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Job Number: 581226
File Number: NC9394
Date: 12 April 2007
Model: Radioband/R
FCC ID: UZ5-Radioband-R

Electromagnetic Compatibility Test Report

For

JCM TECHNOLOGIES S A

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1285 Walt Whitman Rd.
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Job Number: 581226 NC9394 Page 2 of 46
Model Number: Radioband/R
Client Name: JCM TECHNOLOGIES S A
FCC ID: UZ5-Radioband-R

Test Report Details

Tests Performed By: **Underwriters Laboratories Inc.
1285 Walt Whitman Rd.
Melville, NY 11747**

Tests Performed For: **JCM TECHNOLOGIES S A
BISBE MORGADES, 46 BAIXOS
VIC, 08500**

Applicant Contact: **GEMMA REVERTER**
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E-mail: **GREVERTER@JCM-TECH.COM**

Test Report Date: **20 March 2007**

Product Type: **Transceiver**

Product standards **FCC Part 15, Subpart C 15.209, 15.231, 15.31
FCC Part 15, Subpart B, 15.109**

Model Number: **RADIOBAND/R**

Sample Serial Number: **Not provided**

EUT Category: **RF Remote Control Transmitter/Receiver – 868.35MHz**

Testing Start Date: **08 March 2007**

Date Testing Complete: **12 April 2007**

Overall Results: Compliant

Underwriters Laboratories Inc. reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. Underwriters Laboratories Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from Underwriters Laboratories Inc. issued reports. This report shall not be used to claim, constitute or imply product certification, approval, or endorsement by NVLAP, A2LA, or any agency of the US government.

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Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
12 April 2007	Original	-	-

1.0 GENERAL - Product Description

1.1 Equipment Description

The Radioband/R is part of the Radioband system. It is an radio communication system for safety edges that offers a two-way 868 MHz link. With self-test between the transmitter and receiver parts. The Radioband system is made up of a transmitter unit and a receiver unit. The transmitter part is connected to the safety edge and the receiver part is connected to the control panel. Communication between the transmitter and receiver is established by radio.

1.2 Device Configuration During Test

1.2.1 Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	Transceiver	JCM TECHNOLOGIES S A	Radioband/R	None
SIM	Resistor/switch	-	8k2	Simulation of switch activation

Note:

* **EUT** - Equipment Under Test, **AE** - Auxiliary/Associated Equipment, or **SIM** - Simulator (Not Subjected to Test)

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1.2.1 Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m (Y/N)	Cable Shielded (Y/N)	Comments
0	Enclosure	N/E	—	—	None
1	Mains	AC/DC	Y	N	None

Note:
 *AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
 I/O = Signal Input or Output Port (Not Involved in Process Control)
 TP = Telecommunication Ports

1.2.1 EUT Internal Operating Frequencies:

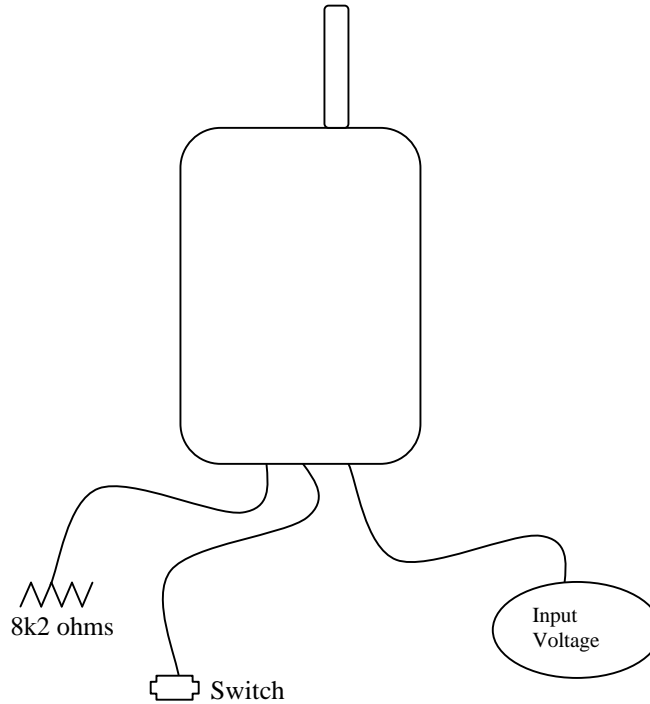
Frequency (MHz)	Description	Frequency (MHz)	Description
868.35	Transmit Frequency	4	Microcontroller

1.2.1 Power Interface:

Mode # /Rated	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	12-24	-	-	DC/AC	-	Powered by AC or DC power at the same input terminals. Power is regulated after the input.
1	12	-	-	DC	-	Powered by AC/DC Converter
2	12			AC	1	Powered by AC/AC Converter

1.3 Block Diagram:

The diagram below illustrates the configuration of the equipment above.



1.4 EUT Operation Modes

Mode #	Description
1	Continuously transmitting and receiving.
2	Periodically transmitting and receiving.

1.5 EUT Configurations

Mode #	Description
1	Stand Alone Device

2.0 Results Summary

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by Underwriters Laboratories Inc. in accordance with the procedures stated in each test requirement and specification. The applicant determined the list of tests performed were applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

2.1 Reference Standards

Standard Number	Standard Name	Standard Date
Part 15, Subpart C 15.35, 15.209, 15.231	Part 15 - Radio Frequency Devices	2006
Part 15, Subpart B 15.109	Part 15 - Radio Frequency Devices	2006

2.2 Results Summary

Requirement – Test	Result (C/NC)*
15.35 Pulse Train	C
15.109 Radiated Emissions – Unintentional	C
15.207 Conducted Emissions	C
15.209 Radiated Emissions Restricted Bands	C
15.231 Radiated Emissions – Fundamental and Spurious Emissions	C

Note: C-Compliant, NC-Non-Compliant

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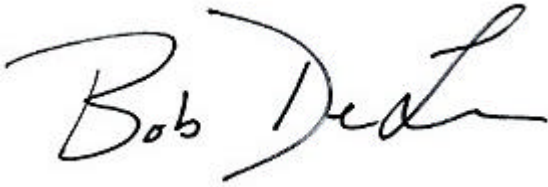
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2.3 Deviations from standard test methods

None

2.4 Device Modifications Necessary for Compliance

None



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Conformity Assessment Services

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3.0 Calibration of Equipment Used for Measurement

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is one year or the manufacturers' recommendation, whichever is less.

All test equipment calibrations are traceable to the National Institute of Standards and Technology (NIST); therefore, all test data recorded in this report is traceable to NIST.

4.0 EMISSIONS TEST RESULTS

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be verified at the time the test is conducted.

Ambient Temperature, °C	22.5 ± 2.5	Relative Humidity, %	45 ± 15	Barometric Pressure, mBar	950 ± 150
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4.1 Test Conditions and Results – PULSE TRAIN

Test Description	Measurements were made in the laboratory environment. A Dipole antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15, Subpart A

Table 1 Pulse Train Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	2
Supplementary information: None		

Table 2 Pulse Train Test Equipment

Test Equipment Used			
Description	Manufacturer	Model	Identifier
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081
Oscilloscope	Tektronix	TDS680B	ME5A-258
Dipole Antenna	EMCO	3121C - B4	ME5A-751
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	4848

