

FCC Test Report

Product Name	Infotainment System with Headunit (with BT, WLAN, Klear technology)
Model No	NTG5 HU
FCC ID.	T8G9099

Applicant	Harman Becker Automotive Systems GmbH
Address	Becker-Göring-Str. 16, 76307 Karlsbad, Germany

Date of Receipt	Mar, 11, 2013
Issue Date	Mar, 15, 2013
Report No.	133230R-RFUSP44V01
Report Version	V1.0



The test results relate only to the samples tested.

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This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Test Report Certification

Issue Date: Mar, 15, 2013

Report No.: 133230R-RFUSP44V01



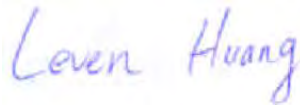
Product Name	Infotainment System with Headunit (with BT, WLAN, Kleer technology)
Applicant	Harman Becker Automotive Systems GmbH
Address	Becker-Görling-Str. 16, 76307 Karlsbad, Germany
Manufacturer	Harman Becker Automotive Systems GmbH
Model No.	NTG5 HU
EUT Rated Voltage	DC 12V (Power by vehicle Battery)
EUT Test Voltage	DC 12V (Power by vehicle Battery)
Trade Name	Daimler
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2012 ANSI C63.4: 2003, ANSI C63.10: 2009
Test Result	Complied

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Documented By :



(Senior Adm. Specialist / Leven Huang)

Tested By :



(Engineer / Jack Hsu)

Approved By :



(Manager / Vincent Lin)

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Infotainment System with Headunit (with BT, WLAN, Klear technology)
Trade Name	Daimler
Model No.	NTG5 HU
FCC ID.	T8G9099
Frequency Range	2403-2478MHz
Channel Separation	5 MHz
Channel Number	16
Type of Modulation	MSK
Antenna Type	Printed patch Antenna
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto
FCC equipment class	DTS

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	WISI	AG200	Printed patch	1.5dBi for 2.4 GHz

Note: The antenna of EUT is conform to FCC 15.203

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2403MHz	Channel 02:	2408MHz	Channel 03:	2413 MHz	Channel 04:	2418 MHz
Channel 05:	2423MHz	Channel 06:	2428MHz	Channel 07:	2433 MHz	Channel 08:	2438 MHz
Channel 09:	2443 MHz	Channel 10:	2448 MHz	Channel 11:	2453 MHz	Channel 12:	2458 MHz
Channel 13:	2463MHz	Channel 14:	2468 MHz	Channel 15:	2473 MHz	Channel 16:	2478 MHz

Note:

1. The EUT is an Infotainment System with Headunit (with BT, WLAN, Klear technology) with a built-in WLAN、Bluetooth and Klear transceiver, this report for Klear.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. These tests are conducted on a sample for the purpose of demonstrating compliance of 2.4GHz transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode:	Mode 1: Transmit
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1.2. Operational Description

The EUT “Infotainment System with Headunit (with BT, WLAN, Klear technology)” is based on new low power Intel e-Module technology for a high performance infotainment system, This system will be installed in the new S-Class (W222) of Mercedes Benz and one year later in the new C-Class (W205). It contains features like navigation, different Tuner technologies, CD/DVD-Drive, HDD-Drive, RSC (Rear-Seat-Communication), Bluetooth, WLAN and Klear wireless technology. It was designed for use within different car series for different target markets.

The Number of the channels is 16 in 2403~2478MHz, The device adapts the MSK modulation, The Antenna is Printed patch Antenna

The Fondunit has two Klear Chips for connecting two Klear Headphones to the FondUnit.

Each chip has one symmetric antenna. The antennas are connected over a Balun to the Klear Chip.

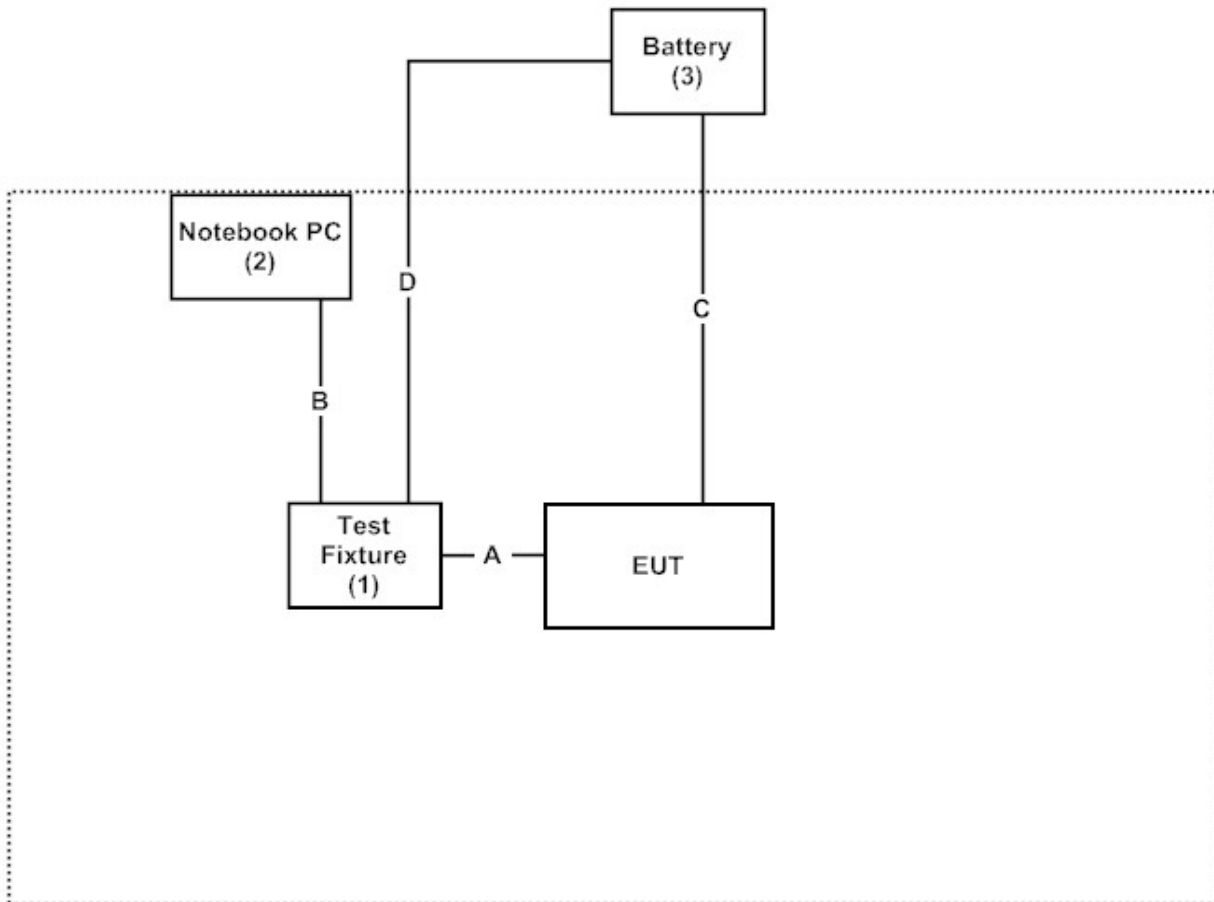
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Test Fixture	Harman Becker	N/A	N/A	N/A
2	Notebook PC	Lenovo	T400	L3AZW4N	N/A
3	DC 12V Battery	TRANE	12B50PE	N/A	N/A

Signal Cable Type	Signal cable Description
A	Signal Cable
B	USB Cable
C	Power Cable
D	Power Cable

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.4
- (2) Execute Software “Pkleer v1.0.0.7” on the notebook PC.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Start the continuous transmission.
- (5) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from

Quietek Corporation's Web Site : <http://tw.quietek.com/tw/emc/accreditations/accreditations.htm>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site :

<http://www.quietek.com/>

Site Description: File on
 Federal Communications Commission
 FCC Engineering Laboratory
 7435 Oakland Mills Road
 Columbia, MD 21046
 Registration Number: 92195

Accreditation on NVLAP
 NVLAP Lab Code: 200533-0

Site Name: Quietek Corporation
 Site Address: No.5-22, Ruishukeng,
 Linkou Dist. New Taipei City 24451,
 Taiwan, R.O.C.
 TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
 E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

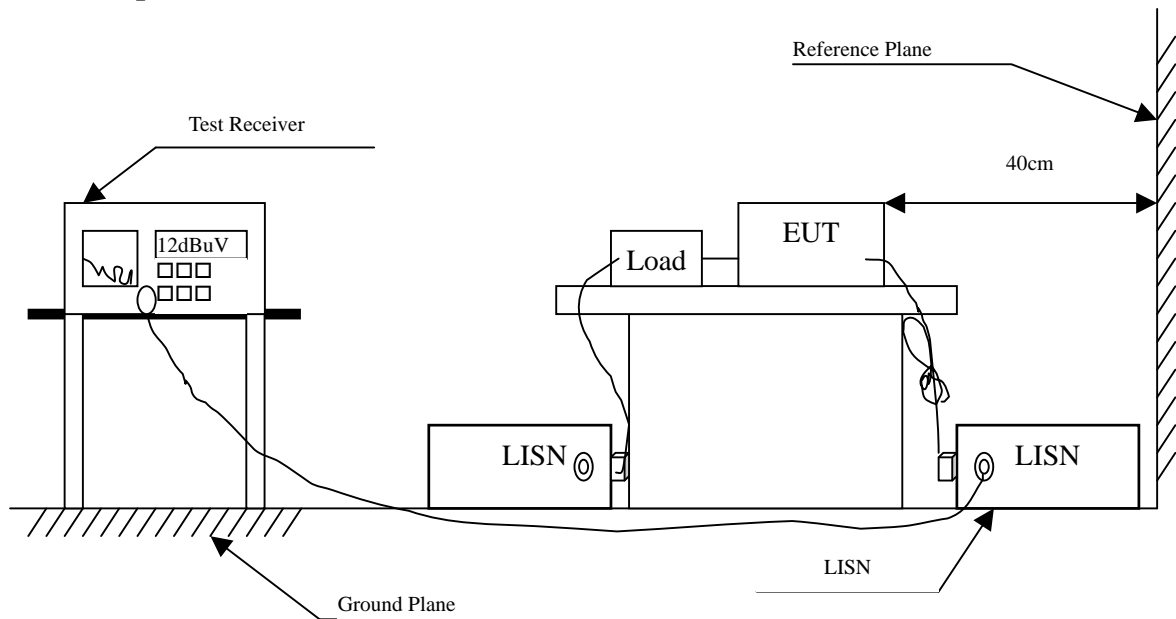
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2012	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2013	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2013	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2013	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2013	
	No.1 Shielded Room				

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AVG
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2009 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Owing to the EUT use battery supply voltage, this test item is not performed.

