Smartrise Engineering, Inc.

ADDENDUM TO TEST REPORT 94840-4

RF Reader
Model: RFID-1

Tested To The Following Standards:

FCC Part 15 Subpart C Section 15.207, 15.209
and
RSS-210 Issue 8

Report No.: 94840-4A

Date of issue: April 3, 2014

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.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Smartrise Engineering, Inc.
8360 Rovana, Suite 3
Sacramento, CA 95828

REPRESENTATIVE: Gilbert Zogbi
Customer Reference Number: 4587

REPORT PREPARED BY:

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

Project Number: 94840

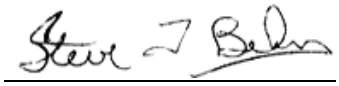
DATE OF EQUIPMENT RECEIPT: September 17, 2013
DATE(S) OF TESTING: September 17, 2013
April 2, 2014

Revision History

Original: Testing of the RF Reader, RFID-1 to FCC Subpart C Section 15.209 and RSS 210 Issue 8.
Addendum A: To add testing of the RF Reader, RFID-1 to FCC Subpart C Section 15.207.

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.
5046 Sierra Pines Drive
Mariposa, CA 95338

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
Mariposa A	US0103	SL2-IN-E-1147R	3082A-2	90477	A-0136

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C and RSS-210 Issue 8

Description	Test Procedure/Method	Results
AC Mains Conducted Emissions	FCC Part 15 Subpart C Section 15.207/ ANSI C63.4 (2003)	Pass
Fundamental	FCC Part 15 Subpart C Section 15.209/ ANSI C63.4 (2003)	Pass
Radiated Spurious Emissions	FCC Part 15 Subpart C Section 15.209/ ANSI C63.4 (2003)	Pass
RSS-210	FCC Part 15 Subpart C Section	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

RF Reader
Manuf: Smartrise Engineering, Inc.
Model: RFID-1
Serial: 219306-INTJ

PERIPHERAL DEVICES

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

Connector Breakout PCB
Manuf: Smartrise Engineering, Inc.
Model: 66 94V0
Serial: 1320

FCC PART 15 SUBPART C

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) 47 CFR 15C requirements for Unlicensed Radio Frequency Devices, Subpart C - Intentional Radiators.

15.207 AC Mains Conducted Emissions

Test Data Sheets

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240

Customer:	**Smartrise Engineering, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**94840**	Date:	4/2/2014
Test Type:	**Conducted Emissions**	Time:	14:21:43
Equipment:	**RF Reader**	Sequence#:	1
Manufacturer:	Smartrise Engineering, Inc.	Tested By:	Eddie Mariscal
Model:	RFID-1		24VDC
S/N:	219306-INTJ		

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP02229	Attenuator	PE7010-10	2/13/2013	2/13/2015
T2	ANP05624	Attenuator	PE7010-10	8/13/2012	8/13/2014
T3	ANMACOND	Cable		8/17/2012	8/17/2014
T4	AN02609	High Pass Filter	HE9615-150K-50-720B	3/25/2014	3/25/2016
T5	AN00374	50uH LISN-Black Lead Amplitude (dB)	8028-TS-50-BNC	3/15/2013	3/15/2015
	AN00374	50uH LISN-White Lead Amplitude (dB)	8028-TS-50-BNC	3/15/2013	3/15/2015

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

Function	Manufacturer	Model #	S/N
RF Reader*	Smartrise Engineering, Inc.	RFID-1	219306-INTJ

Support Devices:

Function	Manufacturer	Model #	S/N
Connector Breakout PCB	Smartrise Engineering, Inc.	66 94V0	1320

Test Conditions / Notes:

EUT is placed atop a wooden, non-conductive turntable of height 80cm. 24VDC is supplied to the Phoenix connector of the breakout PCB from variable DC power supply. Voltage is applied to the EUT from breakout PCB via unshielded RJ45 cable of length 1-foot. Conducted measurements were taken at the mains terminal of the variable DC power supply. EUT is equipped with integral antenna. Transmit signal has duty cycle of 100%.

Highest Clock: 125kHz

Frequency Range of Interest:
0.15-30MHz
RBW = 9kHz; VBW = 30kHz

Environmental Conditions:
Temperature: 22°C
Relative Humidity: 42%
Atmospheric Pressure: 97.7kPa

