Project 20634-15

Pinnacle Peak Holding Corporation dba Setcom Corporation

MS900MAX

Wireless Certification Report FCC 15.247 & RSS-247

Prepared for:

Setcom Corporation 3019 Alvin Devane Blvd. Suite 560 Austin, Texas 78741

By

Professional Testing (EMI), Inc. 1601 North A.W. Grimes Blvd., Suite B Round Rock, Texas 78665

11 Apr 2019

Reviewed by

Written by

Larry Finn Chief Technical Officer

Eric Lifsey EMC Engineer

Revision History

Revision Number	Description	Date
Final01	Model number finalized.	25 Oct 2019

	_		

None.

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Compliance Certificate

Applicant	Device & Test Identification		
Pinnacle Peak Holding Corporation	FCC ID:	TLV-MS900MAX	
dba Setcom Corporation	Industry Canada ID:	6143A-MS900MAX	
3019 Alvin Devane Blvd.	Model(s):	MS900MAX	
Suite 560	Laboratory Project ID:	20634-15	
Austin, Texas 78741			
Certificate Date: 8 May 2019			

The device named above was tested utilizing the following documents and found to be in compliance with the required criteria:

Requirement	Reference	Detail	
FCC 47 CFR Part 15 C	15.247	Operation within the bands <u>902-928 MHz</u> , 2400-2483.5 MHz, and 5725-5850 MHz.	
FCC 47 CFR Part 15 C	15.209	Radiated emission limits; general requirements.	
FCC 47 CFR Part 15 C	15.205	Restricted Bands of Operation	
KDB 558074 D01	DR01	DTS Measurement Guidance v03r02	
KDB 412172	D01	Guidelines for Determining the ERP and EIRP of an RF Transmitting System	
OET Bulletin 65*	Edition 97-01, and Supplement C, Ed. 01-01	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields	
RSS-247	Issue 2	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence- Exempt Local Area Network (LE-LAN) Devices	
RSS-Gen	Issue 4	General Requirements and Information for the Certification of Radio Apparatus	
RSS-102 Issue 4		Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (Al Frequency Bands)	

^{*}MPE is reported separately from this document. **Corresponding RSS references are listed in the body of the report.

I, Eric Lifsey, for Professional Testing (EMI), Inc., being familiar with the above requirements and test procedures have reviewed the test setup, measured data, and this report. I believe them to be true and accurate.



This report has been reviewed and accepted by the Applicant. The undersigned is responsible for ensuring that this device will continue to comply with the requirements listed above.

Representative of Applicant	

1.0 Introduction

1.1 Scope

This report describes the extent to which the equipment under test (EUT) conformed to the intentional radiator requirements of the United States and Canada.

Professional Testing (EMI), Inc., (PTI) follows the guidelines of National Institute of Standards and Technology (NIST) for all uncertainty calculations, estimates, and expressions thereof for electromagnetic compatibility testing.

1.2 EUT Description

Table 1.2.1: Equipment Under Test					
Manufacturer / Model Serial # Description					
Setcom	nono	902 to 928 MHz DTS transceiver; using OFDM with			
Model: MS900MAX	none	proprietary protocols.			

Table 1.2.2: Support Equipment				
Manufacturer / Model Serial # Description				
None				

The EUT is a DC powered base station that provides hands-free real time wireless voice communication for a team of individuals that are equipped with the companion headset product.

The EUT connects by a cable to the user's headset. It gets power from an external power supply, typically that of a vehicle for which it is intended for installation.

1.3 EUT Operation

The EUT was exercised in a manner consistent with normal operations.

1.4 Modifications to Equipment

No modifications were made to the EUT during the performance of the test program.

1.5 Test Site

Measurements were made at the PTI semi-anechoic facility designated Site 45 (FCC 459644, IC 3036B-1) in Austin, Texas. The site is registered with the FCC under Section 2.948 and Industry Canada per RSS-GEN, and is subsequently confirmed by laboratory accreditation (NVLAP). The test site is located at 11400 Burnet Road, Austin, Texas 78758, while the main office is located at 1601 North A.W. Grimes Boulevard, Suite B, Round Rock, Texas, 78665.

1.6 Radiated Measurements

Radiated levels are determined as follows:

Raw Measured Field Level + Antenna Factor + Cable Losses – Amplifier Gain = Corrected Level

Conducted RF levels, when applicable, are determined as follows:

Raw Measured Level + Attenuator Factor + Cable Losses = Corrected Level

Conducted mains levels, when applicable, are determined as follows:

Raw Measured Level + LISN Factor + Cable/Filter/Limiter Losses = Corrected Level

Additionally, measurement distance extrapolation factors are applied and documented where used.

1.7 Applicable Documents and Clauses

Table 1.7.1: Applicable Documents			
Document	Title		
47 CFR	Part 15 – Radio Frequency Devices		
47 CFR	Subpart C - Intentional Radiators, Subpart B – Unintentional Radiators		
ANSI C63.10:2013	American National Standard of Procedures for Compliance Testing of Unlicensed		
ANSI C05.10.2015	Wireless Devices		
ANSI C63.4:2014	American National Standard for Methods of Measurement of Radio- Noise Emissions		
ANSI C63.4.2014	from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz		
RSS-247 Issue 2	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-		
N33-247 ISSUE 2	Exempt Local Area Network (LE-LAN) Devices		
RSS-Gen Issue 4	General Requirements and Information for the Certification of Radio Apparatus		

Table 1.7.2: Applicable Clauses					
Parameter	FCC Part 15 Rule Paragraphs	IC RSS References			
Transmitter Characteristics	15.247	RSS-247 5.2 (DTS) & 5.4, RSS-Gen			
Bandwidth	15.247(a)(2), 2.1049, KDB 558074 D01	RSS-247 6.2.4.1, RSS-Gen 6.6			
Spurious Emission	15.247(d), 15.209, 15.205	RSS-247 5.5, RSS-GEN 6.13 & 8.10			
Band Edge	15.247, 15.205	RSS-247 5.5, RSS-Gen 4.9			
Antenna Requirement	15.247, 15.203	RSS-Gen 8.3			

2.0 Fundamental Power

2.1 Test Procedure

Peak power is measured using conducted means and without modulation. The transmitter hopping sequence is disabled to operate on a single channel for the measurement.

2.2 Test Criteria

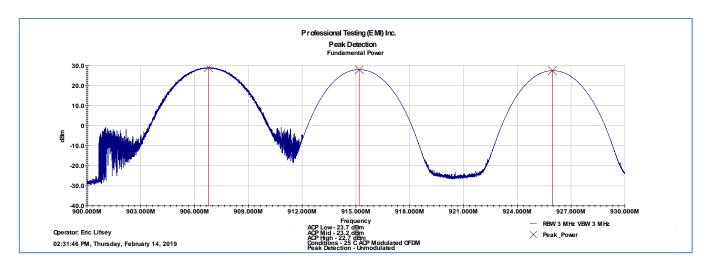
47 CFR (USA) // IC (Canada)					
Section Reference	Date				
	Fundamental Power				
15.247(b)(3) //	Conducted Limits	14 Feb 2019			
RSS-247 5.4(b)	1 W	14 Feb 2019			
	Limit Restated as Field: 125.23 dBμV/m @ 3 m				

2.3 Test Results, Peak Power

Table 2.3.1 Power, Peak, Conducted, Unmodulated						
Frequency MHz	Measured Peak Power At Antenna Port dBm*	Antenna Gain dBi	Power Restated as EIRP dBm	Maximum Measured Peak Power Restated as EIRP mW		
903	29.0	1.2	30.2	1047		
915	28.0	1.2	29.2	831		
926	27.5	1.2	28.7	741		

^{*}Measured in 3 MHz RBW, 3 MHz VBW. **Measured in 1.2 MHz ACP band.

The EUT satisfied the requirements.



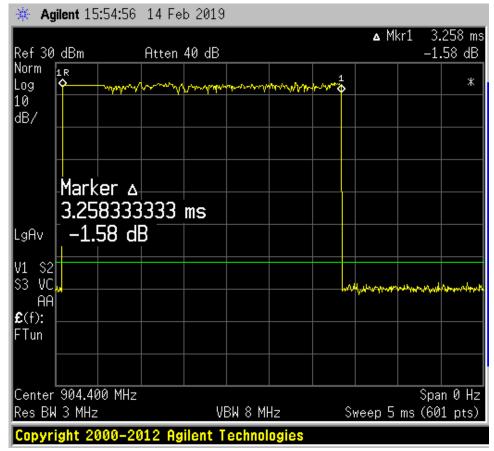
2.4 Test Results, Duty Cycle

Measurement is based on intervals not to exceed 100 msec. Maximum transmitter on time is divided by the lesser of 100 msec or the actual measured minimum transmitter interval time. The result is converted to dB and applied as needed to peak measurements of transmitter artifacts to determine average power. This is not a pass/fail measurement.

