MHz
RF Output Impedance:	50 Ohms
Duty Cycle:	Continuous
6 dB Bandwidth:	10.64 MHz
Emission Designation:	Direct Sequence Spread Spectrum (DSSS)
Oscillator Frequencies:	352 MHz
Antenna Connector Type:	Reversed thrust SMA connector (Teklogix 7035, 8255 and 8260) Standard SMA connector (Teklogix 9150)
Antenna Description:	• Teklogix 7035 (Portable) Manufacturer: NCC Type: Current fed ½ wave antenna with reversed thrust SMA connector Model: N2400SM10B Frequency Range: 2.4-2.5 GHz In/Out Impedance: 50 Ohms Gain: 2 dBi • Teklogix 8255 (Mobile) and 8260 (Mobile) Manufacturer: Larsen Type: ¼ wave antenna with reversed thrust SMA connector Model: KD MUQ 2400 RSM Frequency Range: 2.4-2.5 GHz In/Out Impedance: 50 Ohms Gain: 0 dBi • Teklogix 9150 (Base) Manufacturer: CushCraft Type: Directlink wall mount antenna Model: S2307AMP10SMF Frequency Range: 2.3-2.5 GHz In/Out Impedance: 50 Ohms Gain: 7.5 dBi

2.4. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-shielded)
1	RF IN/IOUT	1	SMA (REVERSED)	Shielded or direct attachment without cable.

NOTE:

- ***Ports of the EUT which in normal operation*** *were connected to ancillary equipment through interconnecting cables via a representative interconnecting cable to simulate the input/output characteristics. RF input/output was correctly terminated to the associated antenna.*
- ***Ports which are not connected to cables during normal intended operation: None***

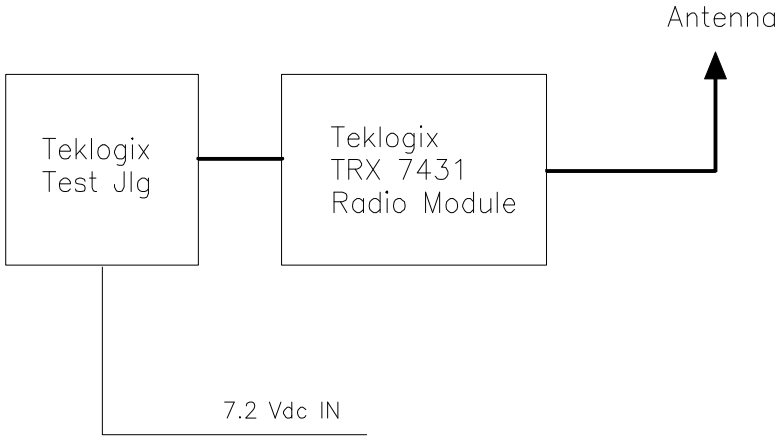
2.5. ANCILLARY EQUIPMENT/TEST SETUP

2.5.1. Test Configuration #1: Teklogix TRX7431 Radio connected to a Test Jig

Ancillary Equipment # 1	
Description:	Teklogix test Jig
Brand name:	N/A
Model Name or Number:	N/A
Serial Number:	N/A
Cable Length & Type:	½ foot ribbon cable between the test jig and the radio module 1 foot coaxial cable from the RF SMA connector to antenna

EUT's Antenna	
Description:	¼ wave antenna with reversed thrust SMA connector
Brand name:	Larsen
Model Name or Number:	KD MUQ 2400 RSM
Serial Number:	None
Cable Length & Type:	None
Connected to EUT's Port:	RF Port

Comments: This test configuration is only for FCC Compliance of an OEM Radio Module, it is not a configuration for real application.

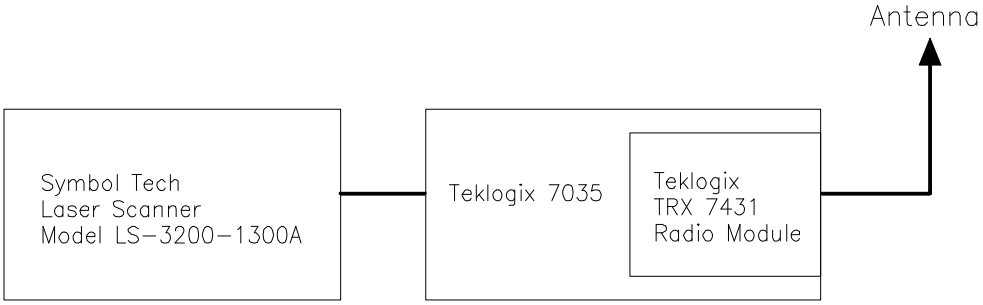


2.5.2. Test Configuration #2: Teklogix TRX7431 Radio installed inside 7035 Handheld Terminal

Ancillary Equipment # 1	
Description:	Handheld terminal
Brand name:	Teklogix
Model Name or Number:	7035
Serial Number:	Pre-production sample
Cable Length & Type:	6 feet long, shielded
Connected to Port:	Peripheral Port (28-pin PCR) of the Teklogix 7035
Power Supply	7.2 Vdc rechargeable battery

Ancillary Equipment # 2	
Description:	Laser Scanner
Brand name:	Symbol Tech
Model Name or Number:	LS-3200-1300A
Serial Number:	M374765
Cable Length & Type:	6 feet long, shielded
Connected to Port:	Peripheral Port (28-pin PCR) of the Teklogix 7035

EUT's Antenna	
Description:	Current fed ½ wave antenna with reversed thrust SMA connector
Brand name:	NCC Inc.
Model Name or Number:	N2400SM10B
Serial Number:	None
Cable Length & Type:	None
Connected to EUT's Port:	RF Port



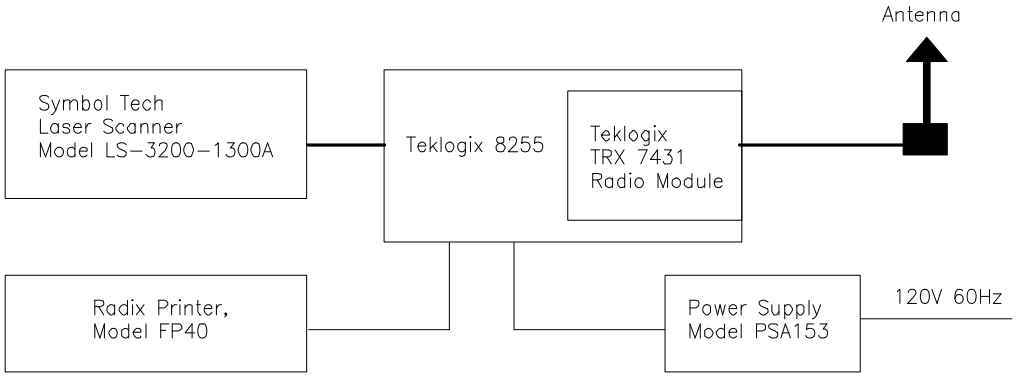
2.5.3. Test Configuration #3: Teklogix TRX7431 Radio installed inside Teklogix 8255 Vehicle Mount Terminal

Ancillary Equipment # 1	
Description:	Vehicle Mount Terminal
Brand name:	Teklogix
Model Name or Number:	8255
Serial Number:	N/A
Cable Length & Type:	6 feet long, shielded
Connected to Port:	Peripheral Port (28-pin PCR) of the Teklogix 8255
Power Supply:	120V 60Hz using external power supply Teklogix Model PSA153

Ancillary Equipment # 2	
Description:	Laser Scanner
Brand name:	Symbol Tech
Model Name or Number:	LS-3200-1300A
Serial Number:	M374765
Cable Length & Type:	6 feet long, shielded
Connected to Port:	Peripheral Port (28-pin PCR) of the Teklogix 8255

Ancillary Equipment # 3	
Description:	Printer
Brand name:	Radix
Model Name or Number:	FP40
Serial Number:	N/A
Cable Length & Type:	6 feet long, shielded
Connected to Port:	Expansion Port (36-pin PCR) of the Teklogix 8255

EUT's Antenna	
Description:	¼ wave antenna with reversed thrust SMA connector
Brand name:	Larsen
Model Name or Number:	KD MUQ 2400 RSM
Serial Number:	None
Cable Length & Type:	6 foot long shielded cable
Connected to EUT's Port:	RF Port



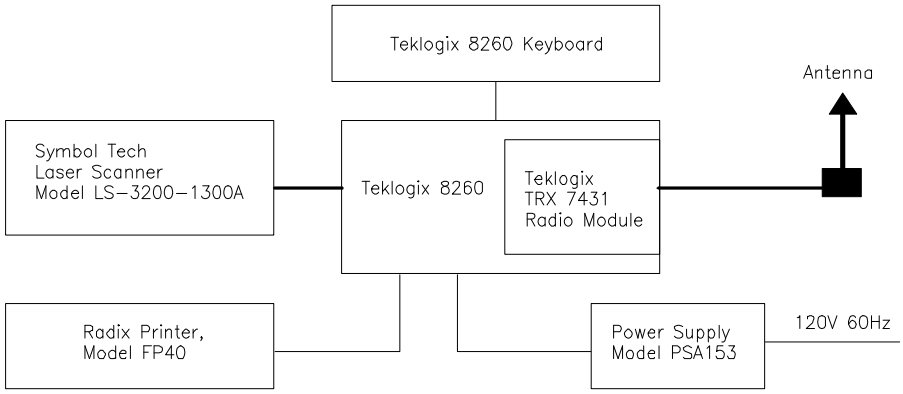
2.5.4. Test Configuration #4: Teklogix TRX7431 Radio installed inside Teklogix 8260 Vehicle Mount Terminal

Ancillary Equipment # 1	
Description:	Vehicle Mount Terminal
Brand name:	Teklogix
Model Name or Number:	8260
Serial Number:	N/A
Cable Length & Type:	6 feet long, shielded
Connected to Port:	Peripheral Port (28-pin PCR) of the Teklogix 8260
Power Supply:	120V 60Hz using external power supply Teklogix Model PSA153

Ancillary Equipment # 2	
Description:	Laser Scanner
Brand name:	Symbol Tech
Model Name or Number:	LS-3200-1300A
Serial Number:	M374765
Cable Length & Type:	6 feet long, shielded
Connected to Port:	Peripheral Port (28-pin PCR) of the Teklogix 8260

Ancillary Equipment # 3	
Description:	Printer
Brand name:	Radix
Model Name or Number:	FP40
Serial Number:	N/A
Cable Length & Type:	6 feet long, shielded
Connected to Port:	Expansion Port (36-pin PCR) of the Teklogix 8260

EUT's Antenna	
Description:	¼ wave antenna with reversed thrust SMA connector
Brand name:	Larsen
Model Name or Number:	KD MUQ 2400 RSM
Serial Number:	None
Cable Length & Type:	6 foot long shielded cable
Connected to EUT's Port:	RF Port



2.5.5. Test Configuration #5: Teklogix TRX7431 Radio installed inside Teklogix 9150 Base Station

Ancillary Equipment # 1	
Description:	Fixed Station
Brand name:	Teklogix
Model Name or Number:	9150
Serial Number:	N/A
Cable Length & Type:	1. 10Base-T Port (RJ45), 10 feet long, shielded 2. 10Base-5 Port (DB15), 10 feet long, shielded 3. 10Base-2 Port (BNC), 10 feelt long, shielded 4. Console Port (RS232), 6 feet long, shielded 5. AC Power cable, non-shielded
Power Supply:	120V 60Hz

Ancillary Equipment # 2	
Description:	ThinkPad Laptop Computer
Brand name:	IBM
Model Name or Number:	IBM ThinkPad
Serial Number:	78-HXHA7
Cable Length & Type:	6 feet long, shielded
Connected to EUT's Port:	RS232 Port of the Teklogix 9150

EUT's Antenna	
Description:	DirectLink wall mount antenna
Brand name:	CushCraft
Model Name or Number:	S2307AMP10SMF
Serial Number:	None
Cable Length & Type:	6 foot long shielded cable
Connected to EUT's Port:	RF Port

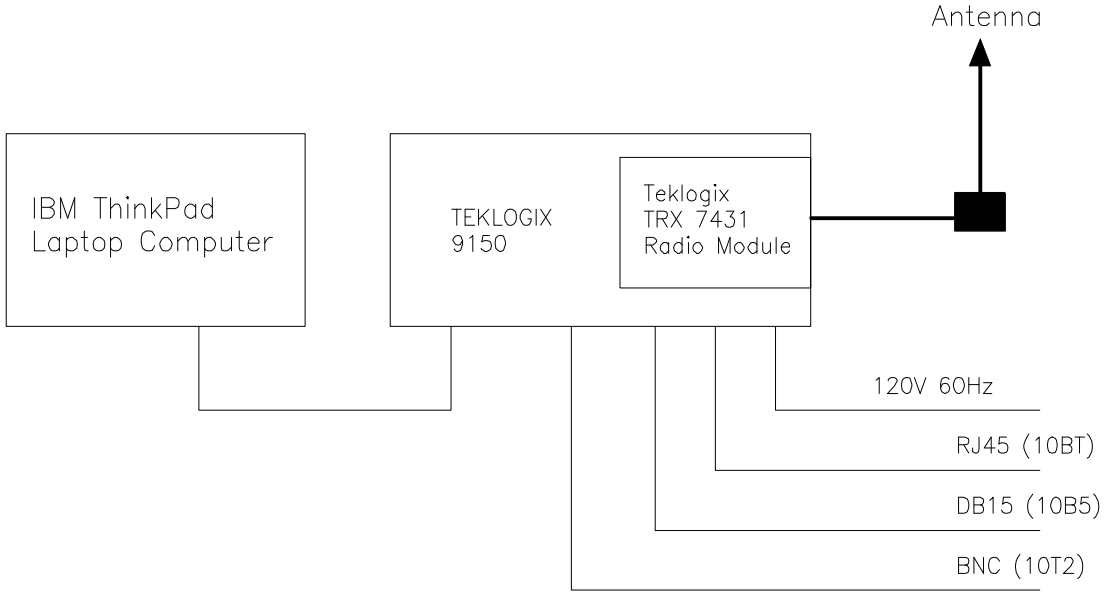


EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C
Humidity:	51%
Pressure:	101 kPa
Power input source:	7.2 Vdc regulated voltage from the Teklogix Systems 7035, 8255, 8260 & 9150

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	▪ Each of lowest, middle and highest channel frequencies transmits continuously for emissions measurements. ▪ The EUT operates in normal Direct Sequence mode for occupancy duration, and frequency separation.
Special Test Software:	▪ Special software is provided by the Applicant to select and operate the EUT at each channel frequency continuously. For example, the transmitter will be operated at each of lowest, middle and highest frequencies individually continuously during testing.
Special Hardware Used:	Teklogix software is provided to operate the EUT at different channel frequency.
Transmitter Test Antenna:	The EUT is tested with the antenna fitted in a manner typical of normal intended use as non-integral antenna equipment.

Transmitter Test Signals:	
Frequencies: ▪ 2412 - 2462 MHz band:	Lowest, middle and highest channel frequencies tested: 2412, 2437 and 2462 MHz
Transmitter Wanted Output Test Signals: ▪ RF Power Output (measured maximum output power): ▪ Normal Test Modulation ▪ Modulating signal source:	 ▪ 371.5 mW Peak ▪ Direct Sequence Spread Spectrum @ 11 Mb/s data rate ▪ Internal

EXHIBIT 4. SUMMARY OF TEST RESULTS

4.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

- AC Powerline Conducted Emissions were performed in UltraTech's shielded room, 16'(L) by 12'(W) by 12'(H).

