

FCC TEST REPORT

For

Dongguan Wanma Soaring Electronic Technology Co.,Ltd

CarDvRD

Model No.: BOSS800

Additional Model No. : BOSS700, BOSS500, SD3, VD3

Prepared for : Dongguan Wanma Soaring Electronic Technology Co.,Ltd
Address : No.28 South Dongshen Road,Zhangyang Fuda Industrial
Zone, ZhangMutou Town, Dongguan, Guangdong, China

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an
Avenue, Bao'an District, Shenzhen, Guangdong, China

Date of receipt of test sample : November 04, 2013
Number of tested samples : 1
Serial number : Prototype
Date of Test : November 04, 2013 - November 09, 2013
Date of Report : November 09, 2013

FCC TEST REPORT
FCC CFR 47 PART 15 Subpart B: 2012**Report Reference No. : LCS131104086TF**

Date Of Issue..... : November 09, 2013

Testing Laboratory Name : Shenzhen LCS Compliance Testing Laboratory Ltd.Address..... : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue,
Bao'an District, Shenzhen, Guangdong, ChinaTesting Location/ Procedure : Full application of Harmonised standards ☒Partial application of Harmonised standards ☐Other standard testing method ☐**Applicant's Name..... : Dongguan Wanma Soaring Electronic Technology Co.,Ltd**Address..... : No.28 South Dongshen Road,Zhangyang Fuda Industrial Zone,
ZhangMutou Town, Dongguan, Guangdong, China**Test Specification**

Standard : FCC CFR 47 PART 15 Subpart B:2012, ANSI C63.4-2009

Test Report Form No. : LCSEMC-1.0

TRF Originator..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2011-03

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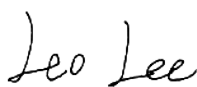
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Test Item Description..... : CarDvRD

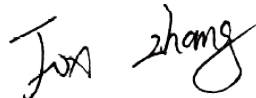
Trade Mark..... : Wanma

Model/ Type Reference..... : BOSS800

Ratings : DC 12V

Result : Positive**Compiled by:**

Leo Lee/ File administrators

Supervised by:

Fox Zhang/ Technique principal

Approved by:

Gavin Liang/ Manager

FCC TEST REPORT

Test Report No. : LCS131104086TFNovember 09, 2013

Date of issue

Type/ Model..... : BOSS800

EUT..... : CarDvRD

Applicant..... : Dongguan Wanma Soaring Electronic Technology Co.,Ltd
Address..... : No.28 South Dongshen Road,Zhangyang Fuda Industrial Zone,
ZhangMutou Town, Dongguan, Guangdong, China
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Address..... : No.28 South Dongshen Road,Zhangyang Fuda Industrial Zone,
ZhangMutou Town, Dongguan, Guangdong, China
Telephone..... : /
Fax..... : /

Test Result**Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION			
Description of Test Item	Standard	Limits	Results
Conducted disturbance at mains terminals	FCC CFR 47 PART 15 Subpart B: 2012	Class B	N/A
Radiated disturbance	FCC CFR 47 PART 15 Subpart B: 2012	Class B	PASS
Note: 1.N/A is an abbreviation for not applicable. 2.This EUT is designed to use on vehicle, so conducted disturbance testing at mains terminals is not applicable for this submit.			

1.2. Description of Test Modes

Test Modes:		
Mode 1	Radar Detecting (Received DC 12V power by a new lead-acid battery)	Record
Note: 1.This FCC Certification submission is only for the Radar Detecting Function of this device. 2.This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.		

2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT : CarDvRD

Model Number : BOSS800

Power Supply : DC 12V

Radar Detecting Frequency : X Band: 10420.0MHz~10620.0MHz
K Band: 23900.0MHz~24300.0MHz
Ka Band: 34100.0MHz~35820.0MHz

Radar Detecting Antenna : Horn Antenna

GPS Receiving Frequency : 1575.42MHz

GPS Receiving Antenna : Ceramic Antenna

2.2. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
renewable energy company	lead-acid battery	RM 12-18	N/A	VOC

Note: A new lead-acid battery supplied DC 12V power to the EUT for testing.

2.3. External I/O

I/O Cable	Quantity	Description
USB Port	1	0.8m, unshielded
DC12V IN Port	1	3.0m, unshielded
TV-OUT Port	1	1.2m, unshielded

2.4. Description of Test Facility

Site Description

EMC Lab. : Accredited by CNAS, June 04, 2010
The Certificate Registration Number. is L4595.

