

Meteorcomm LLC.

TEST REPORT FOR

**Locomotive
Model: 63020**

Tested To The Following Standards:

**Spurious Emissions Only
In accordance with
FCC Part 80 and Part 90I**

Report No.: 94195-14

Date of issue: March 21, 2013



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.

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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: 12399

DATE OF EQUIPMENT RECEIPT:**DATE(S) OF TESTING:****REPORT PREPARED BY:**

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

Project Number: 94195

March 11, 2013

March 11, 2013

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.

A handwritten signature in black ink that reads "Steve Behm". The signature is written in a cursive style and is positioned above a horizontal line.

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

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.00.14
Immunity	5.00.07

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Bothell	US0081	SL2-IN-E-1145R	3082C-1	318736	A-0148

SUMMARY OF RESULTS

Standard / Specification: FCC Part 80 & Part 90I

Description	Test Procedure/Method	Results
Radiated Spurious Emissions	FCC Part 80 / 47 CFR §80.211(f)	Pass
Radiated Spurious Emissions	FCC Part 90I / 47 CFR §90.210(b)	Pass

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

Locomotive

Manuf: Meteorcomm LLC.
Model: 63020
Serial: 63LR000106BK

Programmable Power Supply

Manuf: Ametek
Model: XG100-17MGA
Serial: 1107A05456

PERIPHERAL DEVICES

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

Laptop

Manuf: DELL
Model: Latitude E6410
Serial: Meteorcomm AN2421

Laptop Power Supply

Manuf: DELL
Model: FA90PE1-00
Serial: NA

Mouse

Manuf: DELL
Model: M-UAR DEL7
Serial: NA

FCC PART 80

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) 47 CFR Part 80 for the filing of applications for licenses to operate radio facilities in the maritime services.

Part 80 Radiated Spurious Emissions

Test Data Sheets

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

Customer: **Meteorcomm LLC.**

Specification: **47 CFR §80.211(f) Spurious Emissions**

Work Order #: **94195**

Date: 3/11/2013

Test Type: **Maximized Emissions**

Time: 14:21:35

Equipment: **Locomotive**

Sequence#: 7

Manufacturer: Meteorcomm LLC.

Tested By: Steven Pittsford

Model: 63020

S/N: 63LR000106BK

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03227	Cable	32026-29080-29080-84	5/2/2011	5/2/2013
T2	AN02871	Spectrum Analyzer	E4440A	4/22/2011	4/22/2013
T3	AN01271	Preamp	83017A	8/18/2011	8/18/2013
T4	AN03123	Cable	32026-2-29801-12	10/14/2011	10/14/2013
T5	ANP05546	Cable	Heliastax	9/7/2012	9/7/2014
T6	AN02308	Preamp	8447D	4/3/2012	4/3/2014
T7	AN01993	Biconilog Antenna	CBL6111C	3/2/2012	3/2/2014
T8	ANP05360	Cable	RG214	12/3/2012	12/3/2014
T9	ANP05366	Cable	RG-214	10/14/2011	10/14/2013
T10	AN00052	Loop Antenna	6502	5/16/2012	5/16/2014
T11	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	10/19/2011	10/19/2013

Equipment Under Test (* = EUT):

NA	Manufacturer	Model #	S/N
Locomotive*	Meteorcomm LLC.	63020	63LR000106BK
Programmable Power Supply	Ametek	XG100-17MGA	1107A05456

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	DELL	Latitude E6410	Meteorcomm AN2421
Laptop Power Supply	DELL	FA90PE1-00	NA
Mouse	DELL	M-UAR DEL7	NA

Test Conditions / Notes:

Temperature: 21°C
Pressure: 103.4kPa
Humidity: 33%
Frequency: 9kHz-2.5GHz
Device is a transmitter/receiver operating at 217-220MHz. The transmitter is transmitting. The transmitter is tuned for Low and High Frequency (217.6125MHz & 219.9875MHz). Transmit and Receive ports terminated in characteristic load. EUT is powered by 74VDC via support power supply.
Ethernet traffic is established on maintenance port with support equipment located outside the test area. All EUT ports are filled.
Below 30MHz CISPR Bandwidths, 30MHz-1GHz, RBW=100kHz VBW=300kHz & 1-2.5GHz, RBW=1MHz VBW=3MHz

Ext Attn: 0 dB

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
	MHz	dBμV	T9	T10	T11		Table	dBμV/m	dBμV/m	dB	Ant
1	85.710M	77.7	+0.3	+0.0	+0.0	+0.0	+0.0	59.6	82.2	-22.6	Vert
			+0.0	-28.0	+8.5	+0.6	168		High		138
			+0.5	+0.0	+0.0						
2	110.440M	73.9	+0.3	+0.0	+0.0	+0.0	+0.0	58.4	82.2	-23.8	Vert
			+0.0	-27.9	+10.8	+0.7			High		100
			+0.6	+0.0	+0.0						
3	113.700M	73.1	+0.3	+0.0	+0.0	+0.0	+0.0	57.9	82.2	-24.3	Vert
			+0.0	-27.8	+11.0	+0.7	360		Low		101
			+0.6	+0.0	+0.0						
4	82.200M	75.6	+0.3	+0.0	+0.0	+0.0	+0.0	57.2	82.2	-25.0	Vert
			+0.0	-28.0	+8.2	+0.6	360		Low		101
			+0.5	+0.0	+0.0						
5	5.642M	46.2	+0.1	+0.0	+0.0	+0.0	+0.0	56.1	82.2	-26.1	Perpe
			+0.1	+0.0	+0.0	+0.0			Low		99
			+0.0	+9.7	+0.0						
6	5.686M	45.8	+0.1	+0.0	+0.0	+0.0	+0.0	55.7	82.2	-26.5	Perpe
			+0.1	+0.0	+0.0	+0.0	360		High		99
			+0.0	+9.7	+0.0						
7	5.685M	45.5	+0.1	+0.0	+0.0	+0.0	+0.0	55.4	82.2	-26.8	Paral
			+0.1	+0.0	+0.0	+0.0	345		Low		99
			+0.0	+9.7	+0.0						
8	435.220M	62.7	+0.6	+0.0	+0.0	+0.0	+0.0	55.1	82.2	-27.1	Vert
			+0.0	-28.0	+17.0	+1.4	103		Low		117
			+1.4	+0.0	+0.0						

