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"Wireless That Works"SM

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EMC Test Report
FCC & IC

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Signature Page

HYPER Corporation personnel listed take responsibility for the content of this test report.

Reviewed

/Signed/	9/26/2005
Kevin Marquess	Date

1. List of Revisions

Version	Date	Author(s)	Description
001	09/05/2005	Mimi Warfel	Initial Version
002	09/26/2005	Mimi Warfel	Editorial changes

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2. Disclaimer Notice

This test report applies only to the EUT (Equipment Under Test) and the results of the specifications called out in this report. The test results contained herein relate only to the model(s) identified. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. This Report must not be used to claim product endorsement by A2LA or any agency of the U.S. Government.

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4. General Information

4.1 Identification of the EUT

Project Number	155-0507002
Manufacturer	Datalogic SpA
EUT/Model Number	Gryphon
Date(s) tested	August 23 – September 2, 2005
Description of EUT	Wireless Barcode scanner and docking station
Condition of EUT	Received new production units in good quality
FCC IDs	OMJ0013 – Cradle
	OMJ0014 – Gun
Emissions Designator	842KF1D
Frequency Range:	2402 MHz ~ 2480 MHz
Number of Channels:	79
Frequency of Each Channel	2402 + k (MHz), k=0~78
Type of Modulation	GFSK
Hardware Version	Rev B
Firmware/Software Version	1.1.054.4
Test Facilities	HYPER Corporation:
	1735 North First Street, Suite 311
	San Jose, Ca 95112-4511
	BACL Corp.
	230 Commercial Ave.
	Sunnyvale, CA

4.2 Antenna Information

Manufacturer.	Model Number	Freq. (MHz)	Peak Gain (dBi)	VSWR (max)	Z ₀
Centurion	CAF95901	2400-2500	>2.0 (0 avg)	2.0	50 Ω
Phycom	4311-111-00245	2400-2500	0-1.2	2.0	50 Ω

5. Test Summary

This test report is prepared for Datalogic SpA, Bluetooth Wireless Technology device(s).

5.1 Summary of Test Results

Test	FCC Ref	RSS-210 Ref	FCC Results
AC Line Conducted Emissions	15.207(a)	9.0	Compliant
Carrier Frequency Separation	15.247(a)(1)	6.2.2(o)(a1)	Compliant
Number of Hopping Frequencies	15.247(a)(1)(ii)	6.2.2(o)(a3)	Compliant
Time of Occupancy (Dwell Time)	15.247(a)(1)(ii)	6.2.2(o)(a3)	Compliant
20 dB Bandwidth	15.247(a)(1)(ii)	6.2.2(o)(a1)	Compliant
Peak Output Power	15.247(b)(1)	6.2.2(o)(a3)	Compliant
Band-edge Compliance of RF Conducted Emissions	15.247(c)	6.2.2(o)(d1)	Compliant
Spurious RF Conducted Emissions	15.247(c)	6.2.2(o)(e1)	Compliant
Spurious Emissions Radiated	15.209	6.2.2(o)(e1)	Compliant
RF Exposure	1.1307(b)(1) & 2.1091	(RSS-102)	Compliant ¹

Note:

(1) RF Exposure for IC is documented in a supplement to this report

5.2 Test Specifications

The EUT was tested according to the procedures in FCC Part 15 Subpart C section 15.247 and FCC Public Notice DA 00-705, and also to demonstrate compliance with Industry Canada RSS-210 6.2.2 (O).

5.3 Operation Mode

The EUT module was tested using the reference board as the support test host. The EUT was embedded in and received power and data I/O from the host. A PC connection allowed commands to the module to be issued to put the device into the correct test modes.

5.4 Documentation of test device

Documentation of the tested device has been reviewed by HYPER Corporation engineers and found to be in compliance with applicable test specifications. All documentation is kept in the Job Folder.

5.5 General and Special Conditions

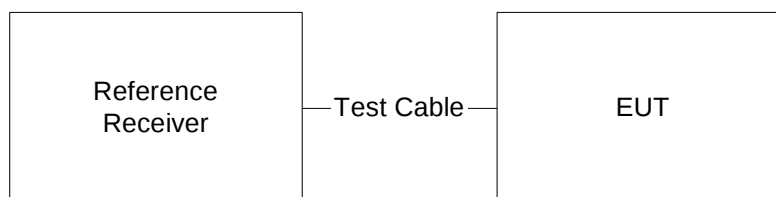
The EUT received power from the test host, which was powered using an AC adaptor plugged into the ac mains. Testing was done in an indoor controlled environment with an average temperature of 23.3° C and relative humidity of 43%, unless specified otherwise.

5.6 Equipment and Cable Configurations

The EUT was tested using serial connector to enable test-modes. The primary cabling considerations were the cable used to connect the antenna port to the measuring equipment.

Manufacturer	Description	Model Number	Serial Number	CAL Date
Agilent Technology	Spectrum Analyzer	E4446A	US44300386	11/10/2004
Agilent Technology	Spectrum Analyzer	8965	3943A01781	10/04/2004
Dell	PC	Lattitude	N/A	N/A

5.7 Test Setup Block Diagram(s)



6. Test Results

6.1 AC-Line Conducted Emissions

The results below were provided via subcontract by BACL, as dictated by their laboratory quality system.

6.1.1 Measurement Procedure

Measurement Uncertainty: All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN. Based on NIS 81, the treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is $\pm 2.4\text{dB}$.

Test Setup: The measurement was performed in shield room, using the same setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC Class B limits. External I/O cables were draped along the edge of the test table and bundled when necessary. The host was connected with LISN-1.

Spectrum Analyzer Setup: The spectrum analyzer was set to investigate the spectrum from 150 kHz to 30 MHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
R&S	Receiver, EMI Test	ESCS30	100176	9/15/2005
R&S	LISN, Artificial Mains	ESH2-Z5	871884/039	8/16/2005

* Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Procedure: During the conducted emissions test, the power cord of the host system was connected to the mains outlet of LISN-1. Maximizing procedure was performed on the six (6) highest emissions of the EUT. All data was recorded in the following modes: peak detection quasi-peak and average. Quasi-Peak readings are distinguished with a "QP". Average readings are distinguished with an "Ave".