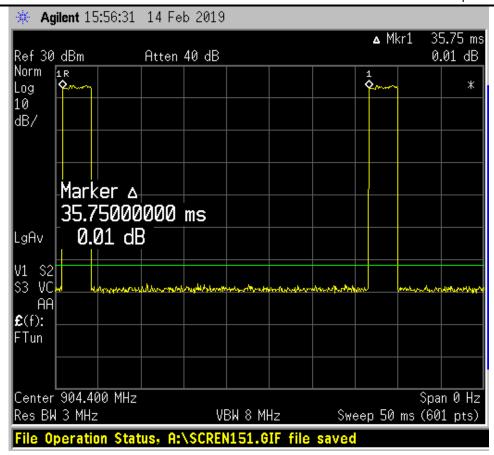
Table 2.4.1 Duty Cycle Results and Average Duty Cycle Factor Result									
Total Measured On Time (msec)	Measured Time Interval (msec)	Duty Cycle Factor Calculation	Result (dB)	Duty Cycle Factor Allowed (dB)					
3.258	35.75	= 20 * Log ₁₀ (3.258 msec / 35.75 msec)	-21.3	-20					

For exposure consideration, the factor is -21.3 / 2 = -10.65 dB

The allowed duty cycle factor is applied to peak measured harmonic signals to find average levels.



Transmit Time



Transmit Interval

3.0 Power Spectral Density

3.1 Test Procedure

A spectrum analyzer is either connected directly to the EUT or used by radiated means to measure the fundamental emission. It is adjusted to measure the power spectral density in the specified resolution bandwidth.

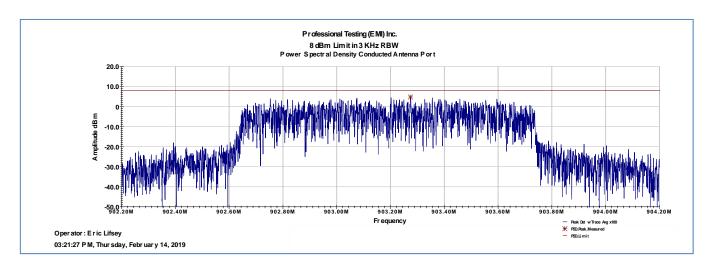
3.2 Test Criteria

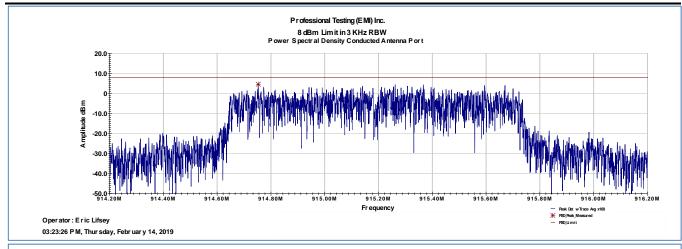
47 CFR (USA) // IC (Canada)									
Section Reference	Parameter	Date							
15.247(e) // RSS-247, 5.2	Power Spectral Density, Conducted Limit: 8 dBm / 3 kHz Restated as field strength limit: 103.23 dBμV/m at 3 m	14 Feb 2019							

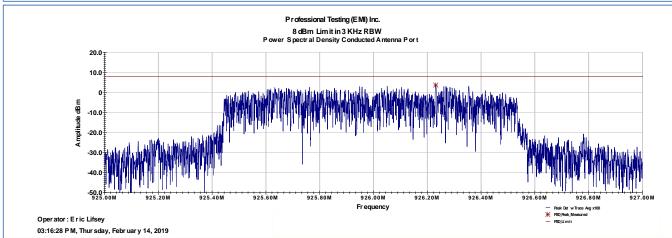
3.3 Test Results

Table 3.3.1 Power Spectral Density, ConductedFrequencyMaximum Measured PSDMHzdBm9034.8			
Frequency	Maximum Measured PSD		
MHz	dBm		
903	4.8		
915	4.6		
926	3.6		

The EUT satisfied the requirements.







4.0 Occupied Bandwidth

4.1 Test Procedure

Bandwidth is measured by radiated means. A recording of the results is included.

4.2 Test Criteria

47 CFR (USA) // IC (Canada)									
Section Reference	Parameter	Date(s)							
15.247(a)(2), 2.1049, KDB 558074 D01 // RSS-Gen 6.6	Bandwidth, 6 dB, 20 dB, 99%	14 Feb 2019							

4.3 Test Results

The bandwidth measurement is used to verify DTS characteristics and/or for general reporting for agency application.

The EUT satisfied the requirements.

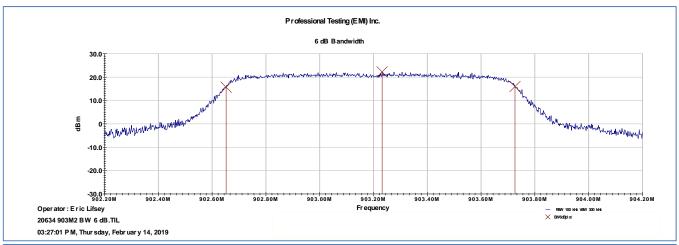
Table 4.3.1 Bandwidth 6 dB, Minimum 500 kHz in 100 kHz RBW									
Low Channel	Mid Channel	High Channel	Reported						
Measured BW	Measured BW	Measured BW	Minimum BW						
(kHz)	(kHz)	(kHz)	(kHz)						
1074	1036	1072	1036						

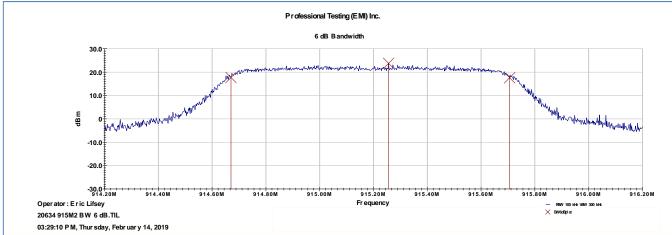
Table 4.3.2 Band	Table 4.3.2 Bandwidth 20 dB, Measure and Report									
Low Channel	Mid Channel	High Channel	Reported							
Measured BW	Measured BW	Measured BW	Maximum BW							
(kHz)	(kHz)	(kHz)	(kHz)							
1202	1192	1192	1202							

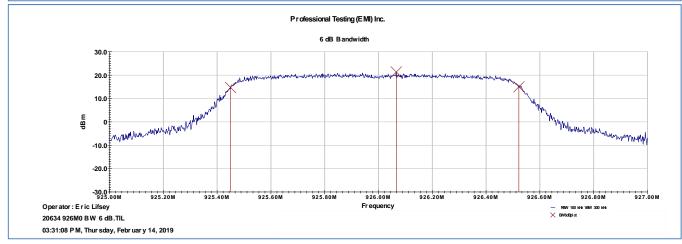
Table 4.3.3 Bandwidth 99%, Measure and Report									
Low Channel	Mid Channel	High Channel	Reported						
Measured BW	Measured BW	Measured BW	Maximum BW						
(kHz)	(kHz)	(kHz)	(kHz)						
1106	1125	1111	1125						

Plotted measurements appear on the following pages.

