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Job Number: 581226  
File Number: NC9394  
Date: April 4, 2007  
Model: GO-SWITCH-E  
GO-SWITCH-S  
FCC ID: U5Z-GO-SWITCH-ES

## Electromagnetic Compatibility Test Report

For

**JCM TECHNOLOGIES S A**

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Underwriters Laboratories Inc.  
1285 Walt Whitman Rd.  
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Tel: (631) 271-6200 Fax: (631)439-6095

Job Number: 581226 NC9394 Page 2 of 44  
Model Number: GO-SWITCH-E, GO-SWITCH-S  
Client Name: JCM TECHNOLOGIES S A  
FCC ID: U5Z-GO-SWITCH-ES

## 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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Test Report Date: **04 April 2007**

Product Type: **Periodic Transmitter**

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

Model Number(s): **GO-SWITCH-E, GO-SWITCH-S**

Sample Serial Number: **Not provided**

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

Testing Start Date: **06 March 2007**

Date Testing Complete: **30 March 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.

This report may contain test results that are not covered by the NVLAP or A2LA accreditation. The scope of accreditation is limited to the specific tests that are listed on the NVLAP and/or A2LA websites referenced at the end of this report.

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## Report Revision History

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

### 1.0 GENERAL - Product Description

#### 1.1 Equipment Description

The EUT is a key switch transmitter with two-position left / right switch (deadman) for wireless communications with the panel receiver. The transmitter operates at 868.35MHz.

There are 2 versions of the GO-SWITCH transmitter. The GO-SWITCH-S is a surface mount version that has a complete metal enclosure. The GO-SWITCH-E is for built-in applications and has a plastic housing that is located within the wall.

Size: 75 x 75 x 65 mm (diameter 58 mm in built-in version)

#### 1.2 Equipment Marking Plate

Not Applicable.

Job Number: 581226  
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 Client Name: JCM TECHNOLOGIES S A  
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### 1.3 Device Configuration During Test

#### 1.3.1 Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	Transmitter	JCM TECHNOLOGIES S A	GO-SWITCH-E	
EUT	Transmitter	JCM TECHNOLOGIES S A	GO-SWITCH-S	Due to product similarity, only spurious emissions above 30MHz were measured to ensure compliance. All other tests are represented by the GO-SWITCH-E

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

#### 1.3.2 Input/Output Ports:

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

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

Job Number: 581226  
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Client Name: JCM TECHNOLOGIES S A  
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### 1.3.3 EUT Internal Operating Frequencies:

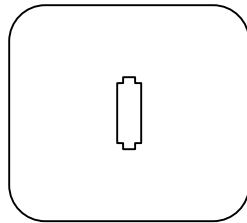
Frequency (MHz)	Description	Frequency (MHz)	Description
868.35	Transmit Frequency	4	Microcontroller

### 1.3.4 Power Interface:

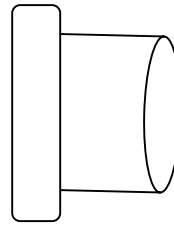
Mode # /Rated	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	3	-	-	DC	-	Powered by 3Vdc Battery
1	3	-	-	DC	-	None

**1.4 Block Diagram:**

The diagram below illustrates the configuration of the equipment above.



Front View



Side View

### 1.5 EUT Operation Modes

Mode #	Description
1	Continuously transmitting.
2	Periodically transmitting.

### 1.6 EUT Configurations

Mode #	Description
1	Stand Alone Device – GO-SWITCH-E
2	Stand Alone Device – GO-SWITCH-S

## 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

### 2.2 Results Summary

Requirement – Test	Result (C/NC)*
15.35 Pulse Train	C
15.209 Radiated Emissions Restricted Bands	C
15.231 Radiated Emissions – Fundamental and Spurious Emissions	C
15.231 a) 1) Cease Operation	C
15.231 c) Occupied Bandwidth	C

Note: C-Compliant, NC-Non-Compliant



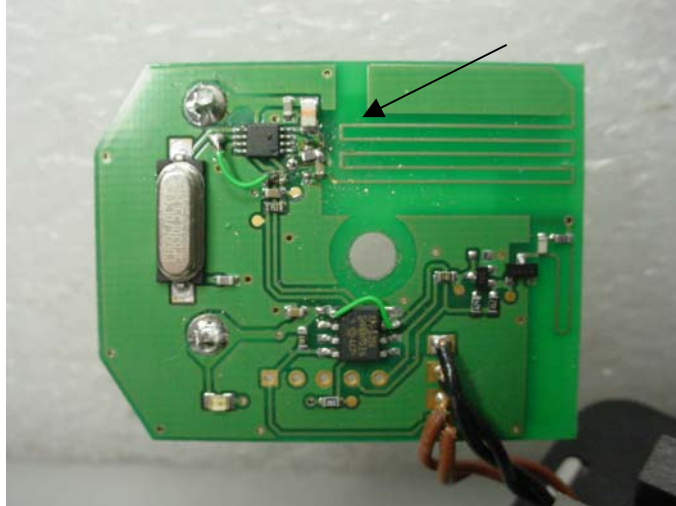
**2.3 Deviations from standard test methods**

None

**2.4 Device Modifications Necessary for Compliance**

The following modifications were made to ensure the spurious emissions complied with the limits.

A 1.2pF capacitor was added between the antenna node and ground.



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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 # (See Section 1.3.4)	EUT Configurations Mode # (See Section 1.6)	EUT Operation Mode # (See 1.5)
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	TDS3054	ME5B-173
Dipole Antenna	EMCO	3121C - B4	ME5A-751
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	4848

