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Job Number:	865327
Project Number:	08CA15844
File Number:	MC15897
Date:	September 2, 2008
Model:	DVS-R-200
FCC ID:	TS9-DVS-R-200

Electromagnetic Compatibility Test Report

For

SICEL TECHNOLOGIES

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Job Number: 865327 File Number: MC15897 Page 2 of 36
Model Number: DVS-R-200
Client Name: SICEL TECHNOLOGIES
FCC ID: TS9-DVS-R-200

Test Report Details

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

Tests Performed For: **SICEL TECHNOLOGIES**
SUITE 308
3800 GATEWAY CENTER BLVD
MORRISVILLE, NC 27560

Applicant Contact: **Brendan McSoley**
Title: **Sr. Design Engineer**
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Test Report Date: **02 September 2008**

Product Type: **DOSE VERIFICATION SYSTEM**

Product standards **FCC Part 15, Subpart C**

Model Number: **DVS-R-200**

Sample Serial Number: **100072**

EUT Category: **Low Power Transmitter**

Testing Start Date: **19 June 2008**

Date Testing Complete: **25 July 2008**

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
None	Original	-	-

1.0 G E N E R A L - Product Description

1.1 Equipment Description

The Dose Verification System (DVS) is used to measure radiation dose received at a tumor site in a patient who is undergoing radiation therapy. The figure below depicts the components of the DVS. The DVS Dosimeter is implanted in a patient near a tumor. It contains a radiation sensor that is used to measure the amount of radiation received. The Wand is used to (a) Power the Dosimeter using an electromagnetic field, (b) transmit requests to the Dosimeter, and (c) receive data from the Dosimeter by decoding the FSK backscatter modulation.

The Base Station contains a panel PC with integrated touch-screen that communicates with the Wand (via RS-232) and provides the user interface. Ethernet to the DVS hardware is a Database Server computer (connected via an Ethernet LAN) that collects the data read from the Dosimeter. The Database Server is not part of the EUT, though it is needed for the system to function.

The antenna is an inductive loop etched in a printed circuit board that cannot be changed or modified by the user.

The transmitter circuitry is regulated so voltage variations are not applicable.

This product is categorically exempt from RF Exposure limitations.

1.2 Equipment Marking Plate



Note: the label on this device is being modified to include the new FCC ID number, new Model Number and new input voltage range of 110Vac – 240Vac, 50-60Hz. This photo is representative of where the label location resides on the product.

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1.3 Device Configuration During Test

1.3.1 Equipment Used During Test:

Use	Product Type	Manufacturer	Model	Comments
EUT	Dose Verification System	SICEL TECHNOLOGIES	DVS-R-200	None
EUT	Dose Verification System – Interrogator	SICEL TECHNOLOGIES	DVS-R-200	None
AE	Laptop	Dell	Inspiron 2500	None
AE	Ethernet Router	Linksys	BEFSR41	None
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	AC	Y	N	None
2	Ethernet	I/O	Y	N	DVS-R-200: 1xRJ-45_shielded. 50-ft. CAT5UTP attached to Ethernet hub located outside of test area.
3	Wand cable	I/O	N	Y	DVS-R-200: detachable cable between base station and reader wand.
4	USB	I/O	-	-	DVS-R-200: 1xUSB. Not used in normal operation. No cable attached during test.
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					

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1.3.3 EUT Internal Operating Frequencies:

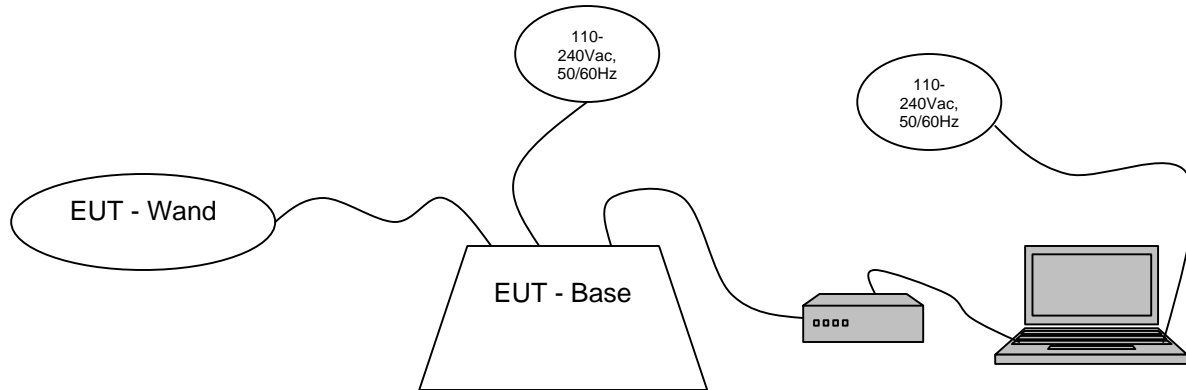
Frequency (MHz)	Description
0.133	RFID Frequency
16	Wand crystal
300	Base Station Panel PC

1.3.4 Power Interface:

Mode # /Rated	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	110-240	-	-	AC - 50-60Hz	1	None
1	120	-	-	AC-60Hz	1	None

1.4 Block Diagram:

The diagram below illustrates the configuration of the equipment above.



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1.5 EUT Configurations

Mode #	Description
1	DVS Reader System and DVS Dosimeter(s) configured to perform system's intended function. The Base Station of the DVS Reader System is connected to a remotely located laptop PC via an Ethernet connection.

1.6 EUT Operation Modes

Mode #	Description
1	DVS continuously interrogating two (2) DVS Dosimeters

2.0 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 Deviations from standard test methods

None

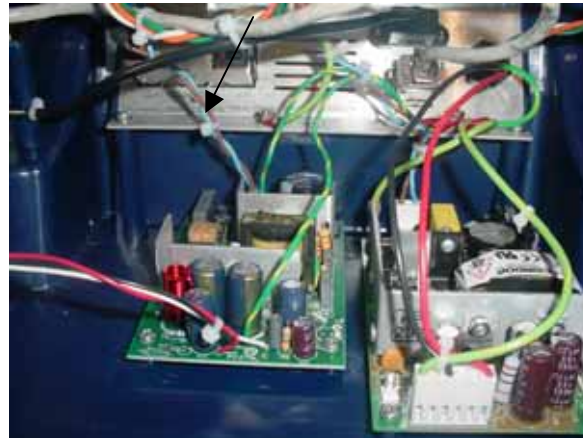
2.2 Device Modifications Necessary for Compliance

For conducted emissions a Corcom PS0S0DH3B filter was installed. Also the internal power wires were twisted together. See photos below:

Line Filter



Power Leads twisted



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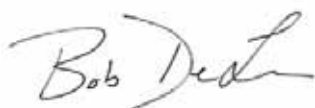
2.3 Reference Standards

Standard Number	Standard Name	Standard Date
FCC Part 15, Subpart C, 15.207, 15.209, 15.215	Code of Federal Regulations, Part 15, Radio Frequency Devices	2007

2.4 Results Summary

Requirement – Test	Result (Compliant / Non-Compliant)*
Conducted Emissions - Mains	Compliant
Radiated Emissions	Compliant
Occupied Bandwidth	Compliant

Test Engineer:



Bob DeLisi (Ext.22345)
 Senior Staff Engineer
 International EMC Services
 Conformity Assessment Services-

Reviewer:



Joe Danisi(Ext.23055)
 Lead Engineering Associate
 International EMC Services
 Conformity Assessment Services

Any information and documentation involving UL Mark services are provided on behalf of Underwriters Laboratories Inc. (UL) or any authorized licensee of UL.