9	5.600M	44.8	+0.1 +0.1 +0.0	+0.0 +0.0 +9.7	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	54.7	82.2 High	-27.5	Paral 99
10	48.500M	70.6	+0.2 +0.0 +0.3	+0.0 -28.0 +0.0	+0.0 +9.5 +0.0	+0.0 +0.4 +0.0	+0.0	53.0	82.2 Low	-29.2	Horiz 101
11	40.260M	65.8	+0.2 +0.0 +0.3	+0.0 -28.1 +0.0	+0.0 +14.1 +0.0	+0.0 +0.4 +0.0	+0.0	52.7	82.2 Low	-29.5	Vert 101
12	24.961M	45.8	+0.1 +0.3 +0.0	+0.0 +0.0 +5.8	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 289	52.0	82.2 Low	-30.2	Paral 99
13	24.960M	44.9	+0.1 +0.3 +0.0	+0.0 +0.0 +5.8	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	51.1	82.2 Low	-31.1	Perpe 99
14	121.120M	65.4	+0.3 +0.0 +0.6	+0.0 -27.8 +0.0	+0.0 +11.5 +0.0	+0.0 +0.7 +0.0	+0.0 323	50.7	82.2 High	-31.5	Horiz 99
15	25.693M	44.6	+0.1 +0.3 +0.0	+0.0 +0.0 +5.6	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	50.6	82.2 High	-31.6	Paral 99
16	25.692M	44.5	+0.1 +0.3 +0.0	+0.0 +0.0 +5.6	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 360	50.5	82.2 Low	-31.7	Perpe 99
17	26.607M	44.7	+0.1 +0.3 +0.0	+0.0 +0.0 +5.3	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 151	50.4	82.2 Low	-31.8	Paral 99
18	439.610M	57.4	+0.6 +0.0 +1.4	+0.0 -28.1 +0.0	+0.0 +17.1 +0.0	+0.0 +1.4 +0.0	+0.0 360	49.8	82.2 High	-32.4	Vert 100
19	85.710M	66.9	+0.3 +0.0 +0.5	+0.0 -28.0 +0.0	+0.0 +8.5 +0.0	+0.0 +0.6 +0.0	+0.0 360	48.8	82.2 High	-33.4	Horiz 99
20	3.079M	37.5	+0.0 +0.1 +0.0	+0.0 +0.0 +9.7	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 34	47.3	82.2 High	-34.9	Perpe 99
21	3.079M	37.4	+0.0 +0.1 +0.0	+0.0 +0.0 +9.7	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 360	47.2	82.2 Low	-35.0	Perpe 99
22	3.079M	37.4	+0.0 +0.1 +0.0	+0.0 +0.0 +9.7	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 168	47.2	82.2 Low	-35.0	Paral 99
23	499.870M	53.5	+0.7 +0.0 +1.6	+0.0 -28.2 +0.0	+0.0 +18.2 +0.0	+0.0 +1.4 +0.0	+0.0 112	47.2	82.2 High	-35.0	Vert 100
24	3.081M	37.3	+0.0 +0.1 +0.0	+0.0 +0.0 +9.7	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	47.1	82.2 High	-35.1	Paral 99
25	23.126M	40.0	+0.1 +0.2 +0.0	+0.0 +0.0 +6.5	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	46.8	82.2 High	-35.4	Perpe 99

26	440.040M	54.3	+0.6 +0.0 +1.4	+0.0 -28.1 +0.0	+0.0 +17.1 +0.0	+0.0 +1.4 186	+0.0	46.7	82.2 High	-35.5	Horiz 100
27	23.128M	39.8	+0.1 +0.2 +0.0	+0.0 +0.0 +6.5	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	46.6	82.2 Low	-35.6	Perpe 99
28	23.126M	39.2	+0.1 +0.2 +0.0	+0.0 +0.0 +6.5	+0.0 +0.0 +0.0	+0.0 +0.0 360	+0.0	46.0	82.2 High	-36.2	Paral 99
29	435.220M	53.0	+0.6 +0.0 +1.4	+0.0 -28.0 +0.0	+0.0 +17.0 +0.0	+0.0 +1.4 360	+0.0	45.4	82.2 Low	-36.8	Horiz 99
30	449.920M	52.5	+0.6 +0.0 +1.5	+0.0 -28.1 +0.0	+0.0 +17.3 +0.0	+0.0 +1.4 360	+0.0	45.2	82.2 Low	-37.0	Horiz 101
31	340.090M	54.9	+0.6 +0.0 +1.2	+0.0 -27.3 +0.0	+0.0 +14.7 +0.0	+0.0 +1.1 360	+0.0	45.2	82.2 High	-37.0	Horiz 100
32	349.910M	54.5	+0.6 +0.0 +1.2	+0.0 -27.4 +0.0	+0.0 +15.0 +0.0	+0.0 +1.2 360	+0.0	45.1	82.2 Low	-37.1	Horiz 101
33	499.790M	51.3	+0.7 +0.0 +1.6	+0.0 -28.2 +0.0	+0.0 +18.2 +0.0	+0.0 +1.4	+0.0	45.0	82.2 Low	-37.2	Vert 101
34	500.020M	51.0	+0.7 +0.0 +1.6	+0.0 -28.2 +0.0	+0.0 +18.2 +0.0	+0.0 +1.4 360	+0.0	44.7	82.2 High	-37.5	Horiz 100
35	1600.000M	53.2	+1.2 +2.3 +0.0	+0.0 +0.0 +0.0	-34.9 +0.0 +22.5	+0.3 +0.0	+0.0 139	44.6	82.2 Low	-37.6	Vert 99
36	1600.016M	52.9	+1.2 +2.3 +0.0	+0.0 +0.0 +0.0	-34.9 +0.0 +22.5	+0.3 +0.0	+0.0 271	44.3	82.2 Low	-37.9	Horiz 101
37	349.980M	53.3	+0.6 +0.0 +1.2	+0.0 -27.4 +0.0	+0.0 +15.0 +0.0	+0.0 +1.2 360	+0.0	43.9	82.2 High	-38.3	Horiz 100
38	1600.040M	52.3	+1.2 +2.3 +0.0	+0.0 +0.0 +0.0	-34.9 +0.0 +22.5	+0.3 +0.0	+0.0 227	43.7	82.2 High	-38.5	Horiz 137
39	680.590M	47.0	+0.8 +0.0 +1.9	+0.0 -28.2 +0.0	+0.0 +20.4 +0.0	+0.0 +1.7	+0.0	43.6	82.2 High	-38.6	Vert 100
40	399.990M	51.7	+0.6 +0.0 +1.4	+0.0 -27.8 +0.0	+0.0 +16.3 +0.0	+0.0 +1.3 360	+0.0	43.5	82.2 High	-38.7	Vert 100
41	31.270k	33.2	+0.0 +0.0 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0 360	+0.0	43.1	82.2 High	-39.1	Paral 99
42	499.790M	49.3	+0.7 +0.0 +1.6	+0.0 -28.2 +0.0	+0.0 +18.2 +0.0	+0.0 +1.4 360	+0.0	43.0	82.2 Low	-39.2	Horiz 101

43	10.117M	32.2	+0.1 +0.2 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	42.4	82.2 Low	-39.8	Paral 99
44	12.749M	32.4	+0.1 +0.2 +0.0	+0.0 +0.0 +9.5	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 360	42.2	82.2 High	-40.0	Paral 99
45	661.170M	45.6	+0.8 +0.0 +1.9	+0.0 -28.3 +0.0	+0.0 +20.3 +0.0	+0.0 +1.7 +0.0	+0.0 359	42.0	82.2 High	-40.2	Vert 100
46	661.080M	45.6	+0.8 +0.0 +1.9	+0.0 -28.3 +0.0	+0.0 +20.3 +0.0	+0.0 +1.7 +0.0	+0.0 360	42.0	82.2 Low	-40.2	Vert 101
47	666.560M	45.6	+0.8 +0.0 +1.9	+0.0 -28.3 +0.0	+0.0 +20.3 +0.0	+0.0 +1.7 +0.0	+0.0 359	42.0	82.2 Low	-40.2	Vert 101
48	10.115M	31.7	+0.1 +0.2 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 41	41.9	82.2 High	-40.3	Perpe 99
49	9.897M	31.6	+0.1 +0.1 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 360	41.7	82.2 Low	-40.5	Perpe 99
50	1400.075M	52.4	+1.1 +2.1 +0.0	+0.0 +0.0 +0.0	-35.3 +0.0 +21.0	+0.3 +0.0 +0.0	+0.0	41.6	82.2 High	-40.6	Horiz 106
51	31.272k	31.6	+0.0 +0.0 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	41.5	82.2 Low	-40.7	Perpe 99
52	1094.332M	54.7	+0.9 +1.9 +0.0	+0.0 +0.0 +0.0	-36.3 +0.0 +19.8	+0.3 +0.0 +0.0	+0.0 360	41.3	82.2 Low	-40.9	Vert 99
53	1600.030M	49.9	+1.2 +2.3 +0.0	+0.0 +0.0 +0.0	-34.9 +0.0 +22.5	+0.3 +0.0 +0.0	+0.0	41.3	82.2 High	-40.9	Vert 99
54	31.270k	31.3	+0.0 +0.0 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 360	41.2	82.2 Low	-41.0	Paral 99
55	119.760M	55.9	+0.3 +0.0 +0.6	+0.0 -27.8 +0.0	+0.0 +11.4 +0.0	+0.0 +0.7 +0.0	+0.0	41.1	82.2 Low	-41.1	Horiz 101
56	350.040M	50.3	+0.6 +0.0 +1.2	+0.0 -27.4 +0.0	+0.0 +15.0 +0.0	+0.0 +1.2 +0.0	+0.0	40.9	82.2 Low	-41.3	Vert 122
57	12.542M	30.6	+0.1 +0.2 +0.0	+0.0 +0.0 +9.6	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	40.5	82.2 Low	-41.7	Perpe 99
58	652.940M	44.2	+0.8 +0.0 +1.8	+0.0 -28.3 +0.0	+0.0 +20.3 +0.0	+0.0 +1.7 +0.0	+0.0 360	40.5	82.2 Low	-41.7	Vert 101
59	1799.850M	46.3	+1.3 +2.4 +0.0	+0.0 +0.0 +0.0	-34.6 +0.0 +24.6	+0.3 +0.0 +0.0	+0.0 286	40.3	82.2 High	-41.9	Horiz 111