Figure 1 Pulse Train Graph

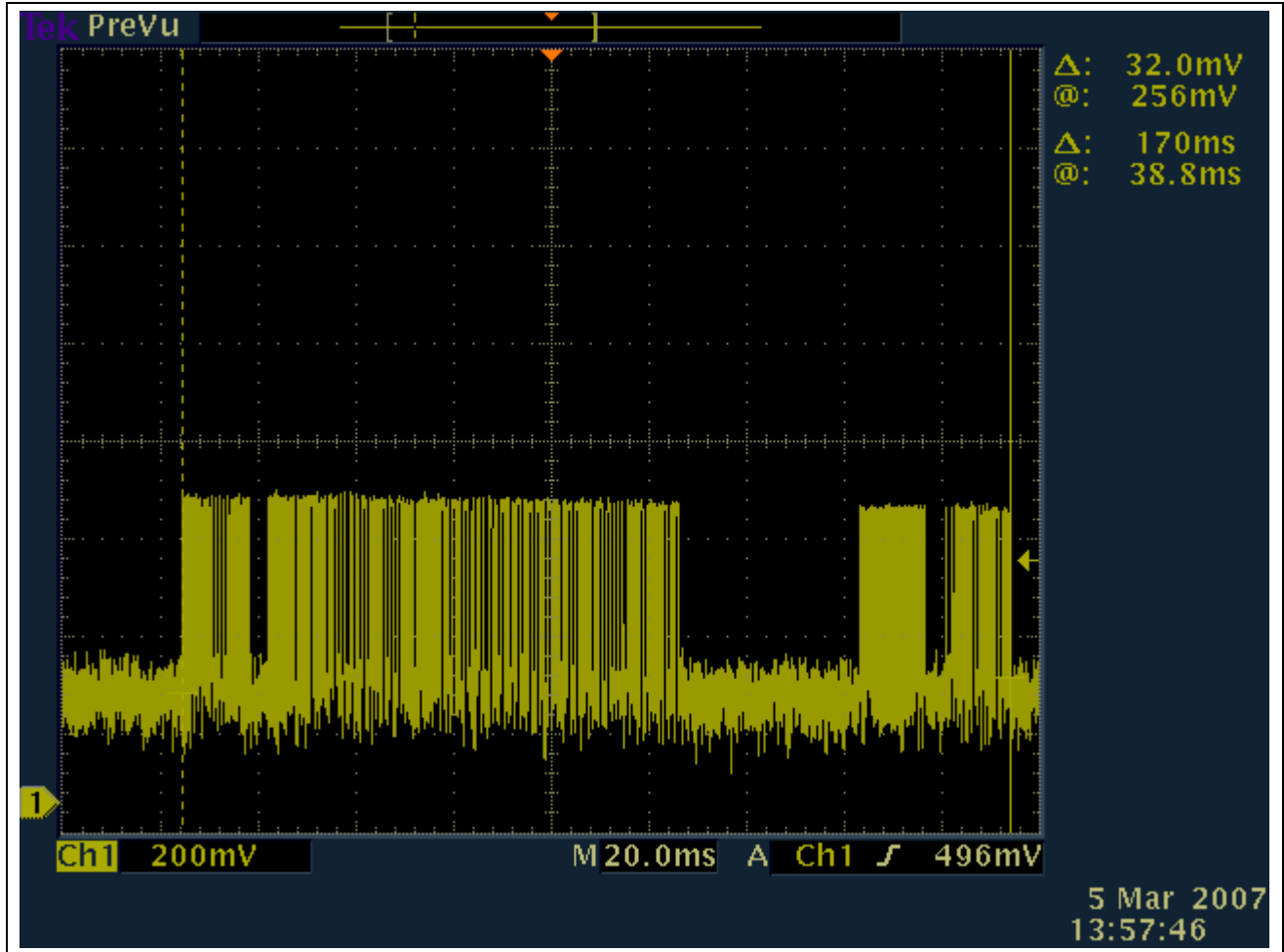


Figure 2 Pulse Train Graph

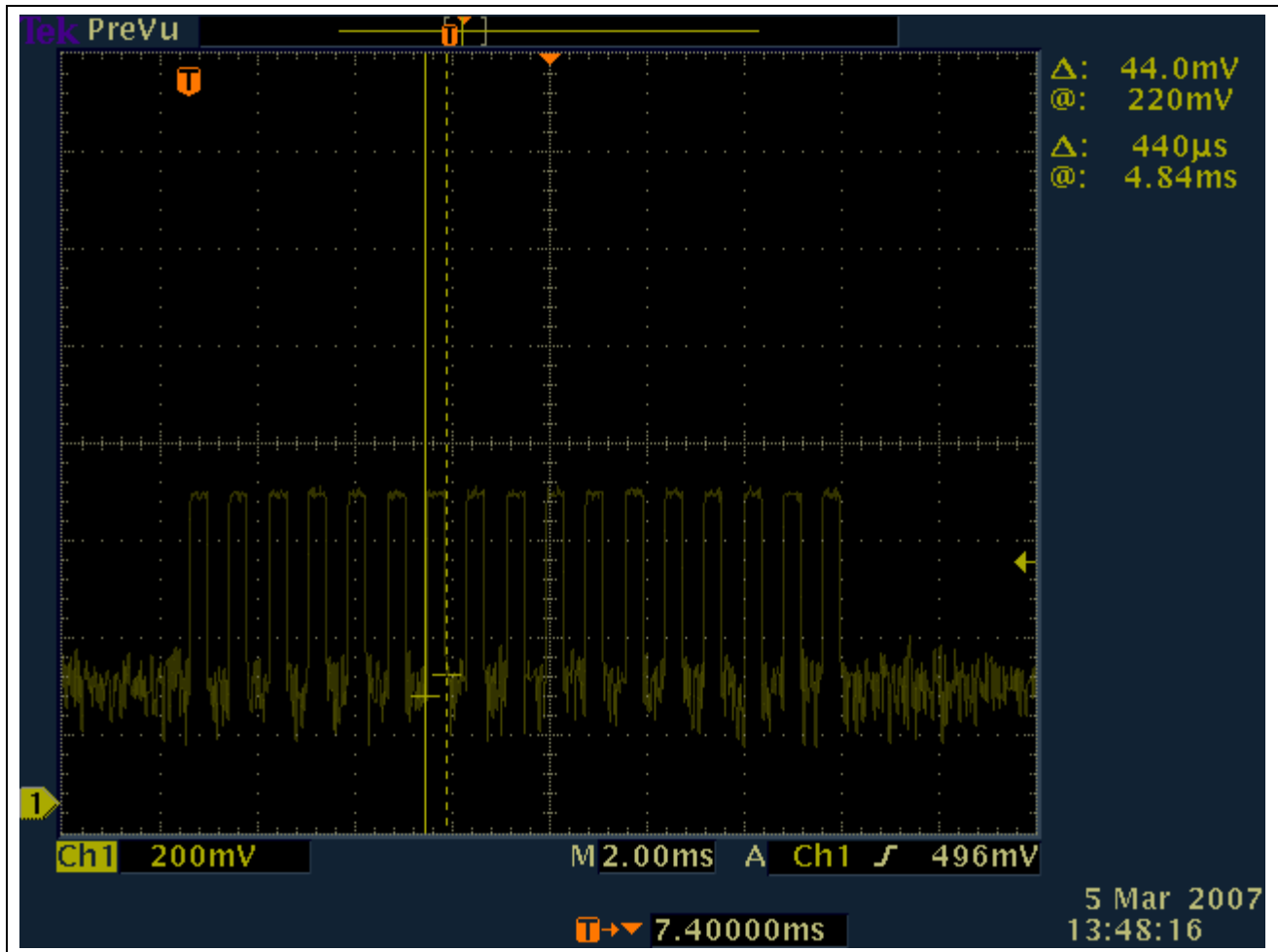


Figure 3 Pulse Train Graph

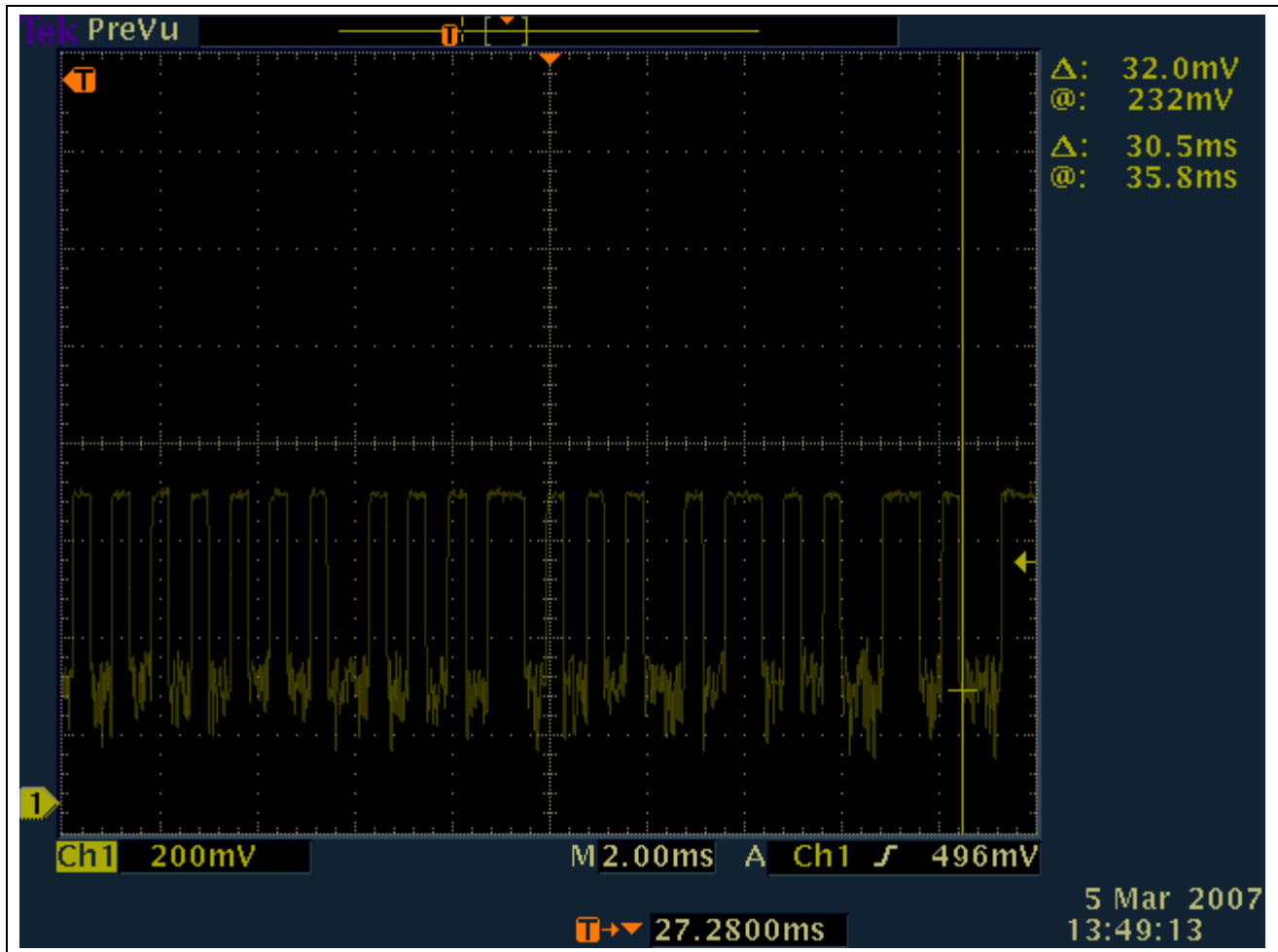


Figure 4 Pulse Train Graph

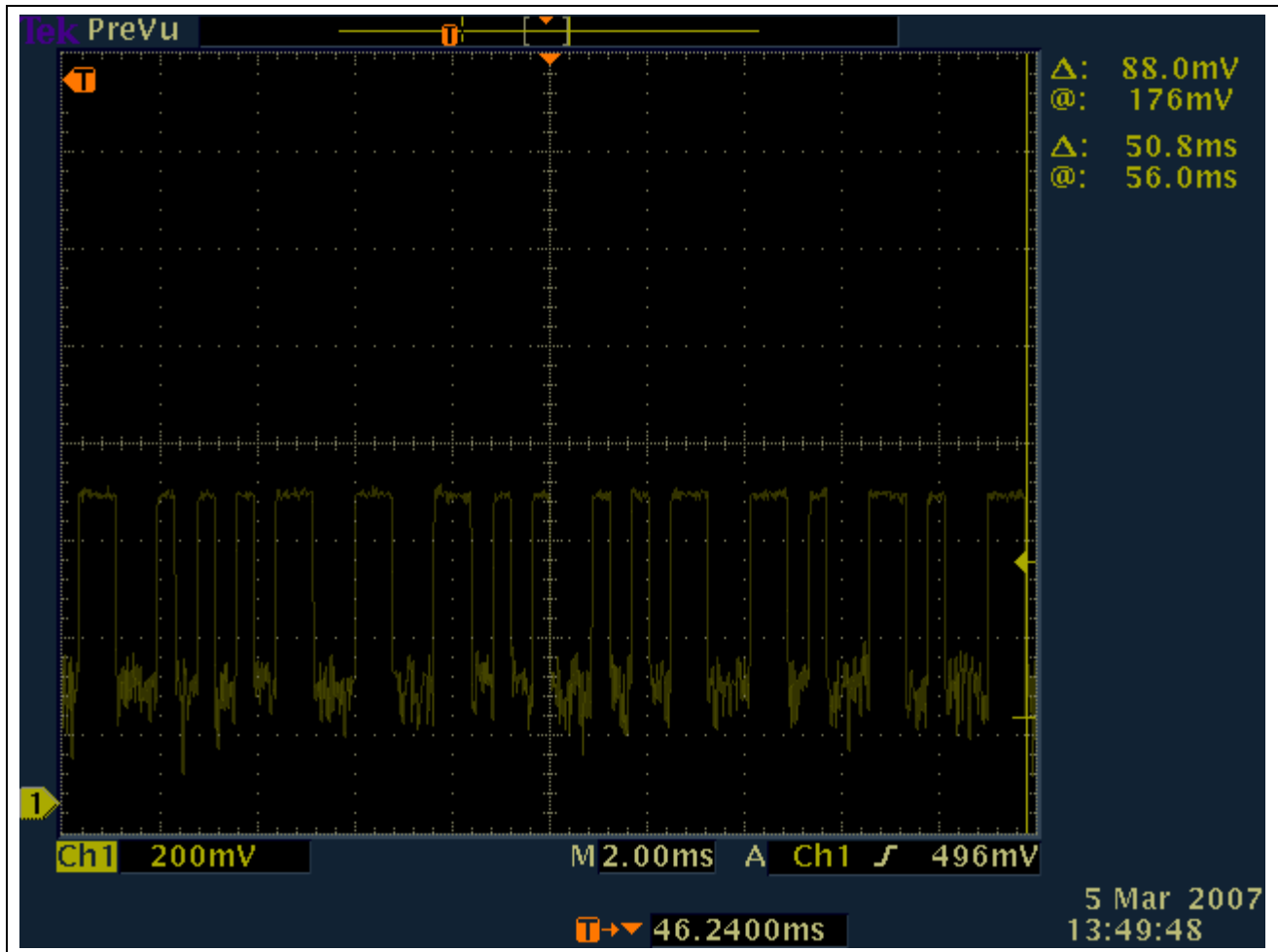


Figure 5 Pulse Train Graph

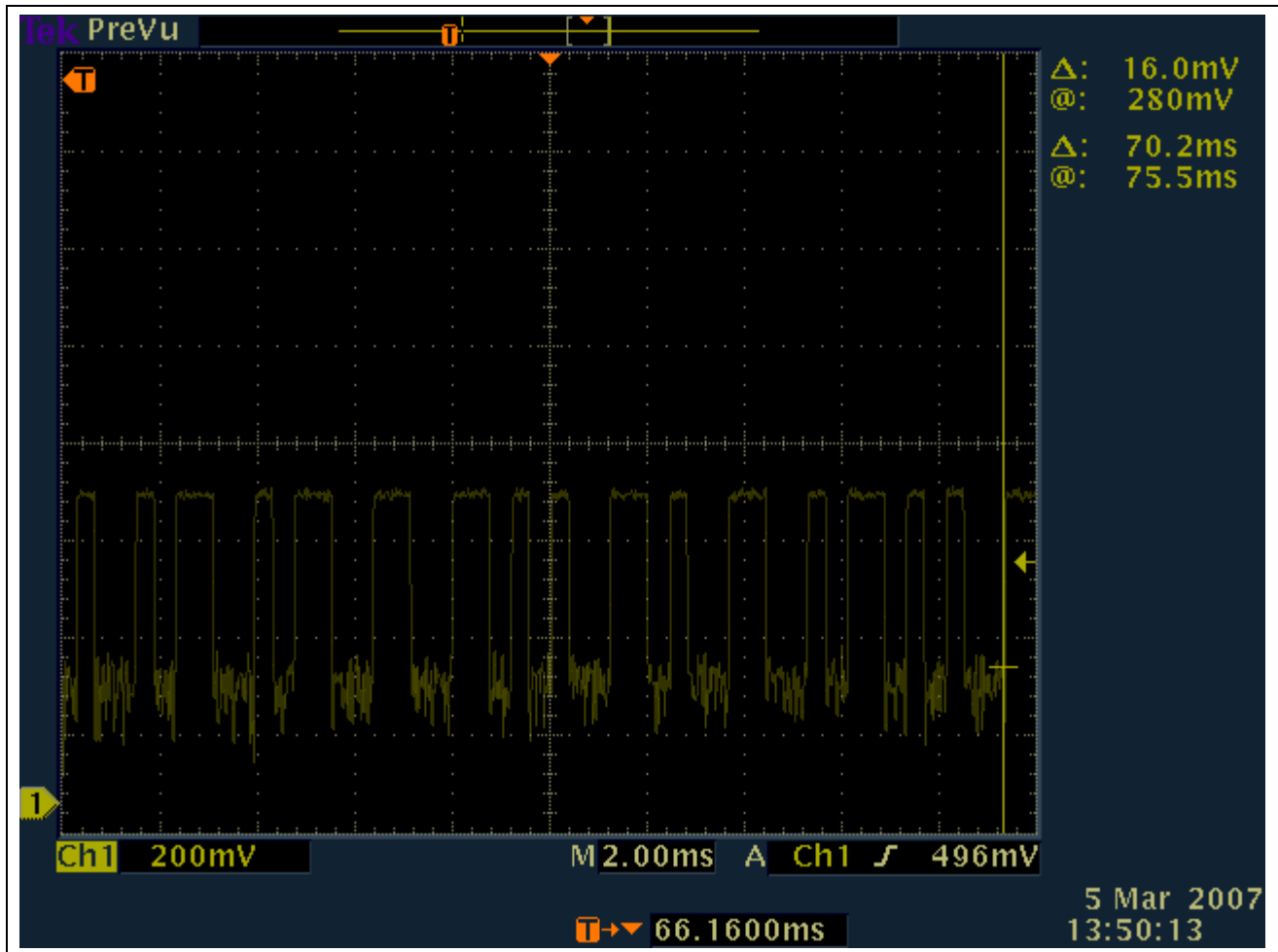




Figure 6 Pulse Train Graph

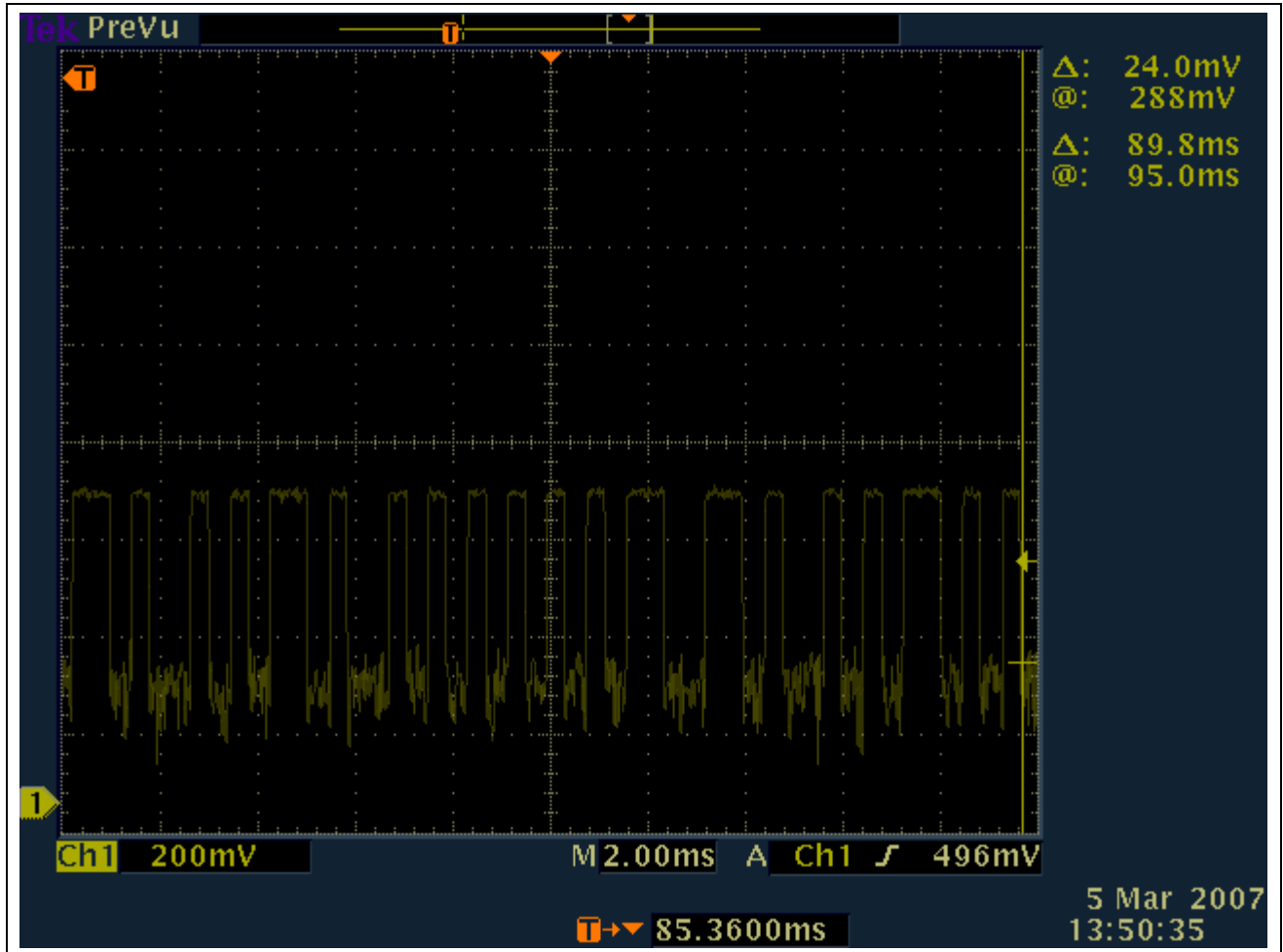


Figure 7 Pulse Train Graph

