

# 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

**REPORT PREPARED BY:**

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

Project Number: 94195

**DATE OF EQUIPMENT RECEIPT:**  
**DATE(S) OF TESTING:**

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.



*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	Heliax	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

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

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

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

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

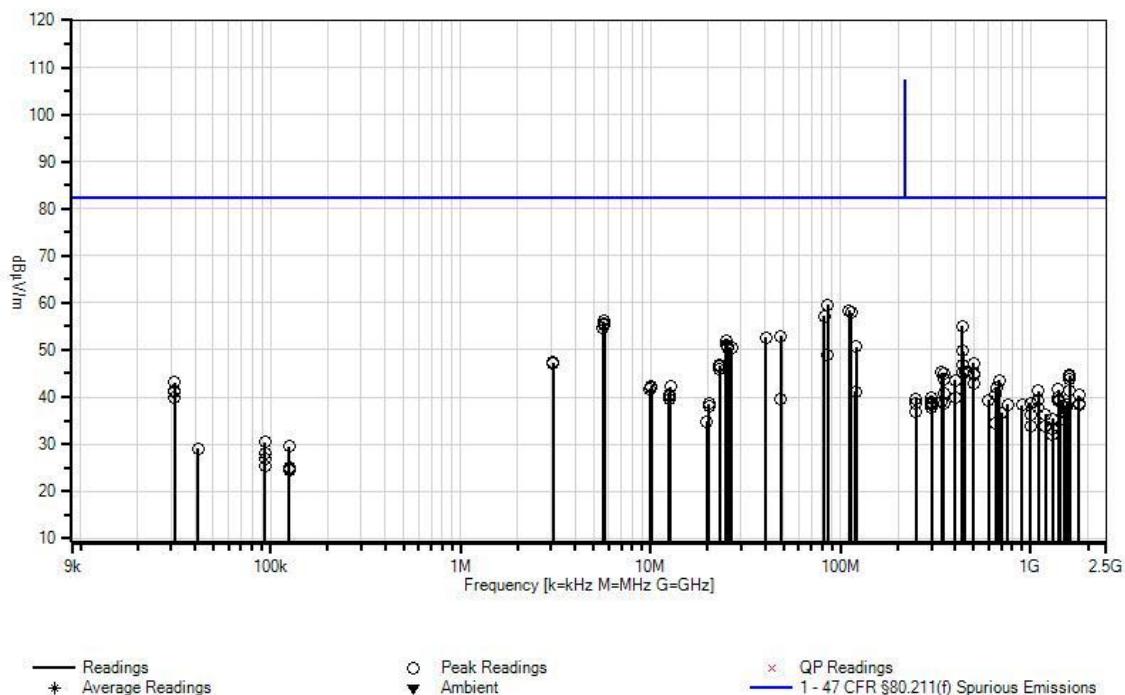
60	12.585M	30.3	+0.1	+0.0	+0.0	+0.0	+0.0	40.2	82.2	-42.0	Perpe
			+0.2	+0.0	+0.0	+0.0	360		High		99
			+0.0	+9.6	+0.0						
61	1400.040M	50.8	+1.1	+0.0	-35.3	+0.3	+0.0	40.0	82.2	-42.2	Vert
			+2.1	+0.0	+0.0	+0.0	360		High		99
			+0.0	+0.0	+21.0						
62	299.960M	50.8	+0.5	+0.0	+0.0	+0.0	+0.0	39.9	82.2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

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

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

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	+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	Heliax	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	3115	10/19/2011	10/19/2013
			C63.5 Calibration		

#### **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

#	Freq	Rdng	Reading listed by margin.				Test Distance: 3 Meters			
			T1	T2	T3	T4	Dist	Corr	Spec	Margin
			T5	T6	T7	T8				
			MHz	dB $\mu$ V	dB	dB	dB	Table	dB $\mu$ V/m	dB $\mu$ V/m
1	85.710M	77.7	+0.3	+0.0	+0.0	+0.0	+0.0	59.6	82.2	-22.6
			+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
			+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
			+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
			+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
			+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
			+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
			+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
			+0.0	-28.0	+17.0	+1.4	103		Low	117
			+1.4	+0.0	+0.0					
9	5.600M	44.8	+0.1	+0.0	+0.0	+0.0	+0.0	54.7	82.2	-27.5
			+0.1	+0.0	+0.0	+0.0			High	99
			+0.0	+9.7	+0.0					
10	48.500M	70.6	+0.2	+0.0	+0.0	+0.0	+0.0	53.0	82.2	-29.2
			+0.0	-28.0	+9.5	+0.4			Low	101
			+0.3	+0.0	+0.0					

