IP MobileNet

ADDENDUM TEST REPORT TO 90892-16

700 MHz 32k Fixed Radio, F32700N-25

Tested to the following standards:

FCC Part 90I

Report No.: 90892-16A

Date of issue: March 22, 2011

TESTING
CERT #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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Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

IP MobileNet
1221 E. Dyer Road, Suite 250
Santa Ana, CA 92705

REPRESENTATIVE: Behruz Rezvani
Customer Reference Number: 005973-00

REPORT PREPARED BY:

Joyce Walker
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 90892

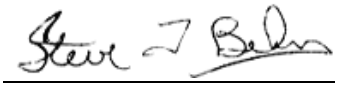
DATE OF EQUIPMENT RECEIPT: July 13, 2010
DATE(S) OF TESTING: July 13, 2010 - March 2, 2011

Revision History

Original: Testing of the 700 MHz 32k Fixed Radio, F32700N-25 to FCC Part 90I.
Addendum A: Added ACCP data for 400kHz to 12MHz and paired receive band. Added data to show compliance for the transmit band of 793-798 MHz. Revised data and added the calculations for the limit line for the Spurious Emissions. Added OBW data as required by FCC Part 2.1049.

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.
110 Olinda Place
Brea, CA 92823

Site Registration & Accreditation Information

Location	JAPAN	CANADA	FCC
Brea D	R-1256, C-1319, T-1660 & G-255	3082D-2	100638

SUMMARY OF RESULTS

Standard / Specification: FCC Part 90I

Description	Test Procedure/Method	Results
RF Power Output	FCC 2.1033(c)(14)/2.1046/90.205(j) TIA/EIA 603	Pass
Modulation Characteristics Audio Frequency Response	FCC 2.1033(c)(14)/2.1047(a)	NA
Modulation Characteristics Modulation Limiting Response	FCC 2.1033(c)(14)/2.1047(b)	NA
Occupied Bandwidth	FCC 2.1033(c)(14)/2.1049/90.543(a) TIA/EIA 603	Pass
Spurious Emissions at Antenna Terminal	FCC 2.1033(c)(14)/2.1051/90.543(c) TIA/EIA 603	Pass
Field Strength of Spurious Radiation	FCC 2.1033(c)(14)/2.1053/90.543(c) TIA/EIA 603	Pass
Frequency Stability	FCC 2.1033(c)(14)/2.1055/90.539(c) & (e) TIA/EIA 603	Pass

NA = Not applicable.

Conditions During Testing

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

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

The following model was tested by CKC Laboratories: **7/800 MHz 32k Fixed Radio, F32789N25**

Since the time of testing the manufacturer has chosen to use the following model name in its place. Any differences between the names does not affect their EMC characteristics and therefore meets the level of testing equivalent to the tested model name shown on the data sheets: **700 MHz 32k Fixed Radio, F32700N-25**

EQUIPMENT UNDER TEST

700 MHz 32k Fixed Radio
Manuf: IP MobileNet
Model: F32700N-25
Serial: NA

PERIPHERAL DEVICES

The EUT was not tested with peripheral devices.

FCC PART 90I

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

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

Engineer Name: S. Hundal

Test Equipment				
Name	**Serial**	**Cal Date**	**Cal Due**	**Asset**
Cable	NA	9/21/2009	9/21/2011	02948
Spectrum Analyzer	MY46186290	2/21/2009	2/21/2011	02869

Test Conditions

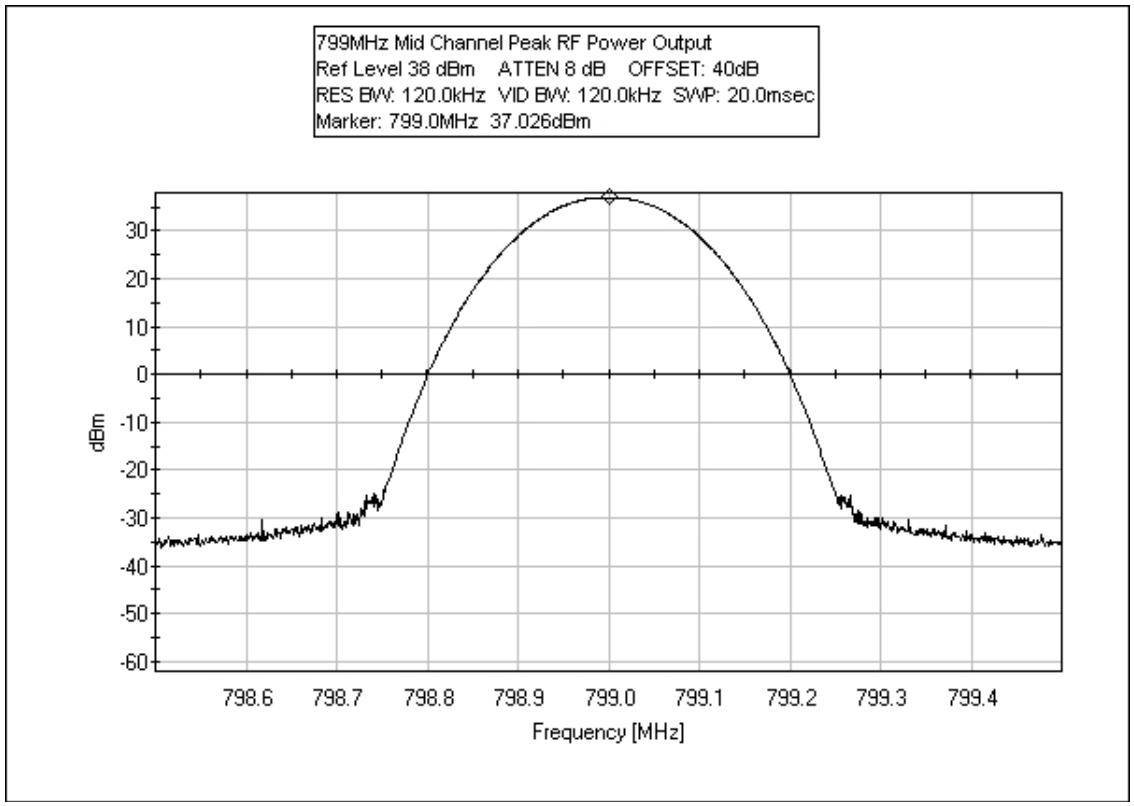
Date of test: Aug 19, 2010

The equipment under test (EUT), support equipment and test equipment are located on the table top. The EUT Ethernet port is connected to the laptop computer via shielded Ethernet cable. The EUT RF_OUT port is connected to high power attenuators and then a high frequency coaxial cable to a spectrum analyzer. The power supply is providing 13.8VDC to the EUT. The laptop is running IpMsg and RemoteKeys and is used to command the EUT to transmit and receive and is also used to change the EUT between transmit and receive channels. The test is performed with the EUT transmitting on its low (793MHz), middle (799MHz), and high (805MHz) channels. The transmit range of the EUT is 793MHz to 805MHz. Bandwidth used: 120kHz. Temperature: 23°C, Humidity: 47%, Pressure: 101kPa.