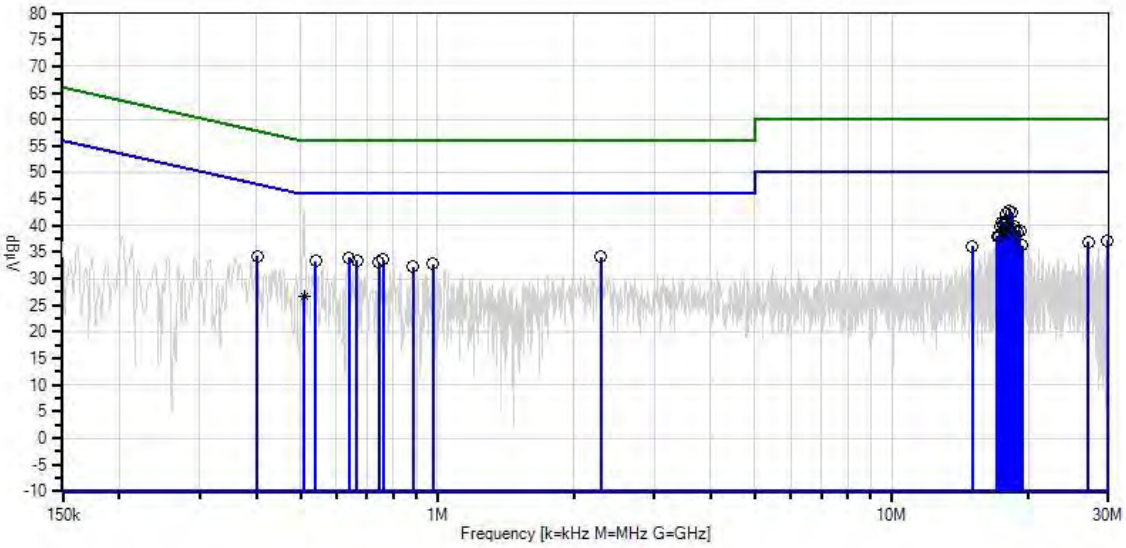
Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Lead: Black

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	18.152M	21.1	+9.9 +0.4	+10.0	+1.2	+0.2	+0.0	42.8	50.0	-7.2	Black
2	18.404M	20.7	+9.9 +0.4	+10.0	+1.2	+0.2	+0.0	42.4	50.0	-7.6	Black
3	17.908M	20.4	+9.9 +0.4	+10.0	+1.2	+0.2	+0.0	42.1	50.0	-7.9	Black
4	17.413M	19.1	+9.9 +0.4	+10.0	+1.2	+0.1	+0.0	40.7	50.0	-9.3	Black
5	17.782M	19.0	+9.9 +0.4	+10.0	+1.2	+0.1	+0.0	40.6	50.0	-9.4	Black
6	17.656M	18.6	+9.9 +0.4	+10.0	+1.2	+0.1	+0.0	40.2	50.0	-9.8	Black
7	18.647M	18.1	+9.9 +0.5	+10.0	+1.2	+0.2	+0.0	39.9	50.0	-10.1	Black
8	17.287M	18.2	+9.9 +0.4	+10.0	+1.2	+0.1	+0.0	39.8	50.0	-10.2	Black
9	18.035M	17.8	+9.9 +0.4	+10.0	+1.2	+0.2	+0.0	39.5	50.0	-10.5	Black
10	18.521M	17.7	+9.9 +0.4	+10.0	+1.2	+0.2	+0.0	39.4	50.0	-10.6	Black
11	19.143M	17.3	+9.9 +0.5	+10.0	+1.2	+0.2	+0.0	39.1	50.0	-10.9	Black
12	17.539M	17.4	+9.9 +0.4	+10.0	+1.2	+0.1	+0.0	39.0	50.0	-11.0	Black
13	18.890M	17.0	+9.9 +0.5	+10.0	+1.2	+0.2	+0.0	38.8	50.0	-11.2	Black
14	18.278M	17.0	+9.9 +0.4	+10.0	+1.2	+0.2	+0.0	38.7	50.0	-11.3	Black
15	2.290M	13.4	+9.9 +0.3	+9.9	+0.5	+0.1	+0.0	34.1	46.0	-11.9	Black

16	640.332k	13.5	+9.7 +0.4	+10.0	+0.2	+0.2	+0.0	34.0	46.0	-12.0	Black
17	17.044M	16.4	+9.9 +0.4	+10.0	+1.2	+0.1	+0.0	38.0	50.0	-12.0	Black
18	17.170M	16.3	+9.9 +0.4	+10.0	+1.2	+0.1	+0.0	37.9	50.0	-12.1	Black
19	761.049k	13.1	+9.7 +0.3	+10.0	+0.3	+0.2	+0.0	33.6	46.0	-12.4	Black
20	666.512k	13.0	+9.7 +0.4	+10.0	+0.2	+0.2	+0.0	33.5	46.0	-12.5	Black
21	539.978k	12.8	+9.7 +0.4	+10.0	+0.2	+0.2	+0.0	33.3	46.0	-12.7	Black
22	29.879M	14.9	+9.8 +0.7	+10.0	+1.6	+0.2	+0.0	37.2	50.0	-12.8	Black
23	745.050k	12.5	+9.7 +0.3	+10.0	+0.3	+0.2	+0.0	33.0	46.0	-13.0	Black
24	27.026M	14.8	+9.8 +0.6	+10.0	+1.5	+0.2	+0.0	36.9	50.0	-13.1	Black
25	979.210k	12.3	+9.7 +0.3	+10.0	+0.3	+0.2	+0.0	32.8	46.0	-13.2	Black
26	401.809k	13.6	+9.7 +0.5	+10.0	+0.2	+0.2	+0.0	34.2	47.8	-13.6	Black
27	19.386M	14.4	+9.9 +0.5	+10.0	+1.3	+0.2	+0.0	36.3	50.0	-13.7	Black
28	886.128k	11.7	+9.7 +0.3	+10.0	+0.3	+0.2	+0.0	32.2	46.0	-13.8	Black
29	15.062M	14.7	+9.9 +0.4	+10.0	+1.1	+0.1	+0.0	36.2	50.0	-13.8	Black
30 Ave	509.435k	6.2	+9.7 +0.4	+10.0	+0.2	+0.2	+0.0	26.7	46.0	-19.3	Black
^	509.435k	22.2	+9.7 +0.4	+10.0	+0.2	+0.2	+0.0	42.7	46.0	-3.3	Black