6.1.2 Test Data:

Bay Area Compliance Laboratory Corp
Class B

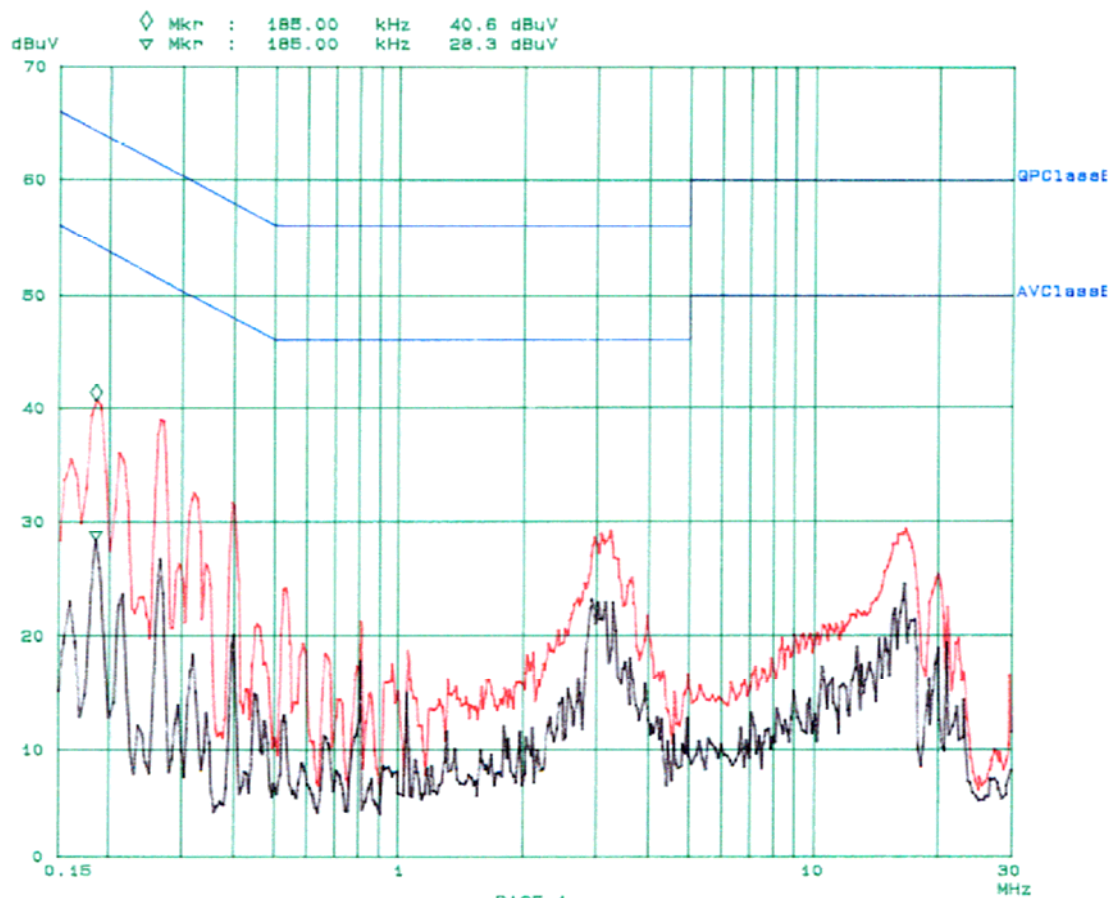
26. Aug 05 09:25

26 / August / 2005

EUT: Bluetooth Scanner (Gryphon BT SH3500)
Manuf: DataLogic
Op Cond: Normal
Operator: Shell
Comment: N
120VAC

Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	
150k	1M	5k	9k	GP+AV	20ms	15dB LN	OFF	
1M	5M	10k	9k	GP+AV	1ms	15dB LN	OFF	
5M	30M	100k	9k	GP+AV	1ms	15dB LN	OFF	