3. Peak Power Output

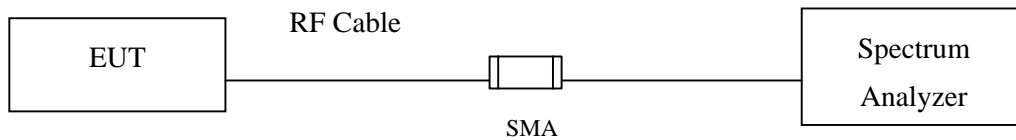
3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2012

Note: 1. All instruments are calibrated every one year.
 2. The test instruments marked by "X" are used to measure the final test results.

3.2. Test Setup

Conducted Measurement



3.3. Limits

The maximum peak power shall be less 1 Watt.

3.4. Test Procedure

The EUT was tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product : Infotainment System with Headunit (with BT, WLAN, Kler technology)
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
01	2403	0.25	<30dBm	Pass
09	2443	-0.42	<30dBm	Pass
16	2478	-1.65	<30dBm	Pass

4. Radiated Emission

4.1. Test Equipment

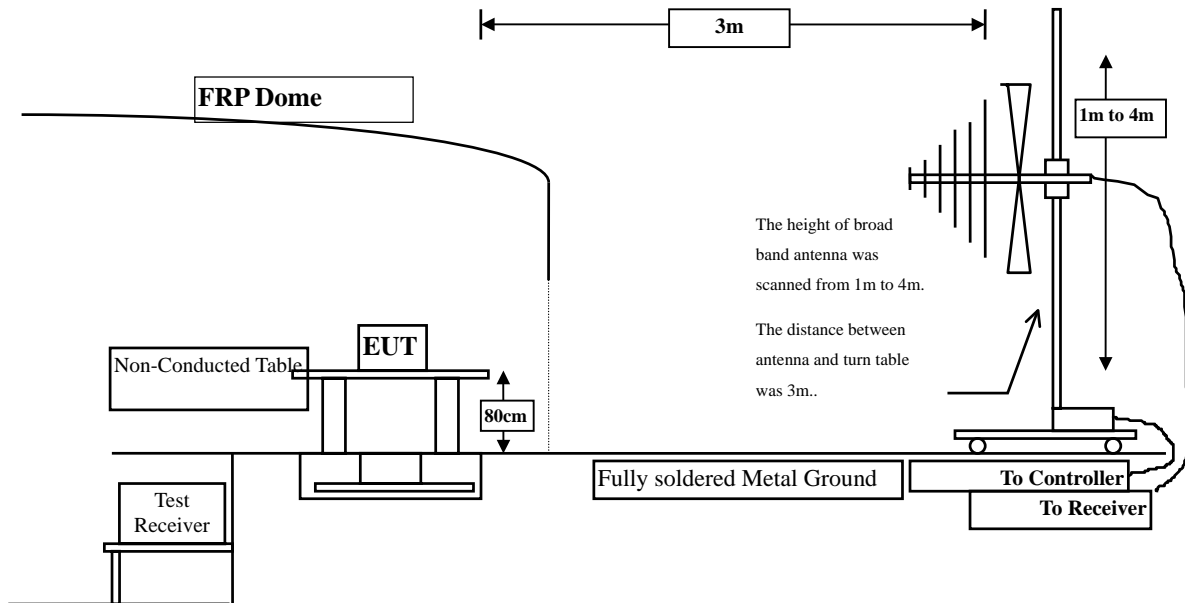
The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2012
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2012
	X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2013
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2012
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2013
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

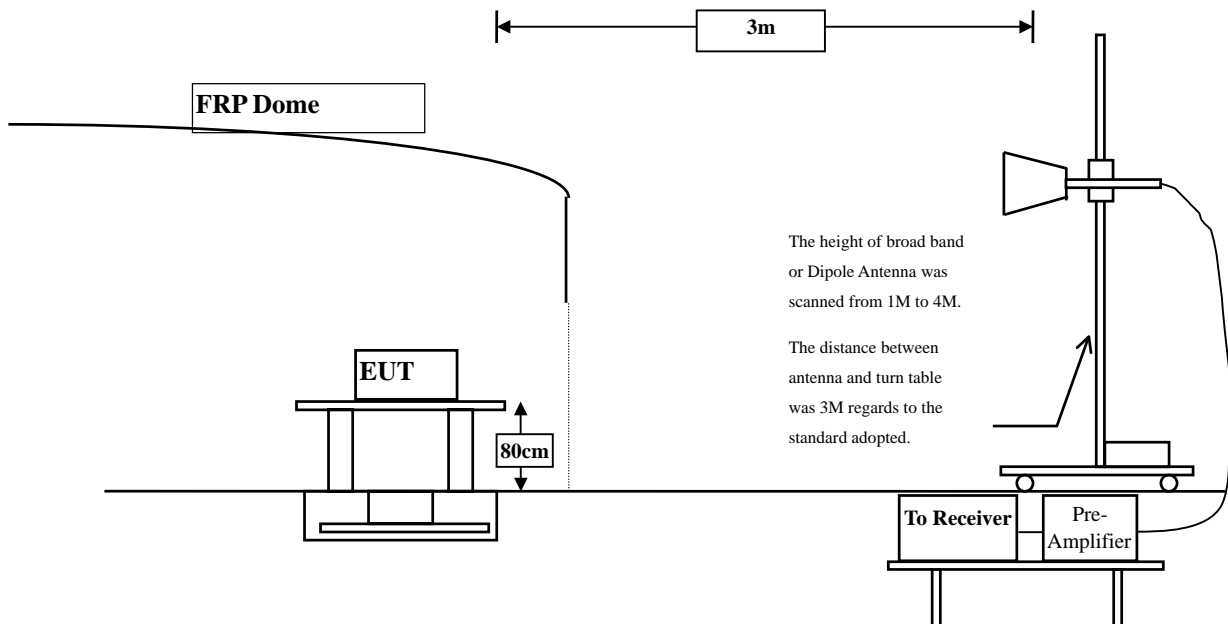
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

4.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



4.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2009 and tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2009 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement. The measurement frequency range from 30MHz - 10th Harmonic of fundamental was investigated.

4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

4.6. Test Result of Radiated Emission

Product : Infotainment System with Headunit (with BT, WLAN, Kleer technology)
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2403MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4806.000	3.328	38.500	41.829	-32.171	74.000
7209.000	10.188	37.430	47.617	-26.383	74.000
9612.000	13.669	37.520	51.189	-22.811	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4806.000	6.626	38.590	45.216	-28.784	74.000
7209.000	11.054	37.540	48.594	-25.406	74.000
9612.000	14.074	36.980	51.054	-22.946	74.000
Average Detector:					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Infotainment System with Headunit (with BT, WLAN, Klear technology)
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2443MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4886.000	2.984	40.170	43.154	-30.846	74.000
7329.000	11.873	36.400	48.273	-25.727	74.000
9772.000	12.527	37.360	49.887	-24.113	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4886.000	5.665	38.410	44.075	-29.925	74.000
7329.000	12.778	36.550	49.328	-24.672	74.000
9772.000	12.979	38.450	51.429	-22.571	74.000

Average Detector:

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Infotainment System with Headunit (with BT, WLAN, Kleer technology)
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2478MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
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Horizontal

Peak Detector:

4956.000	2.771	39.550	42.321	-31.679	74.000
7434.000	12.509	36.140	48.650	-25.350	74.000
9912.000	13.411	37.130	50.541	-23.459	74.000

Average Detector:

--

Vertical

Peak Detector:

4956.000	5.553	39.970	45.524	-28.476	74.000
7434.000	13.416	35.490	48.907	-25.093	74.000
9912.000	13.964	36.760	50.725	-23.275	74.000

Average Detector:

--

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Infotainment System with Headunit (with BT, WLAN, Klear technology)
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2443Hz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
127.000	-10.017	48.868	38.851	-4.649	43.500
295.780	-3.655	44.512	40.857	-5.143	46.000
499.480	0.048	41.846	41.894	-4.106	46.000
648.860	2.038	41.616	43.654	-2.346	46.000
738.100	2.826	39.387	42.213	-3.787	46.000
792.420	5.209	37.691	42.900	-3.100	46.000
Vertical					
158.040	-6.191	43.731	37.540	-5.960	43.500
249.220	-7.634	43.239	35.605	-10.395	46.000
379.200	-1.505	41.231	39.725	-6.275	46.000
540.220	0.121	38.326	38.447	-7.553	46.000
695.420	1.878	38.166	40.044	-5.956	46.000
769.140	2.923	38.902	41.825	-4.175	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

5. RF antenna conducted test

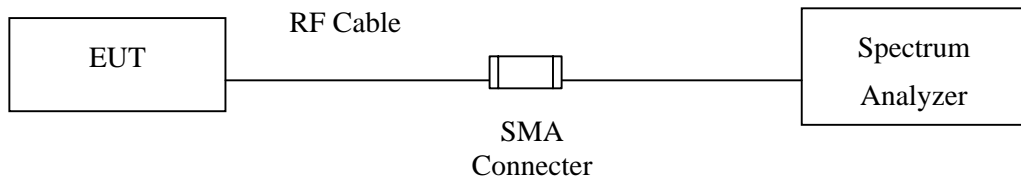
5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2012

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with “X” are used to measure the final test results.

