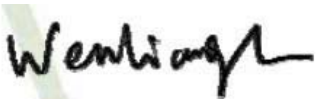
FCC MPE TEST REPORT

47 CFR FCC Part 2 §2.1091

Report Reference No.....:	**NTI2015110102**
FCC ID.....:	**2ACRLH097**
Issue Date.....:	**Nov 13, 2015**
Testing Laboratory Name .....:	**NQSTC for Information Network Products**
Address .....:	1368#, Wuzhong Avenue, Suzhou Jiangsu province, China
Applicant's name.....:	**Harman Automotive Electronic Systems (Suzhou) Co., Ltd**
Address .....:	No125 Fangzhou Rd, Suzhou SIP, Jiangsu, China
Test specification .....:	
Standard .....:	**47 CFR FCC Part 2 §2.1091** **KDB447498D01**
TRF Originator.....:	NQSTC for Information Network Products

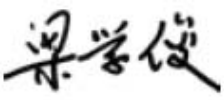
Test item description .....:	**Headunit**
Trade Mark .....:	/
Manufacturer.....:	**Harman Automotive Electronic Systems (Suzhou) Co., Ltd**
Model/Type reference.....:	P.AVN3.0 NA
Listed Models .....:	H097, H087
Modulation Type.....:	GFSK,8DPSK,π/4DQPSK
Operation Frequency.....:	From 2402MHz to 2480MHz
Hardware version .....:	D
Software version .....:	R10
Exposure category .....:	General population/uncontrolled environment
Software version .....:	Production Unit
Rating .....:	DC 12.0V from Battery
Device Type .....:	Mobile Device
Result.....:	**PASS**

Compiled by:



Wenliang Li / Test Engineer

Approved by:



Xuejun Liang / Director

TEST REPORT

Test Report No. :	**NTI2015110102**	Nov 13, 2015 Date of issue

Equipment under Test	:	Headunit
Model /Type	:	P.AVN3.0 NA
Listed Models	:	H097, H087
Applicant	:	**Harman Automotive Electronic Systems (Suzhou) Co., Ltd**
Address	:	No125 Fangzhou Rd, Suzhou SIP, Jiangsu, China
Manufacturer	:	**Harman Automotive Electronic Systems (Suzhou) Co., Ltd**
Address	:	No125 Fangzhou Rd, Suzhou SIP, Jiangsu, China

Test Result:	**PASS**

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.

Revison History

Revision	Issue Date	Revisions	Revised By
00	2015-11-13	Initial Issue	Xuejun Liang

Contents

1. TEST STANDARDS

The tests were performed according to following standards:

KDB447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
FCC Part 2.1091 Radiofrequency Radiation Exposure Evaluation: Mobile Devices
KDB865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations

2 . SUMMARY

2.1. Product Description

The **Harman Automotive Electronic Systems (Suzhou) Co., Ltd's** Model: P.AVN3.0 NA or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	Headunit
FCC ID	2ACRLH097 Contains FCC ID: YZP-VL2000
Model number	P.AVN3.0 NA
BT Modulation Type	GFSK,8DPSK,π/4DQPSK
Bluetooth	Supported BT V3.0
Antenna type	Internal and maximum antenna gain is 0.1dBi for BT modular
Hardware version	D
Software version	R10
BT FCC Operation frequency	2402MHz-2480MHz
Power supply	DC 12.0V from battery
Exposure category :	General population/uncontrolled environment
Software version :	Production Unit
Device Type :	Mobile Device

2.2. Equipment under Test

Power supply system utilised

Power supply voltage	:	○	120V / 60 Hz	○	115V / 60Hz
		●	12 V DC	○	24 V DC
		○	Other (specified in blank below)		

2.3. Short description of the Equipment under Test (EUT)

2.3.1 General Description
P.AVN3.0 NA is Headunit with LTE modular (FCC ID: YZP-VL2000) and Bluetooth V3.0 modular, P.AVN3.0 NA also support AM/FM receive, DAB, SXM, HD Media etc function.

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

2.4. EUT operation mode

The EUT has been tested under typical operating condition. There are EDR (Enhanced Data Rate) and BDR (Basic Data Rate) mode. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. There are 79 channels of EUT, and the test carried out at the lowest channel, middle channel and highest channel .

