Meteorcomm LLC.

TEST REPORT FOR

45MHz 100W GMSK Packet Data Transceiver, MCC-545C

Tested To The Following Standards:

FCC Part 90I

Report No.: 92688-7

Date of issue: February 14, 2012

ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Meteorcomm LLC.
1201 SW 7th Street
Renton, WA 98057

Representative: Fred Cleveland
Customer Reference Number: 11283

REPORT PREPARED BY:

Dianne Dudley
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 92688

DATE OF EQUIPMENT RECEIPT: January 30, 2012
DATE(S) OF TESTING: January 30-31, 2012

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.

Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information

Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
22116 23rd Drive S.E., Suite A
Bothell, WA 98021-4413

Site Registration & Accreditation Information

Location	CB #	Japan	Canada	FCC
Bothell	US0081	R-2296, C-2506, T-1489 & G-284	3082C-1	318736

SUMMARY OF RESULTS

Standard / Specification: FCC Part 90I

Description	Test Procedure/Method	Results
RF Power Output	FCC 2.1033(c)(14)/2.1046/90.205 / TIA- 603	Pass
Modulation Characteristics Audio Frequency Response	FCC 2.1033(c)(14)/2.1047(a)	NA
Modulation Characteristics Modulation Limiting Response	FCC 2.1033(c)(14)/2.1047(b)	NA
Occupied Bandwidth	FCC 2.1033(c)(14)/2.1049/90.209 / TIA- 603	Pass
Spurious Emissions at Antenna Terminal	FCC 2.1033(c)(14)/2.1051/90.210(c) / TIA- 603	Pass
Field Strength of Spurious Radiation	FCC 2.1033(c)(14)/2.1053/90.210(c) / TIA- 603	Pass
Frequency Stability	FCC 2.1033(c)(14)/2.1055/90.213 / TIA- 603	Pass

NA = Not applicable.

Conditions During Testing

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

45MHz 100W GMSK Packet Data Transceiver
Manuf: Meteorcomm LLC.
Model: MCC-545C
Serial: 545308059

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Heatsink
Manuf: Meteorcomm LLC.
Model: NA
Serial: NA

GPS Antenna
Manuf: Synergy Systems, LLC.
Model: SMA-35 3-5V
Serial: 10001339

Laptop
Manuf: HP
Model: NA
Serial: NA

DC Power Supply
Manuf: Astron
Model: VS-35M
Serial: NA

50ohm Load
Manuf: Bird
Model: 100-A-MFN-30
Serial: NA

FCC PART 90I

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) requirements for licensed devices.

2.1033(c)(14)/2.1046/90.205 - RF Power Output

Test Conditions / Setup

The EUT is located on a table. The EUT is connected to a support laptop through a serial cable. 45MHz antenna port is connected to the Power meter through 36dB of attenuation. A heatsink is bolted to the unit for testing purposes ONLY, and a 6" fan is aimed at the heat sink to keep the temperature down. The EUT is connected to a DC power supply. The EUT is in transmit mode.
Temp: 23°C, Humidity: 31%, Pressure: 102.3kPa
Frequency: 43MHz - 44.5MHz - 46MHz

Operating Voltage: 12VDC
Testing performed per TIA-603C

Engineer Name: A. Del Angel

Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
ANP05759	Attenuator	PE7010-20	Pasternack	2/16/2010	2/16/2012
ANP05979	Attenuator	40-6-34	Weinschel	2/9/2010	2/9/2012
AN03227	Cable	32026-29080-29080-84	Astrolab	5/2/2011	5/2/2013
AN02378	Power Meter	438A	HP	3/28/2011	3/28/2013
ANP05389	Attenuator	NA	Narda	1/27/2012	1/27/2014

Test Data

Results Table			
Channel	**Frequency**	**Power (dBm)**	**Result**
Low	43MHz	50.9	PASS
Mid	44.5MHz	50.55	PASS
High	46MHz	50.21	PASS

