Electromagnetic Compatibility Test Report

Tests Performed on a Macmillan Publisher's

iClicker with Radio, Model RLR14

Radiometrics Document RP-6858

Product Detail: FCC ID: T24-RLR14 IC: 6495A-RLR14 Equipment type: 900 MHz Digital transmission system.
Test Standards: US CFR Title 47, Chapter I, FCC Part 15 Subpart C FCC Part 15 CFR Title 47: 2008 Industry Canada RSS-210, Issue 7: 2007 as required for Category I Equipment This report concerns: Original Grant for Certification FCC Part 15.247

Tests Performed For:	*Test Facility:*
Macmillan Publishers **Division of Holtzbrinck Publishers** 41 Madison Av., 38th Floor New York, NY 10010	**Radiometrics Midwest Corporation** 12 East Devonwood Romeoville, IL 60446

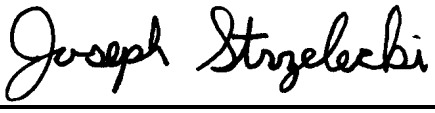
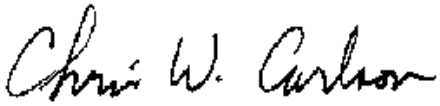
Test Date(s): (Month-Day-Year)
April 30 to August 13, 2010

Document RP-6858 Revisions:

Rev.	Issue Date	Affected Pages	Revised By
0	September 17, 2010		

Table of Contents

1 ADMINISTRATIVE DATA

Equipment Under Test: A Macmillan Publishers, iClicker Transmitter Model: RLR14 Serial Number: none This will be referred to as the EUT in this Report	
Date EUT Received at Radiometrics: (Month-Day-Year) April 30, 2010	*Test Date(s): (Month-Day-Year)* April 30 to August 13, 2010
Test Report Written By: Joseph Strzelecki Senior EMC Engineer	*Test Witnessed By:* The tests were not witnessed by Macmillan Publishers
Radiometrics' Personnel Responsible for Test:  Joseph Strzelecki Senior EMC Engineer NARTE EMC-000877-NE	*Test Report Approved By*  Chris W. Carlson Director of Engineering NARTE EMC-000921-NE

2 TEST SUMMARY AND RESULTS

The EUT (Equipment Under Test) is an iClicker Transmitter, Model RLR14, manufactured by Macmillan Publishers Division of Holtzbrinck Publishers. The detailed test results are presented in a separate section. The following is a summary of the test results.

900 MHz Test Results

Environmental Phenomena	Frequency Range	FCC Section	RSS-210 Section	Test Result
6 dB Bandwidth Test;	902-928 MHz	15.247 a	A8.1 (4)	Pass
20 dB Bandwidth Test;	902-928 MHz	15.247 a	A8.1 (4)	Pass
Peak Output Power	902-928 MHz	15.247 b	A8.1 (1)	Pass
Band-edge Compliance of RF Conducted Emissions	902-928 MHz	15.247 d	A8.4 (2)	Pass
Spurious RF Conducted Emissions	30 MHz to 25 GHz	15.247 d	A8.5	Pass
Spurious Radiated Emissions	30 MHz to 25 GHz	15.247 d	A8.5	Pass
Power Spectral Density	2400 to 2483 MHz	15.247 e	A8.2 (1)	Pass
Conducted Emissions, AC Mains	0.15 - 30 MHz	15.207	7.2.2 of RSS-Gen	Pass
Radiated Emissions (Unintential Radiation Receive mode)	30 MHz to 5 GHz	15.109	Table 2	Pass

2.1 RF Exposure Compliance Requirements

Since the power output is 12.3 mW for the 900 MHz radio and 0.6 mW for the 2.4 GHz Radio, The EUT meets the FCC requirement for RF exposure. There are no power level adjustments and the antenna is permanently attached. The detailed calculations for RF Exposure are presented in a separate document.

3 EQUIPMENT UNDER TEST (EUT) DETAILS

3.1 EUT Description

The EUT is an iClicker Transmitter, Model RLR14, manufactured by Macmillan Publishers Division of Holtzbrinck. The EUT was in good working condition during the tests, with no known defects.

The EUT is a part of a 900 MHz audience response system. It is used to collect votes from an audience, such as in educational settings. It operates in accordance with a proprietary RF protocol. It operates on 16 channels in the 905.5 to 923 MHz range.

3.1.1 FCC Section 15.203 & RSS-GEN Antenna Requirements

The 900 MHz antenna is permanently attached to the PCB via a trace on the circuit board. The antenna is internal to the EUT and it is not readily available to be modified by the end user. Therefore it meets the 15.203 Requirement

3.2 Related Submittals

Macmillan Publishers is not submitting any other products simultaneously for equipment authorization related to the EUT.

4 TESTED SYSTEM DETAILS

4.1 Tested System Configuration

The system was configured for testing in a typical fashion. The EUT was placed on an 80-cm high, nonconductive test stand. The testing was performed in conditions as close as possible to installed conditions. Wiring was consistent with manufacturer's recommendations.

The EUT was tested as a stand-alone device. Power was supplied with a new batteries.

Tested System Configuration List

Item	Description	Type*	Manufacturer	Model Number	Serial Number
1	iClicker Transmitter	E	Macmillan Publishers Division of Holtzbrinck Publishers	RLR14	none

* Type: E = EUT, P = Peripheral, S = Support Equipment; H = Host Computer

4.2 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

4.3 Equipment Modifications

No modifications were made to the EUT at Radiometrics' test facility in order to comply with the standards listed in this report.

5 TEST SPECIFICATIONS AND RELATED DOCUMENTS

Document	Date	Title
FCC CFR Title 47	2008	Code of Federal Regulations Title 47, Chapter 1, Federal Communications Commission, Part 15 - Radio Frequency Devices
ANSI C63.4-2003	2003	Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
IC RSS-210 Issue 7	2007	Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands) Category I Equipment
IC RSS-Gen Issue 2	2007	General Requirements and Information for the Certification of Radiocommunication Equipment (RSS-Gen)
FCC DA 00-705	2000	Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems
FCC 558074	2005	Measurement of Digital Transmission Systems Operating under Section 15.247

The test procedures used are in accordance with the FCC 558074, Industry Canada RSS-212 and ANSI document C63.4-2003, "Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The specific procedures are described herein. Radiated testing was performed at an antenna to EUT distance of 3 meters. The antenna was raised and lowered from 1 to 4 meters.

6 RADIOMETRICS' TEST FACILITIES

The results of these tests were obtained at Radiometrics Midwest Corp. in Romeoville, Illinois, USA. Radiometrics is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025: 2005 "General Requirements for the Competence of Calibration and Testing Laboratories". Radiometrics' Lab Code is 121191 and Certification Number is 1495.01. Radiometrics' scope of accreditation includes all of the test methods listed herein. A copy of the accreditation can be accessed on our web site (www.radiomet.com). Radiometrics accreditation status can be verified at A2LA's web site (www.a2la2.org).

The following is a list of shielded enclosures located in Romeoville, Illinois used during the tests:

Chamber A: Is an anechoic chamber that measures 24' L X 12' W X 12' H. The walls and ceiling are fully lined with ferrite absorber tiles. The floor has a 10' x 10' section of ferrite absorber tiles located in the center. Panashield of Rowayton, Connecticut manufactured the chamber. The enclosure is NAMAS certified.

Chamber E: Is a custom made anechoic chamber that measures 52' L X 30' W X 18' H. The walls and ceiling are fully lined with RF absorber. Pro-shield of Collinsville, Oklahoma manufactured the chamber.

Test Station F: Is an area that measures 10' D X 12' W X 10' H. The floor and back wall are metal shielded. This area is used for conducted emissions measurements.

A separate ten-foot long, brass plated, steel ground rod attached via a 6 inch copper braid grounds each of the above chambers. Each enclosure is also equipped with low-pass power line filters.

The FCC has accepted these sites as test site number US1065. The FCC test site Registration Number is 732175. Details of the site characteristics are on file with the Industry Canada as site number IC3124A-1.

A complete list of the test equipment is provided herein. The calibration due dates are indicated on the equipment list. The equipment is calibrated in accordance to ANSI/NCSL Z540-1 with traceability to the National Institute of Standards and Technology (NIST).