5.2. Test Setup

RF antenna Conducted Measurement:



5.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.4. Test Procedure

The EUT was tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.5. Uncertainty

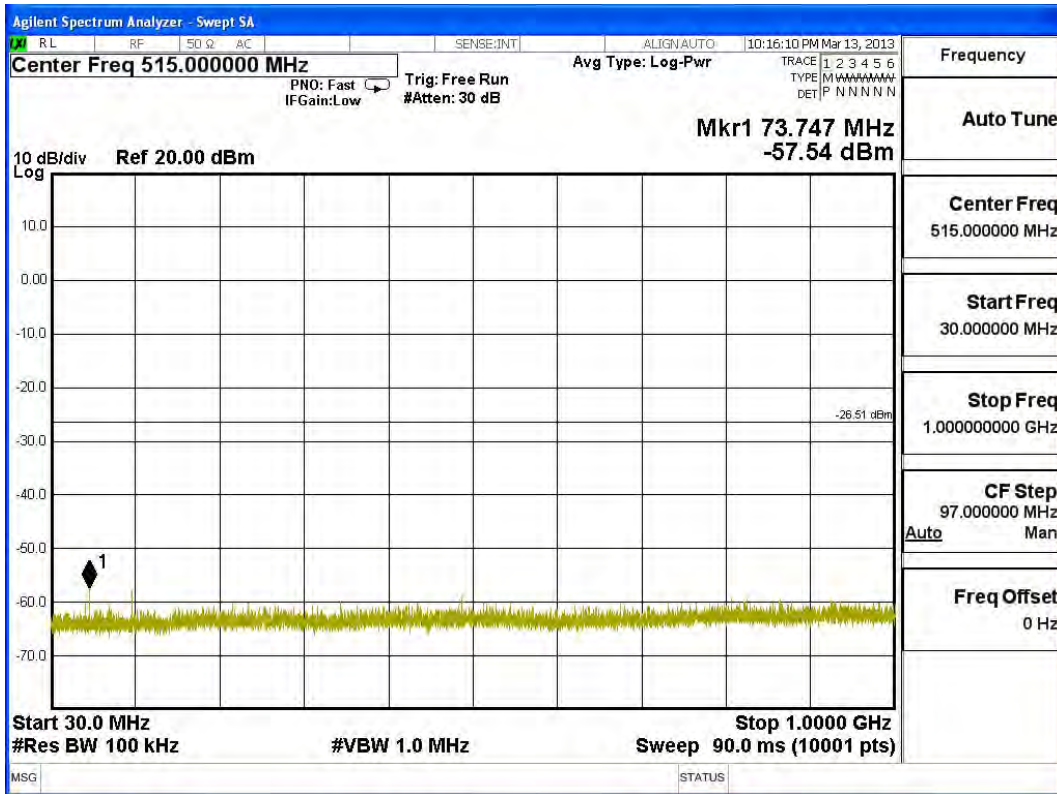
The measurement uncertainty

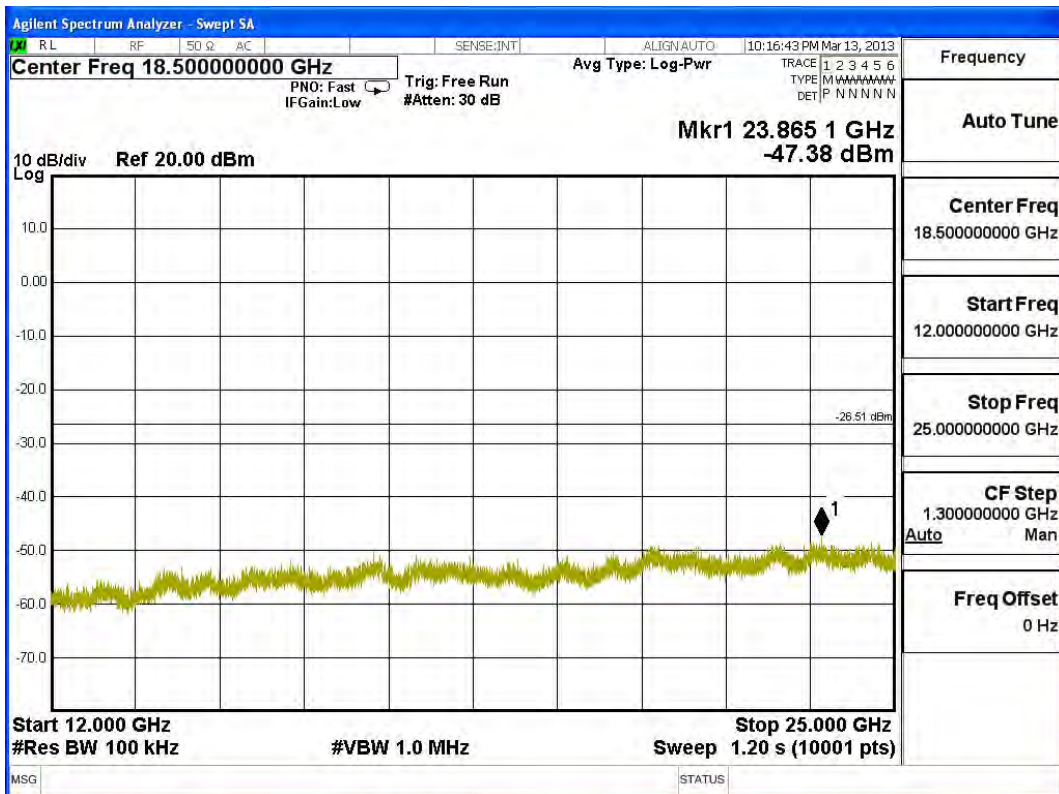
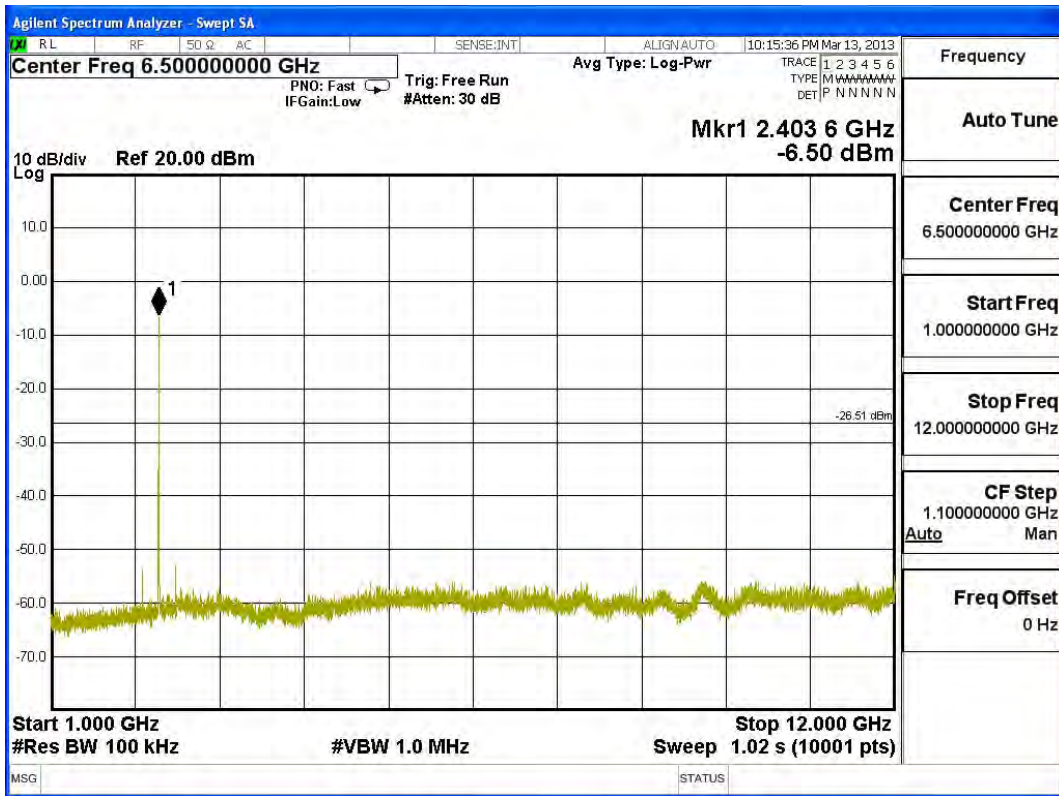
Conducted is defined as $\pm 1.27\text{dB}$