CKC Laboratories, Inc. Date: 4/2/2014 Time: 14:21:43 Smartrise Engineering, Inc. WO#: 94840
15.207 AC Mains - Average Test Lead: Black 24VDC Sequence#: 1 Ext ATTN: 0 dB



Sweep Data
Peak Readings
Average Readings
1 - 15.207 AC Mains - Average
Readings
QP Readings
Ambient
2 - 15.207 AC Mains - Quasi-peak

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240

Customer: **Smartrise Engineering, Inc.**
Specification: **15.207 AC Mains - Average**
Work Order #: **94840** Date: 4/2/2014
Test Type: **Conducted Emissions** Time: 2:42:28 PM
Equipment: **RF Reader** Sequence#: 2
Manufacturer: Smartrise Engineering, Inc. Tested By: Eddie Mariscal
Model: RFID-1 24VDC
S/N: 219306-INTJ

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP02229	Attenuator	PE7010-10	2/13/2013	2/13/2015
T2	ANP05624	Attenuator	PE7010-10	8/13/2012	8/13/2014
T3	ANMACOND	Cable		8/17/2012	8/17/2014
T4	AN02609	High Pass Filter	HE9615-150K-50-720B	3/25/2014	3/25/2016
	AN00374	50uH LISN-Black Lead Amplitude (dB)	8028-TS-50-BNC	3/15/2013	3/15/2015
T5	AN00374	50uH LISN-White Lead Amplitude (dB)	8028-TS-50-BNC	3/15/2013	3/15/2015

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

Function	Manufacturer	Model #	S/N
RF Reader*	Smartrise Engineering, Inc.	RFID-1	219306-INTJ

Support Devices:

Function	Manufacturer	Model #	S/N
Connector Breakout PCB	Smartrise Engineering, Inc.	66 94V0	1320

Test Conditions / Notes:

EUT is placed atop a wooden, non-conductive turntable of height 80cm. 24VDC is supplied to the Phoenix connector of the breakout PCB from variable DC power supply. Voltage is applied to the EUT from breakout PCB via unshielded RJ45 cable of length 1-foot. Conducted measurements were taken at the mains terminal of the variable DC power supply. EUT is equipped with integral antenna. Transmit signal has duty cycle of 100%.

Highest Clock: 125kHz

Frequency Range of Interest:
0.15-30MHz
RBW = 9kHz; VBW = 30kHz

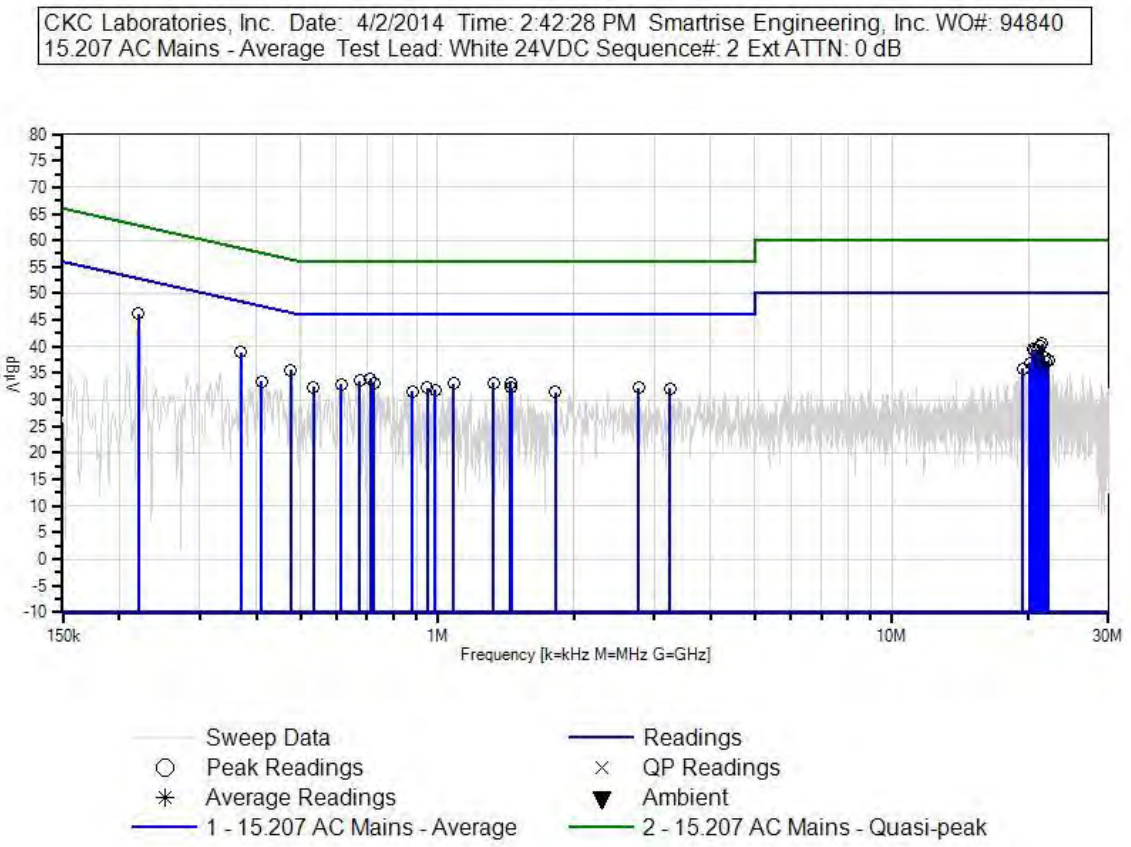
Environmental Conditions:
Temperature: 22°C
Relative Humidity: 42%
Atmospheric Pressure: 97.7kPa

Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Lead: White

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	220.350k	25.1	+9.7 +1.0	+10.0	+0.2	+0.2	+0.0	46.2	52.8	-6.6	White
2	21.413M	18.6	+9.9 +0.5	+10.0	+1.3	+0.2	+0.0	40.5	50.0	-9.5	White
3	369.812k	18.3	+9.7 +0.6	+10.0	+0.2	+0.1	+0.0	38.9	48.5	-9.6	White
4	21.161M	18.3	+9.9 +0.5	+10.0	+1.3	+0.2	+0.0	40.2	50.0	-9.8	White
5	20.422M	17.6	+9.9 +0.5	+10.0	+1.3	+0.2	+0.0	39.5	50.0	-10.5	White
6	20.674M	17.5	+9.9 +0.5	+10.0	+1.3	+0.2	+0.0	39.4	50.0	-10.6	White
7	20.918M	17.4	+9.9 +0.5	+10.0	+1.3	+0.2	+0.0	39.3	50.0	-10.7	White
8	475.984k	15.0	+9.7 +0.5	+10.0	+0.2	+0.2	+0.0	35.6	46.4	-10.8	White
9	713.053k	13.4	+9.7 +0.4	+10.0	+0.3	+0.2	+0.0	34.0	46.0	-12.0	White
10	21.656M	16.0	+9.9 +0.5	+10.0	+1.3	+0.2	+0.0	37.9	50.0	-12.1	White
11	675.238k	13.1	+9.7 +0.4	+10.0	+0.2	+0.2	+0.0	33.6	46.0	-12.4	White
12	22.161M	15.4	+9.9 +0.5	+10.0	+1.3	+0.2	+0.0	37.3	50.0	-12.7	White
13	1.331M	12.5	+9.8 +0.3	+10.0	+0.4	+0.2	+0.0	33.2	46.0	-12.8	White
14	1.450M	12.5	+9.8 +0.3	+10.0	+0.4	+0.2	+0.0	33.2	46.0	-12.8	White
15	21.908M	15.3	+9.9 +0.5	+10.0	+1.3	+0.2	+0.0	37.2	50.0	-12.8	White
16	724.688k	12.5	+9.7 +0.4	+10.0	+0.3	+0.2	+0.0	33.1	46.0	-12.9	White
17	1.087M	12.4	+9.8 +0.3	+10.0	+0.3	+0.2	+0.0	33.0	46.0	-13.0	White
18	20.170M	15.1	+9.9 +0.5	+10.0	+1.3	+0.2	+0.0	37.0	50.0	-13.0	White
19	614.153k	12.4	+9.7 +0.4	+10.0	+0.2	+0.2	+0.0	32.9	46.0	-13.1	White
20	534.160k	11.9	+9.7 +0.4	+10.0	+0.2	+0.2	+0.0	32.4	46.0	-13.6	White
21	21.467M	14.5	+9.9 +0.5	+10.0	+1.3	+0.2	+0.0	36.4	50.0	-13.6	White
22	951.577k	11.8	+9.7 +0.3	+10.0	+0.3	+0.2	+0.0	32.3	46.0	-13.7	White
23	1.458M	11.5	+9.8 +0.3	+10.0	+0.4	+0.2	+0.0	32.2	46.0	-13.8	White

24	2.775M	11.4	+9.9 +0.3	+10.0	+0.5	+0.1	+0.0	32.2	46.0	-13.8	White
25	3.251M	11.4	+9.9 +0.3	+9.9	+0.5	+0.1	+0.0	32.1	46.0	-13.9	White
26	410.535k	12.9	+9.7 +0.5	+10.0	+0.2	+0.2	+0.0	33.5	47.6	-14.1	White
27	989.391k	11.4	+9.7 +0.3	+10.0	+0.3	+0.2	+0.0	31.9	46.0	-14.1	White
28	19.431M	14.0	+9.9 +0.5	+10.0	+1.3	+0.2	+0.0	35.9	50.0	-14.1	White
29	883.219k	11.0	+9.7 +0.4	+10.0	+0.3	+0.2	+0.0	31.6	46.0	-14.4	White
30	1.822M	10.9	+9.8 +0.3	+9.9	+0.4	+0.2	+0.0	31.5	46.0	-14.5	White



Test Setup Photos

15.209 Fundamental

Test Data Sheets

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Drive • Mariposa, CA 95338 • (209) 966-5240

Customer: **Smartrise Engineering, Inc.**
Specification: **15.209 Radiated Emissions**
Work Order #: **94840** Date: 9/17/2013
Test Type: **Maximized Emissions** Time: 16:07:53
Equipment: **RF Reader** Sequence#: 1
Manufacturer: Smartrise Engineering, Inc. Tested By: Eddie Mariscal
Model: RFID-1
S/N: 219306-INTJ

