



RF Exposure Evaluation Report

FOR:

Harman International

Model Number: CMC VP4

Product Description: Automotive Infotainment Unit

FCC ID: QNG-BE2804

IC ID: 6434C-BE2804

References:

1. FCC OET Bulletin 65 Supplement
2. FCC CFR Part 1 (1.1307 & 1.1310), Part 2 (2.1091)
3. RSS-102- Radio Frequency Exposure Compliance of Radiocommunication Apparatus
Issue 4 March 2010, Ch, 2.5 and Ch. 4

1 Administrative Data

1.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
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Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Test Lab Director:	Heiko Strehlow
Responsible Project Leader:	Calvin Lee

1.2 Identification of the Client

Client:	Harman International
Street Address:	26500 Haggerty Road
City/Zip Code	Farmington Hills, MI 48331
Country	USA
Contact Person:	Shain E. Chmura
Phone No.	+1 (248) 592-3157
e-mail:	schmura@harman.com

1.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client.
Manufacturers Address:	
City/Zip Code	
Country	

2 Equipment under Test (EUT)

2.1 Specification of the Equipment under Test

Model No:	CMC VP4
HW Revision:	PV
FCC-ID:	QNG-BE2804
IC-ID:	6434C-BE2804
Product Description:	Automotive Infotainment Unit
Frequency Range of test and number of channels:	IEEE 802.11 b/g: 2412 – 2462 MHz / 11 Channels Bluetooth: 2402-2480MHz / 79 Channels
Type(s) of Modulation:	802.11b: DSSS/ 802.11g: OFDM Bluetooth: GFSK, $\pi/4$ DQPSK, 8DPSK
Antenna Info:	Fakra style external Antenna Gain: 2 dBi
Co-located Transmitters/ Antennas?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Rated Operating Voltage Range:	9-16 VDC
Rated Operating temperature range:	-40°C to 85°C
Test Sample Status:	Pre-Production
Device Category:	<input checked="" type="checkbox"/> Fixed Installation/ Mobile <input type="checkbox"/> Portable
Exposure Category:	<input type="checkbox"/> Occupational/ Controlled <input checked="" type="checkbox"/> General Population/ Uncontrolled

3 Assessment

This report serves as the Technical Information regarding RF Exposure evaluation of the below identified device according to the rules as stipulated in the documents listed under References above.

The device meets the RF exposure limits, or - for some of its radio functions / bands - the conditions for exemption from routine evaluation as defined in the referenced FCC and IC rule parts.

Company	Description	Model #
Harman International	Automotive Infotainment Unit	CMC VP4

2013-02-08 Compliance Calvin Lee
(EMC Engineer)

Date	Section	Name	Signature
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4 RF Exposure Evaluation Requirements

4.1 FCC:

Calculations can be made to predict RF field strength and power density levels around typical RF sources using the general equations (3) and (4) on page 19 of the following FCC document:
“OET Bulletin 65, Edition 97-01 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields”.

The table below is excerpted from Table 1B of 47 CFR 1.1310 titled Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure:

Frequency Range (MHz)	Power density (mW/cm ²)	Averaging time (minutes)
300 – 1500	f (MHz) /1500	30
1500 – 100.000	1.0	30

Using the equation from page 19 of OET Bulletin 65, Edition 97-01:

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (in appropriate units, e.g. mW/cm²)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Note: This device is to be used only for fixed and mobile applications.

Additionally, according to § 2.1091:

The limit for <1.5 GHz mobile operations where no routine evaluation is required is: 1.5W ERP

The limit for >1.5 GHz mobile operations where no routine evaluation is required is: 3W ERP

4.2 IC:

RSS-102 Section 2.5.2

RF exposure evaluation is required if the separation distance between the user and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 1.5 GHz and the maximum EIRP of the device is equal to or less than 2.5 W;
- at or above 1.5 GHz and the maximum EIRP of the device is equal to or less than 5 W.