7 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no deviations or exclusions from the test specifications.

8 CERTIFICATION

Radiometrics Midwest Corporation certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specification. The results relate only to the EUT listed herein. Any modifications made to the EUT subsequent to the indicated test date will invalidate the data and void this certification.

9 TEST EQUIPMENT TABLE

RMC ID	Manufacturer	Description	Model No.	Serial No.	Frequency Range	Cal Period	Cal Date
AMP-05	RMC/Celeritek	Pre-amplifier	MW110G	1001	1.0-12GHz	12 Mo.	02/11/10
AMP-20	Avantek	Pre-amplifier	SF8-0652	15221	8-18GHz	12 Mo	02/11/10
AMP-22	Anritsu	Pre-amplifier	MH648A	M23969	0.1-1200MHz	12 Mo.	02/11/10
ANT-13	EMCO	Horn Antenna	3115	2502	1.0-18GHz	24 Mo.	10/22/08
ANT-44	Impossible Machine	Super Log Antenna	SL-20M2G	1002	20-2000MHz	24 Mo.	11/25/09
ANT-53	EMCO	Loop Antenna	6507	1453	1 kHz-30 MHz	12 Mo	11/04/09
HPF-01	Solar	High Pass Filter	7930-100	HPF-1	0.15-30MHz	24 Mo.	10/27/09
LSN-01	Electrometrics	50 uH LISN	FCC/VDE 50/2	1001	0.01-30MHz	24 Mo.	06/01/09
PRE-01	Hewlett Packard	Preselector	85685A	2510A00143	20 Hz-2GHz	12 Mo.	01/11/10
REC-01	HP / Agilent	Spectrum Analyzer	8566A	2106A02115, 2209A01349	30Hz-22GHz	24 Mo.	10/23/08
REC-03	Anritsu	Spectrum Analyzer	MS2601B	MT94589	0.01-2200MHz	12 Mo.	03/15/10
REC-07	Anritsu	Spectrum Analyzer	MS2601A	MT53067	0.01-2200MHz	12 Mo.	04/06/10
REC-08	Hewlett Packard	Spectrum Analyzer	8566B	2648A13481 2209A01436	30Hz-22GHz	12 Mo.	08/21/09
THM-02	Fluke	Temp/Humid Meter	971	93490471	N/A	12 Mo.	04/01/10

Note: All calibrated equipment is subject to periodic checks.

10 TEST SECTIONS

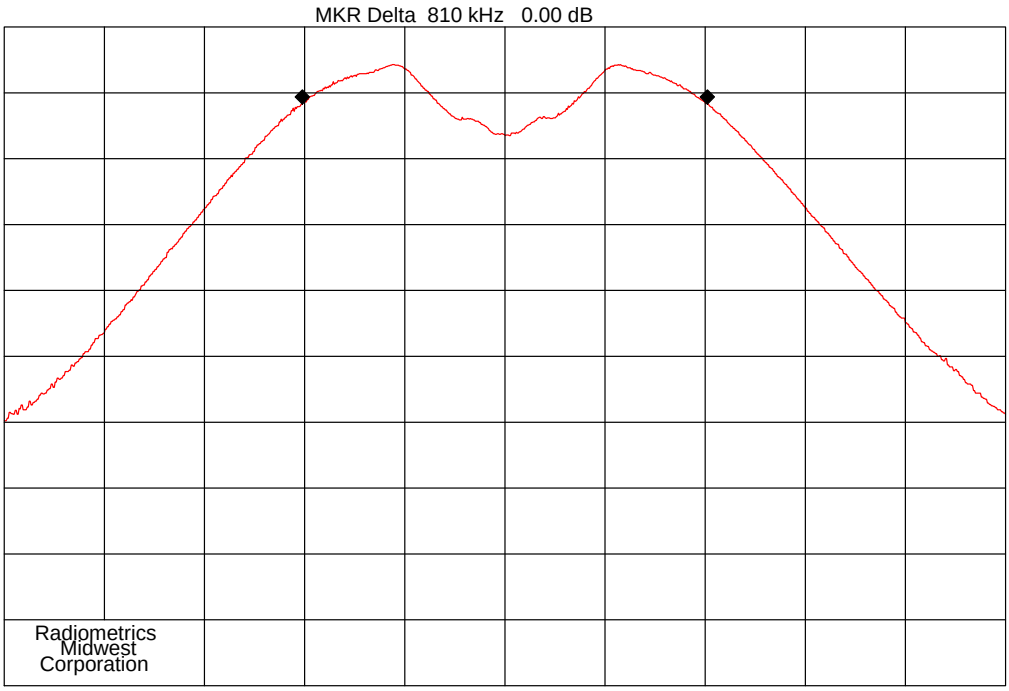
10.1 Occupied Bandwidth

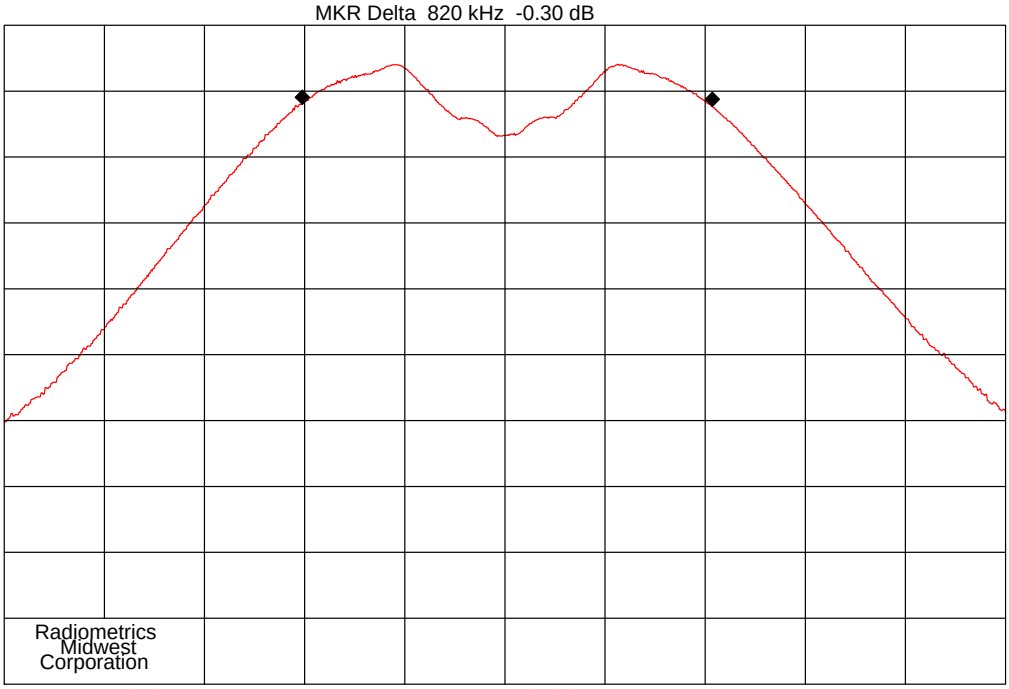
The spectrum analyzer was set to the MAX HOLD mode to record the worst case of the modulation. The EUT was transmitting at its maximum data rate. The trace was allowed to stabilize.