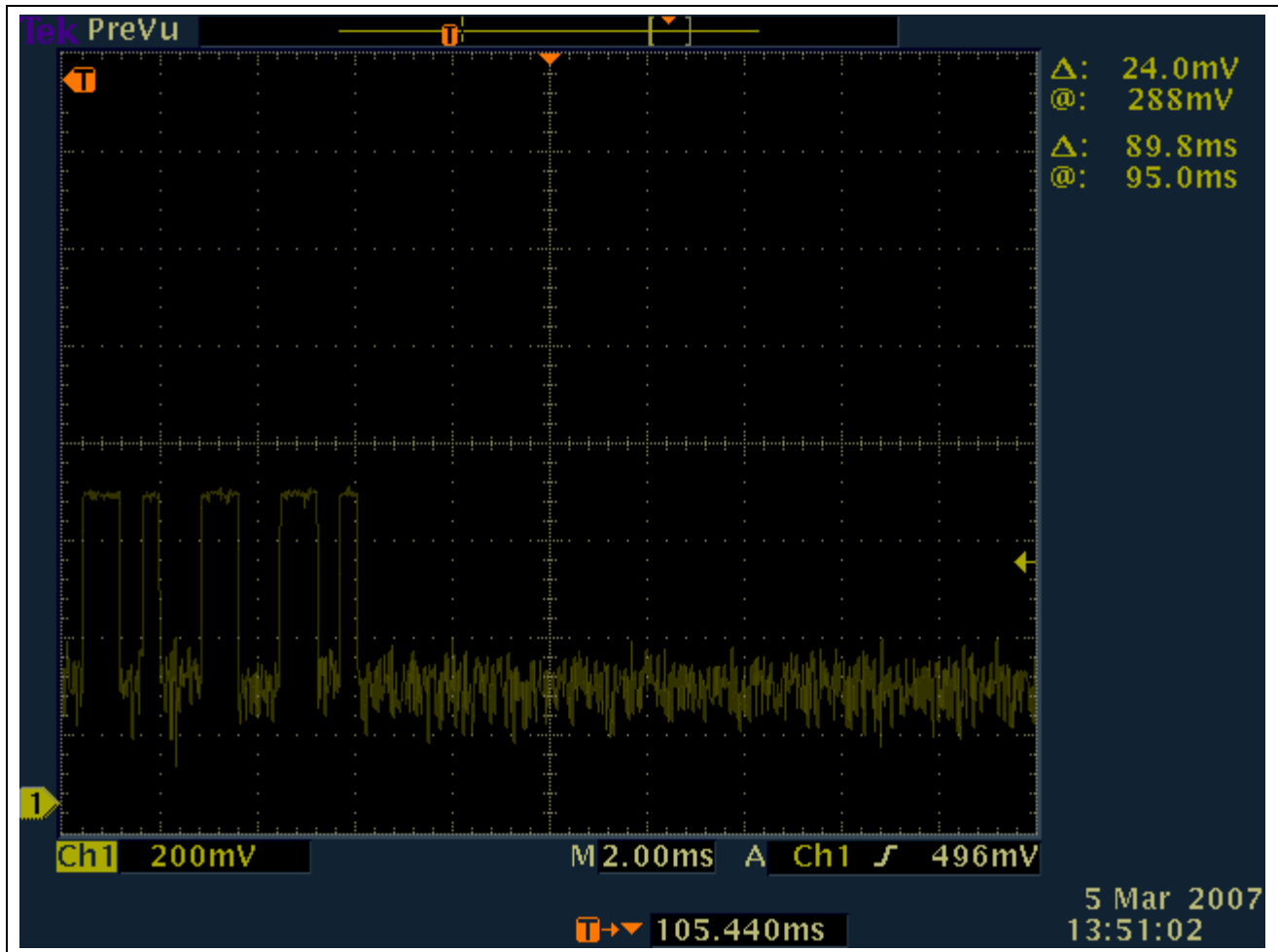


Figure 8 Pulse Train Graph

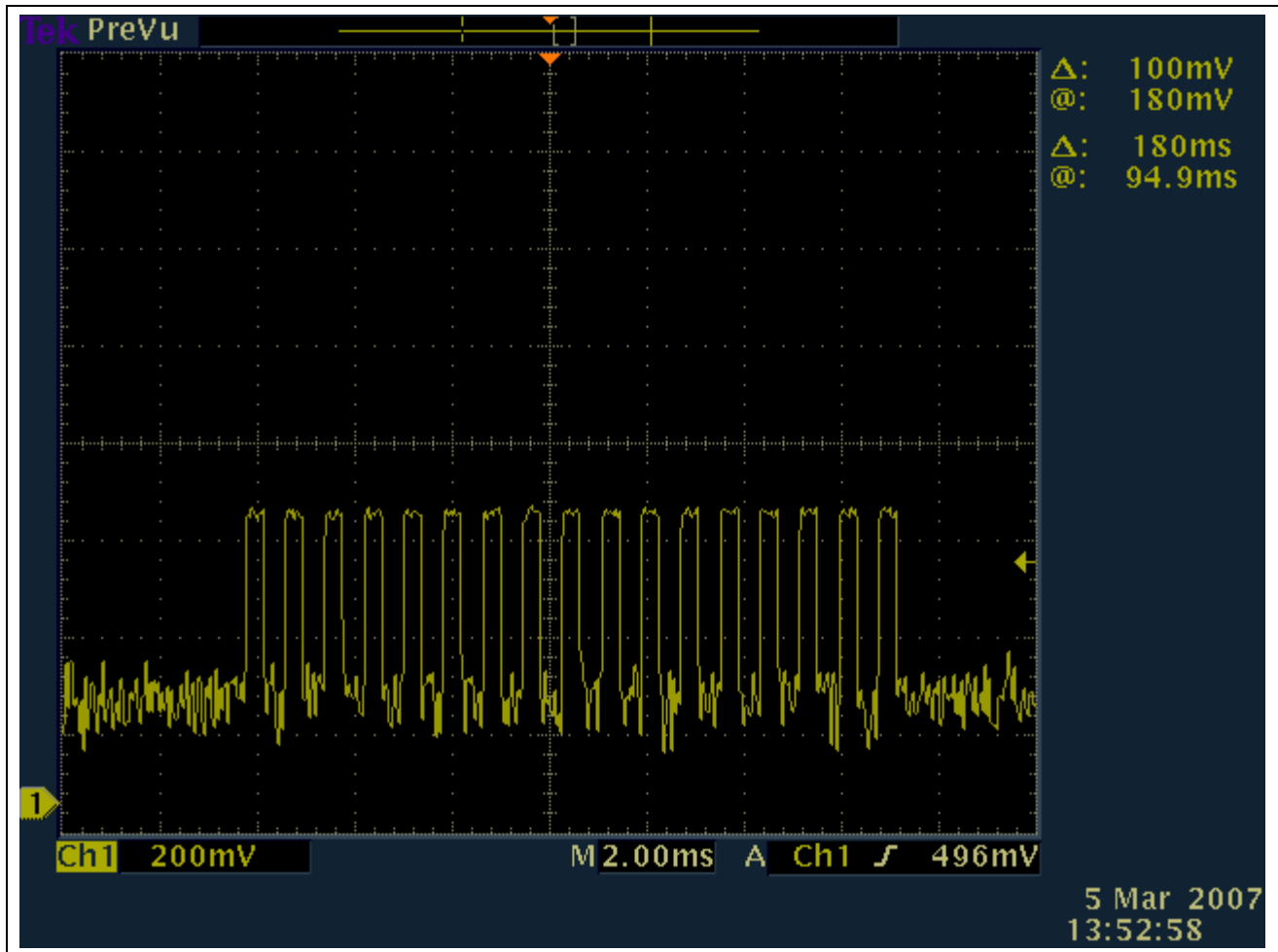
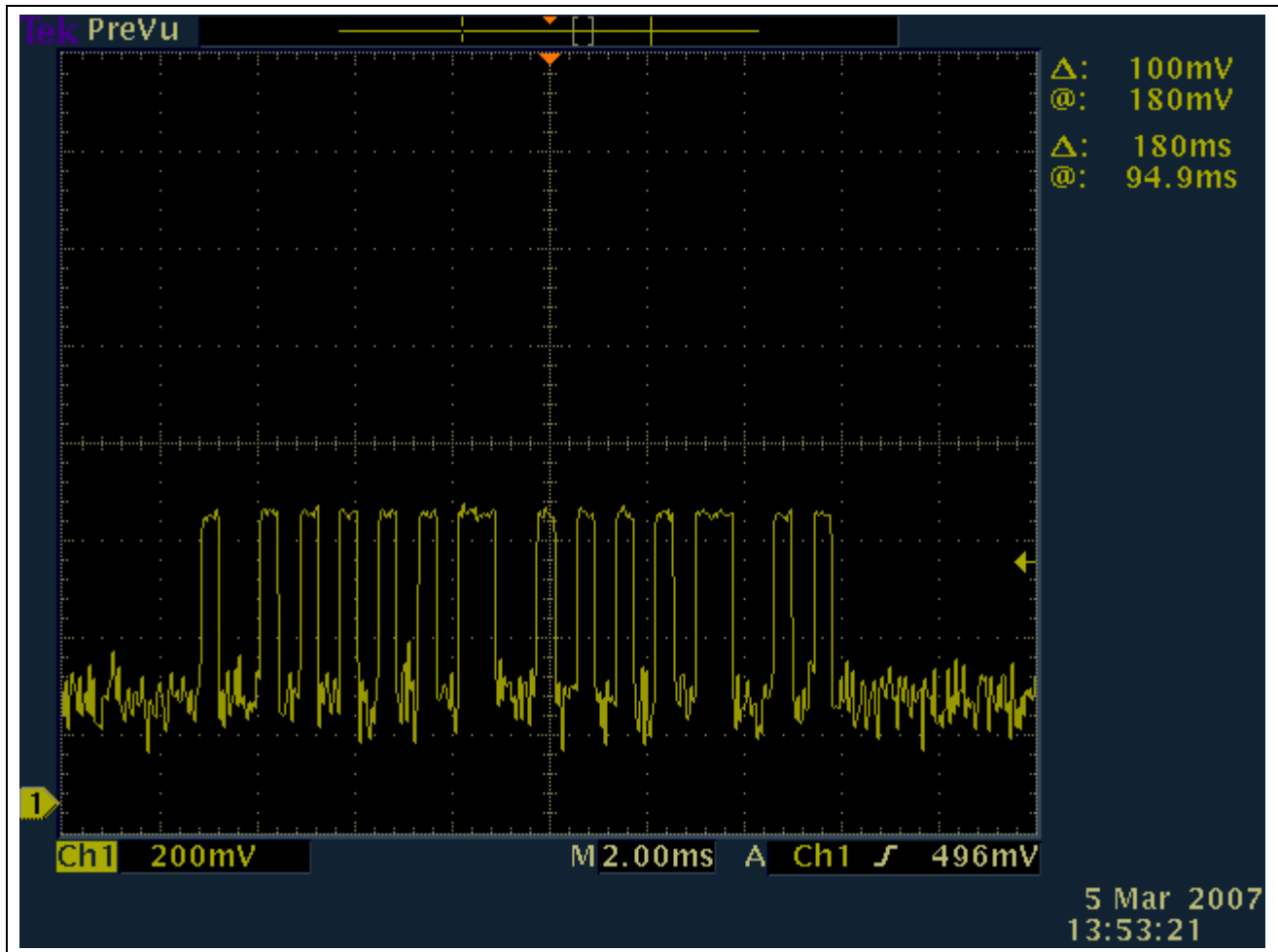


Figure 9 Pulse Train Graph



**4.2 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 3 Cease Operation Configuration Settings**

Power Interface Mode # (See Section 1.3.4)	EUT Configurations Mode # (See Section 1.6)	EUT Operation Mode # (See 1.5)
1	1	2
Supplementary information: None		

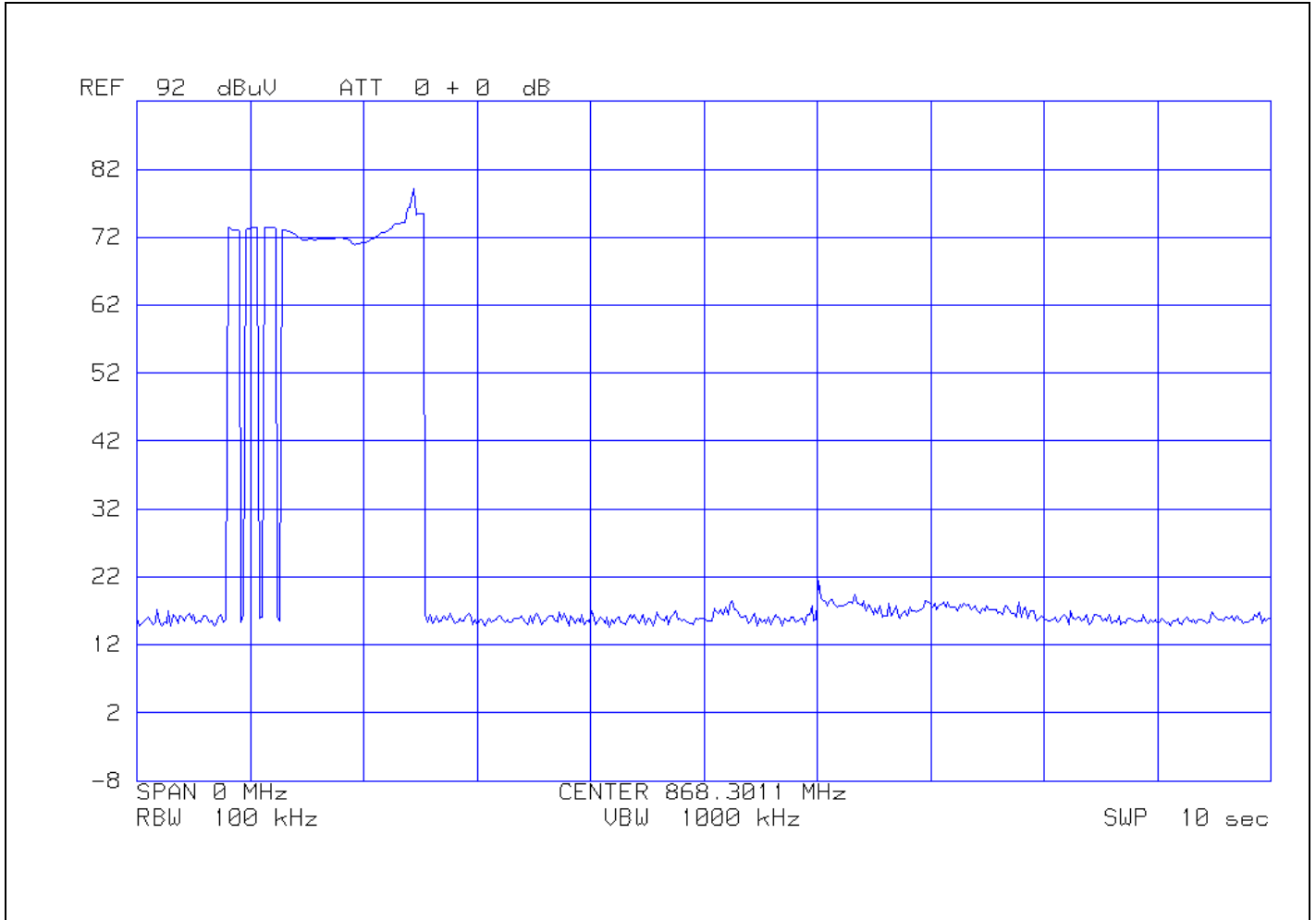
**Table 4 Cease Operation Test Equipment**

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 10 Test Setup for Cease Operation



Figure 11 Cease Operation Graph



**4.3 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

**Table 5 Occupied Bandwidth Configuration Settings**

Power Interface Mode # (See Section 1.3.4)	EUT Configurations Mode # (See Section 1.6)	EUT Operation Mode # (See 1.5)
1	1	2
Supplementary information: None		

