

Electromagnetic Compatibility Test Report

Prepared in accordance with

FCC Part 15: October 2007, RSS-210: June 2007

On

Electronic Article Surveillance Detection System

Evolve Antenna Family

Prepared for:

Checkpoint Systems Inc.

101 Wolf Drive

Thorofare, NJ 08086

Prepared by:

TUV Rheinland of North America, Inc.

Auftraggeber: <i>Client:</i>			Checkpoint Systems Inc. 101 Wolf Drive Thorofare, NJ 08086		
Bezeichnung: <i>Identification:</i>	Electronic Article Surveillance Detection System	Serien-Nr.: <i>Serial No.</i>	See Section 3.5		
Gegenstand der Prüfung: <i>Test item:</i>	Evolve Antenna Family	Prüfdatum: <i>Date</i>	10/30/09		
Prüfort: <i>Testing location:</i>	TUV Rheinland of North America 12 Commerce Road Newtown, CT 06470-1607 U.S.A.				
Prüfgrundlage: <i>Test specification:</i>	Emissions: FCC Part 15 Subpart C: October 2007 / RSS-210: June 2007 FCC Part 15 Subpart 15.223/RSS-210 Annex A2.3 FCC Part 15 Subpart 15.205 and 15.209				
Prüfergebnis: <i>Test Result</i>	Der vorstehend beschriebene Prüfgegenstand wurde geprüft und entspricht oben genannter Prüfgrundlage. The above product was found to be Compliant to the above test standard(s)				
geprüft / tested by: David Hollis		kontrolliert / reviewed by: Randy Sorrenti			
19 November 2009		19 November 2009			
Datum <i>Date</i>	Name <i>Name</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name <i>Name</i>	Unterschrift <i>Signature</i>
Sonstiges : <i>Other Aspects:</i>	None				
Abkürzungen: OK, Pass, Compliant, Complies = entspricht Prüfgrundlage Fail, Not Compliant, Does not Comply = entspricht nicht Prüfgrundlage N/A = nicht anwendbar	Abbreviations: OK, Pass, Compliant, Complies = passed Fail, Not Compliant, Does Not Comply = failed N/A = not applicable				
		Industry Canada			
US5112	200111-0	3466D-1			

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1 General Information

1.1 Scope

This report is intended to document the status of conformance with the requirements of the FCC Part 15: October 2007, RSS-210: June 2007 based on the results of testing performed on 10/30/09 on the Electronic Article Surveillance Detection System, Model No. Evolve Antenna Family, manufactured by Checkpoint Systems Inc.. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT (Equipment Under Test) in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

1.3 Summary of Test Results

Applicant	Checkpoint Systems Inc. 101 Wolf Drive Thorofare, NJ 08086	Tel	(856) 251-2141	Contact	Bayode Olabisi
		Fax	(856) 384-2366	e-mail	bayode.olabisi@checkpt.com
Description	Electronic Article Surveillance Detection System	Model Number	Evolve Antenna Family		
Serial Number	See Section 3.5	Test Voltage/Freq.	120V/60Hz		
Test Date Completed:	10/30/09	Test Engineer	David Hollis		
Standards	Description	Severity Level or Limit		Criteria	Test Result
FCC Part 15 Subpart C: October 2007 / RSS-210: June 2007	Intentional Radiators / Low Power Licensed Exempt Radiocommunication Devices	See sections below		See Below	Complies
FCC Part 15 Subpart 15.223/RSS-210 Annex A2.3	Operation in the band 1.705- 10 MHz	100µV/m @30m		Limit	Complies
FCC Part 15 Subpart 15.207	Conducted limits	Per table in section 207, 150kHz - 30MHz		Limit	Complies
FCC Part 15 Subpart 15.205 and 15.209	Radiated emission limits; general requirements	Class B and per table in section 205 From Fundamental - 1000MHz		Limit	Complies

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2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America located at 12 Commerce Road, Newtown CT is accredited by the commission for performing testing services for the general public on a fee basis. This laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (Registration No US5112). The laboratory scope of accreditation includes: Title 47 CFR Part 15, and 18. The accreditation is updated every 3 years.

2.1.2 NIST / NVLAP

Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Standard 17025:2005 (Lab code: 200111-0). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

2.1.3 Industry Canada

Registration No.: 3466D-1. The OATS has been accepted by Industry Canada to perform testing to 3 and to 10m, based on the test procedures described in ANSI C63.4-2003.

2.2 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions measurements is ± 3.2 dB
The estimated combined standard uncertainty for conducted emissions measurements is ± 1.2 dB

2.3 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005. Equipment calibration records are kept on file at the test facility.

2.4 Measurement Equipment Used

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal dd/mm/yy	Next Cal dd/mm/yy	Test
Power Supply	California Instruments	5001iX	HK53766	12/15/08	12/15/09	All
Antenna, Bilog	Sunol Sciences	JB3	A022707	12/12/08	12/12/10	RE
Receiver	Hewlett Packard	HP 8546A, 85460A	3330A00125, 3325A00134	08/27/09	08/27/10	RE, CE
Antenna, Bilog	Schaffner	CBL6112D	22238	05/01/08	05/01/10	RE
LISN	Schwarzbeck	NSLK 8126A (4 x 25A)	8126278	08/20/08	08/20/10	CE
Magnetic Field Loop Antenna	Schwarzbeck	FMZB 1516	151600/94	11/12/08	11/12/10	RE<30MHz

Note: CE = Conducted Emissions, CI= Conducted Immunity, DP=Disturbance Power, EFT=Electrical Fast Transients, ESD = Electrostatic Discharge, FLI=Flicker, HAR=Harmonics, MF=Magnetic Field Immunity, RE=Radiated Emissions, RI=Radiated Immunity, SI=Surge Immunity, VDSI=Voltage Dips and Short Interruptions

3 Product Information

3.1 Equipment Under Test (EUT) Description

The Evolve Antennas are an Electronic Article Surveillance System (EAS). The system detects target tags attached to merchandise. The targets resonate in the region of 7.2 MHz or 8.2 MHz. When an article of merchandise is purchased, the target is deactivated which causes it to no longer resonate. The Evolve Antennas monitor an area of 3.5 feet on either side of the antenna in the 7.0 to 10.0 MHz range and trigger an alarm when a non-deactivated target is detected.

3.2 General Product Information

The Evolve family of antennas are used for electronic article surveillance. The Evolve antennas continuously scan at a predetermined frequency and detect anti-pilferage tags which pass through the field generated by the antennas. When a tag is detected, the system generates an audible alarm and activates a flashing light on the antenna.

The Evolve antenna family consists of P10, P20, G10, and G20. All four models are floor standing. The P10 and P20 antenna loops are mounted in a hollow plastic frame. The G10 and G20 antenna loops are mounted in a solid Plexiglas frame that is machined to allow the antenna wire to pass through the frame at various points. Both P and G series have three separate loop antenna configurations per gate. All four antenna models use the same digital electronics and transmitter sections. The primary differences between the models are frame material and frame size.

3.3 EUT Modes of Operation

The equipment under test was operated during the measurement under the following conditions:

- Continuous sweep mode at 7.2 Band

3.4 EUT Test Configurations

The models listed below were configured as follows for final testing:

P10: 7.2 band, transmit power = 31

P20: 7.2 band, transmit power = 31

G10: 7.2 band, transmit power = 27

G20: 7.2 band, transmit power = 27

3.5 EUT Serial Numbers

P10 Master: 721603350D10419138
Submaster: 721603350D11399067

P20 Master: 721603350D10419138
Submaster: 721603350D11399067

G10 Master: 721603500D13118038
Submaster: 721603500D12058107

G20 Master: 721603500D13118038
Submaster: 721603500D12058107

3.6 Electrical Support Equipment

None

3.7 EUT Equipment/Cabling Information

Antenna	Cable description	Connected to	Port	Cable length	
				Length	Shielded
P10/P20/G10/G20	Pedestal main pwr AC	TR4210	J18 / J31	3.05 m	Yes
P10/P20/G10/G20	Ext. dc power supply	TR4210	N/A	3.96 m	Yes
P10/P20	Interpedestal LED Lights/sounder (5594 type)	TR4210	J54/J41	3.96 m	Yes
G10/G20	Interpedestal LED Lights/sounder (Cat 5)	TR4210 & dc pwr pcb	J54/J41 & 24 vdc/gnd	3.96 m	No
P10/P20/G10/G20	Interpedestal RG-59 RF coax cable	Coupler pcb	J5	3.96 m	Yes

3.8 Modifications

No modifications implemented for compliance relative to previously tested system for certification under FCC ID: DO4EVOLVE / IC ID: 3356B-EVOLVE.

4 Measurements

4.1 Operation in the band 1.705-10MHz

This test measures the electromagnetic levels of spurious signals generated by the EUT that radiated from the EUT and may affect the performance of other nearby electronic equipment.

4.1.1 Over View of Test

Results	Complies (as tested per this report)				Date	10/26/09		
Standard	FCC Part 15 Subpart 15.223/RSS-210 Annex A2.3							
Product Model	Evolve Antenna Family			Serial#	See Section 3.5			
Configuration	See test plan for details							
Test Set-up	Tested on a 10m O.A.T.S. placed on turn-table, see test plans for details							
EUT Powered By	120V/60Hz	Temp	22°C	Humidity	45%	Pressure	1000mbar	
Emissions Limits	100µV @ 30m (see Note)							
Perf. Criteria	Below Limit		Perf. Verification	Readings Under Limit				
Mod. to EUT	None		Test Performed By	David Hollis				

Note: The limits were adjusted in dBµV for a 10m testing resulting in a peak limit of 80dBµV/m. Measurements have been made in all three orthogonal axes of loop antenna and the EUT was rotated to locate the maximum emissions.

4.1.2 Test Procedure

The emissions tests on the fundamental signal were performed using the procedures of ANSI C63.4 including methods for signal maximizations and EUT configuration. The photos included with the report show the EUT in its maximized configuration.

