Tesla Motors, Inc.

TEST REPORT FOR

Key, 002

Tested To The Following Standards:

FCC Part 15 Subpart C Sections 15.231
and
RSS 210 Issue 8

Report No.: 92925-2

Date of issue: May 7, 2012

ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

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

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

Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Tesla Motors, Inc.
3500 Deer Creek Rd.
Palo Alto, CA 94304

Representative: Robert Cooper
Customer Reference Number: 4700007287

REPORT PREPARED BY:

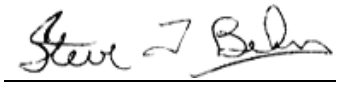
Dianne Dudley
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 92925

DATE OF EQUIPMENT RECEIPT: April 19, 2012
DATE(S) OF TESTING: April 19-May 2, 2012

Report Authorization

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



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

Test Facility Information

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

TEST LOCATION(S):
CKC Laboratories, Inc.
1120 Fulton Place
Fremont, CA 94539

Site Registration & Accreditation Information

Location	CB #	Taiwan	Canada	FCC	Japan
Fremont	US0082	SL2-IN-E-1148R	3082B-1	958979	R-2160 C-2332 T-228 G-522

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C 15.231 and RSS 210 Issue 8

Description	Test Procedure/Method	Results
Timing	FCC Part 15 Subpart C Section 15.231(a)	Pass
RF Power Output	FCC Part 15 Subpart C Section 15.231(b) / ANSI C63.4: 2003	Pass
-20dB Occupied Bandwidth	FCC Part 15 Subpart C Section 15.231(b)	Pass
Field Strength of Spurious Emissions	FCC Part 15 Subpart C Section 15.231(b) / ANSI C63.4: 2003	Pass
99% Bandwidth	RSS 210 Issue 8	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
All testing except the Timing Plot were done using SN: 1. The timing plot was taken using SN: PC000036

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

Key

Manuf: Pektron PLC
Model: 002
Serial: 1 and PC000036

PERIPHERAL DEVICES

The EUT was not tested with peripheral devices.

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.

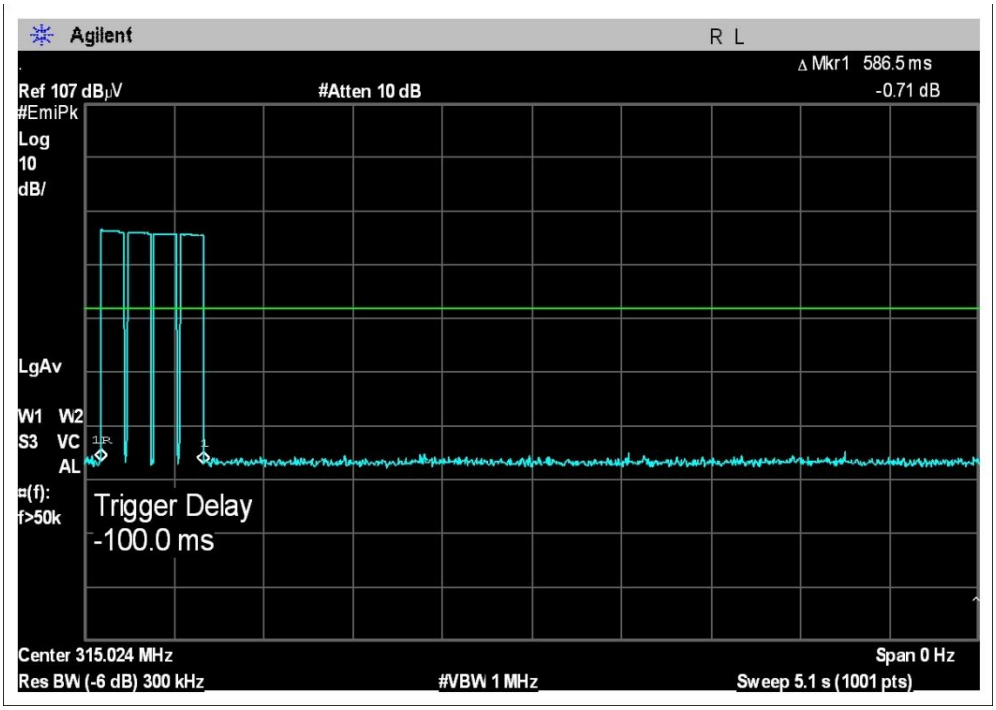
15.231(a) Timing

Engineer Name: C. Nicklas

Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
02668	Spectrum Analyzer	E4446A	Agilent	2/23/2011	2/23/2013
P05299	Cable	RG214	Pasternack	3/6/2011	3/6/2013
None	Loop Antenna	Loop	CKC	NCR	NCR