Figure 1 Test Setup for Polling Transmissions

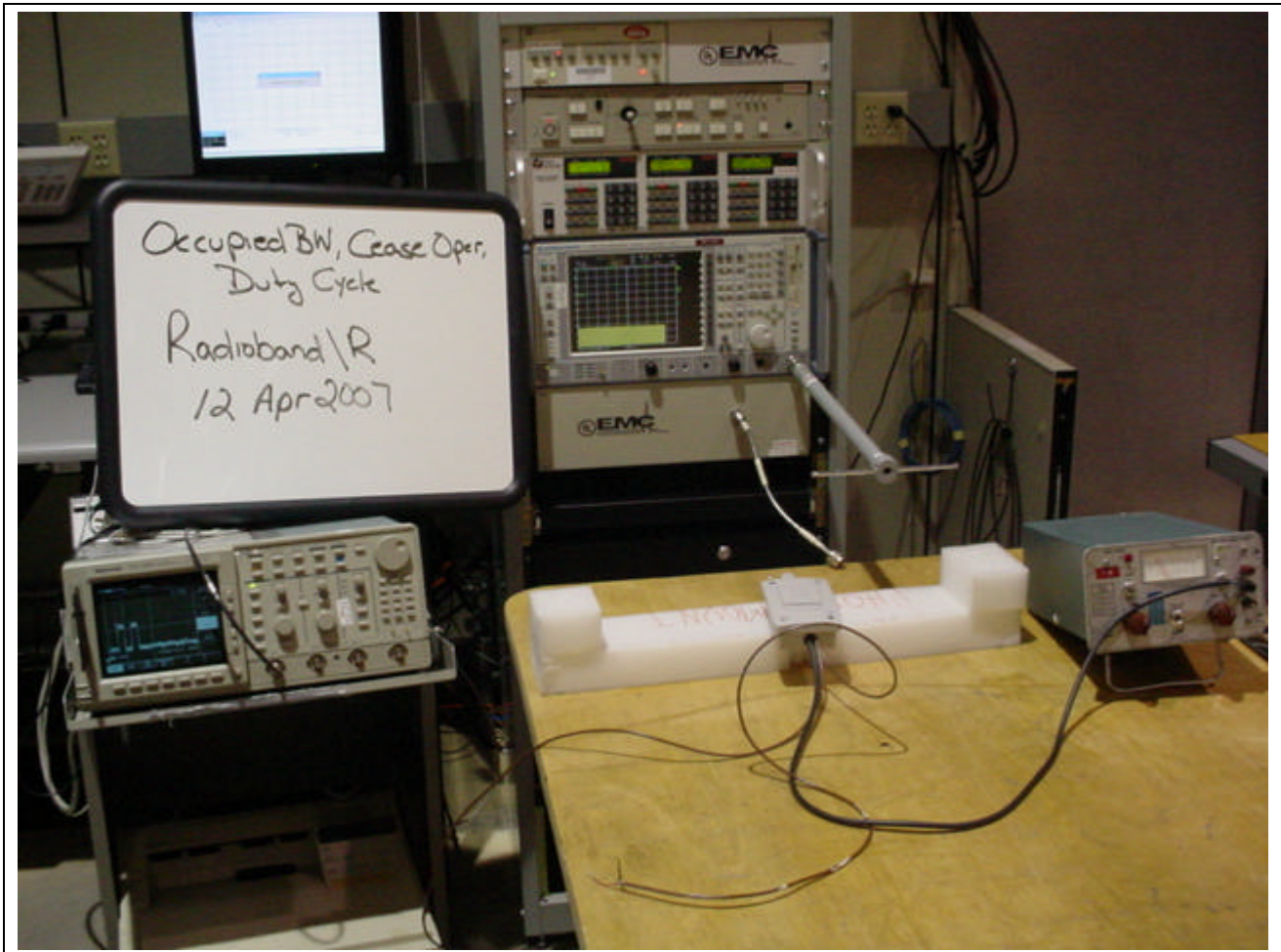


Figure 2 Pulse Train Graph

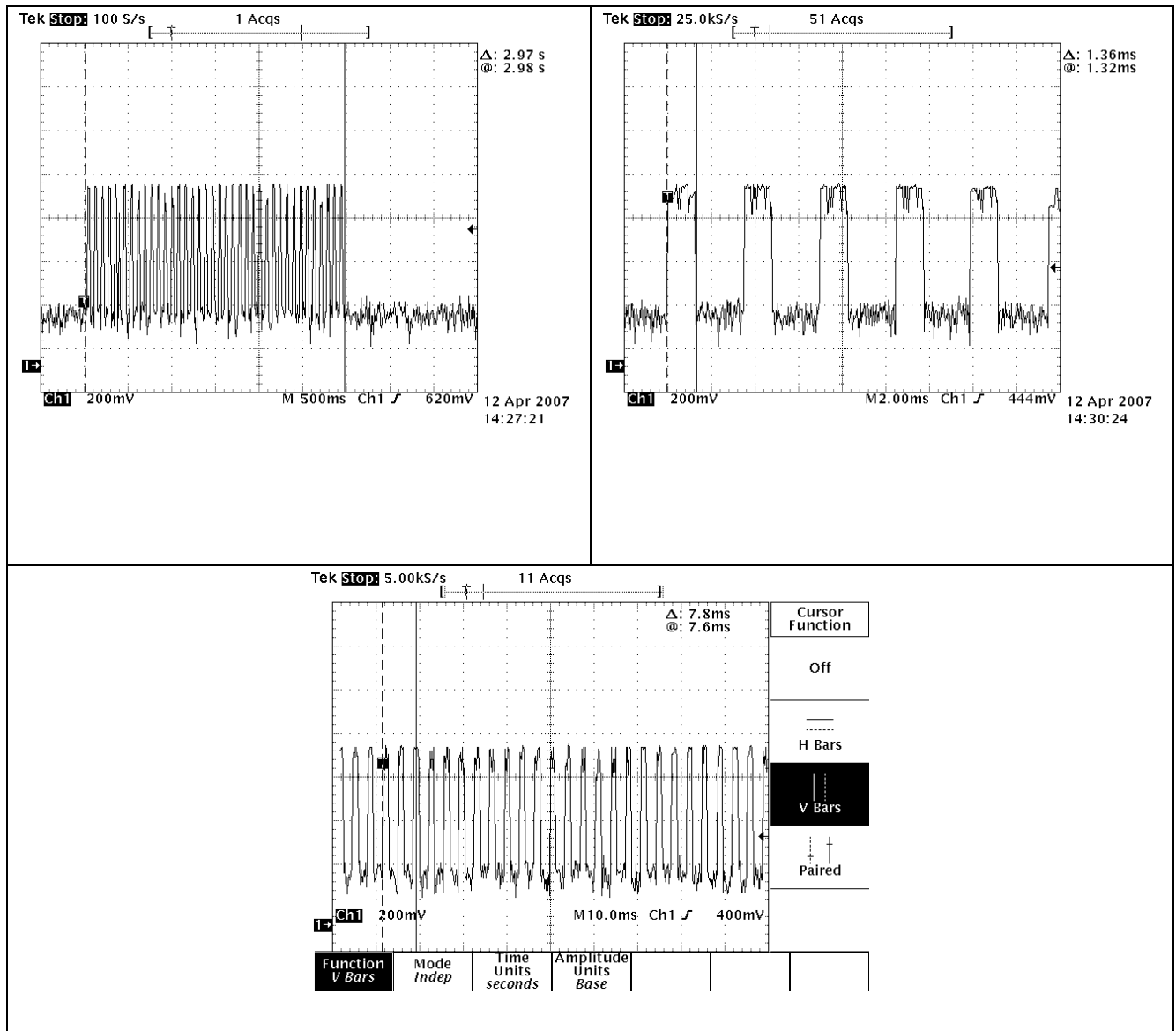
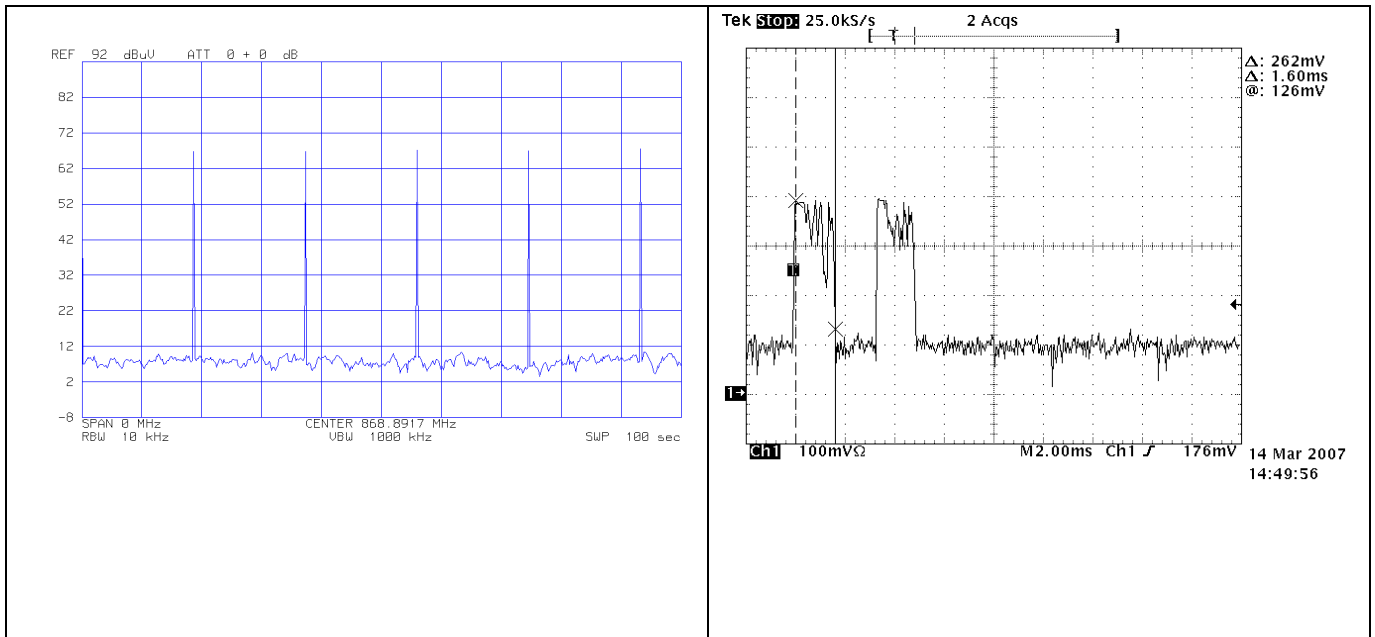


Figure 3 Polling Transmissions



Transmission Time (mS)	Total Transmissions in 1 Hour	Total Transmission Time (mS) in 1 Hour	Requirement
3.2	180	576	Total Transmission time is to be less than 2 seconds in a 1-hr period.

4.2 Test Conditions and Results – OCCUPIED BANDWIDTH

Test Description	Measurements were made in the laboratory environment. A Dipole antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard.
Basic Standard	FCC Part 15, Subpart C
Occupied Bandwidth Limits	
0.25% of Fundamental Frequency	

Table 3 Occupied Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	2
Supplementary information: None		

Table 4 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth (MHz)	Occupied Bandwidth Requirements	
	dBc	%
10kHz	-20	99
Supplementary information: None		

Table 5 Occupied Bandwidth Test Equipment

Test Equipment Used			
Description	Manufacturer	Model	Identifier
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081
Dipole Antenna	EMCO	3121C - B4	ME5A-751
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	4848

Figure 4 Test Setup for Occupied Bandwidth

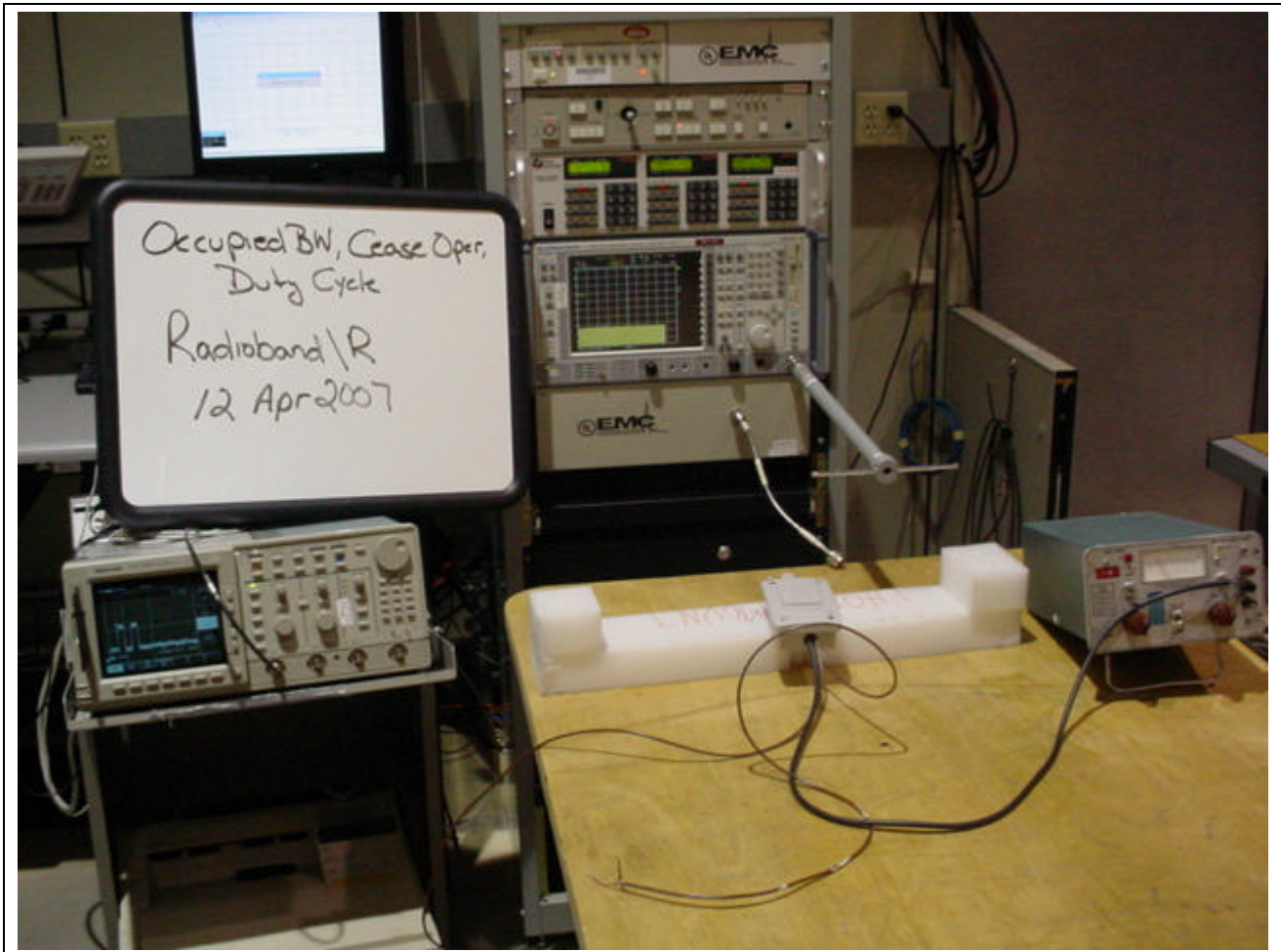
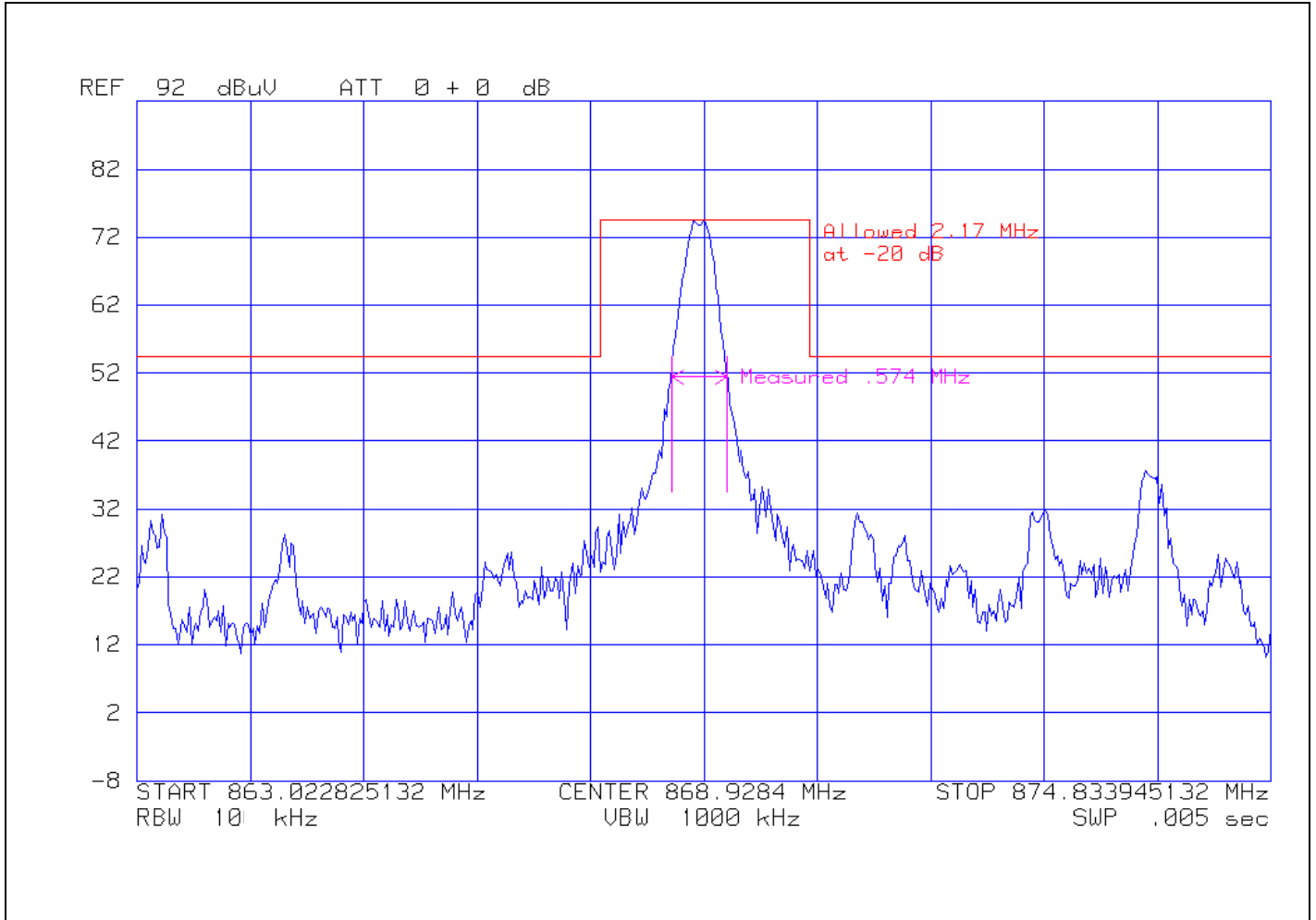