Test Setup Photos

2.1033(c)(14)/2.1049/90.209 - Occupied Bandwidth

Test Conditions / Setup

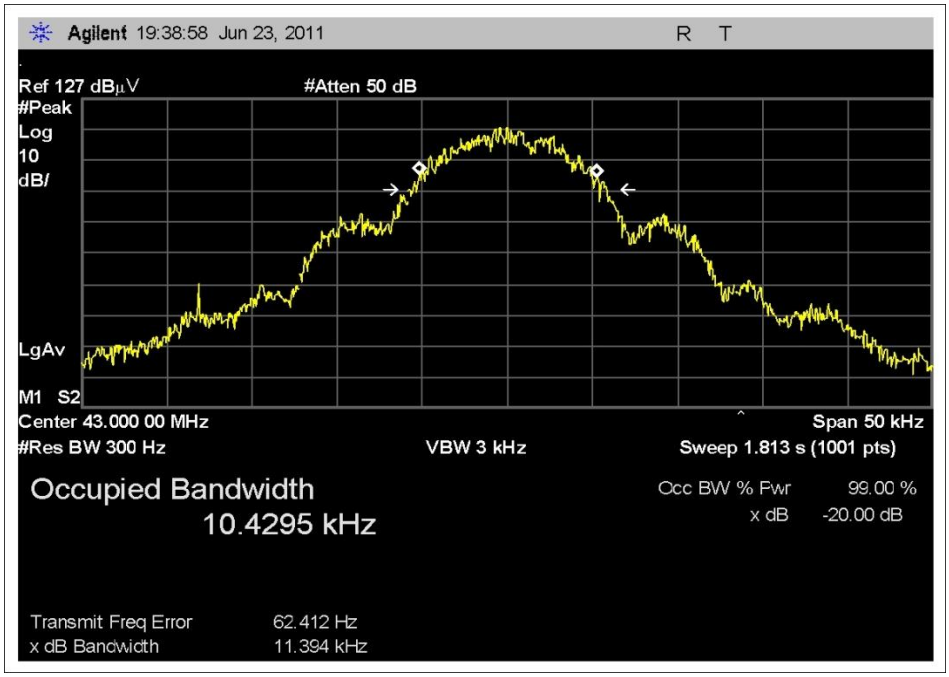
The EUT is located on a table. The EUT is connected to a support laptop through a serial cable. 45MHz antenna port is connected to the Spectrum Analyzer through 36dB of attenuation. A heatsink is bolted to the unit for testing purposes ONLY, and a 6" fan is aimed at the heat sink to keep the temperature down. The EUT is connected to a DC power supply. The EUT is in transmit mode.
Temp: 23°C
Humidity: 31%
Pressure: 102.3kPa
Frequency: 43MHz - 44.5MHz - 46MHz
Operating Voltage: 12VDC
Testing performed per TIA-603C

Engineer Name: A. Del Angel

Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
ANP05759	Attenuator	PE7010-20	Pasternack	2/16/2010	2/16/2012
ANP05979	Attenuator	40-6-34	Weinschel	2/9/2010	2/9/2012
AN03227	Cable	32026-29080-29080-84	Astrolab	5/2/2011	5/2/2013
02871	Spectrum Analyzer	E4440A	Agilent	4/22/2011	4/22/2013
ANP05389	Attenuator	NA	Narda	1/27/2012	1/27/2014

Test Data

Results Table			
Channel	**Frequency**	**OBW (kHz)**	**Results**
Low	43MHz	10.43	Pass
Mid	44.5MHz	10.6	Pass
High	46MHz	10.51	Pass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#Peak
Log
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dB/
LgAv
M1 S2
Center 43.000 00 MHz
Span 50 kHz
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VBW 3 kHz
Sweep 1.813 s (1001 pts)
Occupied Bandwidth
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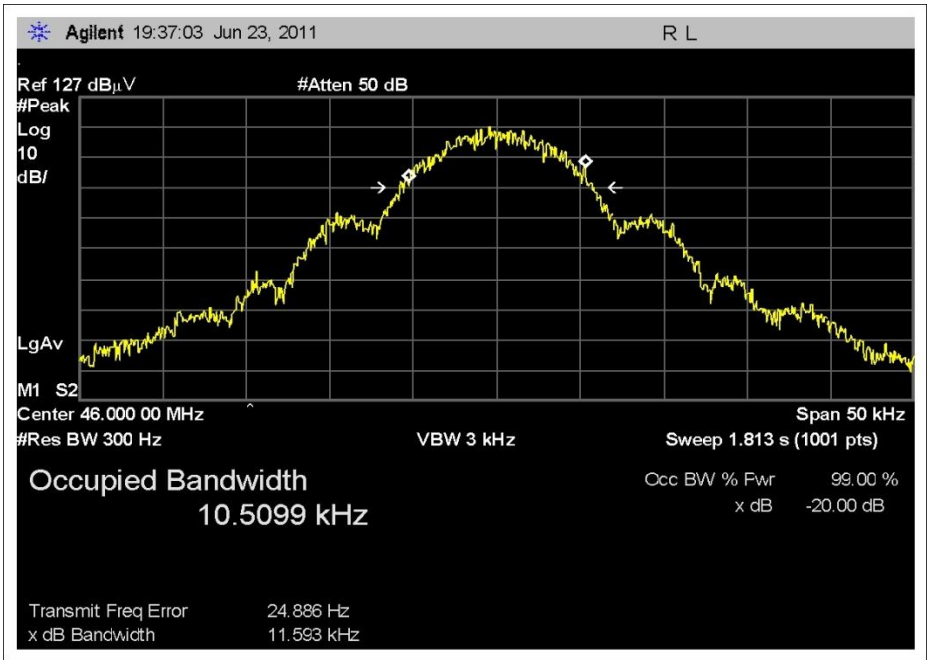
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error 62.412 Hz
x dB Bandwidth 11.394 kHz