5.6. Test Result of RF antenna conducted test

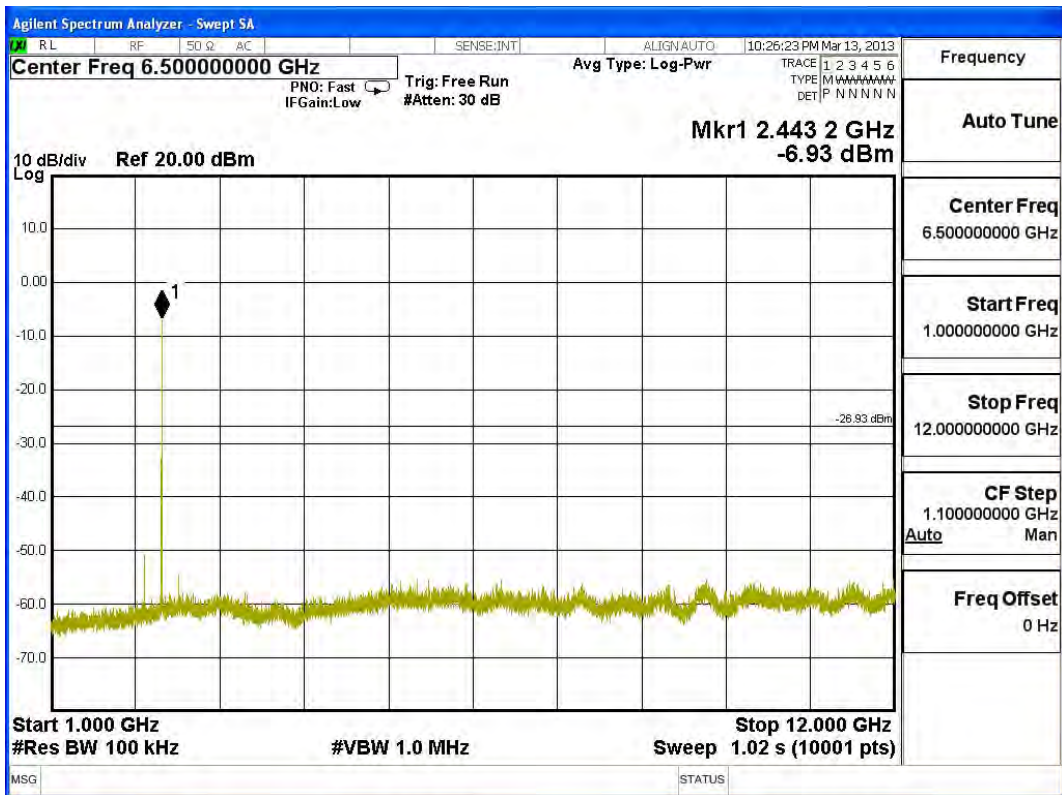
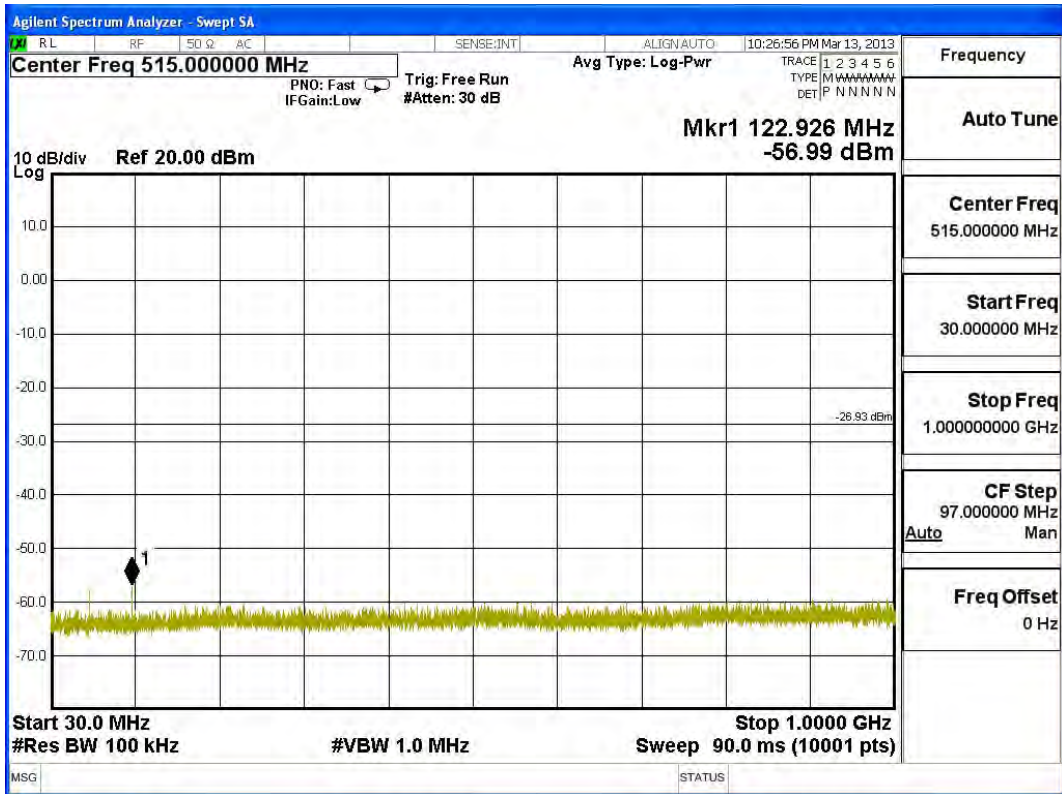
Product : Infotainment System with Headunit (with BT, WLAN, Klear technology)
 Test Item : RF antenna conducted test
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit

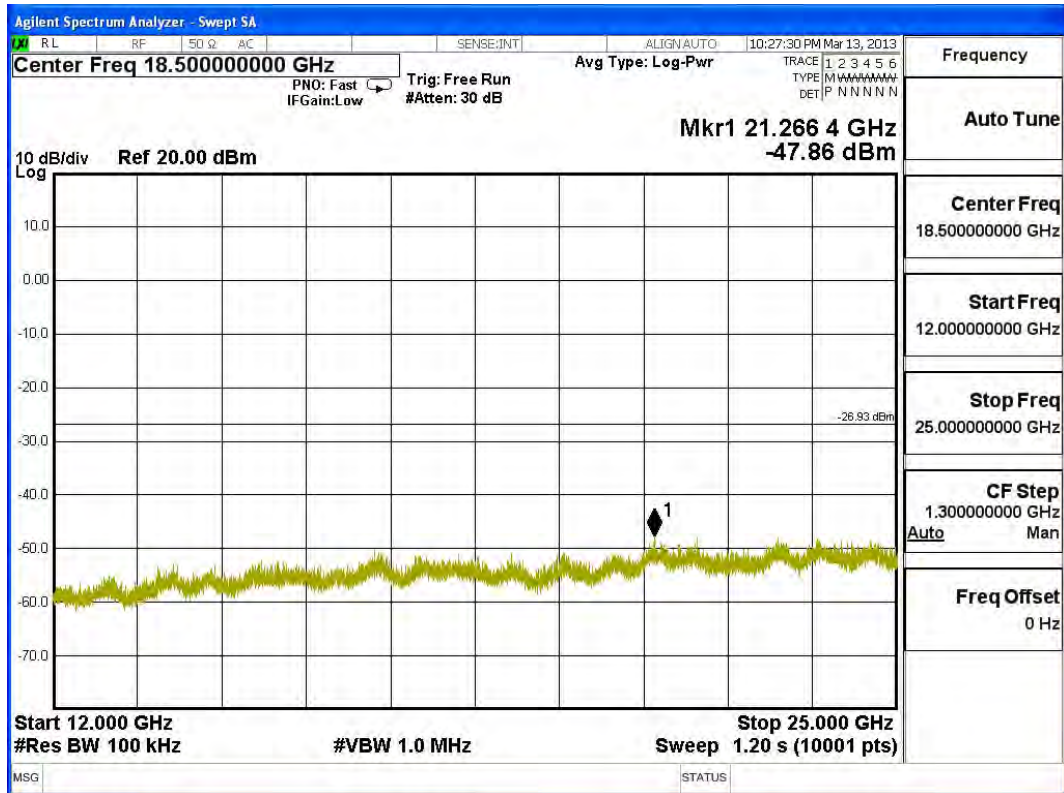
Channel 01(2403Hz)



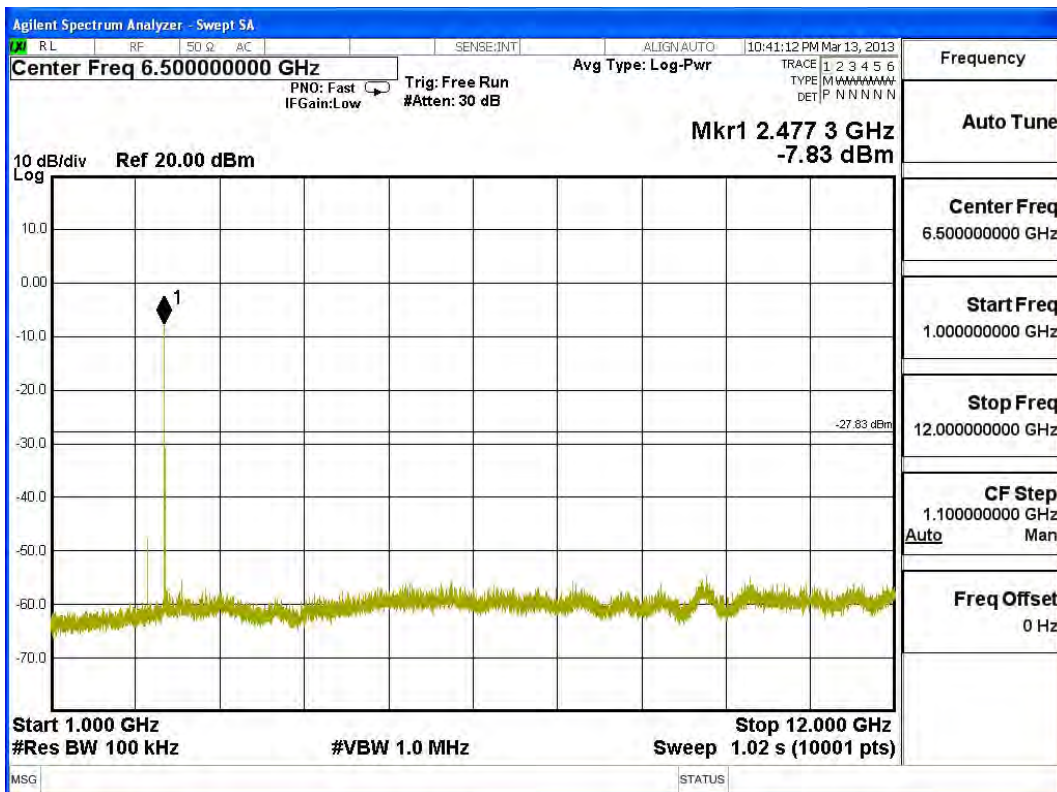
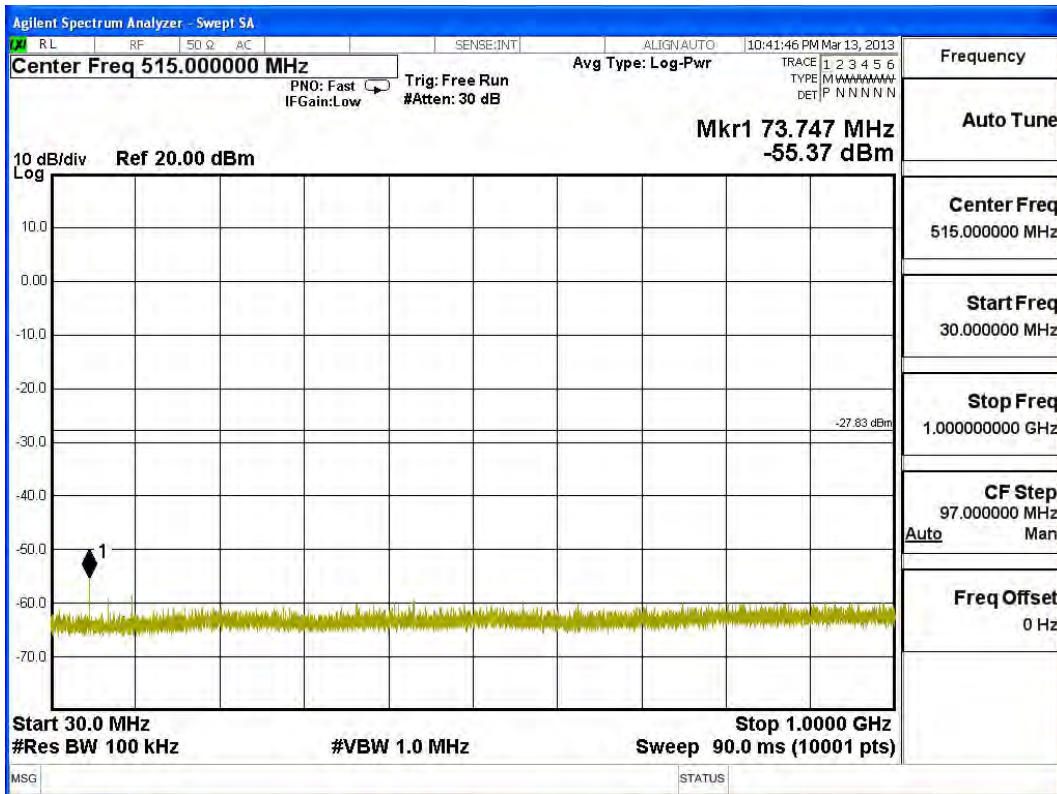