Figure 5 Occupied Bandwidth Graph



4.3 Test Conditions and Results – CEASE OPERATION

Test Description	Measurements were made in the laboratory environment. A Dipole antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15, Subpart C

Table 6 Cease Operation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	2
Supplementary information: None		

Table 7 Cease Operation Test Equipment

Test Equipment Used			
Description	Manufacturer	Model	Identifier
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081
Oscilloscope	Tektronix	TDS3054	ME5B-173
Dipole Antenna	EMCO	3121C - B4	ME5A-751
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	4848

Figure 6 Test Setup for Cease Operation

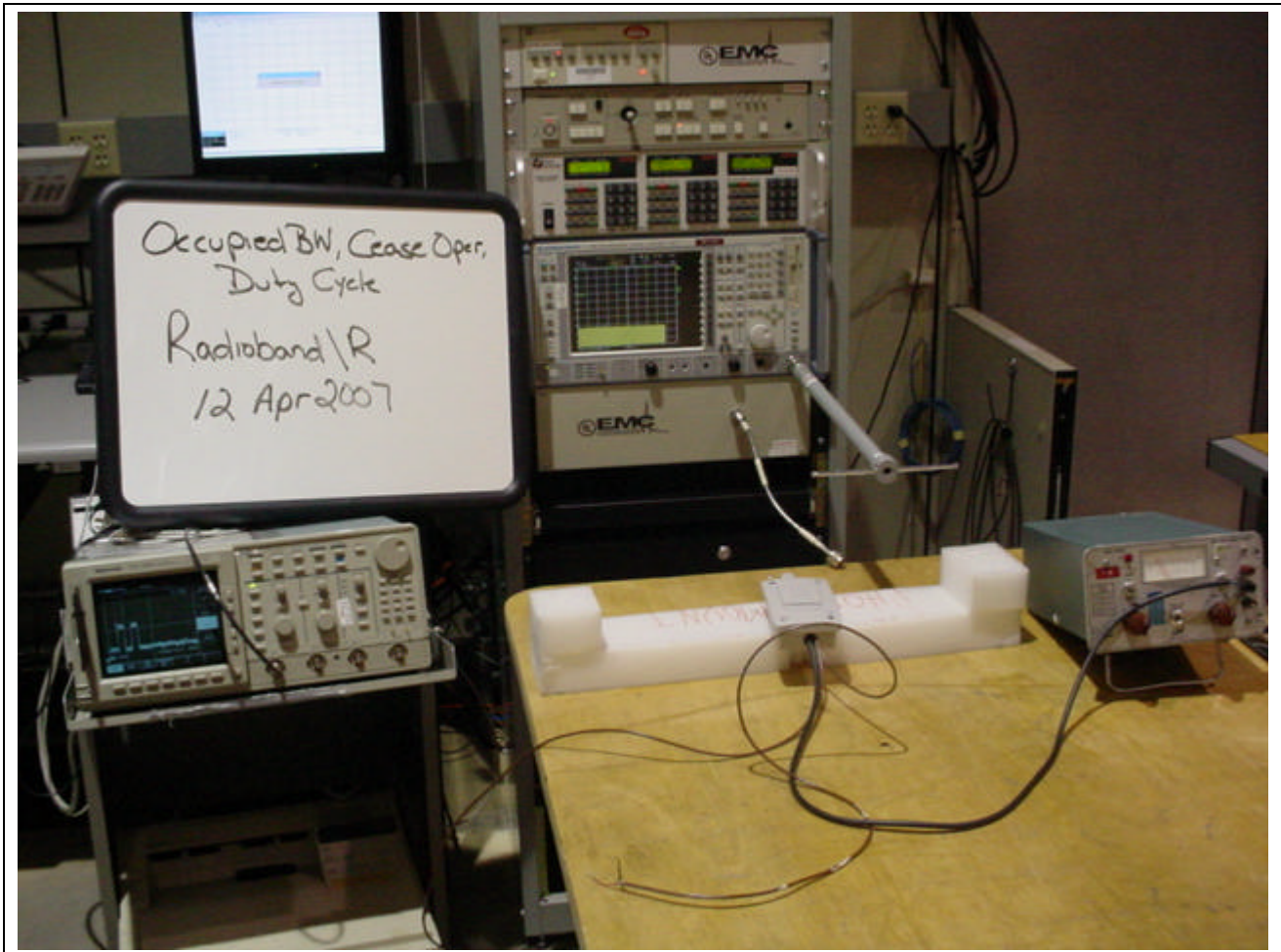
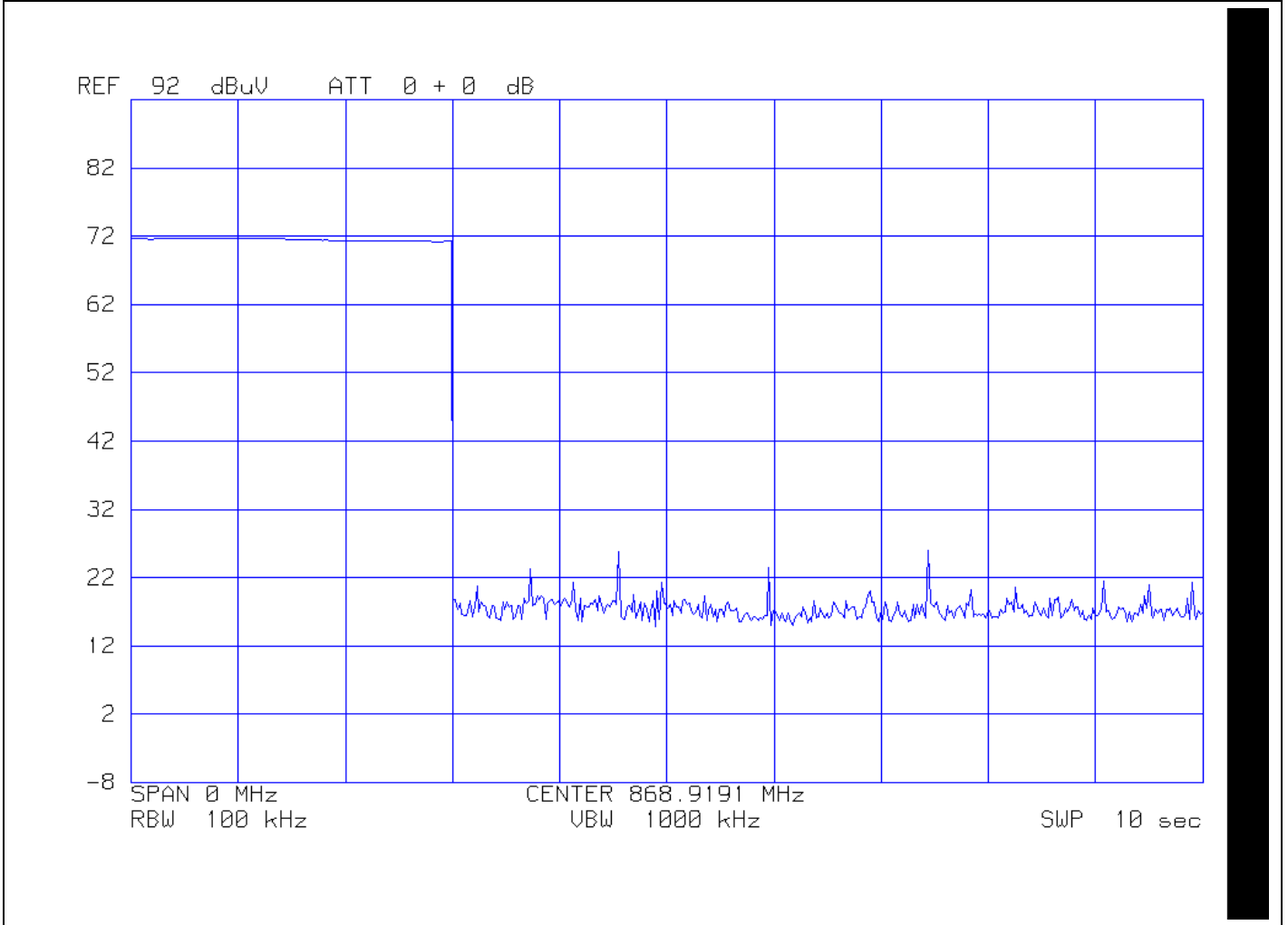


Figure 7 Cease Operation Graph



Transmission Time	Requirement
3 seconds	Cease Operation within 5 seconds

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4.4 Test Conditions and Results – MAINS TERMINAL – CONDUCTED EMISSIONS

Test Description	Measurements were made on a ground plane. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.	
Basic Standard		
UL LPG	80-EM-S0026	
	Frequency range on each side of line	Measurement Point
Fully configured sample scanned over the following frequency range	150kHz to 30MHz	Mains
Limits - Class B		
Frequency (MHz)	Limit (dB μ V)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Supplementary information: None		

Table 8 Conducted Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	2
2	1	2
Supplementary information: None		

Table 9 Conducted Emissions Test Equipment

Test Equipment Used			
Description	Manufacturer	Model	Identifier
Conducted Emissions – Shield Room			
Spectrum Analyzer	Agilent	E7405A	19695
LISN	Solar	9252-50-R-24-BN	ME5A-636
LISN	EMCO	3825/2R	ME5-629
Switch Driver	HP	11713A	44403
RF Switch Box	UL	2	44400
Measurement Software	UL	Version 9.3	44743
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43736

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Figure 8 Test Setup for Conducted Emissions