- Radiated Emissions were performed at the Ultratech's 3 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario.

The above sites have been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville Open Field Test Site has been filed with FCC office (FCC File No.: 31040/SIT 1300B3) and Industry Canada office (Industry Canada File No.: IC2049). Last Date of Site Calibration: Sep. 20, 1999.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC PARAGRAPH.	TEST REQUIREMENTS	COMPLIANCE (YES/NO)
15.107, 15.109	AC Power Conducted Emissions & Radiated Emissions for Receiver and Digital Circuit Portions	Yes (Note 1)
15.247(a)(2)	Spectrum Bandwidth of a Direct Sequence Spread Spectrum System	Yes
15.247(b) & 1.1310	Maximum Peak Power and RF Exposure Limits	Yes
15.247(c)	RF Conducted Spurious Emissions at the Transmitter Antenna Terminal	Yes
15.247(c), 15.209 & 15.205	Transmitter Radiated Emissions	Yes
15.247(d)	Transmitted Power Density of a Direct Sequence Spread Spectrum System	Yes
15.247(e)	Processing Gain of Direct Sequence Spread Spectrum System	Yes

Note 1:
1. The digital circuits portion of the EUT has been tested and verified to comply with FCC Part 15, Subpart B, Class B Digital Devices. The Radio Receiver portion is exempted from FCC authorization since it operates in 2.412-2.462 GHz. The engineering test report can be provided upon FCC requests.
2. These radio with Teklogix systems are only sold for uses in industrial/commercial areas. But per manufacturer's specifications, they all must meet FCC Class B Limits.

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None

EXHIBIT 5. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

5.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in Exhibit 7 of this report

5.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with requirements of UKAS Document NIS 81 with a confidence level of 95%. Please refer to Exhibit 6 for Measurement Uncertainties.

5.3. MEASUREMENT EQUIPMENT USED

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C64.3:1992, FCC 15.247 and CISPR 16-1.

5.4. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUACTURER

The essential function of the EUT is to correctly communicate data to and from radios over RF link.

5.5. AC POWERLINE CONDUCTED EMISSIONS @ FCC PART 15, SUBPART B, PARA.15.107(A)

5.5.1. Limits

The equipment shall meet the limits of the following table:

Test Frequency Range	Test Limits	EMI Detector Used	Measuring Bandwidth
0.45 to 30 MHz	48 dBµV 51 dBµV	Quasi-Peak (Narrow band) Quasi-Peak (Broad band)	B = 10 kHz B = 10 kHz

5.5.2. Method of Measurements

Refer to Exhibit 7 of this test report & ANSI C63.4:1992

5.5.3. Test Equipment List

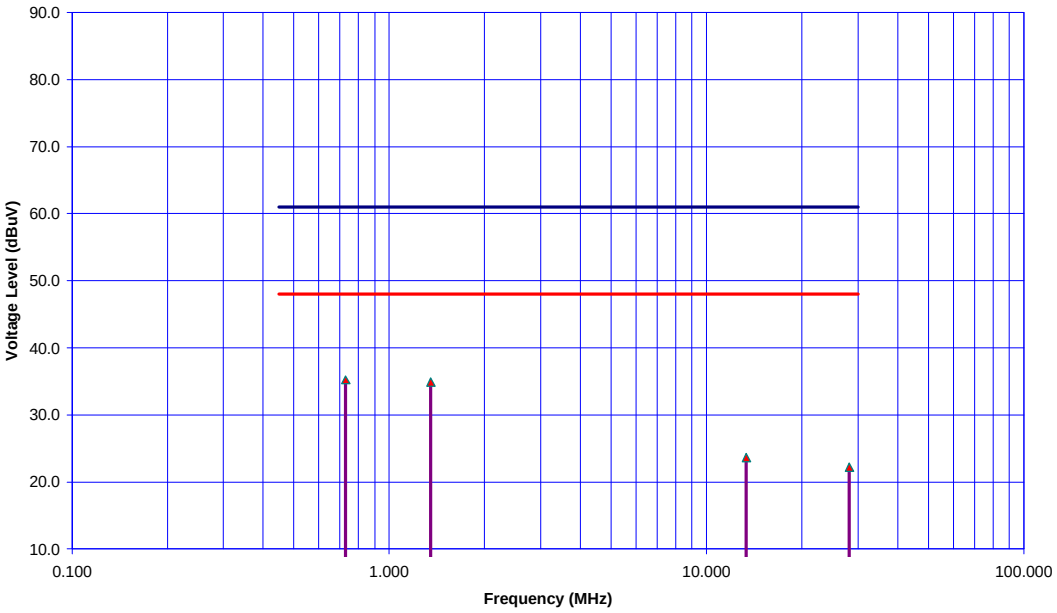
Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Hewlett Packard	HP 8593EM	3412A00103	9 kHz – 26.5 GHz
Transient Limiter	Hewlett Packard	11947A	310701998	9 kHz – 200 MHz 10 dB attenuation
L.I.S.N.	EMCO	3825/2	89071531	9 kHz – 200 MHz 50 Ohms / 50 µH
12'x16'x12' RF Shielded Chamber	RF Shielding	…	..	…

5.5.4. Test data

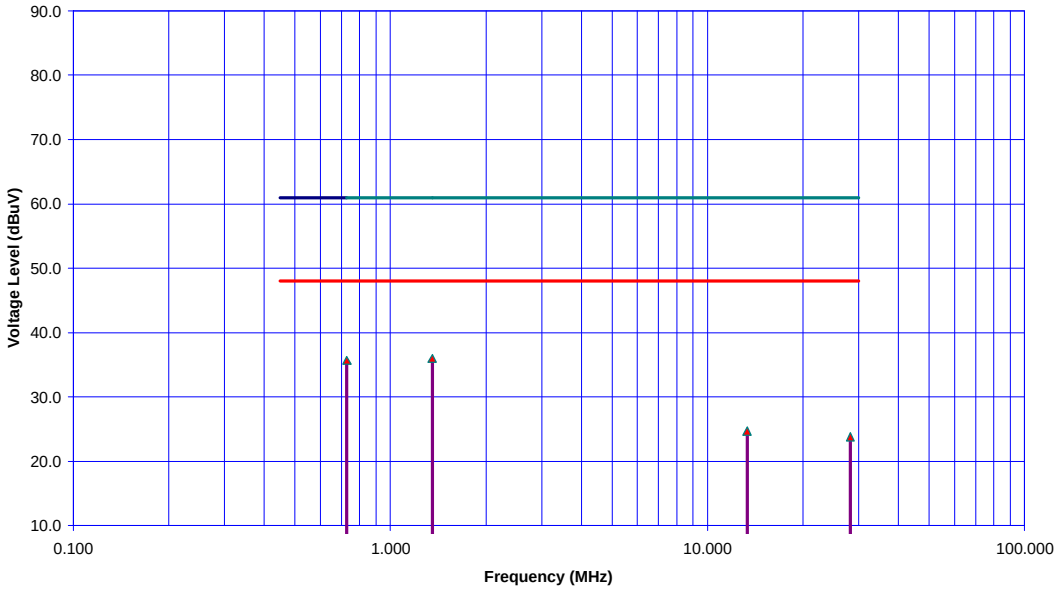
5.5.4.1. Test Configuration #3: Teklogix TRX7431 Radio installed inside Teklogix 8255 Vehicle Mount Terminal

FREQUENCY (MHz)	RF LEVEL (dBuV)	RECEIVER DETECTOR (P/QP/AVG)	QP/NB LIMIT (dBuV)	QP/BB LIMIT (dBuV)	MARGIN (dB)	PASS/ FAIL	LINE TESTED (L1/L2)
0.729	35.2	QP	48.0	61.0	-12.8	PASS	L1
1.353	34.9	QP	48.0	61.0	-13.1	PASS	L1
13.353	23.6	QP	48.0	61.0	-24.4	PASS	L1
28.199	22.2	QP	48.0	61.0	-25.8	PASS	L1
0.729	35.7	QP	48.0	61.0	-12.3	PASS	L2
1.353	36.0	QP	48.0	61.0	-12.0	PASS	L2
13.335	24.7	QP	48.0	61.0	-23.3	PASS	L2
28.199	23.8	QP	48.0	61.0	-24.2	PASS	L2

AC Conducted Emissions - Line #1 (Hot)
Teklogix TRX7431 with 8255 Vehicle Terminal



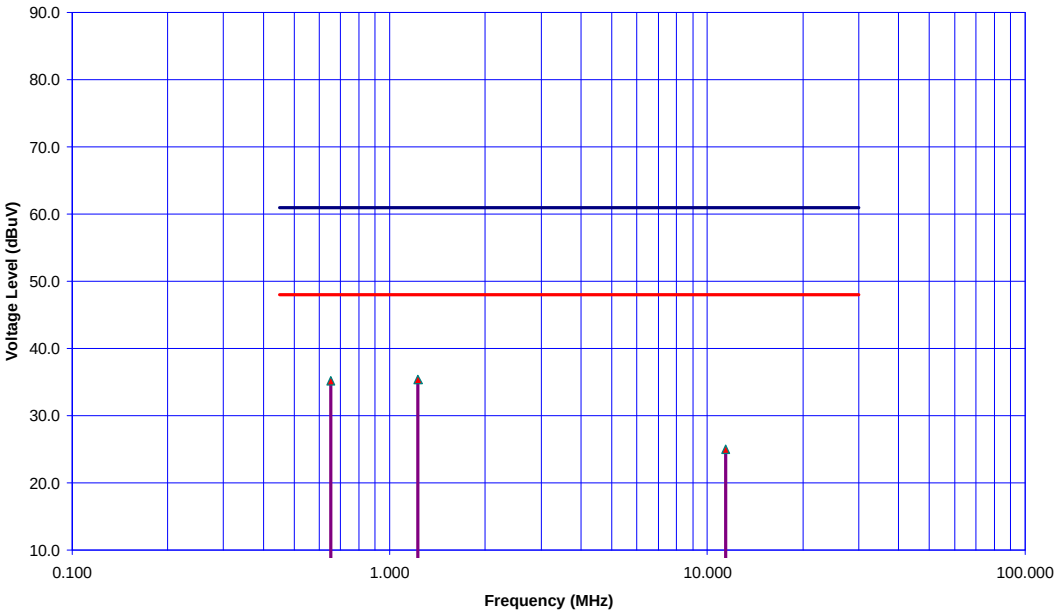
AC Conducted Emissions - Line #2 (Neutral)
Teklogix TRX7431 with 8255 Vehicle Terminal



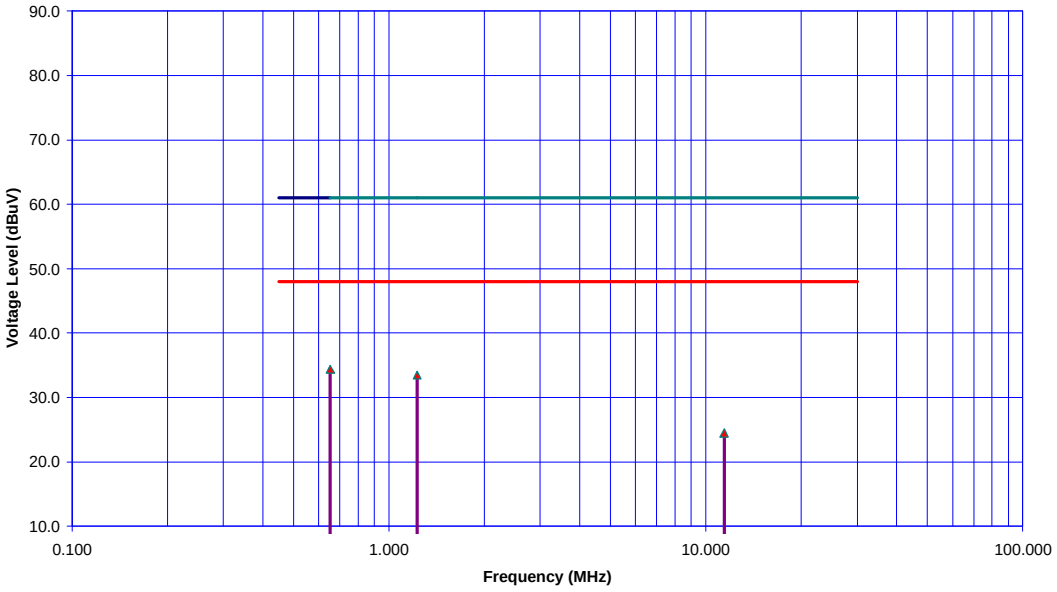
5.5.4.2. Test Configuration #4: Teklogix TRX7431 Radio installed inside Teklogix 8260 Vehicle Mount Terminal

FREQUENCY (MHz)	RF LEVEL (dBuV)	RECEIVER DETECTOR (P/QP/AVG)	QP/NB LIMIT (dBuV)	QP/BB LIMIT (dBuV)	MARGIN (dB)	PASS/ FAIL	LINE TESTED (L1/L2)
0.653	35.2	QP	48.0	61.0	-12.8	PASS	L1
1.228	35.4	QP	48.0	61.0	-12.6	PASS	L1
11.412	25.0	QP	48.0	61.0	-23.0	PASS	L1
0.653	34.4	QP	48.0	61.0	-13.6	PASS	L2
1.228	33.5	QP	48.0	61.0	-14.5	PASS	L2
11.412	24.5	QP	48.0	61.0	-23.5	PASS	L2

AC Conducted Emissions - Line #1 (Hot)
Teklogix TRX7431 with 8260 Vehicle Terminal



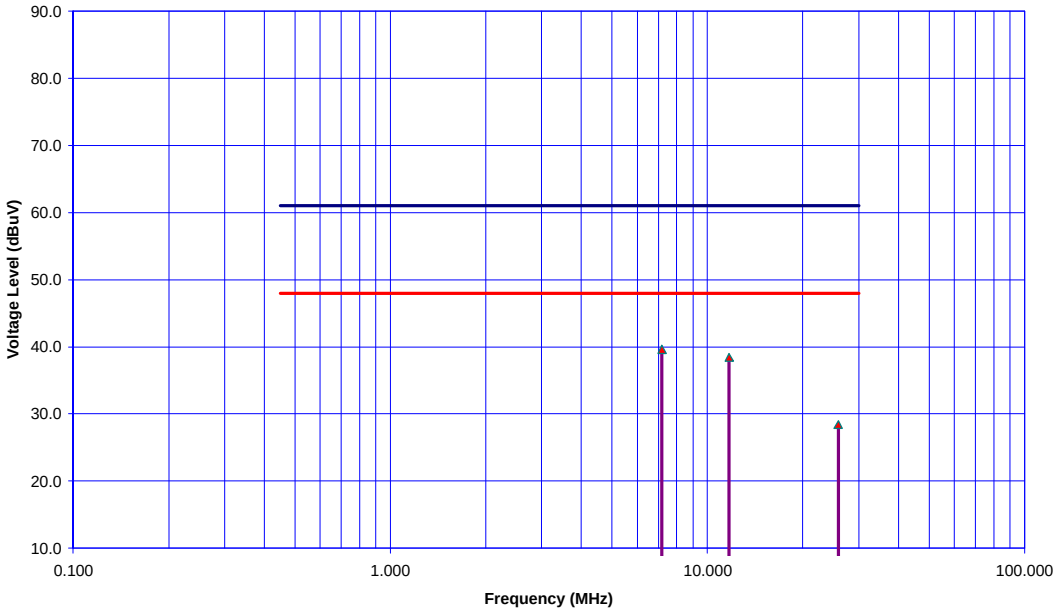
AC Conducted Emissions - Line #2 (Neutral)
Teklogix TRX7431 with 8260 Vehicle Terminal