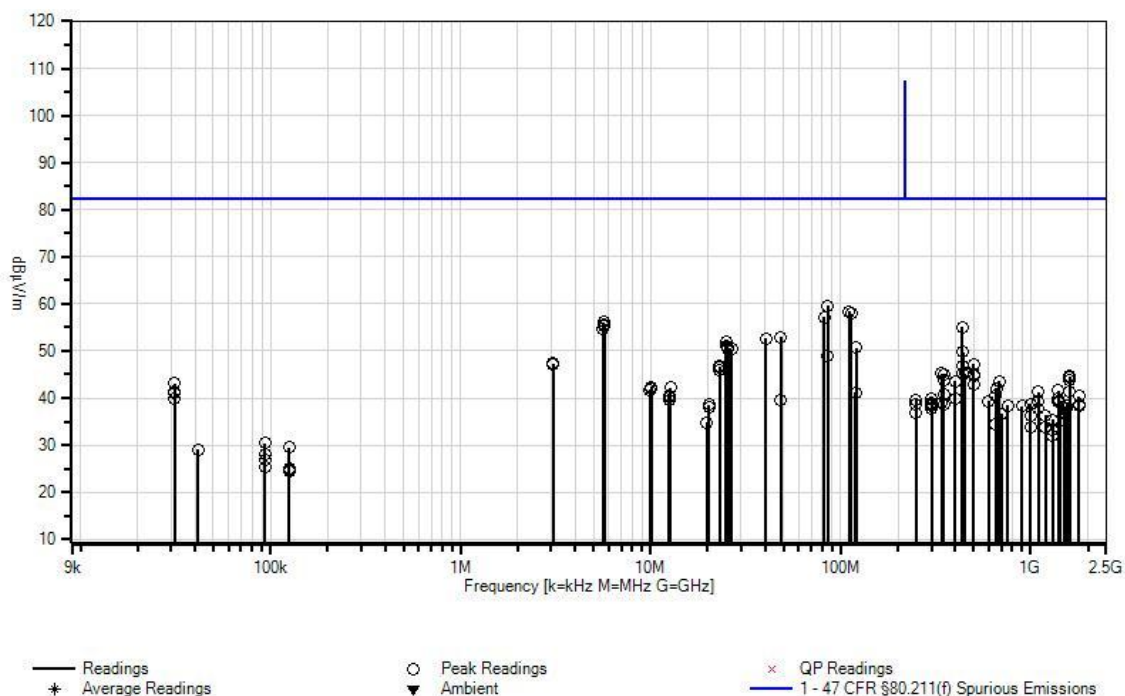
60	12.585M	30.3	+0.1 +0.2 +0.0	+0.0 +0.0 +9.6	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 360	40.2	82.2 High	-42.0	Perpe 99
61	1400.040M	50.8	+1.1 +2.1 +0.0	+0.0 +0.0 +0.0	-35.3 +0.0 +21.0	+0.3 +0.0 +0.0	+0.0 360	40.0	82.2 High	-42.2	Vert 99
62	299.960M	50.8	+0.5 +0.0 +1.1	+0.0 -27.1 +0.0	+0.0 +13.5 +0.0	+0.0 +1.1 +0.0	+0.0 1	39.9	82.2 High	-42.3	Horiz 100
63	400.050M	48.0	+0.6 +0.0 +1.4	+0.0 -27.8 +0.0	+0.0 +16.3 +0.0	+0.0 +1.3 +0.0	+0.0 360	39.8	82.2 Low	-42.4	Horiz 101
64	31.272k	29.9	+0.0 +0.0 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 360	39.8	82.2 High	-42.4	Perpe 99
65	250.090M	51.7	+0.5 +0.0 +1.0	+0.0 -27.1 +0.0	+0.0 +12.5 +0.0	+0.0 +1.0 +0.0	+0.0 360	39.6	82.2 High	-42.6	Vert 100
66	48.580M	57.2	+0.2 +0.0 +0.3	+0.0 -28.0 +0.0	+0.0 +9.4 +0.0	+0.0 +0.4 +0.0	+0.0 +0.0	39.5	82.2 High	-42.7	Horiz 99
67	12.502M	29.6	+0.1 +0.2 +0.0	+0.0 +0.0 +9.6	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 360	39.5	82.2 Low	-42.7	Paral 99
68	599.830M	43.6	+0.7 +0.0 +1.7	+0.0 -28.3 +0.0	+0.0 +20.0 +0.0	+0.0 +1.6 +0.0	+0.0 360	39.3	82.2 High	-42.9	Vert 100
69	1424.915M	49.8	+1.1 +2.1 +0.0	+0.0 +0.0 +0.0	-35.2 +0.0 +21.1	+0.3 +0.0 +0.0	+0.0 35	39.2	82.2 High	-43.0	Vert 99
70	1100.025M	52.5	+1.0 +1.9 +0.0	+0.0 +0.0 +0.0	-36.3 +0.0 +19.8	+0.3 +0.0 +0.0	+0.0 360	39.2	82.2 High	-43.0	Horiz 99
71	1100.025M	52.5	+1.0 +1.9 +0.0	+0.0 +0.0 +0.0	-36.3 +0.0 +19.8	+0.3 +0.0 +0.0	+0.0 242	39.2	82.2 High	-43.0	Vert 401
72	1399.975M	49.9	+1.1 +2.1 +0.0	+0.0 +0.0 +0.0	-35.3 +0.0 +21.0	+0.3 +0.0 +0.0	+0.0 +0.0	39.1	82.2 Low	-43.1	Vert 99
73	299.960M	49.9	+0.5 +0.0 +1.1	+0.0 -27.1 +0.0	+0.0 +13.5 +0.0	+0.0 +1.1 +0.0	+0.0 +0.0	39.0	82.2 High	-43.2	Vert 100
74	340.090M	48.6	+0.6 +0.0 +1.2	+0.0 -27.3 +0.0	+0.0 +14.7 +0.0	+0.0 +1.1 +0.0	+0.0 +0.0	38.9	82.2 High	-43.3	Vert 100
75	1000.000M	53.3	+0.9 +1.8 +0.0	+0.0 +0.0 +0.0	-36.8 +0.0 +19.3	+0.2 +0.0 +0.0	+0.0 70	38.7	82.2 High	-43.5	Vert 119
76	349.980M	48.1	+0.6 +0.0 +1.2	+0.0 -27.4 +0.0	+0.0 +15.0 +0.0	+0.0 +1.2 +0.0	+0.0 +0.0	38.7	82.2 High	-43.5	Vert 100