The marker-to-peak function was set to the peak of the emission. Then the marker-delta function was used to measure 20 dB down one side of the emission. The marker-delta function was reset and then moved to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

Channel MHz	6 dB EBW (kHz)	20 dB EBW (kHz) (Canada)
905.5	810	872
916.0	820	896
923.0	794	834

Judgement: Pass
The Bandwidth must be at least 500 kHz

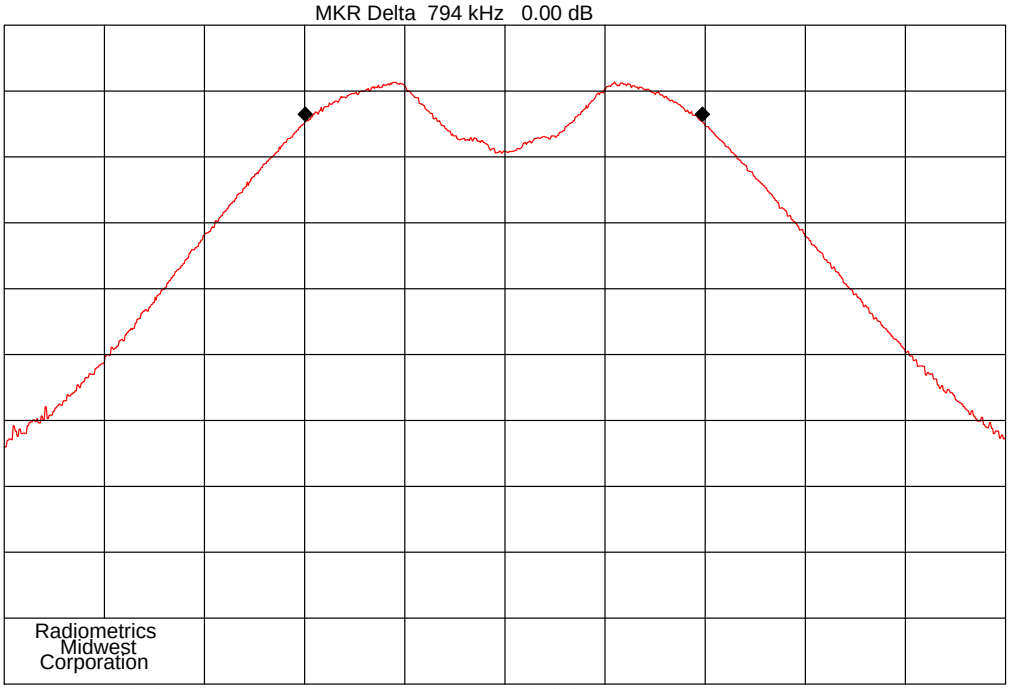




Company: Indesign
CENTER 916.00 MHz
RES BW 100 kHz
10 dB/
Notes: 6 dB Bandwidth, Mid Channel

ITEM : 1479 i-clicker
REF 20.0 dBm
VBW 1 MHz
Time: 12:37

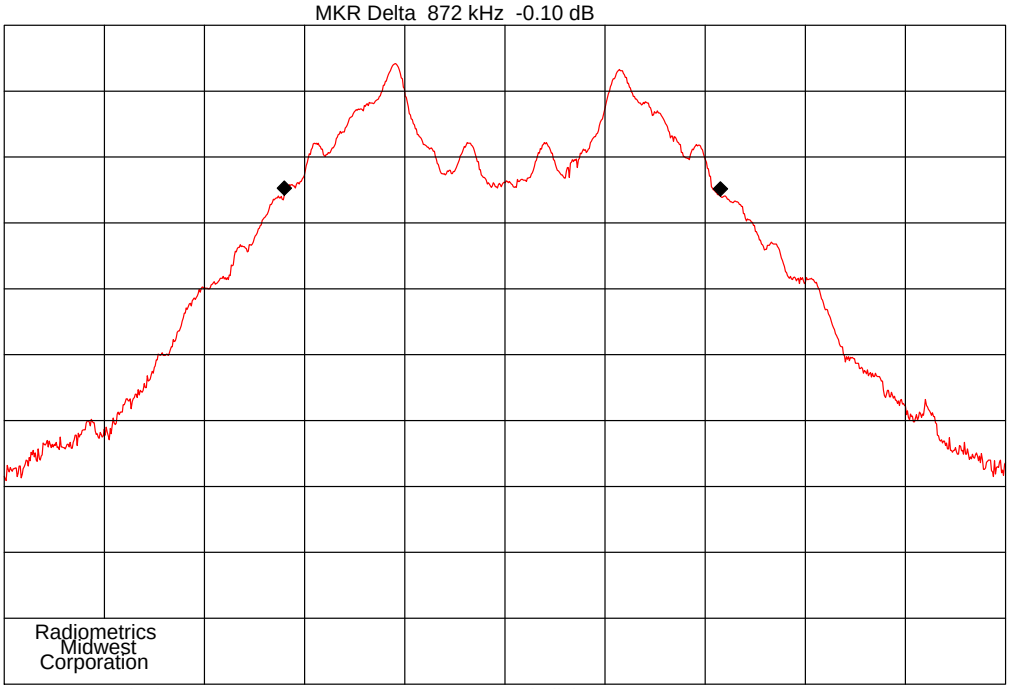
Date : 08-13-2010
SPAN 2.00 MHz
ATTEN 30 dB
SWP 20.0 msec
File: BW-2-6



Company: Indesign
CENTER 923.00 MHz
RES BW 100 kHz
10 dB/
Notes: 6 dB Bandwidth, High Channel

ITEM : 1479 i-clicker
REF 20.0 dBm
VBW 1 MHz
Time: 12:38

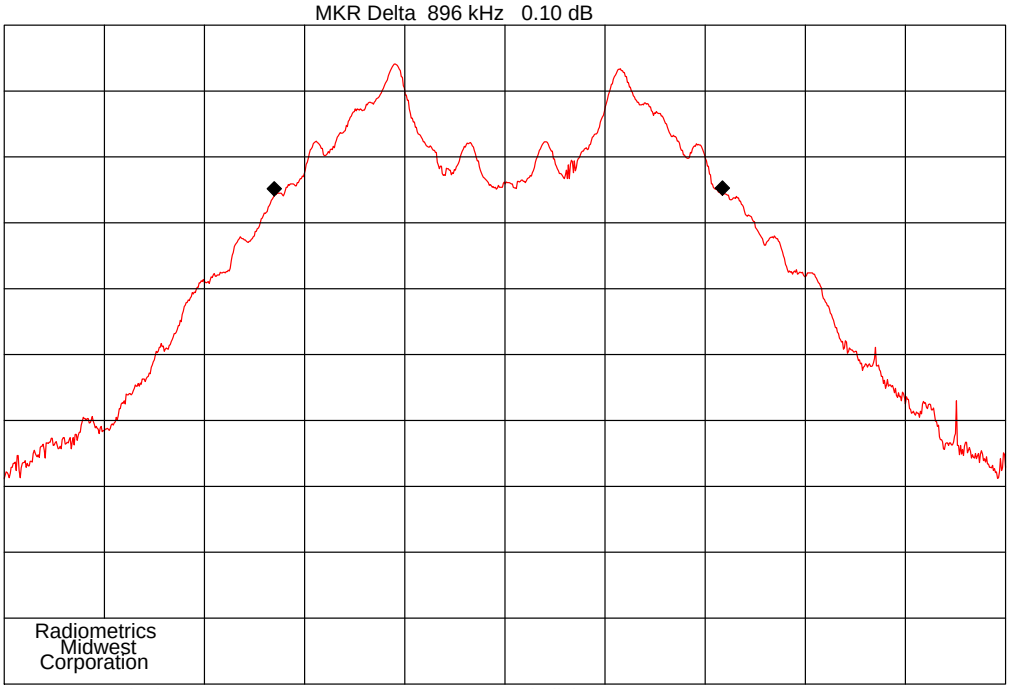
Date : 08-13-2010
SPAN 2.00 MHz
ATTEN 30 dB
SWP 20.0 msec
File: BW-3-6



Company: Indesign
CENTER 905.50 MHz
RES BW 30 kHz
10 dB/
Notes: 20 dB Bandwidth, Low Channel