Bay Area Compliance Laboratory Corp
Class B

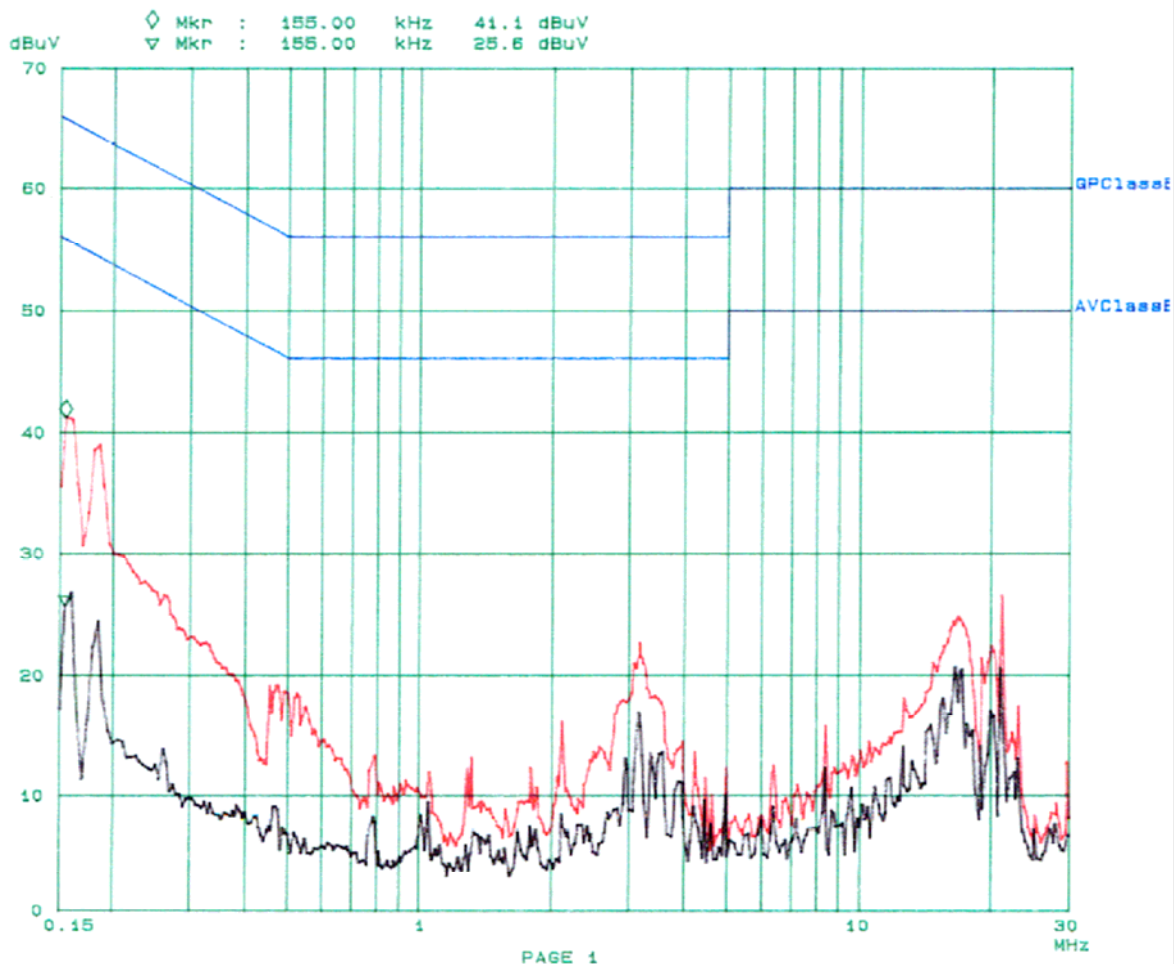
26. Aug 05 09:01

26 / August / 2005
Sney

EUT: Bluetooth Scanner (Gryphon BT SH3500)
Manuf: DataLogic
Op Cond: Normal
Operator: Shell
Comment: L
120VAC

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preampl
150k	1M	5k	9k	QP+AV	20ms	15dB LN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dB LN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dB LN	OFF



6.2 Carrier Frequency Separation

6.2.1 Operation Environment

Temperature: 23.3°C
Relative Humidity: 43%

6.2.2 Test procedure

The carrier frequency separation per FCC 15.247(a)(1) / IC RSS210 6.2.2(o)(a1) was measured using a spectrum analyzer with the resolution (or IF) bandwidth (RBW) $\geq 1\%$ of the span, the span should be wide enough to capture the peaks of two adjacent channels, and the video (or average) bandwidth (VBW) should be $\geq$ RBW. Any transceiver characteristics are defined in the appropriate data-sheet/product note, included in the submission file. The carrier frequency separation result is described as below:

6.2.3 Test data

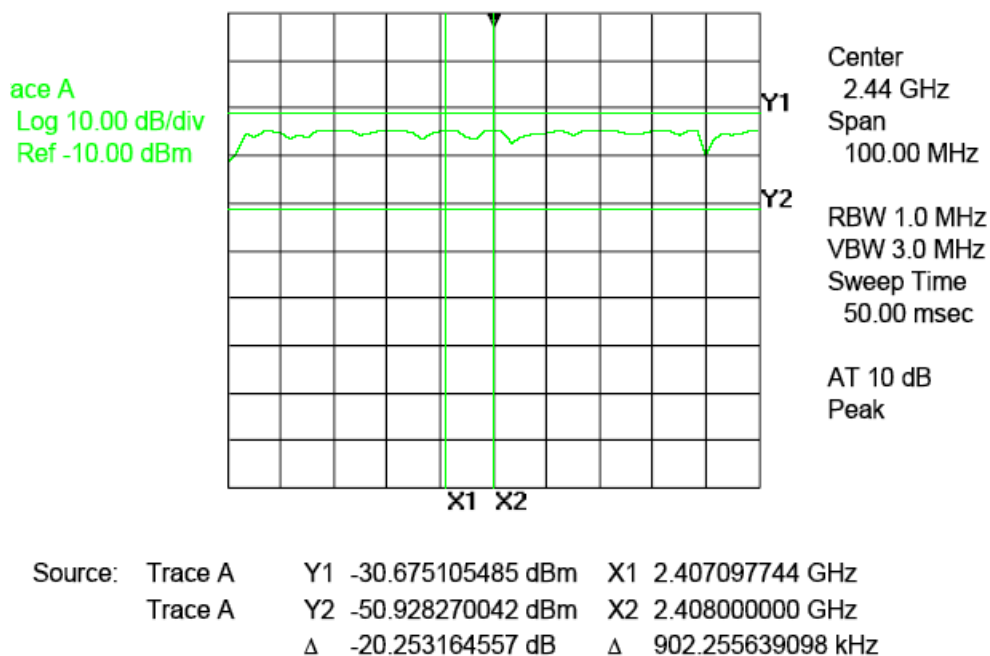


Figure 6.2-1: Carrier Frequency Separation – Low

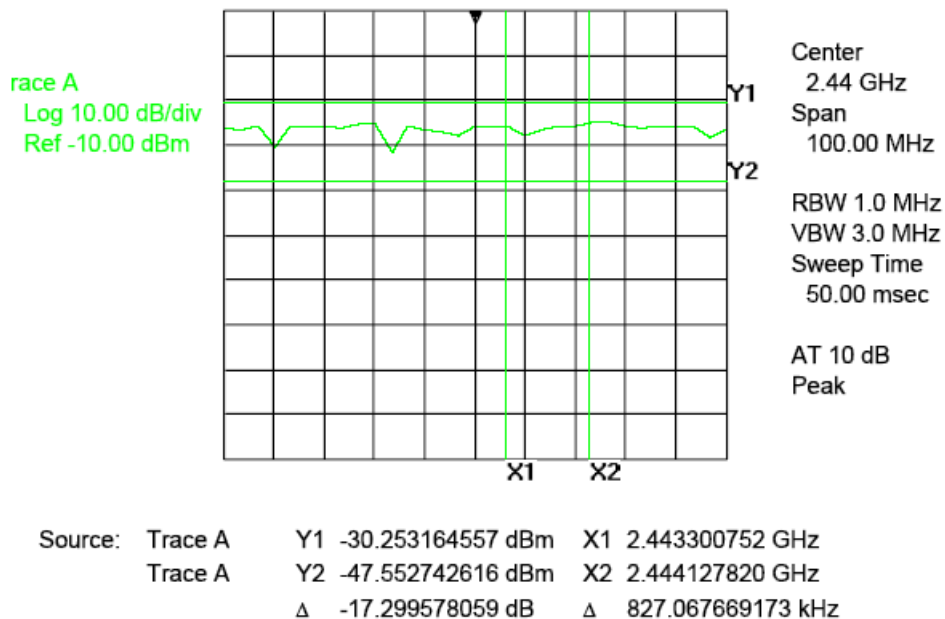


Figure 6.2-2: Carrier Frequency Separation – Mid

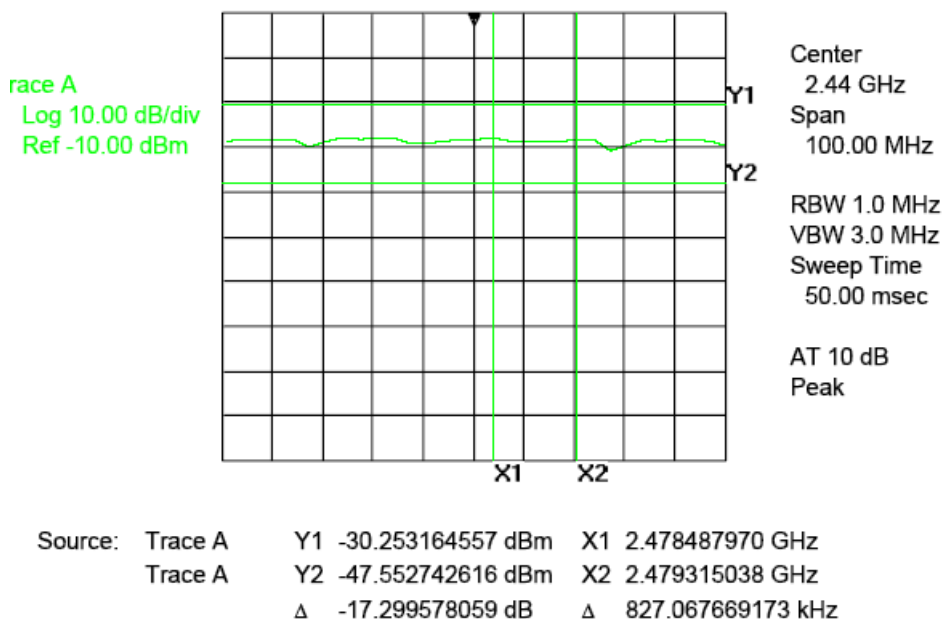


Figure 6.2-3: Carrier Frequency Separation – High

Summary of Carrier Frequency Separation Data

	Frequency (MHz)	Measurement Frequency Separation (kHz)	Limit (kHz) Min
Low	2402	902	25
Mid	2441	827	25
High	2480	827	25

6.3 Number of Hopping Frequencies

6.3.1 Operation Environment

Temperature: 23.3°C
Relative Humidity: 43%

6.3.2 Test procedure

The carrier frequency separation per FCC 15.247(a)(1)(ii)/ IC RSS210 6.2.2(o)(a3) was measured using a spectrum analyzer with RBW $\geq 1\%$ of the span. The VBW is $\geq$ RBW and the span shall be equal to the frequency band of operation. The number of hopping frequencies measured data is shown below.

6.3.3 Test data

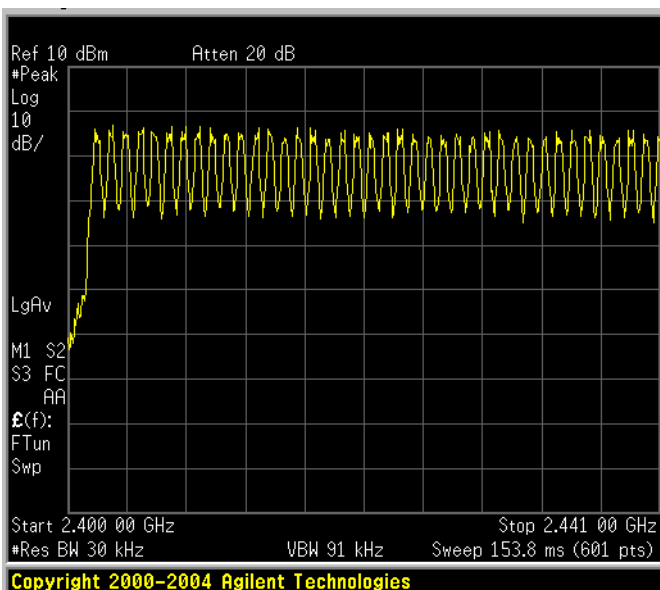


Figure 6.3-1 Channels in the Frequency range 2.400-2.441GHz

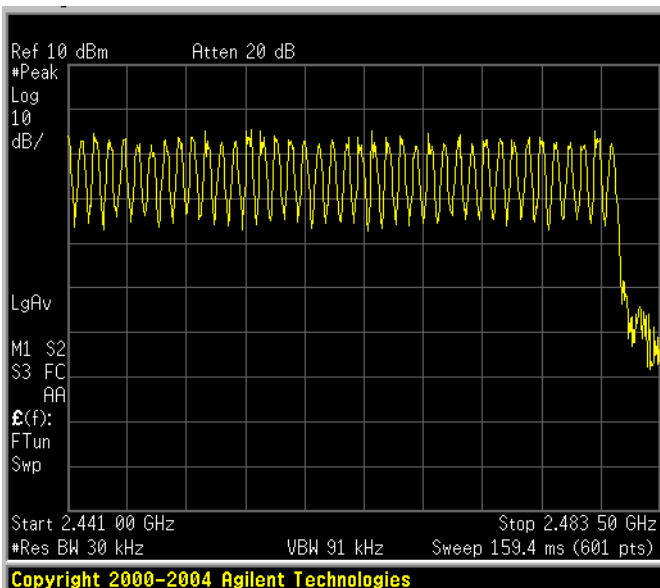


Figure 6.3-2 Channels in the Frequency range 2.440-2.4835GHz

Frequency Range (GHz)	Number of hopping frequencies	Total hopping channels
2.400 ~ 2.441	39.5	79
2.441 ~ 2.4835	39.5	

6.4 Time of Occupancy (Dwell Time)

6.4.1 Operation Environment

Temperature: 23.3°C
Relative Humidity: 43%

6.4.2 Test Procedure

The Time of Occupancy test case per FCC 15.247(a)(1)(ii)/ IC RSS210 6.2.2(o)(a3) was measured using a spectrum analyzer with RBW = 1 MHz. The VBW ≥ RBW and the zero span function of spectrum analyzer were enabled.