RSS-102 4.2: RF Field strength limits for devices used by the General Public (Uncontrolled Environment):

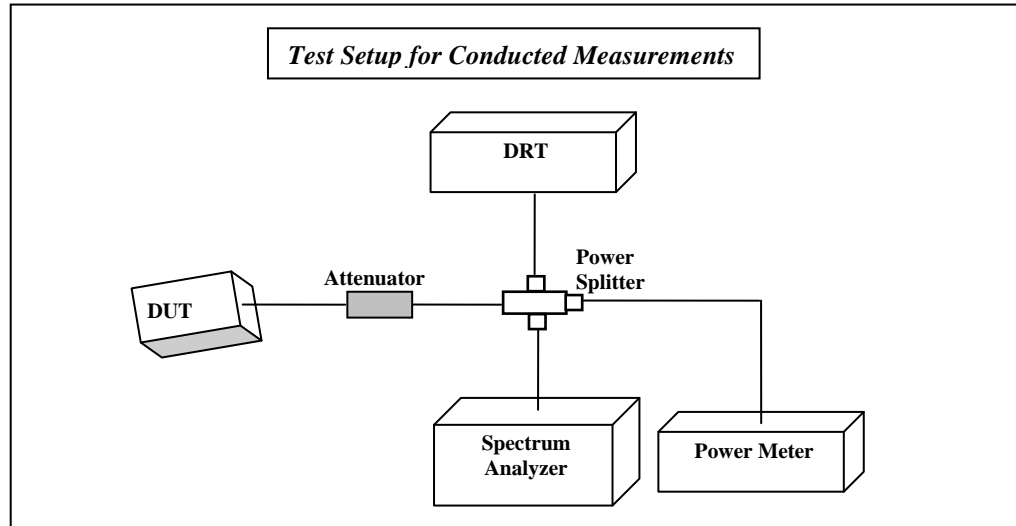
Power density

300MHz- 1500 MHz= f/150 W/m²

1500 MHz- 1500000 MHz= 10 W/m²

5 Measurement procedure:

5.1 Radiated power Calculation- ERP/EIRP-



1. Connect the equipment as shown in the above diagram.
2. Adjust the settings of the Digital Radio Communication Tester (DRT) to connect the EUT at the required channel (OR) alternatively use the EUT to set to transmit at a specific mode.
3. Measure conducted power using the power meter or the Spectrum Analyzer.
4. ERP/EIRP is calculated by adding the antenna gain to the measured conducted power.

EIRP= Measured conducted power+ Antenna Gain (dBi)

(Antenna gain based on measurement or data from the antenna manufacturer.)

ERP= EIRP- 2.14

5.2 Measurement Equipment information:

Instrument/Ancillary	Model	Manufacturer	Serial No.	Cal Date	Cal Interval
Radio Communication Tester	CMU 200	Rohde & Schwarz	101821	May 2011	2 Years
EMI Receiver/Analyzer	ESU 40	Rohde & Schwarz	100251	Aug 2012	2 Years
Spectrum Analyzer	FSU	Rohde & Schwarz	200302	May 2011	2 Years
Loop Antenna	6512	EMCO	00049838	Aug 2011	3 years
Biconilog Antenna	3141	EMCO	0005-1186	Apr 2012	3 years
Horn Antenna (1-18GHz)	3115	ETS	00035114	Mar 2012	3 years
Horn Antenna (1-18GHz)	3115	ETS	00035111	Apr 2012	3 years
Horn Antenna (18-40GHz)	3116	ETS	00070497	Aug 2011	3 years
Communication Antenna	IBP5-900/1940	Kathrein	n/a	n/a	n/a
High Pass Filter	5HC2700	Trilithic Inc.	9926013	Part of system calibration	
High Pass Filter	4HC1600	Trilithic Inc.	9922307	Part of system calibration	
Pre-Amplifier	JS4-00102600	Miteq	00616	Part of system calibration	
Power Smart Sensor	R&S	NRP-Z81	100161	May 2011	2 Years

5.3 Measurement Summary:

ERP/EIRP values as taken from test report # “EMC_HARMA-027-12001_DTS” and “EMC_HARMA-027-12001_DSS” issued by CETECOM Inc. on Feb. 8, 2013.

