

**ELECTROMAGNETIC COMPATIBILITY
TEST REPORT
TO
FCC 47 CFR Part 24
&
INDUSTRY CANADA RSS-133 Issue 5
TEST REPORT
for
Transmitter Intentional Radiator**

Report Number: E10599-1302 1X
Issue: Modified Version 2.0
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Testing laboratory..... : Quality Auditing Institute

Address..... : 16 – 211 Schoolhouse Street, Coquitlam, BC, V3K 4X9, Canada

Accreditations (ISO 17025):



Standard Council of Canada: Accredited Laboratory No. 743

International Accreditation Service Inc.: Accredited Laboratory: No. TL-239

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Contact..... : Randeep Chatha, randeep.chatha@starsolutions.com

Industry Canada Registration : 8076A-11001001
FCC Registration: S52-1-10-01-00-1

Test specifications:

Standard..... : RSP-100 Iss 9; RSS-Gen Iss 3; RSS-102 Iss 4; RSS-133 Iss 6;
FCC Part 2; FCC Part 24.
Test Procedure..... : As called by the standards above and TIA/EIA-603-C
Non-standard test method..... : N/A



STARSOLUTIONS

ENABLING NETWORKS TO REACH NEW MARKETS

Trade Mark:

Manufacturer:

Model Number:

Model Description:

Star Solutions International Inc.

QX9004.0

iCell QUADPAC 1X IP-RAN 1900MHz CPU AC GPS



Revision History

Date	Report Number	Rev #	Details	Authors Initials
Oct 15, 2013	E10599-1302	0.0	Draft Test Report	DJ
Oct 16, 2013	E10599-1302 1X	1.0	Original Release Test Report Corrected document number and Firmware Revision	DJ
Nov 06, 2013	E10599-1302 DO	2.0	Modified Out-Of-Band Spurious Radiated Emissions	DJ

All previous versions of this Report have been superseded by the latest dated Revision as listed in the above table. Please dispose of all previous electronic and paper printed revisions accordingly.

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Section I. GENERAL TEST INFORMATION

EMC TEST SUMMARY

The following tests demonstrate testimony for the FCC & IC Marks for Transceivers / electromagnetic compatibility testing for this EUT as required by FCC Part 24 and IC RSS-133 Issue 6.

Test / Requirement Description	Applicable FCC Rule Parts	Applicable Industry Canada Rule Parts	Results		Pass / Fail
			Limit	Measured	
Antenna Requirements	N/A	RSS-Gen, Issue 3	No	No	Pass
Frequency Range(s)	2.1033(c)(5) 24.229	RSP-100(7.2)(a)	1930-1990MHz	1931.25-1988.75 MHz	Pass
RF power output at antenna terminals	2.1033(c)(6) 2.1033(c)(7) 2.1046 24.232	RSP-100(7.2)(a) RSS-133	EIRP 65 dBm	21.7-22.3 dBm	Pass
99% Bandwidth		RSS-GEN (4.4.1) RSS-133	N/A	1.28MHz	Pass
Occupied Bandwidth (26dB)	2.1049 24.200		N/A	1.44MHz	Pass
Spurious Emissions at antenna terminals	2.1051 2.1057 24.238	RSS-133	-13 dBm	>20dB margin	Pass
Spurious Emissions Radiated Field Strength	2.1053 2.1057	RSS-133	-13 dBm	>20dB margin	Pass
Frequency Stability	2.1055 24.235	RSS-GEN (4.7)	1ppm	0.8ppm	Pass

Tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with CFR 47 FCC Part 24 and Industry Canada RSS-133. The manufacturer is responsible for the tested product configuration, continued product compliance with these standards listed, and for the appropriate auditing of subsequent products as required.

X

Tested By & Report Written By David Johanson,
RF/EMC Test Engineer

X

Reviewed By Amandeep Jathaul
RF/EMC Test Engineer

TEST RESULT CERTIFICATION

Applicant: Star Solutions International, Inc.
 Suite 120 – 4600 Jacombs Rd. Richmond BC, V6V 3B1, Canada

Equipment Under Test:

Part Number: 24245263GS
 Product Description: iCell QUADPAC 1X IP – RAN 1900MHz CPU AC GPS
 Model Number: QX9004.0
 and
 Part Number: 24246788GS
 Product Description: iCell QUADPAC 1X IP – RAN 1900MHz AC GPS
 Model Number: QX9003.0
Date of Test: Sept 23-Oct 09, 2013

EUT DESCRIPTION

EUT	
Functional Description	<p>The Star Solutions iCell QUADPAC 1X IP-RAN 1900MHz CPU AC GPS is a 1xRTT CDMA2000 PCS Base Station which is designed to operate Tx: 1930-1990MHz and RX: 1850-1910MHz.</p> <p>The QuadPAC is part of the Star Solutions All-IP CDMA2000® network.</p> <p>The All-IP CDMA2000® network is an end-to-end, all-Internet-Protocol (IP)-based, wireless communication solution. The CDMA2000® system provides the mobility and media control traditionally associated with a circuit-switched Mobile Switching Center (MSC), but in a packet-based environment.</p> <p>The All-IP CDMA2000® system is 2G- and 3G-capable, supporting cdmaOne and CDMA2000 1x and Evolution Data Optimized (EV-DO) networks. By deploying the CDMA2000® system in 2G and 3G environments, network operators gain the efficiency inherent in packet-based networks, while building a network core that is capable of supporting 3G standards.</p> <p>The iCell™ QuadPAC IP-RAN is a configurable 1RU rackmount basestation solution for CDMA2000™ 1X picocell deployment requirements. The QuadPAC unit is designed to house a 1X BTS Module, a Power Supply Module, a timing source module (either a clock (higher-performance OCXO) module or a GPS receiver module), and an optional CPU Network Module that enables CDMA network functionality such as the BSC, PDSN, and Wireless Call Manager. The QuadPAC provides single-carrier, single-sector coverage with a 32 channel-element capacity.</p> <p>The iCell QuadPAC hardware configuration consists of a base configuration with additional optional modules that can be installed depending on the deployment scenario.</p> <p>The base configuration consists of:</p> <ul style="list-style-type: none"> ■ BSS Module (BTS and integrated BSC) ■ Power Supply Module ■ GPS Module - Provides a frequency reference 1PPS signal via a GPS antenna

	<ul style="list-style-type: none"> ■ Clock Module - Provides a stand-alone frequency reference if a GPS signal is not readily available ■ CPU Module - Enables CDMA network functionality such as the BSC, PDSN, and Wireless Call Manager (wCM).
Operational Description	1X CDMA Forward signal is developed in the Qualcomm CSM5000 CDMA modems in the main digital board of the BTS module. The digitizer module converts the signal to analog. This signal is up-converted to the desired channel frequency, amplified and filtered.
Antenna	No antenna was provided with this sample.
Ratings	100-240Vac 50/60Hz 100VA (in normal operating environment)
Software and Firmware	<p>The EUT was programmed and verified with a host laptop equipment during testing using Windows 7 operating system and Windows Explorer. The Star Solutions Software FCC_TOOL ver 7.0.6 was used to change the channels and power settings of the EUT.</p> <p>The EUT firmware tested was: 1.2.8 Production Release</p> <p>The Software Application firmware was: 8.1.6 Production Release</p>
Received Date	September 23, 2013
Received By	David Johanson
Sample Log	QAI Product Control Log (QM 1305 - Sample Inventory)

FACILITIES AND ACCREDITATION

Testing Laboratory:	Quality Auditing Institute
Address	16 – 211 Schoolhouse Street, Coquitlam, BC, 3K 4X9, Canada
Associated Laboratory:	Quality Auditing Institute EMC lab (Remote location)
Address	19473 Fraser Way, Pitt Meadows, BC, V3Y 2V4, Canada
Tested & Reported by.....	David Johanson
Checked by.....	Amandeep Jathaul

ENVIROMENTAL CONDITIONS:

INDOORS: Temperature: 22-28°C R.H.: 39.7 - 54.4%

OUTDOORS: Temperature: 18°C R.H.: 58%

TESTING METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4, FCC CFR 47 Part 2, FCC CFR 47 Part 24, and RSS-Gen, Issue 3 and RSS-133, Issue 6. The FCC testing was also done using the FCC KDB 971168 D01 Measurement Guidance for Certification of Licensed Digital Transmitters v02r0.