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

The emissions tests were performed according to following regulations:

----- United States -----

Code of Federal Regulations Title 47	Part 15, Subpart C, Radio Frequency Devices
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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 – 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	FCC Part 15, Subpart C, 15.207	
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		
Frequency (MHz)	Limit (dB μ V)	
	Quasi-Peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50
Supplementary information: None		

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Table 1 Conducted Emissions EUT Configuration Settings

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

Table 2 Conducted Emissions Test Equipment

Test Equipment Used			
Description	Manufacturer	Model	Identifier
Conducted Emissions – GP 1			
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081
LISN	EMCO	3825/2R	ME5-790
LISN	Solar	9252-50-R-24-BNC	ME5A-636
Switch Driver	HP	11713A	44397
RF Switch Box	UL	4	44404
Measurement Software	UL	Version 9.3	44736
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43734
Multimeter	Fluke	87V	44547

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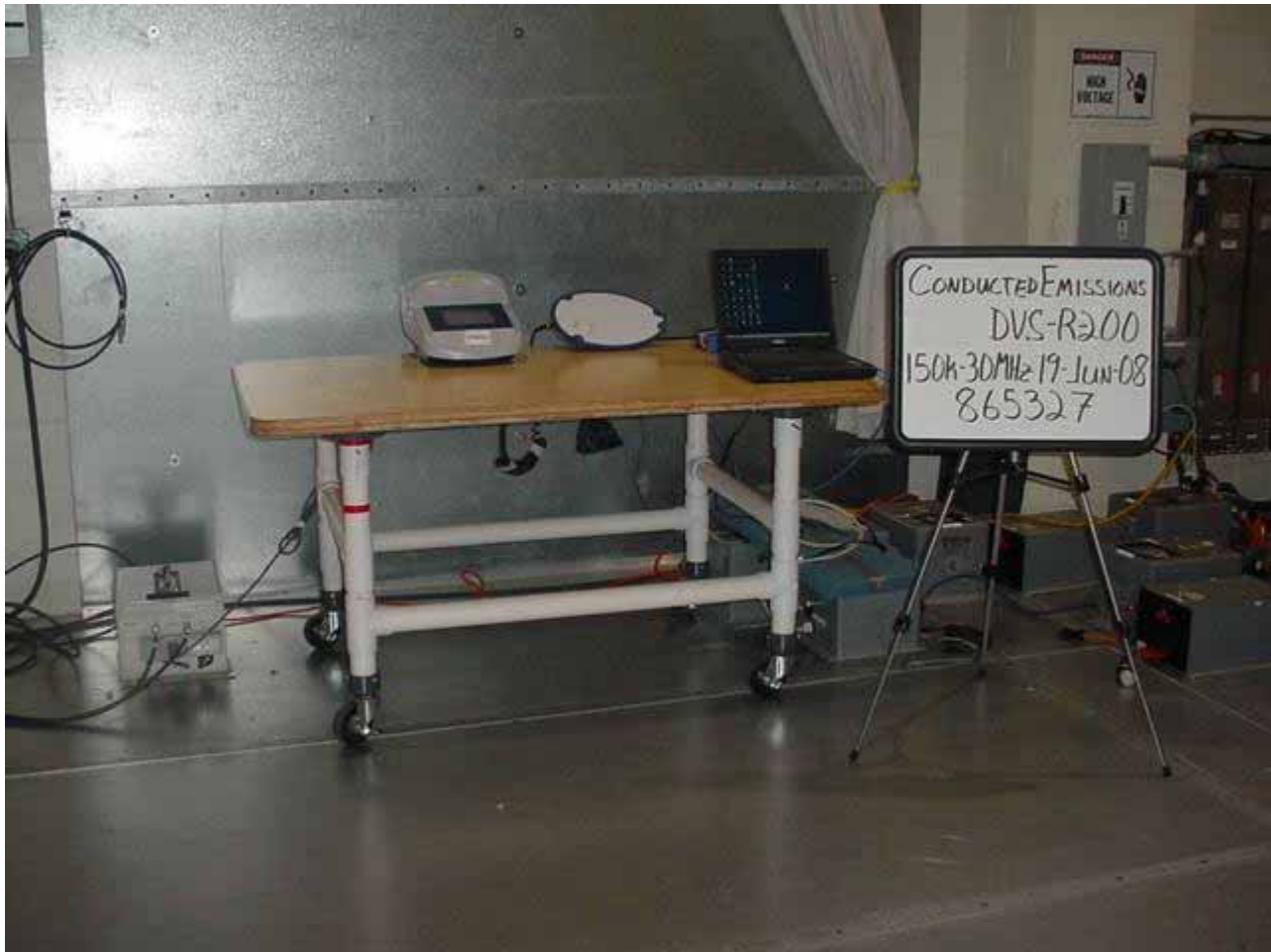
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Figure 1 Test Setup for Conducted Emissions



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Table 3 Conducted Emissions Data Points

Sicel Technologies
 Dose Verification System
 DVS-R-200 Scanning Mode
 Job: 865327 120V 60Hz
 Tested by: DC w/wires bundled