Figure 9 Conducted Emissions Graph – DC Mode

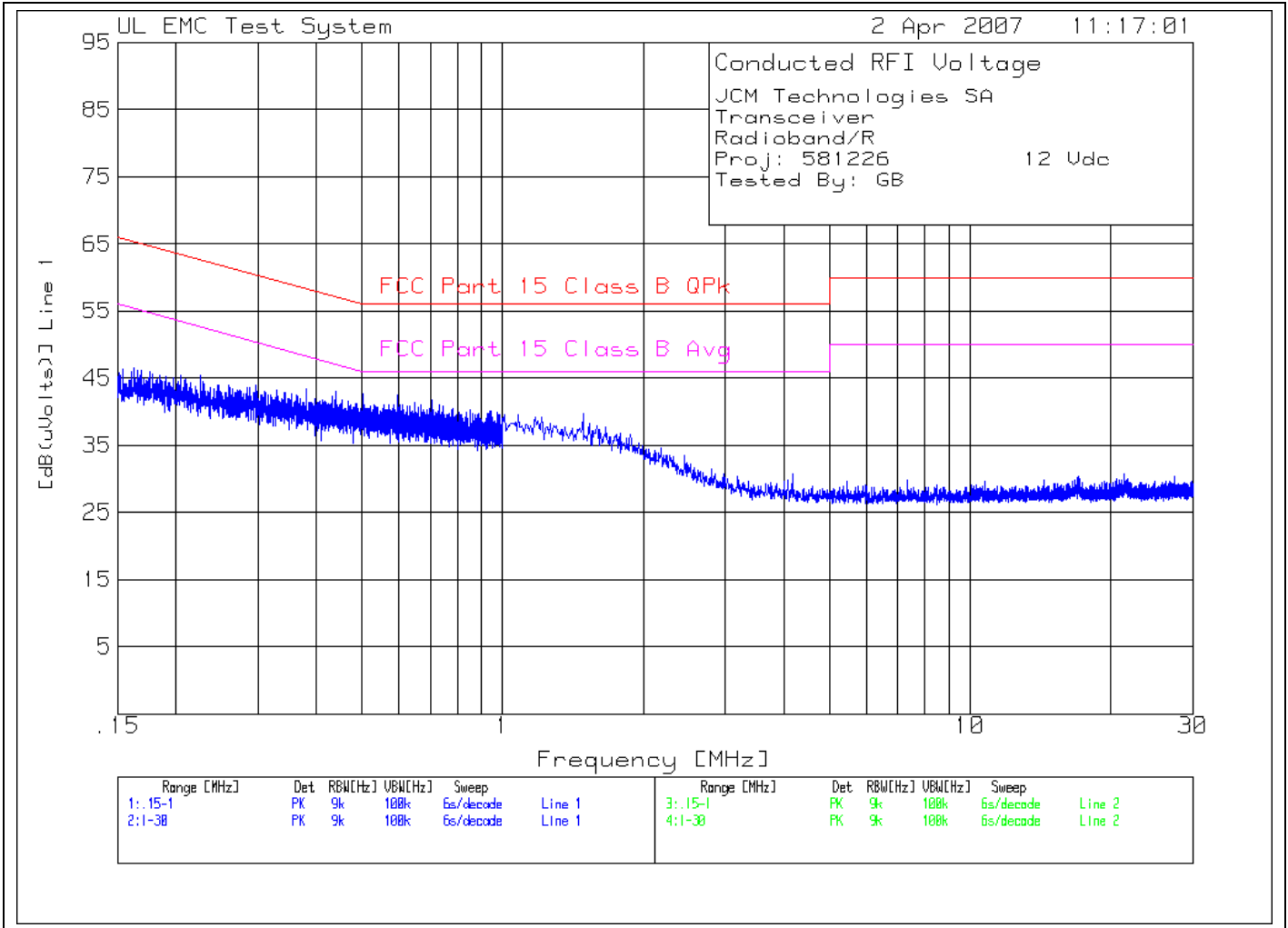
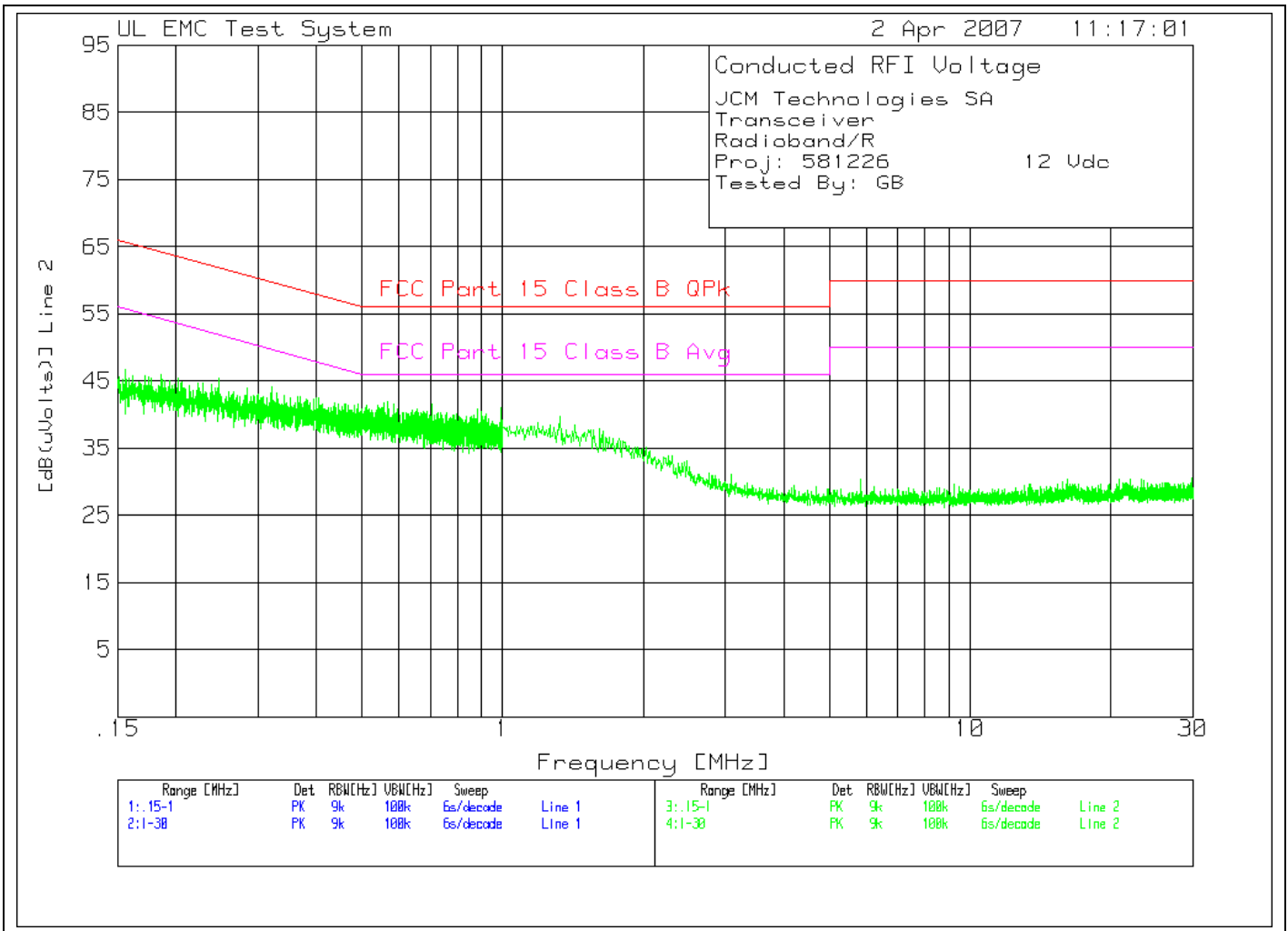


Figure 10 Conducted Emissions Graph – DC Mode



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Table 10 Conducted Emissions Data Points – DC Mode

JCM Technologies SA
 Transceiver
 Radioband/R
 Proj: 581226 12 Vdc
 Tested By: GB

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====							
Line 1	.15 - 1MHz	-----					
1	.32874	32.48 pk	10.7	0	43.18	59.5	49.5
				Margin [dB]		-16.32	-6.32
2	.40634	30.89 pk	10.6	0	41.49	57.7	47.7
				Margin [dB]		-16.21	-6.21
3	.48118	30.18 pk	10.5	0	40.68	56.3	46.3
				Margin [dB]		-15.62	-5.62
4	.57171	30.52 pk	10.5	0	41.02	56	46
				Margin [dB]		-14.98	-4.98
5	.66903	30.59 pk	10.4	0	40.99	56	46
				Margin [dB]		-15.01	-5.01
6	.70656	31.43 pk	10.4	0	41.83	56	46
				Margin [dB]		-14.17	-4.17
7	.79688	29.11 pk	10.4	0	39.51	56	46
				Margin [dB]		-16.49	-6.49
8	.9964	28.52 pk	10.4	0	38.92	56	46
				Margin [dB]		-17.08	-7.08
Line 2	.15 - 1MHz	-----					
9	.3775	31.31 pk	10.6	0	41.91	58.3	48.3
				Margin [dB]		-16.39	-6.39
10	.46295	31.14 pk	10.5	0	41.64	56.6	46.6
				Margin [dB]		-14.96	-4.96
11	.56599	31.43 pk	10.5	0	41.93	56	46
				Margin [dB]		-14.07	-4.07
12	.62218	29.87 pk	10.4	0	40.27	56	46
				Margin [dB]		-15.73	-5.73
13	.76932	29.03 pk	10.4	0	39.43	56	46
				Margin [dB]		-16.57	-6.57
14	.85922	29.32 pk	10.4	0	39.72	56	46
				Margin [dB]		-16.28	-6.28
15	.9489	28.55 pk	10.4	0	38.95	56	46
				Margin [dB]		-17.05	-7.05

LIMIT 1: FCC Part 15 Class B QPk
 LIMIT 2: FCC Part 15 Class B Avg

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector

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JCM Technologies SA

Transceiver

Radioband/R

Proj: 581226 12 Vdc

Tested By: GB

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2
Frequency [MHz]	Reading [dB(uV)]	Factor [dB]	Factor [dB]	[dB(uVolts)]		
=====						
Line 1 .15 - 1MHz						
.32874	20.84 ave	10.7	0	31.54	59.5	49.5
			Margin [dB]:		-27.96	-17.96
.40634	20.34 ave	10.6	0	30.94	57.7	47.7
			Margin [dB]:		-26.76	-16.76
.48118	19.73 ave	10.5	0	30.23	56.3	46.3
			Margin [dB]:		-26.07	-16.07
.57171	19.23 ave	10.5	0	29.73	56	46
			Margin [dB]:		-26.27	-16.27
.66903	18.7 ave	10.4	0	29.1	56	46
			Margin [dB]:		-26.9	-16.9
.70656	18.44 ave	10.4	0	28.84	56	46
			Margin [dB]:		-27.16	-17.16
.79688	18.27 ave	10.4	0	28.67	56	46
			Margin [dB]:		-27.33	-17.33
.9964	17.64 ave	10.4	0	28.04	56	46
			Margin [dB]:		-27.96	-17.96
Line 2 .15 - 1MHz						
.3775	20.51 ave	10.6	0	31.11	58.3	48.3
			Margin [dB]:		-27.19	-17.19
.46295	19.94 ave	10.5	0	30.44	56.6	46.6
			Margin [dB]:		-26.16	-16.16
.56599	19.28 ave	10.5	0	29.78	56	46
			Margin [dB]:		-26.22	-16.22
.62218	-2.87 ave	10.4	0	7.53	56	46
			Margin [dB]:		-48.47	-38.47
.76932	4.61 ave	10.4	0	15.01	56	46
			Margin [dB]:		-40.99	-30.99
.85922	1.59 ave	10.4	0	11.99	56	46
			Margin [dB]:		-44.01	-34.01
.9489	.37 ave	10.4	0	10.77	56	46
			Margin [dB]:		-45.23	-35.23