EUT TESTING CONFIGURATION

For the purpose of compliance testing, the EUT was powered using 120Vac 60Hz. The transmitter was set for continuous operation on various frequencies in modulated modes of operation as required for the test. Only the iCell QUADPAC 1X IP – RAN 1900MHz CPU AC GPS (Model Number: QX9004.0) was tested, it has the extra CPU board installed, since this was considered the same as the iCell QUADPAC 1X IP – RAN 1900MHz AC GPS (Model Number: QX9003.0)

WORST TEST CASE

The worst-case channel is determined as the channel with the highest output power using the narrowest Bandwidth Modulation. The highest measured output power was on Channel 600 at 1960MHz using the default QPSK modulation.

TEST SETUP

The EUT was connected to 120Vac 60Hz power source.

The RF Section Ethernet port was connected to the CPU Ethernet port 1 using a 1meter Ethernet cable with an appropriate Ferrite to reduce the digital mode emissions.

The CPU Ethernet port 2 was connected directly into a Laptop Ethernet port for programming and monitoring of the EUT.

The RF Input port was connected to a 1 meter cable that was terminated with a 50Ohm load.

The RF Output was connected to an EMI Receiver and Spectrum Analyzer or an RF Power Meter through the appropriate cables, attenuators and filters as required to make the RF Conducted measurements.

The RF Output was terminated into a 50Ohm to make the Radiated Spurious Emissions measurements.

The RF GPS port was connected to a 100meter cable and a GPS antenna that was located outside to receive the GPS data from the satellites.

The GPS module was used for all RF and Spurious emissions measurements.

The Clock module was used for Digital mode emissions measurements.

ANTENNA DESCRIPTION

No Antenna was included with this test. The Antenna(s) used for this transmitter must be fixed-mounted on permanent outdoor structures. RF exposure compliance is addressed at the time of licensing, as required by the responsible agencies, including antenna co-location requirements.

GENERAL TEST PROCEDURES

RF Conducted Emissions

The EUT is placed on a test bench connected directly to an EMI Receive and Spectrum Analyzer. Conducted emissions are measured in the frequency range 10kHz to 25GHz using CISPR Peak, Quasi-Peak and Average detectors.

AC Mains Conducted Emissions

The EUT is placed on the turntable 0.8m above a ground plane. Conducted emissions are measured in the frequency range 0.15 – 30MHz using CISPR quasi-peak and average detector.

Radiated Emissions

The EUT is placed on the turntable 0.8m above a ground plane 3m away from a receiving antenna. Height of receiving antenna varied from 1m to 4m, its polarity changes from vertical to horizontal. Turntable rotates 360 degrees. Motion of turntable and receiving antenna allows determining position of maximum emission level. Quasi-peak detector applies for measurements of emissions with frequency range of 30 to 1000MHz. and average/peak detector otherwise.

Radiated Emissions for Out-Of-Band Spurious Emissions

The EUT output was terminated into a 50Ohm load and the Spurious emissions were measured using the Radiated Emissions procedure. The emission level was then re-measured using the Substitution method procedure as outlined in ANSI TIA/EIA-603 section 2.2.12 .

MEASUREMENT UNCERTAINTY

Radio Frequency	: $\pm 1,5 \times 10^{-5}$
Total RF power, conducted.....	: ± 1 dB
RF power density, conducted.....	: ± 2.75 dB
Spurious emissions, conducted.....	: ± 3 dB
All emissions, radiated.....	: ± 3.5 dB
Temperature.....	: $\pm 1^\circ\text{C}$
Humidity.....	: ± 5 %
DC and low frequency voltages.....	: ± 3 %

TESTING EQUIPMENT

Test Equipment List

Manufacturer	Model	Description	Serial No.	Last Cal	Cal Due Date
ETS Lindgren	2165	Turntable	00043677	N/A	N/A
ETS Lindgren	2125	Mast	00077487	N/A	N/A
Sunol Sciences	JB3	Biconilog Antenna 30MHz-3GHz	A120004	28-Oct-2013	28-Oct-2015
COM-POWER	AHA-118	Dual Ridge Horn Antenna	711040	11-Mar-2011	11-Mar-2014
Sunol Sciences	DRH-118	Dual Ridge Horn Antenna	A052804	12-Apr-2012	12-Apr-2015
Rohde & Schwarz	ESU40	EMI Receiver	100011	26-June-2012	26-Jun-2015
Boonton	4200-S/17	RF Microwatt Power Meter	430519BG	13-Mar-2013	13-Mar-2016
Boonton	51033-6E	Average Power Sensor	15779	18-Mar-2013	18-Mar-2016
COM-POWER	LI-115	LISN	241036	9-Mar-2011	9-Mar-2014
ETS Lindgren	S201	3 meter Semi-Anechoic Chamber	1030	N/A	N/A
MadgeTech	PRHTemp2 00	Temperature, Humidity & Pressure Recorder	N53053	26-July-2012	26-July-2015
Cincinnati Sub- Zero	ZH-16-2-2- H/16	Temperature and Humidity Chamber	Z0013305	N/A	N/A

Measurement Software List

Manufacturer	Model	Version	Description
Rhode & Schwarz	EMC 32	6.20.0	Emissions Pre-scan Test Software

Auxiliary Equipment List

Description	Laptop
Manufacturer	Dell
Model No.	PP18L Windows Vista
Description	GPS Antenna
Manufacturer	Trimble
Model No.	57860-20
Description	250w 40dB Attenuator
Manufacturer	SMELECTRONICS
Model No.	SA3N250-40S

Cables

Description	Length	Connector A	Connector B	Shielded	Ferrites
RF Section Ethernet	1m	RJ45	RJ45	No	Yes
CPU Ethernet	1m	RJ45	RJ45	No	No
RF Output	1m	SMA MALE	SMA MALE	Yes	No
RF Input	1m	SMA MALE	SMA MALE	Yes	No
GPS Port	100m	SMA MALE	TNC MALE	Yes	No

Section II. EUT TEST RESULTS

Part 1 - RF Output Power , 99% OBW and 26dB BW

DATE(s): October 4, 2013

TEST STANDARD: FCC Part 24 and IC RSS-133

TEST VOLTAGE: 120Vac 60Hz

MINIMUM STANDARD: 3.16kW (65 dBm)

TEST SETUP: The antenna port of EUT was directly connected to an RF Power Meter or a spectrum analyzer.

MEASUREMENT METHOD: As called by the standards above.

DEVICE DESCRIPTIONS: As described in the above EUT description and set up section.