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4	5	6
=====											
Line - L1	.15	-	1MHz	-	-	-	-	-	-	-	-
1	.15323	43.42 pk	12.1	0	55.52	65.8	55.8	-	-	-	-
				Margin [dB]		-10.28	-.28	-	-	-	-
2	.15952	43.53 pk	11.9	0	55.43	65.5	55.5	-	-	-	-
				Margin [dB]		-10.07	-.07	-	-	-	-
3	.16989	42.99 pk	11.8	0	54.79	65	55	-	-	-	-
				Margin [dB]		-10.21	-.21	-	-	-	-
4	.17823	43.69 pk	11.7	0	55.39	64.6	54.6	-	-	-	-
				Margin [dB]		-9.21	.79	-	-	-	-
5	.19778	37.77 pk	11.4	0	49.17	63.7	53.7	-	-	-	-
				Margin [dB]		-14.53	-4.53	-	-	-	-
6	.2272	36.73 pk	11.2	0	47.93	62.6	52.6	-	-	-	-
				Margin [dB]		-14.67	-4.67	-	-	-	-
7	.2459	41.44 pk	11.1	0	52.54	61.9	51.9	-	-	-	-
				Margin [dB]		-9.36	.64	-	-	-	-
8	.25729	40.29 pk	11	0	51.29	61.5	51.5	-	-	-	-
				Margin [dB]		-10.21	-.21	-	-	-	-
9	.27957	42.49 pk	10.9	0	53.39	60.8	50.8	-	-	-	-
				Margin [dB]		-7.41	2.59	-	-	-	-
10	.28586	41.93 pk	10.9	0	52.83	60.6	50.6	-	-	-	-
				Margin [dB]		-7.77	2.23	-	-	-	-
11	.31731	39.23 pk	10.8	0	50.03	59.8	49.8	-	-	-	-
				Margin [dB]		-9.77	.23	-	-	-	-
12	.34214	34.87 pk	10.7	0	45.57	59.2	49.2	-	-	-	-
				Margin [dB]		-13.63	-3.63	-	-	-	-
13	.38788	37.47 pk	10.6	0	48.07	58.1	48.1	-	-	-	-
				Margin [dB]		-10.03	-.03	-	-	-	-
14	.40165	36.11 pk	10.6	0	46.71	57.8	47.8	-	-	-	-
				Margin [dB]		-11.09	-1.09	-	-	-	-
15	.45028	31.74 pk	10.5	0	42.24	56.9	46.9	-	-	-	-
				Margin [dB]		-14.66	-4.66	-	-	-	-
16	.51455	31.1 pk	10.5	0	41.6	56	46	-	-	-	-
				Margin [dB]		-14.4	-4.4	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C QPk
 LIMIT 2: FCC Part 15 Subpart C Avg

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No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4	5	6
=====											
Line - L1 1 - 30MHz -----											
18	9.9918	37.98 pk	10.6	0	48.58	60	50	-	-	-	-
				Margin [dB]		-11.42	-1.42	-	-	-	-
19	10.39208	35.71 pk	10.6	0	46.31	60	50	-	-	-	-
				Margin [dB]		-13.69	-3.69	-	-	-	-
20	10.65893	37.16 pk	10.6	0	47.76	60	50	-	-	-	-
				Margin [dB]		-12.24	-2.24	-	-	-	-
21	11.58712	41.89 pk	10.6	0	52.49	60	50	-	-	-	-
				Margin [dB]		-7.51	2.49	-	-	-	-
22	11.85977	36.27 pk	10.6	0	46.87	60	50	-	-	-	-
				Margin [dB]		-13.13	-3.13	-	-	-	-
23	12.12663	33.83 pk	10.6	0	44.43	60	50	-	-	-	-
				Margin [dB]		-15.57	-5.57	-	-	-	-
24	15.9902	35.03 pk	10.6	0	45.63	60	50	-	-	-	-
				Margin [dB]		-14.37	-4.37	-	-	-	-
25	16.12363	33.32 pk	10.6	0	43.92	60	50	-	-	-	-
				Margin [dB]		-16.08	-6.08	-	-	-	-
26	24.11762	32.82 pk	10.8	0	43.62	60	50	-	-	-	-
				Margin [dB]		-16.38	-6.38	-	-	-	-
Neutral .15 - 1MHz -----											
27	.15221	54.33 pk	12.1	0	66.43	65.9	55.9	-	-	-	-
				Margin [dB]		.53	10.53	-	-	-	-
28	.1551	43.89 pk	12	0	55.89	65.7	55.7	-	-	-	-
				Margin [dB]		-9.81	.19	-	-	-	-
29	.16547	42.53 pk	11.9	0	54.43	65.2	55.2	-	-	-	-
				Margin [dB]		-10.77	-.77	-	-	-	-
30	.17176	41.89 pk	11.8	0	53.69	64.9	54.9	-	-	-	-
				Margin [dB]		-11.21	-1.21	-	-	-	-
31	.18197	46.35 pk	11.6	0	57.95	64.4	54.4	-	-	-	-
				Margin [dB]		-6.45	3.55	-	-	-	-
32	.18299	45.46 pk	11.6	0	57.06	64.3	54.3	-	-	-	-
				Margin [dB]		-7.24	2.76	-	-	-	-
33	.19574	38.93 pk	11.5	0	50.43	63.8	53.8	-	-	-	-
				Margin [dB]		-13.37	-3.37	-	-	-	-
34	.20832	38.56 pk	11.4	0	49.96	63.3	53.3	-	-	-	-
				Margin [dB]		-13.34	-3.34	-	-	-	-
35	.22907	42.09 pk	11.2	0	53.29	62.5	52.5	-	-	-	-
				Margin [dB]		-9.21	.79	-	-	-	-
36	.23196	41.41 pk	11.2	0	52.61	62.4	52.4	-	-	-	-
				Margin [dB]		-9.79	.21	-	-	-	-
37	.25729	37.45 pk	11	0	48.45	61.5	51.5	-	-	-	-
				Margin [dB]		-13.05	-3.05	-	-	-	-
38	.26358	41.53 pk	11	0	52.53	61.3	51.3	-	-	-	-
				Margin [dB]		-8.77	1.23	-	-	-	-
39	.26783	44.34 pk	11	0	55.34	61.2	51.2	-	-	-	-
				Margin [dB]		-5.86	4.14	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C QPk
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Test No.	Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4	5	6
=====											
Neutral .15 - 1MHz -----											
40	.30252	41.13 pk	10.8	0	51.93	60.2	50.2	-	-	-	-
				Margin [dB]		-8.27	1.73	-	-	-	-
41	.32395	37.95 pk	10.8	0	48.75	59.6	49.6	-	-	-	-
				Margin [dB]		-10.85	-.85	-	-	-	-
42	.38754	37.16 pk	10.6	0	47.76	58.1	48.1	-	-	-	-
				Margin [dB]		-10.34	-.34	-	-	-	-
43	.4008	36.16 pk	10.6	0	46.76	57.8	47.8	-	-	-	-
				Margin [dB]		-11.04	-1.04	-	-	-	-
44	.44892	32.71 pk	10.6	0	43.31	56.9	46.9	-	-	-	-
				Margin [dB]		-13.59	-3.59	-	-	-	-
45	.51387	31.44 pk	10.5	0	41.94	56	46	-	-	-	-
				Margin [dB]		-14.06	-4.06	-	-	-	-
Neutral 1 - 30MHz -----											
17	24.40188	35.86 pk	11	0	46.86	60	50	-	-	-	-
				Margin [dB]		-13.14	-3.14	-	-	-	-
46	11.58712	40.55 pk	10.7	0	51.25	60	50	-	-	-	-
				Margin [dB]		-8.75	1.25	-	-	-	-
47	11.86557	35.56 pk	10.8	0	46.36	60	50	-	-	-	-
				Margin [dB]		-13.64	-3.64	-	-	-	-
48	15.9844	35.34 pk	10.7	0	46.04	60	50	-	-	-	-
				Margin [dB]		-13.96	-3.96	-	-	-	-
49	16.26285	35.42 pk	10.7	0	46.12	60	50	-	-	-	-
				Margin [dB]		-13.88	-3.88	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C QPk
LIMIT 2: FCC Part 15 Subpart C Avg