Accredited by FCC, July 14, 2011
The Certificate Registration Number. is 899208.

Accredited by Industry Canada, May. 02, 2011
The Certificate Registration Number. is 9642A-1

Accredited by VCCI, Japan January 30, 2012
The Certificate Registration Number. is C-4260 and R-380

2.5.Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

2.6.Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	$\pm 3.10\text{dB}$	(1)
	:	30MHz~200MHz	$\pm 2.96\text{dB}$	(1)
	:	200MHz~1000MHz	$\pm 3.10\text{dB}$	(1)
	:	1GHz~26.5GHz	$\pm 3.80\text{dB}$	(1)
	:	26.5GHz~40GHz	$\pm 3.90\text{dB}$	(1)
Conduction Uncertainty	:	150kHz~30MHz	$\pm 1.63\text{dB}$	(1)
1 Power disturbance	:	30MHz~300MHz	$\pm 1.60\text{dB}$	(1)

)
. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

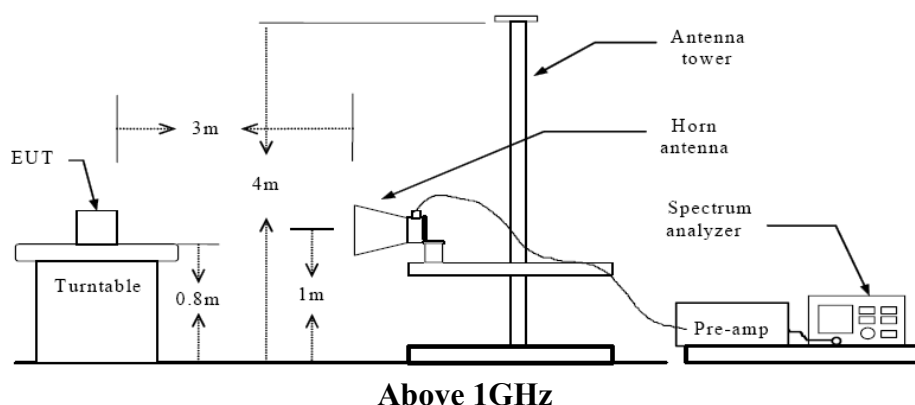
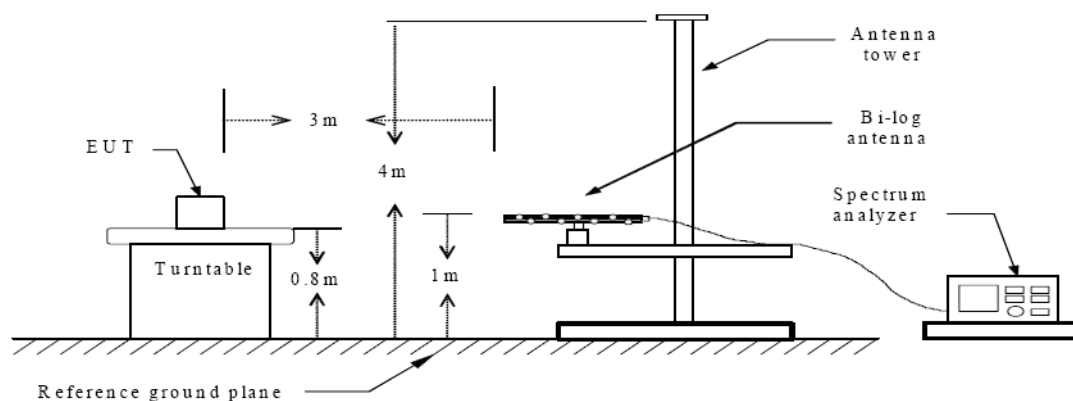
3. RADIATED EMISSION MEASUREMENT

3.1. Test Equipment

The following test equipments are used during the radiated emission measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2013-06-18	2014-06-17
2	Amplifier	SCHAFFNER	COA9231A	18667	2013-06-18	2014-06-17
3	Amplifier	Agilent	8449B	3008A02120	2013-06-16	2014-06-15
4	Amplifier	MITEQ	AMF-6F-260400	9121372	2013-06-16	2014-06-15
5	Spectrum Analyzer	Agilent	E4407B	MY41440292	2013-06-16	2014-06-15
6	Signal analyzer	Agilent	E4448A(External mixers to 40GHz)	US44300469	2013-06-16	2014-06-15
7	Loop Antenna	R&S	HFH2-Z2	860004/001	2013-06-18	2014-06-17
8	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2013-06-10	2014-06-09
9	Horn Antenna	EMCO	3115	6741	2013-06-10	2014-06-09
10	Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	2013-06-10	2014-06-09
11	RF Cable-R03m	Jye Bao	RG142	CB021	2013-06-18	2014-06-17
12	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2013-06-18	2014-06-17