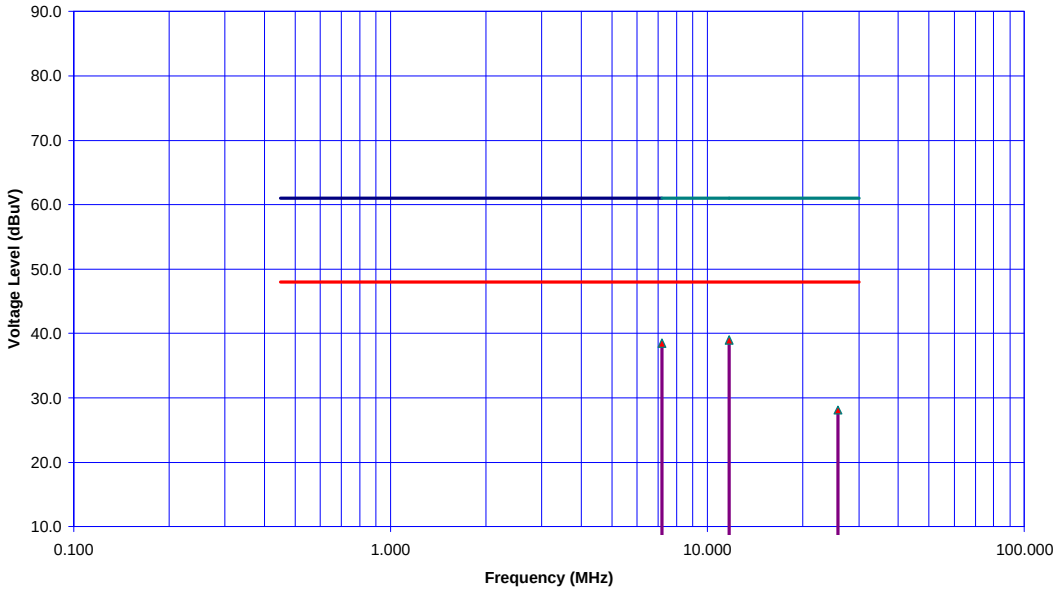
5.5.4.3. Test Configuration #5: Teklogix TRX7431 Radio installed inside Teklogix 9150 Base Station

FREQUENCY (MHz)	RF LEVEL (dBuV)	RECEIVER DETECTOR (P/QP/AVG)	QP/NB LIMIT (dBuV)	QP/BB LIMIT (dBuV)	MARGIN (dB)	PASS/ FAIL	LINE TESTED (L1/L2)
7.184	39.6	QP	48.0	61.0	-8.4	PASS	L1
11.701	38.4	QP	48.0	61.0	-9.6	PASS	L1
25.820	28.4	QP	48.0	61.0	-19.6	PASS	L1
7.184	38.5	QP	48.0	61.0	-9.5	PASS	L2
11.701	39.0	QP	48.0	61.0	-9.0	PASS	L2
25.820	28.1	QP	48.0	61.0	-19.9	PASS	L2

AC Conducted Emissions - Line #1 (Hot)
Teklogix TRX7431 with 9150 Base Station



AC Conducted Emissions - Line #2 (Neutral)
Teklogix TRX7431 with 9150 Base Station



5.5.5. Plots

Refer to Exhibit 12 for actual measurement plots

5.5.6. Photographs of Test Setup

Refer to Exhibit 13 for setup and arrangement of equipment under tests and its ancillary equipment.

5.6. 6 DB BANDWIDTH @ FCC 15.247(A)(2)

5.6.1. Limits

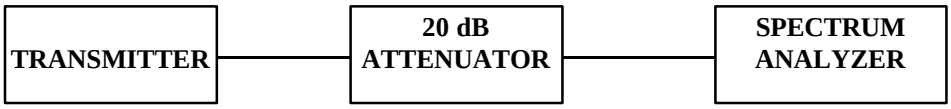
For a direct sequence spread spectrum system, the minimum 6 dB bandwidth shall be at least 500 KHz.

5.6.2. Method of Measurements

Refer to FCC 15.247(c) & ANSI C63.4:1992

The transmitter output was connected to the spectrum analyzer through an attenuator. the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 30 KHz RBW, VBW = 100 KHz,. The 6 dB bandwidth was measured and recorded.
Test Arrangement

5.6.3. Test Arrangement



5.6.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Hewlett Packard	HP 8593EM	3412A00103	9 kHz – 26.5 GHz

5.6.5. Test Data

CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
2412	10.6	0.5	PASS
2437	10.1	0.5	PASS
2462	10.6	0.5	PASS

5.6.6. Plots

Please refer to Exhibit 12 for Measurements data

5.6.7. Photographs of Test Setup

None

5.7. MAXIMUM PEAK OUTPUT POWER @ FCC 15.247(B) AND RF EXPOSURE LIMIT FCC 1.1310

5.7.1. Limits

- **FCC 15.247(b)(1):** Maximum peak output power of the transmitter shall not exceed 1 Watt.
- **FCC 15.247(b)(3):** If the antenna of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- **FCC 15.247(b)(3)(i):** Systems operating in the 2400 - 2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduce by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi..
- **FCC 1.1310:**- The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
(A) Limits for Occupational/Control Exposures				
300-1500	...	...	F/300	6
1500-100,000	...	...	5	6
(B) Limits for General Population/Uncontrolled Exposure				
300-1500	...	...	F/1500	6
1500-100,000	...	...	1.0	30

F = Frequency in MHz

5.7.2. Method of Measurements

Refer to FCC 15.247(b)(1)&(3), ANSI C63-4:1992, FCC @ 1.1310 & OST Bulletin No. 65-October 1985

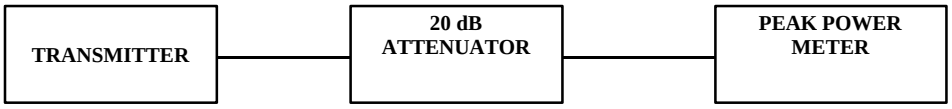
$S = PG/4\Pi r^2 = EIRP/4\Pi r^2$

Where: P: power input to the antenna in mW
EIRP: Equivalent (effective) isotropic radiated power.
S: power density mW/cm^2
G: numeric gain of antenna relative to isotropic radiator
r: distance to centre of radiation in cm

$r = \sqrt{PG/4\Pi S}$

FCC radio frequency exposure limits may be exceeded at distances closer than r cm from the antenna of this device

5.7.3. Test Arrangement



5.7.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Hewlett Packard	HP 8593EM	3412A00103	9 kHz – 26.5 GHz
Peak Power Meter & Peak Power Sensor	Hewlett Packard	8900 8481A	2131A00124 2551A01965	0.1-18 GHz 50 Ohms Input
Microwave Amplifier	Hewlett Packard	HP 83017A		1 GHz to 26.5 GHz
Horn Antenna	EMCO	3155	9701-5061	1 GHz – 18 GHz

5.7.5. Test data

EUT Tested with	Data Rate / Modulation	Tx Antenna Gain (dBi)	Max. Field Strength Level @ 1 MHz BW At 3 m (dBuV/m)	EIRP Power (Watts)	Direct Total Peak Power (Watts)	(Note 1) Total EIRP Power (Watts)	(Note 2) Min. Allowable Distance ® from Skin (Centi-Meter)	RF Safety Requirement
8260 @ 2437 MHz (Mobile)	DSSS @ 11 Mb/s data rate	0.0	106.75	0.014	25.7	0.205	1.81	Note 3
9150 @ 2462 MHz (Base)	DSSS @ 11 Mb/s data rate	7.5	114.72	0.089	25.1	2.565	6.39	Note 4
7035 @ 2437 MHz (Portable)	DSSS @ 11 Mb/s data rate	2.0	114.38	0.082	23.5	1.189	4.35	Note 5
8255 @2437 MHz (Mobile)	DSSS @ 11 Mb/s data rate	0.0	106.56	0.014	25.3	0.196	1.77	Note 3
Test Jig @ 2412 MHz	DSSS @ 11 Mb/s data rate	0.0	106.25	0.013	24.8	0.210	1.83	--

Notes:

(1) The difference of Total Peak power in full band – Peak Power in 1 MHz band (12.2 dB @ 2412 MHz, 11.6 dB @ 2437 MHz and 14.6 dB MHz) were used as a conversion factor to calculate the Total EIRP Power.
(2) EXPOSURE DISTANCE LIMITS: $r = (PG/4\pi S)^{1/2} = (EIRP/4\pi S)^{1/2}$
(3) Antenna of mobile equipment must be located at least 1.81 cm away from the users'. Refer to manufacturer antenna instruction.
(4) Antenna of mobile equipment must be located at least 6.39 cm away from the users'. Refer to manufacturer antenna instruction.
(5) The Specific Absorbance Ration (SAR) test will be performed by 3D-EMC Laboratory Inc. for the portable radio, the test results will be submitted by Ultratech Engineering Labs Inc.

5.7.6. Plots

None

5.7.7. Photographs of Test Setup

None

5.8. TRANSMITTER ANTENNA CONDUCTED EMISSIONS, FCC CFR 47, PARA. 15.247(C)

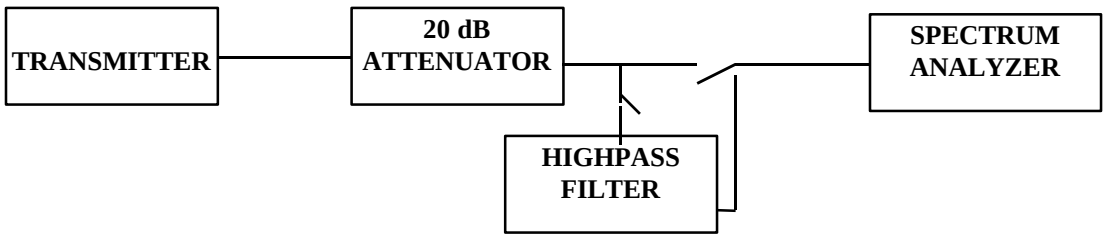
5.8.1. Limits

In any 100 KHz bandwidth outside the operating frequency band, the radio frequency power that is produced by modulation products of the spreading sequence, the information sequence and the carrier frequency shall be at least 20 dB below that in any 100 KHz bandwidth within the band that contains the highest level of the desired power.

5.8.2. Method of Measurements

Refer to FCC 15.247(c) & ANSI C63.4:1992

5.8.3. Test Arrangement



5.8.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Hewlett Packard	HP 8593EM	3412A00103	9 kHz – 26.5 GHz

5.8.5. Test data

Channel Frequency: 2412 MHz **Modulation: DSSS @ 11 Mbps data rate**		**Power Level in 100 kHz BW: 5.56 dBm** **Limit = 5.56 dBm – 20 dB = -14.4 dBm**		
FREQUENCY (MHz)	**RF LEVEL 100 kHz BW (dBm)**	**LIMIT (dBm)**	**MARGIN (dB)**	**PASS/ FAIL**
2412	5.56	--	--	--
552	-50.1	-14.4	-35.7	PASS
695	-42.5	-14.4	-28.1	PASS
2807	-55.7	-14.4	-41.3	PASS
3592	-55.6	-14.4	-41.2	PASS
The emissions were scanned from 10 MHz to 25 GHz and all emissions less than 40 dB below the limits were recorded.				

Channel Frequency: 2437 MHz **Modulation: DSSS @ 11 Mbps data rate**		**Power Level in 100 kHz BW: 5.41dBm** **Limit = 5.41 dBm – 20 dB = -14.6 dBm**		
FREQUENCY (MHz)	**RF LEVEL 100 kHz BW (dBm)**	**LIMIT (dBm)**	**MARGIN (dB)**	**PASS/ FAIL**
2437	5.41	--	--	--
552	-52.9	-14.6	-38.3	PASS
695	-42.8	-14.6	-28.2	PASS
823	-51.5	-14.6	-36.9	PASS
3606	-53.6	-14.6	-39.0	PASS
The emissions were scanned from 10 MHz to 25 GHz and all emissions less than 40 dB below the limits were recorded.				

Channel Frequency: 2462 MHz **Modulation: DSSS @ 11 Mbps data rate**		**Power Level in 100 kHz BW: 5.25 dBm** **Limit = 5.25 dBm – 20 dB = -14.8 dBm**		
FREQUENCY (MHz)	**RF LEVEL 100 kHz BW (dBm)**	**LIMIT (dBm)**	**MARGIN (dB)**	**PASS/ FAIL**
2462	5.25	--	--	--
552	-52.5	-14.8	-37.8	PASS
695	-42.3	-14.8	-27.5	PASS
823	-50.7	-14.8	-35.9	PASS
3606	-54.0	-14.8	-39.2	PASS
The emissions were scanned from 10 MHz to 25 GHz and all emissions less than 40 dB below the limits were recorded.				

5.8.6. Plots

Please refer to Exhibit 12 for Measurements data

5.8.7. Photographs of Test Setup

None

5.9. TRANSMITTER RADIATED EMISSIONS @ 3 METERS, FCC CFR 47, PARA. 15.247(C), 15.209 & 15.205

5.9.1. Limits

In any 100 KHz bandwidth outside the operating frequency band, the radio frequency power that is produced by modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 KHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in @ 15.209(a), which lesser attenuation.

All other emissions inside restricted bands specified in @ 15.205(a) shall not exceed the general radiated emission limits specified in @ 15.209(a)

Remarks:

- Applies to harmonics/spurious emissions that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209.
- @ **FCC CFR 47, Para. 15.237(c)** - The emission limits as specified above are based on measurement instrument employing an average detector. The provisions in **@15.35** for limiting peak emissions apply.

FCC CFR 47, Part 15, Subpart C, Para. 15.205(a) - Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	162.0125 - 167.17	2310 - 2390	9.3 - 9.5
0.49 – 0.51	167.72 - 173.2	2483.5 - 2500	10.6 - 12.7
2.1735 - 2.1905	240 - 285	2655 - 2900	13.25 - 13.4
8.362 - 8.366	322 - 335.4	3260 - 3267	14.47 - 14.5
13.36 - 13.41	399.9 - 410	3332 - 3339	14.35 - 16.2
25.5 – 25.67	608 - 614	3345.8 - 3358	17.7 - 21.4
37.5 – 38.25	960 - 1240	3600 - 4400	22.01 - 23.12
73 - 75.4	1300 - 1427	4500 - 5250	23.6 - 24.0
108 – 121.94	1435 - 1626.5	5350 - 5460	31.2 - 31.8
123 – 138	1660 - 1710	7250 - 7750	36.43 - 36.5
149.9 – 150.05	1718.8 - 1722.2	8025 - 8500	Above 38.6
156.7 – 156.9	2200 - 2300	9000 - 9200	

FCC CFR 47, Part 15, Subpart C, Para. 15.209(a)
-- Field Strength Limits within Restricted Frequency Bands --

FREQUENCY (MHz)	FIELD STRENGTH LIMITS (microvolts/m)	DISTANCE (Meters)
0.009 - 0.490	2,400 / F (KHz)	300
0.490 - 1.705	24,000 / F (KHz)	30
1.705 - 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

5.9.2. Method of Measurements

Refer to **ANSI 63.4-1992, Para. 8** for detailed radiated emissions measurement procedures.

Applies to harmonics/spurious that fall in the restricted bands listed in Section 15.205. the maximum permitted average field strength is listed in Section 15.209. A Pre-Amp and highpass filter are used for this measurement.