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Sicel Technologies
 Dose Verification System
 DVS-R-200 Scanning Mode
 Job: 865327 120V 60Hz
 Tested by: DC w/wires bundled

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4	5	6
Frequency	Reading	Factor	Factor	[dB(uVolts)]						
[MHz]	[dB(uV)]	[dB]	[dB]							
=====										
Line - L1	.15 - 1MHz									
.1519	16.09 ave	12.1	0	28.19	65.9	55.9	-	-	-	-
			Margin [dB]:		-37.71	-27.71	-	-	-	-
.15905	16.32 ave	11.9	0	28.22	65.5	55.5	-	-	-	-
			Margin [dB]:		-37.28	-27.28	-	-	-	-
.16976	9.57 ave	11.8	0	21.37	65	55	-	-	-	-
			Margin [dB]:		-43.63	-33.63	-	-	-	-
.17837	10.68 ave	11.7	0	22.38	64.6	54.6	-	-	-	-
			Margin [dB]:		-42.22	-32.22	-	-	-	-
.19645	30.08 ave	11.5	0	41.58	63.8	53.8	-	-	-	-
			Margin [dB]:		-22.22	-12.22	-	-	-	-
.22671	13.98 ave	11.2	0	25.18	62.6	52.6	-	-	-	-
			Margin [dB]:		-37.42	-27.42	-	-	-	-
.24639	12.35 ave	11.1	0	23.45	61.9	51.9	-	-	-	-
			Margin [dB]:		-38.45	-28.45	-	-	-	-
.25722	31.85 ave	11	0	42.85	61.5	51.5	-	-	-	-
			Margin [dB]:		-18.65	-8.65	-	-	-	-
.27853	16.16 ave	10.9	0	27.06	60.9	50.9	-	-	-	-
			Margin [dB]:		-33.84	-23.84	-	-	-	-
.28694	6.65 ave	10.9	0	17.55	60.6	50.6	-	-	-	-
			Margin [dB]:		-43.05	-33.05	-	-	-	-
.31869	27.9 ave	10.8	0	38.7	59.7	49.7	-	-	-	-
			Margin [dB]:		-21	-11	-	-	-	-
.3413	17.9 ave	10.7	0	28.6	59.2	49.2	-	-	-	-
			Margin [dB]:		-30.6	-20.6	-	-	-	-
.38752	27.93 ave	10.6	0	38.53	58.1	48.1	-	-	-	-
			Margin [dB]:		-19.57	-9.57	-	-	-	-
.40068	29.2 ave	10.6	0	39.8	57.8	47.8	-	-	-	-
			Margin [dB]:		-18	-8	-	-	-	-
.4495	27.76 ave	10.5	0	38.26	56.9	46.9	-	-	-	-
			Margin [dB]:		-18.64	-8.64	-	-	-	-
.51362	27.63 ave	10.5	0	38.13	56	46	-	-	-	-
			Margin [dB]:		-17.87	-7.87	-	-	-	-
Line - L1	1 - 30MHz									
9.9951	28.51 ave	10.6	0	39.11	60	50	-	-	-	-
			Margin [dB]:		-20.89	-10.89	-	-	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 ave - denotes average detection

LIMIT 1: FCC Part 15 Subpart C QPk
 LIMIT 2: FCC Part 15 Subpart C Avg

Job Number: 865327 File Number: MC15897 Page 21 of 36
 Model Number: DVS-R-200
 Client Name: SICEL TECHNOLOGIES
 FCC ID: TS9-DVS-R-200

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level Limit:1 [dB(uVolts)]	2	3	4	5	6
=====									
Line - L1 1 - 30MHz									
10.3983	32.78 ave	10.6	0	43.38	60	50	-	-	-
			Margin [dB]:		-16.62	-6.62	-	-	-
10.6652	32.07 ave	10.6	0	42.67	60	50	-	-	-
			Margin [dB]:		-17.33	-7.33	-	-	-
11.5973	33.49 ave	10.6	0	44.09	60	50	-	-	-
			Margin [dB]:		-15.91	-5.91	-	-	-
11.8638	33.95 ave	10.6	0	44.55	60	50	-	-	-
			Margin [dB]:		-15.45	-5.45	-	-	-
12.131	31.13 ave	10.6	0	41.73	60	50	-	-	-
			Margin [dB]:		-18.27	-8.27	-	-	-
15.9982	31.64 ave	10.6	0	42.24	60	50	-	-	-
			Margin [dB]:		-17.76	-7.76	-	-	-
16.1309	22.3 ave	10.6	0	32.9	60	50	-	-	-
			Margin [dB]:		-27.1	-17.1	-	-	-
24.1297	28.11 ave	10.8	0	38.91	60	50	-	-	-
			Margin [dB]:		-21.09	-11.09	-	-	-
Neutral .15 - 1MHz									
.15124	33.56 ave	12.1	0	45.66	65.9	55.9	-	-	-
			Margin [dB]:		-20.24	-10.24	-	-	-
.1541	23.82 ave	12	0	35.82	65.8	55.8	-	-	-
			Margin [dB]:		-29.98	-19.98	-	-	-
.16547	9.64 ave	11.9	0	21.54	65.2	55.2	-	-	-
			Margin [dB]:		-43.66	-33.66	-	-	-
.17105	10.53 ave	11.8	0	22.33	64.9	54.9	-	-	-
			Margin [dB]:		-42.57	-32.57	-	-	-
.18254	11.28 ave	11.6	0	22.88	64.4	54.4	-	-	-
			Margin [dB]:		-41.52	-31.52	-	-	-
.18412	19.93 ave	11.6	0	31.53	64.3	54.3	-	-	-
			Margin [dB]:		-32.77	-22.77	-	-	-
.19554	30.68 ave	11.5	0	42.18	63.8	53.8	-	-	-
			Margin [dB]:		-21.62	-11.62	-	-	-
.20717	24.48 ave	11.4	0	35.88	63.3	53.3	-	-	-
			Margin [dB]:		-27.42	-17.42	-	-	-
.22862	5.18 ave	11.2	0	16.38	62.5	52.5	-	-	-
			Margin [dB]:		-46.12	-36.12	-	-	-
.2321	6.14 ave	11.2	0	17.34	62.4	52.4	-	-	-
			Margin [dB]:		-45.06	-35.06	-	-	-
.25746	29.92 ave	11	0	40.92	61.5	51.5	-	-	-
			Margin [dB]:		-20.58	-10.58	-	-	-
.26363	27.74 ave	11	0	38.74	61.3	51.3	-	-	-
			Margin [dB]:		-22.56	-12.56	-	-	-
.26876	27.84 ave	11	0	38.84	61.2	51.2	-	-	-
			Margin [dB]:		-22.36	-12.36	-	-	-
.30249	7.45 ave	10.8	0	18.25	60.2	50.2	-	-	-
			Margin [dB]:		-41.95	-31.95	-	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 ave - denotes average detection