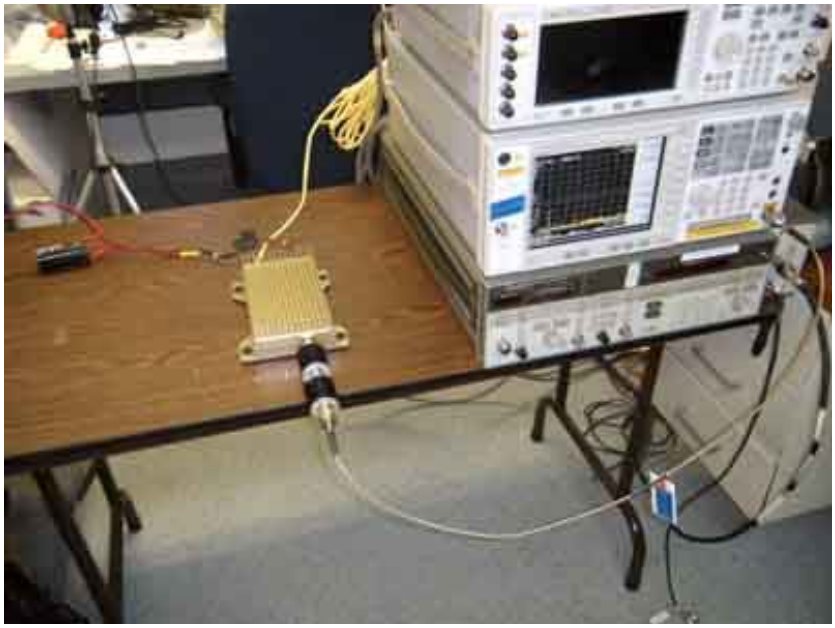
Test Data

90.205(j)/2.1046 RF Output Power

Frequency (MHz)	RF Power Output (Watts)
793.0	4.47
799.0	5.04
805.0	5.44



Test Setup Photos



2.1033(c)(14)/2.1049/90.543(a) - Occupied Bandwidth

Engineer Name: S. Hundal

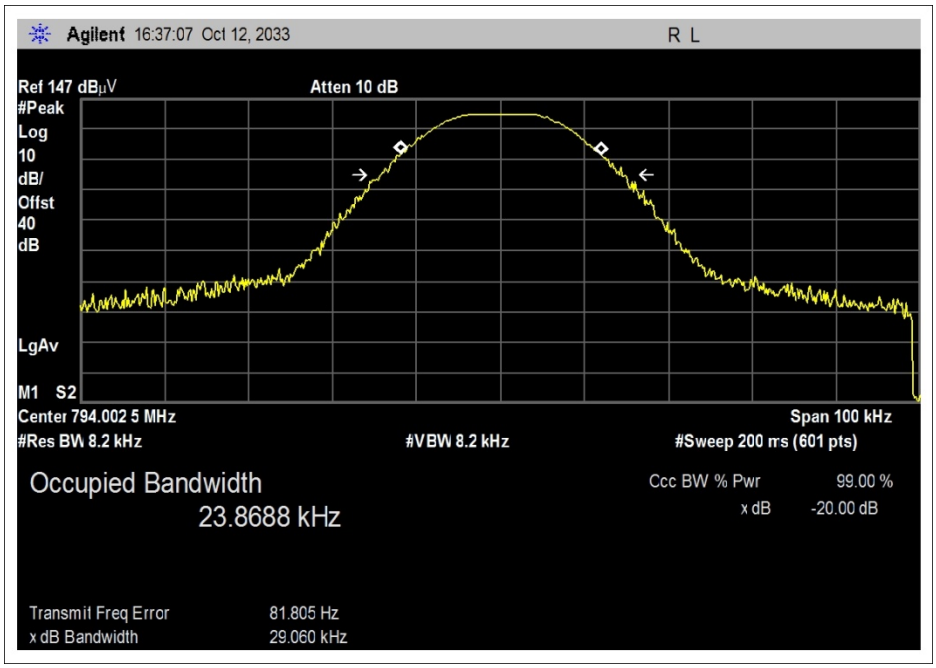
Test Equipment				
Name	**Serial**	**Cal Date**	**Cal Due**	**Asset**
Cable	NA	9/21/2009	9/21/2011	02948
Spectrum Analyzer	MY46186290	2/21/2009	2/21/2011	02869

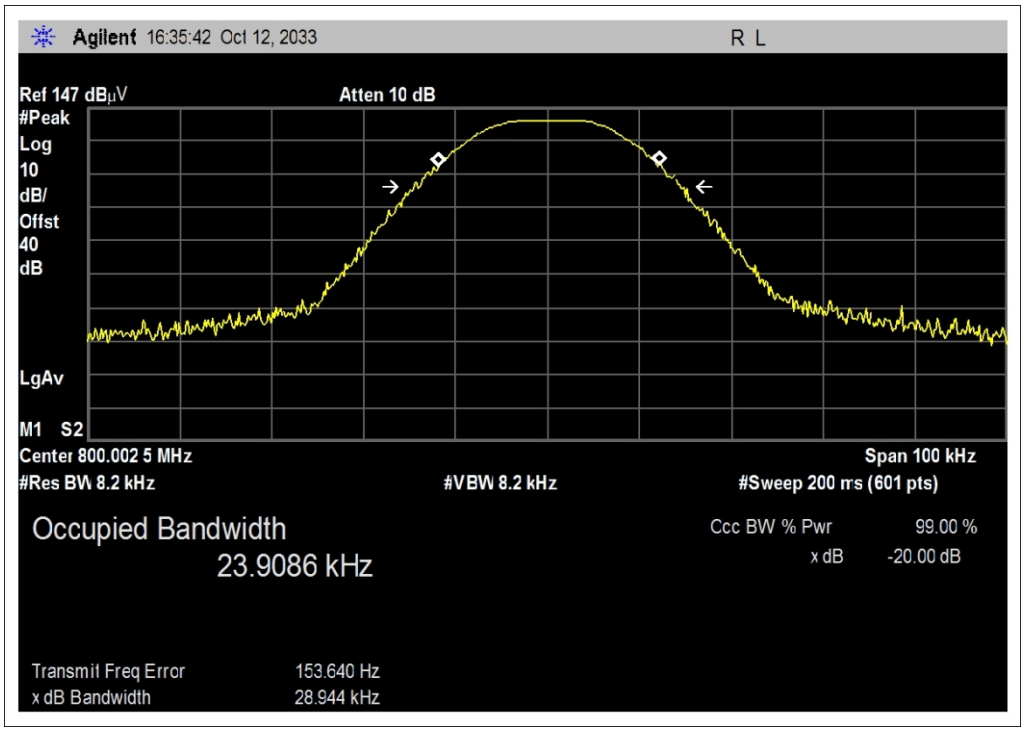
Test Conditions

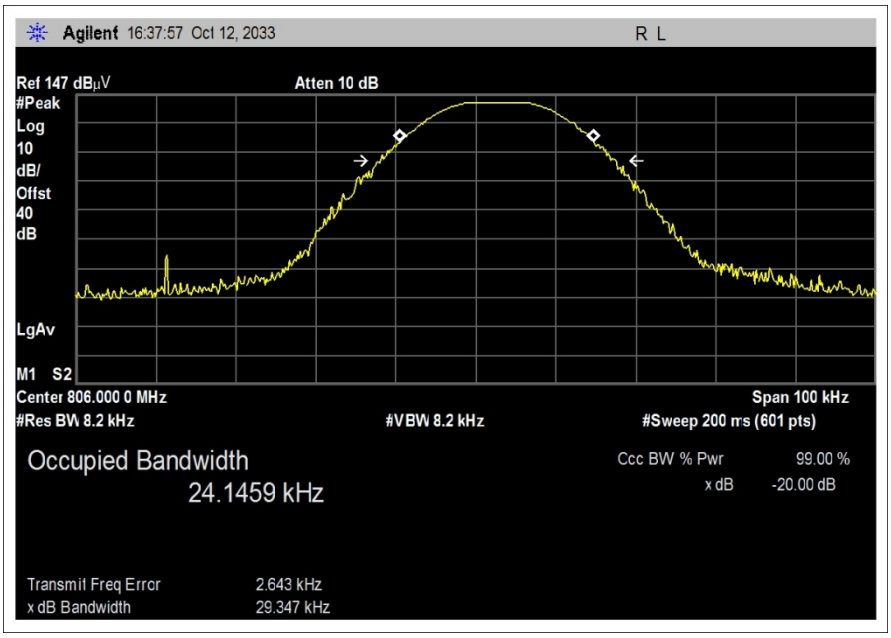
Date of test: July 22, 2010
Test Condition: The equipment under test (EUT), support equipment and test equipment are located on the table top. The EUT Ethernet port is connected to the laptop computer via shielded Ethernet cable. The EUT RF_OUT port is connected to high power attenuators and then a high frequency coaxial cable to a spectrum analyzer. The power supply is providing 13.8VDC to the EUT. The laptop is running IpMsg and RemoteKeys and is used to command the EUT to transmit and receive and is also used to change the EUT between transmit and receive channels. The test is performed with the EUT transmitting on its low (794MHz), middle (800MHz), and high (806MHz) channels. The transmit range of the EUT is 794MHz to 806MHz. Temperature: 27°C, Humidity: 45%, Pressure: 101kPa.

Date of test: Aug 19, 2010
The equipment under test (EUT), support equipment and test equipment are located on the table top. The EUT Ethernet port is connected to the laptop computer via shielded Ethernet cable. The EUT RF_OUT port is connected to high power attenuators and then a high frequency coaxial cable to a spectrum analyzer. The power supply is providing 13.8VDC to the EUT. The laptop is running IpMsg and RemoteKeys and is used to command the EUT to transmit and receive and is also used to change the EUT between transmit and receive channels. The test is performed with the EUT transmitting on its low (793MHz), middle (799MHz), and high (805MHz) channels. The transmit range of the EUT is 793MHz to 805MHz. Bandwidth used: 120kHz. Temperature: 23°C, Humidity: 47%, Pressure: 101kPa.

