

FCC ID: 2ACZ6-STRCD01A

Test Report #: 4126-1
Date: 5/6/2015

TEST REPORT

OF

FCC Part 15 Subpart C (§15.247)

Prepared For:
Stratos Technologies, Inc.
617 Detroit St, #120
Ann Arbor, MI, 48104

Product Name :
Stratos Card

Model Name :
STRATOS CARD 01A

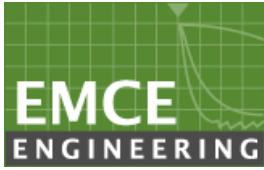
FCC ID : 2ACZ6-STRCD01A

Application Purpose :
Original

Prepared by:

EMCE Engineering, Inc.
44366 S. Grimmer Blvd.,
Fremont, CA 94538 US

This report only responds to the tested sample and may not be reproduced, except in full, without written approval of the EMCE Engineering, Inc.



FCC ID: 2ACZ6-STRCD01A

Test Report #: 4126-1
Date: 5/6/2015

Revision History

Rev.	Issue Date	Description
1	5/6/2015	Initial Issue

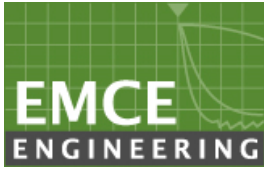
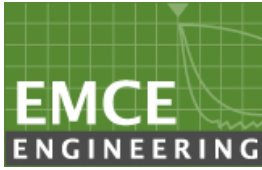


TABLE OF CONTENTS

1. GENERAL INFORMATION	4
2. EUT DESCRIPTION	5
3. SUMMARY OF TEST RESULTS	6
4. MODIFICATIONS	7
5. TEST RESULTS	8
6. TEST EQUIPMENT	27
7. SAMPLE CALCULATION	28



FCC ID: 2ACZ6-STRCD01A

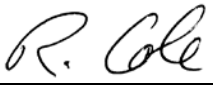
Test Report #: 4126-1
Date: 5/6/2015

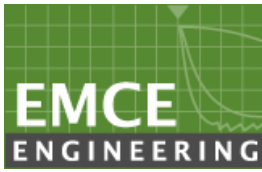
1.0 GENERAL INFORMATION

Test Laboratory:	EMCE Engineering 44366 S. Grimmer Blvd. Fremont, CA 94538 USA Tel: 510-490-4307, Fax: 510-490-3441 bob@universalcompliance.com FCC registration number : 743299 Test Site : FCC : US5291, IC : 3324A
Applicant Name :	Stratos Technologies, Inc. 617 Detroit St, #120 Ann Arbor, MI, 48104 US Contact Person: Greg Marek
Application Purpose :	Original
EUT Description	Remote Controller
Product Name	Stratos Card
Model Name :	STRATOS CARD 01A
Applied Standards :	FCC 47 CFR §15.209, §15.247
FCC ID :	2ACZ6-STRCD01A
IC :	N/A
RF Operating Frequency (ies)	2402 – 2480 MHz
RF Conducted output power	-11.6dBm(0.06918mW)
Antenna Gain	3.3dBi
Modulation	CCK
Emission Designator	N/A
Receipt of EUT :	4/10/15
Date of Testing :	4/15/15 – 5/1/15
Date of Report :	5/6/15

The tests listed in this report have been completed to demonstrate compliance to the CFR 47 Section 15.247.

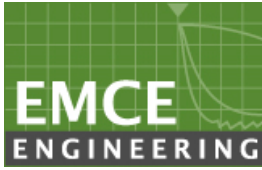
Contents approved:


Name: Bob Cole Title: President



2.0 EUT AND ACCESSORY INFORMATION

EUT				
Product Name	Stratos Card			
Model name	STRATOS CARD 01A			
Frequency Range	2402 – 2480 MHz			
Modulation Type	CCK			
Number of Channels	40			
Manufacturer	Stratos Technologies, Inc.			
Power Source	DC 2.7V (Lithium Battery)			
Antenna Type	PCB Pattern Antenna			
Support Equipment				
Description	Model Number	Serial Number	Manufacturer	Power Cable Description
NONE				
Cable Description				
From	To	Length (Meters)	Shielded (Y/N)	Ferrite Loaded (Y/N)
NONE				

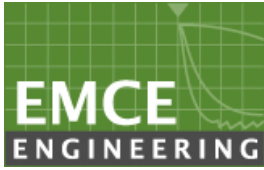


3.0 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

Test Standard		Description	Result (Pass / Fail)
FCC 47 CFR Part 15	RSS 210, RSS-Gen, Issue 4		
15.209(a) 15.247	N/A	Radiated Emissions, Radiated Bandedge, Spurious Emissions	Pass
15.247(a)(2)	N/A	6dB Bandwidth of Operation Frequency	Pass
15.247(a)(3)	N/A	Peak Output Power	Pass
15.247(e)	N/A	Power Spectral Density	Pass
15.247(d)	N/A	Conducted Bandedge	Pass
ANSI C63.4: 2009			
PS: All measurement uncertainties are not taken into consideration for all presented test result.			

PASS The EUT passed that particular test.
FAIL The EUT failed that particular test.
N/A Not Applicable – No IC Application

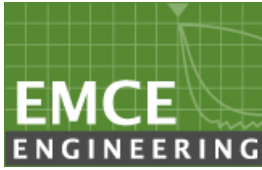


FCC ID: 2ACZ6-STRCD01A

Test Report #: 4126-1
Date: 5/6/2015

4.0 MODIFICATIONS

There were no modifications.

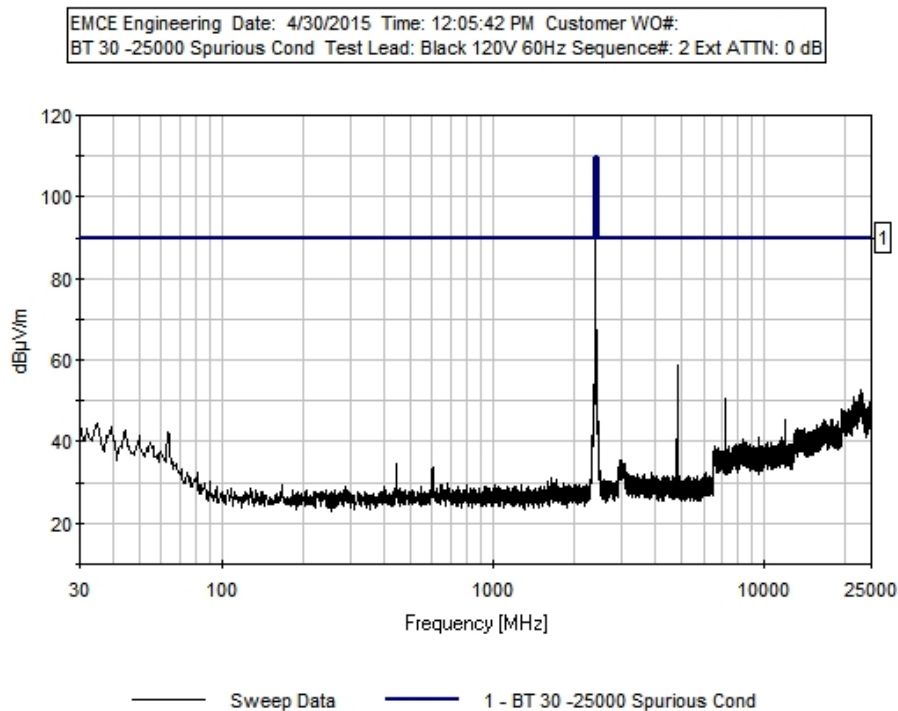


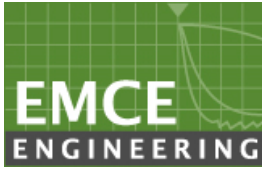
5.0 TEST RESULTS

5.1 Conducted Spurious Emissions

15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement

TEST RESULTS – 2402 MHz Xmit Frequency

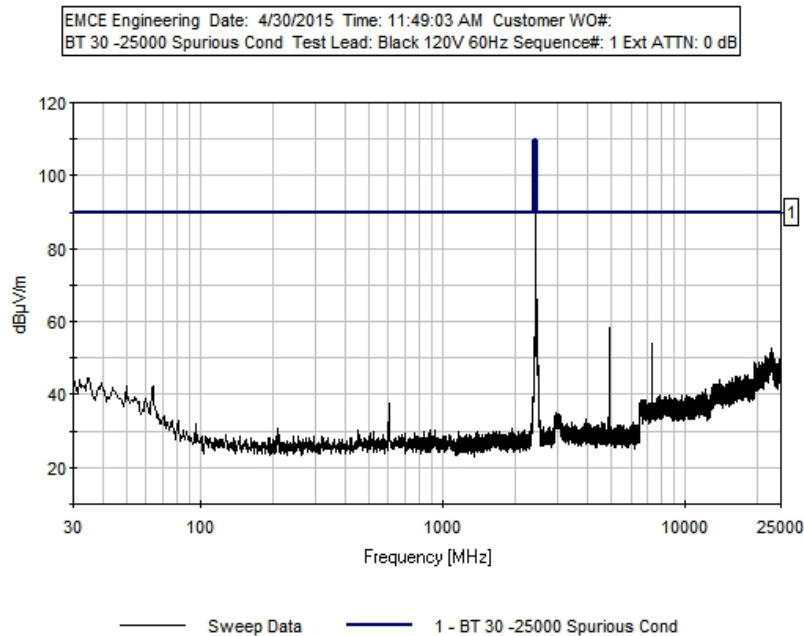




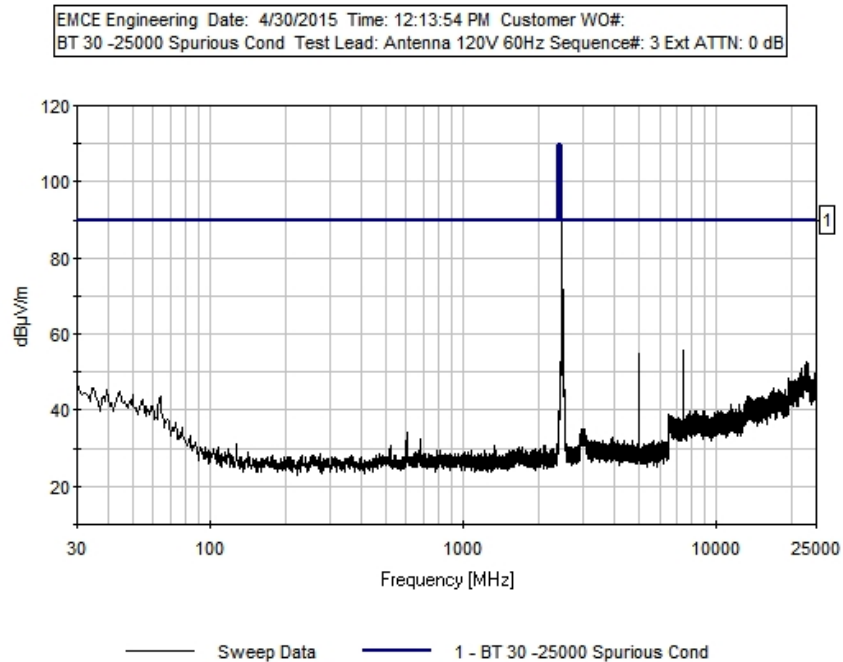
FCC ID: 2ACZ6-STRCD01A

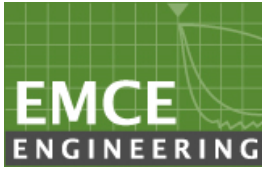
Test Report #: 4126-1
Date: 5/6/2015

TEST RESULTS – 2440 MHz Xmit Frequency



TEST RESULTS – 2480 MHz Xmit Frequency





5.2 6 dB BANDWIDTH OF OPERATION FREQUENCY

LIMIT

§15.247(2)

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

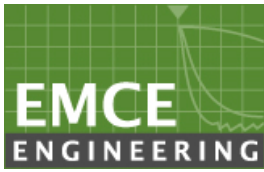
TEST PROCEDURE

- The transmitter output is connected to the spectrum analyzer
- The RBW is set to 100KHz. The VBW is set to 100KHz. The sweep time is coupled.
- Signal Peak is detected
- Bandwidth is determined at the points 6 dB down from the peak value of the modulated carrier.

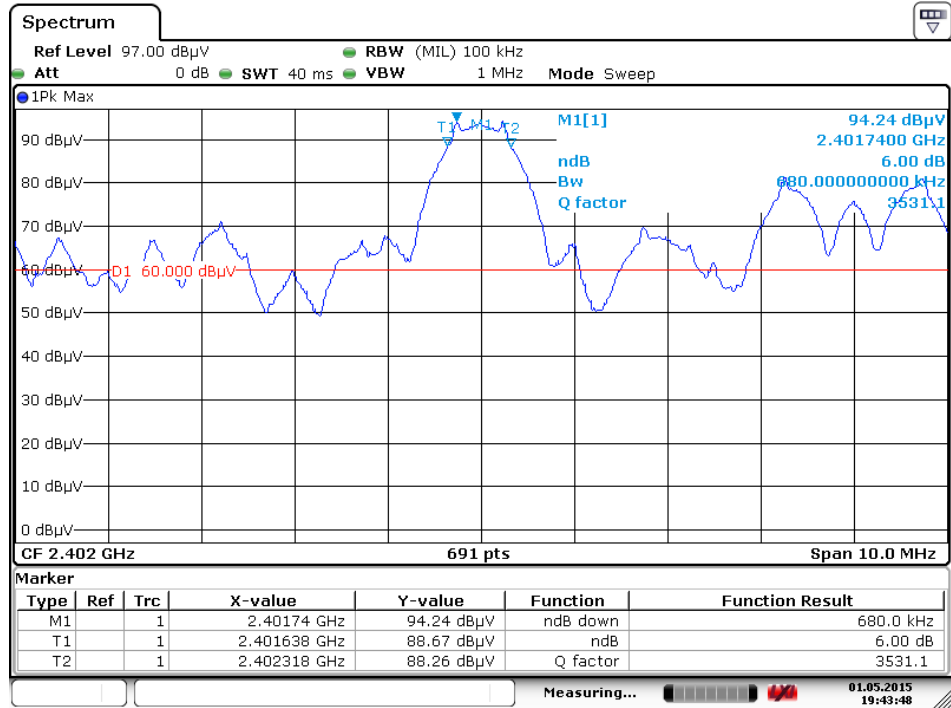
RESULTS

NO non-compliance noted.

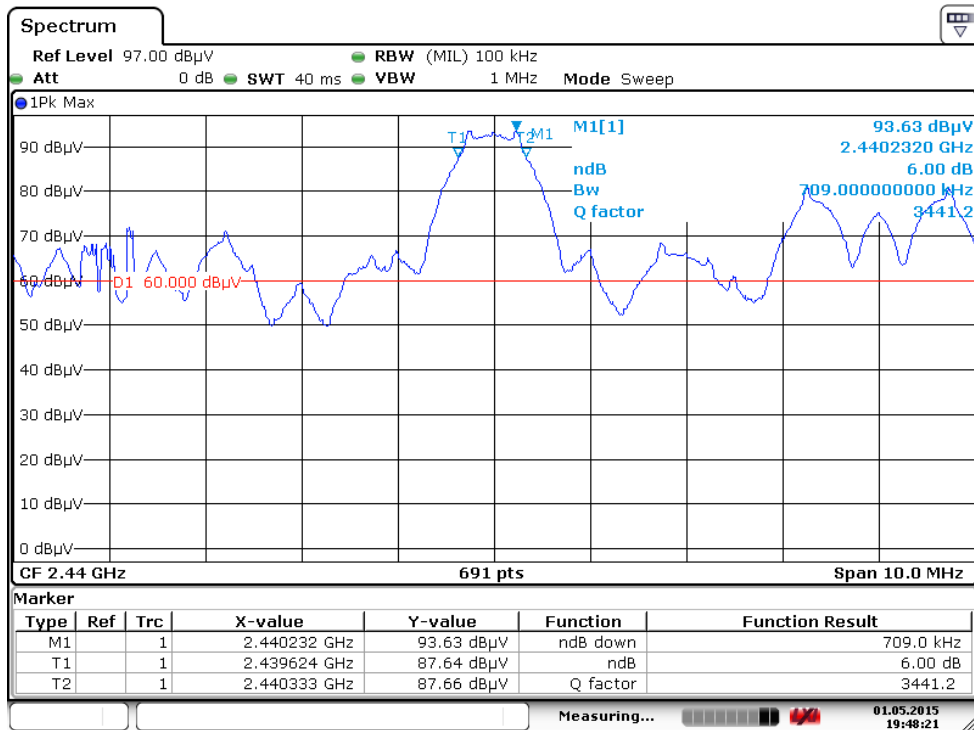
Operating Frequency (MHz)	6dB Bandwidth (KHz)	Limit (KHz)	Result
2402	680	>500	PASS
2440	709	>500	PASS
2480	724	>500	PASS



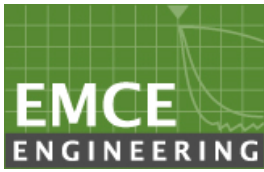
FCC ID: 2ACZ6-STRCD01A

Test Report #: 4126-1
Date: 5/6/2015

Date: 1 MAY 2015 19:43:49

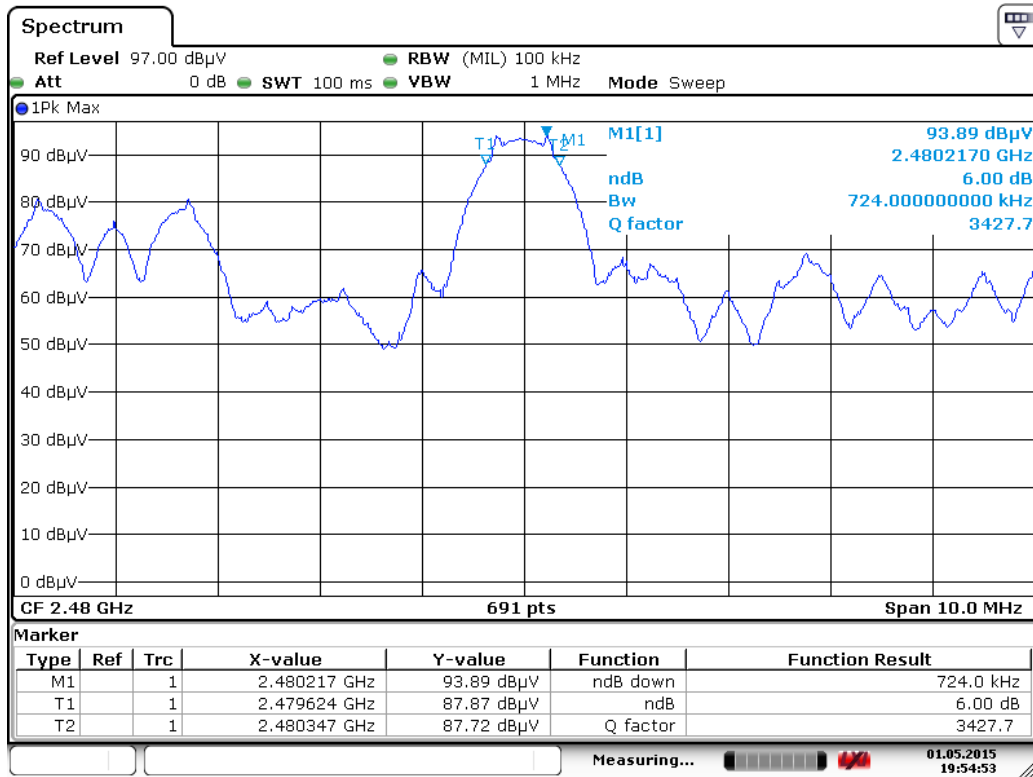


Date: 1 MAY 2015 19:48:22

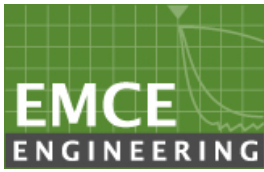


FCC ID: 2ACZ6-STRCD01A

Test Report #: 4126-1
Date: 5/6/2015



Date: 1 MAY 2015 19:54:53



5.3 Peak Power Out

LIMIT

§15.247(d) & IC RSS-

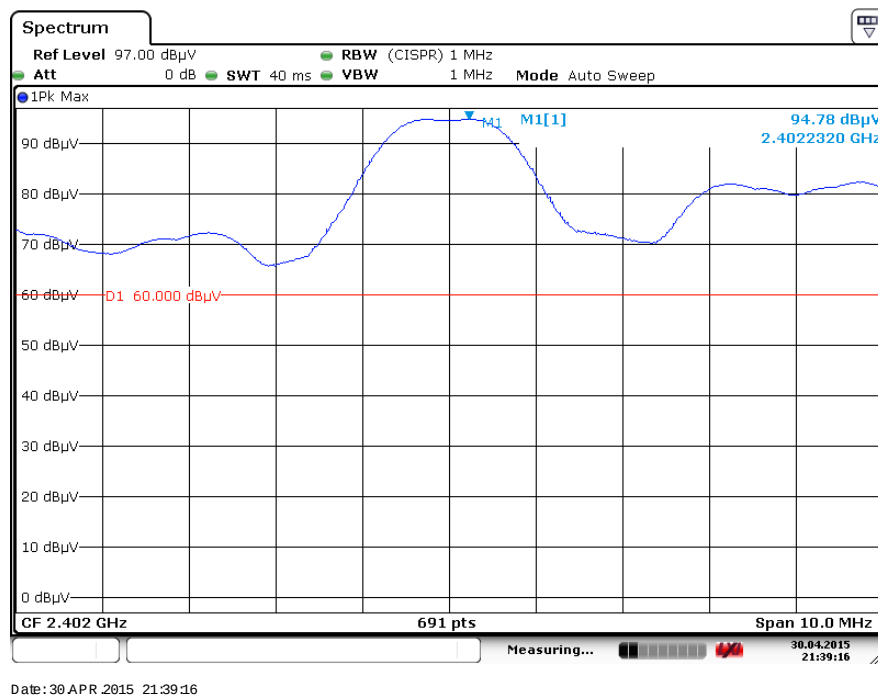
1 Watt / 137 dBuV (50 Ohms conversion)

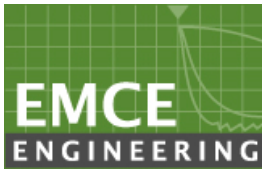
TEST PROCEDURE

The transmitter output to the antenna is connected to a spectrum analyzer. The RBW / VBW is set to 1. The sweep time is coupled and the span is set to 10 MHz.

Peak Output Power

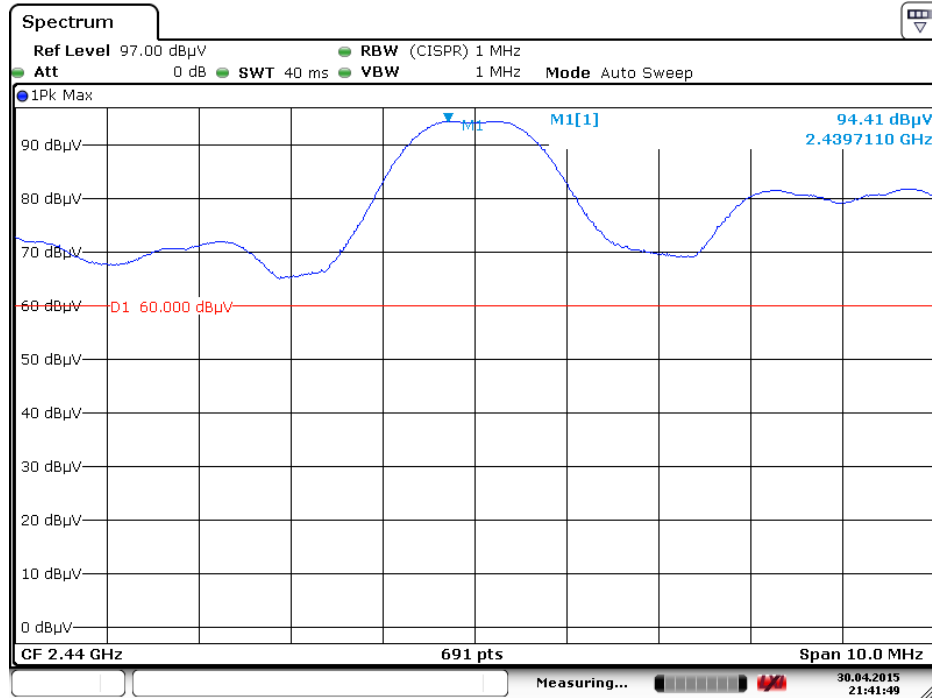
Frequency	Peak Output Power(dBuV)	Limit (dBuV)	Results
2402	94.78	137	PASS
2440	94.41	137	PASS
2480	95.40	137	PASS



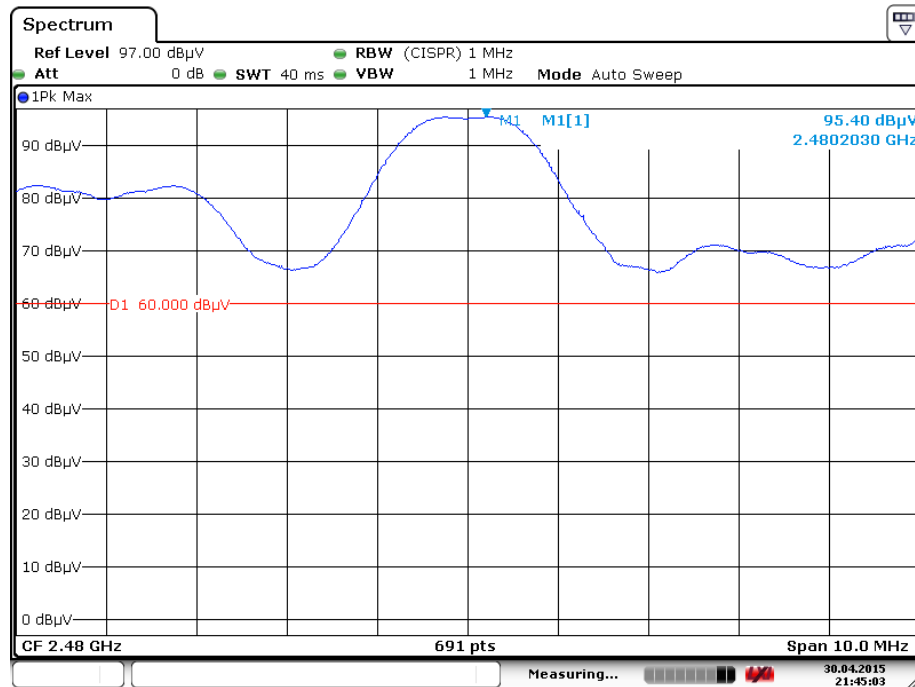


FCC ID: 2ACZ6-STRCD01A

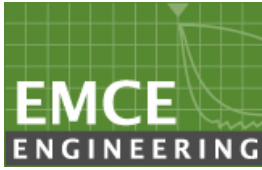
Test Report #: 4126-1
Date: 5/6/2015



Date: 30 APR 2015 21:41:49



Date: 30 APR 2015 21:45:03



5.4 Power Spectral Density

LIMIT

§15.247 (e) & RSS210

8 dBm

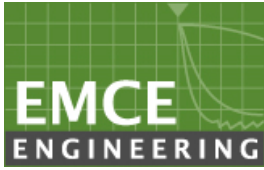
TEST PROCEDURE

The transmitter antenna output is connected to a spectrum analyzer. The RBW is set to 3 KHz and the VBW is set to 10 KHz .

RESULTS

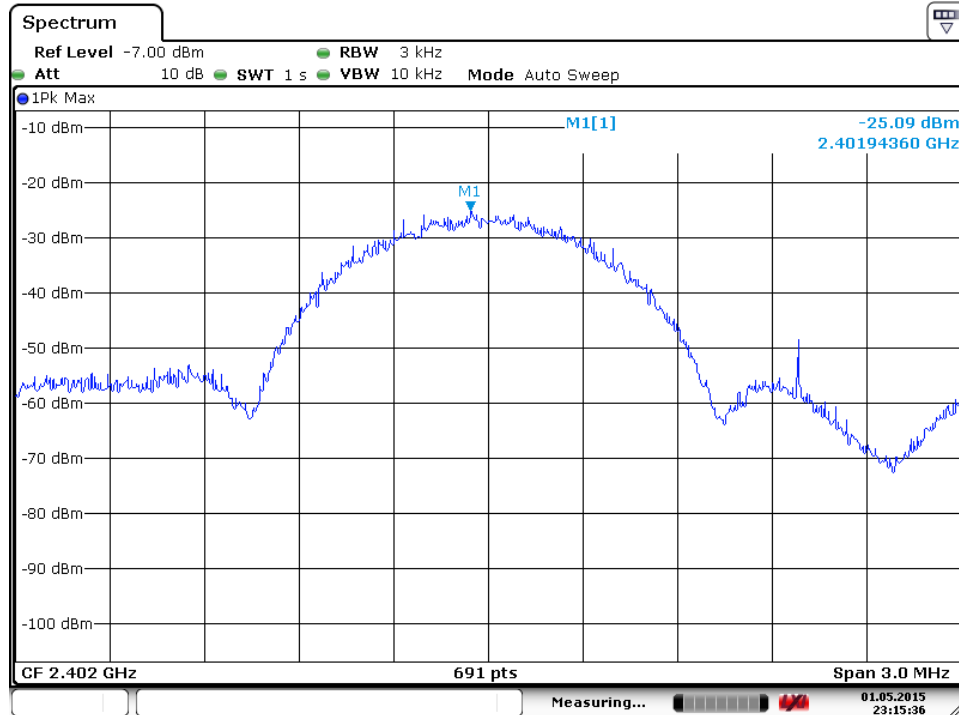
NO non-compliance noted.

Frequency (MHz)	PSD	Limit (dBm)	Result
2402	-25.09	8.0	PASS
2440	-25.04	8.0	PASS
2480	-24.83	8.0	PASS

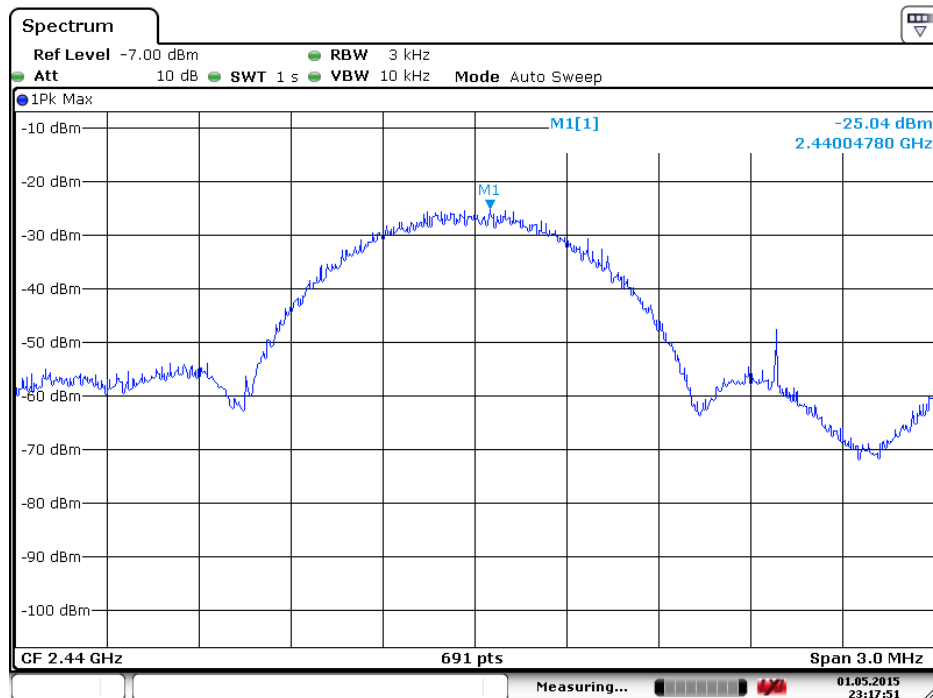


FCC ID: 2ACZ6-STRCD01A

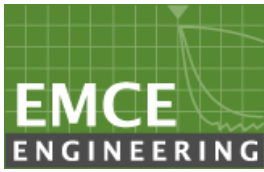
Test Report #: 4126-1
Date: 5/6/2015



Date: 1 MAY 2015 23:15:36

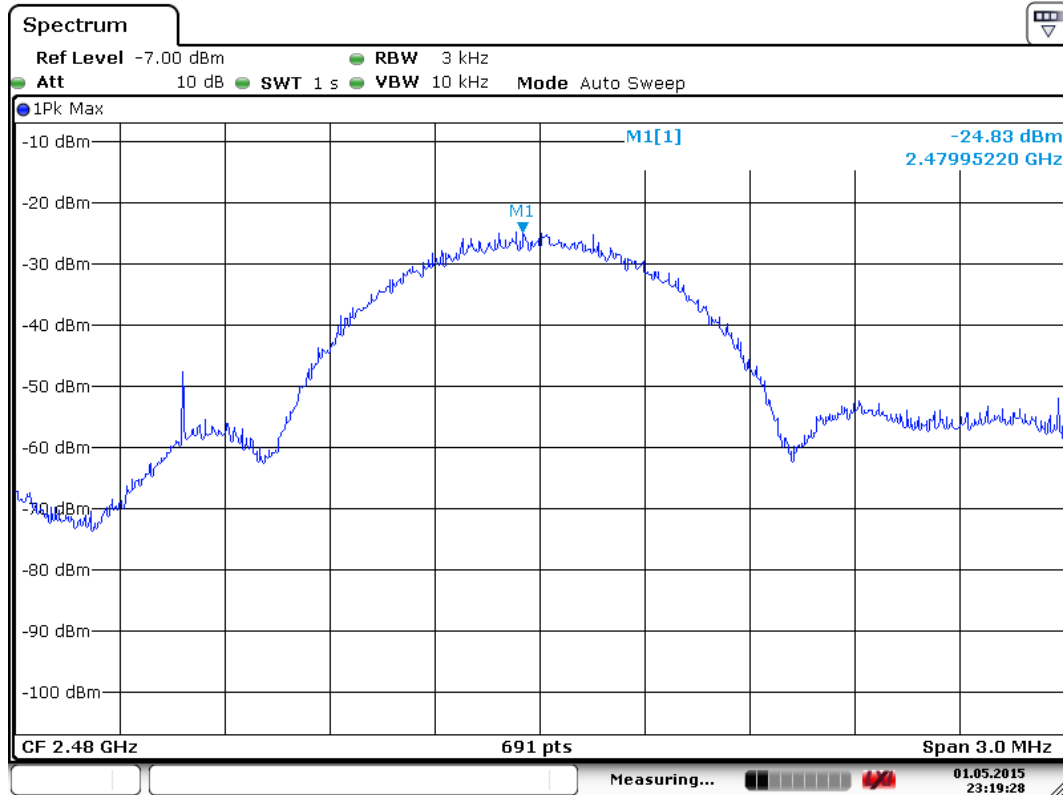


Date: 1 MAY 2015 23:17:52

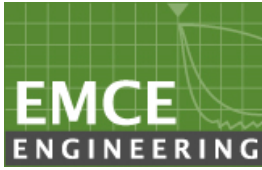


FCC ID: 2ACZ6-STRCD01A

Test Report #: 4126-1
Date: 5/6/2015



Date: 1 MAY 2015 23:19:28



5.5 Bandedge - Conducted Bandedge

LIMIT

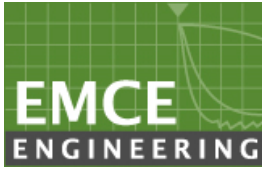
15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Transmitter antenna output connected to spectrum analyzer. Analyzer span is set to show Peak in band, as well as out of band peaks.

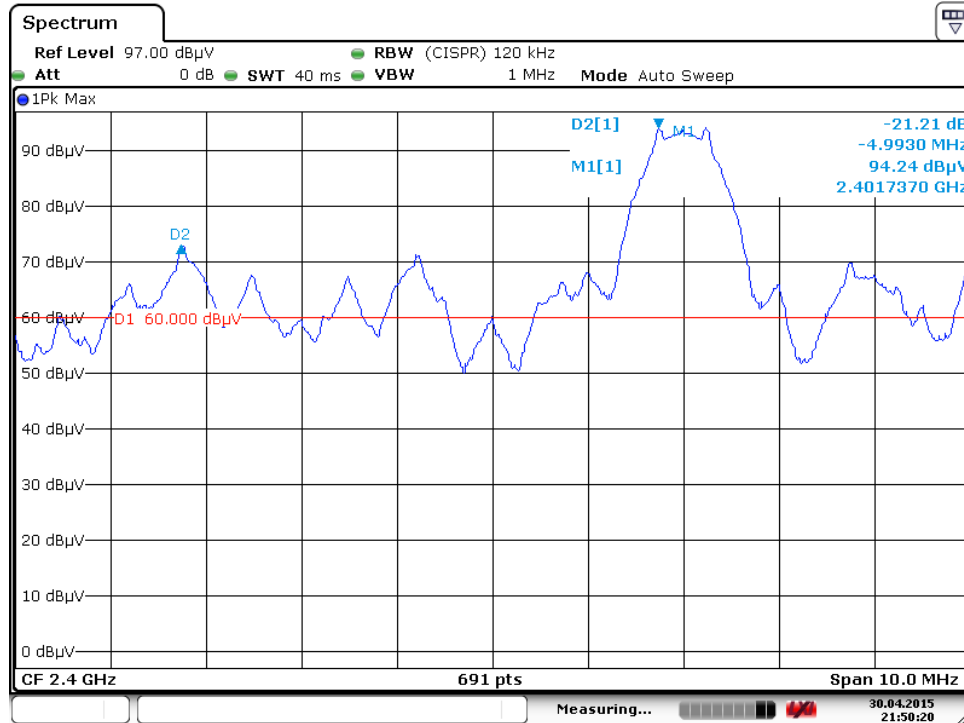
RESULTS

Bandedge	Measured	Limit (dBuV)	Result
2402	21.21	>20	PASS
2480	22.62	>20	PASS

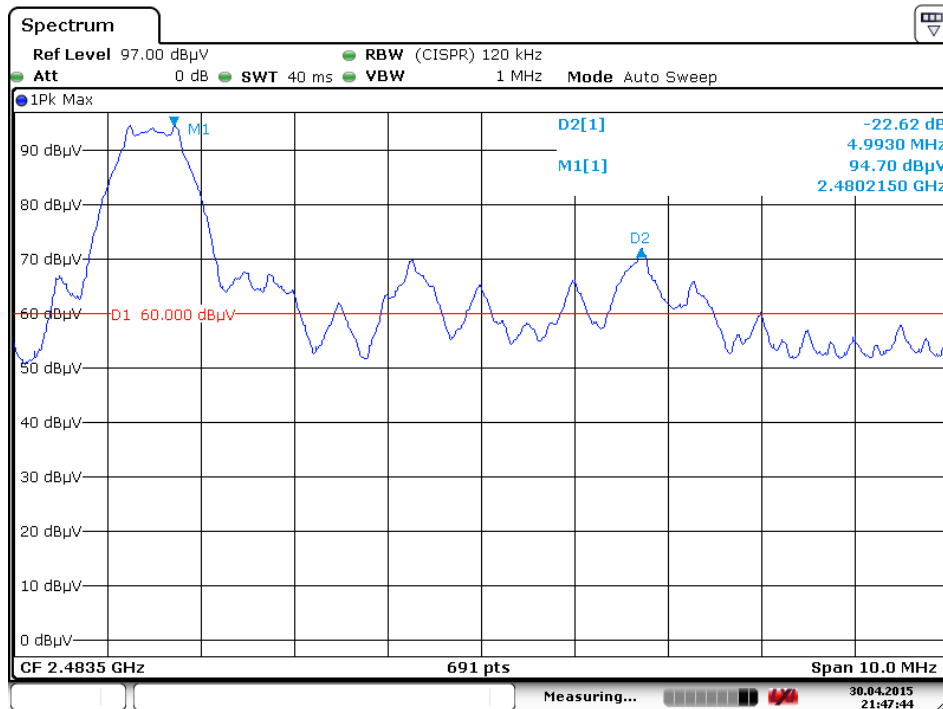


FCC ID: 2ACZ6-STRCD01A

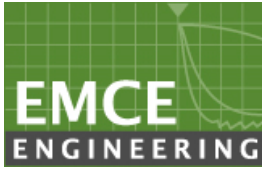
Test Report #: 4126-1
Date: 5/6/2015



Date: 30 APR 2015 21:50:20



Date: 30 APR 2015 21:47:44

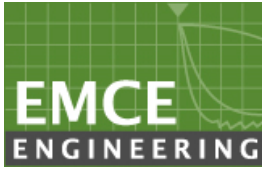


5.6 Radiated Spurious Emissions – Bandedge

LIMIT

15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			



FCC ID: 2ACZ6-STRCD01A

Test Report #: 4126-1
Date: 5/6/2015**RESULT**

Test Location: EMCE Engineering • 44366 S. Grimmer Blvd • Fremont, CA 94538 •

Customer: **Stratos Technologies, Inc.**Specification: **15.247 2483.5 - 2500 peak**Work Order #: **4125**

Date: 5/6/2015

Test Type: **Radiated Scan**

Time: 12:25:55

Equipment: **Credit Card**

Sequence#: 1

Manufacturer: Stratos Technologies, inc.

Tested By: Bob Cole

Model: Stratos 01A

S/N: N/A

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Credit Card*	Stratos Technologies, inc.	Stratos 01A	N/A

Transducer Legend:

T1=100' LMR 900 Rad Cable 12-2013

T2=8449B Preamp

T3=Sunol JB6 S/N A42610

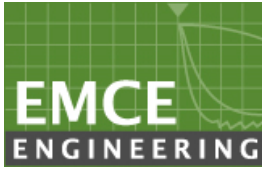
Ext Attn: 0 dB

Measurement Data:

Reading listed by frequency.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	2396.766M	58.1	+4.8	+30.1	+30.5		+0.0 134	63.3	74.0	-10.7	Horiz 180
2	2396.766M	60.5	+4.8	+30.1	+30.5		+0.0 157	65.7	74.0	-8.3	Vert 114
3	2396.983M Ave	45.0	+4.8	+30.1	+30.5		+0.0 157	50.2	54.0	-3.8	Vert 114
4	2396.997M Ave	43.7	+4.8	+30.1	+30.5		+0.0	48.9	54.0	-5.1	Horiz 226
5	2485.160M	61.2	+4.9	+30.2	+30.9		+0.0 118	66.8	74.0	-7.2	Vert 115
6	2485.160M	55.3	+4.9	+30.2	+30.9		+0.0 73	60.9	74.0	-13.1	Horiz 232
7	2485.446M Ave	44.1	+4.9	+30.2	+30.9		+0.0 118	49.7	54.0	-4.3	Vert 115
8	2485.470M Ave	38.9	+4.9	+30.2	+30.9		+0.0 168	44.5	54.0	-9.5	Horiz 154



5.7 TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

§15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

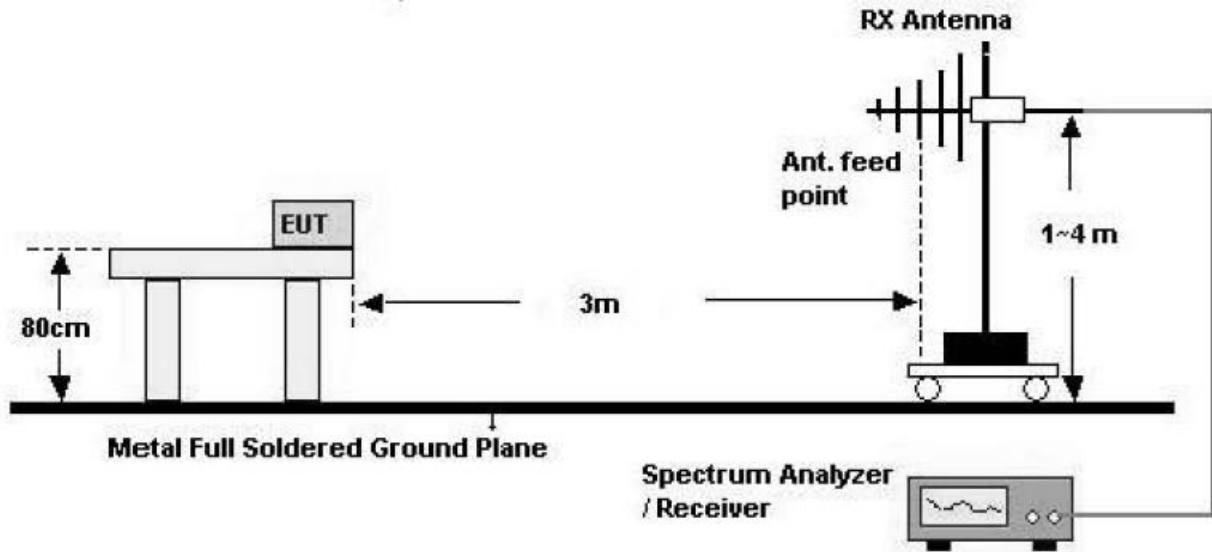
§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table ;

Frequency (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

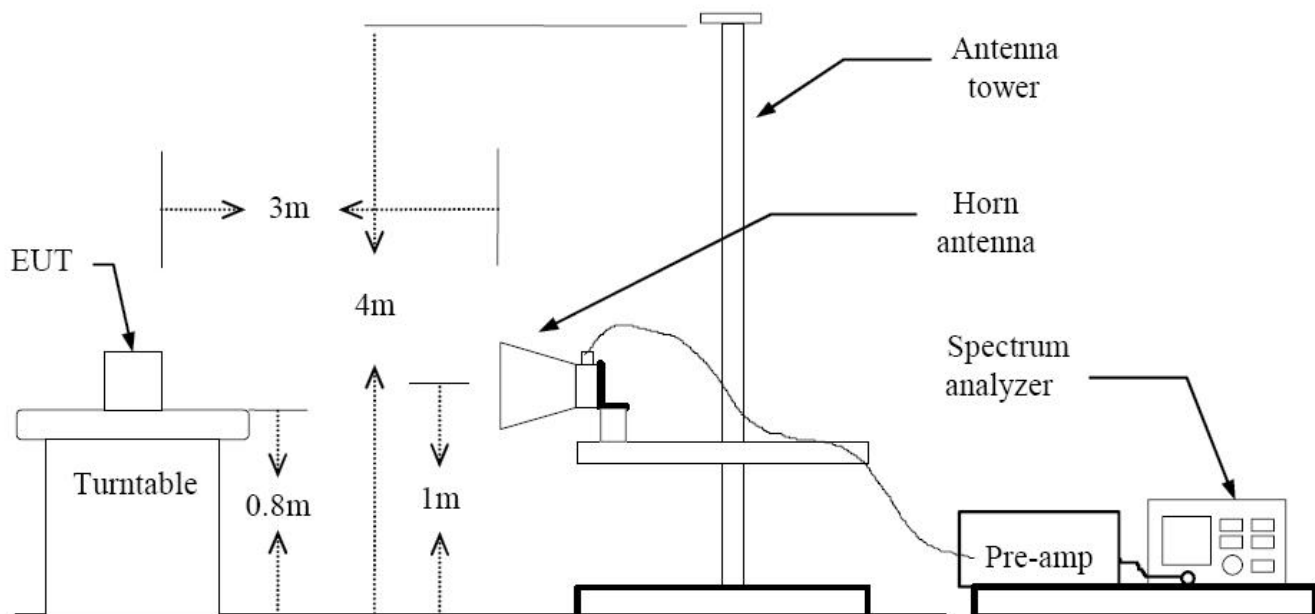
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., Sections 15.231 and 15.241.