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00226	Loop Antenna	6502	3/28/2012	3/28/2014
T2	AN02660	Spectrum Analyzer	E4446A	8/23/2012	8/23/2014
T3	ANP06230	Cable	CXTA04A-50	8/16/2012	8/16/2014

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

Function	Manufacturer	Model #	S/N
RF Reader*	Smartrise Engineering, Inc.	RFID-1	219306-INTJ

Support Devices:

Function	Manufacturer	Model #	S/N
Connector Breakout PCB	Smartrise Engineering, Inc.	66 94V0	1320

Test Conditions / Notes:

EUT is placed atop a wooden, non-conductive turntable of height 80cm. 24VDC is supplied to the Phoenix connector of the breakout PCB from variable DC power supply. Voltage is applied to the EUT from breakout PCB via RJ45 cable. EUT is equipped with integral antenna. Transmit signal has duty cycle of 100%.

Transmit frequency was measured in accordance with 15.31(e). No change in output was detected when voltage was varied to 85% and 115% of the nominal voltage (24VDC).

Highest Clock: 125kHz

Frequency Range of Interest: Carrier

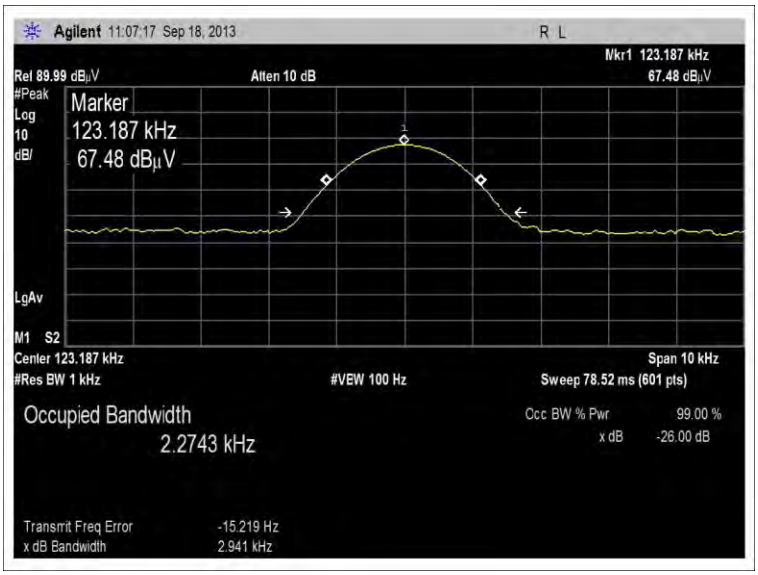
0.150-30MHz: RBW = 9kHz; VBW = 30kHz

Environmental Conditions:
Temperature: 22°C
Relative Humidity: 42%
Atmospheric Pressure: 97.7kPa

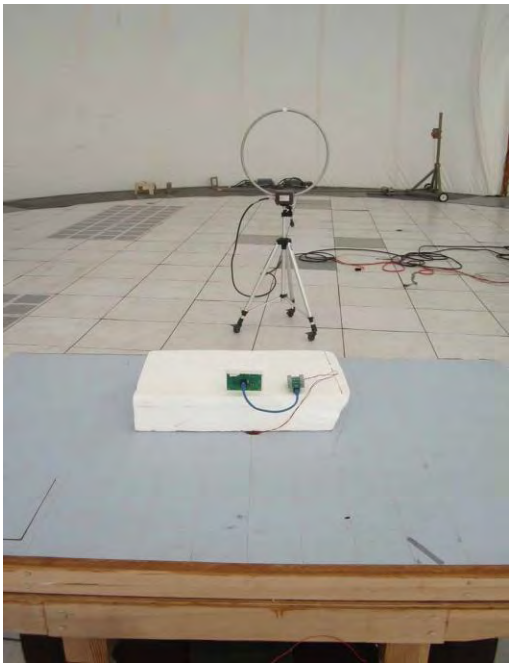
Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	124.280k	67.5	+10.4	+0.0	+0.0		-80.0	-2.1	25.7	-27.8	Vert
2	124.280k	59.9	+10.4	+0.0	+0.0		-80.0	-9.7	25.7	-35.4	Horiz



Test Setup Photos



15.209 Radiated Spurious Emissions

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240

Customer: **Smartrise Engineering, Inc.**
Specification: **15.209 Radiated Emissions**
Work Order #: **94840** Date: 9/17/2013
Test Type: **Maximized Emissions** Time: 15:45:38
Equipment: **RF Reader** Sequence#: 1
Manufacturer: Smartrise Engineering, Inc. Tested By: Eddie Mariscal
Model: RFID-1
S/N: 219306-INTJ

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00226	Loop Antenna	6502	3/28/2012	3/28/2014
T2	AN01991	Biconilog Antenna	CBL6111C	3/14/2012	3/14/2014
T3	ANP06230	Cable	CXTA04A-50	8/16/2012	8/16/2014
T4	AN00062	Preamp	8447D	6/6/2012	6/6/2014
T5	AN03360	Cable	32022-2-29094-36TC	2/4/2013	2/4/2015
	AN02660	Spectrum Analyzer	E4446A	8/23/2012	8/23/2014

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

Function	Manufacturer	Model #	S/N
RF Reader*	Smartrise Engineering, Inc.	RFID-1	219306-INTJ

Support Devices:

Function	Manufacturer	Model #	S/N
Connector Breakout PCB	Smartrise Engineering, Inc.	66 94V0	1320

Test Conditions / Notes:

EUT is placed atop a wooden, non-conductive turntable of height 80cm. 24VDC is supplied to the Phoenix connector of the breakout PCB from variable DC power supply. Voltage is applied to the EUT from breakout PCB via unshielded RJ45 cable of length 1-foot. EUT is equipped with integral antenna. Transmit signal has duty cycle of 100%.