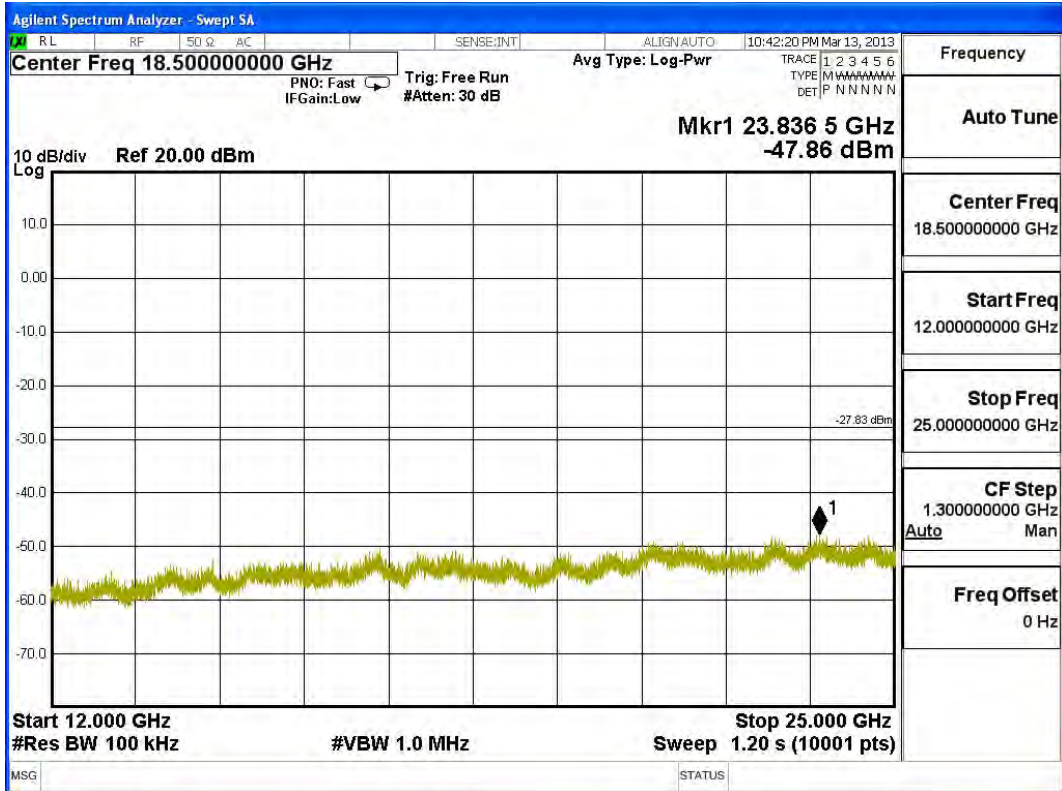
Channel 09 (2443MHz)





Channel 16 (2478MHz)





6. Band Edge

6.1. Test Equipment

RF Conducted Measurement

The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2012

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

RF Radiated Measurement:

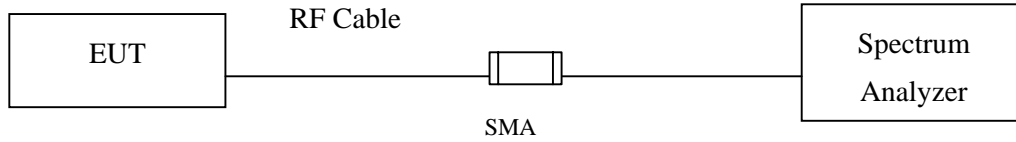
The following test equipments are used during the band edge tests:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	
☒ Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
		Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2012
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2012
		Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2013
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2012
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2013
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

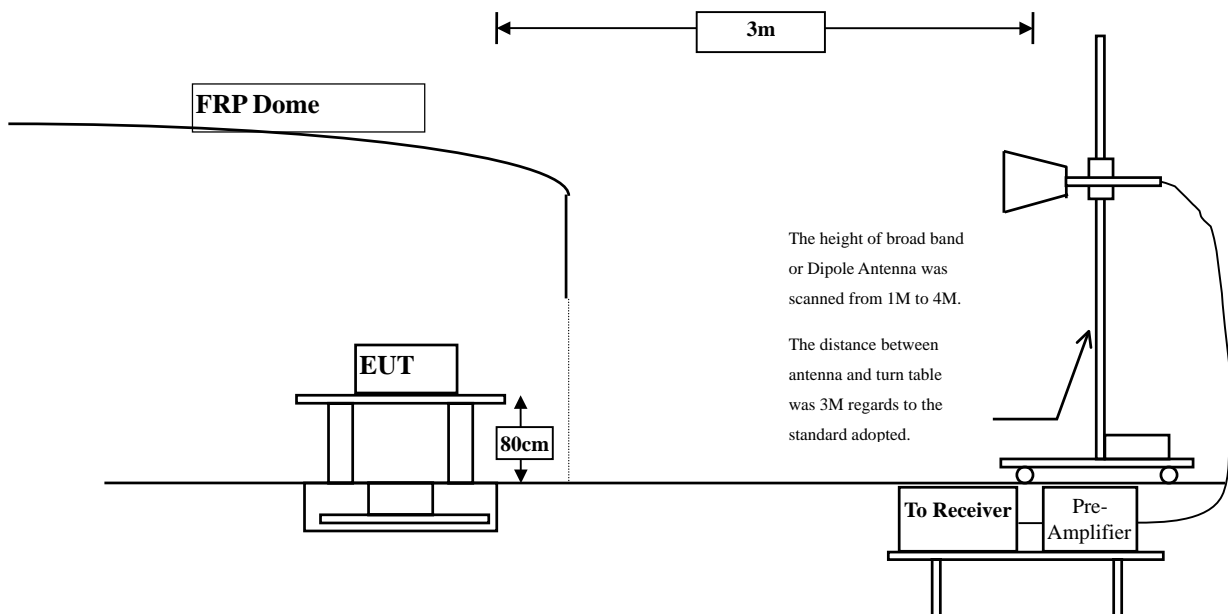
- Note:
1. All instruments are calibrated every one year.
 2. The test instruments marked by "X" are used to measure the final test results.

6.2. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



6.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

6.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2009 and tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2009 on radiated measurement.

6.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

6.6. Test Result of Band Edge

Product : Infotainment System with Headunit (with BT, WLAN, Klear technology)
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2403	31.581	60.49	92.07	Peak
Horizontal	2403	31.581	57.46	89.04	Average
Vertical	2403	30.921	54.32	85.24	Peak
Vertical	2403	30.921	51.73	82.65	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2390	92.07	47.9	44.17	74.000	Peak
Horizontal	2390	89.04	57.48	31.56	54.000	Average
Vertical	2390	85.24	47.9	37.34	74.000	Peak
Vertical	2390	82.65	57.48	25.17	54.000	Average

Note:

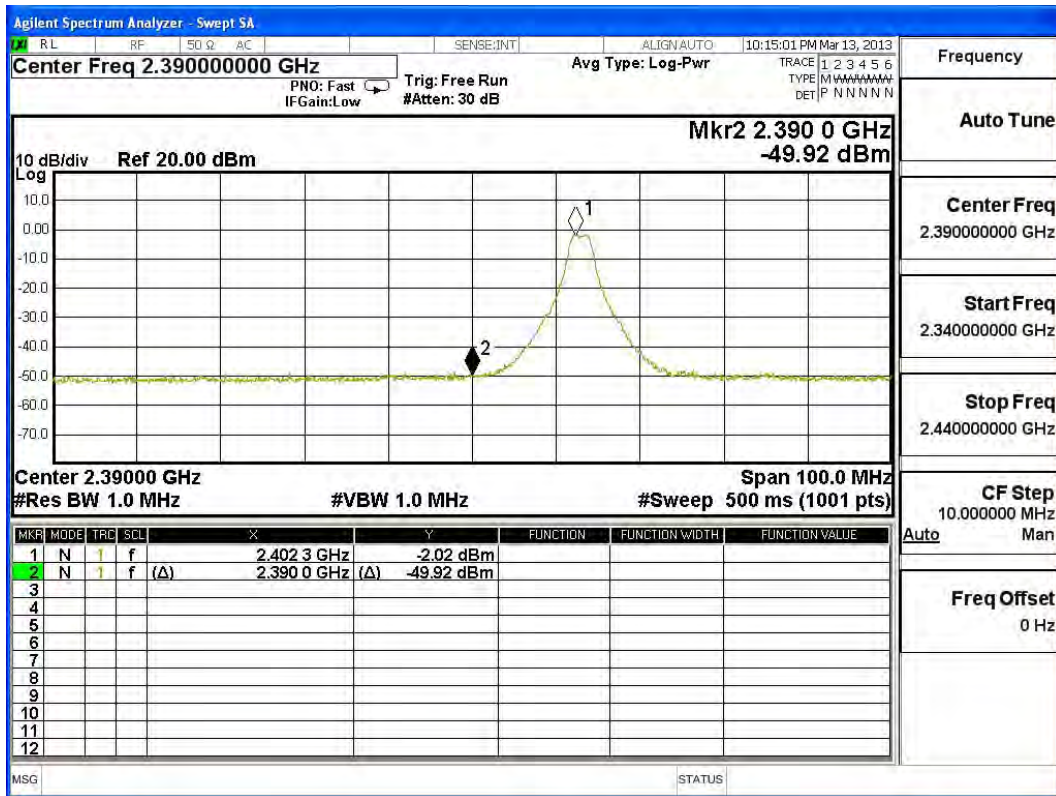
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

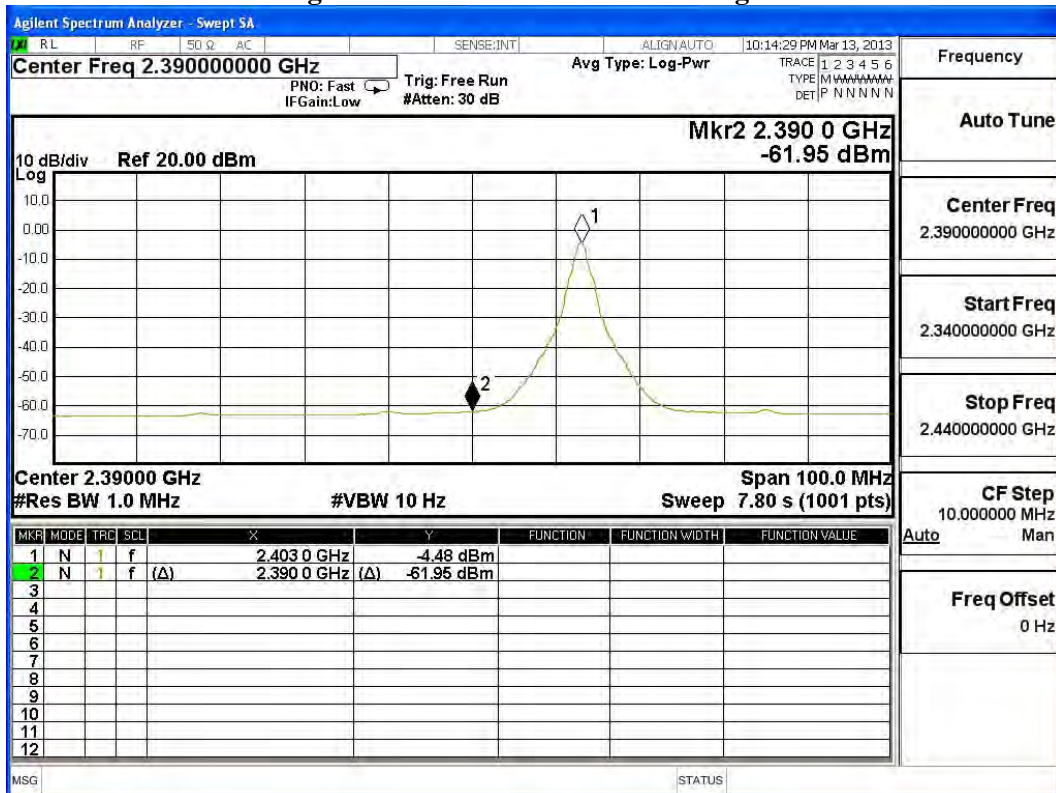
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Average Detector of conducted Band Edge Delta



Product : Infotainment System with Headunit (with BT, WLAN, Klear technology)
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dB(uV/m)]	Detector
Horizontal	2478	32.14	59.36	91.5	Peak
Horizontal	2478	32.14	56.72	88.86	Average
Vertical	2478	31.397	54.33	85.728	Peak
Vertical	2478	31.397	51.71	83.108	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Limit (dBuV/m)	Detector
Horizontal	2483.5	91.5	34.45	57.05	74.000	Peak
Horizontal	2483.5	88.86	42.55	46.31	54.000	Average
Vertical	2483.5	85.728	34.45	51.278	74.000	Peak
Vertical	2483.5	83.108	42.55	40.558	54.000	Average

Note:

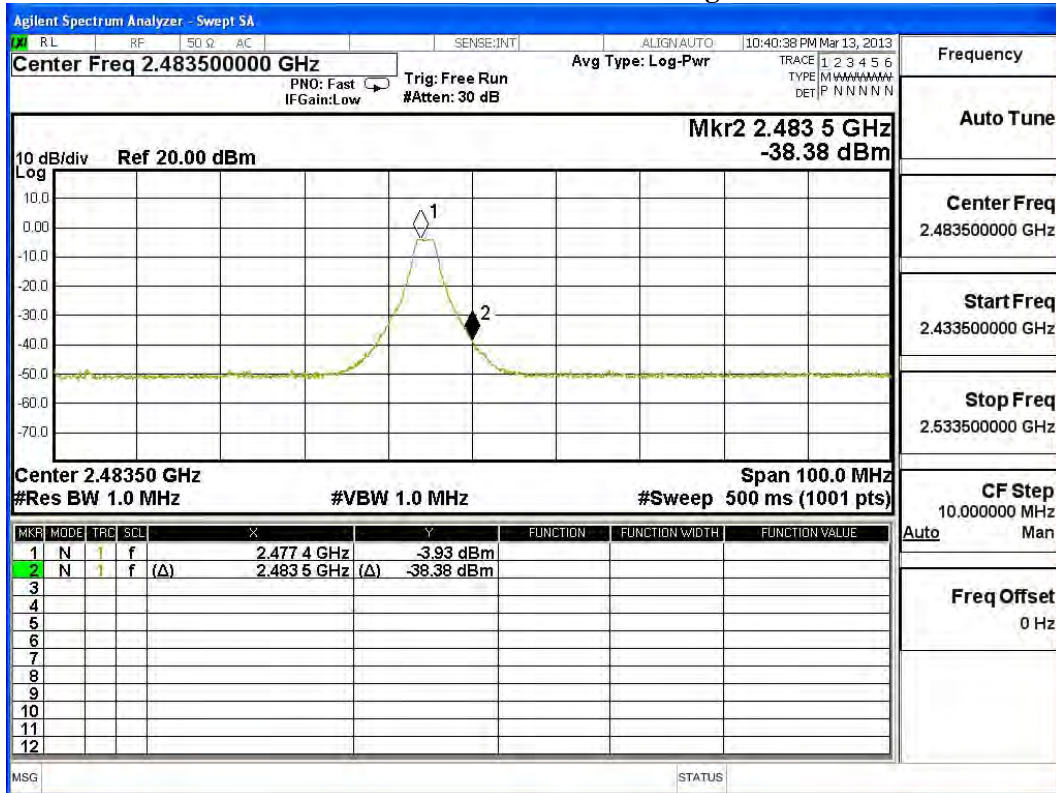
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

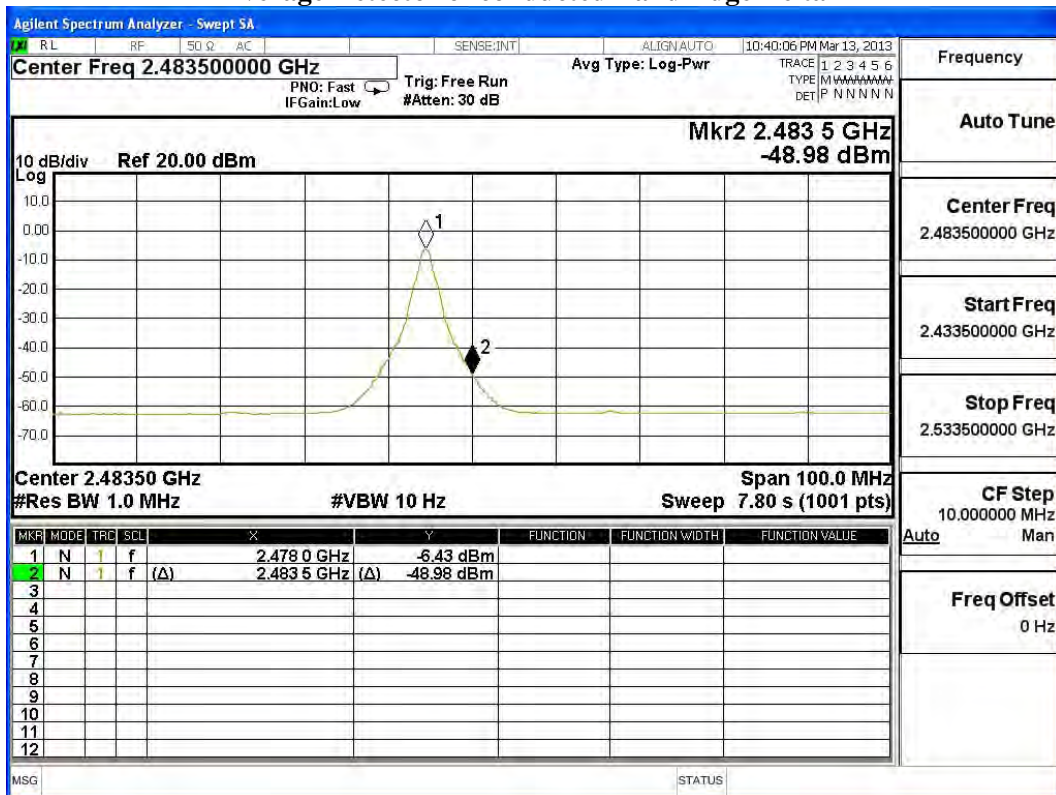
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Average Detector of conducted Band Edge Delta



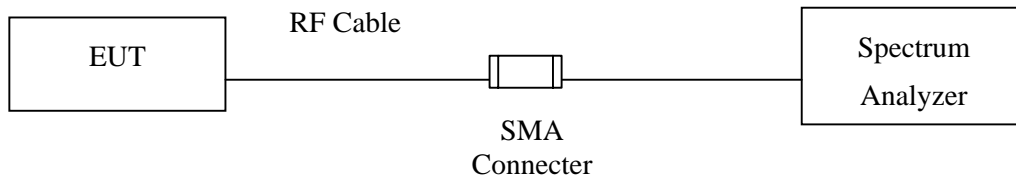
7. Occupied Bandwidth

7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2012

Note: 1. All instruments are calibrated every one year.
 2. The test instruments marked by "X" are used to measure the final test results.