pk - Peak detector
 qp - Quasi-Peak detector
 ave - denotes average detection

LIMIT 1: FCC Part 15 Class B QPk
 LIMIT 2: FCC Part 15 Class B Avg

Figure 11 Conducted Emissions Graph – AC Mode

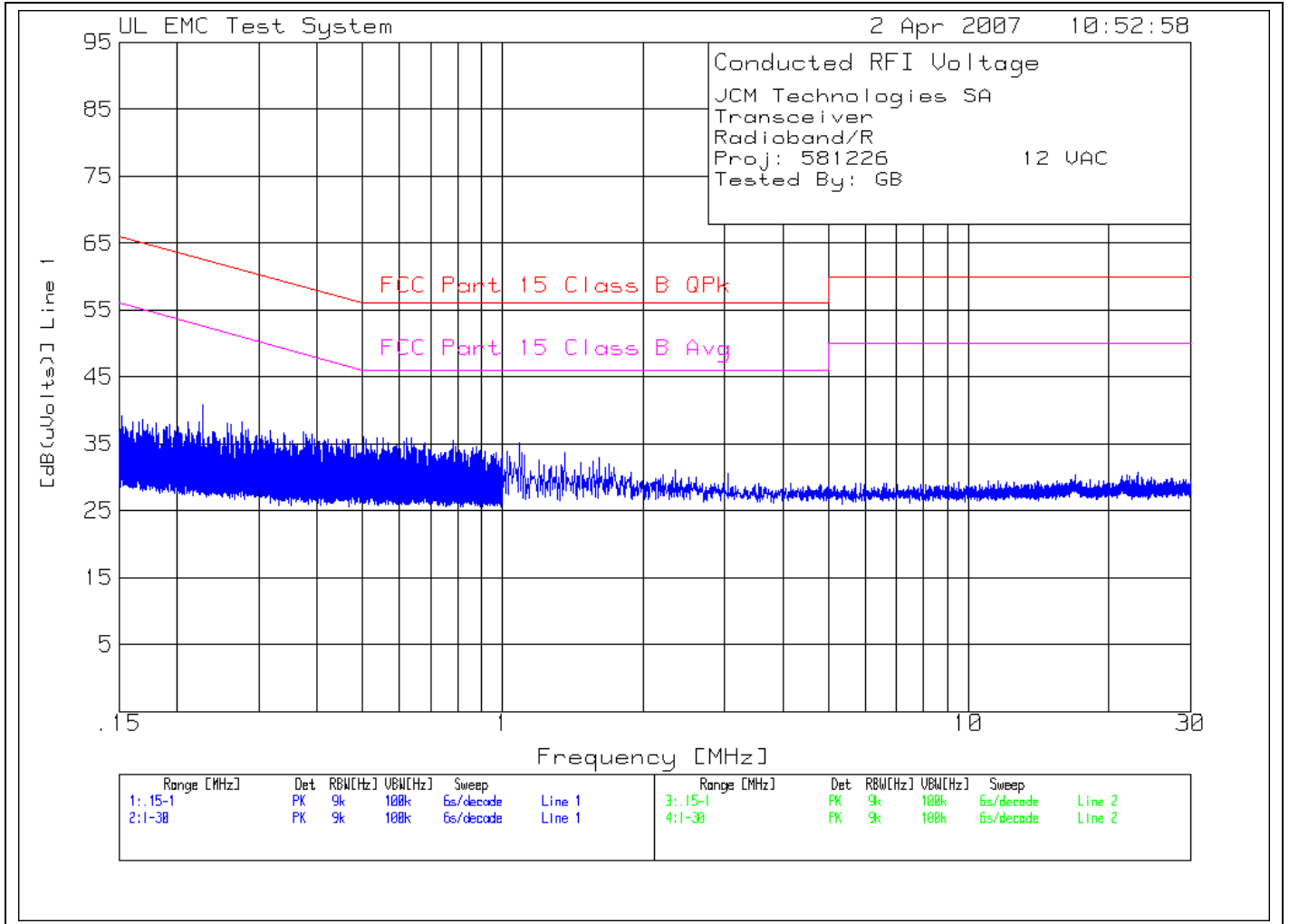
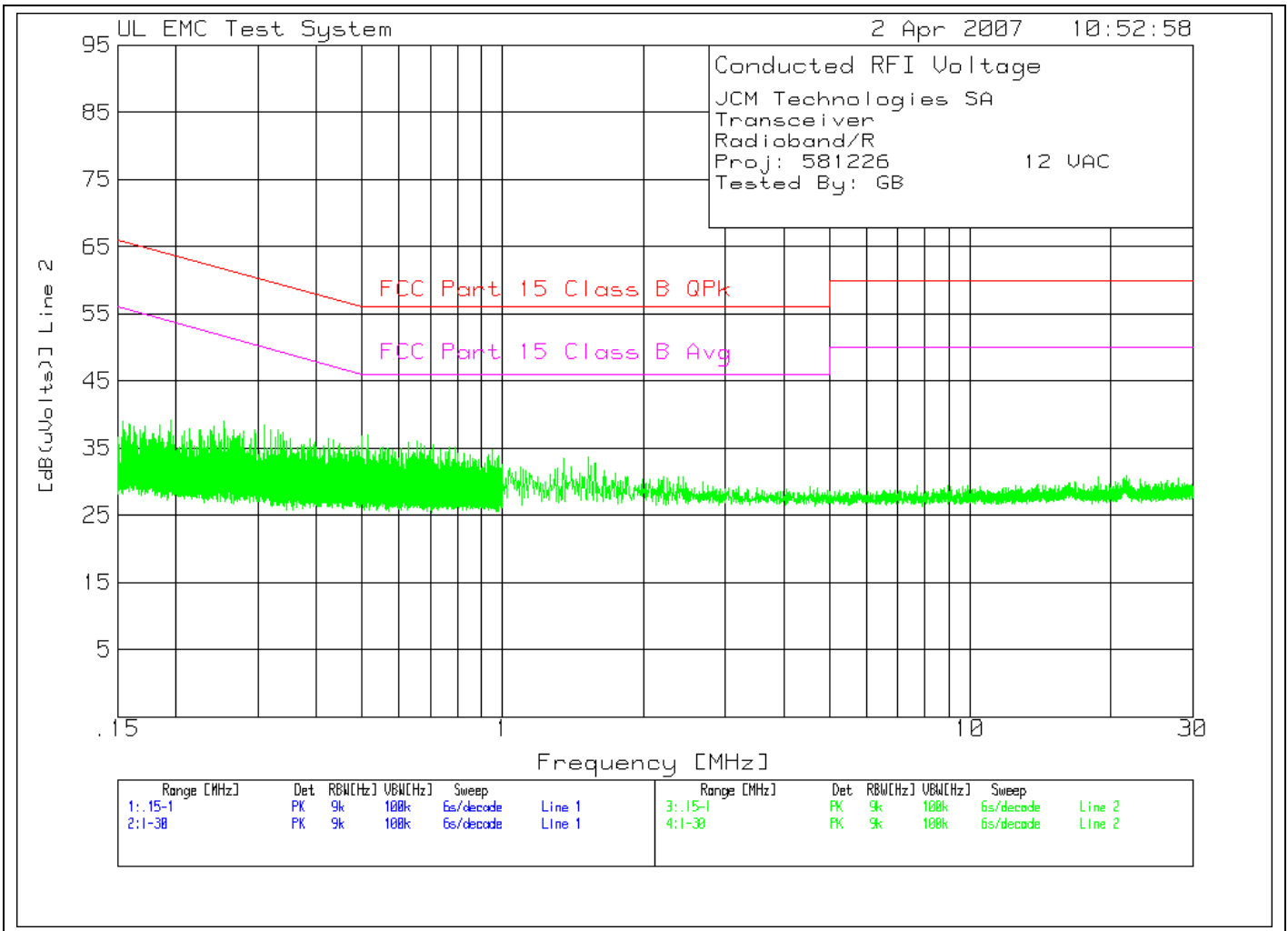


Figure 12 Conducted Emissions Graph – AC Mode



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Table 11 Conducted Emissions Data Points – AC Mode

JCM Technologies SA
 Transceiver
 Radioband/R
 Proj: 581226 12 VAC
 Tested By: GB

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2
=====							
Line 1 .15 - 1MHz -----							
1	.22739	29.59 pk	11.2	0	40.79	62.5	52.5
				Margin [dB]		-21.71	-11.71
2	.3951	25.08 pk	10.6	0	35.68	58	48
				Margin [dB]		-22.32	-12.32
3	.84416	22.91 pk	10.4	0	33.31	56	46
				Margin [dB]		-22.69	-12.69
Line 1 1 - 30MHz -----							
4	1.08681	24.66 pk	10.4	0	35.06	56	46
				Margin [dB]		-20.94	-10.94
5	1.36169	23.19 pk	10.4	0	33.59	56	46
				Margin [dB]		-22.41	-12.41
6	1.60763	22.51 pk	10.4	0	32.91	56	46
				Margin [dB]		-23.09	-13.09
Line 2 .15 - 1MHz -----							
7	.25283	28.01 pk	11	0	39.01	61.7	51.7
				Margin [dB]		-22.69	-12.69
8	.30965	27.67 pk	10.8	0	38.47	60	50
				Margin [dB]		-21.53	-11.53
9	.51574	26.52 pk	10.5	0	37.02	56	46
				Margin [dB]		-18.98	-8.98
10	.68303	24.98 pk	10.4	0	35.38	56	46
				Margin [dB]		-20.62	-10.62
Line 2 1 - 30MHz -----							
11	1.52806	23.28 pk	10.4	0	33.68	56	46
				Margin [dB]		-22.32	-12.32
12	2.37441	20.25 pk	10.4	0	30.65	56	46
				Margin [dB]		-25.35	-15.35

pk - Peak detector
 qp - Quasi-Peak detector
 ave - denotes average detection

LIMIT 1: FCC Part 15 Class B QPk
 LIMIT 2: FCC Part 15 Class B Avg

4.5 Test Conditions and Results – RADIATED EMISSIONS

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meters. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	(3 meter measurement distance)	
Fully configured sample scanned over the following frequency range	1GHz – 10GHz	(3 meter measurement distance)	
Limits – 15.109 Class B / 15.209			
Frequency (MHz)	Limit (dBµV/m)		
	Quasi-Peak	Average	
	General Emissions	Fundamental	Spurious
4-30	69.5	-	-
30 – 88	40	-	-
88 – 216	43.5	-	-
216-960	46	-	
1000-5000	54		61.94
868.9MHz		81.94	
Supplementary information: Spurious limits are only applied against products of the transmitter. All other emissions must meet the general limits.			
Testing performed at 12Vdc only. Power supply to transmitter and all low voltage circuits are regulated after the input power section.			
Limits for unintentional radiation are CISPR 22 Class B limits and testing was performed at 10-meter distance.			

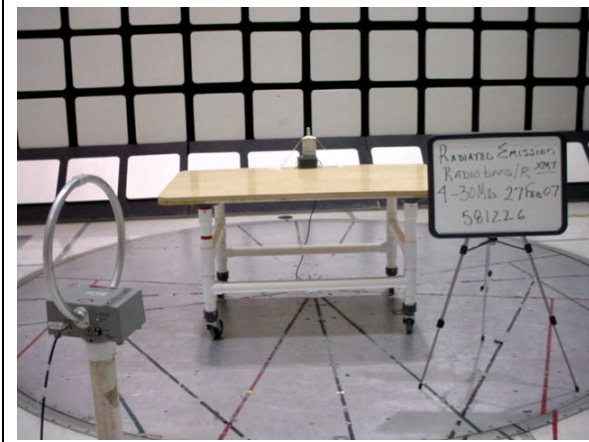
Table 12 Radiated Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
1	1	2
Supplementary information: None		

Table 13 Radiated Emissions Test Equipment

Test Equipment Used			
Description	Manufacturer	Model	Identifier
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081
Bicon Antenna	Schaffner	VBA6106A	SN: 22681
Log-P Antenna	Schaffner	UPA6109	SN: 22987
Horn Antenna	Electro-Metrics	RGA-180	ME5-565
Active Loop Antenna	EMCO	6507	ME5A-288
Preamp (1 - 26GHz)	HP	8449B	ME5-914

Figure 13 Test setup for Radiated Emissions – Transmit Mode



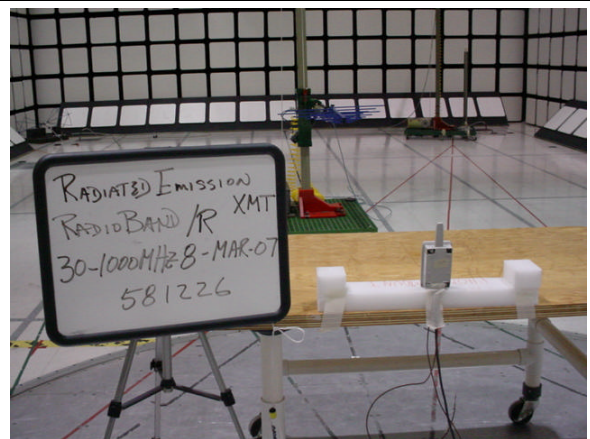
Radiated Emissions Setup 4-30MHz XMT Mode



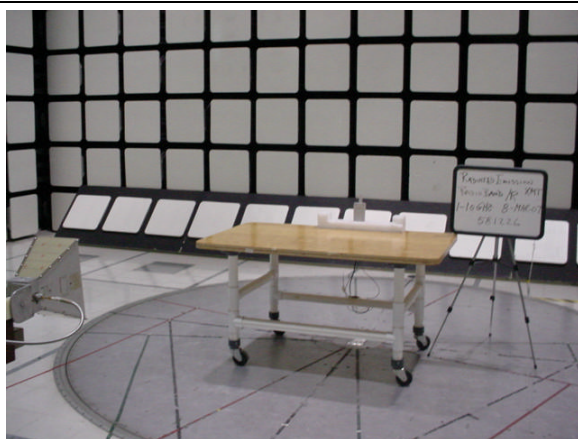
Radiated Emissions Setup 4-30MHz XMT Mode



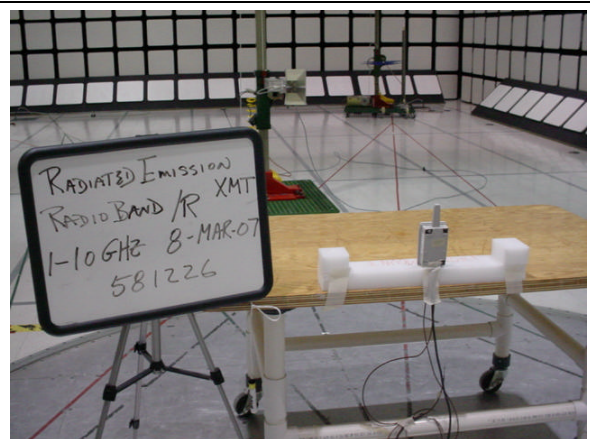
Radiated Emissions Setup 30-1000MHz XMT MODE