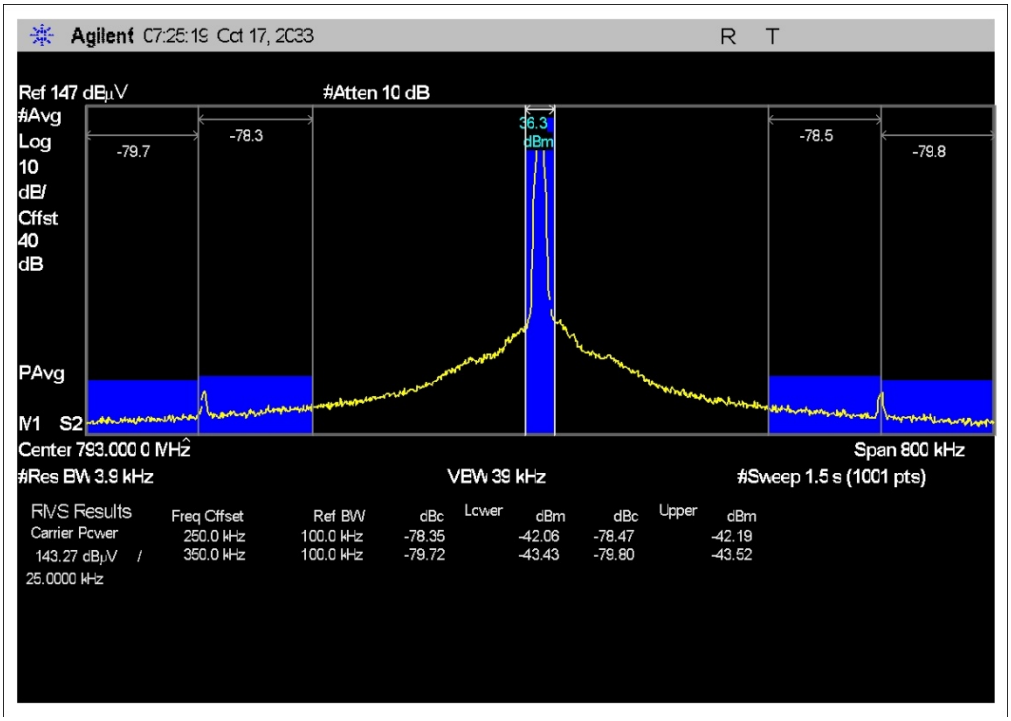
Test Data from July 22, 2010

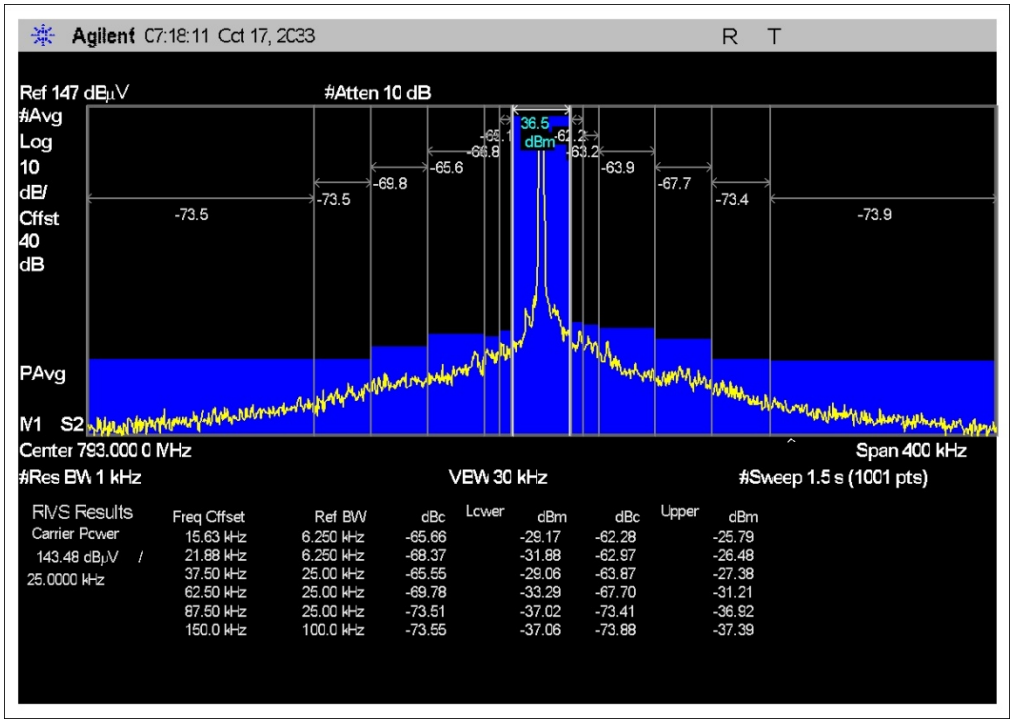


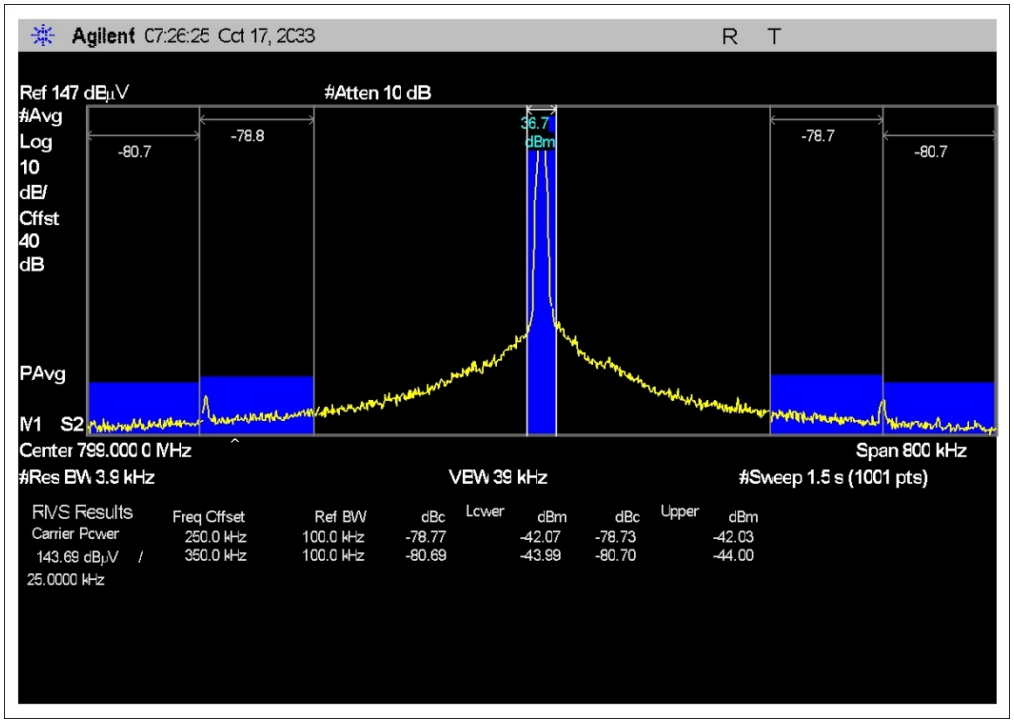


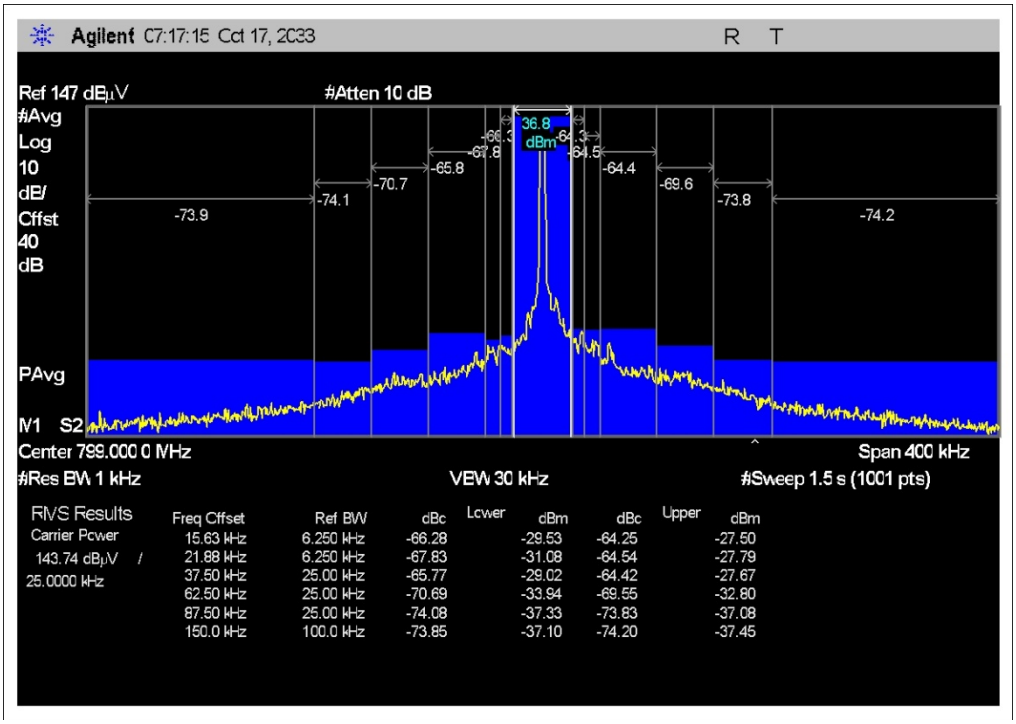

Agilent 16:37:57 Oct 12, 2033
R L
Ref 147 dBµV
Atten 10 dB
#Peak
Log
10
dB/
Offst
40
dB
LgAv
M1 S2
Center 806.000 0 MHz
Span 100 kHz
#Res BW 8.2 kHz
#VBW 8.2 kHz
#Sweep 200 ms (601 pts)
Occupied Bandwidth
24.1459 kHz
Ccc BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error 2.643 kHz
x dB Bandwidth 29.347 kHz