LOW


Agilent 19:38:06 Jun 23, 2011
R T
Ref 127 dBµV
#Atten 50 dB
#Peak
Log
10
dB/
LgAv
M1 S2
Center 44.500 00 MHz
Span 50 kHz
#Res BW 300 Hz
VBW 3 kHz
Sweep 1.813 s (1001 pts)
Occupied Bandwidth
10.6047 kHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -971.986 mHz
x dB Bandwidth 11.523 kHz

MID



HIGH

Test Setup Photos

2.1033(c)(14)/2.1051/90.210(c) - Spurious Emissions at Antenna Terminal

Test Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Meteorcomm LLC.**
Specification: **47 CFR §90.210(c) Spurious Emissions**
Work Order #: **92688** Date: 1/30/2012
Test Type: **Conducted Emissions** Time: 16:34:34
Equipment: **45MHz 100W GMSK packet data transceiver.** Sequence#: 1
Manufacturer: Meteorcomm LLC. Tested By: Armando Del Angel
Model: MCC-545C 12VDC
S/N: 545308059

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05759	Attenuator	PE7010-20	2/16/2010	2/16/2012
T2	ANP05979	Attenuator	40-6-34	2/9/2010	2/9/2012
T3	AN03227	Cable	32026-29080-29080-84	5/2/2011	5/2/2013
T4	AN02871	Spectrum Analyzer	E4440A	4/22/2011	4/22/2013
T5	ANP05389	Attenuator		1/27/2012	1/27/2014

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
45MHz 100W GMSK packet data transceiver.*	Meteorcomm LLC.	MCC-545C	545308059

Support Devices:

Function	Manufacturer	Model #	S/N
Heatsink	Meteorcomm LLC.	NA	NA
DC power Supply	Astron	VS-35M	NA
GPS Antenna	Synergy Systems, LLC.	SMA-35 3-5V	10001339
50ohm Load	Bird	100-A-MFN-30	NA
Laptop	HP	NA	NA

Test Conditions / Notes:

Temp: 23°C
Humidity: 31%
Pressure: 102.3kPa
Frequency: 0.009-500MHz
EUT is located on a table.
EUT is connected to a support laptop through a serial cable.
45MHz antenna port is connected to the spectrum analyzer through 36dB of attenuation.
A heatsink is bolted to the unit for testing purposes ONLY, and a 6" fan is aimed at the heat sink to keep the temperature down. EUT is connected to a DC power supply.
EUT will be transmitting for 110ms and will stop for 630ms (15%DC)
Testing performed per TIA-603C