77	1800.220M	44.7	+1.3 +2.4 +0.0	+0.0 +0.0 +0.0	-34.6 +0.0 +24.6	+0.3 +0.0	+0.0	38.7	82.2 Low	-43.5	Vert 101
78	20.260M	30.5	+0.1 +0.2 +0.0	+0.0 +0.0 +7.7	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 360	38.5	82.2 Low	-43.7	Perpe 99
79	249.960M	50.6	+0.5 +0.0 +1.0	+0.0 -27.1 +0.0	+0.0 +12.5 +0.0	+0.0 +1.0	+0.0	38.5	82.2 Low	-43.7	Vert 101
80	299.960M	49.4	+0.5 +0.0 +1.1	+0.0 -27.1 +0.0	+0.0 +13.5 +0.0	+0.0 +1.1	+0.0 360	38.5	82.2 High	-43.7	Vert 100
81	300.110M	49.3	+0.5 +0.0 +1.1	+0.0 -27.1 +0.0	+0.0 +13.5 +0.0	+0.0 +1.1	+0.0 360	38.4	82.2 High	-43.8	Horiz 100
82	756.080M	40.1	+0.8 +0.0 +2.0	+0.0 -28.0 +0.0	+0.0 +21.6 +0.0	+0.0 +1.9	+0.0	38.4	82.2 Low	-43.8	Vert 99
83	1550.030M	47.6	+1.2 +2.2 +0.0	+0.0 +0.0 +0.0	-35.0 +0.0 +22.0	+0.3 +0.0	+0.0 227	38.3	82.2 High	-43.9	Vert 99
84	1799.920M	44.2	+1.3 +2.4 +0.0	+0.0 +0.0 +0.0	-34.6 +0.0 +24.6	+0.3 +0.0	+0.0	38.2	82.2 High	-44.0	Vert 103
85	899.800M	37.4	+0.9 +0.0 +2.3	+0.0 -27.4 +0.0	+0.0 +23.0 +0.0	+0.0 +2.0	+0.0	38.2	82.2 Low	-44.0	Horiz 108
86	1500.022M	48.3	+1.1 +2.2 +0.0	+0.0 +0.0 +0.0	-35.1 +0.0 +21.4	+0.3 +0.0	+0.0 360	38.2	82.2 Low	-44.0	Vert 101
87	1500.085M	48.2	+1.1 +2.2 +0.0	+0.0 +0.0 +0.0	-35.1 +0.0 +21.4	+0.3 +0.0	+0.0 360	38.1	82.2 High	-44.1	Vert 106
88	20.259M	30.1	+0.1 +0.2 +0.0	+0.0 +0.0 +7.7	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	38.1	82.2 Low	-44.1	Paral 99
89	1550.030M	47.1	+1.2 +2.2 +0.0	+0.0 +0.0 +0.0	-35.0 +0.0 +22.0	+0.3 +0.0	+0.0	37.8	82.2 High	-44.4	Horiz 111
90	1500.035M	47.9	+1.1 +2.2 +0.0	+0.0 +0.0 +0.0	-35.1 +0.0 +21.4	+0.3 +0.0	+0.0	37.8	82.2 High	-44.4	Horiz 100
91	1094.332M	51.1	+0.9 +1.9 +0.0	+0.0 +0.0 +0.0	-36.3 +0.0 +19.8	+0.3 +0.0	+0.0	37.7	82.2 Low	-44.5	Horiz 99
92	300.000M	48.5	+0.5 +0.0 +1.1	+0.0 -27.1 +0.0	+0.0 +13.5 +0.0	+0.0 +1.1	+0.0 360	37.6	82.2 Low	-44.6	Vert 101
93	1500.022M	47.0	+1.1 +2.2 +0.0	+0.0 +0.0 +0.0	-35.1 +0.0 +21.4	+0.3 +0.0	+0.0 93	36.9	82.2 Low	-45.3	Horiz 101

94	250.090M	48.9	+0.5 +0.0 +1.0	+0.0 -27.1 +0.0	+0.0 +12.5 +0.0	+0.0 +1.0	+0.0	36.8	82.2 High	-45.4	Horiz 100
95	700.070M	39.9	+0.8 +0.0 +1.9	+0.0 -28.2 +0.0	+0.0 +20.5 +0.0	+0.0 +1.7	+0.0 302	36.6	82.2 High	-45.6	Horiz 112
96	1525.215M	46.0	+1.2 +2.2 +0.0	+0.0 +0.0 +0.0	-35.0 +0.0 +21.7	+0.3 +0.0	+0.0	36.4	82.2 High	-45.8	Horiz 102
97	1200.025M	48.7	+1.0 +2.0 +0.0	+0.0 +0.0 +0.0	-35.9 +0.0 +20.2	+0.3 +0.0	+0.0 177	36.3	82.2 High	-45.9	Vert 116
98	1000.000M	50.8	+0.9 +1.8 +0.0	+0.0 +0.0 +0.0	-36.8 +0.0 +19.3	+0.2 +0.0	+0.0 189	36.2	82.2 High	-46.0	Horiz 112
99	1299.910M	46.8	+1.0 +2.1 +0.0	+0.0 +0.0 +0.0	-35.5 +0.0 +20.7	+0.3 +0.0	+0.0	35.4	82.2 High	-46.8	Vert 99
100	1524.945M	44.5	+1.2 +2.2 +0.0	+0.0 +0.0 +0.0	-35.0 +0.0 +21.7	+0.3 +0.0	+0.0 360	34.9	82.2 High	-47.3	Vert 102
101	19.710M	26.6	+0.1 +0.2 +0.0	+0.0 +0.0 +7.9	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	34.8	82.2 High	-47.4	Paral 99
102	652.740M	38.0	+0.8 +0.0 +1.8	+0.0 -28.3 +0.0	+0.0 +20.3 +0.0	+0.0 +1.7	+0.0 1	34.3	82.2 Low	-47.9	Horiz 99
103	1200.025M	46.2	+1.0 +2.0 +0.0	+0.0 +0.0 +0.0	-35.9 +0.0 +20.2	+0.3 +0.0	+0.0 67	33.8	82.2 High	-48.4	Horiz 98
104	1000.005M	48.3	+0.9 +1.8 +0.0	+0.0 +0.0 +0.0	-36.8 +0.0 +19.3	+0.2 +0.0	+0.0 154	33.7	82.2 Low	-48.5	Horiz 112
105	1300.120M	44.7	+1.0 +2.1 +0.0	+0.0 +0.0 +0.0	-35.5 +0.0 +20.7	+0.3 +0.0	+0.0 14	33.3	82.2 Low	-48.9	Vert 101
106	1300.340M	43.5	+1.0 +2.1 +0.0	+0.0 +0.0 +0.0	-35.5 +0.0 +20.7	+0.3 +0.0	+0.0 360	32.1	82.2 Low	-50.1	Horiz 99
107	1299.800M	43.5	+1.0 +2.1 +0.0	+0.0 +0.0 +0.0	-35.5 +0.0 +20.7	+0.3 +0.0	+0.0 357	32.1	82.2 High	-50.1	Horiz 111
108	93.760k	20.8	+0.0 +0.0 +0.0	+0.0 +0.0 +9.6	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 360	30.4	82.2 High	-51.8	Paral 99
109	125.070k	20.0	+0.0 +0.0 +0.0	+0.0 +0.0 +9.5	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 360	29.5	82.2 High	-52.7	Paral 99
110	41.610k	19.2	+0.0 +0.0 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 360	29.1	82.2 High	-53.1	Paral 99

111	93.762k	18.4	+0.0	+0.0	+0.0	+0.0	+0.0	28.0	82.2	-54.2	Perpe
			+0.0	+0.0	+0.0	+0.0			Low		99
			+0.0	+9.6	+0.0						
112	93.762k	17.1	+0.0	+0.0	+0.0	+0.0	+0.0	26.7	82.2	-55.5	Perpe
			+0.0	+0.0	+0.0	+0.0	357		High		99
			+0.0	+9.6	+0.0						
113	93.620k	15.8	+0.0	+0.0	+0.0	+0.0	+0.0	25.4	82.2	-56.8	Paral
			+0.0	+0.0	+0.0	+0.0	360		Low		99
			+0.0	+9.6	+0.0						
114	125.070k	15.6	+0.0	+0.0	+0.0	+0.0	+0.0	25.1	82.2	-57.1	Paral
			+0.0	+0.0	+0.0	+0.0	360		Low		99
			+0.0	+9.5	+0.0						
115	125.072k	15.1	+0.0	+0.0	+0.0	+0.0	+0.0	24.6	82.2	-57.6	Perpe
			+0.0	+0.0	+0.0	+0.0			Low		99
			+0.0	+9.5	+0.0						
116	125.072k	14.9	+0.0	+0.0	+0.0	+0.0	+0.0	24.4	82.2	-57.8	Perpe
			+0.0	+0.0	+0.0	+0.0	286		High		99
			+0.0	+9.5	+0.0						

CKC Laboratories, Inc. Date: 3/11/2013 Time: 14:21:35 Meteorcomm LLC. WO#: 94195
Test Distance: 3 Meters Sequence#: 7 None
Meteorcomm LLC. Locomotive P/N: 63020



Test Setup Photos



FCC PART 90I

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) 47 CFR Part 90I requirements for radio communications systems licensed and used in the Public Safety, Industrial/Business Radio Pool, and Radiolocation Radio Services.