Transmit frequency was measured in accordance with 15.31(e). No change in output was detected when voltage was varied to 85% and 115% of the nominal voltage (24VDC).

Highest Clock: 125kHz

Frequency Range of Interest:
9kHz-1000MHz

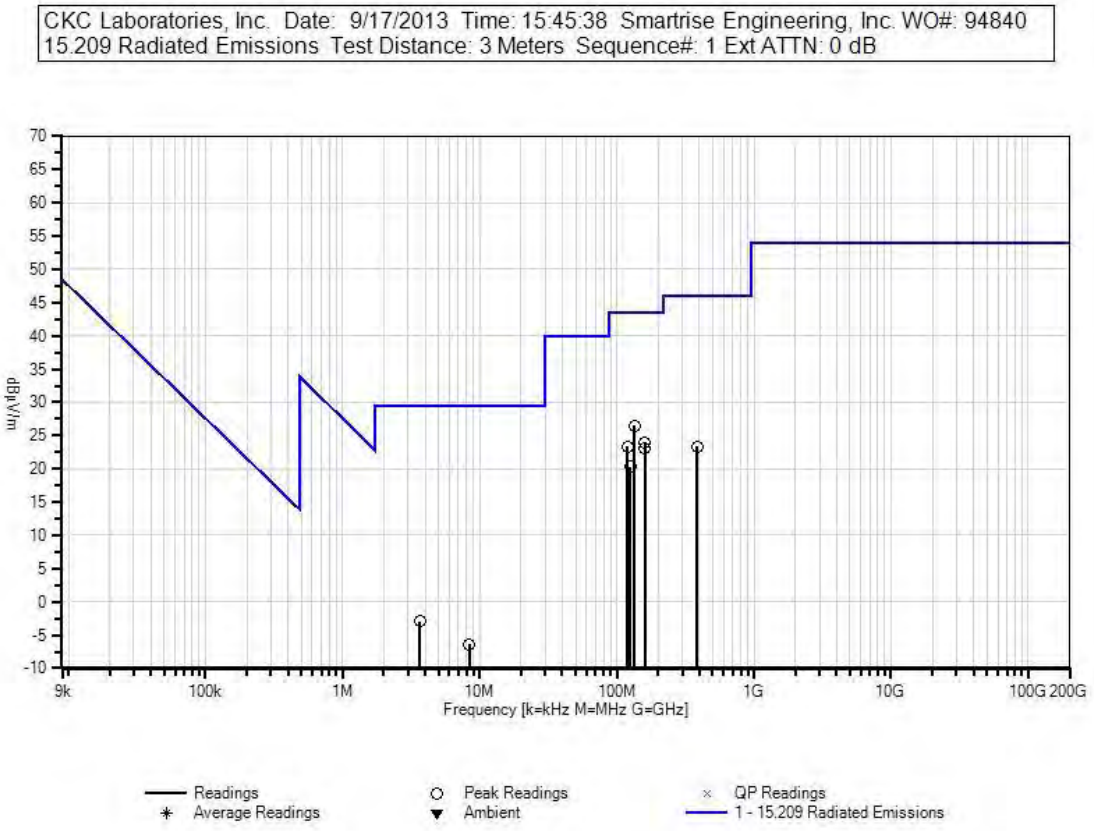
0.009-0.150MHz: RBW = 200Hz; VBW = 600Hz
0.150-30MHz: RBW = 9kHz; VBW = 30kHz
30-1000MHz: RBW = 120kHz; VBW = 300kHz

Environmental Conditions:
Temperature: 22°C, Relative Humidity: 42%, Atmospheric Pressure: 97.7kPa

