Report No.: XEWA2310000073RG07

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TEST REPORT

Application No.: XEWA2310000073RG

Applicant: Harman International Industries Incorporated
Address of Applicant: 30001, Cabot Drive, Novi, MI 48377, USA
Manufacturer: Harman International Industries Incorporated
Address of Manufacturer: 30001, Cabot Drive, Novi, MI 48377, USA

EUT Description: Toyota La-DCM **Model No.:** TYT25_LT_AA

Trade Mark: HARMAN

FCC ID: 2AHPN-TYT25-LT-AA

Standards: 47 CFR Part 2.1091

FCC KDB 447498 D01 v06

Date of Receipt: 2023/11/01 **Date of Issue:** 2024/01/10

Test Result: PASS*

Authorized Signature:

Nows chen

Linus Chen
Wireless Laboratory Manager



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^{*} In the configuration tested, the EUT complied with the standards specified above.



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1 Version

Revision Record						
Version Chapter Date Modifier Remark						
01		2024/01/10		Original		

Prepared By	(Leah Chen) / Test Engineer		
Checked By	Andy Yao /Reviewer		

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2 General Information

2.1 Client Information

Applicant:	Harman International Industries Incorporated
Address of Applicant:	30001, Cabot Drive, Novi, MI 48377, USA
Manufacturer:	Harman International Industries Incorporated
Address of Manufacturer:	30001, Cabot Drive, Novi, MI 48377, USA

2.2 Test Facility

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

•A2LA (Certificate No. 4854.01)

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4854.01.

• Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0095.

IC#: 25613.

FCC –Designation Number: CN1337

SGS-CSTC Standards Technical Services (Xi'an) Co., Ltd. has been recognized as an accredited testing

laboratory.

Designation Number: CN1337.

Test Firm Registration Number: 917410



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2.3 General Description of EUT

EUT Description:	Toyota La-DCM							
Model No.:	TYT25_LT_AA							
Trade Mark:	HARMAN							
Hardware Version:	0.0.3							
Software Version:	TYTLLADCM_R04.5	D						
Power Supply:	12V							
Antenna Type:	☐ External, ☒ Integ	rated						
	WCDMA Band II:	2.67 dBi(Ant0)	WCDMA Band V:	0.44 dBi(Ant0)				
	LTE Band 2:	2.67 dBi(Ant0)	LTE Band 4:	2.53 dBi(Ant0)				
	LTE Band 5:	0.44 dBi(Ant0)	LTE Band 7:	2.13 dBi(Ant0)				
	Bluetooth:	2.92 dBi(Ant2);						
	WIFI 2.4G:	2.92 dBi(Ant2);						
Antenna Gain:	5G WIFI(U-NII-1):	3.59 dBi(Ant2);						
	5G WIFI(U-NII-2A):	4.08 dBi(Ant2);						
	5G WIFI(U-NII-2C):	4.33 dBi(Ant2);						
	5G WIFI(U-NII-3):	4.90 dBi(Ant2);						
	Note:							
	The antenna gain are derived from the gain information report provided by the manufacturer.							
Remark:								
As above information is p suitability, reliability or/an			GS is not liable to the	e accuracy,				



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3 RF Exposure Evaluation

3.1 RF Exposure Compliance Requirement

3.1.1 Limits

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm2)	Averaging time (minutes)
	(A) Limits for Occup	oational/Controlled Expo	sures	
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1.0	6
300-1500	1	1	f/300	6
1500-100,000	1	1	5	6
	(B) Limits for General P	opulation/Uncontrolled	Exposure	
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500	1	1	f/1500	30
1500-100,000	1		1.0	30

F=frequency in MHz

RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).

Friis Formula

Friis transmission formula: Pd = (Pout*G)/(4* Pi * R²)

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm2. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.



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⁼Plane-wave equivalent power density



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3.1.2 Test Procedure

Software provided by client enabled the EUT to transmit data at lowest, middle and highest channel individually

3.1.3 EUT RF Exposure Evaluation

Output Power Into Antenna & RF Exposure Evaluation Distance:

This confirmed that the device comply with MPE limit.