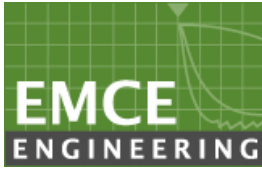
TEST CONFIGURATION

[30 MHz - 1 GHz]



[Above 1 GHz]





TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4 The EUT is set to transmit in a continuous mode.

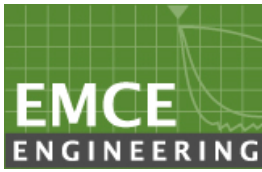
For measurements below 1 GHz the resolution bandwidth is set to 100 KHz for peak detection measurements or 120 KHz or quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and VBW of 10 Hz for average measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

RESULTS:

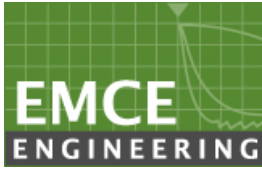
NO non-compliance noted.



MEASUREMENT UNCERTAINTY

Measurement Uncertainty Budget Radiated Emissions @ 10 Meters Per CISRP 16-4-2

Input Quantity	Uncertainty of x_i		U(x) dB	C_i	$C_i u(x_i)$ dB
	dB	Probability Distribution Function			
Receiver Reading	+/- 0.1	K = 1	0.1	1	0.1
Attenuation, Antenna - receiver	+/- 0.1	K = 2	0.05	1	0.05
Antenna Factor	+/- 2.0	K = 2	1.0	1	1.0
Receiver Corrections					
Sine Wave Voltage	+/- 1.0	K = 1	0.5	1	0.5
Pulse Amplitude Response	+/- 1.5	Rectangular	0.87	1	0.87
Pulse Rep Rate Response	+/- 1.5	Rectangular	0.87	1	0.87
Noise Floor Proximity	+/- 0.5	K = 2	0.25	1	0.25
Mismatch Antenna – Receiver	+/- 0.9	U shaped	0.67	1	0.67
Antenna Corrections					
AF Freq Interpolation	+/- 0.3	Rectangular	0.17	1	0.17
AF Height Deviations	+/- 0.5	Rectangular	0.29	1	0.29
Balance	+/- 0.3	Rectangular	0.17	1	0.17
Site Corrections					
Site Imperfections	+/- 3.0	Rectangular	1.22	1	0.82
Separation distance	+/- 0.1	Rectangular	0.06	1	0.06
Table Height	+/- 0.1	K = 2	0.05	1	0.05
Total Measurement Uncertainty - Radiated Emissions @ 10 Meters $2U_c(E) = 4.89$					4.89



FCC ID: 2ACZ6-STRCD01A

Test Report #: 4126-1
Date: 5/6/2015

Test Location: EMCE Engineering • 44366 S. Grimmer Blvd • Fremont, CA 94538 •

Customer: **Stratos Technologies**Specification: **FCC 15.209 30 - 25000 MHz Limits**Work Order #: **4125**

Date: 5/1/2015

Test Type: **Radiated Scan**

Time: 11:24:18

Equipment:

Sequence#: 1

Manufacturer: Stratos Technologies

Tested By: Test Engineer

Model:

S/N:

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Stratos Card	Stratos Technologies, Inc.	Stratos 01A	N/A

Transducer Legend:

T1=100' LMR 900 Rad Cable 12-2013	T2=84125 RF Amps	T5= HP 8447D PreAmp
T3=A.H. SAS-200/571 Horn	T4= JB6 BiLog Antenna	

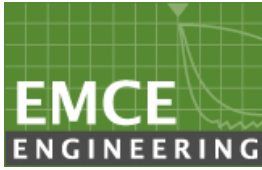
Ext Attn: 0 dB

Measurement Data:

Reading listed by margin.

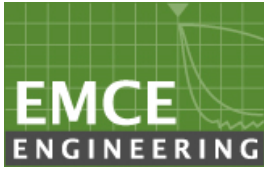
Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	Dist dB	Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	4806.508M	56.0	+7.4	+54.7	+34.7	+0.0	96	43.4	54.0	-10.6	Vert 110
2	4877.500M	54.2	+7.5	+54.7	+34.9	+0.0	134	41.9	54.0	-12.1	Vert 147
3	4960.000M	53.1	+7.6	+54.7	+35.1	+0.0	178	41.1	54.0	-12.9	Vert 139
4	7203.508M	49.2	+0.0	+55.2	+37.0	+0.0	134	31.0	54.0	-23.0	Vert 147
5	7440.000M	49.1	+0.0	+55.2	+36.9	+0.0	238	30.8	54.0	-23.2	Vert 125
6	7317.500M	48.6	+0.0	+55.2	+36.9	+0.0	83	30.3	54.0	-23.7	Vert 118



6.0 TEST EQUIPMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE	CAL. DUE DATE
Spectrum Analyzer Hewlett-Packard	8566B	3014A06947	8/2/14	8/2/16
Quasi-Peak Adapter Hewlett-Packard	85650A	3145A01673	8/2/14	8/2/16
EMI Analyzer System Hewlett-Packard	8593EM	3497A5703	5/17/14	5/17/16
Signal Analyzer Rohde-Schwarz	FSV7	1321.3008K7	3/10/14	3/10/16
HP 84125 EMI Measurement System	84125B	US36432003	5/1 /14	5/1/16
Pre-Amplifier(100KHz-1.3GHz) Hewlett-Packard	8447D	2443A03587	5/1/14	5/1/16
BiConiLog Antenna Sunol Sciences	JB6	1090	2/12/14	2/12/16
Loop Antenna Empire Devices	LP105	000114	8/15/14	8/15/15
RF Signal Cable Murata	25' LMR	N/A	8/10 /14	8/10 /15
RF Signal Cable EMCE	100' LMR	N/A	8/1 /14	8/1 /15



7.0 SAMPLE CALCULATION

FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor.
The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 21.5 dBuV is obtained. The Antenna Factor of 7.4 dB/m and a Cable Factor of 1.1 dB is added. The 30 dBuV/m value is mathematically converted to its corresponding level in uV/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dBuV/m}$$