The frequency range from 1.705 – 10MHz was investigated for this test using a magnetic field loop antenna.

4.1.3 Deviations

Measurement of the fundamental emissions – 1.705 to 10.0 MHz – was performed by setting a spectrum analyzer to “max-hold”, peak detector, 300 kHz bandwidth and a span from 6.0 MHz to 10 MHz. A resolution bandwidth of 300 kHz was used in performing the “true peak” measurements because increasing the bandwidth above 300 kHz did not increase the detected peak of the fundamental.

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4.1.4 Final Test

All final radiated emissions measurements were below (in compliance with) the limits.

4.1.5 Final Measurement Data

P-20 7.2 Band TX=31:

Radiated Emissions Measurements																		
Standard:	47 CFR FCC Part 15.223		PRESCAN or FINAL:	Final		Date:	10/26/2009											
Device Tested:	P20 Master/Submaster		Distance:	10m		File Name:												
Mode:	7.2 Band TX=31																	
Modifications:																		
Meas #	Freq (MHz)	Measured Peak (dB μ V/m)	Peak Limit	Peak Margin	Final Average (dB μ V/m)	Average Limit	Average Margin	Result	Orientation (X,Y,Z)									
RBW = 300kHz VBW=300kHz (FCC Settings)																		
1	7.2	74.07	80.00	-5.93	39.62	60.00	-20.38	Complied	X Orientation									
2	7.6	76.41	80.00	-3.59	41.18	60.00	-18.82	Complied	X Orientation									
3	8.06	77.41	80.00	-2.59	43.29	60.00	-16.71	Complied	X Orientation									
4	8.31	78.18	80.00	-1.82	43.98	60.00	-16.02	Complied	X Orientation									
5	7.2	73.45	80.00	-6.55	38.15	60.00	-21.85	Complied	Y Orientation									
6	7.6	75.85	80.00	-4.15	40.68	60.00	-19.32	Complied	Y Orientation									
7	8.06	77.79	80.00	-2.21	43.78	60.00	-16.22	Complied	Y Orientation									
8	8.31	78.28	80.00	-1.72	44.35	60.00	-15.65	Complied	Y Orientation									
9	7.2	58.01	80.00	-21.99	31.58	60.00	-28.42	Complied	Z Orientation									
10	7.6	61.12	80.00	-18.88	32.26	60.00	-27.74	Complied	Z Orientation									
11	8.06	63.01	80.00	-16.99	33.82	60.00	-26.18	Complied	Z Orientation									
12	8.31	63.73	80.00	-16.27	34.36	60.00	-25.64	Complied	Z Orientation									
Tested by:	David Hollis																	
TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009																		
Peak Limit = Average Limit + 20dB = 60dB μ V/m + 20dB = 80dB μ V/m																		
Average limit = 100 μ V/m @ 30m																		
Average Limit = $20 \log(100\mu\text{V}) = 40\text{dB}\mu\text{V/m}$ @ 30m																		
For 10m measurement the average limit was adjusted = $40\log(10/30) = 20\text{dB}$																		
Average limit = 60dB μ V/m @ 10m																		

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P-10 7.2 Band TX= 31:

Radiated Emissions Measurements								
Standard:			PRESCAN or FINAL:			Date:		
Device Tested:			Distance:			9/23/09		
Mode:			File Name:					
Modifications:								
Meas #	Freq (MHz)	Measured Peak (dB μ V/m)	Peak Limit	Peak Margin	Final Average (dB μ V/m)	Average Limit	Average Margin	Result
RBW = 300kHz VBW=300kHz (FCC Settings)								
1	7.2	75.19	80.00	-4.81	40.95	60.00	-19.05	Complied
2	7.59	76.07	80.00	-3.93	41.25	60.00	-18.75	Complied
3	8.06	76.87	80.00	-3.13	42.02	60.00	-17.98	Complied
4	8.31	76.98	80.00	-3.02	42.15	60.00	-17.85	Complied
5	7.2	75.17	80.00	-4.83	40.88	60.00	-19.12	Complied
6	7.59	77.26	80.00	-2.74	42.19	60.00	-17.81	Complied
7	8.06	78.81	80.00	-1.19	43.95	60.00	-16.05	Complied
8	8.31	79.52	80.00	-0.48	44.65	60.00	-15.35	Complied
9	7.2	58.46	80.00	-21.54	30.37	60.00	-29.63	Complied
10	7.59	60.39	80.00	-19.61	33.25	60.00	-26.75	Complied
11	8.06	61.95	80.00	-18.05	34.55	60.00	-25.45	Complied
12	8.31	62.75	80.00	-17.25	35.94	60.00	-24.06	Complied
Tested by: David Hollis								
TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009								
Peak Limit = Average Limit + 20dB = 60dB μ V/m + 20dB = 80dB μ V/m								
Average limit = 100 μ V/m @ 30m								
Average Limit = $20 \log(100\mu V) = 40$ dB μ V/m @ 30m								
For 10m measurement the average limit was adjusted = $40 \log(10/30) = 20$ dB								
Average limit = 60dB μ V/m @ 10m								

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G-20 7.2 Band TX= 27:

Radiated Emissions Measurements									
Standard:			PRESCAN or FINAL:			Date:			
Device Tested:			Distance:			File Name:			
Mode:									
Modifications:									
Meas #	Freq (MHz)	Measured Peak (dB μ V/m)	Peak Limit	Peak Margin	Final Average (dB μ V/m)	Average Limit	Average Margin	Result	Orientation (X,Y,Z)
RBW = 300kHz VBW=300kHz (FCC Settings)									
1	7.200	74.01	80.00	-5.99	60.00	-60.00	Complied	X Orientation	
2	7.600	76.91	80.00	-3.09	60.00	-60.00	Complied	X Orientation	
3	8.060	77.29	80.00	-2.71	60.00	-60.00	Complied	X Orientation	
4	8.310	77.48	80.00	-2.52	60.00	-60.00	Complied	X Orientation	
5	7.200	72.9	80.00	-7.10	60.00	-60.00	Complied	Y Orientation	
6	7.600	74.3	80.00	-5.70	60.00	-60.00	Complied	Y Orientation	
7	8.060	77.92	80.00	-2.08	60.00	-60.00	Complied	Y Orientation	
8	8.310	79.3	80.00	-0.70	60.00	-60.00	Complied	Y Orientation	
9	7.200	60.57	80.00	-19.43	60.00	-60.00	Complied	Z Orientation	
10	7.600	66.17	80.00	-13.83	60.00	-60.00	Complied	Z Orientation	
11	8.060	65.11	80.00	-14.89	60.00	-60.00	Complied	Z Orientation	
12	8.310	65.54	80.00	-14.46	60.00	-60.00	Complied	Z Orientation	
Tested by: David Hollis									
TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009									
Peak Limit = Average Limit + 20dB = 60dB μ V/m + 20dB = 80dB μ V/m									
Average limit = 100 μ V/m @ 30m									
Average Limit = 20 \log (100 μ V) = 40dB μ V/m @ 30m									
For 10m measurement the average limit was adjusted = 40 \log (10/30) = 20dB									
Average limit = 60dB μ V/m @ 10m									

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G-10 7.2 Band TX= 27:

Radiated Emissions Measurements									
Standard:			PRESCAN or FINAL:			Date:			
Device Tested:			Distance:			File Name:			
Mode:									
Modifications:									
Meas #	Freq (MHz)	Measured Peak (dB μ V/m)	Peak Limit	Peak Margin	Final Average (dB μ V/m)	Average Limit	Average Margin	Result	Antenna Orientation (X,Y,Z)
RBW = 300kHz VBW=1MHz (FCC Settings)									
1	7.2	74.26	80.00	-5.74	39.95	60.00	-20.05	Complied	X Orientation
2	7.6	74.47	80.00	-5.53	40.33	60.00	-19.67	Complied	X Orientation
3	8.06	73.5	80.00	-6.50	38.47	60.00	-21.53	Complied	X Orientation
4	8.31	73.79	80.00	-6.21	38.66	60.00	-21.34	Complied	X Orientation
5	7.2	76.6	80.00	-3.40	41.83	60.00	-18.17	Complied	Y Orientation
6	7.6	77.64	80.00	-2.36	42.24	60.00	-17.76	Complied	Y Orientation
7	8.06	78.82	80.00	-1.18	43.96	60.00	-16.04	Complied	Y Orientation
8	8.31	79.6	80.00	-0.40	44.53	60.00	-15.47	Complied	Y Orientation
9	7.2	59.18	80.00	-20.82	33.26	60.00	-26.74	Complied	Z Orientation
10	7.6	59.92	80.00	-20.08	33.72	60.00	-26.28	Complied	Z Orientation
11	8.06	61.51	80.00	-18.49	34.56	60.00	-25.44	Complied	Z Orientation
12	8.31	62.14	80.00	-17.86	35.84	60.00	-24.16	Complied	Z Orientation
Tested by: David Hollis									
TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009									
Peak Limit = Average Limit + 20dB = 60dB μ V/m + 20dB = 80dB μ V/m									
Average limit = 100 μ V/m @ 30m									
Average Limit = 20 \log (100 μ V) = 40dB μ V/m @ 30m									
For 10m measurement the average limit was adjusted = 40 \log (10/30) = 20dB									
Average limit = 60dB μ V/m @ 10m									