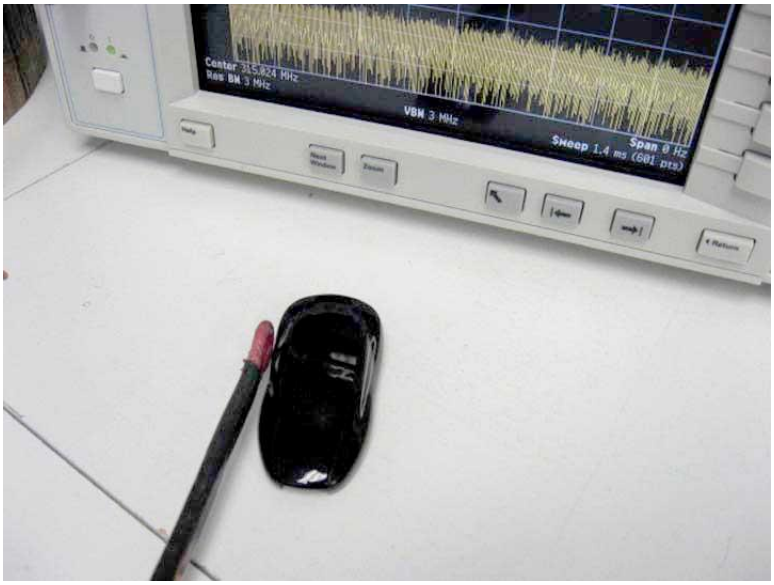
NOTE: NCR = No Calibration Required. The Loop antenna is a pickup source only. The Spectrum analyzer is the device which makes the actual timing measurements and amplitude of the signal is not required. Therefore correction factors and calibration is not required for the loop antenna

Test Data



The timing plot is showing the EUT starting to transmit as the button is depressed with the transmission stopping after just under 600ms with no additional transmissions occurring until the button is again depressed.

Test Setup Photos



15.231(b) RF Power Output

Test Data

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249 - 1170

Customer: **Tesla Motors, Inc.**
Specification: **15.231(b) Fundamental Field Strength**
Work Order #: **92925** Date: 4/19/2012
Test Type: **Maximized Emissions** Time: 15:40:50
Equipment: **key** Sequence#: 12
Manufacturer: Pektron PLC Tested By: C. Nicklas
Model: 002
S/N: 1

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02668	Spectrum Analyzer	E4446A	2/23/2011	2/23/2013
T1	ANP05299	Cable	RG214	3/6/2011	3/6/2013
T2	ANP05300	Cable	RG214/U	3/7/2011	3/7/2013
T3	ANP05440	Cable		3/7/2011	3/7/2013
T4	AN00730	Preamp		1/31/2011	1/31/2013
T5	AN00852	Biconilog Antenna	CBL 6111C	11/16/2010	11/16/2012

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

Function	Manufacturer	Model #	S/N
Key*	Pektron PLC	002	1

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

Maximized Data Fundamental Power
Testing performed to ANSI C63.4: 2003
Temperature: 21.8°C
Humidity: 45%
Atmospheric Pressure: 101.8 kPa
The EUT orientation investigated in three orthogonals during preliminary investigation. Data represents Worst Case Orthogonality. Maximized fundamental power testing performed with a fresh battery.
The EUT is continuously transmitting

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	315.027M	85.9	+0.1 +13.5	+0.5	+1.0	-27.4	+0.0	73.6	74.9	-1.3	Horiz
2	315.021M	67.6	+0.1 +13.5	+0.5	+1.0	-27.4	+0.0 314	55.3	74.9	-19.6	Vert 350