6.4.3 Test data

The worst case time of occupancy (Dwell Time) is (DH5 packet) (4 X 2.933 ms) (dwell time in 1 sec) x 30 seconds = 351.96 ms = 0.35196 sec < 0.4s in 30 sec. – Compliant

Summary Table		
Frequency	Dwell Time (Sec)	Limit (Sec)
Low	165.41 usec	0.4
Mid	165.41 usec	0.4
High	165.38 usec	0.4
Packets in 30 seconds	245.54 msec	0.4

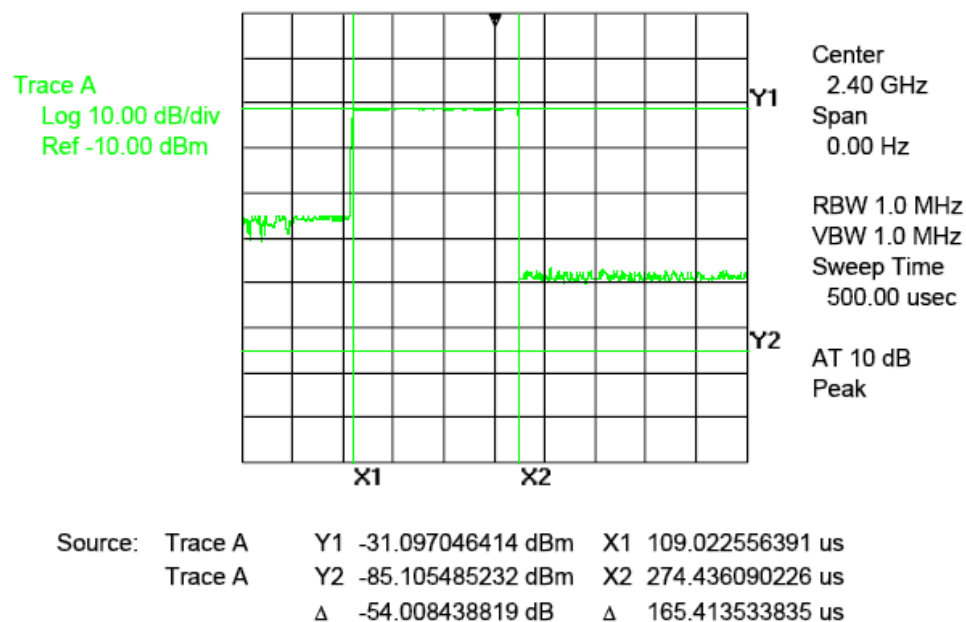


Figure 6.4-1: Dwell Time =165.41 usec

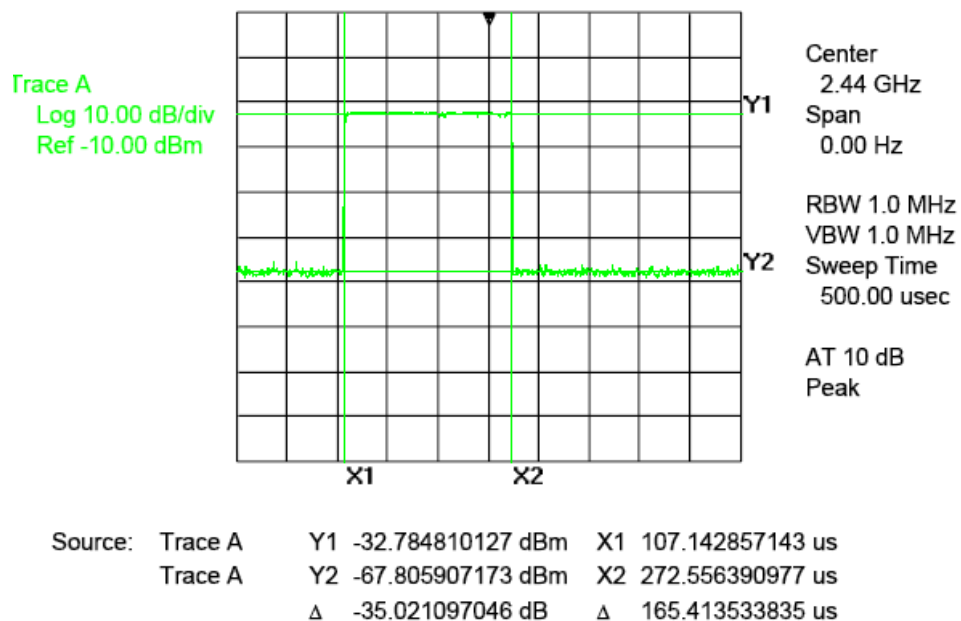


Figure 6.4-2: Dwell Time = 165.41usec

Data corrupted – noted 165.38 us on High CH

Figure 6.4-3: Dwell Time

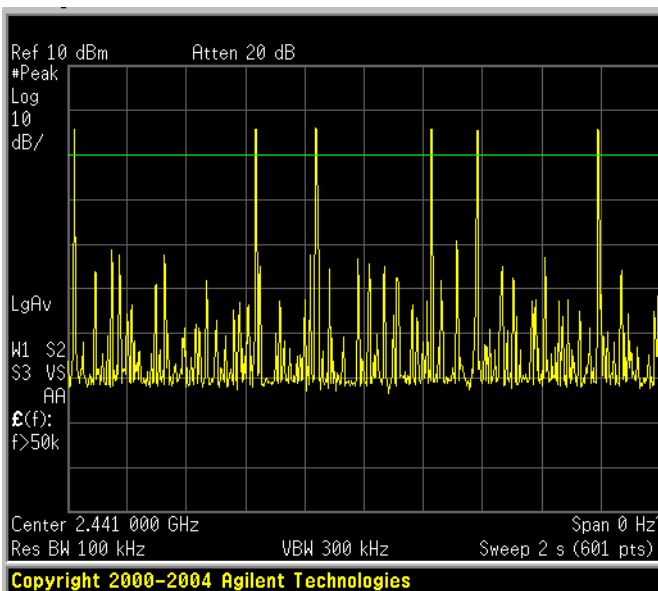


Figure 6.4-4: Plot showing numbers of pulses in 1 second in DH5 Mode
3 occurrences of DH5 packets in 1 second (6 in 2 seconds)

6.5 20 dB Bandwidth

6.5.1 Operation Environment

Temperature: 23.3°C
Relative Humidity: 43%

6.5.2 Test procedure

The 20dB bandwidth per FCC 15.247(a)(1)(ii)/IC RSS210 6.2.2(o)(a1) was measured using spectrum analyzer with the resolution bandwidth > 1% of the 20 dB bandwidth. The VBW shall be $\geq$ RBW, and the span shall equal to approximately 2 to 3 times the 20 dB bandwidth. This test was performed at 3 different channels (low, mid and high), and the maximum 20dB modulation bandwidth is listed below:

6.5.3 Test data

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit
Low	2402	842.10	(1000 kHz) 1 MHz
Middle	2441	766.92	1 MHz
High	2480	827.07	1 MHz