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4.1.6 Photos

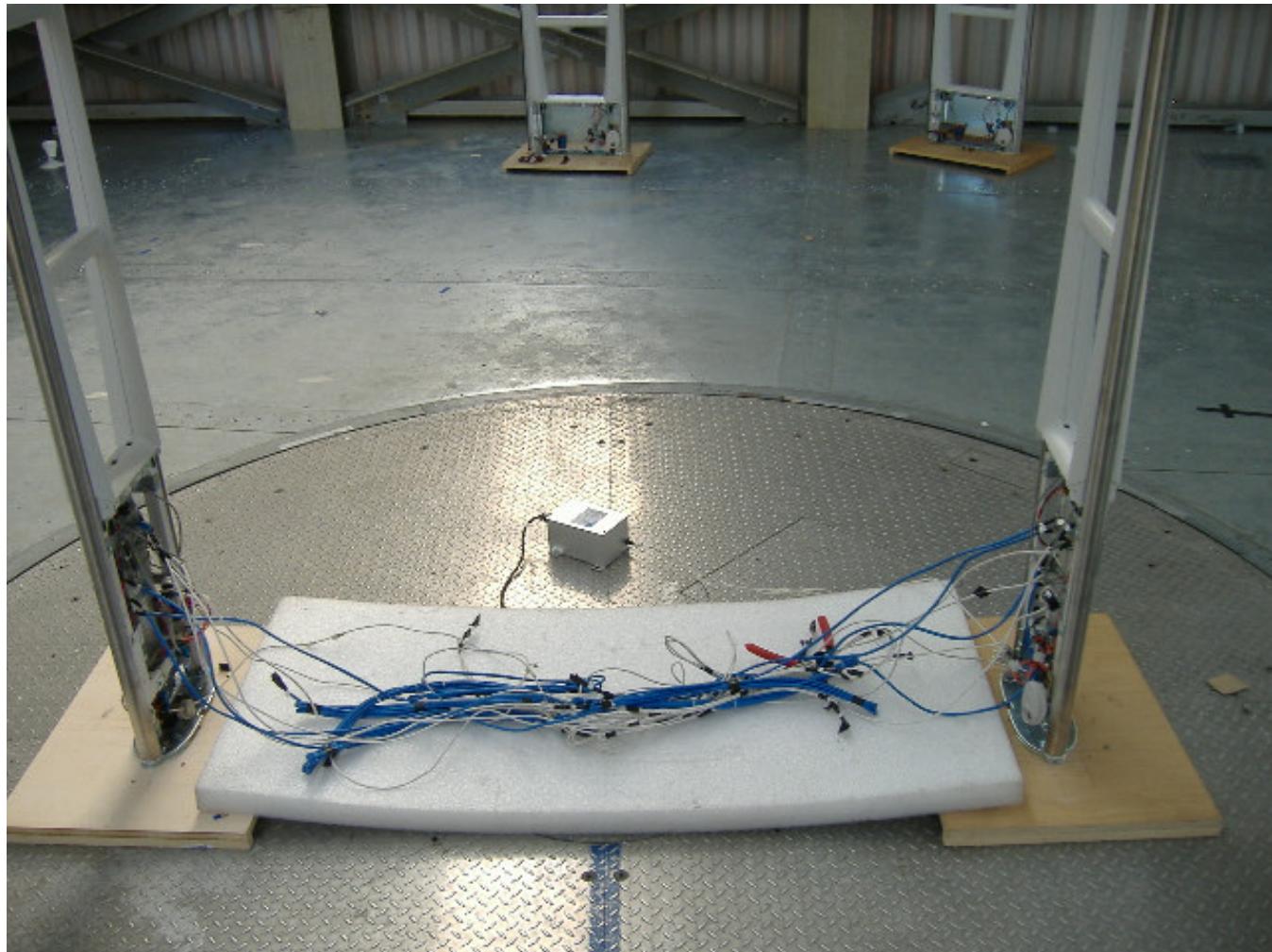


Figure 1 – Radiated Emissions Test Setup – P-20

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Figure 2 – Radiated Emissions Test Setup – P-10

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Figure 3 – Radiated Emissions Test Setup – G-20

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Figure 4 – Radiated Emissions Test Setup – G-10

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4.2 Conducted Limits

This test measures the electromagnetic levels of spurious signals generated by the EUT on the AC power line that may affect the performance of other near by electronic equipment.

4.2.1 Over View of Test

Results	Complies (as tested per this report)				Date	10/27/2009			
Standard	FCC Part 15 Subpart 15.207/RSS-210 Annex A2.3								
Product Model	Evolve Antenna Family		Serial#	See Section 3.5					
Configuration	See test plan for details								
Test Set-up	Tested in shielded room, EUT placed on table. See test plans for details.								
EUT Powered By	120V/60Hz	Temp	22° C	Humidity	45%	Pressure	1000mbar		
Frequency Range	150kHz - 30MHz								
Perf. Criteria	Per table in section 207 (Below Limit)	Perf. Verification		Readings Under Limit for L1 and L2					
Mod. to EUT	None	Test Performed By		David Hollis					

4.2.2 Test Procedure

Conducted and FCC emissions tests were performed using the procedures of ANSI C63.4 including methods for signal maximizations and EUT configuration. The photos included with the report show the EUT in its maximized configuration.

The frequency range from 150kHz - 30MHz was investigated for conducted emissions.

Conducted Emissions measurements were performed in the shielded room using procedures specified in the test plan and standard.

4.2.3 Deviations

There were no deviations from the test methodology listed in the test plan for the conducted emission test.

4.2.4 Final Test

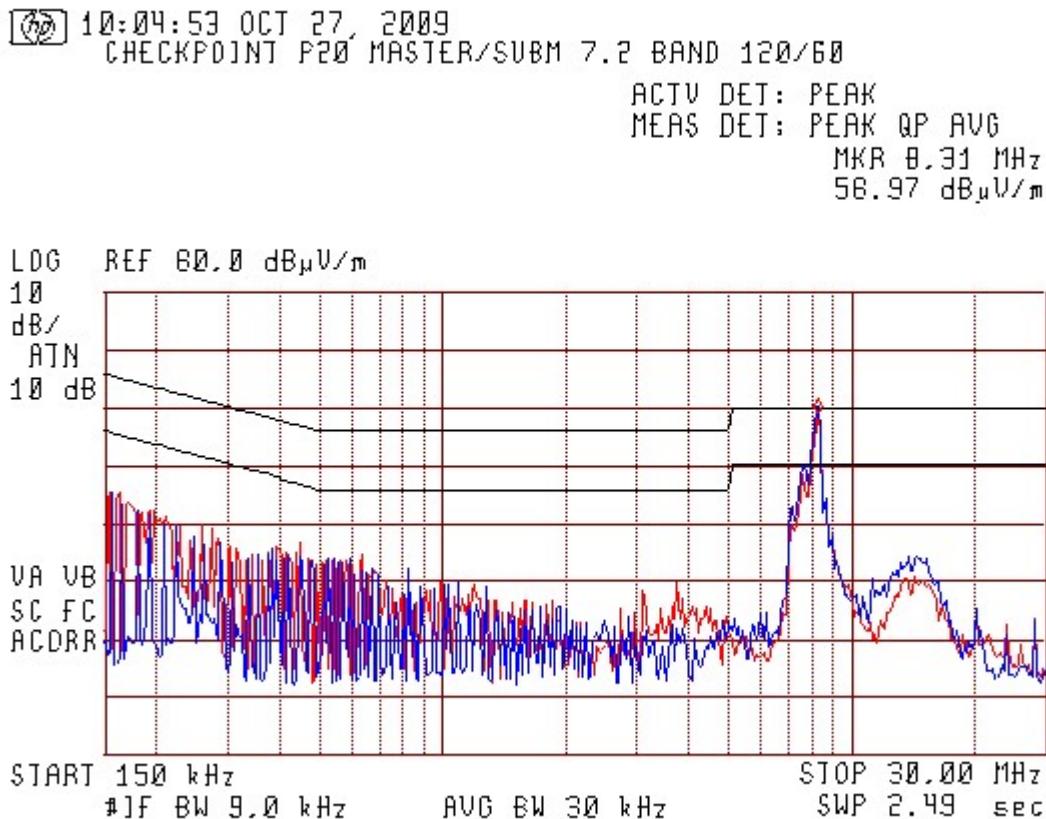
All final conducted emissions measurements were below (in compliance with) the limits.

4.2.5 Final Measurement Data

P20 7.2 Band TX=31

NOTES:

Conducted Emissions @ 120V/60Hz
P-20 7.2Tx Band
Line / Neutral



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Conducted Emissions Measurements												
Standard:		FCC Part 15.207										
Device Tested:		Checkpoint P20 Master/Submaster 7.2 band 120VAC/60Hz										
Signal Num	Freq	Peak Amp	QP Amp	Avg Amp	QP Limit	Avg Limit	Conductor	QP Δ	QP Result	Avg Δ	Average Result	Mode
	MHz	dBuV	dBuV	dBuV	dBuV	dBuV		dB		dB		
1	0.1961	43.04	36.35	21.33	63.77	53.77	Line	-27.42	Complied	-32.44	Complied	
2	7.2073	40.18	37.16	23.57	60.00	50.00	Line	-22.84	Complied	-26.43	Complied	
3	7.6208	48.67	44.88	29.72	60.00	50.00	Line	-15.12	Complied	-20.28	Complied	
4	8.3122	59.50	55.73	39.49	60.00	50.00	Line	-4.27	Complied	-10.51	Complied	
5	14.2913	36.25	30.47	25.24	60.00	50.00	Line	-29.53	Complied	-24.76	Complied	
6	20.0453	19.54	24.80	12.94	60.00	50.00	Line	-35.20	Complied	-37.06	Complied	
7	27.8531	14.77	18.36	6.12	60.00	50.00	Line	-41.64	Complied	-43.88	Complied	
8	0.1961	43.01	36.89	21.46	63.77	53.77	Neutral	-26.88	Complied	-32.31	Complied	
9	7.2073	43.05	40.12	26.48	60.00	50.00	Neutral	-19.88	Complied	-23.52	Complied	
10	7.6208	51.59	47.80	32.53	60.00	50.00	Neutral	-12.20	Complied	-17.47	Complied	
11	8.3122	61.52	57.70	41.60	60.00	50.00	Neutral	-2.30	Complied	-8.40	Complied	Maximum Emissions
12	14.2913	35.64	33.54	28.28	60.00	50.00	Neutral	-26.46	Complied	-21.72	Complied	
13	20.0453	21.96	18.53	11.79	60.00	50.00	Neutral	-41.47	Complied	-38.21	Complied	
14	27.8531	15.53	10.42	4.10	60.00	50.00	Neutral	-49.58	Complied	-45.90	Complied	

