

Report No.: XEWA2310000073RG07
 Rev.: 01
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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*
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Linus Chen
 Wireless Laboratory Manager



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1 Version

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

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



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2 General Information

2.1 Client Information

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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_R04.5D		
Power Supply:	12V		
Antenna Type:	<input type="checkbox"/> External, <input checked="" type="checkbox"/> Integrated		
Antenna Gain:	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);	
	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 provided and confirmed by the applicant. SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.		



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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/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

F=frequency in MHz
 *=Plane-wave equivalent power density
 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: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d is 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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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

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

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/cm ²)	MPE Limit (mW/cm ²)	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			
3	LTE Band 5*	0.0818	0.5498	0.1488	0.1734	1.0000	Pass
	WIFI2.4G	0.0246	1.0000	0.0246			
4	LTE Band 5*	0.0818	0.5498	0.1488	0.1519	1.0000	Pass
	Bluetooth	0.0031	1.0000	0.0031			
5	LTE Band 5*	0.0818	0.5498	0.1488	0.1611	1.0000	Pass
	WIFI5G	0.0123	1.0000	0.0123			
6	LTE Band 5*	0.0818	0.5498	0.1488	0.1765	1.0000	Pass
	WiFi 2.4G	0.0246	1.0000	0.0246			
	Bluetooth	0.0031	1.0000	0.0031			
7	LTE Band 5*	0.0818	0.5498	0.1488	0.1642	1.0000	Pass
	WIFI5G	0.0123	1.0000	0.0123			
	Bluetooth	0.0031	1.0000	0.0031			

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

---End of Report---



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