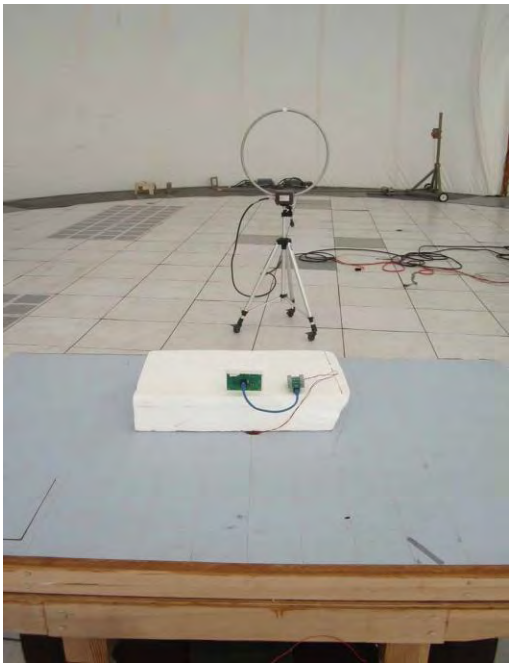
Ext Attn: 0 dB

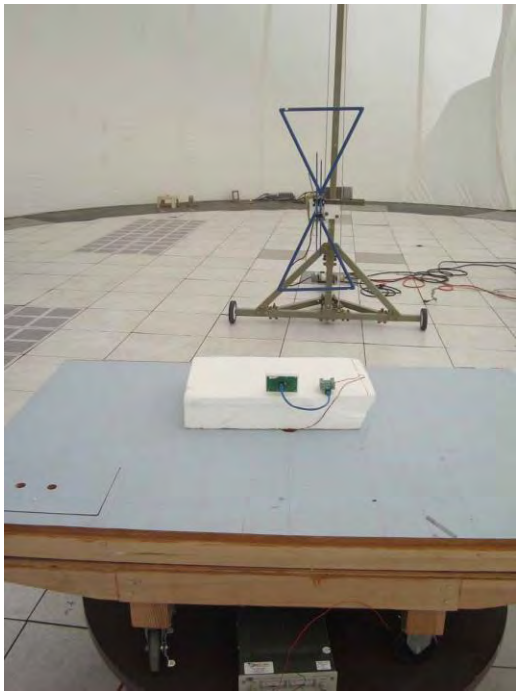
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	134.006M	43.3	+0.0 +0.2	+11.7	+1.3	-30.0	+0.0	26.5	43.5	-17.0	Vert
2	160.000M	42.0	+0.0 +0.2	+10.1	+1.4	-29.8	+0.0	23.9	43.5	-19.6	Vert
3	120.010M	41.4	+0.0 +0.2	+10.7	+1.2	-30.1	+0.0	23.4	43.5	-20.1	Horiz
4	160.010M	41.2	+0.0 +0.2	+10.1	+1.4	-29.8	+0.0	23.1	43.5	-20.4	Horiz
5	383.280M	35.1	+0.0 +0.3	+15.2	+2.3	-29.6	+0.0	23.3	46.0	-22.7	Horiz
6	125.602M	38.2	+0.0 +0.2	+10.8	+1.2	-30.1	+0.0	20.3	43.5	-23.2	Vert
7	3.675M	27.1	+9.8 +0.0	+0.0	+0.2	+0.0	-40.0	-2.9	29.5	-32.4	Vert
8	8.413M	23.4	+9.9 +0.0	+0.0	+0.3	+0.0	-40.0	-6.4	29.5	-35.9	Vert



Test Setup Photos





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Test Data

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240

Customer: **Smartrise Engineering, Inc.**
Work Order #: **94840** Date: 9/17/2013
Test Type: **Maximized Emissions** Time: 16:07:53
Equipment: **RF Reader** Sequence#: 1
Manufacturer: Smartrise Engineering, Inc. Tested By: Eddie Mariscal
Model: RFID-1
S/N: 219306-INTJ

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00226	Loop Antenna	6502	3/28/2012	3/28/2014
T2	AN02660	Spectrum Analyzer	E4446A	8/23/2012	8/23/2014
T3	ANP06230	Cable	CXTA04A-50	8/16/2012	8/16/2014

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

Function	Manufacturer	Model #	S/N
RF Reader*	Smartrise Engineering, Inc.	RFID-1	219306-INTJ

Support Devices:

Function	Manufacturer	Model #	S/N
Connector Breakout PCB	Smartrise Engineering, Inc.	66 94V0	1320

Test Conditions / Notes:

EUT is placed atop a wooden, non-conductive turntable of height 80cm. 24VDC is supplied to the Phoenix connector of the breakout PCB from variable DC power supply. Voltage is applied to the EUT from breakout PCB via RJ45 cable. EUT is equipped with integral antenna. Transmit signal has duty cycle of 100%.

Transmit frequency was measured in accordance with 15.31(e). No change in output was detected when voltage was varied to 85% and 115% of the nominal voltage (24VDC).