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

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

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

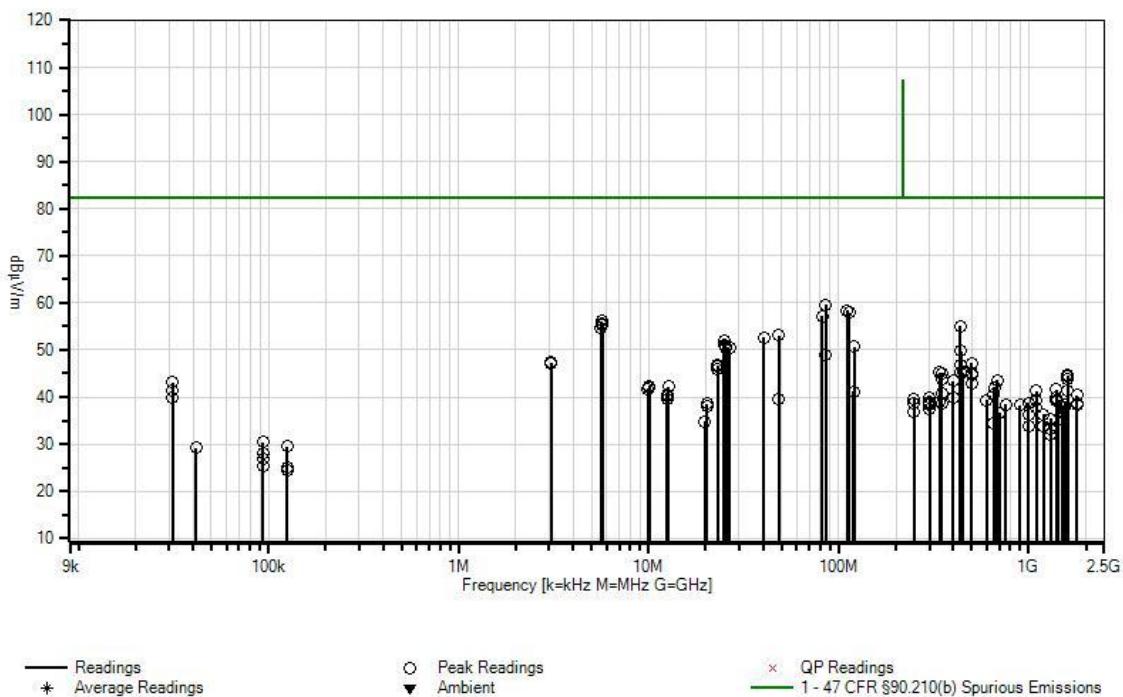
62	299.960M	50.8	+0.5	+0.0	+0.0	+0.0	+0.0	39.9	82.2	-42.3	Horiz
			+0.0	-27.1	+13.5	+1.1	1		High		100
			+1.1	+0.0	+0.0						
63	31.272k	29.9	+0.0	+0.0	+0.0	+0.0	+0.0	39.8	82.2	-42.4	Perpe
			+0.0	+0.0	+0.0	+0.0	360		High		99
			+0.0	+9.9	+0.0						
64	400.050M	48.0	+0.6	+0.0	+0.0	+0.0	+0.0	39.8	82.2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

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

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



## 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  $\text{dB}\mu\text{V}/\text{m}$ , the spectrum analyzer reading in  $\text{dB}\mu\text{V}$  was corrected by using the following formula. This reading was then compared to the applicable specification limit.

<b>SAMPLE CALCULATIONS</b>	
Meter reading	(dB $\mu$ V)
+ Antenna Factor	(dB)
+ Cable Loss	(dB)
- Distance Correction	(dB)
- Preamplifier Gain	(dB)
= Corrected Reading	(dB $\mu$ V/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.

<b>MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE</b>			
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.