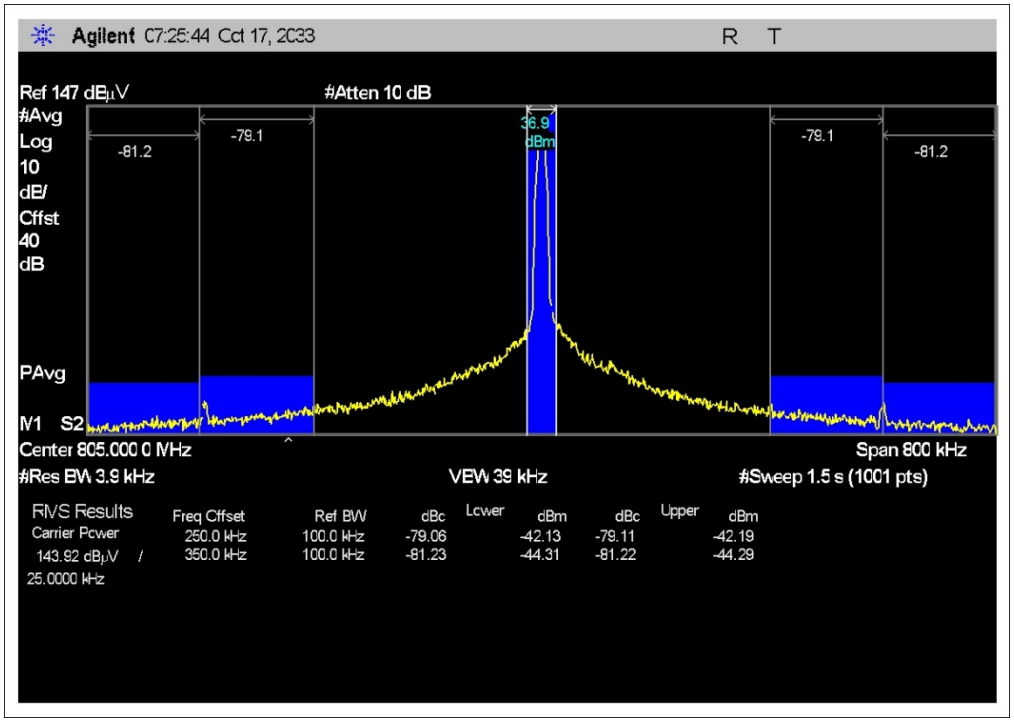
Test Data from Aug 19, 2010

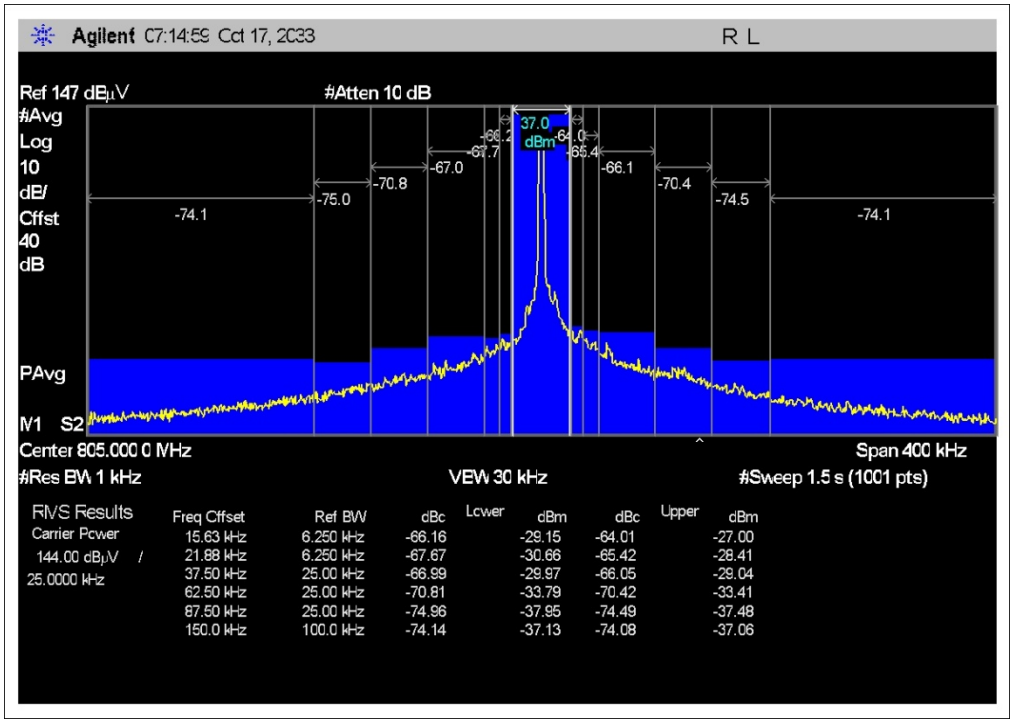


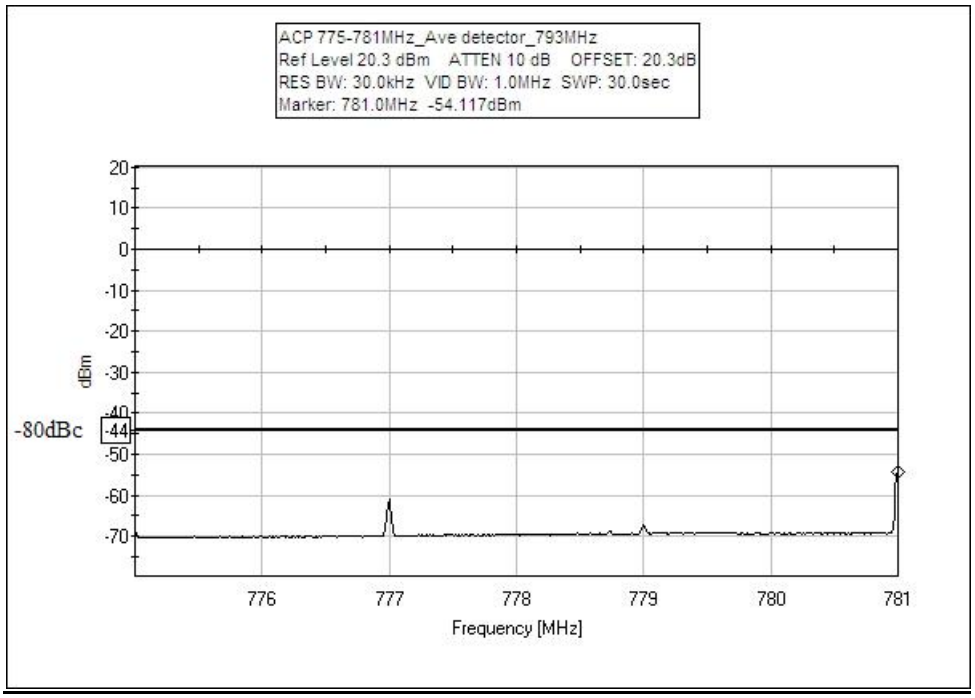



Agilent C7:26:25 Cct 17, 2033
R T
Ref 147 dBµV
#Atten 10 dB
#Avg
Log
10
dB/
Cffst
40
dB
-80.7
-78.8
36.7
dBm
-78.7
-80.7
PAvg
M1 S2
Center 799.000 0 MHz
Span 800 kHz
#Res BW 3.9 kHz
VBW 39 kHz
#Sweep 1.5 s (1001 pts)
RMS Results
Carrier Power
143.69 dBµV /
25.0000 kHz
Freq Offset
Ref BW
dBc
Lower
dBm
dBc
Upper
dBm
250.0 kHz
100.0 kHz
-78.77
-42.07
-78.73
-42.03
350.0 kHz
100.0 kHz
-80.69
-43.99
-80.70
-44.00

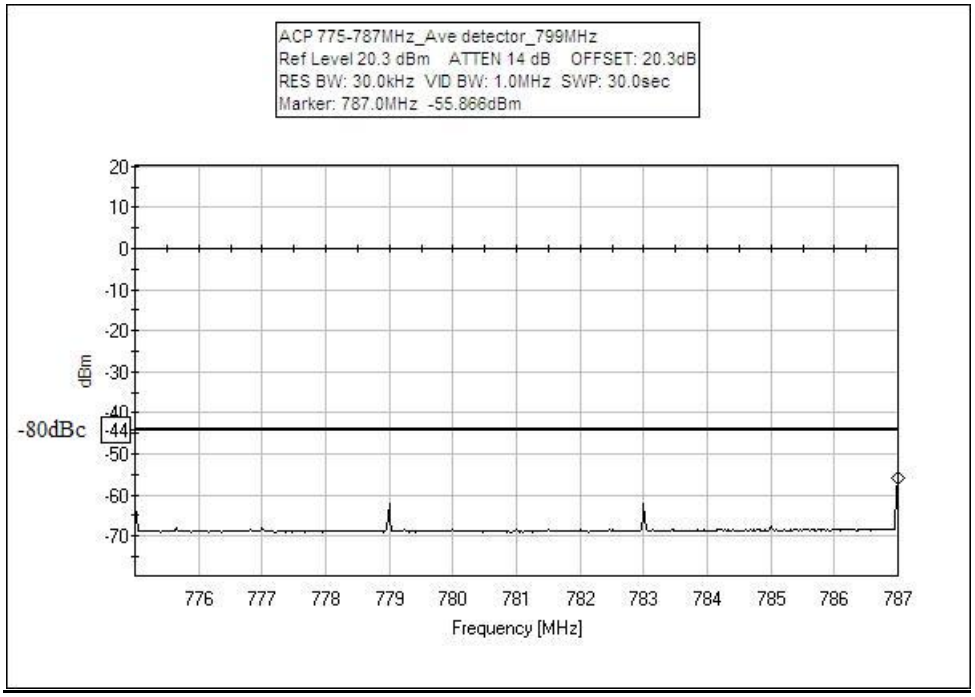

Agilent C7:17:15 Cct 17, 2033
R T
Ref 147 dBµV
#Atten 10 dB
#Avg
Log
10
dB/
Cffst
40
dB
-73.9
-74.1
-70.7
-65.8
-67.8
36.8
dBm
-64.3
-64.5
-64.4
-69.6
-73.8
-74.2
PAvg
M1 S2
Center 799.000 0 MHz
Span 400 kHz
#Res BW 1 kHz
VBW 30 kHz
#Sweep 1.5 s (1001 pts)
RMS Results
Carrier Power
143.74 dBµV /
25.0000 kHz
Freq Offset
Ref BW
dBc
Lower
dBm
dBc
Upper
dBm
15.63 kHz
6.250 kHz
-66.28
-29.53
-64.25
-27.50
21.88 kHz
6.250 kHz
-67.83
-31.08
-64.54
-27.79
37.50 kHz
25.00 kHz
-65.77
-29.02
-64.42
-27.67
62.50 kHz
25.00 kHz
-70.69
-33.94
-69.55
-32.80
87.50 kHz
25.00 kHz
-74.08
-37.33
-73.83
-37.08
150.0 kHz
100.0 kHz
-73.85
-37.10
-74.20
-37.45


Agilent C7:25:44 Oct 17, 2033
R T
Ref 147 dBµV
#Atten 10 dB
#Avg
Log
10
dB/
Offst
40
dB
-81.2
-79.1
36.9
dBm
-79.1
-81.2
PAvg
M1 S2
Center 805.000 0 MHz
Span 800 kHz
#Res BW 3.9 kHz
VBW 39 kHz
#Sweep 1.5 s (1001 pts)
RMS Results
Carrier Power
143.92 dBµV /
25.0000 kHz
Freq Offset
250.0 kHz
350.0 kHz
Ref BW
100.0 kHz
100.0 kHz
dBc
-79.06
-81.23
Lower
dBm
-42.13
-44.31
dBc
-79.11
-81.22
Upper
dBm
-42.19
-44.29

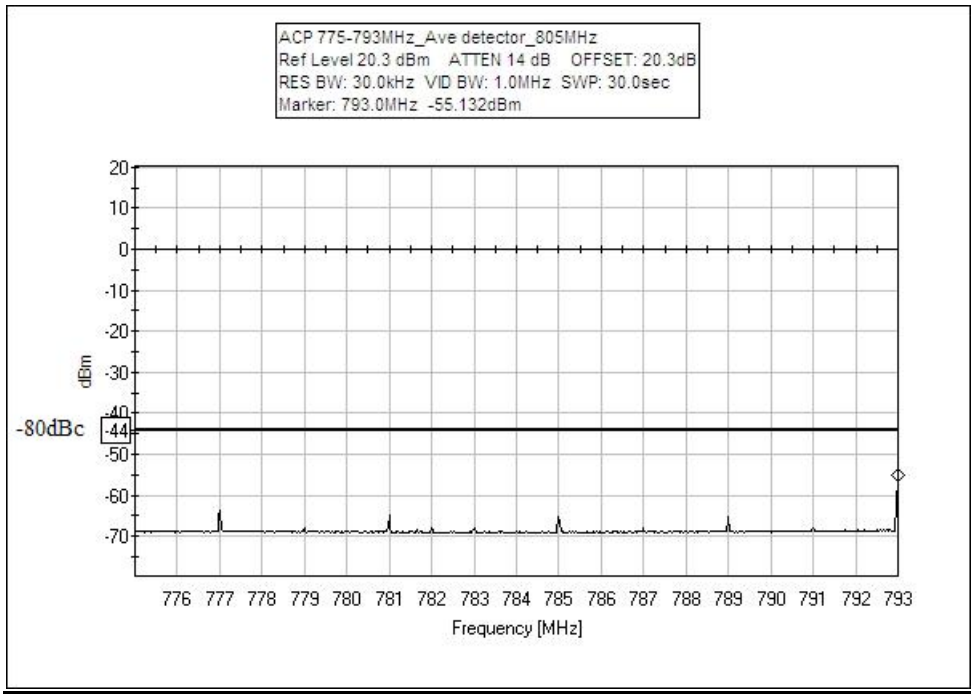

Agilent C7:14:59 Oct 17, 2033
R L
Ref 147 dBµV
#Atten 10 dB
#Avg
Log
10
dB/
Offst
40
dB
-74.1
-75.0
-70.8
-67.0
-67.7
-66.2
37.0
dBm
-64.0
-65.4
-66.1
-70.4
-74.5
-74.1
PAvg
M1 S2
Center 805.000 0 MHz
Span 400 kHz
#Res BW 1 kHz
VBW 30 kHz
#Sweep 1.5 s (1001 pts)
RMS Results
Carrier Power
144.00 dBµV /
25.0000 kHz
Freq Offset
15.63 kHz
21.88 kHz
37.50 kHz
62.50 kHz
87.50 kHz
150.0 kHz
Ref BW
6.250 kHz
6.250 kHz
25.00 kHz
25.00 kHz
25.00 kHz
100.0 kHz
dBc
-66.16
-67.67
-66.99
-70.81
-74.96
-74.14
Lower
dBm
-29.15
-30.66
-29.97
-33.79
-37.95
-37.13
dBc
-64.01
-65.42
-66.05
-70.42
-74.49
-74.08
Upper
dBm
-27.00
-28.41
-29.04
-33.41
-37.48
-37.06



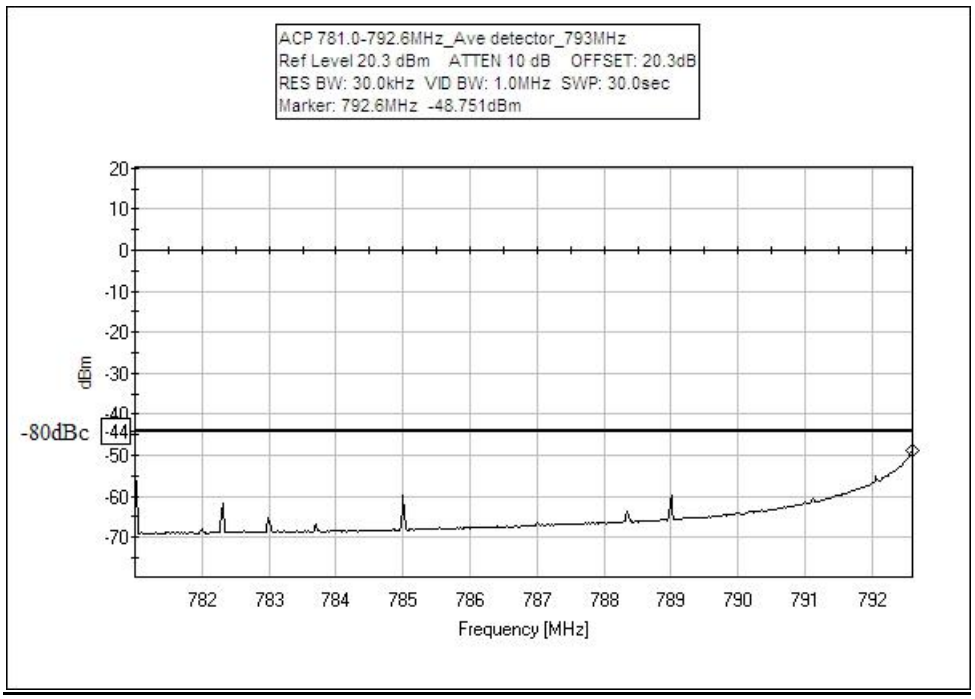
ADJACENT CHANNEL POWER 793 MHz



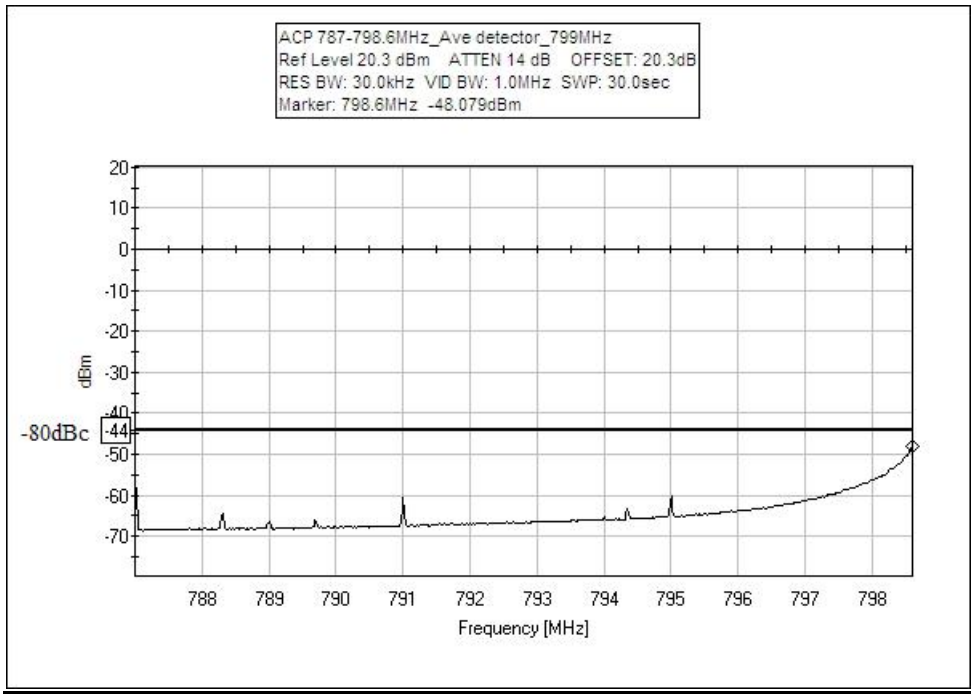
ADJACENT CHANNEL POWER 799 MHz



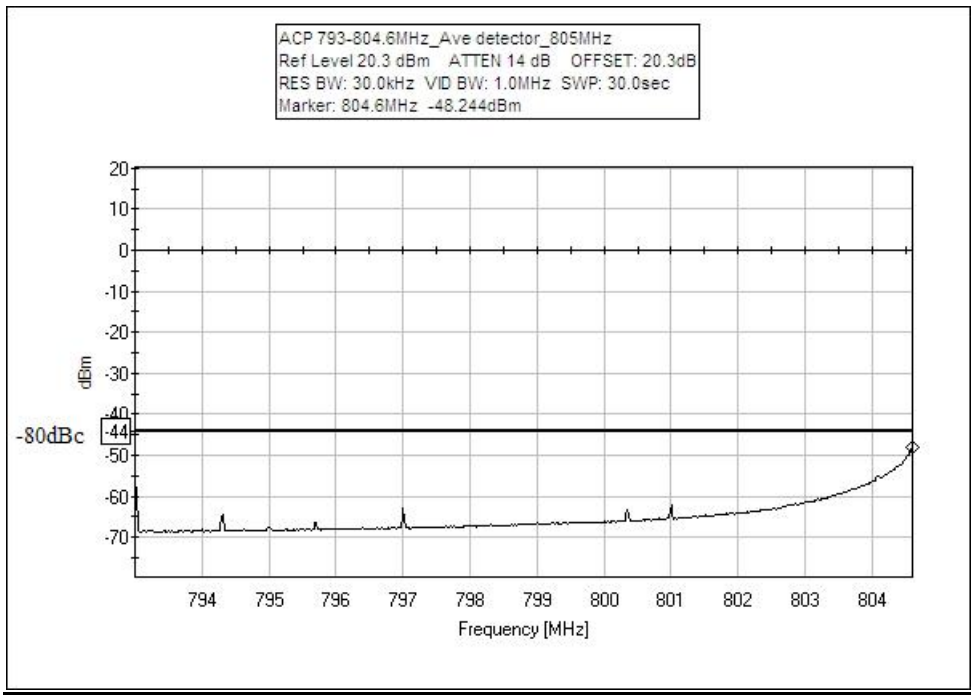
ADJACENT CHANNEL POWER 805 MHz



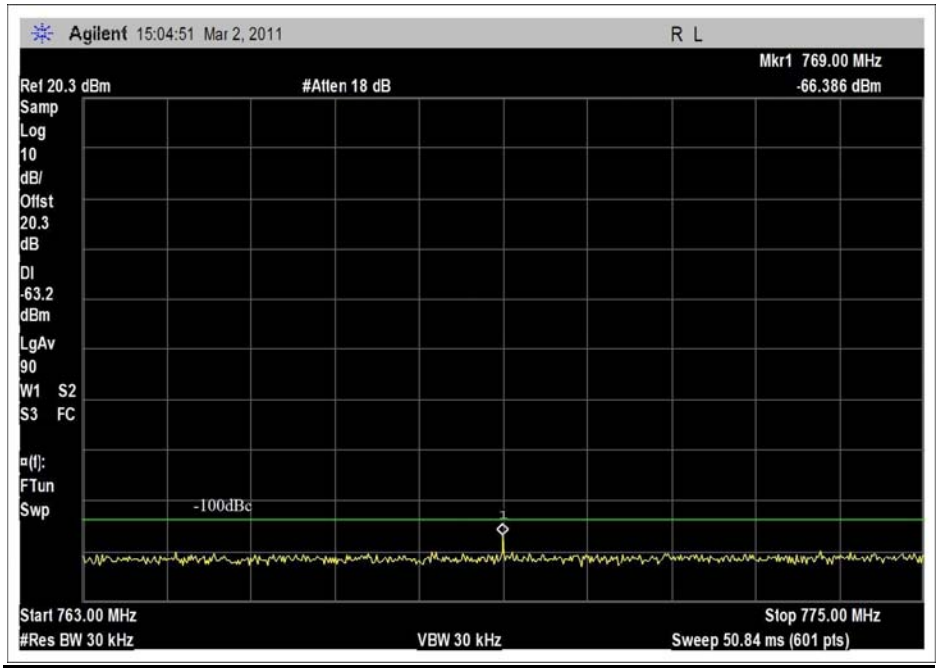
ADJACENT CHANNEL POWER 793 MHz



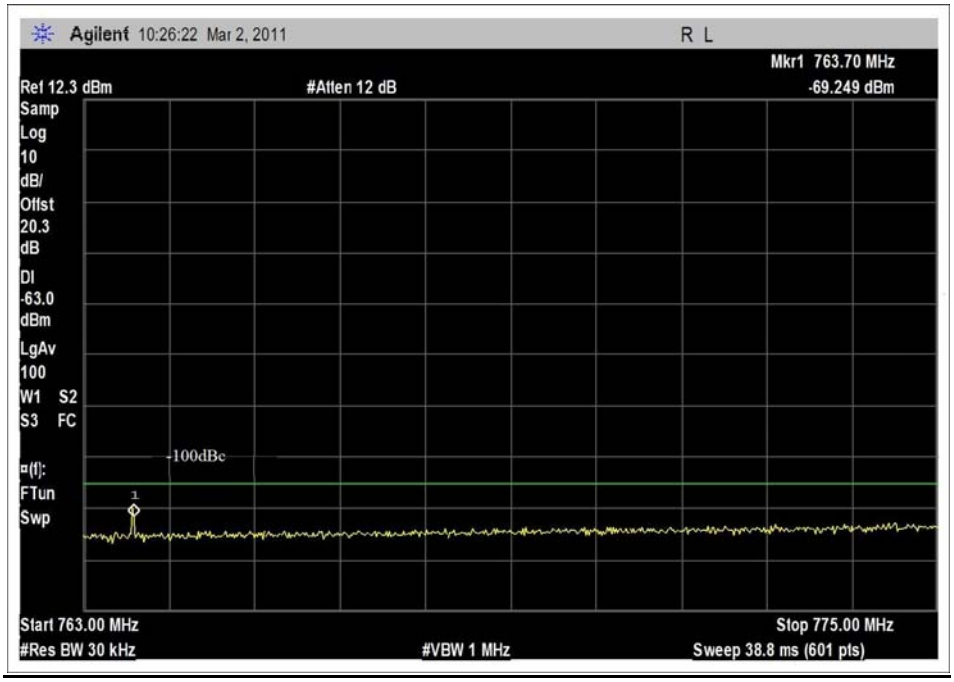
ADJACENT CHANNEL POWER 799 MHz



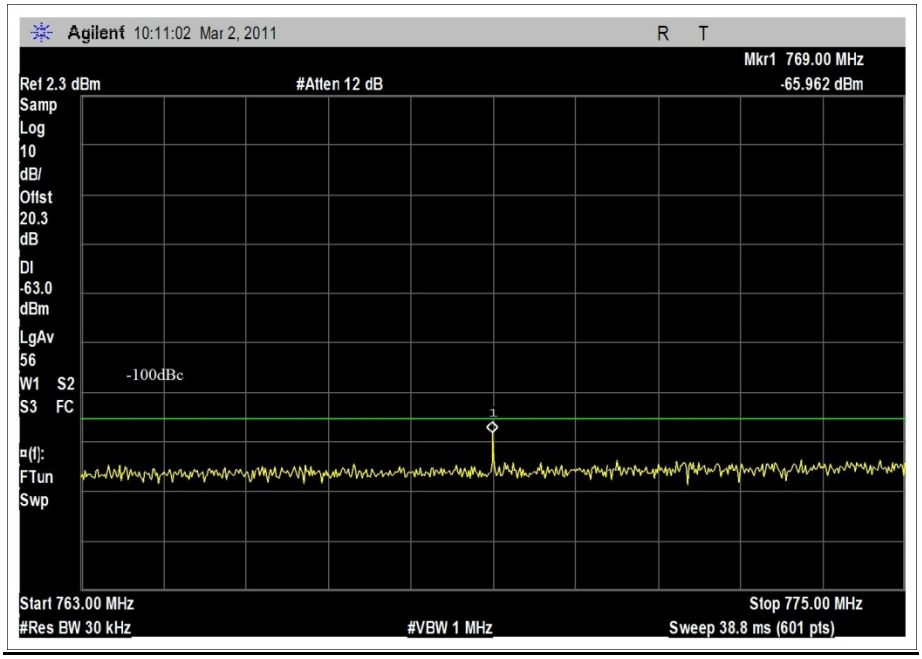
ADJACENT CHANNEL POWER 805 MHz



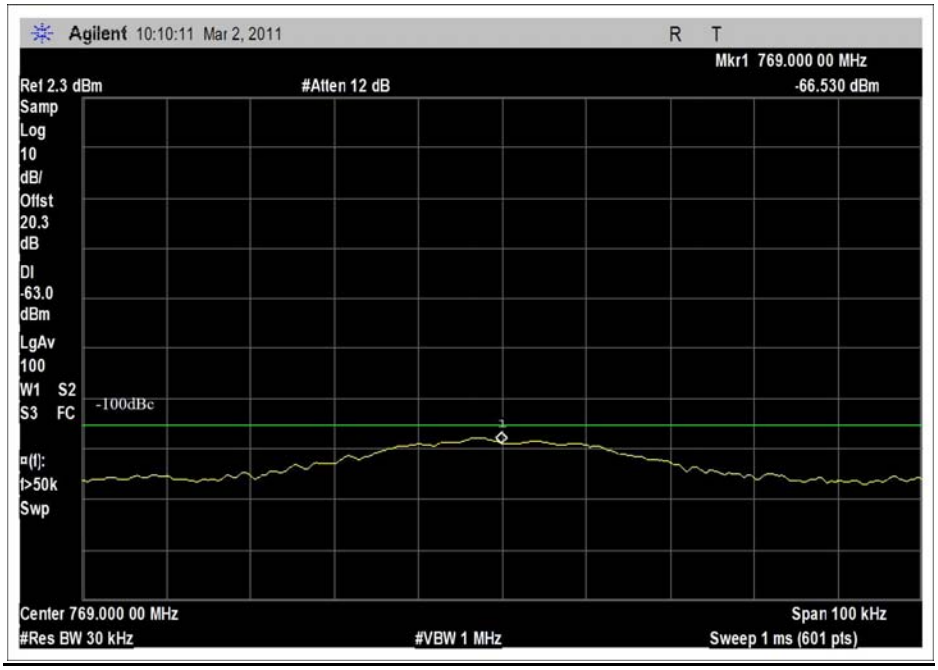
Paired Receive Band 793 MHz



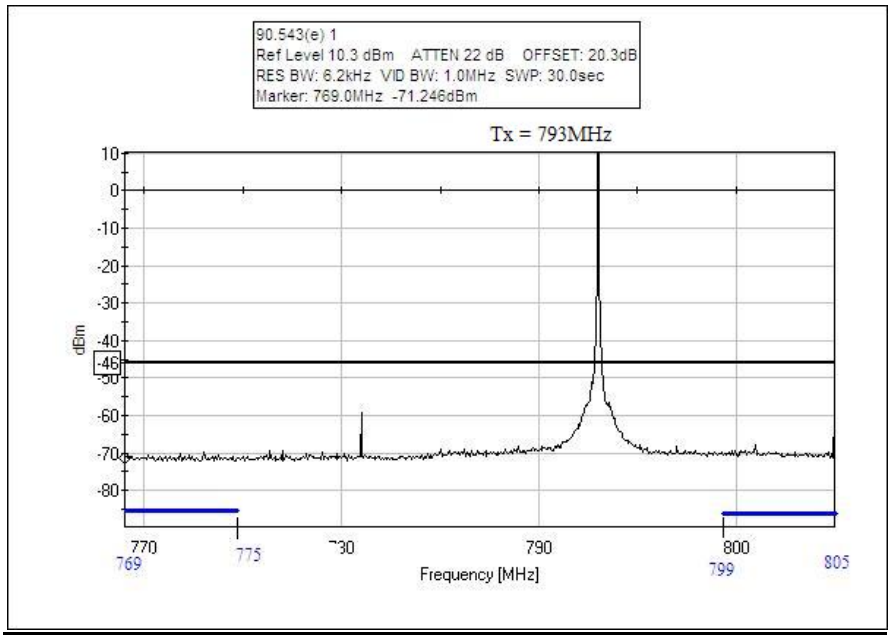
Paired Receive Band 799 MHz



Paired Receive Band 805 MHz

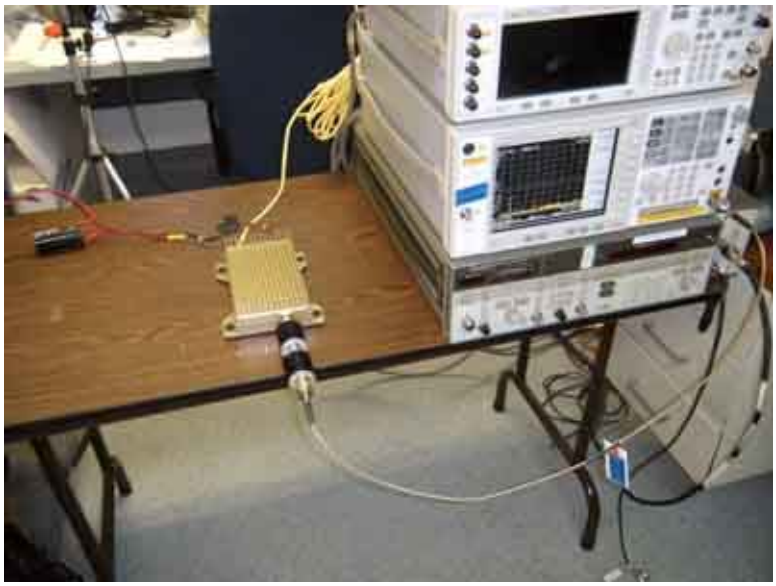


Paired Receive Band 805 MHz (zoom in)



Transmit 793 MHz

Test Setup Photos



2.1033(c)(14)/2.1051/90.543(c) - Spurious Emissions at Antenna Terminal

Test Data

Test Location: CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • (714) 993-6112

Customer:	**IP MobileNet**		
Specification:	**47 CFR §90.543(c) Spurious Conducted Emissions**		
Work Order #:	**90892**	Date:	8/19/2010
Test Type:	**Conducted Emissions**	Time:	10:35:34
Equipment:	**7/800 MHz 32k fixed radio**	Sequence#:	1
Manufacturer:	IP MobileNet	Tested By:	S. Hundal
Model:	F32789N25		120V 60Hz
S/N:	NA		

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02946	Cable	32022-2-2909K-36TC	9/14/2009	9/14/2011
	AN02869	Spectrum Analyzer	E4440A	2/21/2009	2/21/2011

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

Function	Manufacturer	Model #	S/N
7/800 MHz 32k fixed radio*	IP MobileNet	F32789N25	NA

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

The equipment under test (EUT), support equipment and test equipment are located on the table top. The EUT Ethernet port is connected to the laptop computer via shielded Ethernet cable. The EUT RF_OUT port is connected to high power attenuators and then a high frequency coaxial cable to a spectrum analyzer. The power supply is providing 13.8VDC to the EUT. The laptop is running IpMsg and RemoteKeys and is used to command the EUT to transmit and receive and is also used to change the EUT between transmit and receive channels. The test is performed with the EUT transmitting on its low (793MHz), middle (799MHz), and high (805MHz) channels. The transmit range of the EUT is 793MHz to 805MHz.

No Emissions found in the band 1559-1610 MHz

Frequency range of measurement = 4MHz - 8GHz
Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz-10,000 MHz RBW=1 MHz, VBW=1 MHz.

Temperature: 23ºC, Humidity: 47%, Pressure: 101kPa.

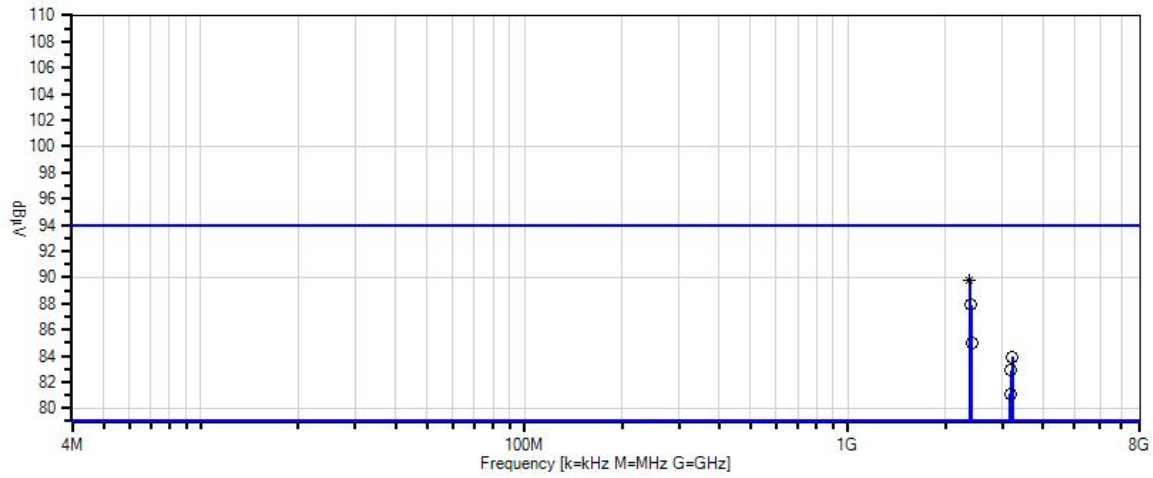
Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Lead: None

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2378.980M Ave	89.2	+0.6				+0.0	89.8	94.0 794MHz Low Channel	-4.2	None
^	2378.980M	89.7	+0.6				+0.0	90.3	94.0 794MHz Low Channel	-3.7	None
3	2397.020M	87.3	+0.6				+0.0	87.9	94.0 800 MHz Mid Channel	-6.1	None
4	2415.020M	84.4	+0.6				+0.0	85.0	94.0 806MHz High Channel	-9.0	None
5	3219.960M	83.2	+0.7				+0.0	83.9	94.0 806MHz High Channel	-10.1	None
6	3195.980M	82.2	+0.7				+0.0	82.9	94.0 800 MHz Mid Channel	-11.1	None
7	3172.000M	80.4	+0.7				+0.0	81.1	94.0 794MHz Low Channel	-12.9	None
8	837.545M	77.5	+0.4				+0.0	77.9	94.0 794MHz Low Channel	-16.1	None
9	843.537M	77.1	+0.4				+0.0	77.5	94.0 800 MHz Mid Channel	-16.5	None
10	849.550M	76.5	+0.4				+0.0	76.9	94.0 806MHz High Channel	-17.1	None
11	754.462M	75.8	+0.4				+0.0	76.2	94.0 800 MHz Mid Channel	-17.8	None
12	760.460M	75.8	+0.4				+0.0	76.2	94.0 806MHz High Channel	-17.8	None
13	748.460M	75.0	+0.4				+0.0	75.4	94.0 794MHz Low Channel	-18.6	None
14	252.000M	68.4	+0.2				+0.0	68.6	94.0 794MHz Low Channel	-25.4	None
15	251.997M	67.7	+0.2				+0.0	67.9	94.0 806MHz High Channel	-26.1	None
16	251.998M	67.3	+0.2				+0.0	67.5	94.0 800 MHz Mid Channel	-26.5	None

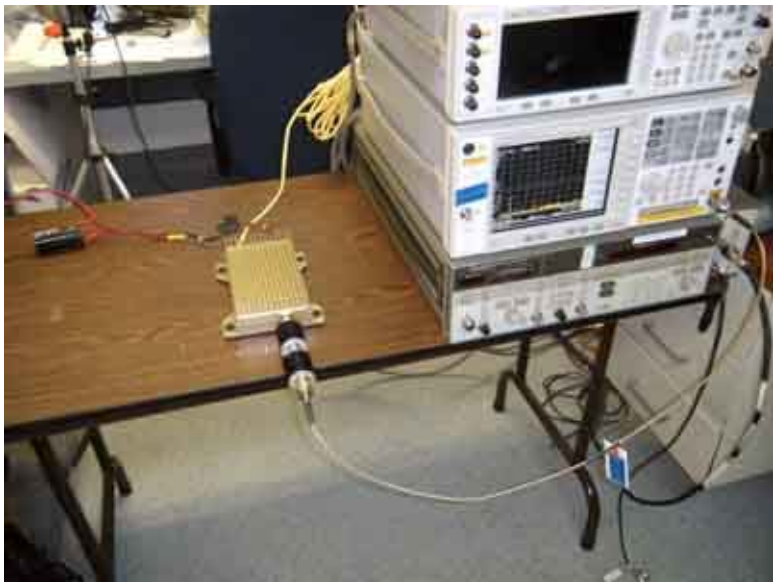
17	537.020M	62.7	+0.3	+0.0	63.0	94.0	-31.0	None 806MHz High Channel
18	539.020M	62.0	+0.3	+0.0	62.3	94.0	-31.7	None 800 MHz Mid Channel
19	516.995M	61.8	+0.3	+0.0	62.1	94.0	-31.9	None 794MHz Low Channel