Part 90I Radiated Spurious Emissions

Test Data Sheets

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(b) Spurious Emissions**
 Work Order #: **94195** Date: 3/11/2013
 Test Type: **Maximized Emissions** Time: 14:21:35
 Equipment: **Locomotive** Sequence#: 7
 Manufacturer: Meteorcomm LLC. Tested By: Steven Pittsford
 Model: 63020
 S/N: 63LR000106BK

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03227	Cable	32026-29080-29080-84	5/2/2011	5/2/2013
T2	AN02871	Spectrum Analyzer	E4440A	4/22/2011	4/22/2013
T3	AN01271	Preamp	83017A	8/18/2011	8/18/2013
T4	AN03123	Cable	32026-2-29801-12	10/14/2011	10/14/2013
T5	ANP05546	Cable	Heliac	9/7/2012	9/7/2014
T6	AN02308	Preamp	8447D	4/3/2012	4/3/2014
T7	AN01993	Biconilog Antenna	CBL6111C	3/2/2012	3/2/2014
T8	ANP05360	Cable	RG214	12/3/2012	12/3/2014
T9	ANP05366	Cable	RG-214	10/14/2011	10/14/2013
T10	AN00052	Loop Antenna	6502	5/16/2012	5/16/2014
T11	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	10/19/2011	10/19/2013

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Locomotive*	Meteorcomm LLC.	63020	63LR000106BK
Programmable Power Supply	Ametek	XG100-17MGA	1107A05456

Support Devices:

Function	Manufacturer	Model #	S/N
Laptop	DELL	Latitude E6410	Meteorcomm AN2421
Laptop Power Supply	DELL	FA90PE1-00	NA
Mouse	DELL	M-UAR DEL7	NA

Test Conditions / Notes:

Temperature: 21°C
Pressure: 103.4kPa
Humidity: 33%
Frequency: 9kHz-2.5GHz

Device is a transmitter/receiver operating at 217-220MHz. The transmitter is transmitting. The transmitter is tuned for Low and High Frequency (217.6125MHz & 219.9875MHz). Transmit and Receive ports terminated in characteristic load. The EUT is powered by 74VDC via support power supply.

Ethernet traffic is established on maintenance port with support equipment located outside the test area. All EUT ports are filled.

Below 30MHz CISPR Bandwidths, 30MHz-1GHz, RBW=100kHz VBW=300kHz & 1-2.5GHz, RBW=1MHz VBW=3MHz

Ext Attn: 0 dB

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	85.710M	77.7	+0.3 +0.0 +0.5	+0.0 -28.0 +0.0	+0.0 +8.5 +0.0	+0.0 +0.6	+0.0 168	59.6	82.2 High	-22.6	Vert 138
2	110.440M	73.9	+0.3 +0.0 +0.6	+0.0 -27.9 +0.0	+0.0 +10.8 +0.0	+0.0 +0.7	+0.0	58.4	82.2 High	-23.8	Vert 100
3	113.700M	73.1	+0.3 +0.0 +0.6	+0.0 -27.8 +0.0	+0.0 +11.0 +0.0	+0.0 +0.7	+0.0 360	57.9	82.2 Low	-24.3	Vert 101
4	82.200M	75.6	+0.3 +0.0 +0.5	+0.0 -28.0 +0.0	+0.0 +8.2 +0.0	+0.0 +0.6	+0.0 360	57.2	82.2 Low	-25.0	Vert 101
5	5.642M	46.2	+0.1 +0.1 +0.0	+0.0 +0.0 +9.7	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	56.1	82.2 Low	-26.1	Perpe 99
6	5.686M	45.8	+0.1 +0.1 +0.0	+0.0 +0.0 +9.7	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 360	55.7	82.2 High	-26.5	Perpe 99
7	5.685M	45.5	+0.1 +0.1 +0.0	+0.0 +0.0 +9.7	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 345	55.4	82.2 Low	-26.8	Paral 99
8	435.220M	62.7	+0.6 +0.0 +1.4	+0.0 -28.0 +0.0	+0.0 +17.0 +0.0	+0.0 +1.4	+0.0 103	55.1	82.2 Low	-27.1	Vert 117
9	5.600M	44.8	+0.1 +0.1 +0.0	+0.0 +0.0 +9.7	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	54.7	82.2 High	-27.5	Paral 99
10	48.500M	70.6	+0.2 +0.0 +0.3	+0.0 -28.0 +0.0	+0.0 +9.5 +0.0	+0.0 +0.4	+0.0	53.0	82.2 Low	-29.2	Horiz 101

11	40.260M	65.8	+0.2 +0.0 +0.3	+0.0 -28.1 +0.0	+0.0 +14.1 +0.0	+0.0 +0.4	+0.0	52.7	82.2 Low	-29.5	Vert 101
12	24.961M	45.8	+0.1 +0.3 +0.0	+0.0 +0.0 +5.8	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 289	52.0	82.2 Low	-30.2	Paral 99
13	24.960M	44.9	+0.1 +0.3 +0.0	+0.0 +0.0 +5.8	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	51.1	82.2 Low	-31.1	Perpe 99
14	121.120M	65.4	+0.3 +0.0 +0.6	+0.0 -27.8 +0.0	+0.0 +11.5 +0.0	+0.0 +0.7	+0.0 323	50.7	82.2 High	-31.5	Horiz 99
15	25.693M	44.6	+0.1 +0.3 +0.0	+0.0 +0.0 +5.6	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	50.6	82.2 High	-31.6	Paral 99
16	25.692M	44.5	+0.1 +0.3 +0.0	+0.0 +0.0 +5.6	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 360	50.5	82.2 Low	-31.7	Perpe 99
17	26.607M	44.7	+0.1 +0.3 +0.0	+0.0 +0.0 +5.3	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 151	50.4	82.2 Low	-31.8	Paral 99
18	439.610M	57.4	+0.6 +0.0 +1.4	+0.0 -28.1 +0.0	+0.0 +17.1 +0.0	+0.0 +1.4	+0.0 360	49.8	82.2 High	-32.4	Vert 100
19	85.710M	66.9	+0.3 +0.0 +0.5	+0.0 -28.0 +0.0	+0.0 +8.5 +0.0	+0.0 +0.6	+0.0 360	48.8	82.2 High	-33.4	Horiz 99
20	3.079M	37.5	+0.0 +0.1 +0.0	+0.0 +0.0 +9.7	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 34	47.3	82.2 High	-34.9	Perpe 99
21	3.079M	37.4	+0.0 +0.1 +0.0	+0.0 +0.0 +9.7	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 168	47.2	82.2 Low	-35.0	Paral 99
22	3.079M	37.4	+0.0 +0.1 +0.0	+0.0 +0.0 +9.7	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 360	47.2	82.2 Low	-35.0	Perpe 99
23	499.870M	53.5	+0.7 +0.0 +1.6	+0.0 -28.2 +0.0	+0.0 +18.2 +0.0	+0.0 +1.4	+0.0 112	47.2	82.2 High	-35.0	Vert 100
24	3.081M	37.3	+0.0 +0.1 +0.0	+0.0 +0.0 +9.7	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	47.1	82.2 High	-35.1	Paral 99
25	23.126M	40.0	+0.1 +0.2 +0.0	+0.0 +0.0 +6.5	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	46.8	82.2 High	-35.4	Perpe 99
26	440.040M	54.3	+0.6 +0.0 +1.4	+0.0 -28.1 +0.0	+0.0 +17.1 +0.0	+0.0 +1.4	+0.0 186	46.7	82.2 High	-35.5	Horiz 100
27	23.128M	39.8	+0.1 +0.2 +0.0	+0.0 +0.0 +6.5	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	46.6	82.2 Low	-35.6	Perpe 99