Test Setup Photos

-20dBc Occupied Bandwidth

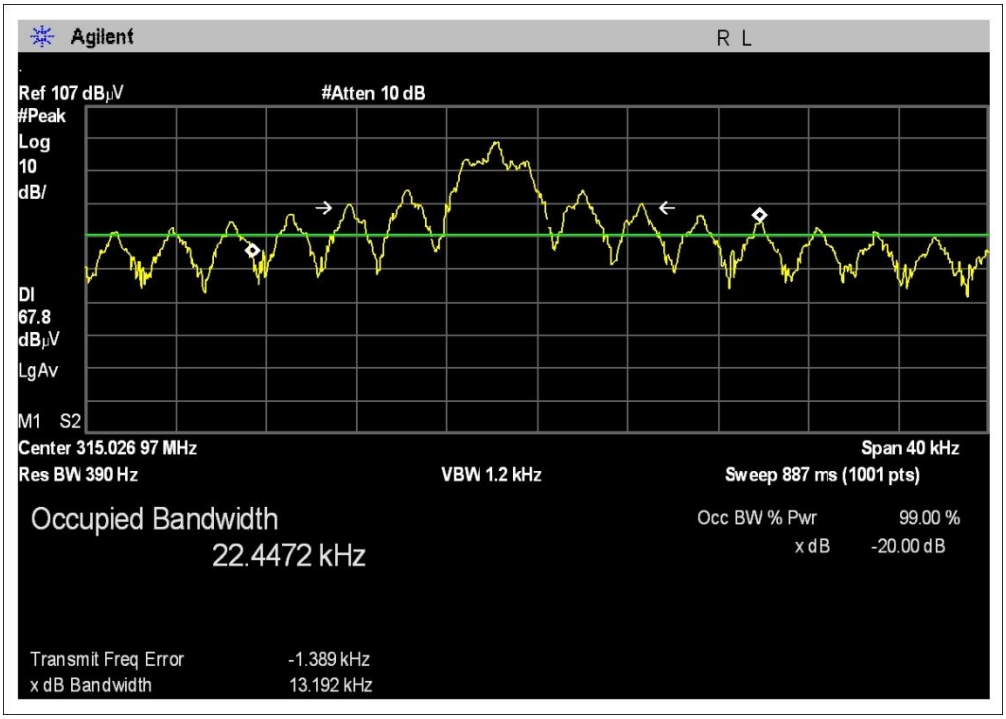
Test Conditions / Setup

Testing performed to ANSI C63.4: 2003
The EUT orientation investigated in three orthogonals during preliminary investigation. Data represents Worst Case Orthogonality. Maximized emissions testing performed with a fresh battery.
The EUT is continuously transmitting
Temperature: 21.7-21.8°C
Humidity: 45%
Atmospheric Pressure: 101.8 kPa

Engineer Name: C. Nicklas

Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
AN02668	Spectrum Analyzer	E4446A	Agilent	2/23/2011	2/23/2013
ANP05299	Cable	RG214	Pasternack	3/6/2011	3/6/2013
ANP05300	Cable	RG214/U	Pasternack	3/7/2011	3/7/2013
ANP05440	Cable		Pasternack	3/7/2011	3/7/2013
AN00730	Preamp		HP	1/31/2011	1/31/2013
AN00852	Biconilog Antenna	CBL 6111C	Schaffer	11/16/2010	11/16/2012
AN00432	Loop Antenna	6502	EMCO	3/31/2011	3/31/2013
ANP01210	Cable	FSJ1P-50A-4A	Andrews	3/15/2011	3/15/2013
ANP05843	Cable	32022-2-29094K-48TC	AtroLab	7/30/2010	7/30/2012
AN03302	Cable		AstroLab	3/21/2012	3/21/2014
AN02810	Preamp	83051A	HP	1/7/2012	1/7/2014
AN02157	Horn Antenna-ANSI C63.5	3115	EMCO	1/17/2011	1/17/2013

Test Data


Agilent
R L
Ref 107 dBµV
#Atten 10 dB
#Peak
Log
10
dB/
Dl
67.8
dBµV
LgAv
M1 S2
Center 315.026 97 MHz
Span 40 kHz
Res BW 390 Hz
VBW 1.2 kHz
Sweep 887 ms (1001 pts)
Occupied Bandwidth
22.4472 kHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -1.389 kHz
x dB Bandwidth 13.192 kHz

Test Setup Photos

15.231(b) Field Strength of Spurious Emissions

Test Data Sheets

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249 - 1170

Customer: **Tesla Motors, Inc.**
Specification: **15.231(b) Spurious Field Strength (315 MHz Transmitter)**
Work Order #: **92925** Date: 4/19/2012
Test Type: **Radiated Scan** Time: 15:21:33
Equipment: **key** Sequence#: 7
Manufacturer: Pektron PLC Tested By: C. Nicklas
Model: 002
S/N: 1