LIMIT 1: FCC Part 15 Subpart C QPk
 LIMIT 2: FCC Part 15 Subpart C Avg

Job Number: 865327 File Number: MC15897 Page 22 of 36
 Model Number: DVS-R-200
 Client Name: SICEL TECHNOLOGIES
 FCC ID: TS9-DVS-R-200

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level Limit:1 [dB(uVolts)]	2	3	4	5	6
=====									
Neutral .15 - 1MHz									
.32262	27.19 ave	10.8	0	37.99	59.6	49.6	-	-	-
			Margin [dB]:		-21.61	-11.61	-	-	-
.38691	28.02 ave	10.6	0	38.62	58.1	48.1	-	-	-
			Margin [dB]:		-19.48	-9.48	-	-	-
.40035	28.96 ave	10.6	0	39.56	57.8	47.8	-	-	-
			Margin [dB]:		-18.24	-8.24	-	-	-
.44974	30.39 ave	10.6	0	40.99	56.9	46.9	-	-	-
			Margin [dB]:		-15.91	-5.91	-	-	-
.51395	29.89 ave	10.5	0	40.39	56	46	-	-	-
			Margin [dB]:		-15.61	-5.61	-	-	-
Neutral 1 - 30MHz									
24.3957	23.85 ave	11	0	34.85	60	50	-	-	-
			Margin [dB]:		-25.15	-15.15	-	-	-
11.5978	33.74 ave	10.7	0	44.44	60	50	-	-	-
			Margin [dB]:		-15.56	-5.56	-	-	-
11.8737	17.71 ave	10.8	0	28.51	60	50	-	-	-
			Margin [dB]:		-31.49	-21.49	-	-	-
15.9978	33.16 ave	10.7	0	43.86	60	50	-	-	-
			Margin [dB]:		-16.14	-6.14	-	-	-
16.2642	34.15 ave	10.7	0	44.85	60	50	-	-	-
			Margin [dB]:		-15.15	-5.15	-	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 ave - denotes average detection

LIMIT 1: FCC Part 15 Subpart C QPk
 LIMIT 2: FCC Part 15 Subpart C Avg

4.2 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) 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, 15.215

Table 4 Occupied Bandwidth Configuration Settings

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

Table 5 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth (MHz)	Occupied Bandwidth Requirements	
	dBc	%OBW
0.01	-20	99
Supplementary information: The 99% Power OBW is included for informational purposes only.		

Table 6 Occupied Bandwidth Test Equipment

Test Equipment Used			
Description	Manufacturer	Model	Identifier
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081
Active Loop Antenna	EMCO	6507	5A-288
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268
Measurement Software	UL	Version 9.3	44740
Multimeter	Fluke	87V	44547