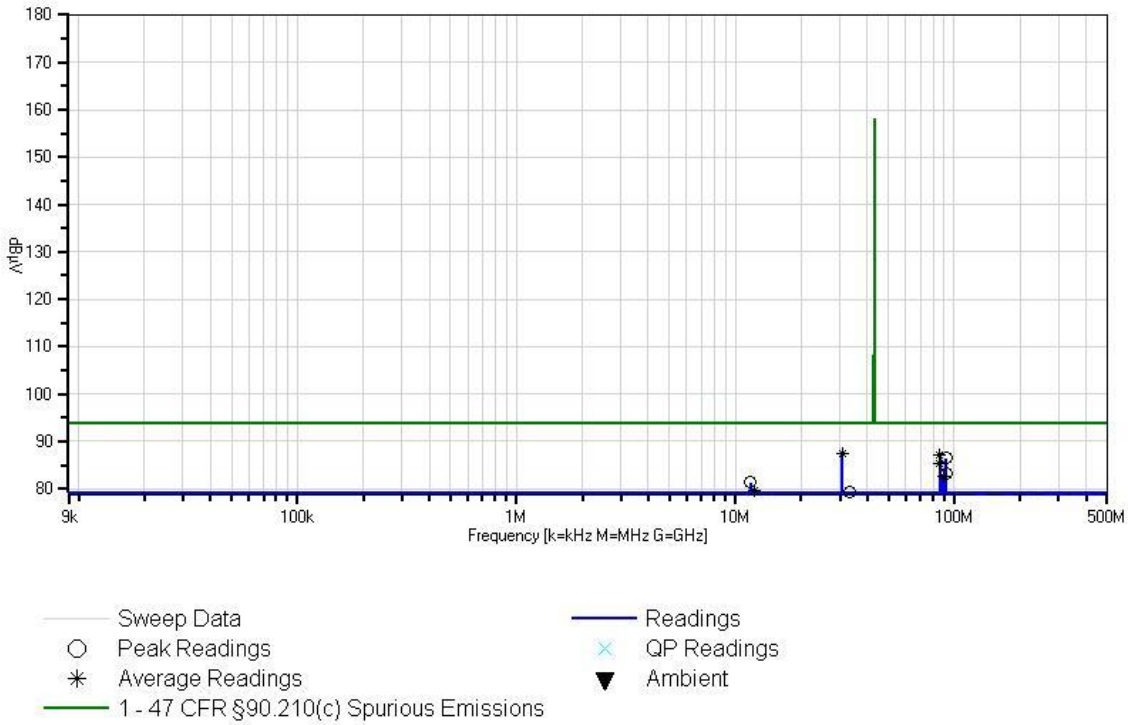
Ext Attn: 0 dB

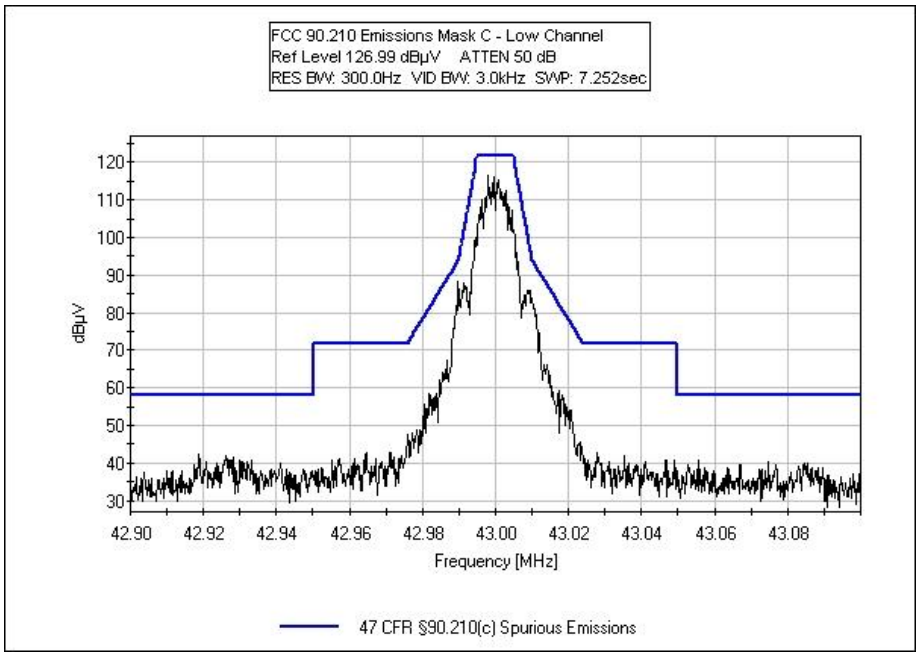
Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	30.820M	51.3	+20.2 +10.0	+5.6	+0.2	+0.0	+0.0	87.3	94.0 LOW Channel	-6.7	Anten
	Ave										
^	30.819M	60.8	+20.2 +10.0	+5.6	+0.2	+0.0	+0.0	96.8	94.0 LOW Channel	+2.8	Anten
3	86.000M	51.1	+20.2 +10.0	+5.6	+0.3	+0.0	+0.0	87.2	94.0 LOW Channel	-6.8	Anten
	Ave										
4	91.995M	50.4	+20.2 +10.0	+5.6	+0.3	+0.0	+0.0	86.5	94.0 HIGH Channel	-7.5	Anten
5	86.000M	49.2	+20.2 +10.0	+5.6	+0.3	+0.0	+0.0	85.3	94.0 LOW Channel	-8.7	Anten
	Ave										
6	92.000M	47.2	+20.2 +10.0	+5.6	+0.3	+0.0	+0.0	83.3	94.0 HIGH Channel	-10.7	Anten
7	89.001M	46.5	+20.2 +10.0	+5.6	+0.3	+0.0	+0.0	82.6	94.0 MID Channel	-11.4	Anten
	Ave										
^	88.996M	49.4	+20.2 +10.0	+5.6	+0.3	+0.0	+0.0	85.5	94.0 MID Channel	-8.5	Anten
9	11.710M	45.5	+20.2 +10.0	+5.6	+0.1	+0.0	+0.0	81.4	94.0 HIGH Channel	-12.6	Anten
10	12.181M	43.6	+20.2 +10.0	+5.6	+0.1	+0.0	+0.0	79.5	94.0 LOW Channel	-14.5	Anten
	Ave										
^	12.181M	52.8	+20.2 +10.0	+5.6	+0.1	+0.0	+0.0	88.7	94.0 LOW Channel	-5.3	Anten
12	33.180M	43.3	+20.2 +10.0	+5.6	+0.2	+0.0	+0.0	79.3	94.0 MID Channel	-14.7	Anten
13	129.006M	41.8	+20.3 +10.0	+5.6	+0.3	+0.0	+0.0	78.0	94.0 LOW Channel	-16.0	Anten
14	133.493M	41.0	+20.3 +10.0	+5.6	+0.3	+0.0	+0.0	77.2	94.0 MID Channel	-16.8	Anten
15	11.330M	40.8	+20.2 +10.0	+5.6	+0.1	+0.0	+0.0	76.7	94.0 MID Channel	-17.3	Anten
16	14.820M	39.5	+20.2 +10.0	+5.6	+0.1	+0.0	+0.0	75.4	94.0 MID Channel	-18.6	Anten
17	178.010M	38.4	+20.3 +10.0	+5.6	+0.4	+0.0	+0.0	74.7	94.0 MID Channel	-19.3	Anten