**Table 6 Occupied Bandwidth Spectrum Analyzer Settings**

Resolution Bandwidth (MHz)	Occupied Bandwidth Requirements	
	dBc	%
0.01	-20	NA
Supplementary information: None		

**Table 7 Occupied Bandwidth Test Equipment**

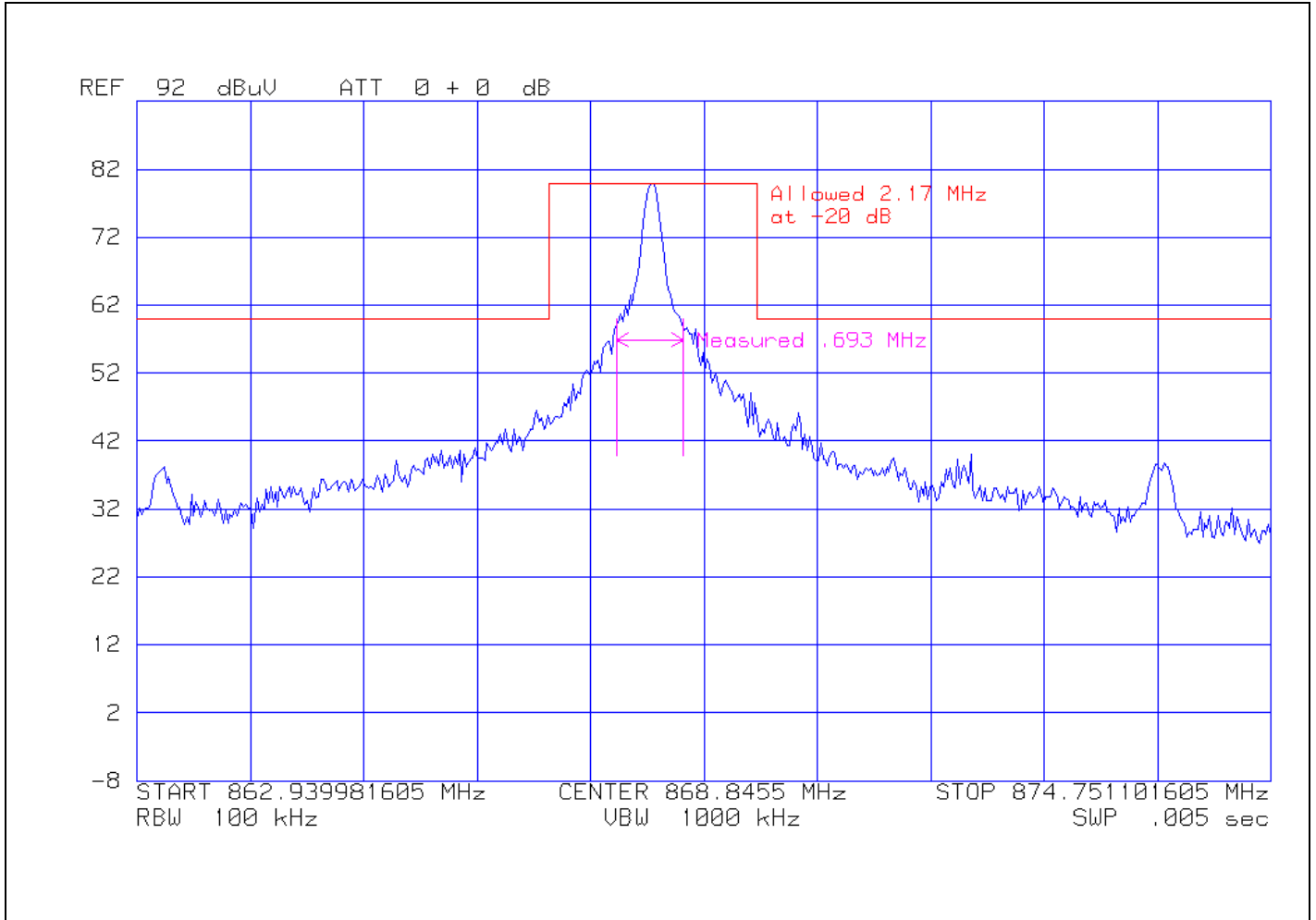
Test Equipment Used			
Description	Manufacturer	Model	Identifier
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081
Dipole Antenna	EMCO	3121C - B4	ME5A-751
Temp/Humidity/ Pressure Meter	Cole Parmer	99760-00	4848



Figure 12 Test Setup for Occupied Bandwidth



Figure 13 Occupied Bandwidth Graph



**4.4 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)	
<b>Limits</b>			
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	-	
1000-10000	54		61.94
868.35MHz		81.94	
Supplementary information: Spurious limits are only applied against products of the transmitter. All other emissions must meet the general limits.			

**Table 8 Radiated Emissions EUT Configuration Settings**

Power Interface Mode # (See Section 1.3.4)	EUT Configurations Mode # (See Section 1.6)	EUT Operation Mode # (See 1.5)
1	1	1
1	1	2
Supplementary information: GO-SWITCH-S only tested from 30MHz-10GHz.		