ITEM : 1479 i-clicker
REF 20.0 dBm
VBW 1 MHz
Time: 12:33

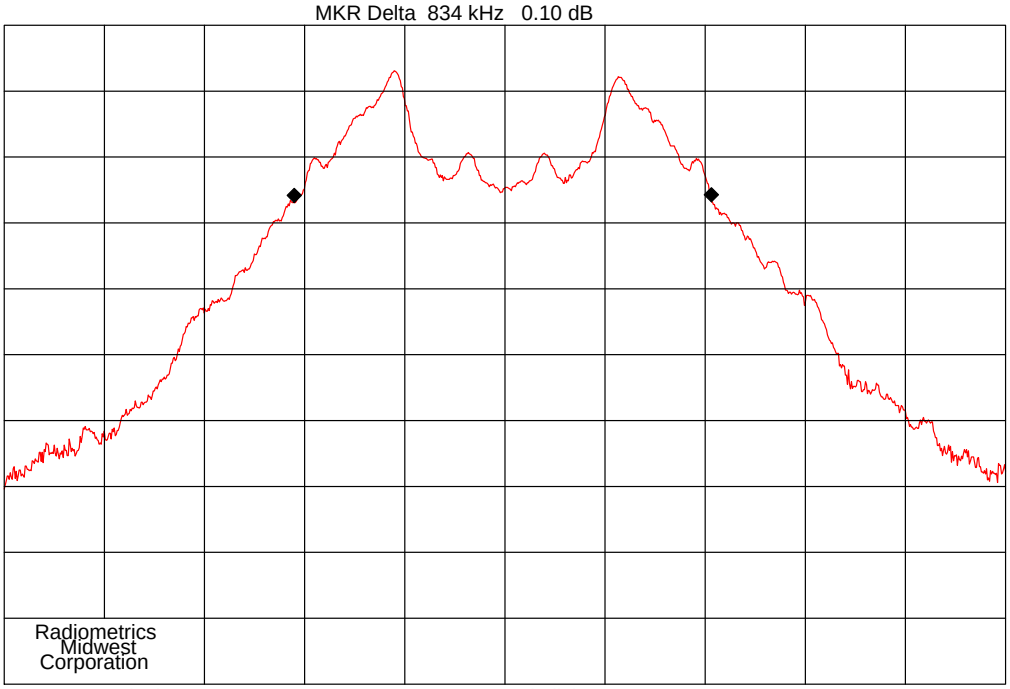
Date : 08-13-2010
SPAN 2.00 MHz
ATTEN 30 dB
SWP 20.0 msec
File: BW-1-20



Company: Indesign
CENTER 916.00 MHz
RES BW 30 kHz
10 dB/
Notes: 20 dB Bandwidth, Mid Channel

ITEM : 1479 i-clicker
REF 20.0 dBm
VBW 1 MHz
Time: 12:35

Date : 08-13-2010
SPAN 2.00 MHz
ATTEN 30 dB
SWP 20.0 msec
File: BW-2-20



10.2 Peak Output Power

The EUT antenna port on the was connected to the spectrum analyzer via a low loss coaxial cable. The power output option 2; Method #3 from FCC rules 558074 was used for this test. The spectrum analyzer was set to the following settings:

Span = 2 MHz; RBW = 3 MHz; VBW = 3 MHz; Sweep = auto
Detector function = peak; Trace = max hold

The trace was allowed to stabilize. The marker-to-peak function was used to measure the peak of the emission. The indicated level is the peak output power. The BW correction factor is 10*Log(BW). Note 30 dBm = 1 watt. Since the gain of the antenna is always less than 6 dB, the limit is not reduced.

Frequency (MHz)	Reading (dBm)	Cable Loss (dB)	Total Power (dBm)		Limit (dBm)
			dBm	Watts	
905.5	14.5	0.4	14.9	0.031	30
916.0	14.4	0.4	14.8	0.030	30
923.0	14.3	0.4	14.7	0.030	30

Judgment: Pass by 19.1 dB

10.3 Power Spectral Density

PSD option 1 was used for this test. No external attenuator was used. A direct connection from the EUT to the analyzer was used.

Since the spectrum line spacing could not be resolved on the spectrum analyzer, the noise density function the spectrum analyzer directly measured the noise power density normalized to a 1 Hz noise power bandwidth. A 34.8 dB for correction factor was used for 3 kHz.

Frequency (MHz)	Spectral Density (dBm per Hz)	Cable Loss (dB)	Correction to 3 kHz (dB)	3 kHz Spectral Density (dBm)	Limit (dBm)
905.5	-29.3	0.4	34.8	5.9	8.0
916.0	-30	0.4	34.8	5.2	8.0
923.0	-31.4	0.4	34.8	3.8	8.0

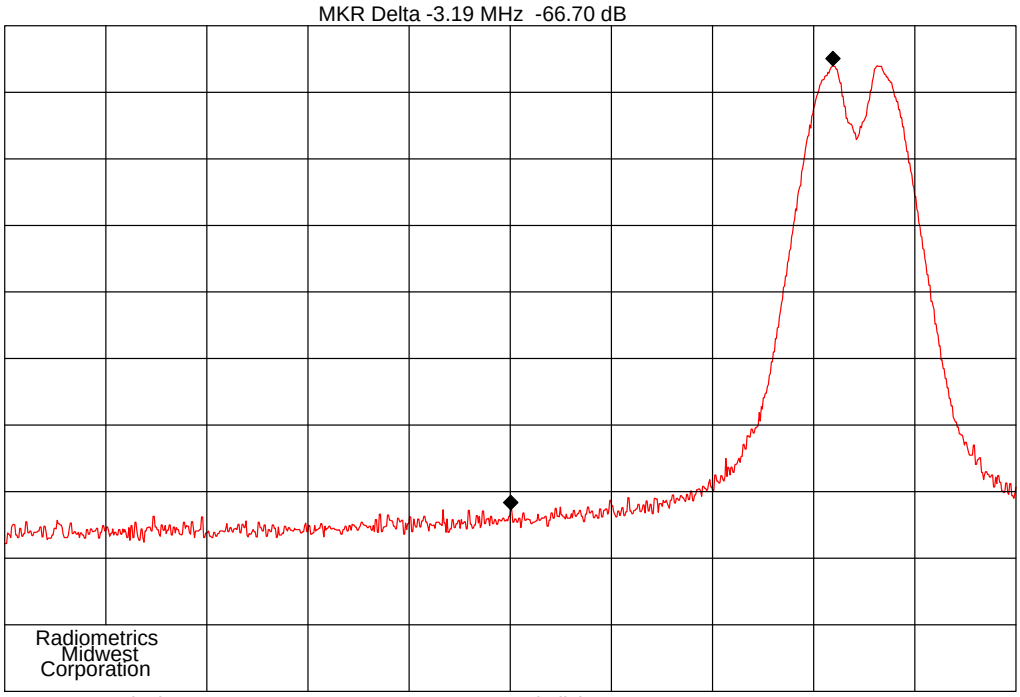
Judgment: Pass by 2.1 dB

10.4 Band-edge Compliance of RF Conducted Emissions

The spectrum analyzer was set to the MAX HOLD mode to record the worst case of the modulation at the band-edge, with the EUT set to the lowest frequency. The trace was allowed to stabilize.

Channel	Band Edge in dB	Minimum Allowed dB
Lower Band edge	66.7	20
Upper Band edge	68.1	20