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02668	Spectrum Analyzer	E4446A	2/23/2011	2/23/2013
T1	ANP05299	Cable	RG214	3/6/2011	3/6/2013
T2	ANP05300	Cable	RG214/U	3/7/2011	3/7/2013
T3	ANP05440	Cable		3/7/2011	3/7/2013
T4	AN00730	Preamp		1/31/2011	1/31/2013
T5	AN00852	Biconilog Antenna	CBL 6111C	11/16/2010	11/16/2012
	AN00432	Loop Antenna	6502	3/31/2011	3/31/2013
T6	ANP01210	Cable	FSJ1P-50A-4A	3/15/2011	3/15/2013
T7	ANP05843	Cable	32022-2-29094K-48TC	7/30/2010	7/30/2012
T8	AN03302	Cable		3/21/2012	3/21/2014
T9	AN02810	Preamp	83051A	1/7/2012	1/7/2014
T10	AN02157	Horn Antenna-ANSI C63.5	3115	1/17/2011	1/17/2013

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

Function	Manufacturer	Model #	S/N
Key*	Pektron PLC	002	1

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

Maximized Data 9kHz - 3.15GHz
Testing performed to ANSI C63.4: 2003
Temperature: 21.7-21.8°C
Humidity: 45%
Atmospheric Pressure: 101.8 kPa
The EUT orientation investigated in three orthogonals during preliminary investigation. Data represents Worst Case Orthogonality. Maximized emissions testing performed with a fresh battery.
The EUT is continuously transmitting
No spurious emissions between 9kHz and 30MHz were found within 20dB below the limit.