EMISSIONS DATA:

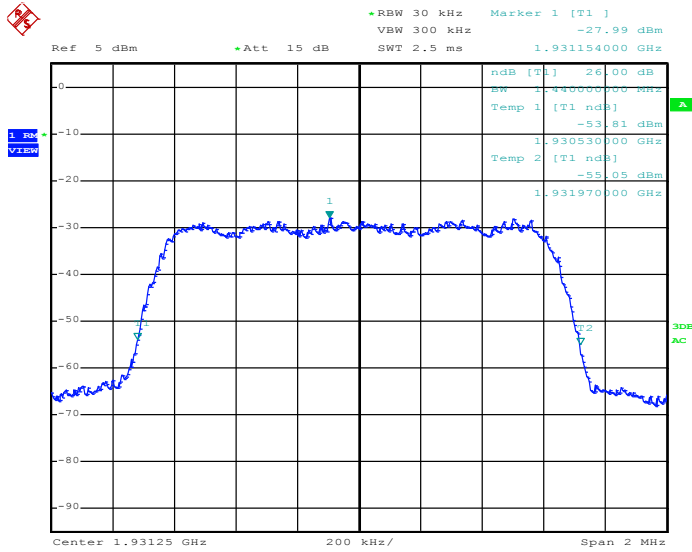
Channel	modulation	Frequency (MHz)	RF Output Setting (dBm)	Measured (dBm)	Corrections (dB)	Measured Output Power (dBm)	99% OBW (MHz)	26dB BW (MHz)
25	DAC9 QPSK	1931.25	21	-20.30	42.5	22.20	1.270	1.440
600	DAC9 QPSK	1960.00	21	-20.18	42.5	22.32	1.280	1.440
1175	DAC9 QPSK	1988.75	21	-20.93	42.6	21.67	1.277	1.428

OBSERVATIONS: The EUT performed as expected.

PERFORMANCE: Complies.

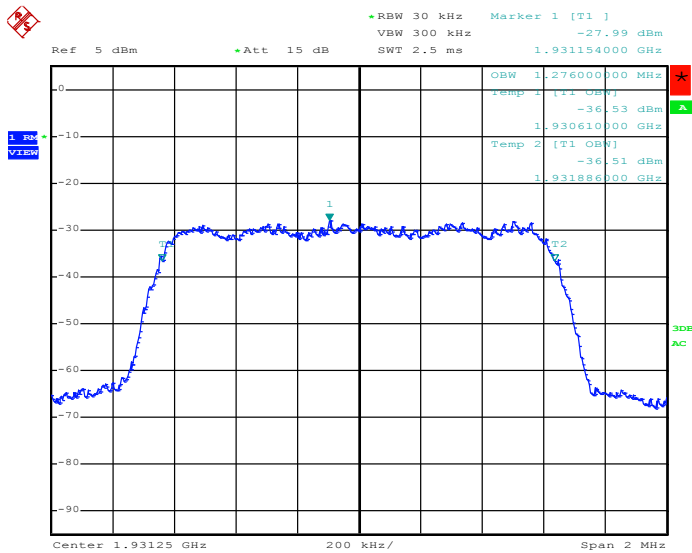
Sample Test Plots

Channel 25 26dB Occupied Bandwidth



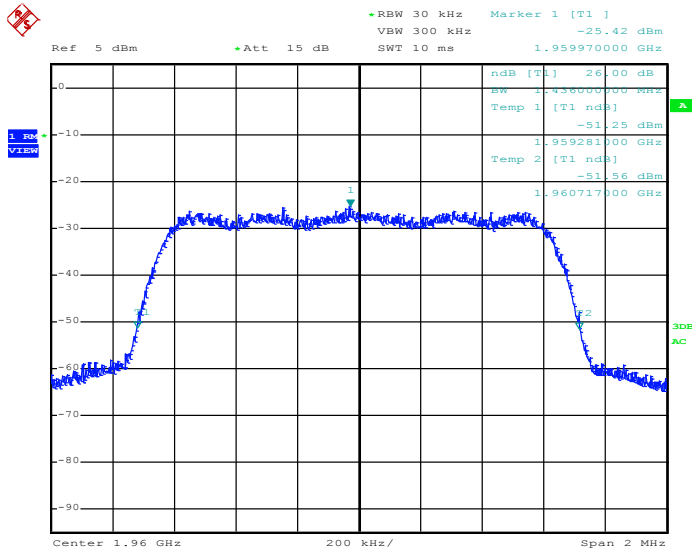
Date: 8.OCT.2013 09:29:00

Channel 25 99% Occupied Bandwidth



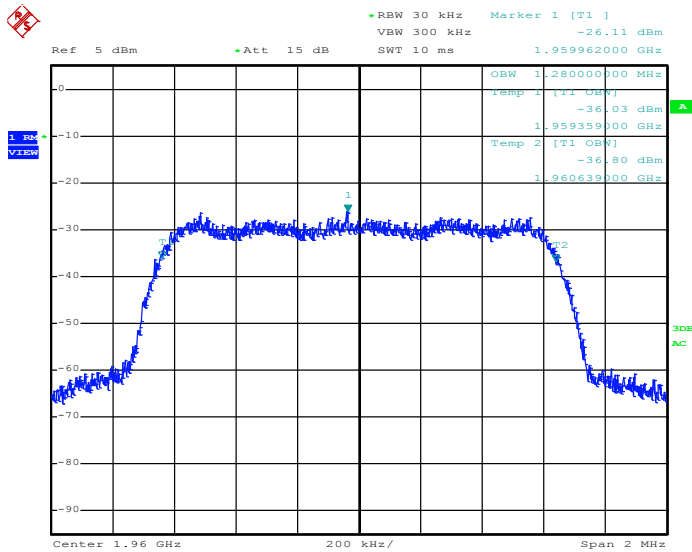
Date: 8.OCT.2013 09:29:49

Channel 600 26dB Occupied Bandwidth



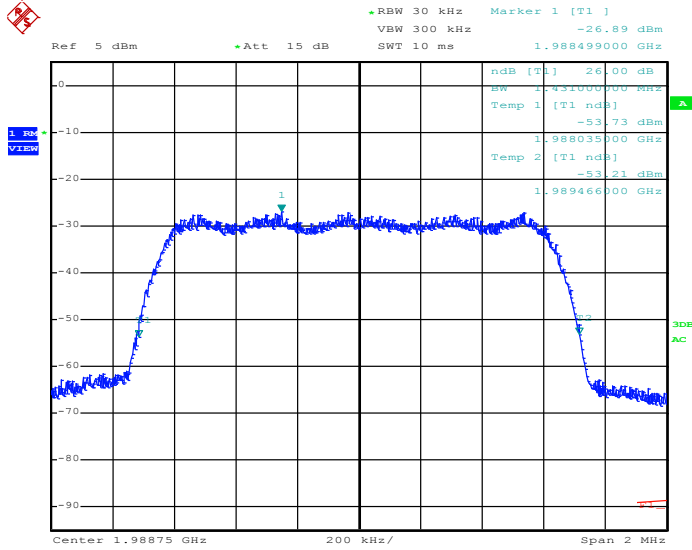
Date: 8.OCT.2013 14:16:36

Channel 600 99% Occupied Bandwidth



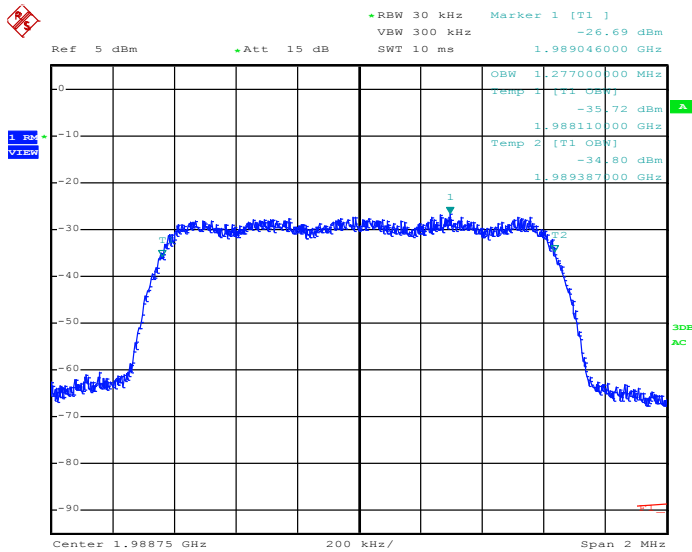
Date: 8.OCT.2013 14:18:29

Channel 1175 26dB Occupied Bandwidth



Date: 8.OCT.2013 13:41:17

Channel 1175 99% Occupied Bandwidth



Date: 8.OCT.2013 13:43:20

Part 2 - Peak-to-Average ratio

DATE(s): October 4, 2013
 TEST STANDARD: FCC Part 24 and IC RSS-133
 TEST VOLTAGE: 120Vac 60Hz
 MINIMUM STANDARD: 13dB
 TEST SETUP: The antenna port of EUT was directly connected to a spectrum analyzer.
 MEASUREMENT METHOD: As called by the standards above.