CKC Laboratories, Inc. Date: 8/19/2010 Time: 10:35:34 IPMobileNet WO#: 90892
47 CFR §90.543(c) Spurious Conducted Emissions Test Lead: None 120V 60Hz Sequence#: 1 Ext ATTN: 0 dB



Sweep Data
Readings
Peak Readings
QP Readings
Average Readings
Ambient
1 - 47 CFR §90.543(c) Spurious Conducted Emissions

Test Setup Photos



2.1033(c)(14)/2.1053/90.543(c) - Field Strength of Spurious Radiation

Test Equipment

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00010	Preamp	8447D	3/19/2010	3/19/2012
T2	AN00851	Biconilog Antenna	CBL6111C	3/8/2010	3/8/2012
T3	ANP01911	Cable	RG214/U	11/11/2009	11/11/2011
T4	ANP05954	Cable	RG-214/U	11/11/2009	11/11/2010
T5	AN02869	Spectrum Analyzer	E4440A	2/21/2009	2/21/2011
T6	ANP04382	Cable	LDF-50	9/22/2008	9/22/2010
T7	AN00787	Preamp	83017A	6/4/2009	6/4/2011
T8	AN00849	Horn Antenna	3115	4/23/2010	4/23/2012
T9	AN02946	Cable	32022-2-2909K-36TC	9/14/2009	9/14/2011
T10	ANP05988	Cable	LDF1-50	3/12/2010	3/12/2012
	AN00314	Loop Antenna	6502	6/30/2010	6/30/2012

Test Conditions

The equipment under test (EUT), support equipment and test equipment are located on the table top. The EUT Ethernet port is connected to the laptop computer via shielded Ethernet cable. The EUT RF_OUT port is connected to high power attenuators and then a high frequency coaxial cable to a spectrum analyzer. The power supply is providing 13.8VDC to the EUT. The laptop is running IpMsg and RemoteKeys and is used to command the EUT to transmit and receive and is also used to change the EUT between transmit and receive channels. The test is performed with the EUT transmitting on its low (794MHz), middle (800MHz), and high (806MHz) channels. The transmit range of the EUT is 794MHz to 806MHz.
No Emissions found in the band 1559-1610 MHz
Frequency range of measurement = 4MHz - 8GHz
Frequency 9 kHz - 150 kHz RBW=200 Hz, VBW=200 Hz; 150 kHz- 30 MHz RBW=9 kHz, VBW=9 kHz; 30 MHz- 1000 MHz RBW=120 kHz, VBW=120 kHz; 1000 MHz-10,000 MHz RBW=1 MHz, VBW=1 MHz.
Temperature: 23ºC, Humidity: 47%, Pressure: 101kPa.

Test Data

Operating Frequency: 794 MHz - 806 MHz
Channels: Low, Mid and High
Highest Measured Output Power: 37.36 ERP(dBm)= 5.44 ERP(Watts)
Distance: 3 meters
Limit: 43+10Log(P) 50.36 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
2,397.00	-25.6	Vert	62.96
2,378.00	-26.9	Vert	64.26
2,415.00	-27.6	Horiz	64.96
3,220.00	-22.6	Vert	59.96
3,196.00	-26.1	Horiz	63.46
843.54	-25.9	Vert	63.26
837.60	-26.8	Horiz	64.16
3,172.00	-27.4	Horiz	64.76
849.60	-27	Horiz	64.36
754.46	-28.9	Vert	66.26
760.50	-29.3	Horiz	66.66
748.50	-30.4	Vert	67.76

Limit line for Spurious Radiated Emission

Required Attenuation = 43+10 Log P (dB)

For radiated spurious emission measured at 3 meter test distance,

Required attenuation = 43+10 Log $P_{t \text{ at 3 meter}}$ dB
Limit line (dBuV) = E_{dBuv} - Attenuation

E_{dBuv} = Measured field strength at 3 meter in dBuV/m

Power Density (Isotropic)

$$P_D = \frac{P_t}{4\pi r^2}$$

P_D = Power Density in Watts /m^2
Pt = Average Transmit Power
r = Test distance

Field Intensity E (V/m)

$$E = \sqrt{P_D \times 377}$$

$$E = \frac{\sqrt{P_t \times 377}}{4\pi r^2}$$

$$E = \sqrt{\frac{P_t \times 30}{r^2}}$$

$$P_t = \left(\frac{E^2 \times r^2}{30} \right)$$

10 Log P_t = 10 Log E^2 (V/m)+ 10 Log r^2 – 10 Log 30

10 Log P_t = 20 Log E (V/m) + 20 Log r – 10 Log 30

At 3 meter, r = 3 m

$10 \text{ Log } P_t = 20 \text{ Log } E \text{ (V/m)} + 20 \text{ Log } 3 - 10 \text{ Log } 30$

$10 \text{ Log } P_t = 20 \text{ Log } E \text{ (V/m)} + 9.54 - 14.77$

$10 \text{ Log } P_t = 20 \text{ Log } E \text{ (V/m)} - 5.23$

*Since 20 Log E (V/m) = 20 Log E (**u**V/m) –120*

$10 \text{ Log } P_t = 20 \text{ Log } E \text{ (uV/m)} - 120 - 5.23$

$10 \text{ Log } P_t = 20 \text{ Log } E \text{ (uV/m)} - 125.23$

Limit line (dBuV) at 3 meter = E_{dBuv} – Attenuation

= E_{dBuv} - (43+10 Log $P_{t \text{ at 3 meter}}$)

= E_{dBuv} - 43 - 10 Log $P_{t \text{ at 3 meter}}$

= E_{dBuv} - 43 – (20 Log E (uV/m) –125.23)

= E_{dBuv} - 43 - 20 Log E (uV/m) + 125.23

= E_{dBuv} - 20 Log E (uV/m) + 82.23

Since 20 Log E (uV/m) = E in dBuV/m

= ~~E_{dBuv}~~ - ~~E_{dBuv}~~ + 82.23

Radiated Emission limit 3 meter = 82.23 dBuV at any power level measured in dBuV

Test Setup Photos

2.1033(c)(14)/2.1055/90.539(c) & (e) - Frequency Stability

Engineer Name: S. Hundal

Test Equipment				
Name	**Serial**	**Cal Date**	**Cal Due**	**Asset**
Spectrum Analyzer	MY46186290	2/21/2009	2/21/2011	02869
Thermometer	6995218	11/9/2009	11/9/2011	P05947
Temperature Chamber	25-1758-25	8/6/2008	8/6/2010	01878
Cable	12237/4A	2/12/2010	2/12/2012	P05421

Test Conditions

The EUT is placed in the temperature chamber. RF signal is monitored from the antenna port. A spectrum analyzer is employed to measured the frequency stability of the EUT

Test Data

Device Model #:		F32789N25						
Operating Voltage:		13.8	**Vdc**					
Frequency Limit:		2.50E+00	**ppm**					

Temperature Variations

		Channel 1 (MHz)	**Dev (ppm)**	**Channel 2 (MHz)**	**Dev (ppm)**	**Channel 3 (MHz)**	**Dev (ppm)**
Channel Frequency:		793.000000000		799.000000000		805.000000000	
Temp (C)	Voltage						
-30	13.8	792.999780000	0.277427	798.999640000	0.450563	804.999780000	0.273292
-20	13.8	792.999780000	0.277427	798.999760000	0.300375	804.999700000	0.372671
-10	13.8	792.999840000	0.201765	798.999820000	0.225282	804.999860000	0.173913
0	13.8	792.999760000	0.302648	798.999780000	0.275344	804.999780000	0.273292
10	13.8	792.999910000	0.113493	798.999900000	0.125156	804.999940000	0.074534
20	13.8	792.999950000	0.063052	798.999910000	0.112641	804.999860000	0.173913
30	13.8	792.999890000	0.138714	798.999900000	0.125156	804.999880000	0.149068
40	13.8	792.999920000	0.100883	798.999900000	0.125156	804.999950000	0.062112
50	13.8	792.999870000	0.163934	798.999880000	0.150188	804.999880000	0.149068

Voltage Variations (±15%)

Temp (C)	Voltage	**Channel 1 (MHz)**	**Dev. (MHz)**	**Channel 2 (MHz)**	**Dev. (MHz)**	**Channel 3 (MHz)**	**Dev. (MHz)**
20	11.7	792.999890000	0.138714	798.999870	0.162703	804.999880	0.149068
20	24.0	792.999960000	0.050441	798.999970	0.037547	804.999960	0.049689
20	15.9	792.999895000	0.132409	798.999800	0.250313	804.999880	0.149068

Max Deviation (ppm)		**+**	**0.30265**		**0.45056**		**0.37267**
Max Deviation (ppm)		**-**	**-0.05044**		**-0.03755**		**-0.04969**
			PASS		**PASS**		**PASS**

Test Setup Photos

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

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

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

Emissions Test Details

TESTING PARAMETERS

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.

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 "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the highest readings, this is indicated as a "QP" or an "Ave" on the appropriate rows of the data sheets. 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/receiver readings recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the measuring device called "peak hold," the measuring device had the ability to measure transients 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

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the quasi-peak detector.

Average

For certain frequencies, average measurements may be made using the spectrum analyzer/receiver. 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.