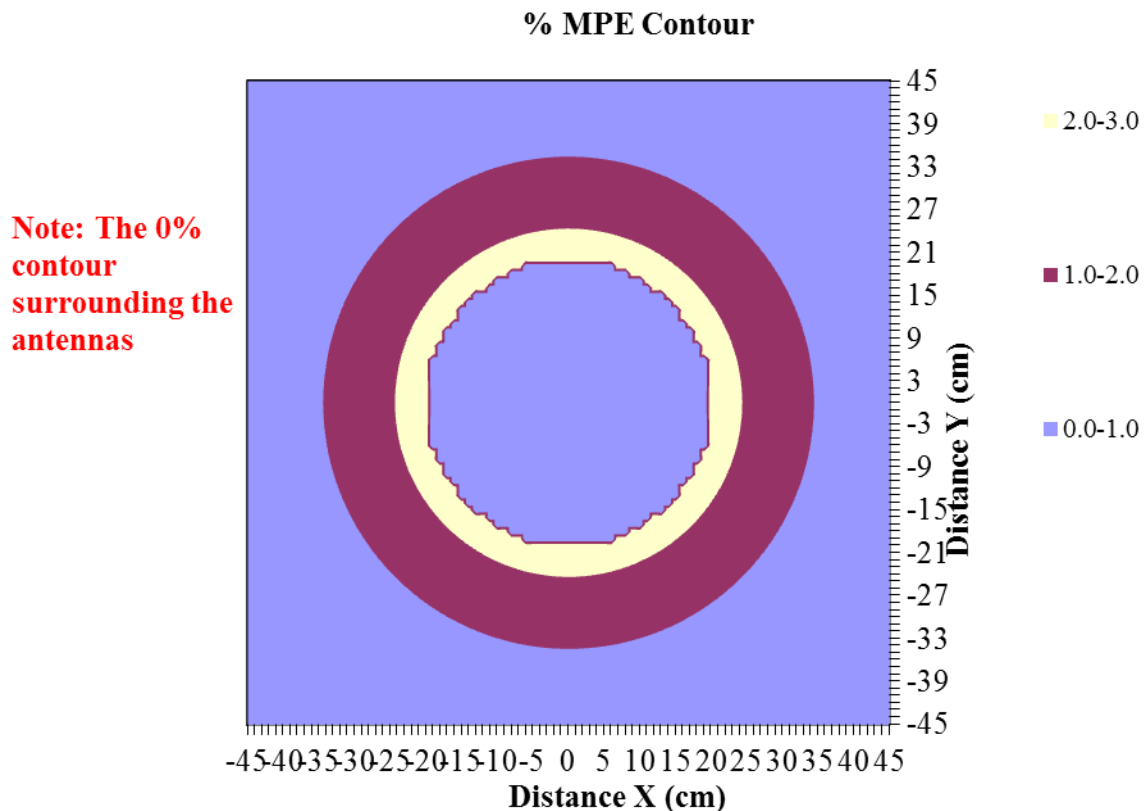
Band/Mode of operation	Peak Radiated Power- EIRP		Limits (IC) (where no routine evaluation is required)	Peak Radiated Power ERP		Limits (FCC) (where no routine evaluation is required)
	dBm	mW	W	dBm	mW	W
Bluetooth	5.2	3.3	5	3.06	2.02	3
WLAN 2.4GHz	21.6	144.5	5	19.46	88.31	3

Since the Peak ERP <3W (FCC) and Peak EIRP <5W (IC), this device is exempt from Routine evaluation.

Prediction for Simultaneous Transmission

Worst case representation of the MPE contour for all the antennas within 0cm of each other is shown below.

Antenna No.		Total	1	2
Tx Status			On	On
Frequency	MHz		2441	2437
MPE Limit	mW/cm ²		1.00	1.00
Max % MPE	%	3.0	0.1	2.9
Power	(W)	0.148	0.003	0.145
Antenna Gain	dBi		0.00	0.00
EIRP	(W)	0.15	0.003	0.145
X	(cm)		0.0	0.0
Y	(cm)		0.0	0.0



Verdict: Since the max MPE is <100%, the device is compliant in simultaneous transmission mode for BT & WLAN.