18	137.992M	38.3	+20.2 +10.0	+5.6	+0.3	+0.0	+0.0	74.4	94.0 HIGH Channel	-19.6	Anten
19	184.005M	35.7	+20.3 +10.0	+5.6	+0.4	+0.0	+0.0	72.0	94.0 HIGH Channel	-22.0	Anten
20	214.989M	34.5	+20.3 +10.0	+5.6	+0.4	+0.0	+0.0	70.8	94.0 LOW Channel	-23.2	Anten
21	171.995M	34.4	+20.3 +10.0	+5.6	+0.4	+0.0	+0.0	70.7	94.0 LOW Channel	-23.3	Anten
22	257.999M Ambient	31.2	+20.3 +10.0	+5.6	+0.5	+0.0	+0.0	67.6	94.0 Noisefloor	-26.4	Anten
23	400.500M Ambient	30.9	+20.3 +10.0	+5.6	+0.6	+0.0	+0.0	67.4	94.0 Noisefloor	-26.6	Anten
24	230.000M Ambient	30.5	+20.3 +10.0	+5.6	+0.5	+0.0	+0.0	66.9	94.0 Noisefloor	-27.1	Anten
25	222.500M Ambient	30.5	+20.3 +10.0	+5.6	+0.4	+0.0	+0.0	66.8	94.0 Noisefloor	-27.2	Anten
26	386.999M Ambient	30.2	+20.3 +10.0	+5.6	+0.6	+0.0	+0.0	66.7	94.0 Noisefloor	-27.3	Anten
27	322.000M Ambient	30.1	+20.3 +10.0	+5.6	+0.5	+0.0	+0.0	66.5	94.0 Noisefloor	-27.5	Anten
28	460.000M Ambient	29.0	+20.3 +10.0	+5.7	+0.6	+0.0	+0.0	65.6	94.0 Noisefloor	-28.4	Anten
29	445.000M Ambient	28.9	+20.3 +10.0	+5.7	+0.6	+0.0	+0.0	65.5	94.0 Noisefloor	-28.5	Anten
30	356.000M Ambient	28.9	+20.3 +10.0	+5.6	+0.6	+0.0	+0.0	65.4	94.0 Noisefloor	-28.6	Anten
31	429.999M Ambient	28.8	+20.3 +10.0	+5.7	+0.6	+0.0	+0.0	65.4	94.0 Noisefloor	-28.6	Anten
32	311.500M Ambient	28.7	+20.3 +10.0	+5.6	+0.5	+0.0	+0.0	65.1	94.0 Noisefloor	-28.9	Anten
33	300.999M Ambient	28.7	+20.3 +10.0	+5.6	+0.5	+0.0	+0.0	65.1	94.0 Noisefloor	-28.9	Anten
34	267.000M Ambient	28.6	+20.3 +10.0	+5.6	+0.5	+0.0	+0.0	65.0	94.0 Noisefloor	-29.0	Anten
35	414.000M Ambient	28.0	+20.3 +10.0	+5.6	+0.6	+0.0	+0.0	64.5	94.0 Noisefloor	-29.5	Anten
36	343.999M Ambient	27.3	+20.3 +10.0	+5.6	+0.6	+0.0	+0.0	63.8	94.0 Noisefloor	-30.2	Anten
37	368.000M Ambient	27.2	+20.3 +10.0	+5.6	+0.6	+0.0	+0.0	63.7	94.0 Noisefloor	-30.3	Anten
38	276.000M Ambient	27.2	+20.3 +10.0	+5.6	+0.5	+0.0	+0.0	63.6	94.0 Noisefloor	-30.4	Anten