Radiated Emissions Setup 30-1000MHz XMT MODE



Radiated Emissions Setup 1-10GHz XMT MODE

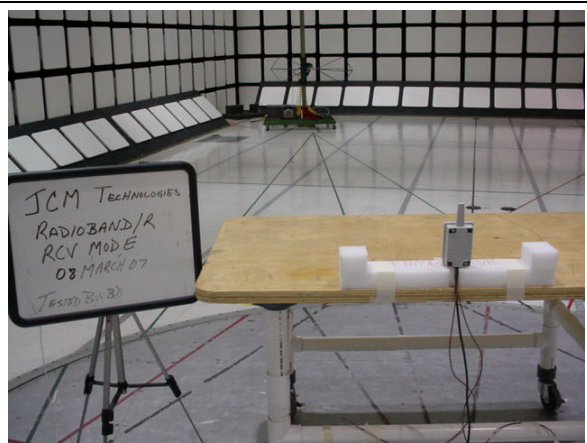


Radiated Emissions Setup 1-10GHz XMT MODE

Figure 14 Test setup for Radiated Emissions – Receive Mode



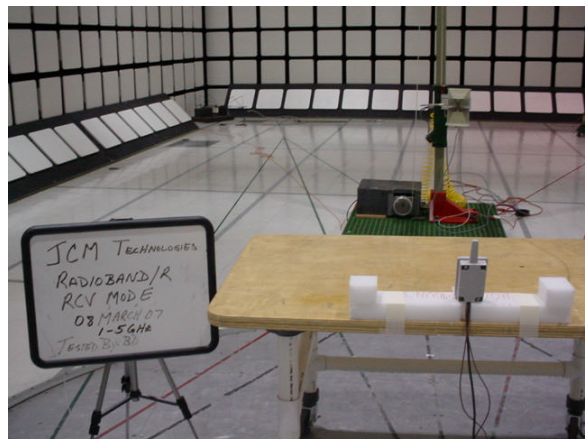
Radiated Emissions Setup 30-1000MHz RCV Mode



Radiated Emissions Setup 30-1000MHz RCV Mode

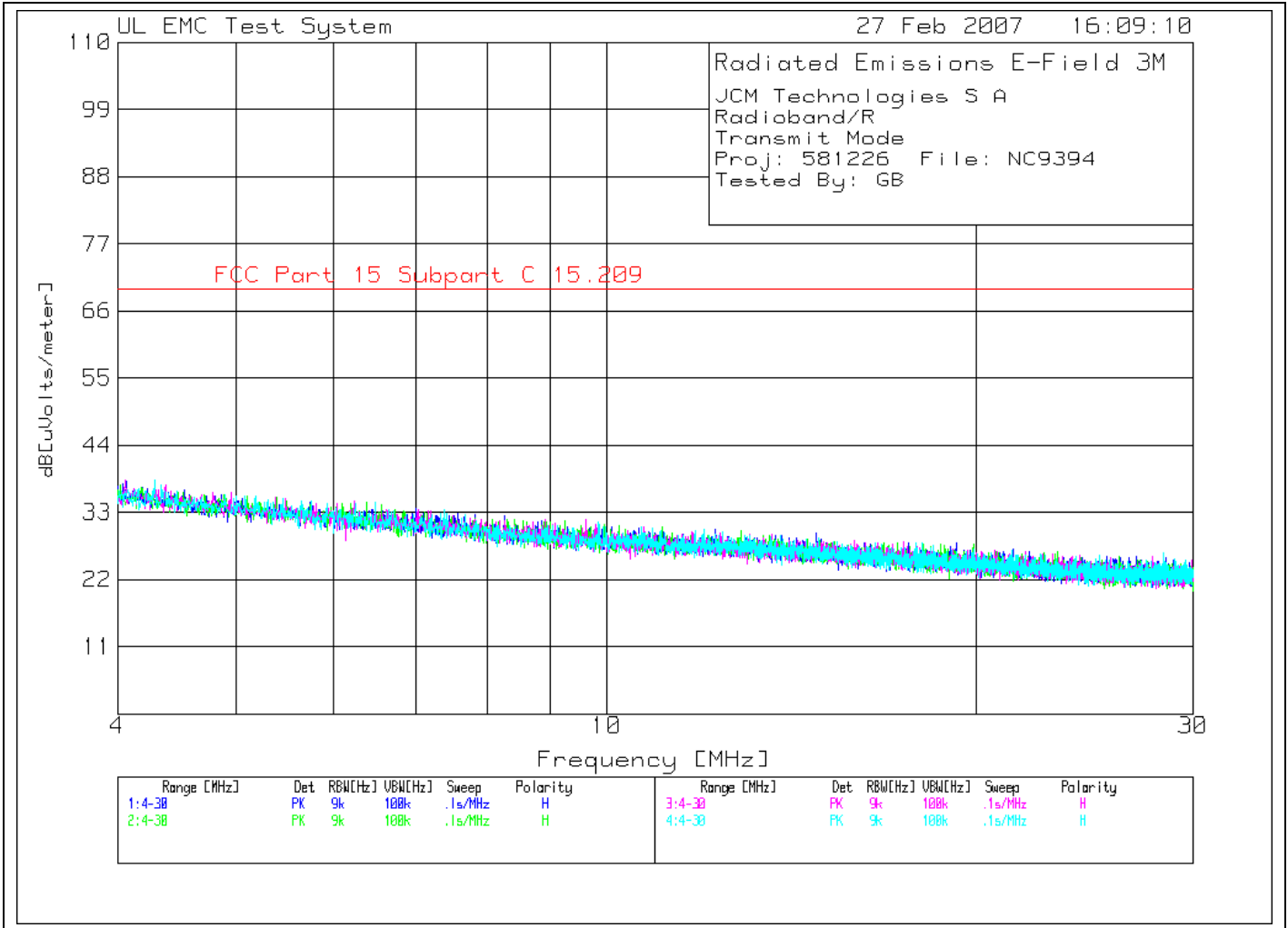


Radiated Emissions Setup 1-5GHz RCV MODE



Radiated Emissions Setup 1-5GHz RCV MODE

Figure 15 Radiated Emissions Graph



Job Number: 581226
 Model Number: Radioband/R
 Client Name: JCM TECHNOLOGIES S A
 FCC ID: UZ5-Radioband-R

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Table 14 Radiated Emissions Data Points

JCM Technologies S A
 Radioband/R
 Transmit Mode
 Proj: 581226 File: NC9394
 Tested By: GB

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
=====						
0°	4 - 30MHz -----					
1	4.06502	22.48 pk	.2	15.4	38.08	69.5
	Azimuth:207	Height:100	Horz	Margin [dB]		-31.42
5	8.26507	16.84 pk	.2	15.4	32.44	69.5
	Azimuth:354	Height:100	Horz	Margin [dB]		-37.06

45°	4 - 30MHz -----					
3	6.3861	19.12 pk	.2	15.3	34.62	69.5
	Azimuth:357	Height:120	Horz	Margin [dB]		-34.88

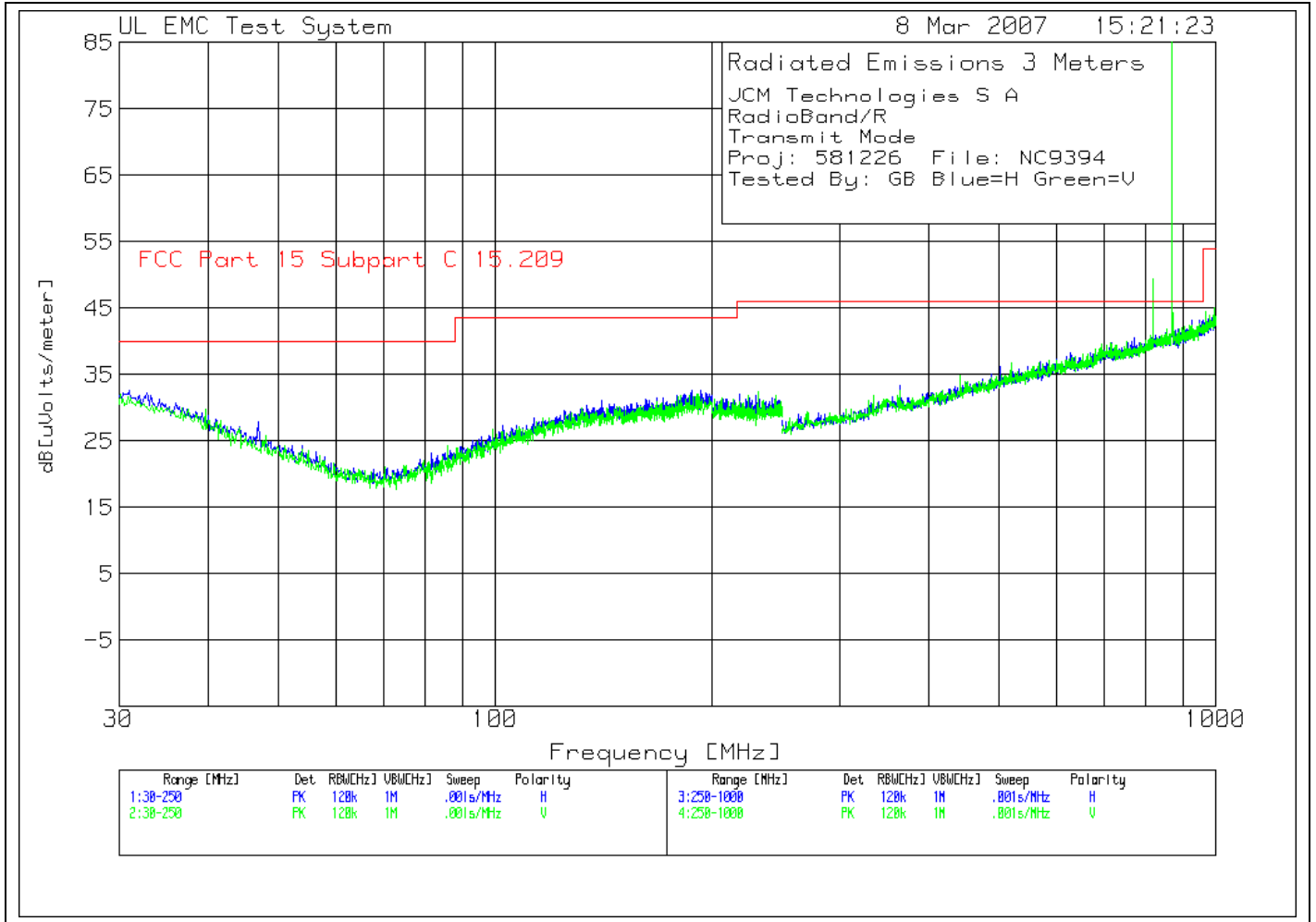
90°	4 - 30MHz -----					
6	9.62391	16.19 pk	.2	15.5	31.89	69.5
	Azimuth:77	Height:139	Horz	Margin [dB]		-37.61

135°	4 - 30MHz -----					
2	4.29257	22.74 pk	.2	15.3	38.24	69.5
	Azimuth:298	Height:160	Horz	Margin [dB]		-31.26
4	7.37434	17.86 pk	.2	15.4	33.46	69.5
	Azimuth:261	Height:160	Horz	Margin [dB]		-36.04

pk - Peak detector

LIMIT 1: FCC Part 15 Subpart C 15.209

Figure 16 Radiated Emissions Graph



Job Number: 581226
 Model Number: Radioband/R
 Client Name: JCM TECHNOLOGIES S A
 FCC ID: UZ5-Radioband-R

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Table 15 Radiated Emissions Data Points