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Model Number: DVS-R-200

Client Name: SICEL TECHNOLOGIES

FCC ID: TS9-DVS-R-200

Figure 3 Test Setup for Occupied Bandwidth



Figure 4 Occupied Bandwidth Graph – 20dB

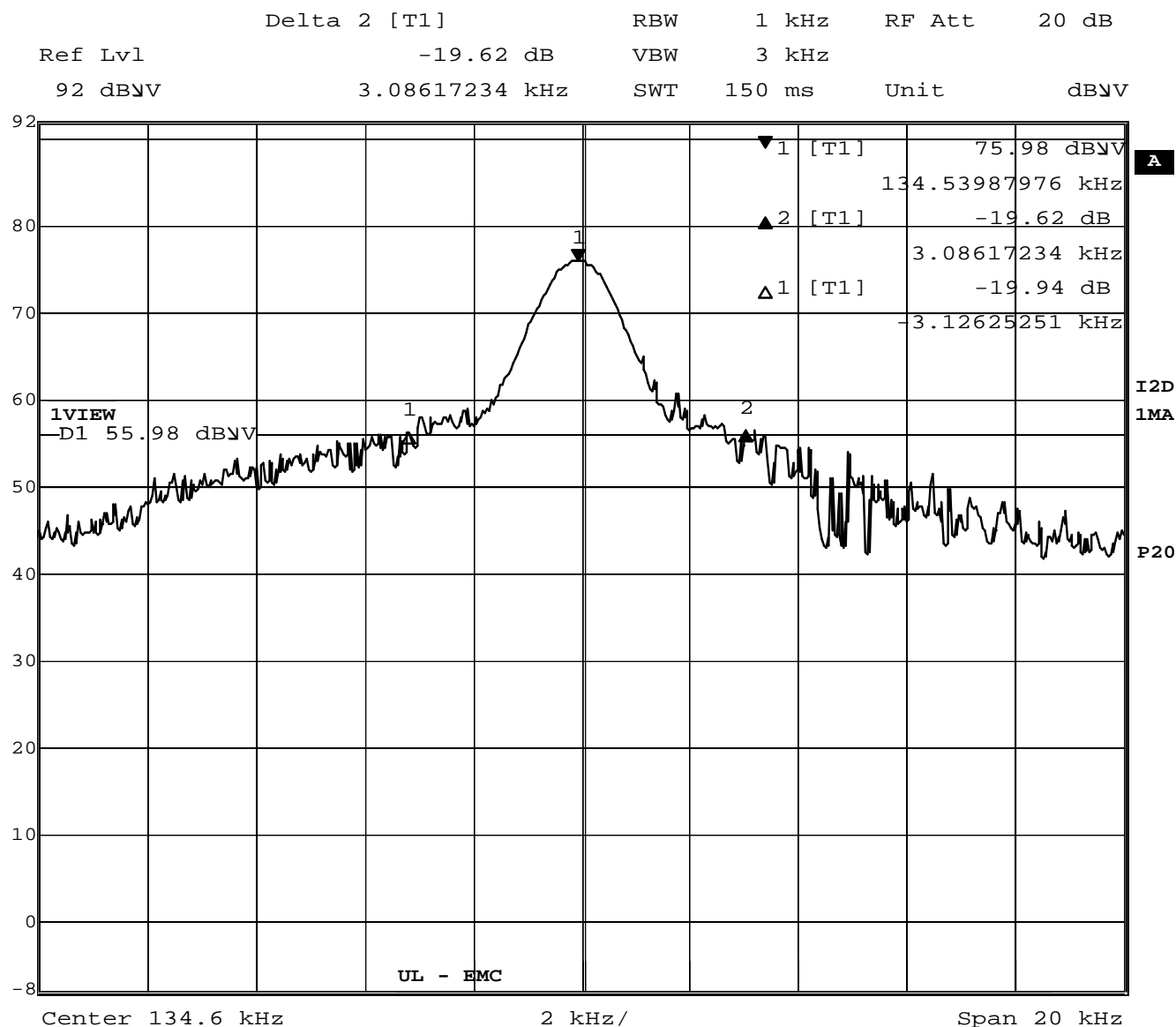
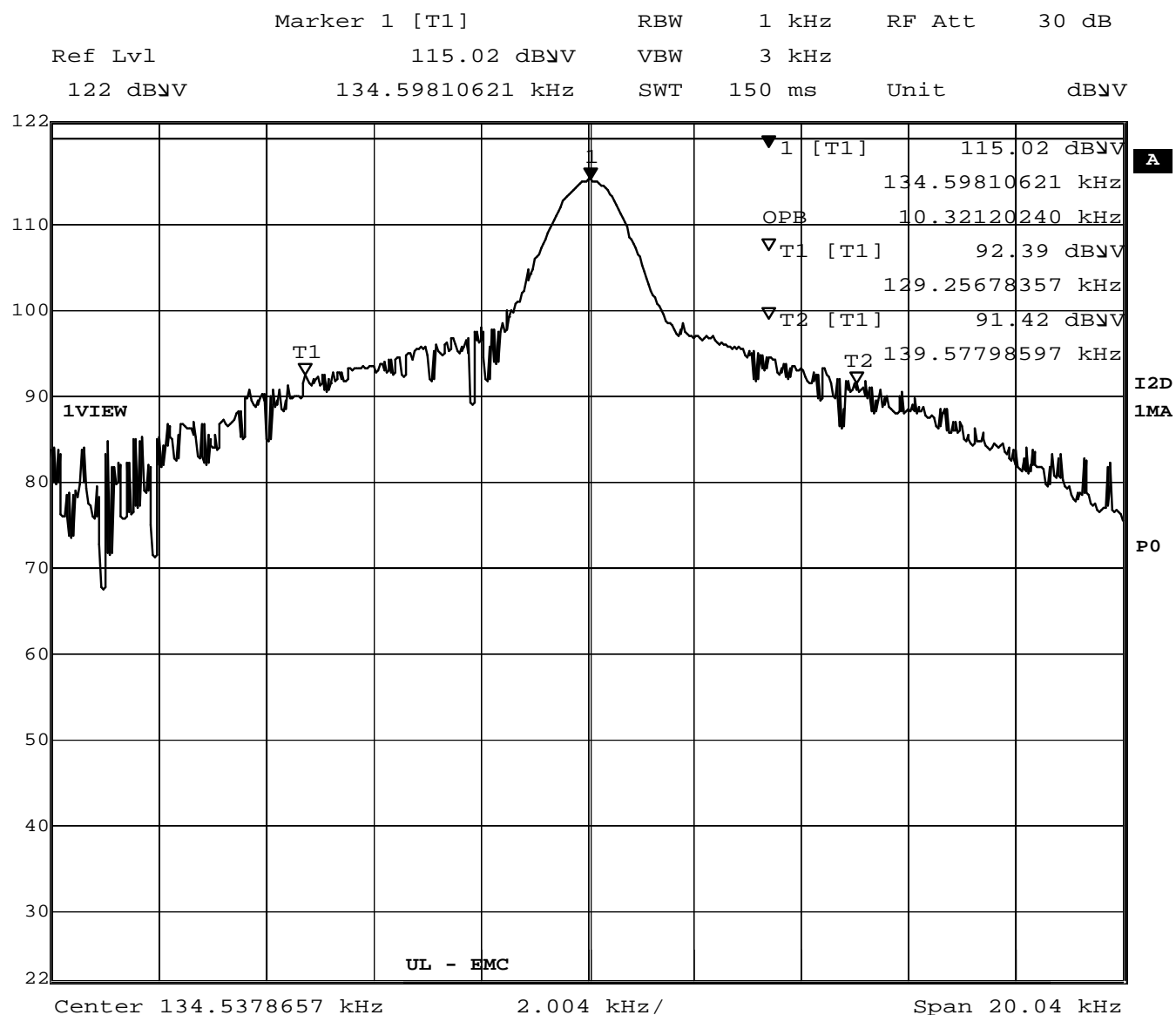


Figure 5 Occupied Bandwidth Graph – 99% Power (informational purposes only).



4.3 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-meter. The EUT was rotated 360° about its azimuth with the receive antenna located at various azimuths with respect to its center axis. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna around its center axis to maximize the signal.			
Basic Standard		FCC Part 15, Subpart C		
UL LPG		80-EM-S0029		
	Frequency range	Measurement Point		
Fully configured sample scanned over the following frequency range	0.009 MHz – 30MHz	(3 meter measurement distance)		
Limits				
Frequency (MHz)	Limit (dBµV/m)			
	Quasi-Peak	Average		
	General Emissions			
0.009 – 0.090	-	154.5 – 134.5		
0.090 – 0.110	134.5 – 132.8	-		
0.110 – 0.490	-	132.8 – 119.8		
0.490 – 1.705	86.8 – 76	-		
1.705 – 30	82.5	-		
Supplementary information: Per 15.33 (a) (1) measurements of a transmitter are made from the lowest generated frequency to the 10 th harmonic. Since the device operates at 133kHz and this is the lowest generated frequency in the device, a start frequency of 9kHz was chosen. The upper frequency of 30MHz was used in lieu of 13.3MHz (10 th harmonic).				
Above the 10 th harmonic, the digital device is a medical apparatus used under the guidance of a medical practitioner. Per 15.103 (e), this product is exempt from FCC Part 15, 15.109 emissions in the range 30MHz to 5000MHz.				
Per 15.31 (f) (2), the extrapolation factor for frequencies below 30MHz the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). For this investigation an extrapolation factor of 53dB/decade was used and determined by measuring the fundamental frequency at 2 distances. The experiment was performed twice with distanced of 3-meters and 30-meters as well as 5-meters and 50-meters. The data for the extrapolation factor used for this investigation is shown below.				
Distance (meters)				
	Meter Reading	Antenna Factor	Cable Loss	Final Reading
3	113.6	12.5	0.1	126.2
5	101.5	12.5	0.1	114.1