Operating Band	Frequency (MHz)	Antenna Gain (dBi)	Max Conducted Power (dBm)	EIRP(ERP) (dBm)	EIRP(ERP) Limit (dBm)	Power Density at R = 20 cm (mW/cm2)	Limit (mW/cm2)	Gain according to EIRP(ERP) (dBi)	Gain according to Pd (dBi)	Max Gain Allowed (dBi)	conclusion
WCDMA Band II	1852.4	2.67	25.00	27.67	33.00	0.1163	1.0000	8.00	12.01	8.00	Pass
WCDMA Band V	826.4	0.44	25.00	23.29	38.45	0.0696	0.5509	15.60	9.42	9.42	Pass
LTE Band 2	1850.7	2.67	25.70	28.37	33.00	0.1367	1.0000	7.30	11.31	7.30	Pass
LTE Band 4	1710.7	2.53	25.70	28.23	30.00	0.1324	1.0000	4.30	11.31	4.30	Pass
LTE Band 5	824.7	0.44	25.70	23.99	38.45	0.0818	0.5498	14.90	8.71	8.71	Pass
LTE Band 7	2502.5	2.13	25.70	27.83	33.00	0.1207	1.0000	7.30	11.31	7.30	Pass
Bluetooth	2402.0	2.92	9.00	11.92	30.00	0.0031	1.0000	NA	NA	NA	Pass
2.4GWIFI	2412.0	2.92	18.00	20.92	30.00	0.0246	1.0000	NA	NA	NA	Pass
5GWIFI	5825.0	4.90	13.00	17.90	30.00	0.0123	1.0000	NA	NA	NA	Pass



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3.1.4 Exposure calculations for multiple sources

When a number of sources at different frequencies, and/or broadband sources, contribute to the total exposure, it becomes necessary to weigh each contribution relative to the MPE in accordance with the provisions of Table(A) and Table(B). To comply with the MPE, the fraction of the MPE in terms of E2, H2 (or power density) incurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity.

In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^{n} \frac{S_i}{MPE_i} \le 1$$

The product also has multiple transmitters The Simultaneous Transmission Possibilities are as below:

Simultaneous Tx Combination	Configuration
1	WIFI2.4G+Bluetooth
2	WIFI5G+Bluetooth
3	WWAN+WIFI2.4G
4	WWAN+Bluetooth
5	WWAN+WIFI5G
6	WWAN+WIFI2.4G+Bluetooth
7	WWAN+WIFI5G+Bluetooth



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No.	Mode	Power Density (mW/cm²)	MPE Limit (mW/cm²)	Result Ratio	Total Ratio	Limit	Result
1	WIFI2.4G	0.0246	1.0000	0.0246	0.0277	1.0000	Pass
'	Bluetooth	0.0031	1.0000	0.0031			
2	WIFI5G	0.0123	1.0000	0.0123	0.0154	1.0000	Pass
	Bluetooth	0.0031	1.0000	0.0031	0.0154		Pass
3	LTE Band 5*	0.0818	0.5498	0.1488	0.1734	1.0000	Pass
3	WIFI2.4G	0.0246	1.0000	0.0246	0.1734	1.0000	Fa55
4	LTE Band 5*	0.0818	0.5498	0.1488	0.1519	1.0000	Pass
4	Bluetooth	0.0031	1.0000	0.0031	0.1519		F 455
5	LTE Band 5*	0.0818	0.5498	0.1488	0.1611	1.0000	Pass
3	WIFI5G	0.0123	1.0000	0.0123	0.1011		F455
	LTE Band 5*	0.0818	0.5498	0.1488		1.0000	Pass
6	WiFi 2.4G	0.0246	1.0000	0.0246	0.1765		
	Bluetooth	0.0031	1.0000	0.0031			
	LTE Band 5*	0.0818	0.5498	0.1488			
7	WIFI5G	0.0123	1.0000	0.0123	0.1642	1.0000	Pass
	Bluetooth	0.0031	1.0000	0.0031			

Remark*: This WWAN Band was recalculated on worst Band.

---End of Report---



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