Average measurement Settings:
 RBW=30kHz; VBW=100kHz; Detector: RMS Average; sweep points: 2001;
 Max hold 1 minute
 Peak measurement Settings:
 RBW=3MHz; VBW=10MHz; Detector: Max Peak; sweep points: 2001;
 Max hold 1 minute

DEVICE DESCRIPTIONS: As described in the above EUT description and set up section.

EMISSIONS DATA:

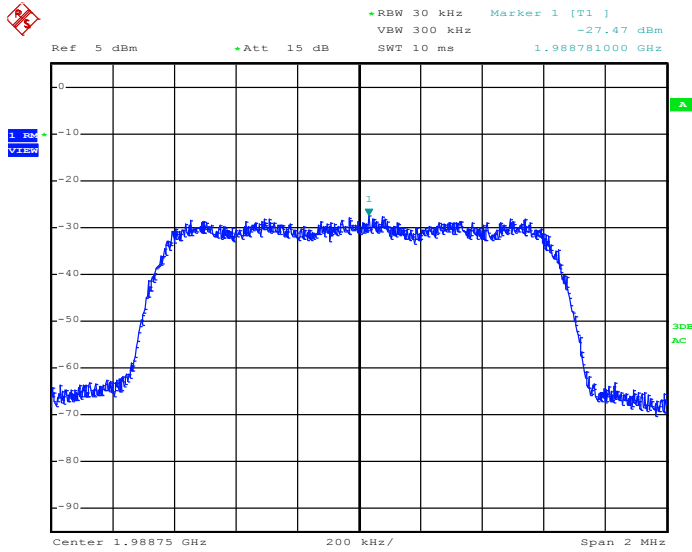
Channel	modulation	Frequency (MHz)	PAR Peak pwr (dBm)	PAR Avg pwr (dBm)	PAR	Limit (dB)	Margin (dB)
25	DAC9 QPSK	1931.25	-17.13	-27.96	10.83	13	2.17
600	DAC9 QPSK	1960.00	-15.39	-25.42	10.03	13	2.97
1175	DAC9 QPSK	1988.75	-16.46	-27.47	11.01	13	1.99

OBSERVATIONS: The EUT performed as expected.

PERFORMANCE: Complies.

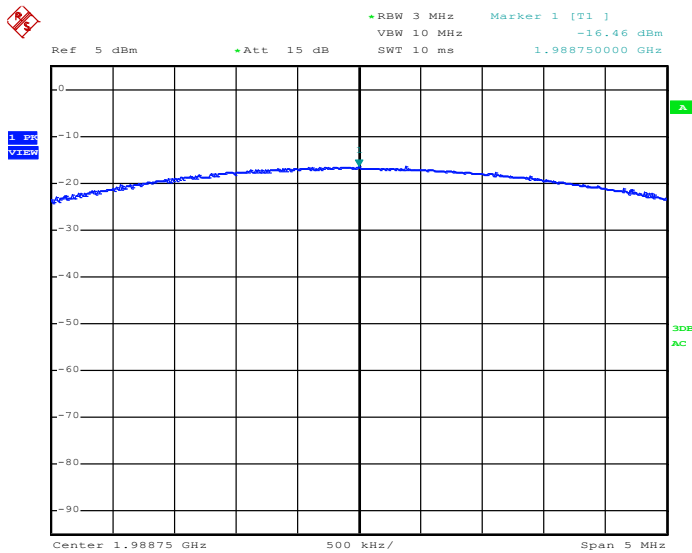
Sample Test Plots

Channel 1175 PAR Average



Date: 8.OCT.2013 13:51:48

Channel 1175 PAR Peak



Date: 8.OCT.2013 13:53:27

Part 3 - Unwanted Emissions Band and Block Edge

DATE(s): October 8-9, 2013
 TEST STANDARD: FCC Part 24 and IC RSS-133
 TEST VOLTAGE: 120Vac 60Hz
 MINIMUM STANDARD: -13dBm
 TEST SETUP: The antenna port of EUT was directly connected to a spectrum analyzer.
 MEASUREMENT METHOD: As called by the standards above.

Blockedge measurement
 Average measurement Settings:
 RBW=30kHz; VBW=100kHz; Detector: RMS Average;
 Max hold 1 minute ; Span: 2MHz

1MHz after blockedge using 1%RBW and 1MHz Power Integration method
 RBW=30kHz; VBW=1MHz; Detector: peak
 Max hold 1 minute ; Span: 1MHz

DEVICE DESCRIPTIONS: As described in the above EUT description and set up section.

EMISSIONS DATA: Block Edge

Channel (Block)	Modulation	Channel Frequency (MHz)	Block Edge Frequency (MHz)	Measured (dBm)	Corrections (dBm)	Measured (dBm)	Limit (dBm)	Margin (dB)
25 (A)	DAC9 QPSK	1931.25	1930	-76.41	42.5	-33.9	-13.000	20.910
275 (A)	DAC9 QPSK	1943.75	1945	-76.61	42.5	-34.1	-13.000	21.110
325 (D)	DAC9 QPSK	1946.25	1945	-76.52	42.5	-34.0	-13.000	21.020
375 (D)	DAC9 QPSK	1948.75	1950	-76.09	42.5	-33.6	-13.000	20.590
425 (B)	DAC9 QPSK	1951.25	1950	-76.07	42.5	-33.6	-13.000	20.570
675 (B)	DAC9 QPSK	1963.75	1965	-75.95	42.5	-33.5	-13.000	20.450
725 (E)	DAC9 QPSK	1966.25	1965	-75.97	42.5	-33.5	-13.000	20.470
775 (E)	DAC9 QPSK	1968.75	1970	-76.54	42.5	-34.0	-13.000	21.040
825 (F)	DAC9 QPSK	1971.25	1970	-75.67	42.5	-33.2	-13.000	20.170
875 (F)	DAC9 QPSK	1973.75	1975	-76.18	42.6	-33.6	-13.000	20.580
925 (C)	DAC9 QPSK	1976.25	1975	-76.53	42.6	-33.9	-13.000	20.930
1175 (C)	DAC9 QPSK	1988.75	1990	-75.65	42.6	-33.1	-13.000	20.050