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 Client Name: SICEL TECHNOLOGIES
 FCC ID: TS9-DVS-R-200

30	60.9	12.5	0.1	73.5
50	48.4	12.5	0.1	61
	3 to 30 meters	52.7		
	5 to 50 meters	53.1		
Extrapolation Factor = 53dB/decade				

Table 7 Radiated Emissions EUT Configuration Settings

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

Table 8 Radiated Emissions Test Equipment

Test Equipment Used			
Description	Manufacturer	Model	Identifier
0.150kHz-30MHz			
EMI Receiver	Rohde & Schwarz	ESIB40	34968
Active Loop Antenna	EMCO	6507	ME5A-288
Switch Driver	HP	11713A	ME7A-627
System Controller	Sunol Sciences	SC99V	44396
Camera Controller	Panasonic	WV-CU254	44395
RF Switch Box	UL	1	44398
Measurement Software	UL	Version 9.3	44740
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268
Multimeter	Fluke	87V	44547

Figure 6 Test setup for Radiated Emissions

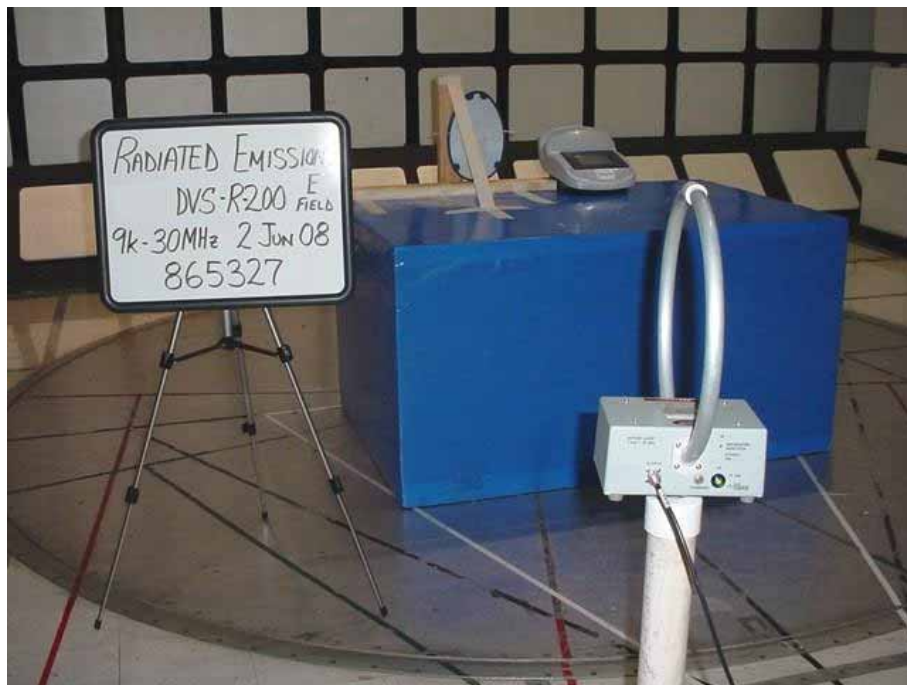
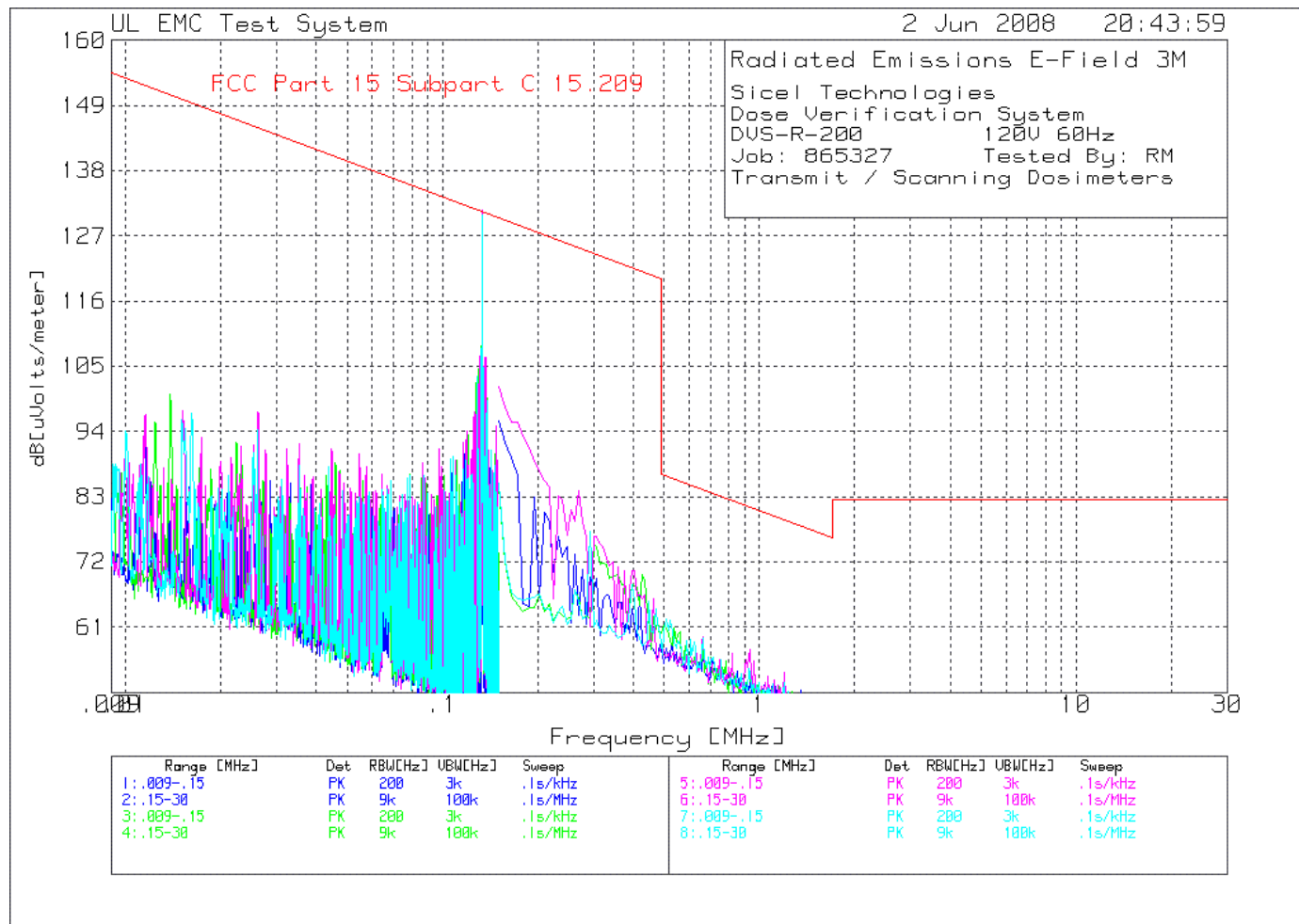