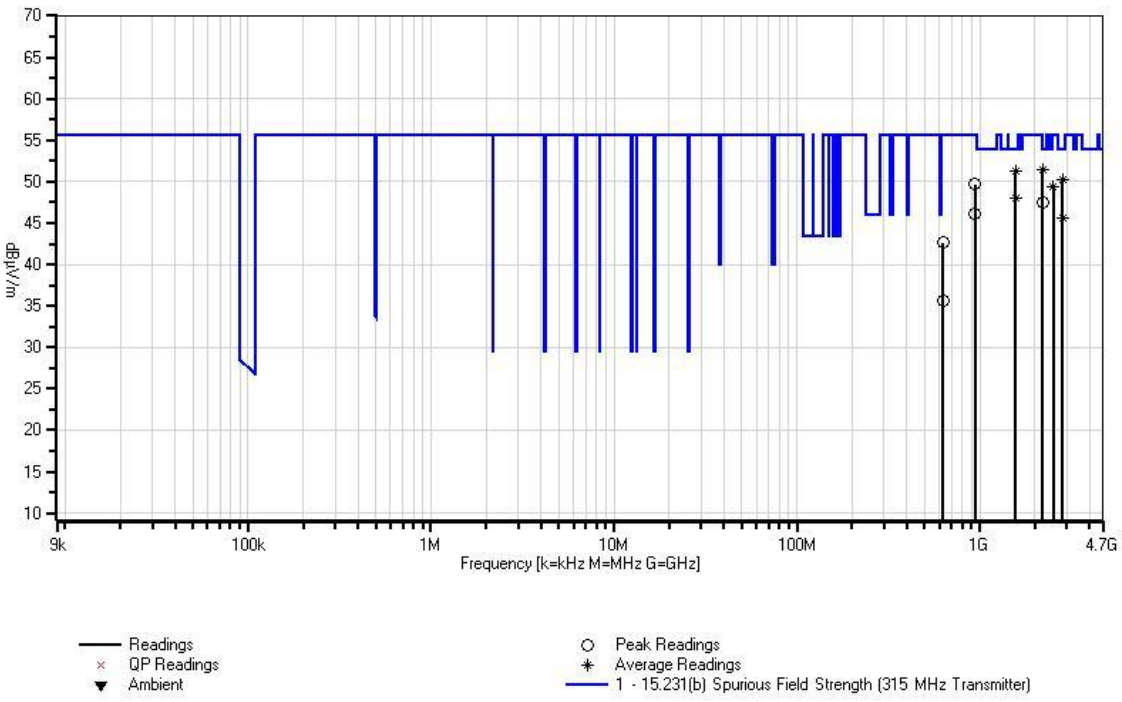
Ext Attn: 0 dB

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

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2205.199M	47.1	+0.0	+0.0	+0.0	+0.0	+0.0	51.5	54.0	-2.5	Horiz
	Ave		+0.0	+2.7	+0.7	+1.0	360				
			-27.2	+27.2							
^	2205.199M	50.0	+0.0	+0.0	+0.0	+0.0	+0.0	54.4	54.0	+0.4	Horiz
			+0.0	+2.7	+0.7	+1.0					
			-27.2	+27.2							
3	1575.176M	51.4	+0.0	+0.0	+0.0	+0.0	+0.0	51.2	54.0	-2.8	Vert
	Ave		+0.0	+2.2	+0.6	+0.9	77				
			-28.4	+24.5							
^	1575.176M	53.2	+0.0	+0.0	+0.0	+0.0	+0.0	53.0	54.0	-1.0	Vert
			+0.0	+2.2	+0.6	+0.9	77				
			-28.4	+24.5							
5	2835.278M	41.8	+0.0	+0.0	+0.0	+0.0	+0.0	50.2	54.0	-3.8	Horiz
	Ave		+0.0	+3.1	+0.8	+1.2	129				
			-26.4	+29.7							
^	2835.278M	46.3	+0.0	+0.0	+0.0	+0.0	+0.0	54.7	54.0	+0.7	Horiz
			+0.0	+3.1	+0.8	+1.2	129				
			-26.4	+29.7							
7	945.089M	52.1	+0.3	+1.0	+2.0	-27.7	+0.0	49.7	55.6	-5.9	Vert
			+22.0	+0.0	+0.0	+0.0	74				129
			+0.0	+0.0							
8	1575.111M	48.2	+0.0	+0.0	+0.0	+0.0	+0.0	48.0	54.0	-6.0	Horiz
	Ave		+0.0	+2.2	+0.6	+0.9	202				
			-28.4	+24.5							
^	1575.111M	50.4	+0.0	+0.0	+0.0	+0.0	+0.0	50.2	54.0	-3.8	Horiz
			+0.0	+2.2	+0.6	+0.9	202				
			-28.4	+24.5							
10	2520.119M	43.3	+0.0	+0.0	+0.0	+0.0	+0.0	49.3	55.6	-6.3	Horiz
	Ave		+0.0	+2.9	+0.8	+1.1	360				
			-26.9	+28.1							
^	2520.119M	48.2	+0.0	+0.0	+0.0	+0.0	+0.0	54.2	55.6	-1.4	Horiz
			+0.0	+2.9	+0.8	+1.1	360				
			-26.9	+28.1							
12	2205.070M	43.1	+0.0	+0.0	+0.0	+0.0	+0.0	47.5	54.0	-6.5	Vert
			+0.0	+2.7	+0.7	+1.0	144				
			-27.2	+27.2							

13	2835.327M Ave	37.2	+0.0 +0.0 -26.4	+0.0 +3.1 +29.7	+0.0 +0.8	+0.0 +1.2	+0.0 259	45.6	54.0	-8.4	Vert
^	2835.327M	43.2	+0.0 +0.0 -26.4	+0.0 +3.1 +29.7	+0.0 +0.8	+0.0 +1.2	+0.0 259	51.6	54.0	-2.4	Vert
15	945.086M	48.5	+0.3 +22.0 +0.0	+1.0 +0.0 +0.0	+2.0 +0.0	-27.7 +0.0	+0.0 198	46.1	55.6	-9.5	Horiz 145
16	630.053M	47.9	+0.2 +19.3 +0.0	+0.8 +0.0 +0.0	+1.5 +0.0	-27.1 +0.0	+0.0 105	42.6	55.6	-13.0	Horiz 129
17	630.062M	40.9	+0.2 +19.3 +0.0	+0.8 +0.0 +0.0	+1.5 +0.0	-27.1 +0.0	+0.0 333	35.6	55.6	-20.0	Vert 150

CKC Laboratories, Inc. Date: 4/19/2012 Time: 15:21:33 Tesla Motors, Inc. WO#: 92925
15.231(b) Spurious Field Strength (315 MHz Transmitter) Test Distance: 3 Meters Sequence#: 7 Horiz
O 3