For measurement below 1 GHz, set RBW = 100 KHz, VBW $\geq$ 100 KHz, SWEEP=AUTO.

For measurement above 1 GHz, set RBW = 1 MHz, VBW = 1 MHz (Peak) & VBW = 10 Hz (Average), SWEEP=AUTO.

If the emission is pulsed, modified the unit for continuous operation, then use the settings above for measurements, then correct the reading by subtracting the peak-average correction factor derived from the appropriate duty cycle calculation. See Section 15.35(b) and (c).

FCC CFR 47, Para. 2.997 - Frequency spectrum to be investigated

The spectrum was investigated from the lowest radio generated in the equipment up to at least the 10^{th} harmonic of the carrier frequency or to the highest frequency practicable in the present state of the art of measuring techniques, whichever is lower. Particular attention should be paid to harmonics and subharmonics of the carrier frequency. Radiation at the frequencies of multiplier stages should be checked. The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

FCC CFR 47, Para. 2.993 - Field Strength Spurious Emissions

(a) Measurements was made to detect spurious emissions radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data were supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph 2.989(c) as appropriate. For equipment operating on frequencies below 1 GHz, an Open Field Test is normally required, with the measuring instrument antenna located in the far field at all test frequencies. In event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurement will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with the reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

(b) Measurements specified in paragraph (a) of this section shall be made for the following equipment:

(1) Those in which the spurious emission are required to be 60 dB or more below he mean power of the transmitter.
(2) All equipment operating on frequencies higher than 25 MHz
(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
(4) Other types of equipment as required, when deemed necessary by the commission.

5.9.3. Test Arrangement

Please refer to Test Arrangement in Sec. 2.5.1 to 2.5.5 for details of test setup for emission measurements.

5.9.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Advantest	R3271	15050203	100 Hz to 32 GHz with external mixer for frequency above 32 GHz
Microwave Amplifier	Hewlett Packard	HP 83017A		1 GHz to 26.5 GHz
Biconilog Antenna	EMCO	3143	1029	20 MHz to 2 GHz
Horn Antenna	EMCO	3155	9701-5061	1 GHz – 18 GHz
Horn Antenna	EMCO	3160-09	..	18 GHz – 26.5 GHz
Horn Antenna	EMCO	3160-10	..	26.5 GHz – 40 GHz
Mixer	Tektronix	118-0098-00	..	18 GHz – 26.5 GHz
Mixer	Tektronix	119-0098-00	..	26.5 GHz – 40 GHz

5.9.5. Test data

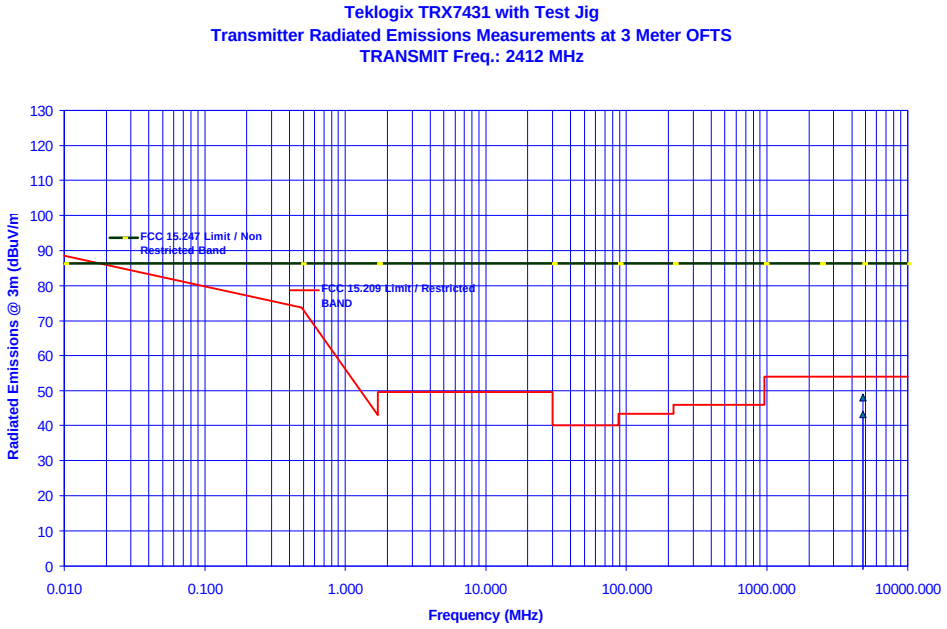
5.9.5.1. Test Configuration #1: Teklogix TRX7431 Radio with Teklogix Test Jig

Channel Frequency Tested: 2412 MHz
Power Level in 1 MHz BW: 106.25 dBµV/m
Limit: 86.3 dBµV/m

2412	106.25	--	V	--	--	--	--
2412	98.72	--	H	--	--	--	--
4824	61.38	48.19	V	54.0	86.3	-5.8	PASS
4824	54.56	43.34	H	54.0	86.3	-10.7	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)



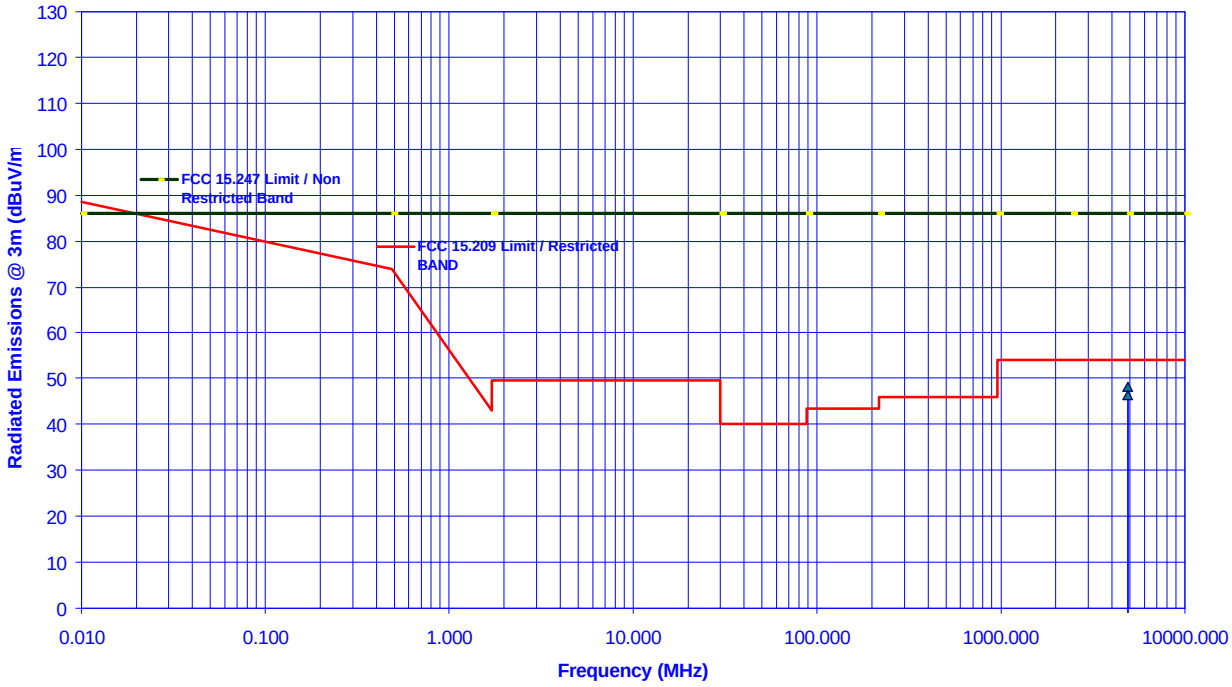
Channel Frequency Tested: 2437 MHz
Power Level in 1 MHz BW: 105.94 dBµV/m
Limit: 85.9 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2437	105.94	--	V	--	--	--	--
2437	104.78	--	H	--	--	--	--
4874	60.66	48.06	V	54.0	85.9	-5.9	PASS
4874	59.44	46.50	H	54.0	85.9	-7.5	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Test Jig
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2437 MHz



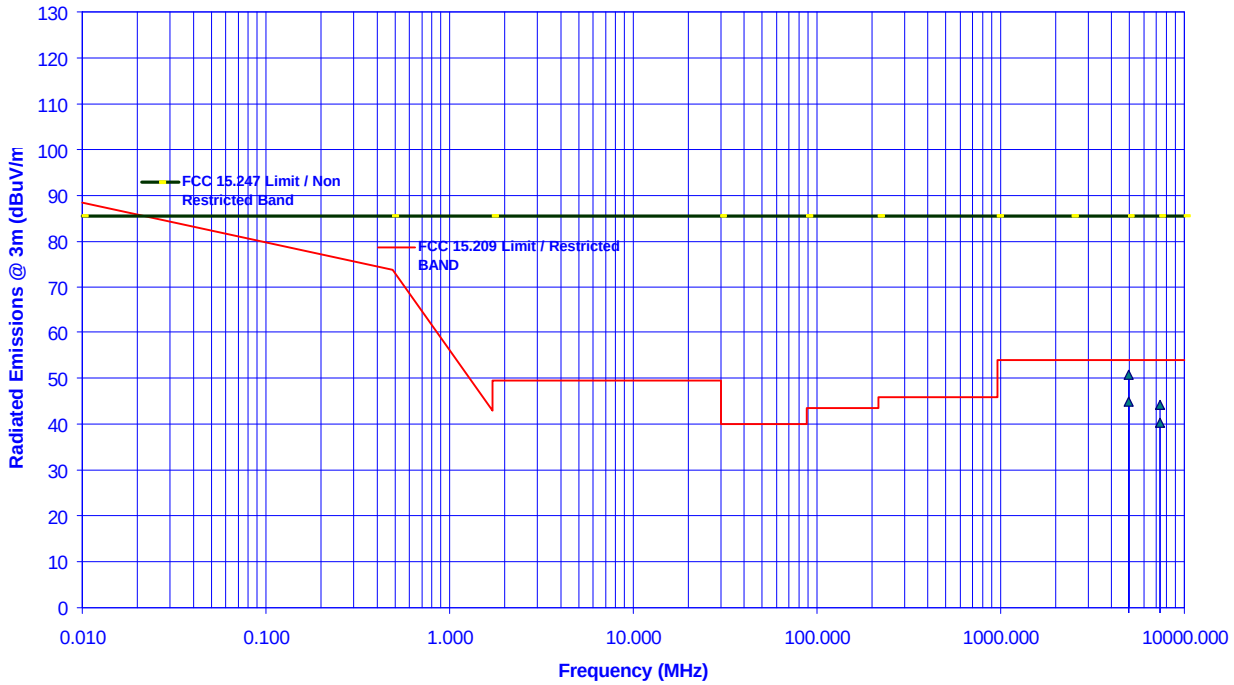
Channel Frequency Tested: 2462 MHz
Power Level in 1 MHz BW: 105.47 dBµV/m
Limit: 85.5 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2462	105.47	--	V	--	--	--	--
2462	102.94	--	H	--	--	--	--
4924	63.22	50.84	V	54.0	85.5	-3.2	PASS
4924	56.38	44.91	H	54.0	85.5	-9.1	PASS
7386	56.47	44.19	V	54.0	85.5	-9.8	PASS
7386	53.09	40.41	H	54.0	85.5	-13.6	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Test Jig
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2462 MHz



5.9.5.2. Test Configuration #2: Teklogix TRX7431 Radio with Teklogix 7035

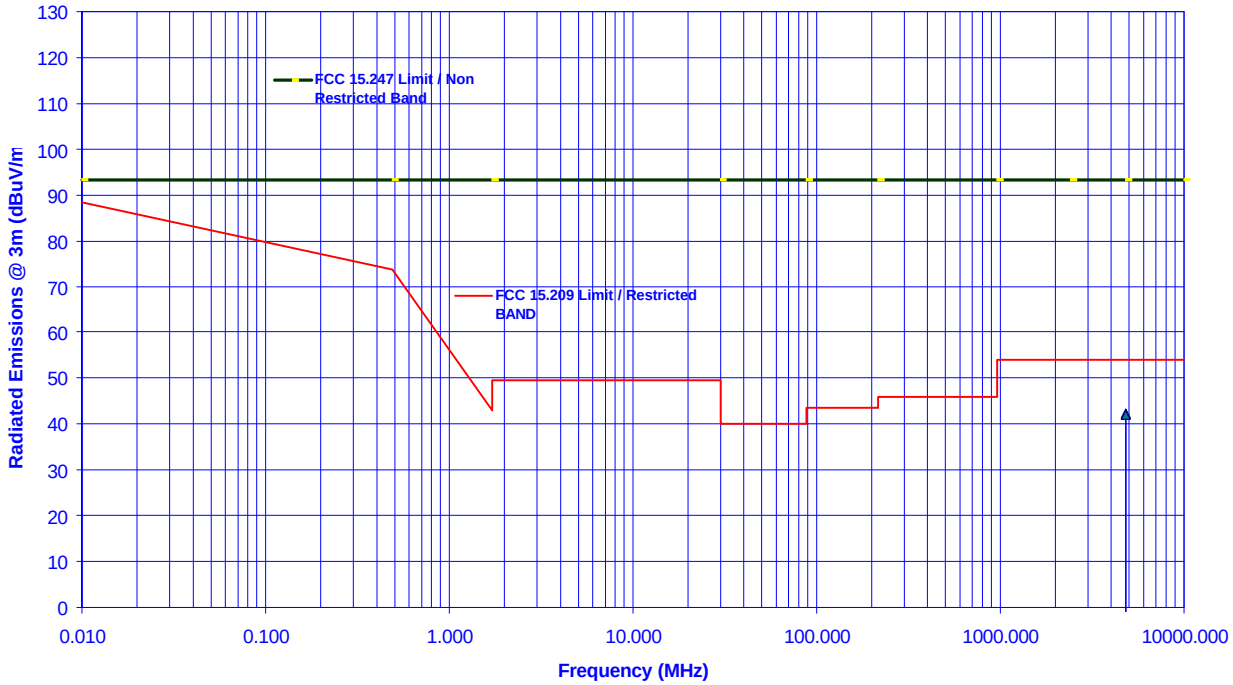
Channel Frequency Tested: 2412 MHz
Power Level in 1 MHz BW: 113.31 dBµV/m
Limit: 93.3 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2412	110.59	--	V	--	--	--	--
2412	113.31	--	H	--	--	--	--
4824	55.41	42.25	V	54.0	93.3	-11.8	PASS
4824	54.84	42.06	H	54.0	93.3	-11.9	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Teklogix 7035
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2412 MHz