28	23.126M	39.2	+0.1 +0.2 +0.0	+0.0 +0.0 +6.5	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0 360	46.0	82.2 High	-36.2	Paral 99
29	435.220M	53.0	+0.6 +0.0 +1.4	+0.0 -28.0 +0.0	+0.0 +17.0 +0.0	+0.0 +1.4	+0.0 360	45.4	82.2 Low	-36.8	Horiz 99
30	340.090M	54.9	+0.6 +0.0 +1.2	+0.0 -27.3 +0.0	+0.0 +14.7 +0.0	+0.0 +1.1	+0.0 360	45.2	82.2 High	-37.0	Horiz 100
31	449.920M	52.5	+0.6 +0.0 +1.5	+0.0 -28.1 +0.0	+0.0 +17.3 +0.0	+0.0 +1.4	+0.0 360	45.2	82.2 Low	-37.0	Horiz 101
32	349.910M	54.5	+0.6 +0.0 +1.2	+0.0 -27.4 +0.0	+0.0 +15.0 +0.0	+0.0 +1.2	+0.0 360	45.1	82.2 Low	-37.1	Horiz 101
33	499.790M	51.3	+0.7 +0.0 +1.6	+0.0 -28.2 +0.0	+0.0 +18.2 +0.0	+0.0 +1.4	+0.0	45.0	82.2 Low	-37.2	Vert 101
34	500.020M	51.0	+0.7 +0.0 +1.6	+0.0 -28.2 +0.0	+0.0 +18.2 +0.0	+0.0 +1.4	+0.0 360	44.7	82.2 High	-37.5	Horiz 100
35	1600.000M	53.2	+1.2 +2.3 +0.0	+0.0 +0.0 +0.0	-34.9 +0.0 +22.5	+0.3 +0.0	+0.0 139	44.6	82.2 Low	-37.6	Vert 99
36	1600.016M	52.9	+1.2 +2.3 +0.0	+0.0 +0.0 +0.0	-34.9 +0.0 +22.5	+0.3 +0.0	+0.0 271	44.3	82.2 Low	-37.9	Horiz 101
37	349.980M	53.3	+0.6 +0.0 +1.2	+0.0 -27.4 +0.0	+0.0 +15.0 +0.0	+0.0 +1.2	+0.0 360	43.9	82.2 High	-38.3	Horiz 100
38	1600.040M	52.3	+1.2 +2.3 +0.0	+0.0 +0.0 +0.0	-34.9 +0.0 +22.5	+0.3 +0.0	+0.0 227	43.7	82.2 High	-38.5	Horiz 137
39	680.590M	47.0	+0.8 +0.0 +1.9	+0.0 -28.2 +0.0	+0.0 +20.4 +0.0	+0.0 +1.7	+0.0	43.6	82.2 High	-38.6	Vert 100
40	399.990M	51.7	+0.6 +0.0 +1.4	+0.0 -27.8 +0.0	+0.0 +16.3 +0.0	+0.0 +1.3	+0.0 360	43.5	82.2 High	-38.7	Vert 100
41	31.270k	33.2	+0.0 +0.0 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 360	43.1	82.2 High	-39.1	Paral 99
42	499.790M	49.3	+0.7 +0.0 +1.6	+0.0 -28.2 +0.0	+0.0 +18.2 +0.0	+0.0 +1.4	+0.0 360	43.0	82.2 Low	-39.2	Horiz 101
43	10.117M	32.2	+0.1 +0.2 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	42.4	82.2 Low	-39.8	Paral 99
44	12.749M	32.4	+0.1 +0.2 +0.0	+0.0 +0.0 +9.5	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 360	42.2	82.2 High	-40.0	Paral 99

45	666.560M	45.6	+0.8 +0.0 +1.9	+0.0 -28.3 +0.0	+0.0 +20.3 +0.0	+0.0 +1.7 359	+0.0	42.0	82.2 Low	-40.2	Vert 101
46	661.080M	45.6	+0.8 +0.0 +1.9	+0.0 -28.3 +0.0	+0.0 +20.3 +0.0	+0.0 +1.7 360	+0.0	42.0	82.2 Low	-40.2	Vert 101
47	661.170M	45.6	+0.8 +0.0 +1.9	+0.0 -28.3 +0.0	+0.0 +20.3 +0.0	+0.0 +1.7 359	+0.0	42.0	82.2 High	-40.2	Vert 100
48	10.115M	31.7	+0.1 +0.2 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0 41	+0.0	41.9	82.2 High	-40.3	Perpe 99
49	9.897M	31.6	+0.1 +0.1 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0 360	+0.0	41.7	82.2 Low	-40.5	Perpe 99
50	1400.075M	52.4	+1.1 +2.1 +0.0	+0.0 +0.0 +0.0	-35.3 +0.0 +21.0	+0.3 +0.0 +0.0	+0.0	41.6	82.2 High	-40.6	Horiz 106
51	31.272k	31.6	+0.0 +0.0 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	41.5	82.2 Low	-40.7	Perpe 99
52	1094.332M	54.7	+0.9 +1.9 +0.0	+0.0 +0.0 +0.0	-36.3 +0.0 +19.8	+0.3 +0.0 +0.0	+0.0 360	41.3	82.2 Low	-40.9	Vert 99
53	1600.030M	49.9	+1.2 +2.3 +0.0	+0.0 +0.0 +0.0	-34.9 +0.0 +22.5	+0.3 +0.0 +0.0	+0.0	41.3	82.2 High	-40.9	Vert 99
54	31.270k	31.3	+0.0 +0.0 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0 360	+0.0	41.2	82.2 Low	-41.0	Paral 99
55	119.760M	55.9	+0.3 +0.0 +0.6	+0.0 -27.8 +0.0	+0.0 +11.4 +0.0	+0.0 +0.7 +0.0	+0.0	41.1	82.2 Low	-41.1	Horiz 101
56	350.040M	50.3	+0.6 +0.0 +1.2	+0.0 -27.4 +0.0	+0.0 +15.0 +0.0	+0.0 +1.2 +0.0	+0.0	40.9	82.2 Low	-41.3	Vert 122
57	12.542M	30.6	+0.1 +0.2 +0.0	+0.0 +0.0 +9.6	+0.0 +0.0 +0.0	+0.0 +0.0 +0.0	+0.0	40.5	82.2 Low	-41.7	Perpe 99
58	652.940M	44.2	+0.8 +0.0 +1.8	+0.0 -28.3 +0.0	+0.0 +20.3 +0.0	+0.0 +1.7 360	+0.0	40.5	82.2 Low	-41.7	Vert 101
59	1799.850M	46.3	+1.3 +2.4 +0.0	+0.0 +0.0 +0.0	-34.6 +0.0 +24.6	+0.3 +0.0 +0.0	+0.0 286	40.3	82.2 High	-41.9	Horiz 111
60	12.585M	30.3	+0.1 +0.2 +0.0	+0.0 +0.0 +9.6	+0.0 +0.0 +0.0	+0.0 +0.0 360	+0.0	40.2	82.2 High	-42.0	Perpe 99
61	1400.040M	50.8	+1.1 +2.1 +0.0	+0.0 +0.0 +0.0	-35.3 +0.0 +21.0	+0.3 +0.0 +0.0	+0.0 360	40.0	82.2 High	-42.2	Vert 99