Tested by: David Hollis

TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009

CE22_B.xls Revised 21OCT2005

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Report No.:

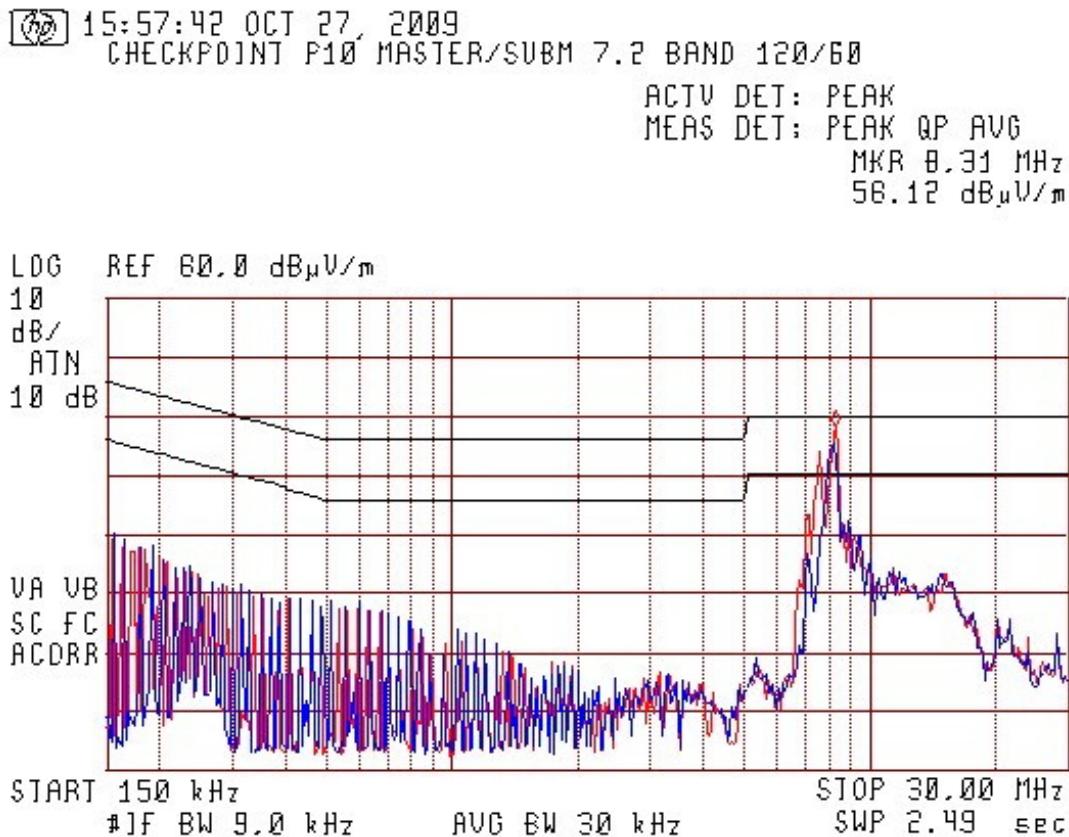
30952970.002

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P10 7.2 Band TX= 31

NOTES:

**Conducted Emissions @ 120V/60Hz
P-10 7.2 Tx Band
Line / Neutral**



Report No.:

30952970.002

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Conducted Emissions Measurements												
Standard:	FCC Part 15.207								Date:	10/27/09		
Device Tested:	Checkpoint P10 Master/Submaster 7.2 band 120VAC/60Hz								File:	.xls		
Signal Num	Freq MHz	Peak Amp dBuV	QP Amp dBuV	Avg Amp dBuV	QP Limit dBuV	Avg Limit dBuV	Conductor	QP Δ dB	QP Result	Avg Δ dB	Average Result	Mode
1	0.2333	45.53	38.22	28.30	62.33	52.33	Line	-24.11	Complied	-24.03	Complied	
2	7.1666	42.15	37.76	21.39	60.00	50.00	Line	-22.24	Complied	-28.61	Complied	
3	7.6012	48.77	44.39	27.33	60.00	50.00	Line	-15.61	Complied	-22.67	Complied	
4	8.3612	57.17	51.94	34.24	60.00	50.00	Line	-8.06	Complied	-15.76	Complied	
5	14.7785	28.06	25.31	16.78	60.00	50.00	Line	-34.69	Complied	-33.22	Complied	
6	21.5180	25.41	19.25	10.75	60.00	50.00	Line	-40.75	Complied	-39.25	Complied	
7	27.9967	21.46	17.35	13.47	60.00	50.00	Line	-42.65	Complied	-36.53	Complied	
8	0.2333	44.45	37.42	21.01	62.33	52.33	Neutral	-24.91	Complied	-31.32	Complied	
9	7.1666	48.37	44.07	28.38	60.00	50.00	Neutral	-15.93	Complied	-21.62	Complied	
10	7.6012	53.08	48.81	32.08	60.00	50.00	Neutral	-11.19	Complied	-17.92	Complied	
11	8.3612	59.49	54.31	36.99	60.00	50.00	Neutral	-5.69	Complied	-13.01	Complied	
12	14.7785	31.96	28.74	19.03	60.00	50.00	Neutral	-31.26	Complied	-30.97	Complied	
13	21.5180	24.99	19.55	11.12	60.00	50.00	Neutral	-40.45	Complied	-38.88	Complied	
14	27.9967	21.73	17.39	13.44	60.00	50.00	Neutral	-42.61	Complied	-36.56	Complied	

Tested by: David Hollis

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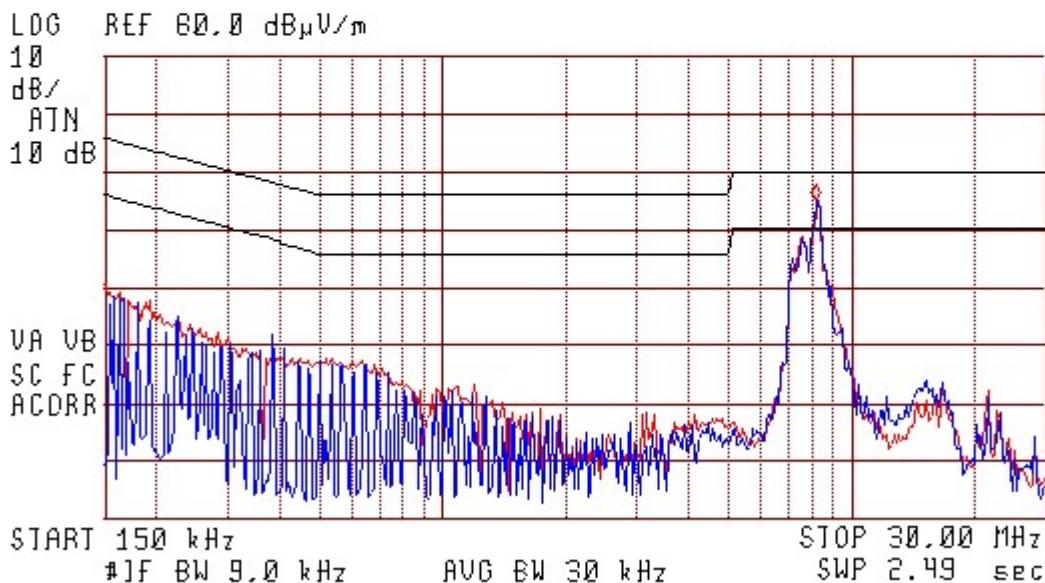
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G20 7.2 Band TX= 27

NOTES:

**Conducted Emissions @ 120V/60Hz
G-20 7.2Tx Band
Line / Neutral**

10:09:44 OCT 28, 2009
CHECKPOINT G20 MASTER/SUBM 7.2 BAND 120/60
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 0.16 MHz
55.13 dB μ V/m



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Conducted Emissions Measurements										
Standard:	FCC Part 15.207									
Device Tested:	Checkpoint G20 Master/Submaster 7.2 band 120VAC/60Hz									
Signal Num	Freq	Peak Amp	QP Amp	Avg Amp	QP Limit	Avg Limit	Conductor	QP Δ	QP Result	Avg Δ
	MHz	dBuV	dBuV	dBuV	dBuV	dBuV		dB		dB
1	0.2342	33.98	26.51	17.84	62.30	52.30	Line	-35.79	Complied	-34.46
2	7.2186	44.22	40.55	26.42	60.00	50.00	Line	-19.45	Complied	-23.58
3	7.6195	49.01	44.94	30.00	60.00	50.00	Line	-15.06	Complied	-20.00
4	8.3421	55.13	50.41	33.45	60.00	50.00	Line	-9.59	Complied	-16.55
5	15.0194	16.60	13.90	6.99	60.00	50.00	Line	-46.10	Complied	-43.01
6	21.5873	22.42	17.57	4.26	60.00	50.00	Line	-42.43	Complied	-45.74
7	27.9990	13.13	10.09	6.50	60.00	50.00	Line	-49.91	Complied	-43.50
8	0.2342	32.90	25.43	10.45	62.30	52.30	Neutral	-36.87	Complied	-41.85
9	7.2186	46.43	42.76	28.60	60.00	50.00	Neutral	-17.24	Complied	-21.40
10	7.6195	51.01	46.94	31.86	60.00	50.00	Neutral	-13.06	Complied	-18.14
11	8.3421	56.67	51.94	35.03	60.00	50.00	Neutral	-8.06	Complied	-14.97
12	15.0194	24.21	21.24	14.39	60.00	50.00	Neutral	-38.76	Complied	-35.61
13	21.5873	22.78	17.82	4.75	60.00	50.00	Neutral	-42.18	Complied	-45.25
14	27.9990	14.42	10.21	6.39	60.00	50.00	Neutral	-49.79	Complied	-43.61
Tested by: David Hollis										
TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009										
CE22_B.xls Revised 21OCT2005										