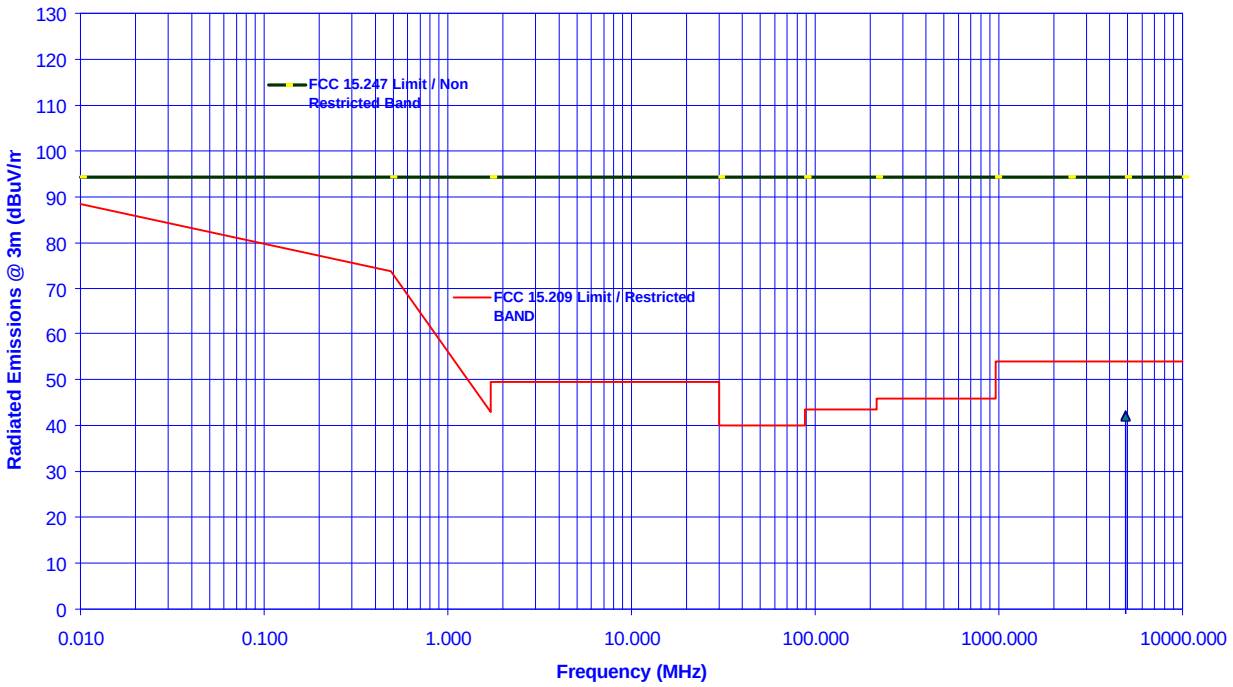
Channel Frequency Tested: 2437 MHz
Power Level in 1 MHz BW: 114.38 dBµV/m
Limit: 94.4 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2437	111.63	--	V	--	--	--	--
2437	114.38	--	H	--	--	--	--
4874	54.72	42.16	V	54.0	94.4	-11.8	PASS
4874	54.50	42.09	H	54.0	94.4	-11.9	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Teklogix 7035
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2437 MHz



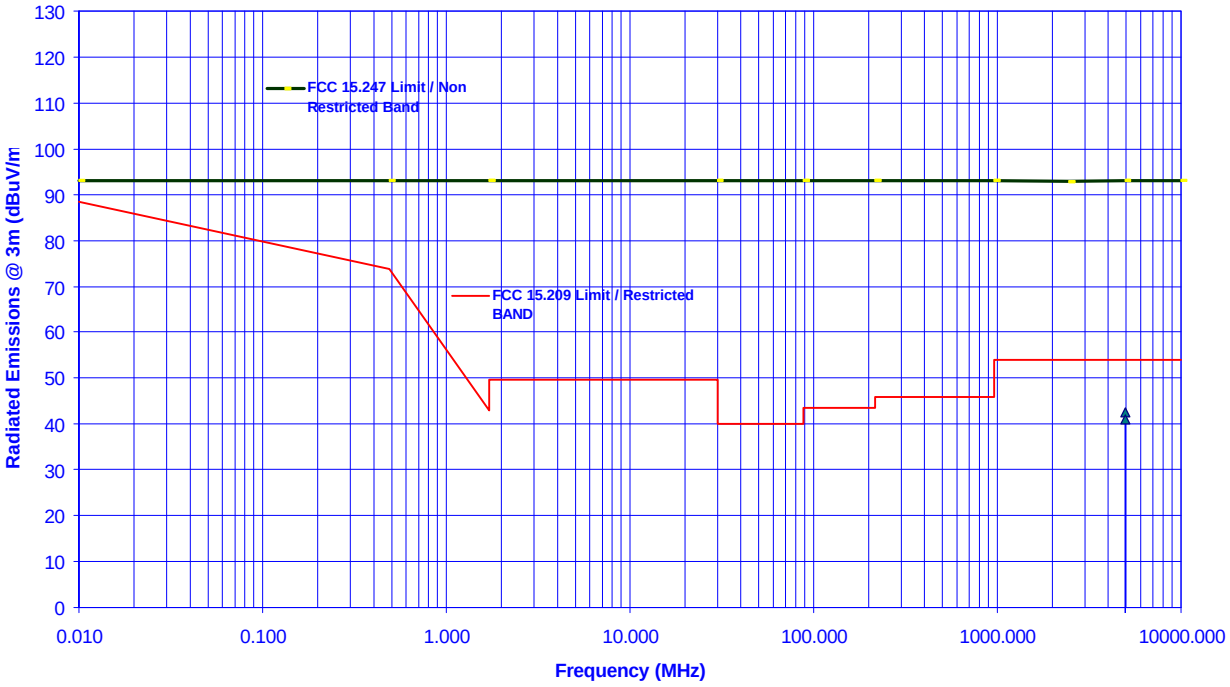
Channel Frequency Tested: 2462 MHz
Power Level in 1 MHz BW: 112.97 dBµV/m
Limit: 93.0 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2462	111.69	--	V	--	--	--	--
2462	112.97	--	H	--	--	--	--
4924	54.84	42.44	V	54.0	93.0	-11.6	PASS
4924	53.00	41.13	H	54.0	93.0	-12.9	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Teklogix 7035
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2462 MHz



5.9.5.3. Test Configuration #3: Teklogix TRX7431 Radio with Teklogix 8255

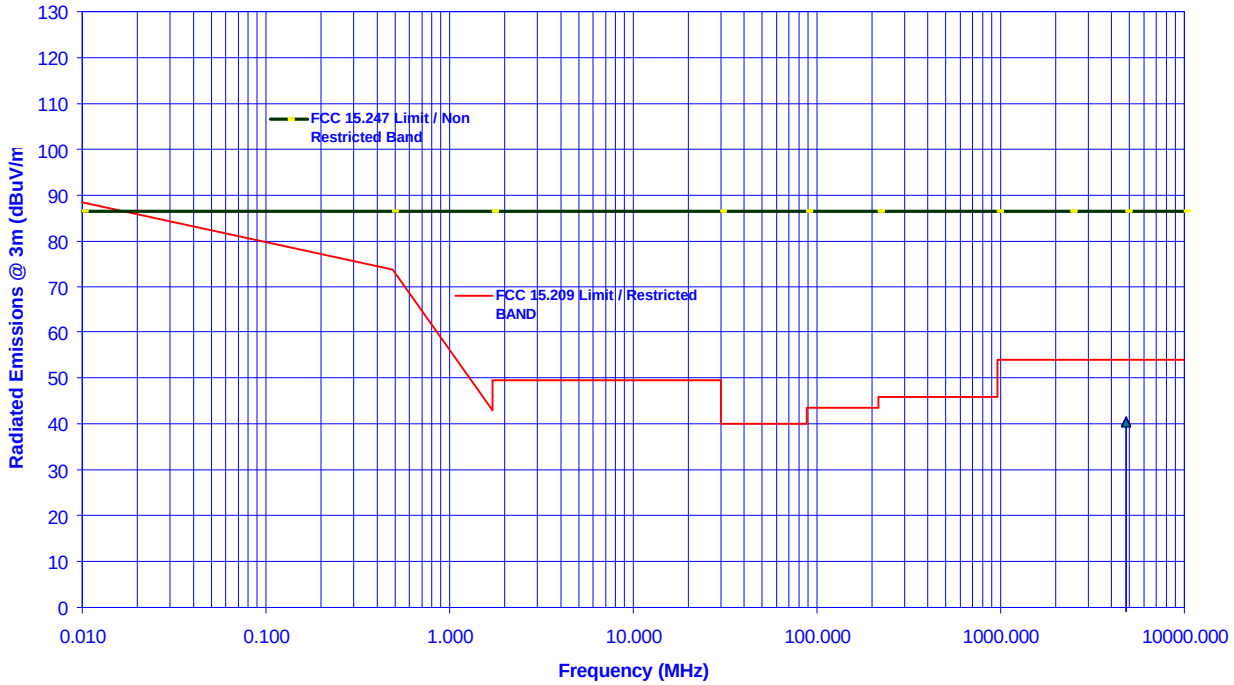
Channel Frequency Tested: 2412 MHz
Power Level in 1 MHz BW: 106.53 dBµV/m
Limit: 86.5 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2412	105.38	--	V	--	--	--	--
2412	106.53	--	H	--	--	--	--
4824	52.88	40.53	V	54.0	86.5	-13.5	PASS
4824	52.91	40.38	H	54.0	86.5	-13.6	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Teklogix 8255
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2412 MHz



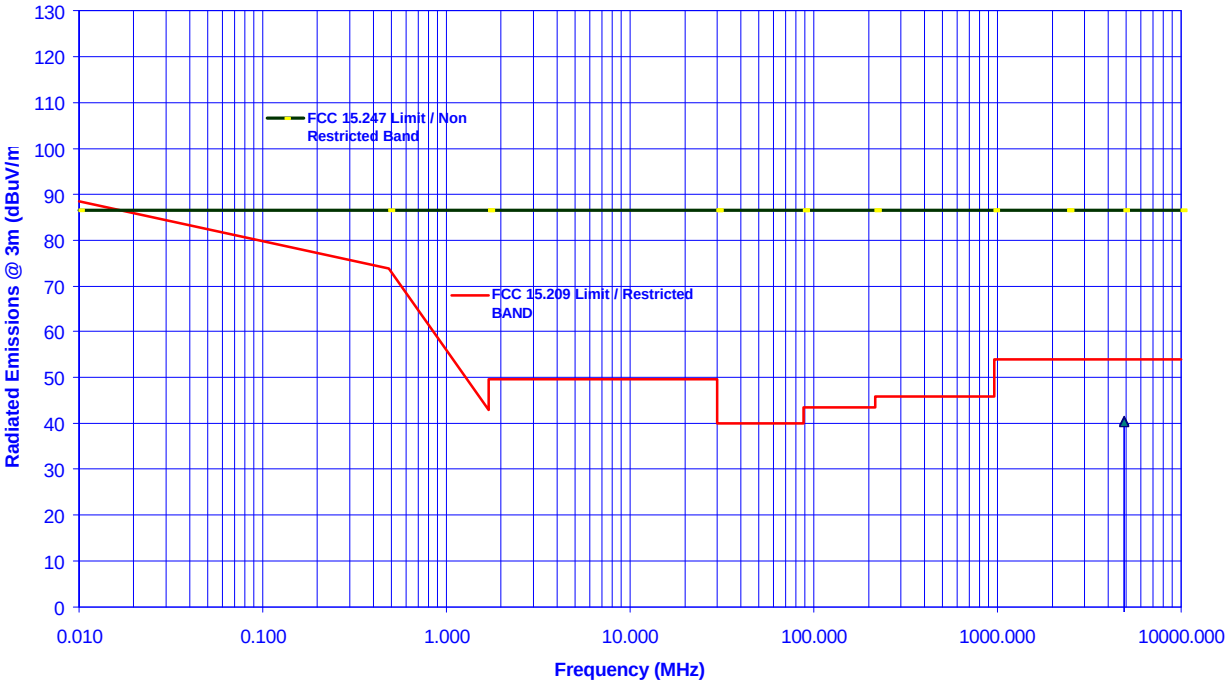
Channel Frequency Tested: 2437 MHz
Power Level in 1 MHz BW: 106.56 dBµV/m
Limit: 86.6 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2437	106.56	--	V	--	--	--	--
2437	103.88	--	H	--	--	--	--
4874	52.06	40.47	V	54.0	86.6	-13.5	PASS
4874	51.75	40.30	H	54.0	86.6	-13.7	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Teklogix 8255
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2437 MHz



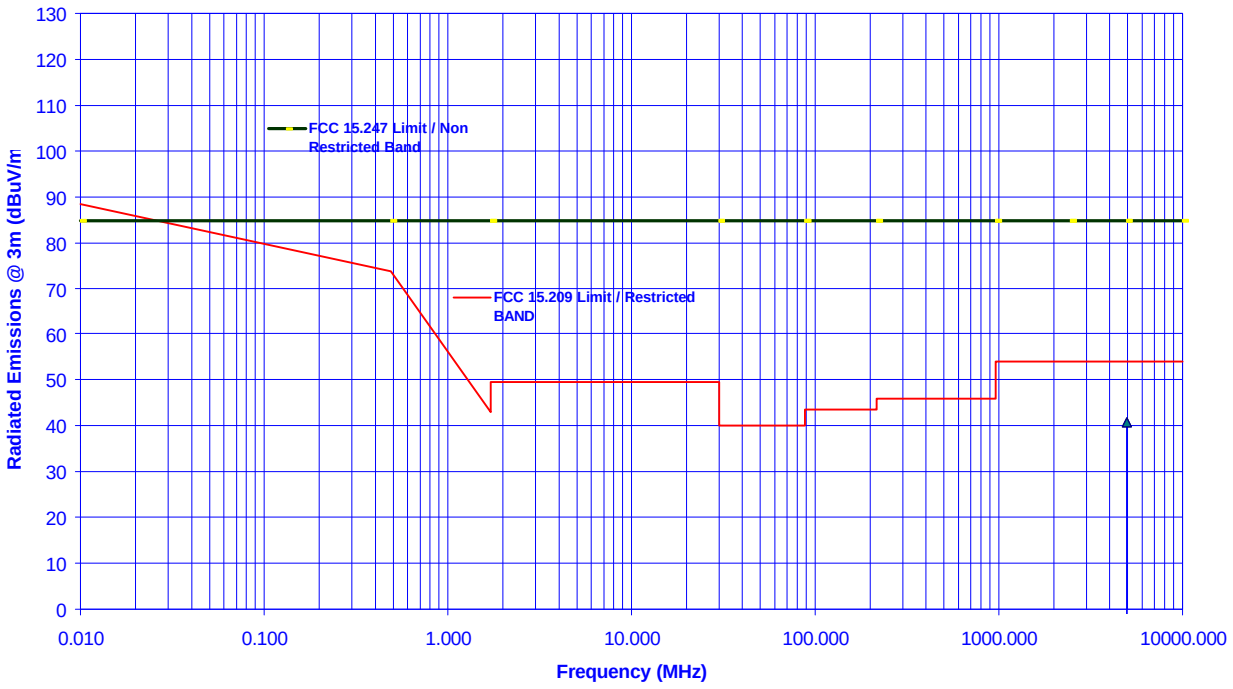
Channel Frequency Tested: 2462 MHz
Power Level in 1 MHz BW: 104.84 dBµV/m
Limit: 84.8 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2462	104.84	--	V	--	--	--	--
2462	104.34	--	H	--	--	--	--
4984	53.38	40.78	V	54.0	84.8	-13.2	PASS
4984	52.78	40.72	H	54.0	84.8	-13.3	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Teklogix 8255
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2462 MHz