First 1MHz band after Blockedge

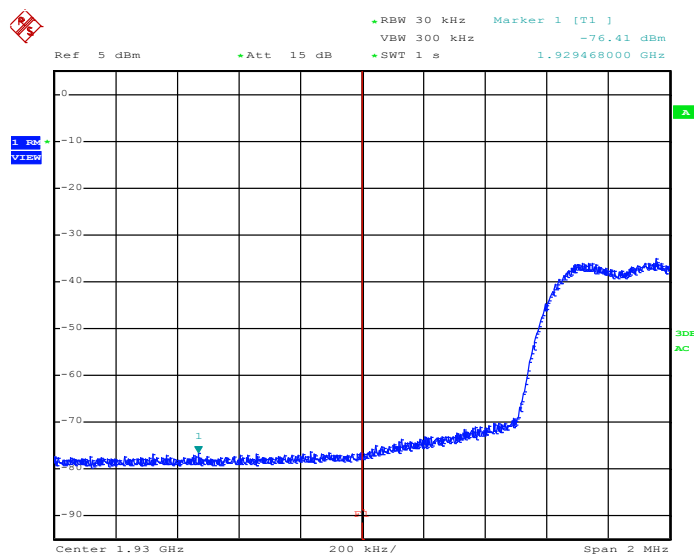
Channel (Block)	Modulation	Channel Frequency (MHz)	Block Edge Frequency (MHz)	Measured (dBm)	Corrections (dBm)	Measured (dBm)	Limit (dBm)	Margin (dB)
25 (A)	DAC9 QPSK	1931.25	1930	-75.3	42.5	-32.8	-13.000	20.910
275 (A)	DAC9 QPSK	1943.75	1945	-74.9	42.5	-32.4	-13.000	21.110
325 (D)	DAC9 QPSK	1946.25	1945	-74.5	42.5	-32.0	-13.000	21.020
375 (D)	DAC9 QPSK	1948.75	1950	-74.3	42.5	-31.8	-13.000	20.590
425 (B)	DAC9 QPSK	1951.25	1950	-74.0	42.5	-31.5	-13.000	20.570
675 (B)	DAC9 QPSK	1963.75	1965	-73.2	42.5	-30.7	-13.000	20.450
725 (E)	DAC9 QPSK	1966.25	1965	-73.2	42.5	-30.7	-13.000	20.470
775 (E)	DAC9 QPSK	1968.75	1970	-73.7	42.5	-31.2	-13.000	21.040
825 (F)	DAC9 QPSK	1971.25	1970	-74.2	42.5	-31.7	-13.000	20.170
875 (F)	DAC9 QPSK	1973.75	1975	-74.6	42.6	-32.0	-13.000	20.580
925 (C)	DAC9 QPSK	1976.25	1975	-75.1	42.6	-32.5	-13.000	20.930
1175 (C)	DAC9 QPSK	1988.75	1990	-74.9	42.6	-32.3	-13.000	20.050

OBSERVATIONS: The EUT performed as expected.

PERFORMANCE: Complies.

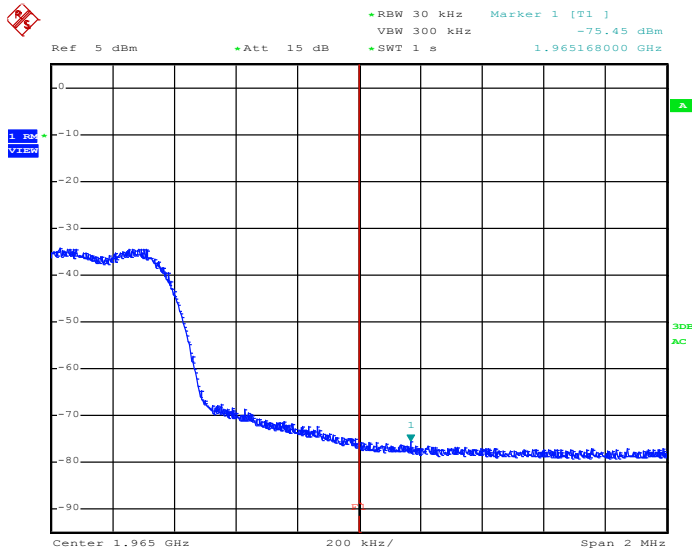
Sample Test Plots

Channel 25 Band Edge



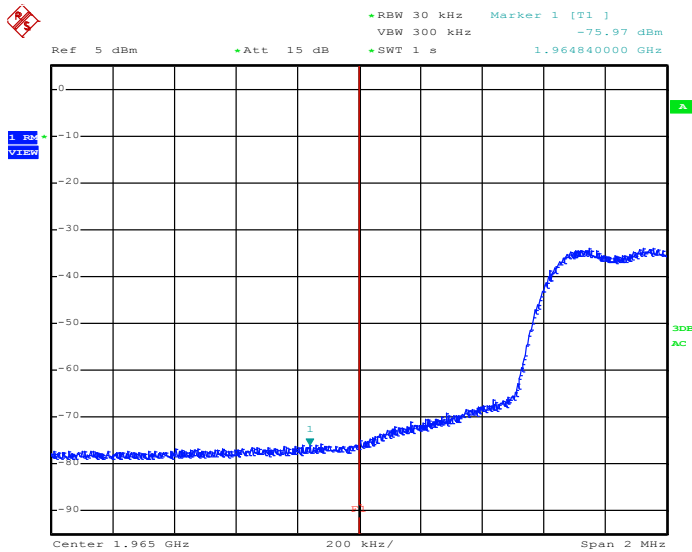
Date: 8.OCT.2013 09:50:03

Channel 675 Block Edge



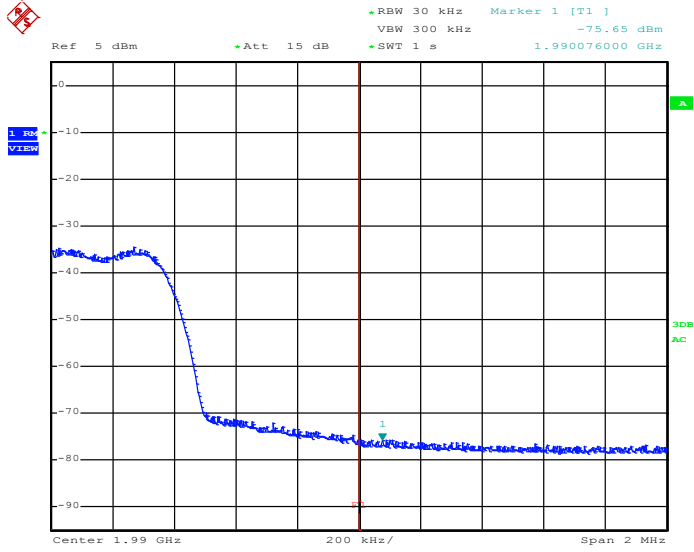
Date: 8.OCT.2013 10:54:28

Channel 725 Block Edge



Date: 8.OCT.2013 11:06:49

Channel 1175 Block Edge



Date: 8.OCT.2013 12:25:22

Part 4 - Out Of Band Spurious Emissions Conducted

DATE: October 05, 2013

TEST STANDARD: FCC Part 24 and IC RSS-133

TEST VOLTAGE: 120Vac 60Hz

TEST CONDITIONS: Indoor – 3meter Semi Anechoic Chamber

MINIMUM STANDARD: -13dBm

TEST SETUP: The Transmitter Output was connected directly to the Spectrum Analyzer through appropriate attenuators and filters using a 1 meter cable. The transmitter was set for continuous transmission. The lowest, middle and highest channels were measured for all emissions 10kHz to 20 GHz.

Conversion Formulas used: For the frequency measurement:
 $E(\text{dBm}) = \text{Meas}(\text{dBuV}) + \text{Cable Loss}(\text{dB}) + \text{Antennuator/Filter Loss}(\text{dB}) - 107$

MEASUREMENT METHOD: Measurements were made using spectrum analyser and receiver using the appropriate attenuators and filters to optimize the reading. The settings used were:

200Hz RBW average detector for the frequency range 9kHz-150kHz
 9kHz RBW average detector for the Frequency range 150kHz to 30MHz
 120kHz RBW quasi-peak detector for the frequency range 30MHz to 1GHz
 1MHz RBW Average detector for the frequency range 1GHz to 20GHz

DEVICE DESCRIPTIONS: As described in the above EUT description and setup section.

EMISSIONS DATA: No transmitter Conducted Spurious Emissions were detected 9kHz to 1GHz. No data or plots are recorded 9kHz to 1GHz.

Plots were taken using a standard set of Attenuators and filters. Then the identified frequencies were manually re-measured using the appropriate attenuators and filters to optimize the reading.