3.2. Block Diagram of Test Setup



3.3.Radiated Emission Limit (Class B)

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
30~88	3	100	40.0
88~216	3	150	43.5
216~960	3	200	46.0
960~1000	3	500	54.0

Remark : (1) Emission level $(\text{dB})\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system

Limits for radiated disturbance Above 1GHz			
Frequency (MHz)	Distance (Meters)	Field Strengths Limit	
		Average Limit ($\text{dB}\mu\text{V/m}$)	Peak Limit ($\text{dB}\mu\text{V/m}$)
Above 1GHz	3	54	74
11.7~12.2GHz	3	54	74
	1	63.5	83.5

Note:

1.The lower limit applies at the transition frequency.

2.Limit calculation and transfer to 1m according to ANSI C63.4.

3.4.EUT Configuration on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

3.5.Operating Condition of EUT

(1) Setup the EUT as shown in Section 3.2.

(2) Let the EUT work in test mode (Mode 1) and measure it.

3.6.Test Procedure

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with

specified bandwidth under Maximum Hold Mode.

6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.

7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.

9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated by-log antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2009 on radiated emission measurement.

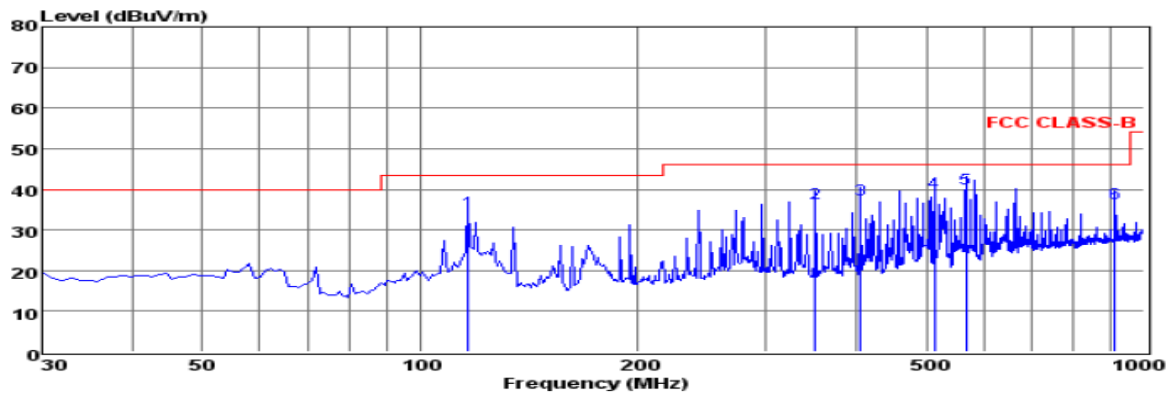
11. According to 15.109(h) states that “Radar detectors shall comply with the emission limits in paragraph (a) of this section over the frequency range of 11.7-12.2 GHz.”. The applicable limit being 63.5dBuV/m(AVG, after calculated) measured at a distance of 1m. Measurements in the 11.7 to 12.2GHz band were made with a Horn antenna. The measurements in the 11.7 to 12.2GHz band represent the ambient noise levels. The attached plots were made with peak detector with the analyzer in a maximum hold for 2 minutes.

3.7.Test Results

PASS.

The test data please refer to following page.