5.9.5.4. Test Configuration #4: Teklogix TRX7431 Radio with Teklogix 8260

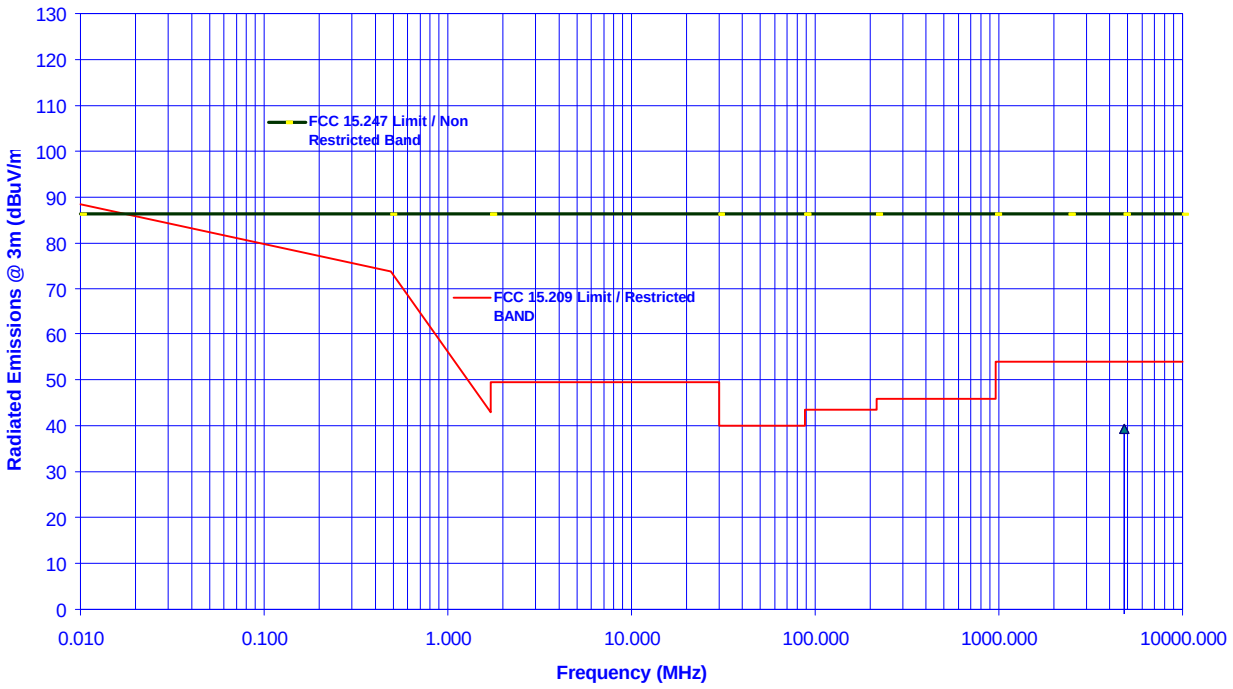
Channel Frequency Tested: 2412 MHz
Power Level in 1 MHz BW: 106.22 dBµV/m
Limit: 86.2 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2412	106.22	--	V	--	--	--	--
2412	105.38	--	H	--	--	--	--
4824	50.56	39.34	V	54.0	86.2	-14.7	PASS
4824	51.44	39.25	H	54.0	86.2	-14.8	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Teklogix 8260
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2412 MHz



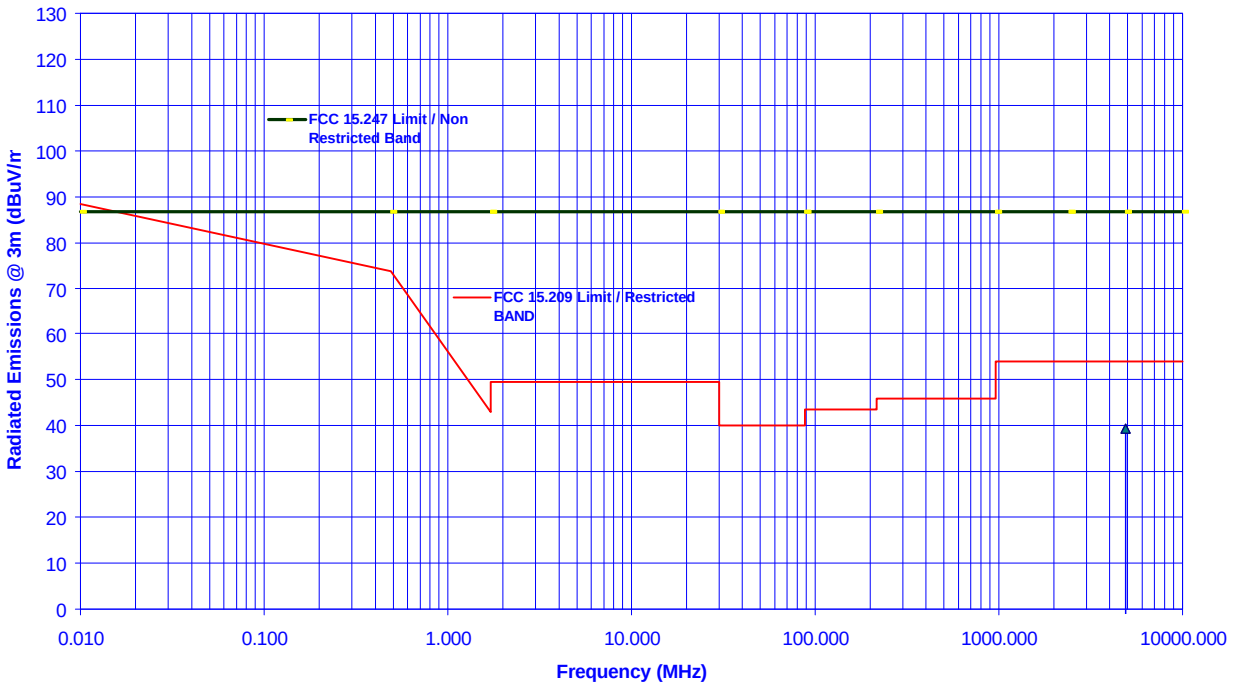
Channel Frequency Tested: 2437 MHz
Power Level in 1 MHz BW: 106.75 dBµV/m
Limit: 86.8 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2437	106.75	--	V	--	--	--	--
2437	105.91	--	H	--	--	--	--
4874	51.31	39.31	V	54.0	86.8	-14.7	PASS
4874	51.78	39.25	H	54.0	86.8	-14.8	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Teklogix 8260
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2437 MHz



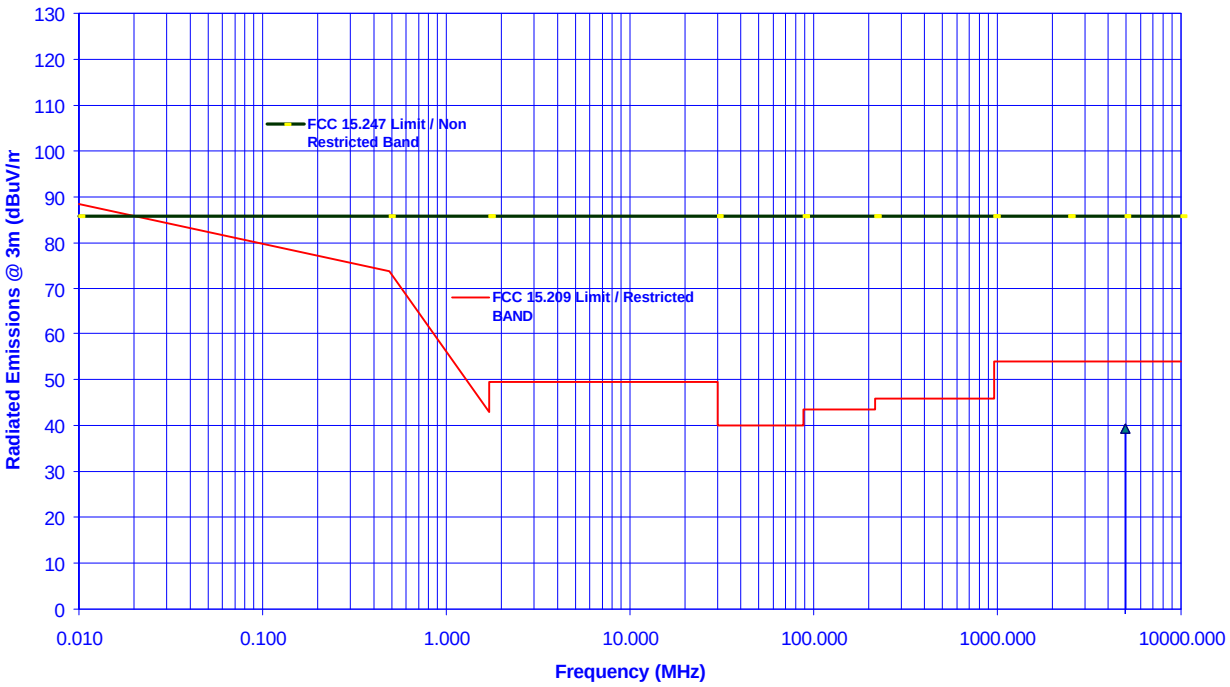
Channel Frequency Tested: 2462 MHz
Power Level in 1 MHz BW: 105.75 dBµV/m
Limit: 85.8 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2462	105.38	--	V	--	--	--	--
2462	105.75	--	H	--	--	--	--
4924	52.19	39.40	V	54.0	85.8	-14.6	PASS
4924	52.31	39.25	H	54.0	85.8	-14.8	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Teklogix 8260
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2462 MHz



5.9.5.5. Test Configuration #5: Teklogix TRX7431 Radio with Teklogix 9150

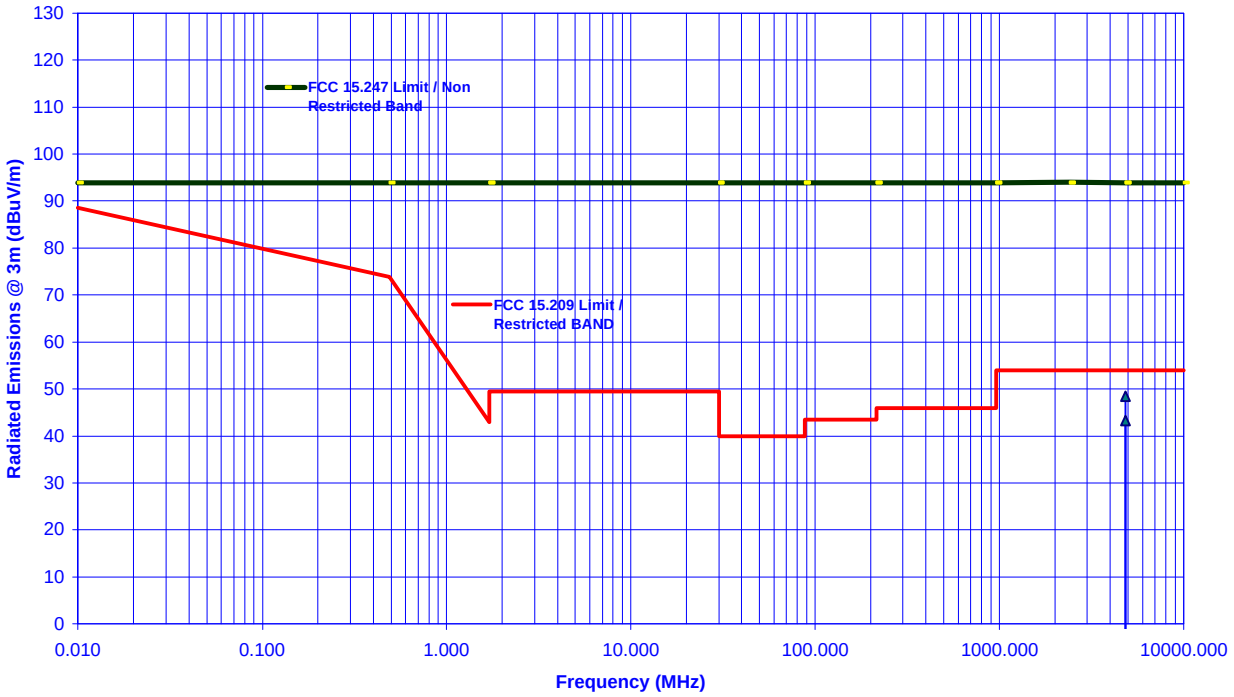
Channel Frequency Tested: 2412 MHz
Power Level in 1 MHz BW: 113.94 dBµV/m
Limit: 93.9 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2412	113.94	--	V	--	--	--	--
2412	105.03	--	H	--	--	--	--
4824	55.25	48.47	V	54.0	93.9	-5.5	PASS
4824	52.75	43.25	H	54.0	93.9	-10.8	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Teklogix 9150
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2412 MHz



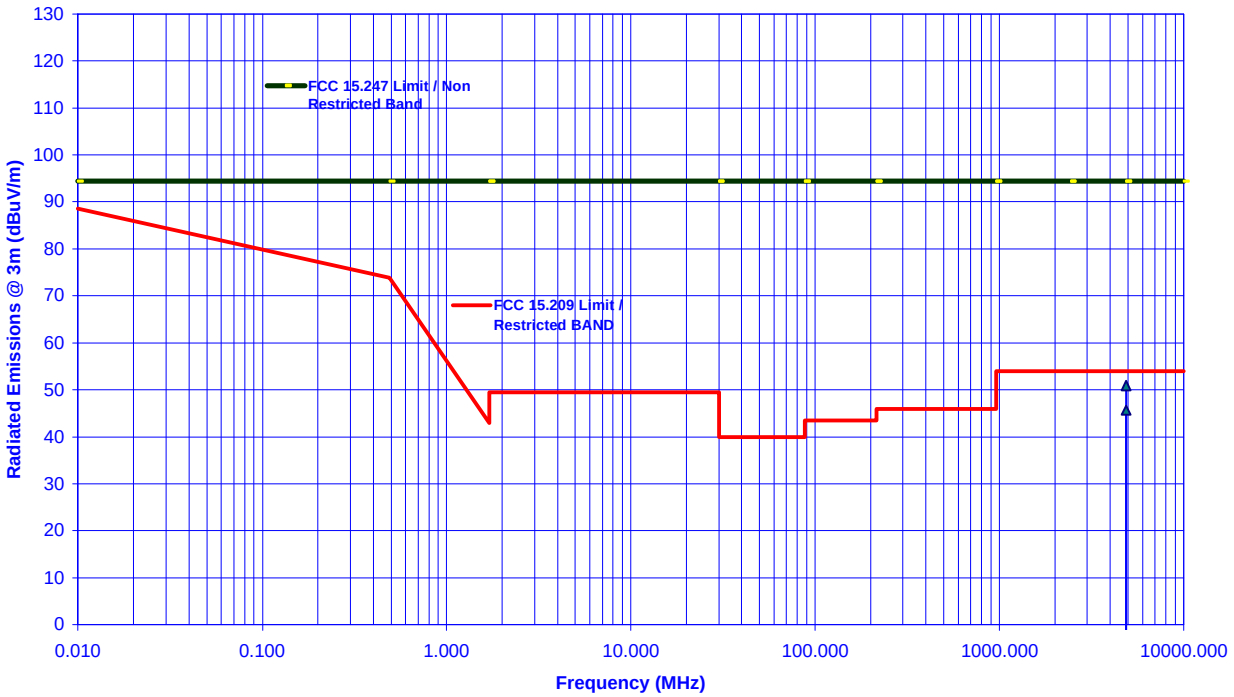
Channel Frequency Tested: 2437 MHz
Power Level in 1 MHz BW: 114.38 dBµV/m
Limit: 94.4 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2437	114.38	--	V	--	--	--	--
2437	105.94	--	H	--	--	--	--
4874	56.69	50.88	V	54.0	94.4	-3.1	PASS
4874	53.81	45.66	H	54.0	94.4	-8.3	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Teklogix 9150
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2437 MHz