Channel	Frequency(MHz)	Channel	Frequency(MHz)
0	**2402**	40	2442
1	2403	41	2443
2	2404	42	2444
3	2405	43	2445
4	2406	44	2446
5	2407	45	2447
6	2408	46	2448
7	2409	47	2449
8	2410	48	2450
9	2411	49	2451
10	2412	50	2452
11	2413	51	2453
12	2414	52	2454

13	2415	53	2455
14	2416	54	2456
15	2417	55	2457
16	2418	56	2458
17	2419	57	2459
18	2420	58	2460
19	2421	59	2461
20	2422	60	2462
21	2423	61	2463
22	2424	62	2464
23	2425	63	2465
24	2426	64	2466
25	2427	65	2467
26	2428	66	2468
27	2429	67	2469
28	2430	68	2470
29	2431	69	2471
30	2432	70	2472
31	2433	71	2473
32	2434	72	2474
33	2435	73	2475
34	2436	74	2476
35	2437	75	2477
36	2438	76	2478
37	2439	77	2479
38	2440	**78**	**2480**
39	**2441**		

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2ACRLH097** filing to comply with FCC Part 2.1091 Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

2.7. Note

1. The Headunit with Bluetooth and LTE modular (FCC ID: YZP-VL2000), the functions of the EUT listed as below:

	Test Standards	Reference Report
BT	FCC Part 15 C 15.247	NTI2015110101
MPE	FCC Part 2.1091(d)	NTI2015110102

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

NQSTC for Information Network Products

1368#, Wuzhong Avenue, Suzhou Jiangsu province, China
The sites are constructed in conformance with the requirements of ANSI C63.4 (2009) and CISPR Publication 22.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 640166
NQSTC for Information NetworkProducts has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 640166, valid time is until Aug 21, 2017.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. 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 ETSI TR 100 028 " Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics" and is documented in the NQSTC for Information Network Products 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.

Hereafter the best measurement capability for NQSTC for Information Network Products is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.23 dB	(1)
Radiated Emission	1~18GHz	5.12 dB	(1)
Radiated Emission	18-40GHz	5.55 dB	(1)
Conducted Disturbance	0.15~30MHz	3.27 dB	(1)
Conducted Power	9KHz~18GHz	0.58 dB	(1)
Spurious RF Conducted Emission	9KHz~40GHz	1.45 dB	(1)
Band Edge Compliance of RF Emission	9KHz~40GHz	1.45 dB	(1)
Occuiped Bandwidth	9KHz~40GHz	-	(1)
Dwell Time	9KHz~40GHz	-	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4. MPE Evaluation

4.1. Evaluation method

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.
In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.
In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0. The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

4.2. Limits for General Population/Uncontrolled Exposure

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

4.3. Calculation Method

Predication of MPE limit at a given distance
Equation from page 18 of OET Bulletin 65, Edition 97-01
$S=PG/4\pi R^2$
Where: S=power density
P=power input to antenna
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
From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the maximum gain of the used antenna is 0dBi, the RF power density can be obtained.

4.4. Conducted Power Results

Test Mode	Channel	Frequency (MHz)	Measured Output Peak Power (dBm)
GFSK	0	2402	-0.83
	39	2441	-1.08
	41	2480	-0.79
π/4 DQPSK	0	2402	3.99
	39	2441	3.93
	41	2480	4.42
8DPSK	0	2402	4.53
	39	2441	4.39
	41	2480	4.84

4.5.Manufacturing tolerance

GFSK (Peak Power)			
Frequency (MHz)	2402	2441	2480
Target (dBm)	-1.0	-1.0	-1.0
Tolerance ±(dB)	1.0	1.0	1.0
π/4 DQPSK (Peak Power)			
Frequency (MHz)	2402	2441	2480
Target (dBm)	4.0	4.0	4.0
Tolerance ±(dB)	1.0	1.0	1.0
8DPSK (Peak Power)			
Frequency (MHz)	2402	2441	2480
Target (dBm)	4.0	4.0	4.0
Tolerance ±(dB)	1.0	1.0	1.0

4.6.Measurement Results

Mode	Frequency (MHz)	Output power (Including tune-up tolerance) (dBm)	Output power (mW)	Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
GFSK	2402	0	1.0000	0.1000	1.0233	0.00002	1.0000
	2441	0	1.0000	0.1000	1.0233	0.00002	1.0000
	2480	0	1.0000	0.1000	1.0233	0.00002	1.0000
π/4 DQPSK	2402	5.0	3.1623	0.1000	1.0233	0.00006	1.0000
	2441	5.0	3.1623	0.1000	1.0233	0.00006	1.0000
	2480	5.0	3.1623	0.1000	1.0233	0.00006	1.0000
8DPSK	2402	5.0	3.1623	0.1000	1.0233	0.00006	1.0000
	2441	5.0	3.1623	0.1000	1.0233	0.00006	1.0000
	2480	5.0	3.1623	0.1000	1.0233	0.00006	1.0000

4.7.Simultaneous Transmission

As the sample with 2 transmitter modular (LTE modular and Bluetooth modular) and share difference antennas, the 2 transmitter modular can simultaneous transmission; LTE modular MPE information from FCC ID: YZP-VL2000 (LTE modular FCC Single Modular Approval); LTE modular also can simultaneous transmit, the maximum Σ of MPE ratios was 0.995.

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;
∑ of MPE ratios ≤ 1.0

Maximum MPE Ratio		∑ MPE ratio	Limit	Results
LTE Modular	BT Modular			
0.995	0.001	0.996	1.0	Compliance

4.8.Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

.....End of Report.....