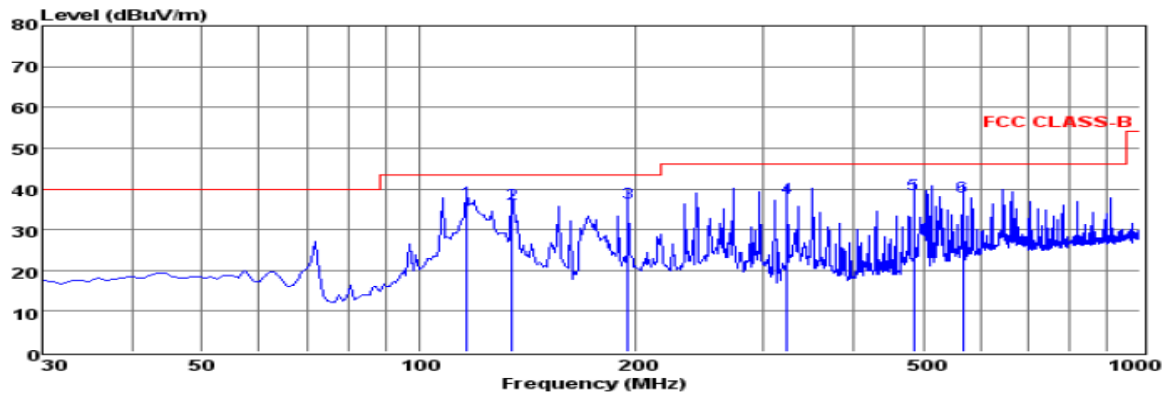
Below 1GHz:



Env./Ins: 24°C/56%
 EUT: CarDvrD
 M/N: BOSS800
 Power Rating: DC 12V
 Test Mode: Mode 1
 Operator: Tree
 Memo:
 pol: VERTICAL

	Freq	Reading	CabLos	Antfac	Measured	Linit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	116.33	22.68	0.68	11.13	34.49	43.50	-9.01	QP
2	351.07	21.25	1.15	14.29	36.69	46.00	-9.31	QP
3	405.39	21.01	1.32	15.17	37.50	46.00	-8.50	QP
4	513.06	21.09	1.30	16.82	39.21	46.00	-6.79	QP
5	567.38	20.83	1.48	17.84	40.15	46.00	-5.85	QP
6	912.70	13.54	1.86	21.17	36.57	46.00	-9.43	QP

Note: 1. All readings are Quasi-peak values.
 2. Measured= Reading + Antenna Factor + Cable Loss
 3. The emission that ate 20db blow the official limit are not reported

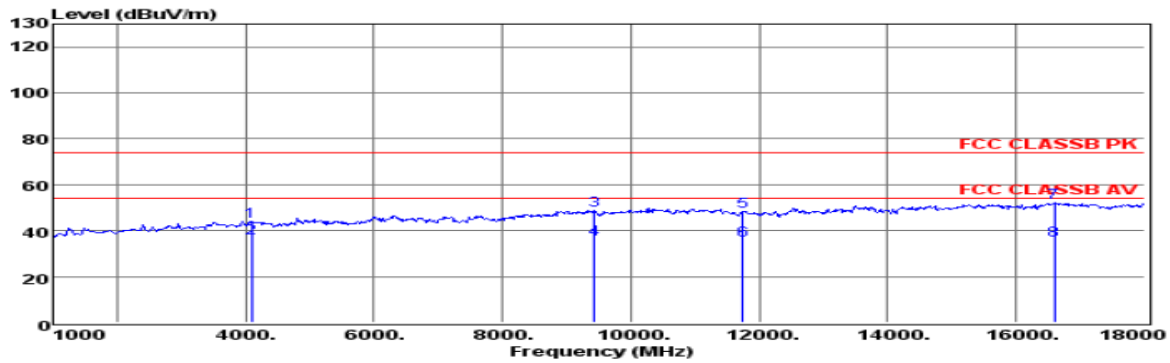


Env./Ins: 24°C/56%
 EUT: CarDvrD
 M/N: BOSS800
 Power Rating: DC 12V
 Test Mode: Mode 1
 Operator: Tree
 Memo:
 pol: HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Linit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	116.33	24.94	0.68	11.13	36.75	43.50	-6.75	QP
2	134.76	27.10	0.74	8.58	36.42	43.50	-7.08	QP
3	194.90	25.01	0.96	10.56	36.53	43.50	-6.97	QP
4	323.91	23.33	1.10	13.48	37.91	46.00	-8.09	QP
5	485.90	21.13	1.37	16.22	38.72	46.00	-7.28	QP
6	567.38	18.76	1.48	17.84	38.08	46.00	-7.92	QP

Note: 1. All readings are Quasi-peak values.
 2. Measured= Reading + Antenna Factor + Cable Loss
 3. The emission that ate 20db blow the official limit are not reported

Above 1GHz:



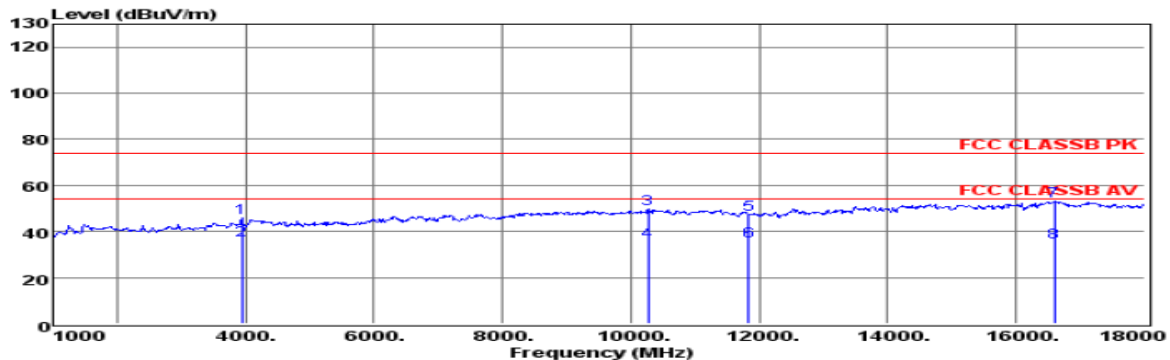
Env. /Ins: 24°C /56%
 EUT: CarDvRD
 M/N: BOSS800
 Power Rating: DC 12V
 Test Mode: Mode 1
 Operator: Tree
 Memo:
 pol: HORIZONTAL

	Freq	Reading	CabLos	AntFac	PreFac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	4094.00	41.17	7.26	32.53	36.84	44.12	74.00	-29.88	Peak
2	4094.00	33.63	7.26	32.53	36.84	36.58	54.00	-17.42	Average
3	9432.00	36.46	9.93	37.93	35.48	48.84	74.00	-25.16	Peak
4	9432.00	23.78	9.93	37.93	35.48	36.16	54.00	-17.84	Average
5	11744.00	37.26	10.20	36.92	35.90	48.48	74.00	-25.52	Peak
6	11744.00	24.48	10.20	36.92	35.90	35.70	54.00	-18.30	Average
7	16589.00	37.13	10.88	39.25	34.95	52.31	74.00	-21.69	Peak
8	16589.00	20.46	10.88	39.25	34.95	35.64	54.00	-18.36	Average

Note: 1. All readings are Quasi-peak values.

2. Measured = Reading + Antenna Factor + Cable Loss - Amp Factor.

3. The emission levels that are 20dB below the official limit are not reported.



Env. /Ins: 24°C /56%
 EUT: CarDvRD
 M/N: BOSS800
 Power Rating: DC 12V
 Test Mode: Mode 1
 Operator: Tree
 Memo:
 pol: VERTICAL

	Freq	Reading	CabLos	AntFac	PreFac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	3941.00	43.39	7.12	32.40	36.81	46.10	74.00	-27.90	Peak
2	3941.00	33.43	7.12	32.40	36.81	36.14	54.00	-17.86	Average
3	10265.00	37.24	10.12	38.17	35.78	49.75	74.00	-24.25	Peak
4	10265.00	23.41	10.12	38.17	35.78	35.92	54.00	-18.08	Average
5	11829.00	36.10	10.21	36.79	35.71	47.39	74.00	-26.61	Peak
6	11829.00	24.31	10.21	36.79	35.71	35.60	54.00	-18.40	Average
7	16589.00	38.13	10.88	39.25	34.95	53.31	74.00	-20.69	Peak
8	16589.00	20.32	10.88	39.25	34.95	35.50	54.00	-18.50	Average

Note: 1. All readings are Quasi-peak values.