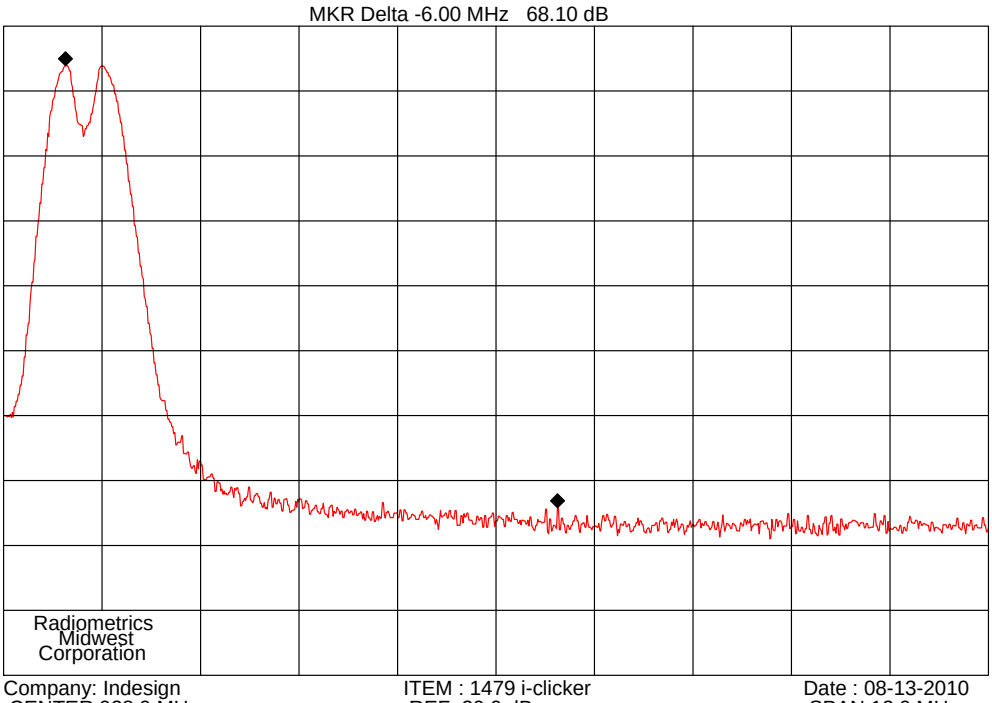
Judgment: Pass by 46.7 dB



Company: Indesign
CENTER 902.0 MHz
RES BW 100 kHz
10 dB/
Notes: Lower Band Edge,

ITEM : 1479 i-clicker
REF 20.0 dBm
VBW 300 kHz
Time: 13:16

Date : 08-13-2010
SPAN 10.0 MHz
ATTEN 30 dB
SWP 20.0 msec
File: BE-1



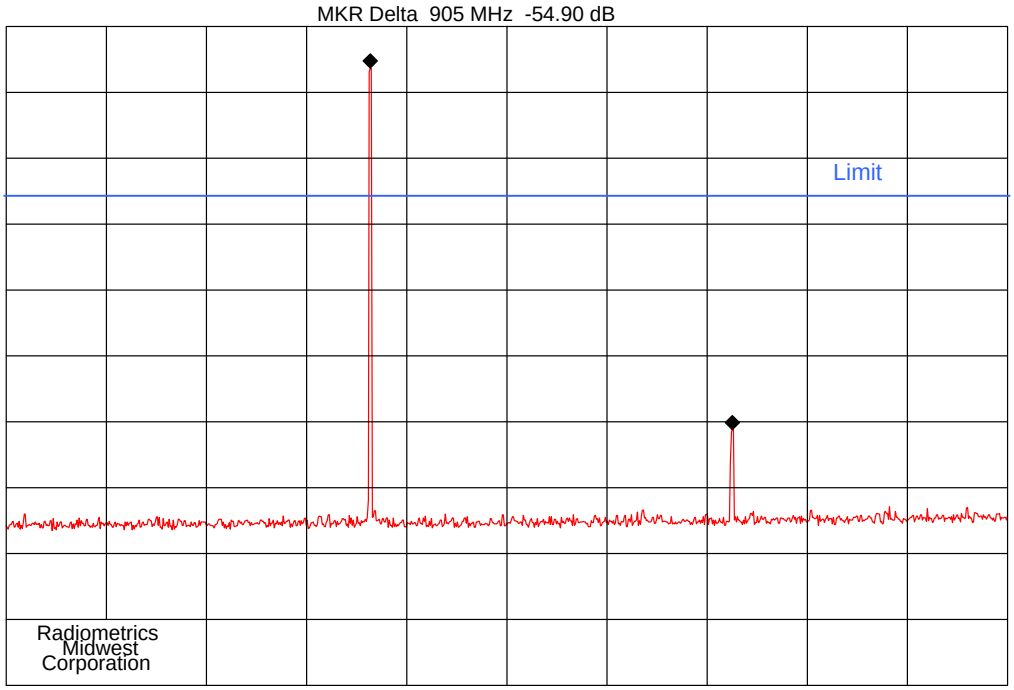
Company: Indesign
CENTER 928.0 MHz
RES BW 100 kHz
10 dB/
Notes: Upper Band Edge, Highest Channel

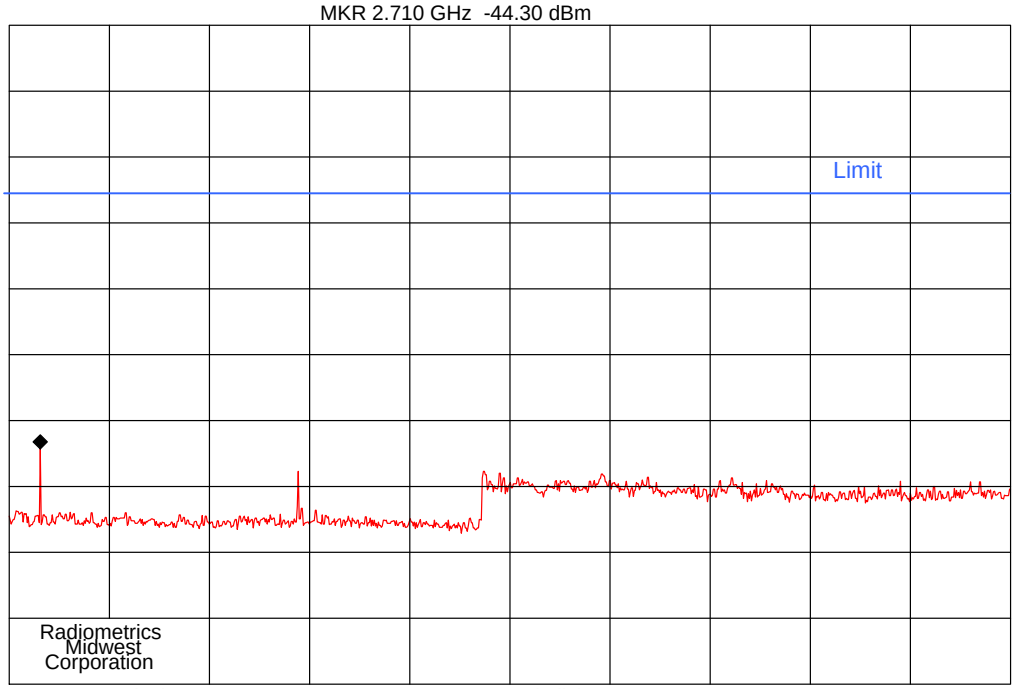
ITEM : 1479 i-clicker
REF 20.0 dBm
VBW 300 kHz
Time: 13:19

Date : 08-13-2010
SPAN 12.0 MHz
ATTEN 30 dB
SWP 20.0 msec
File: BE-2

10.5 Spurious RF Conducted Emissions

The spectrum analyzer was set to the MAX HOLD mode to record all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic. The trace was allowed to stabilize. The first two plots were made while stepping through three frequencies (Low middle and high). Each frequency was on for 30 seconds.

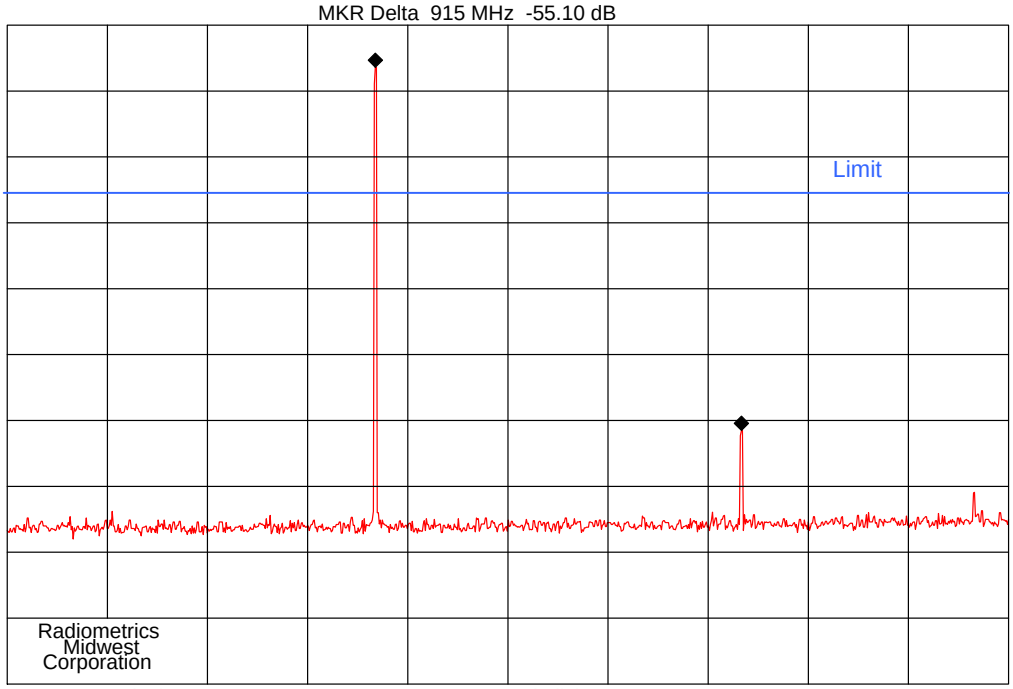




Company: Indesign
START 2.50 GHz
RES BW 100 kHz
10 dB/
Notes: Conducted Emissions, Lowest Channel

ITEM : 1479 i-clicker
REF 20.0 dBm
VBW 300 kHz
Time: 14:31

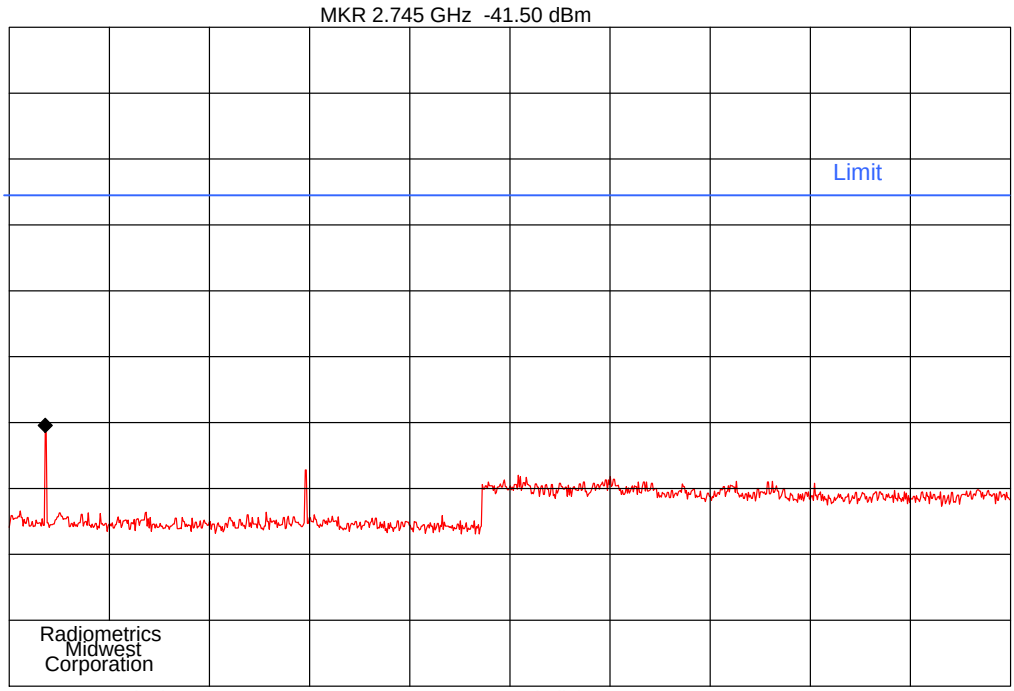
Date : 08-13-2010
STOP 9.50 GHz
ATTEN 30 dB
SWP 2.10 sec
File: ACE-1-2



Company: Indesign
START 1 MHz
RES BW 100 kHz
10 dB/
Notes: Conducted Emissions, Middle Channel

ITEM : 1479 i-clicker
REF 20.0 dBm
VBW 300 kHz
Time: 14:33

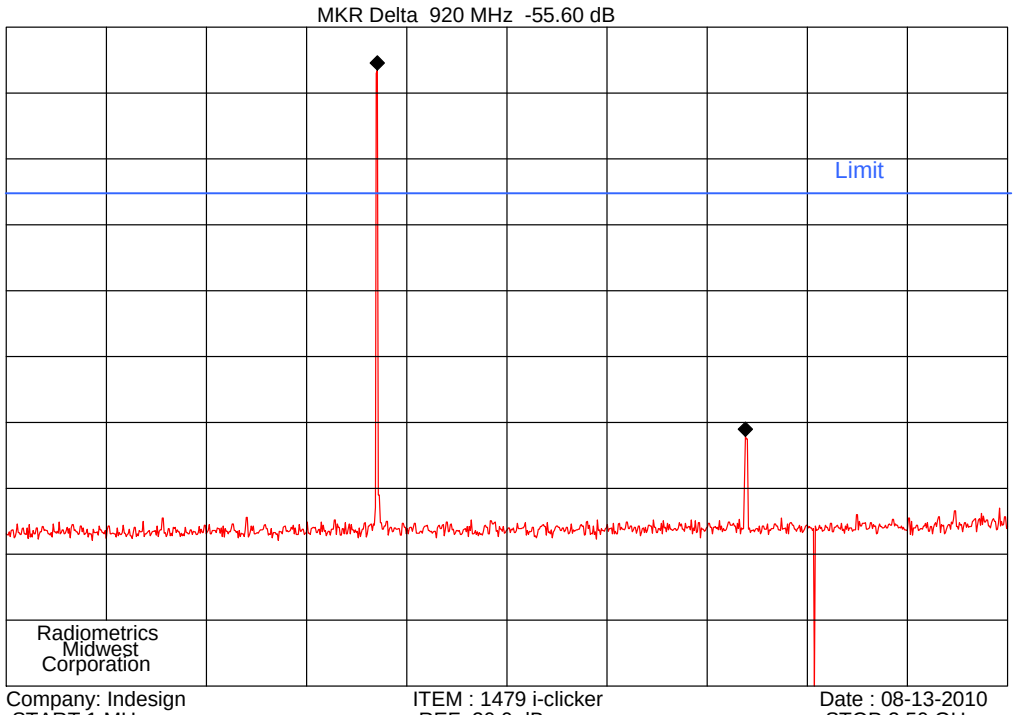
Date : 08-13-2010
STOP 2.50 GHz
ATTEN 30 dB
SWP 750 msec
File: ACE-1-2



Company: Indesign
START 2.50 GHz
RES BW 100 kHz
10 dB/
Notes: Conducted Emissions, Middle Channel

ITEM : 1479 i-clicker
REF 20.0 dBm
VBW 300 kHz
Time: 14:32

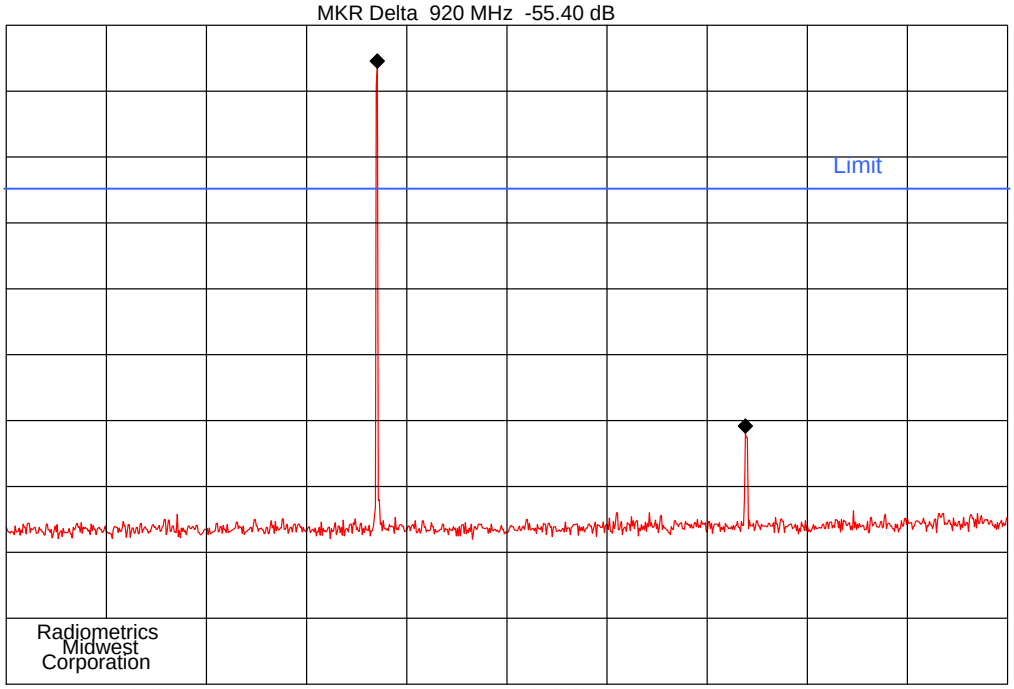
Date : 08-13-2010
STOP 9.50 GHz
ATTEN 30 dB
SWP 2.10 sec
File: ACE-2-2



Company: Indesign
START 1 MHz
RES BW 100 kHz
10 dB/
Notes: Conducted Emissions, Highest Channel

ITEM : 1479 i-clicker
REF 20.0 dBm
VBW 300 kHz
Time: 14:43

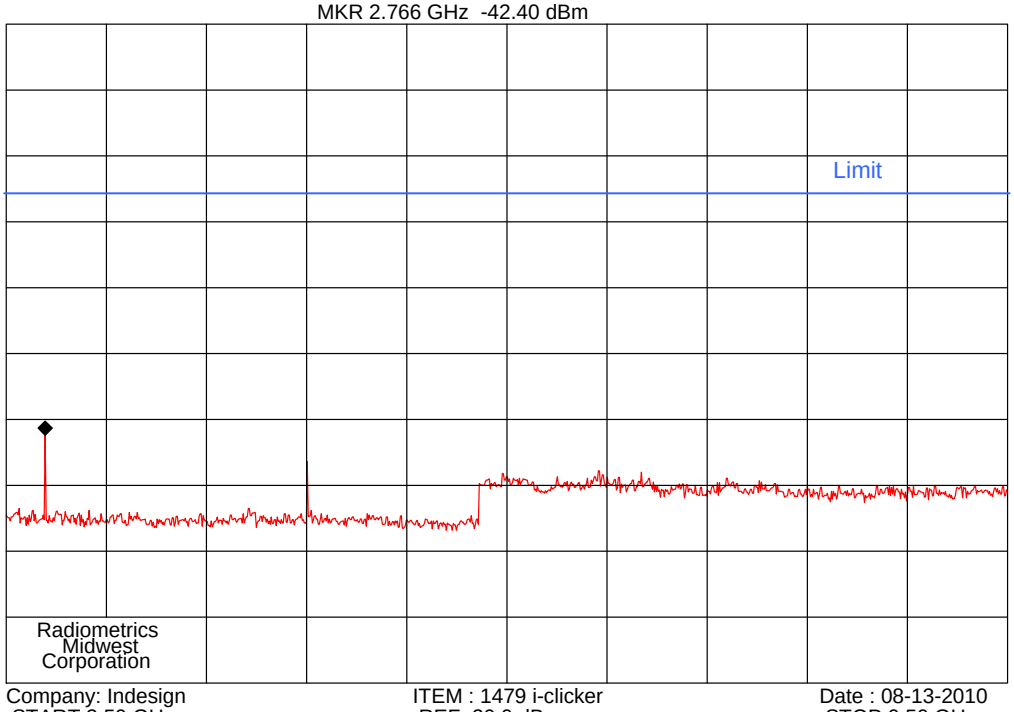
Date : 08-13-2010
STOP 2.50 GHz
ATTEN 30 dB
SWP 750 msec
File: ACE-3-1



Company: Indesign
START 1 MHz
RES BW 100 kHz
10 dB/
Notes: Conducted Emissions, Highest Channel

ITEM : 1479 i-clicker
REF 20.0 dBm
VBW 300 kHz
Time: 14:44

Date : 08-13-2010
STOP 2.50 GHz
ATTEN 30 dB
SWP 750 msec
File: ACE-3-1a



Company: Indesign
START 2.50 GHz
RES BW 100 kHz
10 dB/
Notes: Conducted Emissions, Highest Channel

ITEM : 1479 i-clicker
REF 20.0 dBm
VBW 300 kHz
Time: 14:45

Date : 08-13-2010
STOP 9.50 GHz
ATTEN 30 dB
SWP 2.10 sec
File: ACE-3-2

Judgement: Pass by at least 30 dB

10.6 Spurious Radiated Emissions

Radiated emission measurements were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. The radiated emission measurements were performed with a spectrum analyzer. The bandwidth used from 150 kHz to 30 MHz is 9 or 10 kHz and the bandwidth from 30 MHz to 1000 MHz is 100 or 120 kHz. Above 1 GHz, a 1 MHz bandwidth is used. A 10 dB linearity check is performed prior to start of testing in order to determine if an overload condition exists.

From 30 to 1000 MHz, an Anritsu spectrum analyzer was used. For tests from 1 to 25 GHz, an HP 8566 spectrum analyzer was used. For tests from 1 to 10 GHz, a high pass filter was used to reduce the fundamental emission. A harmonic mixer was used from 18 to 25 GHz. Figure 4 herein lists the details of the test equipment used during radiated emissions tests. In addition, a high pass filter was used to reduce the fundamental emission. The was device was rotated through three orthogonal axis as per 13.1.4.1 of ANSI C63.4 during the prescans and during final radiated tests.

Final radiated emissions measurements were performed inside of an anechoic chamber at a test distance of 3 meters. The anechoic chamber is designated as Chamber E. This Chamber meets the Site Attenuation requirements of ANSI C63.4 and CISPR 16-1. Chamber E is located at 12 East Devonwood Ave. Romeoville, Illinois EMI test lab.

The entire frequency range from 30 to 25000 MHz was slowly scanned with particular attention paid to those frequency ranges which appeared high. Measurements were performed using two antenna polarizations, (vertical and horizontal). The worst case emissions were recorded. All measurements may be performed using either the peak, average or quasi-peak detector functions. If the peak detector data exceeds or is marginally close to the limits, the measurements are repeated using a quasi-peak detector or average function as required by the specification for final determination of compliance.

The detected emission levels were maximized by rotating the EUT, adjusting the positions of all cables, and by scanning the measurement antenna from 1 to 4 meters above the ground.

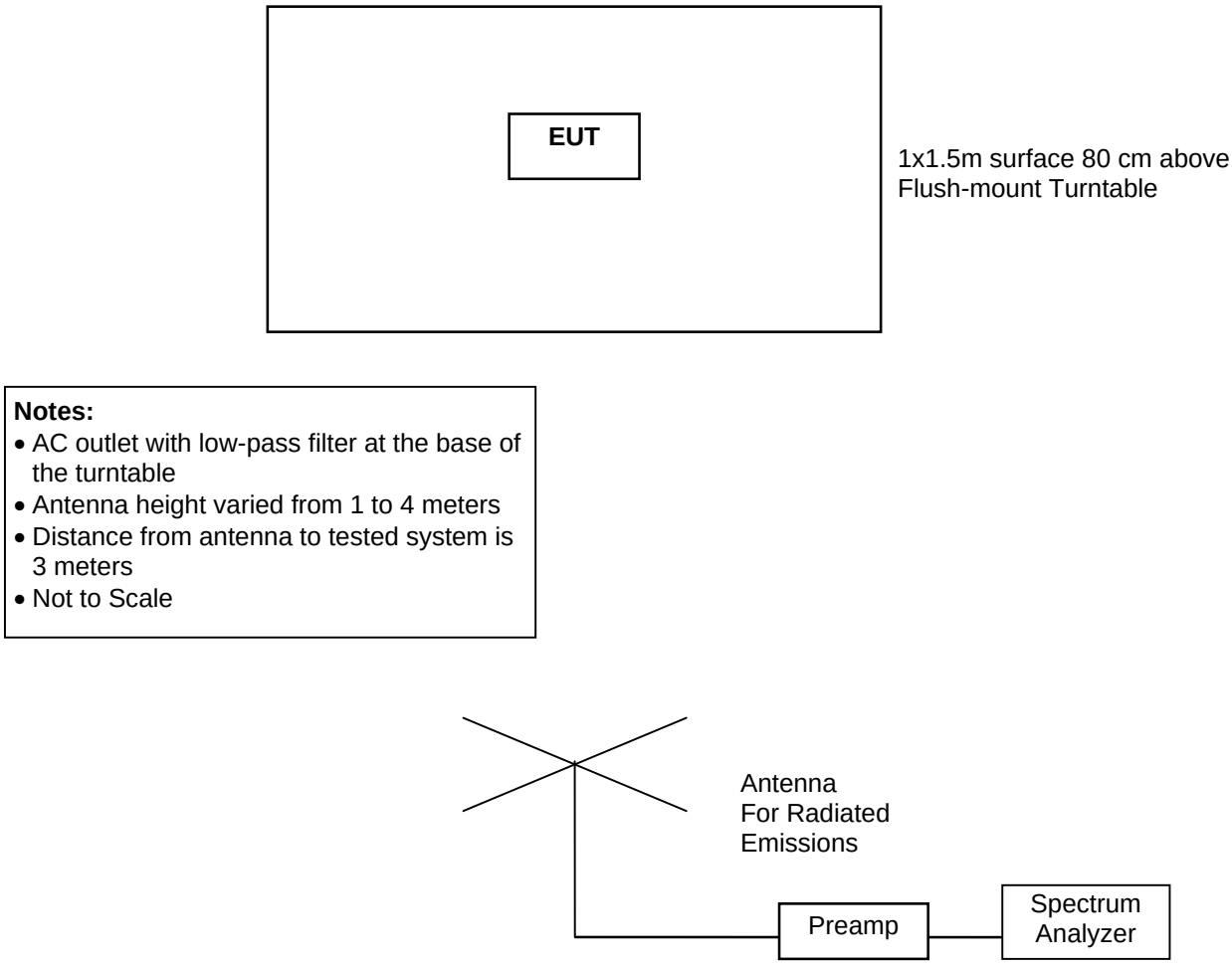
10.6.1 Radiated Emissions Field Strength Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and by subtracting the Amplifier Gain from the measured reading. The basic equation is as follows:

FS = RA + AF + CF – AG + HPF

Where: FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain
HPF = High pass Filter Loss

Figure 1. Drawing of Radiated Emissions Setup



10.6.2 Spurious Radiated Emissions Test Results

The following spectrum analyzer settings were used.

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
A Video Bandwidth of 10 Hz was used for Average measurements above 1 GHz.

10.6.3 Radiated Emissions Results; Above 1 GHz

hrm #	Tx Freq MHz	Spectrum Analyzer Reading in dBuV				Corr. Fact dB	Emission Freq MHz	Field Strength				Margin Under Limit
		Vertical Polarization		Horizontal Polarization				EUT		Limit		
		Peak	Ave	Peak	Ave			dBuV/m				
2	905.5	59.1	40.7	63.2	44.8	1.9	1811	59.5	46.7	94	74	27.3
3	905.5	48.7	30.3	51.3	32.9	4.6	2716.5	51.6	37.5	74	54	16.5
4	905.5	37.5	19.1	36.1	17.7	8.6	3622	44.7	27.7	74	54	26.3
5	905.5	50.8	32.4	51.0	32.6	11.1	4527.5	62.1	43.7	74	54	10.3
6	905.5	41.3	22.9	37.2	18.8	12.4	5433	50.3	35.3	74	54	18.7
7	905.5	42.0	23.6	41.2	22.8	13.4	6338.5	54.6	37.0	94	74	37.0
8	905.5	40.3	21.9	38.5	20.1	15.4	7244	54.0	37.3	74	54	16.7
9	905.5	41.0	22.6	39.5	21.1	17.0	8149.5	56.5	39.6	74	54	14.4
10	905.5	39.6	21.2	38.9	20.5	19.9	9055	58.8	41.1	74	54	12.9
2	916.0	57.6	39.2	58.2	39.8	1.6	1832	59.8	41.4	94	74	32.6
3	916.0	48.4	30.0	48.0	29.6	4.6	2748	46.5	34.6	74	54	19.4
4	916.0	38.0	19.6	36.8	18.4	8.8	3664	45.6	28.4	74	54	25.6
5	916.0	52.8	34.4	53.7	35.3	11.3	4580	65.0	46.6	74	54	7.4
6	916.0	36.4	18.0	35.9	17.5	12.6	5496	49.0	30.6	94	74	43.4
7	916.0	41.8	23.4	41.9	23.5	13.3	6412	55.2	36.8	94	74	37.2
8	916.0	38.8	20.4	38.5	20.1	15.8	7328	54.3	36.2	74	54	17.8
9	916.0	41.8	23.4	39.3	20.9	17.2	8244	59.0	40.6	74	54	13.4
10	916.0	40.0	21.6	38.7	20.3	20.0	9160	58.6	41.6	74	54	12.4
2	923.0	58.0	39.6	60.7	42.3	1.6	1846	62.3	43.9	74	54	10.1
3	923.0	48.0	29.6	49.7	31.3	4.7	2769	46.2	36.0	74	54	18.0
4	923.0	38.0	19.6	36.3	17.9	8.9	3692	43.8	28.5	74	54	25.5
5	923.0	54.1	35.7	55.5	37.1	11.3	4615	66.8	48.4	74	54	5.6
6	923.0	37.0	18.6	36.9	18.5	12.6	5538	49.5	31.2	94	74	42.8
7	923.0	42.3	23.9	43.1	24.7	13.2	6461	56.3	37.9	94	74	36.1
8	923.0	39.6	21.2	39.1	20.7	16.2	7384	55.3	37.4	74	54	16.6
9	923.0	41.4	23.0	40.1	21.7	17.4	8307	58.8	40.4	74	54	13.6
10	923.0	39.0	20.6	39.6	21.2	20.4	9230	59.4	41.6	74	54	12.4
Column numbers (see below for explanations)												
1	2	3	4	5	6	7	8	9	10	11	12	13

Column #1. hrm = Harmonic; BE = Band Edge emissions
Column #2. Frequency of Transmitter.
Column #3. Uncorrected readings from the spectrum analyzer in dBuV (Highest of three Axis Rotations)
Column #4. Average Reading based on peak reading reduced by the Duty cycle correction. (Highest of three Axis Rotations)
Column #5. Same as Column #3 except Horizontal Receive antenna
Column #6. Same as Column #4 except Horizontal Receive antenna
Column #7. Corr. Factors = Cable Loss – Preamp Gain + Antenna Factor
Column #8. Frequency of Tested Emission
Column #9. Highest peak field strength at listed frequency.
Column #10. Highest Average field strength at listed frequency.
Column #11. Peak Limit. (Non-Restricted Band limit set to a nominal of 94)
Column #12. Average Limit. (Non-Restricted Band limit set to a nominal of 74)
Column #13. The margin is the worst case margin in dB under the peak or average limits for that row.

Spurrious Emissions Below 1 GHz

Manufacturer	Macmillan Publishers	Specification	FCC Part 15.247 & RSS-210
Model	RLR14	Test Date	August 12, 2010
Serial Number	none	Test Distance	3 Meters
Abbreviations	Pol = Antenna Polarization; V = Vertical; H = Horizontal; BC = Biconical (ANT-3); LP = Log-Periodic (ANT-6); HN = Horn (ANT-13) P = peak; Q = QP		
Notes	Corr. Factors = Cable Loss – Preamp Gain – Duty Cycle Factor + HP Filter Loss		
	Worst case emissions from the Receive Mode		

Freq. (MHz)	Meter Reading (dBuV)	Dect. Type	Antenna		Corr. Factors (dB)	Field Strength (dBuV/m)		Margin Under Limit (dB)
			Factor (dB)	Pol/ID#		EUT	Limit	
47.2	25.8	P	14.4	H/44	-17.7	22.5	40.0	17.5
125.2	27.1	P	14.5	H/44	-16.7	24.8	43.5	18.7
95.2	29.3	P	8.5	V/44	-17.0	20.8	43.5	22.7
95.6	31.2	P	8.6	V/44	-17.0	22.8	43.5	20.7
114.4	30.0	P	13.3	V/44	-16.8	26.4	43.5	17.1
133.2	33.6	P	12.8	V/44	-16.8	29.7	43.5	13.8
172.4	30.7	P	9.4	V/44	-16.3	23.8	43.5	19.7
915.0	20.0	P	22.6	V/44	-11.5	31.1	46.0	14.9

Judgment: Pass by 13.8 dB

Transmitter Spurrious emssions

Freq. (MHz)	Meter Reading (dBuV)	Dect. Type	Antenna		Corr. Factors (dB)	Field Strength (dBuV/m)		Margin Under Limit (dB)
			Factor (dB)	Pol/ID#		EUT	Limit	
47.3	25.9	P	14.4	H/44	-17.7	22.6	40.0	17.4
125.1	26.2	P	14.5	H/44	-16.7	24.0	43.5	19.5
95.8	31.2	P	8.6	V/44	-17	22.8	43.5	20.7
114.4	29.2	P	13.3	V/44	-16.8	25.7	43.5	17.8
133.2	33.3	P	12.8	V/44	-16.8	29.3	43.5	14.2
172.4	29.8	P	9.4	V/44	-16.3	22.9	43.5	20.6