CKC Laboratories, Inc. Date: 1/30/2012 Time: 16:34:34 Meteorcomm LLC. WO#: 92688
47 CFR §90.210(c) Spurious Emissions Test Lead: Antenna Port Antenna Port Sequence#: 1 Ext ATTN: 0 dB

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dBµV
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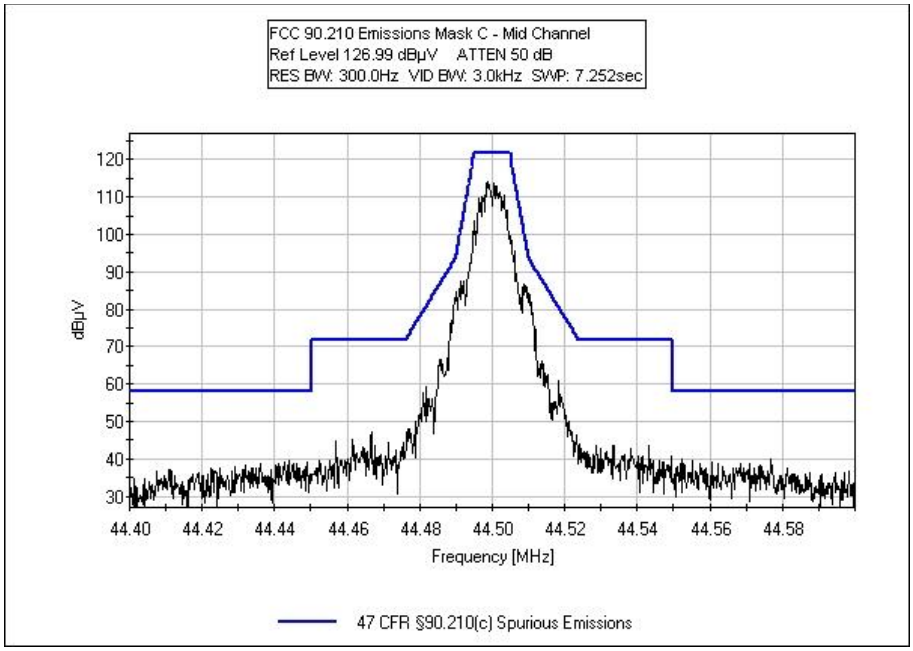
110
100
90
80
70
60
50
40
30
42.90
42.92
42.94
42.96
42.98
43.00
43.02
43.04
43.06
43.08
Frequency [MHz]
47 CFR §90.210(c) Spurious Emissions

LOW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RES BW: 300.0Hz VID BW: 3.0kHz SWP: 7.252sec
dBµV
120
110
100
90
80
70
60
50
40
30
44.40
44.42
44.44
44.46
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44.52
44.54
44.56
44.58
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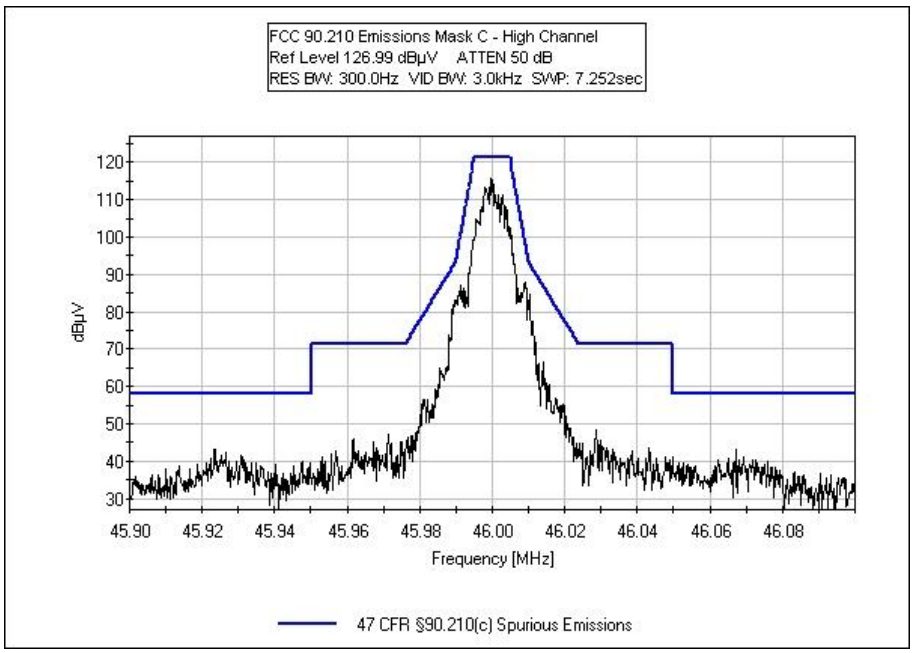
47 CFR §90.210(c) Spurious Emissions