7.2. Test Setup



7.3. Limits

The minimum bandwidth shall be at least 500 kHz.

7.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2009; tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 1-5% of the emission bandwidth, $VBW \geq 3 * RBW$

7.5. Uncertainty

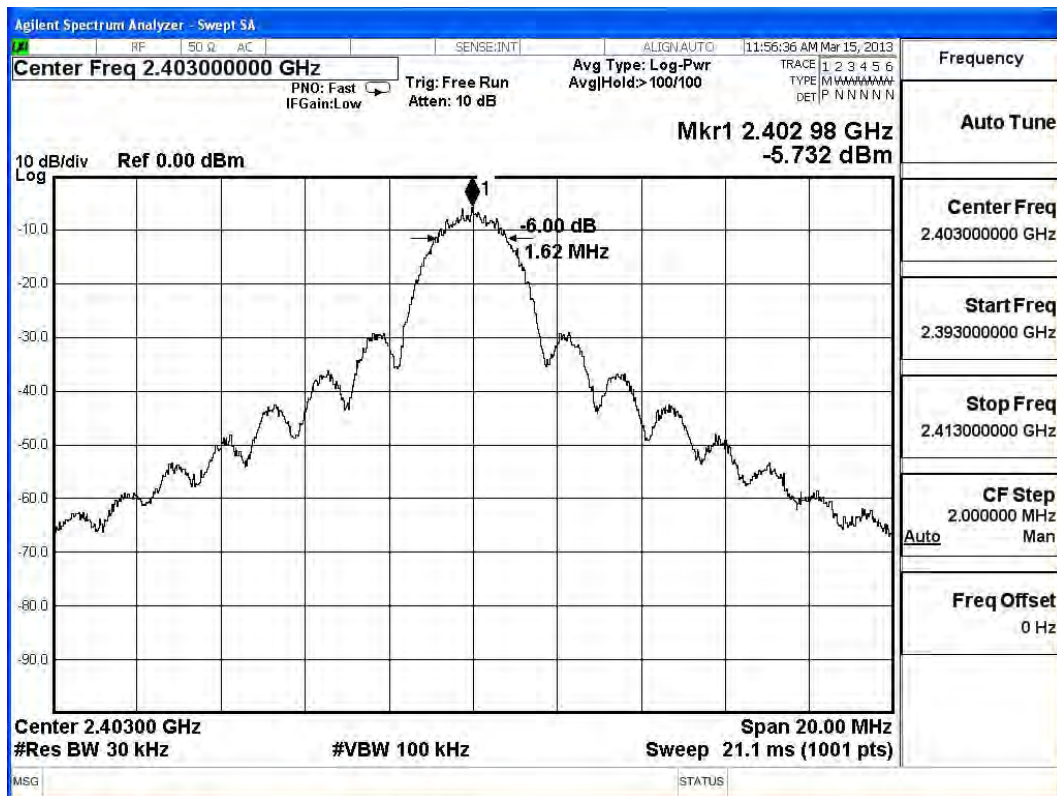
$\pm 150\text{Hz}$

7.6. Test Result of Occupied Bandwidth

Product : Infotainment System with Headunit (with BT, WLAN, Klear technology)
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2403MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2403.00	1620	>500	Pass

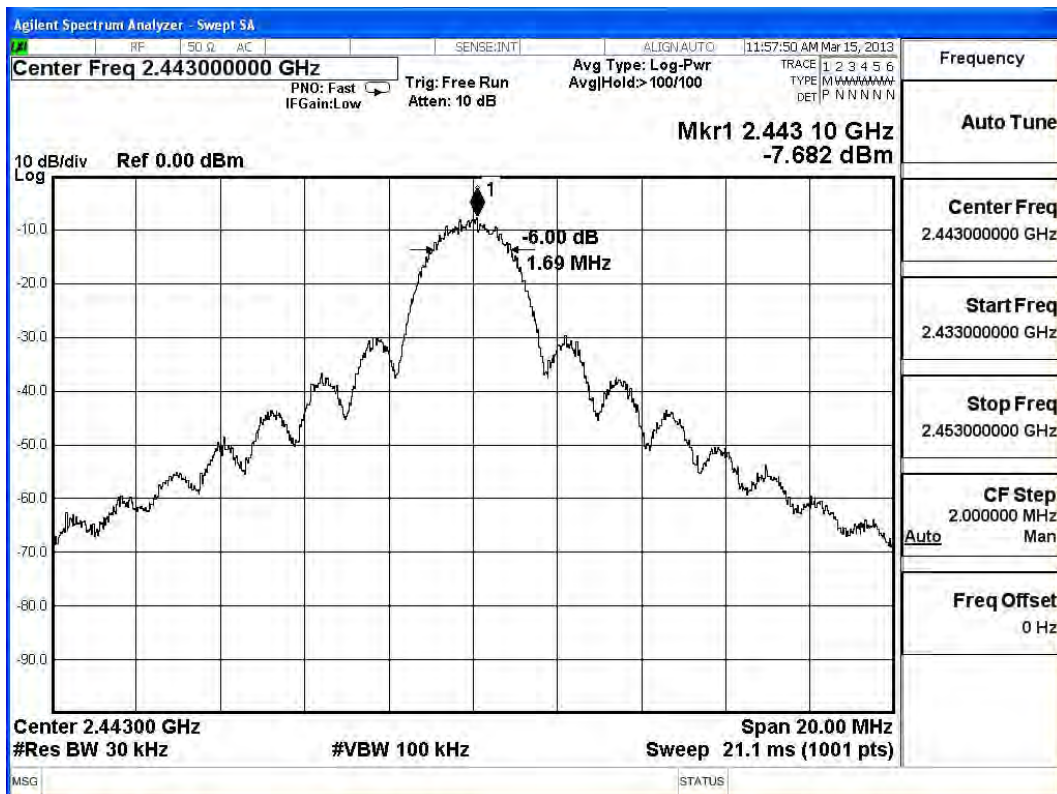
Figure Channel 01:



Product : Infotainment System with Headunit (with BT, WLAN, Kleer technology)
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2443MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
09	2443.00	1690	>500	Pass

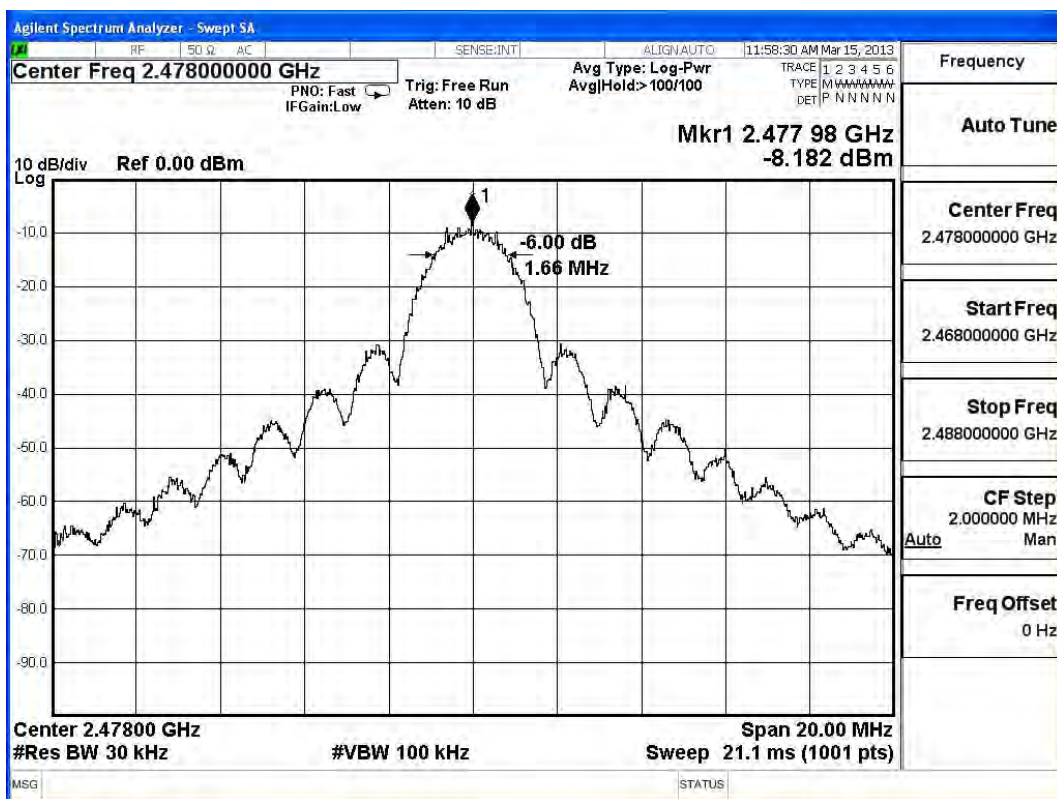
Figure Channel 09:



Product : Infotainment System with Headunit (with BT, WLAN, Klear technology)
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2478MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
16	2478.00	1660	>500	Pass

Figure Channel 16:



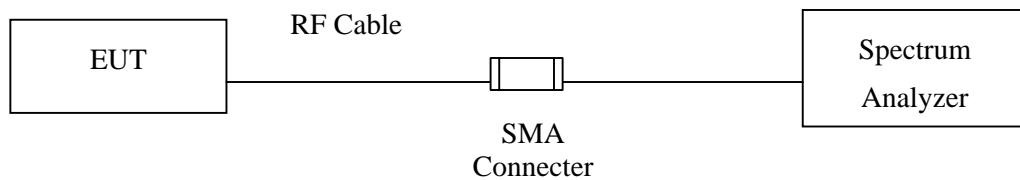
8. Power Density

8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2012

Note: 1. All equipments are calibrated every one year.
 2. The test instruments marked by “X” are used to measure the final test results.