Out Of Band Spurious Emissions Conducted – Low Channel 25 – 1931.25MHz

Frequency (MHz)	Final (dBm)	Limit (dBm)	Margin (dB)
3862.58326	-28.1	-13.0	15.1
5793.74999	-40.5	-13.0	27.5
7725.00003	-43.5	-13.0	30.5

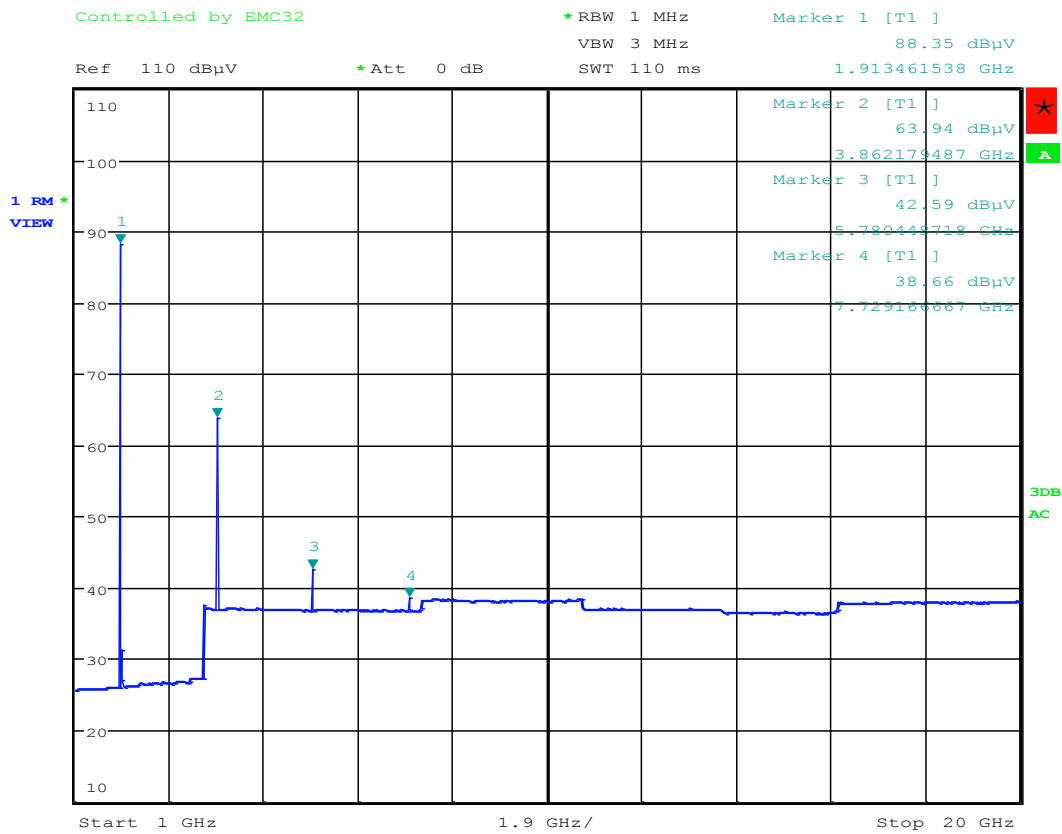
Out Of Band Spurious Emissions Radiated – Middle Channel 600 – 1960.00MHz

Frequency (MHz)	Final (dBm)	Limit (dBm)	Margin (dB)
3920.00021	-27.6	-13.0	14.6
5880.00038	-36.9	-13.0	23.9
7840.00093	-42.6	-13.0	29.6

Out Of Band Spurious Emissions Radiated – High Channel 1175 – 1988.75MHz

Frequency (MHz)	Final (dBm)	Limit (dBm)	Margin (dB)
3977.50023	-24.7	-13.0	11.7
5966.25003	-35.7	-13.0	22.7
7955.00042	-39.8	-13.0	26.8
9943.75053	-44.0	-13.0	31.0

Conducted emission 1GHz – 20GHz – Low Channel 25

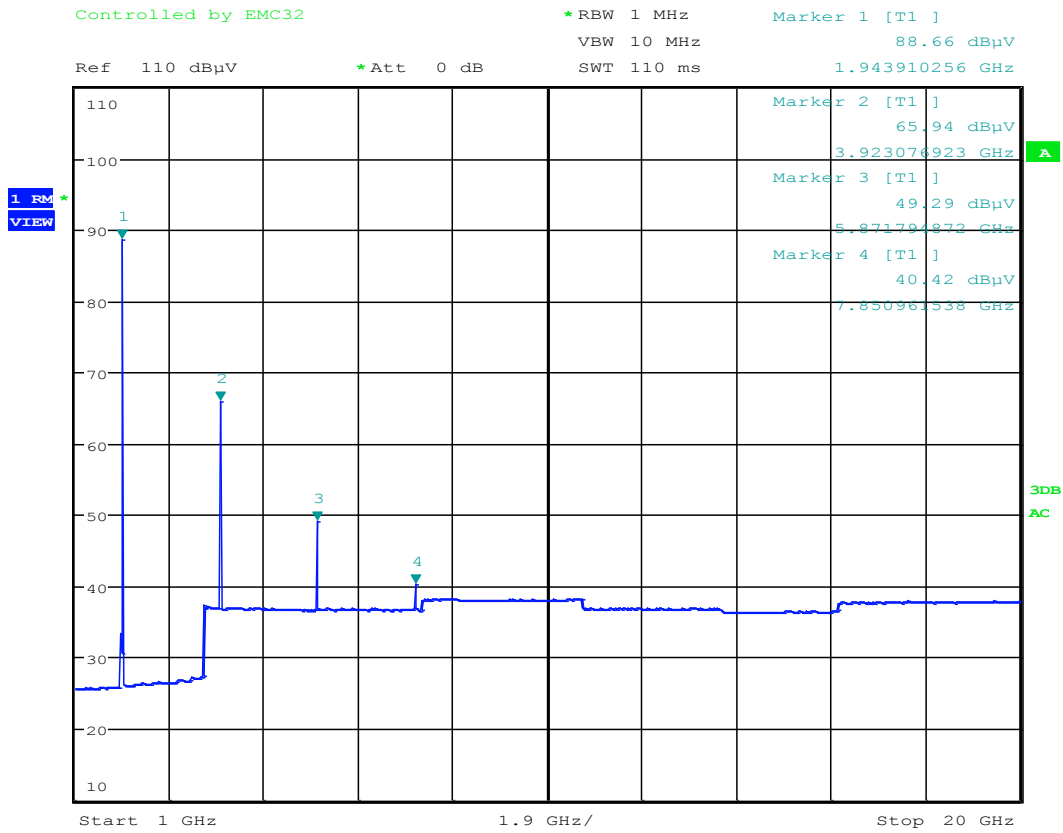


TTTTTT

Date: 5.OCT.2013 02:24:09

Reference use only

Conducted emission 1GHz – 20GHz – Middle Channel 600



TTTTTT

Date: 5.OCT.2013 02:44:06

Reference use only

Conducted emission 1GHz – 20GHz – High Channel 1175

Controlled by EMC32

*RBW 1 MHz Marker 1 [T1]