**Table 9 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 14 Test setup for Radiated Emissions – 4MHz-30MHz**

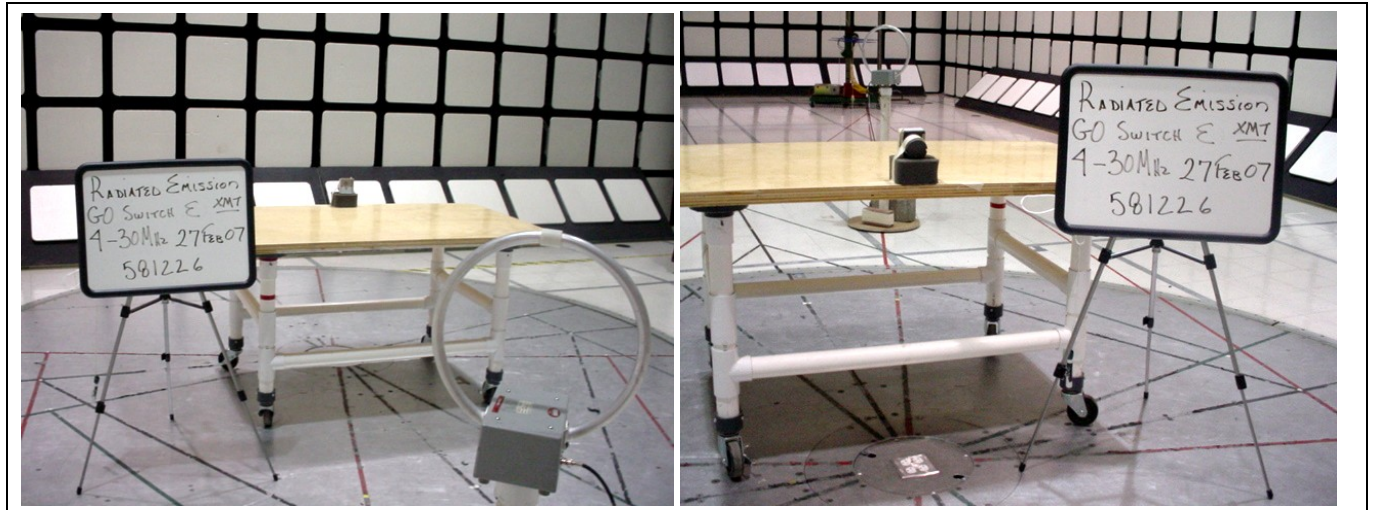


Figure 15 Test setup for Radiated Emissions –30MHz-1000MHz

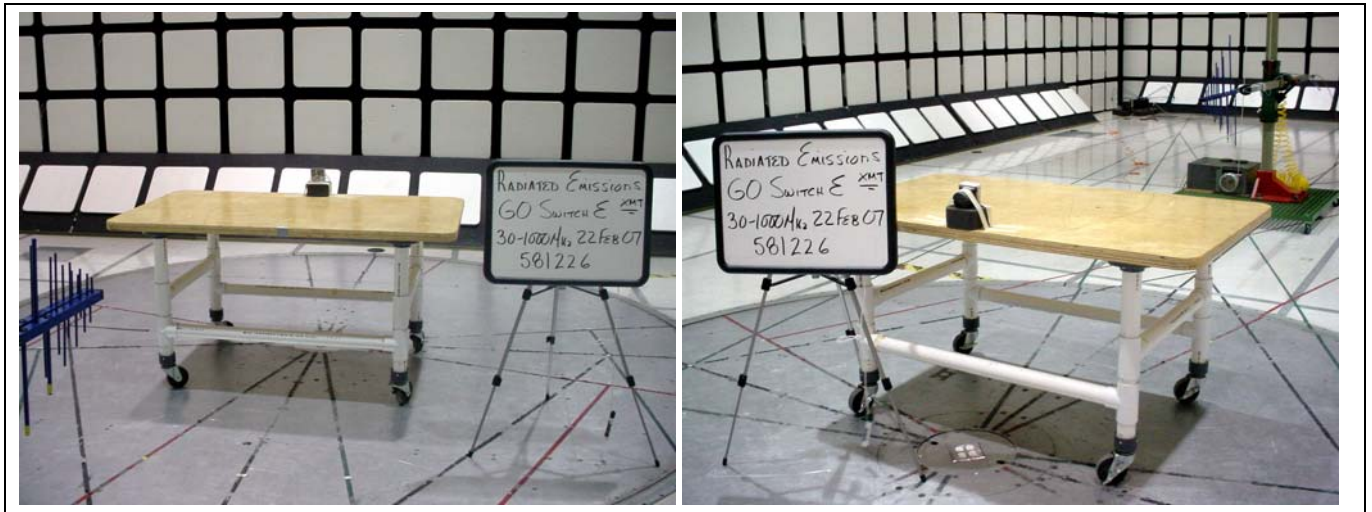
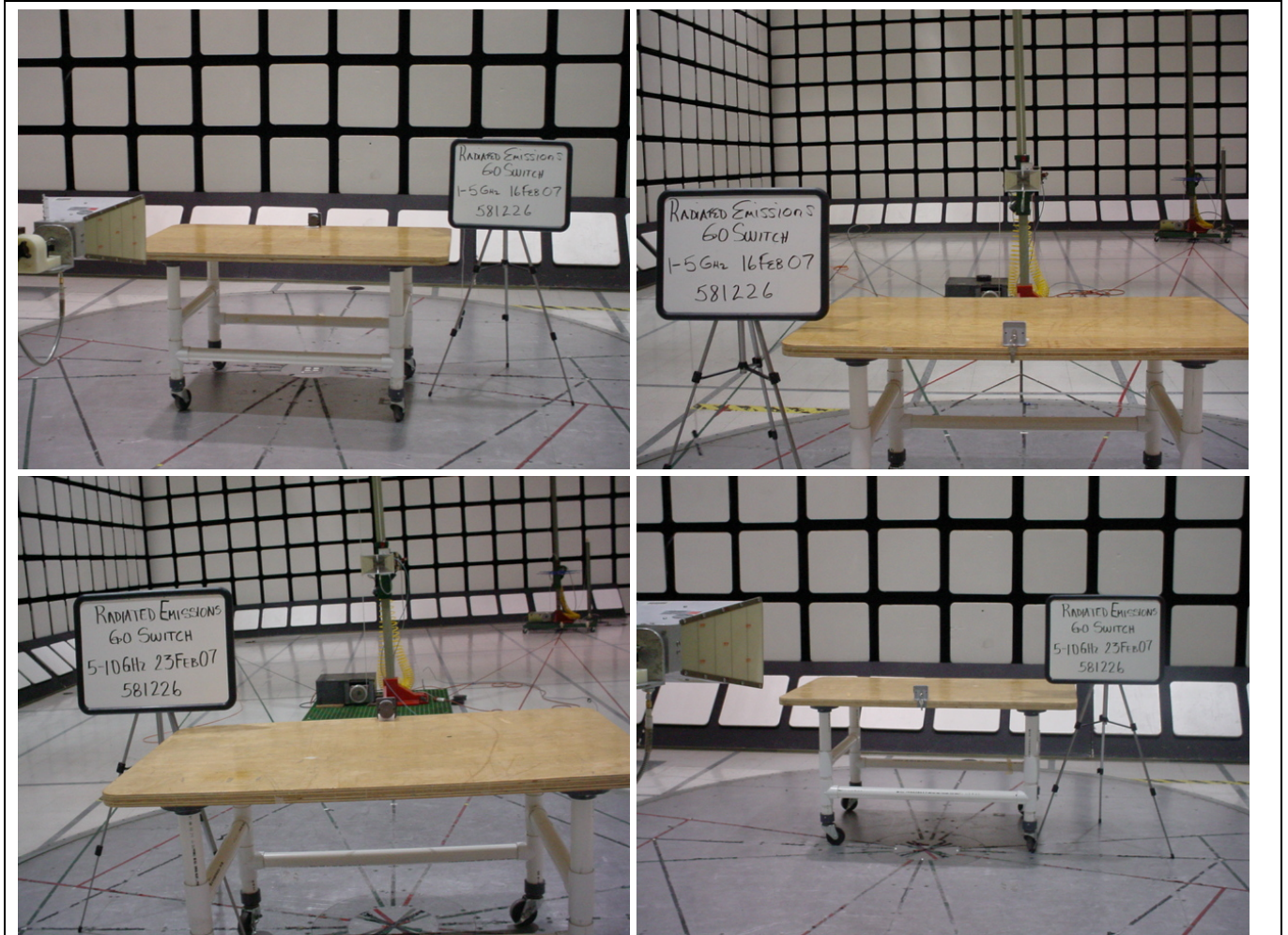
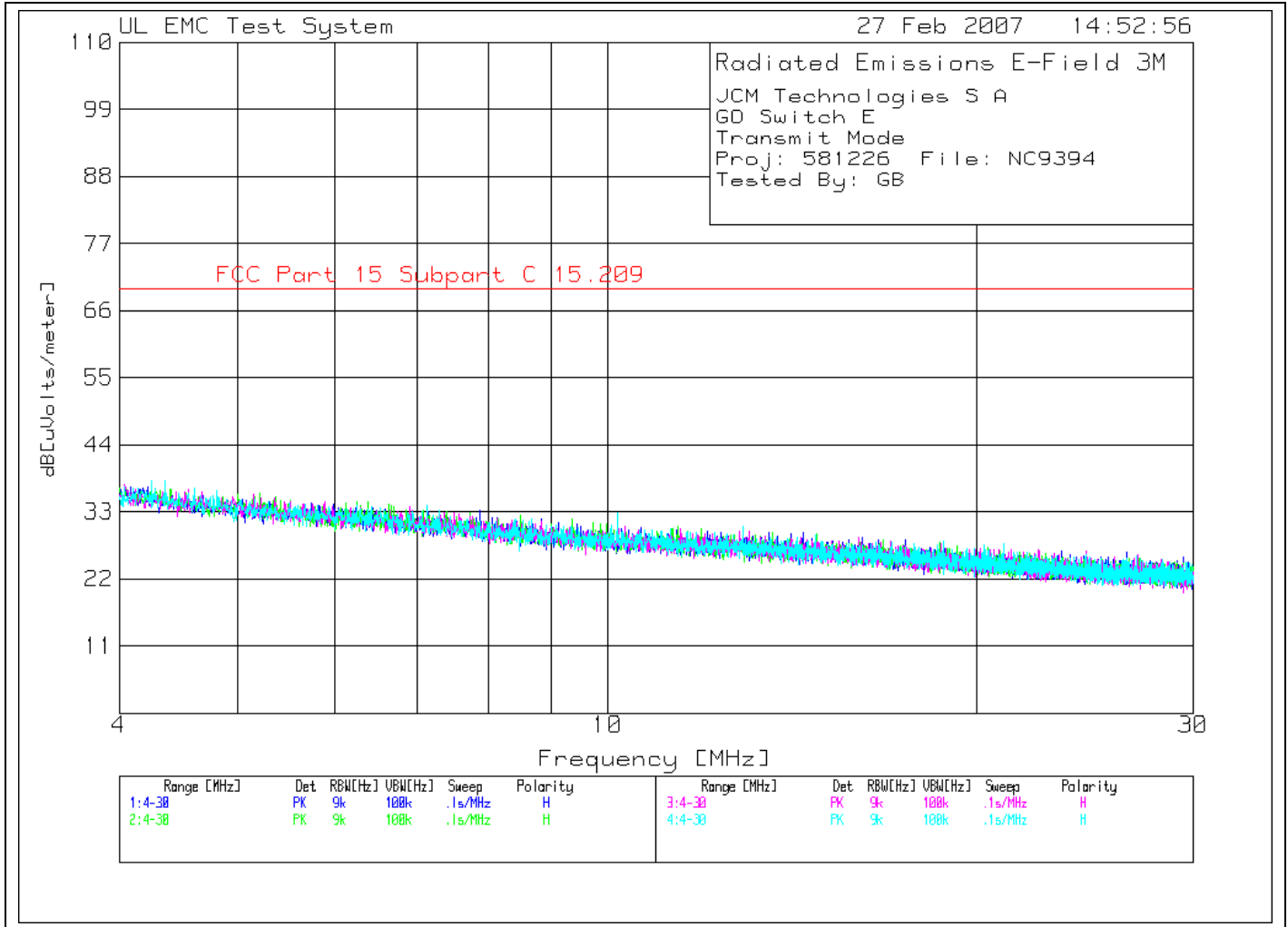




Figure 16 Test setup for Radiated Emissions –1GHz-10GHz



**Figure 17 Radiated Emissions Graph – 4MHz-30MHz (GO-SWITCH-E)**



**Table 10 Radiated Emissions Data Points (GO-SWITCH-E)**

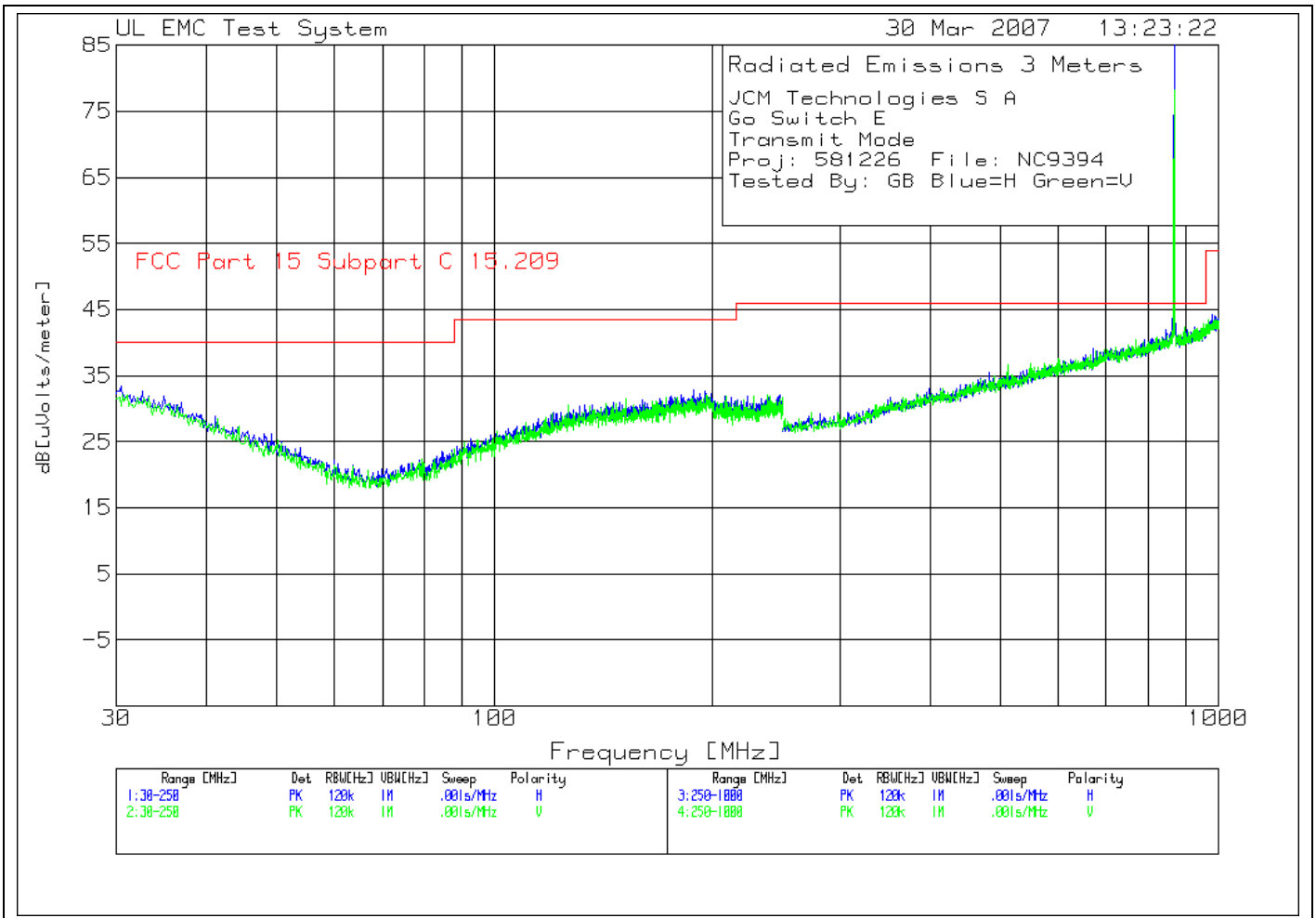
JCM Technologies S A  
 GO Switch E  
 Transmit Mode  
 Proj: 581226 File: NC9394  
 Tested By: GB

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
=====						
0° 4 - 30MHz -----						
6	14.44161	13.25 pk	.3	16.1	29.65	69.5
	Azimuth:60	Height:101	Horz	Margin [dB]		-39.85
-----						
135° 4 - 30MHz -----						
1	4.25356	22.62 pk	.2	15.3	38.12	69.5
	Azimuth:212	Height:160	Horz	Margin [dB]		-31.38
2	4.35759	22.56 pk	.2	15.3	38.06	69.5
	Azimuth:359	Height:160	Horz	Margin [dB]		-31.44
3	7.12728	18.37 pk	.2	15.4	33.97	69.5
	Azimuth:181	Height:160	Horz	Margin [dB]		-35.53
4	10.18955	17.05 pk	.2	15.5	32.75	69.5
	Azimuth:168	Height:160	Horz	Margin [dB]		-36.75
5	12.90073	14.49 pk	.3	15.9	30.69	69.5
	Azimuth:144	Height:160	Horz	Margin [dB]		-38.81

LIMIT 1: FCC Part 15 Subpart C 15.209



Figure 18 Radiated Emissions Graph – 30MHz-1000MHz (GO-SWITCH-E)



**Table 11 Radiated Emissions Data Points – 30MHz-1000MHz (GO-SWITCH-E)**

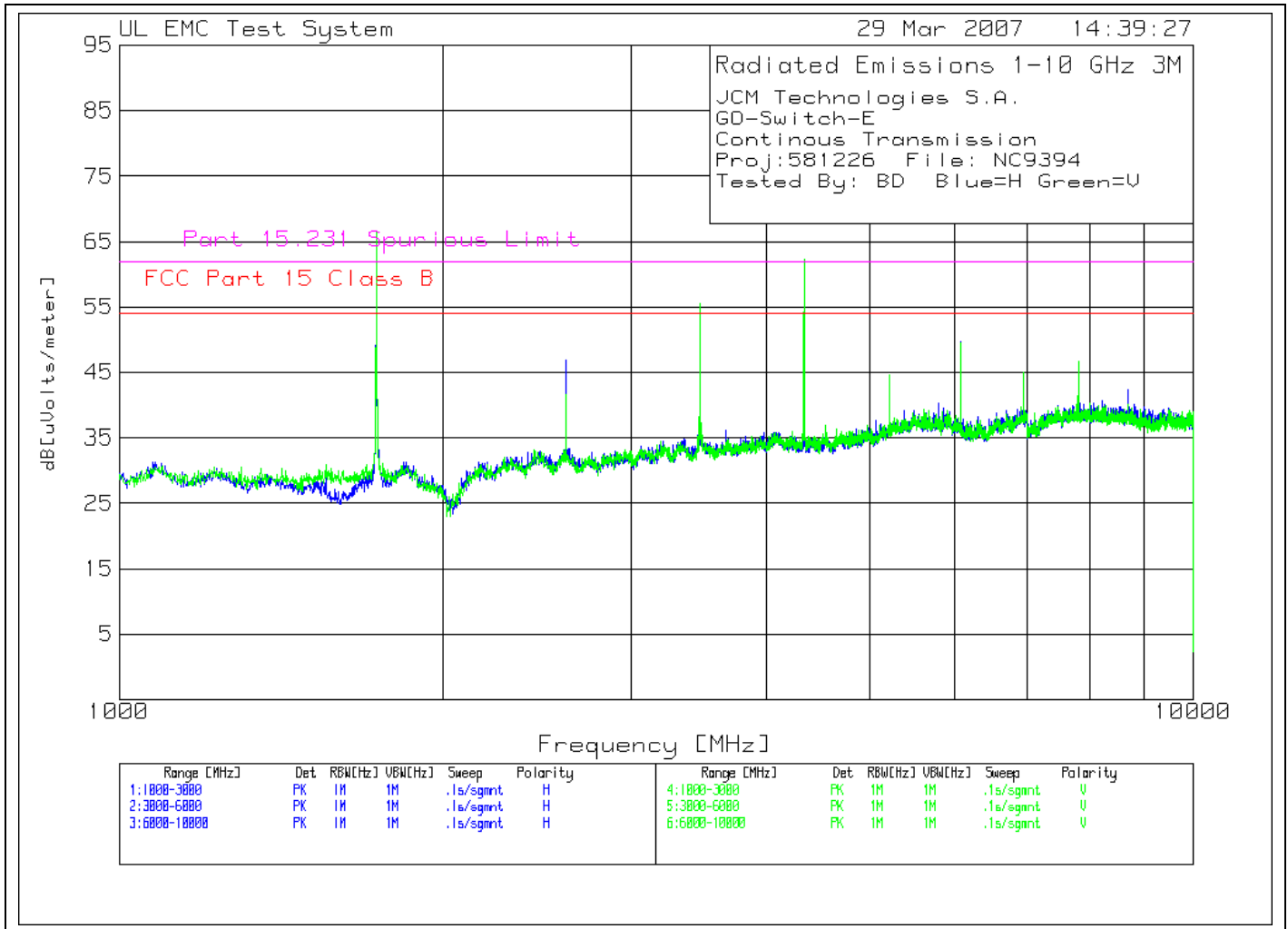
JCM Technologies S A  
 Go Switch E  
 Transmit Mode  
 Proj: 581226 File: NC9394  
 Tested By: GB Blue=H Green=V

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 30 - 250MHz -----								
1	30.4403	15.58 pk	-.5	18.4	33.48	40	-	-
	Azimuth:344	Height:250	Horz	Margin [dB]		-6.52		
2	39.0994	14.55 pk	-.2	14.7	29.05	40	-	-
	Azimuth:17	Height:101	Horz	Margin [dB]		-10.95		
3	117.4716	15.93 pk	0	12.7	28.63	43.5	-	-
	Azimuth:162	Height:101	Horz	Margin [dB]		-14.87		
Vertical 30 - 250MHz -----								
4	151.6678	16.91 pk	0	14.6	31.51	43.5	-	-
	Azimuth:357	Height:101	Vert	Margin [dB]		-11.99		
Horizontal 250 - 1000MHz -----								
5	868.4123	62.47 pk	1.5	22.8	86.77	81.94	-7.39	79.38
	Azimuth:318	Height:101	Horz	Margin [dB]		-2.56		
Vertical 250 - 1000MHz -----								
6	868.4123	53.94 pk	1.5	22.8	78.24	81.94	-7.39	70.85
	Azimuth:12	Height:101	Vert	Margin [dB]		-11.09		

LIMIT 1: FCC Part 15 Subpart C 15.209 / 15.231

pk - Peak detector

Figure 19 Radiated Emissions Graph – 1GHz-10GHz (GO-SWITCH-E)



Job Number: 581226  
 Model Number: GO-SWITCH-E, GO-SWITCH-S  
 Client Name: JCM TECHNOLOGIES S A  
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**Table 12 Radiated Emissions Data Points – 1GHz-10GHz (GO-SWITCH-E)**

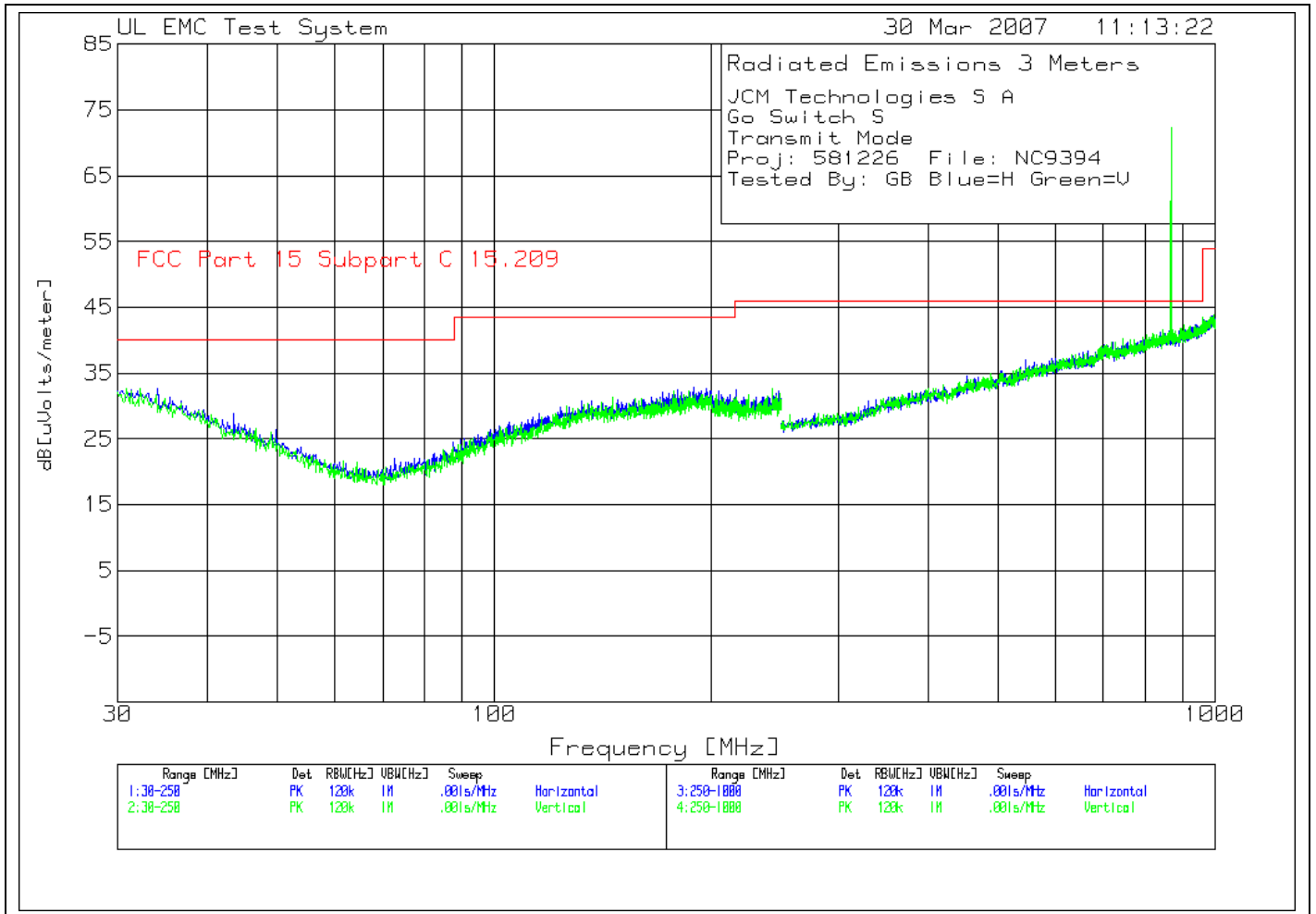
JCM Technologies S.A.  
 GO-Switch-E  
 Continuous Transmission  
 Proj:581226 File: NC9394  
 Tested By: BD Blue=H Green=V

Test No.	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								
1736.5862	74.02 pk	-33.8		26.5	66.72	61.94	-7.39	59.33
Azimuth: 225 Height:107 Horz				Margin [dB]:			-2.61	
2604.9248	52.87 pk	-32.7		29.2	49.37	61.94	-7.39	41.98
Azimuth: 279 Height:166 Horz				Margin [dB]:			-19.96	
Horizontal 3000 - 6000MHz								
3473.3076	57.47 pk	-31.3		31.5	57.67	61.94	-7.39	50.28
Azimuth: 70 Height:125 Horz				Margin [dB]:			-11.66	
4341.6533	55.38 pk	-30.7		32.4	57.08	61.94	-7.39	49.69
Azimuth: 166 Height:128 Horz				Margin [dB]:			-12.25	
Horizontal 6000 - 10000MHz								
6078.2305	45.58 pk	-28.9		34.4	51.08	61.94	-7.39	43.69
Azimuth: 136 Height:102 Horz				Margin [dB]:			-18.25	
Vertical 1000 - 3000MHz								
1736.5924	72.91 pk	-33.8		26.5	65.61	61.94	-7.39	58.22
Azimuth: 171 Height:104 Vert				Margin [dB]:			-3.72	
Vertical 3000 - 6000MHz								
3473.2074	56.78 pk	-31.3		31.2	56.68	61.94	-7.39	49.29
Azimuth: 206 Height:106 Vert				Margin [dB]:			-12.65	
4341.5719	64.49 pk	-30.7		32.6	66.39	61.94	-7.39	59.00
Azimuth: 101 Height:109 Vert				Margin [dB]:			-2.94	
Vertical 6000 - 10000MHz								
6078.2699	44.9 pk	-28.9		34.5	50.5	61.94	-7.39	43.11
Azimuth: 72 Height:136 Vert				Margin [dB]:			-18.83	

LIMIT 1: FCC Part 15 Class 15.231

pk - Peak detector

Figure 20 Radiated Emissions Graph – 30MHz-1000MHz (GO-SWITCH-S)



**Table 13 Radiated Emissions Data Points – 30MHz-1000MHz (GO-SWITCH-S)**

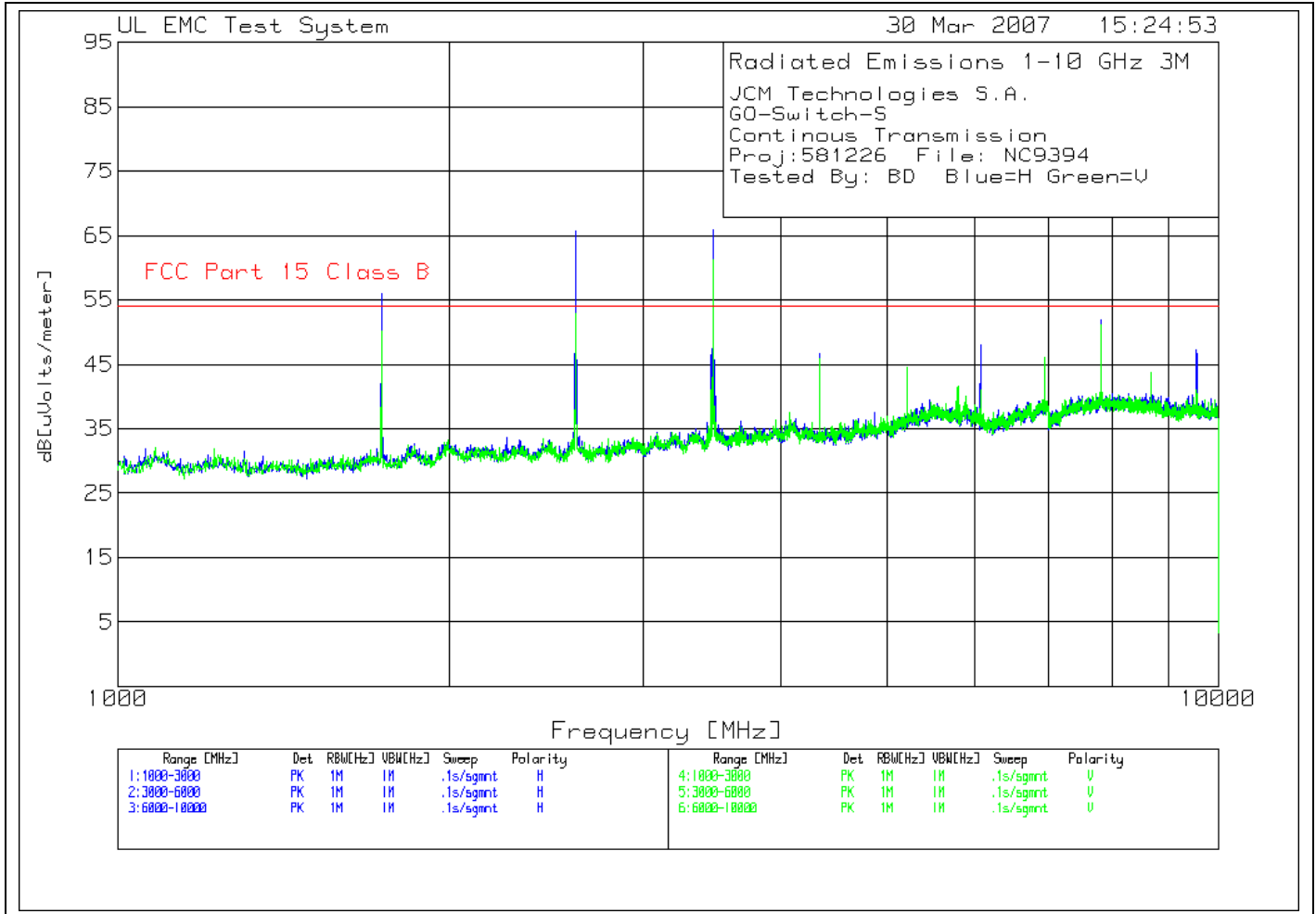
JCM Technologies S A  
 Go Switch S  
 Transmit Mode  
 Proj: 581226 File: NC9394  
 Tested By: GB Blue=H Green=V

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 30 - 250MHz -----								
3	34.1094	16.33 pk	-.3	16.7	32.73	40		
	Azimuth:119	Height:99	Horz	Margin [dB]		-7.27		
4	43.5023	16.19 pk	-.2	12.8	28.79	40		
	Azimuth:79	Height:400	Horz	Margin [dB]		-11.21		
5	132.0013	16.78 pk	0	14	30.78	43.5		
	Azimuth:4	Height:250	Horz	Margin [dB]		-12.72		
Vertical 30 - 250MHz -----								
6	145.6504	16.76 pk	.1	14.4	31.26	43.5		
	Azimuth:68	Height:101	Vert	Margin [dB]		-12.24		
Horizontal 250 - 1000MHz -----								
1	868.4123	42.97 pk	1.5	22.8	67.27	81.94	-7.39	59.88
	Azimuth:274	Height:200	Horz	Margin [dB]		-21.96		
Vertical 250 - 1000MHz -----								
2	868.4123	47.99 pk	1.5	22.8	72.29	81.84	-7.39	64.90
	Azimuth:349	Height:101	Vert	Margin [dB]		-17.04		

LIMIT 1: FCC Part 15 Subpart C 15.209 / 15.231

pk - Peak detector

**Figure 21 Radiated Emissions Graph – 1GHz-10GHz (GO-SWITCH-S)**



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**Table 14 Radiated Emissions Data Points – 1GHz-10GHz (GO-SWITCH-S)**

JCM Technologies S.A.  
 GO-Switch-S  
 Continous Transmission  
 Proj:581226 File: NC9394  
 Tested By: BD Blue=H Green=V

Test No.	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								
1736.6067	62.34 pk	-33.8		26.5	55.04	61.94	-7.39	47.65
Azimuth: 131 Height:105 Horz				Margin [dB]:			-14.29	
2604.9477	68.26 pk	-32.7		29.2	64.76	61.94	-7.39	57.37
Azimuth: 305 Height:135 Horz				Margin [dB]:			-4.57	
Horizontal 3000 - 6000MHz								
3473.2398	64.86 pk	-31.3		31.5	65.06	61.94	-7.39	57.67
Azimuth: 284 Height:108 Horz				Margin [dB]:			-4.27	
3473.1998	64.85 pk	-31.3		31.5	65.05	61.94	-7.39	57.66
Azimuth: 284 Height:108 Horz				Margin [dB]:			-4.28	
4341.5623	42.13 pk	-30.7		32.4	43.83	61.94	-7.39	36.44
Azimuth: 122 Height:108 Horz				Margin [dB]:			-25.5	
5209.8072	36.79 pk	-29.5		33.7	40.99	61.94	-7.39	33.6
Azimuth: 273 Height:111 Horz				Margin [dB]:			-28.34	
Horizontal 6000 - 10000MHz								
6078.1913	41.18 pk	-28.9		34.4	46.68	61.94	-7.39	39.29
Azimuth: 326 Height:122 Horz				Margin [dB]:			-22.65	
6946.458	38.53 pk	-28		35.2	45.73	61.94	-7.39	38.34
Azimuth: 337 Height:131 Horz				Margin [dB]:			-23.6	
7814.7677	36.98 pk	-26.9		36.9	46.98	61.94	-7.39	39.59
Azimuth: 345 Height:104 Horz				Margin [dB]:			-22.35	
9551.269	34.96 pk	-28.4		37.8	44.36	61.94	-7.39	36.97
Azimuth: 319 Height:104 Horz				Margin [dB]:			-24.97	
Vertical 1000 - 3000MHz								
1736.6889	61.57 pk	-33.8		26.5	54.27	61.94	-7.39	46.88
Azimuth: 167 Height:110 Vert				Margin [dB]:			-15.06	
2604.9818	54.98 pk	-32.7		29	51.28	61.94	-7.39	43.89
Azimuth: 178 Height:122 Vert				Margin [dB]:			-18.05	



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Test No.	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 3000 - 6000MHz								
3473.2549	59.35	pk	-31.3	31.2	59.25	61.94	-7.39	51.86
Azimuth: 227 Height:156 Vert				Margin [dB]:			-10.08	
4341.5353	50.03	pk	-30.7	32.6	51.93	61.94	-7.39	44.54
Azimuth: 203 Height:106 Vert				Margin [dB]:			-17.4	
5209.8317	40.28	pk	-29.5	33.8	44.58	61.94	-7.39	37.19
Azimuth: 353 Height:158 Vert				Margin [dB]:			-24.75	
Vertical 6000 - 10000MHz								
6946.471	41.04	pk	-28	35.4	48.44	61.94	-7.39	41.05
Azimuth: 333 Height:127 Vert				Margin [dB]:			-20.89	
7814.7928	39.6	pk	-26.9	36.9	49.6	61.94	-7.39	42.21
Azimuth: 155 Height:164 Vert				Margin [dB]:			-19.73	
8683.1777	33.1	pk	-27.8	37.4	42.7	61.94	-7.39	35.31
Azimuth: 201 Height:104 Vert				Margin [dB]:			-26.63	
8683.1196	32.57	pk	-27.8	37.4	42.17	61.94	-7.39	34.78
Azimuth: 201 Height:104 Vert				Margin [dB]:			-27.16	

LIMIT 1: FCC Part 15 Subpart C, 15.231

pk - Peak detector

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#### 4.5 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 $\mu\text{V/m}$ to $\text{dB}\mu\text{V/m}$ (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 ( $\text{dB}\mu\text{V/m}$ ) = Measured field strength ( $\text{dB}\mu\text{V}$ ) + Antenna Factor ( $\text{dB/m}$ ) + Cable Factor ( $\text{dB}$ )

$$\text{Field Strength (dB}\mu\text{V/m)} = 16.33\text{dB}\mu\text{V} + (0.3\text{dB/m}) + 16.7\text{dB}$$

$$\text{Field Strength (dB}\mu\text{V/m)} = 32.73$$

##### **Duty Cycle Correction Factor calculation.**

Total number of pulses counted in 100ms.

Total time on = 42.72mS

$$\text{Duty cycle correction factor} = 20 \log (42.72\text{mS} / 100\text{ms})$$

$$= 20 \log (0.4272)$$

$$= -7.39\text{dB}$$

## 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.

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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