2. Measured = Reading + Antenna Factor + Cable Loss - Amp Factor.

3. The emission levels that are 20dB below the official limit are not reported.

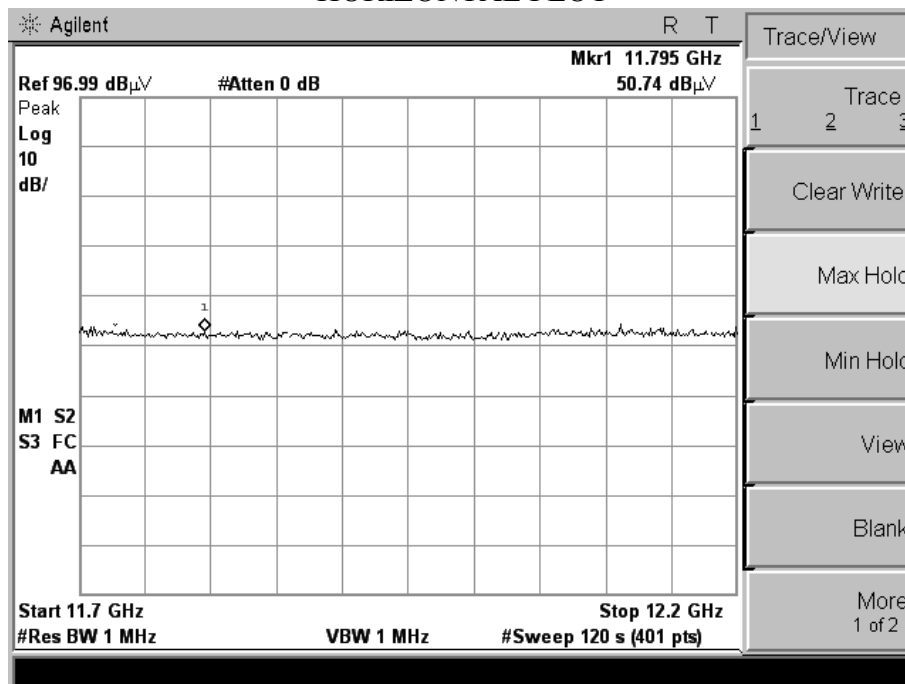
***Note: 18~40GHz at least have 20dB margin. No recording in the test report.

Test Plot for 11.7~12.2GHz(Measured at 1m):

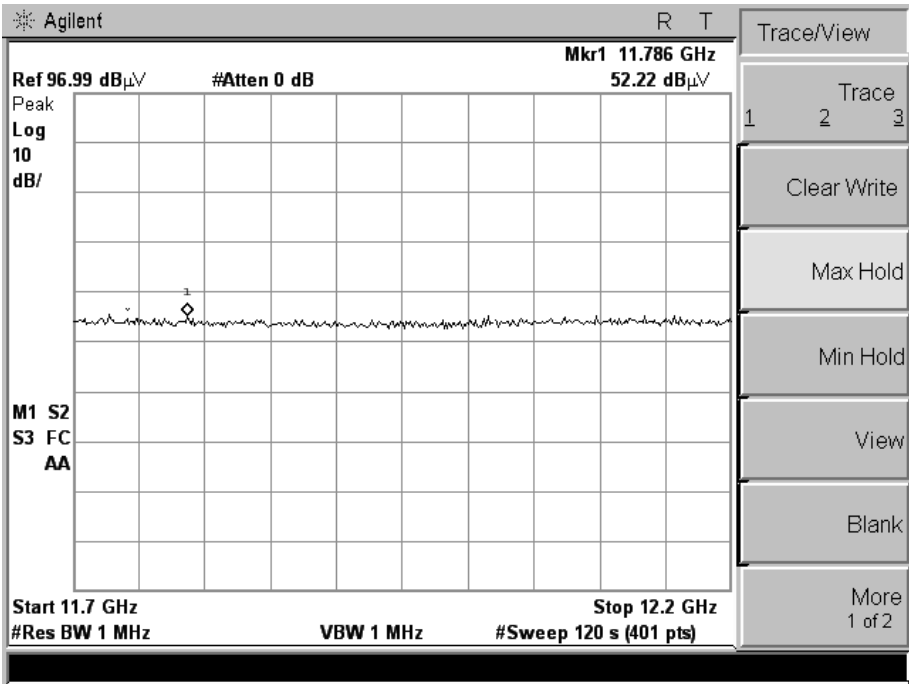
Freq. GHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
11.795	50.74	36.79	35.71	10.2 ₁	62.03	83.5	-21.47	Peak	Horizontal
11.795	35.87	36.79	35.71	10.2 ₁	47.16	63.5	-16.34	Average	Horizontal
11.786	52.22	36.79	35.71	10.2 ₁	63.51	83.5	-19.99	Peak	Vertical
11.786	37.11	36.79	35.71	10.2 ₁	48.40	63.5	-15.10	Average	Vertical

***Note: Only recorded the worst case.

HORIZONTAL PLOT



VERTICAL PLOT



4. MANUFACTURER/ APPROVAL HOLDER DECLARATION

The following Series model(s):

BOSS700	BOSS500	SD3	VD3
---------	---------	-----	-----

Belong to the tested device:

Product description : CarDvRD

Model name : BOSS800

Remark: PCB board, structure and internal of these model(s) are the same,
So no additional models were tested.

-----THE END OF REPORT-----