Figure 7 Radiated Emissions Graph



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 Model Number: DVS-R-200
 Client Name: SICEL TECHNOLOGIES
 FCC ID: TS9-DVS-R-200

Table 9 Radiated Emissions Data Points

Sicel Technologies											
Dose Verification System											
DVS-R-200 120V 60Hz											
Job: 865327 Tested By: RM											
Transmit / Scanning Dosimeters											
	Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4	5	6
No.	Frequency	Reading	Factor	Factor	dB[uVolts/meter]						
	[MHz]	[dB(uV)]	[dB]	[dB]							
=====											
0° .009 - .15MHz -----											
1	.01148	45.81 pk	19.9	28.3	94.01	152.4	-	-	-	-	-
	Azimuth:6	Height:100	Horz	Margin [dB]	-58.39		-	-	-	-	-
2	.13336	91.75 pk	20	15.8	127.55	131.1	-	-	-	-	-
	Azimuth:285	Height:100	Horz	Margin [dB]	-3.55		-	-	-	-	-
0° .15 - 30MHz -----											
3	.15	60.09 pk	20	15.7	95.79	130.1	-	-	-	-	-
	Azimuth:53	Height:100	Horz	Margin [dB]	-34.31		-	-	-	-	-
4	.19479	47.29 pk	20	15.6	82.89	127.8	-	-	-	-	-
	Azimuth:355	Height:100	Horz	Margin [dB]	-44.91		-	-	-	-	-
45° .009 - .15MHz -----											
5	.01374	53.34 pk	20	27	100.34	150.8	-	-	-	-	-
	Azimuth:1	Height:100	Horz	Margin [dB]	-50.46		-	-	-	-	-
6	.13336	94.92 pk	20	15.8	130.72	131.1	-	-	-	-	-
	Azimuth:1	Height:100	Horz	Margin [dB]	-.38		-	-	-	-	-
45° .15 - 30MHz -----											
7	.29929	39.16 pk	20	15.6	74.76	124.1	-	-	-	-	-
	Azimuth:131	Height:100	Horz	Margin [dB]	-49.34		-	-	-	-	-
8	.42618	34.29 pk	20	15.5	69.79	121	-	-	-	-	-
	Azimuth:70	Height:100	Horz	Margin [dB]	-51.21		-	-	-	-	-
90° .009 - .15MHz -----											
9	.02615	54.98 pk	20	22.2	97.18	145.2	-	-	-	-	-
	Azimuth:149	Height:100	Horz	Margin [dB]	-48.02		-	-	-	-	-
10	.13336	95.57 pk	20	15.8	131.37	131.1	-	-	-	-	-
	Azimuth:1	Height:100	Horz	Margin [dB]	.27		-	-	-	-	-
90° .15 - 30MHz -----											
11	.15	65.81 pk	20	15.7	101.51	130.1	-	-	-	-	-
	Azimuth:307	Height:100	Horz	Margin [dB]	-28.59		-	-	-	-	-
12	.26943	48.4 pk	20	15.6	84	125	-	-	-	-	-
	Azimuth:1	Height:100	Horz	Margin [dB]	-41		-	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - Average log detector
 ave - Average detector

Job Number: 865327 File Number: MC15897 Page 32 of 36
 Model Number: DVS-R-200
 Client Name: SICEL TECHNOLOGIES
 FCC ID: TS9-DVS-R-200

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4	5	6
=====											
135° .009 - .15MHz -----											
13	.01617	51.31 pk	20.1	25.6	97.01	149.4	-	-	-	-	-
	Azimuth:358	Height:100	Horz	Margin [dB]		-52.39	-	-	-	-	-
14	.13336	94.73 pk	20	15.8	130.53	131.1	-	-	-	-	-
	Azimuth:358	Height:100	Horz	Margin [dB]		-.57	-	-	-	-	-
135° .15 - 30MHz -----											
15	.15	49.54 pk	20	15.7	85.24	130.1	-	-	-	-	-
	Azimuth:328	Height:100	Horz	Margin [dB]		-44.86	-	-	-	-	-
16	.47097	28.51 pk	20	15.5	64.01	120.1	-	-	-	-	-
	Azimuth:6	Height:100	Horz	Margin [dB]		-56.09	-	-	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - Average log detector
 ave - Average detector

Job Number: 865327 File Number: MC15897 Page 33 of 36
 Model Number: DVS-R-200
 Client Name: SICEL TECHNOLOGIES
 FCC ID: TS9-DVS-R-200

Sichel Technologies
 Dose Verification System
 DVS-R-200 120V 60Hz
 Job: 865327 Tested By: RM
 Transmit / Scanning Dosimeters

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4	5	6
Frequency	Reading	Factor	Factor	dB[uVolts/meter]						
[MHz]	[dB(uV)]	[dB]	[dB]							
.1333	93.12 ave	20	15.8	128.92	131.1	-	-	-	-	-
Azimuth: 16 Height:100 Horz Margin [dB]: -2.18						-	-	-	-	-

Note: maximum signal of all azimuths reported.

LIMIT 1: FCC Part 15 Subpart C 15.209

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - Average log detector
 ave - Average detector

Job Number: 865327 File Number: MC15897 Page 34 of 36
Model Number: DVS-R-200
Client Name: SICEL TECHNOLOGIES
FCC ID: TS9-DVS-R-200

5.0 Fundamental Frequency and Spurious Emissions Measurement Limit Calculations

Radiated Emissions Limit conversion from $\mu\text{V/m}$ to $\text{dB}\mu\text{V/m}$ (accordance with paragraph 15.209 Fundamental and Spurious limits)

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

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

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

Radiated Emissions test data obtained during measurements.

Field Strength ($\text{dB}\mu\text{A/m}$) = Measured field strength ($\text{dB}\mu\text{A}$) + Antenna Factor (dB/m) + G/L Factor (dB)

Field Strength ($\text{dB}\mu\text{A/m}$) = $93.12\text{dB}\mu\text{A} + 15.8\text{dB/m} + 20\text{dB}$

Field Strength ($\text{dB}\mu\text{A/m}$) = 33.84

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.



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