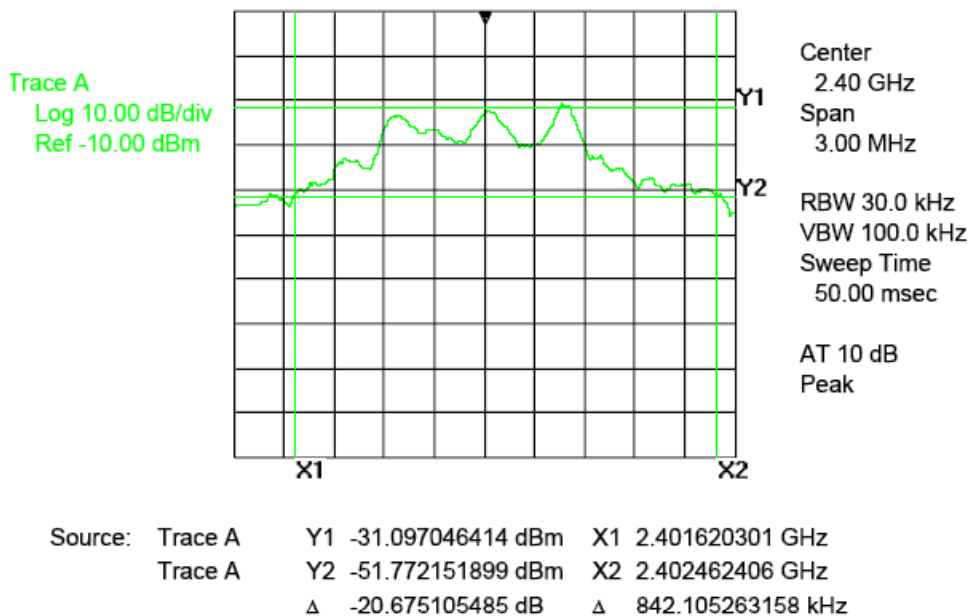


Figure 6.5-1: Bandwidth of the 2402 MHz channel

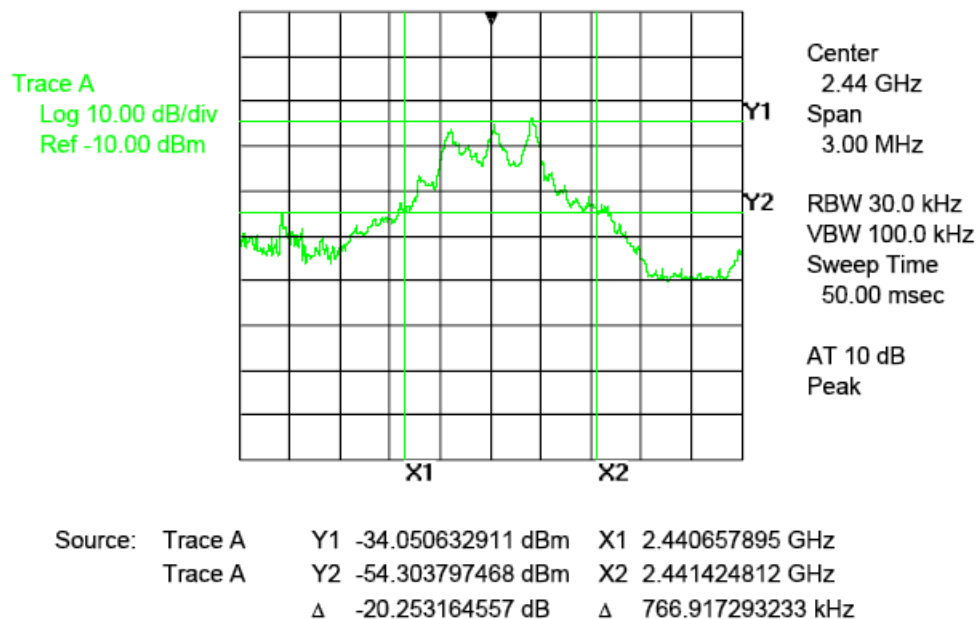


Figure 6.5-2: Bandwidth of the 2441 MHz channel

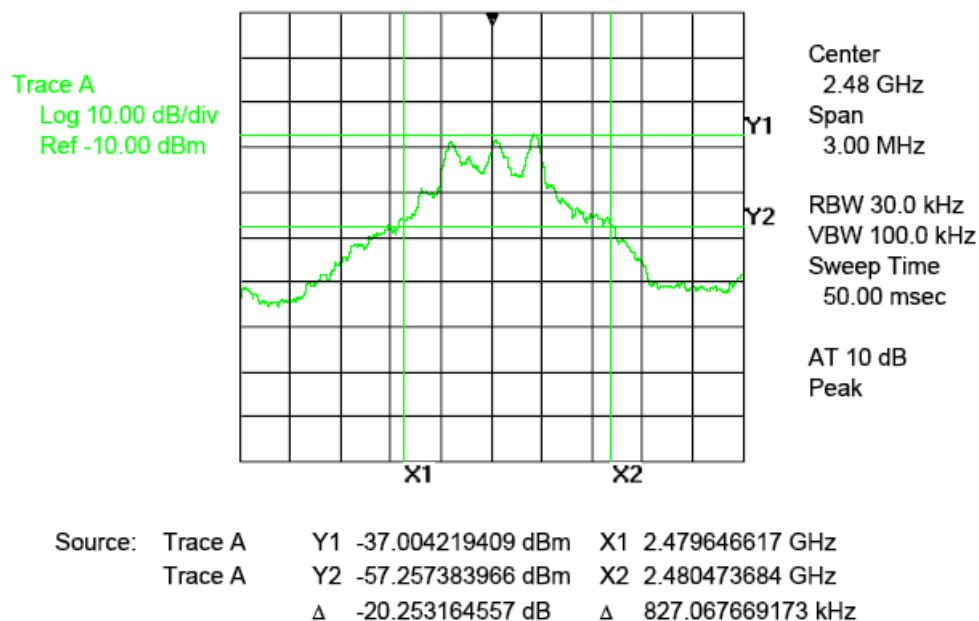


Figure 6.5-3: Bandwidth of the 2480 MHz channel

6.6 Peak Output Power

6.6.1 Operation Environment

Temperature: 23.3°C
Relative Humidity: 43%

6.6.2 Test procedure:

The Peak Output Power per FCC 15.247(b)(1)/ IC RSS210 6.2.2(o)(a3) was measured on the EUT using a 50-Ohm SMA cable connected to the spectrum analyzer.