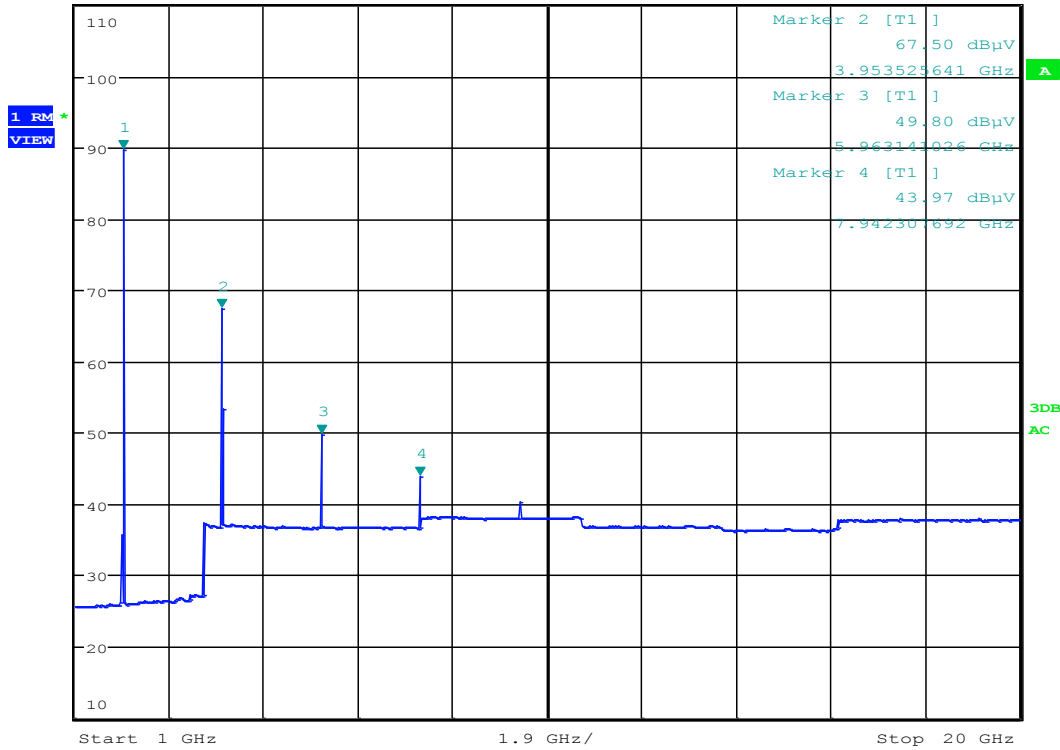
VBW 10 MHz 89.79 dBµV

Ref 110 dBµV

*Att 0 dB

SWT 110 ms

1.974358974 GHz



TTTTT

Date: 5.OCT.2013 03:01:04

Reference use only

Part 5 - Out Of Band Spurious Emissions Radiated

DATE: November 01, 2013

TEST STANDARD: FCC Part 24 and IC RSS-133

TEST VOLTAGE: 120Vac 60Hz

TEST CONDITIONS: Indoor – 3meter Semi Anechoic Chamber

MINIMUM STANDARD: -13dBm EIRP

Conversion Formulas used: For the frequency measurement:
 $E(\text{dBuV/m}) = \text{Measurement (dBuV)} + \text{Cable Loss(dB)} + \text{Antenna Factor (dB/m)}$
 $\text{EIRP(dBm)} = E(\text{dBuV}) + 20\text{Log(D)} - 104.8$
 $\text{ERP} = \text{EIRP} - 2.15$

TEST SETUP: The EUT was tested in our 3 m SAC and was positioned on the center of the turntable and powered up. The Transmitter Output was connected to a 50Ohm Load using a 1 meter cable. The transmitter was set for continuous transmission. The lowest, middle and highest channels were measured for all radiated emissions 10kHz to 18 GHz. The EUT was placed flat on the table top as indicated in the test photos.

MEASUREMENT METHOD: Measurements were made using spectrum analyser and receiver using the appropriate antennas, amplifiers, attenuators and filters. The settings used were:

200Hz RBW Peak detector for the frequency range 9kHz-150kHz
9kHz RBW Peak detector for the Frequency range 150kHz to 30MHz
10kHz RBW Peak detector for the frequency range 30MHz to 1GHz
1MHz RBW Peak detector for the frequency range 1GHz to 18GHz

The emissions were then re-measured using the Substitution method Procedure as described in ANSI TIA/EIA-603 Section 2.2.12

DEVICE DESCRIPTIONS: As described in the above EUT description and setup section.

EMISSIONS DATA: No transmitter Radiated Spurious Emissions were detected 9kHz to 1GHz. No data or plots are recorded 9kHz to 30MHz. The 30MHz to 1GHz plot and data are only from the Digital Circuitry and are included for reference only.

Out Of Band Spurious Emissions Radiated – Low Channel 25

Frequency (MHz)	Peak EIRP Final measurement (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Limit (dBm)	Margin (dB)
3862.8000	-33.6	106.6	V	346.9	-8.7	-13	20.6
5784.6000	-52.0	225.8	V	40.9	-2.9	-13	39.0
7712.8000	-66.3 (nflr)	100.0	V	0.0	3.0	-13	53.3

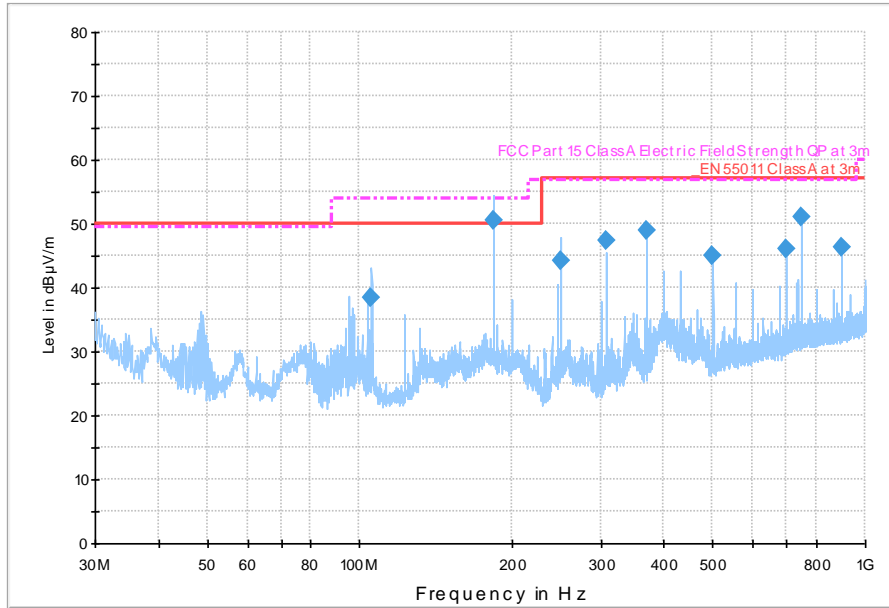
Out Of Band Spurious Emissions Radiated – Middle Channel 600

Frequency (MHz)	Peak EIRP Final measurement (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Limit (dBm)	Margin (dB)
3920.60000	-39.2	151.3	V	162.3	-8.7	-13	26.2
5880.00000	-50.5	111.0	V	161.5	-2.9	-13	37.5
7840.00000	-67.0 (nflr)	100.0	V	0.0	3.0	-13	54.0

Out Of Band Spurious Emissions Radiated – High Channel 1175

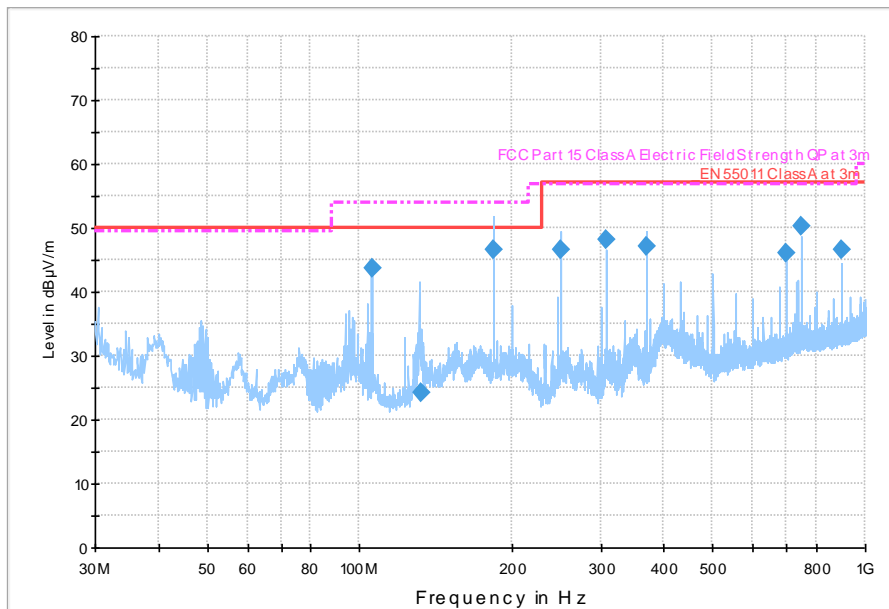
Frequency (MHz)	Peak EIRP Final measurement (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Limit (dBm)	Margin (dB)
3977.5000	-39.0	120.2	V	164.7	-8.7	-13	26.0
5966.2500	-49.3	115.1	V	162.6	-2.9	-13	36.3
7955.0000	-66.8 (nflr)	100.0	V	0.0	3.0	-13	53.8