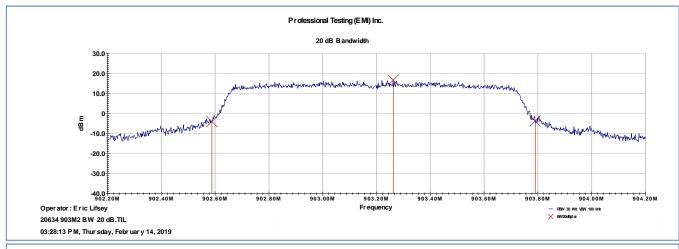
4.3.1 Bandwidth Plots, 6 dB

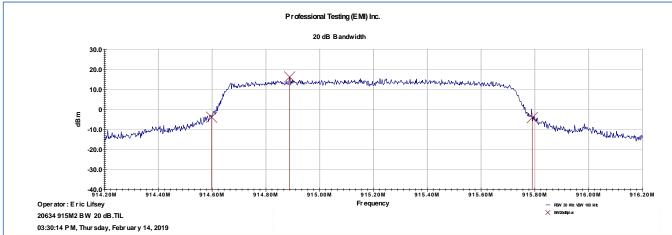


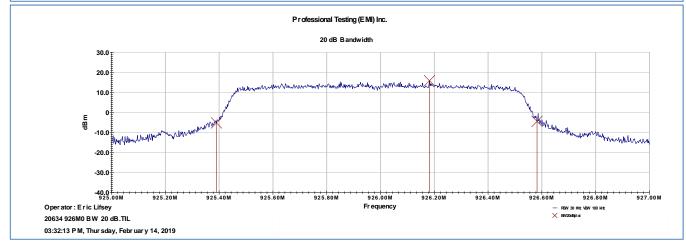




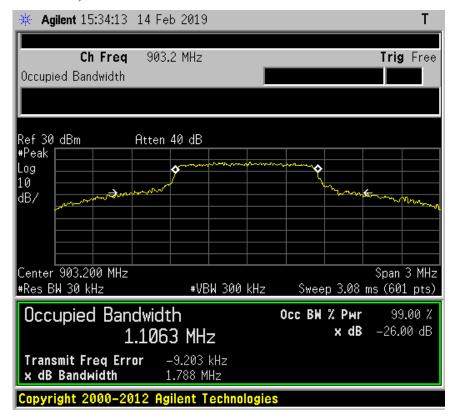
4.3.2 Bandwidth Plots, 20 dB

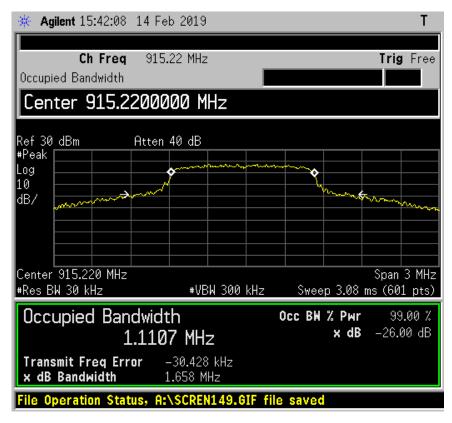


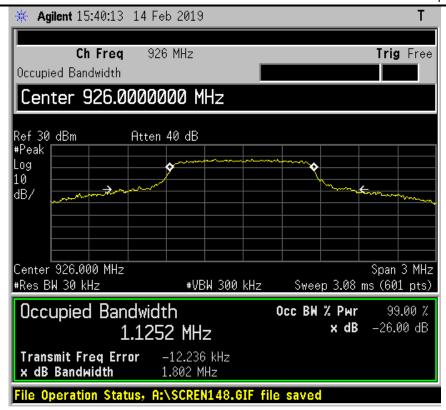




4.3.3 Bandwidth Plots, 99%





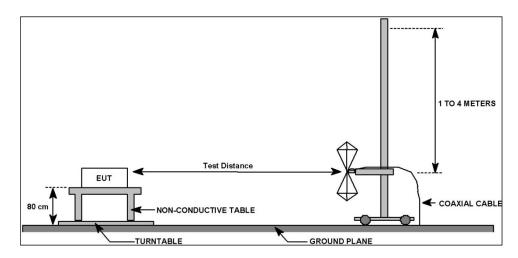


5.0 Radiated Spurious Emissions, Receive Mode

5.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The EUT was centered on a rotating turntable. Measurements below 1 GHz were taken at a test distance of 10 meters from the measurement antenna. Above 1 GHz the measurement distance was 3 meters.

Spurious emissions below 1 GHz were measured with quasi-peak detection with a resolution bandwidth of 120 kHz. Above 1 GHz peak measurements were taken and average measured where appropriate and 1 MHz resolution bandwidth. A diagram showing the test setup appears below.



5.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.247(d), 15.209, 15.205 // RSS-247 5.5, RSS-Gen 6.13 & 8.10	Field Strength of Radiated Spurious/Harmonic Emissions Receive Mode	14 Feb 2019

5.3 Test Results

The EUT was tuned to the middle channel and placed in receive mode.

The EUT satisfied the criteria.

5.3.1 Up to 1 GHz

			Profes	sional Te	sting, El	VII, Inc.				
Test Metho	od:		•	an National Star Electronic Equi					oise Em	issions from
In accorda	nce with:	FCC Part 15 Emissions L		Federal Regulat	ions Part 47, S	Subpart B - Ur	intentio	nal Radiato	ors, Rad	iated
Section:		15.109			1					
Test Date(s):	2/14/2019			EUT Serial	#:	None			
Customer:		Setcom (T	enX)		EUT Part #:		None			
Project Nu		20634			Test Techn		Eric Lif			
Purchase C		0			Supervisor		Lisa Ar			
Equip. Und	der Test:	Liberator	Max Base		Witness' N	ame:	Jason	Gossiaux		
		Radiated E	missions Test	t Results Data	a Sheet			Page:	1	of 1
EUT L	ine Voltage	: :	9 VDC		EUT Pow	ver Frequen	су:	0	N/A	
Antenn	a Orientati	on:	Vertic	al	Frequ	ency Range:		30N	1Hz to	1GHz
	EUT	Mode of Op	eration:			Receiv	e Mode	Mid Cha	an	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit L		argin dB)	Test Result
60.003	10	251	3.52	Quasi-peak	31.505	11.694	29.	5 -:	17.8	Pass
69.555	10	9	1.74	Quasi-peak	27.549	7.864	29	5 -2	21.6	Pass
298.561	10	300	1.18	Quasi-peak	31.356	20.649	35.	6 -:	15.0	Pass
672.024	10	224	2.24	Quasi-peak	25.251	23.892	35.	6 -:	11.7	Pass
934.852	10	80	3.42	Quasi-peak	21.174	25.446	35.	6 -:	10.2	Pass
952.040	10	274	4	Quasi-peak	21.031	25.734	35.	6 -	9.9	Pass
Radiat	ted Emission	sting, EMI, ns, 10m Dista ity Measured Emissi	ın ce		ı	·		Quasi-peak Ambient So Pre-scan E Quasi-peak LPRF Verified Low	an missions Reading ication Limi	
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				Profess	sional Te	sting, EN	VII, Inc.				
Test Metho	d:			•	n National Star Electronic Equi					-Noise Em	issions from
In accordan	nce with:	FCC Par Emissio			Federal Regulat	ions Part 47, S	Subpart B - Ur	intentio	nal Radia	ators, Radi	ated
Section:		15.109									
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Customer:	•	Setcon	_	nX)		EUT Part #:		None			
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Equip. Ond							airie.	Jason			
					Results Data				Page:		of 1
	ne Voltage		9				er Frequen		0	N/A	
Antenna	Orientatio		• -	Horizor	ntal	Freque	ency Range:			OMHz to	1GHz
	EUT N	/lode of	-	ration:			Receiv	e Mode	Mid C	han	
Frequency Measured (MHz)	Test Distance (Meters)	Direct	ion	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Le		Margin (dB)	Test Resul
31.586	10	145	5	2.36	Quasi-peak	23.998	12.284	29.5	5	-17.2	Pass
336.004	10	73	}	1.71	Quasi-peak	34.626	24.923	35.6	5	-10.7	Pass
455.999	10	44		1.37	Quasi-peak	31.249	24.645	35.6		-11.0	Pass
468.000	10	298		1.17	Quasi-peak	31.184	25.228	35.6		-10.4	Pass
945.603	10	85		1.14	Quasi-peak	21.074	25.617	35.6		-10.0	Pass
963.407	10	146	0	1.13	Quasi-peak	21.017	26.009	43.5	>	-17.5	Pass
Radiate	ssional Tes ed Emission 3Hz Horizontal Pola	s, 10m E	Distan	ce				:	— Ambien — Pre-sca ⊽ Quasi-po × LPRFV	eak Limit t Scan n Emissions eak Reading er ification Limit I Low-PREQP R	
Field Strength (dBµV/m) 20 × 70 ×							×	<u>**</u>			
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30M	,		-	100M	Free	# IODOV	'	,			1G
	Eric Lifsey 119'RE'T7v1.2'Run0' me-09:08:06 AM, Th		uary 14, 2	Power: 9	ceive mode	puency	I	EUT: Liberato Project Num l Client: Setcon	per: 20634		
			≤ 1GI	Hz Horizont	al Antenna P	olarity Mea	sured Emis	sions		_	_

5.3.2 Up to 5 GHz

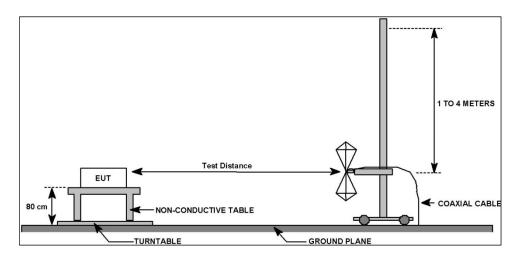
			Profess	sional Te	sting, El	MI, Inc.			
Test Method: ANSI C63.4: 2014, American National Standard for Methods of Measurement of Radio-Noise Emissions fro Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated									
In accorda	nce with:	FCC Part 15.1 Emissions Lin		ederal Regula	tions Part 47,	Subpart B - Un	nintentional R	adiators, Rad	iated
Section:		15.109			1		,		
Test Date(s	s):	2/14/2019			EUT Serial		None		
Customer:		Setcom (Te	nX)		EUT Part #:		None		
Project Nu		20634			Test Techn		Eric Lifsey		
Purchase C Equip. Und		LiberatorM	lay Raso		Supervisor: Witness' N		Lisa Arndt Jason Goss	riauv	
-quip. Onu				Results Dat	•	airie.		ge: 1	of 1
FUT I	ine Voltage		O VDC	Results Dat		ver Frequen		0 N/A	
	a Orientatio		Vertica	al		ency Range:		Above 1	
	EUT N	Mode of Ope	eration:			Receiv	e Mode Mi	d Chan	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBμV/m)	Margin (dB)	Test Result
1235.99	3	103	1.39	Average	43.3	31.444	54.0	-22.5	Pass
1296	3	233	1.93	Average	40.2	28.443	54.0	-25.5	Pass
2944.92	3	112	3.6	Average	35.9	28.848	54.0	-25.1	Pass
4602.9	3	205	2.74	Average	35	30.736	54.0	-23.2	Pass
Radiat		sting, EMI, II s, 3m Distand uredEmissions					▽ Av — Pe — Pr	erage Limit erage Reading ak Limit e-scan Emissions ak Reading	
Field Strength (dBµV/m) 20 20 20 20 20 20 20 20 20 20 20 20 20	Antino de la constanta de la c	The state of the s	and the second second second		anni propinski kali prijeski krije sekolika				m de contractor
20 [‡] 1G Operator:	Eric Lifsey 419'RE'T7v1.2'Run01		Mode: Rec	Fre	equency		EUT: Liber ator m ax E Project Number : 206		5G

							Setcom	Corporation	– MS900MA
			Profess	sional Te	esting, El	VII, Inc.			
Test Metho	od:		2014, America Electrical and					adio-Noise Er	missions from
In accorda	nce with:	FCC Part 15. Emissions Li	109 - Code of F	ederal Regula	tions Part 47,	Subpart B - Ur	nintentional I	Radiators, Rad	diated
Section:		15.109							
Test Date(s):	2/14/2019)		EUT Serial	#:	None		
Customer:		Setcom (T	enX)		EUT Part #		None		
Project Nu	mber:	20634			Test Techn	ician:	Eric Lifsey		
Purchase C	Order #:	0			Supervisor		Lisa Arndt		
Equip. Und	ler Test:	Liberator	/lax Base		Witness' N	ame:	Jason Gos	siaux	
	F	Radiated Er	nissions Test	Results Dat	a Sheet		Pa	age: 1	of 1
EUT L	ine Voltage:		9 VDC		EUT Pov	ver Frequen	cy:	0 N/A	1
Antenn	a Orientatio	n:	Horizon	ital	Frequ	ency Range		Above 1	lGHz
	EUT N	/lode of Op	eration:			Receiv	e Mode M	id Chan	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level		Test Results
1224.04	3	271	2.35	Average	41.3	29.463	54.0	-24.5	Pass
3003.57	3	31	1.8	Average	36	29.07	54.0	-24.9	Pass
3765.99	3	300	2.2	Average	36.4	29.873	54.0	-24.1	Pass
3981.01	3	133	1.82	Average	35.6	29.428	54.0	-24.5	Pass
Radiat	essional Tes ed Emission or izontal Polarity Mea	s, 3m Distan					— А — Р △ Р	eak Limit ver age Limit re-scan Emissions eak Reading ver age Reading	
Field Strength (d.B _L V/m) 90 90 90 90 90 90 90 90 90 90	and the same of th	<u>Unhaberraries</u>	the same of the same of		they are some of the children	and the state of t	the state of the s	Manager Land and the State of t	na santa anta da pro-
20634 021	Eric Lifsey 419'RE'T7v1.2'Run01 ime-09:40:38 AM, Thu		Power: 9	ceive mode	equency		EUT: Liberatormax Project Number: 20 Client: Setcom		5G

6.0 Radiated Spurious Emissions, Transmit Mode

6.1 Test Procedure

Radiated emissions are measured with the EUT transmitting on the required frequencies.



6.1.1 Test Distance and Detec	tion Method								
30 MHz to 1 GHz 1 GHz to 18 GHz 18 GHz to 25 GHz									
10 m	3 m	1 m							
Quasi-peak	Peak & Average	Peak & Average							

6.2 Test Criteria

47 CFR (USA) // IC (Canada)										
Section Reference	Parameter	Date(s)								
15.247(d), 15.205 // RSS-247 5.5, RSS-Gen 6.13 & 8.10	Field Strength of Radiated Spurious/Harmonic Emissions Transmit Mode	14 Feb 2019								

6.3 Test Results

Modulation was enabled for this test and the transmitter was placed into continuous transmit mode.

Lowest fundamental power measured 30.2 dBm; subtracting 20 dBc yields limit for unrestricted bands of 10.2 dBm. For field strength at 3 meters (> 1 GHz) the limit calculates to 105.4 dB μ V/m. Note that the general emission limits were satisfied.

The duty cycle averaging factor applies -20.0 dB to the peaks recorded for the harmonics.

6.3.1 Up to 1 GHz, Middle Channel

			Profes	sional Te	sting, EN	VII, Inc.			
Test Metho	od:	ANSI C63.10: Devices	2013: Ameri	can National Sta	andard of Proc	edures for Co	mpliance Te	sting of Unlice	nsed Wirele
In accordan	ice with:	FCC Part 15.2 Limits	209 - Code of	Federal Regulat	ions Part 47, S	Subpart C - Int	tentional Ra	diators, Radiate	ed Emissions
Section:		15.209							
Test Date(s	s):	2/14/2019			EUT Serial	# :	None		
Customer:		Setcom (Te	nX)		EUT Part #:		None		
Project Nur	mber:	20634			Test Techni	ician:	Eric Lifsey	7	
Purchase O	rder #:	0			Supervisor:		Lisa Arnd	t	
Equip. Und	er Test:	LiberatorM	ax Base		Witness' N	ame:	Jason Gos	ssiaux	
	F	Radiated Em	issions Test	Results Data	Sheet		P	age: 1	of 1
EUT Li	ne Voltage:	: 9	9 VDC		EUT Pow	ver Frequen	су:	0 N/A	
Antenna	Orientatio	n:	Vertic	al	Frequ	ency Range	•	30MHz to	1GHz
	EUT N	lode of Ope	eration:			Transn	nit Middle	Channel	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Leve (dBµV/m)		Test Resul
33.775	10	67	1.79	Quasi-peak	38.899	26.253	29.5	-3.2	Pass
33.792	10	79	2.03	Quasi-peak	40.302	27.649	29.5	-1.9	Pass
33.775	10	67	1.79	Quasi-peak	38.899	26.253	29.5	-3.2	Pass
34.782	10	14	1.54	Quasi-peak	40.715	27.644	29.5	-1.9	Pass
46.735	10	147	1.29	Quasi-peak	37.557	19.85	29.5	-9.7	Pass
54.121	10	117	3.55	Quasi-peak	36.415	17.149	29.5	-12.4	Pass
71.901	10	81	2.39	Quasi-peak	39.752	20.016	29.5	-9.5	Pass
878.482	10	63	3.54	Quasi-peak	31.014	34.471	35.6	-1.1	Pass
942.632	10	106	3.14	Quasi-peak	29.815	34.283	35.6	-1.3	Pass
Radiate	ed Emission	ting, EMI, Ir s, 10m Distan Measured Emission	ce				— A — P ∇ G × L ∇ V	Quasi-peak Limit nm bient Scan Pre-scan Emissions Quasi-peak Reading PRFVerification Limit /er ified Low-PRFQP R imit 15.247d	
Field Strength (d Bµ/m) 100 100 100 100 100 100 100 1	ex	×							××
20 m/y/*/ 10 m/y/*/ 30M Operator: I	Eric Lifsey M9'RE'T7v1.2'Run02	TX'MidChantil		ınsm it m ode; Mid chann	uency		EUT: Liberator max Project Number: 20		1G
Current Tir	me -10:20:52 AM, Thu	ırsday, February 14, 2	Note. ren	rites added.	larity Meas		Client: Setcom		

							Setcom	Corporation -	– MS900MA		
			Profes	sional Te	sting, EN	VII, Inc.					
Test Metho	d:	ANSI C63.10 Devices	: 2013: Ameri	can National Sta	andard of Proc	edures for Co	ompliance Te	sting of Unlice	nsed Wireless		
In accordan	ice with:	FCC Part 15.2 Limits	C Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissio nits								
Section:		15.209									
Test Date(s):	2/14/2019			EUT Serial	# :	None				
Customer:		Setcom (Te	nX)		EUT Part #:		None				
Project Nur	nber:	20634			Test Techn	ician:	Eric Lifsey				
Purchase O	rder #:	0			Supervisor		Lisa Arndt				
Equip. Und	er Test:	LiberatorN	lax Base		Witness' N	ame:	Jason Gos	siaux			
	F	Radiated Em	nissions Test	Results Data	a Sheet		P	age: 1	of 1		
EUT Li	ne Voltage:	9	9 VDC		EUT Pov	ver Frequen	icy:	0 N/A			
Antenna	Orientatio	n:	Horizor	ntal	Frequ	ency Range	:	30MHz to	1GHz		
	EUT N	lode of Ope	eration:			Transn	nit Middle	Channel			
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Leve (dBµV/m)		Test Results		
33.067	10	62	3.21	Quasi-peak	23.477	11.14	29.5	-18.4	Pass		
76.907	10	70	3.89	Quasi-peak	24.797	4.917	29.5	-24.6	Pass		
456.003	10	238	2.88	Quasi-peak	32.196	25.592	35.6	-10.0	Pass		
467.999	10	227	2.92	Quasi-peak	32.206	26.25	35.6	-9.4	Pass		
630.143	10	220	1.37	Quasi-peak	21.967	20.058	35.6	-15.5	Pass		
Radiate	ed Emission	ting, EMI, II s, 10m Distan ity Measured Emissi	ce				— A — P ▽ Q × U	Lasi-peak Limit mbient Scan re-scan Emissions Lasi-peak Reading PRF Verification Limit erified Low-PRFQP R mit 15,247d			
10 0 30M Operator: I	Eric Lifsey	TX'MidChantil		nsm it m ode; Mid chann	uency		EUT: Liberator max		1G		
Cur rent Tir	me -10:31:18 AM, Thu	rsday, February 14,	Power: 9 2019 Note: Feri	VDC ites added.			Client: Setcom				
	- ,		Note: Fer	ites added							

≤ 1GHz Horizontal Antenna Polarity Measured Emissions

6.3.2 1 to 10 GHz, Bottom Channel

			Profess	sional Te	sting, EN	VII, Inc.			
Test Metho	d:	ANSI C63.10: Devices	2013: Americ	an National St	andard of Proc	edures for Co	mpliance Tes	ting of Unlice	nsed Wireless
In accordan	ce with:	FCC Part 15.2 Limits	09 - Code of F	ederal Regulat	tions Part 47, S	Subpart C - Int	tentional Rad	iators, Radiato	ed Emissions
Section:		15.209							
Test Date(s):	2/14/2019			EUT Serial	# :	None		
Customer:		Setcom (Te	nX)		EUT Part #:		None		
Project Nur	nber:	20634			Test Techni	ician:	Eric Lifsey		
Purchase O	rder #:	0			Supervisor:		Lisa Arndt		
Equip. Und	er Test:	LiberatorM	ax Base		Witness' N	ame:	Jason Gos	siaux	
	F	Radiated Em	issions Test	Results Data	a Sheet		Pa	ige: 1	of 1
EUT Li	ne Voltage	: 9	VDC		EUT Pow	er Frequen	cy:	0 N/A	
Antenna	Orientatio	n:	Vertic	al	Frequ	ency Range:		Above 1	GHz
	EUT N	lode of Ope	eration:			Transm	it Bottom (Channel	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
1806.4	3	57	2.57	Peak	70.5	60.812	74.0	-13.1	Pass
2709.58	3	270	2.21	Peak	69	61.085	74.0	-12.9	Pass
3612.78	3	328	3.88	Peak	65.2	58.461	74.0	-15.5	Pass
5419.14	3	349	3.38	Peak	50.2	47.816	74.0	-26.1	Pass
6322.35	3	108	3.36	Peak	48.2	49.186	74.0	-24.8	Pass
7225.58	3	125	3.23	Peak	48	51.358	74.0	-22.6	Pass
8128.71	3	122	3.52	Peak	45.9	51.547	74.0	-22.4	Pass
9031.91	3	113	1.95	Peak	49.3	57.027	74.0	-16.9	Pass
Radiate		sting, EMI, Ir s,3m Distand sured Emissions		· — — ·			▽ Av — Pe — Pr	er age Limit er age Reading ak Limit e-scan Emissions ak Reading	
Field Strength (dBµV/m) 09 09			_		A		Δ		
30 40 20 1G	ndrandrik da	A share the state of the state of	and the same of th	And a second of the second of		Browle and Browledge de de			10G
Operator: I		ursday, February 14, 2	Power:9	nsmit mode; Bottom cl	quency nannel	F	EUT: Liberatorm ax E Project Number: 206 Client: Setcom		

			Profes	sional Te	sting, El	VII, Inc.					
Test Metho	d:	ANSI C63.1 Devices	0: 2013: Ameri	can National St	andard of Proc	edures for Co	mpliance	Testing	g of Unlicer	nsed Wir	eless
In accordan	ce with:	FCC Part 15 Limits	.209 - Code of	Federal Regula	tions Part 47,	Subpart C - Int	tentional	Radiato	ors, Radiate	d Emissi	ons
Section:		15.209									
Test Date(s)):	2/14/201			EUT Serial		None				
Customer:		Setcom (1	enX)		EUT Part #:		None				
Project Nun		20634			Test Techn		Eric Life	_•			
Purchase O		0	Man Dana		Supervisor		Lisa Arı				
Equip. Und	er rest:	Liberator	viax Base		Witness' N	ame:	Jason G	ossia	ux		
	F	Radiated E	missions Tes	t Results Dat	a Sheet			Page	: 1	of	1
EUT Li	ne Voltage:	•	9 VDC		EUT Pov	ver Frequen	су:	0	N/A		
Antenna	Orientatio	n:	Horizoi	ntal	Frequ	ency Range	•		Above 10	GHz	
	EUT N	lode of O	peration:			Transm	it Botto	m Cha	annel		
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Le	_	Margin (dB)	Test Re	sults
1806.48	3	146	3.14	Peak	70	60.324	74.0)	-13.6	Pas	S
2709.5	3	54	3.01	Peak	70.7	62.78	74.0)	-11.2	Pas	S
3612.7	3	358	2.04	Peak	63.8	57.002	74.0)	-17.0	Pas	S
8128.64	3	30	2.08	Peak	43.9	49.547	74.0)	-24.4	Pas	S
9031.63	3	98	3.49	Peak	44.2	51.976	74.0)	-22.0	Pas	S
Radiate	ssional Tes ed Emission orizontal Polarity Ma	s, 3m Dista	nce					Peak Li Average Pre-sca Peak R Average	ge Limit an Emissions eading		
80 2 70											
Field Strength (dBµV/m			<u> </u>	- 	—————————————————————————————————————					-	
∯ 50 50									— A	<u> </u>	
#S Pai 40	the state of the s	and the state of t	and the state of t	and the state of t	Managara da da da basaga da	A STATE OF THE STA					
1											
20 [±] 1G			+	F	a once	-	-	+		10G	i
Operator: E Current Tin	Eric Lifsey ne-12:46:22 PM, Thu	ursday, February 1	Power:9	ansmit mode; Bottom o	quency :hannel		EUT: Liber ator Project Numb Client: Setcom	er: 20634			
		. 1	GHz Horizont	tal Antanna [Polarity Maa	cured Emic	sions				

6.3.3 Up to 1 GHz, Middle Channel

			Profes	sional Te	sting, EN	VII, Inc.			
Test Metho	od:	ANSI C63.10 Devices	: 2013: Ameri	can National Sta	andard of Proc	edures for Co	mpliance Tes	ting of Unlice	nsed Wireles
In accordar	nce with:	FCC Part 15.2 Limits	209 - Code of	Federal Regulat	ions Part 47, S	Subpart C - Int	entional Radi	ators, Radiate	ed Emissions
Section:		15.209							
Test Date(s	s):	2/14/2019			EUT Serial	‡ :	None		
Customer:		Setcom (Te	nX)		EUT Part #:		None		
Project Nur	mber:	20634			Test Techni	ician:	Eric Lifsey		
Purchase O	rder #:	0			Supervisor:		Lisa Arndt		
Equip. Und	er Test:	Liberator	lax Base		Witness' N	ame:	Jason Goss	iaux	
	F	Radiated Em	nissions Test	t Results Data	a Sheet		Pa	ge: 1	of 1
EUT Li	ine Voltage	: 9	9 VDC		EUT Pow	er Frequen	cy:	0 N/A	
Antenna	orientation of the state of the	n:	Vertic	al	Frequ	ency Range:		30MHz to	1GHz
	EUT N	Node of Ope	eration:			Transm	nit Middle C	hannel	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Result
33.775	10	67	1.79	Quasi-peak	38.899	26.253	29.5	-3.2	Pass
33.792	10	79	2.03	Quasi-peak	40.302	27.649	29.5	-1.9	Pass
33.775	10	67	1.79	Quasi-peak	38.899	26.253	29.5	-3.2	Pass
34.782	10	14	1.54	Quasi-peak	40.715	27.644	29.5	-1.9	Pass
46.735	10	147	1.29	Quasi-peak	37.557	19.85	29.5	-9.7	Pass
54.121	10	117	3.55	Quasi-peak		17.149	29.5	-12.4	Pass
71.901	10	81	2.39	Quasi-peak	39.752	20.016	29.5	-9.5	Pass
878.482	10	63	3.54	Quasi-peak	31.014	34.471	35.6	-1.1	Pass
942.632	10	106	3.14	Quasi-peak	29.815	34.283	35.6	-1.3	Pass
Radiat	ed Emission	iting, EMI, II s, 10m Distan	ce				— Am — Pro ▽ Qu	asi-peak Limit Ibient Scan -scan Emissions asi-peak Reading RF Verification Limit	
120 (m/V) (d BIV/m) (m/V) (m/V	× ×	× ×					⊽ Vei	ified Low-PRF QP R	eading
30M Operator:	Eric Lifsey 119'RE'T7v1.2'Run02	'TY'MidChantil	100M Mode: Tra	Freq	uency		EUT: Liberatormax B		1G
2000-1-021-		IX WILCOTELLUI	Power: 9	VD0			1 Oject Number . 200	-	

								Seto	com Co	rporation	– MS90	(AMO
				Profes	sional Te	sting, El	VII, Inc.					
Test Metho	od:	ANSI Co		2013: Ameri	can National Sta	andard of Proc	edures for Co	mpliand	ce Testi	ng of Unlice	nsed W	ireless
In accordar	accordance with: FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits										sions	
Section:		15.209										
Test Date(s	s):	2/14/2	2019			EUT Serial	# :	None				
Customer:		Setcor	n (Te	nX)		EUT Part #:		None				
Project Nur		20634				Test Techn	ician:	Eric Li				
Purchase O		0				Supervisor		Lisa A				
Equip. Und	er Test:	Libera	torM	ax Base		Witness' N	ame:	Jason	Gossi	aux		
	F	Radiate	d Em	issions Test	t Results Data	Sheet			Pag	ge: 1	of	1
EUT Li	ne Voltage:	:	9	VDC		EUT Pow	ver Frequen	су:	0	N/A		
Antenna	Orientatio	n:		Horizor	ntal	Frequ	ency Range	:		30MHz to	1GHz	
	EUT N	lode o	f Ope	ration:			Transn		ldle Cl	nannel		
Frequency Measured (MHz)	Test Distance (Meters)	EU Direct (Degre	tion	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit I		Margin (dB)	Test R	lesults
33.067	10	62	2	3.21	Quasi-peak	23.477	11.14	29	.5	-18.4	Pa	ISS
76.907	10	70)	3.89	Quasi-peak	24.797	4.917	29	.5	-24.6	Pa	iss
456.003	10	23	8	2.88	Quasi-peak	32.196	25.592	35	.6	-10.0	Pa	ISS
467.999	10	22	7	2.92	Quasi-peak	32.206	26.25	35	.6	-9.4	Pa	ISS
630.143	10	22	0	1.37	Quasi-peak	21.967	20.058	35	.6	-15.5	Pa	ISS
Radiat	SSIONAL TES ed Emission GHz Horizonal Polar	s, 10m [Distan	ce					— Amb — Pre- ∇ Quas × LPRI ∇ Verif	i-peak Limit ient Scan scan Emissions i-peak Reading FVer ification Limi ied Low-PRFQP I 15.247d		
10 0 30M Operator:	Eric Lifsey			Power: 9	ınsm it m ode; Mid chann	Lency	F	EUT: Liber at	tormax Bar		10	3

≤ 1GHz Horizontal Antenna Polarity Measured Emissions

6.3.4 Up to 10 GHz, Middle Channel

			Profess	sional Te	sting, EN	VII, Inc.				
Γest Metho	d:	ANSI C63.10 Devices	: 2013: Americ	an National St	andard of Proc	edures for Co	mpliand	ce Testi	ing of Unlice	nsed Wireles
n accordan	ce with:	FCC Part 15.2 Limits	209 - Code of F	ederal Regula	tions Part 47, S	Subpart C - Int	tentiona	al Radia	tors, Radiate	ed Emissions
Section:		15.209								
Test Date(s):	2/14/2019			EUT Serial	# :	None			
ustomer:		Setcom (Te	nX)		EUT Part #:		None			
roject Nur		20634			Test Techn	ician:	Eric Li			
urchase O		0			Supervisor:		Lisa A			
quip. Und	er Test:	LiberatorN	lax Base		Witness' N	ame:	Jason	Gossi	aux	
	F	Radiated Em	issions Test	Results Dat	a Sheet			Pag	ge: 1	of 1
EUT Li	ne Voltage:	: !	9 VDC		EUT Pow	er Frequen	cy:	0	N/A	
Antenna	Orientatio	n:	Vertic	al	Freque	ency Range			Above 1	GHz
	EUT N	Node of Ope	eration:			Transn	nit Mid	ldle Cl	nannel	
Frequency	Test	EUT	Antenna		Recorded	Corrected				
Measured	Distance	Direction	Height	Detector	Amplitude	Level	Limit I		Margin	Test Result
(MHz)	(Meters)	(Degrees)	(Meters)	Function	(dBµV)	(dBµV/m)	(dBμ\	//m)	(dB)	
1830.36	3	56	1.98	Peak	69.2	59.608	74	.0	-14.3	Pass
2745.58	3	351	1.94	Peak	71.1	63.297	74	.0	-10.7	Pass
3660.8	3	148	1.93	Peak	63.4	56.652	74	.0	-17.3	Pass
6406.32	3	143	1.48	Peak	48.6	49.625	74	.0	-24.3	Pass
7330.91	3	153	1.46	Peak	38.5	42.188	74	.0	-31.8	Pass
8204.86	3	340	1.16	Peak	36.3	41.88	74	.0	-32.1	Pass
9163.36	3	239	1.14	Peak	34.1	42.589	74	.0	-31.4	Pass
Radiate		iting, EMI, II s, 3m Distand sured Emissions						— Peal	rage Limit k Limit scan Emissions k Reading	
80										_
Field Strength (d Btw/m) 20 89 40			_						-	_
g 60 -			<u> </u>	- — 						_
∯ 6 50 −								_ Δ		
Stre						فلايم بالمارية المارية	فأنتسقتهان أريتين	Marie Marie	A LEADING THE REPORT OF	
물 40		A STATE OF THE PERSON NAMED IN COLUMN NAMED IN								
30	The state of the s							_		
20 [±]			'		1	-	-		+ + + + + + + + + + + + + + + + + + + +	10G
20± 1G										
1G				Fre nsmit mode; Mid chan	quency	1	EUT: Libera	ntormax Ba	ase	

> 1GHz Vertical Antenna Polarity Measured Emissions

							Setcor	n Corpor	ation -	– MS90	(AMO
			Profes	sional Te	sting, El	VII, Inc.					
Test Metho	d:	ANSI C63.1 Devices	0: 2013: Ameri	can National St	andard of Proc	edures for Co	ompliance [·]	Testing of	Unlice	nsed Wi	ireless
In accordan	ce with:	FCC Part 15 Limits	.209 - Code of	Federal Regula	tions Part 47,	Subpart C - Int	tentional R	adiators,	Radiat	ed Emiss	sions
Section:		15.209									
Test Date(s):	2/14/201	9		EUT Serial	#:	None				
Customer:		Setcom (1	enX)		EUT Part #:		None				
Project Nur	nber:	20634			Test Techn	ician:	Eric Lifse	•			
Purchase O	rder #:	0			Supervisor		Lisa Arn	dt			
Equip. Und	er Test:	Liberator	Max Base		Witness' N	ame:	Jason G	ossiaux			
	F	Radiated E	missions Test	Results Dat	a Sheet			Page:	1	of	1
EUT Li	ne Voltage:		9 VDC		EUT Pow	ver Frequen	ісу:	0	N/A		
Antenna	Orientatio	n:	Horizor	ntal	Frequ	ency Range	:	Ab	ove 1	GHz	
	EUT N	lode of O	eration:			Transn	nit Middl	e Chann	el		
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBμV/m)	Limit Lev	-	argin dB)	Test R	esults
1816.04	3	130	3.25	Peak	68.8	59.153	74.0	-1	4.8	Pa	SS
2724.11	3	185	3.2	Peak	63.2	55.389	74.0	-1	8.6	Pa	SS
3679.91	3	281	1.09	Peak	46	39.278	74.0	-3	4.7	Pa	SS
4578.45	3	115	3.39	Peak	43.6	39.282	74.0	-3	4.7	Pa	SS
9179.91	3	352	3.71	Peak	34.6	43.126	74.0	-3	8.0	Pa	SS
Radiate	ssional Tes ed Emission or izontal Polarity Ma	s, 3m Distai	се				— — — —	Peak Limit Average Lim Pre-scan Em Peak Reading	issions		
Field Strength (d Blu/m) 80 70 10	entered to the little was a	and the little section of the latest						of many the state of the state		100	G
Operator: P	Eric Lifsey me-12:02:01 PM, Thu	ırsday, February 1	Power:9	ınsm it m ode; Mid chanr	quency el	F	EUT: Liberatorm Project Number Client: Setcom				