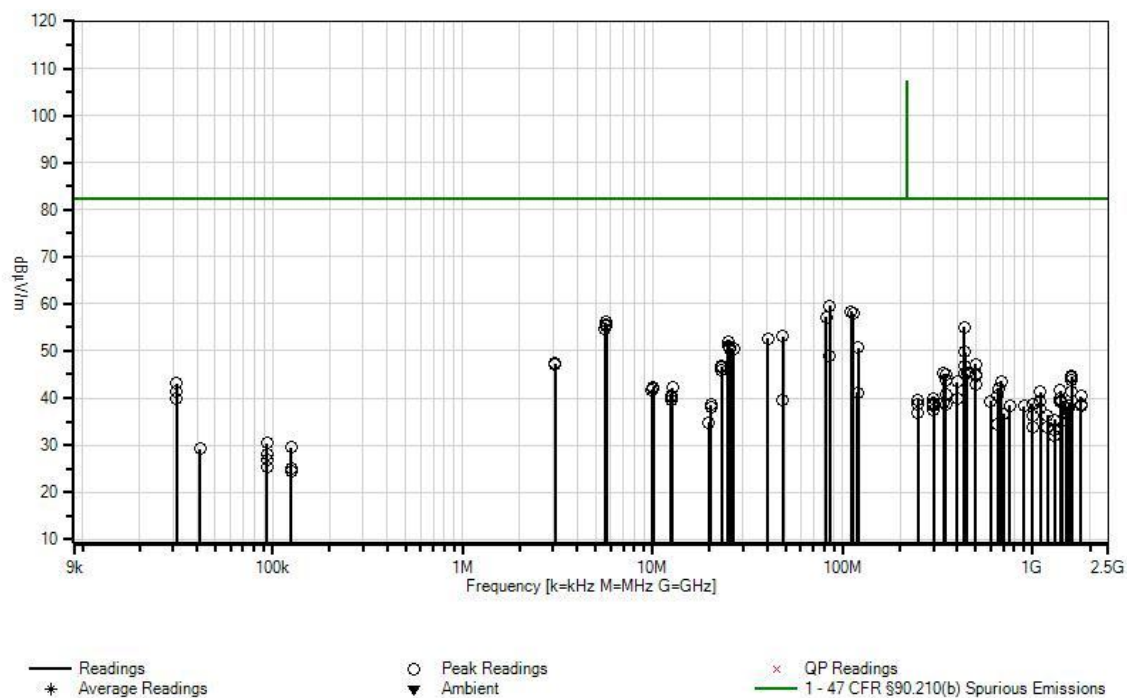
62	299.960M	50.8	+0.5 +0.0 +1.1	+0.0 -27.1 +0.0	+0.0 +13.5 +0.0	+0.0 +1.1 1	+0.0 1	39.9	82.2 High	-42.3	Horiz 100
63	31.272k	29.9	+0.0 +0.0 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0 360	+0.0 360	39.8	82.2 High	-42.4	Perpe 99
64	400.050M	48.0	+0.6 +0.0 +1.4	+0.0 -27.8 +0.0	+0.0 +16.3 +0.0	+0.0 +1.3 360	+0.0 360	39.8	82.2 Low	-42.4	Horiz 101
65	250.090M	51.7	+0.5 +0.0 +1.0	+0.0 -27.1 +0.0	+0.0 +12.5 +0.0	+0.0 +1.0 360	+0.0 360	39.6	82.2 High	-42.6	Vert 100
66	48.580M	57.2	+0.2 +0.0 +0.3	+0.0 -28.0 +0.0	+0.0 +9.4 +0.0	+0.0 +0.4 360	+0.0 360	39.5	82.2 High	-42.7	Horiz 99
67	12.502M	29.6	+0.1 +0.2 +0.0	+0.0 +0.0 +9.6	+0.0 +0.0 +0.0	+0.0 +0.0 360	+0.0 360	39.5	82.2 Low	-42.7	Paral 99
68	599.830M	43.6	+0.7 +0.0 +1.7	+0.0 -28.3 +0.0	+0.0 +20.0 +0.0	+0.0 +1.6 360	+0.0 360	39.3	82.2 High	-42.9	Vert 100
69	1424.915M	49.8	+1.1 +2.1 +0.0	+0.0 +0.0 +0.0	-35.2 +0.0 +21.1	+0.3 +0.0 35	+0.0 35	39.2	82.2 High	-43.0	Vert 99
70	1100.025M	52.5	+1.0 +1.9 +0.0	+0.0 +0.0 +0.0	-36.3 +0.0 +19.8	+0.3 +0.0 360	+0.0 360	39.2	82.2 High	-43.0	Horiz 99
71	1100.025M	52.5	+1.0 +1.9 +0.0	+0.0 +0.0 +0.0	-36.3 +0.0 +19.8	+0.3 +0.0 242	+0.0 242	39.2	82.2 High	-43.0	Vert 401
72	1399.975M	49.9	+1.1 +2.1 +0.0	+0.0 +0.0 +0.0	-35.3 +0.0 +21.0	+0.3 +0.0 360	+0.0 360	39.1	82.2 Low	-43.1	Vert 99
73	299.960M	49.9	+0.5 +0.0 +1.1	+0.0 -27.1 +0.0	+0.0 +13.5 +0.0	+0.0 +1.1 360	+0.0 360	39.0	82.2 High	-43.2	Vert 100
74	340.090M	48.6	+0.6 +0.0 +1.2	+0.0 -27.3 +0.0	+0.0 +14.7 +0.0	+0.0 +1.1 360	+0.0 360	38.9	82.2 High	-43.3	Vert 100
75	349.980M	48.1	+0.6 +0.0 +1.2	+0.0 -27.4 +0.0	+0.0 +15.0 +0.0	+0.0 +1.2 360	+0.0 360	38.7	82.2 High	-43.5	Vert 100
76	1000.000M	53.3	+0.9 +1.8 +0.0	+0.0 +0.0 +0.0	-36.8 +0.0 +19.3	+0.2 +0.0 70	+0.0 70	38.7	82.2 High	-43.5	Vert 119
77	1800.220M	44.7	+1.3 +2.4 +0.0	+0.0 +0.0 +0.0	-34.6 +0.0 +24.6	+0.3 +0.0 360	+0.0 360	38.7	82.2 Low	-43.5	Vert 101
78	299.960M	49.4	+0.5 +0.0 +1.1	+0.0 -27.1 +0.0	+0.0 +13.5 +0.0	+0.0 +1.1 360	+0.0 360	38.5	82.2 High	-43.7	Vert 100