Radiated emission 30MHz – 1 GHz Transmitter Off



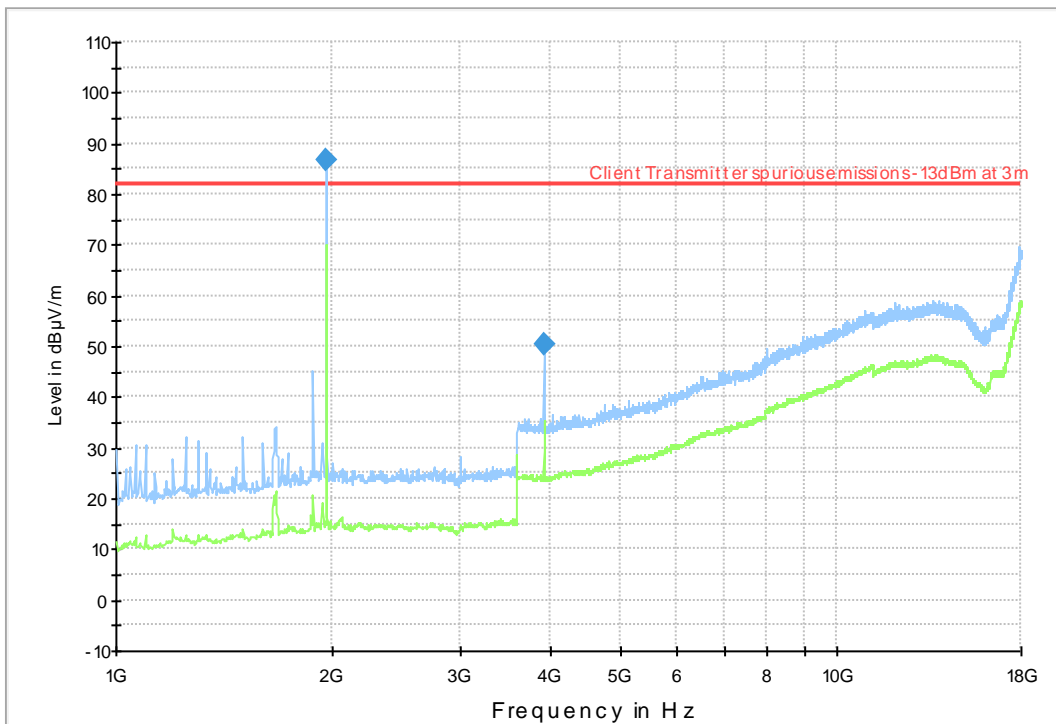
Reference plot only

Transmitter On – Channel 25



Reference plot only

Radiated emission 1 to 18GHz Transmitter On – Channel 600



Reference plot only

Part 6 - Frequency Stability

DATE: October 03, 2013

TEST STANDARD: FCC Part 24 and IC RSS-133

TEST VOLTAGE: 120Vac 60Hz +/-15%

TEST CONDITIONS: Temperature Controlled Chamber -30 to +50°Celsius

MINIMUM STANDARD: +/- 1ppm

TEST SETUP: The EUT was tested in our Temperature Chamber and was positioned on the center of the turntable and powered up. The Transmitter Output was connected to a Spectrum Analyzer using appropriate attenuators.

MEASUREMENT METHOD: The transmitter was not able to be set for CW Signals so the readings were taken with modulated signals using the ndB down method using 30kHz RBW.. Only the middle channel was measured. The EUT was soaked at each temperature for a minimum of 30 minutes prior to making the measurements.

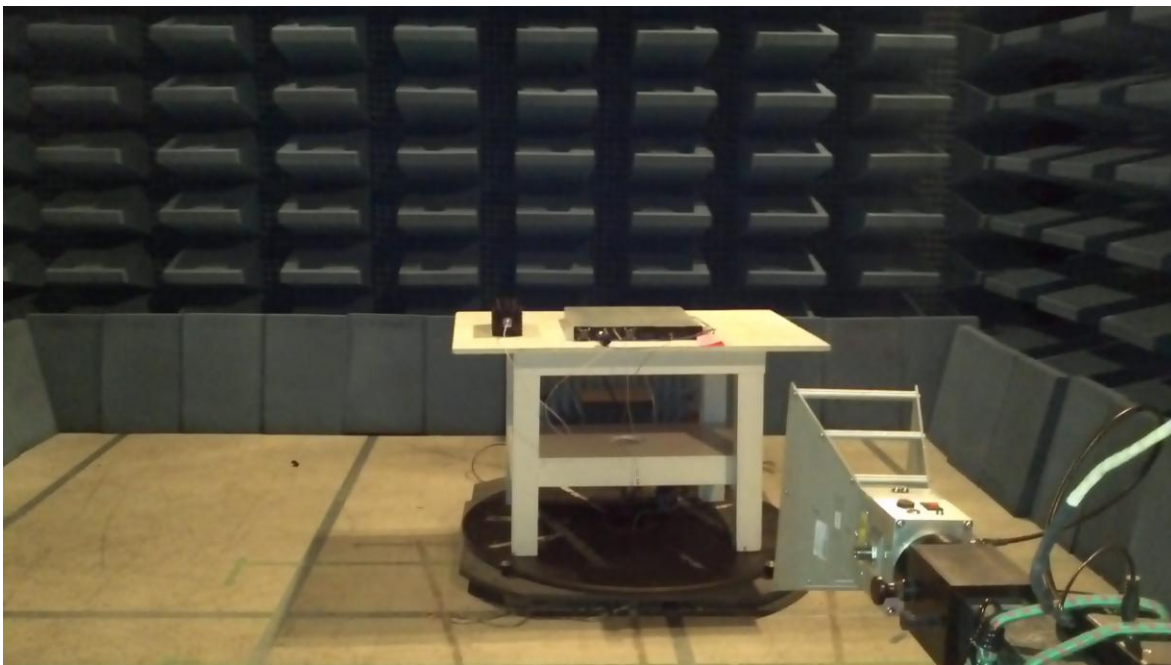
DEVICE DESCRIPTIONS: As described in the above EUT description and setup section.

DATA:

Temp (C)	Frequency Measured at 120Vac 60Hz (MHz)	Drift (Hz)	Drift (ppm)
-30	1959.999217	-783	0.4
-20	1959.999718	-282	0.1
-10	1959.999823	-177	0.1
0	1959.999993	-7	0.0
10	1959.999986	-14	0.0
20	1960.000000	0	0.0
30	1960.000000	0	0.0
40	1960.000013	13	0.0
50	1959.999515	-485	0.2

Voltage (AC)	Frequency Measured at 20 Deg. Celsius (MHz)	Drift (Hz)	Drift (ppm)
102	1959.999217	-783	0.4
138	1959.999718	-282	0.1

Appendix A: EUT photos during the testing







End of report

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last page of this test report