6.6.3 Test data

Channel	Frequency (MHz)	Transmitter Peak Output Power (dBm)	Limit (dBm)
Low	2402	-4.7	20.97
Middle	2441	-7.93	20.97
High	2480	-11.73	20.97
			20.97dBm = 0.125 W

Antenna gain : = 1.2 dBi (worst case for eirp) = 1.318

Peak Field strength = 91.7 dBuV/m = 0.03846 V/m

$P = (F * D)^2 / (30 * \text{ant gain}) = (.03846 * 9)^2 / (30 * 1.318)$
= 0.3367 mW = -4.7 dBm

EIRP = -4.7 dBm

Figure 6.6-1: Peak Output Power on 2402 MHz

Middle CH : 88.5 dBuV/m = 0.02661 V/m

power = 0.1612 mW = **-7.93dBm**

Figure 6.6-2: Peak Output Power on 2441 MHz

High CH : 84.9 dBuV/m = 0.01758 V/m

EIRP = 0.0672 mW = **-11.73 dBm**

Figure 6.6-3: Peak Output Power on 2480 MHz

6.7 Band-Edge Compliance of RF Conducted Emissions

6.7.1 Operation Environment

Temperature: 23.3°C
Relative Humidity: 43%

6.7.2 Test procedure

The band-edge compliance of RF conducted emissions of the EUT was measured per FCC 15.247(c)/IC RSS210 6.2.2(o)(d1). The EUT was set to operate on the lowest operating frequency and the level at the lower band-edge was measured. The upper band-edge level was then measured with the EUT operating on the highest operating frequency.

6.7.3 Test data

Band-edge Frequency (MHz)	Attenuation (dB) Relative to Peak	Limit (dB) - Minimum
2400 (Hopping Off)	-35.44	-20
2400 (Hopping On)	-30.38	-20
2483.5 (Hopping Off)	-27.00	-20
2483.5 (Hopping On)	-26.16	-20

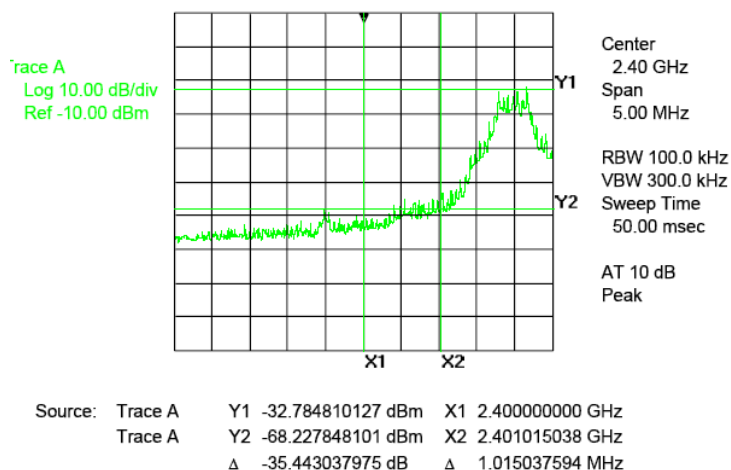


Figure 6.7-1: Band-Edge Compliance – Lower Band-Edge (2400MHz) – Hopping Off

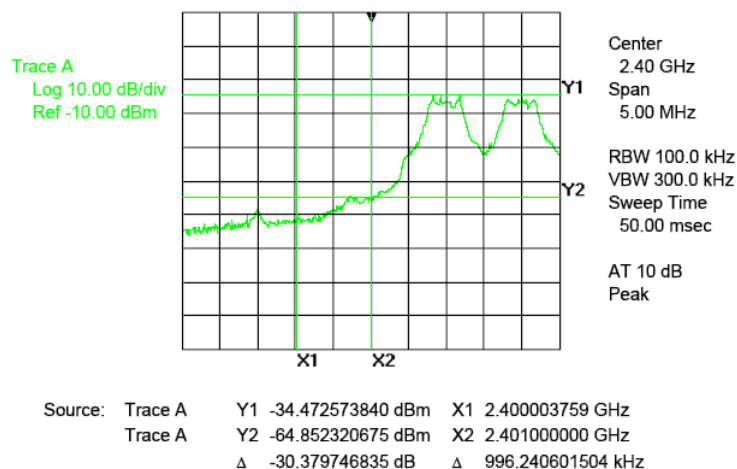


Figure 6.7-2: Band-Edge Compliance – Lower Band-Edge (2400MHz) – Hopping On

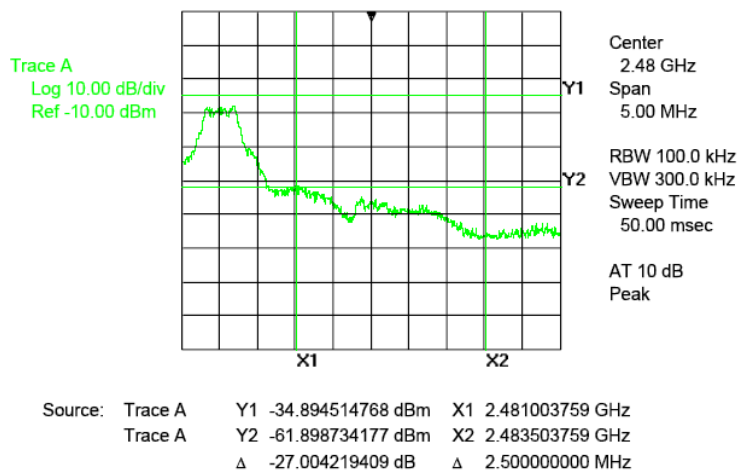


Figure 6.7-3: Band-Edge Compliance – Upper Band-Edge (2483.5MHz) Hopping Off

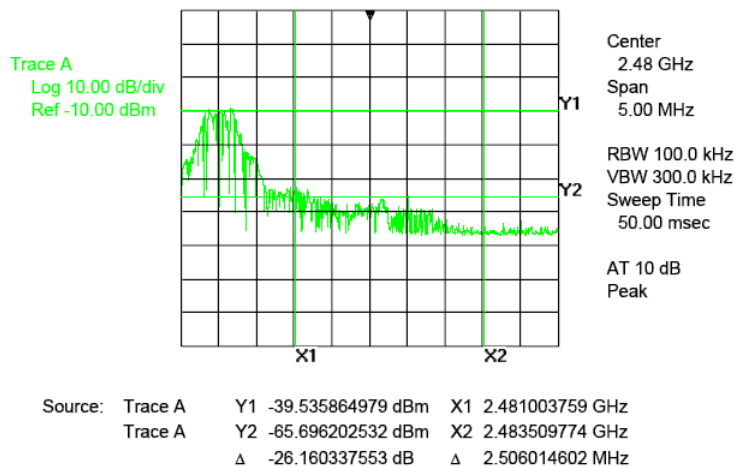


Figure 6.7-4: Band-Edge Compliance – Upper Band-Edge (2483.5MHz) Hopping On

6.8 Radiated Spurious Emission (15.205, 15.209, 15.247)

The results below were provided via subcontract by BACL. The testing was performed as dictated by the laboratory's ISO/IEC 17025-quality system.