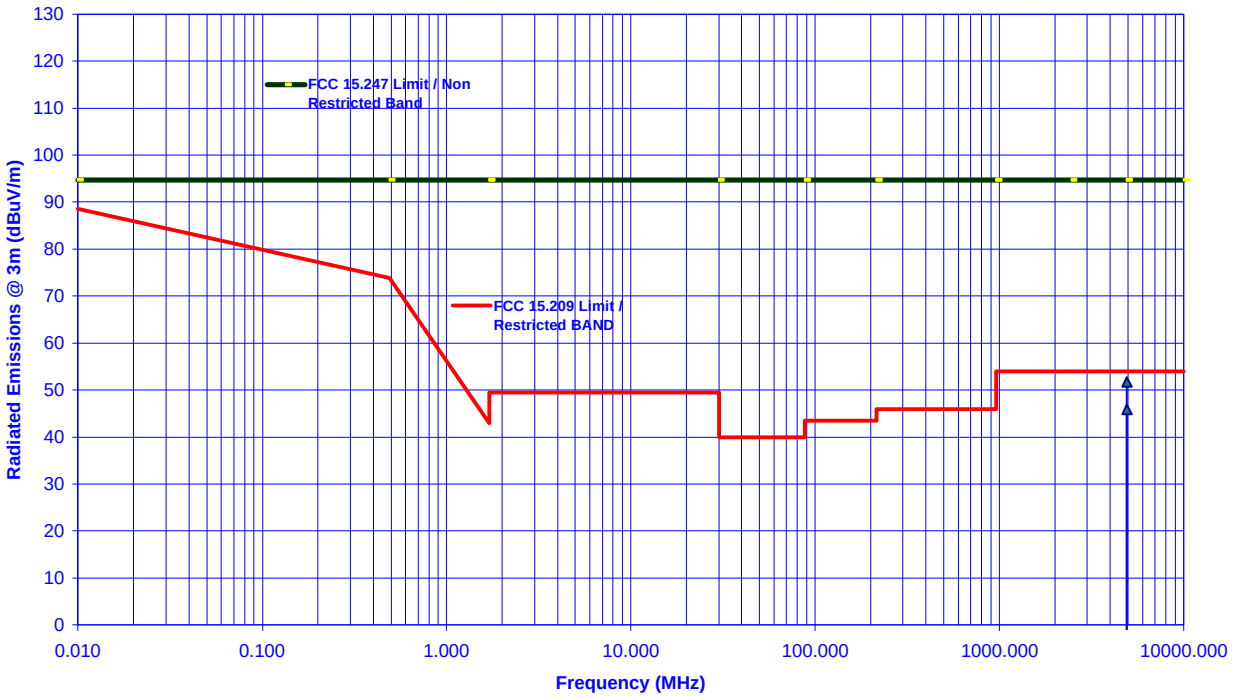
Channel Frequency Tested: 2462 MHz
Power Level in 1 MHz BW: 114.72 dBµV/m
Limit: 94.7 dBµV/m

FREQUENCY (MHz)	RF PEAK LEVEL (dBuV/m)	RF AVG LEVEL (dBuV/m)	ANTENNA PLANE (H/V)	LIMIT 15.209 (dBuV/m)	LIMIT 15.247 (dBuV/m)	MARGIN (dB)	PASS/ FAIL
2462	114.72	--	V	--	--	--	--
2462	106.63	--	H	--	--	--	--
4924	56.72	51.69	V	54.0	94.7	-2.3	PASS
4924	53.84	45.88	H	54.0	94.7	-8.1	PASS

The emissions were scanned from 10 MHz to 25 GHz and all emissions less 40 dB below the limits were recorded.

Emission within the restricted band specified in @ 15.205(a)

Teklogix TRX7431 with Teklogix 9150
Transmitter Radiated Emissions Measurements at 3 Meter OFTS
TRANSMIT Freq.: 2462 MHz



5.9.6. Plots

Refer to Exhibit 12 for measurement plots.

5.9.7. Photographs of Test Setup

Refer to Exhibit 13 for test setup and arrangement of equipment under tests and its ancillary equipment.

5.10. TRANSMITTED POWER DENSITY OF A DIRECT SEQUENCE SPREAD SPECTRUM SYSTEM, FCC CFR 47, PARA. 15.247(D)

5.10.1. Limits

For a direct sequence system, the transmitted power density average over any 1 second interval shall not be greater than 8 dBm in any 3 KHz bandwidth within this band.

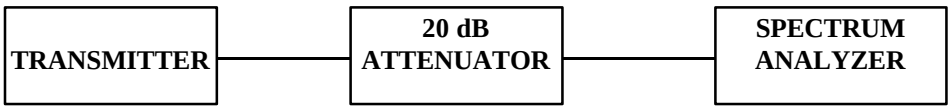
5.10.2. Methof of Measurements

A scan was made by using a spectrum analyzer with the detector function set to NORMAL mode.

Locate and zoom in on emission peak(s) within the passband. Set RBW = 3 KHz, VBW $\geq$ RBW, Sweep = SPAN/3 KHz. For example, a span of 1.5 MHz, the sweep should be $1.6x10^6/3.0x10^3$= 500 seconds. The measured peak level must be no greater than +8 dBm.

- For devices with spectrum line spacing greater than 3 KHz no change is required.
- For devices with spectrum line spacing equal to or less than 3 KHz, the resolution bandwidth must be reduced below 3 KHz until the individual lines in the spectrum are resolved. The measurement data must then be normalized to 3 KHz by summing the power of all the individual spectral lines within 3 KHz band (in linear power units) to determine compliance.
- If the spectrum line spacing cannot be resolved on the available spectrum analyzer, the noise density function on most modern conventional spectrum analyzer will directly measure the noise power density normalized to 1 Hz noise power bandwidth. Add 30 dB for correction to 3 KHz.
- Should all the above fail or any controversy develop regarding accuracy of measurement, the Laboratory will use HP 89440A Vector Signal Analyzer for final measurement unless a clear showing can be made for a further alternate.
-

5.10.3. Test Arrangement



5.10.4. Test Equipment List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range
Spectrum Analyzer/ EMI Receiver	Hewlett Packard	HP 8593EM	3412A00103	9 kHz – 26.5 GHz

5.10.5. Test Data

CHANNEL NUMBER	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 KHz BW (dBm)	LIMIT (dBm)	MARGIN (dB)	COMMENTS (PASS/FAIL)
1	2412	-6.7	8.0	-14.7	PASS
6	2437	-7.1	8.0	-15.1	PASS
11	2462	-6.9	8.0	-14.9	PASS

5.10.6. Plots

Refer to Exhibit 12 for Measurement Plots

5.10.7. Photographs of Test Setup

None

5.11. PROCESSING GAIN OF A DIRECT SEQUENCE SPREAD SPECTRUM, FCC CFR 47, PARA. 15.247(E)

Refer to attached Processing Gain For WaveLAN IEEE PC CARD type 2 HS from Lucent Technologies.

EXHIBIT 6. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994)

6.1. LINE CONDUCTED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Line Conducted)	PROBABILITY DISTRIBUTION	UNCERTAINTY (dB)	
		9-150 kHz	0.15-30 MHz
EMI Receiver specification	Rectangular	±1.5	±1.5
LISN coupling specification	Rectangular	±1.5	±1.5
Cable and Input Transient Limiter calibration	Normal (k=2)	±0.3	±0.5
Mismatch: Receiver VRC Γ_1 = 0.03 LISN VRC Γ_R = 0.8(9 kHz) 0.2 (30 MHz) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	±0.2	±0.3
System repeatability	Std. deviation	±0.2	±0.05
Repeatability of EUT	--	--	--
Combined standard uncertainty	Normal	±1.25	±1.30
Expanded uncertainty U	Normal (k=2)	±2.50	±2.60

Sample Calculation for Measurement Accuracy in 150 kHz to 30 MHz Band:

$u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)} = \pm \sqrt{(1.5^2 + 1.5^2)/3 + (0.5/2)^2 + (0.05/2)^2 + 0.35^2} = \pm 1.30$ dB

$U = 2u_c(y) = \pm 2.6$ dB

6.2. RADIATED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Radiated Emissions)	PROBABILITY DISTRIBUTION	UNCERTAINTY (± dB)	
		3 m	10 m
Antenna Factor Calibration	Normal (k=2)	±1.0	±1.0
Cable Loss Calibration	Normal (k=2)	±0.3	±0.5
EMI Receiver specification	Rectangular	±1.5	±1.5
Antenna Directivit	Rectangular	+0.5	+0.5
Antenna factor variation with height	Rectangular	±2.0	±0.5
Antenna phase center variation	Rectangular	0.0	±0.2
Antenna factor frequency interpolation	Rectangular	±0.25	±0.25
Measurement distance variation	Rectangular	±0.6	±0.4
Site imperfections	Rectangular	±2.0	±2.0
Mismatch: Receiver VRC Γ_1 = 0.2 Antenna VRC Γ_R = 0.67(Bi) 0.3 (Lp) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	+1.1 -1.25	±0.5
System repeatability	Std. Deviation	±0.5	±0.5
Repeatability of EUT		-	-
Combined standard uncertainty	Normal	+2.19 / -2.21	+1.74 / -1.72
Expanded uncertainty U	Normal (k=2)	+4.38 / -4.42	+3.48 / -3.44

Calculation for maximum uncertainty when 3m biconical antenna including a factor of k=2 is used:

$U = 2u_c(y) = 2x(+2.19) = +4.38$ dB And $U = 2u_c(y) = 2x(-2.21) = -4.42$ dB

EXHIBIT 7. MEASUREMENT METHODS

7.1. GENERAL TEST CONDITIONS

7.1.1. Test Conditions

- The measurement shall be made in the operational mode producing the largest emission in the frequency band being investigated consistent with normal applications.
- An attempt shall be made to maximize the detected radiated emissions, for example moving cables of the equipment, rotating the equipment by 360^{o} and moving the measuring receiving antenna up and down within 1 to 4 meters high.
- Where appropriate, a single tone or a bit stream shall be used to modulate the receiver. The manufacturer shall define the modulation with the highest emission in transmit mode.

7.1.2. Method of Measurements - AC Mains Conducted Emissions

- AC Mains conducted emissions measurements were performed in accordance with the standard against appropriate limits for each detector function.
- The test was performed in the shielded room, 16'(L) by 16'(W) by 12'(H).
- The test was performed were made over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio noise voltage which was conducted from the EUT power-input terminals that were directly connected to a public power network.
- The EUT normally received power from another device that connects to the public utility ac power lines, measurements would be made on that device with the EUT in operation to ensure that the device continues to comply with the appropriate limits while providing the EUT with power.
- If the EUT operates only from internal or dedicated batteries, with no provisions for connection to the public utility ac power lines, AC Mains conducted measurements are not required.
- Table-top devices were placed on a platform of nominal size 1 m by 1.5m raised 80 cm above the conducting ground plane.
- The EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the power source. All unused 50-Ohm connectors of the LISN was terminated in 50-ohm when not connected to the measuring instruments.
- The line cord of the EUT connected to one LISN which was connected to the measuring instrument. Those power cords for the units of devices not under measurement were connected to a separate multiple ac outlet. Drawings and photographs of typically conducted emission test setups were shown in the Test Report. Each current-carrying conductor of the EUT shall be individually tested.
- The EUT was normally operated with a ground (safety) connection, the EUT was connected to the ground at the LISN through a conductor provided in the lead from the ac power mains to the LISN.
- The excess length of the power cord was folded back and forth in an 8-shape on a wooden strip with a vertical prong located on the top of the LISN case.
- The EUT was set-up in its typical configuration and operated in its various modes as described in this test report.
- A preliminary scan was made by using spectrum analyzer system with the detector function set to PEAK mode (9 KHz RBW, VBW > RBW), frequency span 150KHz-30MHz.

- The maximum conducted emission for a given mode of operation was found by using the following step-by-step procedure:

  Step1. Monitor the frequency range of interest at a fixed EUT azimuth.

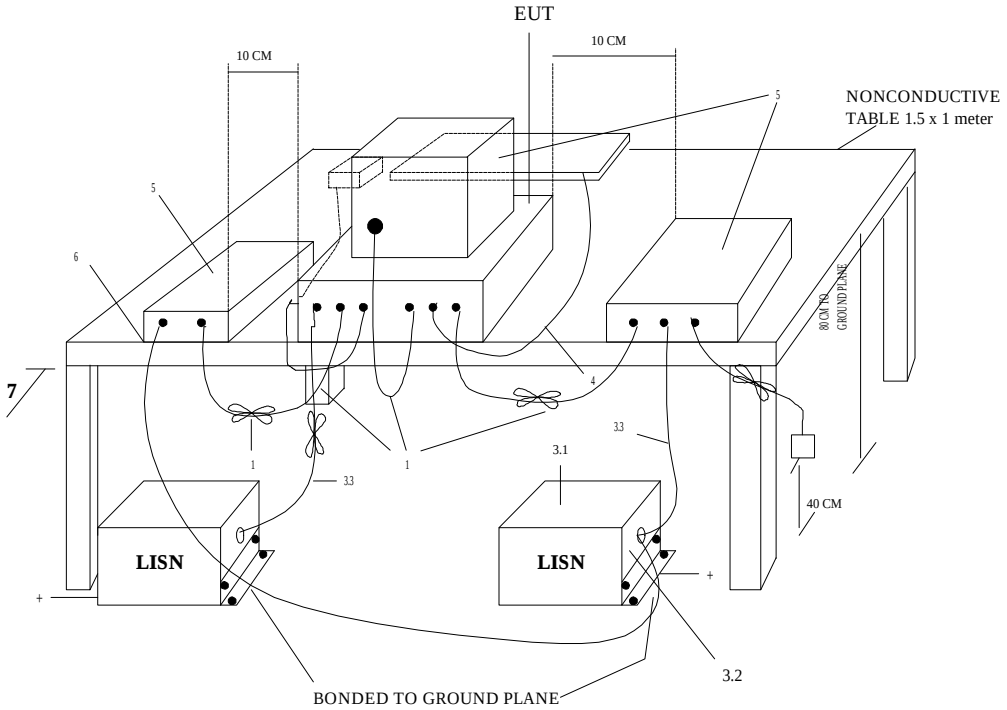
  Step2. Manipulate the system cables and peripheral devices to produce highest amplitude signal relative to the limit. Note the amplitude and frequency of the suspect signal.

Step3. The effects of various modes of operation is examined. This is done by varying equipment operation modes as step 2 is being performed.

Step4. After completing step 1 through 3, record EUT and peripheral device configuration, mode of operation, cable configuration, signal levels and frequencies for final test.

- Each highest signal level at the maximized test configuration was zoomed in a small frequency span on the spectrum analyzer's display (the manipulation of cables and peripheral devices and EUT operation modes might have to be repeated to obtain the highest signal level with the spectrum analyzer set to PEAK detector mode 10 KHz RBW and VBW > RBW). The spectrum analyzer was then set to CISPR QUASI-PEAK detector mode (9 KHz RBW, 1 MHz VBW) and AVERAGE detector mode (10 kHz RBW, 1 Hz VBW). The final highest RF signal levels and frequencies were record.

- ***Broad-band ac Powerline conducted emissions***:- If the EUT exhibits ac Powerline conducted emissions that exceed the limit with the instrument set to the quasi-peak mode, then measurements should be made in the average mode. If the amplitude measured in the quasi-peak mode is at least 6 dB higher than the amplitude measured in the average mode, the level measured in quasi peak mode may be reduced by 13 dB before comparing it to the limit.



+LISNs may have to be moved to the side to meet 3.3 below

LEGEND:

1. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back at forth forming a bundle 30 to 40 cm long, hanging approximately in the middle between ground plane and table.