MID



HIGH

Test Setup Photos


01/30/2012 16:33

2.1033(c)(14)/2.1053/90.210(c) - Field Strength of Spurious Radiation

Test Conditions / Setup

The EUT is located on the back of the test table, on the center of the turn table. The EUT is connected to a support laptop located on the outside of the test chamber through a serial cable. GPS port is terminated with a GPS antenna. 45MHz antenna port is terminated with a 50ohm load. A heatsink is bolted to the unit for testing purposes ONLY, and a 6" fan is aimed at the heat sink to keep the temperature down. DC power supply is located under the test table. For testing purposes the EUT will be transmitting for 110ms and will stop for 630ms (15%DC).
Temp: 23°C
Humidity: 31%
Pressure: 102.3kPa
Frequency: 0.009-500MHz
Testing performed per TIA-603C

Engineer Name: A. Del Angel

Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
AN01316	Preamp	8447D	HP	5/21/2010	5/21/2012
AN01994	Biconilog Antenna	CBL6111C	Chase	3/8/2010	3/8/2012
AN03227	Cable	32026-29080-29080-84	AstroLab	5/2/2011	5/2/2013
ANP05360	Cable	RG214	Belden	11/8/2010	11/8/2012
ANP05366	Cable	RG-214	Belden	10/14/2011	10/14/2013
AN02871	Spectrum Analyzer	E4440A	Agilent	4/22/2011	4/22/2013
AN00052	Loop Antenna	6502	EMCO	6/8/2010	6/8/2012
ANP05547	Cable	Heliax	Andrews	7/26/2011	7/26/2013

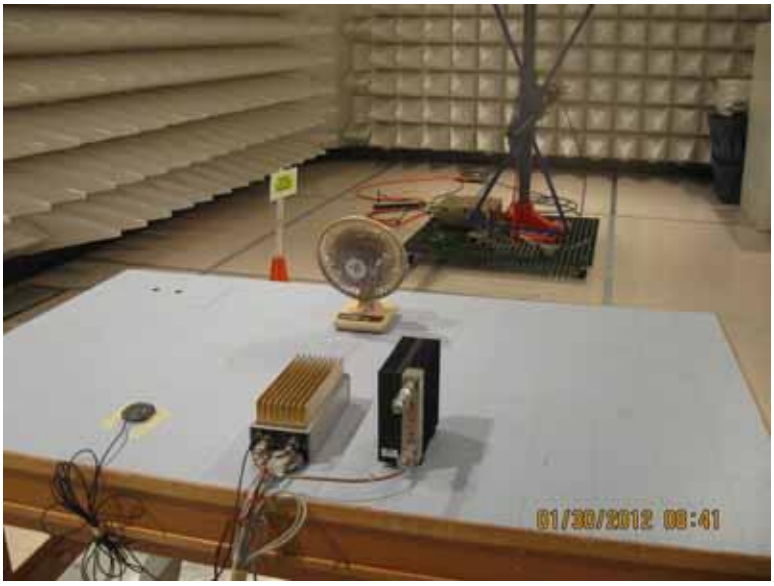
Test Data

Operating Frequency: 43-46 MHz
Channels: Low, Mid and High
Highest Measured Output Power: 50.90 (dBm)= 123.027 (Watts)
Distance: 3 meters
Limit: 43+10Log(P)= 63.90 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
172.00	-36.50000434	Vert	87.40
178.00	-38.90000434	Vert	89.80
184.00	-42.30000434	Vert	93.20
89.00	-43.00000434	Horiz	93.90
92.00	-45.20000434	Horiz	96.10
171.99	-45.50000434	Horiz	96.40
133.50	-45.80000434	Vert	96.70
86.00	-45.80000434	Vert	96.70
92.00	-45.90000434	Vert	96.80
311.50	-45.90000434	Horiz	96.80
138.00	-46.00000434	Vert	96.90
129.00	-46.50000434	Vert	97.40
89.00	-46.80000434	Vert	97.70
230.00	-47.10000434	Vert	98.00
178.00	-47.20000434	Horiz	98.10
129.00	-48.60000434	Horiz	99.50
184.00	-49.90000434	Horiz	100.80
86.00	-49.90000434	Horiz	100.80
133.50	-50.00000434	Horiz	100.90
322.00	-50.50000434	Horiz	101.40
230.00	-50.50000434	Horiz	101.40
344.00	-50.90000434	Horiz	101.80
301.00	-51.10000434	Horiz	102.00
222.50	-51.40000434	Vert	102.30
138.00	-52.10000434	Horiz	103.00
258.00	-52.40000434	Vert	103.30
368.00	-53.50000434	Horiz	104.40
356.00	-54.20000434	Horiz	105.10
215.00	-54.50000434	Vert	105.40
222.50	-55.00000434	Horiz	105.90
387.00	-55.70000434	Horiz	106.60
400.50	-55.90000434	Horiz	106.80