Test Setup Photos

RSS-210

99% Bandwidth

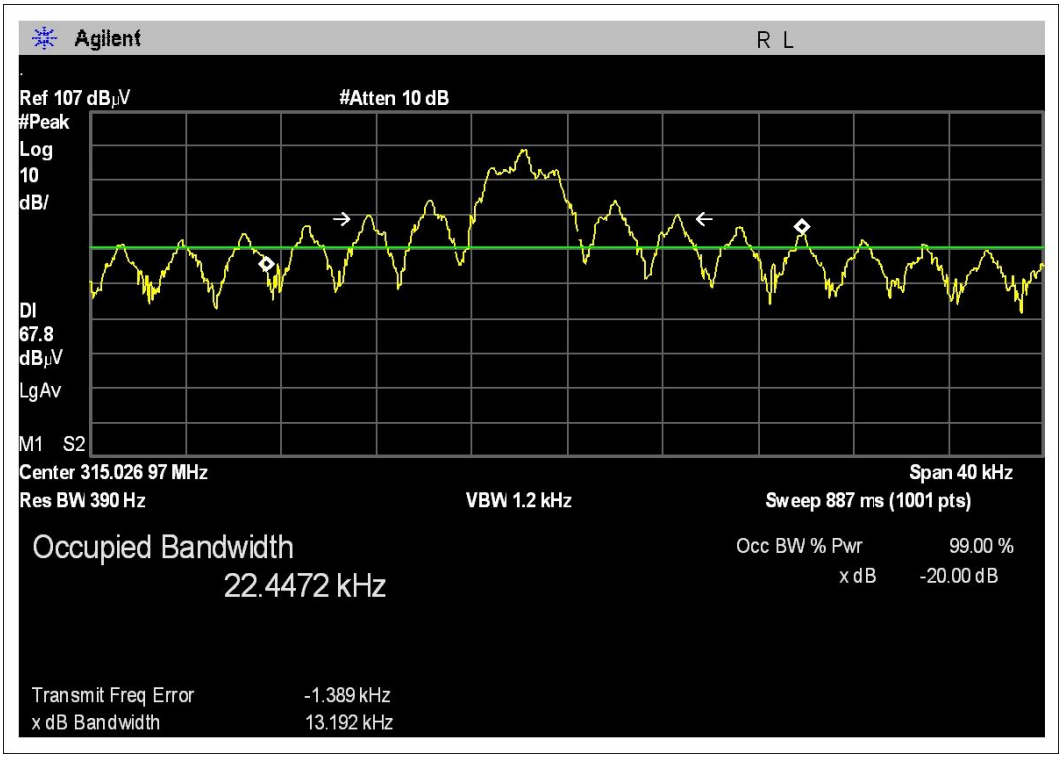
Test Conditions / Setup

The EUT orientation investigated in three orthogonals during preliminary investigation. Data represents Worst Case Orthogonality. Maximized emissions testing performed with a fresh battery.
The EUT is continuously transmitting
Temperature: 21.7-21.8°C
Humidity: 45%
Atmospheric Pressure: 101.8 kPa

Engineer Name: C. Nicklas

Test Equipment					
Asset/Serial #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
AN02668	Spectrum Analyzer	E4446A	Agilent	2/23/2011	2/23/2013
ANP05299	Cable	RG214	Pasternack	3/6/2011	3/6/2013
ANP05300	Cable	RG214/U	Pasternack	3/7/2011	3/7/2013
ANP05440	Cable		Pasternack	3/7/2011	3/7/2013
AN00730	Preamp		HP	1/31/2011	1/31/2013
AN00852	Biconilog Antenna	CBL 6111C	Schaffer	11/16/2010	11/16/2012
AN00432	Loop Antenna	6502	EMCO	3/31/2011	3/31/2013
ANP01210	Cable	FSJ1P-50A-4A	Andrews	3/15/2011	3/15/2013
ANP05843	Cable	32022-2-29094K-48TC	AtroLab	7/30/2010	7/30/2012
AN03302	Cable		AstroLab	3/21/2012	3/21/2014
AN02810	Preamp	83051A	HP	1/7/2012	1/7/2014
AN02157	Horn Antenna- ANSI C63.5	3115	EMCO	1/17/2011	1/17/2013

Test Data


Agilent
R L
Ref 107 dBµV
#Atten 10 dB
#Peak
Log
10
dB/
DI
67.8
dBµV
LgAv
M1 S2
Center 315.026 97 MHz
Span 40 kHz
Res BW 390 Hz
VBW 1.2 kHz
Sweep 887 ms (1001 pts)
Occupied Bandwidth
22.4472 kHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -1.389 kHz
x dB Bandwidth 13.192 kHz

Test Setup Photos

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

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

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

Emissions Test Details

TESTING PARAMETERS

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

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

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

CORRECTION FACTORS

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

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

TEST INSTRUMENTATION AND ANALYZER SETTINGS

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

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

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

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

Peak

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

Quasi-Peak

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

Average

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