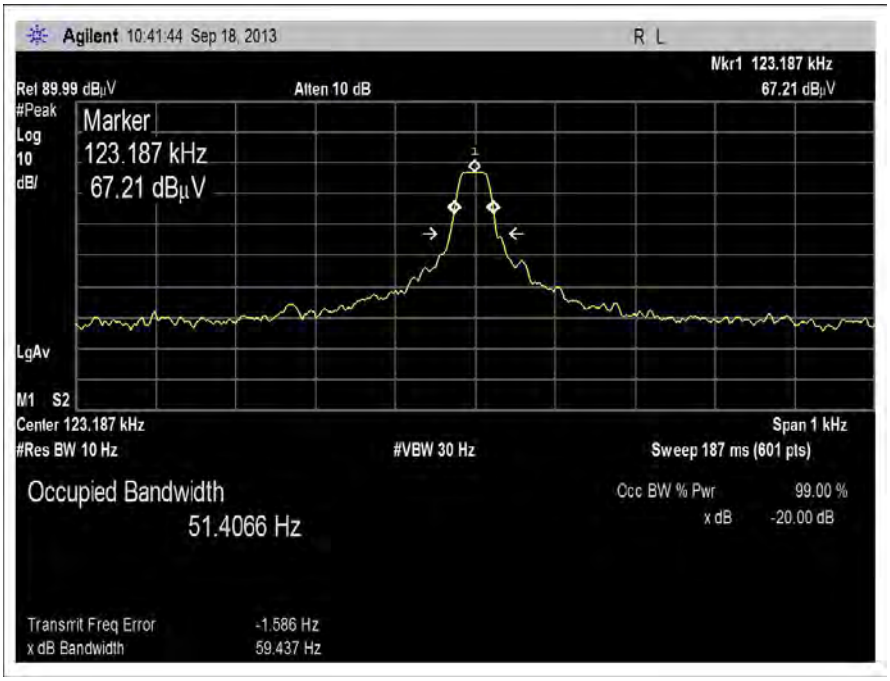
Highest Clock: 125kHz

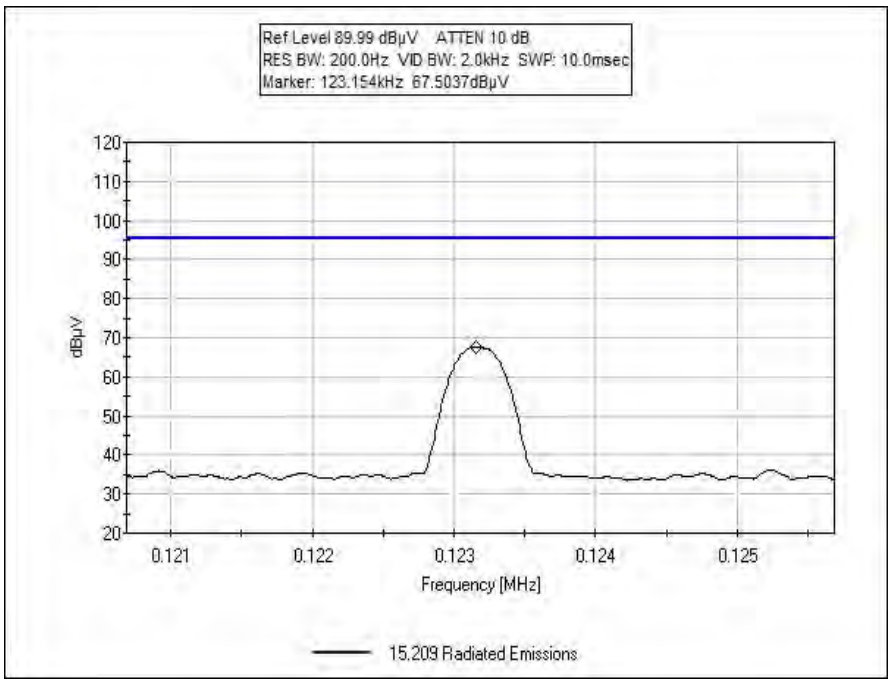
Frequency Range of Interest:
Fundamental

RBW = 200Hz; VBW = 600Hz

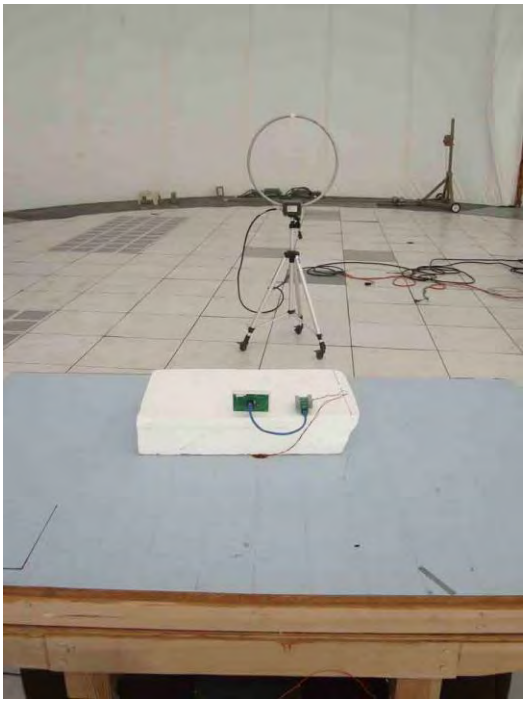
Environmental Conditions:
Temperature: 22°C
Relative Humidity: 42%
Atmospheric Pressure: 97.7kPa

Test Plots


Agilent 10:41:44 Sep 18, 2013
R L
Mkr1 123.187 kHz
67.21 dBµV
Ref 89.99 dBµV
Atten 10 dB
#Peak
Log
10
dB/
Marker
123.187 kHz
67.21 dBµV
LgAv
M1 S2
Center 123.187 kHz
Span 1 kHz
#Res BW 10 Hz
#VBW 30 Hz
Sweep 187 ms (601 pts)
Occupied Bandwidth
51.4066 Hz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -1.586 Hz
x dB Bandwidth 59.437 Hz


Ref Level 89.99 dBµV ATTEN 10 dB
RES BW: 200.0Hz VID BW: 2.0kHz SWP: 10.0msec
Marker: 123.154kHz 67.5037dBµV
dBµV
120
110
100
90
80
70
60
50
40
30
20
0.121
0.122
0.123
0.124
0.125
Frequency [MHz]
15.209 Radiated Emissions

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	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.