JCM Technologies S A
 RadioBand/R
 Transmit Mode

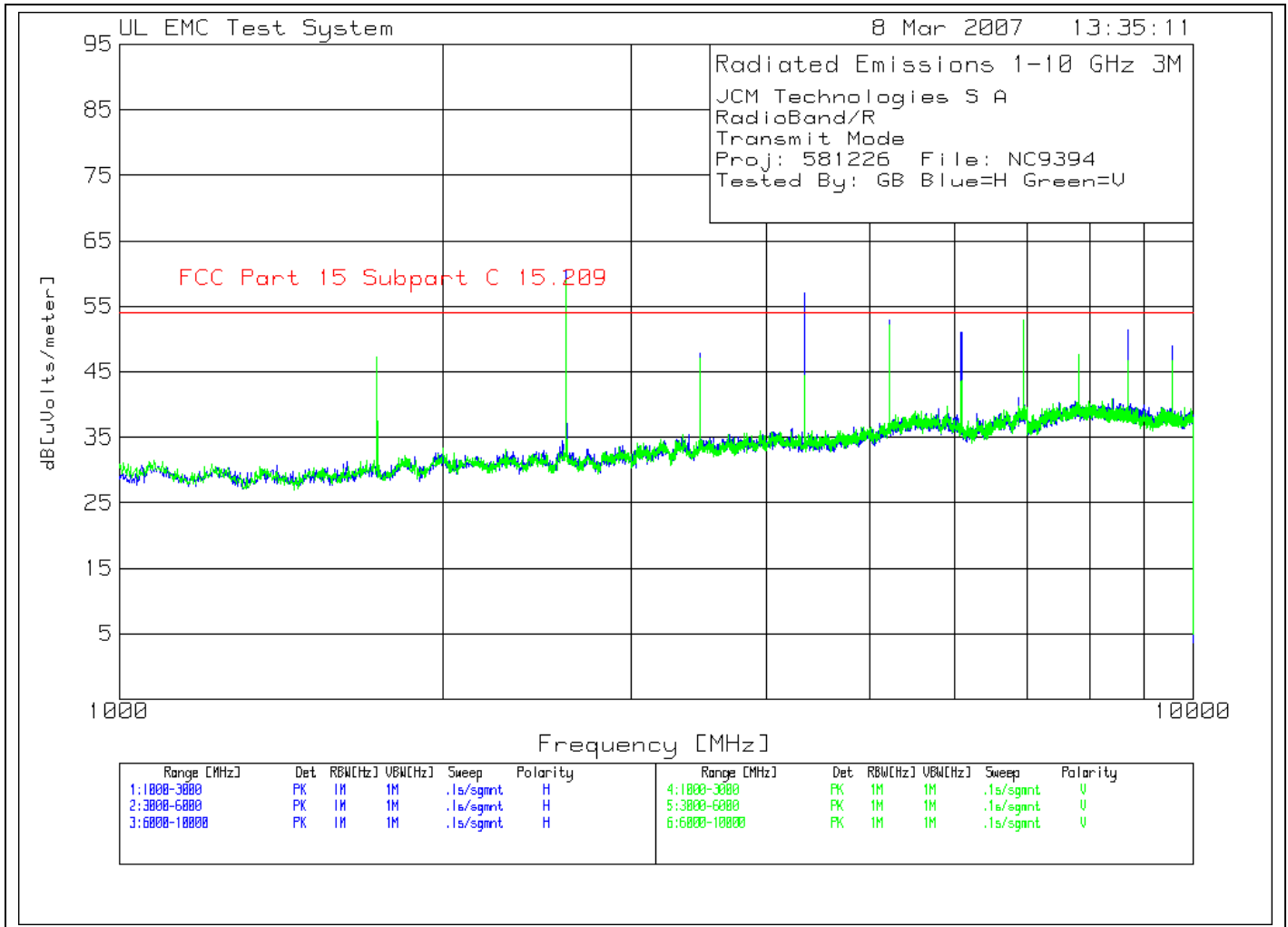
Proj: 581226 File: NC9394
 Tested By: GB Blue=H Green=V

No.	Frequency [MHz]	Test Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	Average Correction Factor[dB]	Average Level [dBuV/m]
Horizontal 30 - 250MHz -----								
1	46.8779	16.64 pk	-.2	11.4	27.84	40		
	Azimuth:15	Height:249	Horz	Margin [dB]			-12.16	
2	140.6604	16.84 pk	.1	14.2	31.14	43.5		
	Azimuth:39	Height:400	Horz	Margin [dB]			-12.36	
3	195.9907	16.43 pk	.1	15.8	32.33	43.5		
	Azimuth:124	Height:101	Horz	Margin [dB]			-11.17	
Vertical 30 - 250MHz -----								
7	30.1468	14.51 pk	-.5	18.1	32.11	40		
	Azimuth:40	Height:101	Vert	Margin [dB]			-7.89	
8	159.006	15.32 pk	.2	14.6	30.12	43.5		
	Azimuth:201	Height:101	Vert	Margin [dB]			-13.38	
9	231.948	16.08 pk	.3	16	32.38	46		
	Azimuth:40	Height:101	Vert	Margin [dB]			-13.62	
Horizontal 250 - 1000MHz -----								
4	363.5757	17.3 pk	.5	15.5	33.3	46		
	Azimuth:222	Height:200	Horz	Margin [dB]			-12.7	
5	501.6678	17.12 pk	.9	18.1	36.12	46		
	Azimuth:183	Height:400	Horz	Margin [dB]			-9.88	
6	976.4843	17.4 pk	1.6	24.4	43.4	54		
	Azimuth:44	Height:200	Horz	Margin [dB]			-10.6	
Vertical 250 - 1000MHz -----								
10	363.5757	16.71 pk	.5	15.5	32.71	46		
	Azimuth:355	Height:101	Vert	Margin [dB]			-13.29	
11	816.8779	25.64 pk	1.5	22.2	49.34	61.94	-8.39	40.95
	Azimuth:346	Height:200	Vert	Margin [dB]			-20.99	
12	868.9126	63.83 pk	1.5	22.9	88.23	81.94	-8.39	79.84
	Azimuth:44	Height:101	Vert	Margin [dB]			-2.1	

LIMIT 1: FCC Part 15 Subpart C 15.209 / 15.231

pk - Peak detector

Figure 17 Radiated Emissions Graph



Job Number: 581226
 Model Number: Radioband/R
 Client Name: JCM TECHNOLOGIES S A
 FCC ID: UZ5-Radioband-R

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Table 16 Radiated Emissions Data Points

JCM Technologies S A
 RadioBand/R
 Transmit Mode
 Proj: 581226 File: NC9394
 Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	Average Correction Factor[dB]	Average Level [dBuV/m]
Horizontal 1000 - 3000MHz -----								
1	1736.737	54.19 pk	-33.8	26.5	46.89	61.94	-8.39	38.5
	Azimuth:60	Height:100	Horz	Margin [dB]		-23.44		
2	2607.608	63.97 pk	-32.7	29.2	60.47	61.94	-8.39	52.08
	Azimuth:305	Height:100	Horz	Margin [dB]		-9.86		
Horizontal 3000 - 6000MHz -----								
3	3474.316	47.57 pk	-31.3	31.5	47.77	61.94	-8.39	39.38
	Azimuth:6	Height:101	Horz	Margin [dB]		-22.56		
4	4344.897	55.33 pk	-30.7	32.4	57.03	61.94	-8.39	48.64
	Azimuth:26	Height:101	Horz	Margin [dB]		-13.3		
5	5213.476	48.73 pk	-29.5	33.7	52.93	61.94	-8.39	44.54
	Azimuth:332	Height:101	Horz	Margin [dB]		-17.4		
Horizontal 6000 - 10000MHz -----								
6	6082.041	45.48 pk	-28.8	34.4	51.08	61.94	-8.39	42.69
	Azimuth:359	Height:101	Horz	Margin [dB]		-19.25		
7	6950.475	43.01 pk	-28	35.2	50.21	61.94	-8.39	41.82
	Azimuth:33	Height:101	Horz	Margin [dB]		-20.12		
8	7818.909	33.18 pk	-26.9	36.9	43.18	61.94	-8.39	34.79
	Azimuth:6	Height:101	Horz	Margin [dB]		-27.15		
9	8689.345	41.4 pk	-27.8	37.8	51.4	61.94	-8.39	43.01
	Azimuth:298	Height:101	Horz	Margin [dB]		-18.93		
10	9557.779	39.46 pk	-28.4	37.8	48.86	61.94	-8.39	40.47
	Azimuth:305	Height:101	Horz	Margin [dB]		-21.47		
Vertical 1000 - 3000MHz -----								
11	1736.737	54.5 pk	-33.8	26.5	47.2	61.94	-8.39	38.81
	Azimuth:32	Height:200	Vert	Margin [dB]		-23.13		
12	2607.608	62.65 pk	-32.7	29	58.95	61.94	-8.39	50.56
	Azimuth:169	Height:101	Vert	Margin [dB]		-11.38		
Vertical 3000 - 6000MHz -----								
13	3474.316	47.13 pk	-31.3	31.2	47.03	61.94	-8.39	38.64
	Azimuth:251	Height:100	Vert	Margin [dB]		-23.3		
14	4344.897	42.55 pk	-30.7	32.6	44.45	61.94	-8.39	36.06
	Azimuth:53	Height:200	Vert	Margin [dB]		-25.88		

LIMIT 1: FCC Part 15 Subpart C 15.209 / 15.231

pk - Peak detector

Job Number: 581226
 Model Number: Radioband/R
 Client Name: JCM TECHNOLOGIES S A
 FCC ID: UZ5-Radioband-R

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JCM Technologies S A
 RadioBand/R
 Transmit Mode

Proj: 581226 File: NC9394
 Tested By: GB Blue=H Green=V

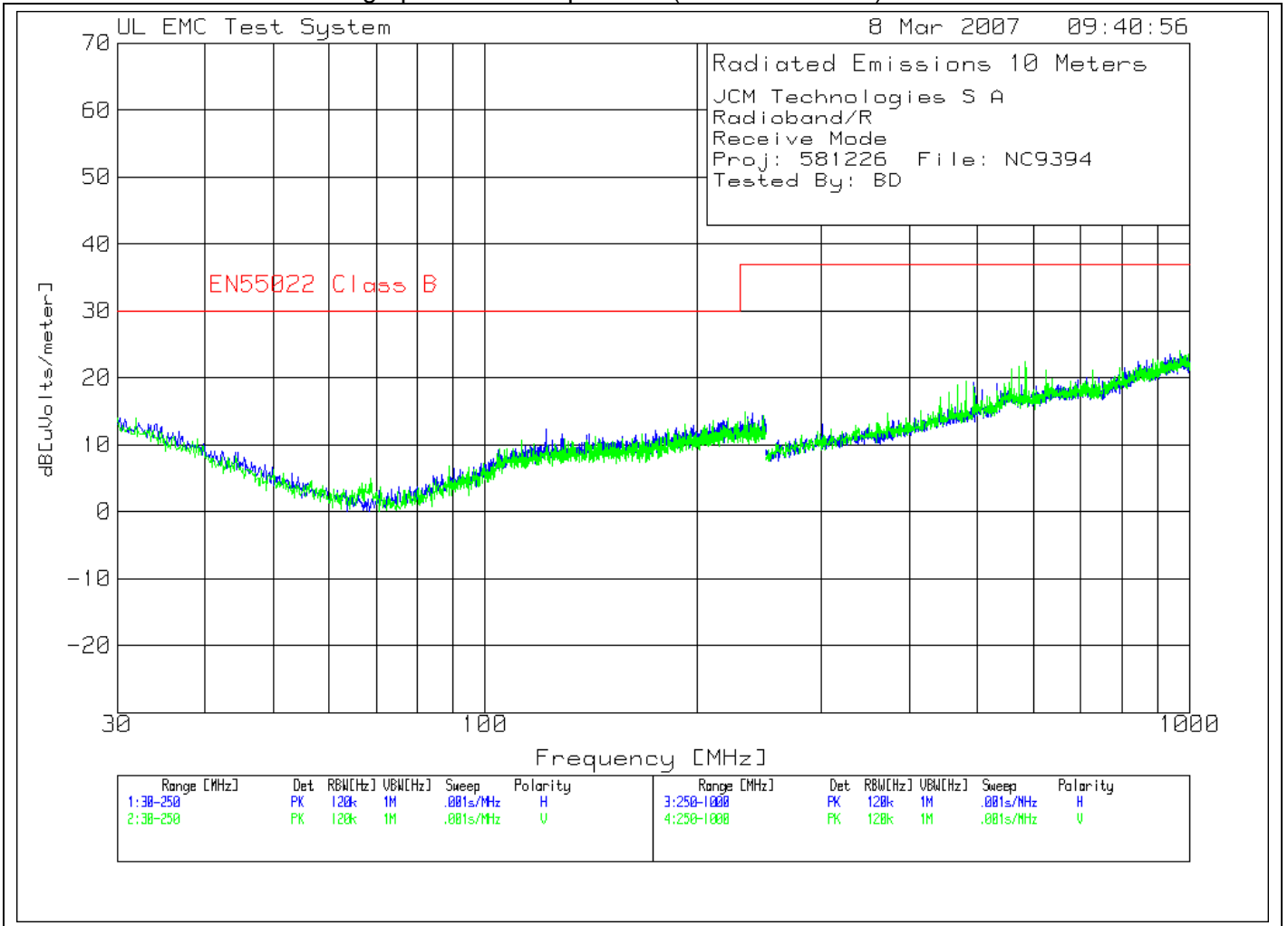
No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	Average Correction Factor[dB]	Average Level [dBuV/m]
Vertical 6000 - 10000MHz -----								
15	5213.476	47.87 pk	-29.5	33.8	52.17	61.94	-8.39	43.78
	Azimuth:223	Height:100	Vert	Margin [dB]		-18.16		
16	6082.041	38.06 pk	-28.8	34.5	43.76	61.94	-8.39	35.37
	Azimuth:332	Height:101	Vert	Margin [dB]		-26.57		
17	6950.475	45.42 pk	-28	35.4	52.82	61.94	-8.39	44.43
	Azimuth:33	Height:101	Vert	Margin [dB]		-17.51		
18	7820.91	37.71 pk	-26.9	36.9	47.71	61.94	-8.39	39.32
	Azimuth:60	Height:101	Vert	Margin [dB]		-22.62		
19	8689.345	37.01 pk	-27.8	37.4	46.61	61.94	-8.39	38.22
	Azimuth:25	Height:200	Vert	Margin [dB]		-23.72		
20	9559.78	37.3 pk	-28.4	37.8	46.7	61.94	-8.39	38.31
	Azimuth:332	Height:101	Vert	Margin [dB]		-23.63		