276.00	-56.20000434	Horiz	107.10
258.00	-57.00000434	Horiz	107.90
301.00	-57.70000434	Vert	108.60
414.00	-57.80000434	Horiz	108.70
215.00	-58.20000434	Horiz	109.10
400.50	-59.20000434	Vert	110.10
311.50	-59.20000434	Vert	110.10
276.00	-59.40000434	Vert	110.30
445.00	-59.50000434	Horiz	110.40
344.00	-59.50000434	Vert	110.40
430.00	-59.60000434	Horiz	110.50
267.00	-60.30000434	Vert	111.20
430.00	-60.90000434	Vert	111.80
445.00	-61.40000434	Vert	112.30
267.00	-61.70000434	Horiz	112.60
460.00	-61.90000434	Horiz	112.80
414.00	-61.90000434	Vert	112.80
356.00	-61.90000434	Vert	112.80
322.00	-62.20000434	Vert	113.10
368.00	-64.20000434	Vert	115.10
460.00	-64.60000434	Vert	115.50
387.00	-65.30000434	Vert	116.20

Test Setup Photos


01/30/2012 08:41

2.1033(c)(14)/2.1055/90.213 - Frequency Stability

Test Conditions / Setup

The EUT is located inside the temperature chamber. The EUT is connected to a support laptop through a serial cable. 45MHz antenna port is connected to the Spectrum Analyzer through 36dB of attenuation. A heatsink is bolted to the unit for testing purposes ONLY, and a 6" fan is aimed at the heat sink to keep the temperature down. The EUT is connected to a DC power supply. The EUT in transmit mode. Measurements will be taken at 10°C intervals between -30°C to +50°C. Frequency: 43MHz - 44.5MHz - 46MHz.
Testing performed per TIA-603C

Engineer Name: A. Del Angel

Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
ANP05759	Attenuator	PE7010-20	HP	2/16/2010	2/16/2012
ANP05979	Attenuator	40-6-34	Weinschel	2/9/2010	2/9/2012
AN03227	Cable	32026-29080-29080-84	AstroLab	5/2/2011	5/2/2013
AN02871	Spectrum Analyzer	E4440A	Agilent	4/22/2011	4/22/2013
ANP05389	Attenuator	NA	Narda	1/27/2012	1/27/2014
AN02757	Temperature Chamber	F100/350-8	Bemco	1/6/2011	1/6/2013

Test Data

Device Model #:	MCC-545C	
Operating Voltage:	12	**VDC**
Frequency Limit:	20	**PPM**

Temperature Variations

		Channel 1 (MHz)	Dev. (PPM)	Channel 2 (MHz)	Dev. (PPM)	Channel 3 (MHz)	Dev. (PPM)
Channel Frequency:		**43.000000**		**44.500000**		**46.000000**	
Temp (C)	Voltage						
-30	12	42.999962	0.88372	44.499968	0.71910	45.999966	0.73913
-20	12	42.999969	0.72093	44.499968	0.71910	45.999967	0.71739
-10	12	42.999987	0.30233	44.499988	0.26966	45.999989	0.23913
0	12	43.000001	0.02326	44.500000	0.00000	46.000001	0.02174
10	12	43.000004	0.09302	44.500004	0.08989	46.000005	0.10870
20	12	43.000000	0.00000	44.499998	0.04494	45.999998	0.04348
30	12	43.000003	0.06977	44.500004	0.08989	46.000004	0.08696
40	12	43.000002	0.04651	44.500002	0.04494	46.000002	0.04348
50	12	43.000004	0.09302	44.500004	0.08989	46.000004	0.08696

Voltage Variations (±15%)

20	10.2	42.999998	0.04651	44.499999	0.02247	45.999998	0.04348
20	12	43.000000	0.00000	44.499998	0.04494	45.999998	0.04348
20	13.8	42.999998	0.04651	44.499998	0.04494	45.999999	0.02174

Max Deviation (PPM)			**0.88372**			**0.71910**	**0.73913**
			PASS			**PASS**	**PASS**

Test Setup Photos

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

The reported measurement uncertainties are calculated based on the worst case of all laboratory environments from CKC Laboratories, Inc. test sites. Only those parameters which require estimation of measurement uncertainty are reported. The reported worst case measurement uncertainty is less than the maximum values derived in CISPR 16-4-2. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula. This reading was then compared to the applicable specification limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or carrot ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.