79	249.960M	50.6	+0.5 +0.0 +1.0	+0.0 -27.1 +0.0	+0.0 +12.5 +0.0	+0.0 +1.0	+0.0	38.5	82.2 Low	-43.7	Vert 101
80	20.260M	30.5	+0.1 +0.2 +0.0	+0.0 +0.0 +7.7	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 360	38.5	82.2 Low	-43.7	Perpe 99
81	300.110M	49.3	+0.5 +0.0 +1.1	+0.0 -27.1 +0.0	+0.0 +13.5 +0.0	+0.0 +1.1	+0.0 360	38.4	82.2 High	-43.8	Horiz 100
82	756.080M	40.1	+0.8 +0.0 +2.0	+0.0 -28.0 +0.0	+0.0 +21.6 +0.0	+0.0 +1.9	+0.0	38.4	82.2 Low	-43.8	Vert 99
83	1550.030M	47.6	+1.2 +2.2 +0.0	+0.0 +0.0 +0.0	-35.0 +0.0 +22.0	+0.3 +0.0	+0.0 227	38.3	82.2 High	-43.9	Vert 99
84	1799.920M	44.2	+1.3 +2.4 +0.0	+0.0 +0.0 +0.0	-34.6 +0.0 +24.6	+0.3 +0.0	+0.0	38.2	82.2 High	-44.0	Vert 103
85	899.800M	37.4	+0.9 +0.0 +2.3	+0.0 -27.4 +0.0	+0.0 +23.0 +0.0	+0.0 +2.0	+0.0	38.2	82.2 Low	-44.0	Horiz 108
86	1500.022M	48.3	+1.1 +2.2 +0.0	+0.0 +0.0 +0.0	-35.1 +0.0 +21.4	+0.3 +0.0	+0.0 360	38.2	82.2 Low	-44.0	Vert 101
87	1500.085M	48.2	+1.1 +2.2 +0.0	+0.0 +0.0 +0.0	-35.1 +0.0 +21.4	+0.3 +0.0	+0.0 360	38.1	82.2 High	-44.1	Vert 106
88	20.259M	30.1	+0.1 +0.2 +0.0	+0.0 +0.0 +7.7	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	38.1	82.2 Low	-44.1	Paral 99
89	1550.030M	47.1	+1.2 +2.2 +0.0	+0.0 +0.0 +0.0	-35.0 +0.0 +22.0	+0.3 +0.0	+0.0	37.8	82.2 High	-44.4	Horiz 111
90	1500.035M	47.9	+1.1 +2.2 +0.0	+0.0 +0.0 +0.0	-35.1 +0.0 +21.4	+0.3 +0.0	+0.0	37.8	82.2 High	-44.4	Horiz 100
91	1094.332M	51.1	+0.9 +1.9 +0.0	+0.0 +0.0 +0.0	-36.3 +0.0 +19.8	+0.3 +0.0	+0.0	37.7	82.2 Low	-44.5	Horiz 99
92	300.000M	48.5	+0.5 +0.0 +1.1	+0.0 -27.1 +0.0	+0.0 +13.5 +0.0	+0.0 +1.1	+0.0 360	37.6	82.2 Low	-44.6	Vert 101
93	1500.022M	47.0	+1.1 +2.2 +0.0	+0.0 +0.0 +0.0	-35.1 +0.0 +21.4	+0.3 +0.0	+0.0 93	36.9	82.2 Low	-45.3	Horiz 101
94	250.090M	48.9	+0.5 +0.0 +1.0	+0.0 -27.1 +0.0	+0.0 +12.5 +0.0	+0.0 +1.0	+0.0	36.8	82.2 High	-45.4	Horiz 100
95	700.070M	39.9	+0.8 +0.0 +1.9	+0.0 -28.2 +0.0	+0.0 +20.5 +0.0	+0.0 +1.7	+0.0 302	36.6	82.2 High	-45.6	Horiz 112

96	1525.215M	46.0	+1.2 +2.2 +0.0	+0.0 +0.0 +0.0	-35.0 +0.0 +21.7	+0.3 +0.0	+0.0	36.4	82.2 High	-45.8	Horiz 102
97	1200.025M	48.7	+1.0 +2.0 +0.0	+0.0 +0.0 +0.0	-35.9 +0.0 +20.2	+0.3 +0.0	+0.0 177	36.3	82.2 High	-45.9	Vert 116
98	1000.000M	50.8	+0.9 +1.8 +0.0	+0.0 +0.0 +0.0	-36.8 +0.0 +19.3	+0.2 +0.0	+0.0 189	36.2	82.2 High	-46.0	Horiz 112
99	1299.910M	46.8	+1.0 +2.1 +0.0	+0.0 +0.0 +0.0	-35.5 +0.0 +20.7	+0.3 +0.0	+0.0	35.4	82.2 High	-46.8	Vert 99
100	1524.945M	44.5	+1.2 +2.2 +0.0	+0.0 +0.0 +0.0	-35.0 +0.0 +21.7	+0.3 +0.0	+0.0 360	34.9	82.2 High	-47.3	Vert 102
101	19.710M	26.6	+0.1 +0.2 +0.0	+0.0 +0.0 +7.9	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	34.8	82.2 High	-47.4	Paral 99
102	652.740M	38.0	+0.8 +0.0 +1.8	+0.0 -28.3 +0.0	+0.0 +20.3 +0.0	+0.0 +1.7	+0.0 1	34.3	82.2 Low	-47.9	Horiz 99
103	1200.025M	46.2	+1.0 +2.0 +0.0	+0.0 +0.0 +0.0	-35.9 +0.0 +20.2	+0.3 +0.0	+0.0 67	33.8	82.2 High	-48.4	Horiz 98
104	1000.005M	48.3	+0.9 +1.8 +0.0	+0.0 +0.0 +0.0	-36.8 +0.0 +19.3	+0.2 +0.0	+0.0 154	33.7	82.2 Low	-48.5	Horiz 112
105	1300.120M	44.7	+1.0 +2.1 +0.0	+0.0 +0.0 +0.0	-35.5 +0.0 +20.7	+0.3 +0.0	+0.0 14	33.3	82.2 Low	-48.9	Vert 101
106	1300.340M	43.5	+1.0 +2.1 +0.0	+0.0 +0.0 +0.0	-35.5 +0.0 +20.7	+0.3 +0.0	+0.0 360	32.1	82.2 Low	-50.1	Horiz 99
107	1299.800M	43.5	+1.0 +2.1 +0.0	+0.0 +0.0 +0.0	-35.5 +0.0 +20.7	+0.3 +0.0	+0.0 357	32.1	82.2 High	-50.1	Horiz 111
108	93.760k	20.8	+0.0 +0.0 +0.0	+0.0 +0.0 +9.6	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 360	30.4	82.2 High	-51.8	Paral 99
109	125.070k	20.0	+0.0 +0.0 +0.0	+0.0 +0.0 +9.5	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 360	29.5	82.2 High	-52.7	Paral 99
110	41.610k	19.2	+0.0 +0.0 +0.0	+0.0 +0.0 +9.9	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 360	29.1	82.2 High	-53.1	Paral 99
111	93.762k	18.4	+0.0 +0.0 +0.0	+0.0 +0.0 +9.6	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0	28.0	82.2 Low	-54.2	Perpe 99
112	93.762k	17.1	+0.0 +0.0 +0.0	+0.0 +0.0 +9.6	+0.0 +0.0 +0.0	+0.0 +0.0	+0.0 357	26.7	82.2 High	-55.5	Perpe 99

113	93.620k	15.8	+0.0	+0.0	+0.0	+0.0	+0.0	25.4	82.2	-56.8	Paral
			+0.0	+0.0	+0.0	+0.0	360		Low		99
			+0.0	+9.6	+0.0						
114	125.070k	15.6	+0.0	+0.0	+0.0	+0.0	+0.0	25.1	82.2	-57.1	Paral
			+0.0	+0.0	+0.0	+0.0	360		Low		99
			+0.0	+9.5	+0.0						
115	125.072k	15.1	+0.0	+0.0	+0.0	+0.0	+0.0	24.6	82.2	-57.6	Perpe
			+0.0	+0.0	+0.0	+0.0			Low		99
			+0.0	+9.5	+0.0						
116	125.072k	14.9	+0.0	+0.0	+0.0	+0.0	+0.0	24.4	82.2	-57.8	Perpe
			+0.0	+0.0	+0.0	+0.0	286		High		99
			+0.0	+9.5	+0.0						

CKC Laboratories, Inc. Date: 3/11/2013 Time: 14:21:35 Meteorcomm LLC. WO#: 94195
Test Distance: 3 Meters Sequence#: 7 None
Meteorcomm LLC. Locomotive P/N: 63020



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 dB μ V/m, the spectrum analyzer reading in dB μ V 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	9 kHz	150 kHz	200 Hz
RADIATED 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.