LIMIT 1: FCC Part 15 Subpart C 15.209 / 15.231

pk - Peak detector

Figure 18 Radiated Emissions Graph

Note: Product Mode noted in graph is normal operation (transceive mode)



Job Number: 581226
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Table 17 Radiated Emissions Data Points

JCM Technologies S A
 Radioband/R
 Transceive Mode
 Proj: 581226 File: NC9394
 Tested By: BD

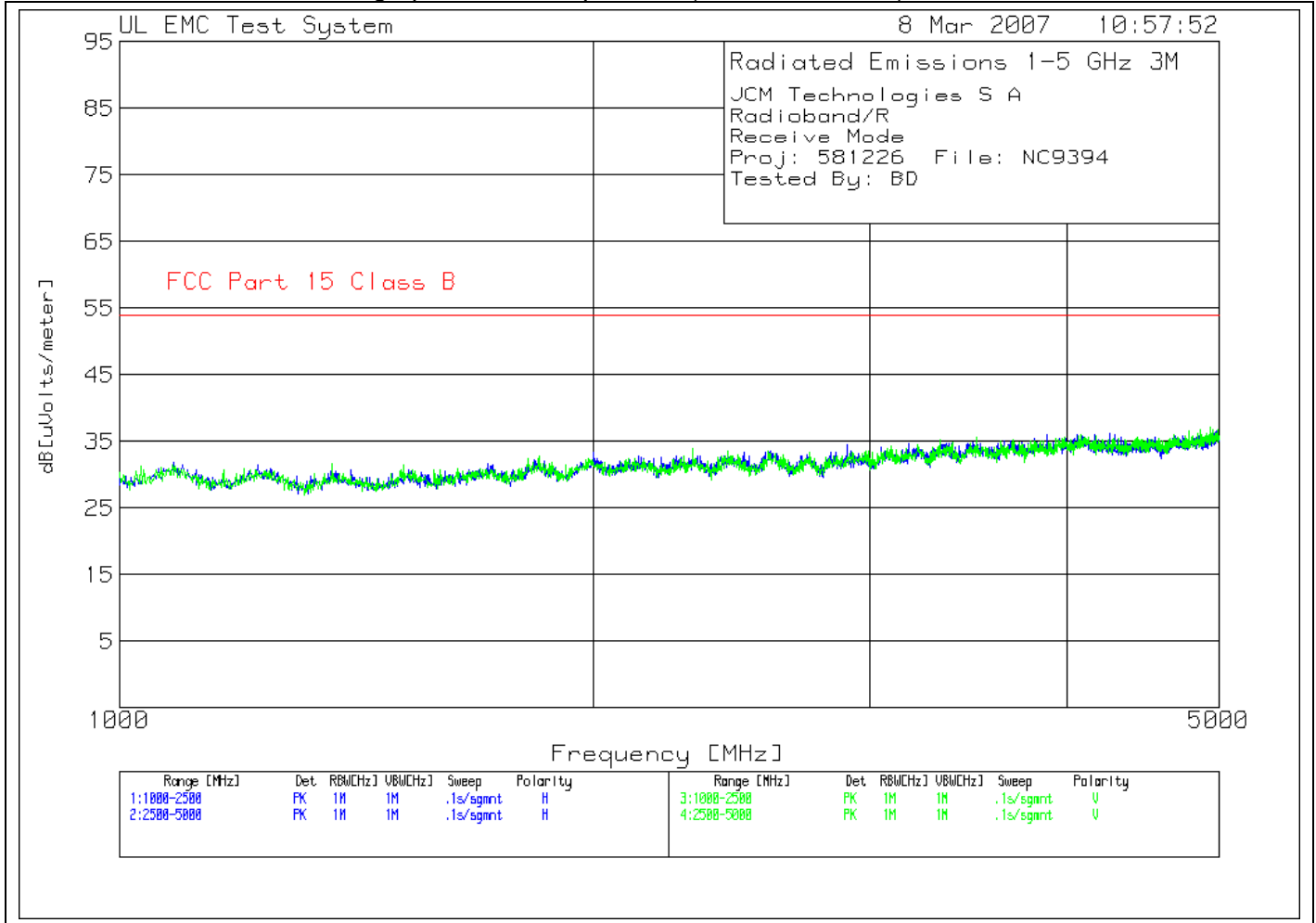
No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
=====						
Horizontal 30 - 250MHz -----						
1	122.0213	34.79 pk	-35.8	13.4	12.39	30
	Azimuth:358	Height:250	Horz	Margin [dB]		-17.61
Horizontal 250 - 1000MHz -----						
2	493.6624	34.24 pk	-32.6	17.7	19.34	37
	Azimuth:316	Height:199	Horz	Margin [dB]		-17.66
Vertical 250 - 1000MHz -----						
3	467.6451	34.62 pk	-32.8	17.2	19.02	37
	Azimuth:13	Height:101	Vert	Margin [dB]		-17.98
4	481.1541	34.83 pk	-32.9	17.5	19.43	37
	Azimuth:317	Height:101	Vert	Margin [dB]		-17.57
5	571.7145	33.72 pk	-31.7	19.6	21.62	37
	Azimuth:346	Height:399	Vert	Margin [dB]		-15.38
6	584.7231	34.11 pk	-31.4	19.7	22.41	37
	Azimuth:309	Height:300	Vert	Margin [dB]		-14.59

LIMIT 1: EN55022 Class B

pk - Peak detector
 qp - Quasi-Peak detector

Figure 19 Radiated Emissions Graph

Note: Product Mode noted in graph is normal operation (transceive mode)



Job Number: 581226
 Model Number: Radioband/R
 Client Name: JCM TECHNOLOGIES S A
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Table 18 Radiated Emissions Data Points

JCM Technologies S A
 Radioband/R
 Transceive Mode
 Proj: 581226 File: NC9394
 Tested By: BD

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
Horizontal 1000 - 2500MHz -----						
1	1082.583	41.29 pk	-34.9	25.4	31.79	54
	Azimuth:6	Height:101	Horz	Margin [dB]		-22.21
2	1225.225	40.76 pk	-34.6	25.4	31.56	54
	Azimuth:278	Height:200	Horz	Margin [dB]		-22.44
3	1714.715	38.97 pk	-33.7	26.4	31.67	54
	Azimuth:332	Height:101	Horz	Margin [dB]		-22.33
Horizontal 2500 - 5000MHz -----						
4	2595.063	37.23 pk	-32.7	29.1	33.63	54
	Azimuth:168	Height:101	Horz	Margin [dB]		-20.37
5	3378.919	35.47 pk	-31.9	31.2	34.77	54
	Azimuth:136	Height:101	Horz	Margin [dB]		-19.23
6	4189.46	33.32 pk	-30.5	32.4	35.22	54
	Azimuth:59	Height:200	Horz	Margin [dB]		-18.78
Vertical 1000 - 2500MHz -----						
7	1081.081	41.04 pk	-34.9	25.3	31.44	54
	Azimuth:332	Height:200	Vert	Margin [dB]		-22.56
8	1199.7	40.14 pk	-34.6	25.3	30.84	54
	Azimuth:223	Height:101	Vert	Margin [dB]		-23.16
9	1848.348	39.5 pk	-33.6	27	32.9	54
	Azimuth:32	Height:101	Vert	Margin [dB]		-21.1
Vertical 2500 - 5000MHz -----						
10	2566.711	36.44 pk	-32.9	28.9	32.44	54
	Azimuth:278	Height:101	Vert	Margin [dB]		-21.56
11	3092.061	36.02 pk	-32.2	30.5	34.32	54
	Azimuth:250	Height:200	Vert	Margin [dB]		-19.68
12	4676.451	33.03 pk	-30	32.9	35.93	54
	Azimuth:4	Height:101	Vert	Margin [dB]		-18.07

LIMIT 1: FCC Part 15 Class B

pk - Peak detector

4.6 Fundamental Frequency and Spurious Emissions Measurement Limit Calculations

Limit Calculation

Fundamental Frequency is MHz

$$\text{Limit} = 20 \cdot \log (\text{mV/m})$$

$$\text{Limit} = 20 \cdot \log (12500)$$

$$\text{Limit} = 81.94\text{dBuV/m}$$

Spurious Emissions Limit

Fundamental Frequency is above 470MHz

$$\text{Limit} = 20 \cdot \log (\text{uV/m})$$

$$\text{Limit} = 20 \cdot \log (1250)$$

$$\text{Limit} = 61.94\text{dBuV}$$

Radiated Emissions Limit conversion from mV/m to dBmV/m (accordance with paragraph 15.209)

$$\text{Radiated Emissions Limit (dB}\mu\text{V/m)} = 20 \cdot \log (\mu\text{V/m})$$

$$\text{Radiated Emissions Limit (dB}\mu\text{V/m)} = 20 \cdot \log (90)$$

$$\text{Radiated Emissions Limit (dB}\mu\text{V/m)} = 39.1$$

Radiated Emissions test data obtained during measurements.

Field Strength (dB μ V/m) = Measured field strength (dB μ V/m) + Cable Factor + (dB)Antenna Factor (dB)

$$\text{Field Strength (dB}\mu\text{V/m)} = 30.03\text{dB}\mu\text{V} - 30.0\text{dB} + 32.9\text{dB/m}$$

$$\text{Field Strength (dB}\mu\text{V/m)} = 35.93\text{dBuV/m}$$

Duty Cycle Correction Factor calculation.

Total number of pulses counted in 100ms = 28.

Total time on per pulse = 1.36mS

Total time on = 38.08mS

$$\text{Duty cycle correction factor} = 20 \log (38.08\text{mS} / 100\text{ms})$$

$$= 20 \log (0.0216)$$

$$= \mathbf{-8.39\text{dB}}$$

Appendix A

Accreditations and Authorizations



NVLAP Lab code: 100255-0

NVLAP: Recognized under the National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC EN17025 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. For a full scope listing see <http://ts.nist.gov/ts/htdocs/210/214/scopes/1002550.htm>



FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland (Ref. No. 91040).



Industry Canada Industrie Canada

Industry of Canada: Accredited by Industry Canada for performance of radiated measurements. Our test site complies with RSP 100, Issue 7, Section 3.3. File #: IC 2181



VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: (Radiated Emissions) R-797, (Conducted Emissions) C-832, C-833, C-834 and (Conducted Emissions - Telecommunications Ports) T-160.

Job Number: 581226
Model Number: Radioband/R
Client Name: JCM TECHNOLOGIES S A
FCC ID: UZ5-Radioband-R

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ICASA: ICASA (Independent Communications Authority of South Africa) has appointed UL as a Designated Test Laboratory to test Telecommunications equipment for type approval in compliance with CISPR 22 to assist in fulfilling its mandate under section 54(1) of the Telecommunications Act, 1996 (Act 103 of 1996).



NIST/CAB: Validated by the European Commission as a U.S. Conformity Assessment Body (CAB) of the U.S.-EU Mutual Recognition Agreement (MRA) for the Electromagnetic Compatibility - Council Directive 89/336/EEC, Article 10 (2). Also validated for the Telecommunication Equipment-Council Directive 99/5/EC, Annex III and IV, Identification Number: 0983.

NIST/CAB: Provisioned to act as a U.S. Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the Asia Pacific Economic Cooperation (APEC) MRA between the American Institute in Taiwan (AIT) and the United States. Our laboratory is considered qualified to test equipment subject to the applicable EMC regulations of the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) which require testing to CNS 13438 (CISPR 22).

NIST/CAB: Recognized by the Infocomm Development Authority of Singapore (IDA) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Our laboratory is provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA. Our scope of designation includes IDA TS EMC (CISPR 22), IEC 61000-4-2, -4-3, -4-4, -4-5, and -4-6