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Report No.:

30952970.002

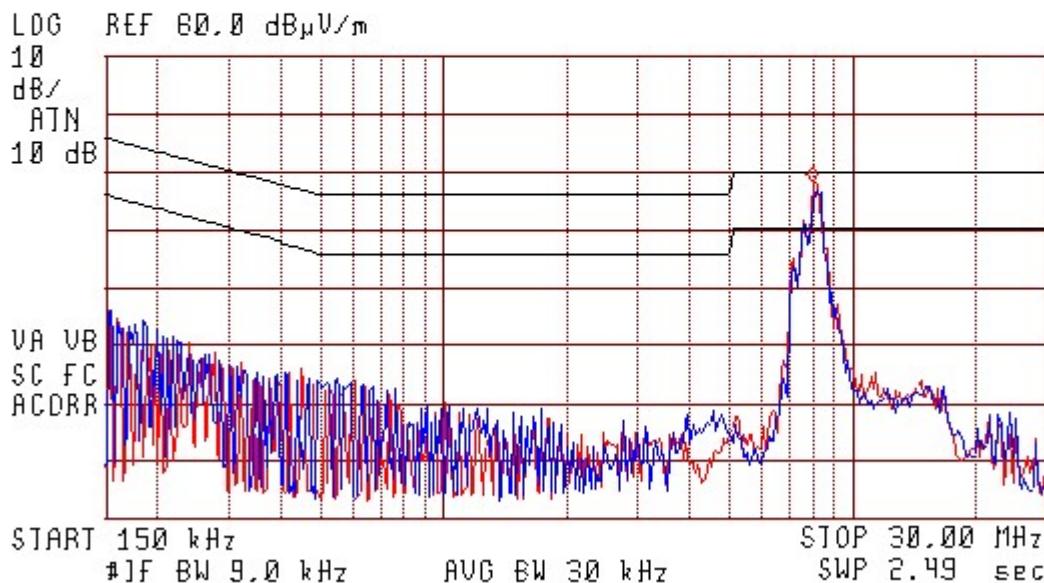
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G10 7.2 Band TX= 27

NOTES:

Conducted Emissions @ 120V/60Hz
G-10 7.2Tx Band
Line / Neutral

14:58:28 OCT 27, 2009
CHECKPOINT G10 MASTER/SUBM 7.2 BAND 120/60
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 7.93 MHz
56.29 dB μ V/m



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30952970.002

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Conducted Emissions Measurements										
Standard:	FCC Part 15.207									
Device Tested:	Checkpoint G10 Master/Submaster 7.2 band 120VAC/60Hz									
Signal Num	Freq	Peak Amp	QP Amp	Avg Amp	QP Limit	Avg Limit	Conductor	QP Δ	QP Result	Avg Δ
	MHz	dBuV	dBuV	dBuV	dBuV	dBuV		dB		dB
1	0.2335	31.93	23.31	16.93	62.33	52.33	Line	-39.02	Complied	-35.40
2	7.2077	43.83	39.56	24.70	60.00	50.00	Line	-20.44	Complied	-25.30
3	7.6012	49.52	45.50	29.98	60.00	50.00	Line	-14.50	Complied	-20.02
4	8.3419	62.09	56.35	37.60	60.00	50.00	Line	-3.65	Complied	-12.40
5	15.2294	24.59	21.40	14.66	60.00	50.00	Line	-38.60	Complied	-35.34
6	24.2335	18.42	14.81	1.55	60.00	50.00	Line	-45.19	Complied	-48.45
7	27.9998	13.64	10.29	6.37	60.00	50.00	Neutral	-49.71	Complied	-43.63
8	0.2335	30.50	23.06	13.07	62.33	52.33	Neutral	-39.27	Complied	-39.26
9	7.2077	46.38	41.99	26.98	60.00	50.00	Neutral	-18.01	Complied	-23.02
10	7.6012	51.56	47.52	31.93	60.00	50.00	Neutral	-12.48	Complied	-18.07
11	8.3419	63.68	58.02	39.31	60.00	50.00	Neutral	-1.98	Complied	-10.69
12	15.2294	25.73	22.79	16.53	60.00	50.00	Neutral	-37.21	Complied	-33.47
13	24.2335	18.50	14.71	0.96	60.00	50.00	Neutral	-45.29	Complied	-49.04
14	27.9998	15.58	10.95	6.62	60.00	50.00	Neutral	-49.05	Complied	-43.38

Tested by: David Hollis

TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009

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4.2.6 Photos



Figure 5 – Conducted Emissions Test Setup – P-20

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Figure 6 – Conducted Emissions Test Setup – P-10

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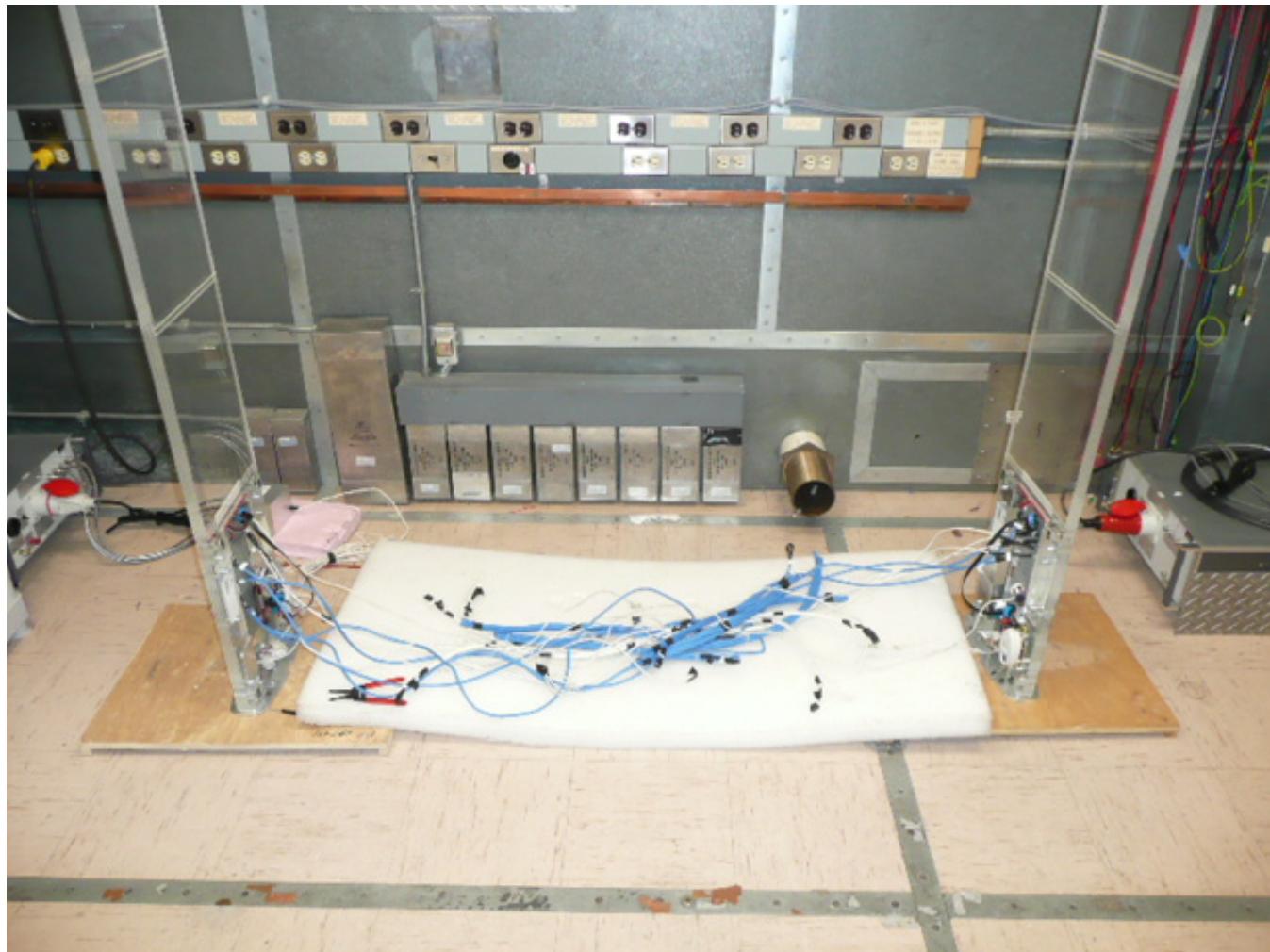


Figure 7 – Conducted Emissions Test Setup – G-20

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Figure 8 – Conducted Emissions Test Setup – G-10

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4.3 Radiated Emissions Limits

This test measures the electromagnetic levels of spurious signals generated by the EUT that radiated from the EUT and may affect the performance of other nearby electronic equipment.

4.3.1 Test Over View

Results	Complies (as tested per this report)				Date	10/28/09			
Standard	FCC Part 15 Subpart 15.205 and 15.209								
Product Model	Evolve Antenna Family		Serial#	See Section 3.5					
Configuration	See test plan for details								
Test Set-up	Tested on a 10m O.A.T.S. placed on turn-table, see test plans for details.								
EUT Powered By	120V/60Hz	Temp	22° C	Humidity	45%	Pressure	1000mbar		
Frequency Range	From Fundamental - 1000MHz								
Perf. Criteria	Below Limit		Perf. Verification	Readings under Limit					
Mod to EUT	None		Test Performed By	David Hollis					

4.3.2 Test Procedure

Radiated emissions tests were performed using the procedures of ANSI C63.4 including methods for signal maximizations and EUT configuration. The photos included with the report show the EUT in its maximized configuration.

The frequency range from 30MHz to 1000MHz was investigated for radiated emissions.