2. I/O cables that are connected to a peripheral shall be bundled in center. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1m.

3. EUT connected to one LISN. Unused LISN connectors shall be terminated in 50 Ohm. LISN can be placed on top of, or immediately beneath, ground plane.
3.1 All other equipment powered from second LISN.
3.2 Multiple outlet strip can be used for multiple power cords of non-EUTequipment.
3.3 LISN at least 80 cm from nearest part of EUT chassis.

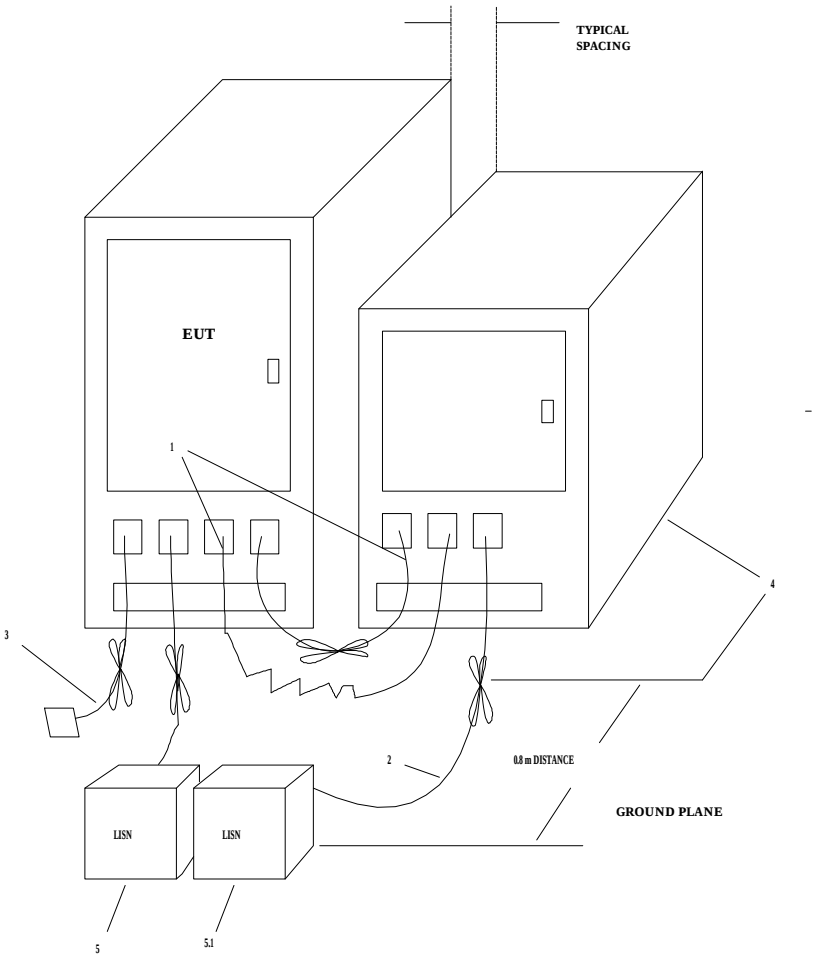
4. Cables of hand-operated devices, such as keyboards, mouses, etc., have to be placed as close as possible to the host.

5. Non-EUT components being tested.

6. Rear of EUT, including peripherals, shall be all aligned and flush with rear of tabletop.

7. Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the floor ground plane (see 5.2)

Tabletop Equipment Conducted Emissions



LEGENEND:

1. Excess I/O cables shall be bundled in center. If bundling is not possible, the cables shall be arranged in serpentine fashion. Bunding shall not exceed 40 cm in length.

2. Excess power cords shall be bundled in the center or shortened to appropriated length.

3. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using correct terminating impedance. If bundling is not possible, the cable shall be arranged in serpentine fashion.

4. EUT and all cables shall be insulated from ground plane by 3 to 12 mm of insulating material.

5. EUT connected to one LISN. LISN can be placed on top of, or immediately beneath, ground plane.
5.1 All other equipment powered from second LISN.

Floor-Standing Equipment Conducted Emissions

7.1.3. Method of Measurements - Electric Field Radiated Disturbance

- The radiated emission measurements were performed at the UltraTech's 10 or 30 Meter Open Field Test Site (OFTS) situated in the Town of Oakville, province of Ontario. The Attenuation Characteristics of OFTS have been filed to FCC, Industry Canada, ACA/Austel, NVLap and ITI.
- Radiated emissions measurements were made using the following test instruments:

    1. Calibrated EMCO BiconiLog antenna in the frequency range from 30 MHz to 2000 MHz.
    2. Calibrated Emco Horn antennas in the frequency range above 1000 MHz (1GHz - 40 GHz).
    3. 3.Calibrated Advantest spectrum analyzer and pre-selector. In general, the spectrum analyzer would be used as follows:

        - The rf electric field levels were measured with the spectrum analyzer set to PEAK detector (120 KHz VBW and VBW $\geq$ RBW).

        - If any rf emission was observed to be a broadband noise, the spectrum analyzer's CISPR QUASI-PEAK detector (120 KHz RBW and VBW $\geq$ RBW) was then set to measure the signal level.

        - If the signal being measured was narrowband and the ambient field was broadband, the bandwidth of the spectrum analyzer was reduced.

- The EUT was set-up in its typical configuration and operated in its various modes as described in this test report.
- The frequencies of emissions was first detected. Then the amplitude of the emissions was measured at the specified measurement distance using required antenna height, polarization, and detector characteristics.
- During this process, cables and peripheral devices were manipulated within the range of likely configuration.
- For each mode of operation required to be tested, the frequency spectrum was monitored. Variations in antenna heights (from 1 meter to 4 meters above the ground plane), antenna polarization (horizontal plane and vertical plane), cable placement and peripheral placement were explored to produce the highest amplitude signal relative to the limit.

  The maximum radiated emission for a given mode of operation was found by using the following step-by-step procedure:

  Step1: Monitor the frequency range of interest at a fixed antenna height and EUT azimuth.

  Step2: Manipulate the system cables to produce highest amplitude signal relative to the limit. Note the amplitude and frequency of the suspect signal.

  Step3: Rotate the EUT 360 degrees to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, go back to the azimuth and repeat Step 2. Otherwise, orient the EUT azimuth to repeat the highest amplitude observation and proceed.

  Step4: Move the antenna over its full allowed range of travel (1 to 4 meters) to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, return to Step 2 with the highest amplitude observation and proceed.

Step5: Change the polarization of the antenna and repeat Step 2 through 4. Compare the resulting suspected highest amplitude signal with that found for the other polarization. Select and note the higher of the two signals. This signal is termed the highest observed signal with respect to the limit for this EUT operational mode.

Step6: The effects of various modes of operation is examined. This is done by varying the equipment modes as steps 2 through 5 are being performed.

Step7: After completing steps 1 through 6, record the final highest emission level, frequency, antenna polarization and detector mode of the measuring instrument.

Calculation of Field Strength:

The field strength is calculated by adding the calibrated antenna factor and cable factor, and subtracting the Amplifier gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

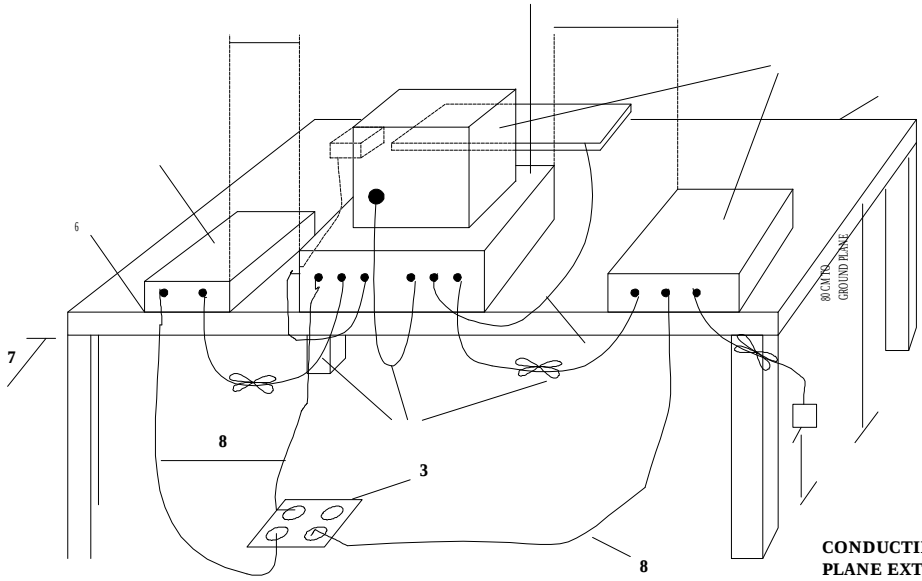
$$FS = RA + AF + CF - AG$$

Where	FS	=	Field Strength
	RA	=	Receiver/Analyzer Reading
	AF	=	Antenna Factor
	CF	=	Cable Attenuation Factor
	AG	=	Amplifier Gain

Example: If a receiver reading of 60.0 dBuV is obtained, the antenna factor of 7.0 dB/m and cable factor of 1.0 dB are added, and the amplifier gain of 30 dB is subtracted. The actual field strength will be:.

Field Level = 60 + 7.0 + 1.0 - 30 = 38.0 dBuV/m.

Field Level = $10^{(38/20)}$ = 79.43 uV/m.



CONDUCTING GROUND PLANE EXTENDS 0.5 m BEYOND EUT SYSTEM FOOTPRINT

LEGEND:

1. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 to 40 cm long, hanging approximately in the middle between ground plane and table.

2. I/O cables that are connected to a peripheral shall be bundled in center. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1m.

3. If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground plane with the receptable flush with the ground plane.

4. Cables of hand-operated devices, such as keyboards, mouses, etc., have to be placed as close as possible to the controller.

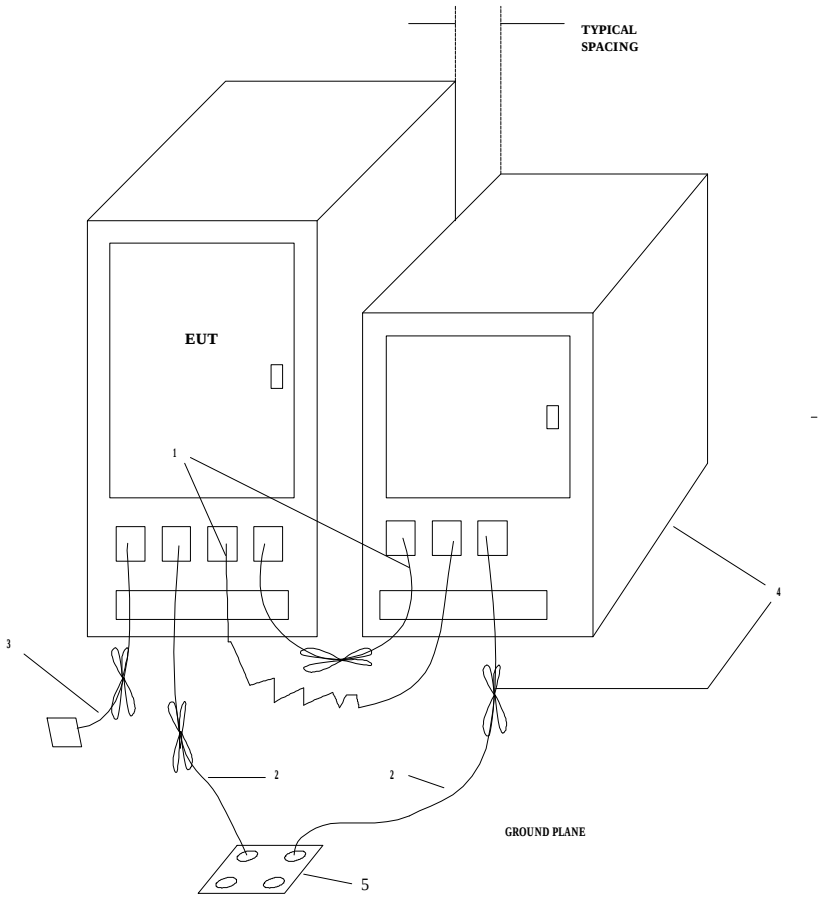
5. Non-EUT components of EUT system being tested.

6. The rear of all components of the system under test shall be located flush with the rear of the table.

7. No vertical conducting wall used.

8. Power cords drape to the floor and are routed over to receptacle.

Tabletop Equipment Radiated Emissions



LEGEND:

1. Excess I/O cables shall be bundled in center. If bundling is not possible, the cables shall be arranged in serpentine fashion.

2. Excess power cords shall be bundled in the center or shortened to appropriated length.

3. I/O cables that are not connected to aperipheral shall be bundled in the center. The end of the cable may be terminated if required using correct terminating impedance. If bundling is not possible, the cable shall be arranged in serpentine fashion.

4. EUT and all cables shall be inslulated from ground plane by 3 to 12 mm of insulating material.

5. If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground plane with the receptacle flush with the ground plane.

Floor-Standing Equipment Radiated Emissions

EXHIBIT 8. APPLICANT'S LETTERS & STATEMENT

8.1. APPLICANT'S AUTHORIZATION TO APPOINT ULTRATECH ENGINEERING LABS INC. TO ACT AS AN AGENT

Refer to attached letter, which authorized Ultratech Engineering Labs Inc. to act as an agent on behalf of Teklogix Inc.

8.2. APPLICATION FOR EXEMPTION OF THE SPECIAL COUPLING/PERMANENTLY ATTACHED ANTENNAS AND SAR TESTS

Refer to attached letter from Teklogix Inc. for details.

EXHIBIT 9. FCC ID LABEL & SKETCH OF LABEL LOCATION

Refer to attached FCC ID Label and its location.

EXHIBIT 10. "FCC INFORMATION TO USER"

Refer to the user's manual ("Caution To User" section).

EXHIBIT 11. PHOTOGRAPHS OF EQUIPMENT UNDER TEST

Refer to attached photographs of equipment under test.

EXHIBIT 12. PLOTS OF MEASUREMENTS

12.1. AC POWERLINE CONDUCTED EMISSIONS MEASUREMENT PLOTS

Refer to attached AC PowerLine Conducted Emissions Plots.

12.2. 6dB BANDWIDTH MEASUREMENT PLOTS.

Refer to attached 6dB bandwidth plots.

12.3. TRANSMITTER ANTENNA CONDUCTED EMISSIONS MEASUREMENT PLOTS

Refer to attached transmitter antenna conducted emissions plots.

12.4. TRANSMITTER RADIATED EMISSIONS MEASUREMENT PLOTS

Refer to attached transmitter radiated emissions plots.

12.5. TRANSMITTED POWER DENSITY MEASUREMENT PLOTS

Refer to attached transmitted power density plots.

EXHIBIT 13. PHOTOGRAPHS OF TEST SETUP

13.1. AC POWERLINE CONDUCTED EMISSIONS TEST SETUP PHOTOS

Refer to attached AC PowerLine Conducted Emissions Test Setup Photos.

13.2. TRANSMITTER RADIATED EMISSIONS TEST SETUP PHOTOS

Refer to attached Transmitter Radiated Emissions Test Setup Photos.

EXHIBIT 14. SYSTEM BLOCK DIAGRAM(S) & SCHEMATIC DIAGRAMS

Refer to attached system block diagram, the schematic diagram(s) will be submitted by Lucent Technologies concurrently.

EXHIBIT 15. USER'S MANUAL

Refer to attached user's manual.