6.8.1 Measurement Procedure

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 limits. The spacing between the peripherals was 10 centimeters. External I/O cables were draped along the edge of the test table and bundled when necessary. The EUT was connected to the power adapter, which was connected with 120 Vac/60Hz power source.

Corrected Amplitude & Margin Calculation

The corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor then subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows: $\text{Margin} = \text{Corr. Ampl.} - \text{FCC 15.209 Limit}$.

6.8.2 Test data

Bay Area Compliance Laboratory, Corp.

Company Name : Data Logic
EUT Description: BT Barcode Scanner
Date: 09/02/05
Test Setup: EUT / Laptop
Report # : R0508242
File Name: 050209B1.DataLogic

LC = 2402 MHz
MC = 2442 MHz
HC = 2480 MHz

Run#1 Radiated Harmonic and Spur Emission

Run # 1- 1 :Primary scan 1GHz -25GHz , (Lowest channel. :

2402 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Mit (dBuV)	15.247 Margin	Comments	Testing Condition
2402.0000	96.8	90	1.0	v	28.7	2.0	35.8	91.7				Bursting
2402.0000	93.3	0	1.2	h	28.7	2.0	35.8	88.1				Bursting
2402.0000	42.6	180	1.2	v	28.7	2.0	35.8	37.4				Bursting
2402.0000	41.4	0	1.2	h	28.7	2.0	35.8	36.2				Bursting
4804.0000	44.9	270	2.4	v	32.5	3.1	34.8	45.7	74	-28.3		Bursting
4804.0000	44.3	180	2.3	h	32.5	3.1	34.8	45.1	74	-28.9		Bursting
4804.0000	30.8	270	2.4	v	32.5	3.1	34.8	31.6	54	-22.5		Bursting
4804.0000	30.1	180	2.3	h	32.5	3.1	34.8	30.9	54	-23.1		Bursting
2276.0000	52.5	90	2.0	v	28.7	2.0	35.8	47.3	74	-26.7		Bursting
2276.0000	51.2	180	2.0	h	28.7	2.0	35.8	46.0	74	-28.0		Bursting
2276.0000	44.3	180	2.0	v	28.7	2.0	35.8	39.1	54	-14.9		Bursting
2276.0000	43.7	90	2.0	h	28.7	2.0	35.8	38.5	54	-15.5		Bursting

Run # 1- 1 :Primary scan 1GHz -25GHz , (Lowest channel. :

2442 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Mit (dBuV)	15.247 Margin	Comments	Testing Condition
2442.0000	93.7			v	28.7	2.0	35.8	88.5				Bursting
2442.0000	90.3			h	28.7	2.0	35.8	85.1				Bursting
2442.0000	41.7			v	28.7	2.0	35.8	36.5				Bursting
2442.0000	40.1			h	28.7	2.0	35.8	34.9				Bursting
4884.0000	43.7	270	2.4	v	32.5	3.1	34.8	44.5	74	-29.5		Bursting
4884.0000	43.1	180	2.2	h	32.5	3.1	34.8	43.9	74	-30.1		Bursting
4884.0000	30.2	270	2.4	v	32.5	3.1	34.8	31.0	54	-23.0		Bursting
4884.0000	30.1	180	2.2	h	32.5	3.1	34.8	30.9	54	-23.1		Bursting
2276.0000	51.8	270	2.4	v	28.7	2.0	35.8	46.6	74	-27.4		Bursting
2276.0000	50.7	180	2.3	h	28.7	2.0	35.8	45.5	74	-28.5		Bursting
2276.0000	44.1	270	2.4	v	28.7	2.0	35.8	38.9	54	-15.1		Bursting
2276.0000	42.8	180	2.1	h	28.7	2.0	35.8	37.6	54	-16.4		Bursting

Run # 1- 1 :Primary scan 1GHz -25GHz , (Lowest channel. :

2480 MHz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV/m	15.247 Mit (dBuV)	15.247 Margin	Comments	Testing Condition
2480.0000	90.1			v	28.7	2.0	35.8	84.9				Bursting
2480.0000	87.8			h	28.7	2.0	35.8	82.6				Bursting
2480.0000	40.1			v	28.7	2.0	35.8	34.9				Bursting
2480.0000	38.6			h	28.7	2.0	35.8	33.4				Bursting
4960.0000	42.1	270	2.4	v	32.5	3.1	34.8	42.9	74	-31.1		Bursting
4960.0000	40.2	90	2.1	h	32.5	3.1	34.8	41.0	74	-33.0		Bursting
4960.0000	29.4	270	2.4	v	32.5	3.1	34.8	30.2	54	-23.8		Bursting
4960.0000	28.6	90	2.1	h	32.5	3.1	34.8	29.4	54	-24.6		Bursting
2276.0000	51.6	270	2.4	v	28.7	2.0	35.8	46.4	74	-27.6		Bursting
2276.0000	50.3	90	2.1	h	28.7	2.0	35.8	45.1	74	-28.9		Bursting
2276.0000	43.8	270	2.4	v	28.7	2.0	35.8	38.6	54	-15.4		Bursting
2276.0000	42.6	90	2.1	h	28.7	2.0	35.8	37.4	54	-16.6		Bursting

Run # 1- 4 :Primary scan 30MHz -1GHz ,

Frequency MHz	Reading dBuV	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Factor dBuV	15B Limit	15B Margin	Comments
60.00	40.1	270	3.2	H	7.4	1.7	28.5	20.7	40	-19.3	
60.00	41.2	75	1.8	V	7.4	1.7	28.5	21.8	40	-18.2	
924.00	30.1	270	2.1	H	22.1	6.9	27.3	31.8	46	-14.2	
924.00	31.2	330	1.2	V	22.1	6.9	27.3	32.9	46	-13.1	
48.00	45.1	280	2.8	H	10.6	1.5	28.6	28.6	40	-11.4	
48.00	44.2	250	1.0	V	10.6	1.5	28.6	27.7	40	-12.3	