Radiated emission testing was first performed at a distance of 3 meters in the semi-anechoic chamber in order to identify the specific frequencies for which these measurements will be made. Harmonics and spurious emissions testing <30MHz were performed at 10m distance on the OATS using a magnetic field loop antenna. Harmonics and spurious emissions test >30MHz were performed on the 3 m OATS using a Bilog antenna

4.3.3 Deviations

There were no deviations from the test methodology listed in the test plan for the harmonic current emissions test.

4.3.4 Final Test

All final radiated emissions measurements were below (in compliance with) the limits. No emissions at harmonics of the fundamental frequencies were detected on any of the systems listed in this test report.

Radiated emissions prescan data above 30MHz for the G10 and G20 systems yielded similar data. Based on these results, it was deemed unnecessary to perform final measurements for both systems. The G10 system was selected to represent both systems for radiated emissions final testing.

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4.3.5 Final Measurement Data

P-20 7.2 Band TX=31 RE Final:

Radiated Emissions Measurements							PRESCAN or FINAL:		Date:			
Standard:	47 CFR 15.209, Class B			Final		7/17/09						
Device Tested:	P20 Master/Submaster 7.2 band tx=31			Distance:		3.0m		File:				
Measured Level												
Meas #	Freq (MHz)	Peak	Quasi-Peak	Average	Quasi-Peak Limit	Quasi-Peak Δ	Antenna + Cable Correction Factor (included in measured levels)	Result	Polarization	Angle (degrees)	Antenna Height (meters)	Comment
1	43.2000	34.85	29.50	10.11	40.00	-10.50	12.65	Complied	Vertical	0	1.40	
2	45.6150	39.17	32.87	18.83	40.00	-7.13	11.78	Complied	Vertical	0	1.40	
3	57.6250	37.36	32.09	11.63	40.00	-7.91	7.96	Complied	Vertical	0	1.40	
4	407.9775	45.67	40.91	9.79	46.00	-5.09	15.76	Complied	Vertical	180	1.30	
5	424.5286	47.34	42.50	11.64	46.00	-3.50	16.28	Complied	Vertical	180	1.30	
6	428.0125	47.37	42.63	11.42	46.00	-3.37	16.33	Complied	Vertical	180	1.30	
7	432.0400	48.40	43.36	13.28	46.00	-2.64	16.38	Complied	Vertical	180	1.30	
8	446.5075	46.61	41.99	11.59	46.00	-4.01	16.55	Complied	Vertical	180	1.30	
Tested by: David Hollis											REFCC15B.xls Revised 10MAR03	
TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009												

P-10 7.2 Band TX= 31 RE Final:

Radiated Emissions Measurements							PRESCAN or FINAL:		Date:			
Standard:	47 CFR 15.209			Final		10/08/09						
Device Tested:	P10 Master/Submaster 7.2 Band TX=31			Distance:		3.0m		File:				
Measured Level												
Meas #	Freq (MHz)	Peak	Quasi-Peak	Average	Quasi-Peak Limit	Quasi-Peak Δ	Antenna + Cable Correction Factor (included in measured levels)	Result	Polarization	Angle (degrees)	Antenna Height (meters)	Comment
1	53.2325	46.52	39.91	11.02	40.00	-0.09	8.24	Complied	Vertical	220	2.10	
2	56.5700	45.76	39.20	9.02	40.00	-0.80	7.77	Complied	Vertical	300	2.00	
3	74.9475	35.43	28.67	12.64	40.00	-11.33	7.21	Complied	Vertical	360	1.30	
4	121.1175	33.91	28.35	4.73	43.50	-15.15	13.41	Complied	Vertical	100	1.30	
5	153.4475	24.38	16.92	3.64	43.50	-26.58	11.74	Complied	Vertical	300	1.00	
6	436.0950	36.10	28.68	8.93	46.00	-17.32	19.09	Complied	Vertical	360	1.00	
7	457.9125	35.10	28.00	9.24	46.00	-18.00	19.46	Complied	Vertical	360	1.00	
8	484.5750	35.89	28.68	9.65	46.00	-17.32	19.74	Complied	Vertical	360	1.00	
Tested by: David Hollis											REFCC15B.xls Revised 10MAR03	
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G-10 7.2 Band TX= 27 RE Final:

Radiated Emissions Measurements													
Standard:					PRESCAN or FINAL:					Date:			
Device Tested:					Distance:					File:			
Measured Level													
Meas #	Freq (MHz)	Peak	Quasi-Peak	Average	Quasi-Peak Limit	Quasi-Peak Δ	Antenna + Cable Correction Factor (included in measured levels)	Result	Polarization	Angle (degrees)	Antenna Height (meters)	Comment	
1	53.2025	45.12	38.33	10.23	40.00	-1.67	8.24	Complied	Vertical	270	1.00		
2	64.8125	33.86	27.80	9.14	40.00	-12.20	7.00	Complied	Vertical	270	1.00		
3	72.0612	38.12	32.71	10.78	40.00	-7.29	6.90	Complied	Vertical	360	1.00		
4	108.2875	37.91	31.33	6.36	43.50	-12.17	12.55	Complied	Vertical	360	1.00		
5	149.8750	27.14	18.69	6.02	43.50	-24.81	11.82	Complied	Vertical	360	1.00		
6	235.6250	29.01	22.65	4.57	46.00	-23.35	12.85	Complied	Vertical	360	1.00		
7	432.0500	32.58	26.39	10.03	46.00	-19.61	18.99	Complied	Vertical	120	1.00		
8	504.1000	34.36	27.21	10.13	46.00	-18.79	20.10	Complied	Vertical	120	1.00		
9	525.7125	34.70	28.26	14.32	46.00	-17.74	20.53	Complied	Vertical	60	1.00		
Tested by: David Hollis													
TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009													
REFCC15B.xls Revised 10MAR03													

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4.3.6 Operation in Restricted Bands

The EUT is a digital swept frequency hopping transmitter. The EUT hops on discrete frequencies. The discrete frequencies that can be transmitted by the EUT are as follows:

Frequency Band	Band width	Actual Transmitted frequencies (MHz)	Region
8.2	7.950 to 8.450 MHz	8.450, 8.325, 8.075, 7.950	NAM and EU
8.6	8.075 to 9.125 MHz	9.125, 8.875, 8.325, 8.075	NAM
9	8.075 to 9.325 MHz	9.325, 9.075, 8.325, 8.075	NAM
9.5	9.200 to 9.800 MHz	9.800, 9.600, 9.400, 9.200	NAM
7.2 + 8.2	7.200 to 8.325 MHz	8.325, 8.075, 7.600, 7.200	NAM

The restricted frequency bands (per FCC Part 15 Clause 15.205) in the operating frequency band of the EUT are as follows:

8.291 – 8.294 MHz
8.362 – 8.366 MHz
8.37625 – 8.38675 MHz
8.41425 – 8.41475 MHz

The transmitter is not capable of hopping into, or operating, in the restricted frequency bands and therefore complies with the restriction.

4.4 Emissions Bandwidth

This test measures the emission bandwidth of the fundamental frequency generated by the EUT that may be outside the allowed transmission frequency

4.4.1 Test Over View

Results	Complies (as tested per this report)				Date	10/27/09			
Standard	FCC Part 15 Subpart 15.215 and RSS-210								
Product Model	Evolve Antenna Family		Serial#	See Section 3.5					
Configuration	See test plan for details								
Test Set-up	Tested on a 10m O.A.T.S. placed on turn-table, see test plans for details								
EUT Powered By	120V/60Hz	Temp	22° C	Humidity	45%	Pressure	1000mbar		
Frequency Range	8.2MHz Band								
Perf. Criteria	Within Frequency Range	Perf. Verification		Readings under Limit					
Mod to EUT	None	Test Performed By		David Hollis					

4.4.2 Test Procedure

The emissions of the fundamental were measured with a loop antenna in 3 orthogonal orientations. The measurement of the bandwidth was done at -6db and -20dB on each side of the fundamental frequency. The test method includes signal maximizations of EUT configuration, by turning the turntable 360degrees and recording the highest emissions. The photos included with the report show the EUT in its maximized configuration.

4.4.3 Deviations

There were no deviations from the test methodology listed in the test plan for the Bandwidth Emissions test.

4.4.4 Final Test

All final radiated emissions measurements were below (in compliance with) the limits.

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4.4.5 Final Measurement Data

NOTES:

Emission Bandwidth
P20 7.2 Band
6dB Bandwidth



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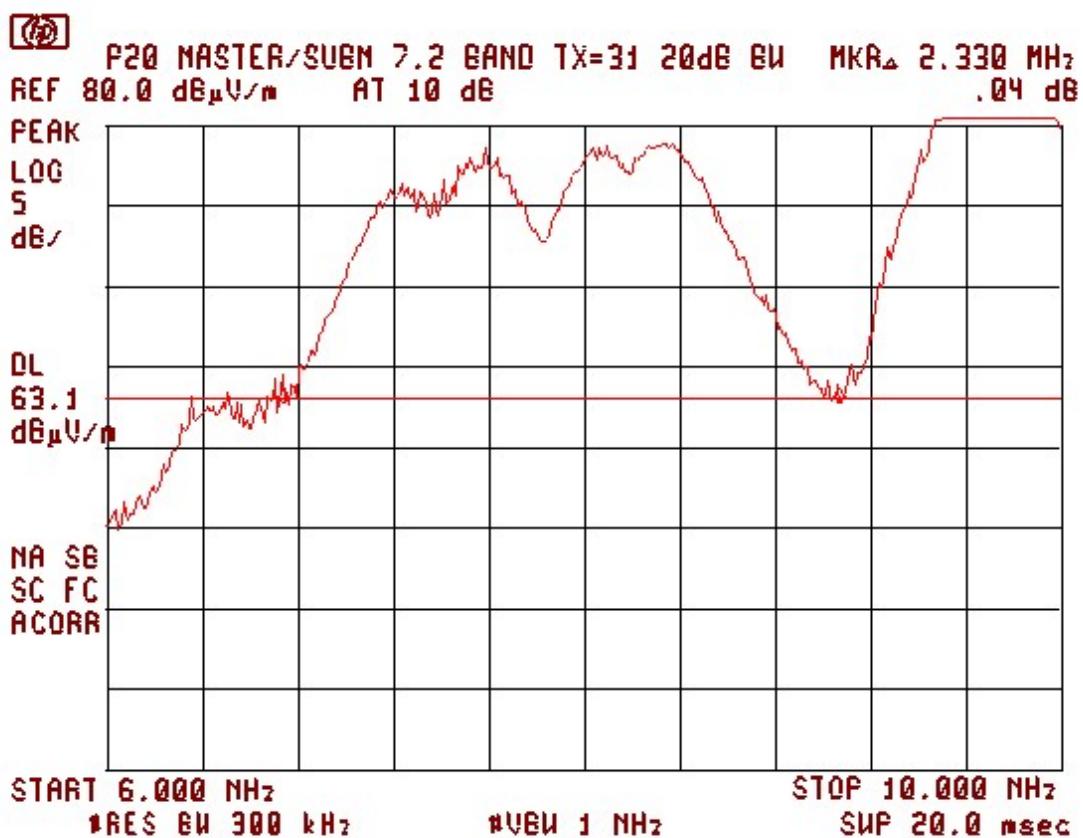
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NOTES:

Emission Bandwidth
P-20 7.2 Band
20 dB Bandwidth



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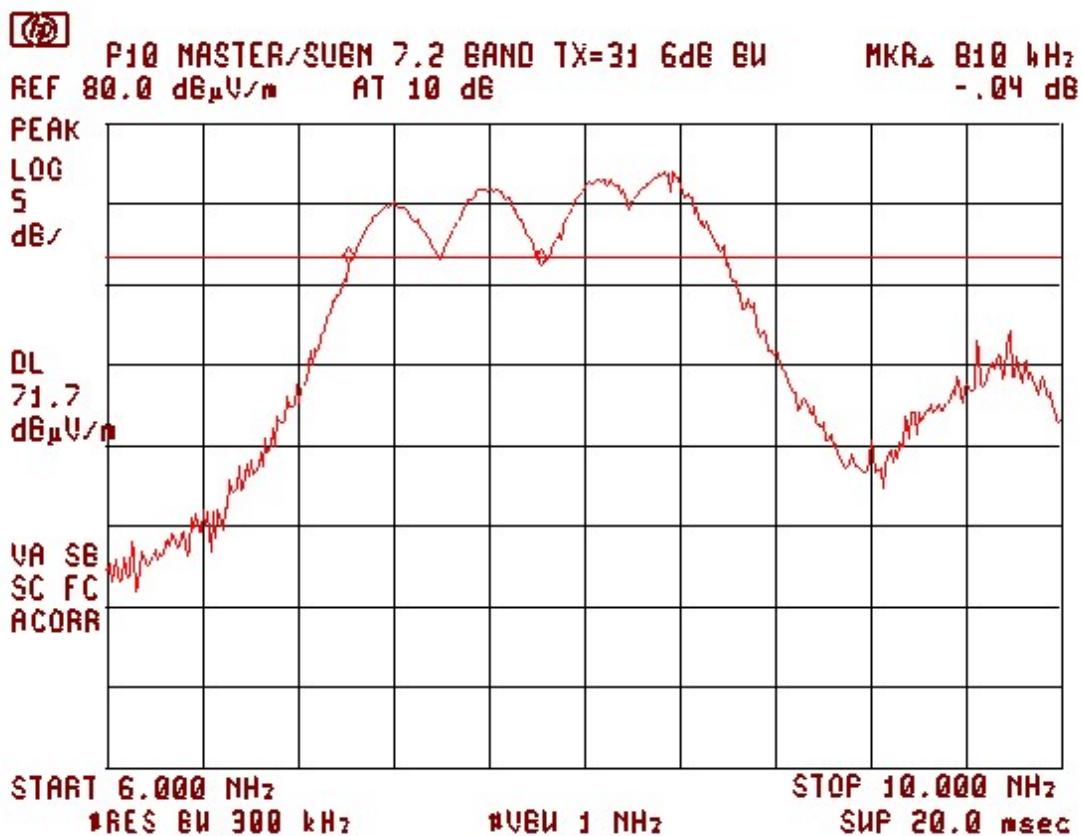
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NOTES:

Emission Bandwidth
P-10 7.2 Band
6 dB Bandwidth



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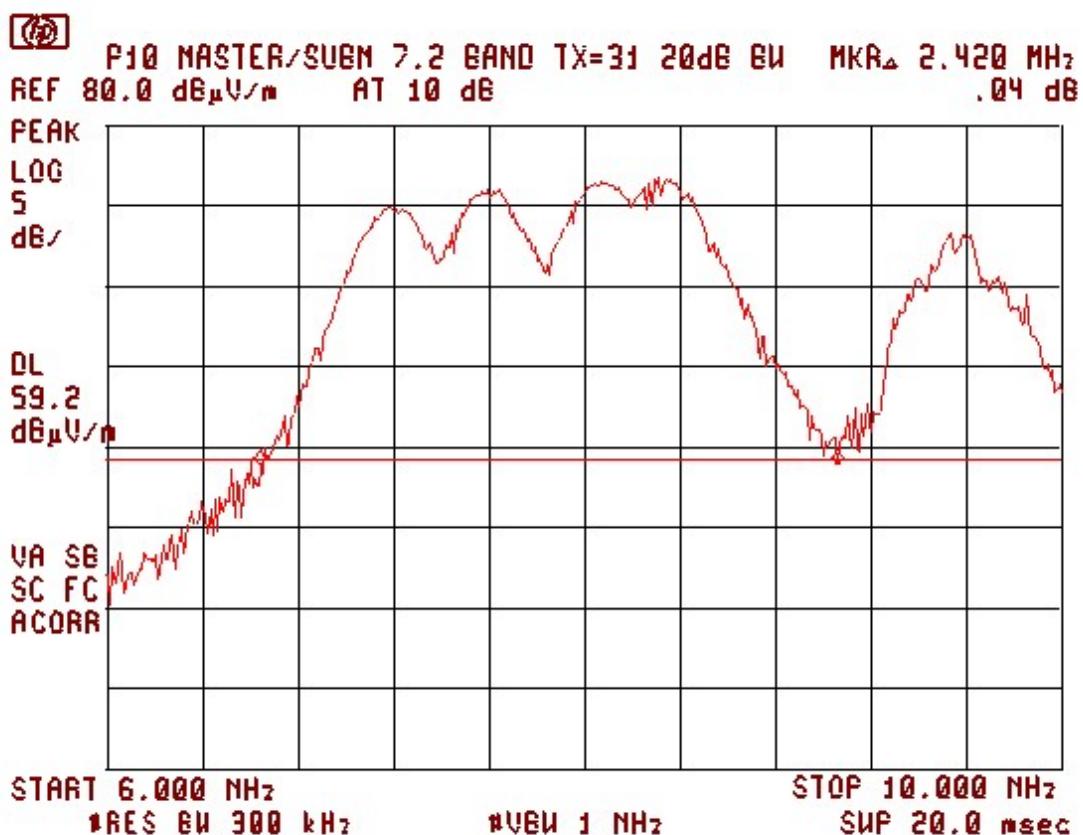
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NOTES:

Emission Bandwidth
P-10 7.2 Band
20 dB Bandwidth



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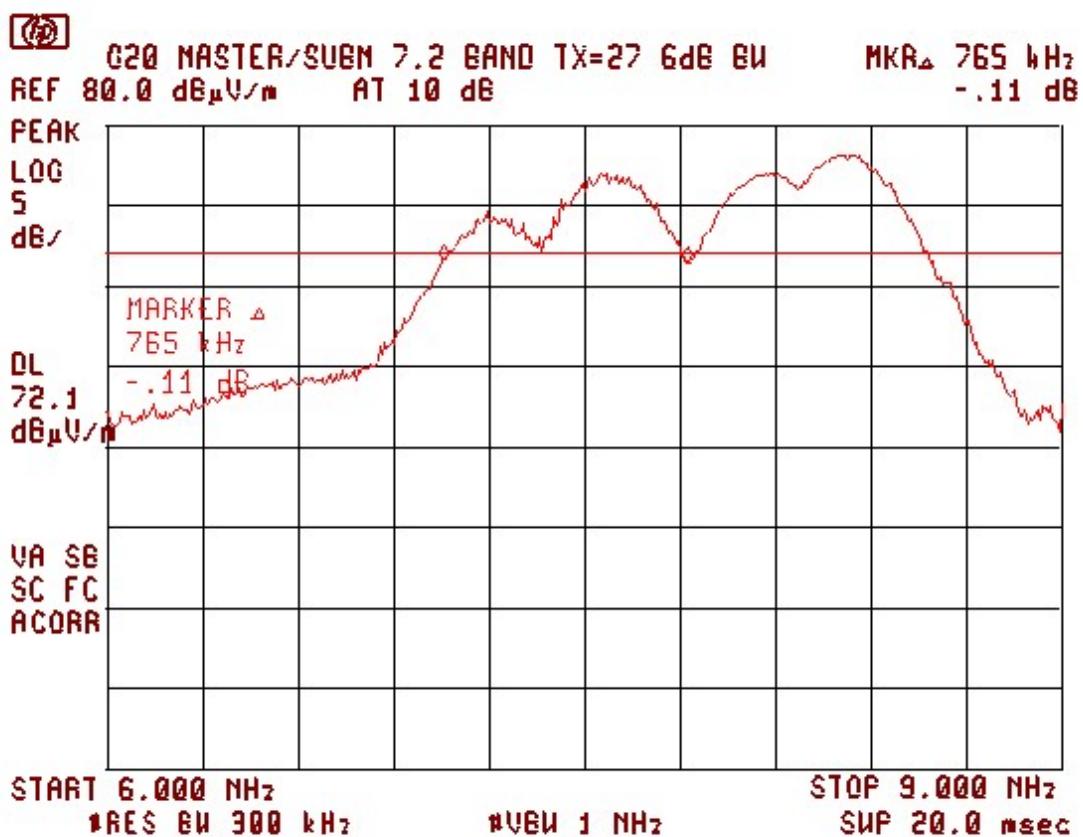
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NOTES:

Emission Bandwidth
G-20 7.2 Band
6 dB Bandwidth



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NOTES:

Emission Bandwidth
G-20 7.2 Band
20 dB Bandwidth



020 MASTER/SUBM 7.2 BAND TX=27 6dB EU MKR_A 2.820 MHz
REF 80.0 dB_μV/m AT 10 dB .06 dB

PEAK

LOG

S

dB/s

DL

61.9

dB_μV/m

VA SB
SC FC
ACORR

START 6.000 MHz

RES BW 300 kHz

STOP 9.000 MHz

SUP 20.0 msec

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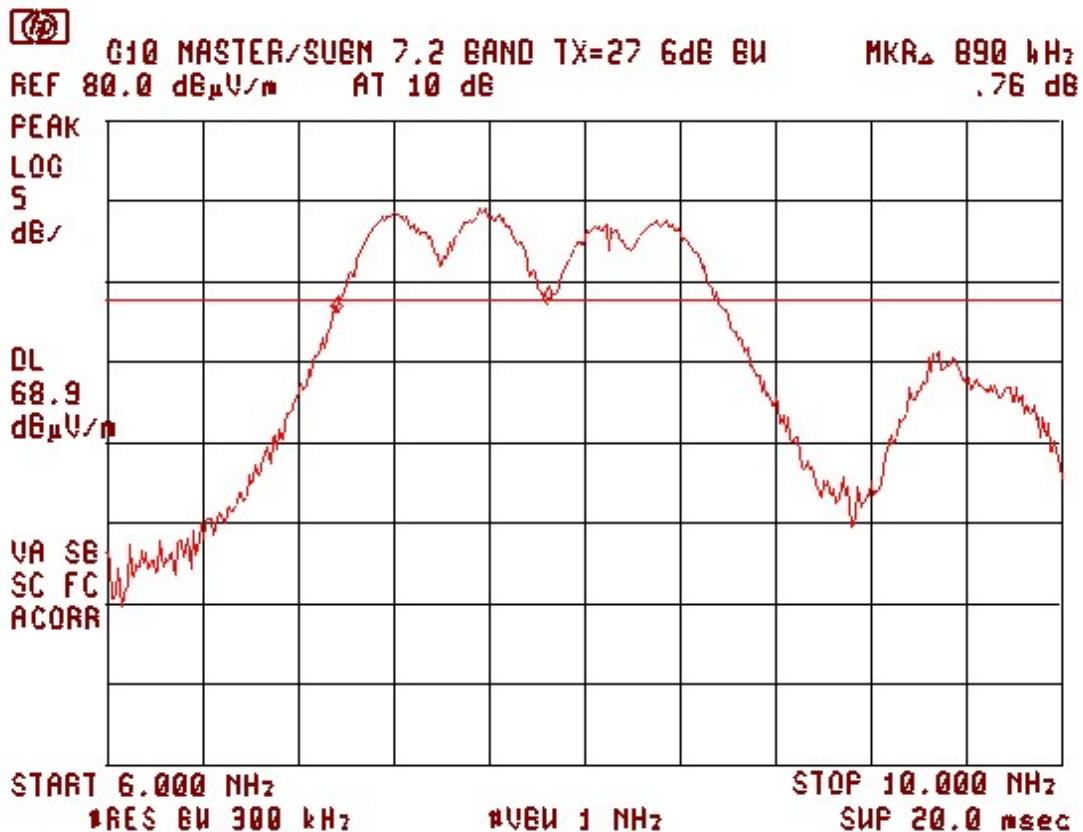
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NOTES:

Emission Bandwidth
G-10 7.2 Band
6 dB Bandwidth



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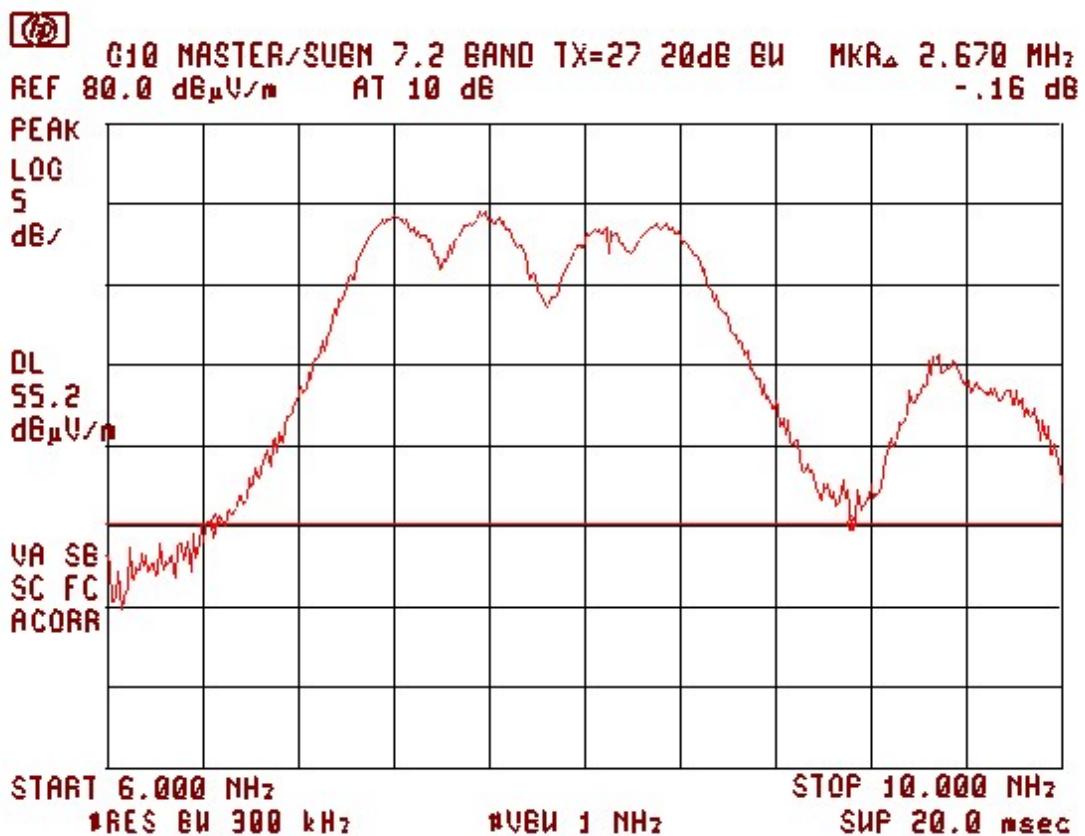
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NOTES:

Emission Bandwidth
G-10 7.2 Band
20 dB Bandwidth



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Band Edge Measurement				PRESCAN or FINAL:		Date:		
Standard:	47 CFR FCC Part 15.215 /RSS-210			Final	10/26/2009			
Device Tested:	Checkpoint - P20 Master/Submaster 7.2 Band TX=31			Distance:	3m	File:		
Measured Level								
Meas #	TX Band	-6dB Low End (MHz)	-6dB High End (MHz)	Measured Bandwidth (MHz)	-20dB Low End (MHz)	-20dB High End (MHz)	Measured Bandwidth (MHz)	Comment
RBW = 300kHz VBW=300kHz (FCC Settings)								
1	7.2	7.050	7.830	0.780	6.740	9.070	2.330	
Tested by:	David Hollis							
TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009								

Band Edge Measurement				PRESCAN or FINAL:		Date:		
Standard:	47 CFR FCC Part 15.215 /RSS-210			Final	9/23/2009			
Device Tested:	P10 Master/Submaster 7.2 Band TX=31			Distance:	10m	File:		
Measured Level								
Meas #	TX Band	-6dB Low End (MHz)	-6dB High End (MHz)	Measured Bandwidth (MHz)	-20dB Low End (MHz)	-20dB High End (MHz)	Measured Bandwidth (MHz)	Comment
RBW = 300kHz VBW=300kHz (FCC Settings)								
1	7.2	7.010	7.820	0.810	6.640	9.060	2.420	
Tested by:	David Hollis							
TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009								

Band Edge Measurement				PRESCAN or FINAL:		Date:		
Standard:	47 CFR FCC Part 15.215 /RSS-210			Final	10/7/2009			
Device Tested:	Checkpoint - G20 Master/Submaster 7.2 Band TX=27			Distance:	3m	File:		
Measured Level								
Meas #	TX Band	-6dB Low End (MHz)	-6dB High End (MHz)	Measured Bandwidth (MHz)	-20dB Low End (MHz)	-20dB High End (MHz)	Measured Bandwidth (MHz)	Comment
RBW = 300kHz VBW=300kHz (FCC Settings)								
1	7.2	7.058	7.830	0.765	6.075	8.895	2.820	
Tested by:	David Hollis							
TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009								

Band Edge Measurement				PRESCAN or FINAL:		Date:		
Standard:	47 CFR FCC Part 15.215 /RSS-210			Final	9/23/2009			
Device Tested:	G10 Master/Submaster 7.2 Band TX=27			Distance:	10m	File:		
Measured Level								
Meas #	TX Band	-6dB Low End (MHz)	-6dB High End (MHz)	Measured Bandwidth (MHz)	-20dB Low End (MHz)	-20dB High End (MHz)	Measured Bandwidth (MHz)	Comment
RBW = 300kHz VBW=300kHz (FCC Settings)								
1	7.2	6.950	7.840	0.890	6.450	9.120	2.670	
Tested by:	David Hollis							
TUV Rheinland of North America, Inc. 12 Commerce Road Newtown, CT 06470 Tel:(203) 426-0888 Fax: (203) 426-4009								

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