> 1GHz Horizontal Antenna Polarity Measured Emissions

6.3.5 Up to 10 GHz, Bottom Channel

			Profess	sional Te	sting, El	MI, Inc.			
Test Metho	d:	ANSI C63.10: Devices	2013: Americ	can National Sta	andard of Proc	edures for Co	mpliance Test	ing of Unlicer	nsed Wireless
In accordan	ice with:	Limits	09 - Code of F	ederal Regulat	tions Part 47, 9	Subpart C - Int	entional Radia	ators, Radiate	ed Emissions
Section:		15.209			I		r		
Test Date(s	<u>):</u>	2/14/2019			EUT Serial		None		
Customer:		Setcom (Te	nX)		EUT Part #:		None		
Project Nur		20634			Test Techn		Eric Lifsey		
Purchase O		0			Supervisor		Lisa Arndt		
Equip. Und	er Test:	LiberatorM	ax Base		Witness' N	ame:	Jason Goss	iaux	
	F	Radiated Em	issions Test	Results Data	a Sheet		Pa	ge: 1	of 1
EUT Li	ne Voltage:	: 9	VDC		EUT Pow	ver Frequen	cy: (N/A	
Antenna	Orientatio	on:	Vertic	al	Frequ	ency Range		Above 10	GHz
	EUT N	lode of Ope	eration:			Transm	it Bottom C	hannel	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
1806.4	3	57	2.57	Peak	70.5	60.812	74.0	-13.1	Pass
2709.58	3	270	2.21	Peak	69	61.085	74.0	-12.9	Pass
3612.78	3	328	3.88	Peak	65.2	58.461	74.0	-15.5	Pass
5419.14	3	349	3.38	Peak	50.2	47.816	74.0	-26.1	Pass
6322.35	3	108	3.36	Peak	48.2	49.186	74.0	-24.8	Pass
7225.58	3	125	3.23	Peak	48	51.358	74.0	-22.6	Pass
8128.71	3	122	3.52	Peak	45.9	51.547	74.0	-22.4	Pass
9031.91	3	113	1.95	Peak	49.3	57.027	74.0	-16.9	Pass
Radiate		eting, EMI, Ir s, 3m Distanc sured Emissions		· — — ·			∇ Ave— Pea— Pre	rage Limit rage Reading k Limit -scan Emissions k Reading	
Elield Strength (dB LV/m) So S	adventurite table 12 th the company	A house the state of the state of				and the state of t			
20 1G Operator: E Current Tir	-	ursday, February 14, 2	Power: 9 019 Note: Ferr	nsmit mode; Bottom ch VDC ites added.	puency Diarity Meas	F (EUT: Liberator max Ba Project Number: 2063 Client: Setcom		10G

							Setcom C	orporation -	– MS900MA
			Profes	sional Te	sting, El	MI, Inc.			
est Metho	od:	ANSI C63.1 Devices	0: 2013: Ameri	can National St	andard of Prod	cedures for Co	ompliance Test	ting of Unlice	nsed Wireles
n accorda	nce with:	FCC Part 15 Limits	.209 - Code of	Federal Regulat	tions Part 47,	Subpart C - Int	tentional Radi	ators, Radiate	ed Emissions
ection:		15.209							
est Date(s):	2/14/201	9		EUT Serial	#:	None		
Customer:		Setcom (1	enX)		EUT Part #		None		
Project Nu	mber:	20634			Test Techn	ician:	Eric Lifsey		
orchase C	Order #:	0			Supervisor		Lisa Arndt		
quip. Und	ler Test:	Liberator	Max Base		Witness' N	ame:	Jason Goss	iaux	
	F	Radiated E	missions Test	t Results Data	a Sheet		Pa	ge: 1	of 1
EUT L	ine Voltage	:	9 VDC		EUT Pov	ver Frequen	icy:	N/A	
Antenn	a Orientatio	n:	Horizor	ntal	Frequ	ency Range		Above 1	GHz
	EUT N	/lode of O	eration:			Transm	nit Bottom C	Channel	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBμV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Result
1806.48	3	146	3.14	Peak	70	60.324	74.0	-13.6	Pass
2709.5	3	54	3.01	Peak	70.7	62.78	74.0	-11.2	Pass
3612.7	3	358	2.04	Peak	63.8	57.002	74.0	-17.0	Pass
8128.64	3	30	2.08	Peak	43.9	49.547	74.0	-24.4	Pass
9031.63	3	98	3.49	Peak	44.2	51.976	74.0	-22.0	Pass
Radiat	essional Tes ted Emission Horizontal Polarity M	s, 3m Dista	nce				— Ам — Ргс △ Ре	ak Limit erage Limit e-scan Emissions ak Reading erage Reading	
80									
<u>£</u> 70									
Ag 60 −			ф <u></u>						_
gth (6					1				
ii 50 E									Tara Maria
Field Strength (d BLV/m)	adding the second second	majoritus inicides de la company	the state of the state of the state of	Control of the State of State	Manager Alexander				
30									
20 [‡] 1G									10G
iG				Free	quency	1	EUT: Liber ator m ax B	lase	100
Operator:	Eric Lifsey			ansmit mode; Bottom c	hannel		Project Number: 206		
•	ime -12:46:22 PM, Th	ursday, February 1	Power: 9 4, 2019 Note: Fer	VDC rites added.			Client: Setcom		
					Dolovit - NA	aurad Fasts	sions		
		> 1	SHZ HORIZONI	tal Antenna F	olarity Mea	isured Emis	sions		

6.3.6 Up to 10 GHz, Top Channel

			op Channel						
			Profess	sional Te	sting, El	MI, Inc.			
ANSI C63.10: 2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices									
In accordance with: FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Limits									
Section: 15.209									
Test Date(s):	2/14/201			EUT Serial	#:	None		
Customer:		Setcom (1	「enX)		EUT Part #:		None		
Project Nur		20634			Test Techn		Eric Lifsey		
Purchase O		0			Supervisor		Lisa Arnd		
Equip. Und	er Test:	Liberator	Max Base		Witness' N	ame:	Jason Gos	ssiaux	
	F	Radiated E	missions Test	Results Dat	a Sheet		Р	age: 1	of 1
EUT Li	ne Voltage:		9 VDC		EUT Pov	ver Frequen	су:	0 N/A	
Antenna	Orientatio	n:	Vertic	al	Frequency Range: Above 1GHz				GHz
	EUT N	lode of O	peration:			Trans	mit Top C	hannel	_
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)		Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Leve (dBµV/m)		Test Results
1851.99	3	56	1.85	Peak	68.8	59.217	74.0	-14.7	Pass
2777.99	3	2	2.5	Peak	68.3	60.6	74.0	-13.4	Pass
3703.97	3	351	3.76	Peak	66.2	59.478	74.0	-14.5	Pass
5555.91	3	349	3.97	Peak	48	45.89	74.0	-28.1	Pass
7407.93	3	96	1.13	Peak	48.2	52.227	74.0	-21.7	Pass
8333.9	3	106	1.14	Peak	48.4	54.636	74.0	-19.3	Pass
9259.9	3	164	1.12	Peak	52	60.94	74.0	-13.0	Pass
Professional Testing, EMI, Inc Radiated Emissions, 3m Distance 1-18GHz Vertical Polarity Measured Emissions 90 Peak Reading Peak Reading Peak Reading									
80									
Field Strength (dBµV/m) 09 09 09			一 十	· · · · · · · · · · · · · · · · · · ·	—————————————————————————————————————			_	- -
Strength 20					11. 40. 11.14.				
공 40 교 30	A PROPERTY AND A STREET	p like in the second second second second		al anguith a all and a late					

Fr equency

Mode: Transmit mode; Top channel

Power: 9 VDC

Note: Fer rites added.

Operator: Eric Lifsey

Current Time -01:26:52 PM, Thursday, February 14, 2019

EUT: Liber ator max Base

Project Number: 20634

Client: Setcom

							Setco	om Cor	poration -	- MS900	JIVIA
			Profess	ional Te	sting, EN	VII, Inc.					
Test Metho	ANSI C63.10: 2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices										
In accordance with: FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissic Limits							ions				
Section:	ection: 15.209										
Test Date(s):	2/14/2019				#:	None				
Customer:		Setcom ((TenX)		EUT Part #: None						
Project Nur	nber:	20634			Test Techn		Eric Life				
Purchase O	rder #:	0			Supervisor		Lisa Ar	ndt			
Equip. Und	er Test:	Liberato	rMax Base		Witness' N	ame:	Jason (Gossia	ux		
	F	Radiated	Emissions Test	Results Data	Sheet			Page	: 1	of	1
EUT Li	ne Voltage:	:	9 VDC		EUT Pow	ver Frequen	cy:	0	N/A		
Antenna	Orientatio	n:	Horizon	tal	Frequ	ency Range			Above 10	GHz	
	EUT N	lode of C	peration:				mit Top	o Char	nel		
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees		Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Le		Margin (dB)	Test Re	esults
1851.97	3	177	3.8	Peak	66.6	57.039	74.0)	-16.9	Pas	SS
2778.06	3	193	2.33	Peak	67.6	59.875	74.0)	-14.1	Pas	SS
3703.81	3	9	2.12	Peak	64.9	58.209	74.0)	-15.7	Pas	SS
8333.84	3	50	3.59	Peak	44.6	50.854	74.0)	-23.1	Pas	SS
9260.02	3	83	1.29	Peak	47.7	56.645	74.0)	-17.3	Pas	SS
Radiat											
Field Strength (dBµV/m) 30.00.00.00.00.00.00.00.00.00.00.00.00.0	A STATE OF THE PARTY OF THE PAR					and the second					
20 [±] 1G Operator:	Eric Lifsey		Mode: Trai	nsm it m ode; Top chann	juency el		EUT: Liberator Project Numb			10G	ì

> 1GHz Horizontal Antenna Polarity Measured Emissions

Note: Fer rites added.

7.0 Antenna Construction Requirements

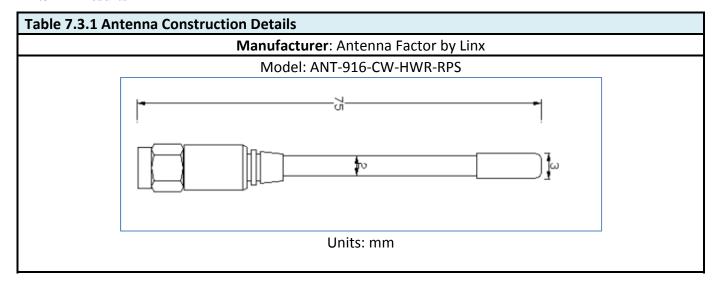
7.1 Procedure

A direct examination of the antenna construction is performed and compared to rule criteria that prevent wireless device antennas from being modified by end users.

7.2 Criteria

47 CFR (USA) // IC (Canada)						
Section Reference	Parameter	Date(s)				
15.203 // RSS-Gen 8.3	Antenna Construction	14 Feb 2019				

7.3 Results



- Antenna is center-fed half-wave.
- The connector is a reverse-polarized center pin SMA type.
- Peak gain is 1.2 dBi.

The antenna design above satisfies the requirements of the rules.

8.0 Equipment

8.1 Radiated Emissions, Transmit & Receive Mode

	Radiated Emissions Test Equipment List								
Til	Tile! Software Version: Version: 7.1.2.17 (Jan 08, 2016 - 02:12:48 PM) or 4.1.A.0, April 14, 2009, 11:01:00PM								
	Test Profile: 2018_Radiated Emissions_TILE7_v1EL.til								
Asset #	Manufacturer	Model	Equipment Nomenclature Serial		Calibration Due Date				
1509A	Braden	TDK 10M	TDK 10M Chamber, NSA < 1 GHz	DAC-012915-005	7/10/2019				
1890	НР	8447F-H64	Preamp/Amp, 9kHz-1300MHz, 28/25dB	3313A05298	1/10/2020				
1937	Agilent	E4440A - AYZ	PSA , 3 Hz - 26.5 GHz, Opt. AYZ	MY44808298	11/8/2019				
1926	ETS-Lindgren	3142D	Antenna, Biconilog, 26 MHz - 6 GHz	135454	3/7/2019				
C027	none	RG214	Cable Coax, N-N, 25m, 30MHz - 1GHz	none	9/21/2019				
1327	EMCO	1050	Controller, Antenna Mast	none	N/A				
0942	EMCO	11968D	Turntable, 4ft.	9510-1835	N/A				
1969	HP	11713A	11713A Attenuator/Switch Driver		N/A				
1509B	Braden	TDK 10M	TDK 10M Chamber,sVSWR > 1 GHz	DAC-012915-005	11/16/2019				
2004	Miteq	AFS44-00101800- 2S-10P-44	Amplifier, 40dB, .1-18GHz	0	1/10/2020				
C030	none	none	Cable Coax, N-N, 30m, 1 - 18GHz	none	9/21/2019				
1325	EMCO	1050	Controller, Antenna Mast	9003-1461	N/A				
1780	ETS-Lindgren	3117	Antenna, Double Ridged Guide Horn, 1 - 18 GHz	110313	3/15/2019				

8.2 Conducted Antenna Port Measurements of Power, PSD, Bandwidth, and Timings

Asset #	Manufacturer	Model #	Description	Calibration Due
2295	Agilent	E4440A	Spectrum Analyzer	6 Nov 2019

9.0 Measurement Bandwidths

Radiated Emissions Spectrum Analyzer Bandwidth and Measurement Time - Peak Scan								
Frequency Band Start (MHz)	Frequency Band Stop (MHz)	6 dB Bandwidth (kHz)	Number of Ranges Used	Measurement Time per Range				
0.009	0.15	0.3	2	Multiple Sweeps				
0.15	30	9	6	Multiple Sweeps				
30	1000	120	2	Multiple 800 mS Sweeps				
1000	6000	1000	2	Multiple Sweeps				
6000	18000	1000	2	Multiple Sweeps				
18000	26500	1000	2	Multiple Sweeps				

*Notes:

^{1.} The settings above are specifically calculated for the E4440A series of spectrum analyzers, which have 8,000 data points per range.

^{2.} The measurement receiver resolution bandwidth setting was 300 Hz for quasi-peak measurements from 9-150 kHz.

^{3.} The measurement receiver resolution bandwidth setting was 9 kHz for quasi-peak measurements from 0.15-30 MHz.

^{4.} The measurement receiver resolution bandwidth setting was 120 kHz for quasi-peak measurements from 30-1000 MHz.

^{5.} The measurement receiver resolution bandwidth setting was 1 MHz for average measurements from 1-18 GHz.

Appendix: Policy, Rationale, and Evaluation of EMC Measurement Uncertainty

All uncertainty calculations, estimates and expressions thereof shall be in accordance with NIST policy. Since PTI operates in accordance with NIST (NVLAP) Handbook 150-11: 2007, all instrumentation having an effect on the accuracy or validity of tests shall be periodically calibrated or verified traceable to national standards by a competent calibration laboratory. The certificates of calibration or verification on this instrumentation shall include estimates of uncertainty as required by NIST Handbook 150-11.

1. Rationale and Summary of Expanded Uncertainty.

Each piece of instrumentation at PTI that is used in making measurements for determining conformance to a standard (or limit), shall be assessed to evaluate its contribution to the overall uncertainty of the measurement in which it is used. The assessment of each item will be based on either a type A evaluation or a type B evaluation. Most of the evaluations will be type B, since they will be based on the manufacturer's statements or specifications of the calibration tolerances, or uncertainty will be stated along with a brief rationale for the type of evaluation and the resulting stated uncertainties.

The individual uncertainties included in the combined standard uncertainty for a specific test result will depend on the configuration in which the item of instrumentation is used. The combination will always be based on the law of propagation of uncertainty. Any systematic effects will be accommodated by including their uncertainties, in the calculation of the combined standard uncertainty; except that if the direction and amount of the systematic effect cannot be determined and separated from its uncertainty, the whole effect will be treated as uncertainty and combined along with the other elements of the test setup.

Type A evaluations of standard uncertainty will usually be based on calculating the standard deviation of the mean of a series of independent observations, but may be based on a least-squares curve fit or the analysis of variance for unusual situations. Type B evaluations of standard uncertainty will usually be based on manufacturer's specifications, data provided in calibration reports, and experience. The type of probability distribution used (normal, rectangular, a priori, or u-shaped) will be stated for each Type B evaluation.

In the evaluation of the uncertainty of each type of measurement, the uncertainty caused by the operator will be estimated. One notable operator contribution to measurement uncertainty is the manipulation of cables to maximize the measured values of radiated emissions. The operator contribution to measurement uncertainty is evaluated by having several operators independently repeat the same test. This results in a Type A evaluation of operator-contributed measurement uncertainty.

A summary of the expanded uncertainties of PTI measurements is shown as Table 1. These are the worst-case uncertainties considering all operative influence factors.

Table 1: Summary of Measurement Uncertainties for Site 45

Type of Measurement	Frequency Range	Meas. Dist.	Expanded Uncertainty U, dB (k=2)
Mains Conducted Emissions	150 kHz to 30 MHz	N/A	2.9
Telecom Conducted Emissions	150 kHz to 30 MHz	N/A	2.8
Padiated Emissions	30 to 1,000 MHz	10 m	4.8
Radiated Emissions	1 to 18 GHz	3 m	5.7

End of Report