8.2. Test Setup



8.3. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2009; tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

Set RBW= 100 kHz, VBW \geq 300KHz, SPAN to 5-30 % greater than the EBW,

Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(3\text{ kHz}/100\text{ kHz}) = -15.2\text{ dB}$.

8.5. Uncertainty

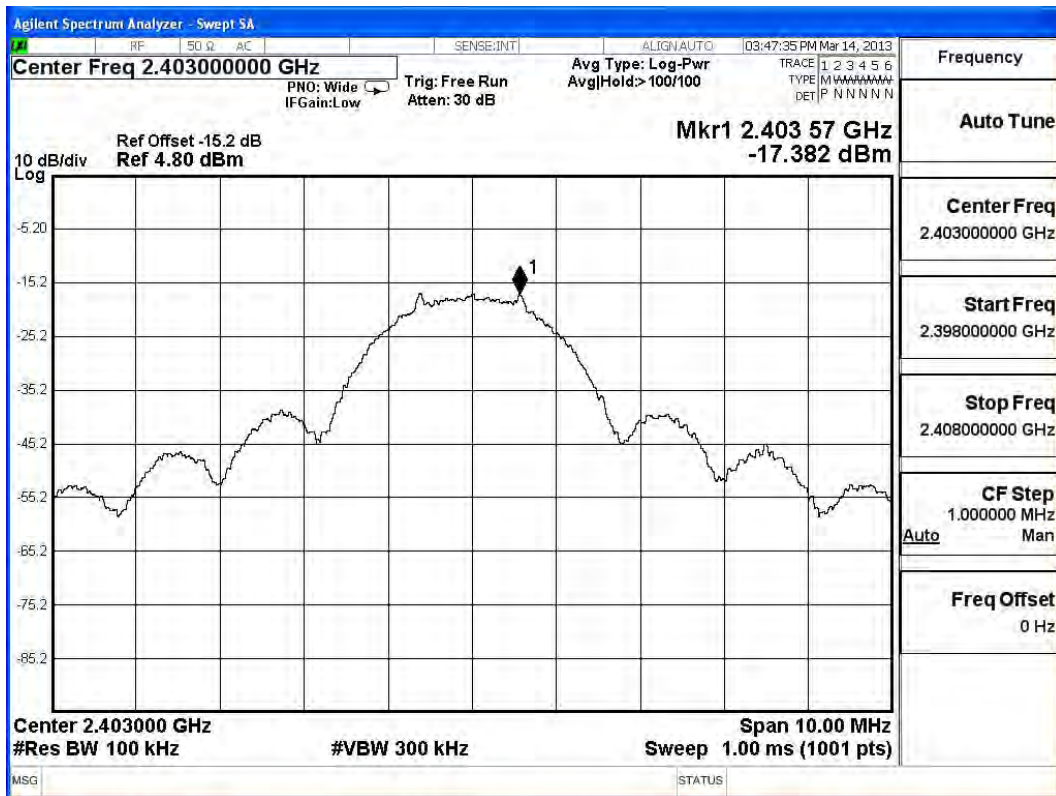
$\pm 1.27\text{ dB}$

8.6. Test Result of Power Density

Product : Infotainment System with Headunit (with BT, WLAN, Klear technology)
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit(2403MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2403.00	-17.382	< 8dBm	Pass

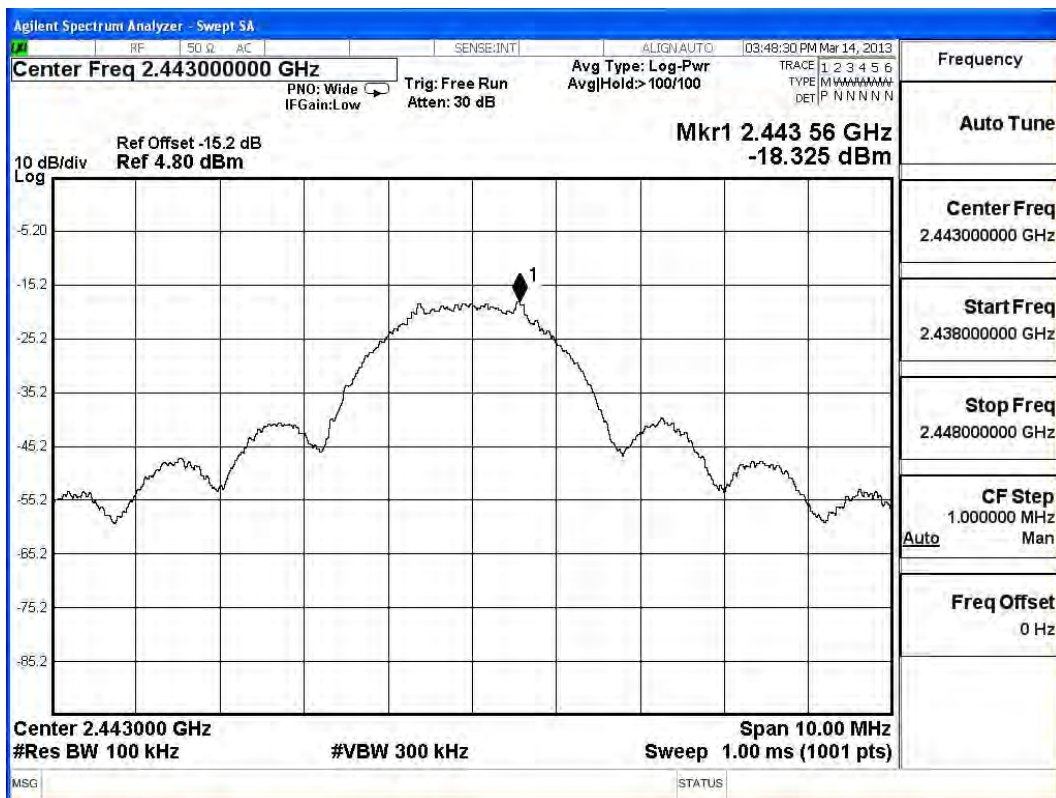
Figure Channel 01:



Product : Infotainment System with Headunit (with BT, WLAN, Klear technology)
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (2443MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
09	2443.00	-18.325	< 8dBm	Pass

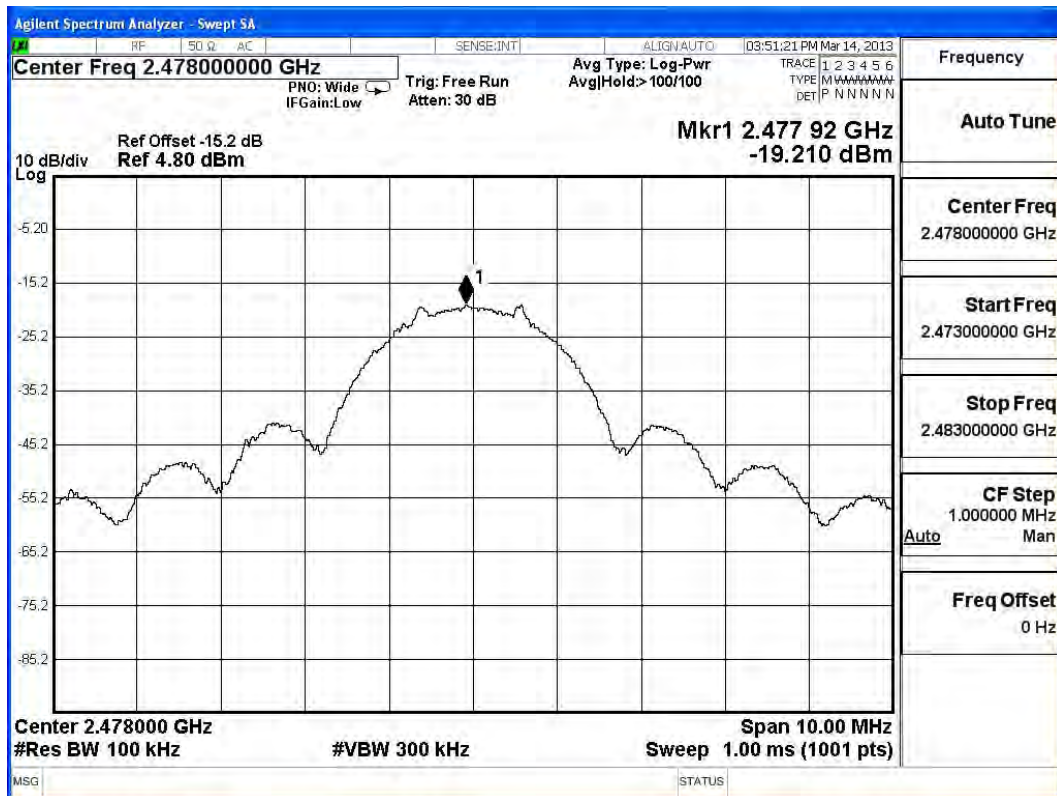
Figure Channel 09:



Product : Infotainment System with Headunit (with BT, WLAN, Klear technology)
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2478MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
16	2478.00	-19.210	< 8dBm	Pass

Figure Channel 16:



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs